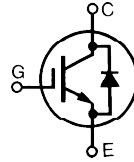


# High Voltage, High Gain BIMOSFET™

## IXBF55N300

### Monolithic Bipolar MOS Transistor

(Electrically Isolated Tab)



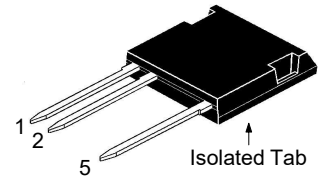
$$V_{CES} = 3000V$$

$$I_{C110} = 34A$$

$$V_{CE(sat)} \leq 3.2V$$

| Symbol                                       | Test Conditions  | Maximum Ratings   |            |
|--|--|-------------------|------------|
| $V_{CES}$                                    | $T_C = 25^\circ C$ 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   | $\pm 25$          | V          |
| $V_{GEM}$                                    | Transient  | $\pm 35$          | V          |
| $I_{C25}$                                    | $T_C = 25^\circ C$   | 86                | A          |
| $I_{C110}$                                   | $T_C = 110^\circ C$  | 34                | A          |
| $I_{CM}$                                     | $T_C = 25^\circ C$ , 1ms   | 600               | A          |
| <b>SSOA</b><br><b>(RBSOA)</b>                | $V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 2\Omega$                                      | $I_{CM} = 110$    | A          |
|  | Clamped Inductive Load   | 1500              | V          |
| <b><math>T_{SC}</math></b><br><b>(SCSOA)</b> | $V_{GE} = 15V$ , $T_J = 125^\circ C$ ,<br>$R_G = 10\Omega$ , $V_{CE} = 1250V$ , Non-Repetitive | 10                | $\mu s$    |
| $P_C$  | $T_C = 25^\circ C$   | 357               | 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<br>1.6 mm (0.062 in.) from Case for 10s                 | 300               | $^\circ C$ |
| $F_C$  | Mounting Force   | 20..120 / 4.5..27 | N/lb       |
| $V_{ISOL}$                                   | 50/60Hz, 1 Minute  | 4000              | V~         |
| <b>Weight</b>                                |  | 5                 | g          |

### ISOPLUS i4-Pak™



1 = Gate  
2 = Emitter

5 = Collector

### Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 4000V~ Electrical Isolation
- High Blocking Voltage
- High Peak Current Capability
- Low Saturation Voltage

### Advantages

- Low Gate Drive Requirement
- High Power Density

### Applications

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

| Symbol        | Test Conditions<br>( $T_J = 25^\circ C$ 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              |
| $I_{CES}$     | $V_{CE} = V_{CES}$ , $V_{GE} = 0V$<br>Note 2, $T_J = 125^\circ C$   |                       |      | 50 $\mu A$<br>3 mA |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 25V$                                  |                       |      | $\pm 200$ nA       |
| $V_{CE(sat)}$ | $I_C = 55A$ , $V_{GE} = 15V$ , Note 1<br>$T_J = 125^\circ C$        |                       | 2.7  | 3.2 V              |
|               |   |                       | 3.3  | V                  |

| Symbol Test Conditions<br>( $T_J = 25^\circ\text{C}$ 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                      |
| $t_{d(on)}$  | <b>Resistive Switching Times, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = 110\text{A}, V_{GE} = 15\text{V}$<br>$V_{CE} = 1250\text{V}, R_G = 2\Omega$  |                       | 54   | ns                      |
| $t_r$  |  |                       | 307  | ns                      |
| $t_{d(off)}$   |  |                       | 230  | ns                      |
| $t_f$  |  |                       | 268  | ns                      |
| $t_{d(on)}$  | <b>Resistive Switching Times, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = 110\text{A}, V_{GE} = 15\text{V}$<br>$V_{CE} = 1250\text{V}, R_G = 2\Omega$ |                       | 52   | ns                      |
| $t_r$  |  |                       | 585  | ns                      |
| $t_{d(off)}$   |  |                       | 215  | ns                      |
| $t_f$  |  |                       | 260  | ns                      |
| $R_{thJC}$   |  |                       |      | 0.35 $^\circ\text{C/W}$ |
| $R_{thCS}$   |  | 0.15                  |      | $^\circ\text{C/W}$      |

**Reverse Diode**

| Symbol Test Conditions<br>( $T_J = 25^\circ\text{C}$ 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         |
| $t_{rr}$   | $I_F = 28\text{A}, V_{GE} = 0\text{V}, -di_F/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}, V_{GE} = 0\text{V}$ |                       | 1.9  | $\mu\text{s}$ |
| $I_{RM}$   |   |                       | 54   | A             |

**Notes:**

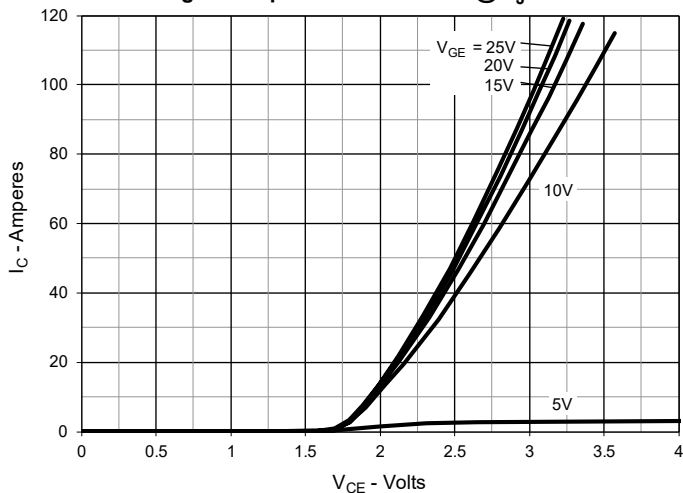
1. Pulse test,  $t < 300\mu\text{s}$ , duty cycle,  $d < 2\%$ .
2. Device must be heatsunk for high-temperature leakage current measurements to avoid thermal runaway.

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

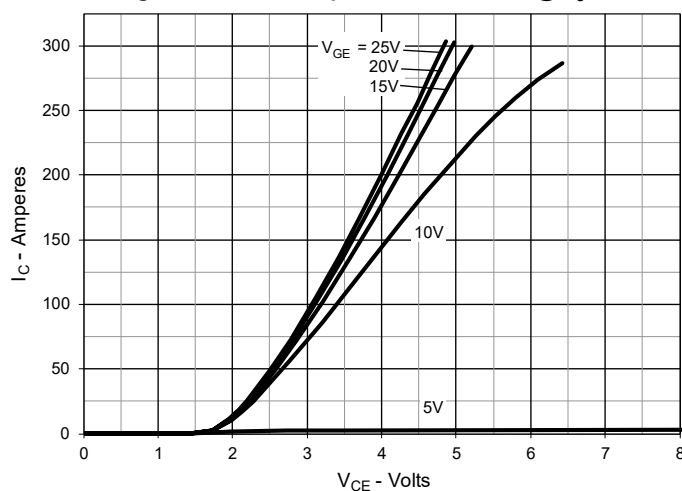
Littelfuse reserves the right to change limits, test conditions and dimensions.

|  |           |           |           |           |             |             |             |             |             |             |
|--|-----------|-----------|-----------|-----------|-------------|-------------|-------------|-------------|-------------|-------------|
| 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   | 6,404,065B1 | 6,683,344   | 6,727,585   | 7,005,734B2 | 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 | 6,306,728B1 | 6,583,505   | 6,710,463   | 6,771,478B2 | 7,071,537   |             |

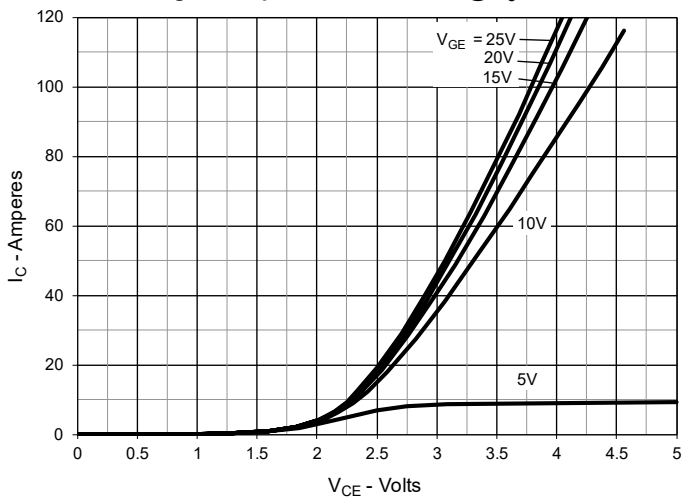
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



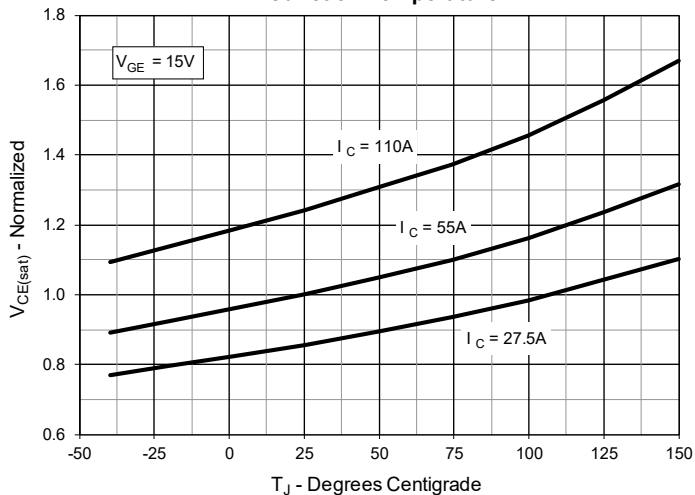
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



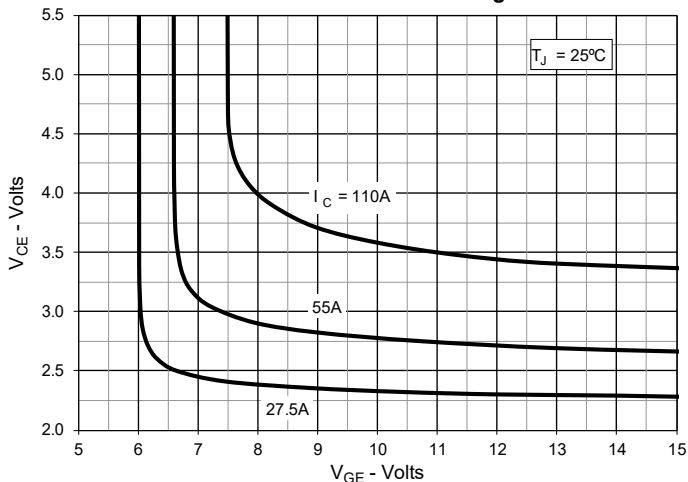
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



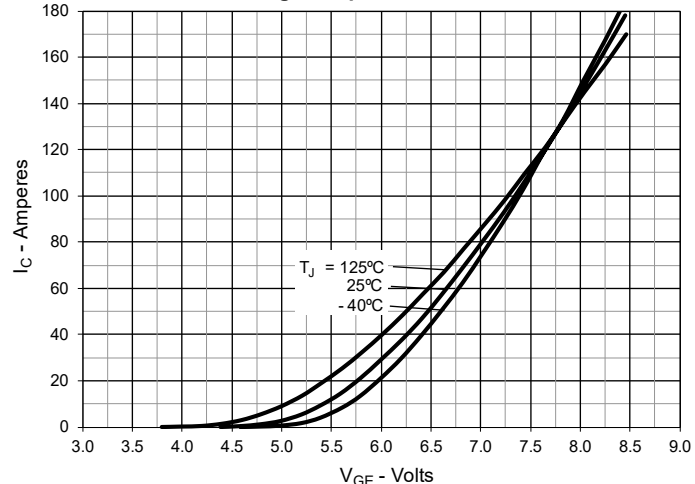
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**

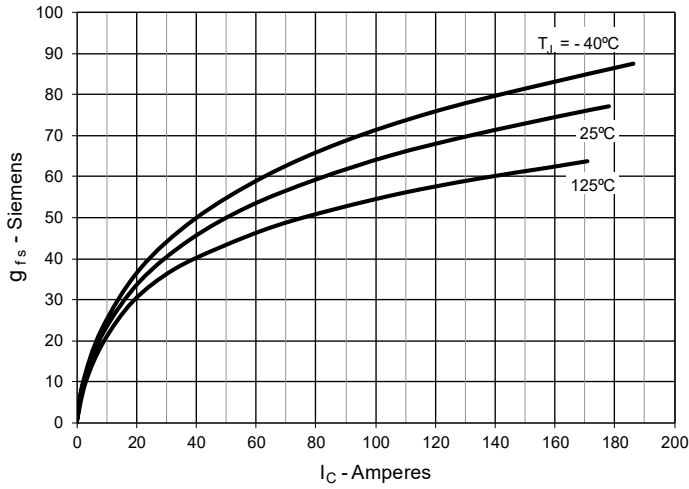
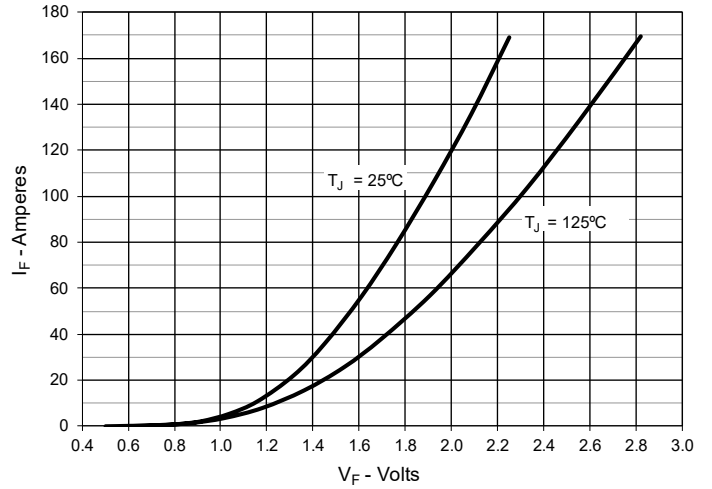
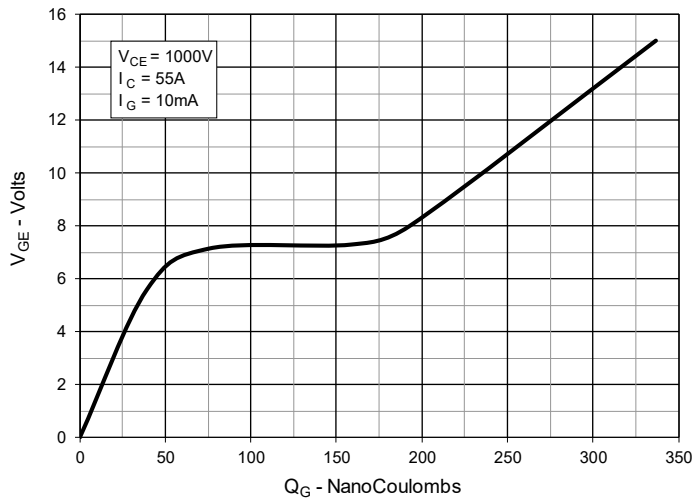
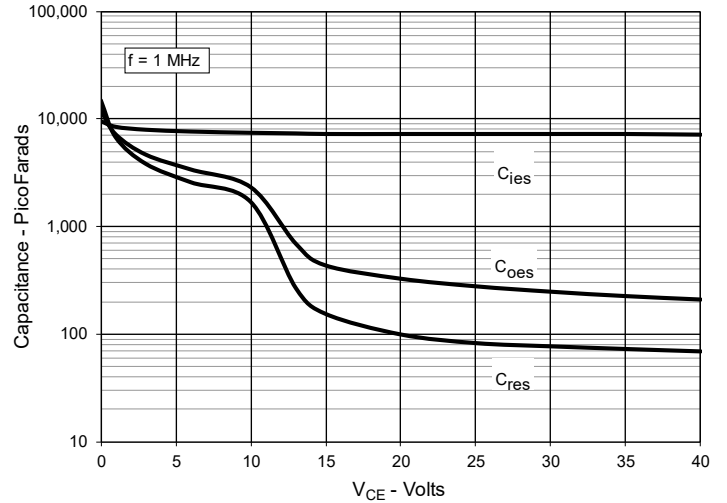
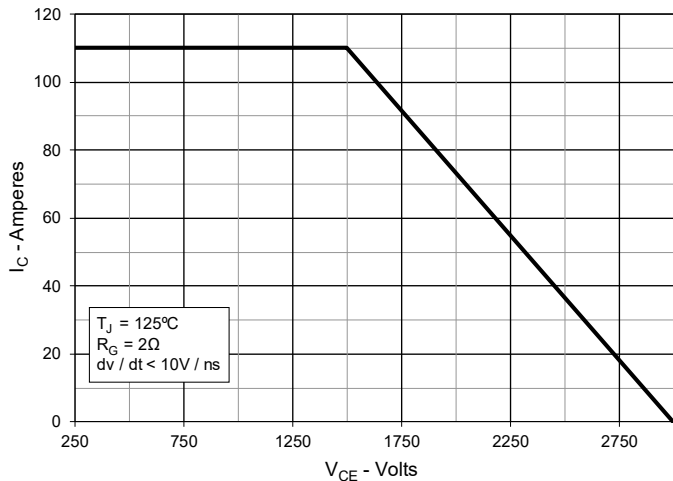
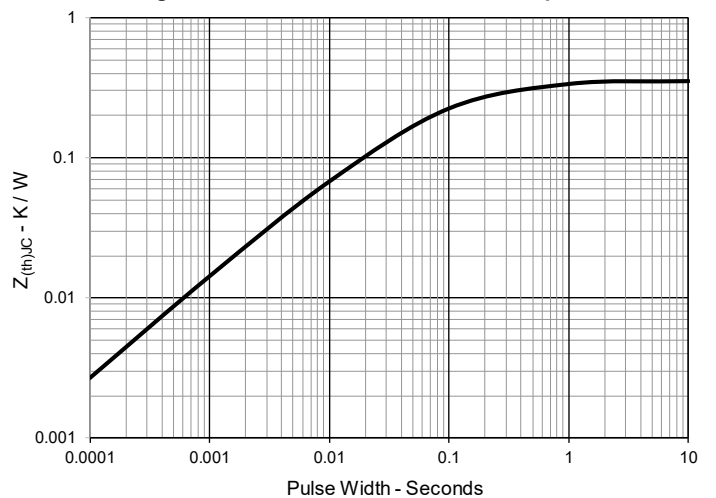


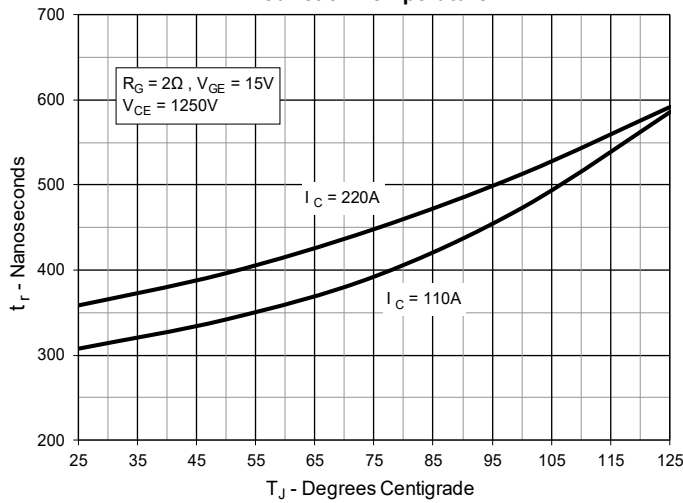
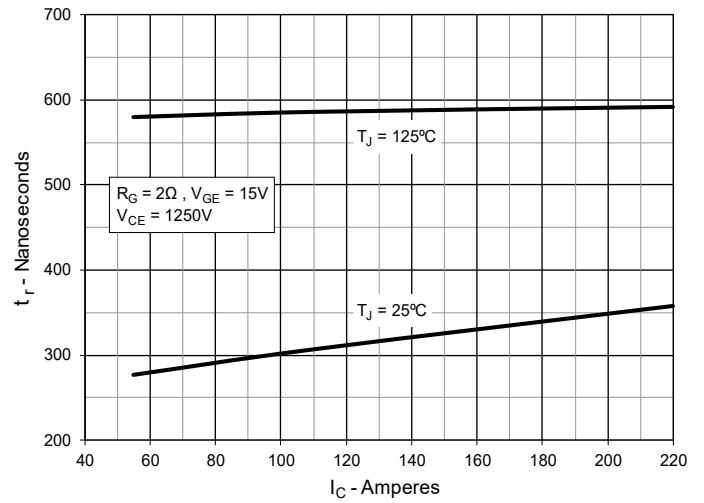
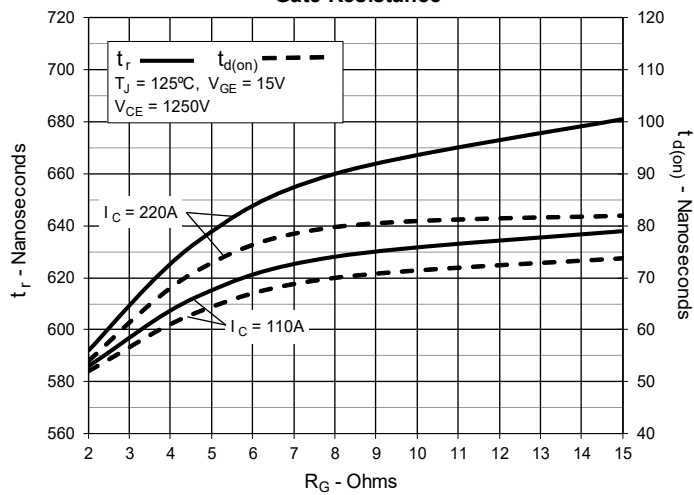
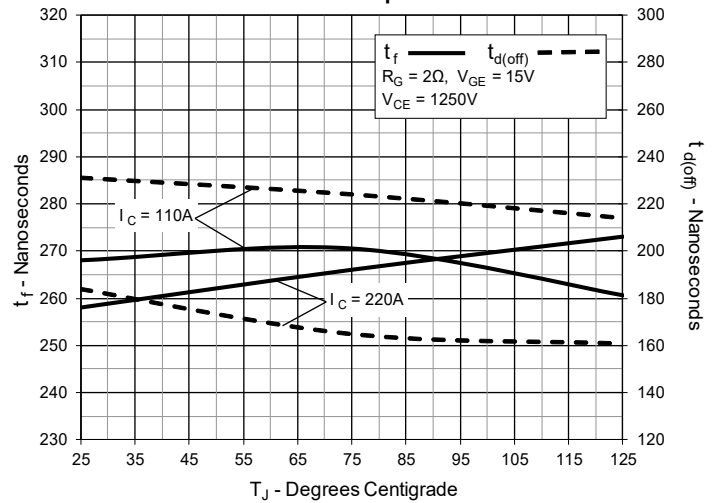
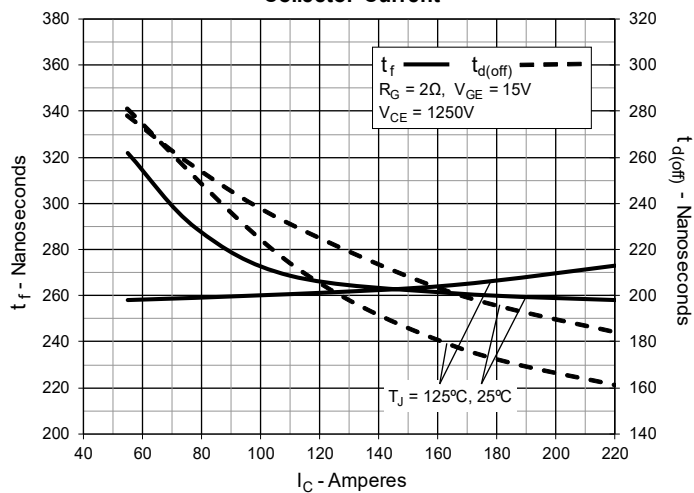
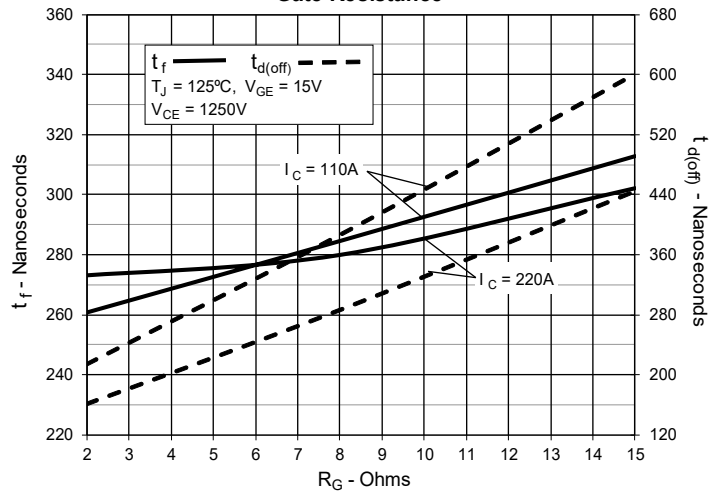
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**



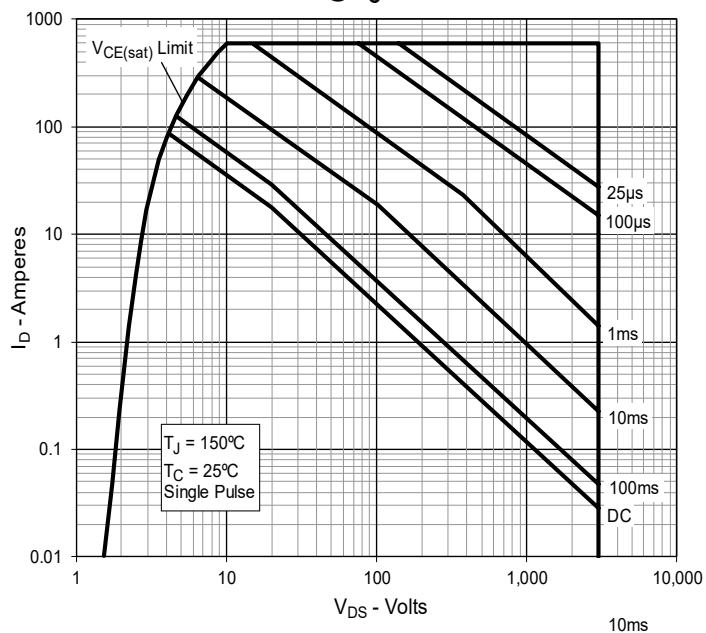
**Fig. 6. Input Admittance**



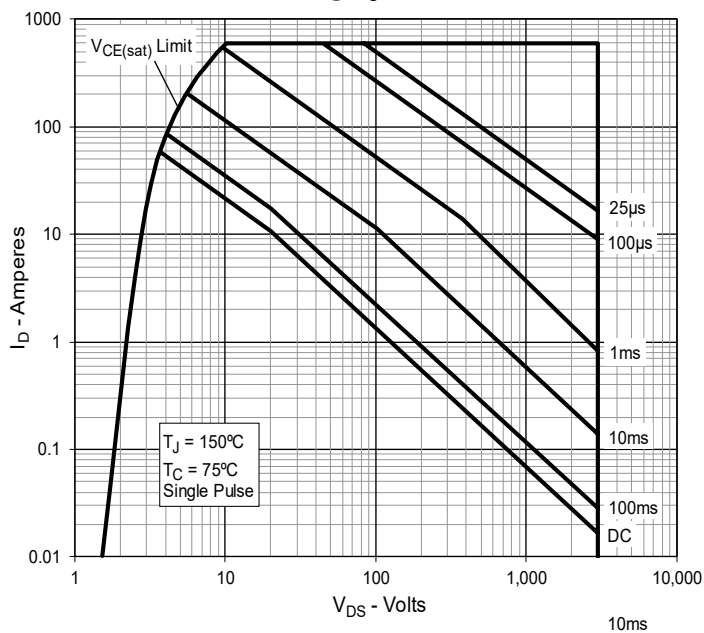
**Fig. 7. Transconductance**

**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**


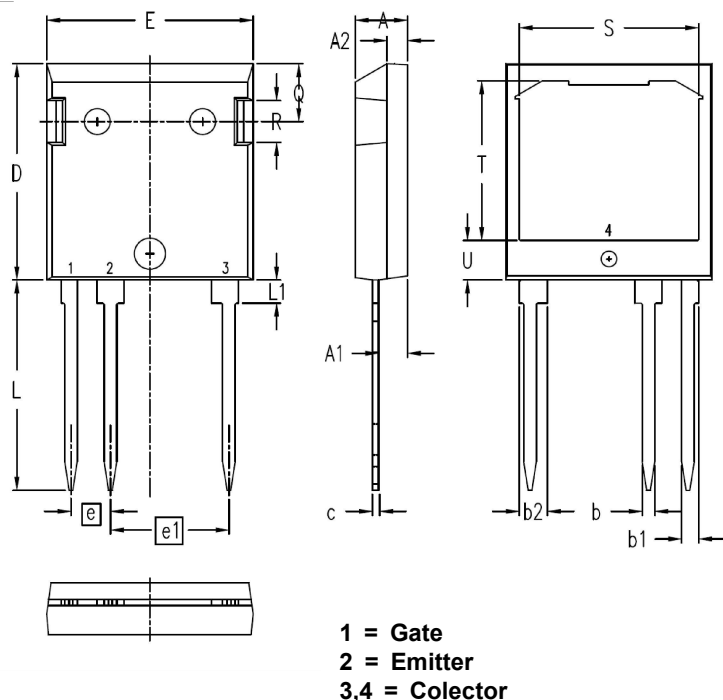
**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**

**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**  
@  $T_C = 75^\circ\text{C}$



**ISOPLUS i4-Pak Outline**


| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .193     | .201 | 4.90        | 5.10  |
| A1  | .106     | .114 | 2.70        | 2.90  |
| A2  | .075     | .083 | 1.90        | 2.10  |
| b   | .047     | .055 | 1.20        | 1.40  |
| b1  | .061     | .069 | 1.55        | 1.75  |
| b2  | .087     | .094 | 2.20        | 2.40  |
| c   | .020     | .029 | 0.51        | 0.74  |
| D   | .819     | .846 | 20.80       | 21.50 |
| E   | .768     | .799 | 19.50       | 20.30 |
| e   | .150 BSC |      | 3.81 BSC    |       |
| e1  | .450 BSC |      | 11.43 BSC   |       |
| L   | .780     | .838 | 19.80       | 21.30 |
| L1  | .083     | .094 | 2.10        | 2.40  |
| Q   | .213     | .236 | 5.40        | 6.00  |
| R   | .157     | .169 | 4.00        | 4.30  |
| S   | .673     | .685 | 17.10       | 17.40 |
| T   | .602     | .614 | 15.30       | 15.60 |
| U   | .142     | .154 | 3.60        | 3.90  |