IXYS

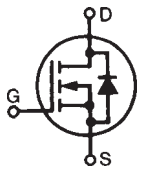
Preliminary Technical Information

# High Voltage Power MOSFET w/ Extended FBSOA

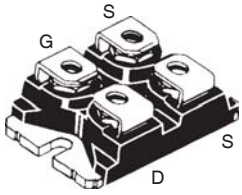
# IXTN5N250

$V_{DSS}$ = 2500V
$I_{D25}$ = 5A
$R_{DS(on)}$ ≤ 8.8Ω

N-Channel Enhancement Mode
Avalanche Rated
Guaranteed FBSOA




**miniBLOC**
E153432




G = Gate D = Drain
S = Source

Either Source Terminal S can be used as the Source Terminal or the Kelvin Source (Gate Return) Terminal.

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 150°C | 2500 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 150°C, $R_{GS}$ = 1MΩ | 2500 | V |
| $V_{GSS}$ | Continuous | ±30 | V |
| $V_{GSM}$ | Transient | ±40 | V |
| $I_{D25}$ | $T_C$ = 25°C | 5 | A |
| $I_{DM}$ | $T_C$ = 25°C, Pulse Width Limited by $T_{JM}$ | 20 | A |
| $I_A$ | $T_C$ = 25°C | 2.5 | A |
| $E_{AS}$ | $T_C$ = 25°C | 2.5 | J |
| $P_D$ | $T_C$ = 25°C | 700 | W |
| $T_J$ | | -55 to +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | -55 to +150 | °C |
| $V_{ISOL}$ | 50/60 Hz, RMS, t = 1minute | 2500 | V~ |
| | $I_{ISOL}$ ≤ 1mA, t = 1s | 3000 | V~ |
| $M_d$ | Mounting Torque for Base Plate | 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, $I_D$ = 1mA | 2500 | | | V |
| $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 1mA | 2.0 | | 5.0 | V |
| $I_{GSS}$ | $V_{GS}$ = ±30V, $V_{DS}$ = 0V | | | ±200 | nA |
| $I_{DSS}$ | $V_{DS}$ = 2kV, $V_{GS}$ = 0V | | | 50 | μA |
| | $T_J$ = 125°C | | | 4 | mA |
| $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 0.5 • $I_{D25}$, Note 1 | | | 8.8 | Ω |

### Features

- International Standard Package
- Molding Epoxies Meet UL94 V-0 Flammability Classification
- Guaranteed FBSOA at 75°C
- miniBLOC with Aluminum Nitride Isolation
- Low Package Inductance

### Advantages

- Easy to Mount
- Space Savings
- High Power Density

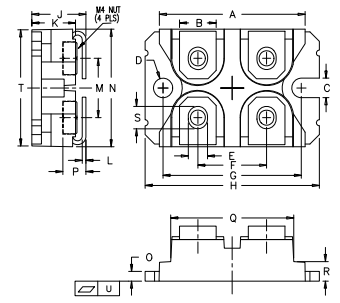
### Applications

- High Voltage Power Supplies
- Capacitor Discharge
- Pulse Circuits

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| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 50V, $I_D$ = 0.5 • $I_{D25}$, Note 1 | 3.0 | 4.5 | 6.0 | S |
| $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 25V, f = 1MHz | | 8560 | | pF |
| $C_{oss}$ | | | 315 | | pF |
| $C_{rss}$ | | | 90 | | pF |
| $t_{d(on)}$ | **Resistive Switching Times** | | 33 | | ns |
| $t_r$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 • $I_{D25}$ | | 20 | | ns |
| $t_{d(off)}$ | $R_G$ = 1Ω (External) | | 90 | | ns |
| $t_f$ | | | 44 | | ns |
| $Q_{g(on)}$ | $V_{GS}$ = 10V, $V_{DS}$ = 1000V, $I_D$ = 0.5 • $I_{D25}$ | | 200 | | nC |
| $Q_{gs}$ | | | 28 | | nC |
| $Q_{gd}$ | | | 70 | | nC |
| $R_{thJC}$ | | | | 0.18 | °C/W |
| $R_{thCS}$ | | | 0.05 | | °C/W |

**SOT-227B (IXTN) Outline**




(M4 screws (4x) supplied)

| SYM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS 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 |

**Safe Operating Area Specification**

| Symbol | Test Conditions | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| **SOA** | $V_{DS}$ = 2000V, $I_D$ = 0.11A, $T_C$ = 75°C, tp = 3s | 220 | | | W |

**Source-Drain Diode**

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0V | | | 5 | A |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$ | | | 20 | A |
| $V_{SD}$ | $I_F$ = $I_S$, $V_{GS}$ = 0V, Note 1 | | | 1.5 | V |
| $t_{rr}$ | $I_F$ = 2.5A, -di/dt = 100A/μs, $V_R$ = 100V | | 1.2 | | μs |

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

**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 moreof the following U.S. patents: 4,835,592 4,850,072 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 @ $T_J$ = 25ºC**

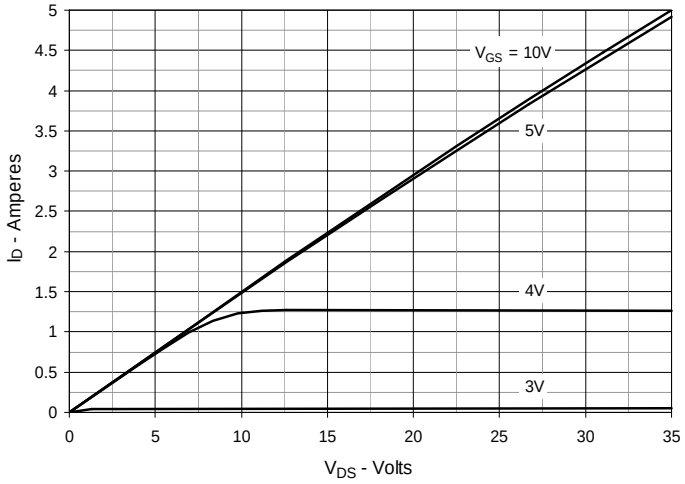



**Fig. 2. Output Characteristics @ $T_J$ = 125ºC**

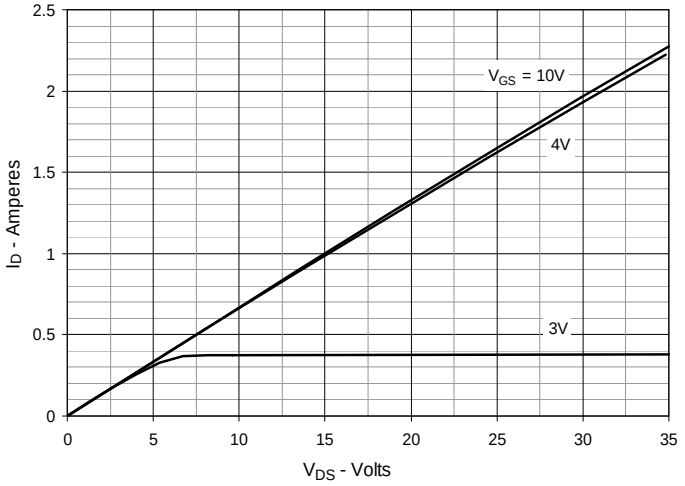



**Fig. 3. $R_{DS(on)}$ Normalized to $I_D$ = 2.5A Value vs. Junction Temperature**

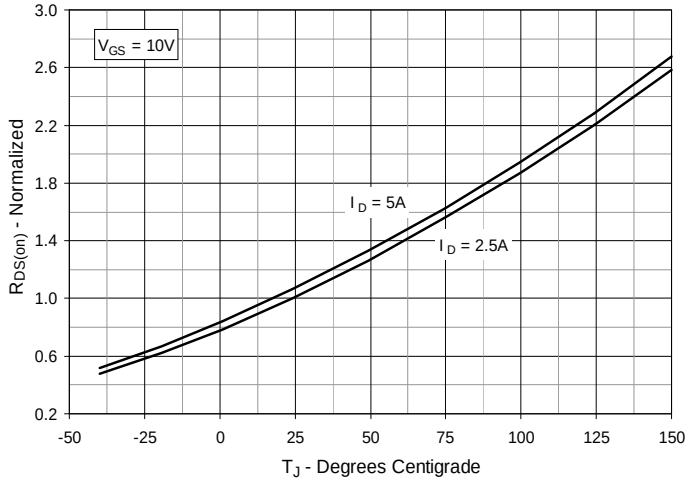



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D$ = 2.5A Value vs. Drain Current**

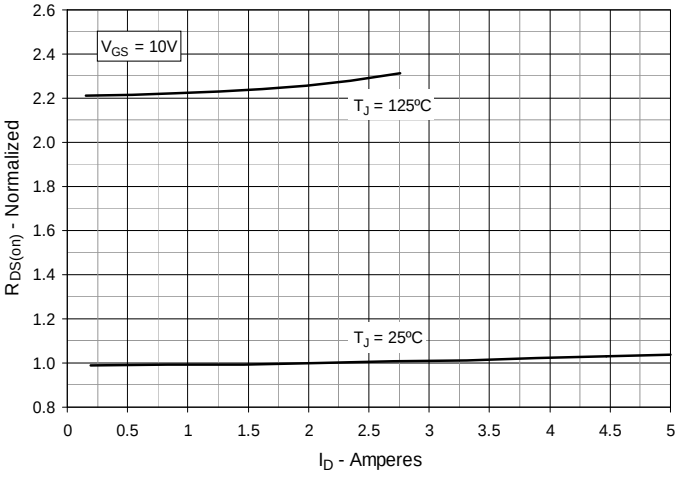



**Fig. 5. Maximum Drain Current vs. Case Temperature**

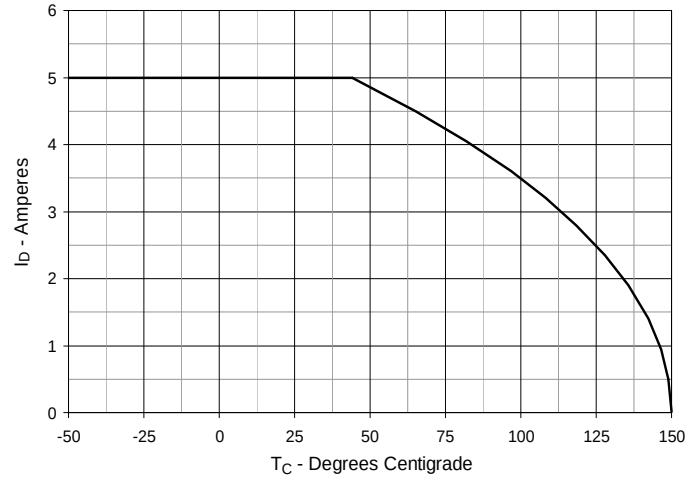
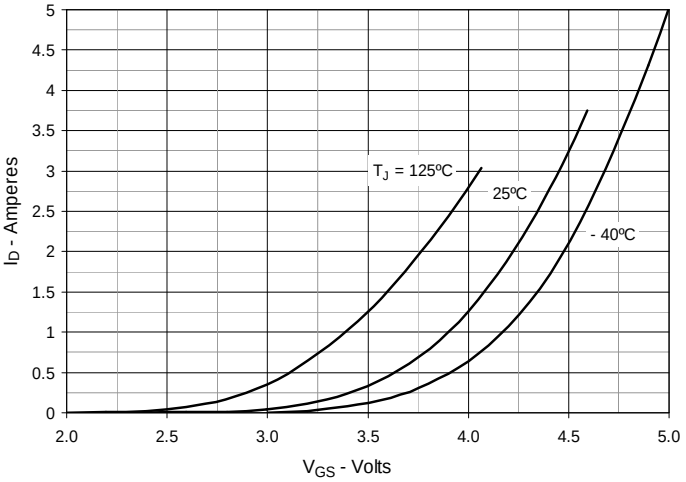



**Fig. 6. Input Admittance**




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**Fig. 7. Transconductance**

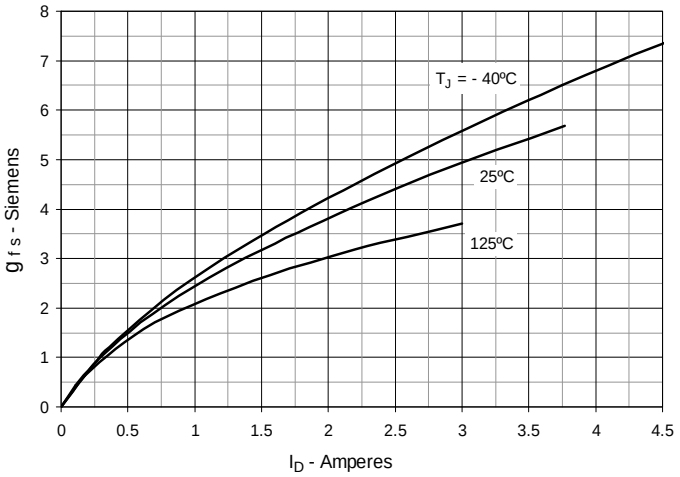



**Fig. 8. Forward Voltage Drop of Intrinsic Diode**

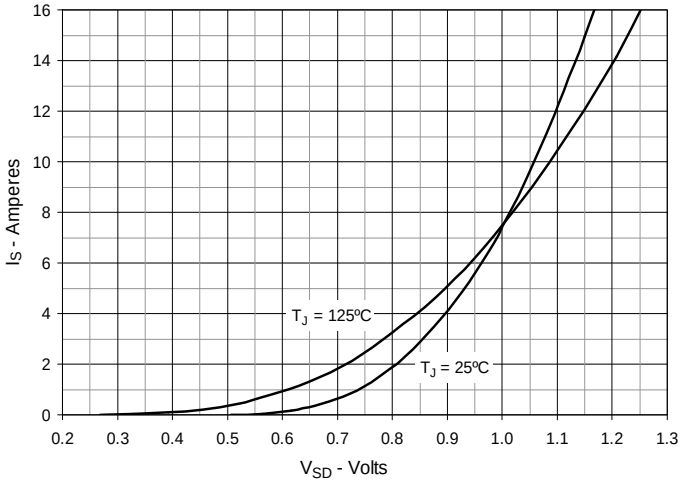



**Fig. 9. Gate Charge**

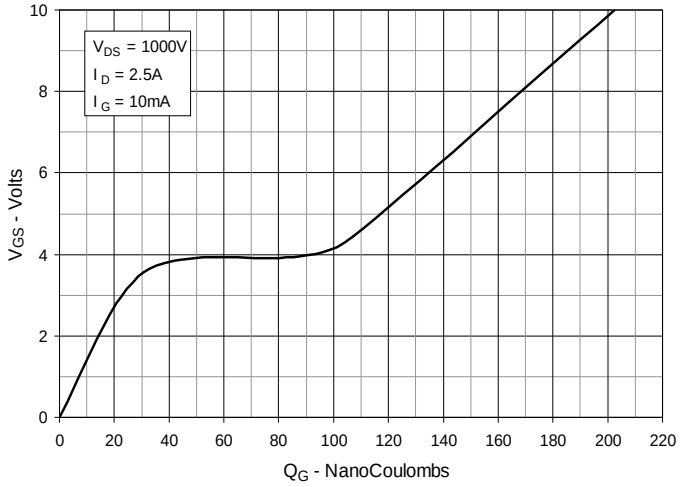



**Fig. 10. Capacitance**

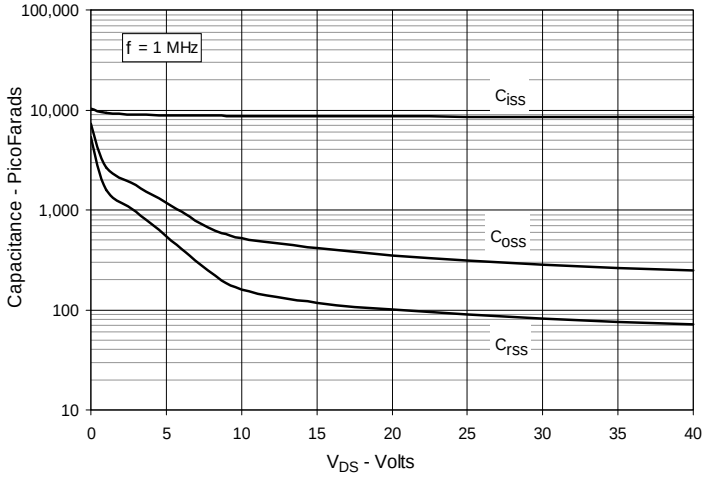



**Fig. 11. Forward-Bias Safe Operating Area @ $T_C$ = 25ºC**

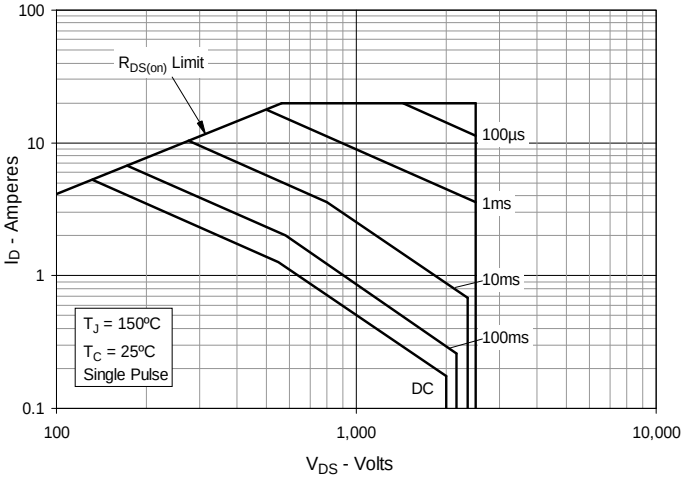
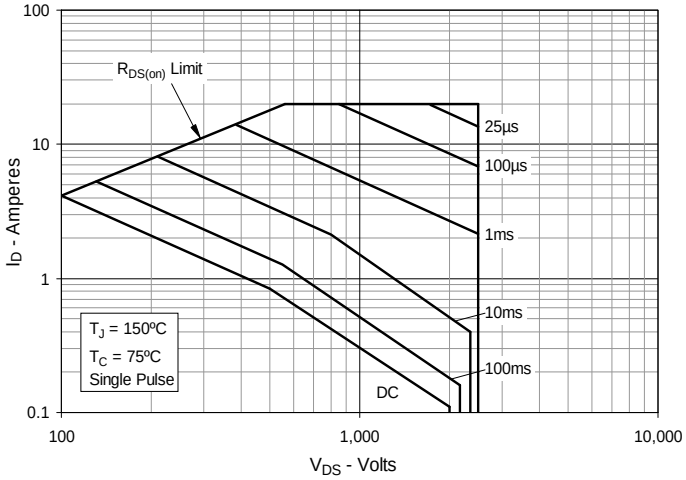
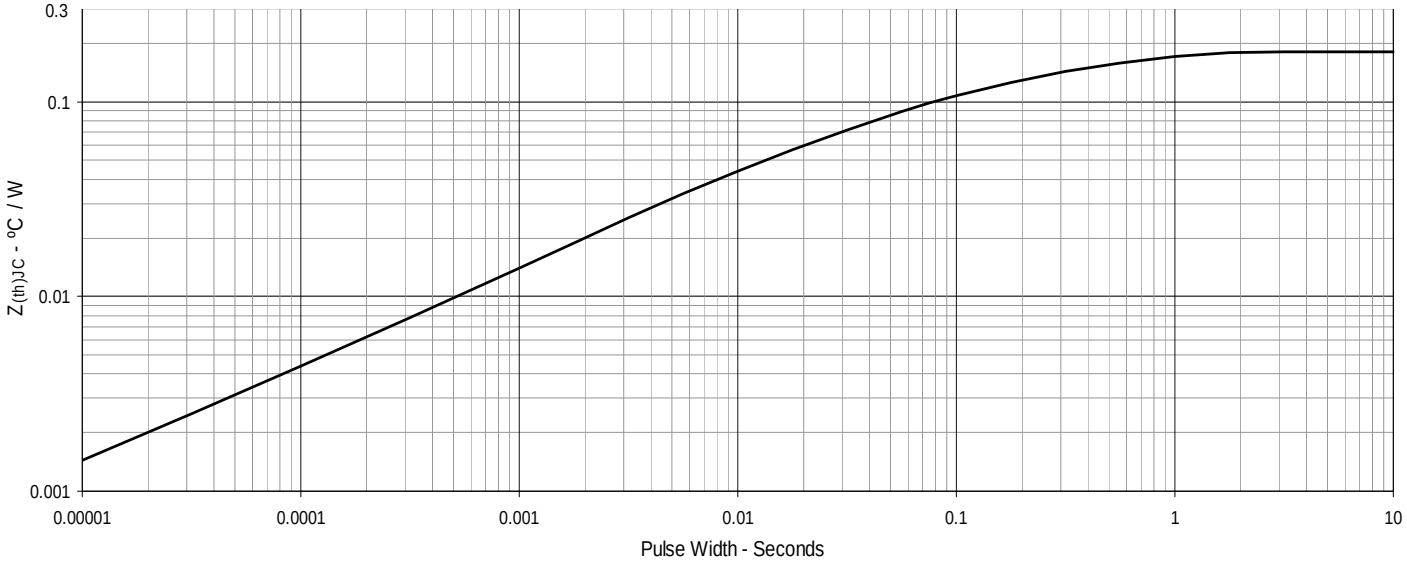



**Fig. 12. Forward-Bias Safe Operating Area @ $T_C$ = 75ºC**




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

**Fig. 13. Maximum Transient Thermal Impedance**




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