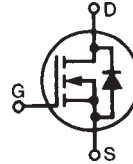


# PolarHT™ Power MOSFET

## IXTK 102N30P

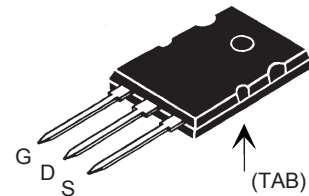
$$\begin{aligned} V_{DSS} &= 300 \text{ V} \\ I_{D25} &= 102 \text{ A} \\ R_{DS(on)} &\leq 33 \text{ m}\Omega \end{aligned}$$

N-Channel Enhancement Mode  
Avalanche Rated



| Symbol       | Test Conditions                                                                                                                         | Maximum Ratings |                  |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$    | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$                                                                                          | 300             | V                |
| $V_{DGR}$    | $T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$                                                              | 300             | V                |
| $V_{GSS}$    | Continuous                                                                                                                              | $\pm 20$        | V                |
| $V_{GSM}$    | Transient                                                                                                                               | $\pm 30$        | V                |
| $I_{D25}$    | $T_C = 25^\circ\text{C}$                                                                                                                | 102             | A                |
| $I_{D(RMS)}$ | External lead current limit                                                                                                             | 75              | A                |
| $I_{DM}$     | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                              | 250             | A                |
| $I_{AR}$     | $T_C = 25^\circ\text{C}$                                                                                                                | 60              | A                |
| $E_{AR}$     | $T_C = 25^\circ\text{C}$                                                                                                                | 60              | mJ               |
| $E_{AS}$     | $T_C = 25^\circ\text{C}$                                                                                                                | 2.5             | J                |
| $dv/dt$      | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 4 \Omega$ | 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             | $^\circ\text{C}$ |
| $T_{SOLD}$   | Plastic body for 10 s                                                                                                                   | 260             | $^\circ\text{C}$ |
| $M_d$        | Mounting torque                                                                                                                         | 1.13/10         | Nm/lb.in.        |
| Weight       | TO-264                                                                                                                                  | 10              | g                |

TO-264 (IXTK)



G = Gate      D = Drain  
S = Source      TAB = Drain

### Features

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

### Advantages

- Easy to mount
- Space savings
- High power density

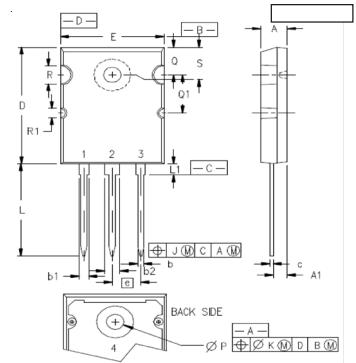
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                     | Characteristic Values |      |                                       |
|--------------|-----------------------------------------------------------------------------------------------------------------|-----------------------|------|---------------------------------------|
|              |                                                                                                                 | Min.                  | Typ. | Max.                                  |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$                                                                | 300                   |      | V                                     |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 500 \mu\text{A}$                                                                     | 2.5                   |      | 5.0 V                                 |
| $I_{GSS}$    | $V_{GS} = \pm 20 \text{ V}_{DC}$ , $V_{DS} = 0$                                                                 |                       |      | $\pm 200 \text{ nA}$                  |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0 \text{ V}$<br>$T_J = 125^\circ\text{C}$                                       |                       |      | 25 $\mu\text{A}$<br>250 $\mu\text{A}$ |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$<br>Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2\%$ |                       |      | 33 $\text{m}\Omega$                   |

| Symbol       | Test Conditions                                                                                         | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                        |
|--------------|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------------------------|
|              |                                                                                                         | Min.                                                                              | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 10\text{ V}$ ; $I_D = 0.5 I_{D25}$ , pulse test                                               | 45                                                                                | 57   | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                     |                                                                                   | 7500 | pF                     |
| $C_{oss}$    |                                                                                                         |                                                                                   | 1150 | pF                     |
| $C_{rss}$    |                                                                                                         |                                                                                   | 230  | pF                     |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = 60\text{ A}$<br>$R_G = 3.3\ \Omega$ (External) |                                                                                   | 30   | ns                     |
| $t_r$        |                                                                                                         |                                                                                   | 28   | ns                     |
| $t_{d(off)}$ |                                                                                                         |                                                                                   | 130  | ns                     |
| $t_f$        |                                                                                                         |                                                                                   | 30   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = 0.5 I_{D25}$                                   |                                                                                   | 224  | nC                     |
| $Q_{gs}$     |                                                                                                         |                                                                                   | 50   | nC                     |
| $Q_{gd}$     |                                                                                                         |                                                                                   | 110  | nC                     |
| $R_{thJC}$   |                                                                                                         |                                                                                   |      | $0.18^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                         | 0.15                                                                              |      | $^\circ\text{C/W}$     |

## Source-Drain Diode

| Symbol   | Test Conditions                                                                                           | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|----------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
|          |                                                                                                           | Min.                                                                              | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{ V}$                                                                                     |                                                                                   |      | 102 A         |
| $I_{SM}$ | Repetitive                                                                                                |                                                                                   |      | 250 A         |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{ V}$ ,<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$  |                                                                                   |      | 1.5 V         |
| $t_{rr}$ | $I_F = 25\text{ A}$ , $-di/dt = 100\text{ A}/\mu\text{s}$<br>$V_R = 100\text{ V}$ , $V_{GS} = 0\text{ V}$ |                                                                                   | 250  | ns            |
| $Q_{RM}$ |                                                                                                           |                                                                                   | 3.3  | $\mu\text{C}$ |

## TO-264 (IXTK) Outline



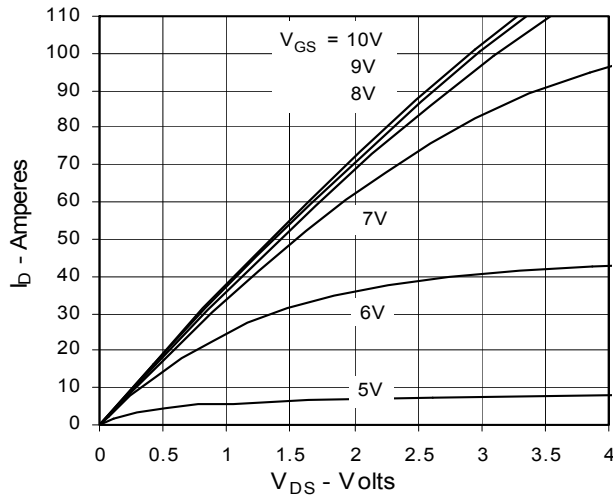
- 1 - GATE  
2, 4 - DRAIN (COLLECTOR)  
3 - SOURCE (EMITTER)

| SYM | INCHES   |       | MILLIMETERS |       |
|-----|----------|-------|-------------|-------|
|     | MIN      | MAX   | MIN         | MAX   |
| A   | .185     | .209  | 4.70        | 5.31  |
| A1  | .102     | .118  | 2.59        | 3.00  |
| b   | .037     | .055  | 0.94        | 1.40  |
| b1  | .087     | .102  | 2.21        | 2.59  |
| b2  | .110     | .126  | 2.79        | 3.20  |
| c   | .017     | .029  | 0.43        | 0.74  |
| D   | 1.007    | 1.047 | 25.58       | 26.59 |
| E   | .760     | .799  | 19.30       | 20.29 |
| e   | .215 BSC |       | 5.46 BSC    |       |
| J   | .000     | .010  | 0.00        | 0.25  |
| K   | .000     | .010  | 0.00        | 0.25  |
| L   | .779     | .842  | 19.79       | 21.39 |
| L1  | .087     | .102  | 2.21        | 2.59  |
| ØP  | .122     | .138  | 3.10        | 3.51  |
| Q   | .240     | .256  | 6.10        | 6.50  |
| Q1  | .330     | .346  | 8.38        | 8.79  |
| ØR  | .155     | .187  | 3.94        | 4.75  |
| ØR1 | .085     | .093  | 2.16        | 2.36  |
| S   | .243     | .253  | 6.17        | 6.43  |

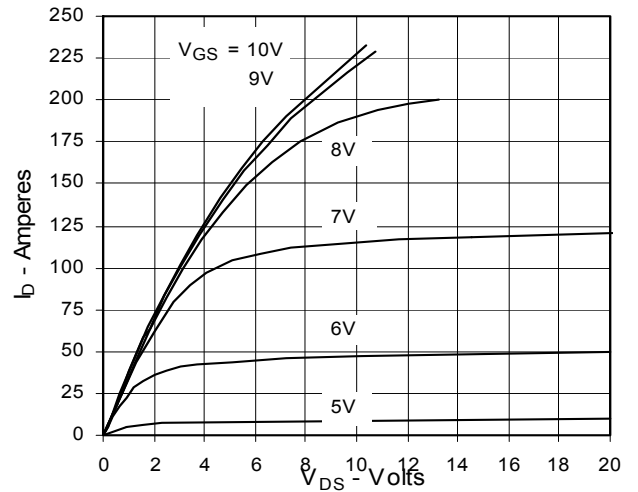
IXYS reserves the right to change limits, test conditions, and dimensions.

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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

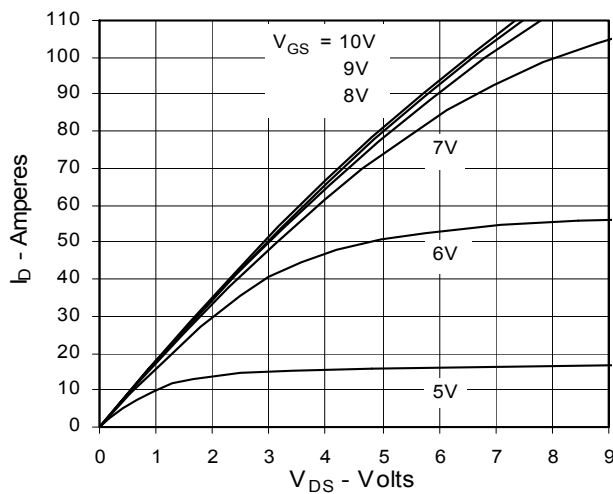
**Fig. 1. Output Characteristics  
@ 25°C**



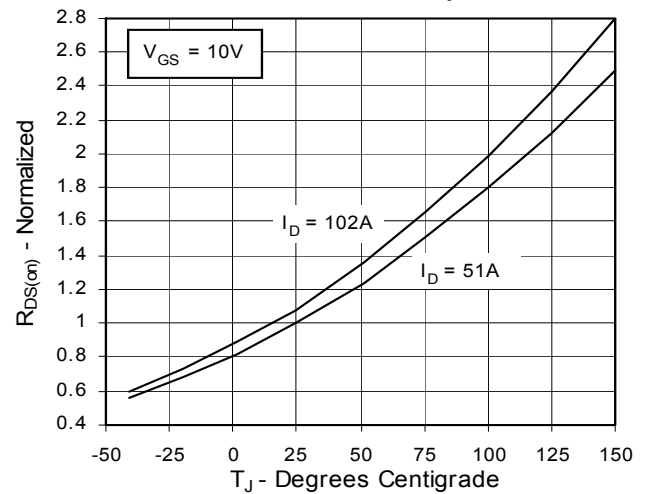
**Fig. 2. Extended Output Characteristics  
@ 25°C**



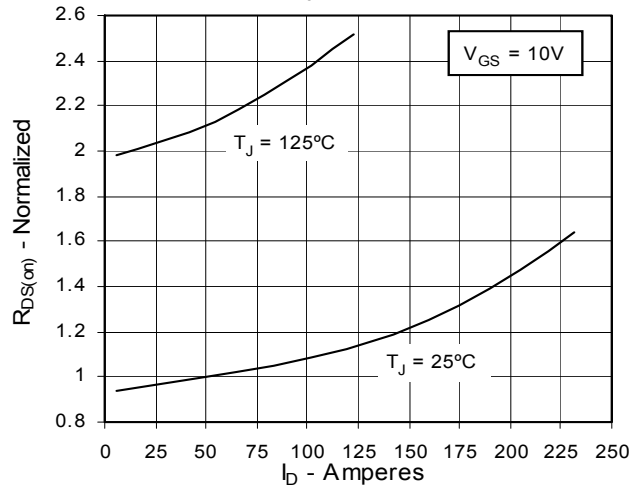
**Fig. 3. Output Characteristics  
@ 125°C**



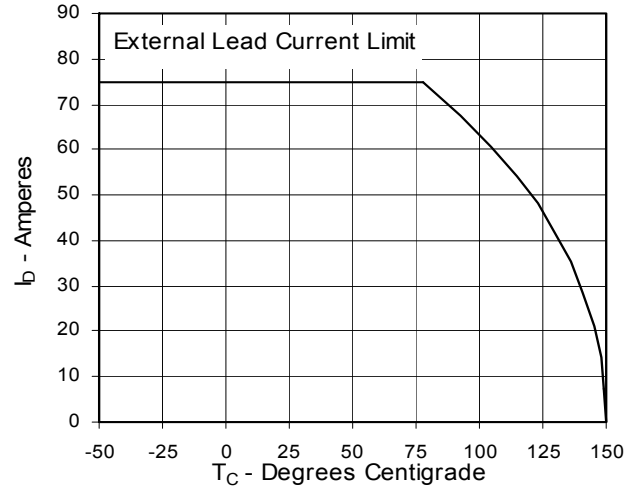
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$   
Value vs. Junction Temperature**



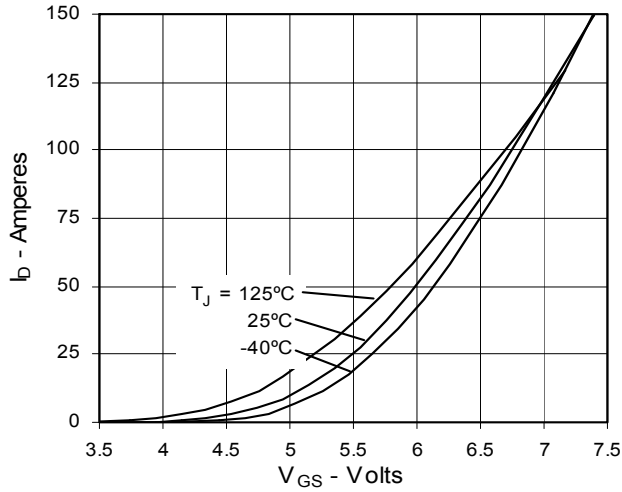
**Fig. 5.  $R_{DS(on)}$  Normalized to  
0.5  $I_{D25}$  Value vs.  $I_D$**



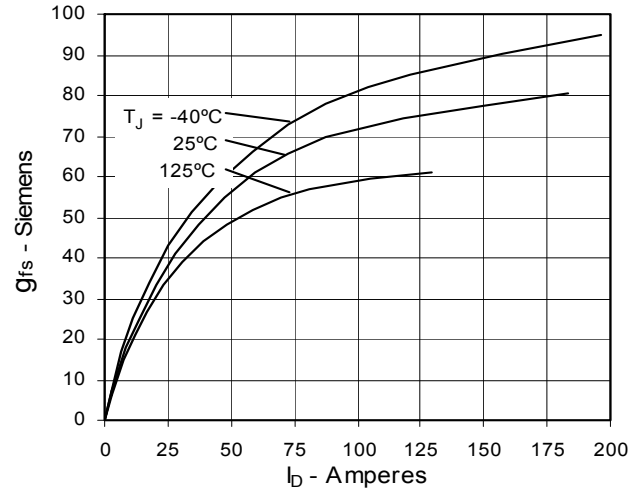
**Fig. 6. Drain Current vs. Case  
Temperature**



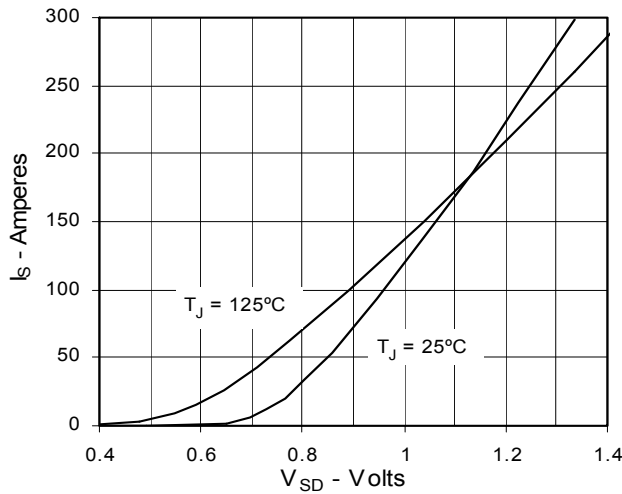
**Fig. 7. Input Admittance**



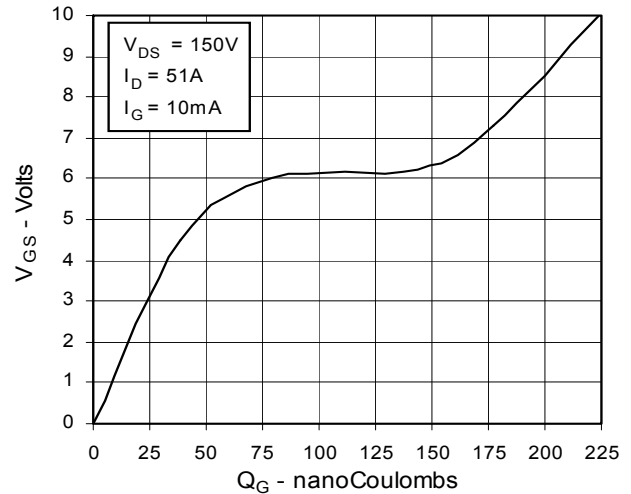
**Fig. 8. Transconductance**



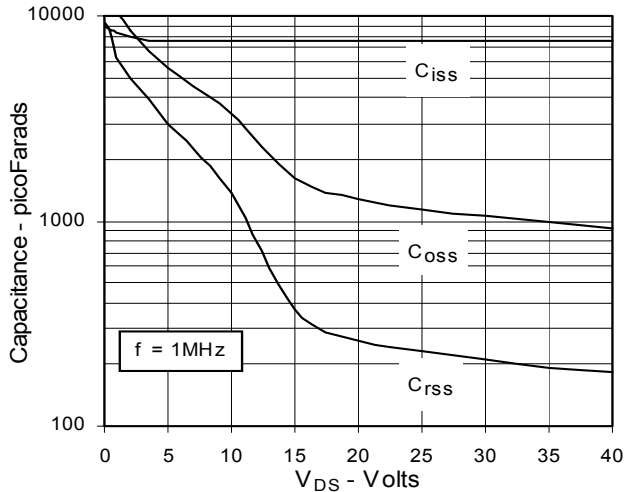
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



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

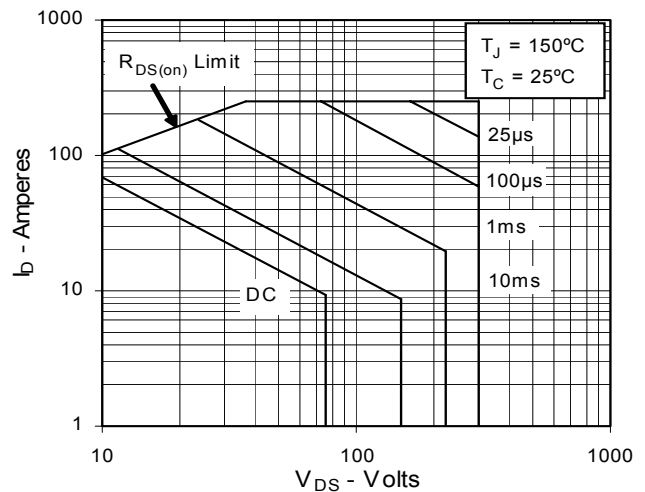
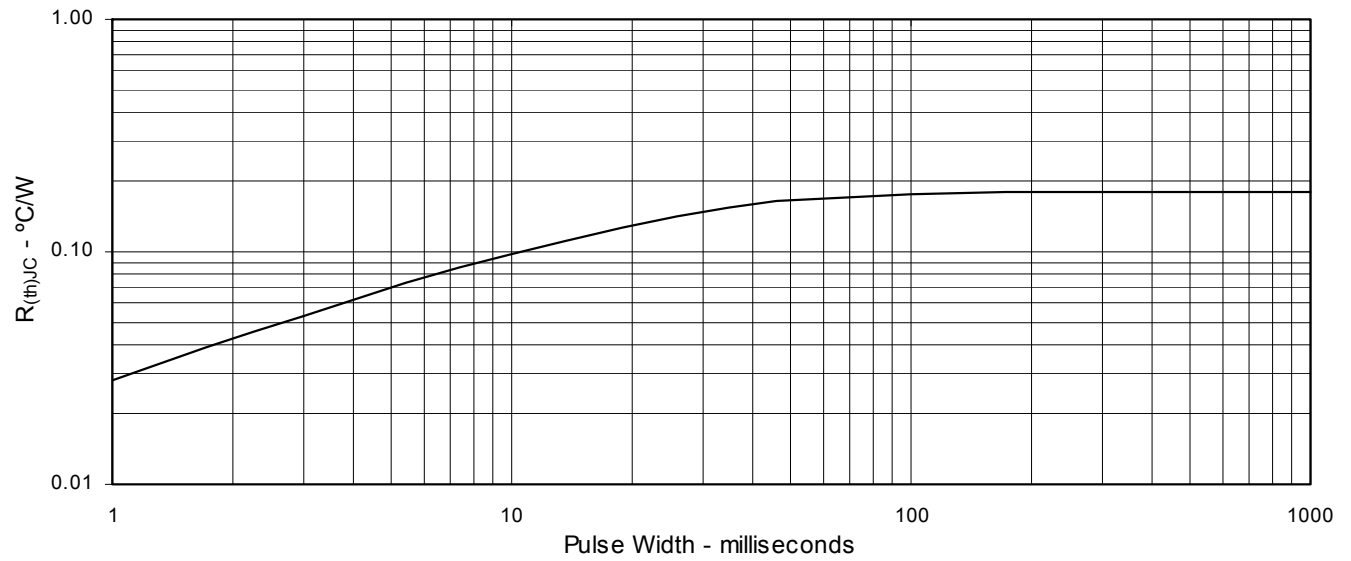


Fig. 13. Maximum Transient Thermal Resistance





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