

1500V MOS-Gated Thyristors

For high-power capacitive discharge or solid-state surge protection applications

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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 1500V MOS-Gated Thyristors housed in its proprietary Surface Mount Power Device (SMPD) and high-voltage TO-247 packages. Capable of carrying current up to 32kA for a period of 1 microsecond, they are well suited for high-power pulse and capacitive discharge circuits.

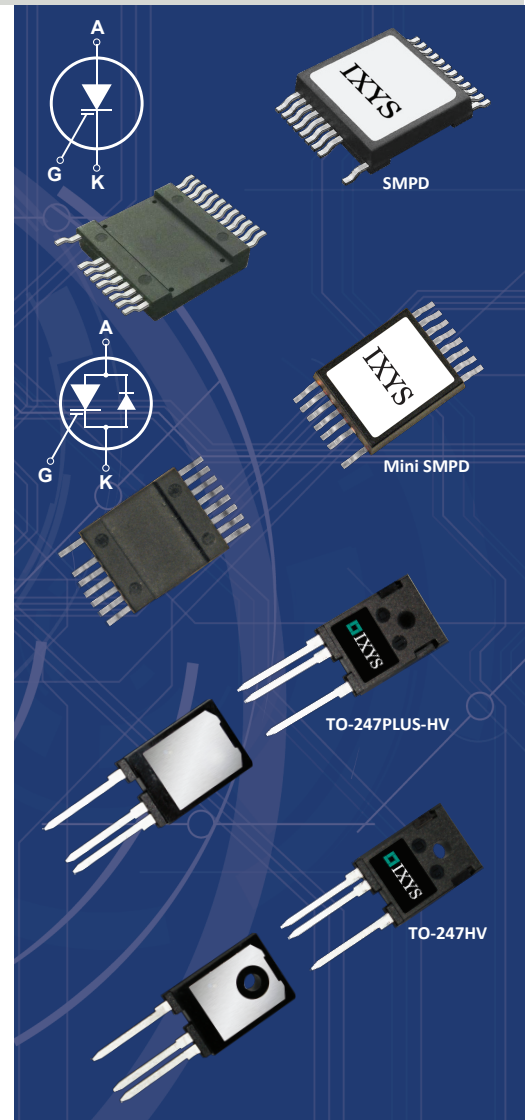
These devices can be switched on by a voltage applied to their gate terminals, making it easy for integration with other power devices in the system. Once triggered, within tens of nanoseconds, they can conduct very high current. An anti-parallel protection diode integrated in the same package is also available.

The 1500V Thyristors packaged in the IXYS SMPDs can be easily surface-mounted on a Printed Circuit Board (PCB) using a standard pick-and-place and reflow soldering process. No costly screws, cables, bus-bars or hand soldered contacts are needed. Weighing only 8g and 5g, respectively, the SMPD and Mini-SMPD packages are much lighter than comparable conventional power modules, thereby enabling lower weight power systems for IXYS customers. Moreover, an electrically isolated tab is provided for heat sinking, and a ceramic isolation of 2.5kV is achieved with the Direct Copper Bond (DCB) substrate technology. The DCB provides low thermal impedance and best-in-class power and temperature cycling capabilities.

Another packaging option includes high-voltage versions of the international standard size TO-247: TO-247HV and TO-247PLUS-HV. These packages have an increased creepage distance between leads, making it possible to withstand higher voltages.

The new 1500V MOS-Gated Thyristors are suitable for capacitive discharge applications, ignition circuits, and solid-state surge protection applications in a variety of aerospace, medical, and industrial settings.

The MMIX1H60N150V1 with an integrated anti-parallel diode is available in the SMPD and the MMJX1H40N150 (without a diode) in the Mini-SMPD; the maximum surge current ratings are 32kA and 15.5kA, respectively. The IXHX40N150V1HV (with a diode) is built in the TO-247PLUS-HV and IXHH40N150HV in the TO-247HV; they both have the maximum surge current rating of 7.6kA.



FEATURES

- Proprietary high voltage packages
- Very high current capability
- Anti-parallel diodes
- Silicon chip on Direct Copper Bond (DCB) substrate
- Isolated mounting surface
- 2500V electrical isolation

ADVANTAGES

- High power density
- Low gate drive requirement

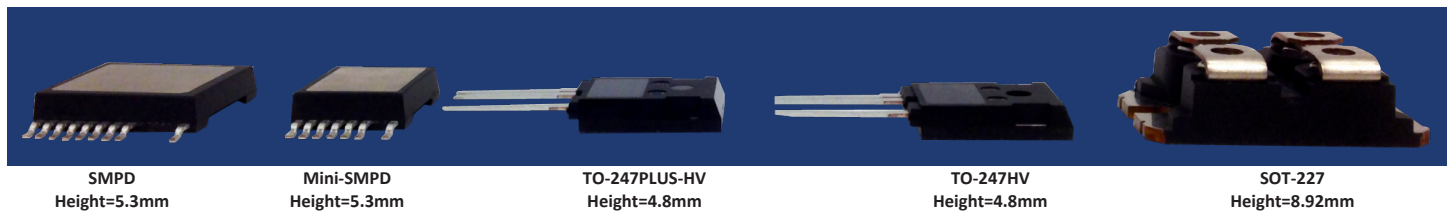
APPLICATIONS

- Capacitive discharge circuits
- Ignition circuits
- Solid state surge protection

Available Parts

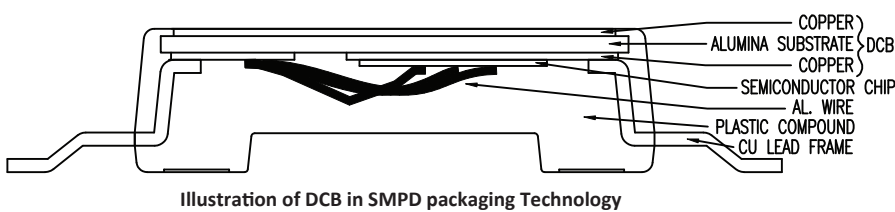
Part Number	V_{DM} (V)	I_{TSM} $1\mu s$ $T_c=25^\circ C$ (kA)	I_{TSM} $10\mu s$ $T_c=25^\circ C$ (kA)	r_T typ (m Ω)	V_T max (V)	$Q_{g(on)}$ typ (nC)	t_{ri} typ $T_j=25^\circ C$ (ns)	$V_{GK(th)}$ max (V)	Configuration	Package Style
IXHH40N150HV	1500	7.6	3.5	1.2	7.5	99	100	5	Single	TO-247HV
IXHX40N150V1HV	1500	7.6	3.5	1.2	7.5	99	100	5	Copacked	TO-247PLUS-HV
MMJX1H40N150	1500	15.5	6.4	1.2	6	99	100	5	Single	Mini-SMPD
MMIX1H60N150V1	1500	32	11.8	1.2	6	180	100	5	Copacked	SMPD

Proprietary SMPD and high-voltage packages



The figure above illustrates a comparison of the SMPD and high-voltage TO-247 packages with other industry standard packages. For instance, compared to a conventional high power package such as the SOT-227, the IXYS SMPD features 1/4 the weight and 1/3 the volume and provides similar electrical and thermal characteristics.

Direct Copper Bond (DCB) isolation



- Provides 2500V 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 Circuits

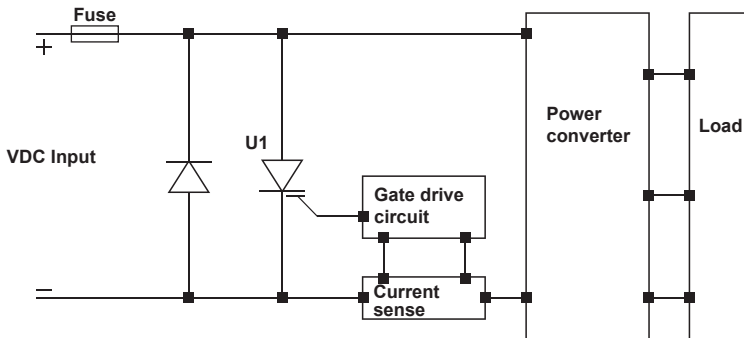


Figure 1: Overcurrent protection circuit

Figure 1 illustrates a general overcurrent protection circuit that makes use of a MOS-Gated Thyristor, IXHH40N150HV (U1). The current sense block detects the converter current. If it exceeds a preset value, the MGT is turned on by the gate drive circuit. The MGT then "crowbars" all the current, and the power converter is protected.

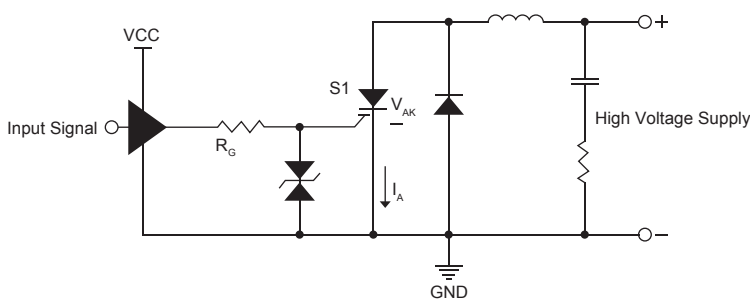


Figure 2: Capacitive discharge circuit

Figure 2 depicts a capacitive discharge circuit that employs a MOS-Gated Thyristor, MMJX1H40N150 (S1).