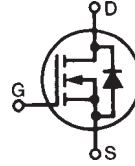


Polar™
Power MOSFET

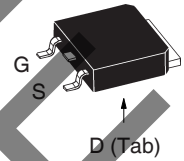
IXTY1R6N50P
IXTP1R6N50P

$V_{DSS} = 500V$
 $I_{D25} = 1.6A$
 $R_{DS(on)} \leq 6.5\Omega$

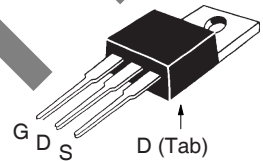
N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Rectifier



TO-252
(IXTY)



TO-220AB
(IXTP)



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

| Symbol | Test Conditions | Maximum Ratings | |
|------------|--|--------------------|------------|
| V_{DSS} | $T_J = 25^\circ C$ to $150^\circ C$ | 500 | V |
| V_{DGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GS} = 1M\Omega$ | 500 | V |
| V_{GSS} | Continuous | ± 30 | V |
| V_{GSM} | Transient | ± 40 | V |
| I_{D25} | $T_C = 25^\circ C$ | 1.6 | A |
| I_{DM} | $T_C = 25^\circ C$, Pulse Width Limited by T_{JM} | 2.5 | A |
| I_A | $T_C = 25^\circ C$ | 1.6 | A |
| E_{AS} | $T_C = 25^\circ C$ | 75 | mJ |
| dv/dt | $I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ C$ | 10 | V/ns |
| P_D | $T_C = 25^\circ C$ | 43 | W |
| T_J | | -55 ... +150 | $^\circ C$ |
| T_{JM} | | 150 | $^\circ C$ |
| T_{stg} | | -55 ... +150 | $^\circ C$ |
| T_L | Maximum Lead Temperature for Soldering | 300 | $^\circ C$ |
| T_{SOLD} | 1.6 mm (0.062in.) from Case for 10s | 260 | $^\circ C$ |
| F_C | Mounting Force (TO-263) | 10..65 / 2.2..14.6 | N/lb |
| M_d | Mounting Torque (TO-220) | 1.13 / 10 | Nm/lb.in |
| Weight | TO-252 | 0.35 | g |
| | TO-220 | 3.00 | g |

Features

- International Standard Packages
- Low Q_G
- Avalanche Rated
- Low Package Inductance
- Fast Intrinsic Rectifier

Advantages

- High Power Density
- Easy to Mount
- Space Savings

Applications

- DC-DC Converters
- Switch-Mode and Resonant-Mode Power Supplies
- AC and DC Motor Drives
- Discharge Circuits in Lasers, Spark Igniters, RF Generators
- High Voltage Pulse Power Applications

| Symbol | Test Conditions ($T_J = 25^\circ C$ Unless Otherwise Specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|--------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0V$, $I_D = 250\mu A$ | 500 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 25\mu A$ | 3.0 | | 5.5 V |
| I_{GSS} | $V_{GS} = \pm 20V$, $V_{DS} = 0V$ | | | ± 50 nA |
| I_{DSS} | $V_{DS} = V_{DSS}$, $V_{GS} = 0V$ $T_J = 125^\circ C$ | | | 1 μA |
| | | | | 50 μA |
| $R_{DS(on)}$ | $V_{GS} = 10V$, $I_D = 0.5 \cdot I_{D25}$, Notes 1, 2 | | | 6.5 Ω |

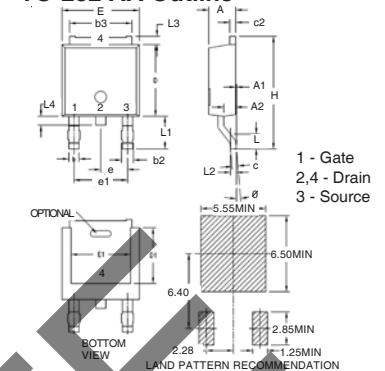
| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|--------------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $V_{DS} = 20\text{V}$, $I_D = 0.5 \cdot I_{D25}$, Note 1 | 0.7 | 1.3 | S |
| C_{iss} | $V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$ | | 140 | pF |
| C_{oss} | | | 20 | pF |
| C_{rss} | | | 2.6 | pF |
| $t_{d(on)}$ | Resistive Switching Times $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ $R_G = 50\Omega$ (External) | | 20 | ns |
| t_r | | | 26 | ns |
| $t_{d(off)}$ | | | 45 | ns |
| t_f | | | 23 | ns |
| $Q_{g(on)}$ | $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ | | 3.9 | nC |
| Q_{gs} | | | 1.4 | nC |
| Q_{gd} | | | 1.3 | nC |
| R_{thJC} | | | 2.9 | $^\circ\text{C/W}$ |
| R_{thCS} | TO-220 | 0.50 | | $^\circ\text{C/W}$ |

Source-Drain Diode

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|----------|--|-----------------------|------|-------|
| | | Min. | Typ. | Max. |
| I_S | $V_{GS} = 0\text{V}$ | | | 1.6 A |
| I_{SM} | Repetitive, Pulse Width Limited by T_{JM} | | | 5.0 A |
| V_{SD} | $I_F = I_S$, $V_{GS} = 0\text{V}$, Note 1 | | | 1.5 V |
| t_{rr} | $I_F = 1.6\text{A}$, $V_{GS} = 0\text{V}$, $-di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}$ | | 400 | ns |

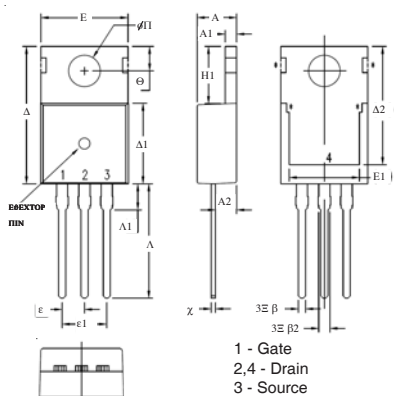
- Notes: 1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.
2. On through-hole package, $R_{DS(on)}$ Kelvin test contact location must be 5mm or less from the package body.

TO-252 AA Outline



| SYM | INCHES | | MILLIMETERS | |
|-----|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .086 | .094 | 2.19 | 2.38 |
| A1 | 0 | .005 | 0 | 0.12 |
| A2 | .038 | .046 | 0.97 | 1.17 |
| b | .025 | .035 | 0.64 | 0.89 |
| b2 | .030 | .045 | 0.76 | 1.14 |
| b3 | .200 | .215 | 5.08 | 5.46 |
| c | .018 | .024 | 0.46 | 0.61 |
| c2 | .018 | .023 | 0.46 | 0.58 |
| D | .235 | .245 | 5.97 | 6.22 |
| D1 | .180 | .205 | 4.57 | 5.21 |
| E | .250 | .265 | 6.35 | 6.73 |
| E1 | .170 | .205 | 4.32 | 5.21 |
| e | .090 BSC | | 2.28 BSC | |
| e1 | .180 BSC | | 4.57 BSC | |
| H | .370 | .410 | 9.40 | 10.42 |
| L | .055 | .070 | 1.40 | 1.78 |
| L1 | .100 | .115 | 2.54 | 2.92 |
| L2 | .020 BSC | | 0.50 BSC | |
| L3 | .025 | .040 | 0.64 | 1.02 |
| L4 | .025 | .040 | 0.64 | 1.02 |
| e | 0* | 10* | 0* | 10* |

TO-220 Outline



| SYM | INCHES | | MILLIMETERS | |
|------|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .169 | .185 | 4.30 | 4.70 |
| A1 | .047 | .055 | 1.20 | 1.40 |
| A2 | .079 | .106 | 2.00 | 2.70 |
| b | .024 | .039 | 0.60 | 1.00 |
| b2 | .045 | .057 | 1.15 | 1.45 |
| c | .014 | .026 | 0.35 | 0.65 |
| D | .587 | .626 | 14.90 | 15.90 |
| D1 | .335 | .370 | 8.50 | 9.40 |
| (D2) | .500 | .531 | 12.70 | 13.50 |
| E | .382 | .406 | 9.70 | 10.30 |
| (E1) | .283 | .323 | 7.20 | 8.20 |
| e | .100 BSC | | 2.54 BSC | |
| e1 | .200 BSC | | 5.08 BSC | |
| H1 | .244 | .268 | 6.20 | 6.80 |
| L | .492 | .547 | 12.50 | 13.90 |
| L1 | .110 | .154 | 2.80 | 3.90 |
| ØP | .134 | .150 | 3.40 | 3.80 |
| Q | .106 | .126 | 2.70 | 3.20 |

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

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

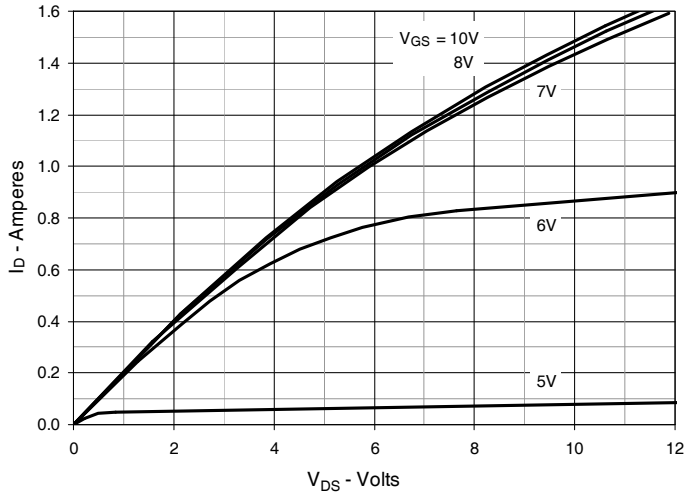


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

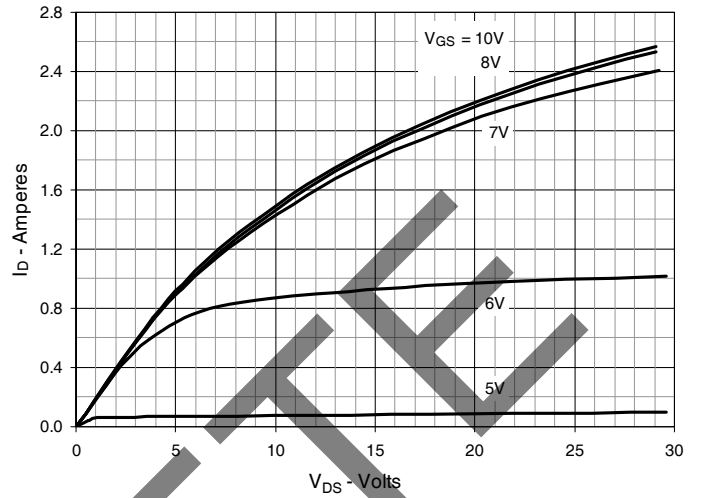


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

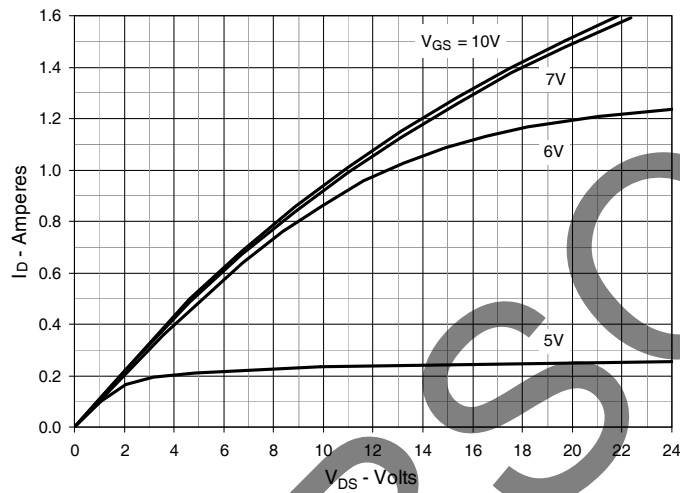


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 0.8\text{A}$ Value vs. Junction Temperature

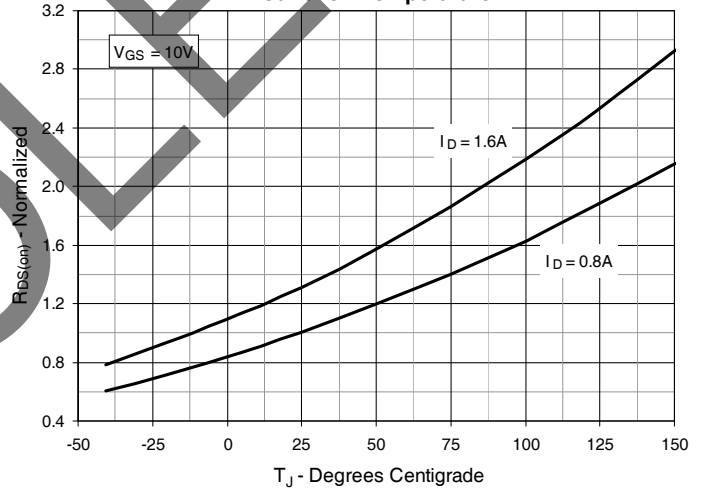


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 0.8\text{A}$ Value vs. Drain Current

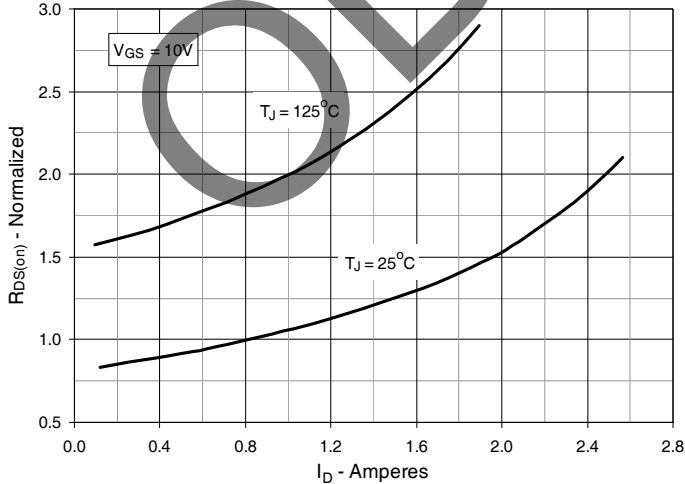


Fig. 6. Maximum Drain Current vs. Case Temperature

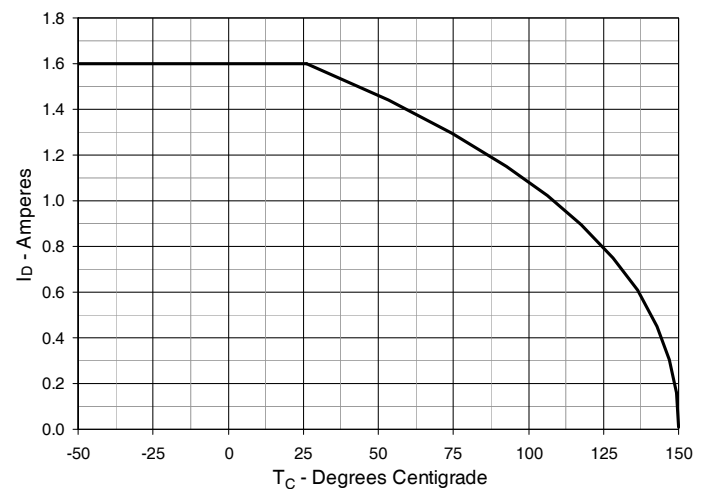


Fig. 8. Input Admittance

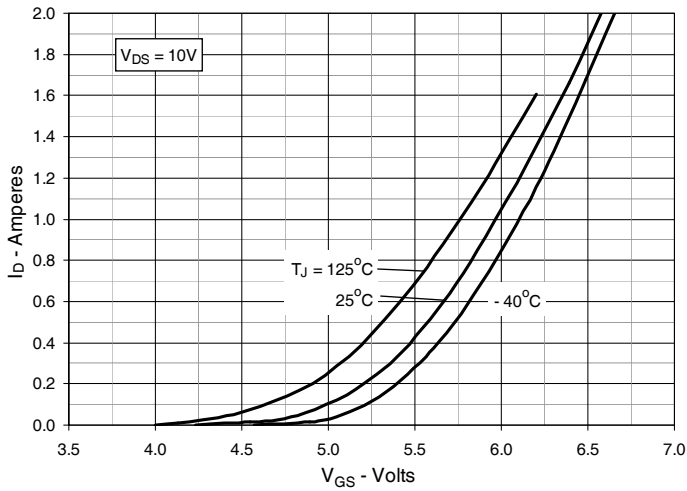


Fig. 9. Transconductance

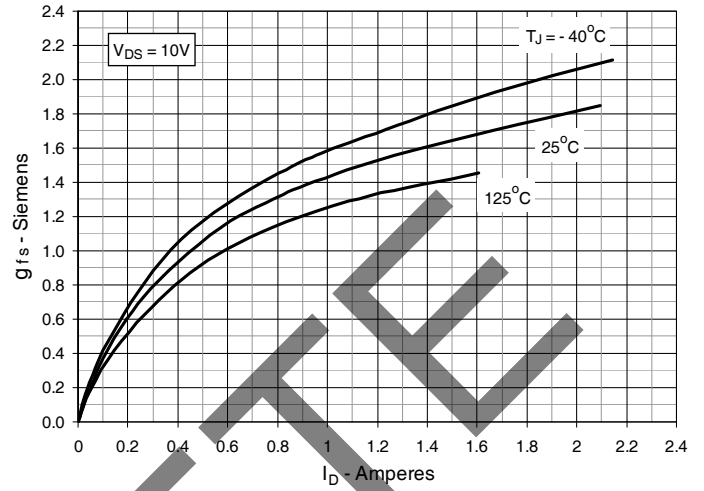


Fig. 10. Forward Voltage Drop of Intrinsic Diode

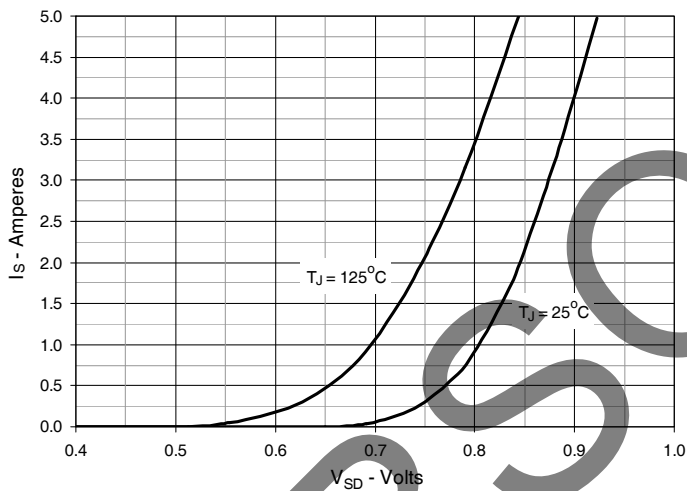


Fig. 11. Gate Charge

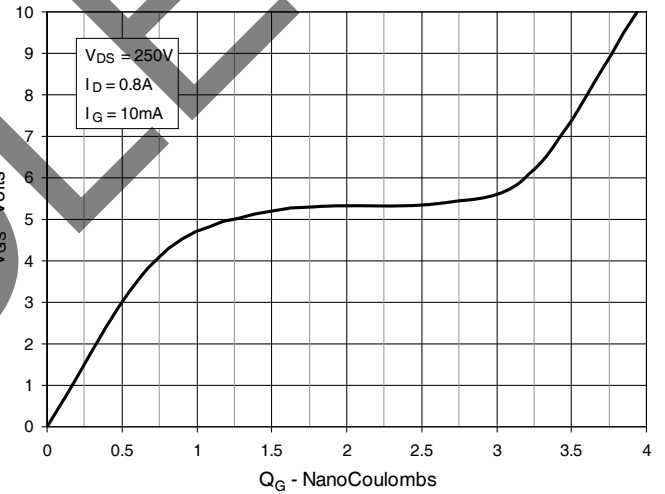


Fig. 12. Capacitance

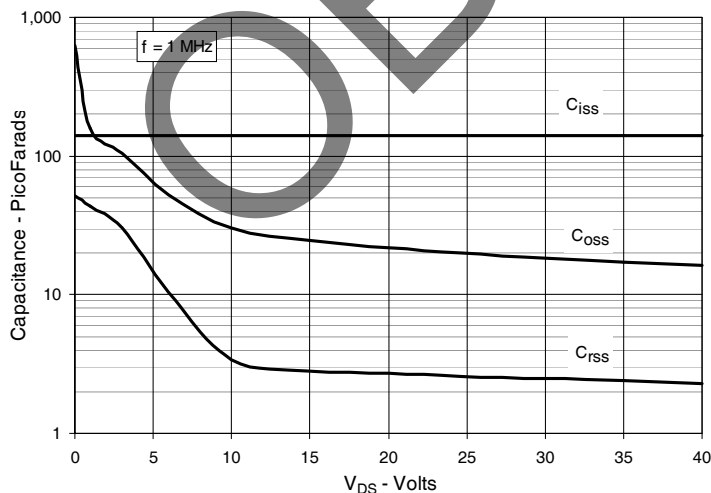


Fig. 14. Forward-Bias Safe Operating Area

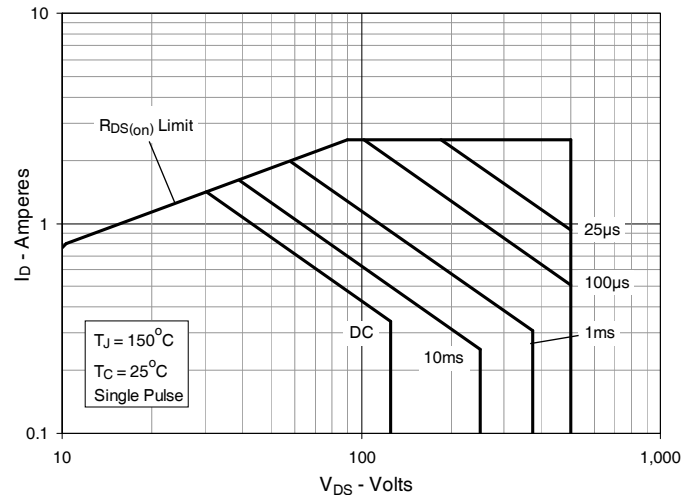
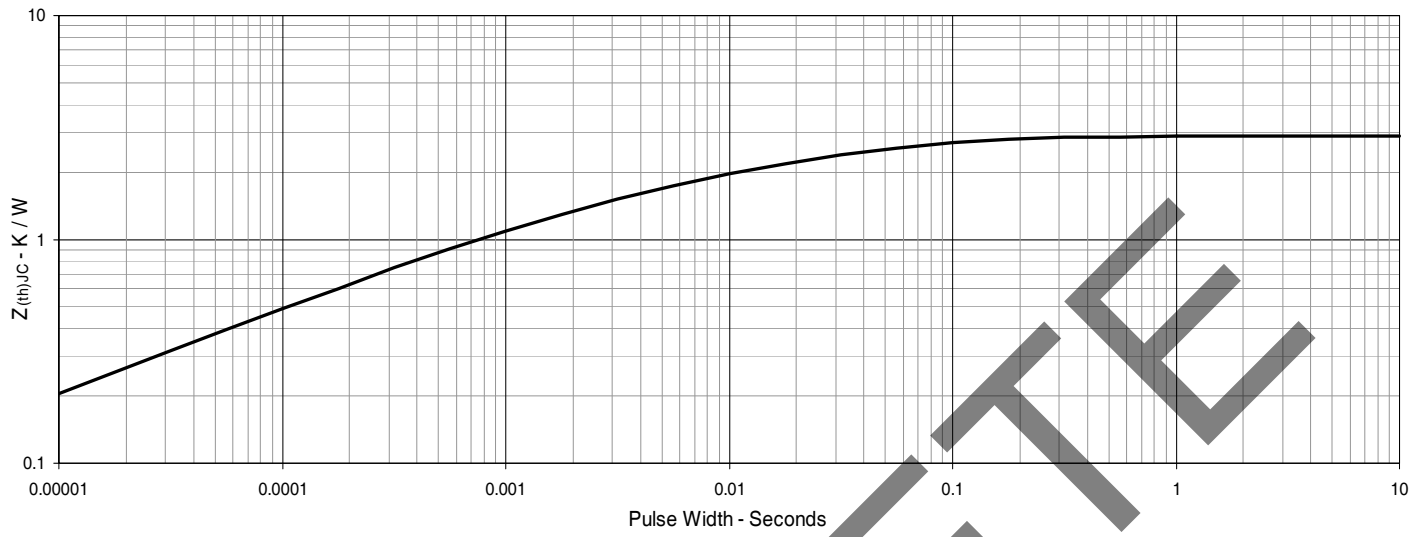


Fig. 13. Maximum Transient Thermal Impedance



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