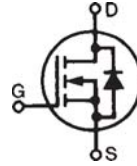


## Depletion Mode MOSFET

**IXTY1R6N100D2**  
**IXTA1R6N100D2**  
**IXTP1R6N100D2**

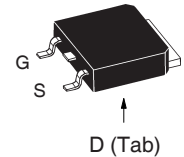
$V_{DSX} = 1000V$   
 $I_{D(on)} \geq 1.6A$   
 $R_{DS(on)} \leq 10\Omega$

## N-Channel

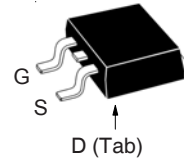


| Symbol     | Test Conditions                     | Maximum Ratings |            |
|------------|-------------------------------------|-----------------|------------|
| $V_{DSX}$  | $T_J = 25^\circ C$ to $150^\circ C$ | 1000            | V          |
| $V_{GSX}$  | Continuous                          | $\pm 20$        | V          |
| $V_{GSM}$  | Transient                           | $\pm 30$        | V          |
| $P_D$      | $T_C = 25^\circ C$                  | 100             | 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-220)            | 1.13 / 10       | Nm/lb.in.  |
| Weight     | TO-252                              | 0.35            | g          |
|            | TO-263                              | 2.50            | g          |
|            | TO-220                              | 3.00            | g          |

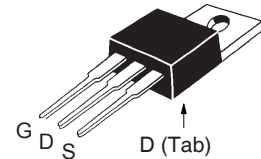
### TO-252 (IXTY)



### TO-263 AA (IXTA)



### TO-220AB (IXTP)



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.                    |
| $BV_{DSX}$     | $V_{GS} = -5V, I_D = 250\mu A$  | 1000                  |      | V                       |
| $V_{GS(off)}$  | $V_{DS} = 25V, I_D = 100\mu A$  | - 2.5                 |      | - 4.5 V                 |
| $I_{GSX}$      | $V_{GS} = \pm 20V, V_{DS} = 0V$                                       |                       |      | $\pm 100$ nA            |
| $I_{DSX(off)}$ | $V_{DS} = V_{DSX}, V_{GS} = -5V$<br>$T_J = 125^\circ C$               |                       |      | 2 $\mu A$<br>25 $\mu A$ |
| $R_{DS(on)}$   | $V_{GS} = 0V, I_D = 0.8A$ , Note 1                                    |                       |      | 10 $\Omega$             |
| $I_{D(on)}$    | $V_{GS} = 0V, V_{DS} = 50V$ , Note 1                                  | 1.6                   |      | A                       |

### Features

- Normally ON Mode
- International Standard Packages
- Molding Epoxies Meet UL 94 V-0 Flammability Classification

### Advantages

- Easy to Mount
- Space Savings
- High Power Density

### Applications

- Audio Amplifiers
- Start-Up Circuits
- Protection Circuits
- Ramp Generators
- Current Regulators
- Active Loads

| Symbol                   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)   | Characteristic Values |      |  |
|--------------------------|---|-----------------------|------|--|
|                          |   | Min.                  | Typ. | Max.   |
| $g_{fs}$                 | $V_{DS} = 30\text{V}$ , $I_D = 0.8\text{A}$ , Note 1  | 0.65                  | 1.10 | S  |
| $C_{iss}$                | $V_{GS} = -10\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$  |                       | 645  | pF   |
| $C_{oss}$                |   |                       | 43   | pF   |
| $C_{rss}$                |   |                       | 11   | pF   |
| $t_{d(on)}$              | <b>Resistive Switching Times</b><br>$V_{GS} = \pm 5\text{V}$ , $V_{DS} = 500\text{V}$ , $I_D = 0.8\text{A}$<br>$R_G = 5\Omega$ (External) |                       | 27   | ns   |
| $t_r$                    |   |                       | 65   | ns   |
| $t_{d(off)}$             |   |                       | 34   | ns   |
| $t_f$                    |   |                       | 41   | ns   |
| $Q_{g(on)}$              | $V_{GS} = 5\text{V}$ , $V_{DS} = 500\text{V}$ , $I_D = 0.8\text{A}$   |                       | 27.0 | nC   |
| $Q_{gs}$                 |   |                       | 1.6  | nC   |
| $Q_{gd}$                 |   |                       | 13.5 | nC   |
| $R_{thJC}$<br>$R_{thCS}$ | TO-220  |                       | 0.50 | $1.25^\circ\text{C/W}$<br>$^\circ\text{C/W}$ |

### Safe-Operating-Area Specification

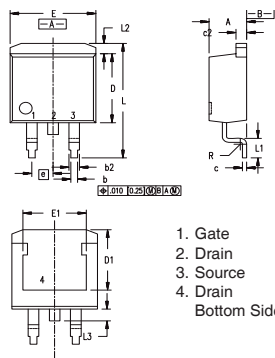
| Symbol | Test Conditions   | Characteristic Values |      |      |
|--------|---|-----------------------|------|------|
|        |   | Min.                  | Typ. | Max. |
| SOA    | $V_{DS} = 800\text{V}$ , $I_D = 75\text{mA}$ , $T_C = 75^\circ\text{C}$ , $T_p = 5\text{s}$ | 60                    |      | W    |

### Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                              | Characteristic Values |      |               |
|----------|--|-----------------------|------|---------------|
|          |  | Min.                  | Typ. | Max.          |
| $V_{SD}$ | $I_F = 1.6\text{A}$ , $V_{GS} = -10\text{V}$ , Note 1  |                       | 0.8  | 1.3 V         |
| $t_{rr}$ | $I_F = 1.6\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ , $V_{GS} = -10\text{V}$ |                       | 970  | ns            |
| $I_{RM}$ |  |                       | 9.96 | A             |
| $Q_{RM}$ |  |                       | 4.80 | $\mu\text{C}$ |

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

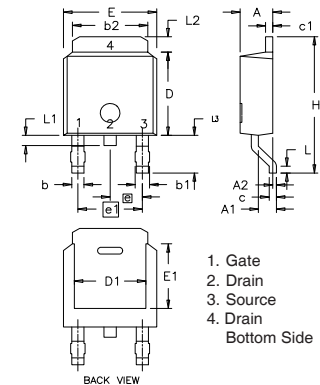
### TO-263 Outline



| Dim. | Millimeter |       | Inches |      |
|------|------------|-------|--------|------|
|      | Min.       | Max.  | Min.   | Max. |
| A    | 4.06       | 4.83  | .160   | .190 |
| b    | 0.51       | 0.99  | .020   | .039 |
| b2   | 1.14       | 1.40  | .045   | .055 |
| c    | 0.40       | 0.74  | .016   | .029 |
| c2   | 1.14       | 1.40  | .045   | .055 |
| D    | 8.64       | 9.65  | .340   | .380 |
| D1   | 8.00       | 8.89  | .280   | .320 |
| E    | 9.65       | 10.41 | .380   | .405 |
| E1   | 6.22       | 8.13  | .270   | .320 |
| e    | 2.54       | BSC   | .100   | BSC  |
| L    | 14.61      | 15.88 | .575   | .625 |
| L1   | 2.29       | 2.79  | .090   | .110 |
| L2   | 1.02       | 1.40  | .040   | .055 |
| L3   | 1.27       | 1.78  | .050   | .070 |
| L4   | 0          | 0.13  | 0      | .005 |

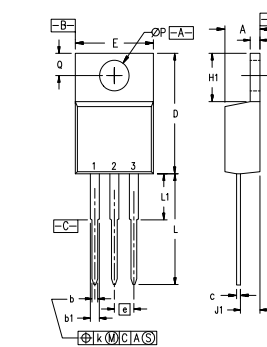
- Gate
  - Drain
  - Source
  - Drain
- Bottom Side

### TO-252 AA Outline



| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 2.19       | 2.38  | 0.086  | 0.094 |
| A1   | 0.89       | 1.14  | 0.035  | 0.045 |
| A2   | 0          | 0.13  | 0      | 0.005 |
| b    | 0.64       | 0.89  | 0.025  | 0.035 |
| b1   | 0.76       | 1.14  | 0.030  | 0.045 |
| b2   | 5.21       | 5.46  | 0.205  | 0.215 |
| c    | 0.46       | 0.58  | 0.018  | 0.023 |
| c1   | 0.46       | 0.58  | 0.018  | 0.023 |
| D    | 5.97       | 6.22  | 0.235  | 0.245 |
| D1   | 4.32       | 5.21  | 0.170  | 0.205 |
| E    | 6.35       | 6.73  | 0.250  | 0.265 |
| E1   | 4.32       | 5.21  | 0.170  | 0.205 |
| e    | 2.28       | BSC   | 0.090  | BSC   |
| e1   | 4.57       | BSC   | 0.180  | BSC   |
| H    | 9.40       | 10.42 | 0.370  | 0.410 |
| L    | 0.51       | 1.02  | 0.020  | 0.040 |
| L1   | 0.64       | 1.02  | 0.025  | 0.040 |
| L2   | 0.89       | 1.27  | 0.035  | 0.050 |
| L3   | 2.54       | 2.92  | 0.100  | 0.115 |

### TO-220 Outline



- Pins: 1 - Gate  
2 - Drain  
3 - Source

| SYM | INCHES |      | MILLIMETERS |       |
|-----|--------|------|-------------|-------|
|     | MIN    | MAX  | MIN         | MAX   |
| A   | .170   | .190 | 4.32        | 4.83  |
| b   | .025   | .040 | 0.64        | 1.02  |
| b1  | .045   | .065 | 1.15        | 1.65  |
| c   | .014   | .022 | 0.35        | 0.56  |
| D   | .580   | .630 | 14.73       | 16.00 |
| E   | .390   | .420 | 9.91        | 10.66 |
| e   | .100   | BSC  | 2.54        | BSC   |
| F   | .045   | .055 | 1.14        | 1.40  |
| H1  | .230   | .270 | 5.85        | 6.85  |
| J1  | .090   | .110 | 2.29        | 2.79  |
| k   | 0      | .015 | 0           | 0.38  |
| L   | .500   | .550 | 12.70       | 13.97 |
| L1  | .110   | .230 | 2.79        | 5.84  |
| ØP  | .139   | .161 | 3.53        | 4.08  |
| Q   | .100   | .125 | 2.54        | 3.18  |

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 | 7,157,338 B2 |
|  | 4,850,072 | 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 @  $T_J = 25^\circ\text{C}$

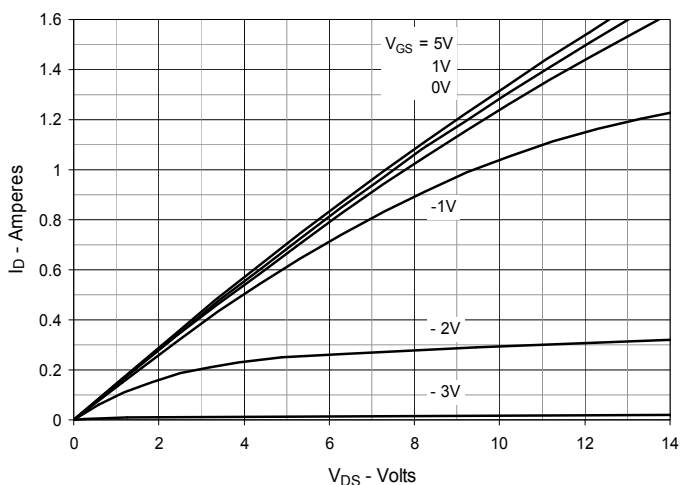


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

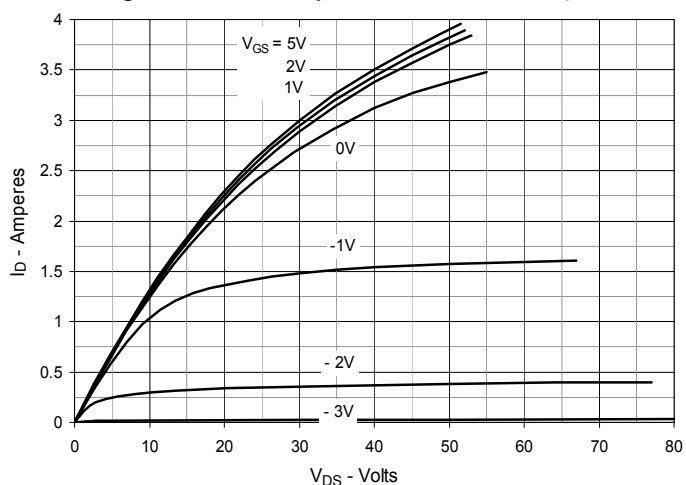


Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$

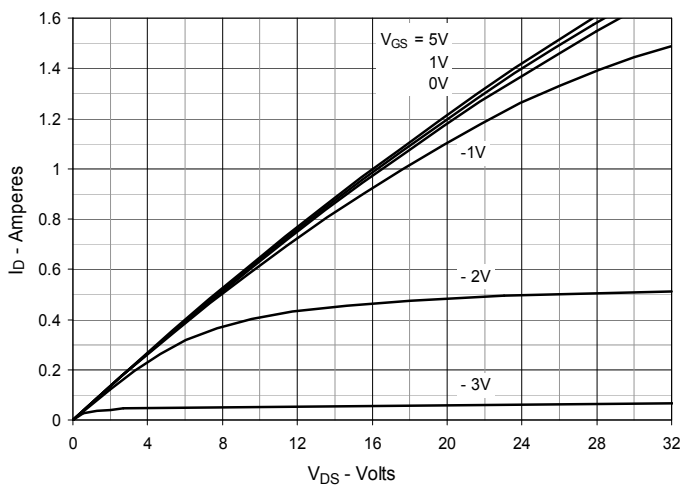


Fig. 4. Drain Current @  $T_J = 25^\circ\text{C}$

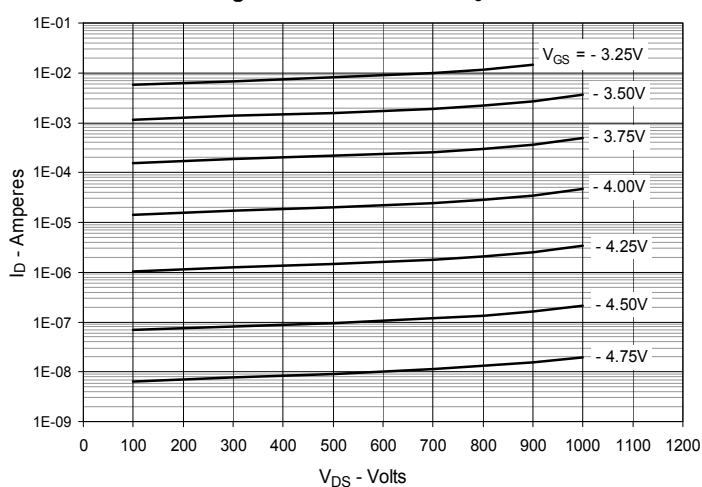


Fig. 5. Drain Current @  $T_J = 100^\circ\text{C}$

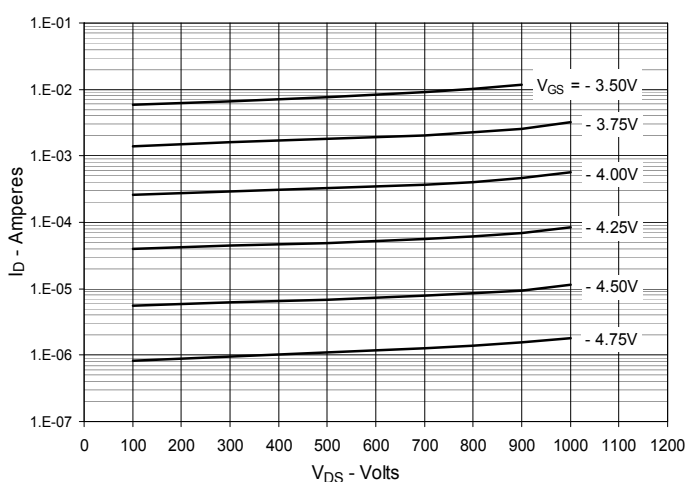
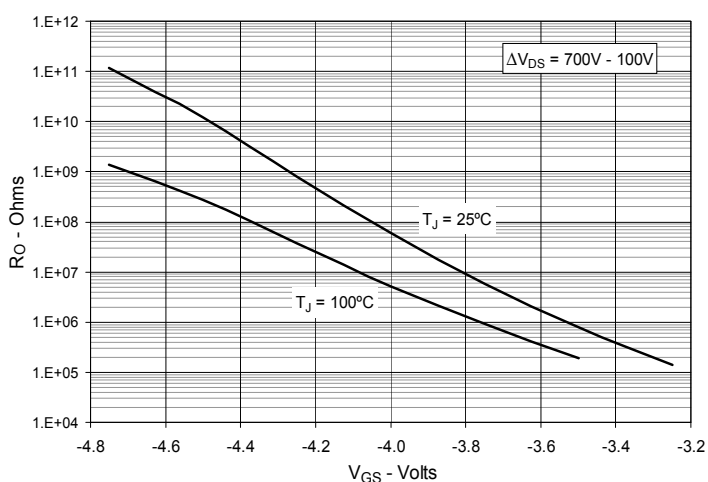
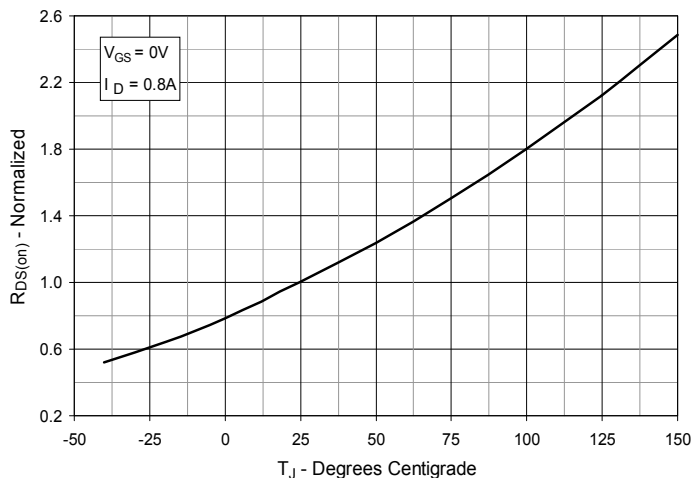


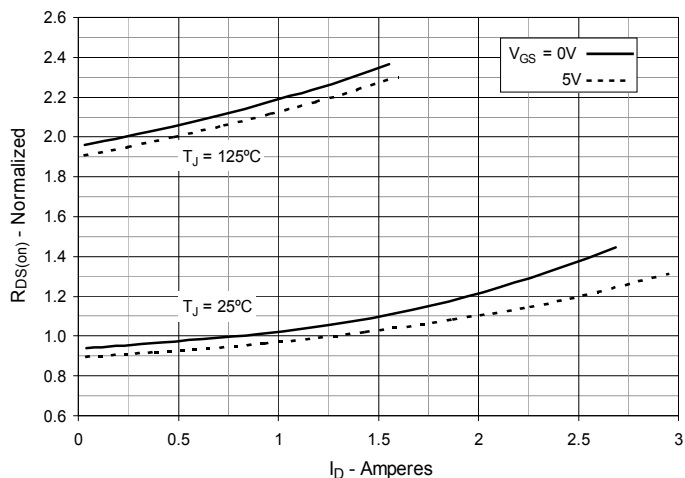
Fig. 6. Dynamic Resistance vs. Gate Voltage



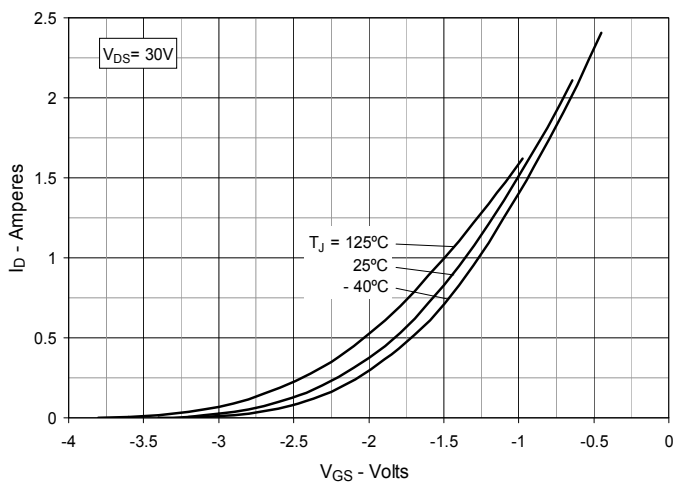
**Fig. 7. Normalized  $R_{DS(on)}$  vs. Junction Temperature**



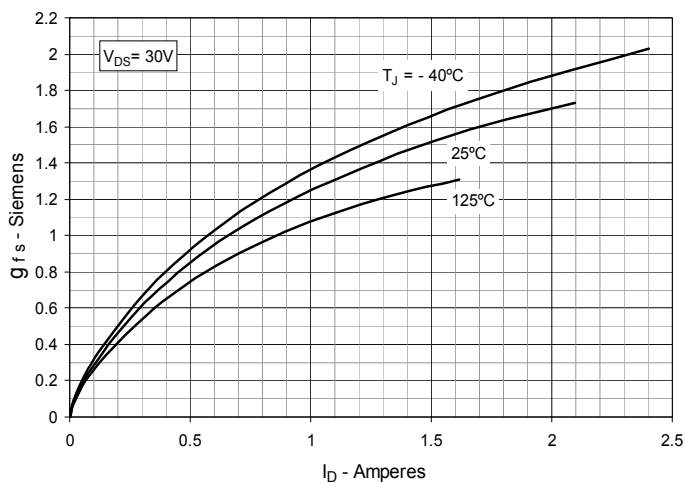
**Fig. 8.  $R_{DS(on)}$  Normalized to  $I_D = 0.8A$  Value vs. Drain Current**



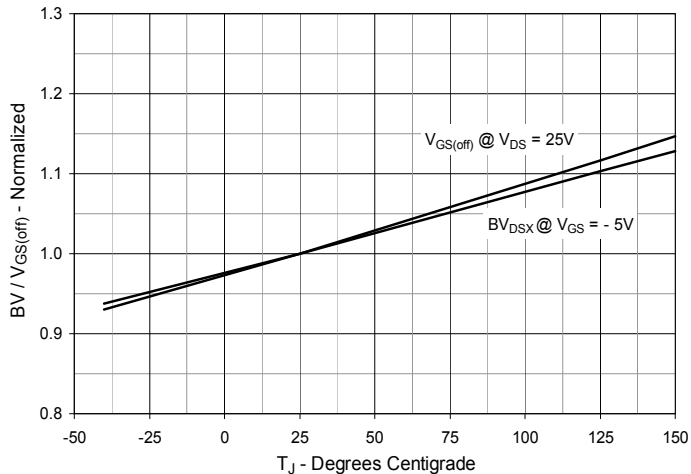
**Fig. 9. Input Admittance**



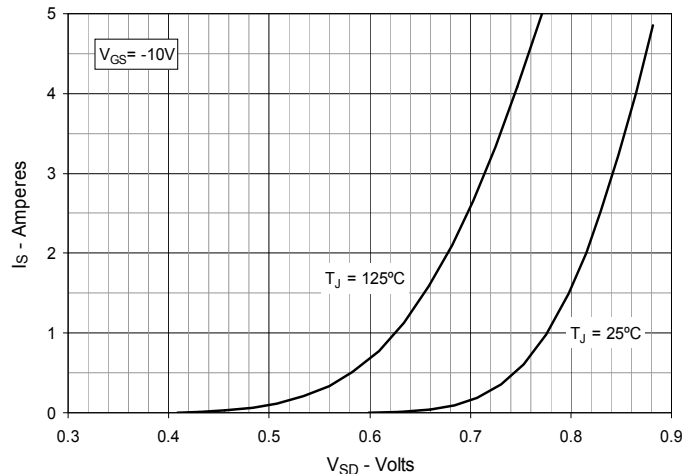
**Fig. 10. Transconductance**



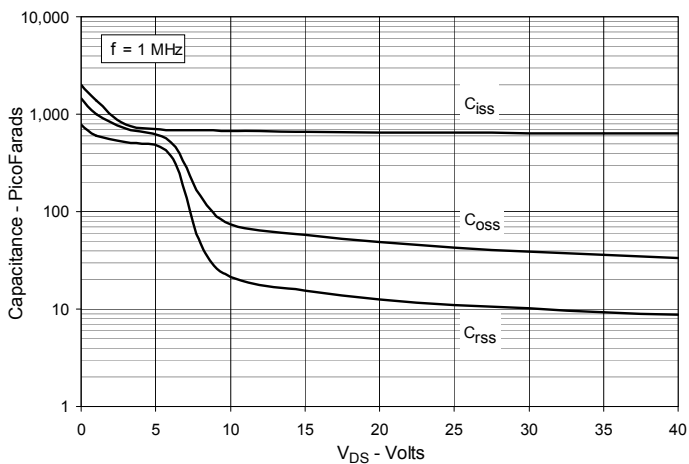
**Fig. 11. Breakdown and Threshold Voltages vs. Junction Temperature**



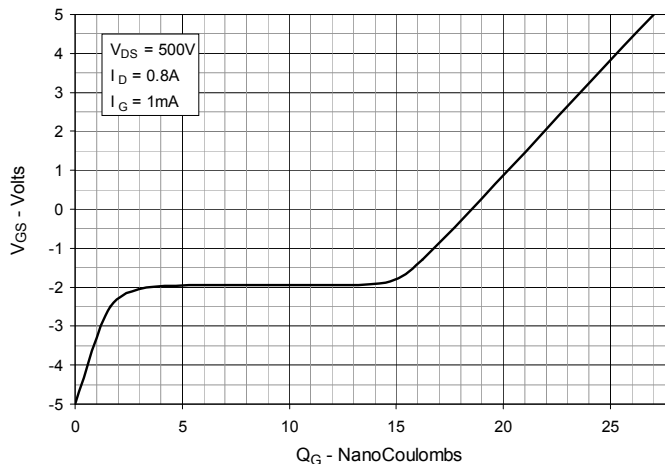
**Fig. 12. Forward Voltage Drop of Intrinsic Diode**



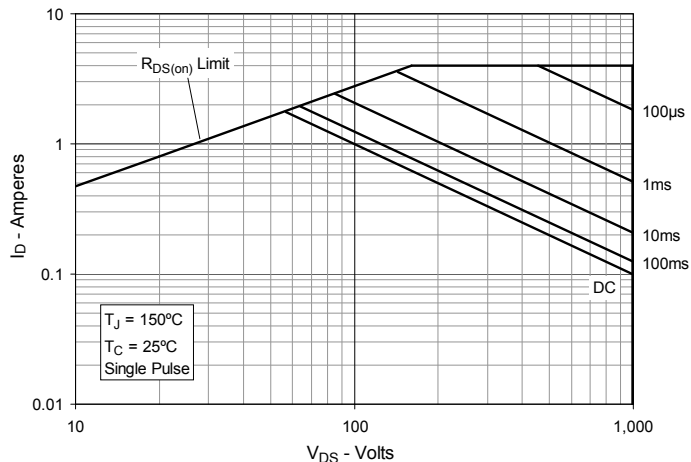
**Fig. 13. Capacitance**



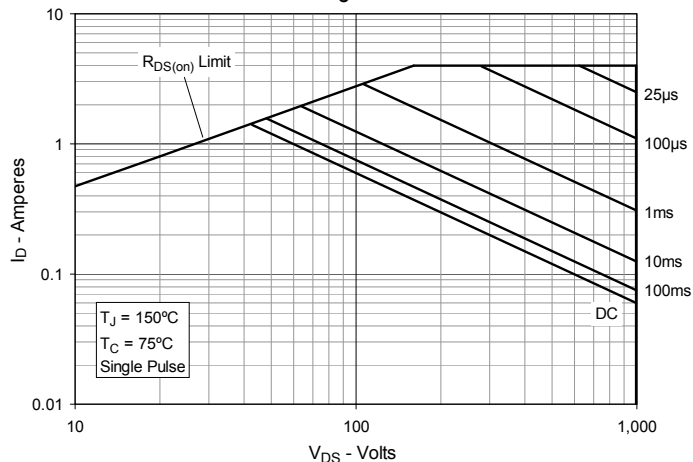
**Fig. 14. Gate Charge**



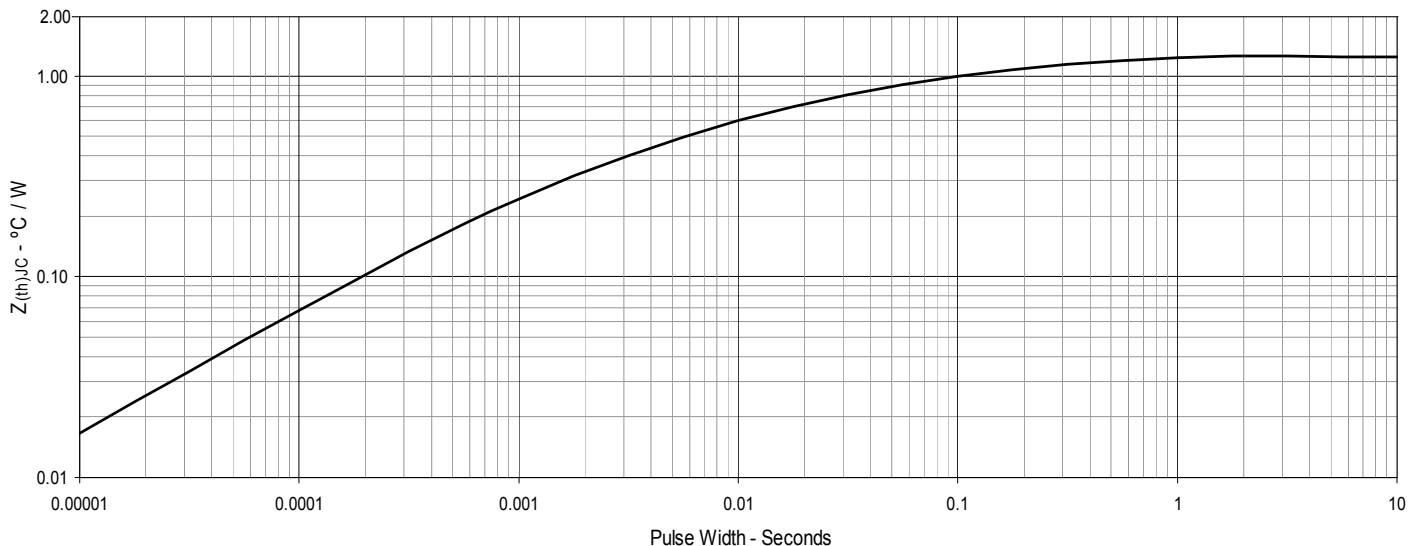
**Fig. 15. Forward-Bias Safe Operating Area @  $T_C = 25^\circ\text{C}$**



**Fig. 16. Forward-Bias Safe Operating Area @  $T_C = 75^\circ\text{C}$**



**Fig. 17. Maximum Transient Thermal Impedance**



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