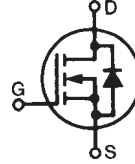


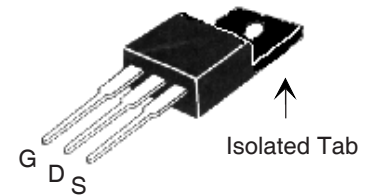
**Polar™ Power MOSFET**
**IXTA7N60PM**
**IXTP7N60PM**
**(Electrically Isolated Tab)**

 N-Channel Enhancement Mode  
 Avalanche Rated  
 Fast Intrinsic Diode


$$V_{DSS} = 600V$$

$$I_{D25} = 4A$$

$$R_{DS(on)} \leq 1.1\Omega$$

**OVERMOLDED TO-220  
 (IXTP...M) OUTLINE**

 G = Gate      D = Drain  
 S = Source

| Symbol        | Test Conditions   | Maximum Ratings |            |
|---------------|---|-----------------|------------|
| $V_{DSS}$     | $T_J = 25^\circ C$ to $150^\circ C$                             | 600             | V          |
| $V_{DGR}$     | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1 M\Omega$      | 600             | V          |
| $V_{GSS}$     | Continuous  | $\pm 30$        | V          |
| $V_{GSM}$     | Transient   | $\pm 40$        | V          |
| $I_{D25}$     | $T_C = 25^\circ C$  | 4               | A          |
| $I_{DM}$      | $T_C = 25^\circ C$ , pulse width limited by $T_{JM}$            | 14              | A          |
| $I_A$         | $T_C = 25^\circ C$  | 7               | A          |
| $E_{AS}$      | $T_C = 25^\circ C$  | 400             | mJ         |
| $dv/dt$       | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J = 150^\circ C$ | 10              | V/ns       |
| $P_D$         | $T_C = 25^\circ C$  | 41              | W          |
| $T_J$         |   | - 55 ... +150   | $^\circ C$ |
| $T_{JM}$      |   | 150             | $^\circ C$ |
| $T_{stg}$     |   | - 55 ... +150   | $^\circ C$ |
| $T_L$         | 1.6 mm (0.062 in.) from case for 10 s                           | 300             | $^\circ C$ |
| $T_{SOLD}$    | Plastic body for 10 s   | 260             | $^\circ C$ |
| $M_d$         | Mounting torque   | 1.13/10         | Nm/lb.in.  |
| <b>Weight</b> |   | 2.5             | g          |

**Features**

- Plastic overmolded tab for electrical isolation
- International standard package
- Avalanche rated
- Low package inductance
  - easy to drive and to protect

**Advantages**

- Easy to mount
- Space savings

**Applications**

- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- AC motor drives
- Uninterruptible power supplies
- High speed power switching applications

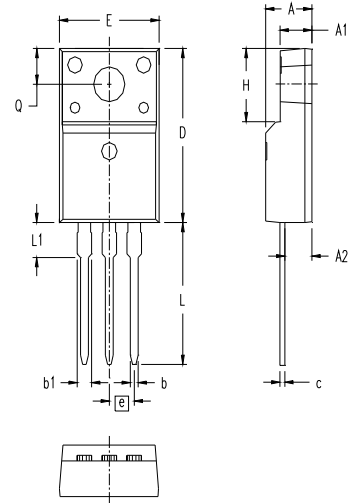
| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , unless otherwise specified) | Characteristic Values |      |                         |
|--------------|---|-----------------------|------|-------------------------|
|              |   | Min.                  | Typ. | Max.                    |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                      | 600                   |      | V                       |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 100\mu A$                                  | 3.0                   |      | 5.5 V                   |
| $I_{GSS}$    | $V_{GS} = \pm 30V$ , $V_{DS} = 0V$                                    |                       |      | $\pm 100$ nA            |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0V$                                   |                       |      | 5 $\mu A$<br>50 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 3.5A$ , Note 1                                |                       |      | 1.1 $\Omega$            |

| Symbol       | Test Conditions  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |          |
|--------------|--|---|------|----------|
|              |  | Min.  | Typ. | Max.     |
| $g_{fs}$     | $V_{DS} = 10\text{V}, I_D = 3.5\text{A}$ , Note 1                    | 4   | 7    | S        |
| $C_{iss}$    | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$           |   | 1180 | pF       |
| $C_{oss}$    |  |   | 110  | pF       |
| $C_{rss}$    |  |   | 11   | pF       |
| $t_{d(on)}$  | <b>Resistive Switching Times</b>                                     |   | 20   | ns       |
| $t_r$        | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 7\text{A}$   |   | 27   | ns       |
| $t_{d(off)}$ | $R_G = 18\Omega$ (External)  |   | 65   | ns       |
| $t_f$        |  |   | 26   | ns       |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 3.5\text{A}$ |   | 20   | nC       |
| $Q_{gs}$     |  |   | 7    | nC       |
| $Q_{gd}$     |  |   | 7    | nC       |
| $R_{thJC}$   |  |   |      | 3.0 °C/W |

### Source-Drain Diode

| Symbol   | Test Conditions  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) |      |       |
|----------|--|---|------|-------|
|          |  | Min.  | Typ. | Max.  |
| $I_S$    | $V_{GS} = 0\text{V}$   |   |      | 7 A   |
| $I_{SM}$ | Repetitive, pulse width limited by $T_{JM}$  |   |      | 28 A  |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{V}$ , Note 1   |   |      | 1.5 V |
| $t_{rr}$ | $I_F = 7\text{A}, -di/dt = 100\text{A}/\mu\text{s}, V_R = 100\text{V}, V_{GS} = 0\text{V}$ |   | 500  | ns    |

### ISOLATED TO-220 (IXTP...M)



Terminals: 1 - Gate  
2 - Drain (Collector)  
3 - Source (Emitter)

| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .177     | .193 | 4.50        | 4.90  |
| A1  | .092     | .108 | 2.34        | 2.74  |
| A2  | .101     | .117 | 2.56        | 2.96  |
| b   | .028     | .035 | 0.70        | 0.90  |
| b1  | .050     | .058 | 1.27        | 1.47  |
| c   | .018     | .024 | 0.45        | 0.60  |
| D   | .617     | .633 | 15.67       | 16.07 |
| E   | .392     | .408 | 9.96        | 10.36 |
| e   | .100 BSC |      | 2.54 BSC    |       |
| H   | .255     | .271 | 6.48        | 6.88  |
| L   | .499     | .523 | 12.68       | 13.28 |
| L1  | .119     | .135 | 3.03        | 3.43  |
| ∅P  | .121     | .129 | 3.08        | 3.28  |
| Q   | .126     | .134 | 3.20        | 3.40  |

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

### PRELIMINARY TECHNICAL INFORMATION

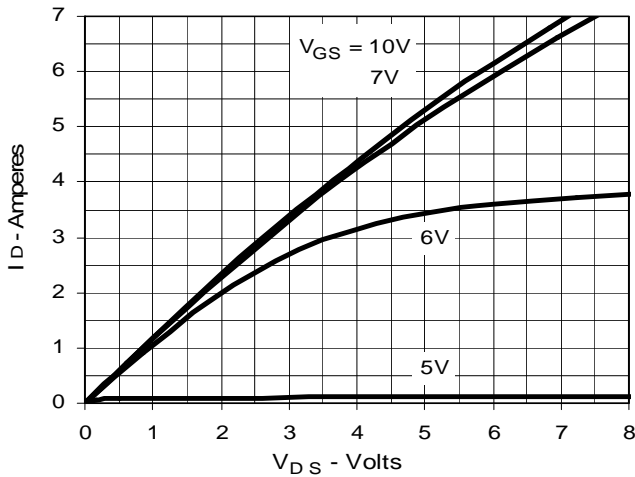
The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right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

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

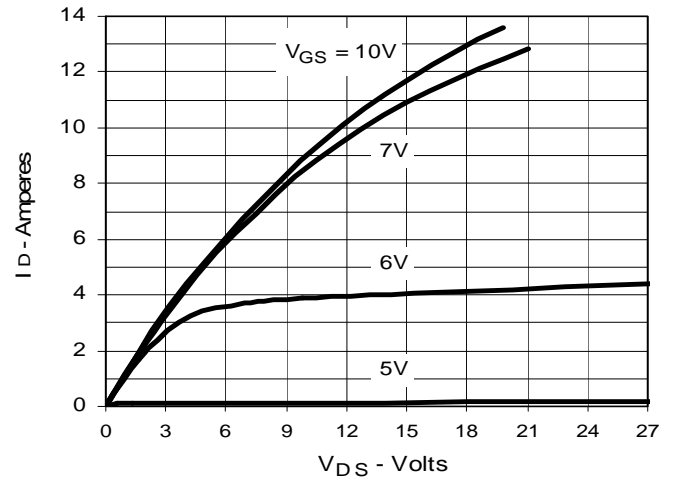
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |              |              |              |              |              |             |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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 |
| 4,850,072 | 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    |             |

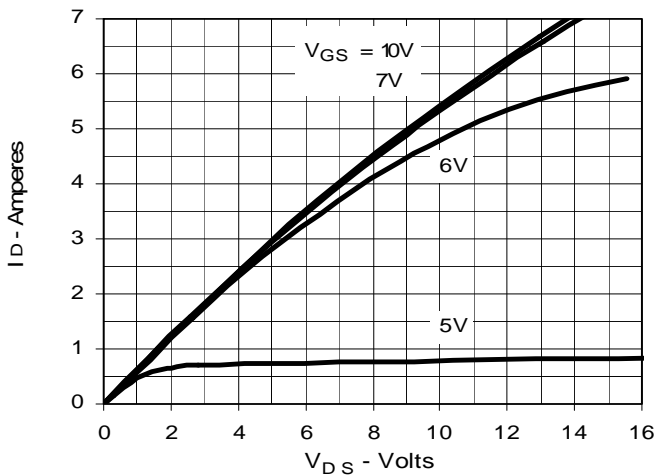
**Fig. 1. Output Characteristics  
@ 25°C**



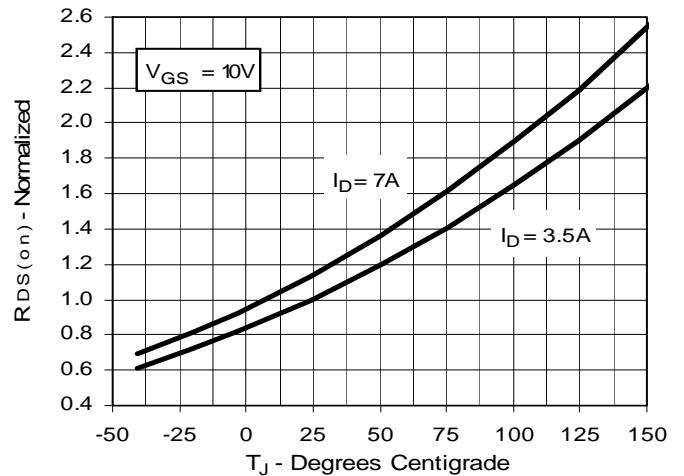
**Fig. 2. Extended Output Characteristics  
@ 25°C**



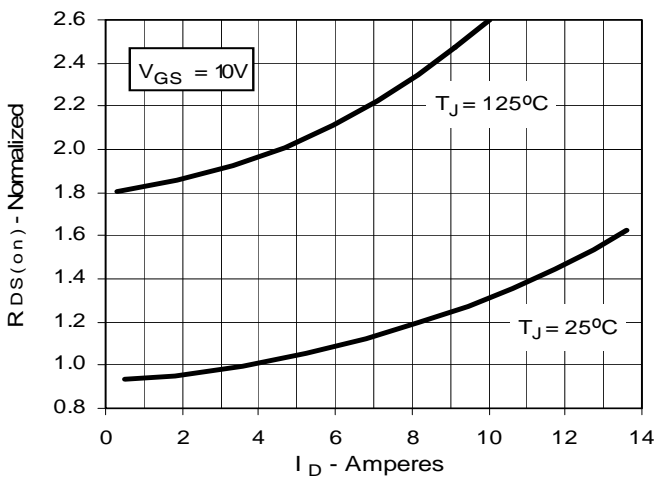
**Fig. 3. Output Characteristics  
@ 125°C**



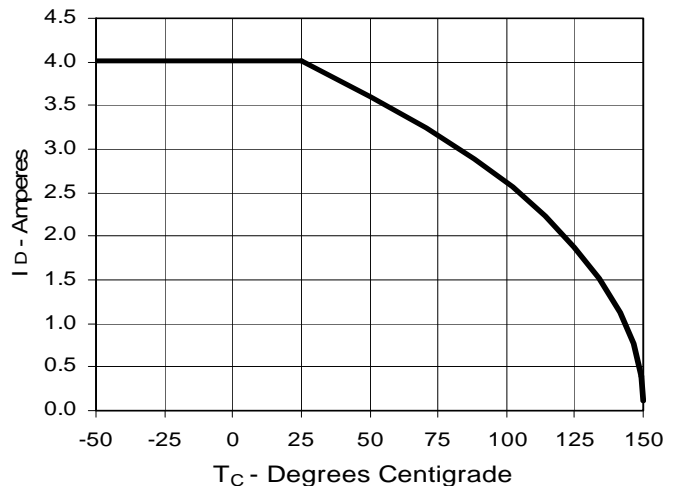
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value  
vs. Junction Temperature**



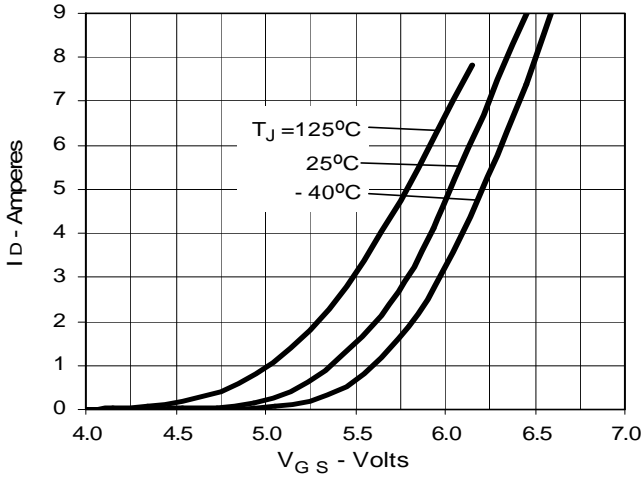
**Fig. 5.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value  
vs.  $I_D$**



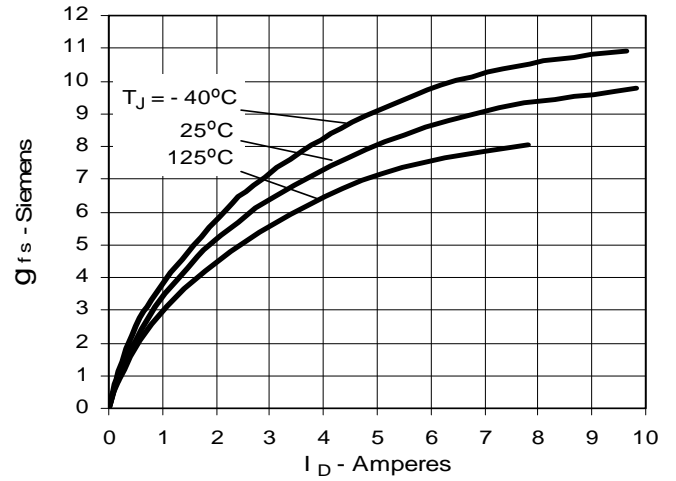
**Fig. 6. Drain Current vs. Case Temperature**



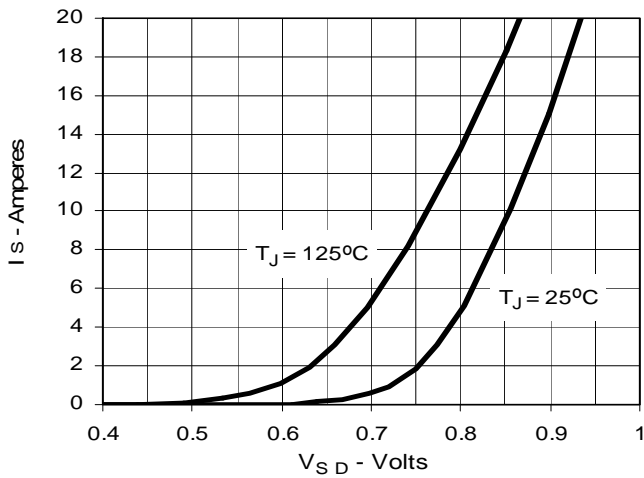
**Fig. 7. Input Admittance**



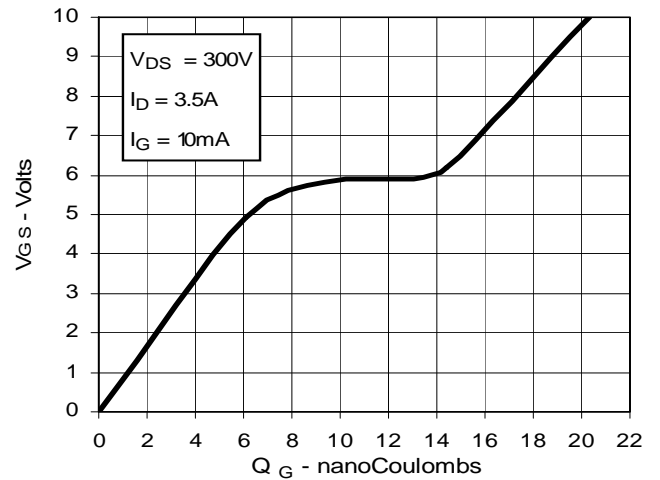
**Fig. 8. Transconductance**



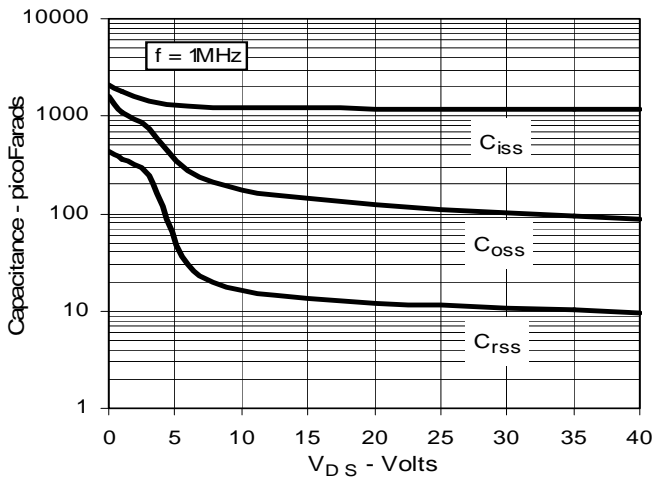
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



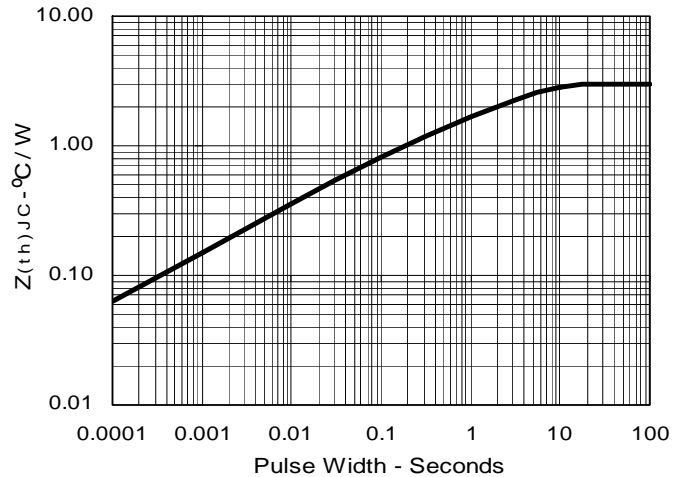
**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



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



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