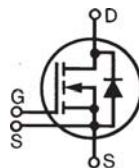


# Polar™ HiPerFET™ Power MOSFET

## IXFN300N10P

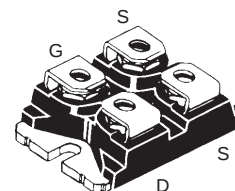
N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



$$\begin{aligned} V_{DSS} &= 100V \\ I_{D25} &= 295A \\ R_{DS(on)} &\leq 5.5m\Omega \\ t_{rr} &\leq 200ns \end{aligned}$$

| Symbol     | Test Conditions                                                    | Maximum Ratings |            |
|------------|--------------------------------------------------------------------|-----------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $175^\circ C$                                | 100             | V          |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $175^\circ C$ , $R_{GS} = 1M\Omega$          | 100             | V          |
| $V_{GSS}$  | Continuous                                                         | $\pm 20$        | V          |
| $V_{GSM}$  | Transient                                                          | $\pm 30$        | V          |
| $I_{D25}$  | $T_C = 25^\circ C$                                                 | 295             | A          |
| $I_{LRMS}$ | External Lead Current Limit                                        | 200             | A          |
| $I_{DM}$   | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$               | 900             | A          |
| $I_A$      | $T_C = 25^\circ C$                                                 | 100             | A          |
| $E_{AS}$   | $T_C = 25^\circ C$                                                 | 3               | J          |
| $dv/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 175^\circ C$ | 20              | V/ns       |
| $P_D$      | $T_C = 25^\circ C$                                                 | 1070            | W          |
| $T_J$      |                                                                    | -55 ... +175    | $^\circ C$ |
| $T_{JM}$   |                                                                    | 175             | $^\circ C$ |
| $T_{stg}$  |                                                                    | -55 ... +175    | $^\circ C$ |
| $T_L$      | 1.6mm (0.062 in.) from Case for 10s                                | 300             | $^\circ C$ |
| $V_{ISOL}$ | 50/60 Hz, RMS                                                      | $t = 1min$      | 2500 V~    |
|            | $I_{ISOL} \leq 1mA$                                                | $t = 1s$        | 3000 V~    |
| $M_d$      | Mounting Torque                                                    | 1.5/13          | Nm/lb.in   |
|            | Terminal Connection Torque                                         | 1.3/11.5        | Nm/lb.in   |
| Weight     |                                                                    | 30              | g          |

miniBLOC  
E153432



G = Gate  
S = Source  
D = Drain

Either Source terminal at miniBLOC can be used as Main or Kelvin Source

### Features

- International Standard Package
- miniBLOC, with Aluminium Nitride Isolation
- Low  $R_{DS(on)}$  and  $Q_G$
- Avalanche Rated
- Low Package Inductance
- Fast Intrinsic Rectifier

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

### Applications

- DC-DC Converters
- Battery Chargers
- Switch-Mode and Resonant-Mode Power Supplies
- DC Choppers
- AC and DC Motor Drives
- Uninterrupted Power Supplies
- High Speed Power Switching Applications

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                |
|--------------|-----------------------------------------------------------------------|-----------------------|------|----------------|
|              |                                                                       | Min.                  | Typ. | Max.           |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 3mA$                                           | 100                   |      | V              |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 8mA$                                       | 2.5                   |      | 5.0 V          |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                    |                       |      | $\pm 200$ nA   |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 150^\circ C$             |                       |      | 25 $\mu A$     |
|              |                                                                       |                       |      | 1.5 mA         |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 50A$ , Note 1                                 |                       |      | 5.5 m $\Omega$ |

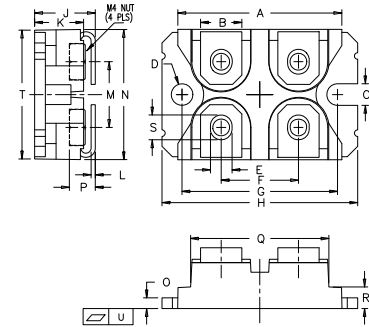
| Symbol       | Test Conditions                                                                                                          | Characteristic Values |      |               |
|--------------|--------------------------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|              |                                                                                                                          | Min.                  | Typ. | Max.          |
| $g_{fs}$     | $V_{DS} = 10V, I_D = 60A$ , Note 1                                                                                       | 55                    | 92   | S             |
| $C_{iss}$    | $V_{GS} = 0V, V_{DS} = 25V, f = 1MHz$                                                                                    |                       | 23   | nF            |
| $C_{oss}$    |                                                                                                                          |                       | 6100 | pF            |
| $C_{rss}$    |                                                                                                                          |                       | 417  | pF            |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10V, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 100A$<br>$R_G = 1\Omega$ (External) |                       | 36   | ns            |
| $t_r$        |                                                                                                                          |                       | 35   | ns            |
| $t_{d(off)}$ |                                                                                                                          |                       | 56   | ns            |
| $t_f$        |                                                                                                                          |                       | 25   | ns            |
| $Q_{g(on)}$  | $V_{GS} = 10V, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 150A$                                                                   |                       | 279  | nC            |
| $Q_{gs}$     |                                                                                                                          |                       | 84   | nC            |
| $Q_{gd}$     |                                                                                                                          |                       | 107  | nC            |
| $R_{thJC}$   |                                                                                                                          | 0.05                  | 0.14 | $^{\circ}C/W$ |
| $R_{thCS}$   |                                                                                                                          |                       |      | $^{\circ}C/W$ |

## Source-Drain Diode

| Symbol   | Test Conditions                                  | Characteristic Values |      |         |
|----------|--------------------------------------------------|-----------------------|------|---------|
|          |                                                  | Min.                  | Typ. | Max.    |
| $I_S$    | $V_{GS} = 0V$                                    |                       |      | 300 A   |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$      |                       |      | 1000 A  |
| $V_{SD}$ | $I_F = 100A, V_{GS} = 0V$ , Note 1               |                       |      | 1.3 V   |
| $t_{rr}$ | $I_F = 150A, -di/dt = 100A/\mu s$<br>$V_R = 50V$ | 0.71                  | 200  | ns      |
| $Q_{RM}$ |                                                  |                       |      | $\mu C$ |
| $I_{RM}$ |                                                  |                       |      | A       |

Note 1: Pulse test,  $t \leq 300\mu s$ , duty cycle,  $d \leq 2\%$ .

## SOT-227B Outline (IXFN)



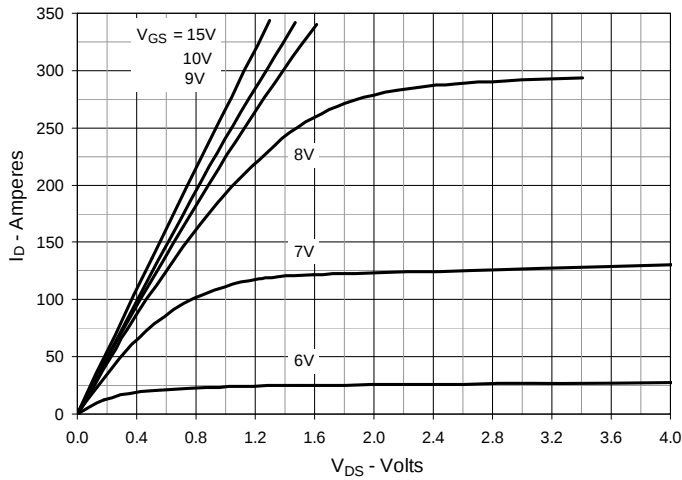
| SYM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 1.240  | 1.255 | 31.50       | 31.88 |
| B   | .307   | .323  | 7.80        | 8.20  |
| C   | .161   | .169  | 4.09        | 4.29  |
| D   | .161   | .169  | 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.

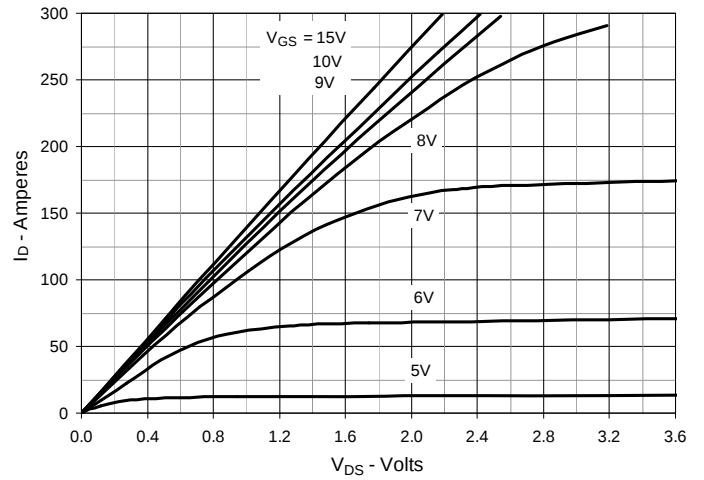
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |              |              |              |              |              |             |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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    | 7,005,734 B2 | 7,157,338B2 |
| 4,860,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 B1 | 6,534,343    | 6,710,405 B2 | 6,759,692    | 7,063,975 B2 |             |
| 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 | 7,071,537    |             |

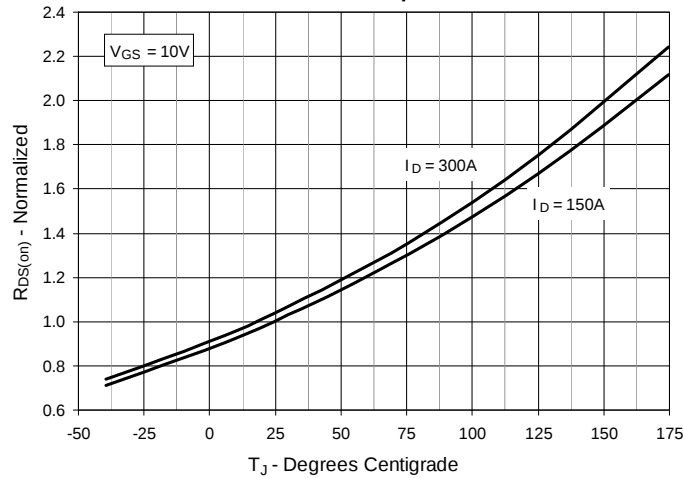
**Fig. 1. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



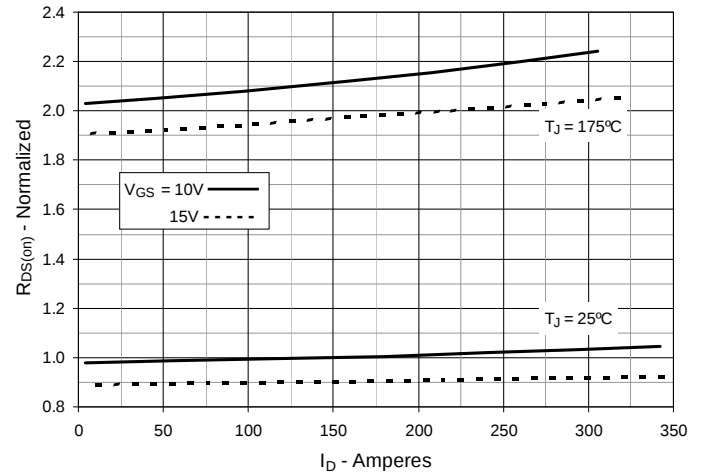
**Fig. 2. Output Characteristics @  $T_J = 150^\circ\text{C}$**



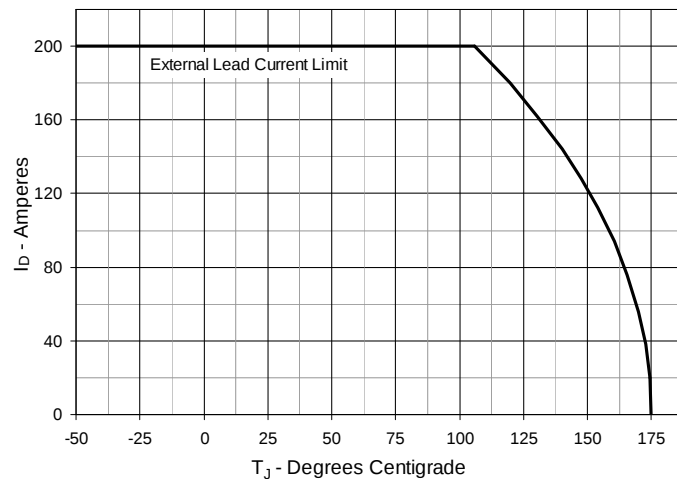
**Fig. 3.  $R_{DS(on)}$  Normalized to  $I_D = 150\text{A}$  Value vs. Junction Temperature**



**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 150\text{A}$  Value vs. Drain Current**



**Fig. 5. Maximum Drain Current vs. Case Temperature**



**Fig. 6. Input Admittance**

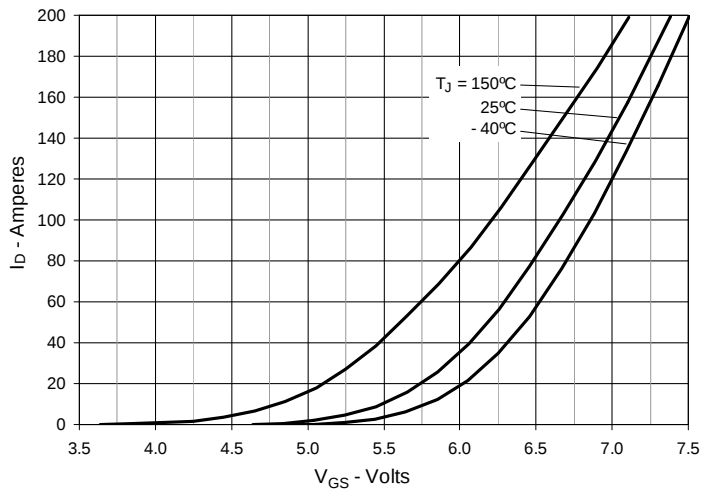


Fig. . Transconductance

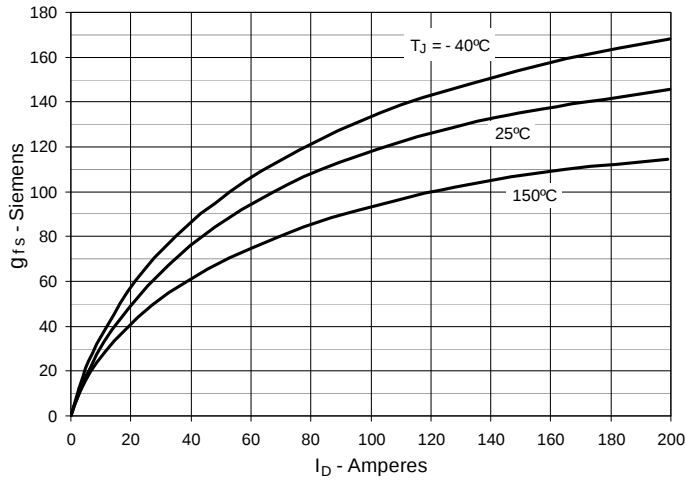


Fig. 8. Forward Voltage Drop of Intrinsic Diode

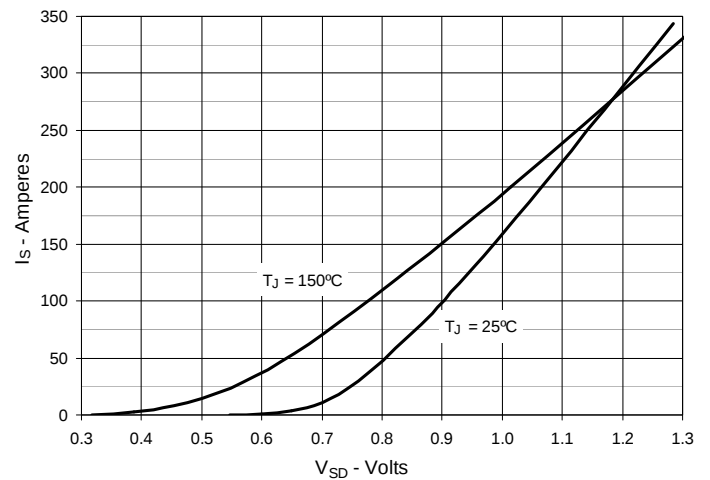


Fig. 9. Gate Charge

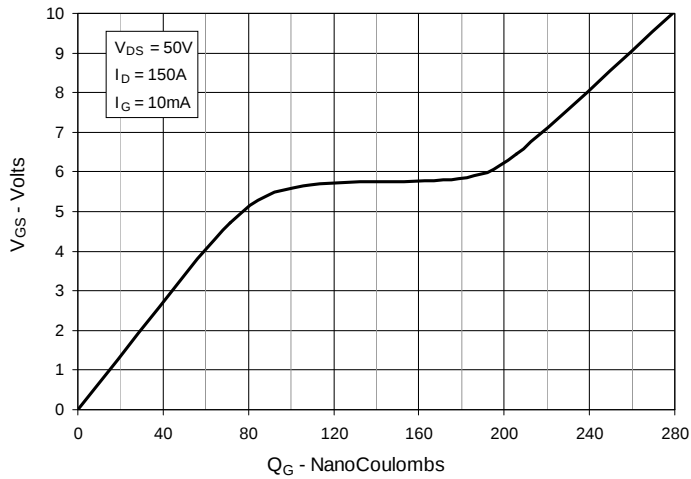


Fig. 10. Capacitance

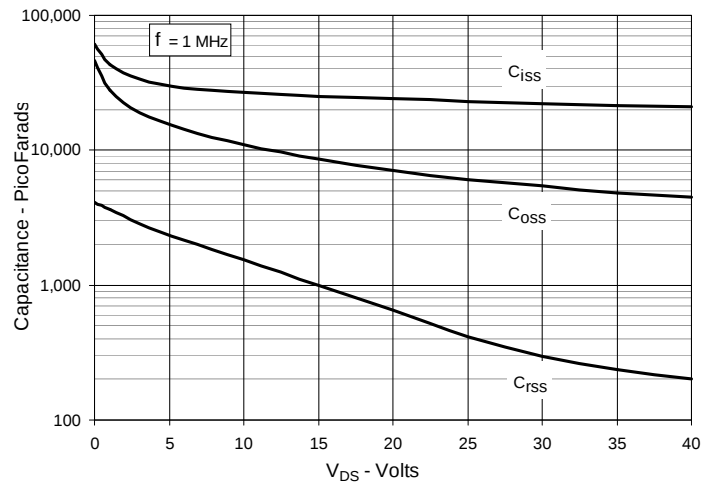


Fig. 11. Forward-Bias Safe Operating Area

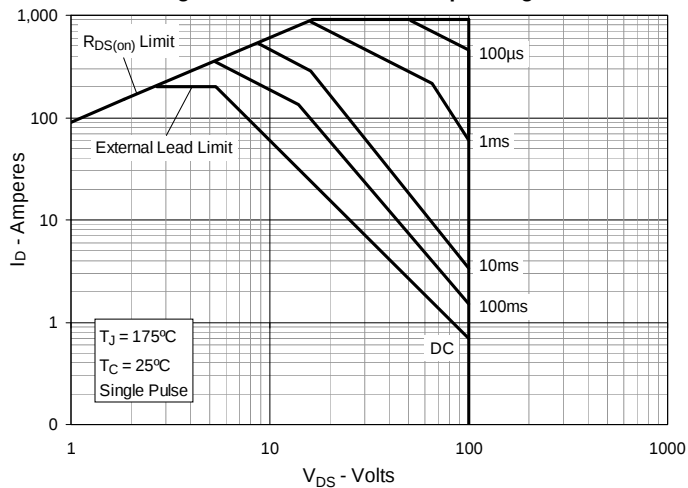
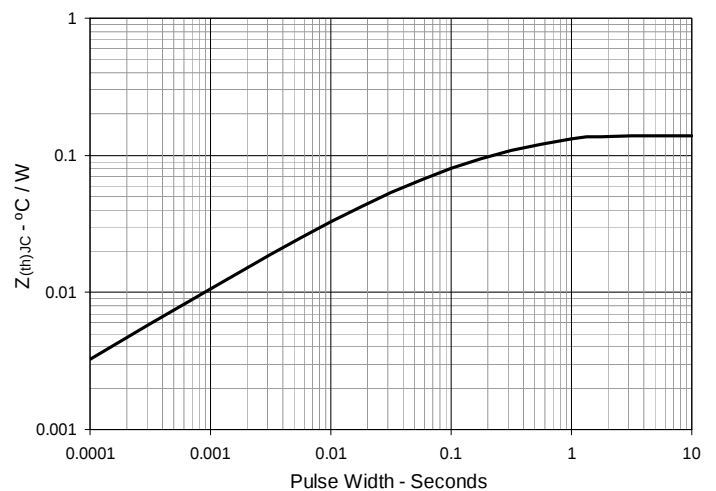


Fig. 12. Maximum Transient Thermal Impedance





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