

# PolarHV™ HiPerFET IXFN 80N50P

## Power MOSFET

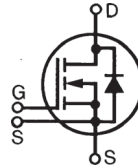
$$V_{DSS} = 500 \text{ V}$$

$$I_{D25} = 66 \text{ A}$$

$$R_{DS(on)} \leq 65 \text{ m}\Omega$$

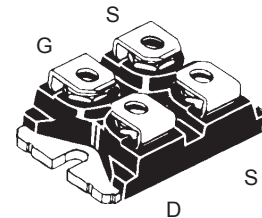
$$t_{rr} \leq 200 \text{ ns}$$

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



| Symbol        | Test Conditions   | Maximum Ratings                      |                  |
|---------------|---|--------------------------------------|------------------|
| $V_{DSS}$     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$   | 500                                  | V                |
| $V_{DGR}$     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$  | 500                                  | V                |
| $V_{GS}$      | Transient   | $\pm 40$                             | V                |
| $V_{GSM}$     | Continuous  | $\pm 30$                             | V                |
| $I_{D25}$     | $T_C = 25^\circ\text{C}$  | 66                                   | A                |
| $I_{DM}$      | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$  | 200                                  | A                |
| $I_{AR}$      | $T_C = 25^\circ\text{C}$  | 80                                   | A                |
| $E_{AR}$      | $T_C = 25^\circ\text{C}$  | 80                                   | mJ               |
| $E_{AS}$      | $T_C = 25^\circ\text{C}$  | 3.0                                  | J                |
| $dv/dt$       | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2 \Omega$ | 10                                   | V/ns             |
| $P_D$         | $T_C = 25^\circ\text{C}$  | 700                                  | 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                                  | $^\circ\text{C}$ |
| $V_{ISOL}$    | 50/60 Hz; $I_{ISOL} \leq 1 \text{ mA}$  | 2500                                 | V~               |
| $M_d$         | Mounting torque<br>Terminal connection torque (M4)  | 1.5/13 Nm/ib.in.<br>1.5/13 Nm/ib.in. |                  |
| <b>Weight</b> |   | 30                                   | g                |

miniBLOC, SOT-227 B (IXFN)  
E153432



G = Gate      D = Drain  
S = Source

Either source tab S can be used for source current or Kelvin gate return.

### Features

- | Fast intrinsic diode
- | International standard package
- | Unclamped Inductive Switching (UIS) rated
- | UL recognized.
- | Isolated mounting base

### 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.  |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 500 \mu\text{A}$                          | 500                   |      | V   |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 8 \text{ mA}$                                  | 3.0                   |      | 5.0 V   |
| $I_{GSS}$    | $V_{GS} = \pm 30 \text{ V}_{DC}$ , $V_{DS} = 0$                           |                       |      | $\pm 200 \text{ nA}$                                  |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0 \text{ V}$                              |                       |      | 25 $\mu\text{A}$<br>1 mA<br>$T_J = 125^\circ\text{C}$ |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$ , Note 1                    |                       |      | 65 m $\Omega$   |

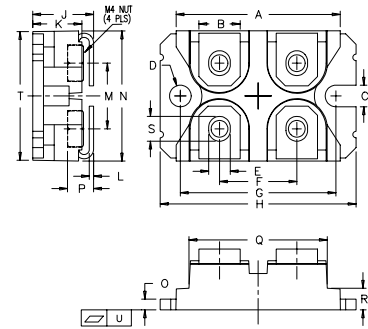
| Symbol       | Test Conditions   | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) |      |                        |    |
|--------------|---|---|------|------------------------|----|
|              |   | Min.  | Typ. | Max.                   |    |
| $g_{fs}$     | $V_{DS} = 20\text{ V}; I_D = 0.5 I_{D25}$ , Note 1              | 35  | 70   | S                      |    |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$   |   | 12.7 | nF                     |    |
| $C_{oss}$    |   |   | 1280 | pF                     |    |
| $C_{rss}$    |   |   | 120  | pF                     |    |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$ |   | 25   | ns                     |    |
| $t_r$        |   |   | 27   | ns                     |    |
| $t_{d(off)}$ |   | $R_G = 2\ \Omega$ (External)  |      | 70                     | ns |
| $t_f$        |   |   |      | 18                     | ns |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$ |   | 195  | nC                     |    |
| $Q_{gs}$     |   |   | 70   | nC                     |    |
| $Q_{gd}$     |   |   | 64   | nC                     |    |
| $R_{thJC}$   |   |   |      | $0.18^\circ\text{C/W}$ |    |
| $R_{thCK}$   |   | 0.05  |      | $^\circ\text{C/W}$     |    |

### Source-Drain Diode

| Symbol   | Test Conditions  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) |      |               |
|----------|--|---|------|---------------|
|          |  | Min.  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{ V}$                                  |   |      | 80 A          |
| $I_{SM}$ | Repetitive   |   |      | 200 A         |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{ V}$ , Note 1              |   |      | 1.5 V         |
| $t_{rr}$ | $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}$ |   |      | 200 ns        |
| $Q_{RM}$ | $V_R = 100\text{ V}, V_{GS} = 0\text{ V}$              |   | 0.8  | $\mu\text{C}$ |
| $I_{RM}$ |  |   | 8    | A             |

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

### miniBLOC, SOT-227B (IXFN) Outline

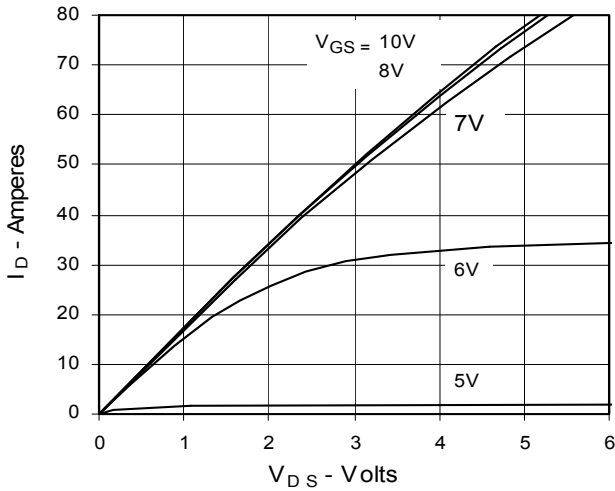


| SYM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 1.240  | 1.255 | 31.50       | 31.88 |
| B   | .307   | .323  | 7.80        | 8.20  |
| C   | .161   | .169  | 4.09        | 4.29  |
| D   | .161   | .169  | 4.09        | 4.29  |
| E   | .161   | .169  | 4.09        | 4.29  |
| F   | .587   | .595  | 14.91       | 15.11 |
| G   | 1.186  | 1.193 | 30.12       | 30.30 |
| H   | 1.496  | 1.505 | 38.00       | 38.23 |
| J   | .460   | .481  | 11.68       | 12.22 |
| K   | .351   | .378  | 8.92        | 9.60  |
| L   | .030   | .033  | 0.76        | 0.84  |
| M   | .496   | .506  | 12.60       | 12.85 |
| N   | .990   | 1.001 | 25.15       | 25.42 |
| O   | .078   | .084  | 1.98        | 2.13  |
| P   | .195   | .235  | 4.95        | 5.97  |
| Q   | 1.045  | 1.059 | 26.54       | 26.90 |
| R   | .155   | .174  | 3.94        | 4.42  |
| S   | .186   | .191  | 4.72        | 4.85  |
| T   | .968   | .987  | 24.59       | 25.07 |
| U   | -.002  | .004  | -0.05       | 0.1   |

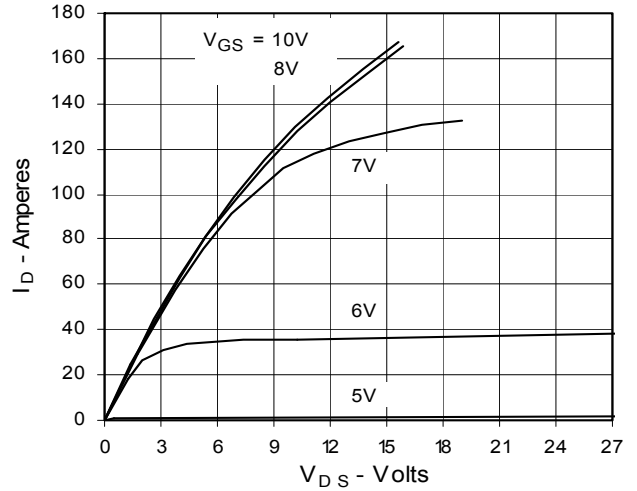
IXYS reserves the right to change limits, test conditions, and dimensions.

|  |           |           |           |           |              |              |             |              |
|--|-----------|-----------|-----------|-----------|--------------|--------------|-------------|--------------|
| 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    |
| 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    | 6,710,405B2 | 6,759,692    |
|  | 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 |

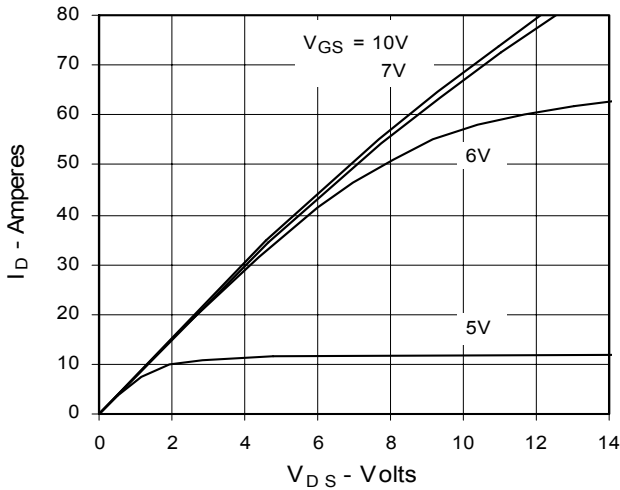
**Fig. 1. Output Characteristics**  
@ 25°C



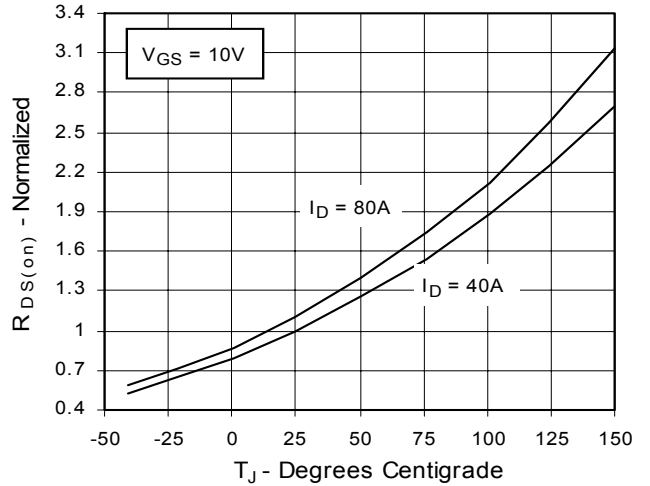
**Fig. 2. Extended Output Characteristics**  
@ 25°C



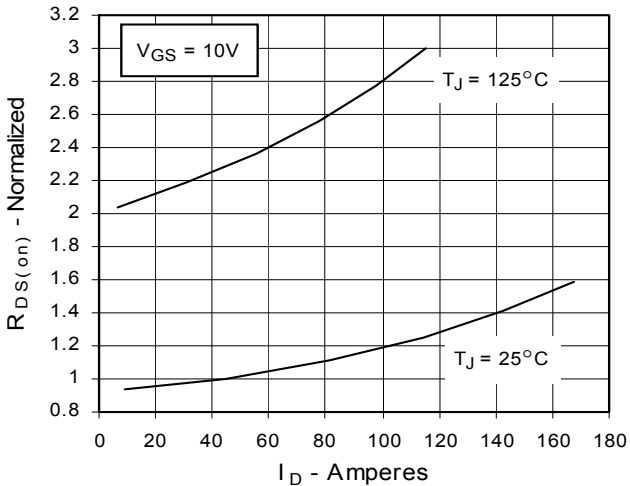
**Fig. 3. Output Characteristics**  
@ 125°C



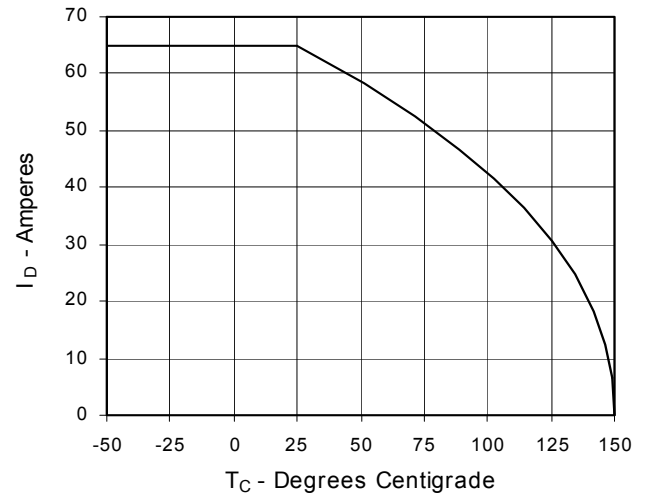
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 40A$  Value vs. Junction Temperature**



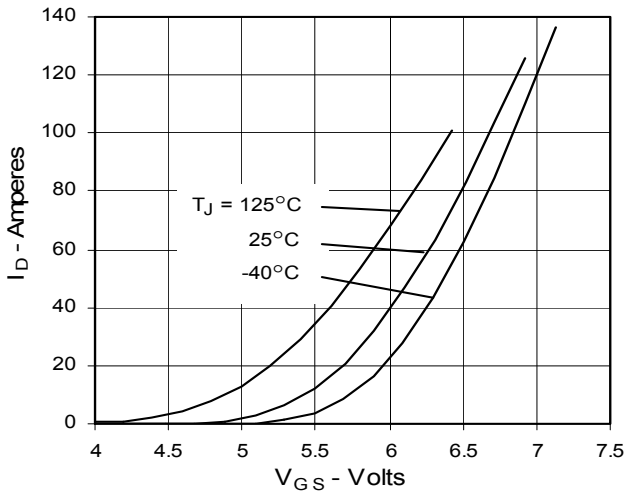
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 40A$  Value vs. Drain Current**



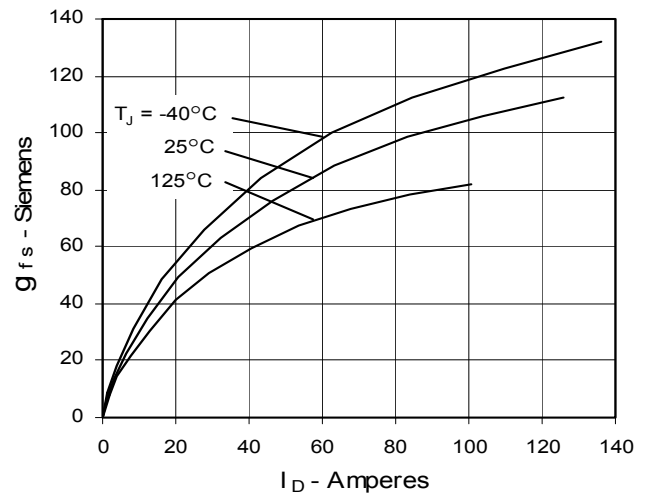
**Fig. 6. Drain Current vs. Case Temperature**



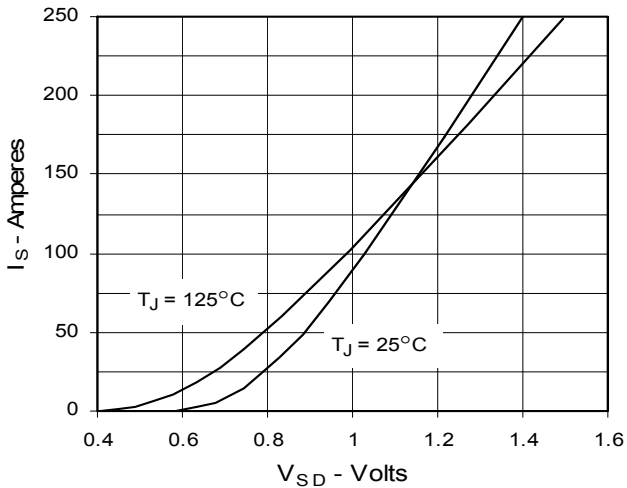
**Fig. 7. Input Admittance**



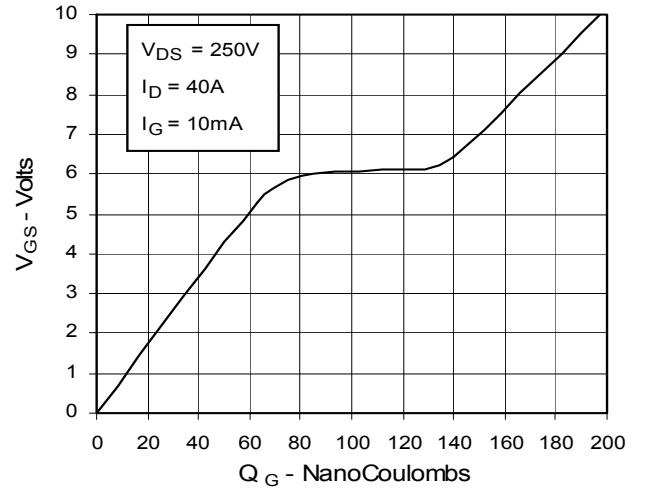
**Fig. 8. Transconductance**



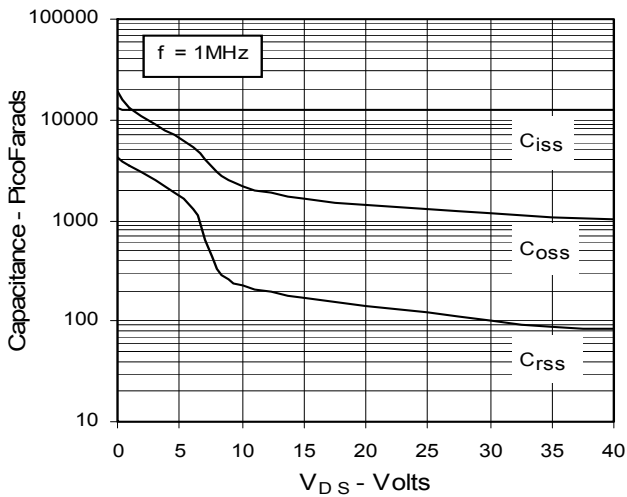
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Forward-Bias Safe Operating Area**

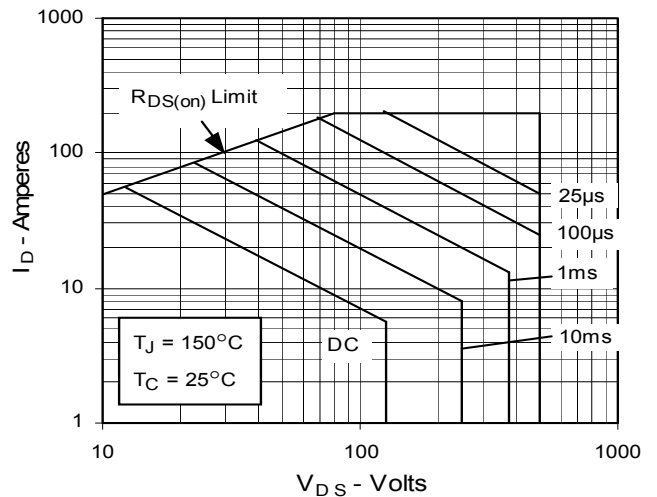
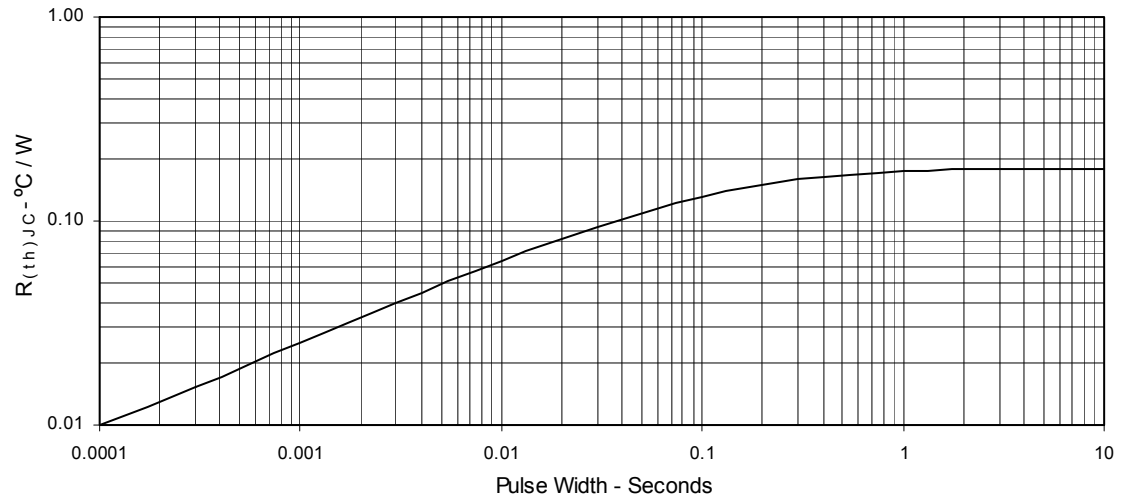


Fig. 13. Maximum Transient Thermal Resistance





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