

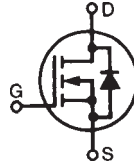
**Linear™ Power MOSFET  
w/Extended FBSOA**
**IXTK3N250L  
IXTX3N250L**

$$V_{DSS} = 2500V$$

$$I_{D25} = 3A$$

$$R_{DS(on)} \leq 10\Omega$$

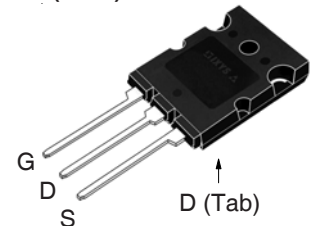
N-Channel Enhancement Mode



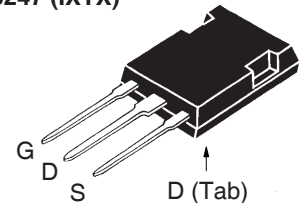
| Symbol     | Test Conditions   | Maximum Ratings   |            |
|------------|---|-------------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $150^\circ C$                       | 2500              | V          |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$ | 2500              | V          |
| $V_{GSS}$  | Continuous  | $\pm 20$          | V          |
| $V_{GSM}$  | Transient   | $\pm 30$          | V          |
| $I_{D25}$  | $T_C = 25^\circ C$  | 3                 | A          |
| $I_{DM}$   | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$      | 8                 | A          |
| $P_D$      | $T_C = 25^\circ C$  | 417               | 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               | $^\circ C$ |
| $M_d$      | Mounting Torque (TO-264)                                  | 1.13/10           | Nm/lb.in   |
| $F_C$      | Mounting Force (PLUS247)                                  | 20..120 / 4.5..27 | N/lb       |
| Weight     | TO-264  | 10                | g          |
|            | PLUS247   | 6                 | g          |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                    |
|--------------|---|-----------------------|------|--------------------|
|              |   | Min.                  | Typ. | Max.               |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 1mA$   | 2500                  |      | V                  |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 1mA$                                       | 3.0                   |      | 5.0 V              |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                    |                       |      | $\pm 200$ nA       |
| $I_{DSS}$    | $V_{DS} = 0.8 \cdot V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 125^\circ C$   |                       |      | 50 $\mu A$<br>2 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                   |                       |      | 10 $\Omega$        |

TO-264 (IXTK)



PLUS247 (IXTX)



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

**Features**

- Designed for Linear Operation
- International Standard Packages
- Guaranteed FBSOA at  $75^\circ C$

**Advantages**

- Easy to Mount
- Space Savings
- High Power Density

**Applications**

- Solid State Circuit Breakers
- Soft Start Controls
- Linear Amplifiers
- Programmable Loads
- Current Regulators

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)  | Characteristic Values |      |      |                    |
|--------------|--|-----------------------|------|------|--------------------|
|              |  | Min.                  | Typ. | Max. |                    |
| $g_{fs}$     | $V_{DS} = 30\text{V}$ , $I_D = 1.5\text{A}$ , Note 1   | 0.6                   | 1.0  | 1.4  | S                  |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$   |                       | 5400 |      | pF                 |
| $C_{oss}$    |  |                       | 260  |      | pF                 |
| $C_{rss}$    |  |                       | 63   |      | pF                 |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$<br>$R_G = 1\Omega$ (External) |                       | 44   |      | ns                 |
| $t_r$        |  |                       | 32   |      | ns                 |
| $t_{d(off)}$ |  |                       | 120  |      | ns                 |
| $t_f$        |  |                       | 160  |      | ns                 |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$   |                       | 230  |      | nC                 |
| $Q_{gs}$     |  |                       | 58   |      | nC                 |
| $Q_{gd}$     |  |                       | 100  |      | nC                 |
| $R_{thJC}$   |  |                       |      | 0.30 | $^\circ\text{C/W}$ |
| $R_{thCS}$   |  | 0.15                  |      |      | $^\circ\text{C/W}$ |

### Safe Operating Area Specification

| Symbol | Test Conditions   | Characteristic Values |      |      |   |
|--------|---|-----------------------|------|------|---|
|        |   | Min.                  | Typ. | Max. |   |
| SOA    | $V_{DS} = 2\text{kV}$ , $I_D = 125\text{mA}$ , $T_C = 75^\circ\text{C}$ , $T_p = 5\text{s}$ | 250                   |      |      | W |

### Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                              | Characteristic Values |      |      |               |
|----------|--|-----------------------|------|------|---------------|
|          |  | Min.                  | Typ. | Max. |               |
| $I_S$    | $V_{GS} = 0\text{V}$   |                       |      | 3    | A             |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$  |                       |      | 12   | A             |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1  |                       |      | 1.5  | V             |
| $t_{rr}$ | $I_F = 1.5\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$ ,<br>$V_R = 100\text{V}$ , $V_{GS} = 0\text{V}$ |                       | 370  |      | ns            |
| $I_{RM}$ |  |                       | 18.4 |      | A             |
| $Q_{RM}$ |  |                       | 3.4  |      | $\mu\text{C}$ |

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

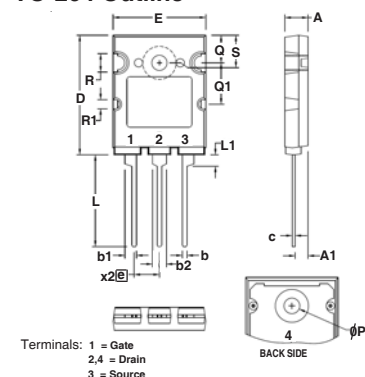
### ADVANCE TECHNICAL INFORMATION

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 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: 4,860,072 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

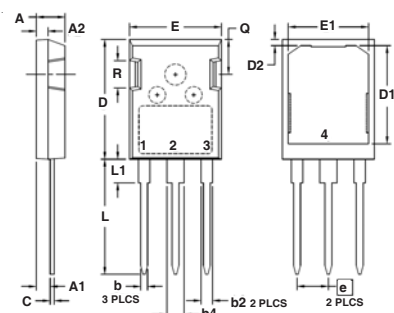
### TO-264 Outline



Terminals: 1 = Gate  
2,4 = Drain  
3 = Source

| SYM    | INCHES   |       | MILLIMETERS |       |
|--------|----------|-------|-------------|-------|
|        | MIN      | MAX   | MIN         | MAX   |
| A      | .185     | .209  | 4.70        | 5.30  |
| A1     | .102     | .118  | 2.60        | 3.00  |
| b      | .035     | .049  | 0.90        | 1.25  |
| b1     | .091     | .106  | 2.30        | 2.70  |
| b2     | .110     | .126  | 2.80        | 3.20  |
| c      | .020     | .033  | 0.50        | 0.85  |
| D      | 1.012    | 1.035 | 25.70       | 26.30 |
| E      | .776     | .799  | 19.70       | 20.30 |
| e      | .215 BSC |       | 5.46 BSC    |       |
| L      | .768     | .807  | 19.50       | 20.50 |
| L1     | .091     | .106  | 2.30        | 2.70  |
| phi P  | .122     | .138  | 3.10        | 3.50  |
| Q      | .228     | .244  | 5.80        | 6.20  |
| Q1     | .346     | .362  | 8.80        | 9.20  |
| phi R  | .150     | .165  | 3.80        | 4.20  |
| phi R1 | .071     | .087  | 1.80        | 2.20  |
| S      | .228     | .244  | 5.80        | 6.20  |

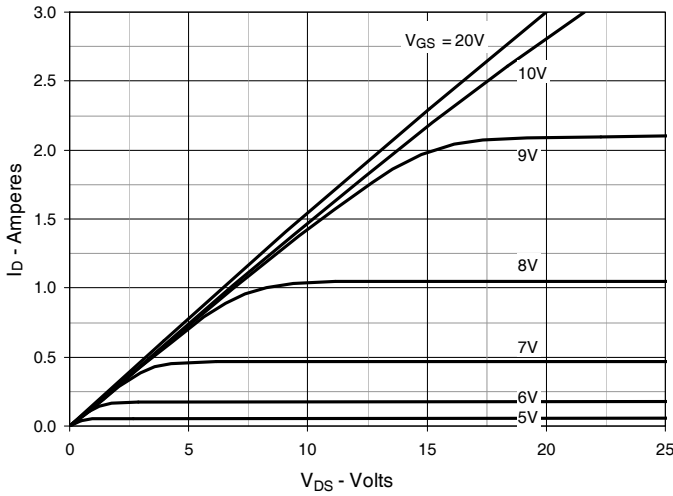
### PLUS 247™ Outline



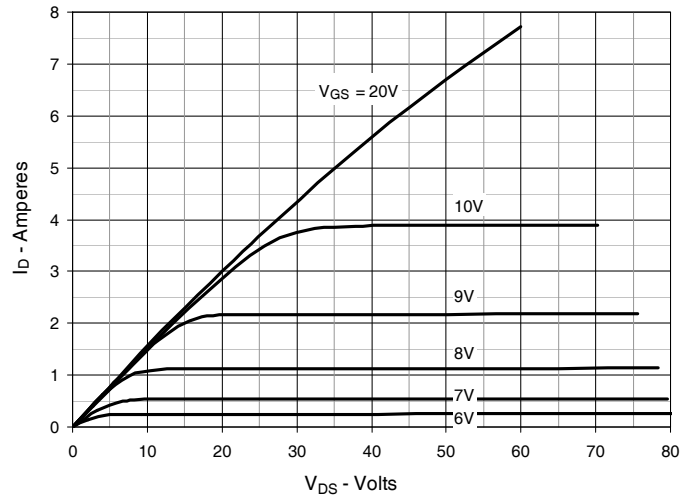
Terminals: 1 - Gate  
2,4 - Drain  
3 - Source

| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .190     | .205 | 4.83        | 5.21  |
| A1  | .090     | .100 | 2.29        | 2.54  |
| A2  | .075     | .085 | 1.91        | 2.16  |
| b   | .045     | .055 | 1.14        | 1.40  |
| b1  | .075     | .087 | 1.91        | 2.20  |
| b4  | .115     | .126 | 2.92        | 3.20  |
| C   | .024     | .031 | 0.61        | 0.80  |
| D   | .819     | .840 | 20.80       | 21.34 |
| D1  | .650     | .690 | 16.51       | 17.53 |
| D2  | .035     | .050 | 0.89        | 1.27  |
| E   | .620     | .635 | 15.75       | 16.13 |
| E1  | .520     | .560 | 13.08       | 14.22 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| L   | .780     | .810 | 19.81       | 20.57 |
| L1  | .150     | .170 | 3.81        | 4.32  |
| Q   | .220     | .244 | 5.59        | 6.20  |
| R   | .170     | .190 | 4.32        | 4.83  |

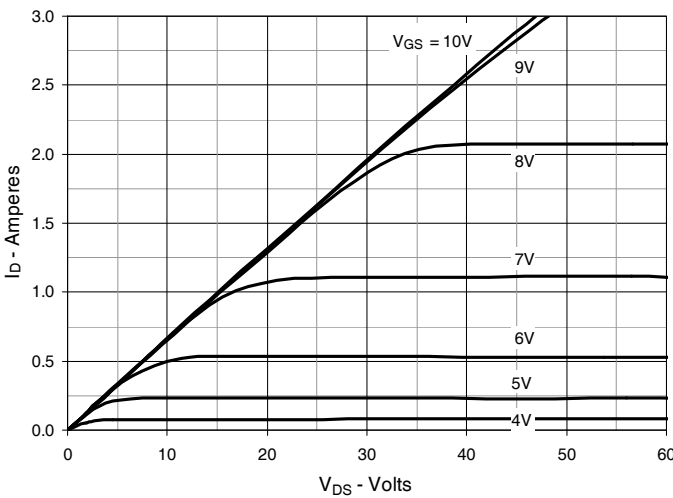
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



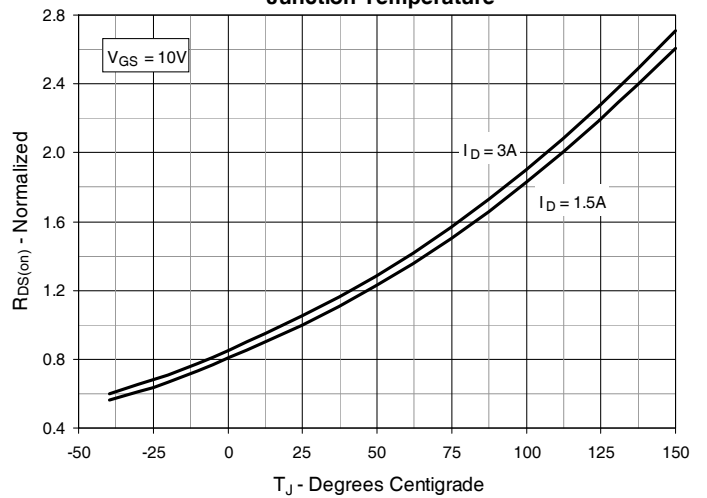
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



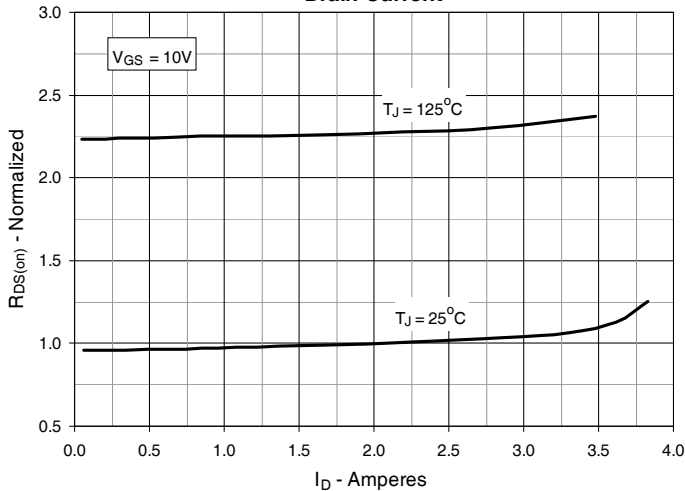
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



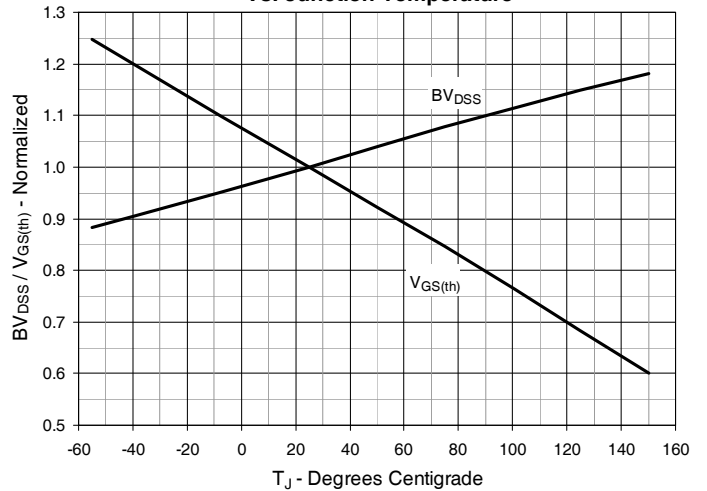
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 1.5\text{A}$  Value vs. Junction Temperature**



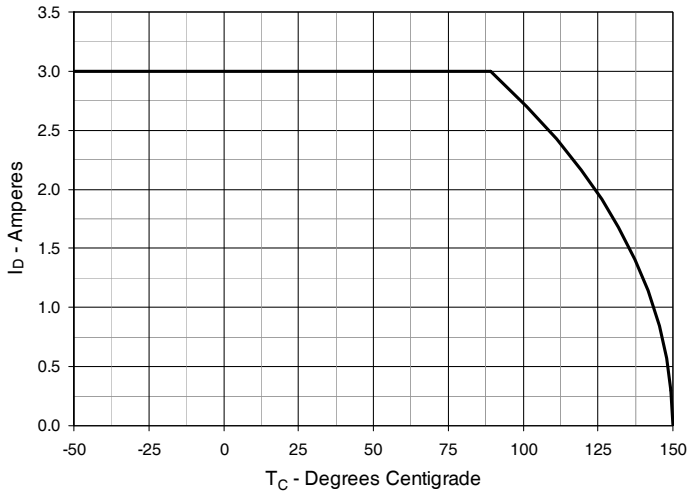
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 1.5\text{A}$  Value vs. Drain Current**



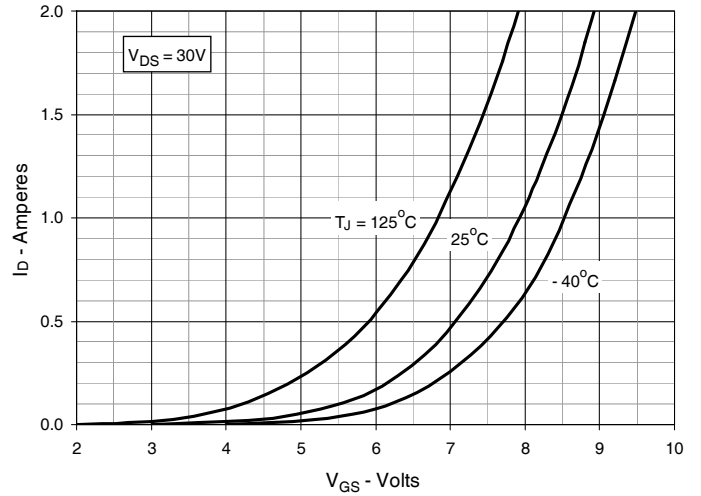
**Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature**



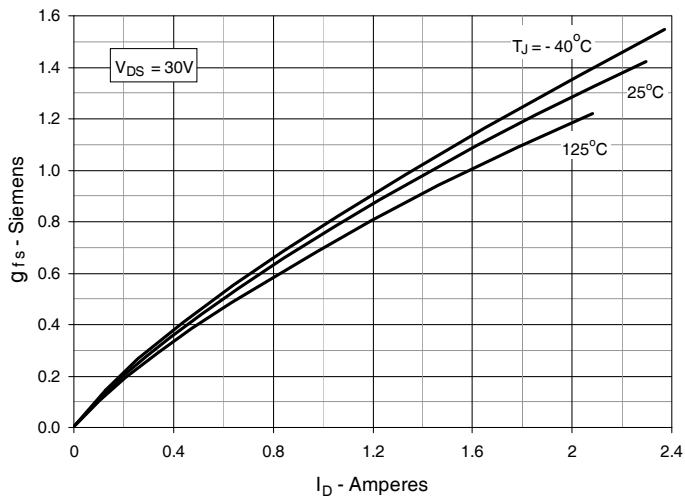
**Fig. 7. Maximum Drain Current vs. Case Temperature**



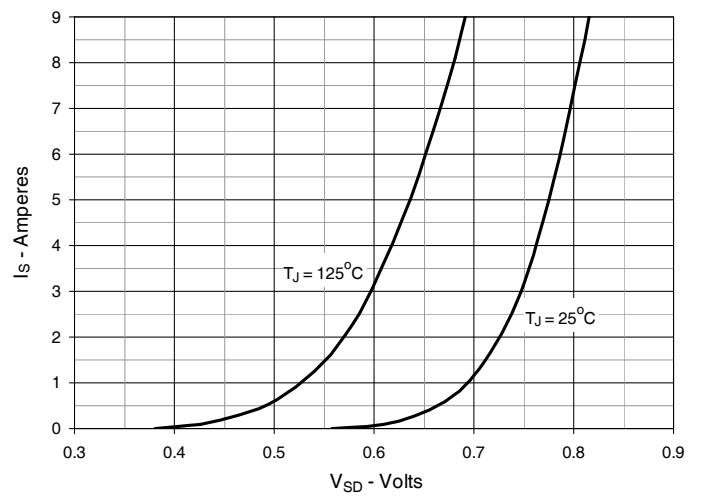
**Fig. 8. Input Admittance**



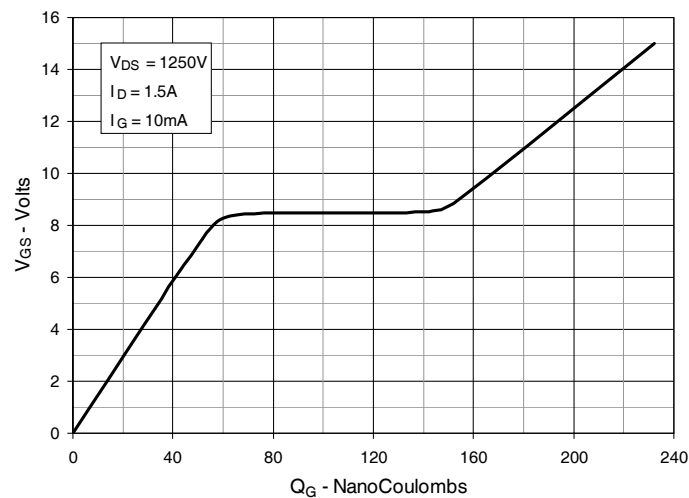
**Fig. 9. Transconductance**



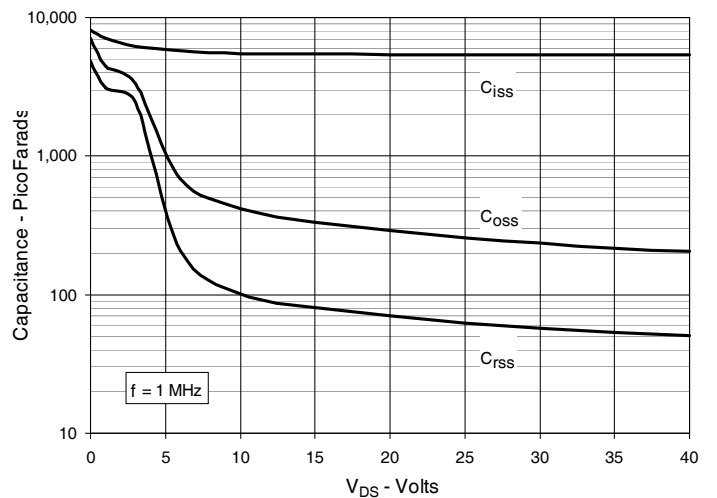
**Fig. 10. Forward Voltage Drop of Intrinsic Diode**



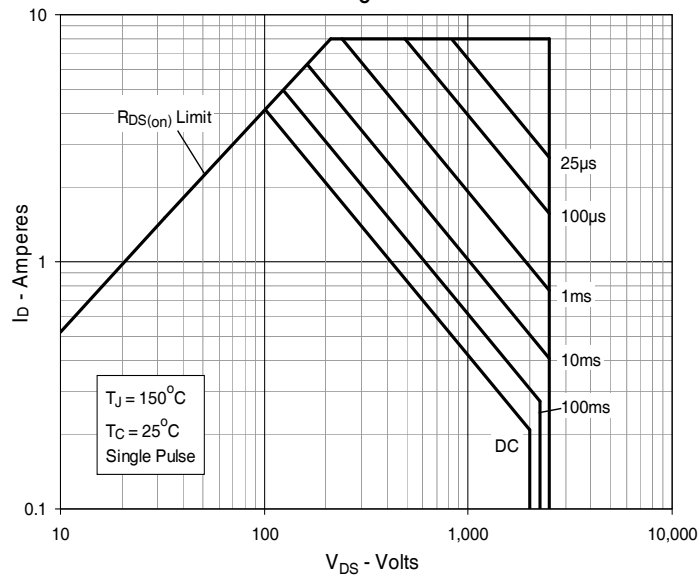
**Fig. 11. Gate Charge**



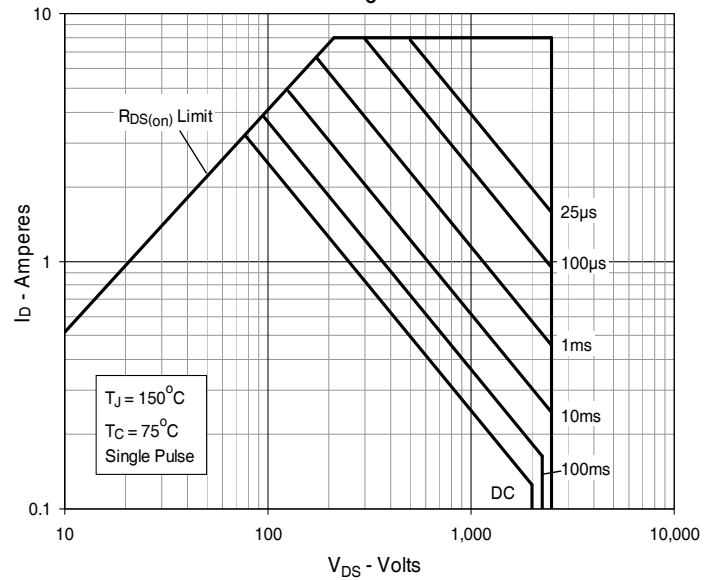
**Fig. 12. Capacitance**



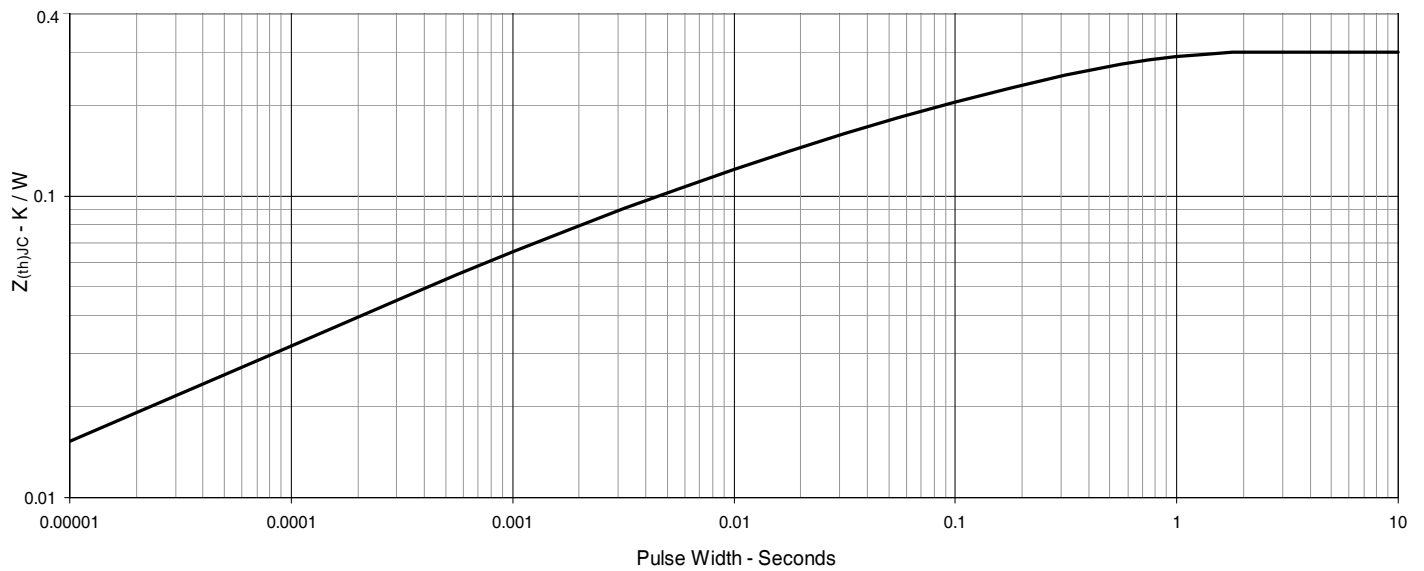
**Fig. 13. Forward-Bias Safe Operating Area**  
@  $T_C = 25^\circ\text{C}$



**Fig. 14. Forward-Bias Safe Operating Area**  
@  $T_C = 75^\circ\text{C}$



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





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