

650V Ultra Junction X2-Class HiPerFET™ Power MOSFETs

Optimized for soft switching power conversion applications

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OVERVIEW

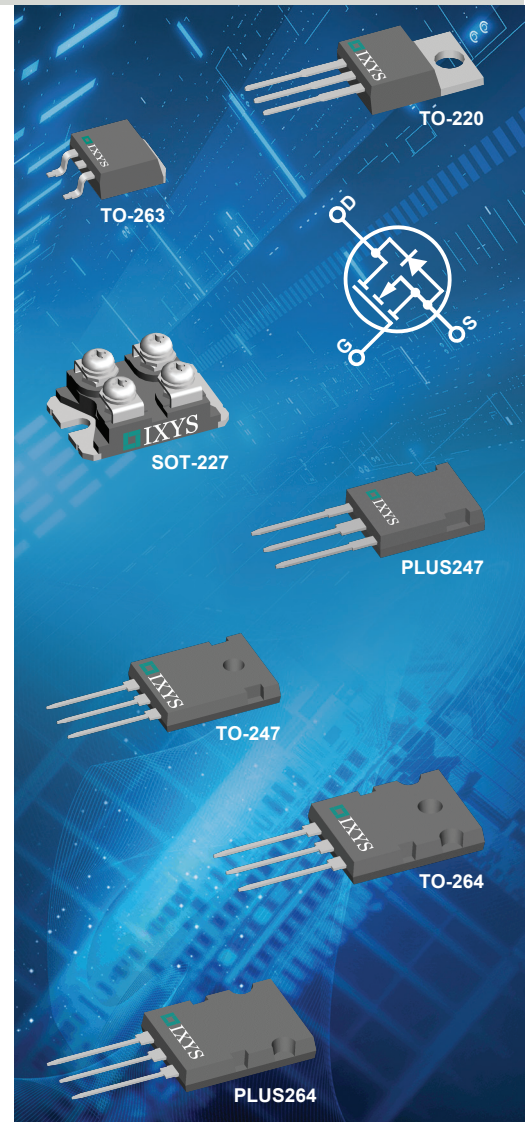
IXYS Corporation (NASDAQ: IXYS), a global manufacturer of power semiconductors and integrated circuits (ICs) for energy efficiency, power management, transportation, medical, and motor control applications, announces an expansion of its Ultra Junction Power MOSFET product line: 650V X2-Class Power MOSFETs with fast body diodes. With on-resistance as low as 17 milliohms and current ratings ranging from 22A to 150A, these devices are optimized for soft-switching resonant-mode power conversion applications.

The intrinsic fast body diodes HiPerFETs™ of the MOSFETs display very soft recovery characteristics, minimizing electromagnetic interference (EMI), especially in half or full-bridge switching topologies. With low reverse recovery charge and time, the body diodes can be utilized to make sure that all the energies are removed during high-speed switching to avoid device failure and achieve high efficiency.

Like other Ultra Junction MOSFETs from IXYS, these new devices have been developed using a charge compensation principle and proprietary process technology, resulting in Power MOSFETs with significantly reduced on-resistance and gate charge. They also exhibit a superior dv/dt performance and are avalanche rated as well. Thanks to the positive temperature coefficient of their on-state resistance, they can be operated in parallel to meet higher current requirements.

Suitable applications include resonant-mode power supplies, high intensity discharge (HID) lamp ballast, AC and DC motor drives, DC-DC converters, robotic and servo control, battery chargers, 3-level solar inverters, and LED lighting.

These new 650V X2 Power MOSFETs with HiPerFET™ body diodes are available in the following international standard size packages: TO-220, TO-263, SOT-227, TO-247, PLUS247, TO-264, and PLUS264. Some example part numbers include IXFA22N65X2, IXFH46N65X2, IXFK120N65X2, and IXFN150N65X2, with drain current ratings of 22A, 34A, 120A, and 145A, respectively.



FEATURES

- Low $R_{DS(ON)}$ and Q_g
- Fast body diode
- dv/dt ruggedness
- Avalanche rated
- Low package inductance
- International standard packages

ADVANTAGES

- Higher efficiency
- High power density
- Easy to mount
- Space savings

APPLICATIONS

- Resonant mode power supplies
- High intensity discharge (HID) lamp ballast
- AC and DC motor drives
- DC-DC converters
- Robotic and servo control
- Battery chargers
- 3-level solar inverters
- LED lighting
- Unmanned Aerial Vehicles (UAVs)

Available Parts

Part Number	V_{DSS} (V)	I_{D25} $T_c = 25^\circ\text{C}$ (A)	$R_{DS(on)}$ $T_J = 25^\circ\text{C}$ max (Ω)	$Q_{g(on)}$ typ (nC)	C_{iss} typ (pF)	t_{rr} typ (ns)	$R_{th(jc)}$ max ($^\circ\text{C}/\text{W}$)	P_D max (W)	Package Type
IXFA22N65X2	650	22	0.145	37	2190	145	0.32	390	TO-263
IXFH22N65X2	650	22	0.145	37	2190	145	0.32	390	TO-247
IXFP22N65X2	650	22	0.145	37	2190	145	0.32	390	TO-220
IXFH34N65X2	650	34	0.1	56	3230	164	0.23	540	TO-247
IXFH46N65X2	650	46	0.069	98	4570	180	0.19	660	TO-247
IXFH60N65X2	650	60	0.052	108	6300	180	0.16	780	TO-247
IXFH80N65X2	650	80	0.038	140	8300	200	0.14	890	TO-247
IXFK100N65X2	650	100	0.03	183	10800	200	0.12	1040	TO-264
IXFX100N65X2	650	100	0.03	183	10800	200	0.12	1040	PLUS247
IXFN120N65X2	650	108	0.024	240	14000	220	0.14	890	SOT-227
IXFK120N65X2	650	120	0.024	240	14000	220	0.1	1250	TO-264
IXFX120N65X2	650	120	0.024	240	14000	220	0.1	1250	PLUS247
IXFN150N65X2	650	145	0.017	355	21000	260	0.12	1040	SOT-227
IXFB150N65X2	650	150	0.017	355	21000	260	0.08	1560	PLUS264

Application Circuits

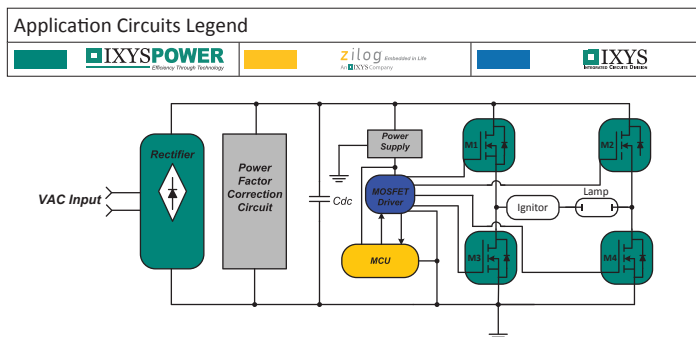


Figure 1: High Intensity Discharge (HID) lamp ballast

Figure 2 illustrates a typical LLC resonant DC-DC converter. It consists of a half-bridge stage, control unit (power supply, MCU, and MOSFET gate driver), resonant tank, and a rectifier and filter stage. The resonant tank is made up of the inductors (L_r and L_m) and capacitor (C_r). Two Ultra Junction HiPerFET™ MOSFETs (**IXFK120N65X2**) are paired to form the LLC half-bridge resonant converter stage to ensure a fast, space-saving, and energy-efficient power switching operation.

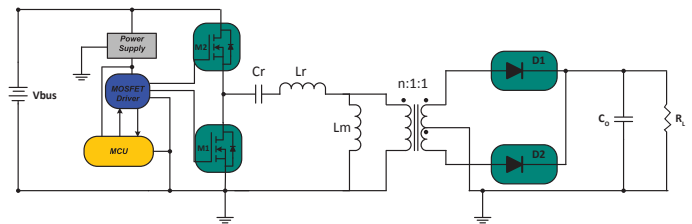


Figure 2: LLC resonant half-bridge converter

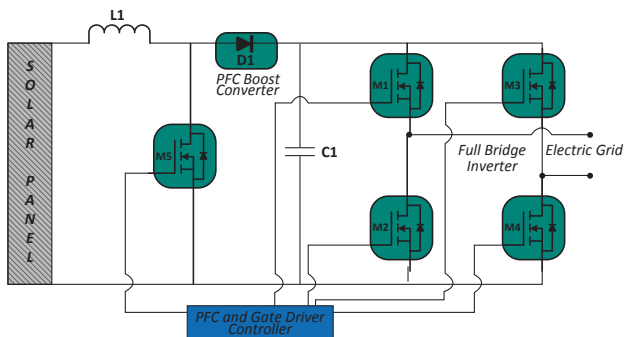


Figure 3: Solar inverter

Figure 3 depicts a generic solar inverter circuit comprised of a Power Factor Correction (PFC) boost converter and full-bridge power inverter stage. The input power from the solar panel enters the PFC converter and then the full-bridge inverter, before interfacing with the electrical grid. Four **IXFH80N65X2** Ultra-Junction HiPerFET™ MOSFETs (M1, M2, M3, and M4) can be utilized to construct the full-bridge stage. The **IXTH80N65X2** (M5), one of our previously released Ultra Junction devices optimized for hard-switching applications, can be used to realize the PFC.