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[IXBH24N170](#)

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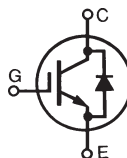
# High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

## IXBT24N170 IXBH24N170

$$V_{CES} = 1700V$$

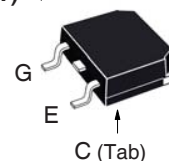
$$I_{C110} = 24A$$

$$V_{CE(sat)} \leq 2.5V$$

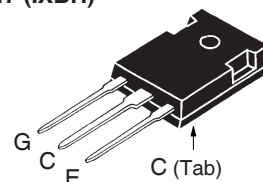


| Symbol         | Test Conditions                                             | Maximum Ratings     |             |
|----------------|-------------------------------------------------------------|---------------------|-------------|
| $V_{CES}$      | $T_J = 25^{\circ}C$ to $150^{\circ}C$                       | 1700                | V           |
| $V_{CGR}$      | $T_J = 25^{\circ}C$ to $150^{\circ}C$ , $R_{GE} = 1M\Omega$ | 1700                | V           |
| $V_{GES}$      | Continuous                                                  | $\pm 20$            | V           |
| $V_{GEM}$      | Transient                                                   | $\pm 30$            | V           |
| $I_{C25}$      | $T_C = 25^{\circ}C$                                         | 60                  | A           |
| $I_{C110}$     | $T_C = 110^{\circ}C$                                        | 24                  | A           |
| $I_{CM}$       | $T_C = 25^{\circ}C$ , 1ms                                   | 230                 | A           |
| <b>SSOA</b>    | $V_{GE} = 15V$ , $T_{VJ} = 125^{\circ}C$ , $R_G = 10\Omega$ | $I_{CM} = 50$       | A           |
| <b>(RBSOA)</b> | Clamped Inductive Load                                      | $V_{CES} \leq 1360$ | V           |
| $P_C$          | $T_C = 25^{\circ}C$                                         | 250                 | 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-268                                                      | 4                   | g           |
|                | TO-247                                                      | 6                   | g           |

TO-268 (IXBT)



TO-247 (IXBH)



G = Gate      C = Collector  
E = Emitter    Tab = Collector

### Features

- High Blocking Voltage
- International Standard Packages
- Low Conduction Losses

### Advantages

- Low Gate Drive Requirement
- High Power Density

### Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- Laser Generators
- Capacitor Discharge Circuits
- AC Switches

| Symbol        | Test Conditions<br>( $T_J = 25^{\circ}C$ Unless Otherwise Specified) | Characteristic Values |      |                           |
|---------------|----------------------------------------------------------------------|-----------------------|------|---------------------------|
|               |                                                                      | Min.                  | Typ. | Max.                      |
| $BV_{CES}$    | $I_C = 250\mu A$ , $V_{GE} = 0V$                                     | 1700                  |      | V                         |
| $V_{GE(th)}$  | $I_C = 250\mu A$ , $V_{CE} = V_{GE}$                                 | 2.5                   |      | 5.0 V                     |
| $I_{CES}$     | $V_{CE} = 0.8 \cdot V_{CES}$ , $V_{GE} = 0V$<br>$T_J = 125^{\circ}C$ |                       |      | 25 $\mu A$<br>500 $\mu A$ |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                   |                       |      | $\pm 100$ nA              |
| $V_{CE(sat)}$ | $I_C = I_{C110}$ , $V_{GE} = 15V$ , Note 1<br>$T_J = 125^{\circ}C$   |                       | 2.4  | 2.5 V<br>V                |

**IXYS**

**IXBT24N170**  
**IXBH24N170**

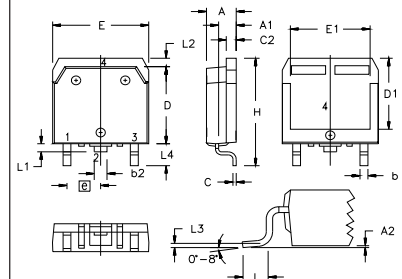
| Symbol       | Test Conditions                                                                                                                       | Characteristic Values |      |           |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-----------|
|              |                                                                                                                                       | Min.                  | Typ. | Max.      |
| $g_{fs}$     | $I_C = I_{C110}, V_{CE} = 10V$ , Note 1                                                                                               | 15                    | 25   | S         |
| $C_{ies}$    | $V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$                                                                                                 |                       | 2790 | pF        |
| $C_{oes}$    |                                                                                                                                       |                       | 163  | pF        |
| $C_{res}$    |                                                                                                                                       |                       | 60   | pF        |
| $Q_{g(on)}$  | $I_C = I_{C110}, V_{GE} = 15V, V_{CE} = 0.5 \cdot V_{CES}$                                                                            |                       | 140  | nC        |
| $Q_{ge}$     |                                                                                                                                       |                       | 16   | nC        |
| $Q_{gc}$     |                                                                                                                                       |                       | 60   | nC        |
| $t_{d(on)}$  | <b>Resistive Switching Times, <math>T_J = 25^\circ C</math></b><br>$I_C = I_{C110}, V_{GE} = 15V$<br>$V_{CE} = 850V, R_G = 10\Omega$  |                       | 33   | ns        |
| $t_r$        |                                                                                                                                       |                       | 82   | ns        |
| $t_{d(off)}$ |                                                                                                                                       |                       | 315  | ns        |
| $t_f$        |                                                                                                                                       |                       | 750  | ns        |
| $t_{d(on)}$  | <b>Resistive Switching Times, <math>T_J = 125^\circ C</math></b><br>$I_C = I_{C110}, V_{GE} = 15V$<br>$V_{CE} = 850V, R_G = 10\Omega$ |                       | 35   | ns        |
| $t_r$        |                                                                                                                                       |                       | 155  | ns        |
| $t_{d(off)}$ |                                                                                                                                       |                       | 325  | ns        |
| $t_f$        |                                                                                                                                       |                       | 960  | ns        |
| $R_{thJC}$   | TO-247                                                                                                                                |                       |      | 0.50 °C/W |
| $R_{thCS}$   |                                                                                                                                       | 0.21                  |      | °C/W      |

## Reverse Diode

| Symbol   | Test Conditions                                                 | Characteristic Values |      |         |
|----------|-----------------------------------------------------------------|-----------------------|------|---------|
|          |                                                                 | Min.                  | Typ. | Max.    |
| $V_F$    | $I_F = 24A, V_{GE} = 0V$                                        |                       |      | 2.8 V   |
| $t_{rr}$ | $I_F = 12A, V_{GE} = 0V, -di_F/dt = 100A/\mu s$<br>$V_R = 100V$ |                       | 1.06 | $\mu s$ |
| $I_{RM}$ |                                                                 |                       | 26   | A       |

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

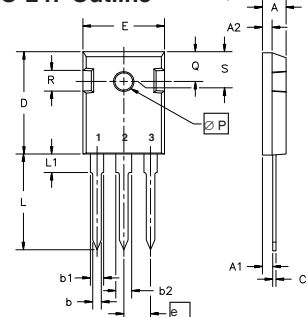
## TO-268 Outline



Terminals: 1 - Gate  
3 - Emitter  
2,4 - Collector

| 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



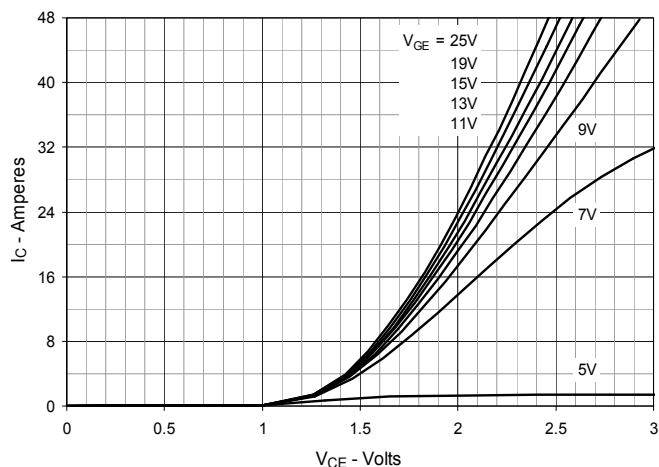
Terminals: 1 - Gate  
3 - Emitter  
2 - Collector

| 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  |
| 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 |       |

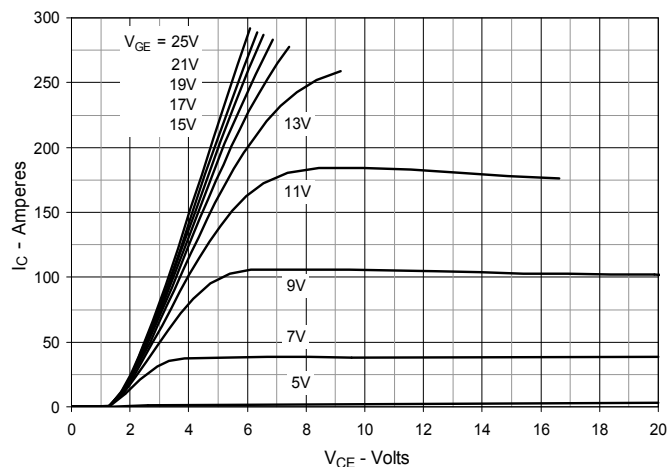
IXYS Reserves the Right to Change Limits, Test Conditions and Dimensions.

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

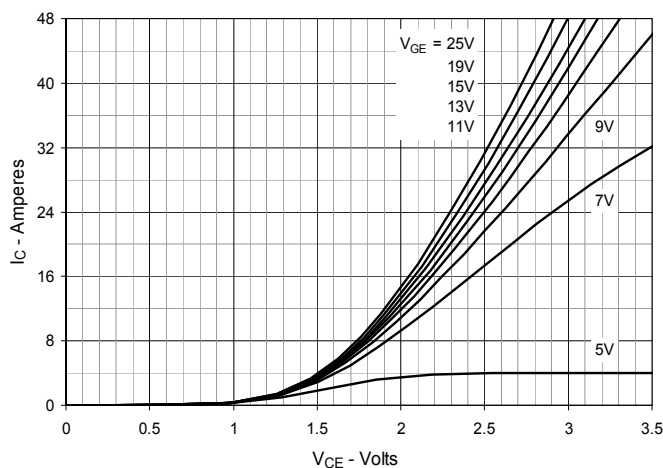
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



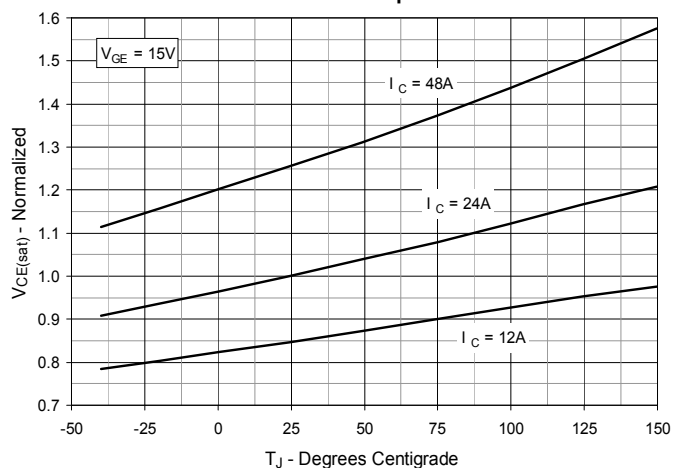
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



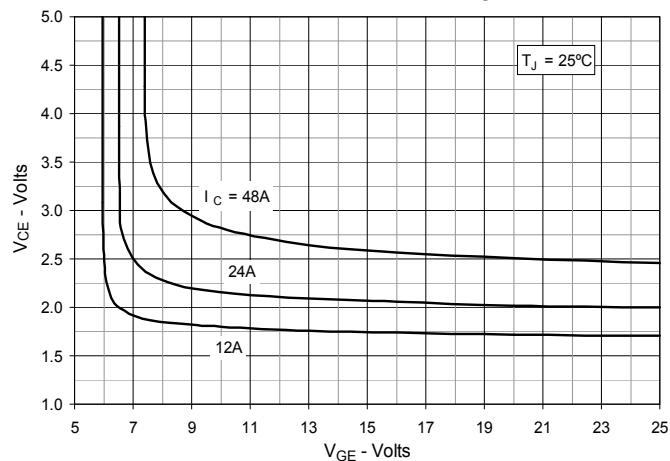
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



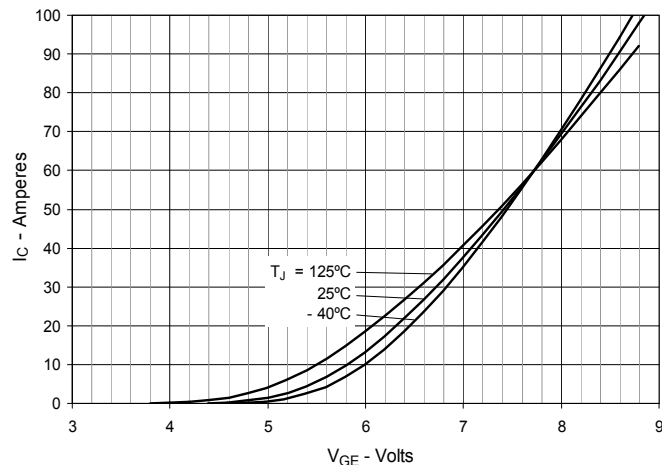
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**



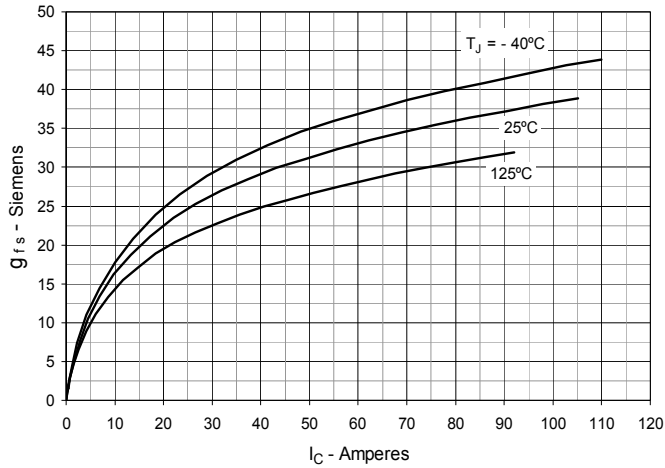
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**



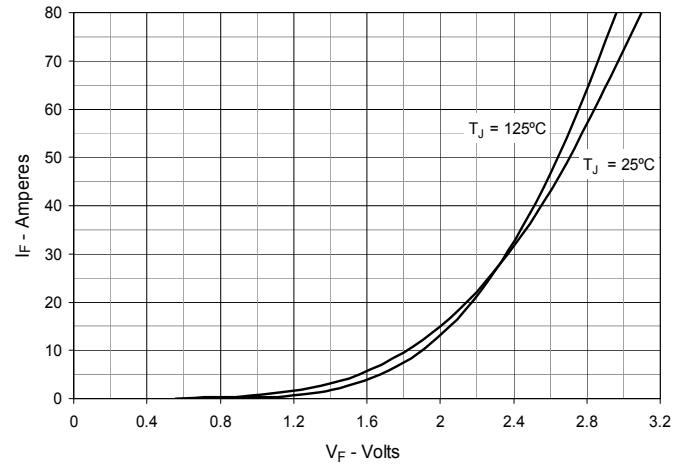
**Fig. 6. Input Admittance**



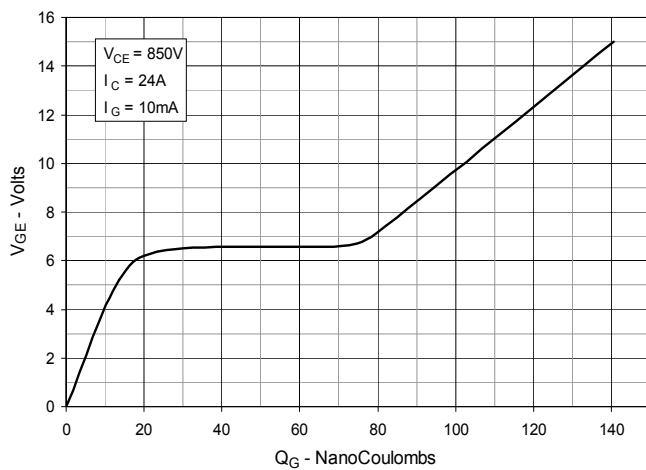
**Fig. 7. Transconductance**



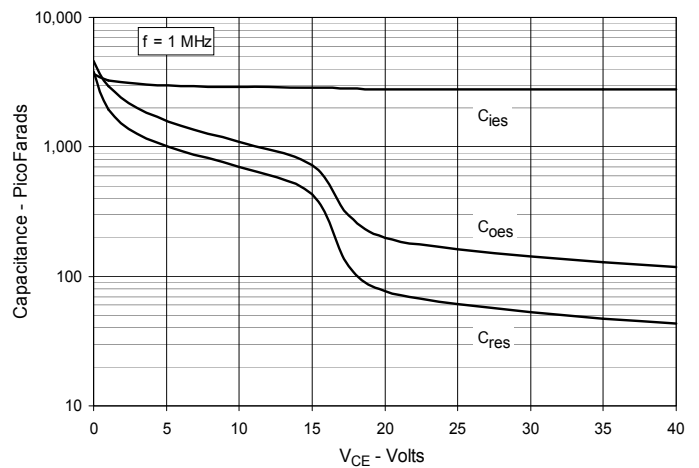
**Fig. 8. Forward Voltage Drop of Intrinsic Diode**



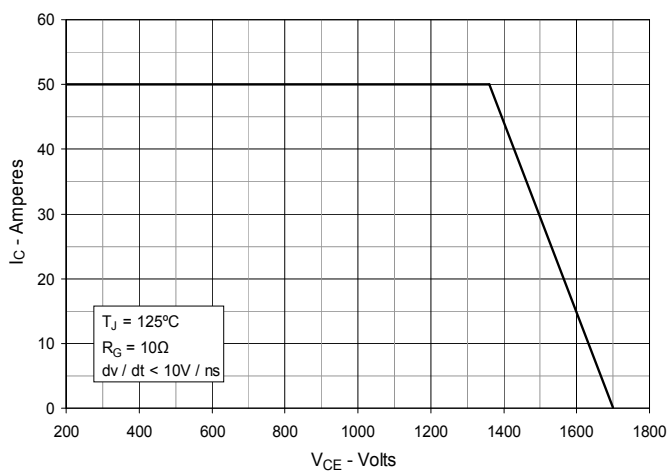
**Fig. 9. Gate Charge**



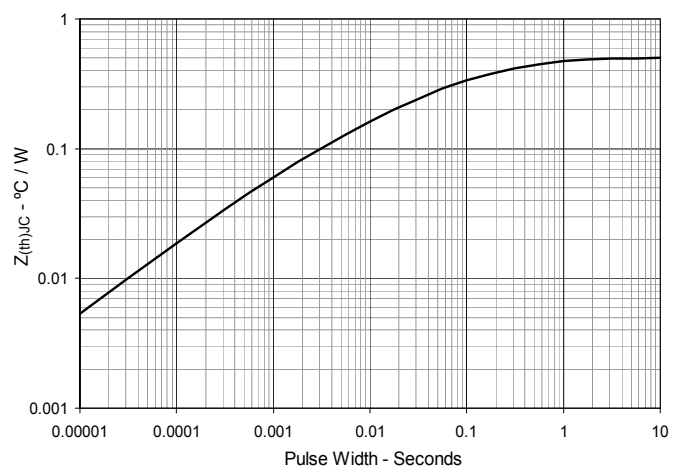
**Fig. 10. Capacitance**



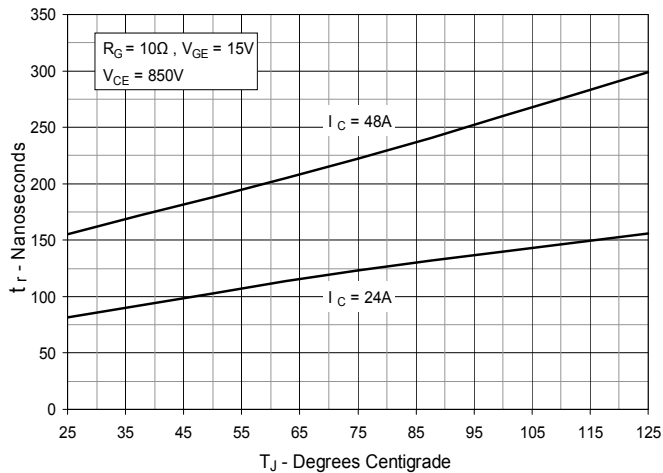
**Fig. 11. Reverse-Bias Safe Operating Area**



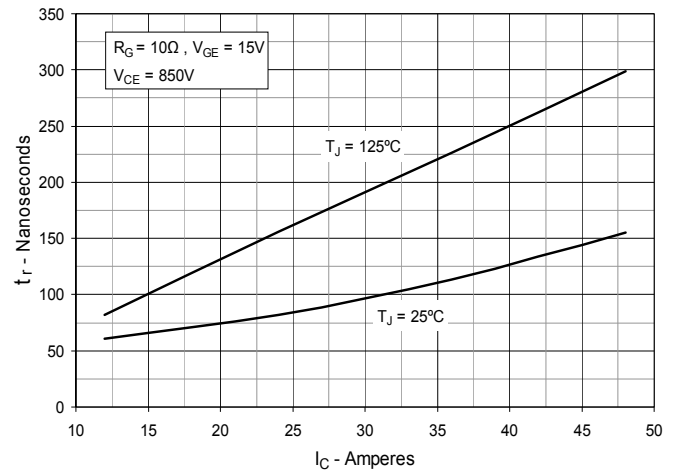
**Fig. 12. Maximum Transient Thermal Impedance**



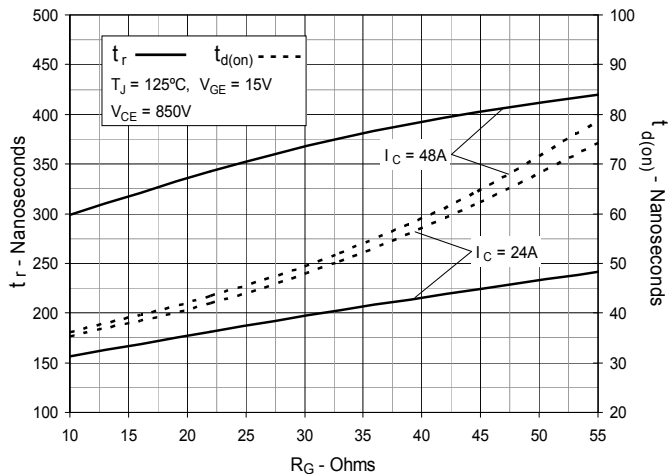
**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**



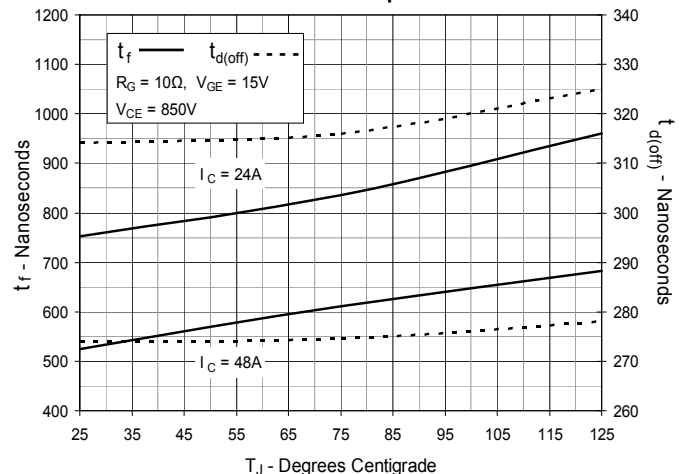
**Fig. 14. Resistive Turn-on Rise Time vs. Collector Current**



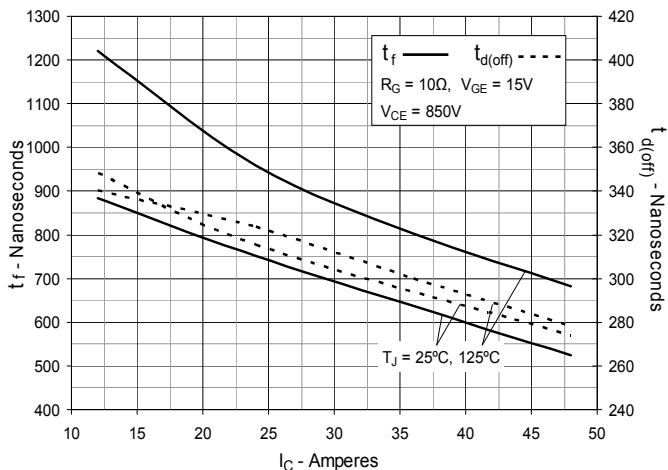
**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**



**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**

