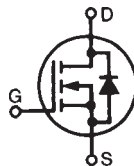


## Polar™ Power MOSFET

**IXTA08N120P**  
**IXTP08N120P**

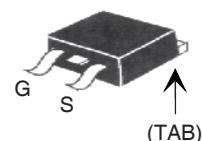
$$\begin{aligned} V_{DSS} &= 1200V \\ I_{D25} &= 0.8A \\ R_{DS(on)} &\leq 25\Omega \end{aligned}$$

N-Channel Enhancement Mode  
Avalanche Rated

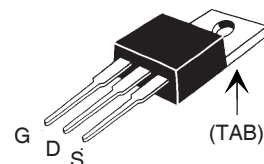


| Symbol     | Test Conditions                                                          | Maximum Ratings |                  |
|------------|--------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                          | 1200            | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GS} = 1M\Omega$    | 1200            | V                |
| $V_{GSS}$  | Continuous                                                               | $\pm 20$        | V                |
| $V_{GSM}$  | Transient                                                                | $\pm 30$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                 | 0.8             | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$               | 1.8             | A                |
| $I_A$      | $T_C = 25^\circ\text{C}$                                                 | 0.8             | A                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                 | 80              | mJ               |
| $dV/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ | 10              | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                 | 50              | 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 (0.062) from case for 10s                                          | 300             | $^\circ\text{C}$ |
| $T_{SOLD}$ | Plastic body for 10s                                                     | 260             | $^\circ\text{C}$ |
| $M_d$      | Mounting torque (TO-220)                                                 | 1.13 / 10       | Nm/lb.in.        |
| Weight     | TO-263                                                                   | 2.50            | g                |
|            | TO-220                                                                   | 3.00            | g                |

TO-263 (IXTA)



TO-220 (IXTP)



G = Gate  
S = Source

D = Drain  
TAB = Drain

### Features

- International standard packages
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
  - easy to drive and to protect

### Advantages

- Easy to mount
- Space savings
- High power density

### Applications:

- High Voltage Switched-mode and resonant-mode power supplies
- High Voltage Pulse Power Applications
- High Voltage Discharge circuits in Lasers Pulsers, Spark Igniters, RF Generators
- High Voltage DC-DC converters
- High Voltage DC-AC inverters

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)           | Characteristic Values |      |             |
|--------------|---------------------------------------------------------------------------------------|-----------------------|------|-------------|
|              |                                                                                       | Min.                  | Typ. | Max.        |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                                      | 1200                  |      | V           |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 50\mu A$                                                   | 2.5                   |      | 4.5 V       |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                                    |                       |      | $\pm 50$ nA |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$                                                                    |                       |      | 5 $\mu A$   |
|              | $V_{GS} = 0V$ <span style="float: right;"><math>T_J = 125^\circ\text{C}</math></span> |                       |      | 100 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                                   | 20.5                  | 25   | $\Omega$    |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                                                         | Characteristic Values |      |                        |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|------------------------|
|              |                                                                                                                                                     | Min.                  | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 30\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                                                                                          | 0.38                  | 0.63 | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                                    |                       | 333  | pF                     |
| $C_{oss}$    |                                                                                                                                                     |                       | 20   | pF                     |
| $C_{rss}$    |                                                                                                                                                     |                       | 4.7  | 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>$R_G = 50\Omega$ (External) |                       | 20   | ns                     |
| $t_r$        |                                                                                                                                                     |                       | 26   | ns                     |
| $t_{d(off)}$ |                                                                                                                                                     |                       | 55   | ns                     |
| $t_f$        |                                                                                                                                                     |                       | 24   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                                                                    |                       | 14.0 | nC                     |
| $Q_{gs}$     |                                                                                                                                                     |                       | 2.0  | nC                     |
| $Q_{gd}$     |                                                                                                                                                     |                       | 8.2  | nC                     |
| $R_{thJC}$   | (TO-220)                                                                                                                                            |                       | 0.50 | 2.5 $^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                                     |                       |      | $^\circ\text{C/W}$     |

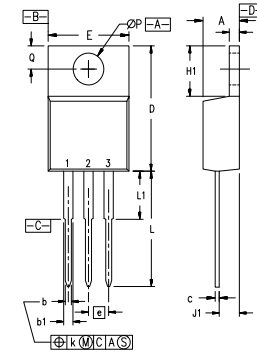
## Source-Drain Diode

Characteristic Values  
( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

| Symbol   | Test Conditions                                                                                          | Min. | Typ. | Max.  |
|----------|----------------------------------------------------------------------------------------------------------|------|------|-------|
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                     |      |      | 0.8 A |
| $I_{SM}$ | Repetitive, pulse width limited by $T_{JM}$                                                              |      |      | 2.4 A |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1                                                              |      |      | 1.5 V |
| $t_{rr}$ | $I_F = 0.8\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$ ,<br>$V_R = 100\text{V}$ , $V_{GS} = 0\text{V}$ |      | 900  | ns    |

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

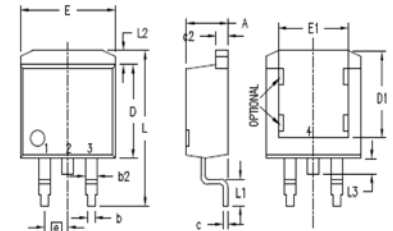
## TO-220 (IXTP) Outline



Pins: 1 - Gate 2 - Drain

| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .170     | .190 | 4.32        | 4.83  |
| b   | .025     | .040 | 0.64        | 1.02  |
| b1  | .045     | .065 | 1.15        | 1.65  |
| c   | .014     | .022 | 0.35        | 0.56  |
| D   | .580     | .630 | 14.73       | 16.00 |
| E   | .390     | .420 | 9.91        | 10.66 |
| e   | .100 BSC |      | 2.54 BSC    |       |
| F   | .045     | .055 | 1.14        | 1.40  |
| H1  | .230     | .270 | 5.85        | 6.85  |
| J1  | .090     | .110 | 2.29        | 2.79  |
| k   | 0        | .015 | 0           | 0.38  |
| L   | .500     | .550 | 12.70       | 13.97 |
| L1  | .110     | .230 | 2.79        | 5.84  |
| ØP  | .139     | .161 | 3.53        | 4.08  |
| Q   | .100     | .125 | 2.54        | 3.18  |

## TO-263 (IXTA) Outline



1. GATE
  2. DRAIN (COLLECTOR)
  3. SOURCE (EMITTER)
  4. DRAIN (COLLECTOR)
- BOTTOM SIDE

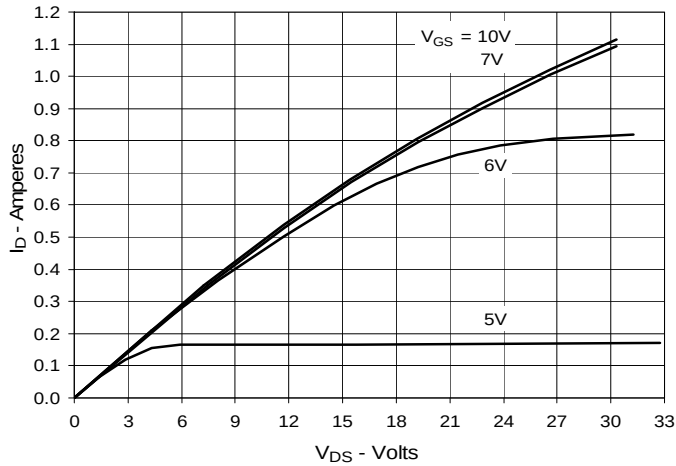
| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .160     | .190 | 4.06        | 4.83  |
| A1  | .080     | .110 | 2.03        | 2.79  |
| b   | .020     | .039 | 0.51        | 0.99  |
| b2  | .045     | .055 | 1.14        | 1.40  |
| c   | .016     | .029 | 0.40        | 0.74  |
| c2  | .045     | .055 | 1.14        | 1.40  |
| D   | .340     | .380 | 8.64        | 9.65  |
| D1  | .315     | .350 | 8.00        | 8.89  |
| E   | .380     | .410 | 9.65        | 10.41 |
| E1  | .245     | .320 | 6.22        | 8.13  |
| e   | .100 BSC |      | 2.54 BSC    |       |
| L   | .575     | .625 | 14.61       | 15.88 |
| L1  | .090     | .110 | 2.29        | 2.79  |
| L2  | .040     | .055 | 1.02        | 1.40  |
| L3  | .050     | .070 | 1.27        | 1.78  |
| L4  | 0        | .005 | 0           | 0.13  |

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

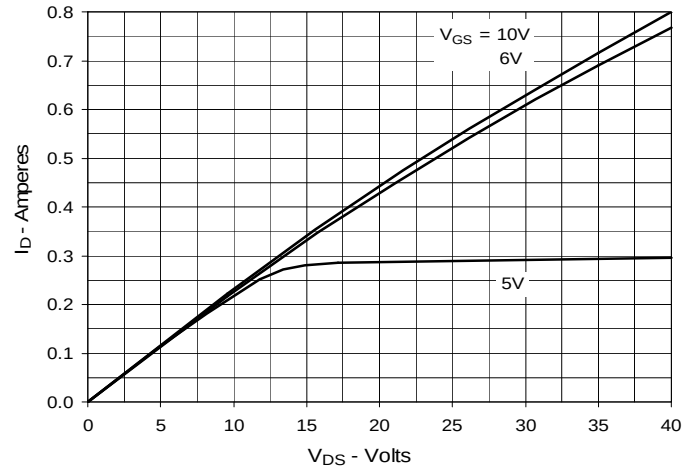
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |              |              |              |              |              |             |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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    |             |

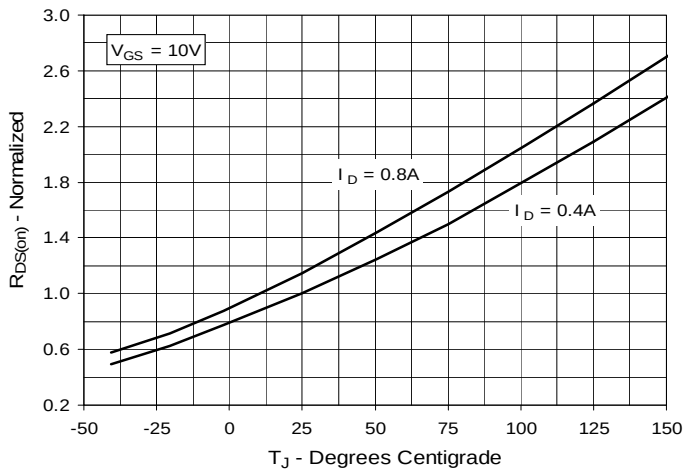
**Fig. 1. Extended Output Characteristics  
@ 25°C**



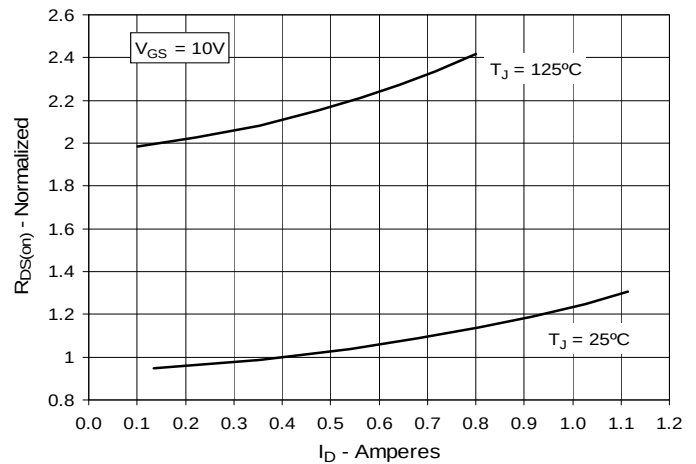
**Fig. 2. Output Characteristics  
@ 125°C**



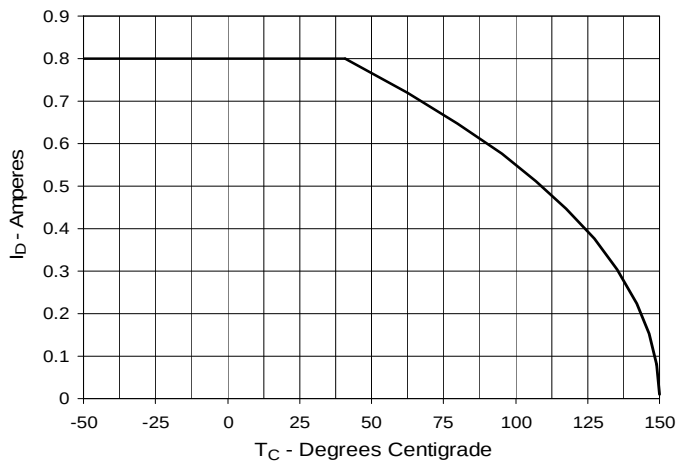
**Fig. 3.  $R_{DS(on)}$  Normalized to  $I_D = 0.4A$  Value  
vs. Junction Temperature**



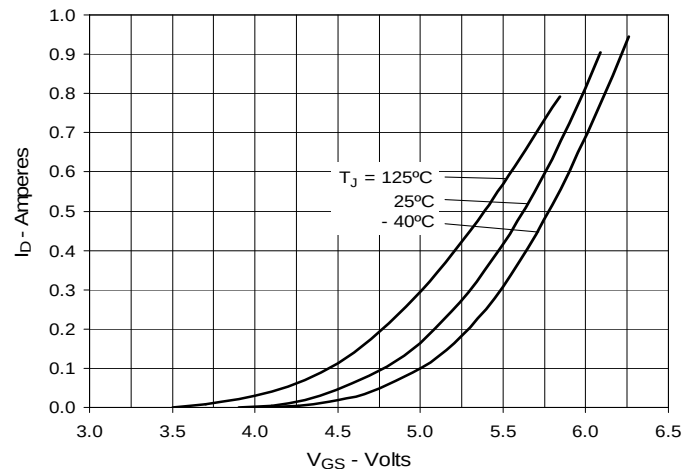
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 0.4A$  Value  
vs. Drain Current**



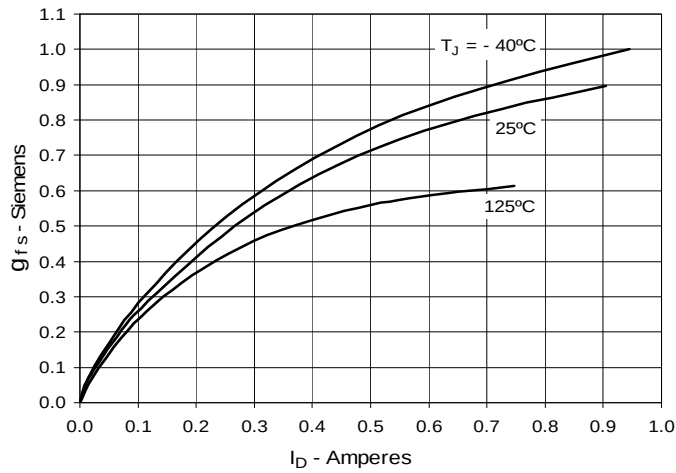
**Fig. 5. Maximum Drain Current vs.  
Case Temperature**



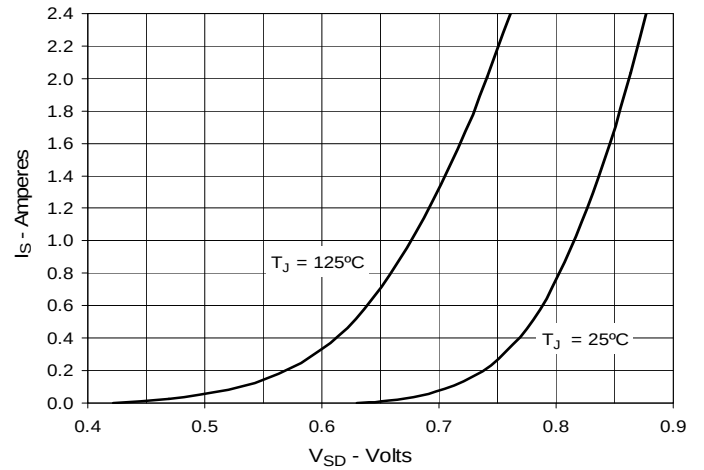
**Fig. 6. Input Admittance**



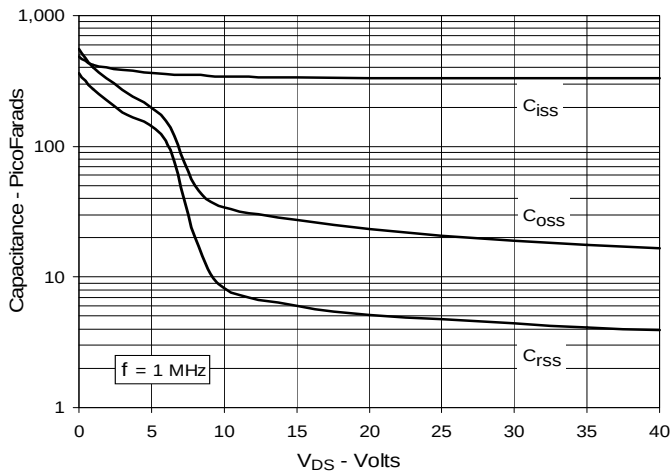
**Fig. 7. Transconductance**



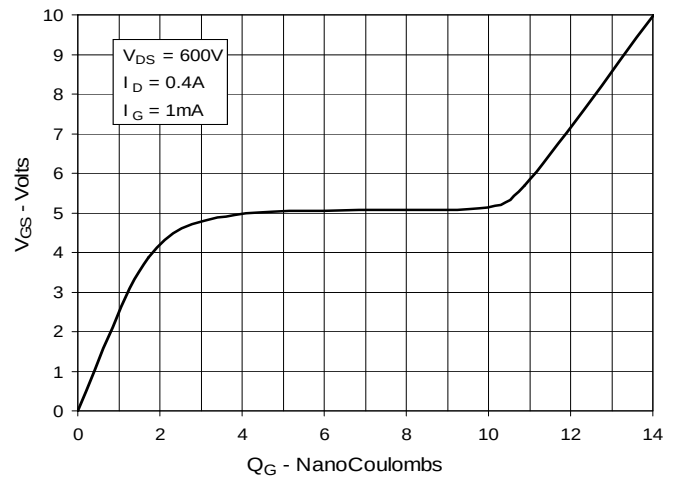
**Fig. 8. Forward Voltage Drop of Intrinsic Diode**



**Fig. 9. Capacitance**



**Fig. 10. Gate Charge**



**Fig. 11. Maximum Transient Thermal Impedance**

