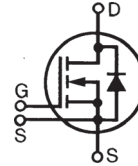


# PolarHV™ HiPerFET IXFN 64N60P

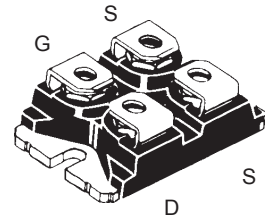
## Power MOSFET

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode

$$\begin{aligned} V_{DSS} &= 600 \text{ V} \\ I_{D25} &= 50 \text{ A} \\ R_{DS(on)} &\leq 96 \text{ m}\Omega \\ t_{rr} &\leq 200 \text{ ns} \end{aligned}$$



miniBLOC, SOT-227 B (IXFN)  
E153432



G = Gate      D = Drain  
S = Source

Either Source terminal S can be used as the Source terminal or the Kelvin Source (gate return) terminal.

| 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 $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$                                                          | 600                | V                |
| $V_{GSS}$  | Continuous                                                                                                                              | $\pm 30$           | V                |
| $V_{GSM}$  | Transient                                                                                                                               | $\pm 40$           | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 50                 | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                              | 150                | A                |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                | 64                 | A                |
| $E_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                | 80                 | mJ               |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                                                                                | 3.5                | J                |
| $dv/dt$    | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2 \Omega$ | 20                 | 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, RMS, 1 minute                                                                                                                 | 2500               | V~               |
| $M_d$      | Mounting torque<br>Terminal torque                                                                                                      | 1.13/10<br>1.13/10 | Nm/lb.in.        |
| Weight     |                                                                                                                                         | 30                 | g                |

### Features

- International standard package
- Encapsulating epoxy meets UL 94 V-0, flammability classification
- miniBLOC with Aluminium nitride isolation
- Low  $R_{DS(on)}$  HDMOS™ process
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
- Fast intrinsic Rectifier

### Applications

- DC-DC converters
- Synchronous rectification
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- Temperature and lighting controls
- Low voltage relays

### 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.                                   |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 3 \text{ mA}$                               | 600                   |      | 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>$V_{GS} = 0 \text{ V}$<br>$T_J = 125^\circ\text{C}$   |                       |      | 25 $\mu\text{A}$<br>1000 $\mu\text{A}$ |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$ , Note 1                      |                       |      | 96 $\text{m}\Omega$                    |

| 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                                              | 40                                                                                | 63   | S                        |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                   |                                                                                   | 12   | nF                       |
| $C_{oss}$    |                                                                                                 |                                                                                   | 1150 | pF                       |
| $C_{rss}$    |                                                                                                 |                                                                                   | 80   | pF                       |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$<br>$R_G = 1\ \Omega$ (External) |                                                                                   | 28   | ns                       |
| $t_r$        |                                                                                                 |                                                                                   | 23   | ns                       |
| $t_{d(off)}$ |                                                                                                 |                                                                                   | 79   | ns                       |
| $t_f$        |                                                                                                 |                                                                                   | 24   | ns                       |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$                                 |                                                                                   | 200  | nC                       |
| $Q_{gs}$     |                                                                                                 |                                                                                   | 70   | nC                       |
| $Q_{gd}$     |                                                                                                 |                                                                                   | 68   | nC                       |
| $R_{thJC}$   |                                                                                                 |                                                                                   | 0.05 | $0.18\ ^\circ\text{C/W}$ |
| $R_{thCK}$   |                                                                                                 |                                                                                   |      | $^\circ\text{C/W}$       |

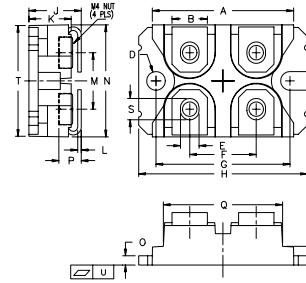
## Source-Drain Diode

| Symbol   | Test Conditions                                                                | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|----------|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
|          |                                                                                | Min.                                                                              | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{ V}$                                                          |                                                                                   |      | 64 A          |
| $I_{SM}$ | Repetitive                                                                     |                                                                                   |      | 150 A         |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{ V}$ , Note 1                                      |                                                                                   |      | 1.5 V         |
| $t_{rr}$ | $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}$<br>$V_R = 100\text{ V}$ |                                                                                   | 0.6  | 200 ns        |
| $Q_{RM}$ |                                                                                |                                                                                   |      | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                |                                                                                   |      | A             |

## Notes:

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

## miniBLOC, SOT-227 B



M4 screws (4x) supplied

| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 31.50      | 31.88 | 1.240  | 1.255 |
| B    | 7.80       | 8.20  | 0.307  | 0.323 |
| C    | 4.09       | 4.29  | 0.161  | 0.169 |
| D    | 4.09       | 4.29  | 0.161  | 0.169 |
| E    | 4.09       | 4.29  | 0.161  | 0.169 |
| F    | 14.91      | 15.11 | 0.587  | 0.595 |
| G    | 30.12      | 30.30 | 1.186  | 1.193 |
| H    | 38.00      | 38.23 | 1.496  | 1.505 |
| J    | 11.68      | 12.22 | 0.460  | 0.481 |
| K    | 8.92       | 9.60  | 0.351  | 0.378 |
| L    | 0.76       | 0.84  | 0.030  | 0.033 |
| M    | 12.60      | 12.85 | 0.496  | 0.506 |
| N    | 25.15      | 25.42 | 0.990  | 1.001 |
| O    | 1.98       | 2.13  | 0.078  | 0.084 |
| P    | 4.95       | 5.97  | 0.195  | 0.235 |
| Q    | 26.54      | 26.90 | 1.045  | 1.059 |
| R    | 3.94       | 4.42  | 0.155  | 0.174 |
| S    | 4.72       | 4.85  | 0.186  | 0.191 |
| T    | 24.59      | 25.07 | 0.968  | 0.987 |
| U    | -0.05      | 0.1   | -0.002 | 0.004 |

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

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 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  
 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**

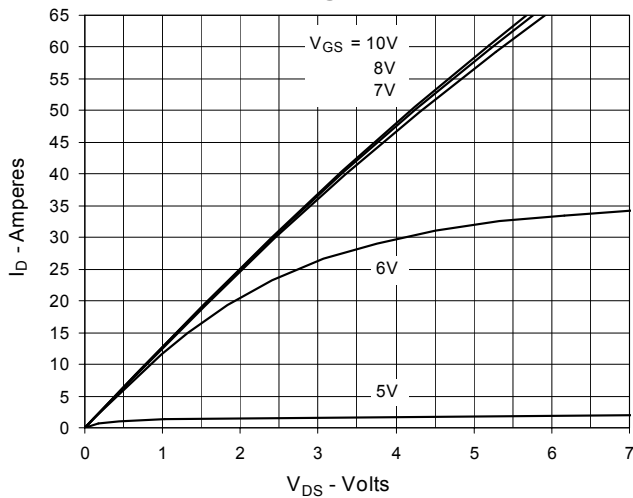


**Fig. 2. Extended Output Characteristics  
@ 25°C**

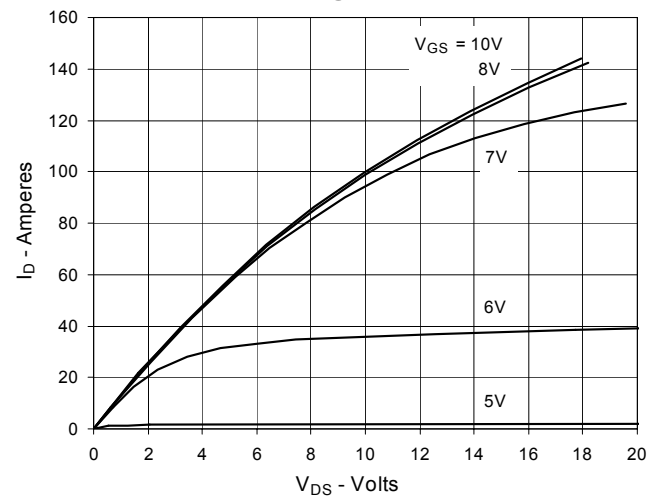


**Fig. 3. Output Characteristics  
@ 125°C**

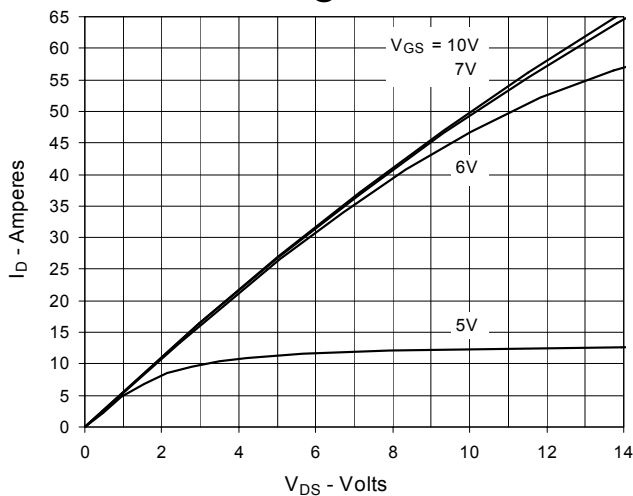


**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 32A$  vs.  
Junction Temperature**

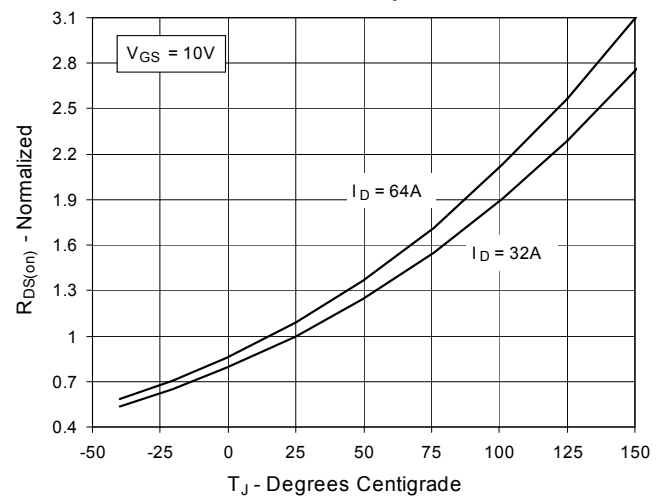


**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 32A$  vs.  
Drain Current**

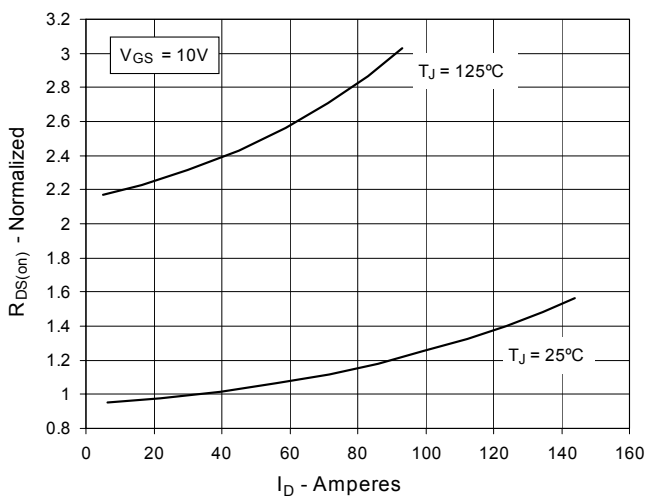


**Fig. 6. Maximum Drain Current vs.  
Case Temperature**

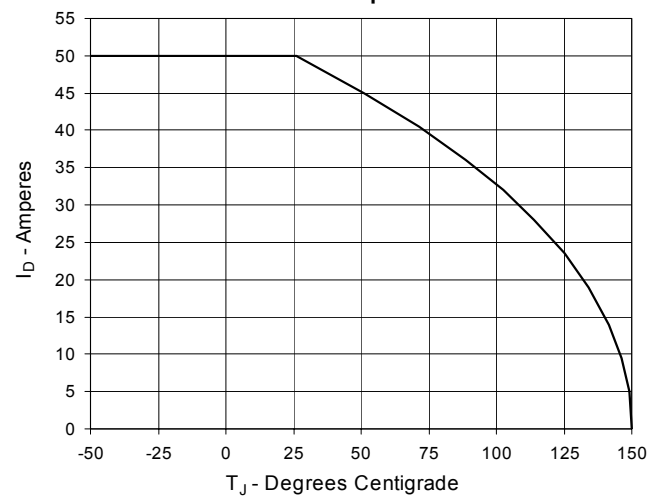


**Fig. 7. Input Admittance**

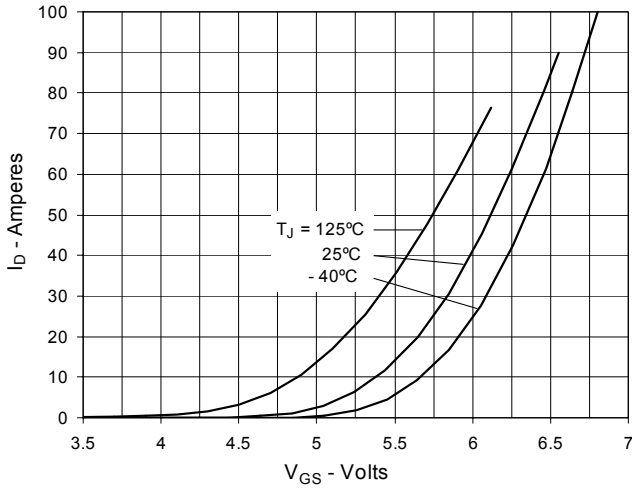


**Fig. 8. Transconductance**

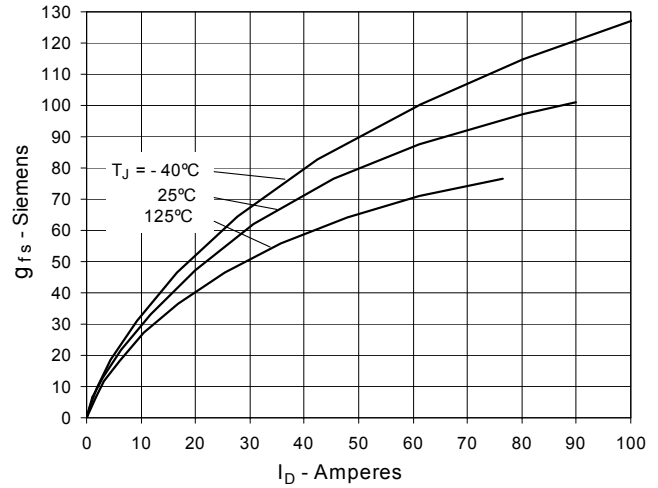


**Fig. 9. Forward Voltage Drop of Intrinsic Diode**

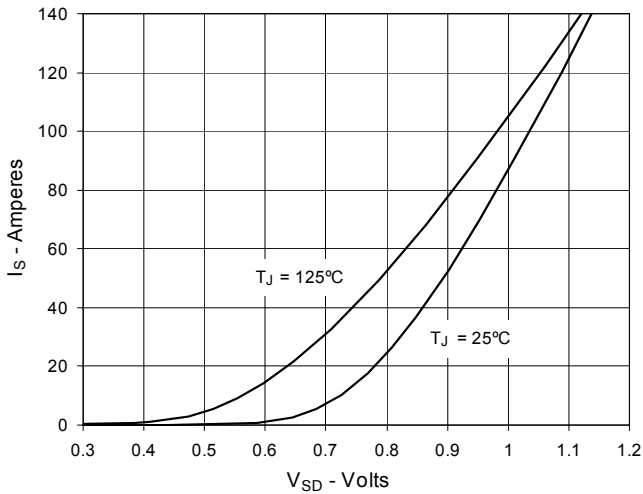


**Fig. 10. Gate Charge**

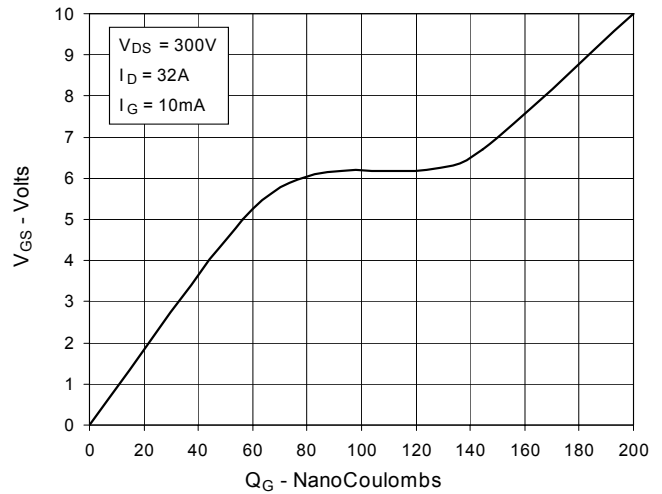


**Fig. 11. Capacitance**

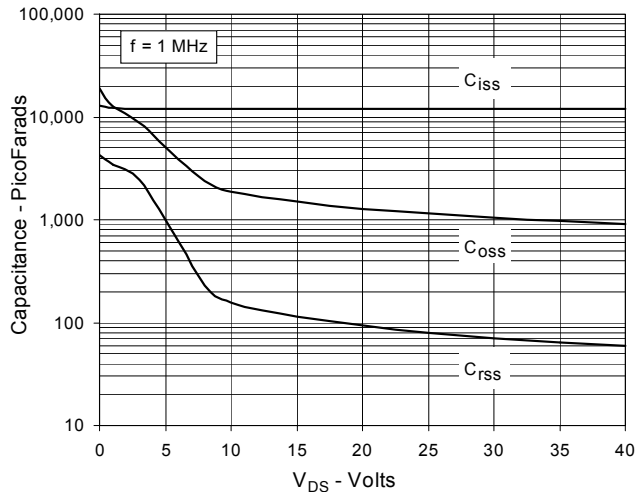


**Fig. 12. Forward-Bias Safe Operating Area**

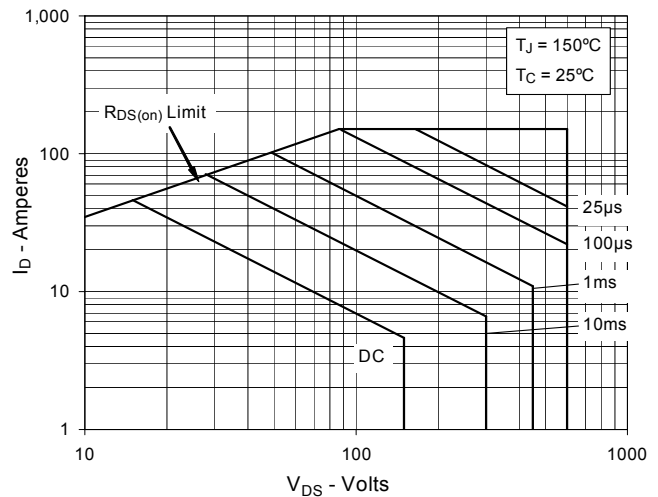
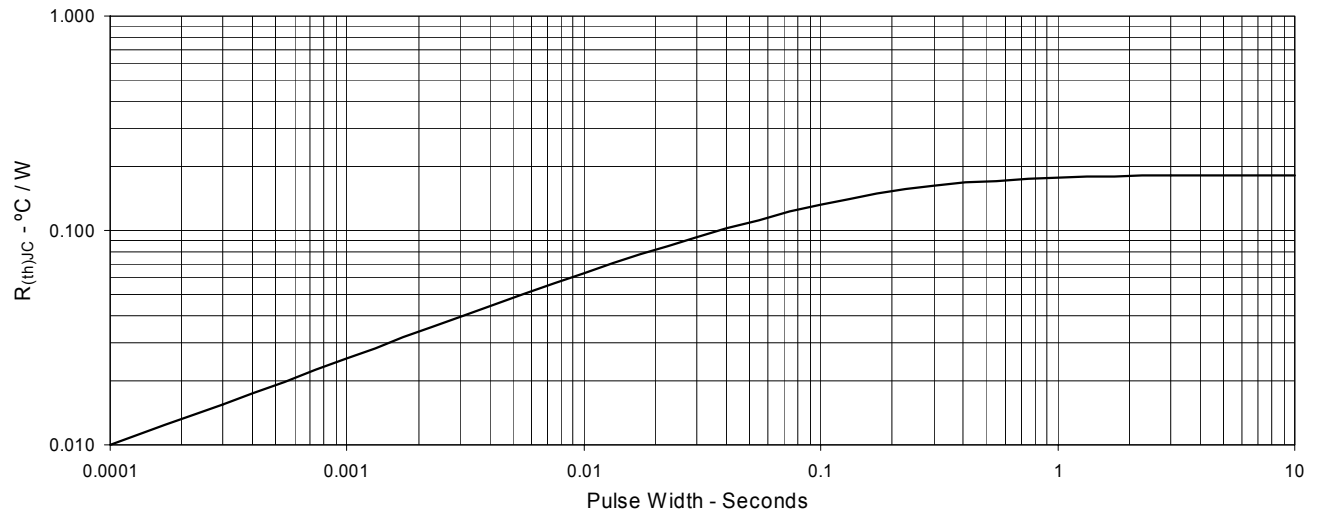


**Fig. 13. Maximum Transient Thermal Resistance**



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