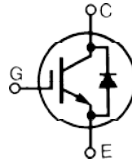


High Voltage, High Gain BiMOSFET™

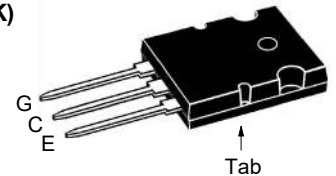
IXBK55N300 IXBX55N300

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

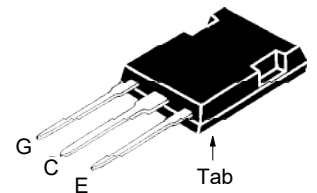
Monolithic Bipolar MOS Transistor



TO-264
(IXBK)



PLUS247
(IXBX)



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

| Symbol | Test Conditions | Maximum Ratings | |
|----------------------------|--|-----------------|------------|
| V_{CES} | $T_J = 25^\circ C$ to $150^\circ C$ | 3000 | V |
| V_{CGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$ | 3000 | V |
| V_{GES} | Continuous | ± 25 | V |
| V_{GEM} | Transient | ± 35 | V |
| I_{C25} | $T_C = 25^\circ C$ (Chip Capability) | 130 | A |
| I_{C110} | $T_C = 110^\circ C$ | 55 | A |
| I_{CM} | $T_C = 25^\circ C$, 1ms | 600 | A |
| SSOA | $V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 2\Omega$ | $I_{CM} = 110$ | A |
| (RBSOA) | Clamped Inductive Load | 1500 | V |
| T_{SC} (SCSOA) | $V_{GE} = 15V$, $T_J = 125^\circ C$, $R_G = 10\Omega$, $V_{CE} = 1250V$, Non-Repetitive | 10 | μs |
| P_C | $T_C = 25^\circ C$ | 625 | 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 1.6 mm (0.062 in.) from Case for 10 | 300 | $^\circ C$ |
| 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 |

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 ($T_J = 25^\circ C$, 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} | $V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ C$ | | | 50 μA 3 mA |
| I_{GES} | $V_{CE} = 0V$, $V_{GE} = \pm 25V$ | | | ± 200 nA |
| $V_{CE(sat)}$ | $I_C = 55A$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ C$ | | 2.7 3.3 | 3.2 V V |

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

Reverse Diode

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

Note 1: Pulse Test, $t \leq 300\mu\text{s}$, Duty Cycle, $d \leq 2\%$.

Additional provisions for lead-to-lead isolation are required at $V_{CE} > 1250\text{V}$.

Littelfuse 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 | 6,259,123B1 | 6,534,343 | 6,710,405B2 | 6,759,692 | 7,063,975B2 | |
| | 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 @ $T_J = 25^\circ\text{C}$

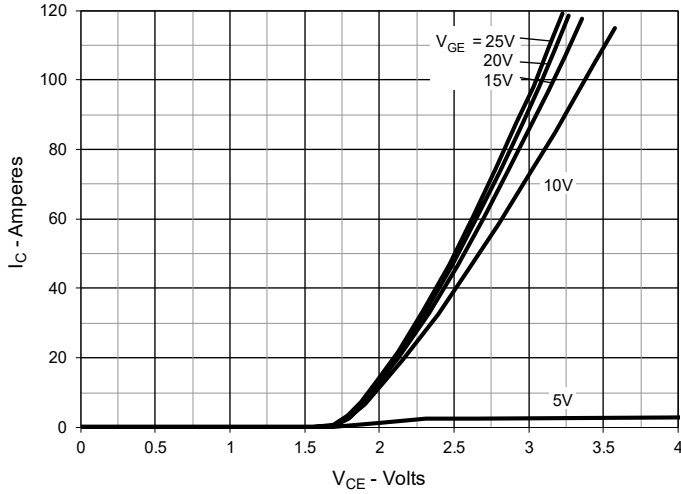


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

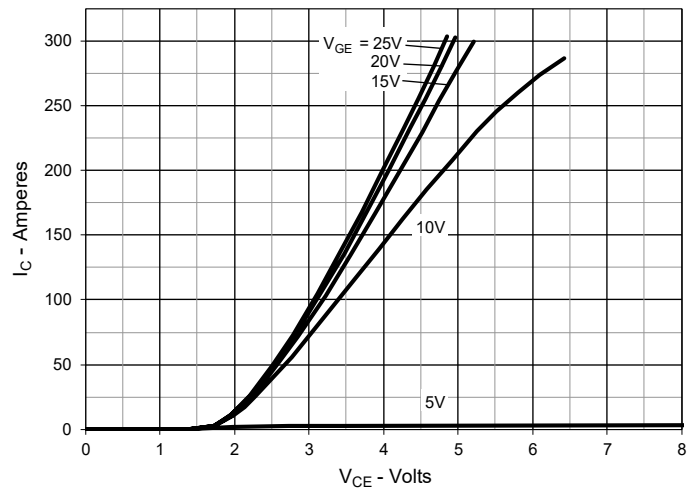


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

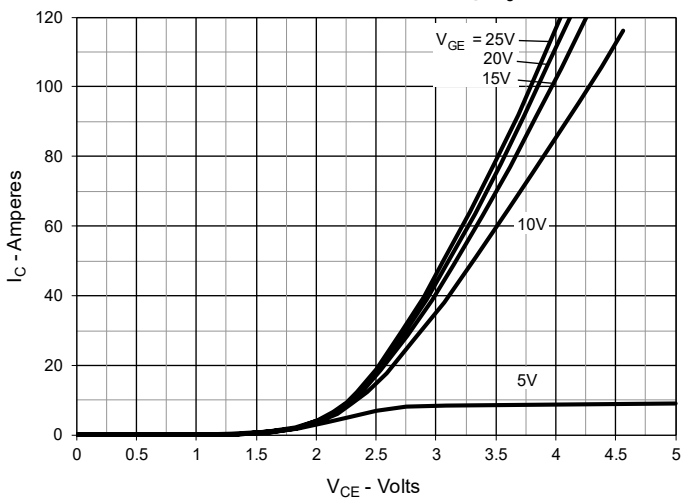


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

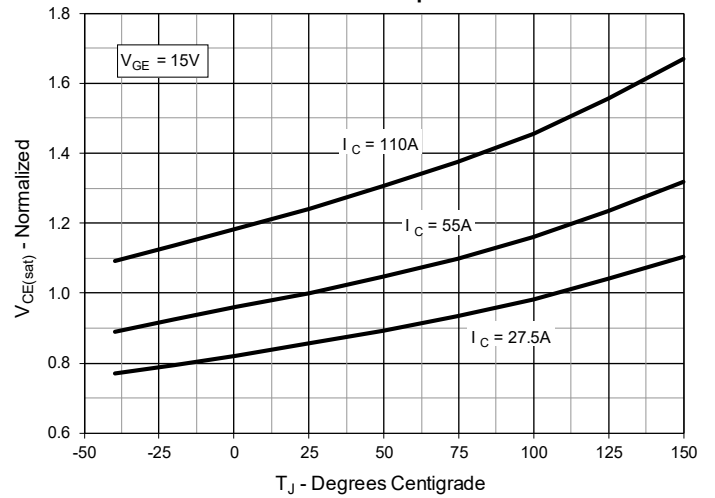


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

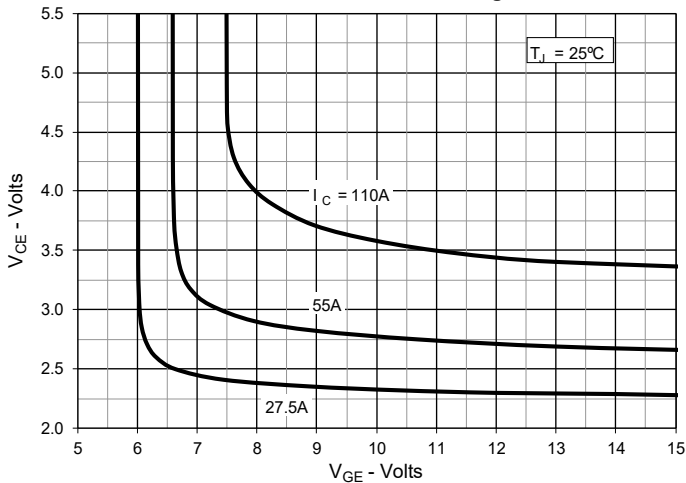


Fig. 6. Input Admittance

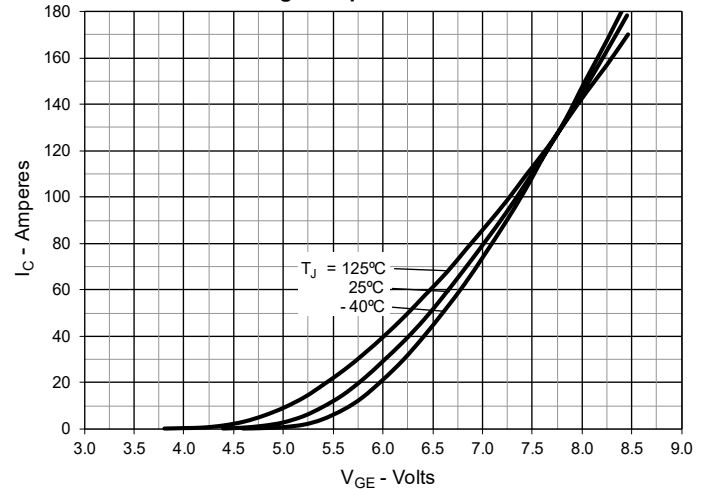


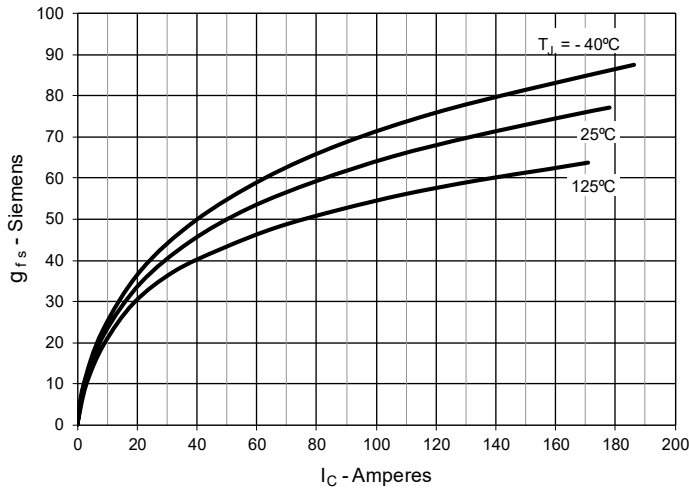
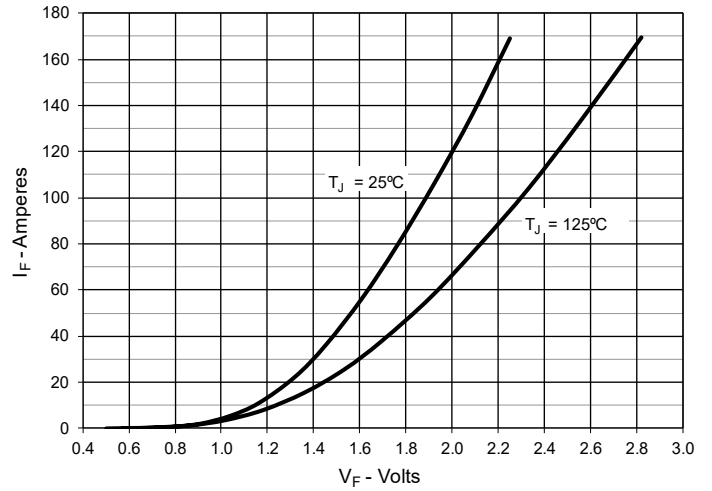
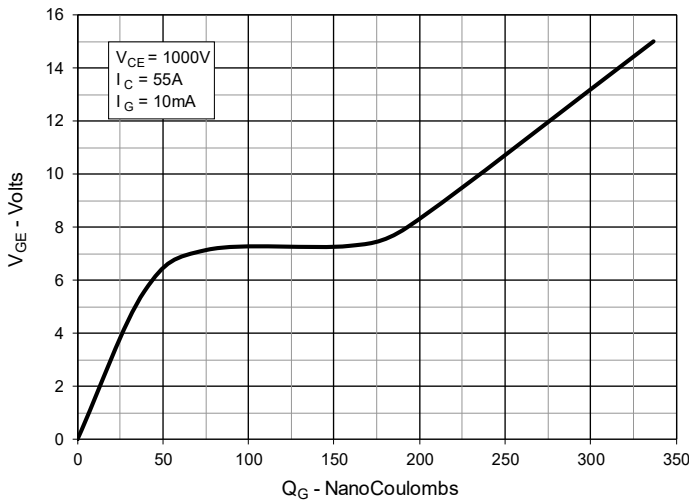
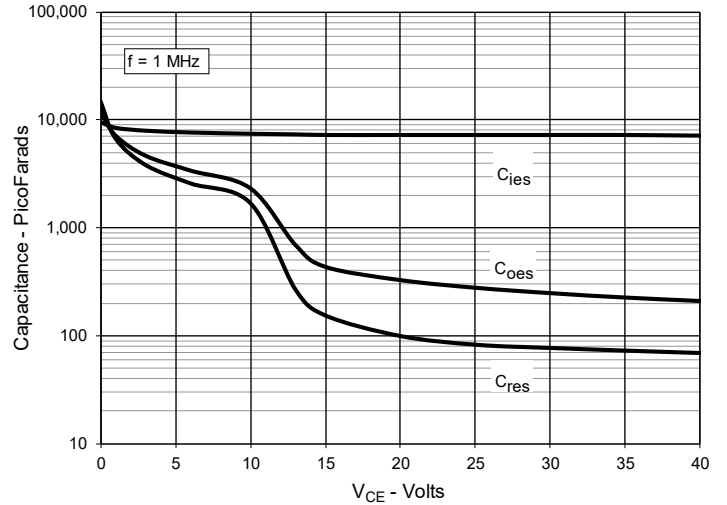
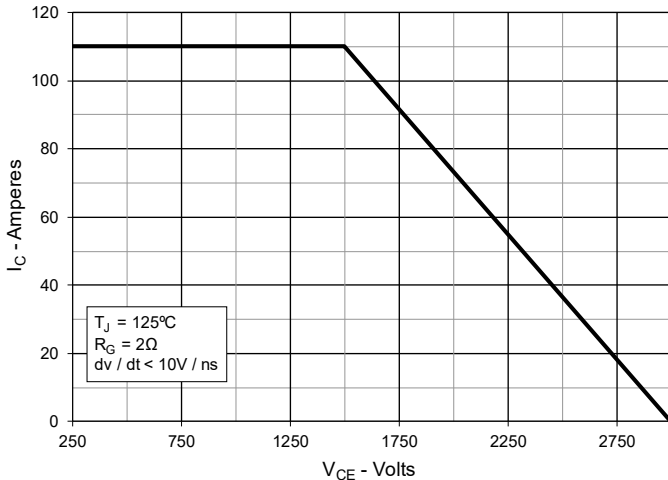
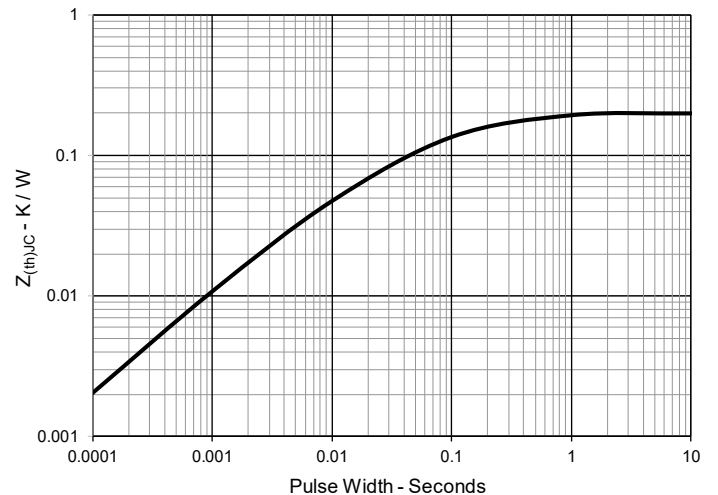
Fig. 7. Transconductance

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

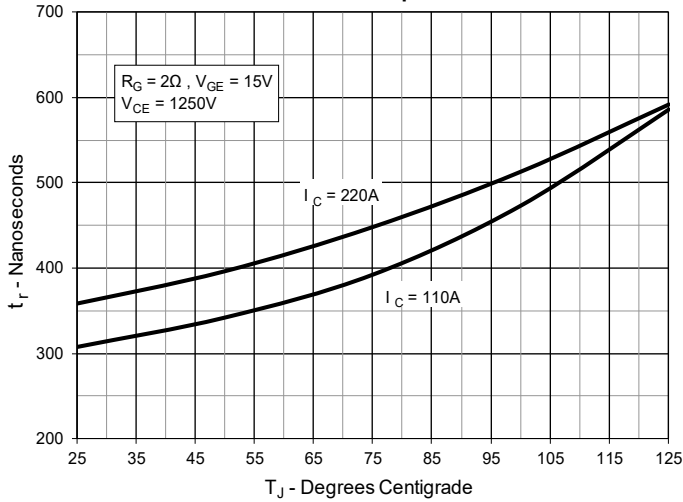


Fig. 14. Resistive Turn-on Rise Time vs. Collector Current

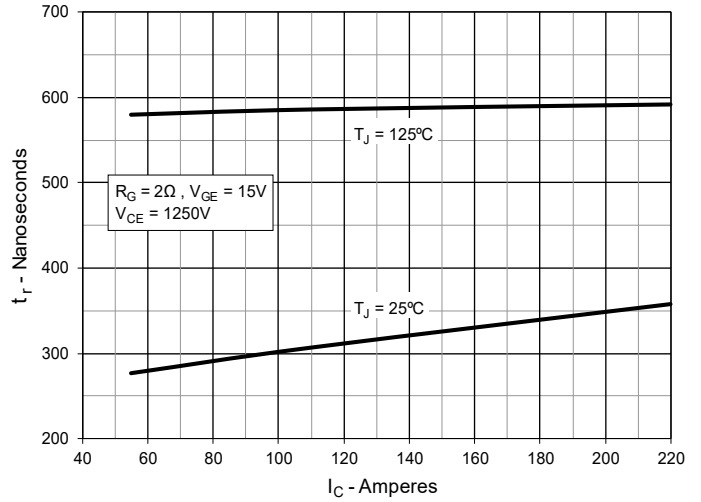


Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance

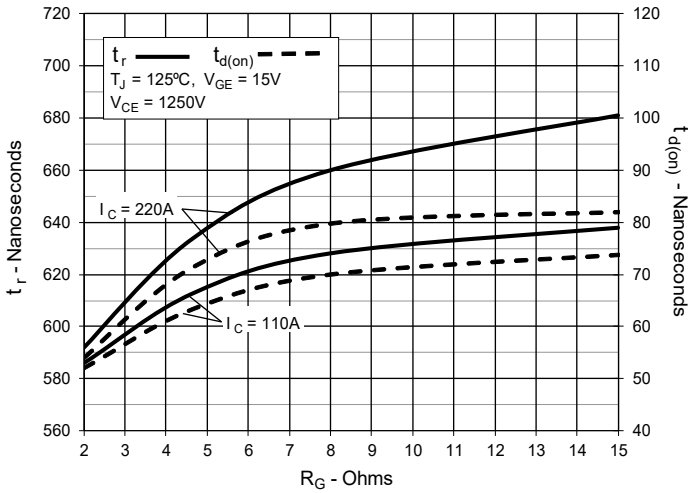


Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature

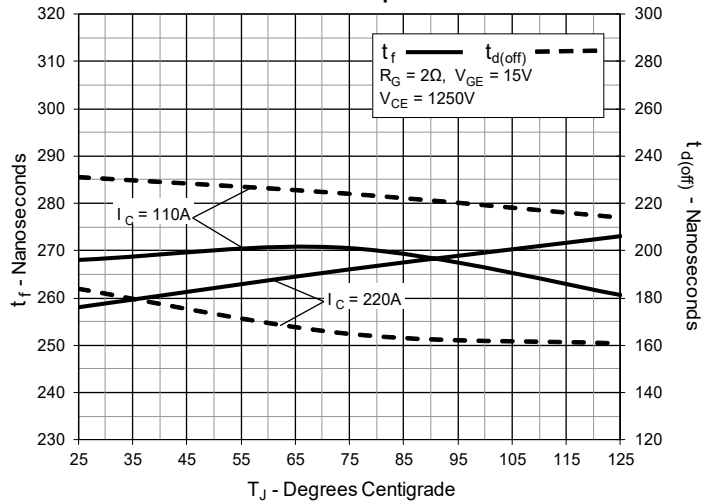


Fig. 17. Resistive Turn-off Switching Times vs. Collector Current

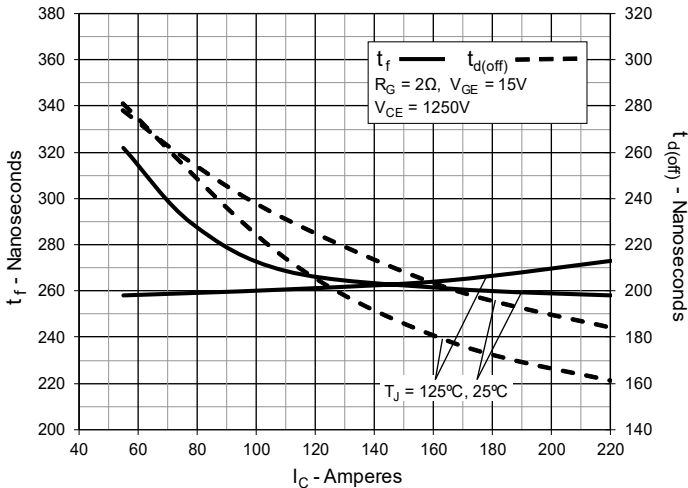


Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance

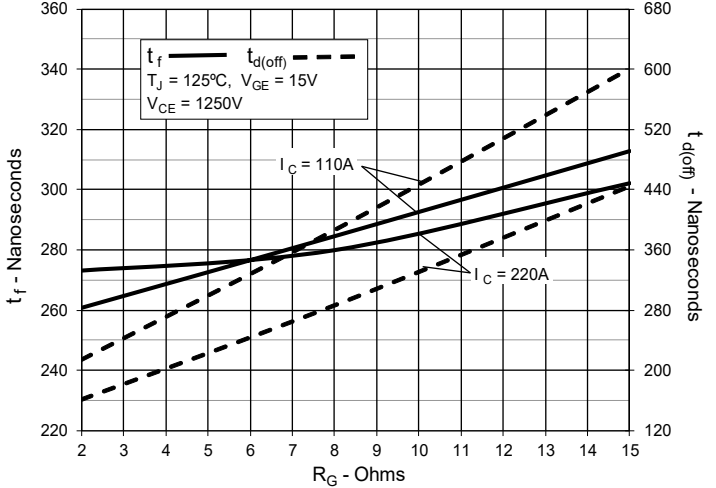


Fig. 19. Forward-Bias Safe Operating Area
@ $T_C = 25^\circ\text{C}$

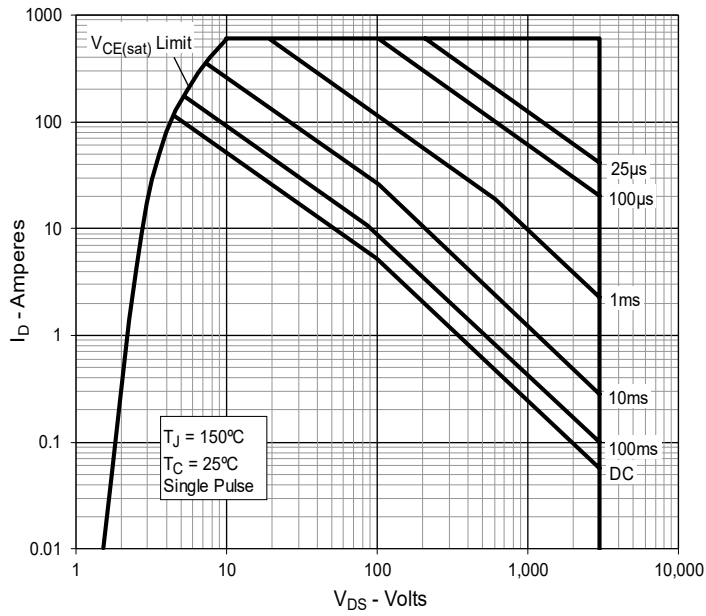
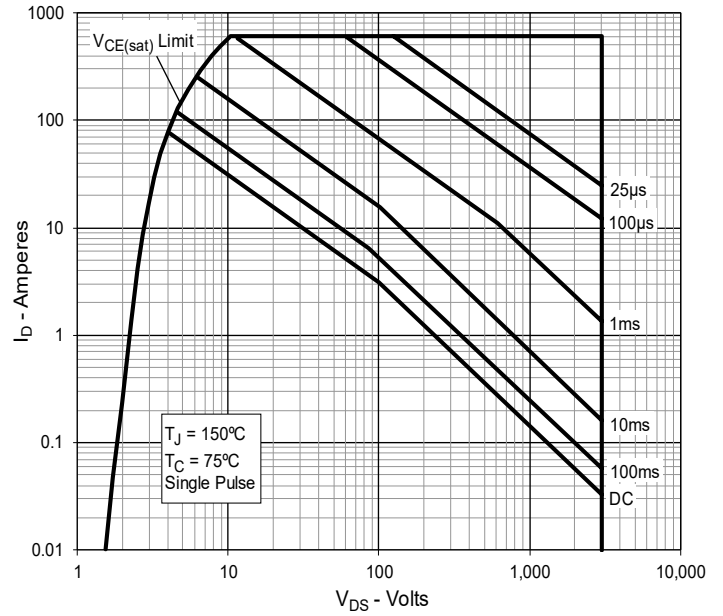
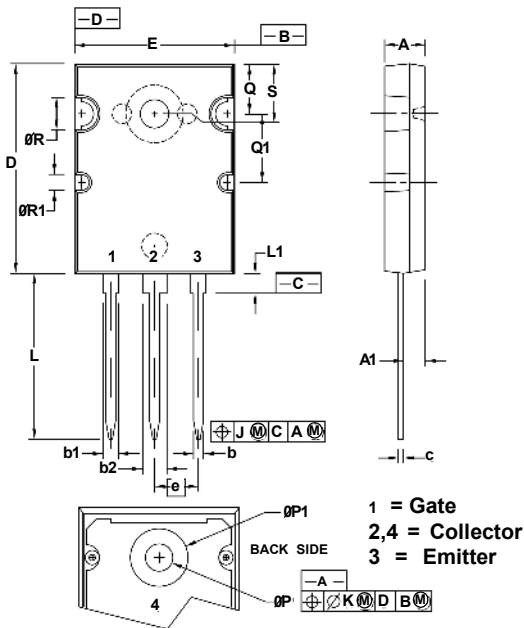
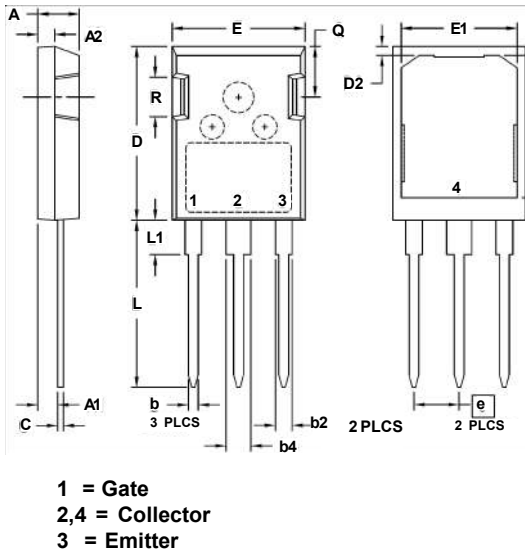


Fig. 20. Forward-Bias Safe Operating Area
@ $T_C = 75^\circ\text{C}$



TO-264 Outline


| SYMBOL | INCHES | | MILLIMETERS | |
|--------|----------|-------|-------------|-------|
| | MIN | MAX | MIN | 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 | .215 BSC | | 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 |
| ∅P | .122 | .138 | 3.10 | 3.51 |
| ∅P1 | .270 | .290 | 6.86 | 7.37 |
| Q | .240 | .256 | 6.10 | 6.50 |
| Q1 | .330 | .346 | 8.38 | 8.79 |
| ∅R | .155 | .187 | 3.94 | 4.75 |
| ∅R1 | .085 | .093 | 2.16 | 2.36 |
| S | .243 | .253 | 6.17 | 6.43 |

PLUS247™ Outline


| SYM | INCHES | | MILLIMETERS | |
|-----|----------|------|-------------|-------|
| | MIN | MAX | MIN | 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 | .520 | .560 | 13.08 | 14.22 |
| e | .215 BSC | | 5.45 BSC | |
| L | .780 | .810 | 19.81 | 20.57 |
| L1 | .150 | .170 | 3.81 | 4.32 |
| Q | .220 | .244 | 5.59 | 6.20 |
| R | .170 | .190 | 4.32 | 4.83 |



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