

**High Voltage, High Gain  
BIMOSFET™**
**IXBH2N250  
IXBT2N250**
**Monolithic Bipolar MOS  
Transistor**

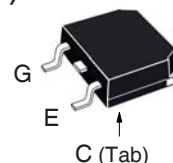

$$V_{CES} = 2500V$$

$$I_{C110} = 2A$$

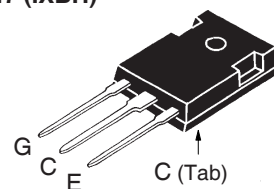
$$V_{CE(sat)} \leq 3.80V$$

| 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       | $^\circ C$ |
| $T_L$          | 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-247   | 6                  | g          |
|                | TO-268   | 4                  | g          |

TO-268 (IXBT)



TO-247 (IXBH)



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

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                  |      | V                         |
|               |   | 4.08                  |      | 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                  |      | $^\circ\text{C/W}$ |

### 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,  $d \leq 2\%$ .

### PRELIMINARY TECHNICAL INFORMATION

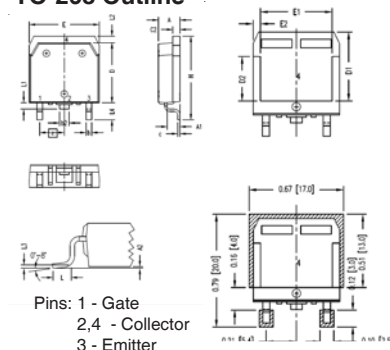
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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:

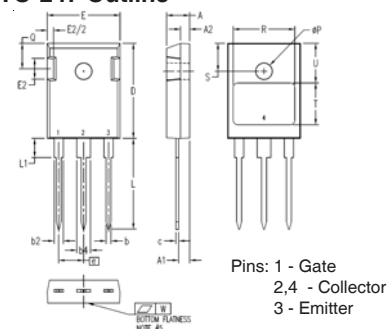
|           |           |           |           |              |              |              |              |              |             |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 4,835,592 | 4,931,844 | 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



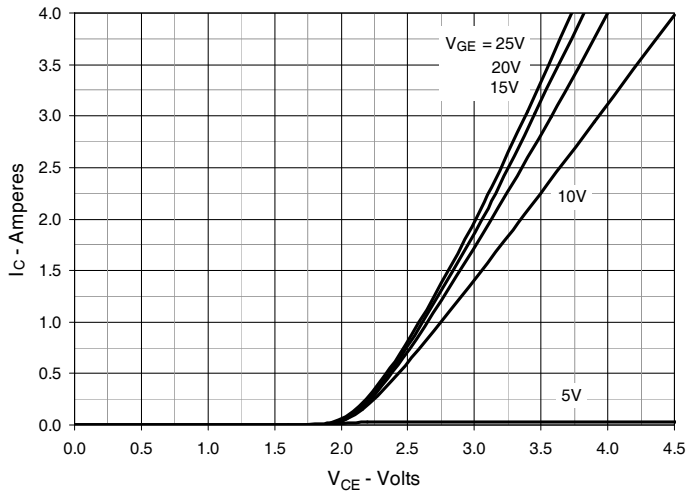
| SYMBOL | INCHES |      | MILLIMETERS |       |
|--------|--------|------|-------------|-------|
|        | MIN    | MAX  | MIN         | MAX   |
| A      | .193   | .201 | 4.90        | 5.10  |
| A1     | .106   | .114 | 2.70        | 2.90  |
| A2     | .001   | .010 | 0.02        | 0.25  |
| b      | .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 |
| D2     | .320   | .335 | 8.13        | 8.50  |
| E      | .624   | .632 | 15.85       | 16.05 |
| E1     | .524   | .535 | 13.30       | 13.60 |
| E2     | .045   | .055 | 1.14        | 1.39  |
| 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

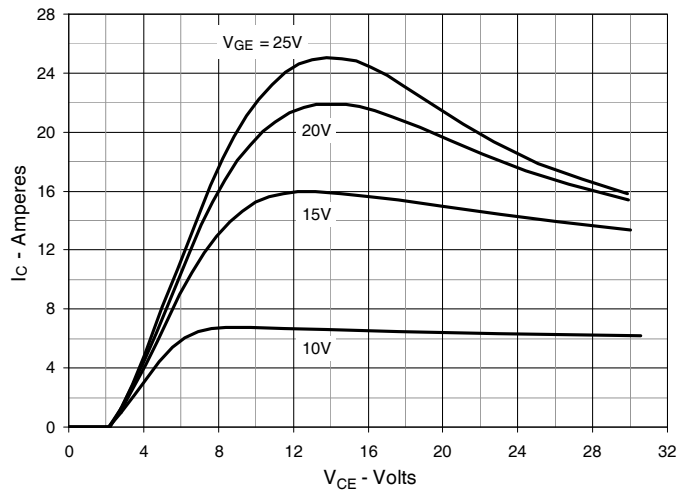


| SYM | INCHES |      | MILLIMETERS |       |
|-----|--------|------|-------------|-------|
|     | MIN    | MAX  | MIN         | MAX   |
| A   | .190   | .205 | 4.83        | 5.21  |
| A1  | .087   | .100 | 2.21        | 2.54  |
| A2  | .075   | .085 | 1.91        | 2.16  |
| b   | .045   | .055 | 1.14        | 1.40  |
| b2  | .075   | .085 | 1.91        | 2.16  |
| b4  | .115   | .126 | 2.92        | 3.20  |
| c   | .023   | .033 | 0.58        | 0.84  |
| D   | .820   | .840 | 20.83       | 21.34 |
| E   | .620   | .635 | 15.75       | 16.13 |
| E2  | .175   | .195 | 4.44        | 4.95  |
| e   | .215   | BSC  | 5.45        | BSC   |
| L   | .780   | .810 | 19.81       | 20.57 |
| L1  | .160   | .177 | 4.06        | 4.50  |
| Q   | .220   | .240 | 5.59        | 6.10  |
| R   | .520   | .540 | 13.21       | 13.72 |
| S   | .242   | BSC  | 6.15        | BSC   |
| T   | .355   | .375 | 9.02        | 9.53  |
| U   | .345   | .370 | 8.76        | 9.40  |
| ØP  | .140   | .144 | 3.55        | 3.66  |
| W   | .000   | .004 | 0.00        | 0.10  |

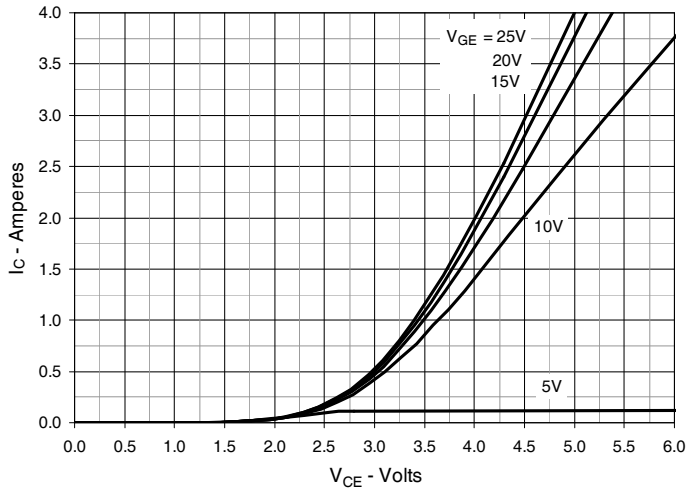
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



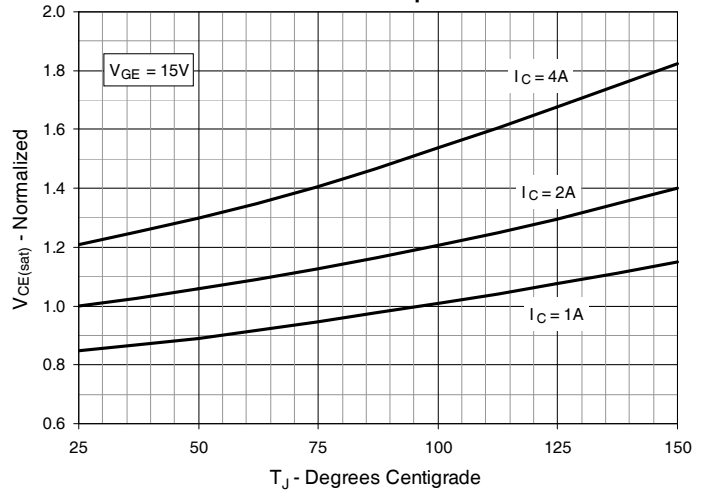
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



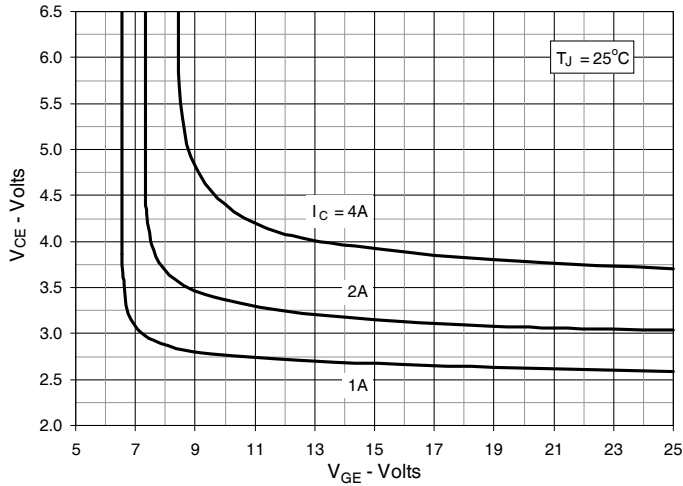
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



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



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



**Fig. 6. Input Admittance**

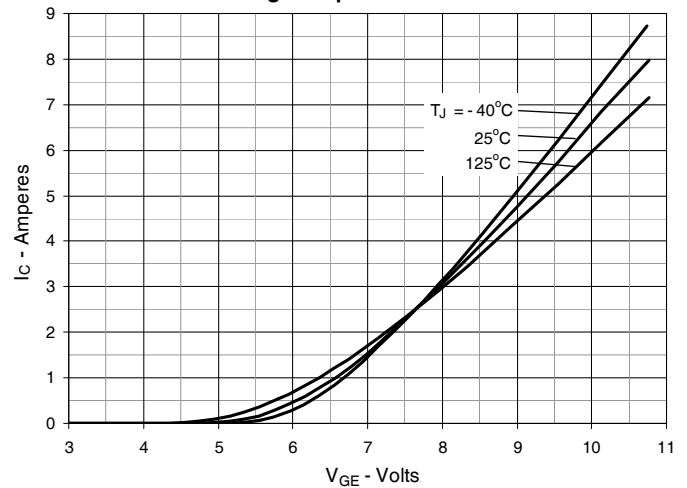


Fig. 7. Transconductance

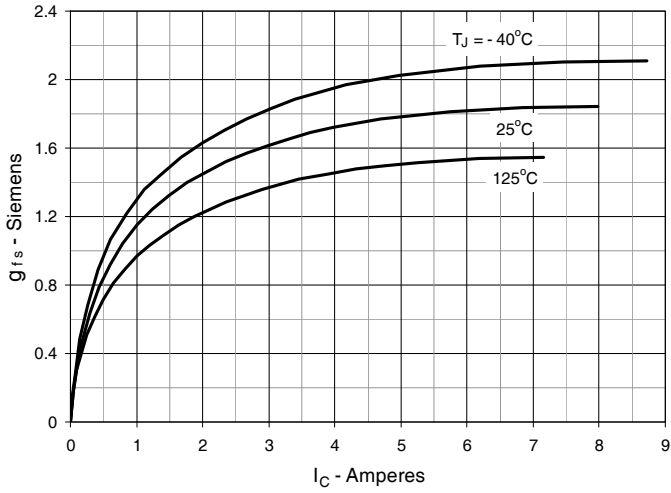


Fig. 8. Forward Voltage Drop of Intrinsic Diode

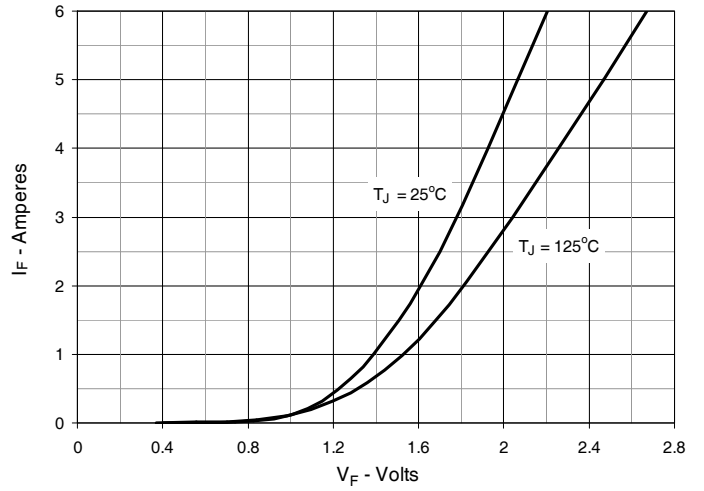


Fig. 9. Gate Charge

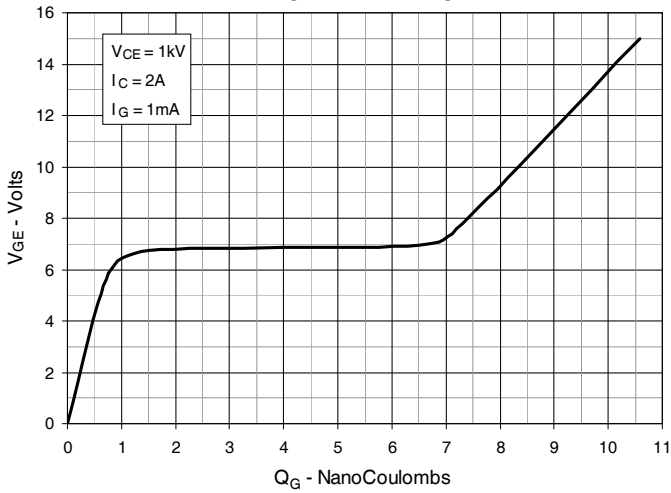


Fig. 10. Capacitance

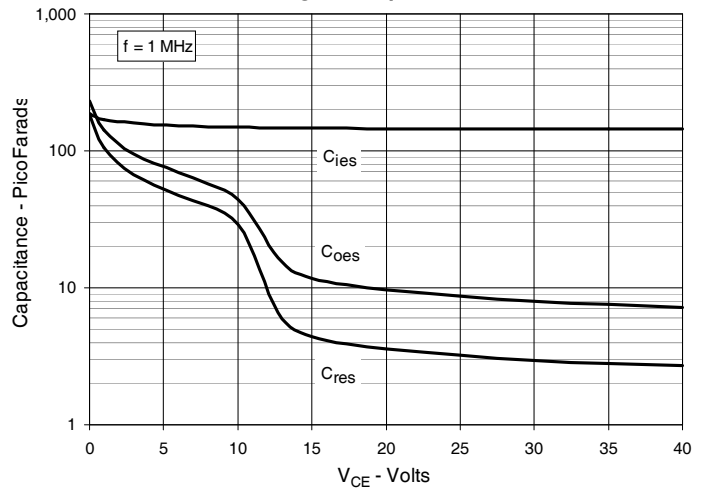


Fig. 11. Reverse-Bias Safe Operating Area

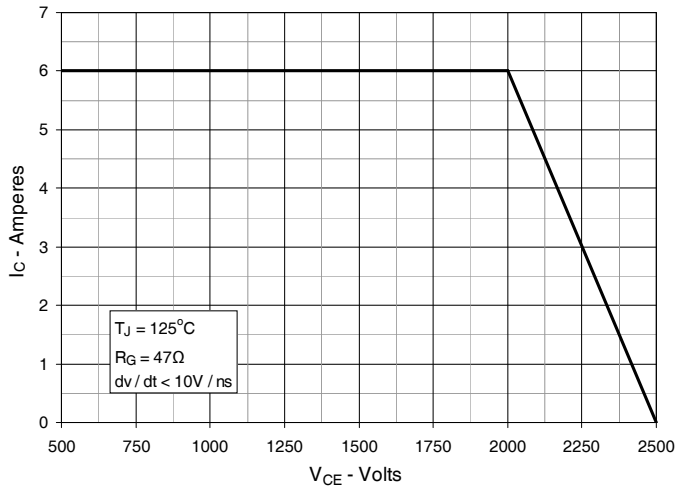
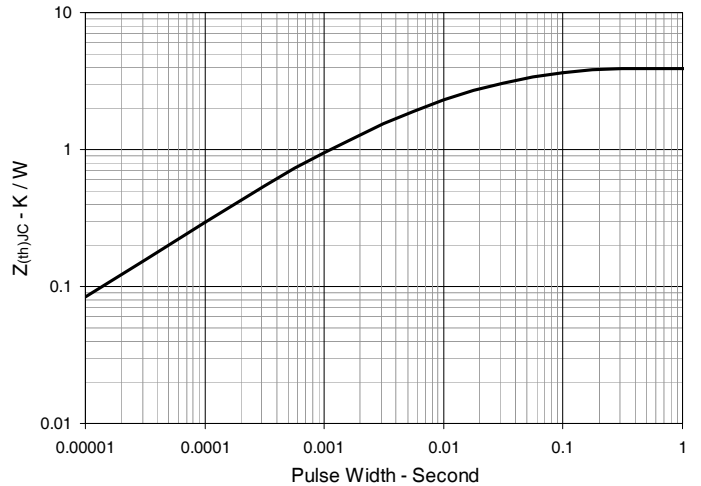
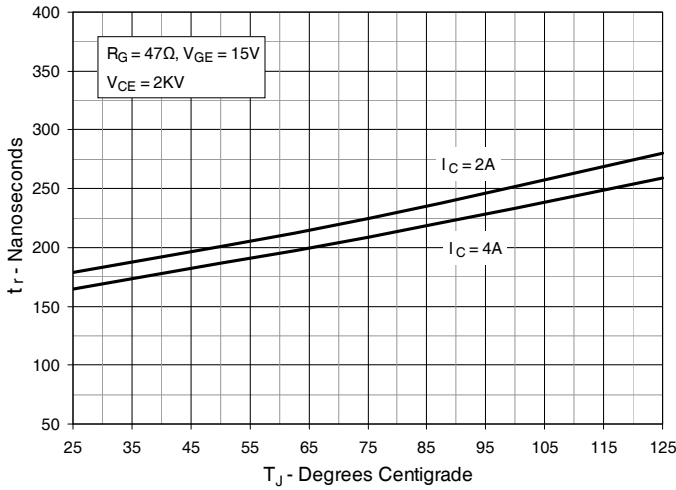


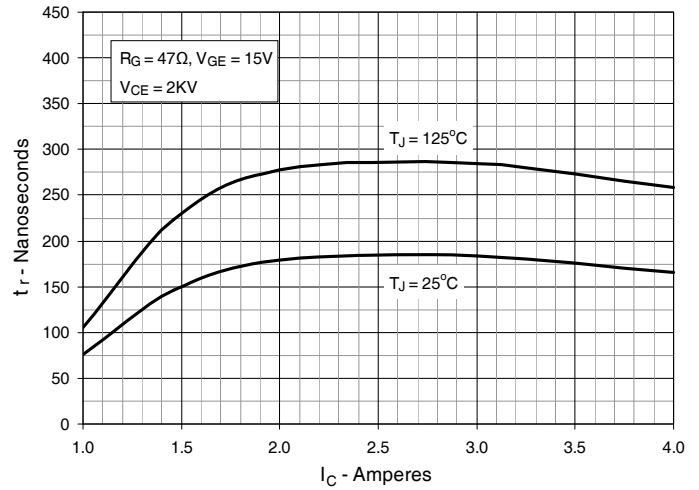
Fig. 12. Maximum Transient Thermal Impedance



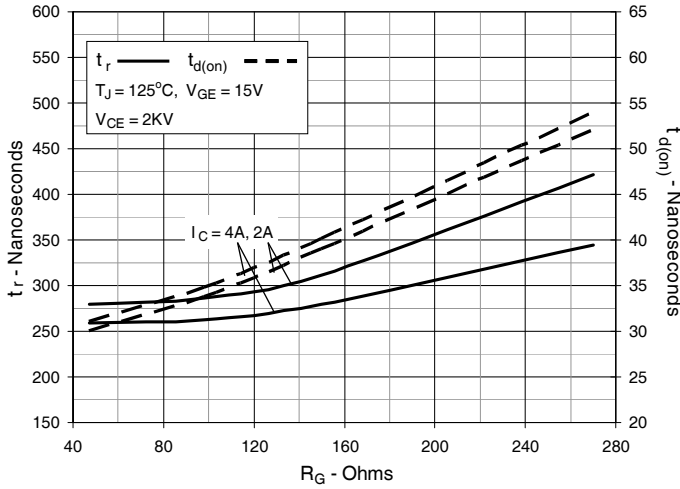
**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**



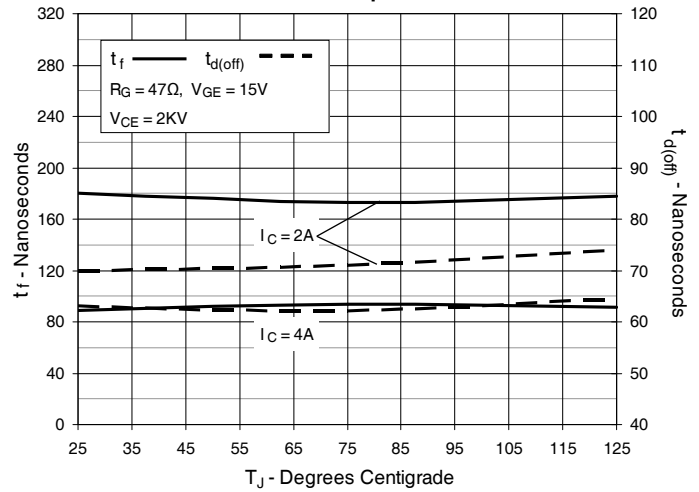
**Fig. 14. Resistive Turn-on Rise Time vs. Collector Current**



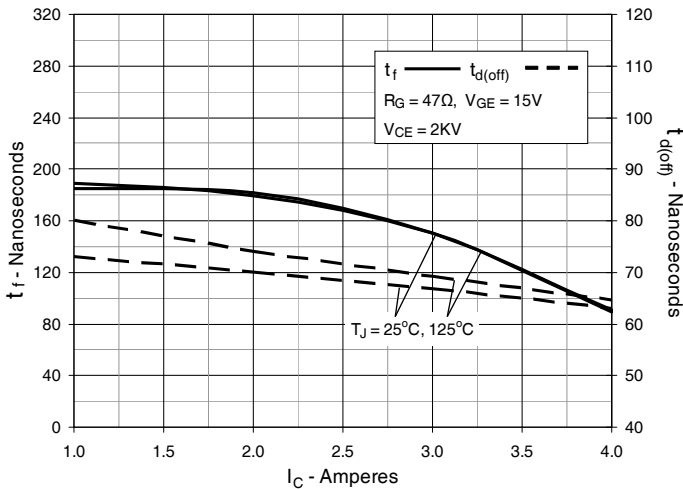
**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**



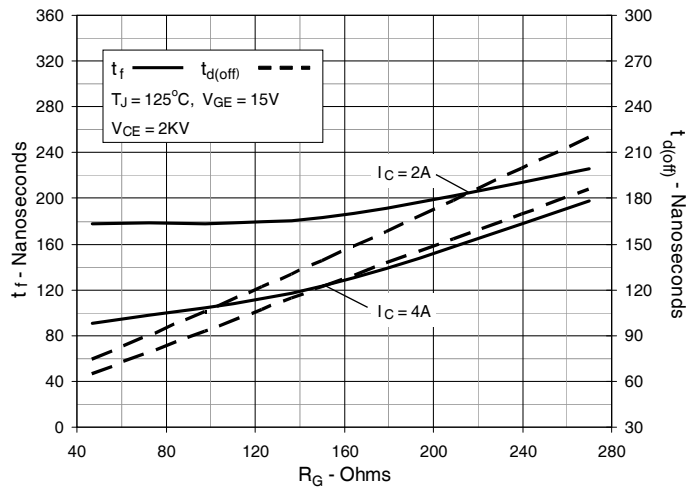
**Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature**



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



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



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