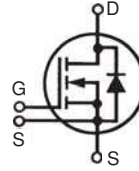


Linear Power MOSFET IXTN46N50L

With Extended FBSOA

N-Channel Enhancement Mode

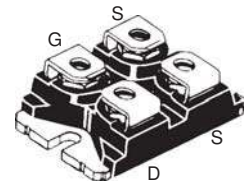


$$V_{DSS} = 500 \text{ V}$$

$$I_{D25} = 46 \text{ A}$$

$$R_{DS(on)} \leq 0.16 \text{ } \Omega$$

| Symbol | Test Conditions | Maximum Ratings |
|---------------|--|--|
| V_{DSS} | $T_J = 25^\circ\text{C}$ to 150°C | 500 V |
| V_{DGR} | $T_J = 25^\circ\text{C}$ to 150°C ; $R_{GS} = 1 \text{ M}\Omega$ | 500 V |
| V_{GS} | Continuous | ± 30 V |
| V_{GSM} | Transient | ± 40 V |
| I_{D25} | $T_C = 25^\circ\text{C}$ | 46 A |
| I_{DM} | $T_C = 25^\circ\text{C}$, pulse width limited by T_{JM} | 100 A |
| I_{AR} | $T_C = 25^\circ\text{C}$ | 46 A |
| E_{AR} | $T_C = 25^\circ\text{C}$ | 60 mJ |
| E_{AS} | $T_C = 25^\circ\text{C}$ | 1.5 J |
| P_D | $T_C = 25^\circ\text{C}$ | 700 W |
| T_J | | -55 to $+150$ $^\circ\text{C}$ |
| T_{JM} | | 150 $^\circ\text{C}$ |
| T_{stg} | | -55 to $+150$ $^\circ\text{C}$ |
| V_{ISOL} | 50/60 Hz, RMS, $I_{ISOL} \leq 1 \text{ mA}$ | $T = 1 \text{ min}$ 2500 V~ $T = 1 \text{ s}$ 3000 V~ |
| M_d | Mounting torque for Base Plate Terminal connection torque | 1.5/13 Nm/lb.in. 1.3/11.5 Nm/lb.in. |
| Weight | | 30 g |

 miniBLOC, SOT-227 B (IXTN)
E153432

 G = Gate
S = Source
D = Drain

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

Features

- Designed for linear operation
- International standard package
- Molding epoxy meets UL94 V-0 flammability classification
- miniBLOC with Aluminium nitride isolation

Applications

- Programmable loads
- Current regulators
- DC-DC converters
- Battery chargers
- DC choppers
- Temperature and lighting controls

Advantages

- Easy to mount
- Space savings
- High power density

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|--------------|---|---|------|--------------------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0 \text{ V}$, $I_D = 1 \text{ mA}$ | 500 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 250 \text{ } \mu\text{A}$ | 3 | | V |
| I_{GSS} | $V_{GS} = \pm 30 \text{ V}$, $V_{DS} = 0 \text{ V}$ | | | ± 200 nA |
| I_{DSS} | $V_{DS} = V_{DSS}$, $V_{GS} = 0 \text{ V}$ | | | 50 μA 1 mA |
| $R_{DS(on)}$ | $V_{GS} = 20 \text{ V}$, $I_D = 0.5 I_{D25}$ Note 1 | | | 0.16 Ω |

| Symbol | Test Conditions | Characteristic Values | | | |
|---------------------|--|---|------|------|------|
| | | (T _J = 25°C, unless otherwise specified) | | | |
| | | Min. | Typ. | Max. | |
| g _{fs} | V _{DS} = 10 V; I _D = 0.5 • I _{D25} , Note 1 | 7 | 10 | 13 | S |
| C _{iss} | V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz | | 7000 | | pF |
| C _{oss} | | | 900 | | pF |
| C _{rss} | | | 170 | | pF |
| t _{d(on)} | V _{GS} = 15 V, V _{DS} = 0.5 • V _{DSS} , I _D = 0.5 • I _{D25} R _G = 2 Ω (External), | | 40 | | ns |
| t _r | | | 50 | | ns |
| t _{d(off)} | | | 80 | | ns |
| t _f | | | 42 | | ns |
| Q _{g(on)} | V _{GS} = 15 V, V _{DS} = 0.5 • V _{DSS} , I _D = 0.5 • I _{D25} | | 260 | | nC |
| Q _{gs} | | | 85 | | nC |
| Q _{gd} | | | 125 | | nC |
| R _{thJC} | | | | 0.18 | °C/W |
| R _{thCS} | | | 0.05 | | °C/W |

Safe Operating Area Specification

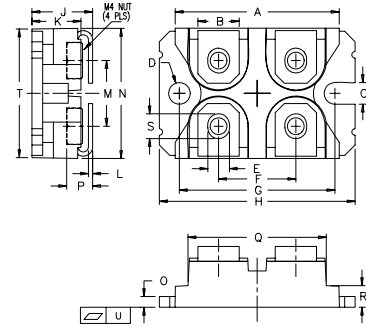
| Symbol | Test Conditions | Min. | Typ. | Max. |
|--------|--|------|------|------|
| SOA | V _{DS} = 400 V, I _D = 0.6 A, T _C = 90°C | 240 | | W |

Source-Drain Diode

| Symbol | Test Conditions | Characteristic Values | | | |
|-----------------|---|---|------|------|----|
| | | (T _J = 25°C, unless otherwise specified) | | | |
| | | Min. | Typ. | Max. | |
| I _S | V _{GS} = 0 V | | | 46 | A |
| I _{SM} | Repetitive; pulse width limited by T _{JM} | | | 100 | A |
| V _{SD} | I _F = I _S , V _{GS} = 0 V, Note 1 | | | 1.5 | V |
| t _{rr} | I _F = I _S , -dt/dt = 100 A/μs, V _R = 100 V | | 600 | | ns |

Note 1: Pulse test, t < 300 μs, duty cycle, d ≤ 2 %

SOT-227B (IXTN) Outline



(M4 screws (4x) supplied)

| 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 |

PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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 | 7,157,338 B2 |
| 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 @ 25°C

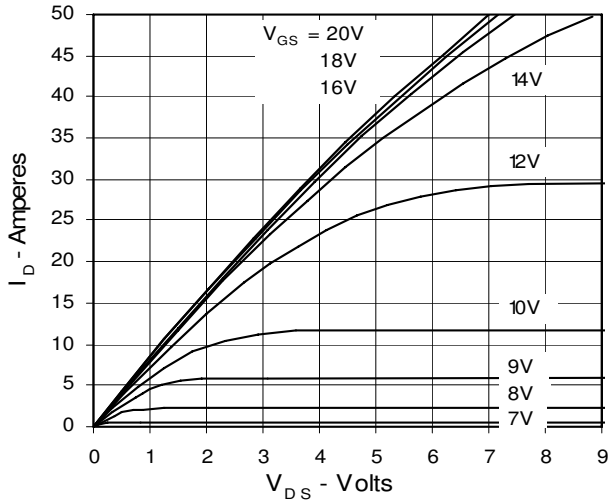


Fig. 2. Extended Output Characteristics @ 25°C

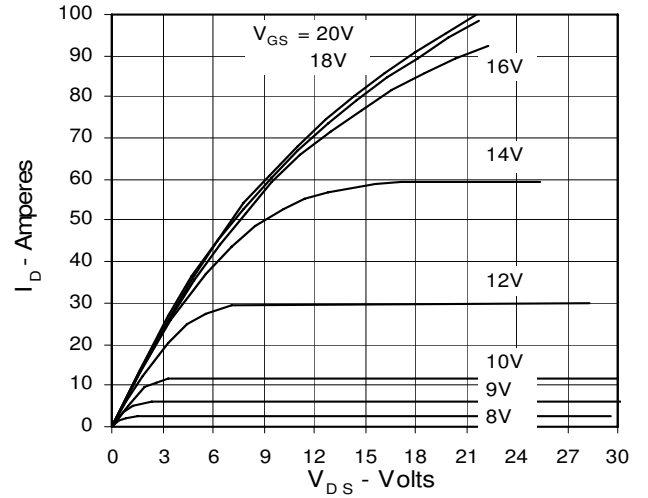


Fig. 3. Output Characteristics @ 125°C

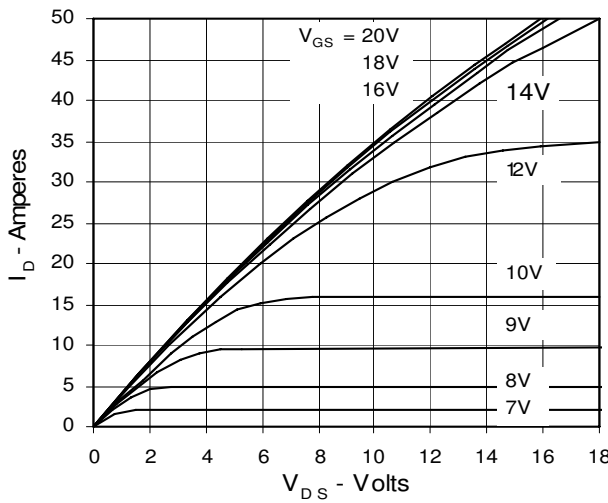


Fig. 4. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. Junction Temperature

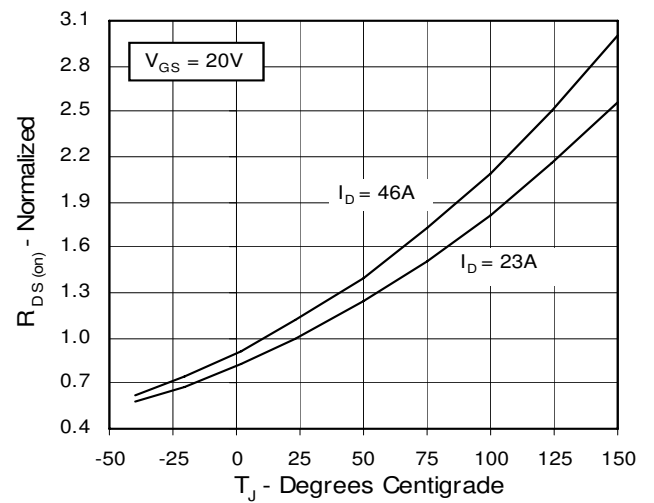


Fig. 5. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. I_D

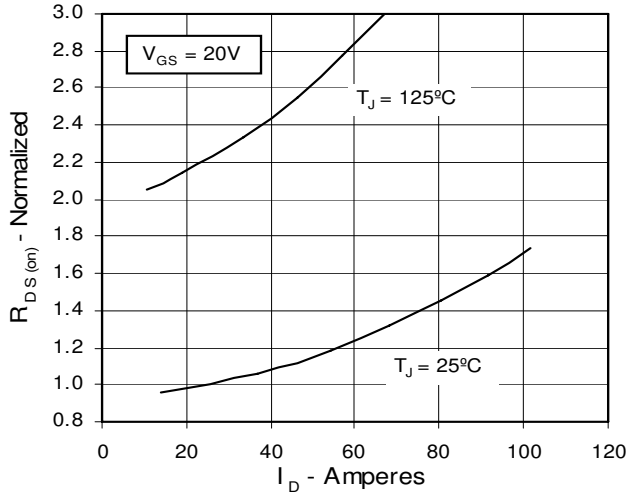


Fig. 6. Drain Current vs. Case Temperature

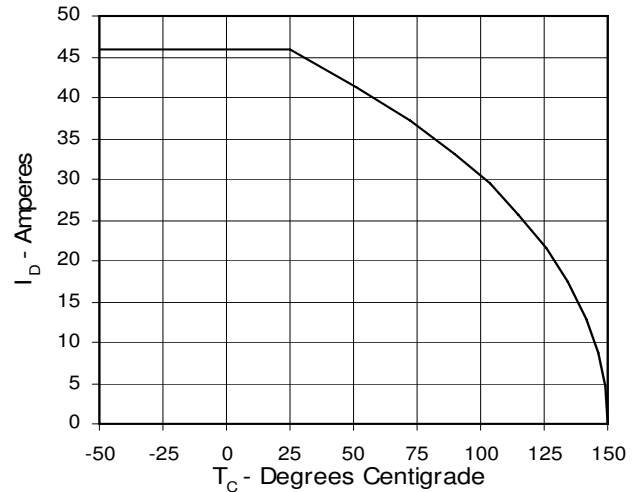


Fig. 7. Input Admittance

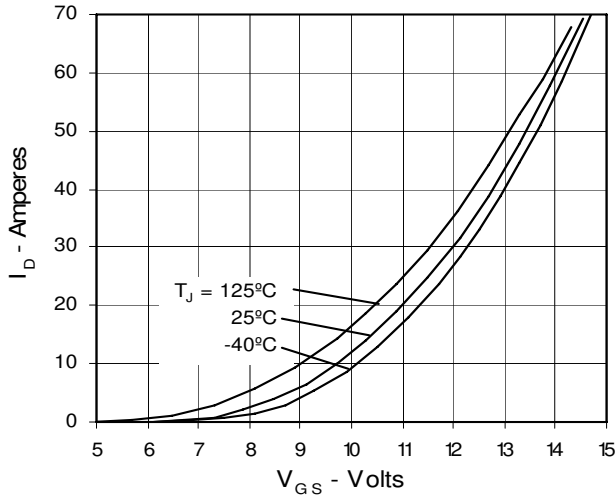


Fig. 8. Transconductance

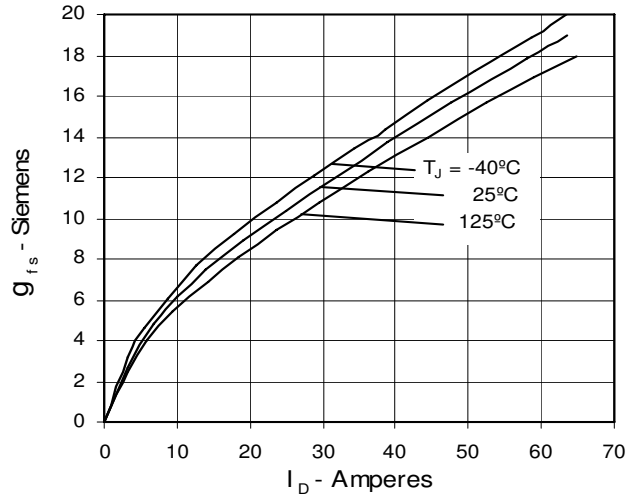


Fig. 9. Source Current vs. Source-To-Drain Voltage

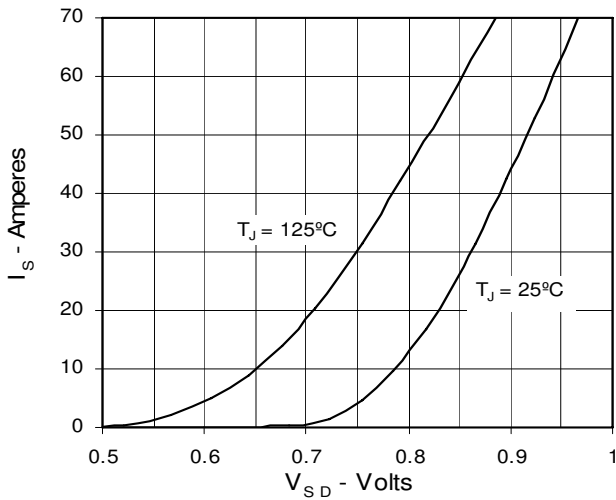


Fig. 10. Gate Charge

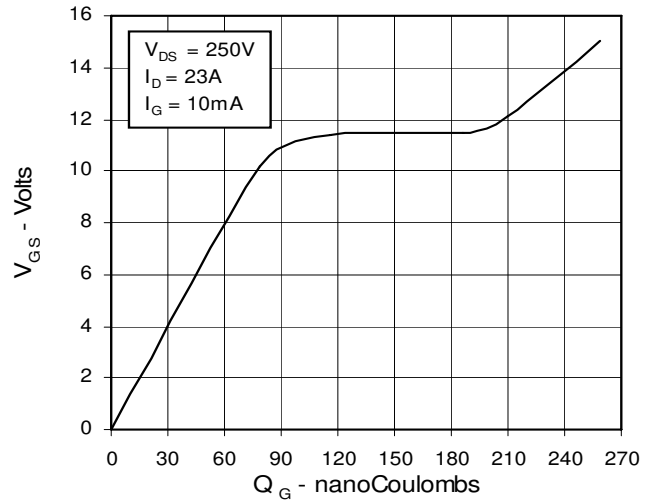


Fig. 11. Capacitance

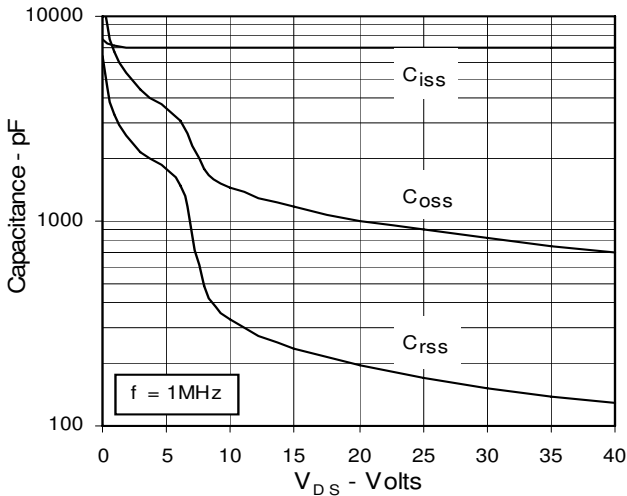


Fig. 12. Forward-Bias Safe Operating Area @ $T_C = 25^\circ\text{C}$

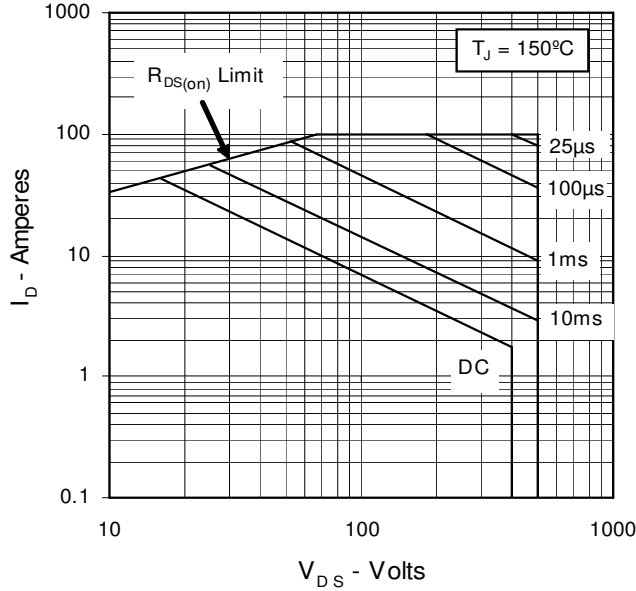


Fig. 13. Forward-Bias Safe Operating Area @ $T_C = 90^\circ\text{C}$

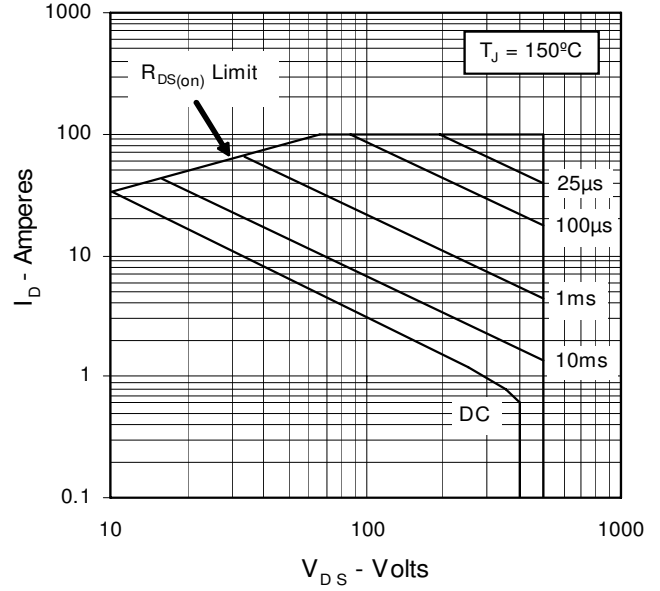
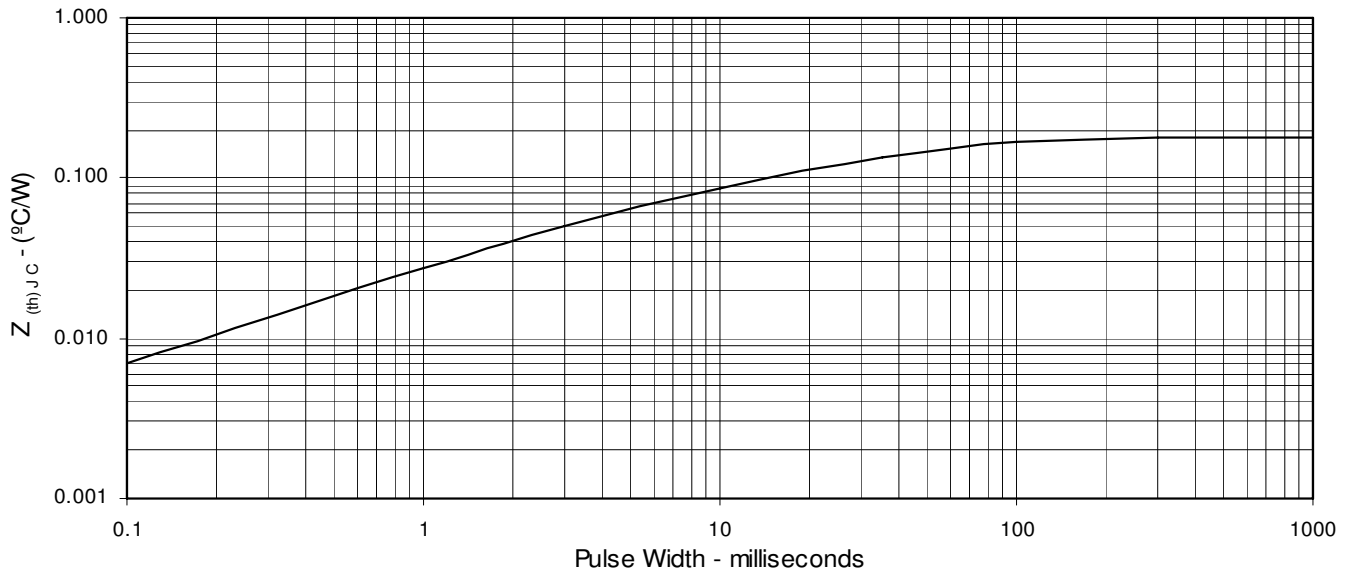


Fig. 14. Maximum Transient Thermal Impedance





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