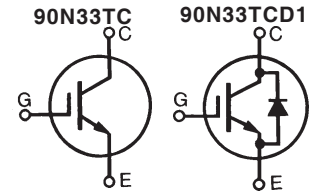


**Trench Gate,
High Speed,
IGBTs**

**IXGA90N33TC
IXGQ90N33TC
IXGQ90N33TCD1**

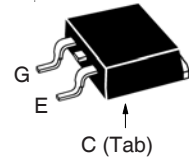
**$V_{CES} = 330V$
 $I_{CP} = 360A$
 $V_{CE(sat)} \leq 1.80V$**

For PDP Applications

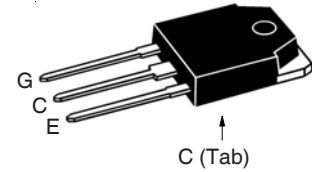


| Symbol | Test Conditions | Maximum Ratings | |
|--------------|--|-----------------|------------|
| V_{CES} | $T_J = 25^\circ C$ to $150^\circ C$ | 330 | V |
| V_{GES} | Continuous | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ C$ (Chip Capability) | 90 | A |
| $I_{C(RMS)}$ | Lead Current Limit | 75 | A |
| I_{C110} | $T_C = 110^\circ C$ | 38 | A |
| I_{CP} | $T_C \leq 150^\circ C$, $tp \leq 10\mu s$ | 60 | A |
| I_{CP} | $T_C \leq 150^\circ C$, $tp \leq 10\mu s$, Duty cycle $\leq 1\%$ | 360 | A |
| P_C | $T_C = 25^\circ C$ | 200 | 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-3P) | 1.13/10 | Nm/lb.in. |
| Weight | TO-263 | 2.5 | g |
| | TO-3P | 5.5 | g |

TO-263 AA (IXGA)



TO-3P (IXGQ)



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

Features

- Low $V_{CE(sat)}$ - for minimum On-State Conduction Losses
- Fast Switching

Applications

- PDP Screen Drivers

| Symbol | Test Conditions ($T_J = 25^\circ C$, Unless Otherwise Specified) | Characteristic Values | | |
|---------------|---|-----------------------|-------------|--------------------------|
| | | Min. | Typ. | Max. |
| BV_{CES} | $I_C = 250\mu A$, $V_{GE} = 0V$ | 330 | | V |
| $V_{GE(th)}$ | $I_C = 250\mu A$, $V_{CE} = V_{GE}$ | 3.0 | | 5.0 V |
| I_{CES} | $V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ C$ | | | 1 μA 200 μA |
| I_{GES} | $V_{CE} = 0V$, $V_{GE} = \pm 20V$ | | | ± 200 nA |
| $V_{CE(sat)}$ | $V_{GE} = 15V$, $I_C = 20A$, Note 1 | | | 1.40 V |
| | | | $I_C = 45A$ | 1.54 1.80 V |
| | $I_C = 90A$ | $T_J = 125^\circ C$ | | 1.54 V |
| | | | | 1.82 V |
| | $T_J = 125^\circ C$ | | 1.95 V | |

Symbol Test Conditions

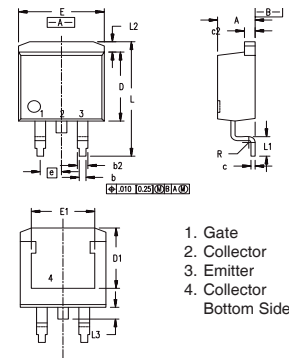
($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)

Characteristic Values

Min. Typ. Max.

| | | | | |
|--------------|--|------|------|-------------------------|
| g_{fS} | $I_C = 45\text{A}, V_{CE} = 10\text{V}, \text{Note 1}$ | 40 | 65 | S |
| C_{ies} | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$ | | 2320 | pF |
| C_{oes} | | | 180 | pF |
| C_{res} | | | 21 | pF |
| Q_g | $I_C = 45\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$ | | 69 | nC |
| Q_{ge} | | | 15 | nC |
| Q_{gc} | | | 13 | nC |
| $t_{d(on)}$ | Resistive Switching Times, $T_J = 25^\circ\text{C}$ $I_C = 45\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 240\text{V}, R_G = 5\Omega$ | | 13 | ns |
| t_r | | | 30 | ns |
| $t_{d(off)}$ | | | 38 | ns |
| t_f | | | 49 | ns |
| $t_{d(on)}$ | Resistive Switching Times, $T_J = 125^\circ\text{C}$ $I_C = 45\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 240\text{V}, R_G = 5\Omega$ | | 13 | ns |
| t_r | | | 28 | ns |
| $t_{d(off)}$ | | | 50 | ns |
| t_f | | | 74 | ns |
| R_{thJC} | | | | 0.62 $^\circ\text{C/W}$ |
| R_{thCS} | TO-3P | 0.21 | | $^\circ\text{C/W}$ |

TO-263 Outline



| Dim. | Millimeter | | Inches | |
|------|------------|-------|--------|------|
| | Min. | Max. | Min. | Max. |
| A | 4.06 | 4.83 | .160 | .190 |
| b | 0.51 | 0.99 | .020 | .039 |
| b2 | 1.14 | 1.40 | .045 | .055 |
| c | 0.40 | 0.74 | .016 | .029 |
| c2 | 1.14 | 1.40 | .045 | .055 |
| D | 8.64 | 9.65 | .340 | .380 |
| D1 | 8.00 | 8.89 | .280 | .320 |
| E | 9.65 | 10.41 | .380 | .405 |
| E1 | 6.22 | 8.13 | .270 | .320 |
| e | 2.54 | BSC | .100 | BSC |
| L | 14.61 | 15.88 | .575 | .625 |
| L1 | 2.29 | 2.79 | .090 | .110 |
| L2 | 1.02 | 1.40 | .040 | .055 |
| L3 | 1.27 | 1.78 | .050 | .070 |
| L4 | 0 | 0.13 | 0 | .005 |

Reverse Diode

Symbol Test Conditions

($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)

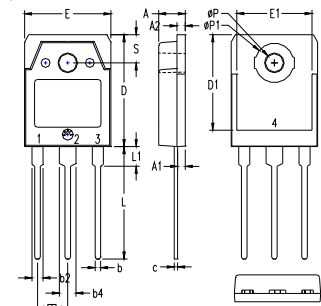
Characteristic Values

Min. Typ. Max

| | | | | |
|------------|---|--|--|------------------------|
| V_F | $I_F = 20\text{A}, V_{GE} = 0\text{V}, \text{Note 1}$ | | | 2.0 V |
| R_{thJC} | | | | 2.5 $^\circ\text{C/W}$ |

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

TO-3P Outline



1 = Gate 2,4 = Collector
3 = Emitter

| SYM | INCHES | | MILLIMETERS | |
|-----|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .185 | .193 | 4.70 | 4.90 |
| A1 | .051 | .059 | 1.30 | 1.50 |
| A2 | .057 | .065 | 1.45 | 1.65 |
| b | .035 | .045 | 0.90 | 1.15 |
| b2 | .075 | .087 | 1.90 | 2.20 |
| b4 | .114 | .126 | 2.90 | 3.20 |
| c | .022 | .031 | 0.55 | 0.80 |
| D | .780 | .799 | 19.80 | 20.30 |
| D1 | .665 | .677 | 16.90 | 17.20 |
| E | .610 | .622 | 15.50 | 15.80 |
| E1 | .531 | .539 | 13.50 | 13.70 |
| e | .215 BSC | | 5.45 BSC | |
| L | .779 | .795 | 19.80 | 20.20 |
| L1 | .134 | .142 | 3.40 | 3.60 |
| L2 | .126 | .134 | 3.20 | 3.40 |
| ØP1 | .272 | .280 | 6.90 | 7.10 |
| S | .193 | .201 | 4.90 | 5.10 |

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

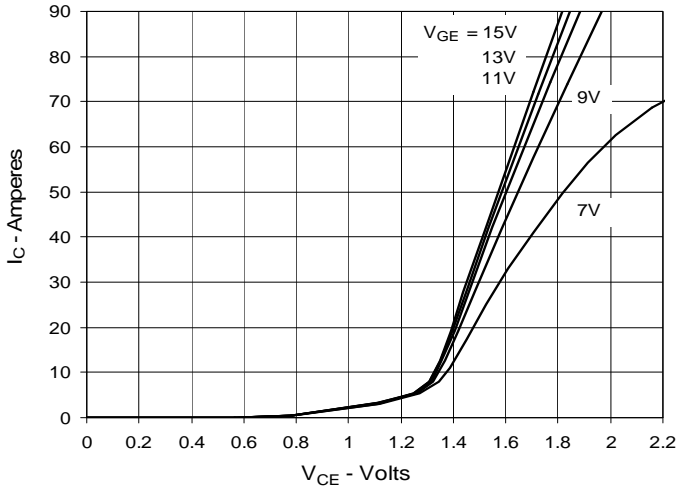


Fig. 2. Extended Output Characteristics @ 25°C

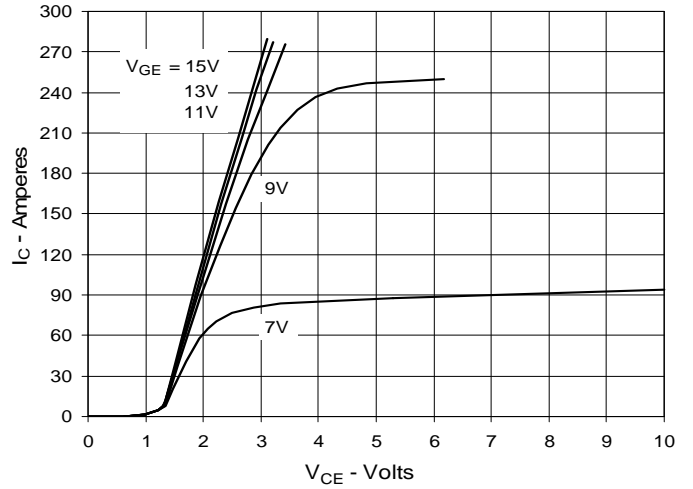


Fig. 3. Output Characteristics @ 125°C

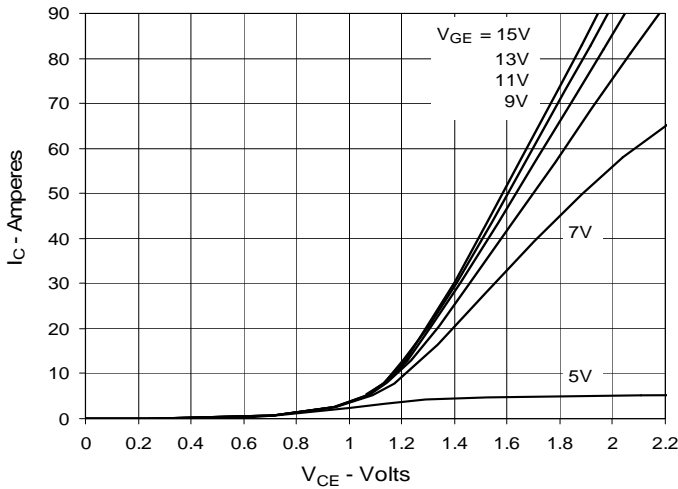


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

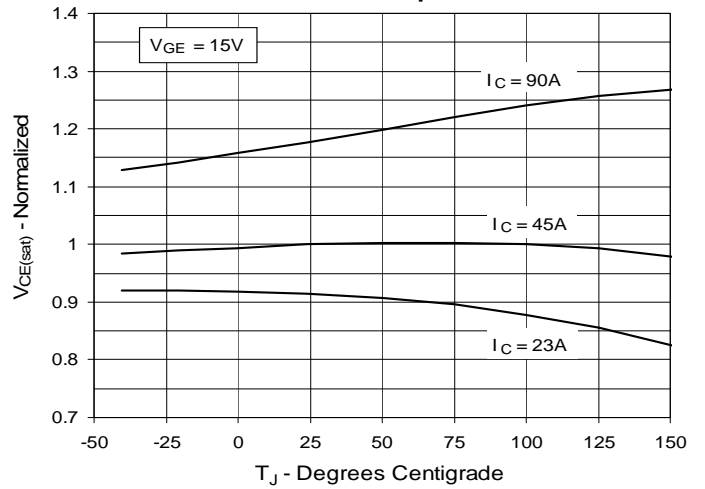


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

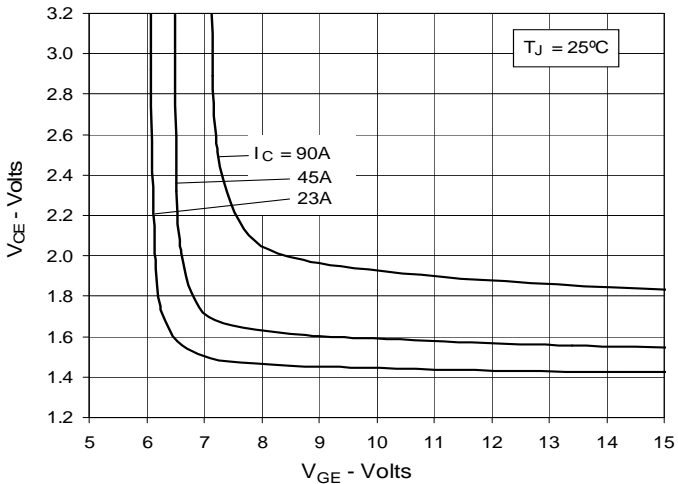


Fig. 6. Input Admittance

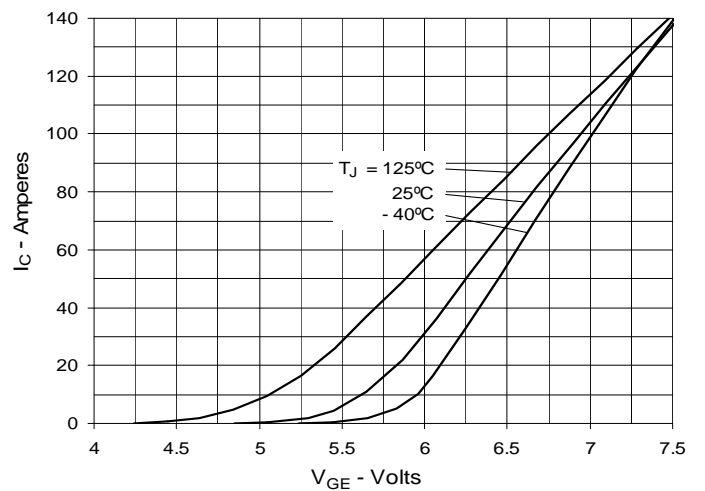


Fig. 7. Transconductance

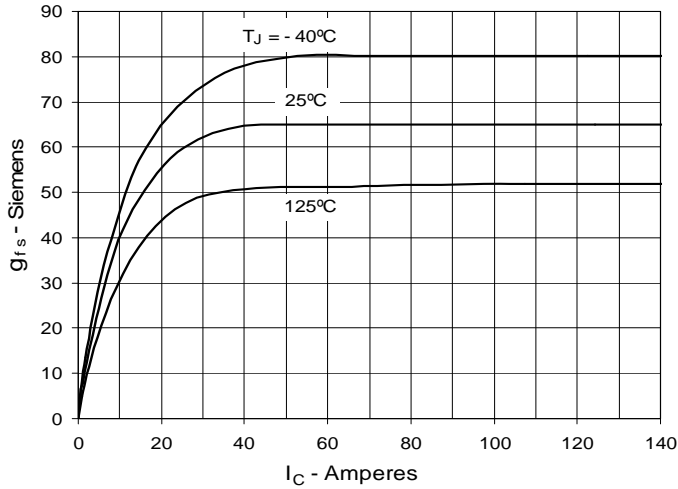


Fig. 8. Gate Charge

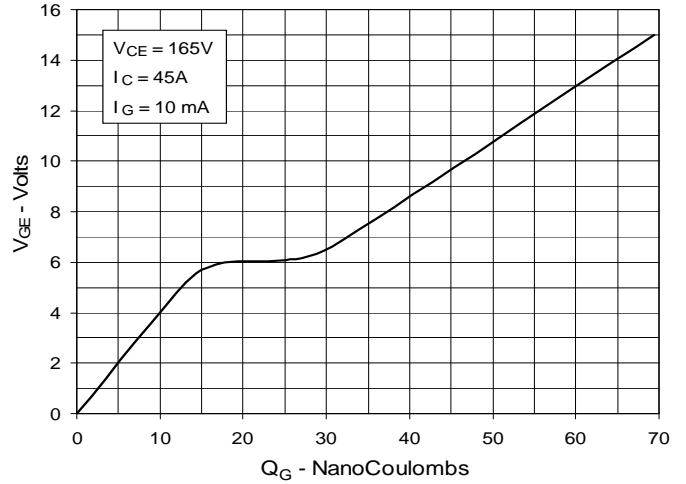


Fig. 9. Reverse-Bias Safe Operating Area

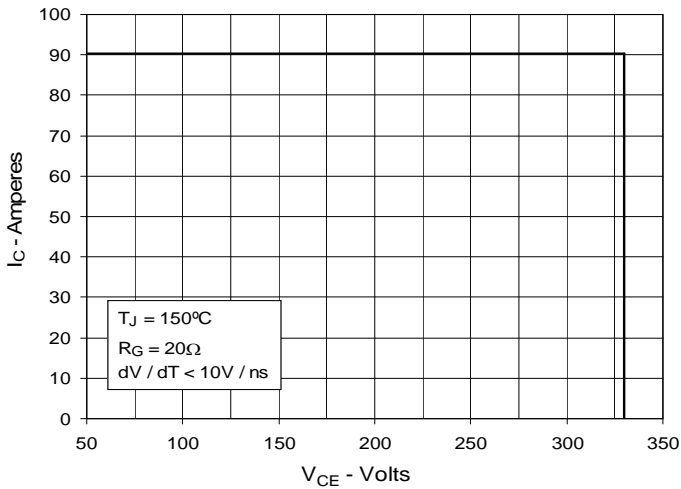


Fig. 10. Capacitance

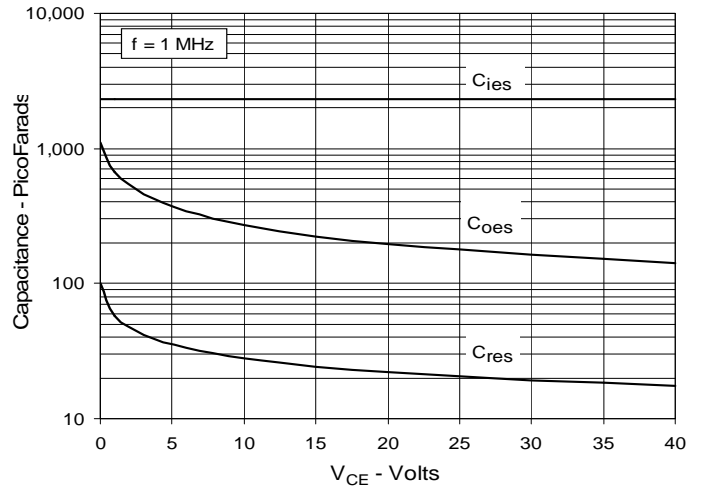


Fig. 11. Forward-Bias Safe Operating Area

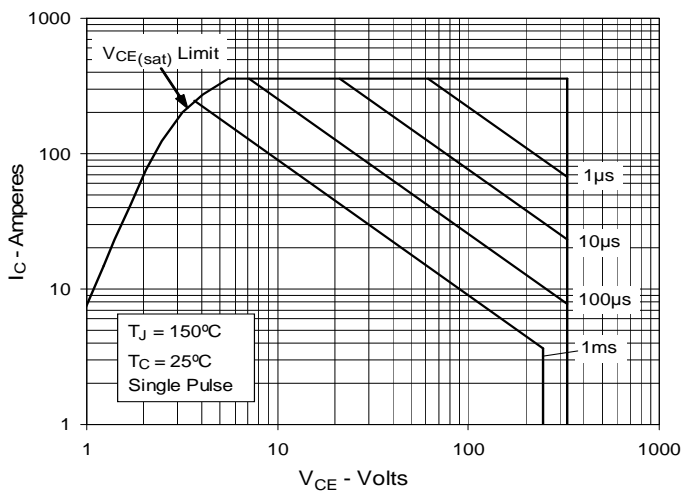


Fig. 12. Maximum Transient Thermal Impedance

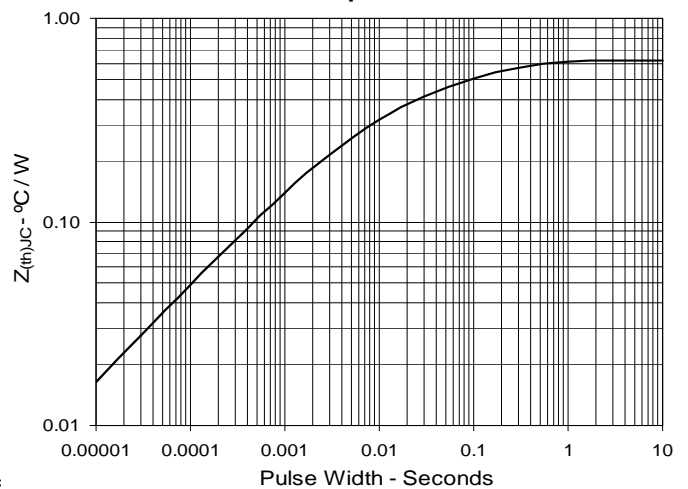


Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature

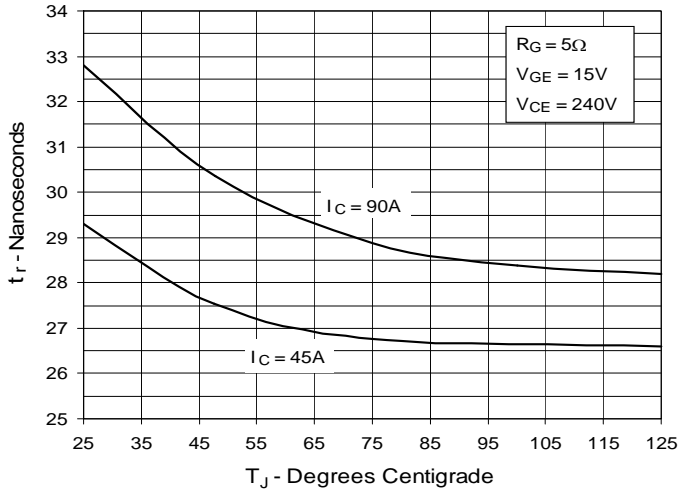


Fig. 14. Resistive Turn-on Rise Time vs. Collector Current

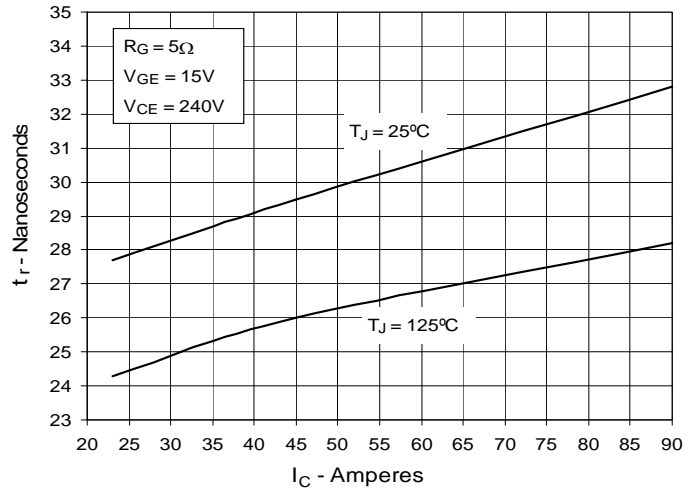


Fig. 16. Resistive Turn-on Switching Times vs. Gate Resistance

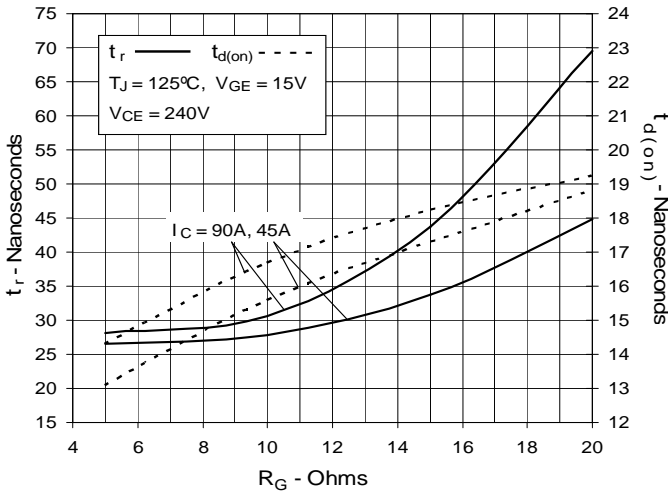


Fig. 17. Resistive Turn-off Switching Times vs. Junction Temperature

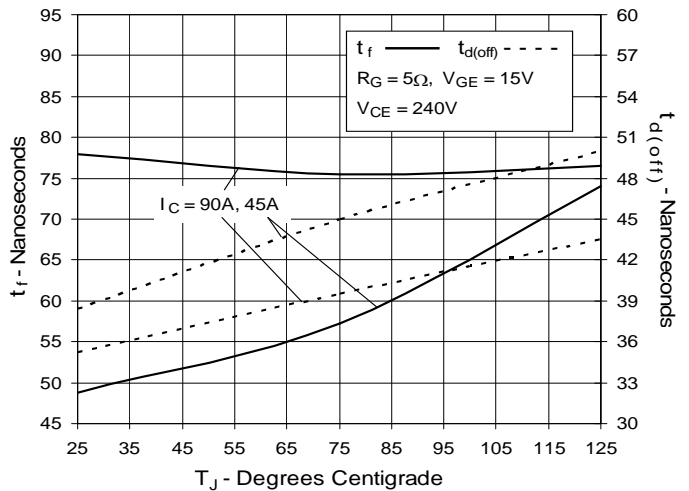


Fig. 18. Resistive Turn-off Switching Times vs. Collector Current

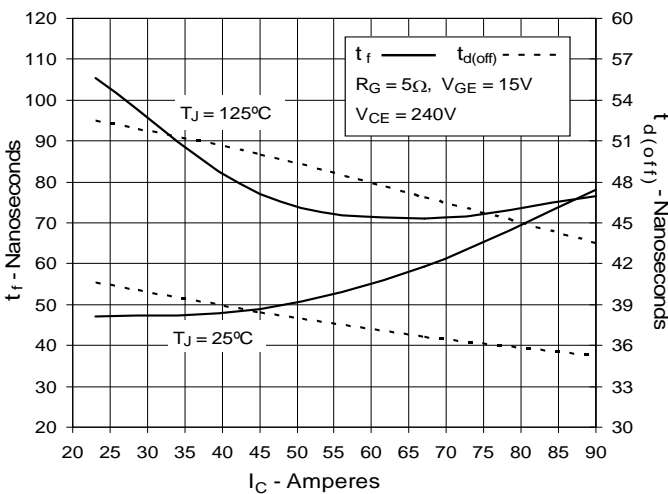


Fig. 19. Resistive Turn-off Switching Times vs. Gate Resistance

