

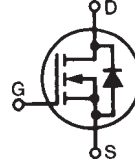
# Polar™ Power MOSFET

## IXTP18N60PM

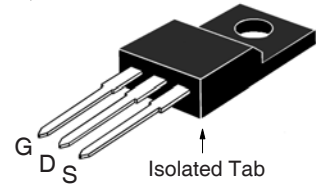
$$\begin{aligned} V_{DSS} &= 600V \\ I_{D25} &= 9A \\ R_{DS(on)} &\leq 420m\Omega \end{aligned}$$

### (Electrically Isolated Tab)

N-Channel Enhancement Mode  
Avalanche Rated



OVERMOLDED  
(IXTP...M) OUTLINE



G = Gate      D = Drain  
S = Source

| Symbol       | Test Conditions                                                          | Maximum Ratings |                  |
|--------------|--------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$    | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$                           | 600             | V                |
| $V_{DGR}$    | $T_J = 25^\circ\text{C to } 150^\circ\text{C}, R_{GS} = 1M\Omega$        | 600             | V                |
| $V_{GSS}$    | Continuous                                                               | $\pm 30$        | V                |
| $V_{GSM}$    | Transient                                                                | $\pm 40$        | V                |
| $I_{D25}$    | $T_C = 25^\circ\text{C}$                                                 | 9               | A                |
| $I_{DM}$     | $T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$               | 54              | A                |
| $I_A$        | $T_C = 25^\circ\text{C}$                                                 | 18              | A                |
| $E_{AS}$     | $T_C = 25^\circ\text{C}$                                                 | 1               | J                |
| $dv/dt$      | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ | 10              | V/ns             |
| $P_D$        | $T_C = 25^\circ\text{C}$                                                 | 90              | W                |
| $T_J$        |                                                                          | -55 ... +150    | $^\circ\text{C}$ |
| $T_{JM}$     |                                                                          | 150             | $^\circ\text{C}$ |
| $T_{stg}$    |                                                                          | -55 ... +150    | $^\circ\text{C}$ |
| $T_L$        | 1.6mm (0.062in.) from Case for 10s                                       | 300             | $^\circ\text{C}$ |
| $T_{solder}$ | Plastic Body for 10 Seconds                                              | 260             | $^\circ\text{C}$ |
| $M_d$        | Mounting Torque                                                          | 1.13 / 10       | Nm/lb.in.        |
| Weight       |                                                                          | 2.5             | g                |

### Features

- Plastic Overmolded Tab for Electrical Isolation
- International Standard Package
- 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

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- Laser Drivers
- AC and DC Motor Drives
- Robotics and Servo Controls

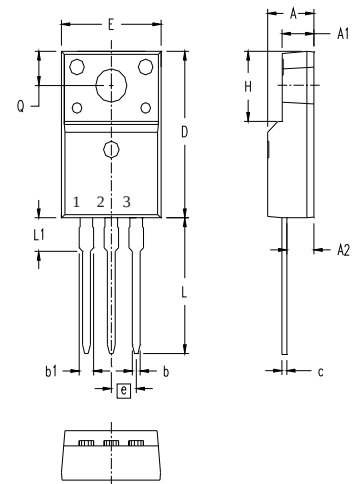
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | Characteristic Values |      |                |
|--------------|---------------------------------------------------------------------------|-----------------------|------|----------------|
|              |                                                                           | Min.                  | Typ. | Max.           |
| $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                                             | 600                   |      | V              |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$                                         | 2.5                   |      | 4.5 V          |
| $I_{GSS}$    | $V_{GS} = \pm 30V, V_{DS} = 0V$                                           |                       |      | $\pm 100$ nA   |
| $I_{DSS}$    | $V_{DS} = V_{DSS}, V_{GS} = 0V$                                           |                       |      | 25 $\mu A$     |
|              | $T_J = 125^\circ\text{C}$                                                 |                       |      | 250 $\mu A$    |
| $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 9A$ , Note 1                                         |                       |      | 420 m $\Omega$ |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                                                                | Characteristic Values |      |                         |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------------|
|              |                                                                                                                                            | Min.                  | Typ. | Max.                    |
| $g_{fs}$     | $V_{DS} = 20\text{V}$ , $I_D = 9\text{A}$ , Note 1                                                                                         | 9                     | 16   | S                       |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                           |                       | 2500 | pF                      |
| $C_{oss}$    |                                                                                                                                            |                       | 280  | pF                      |
| $C_{rss}$    |                                                                                                                                            |                       | 23   | pF                      |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 9\text{A}$<br>$R_G = 5\Omega$ (External) |                       | 21   | ns                      |
| $t_r$        |                                                                                                                                            |                       | 22   | ns                      |
| $t_{d(off)}$ |                                                                                                                                            |                       | 62   | ns                      |
| $t_f$        |                                                                                                                                            |                       | 22   | ns                      |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 9\text{A}$                                                                   |                       | 50   | nC                      |
| $Q_{gs}$     |                                                                                                                                            |                       | 15   | nC                      |
| $Q_{gd}$     |                                                                                                                                            |                       | 18   | nC                      |
| $R_{thJC}$   |                                                                                                                                            |                       |      | 1.39 $^\circ\text{C/W}$ |

## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                    | Characteristic Values |      |       |
|----------|------------------------------------------------------------------------------------------------|-----------------------|------|-------|
|          |                                                                                                | Min.                  | Typ. | Max.  |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                           |                       |      | 18 A  |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                    |                       |      | 54 A  |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1                                                    |                       |      | 1.5 V |
| $t_{rr}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ |                       | 500  | ns    |

## OVERMOLDED TO-220



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

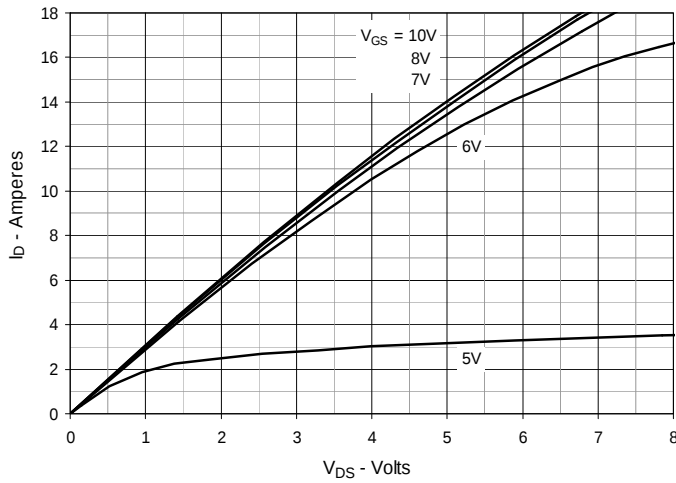
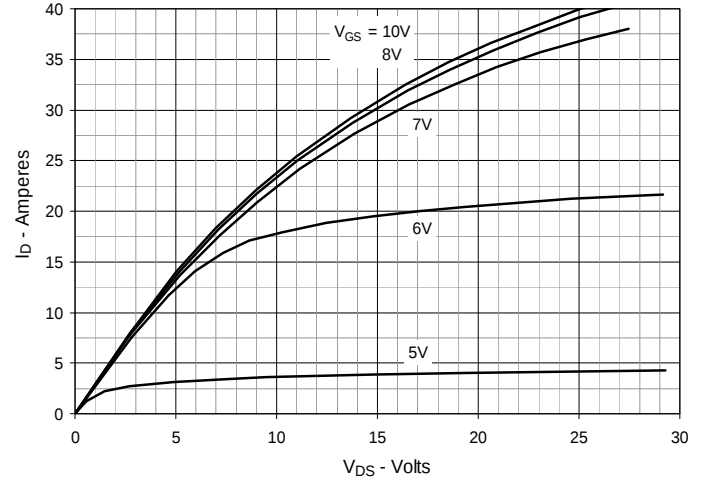
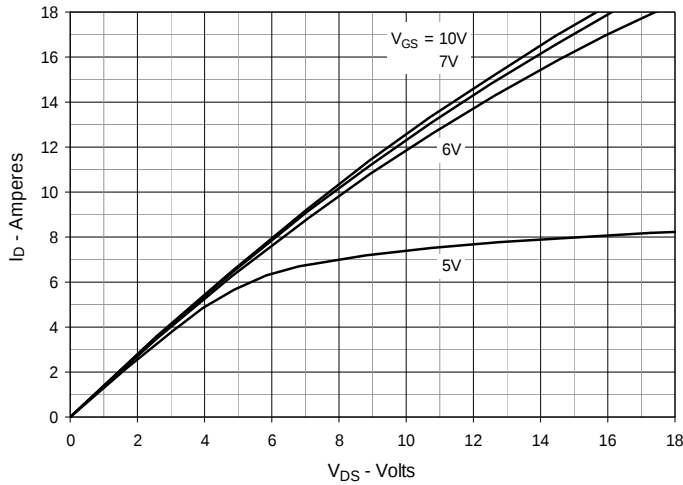
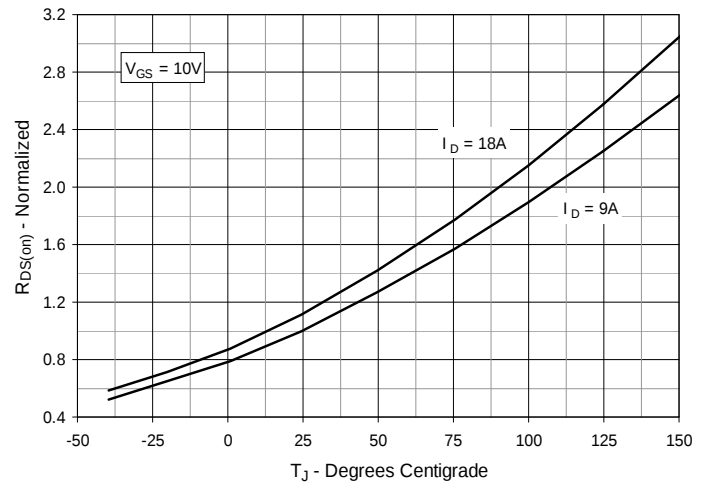
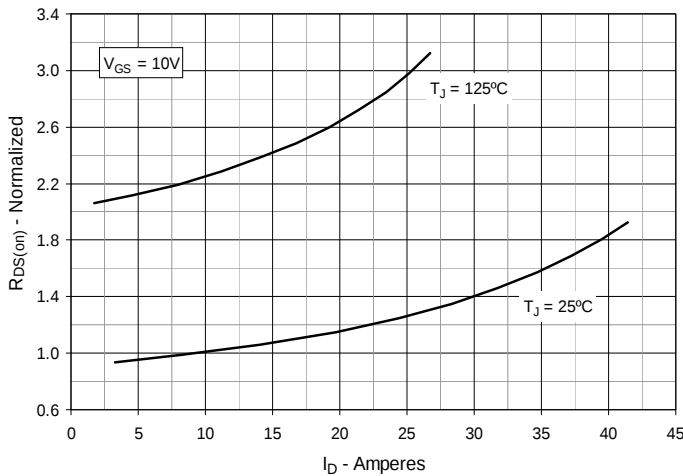
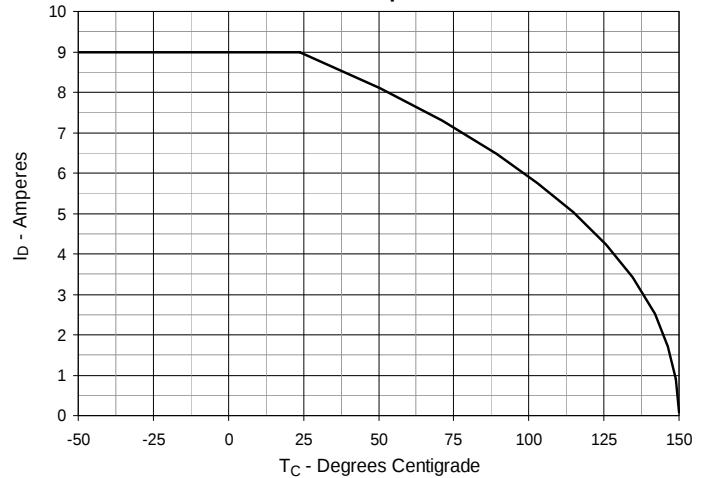
| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .177     | .193 | 4.50        | 4.90  |
| A1  | .092     | .108 | 2.34        | 2.74  |
| A2  | .101     | .117 | 2.56        | 2.96  |
| b   | .028     | .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  |
| ØP  | .121     | .129 | 3.08        | 3.28  |
| Q   | .126     | .134 | 3.20        | 3.40  |

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

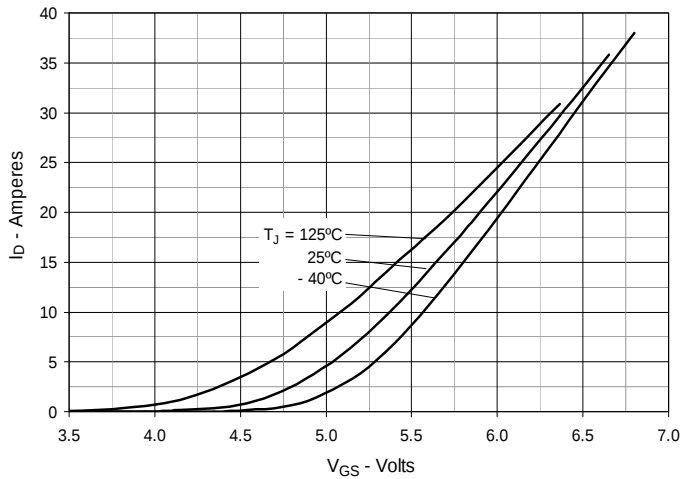
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

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

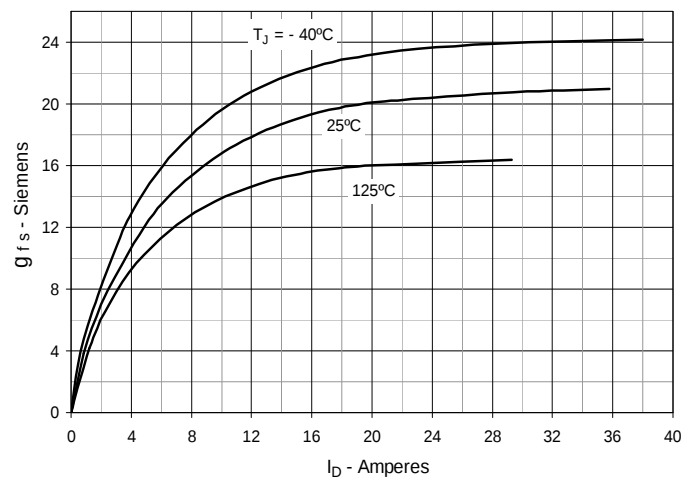
|           |           |           |           |              |              |              |              |              |              |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|--------------|
| 4,835,592 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665    | 6,404,065 B1 | 6,683,344    | 6,727,585    | 7,005,734 B2 | 7,157,338 B2 |
| 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 @  $T_J = 25^\circ\text{C}$** 

**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$** 

**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$** 

**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 9\text{A}$  Value vs. Junction Temperature**

**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 9\text{A}$  Value vs. Drain Current**

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


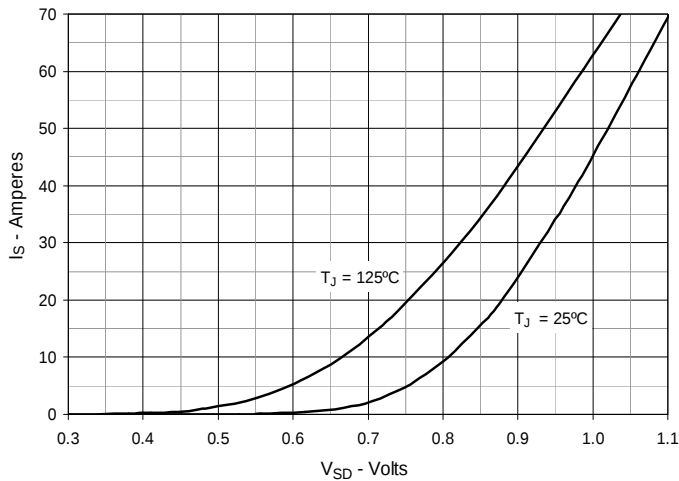
**Fig. 7. Input Admittance**



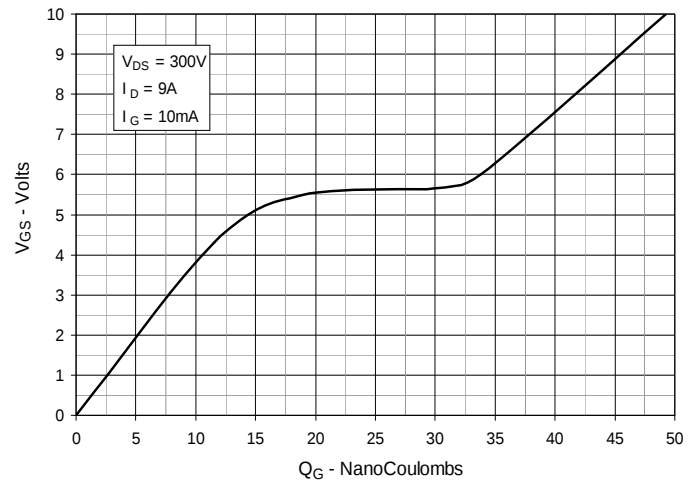
**Fig. 8. Transconductance**



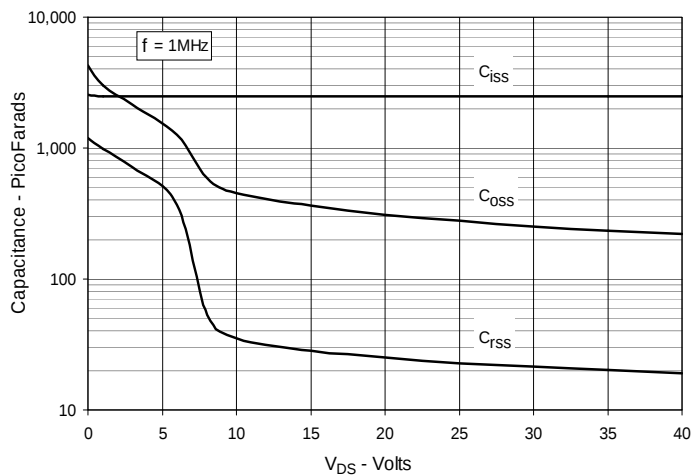
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



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

