

PolarP2™ Power MOSFETs

LATEST GENERATION OF RUGGED AND FAST POLAR-SERIES POWER MOSFETS

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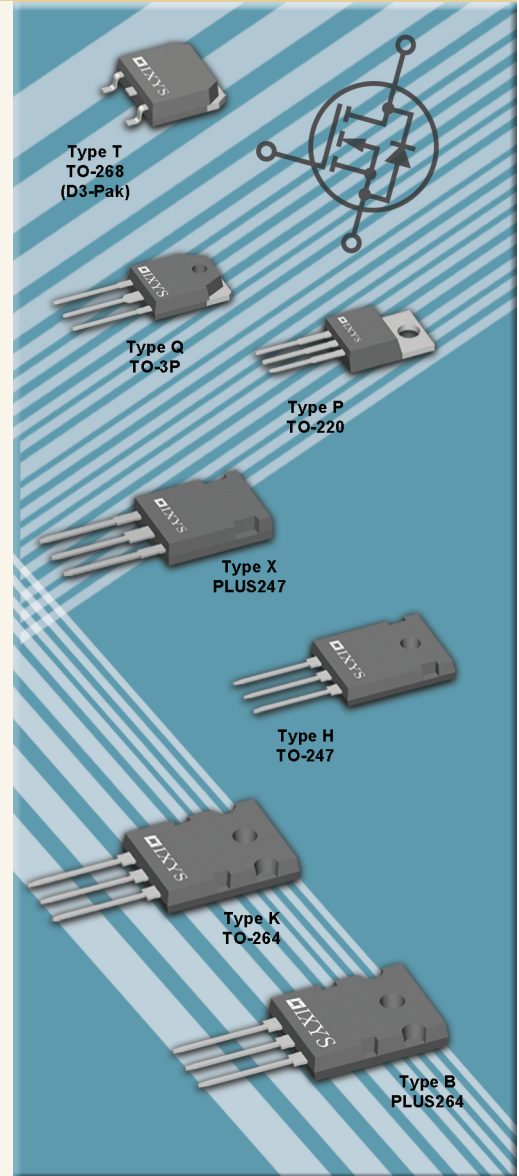
OVERVIEW

IXYS extends its portfolio of rugged and energy-efficient Power MOSFET solutions with the introduction of its new PolarP2™ Power MOSFET family. These new devices are manufactured using IXYS' proprietary PolarP2™ Technology Platform, yielding new and improved devices that feature an optimized combination of low on-state resistance and gate charge, achieving a FOM (Figure of Merit: $R_{ds(on)} \times Q_g$) as low as 12ohm/nC. The newly introduced PolarP2™ Power MOSFET Family consist of two subclasses, presenting end-customers greater system design flexibility and the opportunity to select a device with the best combination of performance and cost. These subclasses include the cost-effective PolarP2™ Standard and the high-performance PolarP2 HiPerFET™.

PolarP2™ Standard Power MOSFETs are available with drain current ratings of 16, 22, 42, and 52 Amperes and are tailored to provide designers with a device solution that offers the best compromise between performance and cost. In comparison to previous Polar-Series generations, these new standard versions demonstrate up to a 20 percent reduction in on-state resistance ($R_{ds(on)}$) while maintaining low gate charge values (As low as 43nC). The avalanche capabilities of these devices add an additional safeguard against over-voltage transients.

PolarP2 HiPerFET™ versions are offered with drain current ratings of 24, 42, 22, 74, 94 and 120 Amperes. These high-performance versions retain all the features and advantages of the PolarP2™ Standard versions, with the added benefit of a fast intrinsic rectifier for increased turn-off dV/dt immunity and low reverse recovery speeds ($t_{rr} \leq 250ns$). Furthermore, these new devices eliminate the need for discrete anti-parallel high voltage diodes used in conventional designs, thereby reducing part count, simplifying PCB layouts, reducing overall losses and improving power density. The featured fast intrinsic body diode properties of these HiPerFET™ versions play a pivotal role in overall device performance by providing faster transient response, increased power efficiency, improved ruggedness, and higher operating frequencies. These combined performance enhancements make them ideal device selections for popular zero voltage switching (ZVS) topologies where body diode reverse recovery characteristics are critical.

The superior performance, energy savings, rugged design, and cost-effectiveness of these new 2nd generation Polar-Series Power MOSFETs allow for the development of more efficient power subsystems in applications such as high frequency inverters in power conversion and solar energy generation. These devices are also ideal for switch/resonant-mode power supplies and UPS's for telecommunication, base stations, servers, and server farms and energy efficient consumer appliances. Other applications that will benefit from these devices include power factor correction circuits, motor drives, lamp ballasts, laser drivers, DC-DC converters, robotics and servo control.



FEATURES

- Avalanche rated
- International standard packages
- Dynamic dV/dt rating
- Fast intrinsic diode (HiPerFET™ versions)
- Low $R_{ds(on)}$ and Q_g
- Low package inductance

BENEFITS

- High power density
- Easy to mount
- Space savings

APPLICATIONS

- DC-DC converters
- Battery chargers
- Lamp ballasts
- Switch-mode and resonant-mode power supplies
- AC and DC motor drives
- High speed power switching applications (HiPerFET™ versions)
- Robotics and servo controls
- Laser drivers

N-Channel PolarP2™ MOSFET Family

Part Number	Vdss max (V)	Id @ Tc=25°C (A)	Rds(on) @ Tj=25°C (Ω)	Ciss typ (pF)	Qg typ (nC)	trr max (ns)	RthJC max (°C/W)	Pd (W)	Package Type
Standard Version									
IXTH450P2	500	16	0.33	2530	43	400	0.42	300	TO-247
IOTP450P2	500	16	0.33	2530	43	400	0.42	300	TO-220
IXTQ450P2	500	16	0.33	2530	43	400	0.42	300	TO-3P
IXTQ460P2	500	22	0.27	3020	58	400	0.25	500	TO-3P
IXTQ470P2	500	42	0.145	5400	88	400	0.15	830	TO-3P
IXTQ480P2	500	52	0.12	6800	108	400	0.13	960	TO-3P
HiPerFET™ Version									
IXFH42N50P2	500	42	0.145	5300	92	250	0.15	830	TO-247
IXFT42N50P2	500	42	0.145	5300	92	250	0.15	830	TO-268
IXFH52N50P2	500	52	0.12	6800	113	250	0.13	960	TO-247
IXFT52N50P2	500	52	0.12	6800	113	250	0.13	960	TO-268
IXFK74N50P2	500	74	0.077	9900	165	250	0.089	1400	TO-264
IXFX74N50P2	500	74	0.077	9900	165	250	0.089	1400	PLUS247
IXFK94N50P2	500	94	0.055	13700	220	250	0.096	1300	TO-264
IXFX94N50P2	500	94	0.055	13700	220	250	0.096	1300	PLUS247
IXFB120N50P2	500	120	0.043	19000	300	300	0.066	1890	PLUS264

Application Circuits

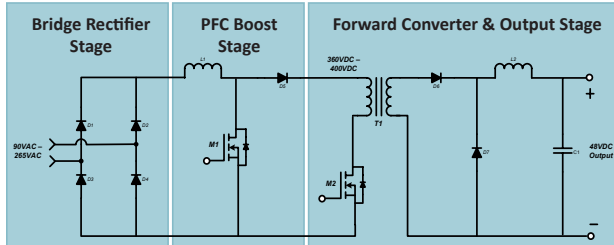


Figure 1: 48V Telecom Power Supply Topology

Figure 1 depicts a basic circuit topology of a 48V Telecom Power Supply. This power supply is comprised of three stages: Full-bridge Rectifier Stage, PFC Boost Stage, and a Forward Converter Stage. An AC voltage originating from a power source is converted into a DC value through a full bridge rectifier stage. This DC value is then processed via a PFC boost stage to keep the input mains current and voltage in phase and to boost the DC bus voltages up to 400VDC. This DC bus voltage is stepped down through the use of a forward converter which uses a MOSFET (M2) as a control power switch. Transformer (T1) is utilized to provide galvanic isolation between the input line and output line. IXYS PolarP2™ Std. or HiPerFET™ Power MOSFETs can be employed as power switch solutions in the PFC Boost (M1) and Forward Converter (M2) stages, providing fast and efficient power switching operation.

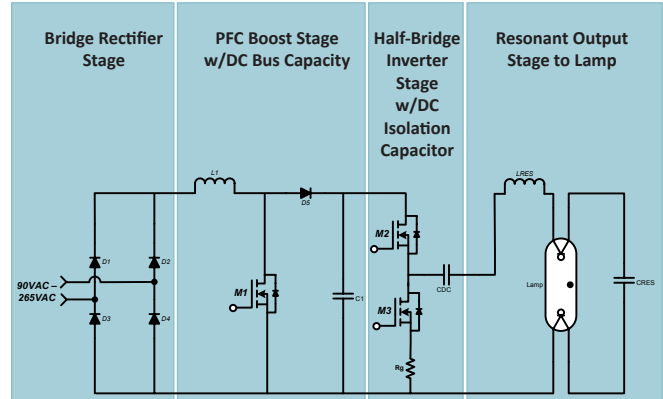


Figure 2: Fluorescent Lamp Ballast Topology

Figure 2 illustrates a basic fluorescent lamp ballast topology. This basic lamp ballast topology includes a full bridge rectifier stage, power factor correction boost stage, half-bridge inverter stage and resonant output stage. An AC power source is converted into a DC value via the bridge rectifier stage. This DC value is then processed via PFC boost stage to keep the main current and voltage in phase and to provide DC bus voltages of up to 400VDC. This DC value is then fed into a half-bridge inverter to drive the resonant output stage. The output of the resonant L-C circuit is used to control the fluorescent lamp. IXYS PolarP2™ Std and HiPerFET™ Power MOSFET can be implemented in the PFC boost (M1) Stage or half-bridge inverter (M2 & M3) stage for efficient and robust power switching duties.