

High Voltage IGBT For Capacitor Discharge Applications

MMIX4G20N250

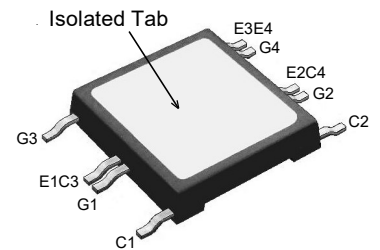
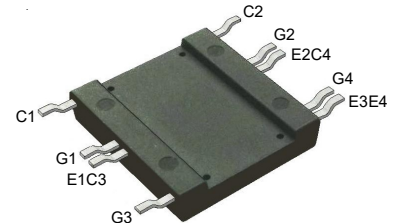
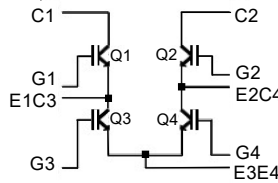
$$V_{CES} = 2500V$$

$$I_{C25} = 23A$$

$$V_{CE(sat)} \leq 3.1V$$

(Electrically Isolated Tab)

H-Bridge Configuration



G = Gate E = Emitter
C = Collector

| Symbol | Test Conditions | Maximum Ratings | |
|----------------|--|------------------|------------|
| V_{CES} | $T_J = 25^\circ C$ 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 | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ C$ | 23 | A |
| I_{C90} | $T_C = 90^\circ C$ | 14 | A |
| I_{CM} | $T_C = 25^\circ C$, $V_{GE} = 19V$, 1ms 10ms | 105 55 | A A |
| SSOA | $V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 20\Omega$ | $I_{CM} = 60$ | A |
| (RBSOA) | Clamped Inductive Load | 1500 | V |
| P_C | $T_C = 25^\circ C$ | 100 | W |
| T_J | | -55 ... +150 | $^\circ C$ |
| T_{JM} | | 150 | $^\circ C$ |
| T_{stg} | | -55 ... +150 | $^\circ C$ |
| T_{SOLD} | Plastic Body for 10 seconds | 260 | $^\circ C$ |
| F_C | Mounting Force | 50..200 / 11..45 | Nm/lb.in. |
| V_{ISOL} | 50/60Hz, 1 Minute | 4000 | V~ |
| Weight | | 8 | g |

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 4000V~ Electrical Isolation
- High Peak Current Capability
- Low Saturation Voltage
- Molding Epoxies Meet UL 94 V-0 Flammability Classification

Advantages

- High Power Density
- Easy to Mount

Applications

- Capacitor Discharge
- Pulser Circuits

| Symbol | Test Conditions ($T_J = 25^\circ C$, Unless Otherwise Specified) | Characteristic Values | | |
|---------------|---|-----------------------|------|---------------------------|
| | | Min. | Typ. | Max. |
| BV_{CES} | $I_C = 250\mu A$, $V_{GE} = 0V$ | 2500 | | V |
| $V_{GE(th)}$ | $I_C = 250\mu A$, $V_{CE} = V_{GE}$ | 3.0 | | 5.0 V |
| I_{CES} | $V_{CE} = 0.8 \cdot V_{CES}$, $V_{GE} = 0V$ Note 2, $T_J = 125^\circ C$ | | | 10 μA 750 μA |
| I_{GES} | $V_{CE} = 0V$, $V_{GE} = \pm 20V$ | | | ± 100 nA |
| $V_{CE(sat)}$ | $I_C = 20A$, $V_{GE} = 15V$, Note 1 | | | 3.1 V |

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|--------------|--|-----------------------|------|-----------|
| | | Min. | Typ. | Max. |
| g_{fs} | $I_C = 20\text{A}$, $V_{CE} = 10\text{V}$, Note 1 | 8 | 13 | S |
| $I_{C(ON)}$ | $V_{GE} = 20\text{V}$, $V_{CE} = 15\text{V}$, Note 1 | | 190 | A |
| C_{ies} | } $V_{CE} = 15\text{V}$, $V_{GE} = 20\text{V}$, $f = 1\text{MHz}$ | | 1190 | pF |
| C_{oes} | | | 53 | pF |
| C_{res} | | | 18 | pF |
| Q_g | } $I_C = 20\text{A}$, $V_{GE} = 15\text{V}$, $V_{CE} = 1000\text{V}$ | | 53 | nC |
| Q_{ge} | | | 8 | nC |
| Q_{gc} | | | 22 | nC |
| $t_{d(on)}$ | } Resistive Switching Times $I_C = 40\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 1250\text{V}$, $R_G = 10\Omega$ | | 57 | ns |
| t_r | | | 160 | ns |
| $t_{d(off)}$ | | | 136 | ns |
| t_f | | | 930 | ns |
| R_{thJC} | | | | 1.25 °C/W |
| R_{thCS} | | 0.05 | | °C/W |
| R_{thJA} | | 30 | | °C/W |

Notes:

1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.
2. Device must be heatsunk for high temperature leakage current measurements to avoid thermal runaway.

Littelfuse reserves the right to change limits, test conditions, and dimensions.

| | | | | | | | | | | |
|---|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| IXYS MOSFETs and IGBTs are covered | 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 |
| by one or more of the following U.S. patents: | 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 @ $T_J = 25^\circ\text{C}$

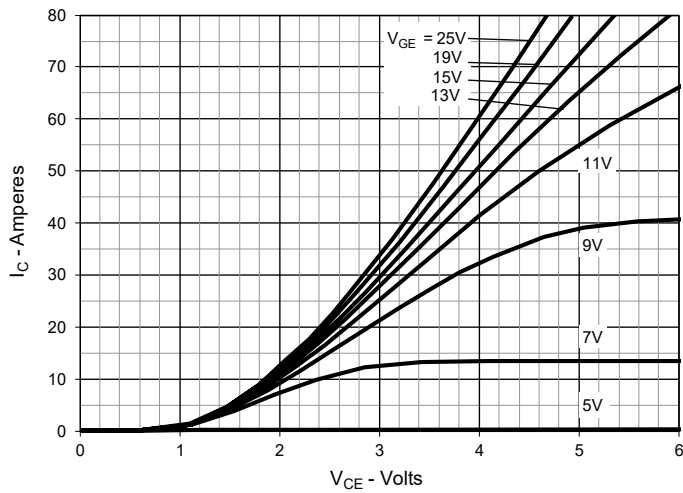


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

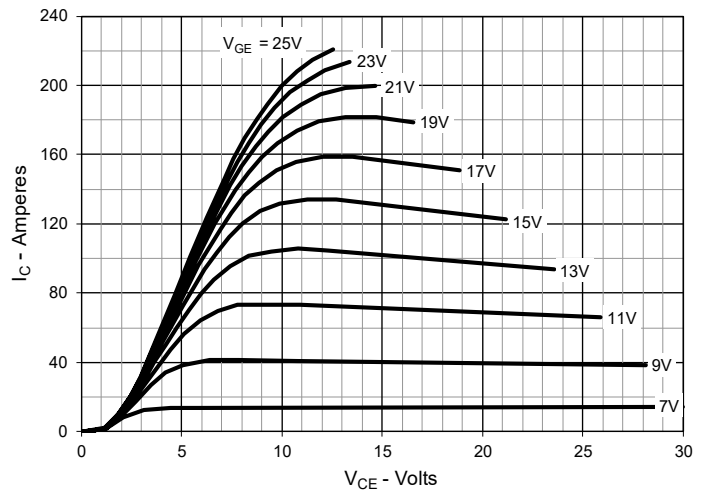


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

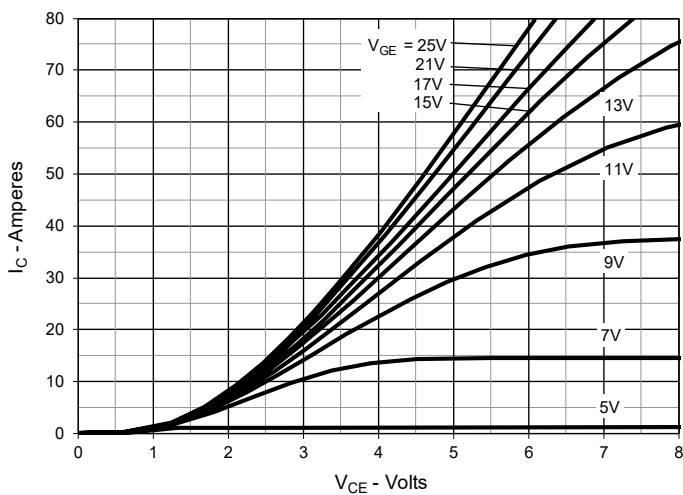


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

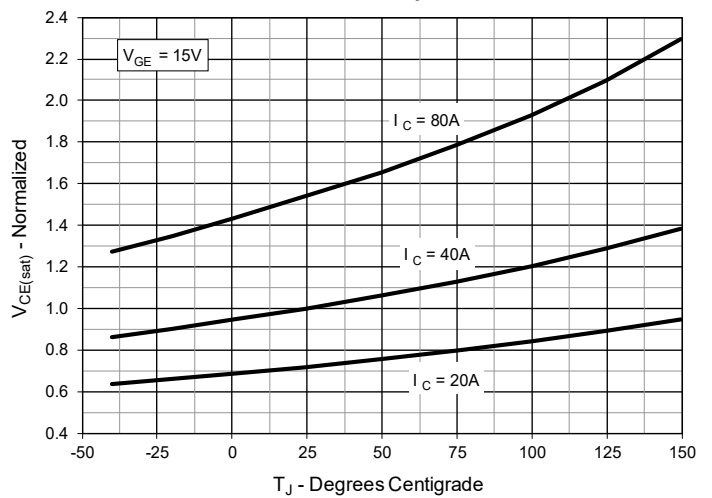


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

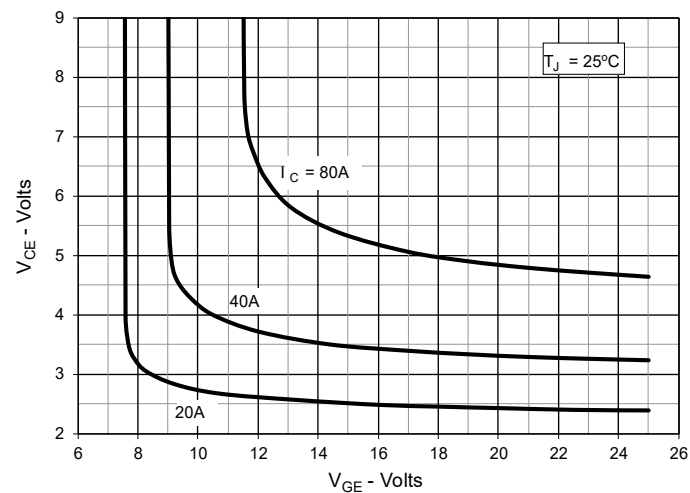


Fig. 6. Input Admittance

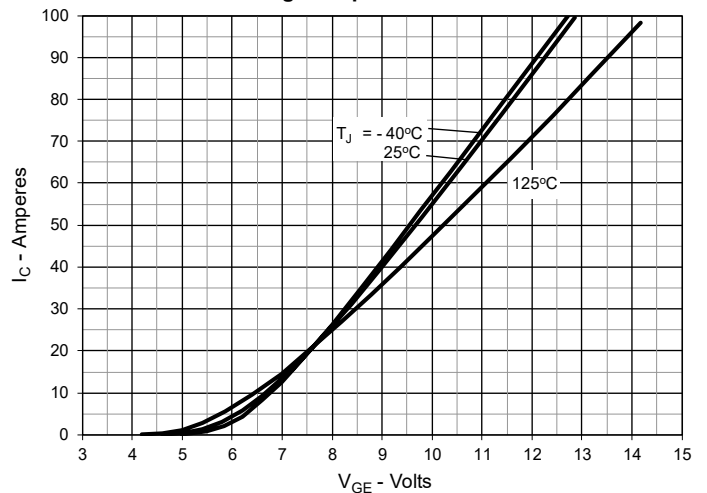


Fig. 7. Transconductance

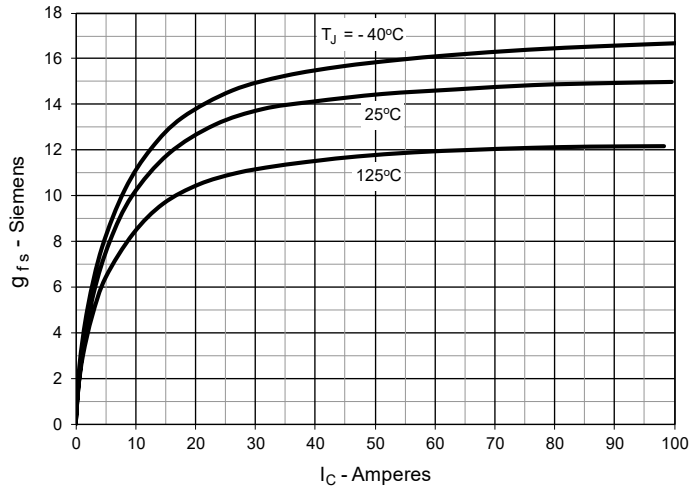


Fig. 8. Gate Charge

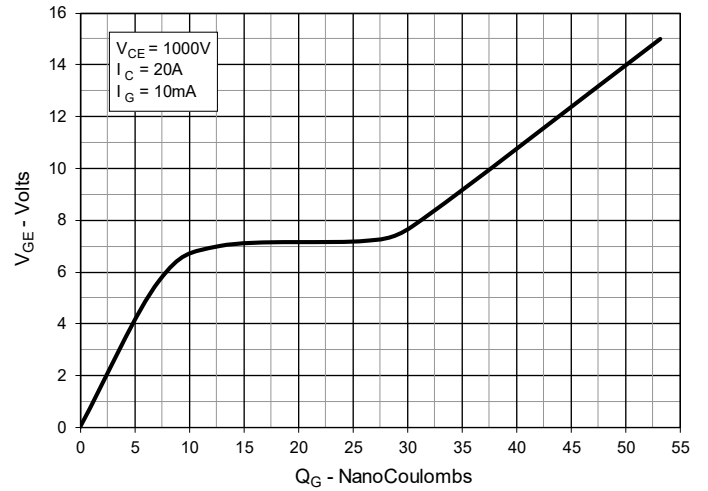


Fig. 9. Reverse-Bias Safe Operating Area

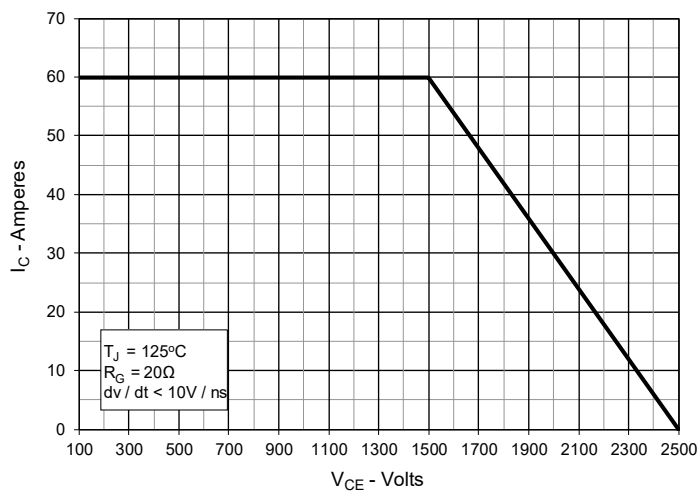


Fig. 10. Capacitance

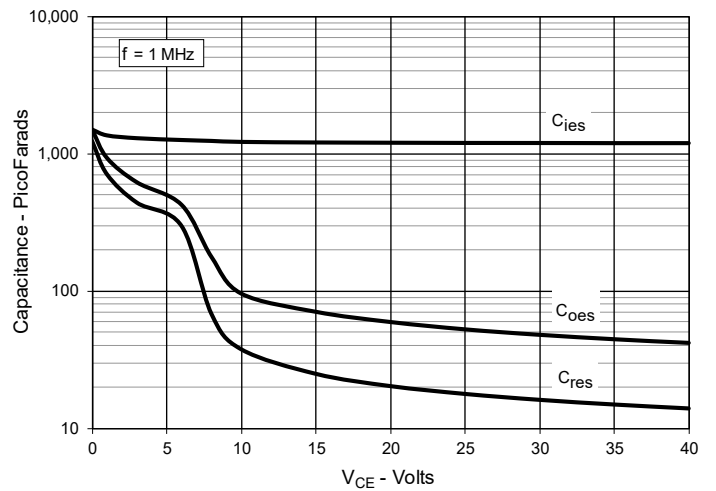


Fig. 11. Maximum Transient Thermal Impedance

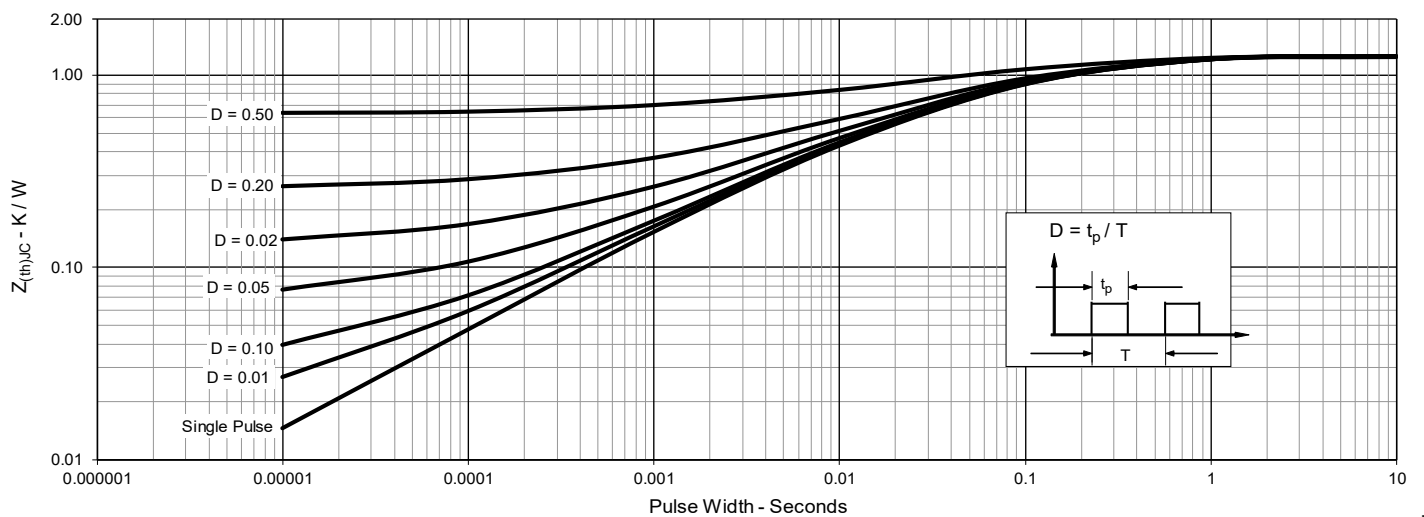


Fig. 12. Resistive Turn-on Rise Time vs. Junction Temperature

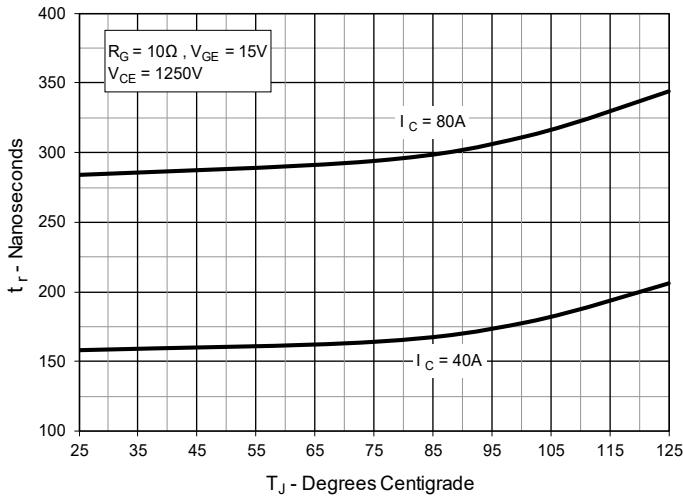


Fig. 13. Resistive Turn-on Rise Time vs. Collector Current

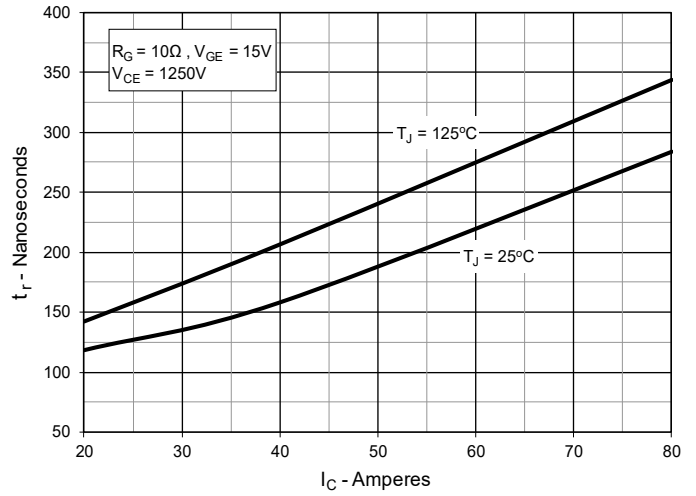


Fig. 14. Resistive Turn-on Switching Times vs. Gate Resistance

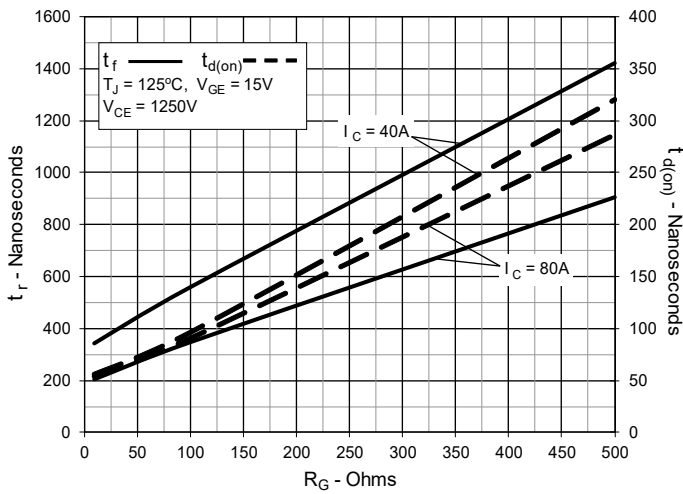


Fig. 15. Resistive Turn-off Switching Times vs. Junction Temperature

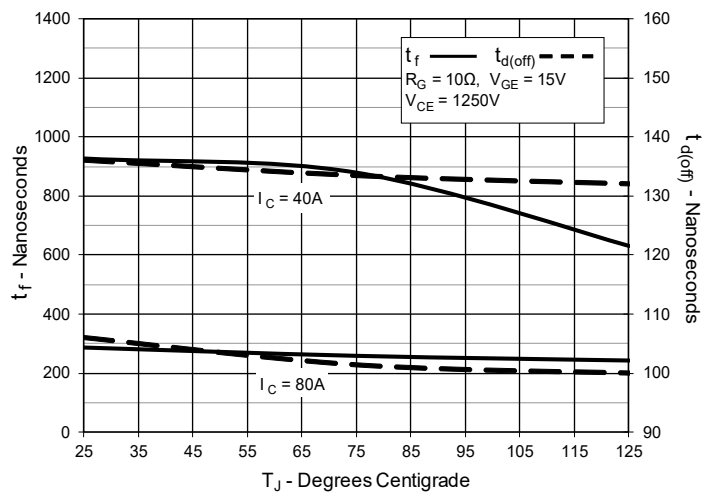


Fig. 16. Resistive Turn-off Switching Times vs. Collector Current

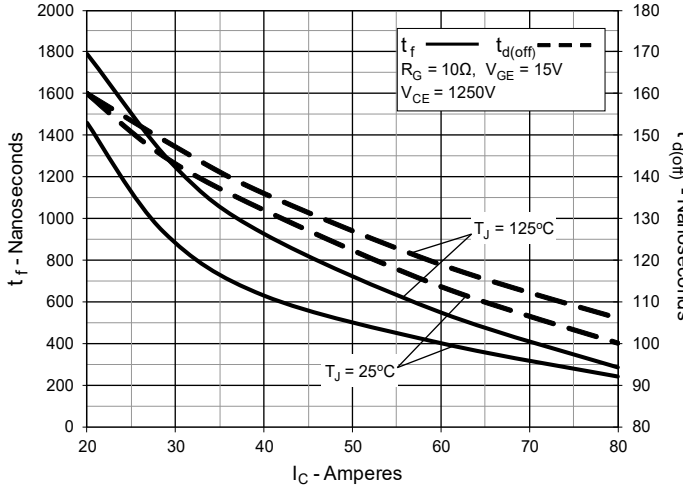
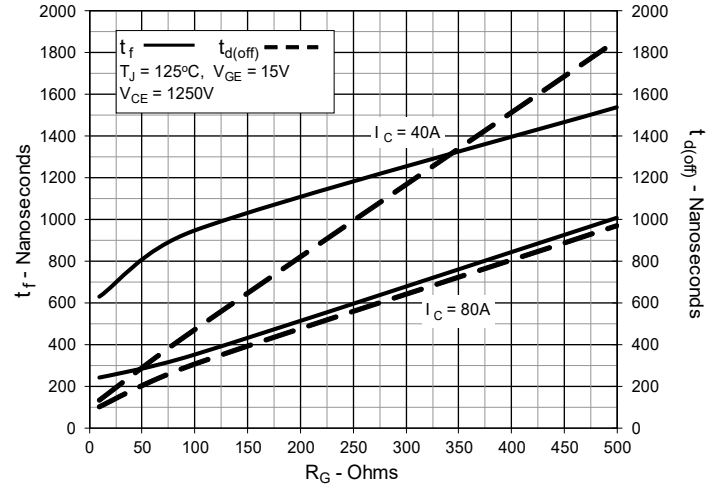
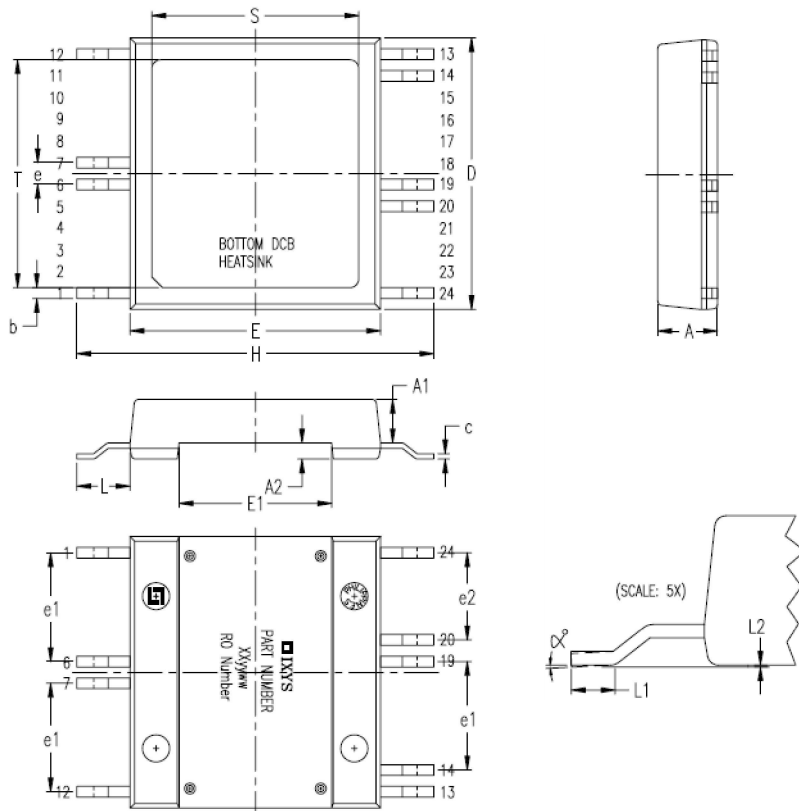


Fig. 17. Resistive Turn-off Switching Times vs. Gate Resistance



Package Outline


| SYM | INCHES | | MILLIMETERS | |
|-----|----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .209 | .224 | 5.30 | 5.70 |
| A1 | .154 | .161 | 3.90 | 4.10 |
| A2 | .055 | .063 | 1.40 | 1.60 |
| b | .035 | .045 | 0.90 | 1.15 |
| c | .018 | .026 | 0.45 | 0.65 |
| D | .976 | .994 | 24.80 | 25.25 |
| E | .898 | .915 | 22.80 | 23.25 |
| E1 | .543 | .559 | 13.80 | 14.20 |
| e | .079 BSC | | 2.00 BSC | |
| e1 | .394 BSC | | 10.00 BSC | |
| e2 | .315 BSC | | 8.00 BSC | |
| H | 1.272 | 1.311 | 32.30 | 33.30 |
| L | .181 | .209 | 4.60 | 5.30 |
| L1 | .051 | .067 | 1.30 | 1.70 |
| L2 | .000 | .006 | 0.00 | 0.15 |
| S | .736 | .760 | 18.70 | 19.30 |
| T | .815 | .839 | 20.70 | 21.30 |
| α | 0 | 4° | 0 | 4° |