IXYS

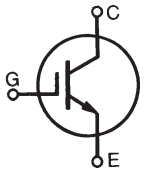
Preliminary Technical Information

# High Voltage IGBT

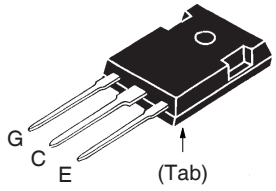
# IXGH10N300

$V_{CES}$ = 3000V
$I_{C90}$ = 10A
$V_{CE(sat)}$ ≤ 4.0V

## For Capacitor Discharge Applications




**TO-247 AD**




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

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{CES}$ | $T_J$ = 25°C to 150°C | 3000 | V |
| $V_{CGR}$ | $T_J$ = 25°C to 150°C, $R_{GE}$ = 1MΩ | 3000 | V |
| $V_{GES}$ | Continuous | ±20 | V |
| $V_{GEM}$ | Transient | ±30 | V |
| $I_{C25}$ | $T_C$ = 25°C | 18 | A |
| $I_{C90}$ | $T_C$ = 90°C | 10 | A |
| $I_{CM}$ | $T_C$ = 25°C, 1ms | 35 | A |
| **SSOA** | $V_{GE}$ = 20V, $T_{VJ}$ = 125°C, $R_G$ = 50Ω | $I_{CM}$ = 32 | A |
| **(RBSOA)** | Clamped Inductive Load | @ ≤ 1250 | V |
| $P_C$ | $T_C$ = 25°C | 125 | W |
| $T_J$ | | -55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | -55 ... +150 | °C |
| $T_L$ | Maximum Lead Temperature for Soldering | 300 | °C |
| $T_{SOLD}$ | 1.6 mm (0.062in.) from Case for 10s | 260 | °C |
| $M_d$ | Mounting Torque | 1.13/10 | Nm/lb.in. |
| **Weight** | | 6 | g |

### Features

- High Peak Current Capability
- Low Saturation Voltage
- Low Gate Drive Requirement
- Molding Epoxies Meet UL 94 V-0 Flammability Classification

### Applications

- Capacitor Discharge
- Pulser Circuits

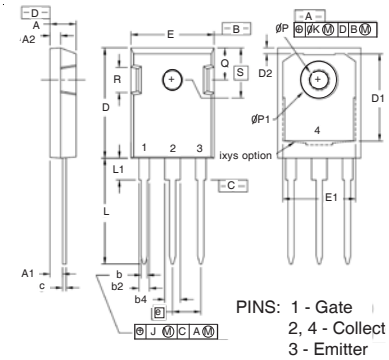
### Advantages

- High Power Density
- Easy to Mount

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{CES}$ | $I_C$ = 250μA, $V_{GE}$ = 0V | 3000 | | | V |
| $V_{GE(th)}$ | $I_C$ = 250μA, $V_{CE}$ = $V_{GE}$ | 3.0 | | 5.0 | V |
| $I_{CES}$ | $V_{CE}$ = 0.8 • $V_{CES}$, $V_{GE}$ = 0V | | | 25 | μA |
| | $T_J$ = 125°C | | | 1.25 | mA |
| $I_{GES}$ | $V_{CE}$ = 0V, $V_{GE}$ = ±20V | | | ±100 | nA |
| $V_{CE(sat)}$ | $I_C$ = 10A, $V_{GE}$ = 15V | | | 4.0 | V |
| | $T_J$ = 125°C | | 4.6 | | V |

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. |
|---|---|---|---|---|
| $g_{fs}$ | $I_C$ = 10A, $V_{CE}$ = 10V, Note 1 | 3.2 | 5.4 | S |
| $I_{C(ON)}$ | $V_{GE}$ = 15V, $V_{CE}$ = 15V, Note 1 | | 50 | A |
| $C_{ies}$ | $V_{CE}$ = 25V, $V_{GE}$ = 0V, f = 1MHz | | 535 | pF |
| $C_{oes}$ | | | 24 | pF |
| $C_{res}$ | | | 8 | pF |
| $Q_{g(on)}$ | $I_C$ = 10A, $V_{GE}$ = 15V, $V_{CE}$ = 0.5 • $V_{CES}$ | | 30 | nC |
| $Q_{ge}$ | | | 6 | nC |
| $Q_{gc}$ | | | 16 | nC |
| $t_{d(on)}$ | **Resistive Switching Times, $T_J$ = 25°C** | | 68 | ns |
| $t_r$ | $I_C$ = 20A, $V_{GE}$ = 15V | | 128 | ns |
| $t_{d(off)}$ | $V_{CE}$ = 1250V, $R_G$ = 50Ω | | 140 | ns |
| $t_f$ | | | 520 | ns |
| $t_{d(on)}$ | **Resistive Switching Times, $T_J$ = 125°C** | | 66 | ns |
| $t_r$ | $I_C$ = 20A, $V_{GE}$ = 15V | | 146 | ns |
| $t_{d(off)}$ | $V_{CE}$ = 1250V, $R_G$ = 50Ω | | 145 | ns |
| $t_f$ | | | 660 | ns |
| $R_{thJC}$ | | | | 1.00 °C/W |
| $R_{thCK}$ | | | 0.21 | °C/W |

**TO-247 Outline**




| SYM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS 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 |
| øP | .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 | |

Note

1. Pulse test, t ≤ 300µs, duty cycle, d ≤ 2%.
2. Additional provisions for lead-to-lead voltage isolation are required at $V_{CE}$ > 1200V.

**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.

**Fig. 1. Output Characteristics @ $T_J$ = 25ºC**

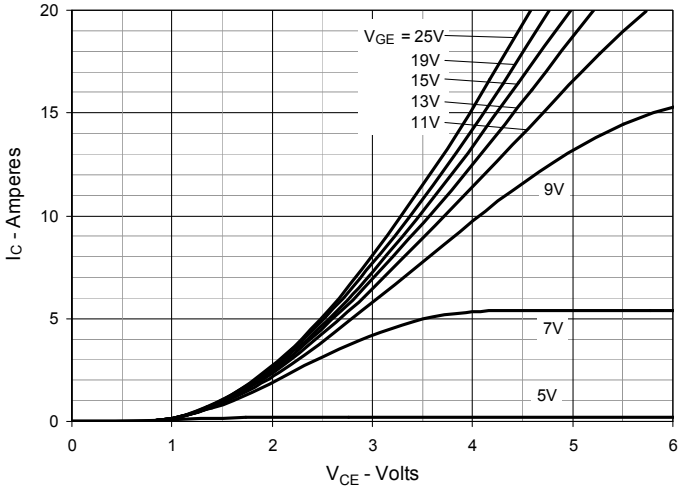



**Fig. 2. Extended Output Characteristics @ $T_J$ = 25ºC**

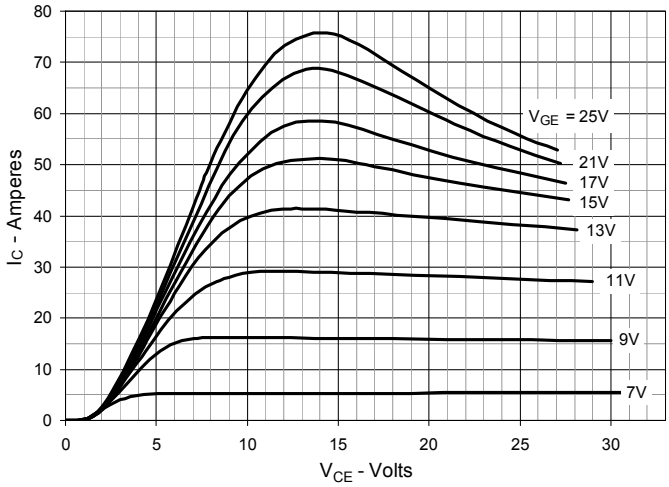



**Fig. 3. Output Characteristics @ $T_J$ = 125ºC**

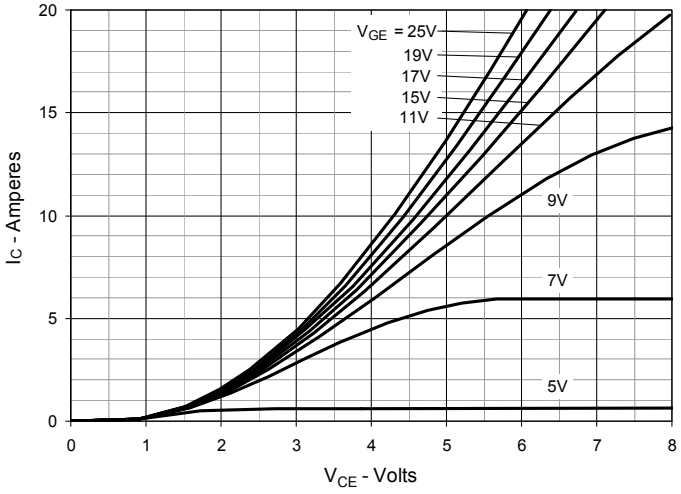



**Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature**

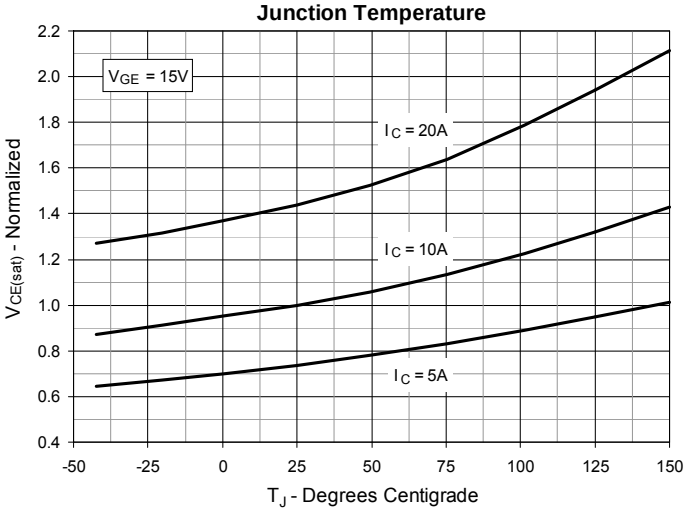



**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**

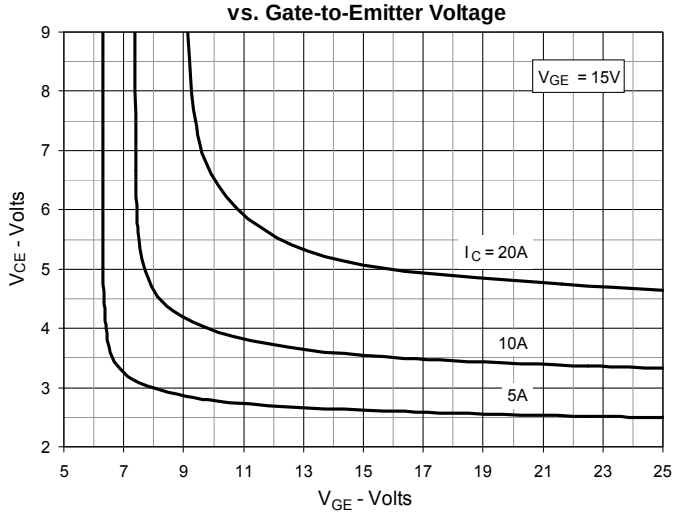



**Fig. 6. Input Admittance**

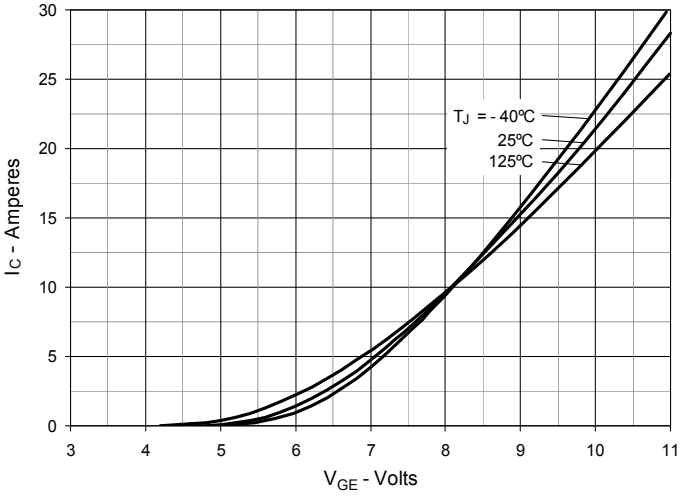


**Fig. 7. Transconductance**

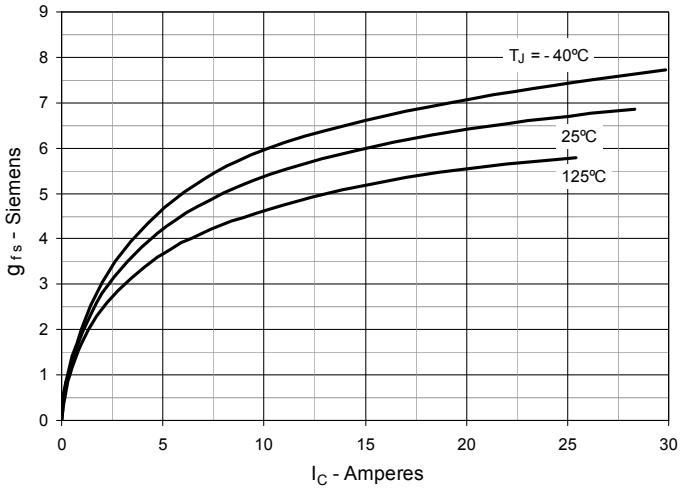



**Fig. 8. Gate Charge**

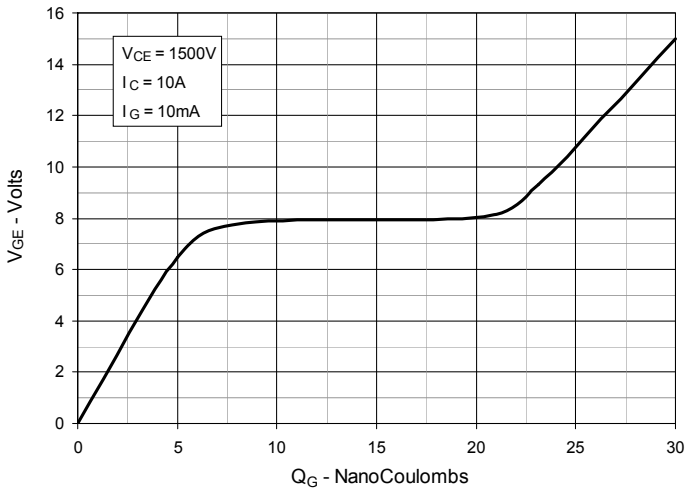



**Fig. 9. Reverse-Bias Safe Operating Area**

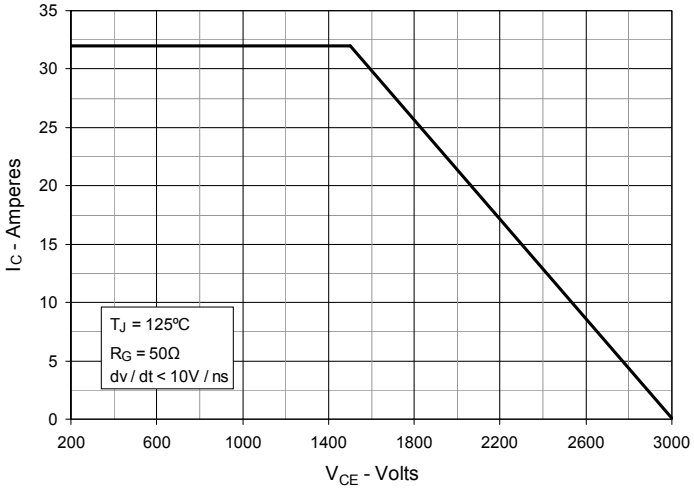



**Fig. 10. Capacitance**

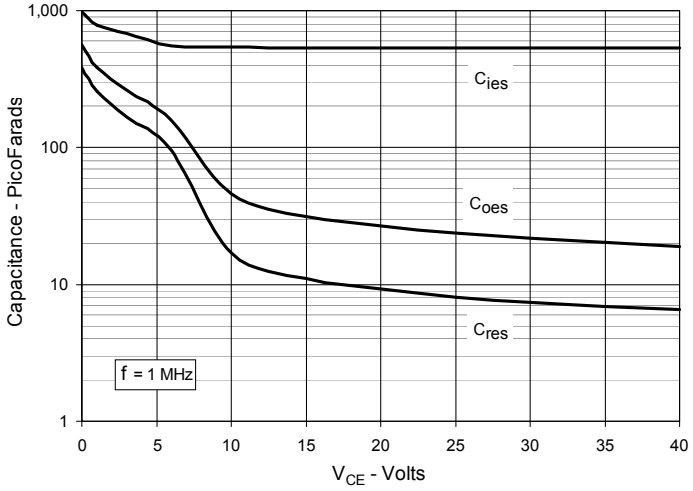



**Fig. 11. Maximum Transient Thermal Impedance**

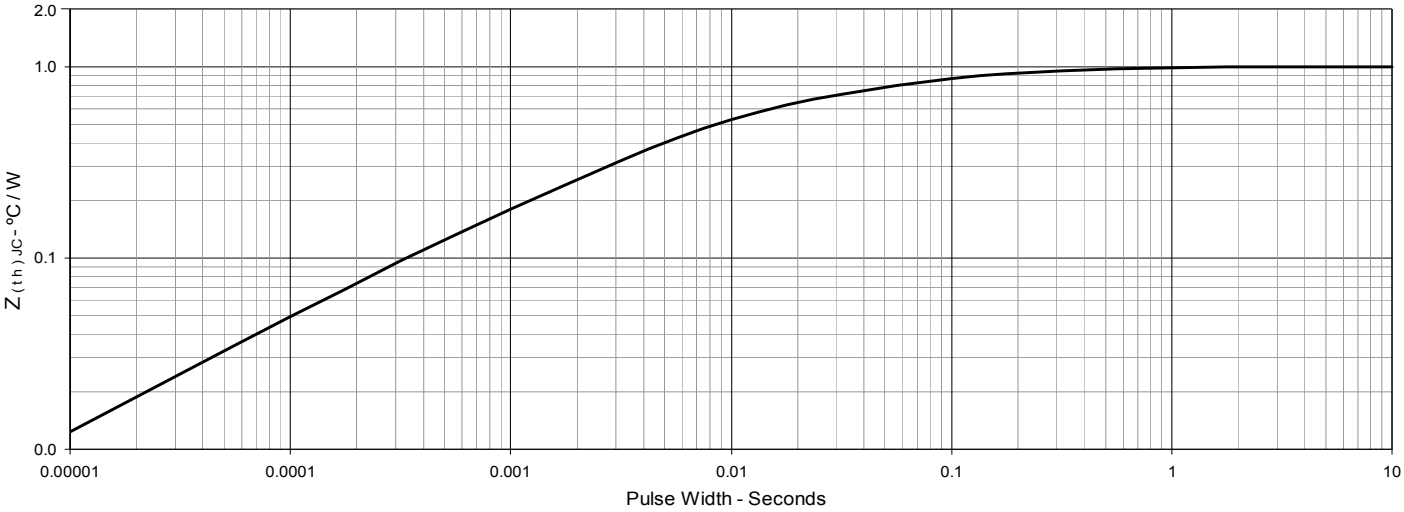


**Fig. 12. Resistive Turn-on Rise Time vs. Junction Temperature**

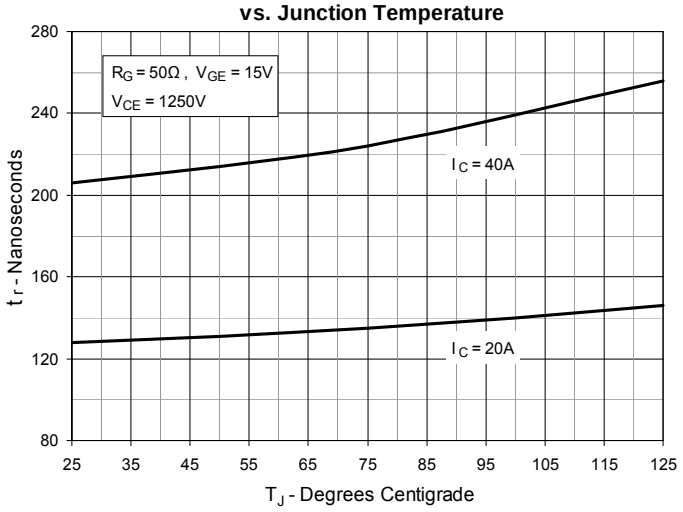



**Fig. 13. Resistive Turn-on Rise Time vs. Collector Current**

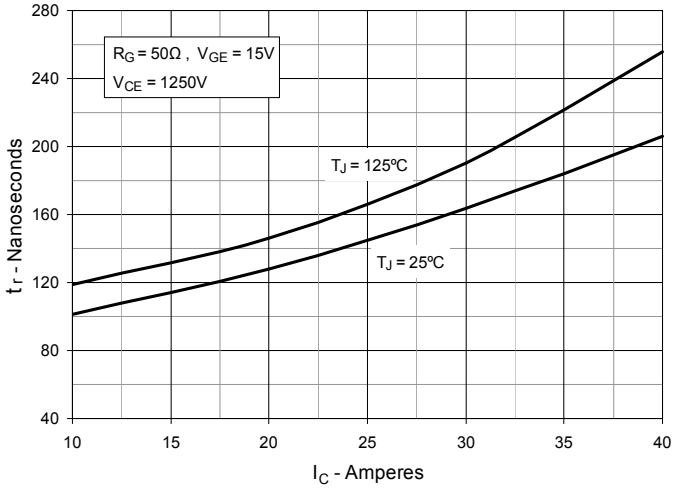



**Fig. 14. Resistive Turn-on Switching Times vs. Gate Resistance**

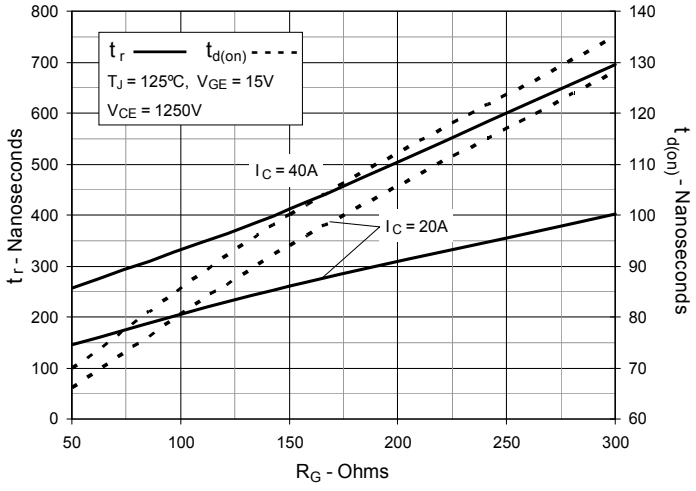



**Fig. 15. Resistive Turn-off Switching Times vs. Junction Temperature**

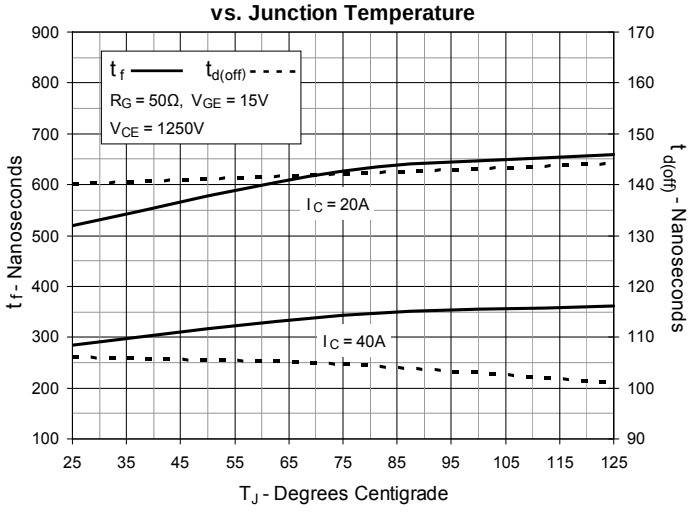



**Fig. 16. Resistive Turn-off Switching Times vs. Collector Current**

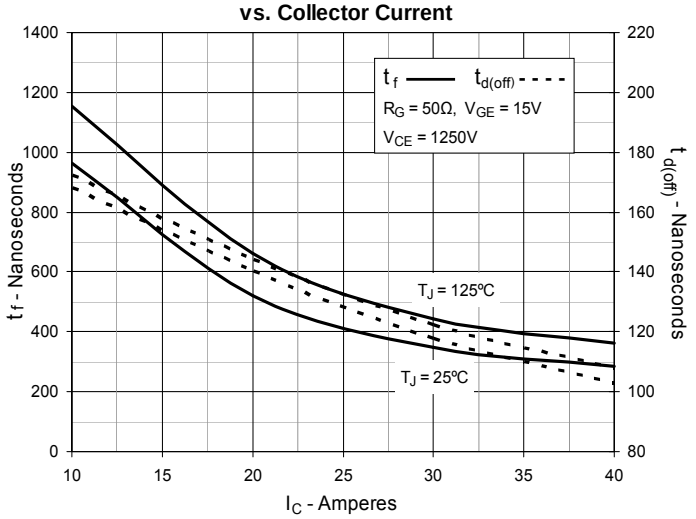



**Fig. 17. Resistive Turn-off Switching Times vs. Gate Resistance**