

# 3600V Reverse Conducting IGBTs (BiMOSFETs™)

Well-suited for high-voltage, high-current power conversion applications

December 2014

## OVERVIEW

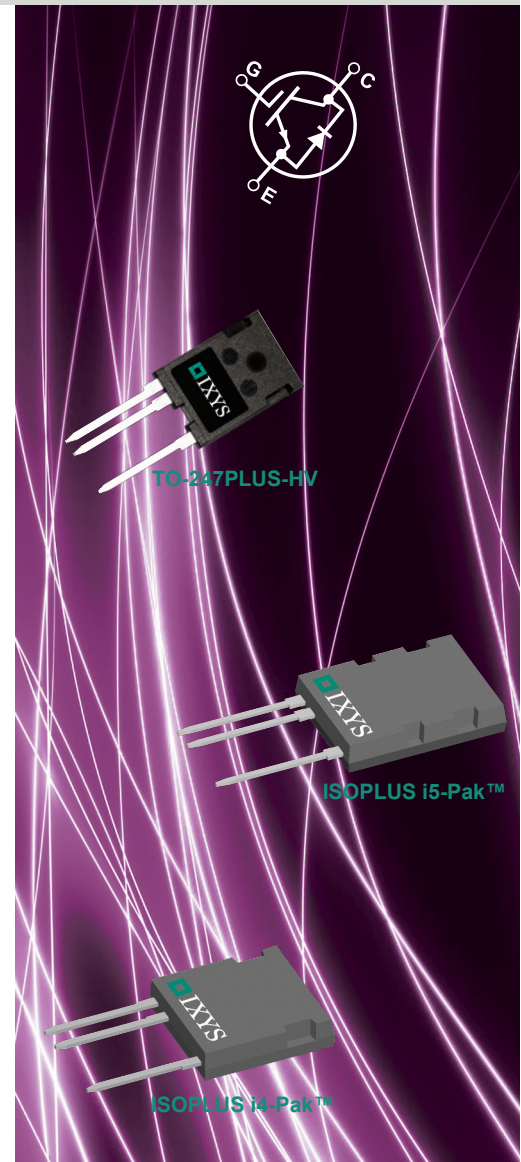
IXYS Corporation (NASDAQ: IXYS), a manufacturer of power semiconductors and integrated circuits for energy efficiency, power management, and motor control applications, announces the release of new reverse-conducting IGBTs: 3600V BiMOSFETs™. Featuring “free” intrinsic body diodes and current ratings from 45A to 125A, these devices present combined strengths of both MOSFETs and IGBTs. They are ideal for high-speed, high-voltage, and high-current power conversion applications.

By using these high-voltage BiMOSFETs™ power designers can eliminate multiple series-parallel lower voltage, lower current rated devices, thereby reducing the number of power components required and simplifying their associated gate drive circuitry. This results in a much simpler system design with a lower cost and improved reliability.

Also, if needed, thanks to the positive temperature coefficient of the on-state voltage and diode forward voltage, these devices can be operated in parallel to meet even higher current requirements. Furthermore, during the turn-off transition, the monolithic body diode provides a path for the inductive load current, suppressing high voltage transients from inflicting damage to the device.

The new 3600V BiMOSFETs™ can be utilized in a number of power switching systems, including switched-mode and resonant-mode power supplies, uninterruptible power supplies, laser and X-ray generators, capacitor discharge circuits, and AC switches.

These reverse-conducting IGBTs are available in the following international standard size packages: ISOPLUS i4-Pak™, ISOPLUS i5-Pak™, and TO-247PLUS-HV. The first two packages provide an electrical isolation of 4000V through the Direct Copper Bond (DCB) substrate technology. The TO-247PLUS-HV has an increased creepage distance between leads, making it possible to withstand higher voltages. The part numbers include IXBF20N360, IXBF50N360, IXBL60N360, and IXBX50N360HV, with collector current ratings of 45A, 70A, 92A, and 125A, respectively.



## FEATURES

- "Free" intrinsic body diode
- High power density
- High frequency operation
- Low conduction losses
- MOS gate turn on for drive simplicity
- 4000V electrical isolation

## ADVANTAGES

- Low gate drive requirements
- Space savings (eliminates multiple series-parallel lower voltage, lower current rated devices)
- Easy to mount

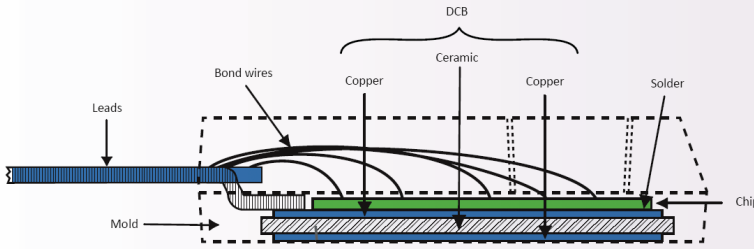
## APPLICATIONS

- Switched-mode and resonant-mode power supplies
- Uninterruptible Power Supplies (UPS)
- Laser and X-ray generators
- Capacitor discharge circuits
- High voltage pulser circuits
- High voltage test equipment
- AC switches

# Available Parts

Part Number	$V_{CES}$ (V)	$I_{C25}$ $T_c=25^\circ\text{C}$ (A)	$I_{C110}$ $T_c=110^\circ\text{C}$ (A)	$V_{CE(sat)}$ typ. $T_j=25^\circ\text{C}$ (V)	$Q_{g(ion)}$ typ. (nC)	$t_f$ (resistive load) typ. $T_j=25^\circ\text{C}$ (ns)	VF max. $T_J=25^\circ\text{C}$ (V)	RthJC max. ( $^\circ\text{C}/\text{W}$ )	Package
IXBF20N360	3600	45	18	2.9	110	1045	3.5	0.54	ISOPLUS i4-Pak™
IXBF50N360	3600	70	28	2.4	210	1750	3	0.43	ISOPLUS i4-Pak™
IXBL60N360	3600	92	36	2.8	450	910	5	0.3	ISOPLUS i5-Pak™
IXBX50N360HV	3600	125	50	2.4	210	1750	3	0.19	TO-247PLUS-HV

## Direct Copper Bond (DCB) isolation



- Provides up to 4000V ceramic isolation
- Improves temperature and power cycling capabilities
- Reduces EMI/RFI due to low coupling capacitance between die and heat sink
- Lowers thermal resistance ( $R_{thJS}$ )
- Allows new circuit configurations

## Application Examples

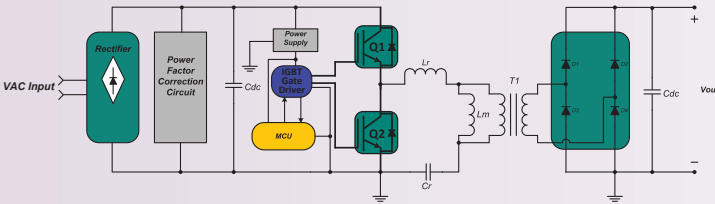


Figure 1: Half-bridge resonant power supply

Figure 1 illustrates a simplified SMPS circuit diagram that uses an LLC resonant converter as the primary power conversion element of the circuit. The indicated SMPS circuit consists of a primary rectifier, power factor correction circuit, control unit (power supply, MCU, and IGBT Driver), LLC half-bridge resonant converter, isolation transformer, and secondary rectifier stage. Two BiMOSFETs™, **IXBL60N360**, are paired to form the LLC half-bridge resonant converter stage to ensure a fast, space-saving, and energy-efficient power switching operation.

Figure 2 and Figure 3 demonstrate AC switches which make use of the **IXBF20N360** BiMOSFET™. Both can control the current precisely and also provide an overcurrent protection function. Figure 2 is a cost effective option.

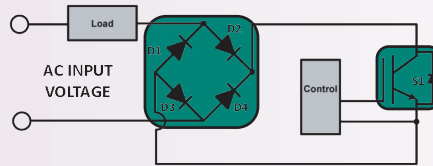


Figure 2: AC switch

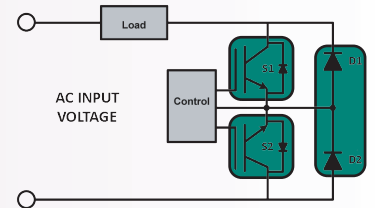


Figure 3: Bi-directional AC switch



---

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).