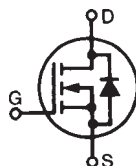


# Polar™ HiPerFET™ Power MOSFET

## IXFB210N20P

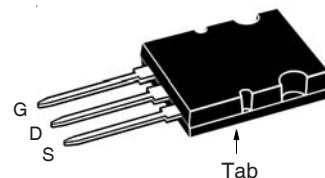
N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



$$\begin{aligned} V_{DSS} &= 200V \\ I_{D25} &= 210A \\ R_{DS(on)} &\leq 10.5m\Omega \\ t_{rr} &\leq 200ns \end{aligned}$$

| Symbol     | Test Conditions                                                    | Maximum Ratings |            |
|------------|--------------------------------------------------------------------|-----------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $175^\circ C$                                | 200             | V          |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $175^\circ C$ , $R_{GS} = 1M\Omega$          | 200             | V          |
| $V_{GSS}$  | Continuous                                                         | $\pm 20$        | V          |
| $V_{GSM}$  | Transient                                                          | $\pm 30$        | V          |
| $I_{D25}$  | $T_C = 25^\circ C$ (Chip Capability)                               | 210             | A          |
| $I_{LRMS}$ | Lead Current Limit, RMS                                            | 160             | A          |
| $I_{DM}$   | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$               | 600             | A          |
| $I_A$      | $T_C = 25^\circ C$                                                 | 105             | A          |
| $E_{AS}$   | $T_C = 25^\circ C$                                                 | 4               | J          |
| $dv/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 175^\circ C$ | 20              | V/ns       |
| $P_D$      | $T_C = 25^\circ C$                                                 | 1500            | W          |
| $T_J$      |                                                                    | -55 ... +175    | $^\circ C$ |
| $T_{JM}$   |                                                                    | 175             | $^\circ C$ |
| $T_{stg}$  |                                                                    | -55 ... +175    | $^\circ C$ |
| $T_L$      | 1.6mm (0.062 in.) from Case for 10s                                | 300             | $^\circ C$ |
| $T_{SOLD}$ | Plastic Body for 10s                                               | 260             | $^\circ C$ |
| $F_C$      | Mounting Force                                                     | 30..120/6.7..27 | N/lb.      |
| Weight     |                                                                    | 10              | g          |

### PLUS264™



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

### Features

- Low Package Inductance
- Avalanche Rated
- High Current Handling Capability
- Low  $R_{DS(on)}$  and  $Q_G$
- Fast Intrinsic Diode

### Advantages

- Easy to Mount
- Space Savings
- High Power Density

### Applications

- DC-DC Converters
- Battery Chargers
- Switch-Mode and Resonant-Mode Power Supplies
- DC Choppers
- AC and DC Motor Drives
- Uninterrupted Power Supplies
- High Speed Power Switching Applications

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                    |
|--------------|-----------------------------------------------------------------------|-----------------------|------|--------------------|
|              |                                                                       | Min.                  | Typ. | Max.               |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 3mA$                                           | 200                   |      | V                  |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 8mA$                                       | 2.5                   |      | 4.5 V              |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                    |                       |      | $\pm 200$ nA       |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 150^\circ C$             |                       |      | 25 $\mu A$<br>2 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                   |                       |      | 10.5 m $\Omega$    |

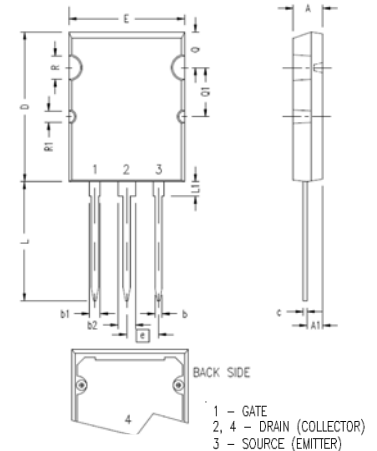
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                                                                        | Characteristic Values |      |                        |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|------------------------|
|              |                                                                                                                                                    | Min.                  | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 10\text{V}$ , $I_D = 60\text{A}$ , Note 1                                                                                                | 60                    | 103  | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                                   |                       | 18.6 | nF                     |
| $C_{oss}$    |                                                                                                                                                    |                       | 3270 | pF                     |
| $C_{rss}$    |                                                                                                                                                    |                       | 80   | 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>$R_G = 1\Omega$ (External) |                       | 43   | ns                     |
| $t_r$        |                                                                                                                                                    |                       | 30   | ns                     |
| $t_{d(off)}$ |                                                                                                                                                    |                       | 70   | ns                     |
| $t_f$        |                                                                                                                                                    |                       | 18   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                                                                   |                       | 255  | nC                     |
| $Q_{gs}$     |                                                                                                                                                    |                       | 94   | nC                     |
| $Q_{gd}$     |                                                                                                                                                    |                       | 83   | nC                     |
| $R_{thJC}$   |                                                                                                                                                    |                       | 0.13 | $0.10^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                                    |                       |      | $^\circ\text{C/W}$     |

## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)     | Characteristic Values |      |               |
|----------|---------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                 | Min.                  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$                                                            |                       |      | 210 A         |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                     |                       |      | 800 A         |
| $V_{SD}$ | $I_F = 105\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1                             |                       |      | 1.3 V         |
| $t_{rr}$ | $I_F = 105\text{A}$ , $-di/dt = 150\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ | 1.34                  | 200  | ns            |
| $Q_{RM}$ |                                                                                 |                       |      | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                 |                       |      | A             |

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

## PLUS264™ (IXFB) Outline



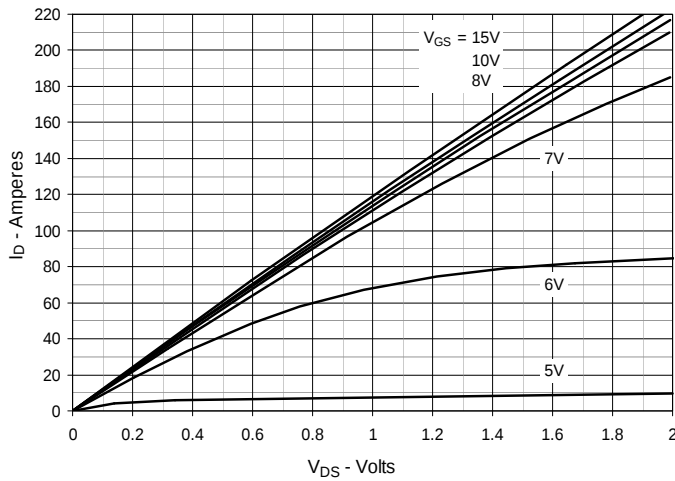
| SYM | INCHES   |       | MILLIMETERS |       |
|-----|----------|-------|-------------|-------|
|     | MIN      | MAX   | MIN         | MAX   |
| A   | .185     | .209  | 4.70        | 5.31  |
| A1  | .102     | .118  | 2.59        | 3.00  |
| b   | .037     | .055  | 0.94        | 1.40  |
| b1  | .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    |       |
| L   | .779     | .842  | 19.79       | 21.39 |
| L1  | .087     | .102  | 2.21        | 2.59  |
| 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  |

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

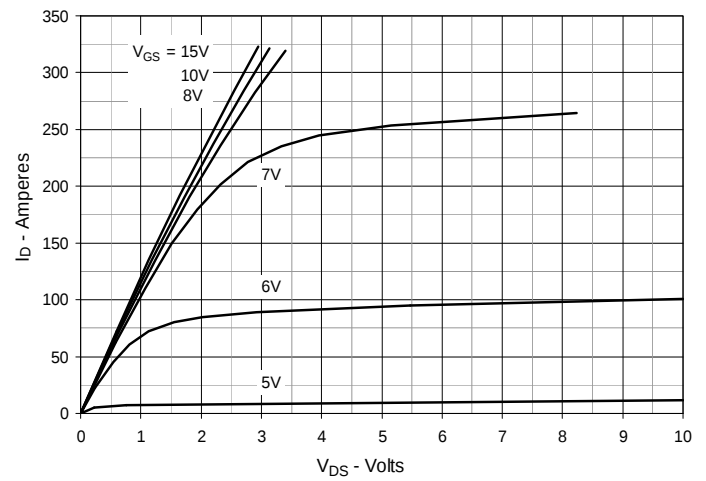
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |              |              |              |              |              |             |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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 | 7,157,338B2 |
| 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    |             |

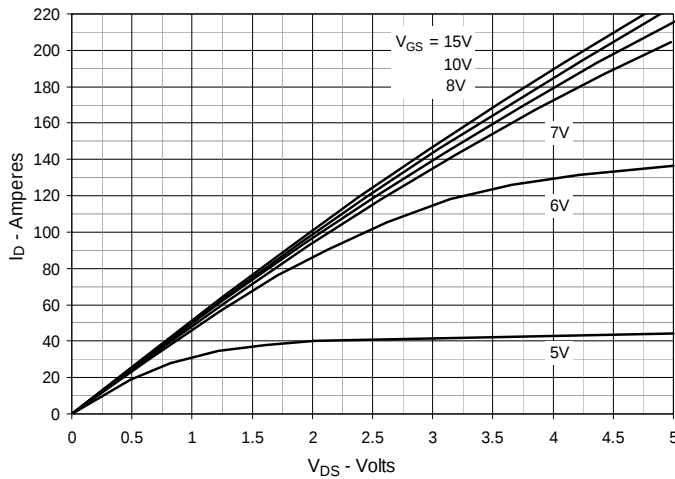
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



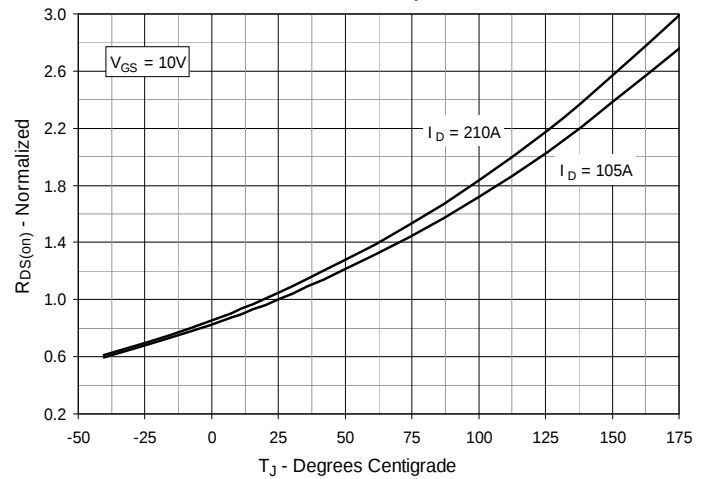
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



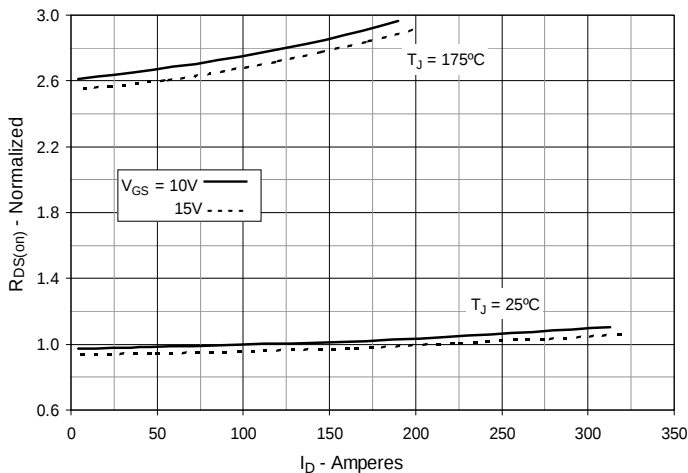
**Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$**



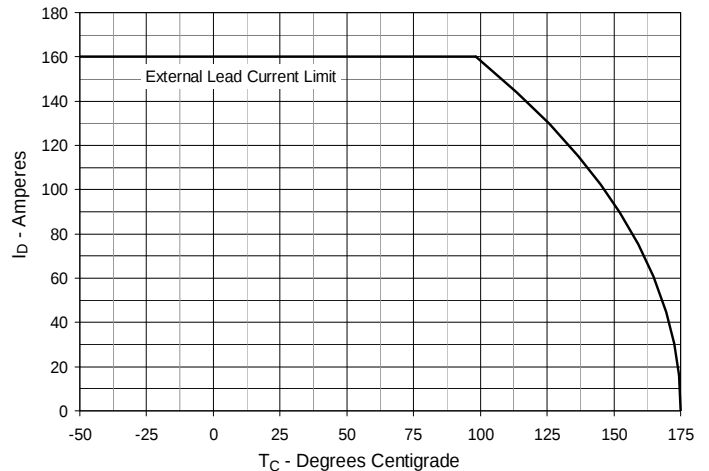
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 105\text{A}$  Value vs. Junction Temperature**



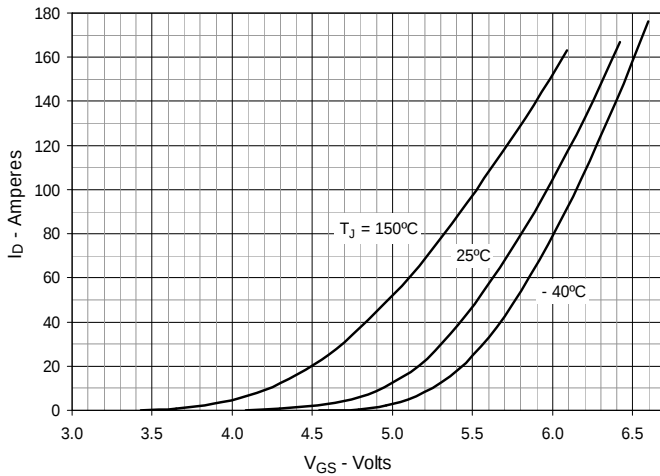
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 105\text{A}$  Value vs. Drain Current**



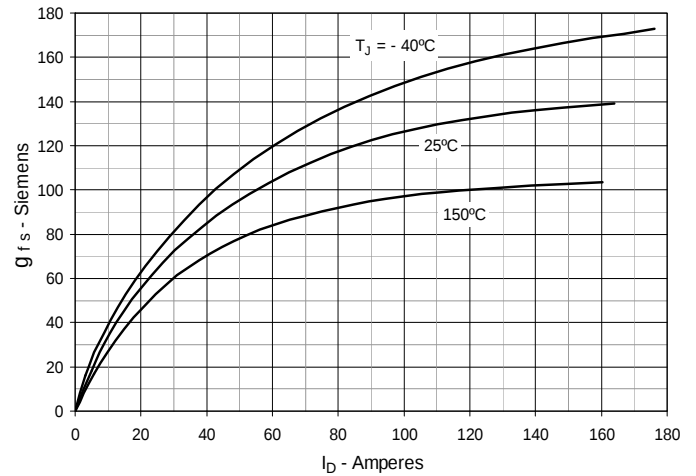
**Fig. 6. Maximum Drain Current vs. Case Temperature**



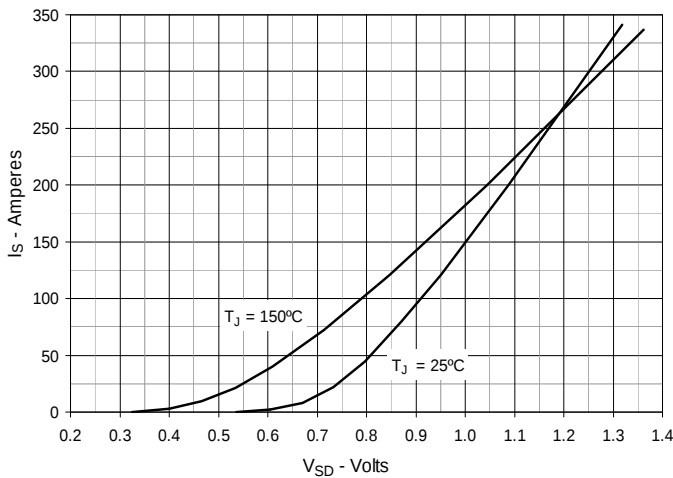
**Fig. 7. Input Admittance**



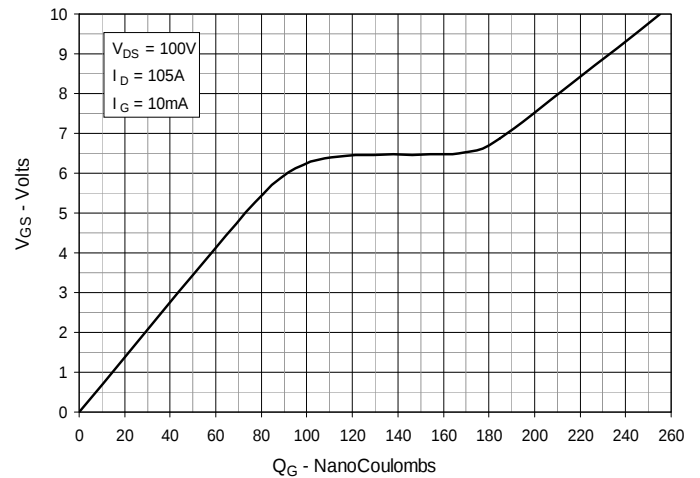
**Fig. 8. Transconductance**



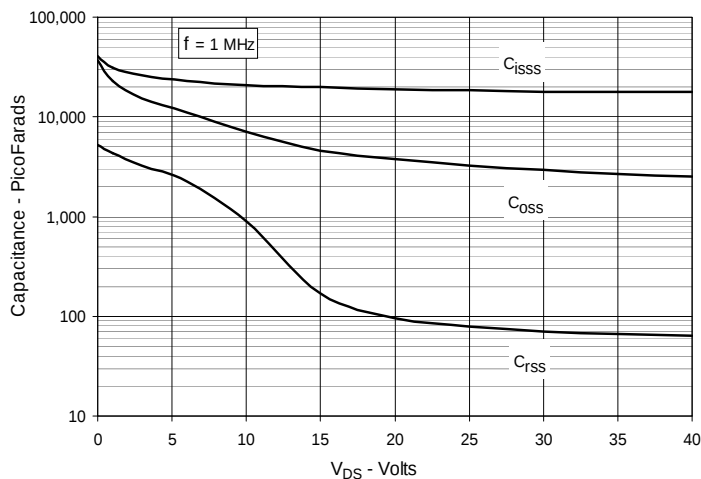
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



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

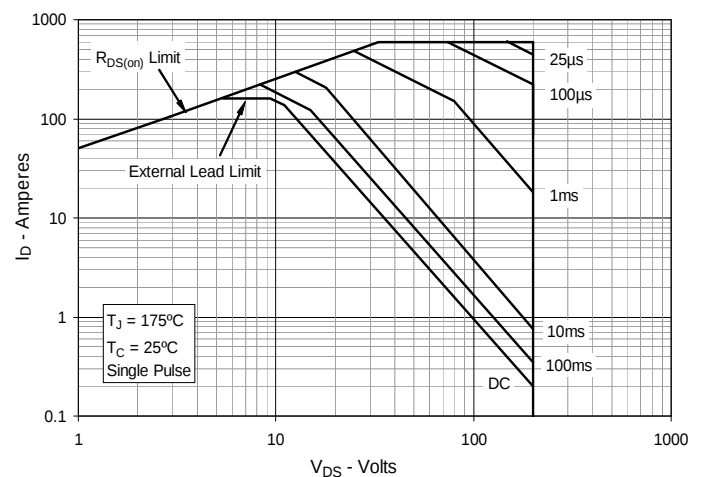
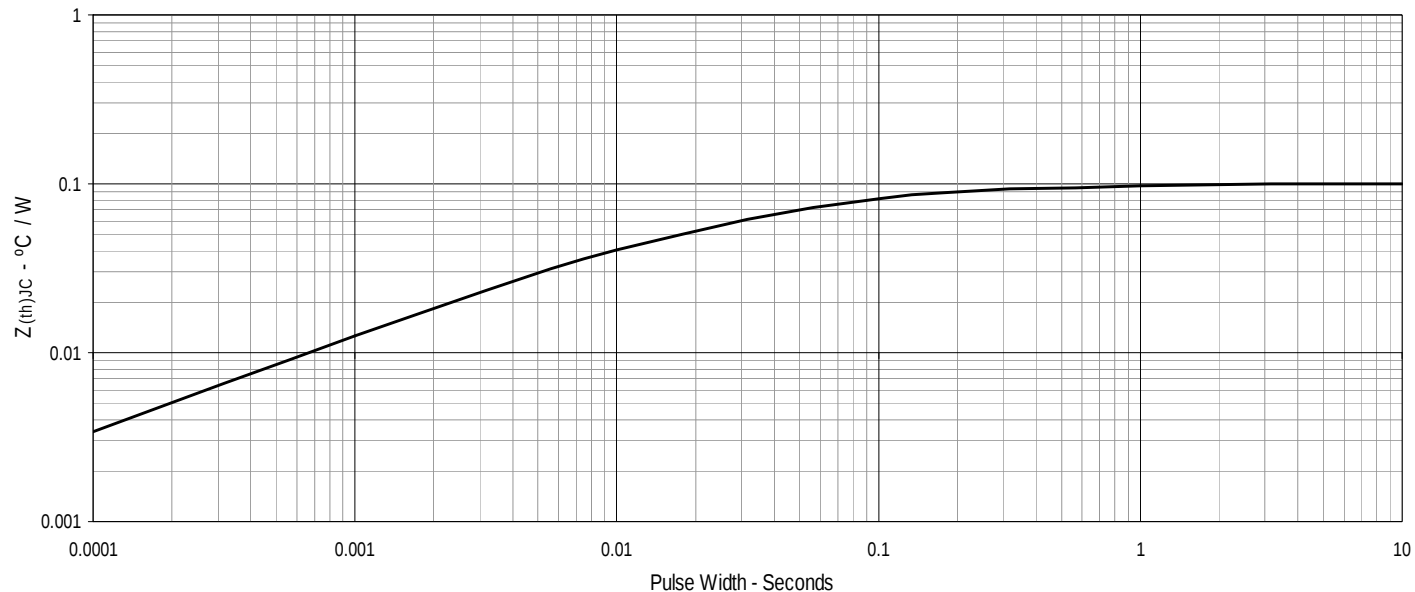


Fig. 13. Maximum Transient Thermal Impedance





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