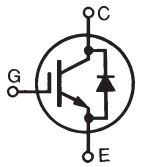
# IXYS

## High Voltage, High Gain BiMOSFET™

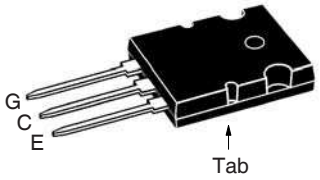
## Monolithic Bipolar MOS Transistor

# IXBK55N300
# IXBX55N300

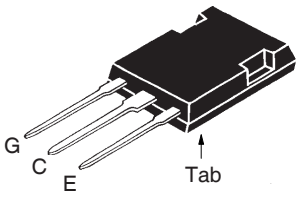
$V_{CES}$ = 3000V
$I_{C110}$ = 55A
$V_{CE(sat)}$ ≤ 3.2V




**TO-264 (IXBK)**




**PLUS247 (IXBX)**




G = Gate E = Emitter
C = Collector 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 | ±25 | V |
| $V_{GEM}$ | Transient | ±35 | V |
| $I_{C25}$ | $T_C$ = 25°C ( Chip Capability ) | 130 | A |
| $I_{LRMS}$ | $T_C$ = 25°C ( Lead RMS Limit ) | 120 | A |
| $I_{C110}$ | $T_C$ = 110°C | 55 | A |
| $I_{CM}$ | $T_C$ = 25°C, 1ms | 600 | A |
| **SSOA** | $V_{GE}$ = 15V, $T_{VJ}$ = 125°C, $R_G$ = 2Ω | $I_{CM}$ = 110 | A |
| **(RBSOA)** | Clamped Inductive Load | @0.8 • $V_{CES}$ | |
| $T_{SC}$ **(SCSOA)** | $V_{GE}$ = 15V, $T_J$ = 125°C, $R_G$ = 10Ω, $V_{CE}$ = 1250V, Non-Repetitive | 10 | μs |
| $P_C$ | $T_C$ = 25°C | 625 | 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 (0.062 in.) from Case for 10 | 260 | °C |
| $M_d$ | Mounting Torque (TO-264 ) | 1.13/10 | Nm/lb.in. |
| $F_C$ | Mounting Force (PLUS247 ) | 20..120/4.5..27 | N/lb. |
| **Weight** | TO-264 | 10 | g |
| | PLUS247 | 6 | g |

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{CES}$ | $I_C$ = 1mA, $V_{GE}$ = 0V | 3000 | | | V |
| $V_{GE(th)}$ | $I_C$ = 4mA, $V_{CE}$ = $V_{GE}$ | 3.0 | | 5.0 | V |
| $I_{CES}$ | $V_{CE}$ = $V_{CES}$, $V_{GE}$ = 0V | | | 50 | μA |
| | $T_J$ = 125°C | | | 3 | mA |
| $I_{GES}$ | $V_{CE}$ = 0V, $V_{GE}$ = ± 25V | | | ±200 | nA |
| $V_{CE(sat)}$ | $I_C$ = 55A, $V_{GE}$ = 15V, Note 1 | | 2.7 | 3.2 | V |
| | $T_J$ = 125°C | | 3.3 | | V |

### Features

- High Blocking Voltage
- International Standard Packages
- Low Conduction Losses
- High Current Handling Capability
- MOS Gate Turn-On
  - Drive Simplicity

### Advantages

- Easy to Mount
- Space Savings
- High Power Density

### Applications

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

| Symbol | Test Conditions ($T_J$ = 25°C Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $I_C$ = 55A, $V_{CE}$ = 10V, Note 1 | 32 | 50 | | S |
| $C_{ies}$ | $V_{CE}$ = 25V, $V_{GE}$ = 0V, f = 1MHz | | 7300 | | pF |
| $C_{oes}$ | | | 275 | | pF |
| $C_{res}$ | | | 83 | | pF |
| $Q_g$ | $I_C$ = 55A, $V_{GE}$ = 15V, $V_{CE}$ = 1000V | | 335 | | nC |
| $Q_{ge}$ | | | 47 | | nC |
| $Q_{gc}$ | | | 130 | | nC |
| $t_{d(on)}$ | **Resistive Switching Times, $T_J$ = 25°C** | | 54 | | ns |
| $t_r$ | $I_C$ = 110A, $V_{GE}$ = 15V | | 307 | | ns |
| $t_{d(off)}$ | $V_{CE}$ = 1250V, $R_G$ = 2Ω | | 230 | | ns |
| $t_f$ | | | 268 | | ns |
| $t_{d(on)}$ | **Resistive Switching Times, $T_J$ = 125°C** | | 52 | | ns |
| $t_r$ | $I_C$ = 110A, $V_{GE}$ = 15V | | 585 | | ns |
| $t_{d(off)}$ | $V_{CE}$ = 1250V, $R_G$ = 2Ω | | 215 | | ns |
| $t_f$ | | | 260 | | ns |
| $R_{thJC}$ | | | | 0.20 | °C/W |
| $R_{thCS}$ | | | 0.15 | | °C/W |

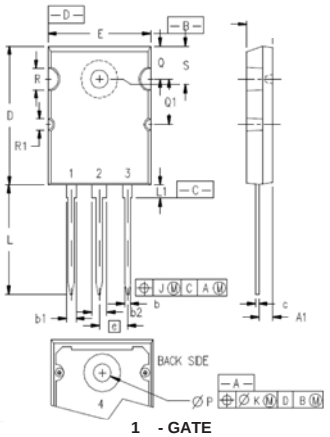
**Reverse Diode**

| Symbol | Test Conditions ($T_J$ = 25°C Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max | |
|---|---|---|---|---|---|
| $V_F$ | $I_F$ = 55A, $V_{GE}$ = 0V, Note 1 | | | 2.5 | V |
| $t_{rr}$ | $I_F$ = 28A, $V_{GE}$ = 0V, $-di_F/dt$ = 100A/µs | | 1.9 | | µs |
| $I_{RM}$ | $V_R$ = 100V, $V_{GE}$ = 0V | | 54 | | A |

Note 1: Pulse Test, t ≤ 300µs, Duty Cycle, d ≤ 2%.

Additional provisions for lead-to-lead isolation are required at $V_{CE}$ >1200V.

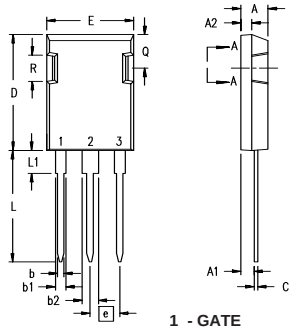
**TO-264 Outline**




**1 - GATE**
**2,4 - COLLECTOR**
**3 - EMITTER**

| SYM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS MAX |
|---|---|---|---|---|
| A | .185 | .209 | 4.70 | 5.31 |
| A1 | .102 | .118 | 2.59 | 3.00 |
| b | .037 | .055 | 0.94 | 1.40 |
| b1 | .087 | .102 | 2.21 | 2.59 |
| b2 | .110 | .126 | 2.79 | 3.20 |
| c | .017 | .029 | 0.43 | 0.74 |
| D | 1.007 | 1.047 | 25.58 | 26.59 |
| E | .760 | .799 | 19.30 | 20.29 |
| e | .215BSC | | 5.46 BSC | |
| J | .000 | .010 | 0.00 | 0.25 |
| K | .000 | .010 | 0.00 | 0.25 |
| L | .779 | .842 | 19.79 | 21.39 |
| L1 | .087 | .102 | 2.21 | 2.59 |
| ØP | .122 | .138 | 3.10 | 3.51 |
| Q | .240 | .256 | 6.10 | 6.50 |
| Q1 | .330 | .346 | 8.38 | 8.79 |
| ØR | .155 | .187 | 3.94 | 4.75 |
| ØR1 | .085 | .093 | 2.16 | 2.36 |
| S | .243 | .253 | 6.17 | 6.43 |

**PLUS 247™ Outline**



**1 - GATE**
**2 - COLLECTOR**
**3 - EMITTER**

| Dim. | Millimeter Min. | Millimeter Max. | Inches Min. | Inches Max. |
|---|---|---|---|---|
| A | 4.83 | 5.21 | .190 | .205 |
| $A_1$ | 2.29 | 2.54 | .090 | .100 |
| $A_2$ | 1.91 | 2.16 | .075 | .085 |
| b | 1.14 | 1.40 | .045 | .055 |
| $b_1$ | 1.91 | 2.13 | .075 | .084 |
| $b_2$ | 2.92 | 3.12 | .115 | .123 |
| C | 0.61 | 0.80 | .024 | .031 |
| D | 20.80 | 21.34 | .819 | .840 |
| E | 15.75 | 16.13 | .620 | .635 |
| e | 5.45 BSC | | .215 BSC | |
| L | 19.81 | 20.32 | .780 | .800 |
| L1 | 3.81 | 4.32 | .150 | .170 |
| Q | 5.59 | 6.20 | .220 | 0.244 |
| R | 4.32 | 4.83 | .170 | .190 |

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

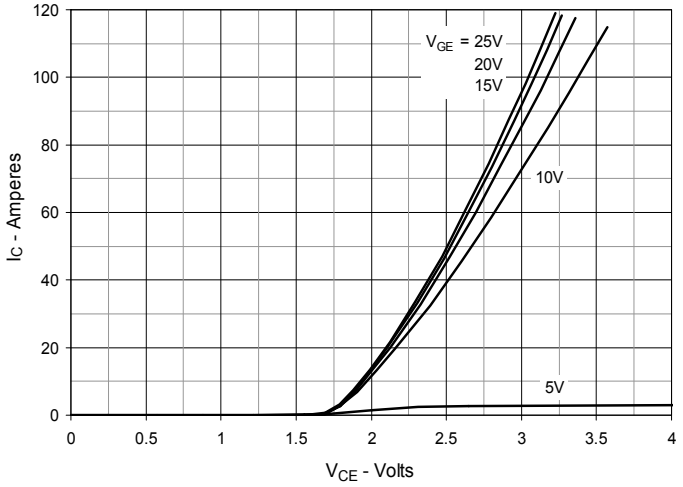



**Fig. 2. Extended Output Characteristics @ $T_J$ = 25ºC**

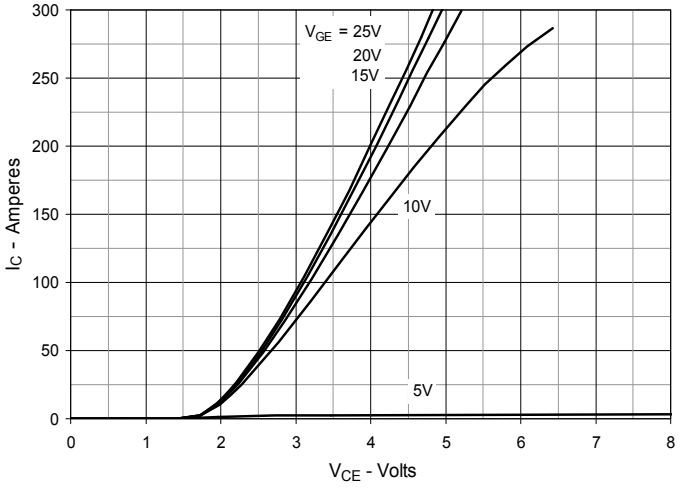



**Fig. 3. Output Characteristics @ $T_J$ = 125ºC**

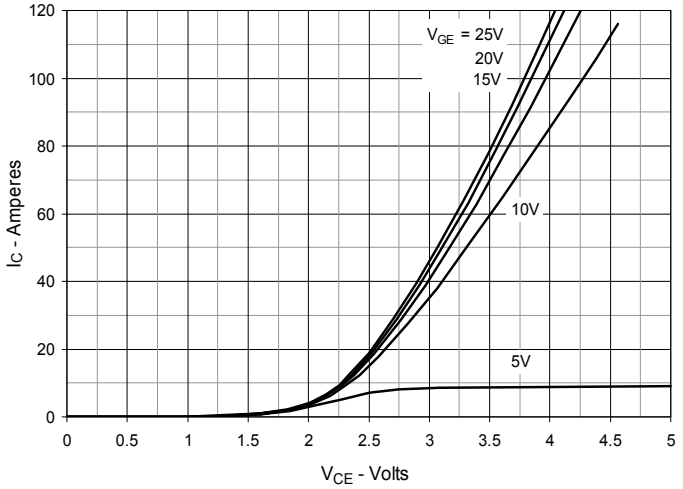



**Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature**

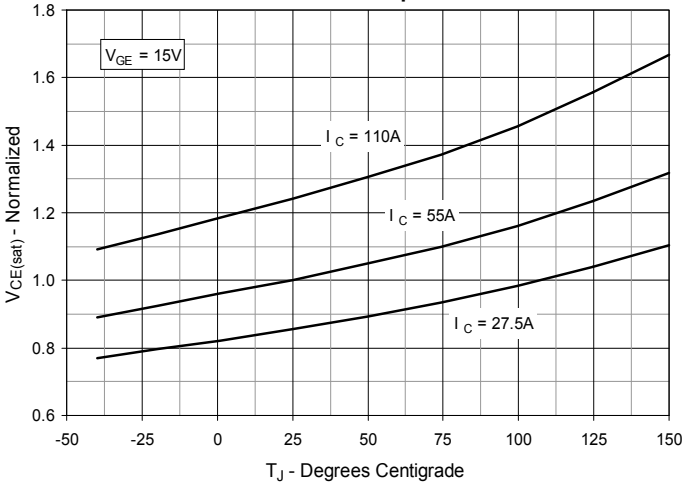



**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**

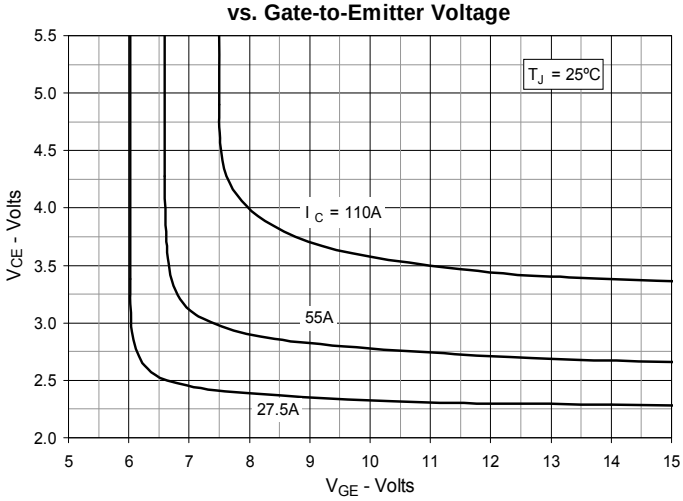



**Fig. 6. Input Admittance**

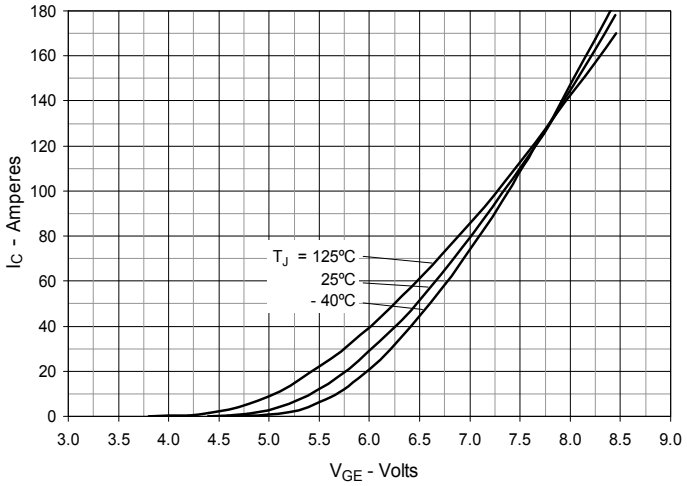


**Fig. 7. Transconductance**

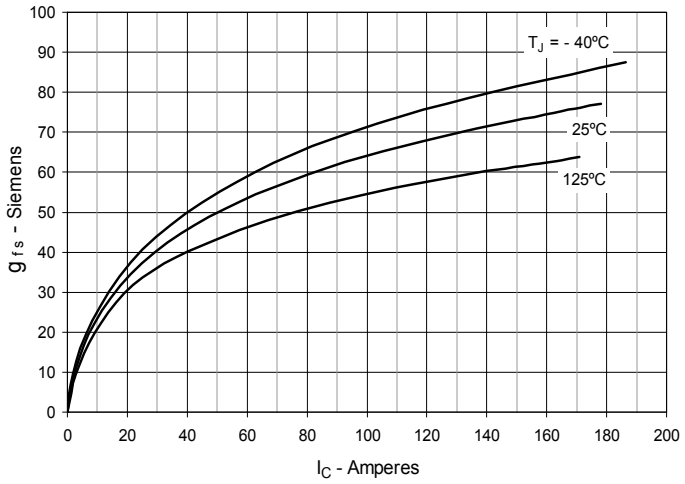



**Fig. 8. Forward Voltage Drop of Intrinsic Diode**

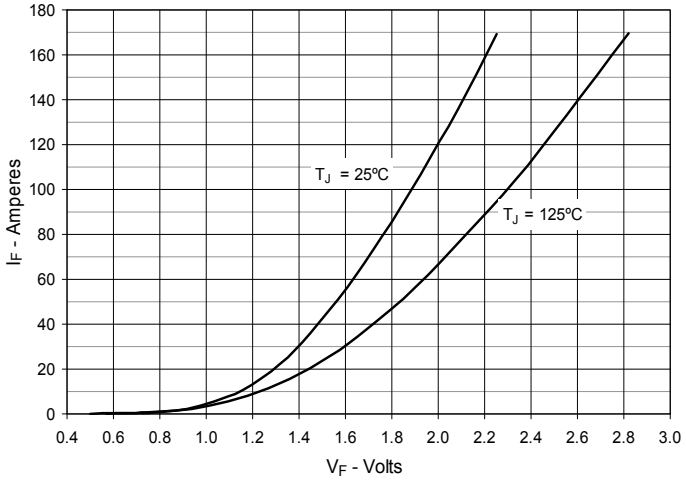



**Fig. 9. Gate Charge**

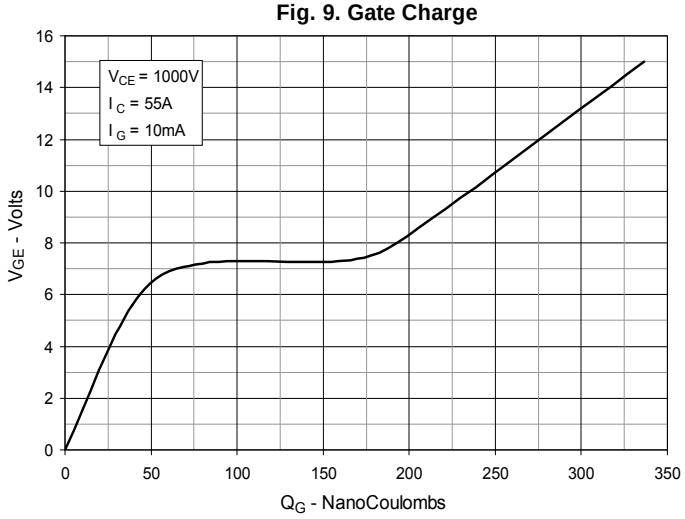



**Fig. 10. Capacitance**

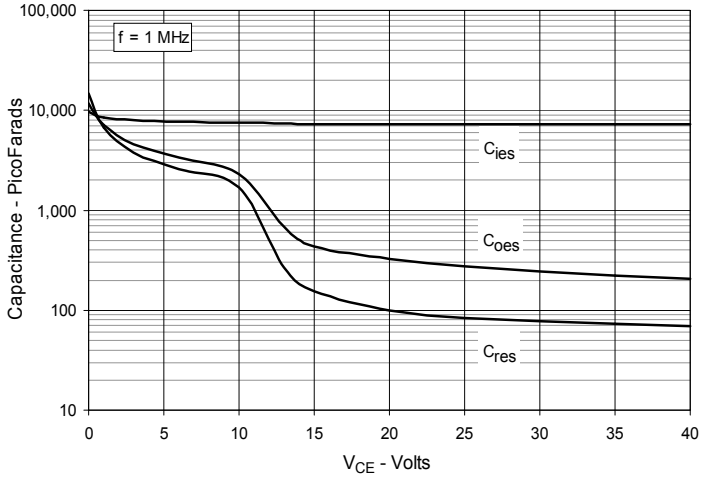



**Fig. 11. Reverse-Bias Safe Operating Area**

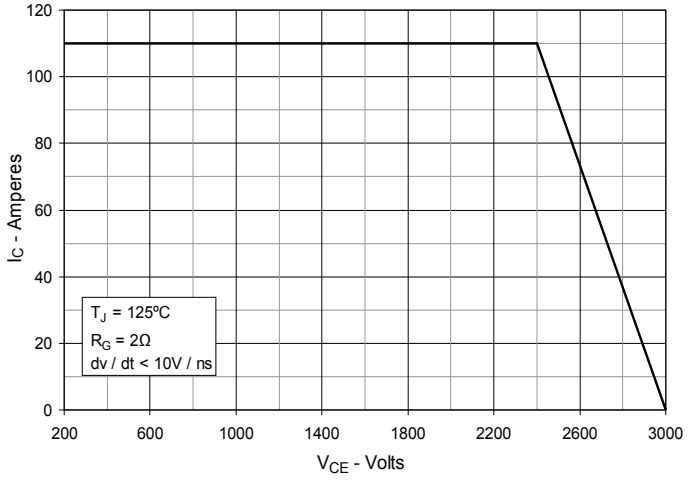



**Fig. 12. Maximum Transient Thermal Impedance**

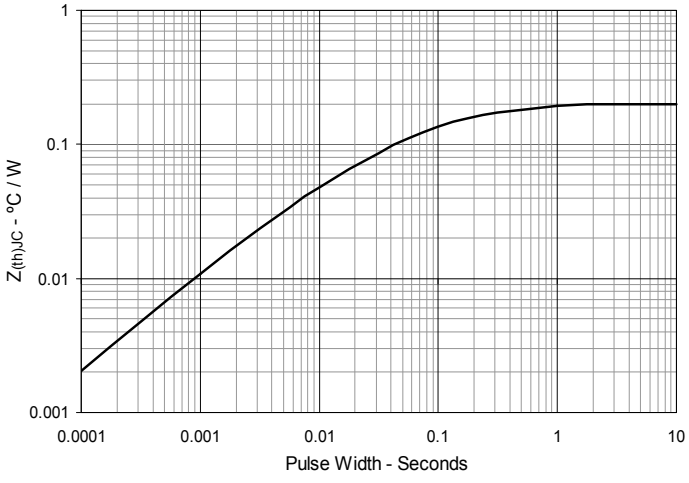


**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**

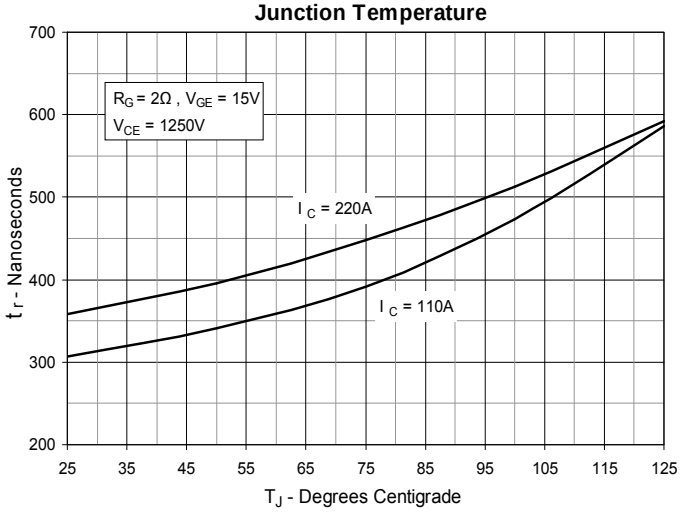



**Fig. 14. Resistive Turn-on Rise Time vs. Collector Current**

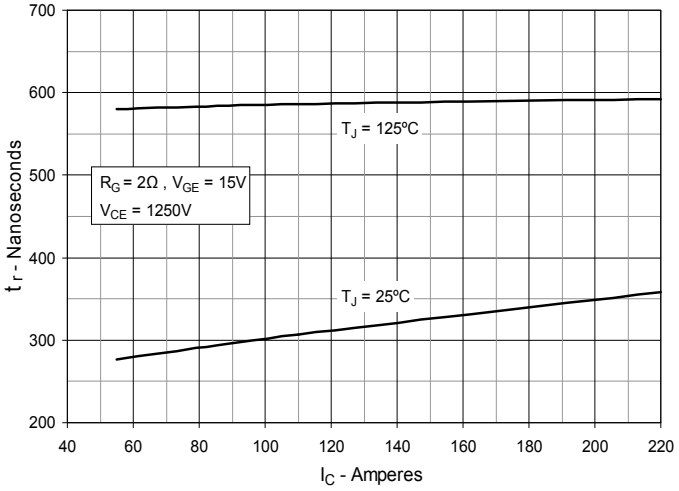



**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**

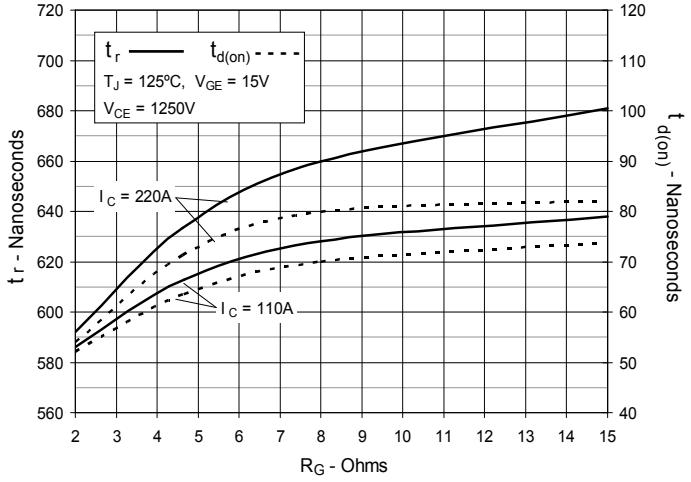



**Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature**

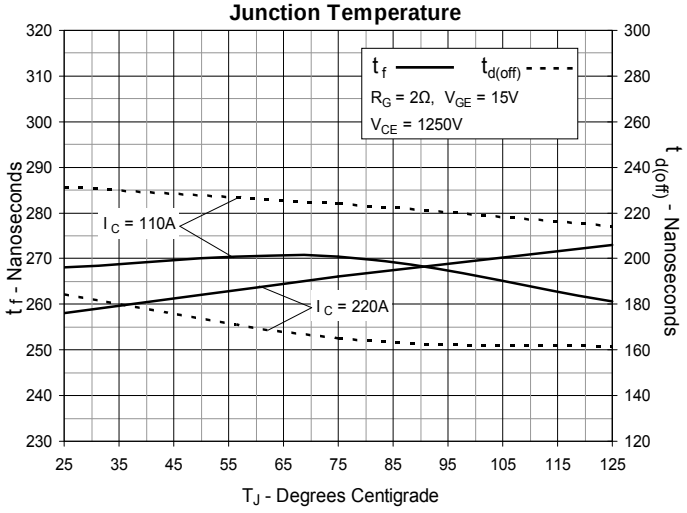



**Fig. 17. Resistive Turn-off Switching Times vs. Collector Current**

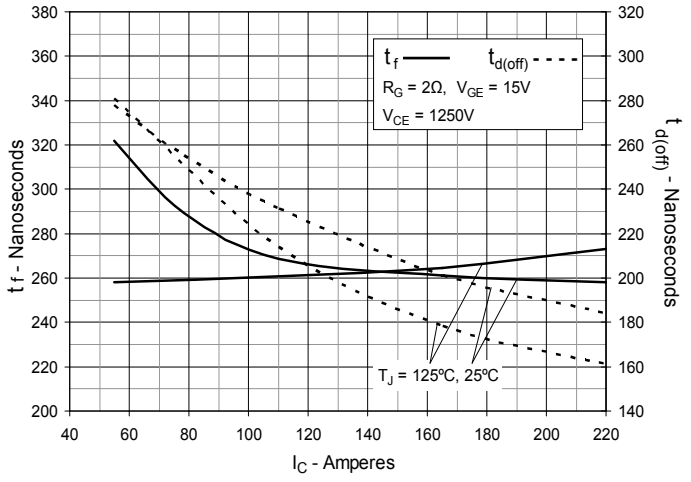



**Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance**

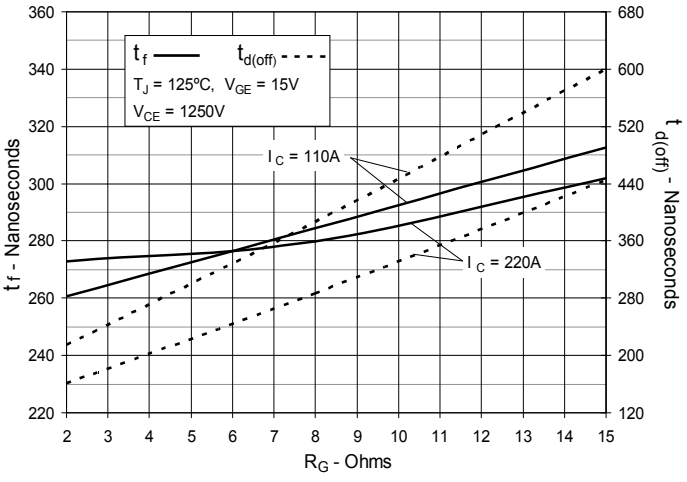


**Fig. 19. Forward-Bias Safe Operating Area @ $T_C$ = 25ºC**

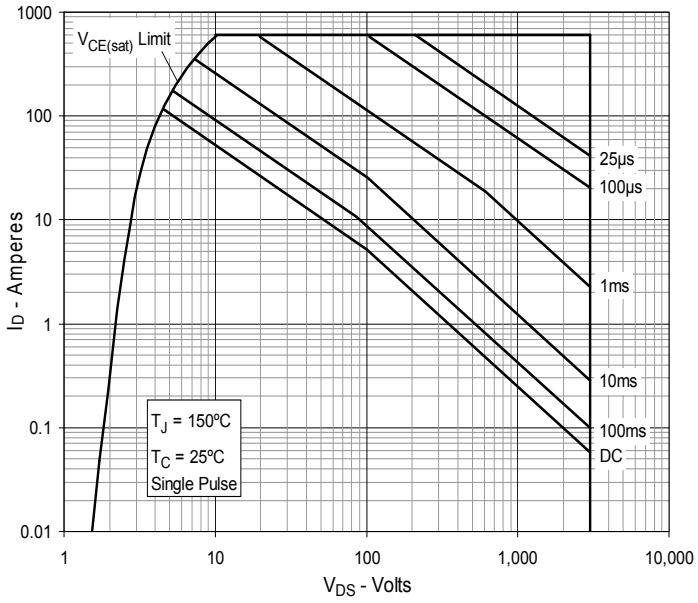



**Fig. 20. Forward-Bias Safe Operating Area @ $T_C$ = 75ºC**