

X-Class HiPerFET™ Power MOSFET

IXFN90N85X

$$V_{DSS} = 850V$$

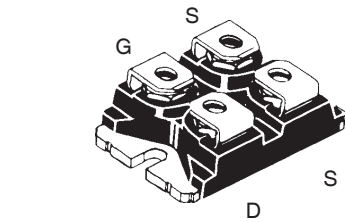
$$I_{D25} = 90A$$

$$R_{DS(on)} \leq 41m\Omega$$

N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode



miniBLOC, SOT-227
E153432



G = Gate
S = Source
D = Drain

| Symbol | Test Conditions | Maximum Ratings | |
|---------------|--|-----------------|------------|
| V_{DSS} | $T_J = 25^\circ C$ to $150^\circ C$ | 850 | V |
| V_{DGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GS} = 1M\Omega$ | 850 | V |
| V_{GSS} | Continuous | ± 30 | V |
| V_{GSM} | Transient | ± 40 | V |
| I_{D25} | $T_C = 25^\circ C$ | 90 | A |
| I_{DM} | $T_C = 25^\circ C$, Pulse Width Limited by T_{JM} | 180 | A |
| I_A | $T_C = 25^\circ C$ | 45 | A |
| E_{AS} | $T_C = 25^\circ C$ | 4 | J |
| P_D | $T_C = 25^\circ C$ | 1200 | W |
| dv/dt | $I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ C$ | 50 | V/ns |
| T_J | | -55 ... +150 | $^\circ C$ |
| T_{JM} | | 150 | $^\circ C$ |
| T_{stg} | | -55 ... +150 | $^\circ C$ |
| V_{ISOL} | 50/60 Hz, RMS $t = 1$ minute | 2500 | V~ |
| | $I_{ISOL} \leq 1mA$ $t = 1$ second | 3000 | V~ |
| M_d | Mounting Torque | 1.5/13 | Nm/lb.in |
| | Terminal Connection Torque | 1.3/11.5 | Nm/lb.in |
| Weight | | 30 | g |

Features

- International Standard Package
- miniBLOC, with Aluminium Nitride Isolation
- Isolation Voltage 2500V~
- High Current Handling Capability
- Fast Intrinsic Diode
- Avalanche Rated
- Low $R_{DS(on)}$

Advantages

- High Power Density
- Easy to Mount
- Space Savings

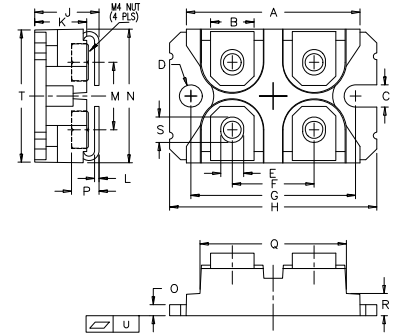
Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- PFC Circuits
- AC and DC Motor Drives
- Robotics and Servo Controls

| Symbol | Test Conditions ($T_J = 25^\circ C$ Unless Otherwise Specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|--------------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0V$, $I_D = 3mA$ | 850 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 8mA$ | 3.5 | | 5.5 V |
| I_{GSS} | $V_{GS} = \pm 30V$, $V_{DS} = 0V$ | | | ± 200 nA |
| I_{DSS} | $V_{DS} = V_{DSS}$, $V_{GS} = 0V$ $T_J = 125^\circ C$ | | | 50 μA 5 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$, $I_D = 45A$, Note 1 | | | 41 m Ω |

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|-------------------------------------|---|--|------|--------------------------|
| | | Min. | Typ. | Max |
| g_{fs} | $V_{DS} = 10\text{V}$, $I_D = 45\text{A}$, Note 1 | 37 | 62 | S |
| R_{Gi} | Gate Input Resistance | | 0.60 | Ω |
| C_{iss} | $V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$ | | 13.3 | nF |
| C_{oss} | | | 13.0 | nF |
| C_{rss} | | | 220 | pF |
| Effective Output Capacitance | | | | |
| $C_{o(er)}$ | Energy related | $V_{GS} = 0\text{V}$ $V_{DS} = 0.8 \cdot V_{DSS}$ | 395 | pF |
| $C_{o(tr)}$ | Time related | | 1820 | pF |
| $t_{d(on)}$ | Resistive Switching Times $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 45\text{A}$ $R_G = 1\Omega$ (External) | | 50 | ns |
| t_r | | | 20 | ns |
| $t_{d(off)}$ | | | 126 | ns |
| t_f | | | 8 | ns |
| $Q_{g(on)}$ | $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 45\text{A}$ | | 340 | nC |
| Q_{gs} | | | 78 | nC |
| Q_{gd} | | | 190 | nC |
| R_{thJC} | | | | 0.104 $^\circ\text{C/W}$ |
| R_{thCS} | | 0.05 | | $^\circ\text{C/W}$ |

SOT-227B (IXFN) 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 |

Source-Drain Diode

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|----------|---|-----------------------|------|---------------|
| | | Min. | Typ. | Max. |
| I_S | $V_{GS} = 0\text{V}$ | | | 90 A |
| I_{SM} | Repetitive, Pulse Width Limited by T_{JM} | | | 360 A |
| V_{SD} | $I_F = I_S$, $V_{GS} = 0\text{V}$, Note 1 | | | 1.4 V |
| t_{rr} | $I_F = 45\text{A}$, $-di/dt = 200\text{A}/\mu\text{s}$ $V_R = 100\text{V}$, $V_{GS} = 0\text{V}$ | | 250 | ns |
| Q_{RM} | | | 5.3 | μC |
| I_{RM} | | 42.0 | | A |

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

ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. 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 | 7,157,338B2 |
| 4,860,072 | 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 | |

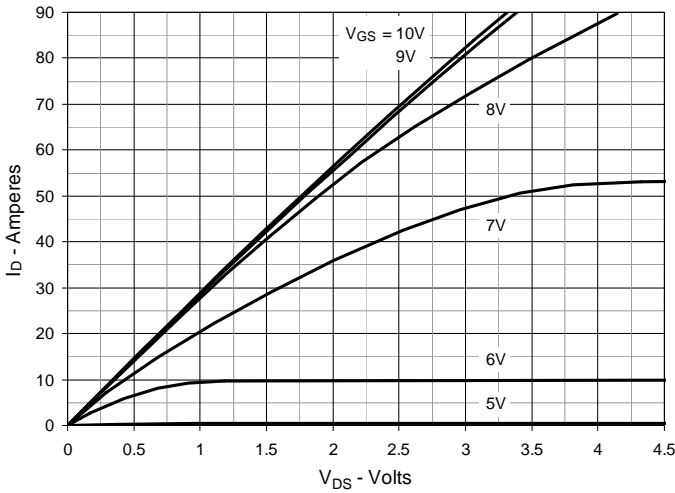
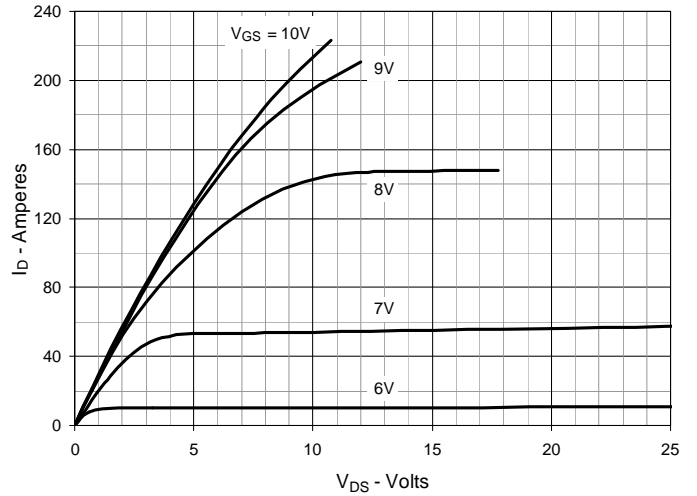
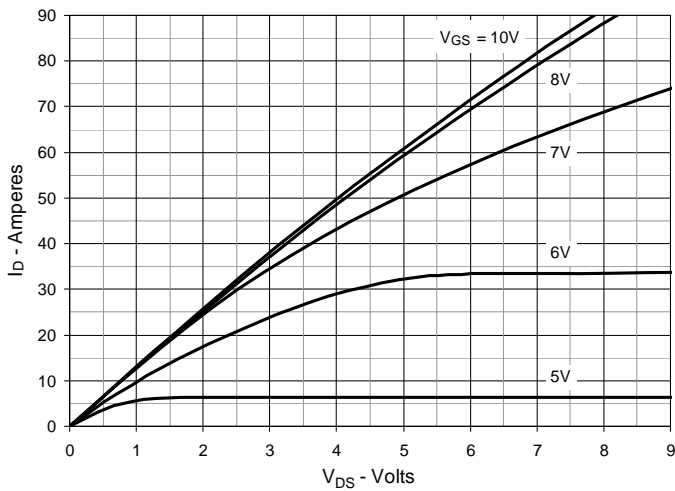
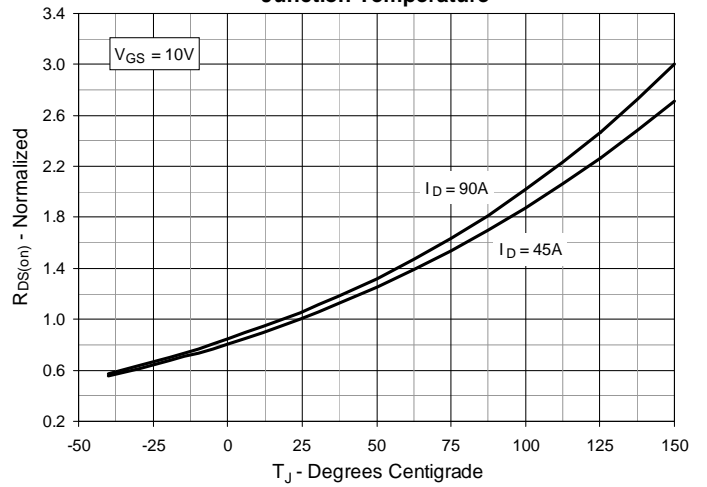
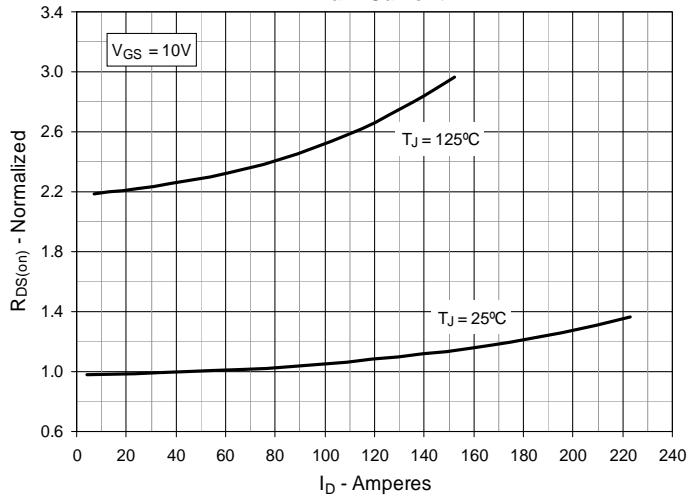
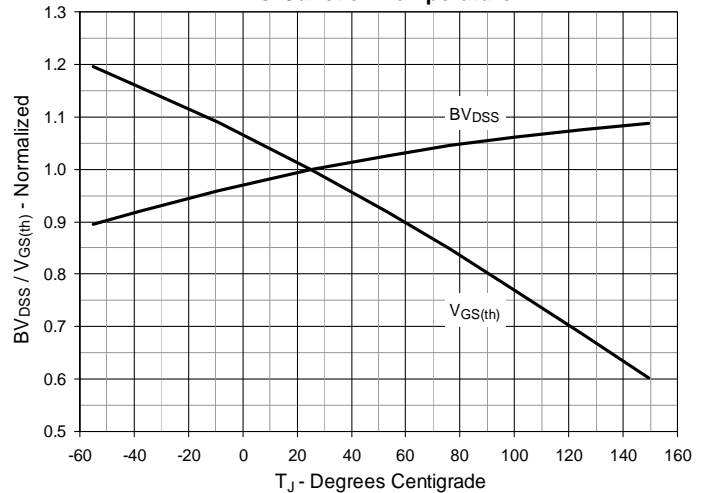
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

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

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

Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 45\text{A}$ Value vs. Junction Temperature

Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 45\text{A}$ Value vs. Drain Current

Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature


Fig. 7. Maximum Drain Current vs. Case Temperature

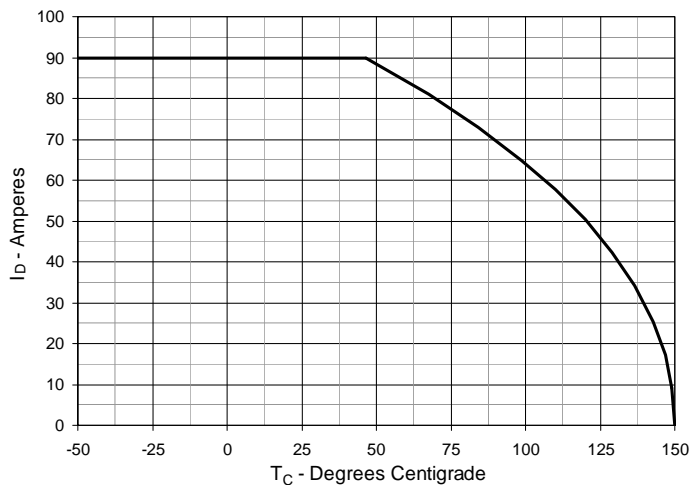


Fig. 8. Input Admittance

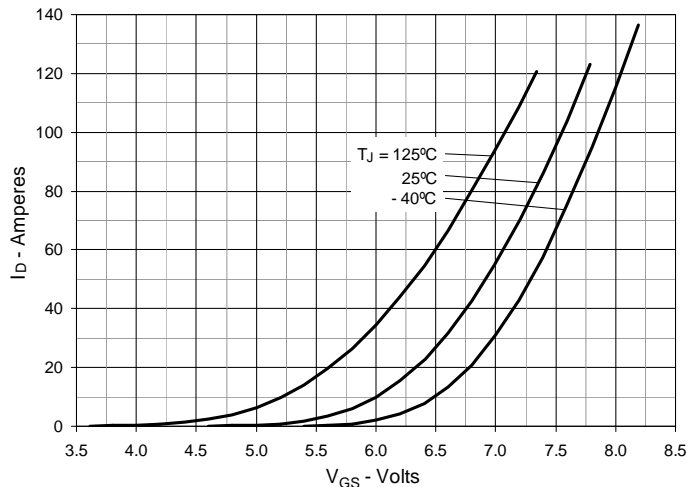


Fig. 9. Transconductance

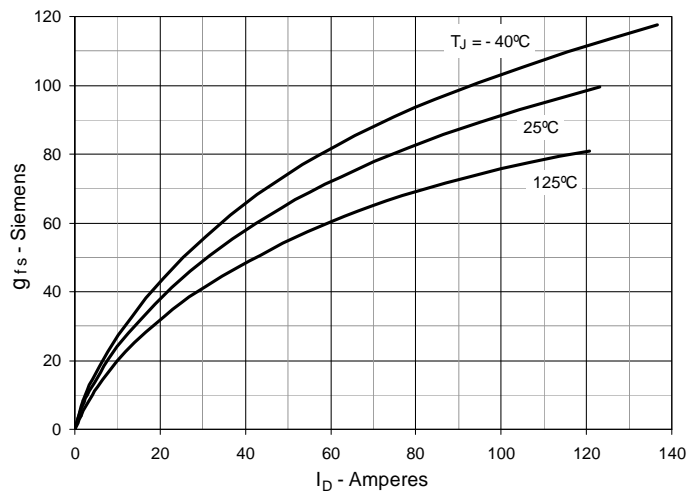


Fig. 10. Forward Voltage Drop of Intrinsic Diode

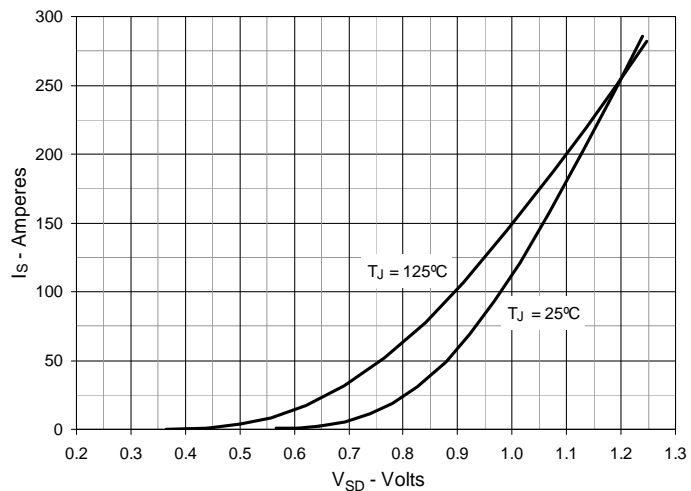


Fig. 11. Gate Charge

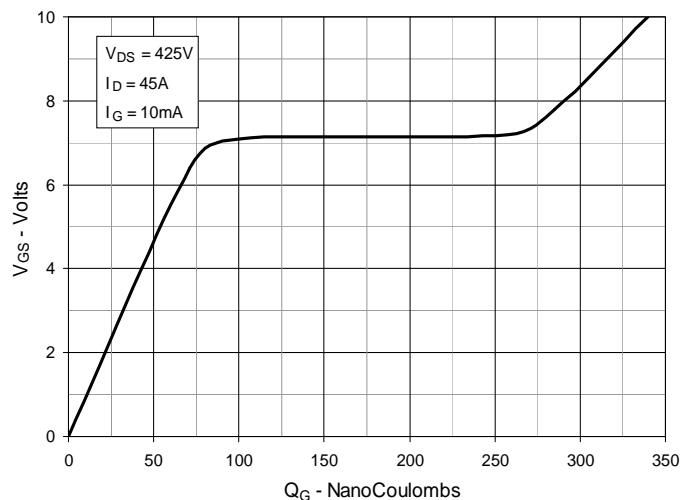


Fig. 12. Capacitance

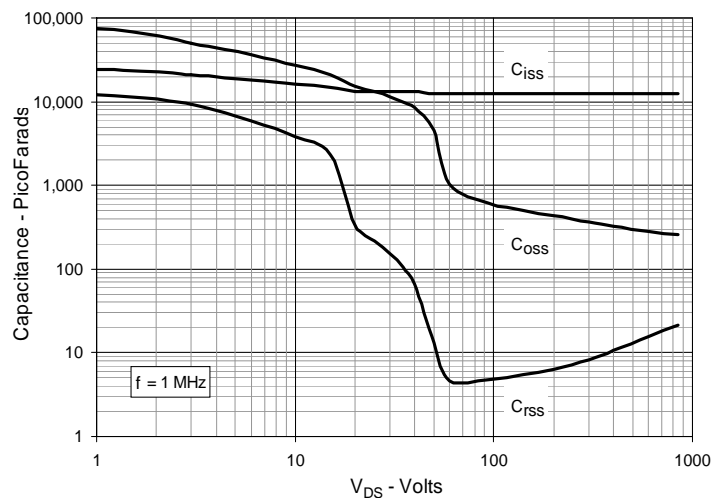


Fig. 13. Output Capacitance Stored Energy

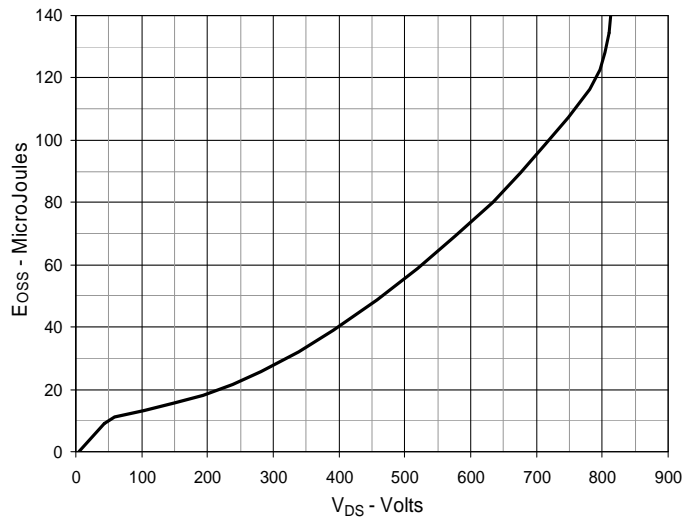


Fig. 14. Forward-Bias Safe Operating Area

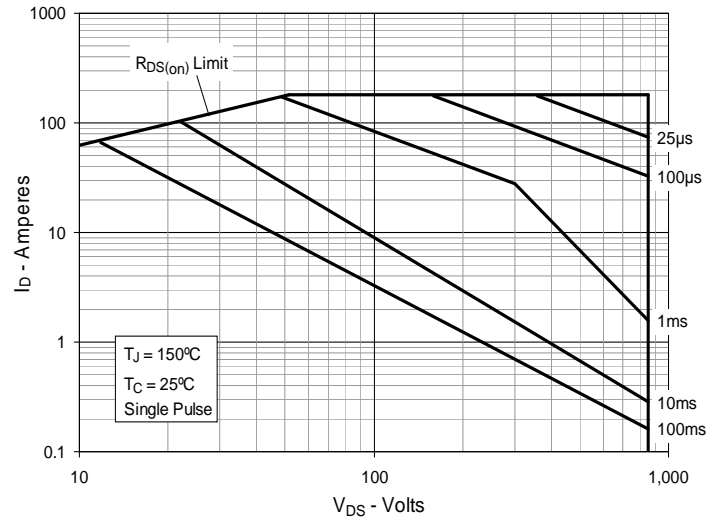
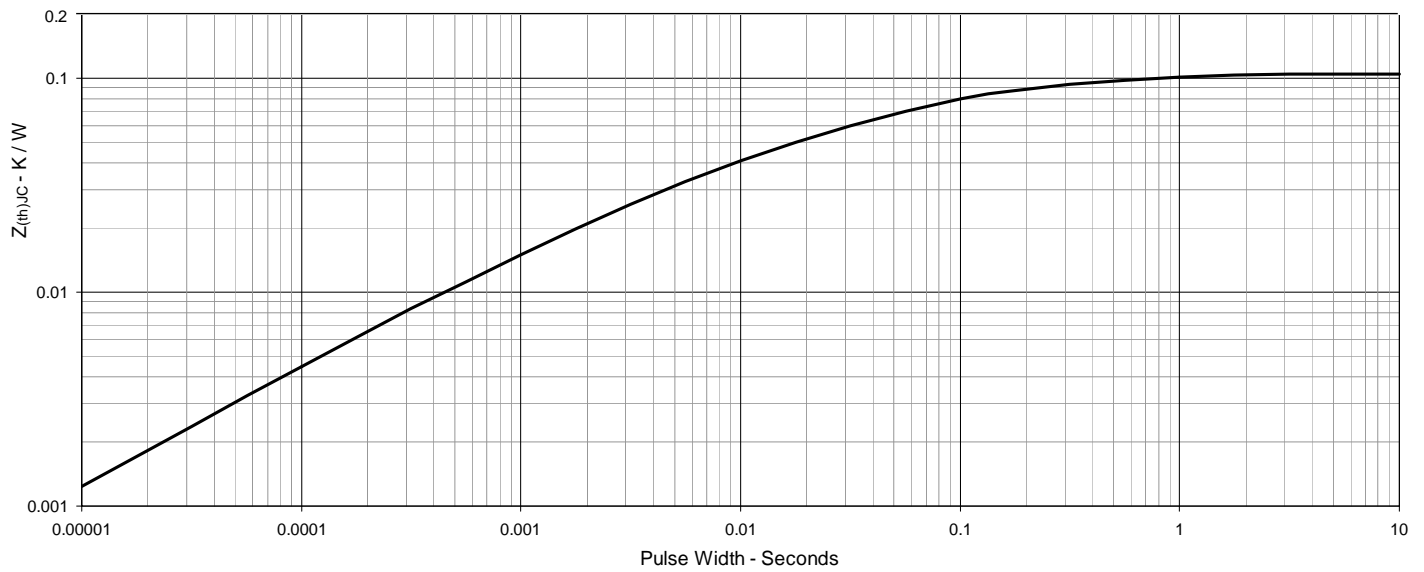


Fig. 15. Maximum Transient Thermal Impedance





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