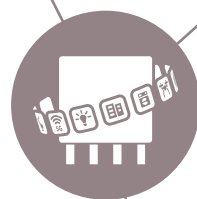




Power and sensing

Selection guide 2020





Connectivity and linking the real to the digital world is no longer a dream – it is a lived reality. Future is something we create together to make life easier, safer, and greener.

连接真实世界和数字世界不再是一个梦想，而是活生生的现实。未来由我们共同创造，让生活更轻松、更安全、更环保。

Andreas Urschitz,
Division President of Power and Sensor Systems
电源和传感系统事业部总裁

Dear reader,

The era of convergence is here. The trends of the past – such as energy efficiency and security – are now global challenges: how do we sustainably feed our needs in mobility, IoT and big data? Together, these questions transform life as we know it, intertwining technology with humanity.

From the cloud and the edge, personal vehicles and power tools, to drones and satellites, thousands of systems we use every day rely on efficient and intelligent power. Our next generation of silicon solutions and our wide-bandgap portfolio, including CoolSiC™ and CoolGaN™ devices, provide unparalleled performance and reliability for 5G, big data and renewable energy applications. The cooler, smaller and lighter MERUSTM audio amplifiers enable customers to achieve better-sounding systems and deliver exceptional audio performance in smart speakers and other audio home, portable and professional audio products.

Collectively, we are building towards a new age of interaction with multiple devices. These need to perceive and respond to events while steadily extending and enhancing their performance to further ease our lives. We meet this challenge with intuitive sensing - by giving things human-like senses for a greater contextual awareness. Founded on Infineon's 40 years of experience in the development of sensor products, our XENSIV™ products deliver exceptional accuracy and best-in-class measurement performance. Spanning magnetic, pressure, acoustic, 3D image (REAL3™) and radar sensor MMICs (RASICTM for automotive), our broad XENSIV™ portfolio ensures the perfect fit for all performance and integration needs – regardless of the industry.

Building on the company's in-depth system understanding, the 2020 edition of the Power and Sensing Selection Guide offers a comprehensive selection of power and sensors system solutions for your future success.

尊敬的读者：

“大融合”时代已然到来。以往的一些发展趋势（诸如能源效率和安全性等）现已成为全球性挑战：我们如何才能秉承可持续性发展理念来满足我们在移动交通、物联网和大数据方面的需求？这些问题的演进为我们的生活带来了巨大变革，将科技与人类生活交织在一起。

从云端和先进的私家车和动力工具，到无人机和卫星，我们每天使用的无数系统都离不开高效、智能的电源。我们下一代硅解决方案和我们宽禁带产品组合（包括 CoolSiC™ 和 CoolGaN™ 设备）为 5G、大数据和可再生能源应用提供了无与伦比的性能和可靠性。利用更酷、更小和更轻的 MERUSTM 音频放大器，客户可以实现音质更佳的系统，在智能扬声器和其他音频家电、便携和专业音频产品中提供卓越的音频性能。

总而言之，我们正在迈向一个与多个设备交互的新时代。这些设备需要感知和响应事件，同时稳定地扩展和增强其性能，让我们的生活变得更加轻松惬意。我们赋予事物类似于人类的感知、通过直观感知来应对此项挑战，从而获得更佳的情境意识。依托英飞凌在传感器产品开发领域长达 40 年的经验，我们的 XENSIV™ 产品提供卓越的精确性和一流的测量性能。我们丰富的 XENSIV™ 产品组合涵盖磁性、压力、声学、三维图像 (REAL3™) 和雷达传感器 MMIC (用于汽车行业的 RASICTM)。无论何种行业，这些产品均可确保完美满足所有性能和集成需求。

《2020 电源与传感选型指南》以公司对系统的深厚了解为基础，提供综合全面的电源和传感器系统解决方案，助力您走向成功的未来。

Andreas Urschitz,
Division President of Power and Sensor Systems
电源和传感系统事业部总裁

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From product thinking to system understanding

Infiniteon enables efficient generation, transmission and conversion of electrical energy



We make life easier, safer and greener – with technology that achieves more, consumes less and is accessible to everyone.

www.infineon.com/power

Applications

20-300 V MOSFETs

500-950 V MOSFETs

WBG semiconductors

Discrete IGBTs

Power ICs

Intelligent switches and input ICs

Gate driver ICs

Microcontrollers

XENSIV™ sensors

Packages



Advanced system solutions for consumer applications

- › Class D audio amplifiers
- › Major home appliances - air conditioning and induction cooking
- › Smart speaker
- › Service robots
- › SMPS – TV power supply
- › SMPS – mobile charger
- › Wireless charging
- › Wearables and healthtech



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

Applications

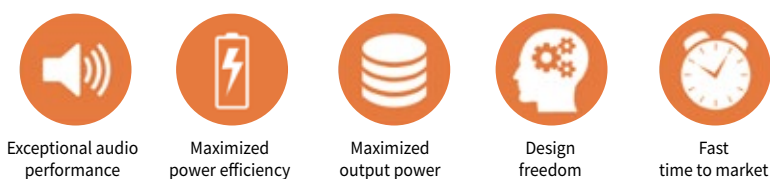


Class D audio amplifiers

No compromise on quality – products for exceptional audio performance

At Infineon, we manufacture power-efficient class D audio amplifier solutions that maintain best-in-class audio quality, without heating up the surroundings. We believe smaller and lighter is better, and that the amplifier embedded in your product should be heard, but not seen. Our amplifier solutions help you design robust, flexible products that meet the needs of your customers and the market. Choose from our high-performance class D audio amplifier solutions for all power ranges and application requirements, from the smallest fully integrated single-chip solutions to highly scalable driver and power MOSFET combinations (for full portfolio of audio amplifier ICs, see **pages 236-240**).

Design with Infineon's solutions to benefit from:

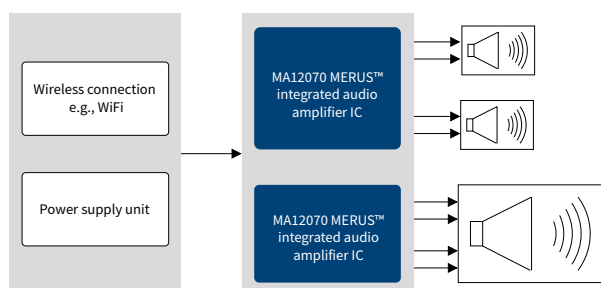


Portable/battery powered audio applications	Home audio applications	Professional audio applications
Battery powered speakers: › On-the-go Bluetooth speakers › Docking speakers › Boom boxes › Wearable speakers	› Multiroom systems › Audio hub › TVs › Sound bars › Home theater systems › Smart speakers	› Power-over-ethernet (PoE) audio systems › Touring amplifiers › Active speakers › Public announcement 70-100 V systems › Music instrument amplifiers

Home audio

Modern home audio products vary in shapes, sizes and configurations, but common requirement is great sound in combination with outstanding industrial and acoustic design. In addition to producing exceptional sound quality, MERUS™ amplifiers from Infineon can completely eliminate the need for bulky and expensive LC output filters and heatsinks. This allows design of new innovative and great sounding home audio products in form factors and shapes that were previously unthinkable.

Solution example: 2.1 configuration (2xBTL + 1xPBTL)



Solution specification

Number of audio channels: 2 bridge-tied load (BTL) and 1 parallel BTL channels

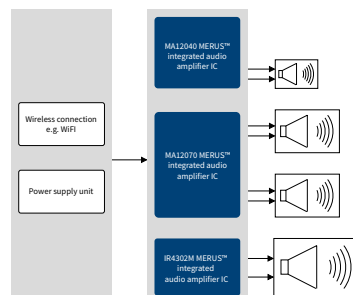
Peak power output: 2x80 W @ 4 Ω, 10% THD and 160 W @ 2 Ω, 10% THD

Featured audio ICs: 2x MA12070

www.infineon.com/merus

www.infineon.com/audio

4.1 configuration (4xBTL + 1xPBTL)



Solution specification

Number of audio channels: 4 bridge-tied load (BTL) and 1 parallel BTL channels

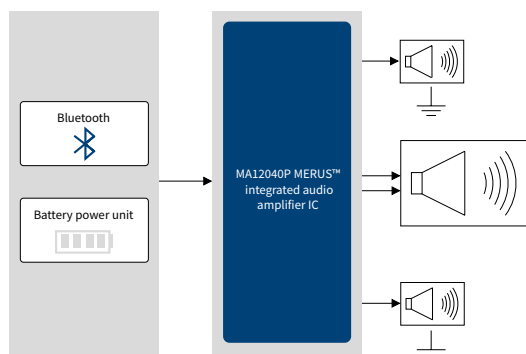
Peak power output: 2x80 W @ 4 Ω, 10% THD and 160 W @ 2 Ω, 10% THD

Featured audio ICs: MA12040, MA12070 and IR4302M

Portable audio

When designing portable/battery powered audio devices, it is essential to maximize battery playback time, and at the same time, maintain an excellent audio performance. Infineon's MERUS™ amplifiers provide up to twice as long battery playback time in combination with the best-in-class audio performance and unsurpassed sound quality.

Solution example: 2.1 configuration (2xSE + 1xBTL)



Solution specification

Number of audio channels: 2 single-ended (SE) and 1 bridge-tied load (BTL) channels

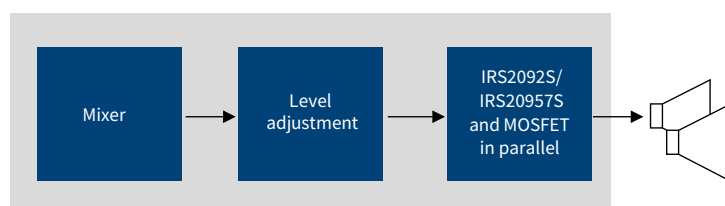
Peak power output: 2x10 W and 40 W @ 4 Ω, 10% THD

Featured audio IC: MA12040P including volume control and limiter

Professional audio

Professional audio equipment is all about maximizing output power and power density. With the conception of Infineon's MERUS™ multilevel class D technology and GaN-based CoolGaN™ e-mode HEMTs, it is now possible to conceive both amplifiers and power supply units with great audio performance and high efficiency in a very compact design. For engineers developing amplifiers, Infineon offers both monolithic and chip-set solutions with versatile MOSFET combinations for the scaling of output power.

Solution example: active speakers



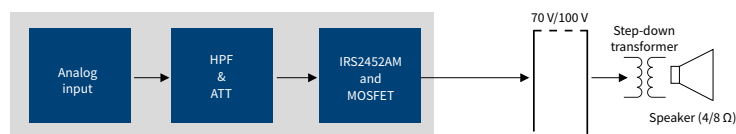
Solution specification

Number of audio channels: 2 half-bridge channels

Peak power output: 500 W @ 4 Ω, 1% THD

Featured audio ICs: IRS2092S, IRS20957S

Solution example: public announcement 70-100 V system



Solution specification

Number of channels: 2 half bridge channels

Peak power output: 500 W, 70 V_{rms}/100 V_{rms}, 1% THD

Featured audio IC: IRS2452AM

For full product portfolio, see 234-238.

www.infineon.com/audiosolutions

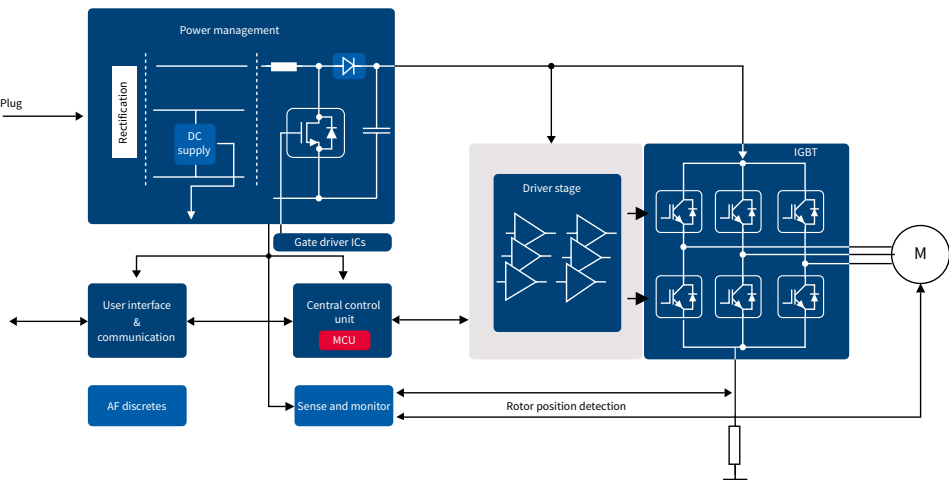
For more details on the product, click on the part number.



Major home appliances

Innovative approach for air conditioning

Product designers are facing the daunting challenge of developing smaller, smarter, more powerful, and more energy-efficient appliances. Based on industry-leading technology and manufacturing expertise, Infineon’s line of innovative components for household appliances meets and exceeds even the most rigorous requirements for reliability and quality. The block diagram of an air conditioning system shown below, together with the product selection table, provides an effective recommendation for engineers to select the right component for each power management stage inside major home appliances.



In addition to efficiency gain through power solutions, Infineon’s XENSIV™ sensor portfolio also enhances the operation of major home appliances through advanced sensor-enabled use cases such as condition monitoring and predictive maintenance to detect potential device failures before they occur. Furthermore, integration of voice control or presence detection in those appliances increases user convenience and results in even more efficient devices.

Product category	Product family	Benefits
Sensors	XENSIV™ MEMS microphones IM69D130	High performance microphone with low self-noise (high SNR) and low distortions enables noise monitoring for advanced predictive maintenance analytics
	XENSIV™ digital barometric pressure sensors DPSxxx	Advanced predictive maintenance analytics are enabled based on highest precision and relative accuracy over a wide temperature range to detect anomalies in air flow
	XENSIV™ TLV493D-A1B6 3D magnetic sensor	Accurate three-dimensional sensing with extremely low power consumption in a small 6-pin package to enable vibration and position monitoring of the compressor
	XENSIV™ TLI4970 current sensor	Fully digital solution featuring high precision and ease of use, significantly reduces overall implementation efforts as well as PCB space to enable cost fan and compressor current measurement
Radar sensor	XENSIV™ 60 GHz radar sensor	Accurate presence detection and vibration detection based on ability to track sub-millimeter motion at high speed and accuracy, in both stand-alone chip as well as system solution available




Recommended products

Functional block	Topology	Voltage class	Technology/product family	Selection/benefit
PFC AC-DC	IGBT – PFC CCM (high frequency – SC)	600 V	HighSpeed 3	Recommendation
	IGBT – PFC CCM (low frequency – SC)	600 V	TRENCHSTOP™ Performance	Recommendation
	IGBT – PFC CCM (cost competitive – no SC)	650 V	TRENCHSTOP™ 5 – H5	Recommendation
	IGBT – PFC CCM (low losses – SC)	650 V	TRENCHSTOP™ IGBT6	Recommendation
	IGBT – PFC	600 V	TRENCHSTOP™ Advanced Isolation	Recommendation
	IGBT – PFC (cost competitive – no SC)	650 V	TRENCHSTOP™ 5 WR5	Recommendation
	MOSFET – PFC CCM	600 V	CoolMOS™ P7	Reference
	Diode – PFC CCM	650 V	Rapid 1 and Rapid 2 diodes	Recommendation
	Controller – PFC CCM	–	ICE2PCS0xG, ICE3PCS0xG	Recommendation
	IPM – PFC CCM	650 V	CIPOS™ Mini PFC interleaved IPM series, CIPOS™ PFC integrated IPM series	Recommendation
	Low-side gate driver IC – PFC	25 V	Single low-side driver EiceDRIVER™ 1ED44176N01F, 1ED44175N01B, 1ED44173N01B *	OCP, fault and enable function in DSO-8/SOT23-6
			Dual low-side driver IRS4427S	Rugged and reliable in DSO-8
			Single low-side driver IRS44273L	Rugged and reliable in SOT23-5
	Half-bridge gate driver – totem pole PFC	650 V	EiceDRIVER™ 2ED2304S06F, 2ED2106S06F, 2ED2182S06F	SOI with integrated bootstrap diode
DC-AC	IGBT – B6-VSI	650 V	TRENCHSTOP™ IGBT6	Efficiency
	IGBT – B6-VSI	600 V	RC-Drives Fast, RC-D2 *	Recommendation
	MOSFET – B6-VSI	600 V	CoolMOS™ PFD7	Cost/performance
	IPM – B6-VSI	600 V	CIPOS™ Mini	Recommendation
	Half-bridge gate driver ICs	650 V	EiceDRIVER™ 2ED2304S06F, 2ED2106S06F, 2ED2182S06F	SOI with integrated bootstrap diode
	Half-bridge gate driver ICs	600 V	EiceDRIVER™ 2EDL05106PF, 2EDL23106PJ, IRS2890DS, 2ED28073J06F *	Integrated bootstrap diode/FET
	Three-phase gate driver ICs	600 V	6EDL04106PT, IR2136S, 6ED003L06-F2	OCP, fault and enable function
AUX	Flyback fixed frequency	700 V	CoolSET™ F5 *	Recommendation
Microcontroller/motor control IC	32-bit Arm® Cortex®-M4	–	XMC4100/XMC4200	Recommendation
	iMOTION™	–	IRMCxx motor control IC (incl. motion control algorithm)	Recommendation
Microcontroller supply	Linear voltage regulator	Up to 20 V	IFX1763, IFX54441, IFX54211, IFX3008	Efficiency
Communication	CAN transceiver	–	IFX1050, IFX1051, IFX1040	Robustness
Position sensing	Angle sensor	–	TLE5009, TLI5012B	Recommendation
	Hall switch	–	TLI496x	Recommendation

www.infineon.com/homeappliance

* For more information on the product, contact our product support

For more details on the product, click on the part number. 



Major home appliances

Highest performance and efficiency for induction cooking

Resonant-switching applications such as induction cooktops and inverterized microwave ovens have unique system requirements. The consumer marketplace demands them to be cost-effective, energy efficient, and reliable. To achieve the named goals, designers need solutions that are developed specifically for these applications.

Infineon's reverse conducting (RC) discrete IGBTs were developed for resonant switching with a monolithically integrated reverse conducting diode. With technology leadership and a broad portfolio of devices with voltage classes ranging from 650 to 1600 V, Infineon provides the industry benchmark performance in terms of switching and conduction losses.

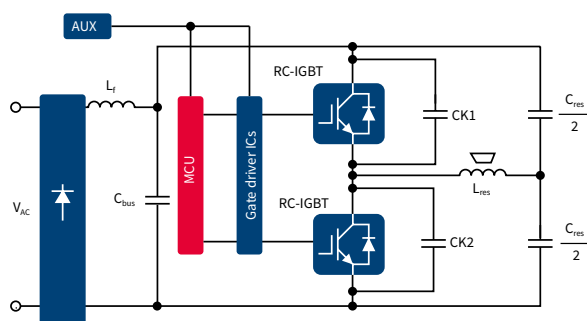
The latest RC-H5 family, previously offered with blocking voltages of 1200 V and 1350 V in a wide current range from 20 A to 40 A, is now with the addition of a new 1350 V, 20 A IGBT completed.

The Integrated Power Device Protect (IPD Protect), IEWS20R5135IPB, is a new device in Infineon's portfolio for induction cooking applications, which adds new functionalities to standard discrete IGBTs. The innovative IPD Protect combines a 1350 V, 20 A IGBT in RC-H5 technology with a unique protecting gate driver IC in a TO-247 6-pin package.

The RC-E family is cost- and feature-optimized specifically for low- to mid-range induction cookers and other resonant applications. This new family offers Infineon's proven quality in RC IGBTs with the best price-performance ratio and ease of use. Infineon also offers a range of complementary products, such as low-side gate drivers and high-voltage level-shift gate drivers which can be used with the IGBTs, as well as in the central control and power supply subsystems of induction cooking appliances.

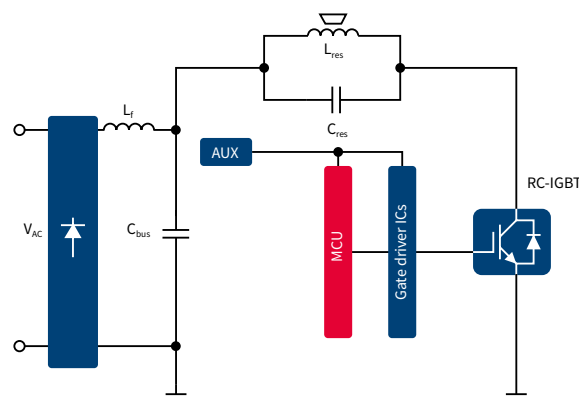
Induction heating inverter (current resonance)

Half-bridge



Induction heating inverter (voltage resonance)

Single switch





Recommended products

Induction heating	Topology	Voltage class	Technology/product family	Selection/benefit
DC-AC	Series-resonant half-bridge	650 V	RC-H5	Recommendation
	Quasi-resonant single switch	1100 V	RC-H3	Recommendation
	Quasi-resonant single switch	1200 V	RC-H5, RC-E	Recommendation
	Quasi-resonant single switch	1350 V	RC-H5	Recommendation
	Quasi-resonant single switch	1600 V	RC-H2	Recommendation
	Quasi-resonant single switch and protective driver	1350 V	RC-H5/IPD Protect	Integrated power device
Gate driver ICs	Low-side gate driver	25 V	EiceDRIVER™ 1ED44176N01F, 1ED44175N01B, 1ED44173N01B, IRS44273L	1ED integrated with OPC, fault and enable functions
	Half-bridge gate driver	650 V/600 V	EiceDRIVER™ 2ED2304S06F, 2ED2106S06F, 2ED2182S06F, 2EDL23I06PJ	SOI with integrated bootstrap diode
	Isolated gate driver	1200 V	EiceDRIVER™ 1EDI20I12AF, 1EDI20I12MF, 2ED020I12-F2	Galvanic isolation, separate sink/source output, DESAT, Miller clamp
Microcontroller	32-bit Arm® Cortex®-M0	-	XMC1302	Recommendation
Microcontroller supply	Linear voltage regulator	Up to 20 V	IFX54211	Efficiency
AUX	Fixed-frequency flyback	700 V	CoolSET™ F5 *	Recommendation



Smart speaker

Design speakers for an intuitive and outstanding user experience

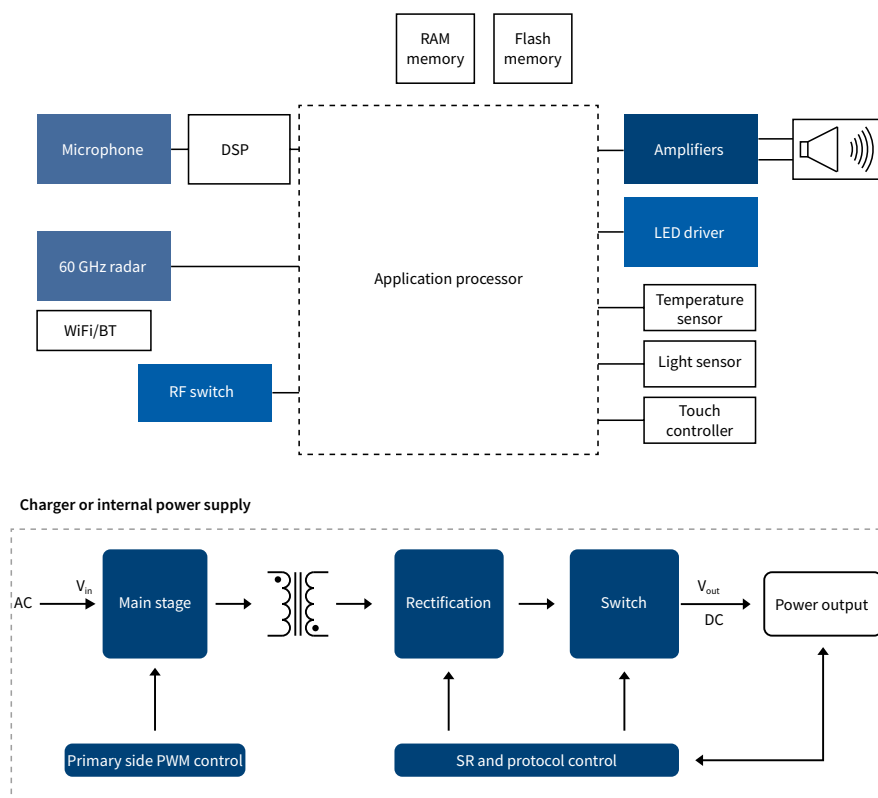
Once a novelty in households, speakers are more and more becoming a norm. With this rapid adaptation, user expectations are rising and the frustration with devices that are not understanding or hearing commands leads to lower usage rates and growth below its full potential. Components such as MEMS microphones and new technologies such as radar are key to improving the user experience in the smart speaker segment.

Infineon has a long-standing expertise in both sensor and power solutions that fulfill the consumer market requirements in terms of outstanding performance as well as reliable customer service and operations.

Features and benefits

Key features	Key benefits
Low self-noise (high SNR) and distortion, a wide dynamic range, plus a high acoustic overload-point microphone	Improved audio input and thus command recognition, especially in extended use cases such as whispering or longer distances to the speaker for better user experience
Infineon's proprietary multilevel switching technology at fully rated power in a wide range of audio products	Enables very low power loss under all operating conditions and enables the class D audio amplifier to be used in filterless configurations
Ultrahigh power efficiency and cool operation of the audio amplifiers	Extended battery playback time or the reduction of battery size without compromising on battery playback time to save cost
Highly efficient and power-dense SMPS solutions	Highly efficient charger in small form factor

Application diagram





Recommended products

Functional block	Product family	Topology	Product	Benefits
Audio input	Microphones	-	XENSIV™ MEMS microphones IM69D130	› High performance microphone with low self-noise (high SNR) and low distortions represents a new benchmark in performance enabling superior user experience
Audio output	Class D amplifier	-	MERUS™ class D audio amplifiers MA120xx	› Cooler, smaller and lighter amplifiers designed to maximize power efficiency and dynamic range while providing best-in-class audio performance in product form factors for great sounding audio products
Presence detection	Radar sensor	-	XENSIV™ 60 GHz radar sensor	› Accurate presence detection and vibration detection based on ability to track sub-millimeter motion at high speed and accuracy, both stand-alone chip as well as system solution available
SMPS - Flyback converter	High voltage MOSFETs	Flyback	700 V CoolMOS™ P7 (standard grade)	› Best price-competitive CoolMOS™ SJ MOSFET family › Lower switching losses than a standard MOSFET
		ACF, FMCI	600 V CoolMOS™ PFD7	› Lower Q_{rr} , lower hysteresis loss, low $R_{DS(on)}$
	Control ICs	QR flyback ICs	ICE5QSAG	› High efficiency and low standby power
		FFR flyback IC	XDPS21071	› High power density and ideal for USB-PD
SMPS - Synchronous rectification	Low voltage MOSFETs	Synchronous rectification	OptiMOS™ PD	› Low conduction losses and reduced overshoot › Logic level switching/S308/PQFN 3.3x3.3 packages available
	Control ICs	Synchronous rectification	IR1161LTRPBF	› High efficiency / simple external circuitry
SMPS - Load switch	Low voltage MOSFETs	Load switch	OptiMOS™ 30 V	› Low conduction losses › S308/PQFN 3.3x3.3 packages available

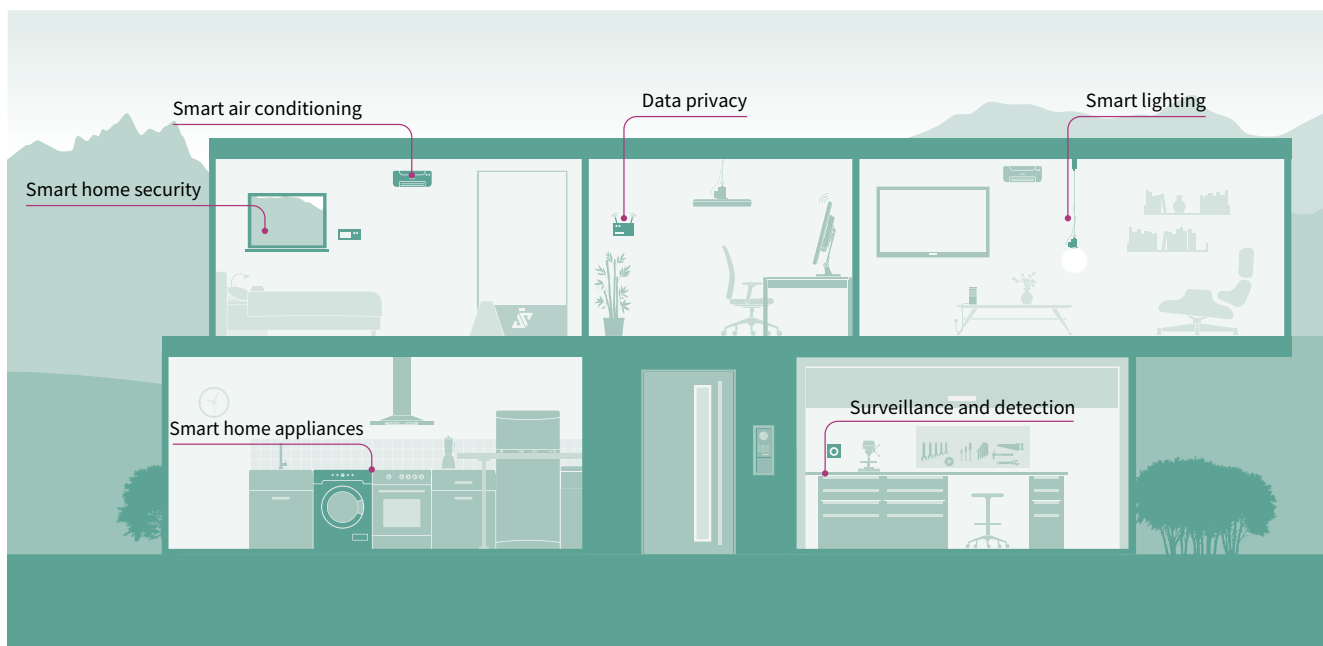


Smart home

Smartifying homes the secured way

How does a smart home differ from a regular home? A smart home is equipped with technologies that make our lives more convenient and energy efficient. Today, the growing range of technologies encompasses smart home appliances, mobile devices and home automation systems, many of which are interconnected. But being 'smart' in this sense requires appliances and systems fitted with the right semiconductor solutions. They empower smart appliances, devices and systems to make sense of their environment and current situation. Working together, sensors, controllers and actuators enable members of a smart home to properly collect, interpret and process real-time data, then trigger the appropriate action or response. In an age of mounting security threats, security solutions keep all activities and system secured and out of harm's way.

From intelligent lighting control to optimized energy consumption, each smart home function depends on intelligent semiconductors. As this rapidly changing field continues to evolve and mature, having a reputable and reliable partner in smart home semiconductor technologies such as Infineon makes all the difference.



Benefit from our smart home expertise

Unparalleled system knowledge

Our in-depth system know-how coupled with our market expertise means you get application specific solutions that are best in class

Lasting reliability

With a proven track record, our high-quality products help keep our customers' business uncertainty at a minimum.

Easy-to-integrate solutions

We enable you to reduce your time-to-market thanks to easy-to-integrate products and a strong global support team for your designs.

www.infineon.com/smarthome





For more details on the product, click on the part number.

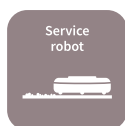


Infiniteon's leading portfolio of best-fit, ready-to-use semiconductor solutions empowers you to create innovative smart home applications that meet both current and future demands. You can count on our components to be smart, secured and energy efficient. In our one-stop shop, you will find all components and solutions required for your project. Furthermore, our products are easy to integrate into your designs.

As you forge new, unexplored territory in the smart home realm, our in-depth know-how of our components and their potential in smart homes and home automation systems enable us to support you through and through. At the cutting-edge of key smart home technologies, we are in the position to guide you through this exciting new market while you explore new opportunities and business models. Especially those new to smart homes will appreciate our easy-to-use smart home demo and our basic offering of solutions.

How Infiniteon's offering enhances your project

<p>Advanced sensing </p> <p>Contextual sensitivity with market-leading accuracy and reliability. For more natural, seamless interaction between humans, machines and the surroundings.</p>	<p>Trusted security </p> <p>The right, easy to implement security solutions for smart, always secured homes. We meet your design's evolving security needs without compromising on convenience.</p>	<p>Cross-application control </p> <p>Ensure optimized system performance thanks to our deep system understanding and strong processing and steering know-how. The result: an excellent user experience.</p>	<p>Efficient power management </p> <p>Our innovative power electronics technologies allow users to save energy and run applications at a market-leading low energy level. It's the basis for real green smart homes.</p>
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Robotics

Superior solutions for industrial and service robotics

Disruptive technologies have significantly changed our lifestyle in the past few decades. Now a new era is on the horizon – the age of robots. Robots are joining the ranks of innovative and disruptive technologies by revolutionizing traditional habits and processes. Today's robots are able to identify and navigate through surroundings, work alongside and even interact with humans. Moreover, they teach themselves the skills required to complete a new task.

All this would not be possible without semiconductor solutions. Whether in an industrial robot, a cobot, an automated guided vehicle (AGV) or a service robot, intelligent semiconductors are the key enabler for all major robotic functions. Drawing on our insight into all facets of the robotics field, and with a comprehensive portfolio of power products and sensors on offer, we are able to provide reliable system solutions that address the latest trends in robotics like artificial intelligence, the Internet of Things, smart home, cloud based services, human machine interface etc., and add value to nearly every robot design.

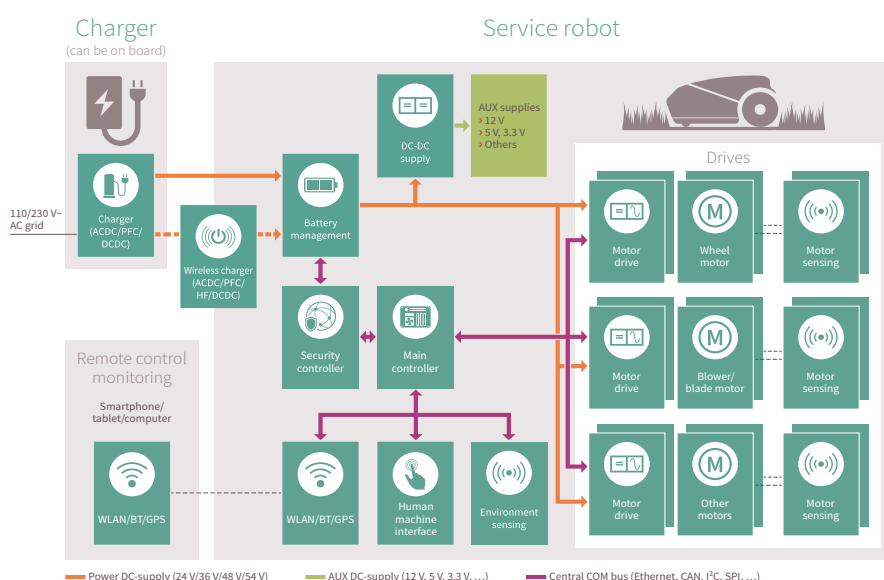
Features and benefits

Key features
Fast time to market
Complete solutions – broad portfolio
Extended battery lifetime and product life spans
Overall system size and cost reduction
Security, quality, and safety
Authentication

Key benefits
A complete eco-system of simulations, documentation, and demonstration boards enable a faster time to market
Whatever design specification, Infineon has the answer thanks to its comprehensive portfolio of products and solutions which you can easily tailor to your needs
High reliability of Infineon components results in prolonged product life spans
Reduction of overall system size and cost thanks to small form factor and compact design of components, both of which are required for highest power density BOM savings thanks to lowest $R_{DS(on)}$
Trustworthy hardware-based security
As a security market leader with a proven track record and outstanding partner network for embedded security, Infineon provides highest quality standards and a safety-certified development process
OPTIGA™ Trust enables authentication of components connected to the system (e.g., battery pack recognition to avoid second-party batteries)

Domestic robots - simplifying everyday life and work

Structural system overview: domestic robots



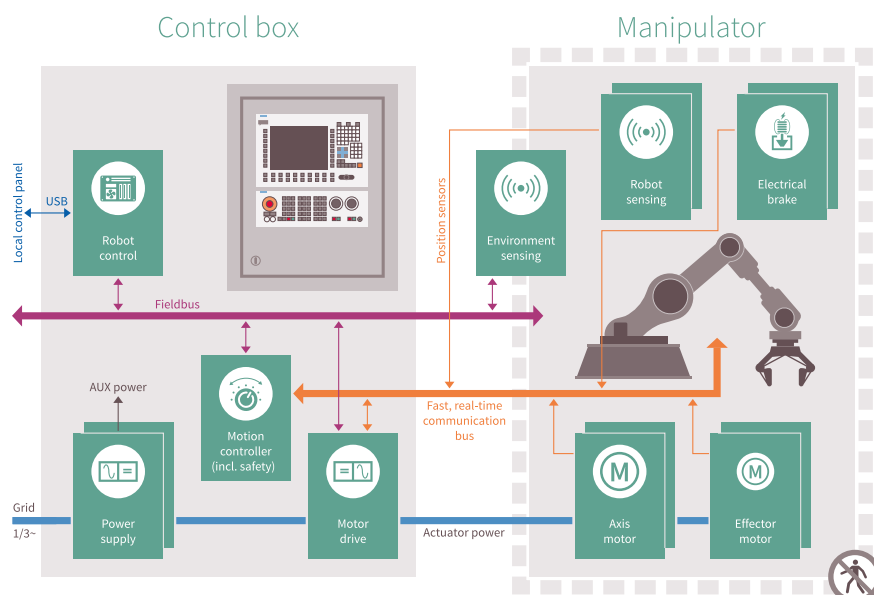
The latest generation of domestic robots is ushering in a new level of assistance and simplicity in homes and professional environments. They directly interact with humans, which introduces unique challenges from a design perspective, especially in domestic environments. Energy efficiency, long battery life as well as security aspects and sensing capabilities are key to user-friendly and safe designs. By choosing Infineon, you get a one-stop semiconductor shop for all your service-robot design needs.

www.infineon.com/service-robotics

For more details on the product, click on the part number.

Cobots – advance through collaboration

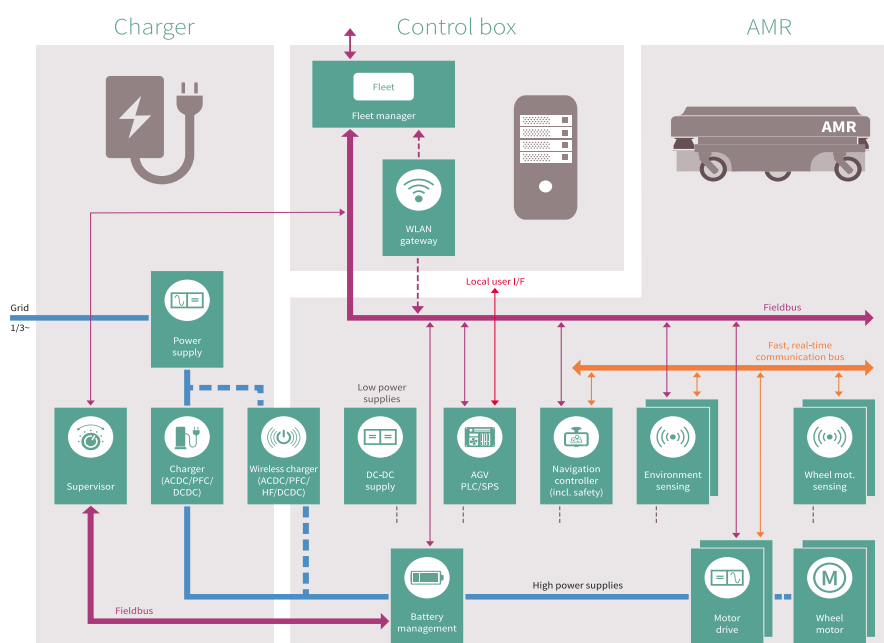
Structural system overview: cobots



Cobots, or collaborative robots, work outside the limitation of a safety cell, in a direct interaction with real people. This setup requires a precise set of design features, especially for the sake of workplace safety. With Infineon's semiconductors for cobot systems, you benefit from the expertise of an experienced and reliable partner. Our radar and sensor solutions, for example, provide the tools to uphold even the highest safety standards and allow the robots to leave their formerly fenced working environment.

Mobile robots – driving production and logistics forward

Structural system overview: battery-powered mobile robots



Autonomous mobile robots (AMRs) are a self-driving force behind automated manufacturing processes. Battery-powered systems offer the highest degree of flexibility within working environments. Covering the entire product portfolio for robotics applications – from the power supply to motor drives and sensors for navigation and environment scanning – Infineon is equipped to ensure AMRs can find their way through nearly all production environments.

Recommended products

Functional block	Purpose	Characteristics	Component Type or Family
Power: -Power supply -Power factor correction (PFC) -Charger -Battery management	Power switches (0.4-6 kW output power)	25-150 V	OptiMOS™
		20-75 V	StrongIRFET™
		P-/N-channel - 60 to 20 V	Small signal MOSFETs
		600-800 V	CoolMOS™ P7
		600 V	CoolMOS™ C7
		600 V	CoolMOS™ CFD7
		600 V	CoolGaN™
		600 V	IGBT HighSpeed 5
	PFC power diodes	650 V Schottky diode	CoolSiC™
	Integrated power stage	800 V	CoolSET™
	Gate driver ICs	200 V/650 V, half-bridge	IRS2005M, IRS2007M, IRS2008M, 2ED2106S06F, 2ED2182S06F
		20 V, non-isolated, low-side	EiceDRIVER™ 1EDN/2EDN, 1ED44175, 2ED24427 *
		650 V/1200 V, galvanic isolation	EiceDRIVER™ 1ED Compact/1EDF2/2EDF/2EDS
		650 V/1200 V, three-phase	EiceDRIVER™ 6EDL04, 6ED2230
	Microcontroller	Arm® Cortex®-M0 microcontroller	XMC1100/XMC1300
		Arm® Cortex®-M4 microcontroller	XMC4200
	Voltage regulators	LDO and DC-DC switching regulators	e.g., IFX1763, IFX90121
	Battery authentication	Hardware-based, embedded security	OPTIGA™ Trust B
Motor control	Motor inverter power switches	<12 V, <400 W	PROFET™
		20-60 V	StrongIRFET™
		60 V	SIPMOS™ *
		25-100 V, <1 kW	OptiMOS™
		P-/N-channel MOSFETs ranging from -60 V to 20 V	Small signal MOSFETs
		600 V, <500 W	CoolMOS™ CFD7
		650 V, <500 W	CoolMOS™ CFD2
		600 V/1200 V, <10 kW	TRENCHSTOP™
		1200 V, 10-20 kW	CoolSiC™
		Fully integrated, 600 V, 0.5-5 kW	CIPOS™
		Fully integrated, 600 V, <20 kW	EasyPIM™
		Fully integrated, 1200 V, 10-20 kW	CoolSiC™ Easy1B *
	Gate driver ICs	200 V/650 V, half-bridge	IRS2005M, IRS2007M, IRS2008M, 2ED2106S06F, 2ED2182S06F
		20 V, non-isolated, low-side	EiceDRIVER™ 1EDN/2EDN, 1ED44175, 2ED24427 *
		650 V/1200 V, galvanic isolation	EiceDRIVER™ 1ED Compact/1EDF2/2EDF/2EDS
		650 V/1200 V, three-phase	EiceDRIVER™ 6EDL04, 6ED2230
		Integrated gate driver ICs	NovalithIC™
		Automotive embedded power ICs	TLE986x, TLE987x
		Arm® Cortex®-M0 microcontroller	XMC1000 microcontroller family
		Arm® Cortex®-M4 microcontroller	XMC4000 microcontroller family
	Microcontroller	TriCore™ Safety certified security on-chip	AURIX™
		Fully integrated motor control ICs	iMOTION™
	Position and condition sensing	XENSIV™ magnetic Hall switches	TLx496x
		XENSIV™ angle sensor, digital I/F	TLE/TLI5012B, TLE5014SP
		XENSIV™ angle sensor, analog I/F	TLE5009/5109/5309/5501
		XENSIV™ 3D magnetic sensor, digital I/F	TLV/TLE/TLI493D
		XENSIV™ current sensor, digital I/F	TLI 4970
		XENSIV™ current sensor, analog I/F	TLI4971
Sensing: -Robot sensing -Environment sensing -Human machine interface	Object and condition sensing	XENSIV™ pressure/temperature sensor, digital I/F	DPS310
		XENSIV™ 24 GHz radar sensor	BGT24MTR11/12, BGT24MR2
		XENSIV™ MEMS microphones, digital I/F	IM69D120/IM69D130
		XENSIV™ ToF 3D imaging @ 38-100 k pixel	REAL3™ IRS1125C */IRS1645C/IRS2381C
	Audio	Class D audio amplifier	IR43x1M, IR43x2M
		Interface	CAN, CAN FD, CAN PD @ 1-5 MBit/s
	Interface	Industrial CAN transceiver	ISOFACE™
		Industrial interface ICs	ISOFACE™
	LED drivers	Driving currents from 10-250 mA	Linear driver ICs BCR3xx, BCR4xx
		Support currents from 150 mA to 3A	DC-DC switch mode ILD4xxx, ILD6xxx
Security and safety -Motion controller (incl. safety) -Security controller	Controller	TriCore™ Safety certified with security on-chip	AURIX™
	Sensors	Safe angle sensing - dual die structure	e.g., TLE5009xxxD
	Voltage regulators	DC-DC voltage regulator 12 V/5 V or 3.3 V; watchdog, error monitoring, safe state control, BIST etc.	e.g., TLF35584
	Security	Hardware-based, embedded security solutions, mutual authentication, secure communication, key protection, data signing etc.	OPTIGA™ TPM/Trust B/Trust X



SMPS

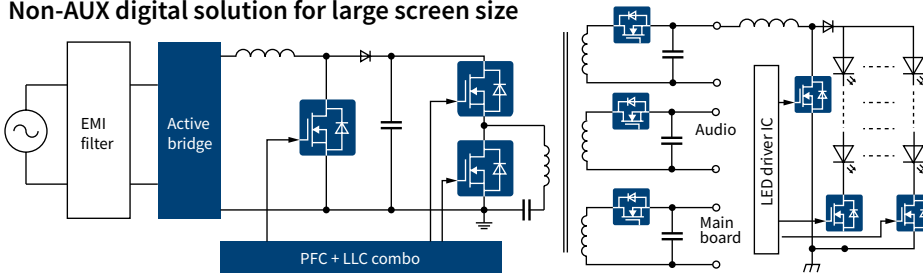
Diversify TV power supply with cost, performance, and ease of use

In addition to their outstanding image quality, new generation TVs gain attention for their user interface, low power consumption, and slim design. This requires the power supply unit (PSU) to either keep a low profile to maintain the slim appearance of a TV and a low thermal dissipation image or to have an external adapter. In addition, a growing number of TV manufacturers will use external adapters to deliver DC power to the TV. Infineon introduced two products based on digital power technology, designed to meet challenging efficiency and standby power requirements for the IoT-enabled TVs (both embedded PSU and adapter).

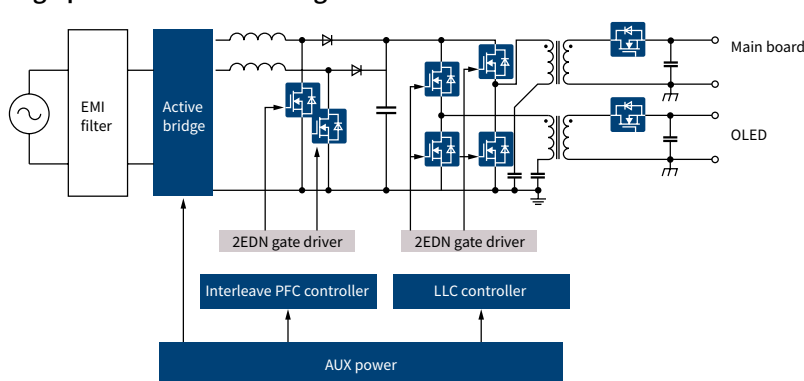
Thanks to digital power, our customers can reduce the number of TV power supplies by adapting the digital IC parameters to different TV and screen models by flexible and easy parameter setting. Infineon's recently introduced digital-based flyback controllers are ideal to implement in low-power adapters for TVs and monitors. With the digital soft switching, the adapter power density can be improved significantly. The 600 V CoolMOS™ P7 series has been developed to cover a broad spectrum of different applications where the excellent performance and perfect ease of use are required. The rugged body diode enables not only the use in hard-switching topologies, such as power factor correction, boost, and two transistor forward, but also in resonant topologies such as LLC where the technologies lead to high efficiency in both hard-switching and resonant circuits.

For higher on-state resistance ($R_{DS(on)}$) classes, there is a new feature of an integrated ESD diode that helps improve the quality in manufacturing. At the same time, the low $R_{DS(on)}$ and gate charge (Q_G) enable high efficiency in the various topologies. The 600 V CoolMOS™ P7 comes with a wide variety of $R_{DS(on)}$ s and packages on consumer grade to make it best suitable for TV power by balancing the cost and performance. Infineon developed specifically for TV power supplies a family of packages, characterized by short lead, SOT-223 mold stopper, and wide creepage distance, which enable our customers' low-cost and reliable manufacturing.

Non-AUX digital solution for large screen size



High power solution for larger screen size

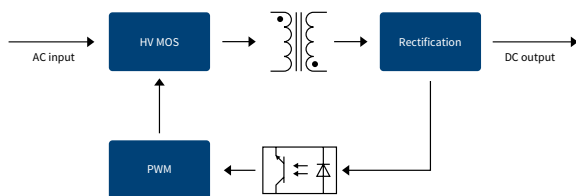


www.infineon.com/smps

For more details on the product, click on the part number.



Flyback solution for small screen size




Recommended products

Functional block	Product category	Topology	Product family	Benefits
Main stage/PFC combo non-AUX	High voltage MOSFETs	Active bridge	600 V CoolMOS™ S7	<ul style="list-style-type: none"> Body diode robustness at AC line commutation Improved thermal resistance Absolute lowest $R_{DS(on)}$ in the market Enables top-side cooling with DDPACK and QDPAK Ideal fit for solid state and hybrid relays and circuit breakers
			600 V CoolMOS™ P7	<ul style="list-style-type: none"> Fast-switching speed for improved efficiency Low gate charge for enhanced light-load efficiency and low power consumption at no-load condition Optimized V_{GS} threshold for lower turn-off losses Rugged body diode for HB LLC application
		DCM PFC, HB LLC	600 V CoolMOS™ PFD7	<ul style="list-style-type: none"> Robustness and reliability with integrated robust, fast body diode and up to 2 kV ESD protection in gate Reduced gate charge for enhanced light-load efficiency, and lower hysteresis loss
	Control ICs	IDP2308	PFC-LLC non-AUX digital IC for TV embedded PSU	<ul style="list-style-type: none"> Low BOM count/system cost due to high integration Low standby power High system reliability Shorter development cycles and higher design and production flexibility
		IDP2303A	PFC-LLC non-AUX digital IC for TV adapter	<ul style="list-style-type: none"> Low BOM count/system cost due to high integration Low standby power Small form factor designs High system reliability
Synchronous rectification	Low voltage MOSFETs	Synchronous rectification	OptiMOS™ 5 100-150 V	<ul style="list-style-type: none"> Low conduction losses, reduced overshoot FullPAK package available
PFC	Boost diodes	DCM PFC	650 V Rapid diode	<ul style="list-style-type: none"> Low conduction losses
	Control ICs	CCM PFC ICs	ICE3PCS0xG	<ul style="list-style-type: none"> High PFC and low THD
Main stage	Control ICs	HB LLC ICs	ICE1HS01G-1/ICE2HS01G	<ul style="list-style-type: none"> High efficiency and low EMI
Auxiliary power supply	Control ICs	QR/FF flyback CoolSET™	700 V/800 V – ICE5QRxx70/80A(Z)(G)	<ul style="list-style-type: none"> Low standby power, high efficiency, and robustness
Flyback	Control ICs	Digital ZVS flyback	IDP2105 *	<ul style="list-style-type: none"> Forced resonant ZVS control reduces the switching loss Multilevel protection enables the robust design Flexible firmware provides more differentiation for OEMs
	High voltage MOSFETs	Flyback	700 V CoolMOS™ P7	<ul style="list-style-type: none"> Optimized for flyback topologies Best price competitive CoolMOS™ SJ MOSFET family Lower switching losses versus standard MOSFET Controlled dV/dt and di/dt for better EMI

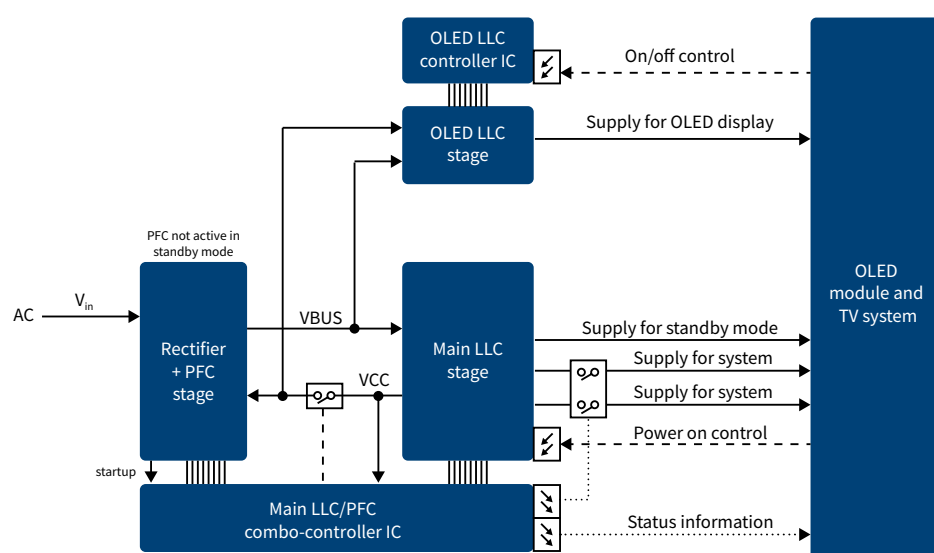
www.infineon.com/smps

*For more information on the product, contact our product support

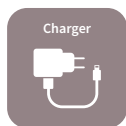
For more details on the product, click on the part number. 



OLED TV power block diagram



Benefiting from several advantages of organic light emitting diodes (OLED), various TV manufacturers are developing OLED TVs to level up the user experience of their consumers. Comparing with LCD/LED TV panels, the OLED can be thinner, lighter, and more flexible, also the power consumption is lower. With the excellent performance of Infineon's GaN e-mode HEMTs (for full portfolio see **pages 156-160**), the OLED TV becomes even thinner and more reliable.



SMPS

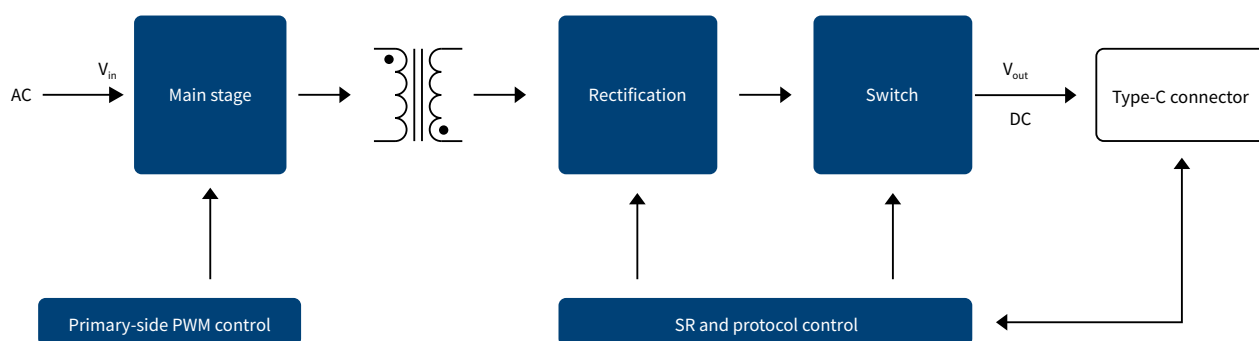
Best solutions for mobile charger

Modern mobile devices require a charger that provides faster charging but comes in a small size. High power density and cost-effective power supplies can be designed by operating the converter at a higher switching frequency to avoid a considerable increase in the transformer and the output capacitor size. In achieving the required thermal performance and EMI behavior, power devices with lower losses and controlled switching behavior enable effective and fast product development.

Infineon's state-of-the-art digital-based controller, XDPS2107, enables the forced frequency resonant flyback (zero voltage switching) operation, ideal to be implemented in high power density adapters and well-supporting USB-PD requirements.

To address these requirements, Infineon offers its CoolMOS™ P7 SJ MOSFET family for adapters and chargers. Special care has been taken to ensure very good thermal behavior, increased efficiency, and fulfillment of all EMI requirements, enabling our customers to easily design products based on this new family. In addition, power devices in IPAK/SMD packages enable optimal PCB layout through minimal footprint. SMD packages offer additional benefits for automatized large volume production. Specifically, high power density at low manufacturing cost can be delivered using Infineon's SOT-223 cost-effective package, which enables SMT manufacturing to maintain very good thermal performances.

The digital soft-switching controller, CoolMOS™ high-voltage MOSFETs, OptiMOS™ low-voltage MOSFETs and synchronous rectification IC portfolios, enable high power density designs whilst meeting the thermal requirements.



Functional block	Product category	Topology	Product family	Benefits
Flyback converter	High voltage MOSFETs	Flyback	700 V CoolMOS™ P7 (standard grade)	<ul style="list-style-type: none"> Best price competitive CoolMOS™ SJ MOSFET family Lower switching losses versus standard MOSFET
		ACF, FMC	600 V CoolMOS™ PFD7 (standard grade)	<ul style="list-style-type: none"> Robustness and reliability with integrated robust fast body diode and up to 2 kV ESD protection Reduced gate charge for enhanced light-load efficiency Lower hysteresis loss
	Control IC	FFR flyback IC	XDPS21071	<ul style="list-style-type: none"> High power density and ideal for USB-PD
Synchronous rectification	Low voltage MOSFETs	Synchronous rectification	OptiMOS™ PD 25 V – 150 V	<ul style="list-style-type: none"> Low conduction losses and reduced overshoot Logic level switching S308/PQFN 3.3 x 3.3 package available
	Control IC	Synchronous rectification	IR1161LTRPBF	<ul style="list-style-type: none"> High efficiency Simple external circuitry
Load switch	Low voltage MOSFETs	Load switch	OptiMOS™ PD 25 V/30 V	<ul style="list-style-type: none"> Low conduction losses S308/PQFN 3.3 x 3.3 package available

www.infineon.com/smcs

For more details on the product, click on the part number.



Wireless charging solutions

Cost-effective and secure offerings for consumer, industrial and automotive applications

Over the last years, wireless charging has gained more and more traction in the market and is expected to heavily influence our daily lives in future. Infineon offers a broad portfolio of efficient, high-quality products and solutions to serve the key requirements of the dominant market standards: inductive (Qi (WPC)) and resonant (AirFuel). Whether you charge a smartphone (e.g. at home or in the car), a handful of wearables, a power tool, a laptop or a service robot, Infineon's components and solutions help you overcome a wide range of common wireless power transfer challenges for consumer, industrial, and automotive wireless charging designs.

Wireless charging standards

	Inductive single-coil	Inductive multi-coil	Magnetic resonance
Standard	Qi inductive 110-205 kHz		Resonant AirFuel 6.78 MHz
Positioning of receiver application	Exact positioning	Positioning more flexible (X and Y direction)	Free positioning (up to >30 mm vertical freedom)
Number of devices charged	Charges only one device	Charges one device but with better user experience	Charges multiple devices
Rx-Tx communication	In-band communication		Bluetooth low energy or in-band communication

Many end markets for wireless charging or wireless power transfer



Infineon's key enabling products for consumer, industrial, and automotive solutions

- › Low and medium voltage power MOSFETs – OptiMOS™ and StrongIRFET™
- › Gate driver ICs – EiceDRIVER™ or DC-DC low voltage gate driver
- › 32-bit microcontrollers – XMC™ and AURIX™
- › Wireless power controller (including software IP) – XMC™-SC and AURIX™
- › P-channel and N-channel small signal power MOSFETs
- › High-voltage power MOSFETs – CoolMOS™ Superjunction MOSFETs
- › PWM/flyback controllers and integrated power stage ICs – CoolSET™
- › Gallium nitride (GaN) – CoolGaN™ e-mode HEMTs
- › Dedicated automotive power products – MOSFETs, DC-DC, LDO, PMIC with ASIL qualification
- › Voltage and buck regulators for component and bridge supply
- › Authentication – OPTIGA™ Trust Qi *
- › Reverse conducting IGBTs – 650V TRENCHSTOP™ 5

www.infineon.com/wirelesscharging

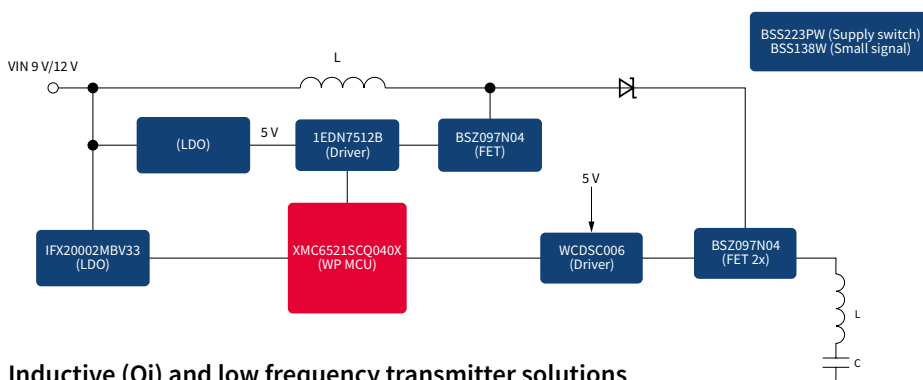
* Available when WPC Qi specification is released

For more details on the product, click on the part number.

Components for inductive designs for consumer and industrial applications

Especially for the emerging higher power (15 W+) transmitter applications equipping your half- or full-bridge topologies with components from the OptiMOS™ product family, driver ICs, and voltage regulators pays off with superior power transfer performance. Single and dual N-channel OptiMOS™ versions with excellent $R_{DS(on)}$ and charge characteristics are available in small footprint packages for your wireless power transmitter design. For multicoil designs, there are very suitable IR MOSFET™ devices in 2 x 2 mm packages ready to use. In addition, Infineon's XMC™ 32-bit industrial microcontrollers provide the flexibility to charge “just about anything”. Infineon's portfolio supports individual needs by either an Arm® Cortex®-M0 core (XMC1000 family) or a Cortex®-M4 core with a floating point unit (XMC4000 family). In addition, wireless power controllers – XMC™-SC, including software IP, are available for selected applications in our portfolio (for further details check **page 327**). Ensuring that you, your data, and your devices remain secured and safe during charging, Infineon adds a new member to its OPTIGA™ Trust family – the OPTIGA™ Trust UWP. Infineon readily supports the WPC Qi authentication standard with an integrated turnkey solution.

System diagram: inductive wireless charging – 15 W Qi transmitter for smartphones



Inductive (Qi) and low frequency transmitter solutions

Products	Voltage class	Package	Part number	$R_{DS(on)}$ max @ $V_{GS} = 4.5\text{ V}$ [mQ]	Recommendation
MOSFETs	20 V	PQFN 2 x 2	IRLHS6242	11.7 (= 2.5 V drive capable)	Right fit
	25 V		IRFHS8242	21	Right fit
	30 V	SuperSO8	BSC0996NS	11.8	Right fit
			BSC0993ND	7	Best performance
		PQFN 3.3 x 3.3	BSZ0589NS	4.4	Best performance
			BSZ0994NS	8.6	Right fit
			BSZ0909NS	15	Right fit
		PQFN 3.3 x 3.3 dual	BSZ0909ND	25	Best performance
			BSZ0910ND	13	Best performance
		PQFN 2 x 2	IRFHS8342	25	Right fit
	IRLHS6342		15.5 (= 2.5 V drive capable)	Best performance	
40 V	PQFN 3.3 x 3.3	BSZ097N04LS	14.2	Right fit	
	SuperSO8	BSC035N04LSG	5.3	Right fit	
Reverse conducting IGBTs	650 V	TO-247-3	IHW30N65R5 (30 A)		
			IHW40N65R5 (40 A)		
			IHW50N65R5 (50 A)		
Gate driver ICs	EiceDRIVER™ 1EDN7512B, 2EDN7524G, IRS2007M, 2ED2182S06F				
	PX3519, IRS2301S, WCDSC006				
Microcontroller or wireless power controller	XMC™ MCU and wireless power controller XMC™-SC (including software IP)				
Voltage regulators	IR3841M **, IFX20002, IFX91041EJV50, IFX90121ELV50, IFX81481ELV				
Small signal MOSFETs	BSS209PWH6327, BSS138WH6433 * * – Please check online ¹⁾				
Authentication	SLS32AIA020Ux – OPTIGA™ Trust Qi * (USON10 3 x 3 package)				

Find here additional MOSFET and driver IC offerings!

www.infineon.com/cms/en/tools/solution-finder/product-finder/gate-driver

www.infineon.com/cms/en/tools/solution-finder/product-finder/mosfet-finder

www.infineon.com/wirelesscharging

1) www.infineon.com/smallsignalmosfets

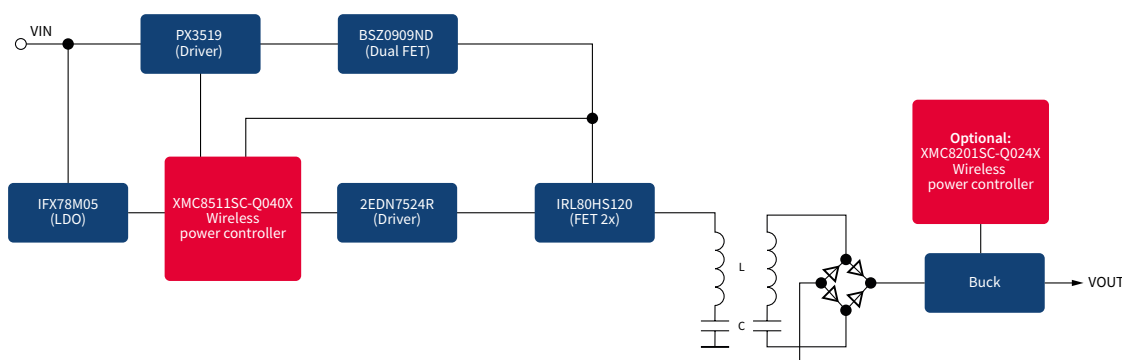
* Available when WPC Qi specification is released

** For more information on the product, contact our product support

Components for resonant designs for consumer and industrial

Infineon offers superior power MOSFET technologies especially in the 30-100 V classes for class D inverter designs and in the 150-250 V voltage classes for class E inverters to address MHz switching implementations. We provide industry leading products when it comes to fast switching and have the best figure of merit for gate charge times $R_{DS(on)}$ and for C_{oss} thus enabling our customer to achieve 6.78 MHz inverter designs using robust silicon MOSFET technology. CoolGaN™ 600 V with low and highly linear C_{oss} , as well as low Q_G , enables high efficiency at higher power levels, especially in higher power class E designs. The CoolGaN™ portfolio qualifying for the use in wireless charging applications will be extended by adding 100 V and 200 V products over the next years. Infineon offers the “coolest” driver ICs in the industry, already available as low-side drivers for class E implementations and very soon as level shifted half-bridge driver for class D topologies. If your transmitter design uses a pre-regulator (buck or buck/boost) to control the input voltage of your amplifier you can find OptiMOS™ solutions in the **20-300 V MOSFETs** section. Here again, the XMC™ industrial microcontroller and the XMC™-SC wireless power controller, including software IP, are a great fit to charge “just about anything”.

System diagram: resonant wireless charging – 2.5 W transmitter and receiver – 6.78 MHz - proprietary solution



Components for resonant (AirFuel) and high frequency solutions

Products	Voltage class	Package	Part number	$R_{DS(on)}$ max @ $V_{GS} = 4.5$ [mΩ]	Q_G typical [nC]	C_{oss} typical [pF]	Topology
MOSFETs	30 V	PQFN 2 x 2 dual	IRLHS6376PBF ***	48	2.8	32	Class D
		PQFN 3.3 x 3.3 dual	BSZ0909ND	25	1.8	120	Class D
			BSZ0910ND	13	5.6	230	Class D
		SOT-23	IRLML0030PBF	33	2.75	84	Class D
	40 V	SOT-23	IRLML0040	62	2.8	49	Class D
	60 V	SOT-23	IRLML0060	98	2.6	37	Class D
	80 V	PQFN 2 x 2	IRL80HS120	32	3.5	68	Class D/E
	100 V	PQFN 2 x 2	IRL100HS121	42	2.7	62	Class D/E
	150 V	PQFN 3.3 x 3.3	BSZ900N15NS3	75 **	4.1 **	46	Class E
			BSZ520N15NS3	42 **	7.2 **	80	Class E
			BSZ900N20NS3	78 **	7.2 **	52	Class E
			BSZ22DN20NS3	200 **	3.5 **	24	Class E
	200 V		BSZ12DN20NS3	111 **	5.4 **	39	Class E
			BSZ42DN25NS3	375 **	3.6 **	21	Class E
250 V							
GaN e-mode HEMT	CoolGaN™ 600 V e-mode GaN HEMT IGT60R190D1S (HSOF-8-3)						
Gate driver ICs	EiceDRIVER™ 2EDL71 *, 1EDN7512, 2EDN7524, 2ED2182S06F, 2ED24427N01F ***, 1EDI60N12AF						
	GaN EiceDRIVER™ gate driver ICs 1EDS5663H, 1EDF5673F, 1EDF5673K						
Microcontroller or wireless power controller	XMC™ MCU and wireless power controller XMC™-SC * (including software IP)						
Voltage regulators	IR3841M ***, IFX20002, IFX91041EJV50, IFX90121ELV50, IFX81481ELV						
Small signal MOSFETs	Please check online ⁽¹⁾						

Find here additional MOSFET and driver IC offerings!

www.infineon.com/cms/en/tools/solution-finder/product-finder/gate-driver

www.infineon.com/cms/en/tools/solution-finder/product-finder/mosfet-finder

www.infineon.com/wirelesscharging

* On demand

** $V_{GS} = 8$ V

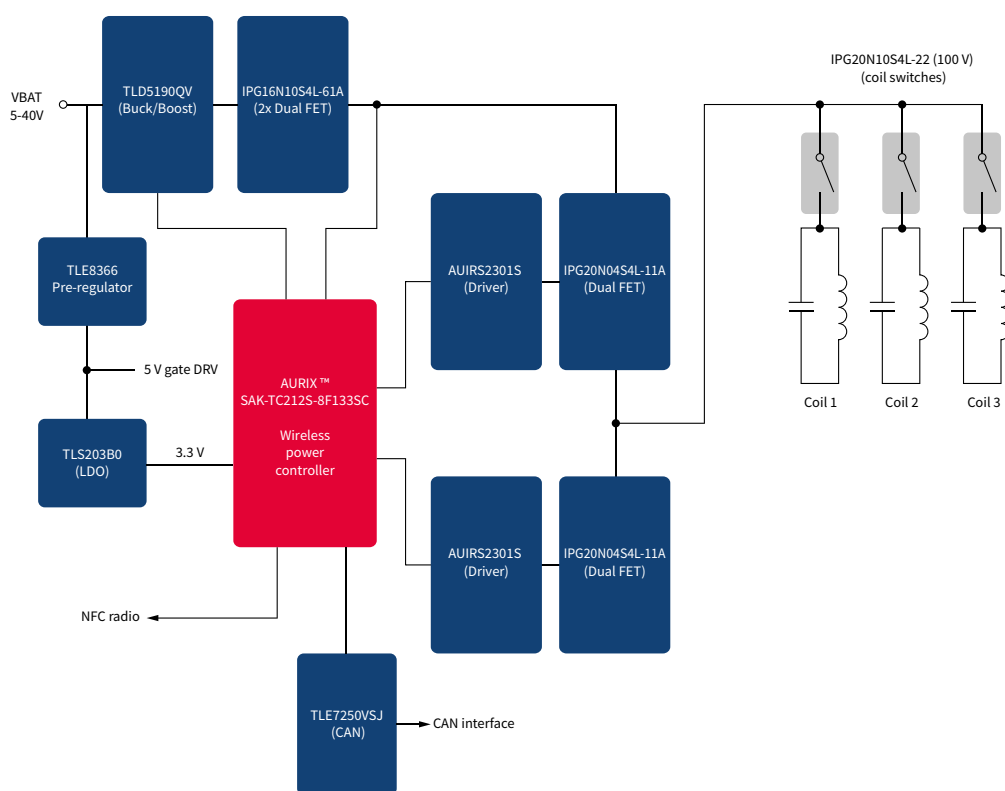
*** For more information on the product, contact our product support

For more details on the product, click on the part number.

Wireless in-car charging (automotive)

The next generation of in-cabin wireless charging systems have to meet strict automotive safety, security, environmental, and regulatory requirements while still enabling industry-leading charging performance and efficiency. Infineon's AURIX™ microcontroller, voltage regulators, power MOSFET technologies, and network ICs will easily support these requirements with a complete charging solution. With 15 W charging that meets existing standards, including fast-charging smartphones, the solution easily supports future changes with a software update. Infineon's new innovative foreign object detection (FOD) system or our unique improved power drive architecture that provides unparalleled EMI performance are just two benefits out of many to address the design challenges in the automotive wireless charging market. Discover our complete offerings for in-cabin charging on a system level on **Infineon's wireless charging webpage** – something you will not find just anywhere.


System diagram: AURIX™-based wireless charger – three-coil



Automotive products for wireless charging	Voltage class	Package	Part number	R _{DS(on)} max @ V _{GS} = 4.5 V [mQ]	Q _g typical [nC]
Inverter automotive grade MOSFETs	40 V	SuperSO8 5 x 6 dual	IPG20N04S4-12A	15.5	9
		S308 3.3 x 3.3	IPZ40N04S5L-4R8	6.7	11
			IPZ40N04S5L-7R4	10.7	6.5
Automotive products for wireless charging	Voltage class	Package	Part number	R _{DS(on)} max @ V _{GS} = 4.5 V [mQ]	R _{DS(on)} max @ V _{GS} = 10 V [mQ]
Coil selection switch	60 V	TDSO8-8	IPG20N06S4L-11A	15.8	11.2
	100 V	SuperSO8 5 x 6 dual	IPG20N10S4L-22A	28	22
			IPG20N10S4L-35A	45	35
			IPG16N10S4L-61A	78	61
Microcontroller and wireless power controller	AURIX™ SAK-TC212S-4F100N *, SAK-TC212S-8F133SC				
Power supply	TLD5190 – buck-boost controller/TLE8366, TLS4120x, TLS203x/TLF35584 – safety MCU supply + CAN supply				
CAN	TLE7250SJ – high performance CAN transceiver				
Gate driver ICs	AUIRS2301S				

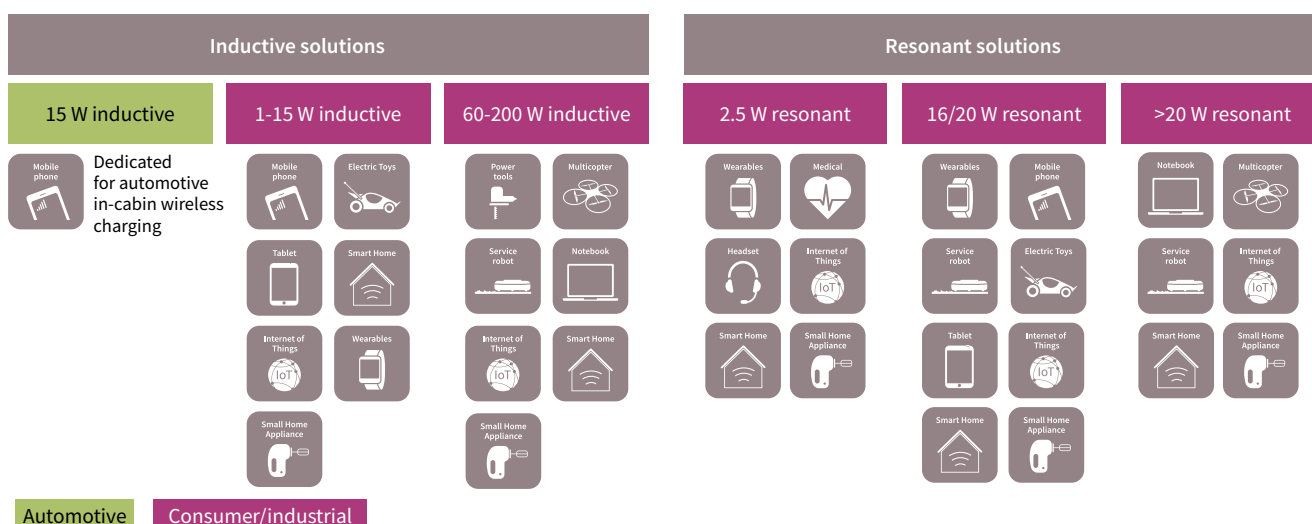
www.infineon.com/wirelesscharging

*For more information on the product, contact our product support

For more details on the product, click on the part number. 

System solutions for wireless charging

Master your design challenges with Infineon. With our broad range of designs, customers have the possibility to make wireless charging available for different kinds of applications. For more information on the availability of our boards, please visit www.infineon.com/wirelesscharging or get in contact with us via www.infineon.com/support.



Reference design

Valkyrie – the 15W Qi transmitter (Tx) for charging smartphones

REF_10WTx_QI_4102 *

Board specification

	Board number	REF_10WTx_QI-4102
	Solution max. power capability [W]	7.5 W / 10 W
	Frequency	fixed 127.8 kHz (Apple iOS), variable (Android)
	Input power supply	USB QC 3.0 (9 V / 12 V)
	Topology	boost topology (half-bridge solution)
	Power regulation method	Variable voltage boost (added frequency control for Android)
	Rx-Tx communication	In-band communication (bi-directional)
	Supports	WPC 1.2.4 EPP
	Charging rates Rx	Up to 15 W
	FOD measurements calculated Tx power	Direct AC measurement at coil
	DC-DC efficiency	83%
	Dimensions	L: 85 mm, W: 50 mm, H: 6.4 mm / Active area: L: 45 mm, W: 40 mm
	Coil type	MP-A11

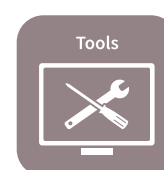


Spark Connected Inc. is our official partner for wireless charging.

The software IP is provided by our partner.

For details visit: www.sparkconnected.com

Find the right solutions for your wireless charging designs in four steps
 Infineon's selection tool for wireless charging allows you to find the right solutions for your designs in just four steps: select the application, power range, standard, and the topology you want to apply and get an overview of Infineon's most recommended offerings.



Try now!

www.infineon.com/wirelesscharging

*On demand

For more details on the product, click on the part number.



Wearables and healthtech

Next level of wearable devices with Infineon's sensing, RF, power, and security solutions

Smart wearable devices have become an essential part of our lives and are expected to gain more popularity in the future. Wearables are devices that can be comfortably worn on the body and that are used for multiple purposes depending on the application. With Infineon's product offerings, customers can solve design challenges such as data security, sensor accuracy, longer battery lifetime, small form factor of the components, device protection, and differentiation between everyday movements and a fall.

Key enabling products:

- > XENSIV™ barometric pressure sensors
- > OPTIGA™ Trust B
- > Broad RF switch portfolio
- > GPS LNA
- > 4G/5G LTE LNAs
- > eSim
- > XENSIV™ MEMS microphone
- > Wireless charging solutions
- > 3D Image Sensor REAL3™
- > 32Mb NVM ultralow power flash memory
- > ESD protection
- > SECORA™ Connect
- > XENSIV™ 60 GHz radar

Wearable applications addressed by Infineon



Smartwatch
and sport watch



Wristband



Hearables



AR/VR glasses



Smart clothing



Healthtech

Highest accuracy



Achieve robust and accurate altitude measurement, location tracking, precise single step or body motion detection

Increased battery lifetime



Infineon's products with smallest form factors and low energy consumptions provide high functional integration and long-lasting battery

Fast and secure transactions



Easy implementation of smart payment, ticketing or access control with Infineon's NFC solution

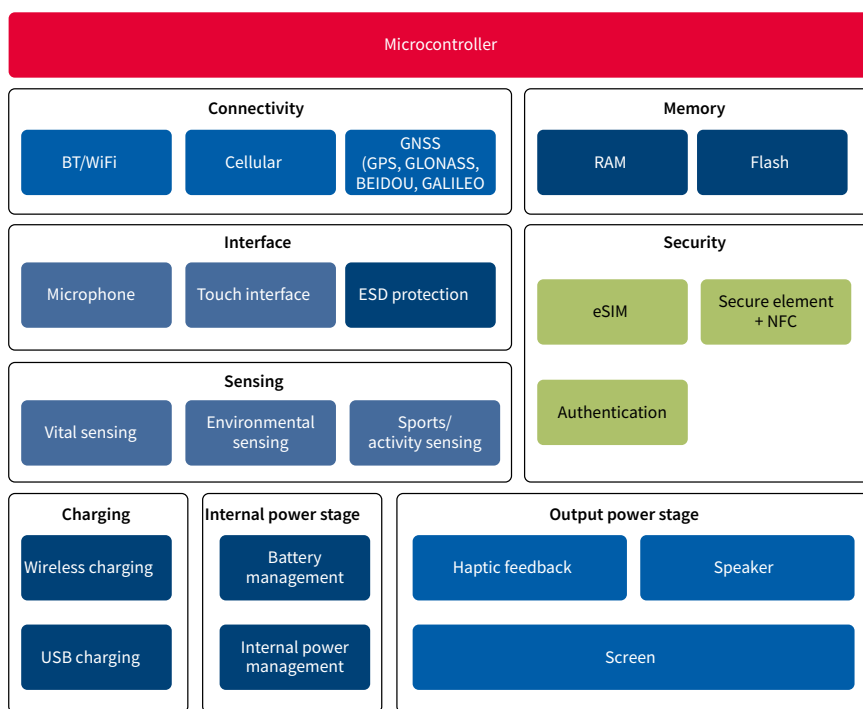
Easy to integrate solutions



Decrease your time to market. Thanks to our broad product portfolio and solution offerings such as wireless charging, eSim, ESD protection or authentication



Functional blocks of smartwatch, sports watch, and wristband



Solution tree for smartwatch, sport watch, and wristband

Functional block	Product family	Functional block	Recommended parts and families
Security	<ul style="list-style-type: none"> OPTIGA™ Trust B SLE 95250 SECORA™ Connect * eSim: NC1025 * 	Interface	<ul style="list-style-type: none"> Broad ESD protection product portfolio XENSIV™ MEMS microphone
Wireless charging	<ul style="list-style-type: none"> 2 W inductive * 2.5 W resonant * 	Memory	<ul style="list-style-type: none"> 32Mb NVM flash memory
Sensing	<ul style="list-style-type: none"> XENSIV™ pressure sensor DPS310/DPS368 	Connectivity	<ul style="list-style-type: none"> Broad 4G/5G LNA product portfolio GNSS LNA: BGA123L4, BGA123N6, BGA524N6, BGA125N6 Broad RF switches portfolio

www.infineon.com/wearables

* Available on request

For more details on the product, click on the part number.



SMPS and digital power management solutions for data processing applications

- › DC-DC enterprise solutions for data processing applications
- › SMPS – laptop adapters
- › SMPS – PC power supply
- › SMPS – server power supply
- › SMPS – telecom power supply



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

Applications



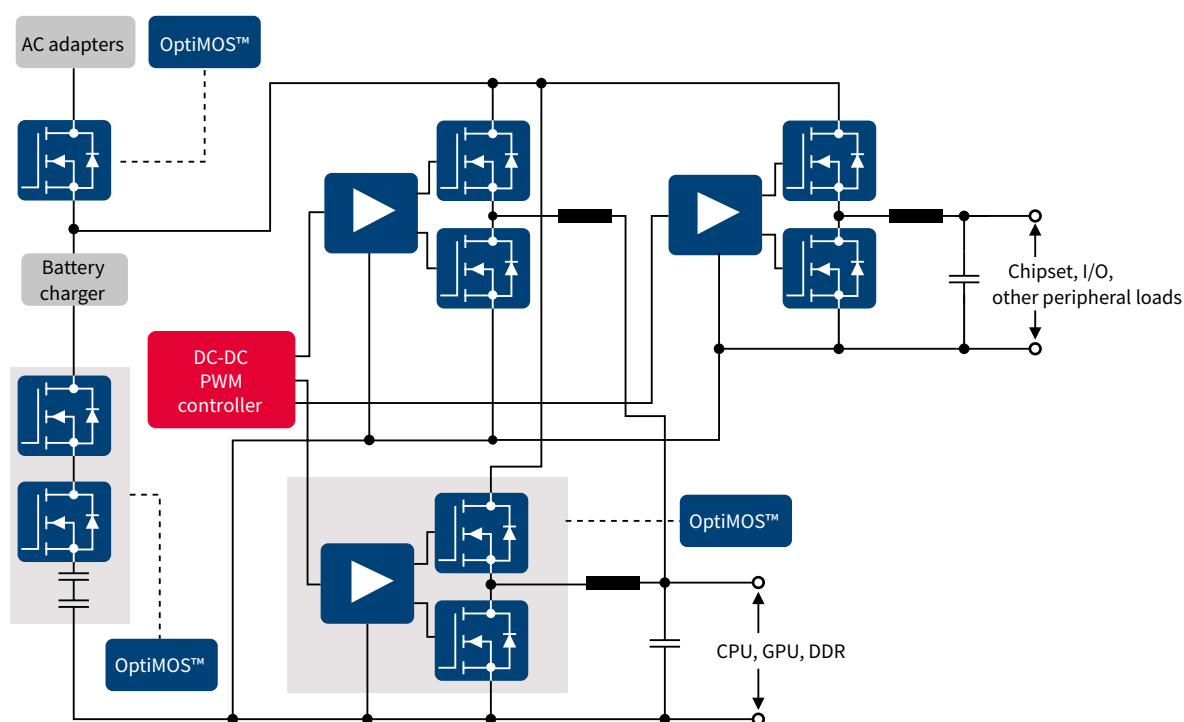
DC-DC enterprise power solution for data processing applications

Multiphase and point-of-load DC-DC solution

As an industry leader in digital power management, Infineon delivers solutions for the next-generation server, communication, storage and client computing applications. Infineon offers a complete portfolio including digital PWM controllers, integrated power stages, integrated point-of-load (POL) voltage regulators, MOSFET drivers, power blocks and discrete MOSFETs. These proven technologies offer full flexibility to our customers to optimize a complete system solution for space, performance, ease of design and cost to meet critical design goals. In addition, our latest software tools help simplify design, shorten design cycles and improve time-to-market.

Features and benefits

Key features	Key benefits
Best-in-class efficiency	Digital controller and power stage provide industry's highest efficiency of more than 95 percent
Multi-protocol support	Intel SVID, AMD SVI2, NVIDIA PWM VID, parallel VID (up to 8 bits), PMBus™ Rev1.3, AVS Bus (PMBus™ Rev1.3)
Complete system solution	A broad portfolio of fully integrated point-of-load, integrated power stage and digital controller solutions in addition to discrete drivers and MOSFETs offers full flexibility to optimize complete system solutions ranging from 1 A to 1000+ A.
Digital controller flexibility	Industry's benchmark for feature richness and low quiescent power with up to 16-phases
Ease of design	Intuitive GUI enables faster optimization, thereby reduces design cycle time
Smallest solution size	Best-in-class OptiMOS™ MOSFETs combined with advanced packaging technologies enable high power density at high efficiency, and the superior control engine with digital controllers helps minimize output capacitance significantly





Multiphase DC-DC system solution

		Powered ICs	Voltage	
			VCCIO	V _{core}
<div>Server</div> <div>Storage</div>	Server/storage	Server chipset	VMCP	V _{mem}
	Server-Intel/IBM/AMD/ARM Workstation Storage			V _{core}
<div>Consumer</div>	High-end consumer	PC chipset		Graphics
	High-end desktop Graphic Notebook Industrial PC Gaming			
<div>Datacom</div> <div>Telecom</div>	Comms	ASIC ASSP FPGA	FPGAs (~0.5–3.3 V)	Networking SoCs and ASICs, FPGAs
	<div>Datacom</div> Comms core SOHO SAN Edge access		ASICs (~1.0 V)	Multi-core processors
	<div>Telecom</div> Base station (macro + distributed)		ASSPs (~1.0 V)	Ethernet switch ICs
			10-30 A single-phase (multi-rail)	>30 A multiphase/rail

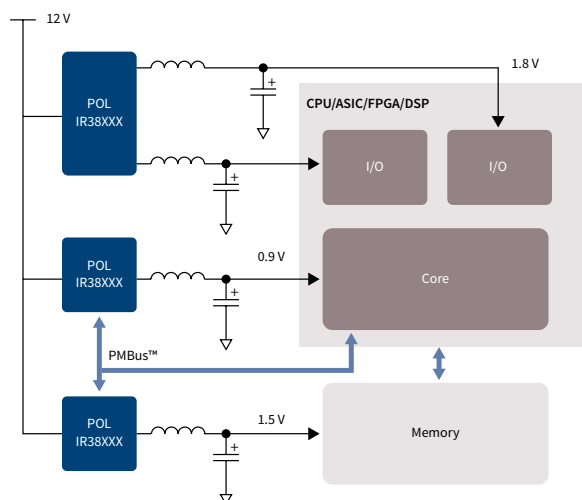


DC-DC enterprise power solution for data processing applications

Integrated point-of-load (IPOL) converters

Infineon's IPOL converters integrate a PWM controller, a driver and MOSFETs into a small PQFN package for ease of use. The patented PWM modulation scheme allows greater than 1 MHz switching frequencies to deliver ultracompact layouts and the smallest bill of materials (BOM). A PMBus™ interface is available for monitoring and control in systems that use advanced CPUs, ASICs and FPGAs.

Block diagram

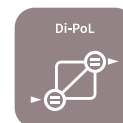


Key features

- › Input voltage range 4.5-21 V
- › Output current 1-35 A
- › Operating temperature range of -40 to 125°C

Key benefits

- › Integrated controller, driver, MOSFETs for small footprint
- › High-efficiency MOSFETs and thermally enhanced packages for operation without heat sinks



DC-DC IPOL portfolio

Digital interface IPOL

I ² C PMBus™, telemetry, margin, faults, SVID PVID Digital control/configuration, telemetry and diagnostic					
Part number	Max. current [A]	Package size [mm]	Max. V _{in}	Max. f _{sw}	Distinctive features
IR38064MTRPBF	35	5 x 7	21 V	1500 KHz	PMBus™
IR38063M	25	5 x 7	21 V	1500 KHz	
IR38062M	15	5 x 7	21 V	1500 KHz	
IR38060M	6	5 x 6	16 V	1500 KHz	
IR38163M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID + PMBus™
IR38165M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID
IR38363M	15	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID + PMBus™
IR38365M	15	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID
IR38263M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, PVID + PMBus™
IR38265M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, PVID
IR38164M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID + PMBus™, enhanced I _{mon}
IRPS5401M	4+4+2 +2+0.5	7 x 7	14 V	1500 KHz	5 output PMIC, PMBus™

Analog IPOL

„Performace“ voltage-mode PWM Ultralow jitter and noise, high accuracy and low ripple					
Part number	Max. current [A]	Package size [mm]	Max. V _{in}	Max. f _{sw}	Distinctive features
IR3883MTRPBF	3	3 x 3	14 V	800 KHz	Constant-on-time
IR3888MTRPBF	25	5 x 6	17 V	2000 KHz	
IR3887MTRPBF *	30	4 x 5	17 V	2000 KHz	
IR3889MTRPBF	30	5 x 6	17 V	2000 KHz	

www.infineon.com/dataprocessing

*Coming soon

For more details on the product, click on the part number.



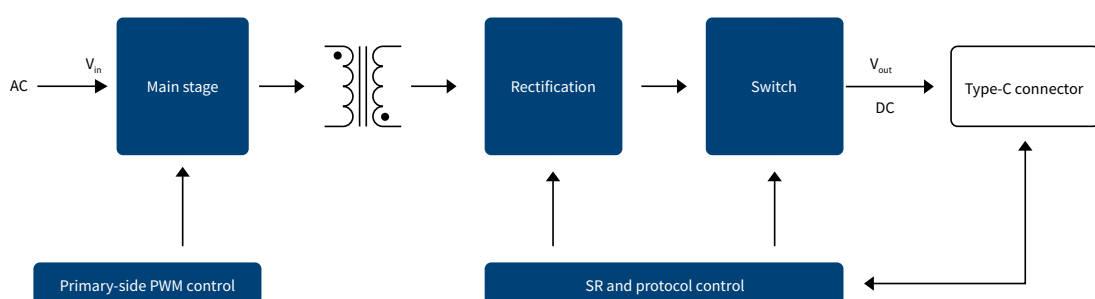
SMPS

Right-fit portfolio for competitive design of laptop adapters

Manufacturing slimmer and lighter adapters requires ICs that enable high efficiency with good electromagnetic interference (EMI) performance and low standby power. There is also a need for cost-effective MOSFETs in small packages that feature good EMI and excellent thermal performance. Infineon offers a wide range of products specifically designed for adapters including high-voltage MOSFETs and control ICs for PFC and PWM stages, as well as low-voltage MOSFETs for synchronous rectification. With these products, Infineon supports the trend towards a significantly higher efficiency level, especially in partial load conditions, as well as the miniaturization of the adapter.

Extremely versatile are the CoolMOS™ P7 SJ MOSFET series and the latest body-diode performance-enhanced CoolMOS™ PFD7 series which combine high efficiency and optimized cost with the ease of use. Infineon developed a family of packages, characterized by having a short lead, IPAK short lead with ISO-standoff and wide creepage that enable our customers' low-cost and reliable manufacturing, specifically for adapters. High power density at low manufacturing cost can be achieved by using Infineon's SOT-223 cost-effective package and ThinPAK 5x6 and 8x8 high-density SMD packages which enable SMT manufacturing while maintaining very good thermal performances. For synchronous rectification, Infineon's OptiMOS™ PD logic-level power MOSFET series offer extremely low on-state resistance and low capacitances.

The new control ICs such as the digital-based XDP™ controller enable forced-frequency-resonant zero-voltage-switching (FFR ZVS) operation, ideal in high-power-density adapter designs and supporting USB-PD requirements.



Multiple and often clunky chargers and adapters for phones, tablets, and laptops pose a nuisance for many users due to the additional weight and added space. That created a need and a trend towards higher power density and consequently smaller devices. Today, flyback power conversion topology is typically used in such systems and the form factor is limited by the efficiency achievable at 90 V_{AC} input voltage and full load.

The highest-power-density systems available today reach ~12 W/in³ (for 65 W maximum output power). Infineon's CoolGaN™ e-mode HEMTs enable a breakthrough with respect to power density for adapter and charger systems enabling ~20 W/in³ power density systems (for 65 W maximum output power). This advantage can be realized by implementing Infineon's CoolGaN™ in a half-bridge topology that allows simultaneous increase of switching frequency and efficiency.



Infineon's 20 W/in³ adapter (cased) - 24 W/in³ (uncased) with 65 W output power capability (LxWxH: 74.2 mm x 36.5 mm x 16.5 mm)



Recommended products

Functional block	Product category	Topology	Product family	Benefits
Flyback converter	High voltage MOSFETs and HEMTs	Flyback	600 V/700 V/800 V CoolMOS™ P7 SJ MOSFETs	<ul style="list-style-type: none"> › Fast switching speed for improved efficiency and thermals › Reduced gate charge for enhanced light load efficiency › Optimized gate-to-source voltage (V_{GS}) threshold for lower turn-off losses
		ACF, FMCi	600 V CoolMOS™ PFD7 SJ MOSFETs	<ul style="list-style-type: none"> › Robustness and reliability with integrated robust fast body diode and up to 2 kV ESD protection › Reduced gate charge for enhanced light load efficiency › Lower hysteresis loss
		Flyback (ACF, FFR, etc.)	CoolGaN™ 600 V e-mode HEMTs	<ul style="list-style-type: none"> › Highest efficiency › Highest power density
	Low voltage MOSFETs	Flyback/auxiliary synchronous rectification	OptiMOS™ 100-150 V	<ul style="list-style-type: none"> › Low conduction losses and reduced overshoot › Logic level can support low voltage gate drive to achieve high efficiency
	Control ICs	QR flyback IC	ICE2QS03G, ICE5QSAG	<ul style="list-style-type: none"> › High efficiency and low standby power
		FFR flyback IC	XDPS21071	<ul style="list-style-type: none"> › High power density and digital control › Suitable for USB-PD design
PFC	High voltage MOSFETs, HEMTs, and diodes	DCM PFC	600 V CoolMOS™ P7 SJ MOSFETs	<ul style="list-style-type: none"> › Fast switching speed for improved efficiency › Reduced gate charge for enhanced light load efficiency › Optimized gate-to-source voltage (V_{GS}) threshold for lower turn-off losses
		DCM/CCM PFC	CoolGaN™ 600 V e-mode HEMTs	<ul style="list-style-type: none"> › Highest efficiency contribution via less parasitic parameter › Space saving with SMD smaller package
	Boost diode	DCM/PFC	650 V Rapid 1 diodes	<ul style="list-style-type: none"> › Low conduction losses
	Control ICs	DCM PFC ICs	TDA4863G, IRS2505LTRPBF	<ul style="list-style-type: none"> › Simple external circuitry › High PFC and low THD
Main stage	High voltage MOSFETs and HEMTs	HB LLC	600 V CoolMOS™ P7 SJ MOSFETs	<ul style="list-style-type: none"> › Fast switching speed for improved efficiency and thermals › Reduced gate charge for enhanced light load efficiency › Optimized gate-to-source voltage (V_{GS}) threshold for lower turn-off losses
			CoolGaN™ 600 V e-mode HEMTs	<ul style="list-style-type: none"> › Highest efficiency › Highest power density
Synchronous rectification	Low voltage MOSFETs	Synchronous rectification	OptiMOS™ PD 100-150 V	<ul style="list-style-type: none"> › Low conduction losses, reduced overshoot › Adapter-oriented synchronous rectification MOSFETs
	Control ICs	Synchronous rectification	IR1161LTRPBF	<ul style="list-style-type: none"> › High efficiency › Simple external circuitry



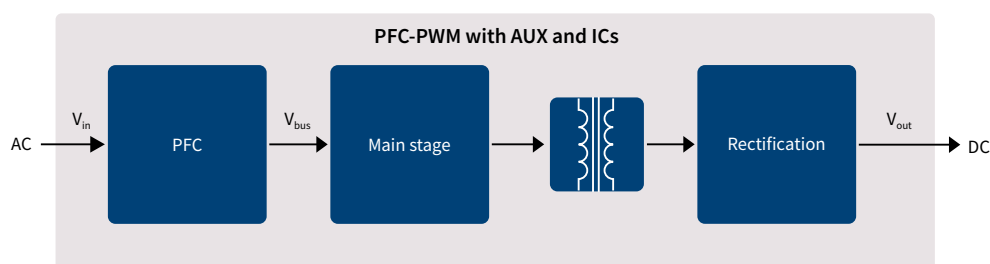
SMPS

More efficient PC power supply

The PC power market is divided into high-end gaming PC and better cost-performance sectors to achieve a better price/performance for desktop SMPS. The PC OEMs are implementing the desktop SMPS by removing the AUX power block to save the cost of having a flyback circuit.

Due to new structure of the CPU and GPU, more and more higher peak power is needed (1.5 to 2 times higher than normal power). In addition to the needed CCM PFC, Infineon 600 V CoolMOS™ P7 and 40 V / 60 V OptiMOS™ offer the best price/performance and reliability to meet the design requirements, as well as to achieve the highest efficiency enabled by semiconductors available in the market.

For those CPU and GPU power hungry gaming PCs, the ICE3PCS0xG CCM PFC IC provides high efficiency over the whole load range and low count of external components, in addition, the ICE3PCS0xG CCM PFC IC offers fast output dynamic response during load jump. In additions to PGFC IC, Infineon's LLC ICs ICE1HS01G/ICE2HS01G support customers to minimize the external component count.



Recommended products

Functional block	Product category	Topology	Technology	Benefits
PFC/main stage	High voltage MOSFETs	CrCM/DCM PFC	600 V CoolMOS™ P7	<ul style="list-style-type: none"> Best thermal performance Rugged body diode ESD enhancement for production line Wide $R_{DS(on)}$ portfolio including both THD and SMD packages
			600 V CoolMOS™ P6	<ul style="list-style-type: none"> Fast switching speed for improved efficiency and thermals Low gate charge for enhanced light-load efficiency and low power consumption at no load condition Optimized V_{GS} threshold for low turn-off losses
			500 V CoolMOS™ CE	<ul style="list-style-type: none"> Optimized cost/performance Lower transition losses versus standard MOSFET
	Boost diodes	DCM PFC	650 V Rapid 1	<ul style="list-style-type: none"> Low conduction losses
		CCM PFC	650 V Rapid 2	<ul style="list-style-type: none"> Low reverse-recovery losses and PFC switch turn-on losses
	Control ICs	CCM PFC ICs	ICE3PCS0xG	<ul style="list-style-type: none"> High PFC and low THD
Main stage	Control ICs	HB LLC ICs	650 V – ICE1HS01G-1/ ICE2HS01G	<ul style="list-style-type: none"> High efficiency and low EMI
Synchronous rectification	Medium voltage diodes	HB LLC + center-tap	OptiMOS™ 40 V	<ul style="list-style-type: none"> Optimized cost/performance and low thermals
			OptiMOS™ 60 V	<ul style="list-style-type: none"> Layout tolerance and low thermals



SMPS

Highly efficient server power supply

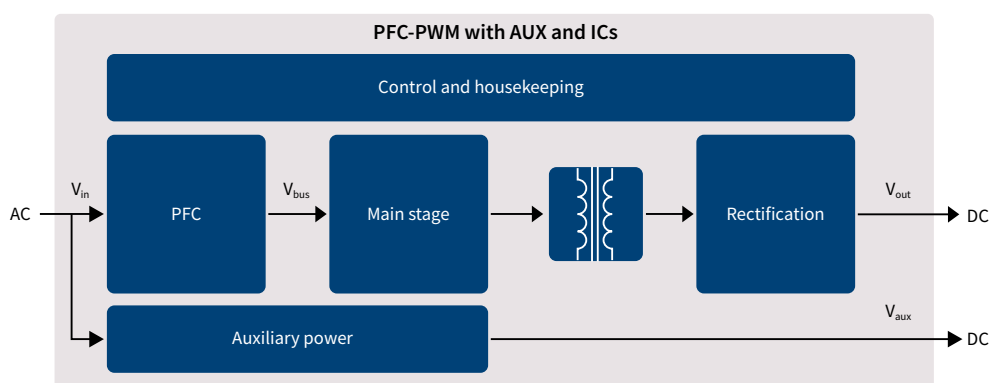
The trend in the field of data center and enterprise servers is to deliver more power per rack. Meanwhile, the rising cost of energy and environmental concerns make SMPS-efficiency optimization a key requirement across the entire load range for server and data center designs. This challenging task is combined with the requirement for higher power and higher power density and cost-effectiveness.

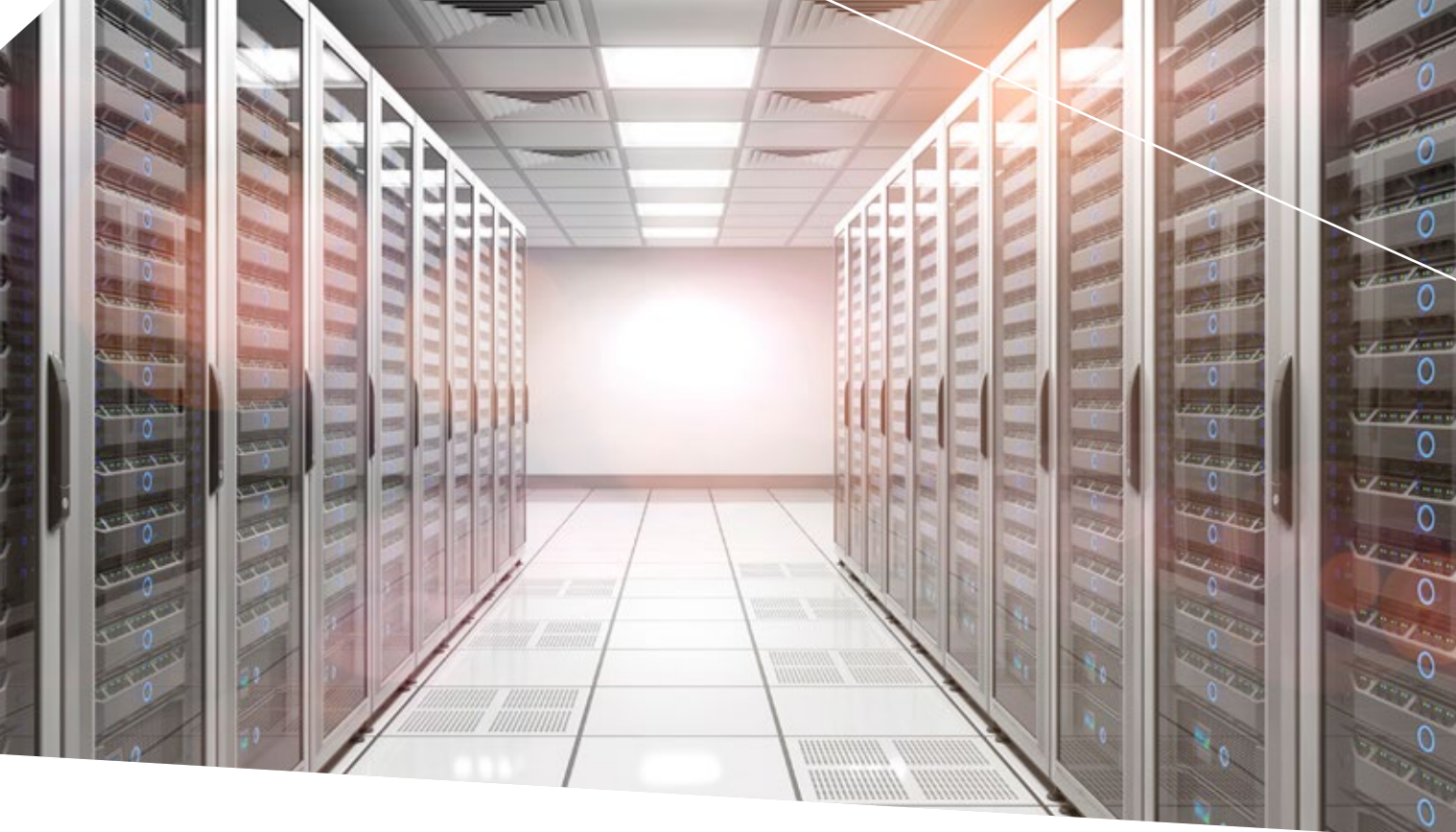
In the PFC stage and generally in hard-switching topologies used in server applications, Infineon recommends its 600 V CoolMOS™ C7 and G7 families offering the lowest FOM $R_{DS(on)} \cdot Q_G$ and $R_{DS(on)} \cdot E_{oss}$. These MOSFET series provide the lowest switching losses, which is necessary in fast-switching-frequency operations in high-end server SMPS. With Infineon's C7 and G7 series, the efficiency is optimized already from a very light-load operation. 600 V CoolMOS™ C7 and G7 products are used with Infineon's industry-benchmark non-isolated 2EDN752x gate driver IC family. Available in compact SMD packages such as ThinPAK, DPAK and TOLL, these SJ MOSFETs offer benefits in space usage and power density.

Complementary to the 600 V CoolMOS™ C7 in high efficiency PFC is the CoolSiC™ Schottky diodes. The 600 V CoolMOS™ P7 family offers a good compromise between price and performance. This is valuable in both PFC and HV DC-DC stages where low Q_G and turn-off losses are important benefits, especially in case of high-switching-frequency operation and high light-load efficiency requirements.

As high power (2-6 kW and above) require ultrahigh efficiency (96-98 percent peak) and high power density, Infineon's CoolGaN™ 600 V e-mode HEMTs family with totem-pole PFC controls deliver the highest efficiency and power density in the world. Using the 600 V CoolMOS™ S7 devices with active bridge circuit fulfills the Titanium® requirement at the lowest cost. Operating expenses (OPEX) and capital expenditures (CAPEX) are both reduced through simplified topologies and the power density in the server PSU is doubled.

In applications with low output voltage and high output current, further efficiency improvements are enabled by the continuous reduction of on-resistance. This can be achieved by using Infineon's low-voltage OptiMOS™ MOSFET series in the synchronous rectification stage. Infineon's low-voltage products are complemented by StrongIRFET™ devices that are optimized for lower switching frequencies and highest system robustness.





Recommended products

Functional block	Product category	Topology	Product family	Benefits
PFC	High voltage MOSFETs	CCM/interleaved PFC; TTF	600 V/650 V CoolMOS™ C7 650 V CoolMOS™ G7 600 V CoolMOS™ S7	<ul style="list-style-type: none"> Best FOM $R_{DS(on)} \cdot Q_G$ and $R_{DS(on)} \cdot E_{oss}$ Lowest $R_{DS(on)}$ per package Low dependency of switching losses from $R_{g,ext}$
	High voltage GaN	Totem-pole PFC	CoolGaN™ 600 V	<ul style="list-style-type: none"> Enable the highest efficiency and highest power density
	SiC diodes	CCM/interleaved PFC	CoolSiC™ Schottky diode 650 V G5	<ul style="list-style-type: none"> Low FOM $V_F \cdot Q_G$
	Control ICs	CCM PFC ICs	ICE3PCS0xG	<ul style="list-style-type: none"> Ease of use
Main stage	High voltage MOSFETs	ITTF	600 V CoolMOS™ C7/P6	<ul style="list-style-type: none"> Fast switching speed for improved efficiency and thermals Low gate charge for enhanced light load efficiency and low power consumption at no load condition Optimized V_{GS} threshold for lower turn-off losses Rugged body diode which prevents device failure during hard commutation
		LLC, half-bridge below 1 kW	600 V CoolMOS™ P7, CFD7	<ul style="list-style-type: none"> Low turn-off losses Low Q_{oss} Low Q_G
		LLC, phase shift full-bridge below 1 kW	600 V CoolMOS™ CFD7, 650 V CoolMOS™ CFD2	<ul style="list-style-type: none"> Fast and rugged body diode Optimized low Q_G and soft commutation behavior to reach highest efficiency Highest reliability for 650 V V_{DS}
		ZVS PS FB, LLC, TTF	TRENCHSTOP™ IGBT 650 V F5	<ul style="list-style-type: none"> Improved ruggedness and high efficiency in low inductance designs
	Control ICs	HB LLC ICs	ICE1HS01G-1 ICE2HS01G	<ul style="list-style-type: none"> High efficiency and low EMI
Synchronous rectification	Low voltage MOSFETs	HB LLC and center tap	OptiMOS™ 40 V	<ul style="list-style-type: none"> High efficiency over whole load range, layout tolerance
		ITTF	OptiMOS™ 60 V	<ul style="list-style-type: none"> High efficiency, low thermals, low V_{DS} overshoot
		ZVS PS FB and center tap	OptiMOS™ 80 V	<ul style="list-style-type: none"> High efficiency over whole load range, low V_{DS} overshoot and oscillations
Auxiliary power supply	Control ICs	QR/FF flyback CoolSET™	800 V – ICE2QRxx80(Z)(G) ICE3xRxx80J(Z)(G) 700 V ICE5QRxx70A(Z)(G) 800 V ICE5QRxx80A(Z)(G)	<ul style="list-style-type: none"> Low standby power, high efficiency and robustness An integrated 700 V/800 V superjunction power MOSFET with avalanche capability Burst mode entry/exit to optimize standby power at different low load conditions
Housekeeping	Microcontrollers	-	XMC1xxx	<ul style="list-style-type: none"> Flexibility, HR PWM, digital communication Arm®-based standard MCU family and wide family
Conversion	Microcontrollers	-	XMC4xxx	<ul style="list-style-type: none"> Flexibility, HR PWM and digital communication
PFC, PWM/resonant converter, synchronous rectification	Gate driver ICs	-	EiceDRIVER™ 1EDix	<ul style="list-style-type: none"> 100 ns typical propagation delay time Functional isolation Separate source
		-	EiceDRIVER™ 2EDNx	<ul style="list-style-type: none"> 8 V UVLO option -10 V input robustness Output robust against reverse current



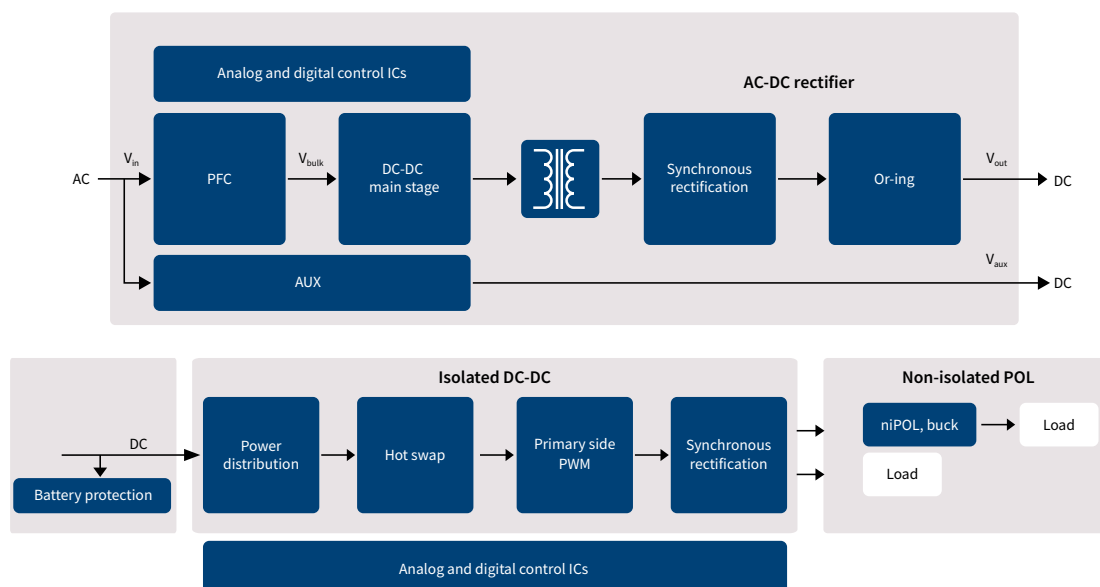
SMPS

Full system solution for telecom power supply

The ever increasing data consumption, coupled with new levels of virtualization and complexity of the 5G telecom infrastructure, is bringing its demanding requirements into the telecom power arena. The outstanding improvements made in telecom SMPS performance in the past decade have been primarily brought by the dramatic reduction of the on resistance achieved in high voltage MOSFETs, using the revolutionary superjunction principle. This principle was introduced by Infineon at the end of the nineties with the CoolMOS™ series.

To achieve the current demanding, flat energy efficiency targets, it has been increasingly popular to employ synchronous rectification utilizing the unique performance of medium-voltage OptiMOS™ power MOSFETs. OptiMOS™ power MOSFET family, which has gained terrific popularity in DC-DC brick solutions, coupled with gate-driver ICs and microcontrollers efficiently powers the BBUs, RRUs and AAUs of the macro and the small cells.

Infineon's wide bandgap technologies, such as CoolGaN™ 600 V (gallium-nitride-based) and CoolSiC™ 650 V (silicon-carbide-based) for primary side and upcoming CoolGaN™ 100V/200V * for synchronous rectification, complement the wide portfolio of silicon-based switches, enabling highest electrical conversion efficiency and robustness at attractive system costs. Infineon's EiceDRIVER™ gate driver IC family perfectly matches the CoolGaN™ and CoolSiC™ products.



Recommended products

Functional block	Product category	Topology	Product family	Benefits
PFC	High voltage MOSFETs	CCM/interleaved Dual-boost PFC	600 V/650 V CoolMOS™ C7	<ul style="list-style-type: none"> Best FOM $R_{DS(on)} \cdot Q_G$ and $R_{DS(on)} \cdot E_{oss}$ Lowest $R_{DS(on)}$ per package Low dependency of switching losses from $R_{g,ext}$
			600 V CoolMOS™ P7	<ul style="list-style-type: none"> Low turn-off losses Low Q_{oss} Low Q_G
			TRENCHSTOP™ 5 IGBT 650 V H5 TRENCHSTOP™ 5 IGBT 650 V S5	<ul style="list-style-type: none"> Best trade-off between switching and conduction losses Low gate charge Q_G High current density
	High voltage GaN	CCM totem pole	CoolGaN™ 600 V	<ul style="list-style-type: none"> Switching at high frequencies (> Si) Enables high power density
	SiC diodes	CCM/interleaved PFC Dual-boost PFC	CoolSiC™ Schottky diode 650 V G6	<ul style="list-style-type: none"> Low FOM $V_F \cdot Q_C$
	Control ICs	CCM PFC ICs	800 V – ICE3PCS0xG	<ul style="list-style-type: none"> High PFC and low THD
	Gate driver ICs	Totem-pole PFC	EiceDRIVER™ 1EDF5673F and 1EDF5673K	<ul style="list-style-type: none"> Low driving impedance (on-resistance 0.85 Ω source, 0.35 Ω sink) Input-output propagation delay accuracy: ±5 ns Functional and reinforced isolation available
	GaN gate driver ICs	Totem-pole PFC	Half-bridge: EiceDRIVER™ 2ED2106S06F, 2EDL23N06PJ, 2ED2182S06F	<ul style="list-style-type: none"> Integrated bootstrap diode Low level-shift loss Excellent ruggedness against negative transient voltages on V_S pin
		Interleaved PFC	Low side: EiceDRIVER™ 2ED4427N01F *, 1ED44176N01F, 1ED44175N01B	<ul style="list-style-type: none"> OCF, fault and enable function in DSO-8/SOT23-6 2ED – 10 A, dual low side driver
DC-DC main stage	High voltage MOSFETs	TTF, ITTF	600 V CoolMOS™ C7/P7	<ul style="list-style-type: none"> Fast-switching speed for improved efficiency and thermals Low gate charge for enhanced light load efficiency Optimized V_{GS} threshold for lower turn-off losses Rugged body diode which prevents device failure during hard commutation
		HB/FB LLC	600 V CoolMOS™ P7	<ul style="list-style-type: none"> Low turn-off losses Low Q_{oss} Low Q_G
		HB/FB LLC, ZVS PSFB	600 V CoolMOS™ CFD7	<ul style="list-style-type: none"> Best-in-class Q_{rr} and t_{rr} level Significantly reduced Q_G Improved efficiency over previous CoolMOS™ fast-body-diode series
	Gate driver ICs	HB LLC, ZVS phase-shift full-bridge	Half-bridge: EiceDRIVER™ 2ED2106S06F, 2ED2182S06F, 2EDL23N06PJ High side: 1EDI60N12AF, 1ED3122MU12H *, 1ED02012-F2	<ul style="list-style-type: none"> Integrated bootstrap diode Low level-shift loss Excellent ruggedness against negative transient voltages on V_S pin Isolated gate driver, up to 10 A, 100 ns propagation delay Miller clamp and DESAT protection, UL certified
	Control ICs	HB LLC	ICE1HS01G-1, ICE2HS01G	<ul style="list-style-type: none"> High efficiency and low EMI
	GaN gate driver ICs	LLC, ZVS phase-shift full-bridge	EiceDRIVER™ 1EDS5663H	<ul style="list-style-type: none"> Low driving impedance (on-resistance 0.85 Ω source, 0.35 Ω sink) Input-output propagation delay accuracy: +/- 5 ns Functional and reinforced isolation available
	GaN e-mode HEMTs	LLC, ZVS phase-shift full-bridge	CoolGaN™ 600 V	<ul style="list-style-type: none"> Enables the highest efficiency and highest power density
	Synchronous rectification	Synchronous rectification MOSFET	OptiMOS™ 80-200 V	<ul style="list-style-type: none"> Industry's lowest FOM ($R_{DS(on)} \cdot Q_G$) leading to high efficiency at good price/performance Low voltage overshoots enabling easy design-in Industry's lowest $R_{DS(on)}$ Highest system efficiency and power density Outstanding quality and reliability Reduces the need for a snubber circuit
			Half-bridge: EiceDRIVER™ IRS2010S *, 2ED2182S06F, 2EDL23N06PJ Low side: EiceDRIVER™ 2ED4427N01F, IRS4427S, 1ED44175N01B	<ul style="list-style-type: none"> Integrated bootstrap diode Low level-shift loss Excellent ruggedness against negative transient voltages on V_S pin OCF, fault and enable function in SOT23-6 2ED – 10 A, dual low-side driver, DSO-8 with power pad
Auxiliary power supply	Control ICs	5 th generation QR/FF flyback CoolSET™	QR 800 V - ICE5QRxx80Ax FF 800 V - ICE5xRxx80AG	<ul style="list-style-type: none"> Quasi-resonant-switching operation for high efficiency and low EMI signature Fixed-frequency-switching operation for ease of design – 100 KHz and 125 KHz Fast and robust start-up with cascode configuration Robust protection with adjustable line input overvoltage protection, V_{CC} and CS pin short-to-ground protection Optimized light-load efficiency with selectable burst mode entry/exit profile Frequency reduction for mid- and light-load condition to reduce switching losses and increase efficiency Direct feedback and regulation with integrated error amplifier for non-isolated output High power delivery of up to 42 W with 800 V CoolSET™ in heatsink-free SMD package
Housekeeping	Microcontrollers	-	XMC1xxx	<ul style="list-style-type: none"> Flexibility, HR PWM, digital communication Arm®-based standard MCU family and wide family
Conversion	Microcontrollers	-	XMC4xxx	<ul style="list-style-type: none"> Flexibility, HR PWM, digital communication Arm®-based standard MCU family and wide family
Isolated DC-DC	Microcontrollers	-	XDPP1100	<ul style="list-style-type: none"> Optimized for 48 V telecom isolated conversion Highly flexible digital core State-of-the-art dedicated AFE State-machine based fast loop control Pre-programmed peripherals in ROM Negligible internal power consumption Industry smallest digital power controller



Recommended products

Functional block	Product category	Topology	Product family	Benefits
PFC, PWM/ resonant converter, synchronous rectification	Gate driver ICs	Single-channel non-isolated	EiceDRIVER™ 1EDN751x / 1EDN851x	<ul style="list-style-type: none"> > 4 V and 8 V UVLO option > 8 A sink and 4 A source driver capability > 19 nS propagation delay precision for fast MOSFET and GaN switching > (-)10 V input robustness
		Single-channel non-isolated	EiceDRIVER™ 1EDN7550 / 1EDN8550	<ul style="list-style-type: none"> > 4 V and 8 V UVLO option > 8 A sink and 4 A source driver capability > True differential inputs for ground shift robustness (CMR up to +/-150 V)
		Dual-channel non-isolated	EiceDRIVER™ 2EDN75xx / 2EDN85xx	<ul style="list-style-type: none"> > 4 V and 8 V UVLO option > 5 A Source and Sink driver capability > 17 nS propagation delay precision for fast Mosfet and GaN switching > (-)10 V input robustness
		Dual-channel junction isolated	EiceDRIVER™ 2EDL811x / 2EDL801x	<ul style="list-style-type: none"> > 2 A/3 A/4 A source (high and low side) and 6 A sink (low side) and 5 A sink (high side) driver capability > 2 control input version: independent and differential (shoot-through protection with -8 V/ +15 V GND shift robustness) > 120 V on-chip bootstrap diode > Support operating frequency up to 1 MHz
		Single-channel isolated	EiceDRIVER™ 1EDi Compact	<ul style="list-style-type: none"> > 100 ns typical propagation delay time > Functional isolation 1.2 kV separate source and sync outputs
		Dual-channel isolated	EiceDRIVER™ 2EDFx	<ul style="list-style-type: none"> > 35 ns typical propagation delay time > Functional isolation 1.5 kVCMTI > 150 V/ns
		Dual-channel isolated	EiceDRIVER™ 2EDSx	<ul style="list-style-type: none"> > 35 ns typical propagation delay time > Reinforced (safe) isolation 6 kV CMTI > 150 V/ns
Or-ing	Low voltage MOSFETs	Or-ing MOSFET	OptiMOS™ 60-200 V	<ul style="list-style-type: none"> > Industry's lowest FOM ($R_{DS(on)} \cdot Q_g$) leading to high efficiency at good price/performance > Low-voltage overshoots enabling easy design-in
Battery protection	Low voltage MOSFETs	MOSFET	OptiMOS™ 60-150 V	
Isolated DC-DC	Low voltage MOSFETs	Primary-side PWM MOSFET	OptiMOS™ 60-200 V	<ul style="list-style-type: none"> > Industry's lowest $R_{DS(on)}$ > Highest system efficiency and power density > Outstanding quality and reliability > Reduces the need for a snubber circuit
			StrongIRFET™ 60-200 V	
			Small signal MOSFETs 60-200 V	
		Synchronous- rectification MOSFET	OptiMOS™ 40-100 V	
			StrongIRFET™ 40-100 V	
		Or-ing MOSFET	OptiMOS™ 25-30 V	
			StrongIRFET™ 25-30 V	
		Active snubber	OptiMOS™ Power MOSFET 60 V/100 V/150 V	



Wide bandgap semiconductors

A new era in power electronics

From operating expense and capital expenditure reduction, through higher power density enabling smaller and lighter designs, to overall system cost reduction, the benefits are compelling.

Interested? Learn more at:
www.infineon.com/wbg



Applications

20-300 V MOSFETs

500-950 V MOSFETs

WBG semiconductors

Discrete IGBTs

Power ICs

Intelligent switches and input ICs

Gate driver ICs

Microcontrollers

XENSIV™ sensors

Packages



Advanced system solutions for industrial applications

- › Smart building
- › Power over Ethernet (PoE)
- › LED lighting
- › Power and gardening tools
- › Battery formation
- › Energy storage systems
- › Solar
- › UPS
- › SMPS - embedded power supply
- › SMPS - industrial SMPS



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

Applications



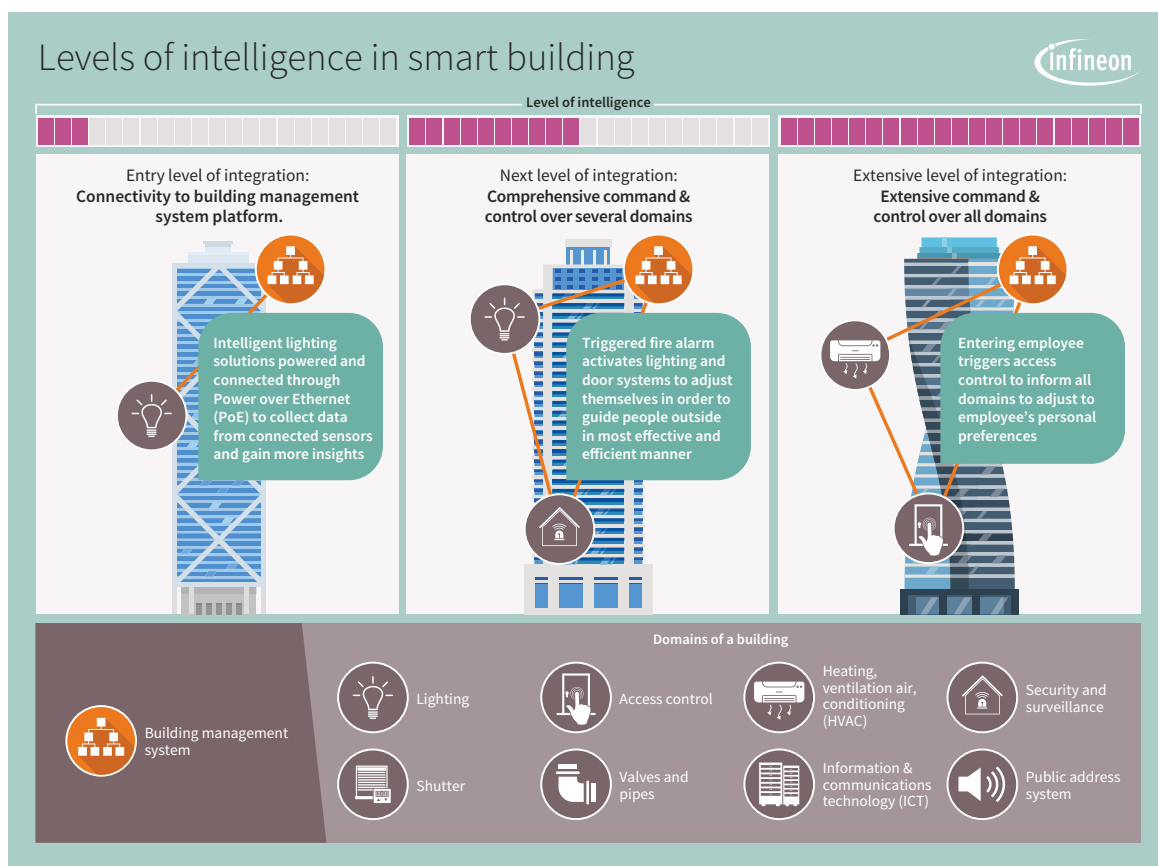
Smart building

Make connected buildings smart with Infineon's full-spectrum portfolio

With the rise of IoT and big data in building automation, commercial buildings are now on the verge of becoming smart. Thanks to a myriad of smart devices placed inside a building, intelligent buildings can collect and process a variety of data and take data-based decisions to optimize their operations. This does not only result in significant savings in energy costs but also increases the overall comfort for people inside the building. There are several steps to reach a fully integrated smart building. Across all smart building domains, manufacturers and integrators alike are struggling to climb the ladder of smartification by slowly adding more and more functionalities to smart building devices.

A starting point can be first-level data collection thanks to accurate sensors, combined with increased energy efficiency. The goal is to eventually reach a level of smartness in which advanced building analytics can be conducted so that the building reacts in an intuitive way to its tenants. At the same time, the different domains of a building should be integrated to increase the use of the collected data.

Infineon provides the right solutions for smart buildings as well as the system expertise and the partnership ecosystem needed to make buildings smart.

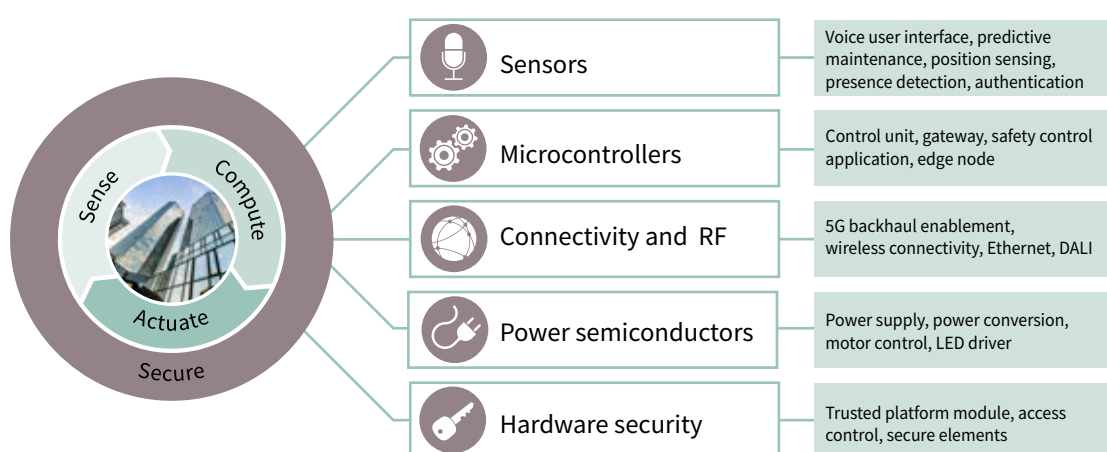




Infiniteon offers a broad portfolio of products to transform ordinary buildings into smart buildings, ranging from sensors and power management ICs to microcontrollers and security ICs.

- › Best in class XENSIV™ sensor portfolio enabling accurate data collection in a building environment
- › Leading MOSFETs, drivers and other power semiconductor solutions for power-efficient devices
- › Microcontrollers for data processing and analyses at the edge
- › Security ICs, developed with proven expertise, for strong protection of IoT devices against security threats

Additionally, Infineon has a long-standing expertise in common building automation domains, such as lighting and HVAC.





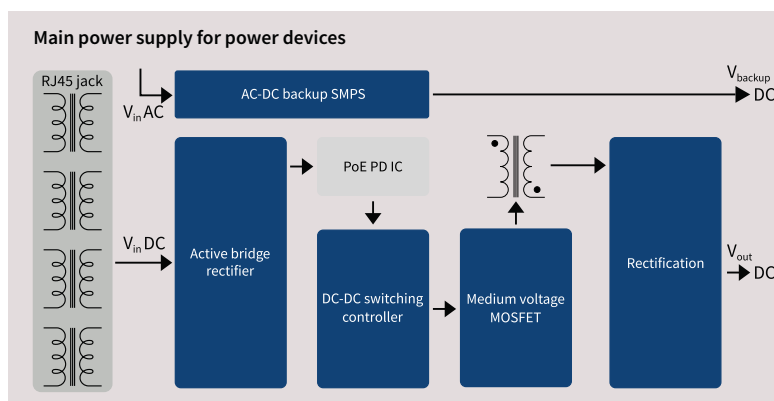
Power over Ethernet (PoE)

Design reliable and power efficient PoE power supplies

Power over Ethernet (PoE) has been around for years, but it is only with the new standard IEEE 802.3bt that the maximum power that can be delivered via a twisted pair Ethernet cable has been significantly increased. Power sourcing equipment (PSE) now provides up to 100 W per port whereas powered devices (PD) will have up to 71 W available. The adoption of this new PoE standard also depends largely on the capability of being able to increase the power density on the PSE side while maintaining the same form factor. Infineon has a long-standing expertise in switched mode power supply (SMPS) designs and offers a highly reliable, rugged and efficient high-quality MOSFET portfolio for your PoE PSE and PD designs.

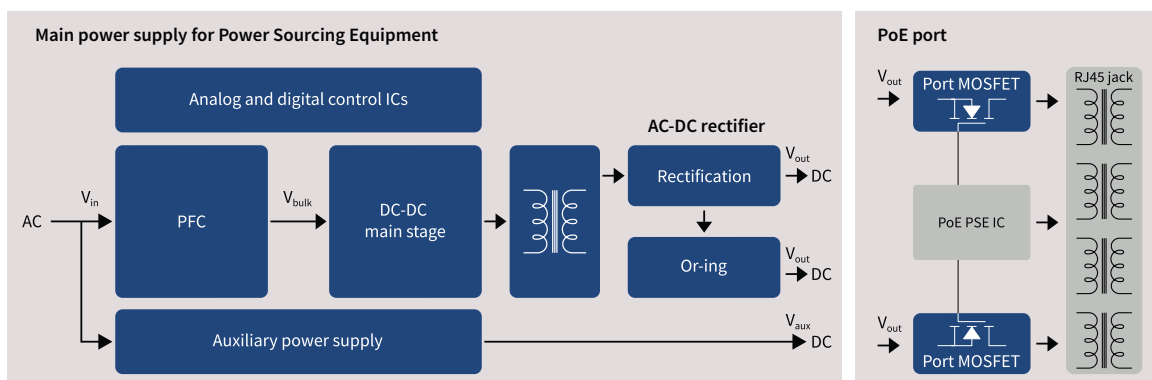
Powered devices

Powered devices (PD) include devices powered by PoE such as wireless access points, 5G small-cell radio units, IP cameras, conference systems, thin clients or public address systems. DC-DC SMPS designs need to be power efficient to maximize the available power for the PD itself with the simultaneous increase of power density. Moreover, PDs need to function reliably in the field even under potentially rough conditions for a long time.



Power sourcing equipment

Power sourcing equipment (PSE) is any equipment that is able to provide and source power on the twisted pair Ethernet cable, such as PoE switches, PoE extenders and PoE injectors. PSE needs to be highly reliable to prevent device failure and ensure uninterrupted operations of connected power devices. With IEEE 802.3bt PoE, the power demand for PoE switches significantly increases with highest efficiency over broad-load condition. For example, to fully enable a switch with six 802.3bt compliant PoE ports, up to 600 W of available PoE power budget is required. This will make modifications in AC-DC SMPS designs necessary to fulfill these requirements.

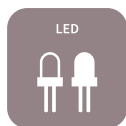


Recommended product portfolio for power sourcing equipment

Functional block	Product category	Topology	Product family	Benefits
PFC	High voltage MOSFETs	DCM, CrCM, CCM,	600 V/650 V CoolMOS™ C7 600 V CoolMOS™ P7	<ul style="list-style-type: none"> Best FOM $R_{DS(on)} \cdot Q_G$ and $R_{DS(on)} \cdot E_{oss}$ Lowest $R_{DS(on)}$ per package Lowest dependency of switching losses from $R_{g,ext}$ Low turn-off losses, low Q_{oss}, and low Q_G
	Control ICs	DCM, CrCM, CCM	IRS2505L, ICE3PCS0xG, TDA4863G	<ul style="list-style-type: none"> Simple external circuitry High PFC and low THD
	High voltage GaN	CCM totem pole	CoolGaN™ 600 V	Highest efficiency and highest power density
	GaN driver ICs	CCM totem pole	1EDF5673Fx/1EDS5663H EiceDRIVER™	<ul style="list-style-type: none"> Low driving impedance (on-resistance 0.85 Ω source, 0.35 Ω sink) Input-output propagation delay accuracy: +/- 5 ns Functional and reinforced isolation available
	SiC schottky diode	DCM, CrCM, CCM	CoolSiC™ Schottky diode 650 V G5/G6	Low FOM $V_f \cdot Q_C$
DC-DC main stage	Power silicon diode	DCM, CrCM, CCM	650 V Rapid 1/2 diodes	Low conduction losses
	High voltage MOSFETs	Flyback (ACF), HB LLC, FB LLC, ITTF, ZVS	600 V CoolMOS™ P7/C7/CFD7 650 V TRENCHSTOP™ F5	<ul style="list-style-type: none"> Best FOM $R_{DS(on)} \cdot Q_G$ and $R_{DS(on)} \cdot E_{oss}$ Lowest $R_{DS(on)}$ per package Lowest dependency of switching losses from $R_{g,ext}$ Low turn-off losses, low Q_{oss}, and low Q_G
	Low and medium voltage MOSFETs	Isolated DC-DC primary-side PWM	OptiMOS™ 60 V-200 V StrongIRFET™ 60 V-200 V Small signal MOSFETs 60 V-200 V	<ul style="list-style-type: none"> Industry's lowest $R_{DS(on)}$ Highest system efficiency and power density Outstanding quality and reliability Reduces the need for a snubber circuit
	Gate driver ICs	-	EiceDRIVER™ 1EDNx/1EDI/2EDN7x/ 2EDLx/2EDFx/2EDSx	<ul style="list-style-type: none"> Broadest portfolio in terms of isolation, channels, and protection
	Control ICs	HB LLC PWM-QF PWM-FF	ICE2HS01G ICE5QSAG / ICE5QSBG ICE5ASAG / ICE5GSAG	High efficiency and low EMI
	High voltage GaN	Flyback (ACF), HB LLC, FB LLC, ZVS	CoolGaN™ 600 V	Highest efficiency and highest power density
	GaN driver ICs	-	EiceDRIVER™ 1EDF5673Fx/1EDS5663H	<ul style="list-style-type: none"> Low driving impedance (on-resistance 0.85 Ω source, 0.35 Ω sink) Input-output propagation delay accuracy: +/- 5 ns Functional and reinforced isolation available
PFC-main stage combo	PFC control ICs	Boost PFC, HB LLC	IDP2308, IDP2303A	Low BOM, high efficiency, and low standby power
	High voltage MOSFETs	HB LLC	600 V CoolMOS™ P7	<ul style="list-style-type: none"> Low turn-off losses, low Q_{oss}, and low Q_G Fast-switching speed for improved efficiency and thermals
Rectification	Low and medium voltage MOSFETs	Synchronous rectification	OptiMOS™ 100 V-150 V OptiMOS™ 40 V-120 V StrongIRFET™ 40 V-100 V	<ul style="list-style-type: none"> Industry's lowest $R_{DS(on)}$ Highest system efficiency and power density Outstanding quality and reliability Reduces the need for a snubber circuit
	Gate driver ICs	-	EiceDRIVER™ 1EDNx/1EDI/2EDN7x/ 2EDLx/2EDFx/2EDSx	Broadest portfolio in terms of isolation, channels, and protection
	Control ICs	Synchronous rectification	IR1161L IR11688S	<ul style="list-style-type: none"> High efficiency Simple external circuitry
Or-ing	Low and medium voltage MOSFETs	Or-ing MOSFETs	OptiMOS™ 25 V-200 V	<ul style="list-style-type: none"> Industry's lowest FOM ($R_{DS(on)} \cdot Q_G$) Highest system efficiency and power density
Auxiliary power supply	AC-DC integrated power stage	Fixed frequency (FF) Quasi resonant (QR)	CoolSET™ ICE5xR CoolSET™ ICE5QR	<ul style="list-style-type: none"> Quasi-resonant switching operation for high efficiency and low EMI signature Fixed frequency switching operation for ease of design
Analog and digital control IC	32-bit XMC™ industrial microcontroller based on Arm® Cortex®-M	-	32-bit XMC1000 32-bit XMC4000	<ul style="list-style-type: none"> Flexibility, HR PWM, digital communication Arm® based standard MCU family and wide family
Port MOSFET	Medium voltage MOSFETs	-	IR MOSFET™ 100 V OptiMOS™ 100 V	<ul style="list-style-type: none"> Widest SOA Outstanding quality and reliability Lowest $R_{DS(on)}$

Recommended product portfolio for powered devices

Functional block	Product category	Topology	Product family	Benefits
Active bridge rectifier	Medium voltage MOSFETs	Active bridge rectifier	OptiMOS™ 100 V-150 V IR MOSFET™ 100 V	<ul style="list-style-type: none"> Industry's lowest $R_{DS(on)}$ Highest system efficiency and power density
Rectification	Low and medium voltage MOSFETs	Synchronous rectification	OptiMOS™ 25 V-100 V OptiMOS™ 40 V IR MOSFET™ 20 V-100 V	<ul style="list-style-type: none"> Industry's lowest $R_{DS(on)}$ Highest system efficiency and power density Outstanding quality and reliability
	Control ICs	Synchronous rectification	IR1161L& IR11688S	<ul style="list-style-type: none"> High efficiency Simple external circuitry
DC-DC switching stage	Medium voltage MOSFETs	Flyback (ACF)	OptiMOS™ 100 V-150 V	<ul style="list-style-type: none"> Low conduction losses, reduced overshoot Logic level switching
AC-DC backup SMPS	High voltage MOSFETs	Flyback (ACF)	600 V to 950 V CoolMOS™ P7	<ul style="list-style-type: none"> Fast-switching speed for improved efficiency and thermals Reduced gate charge for enhanced light load efficiency Optimized gate-to-source voltage (V_{gs}) threshold for lower turn-off losses
	AC-DC integrated power stage	Fixed frequency (FF) Quasi resonant (QR)	CoolSET™ ICE5xR CoolSET™ ICE5QR	<ul style="list-style-type: none"> Quasi-resonant switching operation for high efficiency and low EMI signature Fixed frequency switching operation for ease of design



LED lighting

Solutions for cost sensitive applications as well as for smart lighting

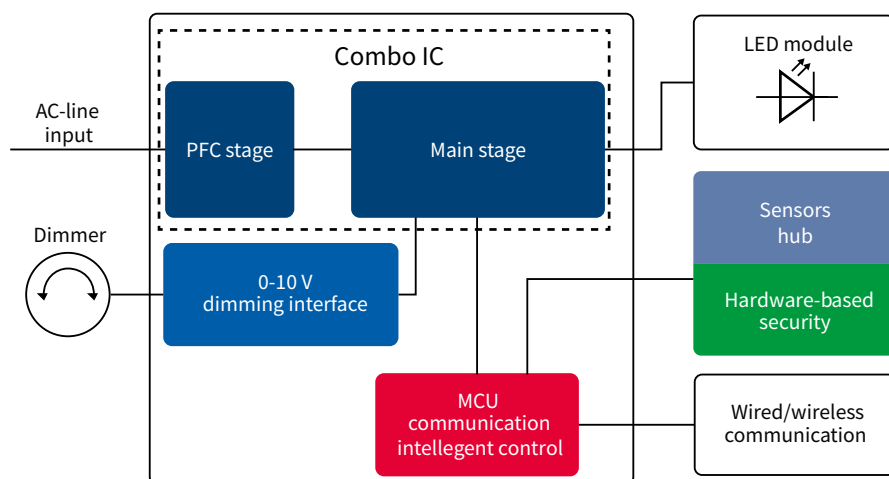
At Infineon, we focus on supplying tailored products for LED drivers, LED strips, horticultural, and smart lighting. Our broad portfolio of tailored products and solutions for LED lighting comprises LED driver ICs, MOSFETs, and microcontrollers suited for LED drivers as well sensors and dedicated ICs for secure communication. In addition to offering products of proven quality, a competent global lighting team supports our lighting customers in designing LED lighting products and systems in collaboration with our channel partners.

Key trends and challenges in LED lighting and our offering:

- › Human-centric lighting (HCL)
 - The lowest cost implementation of tunable white with single-stage flyback constant voltage and smart linear regulators with advanced headroom control ensuring high efficiency – BCR601
- › Configuration of output current and some further parameters
 - Our NFC controller allows the configuration of the output current without the need of an additional microcontroller
 - Our XDPL lighting IC family allows, besides output current, also adjustment of other features like protection, dimming curves, etc.
- › Cost reduction combined with efficiency increase
 - Integration of resonance inductor for PFC + resonant topology enables highest efficiency at low cost. Integration is enabled by the coreless transformer technology that enables high switching frequencies



LED drivers

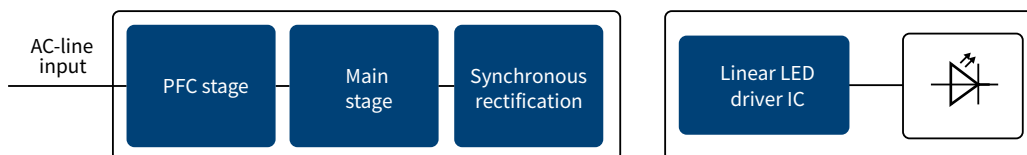




Recommended LED driver products

Functional block	Product type	Product family	MOSFET technology	Voltage class
PFC stage	PFC	IRS2505	CoolMOS™ P7	600/700/800/950 V ¹⁾
Main stage	PFC + LCC (constant current) PFC + LLC (constant current)	ICL5102 ²⁾	CoolMOS™ P7 (up to 600 mΩ)	600 V/650 V
			CoolMOS™ CE (above to 600 mΩ)	600 V
	PFC + flyback (dual stage)	XDPL8220 ³⁾ / XDPL8221 ²⁾	CoolMOS™ P7	800 V/950 V
	PFC/flyback (single-stage constant voltage)	XDPL8105	CoolMOS™ P7	800 V/950 V
	PFC/flyback (single-stage constant voltage)	XDPL8218	CoolMOS™ P7	800 V/950 V
Buck / linear solutions	Secondary buck (single-channel) Secondary buck (multichannel)	ILD6150 / ILD8150	Integrated	60 V/80 V
	Secondary linear	BCR601	Small signal MOSFETs	75 V/100 V
Synchronous rectification	Synchronous rectification controller	IR1161 / IR11688	OptiMOSTM	100 V/150 V/200 V
Dimming	0-10 V dimming interface IC	CDM10 V	-	-
		CDM10 VD	-	-
NFC	NFC controller	NLM0010 / NLM0011 *	-	-
Hardware based security	OPTIGA™	OPTIGA™ Trust	-	-
Microcontroller	XMC™ microcontroller	XMC1100	-	-
Sensors	XENSIV™ radar sensor IC	BGT24LTR11	-	-

LED driver with constant voltage output and linear/switch mode LED driver ICs



Linear LED driver IC product portfolio

Functional block	Topology	IC product family	MOSFET technology
Lowest cost LED driver IC	Linear	BCR400W series	Integrated
Low voltage drop LED driver IC		BCR430 / BCR431 **	
Robust LED driver IC		BCR40xU / BCR42xU	

For additional portfolio of lighting ICs, take a look at **pages 242-257**.

www.infineon.com/lighting

1) 700 V, 800 V and 950 V CoolMOS™ P7 are optimized for PFC and flyback topologies.
600 V CoolMOS™ P7 is suitable for hard as well as soft switching topologies (flyback, PFC and LLC)

2) PFC and resonant combo controllers

3) PFC and flyback combo controllers

* Contains besides current configuration also Constant Lumen Output (CLO) feature

** For more information on the product, contact our product support

For more details on the product, click on the part number.



Power and gardening tools

Battery-powered home and professional applications

Infineon is bringing reliability and safety to consumer projects. Millions of households worldwide rely on power tools to complete daily tasks or creative projects around the home. Consumers want robust, reliable and portable power tools that are easy-to-use with low price and long battery life as key selection options. Battery-powered tools must also be equipped with diagnostic and safety features to ensure confidence with high quality.

Infineon's broad portfolio offers best-fit, innovative solutions for all power tools applications. We help you meet each consumer need and reduce your overall costs. Also, our wireless-charging reference designs deliver high performance and are easily optimized in our DAVE™ development platform. Configure your BOM and exceed expectations with Infineon components in your cordless power tool designs.

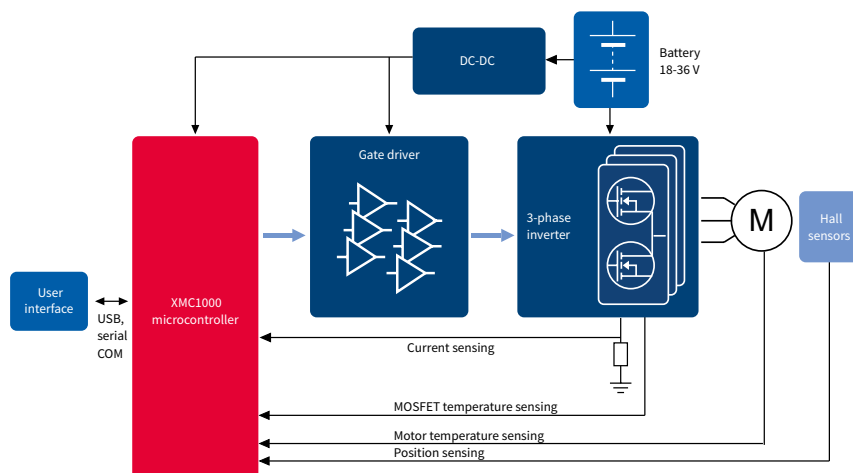
Features and benefits

Key features
Comprehensive portfolio of products and solutions, easy to tailor to design specification
Infineon offers complete solutions for power supplies, chargers and motor drives
Best-in-class MOSFETs e.g. OptiMOS™ and HEXFET™/StrongIRFET™ extend battery lifetime and reduce chances for control failure
High reliability of Infineon components
Offering LV FETs with SMD packaging improves the productive capability by automatic production, improves reliability and reduces assembly cost
Components featuring small form factor and compact design offering highest power density and BOM savings thanks to lowest $R_{DS(on)}$
Trustworthy hardware-based security
Highest quality standards and a safety-certified development process
Proven track record and outstanding partner network for embedded security
OPTIGA™ Trust enables authentication of components connected to the system (e.g., battery pack recognition to avoid second-party batteries etc.)
Evaluation and demonstration boards for fast prototyping
Available simulations, documentation, and system support to reduce development time and cost

Key benefits
Convenient selection of the right fit products thanks to broad portfolio and complete solutions
Extended battery lifetime and product life span
Productive capability
Overall system size and cost reduction
Security, quality, and safety
Authentication
Short time to market




Application block diagram example: cordless power tools



Infineon product offering		Home and professional applications
Supply voltage		10.8-56 V
OptiMOS™ and HEXFET™/StrongIRFET™ power MOSFETs	Voltage	20-100 V
	Package	SuperSO8, PQFN 3x3, DirectFET™ S/M/L-Can, TOLL, TO-220, TO-247, DPAK, D ² PAK, D ² PAK 7-pin
CoolMOS™ P7 SJ MOSFET *	Voltage	600-700 V
Gate driver ICs		EiceDRIVER™ 1EDN/2EDN/6EDL04N02PR, 6ED003L02- F2, 2EDL05N06PF, 2ED2304S06F, IRS2005S/M, IRS2007S, IRS2008S, IRS2301 *, IRS21867, IRS2304 Integrated: IFX9201SG/ BTN8982
IPM – CIPOS™ Nano		IRSM005-800MH, IRSM005-301MH
Authentication IC, security		OPTIGA™ Trust B
XMC™ microcontrollers iMotion™ ePower		XMC1300, XMC4400/XMC4500, iMOTION™ IRMCK099M ePower: TLE987X (BLDC)
Microcontroller and driver supply: linear voltage and DC-DC switching regulators		IFX1763/IFX54441/IFX54211/IFX30081/IFX90121/IFX91041
CAN transceivers		IFX1050, IFX1051
XENSIV™ sensors		Hall switches (TLE496X *), Angle sensor (TLI5012B), 3D magnetic sensor (TLV493D)

www.infineon.com/powertools

*For more information on the product, contact our product support

For more details on the product, click on the part number. 



Battery formation

Solutions that make battery formation equipment more accurate and efficient

Everyday routine is being increasingly pervaded by a growing number of wireless and battery powered devices – electric vehicles (EVs) among them. This trend further drives a steadily rising demand for the production of batteries with different charging capacities. Consequently, battery manufacturers find themselves confronted with the challenge to increase efficiency throughout their production and meet the required volume.

The essential stage every battery needs to undergo in the manufacturing process is battery formation. In it, the newly assembled batteries are initially charged and discharged with high voltage and current accuracy with the aim to activate the battery material. Formation cycling has great impact on battery lifetime, quality and cost, but is currently the bottleneck in the production process as it is expensive and time-consuming.

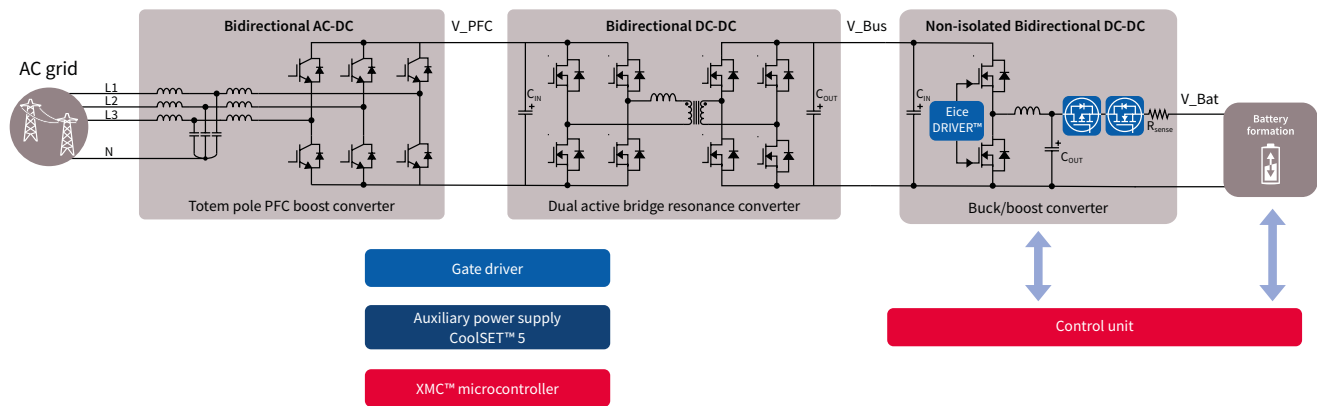
With its comprehensive product portfolio of cost- and efficiency-optimized products Infineon offers full-spectrum power system solutions, and adequately addresses the application requirements of high accuracy, efficiency and power density.

Features and benefits

Key features
High voltage and current accuracy (up to 0.01%) during charge and discharge cycles
High power density
High efficiency
Optimal thermal management during operation
High system reliability due to 24/7 operation cycles

Key benefits
Highly efficient, innovative and cost-attractive solutions leading to overall BOM savings enabling size reduction
High power density semiconductors
Fast time to market due to the complete ecosystem: <ul style="list-style-type: none">> Simulations> Documentation> Demonstration boards
Increased lifetime and reliability due to Infineon's quality
One-stop-shop portfolio

Application diagram





Highlight/ recommended product portfolio

Functional block	Product category	Topology	Product family	Benefits
Bi-directional AC-DC – PFC	CoolMOS™ MOSFET	600 V & 650 V	TO-247	<ul style="list-style-type: none"> Best-in-class Q_{rr} and t_{rr} level Significantly reduced Q_G Improved efficiency over previous CoolMOS™ fast body diode series
	CoolSiC™ MOSFET	650 V & 1200 V	TO-247	<ul style="list-style-type: none"> Input needed
	TRENCHSTOP™ 5 IGBT	650 V	TO-247	<ul style="list-style-type: none"> Best-in-class efficiency, resulting in lower junction and case temperature leading to higher device reliability Higher power density designs
	TRENCHSTOP™ 6 IGBT	1200 V	TO-247	<ul style="list-style-type: none"> Low conduction losses with 1.85 V, $V_{CE(sat)}$ for S6 series Full rated, robust freewheeling diode
	Gate driver	650 or 1200 V EiceDRIVER™	PG-DSO-16	<ul style="list-style-type: none"> Integrated bootstrap diode Low level shift loss Excellent ruggedness against negative transient voltages on VS pin
Bi-directional isolated DC-DC	CoolMOS™ MOSFET	600 V and 650 V	TO-247, D ² PAK	<ul style="list-style-type: none"> Best-in-class Q_{rr} and t_{rr} level Significantly reduced Q_G Improved efficiency over previous CoolMOS™ fast body diode series
	CoolSiC™ MOSFET	650 V and 1200 V	TO-247	<ul style="list-style-type: none"> Combination of high performance, high reliability and ease of use
	TRENCHSTOP™ 5 IGBT	650 V	TO-247	<ul style="list-style-type: none"> Best-in-class efficiency, resulting in lower junction and case temperature leading to higher device reliability Higher power density designs
	OptiMOS™ MOSFET	60 V – 150 V	Shrink SuperSO8 SuperSO8 TOLL D ² PAK	<ul style="list-style-type: none"> Lowest $R_{DS(on)}$ Ideal for high switching frequency Increased power density Reduced system cost Less paralleling
Bi-directional non-isolated DC-DC	OptiMOS™ MOSFET	25 V – 60 V	Shrink SuperSO8 SuperSO8 TOLL D ² PAK	
	OptiMOS™ Power block	25 V and 30 V	Power stage 5x6	<ul style="list-style-type: none"> Integrated solution with low side and high side MOSFET Space reduction Minimized loop inductance Higher efficiency
	Gate driver ICs	Low-side with truly differential input	1EDNx550 in PG-SOT23-6	<ul style="list-style-type: none"> Control inputs independent from gate driver GND Fast Miller plateau transition Robust against false MOSFET triggering Increased power density and BOM savings
		Functional level shift	2EDL in QFN package	<ul style="list-style-type: none"> Level-shift high and low side dual channel driver Strong source and sink current capability 120 V on-chip bootstrap diode Fast propagation delay



Energy storage systems

Make energy storage systems the backbone of the new energy era with our semiconductor system solutions

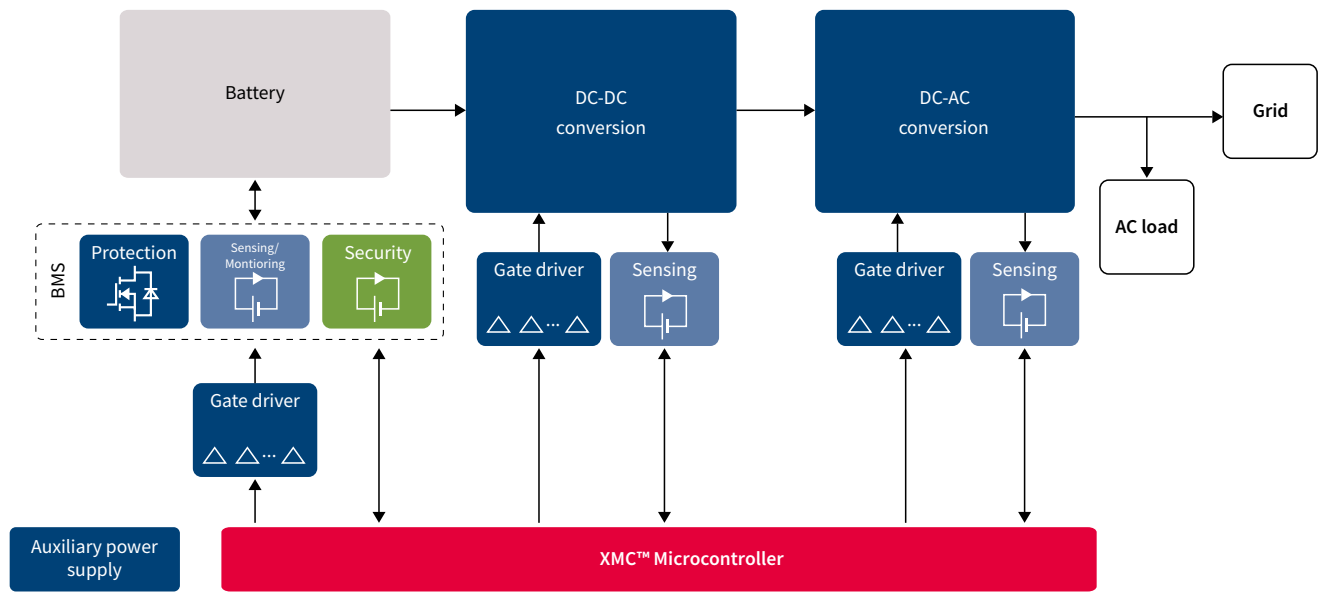
Facing diminishing fossil reserves, the world nonetheless needs to manage rising demand for electrical energy while meeting the growing call for urgent climate action. The transition to renewable energies has become inevitable.

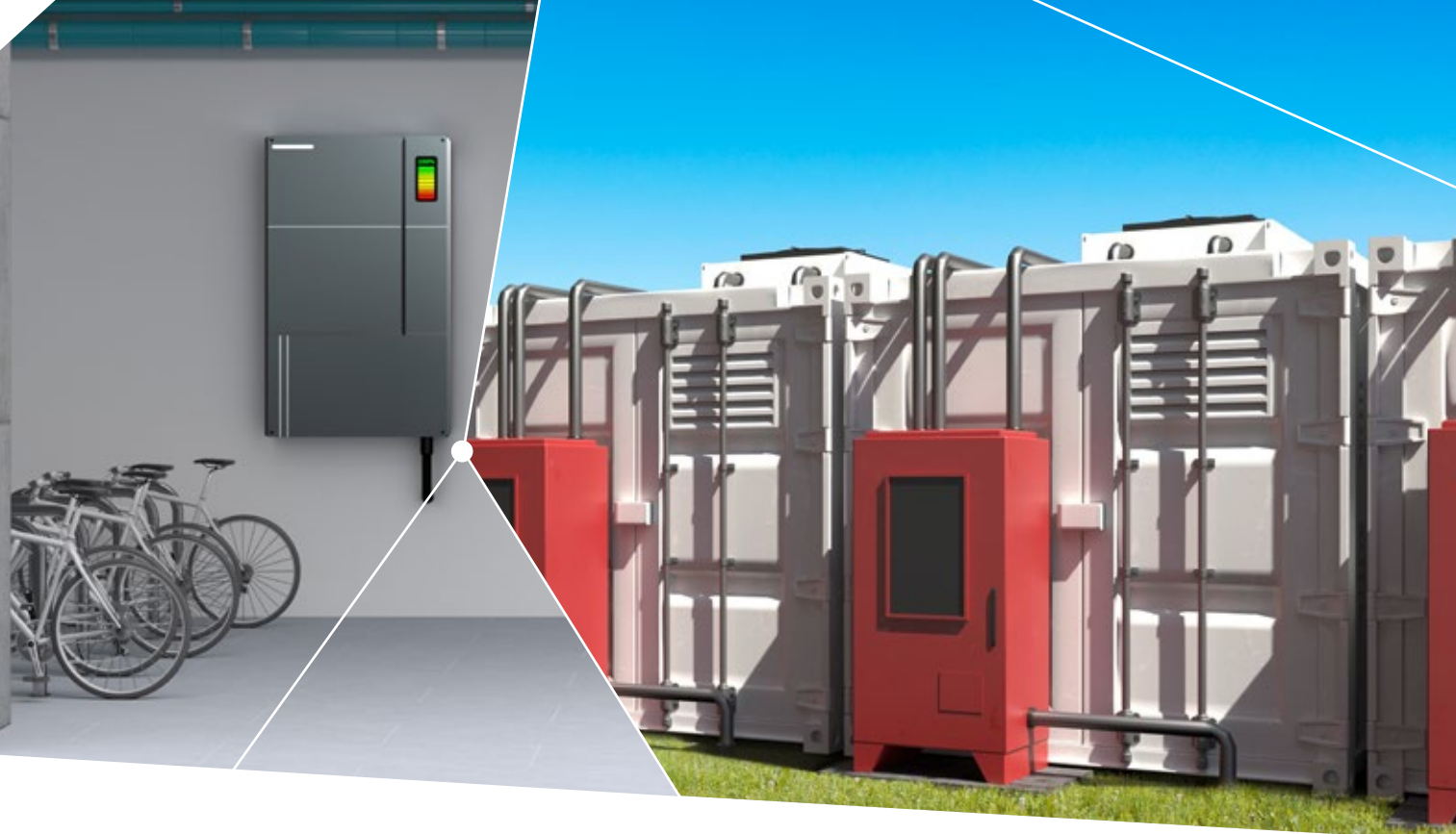
Energy storage systems are a vital part to successfully manage this transition. Our system solutions help to make energy storage the backbone of the new energy era. Our unique application expertise and comprehensive offering makes us the natural choice to advance energy storage solutions in terms of efficiency, performance, optimal cost, and Energy storage systems are a vital part to successfully manage this transition. Our system solutions help to make energy storage the backbone of the new energy era. Our unique application expertise and comprehensive offering makes us the natural choice to advance energy storage solutions in terms of efficiency, performance, optimal cost, and innovation.

Features and benefits

Key features	Key benefits
Efficient power conversion in DC-DC and AC-DC stage	Improvement of system performance with industry leading semiconductor offering such as OptiMOS™, CoolMOS™, CoolSiC™ MOSFETs but also best-in-class modules
Power dense design	Reduction of design efforts and faster time to market
Bi- directional power flow	Trust in a true partnership during the whole system lifetime
Safe operation of Lithium-ion battery	Full system provider form power conversion stage (PCS) to the battery management system (BMS)
Long battery life time	

Application diagram





Highlight/ recommended product portfolio

Functional block	Power/battery voltage	Voltage class [V _{DS} max]	Product family	Package	Benefits
Power conversion systems (PCS)	< 10 kW	150 V	OptiMOS™	Super S08, TOLL	› High power density and system cost reduction
		600 V/650 V	CoolMOS™ CFD7 / S7	TO-220/247, ThinPAK 8x8, TOLL	› Highest efficiency, enabling increased power density / more compact and easier design
		600 V	CoolSiC™ Schottky diode G6	TO-220	› Improved system efficiency and extremely fast switching
		650 V	CoolSiC™ MOSFET	TO-247	› Combination of high performance, high reliability and ease of use
	10-100 kW	150 V	OptiMOS™	TO-263	› High power density and system cost reduction
		600 V	CoolMOS™ C7/P7	TO-247	› Ease of use and fast design-in
		650 V	CoolSiC™ MOSFET	TO-247	› Combination of high performance, high reliability and ease of use
		650 V	TRENCHSTOP™ 5 H5	TO-247	› Benefit increase at high current conditions
		650 V	CoolSiC™ Schottky diode C6	TO-220	› Higher frequency and increased power density
		1200 V	CoolSiC™ MOSFET	TO-247	› Highest efficiency and increased power density
		1200 V	TRENCHSTOP™ 5/6 or S6	TO-247	› High device reliability and lifetime expectancy
	101-250 kW	150 V	OptiMOS™	D ² PAK	› Enables and simplifies the setup of 2 nd life batteries › Lower switching voltage enables higher inverter efficiency
		200 V	OptiMOS™	D ² PAK	› Enables and simplifies the setup of 2 nd life batteries › Lower switching voltage enables higher inverter efficiency
		1200 V	EasyPACK™ 2B	Modules	› Highest efficiency for reduced cooling effort
		1700 V	PrimePACK™ / EconoDUAL™	Modules	› High power density › Easy and most reliable assembly
	> 0.25 MW	1200 V	PrimePACK™ / EconoDUAL™	Modules	
		1700 V	PrimePACK™ / EconoDUAL™	Modules	
	Gate driver		EiceDRIVER™ 2EDS	PG-DSO-16-NB	› Dual-channel functional isolated › Dual-channel reinforced (safe) isolated › Single-channel non-isolated
			EiceDRIVER™ 2EDF	PG-DSO-16-NB	
			EiceDRIVER™ 1EDN	PG-SOT23-6	
BMS – battery protection	40-60 V	100 V	OptiMOS™/OptiMOS™ LinearFET	TOLL, D ² PAK	› Highest system efficiency
	60-100 V	150 V	OptiMOS™/OptiMOS™ LinearFET	TOLL, D ² PAK	› Minimize parallelization of MOSFETs
	100-150 V	200-300 V	OptiMOS™/OptiMOS™ LinearFET	D ² PAK	› Market leading MOSFETs with lowest R _{DS(on)} enabling low conduction losses › Widest SOA area with LinearFET™
	150-400 V	600 V	CoolMOS™ S7	TO-247	› Lowest R _{DS(on)} MOSFET



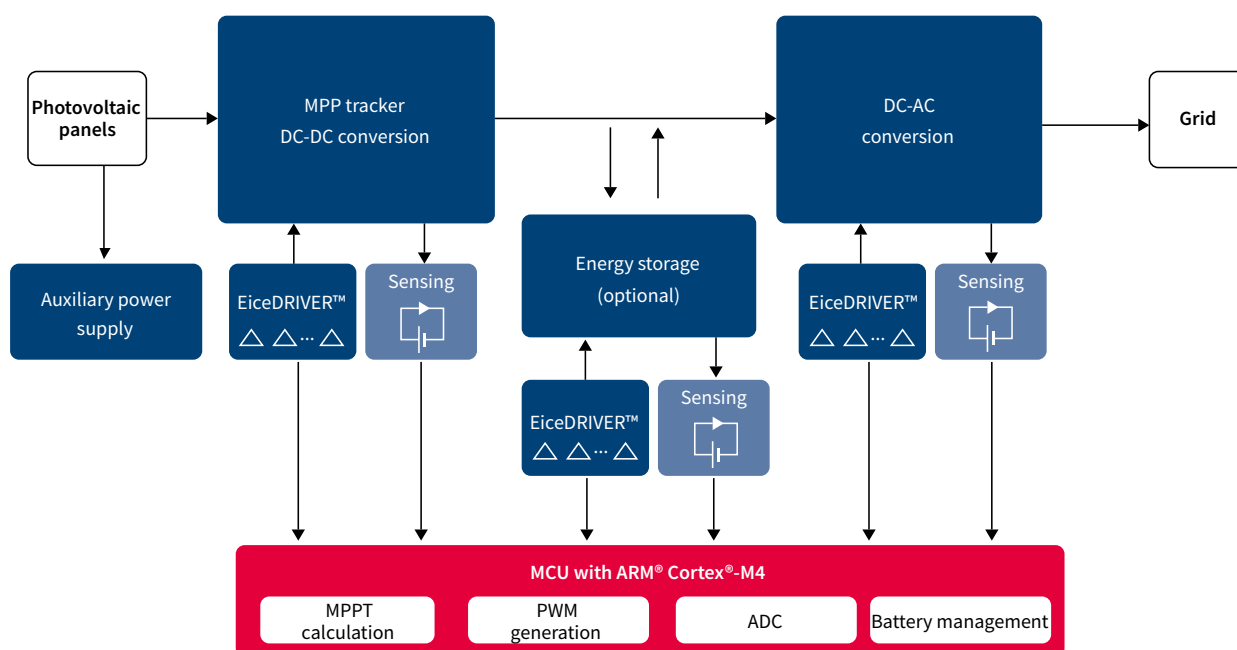
Solar

High efficiency designs for solar power systems

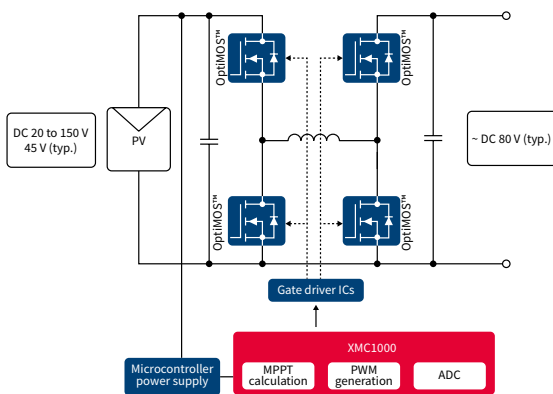
Infineon provides a comprehensive portfolio to deliver the best efficiency and reliability for solar applications. Infineon's cutting edge technologies such as CoolMOS™ SJ MOSFETs, HighSpeed3 IGBT and TRENCHSTOP™ 5, CoolSiC™ Schottky diodes, CoolSiC™ MOSFETs, coreless transformer, driver, etc. combined with the rich experience and highest quality ensure the company's leader position in solar applications. The newly added Arm® Cortex™-M4 based MCU enables easy and high efficiency design.

	Optimizer 250-750 W	Single and multiple panel micro inverter 250 -1500 W	String inverter 1-200 kW	Central inverter 500-5000 kW
MOSFETs	OptiMOS™ SuperSO8/DirectFET™ 60-150 V	OptiMOS™ SuperSO8 DirectFET™ 60-200V	OptiMOS™ 150-300 V	
SiC MOSFETs		CoolMOS™ TOLL/D-PAK 600-800 V	CoolMOS™ TO-247-3/TO-247-4 600/650 V	
IGBTs			CoolSiC™ MOSFET TO-247-3/TO-247-4 1200 V	
Gate driver ICs	EiceDRIVER™ 2ED1/1EDCompact/SOI/1EDB	EiceDRIVER™ 2ED1/1EDB/1EDCompact/SOI/1ED-F2/1EDB	650 V TRENCHSTOP™ 5 / 1200 V HighSpeed 3 TO-247-3/TO-247-4/TO-247PLUS 600 V/650 V/1200 V	Easy 1B/2B
SiC diodes		CoolSiC™ Schottky diodes DPAK/TO-220 600 V/1200 V D²PAK 650 V	CoolSiC™ Schottky diodes TO-220/TO-247/TO-247-2/DPAK/D²PAK 650 V/1200 V	PrimePACK™ / EconoDUAL™ 3 / 62 mm
Auxiliary power supply			BAT165 Schottky diode	
Microcontrollers	XMC1xxx Arm® Cortex®-M0	XMC1xxx Arm® Cortex®-M0	CoolSET™ 800 V	
	XMC45xx Arm® Cortex®-M4	XMC45xx Arm® Cortex®-M4	XMC1xxx Arm® Cortex®-M0	XMC1xxx Arm® Cortex®-M0
			XMC45xx Arm® Cortex®-M4	XMC45xx Arm® Cortex®-M4

Infineon's products for complete solar system



Optimizer

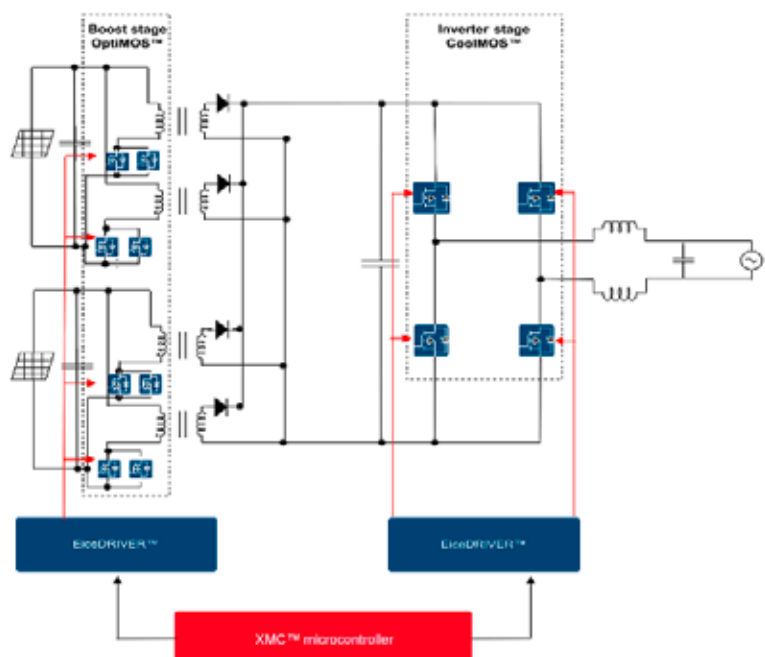


Functional block	Product family	Input voltage	Voltage class [V _{DS} max]	Package *	Part number *	R _{DS(on)}
Buck boost MPPT	OptiMOS™	≤ 48 V	60 V	SuperSO8	BSC012N06NS	1.2 mΩ
				DirectFET™	BSB028N06NN3 G	2.8 mΩ
		≤ 64 V	80 V	SuperSO8	BSC021N08NS5	2.1 mΩ
				DirectFET™	BSB044N08NN3 G	4.4 mΩ
		≤ 80 V	100 V	SuperSO8	BSC027N10NS5	2.7 mΩ
				DirectFET™	BSB056N10NN3 G	5.6 mΩ
Gate driver ICs	Single channel	≤ 125 V	150 V	SuperSO8	BSC220N20NSFD	9.3 mΩ
				PG-SOT23-6	1EDN8550	
Microcontroller	XMC1000				VDSO8	2EDL81xx

Microinverter

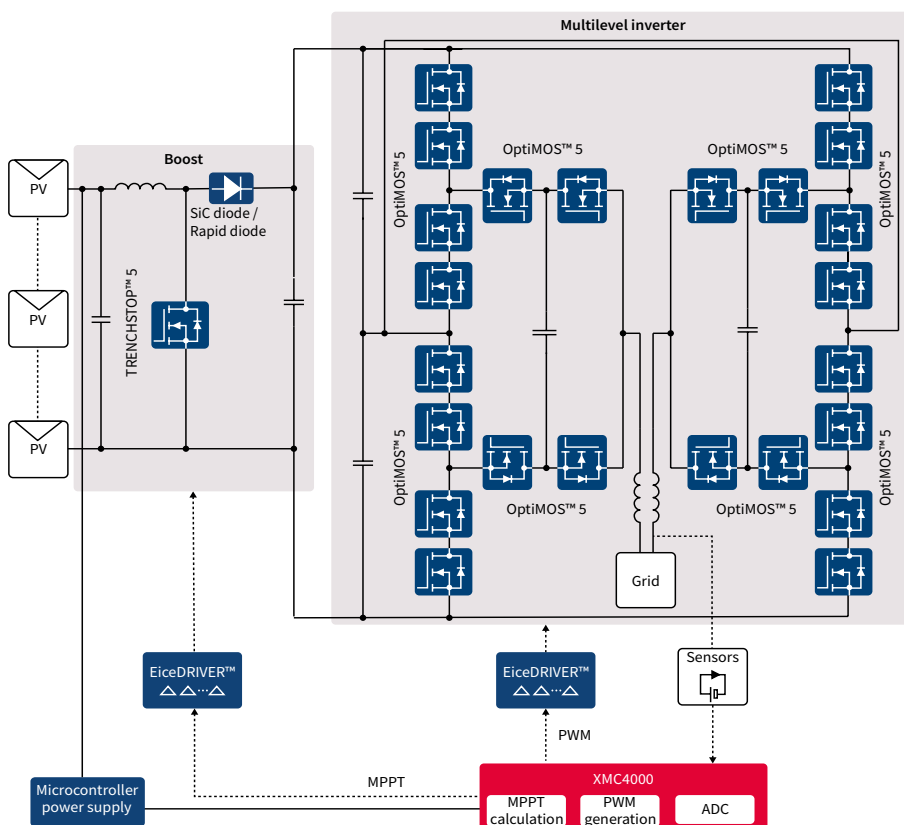
Micro inverter can either be used per

- › single (~300 W) PV panel or
- › multiple PV panels (600 – 1500 W)



Functional block	Product family	Voltage class [V _{DS} max]	Package *	Part number *	R _{DS(on)}	
MPPT – Boost stage	OptiMOS™	60 V	SuperSO8	BSC028N06NS	2.8 mΩ	
		80 V		BSC026N08NS5	2.6 mΩ	
		120 V		BSC190N12NS3	19.0 mΩ	
		150 V		BSC093N15NS5	9.3 mΩ	
				BSC160N15NS5	16.0 mΩ	
	CoolSiCTM Schottky diode	1200 V	DPAK	IDM02G120C5	2.0 A	
				IDM05G120C5	5.0 A	
				IDM08G120C5	8.0 A	
	Gate driver: EiceDRIVER™		VDSON-8	2EDL81xx		
			PG-DSO-8-60/PG-TSSOP-8-1	2EDN7524F		
Inverter stage	CoolMOS™	600 V	TO-Leadless	IPT60R102G7		102.0 mΩ
			D ² PAK	IPB60R145CDF7 *		145.0 mΩ
			TO-247	IPW60R145CFD7		145.0 mΩ
		650 V	D ² PAK	IPB65R150CFD		150.0 mΩ
			TO-247	IPW65R150CFD		150.0 mΩ
	Gate driver: EiceDRIVER™		PG-DSO-16	2EDS8165H		
				2EDS8265H		
Microcontroller				XMC1000, XMC4000		

Single-phase string inverter – multilevel topology



In multilevel inverter, four high voltage MOSFETs/IGBTs in H-bridge topology are replaced with a higher number of lower voltage MOSFETs. Compared to a conventional H-bridge inverter, a multilevel inverter, composed of lower voltage MOSFETs, offers several advantages:

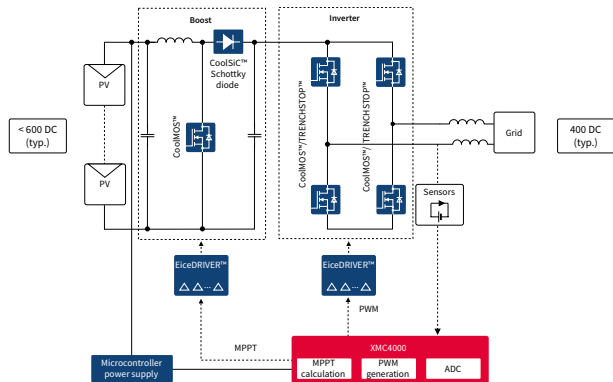
- › With much lower $R_{DS(on)}$ and switching loss parameters it significantly reduces conduction and switching losses
- › Higher effective output frequency (smaller magnetics) is possible with lower switching losses
- › Improved EMC due to reduced switching voltages
- › Significant reduction in cooling system, size and weight

Discrete power devices for multilevel string inverter

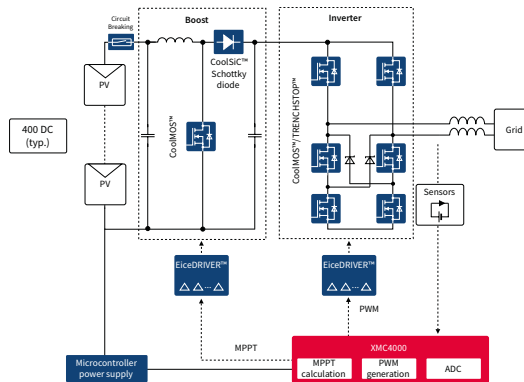
Functional block	Product family	Voltage class [$V_{DS\ max}$]	Package	Part number	$R_{DS(on)}$
Boost	CoolMOS™	600 V	TO-247	IPW60R017C7	17 mΩ
			TO-247	IPW60R024P7	24 mΩ
			D ² PAK	IPB60R045P7	45 mΩ
	IGBT TRENCHSTOP™ 5	650 V	TO-247	IKW40N65EH5, IKW40N65ES5	40 A
			D ² PAK	IKB40N65EH5, IKB40N65ES5	40 A
	CoolSiC™ Schottky diode	650 V	TO-247	IDW20G65C5	20 A
Flying-capacitor-based active neutral-point-clamp (NPC)	OptiMOS™	150 V	PG-SOT23-6	1EDN8511B	4 A / 8 A
			SuperSO8	BSC093N15NS5	9.3 mΩ
			SuperSO8	BSC110N15NS5	11 mΩ
			DirectFET™	IRF150DM115 *	11.3 mΩ
			D ² PAK	IPB044N15N5	4.4 mΩ
			D ² PAK	IPB048N15N5	4.8 mΩ
Gate driver ICs	EiceDRIVER™ 2EDi		NB-DSO16	2EDF7275F	4 A / 8 A
Microcontroller	XMC4000				

Single-phase string inverter

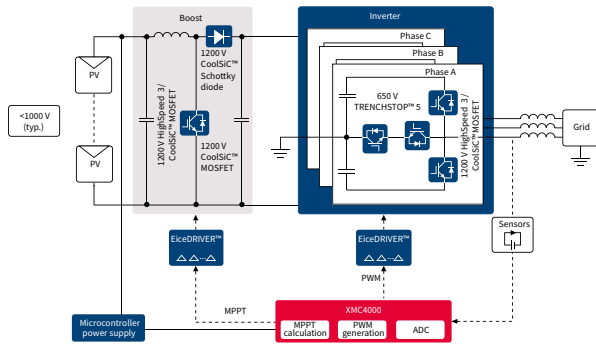
H4 topology



H6 topology



Three-phase string inverter



Discrete power devices for string inverter

Inverter type	Functional block	Product category	Product technology	Voltage	Package	Part number	R _{DS(on)}	Ampere
Single phase	MPPT – Boost stage	Si MOSFET	CoolMOS™ P7	600 V	TO-247-3	IPW60R037P7	37 mΩ	-
					TO-247-4	IPZA60R037P7	37 mΩ	-
		SiC MOSFET	CoolSiC™ MOSFET	650 V	TO-247-4	IMZA65R027M1H	27 mΩ	-
					TO-247-3	IMW65R048M1H	48 mΩ	-
		IGBT	TRENCHSTOP™ 5 S5/H5	650 V	TO-247-3	IMW120R045M1	45 mΩ	-
					TO-247-4	IKZ50N65ES5, IKZ50N65EH5	-	50 A
		Diode	CoolSiC™ diode	650 V	TO-247	IDW20G65C5	-	20 A
	Inverter	Si MOSFET	CoolMOS™ C7	650 V	TO-247-3	IPW65R65C7 *	65 mΩ	-
				600 V	TO-Leadless	IPT60R022S7	22 mΩ	-
			CoolMOS™ S7	600 V	TO-247-3	IPT60R040S7	40 mΩ	-
							18	-
		CoolMOS™ CFD 7	600 V	TO-247-3	IPW60R018CFD7	31	-	
						600 V	IPW60R031CFD7	
		SiC MOSFET	CoolSiC™ MOSFET	650 V	TO-247-4	IMZA65R027M1H	27 mΩ	-
					TO-247-3	IMW65R048M1H	48 mΩ	-
		IGBT	TRENCHSTOP™ 5 S5/H5	650 V	TO-247-3	IMW120R045M1	45 mΩ	-
					TO-247-4	IKZ50N65ES5, IKZ50N65EH5	-	50 A
		TO-247-3	IKW40N65ES5, IKW40N65EH5 *	-	40 A			
Gate driver ICs	EiceDRIVER™ 1ED Compact, EiceDRIVER™ 2EDN Family							
Three phase	MPPT – Boost stage	IGBT	HighSpeed 3	1200 V	TO-247-3	IKW40N120H3	-	40 A
					TO-247PLUS-3	IKQ75N120CH3	-	75 A
		SiC MOSFET	CoolSiC™ MOSFET	1200 V	TO-247-3/-4	IMW120R030M1H, IMZ120R030M1H	30 mΩ	-
						IMW120R045M1, IMZ120R045M1	45 mΩ	-
	Inverter	IGBT	HighSpeed 3	1200 V	TO-247-3	IMW120R060M1H, IMZ120R060M1H	60 mΩ	-
					TO-247PLUS-3	IKW40N120H3	-	40 A
		SiC MOSFET	CoolSiC™ MOSFET	1200 V	TO-247-3/-4	IKQ75N120CH3 *	-	75 A
						IMW120R030M1H, IMZ120R030M1H	30 mΩ	-
IMW120R045M1, IMZ120R045M1	45 mΩ	-						
	IMW120R060M1H, IMZ120R060M1H	60 mΩ	-					
Gate driver ICs			EiceDRIVER™ 1ED Compact, EiceDRIVER™ 2EDN family, EiceDRIVER™ 1EDB					
Microcontroller			XMC4000					

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*For more information on the product, contact our product support

For more details on the product, click on the part number.



Uninterruptible power supply (UPS)

Attractive solutions for highest efficiency and power density

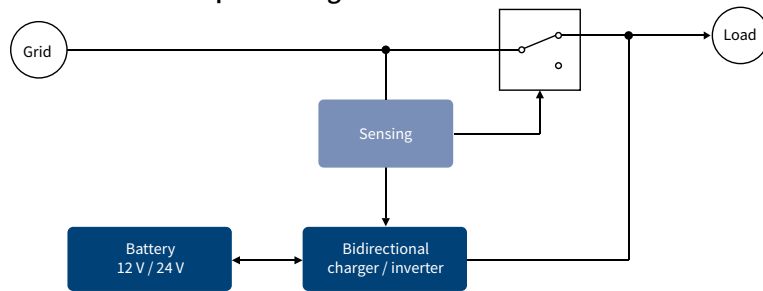
Today's uninterruptible power supply systems introduce a wide range of challenges. Overcoming them requires an increase in output power, energy efficiency and power density. We offer complete system-level solutions and high quality products for diverse uninterruptible power supply applications. Equipped with our semiconductors, UPS applications can achieve best-possible power-conversion efficiency and cutting-edge power density. The benefits are cost reduction and fewer passive components – regardless of the topology used.

Our solutions and products for UPS applications fulfill the latest market requirements. This includes the trend of modularization of UPS brick units due to scalable power demand from data centers, as well as the topology shift from two-level to three-level to achieve higher efficiency. Our products are suitable for any kind of uninterruptible power supplies in telecom, data center, server or industrial automation environments.

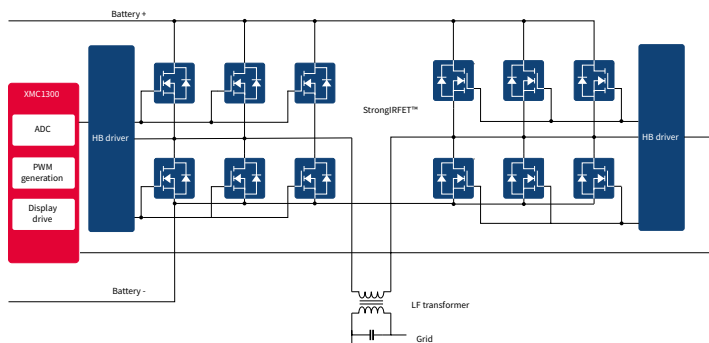
	Offline UPS	Online UPS
MOSFETs	OptiMOS™ and StrongIRFET™ 20-300 V CoolMOS™ SJ MOSFETs 500-950 V	
SiC diodes		CoolSiC™ Schottky diode
IGBTs		TRENCHSTOP™ IGBT6 TRENCHSTOP™ 5 H5
Power module and stack		EasyPACK™
Driver ICs	EiceDRIVER™ 1EDi EiceDRIVER™ 2EDi	EiceDRIVER™ 1ED Compact
Auxiliary power supply		CoolSET™ 650-800 V
Microcontrollers	XMC1300 series	

Offline UPS

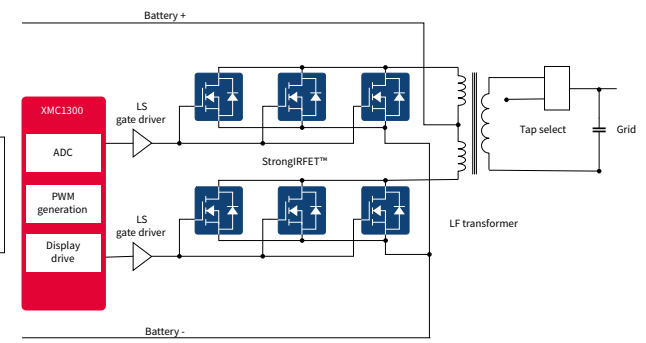
Bidirectional UPS power stage



Full-bridge bidirectional power stage

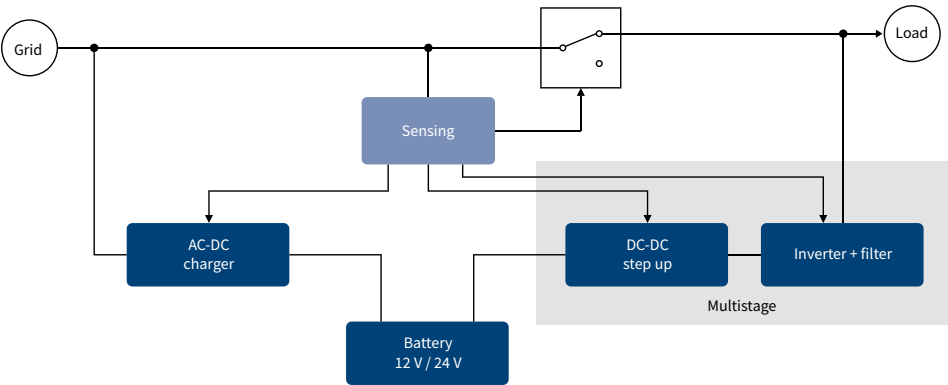


Push-pull bidirectional power stage

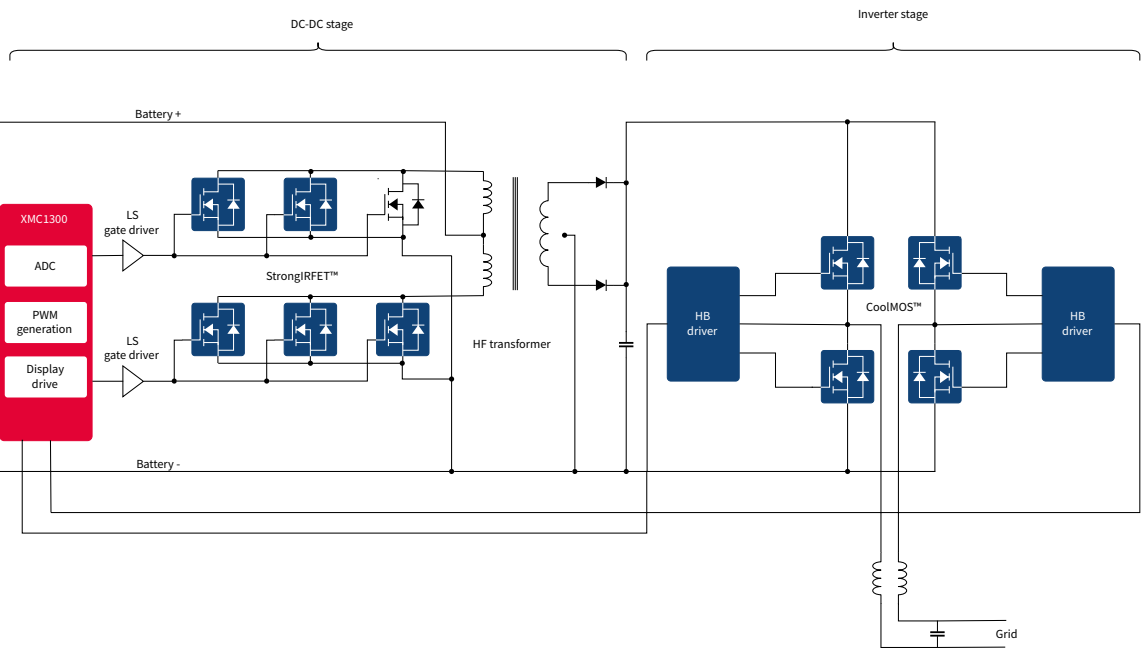


	Battery voltage	Topology	MOSFET breakdown voltage	TO-220	TO-247	D ² PAK and D ² PAK-7	Gate drivers
Inverter/charger MOSFETs	12 V	Push-pull	60 V	IRFB7530 IRFB7534 IRFB7540 IRFB7545	IRFP3006 IRFP7530 IRFP7537	IRFS7530 IRFS7530-7P	IRS44273 IRS4427 1EDN751x 2EDN851x *
		Full-bridge	30 V 40 V	IRLB3813 IRLB8314 IRLB8743 IRFB7430 (40 V)	IRFP7430	IRFS7430 (40 V) IRFS7430-7P (40 V)	IRS211X * IRS2186 2EDL811X 1EDN7550B
	24 V	Push-pull	75 V 100 V	IRFB3077 IRFB3207 IRFB7730 IRFB7734	IRFP7718	IRFS7430 IRFS7734 IRF3610S (100 V) IRFS4010 (100 V)	IRS44273 IRS4427 1EDN851X 2EDN852X
		Full-bridge	40 V 60 V	IRFB7430 IRFB7434 IRFB7545 (60 V) IRF60B217 (60 V)	IRFP7530 IRFP3006 IRFP7537	IRFS7430 IRFS7430-7P IRF7430* IRFS7530-7P	IRS211X * IRS2186 2EDL811X 1EDN7550B
	48 V	Push-pull	150 V	IRFB4115 IRFB4321 IPP046N15N5 * IRFB4228 IRFB4019	IRFP4568 IRFP4321 IRF150P220 IRF150P221	IRFS4321 IRFS4115 IRB048N15N5* IRFS4615	IRS44273 IRS4427 1EDN851X 2EDN852X
		Full-bridge	100 V	IPP030N10N IRFB4110 IPP086N10N3G IRFB4510 IPP180N10N3G	IRFP4468 IRFP4110 IRF100P218 IRF100P219	IRFS3610 * IRF3710S IRF8010S IRFS4510 IRFS4010	IRS211X * IRS2186 2EDL811X 1EDN8550B
	72 V	Push-pull	200 V	IPP110N20N3 IRFB4127 IRFB4227 IPP320N20N3 IRFB4320 *	IRF200P222 IRFP4668 IRF200P223 IRFP4127 IRFP4227	IPB110N20N3LF IRFS4127 IRFS4227 IRFB117N20NFD * IRF200S234	IRS44273 IRS4427 1EDN851X 2EDN852X
		Full-bridge	150 V	IRFB4321 IPP046N15N5 *	IRFP4568 IRF150P220	IRFS4321 IRB048N15N5 *	IRS211X * IRS2186 2EDL811X
		Full-bridge	200 V	IPP110N20N3 IRFB4227	IRF200P222 IRFP4668	IPB110N20N3LF IRFS4127	IRS211X * IRS2186 2EDL811X
Microcontrollers	12-72 V	XMC1300 series					

Unidirectional



Unidirectional power stage (output stage)



Unidirectional DC-DC stage

Battery voltage	Topology	MOSFET breakdown voltage	TO-220	TO-247	D ² PAK and D ² PAK-7	Gate drivers
12 V	Push-pull	40 V	IRFB7430 IRFB7434	IRFP7718	IRFS7430 IRFS7430-7P IRF7430 *	IRS44273 IRS4427 1EDN851X 2EDN852X
		60 V	IRFB7540 IRFB7545 IRF60B217		IRFS7530-7P	
		75 V		IRFP7718		
24 V	Push-pull	75 V	IRFB3077 IRFB3207 IRFB7730 IRFB7734	IRFP7718	IRFS7730 IRFS7734	
		100 V		IRF100P218 IRFP4468	IRFS4010 IRF3610S	
		150 V	IRFB4115 IRFB4321 IPP046N15N5* IRFB4228 IRFB4019	IRF150P220	IRFS4321 IRFS4115 IRB048N15N5 * IRFS4615	
Microcontrollers		XMC1300 series				



Unidirectional inverter stage


Battery voltage	Topology	MOSFET breakdown voltage	TO-220	TO-247	Gate drivers
200 V	Full-bridge inverter 120 V _{AC}	300 V	IPP410N30N IRFB4137	IRF300P226 IRF300P227 IRFP4868 IRFP4137	IRS211X * IRS2186
400 V	Full-bridge inverter 220 V _{AC}	500 V	IPP50R280CE IPP50R380CE IPP50R190CE	IPW50R190CE	IRS211X * IRS2186
Microcontrollers		XMC1300 series			

Unidirectional charger

Battery voltage	Topology	MOSFET breakdown voltage	TO-220	TO-247	PG-DIP-7
12-72 V	Flyback	650 V	CoolSET™		ICE3RBR1765JZ ICE3RBR0665JZ
12-72 V	Flyback	800 V	CoolMOS™ P7	IPP80R750P7 IPP80R600P7 IPP80R450P7 IPP80R360P7 IPP80R280P7	
Microcontrollers		Integrated, ICE3AS03LJG, ICE3BS03LJG			

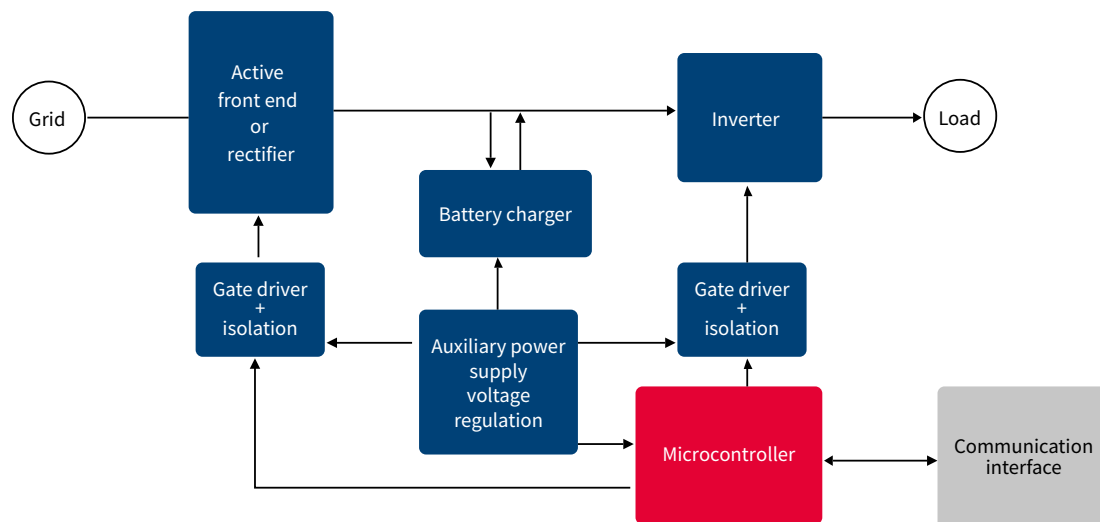
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*For more information on the product, contact our product support

For more details on the product, click on the part number. 

Online UPS


Online UPS power stage



Stage	Topology	Voltage class	Technology	Part number
Rectifier	Three-phase	800 V/1600 V	EasyBRIDGE, EconoBRIDGE™	
PFC	Boost PFC / Vienna "T-type"	1200 V	TRENCHSTOP™ IGBT6	IKW40N120CS6 IKQ75N120CS6
	Boost PFC / Vienna rectifier	1200 V	CoolSiC™ MOSFET	F3L15MR12W2M1_B69
	Boost PFC / Vienna "T-type"	650 V	TRENCHSTOP™ 5 H5	IKW50N65EH5 IKW75N65EH5
	Boost PFC	600 V/1200 V	EasyPACK™	
	Boost PFC	1200 V	CoolSiC™ Schottky diode	
	PFC	600 V	CoolMOS™ P7	IPP60R060P7 IPB60R060P7
	PFC	600 V	CoolMOS™ C7	IPP60R040C7 IPB60R040C7
Inverter	NPC 1	650 V	TRENCHSTOP™ 5 H5	IKW50N65EH5 IKW75N65EH5 IKZ50N65EH5 IKZ75N65EH5
	NPC 1	650 V	TRENCHSTOP™ 5 S5	IKW50N65ES5 IKW75N65ES5
	NPC 1	650 V	TRENCHSTOP™ HighSpeed3 IGBT Rapid diode	FS3L50R07W2H3F_B11
	NPC 2	1200 V	TRENCHSTOP™ IGBT6	IKW40N120CS6 IKQ75N120CS6
	NPC 2	1200 V	CoolSiC™ Schottky diode	
	NPC 2	1200 V	TRENCHSTOP™ HighSpeed3 IGBT Rapid diode	FS3L25R12W2H3_B11 F3L200R12W2H3_B11 F3L200R12W2H3_B47 *
	NPC 2	650 V	TRENCHSTOP™ 5 S5	IKW50N65ES5 IKW75N65ES5
	Two-level	1200 V	EconoPACK™, EasyPACK™	FS75R12W2T4_B11 FS200R12KT4R_B11
	Two-level	1200 V	EconoDUAL™	FF600R12ME4_B11
	Three-level NPC1	600 V/1200 V	EconoPACK™	F3L300R07PE4
Battery charger	Half-bridge	1200 V	TRENCHSTOP™ IGBT6	IKW40N120CS6 IKQ75N120CS6
		1200 V	CoolSiC™ MOSFET	FF6MR12W2M1_B11
		650 V	TRENCHSTOP™ 5 H5	IKW50N65EH5 IKW75N65EH5
Gate driver ICs	Single-channel	1200 V	EiceDRIVER™ 1ED Compact	
AUX	-	650-800 V	CoolSET™	

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For more details on the product, click on the part number. 



SMPS

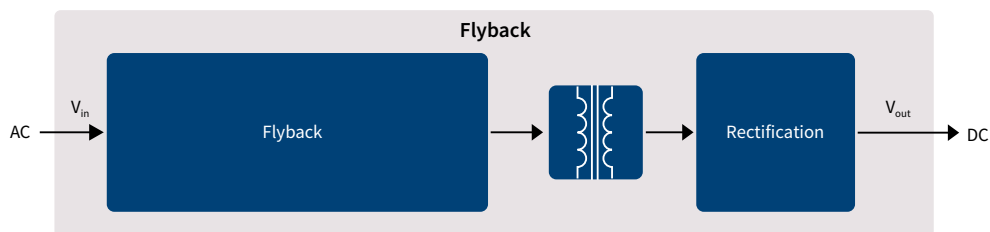
Full system solutions for embedded power supplies

Customers who design or manufacture a product that needs embedded intelligence typically want to focus on the system design of their product, be it white goods, a vending machine, an automatic door opener or any other product. They do not want to spend valuable efforts and time in designing the power supply systems. They just want to use them, having a trouble-free, EMI friendly, and reliable power supply.

Along with a wide range of products, we developed flexible and easy to reuse reference designs with the intention to provide our customers with best fitting solutions tailored for their different needs.

Depending on these needs, our customers can select very low-cost power supply reference designs featuring high integration or using a platform approach to reuse the same power designs for different products that need different power supplies. If high efficiency is needed, for example to meet ENERGY STAR label requirements or to improve overall thermal performance, we offer power supply reference designs with the outstanding efficiency levels.

Our comprehensive reference design offering coupled with application notes help our customers to drastically improve the efficiency of their power supply by using secondary-side synchronous rectification instead of a rectifier diode. Benefits of synchronous rectification are greater efficiency and improved thermal performance of the power supply.



Functional block	Product category	Topology	Technology	Benefits
Auxiliary power supply	Control ICs	QR/FF flyback CoolSET™	700 V/800 V ICE5QRxx70/80A(Z)(G)	<ul style="list-style-type: none"> Low standby power, high efficiency and robustness
Flyback	Control ICs	QR flyback	ICE5QSAG	<ul style="list-style-type: none"> High efficiency and low standby power
	High voltage MOSFET	Flyback	700 V/800 V CoolMOS™ P7	<ul style="list-style-type: none"> Best price competitive CoolMOS™ family Lower switching losses versus standard MOSFET Controlled dV/dt and di/dt for better EMI

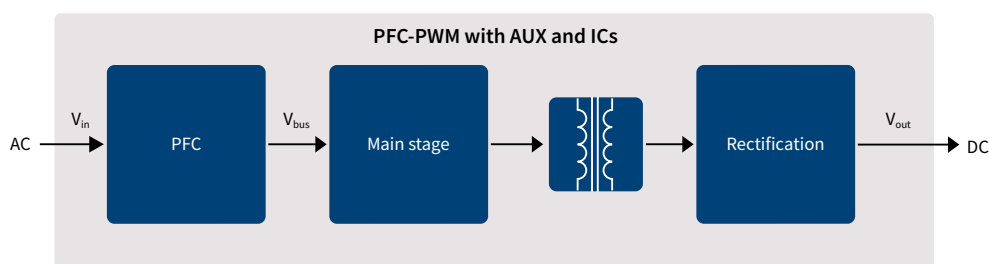


Industrial SMPS

Reliable and robust

Industrial SMPS powers a wide range of devices from industrial automation robots to medical equipment and vending machines. With the expansion of the Internet of Things (IoT) and the adoption of Industry 4.0, the demand for industrial SMPS is on the rise. Industrial switch-mode power supplies (SMPS) are mostly operated in environments such as outdoor without air conditioning, or systems without fans. Such operating conditions make reliability and robustness the key requirements for the industrial SMPS, especially when it comes to high temperature operations, outdoor use, line surges, load jumps, short circuit, etc.

In addition to quality, reliable supply and long-term product availability are also some of the key customer concerns. Industrial SMPS life cycle goes over 10 years and it takes 3 to 5 years to ramp. Hence, not only do customers need a high quality products, but also a stable and reliable supply over the industrial SMPS lifecycle (10 to 20 years). Infineon offers this with its CoolMOS™, OptiMOS™ and StrongIRFET™ product families, which thanks to the high robustness and reliable performance have been meeting customer and market requirements for more than 20 years. Infineon's products offer the best price/performance ratio along with highest efficiency and reliability. For new designs, we highlight our CoolMOS™ P7 600 V/800 V/950 V parts, as well as the latest generation of OptiMOS™ 30 V/40 V/60 V/80 V/100 V/150 V and 250 V products. For designs with convection-cooled, high power supplies, our CoolMOS™ S7 in active bridge will reduce the power losses to enable the operation without fans.



Functional block	Product category	Topology	Technology	Benefits
PFC/Main stage	High voltage MOSFETs	CrCM/DCM PFC	600 V / 800 V / 950 V CoolMOS™ P7	<ul style="list-style-type: none"> Best thermal performance Rugged body diode ESD enhancement for production line Wide $R_{DS(on)}$ portfolio including both THD and SMD packages
			600 V CoolMOS™ P6	<ul style="list-style-type: none"> Fast-switching speed for improved efficiency and thermals Low gate charge for enhanced light-load efficiency and low power consumption at no load condition Optimized V_{GS} threshold for low turn-off losses
			600 V CoolMOS™ S7	<ul style="list-style-type: none"> PFC Efficiency boost ~1% Lowest $R_{DS(on)}$ in SMD packages
	Boost diodes	DCM PFC	650 V Rapid 1	<ul style="list-style-type: none"> Low conduction losses
		CCM PFC	650 V Rapid 2	<ul style="list-style-type: none"> Low reverse recovery losses and PFC switch turn-on losses
	Control ICs	CCM PFC ICs	ICE3PCS0xG	<ul style="list-style-type: none"> High PFC and low THD
Main stage	Control ICs	HB LLC ICs	650 V – ICE1HS01G-1/ ICE2HS01G	<ul style="list-style-type: none"> High efficiency and low EMI
Synchronous rectification	Medium voltage diodes	HB LLC + center-tap	OptiMOS™ 30 V/40 V/60 V/80 V/150 V/250 V	<ul style="list-style-type: none"> Optimized cost/performance and low thermals



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs


Discrete IGBTs

WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

Applications

An aerial photograph of a city skyline at sunset. The sky is filled with soft, orange and yellow clouds. In the foreground, a large, lush green park with many trees and a winding path is visible. The city skyline in the background features numerous skyscrapers, including a prominent, tall, slender tower. The overall scene is bathed in the warm light of the setting sun.

Advanced system solutions for transportation and infrastructure

- › Fast EV charging
- › E-mobility
- › Light electric vehicles and forklifts
- › Multicopter





Fast EV charging

Advanced solutions for DC EV charging

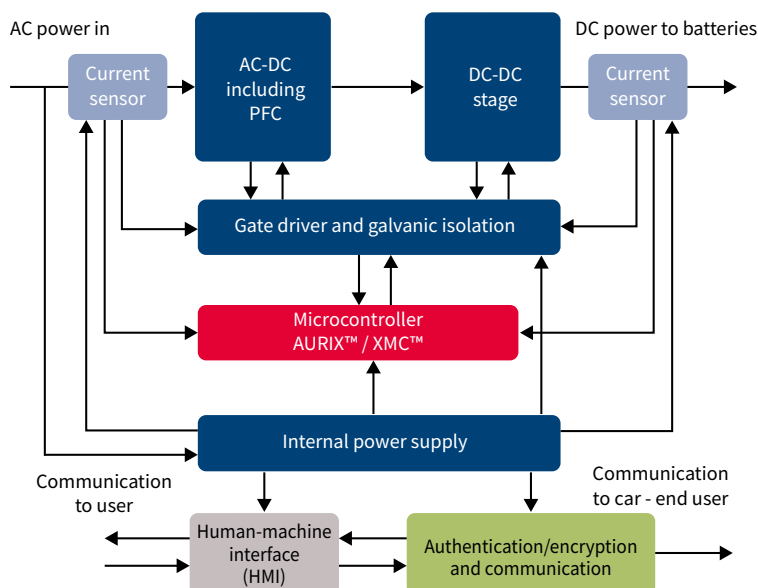
As e-mobility increasingly becomes part of daily life, there is a growing need for more efficient charging solutions. Fast electric vehicle (EV) charging stations equipped with powerful DC chargers are the answer. DC EV chargers are an attractive choice because they allow much faster charging than the standard AC EV ones that many EV owners have at home. Today, a DC charger with 150 kW can put a 200 km charge on an EV in around 15 minutes. As fast charging and battery technologies continue to evolve and improve in the near future, experts anticipate the charging time to drop even further.

As a market leader and the global front-runner in power electronics, Infineon enables you to bring energy-efficient DC EV charger designs to life, with our highly efficient components and in-depth technical support. We cover power ranges from kilowatts to megawatts in our broad portfolio of high-quality power semiconductors, microcontrollers, gate drivers and security, safety, and authentication solutions. Our CoolMOS™ and CoolSiC™ MOSFETs, for example, are ideal in a wide range of DC EV charging designs. Their matchless advantages include high frequency operation, high power density and reduced switching losses, allowing you to reach high levels of efficiency in any battery charging system.

Infineon offering and customer benefits

Infineon offering	Customer benefits
CoolMOS™ and CoolSiC™ discrete and power module semiconductor solutions	Highly efficient power conversion for reducing system size by up to 50 % and reduced cooling efforts
EiceDRIVER™ and XMC™ microcontroller	Scalability across various platforms for upgrading system power charger levels on demand
XENSIV™ magnetic current sensor	Safe drive and ease of control
OPTIGA™	Bidirectional high precision current sensing
Power supply ICs (LDO, DC-DC)	Identity protection against fake devices and protection against the manipulation of the data
Communication (CAN transceiver)	Robust quality and easy to use implementation shorten time to market and guarantee long operation

Application diagram



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For more details on the product, click on the part number.



Infineon's solution recommendation for DC EV charging system blocks

Our solutions are designed for harsh environmental conditions and long lifetime as we have an excellent understanding of quality requirements. Take the next step by exploring our product portfolio for DC EV charging systems.

PFC stage (three-phase input)

Product category	Product family	Product	Additional information
High voltage MOSFET / SiC MOSFET / IGBT	650 V CoolMOS™ C7	IPW65R019C7	650 V, 19 mΩ, TO-247
	600 V CoolMOS™ C7	IPW60R017C7	600 V, 17 mΩ, TO-247
	600 V CoolMOS™ P7	IPW60R024P7	600 V, 24 mΩ, TO-247
		IPW60R037P7	600 V, 37 mΩ, TO-247
		IPW60R060P7	600 V, 60 mΩ, TO-247
	650 V TRENCHSTOP™ 5 H5	IKW50N65EH5/IKZ50N65EH5	650 V, 50 A, TO-247-3/4
		IKW75N65EH5/IKZ75N65EH5	650 V, 75 A, TO-247-3/4
	1200 V CoolSiC™ MOSFETs	IMW120R045M1/IMZ120R045M1	1200 V, 45 mΩ, TO-247-3/4
	1200 V CoolSiC™ Easy modules	F3L15MR12W2M1_B69	1200 V, 15 mΩ, Easy 2B, Vienna rectifier phase leg
		FS45MR12W1M1_B11	1200 V, 45 mΩ, Easy 1B, six-pack
SiC diodes	1200 V CoolSiC™ Schottky diodes generation 5	IDW15G120C5B/IDWD15G120C5	1200 V, 15 A, TO-247-3/2
		IDW20G120C5B/IDWD20G120C5	1200 V, 20 A, TO-247-3/2
		IDW30G120C5B/IDWD30G120C5	1200 V, 30 A, TO-247-3/2

HV DC-DC main stage

Product category	Product family	Product	Additional information
High voltage MOSFET / SiC MOSFET	600 V CoolMOS™ CFD7 / CSFD	IPW60R018CFD7	600 V, 18 mΩ, TO-247
		IPW60R024CFD7	600 V, 24 mΩ, TO-247
		IPW60R037CSFD	600 V, 37 mΩ, TO-247
		IPW60R040CFD7	600 V, 40 mΩ, TO-247
		IPW60R055CFD7	600 V, 55 mΩ, TO-247
		IPW60R070CFD7	600 V, 70 mΩ, TO-247
	600 V CoolMOS™ C7	IPW65R045C7	650 V, 45 mΩ, TO-247
	600 V CoolMOS™ P7	IPW60R080P7	600 V, 80 mΩ, TO-247
	650 V CoolMOS™ CFD7	IPW65R029CFD7 *	Coming soon ,650 V, 29 mΩ, TO-247
		IPW65R029CFD7 *	Coming soon , 650 V, 29 mΩ, TO-247-4
	1200 V CoolSiC™ SiC MOSFET	IMW120R045M1/IMZ120R045M1	1200 V, 45 mΩ, TO-247-3/4
	1200 V CoolSiC™ Easy module	FF6MR12W2M1(P)_B11 *	1200 V, 6 mΩ, Easy 2B, half-bridge
		FF8MR12W2M1(P)_B11 *	1200 V, 8 mΩ, Easy 2B, half-bridge
		FF11MR12W1M1_B11	1200 V, 11 mΩ, Easy 1B, half-bridge
		FF23MR12W1M1(P)_B11 *	1200 V, 23 mΩ, Easy 1B, half-bridge
		F4-23MR12W1M1(P)_B11 *	1200 V, 23 mΩ, Easy 1B, fourpack
		FS45MR12W1M1_B11	1200 V, 45 mΩ, Easy 1B, sixpack
SiC Diodes Output rectification diodes	1200 V CoolSiC™ Schottky diode generation 5	IDW15G120C5B/IDWD15G120C5	1200 V, 15 A, TO-247-3/2
		IDW20G120C5B/IDWD20G120C5	1200 V, 20 A, TO-247-3/2
		IDW30G120C5B/IDWD30G120C5	1200 V, 30 A, TO-247-3/2
	650 V CoolSiC™ Schottky diode generation 5	IDW12G65C5	650 V, 12 A, TO-247
		IDW16G65C5	650 V, 16 A, TO-247
		IDW20G65C5	650 V, 20 A, TO-247
		IDW20G65C5B	650 V, 10 A, TO-247
		IDW24G65C5B	650 V, 24 A, TO-247
		IDW30G65C5	650 V, 30 A, TO-247
		IDW32G65C5B	650 V, 32 A, TO-247
		IDW40G65C5	650 V, 40 A, TO-247
		IDW40G65C5B	650 V, 40 A, TO-247
	650 V CoolSiC™ Schottky diode generation 6	IDH20G65C6	650 V, 20 A, TO-220
		IDH16G65C6	650 V, 16 A, TO-220 real 2-pin
		IDH12G65C6	650 V, 12 A, TO-220 real 2-pin
		IDH10G65C6	650 V, 10 A, TO-220 real 2-pin
		IDH08G65C6	650 V, 8 A, TO-220 real 2-pin
		IDH06G65C6	650 V, 6 A, TO-220 real 2-pin
		IDH04G65C6	650 V, 4 A, TO-220 real 2-pin
		IDDD20G65C6	650 V, 20 A, Double DPAK
		IDDD16G65C6	650 V, 16 A, Double DPAK
		IDDD12G65C6*	650 V, 12 A, Double DPAK
		IDDD10G65C6	650 V, 10 A, Double DPAK
		IDDD08G65C6	650 V, 8 A, Double DPAK
		IDDD06G65C6	650 V, 6 A, Double DPAK
		IDDD04G65C6	650 V, 4 A, Double DPAK


(P): Module with pre-applied thermal interface material (TIM)

Gate driver and galvanic isolation

Product category	Product family	Product	Additional information
Gate driver ICs	EiceDRIVER™ (non-isolated)	1EDN family, 2EDN family	Single-channel/dual-channel, non-isolated low-side gate driver ICs
		2ED24427N01F *	10 A dual-channel low-side gate driver with DSO-8 power pad package
	EiceDRIVER™ level shift gate driver	IR2214SS, 2ED2184S06F, 2ED2110S06M*	1200 V / 650 V half-bridge gate driver for IGBTs and MOSFETs with level-shift technology
	EiceDRIVER™ (galvanic isolation)	2EDF7175F, 2EDF7275F	Dual-channel functional isolated (1,5 kV)
		2EDS8265H, 2EDS8165H	Dual-channel reinforced (safe) isolated (6 kV)
		1EDI40I12AF/H, 1EDI60I12AF, 1EDI60I12AH, 1EDC40I12AH, 1EDC60I12AH, 1ED3124MU12H/F*	1200 V single-channel, galvanic isolated driver with separate source and sink outputs to drive CoolMOS™ SJ MOSFETs in floating mode as in Vienna rectifier variants
		1EDC20H12AH, 1EDC60H12AH, 1ED020I12-F2, 2ED020I12-F2 1ED3491MU12M*	1200 V, single-channel/dual-channel, galvanic-isolated driver recommended to drive CoolSiC™ MOSFETs and CoolSiC™ EasyPack™ power modules
		1EDI30I12MF/H, 1EDC30I12H*, 1EDI10I12MF/H, 1EDC10I12MH 1ED3122MU12H *	1200 V, single-channel, galvanic-isolated driver with integrated Miller clamp to drive TRENCHSTOP™ 5 IGBTs H5

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* For more information on the product, contact our product support

For more details on the product, click on the part number. 

Current sensor

Product category	Product family	Product	Additional information
Magnetic current sensor	XENSIV™	TLI4971-A120T5-E0001	
		TLI4971-A120T5-U-E0001	UL certified

Microcontroller

Product category	Product family	Product	Additional information
Microcontroller	XMC™	XMC1400 family (PFC stage)	Arm® Cortex® M0 based microcontroller
		XMC4500/XMC4700 (HV DC-DC/PWM stage)	Arm® Cortex® M4F based microcontroller
	AURIX™	TC26X/TC27X TC36X/TC37X	TriCore™ AURIX™ 32-bit microcontroller HSM (hardware secure module) full EVITA compliance

Internal power supply

Product category	Product family	Product	Additional information
AC-DC power conversion	CoolSET™ 5 QR/FF flyback	ICE5QR0680AG	800 V, 42 W, 710 mΩ, PG-DSO-12
		ICE5AR0680AG	800 V, 42 W, 710 mΩ, PG-DSO-12
	5 th generation PWM controllers and CoolMOS™ P7	ICE5QSAG and IPP80R360P7	800 V, 360 mΩ, TO-220
		ICE5QSAG and IPA95R450P7	950 V, 450 mΩ, TO-220 FP
	CoolMOS™ HV SJ MOSFETs	IPN95R1K2P7	950 V, 450 mΩ, SOT-223
		IPN80R1K4P7	800 V, 1.4 Ω, SOT-223
DC-DC power conversion	Low power LDOs	IFX30081	50 mA ultralow quiescent current linear voltage regulator with wide input voltage range
		IFX54211	150 mA LDO in tiny package
		IFX54441	300 mA low noise LDO
		IFX25001	400 mA wide input voltage LDO
	Buck converter	IFX91041	1.9 A DC-DC buck converter
	Safety PMIC for AURIX™ MCU	TLF35584	Multichannel power supply IC, optimized for AURIX™ MCU, up to ASIL-D rated

Authentication and encryption

As embedded systems are increasingly becoming targets of attackers, Infineon offers OPTIGA™ - a turnkey security solution.


Product category	Product family	Product	Additional information
Security	OPTIGA™ Trust B	SLE952500000XTSA1	Assymmetric ECC authentication with individual certificate key pair and an extended temperature range of -40 to 110°C
	OPTIGA™ Trust TPM	SLB9670XQ2.0 *	Fully TCG TPM 2.0 standard compliant module with the SPI interface
	SLC37	SLC37ESA2M0, SLI97CSIFX1M00PE *	New class of performance and security cryptocontroller adhering to CC EAL6+ high targeted and EMVCo targeted certifications for payment and eSIM applications

Communication

Product category	Product family	Product	Additional information
CAN transceiver	Industrial grade transceiver	IFX1050G	High speed CAN with 1Mbps, certified to ISO11898-2
		IFX1051G *	High speed CAN with 2Mbps, certified to ISO11898-2
	Automotive transceiver	TLE9250SJ	Automotive grade high speed CAN FD transceiver with 5 Mbps, certified to ISO11898-5
		TLE9250LE	Automotive grade high speed CAN FD transceiver with 5 Mbps, certified to ISO1189-5 in tiny SMD package

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* For more information on the product, contact our product support

For more details on the product, click on the part number. 



E-mobility

Best solutions for battery chargers, wireless charging and battery management

To recharge the battery of an electric or hybrid car, a charger is needed. Chargers can be implemented onboard or off-board the vehicle. Electric energy is transferred to the vehicle by wire or by wireless methods like resonant inductive power transfer. Power units onboard the vehicle require automotive-grade components, while the wider product selection of industrial-grade components can be used for off-board units.

Onboard chargers

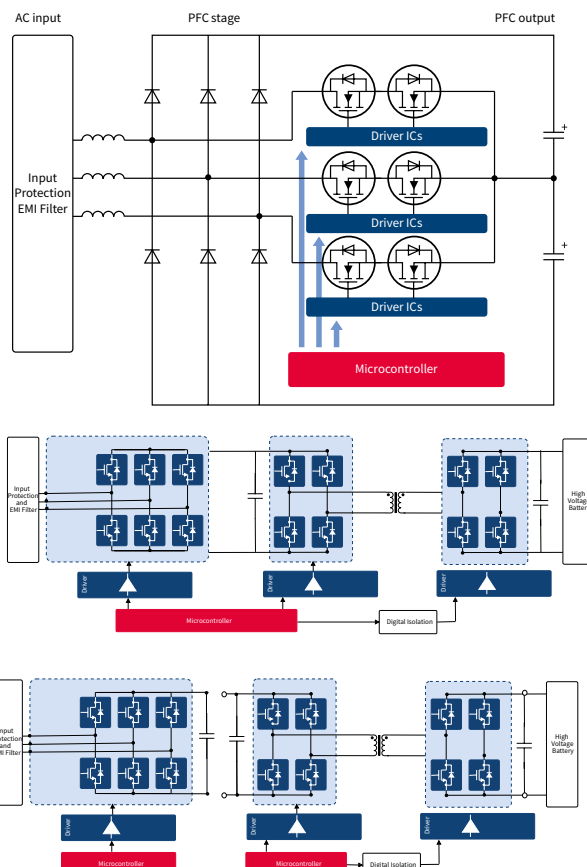
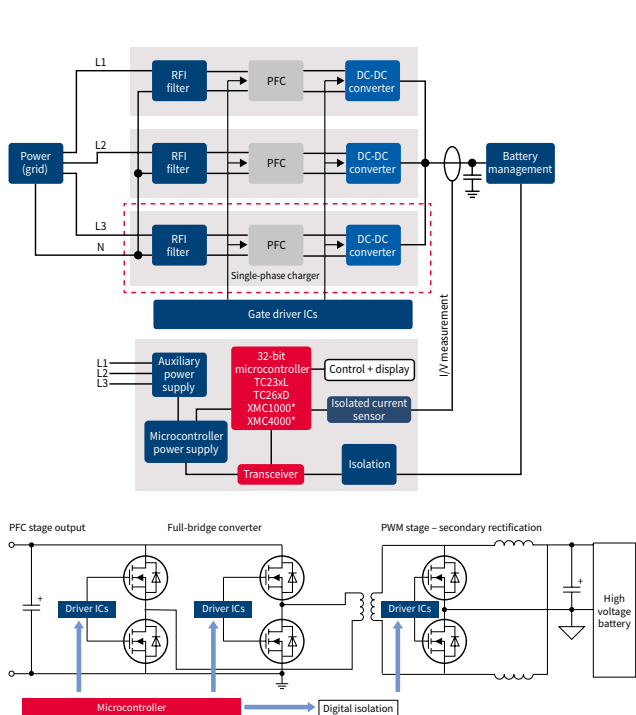
In cars with onboard chargers the batteries can be recharged from any standard AC power outlet, which provides maximum power of 6.6 kW best case (single-phase 230 V/32 A) or 22 kW (three-phase input grid). System designers face the challenge of supporting the varied voltage and current levels while increasing the power density. When it comes to on-board charging, the key success factors involve efficiency and a high power density for a small form factor. The long-term trend is moving towards bi-directional charging, where the charger also feeds power from the car to the smart grid.

Off-board chargers

The off-board chargers ensure the proper energy flow from AC grid and HV battery charging electronics. While AC charger delivers only limited power of up to 22kW and thus longer charging time, DC charger will enable much faster battery fill with higher power levels. Infineon provides various solutions that reduce power losses, maximizing power savings and boosting performance.

Ultrafast chargers with power ratings of 50 kW and above are usually build with power stack of 20-30 kW for modularity. Often, bidirectional operation of power conversion stage is a requirement for enabling the charger for V2G operation.

AC-DC battery chargers: functional blocks



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*For off-board chargers only

For more details on the product, click on the part number.

Product portfolio for onboard and off-board charger applications

Infineon's comprehensive portfolio of semiconductors (sensors, microcontrollers, power semiconductors, etc.) lends itself perfectly to designs of compact units for onboard, off-board, and wireless charging. Our products in this sector support high switching frequencies at lowest possible on-state resistance ($R_{DS(on)}$) to enable compact and efficient designs: MOSFETs such as CoolMOS™, IGBTs such as TRENCHSTOP™ 5 and SiC Schottky diodes, such as 650 V CoolSiC™ diode. In addition, integrated MOSFET and IGBT drivers, controller ICs for active CCM PFC high-performance microcontroller solutions and highly accurate current sensors complete our product portfolio. For more information about off-board chargers, refer to **page 74 - Fast EV charging**.

Automotive products for on-board units

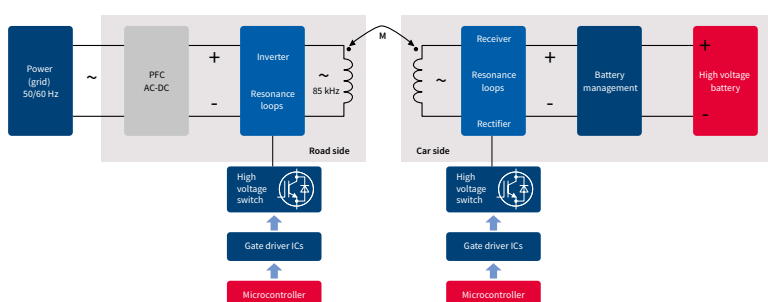
Part number	Product family	Description
IPx65RxxxCFDA	CoolMOS™ 650 V	650 V MOSFET with integrated fast body diode
AIKW50N, AIKW40N, AIGW40	TRENCHSTOP™ 5 AUTO IGBT	IGBT discrete dedicated to automotive applications
AIMW120Rx *	CoolSiC™ 1200 V	Automotive 1200 V discrete SiC MOSFET
AUIRS2191S, AUIRS2113S	Level shifter	Automotive high and low side driver
2ED02012FA	Automotive EiceDRIVER™	Dual-channel isolated driver for 650 V/1200 V IGBTs and MOSFETs
TC23xL, TC26xD	AURIX™ microcontroller	32-bit lockstep microcontroller
TLF35584	OPTIREG™ PMIC	ISO26262 – system-supply optimized for AURIX™
TLE9250, TLE9251	CAN FD transceiver	High-speed automotive CAN transceiver with 5Mbps
TLE9461, TLE9471	Automotive system basic chips	High integrated solution for microcontroller supply and communication
TL5810, TL5850, TL5105	OPTIREG™ Linear	Automotive linear voltage regulators
TLI4971	XENSIV™ current sensor	Coreless magnetic current sensors

Industrial products for off-board units

Part number	Product family	Description
IKWxxN65F5/H5/EH5, IKZxxN65EH5	TRENCHSTOP™ 5 IGBTs	650 V ultrafast/fast IGBT with Rapid 1 diode
IGWxxN65F5/H5, IGZxxN65H5	TRENCHSTOP™ 5 IGBTs	650 V ultrafast/fast IGBT
IDWxxG65/120C5(B ³⁾)	CoolSiC™ diodes	650 V/1200 V SiC Schottky diode generation 5
IDWDxxG120C5	CoolSiC™ diodes	1200 V SiC Schottky diode generation 5 TO-247 2-pin
IMW/Z120RxxxM1H	CoolSiC™ MOSFETs	1200 V SiC MOSFETs
IPW65RxxxC7	CoolMOS™ SJ MOSFETs	650 V MOSFET, CoolMOS™ C7 series for hard switching topologies
IPW60RxxxP7	CoolMOS™ SJ MOSFETs	600 V MOSFET, CoolMOS™ P7 series for hard switching topologies
IPW65RxxxCFD	CoolMOS™ SJ MOSFETs	650 V MOSFET, CoolMOS™ CFD2 series for soft switching topologies
IPW60RxxxCFD7	CoolMOS™ SJ MOSFETs	600 V MOSFET, CoolMOS™ CFD7 series for soft switching topologies
HybridPACK™1	Power module	1200 V/200 A for fast and ultrafast charging (>10 kW/phase)
XMC1000 ²⁾ , XMC4000 ²⁾	XMC™ microcontrollers	32-bit Arm® Cortex® M0/M4F microcontrollers, up to 125°C ambient temperature (XMC4000)
IFX1763, IFX54441, IFX54211	Linear voltage regulators	Linear voltage regulator family with output current capability of 500 mA/300 mA/150 mA respectively
IFX1050, IFX1021 *	Transceivers	High-speed CAN transceiver/LIN transceiver
TLI4970	Current sensor	600 V functional isolation, ± 50 A
2EDNxxxR/R	EiceDRIVER™ 2EDN gate driver ICs	Dual-channel, low-side, non-isolated
1EDxxx12AF/MF, 1ED31xxMU12H	EiceDRIVER™ 1ED Compact gate driver	1200 V, single-channel, isolated driver with Miller clamp or separate output
1ED-F2, 2ED-F2, 1ED34x1MU12M	EiceDRIVER™ Enhanced	1200 V, single-channel, galvanic isolated driver with DESAT, Miller clamp, Soft-off
2ED24427N01F *	EiceDRIVER™ low side gate driver	10 A dual low side gate driver with DSO-8 thermal pad package
IR2214SS, 2ED21xxS06F	EiceDRIVER™ level shift gate driver	1200 V/650 V half-bridge gate driver for IGBTs and MOSFETs

Wireless charging

Wireless methods for power transfer to charge the batteries of electric vehicles are gaining attention. Several concepts for wireless power transfer systems have been proposed, which in general seek to compensate the significant stray inductances on primary and secondary sides of the magnetic couplers by adaptive resonant methods. At the end of 2013, SAE announced a new standard for inductive charging which defined three power levels at 85 kHz. Infineon's CoolMOS™ CFD7, C7, and P7 series along with TRENCHSTOP™ 5 IGBTs, CoolSiC™ diodes, and EiceDRIVER™ gate driver ICs are perfectly suited for driving inductive power transfer systems on the road side which operate inside the 80 to 90 kHz band.



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- 1) in development
 - 2) for external chargers
 - 3) „B“ in product name refers to common-cathode configuration
- * For more information on the product, contact our product support

For more details on the product, click on the part number.

Automotive products for the car side * *

Part number	Product family	Description
1ED02012FA2	Automotive EiceDRIVER™	Single-channel isolated driver for 650 V/1200 V IGBTs and MOSFETs
1ED02012FTA	Automotive EiceDRIVER™	Single-channel isolated driver, two-level turn-off for 650 V/1200 V IGBTs
2ED02012FA	Automotive EiceDRIVER™	Dual-channel isolated driver for 650 V/1200 V IGBTs and MOSFETs
IPx65RxxCFDA	CoolMOS™	650 V MOSFET with integrated fast body diode
TC23xL, TC26xD	AURIX™	32-bit lockstep microcontroller
TLF35584 1)	OPTIREG™ PMIC	ISO26262 – system-supply optimized for AURIX™
TLE9250, TLE9251	CAN FD transceiver	High-speed automotive CAN transceiver with 5 Mbps
TLE9461, TLE9471	Automotive system basic chips	High integrated solution for microcontroller supply and communication
TLS810, TLS850, TLS105	OPTIREG™ Linear	Automotive linear voltage regulators

Industrial products for the road side * *

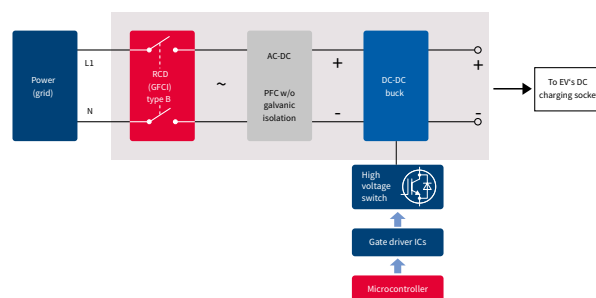
Part number	Product family	Description
IPW60R031CFD7	CoolMOS™ CFD7 SJ MOSFET	600 V MOSFET, 31 mΩ, TO-247
IPW60R040C7	CoolMOS™ C7 SJ MOSFET	600 V MOSFET, 40 mΩ, TO-247
IPW60R037P7	CoolMOS™ P7 SJ MOSFET	600 V MOSFET, 37 mΩ, TO-247
IKW40N65F5	TRENCHSTOP™ 5 IGBTs	Fast IGBT with Rapid 1 diode, 40 A, TO-247
IGW40N65F5	TRENCHSTOP™ 5 IGBTs	Fast IGBT, single, 40 A, TO-247
IDW40G65C5	CoolSiC™ diode	650 V SiC Schottky diode generation 5, 40 A, TO-247 ²⁾
XMC4000	XMC™ microcontroller	32-bit Arm® Cortex® -M4F microcontrollers, up to 125 °C ambient temperature
IFX1763, IFX54441	Linear voltage regulators	Linear voltage regulator family with output current capability of 500 mA or 300 mA respectively
TLI4970	Current sensor	600 V functional isolation, ± 50 A
2ED21xxS06F	EiceDRIVER™ SOI gate driver	650 V half-bridge gate driver for IGBTs and MOSFETs
1EDxxl12AF/MF, 1ED31xxMU12H	EiceDRIVER™ 1ED Compact gate driver IC	1200 V, single-channel, isolated driver with Miller clamp or separate output

Charger concepts without galvanic isolation of the power stages

Transformerless designs, without galvanic isolation inside the power stages, are economic and efficient. But enhanced safety measures may be required to operate such designs from standard AC-grid power outlets. Type-B RCD (GFCI) safety switches are needed on the grid side to immediately break the circuit in case an unintended feedback of DC-voltage from the HV-battery into the AC-grid occurs under worst-case failure conditions, but type-B safety switches on the grid side are not standard by today. The main reason why non-isolated designs are currently not accepted for onboard chargers is because the level of safety measures on the grid side of the charging spot is uncertain. However, inside an off-board charger installation with an integrated type-B safety switch, the use of non-isolated concepts may be indicated. To highlight their opportunities, Infineon has investigated non-isolated concepts, built and evaluated laboratory demonstrators of single-phase 3 kW chargers without galvanic isolation inside the power stages.

Concept demonstrator³⁾ of lean and efficient off-board DC-charger without galvanic isolation

- › Input 230 V/50 Hz single-phase AC
- › Output 220 V-390 V_{DC}, max. power 3.3 kW at 350 V with 96.2 percent efficiency



Industrial products for the road side

Part number	Product family	Description
ICE3PCS01G	Integrated controller	For active CCM PFC, DSO 14-pin
IPW65R019C7	CoolMOS™ C7 SJ MOSFET	650 V MOSFET, 19 mΩ, TO-247
IKW40N65H5	TRENCHSTOP™ 5 IGBT	650 V fast IGBT with Rapid 1 diode, 40 A, TO-247
IKW50N65EH5	TRENCHSTOP™ 5 IGBT	650 V fast IGBT with Rapid 1 diode, 50 A, TO-247
IDW30G65C5	CoolSiC™ diode	650 V SiC Schottky diode generation 5, 30 A, TO-247
TLI4970	Current sensor	600 V functional isolation, ± 50 A
1EDxxl12AF/MF, 1ED31xxMU12H	EiceDRIVER™ 1ED Compact gate driver	1200 V, single-channel, isolated driver with Miller clamp or separate output
2ED24427N01F *	EiceDRIVER™ low side gate driver	10 A dual low-side gate driver with DSO-8 thermal pad package

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- 1) In development
- 2) Automotive version under consideration
- 3) More detailed information about this demonstrator is available upon request

* For more information on the product, contact our product support
 ** Available in different current ratings

For more details on the product, click on the part number.

Best solution for battery management

An intelligent battery management system (BMS) is necessary to sustain battery performance throughout its entire lifetime – the challenge there is to tune the utilization of each battery cell individually. Passive cell balancing is the default approach where the weakest of the cells sets the limits for battery lifetime and cruising range. Infineon's microcontrollers and sensors, in combination with our power devices, enable active cell balancing while charging and discharging. An active cell balancing system helps to increase the effective cruising range and the battery lifetime by 5 to 10 percent, compared to passive balancing. In this context, highlights are our 8-bit XC886CM microcontroller family for the slave blocks and the new 32-bit AURIX™ microcontroller family for the master block, OptiMOS™ low voltage MOSFETs, automotive CAN transceivers TLE9250, TLE9251, as well as brand new OPTIREG™ PMIC TLF35584 to enable safety level up-to ASIL-D.

Main switch

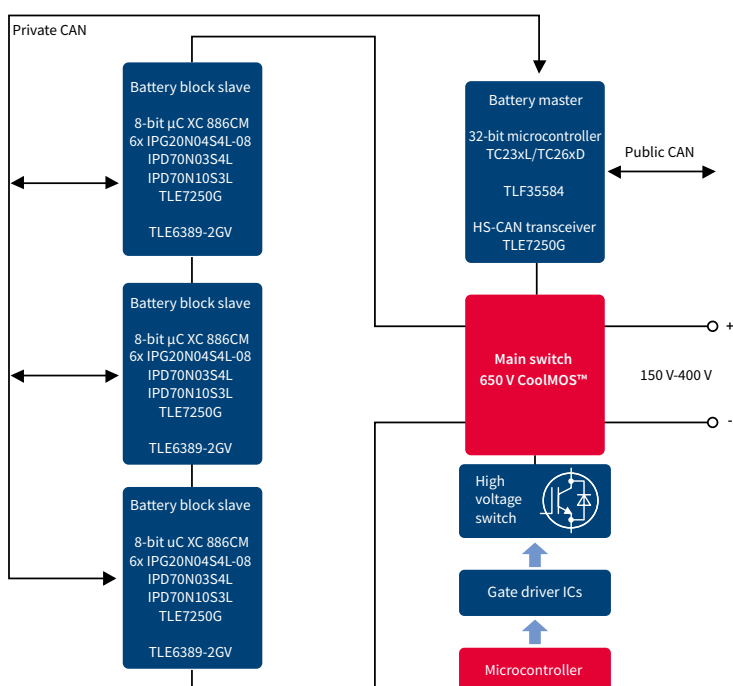
Part number	Product family	Description
IPx65RxxxCFDA	CoolMOS™ CFDA	650 V SJ MOSFET with integrated fast body diode

Battery master

Part number	Description
TC23xL, TC26xD	32-bit AURIX™ lockstep microcontrollers
TLF35584	ISO26262 – system-supply optimized for AURIX™
TLE9250, TLE9251	High-speed automotive CAN transceiver with 5 Mbps
TLE9461, TLE9471	High integrated Solution for Microcontroller supply and communication

Battery slave

Part number	Description
XC886CM	8051-compatible 8-bit automotive microcontroller
TLF35584	ISO26262 – system-supply optimized for AURIX™
TLE9250, TLE9251	High-speed automotive CAN transceiver with 5 Mbps
TLE9461, TLE9471	High integrated Solution for Microcontroller supply and communication
IPG20N04S4L	OptiMOS™-T2 power transistor, logic level, dual, 40 V/8.2 mW
IPD70N03S4L	OptiMOS™-T2 power transistor, logic level, 30 V/4.3 mW
IPD70N10S3L	OptiMOS™-T2 power transistor, logic level, 100 V/11.5 mW





Light electric vehicles and forklift

e-Bike, e-Scooter, e-Rickshaw, LSEV, e-forklift

Light electric vehicles (LEV) are viable options for daily commute. Started with Asia, now moving towards Europe and Americas, the increasingly wide spread of e-kick scooter, e-bike, e-scooter, e-motorcycle, e-rickshaw, as well as low speed electric vehicles, also referred to as neighborhood EV (NEV) are spotted all around the world. Electrification with lithium batteries gives hardware overhaul to some of the existing designs built with lead-acid batteries. With the state-of-art battery technology, LEV manufacturers are launching premium vehicles requiring technologies that enable longer distance per charge, fast charge in various speed class up to 100 km/hr.

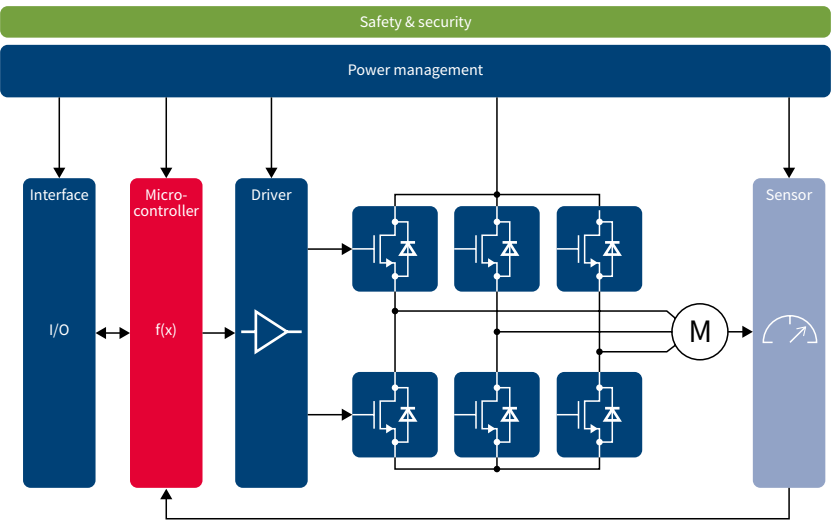
On the other hand, electric forklifts (class I, II, and III) lift loads up to 10 tones while maintaining 4.83 kilometers per hour on 20° incline for 2 minutes. The faster the LEV and the higher load a LSEV or forklift has to carry, the stronger the motor and the motor controller has to be. This requires multiple best-in-class, MOSFETs with lowest on-resistance gathering together in parallel to generate sufficient power.

Infineon’s industrial grade OptiMOS™ and StrongIRFET™ MOSFETs product families consider light electric vehicles mission profile within its qualification process. They provide industry-leading on-resistance as well as robustness against critical conditions (short circuit conditions, hard commutation ruggedness, and instantaneous peak power tolerance). Both product families come with a broad range of voltage classes spreading from 25 V to 300 V with multiple $R_{DS(on)}$ classes to choose from. OptiMOS™ devices are designed for best performance in paralleling operation while StrongIRFET™ devices have great mix between performance and robustness.

Infineon offering and customer benefits

Infineon offering	Customer benefits
Lowest on-resistance $R_{DS(on)}$	Highest power density and BOM cost reduction
Lowest power consumption during operation	Increased battery operating time
Track record of reliability and quality	Prolonged lifetime
Complete portfolio	Enabled scalability
Complete design support with simulations, documentation and demonstration boards for high end solution available	Shortened development cycle

Application diagram



www.infineon.com/lev

For more details on the product, click on the part number.

Highlight/ recommended product portfolio – electric bike and electric kick scooter

Functional block	Product category	Product family	Part number
Motor control	MOSFETs	OptiMOS™ power MOSFET 60 V	IPT007N06N
			BSC039N06NS
		HEXFET™ power MOSFET 60 V	IRFS3006TRL7PP
			IRFH7545TRPBF
		HEXFET™ power MOSFET 75 V	IRFB3607PBF
		OptiMOS™ 5 power MOSFET 80 V	IPT029N08N5
			IPP052N08N5
		OptiMOS™ 5 power MOSFET 100 V	IPT015N10N5
			IPB017N10N5
		OptiMOS™ 3 power MOSFET 100 V	IPB042N10N3
		OptiMOS™ 5 power MOSFET 150 V	IPB048N15N5
		HEXFET™ power MOSFET 200 V	IRFP4668PBF
	Gate driver ICs	EiceDRIVER™ 650 V half-bridge SOI gate driver IC with integrated bootstrap diode	2ED2106S06F
			2ED2182S06F
		EiceDRIVER™ 200 V three-phase SOI driver IC with integrated bootstrap diode	6EDL04N02PR
		EiceDRIVER™ 200 V half-bridge gate driver IC	IRS2005/7/8M, IRS2011S
		EiceDRIVER™ single-channel gate driver IC	1EDN7550
	Voltage regulator	Monolithic integrated voltage regulator	IFX21004TN
	Sensors	XENSIV™ integrated Hall effect switch	TLE4964-1M
		XENSIV™ 3D magnetic sensor	TLE493DW2B6Ax
	Motor control IC	iMOTION™ digital motor controller	IMC101T-F064
	Microcontrollers	3-Phase Bridge Driver IC with Integrated Arm® Cortex® M3	TLE9877QXW40
		XMC1400 series	XMC1404-F064X0200
Battery management	MOSFETs	OptiMOS™ 5 100 V	IPT015N10N5
		OptiMOS™ 3 100 V	IPT020N10N3
Safety and security	Security chip	OPTIGA™ Trust B	SLE 95250

Highlight/ recommended product portfolio – electric scooter, LSEV and forklift

Functional block	Product category	Product family	Part number
Motor control	MOSFETs	OptiMOS™ 5 power MOSFET 80 V	IPT012N08N5
		OptiMOS™ 3 power MOSFET 80 V	IPB019N08N3 G
		OptiMOS™ 5 power MOSFET 100 V	IPT015N10N5
			IPB027N10N5
			IPP051N15N5
		HEXFET™ power MOSFET 100 V	IRFB4110
		OptiMOS™ 5 power MOSFET 150 V	IPB044N15N5
		OptiMOS™ Fast Diode (FD) power MOSFET 200 V	IPB156N22NFD
		OptiMOS™ 3 power MOSFET 200 V	IPB107N20N3 G
		StrongIRFET™ power MOSFET 200 V	IRF200S234
	Gate driver ICs	EiceDRIVER™ 1ED Compact 1200 V isolated gate driver	1EDI20N12AF
			1ED3122MU12H *
		EiceDRIVER™ 650 V/600 V, half-bridge/high-side	2ED2106S06F
			2ED2182S06F
			IRS2127S
		EiceDRIVER™ single-channel gate driver IC	1EDN7550
		EiceDRIVER™ reinforced isolated gate driver IC	2EDS8265H
			2EDS8165H
	600V MOSFETs and IGBTs	600 V CoolMOS™ CFD7 power MOSFET	IPW60R018CFD7
		600 V DuoPack IGBT (TRENCHSTOP™ Performance) with RAPID 1 fast anti-parallel diode	IKW30N60DTP
		600 V DuoPack IGBT with RAPID 1 fast anti-parallel diode	IKW50N60DTP
	Voltage regulators	Monolithically integrated w/ dual output: 5 V and 15 V	IFX21004TN V51
		OPTIREG™ Tracker	TLS115D0EJ
	Sensor	XENSIV™ integrated Hall effect switch	TLE4964-1M
	Microcontrollers	XC2000 family	SAK-XC2365B-40F80LR AB
		XMC4300	XMC4300-F100K256
Battery Management	MOSFET	OptiMOS™ 5 150 V	IPB044N15N5
		OptiMOS™ 3 150 V	IPB059N15N3 *
Safety & Security	Security chip	OPTIGA™ Trust B	SLE 95250
Air-conditioning	MOSFETs	HEXFET™ power MOSFET 200 V	IRFP4668PBF
		StrongIRFET™ power MOSFET 200 V	IRF200P222
	Gate driver IC	600 V three phase gate driver IC for IGBTs and MOSFETs	6EDL04I06PT



Multicopter

Reliable and cost-effective solutions to support future design trends

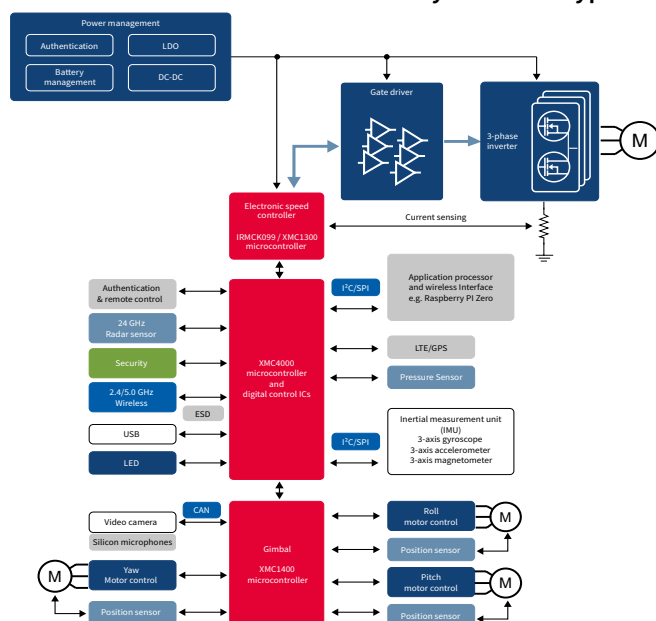
Infineon's comprehensive portfolio of high quality products allows designers to rapidly design, develop, and deploy systems that address the ever more demanding needs of today's customers. We offer a near system solution – everything from XMC™ microcontrollers, to iMOTION™ motor control ICs, to magnetic sensors and many other cutting-edge technologies – with the exception of one commodity, an IMU (inertial measurement unit) for existing solutions. In the very fast growing multicopter market, energy efficiency and reliability are becoming more important. Camera applications, autonomous flying and sophisticated onboard equipment are pushing the limits of power management and reliability. With increased adoption comes increased regulation and the multicopter itself needs to be capable of being piloted in a safe and well-controlled manner. Being a recognized leader in automotive and industrial power electronic systems, Infineon offers high quality system solutions for the next generation of multicopters and enables customers to achieve a higher degree of innovation and differentiation.

Features and benefits

Key features
Development effort and cost reduction
Authentication
Ease-of-precision control for flight and data
Longer flight times
Collision avoidance
Altitude stabilization
Broader portfolio
Fast time-to-market

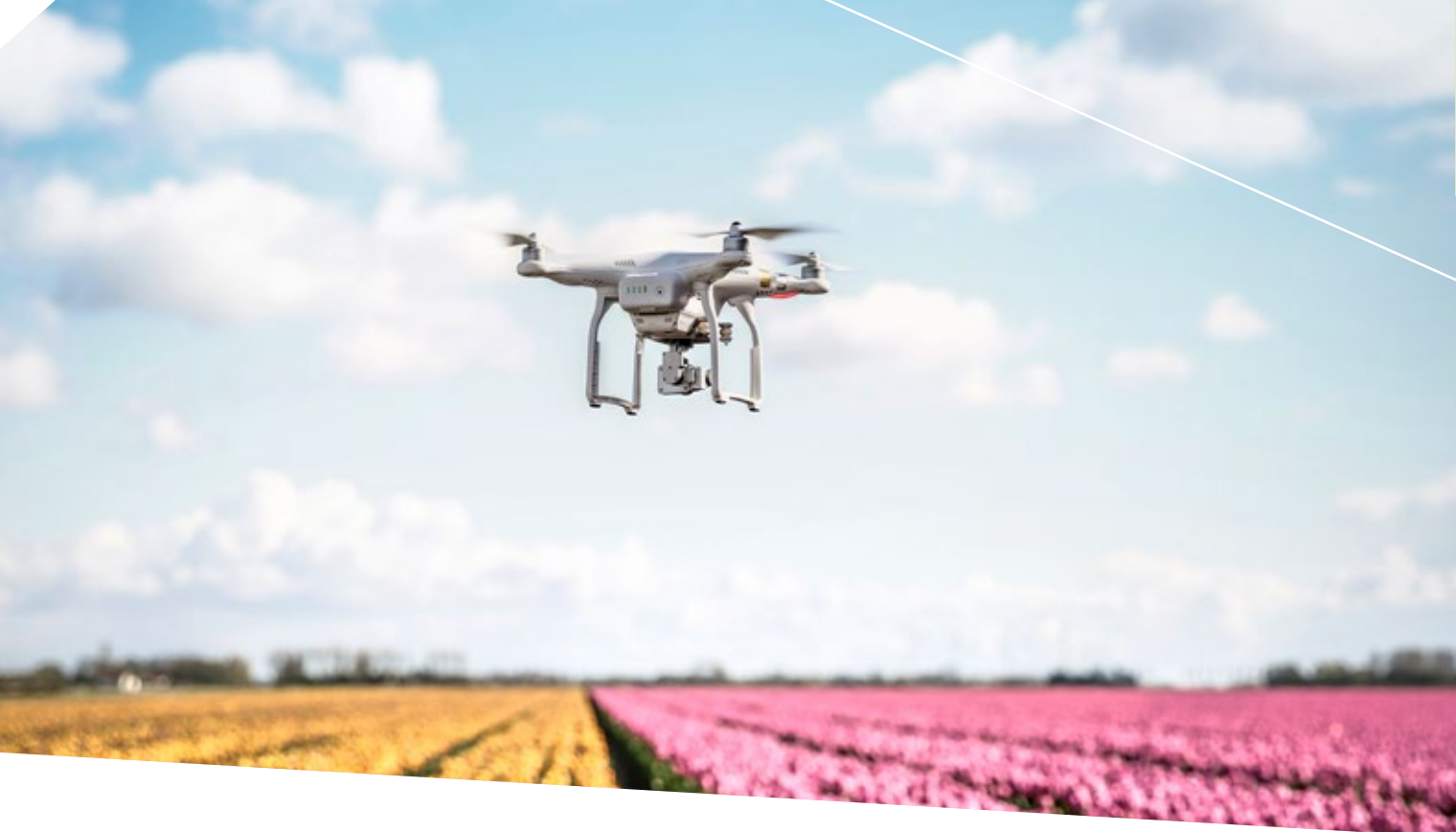
Key benefits
With no or little experience in motor control, customers can implement the iMOTION™ motor control IC and take flight
Project development can be reduced up to 30 percent by using reference designs and the DAVE™ platform for microcontroller programming
Infineon's solutions enable authentication of components connected to the system
Guaranteed safety and protection of the product, avoiding liability
Through the benefits of multifunction sensors, the user can experience an easy, stable, smooth and accurate control of the multicopter
Closed loop control of gimbal motor, sensors enhanced camera stability and data transmission when recording video
The highly efficient components and effective flight control can make the multicopter lighter, which results in longer flight time
XENSIV™ 24 GHz radar sensors have the capability of detecting the proximity of objects such as trees, buildings, etc.
The miniaturized digital barometric air pressure sensors based on capacitive technology guarantee high precision during temperature changes
Infineon can provide all the necessary critical semiconductor components for multicopters
A complete eco-system of simulations, documentation and demoboard solutions enables a faster time-to-market

Overview of the main electronic subsystems of a typical multicopter design



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For more details on the product, click on the part number.




Solution tree for multicopters

Flight control					ESC		
Microcontroller	Sensor	DC-DC module	LDO	Low noise amplifier(LNA)	Microcontroller	Sensor	Intelligent power module
<div>> XMC4000 family</div> <div>> XMC1000 family</div> <div>> AURIX™</div>	<div>> XENSIV™ pressure sensor: DPS310</div> <div>> XENSIV™ 24 GHz radar sensor: BGT24MR</div> <div>> Current sensor: TLI4970</div>	<div>> IFX90121ELV50</div> <div>> IFX91041EJV33</div> <div>> IFX91041EJV50</div>	<div>> IFX1117ME</div> <div>> IFX54441EJV</div> <div>> IFX1763XEJV33</div>	<div>> LTE: BGA7H, BGA7M, BGA7L</div> <div>> GPS: BGA524N6, BGA824N6</div> <div>> Wi-Fi: BFP842ESD, BFR840L3RHESD, BFR843L3 **, etc.</div>	<div>> XMC1300 family</div> <div>> iMOTION™ IRMCK099</div> <div>> ePOWER: TLE987x</div>	<div>> Hall sensor: TLI4961, TLV4961</div> <div>> Angle sensor: TLI5012B, TLE5009</div>	<div>> IRSM005-800MH</div> <div>> IRSM836-084MA</div>
Security	Accessory authentication	Joystick	Interface protection diode	LED driver	MOSFET gate driver	Dual n-channel power MOSFETs	Low voltage MOSFETs
<div>> OPTIGA™ Trust E SLS 32AIA</div> <div>> OPTIGA™ Trust P SLJ 52ACA **</div> <div>> OPTIGA™ TPM SLB 96XX</div>	<div>> OPTIGA™ Trust SLS 10ERE **</div> <div>> OPTIGA™ Trust B SLE 95250</div> <div>> OPTIGA™ Trust X SLS 32AIA</div>	<div>> 3D magnetic sensor: TLV493D</div>	<div>> ESD102 series</div>	<div>> BCR450</div> <div>> BCR321U</div> <div>> BCR421U</div>	<div>> IRS2301S</div> <div>> 6EDL04N02P</div> <div>> IRS23365</div> <div>> PX3517</div>	<div>> IR3742 **, etc.</div> <div>> BSC0925ND, etc.</div>	<div>> OptiMOS™ 5 series</div> <div>> StrongIRFET™ series</div>
Charger				Battery management			
High voltage MOSFETs	Low voltage MOSFETs	Stand alone PWM controller	Authentication ICs	Cell balancing	Low voltage MOSFETs		
<div>> 600 V CoolMOS™ P7 *</div>	<div>> OptiMOS™ 5 40-80 V in TO-220, SuperSO8</div> <div>> StrongIRFET™ 40-75 V</div>	<div>> ICE2QS03G</div>	<div>> OPTIGA™ Trust B SLE 95250</div>	<div>> OptiMOS™ 30 V in SS08, S308, DirectFET™</div> <div>> StrongIRFET™ 30 V</div>	<div>> OptiMOS™ 5 in SuperSO8, S308, DirectFET™</div> <div>> StrongIRFET™ 40-80 V</div>		
Gimbal control							
Microcontrollers	Angle sensor	LDO	CAN transceiver	Low voltage MOSFETs	Dual n-channel power MOSFETs	MOSFET gate driver	
<div>> XMC1400 family</div>	<div>> TLI5012B</div> <div>> TLE5009</div>	<div>> IFX1117ME</div> <div>> IFX54441EJV</div> <div>> IFX1763XEJV33</div>	<div>> HS CAN IFX1050G **</div> <div>> IFX1050GVIO</div>	<div>> OptiMOS™ 5 25-30 V</div> <div>> StrongIRFET™ 25-30 V</div>	<div>> IRFHM8363TRPBF, etc.</div>	<div>> IR2101STRPBF, etc.</div>	

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*If the necessary package/ $R_{DS(on)}$ combination is not available in the new CoolMOS™ P7 series yet, the previous CoolMOS™ CE and P6 series are the preferred series

**For more information on the product, contact our product support

For more details on the product, click on the part number. 



20-300 V MOSFETs

- › 20-300 V MOSFETs N-channel power MOSFETs technology development and product family positioning
- › Guidance for applications and voltage classes
- › Space-saving and high performance packages
- › Discrete and integrated packages
- › OptiMOS™ Source-Down power MOSFETs 25-150 V
- › OptiMOS™ Linear FET
- › OptiMOS™ 6 power MOSFETs 40 V
- › Small signal/small power MOSFETs 250-600 V
- › Product portfolio
- › Nomenclature



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

Applications

OptiMOS™ and StrongIRFET™

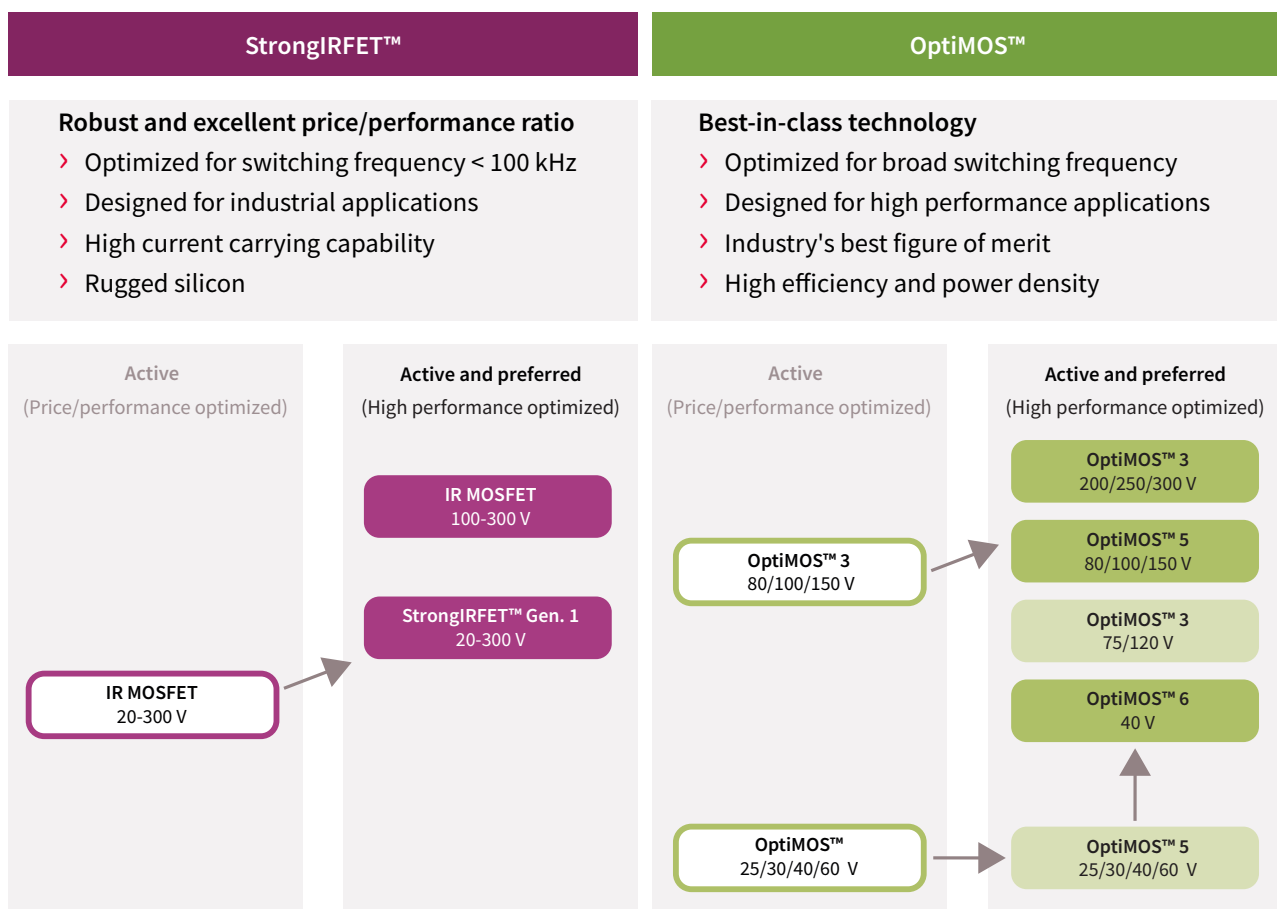
20-300 V N-channel power MOSFETs

Infineon's semiconductors are designed to bring greater efficiency, power density and cost-effectiveness. The full range of OptiMOS™ and StrongIRFET™ power MOSFETs enables innovation and performance in applications such as switch mode power supplies (SMPS), battery powered applications, motor control and drives, inverters, and computing.

Infineon's highly innovative OptiMOS™ and StrongIRFET™ families consistently meet the highest quality and performance demands in key specifications for power system designs such as on-state resistance ($R_{DS(on)}$) and figure of merit (FOM).

OptiMOS™ power MOSFETs provide best-in-class performance. Features include ultralow $R_{DS(on)}$, as well as low charge for high switching frequency applications. StrongIRFET™ power MOSFETs are designed for drives applications and are ideal for designs with a low switching frequency, as well as those that require a high current carrying capability.

Technology development and product family positioning





Infineon's power MOSFET 20-300 V product portfolio is divided into „active and preferred“, referring to the latest technology available offering best-in-class performance, and „active“, consisting of well-established technologies which complete this broad portfolio.

OptiMOS™ 6 power MOSFETs 40 V are the newest addition to the OptiMOS™ product family available either in SuperSO8 or PQFN 3.3 x 3.3 packages. This technology is the perfect solution when best-in-class (BiC) products and high efficiency over a wide range of output power are required. For other voltage classes, from 25 V up to 150 V, OptiMOS™ 5 represents the latest generation in the market, offering either best-in-class (BiC) or price/performance solutions. For high frequency applications, the product portfolio is complemented by OptiMOS™ 3 power MOSFETs 40/60 V as standard components. The „active and preferred“ OptiMOS™ 3 power MOSFETs 75/120 V, as well as 200/250/300 V is the best fit portfolio either in low- or high-frequency applications with a range of products covering from BiC to standard parts.







StrongIRFET™ Gen. 1 is recommended for 20-300 V applications when the the BiC performance is not essential and the cost is a more significant consideration.







Guidance for applications and voltage classes

OptiMOS™ and StrongIRFET™ portfolio, covering 20 up to 300 V MOSFETs, can address a broad range of needs from low- to high-switching frequencies. The tables below provide a guidance on the recommended OptiMOS™ or StrongIRFET™ products for each major sub-application and voltage class.

Recommended voltage			20 V to 30 V	40 V	60 V	75 V to 80 V	100 V	135 V to 150 V	200 V	250 V	300 V
Battery powered	Low power Power tools, Multi-copter, Battery, Industrial Drives	OptiMOS™	✓	✓	✓	✓					
		StrongIRFET™	✓	✓	✓	✓					
	High power (LEV, LSEV)	OptiMOS™			✓	✓	✓	✓	✓		
		StrongIRFET™			✓	✓	✓	✓	✓		
Inverters	Solar	OptiMOS™			✓	✓	✓	✓			
		StrongIRFET™			✓	✓	✓				
	Online UPS	slow switching									
		OptiMOS™	✓	✓	✓	✓	✓	✓	✓	✓	✓
		StrongIRFET™	✓	✓	✓	✓	✓	✓	✓	✓	✓
		fast switching									
		OptiMOS™	✓	✓	✓	✓	✓	✓	✓	✓	✓
		StrongIRFET™	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Offline UPS	OptiMOS™		✓	✓						
		StrongIRFET™		✓	✓						
SMPS	Adapter / Charger	OptiMOS™		✓	✓	✓	✓				
		StrongIRFET™		✓	✓	✓	✓				
	PC Power	OptiMOS™		✓	✓						
		StrongIRFET™		✓	✓						
	LCD TV	OptiMOS™			✓	✓	✓				
		StrongIRFET™			✓	✓	✓				
	Server	OptiMOS™		✓	✓	✓					
		StrongIRFET™		✓	✓	✓					
	AC-DC	OptiMOS™				✓	✓	✓	✓		
		StrongIRFET™				✓	✓				
	Telecom	OptiMOS™	✓	✓	✓	✓	✓	✓			
		StrongIRFET™	✓	✓	✓	✓	✓				

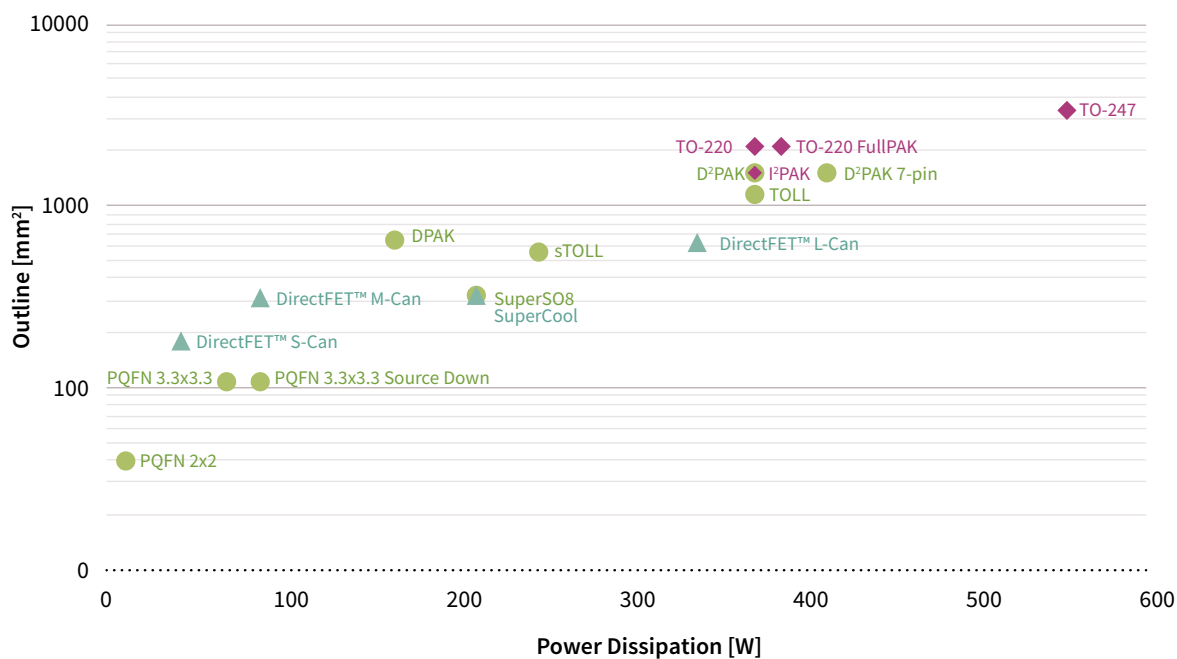
Space-saving and high performance packages

	TO-247	TO-220	TO-220 FullPAK	D ² PAK	D ² PAK 7-pin	TO-Leadless
						
Optimized for high power applications and high current capability						
Height [mm]	5.0	4.4	4.5	4.4	4.4	2.3
Outline [mm]	40.15 x 15.9	29.5 x 10.0	29.5 x 10.0	15.0 x 10.0	15.0 x 10.0	11.68 x 9.9
Thermal resistance R_{thJC} [K/W]	2.0	0.5	2.5	0.5	0.5	0.4

	SuperSO8	Power Block	PQFN 3.3 x 3.3 Source-Down	PQFN 3.3 x 3.3	PQFN 2 x 2	DirectFET™
						
	For highest efficiency and power management	Significant design shrink	High power density and performance	For highest efficiency and power management	Enables significant space saving	Best thermal behavior in a tiny footprint
Height [mm]	1.0	1.0	1.0	1.0	0.9	Small: 0.65 Medium: 0.65 Large: 0.71
Outline [mm]	5.15 x 6.15	5.0 x 6.0	3.3 x 3.3	3.3 x 3.3	2.0 x 2.0	Small: 4.8 x 3.8 Medium: 6.3 x 4.9 Large: 9.1 x 6.98
Thermal resistance R_{thJC} [K/W]	0.8	1.5	1.4	3.2	11.1	0.5

Discrete and integrated packages




OptiMOS™ and StrongIRFET™ technologies are available in different packages to address demands for higher current carrying capability and significant space saving. The broad portfolio enables footprint reduction, boosted current rating and optimized thermal performance. While the surface mount leadless devices are enabled for footprint reduction, through-hole packages are characterized by a high power rating. Furthermore, Infineon offers innovative packages such as DirectFET™ and TO-Leadless. DirectFET™ is designed for high frequency applications by offering the lowest parasitic resistance. This package is available in three different sizes: small, medium and large. TO-Leadless is optimized to dissipate power up to 375 W, increasing power density with a substantial reduction in footprint.

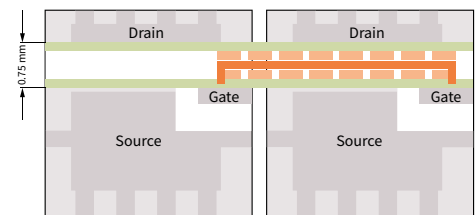


OptiMOS™ Source-Down power MOSFETs 25-150 V

An innovative PQFN 3.3x3.3 mm product family

Once again Infineon sets the standard in MOSFET performance with the new Source-Down package supporting the requirement for high power density and optimized system level efficiency. In contrast to a Drain-Down device, in Source-Down technology, we connect the source potential to the thermal pad (Figure 1). We go even further with the Source-Down Center-Gate footprint. Here the gate-pin is moved to the center supporting easy parallel configuration of multiple MOSFETs. With the larger drain-to-source creepage distance, the gates of multiple devices can be connected on a single PCB layer (Figure 2).

	Standard Drain-Down	New Source-Down	
			
	PQFN 3.3 x 3.3 mm standard Drain-Down footprint	PQFN 3.3 x 3.3 mm Standard-Gate Source-Down footprint	PQFN 3.3 x 3.3 mm Center-Gate Source-Down footprint
R_{thJC} [C/W]	1.8	1.4	1.4



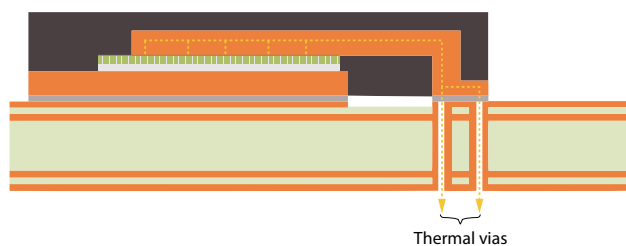
Features and benefits

Key features	Key benefits
Major reduction in $R_{DS(ON)}$, up to 30% due to larger silicon die in same package outline	High current capability
Superior thermal performance in R_{thJC}	More efficient use of real estate
Optimized layout possibilities	High power density and performance
Standard-Gate and Center-Gate footprint	Optimized footprint for MOSFET parallelization with center gate
MSL1 rated	System cost reduction

Optimized thermal management

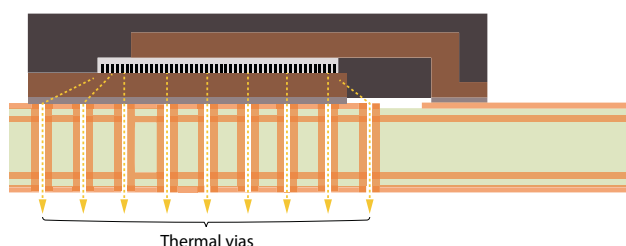
Drain-Down

PQFN 3.3 x 3.3 mm



Source-Down

PQFN 3.3 x 3.3 mm



In the Source-Down concept, the heat is dissipated directly into the PCB through a thermal pad instead of over the bond wire or the copper clip (Figure 3).

- › Significantly improves the thermal resistance (R_{thJC}) of this product family
- › In most cases, thermal vias cannot be used on the thermal pad if it is connected to the noisy switch node potential
- › With Source-Down, the thermal pad of the low-side MOSFET is now on the ground potential enabling the use of thermal vias right underneath the device
- › Considerably improves the thermal performance and the power density in the end application

www.infineon.com/PQFN-3-source-down



For more details on the product, click on the part number.

OptiMOS™ Linear FET

Combining low on-state resistance ($R_{DS(on)}$) with wide safe operating area (SOA)

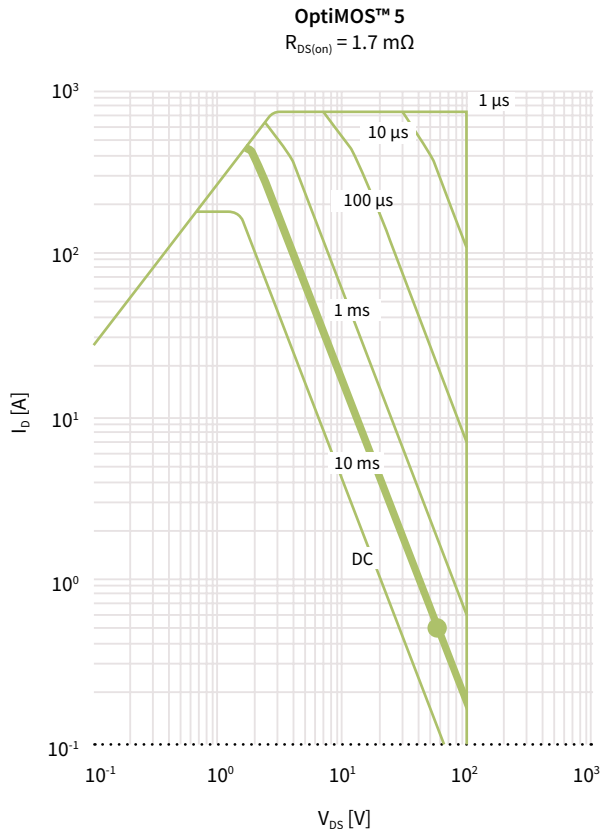
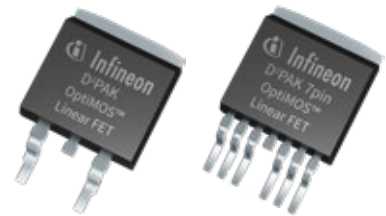
OptiMOS™ Linear FET is a revolutionary approach to avoid the trade-off between on-state resistance ($R_{DS(on)}$) and linear mode capability operation in the saturation region of an enhanced mode MOSFET. It offers the state-of-the-art $R_{DS(on)}$ of a trench MOSFET, as well as the wide SOA of a classic planar MOSFET.

This product is the perfect fit for hot swap and e-fuse applications commonly found in telecom and battery management systems. OptiMOS™ Linear FET prevents damage at the load in case of a short circuit by limiting high inrush currents.

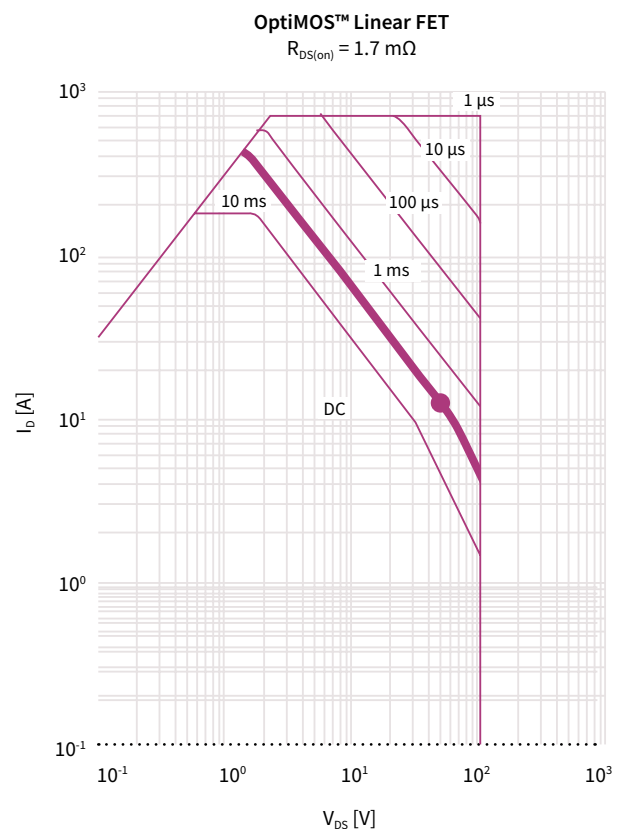
OptiMOS™ Linear FET is currently available in three voltage classes – 100 V, 150 V, and 200 V – in either D²PAK or D²PAK 7-pin packages.

SOA comparison

While the OptiMOS™ 5 power MOSFET 100 V, 1.7 mΩ has an SOA of 0.5 A, the OptiMOS™ Linear FET version at the same $R_{DS(on)}$ offers a much wider SOA of 11.5 A (@ 54 V, 10 ms).



0.5 A @ 54 V
 $t_{\text{pulse}} = 10 \text{ ms}$



11.5 A @ 54 V
 $t_{\text{pulse}} = 10 \text{ ms}$

www.infineon.com/optimos-linearfet

For more details on the product, click on the part number.

OptiMOS™ 6 power MOSFETs 40 V

Next generation of cutting edge MOSFETs

Infiniteon's OptiMOS™ 6 power MOSFET 40 V family offers an optimized solution for synchronous rectification in switched mode power supplies (SMPS) in servers, desktop PCs, wireless and quick chargers. The improved performance in on-state resistance ($R_{DS(on)}$) and figure of merits ($FOM - R_{DS(on)} \times Q_g$ and Q_{gd}) yields an efficiency improvement, allowing easier thermal design and less paralleling, leading to system cost reduction. In addition, the best-in-class $R_{DS(on)}$ makes these devices suitable for ORing circuits.

Infiniteon's market-leading OptiMOS™ 6 power MOSFETs 40 V are available in two different packages:

- SuperSO8 – 5 x 6 mm with $R_{DS(on)}$ ranging from 5.9 mΩ down to 0.7 mΩ
- PQFN 3x3 – 3.3 x 3.3 mm with $R_{DS(on)}$ ranging from 6.3 mΩ down to 1.8 mΩ

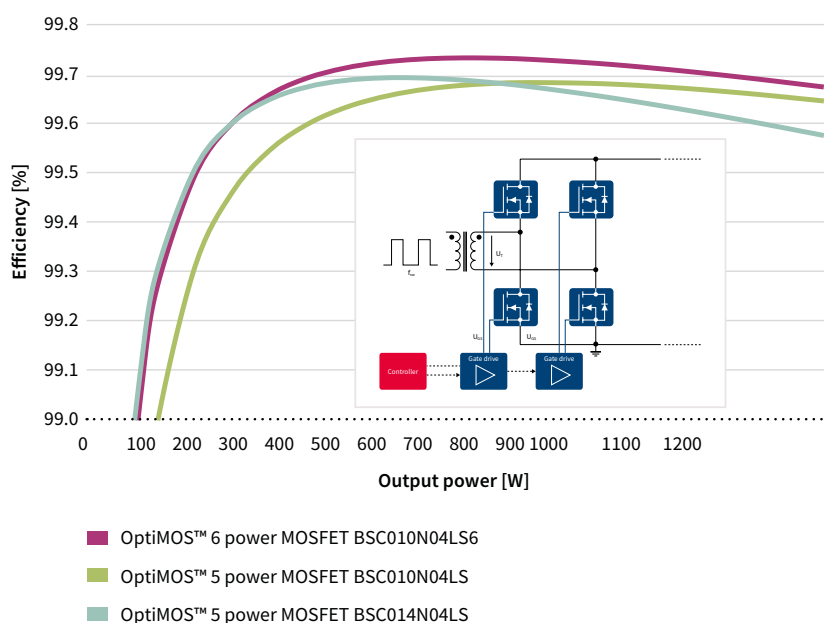


Features and benefits

Key features
Compared to alternative products:
➤ $R_{DS(on)}$ reduced by 30%
➤ Improved FOM $Q_g \times R_{DS(on)}$ by 29%
➤ Improved FOM $Q_{gd} \times R_{DS(on)}$ by 46%
Optimized for synchronous rectification
Suited for ORing circuits
RoHS compliant - halogen free
MSL1 rated

Key benefits
Highest system efficiency and power density
Less paralleling required
Very low voltage overshoot
Reduced need for snubber circuit
System cost reduction

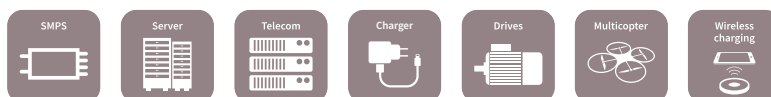
OptiMOS™ 6 40 V combines the best-in-class $R_{DS(on)}$ with the superior switching performance



In SMPS applications, OptiMOS™ 6 is the perfect solution for high efficiency over a wide range of output power, avoiding the trade-off between low and high load conditions.

At the low output power range, where switching losses due to parasitic capacitance in the MOSFET are dominating, OptiMOS™ 6 power MOSFET BSC010N04LS6 achieves the same efficiency as the OptiMOS™ 5 power MOSFET BSC014N04LS at 40% lower $R_{DS(on)}$.

Moreover, compared to the OptiMOS™ 5 power MOSFET 40 V 1.0 mΩ, the OptiMOS™ 6 generation achieves lower switching losses at high load with the same $R_{DS(on)}$. This combination leads to an overall efficiency optimization in low and high load operating points.



Small signal/small power MOSFETs 250-600 V

Combining latest high-performance silicon technology with small and innovative packaging

Small signal/small power products are ideally suited for space-constrained automotive or non-automotive applications. By combining the latest high-performance silicon technology with small and innovative packaging, Infineon's small signal/small power family offers designers more flexibility when it comes to making their power MOSFET selection. The products can be found in almost all applications e.g. battery protection, battery charging, LED lighting, load switches, DC-DC converters, level shifters, low voltage drives and many more.

The entire family includes different packages:

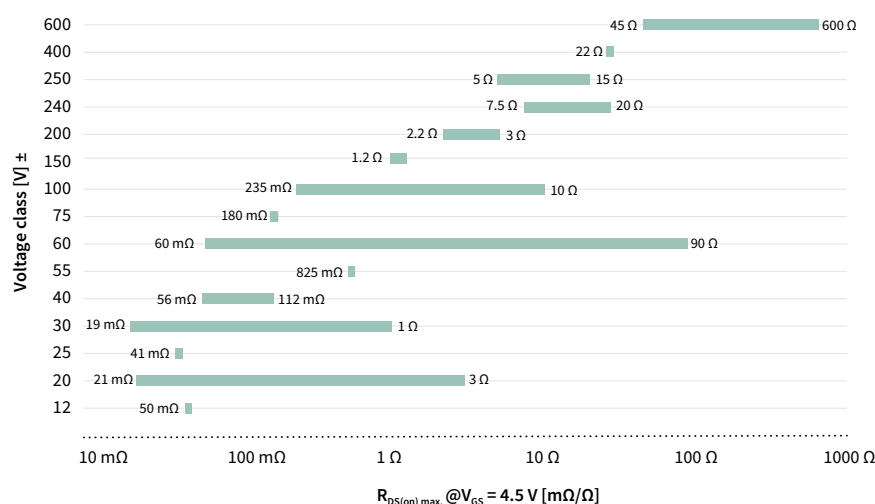
SOT-223, SOT-23, SOT-323, SOT-363, SOT-89, TSOP-6 and SC59

The product portfolio covers N-channel and P-channel enhancement mode MOSFETs as well as N-channel depletion mode products:

- › 20-250 V P-channel enhancement mode (available in single and dual configurations)
- › 20-600 V N-channel enhancement mode (available in single and dual configurations)
- › -20/20 V and -30/30 V complementary (P + N channel) enhancement mode
- › 60-600 V N-channel depletion mode








Key features
Most products qualified to AEC Q101
Four $V_{GS(th)}$ classes available for 1.8 V, 2.5 V, 4.5 V, and 10 V gate drives
ESD protected p-channel parts
V_{DS} range from -250 V to 600 V
RoHS compliant and halogen free

Key benefits
Suitable for automotive and high quality demanding applications
Easy interface to MCU
Reduction of design complexity
Wide selection of products available
Industry standard small outline packages
Environmentally friendly




Small signal/small power MOSFETs are available in seven industry-standard package types ranging from the largest SOT-223 to the smallest SOT-363.

Products are offered in single, dual and complementary configurations and are suitable for a wide range of applications, including battery protection, LED lighting, low voltage drives and DC-DC converters.

	SOT-363	SOT-323	SOT-23	TSOP-6	SC59	SOT-89	SOT-223
							
Package outline [mm²]	4.2	4.2	6.96	7.25	8.4	18	45.5

www.infineon.com/smallsignal

For more details on the product, click on the part number. 



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

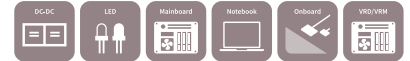
WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

Applications

OptiMOS™ and StrongIRFET™ 20 V (super) logic level



$R_{DS(on)}$ max @ $V_{GS}=10$ V [mΩ]	TO-252 (DPAK)	DirectFET™	PQFN 2 x 2	PQFN 3.3 x 3.3	SuperSO8	SO-8
< 1		IRL6283MTRPBF $R_{DS(on)}=0.65$ mΩ			IRFH6200TRPBF $R_{DS(on)}=0.99$ mΩ	
2-4	IRLR6225TRPBF $R_{DS(on)}=4.0$ mΩ	IRL6297SDTRPBF ** $R_{DS(on)}=3.8$ mΩ; dual		IRLHM620TRPBF *** ¹⁾ $R_{DS(on)}=2.5$ mΩ	BSC026N02KS G $R_{DS(on)}=2.6$ mΩ IRLH6224TRPBF $R_{DS(on)}=3.0$ mΩ	IRF6201TRPBF $R_{DS(on)}=2.45$ mΩ
4-10					BSC046N02KS G $R_{DS(on)}=4.6$ mΩ	IRF3717 $R_{DS(on)}=4.4$ mΩ
> 10			IRLHS6242TRPBF $R_{DS(on)}=11.7$ mΩ IRLHS6276TRPBF ** $R_{DS(on)}=45.0$ mΩ; dual			

OptiMOS™ and StrongIRFET™ 25 V logic level



$R_{DS(on)}$ max @ $V_{GS}=10$ V [mΩ]	DirectFET™	PQFN 2 x 2	PQFN 3.3 x 3.3	SuperSO8	SO-8
< 1	IRF6718L2TRPBF $R_{DS(on)}=0.7$ mΩ BSB008NE2LX $R_{DS(on)}=0.8$ mΩ		IQE006NE2LM5 ³⁾ $R_{DS(on)}=0.6$ mΩ IQE006NE2LM5CG ³⁾ $R_{DS(on)}=0.6$ mΩ BSZ009NE2LS5 $R_{DS(on)}=0.9$ mΩ	BSC004NE2LS5 ²⁾ $R_{DS(on)}=0.9$ mΩ BSC009NE2LS5 $R_{DS(on)}=0.9$ mΩ BSC009NE2LS5I ** $R_{DS(on)}=0.95$ mΩ	
1-2	IRF6898MTRPBF ** $R_{DS(on)}=1.1$ mΩ BSB012NE2LXI ** $R_{DS(on)}=1.2$ mΩ IRF6717MTRPBF $R_{DS(on)}=1.25$ mΩ IRF6894MTRPBF ** $R_{DS(on)}=1.3$ mΩ BSB013NE2LXI ** $R_{DS(on)}=1.3$ mΩ IRF6797MTRPBF ** $R_{DS(on)}=1.4$ mΩ IRF6716M $R_{DS(on)}=1.6$ mΩ IRF6715MTRPBF $R_{DS(on)}=1.6$ mΩ IRF6893MTRPBF ** $R_{DS(on)}=1.6$ mΩ IRF6892STRPBF ** $R_{DS(on)}=1.7$ mΩ IRF6795MTRPBF ** $R_{DS(on)}=1.8$ mΩ		BSZ010NE2LS5 $R_{DS(on)}=1.0$ mΩ BSZ011NE2LS5**** $R_{DS(on)}=1.1$ mΩ BSZ011NE2LS5I $R_{DS(on)}=1.1$ mΩ BSZ013NE2LS5I ** $R_{DS(on)}=1.3$ mΩ BSZ014NE2LS5IF *** $R_{DS(on)}=1.45$ mΩ BSZ017NE2LS5I ** $R_{DS(on)}=1.7$ mΩ BSZ018NE2LS $R_{DS(on)}=1.8$ mΩ BSZ018NE2LSI ** $R_{DS(on)}=1.8$ mΩ	BSC010NE2LS $R_{DS(on)}=1.0$ mΩ BSC010NE2LSI ** $R_{DS(on)}=1.05$ mΩ BSC014NE2LSI ** $R_{DS(on)}=1.4$ mΩ IRFH5250D $R_{DS(on)}=1.4$ mΩ BSC015NE2LS5I ** $R_{DS(on)}=1.5$ mΩ BSC018NE2LS $R_{DS(on)}=1.8$ mΩ BSC018NE2LSI ** $R_{DS(on)}=1.8$ mΩ	
2-4	IRF6714MTRPBF $R_{DS(on)}=2.1$ mΩ BSF030NE2LQ $R_{DS(on)}=3.0$ mΩ BSF035NE2LQ $R_{DS(on)}=3.5$ mΩ IRF6811STRPBF ** $R_{DS(on)}=3.7$ mΩ	ISK024NE2LM5 **** $R_{DS(on)}=2.4$ mΩ	BSZ031NE2LS5 $R_{DS(on)}=3.1$ mΩ BSZ033NE2LS5 $R_{DS(on)}=3.3$ mΩ BSZ036NE2LS $R_{DS(on)}=3.6$ mΩ BSZ037NE2LS5 **** $R_{DS(on)}=3.7$ mΩ BSZ039NE2LS5 **** $R_{DS(on)}=3.9$ mΩ	BSC024NE2LS $R_{DS(on)}=2.4$ mΩ BSC026NE2LS5 $R_{DS(on)}=2.6$ mΩ BSC032NE2LS $R_{DS(on)}=3.2$ mΩ	IRF8252 $R_{DS(on)}=2.7$ mΩ
4-10	IRF6802SD $R_{DS(on)}=4.2$ mΩ IRF6710S2TRPBF $R_{DS(on)}=4.5$ mΩ IRF6712STRPBF $R_{DS(on)}=4.9$ mΩ IRF6810STRPBF ** $R_{DS(on)}=5.2$ mΩ		IRFHM8228TRPBF $R_{DS(on)}=5.2$ mΩ BSZ060NE2LS $R_{DS(on)}=6.0$ mΩ IRFHM8235TRPBF $R_{DS(on)}=7.7$ mΩ	BSC050NE2LS $R_{DS(on)}=5.0$ mΩ	
> 10		IRFHS8242 $R_{DS(on)}=13$ mΩ			

www.infineon.com/powermosfet-12V-300V

* Optimized for resonant applications (e.g. LLC converter)

** Monolithically integrated Schottky-like diode

*** $R_{DS(on)}$ max @ $V_{GS}=4.5$ V

**** For more information on the product, contact our product support

1) 2.5 V_{GS} capable

2) Coming soon

3) Source-Down Center-Gate

For more details on the product, click on the part number.





OptiMOS™ and StrongIRFET™ 25/30 V in Power Stage 3x3 and 5x6



Part number	Package	Monolithically integrated Schottky like diode	BV _{DSS} [V]	R _{DS(on), max.} [mΩ] @ V _{GS} =4.5 V max.		Q _g [nC] @ V _{GS} =4.5 V typ.	
				High-side	Low-side	High-side	Low-side
BSZ0910ND	TISON 3 x 3	–	30	13	13	4.0	4.0
BSZ0909ND	TISON 3 x 3	–	30	25	25	1.8	1.8
BSC0910NDI	TISON 5 x 6	✓	25	5.9	1.6	7.7	25.0
BSC0911ND	TISON 5 x 6	–	25	4.8	1.7	7.7	25.0
BSC0921NDI	TISON 5 x 6	✓	30	7.0	2.1	5.8	21.0
BSC0923NDI	TISON 5 x 6	✓	30	7.0	3.7	5.2	12.2
BSC0924NDI	TISON 5 x 6	✓	30	7.0	5.2	5.2	8.6
BSC0925ND	TISON 5 x 6	–	30	6.4	6.4	5.2	6.7
BSC0993ND	TISON 5 x 6	–	30	7.0	7.0	5.4	6.7

OptiMOS™ and StrongIRFET™ 25/30 V in Power Block 5x6 and 5x4



Part number	Package	Monolithically integrated Schottky like diode	BV _{DSS} [V]	R _{DS(on), max.} [mΩ] @ V _{GS} =4.5 V max.		Q _g [nC] @ V _{GS} =4.5 V typ.	
				High-side	Low-side	High-side	Low-side
BSG0810NDI	TISON 5 x 6	✓	25	4.0	1.2	5.6	16.0
BSG0811ND	TISON 5 x 6	–	25	4.0	1.1	5.6	20.0
BSG0813NDI	TISON 5 x 6	✓	25	4.0	1.7	5.6	12.0

OptiMOS™ and StrongIRFET™ 30 V logic level



$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	TO-252 (DPAK)	TO-263 (D ² PAK)	TO-263 (D ² PAK 7-pin)	TO-220
<1			IPB009N03L G $R_{DS(on)}=0.95\text{ mΩ}$	
1-2		IRLS3813TRLPBF $R_{DS(on)}=1.95\text{ mΩ}$		IRLB3813PBF $R_{DS(on)}=1.95\text{ mΩ}$
2-4	IRLR8743TRPBF $R_{DS(on)}=3.1\text{ mΩ}$	IRFR8314TRPBF $R_{DS(on)}=2.2\text{ mΩ}$		IRLB8314PBF $R_{DS(on)}=2.4\text{ mΩ}$
	IPD031N03L G $R_{DS(on)}=3.1\text{ mΩ}$			IRL3713PBF $R_{DS(on)}=3.0\text{ mΩ}$
		IPB034N03L G $R_{DS(on)}=3.4\text{ mΩ}$		IRLB8743PBF $R_{DS(on)}=3.2\text{ mΩ}$
	IPD040N03L G $R_{DS(on)}=4.0\text{ mΩ}$			IPP034N03L G $R_{DS(on)}=3.4\text{ mΩ}$
4-10	IPD050N03L G $R_{DS(on)}=5.0\text{ mΩ}$	IPB042N03L G $R_{DS(on)}=4.2\text{ mΩ}$		IPP042N03L G $R_{DS(on)}=4.2\text{ mΩ}$
	IRLR8726TRPBF $R_{DS(on)}=5.8\text{ mΩ}$	IPB055N03L G $R_{DS(on)}=5.5\text{ mΩ}$		IRLB8748PBF $R_{DS(on)}=4.8\text{ mΩ}$
	IPD060N03L G $R_{DS(on)}=6.0\text{ mΩ}$	IPB065N03L G $R_{DS(on)}=6.5\text{ mΩ}$		IPP055N03L G $R_{DS(on)}=5.5\text{ mΩ}$
	IPD075N03L G $R_{DS(on)}=7.5\text{ mΩ}$	IPB080N03L G $R_{DS(on)}=8.0\text{ mΩ}$		IRL8113PBF $R_{DS(on)}=6.0\text{ mΩ}$
	IRLR8729TRPBF $R_{DS(on)}=8.9\text{ mΩ}$			IRLB8721PBF $R_{DS(on)}=8.7\text{ mΩ}$
	IPD090N03L G $R_{DS(on)}=9.0\text{ mΩ}$			
	IPD135N03L G $R_{DS(on)}=13.5\text{ mΩ}$			
	IRLR3103 $R_{DS(on)}=19.0\text{ mΩ}$			

OptiMOS™ and StrongIRFET™ 30 V logic level



$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	DirectFET™	PQFN 3.3 x 3.3	SuperSO8	TO-Leadless
<1			BSC005N03LS5 * $R_{DS(on)}=0.5\text{ mΩ}$	IPT004N03L $R_{DS(on)}=0.4\text{ mΩ}$
1-2			BSC005N03LS5I * $R_{DS(on)}=0.5\text{ mΩ}$	
			ISC011N03LS5 $R_{DS(on)}=1.1\text{ mΩ}$	
			IRFH8303TRPBF $R_{DS(on)}=1.1\text{ mΩ}$	
			BSC011N03LS $R_{DS(on)}=1.1\text{ mΩ}$	
			BSC011N03LSI * *	
			$R_{DS(on)}=1.1\text{ mΩ}$	
			BSC011N03LST * * *	
			$R_{DS(on)}=1.1\text{ mΩ}$	
	IRF8301MTRPBF $R_{DS(on)}=1.5\text{ mΩ}$		IRFH8307TRPBF $R_{DS(on)}=1.3\text{ mΩ}$	
	IRF6726MTRPBF $R_{DS(on)}=1.7\text{ mΩ}$	BSZ0500NSI * *	BSC0500NSI * *	
	IRF6727MTRPBF $R_{DS(on)}=1.7\text{ mΩ}$	BSZ019N03LS $R_{DS(on)}=1.9\text{ mΩ}$	BSC014N03LS G $R_{DS(on)}=1.4\text{ mΩ}$	
	IRF8302MTRPBF * *	ISZ019N03LS5 $R_{DS(on)}=1.9\text{ mΩ}$	IRFH5301TRPBF $R_{DS(on)}=1.85\text{ mΩ}$	
		BSZ0901NS $R_{DS(on)}=2.0\text{ mΩ}$	ISC019N03LS5 $R_{DS(on)}=1.9\text{ mΩ}$	
		BSZ0501NSI * *	BSC0901NS $R_{DS(on)}=1.9\text{ mΩ}$	
			BSC0501NSI * *	
			$R_{DS(on)}=1.9\text{ mΩ}$	
			BSC0901NSI * *	
			$R_{DS(on)}=2.0\text{ mΩ}$	
2-4			ISC026N03LS5 $R_{DS(on)}=2.6\text{ mΩ}$	
			ISC037N03LSIS $R_{DS(on)}=3.7\text{ mΩ}$	
		ISZ040N03LSIS $R_{DS(on)}=4.0\text{ mΩ}$	ISC045N03LS5 $R_{DS(on)}=4.5\text{ mΩ}$	
4-10		ISZ065N03LS5 $R_{DS(on)}=6.5\text{ mΩ}$		

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* Coming soon

** Monolithically integrated Schottky-like diode

*** For more information on the product, contact our product support

For more details on the product, click on the part number.

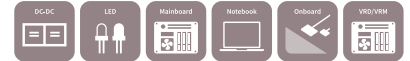
OptiMOS™ and StrongIRFET™ 30 V logic level



$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	DirectFET™	PQFN 3.3 x 3.3	SuperSO8	SO-8	SO-8 Dual	PQFN 2 x 2
2-4	IRF8304MTRPBF $R_{DS(on)}=2.2\text{ mΩ}$	BSZ0901NSI ** $R_{DS(on)}=2.1\text{ mΩ}$	BSC020N03LS G $R_{DS(on)}=2.0\text{ mΩ}$			ISK036N03LM5 ²⁾ $R_{DS(on)}=3.6\text{ mΩ}$
			IRFH5302TRPBF $R_{DS(on)}=2.1\text{ mΩ}$			
	IRF6724MTRPBF $R_{DS(on)}=2.5\text{ mΩ}$	IRLHM620TRPBF $R_{DS(on)}=2.5\text{ mΩ}$	BSC0502NSI ** $R_{DS(on)}=2.4\text{ mΩ}$			
	IRF8306MTRPBF ** $R_{DS(on)}=2.5\text{ mΩ}$	BSZ0902NS $R_{DS(on)}=2.6\text{ mΩ}$	BSC025N03LS G $R_{DS(on)}=2.5\text{ mΩ}$			
			IRFH5302DTRPBF ** $R_{DS(on)}=2.5\text{ mΩ}$			
			BSC0902NS $R_{DS(on)}=2.6\text{ mΩ}$			
			IRF8252TRPBF $R_{DS(on)}=2.7\text{ mΩ}$			
		BSZ0902NSI ** $R_{DS(on)}=2.8\text{ mΩ}$	BSC0902NSI ** $R_{DS(on)}=2.8\text{ mΩ}$	IRF8788TRPBF $R_{DS(on)}=2.8\text{ mΩ}$		
		BSZ0502NSI ** $R_{DS(on)}=2.8\text{ mΩ}$	IRFH8316TRPBF $R_{DS(on)}=2.95\text{ mΩ}$			
			BSC030N03LS G $R_{DS(on)}=3.0\text{ mΩ}$			
		BSZ0503NSI ** $R_{DS(on)}=3.4\text{ mΩ}$	IRFH8318TRPBF $R_{DS(on)}=3.1\text{ mΩ}$			
		IRLHM630 *** $R_{DS(on)}=3.5\text{ mΩ}$	BSC0503NSI ** $R_{DS(on)}=3.2\text{ mΩ}$	IRF7862TRPBF $R_{DS(on)}=3.3\text{ mΩ}$		
		BSZ035N03LS G $R_{DS(on)}=3.5\text{ mΩ}$	BSC034N03LS G $R_{DS(on)}=3.4\text{ mΩ}$	IRF8734TRPBF $R_{DS(on)}=3.5\text{ mΩ}$		
		IRFHM830 $R_{DS(on)}=3.8\text{ mΩ}$	BSC0504NSI ** $R_{DS(on)}=3.7\text{ mΩ}$			
		BSZ0904NSI ** $R_{DS(on)}=4.0\text{ mΩ}$	BSC0904NSI ** $R_{DS(on)}=3.7\text{ mΩ}$			
4-10	IRF6722MTRPBF $R_{DS(on)}=7.7\text{ mΩ}$	IRFHM830D $R_{DS(on)}=4.3\text{ mΩ}$	IRFH8324TRPBF $R_{DS(on)}=4.1\text{ mΩ}$			
		BSZ0506NS $R_{DS(on)}=4.4\text{ mΩ}$	BSC042N03LS G $R_{DS(on)}=4.2\text{ mΩ}$			
		IRFHM8326TRPBF $R_{DS(on)}=4.7\text{ mΩ}$	BSC0906NS $R_{DS(on)}=4.5\text{ mΩ}$			
			IRFH5304TRPBF $R_{DS(on)}=4.5\text{ mΩ}$			
			IRFH8321TRPBF $R_{DS(on)}=4.9\text{ mΩ}$			
		BSZ050N03LS G $R_{DS(on)}=5.0\text{ mΩ}$	IRFH8325TRPBF $R_{DS(on)}=5.0\text{ mΩ}$	IRF8736TRPBF $R_{DS(on)}=4.8\text{ mΩ}$		
		BSZ058N03LS G $R_{DS(on)}=5.8\text{ mΩ}$	BSC050N03LS G $R_{DS(on)}=5.0\text{ mΩ}$			
		IRFHM8329TRPBF $R_{DS(on)}=6.1\text{ mΩ}$	BSC052N03LS $R_{DS(on)}=5.2\text{ mΩ}$			
		BSZ065N03LS $R_{DS(on)}=6.5\text{ mΩ}$	BSC057N03LS G $R_{DS(on)}=5.7\text{ mΩ}$			
	IRF8327S2 * * * * $R_{DS(on)}=7.3\text{ mΩ}$	IRFHM8330TRPBF $R_{DS(on)}=6.6\text{ mΩ}$	IRFH8330TRPBF $R_{DS(on)}=6.6\text{ mΩ}$			
		BSZ0994NS $R_{DS(on)}=7.0\text{ mΩ}$	BSC080N03LS G $R_{DS(on)}=8.0\text{ mΩ}$			
		IRFHM831 $R_{DS(on)}=7.8\text{ mΩ}$	IRFH8334TRPBF $R_{DS(on)}=9.0\text{ mΩ}$	IRF8721TRPBF $R_{DS(on)}=8.5\text{ mΩ}$		
		BSZ088N03LS G $R_{DS(on)}=8.8\text{ mΩ}$	BSC090N03LS G $R_{DS(on)}=9.0\text{ mΩ}$	IRF8714TRPBF $R_{DS(on)}=8.7\text{ mΩ}$		
		IRFHM8334TRPBF $R_{DS(on)}=9.0\text{ mΩ}$	BSC0909NS $R_{DS(on)}=9.2\text{ mΩ}$			
		BSZ100N03LS G $R_{DS(on)}=10.0\text{ mΩ}$				
10-63		BSZ0909NS $R_{DS(on)}=12.0\text{ mΩ}$	BSC120N03LS G $R_{DS(on)}=12.0\text{ mΩ}$	IRF8707TRPBF $R_{DS(on)}=11.9\text{ mΩ}$	IRF7907TRPBF $R_{DS(on)}=11.8\text{ mΩ}+16.4\text{ mΩ}$	IRLHS6342 * * * $R_{DS(on)}=16\text{ mΩ}$
		IRFHM8337TRPBF $R_{DS(on)}=12.4\text{ mΩ}$	IRFH8337TRPBF $R_{DS(on)}=12.8\text{ mΩ}$	IRL6342 ¹⁾ * * * $R_{DS(on)}=14.6\text{ mΩ}$	IRF8513TRPBF * * * * $R_{DS(on)}=2.7\text{ mΩ}+15.5\text{ mΩ}$	IRFHS8342 $R_{DS(on)}=16\text{ mΩ}$
		BSZ130N03LS G $R_{DS(on)}=13.0\text{ mΩ}$		IRL6372 ²⁾ * * * $R_{DS(on)}=18\text{ mΩ; dual}$	IRF8313TRPBF $R_{DS(on)}=15.5\text{ mΩ}+15.5\text{ mΩ}$	IRLHS6376 * * * $R_{DS(on)}=63\text{ mΩ; dual}$
		IRFHM8363TRPBF $R_{DS(on)}=14.9\text{ mΩ}$			IRF7905TRPBF $R_{DS(on)}=17.1\text{ mΩ}+21.8\text{ mΩ}$	
2 x 7.2			BSC072N03LD G $R_{DS(on)}=7.2\text{ mΩ}$			
2 x 15			BSC150N03LD G $R_{DS(on)}=15.0\text{ mΩ}$			



OptiMOST™ and StrongIRFET™ 30 V logic level 5 V optimized



$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	PQFN 3.3 x 3.3	SuperSO8	SO-8	SO-8 Dual
1-2		BSC016N03MS G $R_{DS(on)} \approx 1.6\text{ m}\Omega$		
		BSC020N03MS G $R_{DS(on)} \approx 2.0\text{ m}\Omega$		
2-4		BSC025N03MS G $R_{DS(on)} \approx 2.5\text{ m}\Omega$	BSO033N03MS G $R_{DS(on)} \approx 3.3\text{ m}\Omega$	
	BSZ035N03MS G $R_{DS(on)} \approx 3.5\text{ m}\Omega$	BSC030N03MS G $R_{DS(on)} \approx 3.0\text{ m}\Omega$	BSO040N03MS G $R_{DS(on)} \approx 4.0\text{ m}\Omega$	
4-10		BSC042N03MS G $R_{DS(on)} \approx 4.2\text{ m}\Omega$		
	BSZ050N03MS G $R_{DS(on)} \approx 5.0\text{ m}\Omega$	BSC057N03MS G $R_{DS(on)} \approx 5.7\text{ m}\Omega$		
		BSC080N03MS G $R_{DS(on)} \approx 8.0\text{ m}\Omega$		
	BSZ058N03MS G $R_{DS(on)} \approx 5.8\text{ m}\Omega$	BSC090N03MS G $R_{DS(on)} \approx 9.0\text{ m}\Omega$		
	BSZ088N03MS G $R_{DS(on)} \approx 8.8\text{ m}\Omega$	BSC100N03MS G $R_{DS(on)} \approx 10.0\text{ m}\Omega$		
	BSZ100N03MS G $R_{DS(on)} \approx 10.0\text{ m}\Omega$			
>10	BSZ130N03MS G $R_{DS(on)} \approx 13.0\text{ m}\Omega$	BSC120N03MS G $R_{DS(on)} \approx 12.0\text{ m}\Omega$	BSO110N03MS G $R_{DS(on)} \approx 11.0\text{ m}\Omega$	BSO150N03MD G $R_{DS(on)} \approx 15.0\text{ m}\Omega$
				BSO220N03MD G $R_{DS(on)} \approx 22.0\text{ m}\Omega$

OptiMOST™ and StrongIRFET™ 40 V normal level



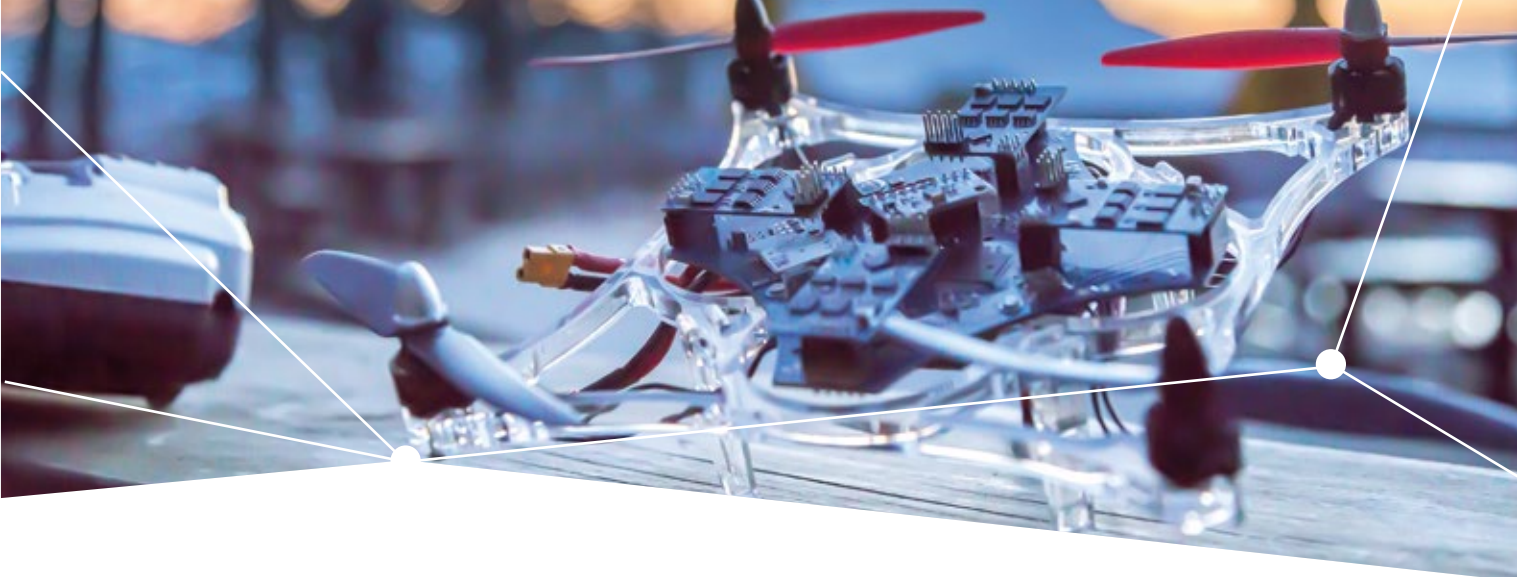
$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	TO-252 (DPAK)	TO-263 (D ² PAK)	TO-263 (D ² PAK 7-pin)	TO-220	TO-247	DirectFET™	PQFN 3.3 x 3.3	SuperSO8	TO-220 FullPAK
<1			IRF40SC240 $R_{DS(on)} \approx 0.65\text{ m}\Omega$						
			IRFS7430TRL7PP $R_{DS(on)} \approx 0.75\text{ m}\Omega$						
1-2		IRFS7430TRLPBF $R_{DS(on)} \approx 1.3\text{ m}\Omega$	IRFS7434TRL7PP $R_{DS(on)} \approx 1.0\text{ m}\Omega$	IRFB7430PBF $R_{DS(on)} \approx 1.3\text{ m}\Omega$	IRFP7430PBF $R_{DS(on)} \approx 1.3\text{ m}\Omega$	IRL40DM247 ²⁾ $R_{DS(on)} \approx 1.0\text{ m}\Omega$		IRFH7084TRPBF $R_{DS(on)} \approx 1.25\text{ m}\Omega$	
		IPB015N04N G $R_{DS(on)} \approx 1.5\text{ m}\Omega$	IPB011N04N G $R_{DS(on)} \approx 1.1\text{ m}\Omega$	IPP015N04N G $R_{DS(on)} \approx 1.5\text{ m}\Omega$		IRF7739L1TRPBF $R_{DS(on)} \approx 1.0\text{ m}\Omega$		IRFH7004TRPBF $R_{DS(on)} \approx 1.4\text{ m}\Omega$	
		IRFS3004 $R_{DS(on)} \approx 1.75\text{ m}\Omega$	IRFS3004-7P $R_{DS(on)} \approx 1.25\text{ m}\Omega$	IRFB7434PBF $R_{DS(on)} \approx 1.6\text{ m}\Omega$		IRF7480MTRPBF $R_{DS(on)} \approx 1.2\text{ m}\Omega$		BSC017N04NS G $R_{DS(on)} \approx 1.7\text{ m}\Omega$	
		IRFS7434TRLPBF $R_{DS(on)} \approx 1.6\text{ m}\Omega$	IRFS7437TRL7PP $R_{DS(on)} \approx 1.4\text{ m}\Omega$	IRFB3004PBF $R_{DS(on)} \approx 1.75\text{ m}\Omega$		IRF7946TRPBF $R_{DS(on)} \approx 1.4\text{ m}\Omega$		IRF40H210 $R_{DS(on)} \approx 1.7\text{ m}\Omega$	
		IRFS7437TRLPBF $R_{DS(on)} \approx 1.8\text{ m}\Omega$	IPB020N04N G $R_{DS(on)} \approx 2.0\text{ m}\Omega$	IRFB7437PBF $R_{DS(on)} \approx 2.0\text{ m}\Omega$		BSB015N04NX3 G $R_{DS(on)} \approx 1.5\text{ m}\Omega$		BSC019N04NS G $R_{DS(on)} \approx 1.9\text{ m}\Omega$	
2-4	IRFR7440TRPBF $R_{DS(on)} \approx 2.4\text{ m}\Omega$	IRFS7440TRLPBF $R_{DS(on)} \approx 2.5\text{ m}\Omega$		IPP023N04N G $R_{DS(on)} \approx 2.3\text{ m}\Omega$		IRF40DM229 $R_{DS(on)} \approx 1.85\text{ m}\Omega$			
	IRFR7446TRPBF $R_{DS(on)} \approx 3.9\text{ m}\Omega$	IRF1404S $R_{DS(on)} \approx 4.0\text{ m}\Omega$		IRFB7440PBF $R_{DS(on)} \approx 2.5\text{ m}\Omega$		IRF7483MTRPBF $R_{DS(on)} \approx 2.3\text{ m}\Omega$		IRFH7440TRPBF $R_{DS(on)} \approx 2.4\text{ m}\Omega$	IPA028N04NM3S $R_{DS(on)} \approx 2.8\text{ m}\Omega$
				IRFB7446PBF $R_{DS(on)} \approx 3.3\text{ m}\Omega$				IRFH5004TRPBF $R_{DS(on)} \approx 2.6\text{ m}\Omega$	
								BSC030N04NS G $R_{DS(on)} \approx 3.0\text{ m}\Omega$	
								IRFH7446TRPBF $R_{DS(on)} \approx 3.3\text{ m}\Omega$	
4-10	IRF40R207 $R_{DS(on)} \approx 5.1\text{ m}\Omega$			IPP041N04N G $R_{DS(on)} \approx 4.1\text{ m}\Omega$				BSC054N04NS G $R_{DS(on)} \approx 5.4\text{ m}\Omega$	IPA041N04N G * $R_{DS(on)} \approx 4.1\text{ m}\Omega$
				IRF40B207 $R_{DS(on)} \approx 4.5\text{ m}\Omega$				IRF40H233 $R_{DS(on)} \approx 5.9\text{ m}\Omega$, dual	
				IPP048N04N G $R_{DS(on)} \approx 4.8\text{ m}\Omega$				BSC076N04ND $R_{DS(on)} \approx 7.6\text{ m}\Omega$, dual	
>10							BSZ105N04NS G $R_{DS(on)} \approx 10.5\text{ m}\Omega$		
							BSZ165N04NS G $R_{DS(on)} \approx 16.5\text{ m}\Omega$		

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2) Coming soon

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OptiMOS™ and StrongIRFET™ 40 V logic level

$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	TO-252 (DPAK)	TO-263 (D ² PAK)	TO-263 (D ² PAK 7-pin)	TO-220	TO-247	DirectFET™	PQFN 3.3 x 3.3	SuperSO8	TO-Leadless
<1			IRL40SC228 $R_{DS(on)}=0.65\text{ mΩ}$			IRL7472L1TRPBF $R_{DS(on)}=0.45\text{ mΩ}$		BSC007N04LS6 $R_{DS(on)}=0.7\text{ mΩ}$	IRL40T209 $R_{DS(on)}=0.8\text{ mΩ}$
			IRL40SC209 $R_{DS(on)}=0.8\text{ mΩ}$						
1-2		IPB015N04L G $R_{DS(on)}=1.5\text{ mΩ}$	IPB011N04L G $R_{DS(on)}=1.1\text{ mΩ}$	IRL40B209 $R_{DS(on)}=1.25\text{ mΩ}$	IRLP3034PBF $R_{DS(on)}=1.7\text{ mΩ}$	BSB014N04LX3 G $R_{DS(on)}=1.4\text{ mΩ}$		BSC010N04LS $R_{DS(on)}=1.0\text{ mΩ}$	
		IRLS3034TRL PBF $R_{DS(on)}=1.7\text{ mΩ}$	IRLS3034TRL7P $R_{DS(on)}=1.4\text{ mΩ}$	IRLB3034PBF $R_{DS(on)}=1.7\text{ mΩ}$		IRL7486MTRPBF $R_{DS(on)}=1.4\text{ mΩ}$		BSC010N04LS6 $R_{DS(on)}=1.0\text{ mΩ}$	
		IRL40S212 $R_{DS(on)}=1.9\text{ mΩ}$		IRL40B212 $R_{DS(on)}=1.9\text{ mΩ}$				BSC010N04LST $R_{DS(on)}=1.0\text{ mΩ}$	
								BSC010N04LSI $R_{DS(on)}=1.05\text{ mΩ}$	
								BSC010N04LSC * $R_{DS(on)}=1.05\text{ mΩ}$	
								BSC014N04LST $R_{DS(on)}=1.4\text{ mΩ}$	
								BSC014N04LS $R_{DS(on)}=1.4\text{ mΩ}$	
								BSC014N04LSI $R_{DS(on)}=1.45\text{ mΩ}$	
								BSC016N04LS G $R_{DS(on)}=1.6\text{ mΩ}$	
							BSZ018N04LS6 $R_{DS(on)}=1.8\text{ mΩ}$	BSC018N04LS G $R_{DS(on)}=1.8\text{ mΩ}$	
								BSC019N04LS $R_{DS(on)}=1.9\text{ mΩ}$	
								BSC019N04LST $R_{DS(on)}=1.9\text{ mΩ}$	
2-4				IRL40B215 $R_{DS(on)}=2.7\text{ mΩ}$		IRF6613TRPBF $R_{DS(on)}=3.4\text{ mΩ}$	BSZ021N04LS6 $R_{DS(on)}=2.1\text{ mΩ}$	BSC022N04LS $R_{DS(on)}=2.2\text{ mΩ}$	
							BSZ024N04LS6 $R_{DS(on)}=2.4\text{ mΩ}$	BSC022N04LS6 $R_{DS(on)}=2.2\text{ mΩ}$	
								IRLH5034TRPBF $R_{DS(on)}=2.4\text{ mΩ}$	
				IPP039N04L G $R_{DS(on)}=3.9\text{ mΩ}$			BSZ025N04LS $R_{DS(on)}=2.5\text{ mΩ}$	BSC026N04LS $R_{DS(on)}=2.6\text{ mΩ}$	
							BSZ028N04LS $R_{DS(on)}=2.8\text{ mΩ}$	BSC027N04LS G $R_{DS(on)}=2.7\text{ mΩ}$	
								BSC032N04LS $R_{DS(on)}=3.2\text{ mΩ}$	
4-10	IPD036N04L G $R_{DS(on)}=3.6\text{ mΩ}$	IRL1404S $R_{DS(on)}=4.0\text{ mΩ}$					BSZ034N04LS $R_{DS(on)}=3.4\text{ mΩ}$	BSC035N04LS G $R_{DS(on)}=3.5\text{ mΩ}$	
	IRLR31142TRPBF ** $R_{DS(on)}=4.5\text{ mΩ}$					IRF6616TRPBF $R_{DS(on)}=5.0\text{ mΩ}$	BSZ040N04LS G $R_{DS(on)}=4.0\text{ mΩ}$	BSC050N04LS G $R_{DS(on)}=5.0\text{ mΩ}$	
						IRF6614TRPBF $R_{DS(on)}=8.3\text{ mΩ}$	BSZ063N04LS6 $R_{DS(on)}=6.3\text{ mΩ}$	BSC059N04LS G $R_{DS(on)}=5.9\text{ mΩ}$	
								BSC059N04LS6 $R_{DS(on)}=5.9\text{ mΩ}$	
								BSC072N04LD $R_{DS(on)}=7.2\text{ mΩ}$, dual	
							BSZ097N04LS G $R_{DS(on)}=9.7\text{ mΩ}$	BSC093N04LS G $R_{DS(on)}=9.3\text{ mΩ}$	

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* Increased creepage distance

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OptiMOS™ and StrongIRFET™ 60 V normal level

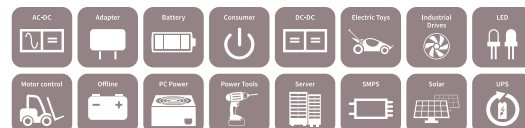
$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	TO-252 (DPAK)	TO-263 (D ⁺ PAK)	TO-263 (D ⁺ PAK 7-pin)	TO-262 (I ⁺ PAK)	TO-220	TO-220 FullPAK	TO-247
1-2			IPB010N06N ²⁾ $R_{DS(on)}=1.0\text{ mΩ}$				
			IRF60C241 * $R_{DS(on)}=1.3\text{ mΩ}$				
			IRFS7530TRL7PP $R_{DS(on)}=1.4\text{ mΩ}$				
			IPB014N06N ²⁾ $R_{DS(on)}=1.4\text{ mΩ}$				
			IPB017N06N3 G $R_{DS(on)}=1.7\text{ mΩ}$				
		IRFS7530TRLPBF $R_{DS(on)}=2.0\text{ mΩ}$	IRFS7534TRL7PP ** $R_{DS(on)}=1.95\text{ mΩ}$	IPI020N06N ²⁾ $R_{DS(on)}=2.0\text{ mΩ}$	IRFB7530PBF $R_{DS(on)}=2.0\text{ mΩ}$		IRFP7530PBF $R_{DS(on)}=2.0\text{ mΩ}$
2-4	IPD025N06N ²⁾ $R_{DS(on)}=2.5\text{ mΩ}$	IRFS7534TRLPBF $R_{DS(on)}=2.4\text{ mΩ}$	IRFS3006TRL7PP $R_{DS(on)}=2.1\text{ mΩ}$		IPP020N06N ²⁾ $R_{DS(on)}=2.0\text{ mΩ}$		
		IRFS3006 $R_{DS(on)}=2.5\text{ mΩ}$		IPI024N06N3 G $R_{DS(on)}=2.4\text{ mΩ}$	IRFB7534PBF $R_{DS(on)}=2.4\text{ mΩ}$		
					IPP024N06N3 G ²⁾ $R_{DS(on)}=2.4\text{ mΩ}$		
		IPB026N06N ²⁾ $R_{DS(on)}=2.6\text{ mΩ}$			IRFB3006PBF $R_{DS(on)}=2.5\text{ mΩ}$		IRFP3006PBF $R_{DS(on)}=2.5\text{ mΩ}$
		IPB029N06N3 G $R_{DS(on)}=2.9\text{ mΩ}$		IPI029N06N ²⁾ $R_{DS(on)}=2.9\text{ mΩ}$	IPP029N06N ²⁾ $R_{DS(on)}=2.9\text{ mΩ}$	IPA029N06N ²⁾ $R_{DS(on)}=2.9\text{ mΩ}$	IRFP3206PBF $R_{DS(on)}=3.0\text{ mΩ}$
					IRFB3206BF $R_{DS(on)}=3.0\text{ mΩ}$	IPA029N06NM5S $R_{DS(on)}=2.9\text{ mΩ}$	
	IPD033N06N ²⁾ $R_{DS(on)}=3.3\text{ mΩ}$	IRFS3206 $R_{DS(on)}=3.0\text{ mΩ}$		IPI032N06N3 G $R_{DS(on)}=3.2\text{ mΩ}$	IPP032N06N3 G $R_{DS(on)}=3.2\text{ mΩ}$	IPA032N06N3 G $R_{DS(on)}=3.2\text{ mΩ}$	
	IPD034N06N3 G $R_{DS(on)}=3.4\text{ mΩ}$	IRFS7537TRLPBF $R_{DS(on)}=3.3\text{ mΩ}$			IRFB7537PBF $R_{DS(on)}=3.3\text{ mΩ}$		IRFP7537PBF $R_{DS(on)}=3.3\text{ mΩ}$
					IRFB3256PBF $R_{DS(on)}=3.4\text{ mΩ}$		
	IPD038N06N3 G $R_{DS(on)}=3.8\text{ mΩ}$	IPB037N06N3 G $R_{DS(on)}=3.7\text{ mΩ}$			IPP040N06N3 G $R_{DS(on)}=4.0\text{ mΩ}$	IPA040N06N ²⁾ $R_{DS(on)}=4.0\text{ mΩ}$	
		IRFS3306 $R_{DS(on)}=4.2\text{ mΩ}$		IPI040N06N3 G $R_{DS(on)}=4.0\text{ mΩ}$	IPP040N06N ²⁾ $R_{DS(on)}=4.0\text{ mΩ}$	IPA040N06N M5S $R_{DS(on)}=4.0\text{ mΩ}$	
					IRFB3306PBF $R_{DS(on)}=4.2\text{ mΩ}$		IRFP3306PBF $R_{DS(on)}=4.2\text{ mΩ}$
4-10	IRFR7540TRPBF $R_{DS(on)}=4.8\text{ mΩ}$	IRFS7540TRLPBF $R_{DS(on)}=5.1\text{ mΩ}$			IRFB7540PBF $R_{DS(on)}=5.1\text{ mΩ}$	IPA057N06N3 G $R_{DS(on)}=5.7\text{ mΩ}$	
	IPD053N06N ²⁾ $R_{DS(on)}=5.3\text{ mΩ}$	IPB054N06N3 G $R_{DS(on)}=5.4\text{ mΩ}$			IPP057N06N3 G ²⁾ $R_{DS(on)}=5.7\text{ mΩ}$		
		IPB057N06N ²⁾ $R_{DS(on)}=5.7\text{ mΩ}$			IRFB7545PBF $R_{DS(on)}=5.9\text{ mΩ}$		
	IRFR7546TRPBF $R_{DS(on)}=7.9\text{ mΩ}$	IRF1018ES $R_{DS(on)}=8.4\text{ mΩ}$			IPP060N06N ²⁾ $R_{DS(on)}=6.0\text{ mΩ}$	IPA060N06N ²⁾ $R_{DS(on)}=6.0\text{ mΩ}$	
	IRFR1018ES * $R_{DS(on)}=8.4\text{ mΩ}$				IRFB7546PBF $R_{DS(on)}=7.3\text{ mΩ}$		
					IRF1018EPBF $R_{DS(on)}=8.4\text{ mΩ}$	IPA060N06NM5S $R_{DS(on)}=6.0\text{ mΩ}$	
	IPD088N06N3 G $R_{DS(on)}=8.8\text{ mΩ}$				IRF60B217 $R_{DS(on)}=9.0\text{ mΩ}$	IPA093N06N3 G $R_{DS(on)}=9.3\text{ mΩ}$	
	IRF60R217 $R_{DS(on)}=9.9\text{ mΩ}$	IPB090N06N3 G $R_{DS(on)}=9.0\text{ mΩ}$			IPP093N06N3 G $R_{DS(on)}=9.3\text{ mΩ}$		
>10	IRFR3806 $R_{DS(on)}=15.8\text{ mΩ}$	IRFS3806 $R_{DS(on)}=15.8\text{ mΩ}$			IRFB3806PBF $R_{DS(on)}=15.8\text{ mΩ}$		

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2) 6 V rated ($R_{DS(on)}$ also specified @ $V_{GS}=6\text{ V}$)

* For more information on the product, contact our product support

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OptiMOS™ and StrongIRFET™ 60 V normal level

$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	DirectFET™	PQFN 3.3 x 3.3	SO-8	SuperSO8	TO-Leadless
<1					IPT007N06N ²⁾ $R_{DS(on)}=0.7\text{ mΩ}$ IPT012N06N ²⁾ $R_{DS(on)}=1.2\text{ mΩ}$
1-2	IRF7749L1TRPBF $R_{DS(on)}=1.5\text{ mΩ}$			BSC012N06NS $R_{DS(on)}=1.2\text{ mΩ}$ BSC014N06NS ²⁾ $R_{DS(on)}=1.4\text{ mΩ}$ BSC014N06NST ²⁾ $R_{DS(on)}=1.45\text{ mΩ}$ BSC016N06NST ²⁾ $R_{DS(on)}=1.6\text{ mΩ}$ BSC016N06NS ²⁾ $R_{DS(on)}=1.6\text{ mΩ}$ BSC019N06NS ²⁾ $R_{DS(on)}=1.9\text{ mΩ}$	
2-4	IRF7748L1TRPBF $R_{DS(on)}=2.2\text{ mΩ}$ BSB028N06NN3 G $R_{DS(on)}=2.8\text{ mΩ}$ IRF60DM206 $R_{DS(on)}=2.9\text{ mΩ}$ IRF7580MTRPBF $R_{DS(on)}=3.6\text{ mΩ}$	BSZ039N06NS $R_{DS(on)}=3.9\text{ mΩ}$		BSC028N06NS ²⁾ $R_{DS(on)}=2.8\text{ mΩ}$ BSC028N06NST ²⁾ $R_{DS(on)}=2.8\text{ mΩ}$ BSC031N06NS3 G $R_{DS(on)}=3.1\text{ mΩ}$ IRFH7085TRPBF $R_{DS(on)}=3.2\text{ mΩ}$ BSC034N06NS ²⁾ $R_{DS(on)}=3.4\text{ mΩ}$ BSC039N06NS ²⁾ $R_{DS(on)}=3.9\text{ mΩ}$ IRFH5006TRPBF $R_{DS(on)}=4.1\text{ mΩ}$	
4-10	IRF6648 $R_{DS(on)}=7.0\text{ mΩ}$ IRF6674 $R_{DS(on)}=11.0\text{ mΩ}$	BSZ042N06NS ²⁾ $R_{DS(on)}=4.2\text{ mΩ}$ BSZ068N06NS ²⁾ $R_{DS(on)}=6.8\text{ mΩ}$ BSZ100N06NS ²⁾ $R_{DS(on)}=10.0\text{ mΩ}$	IRF7855TRPBF $R_{DS(on)}=9.4\text{ mΩ}$ IRF7351TRPBF $R_{DS(on)}=17.8\text{ mΩ, dual}$	IRLH5036TRPBF $R_{DS(on)}=4.4\text{ mΩ}$ IRFH7545TRPBF $R_{DS(on)}=5.2\text{ mΩ}$ BSC066N06NS ²⁾ $R_{DS(on)}=6.6\text{ mΩ}$ BSC076N06NS3 G $R_{DS(on)}=7.6\text{ mΩ}$ BSC097N06NS ²⁾ $R_{DS(on)}=9.7\text{ mΩ}$ BSC097N06NST ²⁾ $R_{DS(on)}=9.7\text{ mΩ}$	
>10		BSZ110N06NS3 G $R_{DS(on)}=11.0\text{ mΩ}$		BSC110N06NS3 G $R_{DS(on)}=11.0\text{ mΩ}$ IRFH5406TRPBF $R_{DS(on)}=14.4\text{ mΩ}$ BSC155N06ND $R_{DS(on)}=15.5\text{ mΩ, dual}$	



OptiMOS™ and StrongIRFET™ 60 V logic level

$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	TO-252 (DPAK)	TO-263 (D ² PAK)	TO-263 (D ² PAK 7-pin)	TO-262 (I ² PAK)	TO-220	PQFN 2 x 2	PQFN 3.3 x 3.3	SuperSO8
1-2			IRL60SC216 $R_{DS(on)}=1.5\text{ mΩ}$ IPB019N06L3 G $R_{DS(on)}=1.9\text{ mΩ}$ IRL60S216 $R_{DS(on)}=1.95\text{ mΩ}$ IRLS3036TRL7PP $R_{DS(on)}=1.9\text{ mΩ}$	IRL60SL216 $R_{DS(on)}=1.95\text{ mΩ}$	IRL60B216 $R_{DS(on)}=1.9\text{ mΩ}$			
2-4		IPB019N06L3 G $R_{DS(on)}=1.9\text{ mΩ}$ IPB034N06L3 G $R_{DS(on)}=3.4\text{ mΩ}$			IRLB3036PBF $R_{DS(on)}=2.4\text{ mΩ}$ IPP037N06L3 G $R_{DS(on)}=3.7\text{ mΩ}$ IPP052N06L3 G $R_{DS(on)}=5.2\text{ mΩ}$	BSZ037N06LS5 $R_{DS(on)}=3.7\text{ mΩ}$	BSC027N06LS5 $R_{DS(on)}=2.7\text{ mΩ}$ BSC028N06LS3 G $R_{DS(on)}=2.8\text{ mΩ}$	
4-10	IPD031N06L3 G $R_{DS(on)}=3.1\text{ mΩ}$ IPD048N06L3 G $R_{DS(on)}=4.8\text{ mΩ}$ IRLR3636TRPBF $R_{DS(on)}=6.8\text{ mΩ}$ IPD079N06L3 G $R_{DS(on)}=7.9\text{ mΩ}$	IPB034N06L3 G $R_{DS(on)}=3.4\text{ mΩ}$ IPB081N06L3 G $R_{DS(on)}=8.1\text{ mΩ}$		IPI084N06L3 G $R_{DS(on)}=8.4\text{ mΩ}$	IPP084N06L3 G $R_{DS(on)}=8.4\text{ mΩ}$	BSZ040N06LS5 $R_{DS(on)}=4.0\text{ mΩ}$ BSZ065N06LS5 $R_{DS(on)}=6.5\text{ mΩ}$ BSZ067N06LS3 G $R_{DS(on)}=6.7\text{ mΩ}$ BSZ099N06LS5 $R_{DS(on)}=9.9\text{ mΩ}$ BSZ100N06LS3 G $R_{DS(on)}=10.0\text{ mΩ}$	IRLH5036TRPBF $R_{DS(on)}=4.4\text{ mΩ}$ BSC065N06LS5 $R_{DS(on)}=6.5\text{ mΩ}$ BSC067N06LS3 G $R_{DS(on)}=6.7\text{ mΩ}$ BSC094N06LS5 $R_{DS(on)}=9.4\text{ mΩ}$ BSC100N06LS3 G $R_{DS(on)}=10.0\text{ mΩ}$ BSC112N06LD $R_{DS(on)}=11.2\text{ mΩ, dual}$	
>10	IPD220N06L3 G $R_{DS(on)}=22.0\text{ mΩ}$ IPD350N06L G $R_{DS(on)}=35.0\text{ mΩ}$					IRL60HS118 $R_{DS(on)}=17.0\text{ mΩ}$		

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2) 6 V rated ($R_{DS(on)}$ also specified @ $V_{GS} = 6\text{ V}$)

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OptiMOS™ and StrongIRFET™ 75 V normal level

$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	TO-252 (DPAK)	TO-263 (D ² PAK)	TO-263 (D ² PAK 7-pin)	TO-220	TO-247	DirectFET™	SuperSO8
1-2		IPB020NE7N3 G $R_{DS(on)}=2.0\text{ mΩ}$	IRFS7730TRL7PP $R_{DS(on)}=2.0\text{ mΩ}$		IRFP7718PBF $R_{DS(on)}=1.8\text{ mΩ}$		
2-4		IRFS7730TRL7PP $R_{DS(on)}=2.6\text{ mΩ}$	IRFS3107TRL7PP $R_{DS(on)}=2.6\text{ mΩ}$	IPP023NE7N3 G $R_{DS(on)}=2.3\text{ mΩ}$	IRFP4368PBF $R_{DS(on)}=1.85\text{ mΩ}$	IRF7759L2TRPBF $R_{DS(on)}=2.3\text{ mΩ}$	
		IRFS3107TRL7PP $R_{DS(on)}=3.0\text{ mΩ}$		IRFB7730PBF $R_{DS(on)}=2.6\text{ mΩ}$			
		IPB031NE7N3 G $R_{DS(on)}=3.1\text{ mΩ}$	IRFS7734TRL7PP $R_{DS(on)}=3.05\text{ mΩ}$	IRFB3077PBF $R_{DS(on)}=3.3\text{ mΩ}$			BSC036NE7NS3 G $R_{DS(on)}=3.6\text{ mΩ}$
		IRFS7734TRL7PP $R_{DS(on)}=3.5\text{ mΩ}$		IPP034NE7N3 G $R_{DS(on)}=3.4\text{ mΩ}$			
				IRFB7734PBF $R_{DS(on)}=3.5\text{ mΩ}$			
4-10		IRFS3207ZTRL7PP $R_{DS(on)}=4.1\text{ mΩ}$		IRFB3207ZPBF $R_{DS(on)}=4.5\text{ mΩ}$			
		IPB049NE7N3 G $R_{DS(on)}=4.9\text{ mΩ}$		IPP052NE7N3 G $R_{DS(on)}=5.2\text{ mΩ}$			BSC042NE7NS3 G $R_{DS(on)}=4.2\text{ mΩ}$
		IRFS3307ZTRL7PP $R_{DS(on)}=5.8\text{ mΩ}$		IRFB3307ZPBF $R_{DS(on)}=5.8\text{ mΩ}$			
		IRFS7762TRL7PP $R_{DS(on)}=6.7\text{ mΩ}$		IPP062NE7N3 G $R_{DS(on)}=6.2\text{ mΩ}$		IRF7780MTRPBF $R_{DS(on)}=5.7\text{ mΩ}$	IRFH5007TRPBF $R_{DS(on)}=5.9\text{ mΩ}$
	IRFR7740TRPBF $R_{DS(on)}=7.2\text{ mΩ}$			IRFB7740PBF $R_{DS(on)}=7.3\text{ mΩ}$			
		IRFS7787TRL7PP $R_{DS(on)}=8.4\text{ mΩ}$		IRFB7787PBF $R_{DS(on)}=8.4\text{ mΩ}$			IRFH7787TRPBF $R_{DS(on)}=8.0\text{ mΩ}$
	IRFR3607PBF $R_{DS(on)}=9.0\text{ mΩ}$	IRFS3607TRL7PP $R_{DS(on)}=9.0\text{ mΩ}$		IRFB3607PBF $R_{DS(on)}=9.0\text{ mΩ}$			
>10	IRFR7746TRPBF $R_{DS(on)}=11.2\text{ mΩ}$			IRFB7746PBF $R_{DS(on)}=10.6\text{ mΩ}$		BSF450NE7NH3 ⁽¹⁾ $R_{DS(on)}=45.0\text{ mΩ}$	



OptiMOS™ and StrongIRFET™ 80 V normal level – logic level

$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	TO-252 (DPAK)	TO-263 (D ² PAK)	TO-263 (D ² PAK 7-pin)	TO-262 (I ² PAK)	TO-220	TO-220 FullPAK	DirectFET™	PQFN 2 x 2	PQFN 3.3 x 3.3	SuperSO8	TO-Leadless
1-2		IPB017N08N5 $R_{DS(on)}=1.7\text{ mΩ}$	IPB015N08N5 $R_{DS(on)}=1.5\text{ mΩ}$								IPT012N08N5 $R_{DS(on)}=1.2\text{ mΩ}$
		IPB020N08N5 $R_{DS(on)}=2.0\text{ mΩ}$	IPB019N08N3 G $R_{DS(on)}=1.9\text{ mΩ}$		IPP020N08N5 $R_{DS(on)}=2.0\text{ mΩ}$					BSC021N08NS5 $R_{DS(on)}=2.1\text{ mΩ}$	IPT019N08N5 $R_{DS(on)}=1.9\text{ mΩ}$
			IPB019N08N5 $R_{DS(on)}=1.95\text{ mΩ}$								
2-4		IPB024N08N5 $R_{DS(on)}=2.4\text{ mΩ}$			IPP023N08N5 $R_{DS(on)}=2.3\text{ mΩ}$					BSC025N08LS5 $R_{DS(on)}=2.5\text{ mΩ}$	
		IPB025N08N3 G $R_{DS(on)}=2.5\text{ mΩ}$	IPB030N08N3 G $R_{DS(on)}=3.0\text{ mΩ}$		IPP027N08N5 $R_{DS(on)}=2.7\text{ mΩ}$					BSC026N08NS5 $R_{DS(on)}=2.6\text{ mΩ}$	
					IPP028N08N3 G $R_{DS(on)}=2.8\text{ mΩ}$	IPA028N08N3 G $R_{DS(on)}=2.8\text{ mΩ}$				BSC030N08NS5 $R_{DS(on)}=3.0\text{ mΩ}$	IPT029N08N5 $R_{DS(on)}=2.9\text{ mΩ}$
		IPB031N08N5 $R_{DS(on)}=3.1\text{ mΩ}$			IPP034N08N5 $R_{DS(on)}=3.4\text{ mΩ}$					BSC037N08NS5 $R_{DS(on)}=3.7\text{ mΩ}$	
										BSC037N08NS5T $R_{DS(on)}=3.7\text{ mΩ}$	
		IPB035N08N3 G $R_{DS(on)}=3.5\text{ mΩ}$		IPI037N08N3 G $R_{DS(on)}=3.7\text{ mΩ}$	IPP037N08N3 G $R_{DS(on)}=3.7\text{ mΩ}$	IPA037N08N3 G $R_{DS(on)}=3.7\text{ mΩ}$				BSC040N08NS5 $R_{DS(on)}=4.0\text{ mΩ}$	
4-10	IPD046N08N5 $R_{DS(on)}=4.6\text{ mΩ}$	IPB049N08N5 $R_{DS(on)}=4.9\text{ mΩ}$			IPP052N08N5 $R_{DS(on)}=5.2\text{ mΩ}$	IPA040N08NM5S $R_{DS(on)}=4.0\text{ mΩ}$	BSB044N08NN3 G $R_{DS(on)}=4.4\text{ mΩ}$			BSC047N08NS3 G $R_{DS(on)}=4.7\text{ mΩ}$	
	IPD053N08N3 G $R_{DS(on)}=5.3\text{ mΩ}$	IPB054N08N3 G $R_{DS(on)}=5.4\text{ mΩ}$			IPP057N08N3 G $R_{DS(on)}=5.7\text{ mΩ}$	IPA052N08NM5S $R_{DS(on)}=5.2\text{ mΩ}$				BSC052N08NS5 $R_{DS(on)}=5.2\text{ mΩ}$	
		IPB067N08N3 G $R_{DS(on)}=6.7\text{ mΩ}$				IPA057N08N3 G $R_{DS(on)}=5.7\text{ mΩ}$				BSC057N08NS3 G $R_{DS(on)}=5.7\text{ mΩ}$	
							IRF6646TRPBF $R_{DS(on)}=9.5\text{ mΩ}$			BSZ070N08LS5 $R_{DS(on)}=7.0\text{ mΩ}$	
	IPD096N08N3 G $R_{DS(on)}=9.6\text{ mΩ}$				IPP100N08N3 G $R_{DS(on)}=9.7\text{ mΩ}$		IRF7854TRPBF $R_{DS(on)}=9.5\text{ mΩ}$			BSZ075N08NS5 $R_{DS(on)}=7.5\text{ mΩ}$	
							IRL80HS120 $R_{DS(on)}=32.0\text{ mΩ}$			BSZ084N08NS5 $R_{DS(on)}=8.4\text{ mΩ}$	
>10							BSB104N08NP3 * $R_{DS(on)}=10.4\text{ mΩ}$			BSZ110N08NS5 $R_{DS(on)}=11.0\text{ mΩ}$	BSC117N08NS5 $R_{DS(on)}=11.7\text{ mΩ}$
	IPD135N08N3 G $R_{DS(on)}=13.5\text{ mΩ}$									BSZ123N08NS3 G $R_{DS(on)}=12.3\text{ mΩ}$	BSC123N08NS3 * $R_{DS(on)}=12.3\text{ mΩ}$
										BSZ340N08NS3 G $R_{DS(on)}=34.0\text{ mΩ}$	BSC340N08NS3 G $R_{DS(on)}=34.0\text{ mΩ}$

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1) DirectFET™ S

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OptiMOS™ and StrongIRFET™ 100 V normal level



$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	TO-252 (DPAK)	TO-263 (D ² PAK)	TO-263 (D ² PAK 7-pin)	TO-262 (I ² PAK)	TO-220	TO-220 FullPAK	TO-247
1-2		IPB020N10N5 $R_{DS(on)}=2.0\text{ mΩ}$	IPB017N10N5 $R_{DS(on)}=1.7\text{ mΩ}$				IRF100P218 $R_{DS(on)}=1.1\text{ mΩ}$
		IPB020N10N5LF $R_{DS(on)}=2.0\text{ mΩ}$	IPB017N10N5LF $R_{DS(on)}=1.7\text{ mΩ}$				IRF100P219 $R_{DS(on)}=2.1\text{ mΩ}$
2-4		IPB027N10N3 G $R_{DS(on)}=2.7\text{ mΩ}$	IPB024N10N5 $R_{DS(on)}=2.4\text{ mΩ}$		IPP023N10N5 $R_{DS(on)}=2.3\text{ mΩ}$		IRFP4468PBF $R_{DS(on)}=2.6\text{ mΩ}$
		IPB027N10N5 $R_{DS(on)}=2.7\text{ mΩ}$	IPB025N10N3 G $R_{DS(on)}=2.5\text{ mΩ}$	IPI030N10N3 G $R_{DS(on)}=3.0\text{ mΩ}$	IPP030N10N3 G $R_{DS(on)}=3.0\text{ mΩ}$	IPA030N10N3 G $R_{DS(on)}=3.0\text{ mΩ}$	
		IPB033N10N5LF $R_{DS(on)}=3.3\text{ mΩ}$	IPB032N10N5 $R_{DS(on)}=3.2\text{ mΩ}$		IPP030N10N5 $R_{DS(on)}=3.0\text{ mΩ}$		
			IPB039N10N3 G $R_{DS(on)}=3.9\text{ mΩ}$		IPP039N10N5 $R_{DS(on)}=3.9\text{ mΩ}$		
4-10	IPD050N10N5 $R_{DS(on)}=5.0\text{ mΩ}$	IPB042N10N3 G $R_{DS(on)}=4.2\text{ mΩ}$	IRFS4010TRL7PP $R_{DS(on)}=4.0\text{ mΩ}$	IPI045N10N3 G $R_{DS(on)}=4.5\text{ mΩ}$	IRF100B201 $R_{DS(on)}=4.2\text{ mΩ}$	IPA045N10N3 G $R_{DS(on)}=4.5\text{ mΩ}$	IRFP4110PBF $R_{DS(on)}=4.5\text{ mΩ}$
	IPD068N10N3 G $R_{DS(on)}=6.8\text{ mΩ}$	IRF100S201 $R_{DS(on)}=4.2\text{ mΩ}$			IRFB4110PBF $R_{DS(on)}=4.5\text{ mΩ}$	IPA050N10NM5S $R_{DS(on)}=5.0\text{ mΩ}$	IRFP4310ZPBF $R_{DS(on)}=6.0\text{ mΩ}$
		IRFS4010TRL7PBF $R_{DS(on)}=4.7\text{ mΩ}$			IPP045N10N3 G $R_{DS(on)}=4.5\text{ mΩ}$		
		IPB065N10N3 G $R_{DS(on)}=6.5\text{ mΩ}$			IRFB4310ZPBF $R_{DS(on)}=6.0\text{ mΩ}$		
		IRFS4310ZTRL7PBF $R_{DS(on)}=7.0\text{ mΩ}$		IPI072N10N3 G $R_{DS(on)}=7.2\text{ mΩ}$	IPP072N10N3 G $R_{DS(on)}=7.2\text{ mΩ}$	IPA083N10N5 $R_{DS(on)}=8.3\text{ mΩ}$	
	IPD082N10N3 G $R_{DS(on)}=8.2\text{ mΩ}$				IPP083N10N5 $R_{DS(on)}=8.3\text{ mΩ}$	IPA083N10NM5S $R_{DS(on)}=8.3\text{ mΩ}$	
		IPB083N10N3 G $R_{DS(on)}=8.3\text{ mΩ}$		IPI086N10N3 G $R_{DS(on)}=8.6\text{ mΩ}$	IPP086N10N3 G $R_{DS(on)}=8.6\text{ mΩ}$	IPA086N10N3 G $R_{DS(on)}=8.6\text{ mΩ}$	
					IRF100B202 $R_{DS(on)}=8.6\text{ mΩ}$		
		IRFS4410ZTRL7PBF $R_{DS(on)}=9.0\text{ mΩ}$			IRFS4410ZTRL7PBF $R_{DS(on)}=9.0\text{ mΩ}$		IRFP4410ZPBF * $R_{DS(on)}=9.0\text{ mΩ}$
					IRFB4410ZPBF $R_{DS(on)}=9.0\text{ mΩ}$		
10-25	IPD122N10N3 G $R_{DS(on)}=12.2\text{ mΩ}$						
	IPD12CN10N G $R_{DS(on)}=12.4\text{ mΩ}$	IPB123N10N3 G $R_{DS(on)}=12.3\text{ mΩ}$					
	IRFR4510TRPBF * $R_{DS(on)}=13.9\text{ mΩ}$	IRFS4510TRL7PBF $R_{DS(on)}=13.9\text{ mΩ}$			IRFB4510PBF $R_{DS(on)}=13.5\text{ mΩ}$	IPA126N10NM3S $R_{DS(on)}=12.6\text{ mΩ}$	
	IPD180N10N3 G * $R_{DS(on)}=18.0\text{ mΩ}$			IPI180N10N3 G $R_{DS(on)}=18.0\text{ mΩ}$			
	IPD25CN10N G $R_{DS(on)}=25.0\text{ mΩ}$						
>25	IPD33CN10N G $R_{DS(on)}=33.0\text{ mΩ}$					IRFI4212H-117P $R_{DS(on)}=72.5\text{ mΩ}$, HB ¹⁾	
	IPD78CN10N G $R_{DS(on)}=78.0\text{ mΩ}$						



OptiMOS™ and StrongIRFET™ 100 V normal level

$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	DirectFET™	PQFN 3.3 x 3.3	SuperSO8	SuperSO8 dual cool	SO-8	TO-Leadless
1-2						IPT015N10N5 $R_{DS(on)} = 1.5\text{ mΩ}$
			BSC027N10NS5 $R_{DS(on)} = 2.7\text{ mΩ}$			IPT020N10N3 $R_{DS(on)} = 2.0\text{ mΩ}$
						IPT020N10N5 $R_{DS(on)} = 2.0\text{ mΩ}$
2-4	IRF7769L1TRPBF $R_{DS(on)} = 3.5\text{ mΩ}$		BSC035N10NS5 $R_{DS(on)} = 3.5\text{ mΩ}$	BSC040N10NS5SC * $R_{DS(on)} = 4.0\text{ mΩ}$		IPT026N10N5 $R_{DS(on)} = 2.6\text{ mΩ}$
			BSC040N10NS5 $R_{DS(on)} = 4.0\text{ mΩ}$			
4-10			BSC050N10N5 * $R_{DS(on)} = 5.0\text{ mΩ}$			
	BSB056N10NN3 G $R_{DS(on)} = 5.6\text{ mΩ}$		BSC060N10NS3 G $R_{DS(on)} = 6.0\text{ mΩ}$			
			BSC070N10NS3 G $R_{DS(on)} = 7.0\text{ mΩ}$	BSC070N10NS5SC * $R_{DS(on)} = 7.0\text{ mΩ}$		
			BSC070N10NS5 $R_{DS(on)} = 7.0\text{ mΩ}$			
			IRFH5010TRPBF $R_{DS(on)} = 9.0\text{ mΩ}$			
		BSZ097N10NS5 $R_{DS(on)} = 9.7\text{ mΩ}$	BSC098N10NS5 $R_{DS(on)} = 9.8\text{ mΩ}$			
10-25			BSC100N10NSF G $R_{DS(on)} = 10.0\text{ mΩ}$			
	IRF6644TRPBF $R_{DS(on)} = 13.0\text{ mΩ}$		BSC109N10NS3 G $R_{DS(on)} = 10.9\text{ mΩ}$			
			BSC118N10NS G $R_{DS(on)} = 11.8\text{ mΩ}$			
			IRFH5110TRPBF $R_{DS(on)} = 12.4\text{ mΩ}$			
	BSF134N10NJ3 G ¹⁾ $R_{DS(on)} = 13.4\text{ mΩ}$		IRFH7110TRPBF $R_{DS(on)} = 13.5\text{ mΩ}$			
			IRFH5210TRPBF $R_{DS(on)} = 14.9\text{ mΩ}$			
		BSZ160N10NS3 G $R_{DS(on)} = 16.0\text{ mΩ}$	BSC160N10NS3 G $R_{DS(on)} = 16.0\text{ mΩ}$			
	IRF6662TRPBF $R_{DS(on)} = 22.0\text{ mΩ}$		BSC196N10NS G $R_{DS(on)} = 19.6\text{ mΩ}$		IRF7853TRPBF $R_{DS(on)} = 18.0\text{ mΩ}$	
>25	IRF6645TRPBF $R_{DS(on)} = 35.0\text{ mΩ}$	BSZ440N10NS3 G $R_{DS(on)} = 44.0\text{ mΩ}$	BSC252N10NSF G $R_{DS(on)} = 25.2\text{ mΩ}$			
	IRF7665S2TRPBF $R_{DS(on)} = 62.0\text{ mΩ}$		BSC440N10NS3 G $R_{DS(on)} = 44.0\text{ mΩ}$			
2 x 75	IRF6665TRPBF $R_{DS(on)} = 63.0\text{ mΩ}$		BSC750N10ND G $R_{DS(on)} = 75.0\text{ mΩ}; \text{dual}$			
2 x 195		IRFHM792TRPBF $R_{DS(on)} = 195.0\text{ mΩ}, \text{dual}$				

OptiMOS™ and StrongIRFET™ 100 V logic level



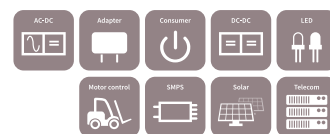
$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	TO-252 (DPAK)	TO-263 (D ² PAK)	TO-263 (D ² PAK 7-pin)	TO-220	PQFN 2 x 2	PQFN 3.3 x 3.3	SuperSO8
2-4			IRLS4030TRL7PP $R_{DS(on)} = 3.9\text{ mΩ}$				BSC034N10LS5 $R_{DS(on)} = 3.4\text{ mΩ}$
4-10		IRLS4030TRL7PP $R_{DS(on)} = 4.3\text{ mΩ}$		IRLB4030PBF $R_{DS(on)} = 4.3\text{ mΩ}$		BSZ096N10LS5 $R_{DS(on)} = 9.6\text{ mΩ}$	BSC070N10LS5 $R_{DS(on)} = 7.0\text{ mΩ}$
							IRLH5030TRPBF $R_{DS(on)} = 9.0\text{ mΩ}$
							BSC096N10LS5 $R_{DS(on)} = 9.6\text{ mΩ}$
10-25				IPP12CN10L G $R_{DS(on)} = 12.0\text{ mΩ}$		BSZ146N10LS5 $R_{DS(on)} = 14.6\text{ mΩ}$	BSC123N10LS G $R_{DS(on)} = 12.3\text{ mΩ}$
	IRLR3110ZTRPBF $R_{DS(on)} = 14.0\text{ mΩ}$					BSZ150N10LS3 * $R_{DS(on)} = 15.0\text{ mΩ}$	BSC146N10LS5 $R_{DS(on)} = 14.6\text{ mΩ}$
>25					IRL100HS121 $R_{DS(on)} = 42.0\text{ mΩ}$		BSC265N10LSF G $R_{DS(on)} = 26.5\text{ mΩ}$

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1) DirectFET™ S

* For more information on the product, contact our product support

For more details on the product, click on the part number.



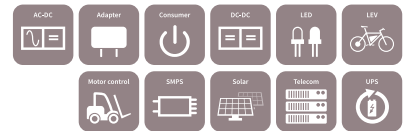
OptiMOS™ and StrongIRFET™ 120 V normal level

$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	TO-252 (DPAK)	TO-263 (D ² PAK)	TO-263 (D ² PAK 7-pin)	TO-262 (IPAK)	TO-220	PQFN 3.3 x 3.3	SuperSO8
2-4		IPB038N12N3 G $R_{DS(on)}=3.8\text{ mΩ}$	IPB036N12N3 G $R_{DS(on)}=3.6\text{ mΩ}$				
4-10				IPI041N12N3 G $R_{DS(on)}=4.1\text{ mΩ}$	IPP041N12N3 G $R_{DS(on)}=4.1\text{ mΩ}$		BSC077N12NS3 G $R_{DS(on)}=7.7\text{ mΩ}$
					IPP048N12N3 G $R_{DS(on)}=4.8\text{ mΩ}$		BSC080N12LS * $R_{DS(on)}=8.0\text{ mΩ}$
				IPI076N12N3 G $R_{DS(on)}=7.6\text{ mΩ}$	IPP076N12N3 G $R_{DS(on)}=7.6\text{ mΩ}$		
10-25	IPD110N12N3 G $R_{DS(on)}=11.0\text{ mΩ}$				IPP114N12N3 G $R_{DS(on)}=11.4\text{ mΩ}$		BSC120N12LS * $R_{DS(on)}=12.0\text{ mΩ}$
		IPB144N12N3 G $R_{DS(on)}=14.4\text{ mΩ}$		IPI147N12N3 G $R_{DS(on)}=14.7\text{ mΩ}$	IPP147N12N3 G $R_{DS(on)}=14.7\text{ mΩ}$	BSZ240N12NS3 G $R_{DS(on)}=24.0\text{ mΩ}$	BSC190N12NS3 G $R_{DS(on)}=19.0\text{ mΩ}$



OptiMOST™ and StrongIRFET™ 135-150 V normal level

$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	DirectFET™	PQFN 3.3 x 3.3	SuperSO8	TO-Leadless
4-10			BSC074N15NS5 ³⁾ $R_{DS(on)}=7.4\text{ mΩ}$	IPT059N15N3 $R_{DS(on)}=5.9\text{ mΩ}$
			BSC093N15NS5 $R_{DS(on)}=9.3\text{ mΩ}$	
10-25	IRF7779L2TRPBF ³⁾ $R_{DS(on)}=11.0\text{ mΩ}$		BSC110N15NS5 $R_{DS(on)}=11.0\text{ mΩ}$	
			BSC160N15NS5 $R_{DS(on)}=16.0\text{ mΩ}$	
	BSB165N15NZ3 G $R_{DS(on)}=16.5\text{ mΩ}$		BSC190N15NS3 G $R_{DS(on)}=19.0\text{ mΩ}$	
>25	BSB280N15NZ3 G $R_{DS(on)}=28.0\text{ mΩ}$	BSZ300N15NS5 $R_{DS(on)}=30.0\text{ mΩ}$	BSC360N15NS3 G $R_{DS(on)}=36.0\text{ mΩ}$	
	IRF6643TRPBF $R_{DS(on)}=34.5\text{ mΩ}$	BSZ520N15NS3 G $R_{DS(on)}=52.0\text{ mΩ}$	BSC520N15NS3 G $R_{DS(on)}=52.0\text{ mΩ}$	
	IRF6775MTRPBF $R_{DS(on)}=56.0\text{ mΩ}$	BSZ900N15NS3 G $R_{DS(on)}=90.0\text{ mΩ}$		



OptiMOST™ and StrongIRFET™ 135-150 V normal level


$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	TO-252 (DPAK)	TO-263 (D ² PAK)	TO-263 (D ² PAK 7-pin)	SuperSO8	TO-251 (IPAK)	TO-262 (I ² PAK)	TO-220	TO-220 FullIPAK	TO-247
4-10		IPB048N15N5 $R_{DS(on)}=4.8\text{ mΩ}$	IPB044N15N5 $R_{DS(on)}=4.4\text{ mΩ}$			IPI051N15N5 $R_{DS(on)}=5.1\text{ mΩ}$	IPP051N15N5 ²⁾ $R_{DS(on)}=5.1\text{ mΩ}$		IRF150P220 $R_{DS(on)}=2.5\text{ mΩ}$
		IPB048N15N5LF $R_{DS(on)}=4.8\text{ mΩ}$	IRF135SA204 ⁵⁾ $R_{DS(on)}=5.9\text{ mΩ}$						IRF150P221 $R_{DS(on)}=4.8\text{ mΩ}$
		IPB072N15N3 G $R_{DS(on)}=7.2\text{ mΩ}$	IPB060N15N5 $R_{DS(on)}=6.0\text{ mΩ}$			IPI075N15N3 G $R_{DS(on)}=7.5\text{ mΩ}$	IPP075N15N3 G $R_{DS(on)}=7.5\text{ mΩ}$		IRFP4568PBF $R_{DS(on)}=5.9\text{ mΩ}$
		IPB073N15N5 $R_{DS(on)}=7.3\text{ mΩ}$	IPB065N15N3 G $R_{DS(on)}=6.5\text{ mΩ}$			IPI076N15N5 $R_{DS(on)}=7.6\text{ mΩ}$	IPP076N15N5 $R_{DS(on)}=7.6\text{ mΩ}$	IPA075N15N3 G $R_{DS(on)}=7.5\text{ mΩ}$	
		IPB083N15N5LF $R_{DS(on)}=8.3\text{ mΩ}$							
		IRF135S203 ⁵⁾ $R_{DS(on)}=8.4\text{ mΩ}$					IRF135B203 ⁵⁾ $R_{DS(on)}=8.4\text{ mΩ}$		
							IRFB4115PBF $R_{DS(on)}=11.0\text{ mΩ}$		
10-25		IPB108N15N3 G $R_{DS(on)}=10.8\text{ mΩ}$	IRFS4115TRL7PP $R_{DS(on)}=11.8\text{ mΩ}$			IPI111N15N3 G $R_{DS(on)}=11.1\text{ mΩ}$	IPP111N15N3 G $R_{DS(on)}=11.1\text{ mΩ}$	IPA105N15N3 G $R_{DS(on)}=10.5\text{ mΩ}$	
		IRFS4321 $R_{DS(on)}=15.0\text{ mΩ}$	IRFS4321TRL7PP $R_{DS(on)}=14.7\text{ mΩ}$				IRFB4321PBF $R_{DS(on)}=15.0\text{ mΩ}$		IRFP4321PBF $R_{DS(on)}=15.5\text{ mΩ}$
		IRFS4115TRL7PBF $R_{DS(on)}=12.1\text{ mΩ}$					IRFB4228PBF $R_{DS(on)}=15.0\text{ mΩ}$		
	IPD200N15N3 G $R_{DS(on)}=20.0\text{ mΩ}$	IPB200N15N3 G $R_{DS(on)}=20.0\text{ mΩ}$					IPP200N15N3 G ²⁾ $R_{DS(on)}=20.0\text{ mΩ}$		
>25		IRFS4615PBF $R_{DS(on)}=42.0\text{ mΩ}$		IRFH5015TRPBF $R_{DS(on)}=31.0\text{ mΩ}$			IRFB4615PBF $R_{DS(on)}=39.0\text{ mΩ}$		
	IRFR4615 $R_{DS(on)}=42.0\text{ mΩ}$	IRFS5615PBF $R_{DS(on)}=42.0\text{ mΩ}$			IRFU4615PBF $R_{DS(on)}=42.0\text{ mΩ}$		IRFB5615PBF $R_{DS(on)}=39.0\text{ mΩ}$		
	IPD530N15N3 G $R_{DS(on)}=53.0\text{ mΩ}$	IPB530N15N3 G $R_{DS(on)}=53.0\text{ mΩ}$		IRFH5215TRPBF $R_{DS(on)}=58.0\text{ mΩ}$		IPI530N15N3 G ²⁾ $R_{DS(on)}=53.0\text{ mΩ}$	IPP530N15N3 G ²⁾ $R_{DS(on)}=53.0\text{ mΩ}$		
							IRFB4019PBF $R_{DS(on)}=95.0\text{ mΩ}$		

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2) 8 V rated ($R_{DS(on)}$ also specified @ $V_{GS}=8\text{ V}$)

3) Coming soon

5) 135 V

For more details on the product, click on the part number. 



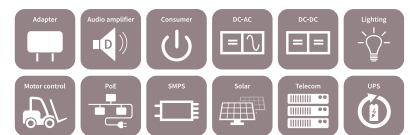
OptiMOS™ and StrongIRFET™ 200 V normal level

$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	TO-252 (DPAK)	TO-263 (D ² PAK)	TO-262 (I ² PAK)	TO-220	TO-220 FullPAK	TO-247
4-10						IRF200P222 $R_{DS(on)}=6.6\text{ mΩ}$ IRFP4668PBF $R_{DS(on)}=9.7\text{ mΩ}$ IRF200P223 $R_{DS(on)}=11.5\text{ mΩ}$
10-25		IPB107N20N3 G $R_{DS(on)}=10.7\text{ mΩ}$ IPB107N20NA ⁴⁾ $R_{DS(on)}=10.7\text{ mΩ}$ IPB110N20N3LF $R_{DS(on)}=11.0\text{ mΩ}$ IPB117N20NFD $R_{DS(on)}=11.7\text{ mΩ}$ IPB156N22NFD ²⁾ $R_{DS(on)}=15.6\text{ mΩ}$ IRFS4127TRL PBF $R_{DS(on)}=22.0\text{ mΩ}$	IPI110N20N3 G $R_{DS(on)}=11.0\text{ mΩ}$	IPP110N20N3 G $R_{DS(on)}=11.0\text{ mΩ}$ IPP110N20NA $R_{DS(on)}=11.0\text{ mΩ}$ IPP120N20NFD $R_{DS(on)}=12.0\text{ mΩ}$ IRFB4127PBF $R_{DS(on)}=20.0\text{ mΩ}$		IRFP4127PBF $R_{DS(on)}=21.0\text{ mΩ}$ IRFP4227PBF $R_{DS(on)}=25.0\text{ mΩ}$
>25		IRFS4227TRL PBF $R_{DS(on)}=26.0\text{ mΩ}$ IPD320N20N3 G $R_{DS(on)}=32.0\text{ mΩ}$ IRFR4620TRL PBF $R_{DS(on)}=78.0\text{ mΩ}$	IPB320N20N3 G $R_{DS(on)}=32.0\text{ mΩ}$ IRFS4620TRL PBF $R_{DS(on)}=78.0\text{ mΩ}$ IRFS4020TRL PBF $R_{DS(on)}=105.0\text{ mΩ}$	IPI320N20N3 G $R_{DS(on)}=32.0\text{ mΩ}$ IRFB4620PBF $R_{DS(on)}=72.5\text{ mΩ}$ IRFB5620PBF $R_{DS(on)}=72.5\text{ mΩ}$ IRFB4020PBF $R_{DS(on)}=100.0\text{ mΩ}$ IRF200B211 $R_{DS(on)}=170.0\text{ mΩ}$	IPA320N20NM3S $R_{DS(on)}=32.0\text{ mΩ}$ IRFI4020H-117P $R_{DS(on)}=100\text{ mΩ, HB}$	



OptiMOS™ and StrongIRFET™ 200 V normal level

$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	DirectFET™	PQFN 3.3 x 3.3	SuperSO8	SO-8	TO-Leadless
10-25			BSC220N20NSFD $R_{DS(on)}=22.0\text{ mΩ}$		IPT111N20NFD $R_{DS(on)}=11.1\text{ mΩ}$
>25			BSC320N20NS3 G $R_{DS(on)}=32.0\text{ mΩ}$ BSC350N20NSFD $R_{DS(on)}=35.0\text{ mΩ}$ BSC500N20NS3G $R_{DS(on)}=50.0\text{ mΩ}$ IRFH5020 $R_{DS(on)}=55.0\text{ mΩ}$ BSZ900N20NS3 G $R_{DS(on)}=90.0\text{ mΩ}$ BSZ12DN20NS3 G $R_{DS(on)}=125.0\text{ mΩ}$ BSZ22DN20NS3 G $R_{DS(on)}=225.0\text{ mΩ}$	IRF7820TRPBF $R_{DS(on)}=78.0\text{ mΩ}$	



OptiMOS™ and StrongIRFET™ 250 V normal level


$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	TO-252 (DPAK)	TO-263 (D ² PAK)	TO-262 (I ² PAK)	TO-220	TO-220 FullPAK	TO-247	PQFN 3.3 x 3.3	SuperSO8	TO-Leadless
10-25		IPB200N25N3 G $R_{DS(on)}=20.0\text{ mΩ}$	IPI200N25N3 G $R_{DS(on)}=20.0\text{ mΩ}$	IPP200N25N3 G $R_{DS(on)}=20.0\text{ mΩ}$		IRF250P224 $R_{DS(on)}=12.0\text{ mΩ}$			
				IPP220N25NFD $R_{DS(on)}=22.0\text{ mΩ}$		IRFP4768PBF $R_{DS(on)}=17.5\text{ mΩ}$			IPT210N25NFD $R_{DS(on)}=21.0\text{ mΩ}$
						IRF250P225 $R_{DS(on)}=22.0\text{ mΩ}$			
>25								BSC430N25NSFD $R_{DS(on)}=43.0\text{ mΩ}$	
		IRFS4229TRL PBF $R_{DS(on)}=48.0\text{ mΩ}$		IRFB4332PBF $R_{DS(on)}=33.0\text{ mΩ}$		IRFP4332PBF $R_{DS(on)}=33.0\text{ mΩ}$		BSC600N25NS3 G $R_{DS(on)}=60.0\text{ mΩ}$	
	IPD600N25N3 G $R_{DS(on)}=60.0\text{ mΩ}$	IPB600N25N3 G $R_{DS(on)}=60.0\text{ mΩ}$	IPI600N25N3 G $R_{DS(on)}=60.0\text{ mΩ}$	IRFB4229PBF $R_{DS(on)}=46.0\text{ mΩ}$				BSC670N25NSFD $R_{DS(on)}=67.0\text{ mΩ}$	
				IPP600N25N3 G $R_{DS(on)}=60.0\text{ mΩ}$	IPA600N25NM3S $R_{DS(on)}=60.0\text{ mΩ}$	IRFP4229PBF $R_{DS(on)}=46.0\text{ mΩ}$	BSZ16DN25NS3 G $R_{DS(on)}=165.0\text{ mΩ}$	IRFH5025 $R_{DS(on)}=100.0\text{ mΩ}$	
							BSZ42DN25NS3 G $R_{DS(on)}=425.0\text{ mΩ}$	BSC16DN25NS3 G $R_{DS(on)}=165.0\text{ mΩ}$	

OptiMOS™ and StrongIRFET™ 300 V normal level



$R_{DS(on), max.}$ @ $V_{GS}=10\text{ V}$ [mΩ]	TO-263 (D ² PAK)	TO-220	TO-247	SuperSO8
0-25			IRF300P226 $R_{DS(on)}=19.0\text{ mΩ}$	
>25	IPB407N30N $R_{DS(on)}=40.7\text{ mΩ}$	IPP410N30N $R_{DS(on)}=41.0\text{ mΩ}$	IRFP4868PBF $R_{DS(on)}=32.0\text{ mΩ}$	
			IRF300P227 $R_{DS(on)}=40.0\text{ mΩ}$	
		IRFB4137PBF $R_{DS(on)}=69.0\text{ mΩ}$	IRFP4137PBF $R_{DS(on)}=69.0\text{ mΩ}$	BSC13DN30NSFD $R_{DS(on)}=130.0\text{ mΩ}$

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For more details on the product,
click on the part number. 



Power MOSFETs complementary



Voltage [V]			PQFN 3.3 x 3.3	SO-8
Complementary	-20/20	>50 mΩ	BSZ15DC02KD H */** N: 55 mΩ, 5.1 A P: 150 mΩ, -3.2 A	
			BSZ215C H */** N: 55 mΩ, 5.1 A P: 150 mΩ, -3.2 A	
	-60/60	11-30 Ω		BSO612CV G * N: 0.12 Ω, 3.0 A P: 0.30 Ω, -2.0 A
				BSO615C G * N: 0.11 Ω, 3.1 A P: 0.30 Ω, -2.0 A

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*Products are qualified to Automotive AEC Q101

**R_{DS(on)} specified at 4.5 V

For more details on the product, click on the part number.

Power P-channel MOSFETs



P-channel MOSFETs	Voltage [V]	TO-252 (DPAK)	TO-263 (D ⁺ PAK)	TO-220	DirectFET™	PQFN 3.3 x 3.3	SuperSO8	SO-8	PQFN 2 x 2
P-channel MOSFETs	-20							BSO201SP H $R_{DS(on)} = 7.0 \text{ m}\Omega$	
								BSO203SP H $R_{DS(on)} = 21.0 \text{ m}\Omega$	
								BSO203P H $R_{DS(on)} = 21.0 \text{ m}\Omega$	
									IRLHS2242TRPBF ** $R_{DS(on)} = 31.0 \text{ m}\Omega$
								BSO207P H $R_{DS(on)} = 45.0 \text{ m}\Omega$	
								BSO211P H $R_{DS(on)} = 67.0 \text{ m}\Omega$	
	-30	IPD042P03L3 G $R_{DS(on)} = 4.2 \text{ m}\Omega$					BSC030P03NS3 G $R_{DS(on)} = 3.0 \text{ m}\Omega$	IRF9310 $R_{DS(on)} = 4.6 \text{ m}\Omega$	
							BSC060P03NS3E G $R_{DS(on)} = 6.0 \text{ m}\Omega$; ESD	IRF9317 $R_{DS(on)} = 6.6 \text{ m}\Omega$	
						BSZ086P03NS3 G $R_{DS(on)} = 8.6 \text{ m}\Omega$		IRF9321 $R_{DS(on)} = 7.2 \text{ m}\Omega$	
		SPD50P03L G ¹⁾ * $R_{DS(on)} = 7.0 \text{ m}\Omega$			IRF9395M $R_{DS(on)} = 7.0 \text{ m}\Omega$; dual	BSZ086P03NS3E G $R_{DS(on)} = 8.6 \text{ m}\Omega$		BSO080P03NS 3 G $R_{DS(on)} = 8.0 \text{ m}\Omega$	
							BSC084P03NS3 G $R_{DS(on)} = 8.4 \text{ m}\Omega$	BSO080P03NS3E G $R_{DS(on)} = 8.0 \text{ m}\Omega$; ESD	
							BSC084P03NS3E G $R_{DS(on)} = 8.4 \text{ m}\Omega$; ESD	BSO080P03S H $R_{DS(on)} = 8.0 \text{ m}\Omega$	
						BSZ120P03NS3 G $R_{DS(on)} = 12.0 \text{ m}\Omega$		BSO301SP H $R_{DS(on)} = 8.0 \text{ m}\Omega$	
						BSZ120P03NS3E G $R_{DS(on)} = 12.0 \text{ m}\Omega$; ESD		IRF9328 $R_{DS(on)} = 11.9 \text{ m}\Omega$	
								IRF9388TRPBF $R_{DS(on)} = 11.9 \text{ m}\Omega$	
								BSO130P03S H $R_{DS(on)} = 13.0 \text{ m}\Omega$	
								IRF9358 $R_{DS(on)} = 16 \text{ m}\Omega$; dual	
						IRFHM9331 ²⁾ $R_{DS(on)} = 15 \text{ m}\Omega$		IRF9332 $R_{DS(on)} = 17.5 \text{ m}\Omega$	
								IRF9392TRPBF *** $R_{DS(on)} = 17.5 \text{ m}\Omega$	
						BSZ180P03NS3 G $R_{DS(on)} = 18.0 \text{ m}\Omega$		IRF9333 $R_{DS(on)} = 19.4 \text{ m}\Omega$	
						BSZ180P03NS3E G $R_{DS(on)} = 18.0 \text{ m}\Omega$; ESD		BSO200P03S H $R_{DS(on)} = 20.0 \text{ m}\Omega$	
								BSO303SP H $R_{DS(on)} = 21.0 \text{ m}\Omega$	IRFH9301TRPBF *** $R_{DS(on)} = 37.0 \text{ m}\Omega$
								BSO303P H $R_{DS(on)} = 21.0 \text{ m}\Omega$; dual	
								IRF9362 $R_{DS(on)} = 21 \text{ m}\Omega$; dual	IRFHS9351TRPBF $R_{DS(on)} = 170.0 \text{ m}\Omega$; dual
								IRF9335 $R_{DS(on)} = 59 \text{ m}\Omega$	
	-60	IPD380P06NM $R_{DS(on)} = 38 \text{ m}\Omega$	IPB110P06LM $R_{DS(on)} = 11 \text{ m}\Omega$	SPP80P06P H * $R_{DS(on)} = 23.0 \text{ m}\Omega$					
		IPD650P06NM $R_{DS(on)} = 65 \text{ m}\Omega$	SPB80P06P G * $R_{DS(on)} = 23.0 \text{ m}\Omega$						
		SPD30P06P G * $R_{DS(on)} = 75.0 \text{ m}\Omega$							
		IPD900P06NM $R_{DS(on)} = 90 \text{ m}\Omega$							
		SPD18P06P G * $R_{DS(on)} = 130.0 \text{ m}\Omega$	SPB18P06P G * $R_{DS(on)} = 130.0 \text{ m}\Omega$	SPP18P06P H * $R_{DS(on)} = 130.0 \text{ m}\Omega$				BSO613SPV G * $R_{DS(on)} = 130.0 \text{ m}\Omega$	
		SPD09P06PL G * $R_{DS(on)} = 250.0 \text{ m}\Omega$							
		IPD25DP06LM $R_{DS(on)} = 250 \text{ m}\Omega$							
		IPD25DP06NM $R_{DS(on)} = 250 \text{ m}\Omega$							
		SPD08P06P G * $R_{DS(on)} = 300.0 \text{ m}\Omega$	SPB08P06P G * ^{***} $R_{DS(on)} = 300.0 \text{ m}\Omega$	SPP08P06P H * $R_{DS(on)} = 300.0 \text{ m}\Omega$					
		IPD40DP06NM $R_{DS(on)} = 400 \text{ m}\Omega$							
	-100	SPD15P10PL G * $R_{DS(on)} = 200.0 \text{ m}\Omega$		SPP15P10PL H * $R_{DS(on)} = 200.0 \text{ m}\Omega$					
		SPD15P10P G * $R_{DS(on)} = 240.0 \text{ m}\Omega$		SPP15P10P H * $R_{DS(on)} = 240.0 \text{ m}\Omega$					
		SPD04P10PL G * $R_{DS(on)} = 850.0 \text{ m}\Omega$							
		SPD04P10P G * $R_{DS(on)} = 1000.0 \text{ m}\Omega$							


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* Products are qualified to Automotive AEC Q101

** $R_{DS(on)}$ specified at 4.5 V

*** For more information on the product, contact our product support

1) 5-leg

2) 2.5 V_{GS} capableFor more details on the product, click on the part number. 

Small signal/small power N-channel



Voltage [V]		SOT-223	TSOP-6	SOT-89	SC59	SOT-23	SOT-323	SOT-363
N-channel	20				BSR802N 23 mΩ, 3.7 A, ULL	IRLML6244 * ¹⁾ 21 mΩ, 6.3 A, LL		
			BSL202SN 22 mΩ, 7.5 A, SLL		BSR202N 21 mΩ, 3.8 A, SLL	IRLML2502 * ¹⁾ 45 mΩ, 4.2 A, SLL		
			IRLMS2002 * ¹⁾ 30 mΩ, 6.5 A, SLL			IRLML6246 * ¹⁾ 46 mΩ, 4.1 A, LL		
						BSS205N 50 mΩ, 2.5 A, SLL		BSD214SN 140 mΩ, 1.5 A, SLL
						BSS806NE 57 mΩ, 2.3 A, ULL, ESD		
			BSL806N ** 82 mΩ, 2.3 A, ULL			BSS806N 57 mΩ, 2.3 A, ULL	BSS214NW 140 mΩ, 1.5 A, SLL	BSD235N 350 mΩ, 0.95 A, SLL, dual
			IRLMS1902 * ¹⁾ 100 mΩ, 3.2 A, SLL			BSS214N 140 mΩ, 1.5 A, SLL	BSS816NW 160 mΩ, 1.4 A, ULL	BSD840N 400 mΩ, 0.88 A, ULL, dual
	25					IRLML2402 * ¹⁾ 250 mΩ, 1.2 A, SLL		
						IRFML8244 * 24 mΩ, 5.8 A, NL		
	30		IRLTS6342 * ¹⁾ 17.5 mΩ, 8.3 A, LL			IRLML0030 * 27 mΩ, 5.3 A, LL		BSD316SN 160 mΩ, 1.4A, LL
			IRFTS8342 * 19 mΩ, 8.2 A, NL			IRLML6344 * ¹⁾ 29 mΩ, 5.0 A, LL		
						BSS306N 57 mΩ, 2.3 A, LL		
						IRLML6346 * ¹⁾ 63 mΩ, 3.4 A, LL		
			IRLMS1503 * 100 mΩ, 3.2 A, LL			IRLML2030 * 100 mΩ, 1.4 A, LL		
						BSS316N 160 mΩ, 1.4 A, LL		
						IRLML2803 * 250 mΩ, 1.2 A, LL		
	55					IRLML0040TRPBF * 56 mΩ, 3.6 A, LL		
						BSS670S2L 650 mΩ, 0.54 A, LL	BSS340NW 400 mΩ, 0.88 A, LL	
	60	BSP318S 90 mΩ, 2.6 A, LL	BSL606SN 60 mΩ, 4.5 A, LL	BSS606N 60 mΩ, 3.2 A, LL		IRLML0060 * 92 mΩ, 2.7 A, LL	BSS138W 3.5 Ω, 0.28 A, LL	2N7002DW 3 Ω, 0.3 A, LL, dual
		BSP320S 120 mΩ, 2.9 A, NL				IRLML2060 * 480 mΩ, 1.2 A, LL	SN7002W 5 Ω, 0.23 A, LL	
		BSP295 300 mΩ, 1.8 A, LL				BSS138N 3.5 Ω, 0.23 A, LL		
						BSS7728N 5 Ω, 0.2 A, LL		
						SN7002N 5 Ω, 0.2 A, LL		
						2N7002 3 Ω, 0.3 A, LL		
						BSS159N 8 Ω, 0.13 A, depl.		
	75	BSP716N 160 mΩ, 2.3 A, LL						
		BSP372N 230 mΩ, 1.8 A, LL				IRLML0100 * 220 mΩ, 1.6 A, LL		
		BSP373N 240 mΩ, 1.8 A, NL				BSS119N 6 Ω, 0.19 A, LL		
		BSP296N 600 mΩ, 1.2 A, LL				V _{GS(th)} 1.8 V to 2.3 V BSS123N 6 Ω, 0.19 A, LL		
	100					V _{GS(th)} 0.8 V to 1.8 V BSS169 12 Ω, 0.09 A, depl.		
	150		IRF5802 * 1.2 mΩ, 0.9 A, NL					
	200	BSP297 1.8 Ω, 0.66 A, LL	IRF5801 * 2.2 mΩ, 0.6 A, NL					
		BSP149 3.5 Ω, 0.14 A, depl.						
	240	BSP88 6 Ω, 0.35 A, 2.8 V rated		BSS87 6 Ω, 0.26 A, LL		BSS131 14 Ω, 0.1 A, LL		
		BSP89 6 Ω, 0.35 A, LL						
		BSP129 6 Ω, 0.05 A, depl.						
	250					BSS139 30 Ω, 0.03 A, depl.		
	400	BSP324 25 Ω, 0.17 A, LL						
	500							
	600	BSP125 45 Ω, 0.12 A, LL		BSS225 45 Ω, 0.09 A, LL		BSS127 500 Ω, 0.023 A, LL		
		BSP135 60 Ω, 0.02 A, depl.				BSS126 700 Ω, 0.007 A, depl.		
	800							

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1) R_{DS(on)} specified at 4.5 V

** For more information on the product, contact our product support

For more details on the product, click on the part number.

Small signal/small power P-channel



Voltage [V]		SOT-223	TSOP-6	SOT-89	SC59	SOT-23	SOT-323	SOT-363
P-channel MOSFETs	-250	BSP317P 4 Ω, -0.43 A, LL		BSS192P 12 Ω, -0.19 A, LL	BSR92P 11 Ω, -0.14 A, LL			
		BSP92P 12 Ω, -0.26 A, LL						
		BSP321P 900 mΩ, -0.98 A, NL						
	-100	BSP322P 800 mΩ, -1.0 A, LL						
		BSP316P 1.8 Ω, -0.68 A, LL			BSR316P 1.8 Ω, -0.36 A, LL			
		ISP650P06NM 65 mΩ, -3.7 A, NL				ISS17EP06LM 1.7 Ω, -0.3 A, LL		
		ISP12DP06NM 125 mΩ, -2.8 A, NL				BSS83P 2 Ω, -0.33 A, LL	BSS84PW 8 Ω, -0.15 A, LL	
		ISP13DP06NMS 125 mΩ, -2.8 A, NL				ISS55EP06LM 5.5 Ω, -0.18 A, NL		
		BSP613P 130 mΩ, 2.9 A, NL						
		ISP25DP06LM 250 mΩ, -1.9 A, LL				BSS84P 8 Ω, -0.17 A, LL		
		ISP25DP06NM 250 mΩ, -1.9 A, NL						
	-60	ISP25DP06LMS 250 mΩ, -1.9 A, LL			BSR315P 800 mΩ, -0.62 A, LL			
		ISP26DP06NMS 260 mΩ, -1.9 A, NL						
		BSP171P 300 mΩ, -1.9 A, LL						
		BSP170P 300 mΩ, -1.9 A, NL						
		ISP75DP06LM 750 mΩ, -1.1 A, LL						
		BSP315P 800 mΩ, -1.17 A, LL						
	-40		IRF5803TRPBF * 112 mΩ, -3.4 A, LL					
			IRF59342TRPBF * 40 mΩ, -5.8 A, LL			IRLML9301TRPBF * 64 mΩ, -3.6 A, LL		BSD314SPE 140 mΩ, -1.5 A, LL, ESD
			BSL307SP 43 mΩ, -5.5 A, LL			BSS308PE 80 mΩ, -2.1 A, LL, ESD		
			BSL308PE 80 mΩ, -2.1 A, LL, dual, ESD			IRLML5203TRPBF * 98 mΩ, -3.0 A, LL		
	-30					BSS314PE 140 mΩ, -1.5 A, LL, ESD		
						BSS315P 150 mΩ, -1.5 A, LL		
						IRLML9303TRPBF * 165 mΩ, -2.3 A, LL		
						IRLML5103TRPBF * 600 mΩ, -0.76 A, LL		
	-20		IRLTS2242 * ¹⁾ 32 mΩ, -6.9 A, SLL					
			BSL207SP ¹⁾ 41 mΩ, -6 A, SLL			IRLML2244 * ¹⁾ 54 mΩ, 4.3 A, LL		
			IRLMS6802 * ¹⁾ 50 mΩ, -5.6 A, SLL			IRLML6402 * ¹⁾ 65 mΩ, -3.7 A, SLL	BSS209PW ¹⁾ 550 mΩ, -0.58 A, SLL	BSV236SP ¹⁾ 175 mΩ, -1.5 A, SLL
			BSL211SP ¹⁾ 67 mΩ, -4.7 A, SLL			IRLML2246 * ¹⁾ 135 mΩ, 2.6 A, LL	BSS223PW ¹⁾ 1.2 Ω, -0.39 A, SLL	BSD223P ¹⁾ 1.2 Ω, -0.39 A, SLL, dual
			IRLMS6702 * ¹⁾ 200 mΩ, -2.4 A, SLL			BSS215P ¹⁾ 150 mΩ, -1.5 A, SLL		
						IRLML6302 * ¹⁾ 600 mΩ, -0.78 A, SLL		
	-12					IRLML6401 * ¹⁾ 50 mΩ, -4.3 A, SLL		

Small signal/small power complementary



Voltage [V]		TSOP-6	SOT-363
Complementary	-20/20	BSL215C N: 140 mΩ, 1.5 A, SLL P: 150 mΩ, 1.5 A, SLL	BSD235C N: 350 mΩ, 0.95 A, SLL P: 1.2 Ω, 0.53 A, SLL
	-30/30	BSL308C N: 57 mΩ, 2.3 A, LL P: 80 mΩ, -2.0 A, LL	
		BSL316C N: 160 mΩ, 1.4 A, LL P: 150 mΩ, -1.5 A, LL	

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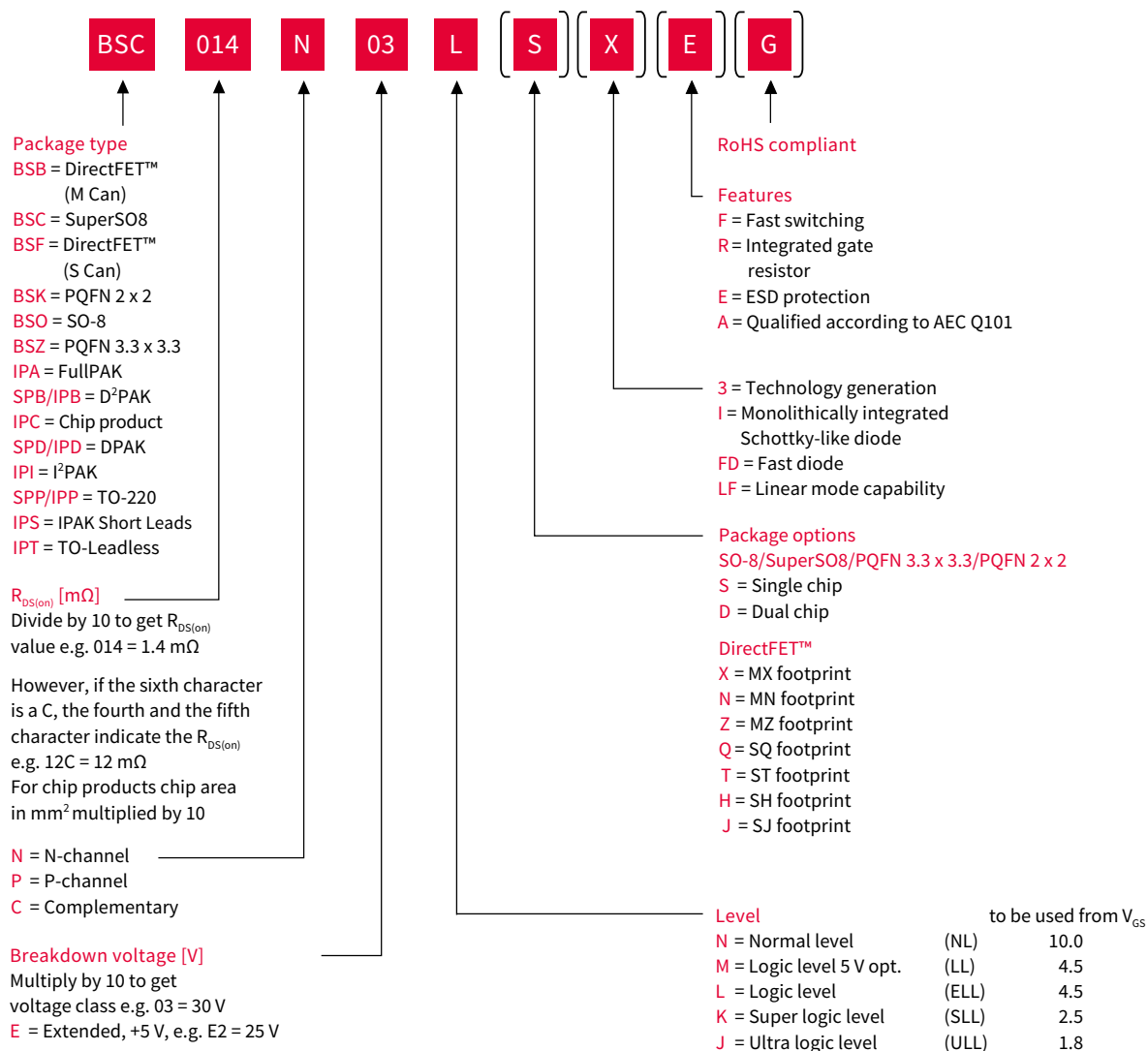
All products are qualified to Automotive AEC Q101 (except the parts marked with *)
1) $R_{DS(on)}$ 4.5 V rated

For more details on the product, click on the part number.

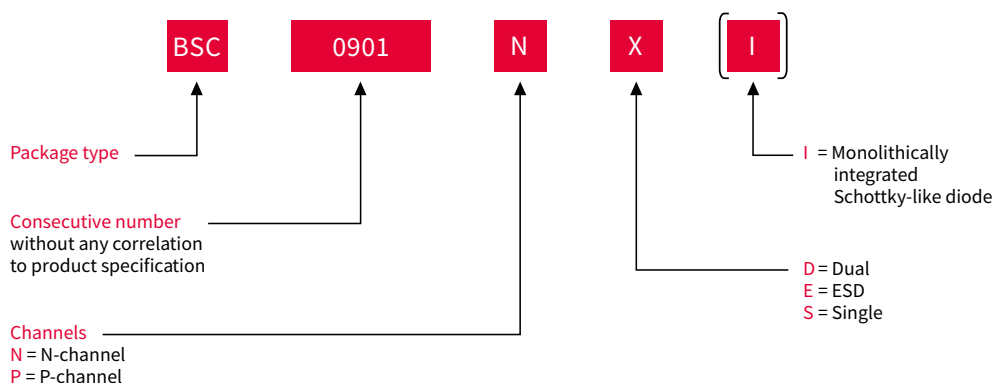
Bare Die					
V(BR)DSS	Part number	$R_{DS(on)}$ typ. @ $V_{GS}=10\text{ V}$	Die Size X	Die Size Y	Die Size Area
30 V	IPC042N03L3 *	0.83 mΩ	2.78 mm	1.53 mm	4.25 mm ²
	IPC055N03L3 *	2.7 mΩ	3.28 mm	1.68 mm	5.51 mm ²
	IPC028N03L3 *	5 mΩ	1.24 mm	2.26 mm	2.80 mm ²
	IPC022N03L3 *	5.3 mΩ	1.05 mm	2.1 mm	2.2 mm ²
	IPC014N03L3 *	10.3 mΩ	1.64 mm	0.84 mm	1.37 mm ²
40 V	IPC218N04N3	0.9 mΩ	5.9 mm	3.7 mm	21.83 mm ²
60 V	IPC218N06N3	1.3 mΩ	5.9 mm	3.7 mm	21.83 mm ²
75 V	IPC302NE7N3	1.2 mΩ	6.7 mm	4.5 mm	30.15 mm ²
80 V	IPC302N08N3	1.2 mΩ	6.7 mm	4.5 mm	30.15 mm ²
100 V	IPC302N10N3	1.7 mΩ	6.7 mm	4.5 mm	30.15 mm ²
	IPC313N10N3R	1.9 mΩ	6 mm	5.2 mm	31.26 mm ²
	IPC26N10NR	3.2 mΩ	6 mm	4.36 mm	26.16 mm ²
	IPC173N10N3	3.6 mΩ	5.76 mm	3 mm	17.28 mm ²
	IPC045N10N3	15.2 mΩ	2.5 mm	1.8 mm	4.5 mm ²
	IPC045N10L3 *	16 mΩ	2.5 mm	1.8 mm	4.5 mm ²
	IPC020N10L3 *	42 mΩ	2.12 mm	0.96 mm	2.04 mm ²
120 V	IPC302N12N3	2.5 mΩ	6.7 mm	4.5 mm	30.15 mm ²
	IPC26N12N	3 mΩ	6.6 mm	3.96 mm	26.13 mm ²
	IPC26N12NR	3.2 mΩ	6 mm	4.36 mm	26.16 mm ²
150 V	IPC331N15NM5R	2.9 mΩ	7.05 mm	4.7 mm	33.14 mm ²
	IPC302N15N3	4.9 mΩ	6.7 mm	4.5 mm	30.15 mm ²
	IPC300N15N3R	4.9 mΩ	6 mm	5 mm	30 mm ²
200 V	IPC300N20N3	9.2 mΩ	6 mm	5 mm	30 mm ²
	IPC302N20N3	9.2 mΩ	6.7 mm	4.5 mm	30.15 mm ²
	IPC302N20NFD	9.4 mΩ	6.7 mm	4.5 mm	30.15 mm ²
250 V	IPC302N25N3	16 mΩ	6.7 mm	4.5 mm	30.15 mm ²

Nomenclature

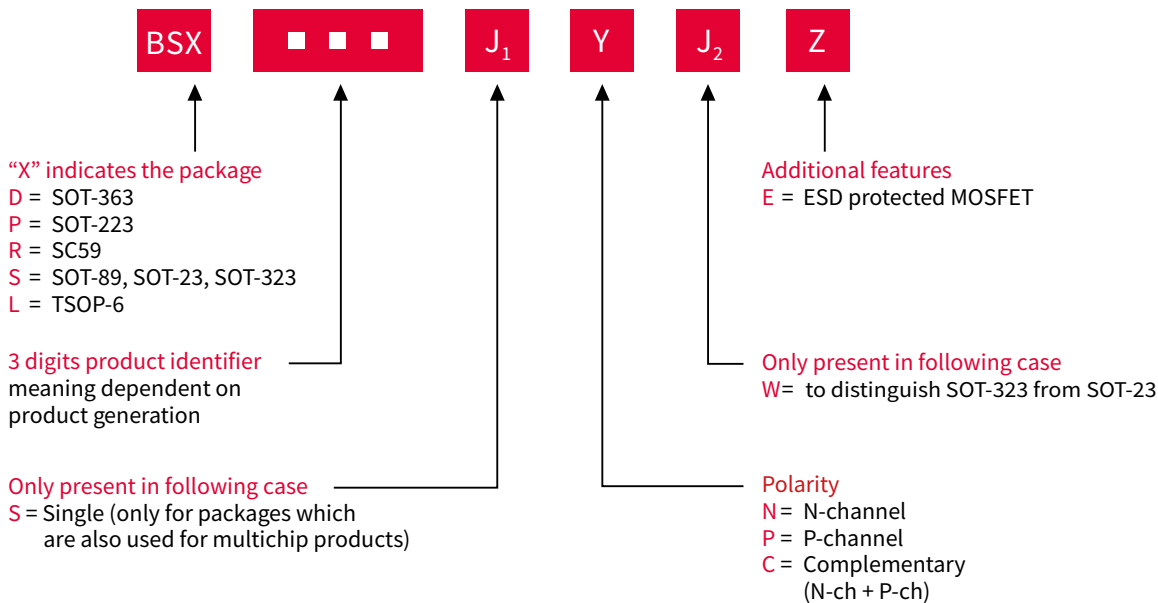
OptiMOS™



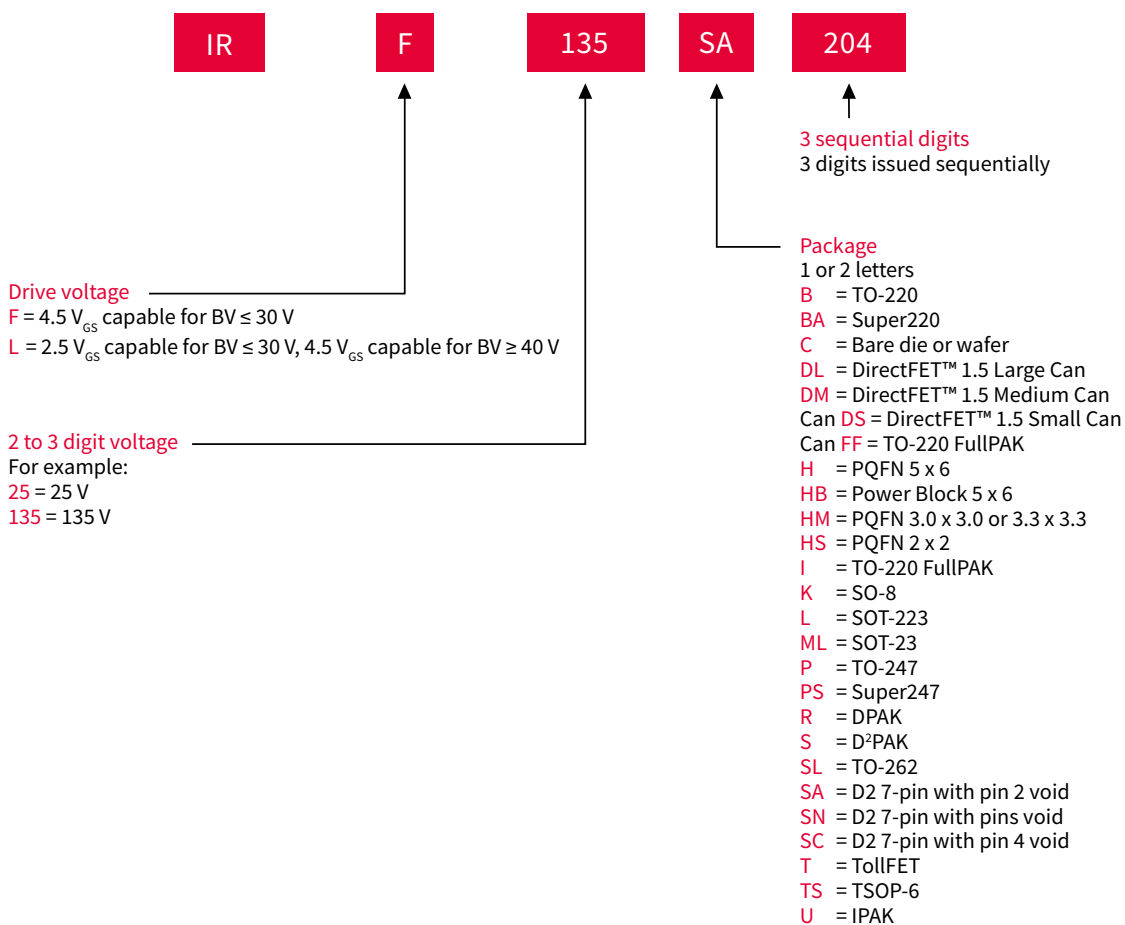
OptiMOS™ 30 V



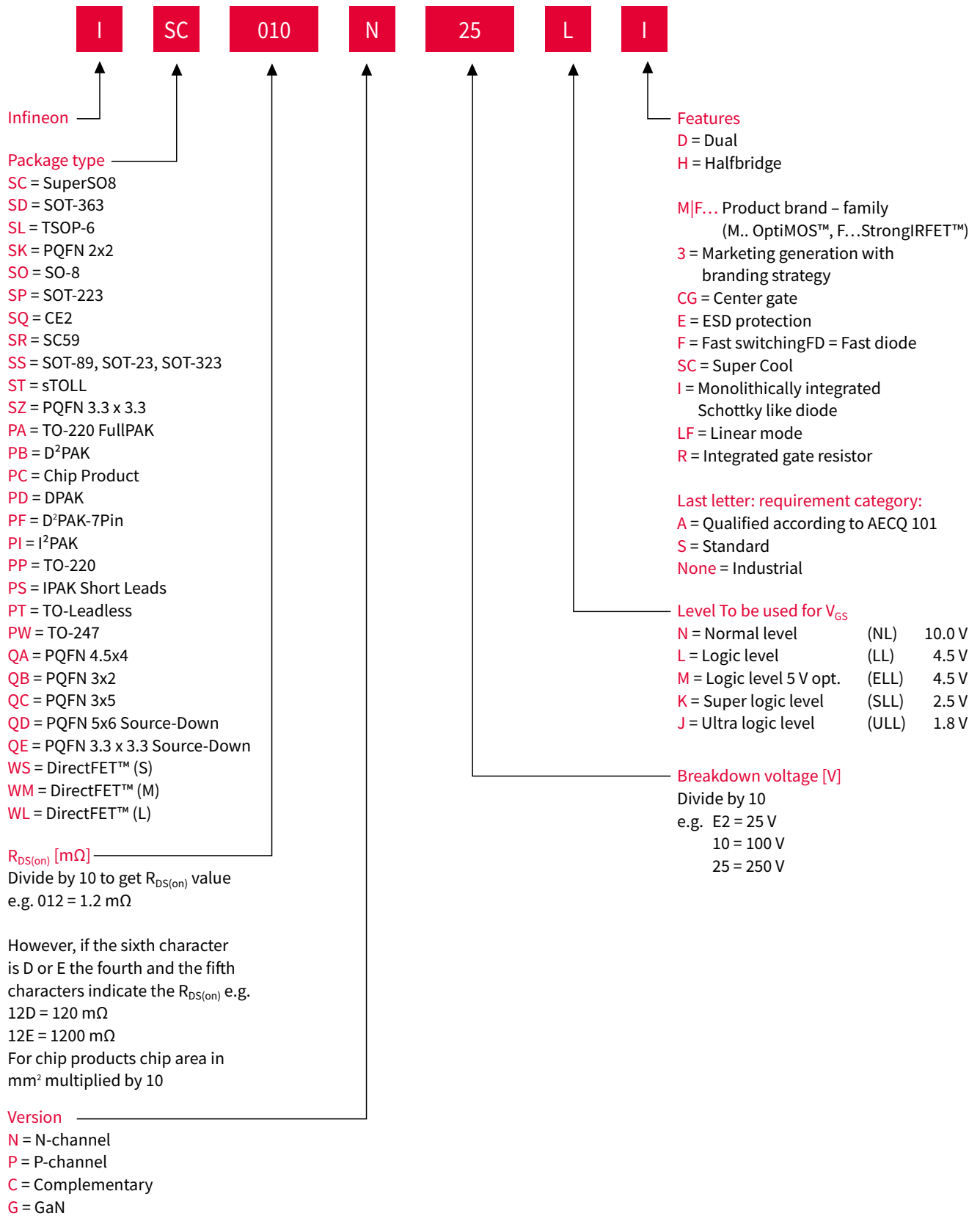
Small signal



StrongIRFET™ (from May 2015 to 2019)



New nomenclature for OptiMOS™ and StrongIRFET™ MOSFETs (2019 onward)





Infineon support for low voltage MOSFETs

Useful links and helpful information

Further information, data sheets and documents

www.infineon.com/powermosfet-12V-300V

www.infineon.com/smallsignal

www.infineon.com/pchannel

www.infineon.com/depletion

www.infineon.com/complementary

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Evaluation boards and simulation models

www.infineon.com/to-leadless-evaluationboard

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Support



Evaluation Board



Tools



Simulation

Applications

20-300 V MOSFETs

500-950 V MOSFETs

WBG semiconductors

Discrete IGBTs

Power ICs

Intelligent switches and input ICs

Gate driver ICs

Microcontrollers

XENSIV™ sensors

Packages



500-950 V MOSFETs

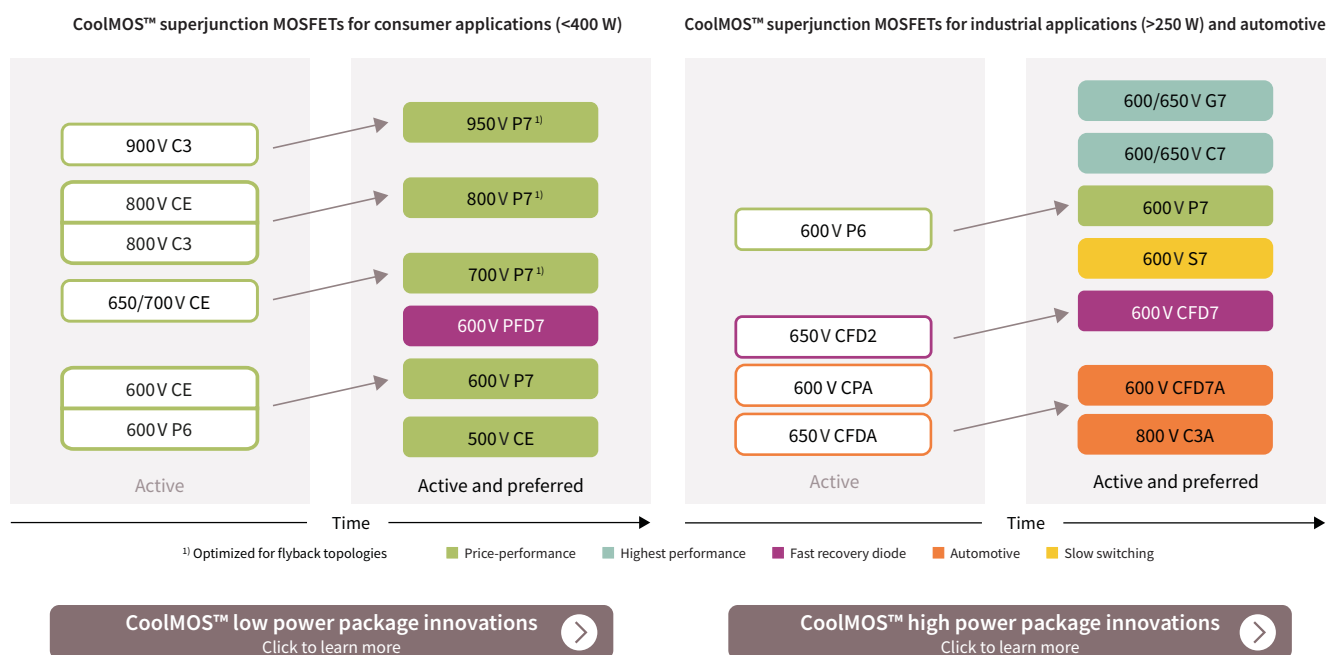
- › CoolMOS™ SJ MOSFETs
- › 950 V CoolMOS™ P7 SJ MOSFETs
- › 800 V CoolMOS™ P7 SJ MOSFETs
- › 700 V CoolMOS™ P7 SJ MOSFETs
- › 600 V CoolMOS™ P7 SJ MOSFETs
- › 600 V CoolMOS™ PFD7 SJ MOSFETs
- › 600 V and 650 V CoolMOS™ C7 and C7 Gold (G7) SJ MOSFETs
- › 600 V CoolMOS™ S7 SJ MOSFETs
- › 600 V CoolMOS™ CFD7 SJ MOSFETs
- › CoolMOS™ CE SJ MOSFETs
- › CoolMOS™ SJ MOSFETs – package innovations
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- › CoolMOS™ product portfolio



CoolMOS™ SJ MOSFETs

Trusted leader in high voltage MOSFETs

The revolutionary CoolMOS™ power MOSFET sets new standards in the field of energy efficiency. Our CoolMOS™ products offer a significant reduction of conduction, switching and driving losses, and enable high power density as well as efficiency for superior power conversion systems.



High voltage superjunction MOSFETs address consumer applications, such as smartphone/tablet chargers, notebook adapters, LED lighting, PC power, as well as audio and TV power supplies. Customers are increasingly replacing standard MOSFETs with superjunction MOSFETs to benefit from higher efficiency and lower power consumption for end users. CoolMOS™ P7 sets a new benchmark by offering high performance and competitive price all at once. CoolMOS™ PFD7 as brand new series shifts the state-of-the-art for high density chargers/adapters as well as low-power motor drives.

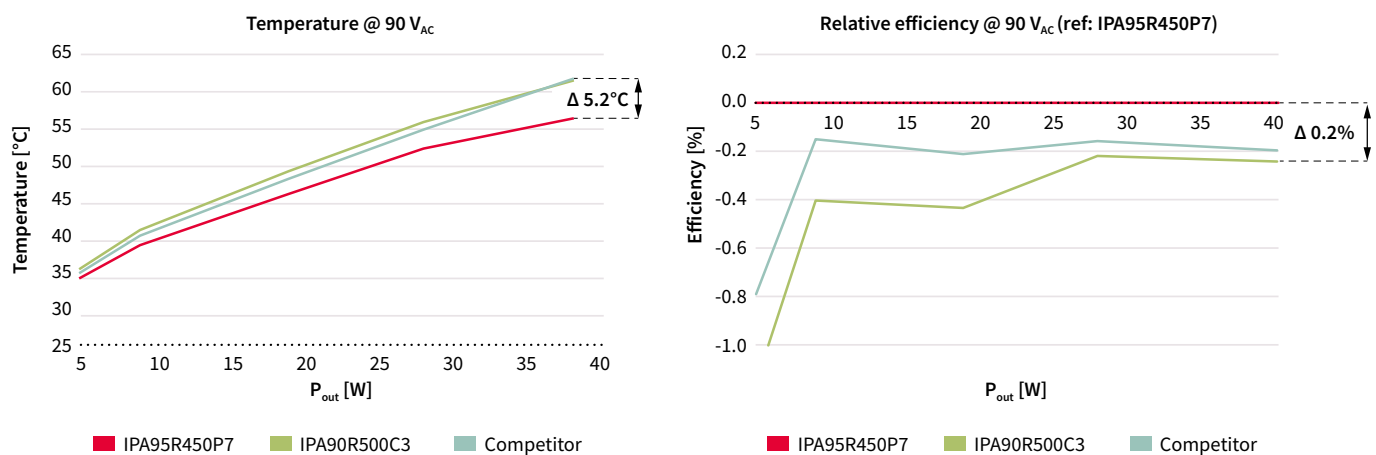
Also for industrial applications such as server, telecom, PC power, solar, UPS, EV-charging and others, Infineon's latest CoolMOS™ 7 superjunction MOSFETs with C7, G7, CFD7 and P7 product families offer what you need - from highest efficiency to best price performance. Complementary to the silicon CoolMOS™ portfolio, Infineon offers a broad wide bandgap (WBG) portfolio of CoolGaN™ e-mode HEMTs and CoolSiC™ MOSFETs to further optimize efficiency and system cost (see **pages 154-172**).

Infineon's industrial- and consumer-qualified CoolMOS™ superjunction MOSFET offering is complemented by the automotive qualified series 600 V CPA, 650 V CFDA, 800 V C3A and our latest 650 V CFD7A. Gain your momentum in the rapidly growing on-board charger and DC-DC converter markets with our excellent performing automotive series with proven outstanding quality standards that go well beyond AEC Q101.

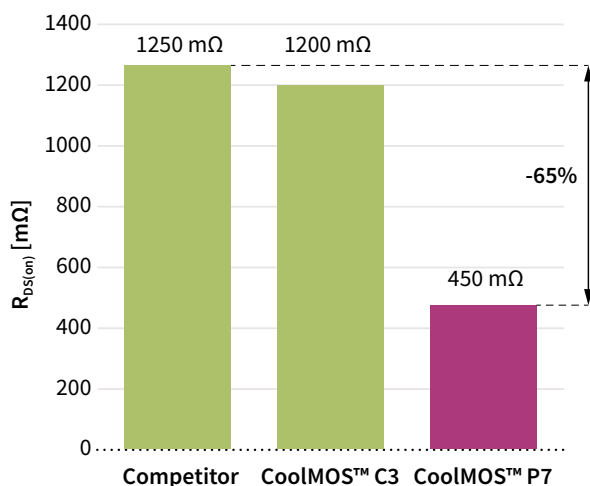
950 V CoolMOS™ P7 SJ MOSFETs

Perfect fit for PFC and flyback topologies

Designed to meet the growing consumer needs in the high voltage MOSFETs arena, the latest 950 V CoolMOS™ P7 technology focuses on the low-power SMPS market. The P7 family addresses applications ranging from lighting, smart meter, mobile phone charger, notebook adapter, to AUX power supply and industrial SMPS. Offering 50 V more blocking voltage than its predecessor 900 V CoolMOS™ C3, the 950 V CoolMOS™ P7 series delivers outstanding performance in terms of efficiency, thermal behavior and ease of use. As all other P7 family members, the 950 V CoolMOS™ P7 series comes with an integrated Zener diode ESD protection. The integrated diode considerably improves ESD robustness, thus reducing ESD-related yield loss and reaching exceptional ease-of-use levels. CoolMOS™ P7 is developed with best-in-class threshold voltage ($V_{GS(th)}$) of 3 V and a narrow tolerance of only ± 0.5 V, which makes it easy to drive and design-in.



Compared to competition, the 950 V CoolMOS™ P7 delivers best-in-class efficiency and thermal performance. Plug-and-play at 90 V_{AC} in a 40 W adapter reference design, featuring the snubberless concept, demonstrates excellent efficiency gains of up to 0.2 % and lower MOSFET temperature of up to 5.2°C compared to similar competitor technology. With over 20 years of experience in superjunction technology, Infineon introduces 950 V CoolMOS™ P7 with best-in-class DPAK on-resistance ($R_{DS(on)}$). This SMD device comes with the $R_{DS(on)}$ of 450 mΩ - more than 60% lower $R_{DS(on)}$ compared to the nearest competitor. Such low $R_{DS(on)}$ value enables higher density designs while decreasing BOM and assembly cost.



Best-in-class DPAK $R_{DS(on)}$

Customer benefits:

- Possible change from leaded to SMD packages
- High power density
- Lower BOM cost
- Lower production cost

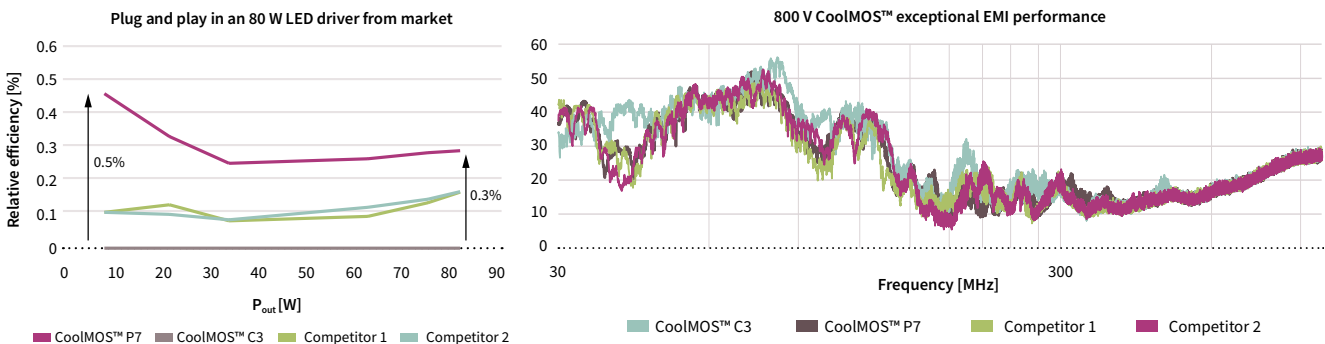


800 V CoolMOST™ P7 SJ MOSFETs

A benchmark in efficiency and thermal performance

With the 800 V CoolMOST™ P7 series, Infineon sets a benchmark in 800 V superjunction technologies and combines best-in-class performance with the remarkable ease of use. This product family is a perfect fit for flyback-based consumer and industrial SMPS applications. In addition, it is also suitable for PFC stages within consumer, as well as solar applications, fully covering the market needs in terms of its price/performance ratio.

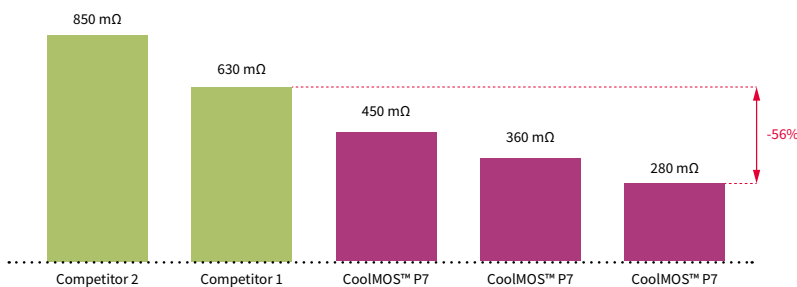
The technology offers fully optimized key parameters to deliver best-in-class efficiency as well as thermal performance. As demonstrated on an 80 W LED driver, bought on the market, the >45 percent reduction in switching losses (E_{oss}) and output capacitance (C_{oss}) as well as the significant improvement in input capacitance (C_{iss}) and gate charge (Q_G), compared to competitor technologies, lead to 0.5 percent higher efficiency at light load which helps to reduce standby power in the end application. At full load, the observed improvement is up to 0.3 percent higher efficiency and 6°C lower device temperature.



EMI is a system level topic, and the optimization needs to be done on the system level only. Nevertheless, a pure plug-and-play measurement on Infineon's 45 W adapter reveals that 800 V CoolMOST™ P7 shows similar EMI performance to Infineon's previous technologies as well as to competitors' technologies.

Compared to competition, the 800 V CoolMOST™ P7 technology allows to integrate much lower $R_{DS(on)}$ values into small packages, such as a DPAK. This finally enables high power density designs at highly competitive price levels.

Overview of lowest DPAK $R_{DS(on)}$ for 800 V superjunction MOSFET



CoolMOST™ P7 sets a new benchmark in best-in-class DPAK $R_{DS(on)}$

Customer benefits:

- > High power density
- > Lower BOM cost
- > Lower production cost

The complete P7 platform has been developed with an integrated Zener diode that is used as an electrostatic discharge (ESD) protection mechanism, which increases the overall device ruggedness up to Human body model (HBM) class 2 level.

www.infineon.com/800V-p7

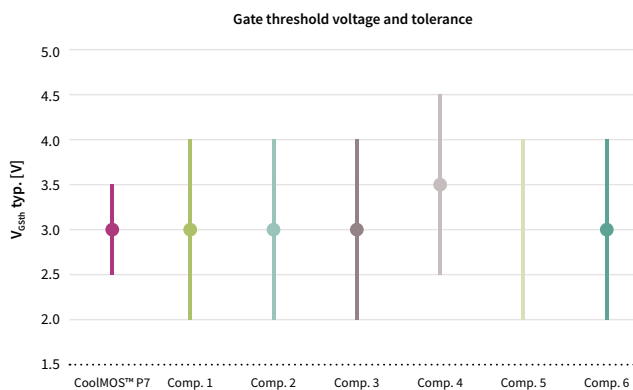
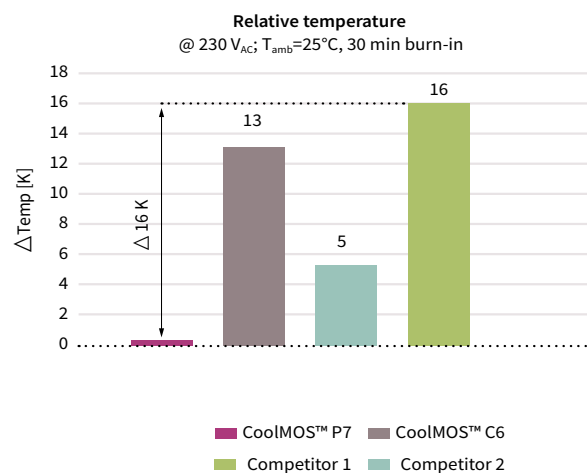
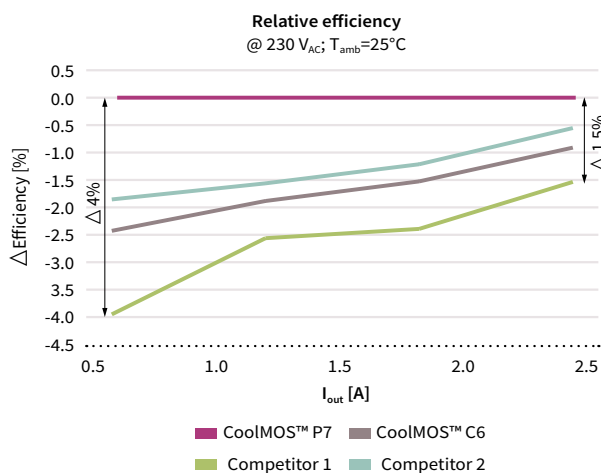


For more details on the product, click on the part number.

700 V CoolMOS™ P7 SJ MOSFETs

Our solution for flyback topologies

The 700 V CoolMOS™ P7 family has been developed to serve today's and, especially, tomorrow's trends in flyback topologies. The family products address the low power SMPS market, mainly focusing on mobile phone chargers and notebook adapters, but are also suitable for power supplies, used within lighting applications, home entertainment (TV, game consoles or audio), and auxiliary power supplies. 700 V CoolMOS™ P7 achieves outstanding efficiency gains of up to 4 percent and a decrease in device temperature of up to 16 K compared to competition. In contrast with the previous 650 V CoolMOS™ C6 technology, 700 V CoolMOS™ P7 offers 2.4 percent gain in efficiency and 12 K lower device temperature, measured at a flyback-based charger application, operated at 140 kHz switching speed.



Keeping the ease of use in mind, Infineon has developed the technology with a low threshold voltage ($V_{GS(th)}$) of 3 V and a very narrow tolerance of ± 0.5 V. This makes the CoolMOS™ P7 easy to design-in and enables the usage of lower gate source voltage, which facilitates its driving and leads to lower idle losses. To increase the ESD ruggedness up to HBM class 2 level, 700 V CoolMOS™ P7 has an integrated Zener diode. This helps to support increased assembly yield, leads to reduction of production related failures and, finally, manufacturing cost savings on customer side.

Features and benefits

Key features
Highly performant technology
› Low switching losses (E_{oss})
› Highly efficient
› Excellent thermal behavior
Allowing high speed switching
Integrated protection Zener diode
Optimized $V_{GS(th)}$ of 3 V with very narrow tolerance of ± 0.5 V
Finely graduated portfolio

Key benefits
Cost-competitive technology
Further efficiency gain at higher switching speed
Supporting less magnetic size with lower BOM costs
High ESD ruggedness up to HBM class 2 level
Easy to drive and design-in
Enabler for smaller form factors and high power density designs
Excellent choice in selecting the best fitting product

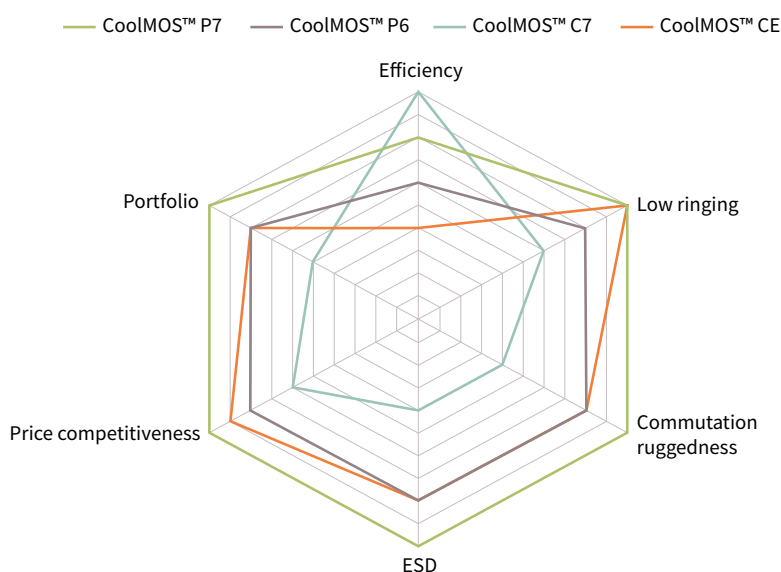


600 V CoolMOS™ P7 SJ MOSFETs

Perfect combination between high efficiency and ease of use

The 600 V CoolMOS™ P7 is a general purpose series, targeting a broad variety of applications, ranging from low power SMPS up to the highest power levels. In the low power arena, it is the successor of the 600 V CoolMOS™ CE, and for high power SPMS applications, it is the replacement for the 600 V CoolMOS™ P6, which makes it the perfect choice for applications such as chargers, adapters, lighting, TV power supply, PC power supply, solar, small light electric vehicles, server power supply, telecom power supply, and electric vehicle (EV) charging.

The 600 V CoolMOS™ P7 is Infineon's most well-balanced CoolMOS™ technology in terms of combining the ease of use and excellent efficiency performance. Compared to its predecessors, it offers higher efficiency and improved power density due to the significantly reduced gate charge (Q_G) and switching losses (E_{OSS}) levels, as well as optimized on-state resistance ($R_{DS(on)}$). The carefully selected integrated gate resistors enable very low ringing tendency and, thanks to its outstanding robustness of body diode against hard commutation, it is suitable for hard as well as soft switching topologies, such as LLC. In addition, an excellent ESD capability helps to improve the quality in manufacturing. The 600 V CoolMOS™ P7 family offers a wide range of on-resistance ($R_{DS(on)}$)/package combinations, including THD, as well as SMD devices, at an $R_{DS(on)}$ granularity from 24 to 600 mΩ and comes along with the most competitive price/performance ratio of all 600 V CoolMOS™ offerings.



Features and benefits

Key features
Suitable for hard and soft switching (PFC and LLC) due to an outstanding commutation ruggedness
Optimized balance between efficiency and ease of use
Significant reduction of switching and conduction losses leading to low MOSFET temperature
Excellent ESD robustness >2 kV (HBM) for all products
Better $R_{DS(on)}$ /package products compared to competition
Large portfolio with granular $R_{DS(on)}$ selection qualified for a variety of industrial and consumer applications

Key benefits
Ease of use and fast design-in through low ringing tendency and usage across PFC and PWM stages
Improved efficiency and simplified thermal management due to low switching and conduction losses
Higher manufacturing quality due to >2 kV ESD protection
Increased power density solutions enabled by using products with smaller footprint
Suitable for a wide variety of applications and power ranges

www.infineon.com/600V-p7



For more details on the product, click on the part number.

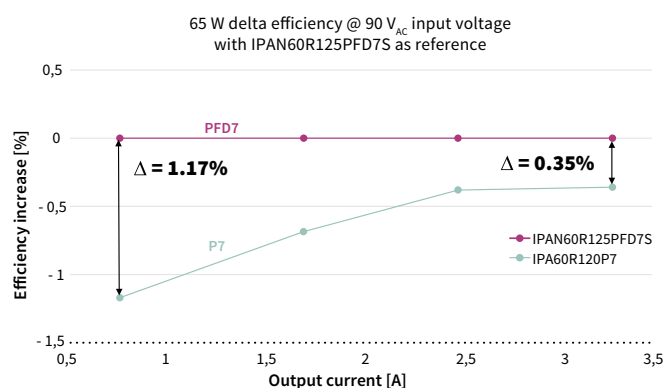
600 V CoolMOS™ PFD7 SJ MOSFETs

The next level for ultrahigh power density designs

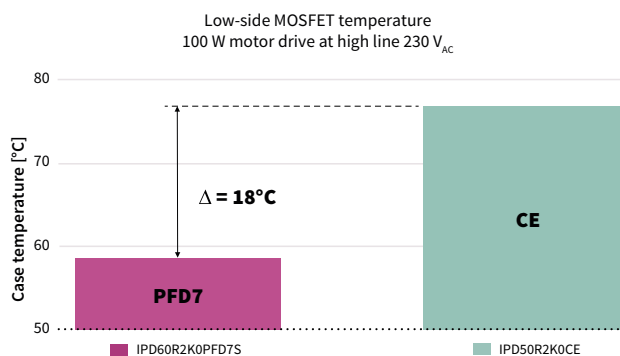
The 600 V CoolMOS™ PFD7 MOSFET series sets a new benchmark in 600 V Superjunction (SJ) technologies, suitable for ultrahigh power density designs as well as low power motor drives. It combines best-in-class performance with ease of use, built on Infineon's superjunction technology innovation and more than 20 years of experience. The products come with an integrated fast body diode ensuring a robust device and reduced bill-of-material (BOM).

This product family offers up to 1.17 % efficiency increase compared to the CoolMOS™ P7 technologies, which leads to a power density increase of 1.8 W. This outstanding improvement is achieved by lower conduction and charge/discharge losses, as well as reduced turn-off and gate-driving losses, enabled by pushing the cutting-edge CoolMOS™ technology to new limits.

A broad range of $R_{DS(on)}$ values in combination with a variety of packages, helps in selecting the right part to optimize designs. Furthermore, an integrated ESD protection of up to 2kV eliminates ESD related yield loss. At the same time, especially our industry-leading SMD package offering contributes to BOM and PCB space savings and simplifies manufacturing. This unique set of product features and their resulting benefits, position the CoolMOS™ PFD7 Superjunction MOSFET family exceptionally well for ultrahigh density applications like chargers and adapters, but also for low-power drives and specific lighting applications.



600 V CoolMOS™ PFD7 increases efficiency in light- and full-load conditions. This results in a power density increase of 1.8 W for ultrahigh power chargers and adapters.



600 V CoolMOS™ PFD7 provides up to 2% higher efficiency at 100 W, which results in an 18°C thermal improvement. Considering its excellent commutation ruggedness as well as its low EMI, it is the perfect solution for low-power drives.

Features and benefits

Key features
Very low FOM $R_{DS(on)} \times E_{oss}$
Extremely low switching losses
Integrated robust fast body diode
Up to 2 kV ESD protection
Wide range of $R_{DS(on)}$ values and broad package portfolio
Excellent communication ruggedness
Low EMI

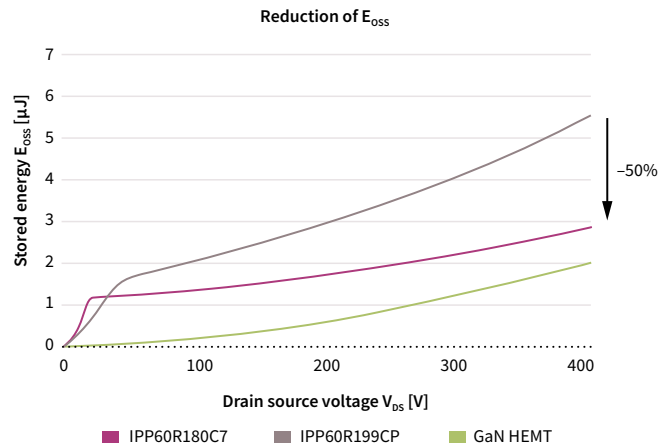
Key benefits
+1.8 W / inch ³ power density improvement compared to latest CoolMOS™ technologies used in charger applications
Supports smaller form factors and thinner designs
Up to 2% efficiency increase and 18°C improved thermal behavior compared to CoolMOS™ CE for low-power drives applications
BOM cost reduction and easy manufacturing
Robustness and reliability
Easy to select right parts for design fine-tuning



600 V and 650 V CoolMOS™ C7 and C7 Gold (G7) SJ MOSFETs

Infiniteon's Superjunction MOSFET series for highest efficiency

The 600 V and 650 V CoolMOS™ C7 and C7 Gold (G7) Superjunction MOSFET series are designed to achieve record level efficiency performance – they offer substantial efficiency benefits over the whole load range in hard switching applications compared to previous series and competition. This is achieved by minimizing switching losses via ultralow levels of switching losses (E_{oss}) (approximately 50 percent reduction compared to the CoolMOS™ CP), reduced gate charge (Q_G) and a careful balance of other relevant product key parameters. The low E_{oss} and Q_G also enable operation at higher switching frequency and related size reduction of the circuit magnetics.



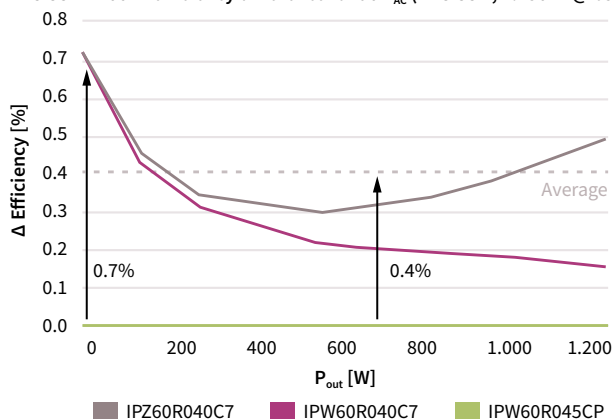
The outstanding figures of merit (FOM) and the best-in-class on-state resistance ($R_{DS(on)}$) offerings make the CoolMOS™ C7 and C7 Gold series key enablers for highest efficiency and power density. While the 650 V CoolMOS™ C7 and G7 (C7 Gold) superjunction MOSFETs are solely designed for hard switching applications such as PFC, the 600 V version is also well suited for high-end LLC stages due to its rugged body diode that withstands slew rates up to 20 V/ns. The product portfolio contains TO-247 4-pin, ThinPAK 8x8, TO-Leadless and top-side cooled Double DPAK (DDPAK) packages which come with additional Kelvin source contacts enabling further efficiency advantages over the classical 3-pin approach.

Features and benefits

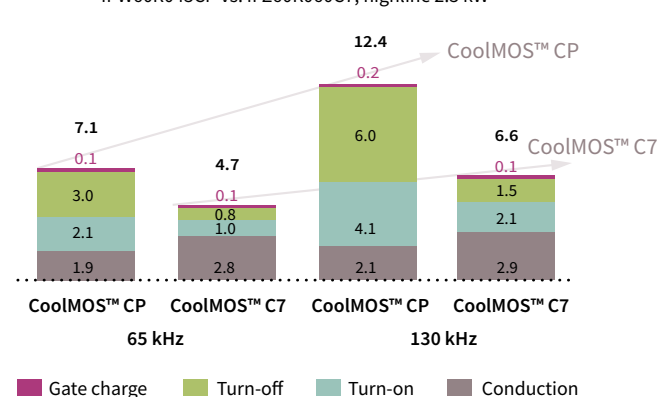
Key features
Reduced switching loss parameters such as Q_G and C_{oss} , enabling higher switching frequency
50 percent E_{oss} reduction compared to older CoolMOS™ CP
Suitable for hard switching topologies (650 V and 600 V)
Suitable for high-end resonant (600 V only) topologies

Key benefits
Increased efficiency in hard switching topologies such as PFC and TTF
Reduced size and cost of magnetic components by increased switching frequency (e.g. 65 -130 kHz)
Increased power density by smaller packages for the same $R_{DS(on)}$

PFC CCM 1200 W efficiency difference for 90 V_{AC} (PFC CCM, 1.150 W @ 65 kHz)



MOSFET losses [W]
IPW60R045CP vs. IPZ60R060C7, highline 2.5 kW



www.infineon.com/c7

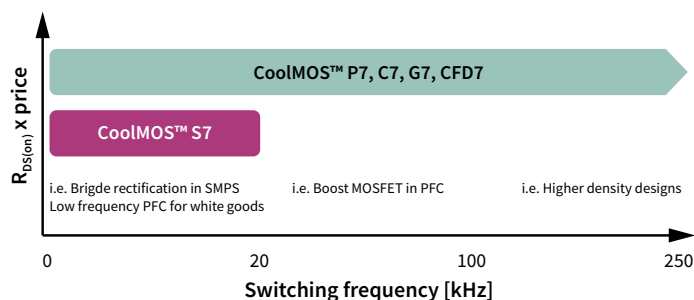


For more details on the product, click on the part number.

600 V CoolMOS™ S7 SJ MOSFETs

The best price/performance SJ MOSFET for low frequency switching applications

The 600 V CoolMOS™ S7 superjunction MOSFET is the perfect fit for applications where MOSFETs are switched at low frequency, such as active bridge rectification, inverter stages, in-rush relays, PLCs, power solid state relay and solid state circuit breakers. The new MOSFET design, not being focused on switching losses, allows the CoolMOS™ S7 to offer cost-optimized, distinctively low on-resistance ($R_{DS(on)}$) values, ideally suited for applications looking to minimize conduction losses at the best price.



The CoolMOS™ S7 leads the way for power density, uniquely fitting a 22 mΩ $R_{DS(on)}$ chip into an innovative small TO-Leadless (TOLL) SMD package.

Use cases

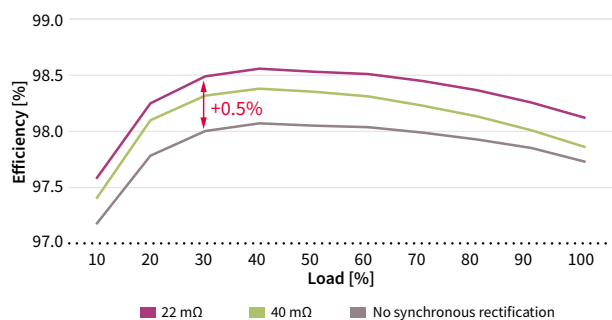
Typically, CoolMOS™ S7 is used in active rectification bridges, where diodes are replaced or paralleled with MOSFETs, obtaining an increase in efficiency without the need for extensive system redesign. In this application, the TO-leadless (TOLL) package in low $R_{DS(on)}$ allows the most efficient and compact modular design based on daughter cards. The CoolMOS™ S7 delivers also tremendous value to solid state relay (SSR) and solid state circuit breaker (SSCB) designs, by bringing the superjunction MOSFET advantages to a system level cost comparable to silicon alternatives. In addition, any socket or topology switching at low frequency can greatly benefit from the leading low $R_{DS(on)}$ x price.

Features and benefits

Key features
Best-in-class $R_{DS(on)}$ in SMD packages
Optimized for conduction performance, reaching the lowest $R_{DS(on)}$ values
High pulse current capability
Improved thermal resistance

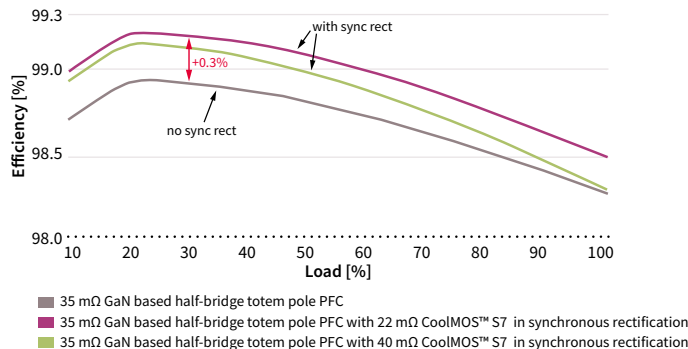
Key benefits
Minimizes conduction losses
An easy step into Titanium level SMPS
Modular, more compact and easier designs
Eliminates or reduces heat sink in solid state relays and circuit breakers
Lower TCO cost or BOM cost

Efficiency in 2400 W PFC at $V_{in} = 230 V_{AC}$ Difference between using or not using the active bridge rectification



CoolMOS™ S7 brings more efficiency to power supplies when used in an active rectification bridge.

3 kW GaN based totem pole PFC efficiency calculation with and without synchronous rectification when $V_{in} = 230 V_{AC}$, $V_{out} = 400 V$, $f_{sw} = 65 kHz$



CoolMOS™ S7 is the perfect complement for CoolSiC™ MOSFETs and CoolGaN™ e-mode HEMTs in totem pole PFC topologies.

www.infineon.com/s7



For more details on the product, click on the part number.

600 V CoolMOS™ CFD7 SJ MOSFETs

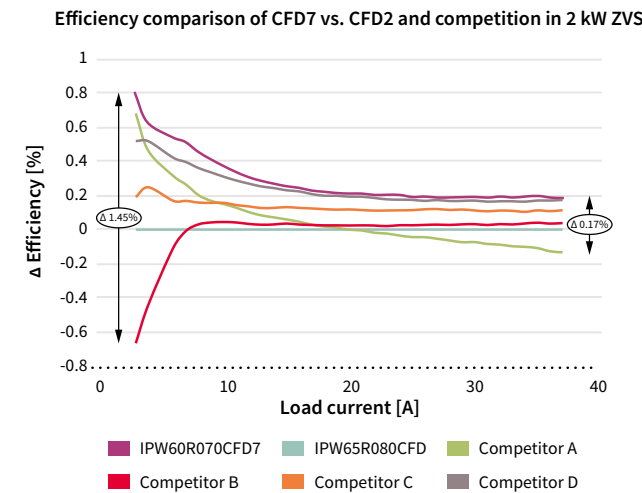
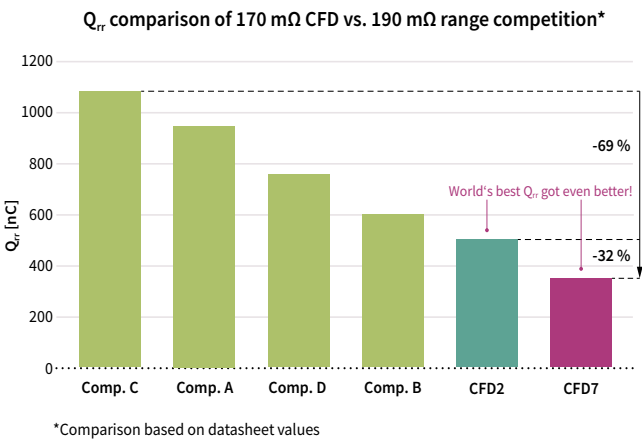
Infiniteon's solution for resonant switching high power applications

The 600 V CoolMOS™ CFD7 is one of Infiniteon’s latest high voltage superjunction MOSFET series with an integrated fast body diode. It is the ideal choice for resonant topologies, such as LLC and ZVS PSFB, and targets the high SMPS market.

As a result of significantly reduced gate charge (Q_G), improved turn-off behavior, a reverse recovery charge (Q_{rr}) of up to 69 percent lower compared to the competition, as well as the lowest reverse recovery time (t_{rr}) in the market, it combines the highest efficiency and best-in-class reliability in soft switching applications, without sacrificing the easy implementation in the design-in process.

In addition, the 600 V CoolMOS™ CFD7 enables higher power density solutions by offering the best-in-class on-state resistance ($R_{DS(on)}$) package combinations in through-hole devices, as well as in surface mount devices. In ThinPAK 8x8 and TO-220 with CoolMOS™ CFD7, a $R_{DS(on)}$ of around 30 percent below the next best competitor offering can be achieved.

All this together makes CoolMOS™ CFD7 the perfect fit for server and telecom applications, and it is also suitable for EV-charging stations.



Features and benefits

Key features
Ultrafast body diode
Best-in-class reverse recovery charge (Q_{rr})
Improved reverse diode dv/dt and di/dt ruggedness
Lowest figure of merit ($R_{DS(on)} \times Q_G \times E_{oss}$)
Best-in-class $R_{DS(on)}$ /package combinations

Key benefits
Best-in-class hard commutation ruggedness
Highest reliability for resonant topologies
Highest efficiency with outstanding ease of use/performance trade-off
Enabling increased power density solutions



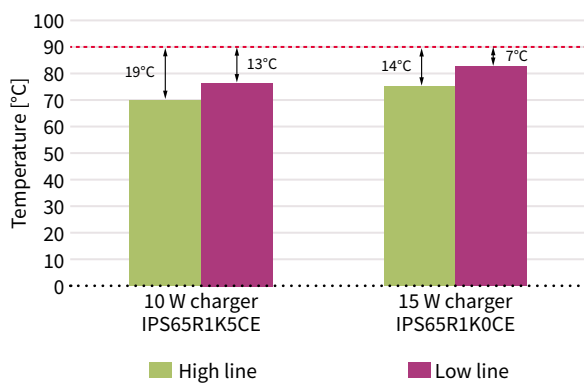
CoolMOS™ CE SJ MOSFETs

High voltage superjunction MOSFETs for consumer applications

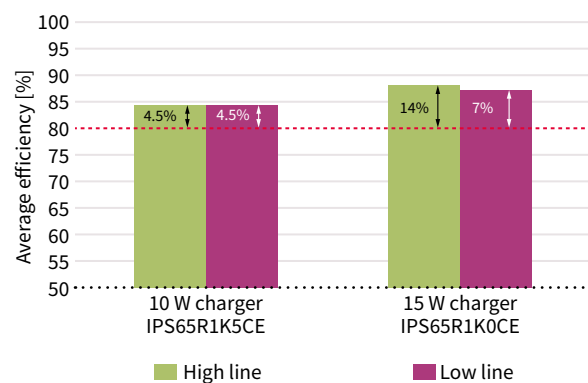
Infineon's CoolMOS™ CE is a product family that addresses consumer and lighting applications. It offers benefits in efficiency and thermal behavior versus standard MOSFETs and is optimized for ease of use and cost-competitiveness, while delivering the right fit performance and excellent Infineon quality.

Application example: 10 W and 15 W smartphone charger

CoolMOS™ CE meets typical MOSFET case temperature requirements in charger applications



CoolMOS™ CE meets the standard efficiency requirements in charger application



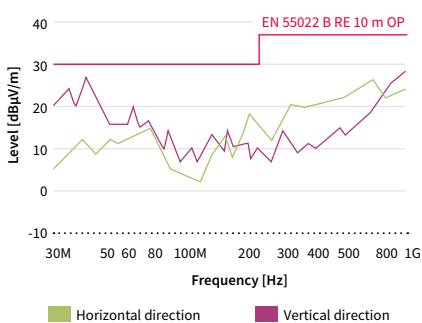
CoolMOS™ CE case temperature:

The maximum MOSFET case temperature is required to be below 90°C. CoolMOS™ CE meets this requirement and offers enough margin required for design-in flexibility.

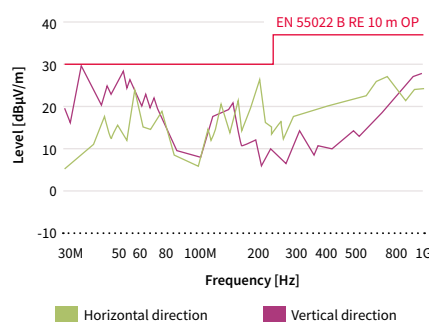
CoolMOS™ CE efficiency performance:

CoolMOS™ CE meets the 80 percent standard efficiency requirement and offers enough margin required for design-in flexibility.

10 W design: IPS65R1K5CE
EN 55022 B radiated HF-field
30 MHz – 1 GHz position



15 W design: IPS65R1K0CE
EN 55022 B radiated HF-field
30 MHz – 1 GHz position



The performance of CoolMOS™ CE in the 10 W and 15 W design demonstrates that the series meets common EMI requirements for charger applications and thus, is also offering design-in flexibility.

CoolMOS™ CE customer benefits	
Product portfolio	We offer a broad portfolio covering five voltage classes in both through-hole and SMD packages
Quality	Our field failure rates are as low as 0.1 DPM
Design-in support	We have a large field application engineering team to provide professional and flexible support for your design



CoolMOS™ SJ MOSFET high power package innovations

Space-saving and high performance packages



An SMD package for high efficiency and controllability in automotive applications

TO-263-7 (D²PAK-7-pin)

The TO-263-7-pin package is an SMD package addressing automotive-specific requirements including high efficiency and controllability. The Kelvin source pin leads to reduced switching losses. Furthermore the new 7-pin design increases the creepage distance at the PCB and therefore helps to improve the manufacturability.



Innovative top-side cooled SMD solution for high power applications

Top-side cooled Double DPAK (DDPAK)

This is the first top-side cooled surface mount device (SMD) package addressing high power SMPS applications such as PC power, solar, server and telecom. SMD-based SMPS designs support fast switching and help to reduce the parasitic inductance associated with long leaded packages such as the common TO-220 package. In today's SMD-based designs, the output power is restricted by the thermal limit of the PCB material because the heat must be dissipated through the board. Thanks to the top-side cooling concept of DDPAK, the thermal decoupling of board and semiconductor is possible, enabling higher power density or improved system lifetime.



For highest efficiency and controllability in high power SMPS markets

TO-247 4-pin with asymmetric leads

The TO-247 4-pin package with asymmetric leads is an optimized version of the standard TO-247 4-pin and enables highest efficiency and controllability in the high power SMPS market. The fourth pin acts as a Kelvin source. The main current of the switch is placed outside of the gate loop and the feedback is eliminated. This leads to less switching losses, especially at high currents. Secondly, the EMI will be reduced due to cleaner waveforms. In addition, the asymmetric leads further improve the ease of use in the design-in process. Compared to the standard TO-247 4-pin the distance between the critical pins has been increased to enable simplified wave soldering and reduced board yield loss.



Enabling significant space savings

ThinPAK 8x8

With very small footprint of only 64 mm² (vs. 150 mm² for the D²PAK) and a very low profile with only 1 mm height (vs. 4.4 mm for the D²PAK) the ThinPAK 8x8 leadless SMD package for high voltage MOSFETs is a first choice to decrease system size in power-density driven designs. Low parasitic inductance and a separate 4-pin Kelvin source connection offer best efficiency and ease of use. The package is RoHS compliant with halogen-free mold compound.




Optimized for high power applications

TO-Leadless

Combined with the latest CoolMOS™ C7 Gold (G7) technology, the TO-Leadless (TOLL) package is Infineon's flagship SMD package for high power/high current SMD solutions. Compared to D²PAK 7-pin, TO-Leadless shows a 30 percent reduction in footprint, yet offers improved thermal performance. This and the 50 percent height reduction result in a significant advantage whenever highest power density is demanded. Equipped with 4-pin Kelvin source connection and low parasitic inductances the package offers best efficiency and ease of use. The package is MSL1 compliant and reflow solderable.

www.infineon.com/coolmos-latest-packages

For more details on the product, click on the part number. 

CoolMOS™ SJ MOSFET low power package innovations

Addressing today's consumer needs



Cost-effective drop-in replacement for DPAK

SOT-223

The SOT-223 package without middle pin is a cost-effective alternative to DPAK, addressing the need for cost reductions in price sensitive applications. It offers a smaller footprint, while still being pin-to-pin compatible with DPAK, thus, allowing a drop-in replacement for DPAK and second sourcing. Moreover, SOT-223 achieves comparable thermal performance to DPAK and enables customers to achieve improved form factors or space savings in designs with low power dissipation.



Solution for slim and small adapters and chargers

ThinPAK 5x6

ThinPAK 5x6 reduces the PCB area by 52 percent and height by 54 percent when compared to the DPAK package which is widely used in chargers and adapters. ThinPAK 5x6 is the right device to replace DPAK and meet the market demands of slimmer and smaller designs. Also ThinPAK 5x6 enables a reduced charger and adapter case hot spot temperature by increasing the space between the MOSFET and the charger and adapter case.



Solution for height reduction in adapters and chargers

TO-220 FullPAK Narrow Lead

Infineon's TO-220 FullPAK Narrow Lead addresses customer needs with regards to height reduction requirements in adapter and charger applications. By offering an optimized standoff width and height and improved creepage distance, the package can be fully inserted into the PCB without any production concerns and, therefore, is especially suitable for slim and semi-slim adapter solutions.



Improved creepage distance for open frame power supplies

TO-220 FullPAK Wide Creepage

This package solution has an increased creepage distance between the pins to 4.25 mm compared to 2.54 mm of a TO-220 FullPAK package. It targets open frame power supplies such as TV sets and PC power, where dust can enter the case through air vents. Dust particles can reduce the effective creepage between pins over time, which may lead to high voltage arcing. The package meets the requirements of open frame power supplies without any additional measures. Thus, it reduces system cost by offering an alternative to frequently used approaches to increase creepage distance.

CoolMOST™ SJ MOSFETs for automotive

600 V CoolMOST™ CPA, 650 V CoolMOST™ CFDA, 800 V CoolMOST™ C3A and new 650 V CoolMOST™ CFD7A – on the fast lane in automotive applications

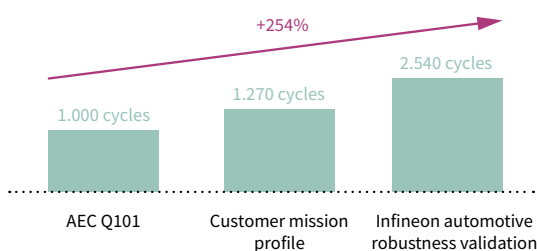
Highest system performance in a size and weight constrained environment, outstanding and proven product quality and reliability, as well as 100 percent reliable delivery are the needs of our automotive customers. With the high voltage automotive MOSFET series 600 V CoolMOST™ CPA and 650 V CoolMOST™ CFDA, 800 V CoolMOST™ C3A and the new 650 V CoolMOST™ CFD7A, Infineon is perfectly prepared to take the challenges in the strongly growing automotive market.

Product series	Key features	Applications	Quality
600 V CoolMOST™ CPA	Best choice for demanding hard switching applications <ul style="list-style-type: none"> ➤ Lowest $R_{DS(on)}$ per package ➤ Lowest gate charge value Q_G 	<ul style="list-style-type: none"> ➤ Hard switching topologies (with SiC diode) ➤ PFC boost stages in on-board charger 	Quality level well beyond the formal requirements of the AEC Q101 standard through <ul style="list-style-type: none"> ➤ Special screening measures in front end, back end ➤ Mission-profile based qualification procedures
650 V CoolMOST™ CFDA	Easy implementation of layout and design <ul style="list-style-type: none"> ➤ Integrated fast body diode ➤ Limited voltage overshoot during hard commutation – self-limiting dI/dt and dV/dt ➤ Low Q_{rr} at repetitive commutation on body diode and low Q_{oss} 	<ul style="list-style-type: none"> ➤ Resonant switching topologies ➤ DC-DC stage of OBC ➤ LLC or full-bridge phase shift (ZVS) in DC-DC converter ➤ HID lamp ➤ Active DC link discharge ➤ Pre-charge 	
800 V CoolMOST™ C3A	<ul style="list-style-type: none"> ➤ Outstanding performance in terms of efficiency, thermal behavior and ease-of-use ➤ High blocking voltage 	<ul style="list-style-type: none"> ➤ Auxiliary Supplies for low-power applications in Traction Inverters ➤ On-Board Charger ➤ HV-LV DC-DC converters ➤ DC-link pre-charge ➤ DC-Link active discharge ➤ Isolation Supervision 	
NEW 650 V CoolMOST™ CFD7A	<ul style="list-style-type: none"> ➤ Improved 650 V CoolMOST™ CFDA ➤ Higher application voltage possible (at the same proven reliability level) ➤ New D2PAK 7-pin with increased creepage distance and Kelvin source ➤ Considerable improvement in key parameters (higher efficiency) 	<ul style="list-style-type: none"> ➤ Hard switching topologies (with SiC diode) ➤ PFC boost stages in on-board charger ➤ Resonant switching topologies ➤ DC-DC stage of OBC ➤ LLC or full-bridge phase shift (ZVS) in DC-DC converter ➤ HID lamp ➤ Active DC link discharge ➤ Pre-charge 	

CoolMOST™ SJ MOSFET automotive – benchmark in quality and reliability

Focus on top-notch quality and reliability without any compromise – that is the principle Infineon applies during development and qualification of all CoolMOST™ superjunction technologies. For our automotive grade derivatives, the great quality levels of the industrial base technologies are further boosted by special screening measures in front- and back-end, as well as by extended qualification procedures. The Infineon robustness validation approach with extended stress-test procedures, doubling the real application requirements, is one of our key measures to ensure a quality level well beyond the formal requirements of the AEC Q101 standard. Aside from extended stress times on standard qualification tests, it comprises test procedures, specially developed by Infineon to ensure highest quality of e.g., the power metallization of our devices. Usage of robust package technologies, 100 percent gate oxide screening, and top-notch production monitoring, including yield screening measures, part average testing (PAT), statistical bin alarm (SBA), and pattern recognition procedures, complete our package to guarantee highest automotive quality. This holistic approach results in an unrivalled quality position of our 600 V CoolMOST™ CPA and 650 V CoolMOST™ CFDA, 800 V CoolMOST™ C3A and the new 650 V CoolMOST™ CFD7A.


Robustness validation – example for thermal cycling test



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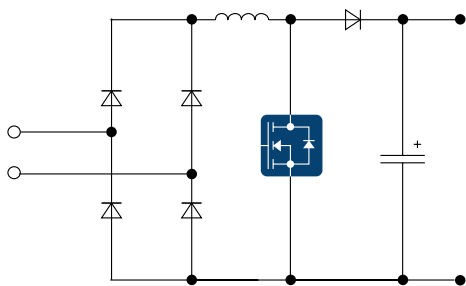
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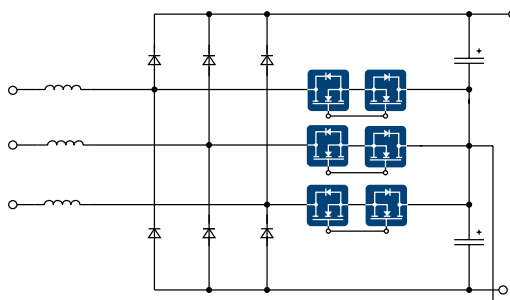
CoolMOS™ SJ MOSFET automotive – ready to support future application trends

Driven by the carbon dioxide (CO₂) reduction initiatives, the market of plug-in hybrid PHEV and pure EV is strongly growing. Higher ranges of the electric vehicles are realized by increasing the battery capacity and the energy efficiency of the used electric components. The used battery voltage classes tend to become standardized at approximately 450 V with a trend towards the higher voltages, as this supports faster charging times and enables lighter cabling within the vehicle. Discrete high voltage components are widely used for on board charger (OBC) and DC-DC converter (LDC) applications, as price pressure increasingly displaces module-based solutions. The trend towards fast charging impacts on the power range demanded from OBC topologies. Presently, as well as in the past, a vast majority of OBC topologies have been found in the range up to 7.2 kW, whereas the future tends to stir the trend towards 11 kW or even up to 22 kW. This development, paired with a demand for high efficiency and power density at low system cost, is a strong driver for the usage of three-phase solutions.

Classic PFC stage for OBC



OBC Vienna rectifier for three-phase PFC in OBC



While for the lower power OBC solutions classic PFC approaches are the well-established approaches in the market, the Vienna rectifier is the optimal solution for the higher power levels. As a true three-phase topology, it delivers full power if attached to a three-phase input but is flexible enough to run on a single-phase if required. The three-level topology minimizes the filter effort compared to other solutions. By using the doubled frequency on the magnetic components, it also helps to significantly reduce the size of the passives. As a three-level topology, the Vienna rectifier, followed by two paralleled DC-DC stages, furthermore leads to a relaxed voltage stress level on the power MOSFETs. This way, it enables to handle upcoming higher battery voltage levels. The $R_{DS(on)}$, required to yield a desired efficiency level in a Vienna Rectifier, is a function of applied switching frequency and demanded power level. With our 600 V CoolMOS™ CPA and 650 V CoolMOS™ CFDA portfolio, covering an $R_{DS(on)}$ range from 45 to 660 mΩ, we are well prepared to support your next generation three-phase Vienna rectifier design. With CoolMOS™ you are ready to seize your share in the emerging high-power onboard-charger markets.

950 V CoolMOST™ P7 **ACTIVE & PREFERRED**

R _{DS(on)} [mΩ]	TO-220	TO-220 FullPAK	SOT-223	TO-251 Long lead	TO-252 (DPAK)	TO-220 Wide creepage	ThinPAK 8x8	D ² PAK
450		IPA95R450P7		IPU95R450P7	IPD95R450P7			
750		IPA95R750P7		IPU95R750P7	IPD95R750P7			
1200		IPA95R1K2P7	IPN95R1K2P7	IPU95R1K2P7	IPD95R1K2P7			
2000			IPN95R2K0P7	IPU95R2K0P7	IPD95R2K0P7			
3700			IPN95R3K7P7	IPU95R3K7P7				

900 V CoolMOST™ C3 **ACTIVE**


R _{DS(on)} [mΩ]	TO-220	TO-262 (I ² PAK)	TO-263 (D ² PAK)	TO-220 FullPAK	TO-247	TO-252 (DPAK)
120					IPW90R120C3	
340	IPP90R340C3	IPJ90R340C3	IPB90R340C3	IPA90R340C3	IPW90R340C3	
500		IPJ90R500C3		IPA90R500C3	IPW90R500C3	
800	IPP90R800C3			IPA90R800C3		
1000	IPP90R1K0C3			IPA90R1K0C3		
1200	IPP90R1K2C3	IPJ90R1K2C3		IPA90R1K2C3		IPD90R1K2C3

800 V CoolMOST™ P7 **ACTIVE & PREFERRED**

R _{DS(on)} [mΩ]	TO-220	TO-220 FullPAK	TO-247	TO-252 (DPAK)	TO-251 (IPAK)	TO-251 (IPAK Short Lead)	SOT-223	TO-220 FullPAK narrow lead
280	IPP80R280P7	IPA80R280P7	IPW80R280P7	IPD80R280P7				IPAN80R280P7
360	IPP80R360P7	IPA80R360P7	IPW80R360P7	IPD80R360P7				IPAN80R360P7
450	IPP80R450P7	IPA80R450P7		IPD80R450P7				IPAN80R450P7
600	IPP80R600P7	IPA80R600P7		IPD80R600P7	IPU80R600P7	IPS80R600P7	IPN80R600P7	
750	IPP80R750P7	IPA80R750P7		IPD80R750P7	IPU80R750P7	IPS80R750P7	IPN80R750P7	
900	IPP80R900P7	IPA80R900P7		IPD80R900P7	IPU80R900P7	IPS80R900P7	IPN80R900P7	
1200	IPP80R1K2P7	IPA80R1K2P7		IPD80R1K2P7	IPU80R1K2P7	IPS80R1K2P7	IPN80R1K2P7	
1400	IPP80R1K4P7	IPA80R1K4P7		IPD80R1K4P7	IPU80R1K4P7	IPS80R1K4P7	IPN80R1K4P7	
2000				IPD80R2K0P7	IPU80R2K0P7	IPS80R2K0P7	IPN80R2K0P7	
2400				IPD80R2K4P7	IPU80R2K4P7	IPS80R2K4P7	IPN80R2K4P7	
3300				IPD80R3K3P7	IPU80R3K3P7		IPN80R3K3P7	
4500				IPD80R4K5P7	IPU80R4K5P7		IPN80R4K5P7	

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For more details on the product,
 click on the part number. 

800 V CoolMOST™ CE **ACTIVE**

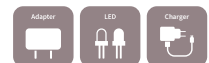
R _{DS(on)} [mΩ]	TO-220	TO-220 FullPAK	TO-247	TO-252 (DPAK)	TO-251 (IPAK)
310		IPA80R310CE			
460		IPA80R460CE			
650		IPA80R650CE			
1000		IPA80R1K0CE		IPD80R1K0CE	IPU80R1K0CE
1400		IPA80R1K4CE		IPD80R1K4CE	
2800				IPD80R2K8CE	

800 V CoolMOST™ C3 **ACTIVE**

R _{DS(on)} [mΩ]	TO-220	TO-263 (D ⁺ PAK)	TO-220 FullPAK	TO-247	TO-252 (DPAK)
85				SPW55N80C3	
290	SPP17N80C3	SPB17N80C3	SPA17N80C3	SPW17N80C3	
450	SPP11N80C3		SPA11N80C3	SPW11N80C3	
650	SPP08N80C3		SPA08N80C3		
900	SPP06N80C3		SPA06N80C3		SPD06N80C3
1300	SPP04N80C3		SPA04N80C3		SPD04N80C3
2700			SPA02N80C3		SPD02N80C3

700 V CoolMOST™ P7 **ACTIVE & PREFERRED**

R _{DS(on)} [mΩ]	TO-251 (IPAK Short Lead)	TO-220 FullPAK	TO-252 (DPAK)	TO-220 FullPAK narrow lead	TO-251 (IPAK Short Lead w/ ISO Standoff)	SOT-223
360	IPS70R360P7S	IPA70R360P7S	IPD70R360P7S	IPAN70R360P7S	IPSA70R360P7S	IPN70R360P7S
450		IPA70R450P7S		IPAN70R450P7S	IPSA70R450P7S	IPN70R450P7S
600	IPS70R600P7S	IPA70R600P7S	IPD70R600P7S	IPAN70R600P7S	IPSA70R600P7S	IPN70R600P7S
750		IPA70R750P7S		IPAN70R750P7S	IPSA70R750P7S	IPN70R750P7S
900	IPS70R900P7S	IPA70R900P7S	IPD70R900P7S	IPAN70R900P7S	IPSA70R900P7S	IPN70R900P7S
1200					IPSA70R1K2P7S	IPN70R1K2P7S
1400	IPS70R1K4P7S		IPD70R1K4P7S		IPSA70R1K4P7S	IPN70R1K4P7S
2000					IPSA70R2K0P7S	IPN70R2K0P7S

700 V CoolMOST™ CE **ACTIVE**

R _{DS(on)} [mΩ]	TO-220 FullPAK Wide Creepage	TO-262 (IPAK)	TO-251 (IPAK Short Lead with ISO Standoff)	TO-252 (DPAK)	TO-251 (IPAK Short Lead)	SOT-223
600	IPAW70R600CE		IPSA70R600CE	IPD70R600CE		
950	IPAW70R950CE	IP170R950CE	IPSA70R950CE	IPD70R950CE	IPST70R950CE	
1000						IPN70R1K0CE
1400			IPSA70R1K4CE	IPD70R1K4CE	IPST70R1K4CE	
1500						IPN70R1K5CE
2000			IPSA70R2K0CE	IPD70R2K0CE	IPST70R2K0CE	
2100						IPN70R2K1CE

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For more details on the product, click on the part number.

650 V CoolMOST™ C7 Gold (G-series) **ACTIVE & PREFERRED**

R _{DS(on)} [mΩ]	TO-220	TO-Leadless (TOLL)	TO-263 (D ² PAK)	TO-220 FullPAK	TO-247	TO-252 (DPAK)
33		IPT65R033G7				
105		IPT65R105G7				
195		IPT65R195G7				

650 V CoolMOST™ C7 **ACTIVE & PREFERRED**

R _{DS(on)} [mΩ]	TO-220	TO-263 (D ² PAK)	TO-220 FullPAK	TO-247	TO-247 4-pin	TO-252 (DPAK)	ThinPAK 8x8
19				IPW65R019C7	IPZ65R019C7		
45	IPP65R045C7	IPB65R045C7	IPA65R045C7	IPW65R045C7	IPZ65R045C7		
65	IPP65R065C7	IPB65R065C7	IPA65R065C7	IPW65R065C7	IPZ65R065C7		
70							IPL65R070C7
95	IPP65R095C7	IPB65R095C7	IPA65R095C7	IPW65R095C7	IPZ65R095C7		
99							IPL65R099C7
125	IPP65R125C7	IPB65R125C7	IPA65R125C7	IPW65R125C7			
130							IPL65R130C7
190	IPP65R190C7	IPB65R190C7	IPA65R190C7	IPW65R190C7		IPD65R190C7	
195							IPL65R195C7
225	IPP65R225C7	IPB65R225C7	IPA65R225C7			IPD65R225C7	
230							IPL65R230C7


650 V CoolMOST™ CE **ACTIVE**

R _{DS(on)} [mΩ]	TO-220	TO-220 FullPAK	TO-247	TO-252 (DPAK)	TO-251 (IPAK)	TO-251 (IPAK Short Lead)	SOT-223	TO-220 FullPAK Narrow Lead
400		IPA65R400CE		IPD65R400CE		IPS65R400CE		
650		IPA65R650CE		IPD65R650CE		IPS65R650CE		IPAN65R650CE
1000		IPA65R1K0CE		IPD65R1K0CE		IPS65R1K0CE		
1500		IPA65R1K5CE		IPD65R1K5CE			IPN65R1K5CE	

650 V CoolMOST™ CFD2 **ACTIVE**

R _{DS(on)} [mΩ]	TO-220	TO-262 (I ² PAK)	TO-263 (D ² PAK)	TO-220 FullPAK	TO-247	TO-252 (DPAK)	ThinPAK 8x8
41					IPW65R041CFD		
80					IPW65R080CFD		
110	IPP65R110CFD		IPB65R110CFD	IPA65R110CFD	IPW65R110CFD		
150	IPP65R150CFD		IPB65R150CFD	IPA65R150CFD	IPW65R150CFD		
165							IPL65R165CFD
190	IPP65R190CFD	IPB65R190CFD	IPB65R190CFD	IPA65R190CFD	IPW65R190CFD		
210							IPL65R210CFD
310	IPP65R310CFD		IPB65R310CFD	IPA65R310CFD			
340							IPL65R340CFD
420	IPP65R420CFD			IPA65R420CFD	IPW65R420CFD	IPD65R420CFD	
660				IPA65R660CFD		IPD65R660CFD	
950						IPD65R950CFD	
1400						IPD65R1K4CFD	

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 For more details on the product,  click on the part number.

600 V CoolMOST™ PFD7 **ACTIVE & PREFERRED**

R _{DS(on)} [mΩ]	TO-220 FullPAK Narrow Leads	TO-251 (IPAK Short Lead)	TO-252 (DPAK)	SOT-223	ThinPAK 5x6
125	IPAN60R125PFD7S				
210	IPAN60R210PFD7S	IPS60R210PFD7S	IPD60R210PFD7S		
280	IPAN60R280PFD7S	IPS60R280PFD7S	IPD60R280PFD7S		
360	IPAN60R360PFD7S	IPS60R360PFD7S	IPD60R360PFD7S	IPN60R360PFD7S	IPLK60R360PFD7 *
600		IPS60R600PFD7S	IPD60R600PFD7S	IPN60R600PFD7S	IPLK60R600PFD7 *
1000		IPS60R1K0PFD7S	IPD60R1K0PFD7S	IPN60R1K0PFD7S	IPLK60R1K0PFD7 *
1500			IPD60R1K5PFD7S	IPN60R1K5PFD7S	IPLK60R1K5PFD7 *
2000			IPD60R2K0PFD7S	IPN60R2K0PFD7S	

600 V CoolMOST™ P7 **ACTIVE & PREFERRED**

Industrial grade



R _{DS(on)} [mΩ]	TO -220	TO-220 FullPAK	TO-247	TO-247 4-pin asymmetric leads	TO-252 (DPAK)	TO-220 FullPAK Wide Creepage	ThinPAK 8x8	D ² PAK
24			IPW60R024P7	IPZA60R024P7				
37			IPW60R037P7	IPZA60R037P7				
45			IPW60R045P7	IPZA60R045P7				IPB60R045P7
60	IPP60R060P7	IPA60R060P7	IPW60R060P7	IPZA60R060P7				IPB60R060P7
65							IPL60R065P7	
80	IPP60R080P7	IPA60R080P7	IPW60R080P7	IPZA60R080P7			IPL60R085P7	IPB60R080P7
99	IPP60R099P7	IPA60R099P7	IPW60R099P7	IPZA60R099P7				IPB60R099P7
105							IPL60R105P7	
120	IPP60R120P7	IPA60R120P7	IPW60R120P7	IPZA60R120P7				IPB60R120P7
125							IPL60R125P7	
160	IPP60R160P7	IPA60R160P7						
180	IPP60R180P7	IPA60R180P7	IPW60R180P7	IPZA60R180P7	IPD60R180P7			IPB60R180P7
185							IPL60R185P7	
280	IPP60R280P7	IPA60R280P7			IPD60R280P7			IPB60R280P7
285							IPL60R285P7	
360	IPP60R360P7	IPA60R360P7			IPD60R360P7			IPB60R360P7
365							IPL60R365P7	
600	IPP60R600P7	IPA60R600P7			IPD60R600P7			

600 V CoolMOST™ P7 **ACTIVE & PREFERRED**

Standard grade



R _{DS(on)} [mΩ]	TO -220	TO-220 FullPAK	TO-220 FullPAK Narrow lead	TO-247 4-pin	TO-252 (DPAK)	TO-220 FullPAK Wide Creepage	ThinPAK 8x8	SOT-223
180		IPA60R180P7S	IPAN60R180P7S		IPD60R180P7S	IPAW60R180P7S		
280		IPA60R280P7S	IPAN60R280P7S		IPD60R280P7S	IPAW60R280P7S		
360		IPA60R360P7S	IPAN60R360P7S		IPD60R360P7S	IPAW60R360P7S		IPN60R360P7S
600		IPA60R600P7S	IPAN60R600P7S		IPD60R600P7S	IPAW60R600P7S		IPN60R600P7S

600 V CoolMOST™ CFD7 **ACTIVE & PREFERRED**

R _{DS(on)} [mΩ]	TO-220	TO-263 (D ² PAK)	TO-220 FullPAK	TO-247	TO-252 (DPAK)	ThinPAK 8x8	DDPAK	TO-Leadless (TOLL)
18				IPW60R018CFD7				
24				IPW60R024CFD7				
31/35				IPW60R031CFD7				IPT60R035CFD7 *
40/45		IPB60R040CFD7		IPW60R040CFD7			IPDD60R045CFD7 *	IPT60R045CFD7 *
55		IPB60R055CFD7		IPW60R055CFD7			IPDD60R055CFD7 *	IPT60R055CFD7 *
60						IPL60R060CFD7		
70	IPP60R070CFD7	IPB60R070CFD7		IPW60R070CFD7				
75						IPL60R075CFD7	IPDD60R075CFD7 *	IPT60R075CFD7 *
90/95	IPP60R090CFD7	IPB60R090CFD7		IPW60R090CFD7		IPL60R095CFD7	IPDD60R090CFD7 *	IPT60R090CFD7 *
105/115	IPP60R105CFD7	IPB60R105CFD7		IPW60R105CFD7		IPL60R115CFD7	IPDD60R105CFD7 *	IPT60R105CFD7 *
125/140	IPP60R125CFD7	IPB60R125CFD7	IPA60R125CFD7	IPW60R125CFD7		IPL60R140CFD7	IPDD60R125CFD7 *	IPT60R125CFD7 *
145/160	IPP60R145CFD7	IPB60R145CFD7	IPA60R145CFD7	IPW60R145CFD7	IPD60R145CFD7	IPL60R160CFD7	IPDD60R145CFD7 *	IPT60R145CFD7 *
170	IPP60R170CFD7	IPB60R170CFD7	IPA60R170CFD7	IPW60R170CFD7	IPD60R170CFD7		IPDD60R170CFD7 *	
185						IPL60R185CFD7		
210/225	IPP60R210CFD7	IPB60R210CFD7	IPA60R210CFD7		IPD60R210CFD7	IPL60R225CFD7		
280	IPP60R280CFD7	IPB60R280CFD7	IPA60R280CFD7		IPD60R280CFD7			
360	IPP60R360CFD7 *	IPB60R360CFD7	IPA60R360CFD7		IPD60R360CFD7			

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*Coming soon

For more details on the product, click on the part number.

600 V CoolMOST™ S7 **ACTIVE & PREFERRED**

R _{DS(on)} [mΩ]	TO -220	QDPAK	TO-Leadless (TOLL)
10		IPDQ60R010S7 *	
22	IPP60R022S7		IPT60R022S7
40			IPT60R040S7
65			IPT60R065S7

600 V CoolMOST™ C7 Gold (G-series) **ACTIVE & PREFERRED**

R _{DS(on)} [mΩ]	TO -220	TO-Leadless (TOLL)	TO-220 FullPAK	TO-247	TO-247 4-pin	TO-252 (Double DPAK)	ThinPAK 8x8
28		IPT60R028G7					
50		IPT60R050G7				IPDD60R050G7	
80		IPT60R080G7				IPDD60R080G7	
102		IPT60R102G7				IPDD60R102G7	
125		IPT60R125G7				IPDD60R125G7	
150		IPT60R150G7				IPDD60R150G7	
190						IPDD60R190G7	

600 V CoolMOST™ C7 **ACTIVE & PREFERRED**

R _{DS(on)} [mΩ]	TO-220	TO-263 (D ² PAK)	TO-220 FullPAK	TO-247	TO-247 4-pin	TO-252 (DPAK)	ThinPAK 8x8
17				IPW60R017C7	IPZ60R017C7		
40	IPP60R040C7	IPB60R040C7		IPW60R040C7	IPZ60R040C7		
60	IPP60R060C7	IPB60R060C7	IPA60R060C7	IPW60R060C7	IPZ60R060C7		
65							IPL60R065C7
99	IPP60R099C7	IPB60R099C7	IPA60R099C7	IPW60R099C7	IPZ60R099C7		
104							IPL60R104C7
120	IPP60R120C7	IPB60R120C7	IPA60R120C7	IPW60R120C7			
125							IPL60R125C7
180	IPP60R180C7	IPB60R180C7	IPA60R180C7	IPW60R180C7		IPD60R180C7	
185							IPL60R185C7

600 V CoolMOST™ P6 **ACTIVE**

R _{DS(on)} [mΩ]	TO-220	TO-220 FullPAK	TO-247	TO-247 4-pin	TO-252 (DPAK)	ThinPAK 5x6	ThinPAK 8x8
41			IPW60R041P6				
70			IPW60R070P6	IPZ60R070P6			
99	IPP60R099P6	IPA60R099P6	IPW60R099P6	IPZ60R099P6			
125	IPP60R125P6	IPA60R125P6	IPW60R125P6				
160	IPP60R160P6	IPA60R160P6	IPW60R160P6				
180							IPL60R180P6
190	IPP60R190P6	IPA60R190P6	IPW60R190P6				
210							IPL60R210P6
230		IPA60R230P6					
255							
280	IPP60R280P6	IPA60R280P6	IPW60R280P6				
330/360						IPL60R360P6S	
380		IPA60R380P6			IPD60R380P6		
600		IPA60R600P6			IPD60R600P6		
650						IPL60R650P6S	

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www.infineon.com/c7

* Coming soon

www.infineon.com/p6
www.infineon.com/g7
www.infineon.com/s7

For more details on the product, click on the part number.

600 V CoolMOST™ CE **ACTIVE**

$R_{DS(on)}$ [mΩ]	TO-220 FullPAK	TO-220 FullPAK Wide Creepage	TO-247	TO-252 (DPAK)	TO-251 (IPAK)	TO-251 (IPAK Short Lead)	SOT-223	TO-220 FullPAK Narrow Lead
190		IPAW60R190CE						
280		IPAW60R280CE						
380		IPAW60R380CE						
400	IPA60R400CE			IPD60R400CE		IPS60R400CE		
460	IPA60R460CE			IPD60R460CE		IPS60R460CE		
600		IPAW60R600CE						
650	IPA60R650CE			IPD60R650CE		IPS60R650CE		IPAN60R650CE
800				IPD60R800CE		IPS60R800CE		IPAN60R800CE
1000	IPA60R1K0CE			IPD60R1K0CE	IPU60R1K0CE	IPS60R1K0CE	IPN60R1K0CE	
1500	IPA60R1K5CE			IPD60R1K5CE	IPU60R1K5CE	IPS60R1K5CE	IPN60R1K5CE	
2100				IPD60R2K1CE	IPU60R2K1CE	IPS60R2K1CE	IPN60R2K1CE	
3400				IPD60R3K4CE		IPS60R3K4CE	IPN60R3K4CE	

500 V CoolMOST™ CE **ACTIVE & PREFERRED**

$R_{DS(on)}$ [mΩ]	TO-220	TO-220 FullPAK	TO-247	TO-252 (DPAK)	TO-251 (IPAK)	TO-251 (IPAK Short Lead)	SOT-223	TO-220 FullPAK Narrow Lead
190	IPP50R190CE	IPA50R190CE						
280	IPP50R280CE	IPA50R280CE		IPD50R280CE				
380	IPP50R380CE	IPA50R380CE		IPD50R380CE				
500		IPA50R500CE		IPD50R500CE				IPAN50R500CE
650				IPD50R650CE			IPN50R650CE	
800		IPA50R800CE		IPD50R800CE			IPN50R800CE	
950		IPA50R950CE		IPD50R950CE			IPN50R950CE	
1400				IPD50R1K4CE			IPN50R1K4CE	
2000				IPD50R2K0CE			IPN50R2K0CE	
3000				IPD50R3K0CE			IPN50R3K0CE	

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www.infineon.com/500v-ce

For more details on the product, click on the part number.

CoolMOST™ SJ MOSFET automotive

650 V CoolMOST™ CFDA **ACTIVE & PREFERRED**

Product type	$R_{DS(on)}$ @ $T_J = 25^\circ\text{C}$ $V_{GS} = 10\text{ V}$ [mΩ]	$I_{D,max.}$ @ $T_J = 25^\circ\text{C}$ [A]	$I_{D,puls,max.}$ [A]	$V_{GS(th),min.-max.}$ [V]	$Q_{G,typ.}$ [nC]	$R_{thJC,max.}$ [K/W]	Package
IPD65R420CFDA	420	8.7	27	3.5...4.5	32	1.5	TO-252
IPD65R660CFDA	660	6	17	3.5...4.5	20	2	TO-252
IPB65R110CFDA	110	31.2	99.6	3.5...4.5	11	0.45	TO-263
IPB65R150CFDA	150	22.4	72	3.5...4.5	86	0.64	TO-263
IPB65R190CFDA	190	17.5	57.2	3.5...4.5	68	0.83	TO-263
IPB65R310CFDA	310	11.4	34.4	3.5...4.5	41	1.2	TO-263
IPB65R660CFDA	660	6	17	3.5...4.5	20	2	TO-263
IPP65R110CFDA	110	31.2	99.6	3.5...4.5	11	0.45	TO-220
IPP65R150CFDA	150	22.4	72	3.5...4.5	86	0.64	TO-220
IPP65R190CFDA	190	17.5	57.2	3.5...4.5	68	0.83	TO-220
IPP65R310CFDA	310	11.4	34.4	3.5...4.5	41	1.2	TO-220
IPW65R048CFDA	48	63.3	228	3.5...4.5	27	0.25	TO-247
IPW65R080CFDA	80	43.3	127	3.5...4.5	16	0.32	TO-247
IPW65R110CFDA	110	31.2	99.6	3.5...4.5	11	0.45	TO-247
IPW65R150CFDA	150	22.4	72	3.5...4.5	86	0.64	TO-247
IPW65R190CFDA	190	17.5	57.2	3.5...4.5	68	0.83	TO-247


600 V CoolMOST™ CPA **ACTIVE & PREFERRED**

Product type	$R_{DS(on)}$ @ $T_J = 25^\circ\text{C}$ $V_{GS} = 10\text{ V}$ [mΩ]	$I_{D,max.}$ @ $T_J = 25^\circ\text{C}$ [A]	$I_{D,puls,max.}$ [A]	$V_{GS(th),min.-max.}$ [V]	$Q_{G,typ.}$ [nC]	$R_{thJC,max.}$ [K/W]	Package
IPB60R099CPA	99	31	93	2.5 ... 3.5	60	0.5	TO-263
IPB60R199CPA	199	16	51	2.5 ... 3.5	32	0.9	TO-263
IPB60R299CPA	299	11	34	2.5 ... 3.5	22	1.3	TO-263
IPP60R099CPA	99	31	93	2.5 ... 3.5	60	0.5	TO-220
IPW60R045CPA	45	60	230	2.5 ... 3.5	150	0.29	TO-247
IPW60R075CPA	75	39	130	2.5 ... 3.5	87	0.4	TO-247
IPW60R099CPA	99	31	93	2.5 ... 3.5	60	0.5	TO-247
IPW60R099CPA	99	31	93	2.5 ... 3.5	60	0.5	TO-262

800 V CoolMOST™ C3A **ACTIVE & PREFERRED**

Product type	$R_{DS(on)}$ @ $T_J = 25^\circ\text{C}$ $V_{GS} = 10\text{ V}$ [mΩ]	$I_{D,max.}$ @ $T_J = 25^\circ\text{C}$ [A]	$I_{D,puls,max.}$ [A]	$V_{GS(th),min.-max.}$ [V]	$Q_{G,typ.}$ [nC]	$R_{thJC,max.}$ [K/W]	Package
IPD80R2K7C3A	2700	2	6	2.1 ... 3.9	12	3	TO-252
IPB80R290C3A	290	17	51	2.1 ... 3.9	91	0.55	TO-263
IPW80R290C3A	290	17	51	2.1 ... 3.9	91	0.55	TO-247

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 For more details on the product,  click on the part number.

650V CoolMOS™ CFD7A **ACTIVE & PREFERRED**

R _{DS(on)} [mΩ]	TO-263 D ² PAK	TO-263-7 D ² PAK 7 pin	TO-220	TO-247
230	IPB65R230CFD7A *	IPBE65R230CFD7A *		
115	IPB65R115CFD7A * *	IPBE65R115CFD7A * *	IPP65R0115CFD7A *	IPW65R115CFD7A *
99	IPB65R099CFD7A *	IPBE65R099CFD7A *	IPP65R099CFD7A *	IPW65R099CFD7A *
75		IPBE65R075CFD7A *		IPW65R075CFD7A *
50	IPB65R050CFD7A *	IPBE65R050CFD7A *	IPP65R050CFD7A *	IPW65R050CFD7A *
35				IPW65R035CFD7A *
22				IPW65R022CFD7A *

* ES available, SOP second half 2020

* * Coming soon

For more details on the product, click on the part number.

CoolMOST™ SJ MOSFETs – packages



SOT-223

Voltage [V]	Series	R _{DS(on)} [mΩ]									
		0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
500	CE								650/800	950/1400	2000/3000
600	P7						360	600			
	CE									1000/1500	2100/3400
	PFD7						360	600		1000/1500	2000
650	CE									2000	
700	P7						360	450/600	700	900/1200/1400	2000
	CE									1000/1500/2100	
800	P7								650/750	900/1200/1400	2000/2400/ 3300/4500
950	P7									1200	2000/3700



TO-247

Voltage [V]	Series	R _{DS(on)} [mΩ]									
		0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	P7	24/37/45	60/80	99/120	180						
	C7	17/40	60	99/120	180						
	P6	41	70	99/125	160/190	280					
	CFD7	18/24/31/40/55	70	90/125/145	170						
	CPA	45	75	99							
650	C7	19/45	65	95/125	190						
	CFD2	41	80	110	150/190			420			
	CFDA	48	80	110	150/190						
	CFD7A	22 */35 */50 *	75 *	99 */115 *							
800	P7					280	360				
	C3		85			290		450			
900	C3			120			340	500			



TO-247 4-pin

Voltage [V]	Series	R _{DS(on)} [mΩ]									
		0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	C7	17/40	60	99							
	P6		70	99							
650	C7	19/45	65	95							



TO-247 4-pin asymmetric leads

Voltage [V]	Series	R _{DS(on)} [mΩ]									
		0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	P7	24/37/45	60/80	99/120	180						



IPAK

Voltage [V]	Series	R _{DS(on)} [mΩ]									
		0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	CE									1000/1500	2100
800	P7							600	750	900/1200/1400	2000/2400 3300/4500
	CE									1000	
950	P7							450	750	1200	2000/3700

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ACTIVE & PREFERRED

* ES available, SOP second half 2020

For more details on the product, click on the part number.



IPAK Short Lead

Voltage [V]	Series	R _{DS(on)} [mΩ]									
		0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	CE						400	460	650/800	1000/1500	2100/3400
	PFD7					210/280	360	600		1000	
650	CE						400		650	1000	
700	P7						360/600			900/1400	
	CE									950/1400	2000
800	P7							600	750	900/1200/1400	2000/2400



IPAK Short Lead with ISO Standoff

Voltage [V]	Series	R _{DS(on)} [mΩ]									
		0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
700	P7						360	450/600	750	900/1200/1400	2000
	CE							600		950/1400	2000



DPAK

Voltage [V]	Series	R _{DS(on)} [mΩ]									
		0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
500	CE					280	380	500	650/800	950/1400	2000/3000
600	P7				180	280	360	600			
	C7				180						
	CE						400	460	650/800	1000/1500	2100/3400
	P6						380	600			
	CFD7				170	280	360 *				
	PFD7					210/280	360	600		1000/1500	2000
650	C7				190	225					
	CE						400		650	1000/1500	
	CFD2							420	660	950/1400	
	CFDA							420	660		
700	P7						360	600		900/1400	
	CE							600		950/1400	2000
800	P7					280	360	450/600	750	900/1200/1400	2000/2400 3300/4500
	C3									900/1300	2700
	CE									1000/1400	2800
900	C3									1200	
950	P7							450	750	1200	2000



I²PAK

Voltage [V]	Series	R _{DS(on)} [mΩ]									
		0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	CPA			99							
650	CFD2				199						
700	CE									950	
900	C3						340	500		1200	

**D²PAK**

		R _{DS(on)} [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	C7	40	60	99/120	180						
	P7	45	60/80	99/120	180	280	360				
	CPA			99	199	299					
	CFD7	40		20/105	170	210					
650		55	70	125/145		280	360				
	C7	45	65	95/125	190	225					
	CFD2			110	150/190		310				
	CFDA			110	150/190		310		660		
	CFD7A	50 **		99 **/115		230 **					
800	C3					290					
900	C3						340				

**D²PAK 7-pin**

		R _{DS(on)} [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
650	CFD7A	50 **	75 **	99 **/115		230 **					

**Double DPAK (DDPAK)**

		R _{DS(on)} [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	G7	50	80	102/125	150/190						

**QDPAK**

		R _{DS(on)} [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	S7	10 *									

**TO-220 FullPAK**

		R _{DS(on)} [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
500	CE				190	280	380	500	800	950	
600	P7		60/80	99/120	160/180	280	360	600			
	C7		60	99/120	180						
	CE						400	460	650	1000/1500	
	CFD7			125	170	280	360 *				
	P6			99/125	160/190	230/280	380	600			
650	C7	45	65	95/125	190	225					
	CE						400		650	1000/1500	
	CFD2			110	150/190		310	420	660		
700	P7						360	450/600	750	900	
800	P7					280	360	450/600	750	900/1200/1400	
	C3					290		450	650	900/1300	2700
	CE						310	460	650	1000/1400	
900	C3						340	500	800	1000/1200	
950	P7							450	750	1200	

**TO-220 FullPAK Narrow Lead**

		R _{DS(on)} [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
500	CE							500			
600	CE								650/800		
	P7				180	280	360	600			
	PFD7			125		210/280	360				
650	CE								650		
700	P7						360	450/600	750	900	
800	P7					280	360	450			



TO-Leadless

		R _{DS(on)} group [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	G7	28/50	80	102/125	150						
	S7	22/40	65								
650	G7	33		105	195						



TO-220

		R _{DS(on)} [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
500	CE				190	280	380				
600	P7		60/80	99/120	160/180	280	360	600			
	C7	40	60	99/120	180						
	P6			99/125	160/190	280					
	CFD7		70	90/125	170	280	360				
	CPA			99							
	S7	22									
650	C7	45	65	95/125	190	225					
	CFD2			110	150/190		310	420			
	CFDA	50		99/110/115	150/190		310		660		
	CFD7A	50 **		99 * */115 **							
800	P7					280	360	450/600	750	900/1200/1400	
	C3					290		450	650	900/1300	
900	C3						340		800	1000/1200	



TO-220 FullPAK Wide Creepage

		R _{DS(on)} [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	P7				180	280	360	600			
	CE				190	280	380	600			
700	CE							600		950	



ThinPAK 5x6

		R _{DS(on)} [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	P6						360		650		
	PFD7						360	600		1000/1500	



ThinPAK 8x8

		R _{DS(on)} [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	P7		65/85	105/125	185	285	365				
	C7		65	104/125	185						
	CFD7		75		185	225					
	P6				180	210					
650	C7		70	99/130	195	230					
	CFD2				165	210	340				

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*Coming soon

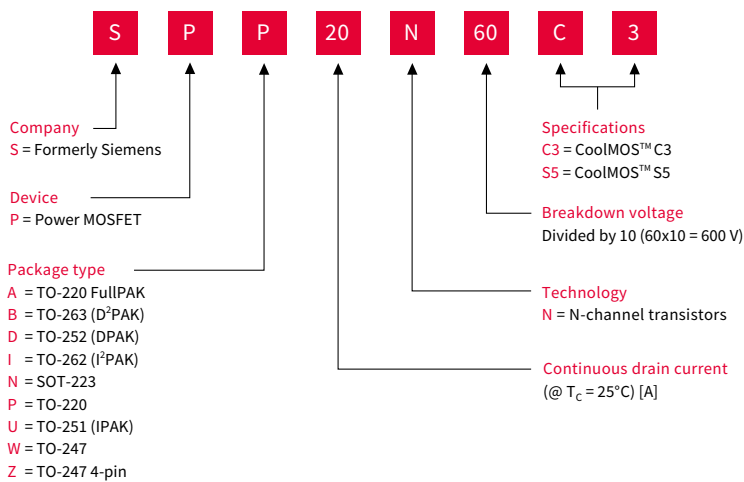
** ES available, SOP second half 2020

ACTIVE & PREFERRED

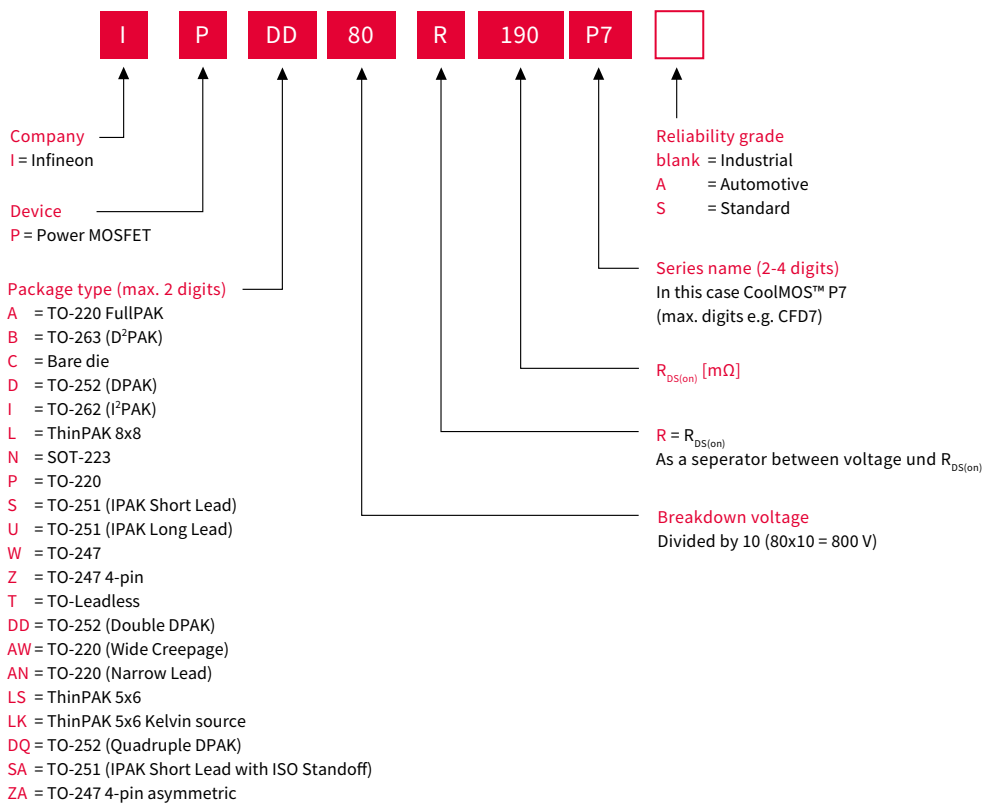
For more details on the product, click on the part number.

Nomenclature

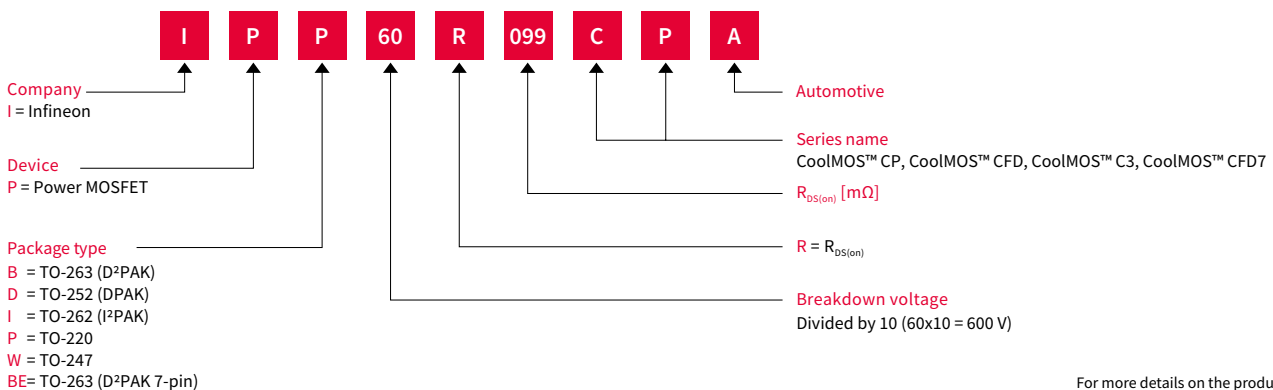
Power MOSFETs (until 2005)



Power MOSFETs (from October 2015 onwards)



Automotive MOSFETs



For more details on the product, click on the part number.



Infineon support for high voltage MOSFETs

Useful links and helpful information

Further information, datasheets and documents

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Evaluationboards and simulation models

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For more details on the product, click on the part number.



Wide bandgap semiconductors

- › CoolGaN™ e-mode HEMTs
- › CoolGaN™ 400 V e-mode GaN HEMTs
- › CoolGaN™ 600 V e-mode GaN HEMTs
- › CoolGaN™ product portfolio
- › Silicon carbide
- › CoolSiC™ silicon carbide MOSFETs 650 V
- › CoolSiC™ silicon carbide MOSFETs 1200 V
- › CoolSiC™ product portfolio
- › CoolSiC™ Schottky diodes
- › CoolSiC™ Schottky diodes 650 V
- › CoolSiC™ Schottky diodes 1200 V
- › SiC diodes product portfolio
- › Silicon power diodes



GaN

Si

Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

Applications

Wide bandgap semiconductors

Gallium nitride (GaN) and silicon carbide (SiC)

The key to the next essential step towards an energy-efficient world is to use new materials, such as wide bandgap semiconductors that allow for greater power efficiency, smaller size, lighter weight, lower overall cost – or all of these together. Infineon, with its unique market position of being currently the only company offering silicon (Si), silicon carbide (SiC) and gallium nitride (GaN) devices, is the customer's first choice in all segments.

CoolGaN™ – ultimate efficiency and reliability

Compared to silicon (Si), the breakdown field of Infineon's CoolGaN™ enhancement mode (e-mode) HEMTs is ten times higher and the electron mobility is double. Both the output charge and gate charge are ten times lower than with Si and the reverse recovery charge is almost zero which is key to high-frequency operations. GaN is the best-suited technology in hard-switching as well as resonant topologies, and is enabling new approaches in current modulation. Infineon's GaN solution is based on the most robust and performing concept in the market – the enhancement-mode concept - offering fast turn-on and turn-off speed. CoolGaN™ products focus on high performance and robustness, and add significant value to a broad variety of systems across many applications such as server, telecom, hyperscale data centers, wireless charging, adapter/charger, and audio. CoolGaN™ switches are easy to design-in with the matching GaN EiceDRIVER™ gate driver ICs from Infineon.

CoolSiC™ - revolution to rely on

Silicon carbide (SiC) has a wide bandgap of 3 electronvolts (eV) and a much higher thermal conductivity compared to silicon. SiC-based MOSFETs are best-suited for high-breakdown, high-power applications that operate at higher frequencies compared to traditional IGBTs. CoolSiC™ MOSFETs come along with a fast internal freewheeling diode, thus making hard commutation without additional diode chips possible. Due to its unipolar character, the MOSFETs show very low, temperature-independent switching and low conduction losses, especially under partial load conditions. Based on proven, high-quality volume manufacturing, Infineon's silicon carbide solutions combine revolutionary technology with benchmark reliability – for our customers' success today and tomorrow. The offering is completed by EiceDRIVER™ SiC MOSFET gate driver ICs based on Infineon's successful coreless transformer technology.



Applications

20-300 V MOSFETs

500-950 V MOSFETs

WBG semiconductors

Discrete IGBTs

Power ICs

Intelligent switches
and input ICs

Gate driver ICs

Microcontrollers

XENSIV™ sensors

Packages

CoolGaN™ e-mode HEMTs

Tailor-made for the highest efficiency and power density in switch mode power supplies

In comparison to the next best silicon alternative, CoolGaN™ enables higher power density and the highest efficiency, especially in the partial load range, through novel topologies such as the CCM totem-pole PFC stage. GaN e-mode HEMT performance features a low reverse recovery charge and excellent dynamic performance in reverse conduction compared to silicon FET solutions. This enables more efficient operation at established frequencies, and much higher frequency operation which can improve power density by shrinking the size of passive components. CoolGaN™ enables doubled output power in a given energy storage slot size, freeing up space and realizing higher efficiency at the same time.

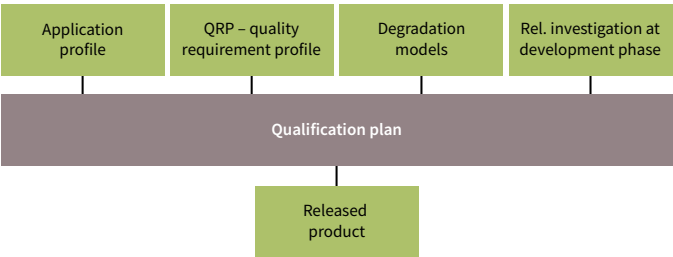
Infiniteon's CoolGaN™ comes with industry-leading reliability. During the quality management process, it is not only the device which is thoroughly tested but also its behavior in the application environment. The performance of CoolGaN™ goes beyond other GaN products in the market.

Features	Design benefits	Advantages
<ul style="list-style-type: none">› Low output charge and gate charge› No reverse recovery charge	<ul style="list-style-type: none">› High power density, small and light design› High efficiency in resonant circuits› New topologies and current modulation› Fast and (near-)lossless switching	<ul style="list-style-type: none">› Operational expenses (OPEX) and capital expenditure (CAPEX) reduction› BOM and overall cost savings

Infiniteon leverages its unique portfolio of high- and low-voltage MOSFETs, driver ICs and digital controllers to complement its CoolGaN™ product line, thus enabling full exploit for GaN benefits.

The highest quality

- The qualification of GaN switches requires a dedicated approach, well above existing silicon standards
- › Infiniteon qualifies GaN devices well beyond industry standards
 - › Application profiles are an integral part of the qualification process
 - › Failure models, based on accelerated test conditions, ensure target lifetime and quality are met
 - › Infiniteon sets the next level of wide bandgap quality



CoolGaN™ e-mode HEMTs overview

CoolGaN™ e-mode HEMTs		
CoolGaN™ 600 V e-mode HEMTs	CoolGaN™ 400 V e-mode HEMTs	
Single-channel functional and reinforced isolated gate-driver ICs for enhancement-mode GaN HEMTs		
Perfect fit for enhancement-mode GaN HEMTs		
1EDF5673K	1EDF5673F	1EDS5663H

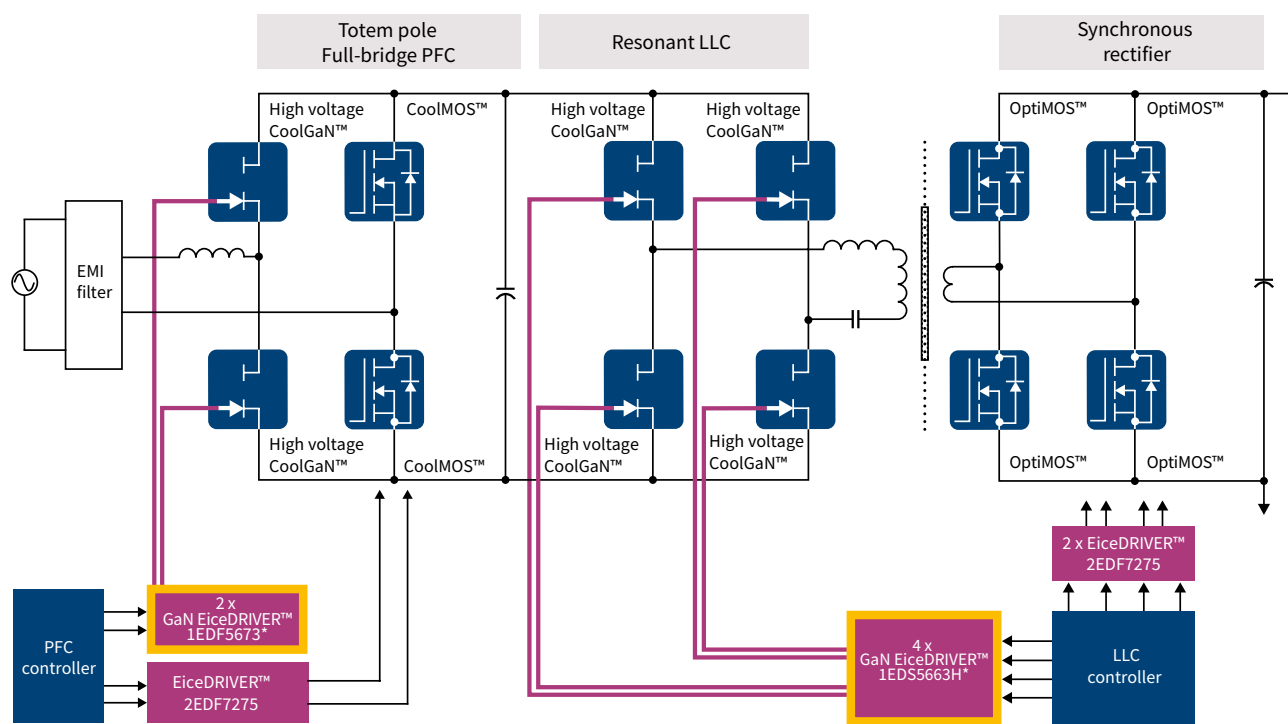
CoolGaN™ 400 V and 600 V e-mode GaN HEMTs – bringing GaN technology to the next level

Infineon's CoolGaN™ 400 V and 600 V e-mode HEMTs enable more than 98 percent system efficiency and help customers to make their end products smaller and lighter. Driving enhancement-mode devices requires some additional features when choosing the correct gate driver IC, however, CoolGaN™ technology does not require customized ICs. Infineon offers three new members of a single-channel galvanically isolated gate driver IC family. The new components are a perfect fit for e-mode GaN HEMTs with non-isolated gate (diode input characteristic) and low threshold voltage, such as CoolGaN™.

Complete support of all requirements specific to e-mode GaN HEMTs operation:

- › Low driving impedance (on-resistance $0.85\ \Omega$ source, $0.35\ \Omega$ sink)
- › Resistor programmable gate current for steady on-state (typically 10 mA)
- › Programmable negative gate voltage to completely avoid spurious turn-on in half-bridges

Block diagram: high-efficiency GaN switched mode power supply (SMPS)



*GaN EiceDRIVER™ ICs are single-channel products

CoolGaN™ 400 V e-mode GaN HEMTs

Class D output stage offering the best audio experience

CoolGaN™ 400 V enables smoother switching and more linear class D output stage by offering low/linear C_{oss} , zero Q_{rr} , and normally-off switch. Ideal class D audio amplifiers offer 0 percent distortion and 100 percent efficiency. What impairs the linearity and power loss is highly dependent on switching characteristics of the switching device. Infineon's CoolGaN™ 400 V breaks through the technology barrier by introducing zero reverse recovery charge in the body diode and very small, linear input and output capacitances.

In addition, the e-mode concept offers fast turn-on and turn-off speed. This feature also simplifies pairing CoolGaN™ with the IRS20957SPBF class D controller and therefore enables faster go-to-market.

CoolGaN™ for class D audio solutions

CoolGaN™ 400 V is tailored for premium HiFi home audio, professional, and aftermarket car audio systems where end users demand every detail of their high resolution soundtracks. These have been conventionally addressed by bulky linear amplifiers or tube amplifiers. With CoolGaN™ 400 V as the class D output stage, audio designers will be able to deliver the best audio experience to their prospective audio fans.

CoolGaN™ 400 V devices in DSO-20-87 and HSOF-8-3 (TOLL-leadless) package have been tested in class D audio amplifier applications on 200 W + 200 W dual-channel system designs.

Key features

- › Ultralow and linear C_{oss} 400 V power devices
- › Zero Q_{rr}
- › E-mode transistor – normally-off switch

Key benefits

- › Clean switching performance
- › Narrow dead time for better THD
- › Easy to use: compatible with the IRS20957SPBF class D audio control IC

The CoolGaN™ 400 V devices benefit from the engineering expertise Infineon has made towards challenging applications, such as telecom rectifiers and SMPS servers, where CoolGaN™ technology proved to be highly reliable. It is the most robust and performing concept in the market. The CoolGaN™ 400 V portfolio is built around class D audio requirements, with high-performing SMD packages to fully exploit the benefits of GaN technology.

CoolGaN™ 600 V e-mode GaN HEMTs

The highest efficiency and power density with reduced system costs

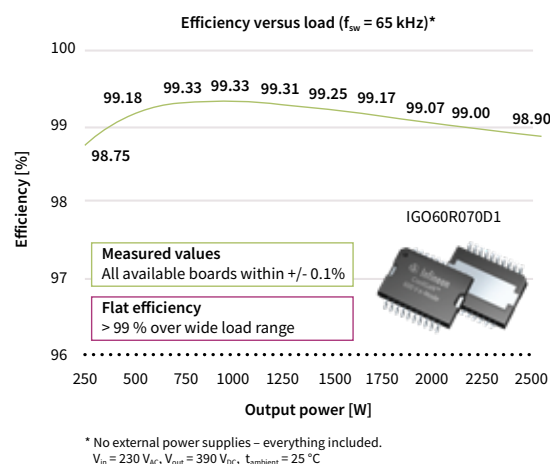
The e-mode concept offers fast turn-on and turn-off speed, as well as a better path towards integration. CoolGaN™ 600 V e-mode HEMTs enable simpler and more cost-effective half-bridge topologies. As e-mode based products reach maturity, CoolGaN™ 600 V HEMTs are gaining growing prominence thanks to their potential. The CoolGaN™ 600 V series is manufactured according to a specific, GaN-tailored qualification process which goes far beyond the standards for silicon power devices. CoolGaN™ 600 V is designed for datacom and server SMPS, telecom rectifiers, as well as mobile chargers and adapters, and can be used as a general switch in many other industrial and consumer applications. It is the most rugged and reliable solution in the market. The CoolGaN™ portfolio is built around high performing SMD packages to fully exploit the benefits of GaN.

CoolGaN™ for PFC

CoolGaN™ enables the adoption of simpler half-bridge topologies (including the elimination of the lossy input bridge rectifier). The result is record efficiency (>99%) with a potential for BOM savings.

CoolGaN™ for resonant topologies

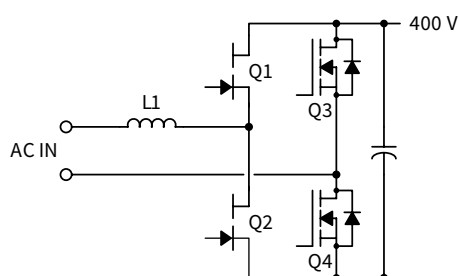
- › In resonant applications, ten times lower Q_{oss} and Q_G enables high-frequency operations (>1 MHz) at the highest efficiency levels
- › Linear output capacitance leads to 8 to 10 times lower dead time
- › Devices can be easily paralleled
- › Power density can be pushed even further by optimizing the thermal performance
- › CoolGaN™ enables to push the efficiency forward, thus enabling high power density e.g., in low-power chargers/adapters



Applications

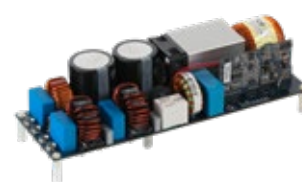
- › Telecom
- › Server
- › Datacom
- › Adapter and charger
- › Wireless charging
- › SMPS

Full-bridge totem pole



Demonstration board

2.5 kW totem pole PFC board:
EVAL_2500W_PFC_GAN_A



- › 2 x 70 mΩ CoolGaN™ in DSO-20-85
- › 2 x 33 mΩ CoolMOS™

CoolGaN™ 400 V e-mode GaN HEMTs



Package	DSO-20-87 Top-side cooling	HSOF-8-3 (TO-Leadless)
P_{max}	up to 500 W	up to 200 W
$R_{DS(on)}$ max.	70 mΩ	70 mΩ
	IGOT40R070D1 **	IGT40R070D1 E8220

CoolGaN™ 600 V e-mode GaN HEMTs



Package	DSO-20-85 Bottom-side cooling	DSO-20-87 Top-side cooling	HSOF-8-3 TO-Leadless	LSON-8-1 DFN 8x8
$R_{DS(on)}$				
42 mΩ	IGO60R042D1 **	IGOT60R042D1 **	IGT60R042D1 **	
70 mΩ	IGO60R070D1	IGOT60R070D1	IGT60R070D1	IGLD60R070D1
190 mΩ			IGT60R190D1S *	IGLD60R190D1
			IGT60R190D1 **	

Infineon's CoolGaN™ devices, driven by single-channel isolated gate driver ICs from the GaN EiceDRIVER™ family, aim to unlock the full potential of GaN technology.

GaN EiceDRIVER™ family product portfolio



Product	Package	Input to output isolation				Propagation delay accuracy	Typ. high level (sourcing) output resistance	Typ. low level (sinking) output resistance	SP number
		Isolation class	Rating	Surge testing	Certification				
1EDF5673K	LGA, 13-pin, 5x5 mm	functional	$V_{IO} = 1.5 \text{ kV}_{DC}$	n.a.	n.a.	-6 ns/+7ns	0.85 Ω	0.35 Ω	SP002447622
1EDF5673F	DSO, 16-pin, 150 mil	functional	$V_{IO} = 1.5 \text{ kV}_{DC}$	n.a.	n.a.	-6 ns/+7ns	0.85 Ω	0.35 Ω	SP003194020
1EDS5663H	DSO, 16-pin, 300 mil	reinforced	$V_{IOTM} = 8 \text{ kV}_{pk}$ $V_{ISO} = 5.7 \text{ kV}_{rms}$	$V_{ISOM} > 10 \text{ kV}_{pk}$	VDE0884-10 UL1577	-6 ns/+7ns	0.85 Ω	0.35 Ω	SP002753980

www.infineon.com/gan

www.infineon.com/gan-eicedriver

* Standard grade

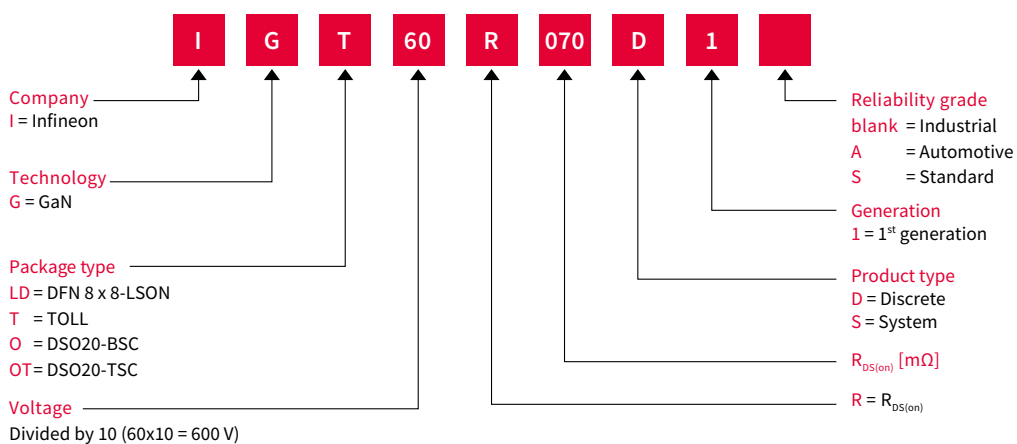
** Coming soon

For more details on the product, click on the part number.



Nomenclature

CoolGaN™






Silicon carbide

Revolution to rely on

Silicon carbide (SiC) devices belong to the so-called wide bandgap semiconductor group, which offers a number of attractive characteristics for high voltage power semiconductors when compared to commonly used silicon (Si). In particular, the much higher breakdown field strength and thermal conductivity of silicon carbide allow developing devices which by far outperform the corresponding silicon-based ones, and enable efficiency levels unattainable otherwise. Infineon's portfolio of SiC devices covers 650 V to 1200 V Schottky diodes as well as the revolutionary CoolSiC™ MOSFETs.

EiceDRIVER™ SiC MOSFET gate driver ICs are well-suited to drive SiC MOSFETs, especially Infineon's ultra-fast switching CoolSiC™ SiC MOSFETs. These gate drivers incorporate most important key features and parameters for SiC driving such as tight propagation delay matching, precise input filters, wide output-side supply range, negative gate voltage capability, active Miller clamp, DESAT protection, and extended CMTI capability.

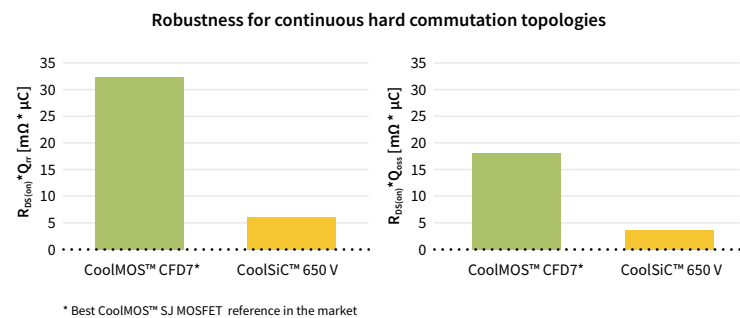
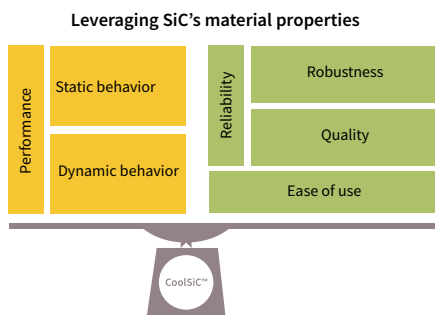
www.infineon.com/coolsic-mosfet
www.infineon.com/SiCgd

For more details on the product, click on the part number. 

CoolSiC™ silicon carbide MOSFETs 650 V

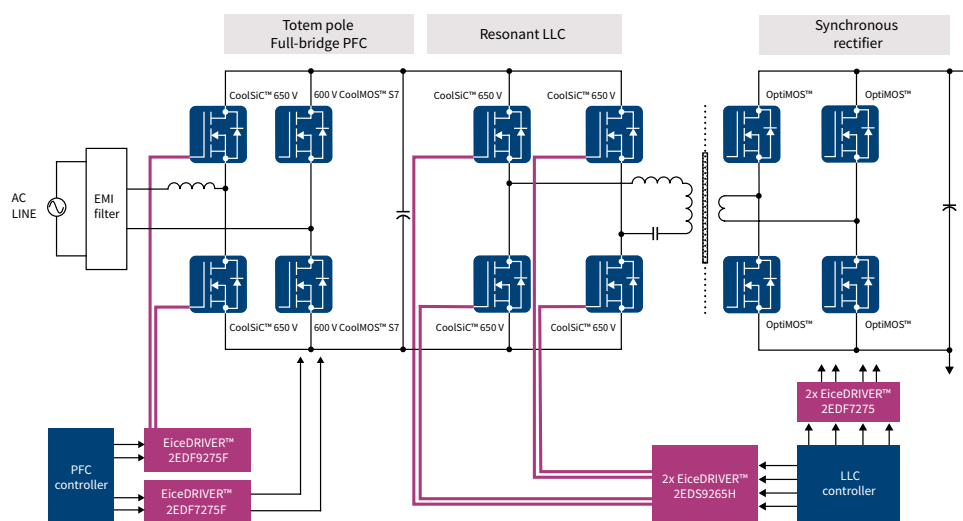
Delivering reliable and cost effective top performance

Silicon carbide physical characteristics, from wide bandgap to electron mobility and thermal conductivity, provide the basis to engineer high performance semiconductor technologies and products. The CoolSiC™ MOSFETs from Infineon maximize the advantages of silicon carbide, offering a high performance product that also meets power electronics design requirements, like reliability and ease of use. As per performance, the CoolSiC™ MOSFETs show low $R_{DS(on)}$ dependency with temperature and low switching losses. The reliability is built on technological strengths and on flawless quality processes. Some aspects of Infineon's SiC technology, like a superior gate oxide reliability, excellent thermal behavior, advanced avalanche ruggedness and short circuit capabilities contribute to the robustness of the device. Infineon's benchmark quality was further improved for silicon carbide, with an application-focused qualification scope exceeding standards, complemented by SiC-specific screening measures. Additional unique features, like 0 V turn-off V_{GS} , wide V_{GS} range, and the use of silicon MOSFET drivers and driving schemas make CoolSiC™ MOSFETs 650 V easy to integrate and use.



CoolSiC™ MOSFETs can enable streamlined and cost-optimized system designs with less components, weight and size, reaching high energy efficiency and power density. For instance, the CoolSiC™ MOSFETs boast a low level of Q_{rr} , roughly 80% less of the best CoolMOS™ reference in the market, the CoolMOS™ CFD7. This ensures the robustness of the body diode, making the CoolSiC™ MOSFETs suitable for topologies with continuous hard commutation, like, the high efficiency Totem Pole PFC, a topology that enables > 99% of efficiency.

High efficiency CoolSiC™ totem-pole PFC in server SMPS (switched mode power supply)



www.infineon.com/cool-sic-mosfet

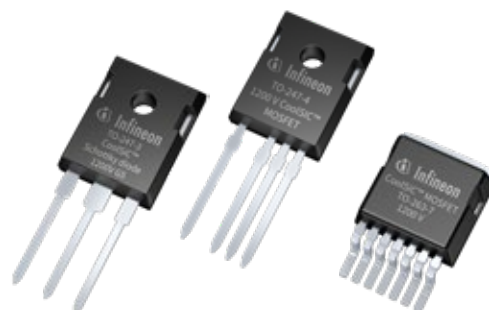
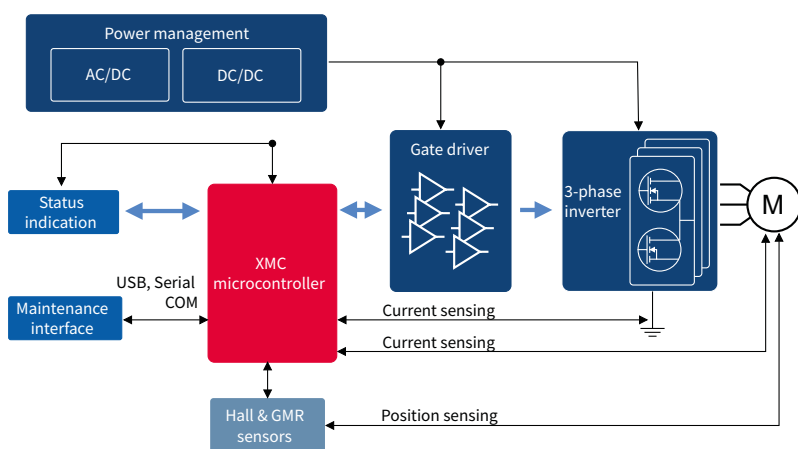
www.infineon.com/SiCgd

For more details on the product, click on the part number.

CoolSiC™ silicon carbide MOSFETs 1200 V

Infiniteon's CoolSiC™ technology enables radically new product designs

Silicon carbide (SiC) opens up new degrees of freedom for designers to harness unseen levels of efficiency and system flexibility. In comparison to traditional silicon-based switches like IGBTs and MOSFETs, the SiC MOSFET offers a series of advantages. These include the low switching losses with 1200 V and 650 V switches, very low reverse recovery losses of the internal commutation proof body diode, temperature-independent low switching losses, and threshold-free on-state characteristics. Based on volume experience and compatibility know-how, Infineon introduces the revolutionary SiC technology which enables radically new product designs with high performance and high reliability. CoolSiC™ MOSFET products are targeted for automotive, photovoltaic inverters, battery charging, EV charging, industrial drives, UPS, SMPS, and energy storage.



Features and benefits

Key features
Very low switching losses
Superior gate-oxide reliability
Threshold-free on-state characteristic
Wide gate-source voltage range
Benchmark gate threshold voltage, $V_{GS(th)} = 4.5 \text{ V}$
Fully controllable dV/dt
Commutation robust body diode, ready for synchronous rectification

Key benefits
Best-in-class system performance
Efficiency improvement and reduced cooling effort
Longer lifetime and higher reliability
Enables higher frequency operation, allowing the increase in power density
Reduction in system cost
Ease of use

TO-247 4-pin package contains an additional connection to the source (Kelvin connection) that is used as a reference potential for the gate driving voltage, thereby eliminating the effect of voltage drops over the source inductance. The result is even lower switching losses than for the TO-247 3-pin version, especially at higher currents and higher switching frequencies.

The gate-source pin of the TO-263 7-pin package, similar as of the TO-247 4-pin, eliminates the effect of voltage drops over the source inductance, therefore further reduce the turn-on switching loss. TO-263 7-pin package minimizes the leakage inductance between drain and source, reduce the risk of high turn-off voltage overshoot.

www.infineon.com/cool-sic-mosfet
www.infineon.com/SiCgd



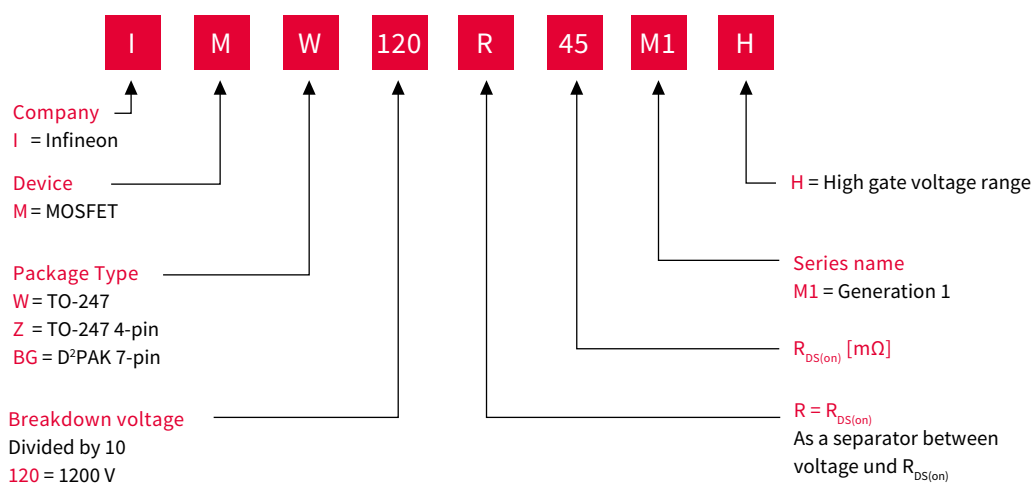
For more details on the product, click on the part number.



CoolSiC™ MOSFET 1200 V ACTIVE & PREFERRED				
Package	TO-247	TO-247-4	D ² PAK 7-pin	Gate Driver for CoolSiC™
$R_{DS(on)}$				
30 mΩ	IMW120R030M1H	IMZ120R030M1H	IMBG120R030M1H *	1EDC60H12AH
45 mΩ	IMW120R045M1 – lead product	IMZ120R045M1 – lead product	IMBG120R045M1H *	1EDC20I12MH
60 mΩ	IMW120R060M1H	IMZ120R060M1H	IMBG120R060M1H *	1ED020I12-F2
90 mΩ	IMW120R090M1H	IMZ120R090M1H	IMBG120R090M1H *	2ED020I12-F2
140 mΩ	IMW120R140M1H	IMZ120R140M1H	IMBG120R140M1H *	1ED3124MU12H *
220 mΩ	IMW120R220M1H	IMZ120R220M1H	IMBG120R220M1H *	1ED3491MU12M *
350 mΩ	IMW120R350M1H	IMZ120R350M1H	IMBG120R350M1H *	1ED3890MU12M *



CoolSiC™ MOSFET nomenclature



www.infineon.com/coolbic-mosfet
www.infineon.com/SiCgd

* Coming soon

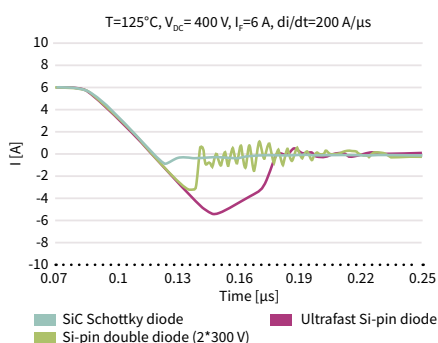
For more details on the product, click on the part number.

CoolSiC™ Schottky diodes

The differences in material properties between silicon carbide and silicon limit the fabrication of practical silicon unipolar diodes (Schottky diodes) to a range up to 100-150 V, with a relatively high on-state resistance and leakage current. In SiC, Schottky diodes can reach a much higher breakdown voltage. Infineon is the world's first SiC discrete power supplier. Infineon offers products up to 1200 V in discrete packages and up to 1700 V in modules.

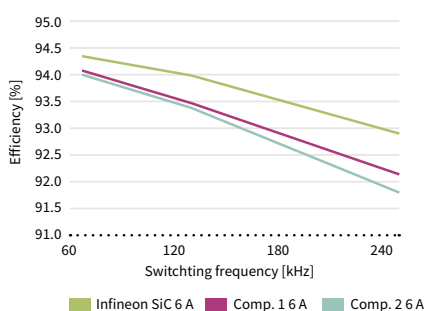
The long market presence and experience enable Infineon to deliver highly reliable, industry-leading SiC performance. With over 10 years of pioneering experience in developing and manufacturing SiC diodes, Infineon's latest CoolSiC™ Schottky diode generation 6 family sets benchmark in quality, efficiency and reliability.

Features	Advantages	Benefits	Applications
<ul style="list-style-type: none"> › No reverse recovery charge › Purely capacitive switching › High operating temperature ($T_{j, \max}$ 175°C) 	<ul style="list-style-type: none"> › Low turn-off losses › Reduction of CoolMOS™ or IGBT turn-on loss › Switching losses independent from load current, switching speed and temperature 	<ul style="list-style-type: none"> › System efficiency improvement compared to Si diodes › Reduced cooling requirements › Enabling higher frequency/increased power density › Higher system reliability due to lower operating temperature › Reduced EMI 	<ul style="list-style-type: none"> › Server › Telecom › Solar › UPS › EV charging › Energy storage › PC power › Motor drives › Lighting › CAV



Reverse recovery charge of SiC Schottky diodes versus Si-pin diodes

The majority of carrier characteristics imply no reverse recovery charge and the only contribution to the switching losses comes from the tiny displacement charge of capacitive nature. In the same voltage range, silicon devices have a bipolar component resulting in much higher switching losses. The graph shows the comparison between various 600 V devices.



Improved system efficiency (PFC in CCM mode operation, full load, low line)

The fast switching characteristics of the SiC diodes provide clear efficiency improvements at system level. The performance gap between SiC and high-end silicon devices increases with the operating frequency.

CoolSiC™ Schottky diodes 650 V

CoolSiC™ Schottky diodes 650 V G6 and G5

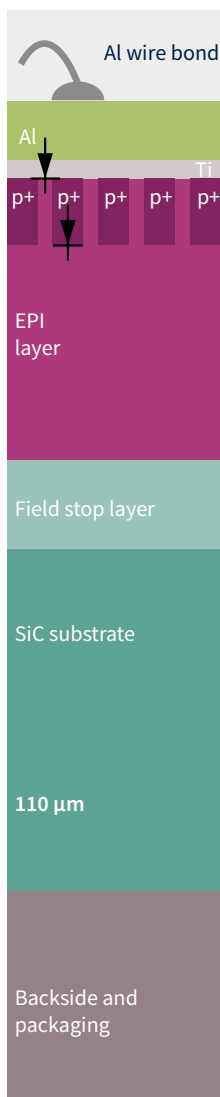
The new CoolSiC™ Schottky diode 650 V G6 product family is built over the strong characteristics of the previous generation G5, fully leveraging technology and process innovation to propose the best efficiency and zero price/performance products to date.

Foundation technology – CoolSiC™ Schottky diodes 650 V G5

The established CoolSiC™ Schottky diodes G5 product family has been optimized after all key aspects including junction structure, substrate and die attach. It represents a well-balanced product family which offers state-of-the-art performance and high surge current capability at a competitive cost level.

Innovation: optimized junction, substrate and die attach

Infineon's SiC Schottky diode generation 5 is optimized with regard to all key aspects relevant for high-power and high-efficiency SMPS applications.



Junction: merged PN structure

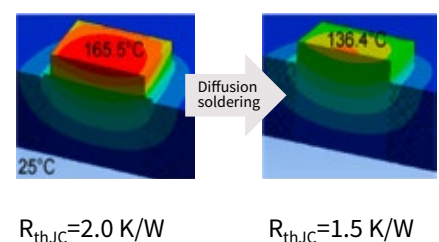
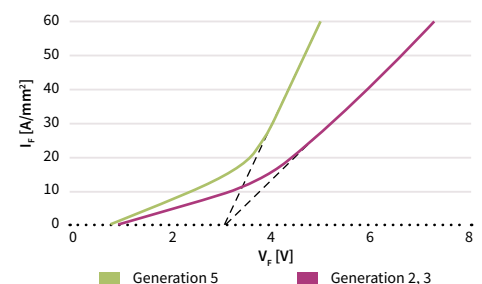
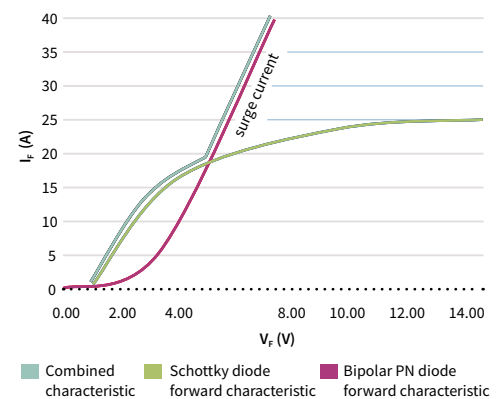
On the junction level, it has an optimized merged PN structure. Compared to competitors, Infineon's SiC diode has an additional P-doped area, which, together with the N-doped EPI layer, forms a PN junction diode. Thus, it is a combination of Schottky diode and PN junction diode. Under normal conditions it works like a standard Schottky diode. Under abnormal conditions such as lighting, AC line drop-out, it works like a PN junction diode. At high current level, the PN junction diode has a significantly lower forward voltage (V_F) than the Schottky diode, which leads to less power dissipation, thus significantly improving the surge current capability.

Substrate: thin wafer technology

On the substrate level, Infineon introduced the thin wafer technology. At the later stage of our SiC diode production, the thin wafer process is used to reduce the wafer thickness by about two-thirds, which significantly reduces the substrate resistance contribution, thus, improving both forward voltage (V_F) and thermal performance.

Die attach: diffusion soldering

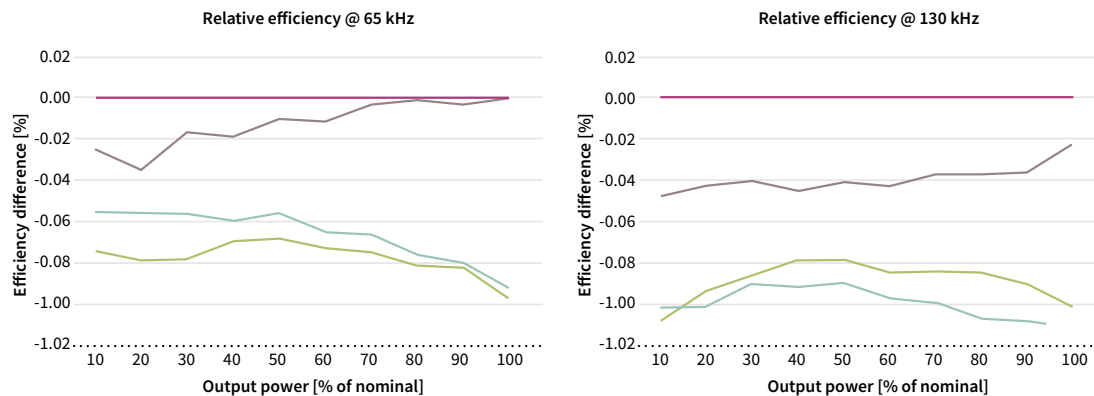
On the backside, package level diffusion soldering is introduced, which significantly improves the thermal path between lead frame and the diode, enhancing the thermal performance. With the same chip size and power dissipation, the junction temperature is reduced by 30°C.



Latest development - CoolSiC™ Schottky diodes 650 V G6

The CoolSiC™ Schottky diodes G6 product family introduces a novel and proprietary Schottky metal system. This contributes to the reduction of the forward voltage (V_F) to levels which are difficult, determining a measurable decrease of conduction losses. Infineon's CoolSiC™ Schottky diodes enable optimum efficiency and ruggedness. Lower forward voltage (V_F) means lower conduction loss, and lower capacitive charge (Q_c) means lower switching loss. $Q_c \times V_F$ is the figure of merit for efficiency, and comparison indicates that the latest generation 6 products have the lowest $Q_c \times V_F$ on the market. Infineon's CoolSiC™ Schottky diodes offer a surge current robustness far better than the one offered by the most efficient products. Thus, under abnormal conditions, this surge current capability offers excellent device robustness.

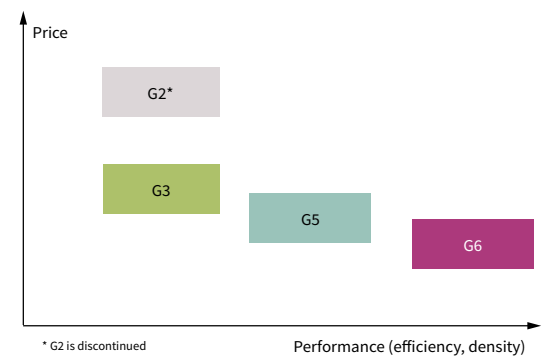
Efficiency comparison



In terms of efficiency, the 8 A G6 device has been tested in CCM PFC. The maximum output power is 3.5 kW. The left figure shows the relative efficiency at 65 kHz, while the right figure shows the relative efficiency at 130 kHz. This shows that Infineon's CoolSiC™ Schottky diode G6 delivers better efficiency over the full load range, keeping this advantage even at 130 kHz, therefore meeting the needs of designers who want to increase the switching frequencies in their designs to attain more power density.

The best price performance

CoolSiC™ Schottky diodes G6 are the outcome of Infineon's continuous technological and process improvements which enable the design and development of SiC-based products, making them more price-competitive and increasing performance across generations. As a result, G6 is Infineon's best price/performance CoolSiC™ Schottky diode generation, offering the highest cost-efficiency. In addition, Infineon offers the reliability of collaborating with the industry leader. Customers can leverage Infineon's proven quality and supply chain reliability. They can benefit from "one-stop-shop" advantages and maximize system performance, combining CoolSiC™ Schottky diodes with the SJ MOSFETs of the CoolMOS™ 7 family, such as 600 V C7, 650 V C7, 600 V G7, 650 V G7 and 600 V P7.



A comprehensive portfolio

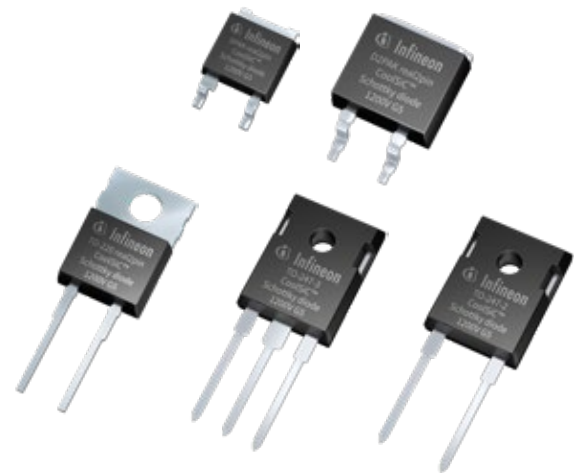
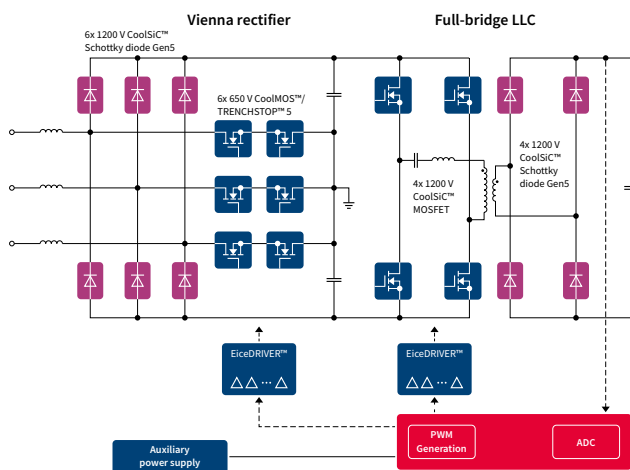
The combined G6 and G5 CoolSiC™ Schottky diode 650 V diode portfolio offers a wide choice of packages and ampere class granularity to allow the best fit to application. G6 comes in double DPAK, the first top-side cooled surface mount package, which allows thermal decoupling of PCB to chip junction and enables higher power dissipation and improved system lifetime thanks to the reduced board temperature.

CoolSiC™ Schottky diodes 1200 V

A new level of system efficiency and reliability

By using hybrid Si power switch/SiC diode sets, industrial application designers will gain flexibility for system optimization compared to purely silicon-based solutions. System improvements such as higher output power, greater efficiency or higher switching frequency are enabled by SiC diodes. By implementing CoolSiC™ diodes generation 5, for example in Vienna rectifier topology, in combination with Infineon's 650 V TRENCHSTOP™ IGBTs and 650 V CoolMOS™ MOSFETs, designers can achieve outstanding system level performance and reliability.

One of most commonly used topologies for EV DC charging

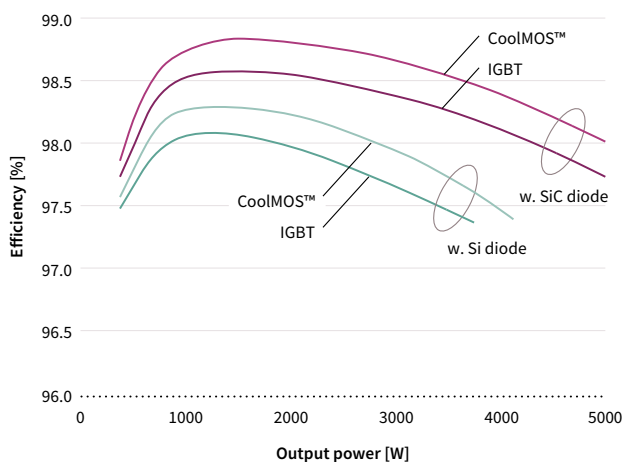


Features and benefits

Key features
Zero Q_{rr} leading to no reverse recovery losses
High surge current capability up to fourteen times of the nominal current
Tight forward voltage distribution
Temperature-independent switching behavior
Low forward voltage ($V_F = 1.4$ V) even at high operating temperature
Available in both through-hole and SMD packages
Up to 40A-rated diode

Key benefits
System efficiency improvement over Si-based diodes
Enabling higher frequency/increased power density solutions
High system reliability by extended surge current
Reduced cooling requirements through lower diode losses and lower case temperatures
System size/cost saving due to reduced heatsink requirements and smaller magnetics

650 V Si IGBT/Si SJ MOSFET and 1200 V SiC diode/ultrafast Si diode in a Vienna rectifier topology, $f_{sw}=48$ kHz



- 650 V SJ MOSFET + 1200 V SiC diode (IPW65R045C7 + IDW15G120C5B)
- 650 V IGBT + 1200 V SiC diode (IKW50N65EH5 + IDW15G120C5B)
- 650 V SJ MOSFET + 1200 V Si diode (IPW65R045C7 + Vendor A)
- 650 V IGBT + 1200 V Si diode (IKW50N65EH5 + Vendor A)

SiC vs. Si diode

- > +0.8% higher efficiency
- > Increased output power is possible

www.infineon.com/sicdiodes1200v



For more details on the product, click on the part number.

CoolSiC™ Schottky diodes 650 V G6 **ACTIVE & PREFERRED**


I_F [A]	TO-220 R2L	TO-247 Dual Die	TO-247	Double DPAK	D ² PAK R2L	ThinPAK 8x8
4	IDH04G65C6			IDDD04G65C6		
6	IDH06G65C6			IDDD06G65C6		
8	IDH08G65C6			IDDD08G65C6		
10	IDH10G65C6			IDDD10G65C6		
12	IDH12G65C6			IDDD12G65C6 *		
16	IDH16G65C6			IDDD16G65C6		
20	IDH20G65C6			IDDD20G65C6		

CoolSiC™ Schottky diodes 650 V G5 **ACTIVE**

I_F [A]	TO-220 R2L	TO-247 Dual Die	TO-247	D ² PAK R2L	ThinPAK 8x8
2	IDH02G65C5			IDK02G65C5	IDL02G65C5
3	IDH03G65C5			IDK03G65C5	
4	IDH04G65C5			IDK04G65C5	IDL04G65C5
5	IDH05G65C5			IDK05G65C5	
6	IDH06G65C5			IDK06G65C5	IDL06G65C5
8	IDH08G65C5			IDK08G65C5	IDL08G65C5
9	IDH09G65C5			IDK09G65C5	
10	IDH10G65C5		IDW10G65C5	IDK10G65C5	IDL10G65C5
12	IDH12G65C5		IDW12G65C5	IDK12G65C5	IDL12G65C5
16	IDH16G65C5		IDW16G65C5		
20	IDH20G65C5	IDW20G65C5B	IDW20G65C5		
24		IDW24G65C5B			
30/32		IDW32G65C5B	IDW30G65C5		
40		IDW40G65C5B	IDW40G65C5		

www.infineon.com/sic

*For more information on the product, contact our product support

For more details on the product,
click on the part number. 

CoolSiC™ Schottky diodes 600 V G3 **ACTIVE**

I_F [A]	TO-220 R2L	TO-247 Dual Die	TO-247	DBAK R2L	D ² PAK	ThinPAK 8x8
3	IDH03SG60C			IDD03SG60C		
4	IDH04SG60C			IDD04SG60C		
5	IDH05SG60C			IDD05SG60C		
6	IDH06SG60C			IDD06SG60C		
8	IDH08SG60C			IDD08SG60C		
9	IDH09SG60C			IDD09SG60C		
10	IDH10SG60C			IDD10SG60C		
12	IDH12SG60C			IDD12SG60C *		

CoolSiC™ Schottky diodes 1200 V G5 **ACTIVE & PREFERRED**

I_F [A]	TO-220 R2L	TO-247 Dual Die	TO-247 R2L	DBAK R2L	D ² PAK R2L
2	IDH02G120C5			IDM02G120C5	IDK02G120C5
5	IDH05G120C5			IDM05G120C5	IDK05G120C5
8	IDH08G120C5			IDM08G120C5	IDK08G120C5
10	IDH10G120C5	IDW10G120C5B	IDWD10G120C5	IDM10G120C5	IDK10G120C5
15/16	IDH16G120C5	IDW15G120C5B	IDWD15G120C5		IDK16G120C5
20	IDH20G120C5	IDW20G120C5B	IDWD20G120C5		IDK20G120C5
30		IDW30G120C5B	IDWD30G120C5		
40		IDW40G120C5B	IDWD40G120C5		

„B“ in product name refers to common-cathode configuration

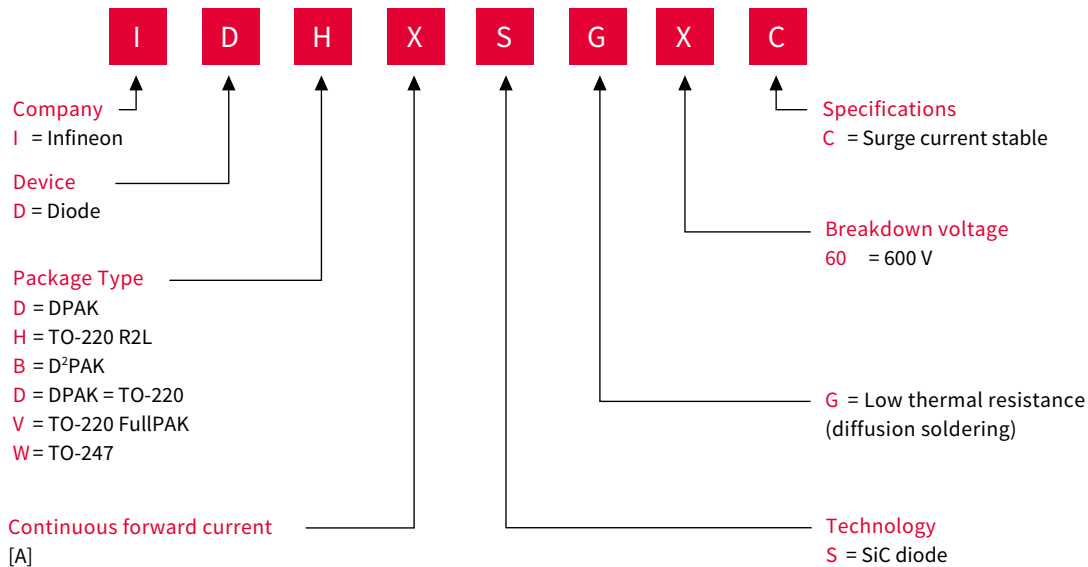
www.infineon.com/sic

*For more information on the product, contact our product support

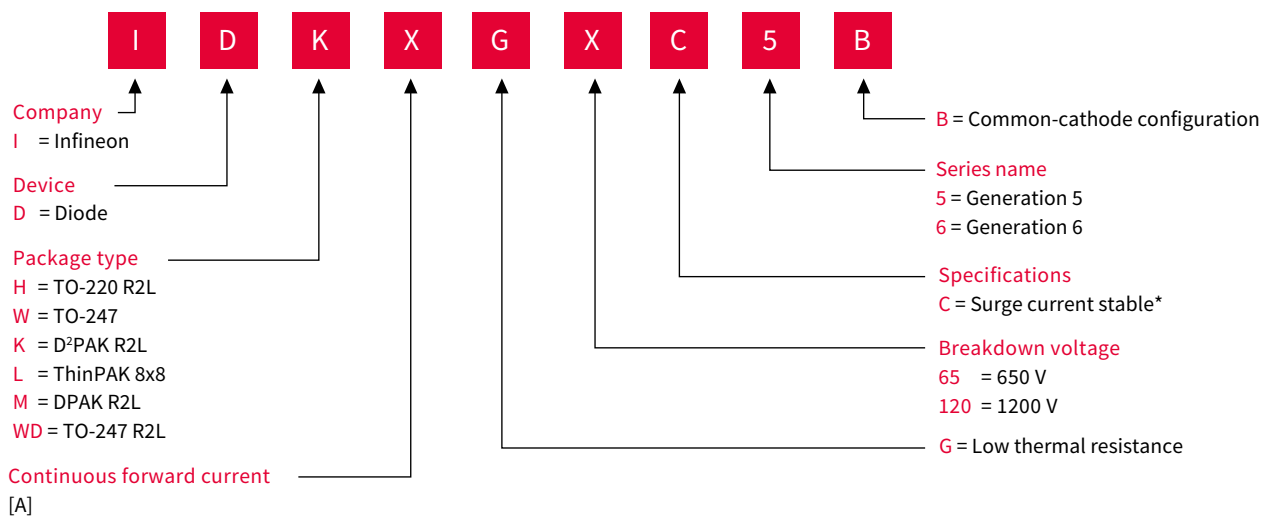
For more details on the product,
click on the part number.

Nomenclature

CoolSiC™ Schottky diodes G2 and G3



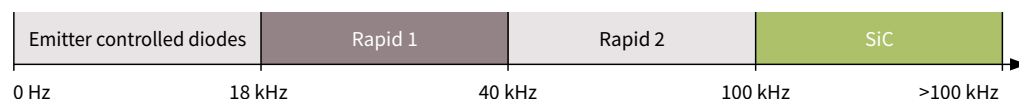
CoolSiC™ Schottky diodes G5 and G6



Silicon power diodes

Filling the gap between SiC diodes and emitter controlled diodes

The Rapid diode family complements Infineon's existing high-power 600 V/650 V diode portfolio by filling the gap between SiC diodes and previously released emitter controlled diodes. They offer a perfect cost/performance balance and target high-efficiency applications switching between 18 and 100 kHz. Rapid 1 and Rapid 2 diodes are optimized to have excellent compatibility with CoolMOS™ and high speed IGBTs (insulated gate bipolar transistor) such as the TRENCHSTOP™ 5 and HighSpeed 3.



The Rapid 1 diode family

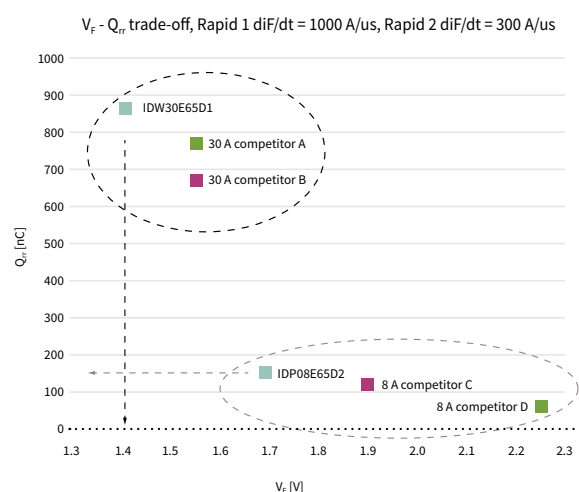
Rapid 1 is forward voltage drop (V_F) optimized to address low switching frequency applications between 18 kHz and 40 kHz, for example, air conditioner and welder PFC stages.

- › 1.35 V temperature-stable forward voltage (V_F)
- › Lowest peak reverse recovery current (I_{rrm})
- › Reverse recovery time (t_{rr}) < 100 ns
- › High softness factor

The Rapid 2 diode family

Rapid 2 is Q_{rr}/t_{rr} optimized hyperfast diode to address high-speed switching applications between 40 kHz and 100 kHz, typically found in PFCs in high efficiency switch mode power supplies (SMPS) and welding machines.

- › Lowest reverse recovery charge (Q_{rr}): V_F ratio for best-in-class performance
- › Lowest peak reverse recovery current (I_{rrm})
- › Reverse recovery t_{rr} < 50 ns
- › High softness factor



www.infineon.com/rapiddiodes

www.infineon.com/ultrasoftdiodes

For more details on the product, click on the part number.

Rapid 1 diodes

650 V product family



Continuous current I_c @ $T_c=100^\circ\text{C}$ [A]	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247 Halogen-Free	TO-247 common cathode Halogen-Free	TO-247 advanced isolation Halogen-Free
8	IDP08E65D1				
15	IDP15E65D1				
20		IDV20E65D1			
30	IDP30E65D1		IDW30E65D1	IDW30C65D1	
40			IDW40E65D1		IDFW40E65D1E
60				IDW60C65D1	IDFW60C65D1
75				IDW75D65D1	
80				IDW80C65D1	

Rapid 2 diodes

650 V product family






Continuous current I_c @ $T_c=100^\circ\text{C}$ [A]	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-220 common cathode Halogen-Free	TO-247 Halogen-Free	TO-247 common cathode Halogen-Free
8	IDP08E65D2	IDV08E65D2			
15	IDP15E65D2	IDV15E65D2		IDW15E65D2	
20	IDP20E65D2		IDP20C65D2		IDW20C65D2
30	IDP30E65D2	IDV30E65D2	IDP30C65D2		IDW30C65D2
40	IDP40E65D2			IDW40E65D2	
80					IDW80C65D2



Emitter controlled diodes

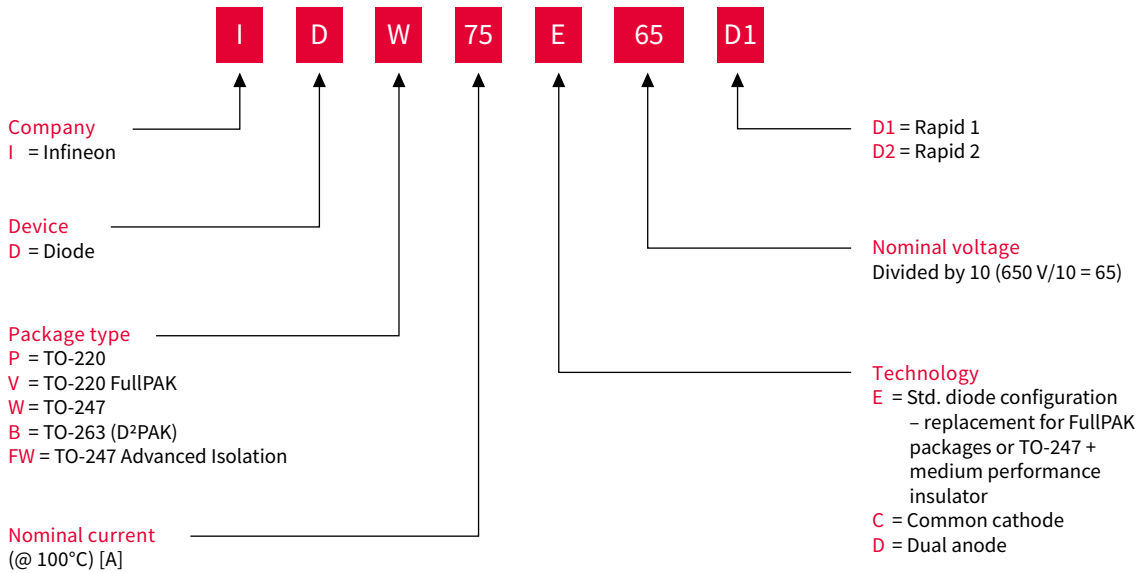
600 V and 1200 V product families



Continuous current I_c @ $T_c=100^\circ\text{C}$ [A]		TO-263 (D ² PAK)  Halogen-Free	TO-220 Real 2-pin  Halogen-Free	TO-247  Halogen-Free
600 V	30			IDW30E60
	50			IDW50E60
	75			IDW75E60
	100			IDW100E60
1200 V	12		IDP12E120	
	18		IDP18E120	
	30	IDB30E120	IDP30E120	

Nomenclature

Silicon power diodes





Infineon support for wide bandgap semiconductors

Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/wbg

www.infineon.com/sic

www.infineon.com/rapiddiodes

www.infineon.com/ultrasoftdiodes

www.infineon.com/gan

www.infineon.com/gan-eicedriver



Support



Evaluation Board



Tools



Simulation



Discrete IGBTs

- › 650 V TRENCHSTOP™ 5 IGBT
 - › 1200 V IGBT families
 - › Lower power drive IGBT portfolio
 - › TRENCHSTOP™ IGBT6
 - › TRENCHSTOP™ advanced isolation
 - › Integrated Power Device – IPD protect
 - › TRENCHSTOP™ 5 selection tree
 - › IGBT selection tree
 - › Discrete IGBTs product portfolio
 - › IGBT nomenclature
- 



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs







Applications

Discrete IGBTs











































Market leadership through groundbreaking innovation and application focus

Resolute to achieve the highest standards in performance and quality, Infineon offers a comprehensive portfolio of application-specific discrete IGBTs.

Discrete IGBT overview


	P-SOT-223-4 SMD SMD, single transistor, small signal	TO-252 (DPAK)	TO-263 (D ² PAK)	TO-220	TO-220 FullPAK	TO-247	TO-247 4-pin	TO- 247PLUS	TO- 247PLUS 4-pin	TRENCHSTOP™ advanced isolation TO-247
Package options										
Voltage class	600 V, 650 V, 1100 V, 1200 V, 1350 V, 1600 V									600 V, 650 V
Configuration	DuoPack (with diode), single IGBTs									Duopack IGBTs (with diode) and single diodes
Continuous collector current $T_c = 100^\circ\text{C}$	3-120 A									40-90 A

New best-in-class technologies and applications

Technology	Application	Gate Driver Family
TRENCHSTOP™ 5 H5/F5 650 V	      	EiceDRIVER™ isolated gate driver (1EDC60H12AH) EiceDRIVER™ 650 V SOI gate driver (2ED2184S06F) EiceDRIVER™ low side gate driver (1ED44175N01B)
TRENCHSTOP™ 5 LS 650 V	  	EiceDRIVER™ isolated gate driver (1EDC20I12MH)
Rapid diode 650 V	    	N/A
RC-H5 650 V/1200 V/1350 V		EiceDRIVER™ isolated gate driver (1EDC20I12MH) EiceDRIVER™ low side gate driver (1ED44175N01B)
RC-E 1200 V		EiceDRIVER™ isolated gate driver (1EDC20I12MH) EiceDRIVER™ low side gate driver (1ED44175N01B)
WR5 650 V	  	EiceDRIVER™ low side gate driver (1ED44175N01B)
RC-drives RC-drives fast 600 V	 	EiceDRIVER™ 650 V SOI gate driver (2ED2184S06F) EiceDRIVER™ 650 V SOI gate driver (6EDL04I06PT)
RC-D2 600 V	     	EiceDRIVER™ 650 V SOI gate driver (2ED2184S06F) EiceDRIVER™ 650 V SOI gate driver (6EDL04I06PT)
TRENCHSTOP™ 5 S5 650 V	   	EiceDRIVER™ isolated gate driver (1EDC20I12MH) EiceDRIVER™ 650 V SOI gate driver (2ED2184S06F)
TRENCHSTOP™ IGBT6 650 V	     	EiceDRIVER™ 650 V SOI gate driver (2ED2106S06F) EiceDRIVER™ 650 V SOI gate driver (6EDL04I06PT)
TRENCHSTOP™ IGBT6 1200 V	   	EiceDRIVER™ isolated gate driver (1ED020I12-F2) EiceDRIVER™ 1200 V level shift gate driver (6ED2230S12T)

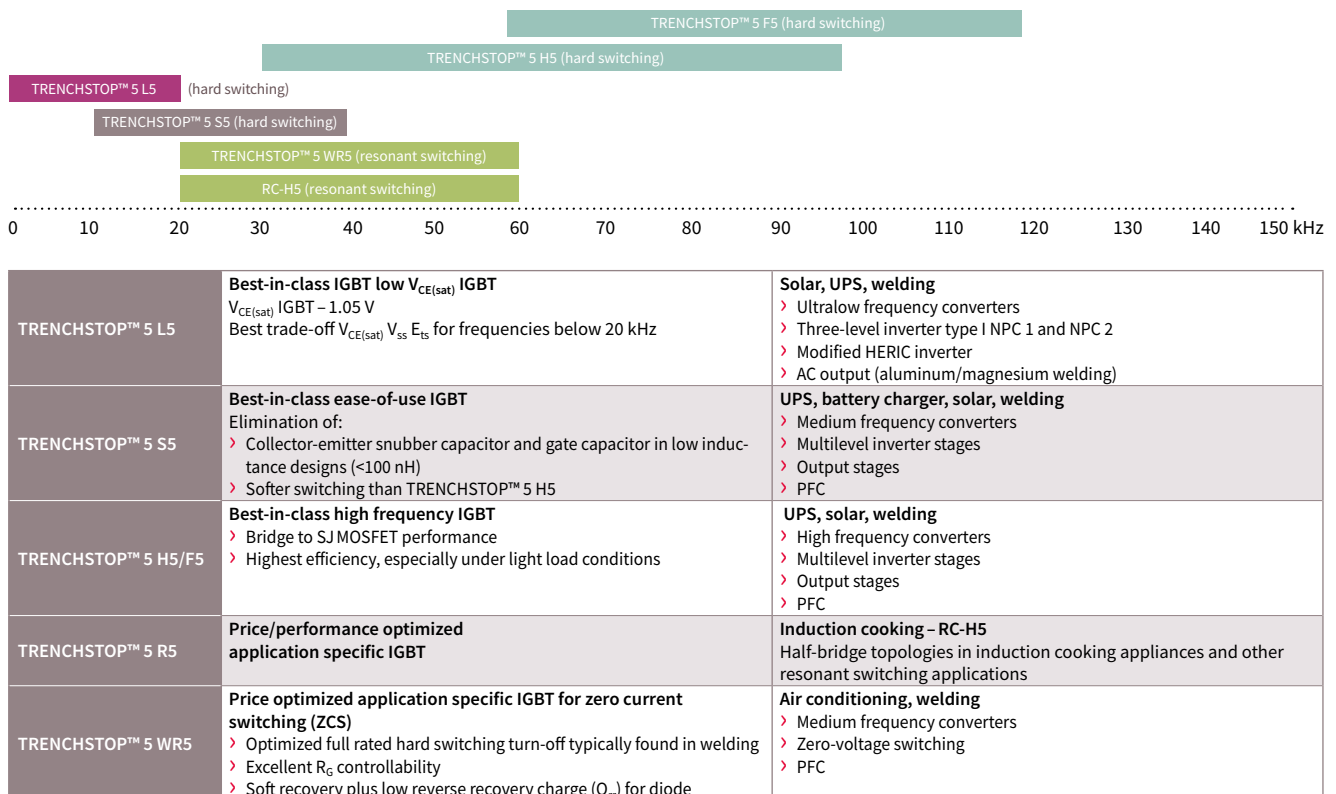
www.infineon.com/igbt discret es

www.infineon.com/gatedriver

For more details on the product, click on the part number. 

650 V TRENCHSTOP™ 5 IGBT

In terms of switching and conduction losses, there is no other IGBT on the market that can match the performance of the TRENCHSTOP™ 5. Wafer thickness has been reduced by more than 25 percent, which enables a dramatic improvement in both switching and conduction losses, while providing an increased breakthrough voltage of 650 V. Based on TRENCHSTOP™ 5 IGBT technology, Infineon has developed six different product families optimized for specific applications, allowing designers to optimize for high efficiency, system cost or reliability demands of the market. The quantum leap of efficiency improvement provided by the TRENCHSTOP™ 5 IGBT families opens up new opportunities for designers to explore. EiceDRIVER™ isolated gate driver like 1ED compact family 650 V IGBT in solar and UPS applications. EiceDRIVER™ low side gate driver with over current protection is widely used in induction cooking application and PFC stage.



Highest power density in D²PAK footprint

Infineon's ultrathin TRENCHSTOP™ 5 IGBT technology allows higher power density in a smaller chip size. Infineon is the first on the market able to fit a 40 A 650 V IGBT with 40 A diode in D²PAK – 25 percent higher than any other competitors that are offering maximum 30 A DuoPack IGBT in D²PAK. Now it is possible to upgrade the available SMD designs for higher power output P_{out} .

Features and benefits

Key features	Key benefits
The highest power density – 40 A IGBT co-packed with a 40 A diode in D ² PAK	Higher power design with D ² PAK package
25 percent higher current than any other competitor	Upgrade of the available designs for higher
Superior efficiency of leading TRENCHSTOP™ 5 technology	Less paralleling for improved system reliability and less complexity
	Smaller PCB, more compact system design, lighter

www.infineon.com/trenchstop5

www.infineon.com/gatedriver

For more details on the product, click on the part number.

1200 V IGBT families

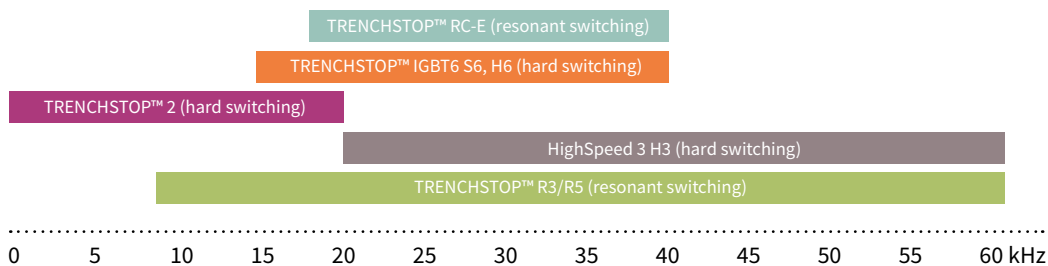
The 1200 V TRENCHSTOP™ 2 IGBT is optimized for low conduction losses with the lowest saturation voltage $V_{CE(sat)}$ of 1.75 V. A soft fast recovery emitter controlled diode further minimizes the turn-on losses.

The 1200 V HighSpeed 3 discrete IGBTs provides the lowest losses and the highest reliability for switching above 20 kHz. Transition to fast switching high speed devices allows reduction in the size of the active components (25-70 kHz).

The new 1200 V IGBT generation, TRENCHSTOP™ IGBT6, is designed to meet requirements of high efficiency, lowest conduction and switching losses in hard switching and resonant topologies, operating at switching frequencies above 15 kHz. The IGBT6 devices can be used as direct replacement for the Highspeed 3 H3 series, without any changes of the design. Such plug-and-play replacement of H3 with new S6 IGBT may benefit up to 0.2 percent efficiency improvement.

The RC-H5 family is the latest generation in the RC-H series of reverse conducting IGBT. With a monolithically integrated diode, they offer optimized performance for resonant switching applications such as induction cooking. R5 devices are also available in 1350 V and 1600 V blocking voltage.

EiceDRIVER™ isolated gate driver like 1ED Compact family and EiceDRIVER™ 1200 V level shift gate driver family are perfect match for the 1200 V IGBT in motor control, general purpose inverter, solar, and UPS applications. EiceDRIVER™ low side gate driver with over current protection is widely used in induction cooking application.




RC-H5	World-class TRENCHSTOP™ RC-H products High performance and low losses	Induction cooking Resonant switching Medium to high frequency converters
RC-E	Competitive TRENCHSTOP™ RC-E Price versus performance leader	Induction cooking Resonant switching Low to medium power cookers
TRENCHSTOP™ 2	Best-in-class 1200 V IGBT <ul style="list-style-type: none"> › Outstanding efficiency › Lowest conduction and switching losses › Market proven and recognized quality leader 	Motor control, general purpose inverter, solar, UPS Low frequency converters
HighSpeed 3 H3	High speed/high power IGBT <ul style="list-style-type: none"> › First tailless/low loss IGBT on market › Market proven and recognized quality leader 	Solar, UPS, welding Medium frequency converters
TRENCHSTOP™ IGBT6	New low switching losses and high power IGBTs <ul style="list-style-type: none"> › Optimized for operation at 15 – 40 kHz › Best combination of low $V_{CE(sat)}$ of 1.85 V and low switching losses 	UPS, solar, welding Medium frequency converters

www.infineon.com/rch5

www.infineon.com/rc-e

www.infineon.com/igbt6-1200v

www.infineon.com/gatedriver

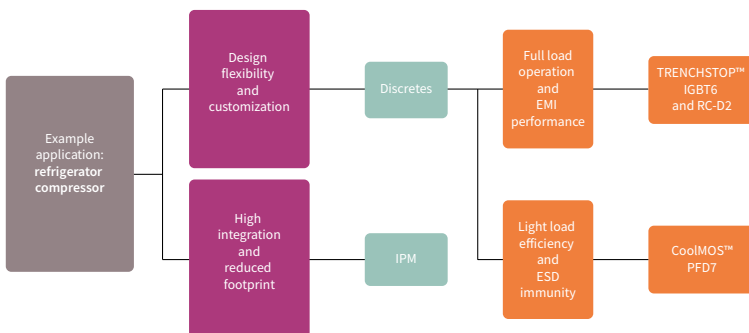
For more details on the product, click on the part number. 

Lower power drive IGBT portfolio

650 V TRENCHSTOP™ IGBT6 and 600 V RC-D2

Motor drives up to 1 kW are used in a wide variety of applications from home appliance fans and compressors to pumps. The market for these products demands design flexibility, EMI performance and easy controllability. Therefore, these compact motors require power electronics with the lowest losses and best thermal performance. The TRENCHSTOP™ IGBT6 family of discrete devices has been designed for the lowest switching losses, which is particularly important in systems with higher switching frequencies up to 30 kHz. Additionally, the IGBTs are co-packed with the soft, fast recovery Rapid 1 anti-parallel diodes for the lowest total losses. With a higher blocking voltage at 650 V, and short circuit rating, TRENCHSTOP™ IGBT6 is a key contributor to robust motor designs. Together with EiceDRIVER™ 650 V SOI gate driver 2ED210x and 2ED218x family, Infineon provides the whole solution for motor drives and home appliances.

The new RC-D2 family of discrete devices has been cost optimized in surface mounted packages. The device contains a monolithically integrated diode and has HV-H3TRB ruggedness capability. With a blocking voltage at 600 V, and short circuit rating, the RC-D2 is a key contributor to cost-effective motor designs. The RC-H5 family is the latest generation in the RC-H series of reverse conducting IGBT. With a monolithically integrated diode, they offer optimized performance for resonant switching applications such as induction cooking. R5 devices are also available in 1350 V and 1600 V blocking voltage.

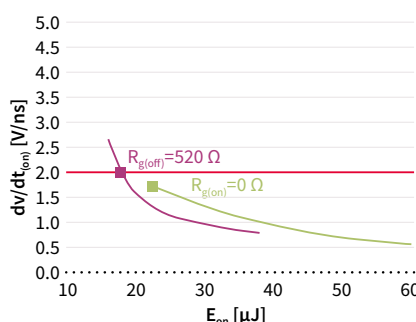
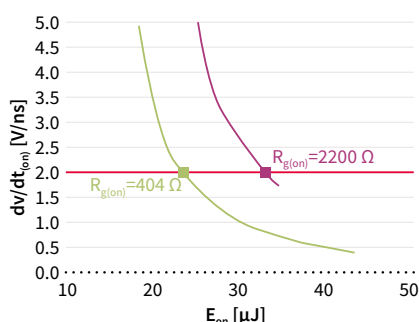


Features and benefits

Key features
Available in surface mounted packages
IGBT6 co-packed with and without diodes (DPAK)
RC-D2 monolithically integrated diode (SOT, DPAK)
SC rating between 3 μ s and 5 μ s
Low EMI due to easy controllability

Key benefits
Enable space limited application
Performance improvement
Cost optimized solution
SC protection
No need for additional components on PCB

EMI performance



- › $R_{g(on)}$ and $R_{g(off)}$ is selected to meet dv/dt of 2 V/ns at 500 mA and T_j of 100°C
- › IGBTs (IKD04N60RC2) are easily controllable by optimizing R_g values
- › CoolMOS™ (IPS60R1K0PFD7S) EMI performance can be enhanced with additional passive components

www.infineon.com/IGBT6

www.infineon.com/gatedriver

For more details on the product, click on the part number.

TRENCHSTOP™ IGBT6

New generation 1200 V fast speed IGBT

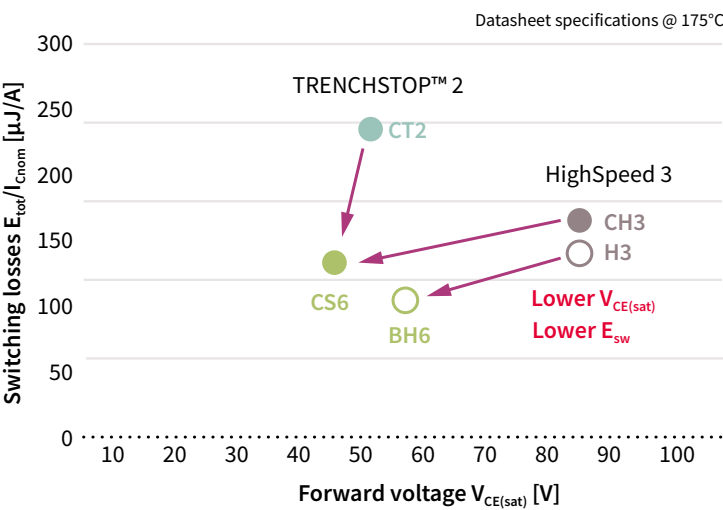
The new 1200 V IGBT generation TRENCHSTOP™ IGBT6 is designed to meet requirements of high efficiency, lowest conduction and switching losses in hard switching and resonant topologies operating at switching frequencies above 15 kHz.

The TRENCHSTOP™ IGBT 6 is released in two product families – low conduction losses optimized S6 series and improved switching losses H6 series. The TRENCHSTOP™ IGBT6 S6 series features low conduction losses of 1.85 V collector-emitter saturation voltage $V_{CE(sat)}$ combined with low switching losses of the HighSpeed 3 H3 series. TRENCHSTOP™ IGBT6 H6 series is optimized for low switching losses, provides ~15 percent lower total switching losses when compared to predecessor generation H3.

Very soft, fast recovery anti-parallel emitter controlled diode is optimized for fast recovery while still maintaining a high level of softness complementing to an excellent EMI behaviour.

Positive temperature coefficient allows easy and reliable device paralleling. Very good R_G controllability allows adjustment of IGBT switching speed to the requirements of application.

EiceDRIVER™ isolated gate driver like 1ED Compact family and EiceDRIVER™ 1200 V level shift gate driver family are perfect match for the 1200 V IGBT6 in motor control, general purpose inverter, solar, and UPS applications.



Features and benefits

Key features
Easy, plug and play replacement of predecessor HighSpeed 3 H3 IGBT
0.15 percent system efficiency improvement when changing from H3 to S6 in TO-247-3
0.2 percent system efficiency improvement when changing from H3 to S6 in TO-247 PLUS 4-pin

Key benefits
Best combination of switching and conduction losses for switching frequency 15–40 kHz
Low conduction losses with 1.85 $V_{CE(sat)}$ for S6 series
High R_G controllability
Low EM
Full rated, robust freewheeling diode

www.infineon.com/igbt6-1200V
www.infineon.com/gatedriver

For more details on the product, click on the part number.

TRENCHSTOP™ advanced isolation

Fully isolated TO-247 package with industry leading IGBTs

TRENCHSTOP™ advanced isolation solution breaks the limits reached by traditional packaging and isolation techniques. This new isolated package enables the highest power density, the best performance and the lowest cooling effort thanks to an effective and reliable thermal path from the IGBT die to the heatsink.

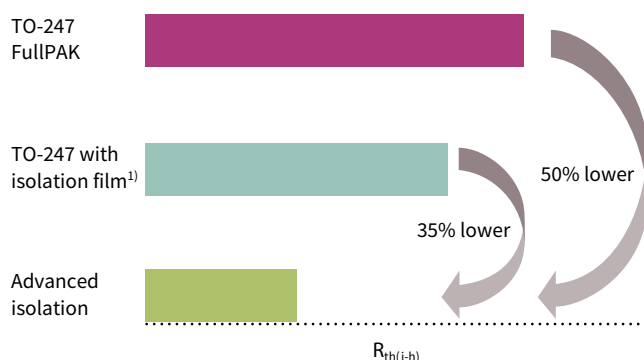
In addition to providing 100 percent electrical isolation, TRENCHSTOP™ advanced isolation also eliminates the need for thermal grease or thermal interface sheets. The new package delivers at least 35 percent lower thermal resistivity, helping designers to increase power density, as well as lower system complexity and assembling costs.

This new package solution allows industrial and home appliance designs to fully utilize the high performance of TRENCHSTOP™ IGBTs without compromises for isolation and cooling.

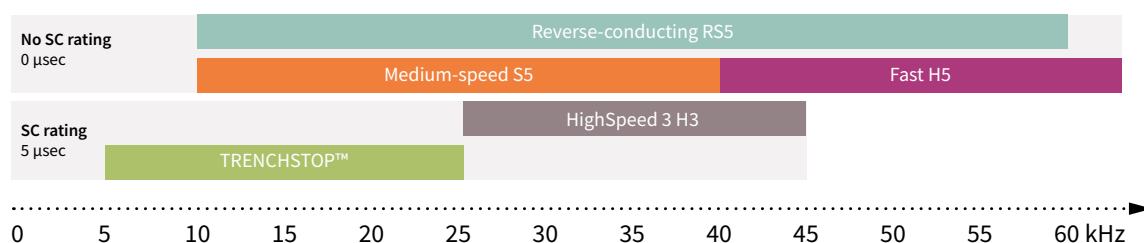
Features and benefits

Key features	Key benefits
2500 V _{RMS} electrical isolation, 50/60 Hz, t = 1 min	Up to 35 percent reduction in assembly time reduces manufacturing cost
100 percent tested isolated mounting surface	Increased power density
Lowest R _{th(j-h)}	Improved reliability from higher yield and no isolation film misalignment
Low coupling capacitance, 38 pF	Less EMI filter design effort
No need for isolation film or thermal interface material	Decreased heatsink size

Thermal resistivity of package and isolation types



1) Isolation material: standard polyimide based reinforced carrier insulator film with 152 µm thickness, 1.3 W/mK thermal conductivity



www.infineon.com/advanced-isolation

www.infineon.com/gatedriver

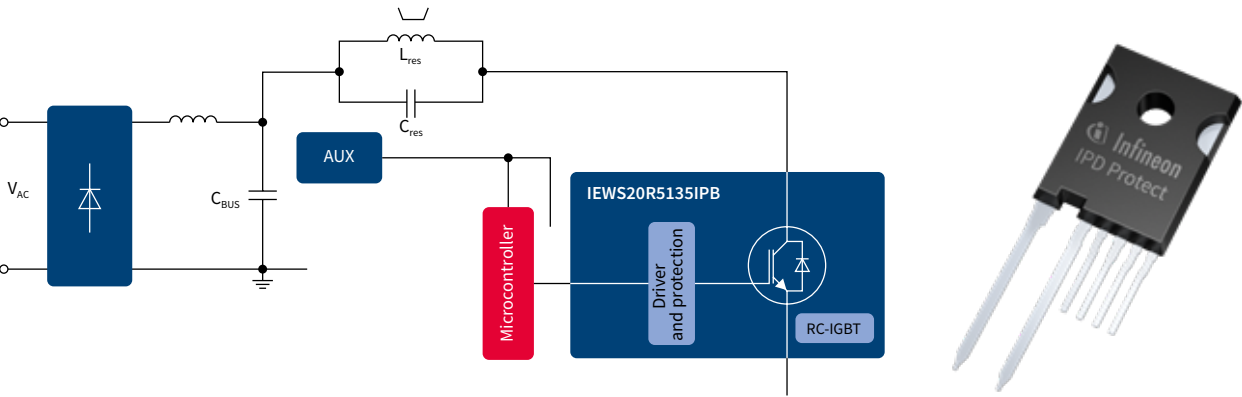
For more details on the product, click on the part number.

Integrated Power Device – IPD protect

IEWS20R5135IPB - 20 A 1350 V TRENCHSTOP™ IGBT with integrated protective functions

Infineon’s IEWS20R5135IPB is a best-in-class IGBT in RC-H5 technology with a unique protective gate driver IC co-packed in a TO-247 6-pin package for induction heating applications. IPD protect has, not only the industry’s best IGBT performance considering blocking voltage, static losses and conduction losses in induction cooktop applications and other soft switching application, but also integrated protection functions.

Its original concept provides protection against overvoltage, overcurrent, and overtemperature and additional features as a unique active clamp control, fault condition notification, and a special two level turn-on gate driving current that reduces significantly the typical high start-up peak current. These integrated protection functions provide a simple and robust solution for increased overall system reliability.



Features and benefits

Key features
Reverse conducting IGBT with monolithic body diode designed for soft switching
Integrated Driver with <ul style="list-style-type: none"> > Overvoltage and overcurrent protection > Active clamp control circuit > Programmable overvoltage threshold > Programmable cycle-by-cycle overcurrent threshold > Integrated gate drive with 2 level turn-on current > Temperature warning > Over-temperature protection > V_{CC} UVLO > Integrated ESD protection and latch immunity on all pins
TO-247 6-pin package

Key benefits
Increased overall reliability, reducing costs for replacement / rework
Reduced board complexity and design-in effort
Simplified BOM and reduced cost for total solution
Best-in-class performance IGBT



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

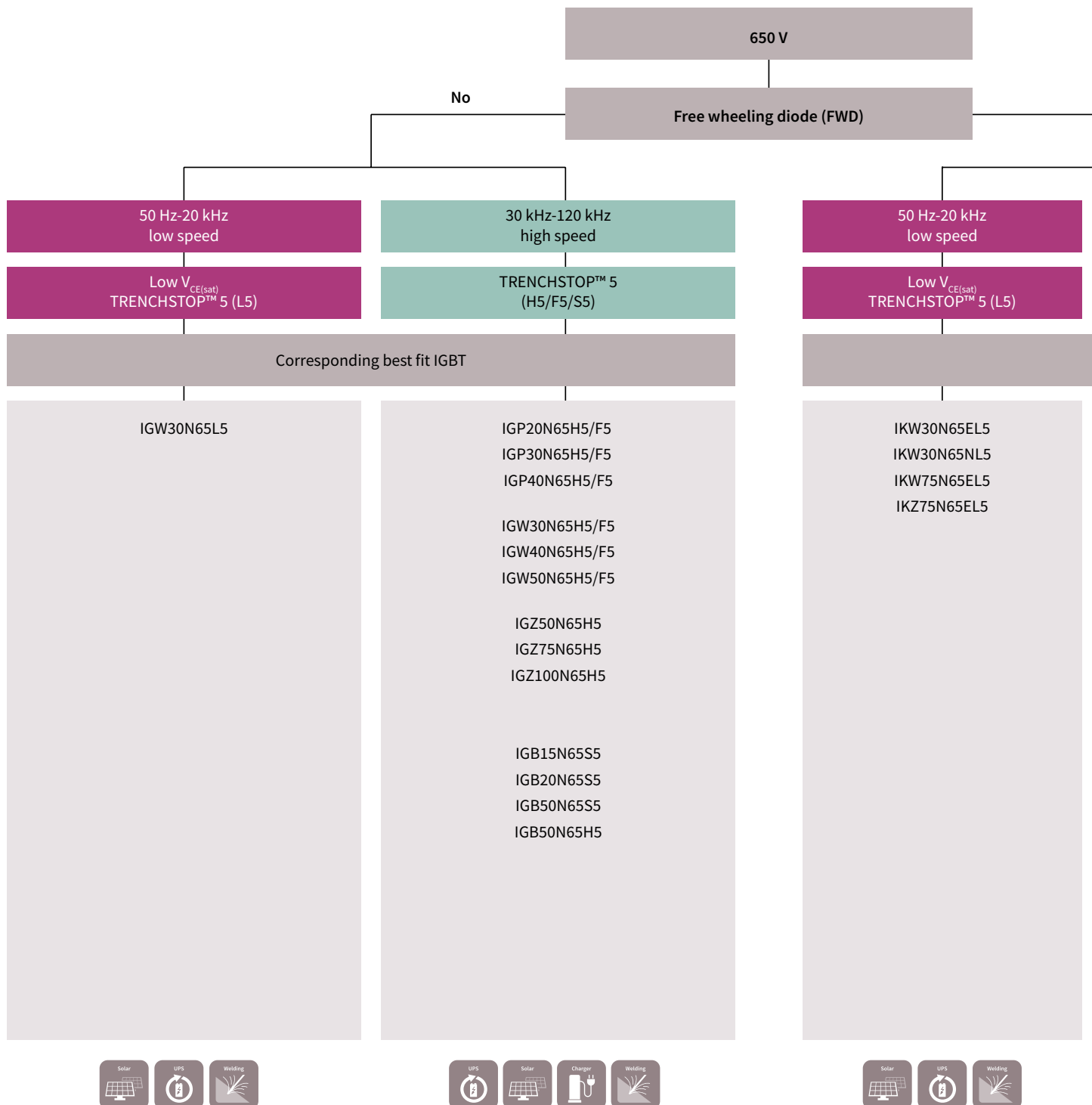
WBG semiconductors

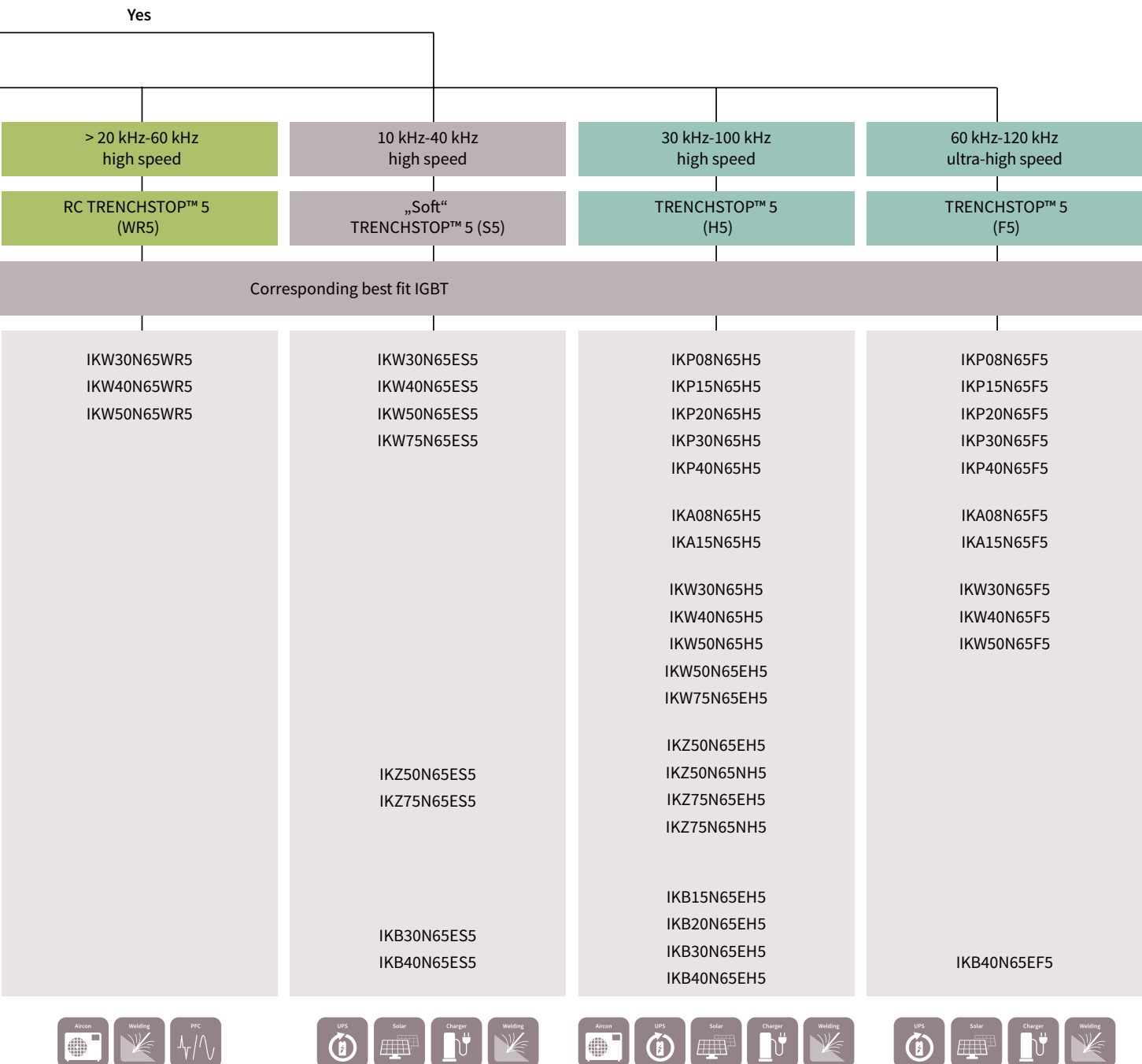
500-950 V MOSFETs

20-300 V MOSFETs

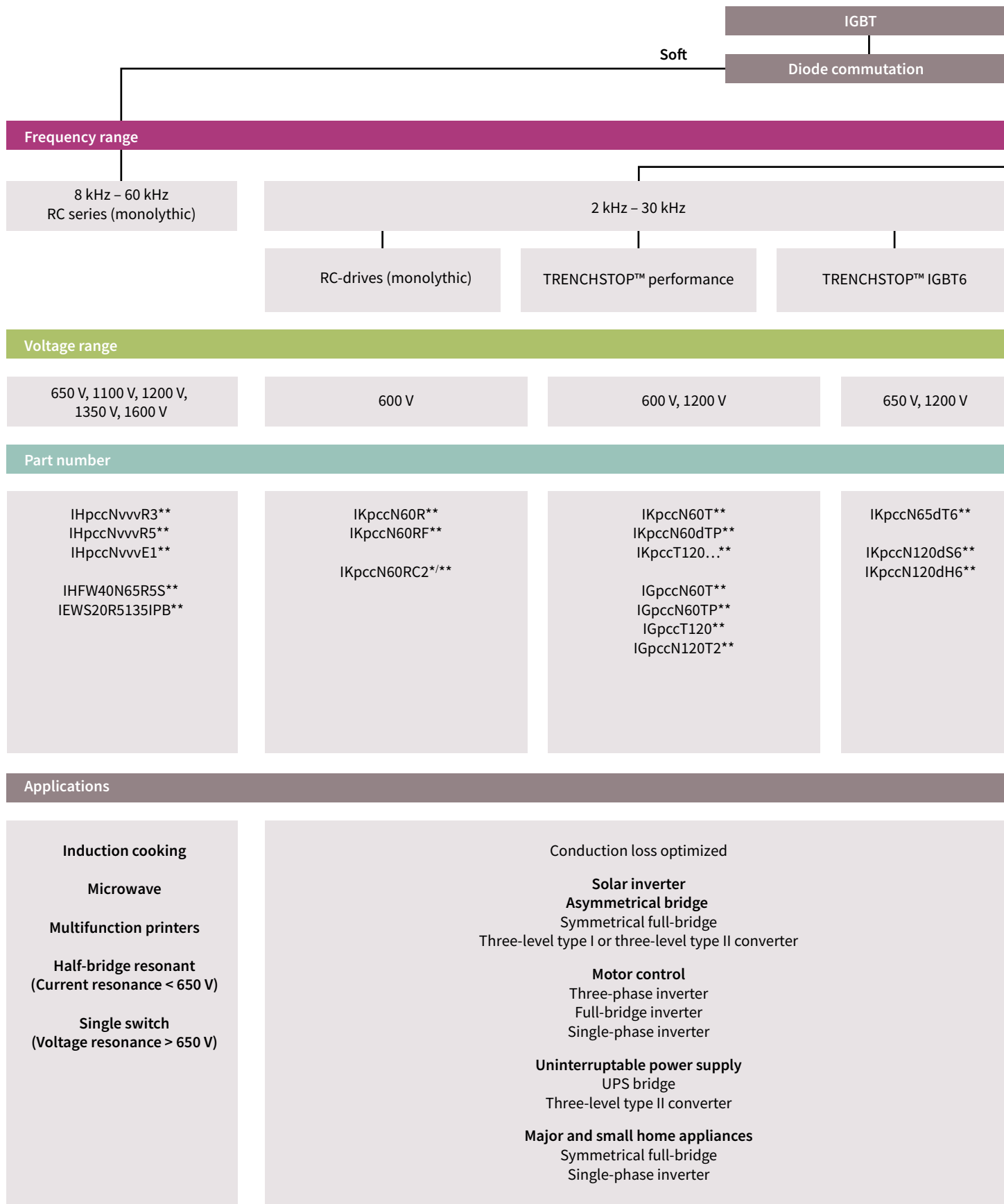
Applications

TRENCHSTOP™ 5 selection tree





IGBT selection tree



www.infineon.com/igbt discret es

www.infineon.com/gatedriver

*Coming soon

**For more information on the product, contact our product support

Hard/no diode for IG** parts

10 kHz – 40 kHz
medium speedSoft turn-off
TRENCHSTOP™ 5 (S5)

650 V

IKpccN65dS5**

> 18 kHz – 60 kHz
high speedHighSpeed 3
(H3)

600 V, 1200 V

IKpccN60H3**
IKpccN120H3**

IGpccN60H3**
IGpccN120H3**10 kHz – 100 kHz
high speedTRENCHSTOP™ 5
H5/F5

650 V

IKpccN65H5**
IKpccN65F5**

IGpccN65H5**
IGpccN65F5**> 18 kHz – 60 kHz
high speedRC TRENCHSTOP™ 5
(WR5)

650 V

IKpccN65dR5**

50 Hz – 20 kHz
low speedLow $V_{CE(sat)}$
TRENCHSTOP™ 5 (L5)

650 V

IKpccN65dL5**

IGpccN65L5****UPS**Energy storage
Battery charger

Welding

Solar inverter**PFC**Battery charger

Welding

UPS

Solar

Energy storage

SMPS

Air conditioning
HVDC (telecom/data centers)

Totem pole PFC**PFC**Welding inverter
Full-bridge
Half-bridge
Two transistor forward**UPS**Three-level NPC1 and
NPC2 topology,
inner switches

Solar
Three-level NPC1 and
NPC2 topology,
inner switches

Welding
AC output
(AI/Mag welding)



TRENCHSTOP™ and RC-drives

600 V/650 V product family together with 650 V SOI gate driver family



Continuous collector current @ T _c =100°C [A]		TO-251 (IPAK) Halogen-Free	TO-252 (DPAK) Halogen-Free	TO-263 (D ² PAK) Halogen-Free	TO-220 Halogen-Free	TO-247 advanced isolation Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247 Halogen-Free	TO-247PLUS/ Super 247 (TO-247AA) Halogen-Free
Single IGBT	4	IGU04N60T							
	6		IGD06N60T IGD06N65T6 *		IGP06N60T				
	10		IGD10N65T6 *	IGB10N60T	IGP10N60T				
	15		IGD15N65T6 *	IGB15N60T	IGP15N60T				
	30			IGB30N60T				IGW30N60T IGW30N60TP	
	40							IGW40N60TP	
	50			IGB50N60T	IGP50N60T			IGW50N60T IGW50N60TP	
	75							IGW75N60T	
IGBT and diode	3		IKD03N60RF						
	4		IKD04N60RF IKD04N60R		IKP04N60T				
	6		IKD06N60RF IKD06N60R IKD06N65ET6 *	IKB06N60T	IKP06N60T		IKA06N60T		
	8		IKD08N65ET6 *						
	10		IKD10N60RF IKD10N60R	IKB10N60T	IKP10N60T		IKA10N60T		
	15		IKD15N60RF IKD15N60R	IKB15N60T	IKP15N60T		IKA15N60T		
	20			IKB20N60T	IKP20N60T			IKW20N60T	
	30							IKW30N60T IKW30N60DTP	
	40							IKW40N60DTP	
	50					IKFW50N60ET		IKW50N60T IKW50N60DTP	
	75					IKFW75N60ET		IKW75N60T	
	100								IKQ100N60T
	120								IKQ120N60T

www.infineon.com/600V-1200V-trenchstop

*For more information on the product, contact our product support

For more details on the product,
click on the part number.



TRENCHSTOP™ IGBT6

650 V product family together with 650 V SOI gate driver family



Continuous collector current @ $T_c=100^\circ\text{C}$ [A]		TO-252 (DPAK) Halogen-Free	TO-220 FullPAK Halogen-Free
	6	IKD06N65ET6 ** IGD06N65T6 **	
	8	IKD08N65ET6 **	IKA08N65ET6 *
	10	IGD10N65T6 **	IKA10N65ET6 *
	15	IGD15N65T6 **	IKA15N65ET6 *

TRENCHSTOP™ IGBT6 NEW!

1200 V fast speed IGBT product family together with isolated gate driver family



Continuous collector current @ $T_c=100^\circ\text{C}$ [A]		TO-247 Halogen-Free	TO-247PLUS 3-pin Halogen-Free	TO-247PLUS 4-pin Halogen-Free
DuoPack	15	IKW15N120BH6		
	40	IKW40N120CS6		IKY40N120CS6
	75		IKQ75N120CS6	IKY75N120CS6

TRENCHSTOP™

1200 V product family together with isolated driver and 1200 V level shift driver family



Continuous collector current @ $T_c=100^\circ\text{C}$ [A]		TO-247 Halogen-Free		TO-247PLUS 3-pin Halogen-Free
		TRENCHSTOP™	TRENCHSTOP™ 2	TRENCHSTOP™ 2
Single IGBT	8	IGW08T120		
	15	IGW15T120		
	25	IGW25T120		
	40	IGW40T120		
	60	IGW60T120		
DuoPack	8	IKW08T120		
	15	IKW15T120	IKW15N120T2	
	25	IKW25T120	IKW25N120T2	
	40	IKW40T120	IKW40N120T2	IKQ40N120CT2
	50			IKQ50N120CT2
	75			IKQ75N120CT2

www.infineon.com/igbt6

* Limited by maximum junction temperature. Applicable for TO-220 standard package.

**For more information on the product, contact our product support

For more details on the product, click on the part number.

Applications

20-300 V MOSFETs

500-950 V MOSFETs

WBG semiconductors

Discrete IGBTs

Power ICs

Intelligent switches
and input ICs

Gate driver ICs

Microcontrollers

XENSIV™ sensors

Packages

Induction cooking series

650 V, 1100 V, 1200 V, 1350 V and 1600 V product families together with isolated driver and low side driver family



Continuous collector current @ T _c =100°C [A]		TO-247 advanced isolation Halogen-Free	TO-247 Halogen-Free					TO-247 6-pin IPD Protect Halogen-Free
			650 V	1100 V	1200 V	1350 V	1600 V	
	15				IHW15N120E1			
	20		IHW20N65R5					IEWS20R5135IPB
	25				IHW20N120R5	IHW20N135R5		
	25				IHW25N120E1			
	30		IHW30N65R5	IHW30N110R3	IHW30N120R5	IHW30N135R5	IHW30N160R5	
	40	IHFW40N65R5S *	IHW40N65R5		IHW40N120R5	IHW40N135R5		
	50		IHW50N65R5					

HighSpeed 3

Together with isolated driver, 650 V SOL driver, and low side driver family



Continuous collector current @ T _c =100°C [A]		TO-263 (D ² PAK) Halogen-Free	TO-220 Halogen-Free	TO-247 advanced isolation Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247 Halogen-Free
IGBT	20	IGB20N60H3	IGP20N60H3			IGW20N60H3
	30	IGB30N60H3	IGP30N60H3			IGW30N60H3
	40					IGW40N60H3
	50					IGW50N60H3
	60					IGW60N60H3
	75					IGW75N60H3
	100					IGW100N60H3
DuoPack	20	IKB20N60H3	IKP20N60H3			IKW20N60H3
	30					IKW30N60H3
	40			IKFW40N60DH3E		IKW40N60H3
	50			IKFW50N60DH3E IKFW50N60DH3		IKW50N60H3
	60			IKFW60N60DH3E IKFW60N60EH3		IKW60N60H3
	75					IKW75N60H3
	90			IKFW90N60EH3		

HighSpeed 3

1200 V product family together with isolated driver, and 1200 V level shift driver family



Continuous collector current @ T _c =100°C [A]		TO-247 Halogen-Free	TO-247PLUS 3-pin Halogen-Free	TO-247PLUS 4-pin Halogen-Free
IGBT	15	IGW15N120H3		
	25	IGW25N120H3		
	40	IGW40N120H3		
DuoPack	15	IKW15N120H3		
	25	IKW25N120H3		
	40	IKW40N120H3	IKQ40N120CH3	IKY40N120CH3
	50		IKQ50N120CH3	IKY50N120CH3
	75		IKQ75N120CH3	IKY75N120CH3

www.infineon.com/rch5
www.infineon.com/rc-e
www.infineon.com/advanced-isolation

*For more information on the product, contact our product support

For more details on the product, click on the part number.

TRENCHSTOP™ 5 F5, H5 and S5

Together with isolated driver, 650 V SOI driver, and low side driver family



Continuous collector current @ $T_c=100^\circ\text{C}$ [A]		TO-263 (D ² PAK) Halogen-Free	TO-220 Halogen-Free	TO-247 advanced isolation Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247 Halogen-Free	TO-247 4-pin Halogen-Free
IGBT	20	IGB20N65S5	IGP20N65F5/IGP20N65H5				
	30	IGB30N65S5 *	IGP30N65F5/IGP30N65H5				
	40		IGP40N65F5/IGP40N65H5			IGW40N65F5/IGW40N65H5	
	50	IGB50N60H5 *				IGW50N65F5/IGW50N65H5	IGZ50N65H5
		IGB50N60S5 *					
	75					IGW75N65H5	IGZ75N65H5
	100						IGZ100N65H5
DuoPack	8		IKP08N65F5/IKP08N65H5		IKA08N65F5/IKA08N65H5		
	15	IKB15N65EH5	IKP15N65F5/IKP15N65H5		IKA15N65F5/IKA15N65H5		
	20	IKB20N65EH5	IKP20N65H5/IKP20N65F5				
	28		IKP28N65ES5				
	30	IKB30N65EH5	IKP30N65H5/IKP30N65F5			IKW30N65H5	
		IKB30N65ES5					
	39		IKP39N65ES5				
	40	IKB40N65ES5	IKP40N65F5/IKP40N65H5	IKFW40N65DH5 *		IKW40N65F5/IKW40N65H5	
		IKB40N65EH5					
		IKB40N65EF5					
	50			IKFW50N65ES5*		IKW50N65F5/IKW50N65H5	IKZ50N65EH5
				IKFW50N65DH5 IKFW50N65EH5*		IKW50N65EH5	
	60			IKFW60N65ES5 *			
	75			IKFW75N65ES5 *		IKW75N65EH5	
				IKFW75N65EH5 *			IKZ75N65EH5
	90			IKFW90N65ES5			

TRENCHSTOP™ 5 L5 low $V_{CE(sat)}$

650 V product family together with low side driver family



Continuous collector current @ $T_c=100^\circ\text{C}$ [A]		TO-251 (IPAK) Halogen-Free	TO-252 (DPAK) Halogen-Free	TO-263 (D ² PAK) Halogen-Free	TO-220 Halogen-Free	TO-262 (I ² PAK) Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247 Halogen-Free	TO-247 4-pin Halogen-Free
IGBT	30							IGW30N65L5 *	
DuoPack	30							IKW30N65EL5	
	75							IKW75N65EL5	IKZ75N75EL5 *

TRENCHSTOP™ 5 WR5

650 V product family together with low side driver family



Continuous collector current @ $T_c=100^\circ\text{C}$ [A]		TO-247 Halogen-Free						
DuoPack	30	IKW30N65WR5						
	40	IKW40N65WR5						
	50	IKW50N65WR5						

TRENCHSTOP™ 5 S5

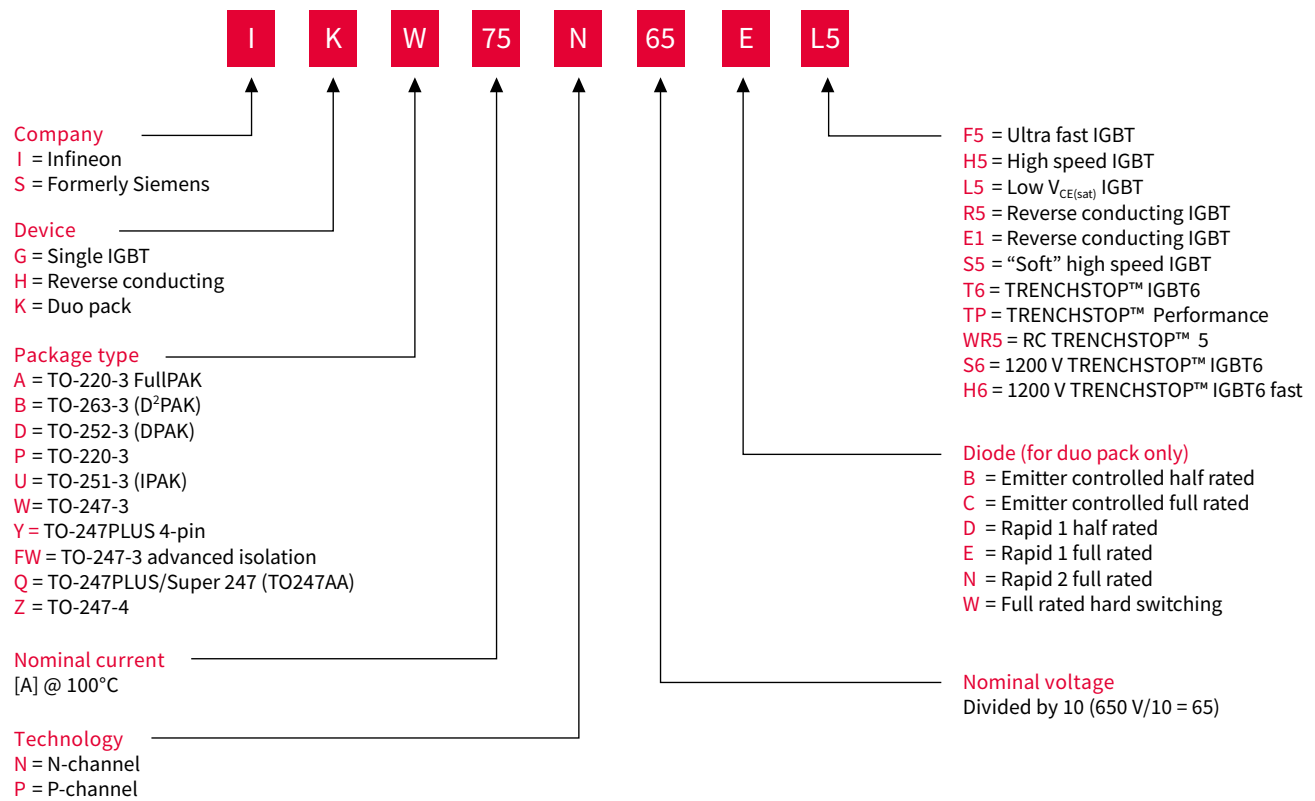
Together with isolated driver, 650 V SOI driver, and low side driver family



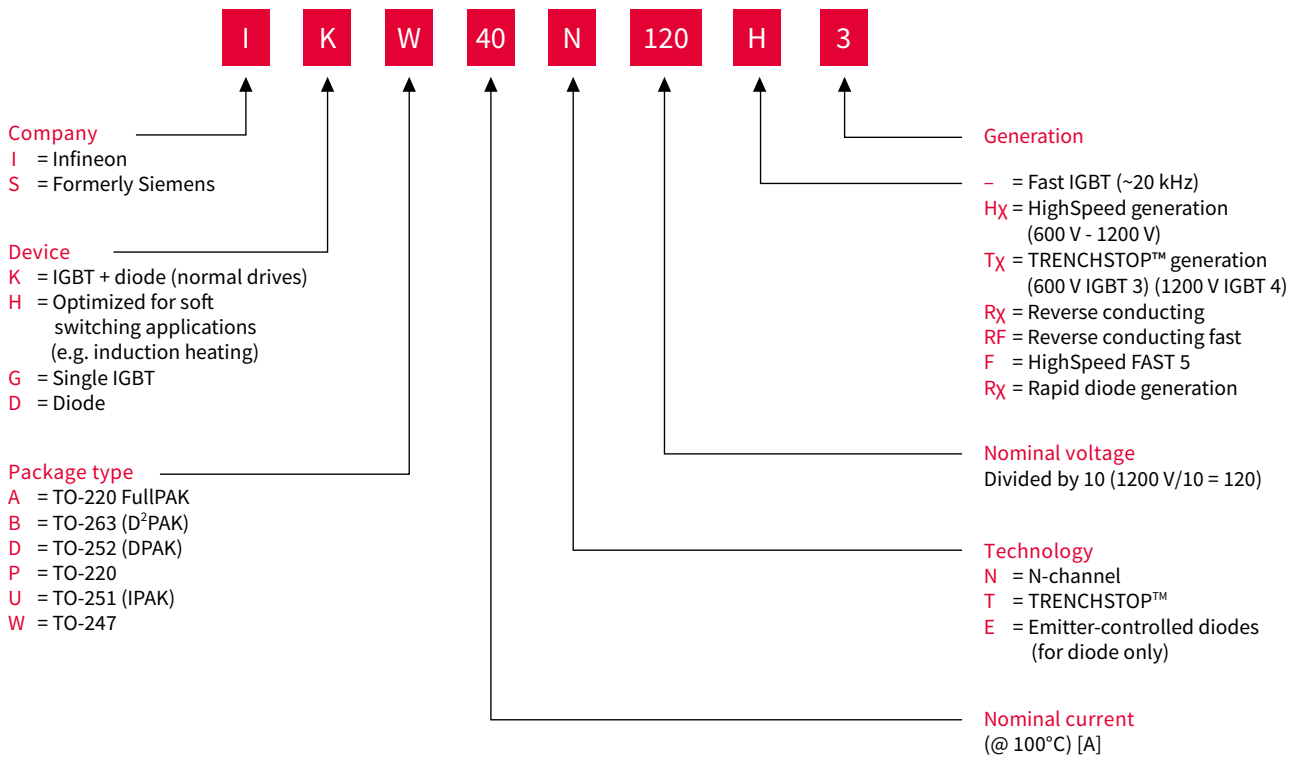
Continuous collector current @ $T_c=100^\circ\text{C}$ [A]		TO-247 Halogen-Free	TO-247 4-pin Halogen-Free
DuoPack	30	IKW30N65ES5	
	40	IKW40N65ES5	
	50	IKW50N65ES5	IKZ50N65ES5
	75	IKW75N65ES5	IKZ50N65ES5

Nomenclature

IGBT (after 03/2013)

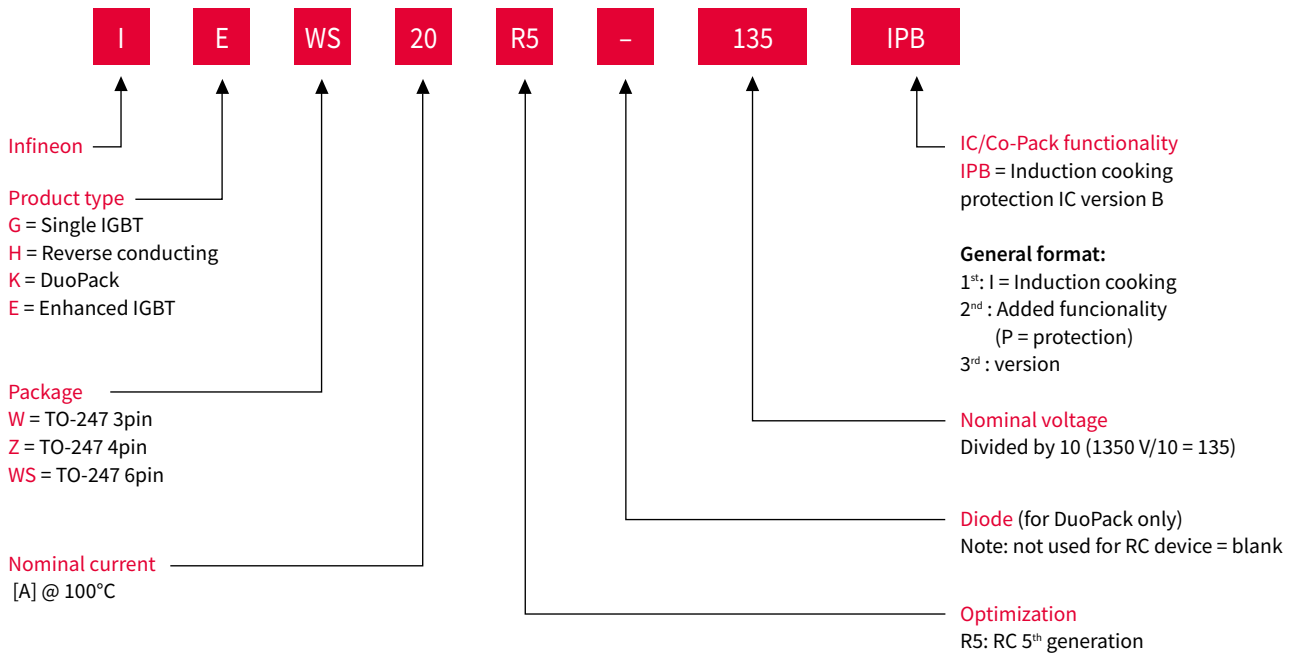


IGBT (before 03/2013)



Nomenclature

IPD protect





Applications

20-300 V MOSFETs

500-950 V MOSFETs

WBG semiconductors

Discrete IGBTs

Power ICs

Intelligent switches
and input ICs

Gate driver ICs

Microcontrollers

XENSIV™ sensors

Packages

Infiniteon support for discrete IGBTs

Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/igbt

www.infineon.com/igbt/discretes

www.infineon.com/discrete-automotive-igbt

www.infineon.com/latest-discrete-packages

Evaluation boards and simulation models

www.infineon.com/eval-TO-247-4pin

www.infineon.com/igbt/discrete-simulationmodels

Support

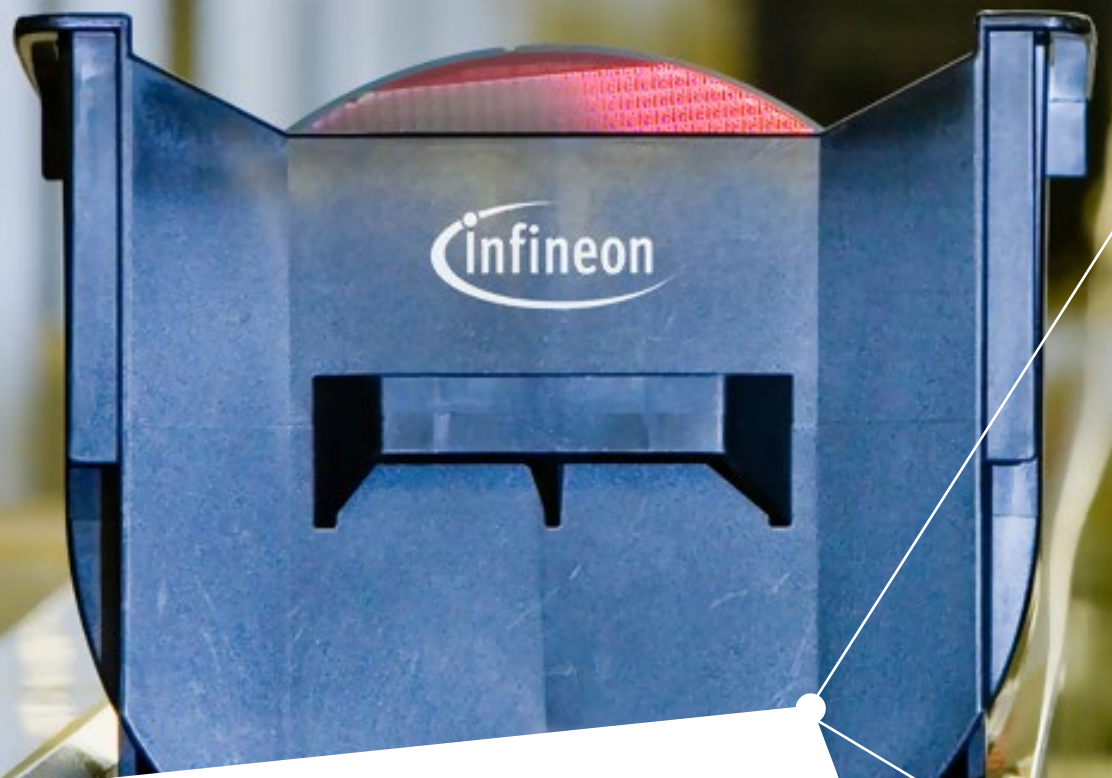
Evaluation
Board

Tools



Simulation





Power management ICs

- › XDP™ SMPS controllers
- › DC-DC digital multiphase controllers
- › PFC controllers
- › PWM controllers
- › Resonant LLC half-bridge controller ICs
- › Integrated power stages
- › Switching regulators
- › Voltage regulators
- › Audio amplifier ICs
- › Lighting ICs
- › Intelligent power modules (IPMs)
- › Motor control ICs



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

Applications

XDP™ SMPS

IDP2308 and IDP2303A – digital multi-mode PFC+LLC combo controller

The IDP2308 and IDP2303A are high performance digital combo controllers with integrated drivers and 600 V depletion cell designed for boost PFC and half-bridge LLC targeting switched mode power supplies (SMPS) from 75 W to 300 W.

- › Support non-AUX operation with the lowest standby performance and start-up cell
- › Support multi-mode PFC operation for optimized efficiency curve
- › Configurable frequency setting for LLC soft-start and normal operation
- › Synchronous PFC and LLC burst mode control with soft-start to prevent acoustic noise
- › Excellent dynamic response by adaptive LLC burst mode
- › Configurable and comprehensive protections for PFC/LLC/IC temp
- › IEC62368-1 certified active X-cap discharge function
- › Flexible IC parameter setting with digital UART interface supports PSU platform approach

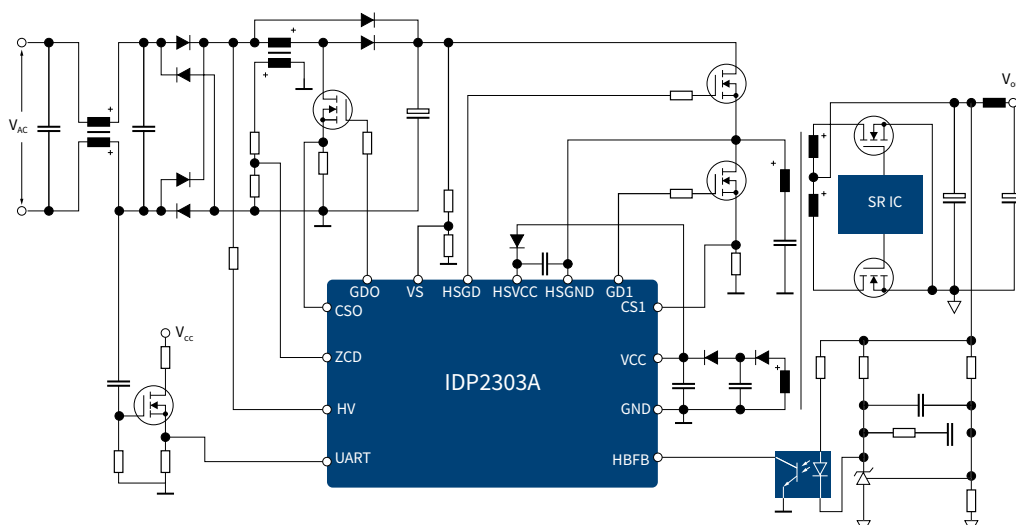
Key benefits

- › Low BOM count due to high integration of digital control
- › No auxiliary power supply needed
- › Easy design of system schematic and PCB layout
- › Small form factor design
- › Higher system reliability
- › Shorter development cycles and higher design and production flexibility




Product	Target application	Major difference	Package
IDP2308	TV embedded PSU	2 nd redundant PFC output overvoltage protection	DSO-14 (with enhanced HV creepage distance)
IDP2303A	Adapter, general SMPS	Constant output voltage	DSO-16

IDP2303A – power adapter

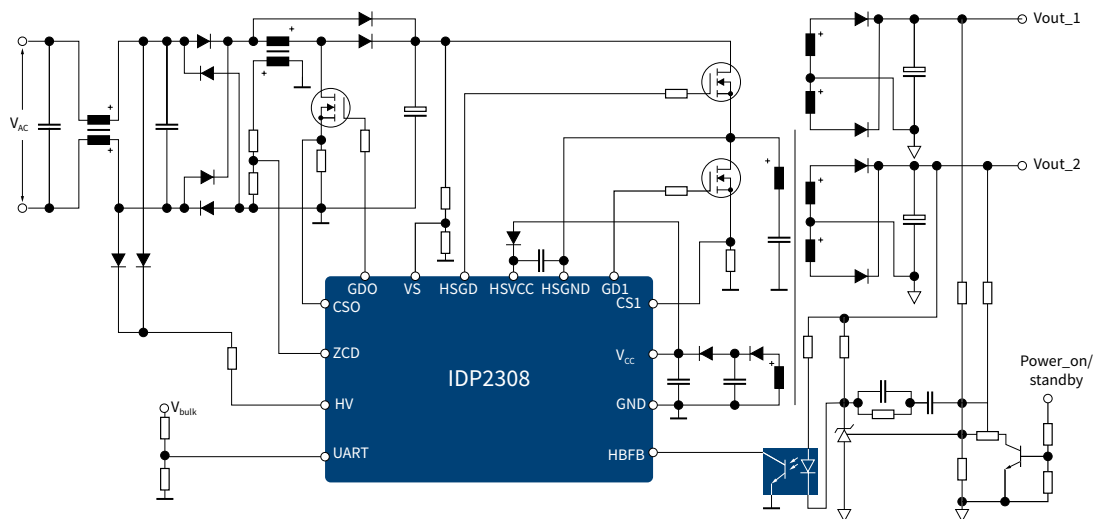


www.infineon.com/xdp-smps

For more details on the product, click on the part number. 




IDP2308 – embedded PSU



Target applications

- › LCD TV power supply
- › General SMPS
- › Power adapter

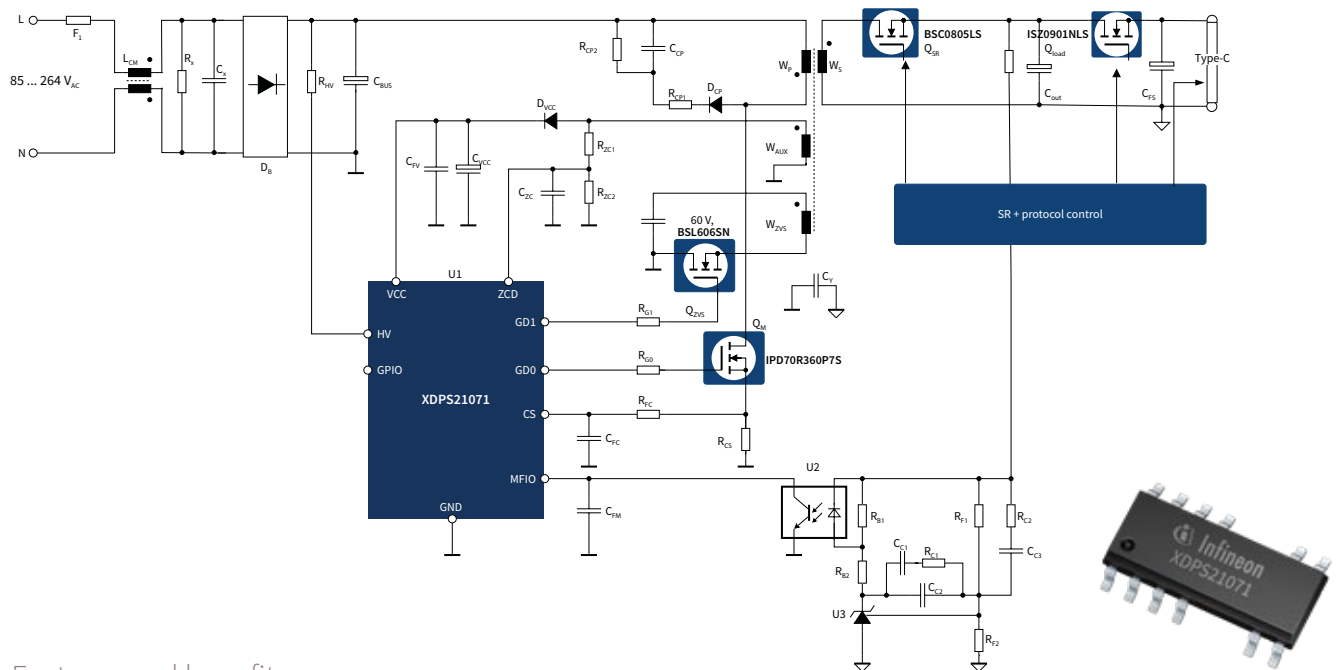
www.infineon.com/xdp-smps

For more details on the product, click on the part number. 

XDP™ SMPS

XDPS21071 – digital FFR flyback controller

XDPS21071 is the first flyback controller in the industry to introduce ZVS (Zero Voltage Switching) on the primary side to achieve high efficiency with simplified circuitry and economical switches. By driving an external low voltage switch to induce a negative current to discharge the main high voltage MOSFET, switching losses can be reduced further than traditional valley switching type of switching scheme. To achieve high efficiency with synchronous rectification, DCM operation is ensured via valley detection for a safe and robust operation.



Features and benefits

Key features	Key benefits
Zero voltage switching	Reduce switching loss and achieve high efficiency
Frequency law optimization	Optimize efficiency across various line/load condition
Active burst mode operation with multi entry/exit threshold	Optimize light and no load efficiency
Integrated dual MOSFET gate driver	Save BOM count and cost with no messy external driver
Easy ZVS implementation with an external 60V MOSFET	Easy to drive, low cost and widely available off the shelf 60V MOSFET
Multiple peak current threshold offset for different output	Fail safe mechanism to limit output power in the event of PD controller failure
CrCM operation with valley detection	Avoid CCM operation and no potential of shoot-through with SR MOSFET

REF_XDPS21071_45W1

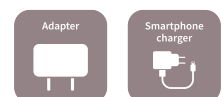


45W USB-PD Type-C reference design in a small form factor based on XDPS21071.

- > 45W USB-PD Type-C charger
- > Universal input range 90~264 V_{AC}
- > Supported output: 5 V/3 A, 9 V/3 A, 12 V/3 A, 15 V/3 A and 20 V/2.25 A
- > Peak efficiency > 90%
- > Low no-load standby input power < 30 mW

Ordering code: REF XDPS2107145W1TOB01

www.infineon.com/xdps21071



For more details on the product, click on the part number.

DC-DC digital multiphase controllers

Point-of-load power management

Infineon's digital multiphase and multirail controllers provide power for today's medium and high current POL applications used in telecom/datacom, server, and storage environments. Infineon's digital controller family enables OEMs and ODMs to improve efficiency and total cost of ownership, while increasing power density and optimizing the total system footprint of the voltage regulator. The products highlighted in the table below represent our fifth generation digital controller family and support up to two rails with 1-6 phases on individual rails. The I2C/PMBus™ interface connects the digital controllers to the application system and provides real time telemetry information, monitoring and control capabilities. The digital controllers are fully configurable through our PowerCode™ and PowerClient™ graphical user interfaces that allows for easy to use and simplified design optimization.

Multi-phase configurations are supported for best power optimization

Feature		Controller family							
Configurable output rails		Dual rail	Dual rail	Dual/single rail	Dual/single rail	Dual rail	Dual/single rail	Dual/single rail	Dual rail
Part number	PMBus™	PXE1610C *	IR35212	XDPE10280B *	XDPE10281B *	IR35204MTRPBF	IR35201MTRPBF	IR35223 *	XDPE132G5C *
Phase configuration	Main	7 ph	7 ph	8 ph	8 ph	4 ph	8 ph	10 ph	16 ph
	Subconfigurations	6 + 1	6+1	8+0, 6+2, 4+4	8+0, 6+2, 4+4	3+1	8+0, 7+1, 6+2	10+0, 5+5	8+8
V _{out_max}		2.5 V	3.3 V	3.04 V	3.04 V	3.3 V	3.3 V	3.3 V	3.3 V
Switching frequency		Up to 2 MHz	Up to 2 MHz	Up to 2 MHz	Up to 2 MHz	Up to 2 MHz	Up to 2 MHz	Up to 2 MHz	Up to 2 MHz
Operating temperature range		- 5°C to 85°C	- 40°C to 85°C	- 40°C to 85°C	- 40°C to 85°C	- 40°C to 85°C	- 40°C to 85°C	- 40°C to 85°C	- 40°C to 120°C
VQFN package		48-lead (6x6) 0.4 mm pitch	48-lead (6x6) 0.4 mm pitch	56-lead (7x7) 0.4 mm pitch	56-lead (7x7) 0.4 mm pitch	40-lead (5x5) 0.4 mm pitch	56-lead (7x7) 0.4 mm pitch	48-lead (6x6) 0.4 mm pitch	56-lead (7x7) 0.4 mm pitch
Typical application		Intel server, high end desktop	Intel server, workstation, high end desktop	Intel server, workstation, high end desktop	AMD server, workstation, high end desktop	AMD server, memory and SOC	AMD server, CPU	Phase redundant based server systems	AMD server, GPU, ASIC, networking ASSP

Advantages of a digital controller

Protection features include a set of sophisticated overvoltage, undervoltage, overtemperature, and overcurrent protections. Each of the controllers in the table above also detect and protect against an open circuit on the remote sensing inputs. These attributes provide a complete and advanced protection feature set for microprocessor, DSP, FPGA or ASIC power systems. Accurate current sense telemetry is achieved through internal calibration that measures and corrects current sense offset error sources upon start-up. Programmable temperature compensation provides accurate current sense information even when using DCR current sense.

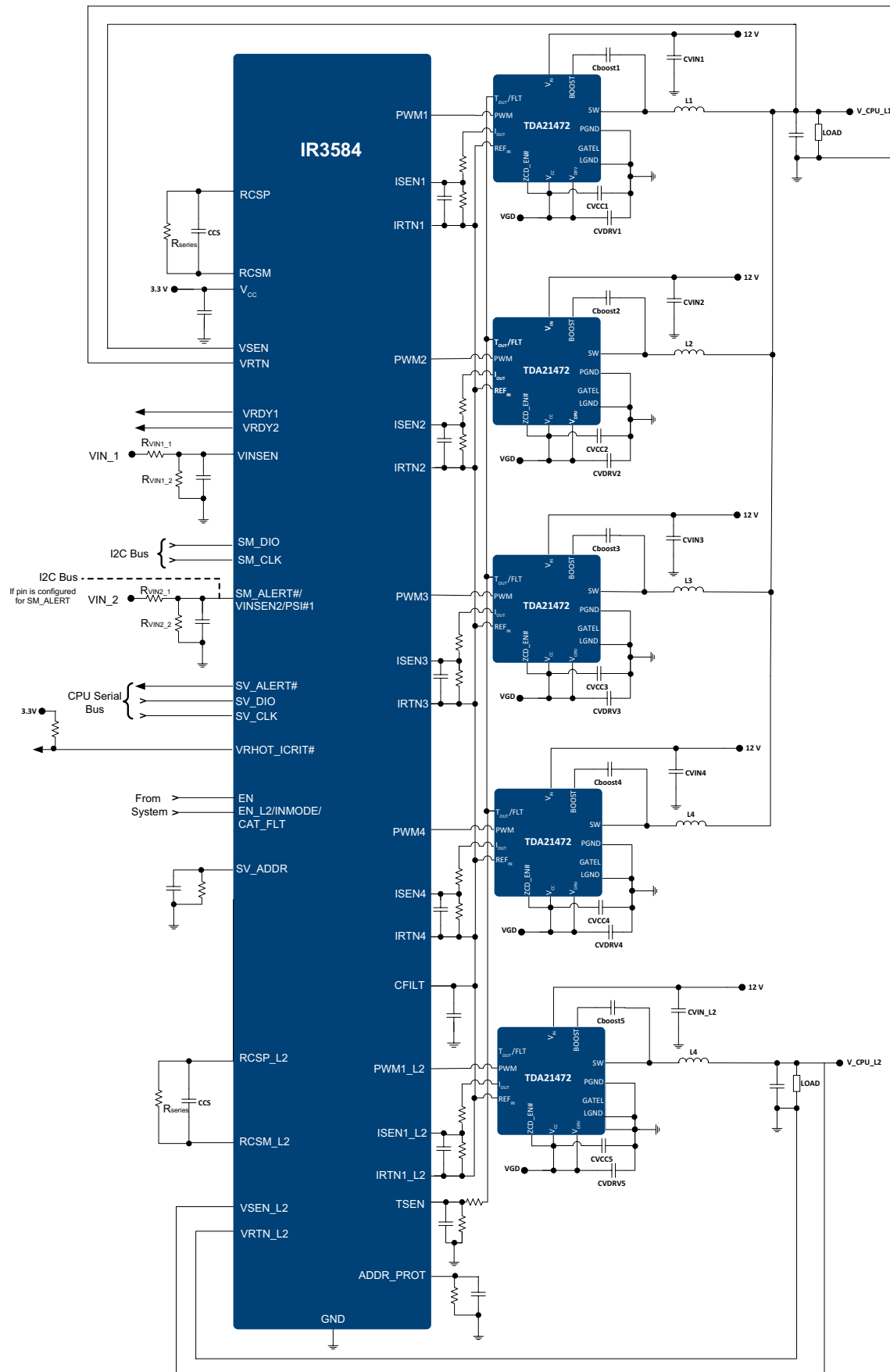
www.infineon.com/digital-controller


*For more information on the product, contact our product support



For more details on the product, click on the part number.

Typical multiphase application circuit

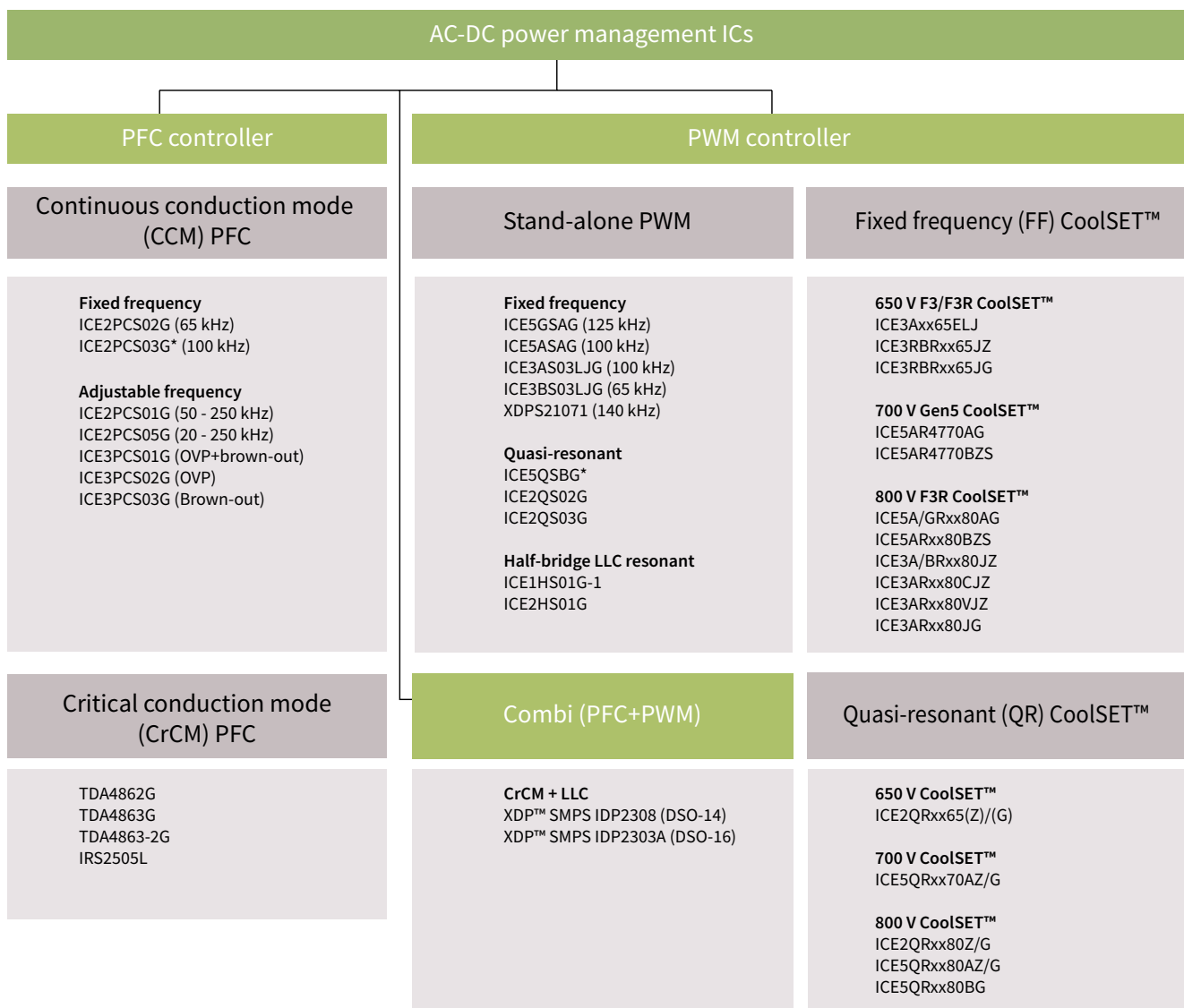


For more details on the product, click on the part number. 

AC-DC power management ICs

Technology leadership in power supply

By offering a wide variety of highly efficient control ICs we enable our customer to meet new demands like PFC regulations and ultra low standby power requirements in a very cost effective way. A comprehensive array of safety features helps to minimize the number of external components, reduces design in time and improves the reliability of the SMPS.

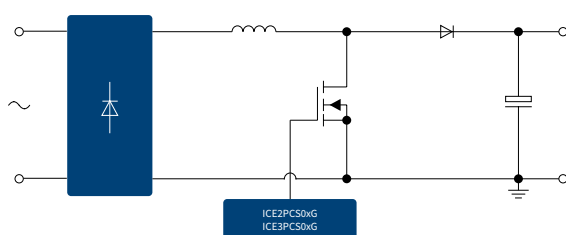


Continuous conduction mode (CCM) PFC ICs

High efficiency and very low system cost

Compared to the first generation of ICE1PCS01/02, the second generation of CCM PFC controller ICs, ICE2PCS01/02, have lower internal reference trimmed at 3V. They also have other advantages such as wider VCC operating range, improved internal oscillator and additional direct bulk capacitor overvoltage protection. Compared to the first and second generation of ICE1PCS0x and ICE2PCS0x, the third generation CCM PFC have the lowest internal reference trimmed at 2.5 V and integrated digital control voltage loop. They also feature low peak current limit at 0.2 V, adjustable gate switching frequency range from 21 kHz to 100 kHz and able to synchronize with external frequency range from 50 kHz to 100 kHz. They are now able to achieve 95% efficiency at full load for all input voltage range.

Application diagram



2nd generation continuous conduction mode PFC IC features

- › Fulfills class D requirements of IEC 61000-3-2
- › Lowest count of external components
- › Adjustable and fixed switching frequencies
- › Frequency range from 20 to 250 kHz
- › Versions with brown-out protection available
- › Wide input range supported
- › Enhanced dynamic response during load jumps
- › Cycle by cycle peak current limiting
- › Integrated protections OVP, OCP
- › DIP-8 and DSO-8
- › Lead-free, RoHS compliant

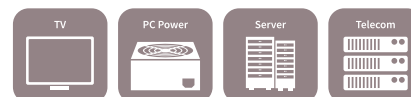
3rd generation continuous conduction mode PFC IC features

- › Fulfills class D requirements of IEC 61000-3-2
- › Integrated digital voltage loop compensation
- › Boost follower function
- › Bulk voltage monitoring signals, brown-out
- › Multi protections such as double OVP
- › Fast output dynamic response during load jump
- › External synchronization
- › Extra-low peak current limitation threshold
- › SO-8 and SO-14
- › Lead-free, RoHS compliant

	ICE2PCS01G ICE2PCS05G	ICE2PCS02G ICE2PCS03G *	ICE3PCS03G	ICE3PCS02G	ICE3PCS01G
Digital control voltage loop	-	-	✓	✓	✓
Variable frequency	✓	-	✓	✓	✓
Synchronous frequency	-	-	✓	✓	✓
Open loop protection	✓	✓	✓	✓	✓
Low peak current limit	-1 V	-1 V	-0.4 V	-0.4 V	-0.2 V
Brown-out protection	-	✓	✓	-	✓
Overvoltage protection	✓	✓	✓	✓	✓
Second overvoltage protection	-	-	-	✓	✓
PFC enable function	-	-	-	-	✓
Boost follower mode	-	-	-	-	✓
5 V regulator	-	-	-	-	✓

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*For more information on the product, contact our product support



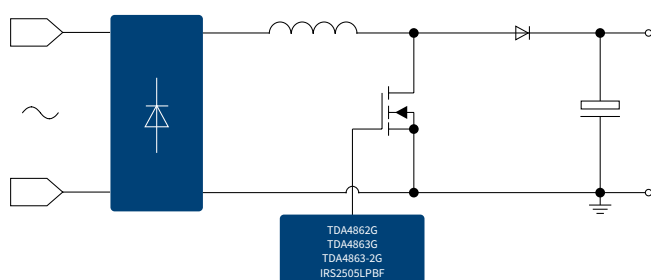
For more details on the product, click on the part number.

Critical conduction mode (CrCM) PFC

Easy design and lowest system cost

Fully compatible with the world standard, these devices are optimized to offer extremely compact and cost effective PFC solutions for electronic ballast and off-line SMPS. By using a zero current detector for discontinuous operation mode a near unity power factor and an excellent THD are achieved. The latest addition are the TDA4863G and TDA4863-2G which are the improved versions of the active power factor controller TDA4862G. Products are available in DSO-8 (TDAxxG parts) and SOT23 (IRS2505L) packages.

Application diagram



TDA4862G

Power factor controller (PFC) IC for high-power factor and active harmonic filter

- > IC for sinusoidal line current consumption
- > Power factor approaching 1
- > Controls boost converter as an active harmonics filter
- > Internal start-up with low current consumption
- > Zero current detector for discontinuous operation mode
- > High current totem pole gate driver
- > Trimmed $\pm 1.4\%$ internal reference
- > Undervoltage lockout with hysteresis
- > Very low start-up current consumption
- > Pin compatible with world standard
- > Output overvoltage protection
- > Current sense input with internal low pass filter
- > Totem pole output with active shutdown during UVLO
- > Junction temperature range -40°C to $+150^{\circ}\text{C}$
- > Available in DIP-8 and SO-8 packages

TDA4863G/TDA4863-2G

Power factor controller IC for high-power factor and low THD additional features to TDA4862

- > Reduced tolerance of signal levels
- > Improved light load behavior
- > Open loop protection
- > Current sense input with leading edge blanking LEB
- > Undervoltage protection
- > SO-8 package

IRS2505LPBF

- > Critical conduction mode PFC control
- > High power factor and ultralow THD
- > Wide load and line range
- > Regulated and programmable DC bus voltage
- > No secondary winding required
- > MOSFET cycle-by-cycle overcurrent protection
- > DC bus overvoltage protection
- > Low EMI gate drive
- > Ultralow start-up current
- > 20.8 V internal Zener clamp on V_{CC}
- > Excellent ESD and latch immunity
- > RoHS compliant
- > 5-pin SOT-23 package

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For more details on the product, click on the part number.

PFC controller portfolio

Critical conduction mode (CrCM) PFC IC portfolio

Product	V _{CC} min.	V _{CC} max.	Package
TDA4862G	11 V	19 V	DSO-8
TDA4863G	10 V	20 V	DSO-8
TDA4863-2G	10 V	20 V	DSO-8
IRS2505L	9 V	20.8 V	SOT23

Continuous conduction mode PFC ICs

2nd generation continuous conduction mode PFC IC product portfolio

Product	Frequency – f _{SW}	Current drives	Package
ICE2PCS01G	50-250 kHz	2.0 A	DSO-8
ICE2PCS02G	65 kHz	2.0 A	
ICE2PCS03G*	100 kHz	2.0 A	
ICE2PCS05G	20-250 kHz	2.0 A	

3rd generation continuous conduction mode PFC IC product portfolio

Product	Frequency – f _{SW}	Current drives	Features	Package
ICE3PCS01G	Adjustable	0.75 A	OVP+brown-out	SO-14
ICE3PCS02G		0.75 A	OVP	SO-8
ICE3PCS03G		0.75 A	Brown-out	SO-8



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

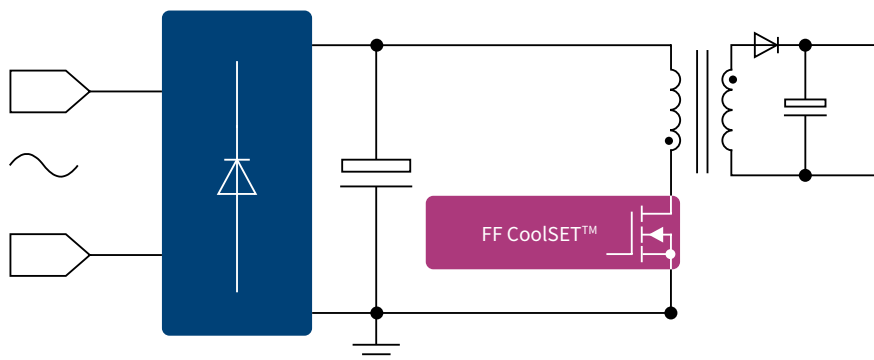
WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

Applications

5th generation fixed frequency PWM IC and CoolSET™



- › Integrated CoolMOS™ in both 700 V and 800 V MOSFET
- › Cascode configuration for brown-in protection, fast and robust start-up
- › Available in both 100 kHz and 125 kHz fixed switching frequency
- › Frequency reduction in tandem with load reduction to increase efficiency
- › Selectable active burst mode entry/exit profile to optimize standby power and ability to disable
- › Support CCM flyback operation with in-build slope compensation
- › Integrated error amplifier for direct feedback (e.g. non-isolated flyback)
- › Adjustable line input overvoltage protection (only ICE5xRxxxxAG)
- › V_{CC} pin short-to-ground protection
- › Auto restart protection mode to minimize interruption to operation
- › DSO-8 package (standalone controller), DIP-7 and DSO-12 package for CoolSET™



Halogen-Free



RoHS

5th generation fixed frequency CoolSET™

Output power ¹⁾ 85 V _{AC} ~300 V _{AC} T _a =50°C	15 W	23 W	27 W	40 W
R _{DS(on)} max	5.18 Ω	2.35 Ω	1.75 Ω	0.80 Ω
700 V	DIP-7	ICE5AR4770BZS		
	DSO-12	ICE5AR4770AG		
800 V	DIP-7	ICE5AR4780BZS		ICE5AR0680BZS
	DSO-12	ICE5GR4780AG	ICE5GR2280AG	ICE5GR1680AG

3rd generation fixed frequency CoolSET™

Output power ¹⁾ 85 V _{AC} ~300 V _{AC} T _a =50°C	10~15 W	19~21 W	23~26 W	30~34 W	37~41 W
R _{DS(on)} max	11.1~5.44 Ω	3.42~2.62 Ω	1.96~1.71 Ω	1.11~1.05 Ω	0.75~0.71 Ω
650 V	DIP-7	ICE3RBR4765JZ		ICE3RBR1765JZ	ICE3RBR0665JZ
	DIP-8	ICE3BR4765J	ICE3A1065ELJ	ICE3BR1765J	ICE3BR0665J
	DSO-12	ICE3RBR4765JG		ICE3RBR1765JG	ICE3RBR0665JG
800 V	DIP-7	ICE3AR4780JZ	ICE3AR2280JZ	ICE3AR1580VJZ	ICE3AR1080VJZ
		ICE3AR4780VJZ	ICE3BR2280JZ		ICE3BR0680JZ
		ICE3AR4780CJZ	ICE3AR2280VJZ		ICE3AR0680VJZ
		ICE3AR10080CJZ	ICE3AR2280CJZ		
	DSO-12	ICE3AR4780JG	ICE3AR2280JG	ICE3AR1080JG	

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1) Calculated DCM maximum output power in an open-frame design based on T_a=50° C and T_j=125°C without copper area as heatsink



For more details on the product, click on the part number.



Fixed frequency PWM IC

FF PWM IC	5 th generation		3 rd generation	
	ICE5ASAG	ICE5GSAG	ICE3AS03LJG	ICE3BS03LJG
Package	DSO-8		DSO-8	
Switching frequency	100 kHz	125 kHz	100 kHz	65 kHz
Operating temperature	-40°C~129°C		-25°C~130°C	
Start-up cell	Cascode		✓	
V _{CC} on/off threshold	16 V/10 V		18 V/10.5 V	
Soft start time	12 ms		10 ms	20 ms
Frequency jittering	✓		✓	
Modulated gate drive	✓		✓	
Active burst mode	✓ (3 level selectable)		✓	
Slope compensation for CCM	✓		-	
Frequency reduction	✓		-	
Integrated error amplifier for direct feedback	✓		-	
Adjustable line input overvoltage protection	✓ with auto restart		-	
Adjustable brown-in protection	✓ with auto restart		-	
V _{CC} pin short-to-ground protection	✓ (no start-up)		-	
V _{CC} undervoltage protection	✓ with auto restart		✓ with auto restart	
V _{CC} overvoltage protection	✓ with auto restart		✓ with latch-up	
Overload /open loop protection	✓ with auto restart		✓ with auto restart	
Overtemperature protection	✓ with auto restart and hysteresis		✓ with latch-up	
External blanking time extension	-		✓ with auto restart	
External protection enable pin	-		✓ with latch-up	




Fixed frequency CoolSET™

	700 V CoolSET™	650 V CoolSET™		
	Gen5 ICE5ARxx70AG(BZS)	Gen3 ICE3Axx65ELJ	Gen3R ICE3BRxx65J	Gen3R ICE3RBRxx65JZ(G)
Package	DIP-7, DSO-12	DIP-8		DIP-7, DSO-12
Output power range	15 W	19 W~34 W	15 W~41 W	14 W~39 W
Operating temperature range	-40°C~129°C	-25°C~130°C		-40°C~130°C
Switching frequency	100 kHz	100 kHz	65 kHz	65 kHz
Frequency reduction	✓	-		
Integrated error amplifier	✓	-		
Slope compensation for CCM mode	✓	-		
V _{cc} on/off threshold	16 V/10 V	18 V/10.5 V		
Soft start time	12 ms	20 ms		
Active burst mode selection	3 level	1 level		
V _{cc} pin short-to-ground protection	No start-up	-		
V _{cc} overvoltage protection	Auto restart	Latch	Auto restart	
Overtemperature protection	Auto restart with hysteresis	Latch	Auto restart	
External protection enable pin	-	Latch	Auto restart	
Adjustable brown-in/-out protection	Brown-in only	-		
Adjustable line input overvoltage protection	Only ICE5ARxx70AG	-		
Fast AC reset	-			
Product available	ICE5AR4770AG ICE5AR4770BZS	ICE3A1065ELJ ICE3A2065ELJ	ICE3BR4765J ICE3BR1765J ICE3BR0665J	ICE3RBR4765JZ ICE3RBR1765JZ ICE3RBR0665JZ ICE3RBR4765JG ICE3RBR1765JG ICE3RBR0665JG

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1) Calculated 85 V_{AC}~300 V_{AC} DCM maximum output power in an open-frame design based on T_a=50°C and T_j=125°C without copper area as heatsink

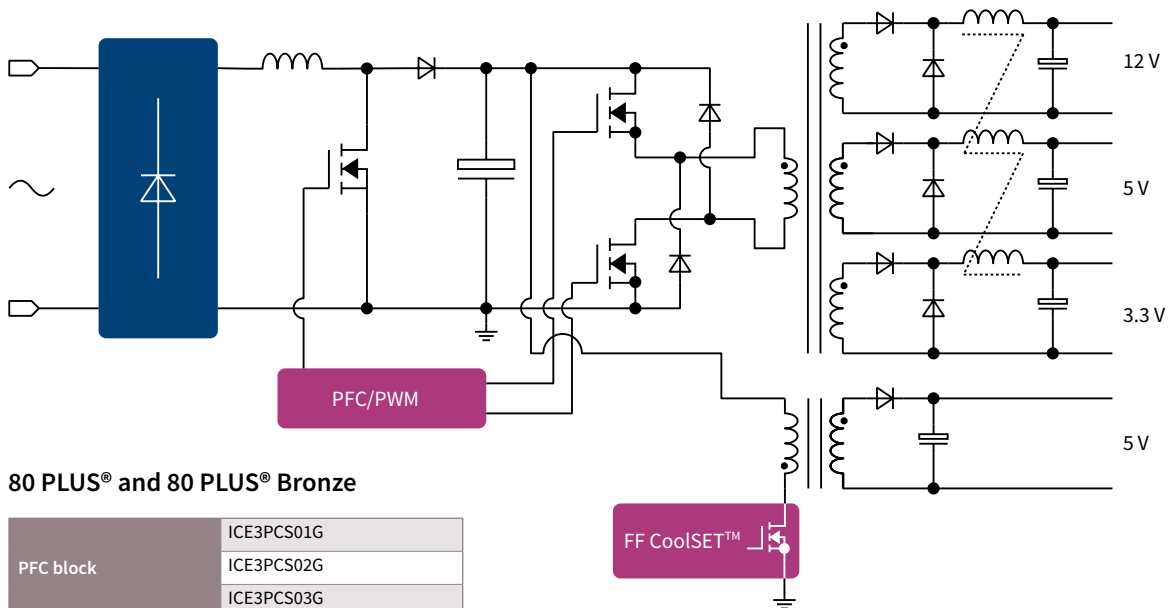
For more details on the product, click on the part number. 



800 V CoolSET™					
Gen3R ICE3A(B)Rxx80JZ	Gen3R ICE3ARxx80CJZ	Gen3R ICE3ARxx80JG	Gen3R ICE3ARxx80VJZ	Gen5 ICE5ARxx80AG(BZS)	Gen5 ICE5GRxx80AG
DIP-7		DSO-12	DIP-7	DIP-7, DSO-12	DSO-12
10 W~40 W	11 W~23 W	14 W~30 W	15 W~39 W	15 W~40 W	15 W~27 W
-25°C~130°C		-40°C~130°C		-40°C~129°C	
100 kHz/65 kHz	100 kHz	100 kHz		100 kHz	125 kHz
-				✓	
-				✓	
-	✓	-		✓	
17 V/10.5 V				16 V/10 V	
10 ms				12 ms	
4 level	3 level	4 level		3 level	
-				No start-up	
Auto restart					
Auto restart with hysteresis					
Auto restart	Latch	Auto restart	-		
Auto restart			-	Brown-in only	
-			Auto restart	Only ICE5ARxx80AG	Auto restart
-	✓	-			
ICE3AR10080JZ ICE3AR4780JZ ICE3AR2280JZ ICE3AR0680JZ ICE3BR2280JZ ICE3BR0680JZ	ICE3AR10080CJZ ICE3AR4780CJZ ICE3AR2280CJZ	ICE3AR4780JG ICE3AR2280JG ICE3AR1080JG	ICE3AR4780VJZ ICE3AR2280VJZ ICE3AR1580VJZ ICE3AR1080VJZ ICE3AR0680VJZ	ICE5AR0680AG ICE5AR4780BZS ICE5AR0680BZS	ICE5GR4780AG ICE5GR2280AG ICE5GR1680AG

Climate saver systems

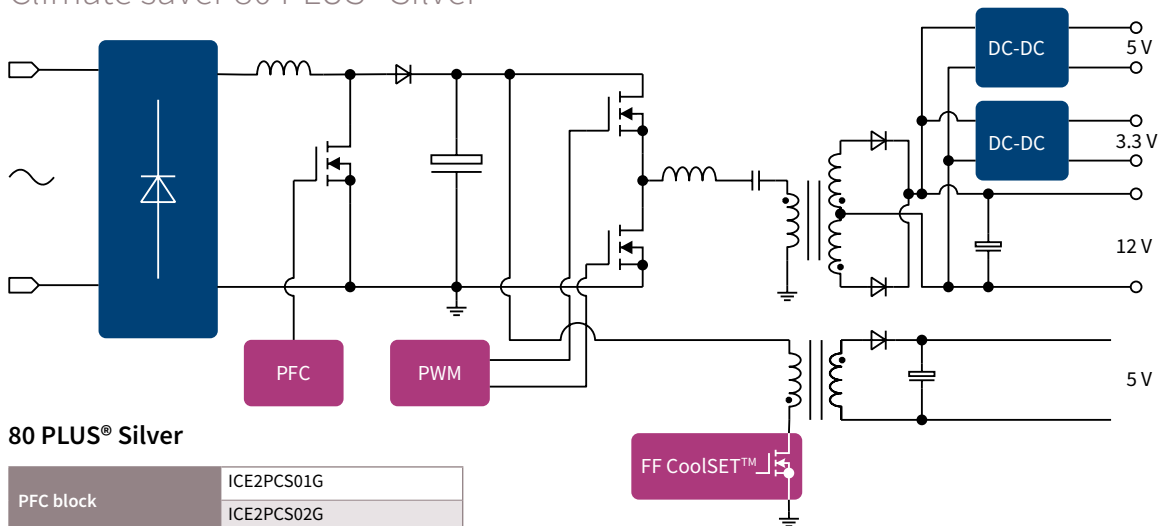
Climate saver 80 PLUS® and 80 PLUS® Bronze



80 PLUS® and 80 PLUS® Bronze

PFC block	ICE3PCS01G
	ICE3PCS02G
	ICE3PCS03G
PWM block	ICE2HS01G
	ICE5GR4780AG
Standby block FF CoolSET™	ICE5GR2280AG
	ICE5GR1680AG
	ICE3AR1080JG
	ICE5AR0680AG

Climate saver 80 PLUS® Silver




80 PLUS® Silver

PFC block	ICE2PCS01G
	ICE2PCS02G
PWM block	ICE1HS01G-1
	ICE5GR4780AG
Standby block FF CoolSET™	ICE5GR2280AG
	ICE5GR1680AG
	ICE3AR1080JG
	ICE5AR0680AG

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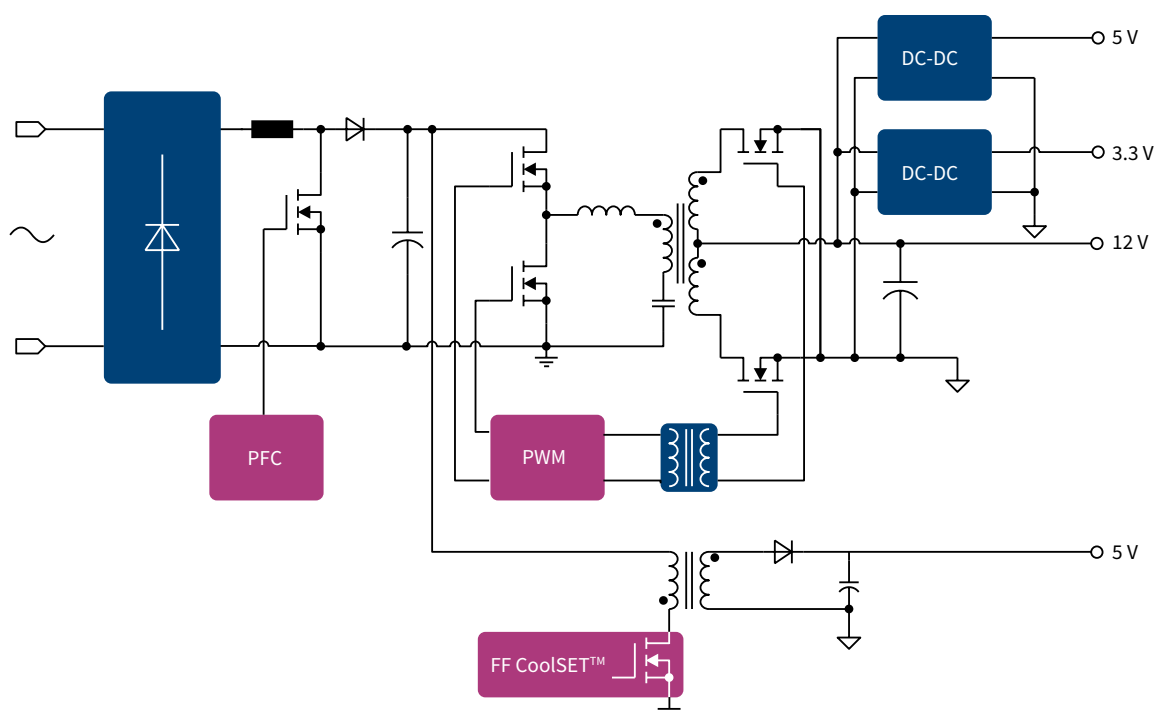
www.infineon.com/coolset

For more details on the product, click on the part number. 

Climate saver 80 PLUS® Gold

Climate saver 80 PLUS® Platinum

Certification for Infineon's PC power reference design



80 PLUS® Gold

PFC block	ICE3PCS01G
	ICE3PCS02G
	ICE3PCS03G
PWM block	ICE2HS01G
Standby block FF CoolSET™	ICE5GR4780AG
	ICE5GR2280AG
	ICE5GR1680AG
	ICE3AR1080JG
	ICE5AR0680AG

80 PLUS® Platinum

Certification for Infineon's PC power reference design

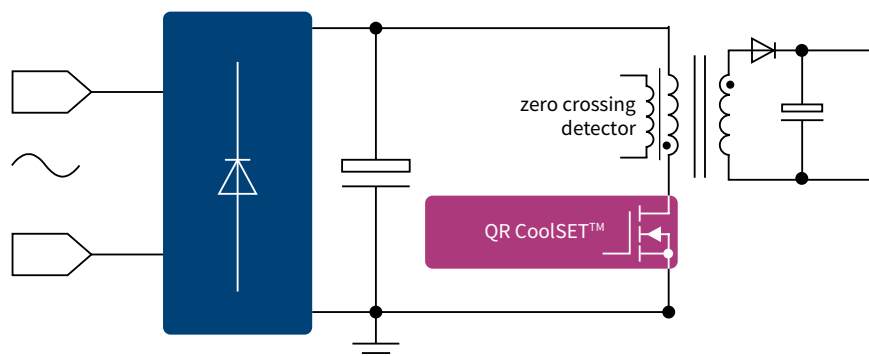
PFC block	ICE3PCS01G
	ICE3PCS02G
	ICE3PCS03G
PWM block	ICE2HS01G
Standby block QR CoolSET™	ICE5QR4780BG *
	ICE5QR2280BG *
	ICE5QR1680BG *
	ICE2QR1080G
	ICE5QR0680BG *

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*For more information on the product, contact our product support

For more details on the product, click on the part number.

5th generation quasi-resonant PWM IC and CoolSET™



- › Integrated CoolMOS™ in both 700 V and 800 V MOSFET with cascode configuration
- › Digital frequency reduction with reducing load
- › Novel quasi-resonant to minimize the spread of switching frequency between low and high line AC input
- › Selectable active burst mode entry/exit profile
- › Auto restart mode for line overvoltage protection
- › Auto restart mode for brown-out protection
- › Auto restart mode for V_{CC} under-/overvoltage protection
- › Auto restart mode for open-loop and output overload protection
- › Auto restart mode for overtemperature protection with hysteresis
- › Auto restart mode for output overvoltage
- › Limited charging current during V_{CC} pin short-to-ground protection
- › Peak power limitation with input voltage compensation
- › Minimum switching frequency limitation (no audible noise on power units on/off)
- › DSO package (controller) and DIP-7/DSO-12 (CoolSET™)



Halogen-Free



RoHS

5th generation quasi-resonant CoolSET™

Output power ¹⁾ 85 V _{AC} ~300 V _{AC} T _a =50°C		15 W	22 W	27 W	32 W	41 W~42 W
R _{DS(on)} max		5.18 Ω	2.35 Ω	1.75 Ω	1.25 Ω	0.80 Ω
700 V	DIP-7	ICE5QR4770AZ	ICE5QR2270AZ		ICE5QR1070AZ	
	DSO-12	ICE5QR4770AG				
800 V	DIP-7	ICE5QR4780AZ	ICE5QR2280AZ			ICE5QR0680AZ
	DSO-12	ICE5QR4780BG *	ICE5QR2280BG *	ICE5QR1680AG ICE5QR1680BG *		ICE5QR0680AG ICE5QR0680BG *

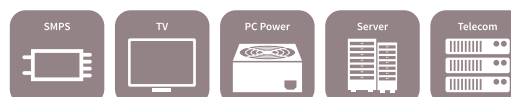
2nd generation quasi-resonant CoolSET™

Output power ¹⁾ 85 V _{AC} ~300 V _{AC} T _a =50°C		14 W~15 W	20 W~21 W	23 W~26 W	31 W	38 W~42 W
R _{DS(on)} max		5.44 Ω ~ 5.18 Ω	2.62 Ω	1.96 Ω	1.11 Ω	0.75 Ω~0.71 Ω
650 V	DIP-7	ICE2QR4765Z		ICE2QR1765Z		ICE2QR0665Z
	DIP-8	ICE2QR4765		ICE2QR1765		ICE2QR0665
	DSO-12	ICE2QR4765G		ICE2QR1765G		ICE2QR0665G
800 V	DIP-7		ICE2QR2280Z			ICE2QR0680Z
	DSO-12	ICE2QR4780G	ICE2QR2280G ICE2QR2280G-1		ICE2QR1080G	

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¹⁾ Calculated maximum output power in an open frame design at T_a=50°C, T_j=125°C and without copper area as heat sink
*For more information on the product, contact our product support

For more details on the product, click on the part number.



Quasi-resonant PWM IC

Feature	ICE5QSAG and ICE5QSBG	ICE2QS02G	ICE2QS03G
Package	DSO-8	DSO-8	DSO-8
Switching scheme	Novel QR with 10 zero crossing counters	QR with 7 zero crossing counters	QR with 7 zero crossing counters
Operating temperature	-40°C~129°C	-25°C~130°C	-25°C~130°C
Startup cell	Cascode	–	✓
V _{CC} on/off	16 V/10 V	12 V/11 V	18 V/10.5 V
Power saving during standby	✓ active burst mode in QR switching 2-level selectable burst mode entry/exit level	–	✓ active burst mode 52 kHz
Digital frequency reduction for high average efficiency	✓	✓	✓
OLP blanking time	Fixed	Adjustable	Fixed
Auto restart timer	Through V _{CC} charging/discharging	Setting with external components	Through V _{CC} charging/discharging
Maximum input power limitation	V _{in} pin voltage dependent	Adjustable through ZC resistor	Adjustable through ZC resistor
V _{CC} undervoltage protection	✓ with auto restart	✓ with latch	✓ with auto restart
Adjustable output overvoltage protection	✓ with auto restart	✓ with latch	✓ with latch
Adjustable line input overvoltage protection	✓	–	–
Brown-out feature	✓	✓	–
V _{CC} pin short-to-ground protection	✓	–	–
Target application	Home appliances, set-top-box, AUX SMPS	AUX power supply to V _{CC} eg. LCD TV multi/main, audio main, PDP TV multi/address	Self-power supply to V _{CC} eg. smart meter, industrial applications

Quasi-resonant CoolSET™

	2 nd generation ICE2QRxxxxZ/G	2 nd generation ICE2QRxx80G-1	5 th generation ICE5QRxxxxA/B/Z/G
Switching scheme	QR with 7 zero crossing counters		Novel QR with 10 zero crossing counters
Integrated MOSFET	650 V and 800 V	800 V	700 V and 800 V
High voltage start-up cell	✓		Cascode
Power saving during standby	Active burst mode f _{sw} @ 52 kHz		2 level selectable active burst mode quasi-resonant
V _{CC} on/off threshold (typ.)	18 V/10.5 V	18 V/9.85 V	16 V/10 V
Adjustable output overvoltage protection	✓ with latch		✓ with auto restart
V _{CC} over/undervoltage protection	✓ with auto restart		✓ with auto restart
Overload/open loop protection	✓ with auto restart		✓ with auto restart
Overtemperature protection	✓ with auto restart		✓ (Auto restart with hysteresis)
Adjustable line input overvoltage protection	–		✓ with auto restart
Brown-out	–		✓ with auto restart
V _{CC} pin short to ground	–		✓ (No start-up)
Package	DIP-7 DIP-8 DSO-12	DIP-7 DSO-12	DIP-7 DSO-12

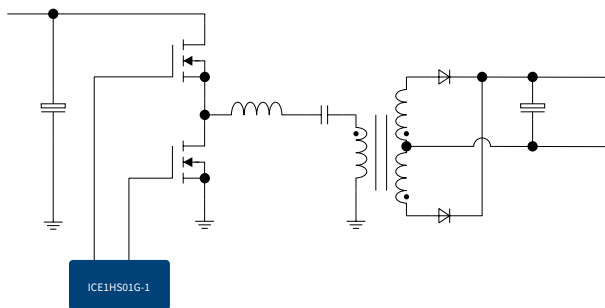
Resonant LLC half-bridge controller IC

Best-in-class converters and controllers to support LLC HB resonant mode topology

Resonant mode power supplies are a variation over SMPS circuits where the switching losses are significantly reduced by adapting zero-voltage or zero-current switching techniques, also known as soft-switching technique. In non-resonant mode SMPS circuits, the switches are subjected to hard switching. LLC HB resonant operates under the ZVS mode, whereby switching loss is reduced to operate converter at a higher switching frequency. In addition, the converter can be further optimized at a high input voltage. This topology allows to eliminate the secondary filter inductor, adopt better rectifier diodes and reduce secondary conduction loss. The converter utilizes leakage and magnetizing inductance of a transformer. With magnetic integration concept, all the magnetic components can be built in one magnetic core.

LLC resonant (no SR)

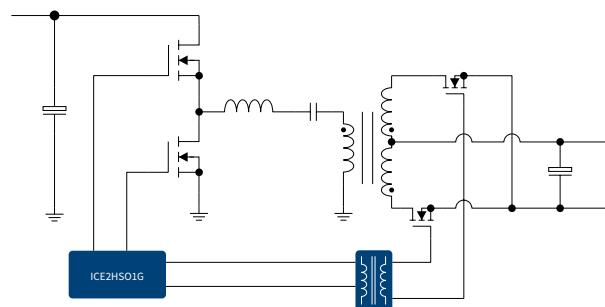
Application diagram – LLC resonant (no SR)



- › Novel and simple design (12 components + HB driver)
- › Minimum operating frequency is adjustable externally
- › Burst mode operation for output voltage regulation during no load and/or bus overvoltage
- › Multiple protections in case of fault
- › Input voltage sense for brown-out protection
- › Open loop/overload fault detection by FB pin with auto restart and adjustable blanking/restart time
- › Frequency shift for overcurrent protection
- › Lead-free, RoHS compliant package
- › DSO-8 package

Resonant LLC half-bridge controller IC with integrated synchronized rectifier control

LLC resonant + SR



- › Novel LLC/SR operation mode and controlled by primary side controller
- › Multiple protections for SR operation
- › Tight tolerance control
- › Accurate setting of switching frequency and dead time
- › Simple system design
- › Optimized system efficiency
- › Multiple converter protections: OTP, OLP, OCP, latch-off enable
- › External disable for either SR switching or HB switching
- › Lead-free, RoHS compliant package
- › DSO-20 package



LLC half-bridge controller IC	ICE1HS01G-1	ICE2HS01G
Package	DSO-8	DSO-20
Switching frequency range	up to 600 kHz	up to 1 MHz
LLC soft start	✓	✓
LLC burst mode	✓	✓
Adjustable minimum frequency	✓	✓
Overload/open loop protection	✓	✓
Mains undervoltage protection with hysteresis	✓	✓
Overcurrent protection	2-level	3-level
Drive signal for synchronous rectification	-	✓
Adjustable dead time	-	✓
External latch-off and OTP	-	✓
Target application	LCD-TV, audio, etc.	Server, PC, LCD-TV, etc.

Product		Frequency – f_{SW}	Dead time	Current drives	Package
ICE1HS01G-1	LLC resonant (no SR)	30 kHz~600 kHz	380 ns	1.5 A	DSO-8
ICE2HS01G	Resonant LLC half-bridge controller IC with integrated synchronized rectifier control (LLC resonant + SR)	30 kHz~1 MHz	100~1000 ns	0.3 A	DSO-20




DC-DC converters

Highest density end-to-end power management solutions

As the innovation leader for power semiconductor and energy efficiency technologies, we are continually developing and working on the best solutions for your applications. Our DC-DC converter portfolio includes integrated power stages, switching regulators, integrated POL converters and integrated POL voltage regulators, as well as digital multiphase controllers (see **page 205**)

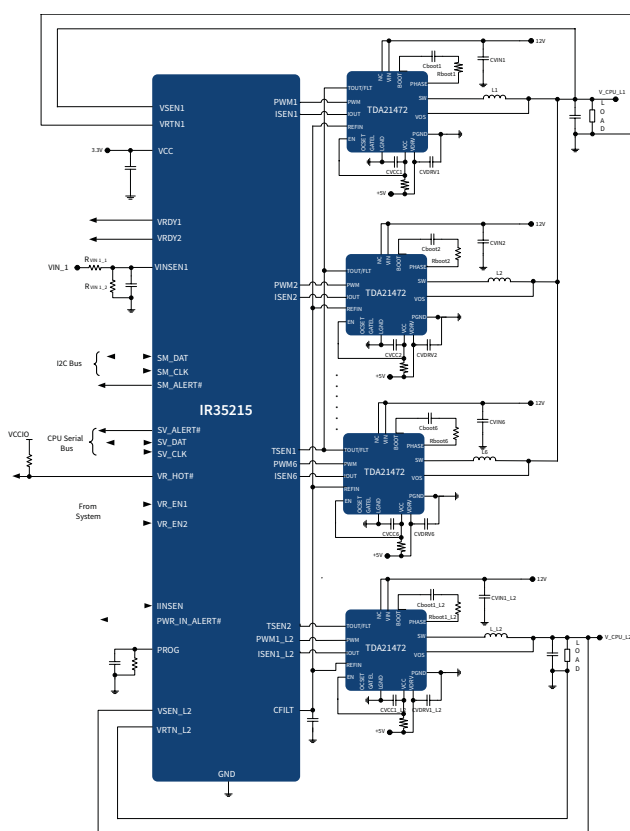
www.infineon.com/power-stages

For more details on the product, click on the part number. 

OptiMOS™ Powerstage

60 A and 70 A integrated power stages with integrated current and temperature telemetry

Infineon's integrated OptiMOS™ Powerstage family contains a synchronous buck gate driver IC which is co-packed with control and synchronous MOSFETs and a Schottky diode to further improve efficiency. The package is optimized for PCB layout, heat transfer, driver/MOSFET control timing and minimal switch node ringing when layout guidelines are followed. The paired gate driver and MOSFET combination enables higher efficiency at lower output voltages required by cutting edge CPU, GPU, ASIC and DDR memory designs. The TDA21472 integrated power stages internal MOSFET current sense algorithm, with integrated temperature compensation, achieves superior current sense accuracy versus best-in-class controller based inductor DCR sense methods. Up to 1.0 MHz switching frequency enables high performance transient response, allowing miniaturization of output inductors, as well as input and output capacitors, while maintaining industry-leading efficiency. The TDA21472 is optimized for CPU core power delivery in server applications. The ability to meet the stringent requirements of the server market also makes the TDA21472 ideally suited for powering GPU, ASIC, DDR memory, and other high current designs.



Features

- › Integrated driver, Schottky diode, control MOSFET and synchronous MOSFET
- › 5 mV/A on-chip MOSFET current sensing with temperature compensated reporting
- › Input voltage (V_{in}) range of 4.5 to 15 V
- › V_{CC} and V_{DR} supply of 4.5 to 7 V
- › Output voltage range from 0.25 up to 5.5 V
- › Output current capability of 70 A
- › Operation up to 1.0 MHz
- › V_{CC} undervoltage lockout (UVLO)
- › 8 mV/°C temperature analog output and thermal flag pull-up to 3.3 V
- › Overtemperature protection (OTP)
- › Cycle-by-cycle self-preservation overcurrent protection (OCP)
- › MOSFET phase fault detection and flag
- › Preliminary overvoltage protection (pre-OVP)
- › Compatible with 3.3 V tri-state PWM input
- › Body-Braking™ load transient support through PWM tri-state
- › Diode emulation mode (DEM) for improved light load efficiency
- › Efficient dual-sided cooling
- › Small 5.0 x 6.0 x 0.9 mm PQFN package

Applications

- › High frequency, high current, low profile DC-DC converters
- › Voltage regulators for CPUs, GPUs, ASICs, and DDR memory arrays

Part type	Package	I_{out} [A]	V_{in} [V]	V_{out} [V]	Switching frequency [MHz]
TDA21472	5 x 6 x 0.9 mm PQFN	70	4.5 to 15	0.25 to 5.5	1.0
TDA21462 *	5 x 6 x 0.9 mm PQFN	60	4.5 to 15	0.25 to 5.5	1.0

www.infineon.com/integrated-powerstages

*For more information on the product, contact our product support

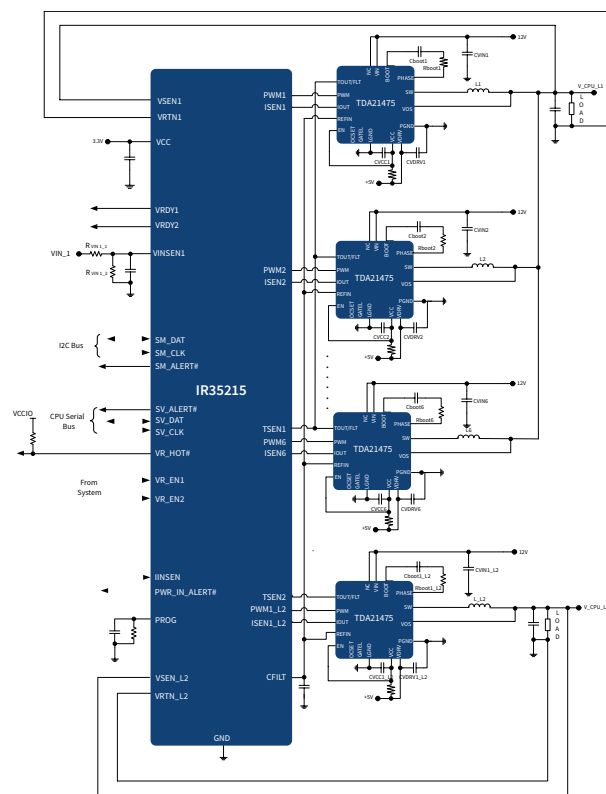


For more details on the product, click on the part number.

OptiMOS™ Powerstage

70 A power stage with exposed top for improved thermal performance

Infineon's TDA21475 exposed-top power stage contains a low quiescent-current synchronous buck gate driver IC co-packaged with high-side and low-side MOSFETs. The package is optimized for PCB layout, heat transfer, driver/MOSFET control timing, and minimal switch node ringing when layout guidelines are followed. The gate driver and MOSFET combination enables higher efficiency at the lower output voltages required by cutting edge CPU, GPU and DDR memory designs. The TDA21475 internal MOSFET current sense algorithm with temperature compensation achieves superior current sense accuracy versus best-in-class controller-based inductor DCR sense methods. Protection includes cycle-by-cycle over current protection with programmable threshold, V_{CC}/V_{DRV} UVLO protection, bootstrap capacitor undervoltage protection, phase fault detection, IC temperature reporting and thermal shutdown. The TDA21475 also features auto replenishment of the bootstrap capacitor to prevent overdischarge. The TDA21475 features a deep-sleep power saving mode, which greatly reduces the power consumption when the multiphase system enters PS3/PS4 mode. Operation at switching frequency as high as 1.5 MHz enables high performance transient response, allowing reduction of output inductance and output capacitance while maintaining industry-leading efficiency. The TDA21475 is optimized for CPU core power delivery in server applications. The ability to meet the stringent requirements of the server market also makes the TDA21475 ideally suited for powering GPU and DDR memory designs.



Features

- › Co-packaged driver, high-side and low-side MOSFETs
- › 5 mV/A on-chip MOSFET current sensing with temperature compensated reporting Input voltage (V_{IN}) range of 4.25 to 16 V
- › V_{CC} and V_{DRV} supply of 4.25 to 5.5 V
- › Output voltage range from 0.25 up to 5.5 V output current capability of 70 A operation up to 1.5 MHz
- › V_{CC}/V_{DRV} undervoltage lockout (UVLO) Bootstrap capacitor undervoltage protection 8 mV/°C temperature analog output
- › Thermal shutdown and fault flag
- › Cycle-by-cycle over current protection with programmable threshold and fault flag MOSFET phase fault detection and flag
- › Auto replenishment of bootstrap capacitor Deep-sleep mode for power saving Compatible with 3.3 V tri-state PWM input Body-Braking™ load transient support Small 5 x 6 x 0.65 mm PQFN package
- › Lead-free RoHS compliant package
- › Integrated driver, Schottky diode, control MOSFET and synchronous MOSFET

Applications

- › High frequency, high current, low profile DC-DC converters
- › Voltage regulators for CPUs, GPUs, ASICs, and DDR memory arrays

Part type	Package	I_{out} [A]	V_{in} [V]	V_{out} [V]	Switching frequency [MHz]
TDA21475 *	5 x 6 x 0.9 mm PQFN	70	4.25 to 16	0.25 to 5.5	1.5

www.infineon.com/integrated-powerstages

*For more information on the product, contact our product support

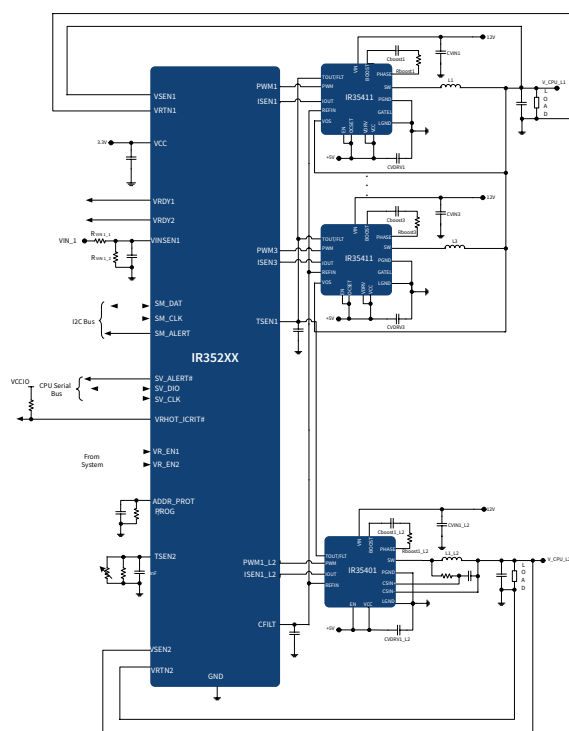


For more details on the product, click on the part number.

OptiMOS™ Powerstage

20 A power stage with integrated current sense

Infineon's IR35401 integrated power stage contains a synchronous buck gate driver IC, which is co-packaged with control and synchronous MOSFETs and Schottky diode to further improve efficiency. The package is optimized for PCB layout, heat transfer, driver/MOSFET control timing, and minimal switch node ringing when layout guidelines are followed. The paired gatedriver and MOSFET combination enables higher efficiency at lower output voltages required by cutting edge CPU, GPU and DDR memory designs. The IR35401 power stage features an integrated current sense amplifier to achieve superior current-sense accuracy against best-in-class controller-based inductor DCR sense methods while delivering the clean and accurate current report information. The protection features inside IR35401 include VCC UVLO and thermal flag. IR35401 also features an auto replenishment of bootstrap capacitor to prevent the bootstrap capacitor from overdischarging. The IR35401 supports deep-sleep mode and consumes <100 μ A VCC bias current when the EN pin is pulled low. Up to 1.5 MHz switching frequency enables high performance transient response, allowing miniaturization of output inductors, as well as input and output capacitors while maintaining industry-leading efficiency. When combined with Infineon's digital controllers, the IR35401 incorporates the Body-Braking™ feature through PWM tri-state which enables reduction of output capacitors. The IR35401 is optimized for low current CPU rails in server applications. The ability to meet the stringent requirements of the server market also makes the IR35401 ideally suited for powering GPU and DDR memory rails.



Applications

- › General purpose POL DC-DC converters
- › Voltage regulators for CPUs, GPUs, ASICs, and DDR memory arrays

Features

- › Integrated driver, control MOSFET and synchronous MOSFET
- › Integrated bootstrap synchronous PFET
- › Inductor DCR current sensing with temperature compensation
- › Input voltage (V_{IN}) range from 4.25 to 16 V
- › V_{CC} supply of 4.25 to 5.5 V
- › Output voltage range from 0.5 to 3 V or up to 5.5 V if the internal current sense amplifier is not used
- › Local lossless inductor current sensing with improved noise immunity and accuracy
- › Single reference based current reporting output
- › Output current capability of 20 A
- › Operation up to 1.5 MHz
- › V_{CC} undervoltage lockout
- › Over-temperature and VCC UVLO fault communication to controller via TOUT pin
- › Compatible with 3.3 V tri-state PWM Input
- › Body-Braking™ load transient support through PWM tri-state
- › Auto-replenishment on BOOST pin
- › Low operating quiescent current and <100 μ A when disabled
- › Small 4 x 5 x 0.9 mm PQFN package
- › Lead-free RoHS compliant package

Part type	Package	I_{out} [A]	V_{in} [V]	V_{out} [V]	Switching frequency [MHz]
IR35401 *	4 x 5 x 0.9 mm PQFN	20	4.25 to 16	0.5 to 5.5	1.5

www.infineon.com/integrated-powerstages

*For more information on the product, contact our product support

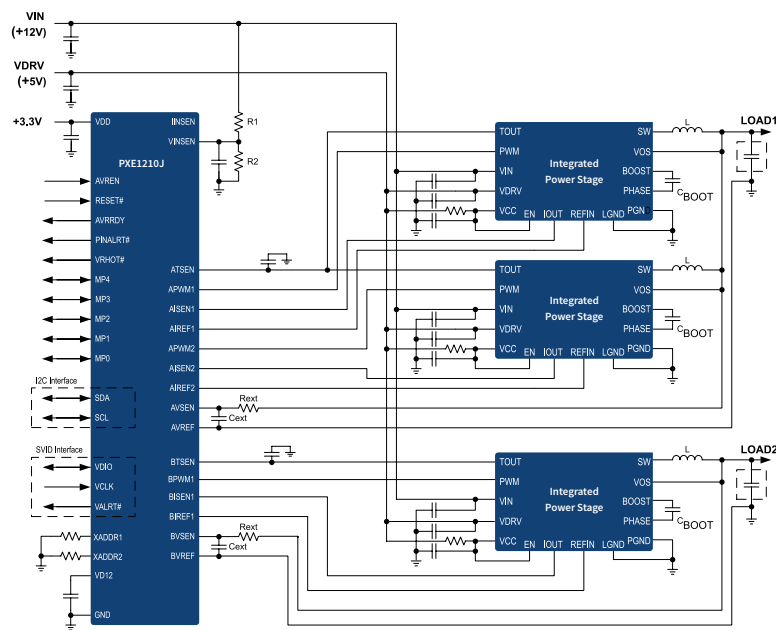


For more details on the product, click on the part number.

OptiMOS™ Powerstage

25 A, 35 A, 40 A integrated power stages with highest efficiency on smallest form factor

Infineon's TDA21240 powerstage is a multichip module that incorporates Infineon's premier MOSFET technology for a single high-side and a single low-side MOSFET coupled with a robust, high performance, high switching frequency gate driver in a single PG-IQFN-30-2 package. The optimized gate timing allows for significant light load efficiency improvements over discrete solutions. When combined with Infineon's family of digital multi-phase controllers, the TDA21240 forms a complete core voltage regulator solution for advanced micro and graphics processors as well as point-of-load applications.



Features

- › For synchronous buck converter step down voltage applications
- › Maximum average current of 40 A
- › Input voltage range +4.5 V to +16 V
- › Power MOSFETs rated 25 V
- › Fast switching technology for improved performance at high switching frequencies (> 500 kHz)
- › Remote driver disable function
- › Includes bootstrap diode
- › Undervoltage lockout
- › Shoot through protection
- › +5 V high side and low side MOSFETs driving voltage
- › Compatible to standard +3.3 V PWM controller integrated circuits
- › Tri-state PWM input functionality
- › Small package: PG-IQFN-30-2 (4 x 4 x 1 mm)
- › RoHS compliant
- › Thermal warning

Applications

- › Desktop and server VR buck converter
- › Single-phase and multiphase POL
- › CPU/GPU regulation in notebook, desktop graphics cards, DDR memory, graphic memory
- › High power density voltage regulator modules (VRM)
- › Qualified for DC-DC industrial applications based on JEDEC (JESD47, JESD22, J-STD20)
- › General purpose POL DC-DC converters

Part type	Package	I_{out} [A]	V_{in} [V]	Switching frequency [MHz]
TDA21242	4 x 4 x 1 mm PQFN	25	4.5 to 16	1.0
TDA21241	4 x 4 x 1 mm PQFN	35	4.5 to 16	1.0
TDA21240	4 x 4 x 1 mm PQFN	40	4.5 to 16	1.0

www.infineon.com/integrated-powerstages



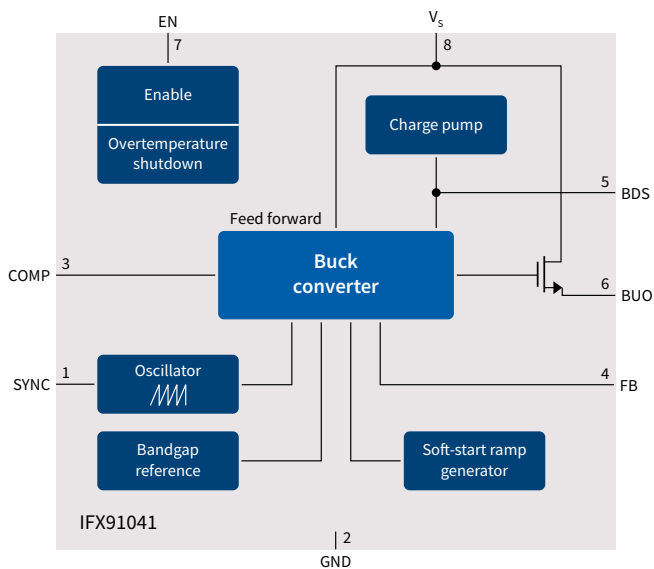
For more details on the product, click on the part number.

DC-DC converters

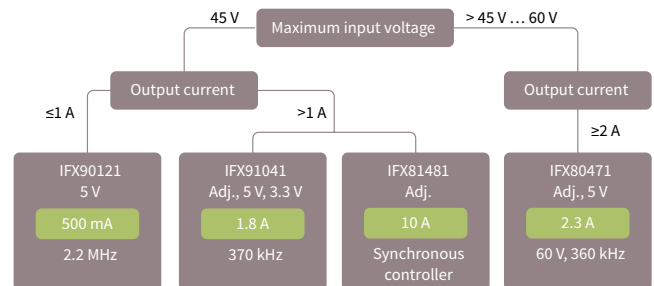
Robust range of controllers and regulators for the widest application spectrum

Our high-efficiency switching regulators and controllers help to reduce energy consumption. In addition to extending the operating time of battery powered systems, they also significantly improve the thermal budget of the application. Overall, this translates into minimal operating costs. For your design flexibility, they are available as adjustable voltage variants as well as with dedicated fixed output voltage values.

IFX91041 block diagram



Industrial DC-DC buck regulators (selection tree)



Features and benefits

Key features
Input voltage up to 60 V
Output currents going from 500 mA up to 10 A
Switching frequencies ranging from 100 kHz to 2.2 MHz
Shutdown quiescent current down to below 2 μ A
Current limitation and overtemperature protection
Enable feature

Key benefits
High-efficiency regulation
Only a few external components needed for stable regulation
Perfectly suited for regulation in pre-/post-regulation power supply architectures

DC-DC converters

Part number	V _Q (multiple)	Output current type	Output current [A]	Product features	Package
IFX81481ELV	Adjustable	Buck controller	10.0	10 A synchronous DC-DC adjustable step down controller; f = 100 kHz-700 kHz, N	PG-SSOP-14
IFX90121EL V50	5.0 V	Buck converter	0.5	V _{in} up to 45 V, 2.2 MHz step-down regulator with low quiescent current	PG-SSOP-14
IFX80471SK V	Adjustable	Buck controller	2.3	V _{in} up to 60 V; V _Q adjustable from 1.25 V up to 15 V; external MOSFET	PG-DSO-14
IFX80471SK V50	5.0 V	Buck controller	2.3	V _{in} up to 60 V; external MOSFET	PG-DSO-14
IFX91041EJV	Adjustable	Buck converter	1.8	V _Q adjustable from 0.6 V up to 16 V; tolerance 2% up to 1000 mA	PG-DSO-8
IFX91041EJ V33	3.3 V	Buck converter	1.8	V _Q fixed to 3.3 V; tolerance 2% up to 1000 mA	PG-DSO-8
IFX91041EJ V50	5.0 V	Buck converter	1.8	V _Q fixed to 5.0 V; tolerance 2% up to 1000 mA	PG-DSO-8

www.infineon.com/industrial-dcdc-converters



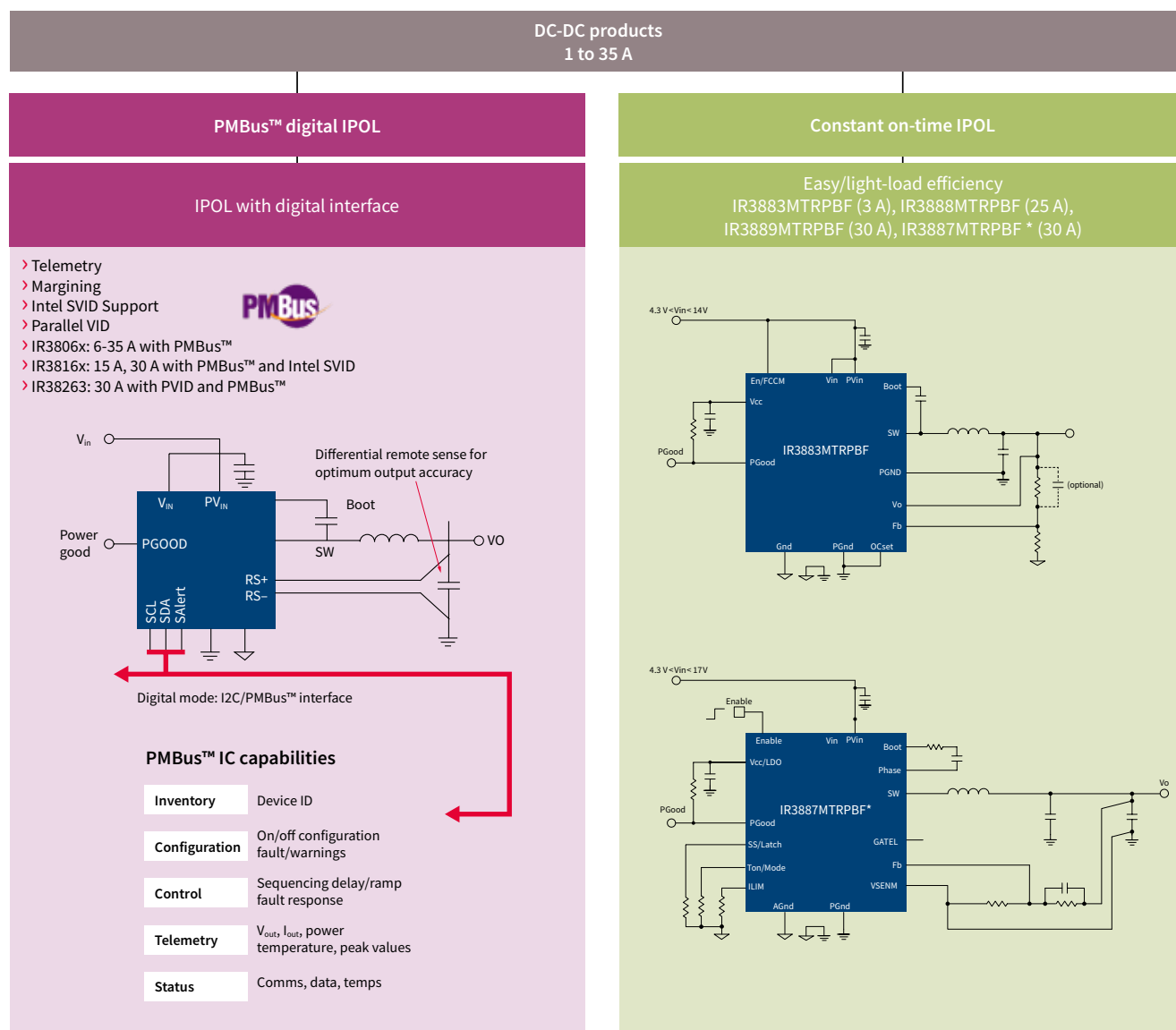
For more details on the product, click on the part number.

Integrated POL voltage regulators

Highest density high efficiency integrated POL (IPOL) for smart enterprise systems

Infineon's integrated POL switching converters deliver benchmark efficiency and dramatically reduce system size. Solutions up to 35 A are available in compact PQFN packages. Target applications include server, storage, routers and switches, telecom base stations, digital home media, mobile computing and embedded data processing. Solutions with and without PMBus digital communication are available in single output and multi-rail format.

Point-of-load products – how to choose



Ready-to-go reference designs and the on-line PowerDesk simulator simplify the task of designing regulated voltage rails. Different control topologies are available to meet an application's specific requirements.

www.infineon.com/ipol

www.infineon.com/analog-ipol

*Coming soon



For more details on the product, click on the part number.

Integrated point-of-load converters IR3806x series (6 A / 15 A / 25 A / 35 A)

Digital interface IPOL voltage regulators

The digital interface IPOL devices are easy-to-use, fully integrated and highly efficient DC-DC regulator offering I2C/PMBus™, parallel VID, Intel SVID. The on-board PWM controller and MOSFETs make the family a space-efficient solution, providing accurate power delivery for low output voltage and high current applications.

The IR3806x family of PMBus™ enabled IR MOSFET™ IPOL based IR MOSFET IPOL voltage regulators offers:

- › Compactness of integrated controller, driver and MOSFETs
- › High performance analog voltage mode engine
- › Flexibility of a rich PMBus™ interface

The IR381(2/3)6x family features OptiMOS™ 5 for the highest efficiency and adds Intel SVID support (IR381(/3)6x) for Intel based systems or parallel VID (IR3826x) for voltage scaling or 8 programmable output voltages booting options to avoid programming at start up. Pin compatible options with and without PMBus™ are available to allow the flexibility of using PMBus™ only during evaluation or easily upgrade a system to PMBus™ without re-layout.

Features and benefits

Key features	Key benefits
PMBus™ revision 1.2 compliant	Only single chip solution with extensive PMBus™, parallel VID, Intel SVID support allows 50 percent space saving versus external power competition
≥ 66 PMBus™ commands	Intel SVID support for Intel-based systems
Wide input voltage range and single 5 V – 16 V input operations	Parallel VID or PMBus™ for voltage setting and margining
Differential remote sense	Telemetry status via digital bus
Ultralow jitter voltage mode engine	Remote monitoring and update
Operation temp: -40° to 125° C	Parameter changes by register
	Flexible sequencing
	High accuracy low ripple
	Integrated sequencing, margin, current and voltage monitoring

Digital interface IPOL

Part number	Max. current [A]	Package size [mm]	Max. V _{in}	Max. f _{sw}	Distinctive features
IR38064MTRPBF	35	5 x 7	21 V	1500 KHz	PMBus™
IR38063M	25	5 x 7	21 V	1500 KHz	
IR38062M	15	5 x 7	21 V	1500 KHz	
IR38060M	6	5 x 6	16 V	1500 KHz	
IR38163M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID + PMBus™
IR38165M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID
IR38363M	15	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID + PMBus™
IR38365M	15	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID
IR38263M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, PVID + PMBus™
IR38265M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, PVID
IR38164M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID + PMBus™, enhanced Imon
IRPS5401M	4+4+2+2+0.5	7 x 7	14 V	1500 KHz	5 output PMIC, PMBus™



www.infineon.com/ipol

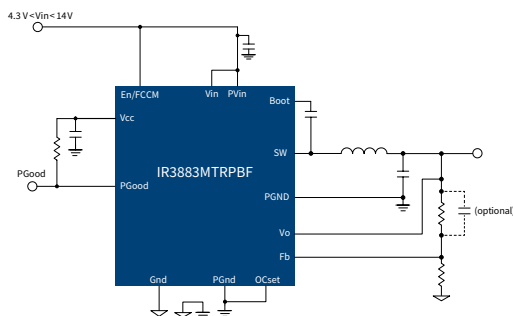
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OptiMOS™ IPOL voltage regulators with COT

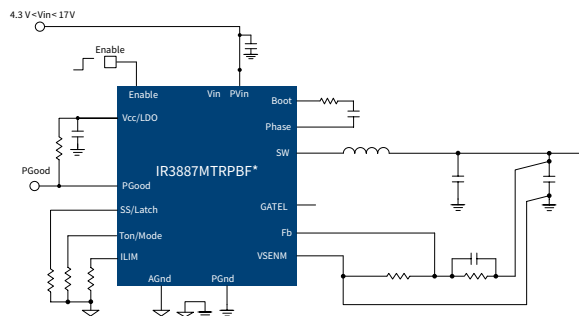
Easy to use with no external compensation and smallest BOM

OptiMOS™ IR3883MTRPBF, IR3887MTRPBF *, IR3889MTRPBF, and IR3888MTRPBF integrated point-of-load DC-DC devices are easy-to-use, fully integrated and highly efficient DC-DC regulators that operate from a wide input voltage range and provide up to 30 A continuous current. The devices increase efficiency and power density and simplify design for POL applications in server, enterprise storage, netcom router and switches, datacom and telecom base stations.

Block diagram IR3883M



Block diagram IR3887M (30 A)



Main benefits

Main benefits
Enhanced Voltage Mode PWM devices offer high accuracy, ultralow ripple and noise, and higher control bandwidth for less capacitors.
Scalable solution from 3A up to 35A.
For designs requiring high density, low cost and easy design, the family includes a 3A device with Enhanced Stability Constant-on-Time (CoT) engine that does not require external compensation enabling easy designs and fast time to market.
Quiescent current down to 5 μ A
Overload, overtemperature, short circuit and reverse-polarity protection
Low current consumption
Extended temperature range -40°C ... +125°C

Analog interface IPOL

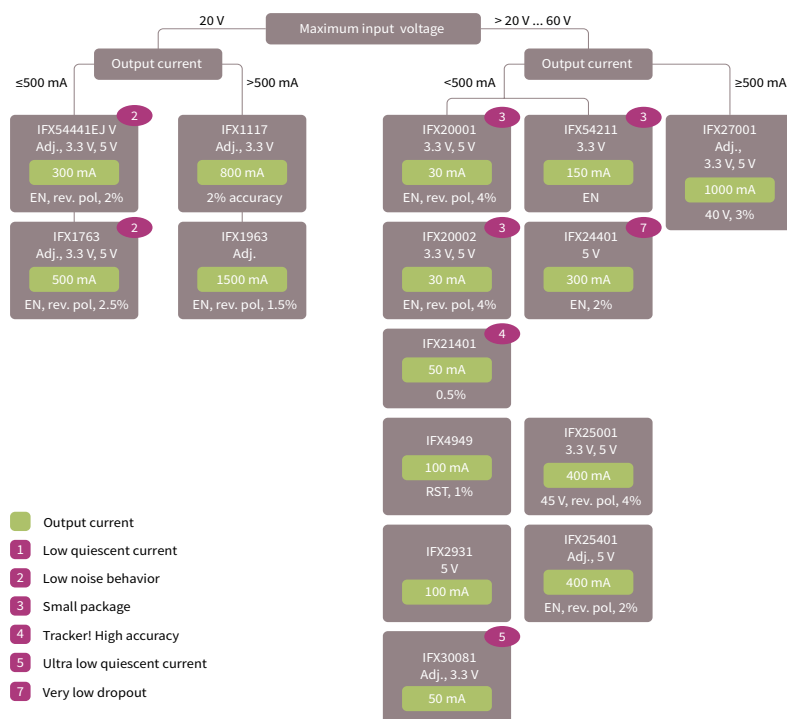
Part number	Max. current [A]	Package size [mm]	Max. V_{in}	Max. f_{sw}	Distinctive features
IR3883MTRPBF	3	3 x 3	14 V	800 KHz	Constant-on-time (COT)
IR3888MTRPBF	25	5 x 6	17 V	2000 KHz	
IR3887MTRPBF *	30	4 x 5	17 V	2000 KHz	
IR3889MTRPBF	30	5 x 6	17 V	2000 KHz	

Voltage regulators

Energy-efficient voltage regulators and trackers

Our linear voltage regulators and trackers help to reduce energy consumption, extending operating time and minimizing operating costs across all kinds of systems. The wide supply voltage range, low quiescent current, rich protective feature set and choice of packages make our devices the perfect fit across a broad application spectrum, apart from automation systems as well for health care, traffic, power tools, lighting and many other multi-market systems. Our trackers are ideal as additional supplies for off-board loads to increase system reliability

Industrial linear voltage regulator (selection tree)



Features and benefits

Key features
Input voltage up to 60 V
Output current up to 1.5 A
Output voltage adjustable or fixed to specific values
Quiescent current down to 5 μ A
Overload, overtemperature, short circuit and reverse-polarity protection
Low current consumption
Extended temperature range -40°C ... +125°C

Key benefits
Pin-to-pin compatibility with industry-standard parts
Very low dropout voltageTrackers for optimized heat distribution and external protection
Trackers for maximum system cost reduction
Small robust packages

Infineon's microcontroller families and industrial voltage regulators

Microcontroller family	Input voltage [V]	Input current (max.) [mA]	Voltage regulator
XMC1000 family	1.8 to 5.5	<100	IFX54211/IFX2931/IFX4949/IFX25001/IFX544xx */ IFX30081
XMC4000 family	3.3	<500/300	IFX1763/IFX544xx */IFX1117/IFX30081
XC8xx	3.3 to 5.0	200	IFX20001/IFX30081/IFX21401/IFX4949/IFX544xx *
XE166/XC2000	1.5 and 3.3 or 5.0	100	IFX25401/IFX24401/IFX2931/IFX4949/IFX1763/IFX54441
TriCore™	1.5 to 3.3	>400	IFX27001/IFX91041/IFX80471/IFX25001/IFX1117

www.infineon.com/industrial-voltage-regulators

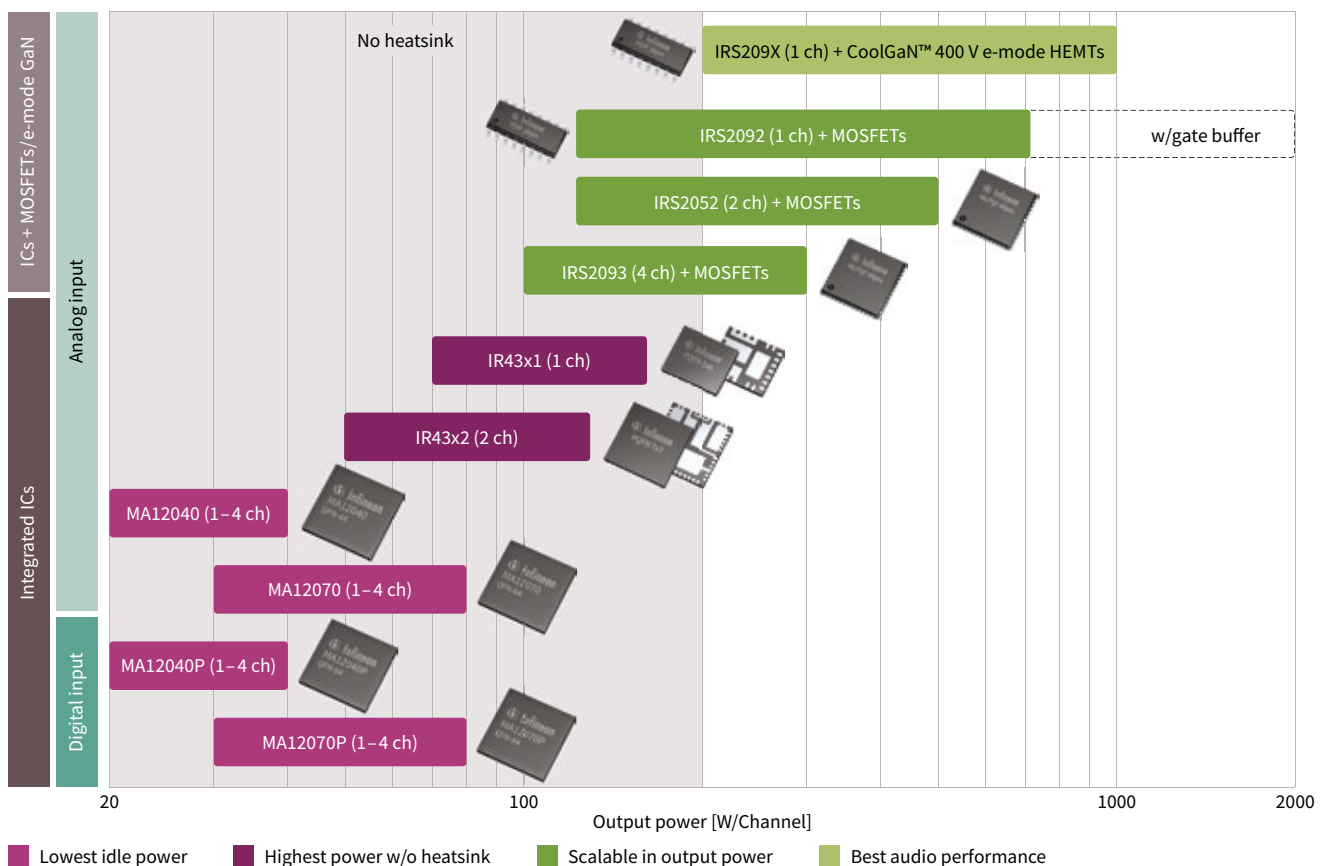
* For more information on the product, contact our product support

For more details on the product, click on the part number.

Integrated class D audio amplifier ICs

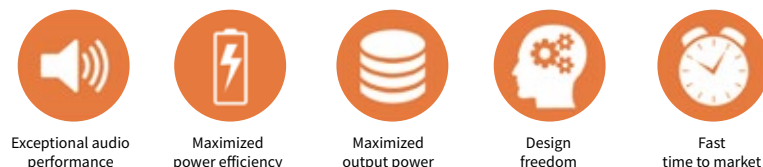
Cooler, smaller and lighter class D audio amplifiers for great sounding products

Infineon's MERUS™ audio solutions enable audio designers to improve the performance of their products, while increasing efficiency and reducing solution size. Advances in semiconductor processes in combination with new innovative architectures are behind a portfolio of class D technologies that allow professional, commercial/home and portable audio applications to benefit from unparalleled performance, power density and reliability. The broad portfolio covers power ranges from 20W to 2kW per channel from the smallest single-chip devices and multi-chip module (MCMs) to highly scalable discrete audio amplifier solutions consisting of powerful MOSFET/CoolGa™ enhancement mode (e-mode) HEMT and driver ICs combinations.



By combining our core principles, competencies, and leadership in groundbreaking power semiconductors with revolutionary audio amplifier technologies, such as MERUS™, we provide solutions that are smaller, lighter, more robust and flexible, running with less heat dissipation. In addition to outstanding quality and reliability, Infineon's amplifier solutions are designed to maximize power efficiency and dynamic range while providing best-in-class performance in product form factors that make them an optimal fit for any high-end application. These include portable/battery powered applications, voice controlled active speakers, television sets, stereo HiFi, soundbars, monitors, power-over-ethernet (PoE) and multichannel systems.

Design with Infineon's solutions to benefit from:



www.infineon.com/merus

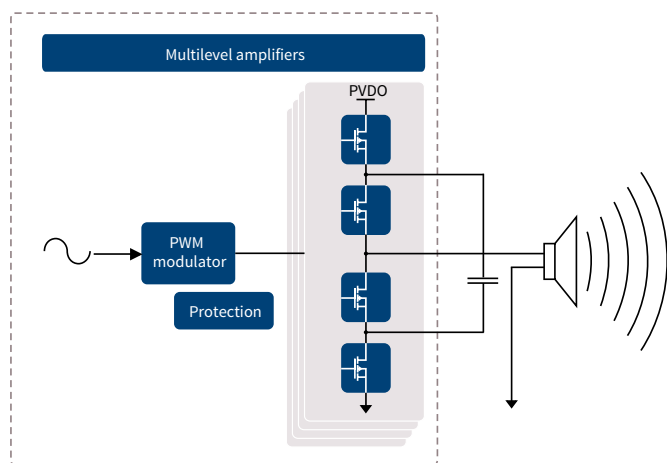
For more details on the product, click on the part number.

Integrated MERUS™ multilevel amplifier ICs for class D audio solutions

High power efficiency and density in small packages

With its revolutionary MERUS™ integrated multilevel class D audio amplifier ICs, Infineon is leading in efficiency and power density. Compared to traditional class D amplifier ICs, which produce only two voltage output levels, multilevel amplifier ICs use additional on-chip MOSFETs and capacitors to produce outputs with a higher signal granularity i.e. higher switching frequencies and/or multiple output signal levels - typically up to five voltage levels

Filterless topology with “flying capacitor” of an integrated class D IC

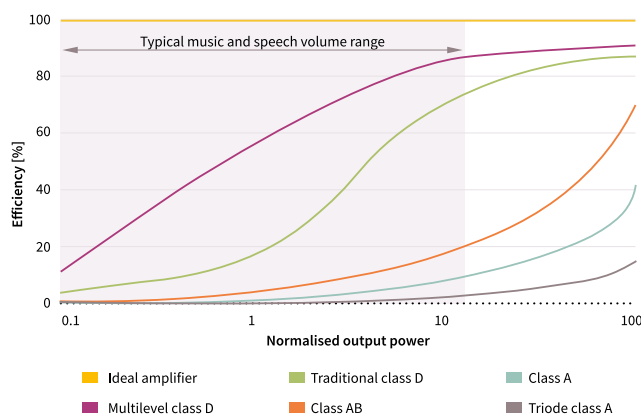


Features and benefits

Key features
Multilevel switching technology
Scalable signal “granularity”
Proprietary circuits architecture

Key benefits
Highest efficiency and power density
Potential LC filter removal
Low THD+N
Cooler operation
Low power loss
Virtually no switching loss measurable in idle mode

Efficiency where it matters for audio reproduction



For MERUS™ integrated multilevel audio amplifier ICs, amplifier efficiency at average output power is key. As the graph on the left shows, MERUS™ multilevel amplifier is much more effective than the traditional class D amplifier, which translates into less power consumption in AC input and in battery powered audio applications.

www.infineon.com/merus



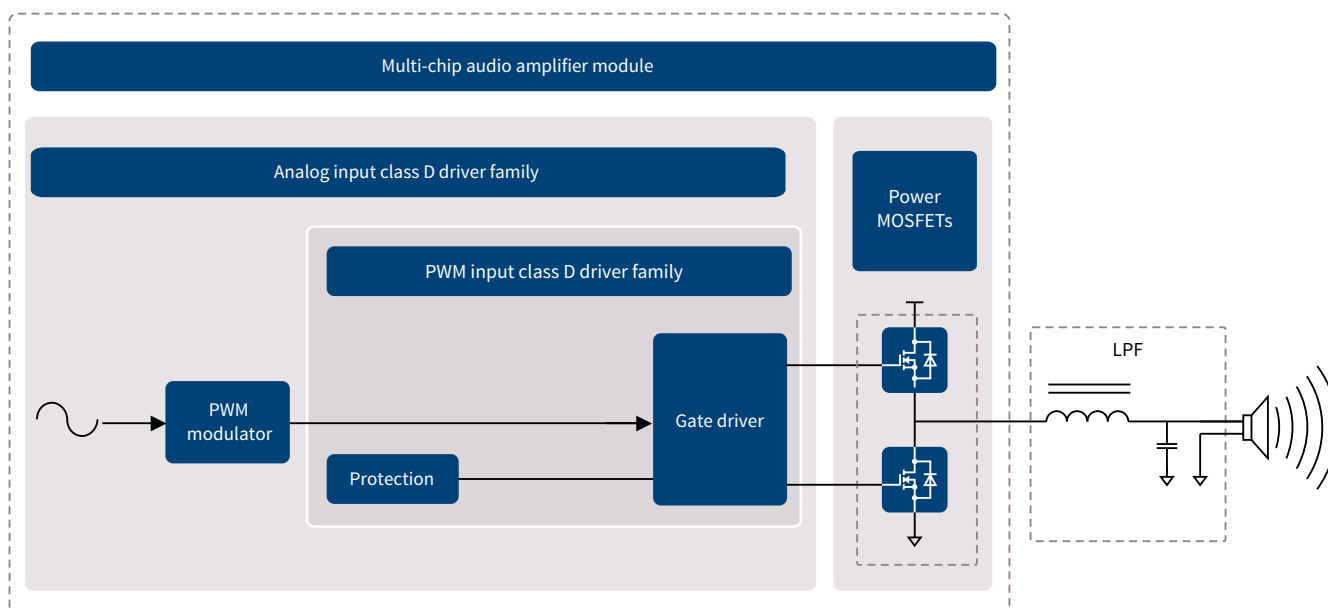
For more details on the product, click on the part number.

MERUS™ integrated audio amplifier multi-chip modules (MCM)

Integrated components for scalable output power and superb audio performance

Multi-chip modules integrate PWM controller and power MOSFETs in a single package to offer a highly efficient, compact solution that reduces component count, shrinks PCB size up to 70 percent, and simplifies class D amplifier design.

Multi-chip audio amplifier module



Features and benefits

Key features
Single package with integrated PWM controller and audio-performance-optimized power MOSFET
Overcurrent protection
Thermal shutdown
Floating differential input
Clip detection
Best-in-class power efficiency and audio performance
Lower component count, leading to design simplification
Compatible with single supply or split rail configuration
Click noise reduction

Key benefits
Extended battery playback time
Unrivalled audio performance
Smaller solution size (BOM reduction, system level cost savings)
Eliminated need for heatsink
High noise immunity
Reliable operation
Thermal efficiency

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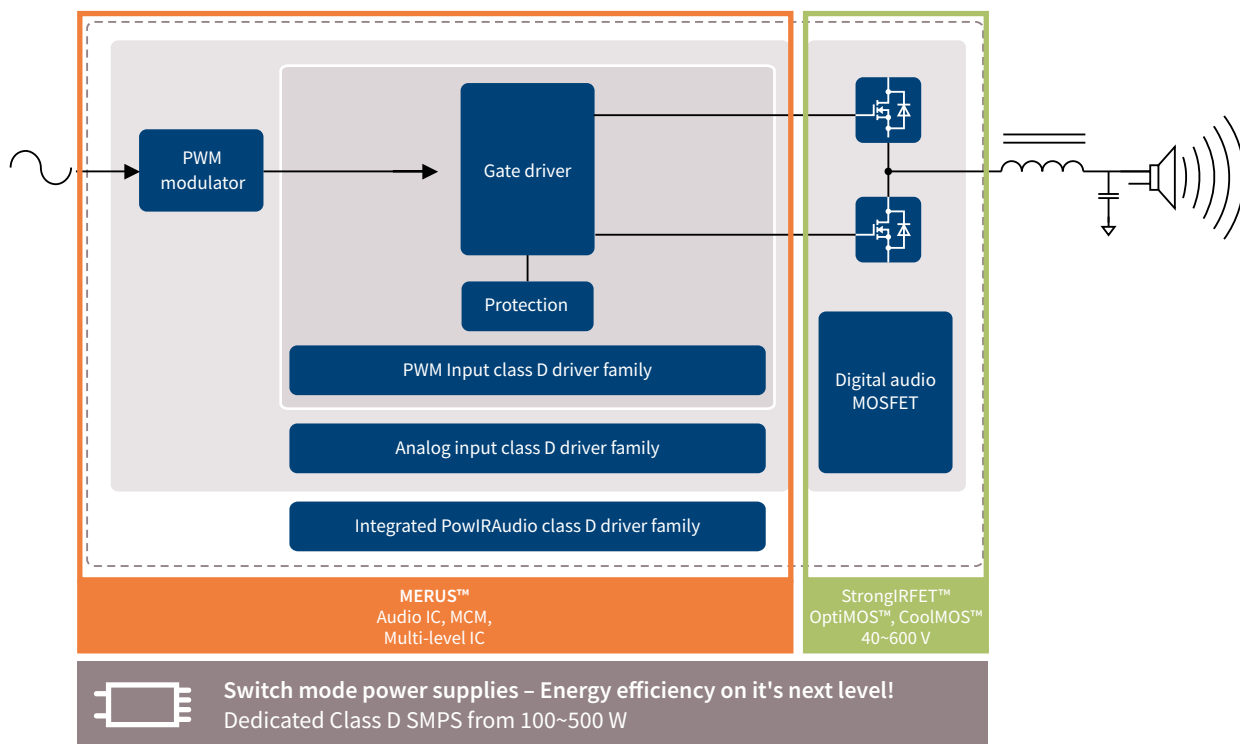
For more details on the product, click on the part number.

Discrete MERUS™ audio amplifier driver ICs with MOSFET and gallium nitride CoolGaN™ 400V e-mode HEMTs

Scalable output power with a unified design platform

Infineon's discrete audio solutions are scalable to various output power levels, simply by replacing the external MOSFETs or CoolGaN™ e-mode HEMTs of the driver-transistor combinations. Key parameters for the transistors used in discrete class D audio applications include on-state resistance ($R_{DS(on)}$), gate charge (Q_G), and reverse recovery charge (Q_{rr}). Our products are specifically suitable for class D audio applications and optimized for these parameters to achieve maximized efficiency, THD and EMI amplifier performance. The CoolGaN™ 400V e-mode HEMTs portfolio is specifically built for class D audio requirements, with high performing SMD packages to fully utilize the benefits of gallium nitride.

Audio solution overview



Features and benefits

Key benefits
Unified design platform
Scalable output power up to over 2 kW per channel
Simple yet effective - exchange of external MOSFET triggers alteration in output power level
Best-in-class power efficiency

Key advantages
Superior audio performance
Increased reliability
Unique audio experience

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For more details on the product, click on the part number.

Integrated class D audio amplifier IC portfolio

MERUS™ integrated multilevel audio amplifier IC product portfolio

		MA12040	MA12040P	MA12070	MA12070P
Specifications	Number of audio channels	2xBTL	2xBTL	2xBTL	2xBTL
	Max. peak power @ 4 ohm 10% THD	2x40 W	2x40 W	2x80 W	2x80 W
	Supply voltage	4-18 V	4-18 V	4-26 V	4-26 V
	3-level and 5-level modulation	✓	✓	✓	✓
	Max. PWM frequency				726 kHz
	Audio input	Analog	Digital	Analog	Digital
	HiRes audio compliant		✓		✓
	Volume and dynamic range control		✓		✓
	Idle power dissipation	<100 mW	<110 mW	<160 mW	<160 mW
	Max. output and all channels switching				
	Audio performance (PMP2)	>107dB DNR 55 µV output noise 0.003% THD+N	>98dB DNR 135 µV output noise 0.006% THD+N	>110dB SNR 45 µV output integrated 0.004% THD+N	101dB SNR 140 µV output noise 0.007% THD+N
Features	Comprehensive protection scheme *	✓	✓	✓	✓
	Configurable for SE or PBTL operation	✓	✓	✓	✓
	I2C communication	✓	✓	✓	✓
	Filterless implementation	✓	✓	✓	✓
	Package type	64-pin QFN package with exposed thermal pad	64-pin QFN package with exposed thermal pad	64-pin QFN package with exposed thermal pad	64-pin QFN package with exposed thermal pad
	Evaluation boards	EVAL_AUDIO_MA12040	EVAL_AUDIO_MA12040P	EVAL_AUDIO_MA12070	EVAL_AUDIO_MA12070P

*All ICs carry a full protection scheme comprising undervoltage lockout, overtemperature warning/error, short circuit/overload protection, power stage pin-to-pin short circuit, error reporting through serial interface (I2C), and DC protection

MERUS™ integrated audio amplifier multi-chip modules (MCMs)

		IR4301M	IR4321M	IR4311M	IR4302M	IR4322M	IR4312M
Specifications	Number of audio channels	1	1	1	2	2	2
	Max. power per channel	160 W	90 W	45 W	130 W	100 W	40 W
	Supply voltage	~ ± 31 V or 62 V	~ ± 25 V or 50 V	~ ± 15 V or 30 V	~ ± 31 V or 62 V	~ ± 25 V or 50 V	~ ± 16 V or 32 V
	Max. PWM frequency	500 kHz	500 kHz	500 kHz	500 kHz	500 kHz	500 kHz
Features	Differential audio input	✓	✓	✓	✓	✓	✓
	Over-current protection	✓	✓	✓	✓	✓	✓
	Integrated power MOSFET	✓	✓	✓	✓	✓	✓
	Voltage	80 V	60 V	40 V	80 V	60 V	40 V
	PWM controller	✓	✓	✓	✓	✓	✓
	Thermal shutdown	✓	✓	✓	✓	✓	✓
	Click noise reduction	✓	✓	✓	✓	✓	✓
	Clip detection				✓	✓	✓
	Package type	5 x 6 mm QFN	5 x 6 mm QFN	5 x 6 mm QFN	7 x 7 mm QFN	7 x 7 mm QFN	7 x 7 mm QFN
	Evaluation boards	IRAUDAMP12 IRAUDAMP19	IRAUDAMP21	IRAUDAMP15	IRAUDAMP16 IRAUDAMP17	IRAUDAMP22	IRAUDAMP18

MERUS™ discrete audio amplifier driver IC product portfolio

Specifications	Number of audio channels	IRS20965S	IRS20957SPBF	IRS2092SPBF	IRS2052M	IRS2093MPBF	IRS2452AM
	Max power per channel	500 W	500 W	500 W	300 W	300 W	500 W
	Supply voltage	± 100 V	± 100 V	± 100 V	± 100 V	± 100 V	± 200 V
	Gate sink/source current	2.0/2.0 A	1.2/1.0 A	1.2/1.0 A	0.6/0.5 A	0.6/0.5 A	0.6/0.5 A
Features	Overcurrent protection	✓	✓	✓	✓	✓	✓
	Overcurrent flag	✓					
	PWM input	✓	✓				
	Floating input	✓	✓	✓	✓	✓	✓
	Deadtime		✓	✓	✓	✓	✓
	Protection control logic	✓	✓	✓	✓	✓	✓
	PWM controller			✓	✓	✓	✓
	Clip detection				✓		
	Click noise reduction			✓	✓	✓	✓
	Temperature sensor input				✓		✓
	Thermal shutdown				✓		
	Clock input				✓		✓
	Package type	16-pin SOIC narrow	16-pin SOIC narrow	16-pin SOIC narrow	MLPQ48	MLPQ48	MLPQ32
	Evaluation boards		IRAUDAMP4A IRAUDAMP6	IRAUDAMP5 IRAUDAMP7S IRAUDAMP7D IRAUDAMP9	IRAUDAMP10	IRAUDAMP8	EVAL_IRAUDAMP23

Recommended MOSFET (through-hole) product portfolio

Output power	Recommended discrete audio driver IC	Speaker resistance		
		2 Ω	4 Ω	8 Ω
150 W	IRS2093MPBF	IRFB4019	IRFB4019	IRFI4020H-117P
200 W	IRS2052M	IRFB5615	IRFB4019	IRFI4020H-117P
300 W	IRS2092SPBF	IRFB4228PBF	IRFB4227	IRFB4229
500 W	IRS20957SPBF	IRFB4228PBF	IRFB4227	IRFB4229
750 W		IRFB4227	IRFB4229	
1000 W		IRFP4668	IRFB4229 x 2	

IRS2093MPBF works up to 150 W and IRS2052M works up to 300 W.

IRS2092SPBF and IRS20957SPBF work with all power levels listed above.

Recommended MOSFET (DirectFET™) product portfolio

Output power	Recommended discrete audio driver IC	Speaker resistance		
		2 Ω	4 Ω	8 Ω
150 W	IRS2093MPBF	IRF6645	IRF6665	IRF6775M
200 W	IRS2052M	IRF6646	IRF6775M	IRF6775M
300 W	IRS2092SPBF	IRF6644	IRF6775M	IRF6785
500 W	IRS20957SPBF	IRF6643	IRF6641	

Recommended CoolGaN™ 400 V e-mode HEMT product portfolio

Package	CoolGaN™ 400 V e-mode HEMT	Recommended discrete audio amplifier driver IC
	HSOF-8-3 (TO-Leadless)	
	P _{max.} Up to 200 W	
	R _{DS(on)} max. 70 mΩ	
OPN	IGT40R070D1 E8220	IRS20957SPBF

Recommended audio evaluation boards

Enabling fast time to market and device performance evaluation

MERUS™ integrated multilevel audio amplifier IC evaluation boards



EVAL_AUDIO_MA12070

Number of audio channels:

2 channels BTL or
1 channel PBTL or
2 channels SE + 1 BTL or
4 channels SE

Output power per channel

(2xBTL, Peak, 10% THD,
4 Ω): 2x 80 W

Featured module IC: MA12070

Input: Analog

OPN: EVALAUDIOMA12070TOBO1



EVAL_AUDIO_MA12070P

Number of audio channels:

2 channels BTL or
1 channel PBTL or
2 channels SE + 1 BTL or
4 channels SE

Output power per channel

(2xBTL, Peak, 10% THD,
4 Ω): 2x 80 W

Featured module IC: MA12070P

Input: Digital

OPN: EVALAUDIOMA12070PTOBO1

MERUS™ integrated audio amplifier multi-chip module (MCM) evaluation boards



IRAUDAMP12

Number of audio
channels: 2

Output power per
channel [RMS]: 130 W

Featured class D IC:
IR4301M

Input: Analog

OPN: IRAUDAMP12



IRAUDAMP17

Number of audio
channels: 2

Output power per
channel [RMS]: 100 W

Featured class D IC:
IR4302M

Input: Analog

OPN: IRAUDAMP17



IRAUDAMP19

Number of audio
channels: 2

Output power per
channel [RMS]: 100 W

Featured class D IC:
IR4301M

Input: Analog

OPN: IRAUDAMP19



IRAUDAMP21

Number of audio
channels: 2

Output power per
channel [RMS]: 135 W

Featured class D IC:
IR4321M

Input: Analog

OPN: IRAUDAMP21



IRAUDAMP22

Number of audio
channels: 2

Output power per
channel [RMS]: 100 W

Featured class D IC:
IR4322M

Input: Analog

OPN: IRAUDAMP22

Discrete MERUS™ audio amplifier driver IC and MOSFET evaluation boards

**IRAUDAMP4A**

Number of audio
channels: 2

Output power per
channel [RMS]: 120 W

Featured driver IC: IRS20957S

Featured MOSFET:

IRF6645TRPbF

OPN: IRAUDAMP4A

**IRAUDAMP5**

Number of audio
channels: 2

Output power per
channel [RMS]: 120 W

Featured driver IC: IRS2092S

Featured MOSFET:

IRF6645TRPbF

OPN: IRAUDAMP5

**IRAUDAMP6**

Number of audio
channels: 2

Output power per
channel [RMS]: 250 W

Featured driver IC: IRS20957S

Featured MOSFET:

IRF6785MTRPbF

OPN: IRAUDAMP6

**IRAUDAMP7S**

Number of audio
channels: 2

Output power per
channel [RMS]: 500 W

Featured driver IC: IR-

S2452AM

Featured MOSFET:

IRFI4019H-117P

OPN: IRAUDAMP7S

**IRAUDAMP9**

Number of audio
channels: 1

Output power per
channel [RMS]: 1700 W

Featured driver IC: IRS2092S

Featured MOSFET:

IRFB4227PbF

OPN: IRAUDAMP9

**IRAUDAMP10**

Number of audio
channels: 2

Output power per
channel [RMS]: 370 W

Featured driver IC: IRS2052M

Featured MOSFET:

IRF6775MTRPbF

OPN: IRAUDAMP10

**IRAUDAMP23**

Number of audio
channels: 2

Output power per
channel [RMS]: 500 W

Featured driver IC: IR-

S2452AM

Featured MOSFET:

IPP60R180C7

OPN: IRAUDAMP23



Discrete audio amplifier driver IC and CoolGaN™ 400 V evaluation board



EVAL_AUDAMP24

Number of audio channels: 2
Output power per channel [RMS]: 300 W @ 1%
Featured driver IC: IRS20957S
Featured HEMT
 IGOT40R070D1
 IGT40R070D1
OPN: EVAL_AUDAMP24

Power supply units for audio evaluation boards



IRAUDPS1

Input voltage: 12 V_{DC}
Output voltage: ± 35 V
Output power per channel [RMS]: 100 W
Featured driver IC: IR2085
Description: 250-1000 W scalable audio power supply
OPN: IRAUDPS1



IRAUDPS3

Input voltage: 110/220 V_{AC}
Output voltage: ± 30 V
Output power per channel [RMS]: 200 W
Featured driver IC: IRS27952S
Description: Power supply for class D audio amplifier
OPN: IRAUDPS3



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

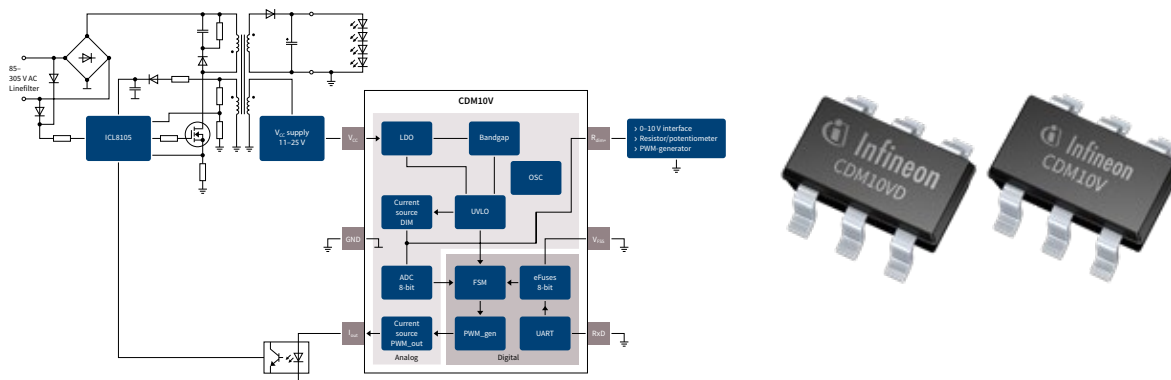
Applications

CDM10V and CDM10VD – most flexible dimming interface ICs for 0-10 V input

Infineon's fully integrated dimming solutions

Infineon's CDM10V and CDM10VD are the industry's first single-chip lighting interface ICs. They are capable of transforming an analog 0–10 V input into a PWM or dimming input signal, required by a lighting controller IC. CDM10V and CDM10VD devices are dedicated for commercial and industrial LED lighting applications. The compact and highly integrated devices allow designers to replace up to 25 discrete components, used in conventional 0–10 V dimming schemes, with a single device. Supplied in an ultra-miniature 6-pin SOT package, the CDM10Vx and CDM10VDx perfectly match small PCBs with high component densities.

Typical application schematic using CDM10V



Features and benefits

Key benefits	Key advantages
Active dimming (0–10 V) and passive dimming (resistor)	Single-device solution leading to low BOM and PCB savings
Embedded digital signal processing which maintains minimum variations from device to device	Dimming ICs in small SOT-23 package for high power density designs
PWM input	Granular portfolio for highest flexibility and easy design-in
One-time configurable device: CDM10V and preconfigured devices with various feature sets	Wide input V_{CC} range 11–25 V, extended range down to 6 V for CDM10V
	Attractive pricing and faster time to market

Product type	I_{out} [mA]	Min. duty cycle [%]	PWM output frequency [kHz]	Dimmer/resistor bias current [μ A]	Dimm-to-Off	Ordering code
CDM10V	5	1/2/5/10	0.2/0.5/1/2	50/100/200/500	Disabled/enabled	CDM10VXTSA1
CDM10V-2	5	n.a.	1	200	Enabled	CDM10V2XTSA1
CDM10V-3	5	1	1	200	Disabled	CDM10V3XTSA1
CDM10V-4	5	n.a.	2	100	Enabled	CDM10V4XTSA1
CDM10VD	5	5	1	120	Enabled	CDM10VDXTSA1
CDM10VD-2	5	10	1	120	Enabled	CDM10V2DXTSA1
CDM10VD-3	1	5	1	120	Enabled	CDM10V3DXTSA1
CDM10VD-4	1	10	1	120	Enabled	CDM10V4DXTSA1

Board name	Description	Ordering code
COOLDIM_PRG_BOARD	Configuration board for CDM10V only	COOLDIMPRGBOARDTOB01
REF-XDPL8220-U30W	30 W two stage PFC FB digital power, efficient and flicker free reference design with CDM10V	REFXDPL8220U30WTOB01
REF-XDPL8105-CDM10V	40 W single stage PFC FB digital power reference design with CDM10V	REFXDPL8105CDM10VTOB01

www.infineon.com/cdm10v



For more details on the product, click on the part number.

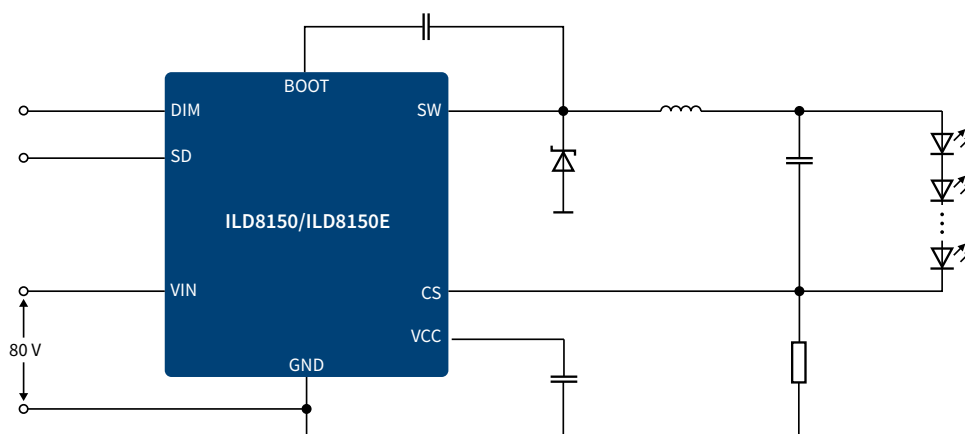
DC-DC switch mode LED driver ICs

ILD8150/ILD8150E – 80 V DC-DC buck LED driver IC for high-power LEDs and high-performance hybrid dimming

The ILD8150 is 80 V DC-DC converter IC, designed to be used in LED applications to drive high power LEDs. For applications operating close to safe extra low voltage (SELV) limits, it provides a high safety voltage margin. The buck LED driver IC is tailored for LEDs in general lighting applications with average currents up to 1.5 A using a high-side integrated switch. Several performance and protection features provide the right fit for professional LED lighting.

The hysteretic current control provides an extremely fast regulation and stable LED current combined with good EMI performance. The efficiency of the LED driver IC is remarkably high, reaching more than 95 percent efficiency over a wide range. A PWM input signal between 250 Hz and 20 kHz controls dimming of the LEDs current in analog mode from 100 to 12.5 percent and 12.5 to 0.5 percent in PWM mode with flicker-free modulation frequency of 3.4 kHz.

Digital PWM dimming detection with high resolution makes ILD8150/E the perfect LED driver IC for the use together with microcontrollers. Precise output current accuracy from device to device under all loads and input voltages conditions makes it perfect for tunable white and flat panel designs where current must be identical string to string.



Features and benefits

Key benefits
Wide input voltage ranging from 8–80 V _{DC}
Up to 1.5 A average output current, adjustable via shunt resistor
Efficiency > 95 percent
Up to 2 MHz switching frequency
Soft-start
PWM dimming input, with 250 Hz to 20 kHz PWM dimming frequency

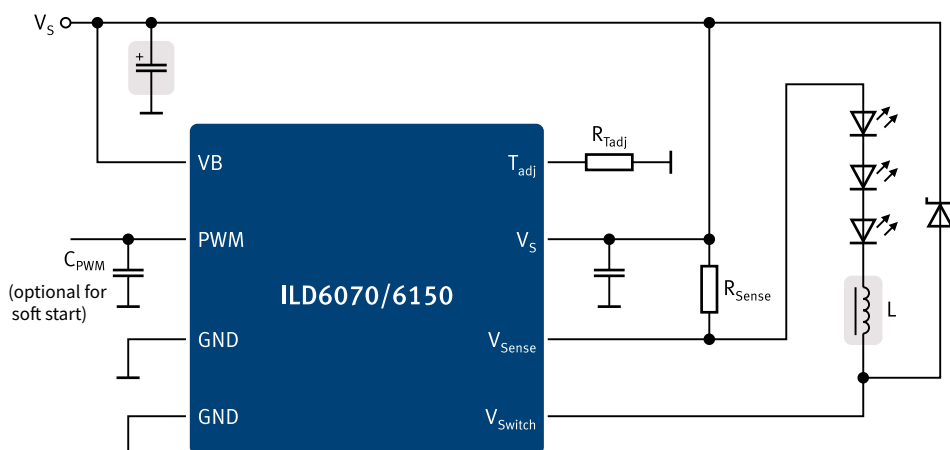
Key advantages
Hybrid dimming for flicker free light down to 0.5 percent
> Analog dimming 100 percent – 12.5 percent
> PWM dimming 12.5 percent – 0.5 percent with 3.4 kHz flicker-free modulation, dim-to-off
Typical 3 percent output current accuracy
Overtemperature protection
Pull-down transistor to avoid LED glowing in dim-to-off
DSO-8 package to enable wave soldering
DSO-8 with exposed pad for higher thermal performance (ILD8150E)

Type	Description	Package	Ordering code
ILD8150	80 V DC-DC buck LED driver IC	DSO-8	ILD8150XUMA1
ILD8150E	80 V DC-DC buck LED driver IC	DSO-8 exposed pad	ILD8150EXUMA1
REF_ILD8150_DC_1.5A	Reference design board 1.5 A	Board with ILD8150E	REFILD8150DC15ATOBO1
REF_ILD8150_DC_1.5A_SMD	Reference design board 1 A with SMD inductor	Board with ILD8150E	REFILD8150DC15ASMDTOBO1

DC-DC switch mode LED driver ICs

ILD series DC-DC switch mode LED driver ICs

The ILD series are switch mode LED driver ICs for high power LEDs. They combine protection features that contribute to the lifetime of LEDs with the flexibility in output current range up to multiple amperes. The new ILD series include LED driver ICs with integrated power stage, as well as with external MOSFET achieving up to 98 percent driver efficiency across a wide range of general lighting applications.



Features and benefits

Key benefits
Wide input voltage range up to 80 V
Scalability in output current from 90 mA up to multiple amperes
Alternative dimming concepts: digital or analog
Hybrid dimming: analog and digital output combined for flicker free light down to 0.5 percent realized with ILD8150

Key advantages
Superior adjustable overtemperature protection for ILD6150 and ILD6070 contributing to longer LED lifetime
Overvoltage and overcurrent protection
ILD1151 supports boost, buck-boost and SEPIC topologies

Type	V _S (min.) [V]	V _S (max.) [V]	I _{out} (typ.) [mA]	I _{out} (max.) [mA]	Package	Dimming	Topology	f _{sw}	Features	Ordering code
ILD1151	4.5	45	90	3.000	SSOP-14	Analog/digital	Boost, buckboost SEPIC	Adjustable 100-500 kHz	Multi topology controller, constant current or constant voltage mode, overvoltage, overcurrent, short on GND protection	ILD1151XUMA1
ILD6070	4.5	60	Selectable by resistor	700	DSO-8 exposed pad	Digital output	Hysteretic buck	1 MHz	Integrated switch rated up to 700 mA, PWM or analog dimming input, adjustable overtemperature protection, overcurrent protection	ILD6070XUMA1
ILD6150	4.5	60	Selectable by resistor	1.500	DSO-8 exposed pad	Digital output	Hysteretic buck	1 MHz	Integrated switch rated up to 1.500 mA, PWM or analog dimming input, adjustable overtemperature protection, overcurrent protection	ILD6150XUMA1
ILD8150	8	80	Selectable by resistor	1.500	DSO-8	Hybrid (analog down to 12% and PWM down to 0,5%) dimming output	Hysteretic buck	2 MHz	Integrated 80 V switch rated up to 1.500 mA with low R _{DS(on)} , hybrid dimming down to 0.5%, UVLO, thermal protection, digital soft-start, flicker-free operation	ILD8150XUMA1
ILD8150E	8	80	Selectable by resistor	1.500	DSO-8 exposed pad	Hybrid (analog down to 12% and PWM down to 0,5%) dimming output	Hysteretic buck	2 MHz	Integrated 80 V switch rated up to 1.500 mA with low R _{DS(on)} , hybrid dimming down to 0.5%, UVLO, thermal protection, digital soft-start, flicker-free operation	ILD8150EXUMA1

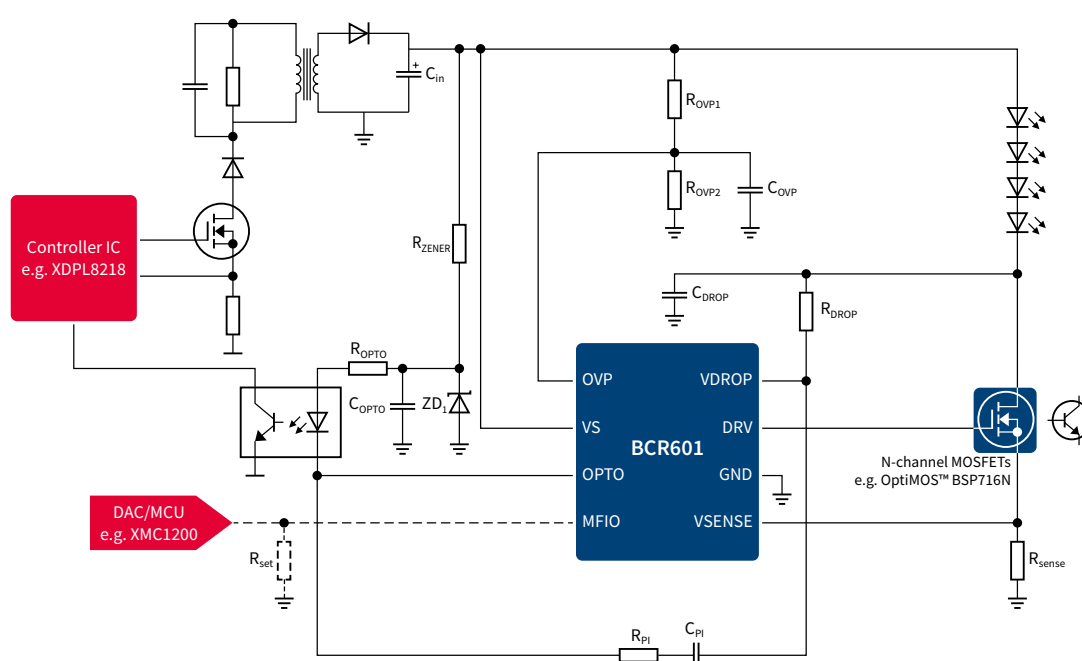
Linear current regulators

60V linear LED controller IC with active headroom control for power- and cost-efficient linear regulation on DC-DC side

A unique feature of BCR601 is to provide feedback to the primary side via an optocoupler to control the output voltage of the primary side converter, e.g. XDPL8218. The integrated control loop minimizes the voltage overhead and power dissipation of the external driver transistor. This capability, coupled with the adjustment of voltage overhead by external configuration according to application needs, leads to power- and cost-efficient LED systems.

AC line ripple suppression, analog dimming option and various protection features round up this device for LED drivers allowing for flicker-free light and longevity of LEDs.

Typical application schematic



Features and benefits

Key features and benefits	
Active headroom control (supports an optocoupler feedback loop to primary side minimizing power losses)	
Dimming in pure analog mode down to 3%	
Suppresses the voltage ripple of the power supply driving a constant LED current for high light quality	
The embedded hot plug protection allows plug in and plug out of any LED load during operation without damaging the LEDs	
Supports wide current range depending on external driver transistor	
Supply voltage range up to 60 V	
Gate driver current 10 mA	
LED current can be adjusted by Rset functionality	
Overtemperature protection and adjustable overvoltage protection	

Order information for BCR601

Type	Description	Ordering code
BCR601	60 V linear LED controller IC with voltage feedback to primary side	BCR601XUMA1
DEMO_BCR601_60V_IVCTRL	Demonstration board BCR601 current and voltage control, 500 mA	DEMOBCR60160VIVCTRLTOB01

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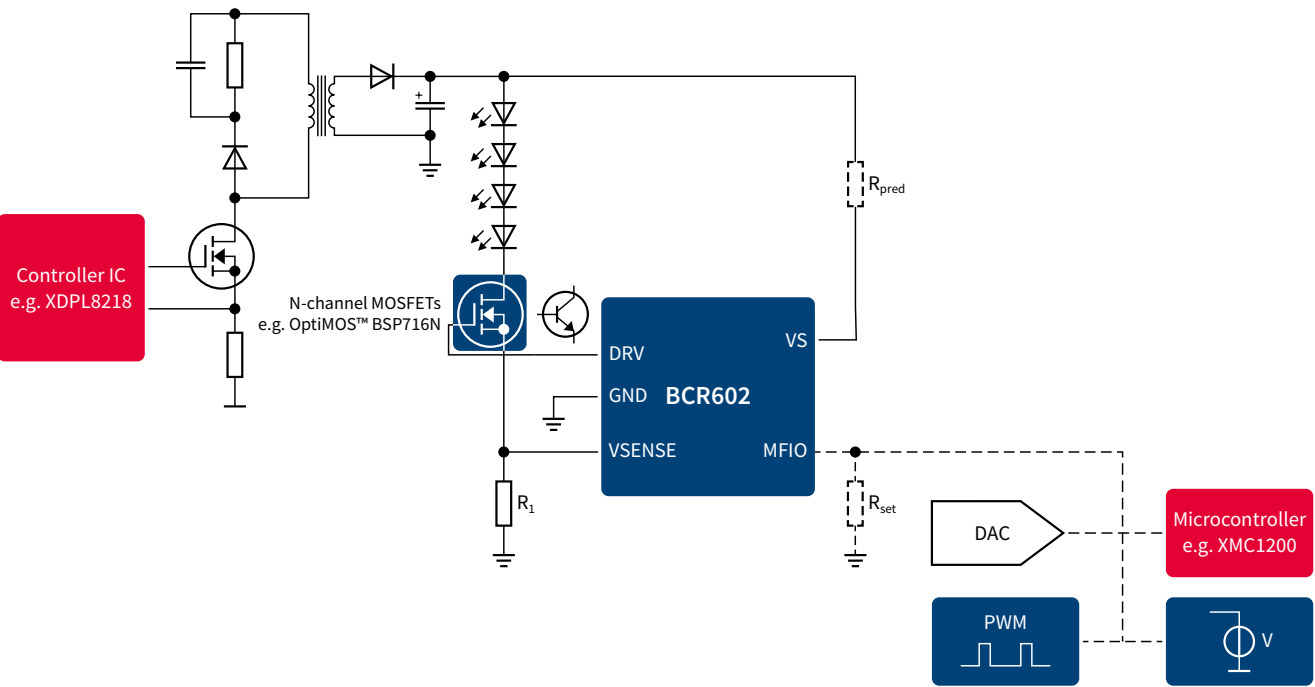


For more details on the product, click on the part number.

60 V linear LED controller IC for dimmable LED applications

The BCR602 is a perfect fit for 48V LED applications by combining small form factor with low cost. Through its higher integration, BOM savings and ensuring long lifetime of LEDs, this controller has many advantages compared to discrete solutions. BCR602 is a linear LED controller IC regulating the LED current with an external driver transistor. It supports either NPN bipolar transistors or N-channel MOSFETs to cover a wide LED current and power range. AC line ripple suppression, flexible dimming options and protection features make it a perfect fit for LED modules allowing for dimmable, flicker-free light and longevity of LEDs.

Typical application schematic



Features and benefits

Key features and benefits	
Suppresses the voltage ripple of the power supply driving a constant LED current for high light quality	
Deep dimming down to 1% (PWM), pure analog dimming down to 3%	
The embedded hot plug protection allows plug in and plug out of any LED load during operation without damaging the LEDs	
Supports wide current range depending on external driver transistor	
Supply voltage range up to 60 V makes it ideal for 48 V designs	
Gate driver current 10 mA	
LED current can be adjusted by Rset functionality	
Overtemperature protection	



Order information for BCR602

Type	Description	Ordering code
BCR602	60 V linear LED controller IC	BCR602XTSA1
DEMO_BCR602_60V_ICTRL	Demonstration board BCR602U current control, 200 mA	DEMOBCR60260VICTRLTOBO1



BCR40x and BCR43x linear LED driver ICs for low power LEDs

The BCR40x family is the smallest size and lowest cost series of LED drivers. These products are perfectly suited for driving low power LEDs in general lighting applications. Thanks to AEC-Q101 qualification, it may also be used in automotive applications such as brake lights or interior.

The advantage over resistor biasing is:

- › Long lifetime of LEDs due to constant current in each LED string
- › Homogenous LED light output independent of LED forward voltage binning, temperature increase and supply voltage variations

The advantage versus discrete semiconductors is:

- › Reduced part count and assembly effort
- › Pretested output current
- › Defined negative temperature co-efficient protection

Needing more details on replacing resistors?



Download now the application note

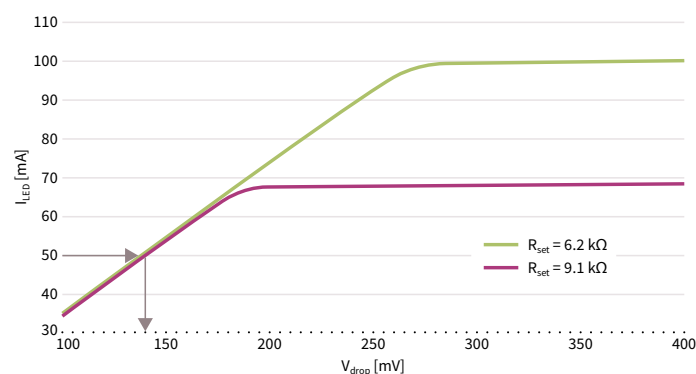
"Driving low power LEDs from 10 to 65 mA LED driver ICs with BCR401W and BCR402W family"

Features and benefits

Key features and benefits
Output current from 10 to 100 mA (adjustable by external resistor)
Supply voltage up to 18 V (BCR401W, BCR402W) and up to 40 V (BCR401U, BCR402U, BCR405U, BCR430U, BCR431U *)
Reduction of output current at high temperature, contributing to long lifetime LED systems
Extra low voltage drop for more voltage headroom and flexibility in designs (BCR430U, BCR431U)
Excellent ESD performance on device and system level for BCR431U
Very small form factor packages with up to 750 mW max. power handling capability



LED current versus voltage drop ($V_s = 24\text{ V}$)



The voltage drop at the integrated LED driver stage can go down to 135 mV at 50 mA and less improving the overall system efficiency and providing extra voltage headroom to compensate for tolerances of LED forward voltage or supply voltage. With the BCR430U and BCR431U, additional LEDs can be added to lighting designs or longer LED strips can be created without changing the supply voltage.

Low-power LED driver ICs (5-100 mA)

Type	Group	Topology	V_s (min.) [V]	V_s (max.) [V]	I_{out} (typ.) [mA]	I_{out} (max.) [mA]	Dimming	Package	P_{tot} (max.) [mW]	Ordering code
BCR401U	LED drivers for low-power LEDs	Linear	1.4	40	10.0	65	PWM by external transistor	SC74	750	BCR401UE6327HTSA1
BCR401W	LED drivers for low-power LEDs	Linear	1.2	18	10.0	60		SOT343	500	BCR401WH6327XTSA1
BCR402U	LED drivers for low-power LEDs	Linear	1.4	40	20.0	65		SC74	750	BCR402UE6327HTSA1
BCR402W	LED drivers for low-power LEDs	Linear	1.4	18	20.0	60		SOT343	500	BCR402WH6327XTSA1
BCR405U	LED drivers for low-power LEDs	Linear	1.4	40	50.0	65		SC74	750	BCR405UE6327HTSA1
BCR430U *	LED drivers for low-power LEDs	Linear	6	42	Defined by R_{set}	100		SOT23	600	BCR430UXTSA1
BCR431U **	LED drivers for low-power LEDs	Linear	6	42	-	-	-	SOT23-6	600	BCR431UXTSA1

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* Ultralow voltage drop version BCR430U with only 135 mV at 50 mA

** Coming soon

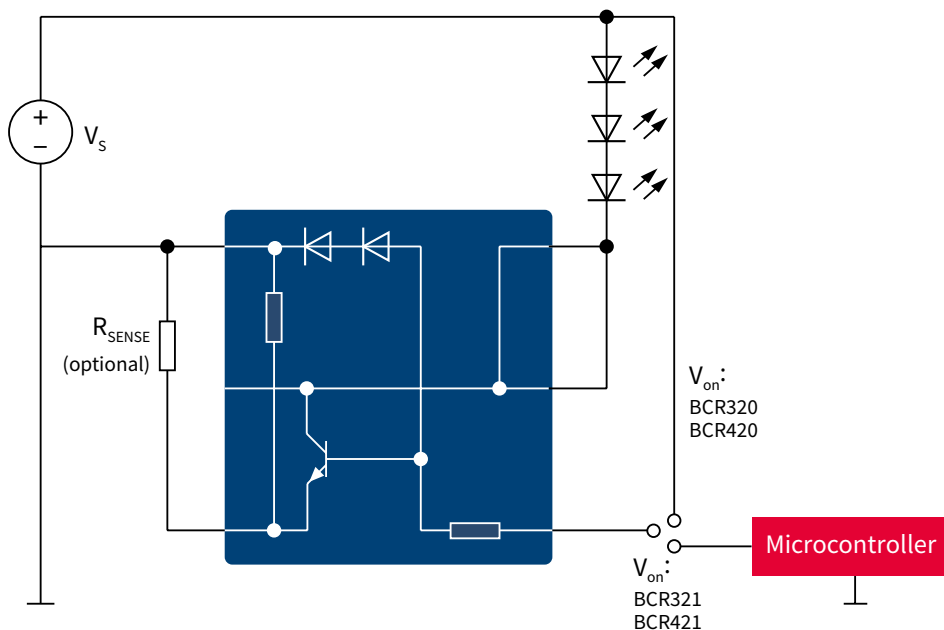


For more details on the product, click on the part number.

BCR32x/BCR42x/BCR450/BCR601/BCR602 linear LED driver and controller ICs for medium and high power LEDs

The BCR32x and BCR42x LED drivers are dedicated linear regulators for 0.5 W LEDs with a maximum output current of 250 mA. They are optimized in terms of cost, size and feature set for medium power LEDs in general lighting applications. Thanks to AEC-Q101 qualification, it may also be used in automotive applications such as brake lights or interior.

Typical application schematic



Features and benefits

Key features and benefits	
Output current from 10 mA up to 300 mA for BCR32x (200 mA for BCR42xU), adjustable by external resistor	
Supply voltage up to 40 V for BCR42x (24 V for BCR32x)	
Direct microcontroller interface for PWM dimming with BCR321U/BCR421U	
Reduction of output current at high temperature, contributing to long lifetime LED systems	
Dedicated 60 V devices targeting 48 V systems BCR601 for LED Driver/ BCR602 for LED Module	
Very small form factor packages with up to 1000 mW max. power handling capability	

Medium- and high-power LED driver ICs

Type	Group	Topology	V _s (min.) [V]	V _s (max.) [V]	I _{out} (typ.) [mA]	I _{out} (max.) [mA]	Dimming	Package	P _{tot} (max.) [mW]	Ordering code
BCR320U	LED drivers for mid-power LEDs	Linear	1.4	24	250	300	No	SC74	1000	BCR320UE6327HTSA1
BCR321U		Linear	1.4	24	250	300	Digital input	SC74	1000	BCR321UE6327HTSA1
BCR420U		Linear	1.4	40	150	200	No	SC74	1000	BCR420UE6327HTSA1
BCR421U		Linear	1.4	40	150	200	Digital input	SC74	1000	BCR421UE6327HTSA1
BCR450	LED controller	Linear	3.0	27	70	Ext. switch	Digital input	SC74	500	BCR450E6327HTSA1
BCR601 ¹⁾	LED controller	Linear	8.0	60	Ext. switch	Ext. switch	Analog	PG-DSO-8	360	BCR601XUMA1
BCR602 ²⁾	LED controller	Linear	8.0	60	Ext. switch	Ext. switch	Analog/PWM	PG-SOT23-6	360	BCR602XTSA1

www.infineon.com/bcr

1) See page 245 for detailed description
2) See page 246 for detailed description



For more details on the product, click on the part number.



AC-DC LED driver IC

Digital and mixed signal, single- and dual-stage high voltage control ICs for LED drivers

XDP™ digital power – digital single- and dual-stage flyback combo controllers


The XDP™ portfolio of high performance digital power control ICs addresses today's challenges such as smart or connected lighting, meeting demanding LED driver requirements with a unique set of features.

Mixed-signal control ICs for solid-state lighting luminaires

Infineon's mixed-signal control ICs for LED drivers deliver excellent power quality and high efficiency for LED lighting applications supporting dimming levels down to 1%. The integration of advanced functions saves external components and minimizes system cost. The wide variety of features and functions gives the option to choose the best fitting part for the application.

www.infineon.com/offline-led-driver



For more details on the product, click on the part number. 

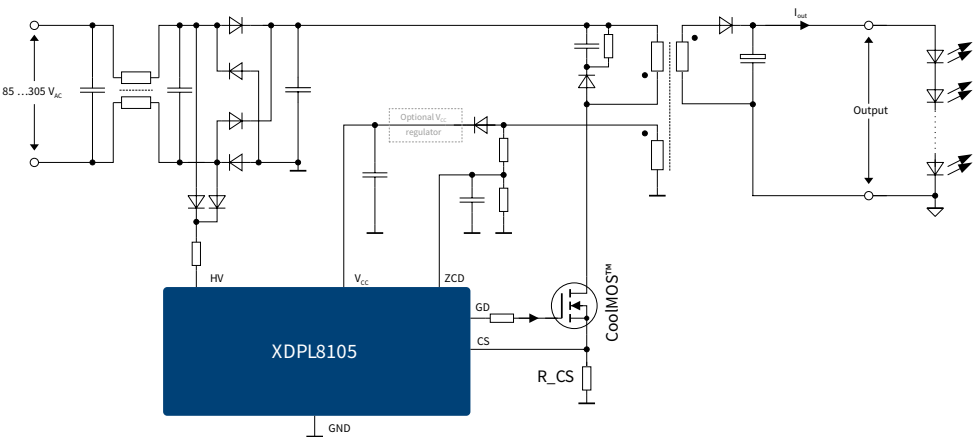
XDP™ LED

The IC family XDP™ is the first all-in-one package solutions combining a digital controller with key power peripherals. Such integration provides exceptional flexibility and performance. The XDP™ family addresses essential features for advanced LED driver.

XDPL8105 – digital flyback controller IC for LED driver

The XDPL8105 is a digital, single-stage flyback controller with high power factor for constant current LED driver. The device offers versatile functions for different indoor and outdoor lighting applications. The IC is available in a DSO-8 package and it provides a wide feature set, requiring a minimum of external components. The advanced control algorithms in the digital core of the XDPL8105 provide multimode operation for high efficiency. Configurable parameters allow last minute changes, shorten the product development and reduce hardware variants. The extensive set of configurable standard and sophisticated protection mechanisms ensure safe, reliable and robust LED driver device for diverse use cases.

Typical application schematic




Features and benefits

Key features and benefits
Constant current with primary side regulation
Supports AC and DC input
Nominal input voltage range 90-305 V _{AC} or 120-350 V _{DC}
Integrated 600 V start-up cell
Power factor > 0.9 and THD < 15 percent over wide load range
Highly accurate primary side control output current typ. ± 3 percent
Reference board efficiency > 90 percent
Internal temperature guard with adaptive thermal management
Multimode operation <ul style="list-style-type: none">> QRM (quasi-resonant mode)> DCM (discontinuous conduction mode)> ABM (active burst mode)
Digital parameters
Relevant error conditions are monitored and protected <ul style="list-style-type: none">> Undervoltage> Overvoltage> Open load> Output shorted

Order information for XDPL8105

Type	Description	Ordering code
XDPL8105	Digital flyback controller IC	XDPL8105XUMA1
REF-XDPL8105-CDM10V	40 W reference design with CDM10V isolated 0 V-10 V dimming interface	REFXDPL8105CDM10VTOB01

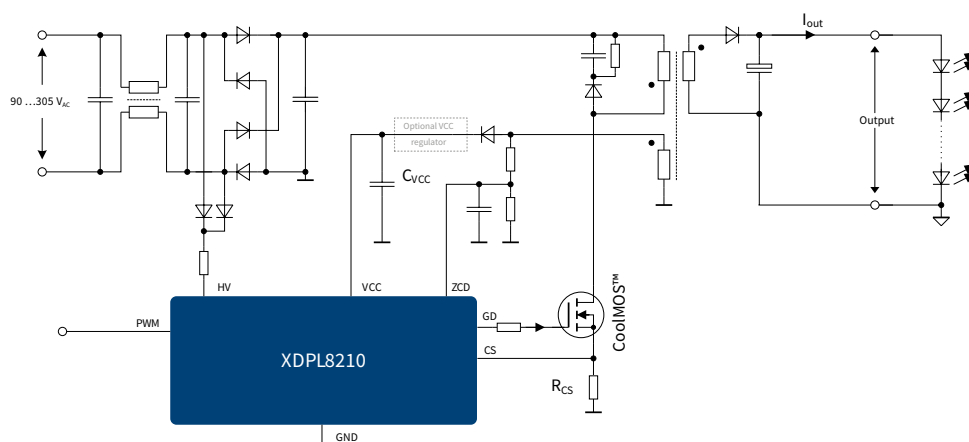
www.infineon.com/xdpl8105

For more details on the product, click on the part number. 

XDPL8210 – digital flyback constant current controller IC for LED driver with 1 percent dimming

The XDPL8210 is a digital, single-stage, quasi-resonant flyback controller with high power factor and high precision primary side controlled constant current output. The IC is available in a DSO-8 package and it provides a wide feature set, which requires only a small number of external components. Sophisticated algorithms provide flicker-free dimming below one percent. The driver fully supports IEC61000-3-2 class C designs. The limited power mode improves functional safety, while configurable parameters allow last minute changes, shorten the product development and reduce hardware variants. The extensive set of configurable standard and sophisticated protection mechanisms ensure safe, reliable and robust LED driver for a large set of use cases.

Typical application schematic



Features and benefits

Key features and benefits
Constant current with primary side regulation
Supports AC and DC input
Nominal input voltage range 90-305 V _{AC} or 90-430 V _{DC}
Reference board efficiency > 90 percent
Power factor > 0.9 and THD < 15 percent over wide load range
Standby power < 100 mW
Internal temperature guard with adaptive thermal management
Multimode operation <ul style="list-style-type: none"> > QRM (quasi-resonant mode) > DCM (discontinuous conduction mode) > ABM (active burst mode)
Digital parameters
Relevant error conditions are monitored and protected <ul style="list-style-type: none"> > Undervoltage > Overvoltage > Open load > Output shorted

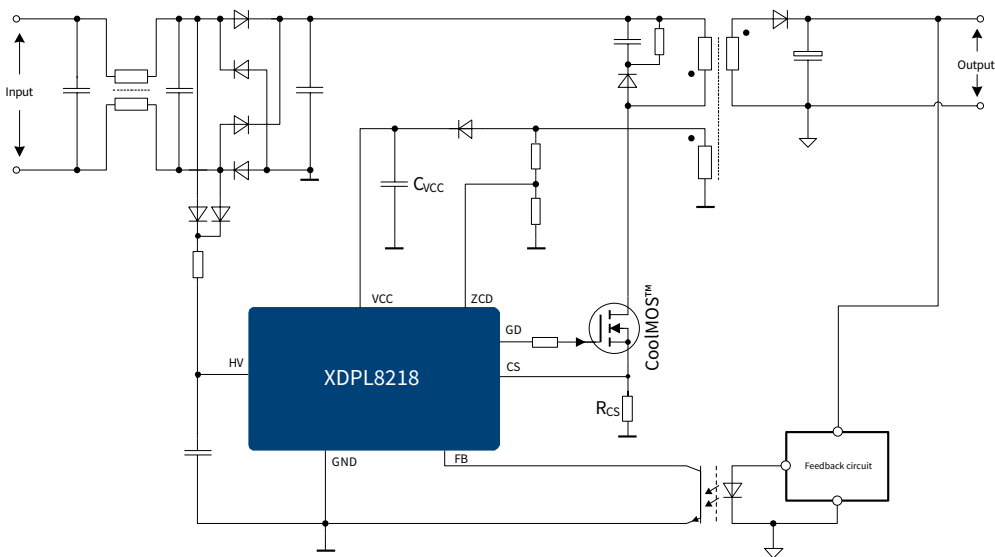
Order information for XDPL8210

Type	Description	Ordering code
XDPL8210	Digital flyback constant current controller IC	XDPL8210XUMA1
REF-XDPL8210-U35W	35 W reference design with CDM10V isolated 0 V-10 V dimming interface	REFXDPL8210U35WTOB01

XDPL8218 – high power factor constant voltage flyback IC with secondary side regulation

The XDPL8218 is a digital, highly integrated, future-proof device combining a constant voltage quasi-resonant flyback controller with algorithms for high power factor and low THD. The main application field for XDPL8218 are dual stage designs with a DC-DC stage at secondary side and XDPL8218 as primary side. The device manages wide load ranges and reacts fast and stable to dynamic load changes. The digital core of the XDPL8218 enables high efficiency over full output power range, multimode operation with quasi-resonant switching at high power, discontinuous conduction mode frequency reduction at medium power and active burst mode at low power. The XDPL8218 is available in a DSO-8 package.

Typical application schematic




Features and benefits

Key features and benefits	
Constant voltage with secondary side regulation	
Supports AC and DC input	
Nominal input voltage range 100-305 V _{AC} or 90-430 V _{DC}	
Reference board efficiency > 90 percent	
Power factor > 0.9 and THD < 15 percent over wide load range	
Standby power < 100 mW	
Internal temperature guard with adaptive thermal management	
Brown-out and brown-in protections	
Embedded digital filters	
Multimode operation	
> QRM (quasi-resonant mode)	
> DCM (discontinuous conduction mode)	
> ABM (active burst mode)	
Digital parameters	
Relevant error conditions are monitored and protected	
> Undervoltage	
> Overvoltage	
> Open load	
> Output shorted	

Order information for XDPL8218

Type	Description	Ordering code
XDPL8218	Digital flyback CV-output controller IC	XDPL8218XUMA1
REF-XDPL8218-U40W	40 W reference board with replaceable feedback circuit	REFXDPL8218U40WTOB01

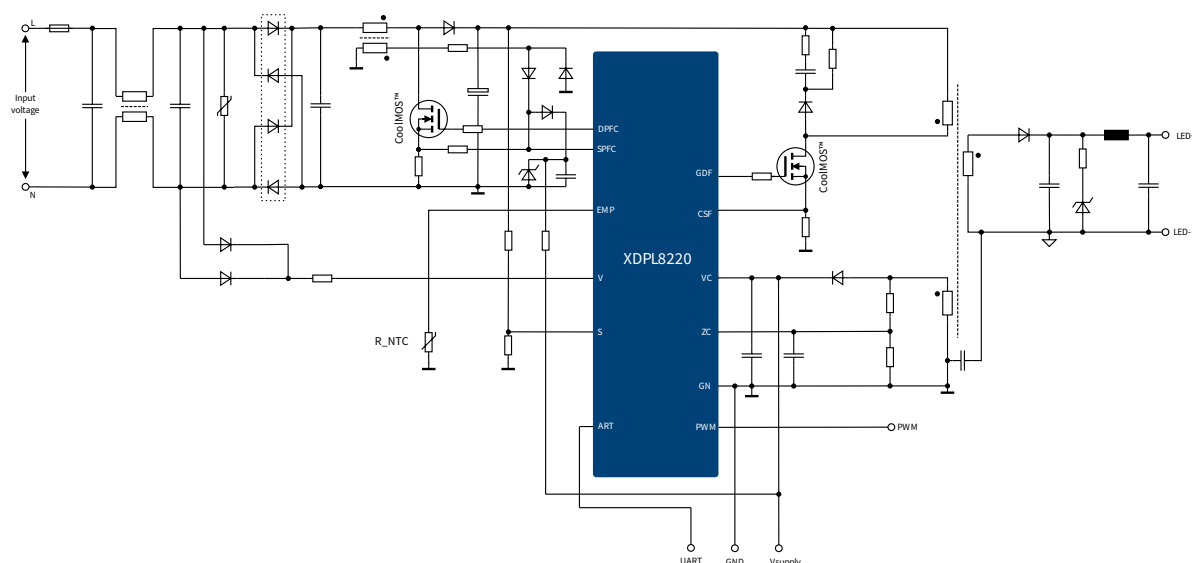
www.infineon.com/xdpl8218

For more details on the product, click on the part number. 

XDPL8220 - digital dual stage multi-mode flyback controller for CC, CV, LP with primary side regulation

The XDPL8220 simplifies for the lighting industry to realize essential features for smart lighting and increases the benefits to the end user and the luminaire manufacturers. The XDPL8220 is a digital, highly integrated, future-proof device combining a quasi-resonant PFC plus a quasi-resonant flyback digital controller with primary side regulation. The multi control features - constant voltage, constant current, and limited power - enable a highly versatile LED driver (e.g. window LED driver). The main application field of the XDPL8220 is advanced dual stage LED driver for indoor or outdoor lighting. The IC is available in a DSO-16 package.

Typical application schematic



Features and benefits

Key features and benefits	
Features and benefits	
Constant current, constant voltage, limited power with primary side regulation	
PWM dimming input controls respective analog output current	
Reference board efficiency > 90 percent	
Power factor > 0.9 and THD < 15 percent over wide load range	
Nominal input voltage range 100-305 V _{AC} or 90-430 V _{DC}	
Standby power < 100 mW	
Internal temperature guard with adaptive thermal management	
Multimode operation	
<ul style="list-style-type: none"> > QRM (quasi-resonant mode) > DCM (discontinuous conduction mode) > ABM (active burst mode) 	
Digital parameters	
Relevant error conditions are monitored and protected	
<ul style="list-style-type: none"> > Undervoltage > Overvoltage > Open load 	

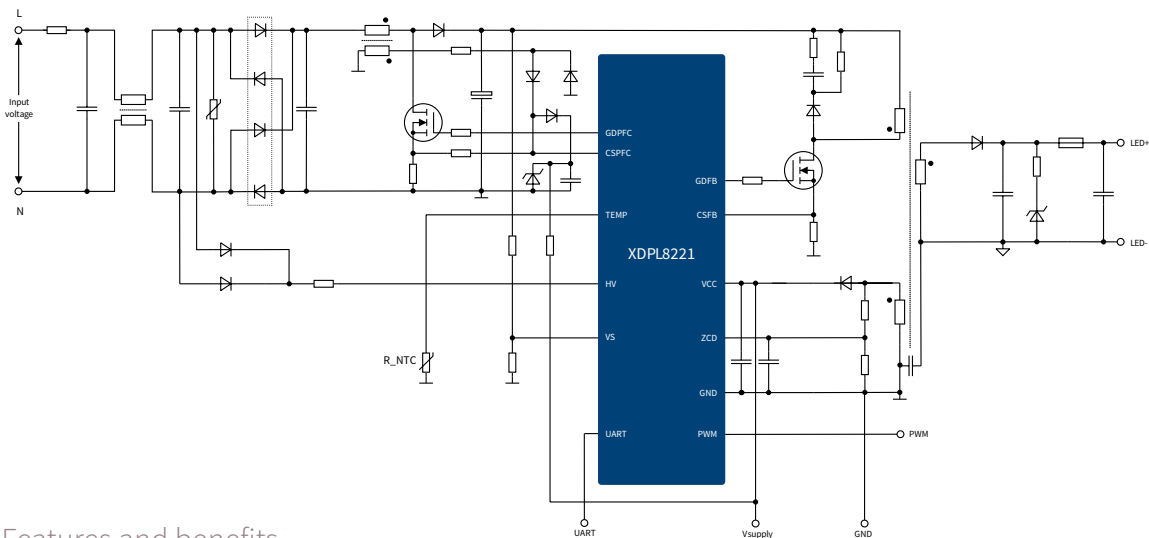
Order information for XDPL8220

Type	Description	Ordering code
XDPL8220	Digital dual stage multimode flyback Controller for CC, CV, LP	XDPL8220XUMA1
REF-XDPL8220-U30W	30 W reference board with CDM10V isolated 0 V-10 V dimming interface	REFXDPL8220U30WTOBO1
REF-XDPL8220-U50W	50 W reference board with CDM10V isolated 0 V-10 V dimming interface	REFXDPL8220U50WTOBO1
REF-XDPL8220-U100W	100 W reference board with CDM10V isolated 0 V-10 V dimming interface	REFXDPL8220U100WTOBO1

XDPL8221 - digital dual stage multi-mode flyback controller for CC, CV, LP with 1 percent dimming and serial interface

The XDPL8221 is a digital, highly integrated, future-proof device combining a quasi-resonant PFC with a quasi-resonant flyback controller with primary side regulation. A serial communication interface supports direct communication with an external microcontroller unit (MCU). The XDPL8221 is especially designed for advanced LED driver in smart lighting or IoT applications, featuring flicker-free dimming down to 1 percent of nominal current. The device enables customizable LED driver and simplifies the generation and maintenance of different variants without increasing the number of stock keeping units. The IC is available in a DSO-16 package.

Typical application schematic




Features and benefits

Key features and benefits
Nominal input voltage range 100-305 V _{AC} or 90-430 V _{DC}
Reference board efficiency > 90 percent
Power factor > 0.9 and THD < 15 percent over wide load range
UART Interface for control and real-time monitoring
Constant current, constant voltage, limited power with primary side regulation
1 percent dimming
Dim-to-off with low standby power < 100 mW
Internal temperature guard with adaptive thermal management
The UART interface and the command set enable to control the function of the XDPL8221 or inquire status information
Multimode operation <ul style="list-style-type: none">> QRM (quasi-resonant mode)> DCM (discontinuous conduction mode)> ABM (active burst mode)
Digital parameters
Relevant error conditions are monitored and protected <ul style="list-style-type: none">> Undervoltage> Overvoltage> Open load> Output shorted

Order information for XDPL8221

Type	Description	Ordering code
XDPL8221	Digital dual stage multimode flyback Controller for CC, CV, LP with 1 percent dimming	XDPL8221XUMA1
REF-XDPL8221-U50W	50 W reference board with CDM10V isolated 0 V-10 V dimming interface	REFXDPL8221U50WTOB01
REF-XDPL8221-U100W	100 W reference board with CDM10V isolated 0 V-10 V dimming interface	REFXDPL8221U100WTOB01

www.infineon.com/xdpl8221

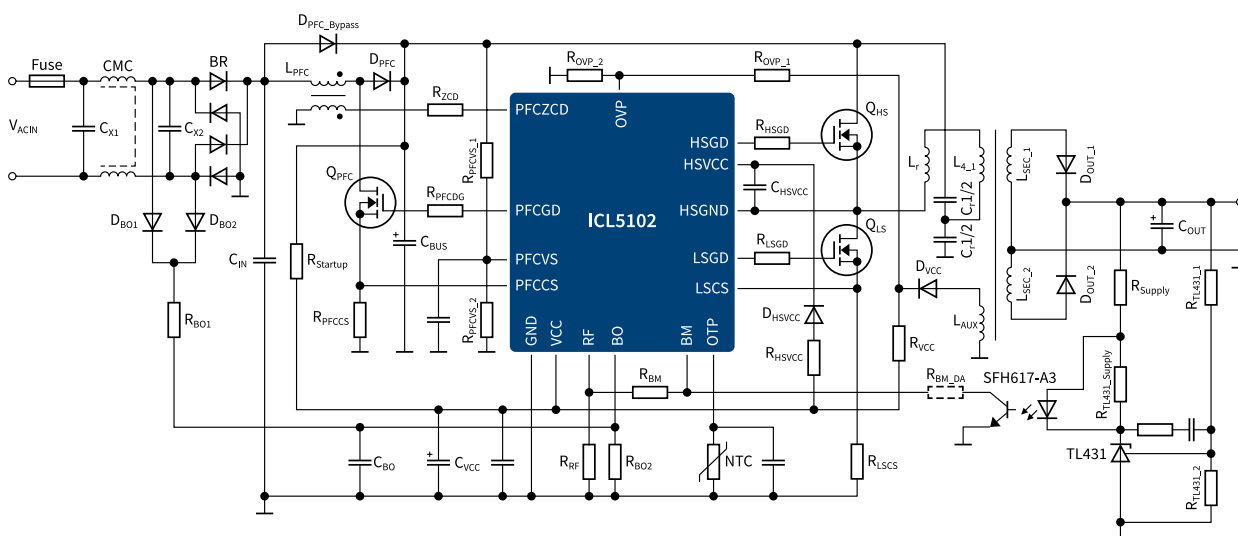
For more details on the product, click on the part number. 

ICL5102

High performance PFC + resonant controller for LCC and LLC

With ICL5102 Infineon offers a highly integrated combo controller IC with a universal input of 70V to 325V, which allows manufactures to realize global designs, keeping cost for product variety and stock low. Highest efficiency of up to 94 percent by resonant topology, a THD factor less than 3.5 percent and a high power factor of more than 0.95 allow for more lumen output and less thermal load, enabling cost effective designs and keeping cost for LEDs and heat sink low. Thanks to the high integration, there is no need for additional expensive components in PFC and LLC stage, reducing the overall BOM cost. In addition integrated protection features complement the ICL5102 features.

Typical application schematic



Features and benefits

Key features and benefits

Small form factor LED driver and low BOM

The high level of integration assures a low count of external components, enabling small form factor designs and making them ideal for compact and slimline power supplies for lighting, such as LED driver for indoor and outdoor applications

High performance, digital PFC and advanced HB driver

The high performance digital PFC stage achieves power factor of 99 percent, through operation in CrCM and DCM mode, in a frequency range of 22 to 500 kHz. This supports stable operation even at low-load conditions down to 0.1 percent of the nominal power without audible noise

Fast time-to-light and low standby

With start-up current of less than 100 μ A the controller provides very fast time-to-light within less than 300 ms, while standby the controller changes into active burst mode which reduces power consumption to less than 300 mW

Safety first

The controller has a comprehensive set of protection features built in to increase the system safety. It monitors in the run mode the complete system regarding bus over- and undervoltage, open loop, overcurrent of PFC and/or inverter, output overvoltage, overtemperature and capacitive load operation



Order information for ICL5102

Type	Description	Ordering code
ICL5102	PFC and resonant controller for LCC and LLC	ICL5102XUMA2
REF-ICL5102-U130W-CC	PFC/LLC-CC constant current evaluation board 130 W LED driver	REFICL5102U130WCCTOBO1

www.infineon.com/icl5102



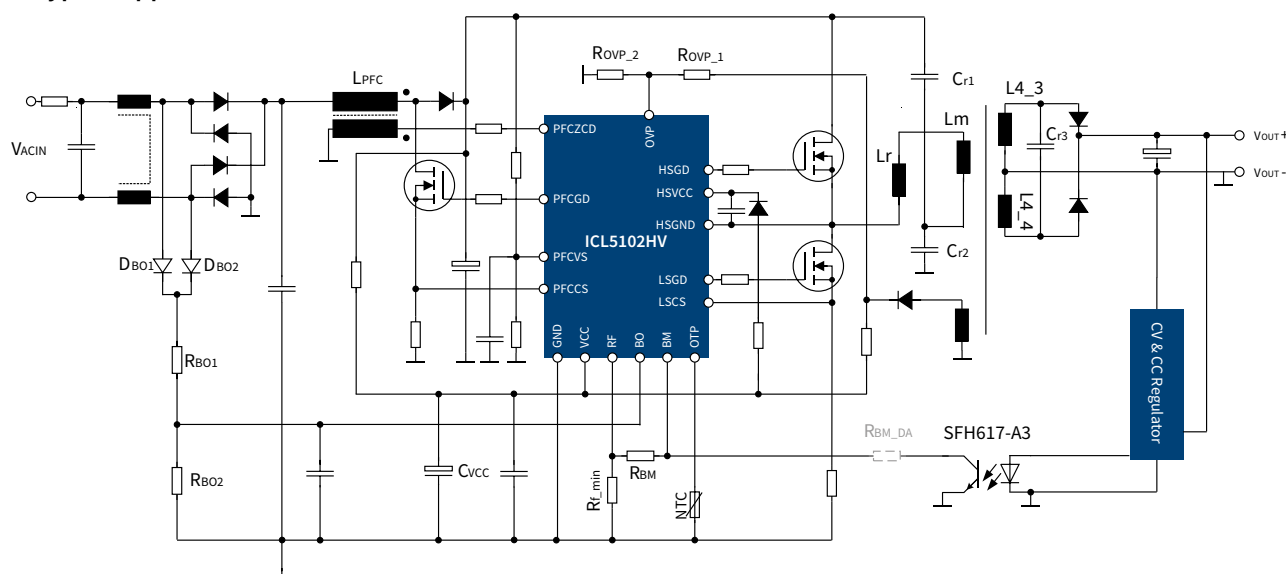
For more details on the product, click on the part number.

ICL5102HV

High performance PFC + resonant controller for LCC and LLC, supporting 980 V high side

ICL5102HV control IC for LED drivers offers a unique one-package solution for lighting applications up to 350 W, supporting LLC/LCC topology. It is particularly designed to deliver best performance of total harmonic distortions (THD) and power factor (PF). Compared to level-shifter technology, the integrated coreless transformer not only further reduces the loss at high operation frequency, but also enhances the capability of handling huge negative voltage (-600 V on HSGND). Reduce the number of external components to optimize form factor and reduce bill of material (BOM) with the integrated two-stage combination controller (PFC + LLC/LCC) for lighting applications. Simplify your design and shorten time-to-market.

Typical application schematic



Features and benefits

Key features and benefits

Small form factor LED driver and low BOM

The high level of integration assures a low count of external components, enabling small form factor designs and making them ideal for compact and slimline power supplies for lighting, such as LED driver for indoor and outdoor applications

High performance, digital PFC and advanced HB driver

The high performance digital PFC stage achieves power factor of 99 percent, through operation in CrCM and DCM mode, in a frequency range of 22 to 500 kHz. This supports stable operation even at low-load conditions down to 0.1 percent of the nominal power without audible noise

Fast time-to-light and low standby

With start-up current of less than 100 μ A the controller provides very fast time-to-light within less than 300 ms, while standby the controller changes into active burst mode which reduces power consumption to less than 300 mW

Safety first

The controller has a comprehensive set of protection features built in to increase the system safety. It monitors in the run mode the complete system regarding bus over- and undervoltage, open loop, overcurrent of PFC and/or inverter, output overvoltage, overtemperature and capacitive load operation



Order information for ICL5102HV

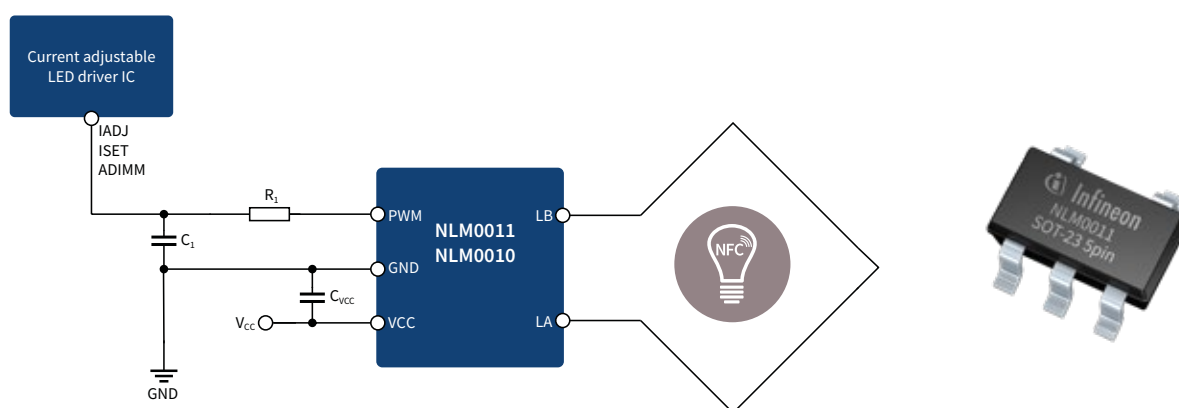
Type	Description	Ordering code
ICL5102HV	PFC and resonant controller for LCC and LLC	ICL5102HVXUMA1
REF-ICL5102HV-U150W	PFC/LCC evaluation board 150 W, CC LED driver	REFICL5102HVU150WTOB01

NFC-PWM configuration ICs

Dual-mode NFC wireless configuration ICs with CLO function and pulse width modulation (PWM) output for lighting applications

The NLM0011 is a dual-mode NFC wireless configuration IC with PWM output. It is compatible with existing analog LED-driver designs and with the NFC-programming specification from the Module-Driver Interface Special Interest Group (MD-SIG). This device is primarily designed for LED applications to enable NFC programming. In addition, advanced features such as the constant lumen output (CLO) as well as the on/off counting are integrated, and there is no need for an additional microcontroller. Since the NLM0011 is designed to work together with mainstream analog driver ICs, there are no firmware development efforts needed. It can be easily adapted into existing designs to replace the “plug-in resistor” current configuration concept. The NLM0010 is a light version without CLO function.

Typical example of NFC lighting application



Features and benefits

Key benefits
Configurable pulse width modulation (PWM) output
NFC contactless interface compliant to ISO/IEC 18000-3 mode 1 (ISO/IEC 15963)
Constant light output (CLO) with 8 configurable points
Integrated operation-time counter (OTC) and on/off counter
Non-volatile memory (NVM) including UID and 20 bytes free memory for user data

Key advantages
Fast and cost effective implementation of NFC programming and CLO without the need of an additional microcontroller
Compatible with most analog LED driver designs using “plug-in resistor” method
Stable PWM output with fixed 2.8 V amplitude and +/-0.1% duty cycle accuracy
Internal voltage regulator (LDO) to avoid influence of instable external supply voltage



EVAL_NLM0011_DC – evaluation board demo kit

This evaluation board not only enables fast demonstration of NFC-PWM configuration ICs with NLM0011 through the NFC-PWM mobile app, but also accelerates the development of the NFC-reader software. EVAL_NLM0011_DC does not require a full system, but allows NFC configuration for existing LED driver boards.

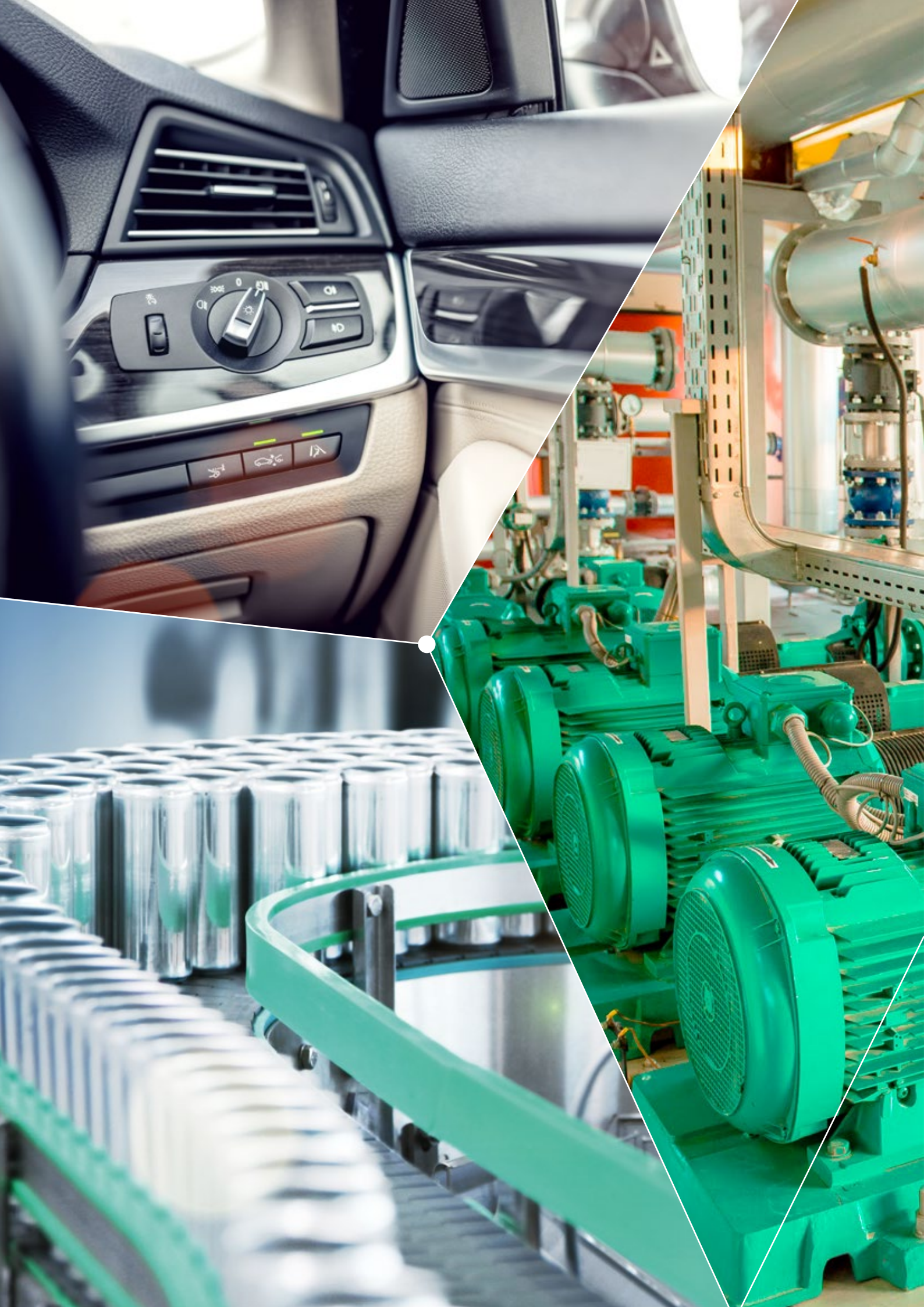
Ordering code: EVALNLM0011DCTOB01

Type	Description	Package	Ordering code
NLM0011	Dual mode NFC configuration IC with PWM output and CLO function	SOT23-5	NLM0011XTSA1
NLM0010	Dual mode NFC configuration IC with PWM output, without CLO function	SOT23-5	NLM0010XTSA1

www.infineon.com/NFC-PWM



For more details on the product, click on the part number.



CIPOS™ IPM family

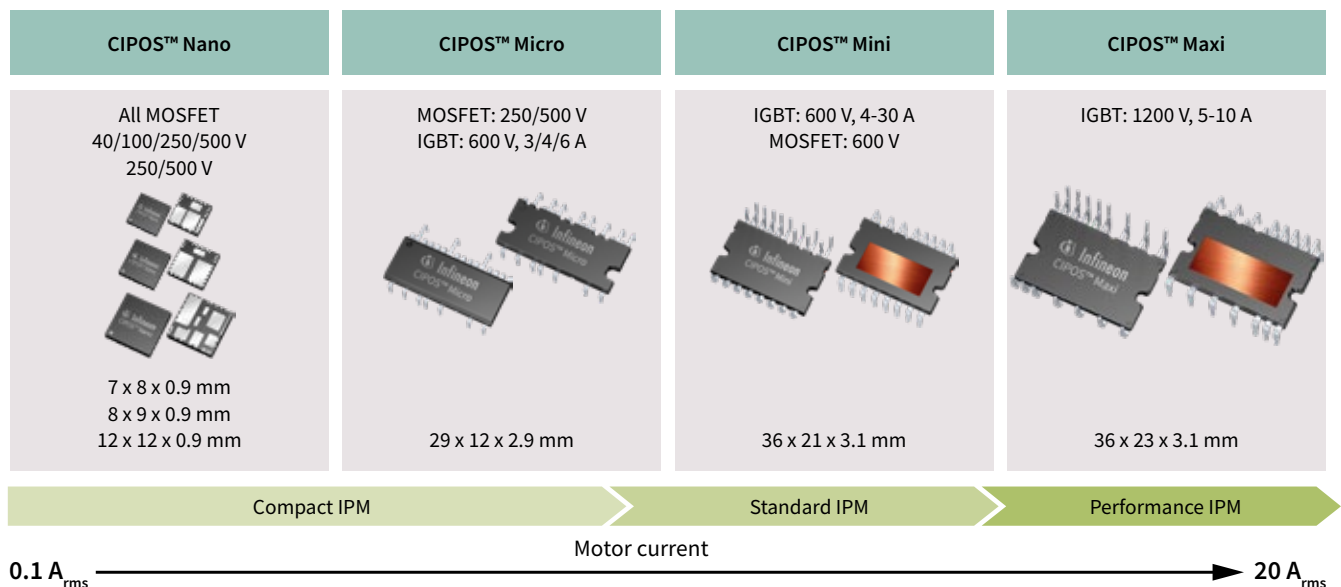
Control integrated power system (CIPOS™) intelligent power modules (IPM)

Depending on the level of integration and power to be handled, Infineon offers a variety of IPMs, with different semiconductors in different packages and different voltage and current classes.

CIPOS™ IPMs are families of highly integrated, compact power modules designed to drive motors in applications ranging from home appliances to fans, pumps, and general purpose drives.

Infineon's energy-efficient IPMs integrate the latest power semiconductor and control IC technology leveraging Infineon's advanced IGBTs, MOSFETs, next-generation gate driver ICs and state-of-the-art thermo-mechanical technology.


CIPOS™ product overview



Key benefits

- > Shorter time-to-market
- > Increased reliability
- > Reduced system design complexity
- > Improved manufacturability

www.infineon.com/ipm

For more details on the product, click on the part number. 

CIPOS™ Nano

Three-phase or half-bridge driver with MOSFETs




CIPOS™ Nano is a family of highly integrated, ultracompact IPMs for high efficiency appliance and light industrial applications including rectifiers, converters, inverters in power management circuits and motor drives for hair dryers, air purifiers, ceiling fans, circulation pumps and ventilators. By utilizing an innovative packaging solution, these IPMs delivers a new benchmark in device size, offering up to a 60 percent smaller footprint than existing three-phase motor control power IPMs.

The family is comprised of a series of fully integrated three-phase or half-bridge surface-mount motor control circuit solutions. The new alternative approach utilizes PCB copper traces to dissipate heat from the module, providing cost savings through a smaller package design and even eliminating the need for an external heat sink.

Features and benefits

Key benefits	Key advantages
Motor drive-optimized fast recovery FETs	Cost savings from smaller footprint and reduced PCB space
Heat sink-less operation	Easy implementation of two or three-phase motor drives with half-bridge IPMs
Smallest modules on the market	IPMs distribute heat dissipation and enable elimination of heat sink
Wide range of footprint compatible parts	Same PCB footprint to address multiple application markets (100-230 V _{AC})
Integrated bootstrap functionality	
Undervoltage lockout for all channels	

Package overview

QFN 12x12 12 x 12 x 0.9 mm	QFN 8x9 8 x 9 x 0.9 mm	QFN 7x8 7 x 8 x 0.9 mm
		

Key applications

- > Small home appliances
- > Hair driers
- > Air purifiers
- > Fans
- > Motor drives
- > Battery management
- > Water pumps
- > CPAP

CIPOS™ Micro

Solution for low power motor drive applications





CIPOS™ Micro is a family of compact IPMs for low power motor drive applications including fans, pumps, air purifiers and refrigerator compressor drives.

These IPMs offer cost-effective power solutions by leveraging industry standard footprints and processes compatible with various PCB substrates. The advanced IPMs feature rugged and efficient high voltage MOSFETs and IGBTs specifically optimized for variable frequency drives with voltage ratings of 250~600 V IGBTs. The IPMs offer DC current ratings ranging up to 6 A to drive motors up to 100 W without heatsink and up to 300 W with heatsink, and are available in both through-hole and surface mount package options.

Features and benefits

Key features	Key benefits
Integrated bootstrap functionality	Ease of design and short time-to-market
Undervoltage lockout for all channels	Compact package with multi lead form options available
Matched propagation delay for all channels	Wide range of current and voltage ratings in the same package
Optimized dV/dt for loss and EMI trade-off	Wide range of modules for 110 V _{AC} or 230 V _{AC} applications in the same footprint
Advanced input filter with shoot-through protection	Lower losses than similar modules in the market
Separate low-side emitter pins for single- or leg-shunt current sensing	
3.3 V logic compatible	
UL certified NTC thermistor for temperature feedback available	
Various lead forms available including through-hole and surface mounted	

Package overview

DIP 29x12 29 x 12 x 3.1 mm	DIP 29x12F 29 x 12 x 3.1 mm	SOP 29x12 29 x 12 x 3.1 mm	SOP 29x12F 29 x 12 x 3.1 mm
			

Key applications

- › Fan motors
- › Low-power general purpose drives (GPI, servo drives)
- › Pumps
- › Blowers
- › Active filter (active power factor correction) for HVAC

CIPOS™ Mini

Broad range of configurations from PFC to inverter

CIPOS™ Mini is a family of high efficient intelligent power modules that has the highest power density with 4 A to 30 A rated product built into single package platform. It integrates various power and control components to increase reliability, and optimize PCB size and system costs. Utilizing multiple configurations, CIPOS™ Mini IPMs are applicable to the wide applications to control variable speed drives, such as air conditioners, washing machines, refrigerators, vacuum cleaners, compressors, and industrial drives up to 3 kW. The configurations offered within the CIPOS™ Mini family are 2-phase MOSFET, 3-phase MOSFET and IGBT, integrated PFC, and 2-phase and 3-phase interleaved PFC. All options include an integrated gate driver and built-in temperature sensor. CIPOS™ Mini provides optimized performance for power applications, which need good thermal conduction and electrical isolation, but also EMI-safe control, innovative fault indication, and overload protection. The feature of Infineon's reverse conducting IGBTs or TRENCHSTOP™ IGBTs are used with a new optimized Infineon SOI gate driver IC for excellent electrical performance.

Features and benefits

Key features	Key benefits
Dual-in-line transfer molded package	High integration (bootstrap circuit, thermistor) for easy design and system space saving
Current rating from 4 A to 30 A, power rating up to 3 kW	Easy and fast platform design from small to large power
Optimized for home appliances and motor drives	Enhanced robustness of the advanced IGBT and gate driver IC technology
Rugged SOI gate driver IC technology	High power density with compact form factor
Advanced protection features	Two kinds of substrates provide cost efficient solution for home appliances
UL-certified	

Package overview

DIP 36x21 36 x 21 x 3.1 mm	DIP 36x21D 36 x 21 x 3.1 mm
	

Key applications

- › Home appliances
- › Room air conditioners
- › Motor control and drives
- › Fan motors, pumps

CIPOS™ Maxi

Solutions for high reliability and performance application

CIPOS™ Maxi IPMs integrate various power and control components to increase reliability, optimize PCB size and system costs. It is designed to control three-phase AC motors and permanent magnet motors in variable speed drives applications, such as low-power motor drives, pumps, fan drives and active filters for HVAC (heating, ventilation, and air conditioning). The existing portfolio offers 5 A and 10 A in 1200 V class up to 1.8 kW power rating. The smallest package in 1200 V IPM class offers highest power density and best performance in its class.

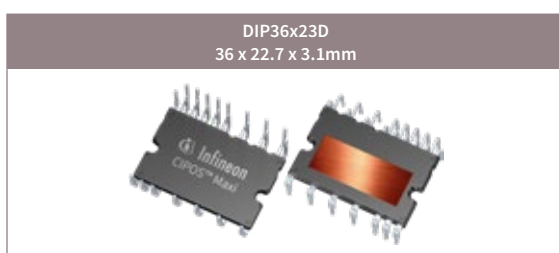
IM818 is the first 1200 V IPM that integrated an optimized 6-channel SOI gate driver to provide built-in dead time that prevents damage from transients. The product concept is especially adapted to power applications, which require excellent thermal performance and electrical isolation as well as meeting EMI requirements and overload protection.

Features and benefits

Key benefits
Fully isolated dual in-line molded module with DCB
1200 V TRENCHSTOP™ IGBT 4
Rugged 1200 V SOI gate driver technology
Integrated bootstrap functionality
Overcurrent shutdown
Undervoltage lockout at all channels
All of six switches turn-off during protection
Cross-conduction prevention
Programmable fault clear timing
Allowable negative VS potential up to -11 V for signal transmission at V _{BS} of 15 V
Low side emitter pins accessible for all phase current monitoring (open emitter)

Key advantages
The smallest package size in 1200 V IPM class with high power density and best performance
Enhanced robustness of gate driver technology for excellent protection
Adapted to high switching application with lower power loss
Simplified design and manufacturing

Package overview



Key applications

- › Fan motors
- › Low-power general purpose drives (GPI, servo drives)
- › Pumps
- › Active filter (active power factor correction) for HVAC
- › HVAC outdoor fan

CIPOS™ IPM product portfolio

MOSFET based CIPOS™ IPMs					
Product family	Voltage [V]	Configuration	R _{DS(on)} max. [Ω]	Package	Product name
CIPOS™ Nano	40	Half-bridge	0.05	QFN 7x8	IRSM005-800MH
	100	Half-bridge	0.02	QFN 7x8	IRSM005-301MH
	250	Half-bridge	0.15	QFN 8x9	IRSM808-204MH
		3-phase inverter	0.45. ~ 2.20	QFN 12x12	IRSM836-084MA/IRSM836-044MA IRSM836-024MA
	500	Half-bridge	0.80/1.70	QFN 8x9	IRSM807-105MH/IRSM808-105MH IRSM807-045MH
		3-phase inverter	1.70 ~ 6.00	QFN 12x12	IRSM836-045MA/IRSM836-035MA/IRSM836-035MB IRSM836-025MA/IRSM836-015MA
CIPOS™ Micro	250	3-phase inverter	2.40	DIP 29x12F	IRSM5y5-024DA ¹⁾ *
			2.40	SOP 29x12F	IRSM5y5-024PA ¹⁾ *
	500		1.30 ~ 6.00	DIP 29x12F	IRSM5y5-065DA */IRSM5y5-055DA ¹⁾ *
					IRSM5y5-035DA */IRSM5y5-025DA ¹⁾ *
			1.30 ~ 6.00	SOP 29x12F	IRSM5y5-015DA ¹⁾ *
CIPOS™ Mini	600	2/3-phase inverter	0.33	DIP 36x21	IRSM5y5-065PA/IRSM5y5-055PA ¹⁾ *
					IRSM5y5-035PA/IRSM5y5-025PA ¹⁾ *
					IRSM5y5-015PA ¹⁾ *
CIPOS™ Mini	600	2/3-phase inverter	0.33	DIP 36x21	IM512-L6A/IM513-L6A

IGBT based CIPOS™ IPMs					
Product family	Voltage [V]	Configuration	Rated current [A]	Package	Product name
CIPOS™ Micro	600	3-phase inverter	3.0/4.0	DIP 29x12F	IM240-S6Y1B/IM240-S6Y2B IM240-M6Y1B/IM240-M6Y2B
			4.0/6.0	DIP 29x12	IM231-M6T2B/IM231-L6T2B
			3.0/4.0	SOP 29x12F	IM240-S6Z1B IM240-M6Z1B
			4.0/6.0	SOP 29x12	IM231-M6S1B/IM231-L6S1B
CIPOS™ Mini	600	PFC integrated	10.0~20.0	DIP 36x21D	IFCM10S60GD/IFCM10P60GD IFCM15S60GD/IFCM15P60GD IM564-X6D
		3-phase inverter	4.0 ~ 30.0	DIP 36x21	IGCM04F60GA/IGCM04G60GA IGCM06F60GA/IGCM06G60GA IGCM10F60GA/IKCM10H60GA/IKCM10L60GA IGCM15F60GA/IKCM15L60GA */IKCM15F60GA/IKCM15H60GA IGCM20F60GA/IKCM20L60GA IKCM30F60GA
			15.0 ~ 30.0	DIP 36x21D	IKCM15L60YD */IKCM20L60YD */IKCM30F60YA ²⁾ *
	650	3-phase interleaved PFC	20	DIP 36x21D	IFCM20T65GD/IFCM20U65GD
		2-phase interleaved PFC	30	DIP 36x21D	IFC30T65GD */IFCM30U65GD
CIPOS™ Maxi	1200	3-phase inverter	5.0/10.0	DIP 36x23D	IM818-SCC/IM818-MCC

1) y = 0 (with NTC), y = 1 (without NTC)

2) y = G (with NTC), y = H (without NTC)



Motor control ICs

Solutions for motor control systems in automotive, consumer and industrial applications

iMOTION™ products for industrial and consumer motor control applications

iMOTION™ products are offered in several integration levels on both hardware as well as software. The hardware integration ranges from stand-alone motor controllers up to fully integrated inverters in the SmartIPMs. On software offering, Infineon is providing full turnkey solutions as well as freely programmable modules. Using the turnkey products that are based on the patented and field proven motor control engine (MCE) and assisted by powerful tools like MCEwizard and MCEdesigner the implementation of a variable speed drive is reduced to configuring the respective motor. Infineon provides complete solution for motor control with its combined offering of iMOTION™ together with EiceDRIVER™ gate drivers, TRENCHSTOP™ IGBTs, CoolMOS™ MOSFETs and CIPOS™ IPMs.


Intelligent motor control ICs

Power bridges for all kind of motors in automotive and industrial applications from 100 mA up to 70 A with different feature sets scaled to your needs. Choose from our single and multi half-bridge ICs, integrated full-bridge drivers, servo and stepper motor drivers or multi-MOSFET driver.

Automotive embedded power ICs (system-on-chip)

Infineon's embedded power ICs are specifically designed to enable mechatronic motor control solutions for a range of motor control applications, where a small package form factor and a minimum number of external components are essential, including but not limited to: window lift, sunroof, wiper, fuel pump, HVAC fans, engine cooling fan, water pumps. See more on embedded power solutions in Microcontroller section, **pages 320-343**.

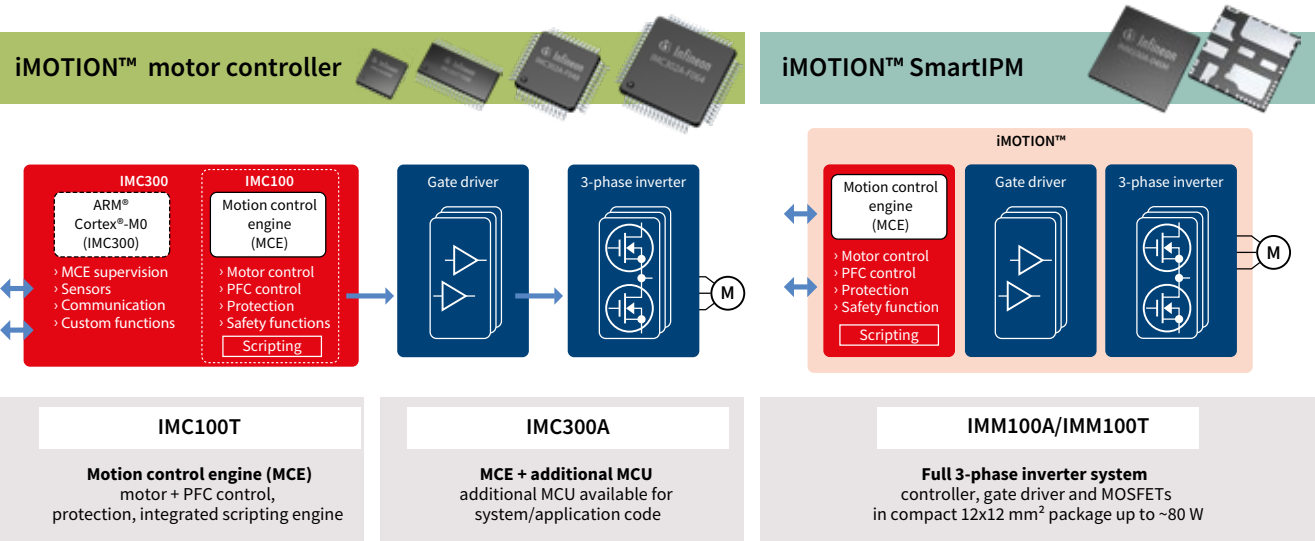
www.infineon.com/motor-control-ics

For more details on the product, click on the part number. 

iMOTION™

Flexible and scalable platform for motor control solutions

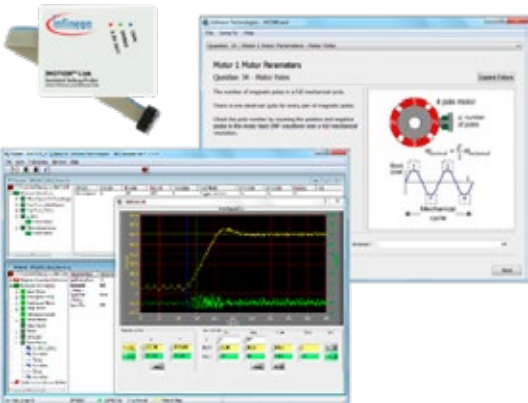
iMOTION™ products integrate all required hardware and software functions for the control of a variable speed drive (VSD). Infineon's field proven motion control engine (MCE) eliminates software coding from the motor control development process reducing the research and development efforts to the configuration for the respective motor. The MCE implements highly efficient control of the motor and an optional power factor correction (PFC) and integrates all necessary protections and a flexible scripting engine. Configuration options allow the use of single or leg shunt current measurement as well as sensorless or hall-based field oriented control (FOC). Assisted by powerful tools like MCEWizard and MCEDesigner it is possible to have the motor up and running in less than an hour. Integrated support for functional safety for home appliances paves the way to meet regulations in the global market.



Features and benefits

Key features
Ready-to-use and field-proven motor control solution
Multiple integrated protection features
Functional safety acc. IEC/UL 60730 supported
Scalable - from motor to scripting, PFC and additional MCU
Various integration levels - from motor controller to SmartIPM
iMOTION™ controller – run with any gate driver and power stage
iMOTION™ SmartIPM – highest integration level

Key benefits
Fastest time to market
Easy to use – no motor control coding required
High performance and energy-optimized solution
Reduced cost of ownership due to R&D savings
Easy adaptation to differing application requirements
Highest flexibility for low or high voltage drives
Reduced system cost due to minimum BOM count and PCB size



PC tools and evaluation kits are available to configure, test and fine-tune the drive inverter.

MCEWizard

SW tool to generate initial drive control parameters

MCEDesigner

SW tool to test, monitor and fine-tune the motor drive – including trace features for live monitoring

iMOTION™ Link

Isolated debug interface to iMOTION™ devices

www.infineon.com/iMOTION
www.infineon.com/iMOTION-software

For more details on the product, click on the part number.








iMOTION™ Modular Application Design Kit

Infiniteon's motor control evaluation platform

The iMOTION™ Modular Application Design Kit (MADK) evaluation platform targets variable speed-drive applications up to 2 kW. The platform offers a modular and scalable system solution with different control board options and a wide range of power boards. While the M1 platform provides control of a permanent magnet synchronous motor (PMSM), the M3 platform additionally includes the power factor correction (PFC) implemented as a CCM boost PFC.

Using the iMOTION™ MADK standardized platform interfaces, different control and power boards can be combined in a system that perfectly meets the requirements of the application. This modular approach allows developers maximum flexibility and scalability during evaluation and development phase at affordable costs.

Get a motor running in less than 1 hour!

Motor control boards		Wide range of power boards		
M1	EVAL-M1-101T IMC101T-T038 Control card		EVAL-M1-36-84A CIPOS™ Nano-power board IRSM836-084MA ~110V/80W	
	EVAL-M1-099M-C IRMCK099 Control card		EVAL-M1-CM610N3 CIPOS™ Mini-power board IKCM10H60GA ~220V/750W	
	EVAL-M1-101TF IMC101T-F048 Control card		EVAL-M1-IM818-A CIPOS™-Maxi power board IM818-MCC ~380V/1500W	
Motor + PFC control boards		Power boards with PFC		
M3	EVAL-M3-102T IMC102T-F064 Control card		EVAL-M3-CM615PN CIPOS™ mini with boost PFC IFCM15S60GD ~220V/650W	
	EVAL-M3-302F IMC302A-F064 Control card		EVAL-M3-IM564 CIPOS™ mini with boost PFC IM564-X6D ~220V/2000W	

Further information, datasheets and documents

www.infineon.com/MADK

For technical assistance

www.infineon.com/support



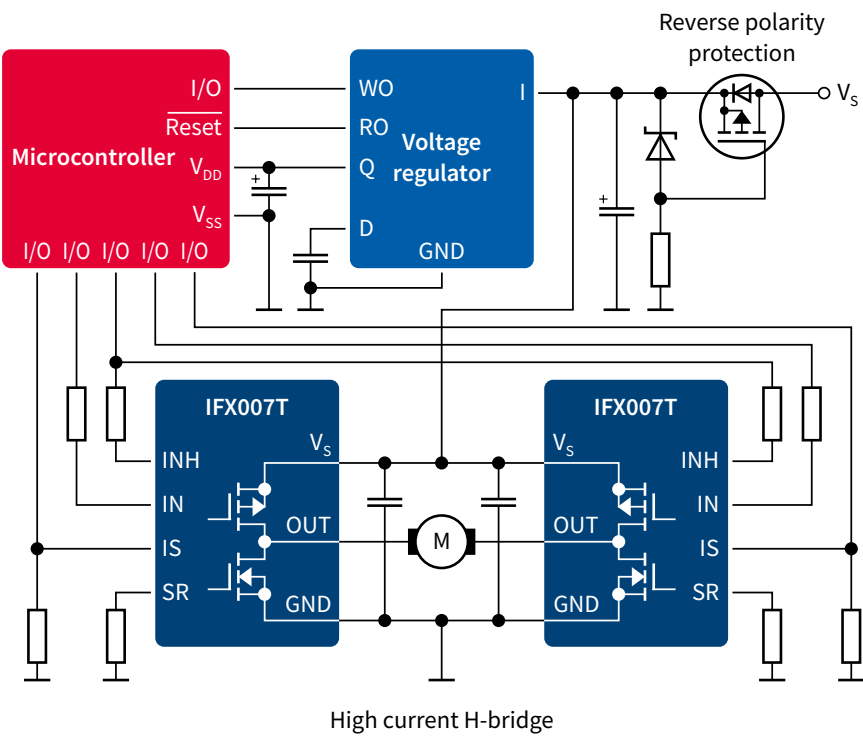
For more details on the product, click on the part number.

Single half-bridge IC

Protected high current half-bridge for use in automotive and industrial applications

The NovalithIC™ provides a complete, low-ohmic protected half-bridge in a single package (typ. path resistance at 25°C down to 10 mΩ). It can also be combined with an additional NovalithIC™ to create a H-bridge or three-phase bridge. The NovalithIC™ family has the capability to switch high-frequency PWM while providing overcurrent, overvoltage and overtemperature protection. The NovalithIC™ family offers cost-optimized, scalable solutions for protected high-current PWM motor drives with very restrictive board space. Due to the P-channel high-side switch the need for a charge pump is eliminated thus minimizing EMI. The latest addition to the NovalithIC™ family is the IFX007T, which is optimized for industrial applications.

Application example for high-current PWM motor drives



Features

Basic features
Low quiescent current
Capable for high PWM frequency
Logic level input
Adjustable slew rate
Cross-current protection

Protection features
Overtemperature shutdown
Overvoltage shutdown
Undervoltage
Overcurrent

Diagnostic features
Overtemperature
Overvoltage
Current sense and status

Product number	Operating range [V]	R _{DS(on)} path (typ.) [mΩ]	I _{D(lim)} (typ.) [A]	I _q (typ.) [μA]	Switch time (typ.) [μs]	Diagnosis	Protection	Package	Qualification
IFX007T	5.5 ... 40.0	10.0	70	7	0.25	OT, OC, CS	UV, OT, OC	PG-TO-263-7	JESD471

www.infineon.com/novalithic

CS = Current sense OC = Overcurrent OT = Overtemperature UV = Undervoltage

For more details on the product, click on the part number.

DC motor control shield with IFX007T for Arduino

The BLDC motor control shield is a high current motor control board compatible with Arduino and Infineon's XMC4700 Boot Kit. It is equipped with three smart IFX007T half-bridges. The BLDC motor control shield is capable to drive one BLDC motor. Alternatively, it can be used to drive one or two bidirectional DC motors (H-Bridge configuration, cascaded to support second motor) or up to three unidirectional DC motors (half-bridge configuration). The implemented integrated NovalithIC™ IFX007T half-bridges can be controlled by a PWM via the IN-pin.

Features

Key features
Capable of high frequency PWM, e.g. 30 kHz
Adjustable slew rates for optimized EMI by changing external resistor
Driver circuit with logic level inputs
Diagnosis with current sense

Target applications

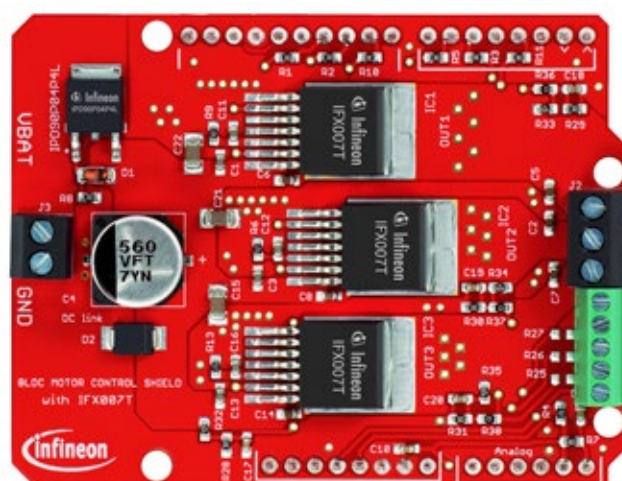
- › Brushed DC motor control up to 250 W continuous load
- › 24 V nominal input voltage (max. 6 V–40 V)
- › Average motor current 30 A restricted due to PCB (IFX007T current limitation @ 55 A min.)

BLDC-SHIELD_IFX007T

DC motor control with half-bridge IFX007T

Infineon's shields for Arduino are compatible with microcontroller boards using the Arduino-compatible form factor, e.g. Infineon's XMC™ microcontroller kits.


Ordering code: BLDCSHIELDIFX007TTOB01



www.infineon.com/shields-for-arduino

www.infineon.com/makers

www.infineon.com/novalithIC

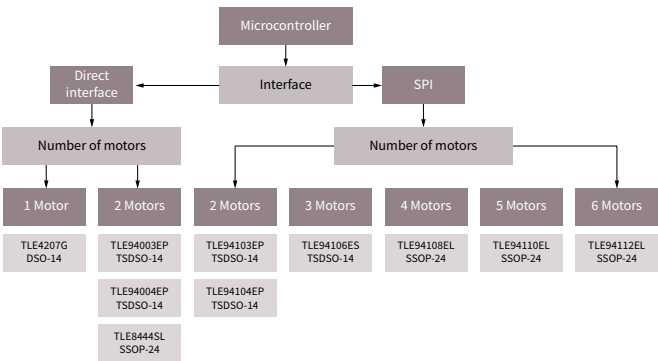
For more details on the product, click on the part number. 

Multi half-bridge ICs

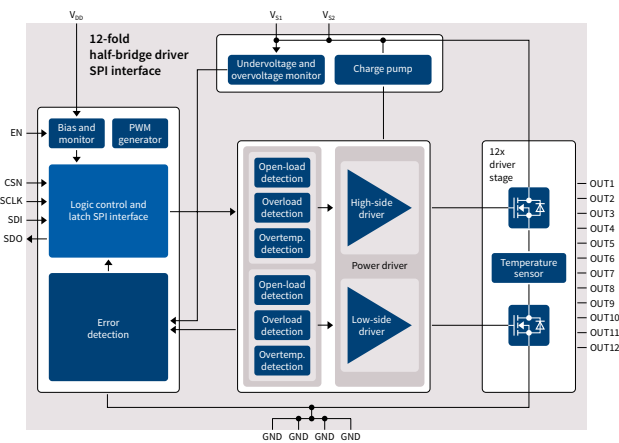
Extensive offering ranging from two-fold half-bridge ICs to twelve-fold half-bridge ICs

The TLE94xyz are protected half-bridge drivers designed for 12 V motion control applications such as small DC motors for heating, ventilation and air conditioning (HVAC), as well as automotive mirror adjustment and fold. The family offers three-, four-, six-, eight-, ten-, and twelve-fold integrated half-bridge driver. All devices can drive DC motor loads up to 0.9 A per output or the outputs can be used stand-alone or combined to increase driving capability up to 3.6 A. They provide diagnosis of short circuit, open load, power supply failure and overtemperature for each half-bridge to ensure safe operation in HVAC or other systems. The TLE94xyz offers enhanced EMC performance, which in combination with the low quiescent current and a small package makes the product attractive for a wide range of 12 V automotive and industrial applications.

Infineon's portfolio of multi half-bridge ICs



Block diagram TLE94112EL



Features and benefits

Key features and benefits
Three-, four-, six-, eight-, ten-, and twelve-fold half-bridges with integrated output stages and PWM
16-bit SPI or direct inputs for control and diagnosis
Voltage supply range: 5.5– 20 V
Adjustable open load threshold for two outputs
Variable driving schemes for up to

Key applications

- › 12 V automotive and industrial applications
- › Flap motors in HVAC systems
- › Mirror adjustment and fold
- › Small DC motors (≤ 0.9 A/output)
- › Bistable relays
- › Bipolar stepper motors in full-step and half-step mode

Product name	Config.	$I_{L(NOM)}$ [A]	$I_{L(lim)}$ [A]	I_q [μA]	$V_{S(OP)}$ [V]	Protection	Diagnostic interface	Highlights	$V_{CE(sat)}/R_{DS(on)}$ [mΩ]	Package
TLE94003EP	3 x half-bridge	3 x 0.30	3 x 0.90	0.6	5.5 to 20	OC, OT, VS, UV/OV	Error flag	TLE94xyz family concept + small package	850/switch	TSDSO-14-EP
TLE94103EP	3 x half-bridge	3 x 0.30	3 x 0.90	0.6	5.5 to 20	OC, OT, OL, VS, UV/OV	16-bit SPI	TLE94xyz family concept + small package		TSDSO-14-EP
TLE94004EP	4 x half-bridge	4 x 0.30	4 x 0.90	0.6	5.5 to 20	OC, OT, VS, UV/OV	Error flag	TLE94xyz family concept + small package		TSDSO-14-EP
TLE94104EP	4 x half-bridge	4 x 0.30	4 x 0.90	0.6	5.5 to 20	OC, OT, OL, VS, UV/OV	16-bit SPI	TLE94xyz family concept + small package		TSDSO-14-EP
TLE94106ES	6 x half-bridge	6 x 0.30	6 x 0.90	0.6	5.5 to 20	OC, OT, OL, VS, UV/OV	16-bit SPI	TLE94xyz family concept + backwards compatible to TLE84106EL		TSDSO-24
TLE94108EL	8 x half-bridge	8 x 0.30	8 x 0.90	0.6	5.5 to 20	OC, OT, OL, VS, UV/OV	16-bit SPI	TLE94xyz family concept		SSOP-24
TLE94110EL	10 x half-bridge	10 x 0.30	10 x 0.90	0.6	5.5 to 20	OC, OT, OL, VS, UV/OV	16-bit SPI	TLE94xyz family concept + backwards compatible to TLE84110		SSOP-24
TLE94112EL	12 x half-bridge	12 x 0.30	12 x 0.90	0.6	5.5 to 20	OC, OT, OL, VS, UV/OV	16-bit SPI	TLE94xyz family concept + 12 outputs in one package		SSOP-24
TLE4207G	2 x half-bridge	2 x 0.80	2 x 1.50	20	8 to 18	OC, OT, VS, UV/OV	Status flag	Error detection		DSO-14
TLE8444SL	4 x half-bridge	4 x 0.50	4 x 0.90	1	8 to 18	OC, OT, OL, VS, UV/OV	Status flag	Open-load detection in ON-state		SSOP-24

DC motor shield with TLE94112EL for Arduino

The DC motor shield is a small evaluation board equipped with TLE94112EL for use with Arduino. The TLE94112EL is capable to drive up to 6 small DC motors in parallel mode or up to 11 DC motors in cascaded mode. All outputs can drive up to 0.9 A. The outputs can be used stand-alone or combined to increase driving capability up to 3.6 A.

Features

Key features
Driver with 12 half-bridge outputs to drive DC motors, resistive or inductive loads
Driver is protected against overtemperature, overcurrent, overvoltage, undervoltage and enables diagnosis of overcurrent, overvoltage, undervoltage
SPI interface with zero clock diagnosis
Enhanced EMC performance
Integrated PWM generator with three different frequencies (80 Hz, 100 Hz, 200 Hz)

Target applications

- › Multi-motor applications
- › DC motors and voltage controlled bipolar stepper motors
- › Toys
- › HVAC systems

www.infineon.com/shields-for-arduino

www.infineon.com/makers


OC = Overcurrent

OT = Overtemperature

OL = Openload

UV = Undervoltage

OV = Overvoltage

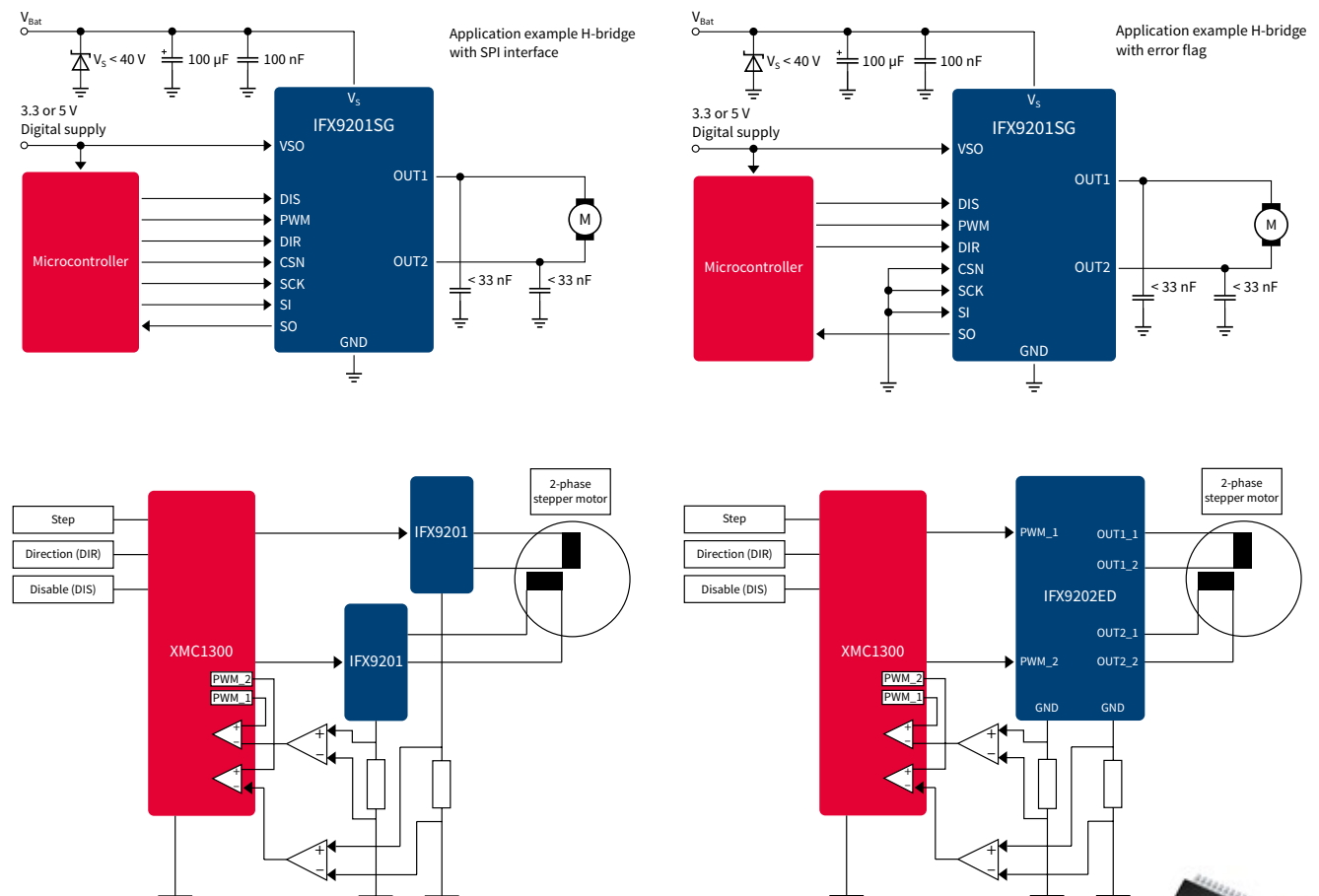
For more details on the product, click on the part number. 

Integrated full-bridge driver

General purpose 6 A H-bridges

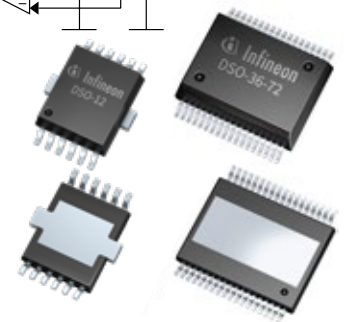
IFX9201SG and IFX9202ED are general purpose 6 A H-bridges designed for the control of small DC motors and inductive loads. The outputs can be pulse width modulated at frequencies up to 20 kHz, which enables operation above the human sonic range by means of PWM/DIR control. While the signal at the DIR input defines the direction of the DC motor, the PWM signal controls the duty cycle. For load currents above the current limitation threshold (8 A typically), the H-bridges switch into chopper current limitation mode.

Applications examples



Features

Key features	
Up to nominal 36 V supply voltage	
Short circuit, overtemperature protection and undervoltage shutdown	
Detailed SPI diagnosis or simple error flag	
Simple design with few external components	
Small and robust DSO-12-17 (IFX9201SG) and DSO-36-72 (IFX9202ED) packages	



Product number	Operating voltage	Current limit (min.) [A]	Quiescent current (typ.) [μ A]	Operating range [V]	$R_{DS(on)}$ (typ./switch) [m Ω]	Package	R_{thJC} (max.) [K/W]
IFX9201SG	4.5 to 36 V	6.0	10.0	70	7	PG-DSO-12 (power)	2.0
IFX9202SG *	4.5 to 36 V	2 x 6.0 A	19.0	5 to 36	2 x 100	DSO-36	2 x 0.5

www.infineon.com/dc-motor-bridges

*For more information on the product, contact our product support

For more details on the product, click on the part number.

H-BRIDGE KIT 2GO with IFX9201SG

Build your own DC motor control with the H-bridge Kit 2GO, a ready-to-use evaluation kit. It is fully populated with all electronic components equipped with the H-bridge IFX9201 combined with XMC1100 microcontroller based on Arm® Cortex®-M0 CPU. It is designed for the control of DC motors or other inductive loads up to 6 A or up to 36 V of supply.

Target applications

- › DC motor control for industrial applications
- › Home and building automation
- › Power tools battery management
- › Industrial robotic applications
- › Electric toys applications

Ordering code: HBRIDGEKIT2GOTOB01



KIT_XMC1300_IFX9201

Stepper motor control shield with IFX9201SG and XMC1300 for Arduino

The stepper motor control shield from Infineon is one of the first high current stepper motor control boards being compatible to Arduino as well as to Infineon's XMC1100 boot kit. The stepper motor control shield is capable to drive the two coils in a stepper motors featuring dual-half bridge configuration. The implemented integrated IFX9201 half-bridges can be controlled by a STEP-signal via the STEP pin. Interfacing to a microcontroller is made easy by the integrated XMC1300 microcontroller that holds the peripherals to allow high-speed current control. Microstepping of the stepper motor can be achieved using the internal comparators, while operational amplifiers are installed to adapt the motor current sense signal to the microcontroller's input levels.

Features and benefits

Key features
Compatible with microcontroller boards using the Arduino form factor, e.g. Infineon's XMC™ microcontroller kits
Capable of high frequency PWM, e.g. 30 kHz
Adjustable slew rates for optimized EMI by changing external resistor
Driver circuit with logic level inputs
Diagnosis with current sense

Key benefits
Fast and inexpensive prototyping of stepper motor control
Simple testing of microstepping algorithms
Diagnose pin to allow hardware feedback during development
Overtemperature shutdown with latch behavior and undervoltage shutdown of the power section


Target applications

- › Stepper motors up to 5 A phase current
- › 24 V nominal input voltage for the power stage
- › Average motor current 3 A without additional cooling effort, 5 A possible with proper cooling

Ordering code: KITXMC1300IFX9201TOB01



www.infineon.com/dc-motor-bridges

For more details on the product, click on the part number. 

Stepper motor driver

Cost-efficient, durable and reliable

The TLE8444SL is a protected quad-half-bridge IC targeted towards automotive and industrial motion control applications. It is a monolithic die based on Infineon's smart mixed technology SPT which combines bipolar and CMOS control circuitry with DMOS power devices. DC Motors can be driven in forward (cw), reverse (ccw), brake and high impedance modes where as stepper motors can be driven in no-current, negative/positive output current modes. These various modes can easily be achieved via standard parallel interface of the device to a microcontroller. The PG-SSOP-24-7 package is advantageous as it saves PCB board space and costs. The integrated short circuit and overtemperature protection as well as its built-in diagnosis features such as over- and undervoltage lockout and open load detection improve system reliability and performance.

Features

Benefits
Suited for fast switching applications (PWM capability up to 10kHz)
Easy failure detection
Low impact on battery lifetime
Implementation of thermal shutdown extends IC lifetime
Allows motor peak currents up to 0.9a
Broken wire connections easily detected
Designed for automotive and industrial applications

Applications

- > Unipolar or bipolar loads
- > Stepper motors in automotive and industrial applications (e.g. idle speed control for small cars or motor bike)



Product number	$I_{L(NOM)}$	$I_{L(lim)}$	I_q [μA]	$V_{S(op)}$	Step operations	Protection	Diagnostic interface	Highlights	Package
TLE8444SL	4x0.50	4x0.90	1	1-18	Full to half-step	SC, OT, OV, UV, OL	Status flag	Open-load detection in on-state	SSOP-24-7

CS = Current sense

OC = Overcurrent

OT = Overtemperature

SC = Short circuit

UV = Undervoltage

OL = Open-load



Infineon support for power ICs

Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/acdc

www.infineon.com/coolset

www.infineon.com/integrated-powerstages

www.infineon.com/digital-controller

www.infineon.com/lighting-ics

www.infineon.com/isoface

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www.infineon.com/xdp

www.infineon.com/ipm

www.infineon.com/madk



Support



Evaluation
Board



Tools



Simulation



Intelligent power switches and modules

- › ISOFACE™ isolated industrial interface
- › HITFET™ protected low-side switches
- › Industrial PROFET™ protected high-side switches
- › Infineon support for intelligent switches and input ICs



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

Applications

ISOFACE™ isolated industrial interface

Output switches and digital input ICs offering unmatched system uptime, reliability and shortened product launch time by 50%

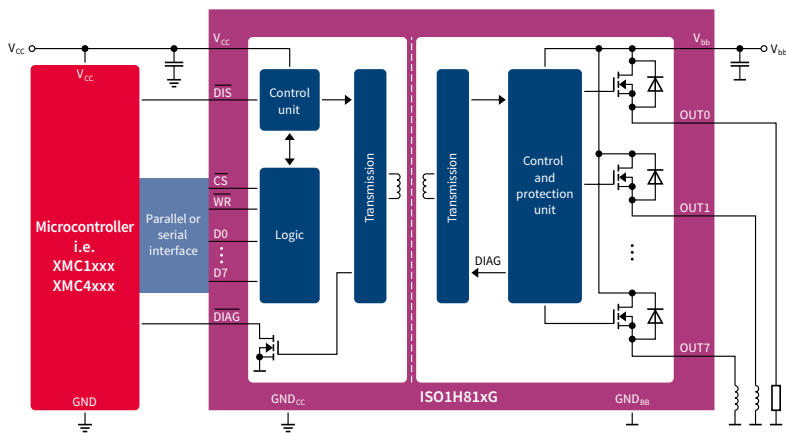
Our ISOFACE™ product family provides robust and intelligent galvanic isolation for industrial control applications such as programmable logic controllers, sensor input modules, control panels and general control equipment. The output switches are compact in design, enabling robust and reliable operation at low system cost. Ideal for high-speed applications, digital input ICs are equally robust, reliable and compact – also offering superior EMI robustness and setting a new standard in diagnostics.

ISOFACE™ galvanic-isolated 8-channel output switches

The ISO1H81xG product family integrates:

- › Robust galvanic isolation (UL508 and EN 61131-2 certified) to protect the 3.3 V/5 V control domain of an industrial control system from the harsh 24 V process side
- › 8-channel high-side power-switching capabilities of up to 1.2 A per channel
- › Active current limitation and overtemperature protection
- › Common diagnostic feedback for overtemperature and for Vbb undervoltage

Isolated output switch block diagram



Isolated output switches



Features and benefits

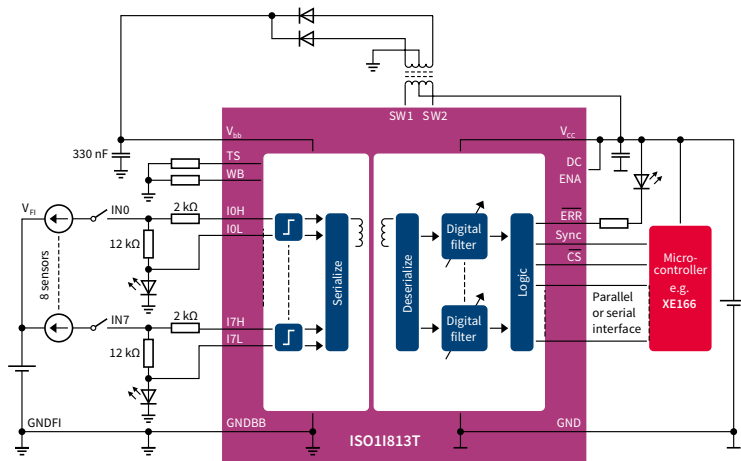
Key features
Integrated galvanic isolation (500 V)
Eight channels (0.6 or 1.2 A, each)
Inductive load switching
Diagnostic feedback (overtemperature, overload)
Serial and parallel MCU interface

Key benefits
Robust and reliable
Compact system solution
Lower system cost
System status feedback
Directly interfacing with all MPUs and MCUs

ISOFACE™ galvanic-isolated digital input ICs

The ISO1I81xT digital input IC family is an intelligent system solution offering robust galvanic isolation between the microcontroller on the “control side” and the 24 V factory floor environment, frequently referred to as the process side.

Digital input switch block diagram



Galvanic-isolated digital input ICs



Features and benefits

Key features
Integrated galvanic isolation (500 V)
Eight channels (IEC type 1/2/3)
Up to 500 kHz sampling speed
Programmable input filters
Channel-specific diagnostics (wire-break, undervoltage)

Key benefits
Robust and reliable
Compact system solution
High-speed applications
Superior EMI robustness
System status feedback
Valuable maintenance support

XMC4800 automation board V2



Orderable part number:
KITXMC48AUTBASEV2TOB01

Featured products

- › XMC4800-E196K2048 -Arm® Cortex®-M4 microcontroller
- › ISO2H823V2.5- 24 V 8-channel isolated output
- › ISO1I813T - 24 V 8-channel isolated input
- › SLS 32AIA020A4 USON10 - OPTIGA™ Trust E – embedded security solution
- › TLE6250GV33 - Infineon CAN transceiver
- › IFX54441LDV - Infineon voltage regulator

Key features

- › Complete automation kit gateway
- › Combined MCU with EtherCAT® slave application
- › Isolated interfaces w/ diagnose
- › Ethernet connectivity with software examples available
- › Full software DAVE™ examples

www.infineon.com/isoface

For more details on the product, click on the part number.

ISOFACE™ product portfolio

ISOFACE™ output switches

Product overview		ISO1H801G	ISO1H811G	ISO1H812G	ISO1H815G	ISO1H816G
Switch	V _{bb} operational range: 11 V to 35 V	✓	✓	✓	✓	✓
	Max. continuous load current per channel	0.6 A	0.6 A	0.6 A	1.2 A	1.2 A
	Load current increase by using outputs in parallel	✓	✓	✓	✓	✓
	Inductive clamping energy per channel: 1 Joule	✓	✓	✓	✓	✓
Microcontroller interface	Type	Parallel	Parallel	Serial	Parallel	Serial
	Nominal voltages	5 V	3.3 V/5 V	3.3 V/5 V	3.3 V/5 V	3.3 V/5 V
Safety features	Isolation voltage: V _{ISO} = 500 V UL508 and EN 61131-2 certified	✓	✓	✓	✓	✓
	Active current limitation	✓	✓	✓	✓	✓
	Thermal shutdown	✓	✓	✓	✓	✓
	Common output disable pin	✓	✓	✓	✓	✓
Diagnostics feedback	Overtemperature		✓	✓	✓	✓
	V _{bb} undervoltage		✓	✓	✓	✓
Package DSO-36 (16x14 mm)		✓	✓	✓	✓	✓
Ordering code		ISO1H801GAUMA1	ISO1H811GAUMA1	ISO1H812GAUMA1	ISO1H815GAUMA1	ISO1H816GAUMA1

ISOFACE™ digital input IC

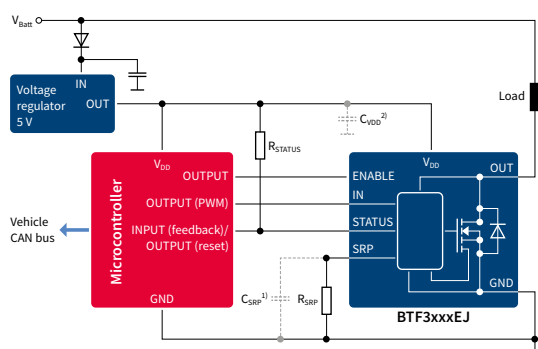
Product overview		ISO1I811T	ISO1I813T
Input characteristics	IEC type: I, II, III	✓	✓
	Input status LED	✓	✓
	Max. sampling frequency	125 kHz	500 kHz
	Deglitching filter setting	Hard wired	Software, individual per channel
	Synchronous data acquisition	–	✓
µC interface	3.3 V/5 V	✓	✓
	Serial and parallel	✓	✓
Safety features	500 V isolation voltage	✓	✓
	Wire break, channel-specific	–	✓
	V _{bb} undervoltage	–	✓
Support for external V _{bb} supply		–	✓
Package TSSOP-48 (8x12.5 mm)		✓	✓
Ordering code		ISO1I811TXUMA1	ISO1I813TXUMA1

HITFET™

Protected low-side switches

HITFET™ stands for highly-integrated temperature-protected MOSFET. These well-established low-side switches offer a compelling feature set with protection against overtemperature, short circuit and overload conditions as well as ESD robustness. The HITFET™+ family is the new generation based on a new technology, enabling a significant shrink compared to the existing HITFET™ portfolio (up to 50 percent shrink). This novel generation consists of standard and fully-featured protected low-side switches (11 to 125 mΩ) in the TO-252-3 DPAK/TO-252-5 DPAK and TDSO-8 packages. HITFET™ and HITFET™+ devices address a wide range of applications including resistive, inductive and resistive loads.

Application diagram example for HITFET™



1) $C_{SRP} \cdot GND < 100 \text{ pF}$ – maximum permitted parasitic capacitance at the SRP-pin
2) Filter capacitor on supply, recommended 100 nF

Key applications

- > Industrial automation *
- > Programmable logic controller (PLC) * *
- > Digital I/O modules
- > Building and home management
- > All kind of solenoid or valve driving
- > Power modules
- > Solar power inverters

Features and benefits

Key features	Key benefits
Low-side switches with integrated protection features	High design flexibility with scalable $R_{DS(on)}$ and package
Scalable in $R_{DS(on)}$ ranges from 490 mΩ down to 11 mΩ	Driving applications with high switching speed requirements up to 25 kHz (e.g. valve, solenoid)
Adjustable slew rate control (BTFxxx)	Easy to design-in
Thermal shutdown with auto restart or latch behavior	Choice of packages to match individual application needs
Status feedback via <ul style="list-style-type: none"> > Increased input current (HITFET™ 2nd gen.) > Digital readout via SRP (BTF3050TE) > Via status pin (BTF3xxxEJ) 	

Low-side switch shield with BTF3050TE for Arduino



Featured products: Three BTF3050TE low-side switches of the HITFET™+ family
Compatible with: Microcontroller boards using the Arduino form factor and the corresponding Infineon's kits with Arm® powered XMC™ microcontroller
Orderable part number: SHIELDBTF3050TETOBO1

BTT3018EJ DEMOBOARD



Featured products: One single-channel low-side switch of BTT3018EJ
Compatible with: Can be used as single stand and is also pin-compatible with microcontroller boards using the Arduino form factor (e.g. XMC1100 Boot Kit, Arduino Uno)
Orderable part number: BTT3018EJDEMOBOARDTOBO1

www.infineon.com/hitfet

www.infineon.com/shields-for-arduino

* See block diagram on page 278

** See block diagram on page 279

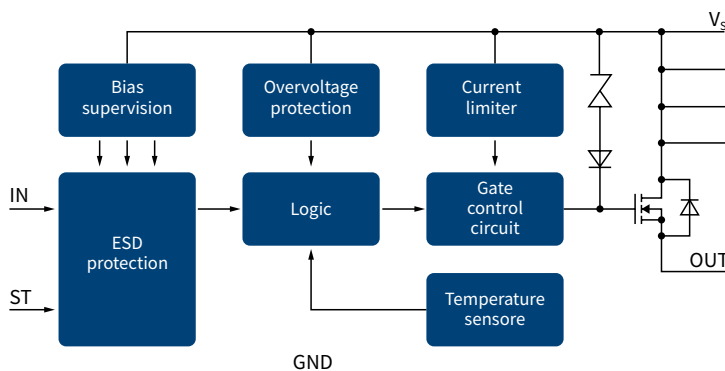
For more details on the product, click on the part number.

Industrial PROFET™

Protected high-side switches

The well-established high-side switch Industrial PROFET™ products were designed for targeting a variety of industrial applications which include all types of resistive, inductive and capacitive loads. Due to their outstanding energy robustness, they are perfectly suitable for switching even higher inductive loads and driving relays. Their main application areas include high-voltage applications (VBAT up to 60 V), high-speed PWM applications (up to 1 kHz) and they are most notably capable of switching higher inductances smoothly. Industrial PROFET™ can be applied to drive any kind of sensor units, indicators, displays, LEDs, relays, valves and magnetic actuators or replace electromechanical relays, fuses and discrete circuits. Industrial PROFET™ products are also the perfect match for applications with long wiring or any other kind of inductive loads or applications with space constraints.

PROFET™ typical block diagram



Key applications

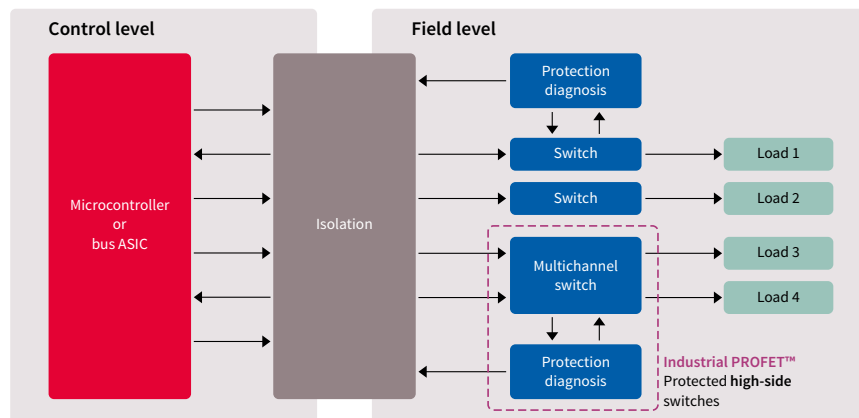
- > Industrial automation
- > Programmable logic controller (PLC)
- > Digital I/O modules
- > Robotics
- > Building and home automation
- > Solar applications
- > Wind energy systems
- > Smart grid
- > Motor control and drives
- > Power supplies

Features and benefits

Key features
Right fit for digital output switches, motor or robot control, protected switching of decentralized loads like sensors or auxiliary supply
Outstanding robustness and reliability as required by industrial mission profiles
Thermally optimized products with low $R_{DS(on)}$ to deal with the high ambient temperatures and limited or even no cooling
Diagnosis and protection for safe system operation
Small and compact design for higher integration and applications with space constraints

Key benefits
Small system form factor
No/little downtime of system in operation
Low heating up of a system
System cost saving by built-in protection and tailored featureset
Reduced system maintenance efforts by providing optimized diagnostics


PLC – programmable logic controller digital output modules



PROFET™ as actuators typically address I/O modules supplying nominal currents of 2 A or 0.5 A. However PROFET™ portfolio as well provides devices also for lower and higher currents. PROFET™ parts are suitable for switching resistive, capacitive and, by featuring high EAS, inductive loads. **Corresponding PROFET™ evaluation boards are available on request.**



www.infineon.com/industrial-profet

For more details on the product, click on the part number. 



Load current Typical, per channel	1-channel	2-channel	4-channel	8-channel
7 A	ITS428L2 ● 7 A, 60 mΩ, TO-252-5			
3 A	ITS4060S-SJ-N, ISP772T 3.1 A, 60 mΩ, DSO-8			
2 A ... 3 A	ITS4100S-SJ-N, ISP762T 2.4 A, 100 mΩ, DSO-8			
1 A ... 2 A	ITS4200S-ME-P, ITS4142N 1.4 A, 200 mΩ, SOT223	ITS4040D-EP-D ● 2.6 A, 40 mΩ, TSDSO14	ITS4075Q-EP-D ● 2.6 A, 75 mΩ, TSDSO14	
	ISP752T 1.3 A, 200 mΩ, DSO-8	ITS5215L ● 2 A, 90 mΩ, DSO-12	ITS724G ● 2 A, 90 mΩ, DSO-20	
	ITS4200S-SJ-D, ISP752R ● 1.2 A, 200 mΩ, DSO-8		ITS716G ● 1 A, 140 mΩ, DSO-20	
			ITS711L1 ● 1 A, 200 mΩ, DSO-20	
0.5 A ... 1 A	ITS4200S-ME-N, ISP452 0.7 A, 200 mΩ, SOT223		ITS4090Q-EP-D ● 0.7 A, 90 mΩ, TSDSO14	ITS42008-SB-D, ITS4880R ● 0.6 A, 200 mΩ, DSO-36
	ITS4200S-ME-O, ITS4141N 0.7 A, 200 mΩ, SOT223		ITS4130Q-EP-D ● 0.65 A, 130 mΩ, TSDSO14	
	ITS4141D 0.5 A, 200 mΩ, TO-252-5			
< 0.5 A	ITS4300S-SJ-D, ISP742RI ● 0.4 A, 300 mΩ, DSO-8	ITS42K5D-LD-F ● 0.25 A, 2.5Ω, TSON-10		
	ITS41k0S-ME-N, ITS4140N 0.2 A, 1Ω, SOT223			

● = With diagnosis


HITFET™ product portfolio

Product type	Product family	Channels	R _{DS(on)} @ 25°C [mΩ]	Nominal load current [A]	E _{AS} [mJ]	Operating voltage range [V]	I _{L(SD)} (typ) [A]	I _{L(lim)} (typ) [A]	I _{L(lim)_TRIG- GER} (typ) [A]	Diagnosis	Package
BTS3011TE	HITFET™+	1	10.7	10	300 @ 5 A	up to 28	–	35	70	Status pin	TO-252-5 (DPAK 5-leg)
BTT3018EJ	HITFET™+	1	16	7.0	150	up to 36	–	45	–	Status pin	TDSO-8
BTS3035EJ	HITFET™+	1	28	5.00	105 @ 5 A	up to 31	–	20.00	–	Status pin	TDSO-8
BTS3035TF	HITFET™+	1	30	5.00	106 @ 5 A	up to 31	–	20.00	–	–	TO-252-3 (DPAK 3-leg)
BTF3035EJ	HITFET™+	1	28	5.00	95 @ 5 A	up to 32	–	14.00	41.00	Status pin	TDSO-8
BTF3050TE	HITFET™+	1	40	3.00	120 @ 3 A	up to 28	–	8.00	30.00	Through SRP pin	TO-252-5 (DPAK 5-leg)
BTS3050EJ	HITFET™+	1	40	4.00	62 @ 3 A	up to 31	–	15.00	–	Status pin	TDSO-8
BTS3050TF	HITFET™+	1	44	4.00	64 @ 4 A	up to 31	–	15.00	–	–	TO-252-3 (DPAK 3-leg)
BTF3050EJ	HITFET™+	1	40	4.00	62 @ 4 A	up to 32	–	10.00	29.00	Status pin	TDSO-8
BTS3060TF	HITFET™+	1	50	3.00	55 @ 3 A	up to 35	–	10.50	–	–	TO-252-3 (DPAK 3-leg)
BTS3080EJ	HITFET™+	1	64	3.00	35 @ 3 A	up to 31	–	10.00	–	Status pin	TDSO-8
BTS3080TF	HITFET™+	1	69	3.00	38 @ 3 A	up to 31	–	10.00	–	–	TO-252-3 (DPAK 3-leg)
BTF3080EJ	HITFET™+	1	64	3.00	33 @ 3 A	up to 32	–	7.00	18.00	Status pin	TDSO-8
BTS3125EJ	HITFET™+	1	100	2.00	30 @ 2 A	up to 31	–	7.00	–	Status pin	TDSO-8
BTS3125TF	HITFET™+	1	108	2.00	24 @ 2 A	up to 31	–	7.00	–	–	TO-252-3 (DPAK 3-leg)
BTF3125EJ	HITFET™+	1	100	2.00	23 @ 2 A	up to 32	–	5.00	12.00	Status pin	TDSO-8
BTS3018TC	HITFET™	1	14	6.00	1900	up to 36	–	30.00	–	Through input pin	TO-263-3-2 (TO-220-3 (SMD))
BTS141TC	HITFET™	1	25	5.10	4000	up to 36	–	25.00	–	Through input pin	TO-263-3-2 (TO-220-3 (SMD))
BTS3028SDL	HITFET™	1	28	5.00	350	up to 36	–	18.00	–	Through input pin	TO-252-3 (DPAK 3-leg)
BTS3028SDR	HITFET™	1	28	5.00	350	up to 36	–	18.00	–	Through input pin	TO-252-3 (DPAK 3-leg)
BTS133TC	HITFET™	1	40	3.80	2000	up to 36	–	21.00	–	Through input pin	TO-263-3-2 (TO-220-3 (SMD))
BTS3046SDL	HITFET™	1	46	3.60	140	up to 36	–	10.00	–	Through input pin	TO-252-3 (DPAK 3-leg)
BTS3046SDR	HITFET™	1	46	3.60	140	up to 36	–	10.00	–	Through input pin	TO-252-3 (DPAK 3-leg)
BTS117TC	HITFET™	1	80	3.50	1000	up to 36	–	7.00	–	Through input pin	TO-263-3-2 (TO-220-3 (SMD))
BTS3104SDL	HITFET™	1	104	2.00	50	up to 36	–	6.00	–	Through input pin	TO-252-3 (DPAK 3-leg)
BTS3104SDR	HITFET™	1	104	2.00	50	up to 36	–	6.00	–	Through input pin	TO-252-3 (DPAK 3-leg)
AUIPS2041L	HITFET™	1	100	1.40	–	up to 35	5.00	–	–	–	SOT-223
AUIPS2051L	HITFET™	1	250	0.90	–	up to 35	1.80	–	–	–	SOT-223
AUIPS2052G	HITFET™	2	250	0.90	–	up to 35	1.80	–	–	–	SO-8 (DSO-8)
BTS3408G	HITFET™	2	480	0.55	800	up to 36	–	1.00	–	Through input pin	DSO-8
BSP75N	HITFET™	1	490	0.70	550	up to 36	–	1.00	–	Through input pin	SOT-223

Industrial PROFET™ product portfolio

Product	Number of channels	R _{DS(on)} (typ) [mΩ]	Nominal load current [A]	E _{AS} [mJ]	Recommended operating voltage range [V]	I _{L(SC)} (typ) [A]	Diagnosis	Package
ITS4060S-SJ-N	1	50	3.10	900 @ 1.50 A	5.00 ... 34.00	17.0	n/a	DSO-8
ISP772T	1	50	2.60	900 @ 1.50 A	5.00 ... 34.00	17.0	n/a	DSO-8
ITS428L2	1	60	7.00	190 @ 7.00 A	4.75 ... 41.00	22.0	Digital	TO252-5
ITS4100S-SJ-N	1	70	2.40	870 @ 1.00 A	5.00 ... 34.00	10.0	n/a	PG-DSO-8
ISP762T	1	70	2.00	870 @ 1.00 A	5.00 ... 34.00	10.0	n/a	DSO-8
ITS4200S-ME-O	1	150	1.10	700 @ 0.50 A	11.00 ... 45.00	1.4	n/a	SOT-223-4
ITS4141N	1	150	1.10	700 @ 0.50 A	12.00 ... 45.00	1.4	n/a	SOT-223-4
ITS4141D	1	150	1.10	12,000 @ 0.50 A	12.00 ... 45.00	1.4	n/a	TO-252-5
ITS4200S-ME-P	1	150	2.20	160 @ 1.00 A	11.00 ... 45.00	3.0	n/a	SOT-223-4
ITS4142N	1	150	2.20	160 @ 1.00 A	12.00 ... 45.00	3.0	n/a	SOT-223-4
ITS4200S-ME-N	1	160	1.20	500 @ 0.50 A	5.00 ... 34.00	1.5	n/a	DSO-8
ISP452	1	160	1.20	500 @ 0.50 A	5.00 ... 34.00	1.5	n/a	SOT-223-4
ITS4200S-SJ-D	1	150	1.70	125 @ 1.00 A	6.00 ... 52.00	6.5	Digital	DSO-8
ISP752R	1	200	1.70	125 @ 1.00 A	6.00 ... 52.00	6.5	Digital	DSO-8
ISP752T	1	200	1.70	125 @ 1.00 A	6.00 ... 52.00	6.5	n/a	DSO-8
ITS4300S-SJ-D	1	250	0.80	800 @ 0.30 A	5.00 ... 34.00	1.2	Digital	DSO-8
ISP742RI	1	350	0.80	800 @ 0.30 A	5.00 ... 34.00	1.2	Digital, inverted	DSO-8
ITS41K0S-ME-N	1	1000	0.55	1000 @ 0.15 A	4.90 ... 60.00	0.9	n/a	SOT-223-4
ITS4140N	1	1000	0.55	1000 @ 0.15 A	4.90 ... 60.00	0.9	n/a	SOT-223-4
ITS4040D-EP-D	2	40	2 x 2.00	185 *	5.00 ... 45.00	4.1	Digital	TSDSO-14
ITS5215L	2	90	2 x 2.00	178 @ 3.50 A	5.50 ... 40.00	15.0	Digital	DSO-12
ITS42K5D-LD-F	2	2500	2 x 0.25	Freewheeling	4.50 ... 45.00	0.6	Digital	TSO-10
ITS4075Q-EP-D	4	75	4 x 2.00	60 *	5.00 ... 45.00	4.1	Digital	TSDSO-14
ITS4090Q-EP-D	4	100	4 x 0.50	410 *	5.00 ... 45.00	1.5	Digital	TSDSO-14
ITS724G	4	90	4 x 2.00	120 @ 3.30 A	5.50 ... 40.00	15.0	Digital	DSO-20
ITS4130Q-EP-D	4	130	4 x 0.50	380 *	5.00 ... 45.00	1.25	Digital	TSDSO-14
ITS716G	4	140	4 x 1.00	76 @ 2.30 A	5.50 ... 40.00	9.0	Digital	DSO-20
ITS711L1	4	200	4 x 1.00	150 @ 1.90 A	5.00 ... 35.00	7.5	Digital	DSO-20
ITS42008-SB-D	8	200	8 x 0.60	10,000 @ 625 mA	11.00 ... 45.00	3.0	Digital	DSO-36
ITS4880R	8	200	8 x 0.60	10,000 @ 625 mA	11.00 ... 45.00	3.0	Digital	DSO-36

www.infineon.com/hitfet
www.infineon.com/industrial-profet

 For more details on the product,
click on the part number. 



Infineon support for intelligent switches and input ICs

Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/isoface

www.infineon.com/hitfet

www.infineon.com/industrial-profet

www.infineon.com/shields-for-arduino



Applications

20-300 V MOSFETs

500-950 V MOSFETs

WBG semiconductors

Discrete IGBTs

Power ICs

Intelligent switches and input ICs

Gate driver ICs

Microcontrollers

XENSIV™ sensors

Packages



Gate driver ICs

- › EiceDRIVER™ 1EDN
- › EiceDRIVER™ 2EDN
- › EiceDRIVER™ 2EDi product
- › GaN EiceDRIVER™
- › 650 V level shift SOI and JI gate driver for IGBTs and MOSFETs
- › 200 V level shift SOI and JI gate driver for MOSFET
- › Non-isolated low-side gate driver ICs
- › EiceDRIVER™ Enhanced 1ED-F2 and 2ED-F2
- › EiceDRIVER™ 1ED Compact
- › EiceDRIVER™ Enhanced 1ED34xx (X3 analog) and 1ED38xx (X3 digital)
- › EiceDRIVER™ 1EDS-SRC
- › Industrial and general purpose gate driver ICs
- › Product portfolio
- › Nomenclature
- › Gate driver selection tool



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

WBG semiconductors

500-950 V MOSFETs

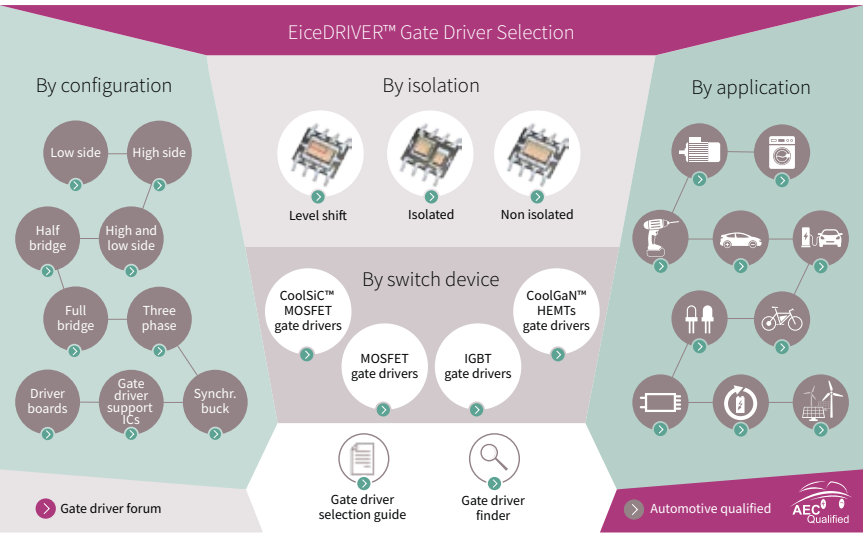
20-300 V MOSFETs

Applications

Gate driver ICs

EiceDRIVER™ gate driver ICs for MOSFETs, IGBTs, SiC MOSFETs and GaN HEMTs

Every switch needs a driver – the right driver makes a difference. Power electronics applications employ power device switches. And power device switches require optimum gate driver solutions. That is why we offer more than 500 EiceDRIVER™ gate driver IC solutions suitable for any power switch, and for any application.



EiceDRIVER™ gate driver ICs provide a wide range of typical output current options, from 0.1-A up to 10-A. Robust gate drive protection features such as fast short-circuit protection (DESAT), active Miller clamp, shoot-through protection, fault, shutdown, and overcurrent protection make them well-suited for both silicon and wide bandgap power devices, including CoolGaN™ and CoolSiC™.

Gate driver configuration			5 V	25 V	100 V	200 V	500 V	600 V	650 V	1200 V
Gate drivers	1-Channel	High-side			●	●	●	●	●	●
		Low-side	●	●						
	2-Channel	High-side							●	●
		Low-side		●						
		High- and low-side				●	●	●	●	●
		Half-bridge			●	●		●	●	●
	4-Channel	Full-bridge			●					
System building blocks	6-Channel	Three-phase				●		●		●
		Current sense					●			●
		Start-up					●			

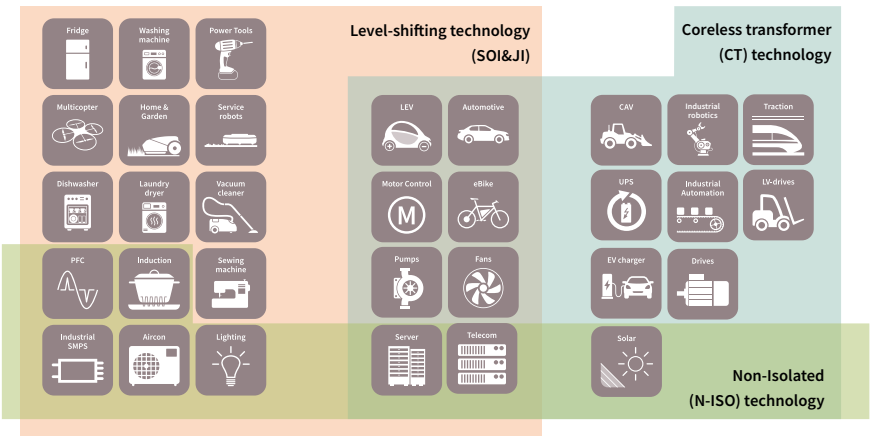
● Non-isolated (N-ISO) ● Junction isolation (JI) ● Silicon on insulator (SOI) ● Coreless transformer (CT)

Right configuration for any power discrete and module

Our portfolio spans a variety of configurations, voltage classes, isolation levels, protection features, and package options. We offer excellent product families of galvanic isolated gate drivers, automotive qualifies gate drivers, 200 V, 500-700 V, 1200 V level shift gate drivers, and non-isolated low-side drivers.

Advanced features for different applications

Our EiceDRIVER™ gate drivers provide advanced features such as integrated bootstrap diode(BSD), overcurrent protection, shutdown, fault reporting, enable, input filter, OPAMP, DESAT, programmable deadtime, shoot through protection, active miller clamp, active shutdown, separate sink and source outputs, short circuit clamping, soft shutdown, two level turn off, galvanic isolation(functional, basic and reinforced), etc.

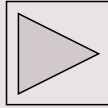


www.infineon.com/gatedriver

For more details on the product, click on the part number.

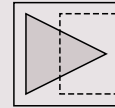
Single-channel low-side driver

Allows low offset of the voltage between input and output



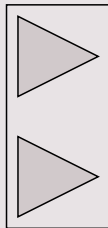
Single-channel high-side driver

Allows high voltage offset between input and output



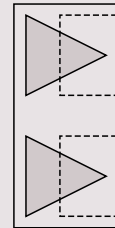
Dual-channel low-side driver

Both channels allow individual low voltage offsets, no interlock



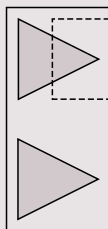
Dual-channel high-side driver

Both channels allow individual high voltage offsets, no interlock



High and low-side driver

Two non-interlocked channels, one for high, one for low voltage offsets



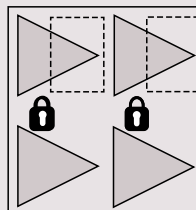
Half-bridge driver

Two interlocked channels where one of the channel allows a high voltage offset



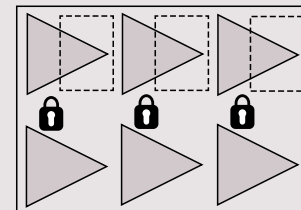
Full-bridge driver

Four channels in a package with two independent half bridges



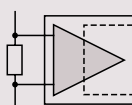
Three-phase bridge

Six channels in a package with three independent half bridges



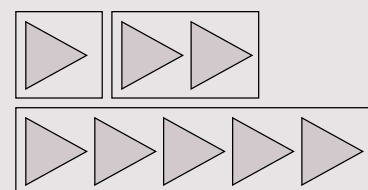
Current sense

Current sensing across a high-voltage offset between sense input and data output



Synchronous-buck driver

High speed drivers for dual high-side and low-side MOSFETs in synchronous rectified buck converters

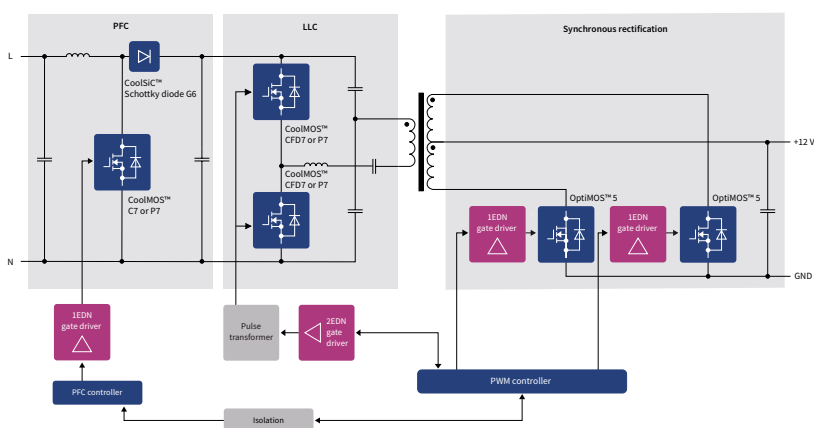


EiceDRIVER™ 1EDN

Rugged, cool and fast, single-channel low-side 4 A/8 A gate driver ICs

Single-channel MOSFET gate driver ICs are the crucial link between control ICs and powerful MOSFET switching devices. EiceDRIVER™ 1EDN family is fast, precise, strong and compatible. In SMPS designs, for fast MOSFET switching, high efficiency is enabled by 5 ns short slew rates and ± 5 ns propagation delay precision. Separate source and sink outputs simplify the application design, while industry standard packages and pinout ease system design upgrades. EiceDRIVER™ 1EDN family brings about the new reference in ruggedness and low power dissipation. A -10 V robustness of control and enable inputs provide crucial safety margin when driving pulse transformers. 5 A reverse output current robustness eliminates the need for Schottky switching diodes when driving MOSFETs in TO-220 and TO-247 packages. True rail-to-rail low impedance output stages ensure the cool operation of driver ICs, while 4 V and 8 V UVLO (undervoltage lockout) options for instant MOSFET offer protection during start-up and under abnormal conditions.

Application overview: 800 W switched mode power supply



Features and benefits

Product features	Product benefits	Application benefits
<ul style="list-style-type: none"> > 4 A source/8 A sink current > 6 ns rise/5 ns fall times > ± 5 ns propagation delay precision > True rail-to-rail low impedance output stages > 4 V and 8 V UVLO options > 19 ns propagation delay > -10 V robustness of inputs > 5 A reverse output current robustness > Industry standard pinout and packages 	<ul style="list-style-type: none"> > Fast Miller plateau transition > Precise timing > Low power dissipation in driver IC > Fast and reliable MOSFET turn-off, independent of control IC > Increased GND-bounce robustness > Saving switching diodes > Straight forward design upgrades 	<ul style="list-style-type: none"> > High power efficiency <ul style="list-style-type: none"> – in hard switching PFC with SiC diode – in half-bridges and synchronous rectifications > Cooler driver IC operation > Higher MOSFET drive capability > Instant MOSFET protection during start-up and under abnormal operation > Crucial safety margin to drive pulse transformer > Increases power density > BOM savings > Short time-to-market

Package	UVLO	Product name	Orderable part number	Pinout
	4 V	1EDN7511B	1EDN7511BXUSA1	
	8 V	1EDN8511B	1EDN8511BXUSA1	
	4 V	1EDN7512B	1EDN7512BXTSA1	
	4 V	1EDN7512G	1EDN7512GXTMA1	



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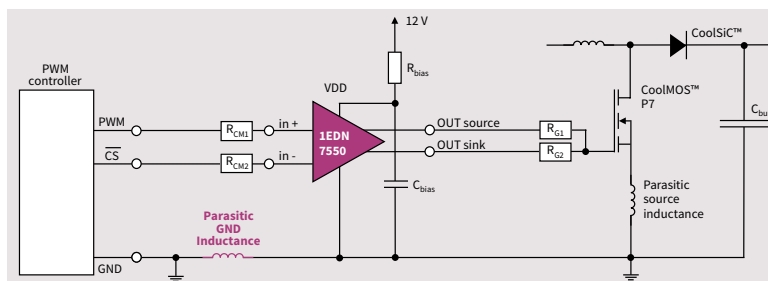
For more details on the product, click on the part number.

EiceDRIVER™ 1EDN7550 and 1EDN8550

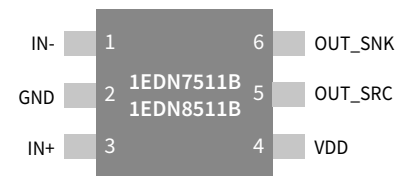
Single-channel low-side gate driver family with truly differential inputs prevents false triggering of power MOSFETs

Single-channel MOSFET gate driver ICs are the crucial link between control ICs and powerful MOSFETs. The input signal levels of conventional low-side gate driver ICs are referenced to the ground potential of the gate driver IC. If in the application the ground potential of the gate driver IC shifts excessively, false triggering of the gate driver IC can occur. Gate driver ground-shifts have two main causes: the parasitic ground inductance between where the gate driver IC is placed and where the control-IC resides, and parasitic source inductances between the gate driver IC and the MOSFET driven by it. Overcome ground-shift challenges in your design with Infineon's single-channel, low-side, EiceDRIVER™ gate driver ICs with truly differential inputs. The 1EDN7550/1EDN8550 gate driver ICs feature control signal inputs which are largely independent from the ground potential. Only the voltage difference between its input contacts is relevant, which prevents false triggering of power MOSFETs.

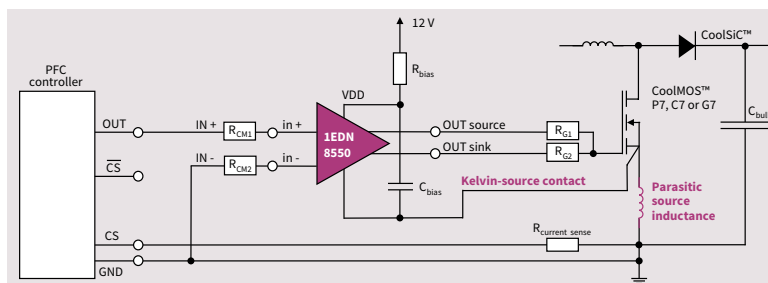
1EDN7550 driving CoolMOS™ SJ MOSFET on single-layer PCB



Pinout



1EDN8550 driving Kelvin source CoolMOS™ SJ MOSFET in boost PFC



Features and benefits

Product features	Product benefits	Application benefits
<ul style="list-style-type: none"> Truly differential inputs 4 A source current 8 A sink current Separate source/sink outputs Low-ohmic output stage 29 ns input minimum pulse width 7 ns propagation delay accuracy 5 A reverse current robustness of the outputs 4 V and 8 V UVLO versions SOT-23 package, 6 pins 	<ul style="list-style-type: none"> Control inputs independent from gate driver GND Fast Miller plateau transition Fast shut-off No diode voltage drop → near zero gate voltage at turn-off Low power dissipation within gate driver IC Up to 15 MHz switching speed Precise No Schottky clamping diodes required Fast and reliable MOSFET turn-off Small 	<ul style="list-style-type: none"> Robust against ground shifts from power MOSFET switching Low MOSFET switching losses Robust against false MOSFET triggering Highest effective MOSFET driving power Efficiency gains Increased power density and BOM savings Instant MOSFET protection under abnormal operation High power density

Type	Ground shift robustness		UVLO	Package	Orderable part number
	dynamic	static			
1EDN7550B	+/- 150 V	+/- 70 V	4 V	SOT-23 6-pin	1EDN7550BXTSA1
1EDN8550B	+/- 150 V	+/- 70 V	8 V	SOT-23 6-pin	1EDN8550BXTSA1

www.infineon.com/1EDN-TDI



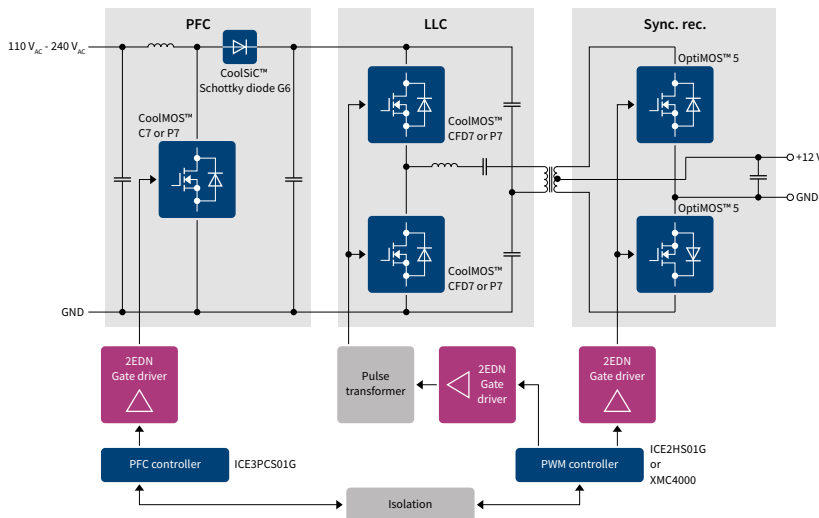
For more details on the product, click on the part number.

EiceDRIVER™ 2EDN

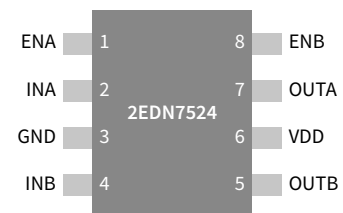
Rugged, cool and fast, dual-channel low-side 4 A/5 A driver IC

Dual-channel driver ICs are the crucial link between digital control ICs and powerful MOSFET and GaN switching devices. EiceDRIVER™ 2EDN family is fast, precise, strong and compatible. In SMPS designs, high efficiency is enabled by 5 ns short slew rates and 10 ns propagation delay precision for fast MOSFET and GaN switching. The family offers numerous deployment options thanks to two 4 A/5 A channels. The channel-to-channel accuracy of 1 ns allows using two channels in parallel, while industry standard packages and pinout ease system design upgrades. EiceDRIVER™ 2EDN family offers the new reference in ruggedness and low power dissipation. A 5 A reverse output current robustness eliminates the need for Schottky switching diodes and reduces bill-of-material.

Application overview 800 W 130 kHz switched mode power supply



Industry standard pinout configuration



Features and benefits

Product features	Product benefits	Application benefits
<ul style="list-style-type: none"> > 5 A source/sink current > 5 ns rise/fall times > <10 ns propagation delay precision > True rail-to-rail low impedance output stages > 4 V and 8 V UVLO options > 19 ns propagation delay for both control and enable inputs > -10 V robustness of control and enable inputs > 5 A reverse output current robustness > 2 independent channels > Excellent 1 ns channel-to-channel accuracy > Industry standard pinout and packages 	<ul style="list-style-type: none"> > Fast Miller plateau transition > Precise timing > Low power dissipation in driver IC > Fast and reliable MOSFET turn-off, independent of control IC > Increased GND-bounce robustness > Saves switching diodes > Option to increase drive current by truly concurrent switching of 2 channels > Straight forward design upgrades 	<ul style="list-style-type: none"> > High power efficiency <ul style="list-style-type: none"> - in hard-switching PFC with SiC diode - in half-bridges and synchronous rectifications > Cooler driver IC operation > Higher MOSFET drive capability > Instant MOSFET protection under abnormal operation > Crucial safety margin to drive pulse transformer > Increases power density > BOM savings > One IC covering many applications > Short time to market

Package	UVLO	Inputs	Product name	Orderable part number	Current
	4 V	Direct	2EDN7524F	2EDN7524FXTMA1	5 A
		Inverted	2EDN7523F	2EDN7523FXTMA1	5 A
	8 V	Direct	2EDN7424F	2EDN7424FXTMA1	4 A
		Inverted	2EDN8524F	2EDN8524FXTMA1	4 A
	4 V	Direct	2EDN7524R	2EDN7524RXUMA1	5 A
		Inverted	2EDN7523R	2EDN7523RXUMA1	5 A
	8 V	Direct	2EDN7424R	2EDN7424RXUMA1	4 A
		Inverted	2EDN8524R	2EDN8524RXUMA1	4 A
	4 V	Direct	2EDN7524G	2EDN7524GXTMA1	5 A
		Inverted	2EDN7523G	2EDN7523GXTMA1	5 A



www.infineon.com/2edn



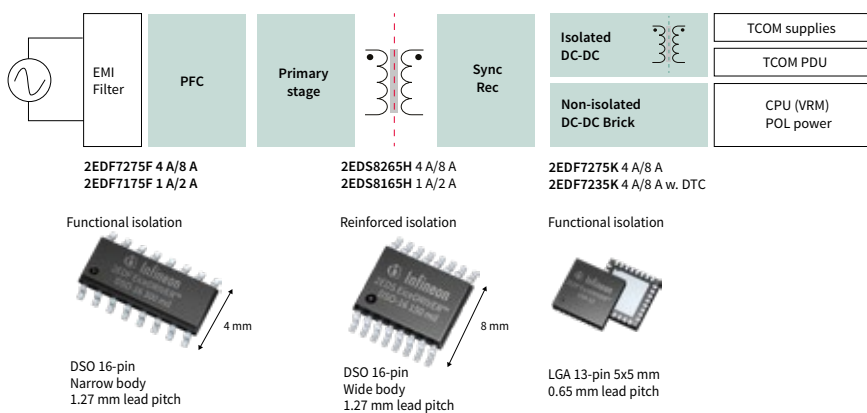
For more details on the product, click on the part number.

EiceDRIVER™ 2EDi

Fast, robust, dual-channel, functional and reinforced isolated MOSFET gate drivers with accurate and stable timing

The EiceDRIVER™ 2EDi product family is designed for use in high-performance power conversion applications. Very strong 4 A/8 A source/sink dual-channel gate drivers increase efficiency in CoolMOS™ and OptiMOS™ MOSFET half-bridges. The low propagation delay of 37 ns, combined with highly accurate and stable timing over temperature and production, enables further efficiency gains within and across galvanically isolated power stages or in multiphase/multilevel topologies. The availability of functional and reinforced isolated drivers in different packages makes them the perfect fit for both primary-side and (safe) secondary-side control. Gate driver outputs come with a high 5 A reverse current capability and 150 V/ns CMTI robustness for high dv/dt power loops. For slower switching or driving smaller MOSFETs, 1 A/2 A peak current product variants are available as well.

System application diagram



Features and benefits

Product key features	Product benefits	System benefits
Fast power switching with accurate timing <ul style="list-style-type: none"> Available with 4 A/8 A and 1 A/2 A source/sink currents Propagation delay typ. 37 ns with 3 ns channel-to-channel mismatch Max. delay variation ~14 ns 	Efficiency gain and lower losses <ul style="list-style-type: none"> Lower switching losses in half-bridges due to fast and accurate turn on/off Perfect for new digital, fast high resolution PWM control including light load optimization 	Enabling higher system efficiency and higher power density designs
Optimized for area and system BOM <ul style="list-style-type: none"> Isolation and driver in one package Low power dissipation due to low on-resistance Output stages with 5A reverse current capability 	Improved thermal behavior at smaller form factor <ul style="list-style-type: none"> LGA with 1 mm, DSO with 2.3 mm package height versus volume > 1 cm³ for pulse transformers Eliminates two costly protection diodes on the gate driver outputs 	Improving long term competitive cost position, integration and mass manufacturability
Robust design against switching noise <ul style="list-style-type: none"> Floating drivers are able to handle large inductive voltage over- and undershoots Very good common mode transient immunity CMTI > 150 V/ns Undervoltage lockout function for switch protection 	Protection and safe operation <ul style="list-style-type: none"> Ideal for use in high power designs with fast switching transients Reliable CT coreless transformer PWM signal chain to turn-on high-side MOSFETs 	Extending end-product lifetime by improving safe operation of power switches in normal and abnormal field (grid) conditions
Output- to -output channel isolation <ul style="list-style-type: none"> Functional level galvanic isolation 	Flexible configurations <ul style="list-style-type: none"> HS+LS, HS+HS, LS+LS or 2x I_{max} on 1xHS 	Lower EMI by ground isolation, driver proximity to MOSFETs or the use of 4-pin Kelvin source MOSFETs
Input- to output channel isolation <ul style="list-style-type: none"> Functional and reinforced galvanic isolation 	Regulatory safety <ul style="list-style-type: none"> Functional for primary-side control Reinforced for secondary-side control 	Simplified safety approval through component (VDE884-x, UL1577) and system (IEC60950, IEC62386) certificates

Part number	Orderable part number (OPN)	Package	PWM input type	Driver source/sink current	Gate driver UVLO	Input to output isolation				Dead-time control
						Isolation class	Rating	Surge testing	Safety certification	
2EDF7275F	2EDF7275FXUMA1	NB-DSO16	Dual mode (IN_A, IN_B)	4 A/8 A	4 V	Functional	V _{IO} = 1.5 kV _{DC}	n.a.	n.a.	no
2EDF7175F	2EDF7175FXUMA1	10 x 6 mm		1 A/2 A						
2EDF7275K	2EDF7275KXUMA1	LGA13		4 A/8 A						yes
2EDF7235K	2EDF7235KXUMA1	5.0 x 5.0 mm		4 A/8 A	8 V	Reinforced	V _{IO} = 8 kV _{peak} (VDE0884-1x) V _{ISO} = 5.7 kV _{rms} (UL1577)	V _{IOSM} = 10 kV _{peak} (IEC60065)	VDE0884-10 UL1577 IEC60950 IEC62368 CQC	no
2EDS8265H	2EDS8265HXUMA1	WB-DSO16		4 A/8 A						
2EDS8165H	2EDS8165HXUMA1	10.3 x 10.3 mm		1 A/2 A						

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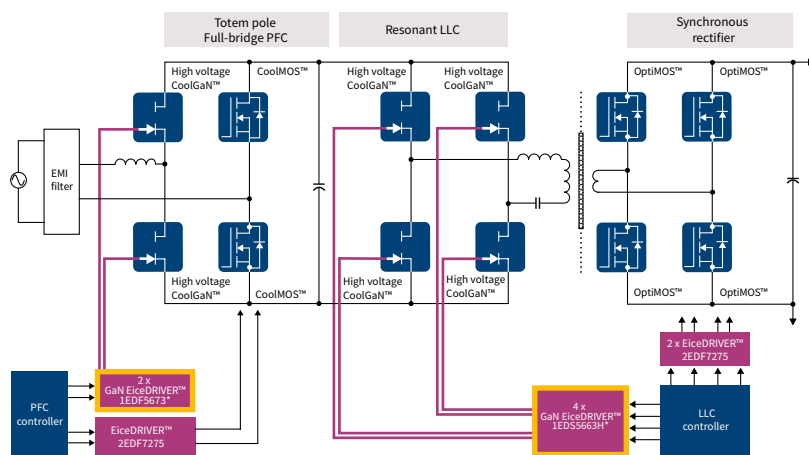
For more details on the product, click on the part number.

GaN EiceDRIVER™

Single-channel isolated gate driver ICs for high voltage GaN switches

CoolGaN™ e-mode HEMTs are best driven by Infineon's GaN EiceDRIVER™ ICs, the 1EDF5673K, 1EDF5673F and 1EDS5663H. They ensure robust and highly efficient high voltage GaN switch operation whilst concurrently minimizing R&D efforts and shortening time-to-market.

High power SMPS application example



*GaN EiceDRIVER™ ICs are single-channel products

Key use cases

- › Totem pole PFCs
- › Vienna rectifiers
- › Multilevel topologies
- › Resonant LLC



Features and benefits

Key features
Low ohmic outputs: <ul style="list-style-type: none"> › Source: 0.85 Ω › Sink: 0.35 Ω
Single-channel galvanic isolation: <div> <div>Functional:</div> <div>Reinforced:</div> </div> <ul style="list-style-type: none"> › $V_{IO} = 1500 V_{DC}$ › $V_{IOTM} = 8000 V_{pk}$ (VDE 0884-10 pending) › $V_{IOWM} = 510 V_{rms}$ (DSO 16-pin) › $V_{IOWM} = 1420 V_{DC}$ › $V_{IOWM} = 460 V_{rms}$ (LGA 5x5) › CMTI min: 200 V/ns
Timing: <ul style="list-style-type: none"> › Minimum output pulse width: 18 ns › Propagation delay accuracy: 13 ns

Key benefits
Positive and negative gate drive currents: <ul style="list-style-type: none"> › Fast turn-on/turn-off GaN switch slew-rates
Firmly hold gate voltage at zero, during off-phase: <ul style="list-style-type: none"> › Avoids spurious GaN switch turn-on › Up to 50% lower dead time losses
Configurable and constant GaN switching slew-rates, across wide range of switching frequency and duty-cycle: <ul style="list-style-type: none"> › Robust and energy efficient SMPS designs › Short time to market
Integrated galvanic isolation: <ul style="list-style-type: none"> › Robust operation in hard-switching applications › Safe isolation where needed



GaN EiceDRIVER™ ICs evaluation environment

High-frequency (1 MHz) half-bridge evaluation board EVAL_1EDF_G1_HB_GAN

Key components:

GaN switches: 2x CoolGaN™ 600 V e-mode HEMTs (IGOT60R070D1)

GaN drivers: 2x GaN EiceDRIVER™ (1EDF5673K)

Order code: EVAL1EDFG1HBGANTOBO1

	LGA 13-pin 5x5 mm	DSO 16-pin 150 mil	DSO 16-pin 300 mil
Package			
Product	1EDF5673K	1EDF5673F	1EDS5663H
OPN	1EDF5673KXUMA1	1EDF5673FXUMA1	1EDS5663HXUMA1
Isolation (input to output)	$V_{IO} = 1500 V_{DC}$	$V_{IO} = 1500 V_{DC}$	$V_{IOTM} = 8000 V_{pk}$ (VDE0884-10 pending)
Source/sink output resistance	0.85 Ω / 0.35 Ω	0.85 Ω / 0.35 Ω	0.85 Ω / 0.35 Ω
UVLO	4.5 V / 5.0 V	4.5 V / 5.0 V	4.5 V / 5.0 V

www.infineon.com/gan-eicedriver



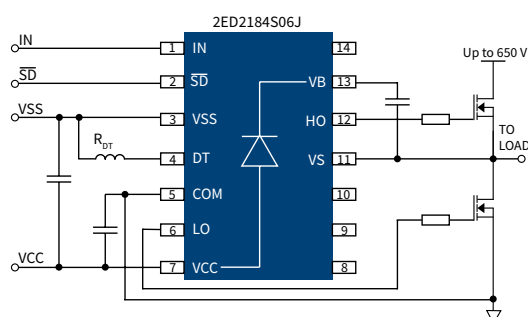
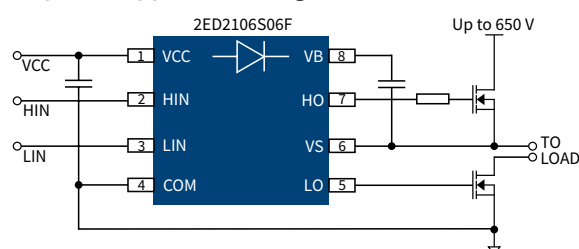
For more details on the product, click on the part number.

650 V level shift SOI and JI gate driver for IGBTs and MOSFETs

EiceDRIVER™ 2ED210xS06 and 2ED218xS06 - 650 V half-bridge, high and low-side gate drivers with integrated bootstrap diode

The 2ED2106/08/09/091S06 gate driver family and 2ED2181/83/84S06 high-current gate driver family are high-voltage power MOSFET and IGBT driver families with half-bridge and high and low-side configuration. Based on SOI-technology, this device has excellent robustness and noise immunity with the capability to maintain operational logic at negative voltages of up to $-11 V_{DC}$ on the VS pin ($V_{CC}=15 V$) on transient voltages. With no parasitic structures, the device is immune to parasitic latch-up at all temperature and voltage conditions.

Simplified application diagrams

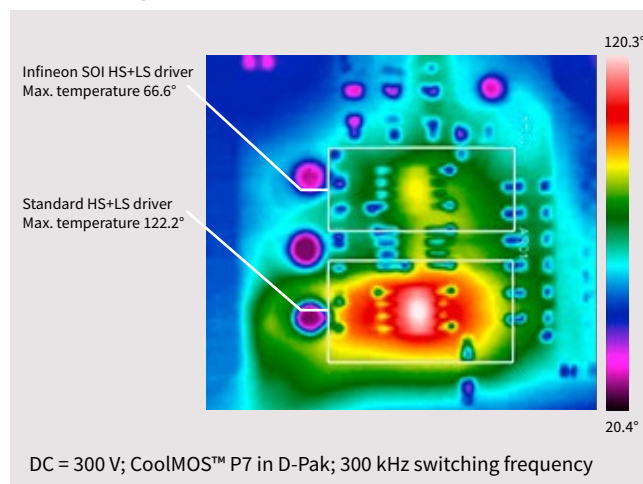


Features and benefits

Key benefits
› Infineon 650 V thin-film SOI-technology
› Integrated ultrafast, low resistance bootstrap diode
› Negative VS transient immunity of 100 V
› Logic operational up to -11 V on VS pin
› Separate logic and power ground (DSO-14)

Key benefits
› Low level shift losses, suitable for high-frequency application
› Quick time to market, reduced BOM cost
› High reliability and robustness
› SOI technology eliminates the parasitic bipolar transistors that are causing latch-up
› Integrated input filters enhance noise immunity

Power dissipation of Infineon SOI



Part	Output current	Input Logic	Configuration	Deadtime	Package	
2ED2106S07F *	+0.29 A/-0.7 A	HIN, LIN	Hide side + Low side	none	DSO-8	
2ED21064S07J *					DSO-14	
2ED2108S07F *		HIN, /LIN		540 ns	DSO-8	
2ED21084S07J *				Programmable	DSO-14	
2ED2109S07F *		IN, /SD	Half-bridge	540 ns	DSO-8	
2ED21094S07J *		IN, DT/SD		Programmable	DSO-14	
2ED21091S07F *					DSO-8	
2ED2181S07F *	+2.5 A/-2.5 A	HIN, LIN	Hide side + Low side	None	DSO-8	
2ED21814S07J *					DSO-14	
2ED2182S07F *					400 ns	DSO-8
2ED21824S07J *					Programmable	DSO-14
2ED2183S07F *		HIN, /LIN	Half-bridge	400 ns	DSO-8	
2ED21834S07J *				Programmable	DSO-14	
2ED2184S07F *		IN, /SD		400 ns	DSO-8	
2ED21844S07J *				Programmable	DSO-14	



Evaluation board : EVAL-M1-2ED2106S

Key components:


- › 650 V high- and low-side gate driver with integrated bootstrap diode (2ED2106S06F)
- › 650 V IGBT6 (IKB10N65ET6)

Order code: EVALM12ED2106STOB01



www.infineon.com/SOI

*For more information on the product, contact our product support

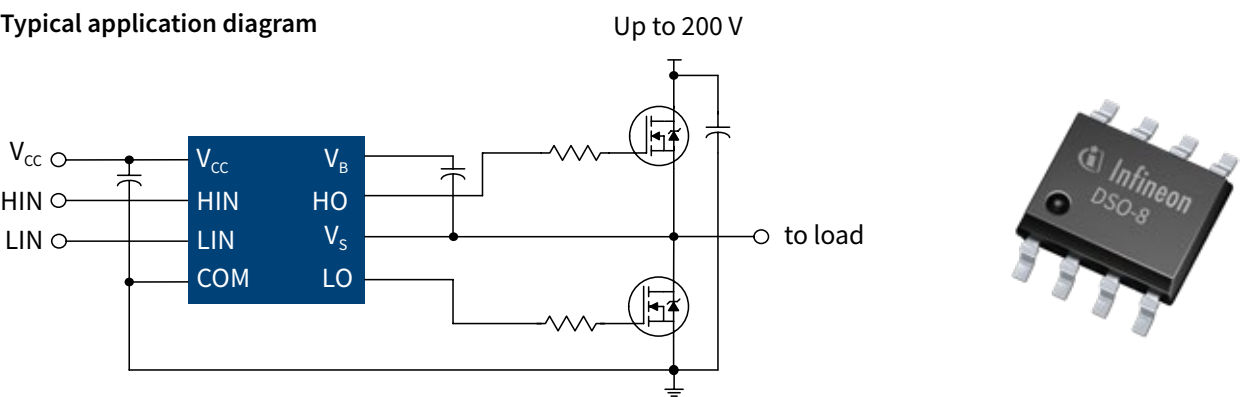
For more details on the product,  click on the part number.

650 V level shift SOI and JI gate drivers for IGBTs and MOSFETs

EiceDRIVER™ 2ED28073J06F - 600 V half-bridge junction isolated gate driver with integrated bootstrap FET

The 2ED28073J06F is a high voltage, high-speed power MOSFET and IGBT drivers with dependent high and low-side referenced output channels. It is optimized to drive CoolMOS™ PFD7 in motor drive applications. Proprietary HVIC and latch immune CMOS technologies enable ruggedized monolithic construction. The output drivers feature a high-pulse current buffer stage designed for minimum driver cross-conduction. The floating channel can be used to drive N-channel power MOSFETs or IGBTs in the high side configuration which operates up to 600 V.

Typical application diagram



Features and benefits

Key features	Key benefits
Source current / sink current: + 20 mA/ - 80 mA	Smaller current for low power drive application with CoolMOS™ PFD7, reduced system cost of high voltage capacitor (C _{DS}).
Negative VS transient immunity of 70 V, dV/dt immune	High reliability and robustness
Lower di/dt gate driver	Better noise immunity
Integrated bootstrap FET	Quick time to market, reduced BOM cost
Integrated short pulse/noise rejection filter	An improvement in the input/output pulse symmetry of the driver and helps to reject noise spikes and short pulses



Evaluation board

EVAL_DRIVE_3PH_PFD7

Key components:

- > CoolMOS™ PFD7 gate driver suitable for low power drives (2ED28073J06F *)
- > 600 V CoolMOS™ PFD7 MOSFET (IPN60R1K5PFD7S)


Order code: EVALDRIVE3PH_PFD7TOBO1

EVAL_DRIVE_3PH_PFD7 is a three-phase motor drive evaluation board with sensorless field oriented control (FOC), which demonstrates Infineon's latest SJ technology tuned specially for motor drives by introducing a complete system-level solution using discrete inverters to control and drive three-phase motors. The evaluation board EVAL_DRIVE_3PH_PFD7 was developed to support customers in the first steps of designing a three-phase inverter stage for the target applications

www.infineon.com/700VHVIC

*For more information on the product, contact our product support

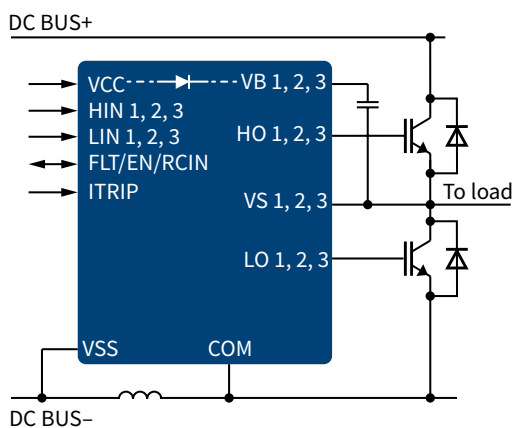


For more details on the product, click on the part number. 

6ED2230S12T - 1200 V three-phase gate driver with overcurrent protection and integrated bootstrap diode (BSD)

The 6ED2230S12T is a 1200 V three-phase SOI gate driver with an integrated bootstrap diode and overcurrent protection, with typical 0.35 A source and 0.65 A sink currents in a DSO-24 package (DSO-28 with 4 pins removed) for driving IGBTs. Proprietary HVIC and latch-immune CMOS technologies enable a robust monolithic design. A current-trip function which terminates all six outputs can also be derived from this resistor. An open-drain FAULT signal is provided to indicate that an overcurrent or undervoltage shutdown has occurred. Fault conditions are cleared automatically after a delay programmed externally via an RC network. The output drivers feature a high-pulse current buffer stage designed for minimum driver cross conduction. Propagation delays are matched to simplify the HVIC's use in high-frequency applications.

Typical application diagram

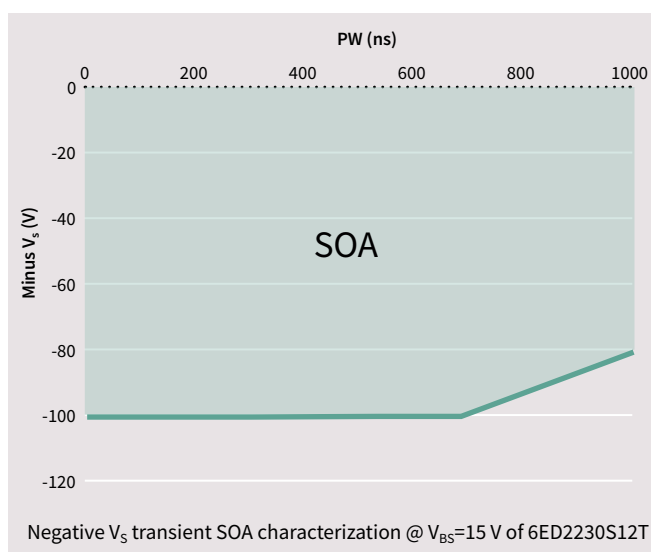


Features and benefits

Key benefits
› Infineon thin-film SOI technology
› Output source/sink current capability +0.35 A/-0.65 A
› Integrated ultrafast, low $R_{DS(on)}$ bootstrap diode
› Overcurrent protection (ITRIP $\pm 5\%$ reference)
› Fault reporting, automatic fault clear and enable function on the same pin (RFE)

Key benefits
› Tolerant to negative transient voltage up to -100 V (pulse width is up to 700 ns) given by SOI technology, high reliability and robustness
› Drive 1200 V IGBT and SiC MOSFET
› Quick time to market, reduced BOM cost
› Advanced protection

Negative V_s transient robustness of Infineon SOI



Evaluation board available: EVAL-M1-6ED2230-B1

Key components:

- › 1200 V three-phase gate driver with integrated bootstrap diode (6ED2230S12T)
- › 1200 V, 15 A three-phase PIM IGBT module (FP15R12W1T4)

Order code: EVALM16ED2230B1TOB01



For more details on the product, click on the part number.

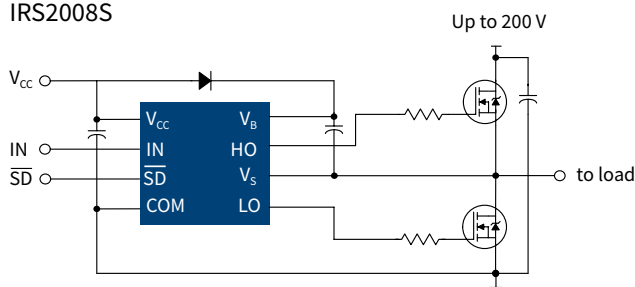
200 V level shift SOI and JI gate drivers for MOSFET

Half-bridge, high and low-side, three-phase gate driver family for low voltage motor drives

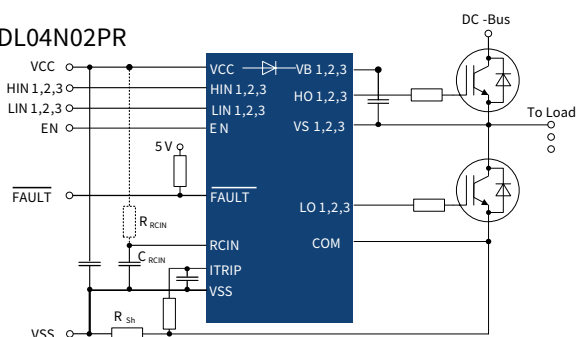
Infineon offers 200 V ICs tailored for low-voltage (24 V, 36 V, and 48 V) and mid-voltage (60 V, 80 V, and 100 V) motor drive applications. These MOSFET drivers provide full driver capability with extremely fast switching speeds, designed-in ruggedness and low power dissipation. The 200 V driver ICs are offered in standard packages and pinout configurations with various logic input options for high design flexibility and fast time to market. Low side supply voltage (VCC) and floating channel supply (VBS) undervoltage lockout (UVLO) ensures reliable start-up operation. The three-phase product family utilizes Infineon's unique Silicon-on-Insulator(SOI) level shift technology to provide functional isolation with industry leading negative VS robustness and reduced level shift losses. The family provides integrated Bootstrap Diodes(BSD) to reduce BOM cost, simplify layout, and reduce PCB size.

Simplified application diagram

IRS2008S



6EDL04N02PR



Features and benefits

Key features
V _{CC} UVLO protection with V _{BS} UVLO for IRS2005/7/8
Deadtime and cross-conduction prevention logic
Three-phase solution with silicon-on-insulator (SOI) technology with integrated bootstrap diodes (BSD)
Deadtime and cross-conduction prevention logic
Fully operational to +200 V off set voltage
Tolerate to negative transient voltage, dV/dt immune
Low quiescent current
Various input options , standard pin-out and packages

Key benefits
Fast and reliable switching
Protection under abnormal operation, Ensure reliable start-up operation
Reduced BOM cost, smaller PCB at lower cost with simpler design
Increased negative VS robustness for increased reliability
Increased device reliability, operational headroom
Low-cost bootstrap power supply
Easy-to-use, straight-forward design
Fast time to market



Evaluation board

EVAL-PS-IRS200X for stepper motor

Key components:

- 200 V high-side and low-side level-shift gate driver (IRS2005S)
- OptiMOS™ 3 power MOSFET 100 V (IPP180N10N3 G)

Order code: EVALPSIRS200XT0B01



Evaluation board

EVAL-6EDL04N02PR for battery powered application

Key components:

- 200 V three-phase gate driver with integrated bootstrap diode (6EDL04N02PR)
- OptiMOS™ power MOSFET 80 V (BSB044N08NN3 G)

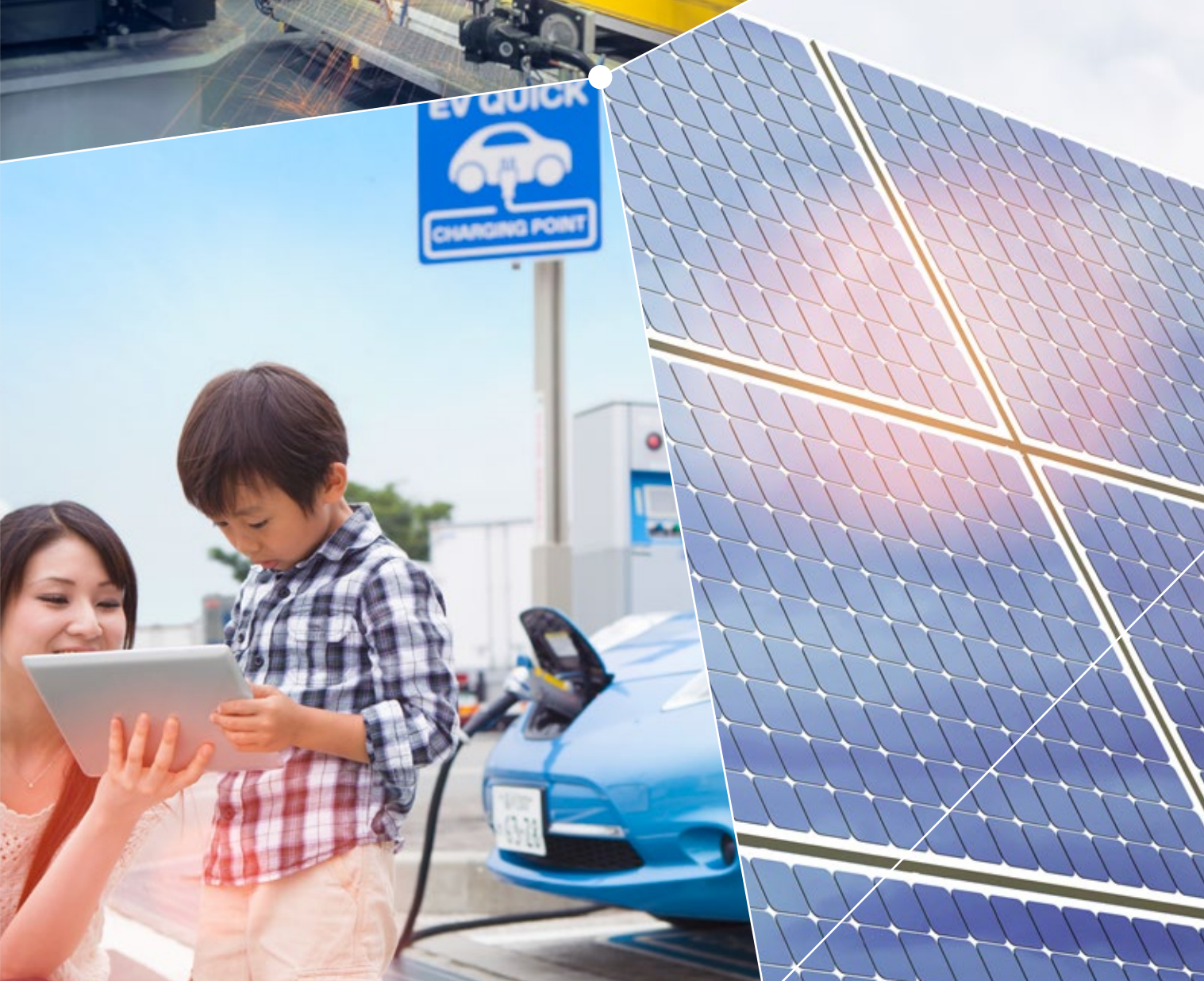
Order code: EVAL6EDL04N02PRT0B01

Part number	Voltage class [V]	Configuration	Channels	Source/sink current typ. [mA]	Deadtime typ. [ns]	Typ. propagation delay [ns]		Control inputs	UVLO typ. [V]	Package	MSL
						on	off				
IRS2008S, IRS2008M	200	Half-bridge	2	290/600	520	680	150	IN, SD	+8.9/-8.2	DSO-8, MLPQ-14L	2
IRS2007S, IRS2007M	200	Half-bridge	2	290/600	520	160	150	HIN, LIN	+8.9/-8.2	DSO-8, MLPQ-14L	2
IRS2005S, IRS2005M	200	High- and low-side	2	290/600	-	160	150	HIN, LIN	+8.9/-8.2	DSO-8, MLPQ-14L	2
6EDL04N02PR	200	Three-phase	6	165/375	310	530	530	HIN, LIN	+9/-8.1	TSSOP-28	3

www.infineon.com/200VHVIC



For more details on the product, click on the part number.



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

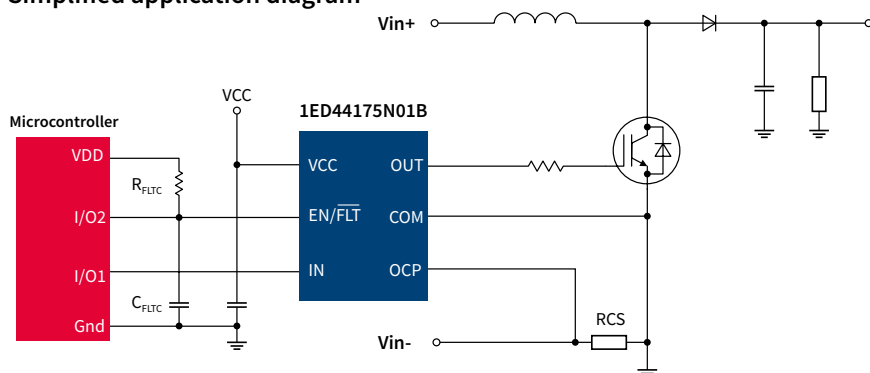
Applications

Non-isolated low-side gate driver ICs

1ED44173/5/6 - 25 V low-side gate driver with integrated overcurrent protection and fault/enable function

The 1ED44173N01B, 1ED44175N01B, and 1ED44176N01F are low-voltage, non-inverting gate drivers designed for ground-referenced applications such as digitally controlled power-factor correction (PFC) circuits requiring overcurrent protection (OCP). OCP is typically implemented by using a current measurement circuit with a comparator such as LM293 and a network of resistors and capacitors. 1ED44173N01B, 1ED44175N01B, and 1ED44176N01F also integrate up to 20% cost and 50% space savings by integrating the OCP comparator, which features an accurate current-sensing threshold tolerance of $\pm 5\%$. 1ED44173N01B, 1ED44175N01B, and 1ED44176N01F also integrate fault-output reporting to the controller and driver enable functionality on the same pin. These driver ICs also have separate logic and power ground pins for operational robustness.

Simplified application diagram



Features and benefits

Product features	Product benefits	Application benefits
Integrated overcurrent protection comparator with accurate OCP threshold	> 0.5 V overcurrent threshold with accurate ± 5 percent tolerance	Potential space savings up to 50 percent and cost savings up to 20 percent compared to the discrete solution
Single pin for fault output and enable function	> Internal Schmitt trigger comparator for the enable function	Flexible fault clear time setup for different microcontroller processing speeds
Programmable fault clear time	> External capacitor (C_{FLT}) sets the length of the fault clear time	Minimizes power consumption
Low quiescent supply current	> Max I_{OCC} : 750 μ A	Avoids noise coupling from output to input which improves noise immunity
Separate logic ground and gate driver return	> V_{SS} and COM pins	Eliminates switching loss at low V_{CC} supply voltage
Undervoltage lockout (UVLO) protection	> Specific UVLO level for IGBTs (typ. on/off = 11.9 V / 11.4 V)	



Evaluation board

EVAL-1ED44176N01F

EVAL-1ED44175N01B *

EVAL-1ED44173N01B *

Key components:

- > 25 V low-side gate driver with integrated OCP (1ED4417x)
- > Single N-Channel HEXFET™ power MOSFET 30 V (IRLML2803)

Order code:

EVAL1ED44176N01FTOBO1

EVAL1ED44175N01BTOBO1

EVAL1ED44173N01BTOBO1

Part Number	Package	IO+/- [A]	UVLO [V]	VOCTH [mV]	ton/off [ns]	Ground pins	Feature
1ED44176N01F	DSO-8	+0.8/-1.75	11.9 / 11.4	500	50	VSS / COM	OCP (positive current sensing), Enable, Fault, Programmable fault clear time
1ED44175N01B	SOT23-6	± 2.6	11.9 / 11.4	-250	50	COM	OCP (negative current sensing), Enable, Fault
1ED44173N01B *	SOT23-6	± 2.6	8 / 7	-250	34	COM	

www.infineon.com/1ED44176

www.infineon.com/1ED44175

*Coming soon

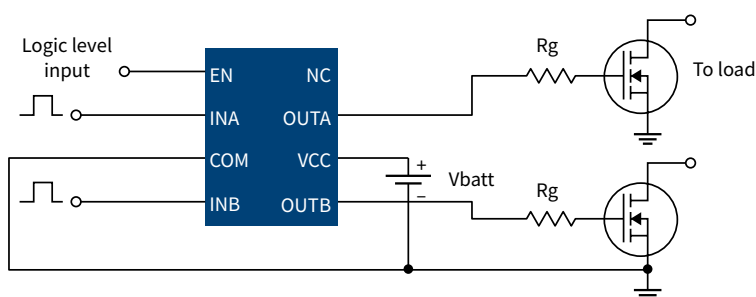


For more details on the product, click on the part number.

2ED24427N01F * – 24 V, 10 A dual low-side gate driver with enable-function in DSO-8 package with thermal pad

The 2ED24427N01F is a low-voltage, power MOSFET and IGBT non-inverting gate driver. Proprietary latch immune CMOS technologies enable rugged monolithic construction. The logic input is compatible with standard CMOS or LSTTL output. The output drivers feature a high pulse current buffer stage designed for minimum driver cross-conduction. Propagation delays between two channels are matched. Internal circuitry on VCC pin provides an undervoltage lockout protection that holds output low until Vcc supply voltage is within operating range.

Simplified application diagram



Features and benefits

Key features
10 A sink and 10 A source driver capability
11.5 V undervoltage lockout
24 V maximum supply voltage
Enable function
DSO-8 package with thermal pad

Key benefits
Suitable for IGBT/MOSFET paralleling, transformer driver, easily drive low $R_{DS(on)}$ MOSFETs at high switching frequencies
Can be used as external booster
Robustness in noisy environment
Dedicated pin to terminates all outputs
Smaller thermal resistor, bigger Power dissipation

In half-bridge LLC or full-bridge ZVS power topologies, 2ED24427N01F can easily drive low $R_{DS(on)}$ high voltage MOSFETs in a half-bridge at high-switching frequencies in. In synchronous rectification, more than two MOSFETs can be paralleled and driven from a single channel of the driver. One 2ED24427 can easily drive both synchronous rectification legs. When higher current needed, 2ED24427N01F can boost the current from regular gate driver and drive high current IGBTs or MOSFETs or EasyPACK™ or EconoPACK™ power modules. 2ED24427 outputs can be paralleled to increase the drive current to drive power modules such as PrimePACK™.

Evaluation board

EVAL-2ED24427N01F *

Key components:

- > 24 V, 10 A dual low-side gate driver with Enable in DSO-8 package with thermal pad (2ED24427N01F **)
- > OptiMOS™ 5 power MOSFET 80 V (BSC026N08NS5)

Order code:

EVAL2ED24427N01FTOBO1

www.infineon.com/gdlowside

*Coming soon

** For more information on the product, contact our product support



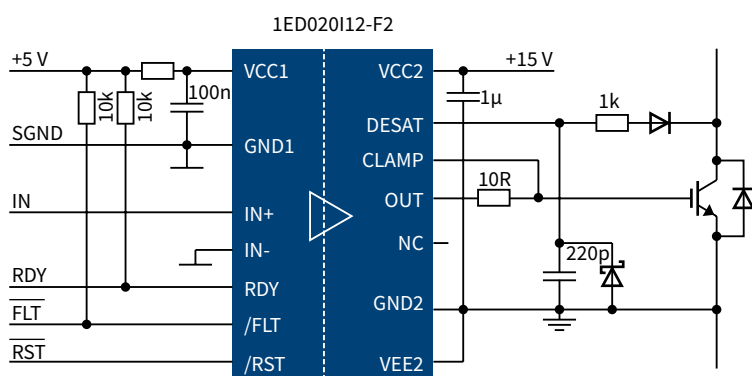
For more details on the product, click on the part number.

EiceDRIVER™ Enhanced 1ED-F2 and 2ED-F2

1200 V single and dual-channel, isolated driver family with DESAT and two level turn off

The EiceDRIVER™ 1ED Enhanced gate driver ICs are galvanic isolated single-channel IGBT and SiC MOSFET drivers in DSO-16 package that provide output current capabilities of typically 2 A. The precision DESAT function for IGBT is also an excellent solution for SiC MOSFET short-circuit protection. All logic pins are 5 V CMOS compatible. 2ED020I12-F2 is the dual-channel version of 1ED020I12-F2 in DSO-36 package. 2ED020I12-FI is a high voltage, high-speed power MOSFET and IGBT driver with interlocking high and low-side referenced outputs.

Simplified application diagram



Features and benefits

Key features
Desaturation detection
Active Miller clamp
100 kV/μs CMTI
Short circuit clamping and active shutdown
Combinable Enable/Shutdown and Fault Feedback signals
Bipolar output supply
Inverting and non-inverting inputs

Key benefits
Protect the power switch from damage during short circuit condition
Small space-saving package with large creepage distance (>8 mm)
Avoids wrong switching patterns in rugged environments
No external filter needed, cost saving and robustness
Higher dynamic range in PWM modulation and shorter deadtime
Suitable for operation at high ambient temperature
Higher robustness in rugged environments



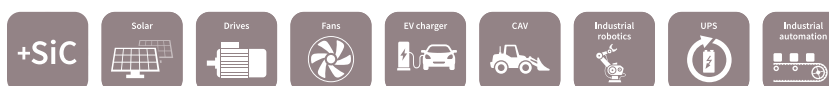
Evaluation board: Key components:

- EVAL-1ED020I12-B2 > 1ED-B2 with EasyPACK™ 1B IGBT module (FS25R12W1T4_B11)
- EVAL-1ED020I12-BT > 1ED-BT with TRENCHSTOP™ IGBT 4 (IKW25N120H3)
- EVAL-2ED020I12-F2 > 2ED-F2 with TRENCHSTOP™ IGBT 3 (IKP20N60H3)

Order code:

- EVAL1ED020I12B2TOBO1
- EVAL1ED020I12BTTOBO1
- EVAL2ED020I12F2TOBO1

EiceDRIVER™ Enhanced	1ED020I12-F2	2ED020I12-F2	1ED020I12-FI	1ED020I12-B2	1ED020I12-BT	2ED020I12-FI
Configuration	Single	Dual	Single	Single	Single	Half-bridge
Package (all 300mil)	DSO-16	DSO-36	DSO-16	DSO-16	DSO-16	DSO-18
Galvanic Isolation	Functional	Functional	Functional	UL 1577; VDE 0884-10	UL 1577; VDE 0884-10	Functional on high-side
Protection function	DESAT, UVLO	DESAT, UVLO	DESAT, UVLO, Two-level turn-off	DESAT, UVLO	DESAT, UVLO, Two-level turn-off	UVLO, OPAMP, comparator
Input	4.1 V/3.8 V	4.1 V/3.8 V	4.1 V/3.8 V	4.1 V/3.8 V	4.1 V/3.8 V	12 V/11 V
Output	12 V/11 V	12 V/11 V	12 V/11 V	12 V/11 V	12 V/11 V	12 V/11 V
DESAT charge current	500 μA	500 μA	500 μA	500 μA	500 μA	No
Typical propagation delay	170 ns	170 ns	170 ns + TLTOff	170 ns	170 ns + TLTOff	85 ns



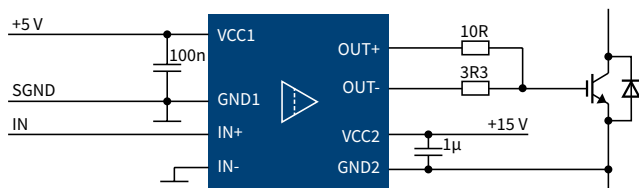
EiceDRIVER™ 1ED Compact

1200 V single-channel, isolated driver family with active Miller clamp or separate output

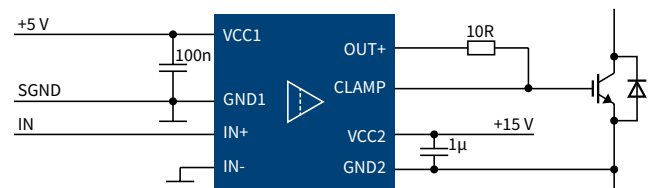
Infineon's EiceDRIVER™ 1ED Compact family now includes the 1ED-X3 Compact family, which is recognized under UL 1577 (pending) with an insulation test voltage of $V_{ISO} = 5000$ V(rms) for 1 min. 1EDC Compact 300 mil family is recognized under UL 1577 with an insulation test voltage of $V_{ISO} = 2500$ V(rms) for 1 min. The functional isolated EiceDRIVER™ 1EDI Compact 150 mil and 300 mil families are also available. The EiceDRIVER™ 1ED Compact family is the perfect driver for superjunction MOSFETs such as CoolMOS™, IGBTs, silicon carbide (SiC) MOSFETs such as CoolSiC™, and IGBT modules.

Simplified application diagram

Separate sink/source outputs



Active Miller clamp



Features and benefits

Key features
DSO-8 300 mil wide body package with 8 mm creepage distance
Up to 10 A typical peak rail-to-rail output
200 kV/μs CMTI
Active Miller clamp or separate output
15 ns propagation delay matching
Short circuit clamping and active shutdown
UL 1577 pending ($V_{ISO} = 5$ kV (rms))

Key benefits
Small space-saving package with large creepage distance (>8 mm)
No external filter needed, cost saving and robustness
Avoids wrong switching patterns in rugged environments
Optimized pinout for low inductance power supply
Higher dynamic range in PWM modulation and shorter deadtime
Higher robustness in rugged environments
Suitable for operation at high ambient temperature



Evaluation board

EVAL-1EDC20H12AH-SIC
EVAL-1EDI60I12AF
EVAL-1ED3121MX12H *
EVAL-1ED3122MX12H *
EVAL-1ED3124MX12H *

Key components:

> CoolSiC™ 1200 V IMZ120R045M1
> TRENCHSTOP™ 5 IGBT IKW50N65F5
> 1ED31xx with IGBT Highspeed 3 1200 V IKQ75N120CH3

Key components:

EVAL1EDC20H12AHSICTOBO1
EVAL1EDI60I12AFTOBO1
EVAL1ED3121MX12HTOBO1
EVAL1ED3122MX12HTOBO1
EVAL1ED3124MX12HTOBO1

1ED Compact, 1200 V, DSO-8, Separate sink/source outputs									
150 mil	1EDI60I12AF	1EDI40I12AF	1EDI20I12AF	1EDI05I12AF				1EDI60N12AF	1EDI20N12AF
150 mil Certified						1ED3124MU12F *			
300 mil	1EDI60I12AH	1EDI40I12AH	1EDI20I12AH	1EDI05I12AH				1EDI60H12AH	1EDI20H12AH
300 mil Certified	1EDC60I12AH	1EDC40I12AH	1EDC20I12AH	1EDC05I12AH	1ED3131MU12H *	1ED3123MU12H *	1ED3120MU12H *	1EDC60H12AH	1EDC20H12AH
						1ED3124MU12H *	1ED3121MU12H *		
Typ. output current [A]	±10	±7.5	±4	±1.3	±3	±9	±3	±10	±4
Prop. delay [ns]	300	300	300	300	280	100	100	125	125
Recommendation	1) All 650 V and 1200 V IGBT discrete and modules					2) All 650 V and 1200 V IGBT discrete and modules, SiC MOSFETs			

1ED Compact, 1200 V, DSO-8, Combined output with active Miller clamp				
150 mil		1EDI30I12MF	1EDI20I12MF	1EDI10I12MF
150 mil Certified	1ED3125MU12F *			
300 mil		1EDI30I12MH	1EDI20I12MH	1EDI10I12MH
300 mil Certified	1ED3122MU12H *	1EDC30I12MH	1EDC20I12MH	1EDC10I12MH
Min. output current [A]	±6	±6	±4	±2.2
Prop. delay [ns]	100	300	300	300
Recommendation	2) All 650 V and 1200 V IGBT discrete and modules, SiC MOSFETs		1) All 650 V and 1200 V IGBT modules	

Perfect for driving SiC MOSFET

www.infineon.com/1EDcompact

* Coming soon



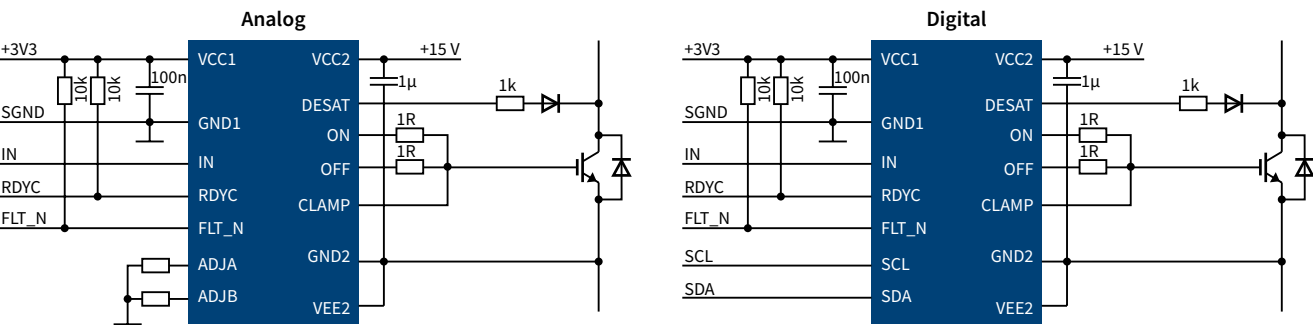
For more details on the product, click on the part number.

EiceDRIVER™ Enhanced 1ED34xx (X3 analog) and 1ED38xx (X3 digital) *

1200 V single-channel, isolated driver family with DESAT and soft-off and I2C configurability

The X3 Analog (1ED34x1Mx12M) family and X3 Digital (1ED38x0Mx12M) include galvanic-isolated single-channel gate driver ICs in a small DSO-16 fine pitch package with a large creepage and clearance of 8 mm. The gate driver ICs provide a typical peak output current of 3 A, 6 A and 9 A. The precision DESAT function for IGBT is also an excellent solution for SiC MOSFET short-circuit protection. Both X3 analog and digital families provide active Miller clamp, soft-off, separate sink and source output. The 1ED34x1Mx12M analog family provides adjustable DESAT filter time and adjustable Soft-off current level functionality. The 1ED38x0Mx12M digital family provide I2C configurability for multiple parameters including DESAT, soft-off, UVLO, active Miller clamp, overtemperature shutdown, two-level turn-off through software.

Simplified application diagram

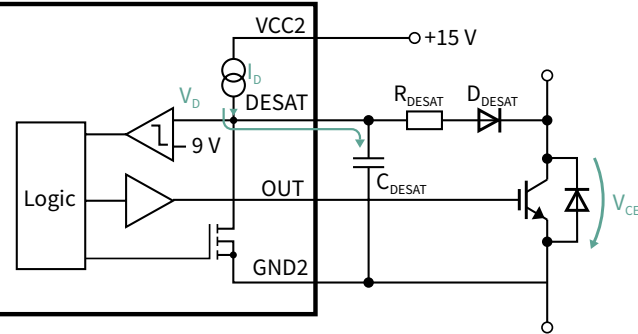


Features and benefits

Key features
Adjustable DESAT and Adjustable Soft-off
High number of configuration capabilities through I2C interface
100 kV/μs CMTI
Active Miller clamp or clamp driver
Separate source/sink output pins
Short circuit clamping and active shutdown
VDE 0884-11 planned ($V_{ORM} = 1.4$ kV)
UL 1577 pending ($V_{ISO} = 5$ kV (rms))

Key benefits
Optimized short circuit control for 3-level inverters
Flexible design
Avoids wrong switching patterns in rugged environments
Small space-saving package with large creepage distance (>8 mm)
No external filter needed, cost saving and robustness
Higher dynamic range in PWM modulation and shorter deadtime
Suitable for operation at high ambient temperature
Higher robustness in rugged environments

DESAT protection



Evaluation board available: EVAL-1ED3491Mx12M *

Protection

- Reliable short-circuit detection via accurate desaturation (DESAT) detection circuits (current source and comparator) protects the power switches from damage during short-circuit condition
- Two-level turn-off (TLTO) for short-circuit current protection to lower collector-emitter voltage overshoot
- Active Miller clamping option protects against parasitic turn-on due to high dV/dt
- Built-in short-circuit clamping limits the gate voltage during short circuit

www.infineon.com/gdisolated

*Coming soon



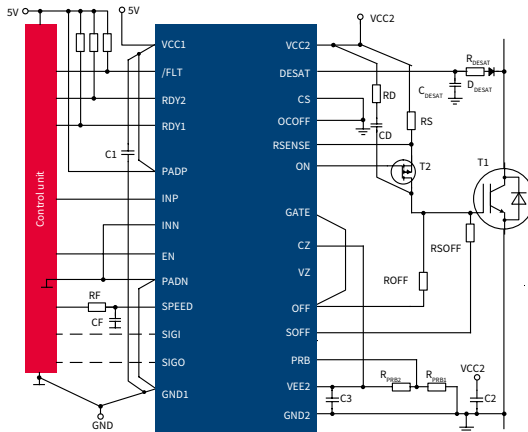
For more details on the product, click on the part number.

EiceDRIVER™ 1EDS-SRC

1200 V single-channel, isolated driver family with slew-rate control

The new EiceDRIVER™ slew-rate control (SRC) family serves the latest generation of highly efficient low-EMI electric drive systems with improved efficiency. This is the first high-voltage isolated gate driver on the market with dynamic slew-rate control (SRC) which allows on-the-fly dV/dt control of electric drives through precise gate current control, providing the best trade-off between minimum power dissipation and minimum EMI depending on operating conditions.

Simplified application diagram



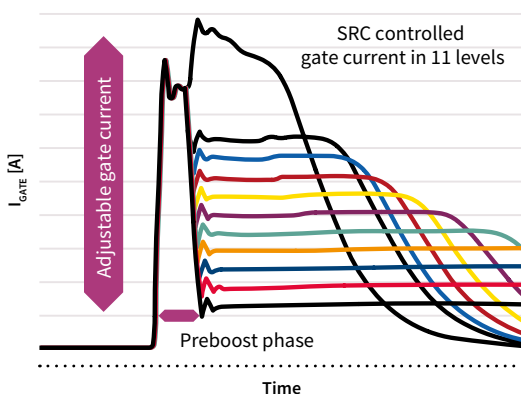
Part Number	Isolation rating
1EDS20I12SV	Isolation according VDE 0884-10 ($V_{ORM} = 1420\text{ V}$) and UL 1577 certified with $V_{ISO} = 5\text{ kV (rms)}$ for 1 min
1EDU20I12SV	UL 1577 certified with $V_{ISO} = 5\text{ kV (rms)}$ for 1 min
1EDI20I12SV	Functional isolation

Features and benefits

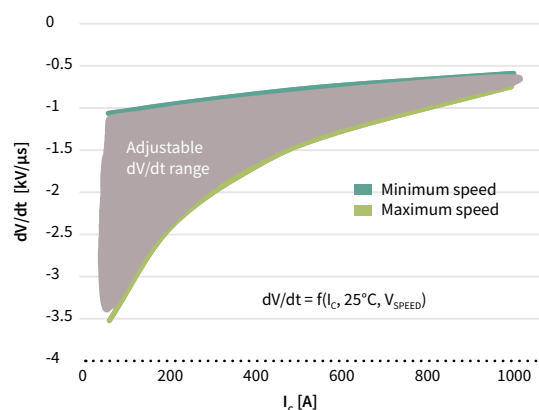
Key features
Real-time adjustable gate current control
Desaturation detection
Overcurrent protection for sense IGBTs and conventional IGBTs
Soft turn-off shutdown: 1 A pull down to rail
Two-level turn-off

Key benefits
Low EMI during low load conditions and high efficiency during high load conditions
Reduction or elimination of dV/dt filter
Drive power modules up to 900 A
Drive 1200 V single-channel IGBT driver
Unique: NPC1 short circuit protection for three-level inverters

Feature – real-time gate current control



Effect – gate turn-on tunable across a very large dV/dt range:



Evaluation board

EVAL-1EDS20I12SV

Key components:

- Isolated gate driver with slew rate control (1EDS20I12SV)
- Suitable for EconoDUAL™3 module FF600R12ME4 (module is not delivered with board)

Order code:

EVAL1EDS20I12SVTOBO2

www.infineon.com/SRC



For more details on the product, click on the part number.

Industrial and general purpose gate driver ICs

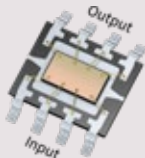
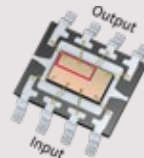
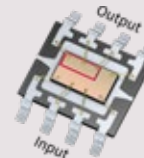
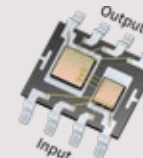
Infineon's gate driver IC solutions are the expert's choice. With more than 500 reliable and efficient gate driver solutions, we provide a comprehensive portfolio for virtually any application. Addressing various application requirements, Infineon delivers solutions with an assortment of gate driver topologies, voltage classes, drive capability, features and package options to optimize performance, minimize size and reduce cost. Some discrete gate driver ICs are also available in bare die. The table below shows additional gate driver IC features available in the current portfolio.

Features	Abbreviation	Benefits
Active Miller clamp	M-CLAMP	Protection against inadvertent dynamic turn-on because of parasitic Miller effects
Active shutdown	SD-ACT	Ensures a safe IGBT off-state in case the output chip is not connected to the power supply or an undervoltage lockout is in effect
Brake chopper	BRAKE	Integrated brake IGBT driver with protection
Comparator	CMP	General purpose comparator included
Current sense	CS	Senses the motor phase current through an external shunt resistor, converts from analog to digital signal, and transfers the signal to the low side
Dedicated JFET control	JFETDRIVE	Optimized to drive SiC JFET
Desaturation protection	DESAT	Protects the IGBT at short circuit
Enable	EN	Dedicated pin terminates all outputs
Fault reporting	FAULT-RPT	Indicates an overcurrent or undervoltage shutdown has occurred
Fault reset	FAULT-RST	Dedicated pin resets the DESAT-FAULT-state of the chip
High-voltage start-up	HVSTART	Provides easy and fast circuit start-up while enabling low circuit standby losses
Integrated bootstrap diode	BSD	Integrated bootstrap reduces BOM
Operational amplifier	OPAMP	An independent op-amp for current measurement or overcurrent detection
Self-oscillating (oscillator)	OSC	Integrated front end oscillator
Overcurrent protection (ITRIP)	OCP	Ensures safe application operation in case of overcurrent
Overtemperature shutdown	OT-OT	Internal overtemperature protection circuit protects the IC against excessive power loss and overheating
Programmable dead time	DT-PROG	Dead time is programmable with external resistor for flexible design
Programmable fault clear time	FLTC	The length of the fault clear time period (t_{FLTC}) is programmed by external capacitor which connected between FLTC and VSS (C_{FLTC}).
Programmable shutdown	SD-PROG	A shutdown feature has been designed into a pin
Separate pin for logic ground	SEP-GND	Dedicated pin or logic ground for improved noise immunity
Separate sink/source outputs	SEP-OUT	Simplifies gate resistor selection, reduces BOM, and improves dV/dt control
Shoot-through protection	STP	Additional shoot-through protection logic such as interlock
Short-circuit clamping	SC-CLAMP	During short circuit the IGBT's gate voltage tends to rise because of the feedback via the Miller capacitance. An additional protection circuit connected to OUT+ limits this voltage to a value slightly higher than the supply voltage.
Shutdown	SD	Dedicated pin disables the IC outputs
Soft overcurrent shutdown	SD-SOFT	Dedicated pin turns off the desaturated transistor, preventing overvoltages
Truly differential inputs	TDI	$\pm 70 V_{DC}$ and $\pm 150 V_{AC}$ ground-shift robustness of low-side gate driver ICs
Two-level turn-off	TLTO	Lowers VCE overshoots at turn-off during short circuits or overcurrent events
UL 1577	UL	Double galvanic isolation certification
Undervoltage lockout	UVLO	Ensures safe application operation by avoiding unexpected driver behavior at low voltages
VDE 0884-10 or VDE 0884-11	VDE	Reinforced galvanic isolation certifications for non-optical couplers

Infineon's industrial and general purpose gate driver ICs utilize the following technologies:


- › (1) Coreless transformer technology (CT)
- › (2) Level-shifting silicon-on-insulator technology (SOI)
- › (3) Level-shifting junction-isolation technology (JI)
- › (4) Non-isolated technology (N-ISO)

Infineon gate driver IC technologies

Non-isolated	Level-shift		Galvanic isolation
Low voltage	Junction isolation	Silicon on insulator	Coreless transformer
 <ul style="list-style-type: none"> › Comprehensive families of single- and dual-low-side drivers with flexible output current, logic configurations, and UVLOs › Rugged technology of the high-voltage gate drivers, and the state-of-the-art 130-nm process 	 <ul style="list-style-type: none"> › 20 years proven technology › Largest portfolio of 200 V, 600 V, 700 V and 1200 V industry standard gate drivers using rugged proprietary HVIC process 	 <ul style="list-style-type: none"> › Infineon SOI technology for high-voltage applications with inherent integrated bootstrap diode capability and lower level-shift losses › Industry best-in-class robustness against negative V_s transient spikes 	 <ul style="list-style-type: none"> › Magnetically-coupled isolation technology provides galvanic isolation (functional, basic and reinforced) › Strongest gate-drive output currents (up to 10 A) reducing need for external booster circuits

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For more details on the product, click on the part number. 

Product overview

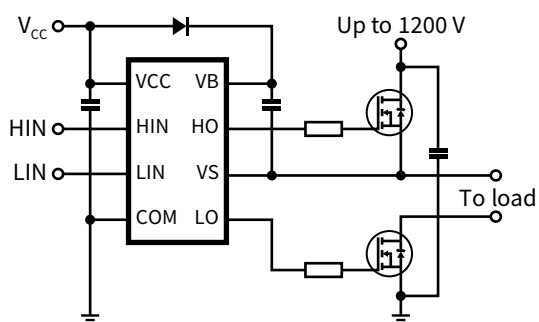
To ease the selection process, this overview is structured along the configurations of the gate driver ICs, as opposed to by application topology.

Half-bridge gate driver ICs					<div><div>Aircom</div><div>Home Appliances</div><div>Industrial</div><div>Drives</div><div>Motor control</div><div>Power Tools</div><div>Solar</div><div>Telecom</div></div>																									
Typical connection					Technology																									
Voltage class [V]	I _Q /I _{IO} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN		Comparator	Operational amplifier	Desaturation protection	Enable	Fault reporting	Integrated bootstrap diode	Over-current protection	Programmable dead time	Programmable shutdown	Self-oscillating (oscillator)	Separate pin for logic ground	Shoot-through protection	Shutdown	Soft over-current shutdown	DSO-8	DSO-14	DSO-16	DSO-16 WB	DSO-18	DIP-8	DIP-14	SSOP-24	VDSO-8	VQFN-14	Chip ¹
1200	1500/2500 2000/3000	12.2/11.2 10.2/9.3	85/85 440/440	2ED020112-FI IR2214SS	CT JI	✓	✓			✓					✓	✓	✓		✓				✓				✓			
650	2500/2500	9.1/8.2	200/200	2ED2182S06F NEW	SOI					✓					✓	✓			✓										✓	
				2ED21824S06J NEW	SOI					✓		✓			✓	✓			✓	✓									✓	
				2ED2183S06F NEW	SOI					✓					✓	✓			✓										✓	
				2ED21834S06J NEW	SOI					✓	✓				✓	✓			✓										✓	
				2ED2184S06F NEW	SOI					✓					✓	✓			✓	✓									✓	
				2ED21844S06J NEW	SOI					✓	✓				✓	✓			✓										✓	
				2ED2108S06F NEW	SOI					✓					✓	✓			✓										✓	
				2ED21084S06J NEW	SOI					✓	✓				✓	✓			✓										✓	
				2ED2109S06F NEW	SOI					✓					✓	✓			✓										✓	
				2ED21094S06J NEW	SOI					✓	✓				✓	✓			✓										✓	
				2ED21091S06F NEW	SOI					✓	✓				✓	✓			✓										✓	
	360 / 700	9.1 / 8.3	300/310	2ED2304S06F NEW	SOI					✓					✓	✓			✓									✓		
	1500/2500 20/80	12.2/11.2 8.9/7.7	85/85 530/530	2ED020106-FI 2ED28073J06** NEW	CT JI					✓					✓	✓			✓					✓					✓	
	290/600	8.9/8	90/90	2ED2103S06F** 2ED2104S06F**	SOI SOI					✓					✓	✓			✓									✓		
600	78/169	8.9/8.2 8.9/8.2	220/220	IR2304 IR25601S	JI JI										✓	✓			✓						✓					
		9/8		IR21531	JI										✓	✓			✓								✓			
		9/8		IR21531D	JI						✓					✓	✓			✓										
		9/8		IR25603	JI										✓	✓			✓											
		11/9		IRS2153D, IRS21531D	JI					✓					✓	✓			✓						✓				✓	
	180/260	9/8	N.A.	IR2108	JI										✓	✓			✓						✓					
		9/8		IR21084	JI								✓			✓	✓			✓					✓					
		9/8		IR2308	JI											✓	✓			✓					✓					
		9/8		IR25606S	JI											✓	✓			✓					✓					
		9/8		IR2109	JI										✓	✓			✓						✓					
		9/8		IR21091	JI								✓		✓	✓			✓						✓					
		9/8		IR21094	JI								✓		✓	✓			✓						✓					
		4.1/3.8		IR2302	JI											✓	✓			✓					✓					
		8.9/8.2		IR2103	JI											✓	✓			✓					✓					
		8.9/8.2		IR2104	JI											✓	✓			✓					✓					
	8.9/8.2	IR25602S	JI											✓	✓			✓					✓							
	220/480	8.9/7.7	500/500	IRS2890DS NEW	JI					✓	✓	✓						✓												
	250/500	8.6/8.2	150/750	IR2111	JI										✓	✓			✓					✓						
	200/350	8.9/8.2	200/220	IRS2304	JI											✓	✓			✓					✓				✓	
		8.9/8.2		IRS2103	JI											✓	✓			✓					✓				✓	
		8.9/8.2		IR2104	JI											✓	✓			✓					✓				✓	
		8.9/8.2		IR25602S	JI											✓	✓			✓					✓				✓	
		8.9/8.2		IRS2103	JI											✓	✓			✓					✓				✓	
		8.9/8.2		IR2104	JI											✓	✓			✓					✓				✓	
		8.9/8.2		IRS2111	JI											✓	✓			✓					✓				✓	
		8.9/8.2		IRS2108	JI												✓	✓			✓				✓				✓	
		8.9/8.2		IR21084	JI									✓			✓	✓			✓				✓				✓	
		8.9/8.2		IR2109	JI											✓	✓			✓					✓				✓	
		8.9/8.2		IR21091	JI									✓		✓	✓			✓					✓				✓	
	8.9/8.2	IR21094	JI											✓	✓			✓					✓				✓			
	210/360	9.1/8.3	150/680	2EDL05N06PF, 2EDL05N06PJ	SOI						✓					✓	✓			✓										
		12.5/11.6		400/420	2EDL05I06PF, 2EDL05I06PJ	SOI						✓				✓	✓			✓										
		8.9/8.2		IRS2183	JI											✓	✓			✓					✓				✓	
		8.9/8.2		IR2183	JI											✓	✓			✓					✓				✓	
		8.9/8.2		IRS21834	JI									✓			✓	✓			✓					✓			✓	
		8.9/8.2		IR21834	JI											✓	✓			✓						✓			✓	
		8.9/8.2		IRS2184	JI											✓	✓			✓					✓				✓	
8.9/8.2		IR2184		JI											✓	✓			✓					✓				✓		
8.9/8.2		IR21844		JI											✓	✓			✓					✓				✓		
8.9/8.2		IRS21844		JI											✓	✓			✓					✓				✓		
2000/3000		10.2/9.3		440/440	IR2114SS	JI			✓		✓					✓	✓			✓						✓			✓	
2300/2800	9.1/8.3 12.5/11.6	300/310 400/420	2EDL23N06PJ 2EDL23I06P	SOI SOI			✓	✓	✓	✓	✓			✓	✓			✓												
200	290/600	8.9/8.2	150/160	IRS2007M, IRS2007S NEW	JI										✓	✓			✓							✓				
			150/680	IRS2008M, IRS2008S NEW	JI												✓	✓			✓						✓			
				120	2000/6000 3000/6000 4000/6000	7/6.5	47/47	2EDL8112G* 2EDL8113G* 2EDL8114G*	JI JI JI								✓	✓			✓						✓		✓	

High-side and low-side gate driver



Typical connection



Voltage class [V]	I _{OH} /I _{OL} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Features			Package						
1200	2000/2500	10.2/9.3	225/280	IR2213	J1		✓	✓			✓		✓		✓
650	290/700	9.1/8.2	200/200	2ED2106S06F	NEW SOI	✓			✓						✓
				2ED21064S06J	NEW SOI	✓				✓				✓	
	2500/2500			2ED2181S06	NEW SOI	✓			✓					✓	
	290/600	8.9/8	90/90	2ED21814S06J	NEW SOI	✓				✓				✓	
				2ED2101S06 *	SOI	✓			✓					✓	
				2ED2110S06 *	SOI	✓	✓	✓			✓			✓	
	2500/2500	2ED2113S06 *	SOI	✓	✓	✓			✓				✓		
600	200/350	8.9/8.2	200/220	IR2106	J1				✓			✓			
		8.9/8.2		IR21064	J1		✓			✓			✓		
		4.1/3.8		IR2301	J1				✓			✓			
		8.9/8.2		IR25604S	J1				✓						
		4.1/3.8		IR25607S	J1				✓						
	210/360	8.9/8.2	150/160	IR2101	J1				✓			✓			✓
		IR2102		J1				✓			✓				
	250/500	8.6/8.2	105/125	IR2112	J1			✓			✓		✓		
		8.6/8.2	130/135	IRS2112	J1		✓	✓			✓		✓		✓
	290/600	8.9/8.2	150/160	IRS2101	J1				✓			✓			✓
		8.9/8.2	200/220	IRS2106	J1				✓			✓			✓
		8.9/8.2		IRS21064	J1		✓			✓		✓			
		360/700	12.5/11.6	400/420	2EDL05I06BF	SOI	✓			✓					
	1900/2300	8.9/8.2	220/180	IRS2181	J1				✓			✓			✓
		8.9/8.2		IR2181	J1				✓			✓			
		8.9/8.2		IR21814	J1		✓			✓			✓		
		8.9/8.2		IRS21814	J1		✓			✓			✓	✓	
	2500/2500	8.6/8.2	94/120	IR2113	J1		✓	✓			✓		✓		✓
		8.6/8.2		IR25607S	J1		✓	✓			✓				
		8.5/8.2	120/130	IRS2113	J1		✓	✓			✓		✓	✓	✓
	4000/4000	8.9/8.2	170/170	IRS2186	J1				✓			✓			✓
		8.9/8.2		IRS21864	J1		✓			✓			✓		
		6/5.5		IRS21867S	J1				✓						
500	2500/2500	8.6/8.2	94/120	IR2110	J1		✓	✓			✓		✓		
		8.5/8.2	120/130	IRS2110	J1		✓	✓			✓		✓		✓
200	290/600	8.9/8.2	150/160	IRS2005S, IRS2005M	J1				✓					✓	
	1000/1000	9/8.2	60/60	IRS2011	J1				✓			✓			✓
		9/8.2	75/80	IR2011	J1				✓			✓			
	3000/3000	8.6/8.2	65/95	IR2010	J1			✓	✓			✓		✓	

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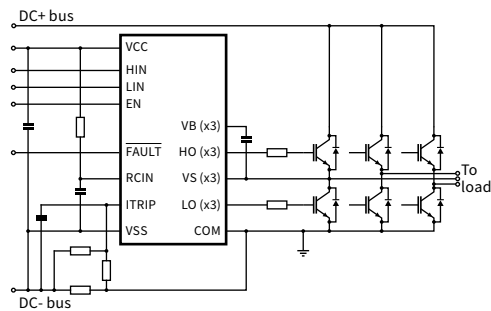
*Coming soon

**For more information on the product, contact our product support

For more details on the product, click on the part number.

Three-phase gate driver ICs

Typical connection



Voltage class [V]	I _{O+} /I _{O-} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Features											Package									
						Brake chopper	Operational amplifier	Desaturation protection	Enable	Fault reporting	Integrated bootstrap diode	Over-current protection	Programmable dead time	Separate pin for logic ground	Shoot-through protection	Shutdown	DSO-20 WB	DSO-24	DSO-28 WB	DIP-28	LCC-32	MQFP-64	TSSOP-28	VQFN-28	VQFN-34	CHIP ¹
1200	350/650	11.4/10.4	600/600	6ED2230S12T NEW	SOI				✓	✓	✓	✓	✓	✓		✓										
	250/500	8.6/8.2	700/750	IR2233	JI	✓			✓		✓	✓	✓	✓			✓	✓	✓						✓	
		10.4/9.4		IR2235	JI	✓			✓		✓	✓	✓	✓			✓	✓	✓							
	350/540	11.2/10.2	550/550	IR2238Q	JI	✓	✓		✓		✓	✓	✓	✓	✓					✓						
600	165/375	11.7/9.8	490/530	6ED003L06-F2	SOI			✓	✓		✓		✓				✓								✓	
		11.7/9.8		6EDL04I06NT , 6EDL04I06PT	SOI			✓	✓	✓	✓	✓				✓									✓	
		9/8.1	530/530	6EDL04N06PT	SOI			✓	✓	✓	✓	✓				✓									✓	
	200/350	8.9/8.2	400/425	IR2136	JI			✓	✓		✓	✓					✓	✓	✓						✓	
		11.1/10.9		IR21363J , IR21363S	JI			✓	✓		✓	✓					✓		✓						✓	
		11.1/10.9		IR21365S	JI			✓	✓		✓	✓					✓									
		8.9/8.2		IR21368S	JI			✓	✓		✓	✓					✓								✓	
		10.4/9.4	530/500	IR21364S	JI			✓	✓		✓	✓				✓									✓	
		11.1/10.9	530/530	IRS2334M , IRS2334S	JI										✓								✓			
		8.9/8.2		IRS2336S	JI			✓	✓		✓	✓					✓		✓							
		8.9/8.2		IRS2336DJ , IRS2336DM , IRS2336DS	JI			✓	✓	✓	✓	✓							✓			✓			✓	
	8.9/8.2	IRS23364DJ , IRS23364DS		JI			✓	✓	✓	✓	✓					✓		✓						✓		
	250/500	8.9/8.2	530/530	IRS23365DM	JI			✓	✓	✓	✓	✓											✓			
		9/8.7		425/675	IR2130, IR2132	JI	✓			✓		✓	✓					✓	✓	✓					✓	
		8.7/8.3		600/1300	IR2131	JI				✓		✓	✓	✓	✓				✓	✓	✓					
		8.6/8.2		700/750	IR2133	JI	✓			✓		✓	✓	✓	✓				✓	✓	✓					
	10.4/9.4	IR2135J , IR2135S	JI		✓			✓		✓	✓	✓	✓				✓	✓	✓					✓		
200	165/375	11.7/9.8	490/530	6ED003L02-F2	SOI			✓	✓		✓	✓										✓				
		9/8.1	530/530	6EDL04N02PR	SOI			✓	✓	✓	✓	✓									✓					

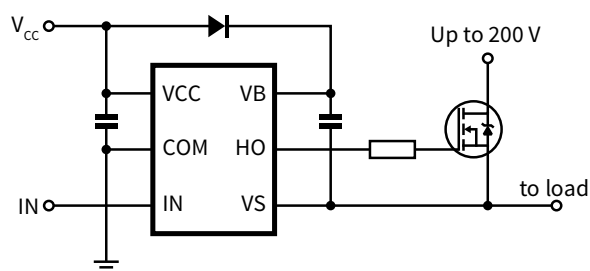
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For more details on the product, click on the part number.

Single high-side gate driver ICs

Typical connection



Voltage class [V]	I _{OH} /I _{OL} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Features																Digital I2C configurability (16 parameters)															
1200	1300/900	12/11.1	300/300	1EDI05I12AF , 1EDI05I12AH	CT										✓	✓				✓	✓																
				1EDC05I12AH	CT												✓	✓				✓															
				1ED020I12-F2	CT	✓				✓		✓	✓			✓				✓						✓											
	2000/2000	12/11	165/170	1ED020I12-B2	CT	✓				✓		✓	✓			✓				✓	✓						✓										
			1750/1750	1ED020I12-FT	CT	✓				✓		✓	✓			✓				✓							✓										
				1ED020I12-BT	CT	✓				✓		✓	✓			✓				✓	✓	✓						✓									
	2200/2300	12/11.1	300/300	1EDI10I12MF , 1EDI10I12MH	CT	✓									✓						✓	✓															
				1EDC10I12MH	CT	✓											✓						✓														
				1ED3120MU12 *	CT												✓	✓				✓		✓													
	3000/3000	10/8	100/100	1ED3121MU12 *	CT											✓	✓				✓		✓														
		12.5/10.5	280/280	1ED3131MU12 *	CT											✓	✓				✓		✓														
			232/232	1ED3431MU12 ** NEW	CT	✓	✓			✓		✓	✓			✓	✓	✓									✓										
			1ED3830MU12 ** NEW	CT	✓		✓		✓		✓	✓			✓	✓	✓	✓				✓						✓									
	4000/3500	9.1/8.5	120/115	1EDI20N12AF	CT											✓	✓					✓															
			125/120	1EDI20H12AH	CT												✓	✓						✓													
		12/11.1	300/300	1EDC20H12AH	CT												✓	✓						✓													
				1EDI20I12AF , 1EDI20I12AH	CT													✓	✓						✓	✓											
				1EDC20I12AH	CT													✓	✓						✓												
	4400/4100			1EDI20I12MH , 1EDI20I12MF	CT	✓										✓							✓	✓													
				1EDC20I12MH	CT	✓										✓							✓														
	4000/4000	16.9/16.4	80/80	1EDI30J12CP	CT				✓		✓						✓							✓													
	6000/6000	10/8	100/100	1ED3122MU12 *	CT	✓										✓					✓		✓														
		12.5/10.5	232/232	1ED3125MU12 *	CT	✓										✓						✓															
			1ED3461MU12 ** NEW	CT	✓	✓			✓		✓	✓			✓	✓	✓								✓												
	5900/6200	12/11.1	300/300	1ED3860MU12 ** NEW	CT	✓		✓		✓		✓	✓			✓	✓	✓	✓					✓	✓												
				1EDI30I12MF , 1EDI30I12MH	CT	✓											✓							✓	✓												
				1EDC30I12MH	CT	✓											✓							✓		✓											
	7500/6800	12/11.1	300/300	1EDI40I12AH , 1EDI40I12AF	CT											✓	✓						✓	✓													
				1EDC40I12AH	CT													✓	✓						✓												
				1EDI20I12SV	NEW CT					✓	✓	✓	✓		✓	✓		✓	✓									✓									
	SRC/2000	11.9/11	460/460	1EDU20I12SV	NEW CT					✓	✓	✓	✓		✓	✓		✓	✓	✓	✓							✓									
	SRC/2000	11.9/11	460/460	1EDS20I12SV	NEW CT					✓	✓	✓	✓		✓	✓		✓	✓	✓	✓							✓									
	9000/9000	10/8	100/100	1ED3123MU12 *	CT											✓	✓					✓		✓													
		12.5/10.5	232/232	1ED3124MU12 *	CT											✓	✓					✓		✓													
			1ED3491MU12 ** NEW	CT	✓	✓			✓		✓	✓			✓	✓	✓							✓													
			1ED3890MU12 ** NEW	CT	✓		✓		✓		✓	✓			✓	✓	✓	✓							✓												
		10000/9400	12/11.1	125/120	1EDI60H12AH	CT											✓	✓						✓	✓												
	1EDC60H12AH				CT													✓	✓					✓													
	1EDI60I12AF , 1EDI60I12AH				CT													✓	✓						✓	✓											
	1EDC60I12AH				CT													✓	✓						✓												
					300/300													✓	✓						✓												
600	160/240	9/8	215/140	IRS25752L	JI																							✓									
			250/500	105/125	IR2117	JI																	✓						✓		✓						
				120/150	IR2118	JI																		✓					✓		✓						
	290/600	10.3/9	150/200	IR2127 , IR2128	JI							✓		✓								✓						✓		✓							
				7.2/6.8	150/150	IR21271	JI							✓		✓							✓					✓		✓							
8.6/8.2				105/125	IRS2117 , IRS2118	JI																	✓					✓		✓							
500	1600/3300	9.2/8.3	200/170	IRS2125	JI								✓		✓											✓											
200	160/240	9/8	215/140	IRS20752L	JI																						✓										
100				IRS10752L	JI																						✓										
650	4000/8000	4.5/5.0	41/37	1EDS5663H	CT																✓	✓			✓												
	4000/8000	4.5/5.0	41/37	1EDF5673F	CT																					✓											
250	4000/8000	4.5/5.0	41/37	1EDF5673K	CT																								✓								

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SRC=Turn on slew rate control

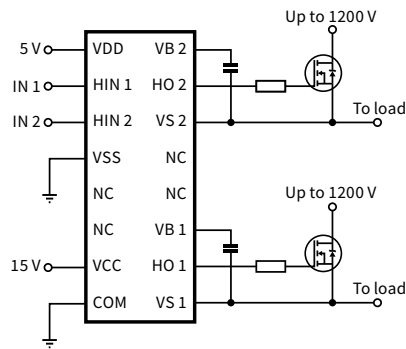
* Coming soon

** For more information on the product, contact our product support

For more details on the product, click on the part number.

Dual high-side/half-bridge

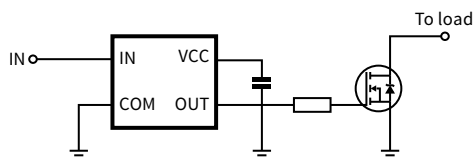
Typical connection



Voltage class [V]	I _{OH} /I _{OL} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Active Miller clamp	Deadtime control	Desaturation protection	Disable	Fault reporting	Fault reset	Separate pin for logic ground	UL 1577	VDE 0884-10	DSO-16	DSO-16 WB	DSO-36 (w/o 4 pins)	TFLGA-13
1200	2000/2000	12/11	165/170	2ED020112-F2	CT	✓	✓		✓	✓	✓							✓
650	4000/8000	4.2/3.9	37 / 37	2EDF7275F	CT			✓						✓				
	1000/2000			2EDF7175F	CT			✓					✓					
	4000/8000	8/7		2EDS8265H	CT			✓				✓	✓		✓			
	1000/2000			2EDS8165H	CT			✓				✓	✓		✓			
				2EDF7235K	CT			✓										
250	4000/8000	4.2/3.9		2EDF7275K	CT		✓	✓										✓

Single low-side gate driver ICs

Typical connection



Voltage class [V]	I_{OH}/I_{OL} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Automatic minimum on time protection	Enable	Fault reporting	Over-current protection	Programmable fault clear time	Programmable minimum on time	Separate sink/source outputs	Synchronous rectification	Truly differential inputs	DSO-8	DIP-8	SOT23-5	SOT23-6	WSON-6
200	1000/4000	10.55/9	50/60	IR11662	N-ISO	✓	✓			✓	✓	✓	✓		✓				
	2000/7000	10.55/9	50/60	IR11672A	N-ISO	✓	✓			✓	✓	✓	✓		✓				
	1000/2500	4.5/4.4	50/50	IR1161L	N-ISO	✓				✓	✓	✓				✓			
80	4000/8000	4.2/3.9	45 / 45	1EDN7550	NEW N-ISO									✓				✓	
		8/7	45 / 45	1EDN8550	NEW N-ISO								✓					✓	
25	2600/2600	8/7.3	34/34	1ED44173N01	NEW N-ISO	✓	✓	✓									✓		
		11.9/11.4	50/50	1ED44175N01	NEW N-ISO	✓	✓	✓									✓		
	800/1750	11.9/11.4	50/50	1ED44176N01F	NEW N-ISO	✓	✓	✓	✓					✓					
	1500/1500	10.2/9.2	50/50	IRS44273L	N-ISO												✓		
20	300/550	5/4.15	50/50	IR44252L	N-ISO												✓		
		5/4.15	50/50	IR44272L	N-ISO		✓										✓		
		5/4.15		IR44273L	N-ISO												✓		
	4000/8000	4.2/3.9	19/19	1EDN7511B	N-ISO													✓	
		8/7		1EDN8511	N-ISO													✓	
		4.2/3.9		1EDN7512B, 1EDN7512G	N-ISO												✓		✓
5	1600/3300	8.9/8	200/150	IR2121	N-ISO			✓	✓						✓				

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* Coming soon

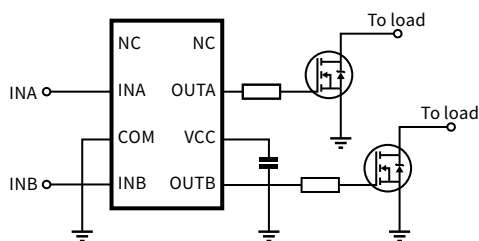
** For more information on the product, contact our product support

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Dual low-side gate driver ICs



Typical connection

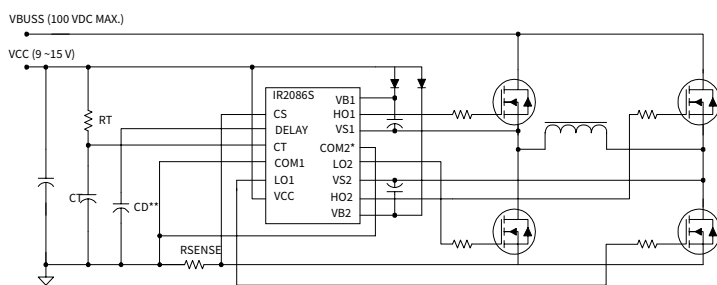


Voltage class [V]	I_{OH}/I_{OL} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Features				Package			
						Automatic minimum on time protection	Enable	Programmable minimum on time	Synchronous rectification	DSO-8	DIP-8	WSON-8	TSSOP-8
200	1000/4000	8.1/7.6	70/60	IR1168	N-ISO	✓			✓	✓			
	1000/4000	8.1/7.6	80/100	IR11682	N-ISO	✓			✓	✓			
	1000/4000	4.55/4.35	60/250	IR11688S	N-ISO	✓		✓	✓	✓			
25	1000/1000	11.5/10	55/55	2ED24427N01 *	N-ISO		✓			✓			
	2300/3300	N.A.	50/50	IRS44262S	N-ISO					✓			
				IRS4426S	N-ISO					✓			
				IRS4427	N-ISO					✓	✓		
			65/85	IR25600	N-ISO					✓	✓		
				IR4426, IR4427	N-ISO					✓	✓		
20	5000/5000	4.2/3.9	19/19	2EDN7523, 2EDN7524	N-ISO		✓			✓		✓	✓
		8/7		2EDN8523F, 2EDN8523R, 2EDN8524F, 2EDN8524R	N-ISO		✓			✓			✓
	4000/4000	4.2/3.9	19/19	2EDN7424R, 2EDN7424F	N-ISO		✓			✓			✓

Full-bridge gate driver ICs



Typical connection



*COM2 must be shorted to COM1 for proper operation
**CD is optional

Voltage class [V]	I_{OH}/I_{OL} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Features				Package		
						Integrated bootstrap diode	Shoot-through protection	Shutdown	Overcurrent protection	Programmable dead time	Self-oscillating (oscillator)	
100	1200/1200	7.25/6.8	40/60	IR2086S	JI				✓	✓	✓	✓
600	180/260	11/9	N.A.	IRS24531DS	JI	✓	✓	✓				✓
				IRS2453D	JI	✓	✓	✓				✓

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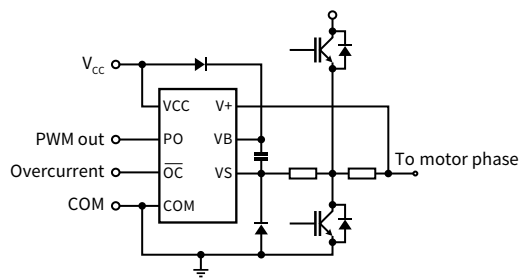
*Coming soon

For more details on the product, click on the part number.

Complementary: current sense ICs



Typical connection

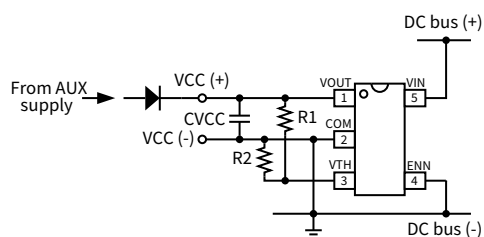


Voltage class [V]	Base PN	Technology	Current sense	Overcurrent protection	DSO-8	DSO-16 WB	DIP-8	SOT23-5
600	IR2175	J1	✓	✓	✓		✓	
	IR25750	J1	✓					✓

Complementary: high-voltage start-up IC



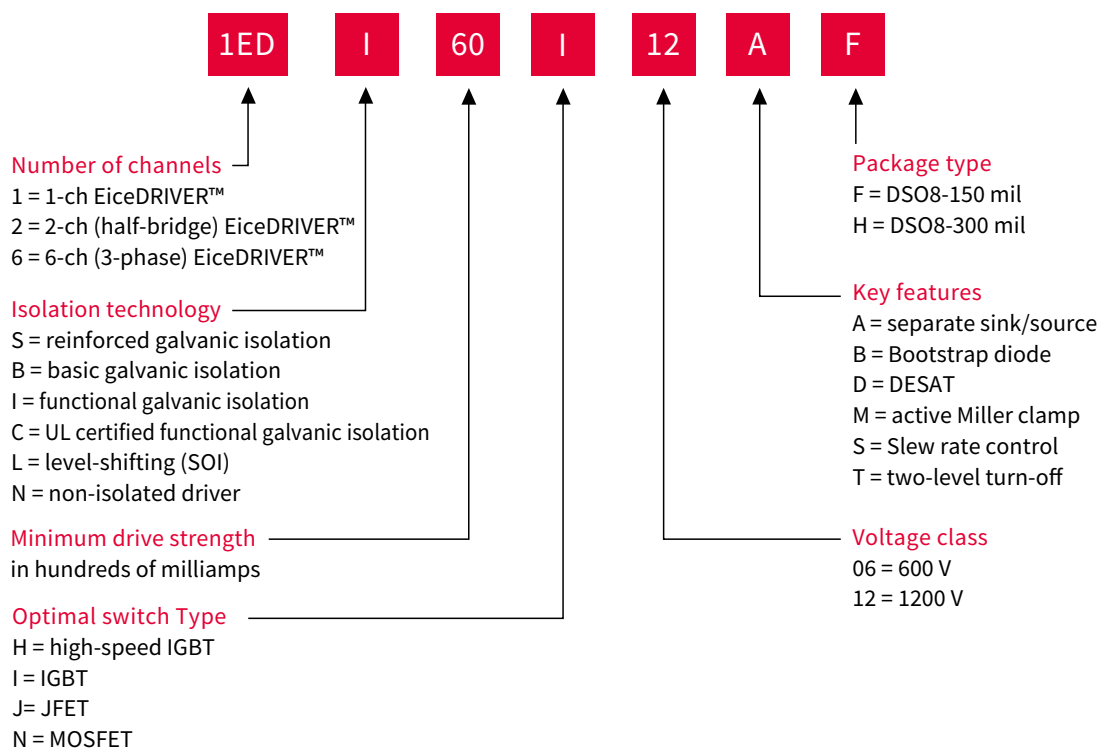
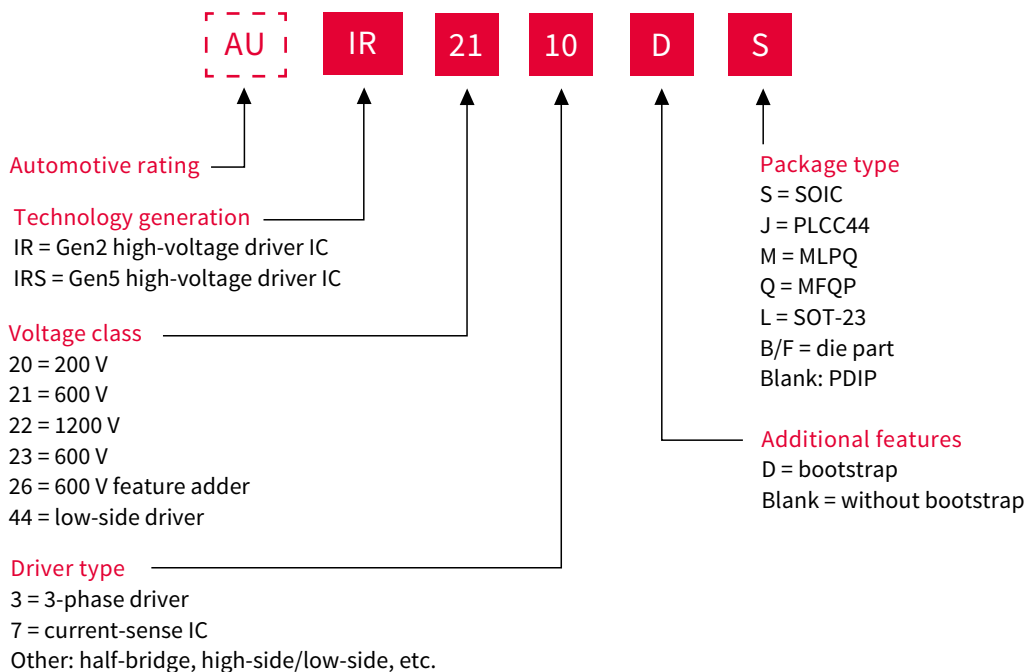
Typical connection



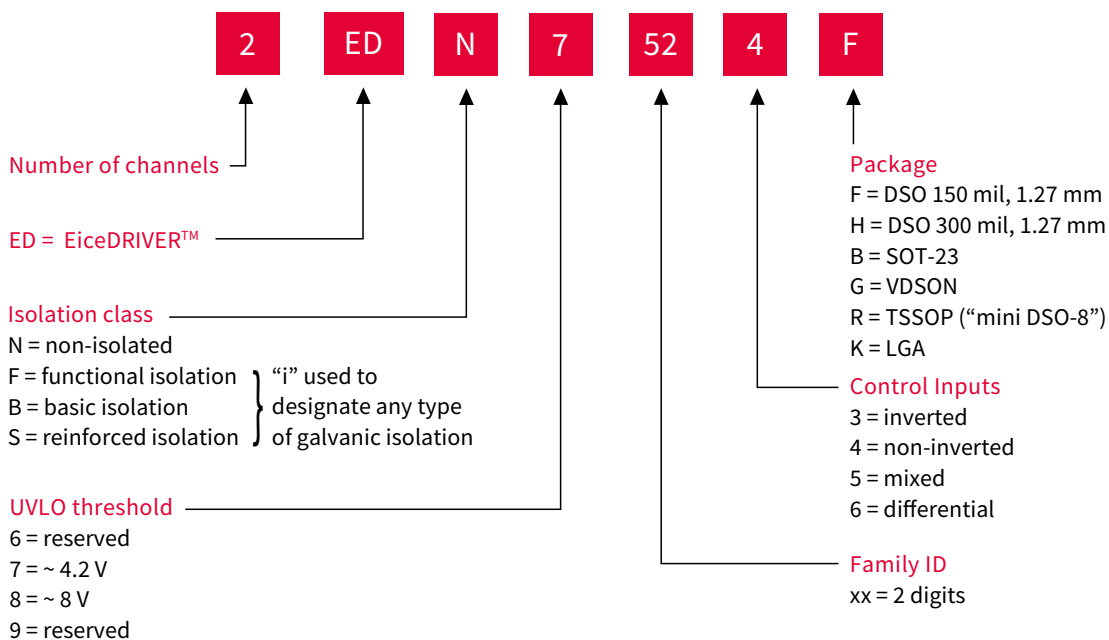
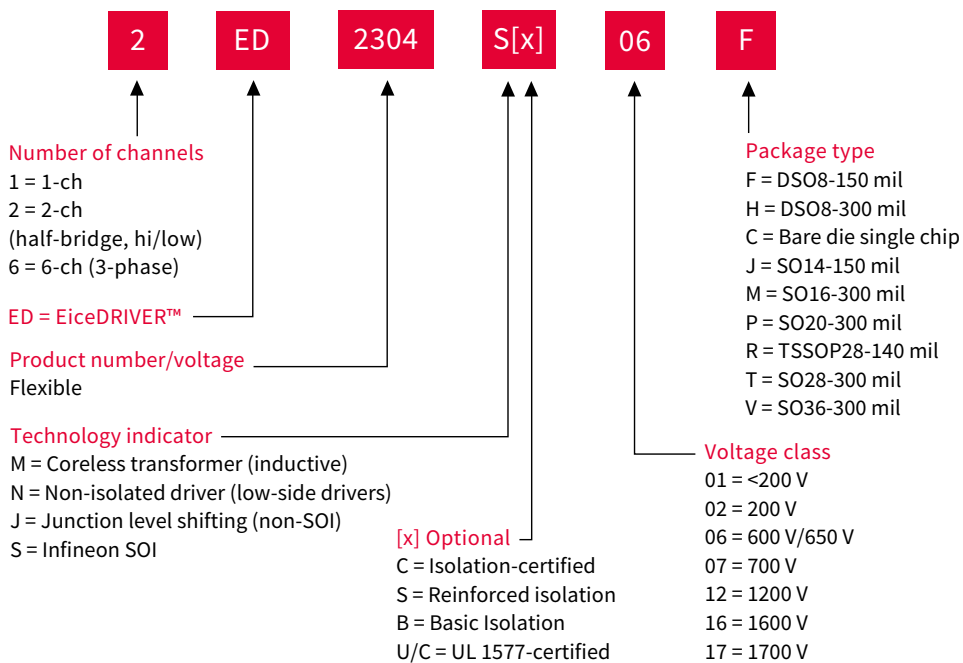
Voltage class [V]	Base PN	Technology	Enable	High voltage start-up	Overtemperature shutdown	Package
480	IRS25751	N-ISO	✓	✓	✓	✓

Nomenclature

Naming convention for existing families of gate driver ICs



Naming convention for existing and upcoming families of gate driver ICs



Gate driver selection tool

To simplify the gate driver selection process, Infineon offers an online easy-to-use gate driver selection tool. By selecting a few key parameters, the tool quickly guides you in finding the right driver for your application.

Click to access the gate driver selection tool



www.infineon.com/gdfinder

For recommended gate drivers by application, visit www.infineon.com/gdapplication to download the PDF version of the gate driver application matrix.

Home Appliances

Discover the next level of power and efficiency

Infineon's gate driver ICs utilize level-shift silicon-on-insulator technology (SOI), and level-shift junction isolation technology (JI) to meet the high performance requirements in home appliance applications.

Recommended Gate Drivers	Home Appliances	General	Air Conditioner (Residential)	Commercial Lighting	Electric Tools (Battery)	Hood Fan/Ceiling Fan/Exhaust Fan	Power Tools (AC)	Refrigerator/Washer/Dryer	Vacuum Cleaner
PFC		■ IR54275 ■ IR54276 ■ IR54277	■ IR54275L ■ IR54276L ■ IR54277L					■ IR54275 ■ IR54276 ■ IR54277	
SMPs	■ KE5047302 ■ KE5047303	■ IR54275 ■ IR54276 ■ IR54277	■ IR54275L ■ IR54276L ■ IR54277L						
DC-DC	■ IR54275 ■ IR54276 ■ IR54277								
Inverter (<1 kW)									
Inverter (>1 kW)									
SR Motor Inverter									
Half-Bridge Topology									
HS-Back									
Sync-Back									

Industrial

Reliable, high quality solutions for the most rugged situations

Infineon's gate driver ICs are the expert's choice. With the breadth and depth of the portfolio, customers can quickly design and build efficient and robust systems for every industrial application.

Recommended Gate Drivers	Industrial	Air Conditioner (Commercial)	Automatic Door Opening Systems	Building Fans & Pumps	Commercial Sewing Machine	Drives	Forklift Truck/CAV	UPS
Compressor/Pump/AC	■ IR54275 ■ IR54276 ■ IR54277	■ IR54275L ■ IR54276L ■ IR54277L						
Inverter (<1 kW)								
Inverter (>1 kW)								
PFC								
DC-DC (1 kW - 100 kW)								
SMPs								
Brake Chopper								
Active Bridge Rectifier								

Mobility & Battery Driven

Full range of best-in-class components

From EV charger and light electric vehicle (LEV) to service robotics and drones, Infineon's family of configurable half-bridge and three-phase gate driver ICs can be combined with powerful Infineon MOSFETs to provide the required power and efficiency. Automotive-specific gate drivers qualified according to AEC-Q100 are also available.

For battery-driven applications, saving battery power is the key. Infineon offers an excellent selection of gate driver ICs providing the highest possible energy efficiency and top precision.

Recommended Gate Drivers	Mobility & Battery Driven	EV Charger/Battery Charger	General Traction	Light Electric Vehicle (LEV)	Launch Mower/Recumbent Service Robotics
Inverter	■ IR54275 ■ IR54276 ■ IR54277	■ IR54275 ■ IR54276 ■ IR54277	■ IR54275 ■ IR54276 ■ IR54277	■ IR54275 ■ IR54276 ■ IR54277	■ IR54275 ■ IR54276 ■ IR54277
DC-DC					
PFC					
HB (LLC)					
Sync-Back					
BLDC					

Renewable Energy

Powering an energy-smart world

Improving efficiency is the number one objective in the field of photovoltaics. Efficiency gains of as little as one percent can still yield enormous returns in renewable energy segment.

Infineon provides a comprehensive portfolio of high-performance gate driver ICs for photovoltaic inverters. By combining EiceDRIVER™ with super-junction MOSFETs such as CoolMOS™, IGBTs, Silicon Carbide (SiC) MOSFET such as CoolSiC™, as well as IGBT and SiC modules, Infineon enables solutions that maximizing uptime and energy production.

Recommended Gate Drivers	Renewable Energy	Wind Pump	Solar Inverter
Inverter (<2 kW)			
Inverter (>2 kW)			
µInverter Boost			
µInverter DC-AC			
String Boost			
String Inverter			
Central Boost/SMPs			
Central Inverter			

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For more details on the product, click on the part number.



Infineon support for gate driver ICs

Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/gatedriver

www.infineon.com/gdapplication

www.infineon.com/gdiso

www.infineon.com/ifxdesigner

www.infineon.com/crs

www.infineon.com/eicedriver

www.infineon.com/1edn

www.infineon.com/2edn

www.infineon.com/gdbrochure

www.infineon.com/gdfinder

www.infineon.com/SiC-GD

www.infineon.com/TDI

www.infineon.com/200vhvic

www.infineon.com/1EDcompact

www.infineon.com/700vhvic

www.infineon.com/microhvic

www.infineon.com/gan-eicedriver

www.infineon.com/2edi



Support



Evaluation
Board



Tools



Microcontrollers

- › XMC™ microcontrollers
- › XMC™ ecosystem, enablement and partners
- › XMC™ digital power conversion kits
- › XMC™ starter kits
- › XMC™ peripherals
- › AURIX™ – 32-bit microcontrollers
- › AURIX™ TC2xx family system architecture
- › AURIX™ TC3xx family system architecture
- › AURIX™ starter and application kits
- › AURIX™ and XMC™ PDH partners
- › Embedded power ICs
- › BLDC Motor Control Shield for Arduino



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

Applications

XMC™

One microcontroller platform – countless solutions

Infineon's XMC™ 32-bit industrial microcontroller portfolio is designed for efficiency and demanding industrial applications.

XMC™ MCU portfolio

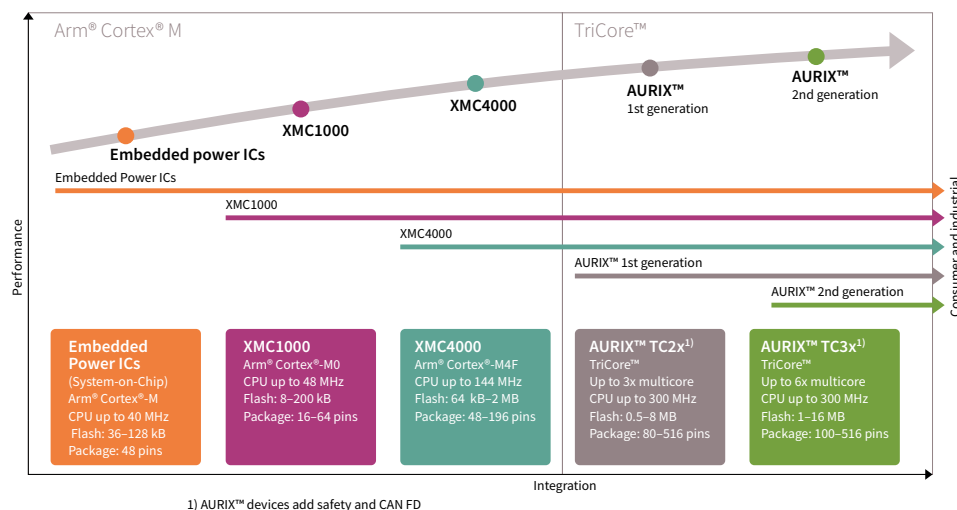
- › RAM: 8 kB up to 352 kB
- › Flash: 16 kB up to 2 MB
- › Accurate analog mixed-signal peripherals
- › Fast timer/PWM peripherals
- › Rich communication interfaces
- › 16-pin to 196-pin count packages

XMC1000 family

- › Arm® Cortex®-M0 up to 48 MHz
- › Peripherals up to 96 MHz
- › One-time event request unit (ERU)
- › V_{DD} : 1.8 to 5.5 V
- › $T_{Ambient}$: -40°C to 105°C


XMC4000 family

- › Arm® Cortex®-M4 up to 144 MHz
- › Built-in DSP, SFPU
- › Peripherals up to 144 MHz
- › Event request unit (ERU)
- › $T_{Ambient}$: -40°C to 125°C



XMC4000 Arm® Cortex®-M4F up to 144 MHz core 64 kB-2 MB Flash up to 125°C	XMC4100 Basic control and connectivity VQFN-48 LQFP-64		XMC4700/4800 Industrial drives, Hall and encoder I/F, ΔΣ demodulator, LQFP-100/144 LFBGA-196	XMC4800, XMC4300 EtherCAT, +drives MultiCAN - 6 nodes LQFP-100/144 LFBGA-196
	XMC4200 Server power 150 ps HRPWM LQFP-64/100		XMC4100/XMC4400 Industrial drives, Hall and encoder I/F, ΔΣ demodulator, LQFP-64/100/144 LFBGA-144	XMC4500 MultiCAN - 3 nodes, Ethernet, +drives ext. memory, SD/MMC LQFP-100/144 LFBGA-144
XMC1000 Arm® Cortex®-M0 up to 48 MHz core/ 96 MHz peripheral 8-200 KB flash up to 105°C 1.8-5.5 V	XMC1400 Flicker-free, 4-Ch LED, SMPS, connectivity VQFN-40/64 LQFP-64		XMC1400 SMPS control, connectivity VQFN-40/64 LQFP-64	XMC1400 Hall and encoder I/F, MATH co-processor, CAN VQFN-40/64 LQFP-64
	XMC1100 Basic control and connectivity TSSOP-16/38 VQFN-24/40		XMC1200, XMC1300 Flicker-free, 4-Ch LED, SMPS, connectivity TSSOP-16/28/38 VQFN-24, -40	XMC1300 SMPS control, connectivity, TSSOP-16/38 VQFN-24/40
XMC™ entry		LED lighting	Digital power	Motor control
				Industrial I/O

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 For more details on the product, click on the part number.
 

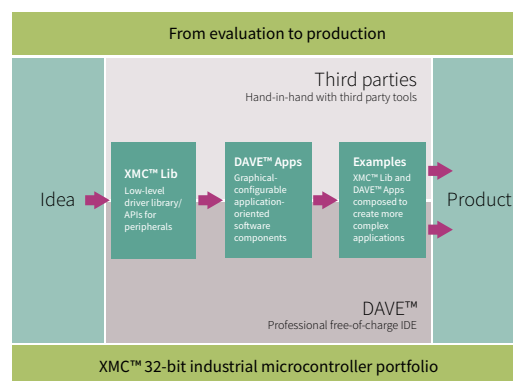


XMC™ ecosystem, enablement and partners

A comprehensive set of tools, products, components, and services are available for fast and efficient design with XMC™ microcontrollers.

Infineon enablement for XMC™ MCUs

- › **DAVE™** – www.infineon.com/dave
Professional and free-of-charge development platform
- › **XMC™ library for Embedded Coder®** – www.infineon.com/matlab
Model-based design from MATLAB® and Simulink® environment, download free of charge
- › **IEC60730 class B library for XMC™** – www.infineon.com/iec60730
Available for XMC™ industrial microcontrollers free of charge
- › **Microcontroller/Probe™ XMC™** – www.infineon.com/ucprobexmc
Free-of-charge version of microcontroller/Probe™ for XMC™ MCUs to build user interfaces for visualizing, observing, and control of the internals of XMC™ MCUs
- › **XMC™ link** – www.infineon.com/xmlink
Functional isolated debug probe, based on SEGGER J-Link technology



In addition to a rich third party ecosystem and enablement landscape, which support the entire development cycle from evaluation to production.

For more www.infineon.com/xmc-ecosystem

Infineon's XMC™ 32-bit industrial microcontroller portfolio is designed for system cost and efficiency for demanding industrial applications. It comes with the most advanced peripheral set in the industry. Fast and largely autonomous peripherals can be configured to support individual needs.


Highlights include analog mixed-signal, timer/PWM and communication peripherals powered by either an Arm® Cortex®-M0 core (XMC1000 family) or an Arm® Cortex®-M4 core with a floating point unit (XMC4000 family).

Arm® Cortex®-M0	Co-processor	Clocks		Memory		Analog			Timer/PWM				Connectivity		Package
		Frequency	Peripherals			ADC1 2-bit/ S&H	Number of channels	Analog comparators	CCU4 (4 ch)	CCU8 (4 ch)	POS IF	BCCU	US IC	CAN 2.0B	
XMC11x	-	32	64	Flash	8-64 kB	1/1	Up to 12	-	1x	-	-	-	2x	-	VQFN 24/40 TSSOP 16/38
				RAM	16 kB										
XMC12x	-	32	64	Flash	16-200 kB	1/2	Up to 12	Up to 3	1x	-	-	✓	2x	-	VQFN 24/40 TSSOP 16/28/38
				RAM	16 kB										
XMC13x	✓	32	64	Flash	8-200 kB	1/2	Up to 12	Up to 3	1x	1x	✓	✓	2x	-	VQFN 24/40 TSSOP 16/38
				RAM	16 kB										
XMC14x	✓	48	96	Flash	32-200 kB	1/2	Up to 12	Up to 4	2x	2x	✓	✓	4x	✓	VQFN 40/48/64 LQFP 64
				RAM	16 kB										
Supply voltage range 1.8-5.5 V															
Temperature range -40°C ... 85°C/105°C															

Arm® Cortex®-M0	Frequency [MHz]	Memory		Analog			Timer/PWM					Connectivity							Package
				ADC1 2-bit/S&H	Number of channels	DAC1 2-bit	CCU4 (4 ch)	CCU8 (4 ch)	HRPWM (150 ps)	POSIF	Σ Demodulator	US IC	CAN 2.0B	USB	Ethernet	EtherCAT®	SDIO/SD/MMC	External BUS Unit (EBU)	
XMC41x	80	Flash	64-128 kB	2/2	Up to 9	2 ch	2x	1x	✓	✓	-	4x	Up to 2	✓	-	-	-	-	VQFN 48 TQFP 64
		RAM	20 kB																
XMC42x	80	Flash	256 kB	2/2	Up to 9	2 ch	2x	1x	✓	✓	-	4x	2x	✓	-	-	-	-	VQFN 48 TQFP 64
		RAM	40 kB																
XMC43x	144	Flash	256 kB	2/2	14	2 ch	2x	1x	-	-	-	4x	2x	✓	✓	✓	✓	-	LQFP 100
		RAM	128 kB																
XMC44x	120	Flash	256-512 kB	4/4	Up to 18	2 ch	4x	2x	✓	2x	4ch	4x	2x	✓	✓	-	-	-	TQFP 64 LQFP 100
		RAM	80 kB																
XMC45x	120	Flash	512 kB-1 MB	4/4	Up to 26	2 ch	4x	2x	-	2x	4 ch	4x	Up to 3	✓	✓	-	✓	✓	LQFP 100/144 LFBGA 144
		RAM	128-160 kB																
XMC47x	144	Flash	1.5-2 MB	4/4	Up to 26	2 ch	4x	2x	-	2x	4 ch	6x	6x	✓	✓	-	✓	✓	LQFP 100/144 LFBGA 196
		RAM	276-352 kB																
XMC48x	144	Flash	1-2 MB	4/4	Up to 26	2 ch	4x	2x	-	2x	4 ch	6x	6x	✓	✓	✓	✓	✓	LQFP 100/144 LFBGA 196
		RAM	276-352 kB																
Supply voltage range 3.1-3.6 V																			
Temperature range -40°C ... 85°C/125°C																			

www.infineon.com/xmc

www.infineon.com/dave

For more details on the product, click on the part number. 



XMC™ digital power explorer kit

The new digital power explorer kit is designed with the particular goal of making it easy for engineers to take the first steps into digital power control with XMC™ microcontrollers. It showcases both XMC™ families Arm® Cortex-M microcontrollers: XMC4000 and XMC1000, 30 V dual n-channel OptiMOS™ MOSFETs and IRS2011S gate drivers. The kit includes two different control card options, XMC1300 control card (Arm® Cortex®-M0) and XMC4200 control card (Arm® Cortex®-M4F), which allow designers to evaluate both XMC™ microcontroller families and make the right price/performance choice for their application.

Features and benefits

Key features
Synchronous buck converter evaluation kit controlled with XMC4200 or XMC1300 Arm® Cortex®-M MCUs
Onboard resistive load banks
Featuring BSC0924NDI dual n-channel OptiMOS™ MOSFET and IRS2011S high- and low-side gate driver
Different control schemes possible <ul style="list-style-type: none"> > Voltage mode control > Peak current mode control (with slope compensation)

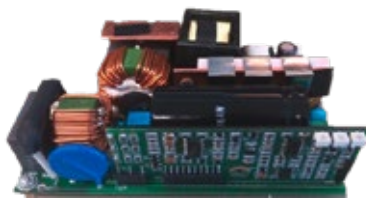
Key benefits
Easy entry in digital power control applications
Understand the details of voltage/peak current control and how to extract the maximum of XMC™ devices
DAVE™ v4 APPs for buck converter and many more example

High power density 800 W 130 kHz platinum server design with XMC1300

The 800 W PFC CCM evaluation board demonstrates design and practical results of an 800 W 130 kHz platinum server PFC evaluation board based on Infineon devices, in terms of power semiconductors, non-isolated gate drivers, analog and digital controllers for the PFC converter, as well as flyback controller for the auxiliary supply. This evaluation board verifies the performance of the latest 600 V CoolMOS™ C7 superjunction MOSFET technology working at 130 kHz in a PFC CCM boost converter along with EiceDRIVER™ ICs and CoolSiC™ Schottky diode 650 V G5 using digital control.

Features and benefits

Key features	Customer benefits
Classic PFC boost stage digitally controlled with XMC1302 including voltage and current loops	High efficient PFC stage with a complete systemsolution from Infineon
Protections, including cycle-by-cycle current protection	HW and SW available
Run time debug with isolated UART to PC interface and PC software	Higher switching frequency permits higher power density


800 W PFC CCM with XMC1300	Specification		Infineon components	
	V _{in}	90-265 V _{AC}	MCU	XMC1302 (TSSOP38)
	V _{out_nom}	380 V _{DC}	MOSFET	600 V CoolMOS™ C7
	I _{out}	2 A	MOSFET driver	EiceDRIVER™ 2EDN7524F non-isolated
	PWM frequency	130 kHz	Diode	CoolSiC™ Schottky diode 650 V G5
	THD	<10%	Auxiliary PSU	ICE2QR4780Z
	Power factor	>0.9 from 20% load		
	Efficiency	97% (peak)		

600 W half-bridge LLC evaluation board with 600 V CoolMOS™ C7 SJ MOSFET with digital control

The 600 W LLC digital control evaluation board shows how to design the half-bridge LLC stage of a server SMPS with the target to meet 80+ Titanium standard efficiency requirements. For this purpose, the latest CoolMOS™ technologies, 600 V CoolMOS™ C7 or P6 superjunction MOSFETs have been used on the primary side, and OptiMOS™ low voltage power MOSFET in SuperSO8, BSC010N04LS, in the synchronous rectification secondary stage in combination with QR CoolSET™ ICE2QR2280Z, high- and low-side driver 2EDL05N06PF, low-side gate driver 2EDN7524F and a XMC4200 microcontroller.

Features and benefits


Key features	Customer benefits
600 W LLC half-bridge stage with synchronous rectification (SR)	Learn LLC topology with a complete system solution from Infineon
All controlled with XMC4200 including:	> HW and SW available
> Start up (PWM to PFM) and burst-mode algorithms	Close to customer solution
> Adaptive dead time and capacitive-mode detection	> High efficiency → 97.8%
> No hard commutation at any condition	> Reliability and power density

600 W LLC digital control	Specification		Infineon components	
	V _{in}	350-410 V _{DC}	MCU	XMC4200 (VQFN48)
	V _{out_nom}	12 V _{DC}	MOSFET SR	BSC010N04LS
	I _{out}	50 A	HB driver	2EDL05N06PF
	P _{out}	600 W	LLC HB MOSFET	CoolMOS™ IPP60R190P6
	f _{res}	157 kHz	Auxiliary PSU	ICE2QR2280Z

www.infineon.com/xmc

www.infineon.com/800w-pfc-eval

www.infineon.com/600w-llc-eval

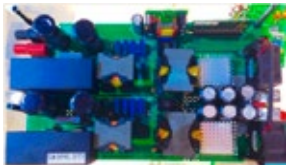
For more details on the product, click on the part number. 

3 kW dual-phase LLC converter using XMC4400

The 3 kW dual-phase LLC demonstration board is an example of a high efficiency isolated DC-DC converter using the state-of-the-art Infineon components, both power devices and controller/driver ICs. The use of an advanced digital control using the XMC4400 microcontroller, together with the latest generation of CoolMOS™ and OptiMOS™ devices, allows achieving a very flat efficiency curve in the entire load range. The demonstration board is targeting the high voltage DC-DC stage of high-end telecom rectifiers.

Features and benefits

Key features	Customer benefits
Full digital control by XMC4400 on the secondary side	Full digital control by XMC4400 on the secondary side
Digital current sharing with phase shedding	Efficiency peak 98.5% and more than 97.2% in the entire load range
Accurate algorithm able to prevent hard commutation and capacitive load mode in LLC operation	Easy monitoring and parameter setting via a graphic user interface

3 kW dual-phase LLC converter using XMC4400	Specification		Infineon components	
	V _{in}	350-410 V _{DC}	MCU	XMC4400 (LQFP64)
	V _{out_nom}	54.3 V _{DC}	SR MOSFET	OptiMOS™ BSC093N15NS5
	I _{out_max}	55 A	Drivers	1EDI60N12AF 2EDN7524R
	P _{out}	3000 W	LLC Half-bridge MOSFET	CoolMOS™ P6 IPW60R041P6
	f _{range}	90-200 kHz	Auxiliary PSU	ICE2QR2280Z
	Peak efficiency	>98.4%		

RGB LED lighting shield with XMC1202 for Arduino

The RGB LED lighting shield with XMC1202 for Arduino uses a DC-DC buck topology and is able to drive up to three LED channels with constant current. The shield itself is powered by a programmable XMC™ 32-bit Arm® MCU with embedded brightness color control unit (BCCU, XMC1200 MCU series), for flicker-free LED dimming and color control.

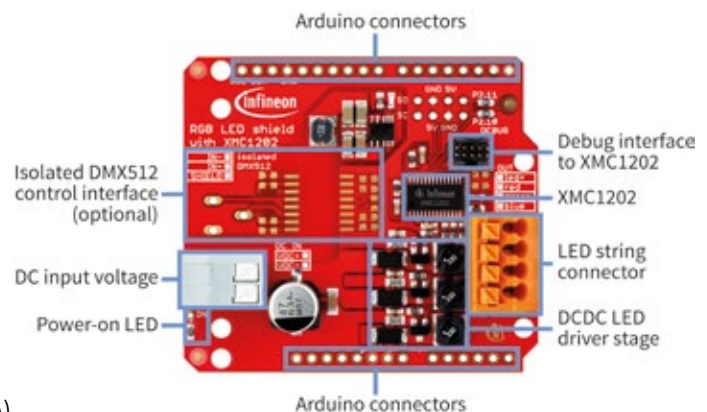
Features

- › Compatible with Arduino Uno R3 and XMC1100 boot kit from Infineon
- › Easily configurable for various light engines and any input voltage (within operating conditions)
- › Wide DC input voltage range
- › Simple I²C interface

Operating conditions

- › Nominal: 12-48 V input voltage (max. 6-60 V)
- › Average LED current up to 700 mA (max. peak current 1 A)

The Infineon shields mentioned above are hardware compatible with Arduino and Infineon's XMC™ boot and relax kits.



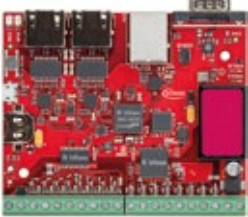
3 kW dual-phase LLC converter

XMC4800 automation board V2 – explore XMC4800 microcontroller based on Arm® Cortex®-M4

The XMC4800 automation board V2 uses Infineon's industry leading XMC™ Arm® Cortex®-M4 microcontroller in combination with Infineon's supply, interface, communication and safety products. The XMC4800 automation board V2 is designed to evaluate the capabilities of the XMC4800 microcontroller especially in EtherCAT® slave applications and can be used with a wide range of development tools including Infineon's free-of-charge Eclipse based IDE, DAVE™.

Features and benefits

Key features	Customer benefits
XMC4800-E196 MCU based on Arm® Cortex®-M4 at 144 MHz	Complete automation kit gateway
EtherCAT® slave controller, 2 MB flash and 352 kB RAM	Combined MCU with EtherCAT slave application
OPTIGA™ Trust E embedded security solution (CC EAL6+)	Isolated interfaces with diagnose
Real time clock crystal	Ethernet connectivity with software examples available
SPI FRAM (64 kB non-volatile memory)	24 V supply
EtherCAT® slave node (2 EtherCAT® PHY and RJ45 Jacks)	CAN connectivity
24 V ISOFACE™ 8-channel inputs and 8-channel outputs CAN transceiver	Full software DAVE™ examples
CAN transceiver	

XMC4800 automation board V2	Type	Description	OPN
	KIT_XMC48_AUT_BASE_V2	The XMC4800 automation board V2 utilizes Infineon's industry leading XMC Arm® Cortex®-M4 microcontroller in combination with Infineon's supply, interface/communication and safety products.	KITXMC48AUTBASEV2TOBO1
	XMC4800-E196K2048	Arm® Cortex®-M4 microcontroller	XMC4800E196K2048AAXQMA1
	ISO2H823V2.5	24 V 8-channel isolated output	ISO2H823V25XUMA1
	ISO1I813T	24 V 8-channel isolated input	ISO1I813TXUMA1
	SLS 32AIA020A4 USON10	OPTIGA™ Trust E – embedded security solution	SLS32AIA020A4USON10XTMA2
	TLE6250GV33	Infineon CAN transceiver	TLE6250GV33XUMA1
	IFX54441LDV	Infineon voltage regulator	IFX54441LDVXUMA1

XMC™ wireless power controller – enabling wireless charging transmitter applications

Infineon's XMC™ wireless power controller, based on the Arm® Cortex®-M0 core, provides a powerful and cost-effective platform for high performance, smart and safe wireless charging applications. The XMC™ wireless power controller helps the next-generation wireless charging systems to meet strict safety, environmental and regulatory requirements, while still enabling industry-leading charging performance and efficiency. This controller works seamlessly with Infineon's power devices in a scalable architecture to provide a complete charging solution for everything from a fast-charge smartphone, to a 20 W robot, or a 60 W drone and beyond.

Features and benefits

Key features	Customer benefits
Supports inductive and resonant charging methods	Supports 15 W charging and existing standards, including fast charging of smartphones
Power levels up to 60 W	Full power 15 W without exotic thermal management
Multiple industry standard and custom charging profiles using the same hardware architecture	Achieves charging rates equivalent to wired charging
Single- and multi-coil transmitters	Supports custom-charging profiles and industry standards on the same hardware
Half- and full-bridge support	Foreign object detection (FOD) with improved accuracy quality-factor monitoring
Variable and fixed frequency transmitter types	Foreign object detection capability can be extended beyond existing standards to improve detection
Buck and boost topologies	Supports custom coils, and greater than three coils
Integrated flash for parameter storage	
Voltage supply 1.8-5.5 V	
Space saving VQFN-40 package	

For a detailed overview of Infineon's wireless charging solutions, check **pages 25-29**.

XMC™ starter kits

Kits and evaluation boards

Xtreme2go

Order number: KIT_XMC_2GO_XTR_XMC1400

- › XMC1400 family kit with ADAFRUIT, MikroE and Shields2Go connectivity. Extension for IoT and other cloud applications.
- › The XMC1400 series devices are optimized for motor control, power conversion and LED Lighting applications and Human-Machine Interface (HMI)

Click on the following to find/purchase the kit:

www.infineon.com/Xtreme2go



Platform2go XMC4400

Order number: KIT_XMC_PLT_2GO_XMC4400

- › Equipped with an Arm® Cortex®-M4 based XMC™ microcontroller, the XMC4400 Platform2Go is designed to evaluate the capabilities of Infineon's XMC4400 microcontroller. It can be used with a wide range of development tools including Infineon's free of charge Eclipse based IDE DAVE™
- › This kit has the XMC4400 device with debugger plus Ethernet, CAN, Arduino, MikroBUS and Shields2Go form factor.

Click on the following to find/purchase the kit:

www.infineon.com/XMC4400platform2go



XMC1400 Arduino

Order number: KIT_XMC1400_ARDUINO

- › This kit utilizes Infineon's industry leading Arm® Cortex® M0 microcontroller in combination with Arduino form factor.
- › It can be used with a wide range of development tools including Infineon's free of charge Eclipse based IDE, DAVE™ and much more.

Click on the following to find/purchase the kit:

www.infineon.com/xmc1400_ARDUINO



Platform2go XMC4200

Order number: KIT_XMC_PLT 2GO_XMC 4200

- › Equipped with an Arm® Cortex®-M4 based XMC™ microcontroller from Infineon Technologies AG, the XMC4200 Platform2Go is designed to evaluate the capabilities of Infineon's XMC4200 microcontroller.
- › It can be used with a wide range of development tools including Infineon's free of charge Eclipse based IDE DAVE™
- › This kit has the XMC4200 device with debugger plus CAN, Arduino, MikroBUS and Shields2Go form factor.

Click on the following to find/purchase the kit:

www.infineon.com/XMC4200platform2go



RGB LED lighting shield

Order number: KIT_XMC_LED_DALI_20_RGB

- › One of the first intelligent evaluation boards compatible with Arduino as well as Infineon's XMC1100 BOOT KIT.
- › Designed to be easily configurable and combinable for different LED light engines and lamps, for fast prototyping and in-expensive evaluation of LED lighting applications.
- › The RGB LED lighting shield with XMC1302 uses a DC-DC buck topology.



Click on the following to find/purchase the kit:

www.infineon.com/cms/en/product/evaluation-boards/kit_xmc_led_dali_20_rgb/




XMC™ peripherals

IEC60730 class B library for XMC™

Supporting the XMC1xxx and XMC4xxx families



In collaboration with the consultancy Hitex, Infineon developed the IEC60730 – class B software library for XMC™ industrial microcontrollers for household electrical appliances. This is a dedicated software library for XMC™ MCUs with routines for internal supervisory functions and for self-diagnostics.

Extended documentation and pre-certified software libraries to XMC™ Cortex® Arm® based controllers are free of charge. For more information, please check: www.hitex.com/classb

Documentation	Consultancy
<ul style="list-style-type: none"> › Safety application note › Failure mode report › FMEDA tool <p>by Infineon, revised in workshops by TÜV Süd</p>	 <p>EMBEDDED TOOLS & SOLUTIONS</p> <p>Implementation support by Hitex</p>

Embedded security for XMC™ MCUs

Infineon and its partners provide solutions which support with data protection, allowing authentication and encryption and securing firmware file updates to prevent cloning and downtimes.

Security solutions		
Software	Hardware	
Secure bootloader by Infineon, XMC1000	OPTIGA™ family by Infineon Hardware-based security solutions	
CodeMeter μEmbedded by WIBU, XMC4000 exclusive	OPTIGA™ Trust family	OPTIGA™ TPM family
KMS/CycurKEYS by ESCRYPT, XMC4000		
emSecure by SEGGER	Turnkey and programmable security solutions	Standardized certified turnkey solution



AURIX™ – 32-bit microcontrollers

32-bit multicore TriCore™ – safety joins performance

AURIX™ is Infineon's family of microcontrollers serving the needs of industrial applications in terms of performance and safety. Its innovative multicore architecture, based on up to six independent 32-bit TriCore™ CPUs at 300 MHz, has been designed to meet the highest safety standards while increasing the performance at the same time. Using the AURIX™ scalable platform, developers will be able to implement applications such as motor control and drives, PLC or any other automation application. Developments using AURIX™ require less effort to achieve the SIL/ IEC61508 standard based on its innovative safety concept and multiple HW safety features. Furthermore, AURIX™ has enhanced communication capabilities to support communication between CAN, LIN, FlexRay and Ethernet buses.

Features and benefits

Key features
TriCore™ with DSP functionality
Best-in-class real-time performance: up to six TriCore™ with up to 300 MHz per core
Supporting floating point and fix point with all cores
Up to 6.9 MB of internal RAM, up to 16 MB of flash
Innovative single supply 5 V or 3.3 V
IEC61508 conformance to support safety requirements up to SIL 3
Embedded EEPROM
Advanced communication peripherals: CAN FD, LIN, SPI, FlexRay, Ethernet

Customer benefits
High scalability gives the best cost-performance fit
High integration leads to significant cost savings
High integration leads to reduced complexity
Innovative supply concept leads to best-in-class power consumption

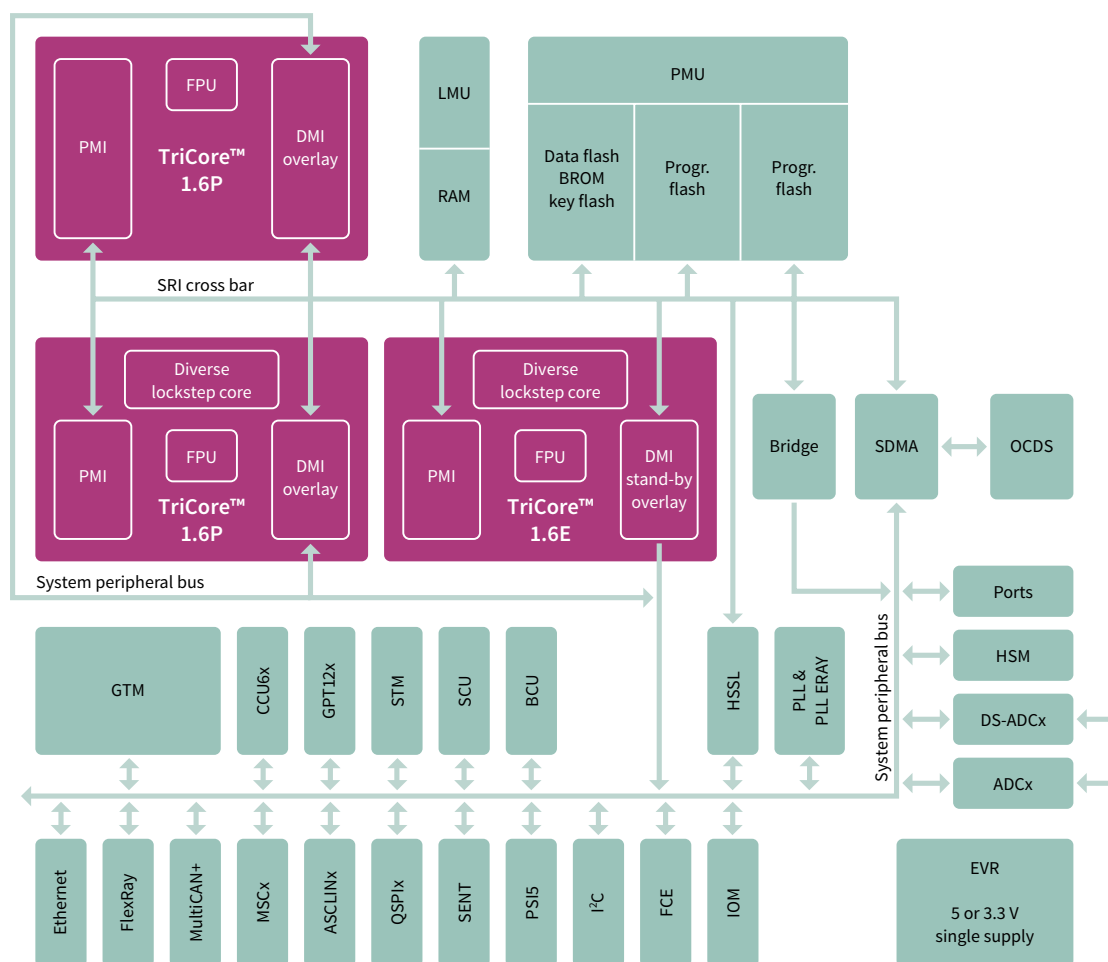


www.infineon.com/aurix

For more details on the product, click on the part number.

AURIX™ TC2xx family system architecture

Powerful 1st generation AURIX™ TC2xx system architecture




AURIX™ TC2xx family package scalability

9x series up to 8 MB					TC297 300 MHz	TC298 300 MHz	TC299 300 MHz
7x series up to 4 MB				TC275 200 MHz	TC277 200 MHz		
6x series up to 2.5 MB			TC264 200 MHz	TC265 200 MHz	TC267 200 MHz		
3x series up to 2 MB		TC233 200 MHz	TC234 200 MHz		TC237 200 MHz		
2x series up to 1 MB	TC222 133 MHz	TC223 133 MHz	TC224 133 MHz				
1x series up to 512 KB	TC212 133 MHz	TC213 133 MHz	TC214 133 MHz				
Flash Package	TQFP-80	TQFP-100	LQFP-144 TQFP-144	LQFP-176	LFBGA-292	BGA-416	LFBGA-516

↑ Upgrade/downgrade with pin-compatible packages

www.infineon.com/aurix

For more details on the product, click on the part number. 

AURIX™ TC2xx portfolio

Product type	Max. clock frequency [MHz]	Program memory [kB]	SRAM (incl. cache) [kB]	Co-processor ¹⁾	Cores/lockstep	Timed I/O	Number of ADC channels	External bus interface	CAN nodes	Communication interfaces ²⁾	Temperature ranges ³⁾	Packages	Additional features/remarks ⁴⁾
TC299TX	300	8000	2728	FPU	3/1	263	84/10 DS	yes	6	4xASCLIN, 6xQSPI, 3xMSC, 2xI2C, 15xSENT, HSSL, 5xPSI5, 2xFlexRay, Ethernet, CAN FD	K	LFBGA-516	EVR, STBU, HSM
TC299TP	300	8000	728	FPU	3/1	263	84/10 DS	yes	6	4xASCLIN, 6xQSPI, 3xMSC, 2xI2C, 15xSENT, HSSL, 5xPSI5, 2xFlexRay, Ethernet, CAN FD	K	LFBGA-516	EVR, STBU, HSM
TC298TP	300	8000	728	FPU	3/1	232	60/10 DS	yes	6	4xASCLIN, 6xQSPI, 3xMSC, 2xI2C, 15xSENT, HSSL, 5xPSI5, 2xFlexRay, Ethernet, CAN FD	K	LFBGA-416	EVR, STBU, HSM
TC297TA	300	8000	2728	FPU, FFT, CIF	3/1	169	60/10 DS	no	6	4xASCLIN, 4xQSPI, 3xMSC, 2xI2C, 15xSENT, HSSL, 5xPSI5, 2xFlexRay, Ethernet, CAN FD	K	LFBGA-292	EVR, STBU, HSM
TC297TX	300	8000	2728	FPU	3/1	263	60/10 DS	no	6	4xASCLIN, 4xQSPI, 3xMSC, 2xI2C, 15xSENT, HSSL, 5xPSI5, 2xFlexRay, Ethernet, CAN FD	K	LFBGA-292	EVR, STBU, HSM
TC297TP	300	8000	728	FPU	3/1	169	60/10 DS	no	6	4xASCLIN, 4xQSPI, 3xMSC, 2xI2C, 15xSENT, HSSL, 5xPSI5, 2xFlexRay, Ethernet, CAN FD	K	LFBGA-292	EVR, STBU, HSM
TC277TP	200	4000	472	FPU	3/2	169	60/6 DS	no	4	4xASCLIN, 4xQSPI, 2xMSC, HSSL, 2xI2C, 10xSENT, 3xPSI5, FlexRay, Ethernet, CAN FD	K	LFBGA-292	EVR, WUT, HSM
TC275TP	200	4000	472	FPU	3/2	112	60/6 DS	no	4	4xASCLIN, 4xQSPI, 2xMSC, HSSL, 2xI2C, 10xSENT, 3xPSI5, FlexRay, Ethernet, CAN FD	K	LQFP-176	EVR, WUT, HSM
TC267D	200	2500	240	FPU	2/1	169	50/3 DS	no	5	4xASCLIN, 4xQSPI, 2xMSC, 2xI2C, 10xSENT, 3xPSI5, HSSL, FlexRay, Ethernet, CAN FD	K	LFBGA-292	EVR, STBU
TC265D	200	2500	240	FPU	2/1	112	50/3 DS	no	5	4xASCLIN, 4xQSPI, 2xMSC, 2xI2C, 10xSENT, HSSL, 3xPSI5, FlexRay, Ethernet, CAN FD	K	LQFP-176	EVR, STBU
TC264DA	200	2500	752	FPU, FFT, CIF	2/1	88	40/3 DS	no	5	4xASCLIN, 4xQSPI, 2xMSC, 2xI2C, 10xSENT, HSSL, 3xPSI5, FlexRay, Ethernet, CAN FD	K	LQFP-144	EVR, STBU
TC264D	200	2500	240	FPU	2/1	88	40/3 DS	no	5	4xASCLIN, 4xQSPI, 2xMSC, 2xI2C, 10xSENT, HSSL, 3xPSI5, FlexRay, Ethernet, CAN FD	K	LQFP-144	EVR, STBU
TC237LP	200	2000	192	FPU	1/1	120	24	no	6	2xASCLIN, 4xQSPI, 4xSENT, FlexRay, CAN FD	K	LFBGA-292	EVR, WUT, HSM
TC234LA	200	2000	704	FPU, FFT	1/1	120	24	no	6	2xASCLIN, 4xQSPI, 4xSENT, FlexRay, Ethernet	K	TQFP-144	EVR, WUT, HSM
TC234LX	200	2000	704	FPU	1/1	120	24	no	6	2xASCLIN, 4xQSPI, 4xSENT, FlexRay, Ethernet	K	TQFP-144	EVR, WUT, HSM
TC234LP	200	2000	192	FPU	1/1	120	24	no	6	2xASCLIN, 4xQSPI, 4xSENT, FlexRay, CAN FD	K	TQFP-144	EVR, WUT, HSM
TC233LP	200	2000	192	FPU	1/1	78	24	no	6	2xASCLIN, 4xQSPI, 4xSENT, FlexRay, CAN FD	K	TQFP-100	EVR, WUT, HSM
TC224L	133	1000	96	FPU	1/1	120	24	no	3	2xASCLIN, 4xQSPI, 4xSENT, CAN FD	K	TQFP-144	EVR, WUT
TC223L	133	1000	96	FPU	1/1	78	24	no	3	2xASCLIN, 4xQSPI, 4xSENT, CAN FD	K	TQFP-100	EVR, WUT
TC222L	133	1000	96	FPU	1/1	59	24	no	3	2xASCLIN, 4xQSPI, 4xSENT, CAN FD	K	TQFP-80	EVR, WUT
TC214L	133	500	96	FPU	1/1	120	14	no	3	2xASCLIN, 4xQSPI, 4xSENT, CAN FD	K	TQFP-144	EVR, WUT
TC213L	133	500	96	FPU	1/1	78	24	no	3	2xASCLIN, 4xQSPI, 4xSENT, CAN FD	K	TQFP-100	EVR, WUT
TC212L	133	500	96	FPU	1/1	59	24	no	3	2xASCLIN, 4xQSPI, 4xSENT, CAN FD	K	TQFP-80	EVR, WUT

¹⁾ CIF = camera and external ADC Interface, FFT = fast fourier transform accelerator, FPU = floating point unit, PCP = peripheral control processor

²⁾ ASC = asynchronous serial channel, ASCLIN = asyn/synchronous local interconnect network, HSSL = high-speed serial link, I²C = inter-integrated circuit, LIN = local interconnect network, MLI = micro link interface, MSC = micro second channel, PSI5 = peripheral sensor interface 5, QSPI = queued serial peripheral interface, SENT = single edge nibble transmission, SSC = synchronous serial channel, CAN FD ISO11898-1:2015

³⁾ Ambient temperature range: A = -40°C ... 140°C, B = 0°C ... 70°C, F = -40°C ... 85°C, H = -40°C ... 110°C, K = -40°C ... 125°C, L = -40°C ... 150°C, X = -40°C ... 105°C

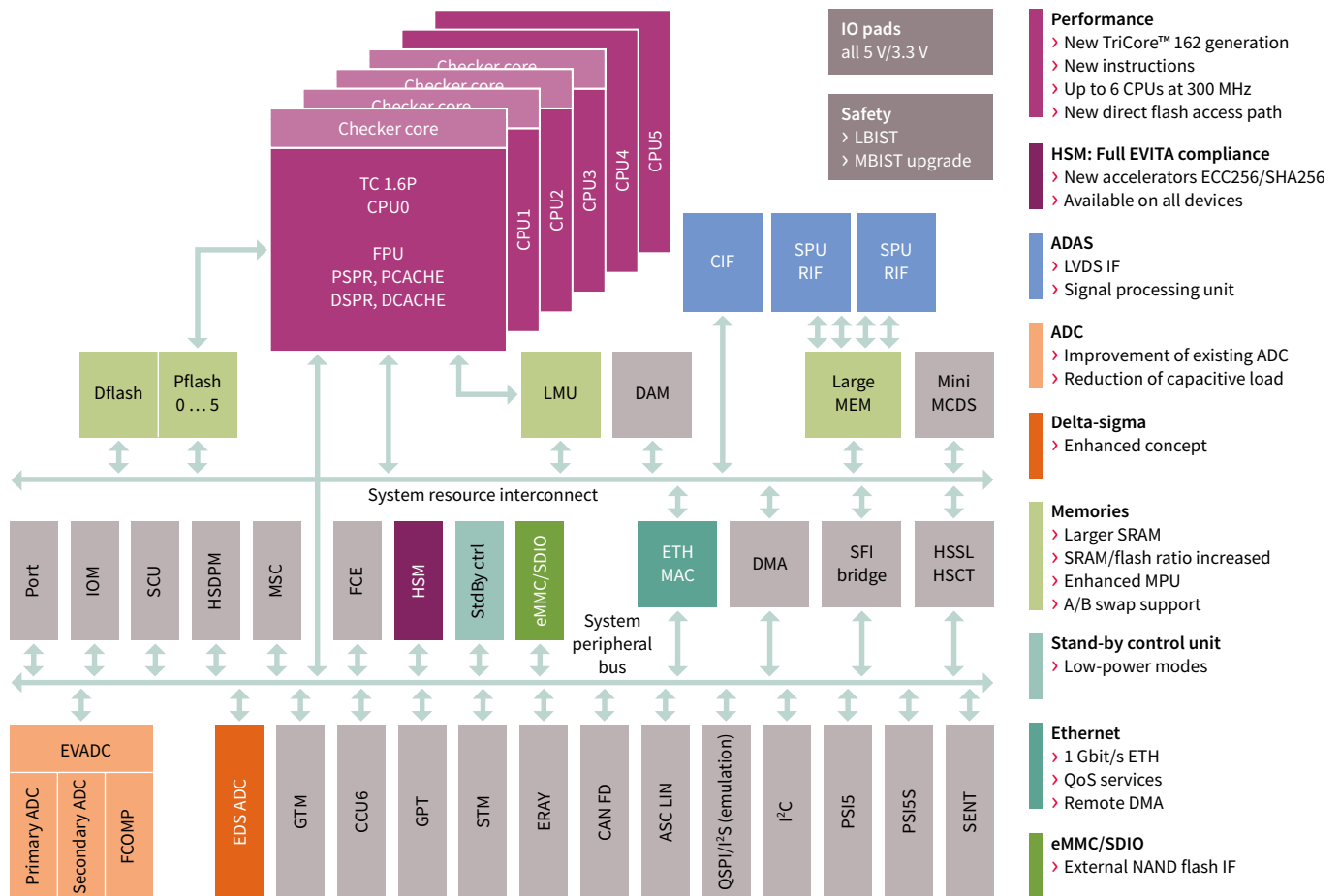
⁴⁾ EVR = embedded voltage regulator, HSM = hardware security module, STBU = stand-by control unit, WUT = wake-up timer

Evolution from TC2xx to TC3xx - Easy migration with focus on reuse

- › Fast conversion of existing AURIX™ TC2xx designs
 - Backwards compatibility
 - High AURIX™ TC3xx compatibility to pinout of existing QFP100/144/176 and BGA packages
- › Flexibility - scalability within the AURIX™ TC3xx family
 - Up-/Downgrade paths for devices in identical packages
 - Compatible pin-out of QFP/BGA package options enabling combination designs
- › Pin-to-pin compatibility between the devices of AURIX™ TC2xx/TC3xx and from generation to generation
- › A high scalability with a very large portfolio for both AURIX™ TC2xx and TC3xx

AURIX™ TC3xx family system architecture

AURIX™ TC3xx – scalable family - from low-cost to high-performance applications



AURIX™ TC3xx provides an upgrade on key parameters with focus on SW & HW reuse

	Performance increase and reduction of power	Increased from 3 to 6 cores Developed in 40 nm for power consumption reduction
	Scalable & backwards compatible to TC2xx	Fully compatible devices with focus on HW & SW reuse
	Functional safety	IEC61508 compliant enabling SiL-3 level
	Enhanced security	Upgraded to Full EVITA support
	Improved networking	Richer peripheral set
	SOTA	Full support of SOTA A/B swap

AURIX™ TC3xx package scalability

6x 300 MHz	9x A series 16 MB							TC397XA 300 MHz	
6x 300 MHz	9x series 16 MB							TC397x 300 MHz	TC399x 300 MHz
4x 300 MHz	Ex series 12 MB							TC387Qx 300 MHz	
4x 300 MHz	8x series 10 MB							TC387Q 300 MHz	TC389Q 300 MHz
3x 300 MHz	7x X series 6 MB							TC377TX 300 MHz	
3x 300 MHz	7x series 6 MB					TC375T 300 MHz		TC377T 300 MHz	
2x 300 MHz	6x series 4 MB			TC364D 300 MHz	TC366D 300 MHz	TC365D 300 MHz		TC367D 300 MHz	
4x 300 MHz	Ax series 4 MB						TC3A8Q 300 MHz	TC3A7Q 300 MHz	
3x 300 MHz	5x A series 4 MB				TC356TA 300 MHz			TC357TA 300 MHz	
2x 300 MHz	3x A series 2 MB				TC336DA ¹⁾ 200 MHz			TC337DA ¹⁾ 200 MHz	
1x 300 MHz	3x series 2 MB	TC332L ¹⁾ 200 MHz	TC333L ¹⁾ 200 MHz	TC334L ¹⁾ 200 MHz	TC336L ¹⁾ 200 MHz			TC337L ¹⁾ 200 MHz	
1x 300 MHz	2x series 1 MB	TC322L 160 MHz	TC323L 160 MHz	TC324L 160 MHz				TC327L 160 MHz	
Flash	Package	TQFP-80	TQFP-100	T/LQFP-144	BGA-180	LQFP-176	BGA-233	LFBGA-292	LFBGA-516

L – Single lockstep core D – Dual core T – Triple core Q – Quadruple core X – Sextuple core

1) An option of 300 MHz is also available

Control and actuate

Sense and compute

- › Advanced package technologies deliver the best price/performance ratio
- › Customers can choose between different devices in the same pin-compatible package

MCU scalability

- › Performance and flash
- › Pin compatibility
- › Binary-compatible cores

Safety/security concept

- › ISO 26262 compliance
- › IEC61508 compliant

**AURIX™ TC3xx****Power consumption**

- › On-chip SC DC-DC high-efficiency power supply
- › Integrated standby controller

Connectivity

- › Ethernet: up to 2x1 GB
- › CAN FD: up to 12 channels
- › eMMC IF

AURIX™ TC3xx portfolio

Product type	Cores/lockstep	Max clock frequency [MHz]	Program memory [kB]	SRAM (incl. cache) [kB]	Radar accelerator/ radar interface ¹⁾	CAN/CAN FD nodes	Ethernet 100/1000 Mbit	External bus interface ²⁾	Communication interfaces	HSM	Temperature ranges	Packages	Additional features/ remarks ³⁾
AURIX™ TC3xx family													
TC399XX	6/4	300	16000	6912	no	12	1	EBU, eMMC, 2x HSSL	6x SPI, 2x FlexRay, 12x LIN, 25x SENT, 4x PSi5, 2x I2C, 4x MSC	EVITA full	K, L	LFBGA-516	5 V/3.3 V EVR, 8-bit SCR
TC399XP	6/4	300	16000	2816	no	12	1	EBU, eMMC, 2x HSSL	6x SPI, 2x FlexRay, 12x LIN, 25x SENT, 4x PSi5, 2x I2C, 4x MSC	EVITA full	K, L	LFBGA-516	5 V/3.3 V EVR, 8-bit SCR
TC397XX	6/4	300	16000	6912	no	12	1	eMMC, 2x HSSL	6x SPI, 2x FlexRay, 12x LIN, 25x SENT, 4x PSi5, 2x I2C, 4x MSC	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC397XP	6/4	300	16000	2816	no	12	1	eMMC, 2x HSSL	6x SPI, 2x FlexRay, 12x LIN, 25x SENT, 4x PSi5, 2x I2C, 4x MSC	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC397XA	6/4	300	16000	6912	2x SPU/ 8x 400 Mbit/s LVDS	12	1	2x HSSL	6x SPI, 2x FlexRay, 12x LIN, 25x SENT, 4x PSi5, 2x I2C, 4x MSC	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC389QP	4/2	300	10000	1568	no	12	1	HSSL	5x SPI, 2x FlexRay, 24x LIN, 25x SENT, 4x PSi5, 2x I2C, 3x MSC	EVITA full	K, L	LFBGA-516	5 V/3.3 V EVR, 8-bit SCR
TC387QP	4/2	300	10000	1568	no	12	1	HSSL	5x SPI, 2x FlexRay, 24x LIN, 25x SENT, 4x PSi5, 2x I2C, 3x MSC	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC377TX	3/3	300	6000	4208	no	12	2	eMMC, HSSL	5x SPI, 1x FlexRay, 12x LIN, 15x SENT, 2x PSi5, 1x I2C, 2x MSC	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC377TP	3/2	300	6000	1136	no	8	1	HSSL	5x SPI, 1x FlexRay, 12x LIN, 15x SENT, 2x PSi5, 1x I2C, 2x MSC	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC375TP	3/2	300	6000	1136	no	8	1	HSSL	5x SPI, 1x FlexRay, 12x LIN, 15x SENT, 2x PSi5, 1x I2C, 2x MSC	EVITA full	K, L	LQFP-176	5 V/3.3 V EVR, 8-bit SCR
TC367DP	2/2	300	4000	672	no	8	1	HSSL	4x SPI, 1x FlexRay, 12x LIN, 10x SENT, 2x PSi5, 1x I2C, 1x MSC	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC366DP	2/2	300	4000	672	no	8	1	HSSL	4x SPI, 1x FlexRay, 12x LIN, 10x SENT, 2x PSi5, 1x I2C, 1x MSC	EVITA full	K, L	LFBGA-196	5 V/3.3 V EVR, 8-bit SCR
TC365DP	2/2	300	4000	672	no	8	1	HSSL	4x SPI, 1x FlexRay, 12x LIN, 10x SENT, 2x PSi5, 1x I2C, 1x MSC	EVITA full	K, L	LQFP-176	5 V/3.3 V EVR, 8-bit SCR
TC364DP	2/2	300	4000	672	no	8	1	HSSL	4x SPI, 1x FlexRay, 12x LIN, 10x SENT, 2x PSi5, 1x I2C, 1x MSC	EVITA full	K, L	TQFP-144	5 V/3.3 V EVR, 8-bit SCR
TC364DP	2/2	300	4000	672	no	8	1	HSSL	4x SPI, 1x FlexRay, 12x LIN, 10x SENT, 2x PSi5, 1x I2C, 1x MSC	EVITA full	K, L	LQFP-144	5 V/3.3 V EVR, 8-bit SCR
TC357TA	3/2	300	4000	3664	2x SPU/ 8x 400 Mbit/s LVDS	8	1	no	4x SPI, 1x FlexRay, 4x LIN	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC356TA	3/2	300	4000	3664	2x SPU/ 8x 400 Mbit/s LVDS	8	1	no	4x SPI, 1x FlexRay, 4x LIN	EVITA full	K, L	LFBGA-196	5 V/3.3 V EVR, 8-bit SCR
TC337DA	2/1	200	2000	1568	1x SPU/ 4x 400 Mbit/s LVDS	8	1	eMMC	4x SPI, 1x FlexRay, 12x LIN, 6x SENT	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC336DA	2/1	200	2000	1568	1x SPU/ 4x 400 Mbit/s LVDS	8	1	eMMC	4x SPI, 1x FlexRay, 12x LIN, 6x SENT	EVITA full	K, L	LFBGA-196	5 V/3.3 V EVR, 8-bit SCR
TC337LP	1/1	200	2000	248	no	8	no	no	4x SPI, 1x FlexRay, 12x LIN, 6x SENT	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC336LP	1/1	200	2000	248	no	8	no	no	4x SPI, 1x FlexRay, 12x LIN, 6x SENT	EVITA full	K, L	LFBGA-196	5 V/3.3 V EVR, 8-bit SCR
TC334LP	1/1	200	2000	248	no	8	no	no	4x SPI, 1x FlexRay, 12x LIN, 6x SENT	EVITA full	K, L	TQFP-144	5 V/3.3 V EVR, 8-bit SCR
TC333LP	1/1	200	2000	248	no	8	no	no	4x SPI, 1x FlexRay, 12x LIN, 6x SENT	EVITA full	K, L	TQFP-100	5 V/3.3 V EVR, 8-bit SCR
TC332LP	1/1	200	2000	248	no	8	no	no	4x SPI, 1x FlexRay, 12x LIN, 6x SENT	EVITA full	K, L	TQFP-80	5 V/3.3 V EVR, 8-bit SCR
TC327LP	1/1	160	1000	96	no	8	no	no	4x SPI, 6x SENT, 6x LIN	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC324LP	1/1	160	1000	96	no	8	no	no	4x SPI, 6x SENT, 6x LIN	EVITA full	K, L	TQFP-144	5 V/3.3 V EVR, 8-bit SCR
TC323LP	1/1	160	1000	96	no	8	no	no	4x SPI, 6x SENT, 6x LIN	EVITA full	K, L	TQFP-100	5 V/3.3 V EVR, 8-bit SCR
TC322LP	1/1	160	1000	96	no	8	no	no	4x SPI, 6x SENT, 6x LIN	EVITA full	K, L	TQFP-80	5 V/3.3 V EVR, 8-bit SCR

1) SPU – Signal processing unit

2) HSSL – High-speed serial link

3) 8-bit SCR – Standby controller for low power modes

4) EVR – Embedded voltage regulator

AURIX™ starter and application kits

Infiniteon starter kits – 32-bit microcontrollers

AURIX™ Triboards Kits

- › Full evaluation board for development to write and debug your 1st programs
- › Includes getting started advice, free TriCore™ entry tool chain, technical documentation, compiler and debugger
- › TriBoard available for all productive silicon



AURIX™ TFT Kits

- › Low cost board for early evaluation with limited access to signals
- › Additional touchscreen display for convenient handling
- › TFT board available for every silicon

Click on the following to find/purchase the kit:

www.infineon.com/aurix-kits



Arduino ShieldBuddy Kits

Order number: KIT_AURIX_TC275_ARD_SB

- › The Hitex TC275/TC375 ShieldBuddy follows the Arduino standard
- › Compatible with 100's of Arduino application shields
- › Evaluation licenses available
- › Ideal for getting started on a high-end real time embedded industrial or automotive application as well as students and hobbyists



AURIX™ TC275 Lite kit

- › AURIX™ TC275/TC375 device in LQFP-176 package
- › FTDI based debugger with micro USB
- › Use of Arduino Uno/compatible platform
- › Coming soon

www.infineon.com/aurix-kits

For more details on the product, click on the part number.



Infineon application kits – 32-bit microcontrollers

Motor control

Order number: KIT_AURIX_TC234_MOTORCTR

- › TC234 application kit with TFT display incl. safety supply TLF35584
- › Driving of a 3-phase PMSM/BLCD (12 V/max. 50 W)
- › BLDC motor from Nanotec integrated
- › Software available with flexible configuration



24 GHz radar

Order number: KIT_ATV_24GHZ_RADAR

- › Range-Doppler radar system with two Rx antennas and one Tx antenna based on AURIX™ TC264DA and BGT24ATR12
- › Allows implementation and testing of 24 GHz radar applications as Doppler movement detectors, FSK or FMCW range/position measurement



Wireless charging

Order number: KIT_AURIX_TC21_SC

- › Supports all fast charge smartphones
- › Unique power drive architecture minimizes EMI
- › Improved accuracy Foreign Object Detection (FOD)



New hybrid kit for inverter applications

- › **IFX system offering:** such as power modules, gate drivers, current and position sensors to develop inverter systems
- › **Software** to start development of inverter for 3-phase motors
- › **AURIX™ 2G hardware** optimized logic board for testing different hybrid kits for inverter applications

Motor control board TC3xx

- › Based on TC397
- › Software FOC (Field Oriented Control) algorithm: encoder as position sensor (GPT12)
- › 3-phase current sensing (EVADC), PWM generation (GTM), communication with drive board (QSPI) commands via TFT display (QSPI)

Industrial robotics

Application example

Application features

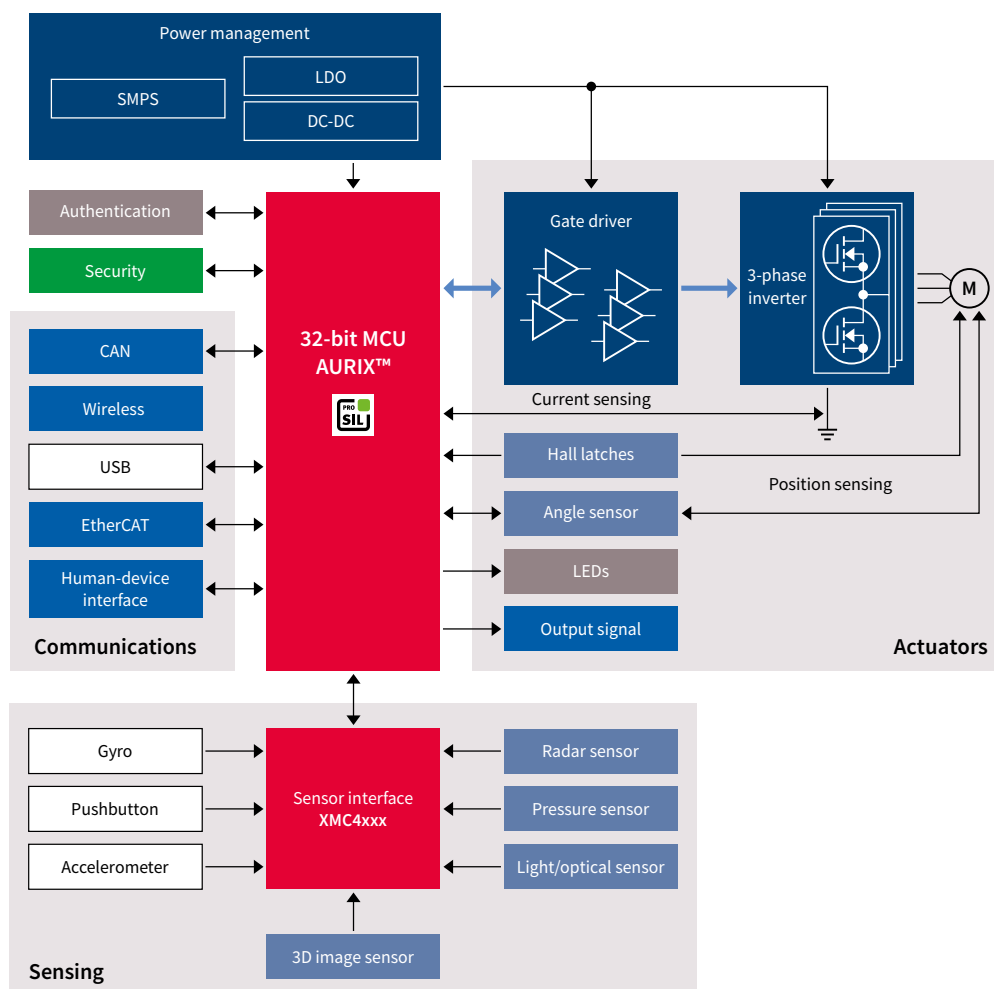
- › High computing performances
- › High level of accuracy, integration and efficiency
- › Safety management in line with current norms
- › Various topologies for axes, joints and motors
- › Security features that protect intellectual property from counterfeiting

System benefits

- › High computing performance: up to 6x 300 MHz
- › High flexibility thanks to tailored peripherals
- › Integrated safety support (EN ISO 10218 and ISO/TS15066)
- › Integrated security with hardware security module
- › Robust 3 V-, 5 V-, LVDS – PortPins
- › Large portfolio with long-term availability

Suggested products

- › TC23x
- › TC33x
- › TC36x
- › TC37x
- › TC38x
- › TC39x
- › XMC4xxx



AURIX™ and XMC™ PDH partners

Preferred Design Houses (PDH) and software resellers

The preferred design house extends the support force by specifying and customizing the know-how. Furthermore, it brings an additional value for customer service. The preferred design house supports the set up for systems using AURIX™ and XMC™, including software and other Infineon products. Our partners are trained to use AURIX™ and XMC™.

Classic (Free of charge)	<ul style="list-style-type: none"> › 1st level customer support covering Infineon products/solutions › Technical interface and support to the customer 	<ul style="list-style-type: none"> › Driving design at customer › Basic training for design teams at customer › 24 h response time to the customer
Premium (Consultancy mode) To be agreed between customers and PDH	<ul style="list-style-type: none"> › Project management and project-specific application support › Specification of general software architecture, defining required layers, control and data flow structure etc. › Specification and implementation of custom device drivers › Optimization of software components with regard to speed/code size 	<ul style="list-style-type: none"> › Software testing › Support for project-specific functional safety engineering › Project-specific support for security solution › Safety support › Security support › Multicore support

	GLOBAL	EMEA																AMERICAS	CHINA	KOREA
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Autosar	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Motor Control	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Lighting	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PFIC Power conversion	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
AURIX™ general support HW	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
AURIX™ general support SW	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Safety Support IEC61508	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Safety Support ISO26262	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Security support /SHE+	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
XMC™ general support HW	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
XMC™ general support SW	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Class B classification	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Capacitive sensing with XMC	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Secure boot for XMC™	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
24 GHz radar	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
77 GHz radar	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Brochure	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Email	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Phone	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
in f	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Basic ●

Essential principles and elementary know-how to support a customer; provision of basic training for design teams

Advanced ●

High-level project-specific application support/consulting

Expert ●

Extensive knowledge and ability to fully support development

Embedded power ICs

System-on-chip solution for motor control applications

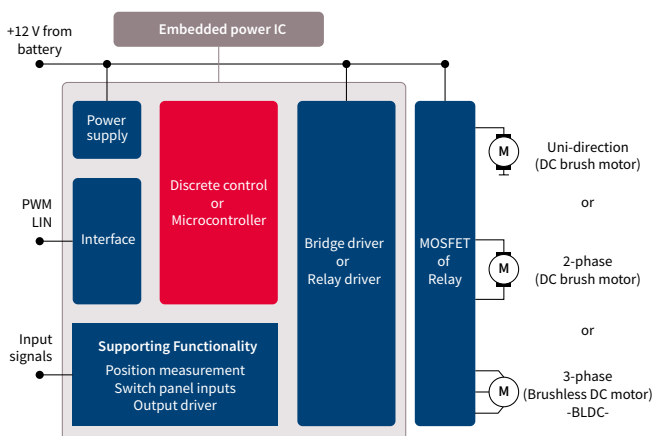
Infineon's Embedded power ICs include a 32-bit Arm® Cortex®-M microcontroller, a voltage regulator, the communication interfaces, along with the driving stages for motor control applications. These system-on-chip solutions offer an unmatched level of integration of all functions required to sense, control and actuate a motor. They save space and energy, improve the overall system reliability through advanced diagnosis features and reduce the overall cost due to a minimum number of external components. They perfectly fit with a range of motor control applications where a small package form factor and a minimum number of external components are essential.

Criteria	TLE984x	TLE9845	TLE9850/1	TLE985x	TLE986x	TLE987x
Controller	Arm® Cortex®-M0				Arm® Cortex®-M3	
Core frequency	25-40MHz	40 MHz			24-40MHz	
Flash size	36KB – 64KB	48KB	48/64KB	48KB – 96KB	36KB – 128KB (Extension to 256KB in development)	
Driver stage	Relay	Half-bridge		H-bridge		B6-bridge
	Relay	PN FET half-bridge *	NN FET half-Bridge	N FET H-bridge		N FET B6-bridge
HV monitor inputs	4-5	5	4		0-1	
Junction temperature levels	150°C	150°C	150°C and 175°C	150°C and 175°C	150°C and 175°C	
Packages	VQFN-48-31		VQFN-48-31 VQFN-48-29	VQFN-48-31 VQFN-48-29	VQFN-48-29 and VQFN-48-31 (TQFP-48 planned)	

Features and benefits

Key features
Extensive diagnostics and protections embedded within the system-on-chip
Minimum number of external components needed
Platform based approach with compatible software between the product families
Data processing, actuation and sensing integrated into the product with 32-bit Arm® Cortex®-M
Leadless VQFN package with 7x7 mm footprint
Intelligent power saving modes including stop and sleep mode and energy management for external sensors (on demand)

Customer benefits
High levels of system reliability
Reduced cost
Support multiple and flexible designs with minimal effort
Space saving
Energy saving



- Embedded power ICs enable mechatronic motor control solutions for either relay, half-bridge or fullbridge DC and BLDC motor applications
- They are supported by a complete development tool chain provided by Infineon and third party vendors. The tool chain includes compilers, debuggers, evaluation boards, LIN low level drivers and configuration tools as well as variety of example software code.

BLDC Motor Control Shield for Arduino

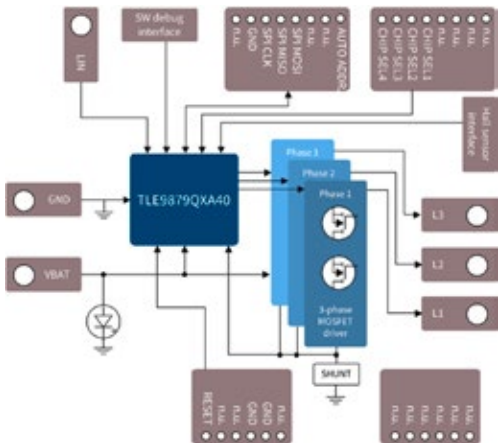
3-phase motor control shield with TLE9879QXA40

The BLDC Shield for Arduino uses the TLE9879QXA40 chip, which is a part of the TLE987x family of the Infineon Embedded power IC portfolio. It enables the shield to drive 3-phase BLDC motors with a variety of different features. One Arduino base board can control up to four BLDC shields via SPI. The BLDC Shield firmware provides an autoaddressing functionality. Every shield in the stack can be controlled independently and run completely different motor control algorithms if desired.

The shield implements three different advanced motor control algorithms:

- › Sensorless field-oriented control (FOC),
- › Block commutation with back EMF (BEMF)
- › Hall based block commutation (HALL)

The firmware can be changed using the SWD Interface
Additional connectors for voltage supply, motor-phases and hall sensors speed up the evaluation.



Features and benefits

Key features
Implemented motor control algorithms (FOC, BEMF, Hall)
Controlled over Arduino via SPI
Compatible with the Arduino Uno or the Infineon XMC™ baseboard
Up to four Shields can be used simultaneously
Each Shield can be controlled independently
Motor parameters can be set for each Shield individually

Customer benefits
Easy to use API, allowing the user to quickly setup an application
High performance BLDC motor control in form of the TLE987x chip

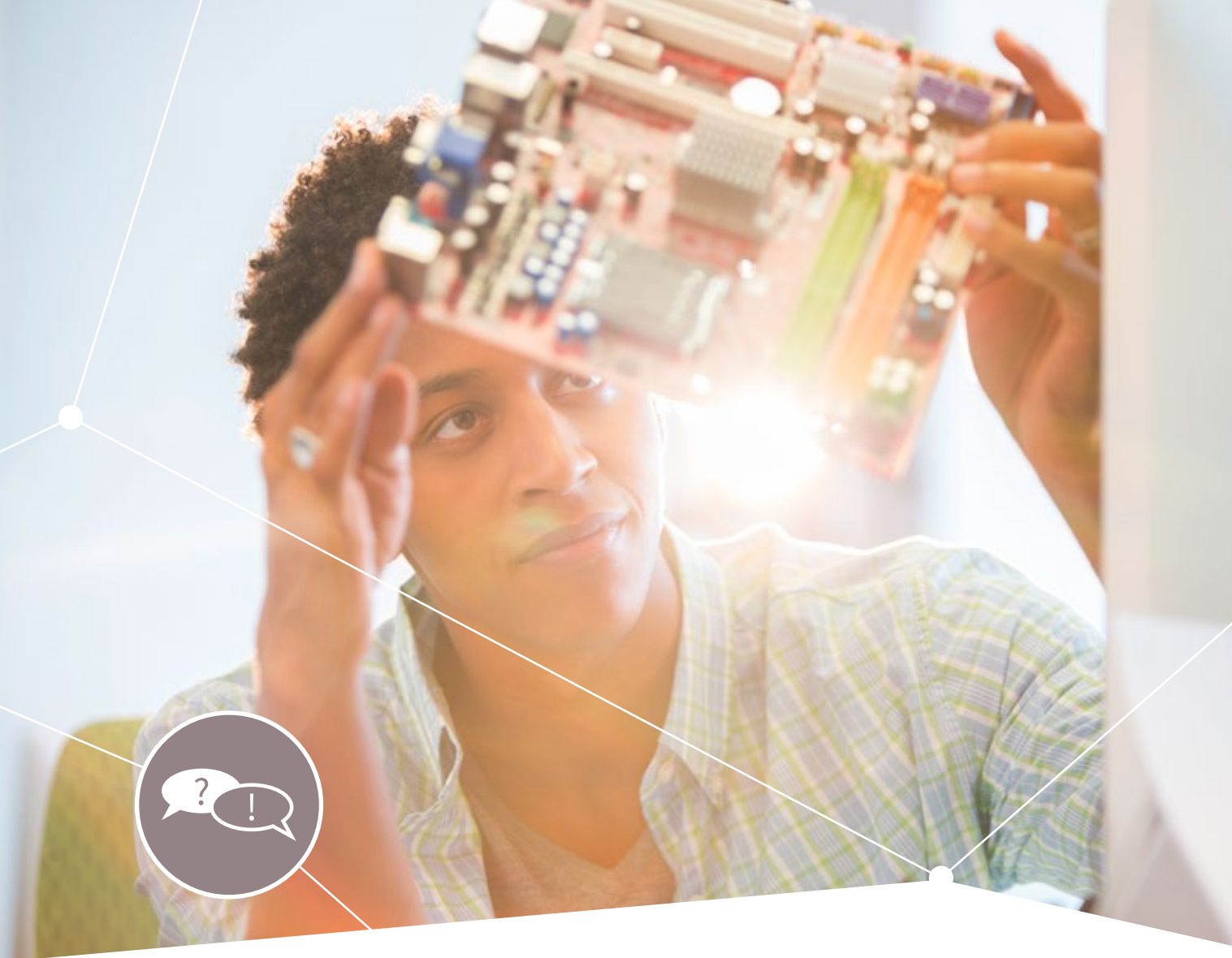


Our BLDC Shield for Arduino comes with a library which includes a collection of code that makes it easy for you to run your project. The Arduino library offers an intuitive API to quickly setup and configure an application.

www.infineon.com/bldcmotorshield
www.infineon.com/shields-for-arduino



For more details on the product, click on the part number.



Infineon support for industrial microcontrollers

One platform, countless solutions



Further information, datasheets and documents

www.infineon.com/xmc
www.infineon.com/xmc1000
www.infineon.com/xmc4000
www.infineon.com/aurix
www.infineon.com/makers

XMC SC Wireless power controller:

www.infineon.com/xmcscwirelesspowercontrollers

XMC™ MCUs ecosystem and enablement – kits, board, tools and software

Boards and kits:

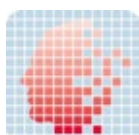
www.infineon.com/xmc-dev
www.infineon.com/connectivitykit
www.infineon.com/ethernet

Ecosystem and tools:

www.infineon.com/xmc-ecosystem

DAVE™ IDE:

www.infineon.com/dave





Sensors

- › XENSIV™ pressure sensors
- › XENSIV™ current sensors
- › XENSIV™ magnetic position sensors
- › Intuitive sensing
- › XENSIV™ MEMS microphone
- › XENSIV™ pressure sensor
- › XENSIV™ 24 GHz radar sensor ICs
- › XENSIV™ 60 GHz radar sensor IC
- › Shield2Go
- › Sensor 2GO kits



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs

WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

Applications



Infineon XENSIV™ – sensing the world

Infineon XENSIV™ sensors are exceptionally precise thanks to industry-leading technologies. They are the perfect fit for various customer applications in automotive, industrial and consumer markets.

From the world leader in sensing technology, XENSIV™ sensors simplify lives by enabling “things” to “see”, “hear”, “feel” and intuitively “understand” their environment. As a result of proven quality and outstanding reliability, customers can rely on XENSIV™ for system stability, durability and integrity. Providing high accuracy and best-in-class measurement performance, XENSIV™ sensors add great value to customer applications. More than 40 years of experience in sensing solutions and a deep-rooted system understanding result in the broadest portfolio of ready-to-use sensor solutions on the market. Ecosystem partners and our customers partner with us for leading technologies, perfect-fit solutions and continuous innovation.

With a proven track record in IoT innovation, we continue to seamlessly and securely connect people and machines. Many IoT trends, such as smart devices and wearables, electromobility and connected cars, smart factories and homes, and energy intelligence are being driven by technologies that develop with XENSIV™ sensors families as one of their key elements. Today, we are already inspiring the next generation of smart environments, capable of understanding and responding to human communication. Infineon's semiconductors are at the very heart of machine-to-machine (M2M), human-machine interface (HMI), mobile and wireless infrastructure technologies. As the technological boundary between humans and machines gradually disappears, these devices need even more advanced intelligence, enriched with voice assistance capabilities and the latest sensor fusion innovations, not to mention robust security technologies to protect personal data. Infineon's sensors and microphones are already delivering this intelligent functionality and inspiring the next step in mobile connectivity.

Absolute pressure sensors (MAP and BAP)

Infineon's pressure sensors are ideal for a wide range of applications in automotive and industrial sectors. Typical applications in automotive include side airbag, engine control and seat comfort with high quality, highly accurate products adhering to ISO26262 standard. Infineon offers the ideal portfolio for these systems.

The analog and digital interfaces of Infineon's pressure sensors provide customers with a high degree of design flexibility and enable manufacturers to meet evolving market demands.

KP21x/KP22x – Analog manifold air pressure sensor IC family (MAP + turbo MAP)

Features

- › Manifold air pressure measurement – MAP and turbo MAP
- › Excellent accuracy of up to 1.0 kPa over a large temperature range
- › Ratiometric analog voltage output proportional to the applied pressure
- › Output signal fully compensated over pressure and temperature
- › Pressure range from 10 to 400 kPa
- › Temperature range from -40 to +140°C
- › Output clamping (optional)
- › Complete product family available with multiple transfer function
- › Reverse polarity protection
- › Green SMD package

KP23x – Analog barometric air pressure (BAP) sensor IC family

Features


- › Absolute air pressure measurement
- › Excellent accuracy of 1.0 kPa over a large temperature range
- › Ratiometric analog voltage output proportional to the applied pressure
- › Output signal fully compensated across pressure and temperature range
- › Pressure range from 40 to 165 kPa
- › Temperature range from -40 to +125°C
- › Serial service interface
- › Open bond detection (OBD) for supply and GND
- › Inverse polarity protection
- › Green SMD package

KP25x/KP264 – Digital barometric air pressure (BAP) sensor IC family

Features

- › Absolute air pressure measurement
- › Excellent accuracy of 1.0 kPa over a large temperature range
- › Real 10-bit pressure resolution
- › Integrated temperature sensor
- › Real 10-bit temperature resolution
- › Power-down mode for reduced power consumption
- › Self diagnosis features
- › Output signal fully compensated across pressure and temperature range
- › Pressure range from 40 to 165 kPa
- › Temperature range from -40 to +125°C
- › Green SMD package

www.infineon.com/pressure

For more details on the product, click on the part number. 

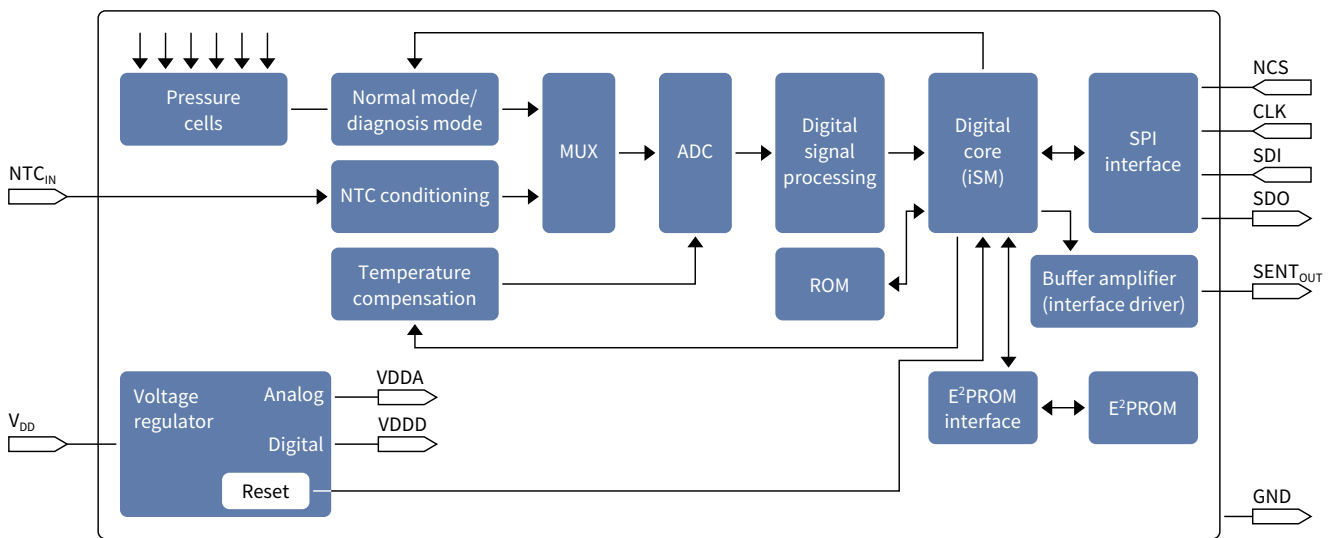
KP276

Media robust MAP sensor with digital interface

Features

- › Media robustness for current automotive requirements
- › Digital single edge nibble transmission (SENT) interface (282 clock ticks)
- › Excellent accuracy of ± 0.77 percent FSS
- › Green SMD package
- › Temperature range -40 to +170°C
- › Integrated NTC temperature sensor functionality with fast start up time (typ. 10ms)

Block diagram



Integrated pressure sensor ICs for manifold and barometric air pressure

Product	Pressure range [kPa]	Max. accuracy [kPa]	Max. operating temperature [°C]	Automotive	Industrial
KP21x *	10 ... 150	1.0	140	✓	✓
KP22x *	10 ... 400	2.5	140	✓	✓
KP23x *	15 ... 115	1.0	125	✓	✓
KP236N6165	60 ... 165	1.0	125	✓	✓
KP253	60 ... 165	1.0	125	✓	✓
KP254	40 ... 115	1.5	125	✓	✓
KP255 *	10 ... 125	1.4	140	✓	✓
KP256	60 ... 165	1.0	125	✓	✓
KP264	40...115	1.5	125	✓	✓
KP276 *	10 ... 400	3.0	170	✓	✓

High-precision coreless current sensors for industrial applications

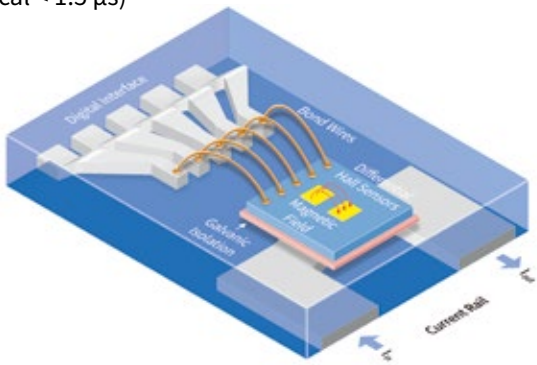
Infineon's current sensors provide accurate and stable current measurement up to 120 A. The products are intended for use in high-voltage industrial applications such as electric drives, photovoltaic inverters, power supplies or battery management systems. The coreless open-loop sensors are based on Infineon's precise and stable Hall technology. Thus, the output signal is highly linear over temperature and lifetime. Due to a lack of an iron core, the sensor signal doesn't show hysteresis and it doesn't suffer from saturation. Thanks to the integrated current rail there is no need for external calibration. The differential measurement with two Hall cells ensures high accuracy even in a noisy environment with cross-talk from adjacent current lines or magnetic stray fields. Highlights of the XENSIV™ TLI4971 include best-in-class thermal performance for high currents as a result of its innovative TISON-8 package as well as isolation against high voltages. The two output pins for fast overcurrent signals can be used for pre-warning and system shut-down. Designers can program the threshold levels of the overcurrent signals and thus adapt them to individual requirements without any external components. The sensor also provides a signal in case of an over or undervoltage condition for the supply voltage. The well-established Infineon's TLI4970 combines superior accuracy with one output pin for overcurrent detection signal. The measurement signal is provided through a 3-pin serial peripheral interface (SPI) using a standard unidirectional 16-bit SPI protocol is used. Several sensors can be connected to a parallel SPI bus.

Features

- › Integrated current rail with typical 225 $\mu\Omega$ insertion resistance enables ultralow power loss
- › Smallest form factor, 8x8 mm SMD, for easy integration and board area saving
- › Single supply voltage, 3.1 to 3.5 V
- › Highly accurate, scalable, DC and AC current sensing
- › Bandwidth greater than 120 kHz enables wide range of applications
- › Very low sensitivity error over temperature (max. 2.5%)
- › Excellent stability of offset over temperature and lifetime
- › High robustness to voltage slew rates up to 10 V/ns
- › Galvanic functional isolation up to 1150 V peak V_{ORM} ; partial discharge capability of at least 1200 V; 4 mm clearance and creepage
- › Differential sensor principle ensures superior magnetic stray field suppression
- › Two independent fast over-current detection (OCD) pins with configurable thresholds enable protection mechanisms for power circuitry (typical < 1.5 μs)
- › Precalibrated sensor

Applications

- › Electrical drives (up to 690 V)
- › Photovoltaic inverter
- › General purpose inverters
- › Overload and overcurrent detection
- › Current monitoring
- › Chargers Power supplies



Product	Accuracy ¹⁾	Current range [A]	Bandwidth [kHz]	Sensitivity [mV/A]	Certification	Industrial	Package
TLI4971-A120T5-U-E0001	3.45%	120.0	120 kHz min.	10	UL	✓	PG-TISON-8
TLI4971-A120T5-E0001	3.45%	120.0	120 kHz min.	10	-	✓	PG-TISON-8

www.infineon.com/current-sensor

1) Total error over lifetime and temperature

For more details on the product, click on the part number.

Hall switches

The energy-saving option with excellent accuracy and robustness

TLE/TLI/TLV4961/64/6: Energy-efficient Hall switch family for up to 32 V

The TLE/TLI/TLV496x-xM/L family of Hall switches saves energy and enables designers to create precise, compact systems. With an operational current consumption of just 1.6 mA, TLE/TLI/TLV496x-xM/L products can cut energy consumption up to 50 percent compared with similar competitor products. Thanks to its small magnetic hysteresis, the family paves the way for precise switching points in systems. The integrated temperature profile compensates magnetic drifts and enables stable performance over temperature and lifetime.

TLE/TLI/TLV496x-xM products come in the small SOT23 package. The sensors also feature an integrated functionality test for better system control.

Features

- › Current consumption of just 1.6 mA
- › 3 to 32 V supply voltage range (over voltage up to 42 V)
- › 7 kV ESD protection (HBM)
- › Overtemperature and overcurrent protection
- › Temperature compensation
- › Smallest SOT23 package
- › Dedicated products for industrial applications (TLI496x)
- › AEC-Q100 qualified
- › Electrical drives


Applications

- › Window lifter (index counting)
- › Power closing (index counting)
- › Gear stick (position detection)
- › Seat belt (position detection)
- › BLDC commutation
(e.g. wiper seat belt pretensioner, pump, seating)
- › Service robots
- › Power tools
- › White goods

Product	Type	Operating point B_{OP}	Release point B_{RP}	Hysteresis ΔB_{HY}	Automotive	Industrial	Consumer	Package
TLE4961-1M/L	Latch	2.0	-2.0	4.0	✓	✓	✓	SOT23/SSO-3-2
TLE4961-2M	Latch	5.0	-5.0	10.0	✓	✓	✓	SOT23
TLE4961-3M/L	Latch	7.5	-7.5	15.0	✓	✓	✓	SOT23/SSO-3-2
TLE4964-1M	Switch	18.0	12.5	5.5	✓	✓	✓	SOT23
TLE4964-2M	Switch	28.0	22.5	5.5	✓	✓	✓	SOT23
TLE4964-3M	Switch	12.5	9.5	3.0	✓	✓	✓	SOT23
TLE4964-5M	Switch	7.5	5.0	2.5	✓	✓	✓	SOT23
TLE4968-1M/L	Bipolar	1.0	-1.0	2.0	✓	✓	✓	SOT23/SSO-3-2
TLE4961-5M	Latch	15.0	-15.0	30.0	✓	✓	✓	SOT23
TLE4961-4M	Latch	10.0	-10.0	20.0	✓	✓	✓	SOT23
TLE4964-4M	Switch	10.0	8.5	1.5	✓	✓	✓	SOT23
TLE4964-6M	Switch	3.5	2.5	1.0	✓	✓	✓	SOT23
TLV4964-1M	Switch	18.0	12.5	5.5	–	–	✓	SOT23
TLV4964-2M	Switch	28.0	22.5	5.5	–	–	✓	SOT23
TLI4961-1M/L	Latch	2.0	-2.0	4.0	–	✓	✓	SOT23/SSO-3-2
TLV4961-3M	Latch	7.5	-7.0	15.0	–	–	✓	SOT23

www.infineon.com/Hall-switches

www.infineon.com/magnetic-sensors

For more details on the product, click on the part number. 

TLE/TLI4963/65-xM

5 V high-precision automotive/industrial Hall-effect sensors

By offering an excellent magnetic behavior Infineon's switches are ideally suited for:

- › Index counting application with a pole wheel
- › Rotor position detection (BLDC motors)
- › Open/close detection

Features

- › 3.0 to 5.5 V operating supply voltage
- › Low current consumption 1.4 mA
- › ESD protection 4 kV HBM
- › Active error compensation (chopped)
- › High stability of magnetic thresholds
- › Low jitter (typ. 0.35 µs)
- › Operating temperature range:
 - from -40 to +170°C (TLE496x-xM)
 - from -40 to +125°C (TLI496x-xM)
- › Small SMD package SOT23
- › TLE: AEC-Q100 qualified
- › TLI: JESD47 qualified



Product	Type	Operating point B _{OP}	Release point B _{RP}	Hysteresis ΔB _{HY}	Automotive	Industrial	Package
TLE4963-1M	Latch	2.0	-2.0	4.0	✓	–	SOT23
TLE4963-2M	Latch	5.0	-5.0	10.0	✓	–	SOT23
TLE4965-5M	Unipolar switch	7.5	5.0	2.5	✓	–	SOT23
TLI4963-1M	Latch	2.0	-2.0	4.0	–	✓	SOT23
TLI4963-2M	Latch	5.0	-5.0	10.0	–	✓	SOT23
TLI4965-5M	Unipolar switch	7.5	5.0	2.5	–	✓	SOT23

TLV496x-xTA/B

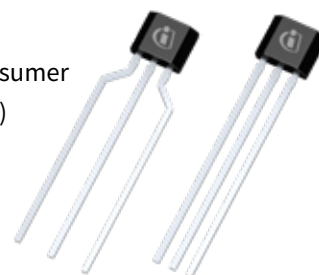
Precision Hall-effect sensor for consumer applications in leaded package

Features

- › 3.0 to 26 V operating supply voltage
- › Low current consumption 1.6 mA
- › ESD protection 4 kV HBM
- › Operating temperature range from -40 to +125 °C
- › Leaded package TO92S

Applications


- › BLDC motor commutation for consumer devices (e.g. e-bikes, fans, aircons)
- › Position detection e.g. flaps and control buttons



Product	Type	Operating point B _{OP}	Release point B _{RP}	Hysteresis ΔB _{HY}	Consumer	Industrial	Package
TLV4961-1TA	Latch	2.0	-2.0	4.0	✓	TO92S-3-1	TO92S-3-1
TLV4961-1TB	Latch	2.0	-2.0	4.0	✓	TO92S-3-2	TO92S-3-2
TLV4961-3TA	Latch	7.5	-7.5	15.0	✓	TO92S-3-1	TO92S-3-1
TLV4961-3TB	Latch	7.5	-7.5	15.0	✓	TO92S-3-2	TO92S-3-2
TLV4964-4TA	Unipolar switch	10.0	8.5	1.5	✓	TO92S-3-1	TO92S-3-1
TLV4964-4TB	Unipolar switch	10.0	8.5	1.5	✓	TO92S-3-2	TO92S-3-2
TLV4964-5TA	Unipolar switch	7.5	5.0	2.5	✓	TO92S-3-1	TO92S-3-1
TLV4964-5TB	Unipolar switch	7.5	5.0	2.5	✓	TO92S-3-2	TO92S-3-2
TLV4968-1TA	Latch	1.0	-1.0	2.0	✓	TO92S-3-1	TO92S-3-1
TLV4968-1TB	Latch	1.0	-1.0	2.0	✓	TO92S-3-2	TO92S-3-2

www.infineon.com/Hall-switches

www.infineon.com/magnetic-sensors

For more details on the product, click on the part number. 

TLx4966

Two-in-one double Hall sensor

Features

- › Two Hall probes for information on speed and direction
- › Excellent matching between the two Hall probes
- › Hall plate distance of 1.45 mm
- › Outstanding quality
- › TSOP6 package
- › TLE: AEC-Q100 qualified
- › TLI: JESD47 qualified

Applications

- › Window lifter
- › Sunroof
- › Automatic tailgate
- › Automated doors
- › Sun blinds
- › Garage doors

Product	Production samples	Temperature range [°C]	Operating voltage [V]	Magnetic thresholds	Output	Comment	Package
TLI4966G	Available	-40 to +125	2.7–24	B _{op} : +7.5 mT B _{rp} : -7.5 mT	Speed and direction	› Horizontal Hall plates › For industrial application › SMD package	TSOP6-6
TLE4966G	Available	-40 to +150	2.7–24	B _{op} : +7.5 mT B _{rp} : -7.5 mT	Speed and direction	› Horizontal Hall plates › SMD package	TSOP6-6
TLE4966-2G	Available	-40 to +150	2.7–24	B _{op} : +7.5 mT B _{rp} : -7.5 mT	Speed and speed	› Horizontal Hall plates › SMD package	TSOP6-6
TLE4966-3G	Available	-40 to +150	2.7–24	B _{op} : +2.5 mT B _{rp} : -2.5 mT	Speed and direction	› Horizontal Hall plates › SMD package	TSOP6-6
TLE4966V-1G	Available	-40 to +150	3.5–32	B _{op} : +2.5 mT B _{rp} : -2.5 mT	Speed and direction	› Horizontal Hall plates › SMD package	TSOP6-6
TLE4966L	Available	-40 to +150	2.7–24	B _{op} : +7.5 mT B _{rp} : -7.5 mT	Speed and direction	› Horizontal Hall plates › Leaded package	SSO-4

Linear Halls



TLE499x family: programmable analog/digital linear Hall sensor family

Infineon's family of TLE499x linear Hall ICs is tailored to the needs of highly accurate angular and linear position detection and current measurement applications. Each product measures the vertical component of a magnetic field and outputs a signal that is directly proportional to the magnetic field. These programmable linear Hall sensors come with different interface options: TLE4997 features ratiometric analog output, while TLE4998P comes with pulse width modulation (PWM), TLE4998S with single edge nibble transmission (SENT) and TLE4998C with short PWM codes (SPC). These high-precision 12-bit resolution linear Hall sensors feature EEPROM memory for flexible programming across a wide range of parameters.

Thanks to digital signal processing based on a 20-bit DSP architecture plus digital temperature compensation, these sensors deliver outstanding temperature stability compared with similar compensation methods. TLE4998 also includes stress compensation to withstand stress effects from the package, such as moisture, thus ensuring best-in-class accuracy over the device's lifetime.

Features

- › Best-in-class accuracy with low drift of output signal temperature range lifetime (including stress compensation in TLE4998)
- › Programmable transfer function (gain, offset), clamping, bandwidth and temperature characteristics
- › AEC-Q100 qualified
- › Available in various packages including SSO-3-9 with two integrated capacitors to improve ESD and ESC behavior
- › Dual-die SMD package
- › TLE4997, TLE4998 ISO26262 ready
- › TLE4999I3 fully ISO26262 compliant

Applications

- › Detecting linear and angular position
- › Detecting pedal and throttle position
- › Steering torque measurement
- › Headlight leveling
- › High-current sensing
- › Seat position and occupant detection
- › Suspension control
- › Detecting gear stick/lever positions
- › Detecting liquid levels in fuel tanks
- › Current sensing e.g. for battery management

Product	Programmable	Number of pins	Sensitivity (programmable range)	Magnetic offset	Supply voltage (extended range)	Automotive	ISO26262	Interface	Package
TLE4997	EEPROM	3/Single die SMD 8	±12.5 to ±300 mV/mT	< ±400 μT	5 V ±10% (7 V)	●	---	Analog	SSO-3-10 TDSO-8
TLE4998P	EEPROM	3/4/Single die SMD 8	±0.2 to ±6%/mT	< ±400 μT	5 V ±10% (16 V)	●	Ready	PWM	SSO-3-10 SSO-4-1 SSO-3-9 (2 capacitors) TDSO-8
TLE4998S	EEPROM	3/4/Single die SMD 8	±8.2 to ±245 LSB ₁₂ /mT	< ±400 μT	5 V ±10% (16 V)	●	Ready	SENT	SSO-3-10 SSO-4-1 SSO-3-9 (2 capacitors) TDSO-8
TLE4998C	EEPROM	3/4/Single die SMD 8	±8.2 to ±245 LSB ₁₂ /mT	< ±400 μT	5 V ±10% (16 V)	●	Ready	SPC	SSO-3-10 SSO-4-1 SSO-3-9 (2 capacitors) TDSO-8
TLE4999I3	EEPROM	3	±73.72 to ±147.44 * LSB ₁₃ /mT	< ±300 μT	5.5–7 V ±10% (16 V)	●	Compliant	PSI5	SSO-3-12

www.infineon.com/linear-hall
www.infineon.com/magnetic-sensors



ISO26262
compliant



ISO26262
ready

For more details on the product, click on the part number.

Dual linear Halls

Two sensors in one SMD package



The SMD package (TDSO) includes two independent sensors with separate power supply and separate signal outputs. Due to special mounting technology, Infineon is able to keep dual-sensor package size very small to enable compact PCB layouts and small magnet sizes.

Infineon offers a wide range of Hall sensors in the TDSO package. The combination of two sensors in one package offers sensors redundancy, a feature which is especially interesting for new generation EPS steering systems with increased ISO26262 requirements and other safety critical applications. All sensors are automotive qualified.

Most products are also available as single-sensor solution with only one sensor. The newest member of the TLE499x family, the TLE4999I3, is a fully ISO26262 compliant linear Hall sensor that includes 2 sensor channels on one chip. The SSO-3 package allows PCB-less application flexibility and the PSI5 interface enables low EMI at high speed communication with minimum wiring.

Features

- › Two sensors in one package
- › Separate power supply and signal output
- › AEC-Q100 qualified
- › Temperature range from -40 to +125°C
- › Outstanding quality
- › Single-sensor versions available
- › 16-pin and 8-pin versions available
- › ISO26262 ready
- › TLE4999I3 ISO26262 compliant

Automotive applications

- › Steering torque systems
- › Pedal position
- › Any other safety critical application

Product	Interface	Dual-/single-sensor available	ISO26262	Package
TLE4997A8D	Analog	yes/yes	Ready	TDSO-8
TLE4998P8D	PWM	yes/yes	Ready	TDSO-8
TLE4998S8D	SENT	yes/yes	Ready	TDSO-8
TLE4998C8D	SPC	yes/yes	Ready	TDSO-8
TLE4999I3	PSI5	monolithic *	Compliant	SSO-3

* 2 sensor channels on one chip



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ISO26262
compliant



ISO26262
ready

For more details on the product, click on the part number.



Angle sensors

Compact designs in small outline packages

Highest variety - low end to high end, standardized and specialized in all four magnetic technologies: Hall, GMR, AMR and TMR

Infineon's magnetic sensor products TLE5501, are fast analogue TMR-based angle sensors dedicated to automotive applications. Their fields of use range from steering angle applications, with the highest functional safety requirements, to motors for wipers, pumps and actuators and electric motors in general. They are also ready to be used in industrial and consumer applications like robotics or gimbal. Angle sensors detect the orientation of an applied magnetic field by measuring sine and cosine angle components with monolithically integrated magneto resistive elements.

Infineon's iGMR sensors are ideal for applications with a wide angle range, such as BLDC motors or steering sensors. They are pre-calibrated and ready to use. Different levels of signal processing integration enable designers to optimize system partitioning. The XENSIV™ iAMR sensors also perfectly fit applications with the highest accuracy requirements, as they offer best performance over temperature, lifetime and magnetic field range.

iGMR, iAMR and iTMR based angle sensors

Diverse redundant sensor with analog and digital interface

Product	Technology	Die configuration	ISO26262	Sin/cos output	Angle output	Second interface	Accuracy	Package
TLE5009	GMR	Single die	Ready	Analog sin/cos	–	–	0.9°	DSO-8
TLE5009A16(D) *	GMR	Dual die	Ready	Analog sin/cos	–	–	1.0°	TDSO-16
TLE5011	GMR	Single die	Ready	SSC (SPI)	–	–	1.6°	DSO-8
TLI5012B	GMR	Single die	Ready	SSC (SPI)	SSC (SPI)	PWM/IIF/SPC/HSM	1.9°	DSO-8
TLE5012B(D)	GMR	Single and dual die	Ready	SSC (SPI)	SSC (SPI)	PWM/IIF/SPC/HSM	1.0°	DSO-8/ TDSO-16
TLE5014C16(D)	GMR	Single and dual die	Compliant	–	SPC	–	1.0°	TDSO-16
TLE5014P16(D)	GMR	Single and dual die	Compliant	–	PWM	–	1.0°	TDSO-16
TLE5014S16(D)	GMR	Single and dual die	Compliant	–	SENT	–	1.0°	TDSO-16
TLE5014SP16(D) *	GMR	Single and dual die	Compliant	–	SPI	–	1.0°	TDSO-16
TLE5109A16(D) *	AMR	Single and dual die	Ready	Analog sin/cos	–	–	0.5°	TDSO-16
TLE5309D	AMR + GMR	Dual die	Ready	Analog sin/cos	SSC (SPI)	–	AMR 0.5°, GMR 1.0°	TDSO-16
TLE5501	TMR	Single die	Compliant	Analog sin/cos	–	–	1.0°	DSO-8

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
www.infineon.com/magnetic-sensors

SPI = Serial peripheral interface

IIF = Incremental interface

PWM = Pulse width modulation

*For more information on the product, contact our product support

For more details on the product, click on the part number. 

iTMR

iTMR based angle sensors

Tunneling Magneto Resistive (iTMR) technology is offering high sensing sensitivity with a high output voltage, reducing the need for an internal amplifier. Thus, the sensor can be connected directly to the microcontroller without any further amplification. In addition, iTMR technology shows a very low temperature drift, reducing external calibration and compensation efforts. The iTMR technology is also well known for its low current consumption.

TLE5501

With the TLE5501 products, Infineon is currently launching the first angle sensor products based on iTMR technology. TLE5501 is available in two versions.

TLE5501 - product versions with different pin out:

- › TLE5501 E0001: pin-compatible to TLE5009 automotive qualified acc. AEC-Q100
- › TLE5001 E0002: decoupled bridges for redundant external angle calculation and highest diagnostic coverage, realizing ISO26262-compliant development ASIL D

**Features**


- › Large output signals of up to 0.37 V/V for direct microcontroller connection
- › Discrete bridge with differential sine and cosine output
- › Very low supply current: ~2 mA
- › Magnetic field range (20-100 mT)
- › Typ. angle error ~ 1.0 ° (overtemperature and lifetime)
- › DSO-8 package
- › AEC-Q100, grade 0: TA = -40°C to 150°C (ambient temperature)
- › For TLE5501 E0002:
 - Reaching ASIL D with just one single sensor chip
 - ISO26262-compliant development ASIL D

Applications

- › Steering angle sensor
- › BLDC motor commutation (e.g. wipers, pumps and actuators)
- › Angular position sensing for e.g. robotics or gimbal
- › Electric motors
- › Industrial automation
- › Safety applications

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For more details on the product, click on the part number. 

TLE5014(D)

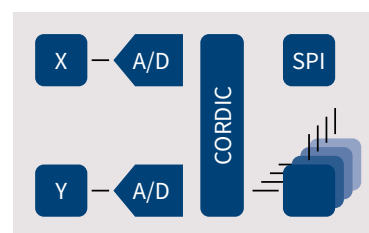
Digital iGMR sensor with an easy-to-use plug-and-play concept for highest functional safety applications



All XENSIV™ TLE5014 angle sensors are available as single and dual die products. The products come pre-configured and pre-calibrated as plug-and-play sensors and are easy to use. Customers can choose between the interfaces SENT, PWM, SPC and SPI. On top of those protocol options, the sensors can be adapted to any kind of application setup via their programmable E²PROM interfaces. TLE5014 magnetic angle sensors meet ISO26262 ASIL C for the single die and ISO26262 ASIL D for the dual die versions. All products are ready for applications with the highest functional safety requirements. The sensors show an extremely small angle error of less than 1° across the entire temperature profile and lifetime. This is particularly helpful in applications with the need for very accurate position sensing such as steering angle sensing or motor commutation. Further application areas range from rotor position measurement, electric power steering (EPS), pedal position to any other kind of position measurement.

Features

- › Easy-to-use, plug-and-play sensors, pre-configured and pre-calibrated
- › Offering high flexibility:
 - Available as single and dual die products
 - 12bit digital interface with protocol options PWM, SENT, SPC and SPI
 - E²PROM and look-up table for customer configuration and calibration
- › High angle accuracy: max. 1.0° over temperature and lifetime
- › High voltage capability up to 26 V
- › Development fully compliant with ISO26262
 - Developed acc. ASIL D level
 - Dual die sensors reaching ASIL D, single die sensors ASIL C metrics
- › Safety manual and safety analysis summary report available on request



Applications

- › Steering angle sensing (SAS)
- › Motor commutation
- › Rotor position measurement
- › Pedal position
- › Safety applications
- › Any other kind of high-accuracy position measurement

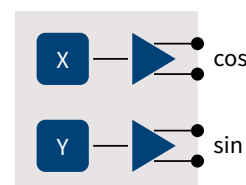
TLE5109A16(D)

Analog iAMR sensor with temperature compensation



Features

- › Features a differential or single-ended analog interface for sine and cosine values
- › Internal temperature drift compensation for gain and offset
- › Also available as a dual-sensor package
- › ISO26262 ready
- › Typical 0.1° angle error over lifetime and temperature range after compensation (max 0.5°)
- › Available as single and dual die product



www.infineon.com/angle-sensors

www.infineon.com/magnetic-sensors

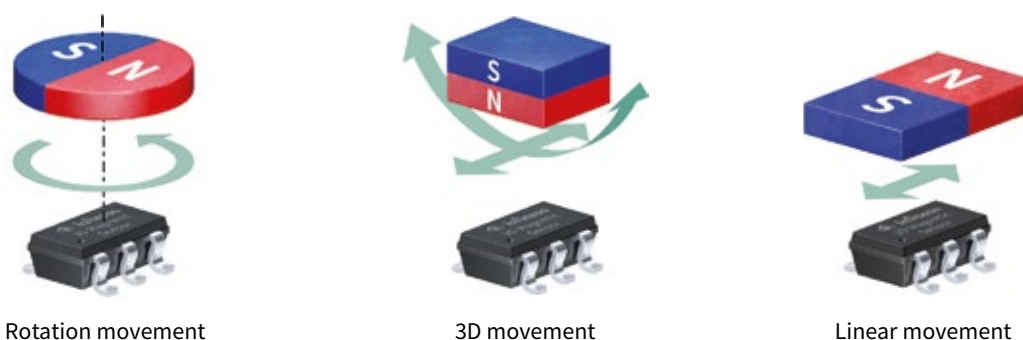
*Giant Magneto resistance

For more details on the product, click on the part number.

3D magnetic sensors

TLV493D-A1B6/TLI493D-A2B6 for consumer and industrial market

The TLV493D-A1B6 sensor realizes an accurate three-dimensional sensing with extremely low power consumption in a small 6-pin package. Capable of detecting the magnetic field in the x, y, and z-direction, the sensor is ideally suited for the measurement of linear, rotation or 3 dimensional movements. Thanks to its small package and low power consumption, the TLx493D-AxB6 can be used in new applications, replacing potentiometer and optical solutions. Featuring contactless position sensing and high temperature stability of the magnetic threshold, the sensor allows systems getting smaller, more accurate and more robust.



Features

- › 3D magnetic sensing
- › Integrated temperature sensing
- › Low current consumption
 - 7 nA in power-down mode
 - 10 μ A in ultralow power mode
- › 2.8 to 3.5 V operating supply voltage
- › Digital output via a 2-wire standard I2C interface
- › Bx, By and Bz linear field measurement up to ± 160 mT
- › JESD47 qualified
- › 12-bit data resolution for each measurement direction
- › Various resolution options from 65 μ T/LSB to 130 μ T
- › Operating temperature range from -40 to +125°C

Product	Temperature range	Qualification	Linear magnetic range	Resolution	IDD	Update rate	Package	Ordering code
TLV493D-A1B6	-40 ... 125°C	JESD47	± 130 mT (typ)	98 μ T/LSB	7 nA – 3.7 mA	10 Hz – 3.3 kHz	TSOP6	SP001286056
TLI493D-A2B6	-40 ... 105°C	JESD47	± 160 mT (min) ± 100 mT (min)	130 μ T/LSB (65 μ T/LSB) ¹⁾	7 nA – 3.3 mA	10 Hz – 8.4 kHz	TSOP6	SP001689844

1) Half range mode

While the TLV493D-A1B6 just supports a typical value for the linear magnetic range of ± 130 mT, the TLI493D-A2B6 specification includes also a minimum value of ± 160 mT.

With the TLI493D-A2B6, a broader microcontroller compatibility as well an enhanced feature set is included.

New features


- › Sensor address read back
- › Short mode range setting, focusing on the half of the magnetic range, ensuring higher accuracy
- › Higher update frequency allows for an application field that requires faster update speed
- › Angular mode (for x and y read-out only)

Applications

- › Anti tempering protection in smart meters
- › Joysticks e.g. for medical equipment, cranes, CCTV-control, game consoles
- › Control elements e.g. white goods multifunction knobs

www.infineon.com/3dmagnetic

www.infineon.com/magnetic-sensors

For more details on the product, click on the part number. 

3D magnetic sensors

TLE493D-A2B6/W2B6 for automotive low power applications

Infineon's TLE493D-x2B6 enables for all kind of automotive control element applications within the passenger compartment or under the hood with a temperature range of -40 to +125°C, with linear magnetic range requirements up to ±160 mT.



Features

- › 3D magnetic sensing
- › Integrated temperature sensing
- › 2.8 to 3.5 V operating supply voltage
- › Low current consumption
 - 0.007 µA in power-down mode
 - 10 µA in ultralow power mode
 - Up to 10 power modes
- › Digital output via a 2-wire standard I2C interface
- › Bx, By and Bz linear field measurement ±160 mT
- › AEC-Q100 qualified
- › 12-bit data resolution for each measurement direction
- › Various resolution options from 67 µT/LSB to 134 µT
- › Operating temperature range from -40 to +125°C

Product	Temperature range	Qualification	Linear magnetic range	Resolution	I _{DD}	Update rate	Wake-up	Package	Ordering code
TLE493D-A2B6	-40 ... 125°C	AEC-Q100	±160 mT (min)	130 µT/LSB (65 µT/LSB) ¹⁾	7 nA – 3.3 mA	10 Hz – 8.4 kHz	No	TSOP6	SP001689848
TLE493D-W2B6 A0 TLE493D-W2B6 A1 TLE493D-W2B6 A2 TLE493D-W2B6 A3	-40 ... 125°C	AEC-Q100	±160 mT (min) ±100 mT (min)	130 µT/LSB (65 µT/LSB) ¹⁾	7 nA – 3.3 mA	0.05 Hz – 8.4 kHz	Yes	TSOP6	SP001655334 SP001655340 SP001655344 SP001655348

1) Half range mode

The XENSIV™ sensor TLE493D-A2B6 features include a sensor address read-back feature for additional communication verification, a half range mode focusing to half of the magnetic range, ensuring higher accuracy and an angular mode (for x and y readout only).

With the TLE493D-W2B6 A0-A3, a 3D sensor has been developed, which includes an enhanced dynamic wake up feature. Four pre-programmed address options (A0-A3) will be available, enabling for a fast start-up initialization, when used in I²C bus configurations. It also includes enhanced test options, and a safety documentation is available to enable the usage of this sensor in the context of ASIL B systems.

Applications

- › Control elements for infotainment/navigation systems, air conditions, multifunctional steering wheels, seat controls
- › Top column modules e.g. direction indicator, wiper control
- › Gear stick position sensing

www.infineon.com/3dmagnetic
www.infineon.com/magnetic-sensors

For more details on the product, click on the part number.

Magnetic speed sensors

Easy to use, robust and cost-effective sensors for speed measurement

Infineon's Hall- and GMR-based magnetic speed sensors are designed to measure speed in safety and powertrain applications such as speedometers, ABS, camshafts/crankshafts and automatic transmissions. They are also used in similar applications in the industrial sector. The sensors use a ferromagnetic gear tooth or encoder structure to measure linear or rotational speed and position. Hall sensor measuring rotational speed with a gear tooth and a magnetic encoder wheel. The majority of sensors also feature additional benefits such as integrated capacitors (C- types) for high EMC robustness and the highest levels of ESD protection.

Modern powertrain systems rely on magnetic speed sensors, along with automotive pressure sensors, to achieve the required CO₂ targets and smart powertrain solutions. Infineon offers a broad variety of magnetic speed sensors for camshaft, crankshaft and transmission applications.

TLE4922

Highly robust, easy-to-use mono-Hall speed sensor with twist-independent mounting

This sensor is specially designed to provide an easy-to-use, robust and cost-effective solution for vehicle or industrial speed sensing applications. The TLE4922 can, therefore, be back-biased using a simple, low-cost bulk magnet, while providing a good air gap performance and switching accuracy. Its hidden adaptive hysteresis and calibration algorithm enable good accuracy over air gap jumps and immunity to vibration and run-out events.

Features


- › Large operating air gap capability
- › Twist-independent mounting
- › Hidden adaptive hysteresis
- › Low current consumption
- › Reverse magnetic polarity capability
- › Advanced protection technology
 - Reverse voltage protection at VS-pin
 - Short-circuit protection
 - Overtemperature protection
- › Wide operating temperature ranges of $-40^{\circ}\text{C} \leq T_j \leq \pm 150^{\circ}\text{C}$
- › High ESD robustness up to $\pm 4 \text{ kV HBM}$
- › 3-wire PWM voltage interface

Applications

- › Two-wheeler
- › Automotive vehicle speed



www.infineon.com/speed-sensors
www.infineon.com/magnetic-sensors

For more details on the product, click on the part number. 

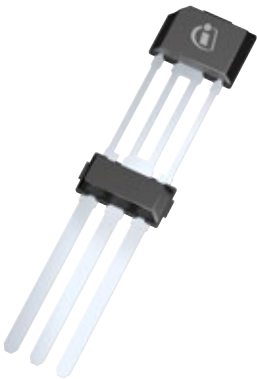
TLE4929

Fully programmable crankshaft sensor

The TLE4929 is an active Hall sensor ideally suited for crankshaft applications and similar industrial applications, such as speedometer or any speed sensor with high accuracy and low jitter capabilities.


Features

- > Differential Hall speed sensor to measure speed and position of tooth/pole wheels
- > Switching point in the middle of the tooth enables backward compatibility
- > Robustness over magnetic stray-field due to differential sensing principle
- > Digital output signal with programmable output-protocol including diagnosis interface
- > Direction detection and stop-start-algorithm
- > High accuracy and low jitter
- > High sensitivity enable large air gap
- > End-of-line programmable to adapt engine parameters
- > Can be used as a differential camshaft sensor
- > Automotive operating temperature range



Product	Automotive	Industrial	Sensor technology	AEC-Q100 qualified	RoHS	HAL free	Product status
TLE4922	✓	✓	Mono-Hall	✓	✓	✓	In production
TLE4929	✓	✓	Differential Hall	✓	✓	✓	In production

www.infineon.com/speed-sensors
www.infineon.com/magnetic-sensors

For more details on the product, click on the part number. 



Packages

XENSIV™ sensors

Microcontrollers

Gate driver ICs

Intelligent switches
and input ICs

Power ICs

Discrete IGBTs


WBG semiconductors

500-950 V MOSFETs

20-300 V MOSFETs

Applications



For more details on the product, [click on the part number.](#) 

Intuitive sensing

Giving things human-like senses for a better contextual awareness

Imagine a world where technology is unobtrusive and seamlessly integrated into our lives. Where intentional/deliberate communication between people and devices is no longer necessary. In this world, there is no need to push buttons or issue commands in order to activate devices, because technology is capable of interpreting implicit intentions and context. This enhances the user experience and makes it more natural – it almost seems like the devices around us intuitively understand what we want them to do. At Infineon, this future is already becoming reality. We develop sensor solutions that enable simple and effortless user interactions with all kinds of smart devices. Bridging the gap between the real and digital worlds, our technology is developed to make

life easier, safer, greener and more efficient. Our intuitive sensing solutions are at the very core of this mission. Reflecting our belief that the essential value of sensor technology lies in making our lives more convenient through seamless, natural interactions between people and sensing devices, our aim is to leave you free to focus on what really matters in life.

Choose your type of sense

Thanks to industry-leading technologies Infineon XENSIV™ sensors are exceptionally precise. They are the perfect fit for various customer applications in automotive, industrial and consumer markets.

Pressure sensors

Our digital barometric pressure sensors give designers the best choice when it comes small form factors, highest precision and accuracy over a wide temperature range, fast read-out speeds and low power consumption.

Radar sensors

Radar supports existing applications while providing features that enable completely new use cases. It measures velocity, range and angle, both horizontal and vertical, for precise position mapping and 3D tracking.

MEMS microphones

Digital MEMS microphones overcome existing audio chain limitations and are designed for applications where low self-noise (high SNR), wide dynamic range, low distortions and a high acoustic overload point are required.

PAS CO2 sensor

Leveraging photoacoustic spectroscopy (PAS), Infineon has developed an exceptionally small CO₂ sensor that overcomes existing size, cost and performance challenges.

Today, sensors already enable interactions between people and devices

This interaction often depends on the interpretation and merging of information from different sources. Machines cannot yet read our minds and do not always have the information necessary to correctly evaluate a given situation. So, we sometimes have to explicitly tell devices what we want them to do. This can be inconvenient and time-consuming. Inspired by human nature, Infineon intuitive sensing solutions are designed to take the complexity out of our interaction with devices.

Reflecting a holistic approach, we combine different sensors with state-of-the-art software to create a comprehensive picture of the world around us. By fusing several smart sensors into one coherent intelligent system, our intuitive sensing solutions simplify complex technical processes and enable people to effortlessly interact with devices. These smart devices intuitively sense the world around them, determining what is expected and needed from them.

XENSIV™ MEMS microphone

Time to debottleneck your audio chain



The popularity of voice user interfaces and the usage of audio recording to share information and experiences are increasing dramatically. However, the performance of microphones often limits the potential of today's cutting-edge devices. Not anymore!

Infineon's XENSIV™ MEMS microphones introduce a new performance class for digital MEMS microphones that overcome existing audio chain limitations. IM69D130 is designed for applications where low self-noise (high SNR), wide dynamic range, low distortions and a high acoustic overload point are required.



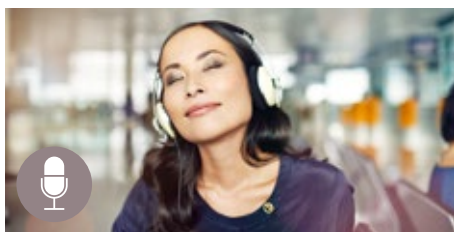
Don't miss a single thing!

With XENSIV™ MEMS microphones, you can create a new user experience benchmark in audio recording.



Talk to tomorrow and be heard!

With XENSIV™ MEMS microphones, you can define the benchmark in speech recognition for a new user experience.



Hear nothing but your favorite beats!

With XENSIV™ MEMS microphones, you can create headsets offering users a benchmark noise cancellation experience.

Features

- › 69 dB(A) signal-to-noise ratio (SNR)
- › Below 1 percent distortions at 128 dB SPL (130 dB SPL AOP)
- › Digital (PDM) interface with 6 μ s group delay at 1 kHz
- › Tight sensitivity (-36 ± 1 dB) and phase (± 2 deg) tolerances
- › 28 Hz low frequency roll-off
- › 4.0 x 3.0 x 1.2 mm package


Benefits

- › High fidelity and far field audio recording
- › Matched, noise and distortion free audio signals for advanced audio processing
- › Ultralow group delay for latency-critical applications
- › No analog components required

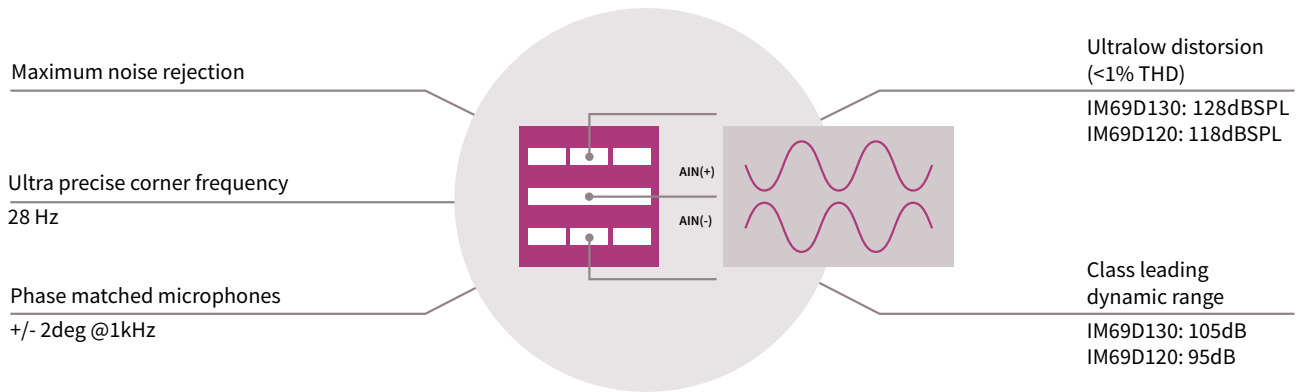
Typical applications

- › High quality audio capturing: e.g. cameras, camcorders, conference systems
- › Voice user interface: e.g. smart speaker, home automation and IoT devices
- › Active noise cancellation: headphones and earphones
- › Audio pattern detection: predictive maintenance, security or safety applications

www.infineon.com/microphones

For more details on the product, click on the part number. 

Infineon's dual backplate MEMS technology is based on a miniaturized symmetrical microphone design, similar as utilized in studio condenser microphones, and results in high linearity of the output signal within a dynamic range of 105 dB. The microphone noise floor is at 25 dB[A] (69 dB[A] SNR) and distortion does not exceed 1 percent even at sound pressure levels of 128 dB SPL (AOP 130 dB SPL). The flat frequency response (28 Hz low-frequency roll-off) and tight manufacturing tolerance result in close phase matching of the microphones, which is important for multi-microphone (array) applications.



Product portfolio

Product	OPN	Package	Current consumption	Sensitivity	Signal to noise	Supply voltage
IM69D130	IM69D130V01XTSA1	LLGA-5-1	980 µA	-36 dBFS	69 dB	1.62-3.6 V
IM69D120	IM69D120V01XTSA1	LLGA-5-1	980 µA	-26 dBFS	69 dB	1.62-3.6 V

Devices with voice user interface

TV, laptop and set top box



+ Highest beam-forming precision

Digital voice assistance and robots



+ Best speech recognition

Smart home appliances



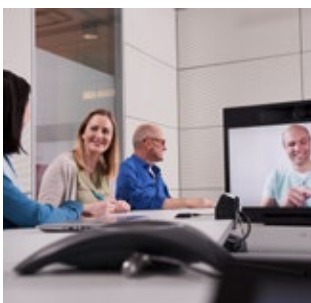
+ Extended voice pickup distance

Audio



+ Best audio quality

Conference



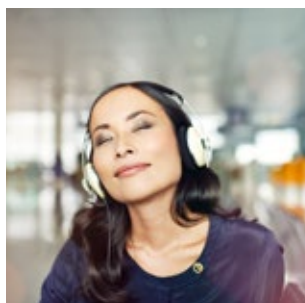
+ Ultraclear voice pickup

Security



+ Sensitive to softest audio signals

Headsets



+ Best noise attenuation

Industry 4.0



+ Smallest pattern deviation detection

XENSIV™ digital barometric pressure sensor

For mobile and wearable devices

Infineon's digital barometric pressure sensor family is the best choice for mobile and wearable devices due to its small form factor, high precision and low power consumption. Pressure sensing is based on capacitive technology which guarantees ultrahigh precision ($\pm 2/\pm 5$ cm) and relative accuracy (± 0.6 hPa) over a wide temperature range. The sensor's internal signal processor converts the output from the pressure and temperature sensor elements to 24-bit results. Each pressure sensor has been calibrated individually and contains calibration coefficients. The coefficients are used in the application to convert the measurement results to true pressure and temperature values. All sensors have a FIFO that can store the latest 32 measurements. Since the host processor can remain in a sleep mode for a longer period between readouts, a FIFO can reduce the system power consumption. Sensor measurements and calibration coefficients are available via the serial I2C/SPI interface.

DPS310

Barometric pressure sensor with very low power consumption, recommended for applications where power consumption is critical and the highest precision in pressure metering is required.

DPS422

Monolithic chip solution that has an ultrasmall critical area and a very thin package (0.73 mm typ.). Beneath high precision pressure metering, DPS422 offers also highly accurate absolute temperature sensing ($\pm 0.4^\circ\text{C}$), which is required in applications like weather stations, thermostats, etc. It can be used in applications such as weather stations/smart thermostats and offers additional features by pressure sensing (e.g. intruder detection, weather forecast).

DPS368


DPS368 offers the best-in-class resolution (± 2 cm), a very fast read-out speed and a low current consumption. The sensor can be used in harsh environment, as it is robust against water (IPx8 - 50 m under water for 1 hour), dust and humidity. The small package size saves up to 80 percent of the space and makes the DPS368 ideal for mobile applications and wearable devices.

Typical applications

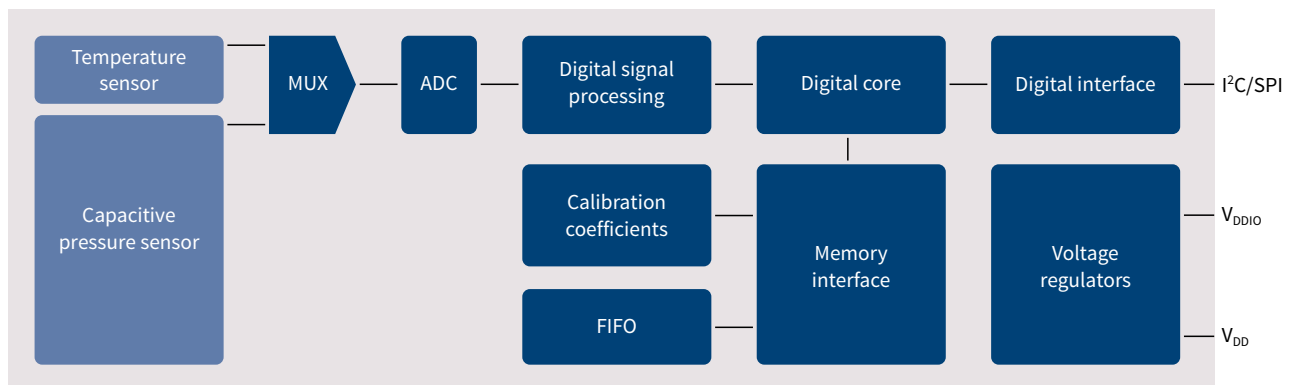
- › Drones: altitude detection and height stability
- › Health and fitness: accurate elevation gain and step counting (e.g. for smart watches)
- › Outdoor navigation: GPS start-up time/accuracy improvement; dead reckoning (e.g. in tunnels)
- › Indoor navigation: floor detection e.g. in shopping malls and parking garages
- › Smart home: micro weather forecasting; room temperature control; intruder detection
- › Air flow control: Smart filter replacement alarm (e.g. in home appliances); predictive maintenance
- › Health care: fall detection; respiratory devices; smart inhalers

Key product features	DPS310	DPS422	DPS368
Package size	LGA 8-pin: 2.0 x 2.5 x 1.0 mm	LGA 8-pin: 2.0 x 2.5 x 0.73 mm	LGA 8-pin: 2.0 x 2.5 x 1.1 mm
Operating pressure range	300 ... 1200 hPa		
Operating temperature range	-40 ... 85°C		
Pressure level precision	± 0.005 hPa (or ± 0.05 m)		± 0.002 hPa (or ± 0.02 m)
Relative accuracy	± 0.06 hPa (or ± 0.5 m)		
Absolute accuracy	± 1 hPa (or ± 8 m)		
Temperature accuracy	0.5°C	< 0.4°C	0.5°C
Pressure temperature sensitivity	0.5 Pa/K		
Measurement time	3.6 ms (low precision); 27.6 ms (standard mode)		
Average current consumption @ 1 Hz sampling rate	1.7 μA pressure measurement, 1.5 μA temp. measurement, standby 0.5 μA	1.7 μA pressure measurement, 2.0 μA temp. measurement, standby < 1 μA	1.7 μA pressure measurement, 1.5 μA temp. measurement, standby 0.5 μA
Supply voltage	V_{DDIO} : 1.2 – 3.6 V; V_{DD} : 1.7 – 3.6 V		
Operating modes	Command (manual), background (automatic), standby		
Interface	I2C and SPI, both with optional interrupt		

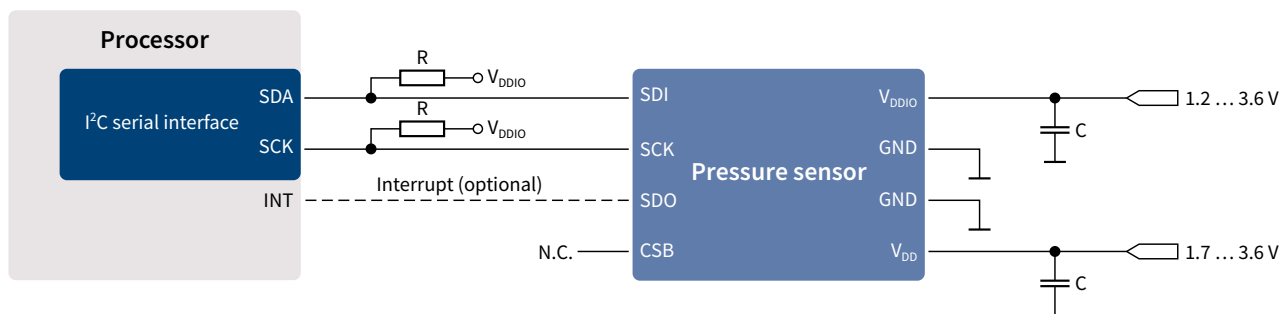
www.infineon.com/pressuresensor

For more details on the product, click on the part number. 

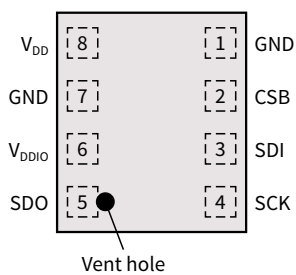
Functional block diagram



Application circuit example (in I²C configuration)



Pin configuration (top view)

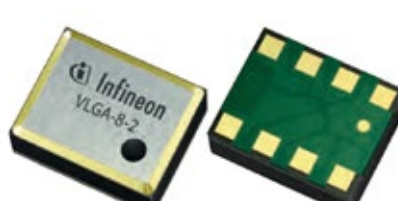


Pin	Name	Function
1	GND	Ground
2	CSB	Chip select
3	SDI	Serial data in/out
4	SCK	Serial clock
5	SDO	Serial data out
6	V _{DDIO}	Digital interface supply
7	GND	Ground
8	V _{DD}	Analog supply

DPS310 package drawing



DPS368 package drawing



DPS422 package drawing



XENSIV™ 24 GHz radar sensor ICs

Infineon offers a wide portfolio of mmWave radar sensors to address different customer requirements. The BGT24M/L family is the largest and highest integrated 24 GHz radar transceiver family currently on the market, saving ~30 percent board space compared to discrete lineups. Infineon provides a total of five 24 GHz industrial radar chips, providing a range of different transmitter and receiver channel configurations, supporting different application requirements.

Applications

- › Building and smart home (IoT)
- › Indoor/outdoor lighting
- › Security
- › UAV/multicopters
- › Robotics
- › Smart street lighting

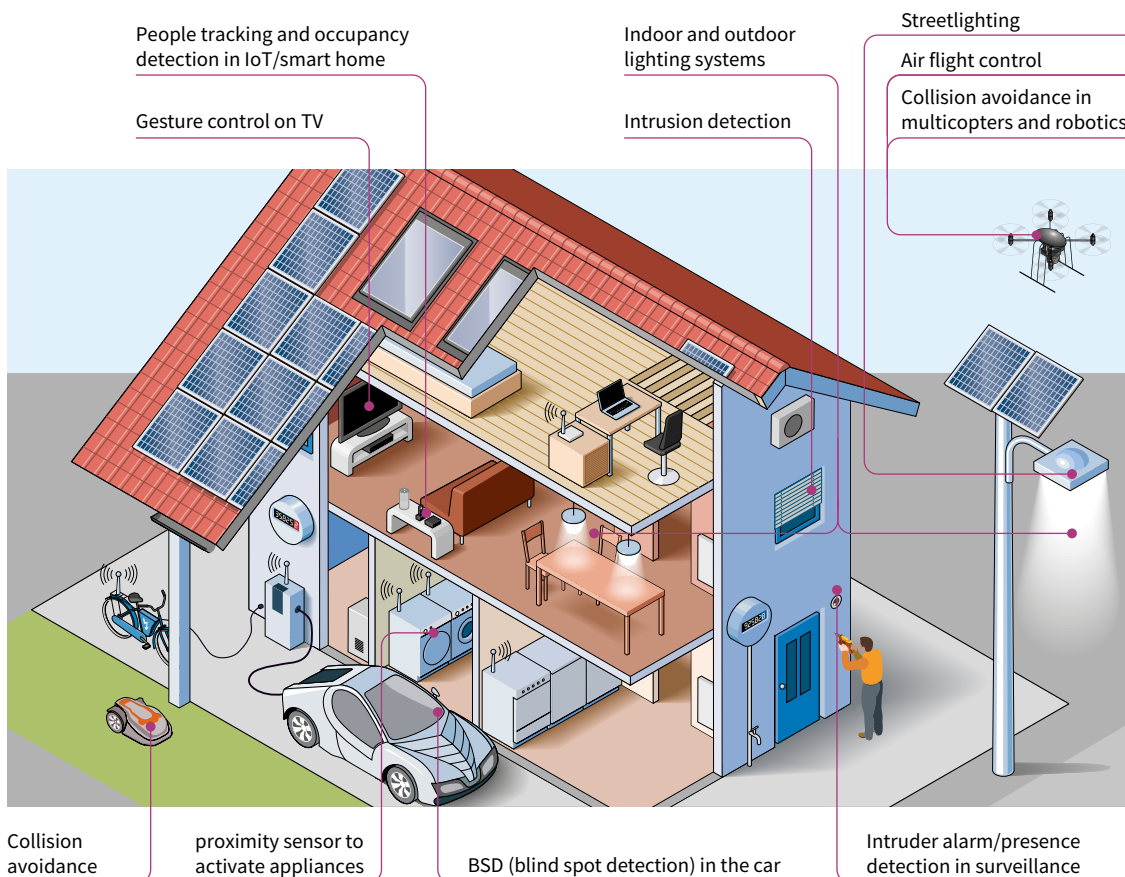


Key benefits

- › Direction, proximity and speed detection
- › Hidden mounting capability
- › Maintains operation through harsh weather conditions
- › Motion tracking
- › Sensitive enough to capture breathing and heartbeat
- › Target positioning
- › Adaptable to different application requirements

In addition to the BGT24M/L family of MMIC chips, Infineon provides a continuously expanding range of evaluation and demonstration boards to support the testing and development of radar in multiple applications. All boards are provided with base level software to support the ease of use and faster time-to-market integration.

Utilizing our strong network of partners, the radar portfolio is extended to include a range of easy-to-integrate modules. Each of them contains Infineon's 24 GHz MMIC.

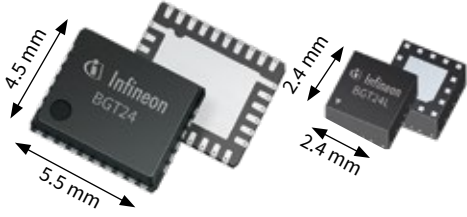


www.infineon.com/24GHz

For more details on the product, click on the part number.

Infiniteon BGT24M/L family of MMIC chips

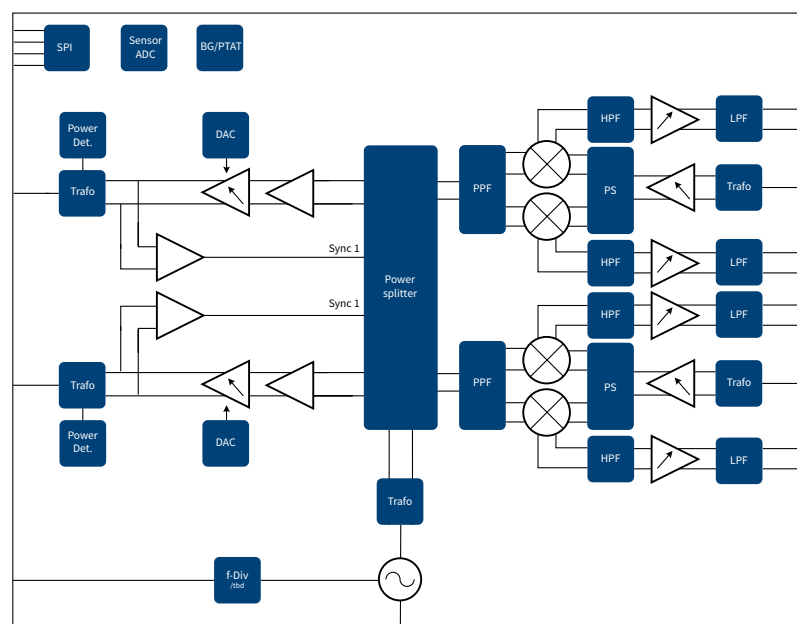
Infiniteon's range of 24 GHz industrial radar chips provides five configurations of transmit and receiver channels, ensuring that there is a chip to support your specific application. From basic applications such as motion detection in security systems, which only requires one transmit and one receive channel, to more complex applications like 3D positioning, which requires two or more receive channels, our range of radar chips supports all of your requirements.

Features	Infiniteon MMIC	Benefits
<ul style="list-style-type: none"> › 24 GHz ISM band operation for motion, speed, direction movement and distance measurements › 5 MMIC chips available › Highly integrated 		<ul style="list-style-type: none"> › Long range distance detection of moving objects up to 30 m › Wide range speed detection up to ± 100 km/h › Lower BOM costs

Product	Configuration	Features
BGT24MTR11	1Tx + 1Rx	<ul style="list-style-type: none"> › Measures not just motion, but also speed, direction, and distance › Small form factor › Resistance to moisture, dirt and temperature › Increased area coverage › Discrete design › Energy savings › Privacy protection › Adaptable to different application requirements › Highly integrated chips eliminating costly external components
BGT24MR2	2Rx	
BGT24MTR12	1Tx + 2Rx	
BGT24LTR11	1Tx + 1Rx	
BGT24LTR22	2Tx + 2Rx	

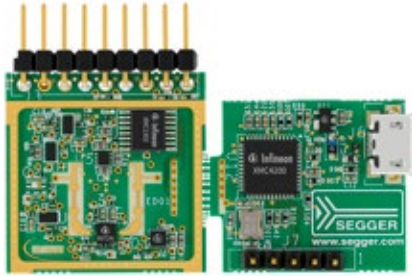
The BGT24LTR22N16 key features

- › 24 GHz transceiver MMIC
- › Fully integrated low phase noise VCO
- › Integrated analog base band stage with programmable gain and filter settings
- › Bi-directional pin for synchronization
- › Built in temperature compensation circuit for VCO stabilization, no PLL needed
- › Low power consumption
- › Fully ESD protected device
- › Single ended RF and IF terminals
- › Single supply voltage 1.5 V



24 GHz evaluation and demonstration boards

Infineon's range of 24 GHz evaluation and demo boards continues to expand to support the needs of our customers and the increasing number of innovative ways radar is being incorporated into new applications.

Features	Infineon development kit	Benefits
<ul style="list-style-type: none"> › Three system boards available › All include 24 GHz radar and XMC™ microcontroller › Kit contains user manual, GUI, MATLAB compiler and Gerber files › Software available via Infineon Toolbox 	 <p>Demokit with SW, reference design</p>	<ul style="list-style-type: none"> › Capability to detect motion, speed and direction of movement (approaching or retreating) distance and angle of arrival based on hardware › Fast prototyping with available software


Sense2GOL Pulse (BGT24LTR11 + XMC4700)	Distance2Go (BGT24MTR11 + XMC4200)	Position2Go (BGT24MTR12 + XMC4700)
<ul style="list-style-type: none"> › Capability to detect motion, speed and direction of movement (approaching or retreating) › Detection range of 18 m for human target at a power consumption < 5 mW › High sensitivity of detection in comparison to PIR › Arduino compatible microcontroller board (Arduino standard connectors) › Modulation parameters can be changed to suit the application requirements › Multiple current sensors for current consumption monitoring and optimization › Integrated multiple element patch antennas 	<ul style="list-style-type: none"> › Capability to detect distance of multiple targets › Capability to detect motion, speed and direction of movement (approaching or retreating) › Operates in harsh environments and detects through non-metallic materials › BGT24MTR11 – 24 GHz highly integrated RF MMIC › XMC4200 Arm® Cortex®-M4 – 32-bit industrial microcontroller › Debug over Cortex 10 pin debug connector › Integrated multiple element patch antennas 	<ul style="list-style-type: none"> › Capability to detect and track position of multiple targets › Capability to detect distance of multiple targets › Capability to detect motion, speed and direction of movement (approaching or retreating) › Operates in harsh environments and detects through non-metallic materials › BGT24MTR12 – 24 GHz highly integrated RF MMIC › XMC4700 Arm® Cortex®-M4 – 32-bit industrial microcontroller › Debug over Cortex 10 pin debug connector › Integrated multiple element patch antennas
Main applications <ul style="list-style-type: none"> › Security › Indoor and outdoor lighting › Smart home › Automatic door opener › Intelligent switches › Speed measurement 	Main applications <ul style="list-style-type: none"> › Drone: soft landing/obstacle avoidance › Smart toilets › Tank level sensing › Intelligent switches 	Main applications <ul style="list-style-type: none"> › Drone/robots: obstacle avoidance › Security › People tracking (IoT, smart home) › Vital sensing
Board dimensions <ul style="list-style-type: none"> › Board 55 mm x 85 mm › Shield: 55 mm x 66 mm 	Board dimensions <ul style="list-style-type: none"> › Board 36 mm x 45 mm 	Board dimensions <ul style="list-style-type: none"> › Board 50 mm x 45 mm
Kit contents <ul style="list-style-type: none"> › RF radar shield: SHIELD_BGT24LTR11 › Programmed controller board: RADAR BB XMC4700 › Micro USB cable › Corner reflector › SW GUI to operate kit › Doppler FW and SW¹⁾ › Schematic and bill-of-materials of module 	Kit contents <ul style="list-style-type: none"> › User's manual › Demonstration board › Corner reflector › SW GUI to operate kit › FMCW FW and SW¹⁾ › Doppler FW and SW¹⁾ › Schematic and bill-of-materials of module 	Kit contents <ul style="list-style-type: none"> › User's manual › Demonstration board › Corner reflector › SW GUI to operate kit › FMCW FW and SW › Doppler FW and SW › Schematic and bill-of-materials of module

Learn radar with Infineon on www.infineon.com/MakeRadar

For the first time we bring radar to makers and developers. Here you can test, develop, and learn radar and its applications. At www.infineon.com/makeradar, you will see how simple it has become to work with ultrasmall radar sensors. The board and data will flow to your browser for testing, and this is not all, if you want to take the next step just take the available Arduino code examples and start your own project.

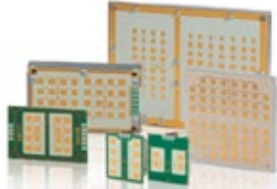
www.infineon.com/24GHz

1) Usage of the FMCW and/or Doppler FW and SW requires agreeing to Infineon's user's agreement and licensing terms.

For more details on the product, click on the part number. 

24 GHz modules

Partnering with the leading radar solution providers enables Infineon to connect our customers looking for turnkey solutions and design support for a complete range of applications.

Features	Partner modules using Infineon chips	Benefits
<ul style="list-style-type: none"> Complete module, including radar MMIC, antenna options, MCU signal processing options, and SW options (Doppler, FSK and FMCW versions available) 	 <p>Module (RF module; RF module + MCU including SW)</p>	<ul style="list-style-type: none"> Ease of design Turnkey solution, no need for test and certification

By integrating Infineon's 24GHz MMIC chip into the partners easy-to-use and simple-to-integrate modules the complexity and time to market for a range of applications such as home automation, multicopter, robotics and street lighting, are reduced.



New application or simple PIR replacement? Radar has it covered.

Radar, used in motion detection applications, increases accuracy when compared to passive infrared (PIR) technology, allowing a more precise measurement of object detection, and providing new capabilities such as the detection of speed and the direction of moving objects. Radar is also superior to camera-based systems by allowing detection of the objects while keeping identities anonymous.

Visit the link below to view our network of partners who provide modules and design support for all 24GHz industrial applications: www.infineon.com/24GHzpartners

Shield2Go

Infineon's Shield2Go boards offer a unique customer and evaluation experience – the boards are equipped with one Infineon IC and come with a ready-to-use Arduino library. Customers can now develop their own system solutions by combining 2GO boards together with Infineon MyIoT adapters. MyIoT adapters are gateways to external hardware solutions like Arduino and Raspberry PI, which are popular IoT hardware platforms. All this enables the fastest evaluation and development of the IoT system.

Security



OPTIGA™ Trust E Security Shield2Go

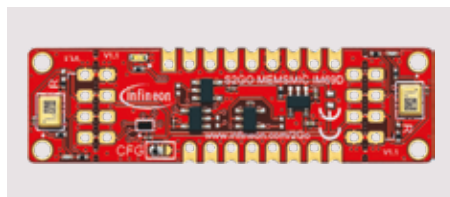
Product name: S2GO_Security_OPTIGA_E
SP: SP001820138



OPTIGA™ Trust X Security Shield2Go

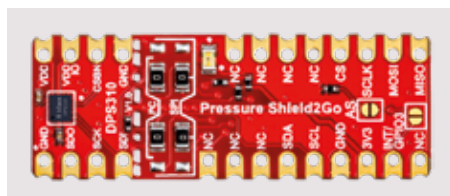
Product name: S2GO SECURITY OPTIGA X
SP: SP002349576

Sensors



IM69D130 Microphone Shield2Go

Product name: S2GO MEMSMIC IM69D
SP: SP002851544



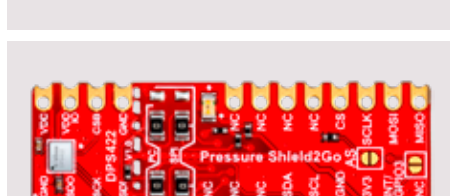
S2GO Pressure Sensor DPS310

Product name: S2GO_PRESSURE_DPS310
SP: SP001777630



S2GO Pressure Sensor DPS368

Product name: S2GO PRESSURE DPS368
Featured product: XENSIV™ pressure sensor DPS368
OPN: S2GOPRESSUREDPS368TOBO1



S2GO Pressure Sensor DPS422

Product name: S2GO PRESSURE DPS422
Featured product: XENSIV™ pressure sensor DPS422
OPN: S2GOPRESSUREDPS422TOBO1

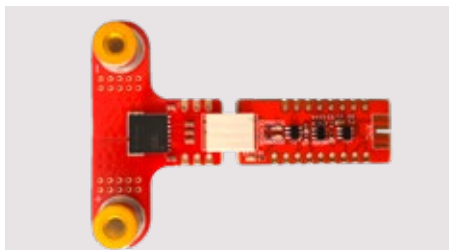


TLI4970 Current Sense Shield2Go

Product name: S2GO_CUR-SENSE_TLI4970
SP: SP001823682

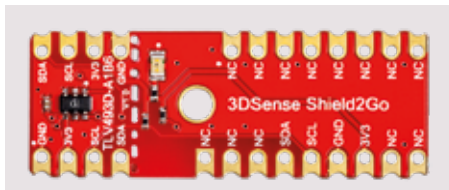
Shield2Go

Sensors



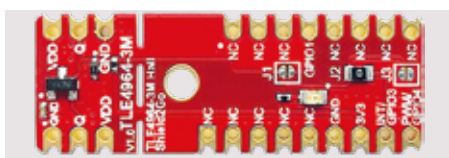
TLI4971 Current Sense Shield2Go

Product name: S2GO_CUR-SENSE_TLI4971
SP: SP005345472



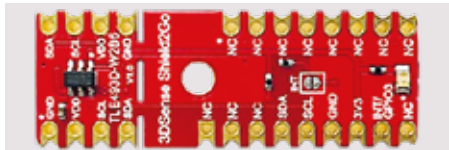
TLV493D 3DSense Shield2Go

Product name: S2GO_3D-SENSE_TLV493D
SP: SP001823678



TLE4964-3M Hall Sense Shield2Go

Product name: S2GO_HALL_TLE4964-3M
SP: SP004308590



TLE493DW2B6 3DSense Shield2Go

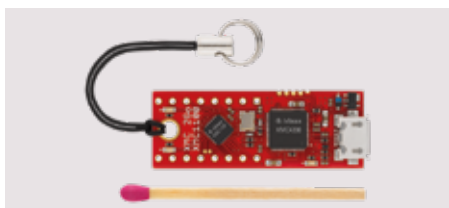
Product name: S2GO_3D_TLE493DW2B6-A0
SP: SP004308594



TLE4966K Double Hall Shield2Go

Product name: S2GO_2_HALL_TLE4966K
SP: SP004308598

Microcontroller



XMC 2Go Kit

Product name: KIT_XMC_2GO_XMC1100_V1
SP: SP001199544

MyIoT – Adapter




MyIoT Adapter

Sales name: MYIOTADAPTERTOB01
SP: SP002434972

Infineon's 2Go boards offer a unique customer and evaluation experience – the boards are equipped with one Infineon IC and come with a ready-to-use Arduino library. Customers can now develop their own system solutions by combining 2Go boards together with Infineon MyIoT adapters.

MyIoT adapters are gateways to external hardware solutions like Arduino and Raspberry PI, which are popular IoT hardware platforms. All this enables the fastest evaluation and development of IoT system.

www.infineon.com/s2go-myiot

For more details on the product, click on the part number. 

Sensor 2GO kits

Infineon's XENSIV™ sensor 2GO kits are budget-priced evaluation boards that are already equipped with a sensor combined with an Arm® Cortex®-M0 CPU. The sensor 2GO kits provide a complete set of on-board

devices, including an on-board debugger. Build your own application and gadget with the sensor 2GO kits. Our 2GO kits are ready-to-use plug-and-play boards.



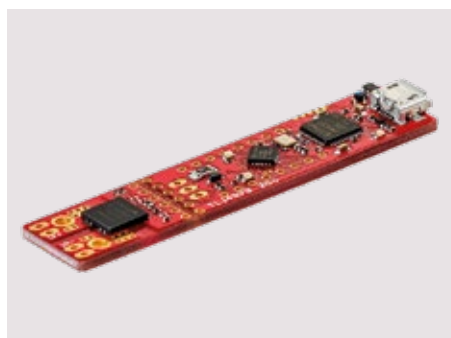
3D Magnetic Sensor 2GO kit

Product name: TLE493D-A2B6 MS2GO/TLE493D-W2B6 MS2GO/
TLV493D-A1B6 MS2GO

SP: SP001707582/ SP001707578/
SP001707574

Features

- › We offer three different derivatives
 - TLE493D-A2B6 (three dimensional magnetic sensor)
 - TLE493D-W2B6 (three dimensional magnetic sensor)
 - TLV493D-A1B6 (three dimensional magnetic sensor)
- › XMC1100 (Arm® Cortex™-M0 based)
- › On-board J-Link Lite Debugger (Realized with XMC4200 Microcontroller)
- › Power over USB (Micro USB), ESD and reverse current protection
- › GUI for free download



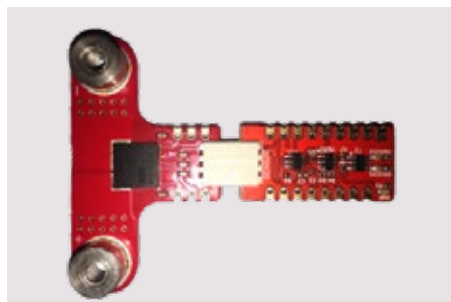
TLI4970 current sensor 2GO kit

Product name: TLI4970050 MS2GO

SP: SP003119148

Features

- › TLI4970-D050T4 (current sensor with digital interface)
- › XMC1100 (Arm® Cortex™-M0 based)
- › On-board J-link lite debugger (realized with XMC4200 microcontroller)
- › Power over USB (micro USB), ESD and reverse current protection
- › GUI for free download



TLI4971 Current Sensor 2GO kit

Product name: TLI4971_MS2GO

SP: SP00534547

Features

- › XENSIV™ magnetic current sensor TLI4971-A120T
- › Sensor board for high current capability (≤20 A)
- › Complete evaluation set including control and debug
- › First measurements possible within minutes



Speed Sensor 2GO kit

Product name: TLE4922 Speed-2-Go-Kit

SP: SP001624692

Features

- › Budget-priced evaluation board for speed sensing
- › Complete speed sensor incl. back-bias magnet, fixing and cable
- › TLE4922 (active mono cell Hall sensor)
- › XMC1100 (Arm® Cortex™-M0 based)
- › On-board J-Link Lite Debugger (realized with XMC4200 microcontroller)
- › Power over USB (Micro USB), ESD and reverse current protection
- › GUI based tool for real in-application evaluation for free download

Sensor 2GO kits



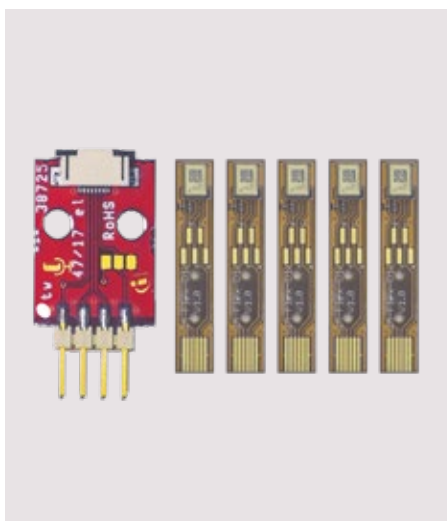
Angle Sensor 2GO kit

Product name: TLE5012B_E1000_MS2GO/TLI5012B_E1000_MS2GO/
TLE5012B_E5000_MS2GO/TLE5012B_E9000_MS2GO

SP: SP002133956/SP002133960/SP002133964/SP002133968

Features

- > Budget-priced evaluation board for angle and position sensing
- > We offer three four derivatives:
 - TLE5012B E1000 version: automotive predefined variant with SSC and IIF communication protocols
 - TLE5012B E5000 version: automotive predefined variant with SSC and PWM communication protocols
 - TLE5012B E9000 version: automotive predefined variant with SSC and SPC communication protocols
 - TLI5012B E1000 version: industrial predefined variant with SSC and IIF communication protocols
- > TLE5012B/TLI5012B GMR digital angle sensor
- > XMC1100 (Arm® Cortex™-M0 based)
- > On-board J-Link Lite Debugger (realized with XMC4200 microcontroller)
- > The kit is compatible with the angle rotate knob for fast evaluation
- > GUI based tool for real in-application evaluation for free download



MEMS 2Go

Product name: EVAL_IM69D130_FLEXKIT

SP: SP002153022

The flex evaluation kit allows simple and easy evaluation of XENSIV™ MEMS microphone IM69D130. The flex board can be easily connected to audio testing setup. The evaluation kit includes five IM69D130 mounted on flex board and one adapter board.

Features

- > Quick and easy evaluation of XENSIV™ MEMS microphones
- > Flex dimensions: 25 x 4.5 mm
- > Adapter dimensions: 20 x 15 mm

Add ons for Sensor 2GO kits and Shield2Go



Joystick for all 3D magnetic sensor 2GO kits and Shield2Go

Product name: JOYSTICK FOR 3D 2 GO KIT

SP: SP001491834

Features

- › Easy mounting on all 3D magnetic sensor 2GO kits and Shield2Go
- › First magnetic joystick measurements within minute



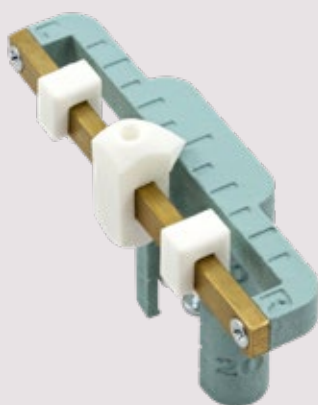
Rotate knob for all 3D magnetic sensor 2GO kits, angle sensor 2GO kits and 3D magnetic sensor Shield2Go

Product name: ROTATE KNOB 3D 2 GO KIT

SP: SP001504602

Features

- › Easy mounting on all 3D magnetic and angle sensor 2GO kits as well as 3D magnetic sensor Shield2Go
- › Rotate knob with magnet as used in control elements and push buttons
- › Use cases 3D magnetic sensors: rotational and vertical movements of control elements and push buttons
- › Use cases angle sensors: simulates rotational movements for angle measurements



Linear slider for all 3D magnetic sensor 2GO kits and Shield2Go

Product name: LINEAR-SLIDER 2GO

SP: SP002043034

Features

- › Easy mounting on all 3D magnetic sensor 2GO kits and Shield2Go
- › First magnetic linear evaluations within minutes
- › Use case: linear movements
- › Linear slider with magnet – flexible setup: adaptable air-gaps, two different magnetic strengths/materials and distance limiters



Out of shaft adapter for all 3D magnetic sensor 2GO kits and Shield2Go

Product name: OUT OF SHAFT FOR 3D 2 GO

SP: SP003475178

Features

- › Easy mounting on all 3D magnetic sensor 2GO kits and Shield2Go
- › Use case: angle measurement in out of shaft configuration with 3D Hall sensor
- › Three different out of shaft configurations possible (x-z, y-z and x-y axis)
- › Magnetic rotation bar with ring magnet included

Add ons for Sensor 2GO kits and Shield2Go



Linear control trigger for all 3D magnetic sensor 2GO Kits and Shield2Go

Product name: POWER_DRILL2GO

Features

- › Easy mounting on all 3D magnetic sensor 2GO Kits and Shield2Go
- › Use case: control trigger for e.g. power drill (linear position measurements with 3D Hall sensor)
- › Magnetic slider with magnet included



Human machine interface (HMI) direction indicator for all 3D magnetic sensor 2GO Kits and Shield2Go

Product name: DIR_INDICATOR2GO

Features

- › Easy mounting on all 3D magnetic sensor 2GO Kits and Shield2Go
- › Use case: human-machine interface (3x3 position matrix) for e.g. automotive direction indicator
- › Magnetic direction indicator with magnet included in handle bar



HMI mini control with 4 directions and 360° rotation for all 3D magnetic sensor 2GO Kits and Shield2Go

Product name: MINI_CONTROL2GO

Features

- › Easy mounting on all 3D magnetic sensor 2GO Kits and Shield2Go
- › Use case: left/right/forward and backward including 360° rotation at all positions
- › Control element includes magnet



Infineon support for sensors

Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/sensors

www.infineon.com/microphones

www.infineon.com/magnetic-sensors

www.infineon.com/current-sensor

www.infineon.com/hall-switches

www.infineon.com/angle-sensors

www.infineon.com/3dmagnetic

www.infineon.com/pressuresensor

www.infineon.com/24GHz

www.infineon.com/pressure

2GO evaluation kits

www.infineon.com/sensors2go

Online simulation tools

www.infineon.com/cms/en/product/sensor/#!simulation



A person wearing a white lab coat and blue gloves is working on a circuit board. The background is a blurred laboratory setting with warm lighting. A white geometric shape, resembling a triangle, is overlaid on the bottom right of the image.

Packages

- › Surface mount device (SMD) technology
- › Through-hole device (THD) technology




Packages


































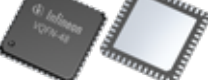

Surface mount device (SMD) technology

DPAK (TO-252-2)		DPAK (TO-252)		DPAK 5-pin (TO-252)		HDSOP-10-1		HDSOP-22-1		D ² PAK (TO-263)										
2	9.9 × 6.5 × 2.3	3	9.9 × 6.5 × 2.3	5	9.9 × 6.5 × 2.3	10	20.96 × 6.5 × 2.3	22	20.96 × 15.0 × 2.3	3	15.0 × 10.0 × 4.4									
																				
D ² PAK (TO-263-2)		TO263-7-11		TO263-7-12		TO263-7-13		D ² PAK 7-pin (TO-263)		TO-Leadless (TOLL)										
2	15.0 × 10.0 × 4.4	7	15.0 × 10.0 × 4.4	7	15.0 × 10.0 × 4.4	7	15.0 × 10.0 × 4.4	7	15.0 × 10.0 × 4.4	8	11.68 × 9.9 × 2.3									
																				
SC59		SOT-23		SOT-23-5		SOT-23-6		SOT-89		SOT-223										
3	3.0 × 2.8 × 1.1	3	2.9 × 2.4 × 1.0	5	2.9 × 1.6 × 1.3	6	2.9 × 1.6 × 1.3	3	4.5 × 4.0 × 1.5	4	6.5 × 7.0 × 1.6									
																				
SOT223-3-1		SOT-323		SOT-363		TSOP6		PQFN 2x2		PQFN 2x2 dual										
3	6.5 × 7.0 × 1.6	3	2.0 × 2.1 × 0.9	6	2.0 × 2.1 × 0.9	6	2.9 × 2.5 × 1.1	6	2.0 × 2.0 × 0.9	6	2.0 × 2.0 × 0.9									
																				
PQFN 3.3x3.3		SuperSOT8		SuperSOT8 dual		SuperSOT8 fused leads		TDSO8-8-47		TDSO8-10-2										
8	3.3 × 3.3 × 1.0	8	5.15 × 6.15 × 1.0	8	5.15 × 6.15 × 1.0	8	5.15 × 6.15 × 1.0	8	5.15 × 6.15 × 1.0	10	3.0 × 3.0 × 0.9									
																				
TDSO8-10-7		TDSO8-8-25 fused leads		TISON-8		TISON-8 (power stage 5x6)		TISON-8-4 (Power Block)		TSON-8-1										
10	3.0 × 3.0 × 0.9	8	3.3 × 3.3 × 1.0	8	7.0 × 7.0 × 1.0	8	5.0 × 6.0 × 1.0	8	5.0 × 6.0 × 1.0	8	3.0 × 3.0 × 1.0									
																				
TSON-8-3		ThinPAK 5x6 (TSON-8)		TSON-10		TSNP-6-13		ThinPAK 8x8 (VSON-4)		VDSO8-8										
8	5.0 × 6.0 × 1.0	8	5.0 × 5.0 × 1.0	10	3.3 × 3.3 × 1.0	6	1.5 × 1 × 0.375	4	8.0 × 8.0 × 1.0	8	4.0 × 4.0 × 0.9									
																				
WSO8-6-1		WSO8-8-3		WSO8-10		DirectFET™ Small Can		DirectFET™ Medium Can		DirectFET™ Large Can										
6	3 × 3 × 0.75	8	3 × 3 × 0.75	10	4.0 × 4.0 × 0.8	V	4.8 × 3.8 × 0.65	V	6.3 × 4.9 × 0.65	V	9.1 × 6.98 × 0.71									
																				
Package (JEITA-code)																				
X	L x W x H																			
 pin-count V = Variable number of pins																				
All dimensions in mm																				

All products are RoHS Compliant.


www.infineon.com/packages

 For more details on the product,
click on the part number. 


IQFN-27-2		IQFN-30 (DrMOS 4x4)		IQFN-31 (DrMOS 5x5)		IQFN-36		IQFN-39		IQFN-40	
27	3.3 x 6.0 x 0.9	30	4.0 x 4.0 x 1.0	31	5.0 x 5.0 x 0.8	36	7.5 x 6.0 x 0.9	39	5.0 x 6.0 x 0.9	40	6.0 x 6.0 x 0.8
											
SO-8/SO-8 dual		SO-16/12		SO-14		SO-16		SO-18		DSO-12	
8	5.0 x 6.0 x 1.75	12	10.0 x 6.0 x 1.75	14	8.75 x 6.0 x 1.75	16	10.0 x 6.0 x 1.75	18	12.8 x 10.3 x 2.65	12	10.3 x 7.8 x 2.6 (max)
											
DSO-16-30 (300 mil)		DSO-24		SSOP-24		TDSO-16		SO-19		SO-20	
16	10.3 x 7.5 x 2.35	24	10.5 x 15.6 x 2.65 (max)	24	6 x 8.65 x 1.75 (max)	16	5.0 x 6.0 x 1.2	19	12.8 x 10.3 x 2.65	20	12.8 x 10.3 x 2.65
											
DSO-28		SO-36		TSSOP-28		TSSOP-48		LFBGA-516-5		LFBGA-292-6	
28	18.1 x 10.3 x 2.65	36	15.9 x 11.0 x 3.5	28	9.7 x 6.4 x 1.2	48	12.5 x 6.1 x 1.1	516	25.3 x 25.3 x 2.8	292	17.3 x 17.3 x 2.35
											
BGA-416-26		TFLGA-13-1		LQFP-176-22		LQFP-144-22		TQFP-144-27		TQFP-100-23	
416	27.3 x 27.3 x 3.2	13	5 x 5 x 0.96	176	26.7 x 26.7 x 2.1	144	22.4 x 22.4 x 2.2	144	18.7 x 18.7 x 1.6	100	14.5 x 14.5 x 1.5
											
TQFP-80-7		VQFN-40-13		VQFN-48-60		VQFN-48-78 (LTI)		VQFN-56-5/-6		Package (JEITA-code)	
80	12.6 x 12.6 x 1.5	40	5 x 5 x 0.85	48	6 x 6 x 0.85	48	7 x 7 x 0.85	56	7 x 7 x 0.9	X	L x W x H
										I pin-count V = Variable number of pins All dimensions in mm	

Through-hole device (THD) technology

IPAK (TO251)		IPAK SL (TO251 SL)		I ² PAK (TO262)		TO220 real 2-pin		TO220 2-pin		TO220 3-pin	
3	15.5 x 6.5 x 2.3	3	10.7 x 6.5 x 2.3	3	25.1 x 10 x 4.4	2	29.15 x 10.0 x 4.4	2	29.1 x 9.9 x 4.4	3	29.15 x 10.0 x 4.4
											
TO220 FullPAK		TO220 FullPAK Narrow Lead		TO220 FullPAK Wide Creepage		TO220-6-46		TO220-6-47		TO-247	
3	29.6 x 10.5 x 4.7	3	29.6 x 10.5 x 4.7	3	28.85 x 11 x 4.7	6	21.7 x 9.9 x 4.4	6	26.1 x 9.9 x 4.4	3	40.15 x 15.9 x 5.0
											
TO-247-3-AI		TO-247 4-pin		DIP-7		DIP-8		DIP-14		DIP-20	
3	41.3 x 10.9 x 5.18	4	40.15 x 15.9 x 5.0	7	9.52 x 8.9 x 4.37	8	9.52 x 8.9 x 4.37	14	19.5 x 8.9 x 4.37	20	24.6 x 9.9 x 4.2
											
Super220		Super247		SSO-3-9		SSO-3-10		SSO-4-1		TO92S-3-1	
3	28.25 x 10.5 x 4.5	3	34.6 x 15.6 x 5	3	A: 3.71 x 5.34 x 1 B: 2.68 x 5.34 x 1.2	3	4.06 x 1.5 x 4.05	4	5.34 x 1.0 x 3.71	3	4.0 x 1.52 x 3.15
											
TO92S-3-2		Package (JEITA-code)									
3	4.0 x 1.52 x 3.15	X	L x W x H								
		 pin-count V = Variable number of pins All dimensions in mm									

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