



Discrete IGBT Product Portfolio

IXYS Corporation

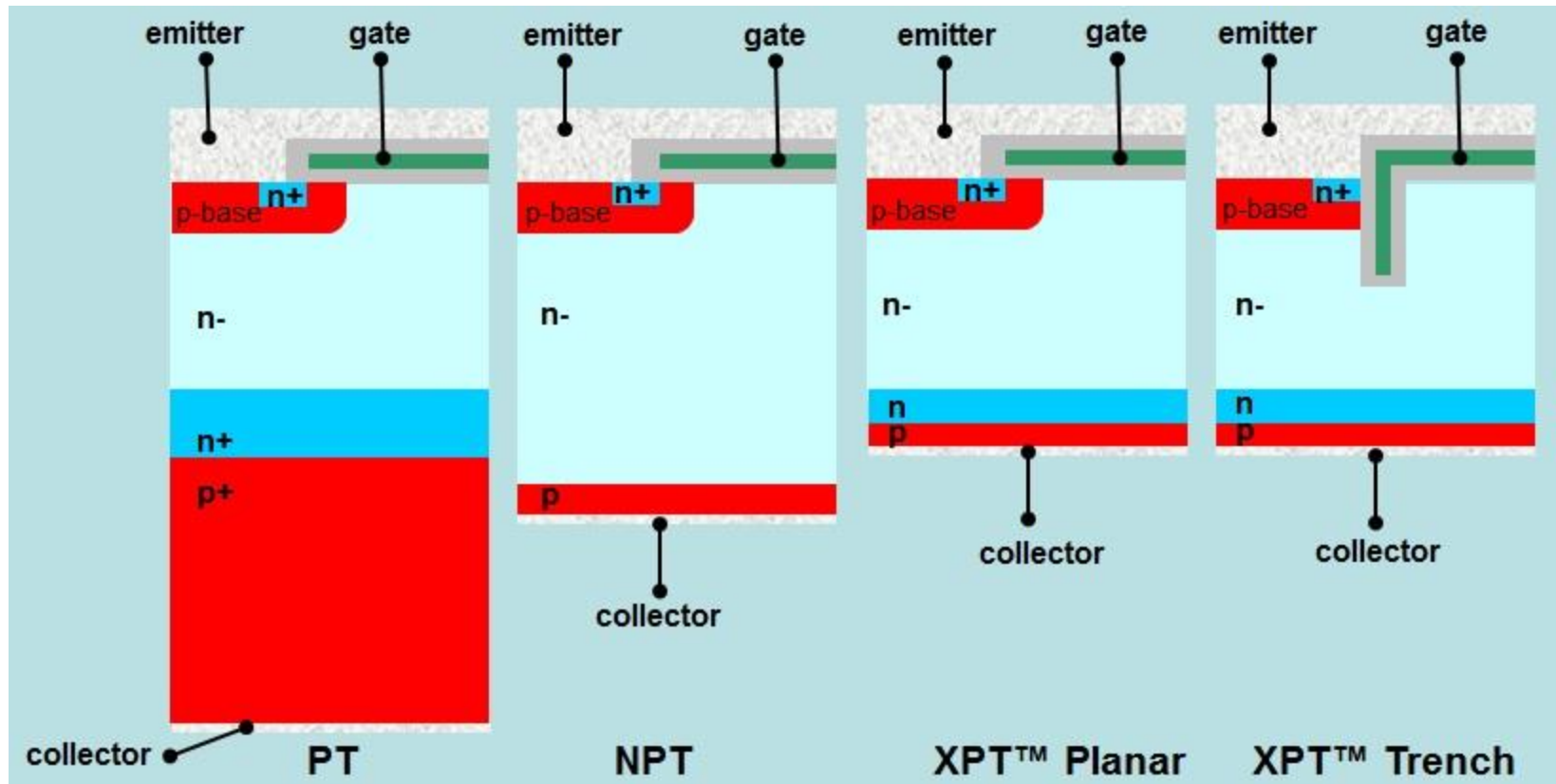
www.ixys.com

November 2013

IXYS IGBT Technologies

- Punch-Through (PT)
- Extreme-Light Punch-Through (XPT™)
- Non Punch-Through (NPT)
- Trench-Gated

IXYS IGBT Structures



IXYS Discrete IGBT Families

Product Series	Voltage (V)	Current (A)	On-state Voltage (V) at 25°C
Extreme Light Punch Through (XPT™)	600-1200	30-200	1.7-3.5
Punch Through (PT)	300-1400	20-200	1.15-5
Non Punch Through (NPT)	600-1700	6-100	2.8-7
Very High Voltage NPT	2500-4000	2-75	2.3-3.9
BiMOSFETs™	1600-3000	2-75	2.3-4.9
RIGBTs	1200	15-40	2.5-6.0

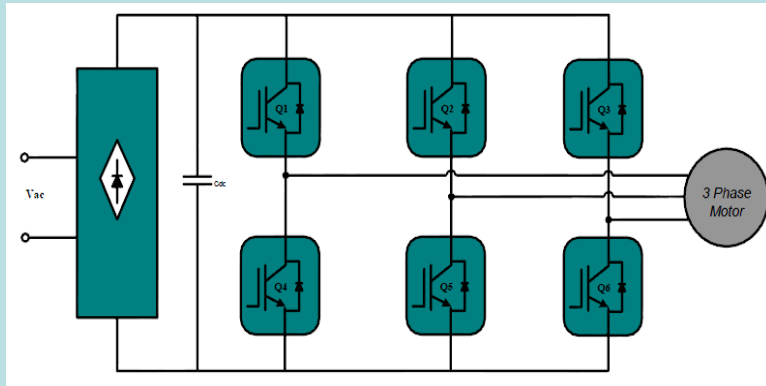
IXYS IGBT Advantages and Applications

Product Family	Advantages	Applications
Extreme Light Punch Through (XPT™)	Thin wafer technology Reduced thermal resistance Low energy losses Fast switching Low tail current High current density Positive temperature coefficient of $V_{CE(sat)}$	Battery chargers, E-bikes, motor drives, power inverters, welding machines, power factor correction circuits, switched-mode power supplies, uninterruptible power supplies
Punch Through (PT)	Optimized for low switching losses High avalanche capability Square RBSOA Anti-parallel ultra-fast diode High power density Low gate drive requirements	High frequency power inverters, motor drives, UPS, PFC circuits, battery chargers, welding machines, lamp ballasts, switched-mode power supplies
Non Punch Through (NPT)	Extremely rugged Low $V_{CE(sat)}$ High power density Optional co-packed Sonic-FRD™ diode International standard packages	Capacitor discharge and pulsed circuits, DC choppers, DC servo and robot drives, uninterruptible power supplies, switched-mode power supplies

IXYS IGBT Advantages and Applications

Product Family	Advantages	Applications
Very High Voltage NPT	High peak current capability Low on-state voltage $V_{CE(sat)}$ UL 94 V-0 Flammability qualified (molding epoxies) High power density Easy to mount Low gate drive requirements Proprietary ISOPLUS™ packages available	Switched-mode and resonant mode power supplies, capacitor discharge applications, pulsed circuits, uninterruptible power supplies
BiMOSFETs™	High blocking voltages Simple drive requirement (MOS-gate turn-on) Low conduction losses High power density Easy to mount International standard packages	Laser and X-ray generators, capacitor discharge circuits, uninterruptible power supplies, switched-mode and resonant-mode power supplies, radar systems
Reverse Blocking IGBTs	Reverse blocking capability Non Punch Through (NPT) IGBT structure Series diode monolithically integrated Positive temperature coefficient of $V_{CE(sat)}$	Current source inverters, matrix converters, bi-directional converters, induction heating

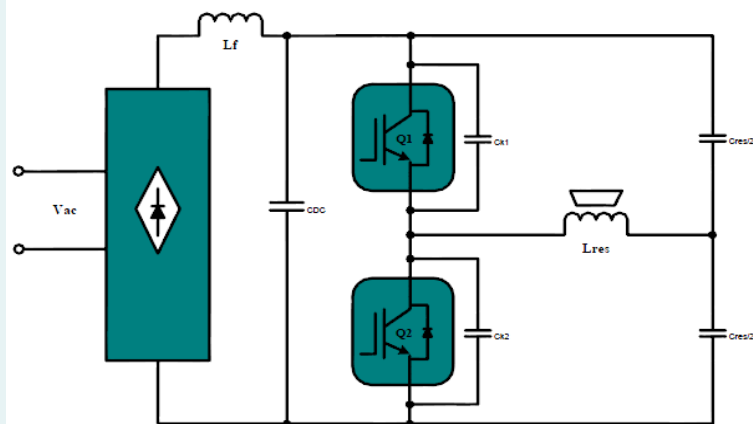
Typical IGBT Applications/Topologies



3-Phase Motor Control

6 XPT™ IGBTs (600V or 1200V)

e.g., IXXH30N60B3D1

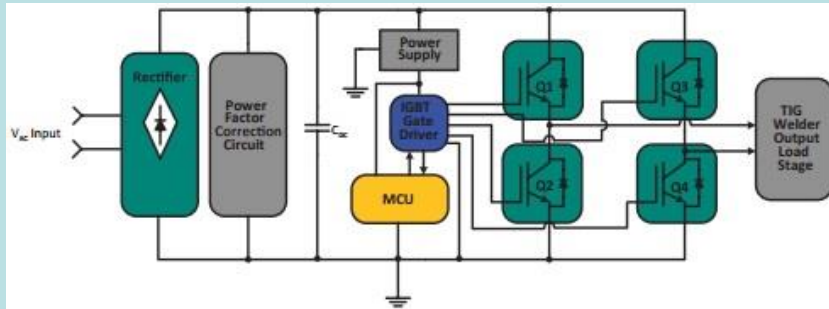


Half-Bridge Induction Heating Inverter (Current Resonance)

2 XPT™ IGBTs (600V or 1200V)

e.g., IXYH30N120C3D1

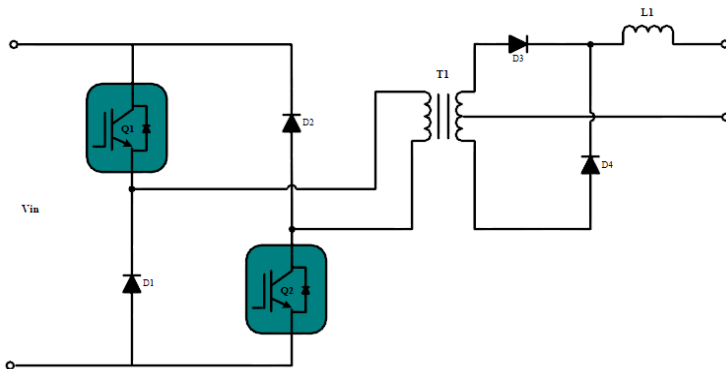
Typical IGBT Applications/Topologies



TIG Welding Inverter

4 XPT™ Trench IGBTs (650V)

e.g., IXXN110N65C4H1



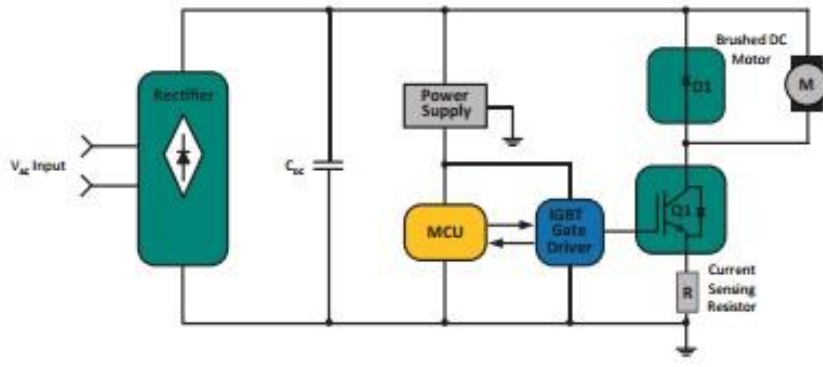
Two Transistor Forward Welding Inverter

2 GenX3™ PT C3-Class IGBTs

(600V or 1200V)

e.g., IXGH30N60C3D1

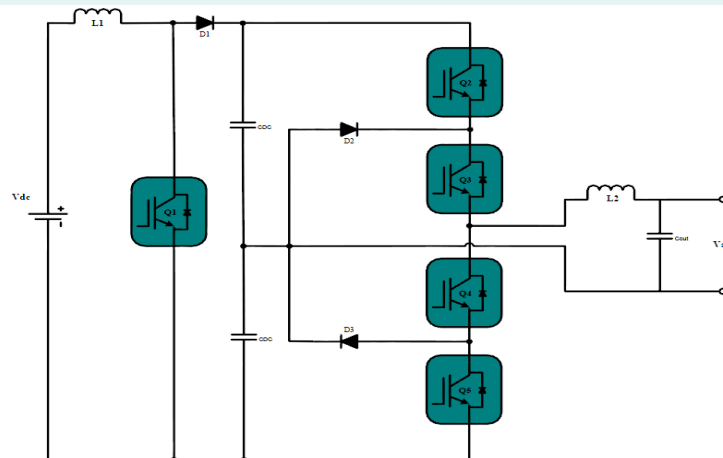
Typical IGBT Applications/Topologies



Brushed DC Motor Drive

2 XPT™ Trench B4-Class IGBTs (650V)

e.g., IXXK110N65B4H1



Three-Level Inverter Type II (Solar, UPS)

4 XPT™ B3-Class IGBTs
(600V or 1200V)

e.g., **IXXH50N60B3D1**

Latest IXYS IGBTs

- 600V XPT™ IGBTs
- 650V Trench XPT™ IGBTs
- 1200V XPT™ IGBTs

300V GenX3™ Punch-Through IGBTs (75A – 600A)

Replacements more expensive MOSFETs.
Comparable performance & efficiency!

FEATURES

- High frequency IGBT
- Square RBSOA
- High avalanche capability
- Drive simplicity with MOS gate turn-on
- High speed current handling capability
- UIS rated

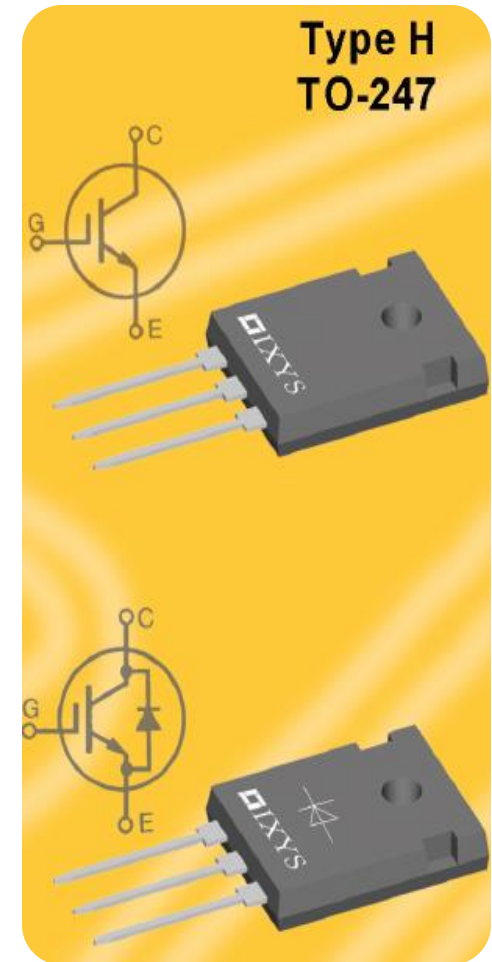
ADVANTAGES

- Low conduction & switching losses incur high efficiency
- A3,B3, C3 “dial-in efficiency”
- Best price/performance ratio
- Socket winner in a wide range of applications

APPLICATIONS

- High frequency power inverters, UPS, motor drives, SMPS, Battery Chargers, welding machines, lamp ballasts, etc.

Suffix “**3**” denotes GenX3
Example: IXGA42N30C**3**



600V PT Trench IGBTs

(21A-50A at $T_c=110^\circ\text{C}$)

High Gain Punch-Through Trench IGBTs!

Features

- Optimized for low switching & conduction losses
- Square RBSOA
- International standard packages
- B4-Class features medium-speed switching capabilities
- C4-Class features high-speed switching capabilities
- Optional co-pack versions available

Advantages

- High power density
- Low gate drive requirement

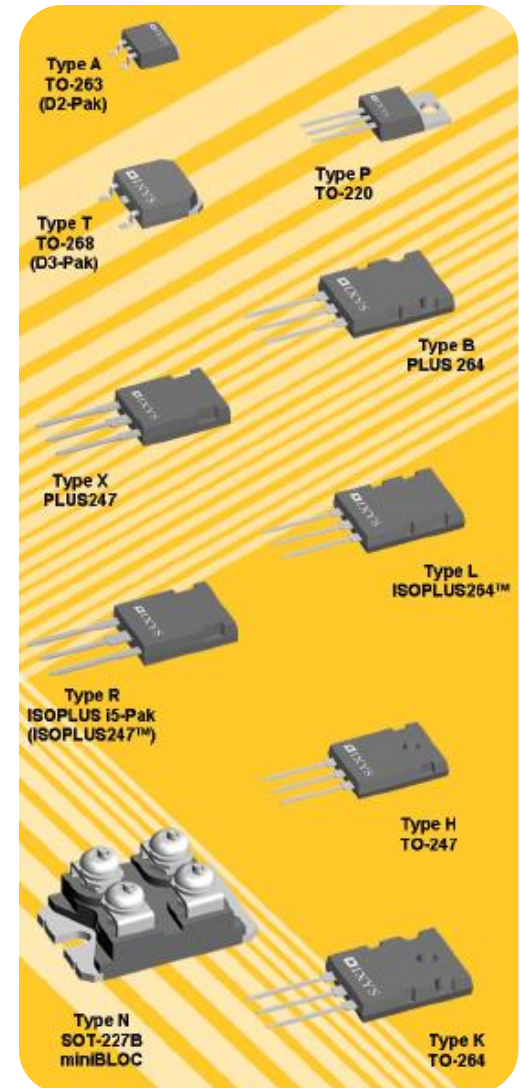
Applications

- Power Inverters, UPS, Motor Drives, SMPS, PFC, Battery Chargers, Welding Machines, Lamp Ballasts, DC Choppers, DC servo and Robot Drives

Example: IXGH24N60**C4D1**

“**C4**” denotes C4-Class

Suffix “**D1**” denotes co-packed version



1200V GenX3™ Punch-Through IGBTs

(22A – 260A)

FEATURES

- Optimized for low conduction losses
- Ultra-low $V_{CE(sat)}$
- Up to 3kHz switching frequency
- International standard packages

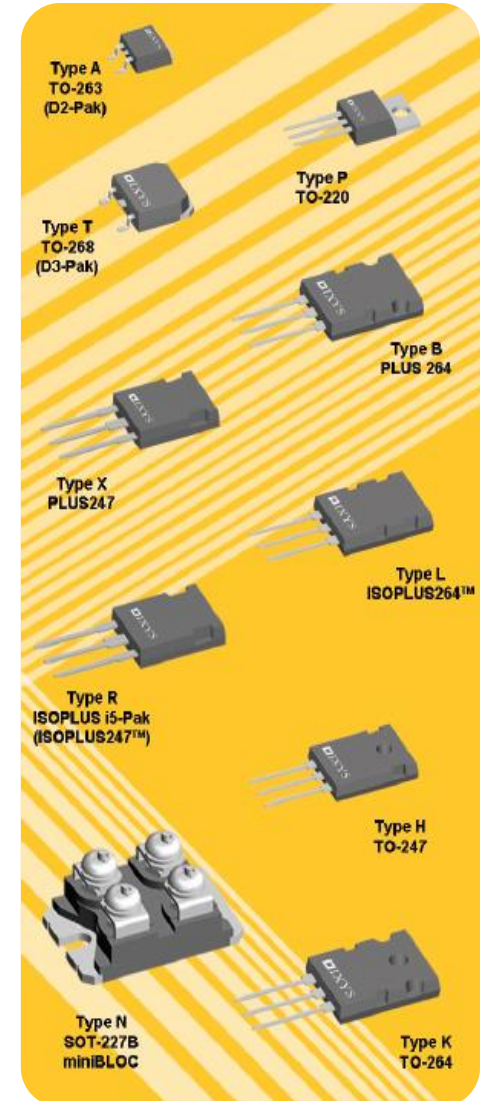
ADVANTAGES

- High power density
- Low gate drive requirement

APPLICATIONS

- AC motor speed control, DC servo and robot drives, DC choppers, UPS, SMPS/RMPS

Suffix “**3**” denotes GenX3™
Example: IXGH40N120C**3**



1400V GenX3™ Punch-Through IGBTs (42A – 60A)

Improved efficiency and reliability

FEATURES

- Optimized for low switching & conduction losses
- High avalanche capability
- Anti-Parallel Ultra fast diode
- International Standard Packages

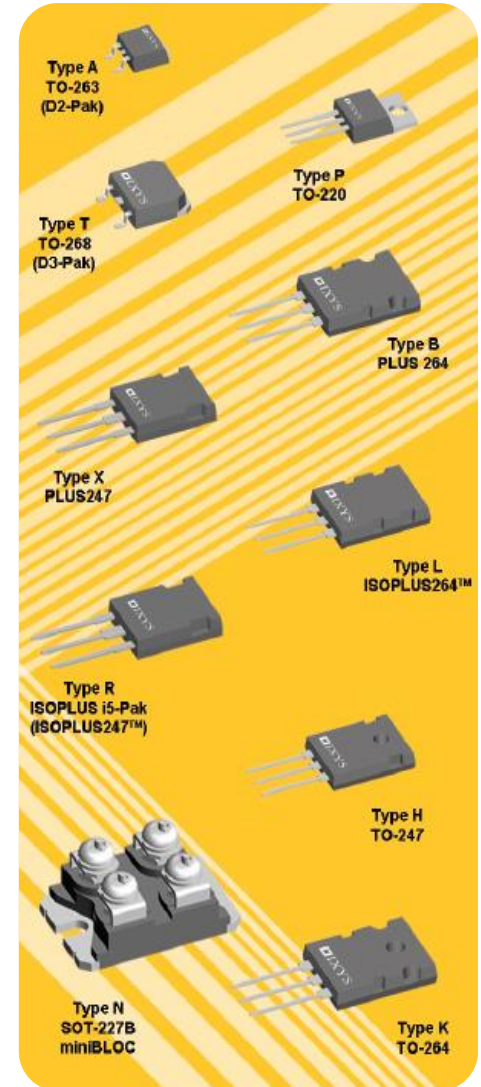
ADVANTAGES

- High power density
- Low gate drive requirements

APPLICATIONS

- High frequency power inverters, UPS, motor drives, SMPS, PFC circuits, battery chargers, welding machines, lamp ballasts

IXGH20N140C3H1
“C3” denotes GenX3™
“H1” denotes Co-pack



600V XPT™ IGBTs

(30A-300A at $T_C=110^\circ\text{C}$)

Rugged and Low Loss Extreme-Light Punch -Through IGBTs!

Features

- B3-Class, optimized for 10-30kHz hard switching operation
- C3-Class, optimized for 20-60kHz hard switching operation
- Low $V_{CE(sat)}$ & E_{ts} (low total switching energy losses)
- Easy to parallel
- Square RBSOA (rated up to 600V)
- Extended FBSOA
- Avalanche rated
- Short circuit capability (10 μs)
- Optional ultra-fast anti-parallel diodes (HiPerFRED™ or Sonic-FRD™)

Advantages

- High power density
- Low gate drive requirement

Applications

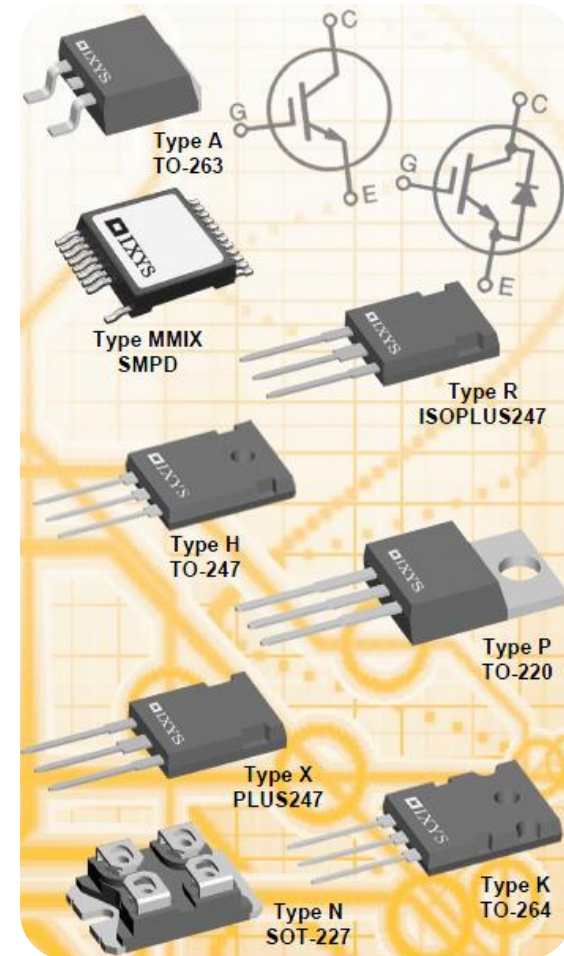
- Power Inverters, UPS, SMPS, PFC, Battery Chargers, Welding Machines, Lamp Ballasts, Motor Drives

Example: IXXK100N60B3H1

Prefix “IXX” denotes XPT™ IGBTs

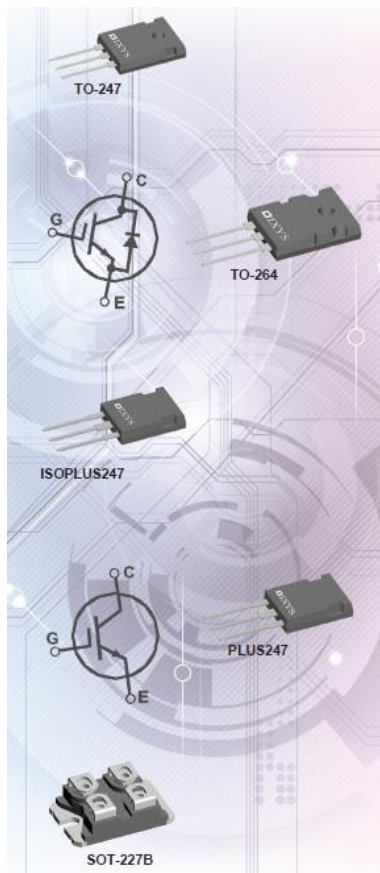
“B3” denotes B3-Class

Suffix “H1” denotes Co-packed Version



650V XPT™ Trench IGBTs

NEW!



Features

- Optimized for low conduction & switching losses
- Square RBSOA
- Ultra-fast anti-parallel recovery diodes (Sonic-FRD™ or HiPerFRED™)
- Positive thermal coefficient of $V_{CE(sat)}$
- Avalanche rated
- High and very high speed types (B3 and C3 Classes) available

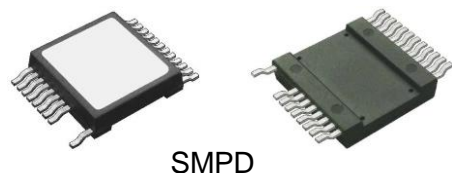
Advantages

- High power density
- Low gate drive requirement
- Easy to parallel

IXXH30N65B4
IXXN110N65C4H1
IXXK160N65C4
IXXX200N65B4

Applications

- High frequency power inverters, UPS, motor drives, SMPS, PFC circuits, battery chargers, welding machines, lamp ballasts.



NEW!

1200V XPT™ IGBTs

(7A-120A at $T_C=110^\circ\text{C}$)

For high-speed, hard-switching applications (up to 50kHz)

Features

- Optimized for low conduction & switching losses
- Square RBSOA
- Ultra-fast anti-parallel recovery diodes (Sonic-FRD™ or HiPerFRED™)
- Positive thermal coefficient of $V_{CE(sat)}$
- Avalanche rated
- B3 & C3 Classes available

Advantages

- High power density
- Low gate drive requirement
- Easy to parallel

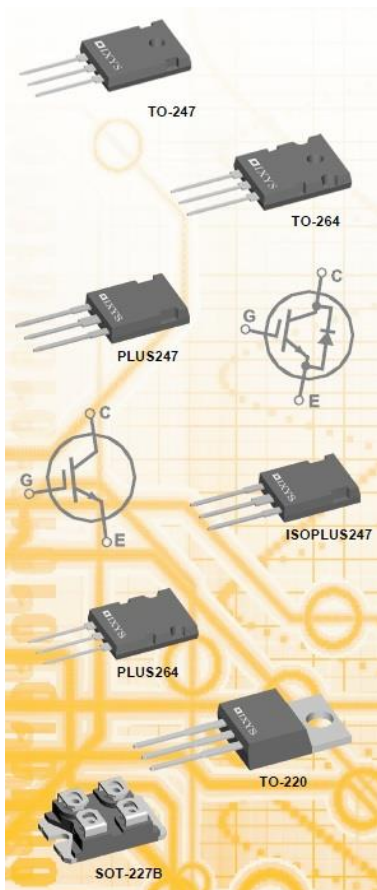
Applications

- High frequency power inverters, UPS, motor drives, SMPS, PFC circuits, battery chargers, welding machines, lamp ballasts.

IXYN82N120**C3H1**

“**C3**” denotes C3-Class

“**H1**” denotes Co-packed diode Sonic-FRD™



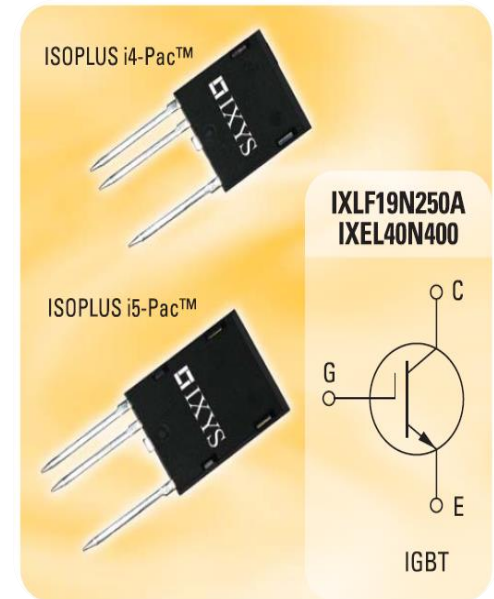
2.5kV – 4kV High Voltage IGBTs (5.5A – 90A)

FEATURES

- Silicon Chip on Direct Copper Bond (DCB) substrate
- Isolated mounting surface
- 4000V electrical isolation
- Proprietary High-Voltage ISOPLUS i4-Pak™ and i5-Pak™ packages
- Molding epoxies meet UL 94 V-0 Flammability classification

ADVANTAGES

- Simplified MOS gate control greatly reduces the complexity of high voltage switching.
- Enables the use of a single device in systems whose circuits use multiple cascaded lower voltage switches, thus promoting device consolidation and improving cost & efficiency.
- Few to no competing devices in the market.



APPLICATIONS

- Pulser Circuits, Cap Discharge circuits, HV power supplies, HV test equipment, Laser, & X-ray generation

600V/400A GenX3™ PT IGBT in SMPD Package

MMIX1G320N60B3

FEATURES

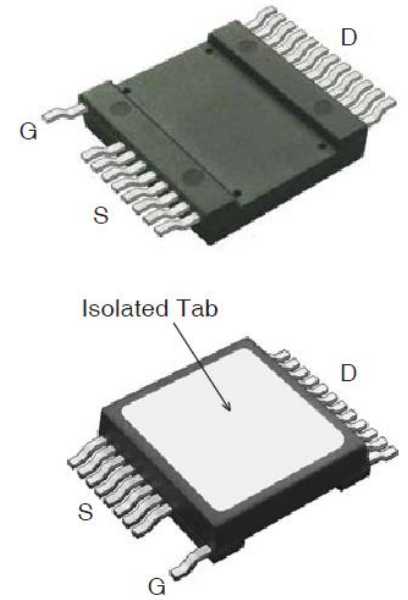
- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 2500V~Electrical Isolation
- Optimized for low conduction and switching losses
- Very High current capability
- Square RBSOA
- Available (medium-speed, low-Vsat PT IGBT for 5-40kHz switching)

ADVANTAGES

- High Power Density
- Low gate drive requirement

APPLICATIONS

- Power inverters, UPS, motor drives, SMPS, PFC, battery chargers, welding machines, and lamp ballasts.



MMIX1**G**320N60**B**3

Prefix “**MMIX**” denotes SMPD Package

“**G** and **B**3” denotes GenX3™ B3-Class IGBT

1200V/220A GenX3™ PT IGBT in SMPD Package

MMIX1G120N120A3V1

(Ultra-low $V_{CE(sat)}$, up to 3kHz power switching)

Features:

- Optimized for Low Conduction Losses (A3-Class)
- Square RBSOA
- Anti-Parallel Ultra Fast Diode
- High Power Density
- Low Gate Drive Requirement

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)



Applications

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts
- Inrush Current Protection Circuits

MMIX1G120N120A3V1
“3” denotes GenX3™