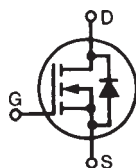


# PolarHV™ Power MOSFET

## IXTA4N80P IXTP4N80P

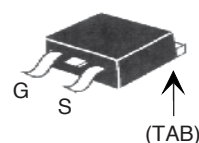
$$\begin{aligned} V_{DSS} &= 800 \text{ V} \\ I_{D25} &= 3.6 \text{ A} \\ R_{DS(on)} &\leq 3.4 \text{ } \Omega \end{aligned}$$

N-Channel Enhancement Mode  
Avalanche Rated

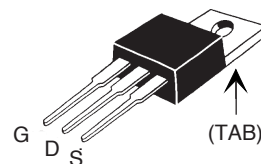


| Symbol     | Test Conditions                                                                                                                                   | Maximum Ratings |                  |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                                                                                   | 800             | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$                                                                    | 800             | V                |
| $V_{GSS}$  | Continuous                                                                                                                                        | $\pm 30$        | V                |
| $V_{GSM}$  | Transient                                                                                                                                         | $\pm 40$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                                                                                          | 3.6             | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                                        | 8               | A                |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                          | 2               | A                |
| $E_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                          | 20              | mJ               |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                                                                                          | 250             | mJ               |
| $dv/dt$    | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 18 \text{ } \Omega$ | 10              | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                                                                                          | 100             | W                |
| $T_J$      |                                                                                                                                                   | -55 ... +150    | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                                                                                                   | 150             | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                                                                                                   | -55 ... +150    | $^\circ\text{C}$ |
| $T_L$      | 1.6 mm (0.062 in.) from case for 10 s                                                                                                             | 300             | $^\circ\text{C}$ |
| $T_{SOLD}$ | Plastic body for 10 s                                                                                                                             | 260             | $^\circ\text{C}$ |
| $M_d$      | Mounting torque (TO-220)                                                                                                                          | 1.13/10         | Nm/lb.in.        |
| Weight     | TO-220                                                                                                                                            | 4               | g                |
|            | TO-263                                                                                                                                            | 3               | 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

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                               | Characteristic Values |      |                                      |
|--------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------|------|--------------------------------------|
|              |                                                                                                                           | Min.                  | Typ. | Max.                                 |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \text{ } \mu\text{A}$                                                                 | 800                   |      | V                                    |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 100 \text{ } \mu\text{A}$                                                                      | 3.0                   |      | 5.5 V                                |
| $I_{GSS}$    | $V_{GS} = \pm 30 \text{ V}$ , $V_{DS} = 0 \text{ V}$                                                                      |                       |      | $\pm 100 \text{ nA}$                 |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ ,<br>$V_{GS} = 0 \text{ V}$ , $T_J = 125^\circ\text{C}$                                                |                       |      | 5 $\mu\text{A}$<br>150 $\mu\text{A}$ |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$<br>Pulse test, $t \leq 300 \text{ } \mu\text{s}$ , duty cycle $d \leq 2 \%$ |                       |      | 3.4 $\Omega$                         |

| Symbol                    | Test Conditions                                                                                                                            | Characteristic Values<br>(T <sub>J</sub> = 25°C, unless otherwise specified) |      |           |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------|-----------|
|                           |                                                                                                                                            | Min.                                                                         | Typ. | Max.      |
| <b>g<sub>fs</sub></b>     | V <sub>DS</sub> = 10 V; I <sub>D</sub> = 0.5 I <sub>D25</sub> , pulse test                                                                 | 2.5                                                                          | 4.0  | S         |
| <b>C<sub>iss</sub></b>    | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz                                                                                   |                                                                              | 750  | pF        |
| <b>C<sub>oss</sub></b>    |                                                                                                                                            |                                                                              | 70   | pF        |
| <b>C<sub>rss</sub></b>    |                                                                                                                                            |                                                                              | 6.3  | pF        |
| <b>t<sub>d(on)</sub></b>  | V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 V <sub>DSS</sub> , I <sub>D</sub> = 0.5 I <sub>D25</sub><br>R <sub>G</sub> = 18 Ω (External) |                                                                              | 22   | ns        |
| <b>t<sub>r</sub></b>      |                                                                                                                                            |                                                                              | 24   | ns        |
| <b>t<sub>d(off)</sub></b> |                                                                                                                                            |                                                                              | 60   | ns        |
| <b>t<sub>f</sub></b>      |                                                                                                                                            |                                                                              | 29   | ns        |
| <b>Q<sub>g(on)</sub></b>  | V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 V <sub>DSS</sub> , I <sub>D</sub> = 0.5 I <sub>D25</sub>                                     |                                                                              | 14.2 | nC        |
| <b>Q<sub>gs</sub></b>     |                                                                                                                                            |                                                                              | 4.8  | nC        |
| <b>Q<sub>gd</sub></b>     |                                                                                                                                            |                                                                              | 4.8  | nC        |
| <b>R<sub>thJC</sub></b>   | (TO-220)                                                                                                                                   |                                                                              |      | 1.25 °C/W |
| <b>R<sub>thCS</sub></b>   |                                                                                                                                            |                                                                              | 0.25 | °C/W      |

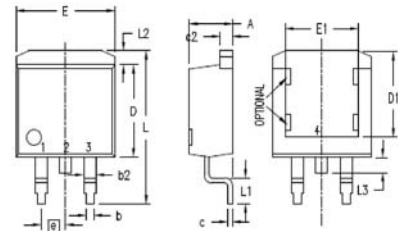
#### Source-Drain Diode

| Symbol                | Test Conditions                                                                          | Characteristic Values<br>(T <sub>J</sub> = 25°C, unless otherwise specified) |      |       |
|-----------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------|-------|
|                       |                                                                                          | Min.                                                                         | Typ. | Max.  |
| <b>I<sub>S</sub></b>  | V <sub>GS</sub> = 0 V                                                                    |                                                                              |      | 3.5 A |
| <b>I<sub>SM</sub></b> | Repetitive                                                                               |                                                                              |      | 8 A   |
| <b>V<sub>SD</sub></b> | I <sub>F</sub> = I <sub>S</sub> , V <sub>GS</sub> = 0 V                                  |                                                                              |      | 1.5 V |
| <b>t<sub>rr</sub></b> | I <sub>F</sub> = 3.5 A, -di/dt = 100 A/μs,<br>Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 % |                                                                              | 560  | ns    |

#### ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

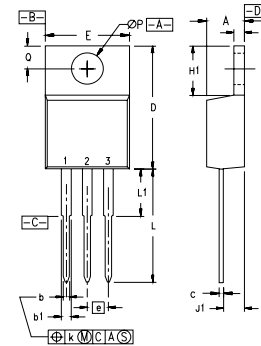
#### TO-263 (IXTA) Outline



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  |

#### TO-220 (IXTP) Outline



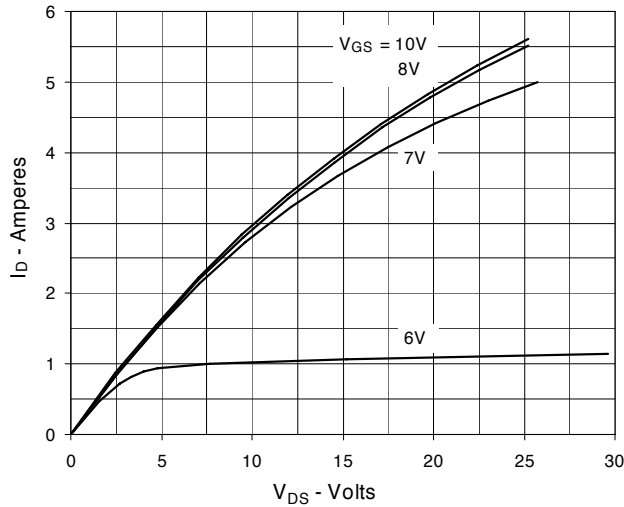
- Pins: 1 - Gate 2 - Drain  
3 - Source 4 - Drain

| 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  |

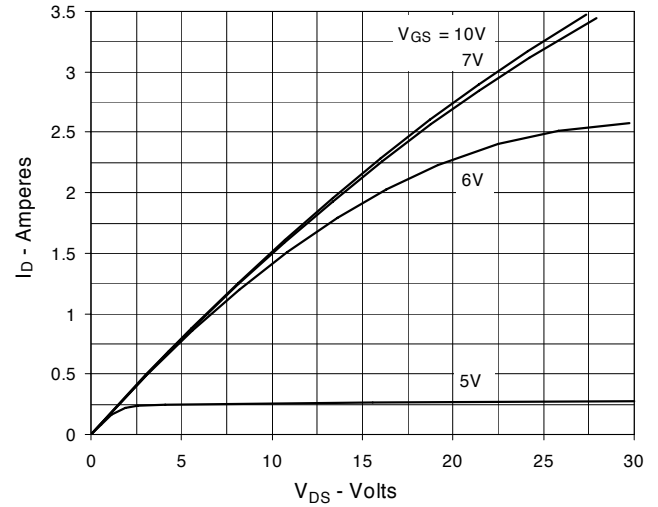
IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETs and IGBTs are covered by 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  
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

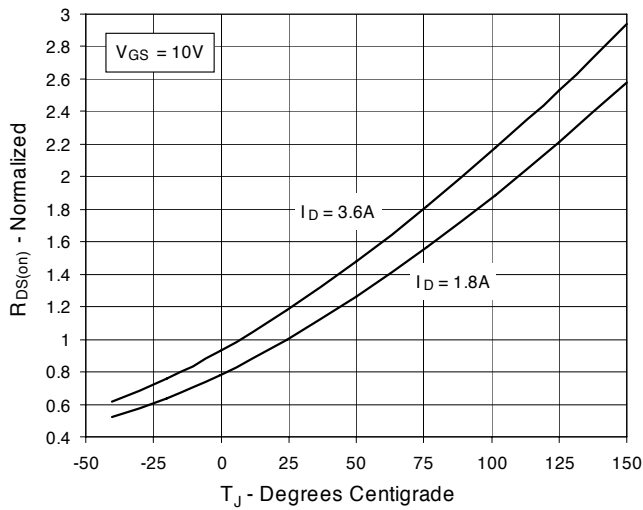
**Fig. 1. Extended Output Characteristics**  
**@ 25°C**



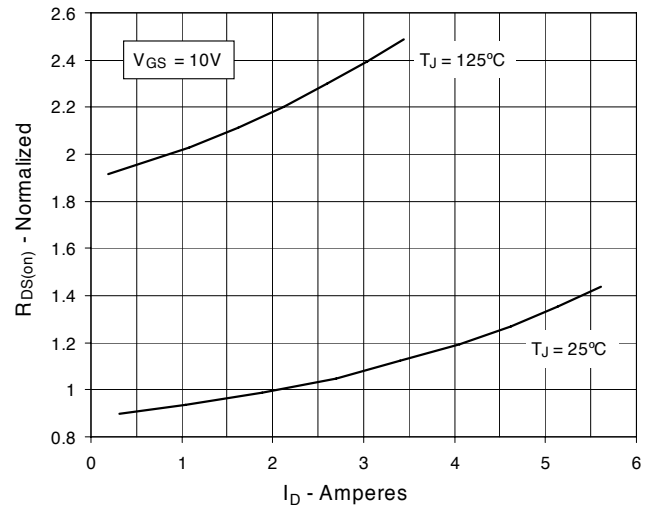
**Fig. 2. Output Characteristics**  
**@ 125°C**



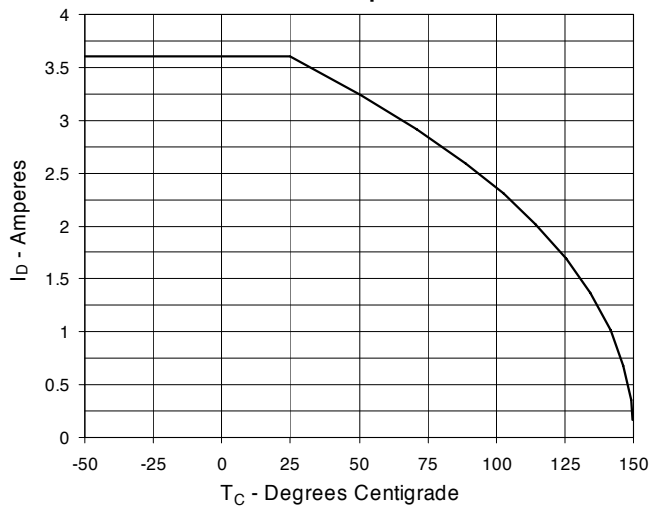
**Fig. 3.  $R_{DS(on)}$  Normalized to  $I_D = 2A$  Value**  
**vs. Junction Temperature**



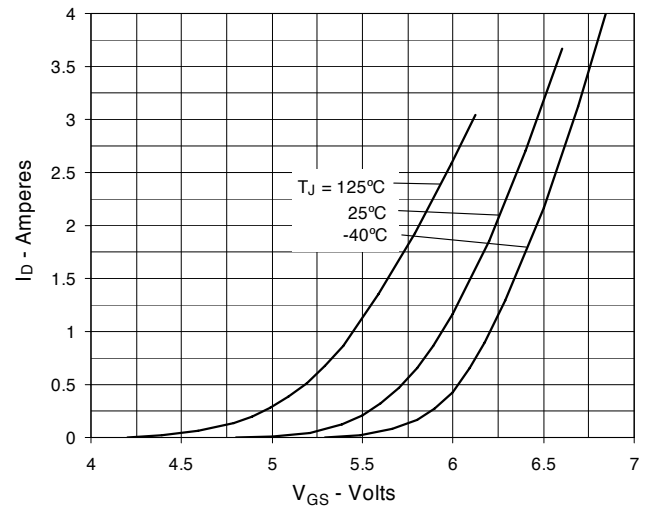
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 2A$  Value**  
**vs. Drain Current**

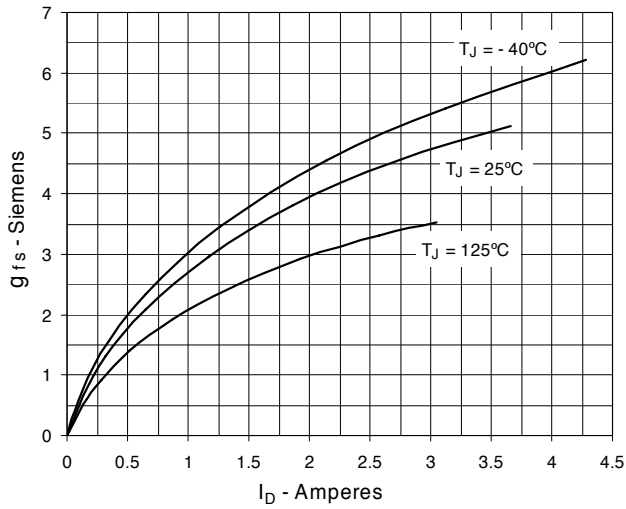
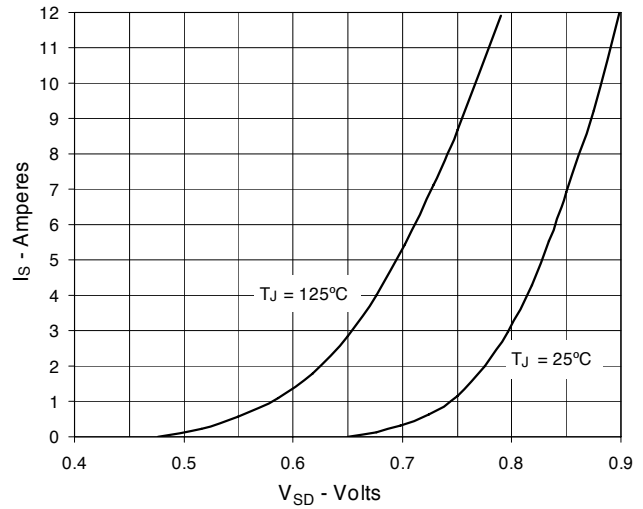
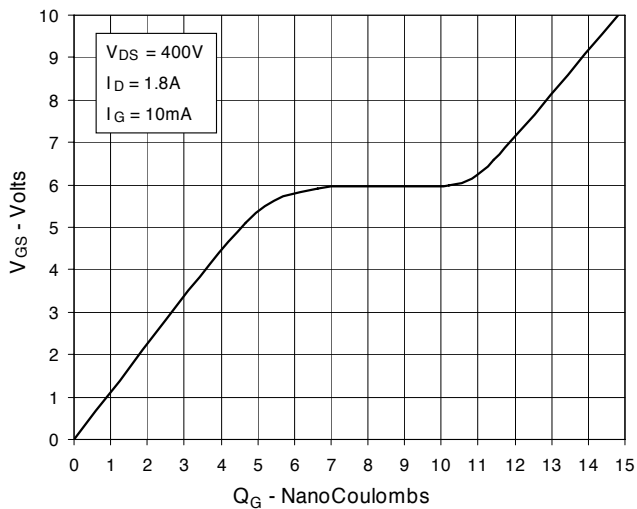
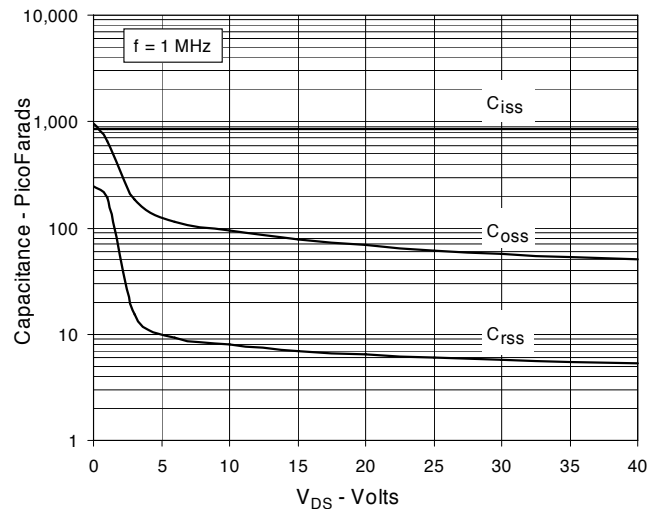
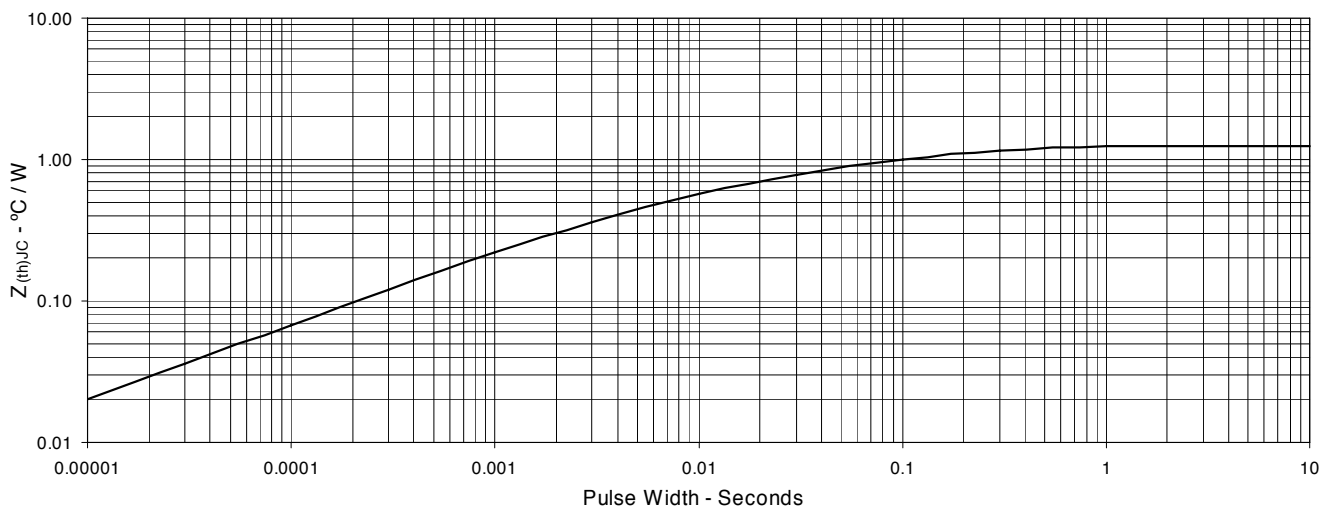


**Fig. 5. Maximum Drain Current vs.**  
**Case Temperature**



**Fig. 6. Input Admittance**



**Fig. 7. Transconductance**

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

**Fig. 9. Gate Charge**

**Fig. 10. Capacitance**

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




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