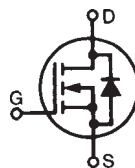


## Polar™ Power MOSFETs

## IXTT52N30P IXTQ52N30P

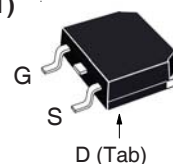
$$\begin{aligned} V_{DSS} &= 300V \\ I_{D25} &= 52A \\ R_{DS(on)} &\leq 73m\Omega \end{aligned}$$

N-Channel Enhancement Mode  
Avalanche Rated

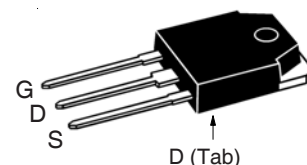


| Symbol     | Test Conditions                                                    | Maximum Ratings |                  |
|------------|--------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$                     | 300             | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C to } 150^\circ\text{C}, R_{GS} = 1M\Omega$  | 300             | V                |
| $V_{GSS}$  | Continuous                                                         | $\pm 20$        | V                |
| $V_{GSM}$  | Transient                                                          | $\pm 30$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                           | 52              | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$         | 150             | A                |
| $I_A$      | $T_C = 25^\circ\text{C}$                                           | 52              | A                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                           | 1               | J                |
| $dv/dt$    | $I_S \leq I_{DM}, V_{DD} \leq V_{DSS}, T_J \leq 150^\circ\text{C}$ | 10              | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                           | 400             | W                |
| $T_J$      |                                                                    | -55 ... +150    | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                    | 150             | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                    | -55 ... +150    | $^\circ\text{C}$ |
| $T_L$      | Maximum Lead Temperature for Soldering                             | 300             | $^\circ\text{C}$ |
| $T_{SOLD}$ | 1.6 mm (0.062in.) from Case for 10s                                | 260             | $^\circ\text{C}$ |
| $M_d$      | Mounting Torque (TO-3P)                                            | 1.13 / 10       | Nm/lb.in         |
| Weight     | TO-286                                                             | 4.0             | g                |
|            | TO-3P                                                              | 5.5             | g                |

TO-268 (IXTT)



TO-3P (IXTQ)



G = Gate      D = Drain  
S = Source    Tab = Drain

### Features

- Fast Intrinsic Rectifier
- Avalanche Rated
- Low  $R_{DS(on)}$  and  $Q_G$
- Low Package Inductance

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

### Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- Laser Drivers
- AC and DC Motor Drives
- Robotics and Servo Controls

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | Characteristic Values |      |               |
|--------------|---------------------------------------------------------------------------|-----------------------|------|---------------|
|              |                                                                           | Min.                  | Typ. | Max.          |
| $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                                             | 300                   |      | V             |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$                                         | 2.5                   |      | 5.0 V         |
| $I_{GSS}$    | $V_{GS} = \pm 20V, V_{DS} = 0V$                                           |                       |      | $\pm 100$ nA  |
| $I_{DSS}$    | $V_{DS} = V_{DSS}, V_{GS} = 0V$<br>$T_J = 125^\circ\text{C}$              |                       |      | 25 $\mu A$    |
|              |                                                                           |                       |      | 250 $\mu A$   |
| $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 0.5 \cdot I_{D25}$ , Note 1                          |                       |      | 73 m $\Omega$ |

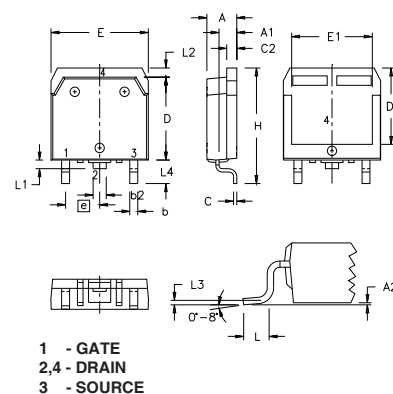
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                                                                          | Characteristic Values |      |                        |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|------------------------|
|              |                                                                                                                                                    | Min.                  | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 10\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                                                                                         | 20                    | 30   | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                                   |                       | 3490 | pF                     |
| $C_{oss}$    |                                                                                                                                                    |                       | 550  | pF                     |
| $C_{rss}$    |                                                                                                                                                    |                       | 130  | 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>$R_G = 4\Omega$ (External) |                       | 24   | ns                     |
| $t_r$        |                                                                                                                                                    |                       | 22   | ns                     |
| $t_{d(off)}$ |                                                                                                                                                    |                       | 60   | ns                     |
| $t_f$        |                                                                                                                                                    |                       | 20   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                                                                   |                       | 110  | nC                     |
| $Q_{gs}$     |                                                                                                                                                    |                       | 25   | nC                     |
| $Q_{gd}$     |                                                                                                                                                    |                       | 53   | nC                     |
| $R_{thJC}$   | TO-3P                                                                                                                                              |                       | 0.25 | $0.31^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                                    |                       |      | $^\circ\text{C/W}$     |

## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                             | Characteristic Values |      |               |
|----------|-------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                                       | Min.                  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                  |                       |      | 52 A          |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                           |                       |      | 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>$V_R = 100\text{V}$ , $V_{GS} = 0\text{V}$ |                       | 250  | ns            |
| $Q_{RM}$ |                                                                                                       |                       | 3.0  | $\mu\text{C}$ |

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

## TO-268 Outline



| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .193     | .201 | 4.90        | 5.10  |
| A1  | .106     | .114 | 2.70        | 2.90  |
| A2  | .001     | .010 | 0.02        | 0.25  |
| b   | .045     | .057 | 1.15        | 1.45  |
| b2  | .075     | .083 | 1.90        | 2.10  |
| C   | .016     | .026 | 0.40        | 0.65  |
| C2  | .057     | .063 | 1.45        | 1.60  |
| D   | .543     | .551 | 13.80       | 14.00 |
| D1  | .488     | .500 | 12.40       | 12.70 |
| E   | .624     | .632 | 15.85       | 16.05 |
| E1  | .524     | .535 | 13.30       | 13.60 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| H   | .736     | .752 | 18.70       | 19.10 |
| L   | .094     | .106 | 2.40        | 2.70  |
| L1  | .047     | .055 | 1.20        | 1.40  |
| L2  | .039     | .045 | 1.00        | 1.15  |
| L3  | .010 BSC |      | 0.25 BSC    |       |
| L4  | .150     | .161 | 3.80        | 4.10  |

## TO-3P Outline

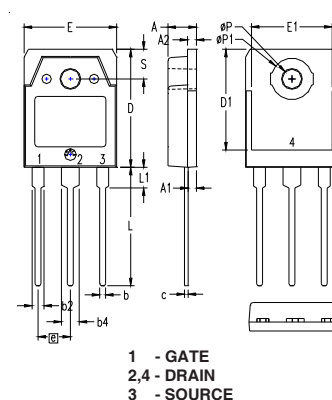


Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$

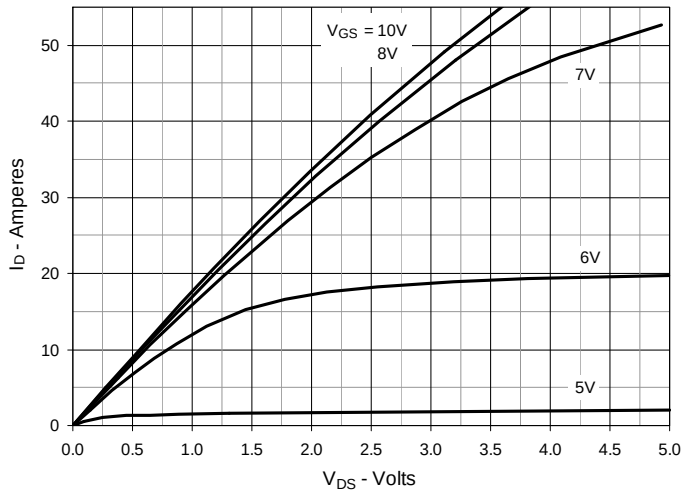


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

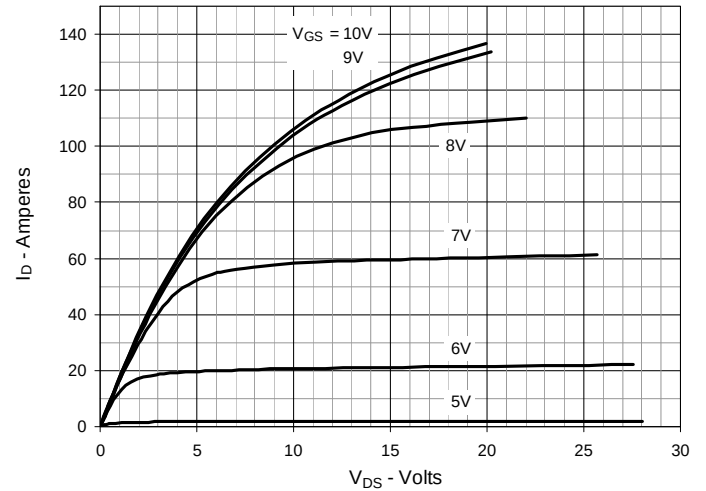


Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$

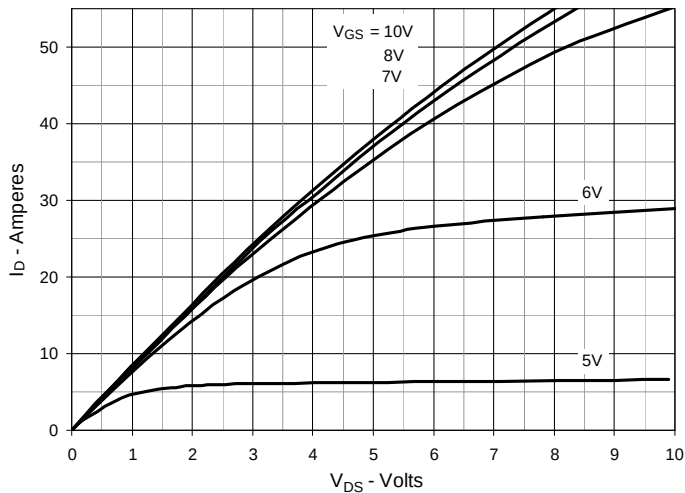


Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 26\text{A}$  Value vs. Junction Temperature

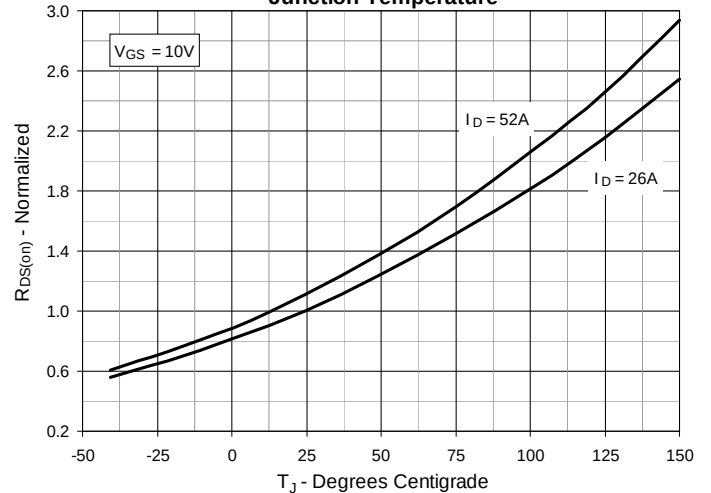


Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 26\text{A}$  Value vs. Drain Current

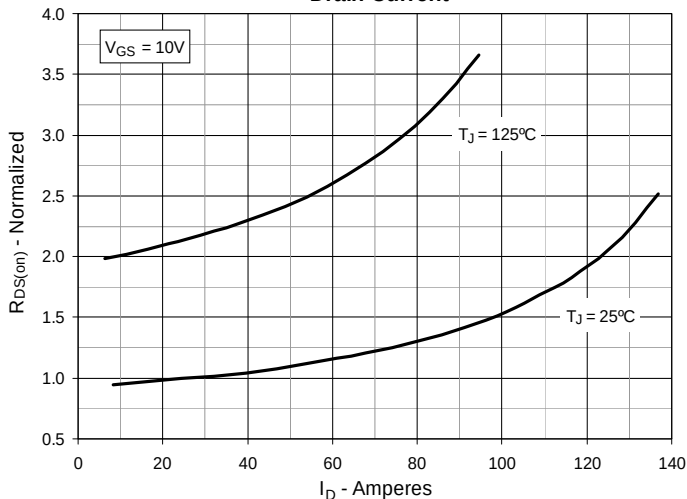
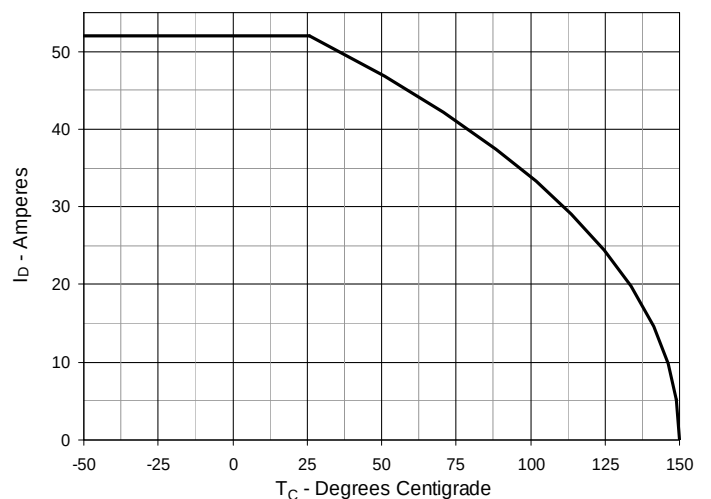
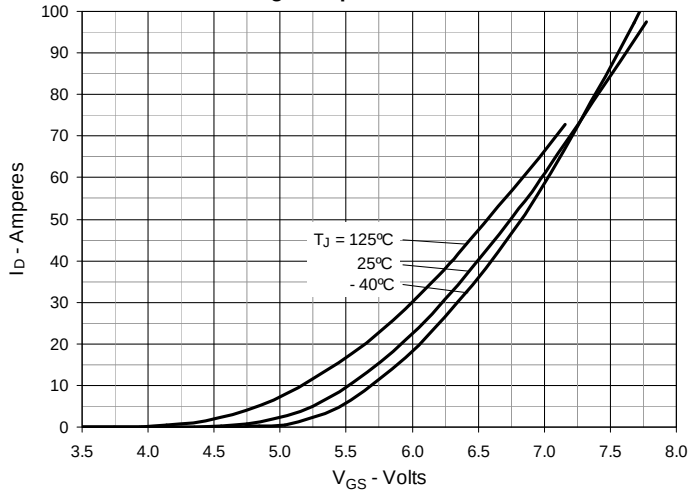


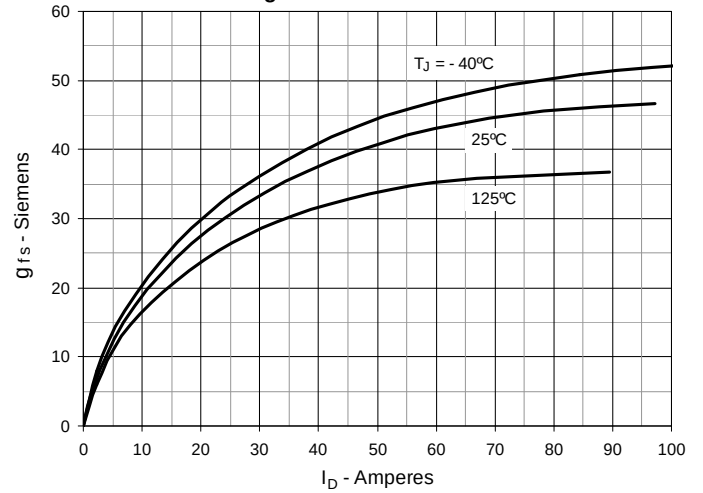
Fig. 6. Maximum Drain Current vs. Case Temperature



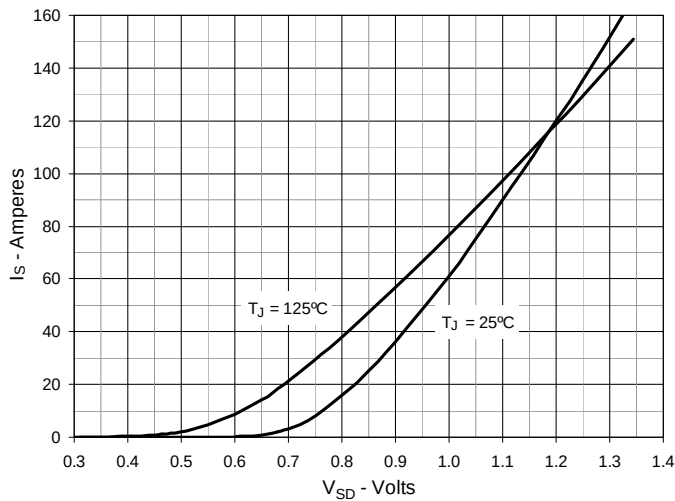
**Fig. 7. Input Admittance**



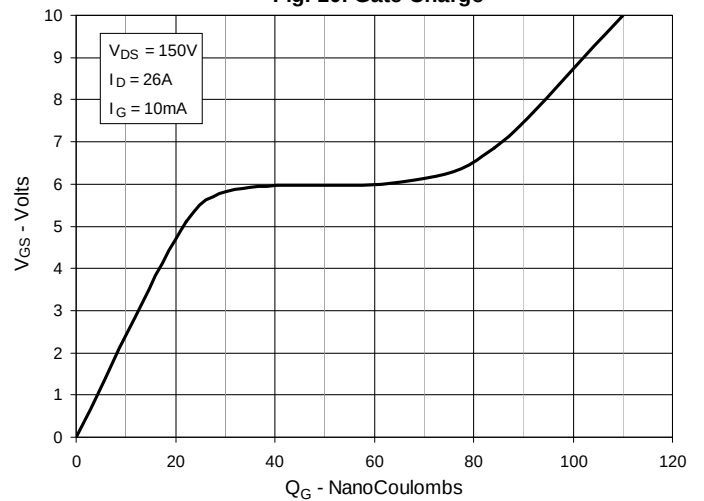
**Fig. 8. Transconductance**



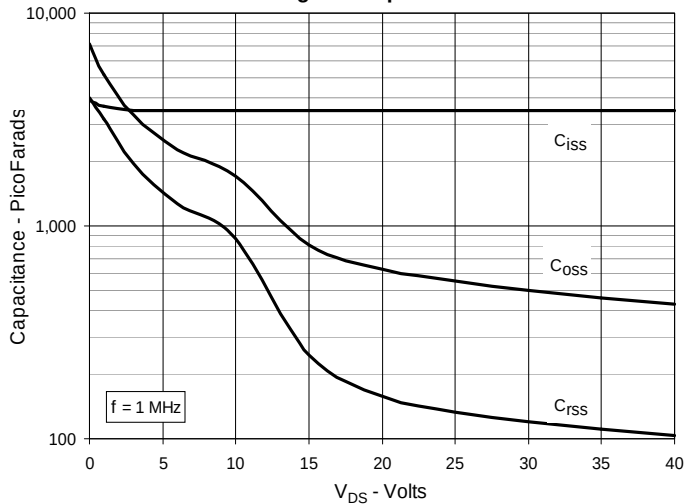
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



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

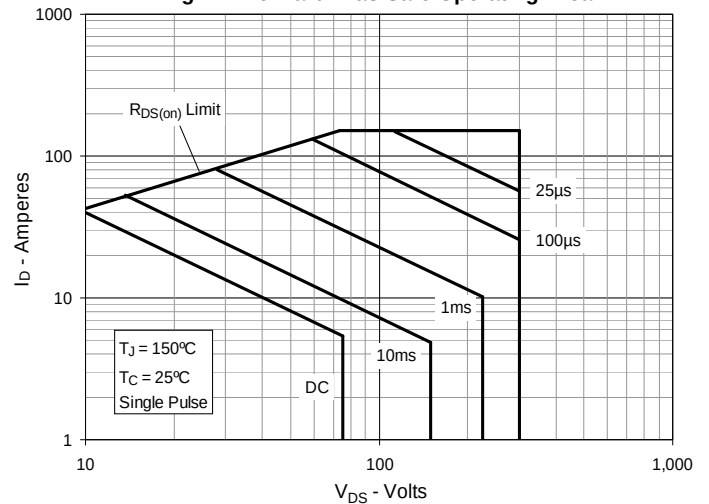
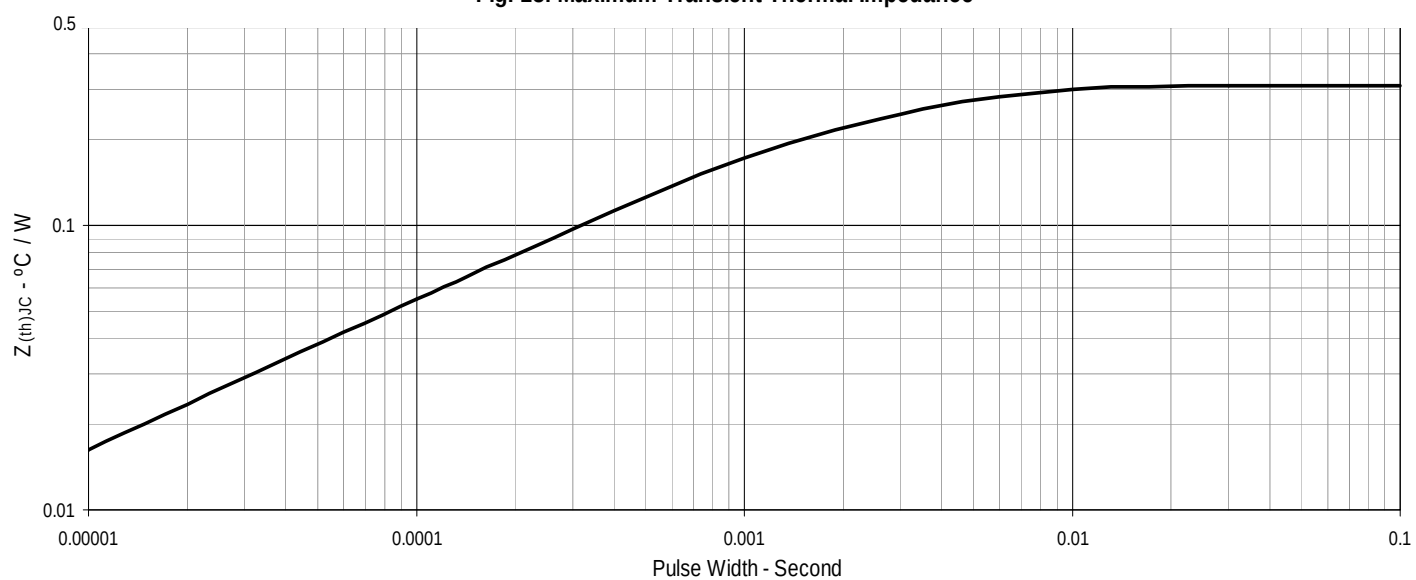


Fig. 13. Maximum Transient Thermal Impedance





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