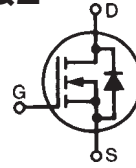


HiPerFET™ Power MOSFETs Q2-Class

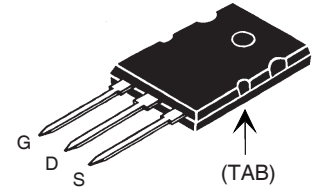
IXFK38N80Q2
IXFN38N80Q2
IXFX38N80Q2

N-Channel Enhancement Mode
Avalanche Rated, High dv/dt, Low Q_g
Low intrinsic R_g, low t_{rr}

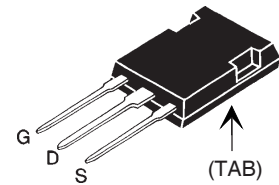


V_{DSS} = 800V
I_{D25} = 38A
R_{DS(on)} ≤ 220mΩ
t_{rr} ≤ 250ns

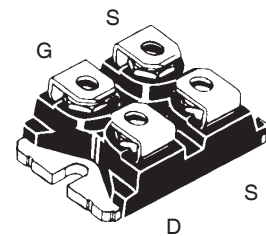
TO-264 (IXFK)



PLUS247 (IXFX)



miniBLOC, SOT-227 B (IXFN)
E153432



| Symbol | Test Conditions | Maximum Ratings | |
|-------------------|--|-------------------|-----------|
| V _{DSS} | T _J = 25°C to 150°C | 800 | V |
| V _{DGR} | T _J = 25°C to 150°C, R _{GS} = 1MΩ | 800 | V |
| V _{GSS} | Continuous | ± 30 | V |
| V _{GSM} | Transient | ± 40 | V |
| I _{D25} | T _C = 25°C | 38 | A |
| I _{DM} | T _C = 25°C, pulse width limited by T _{JM} | 150 | A |
| I _A | T _C = 25°C | 38 | A |
| E _{AS} | T _C = 25°C | 4 | J |
| dv/dt | I _S ≤ I _{DM} , V _{DD} ≤ V _{DSS} , T _J ≤ 150°C | 20 | V/ns |
| P _D | T _C = 25°C | 735 | W |
| T _J | | -55 ... +150 | °C |
| T _{JM} | | 150 | °C |
| T _{stg} | | -55 ... +150 | °C |
| T _L | 1.6mm (0.062 in.) from case for 10s | 300 | °C |
| T _{SOLD} | Plastic body for 10s | 260 | °C |
| V _{ISOL} | 50/60 Hz, RMS | t = 1min | 2500 V~ |
| | I _{ISOL} ≤ 1mA | t = 1s | 3000 V~ |
| M _d | Mounting torque (TO-264) | 1.5/13 | Nm/lb.in. |
| | Terminal connection torque (SOT-227B) | 1.3/11.5 | Nm/lb.in. |
| F _c | Mounting force (PLUS247) | 20..120 / 4.5..27 | N/lb. |
| Weight | TO-264 | 10 | g |
| | PLUS247 | 6 | g |
| | SOT-227B | 30 | g |

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

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

Features

- Double metal process for low gate resistance
- International standard packages
- Epoxy meet UL 94 V-0, flammability classification
- Avalanche energy and current rated
- Fast intrinsic Rectifier
- miniBLOCK package version with Aluminum Nitrate isolation

Advantages

- Easy to mount
- Space savings
- High power density

| Symbol | Test Conditions | Characteristic Values (T _J = 25°C unless otherwise specified) | | |
|---------------------|---|---|------|---------------|
| | | Min. | Typ. | Max. |
| BV _{DSS} | V _{GS} = 0V, I _D = 3mA | 800 | | V |
| V _{GS(th)} | V _{DS} = V _{GS} , I _D = 8mA | 3.0 | | 5.5 V |
| I _{GSS} | V _{GS} = ± 30V, V _{DS} = 0V | | | ± 200 nA |
| I _{DSS} | V _{DS} = V _{DSS} V _{GS} = 0V | | | 50 μA 2 mA |
| R _{DS(on)} | V _{GS} = 10V, I _D = 0.5 • I _{D25} , Note 1 | | | 220 mΩ |

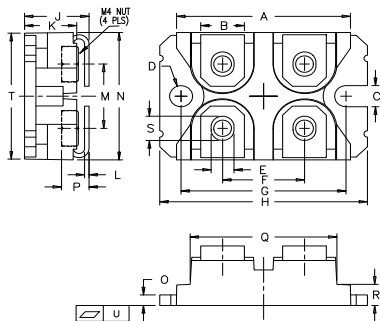
| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$ unless otherwise specified) | Characteristic Values | | |
|--------------|--|-----------------------|------|--------------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $V_{DS} = 10\text{V}, I_D = 0.5 \cdot I_{D25}$, Note 1 | 25 | 37 | S |
| C_{iss} | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$ | | 9500 | pF |
| C_{oss} | | | 888 | pF |
| C_{rss} | | | 185 | pF |
| $t_{d(on)}$ | Resistive Switching Times $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ $R_G = 1\Omega$ (External) | | 20 | ns |
| t_r | | | 16 | ns |
| $t_{d(off)}$ | | | 60 | ns |
| t_f | | | 12 | ns |
| $Q_{g(on)}$ | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ | | 190 | nC |
| Q_{gs} | | | 44 | nC |
| Q_{gd} | | | 88 | nC |
| R_{thJC} | | | 0.17 | $^\circ\text{C/W}$ |
| R_{thCS} | | 0.15 | | $^\circ\text{C/W}$ |

Source-Drain Diode

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$ unless otherwise specified) | | |
|----------|---|---|------|---------------|
| | | Min. | Typ. | Max. |
| I_S | $V_{GS} = 0\text{V}$ | | | 38 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} | $I_F = 25\text{A}, -di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}, V_{GS} = 0\text{V}$ | | | 250 ns |
| Q_{RM} | | | 1 | μC |
| I_{RM} | | | 10 | A |

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

SOT-227B Outline

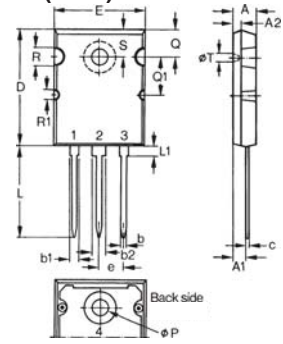


| SYM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.240 | 1.255 | 31.50 | 31.88 |
| B | .307 | .323 | 7.80 | 8.20 |
| C | .161 | .169 | 4.09 | 4.29 |
| D | .161 | .169 | 4.09 | 4.29 |
| E | .161 | .169 | 4.09 | 4.29 |
| F | .587 | .595 | 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 |

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

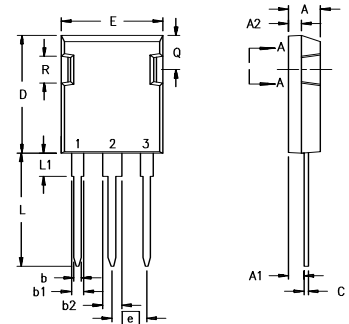
IXYS MOSFETs and IGBTs are covered 4,835,592 4,931,844 5,049,961 5,237,481 6,162,665 6,404,065 B1 6,683,344 6,727,585 7,005,734 B2 7,157,338B2
by one or more of the following U.S. patents: 4,850,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405 B2 6,759,692 7,063,975 B2
4,881,106 5,034,796 5,187,117 5,486,715 6,306,728 B1 6,583,505 6,710,463 6,771,478 B2 7,071,537

TO-264 (IXFK) Outline



| Dim. | Millimeter | | Inches | |
|------|------------|-------|----------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.82 | 5.13 | .190 | .202 |
| A1 | 2.54 | 2.89 | .100 | .114 |
| A2 | 2.00 | 2.10 | .079 | .083 |
| b | 1.12 | 1.42 | .044 | .056 |
| b1 | 2.39 | 2.69 | .094 | .106 |
| b2 | 2.90 | 3.09 | .114 | .122 |
| c | 0.53 | 0.83 | .021 | .033 |
| D | 25.91 | 26.16 | 1.020 | 1.030 |
| E | 19.81 | 19.96 | .780 | .786 |
| e | 5.46 BSC | | .215 BSC | |
| J | 0.00 | 0.25 | .000 | .010 |
| K | 0.00 | 0.25 | .000 | .010 |
| L | 20.32 | 20.83 | .800 | .820 |
| L1 | 2.29 | 2.59 | .090 | .102 |
| P | 3.17 | 3.66 | .125 | .144 |
| Q | 6.07 | 6.27 | .239 | .247 |
| Q1 | 8.38 | 8.69 | .330 | .342 |
| R | 3.81 | 4.32 | .150 | .170 |
| R1 | 1.78 | 2.29 | .070 | .090 |
| S | 6.04 | 6.30 | .238 | .248 |
| T | 1.57 | 1.83 | .062 | .072 |

PLUS247™ (IXFX) Outline



Terminals: 1 - Gate
2 - Drain (Collector)
3 - Source (Emitter)
4 - Drain (Collector)

| Dim. | Millimeter | | Inches | |
|----------------|------------|-------|----------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.83 | 5.21 | .190 | .205 |
| A ₁ | 2.29 | 2.54 | .090 | .100 |
| A ₂ | 1.91 | 2.16 | .075 | .085 |
| b | 1.14 | 1.40 | .045 | .055 |
| b ₁ | 1.91 | 2.13 | .075 | .084 |
| b ₂ | 2.92 | 3.12 | .115 | .123 |
| C | 0.61 | 0.80 | .024 | .031 |
| D | 20.80 | 21.34 | .819 | .840 |
| E | 15.75 | 16.13 | .620 | .635 |
| e | 5.45 BSC | | .215 BSC | |
| L | 19.81 | 20.32 | .780 | .800 |
| L1 | 3.81 | 4.32 | .150 | .170 |
| Q | 5.59 | 6.20 | .220 | 0.244 |
| R | 4.32 | 4.83 | .170 | .190 |

Fig. 1. Output Characteristics
@ 25°C

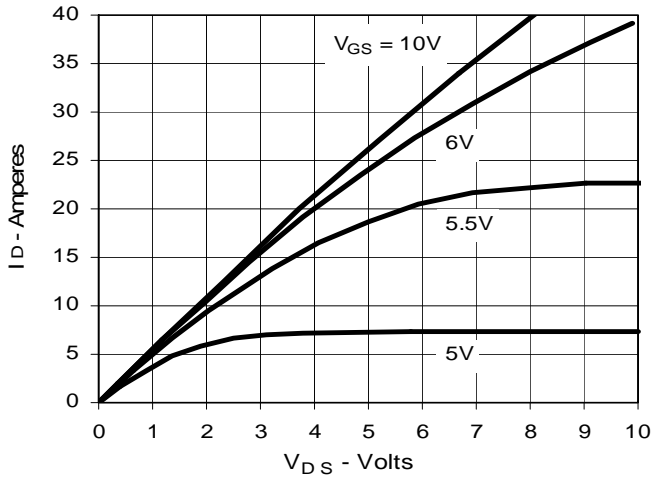


Fig. 2. Extended Output Characteristics
@ 25°C

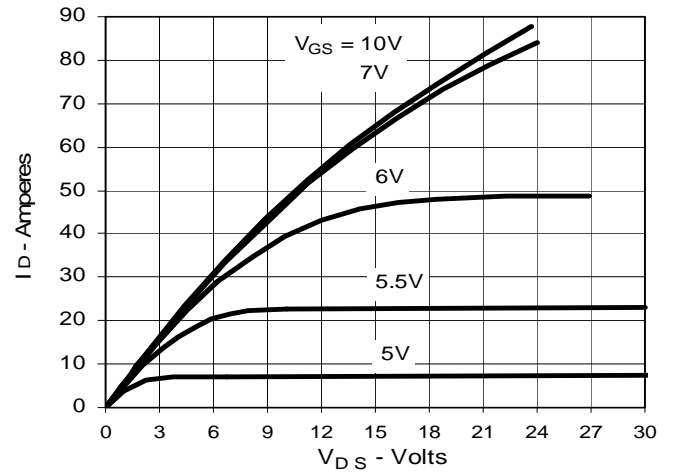


Fig. 3. Output Characteristics
@ 125°C

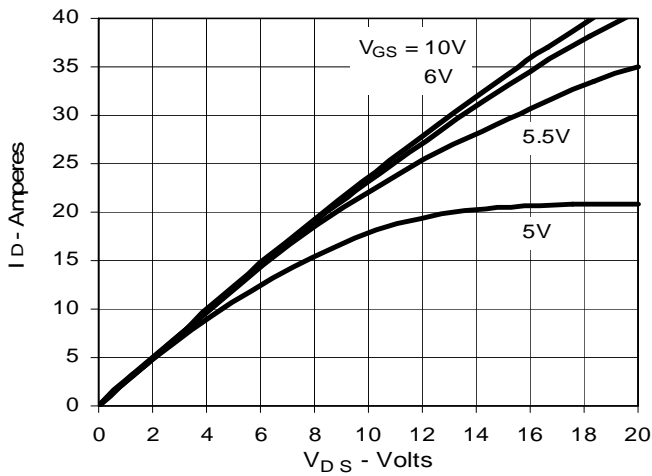


Fig. 4. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. Junction Temperature

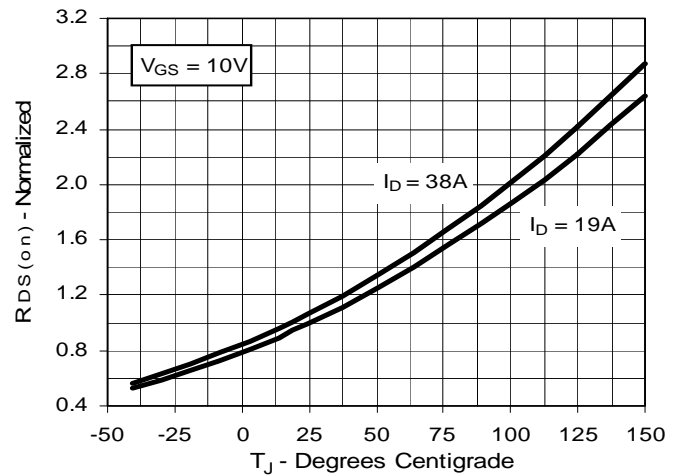


Fig. 5. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. I_D

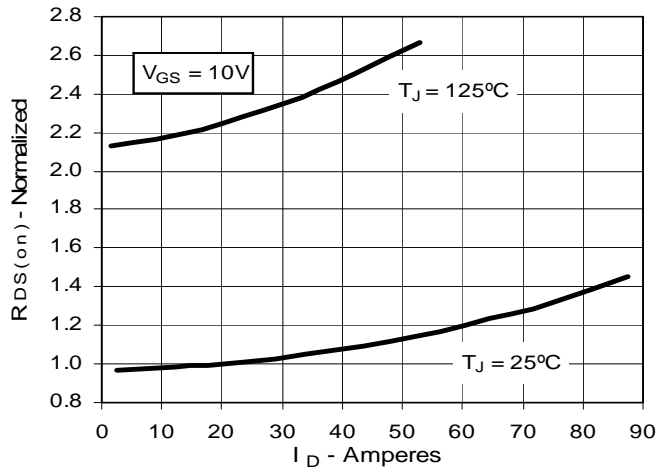


Fig. 6. Drain Current vs. Case Temperature

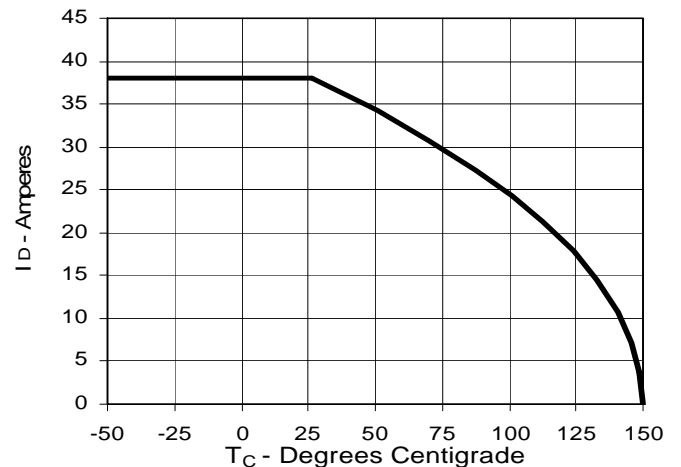


Fig. 7. Input Admittance

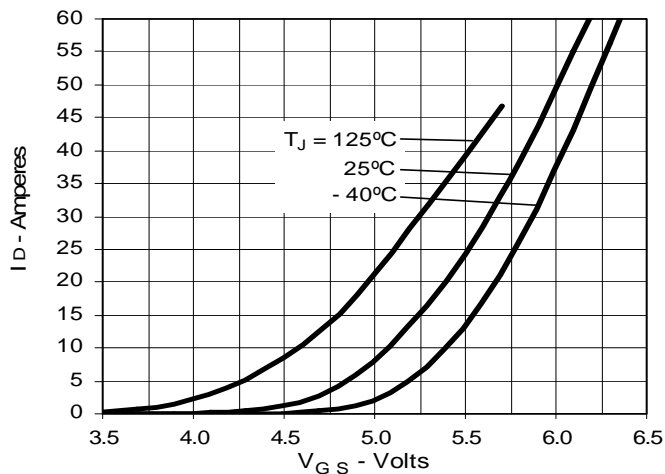


Fig. 8. Transconductance

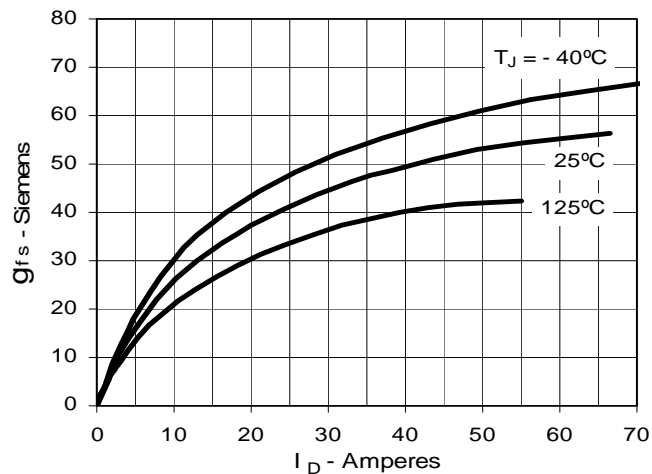


Fig. 9. Source Current vs. Source-To-Drain Voltage

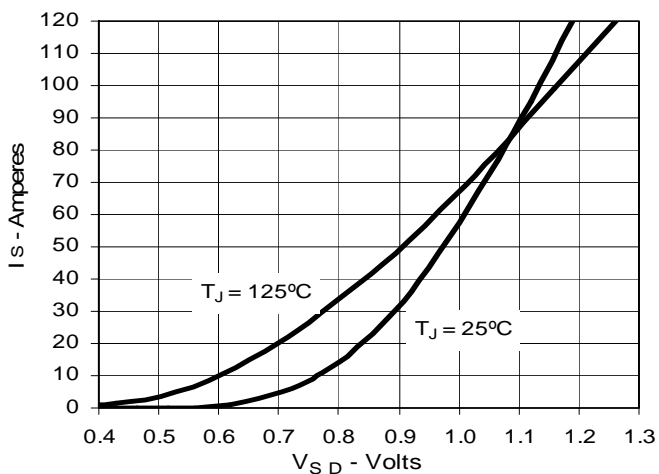


Fig. 10. Gate Charge

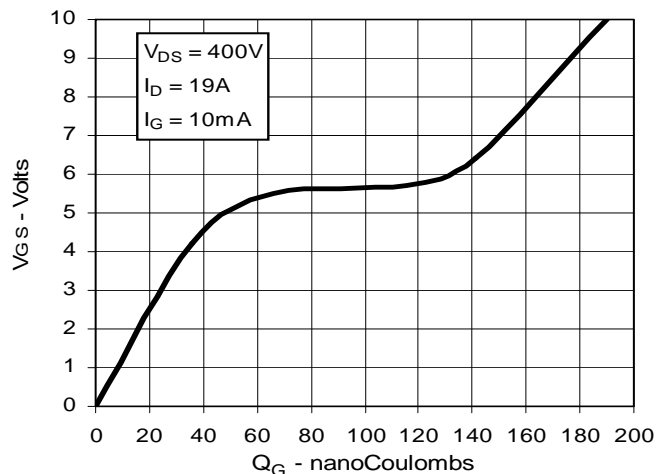


Fig. 11. Capacitance

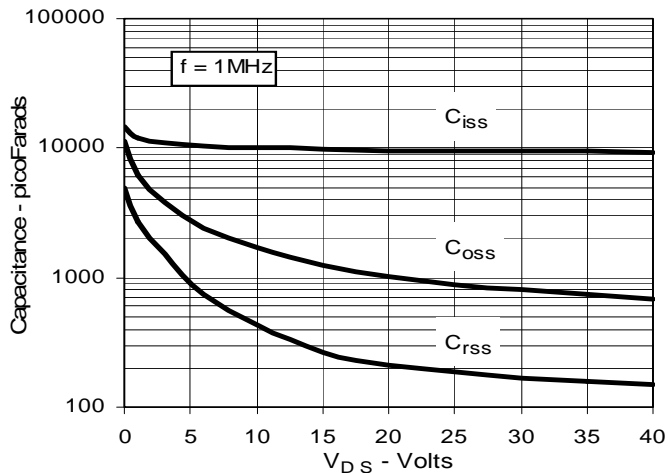


Fig. 12. Forward-Bias Safe Operating Area

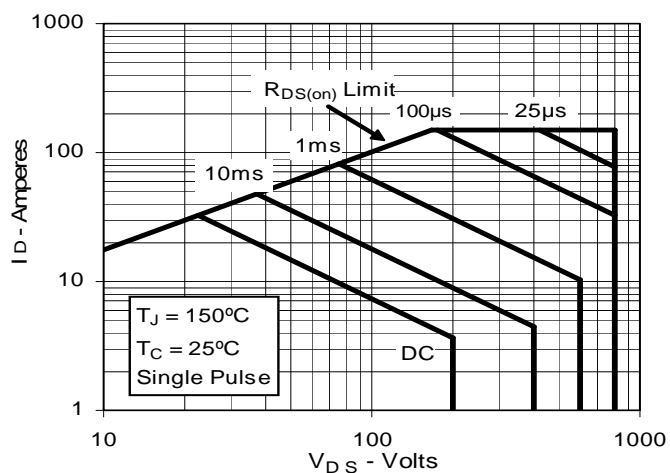
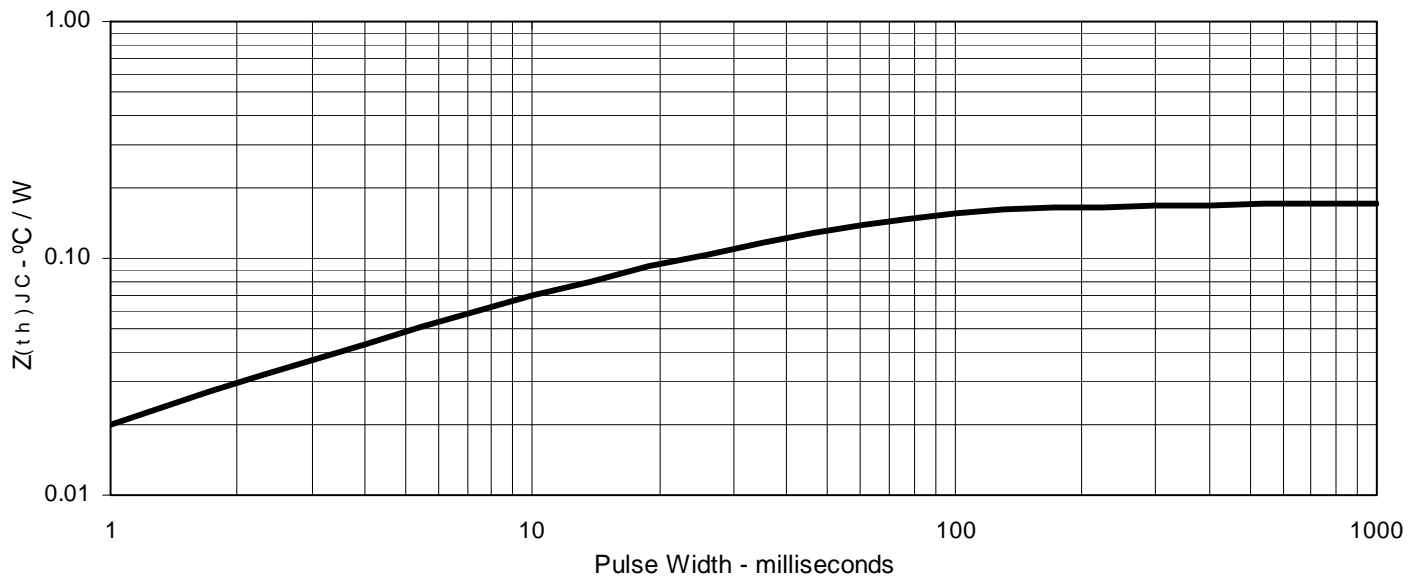


Fig. 13. Maximum Transient Thermal Impedance





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