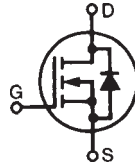


**Polar™ Power MOSFET**  
**HiPerFET™**

 N-Channel Enhancement Mode  
 Avalanche Rated  
 Fast Intrinsic Diode

**IXFH24N90P**  
**IXFT24N90P**


$$V_{DSS} = 900V$$

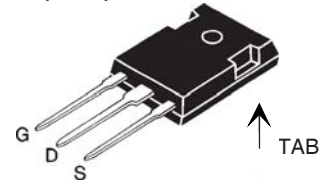
$$I_{D25} = 24A$$

$$R_{DS(on)} \leq 420m\Omega$$

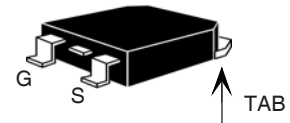
$$t_{rr} \leq 300ns$$

| Symbol        | Test Conditions  | Maximum Ratings |            |
|---------------|--|-----------------|------------|
| $V_{DSS}$     | $T_J = 25^\circ C$ to $150^\circ C$                                | 900             | V          |
| $V_{DGR}$     | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$          | 900             | V          |
| $V_{GSS}$     | Continuous   | $\pm 30$        | V          |
| $V_{GSM}$     | Transient  | $\pm 40$        | V          |
| $I_{D25}$     | $T_C = 25^\circ C$   | 24              | A          |
| $I_{DM}$      | $T_C = 25^\circ C$ , pulse width limited by $T_{JM}$               | 48              | A          |
| $I_A$         | $T_C = 25^\circ C$   | 12              | A          |
| $E_{AS}$      | $T_C = 25^\circ C$   | 1               | J          |
| $dV/dt$       | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$ | 15              | V/ns       |
| $P_D$         | $T_C = 25^\circ C$   | 660             | W          |
| $T_J$         |  | -55 ... +150    | $^\circ C$ |
| $T_{JM}$      |  | 150             | $^\circ C$ |
| $T_{stg}$     |  | -55 ... +150    | $^\circ C$ |
| $T_L$         | Maximum lead temperature for soldering                             | 300             | $^\circ C$ |
| $T_{SOLD}$    | Plastic body for 10s   | 260             | $^\circ C$ |
| $M_d$         | Mounting torque (TO-247)   | 1.13/10         | Nm/lb.in.  |
| <b>Weight</b> | TO-247   | 6               | g          |
|               | TO-268   | 4               | g          |

TO-247 (IXFH)



TO-268 (IXFT)



G = Gate    D = Drain  
 S = Source    TAB = Drain

**Features**

- International standard packages
- Avalanche Rated
- Low package inductance
- Fast intrinsic diode

**Advantages**

- Easy to mount
- Space savings
- High power density

**Applications:**

- Switched-mode and resonant-mode power supplies
- DC-DC Converters
- Laser Drivers
- AC and DC motor drives
- Robotics and servo controls

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , unless otherwise specified) | Characteristic Values |      |                |
|--------------|---|-----------------------|------|----------------|
|              |   | Min.                  | Typ. | Max.           |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 1mA$   | 900                   |      | V              |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 1mA$                                       | 3.5                   |      | 6.5 V          |
| $I_{GSS}$    | $V_{GS} = \pm 30V$ , $V_{DS} = 0V$                                    |                       |      | $\pm 200$ nA   |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0V$ $T_J = 125^\circ C$               |                       |      | 25 $\mu A$     |
|              |   |                       |      | 2 mA           |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                   |                       |      | 420 m $\Omega$ |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified)  | Characteristic Values |      |                        |
|--------------|--|-----------------------|------|------------------------|
|              |  | Min.                  | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 20\text{V}, I_D = 0.5 \cdot I_{D25}$ , Note 1  | 10                    | 16   | S                      |
| $R_{Gi}$     | Gate input resistance  |                       | 1.1  | $\Omega$               |
| $C_{iss}$    | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$   |                       | 7200 | pF                     |
| $C_{oss}$    |  |                       | 490  | pF                     |
| $C_{rss}$    |  |                       | 60   | pF                     |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$<br>$R_G = 2\Omega$ (External) |                       | 46   | ns                     |
| $t_r$        |  |                       | 40   | ns                     |
| $t_{d(off)}$ |  |                       | 68   | ns                     |
| $t_f$        |  |                       | 38   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$   |                       | 130  | nC                     |
| $Q_{gs}$     |  |                       | 50   | nC                     |
| $Q_{gd}$     |  |                       | 58   | nC                     |
| $R_{thJC}$   |  |                       |      | $0.19^\circ\text{C/W}$ |
| $R_{thCS}$   | (TO-247)   | 0.25                  |      | $^\circ\text{C/W}$     |

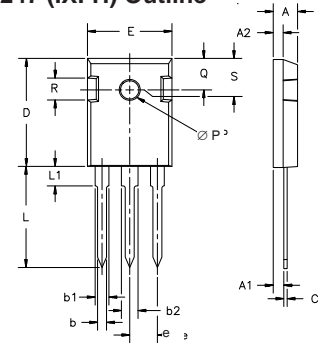
| Source-Drain Diode                                   |  | Characteristic Values |      |        |
|--|--|-----------------------|------|--------|
| $T_J = 25^\circ\text{C}$ unless otherwise specified) |  | Min.                  | Typ. | Max.   |
| $I_S$  | $V_{GS} = 0\text{V}$                                 |                       |      | 24 A   |
| $I_{SM}$   | Repetitive, pulse width limited by $T_{JM}$          |                       |      | 96 A   |
| $V_{SD}$   | $I_F = I_S, V_{GS} = 0\text{V}$ , Note 1             |                       |      | 1.5 V  |
| $t_{rr}$   | $I_F = 12\text{A}, -di/dt = 100\text{A}/\mu\text{s}$ |                       |      | 300 ns |
| $Q_{RM}$   |  |                       | 1.1  |        |
| $I_{RM}$   | $V_R = 100\text{V}, V_{GS} = 0\text{V}$              |                       | 11   | A      |

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

### PRELIMINARY TECHNICAL INFORMATION

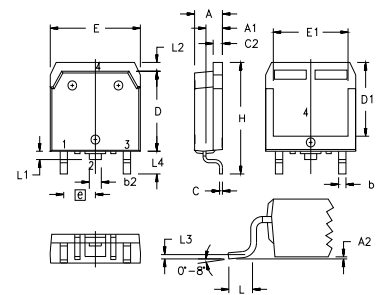
The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

### TO-247 (IXFH) Outline



| Dim.           | Millimeter |       | Inches |       |
|----------------|------------|-------|--------|-------|
|                | Min.       | Max.  | Min.   | Max.  |
| A              | 4.7        | 5.3   | .185   | .209  |
| A <sub>1</sub> | 2.2        | 2.54  | .087   | .102  |
| A <sub>2</sub> | 2.2        | 2.6   | .087   | .102  |
| b              | 1.0        | 1.4   | .040   | .055  |
| b <sub>1</sub> | 1.65       | 2.13  | .065   | .084  |
| b <sub>2</sub> | 2.87       | 3.12  | .113   | .123  |
| C              | .4         | .8    | .016   | .031  |
| D              | 20.80      | 21.46 | .819   | .845  |
| E              | 15.75      | 16.26 | .610   | .640  |
| e              | 5.20       | 5.72  | 0.205  | 0.225 |
| L              | 19.81      | 20.32 | .780   | .800  |
| L <sub>1</sub> |            | 4.50  |        | .177  |
| ∅P             | 3.55       | 3.65  | .140   | .144  |
| Q              | 5.89       | 6.40  | 0.232  | 0.252 |
| R              | 4.32       | 5.49  | .170   | .216  |
| S              | 6.15       | BSC   | 242    | BSC   |

### TO-268 Outline

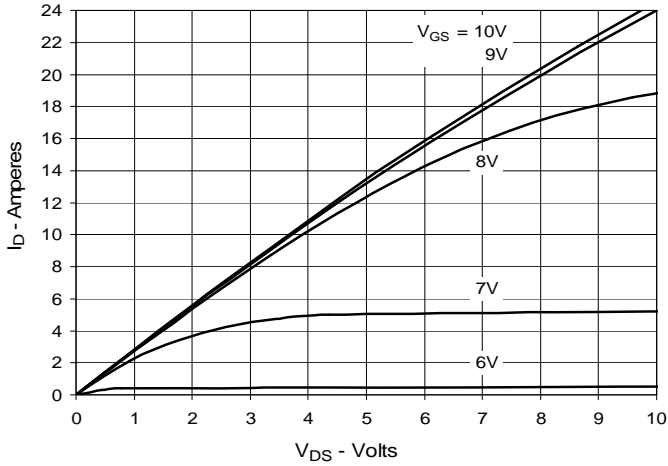


| SYM            | INCHES |          | MILLIMETERS |          |
|----------------|--------|----------|-------------|----------|
|                | MIN    | MAX      | MIN         | MAX      |
| A              | .193   | .201     | 4.90        | 5.10     |
| A <sub>1</sub> | .106   | .114     | 2.70        | 2.90     |
| A <sub>2</sub> | .001   | .010     | 0.02        | 0.25     |
| b              | .045   | .057     | 1.15        | 1.45     |
| b <sub>2</sub> | .075   | .083     | 1.90        | 2.10     |
| C              | .016   | .026     | 0.40        | 0.65     |
| C <sub>2</sub> | .057   | .063     | 1.45        | 1.60     |
| D              | .543   | .551     | 13.80       | 14.00    |
| D <sub>1</sub> | .488   | .500     | 12.40       | 12.70    |
| E              | .624   | .632     | 15.85       | 16.05    |
| E <sub>1</sub> | .524   | .535     | 13.30       | 13.60    |
| e              |        | .215 BSC |             | 5.45 BSC |
| H              | .736   | .752     | 18.70       | 19.10    |
| L              | .094   | .106     | 2.40        | 2.70     |
| L <sub>1</sub> | .047   | .055     | 1.20        | 1.40     |
| L <sub>2</sub> | .039   | .045     | 1.00        | 1.15     |
| L <sub>3</sub> |        | .010 BSC |             | 0.25 BSC |
| L <sub>4</sub> | .150   | .161     | 3.80        | 4.10     |

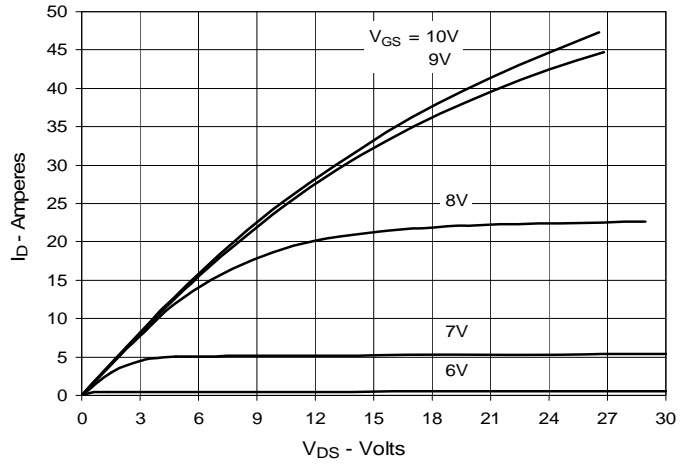
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IXYS MOSFETs and IGBTs are covered 4,835,592 4,931,844 5,049,961 5,237,481 6,162,665 6,404,065 B1 6,683,344 6,727,585 7,005,734 B2 7,157,338B2  
 by one or more of the following U.S. patents: 4,850,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405 B2 6,759,692 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

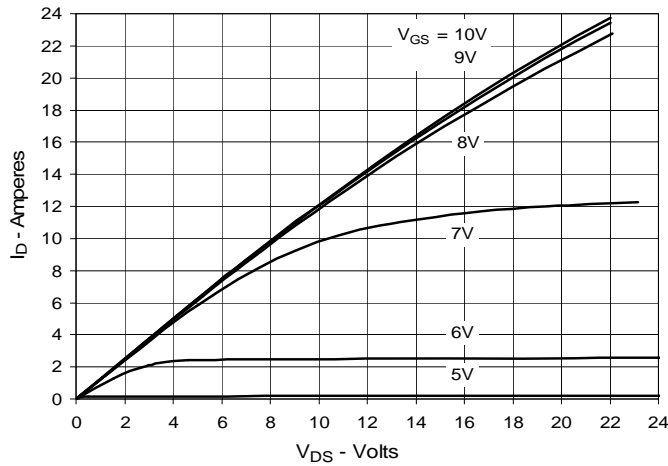
**Fig. 1. Output Characteristics @ 25°C**



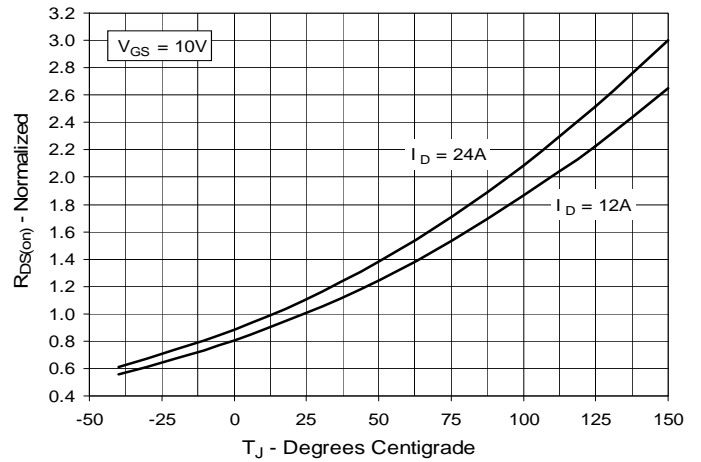
**Fig. 2. Extended Output Characteristics @ 25°C**



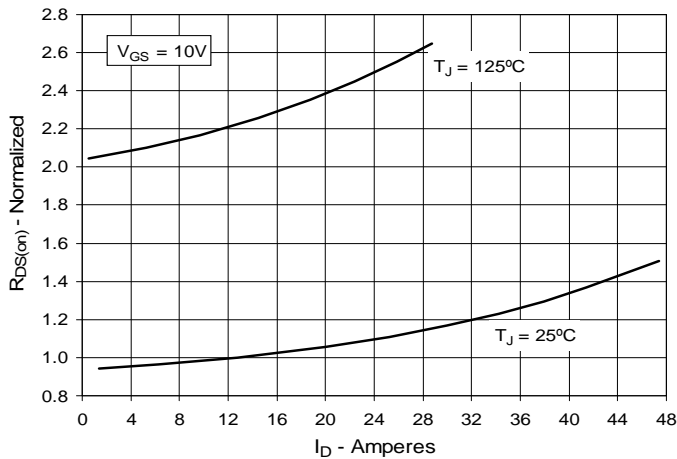
**Fig. 3. Output Characteristics @ 125°C**



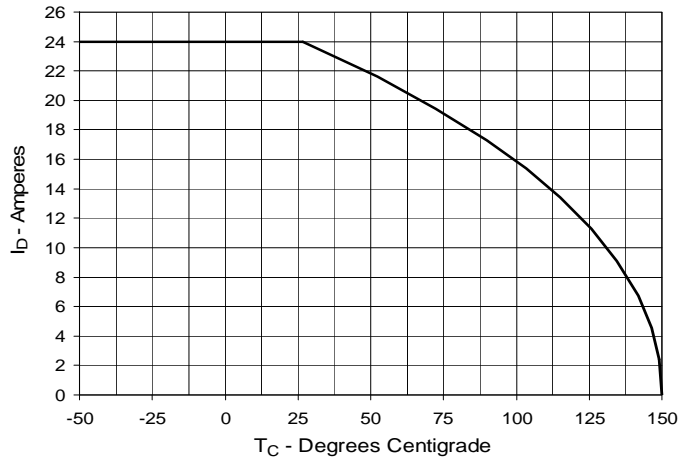
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 12A$  Value vs. Junction Temperature**



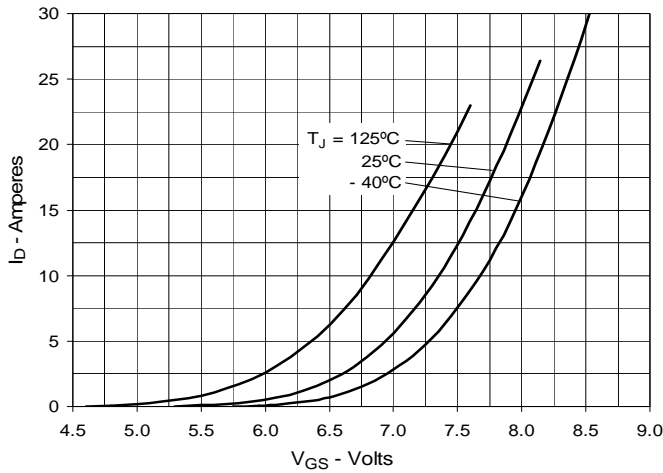
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 12A$  Value vs. Drain Current**



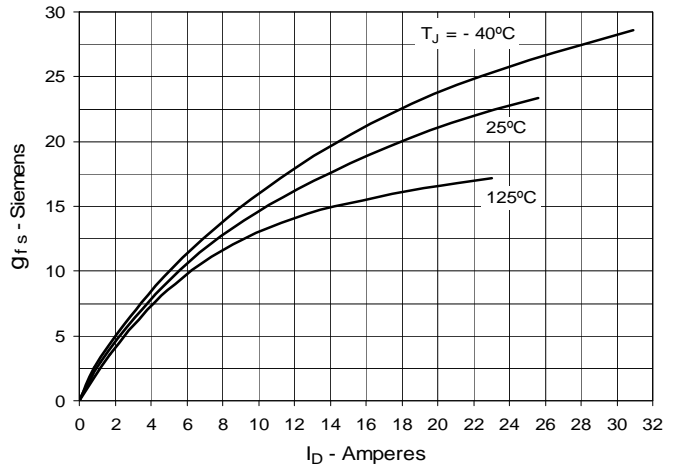
**Fig. 6. Maximum Drain Current vs. Case Temperature**



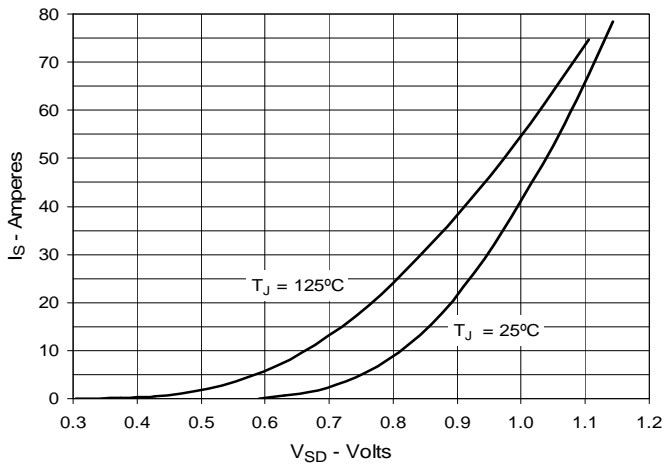
**Fig. 7. Input Admittance**



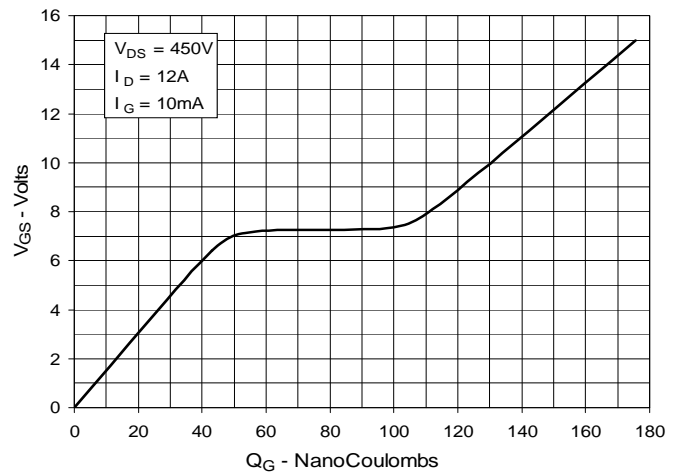
**Fig. 8. Transconductance**



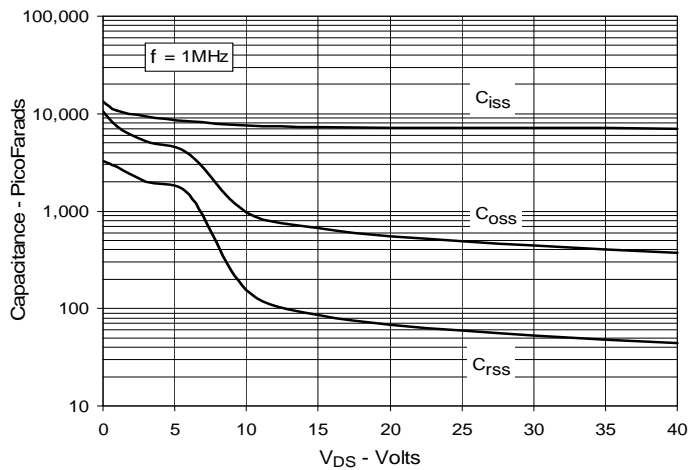
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



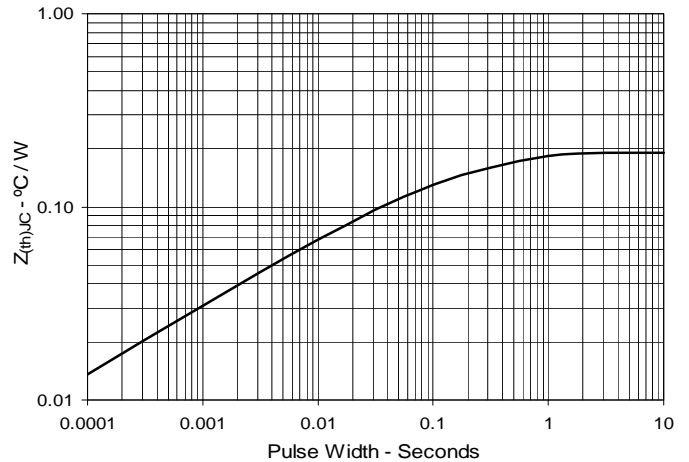
**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Maximum Transient Thermal Impedance**



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