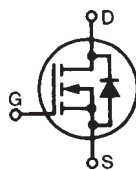


## High Voltage Power MOSFETs

**IXTA02N250**  
**IXTH02N250**  
**IXTV02N250S**

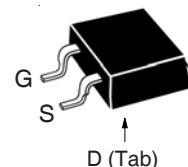
$V_{DSS} = 2500V$   
 $I_{D25} = 200mA$   
 $R_{DS(on)} \leq 450\Omega$

N-Channel Enhancement Mode  
Fast Intrinsic Diode

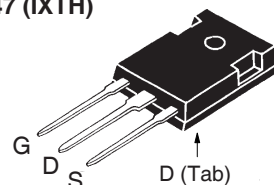


| Symbol     | Test Conditions                                           | Maximum Ratings   |            |
|------------|-----------------------------------------------------------|-------------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $150^\circ C$                       | 2500              | 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          |
| $I_{D25}$  | $T_C = 25^\circ C$                                        | 200               | mA         |
| $I_{DM}$   | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$      | 600               | mA         |
| $P_D$      | $T_C = 25^\circ C$                                        | 83                | W          |
| $T_J$      |                                                           | - 55 ... +150     | $^\circ C$ |
| $T_{JM}$   |                                                           | 150               | $^\circ C$ |
| $T_{stg}$  |                                                           | - 55 ... +150     | $^\circ C$ |
| $T_L$      | 1.6mm (0.062 in.) from Case for 10s                       | 300               | $^\circ C$ |
| $T_{SOLD}$ | Plastic Body for 10s                                      | 260               | $^\circ C$ |
| $M_d$      | Mounting Torque (TO-247)                                  | 1.13 / 10         | Nm/lb.in   |
| $F_c$      | Mounting Force (PLUS220 & TO-263)                         | 11..65 / 25..14.6 | N/lb.      |
| Weight     | TO-263                                                    | 2.5               | g          |
|            | PLUS220                                                   | 4.0               | g          |
|            | TO-247                                                    | 6.0               | g          |

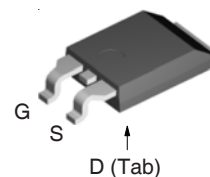
TO-263 (IXTA)



TO-247 (IXTH)



PLUS220SMD (IXTV\_S)



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

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                          |
|--------------|-----------------------------------------------------------------------|-----------------------|------|--------------------------|
|              |                                                                       | Min.                  | Typ. | Max.                     |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                      | 2500                  |      | V                        |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\mu A$                                  | 2.5                   |      | 4.5 V                    |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                    |                       |      | $\pm 100$ nA             |
| $I_{DSS}$    | $V_{DS} = 0.8 \cdot V_{DSS}$<br>$T_J = 125^\circ C$                   |                       |      | 5 $\mu A$<br>500 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 50mA$ , Note 1                                |                       |      | 450 $\Omega$             |

### Features

- Fast Intrinsic Diode
- Low Package Inductance

### Advantages

- Easy to Mount
- Space Savings

### Applications

- High Voltage Power Supplies
- Capacitor Discharge
- Pulse Circuits

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                                                                          | Characteristic Values |      |                        |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|------------------------|
|              |                                                                                                                                                      | Min.                  | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 100\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                                                                                          | 88                    | 145  | mS                     |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                                     |                       | 116  | pF                     |
| $C_{oss}$    |                                                                                                                                                      |                       | 8    | pF                     |
| $C_{rss}$    |                                                                                                                                                      |                       | 3    | 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>$R_G = 100\Omega$ (External) |                       | 19   | ns                     |
| $t_r$        |                                                                                                                                                      |                       | 19   | ns                     |
| $t_{d(off)}$ |                                                                                                                                                      |                       | 32   | ns                     |
| $t_f$        |                                                                                                                                                      |                       | 33   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                                                                     |                       | 7.4  | nC                     |
| $Q_{gs}$     |                                                                                                                                                      |                       | 0.7  | nC                     |
| $Q_{gd}$     |                                                                                                                                                      |                       | 5.3  | nC                     |
| $R_{thJC}$   |                                                                                                                                                      |                       |      | 1.5 $^\circ\text{C/W}$ |
| $R_{thCS}$   | TO-247 & PLUS220                                                                                                                                     | 0.25                  |      | $^\circ\text{C/W}$     |

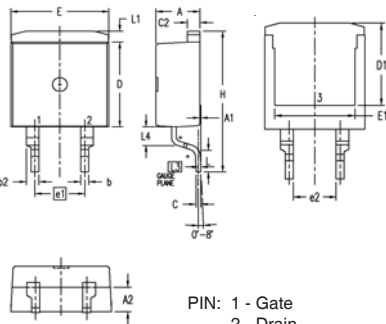
## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)    | Characteristic Values |      |               |
|----------|--------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                | Min.                  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$                                                           |                       |      | 200 mA        |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                    |                       |      | 800 mA        |
| $V_{SD}$ | $I_F = 100\text{mA}$ , $V_{GS} = 0\text{V}$ , Note 1                           |                       |      | 2.0 V         |
| $t_{rr}$ | $I_F = 200\text{mA}$ , $-di/dt = 50\text{A}/\mu\text{s}$ , $V_R = 100\text{V}$ |                       | 1.5  | $\mu\text{s}$ |

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

\*Additional provisions for lead to lead voltage isolation are required at  $V_{DS} > 1200\text{V}$ .

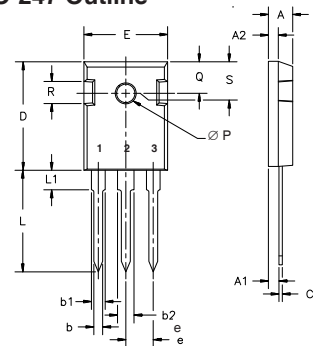
## TO-263 Outline



PIN: 1 - Gate  
2 - Drain  
3 - Source

| SYM  | INCHES |      | MILLIMETER |       |
|------|--------|------|------------|-------|
|      | MIN    | MAX  | MIN        | MAX   |
| A    | .170   | .185 | 4.30       | 4.70  |
| A1   | .000   | .008 | 0.00       | 0.20  |
| A2   | .091   | .098 | 2.30       | 2.50  |
| b    | .028   | .035 | 0.70       | 0.90  |
| b1   | .046   | .054 | 1.18       | 1.38  |
| b2   | .018   | .024 | 0.45       | 0.60  |
| C    | .018   | .024 | 0.45       | 0.60  |
| C2   | .049   | .055 | 1.25       | 1.40  |
| D    | .354   | .370 | 9.00       | 9.40  |
| D1   | .311   | .327 | 7.90       | 8.30  |
| E    | .386   | .402 | 9.80       | 10.20 |
| E1   | .307   | .323 | 7.80       | 8.20  |
| e1   | .200   | BSC  | 5.08       | BSC   |
| (e2) | .163   | .174 | 4.13       | 4.43  |
| H    | .591   | .614 | 15.00      | 15.60 |
| L    | .079   | .102 | 2.00       | 2.60  |
| L1   | .039   | .055 | 1.00       | 1.40  |
| L3   | .010   | BSC  | 0.254      | BSC   |
| (L4) | .071   | .087 | 1.80       | 2.20  |

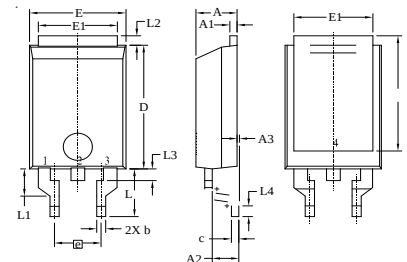
## TO-247 Outline



Terminals: 1 - Gate  
2 - Drain  
3 - Source

| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 4.7        | 5.3   | .185   | .209  |
| A1   | 2.2        | 2.54  | .087   | .102  |
| A2   | 2.2        | 2.6   | .059   | .098  |
| b    | 1.0        | 1.4   | .040   | .055  |
| b1   | 1.65       | 2.13  | .065   | .084  |
| b2   | 2.87       | 3.12  | .113   | .123  |
| C    | .4         | .8    | .016   | .031  |
| D    | 20.80      | 21.46 | .819   | .845  |
| E    | 15.75      | 16.26 | .610   | .640  |
| e    | 5.20       | 5.72  | 0.205  | 0.225 |
| L    | 19.81      | 20.32 | .780   | .800  |
| L1   |            | 4.50  |        | .177  |
| ØP   | 3.55       | 3.65  | .140   | .144  |
| Q    | 5.89       | 6.40  | 0.232  | 0.252 |
| R    | 4.32       | 5.49  | .170   | .216  |
| S    | 6.15       | BSC   | 242    | BSC   |

## PLUS220SMD Outline



1. Gate 2. Drain  
3. Source 4. Drain

| SYM | INCHES |      | MILLIMETER |       |
|-----|--------|------|------------|-------|
|     | MIN    | MAX  | MIN        | MAX   |
| A   | .169   | .185 | 4.30       | 4.70  |
| A1  | .028   | .035 | 0.70       | 0.90  |
| A2  | .098   | .118 | 2.50       | 3.00  |
| A3  | .000   | .010 | 0.00       | 0.25  |
| b   | .035   | .047 | 0.90       | 1.20  |
| b1  | .080   | .095 | 2.03       | 2.41  |
| b2  | .054   | .064 | 1.37       | 1.63  |
| c   | .028   | .035 | 0.70       | 0.90  |
| D   | .551   | .591 | 14.00      | 15.00 |
| D1  | .512   | .539 | 13.00      | 13.70 |
| E   | .394   | .433 | 10.00      | 11.00 |
| E1  | .331   | .346 | 8.40       | 8.80  |
| e   | .200   | BSC  | 5.08       | BSC   |
| L   | .209   | .228 | 5.30       | 5.80  |
| L1  | .118   | .138 | 3.00       | 3.50  |
| L2  | .035   | .051 | 0.90       | 1.30  |
| L3  | .045   | .053 | 1.25       | 1.35  |
| L4  | .039   | .059 | 1.00       | 1.50  |

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

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

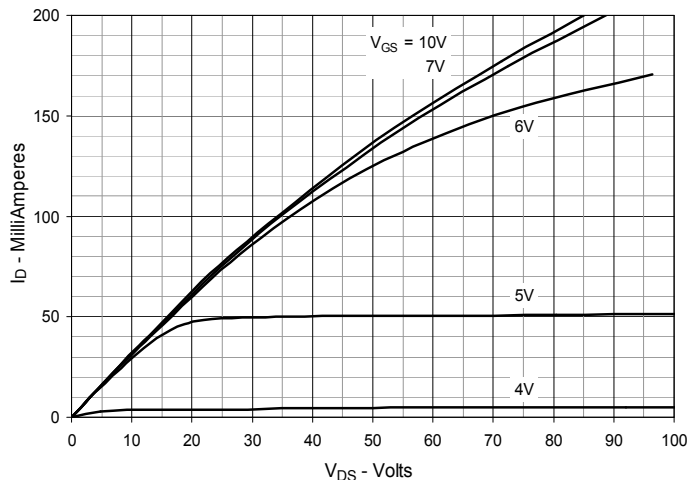


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

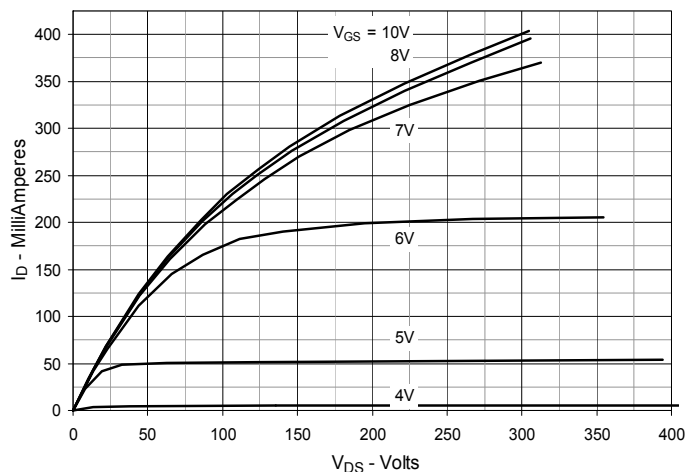


Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$

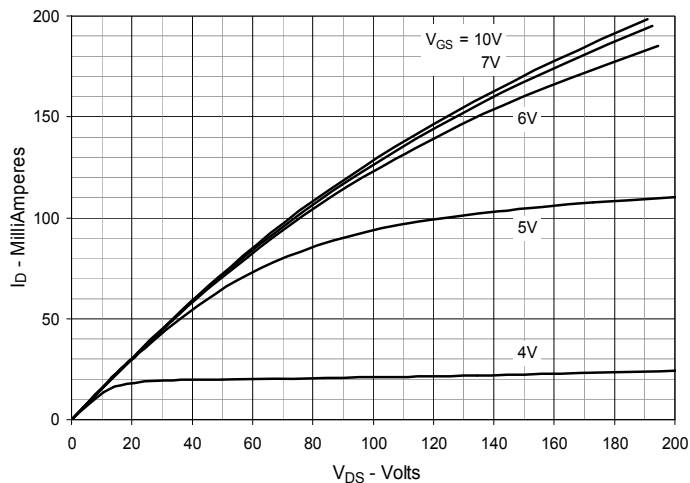


Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 100\text{mA}$  Value vs. Junction Temperature

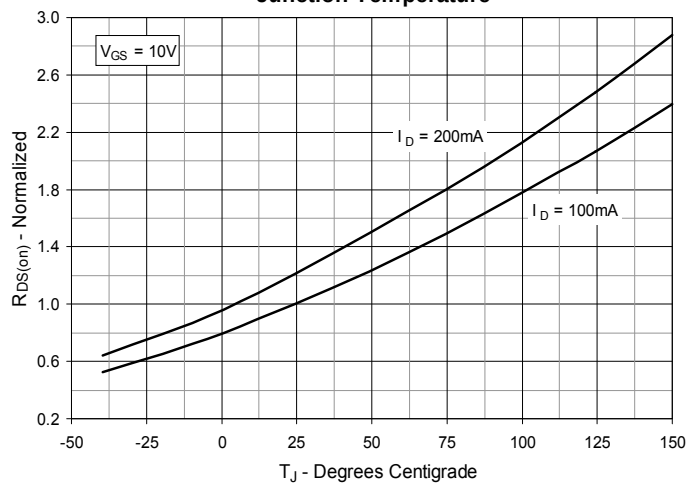


Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 100\text{mA}$  Value vs. Drain Current

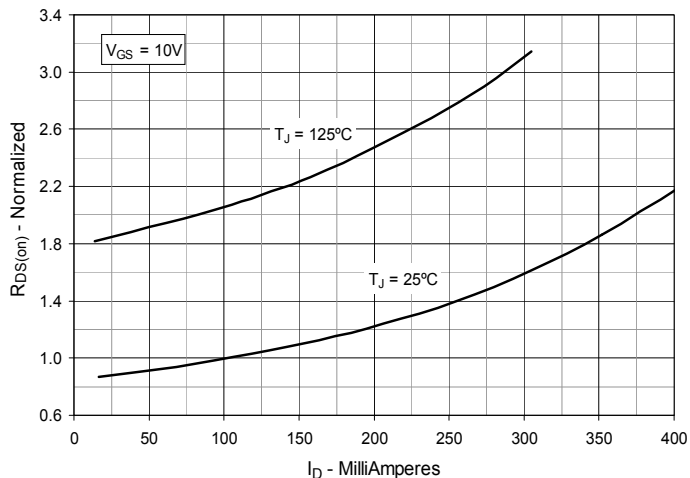


Fig. 6. Maximum Drain Current vs. Case Temperature

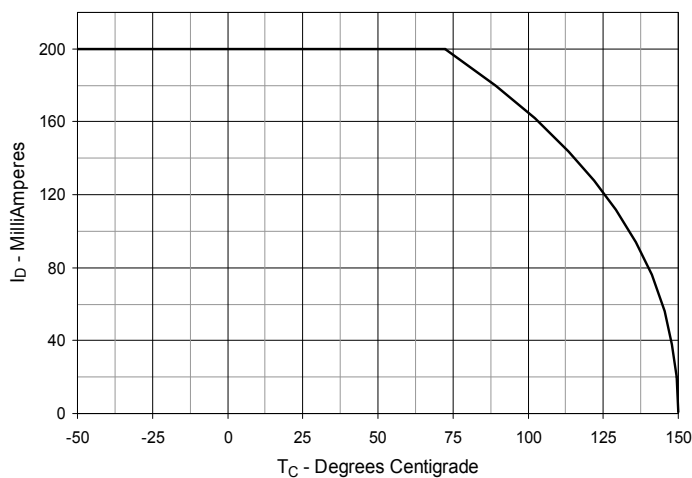


Fig. 7. Input Admittance

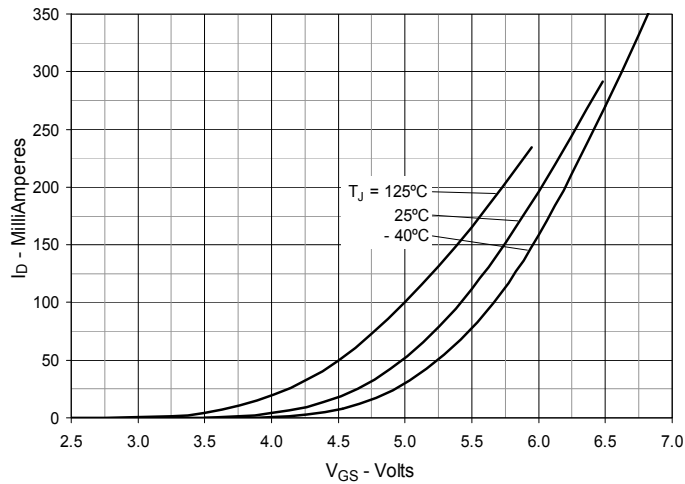


Fig. 8. Transconductance

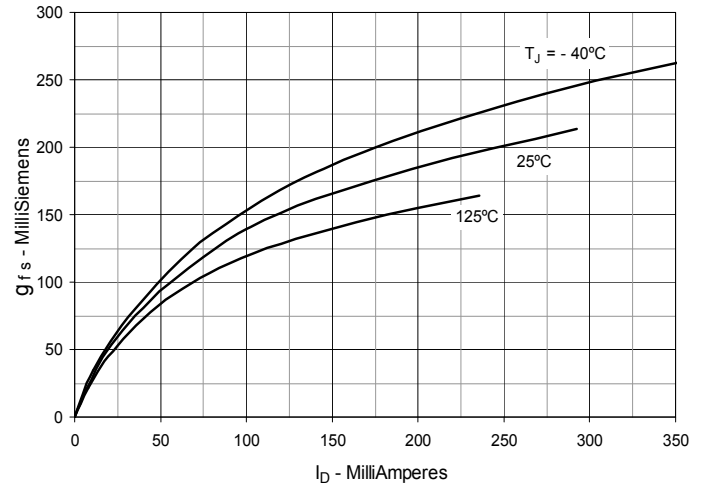


Fig. 9. Forward Voltage Drop of Intrinsic Diode

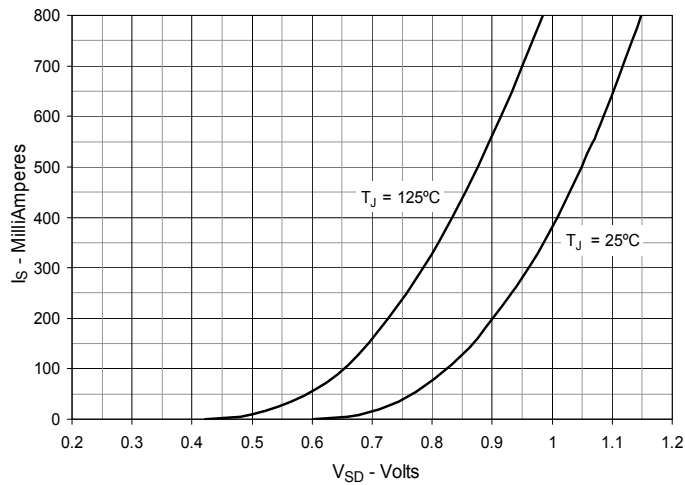


Fig. 10. Gate Charge

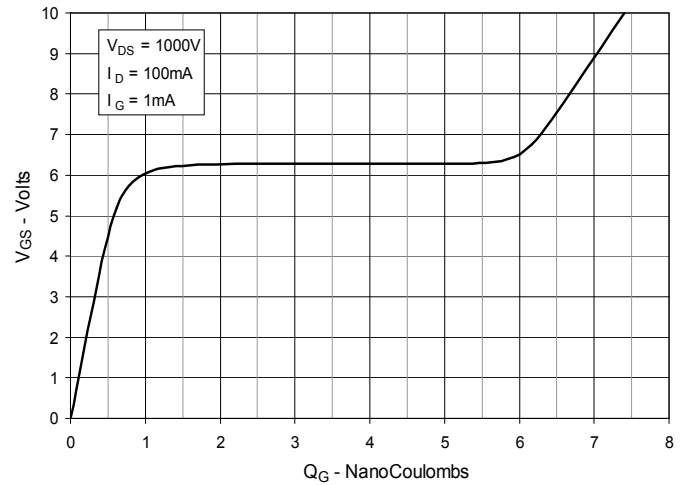


Fig. 11. Capacitance

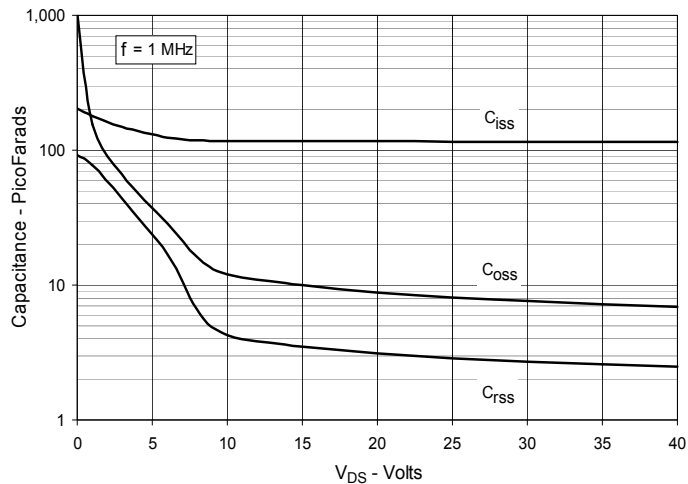


Fig. 12. Maximum Transient Thermal Impedance

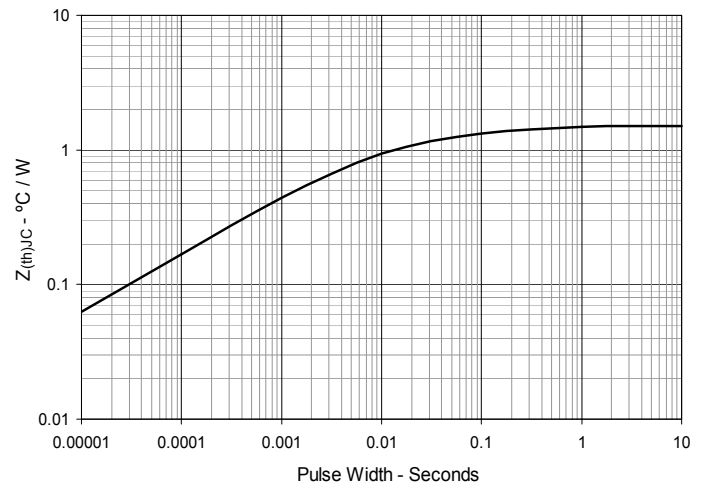


Fig. 13. Forward-Bias Safe Operating Area  
@  $T_C = 25^\circ\text{C}$

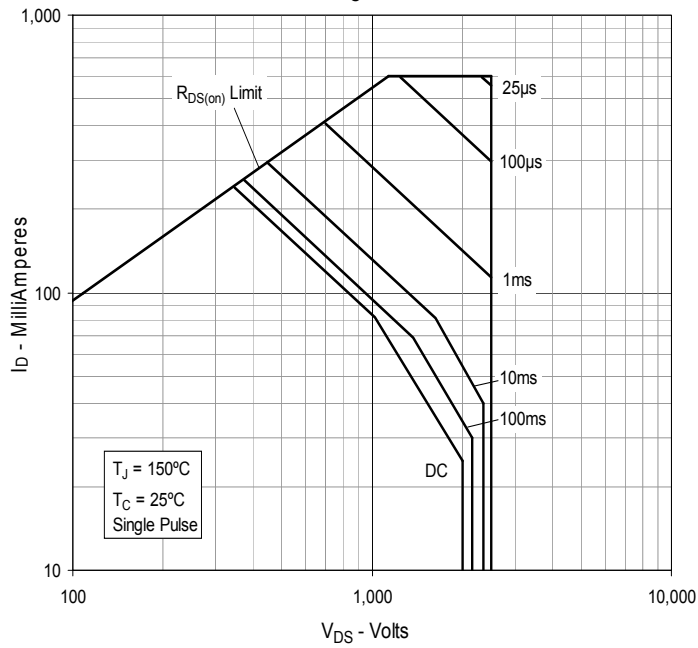


Fig. 14. Forward-Bias Safe Operating Area  
@  $T_C = 75^\circ\text{C}$

