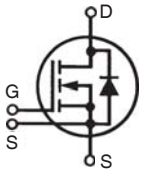
# IXYS

## X3-Class HiPerFET™ Power MOSFET

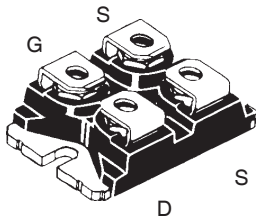
## IXFN210N30X3

$V_{DSS}$ = 300V
$I_{D25}$ = 210A
$R_{DS(on)}$ ≤ 4.6mΩ

N-Channel Enhancement Mode
Avalanche Rated




**miniBLOC, SOT-227**
**E153432**




G = Gate D = Drain
S = Source

| Symbol | Test Conditions | | Maximum Ratings | |
|---|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 150°C | | 300 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 150°C, $R_{GS}$ = 1MΩ | | 300 | V |
| $V_{GSS}$ | Continuous | | ± 20 | V |
| $V_{GSM}$ | Transient | | ± 30 | V |
| $I_{D25}$ | $T_C$ = 25°C | | 210 | A |
| $I_{L(RMS)}$ | External Lead Current Limit | | 200 | A |
| $I_{DM}$ | $T_C$ = 25°C, Pulse Width Limited by $T_{JM}$ | | 650 | A |
| $I_A$ | $T_C$ = 25°C | | 105 | A |
| $E_{AS}$ | $T_C$ = 25°C | | 3 | J |
| $P_D$ | $T_C$ = 25°C | | 695 | W |
| dv/dt | $I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$ | | 50 | V/ns |
| $T_J$ | | | -55 ... +150 | °C |
| $T_{JM}$ | | | 150 | °C |
| $T_{stg}$ | | | -55 ... +150 | °C |
| $V_{ISOL}$ | 50/60 Hz, RMS | t = 1 minute | 2500 | V~ |
| | $I_{ISOL} \le$ 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 |

| Symbol | Test Conditions ($T_J$ = 25°C Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = 3mA | 300 | | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = 8mA | 2.5 | | 4.5 | V |
| $I_{GSS}$ | $V_{GS}$ = ± 20V, $V_{DS}$ = 0V | | | ± 200 | nA |
| $I_{DSS}$ | $V_{DS} = V_{DSS}$, $V_{GS}$ = 0V | | | 25 | μA |
| | $T_J$ = 125°C | | | 2.5 | mA |
| $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D = 0.5 \bullet I_{DSS}$, Note 1 | | 3.8 | 4.6 | mΩ |

### Features

- International Standard Package
- miniBLOC, with Aluminium Nitride Isolation
- Isolation Voltage 2500V~
- High Current Handling Capability
- 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

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| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 10V, $I_D$ = 60A, Note 1 | 84 | 140 | | S |
| $R_{Gi}$ | Gate Input Resistance | | 2 | | Ω |
| $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 25V, f = 1MHz | | 24.2 | | nF |
| $C_{oss}$ | | | 3.1 | | nF |
| $C_{rss}$ | | | 7.7 | | pF |
| | **Effective Output Capacitance** | | | | |
| $C_{o(er)}$ | Energy related; $V_{GS}$ = 0V, $V_{DS}$ = 0.8 • $V_{DSS}$ | | 1100 | | pF |
| $C_{o(tr)}$ | Time related; $V_{GS}$ = 0V, $V_{DS}$ = 0.8 • $V_{DSS}$ | | 4600 | | pF |
| $t_{d(on)}$ | **Resistive Switching Times** | | 38 | | ns |
| $t_r$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 • $I_{DSS}$ | | 40 | | ns |
| $t_{d(off)}$ | $R_G$ = 1Ω (External) | | 210 | | ns |
| $t_f$ | | | 15 | | ns |
| $Q_{g(on)}$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 • $I_{DSS}$ | | 375 | | nC |
| $Q_{gs}$ | | | 107 | | nC |
| $Q_{gd}$ | | | 100 | | nC |
| $R_{thJC}$ | | | | 0.18 | °C/W |
| $R_{thCS}$ | | | 0.05 | | °C/W |

**Source-Drain Diode**

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max | |
|---|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0V | | | 210 | A |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$ | | | 840 | A |
| $V_{SD}$ | $I_F$ = 100A, $V_{GS}$ = 0V, Note 1 | | | 1.4 | V |
| $t_{rr}$ | $I_F$ = 105A, -di/dt = 100A/μs | | 190 | | ns |
| $Q_{RM}$ | $V_R$ = 100V | | 1.4 | | μC |
| $I_{RM}$ | | | 15 | | A |

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

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 4,860,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

**Fig. 1. Output Characteristics @ $T_J$ = 25°C**

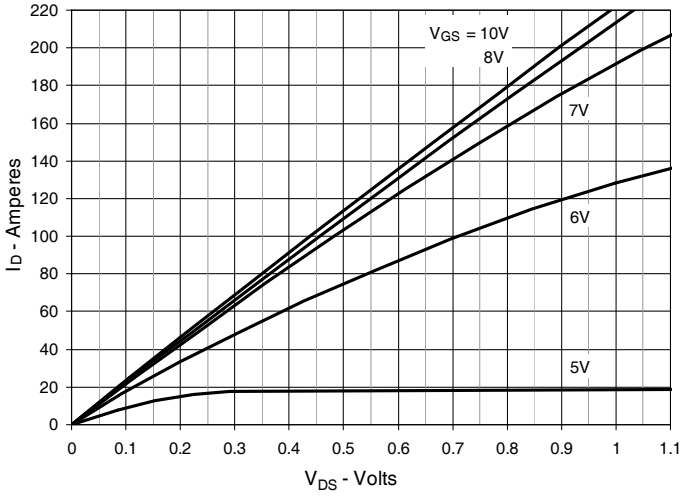



**Fig. 2. Extended Output Characteristics @ $T_J$ = 25°C**

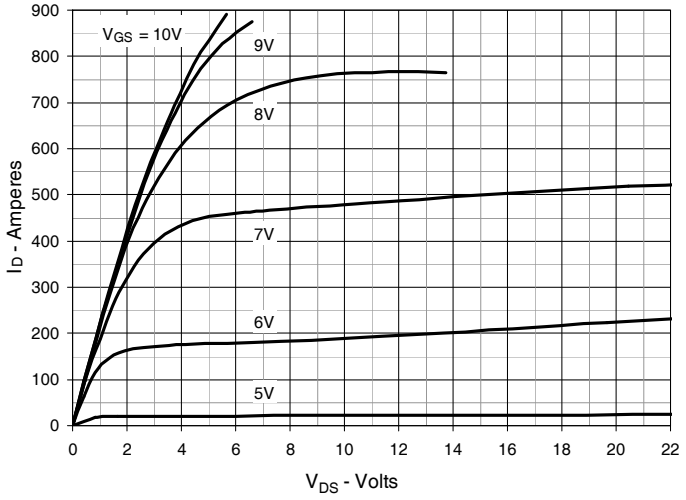



**Fig. 3. Output Characteristics @ $T_J$ = 125°C**

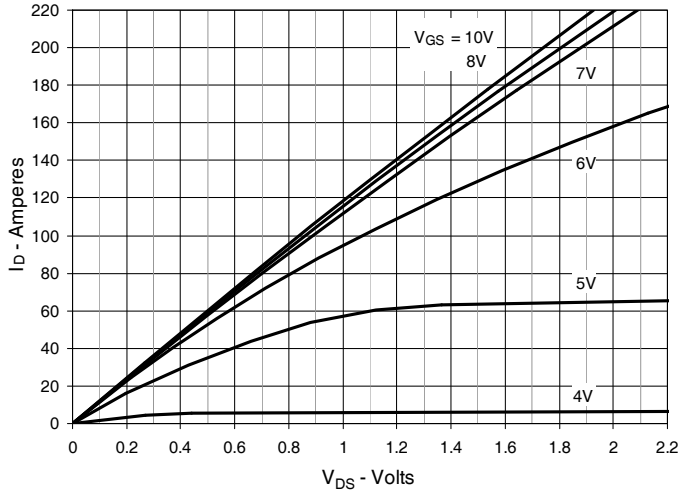



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D$ = 105A Value vs. Junction Temperature**

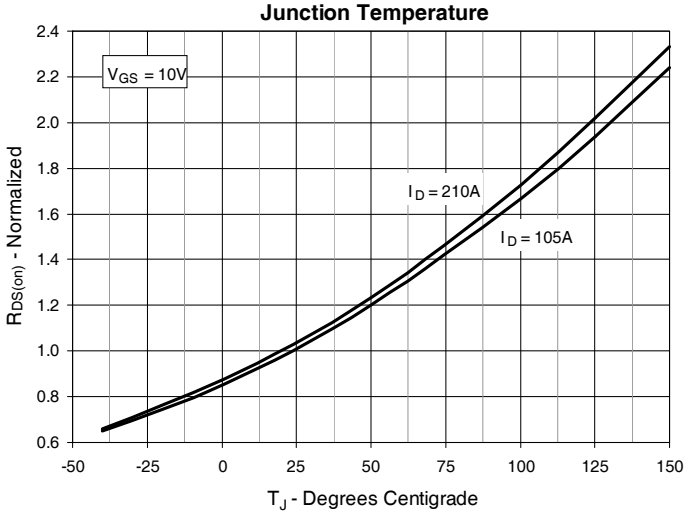



**Fig. 5. $R_{DS(on)}$ Normalized to $I_D$ = 105A Value vs. Drain Current**

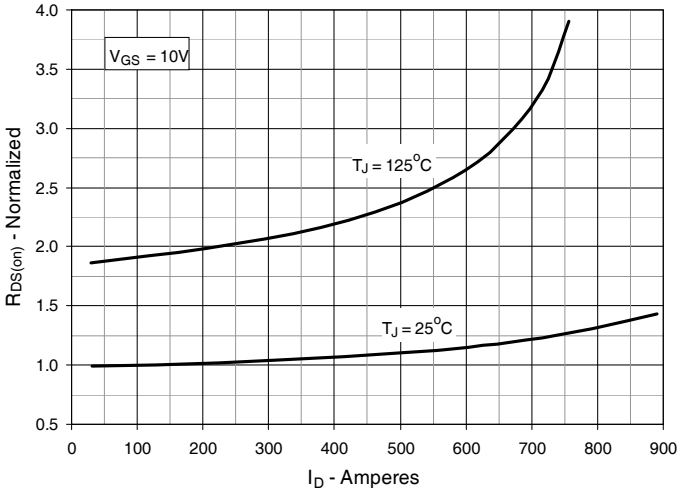
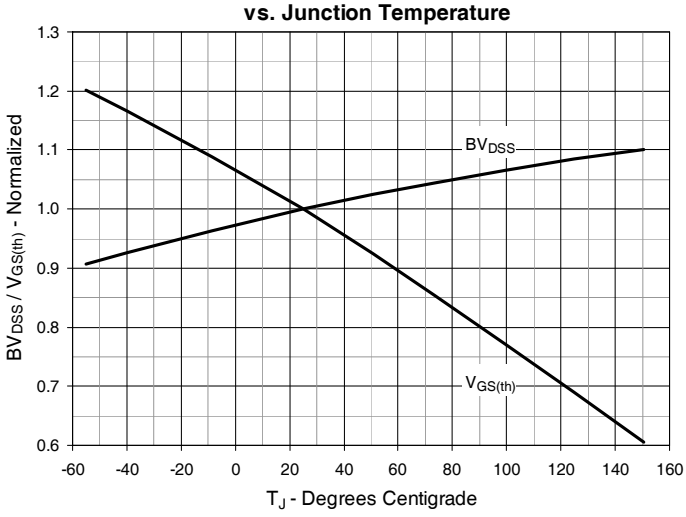



**Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature**




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**Fig. 7. Maximum Drain Current vs. Case Temperature**

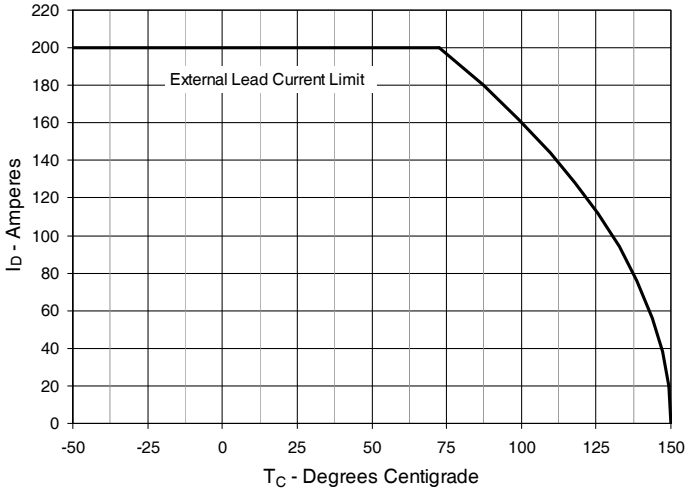



**Fig. 8. Input Admittance**

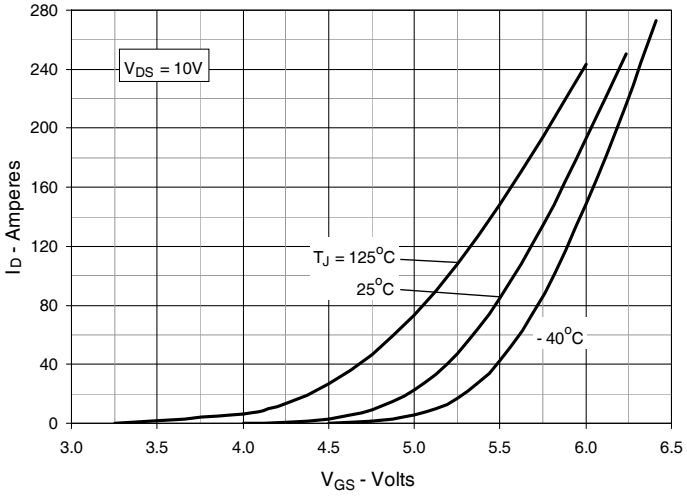



**Fig. 9. Transconductance**

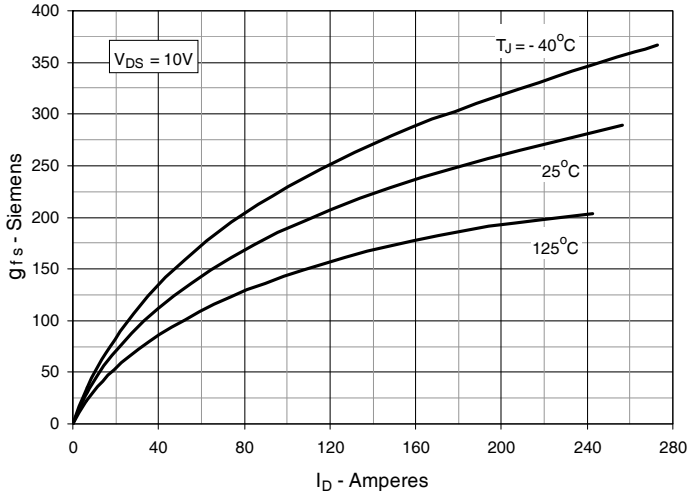



**Fig. 10. Forward Voltage Drop of Intrinsic Diode**

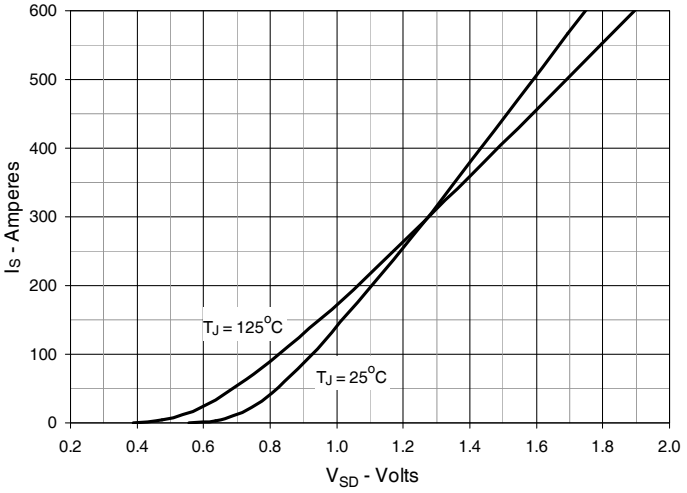



**Fig. 11. Gate Charge**

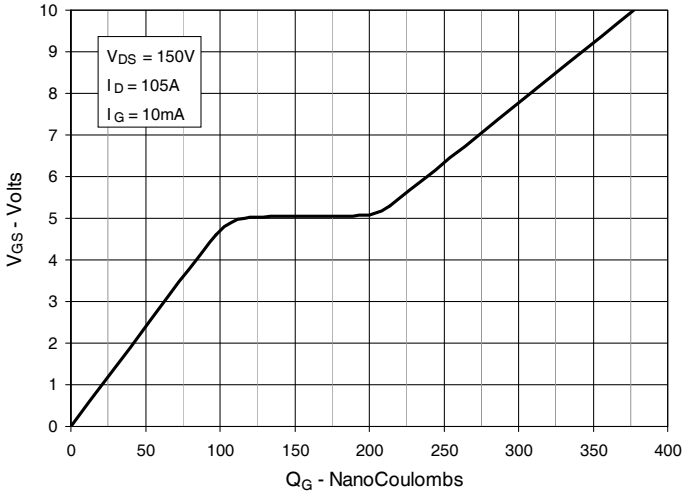
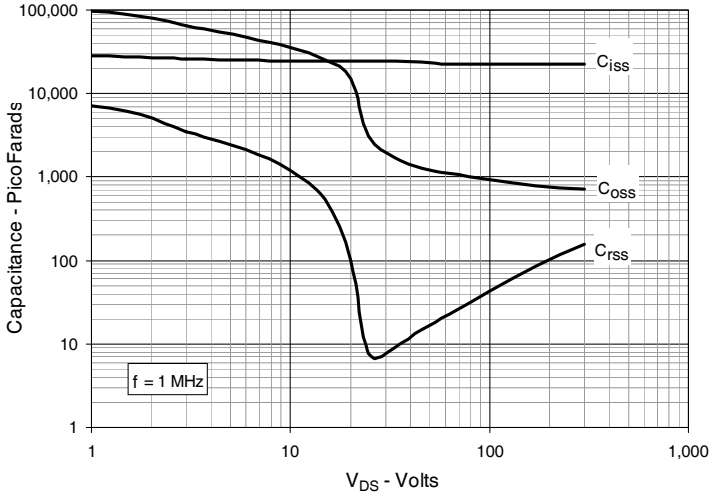



**Fig. 12. Capacitance**




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**Fig. 13. Output Capacitance Stored Energy**

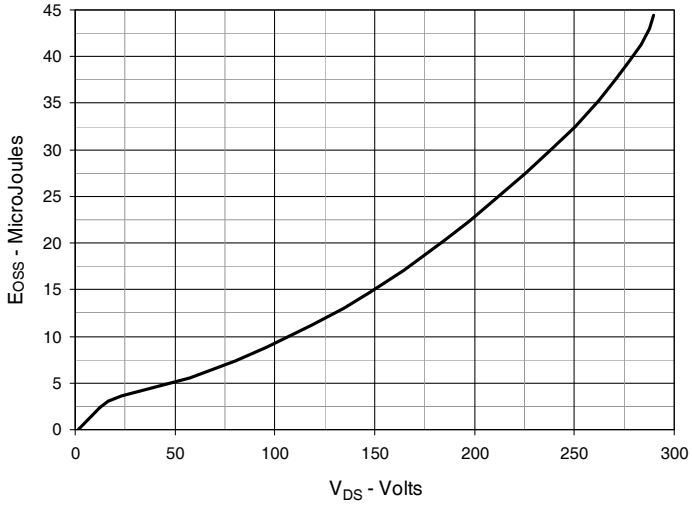



**Fig. 14. Forward-Bias Safe Operating Area**

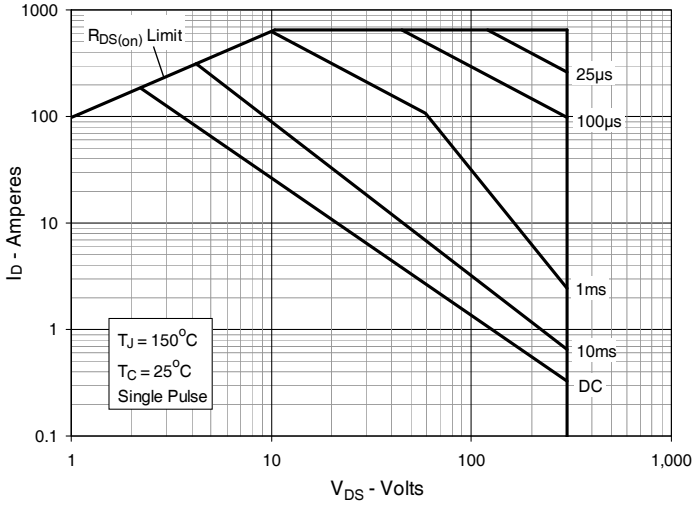
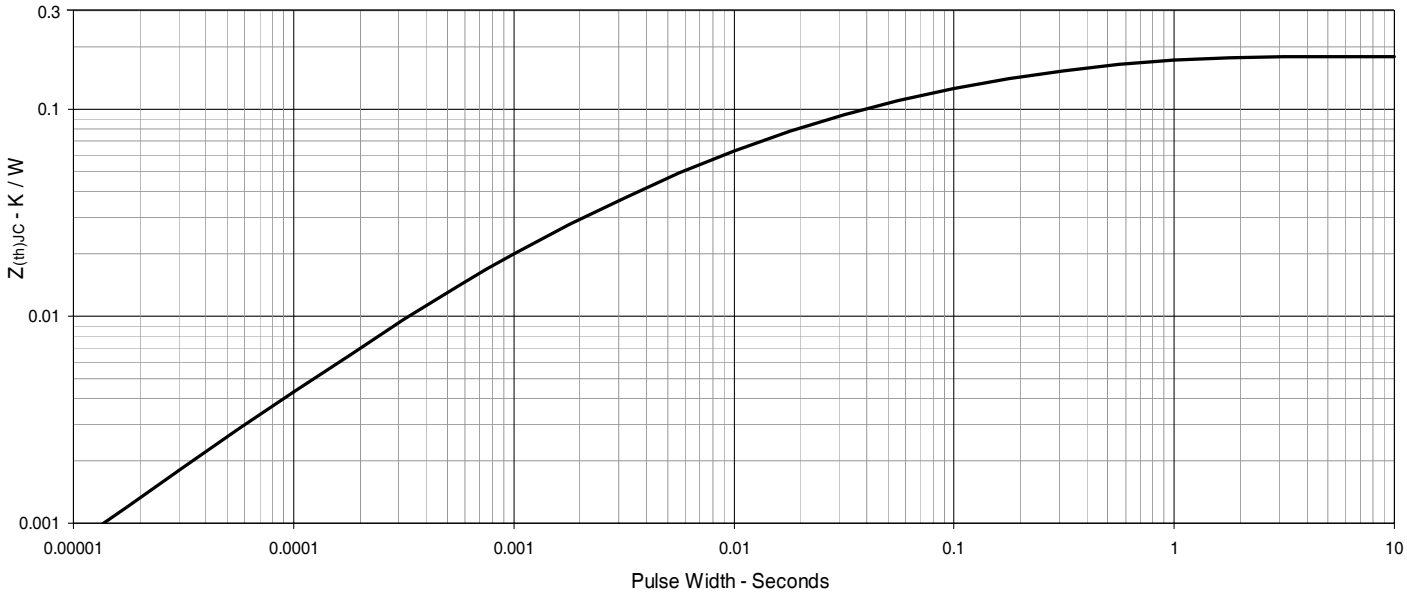
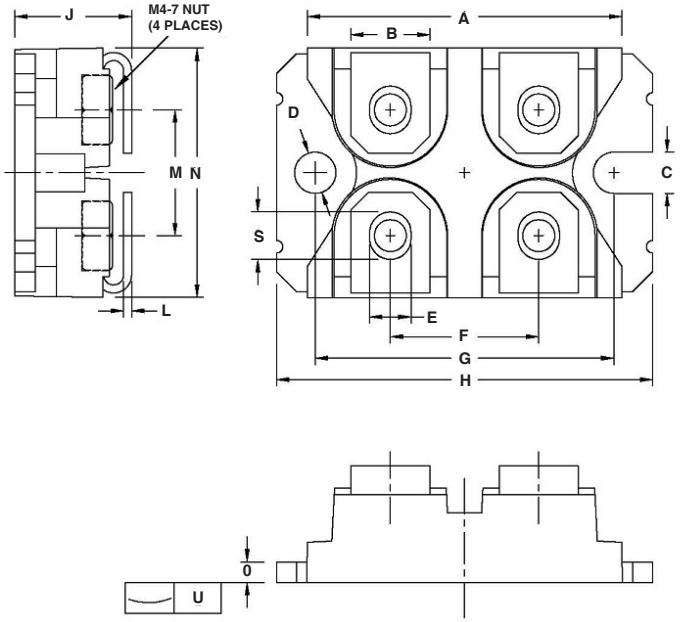



**Fig. 15. Maximum Transient Thermal Impedance**




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**SOT-227 Outline**




| SYM | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 1.224 | 1.260 | 31.10 | 32.00 |
| B | .303 | .327 | 7.70 | 8.30 |
| C | .161 | .173 | 4.10 | 4.40 |
| D | .161 | .173 | 4.10 | 4.40 |
| E | .161 | .173 | 4.10 | 4.40 |
| F | .587 | .598 | 14.90 | 15.20 |
| G | 1.181 | 1.201 | 30.00 | 30.50 |
| H | 1.488 | 1.508 | 37.80 | 38.30 |
| J | .461 | .484 | 11.70 | 12.30 |
| L | .030 | .033 | 0.75 | 0.85 |
| M | .492 | .512 | 12.50 | 13.00 |
| N | .984 | 1.004 | 25.00 | 25.50 |
| O | .075 | .087 | 1.90 | 2.20 |
| S | .181 | .193 | 4.60 | 4.90 |
| U | .000 | .005 | 0.00 | 0.13 |

1. NUT MATERIAL:
   STANDARD – Low carbon steel with Ni plating.
   OPTIONAL: – Brass Nut is available.
   PART NUMBER–BN
2. ALL METAL SURFACE ARE PRE NI PLATED EXCEPT TRIM AREA.




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