IXYSPOWER
Efficiency Through Technology

NEW PRODUCT BRIEF

GigaMOS™ TrenchT2™ Power MOSFETs

POWER MOSFET SOLUTIONS FOR LOW VOLTAGE, HIGH CURRENT POWER CONVERSION SYSTEMS

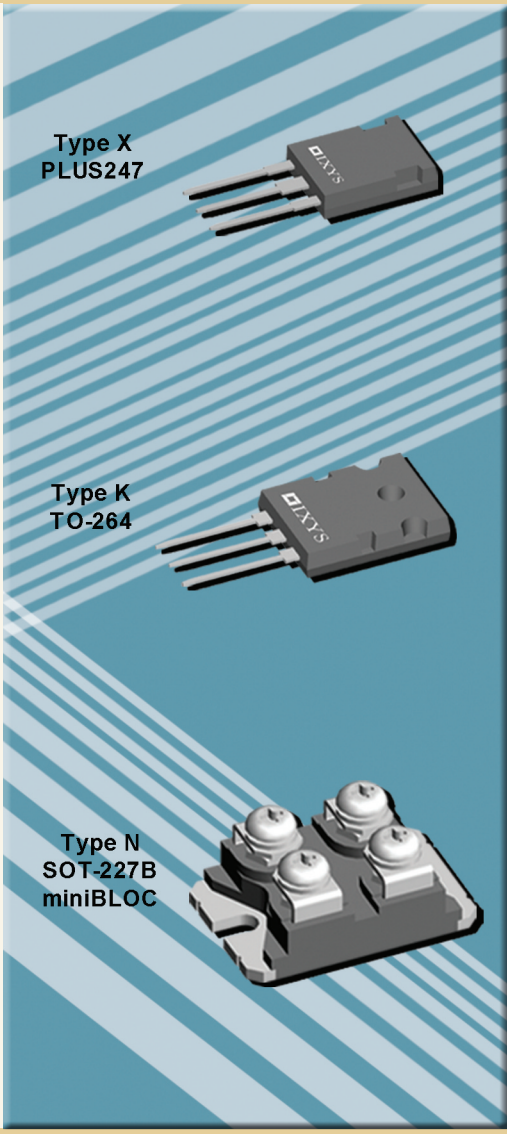
JANUARY 2010

OVERVIEW

IXYS announces the portfolio expansion of its GigaMOS™ product family with new GigaMOS™ TrenchT2™ Standard and HiPerFET™ Power MOSFETs. These new devices are offered with drain-to-source voltage ratings from 40V to 170V and provide high current capabilities of up to 600 Amperes (Tc=@25°C). The combined high current ratings of these devices and available compact package options provide designers the ability to control more power within a smaller footprint. Furthermore, these new devices promote device consolidation through the reduction or elimination of multiple paralleled lower current rated MOSFET devices in high power switching applications. The resultant effect is a reduction in part count, as well as the number of required drive components, thus improving upon over-all system simplicity, reliability, and cost.

These new GigaMOS™ Power MOSFETs incorporate IXYS' TrenchT2™ Technology allowing for improved channel density while achieving lower on-state resistances and gate charge to facilitate energy-efficient switching at high speeds. Power switching capabilities of HiPerFET™ versions are further enhanced via IXYS' proven HiPerFET™ process, yielding a fast intrinsic rectifier which provides low reverse recovery charge (Qrr) and excellent commutating dV/dt ratings. Additional features include a 175°C operating temperature and avalanche capabilities. These combined product attributes coupled with high current ratings, make for an ideal device for high current power switching applications.

IXYS' GigaMOS™ TrenchT2™ Power MOSFETs are available in three industry standard packages TO-264, PLUS247 (hole-less TO-247 variant) and miniBLOC SOT-227. These devices provide designers the best combination of fast switching, high current capability, rugged device design, low on-resistance and cost-effectiveness in a variety of high power switching applications. Suitable applications include synchronous rectification, DC-DC converters, battery chargers, switch-mode/resonant mode power supplies, DC choppers, AC motor drives, and uninterruptible power supplies. The high current capability of these devices make them suitable for electric and hybrid car and carts and other high power battery powered electrical equipment and tools.



FEATURES

- High current capability (up to 600A)
- Low Rds(on) and gate charge (Qg)
- Incorporates IXYS HiPerFET™ technology for fast power switching performance
- Avalanches capabilities

APPLICATIONS

- Synchronous rectification
- DC-DC converters
- Battery chargers
- Switch-mode and resonant-mode power supplies
- DC choppers
- AC motor drives
- Uninterruptible power supplies
- High speed power switching applications

BENEFITS

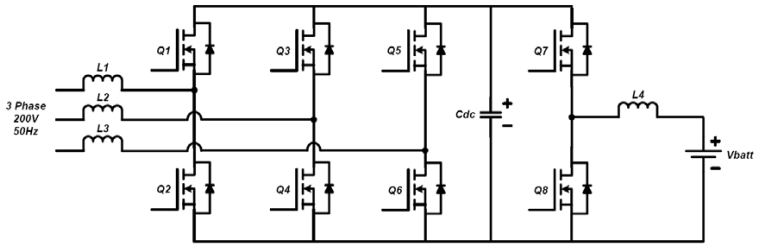
- Eliminates multiple paralleled lower current rated MOSFET devices
- Provides the ability to control more power within a smaller footprint
- Improves overall system reliability and cost

40V – 170V GigaMOS™ TrenchT2™ Power MOSFETs Summary Table

Part Number	Vdss max (V)	Id(cont) Tc=25°C (A)	Rds(on) max TJ=25C (mΩ)	Ciss typ (pF)	Qg typ (nC)	trr typ (nS)	Pd (W)	Package Style
IXTK600N04T2	40	600	1.50	40000	590	100	1250	TO-264
IXTN600N04T2	40	600	1.05	49100	620	105	940	SOT227
IXTX600N04T2	40	600	1.50	40000	590	100	1250	PLUS247
IXTK550N055T2	55	550	1.60	40000	595	100	1250	TO-264
IXTN550N055T2	55	550	1.30	40000	595	100	940	SOT227
IXTX550N055T2	55	550	1.60	40000	595	100	1250	PLUS247
IXFN520N075T2	75	480	1.90	41000	545	150	940	SOT-227
IXFK520N075T2	75	520	2.20	41000	545	150	1250	TO-264
IXFX520N075T2	75	520	2.20	41000	545	150	1250	PLUS247
IXFK240N15T2	150	240	5.20	32000	460	140	1250	TO-264
IXFN240N15T2	150	240	5.20	32000	460	140	830	SOT-227
IXFX240N15T2	150	240	5.20	32000	460	140	1250	PLUS247
IXFN360N15T2	150	310	4.00	47500	715	150	1070	SOT-227
IXFK360N15T2	150	360	4.00	47500	715	150	1670	TO-264
IXFX360N15T2	150	360	4.00	47500	715	150	1670	PLUS247
IXFN320N17T2	170	260	5.20	45000	640	150	1070	SOT-227
IXFK320N17T2	170	320	5.20	45000	640	150	1670	TO-264
IXFX320N17T2	170	320	5.20	45000	640	150	1670	PLUS247

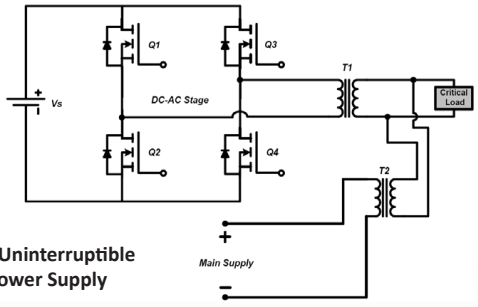
Part number prefix: 'IXT' denotes standard versions ▪ Part number prefix: 'IXF' denotes HiPerFET™ versions

Application Circuits



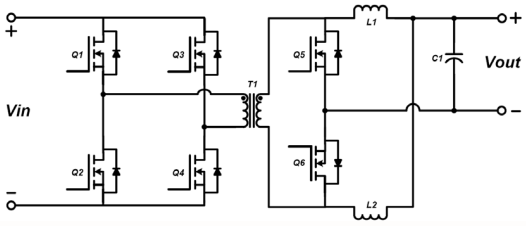
Electric Vehicle Battery Charger

The figure on the left depicts a basic hard switched EV battery charger topology. This hard switched topology consists of a line filter, three phase converter, DC link capacitor, half bridge DC-DC converter and a smoothing inductor to decrease the battery current ripple. GigaMOS™ TrenchT2™ Power MOSFETs can be employed in either the three phase converter stage or half-bridge DC-DC converter stage of this basic hard-switched EV battery charger topology.



UPS Uninterruptible Power Supply

The figure above illustrates a general UPS circuit. The input stage, a full-bridge topology, containing four MOSFETs labeled Q1, Q2, Q3, and Q4. IXYS GigaMOS™ TrenchT2™ Power MOSFETs can be employed for this application. This topology is well suited for low voltage, high current applications. In case of main supply failure, the inverter supplies power from the battery to the critical load through T1. Once the line voltage or main supply is restored, the inverter operates as a rectifier and charges the battery while supplying main power to the load.



ZVS Full-Bridge Topology with Synchronous Rectification

The figure above illustrates a general zero voltage switched full-bridge power converter topology. The input stage, a full-bridge topology, contains four primary side MOSFET devices labeled Q1, Q2, Q3, and Q4. The current doubler at the secondary-side is a synchronous rectifier with two MOSFETs labeled Q5 and Q6. IXYS GigaMOS™ TrenchT2™ Power MOSFETs can be implemented for this synchronous rectification.