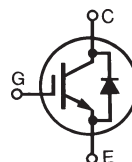


### High Voltage, High Gain BIMOSFET™

### IXBH2N250 IXBT2N250

### Monolithic Bipolar MOS Transistor



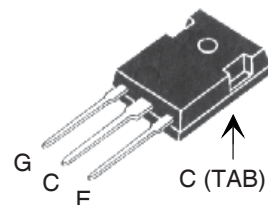
$$V_{CES} = 2500V$$

$$I_{C110} = 2A$$

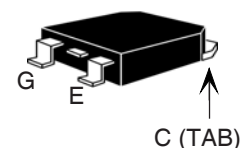
$$V_{CE(sat)} \leq 3.50V$$

| Symbol         | Test Conditions                                            | Maximum Ratings    |            |
|----------------|------------------------------------------------------------|--------------------|------------|
| $V_{CES}$      | $T_C = 25^\circ C$ to $150^\circ C$                        | 2500               | V          |
| $V_{CGR}$      | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GE} = 1M\Omega$  | 2500               | V          |
| $V_{GES}$      | Continuous                                                 | $\pm 20$           | V          |
| $V_{GEM}$      | Transient                                                  | $\pm 30$           | V          |
| $I_{C25}$      | $T_C = 25^\circ C$                                         | 5                  | A          |
| $I_{C110}$     | $T_C = 110^\circ C$                                        | 2                  | A          |
| $I_{CM}$       | $T_C = 25^\circ C$ , 1ms                                   | 13                 | A          |
| <b>SSOA</b>    | $V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 47\Omega$ | $I_{CM} = 6$       | A          |
| <b>(RBSOA)</b> | Clamped Inductive Load                                     | $V_{CE} \leq 2000$ | V          |
| $P_C$          | $T_C = 25^\circ C$                                         | 32                 | 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 10 Seconds                                | 260                | $^\circ C$ |
| $M_d$          | Mounting Torque (TO-247)                                   | 1.13/10            | Nm/lb.in.  |
| <b>Weight</b>  | TO-247                                                     | 6                  | g          |
|                | TO-268                                                     | 4                  | g          |

TO-247 (IXBH)



TO-268 (IXBT)



G = Gate      C = Collector  
E = Emitter    TAB = Collector

### Features

- High Blocking Voltage
- Integrated Anti-parallel Diode
- International Standard Packages
- Low Conduction Losses

### Advantages

- Low Gate Drive Requirement
- High Power Density

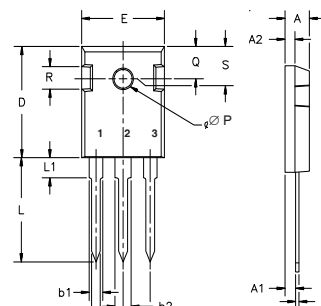
### Applications

- Switched-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- Laser Generator
- Capacitor Discharge Circuit
- AC Switches

| Symbol        | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |              |                           |
|---------------|-----------------------------------------------------------------------|-----------------------|--------------|---------------------------|
|               |                                                                       | Min.                  | Typ.         | Max.                      |
| $BV_{CES}$    | $I_C = 250\mu A$ , $V_{CE} = V_{GE}$                                  | 2500                  |              | V                         |
| $V_{GE(th)}$  | $I_C = 250\mu A$ , $V_{CE} = V_{GE}$                                  | 3.0                   |              | 5.5 V                     |
| $I_{CES}$     | $V_{CE} = 0.8 \cdot V_{CES}$ , $V_{GE} = 0V$<br>$T_J = 125^\circ C$   |                       |              | 10 $\mu A$<br>100 $\mu A$ |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                    |                       |              | $\pm 100$ nA              |
| $V_{CE(sat)}$ | $I_C = 2A$ , $V_{GE} = 15V$ , Note 1<br>$T_J = 125^\circ C$           |                       | 3.15<br>4.08 | V<br>V                    |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                                                                                     | Characteristic Values |      |                         |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------------|
|              |                                                                                                                                                                 | Min.                  | Typ. | Max.                    |
| $g_{fs}$     | $I_C = 2\text{A}$ , $V_{CE} = 10\text{V}$ , Note 1                                                                                                              | 0.85                  | 1.40 | S                       |
| $C_{ies}$    | $V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$                                                                                                |                       | 145  | pF                      |
| $C_{oes}$    |                                                                                                                                                                 |                       | 8.7  | pF                      |
| $C_{res}$    |                                                                                                                                                                 |                       | 3.2  | pF                      |
| $Q_g$        | $I_C = 2\text{A}$ , $V_{GE} = 15\text{V}$ , $V_{CE} = 1\text{kV}$                                                                                               |                       | 10.6 | nC                      |
| $Q_{ge}$     |                                                                                                                                                                 |                       | 0.8  | nC                      |
| $Q_{gc}$     |                                                                                                                                                                 |                       | 6.2  | nC                      |
| $t_{d(on)}$  | <b>Resistive Switching times, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = 2\text{A}$ , $V_{GE} = 15\text{V}$<br>$V_{CE} = 2\text{kV}$ , $R_G = 47\Omega$  |                       | 30   | ns                      |
| $t_r$        |                                                                                                                                                                 |                       | 180  | ns                      |
| $t_{d(off)}$ |                                                                                                                                                                 |                       | 70   | ns                      |
| $t_f$        |                                                                                                                                                                 |                       | 182  | ns                      |
| $t_{d(on)}$  | <b>Resistive Switching times, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = 2\text{A}$ , $V_{GE} = 15\text{V}$<br>$V_{CE} = 2\text{kV}$ , $R_G = 47\Omega$ |                       | 30   | ns                      |
| $t_r$        |                                                                                                                                                                 |                       | 280  | ns                      |
| $t_{d(off)}$ |                                                                                                                                                                 |                       | 74   | ns                      |
| $t_f$        |                                                                                                                                                                 |                       | 178  | ns                      |
| $R_{thJC}$   |                                                                                                                                                                 |                       |      | 3.90 $^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                                                 | 0.21                  |      | $^\circ\text{C/W}$      |

## TO-247 (IXBH) Outline



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

| Dim.           | Millimeter<br>Min. | Max.  | Inches<br>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  |
| 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   |

## Reverse Diode

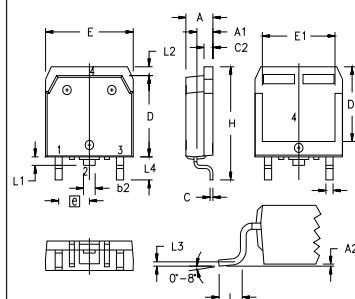
| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                                                   | Characteristic Values |      |               |
|----------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                                                               | Min.                  | Typ. | Max.          |
| $V_F$    | $I_F = 2\text{A}$ , $V_{GE} = 0\text{V}$ , Note 1                                                                             |                       |      | 2.4 V         |
| $t_{rr}$ | $I_F = 2\text{A}$ , $V_{GE} = 0\text{V}$ , $-di_F/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ , $V_{GE} = 0\text{V}$ |                       | 0.92 | $\mu\text{s}$ |
| $I_{RM}$ |                                                                                                                               |                       | 9.80 | A             |
| $Q_{RM}$ |                                                                                                                               |                       | 4.50 | $\mu\text{C}$ |

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.

## TO-268 (IXBT) Outline

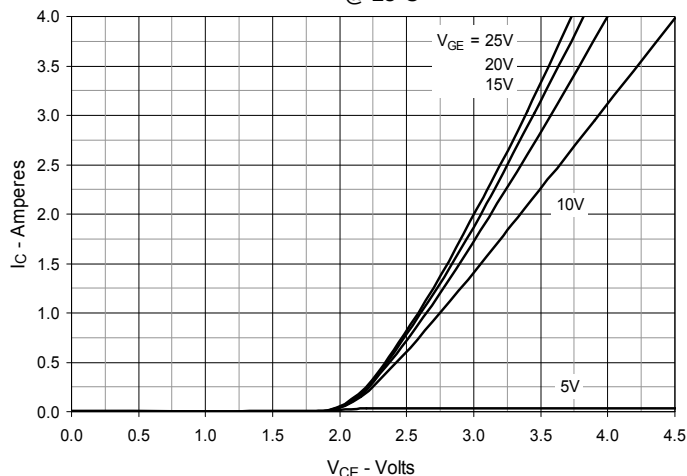


| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .193     | .201 | 4.90        | 5.10  |
| A1  | .106     | .114 | 2.70        | 2.90  |
| A2  | .001     | .010 | 0.02        | 0.25  |
| b   | .045     | .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  |

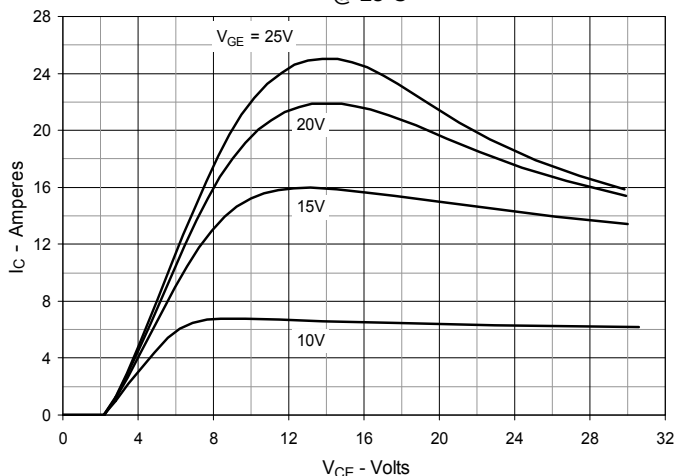
IXYS Reserves the Right to Change Limits, Test Conditions and Dimensions.

|                                                                                  |           |           |           |           |              |              |              |              |              |             |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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 |
|                                                                                  | 4,850,072 | 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    |             |

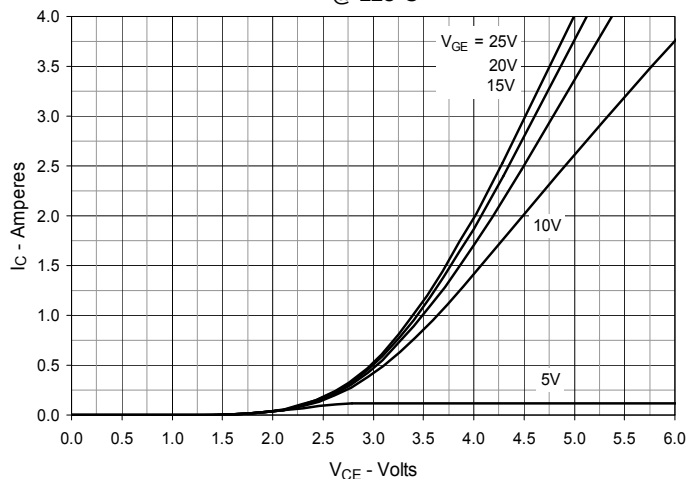
**Fig. 1. Output Characteristics**  
**@ 25°C**



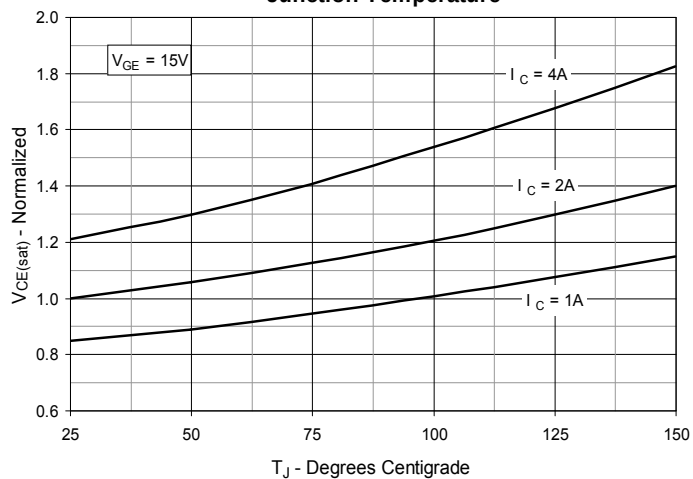
**Fig. 2. Extended Output Characteristics**  
**@ 25°C**



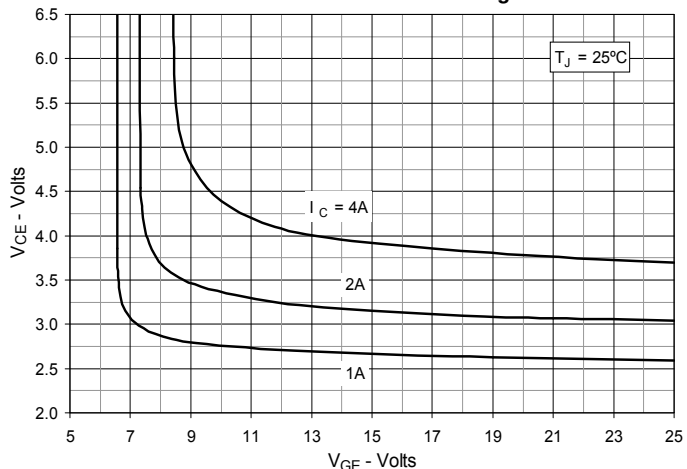
**Fig. 3. Output Characteristics**  
**@ 125°C**



**Fig. 4. Dependence of  $V_{CE(sat)}$  on**  
**Junction Temperature**



**Fig. 5. Collector-to-Emitter Voltage**  
**vs. Gate-to-Emitter Voltage**



**Fig. 6. Input Admittance**

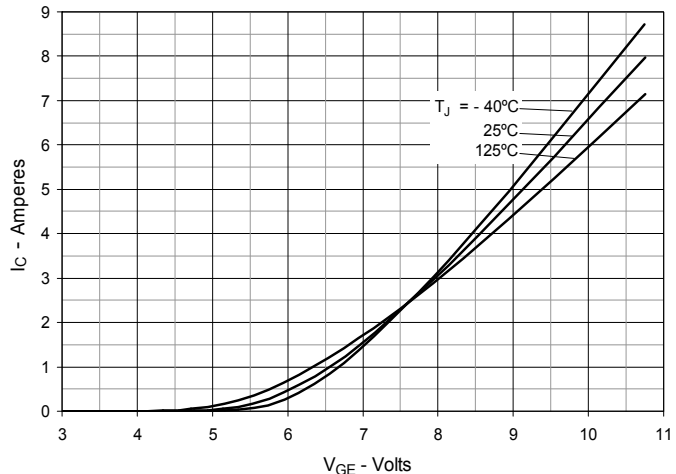


Fig. 7. Transconductance

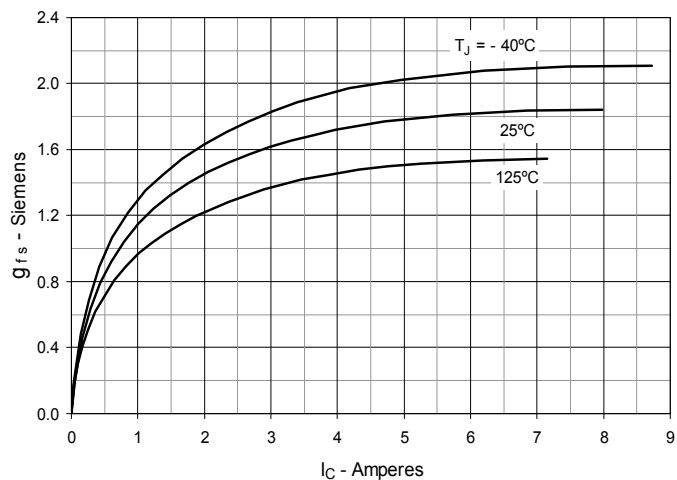


Fig. 8. Forward Voltage Drop of Intrinsic Diode

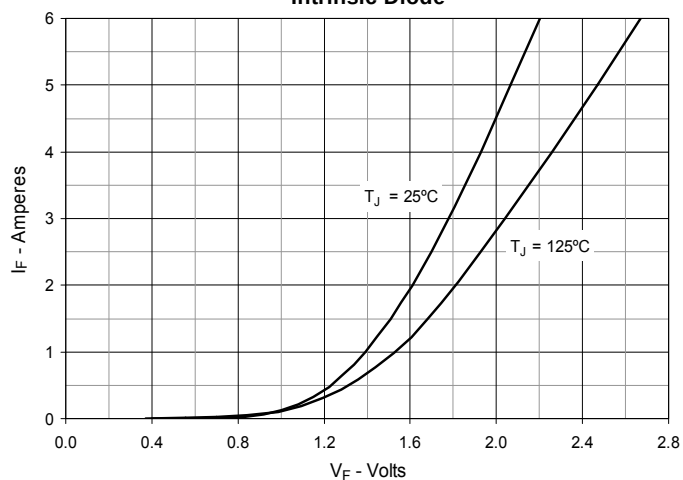


Fig. 9. Gate Charge

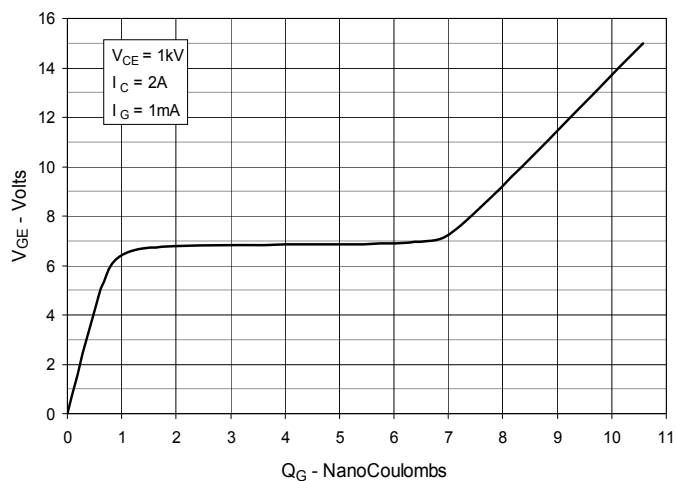


Fig. 10. Capacitance

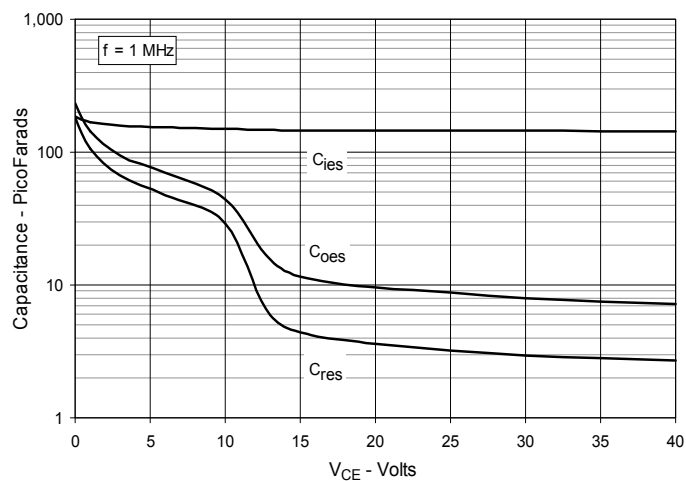


Fig. 11. Reverse-Bias Safe Operating Area

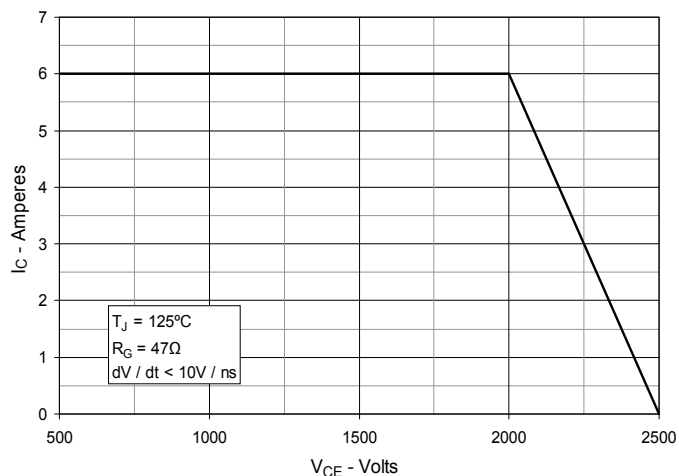
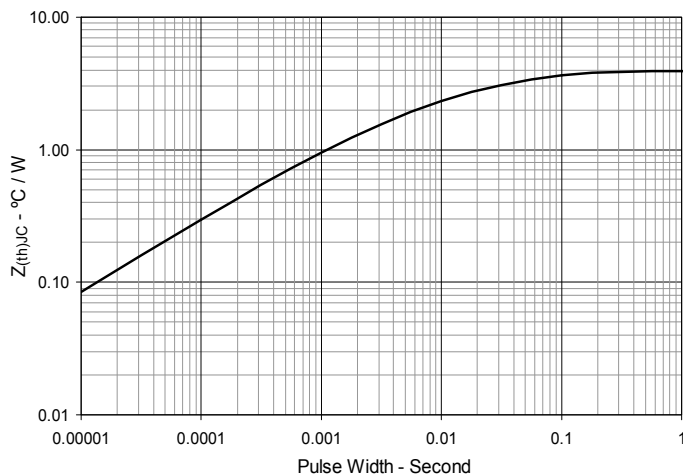
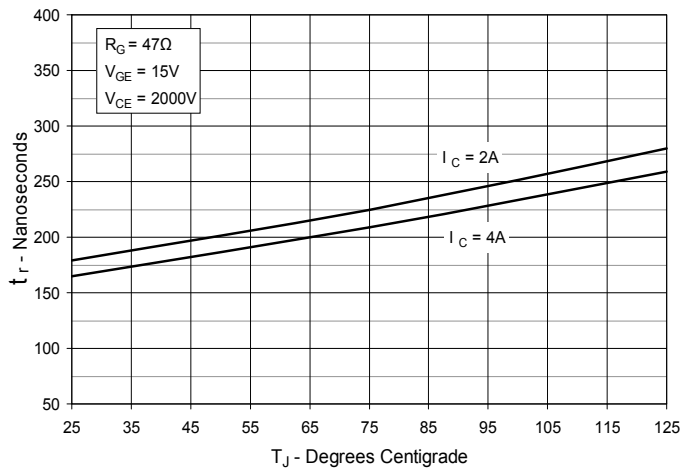


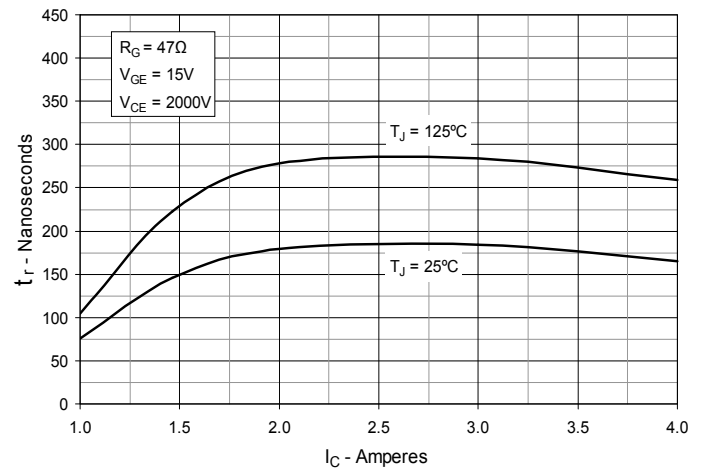
Fig. 12. Maximum Transient Thermal Impedance



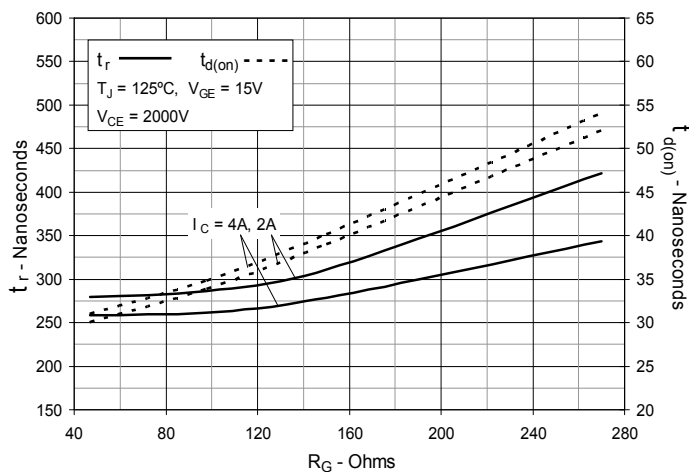
**Fig. 13. Resistive Turn-on**  
**Rise Time vs. Junction Temperature**



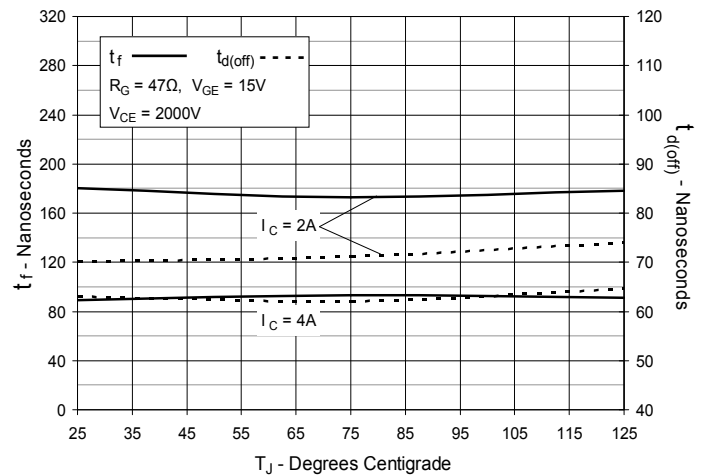
**Fig. 14. Resistive Turn-on**  
**Rise Time vs. Collector Current**



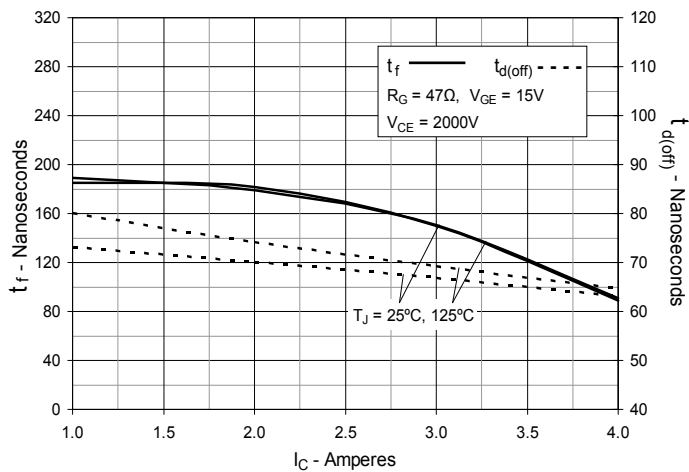
**Fig. 15. Resistive Turn-on**  
**Switching Times vs. Gate Resistance**



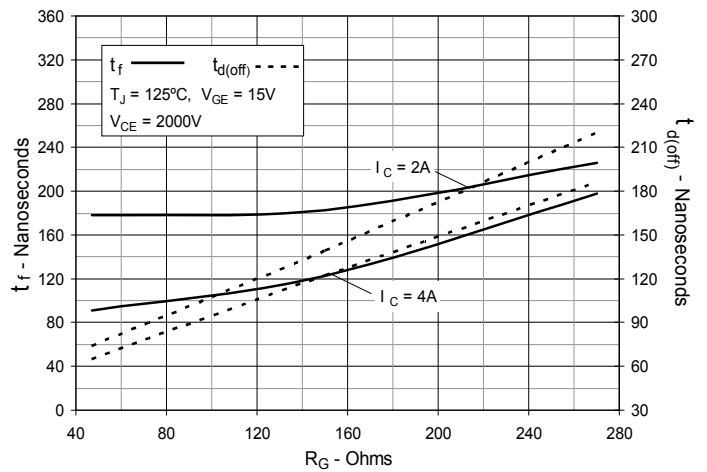
**Fig. 16. Resistive Turn-off**  
**Switching Times vs. Junction Temperature**



**Fig. 17. Resistive Turn-off**  
**Switching Times vs. Collector Current**



**Fig. 18. Resistive Turn-off**  
**Switching Times vs. Gate Resistance**



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