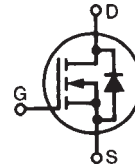


# PolarHV™ HiPerFET IXFN 48N60P

## Power MOSFET

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



$$V_{DSS} = 600 \text{ V}$$

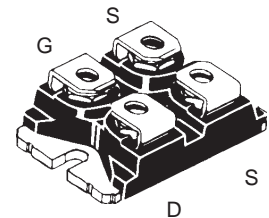
$$I_{D25} = 40 \text{ A}$$

$$R_{DS(on)} \leq 140 \text{ m}\Omega$$

$$t_{rr} \leq 200 \text{ ns}$$

| Symbol        | Test Conditions   | Maximum Ratings                          |                          |
|---------------|---|--|--------------------------|
| $V_{DSS}$     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$   | 600                                      | V                        |
| $V_{DGR}$     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$  | 600                                      | V                        |
| $V_{GSS}$     | Continuous  | $\pm 30$                                 | V                        |
| $V_{GSM}$     | Transient   | $\pm 40$                                 | V                        |
| $I_{D25}$     | $T_C = 25^\circ\text{C}$  | 40                                       | A                        |
| $I_{DM}$      | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$  | 110                                      | A                        |
| $I_{AR}$      | $T_C = 25^\circ\text{C}$  | 48                                       | A                        |
| $E_{AR}$      | $T_C = 25^\circ\text{C}$  | 70                                       | mJ                       |
| $E_{AS}$      | $T_C = 25^\circ\text{C}$  | 2.0                                      | J                        |
| $dv/dt$       | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2 \Omega$ | 10                                       | V/ns                     |
| $P_D$         | $T_C = 25^\circ\text{C}$  | 625                                      | W                        |
| $T_J$         |   | -55 ... +150                             | $^\circ\text{C}$         |
| $T_{JM}$      |   | 150                                      | $^\circ\text{C}$         |
| $T_{stg}$     |   | -55 ... +150                             | $^\circ\text{C}$         |
| $T_L$         | 1.6 mm (0.062 in.) from case for 10 s   | 300                                      | $^\circ\text{C}$         |
| $V_{ISOL}$    | 50/60 Hz, RMS<br>$I_{ISOL} \leq 1 \text{ mA}$   | $t = 1 \text{ min}$<br>$t = 1 \text{ s}$ | 2500<br>3000<br>V~<br>V~ |
| $M_d$         | Mounting torque<br>Terminal connection torque   | 1.5 / 13                                 | Nm/lb.in.<br>Nm/lb.in.   |
| <b>Weight</b> |   | 30                                       | g                        |

miniBLOC, SOT-227 B (IXFN)  
E153432



G = Gate  
S = Source  
D = Drain

Either Source terminal S can be used as the Source terminal or the Kelvin Source (gate return) terminal.

### Features

- International standard package
- Encapsulating epoxy meets UL 94 V-0, flammability classification
- miniBLOC with Aluminium nitride isolation
- Fast recovery diode
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
  - easy to drive and to protect

### Advantages

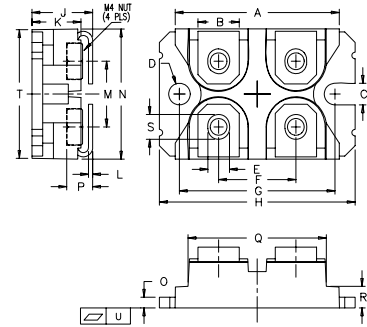
- Easy to mount
- Space savings
- High power density

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                      | Characteristic Values |      |  |
|--------------|--|-----------------------|------|--|
|              |  | Min.                  | Typ. | Max.                                   |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$   | 600                   |      | V                                      |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 8 \text{ mA}$   | 3.0                   |      | 5.5 V                                  |
| $I_{GSS}$    | $V_{GS} = \pm 30 \text{ V}_{DC}$ , $V_{DS} = 0$  |                       |      | $\pm 200 \text{ nA}$                   |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0 \text{ V}$<br>$T_J = 125^\circ\text{C}$  |                       |      | 25 $\mu\text{A}$<br>1000 $\mu\text{A}$ |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 4 \text{ A}$<br>Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2 \%$ |                       |      | 140 $\text{m}\Omega$                   |

| Symbol       | Test Conditions  | Characteristic Values                               |      |          |
|--------------|--|---|------|----------|
|              |  | (T <sub>J</sub> = 25°C, unless otherwise specified) |      |          |
|              |  | Min.  | Typ. | Max.     |
| $g_{fs}$     | $V_{DS} = 20\text{ V}; I_D = 24\text{ A}$ , pulse test                       | 35  | 53   | S        |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                |   | 8860 | pF       |
| $C_{oss}$    |  |   | 850  | pF       |
| $C_{rss}$    |  |   | 60   | pF       |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 24\text{ A}$<br>$R_G = 2\ \Omega$ (External) |   | 30   | ns       |
| $t_r$        |  |   | 25   | ns       |
| $t_{d(off)}$ |  |   | 85   | ns       |
| $t_f$        |  |   | 22   | ns       |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 24\text{ A}$              |   | 150  | nC       |
| $Q_{gs}$     |  |   | 50   | nC       |
| $Q_{gd}$     |  |   | 50   | nC       |
| $R_{thJC}$   | SOT-227B   |   |      | 0.2 °C/W |
| $R_{thCS}$   |  |   | 0.05 | °C/W     |

| Symbol   | Test Conditions   | Characteristic Values                               |      |               |
|----------|---|---|------|---------------|
|          |   | (T <sub>J</sub> = 25°C, unless otherwise specified) |      |               |
|          |   | Min.  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{ V}$   |   |      | 48 A          |
| $I_{SM}$ | Repetitive  |   |      | 110 A         |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{ V}$ ,<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$ |   |      | 1.5 V         |
| $t_{rr}$ | $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}$<br>$V_R = 100\text{ V}$                        |   |      | 200 ns        |
| $Q_{RM}$ |   |   | 0.8  | $\mu\text{C}$ |
| $I_{RM}$ |   |   | 6.0  | A             |

### SOT-227B (IXFN) Outline

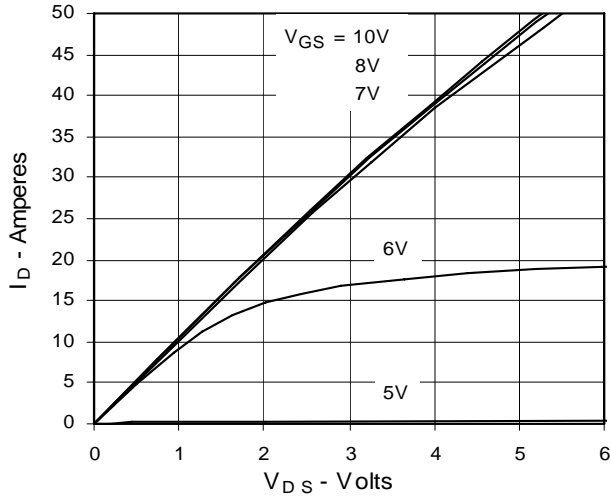


| SYM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 1.240  | 1.255 | 31.50       | 31.88 |
| B   | .307   | .323  | 7.80        | 8.20  |
| C   | .161   | .169  | 4.09        | 4.29  |
| D   | .161   | .169  | 4.09        | 4.29  |
| E   | .161   | .169  | 4.09        | 4.29  |
| F   | .587   | .595  | 14.91       | 15.11 |
| G   | 1.186  | 1.193 | 30.12       | 30.30 |
| H   | 1.496  | 1.505 | 38.00       | 38.23 |
| J   | .460   | .481  | 11.68       | 12.22 |
| K   | .351   | .378  | 8.92        | 9.60  |
| L   | .030   | .033  | 0.76        | 0.84  |
| M   | .496   | .506  | 12.60       | 12.85 |
| N   | .990   | 1.001 | 25.15       | 25.42 |
| O   | .078   | .084  | 1.98        | 2.13  |
| P   | .195   | .235  | 4.95        | 5.97  |
| Q   | 1.045  | 1.059 | 26.54       | 26.90 |
| R   | .155   | .174  | 3.94        | 4.42  |
| S   | .186   | .191  | 4.72        | 4.85  |
| T   | .968   | .987  | 24.59       | 25.07 |
| U   | -.002  | .004  | -0.05       | 0.1   |

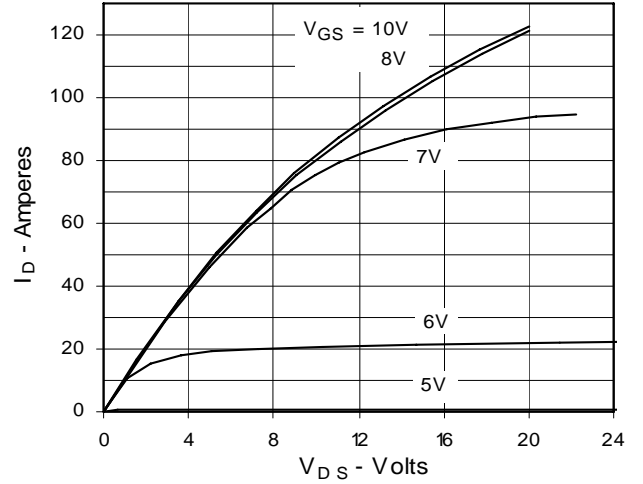
IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETs and IGBTs are covered by 4,835,592 4,931,844 5,049,961 5,237,481 6,162,665 6,404,065 B1 6,683,344 6,727,585  
 one or more of the following U.S. patents: 4,850,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405 B2 6,759,692  
 4,881,106 5,034,796 5,187,117 5,486,715 6,306,728 B1 6,583,505 6,710,463 6,771,478 B2

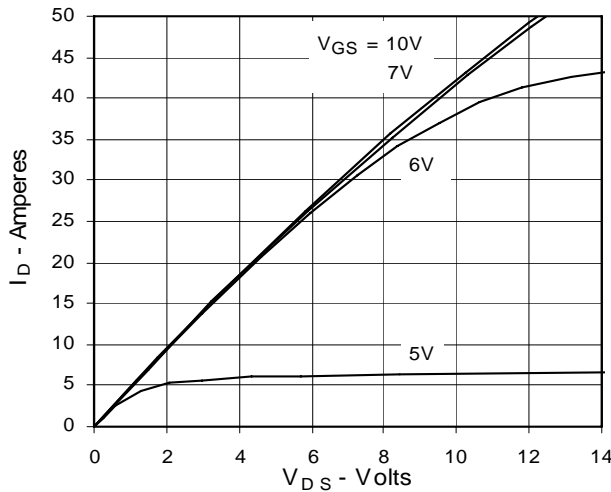
**Fig. 1. Output Characteristics  
@ 25°C**



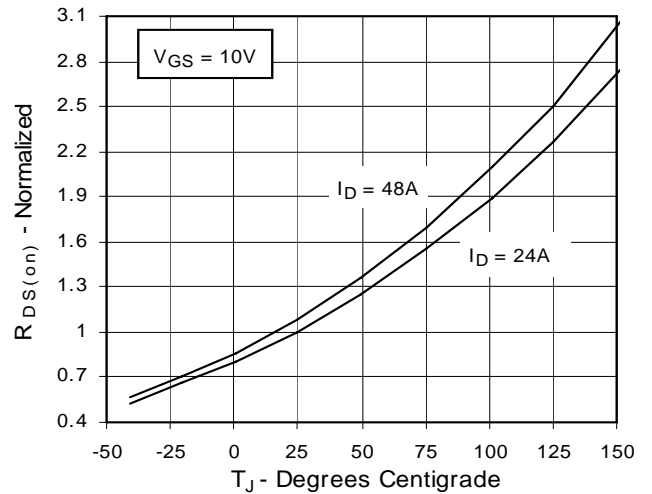
**Fig. 2. Extended Output Characteristics  
@ 25°C**



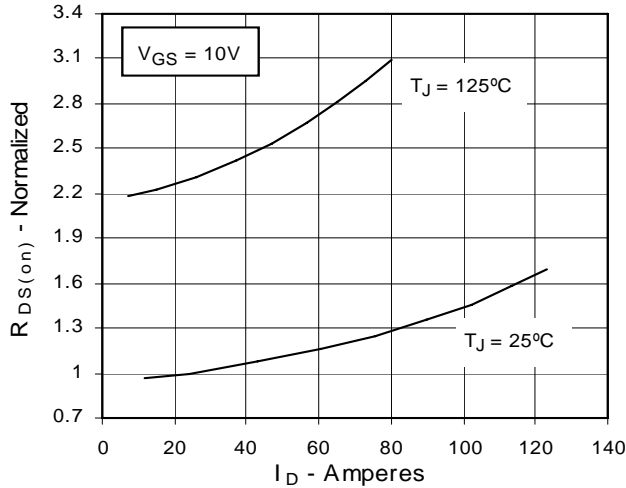
**Fig. 3. Output Characteristics  
@ 125°C**



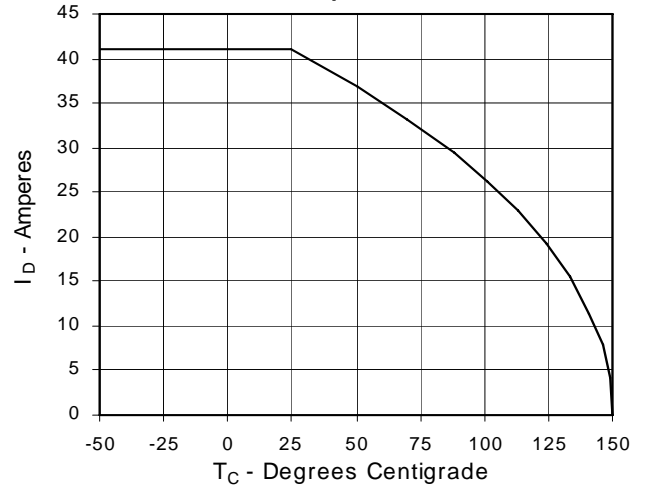
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 24A$   
Value vs. Junction Temperature**



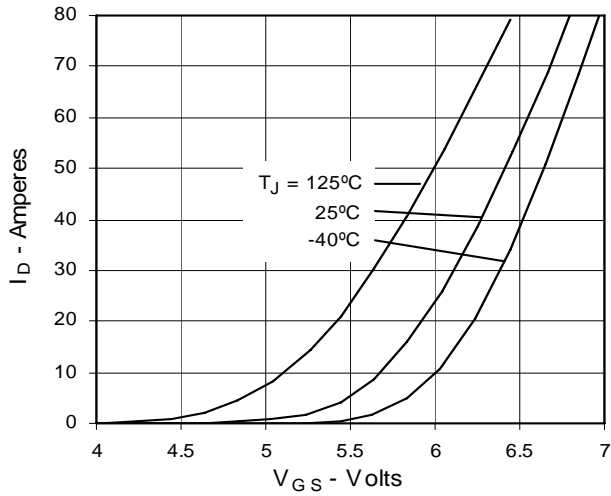
**Fig. 5.  $R_{DS(on)}$  Normalized to  
 $I_D = 24A$  Value vs. Drain Current**



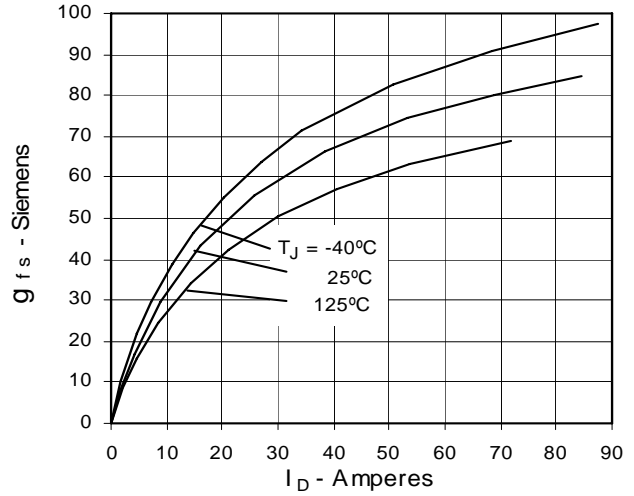
**Fig. 6. Drain Current vs. Case  
Temperature**



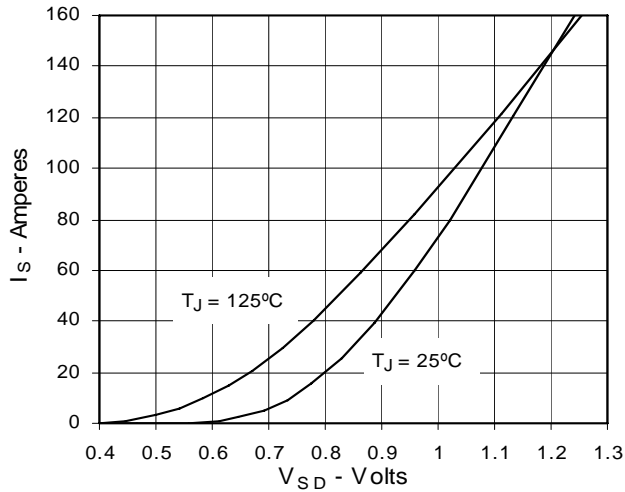
**Fig. 7. Input Admittance**



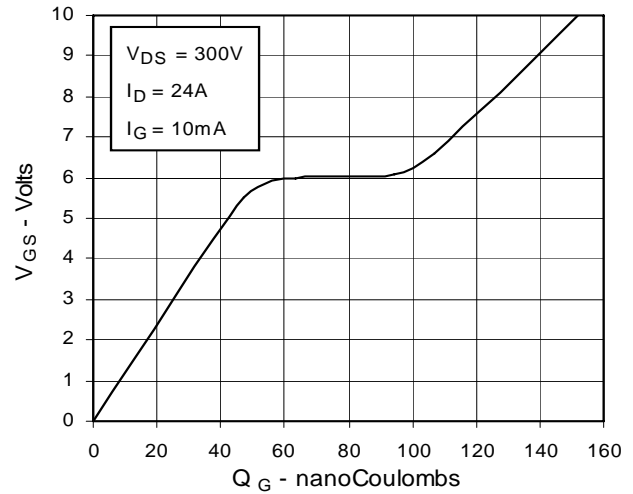
**Fig. 8. Transconductance**



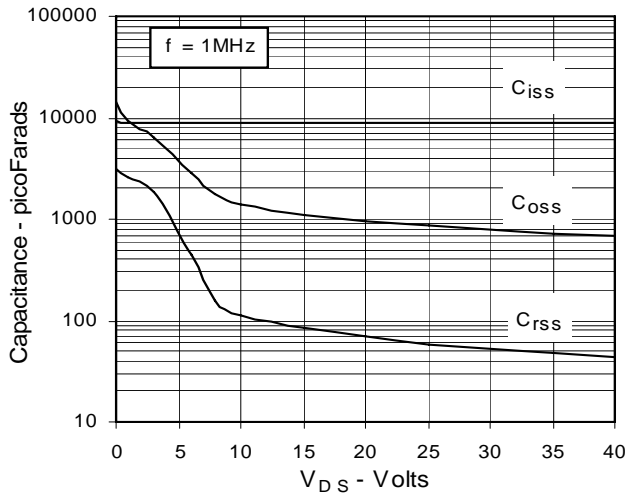
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 13. Maximum Transient Thermal Resistance**

