

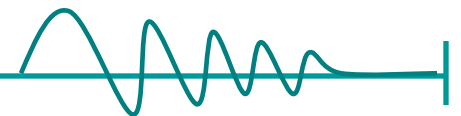


Discrete Power MOSFET Product Portfolio

IXYS Corporation

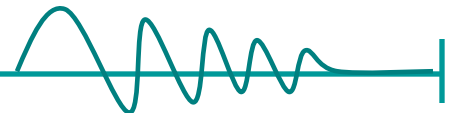
www.ixys.com

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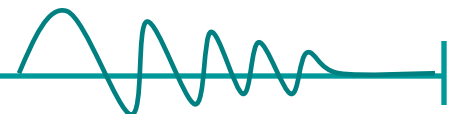
IXYS Power MOSFET Technologies

- Vertical Diffused MOS (VDMOS) Technology
- Trench-Gated Technology



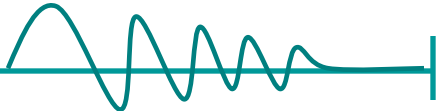
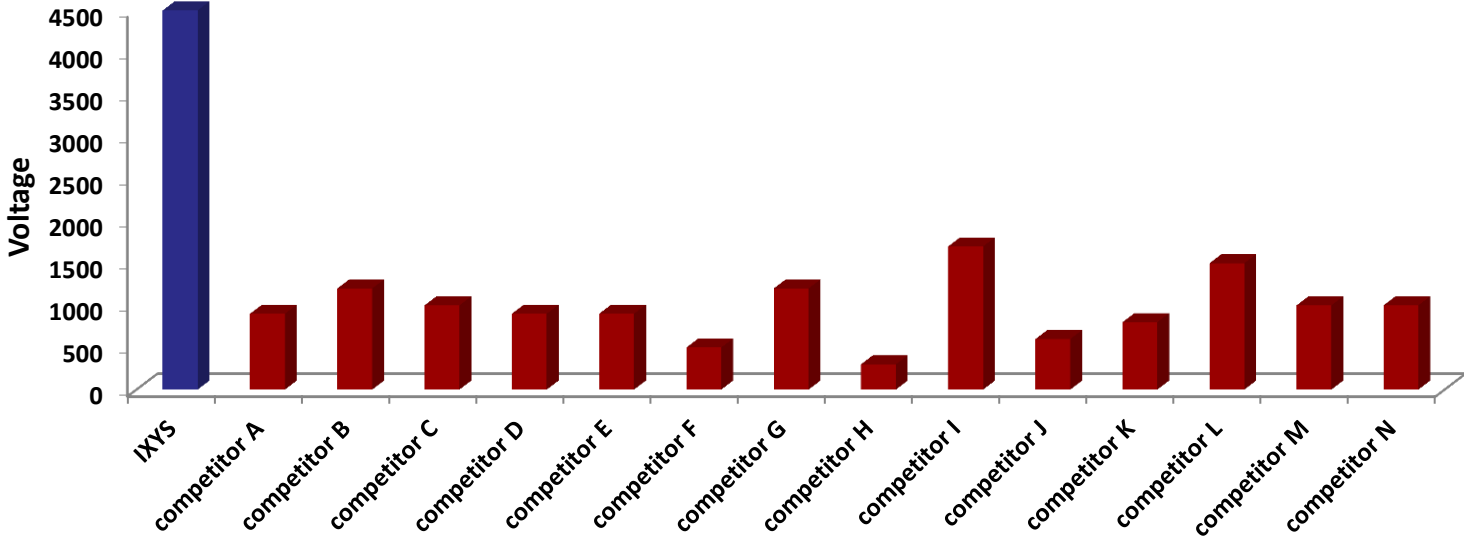
Discrete Power MOSFETs

Product Series	Voltage	Current	$R_{DS(on)}$ (max)
N-Channels			
GigaMOS™ Trench/TrenchT2™	40V - 300V	12A - 600A	1mΩ - 85mΩ
HiPerFET™ (Polar™, Q3-class)	70V - 1200V	0.7A - 340A	3mΩ - 4.5Ω
Linear with Extended FBSOAs	100V - 1500V	8A - 200A	11mΩ - 3.6Ω
Depletion mode	100V - 1700V	0.2A - 20A	64mΩ - 80Ω
Standard (high voltage, very high voltage)	55V - 4500V	0.1A - 250A	5mΩ - 750Ω
P-Channels			
TrenchP™	-50V to -200V	-10A to -210A	7.5mΩ - 0.35Ω
PolarP™	-100V to -600V	-10A to -170A	12mΩ - 1Ω
Standard	-85V to -600V	-8A to -50A	55mΩ - 1.2Ω



Competitive Landscape: discrete Power MOSFETs

- Very few to no competitors above 1700V!
- Closest competitor offers only up to 1700V



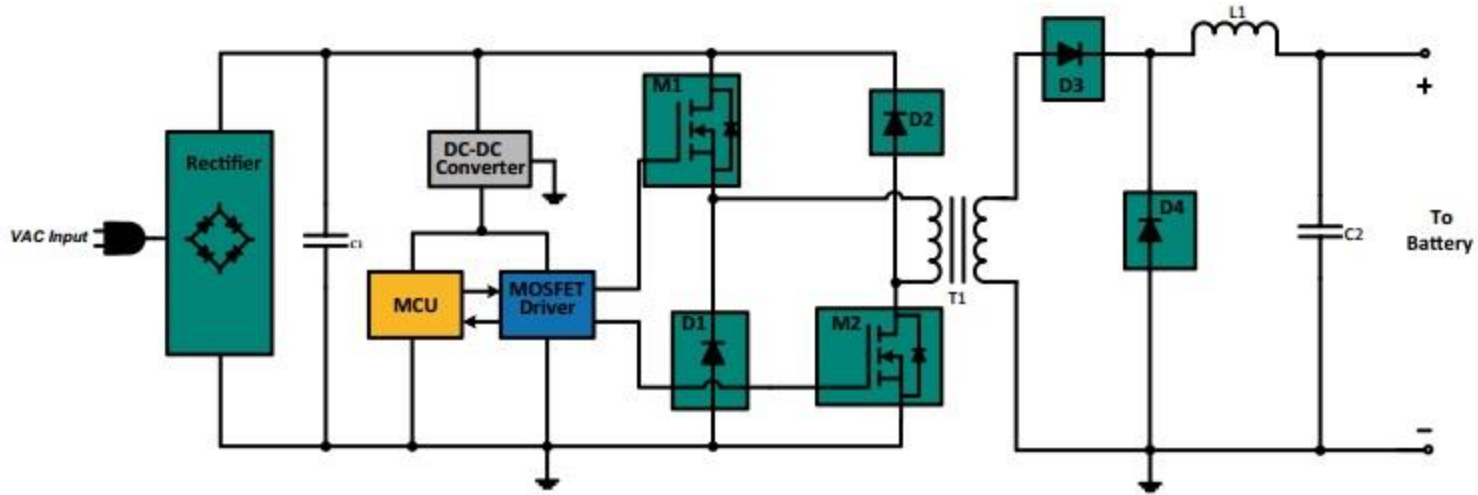
Advantages and Applications

Product Family	Advantages	Applications
GigaMOS™ Trench/TrenchT2™	High current capability Low $R_{DS(on)}$ Avalanche capability Fast intrinsic diodes	Synchronous rectification, DC-DC converters, battery chargers, SMPS, UPS, motor drives, DC choppers
Polar3™ HiPerFET™	Low $R_{DS(on)}$ Low thermal resistance Dynamic dv/dt ratings Simple drive requirements High-speed switching	Solar inverters, lamp ballasts, laser drivers, robotic and servo control, industrial machinery, medical equipment
Q3-Class HiPerFET™	Low gate charge Low $R_{DS(on)}$ High avalanche energy rating Low intrinsic gate resistance High-speed switching	Switched-mode power supplies, PFC, induction heating, arc welding, pulse generation, motor controls, E-bikes

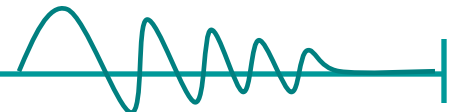
Advantages and Applications

Product Family	Advantages	Applications
LinearL2™ with extended FBSOA	High power in linear mode operation Guaranteed FBSOA at 75°C Avalanche rated Low static drain-to-source on resistance	Current sources, circuit breakers, linear regulators, soft-start applications, programmable loads
Depletion Mode D2™	'Normally-On' operation Low $R_{DS(on)}$ Linear mode tolerant Useable body diode Fast switching	Current regulation, solid-state relays, level shifting, active loads, start-up circuits
High Voltage and Very High Voltage	High blocking voltage Proprietary high-voltage ISOPLUS™ packages Up to 4500V electrical isolation (DCB) UL 94 V-0 Flammability qualified (molding epoxies)	Capacitor discharge circuits, high-voltage power supplies, pulse circuits, laser and X-ray generation systems, energy tapping applications from the power grid

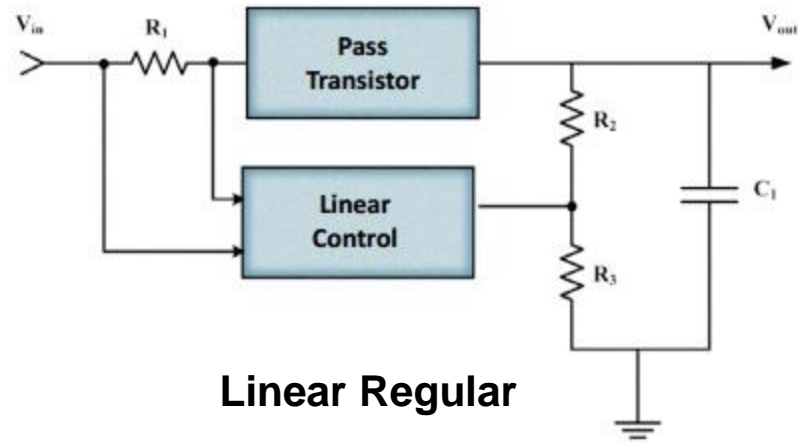
Applications – Battery Charger



- **Key Components**
 - Power MOSFETs (IXFH60N50P3)
 - Gate Driver
 - MCU



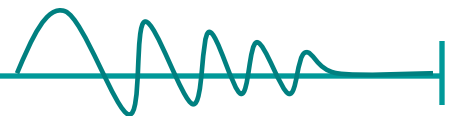
Applications – Linear Operation



- Pass Transistor: Linear Power MOSFET with extended Forward Bias Safe Operating Area (FBSOA)
- LinearL2™ Power MOSFET (IXTK60N50L2)
- Low R_{thJC} and guaranteed FBSOA at 75°C
- Other examples: Class-A amplifiers, Programmable Electronic Loads, Fan Controllers

Latest Power MOSFETs

- 500V-600V Polar3™ HiPerFETs™
- 200V-1000V Q3-Class HiPerFETs™
- 1000V/30A Q3-Class HiPerFET™ in SMPD package
- 4500V MOSFETs



TrenchT2™ Power MOSFETs

(40V - 120V / 70A - 600A)

For low-voltage, high-current power conversion systems

FEATURES

- Ultra low on-state resistance $R_{DS(on)}$
- Fast intrinsic rectifier
- Low package inductance
- 175°C operating temperature
- Avalanche rated

ADVANTAGES

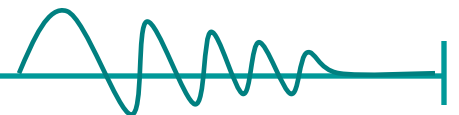
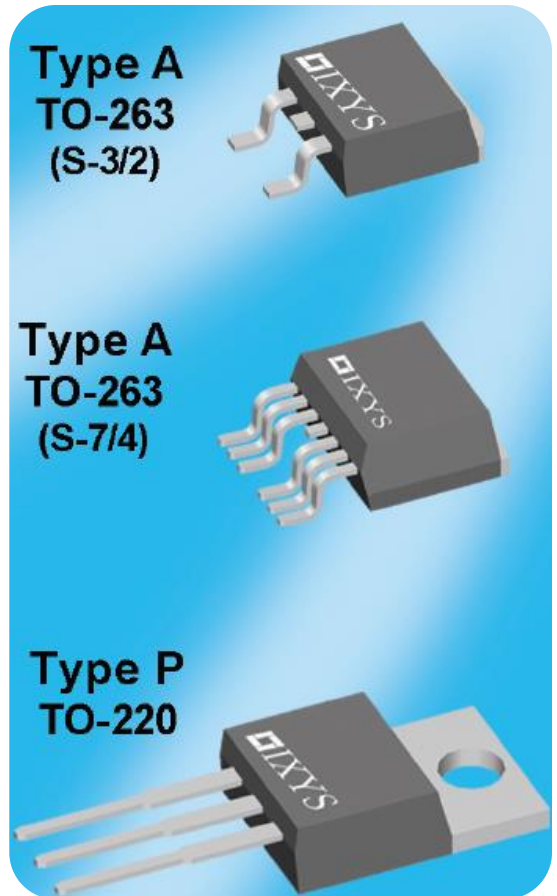
- High power density
- Space saving
- Easy to mount
- Termination is Lead-free and ROHS compliant

APPLICATIONS

- Synchronous rectification, DC-DC converters, off-line UPS, battery powered electric motors, resonant-mode power Supplies, electronic ballasts, Class-D audio amplifiers, DC motor control

IXTA90N055T2

“T2” denotes 2nd generation Trench



GigaMOS™ TrenchT2™ HiPerFET™ MOSFETs (75V - 175V / 76A - 520A)

FEATURES

- High current capability
- Low $R_{DS(on)}$ and gate charge (Q_g)
- Incorporates IXYS HiPerFET™ technology for fast power switching
- Avalanche capabilities

ADVANTAGES

- Eliminates multiple paralleled lower current rated MOSFET devices
- Improves over-all system reliability
- Capability to control more power within a smaller footprint

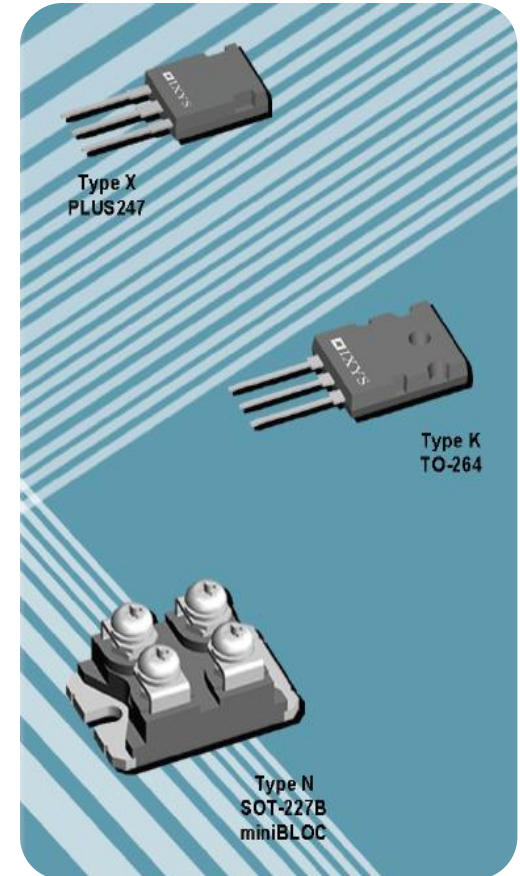
APPLICATIONS

- High-current power switching applications, DC-DC converters, battery chargers, SMPS/RMPS, DC choppers, AC motor drives, uninterruptible power supplies

IXFH150N17T2

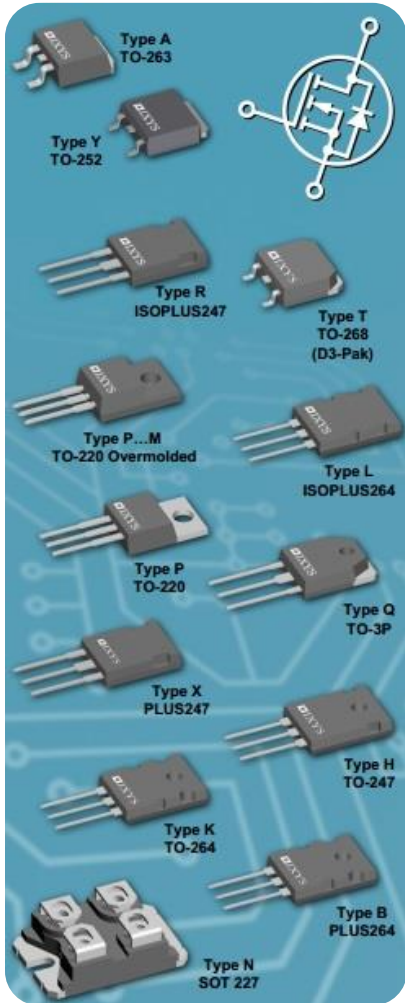
“F” denotes HiPerFET™ devices

“T2” denotes 2nd generation Trench



Polar3™ HiPerFET™ Power MOSFETs

(300V – 600V / 4A – 210A)



FEATURES

Energy efficient. Reliable.

- Low $R_{DS(on)}$ and Q_g
- Low thermal resistance R_{thJC}
- High power dissipation
- Dynamic dv/dt ratings
- Avalanche Rated

ADVANTAGES

- Simple drive requirements
- Enables high speed switching
- Reduced component count & circuit complexity
- Cooler device operation

APPLICATIONS

- SMPS/RMPS, UPS, PFC, DC-DC converters, laser drivers, battery chargers, motor drives, solar inverters, lamp ballasts, robotic and servo control

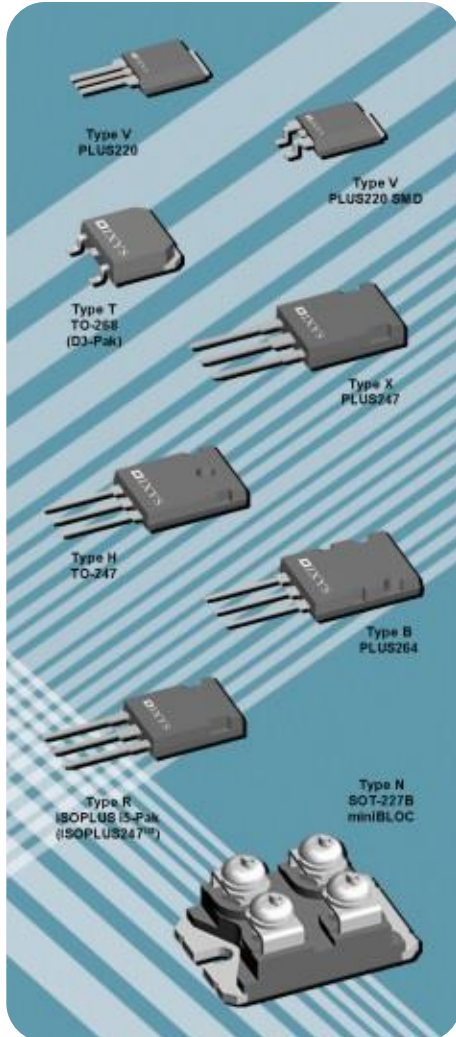
IXFH60N50P3

“F” denotes HiPerFET™

“P3” denotes 3rd Generation Polar series

900V Polar™ HiPerFET™ Power MOSFETs (10.5A – 56A)

Rugged and Fast!



FEATURES

- International standard packages
- ISOPLUS™ high performance package options (2500V electrical isolation)
- Avalanche rated
- Fast intrinsic body diodes with low Q_{rr} and t_{rr}
- Low package inductance
- Excellent ruggedness and dv/dt capability

ADVANTAGES

- High power density
- Easy to mount
- Space savings

APPLICATIONS

- Switch-mode and resonant power supplies, high-voltage lighting, industrial machinery, laser drivers, DC-DC converters, medical equipment

IXFR18N90P

“F” denotes HiPerFET™

“P” denotes Polar™ series

Q3-Class HiPerFET™ Power MOSFETs (200V – 1000V/10A – 100A)

IXYS' latest generation of double metal power MOSFETs!
Extremely fast & rugged design!

FEATURES

- Low $R_{DS(on)}$ and gate charge Q_g
- Low intrinsic gate resistance
- High avalanche energy rating
- Excellent dv/dt performance
- Fast intrinsic rectifier

ADVANTAGES

- High Power Density
- Easy to mount
- Space savings

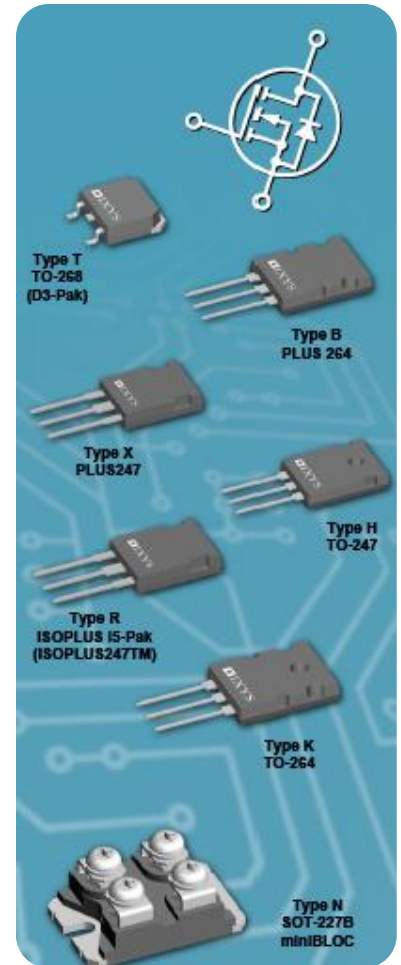
APPLICATIONS

- SMPS, PFC, solar inverters, server and telecom power systems, arc welding, induction heating, motor controls

IXFX32N100Q3

“F” denotes HiPerFET™

“Q3” denotes 3rd Generation Q-Class



LinearL2™ Power MOSFETs with Extended FBSOAs (100V – 600V / 15A – 200A)

With Extended Forward Bias Safe Operating Areas (FBSOA)!

FEATURES

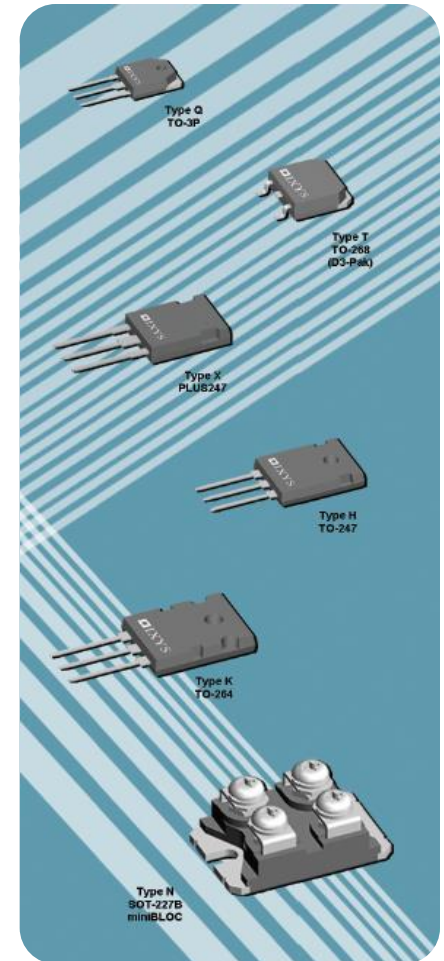
- Designed to sustain high power in linear mode operation
- Low static drain to source on-resistances
- Avalanche rated
- Guaranteed FBSOA at 75°C

ADVANTAGES

- Improved over-all system reliability
- Improved energy efficiency and performance

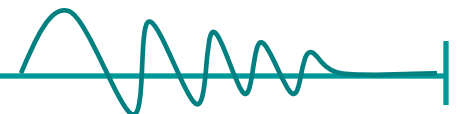
APPLICATIONS

- Current sources, circuit breaker, soft-start applications, power amplifiers, programmable loads, power regulators, motor control, power controllers



IXTH30N50L2

“L2” denotes 2nd generation linear devices



Depletion Mode D2™ Power MOSFETs (100V – 1700V / 800mA – 16A)

FEATURES

- ‘Normally-On’ Operation
- Low R_{dson}
- Fast Switching
- Linear Mode Tolerant
- Useable Body Diode
- Molding epoxies meet UL94 V-0 flammability classification

ADVANTAGES

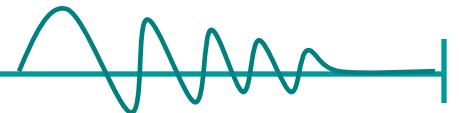
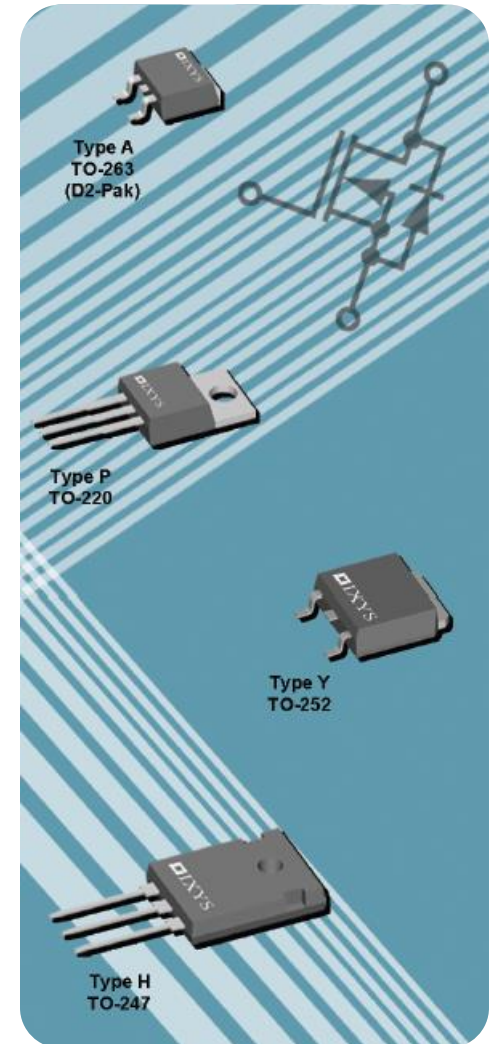
- Simplified Control
- Enables Linear Control for High Voltage Applications (500V and 1000V)
- Reduce Line Power Dissipation for High Line Input
- Ideal for zero power normally-on load switch designs
- Rugged in FBSOA

APPLICATIONS

- Current Regulation, Solid-State Relays, Level Shifting, Load Switch, Active Loads, Start-up Circuits, Power Active Filters

IXTA3N50D2

“D2” denotes Depletion-Mode D2™ MOSFET



1500V Standard Power MOSFETs

(2.5A – 20A)

FEATURES

- International standard or proprietary high-voltage packages
- Molding epoxies meet UL 94 V-0 Flammability Classification
- Fast intrinsic diode
- Low package inductance

ADVANTAGES

- Easy to mount
- Space savings
- High power density

Available in ISO TO-247, TO263,
TO-263HV, TO-247, TO-268,
TO-268HV, PLUS247, TO-264

IXTA4N150HV

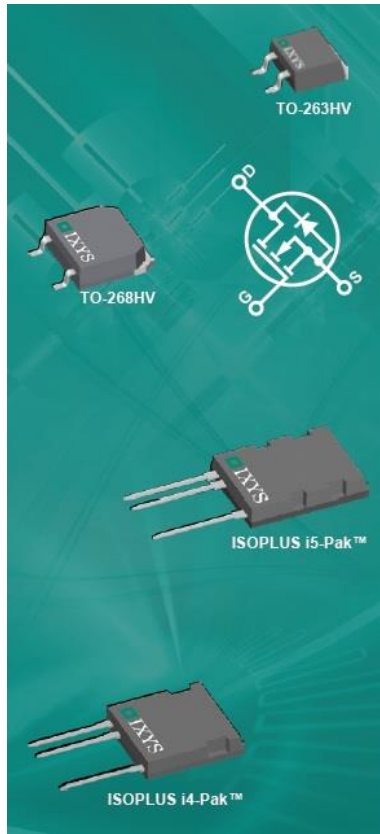
“T” denotes standard devices

“HV” denotes proprietary high-voltage package

APPLICATIONS

- High voltage power supplies, capacitor discharge applications, pulse circuits

4500V Power MOSFETs (200mA – 2A)



FEATURES

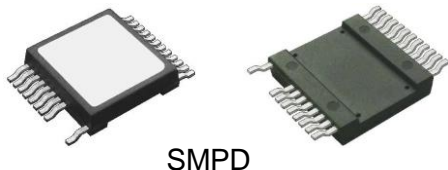
- High blocking voltage
- Proprietary high-voltage ISOPLUS™ packages
- Up to 4500V electrical isolation (DCB)
- UL 94 V-0 Flammability qualified (molding epoxies)

ADVANTAGES

- High power density
- Space savings (eliminates multiple series-connected devices)
- Easy mounting

APPLICATIONS

- Capacitor discharge circuits
- High voltage power supplies
- Pulse circuits
- Laser and X-ray generation systems
- High voltage relay disconnect circuits
- Energy tapping applications from the power grid



SMPD



P-Channel TrenchP™ Power MOSFETs

(-50V to -200V / -10A to -210A)

Type A
TO-263



Type Q
TO-3P



Type P
TO-220



Type H
TO-247



FEATURES

- International standard packages
- Fast intrinsic diode
- Avalanche Rated
- Low Q_g and $R_{DS(on)}$
- Extended FBSOA

ADVANTAGES

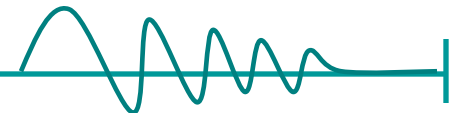
- Low gate charge resulting in simple drive requirement
- High power density
- Fast switching

APPLICATIONS

- Load switches, high side switches, DC/DC converters, high efficiency
Switching power supplies, inverters, battery chargers

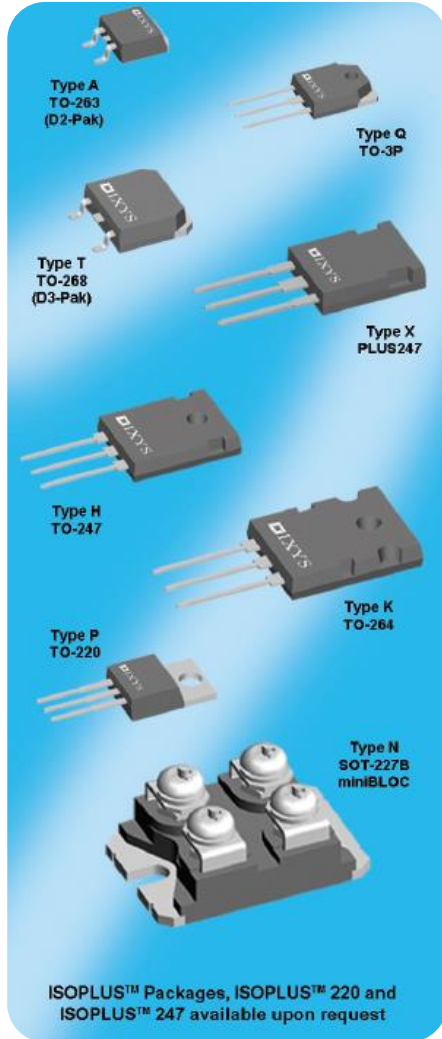
IXTA32P05T

“P” denotes P-Channel MOSFET
“T” denotes “Trench-Gated”



P-Channel PolarP™ Power MOSFETs

(-100V to -600V / -10A to -170A)



FEATURES

- Fast intrinsic diode
- Dynamic dv/dt rated
- Avalanche rated
- Rugged PolarP™ process
- Low gate charge and $R_{DS(on)}$

ADVANTAGES

- Low gate charge results in simple drive requirement
- High power density
- Fast switching
- Easy to parallel

APPLICATIONS

- High-side switching, push-pull amplifiers, DC/DC & DC/AC converters, current regulators, automatic test equipment, battery chargers

IXTN32P60P

“P” denotes P-Channel

“P” denotes Polar™

GigaMOS™ TrenchT2™ MOSFETs in SMPD Package (40V - 150V / 235A - 600A)

FEATURES

- Silicon chip on Direct Copper Bond (DCB) Substrate
- Excellent thermal transfer
- Increased temperature and power cycling capabilities
- 175°C operating Temperature
- Very high current handling capability
- Fast intrinsic diode
- Avalanche rated
- Very low $R_{DS(on)}$

SMPD Advantages:

- Ultra-low and compact package profile
- 5.3mm height x 24.8mm length x 32.3mm width
- Surface mountable via standard reflow process
- 4500V ceramic isolation (DCB)
- Very high power cycling capability
- Excellent thermal performance
- Low package weight (8g)

MMIX1T600N04T2
MMIX1T550N055T2
MMIX1F520N075T2
MMIX1F360N15T2

MMIX1F520N075T2

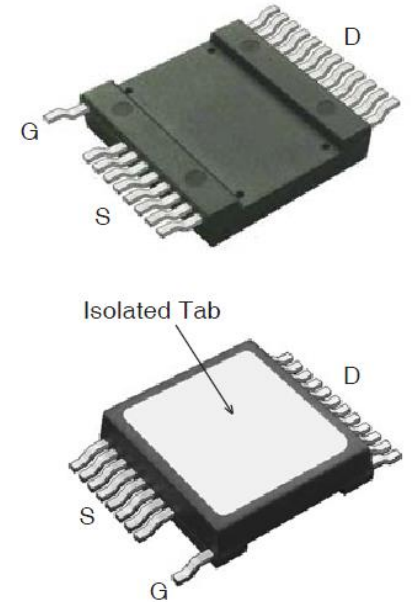
“MMIX” denotes SMPD Package

“F” denotes HiPerFET™

“T2” denotes TrenchT2™

APPLICATIONS

- DC-DC converters, off-line UPS, primary-side switch, high speed power switching applications



Q3-Class HiPerFET™ Power MOSFET in SMPD Technology (1000V, 30A)

NEW!

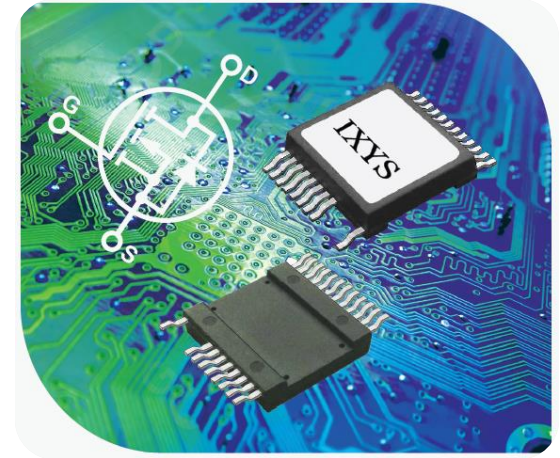
More Power, Less Package (ultra-low profile, energy efficient, and rugged)
MMIX1F44N100Q3

Features:

- Low $R_{DS(on)}$ and gate charge Q_g
- Low intrinsic gate resistance
- Fast intrinsic rectifier
- Excellent dv/dt performance
- High avalanche energy rating
- High power density

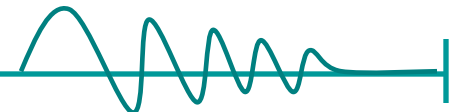
Applications:

- DC-DC converters
- Battery chargers
- Switching and resonant power supplies
- DC choppers
- Temperature and lighting controls



SMPD Advantages:

- Ultra-low and compact package profile
- 5.3mm height x 24.8mm length x 32.3mm width
- Surface mountable via standard reflow process
- 4500V ceramic isolation (DCB)
- Very high power cycling capability
- Excellent thermal performance
- Low package weight (8g)



Polar™ HiPerFET™ Power MOSFET in SMPD (1100V, 24A)

NEW!

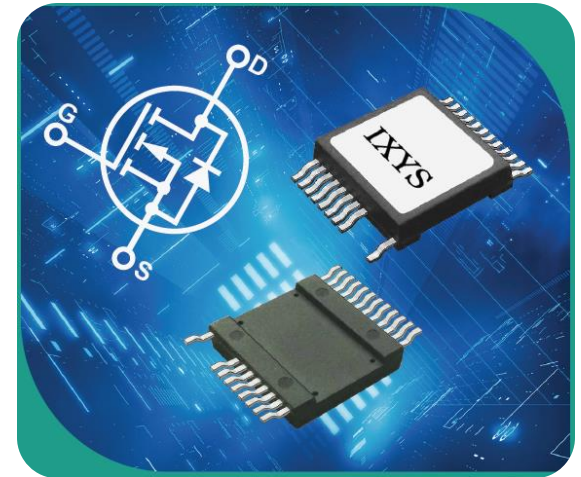
Lighter weight, more power!
MMIX1F40N110P

Features:

- Low $R_{DS(on)}$ and Q_g
- Low thermal resistance R_{thJC}
- Dynamic dv/dt ratings
- Avalanche rated
- Fast intrinsic rectifier
- Low package inductance

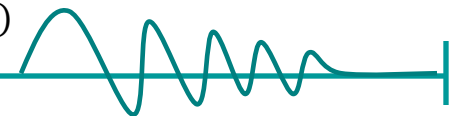
Applications:

- SMPS/RMPS
- Pulse power applications
- Discharge circuits in laser pulsers, spark igniters, RF generators
- DC-DC converters
- DC-AC inverters



SMPD Advantages:

- Ultra-low and compact package profile
- 5.3mm height x 24.8mm length x 32.3mm width
- Surface mountable via standard reflow process
- 4500V ceramic isolation (DCB)
- Very high power cycling capability
- Excellent thermal performance
- Low package weight (8g)



GigaMOS™ TrenchT2™ MOSFETs in DE475 Package (55V – 75V / 465A – 550A)

TrenchT2™ MOSFETs in the ultra-low profile DE-Series package!

FEATURES

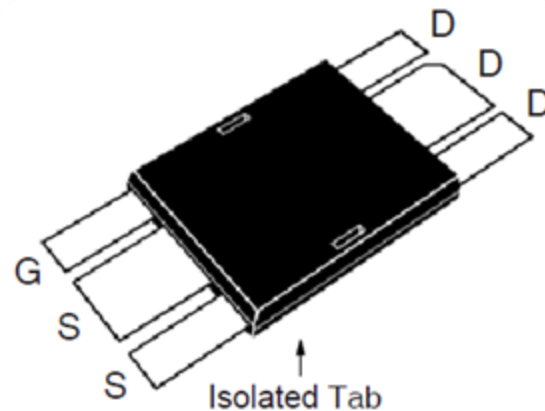
- Silicon chip on Direct-Copper Bond (DCB) Substrate
- Isolated substrate
 - excellent thermal transfer
 - increased temp and power cycling capabilities
 - high voltage isolation (2500V~)
- 175°C operating temperature
- Very high current handling capability
- Fast intrinsic diode
- Avalanche rated
- Very low $R_{DS(on)}$

ADVANTAGES

- Easy to mount, space savings, high power density

APPLICATIONS

- DC-DC converters,
- Off-line UPS,
- Primary-side switch,
- High speed power switching applications



IXT^Z550N055T²

IXF^Z520N075T²

“Z” denotes DE475 package

“F” denotes HiPerFET™ MOSFET

“T²” denotes TrenchT2™