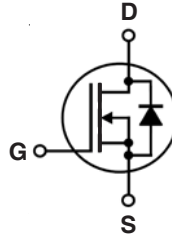


**Depletion Mode  
MOSFET**

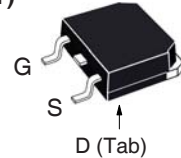
**IXTT16N20D2  
IXTH16N20D2**

**$V_{DSX} = 200V$   
 $I_{D(on)} \geq 16A$   
 $R_{DS(on)} \leq 80m\Omega$**

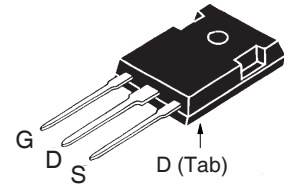
**N-Channel**



**TO-268 (IXTT)**



**TO-247 (IXTH)**



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

| Symbol        | Test Conditions   | Maximum Ratings |            |
|---------------|---|-----------------|------------|
| $V_{DSX}$     | $T_J = 25^\circ C$ to $150^\circ C$                       | 200             | V          |
| $V_{DGX}$     | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$ | 200             | V          |
| $V_{GSX}$     | Continuous  | $\pm 20$        | V          |
| $V_{GSM}$     | Transient   | $\pm 30$        | V          |
| $P_D$         | $T_C = 25^\circ C$  | 695             | 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-247)                                  | 1.13 / 10       | Nm/lb.in.  |
| <b>Weight</b> | TO-268  | 4               | g          |
|               | TO-247  | 6               | g          |

| Symbol         | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                          |
|----------------|---|-----------------------|------|--------------------------|
|                |   | Min.                  | Typ. | Max.                     |
| $BV_{DSX}$     | $V_{GS} = -5V$ , $I_D = 250\mu A$                                     | 200                   |      | 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>$T_J = 125^\circ C$            |                       |      | 5 $\mu A$<br>100 $\mu A$ |
| $R_{DS(on)}$   | $V_{GS} = 0V$ , $I_D = 8A$ , Note 1                                   |                       |      | 80 m $\Omega$            |
| $I_{D(on)}$    | $V_{GS} = 0V$ , $V_{DS} = 25V$ , Note 1                               | 16                    |      | 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.                    |
| $g_{fs}$     | $V_{DS} = 20\text{V}$ , $I_D = 8\text{A}$ , Note 1  | 7                     | 12   | S                       |
| $C_{iss}$    | $V_{GS} = -10\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$  |                       | 5500 | pF                      |
| $C_{oss}$    |   |                       | 1360 | pF                      |
| $C_{rss}$    |   |                       | 607  | pF                      |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = \pm 5\text{V}$ , $V_{DS} = 100\text{V}$ , $I_D = 8\text{A}$<br>$R_G = 3.3\Omega$ (External) |                       | 46   | ns                      |
| $t_r$        |   |                       | 130  | ns                      |
| $t_{d(off)}$ |   |                       | 270  | ns                      |
| $t_f$        |   |                       | 135  | ns                      |
| $Q_{g(on)}$  | $V_{GS} = \pm 5\text{V}$ , $V_{DS} = 100\text{V}$ , $I_D = 8\text{A}$   |                       | 208  | nC                      |
| $Q_{gs}$     |   |                       | 28   | nC                      |
| $Q_{gd}$     |   |                       | 110  | nC                      |
| $R_{thJC}$   | TO-247  |                       |      | 0.18 $^\circ\text{C/W}$ |
| $R_{thCS}$   |   |                       | 0.21 | $^\circ\text{C/W}$      |

### Safe-Operating-Area Specification

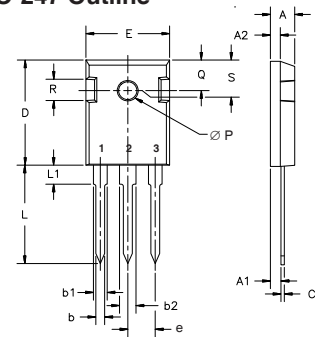
| Symbol | Test Conditions   | Characteristic Values |      |      |
|--------|---|-----------------------|------|------|
|        |   | Min.                  | Typ. | Max. |
| SOA    | $V_{DS} = 200\text{V}$ , $I_D = 2.1\text{A}$ , $T_C = 75^\circ\text{C}$ , $t_p = 5\text{s}$ | 420                   |      | 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   |                       | 0.8  | 1.3 V         |
| $t_{rr}$ | $I_F = 8\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ , $V_{GS} = -10\text{V}$ |                       | 265  | ns            |
| $I_{RM}$ |  |                       | 14.3 | A             |
| $Q_{RM}$ |  |                       | 1.9  | $\mu\text{C}$ |

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

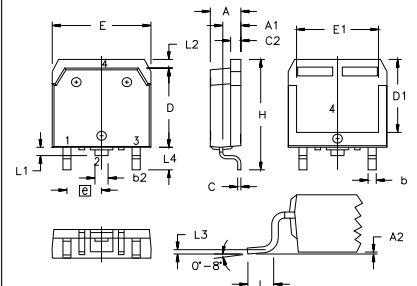
### TO-247 Outline



Terminals: 1 - Gate  
2 - Drain  
3 - Source

| Dim.           | Millimeter |       | Inches |       |
|----------------|------------|-------|--------|-------|
|                | Min.       | Max.  | Min.   | Max.  |
| A              | 4.7        | 5.3   | .185   | .209  |
| A <sub>1</sub> | 2.2        | 2.54  | .087   | .102  |
| A <sub>2</sub> | 2.2        | 2.6   | .059   | .098  |
| b              | 1.0        | 1.4   | .040   | .055  |
| b <sub>1</sub> | 1.65       | 2.13  | .065   | .084  |
| b <sub>2</sub> | 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  |
| L <sub>1</sub> |            | 4.50  |        | .177  |
| ∅P             | 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   |

### TO-268 Outline



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

| SYM            | INCHES   |      | MILLIMETERS |       |
|----------------|----------|------|-------------|-------|
|                | MIN      | MAX  | MIN         | MAX   |
| A              | .193     | .201 | 4.90        | 5.10  |
| A <sub>1</sub> | .106     | .114 | 2.70        | 2.90  |
| A <sub>2</sub> | .001     | .010 | 0.02        | 0.25  |
| b              | .045     | .057 | 1.15        | 1.45  |
| b <sub>2</sub> | .075     | .083 | 1.90        | 2.10  |
| C              | .016     | .026 | 0.40        | 0.65  |
| C <sub>2</sub> | .057     | .063 | 1.45        | 1.60  |
| D              | .543     | .551 | 13.80       | 14.00 |
| D <sub>1</sub> | .488     | .500 | 12.40       | 12.70 |
| E              | .624     | .632 | 15.85       | 16.05 |
| E <sub>1</sub> | .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  |
| L <sub>1</sub> | .047     | .055 | 1.20        | 1.40  |
| L <sub>2</sub> | .039     | .045 | 1.00        | 1.15  |
| L <sub>3</sub> | .010 BSC |      | 0.25 BSC    |       |
| L <sub>4</sub> | .150     | .161 | 3.80        | 4.10  |

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    |             |

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

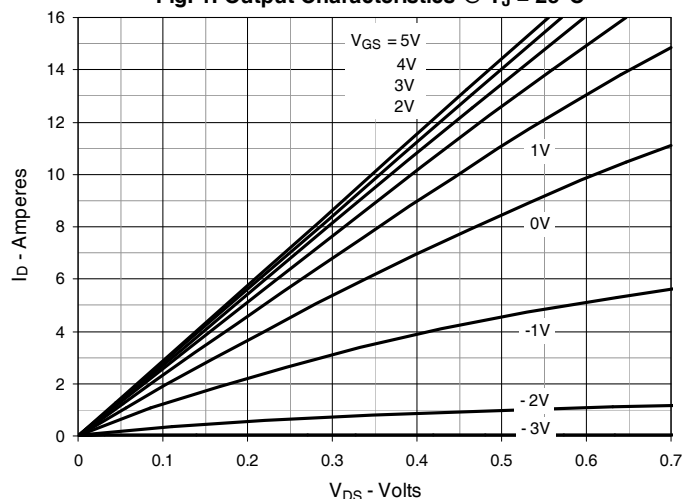


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

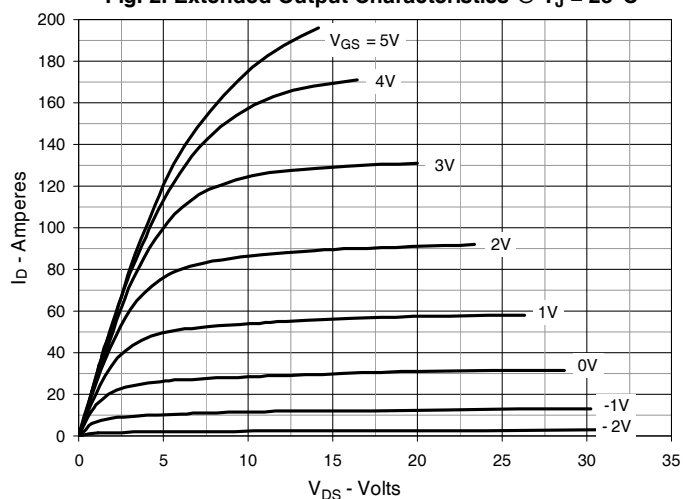


Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$

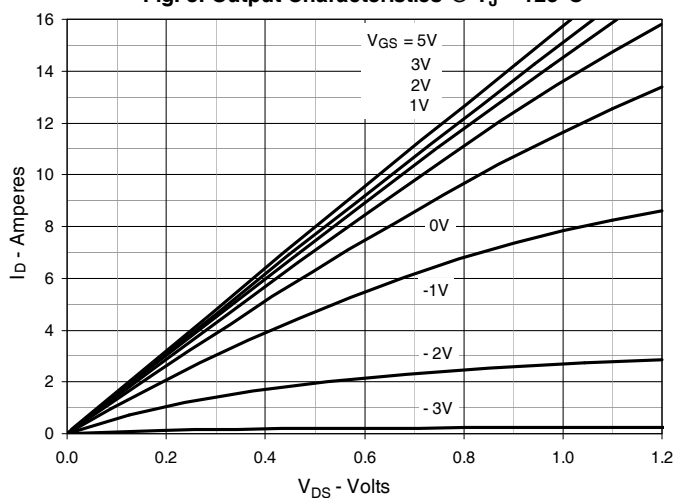


Fig. 4. Drain Current @  $T_J = 25^\circ\text{C}$

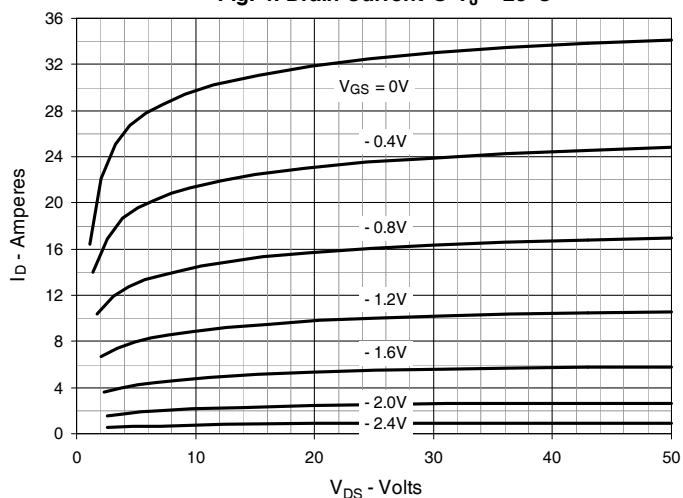


Fig. 5. Drain Current @  $T_J = 100^\circ\text{C}$

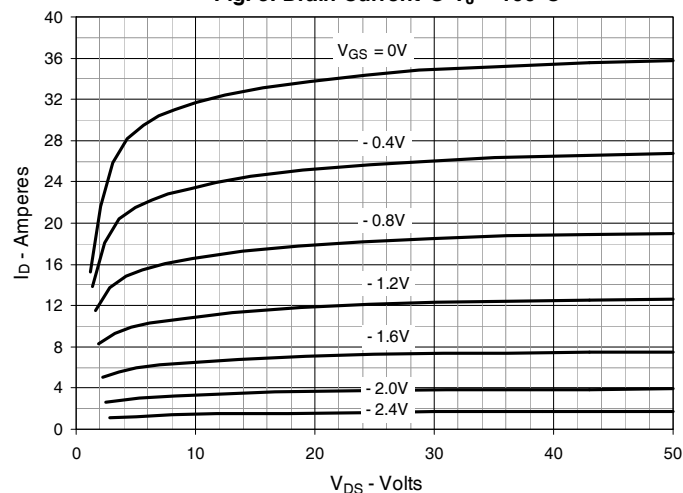


Fig. 6. Dynamic Resistance vs. Gate Voltage

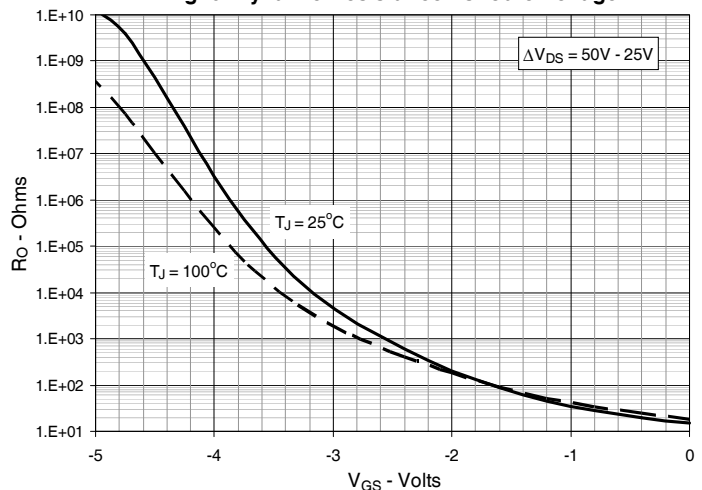


Fig. 7. Normalized  $R_{DS(on)}$  vs. Junction Temperature

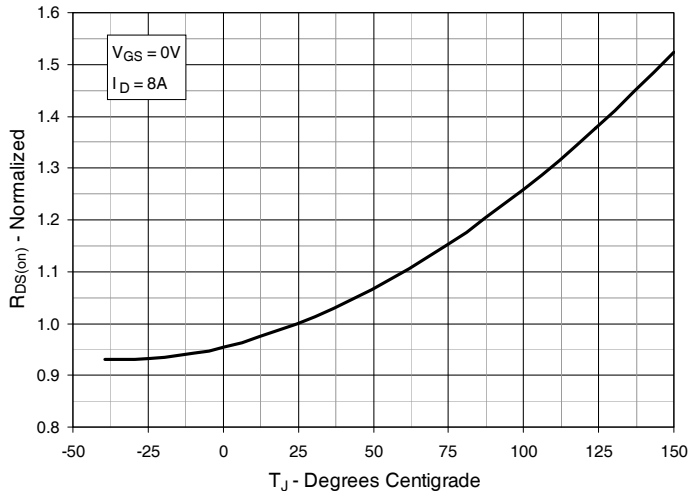


Fig. 8.  $R_{DS(on)}$  Normalized to  $I_D = 8A$  Value vs. Drain Current

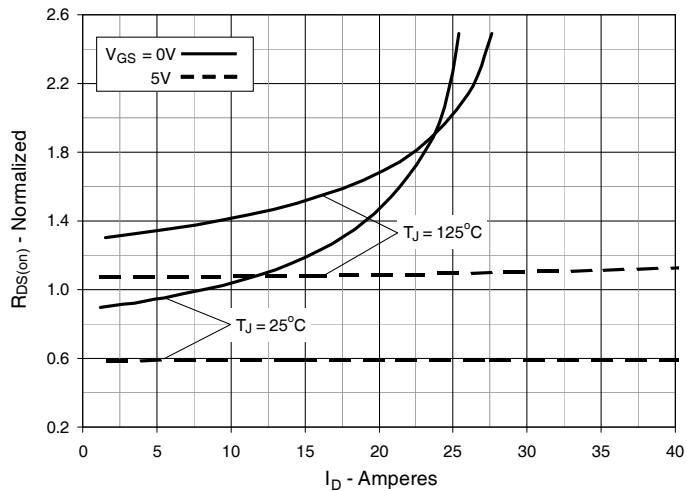


Fig. 9. Input Admittance

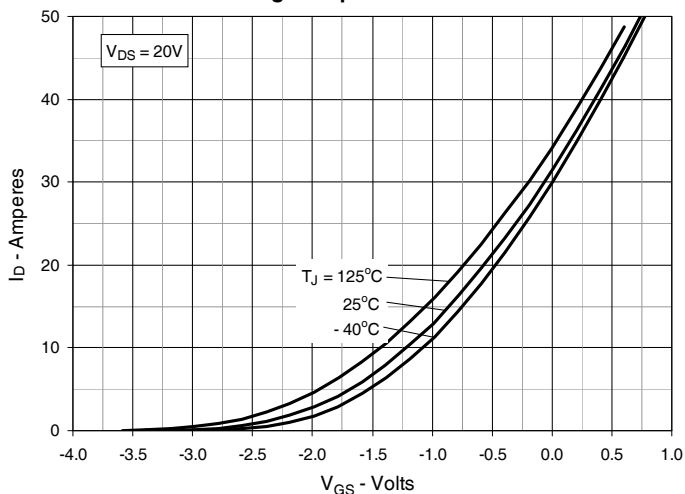


Fig. 10. Transconductance

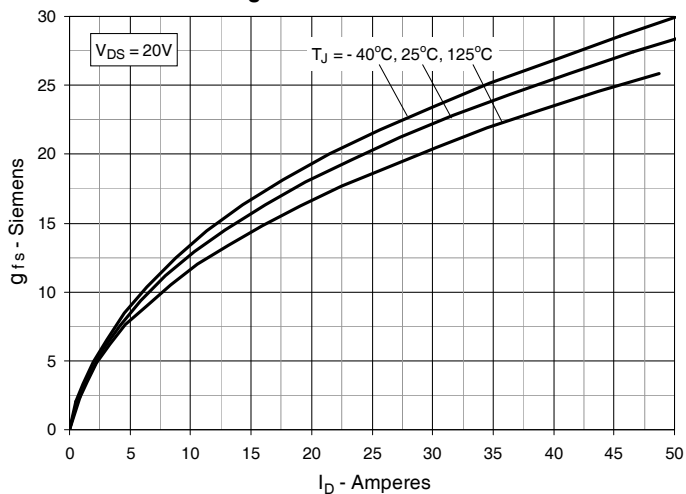


Fig. 11. Normalized Breakdown and Threshold Voltages vs. Junction Temperature

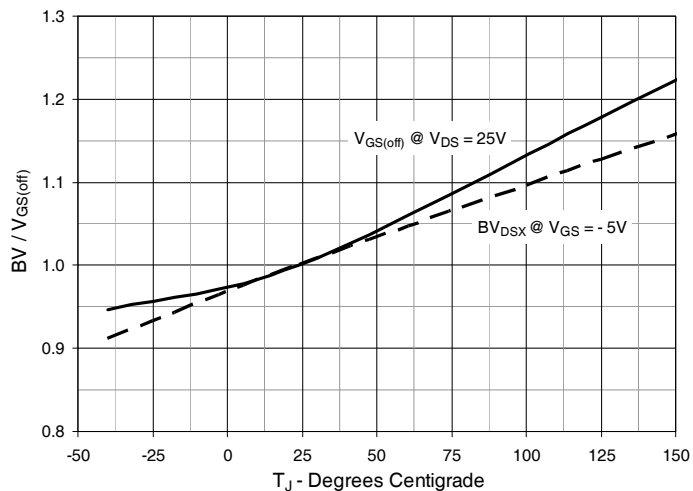
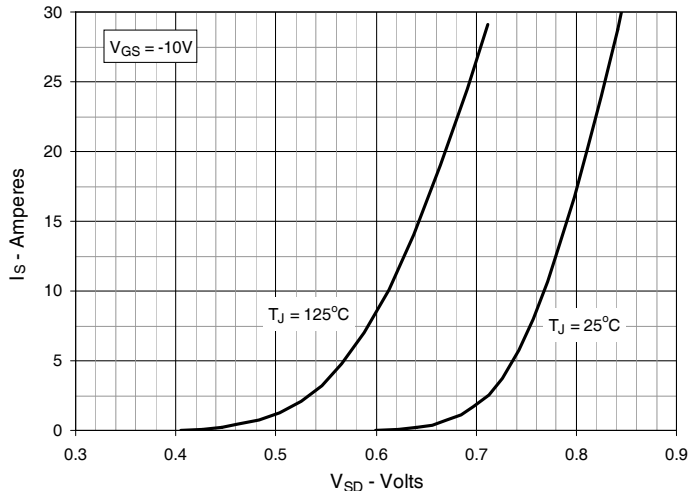
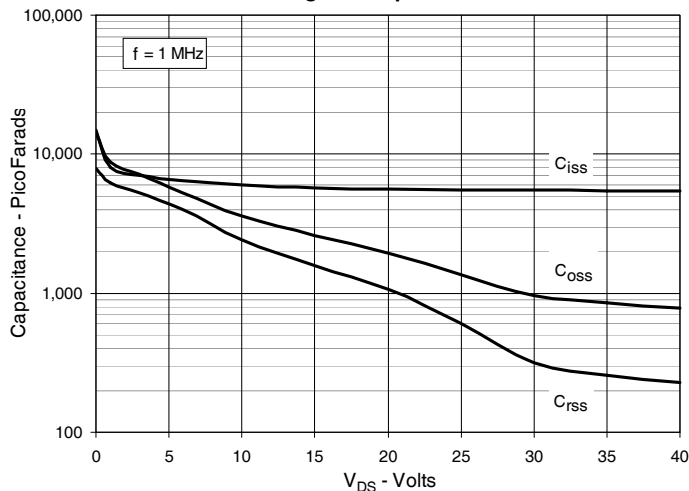


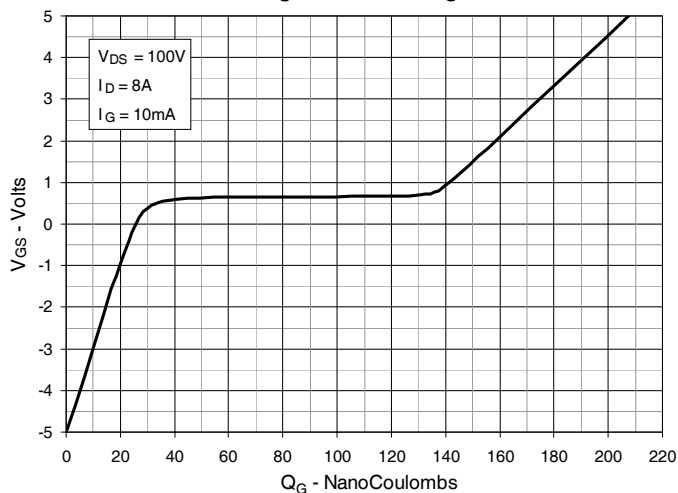
Fig. 12. Forward Voltage Drop of Intrinsic Diode



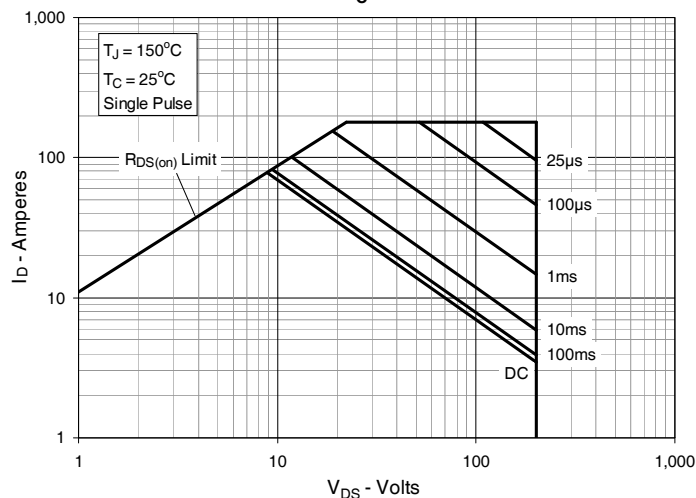
**Fig. 13. Capacitance**



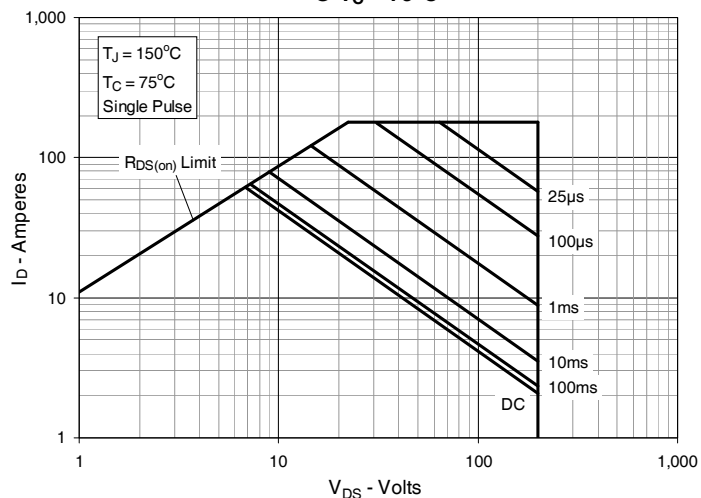
**Fig. 14. Gate Charge**



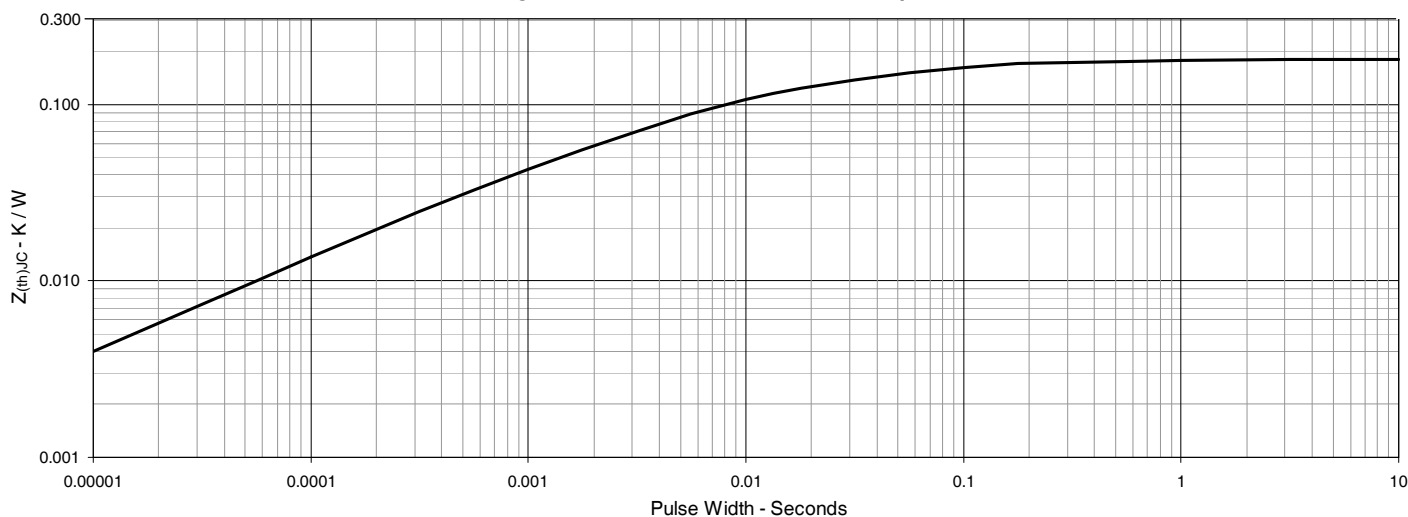
**Fig. 15. Forward-Bias Safe Operating Area  
@ T<sub>C</sub> = 25°C**



**Fig. 16. Forward-Bias Safe Operating Area  
@ T<sub>C</sub> = 75°C**



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





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