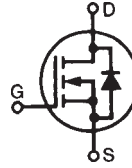


# PolarHV™ HiPerFET IXFN 48N60P

## Power MOSFET

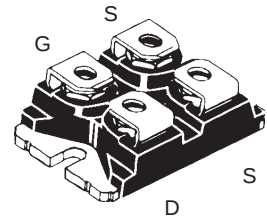
N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



$$\begin{aligned} V_{DSS} &= 600 \text{ V} \\ I_{D25} &= 40 \text{ A} \\ R_{DS(on)} &\leq 140 \text{ m}\Omega \\ t_{rr} &\leq 200 \text{ ns} \end{aligned}$$

| 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                                                                                                                           | $t = 1 \text{ min}$ | 2500 V~          |
|            | $I_{ISOL} \leq 1 \text{ mA}$                                                                                                            | $t = 1 \text{ s}$   | 3000 V~          |
| $M_d$      | Mounting torque                                                                                                                         | 1.5 / 13            | Nm/lb.in.        |
|            | Terminal connection torque                                                                                                              | 1.5 / 13            | Nm/lb.in.        |
| Weight     |                                                                                                                                         | 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

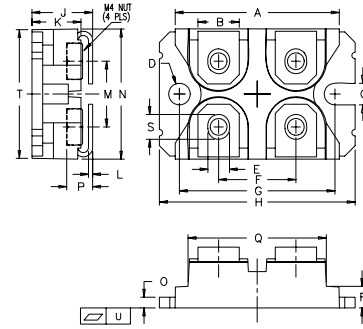
### Advantages

- 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                |
| $I_{GSS}$    | $V_{GS} = \pm 30 \text{ V}_{DC}$ , $V_{DS} = 0$                                                                  |                       |      | $\pm 200 \text{ nA}$ |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$                                                                                               |                       |      | 25 $\mu\text{A}$     |
|              | $V_{GS} = 0 \text{ V}$ , $T_J = 125^\circ\text{C}$                                                               |                       |      | 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<br>( $T_J = 25^\circ\text{C}$ , 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                                                                     |                                                                                   | 0.05 | $0.2\ ^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                              |                                                                                   |      | $^\circ\text{C/W}$      |

| Symbol   | Test Conditions                                                                                       | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , 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>$V_R = 100\text{ V}$                        |                                                                                   | 0.8  | 200 ns        |
| $Q_{RM}$ |                                                                                                       |                                                                                   |      | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                                       |                                                                                   |      | A             |

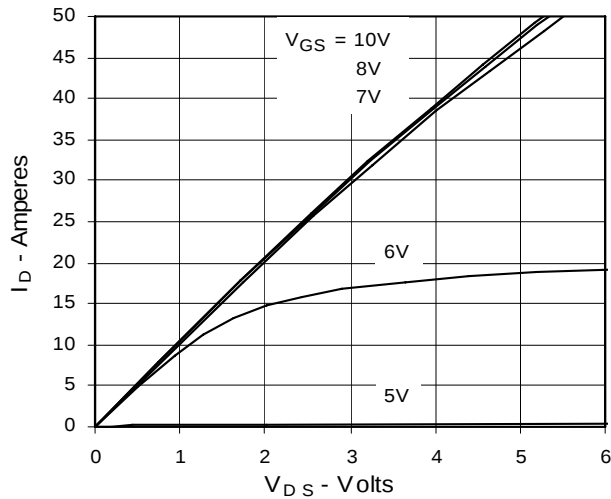
**SOT-227B (IXFN) Outline**


| 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   |

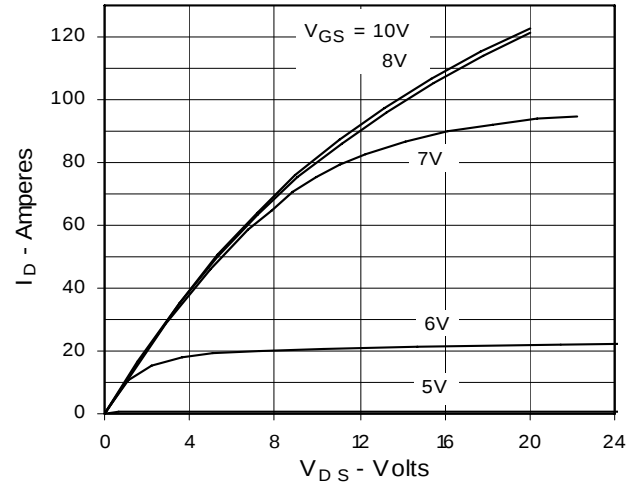
IXYS reserves the right to change limits, test conditions, and dimensions.

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

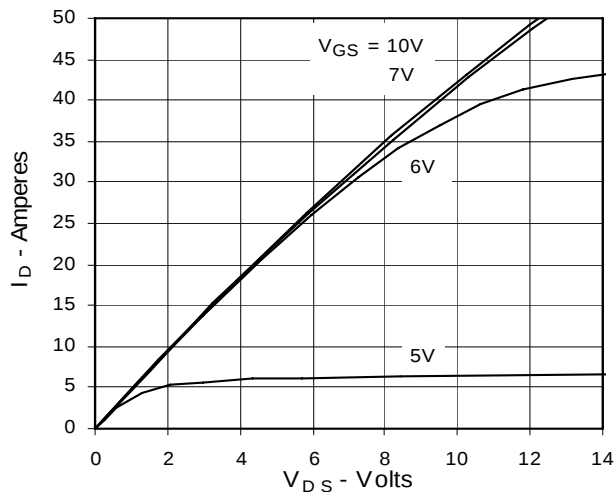
**Fig. 1. Output Characteristics**  
@ 25°C



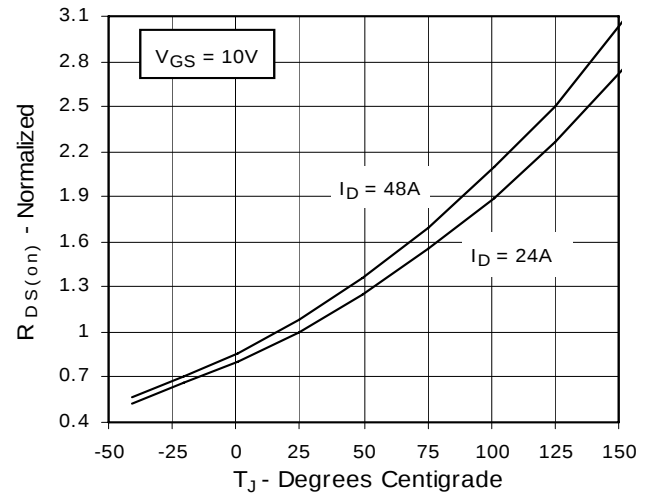
**Fig. 2. Extended Output Characteristics**  
@ 25°C



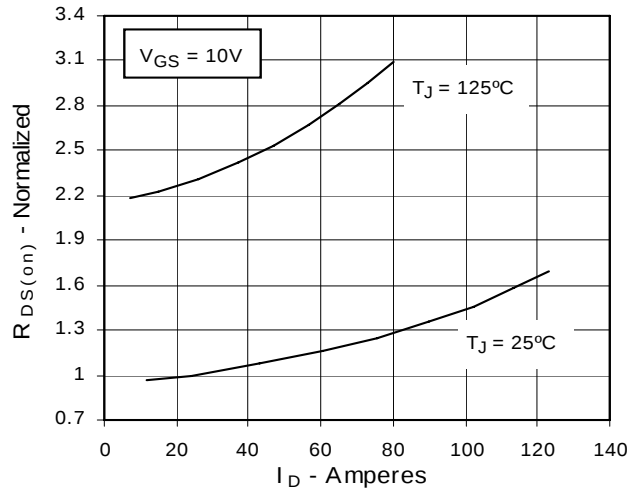
**Fig. 3. Output Characteristics**  
@ 125°C



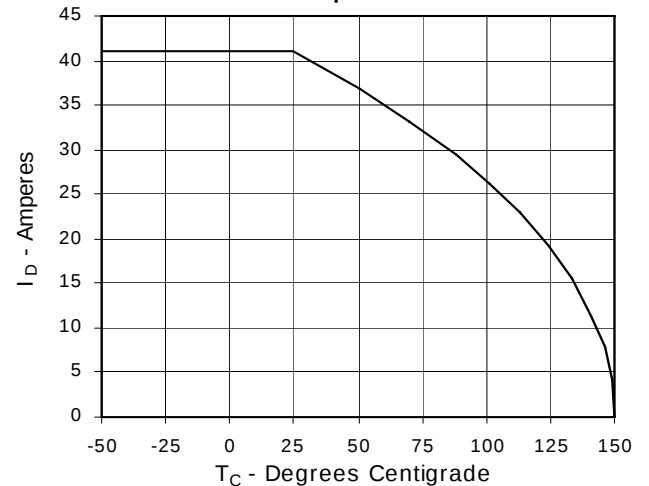
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 24A$  Value vs. Junction Temperature**



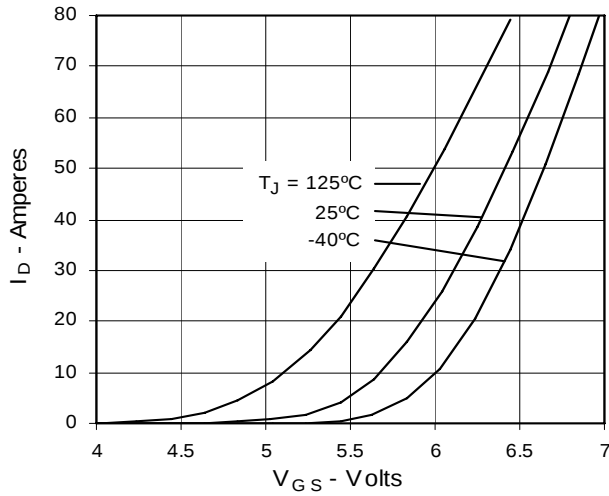
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 24A$  Value vs. Drain Current**



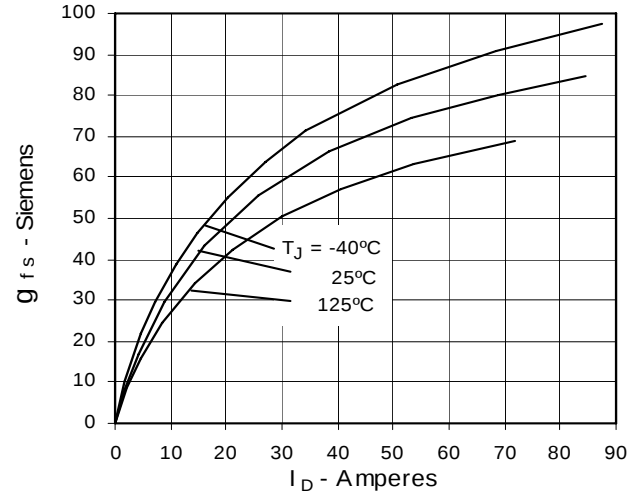
**Fig. 6. Drain Current vs. Case Temperature**



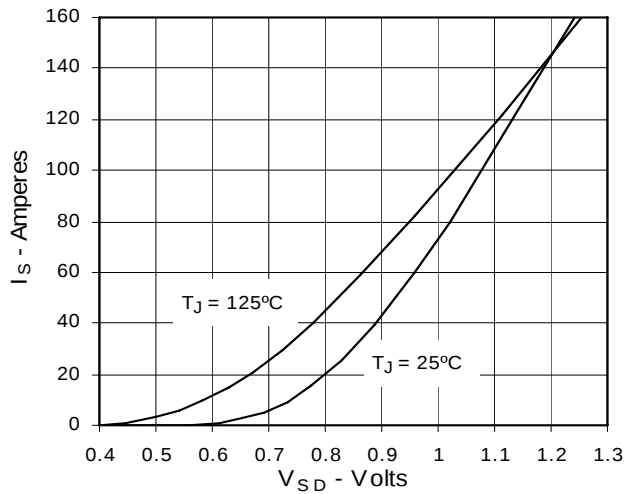
**Fig. 7. Input Admittance**



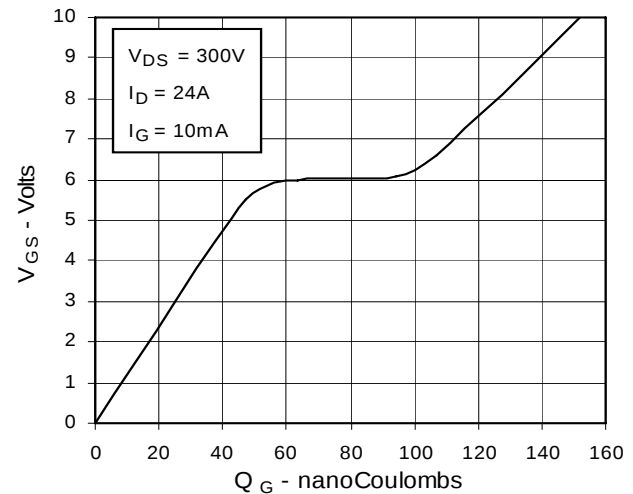
**Fig. 8. Transconductance**



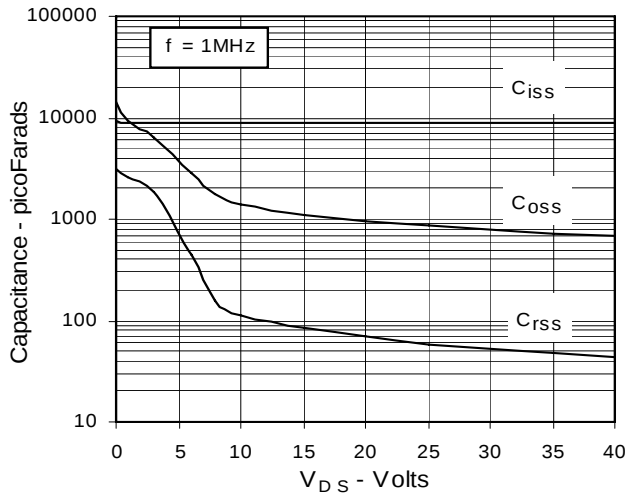
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



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

