Discrete IGBTs

IXYS A Littelfuse Technology

Littelfuse®

Expertise Applied | Answers Delivered

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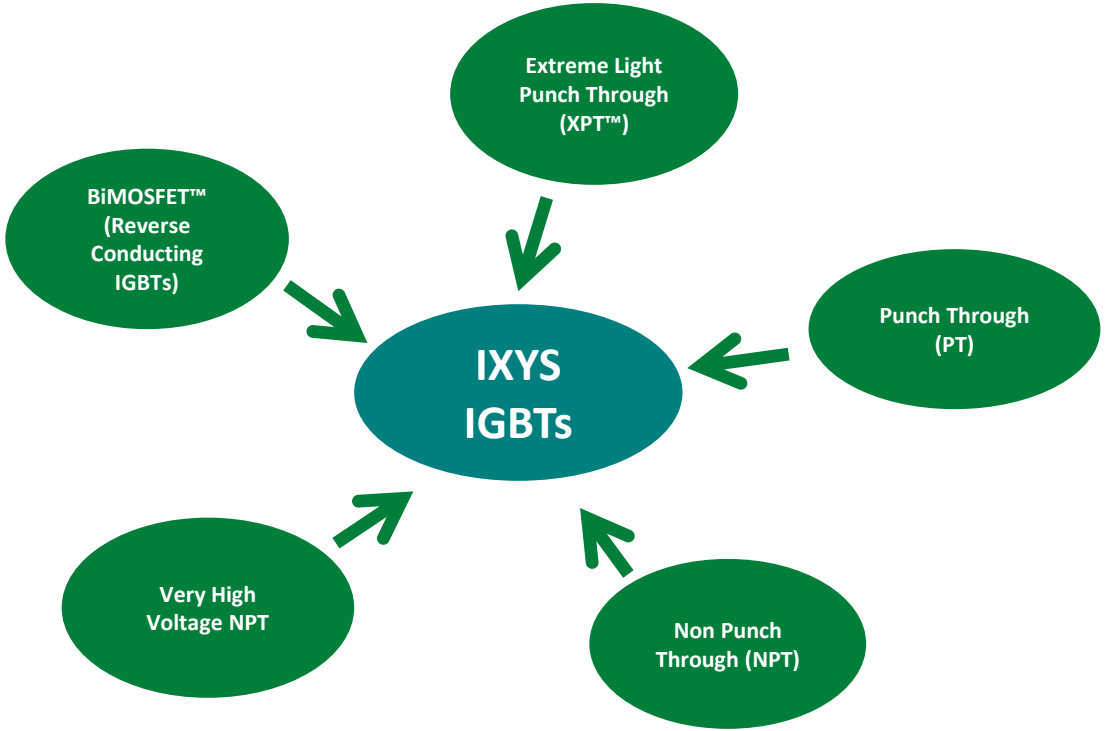
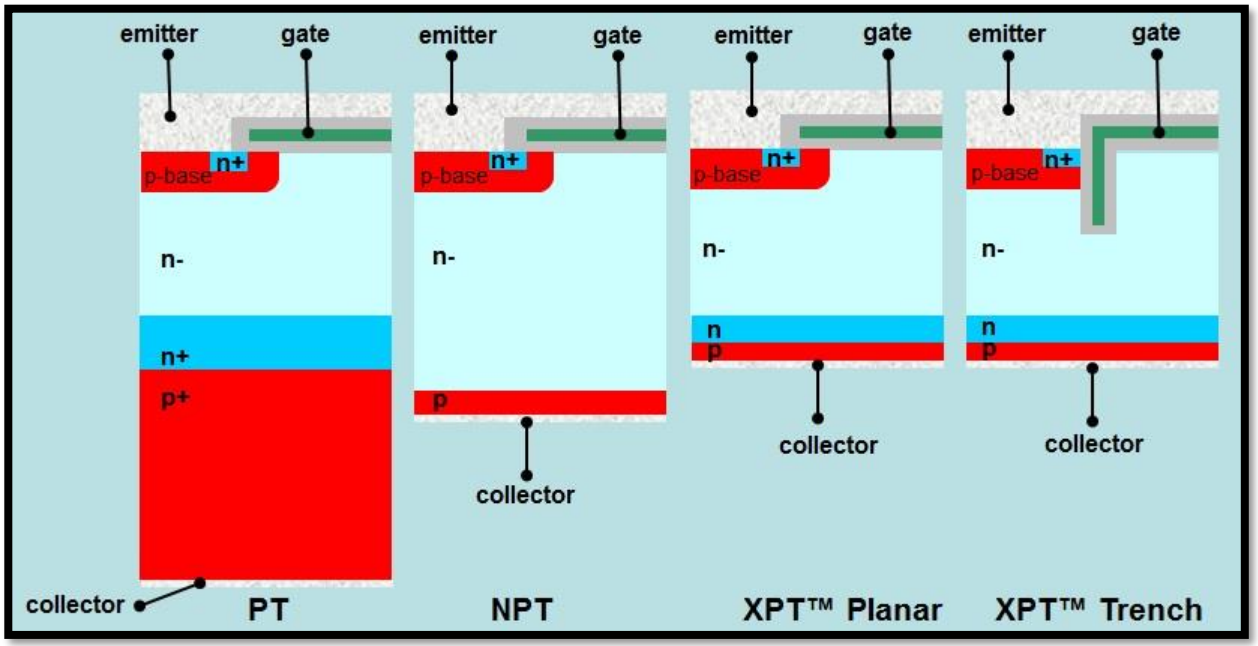


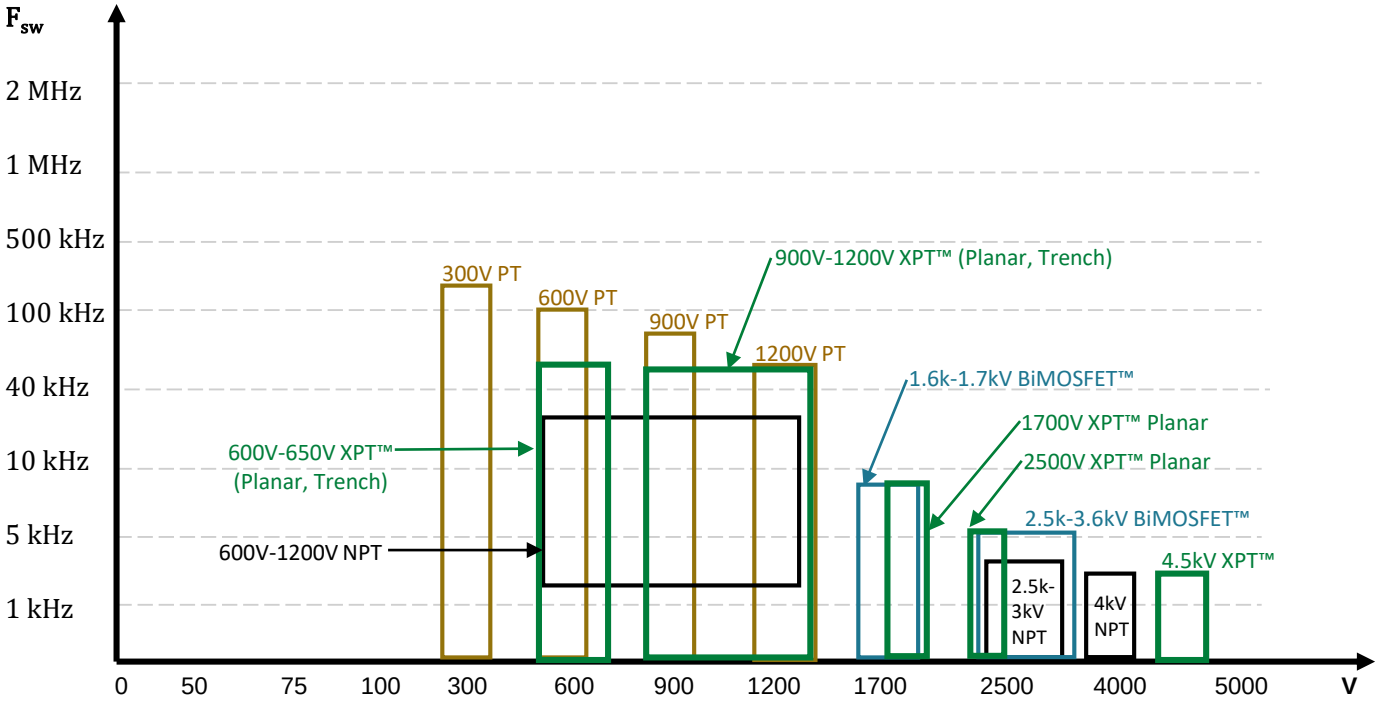
IGBT Structures

eXtreme-light Punch-Through (XPT™) Technology



IGBTs: Cross Sectional Views

IGBT & BiMOSFET Switching Frequency vs Blocking Voltage



II. Discrete IGBT Product Portfolio

Technology	Voltage V_{CES} (V)	Current at 25°C I_{C25} (A)	On-State Voltage at 25°C $V_{CE(sat)}$ (V)
Extreme Light Punch Through (XPT™)	600 – 4500	15 – 600	1.6 – 4.5
Punch Through (PT)	300 – 1200	14 – 430	1.15 – 4.4
Non Punch Through (NPT)	600 – 1700	5.5 – 280	2.5 – 7
Very High Voltage NPT	2500 – 4000	5.5 – 170	2.7 – 3.2
Reverse Conducting IGBTs (BiMOSFET™)	1600 – 3600	5 – 200	2.5 – 7

IXYS IGBT Advantages and Applications

Product Family	Features	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 ▪ 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 and PFC circuits ▪ Battery chargers ▪ Welding machines and 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

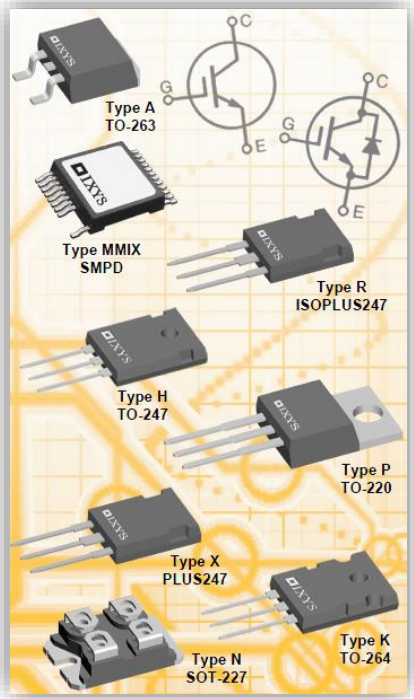
Product Family	Features	Applications
Very High Voltage NPT	▪ High peak current capability ▪ Low on-state voltage $V_{CE(sat)}$ ▪ UL 94 V-0 Flammability qualified (molding epoxies) ▪ High power density ▪ Easy to mount ▪ Low gate drive requirements ▪ Proprietary ISOPLUS™ packages available	▪ Switched-mode and resonant mode power supplies ▪ Capacitor discharge applications ▪ Pulsed circuits ▪ Uninterruptible power supplies
BiMOSFET™ (Reverse Conducting IGBTs)	▪ 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

III. Latest Discrete IGBT Product Lines

- 600V XPT™ Planar
- 650V XPT™ (Planar & Trench)
- 900V XPT™ Planar
- 1200V XPT™ Planar
- 1700V XPT™ Planar
- 2500V XPT™ Planar

600V XPT™ Planar IGBTs (33A-550A)

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



Features

- B3 Class (5-30 kHz), C3 Class (20-60 kHz)
- Low $V_{CE(sat)}$ and total switching energy losses E_{ts}
- Easy to parallel
- Square RBSOA (rated up to 600V)
- Extended FBSOA
- Avalanche rated
- Short circuit capability (10µs)
- Optional ultra-fast anti-parallel diodes (HiPerFRED™ or Sonic-FRD™)

Advantages

- High power density
- Low gate drive requirement

Applications

- Switched-mode power supplies, motor drive, lamp ballasts

Part number example:

IXXK100N60B3H1

Prefix "IXX" denotes X-series XPT™ IGBT

"B3" denotes B3-Class

"H1" denotes co-packed diode Sonic-FRD™

IXXH30N60B3

IXXN200N60B3H1

IXXX300N60C3

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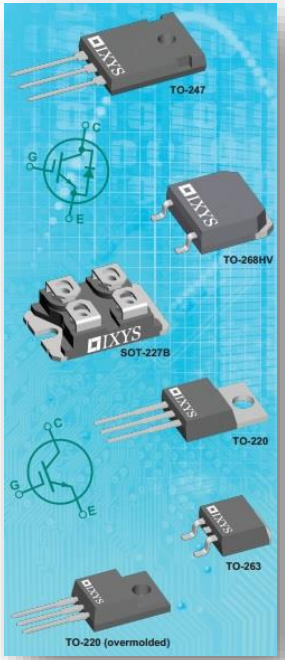
650V XPT™ Planar IGBTs

(15A-600A)

For demanding high-speed hard-switching power conversion systems



Features

- A3 Class (5 kHz), B3 Class (10-30 kHz), C3 Class (20-60 kHz)
- Square RBSOA
- Ultra-fast anti-parallel recovery diodes (Sonic-FRD™)
- Positive thermal coefficient of $V_{CE(sat)}$
- Avalanche rated
- Short circuit capability (5µs-8µs)

Advantages

- High power density
- Low gate drive requirements
- Hard-switching capability
- Temperature stability of diode forward voltage V_F

Part number example:
IXYH30N65C3H1
Prefix "IXY" denotes Y-series XPT™ IGBT
"C3" denotes C3-Class
"H1" denotes co-packed diode Sonic-FRD™

IXYP10N65C3
IXYN100N65C3H1
IXYH100N65C3

Applications

- E-Bikes, power inverters, power factor correction circuits, uninterruptible power supplies, welding machines

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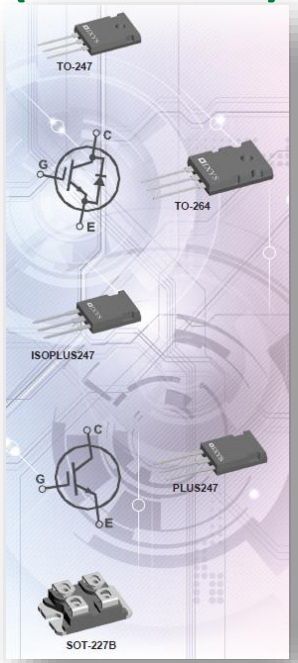
650V XPT™ Trench IGBTs (65A-480A)

Highly efficient low on-state voltage IGBTs for hard or soft switching applications



Features

- A4 Class (5-20 kHz), B4 Class (10-30 kHz), C4 Class (20-60 kHz)
- Square RBSOA
- Ultra-fast anti-parallel recovery diodes (Sonic-FRD™ or HiPerFRED™)
- Positive thermal coefficient of $V_{CE(sat)}$
- Avalanche rated
- Short circuit capable: 10µs

Advantages

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

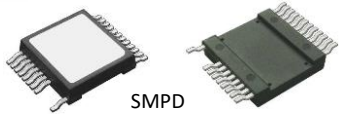
Part number example:

IXXN110N65C4H1
Prefix "IXX" denotes X-series XPT™ IGBT
"C4" denotes C4-Class
"H1" denotes co-packed diode Sonic-FRD™

IXXH30N65B4
IXXK160N65C4
IXXX200N65B4

Applications

- DC motor drive, power inverters, power factor correction (PFC) circuits



SMPD

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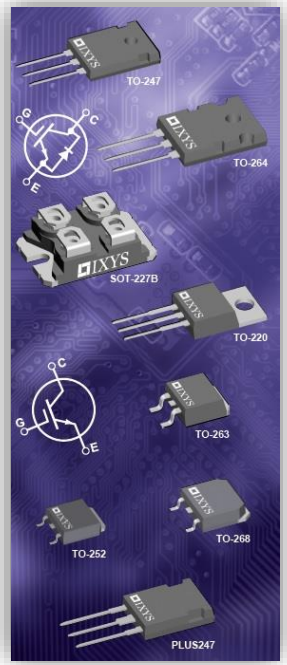
900V XPT™ Planar IGBTs (20A-310A)

For energy-efficient high-speed, hard-switching power conversion applications



Features

- C3 Class: optimized for 20kHz-50kHz switching
- High current handling capability
- Maximum junction temperature T_{JM} =175°C
- Positive thermal coefficient of $V_{CE(sat)}$
- Square RBSOA
- Ultra-fast anti-parallel diodes

Advantages

- Hard-switching capability
- High power density
- Low gate drive requirements

Part number example:
IXYA8N90C3D1
Prefix “IXY” denotes Y-series XPT™ IGBT
“C3” denotes C3-Class
“D1” denotes co-packed diode HiPerFRED™

IXYY8N90C3
IXYT80N90C3
IXYK140N90C3

Applications

- Solar inverters, resonant power supplies, uninterruptible power supplies

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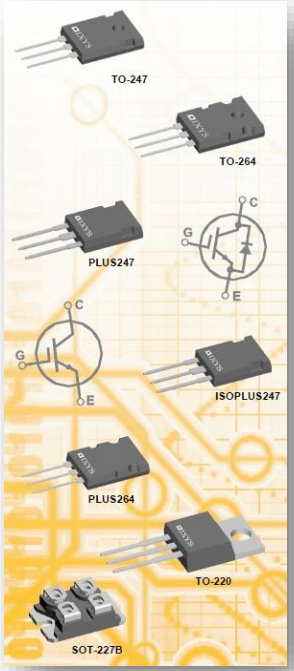
1200V XPT™ Planar IGBTs (36A-320A)

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



Features

- B3 Class (5-30 kHz), C3 Class (20-50 kHz)
- 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

Advantages

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

Applications

- Battery chargers, electronic lamp ballast, TIG welding inverters

Part number example:

IXYN82N120C3H1

Prefix "IXY" denotes Y-series XPT™ IGBT

"C3" denotes C3-Class

"H1" denotes co-packed diode Sonic-FRD™

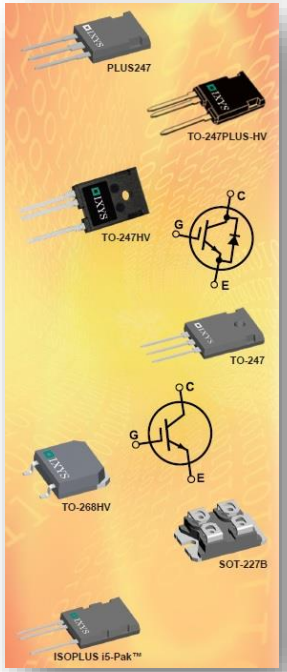
IXYJ20N120C3D1

IXYH40N120B3D1

IXYK100N120B3

1700V & 2500V XPT™ Planar IGBTs (26A-178A)

For high-voltage, high-speed power conversion applications



Features

- Thin wafer XPT™ technology
- Low on-state voltages $V_{CE(sat)}$
- Co-packed fast recovery diodes
- Positive thermal coefficient of $V_{CE(sat)}$
- International standard size high-voltage packages

Advantages

- High efficiency
- Elimination of multiple series-connected devices
- Increased reliability of power systems

Applications

- Pulse circuits, AC switches, laser and X-ray generation

Part number example:
IXYH10N170C
Prefix "IXY" denotes Y-series XPT™ IGBT

IXYN50N170CV1
IXYX50N170CV1
IXYH8N250C
IXYT25N250CHV
IXYX25N250CV1HV

Global Footprint – R&D, Manufacturing & Support

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Americas

Chicago, Illinois, USA (S)
Aliso Viejo, California, USA (RD, M)
Fremont, California, USA (RD, M)
Long Beach, California, USA (RD, M)
Milpitas, California, USA (RD, M)
Orange, California, USA (M)
Santa Clara, California, USA (M)
Champaign, Illinois, USA (RD)
Mount Prospect, Illinois, USA (RD)
Beverly, Massachusetts, USA (RD, M)
Boston, Massachusetts, USA (S, RD)
Troy, Michigan, USA (S)
Rapid City, South Dakota, USA (S, RD, M)
Lake Mills, Wisconsin, USA (S, RD)
Manaus, Brazil (S)
São Paulo, Brazil (S)
Burlington, Canada (S)
Saskatoon, Canada (S, RD)
Matamoros, Mexico (M)
Muzquiz, Mexico (M)
Piedras Negras, Mexico (RD, M)

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Bremen, Germany (S, RD)
Essen, Germany (S)
Lampertheim, Germany (RD, M)
Lauf, Germany (S)
Legnago, Italy (RD, M)
Ozegna, Italy (RD, M)
Kaunas, Lithuania (RD, M)
Amsterdam, Netherlands (S)
Deventer, Netherlands (S)
Leiden, Netherlands (S)
Charneca de Caparica, Portugal (M)
San Sabastian, Spain (RD)
Chippenham, United Kingdom (RD, M)

Asia

Beijing, China (S)
Chu-Pei, Taiwan, China (RD)
Dongguan, China (RD, M)
Hong Kong, China (S)
Kunshan, China (RD, M)
Shanghai, China (S, RD, M)
Suzhou, China (S, RD, M)
Taipei, Taiwan, China (S)
Wuxi, China (RD, M)
Tokyo, Japan (S)
Tsukuba, Japan (RD, M)
Seoul, South Korea (S)
Lipa City, Philippines (RD, M)
Taguig City, Philippines (M)
Singapore (S)

S–International Sales
RD–Research & Development
M–Manufacturing