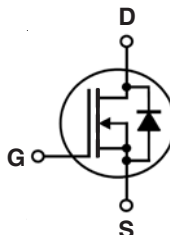


## Depletion Mode MOSFET

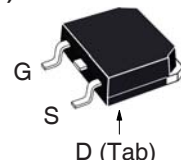
**IXTT16N10D2**  
**IXTH16N10D2**

$$\begin{aligned} V_{DSX} &= 100V \\ I_{D(on)} &\geq 16A \\ R_{DS(on)} &\leq 64m\Omega \end{aligned}$$

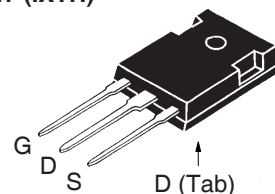
N-Channel



TO-268 (IXTT)



TO-247 (IXTH)



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

| Symbol     | Test Conditions                                                   | Maximum Ratings |                  |
|------------|-------------------------------------------------------------------|-----------------|------------------|
| $V_{DSX}$  | $T_J = 25^\circ\text{C to } 175^\circ\text{C}$                    | 100             | V                |
| $V_{DGX}$  | $T_J = 25^\circ\text{C to } 175^\circ\text{C}, R_{GS} = 1M\Omega$ | 100             | V                |
| $V_{GSX}$  | Continuous                                                        | $\pm 20$        | V                |
| $V_{GSM}$  | Transient                                                         | $\pm 30$        | V                |
| $P_D$      | $T_C = 25^\circ\text{C}$                                          | 830             | W                |
| $T_J$      |                                                                   | - 55 ... +175   | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                   | 175             | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                   | - 55 ... +175   | $^\circ\text{C}$ |
| $T_L$      | Maximum Lead Temperature for Soldering                            | 300             | $^\circ\text{C}$ |
| $T_{SOLD}$ | 1.6 mm (0.062in.) from Case for 10s                               | 260             | $^\circ\text{C}$ |
| $M_d$      | Mounting Torque (TO-247)                                          | 1.13 / 10       | Nm/lb.in         |
| Weight     | TO-268                                                            | 4               | g                |
|            | TO-247                                                            | 6               | g                |

| Symbol         | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified) | Characteristic Values |      |                          |
|----------------|-----------------------------------------------------------------------------|-----------------------|------|--------------------------|
|                |                                                                             | Min.                  | Typ. | Max.                     |
| $BV_{DSX}$     | $V_{GS} = -5V, I_D = 250\mu A$                                              | 100                   |      | V                        |
| $V_{GS(off)}$  | $V_{DS} = 25V, I_D = 4mA$                                                   | - 2.0                 |      | V                        |
| $I_{GSX}$      | $V_{GS} = \pm 20V, V_{DS} = 0V$                                             |                       |      | $\pm 100$ nA             |
| $I_{DSX(off)}$ | $V_{DS} = V_{DSX}, V_{GS} = -5V$<br>$T_J = 150^\circ\text{C}$               |                       |      | 5 $\mu A$<br>250 $\mu A$ |
| $R_{DS(on)}$   | $V_{GS} = 0V, I_D = 8A, \text{Note 1}$                                      |                       |      | 64 m $\Omega$            |
| $I_{D(on)}$    | $V_{GS} = 0V, V_{DS} = 25V, \text{Note 1}$                                  | 16                    |      | A                        |

### Features

- Normally ON Mode
- International Standard Packages
- Molding Epoxies Meet UL94 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.                                          |
| $g_{fs}$     | $V_{DS} = 20\text{V}$ , $I_D = 8\text{A}$ , Note 1                                                                                       | 7                     | 11   | S                                             |
| $C_{iss}$    | $V_{GS} = -10\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                       |                       | 5700 | pF                                            |
| $C_{oss}$    |                                                                                                                                          |                       | 1980 | pF                                            |
| $C_{rss}$    |                                                                                                                                          |                       | 940  | pF                                            |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = \pm 5\text{V}$ , $V_{DS} = 50\text{V}$ , $I_D = 8\text{A}$<br>$R_G = 3.3\Omega$ (External) |                       | 45   | ns                                            |
| $t_r$        |                                                                                                                                          |                       | 43   | ns                                            |
| $t_{d(off)}$ |                                                                                                                                          |                       | 340  | ns                                            |
| $t_f$        |                                                                                                                                          |                       | 70   | ns                                            |
| $Q_{g(on)}$  | $V_{GS} = \pm 5\text{V}$ , $V_{DS} = 50\text{V}$ , $I_D = 8\text{A}$                                                                     |                       | 225  | nC                                            |
| $Q_{gs}$     |                                                                                                                                          |                       | 22   | nC                                            |
| $Q_{gd}$     |                                                                                                                                          |                       | 126  | nC                                            |
| $R_{thJC}$   | TO-247                                                                                                                                   |                       | 0.21 | 0.18 $^\circ\text{C/W}$<br>$^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                          |                       |      |                                               |

## Safe-Operating-Area Specification

| Symbol | Test Conditions                                                                             | Characteristic Values |      |      |
|--------|---------------------------------------------------------------------------------------------|-----------------------|------|------|
|        |                                                                                             | Min.                  | Typ. | Max. |
| SOA    | $V_{DS} = 100\text{V}$ , $I_D = 5.6\text{A}$ , $T_C = 75^\circ\text{C}$ , $t_p = 5\text{s}$ | 556                   |      | W    |

## Source-Drain Diode

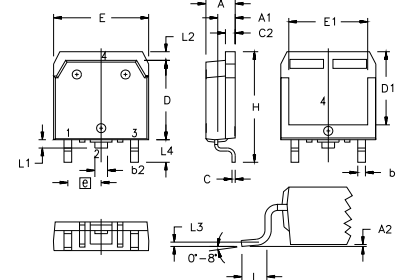
| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                            | Characteristic Values |      |               |
|----------|--------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                                        | Min.                  | Typ. | Max.          |
| $V_{SD}$ | $I_F = 16\text{A}$ , $V_{GS} = -10\text{V}$ , Note 1                                                   |                       | 0.80 | 1.30 V        |
| $t_{rr}$ | $I_F = 8\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ , $V_{GS} = -10\text{V}$ |                       | 205  | ns            |
| $I_{RM}$ |                                                                                                        |                       | 8.50 | A             |
| $Q_{RM}$ |                                                                                                        |                       | 0.88 | $\mu\text{C}$ |

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

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 | 4,931,844 | 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 |
|                                                                                  | 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    |             |

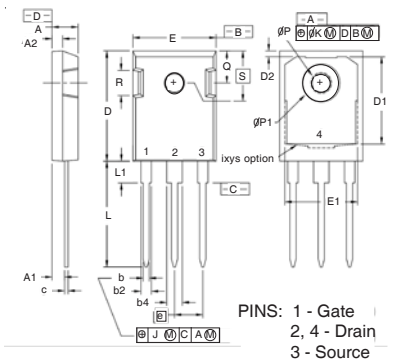
## TO-268 Outline



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

| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .193     | .201 | 4.90        | 5.10  |
| A1  | .106     | .114 | 2.70        | 2.90  |
| A2  | .001     | .010 | 0.02        | 0.25  |
| b   | .045     | .057 | 1.15        | 1.45  |
| b2  | .075     | .083 | 1.90        | 2.10  |
| C   | .016     | .026 | 0.40        | 0.65  |
| C2  | .057     | .063 | 1.45        | 1.60  |
| D   | .543     | .551 | 13.80       | 14.00 |
| D1  | .488     | .500 | 12.40       | 12.70 |
| E   | .624     | .632 | 15.85       | 16.05 |
| E1  | .524     | .535 | 13.30       | 13.60 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| H   | .736     | .752 | 18.70       | 19.10 |
| L   | .094     | .106 | 2.40        | 2.70  |
| L1  | .047     | .055 | 1.20        | 1.40  |
| L2  | .039     | .045 | 1.00        | 1.15  |
| L3  | .010 BSC |      | 0.25 BSC    |       |
| L4  | .150     | .161 | 3.80        | 4.10  |

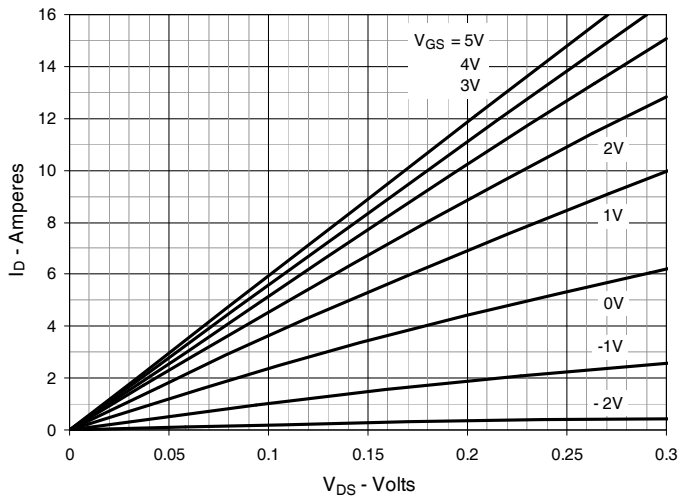
## TO-247 Outline



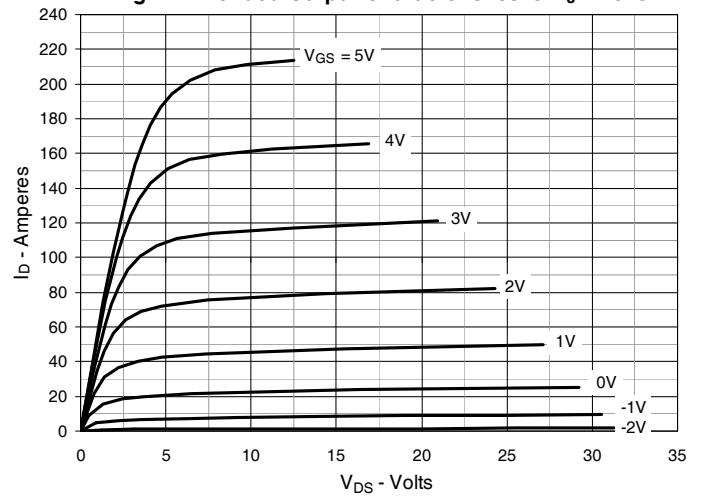
PINS: 1 - Gate  
2, 4 - Drain  
3 - Source

| 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  |
| b2  | .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  | .545     | .565 | 13.84       | 14.35 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| J   | --       | .010 | --          | 0.25  |
| K   | --       | .025 | --          | 0.64  |
| L   | .780     | .810 | 19.81       | 20.57 |
| L1  | .150     | .170 | 3.81        | 4.32  |
| LP  | .140     | .144 | 3.55        | 3.65  |
| ØP1 | .275     | .290 | 6.99        | 7.37  |
| Q   | .220     | .244 | 5.59        | 6.20  |
| R   | .170     | .190 | 4.32        | 4.83  |
| S   | .242 BSC |      | 6.15 BSC    |       |

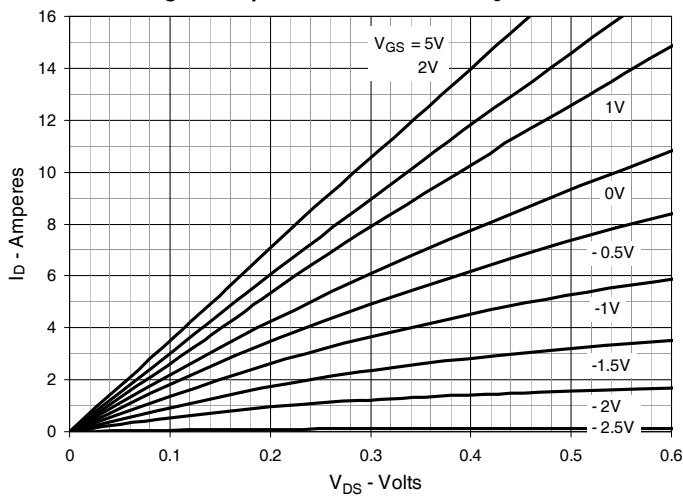
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



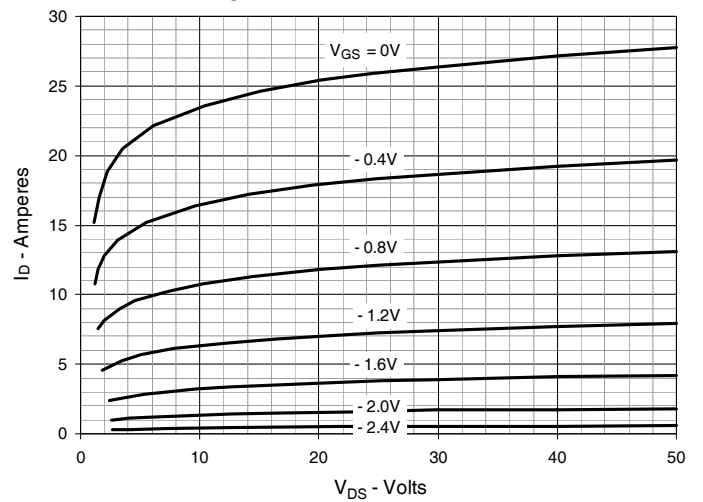
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



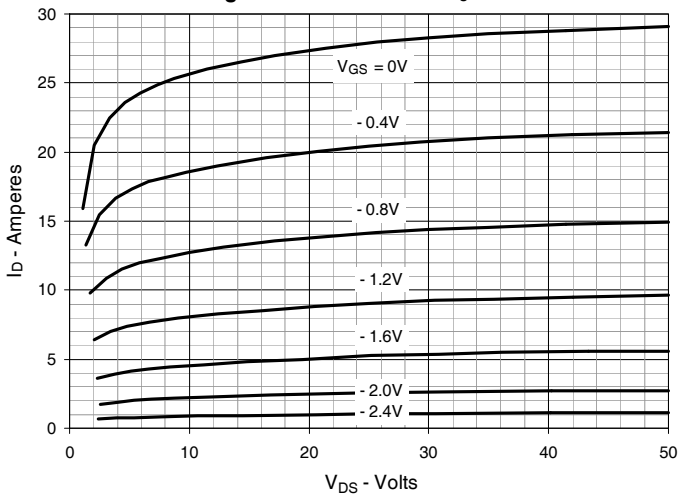
**Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$**



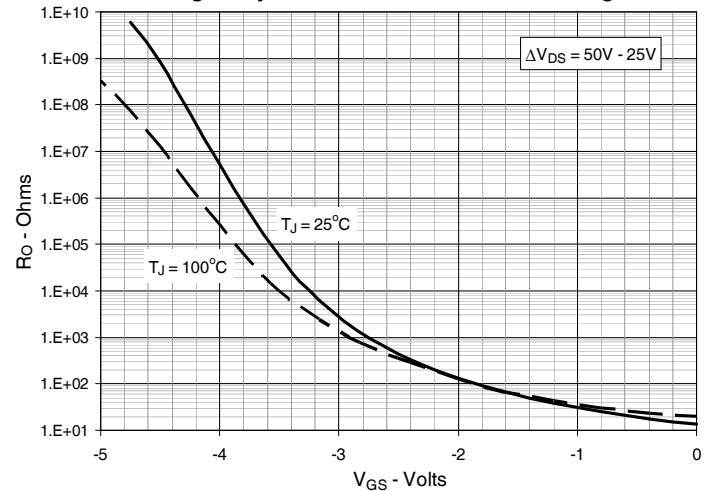
**Fig. 4. Drain Current @  $T_J = 25^\circ\text{C}$**



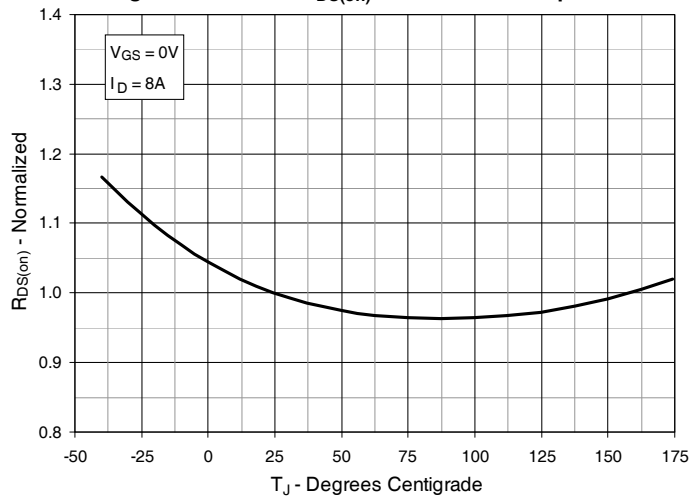
**Fig. 5. Drain Current @  $T_J = 100^\circ\text{C}$**



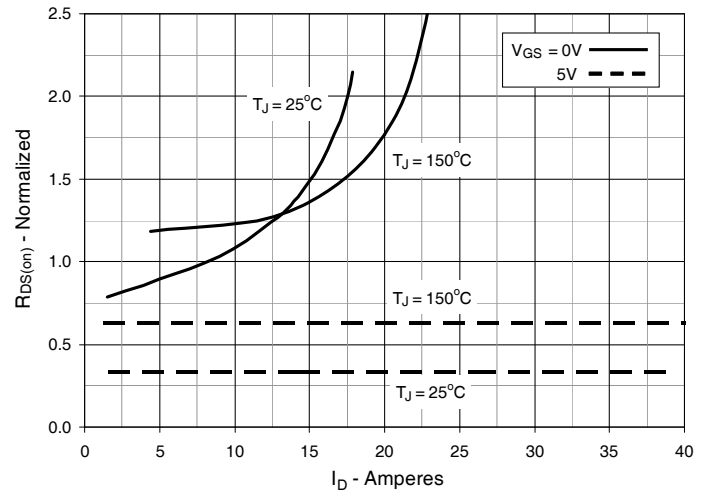
**Fig. 6. Dynamic Resistance vs. Gate Voltage**



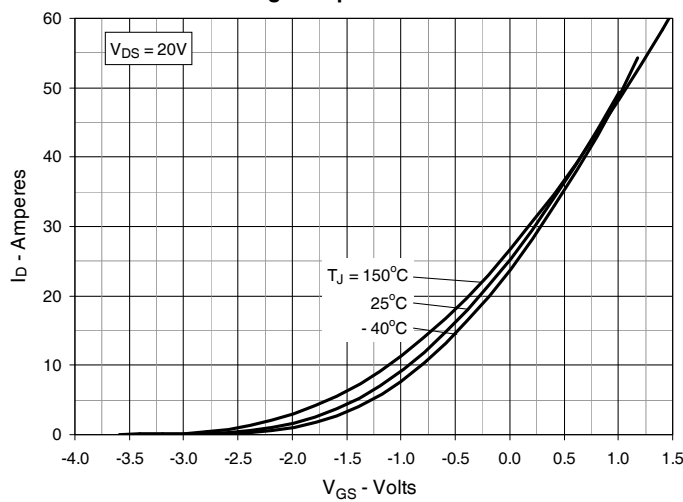
**Fig. 7. Normalized  $R_{DS(on)}$  vs. Junction Temperature**



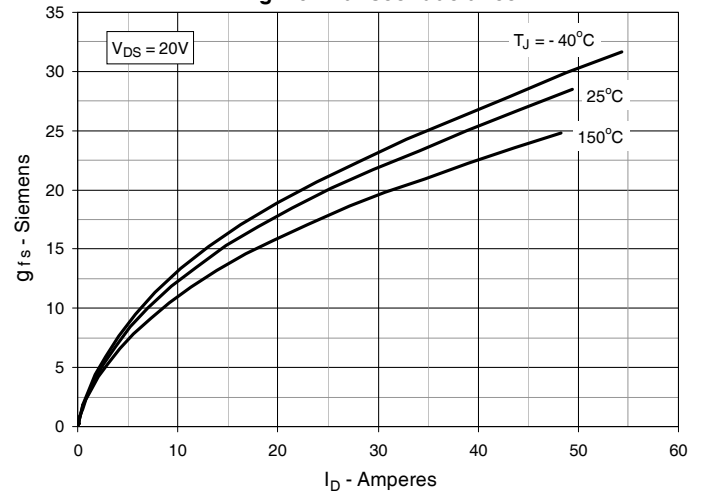
**Fig. 8.  $R_{DS(on)}$  Normalized to  $I_D = 8A$  Value vs. Drain Current**



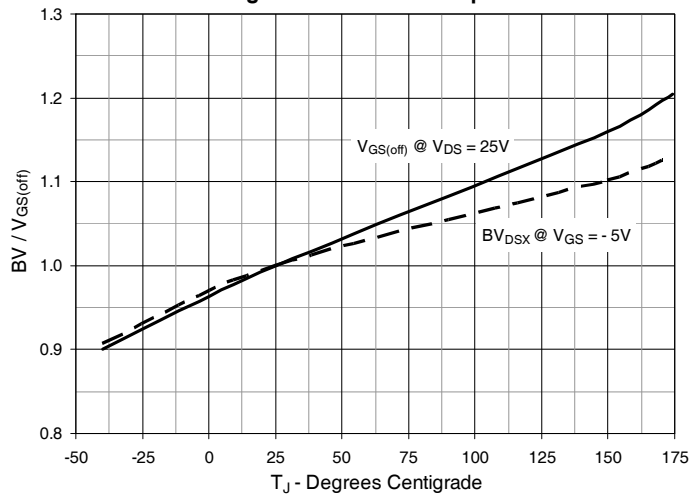
**Fig. 9. Input Admittance**



**Fig. 10. Transconductance**



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



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

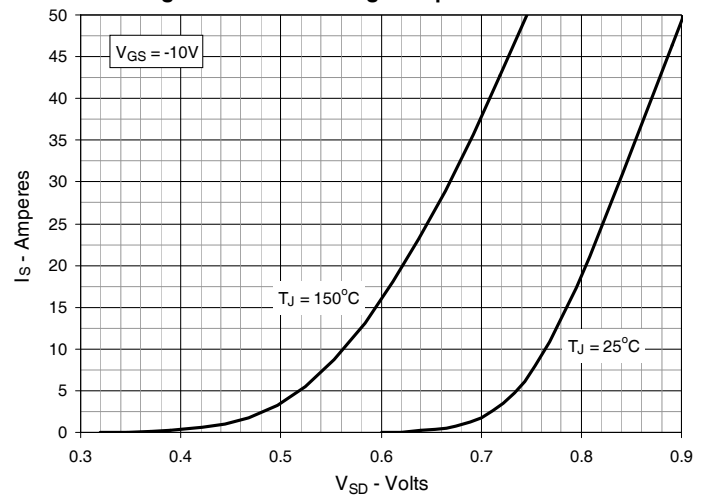


Fig. 13. Capacitance

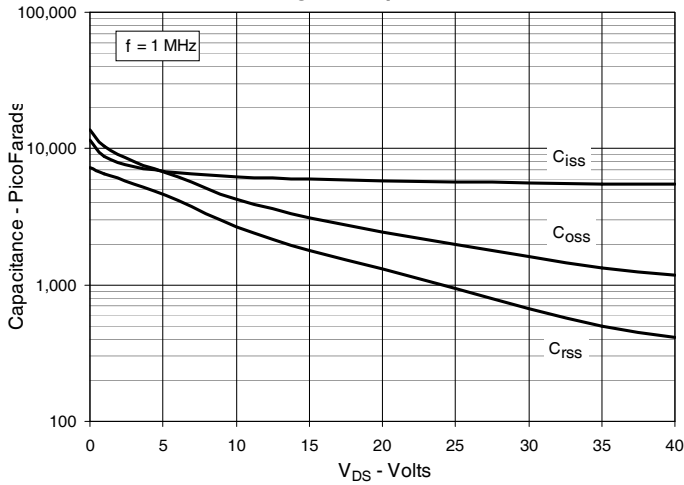


Fig. 14. Gate Charge

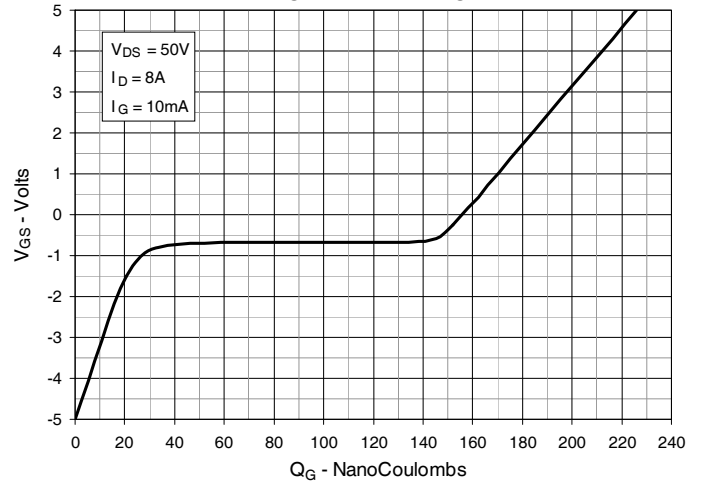


Fig. 15. Forward-Bias Safe Operating Area  
@  $T_C = 25^\circ\text{C}$

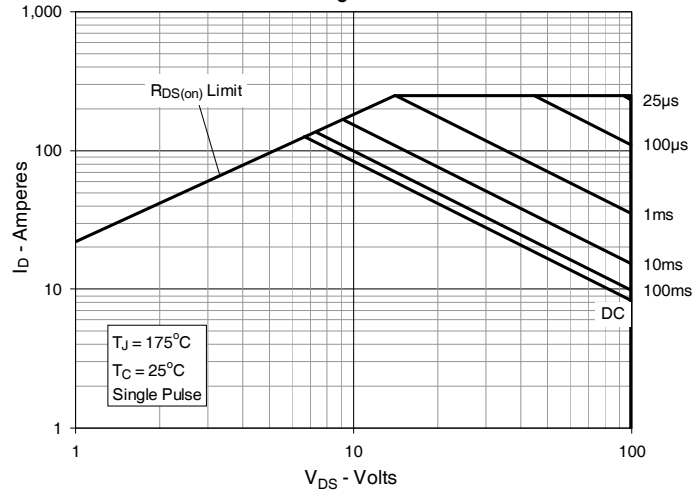


Fig. 16. Forward-Bias Safe Operating Area  
@  $T_C = 75^\circ\text{C}$

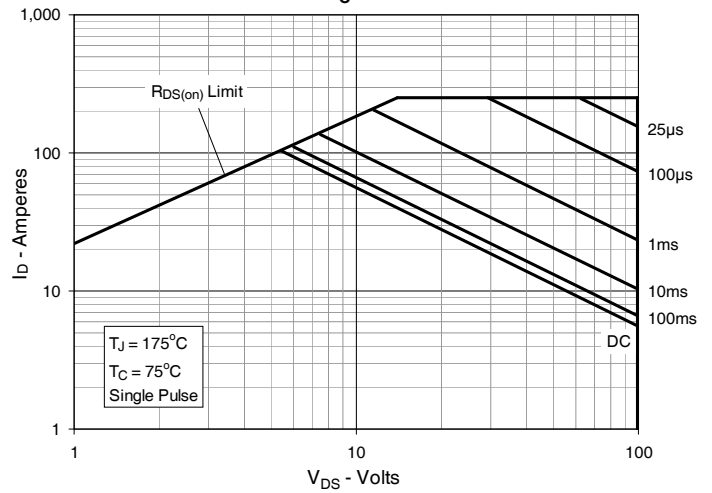
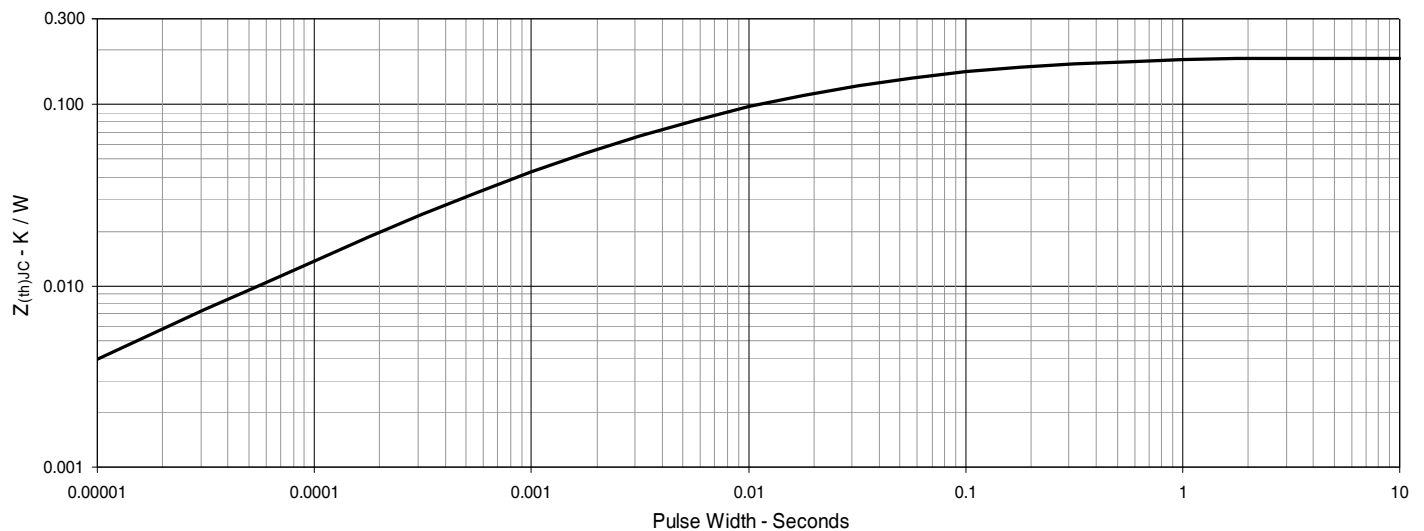


Fig. 17. Maximum Transient Thermal Impedance





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