

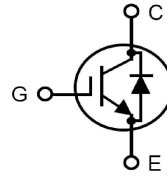
# High Voltage, BiMOSFET™ Monolithic Bipolar MOS Transistor

## IXBF42N300

$$V_{CES} = 3000V$$

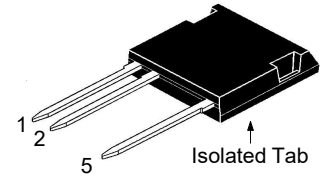
$$I_{C110} = 24A$$

$$V_{CE(sat)} \leq 3.0V$$



(Electrically Isolated Tab)

### ISOPLUS i4-Pak™



1 = Gate  
2 = Emitter

5 = Collector

| 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          |
| $I_{C25}$                          | $T_C = 25^\circ C$   | 60                | A          |
| $I_{C110}$                         | $T_C = 110^\circ C$  | 24                | A          |
| $I_{CM}$                           | $T_C = 25^\circ C$ , 1ms   | 400               | A          |
| <b>SSOA (RBSOA)</b>                | $V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 20\Omega$                                     | $I_{CM} = 84$     | A          |
|                                    | Clamped Inductive Load   | 1500              | V          |
| <b><math>T_{SC}</math> (SCSOA)</b> | $V_{GE} = 15V$ , $T_J = 125^\circ C$ ,<br>$R_G = 82\Omega$ , $V_{CE} = 1500V$ , Non-Repetitive | 10                | $\mu s$    |
| $P_C$                              | $T_C = 25^\circ C$   | 240               | 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  | 3000              | V~         |
| <b>Weight</b>                      |  | 5                 | g          |

### Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 3000V~ Electrical Isolation
- High Blocking Voltage
- High Peak Current Capability
- Low Saturation Voltage
- FBSOA Rated
- SCSOA Rated

### Advantages

- Low Gate Drive Requirement
- High Power Density

### Applications

- Laser Generators
- Capacitor Discharge Circuits
- AC Switches
- Protection Circuits

| 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                     |
| $V_{GE(th)}$  | $I_C = 1mA$ , $V_{CE} = V_{GE}$   | 3.0                   |      | 5.0 V                 |
| $I_{CES}$     | $V_{CE} = 0.8 \cdot V_{CES}$ , $V_{GE} = 0V$<br>Note 2, $T_J = 125^\circ C$ |                       | 250  | 50 $\mu A$<br>$\mu A$ |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 25V$  |                       |      | $\pm 200$ nA          |
| $V_{CE(sat)}$ | $I_C = 42A$ , $V_{GE} = 15V$ , Note 1<br>$T_J = 125^\circ C$                |                       | 2.5  | 3.0 V                 |
|               |   |                       | 3.1  | V                     |

| Symbol Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) |  | Characteristic Values |      |                         |
|--|--|-----------------------|------|-------------------------|
|  |  | Min.                  | Typ. | Max.                    |
| $g_{fs}$   | $I_C = 42\text{A}, V_{CE} = 10\text{V}$ , Note 1   | 28                    | 45   | S                       |
| $C_{ies}$  | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$   |                       | 4780 | pF                      |
| $C_{oes}$  |  |                       | 170  | pF                      |
| $C_{res}$  |  |                       | 56   | pF                      |
| $R_{Gi}$   | Gate Input Resistance  |                       | 3.0  | $\Omega$                |
| $Q_g$  | $I_C = 42\text{A}, V_{GE} = 15\text{V}, V_{CE} = 1000\text{V}$   |                       | 200  | nC                      |
| $Q_{ge}$   |  |                       | 28   | nC                      |
| $Q_{gc}$   |  |                       | 75   | nC                      |
| $t_{d(on)}$  | <b>Resistive Switching Times, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = 42\text{A}, V_{GE} = 15\text{V}$<br>$V_{CE} = 1500\text{V}, R_G = 20\Omega$  |                       | 72   | ns                      |
| $t_r$  |  |                       | 330  | ns                      |
| $t_{d(off)}$   |  |                       | 445  | ns                      |
| $t_f$  |  |                       | 610  | ns                      |
| $t_{d(on)}$  | <b>Resistive Switching Times, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = 42\text{A}, V_{GE} = 15\text{V}$<br>$V_{CE} = 1500\text{V}, R_G = 20\Omega$ |                       | 72   | ns                      |
| $t_r$  |  |                       | 580  | ns                      |
| $t_{d(off)}$   |  |                       | 460  | ns                      |
| $t_f$  |  |                       | 490  | ns                      |
| $R_{thJC}$   |  |                       |      | 0.52 $^\circ\text{C/W}$ |
| $R_{thCS}$   |  | 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.          |
| $V_F$  | $I_F = 42\text{A}, V_{GE} = 0\text{V}$ , Note 1   |                       |      | 2.5 V         |
| $t_{rr}$   | $I_F = 21\text{A}, V_{GE} = 0\text{V}, -di_F/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}, V_{GE} = 0\text{V}$ |                       | 1.7  | $\mu\text{s}$ |
| $I_{RM}$   |   |                       | 43   | A             |

**Notes:**

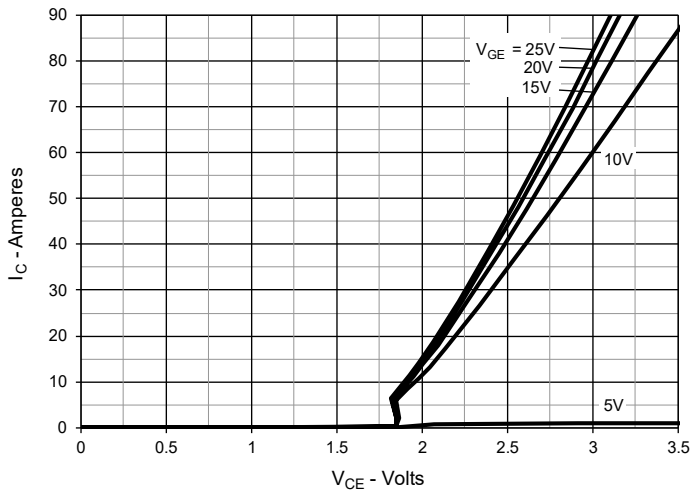
1. Pulse test,  $t < 300\mu\text{s}$ , duty cycle,  $d < 2\%$ .
2. Device must be heatsunk for high-temperature leakage current measurements to avoid thermal runaway.

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

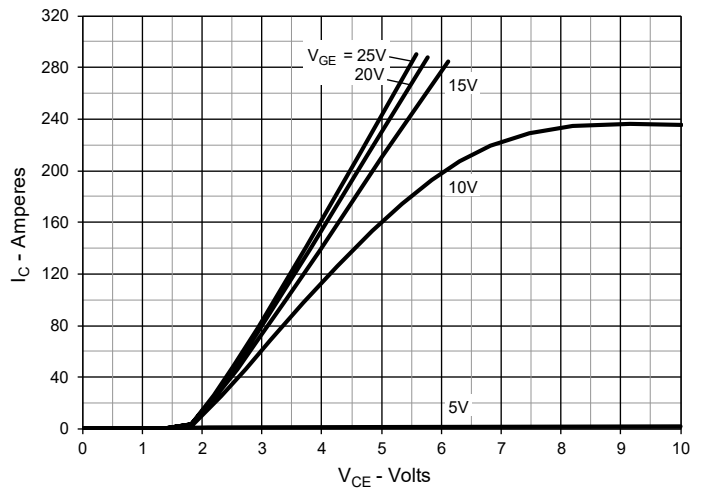
Littelfuse reserves the right to change limits, test conditions and dimensions.

|   |           |           |           |           |              |             |             |              |              |             |
|---|-----------|-----------|-----------|-----------|--------------|-------------|-------------|--------------|--------------|-------------|
| LFMOSFETs 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    | 7,005,734 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    |             |

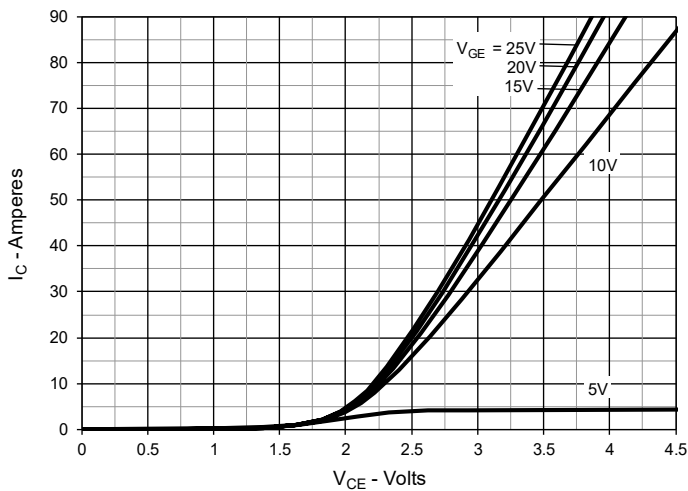
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



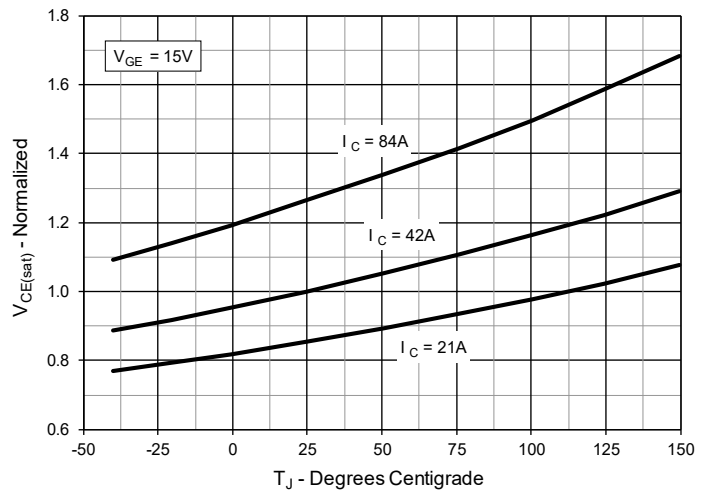
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



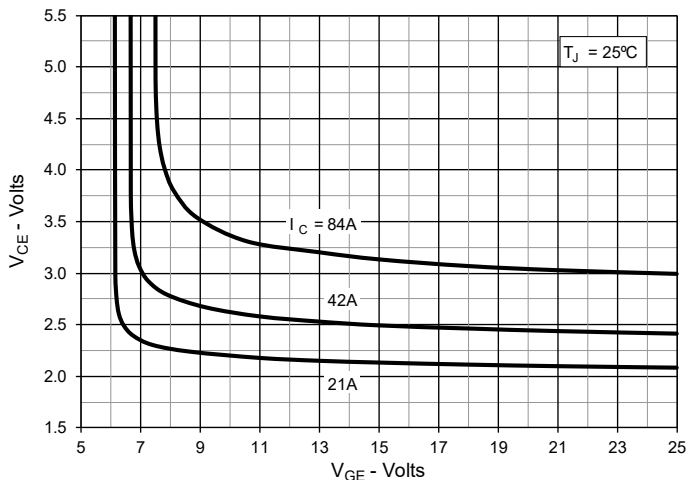
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



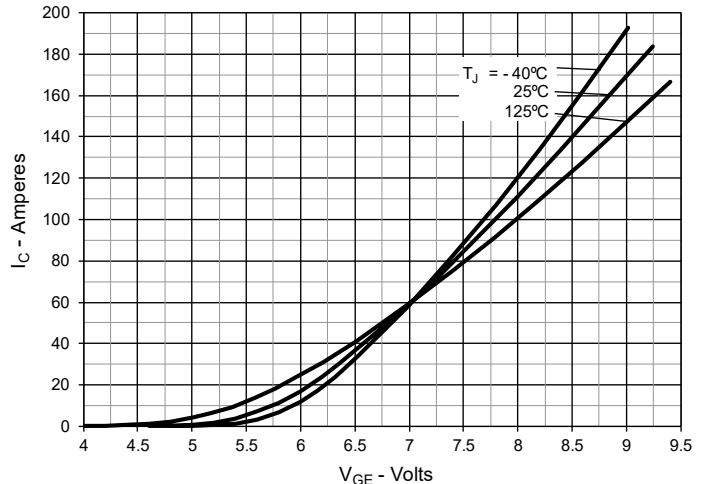
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**



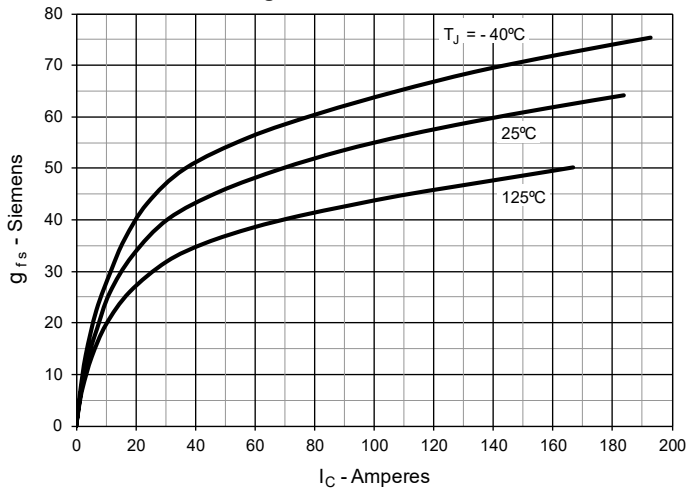
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**



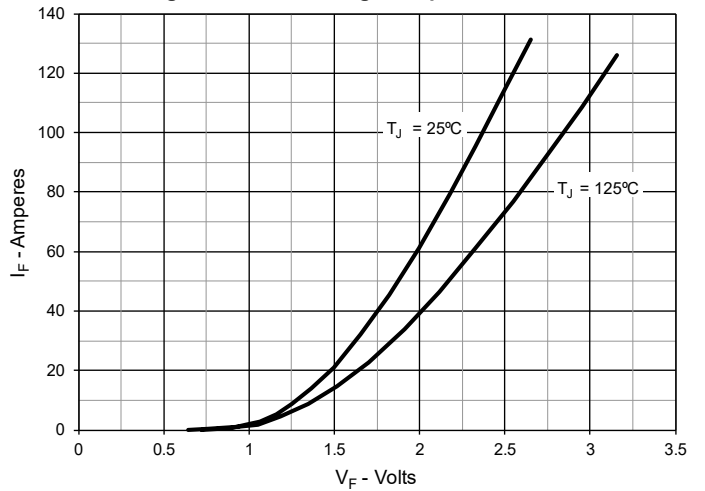
**Fig. 6. Input Admittance**



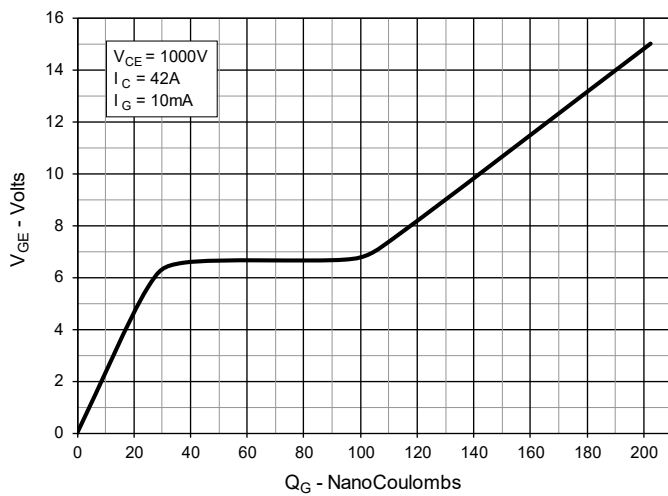
**Fig. 7. Transconductance**



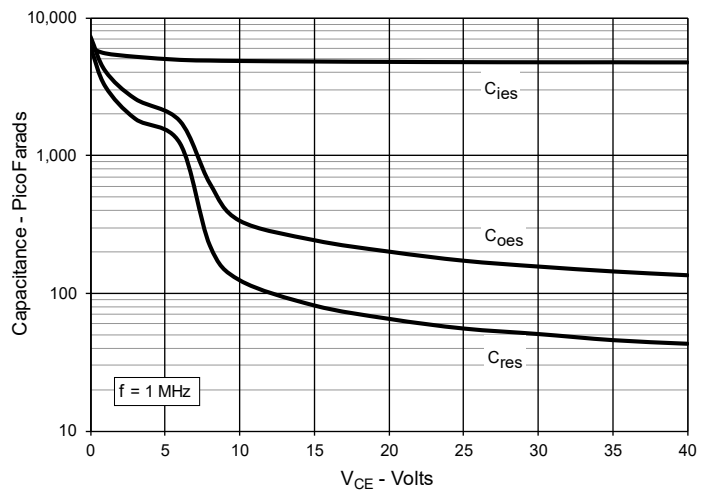
**Fig. 8. Forward Voltage Drop of Intrinsic Diode**



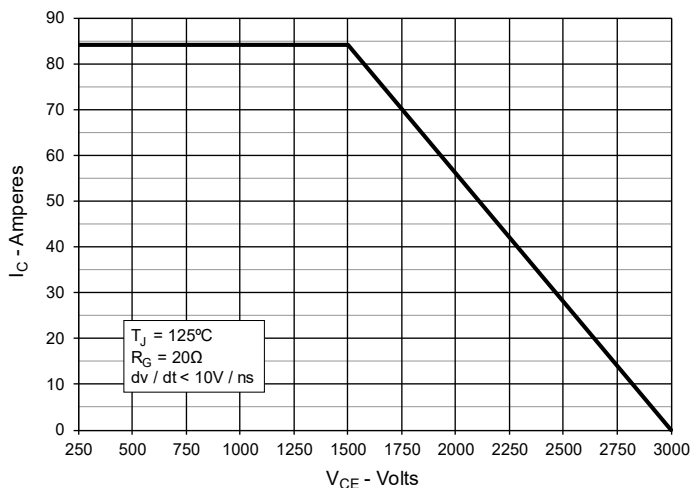
**Fig. 9. Gate Charge**



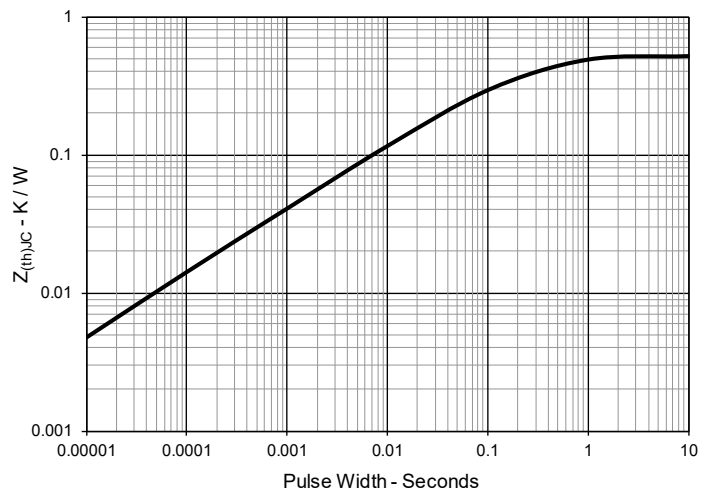
**Fig. 10. Capacitance**



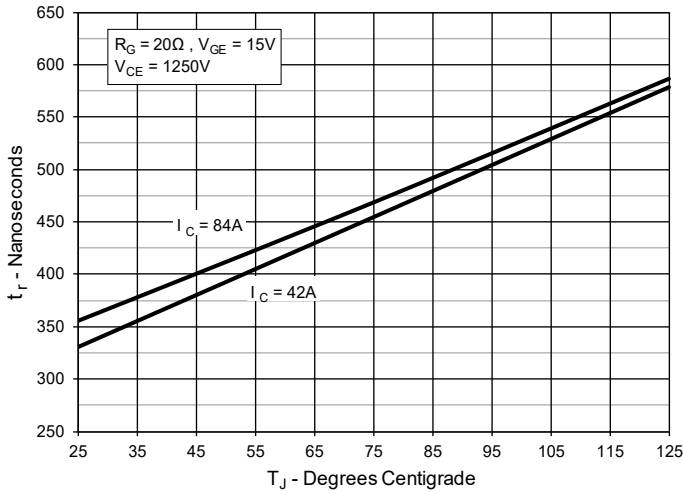
**Fig. 11. Reverse-Bias Safe Operating Area**



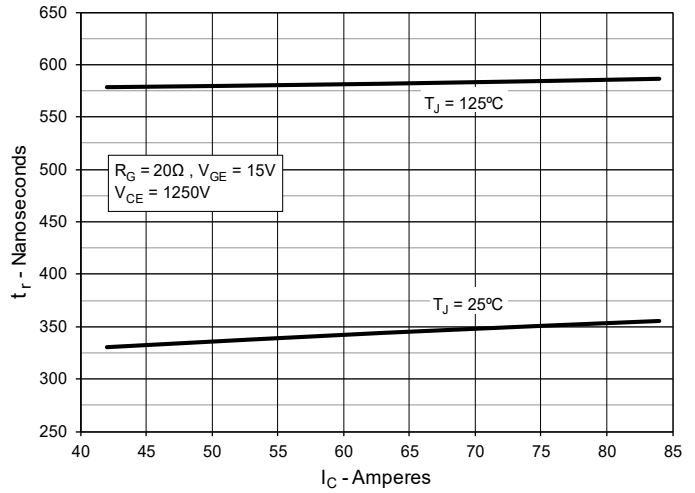
**Fig. 12. Maximum Transient Thermal Impedance**



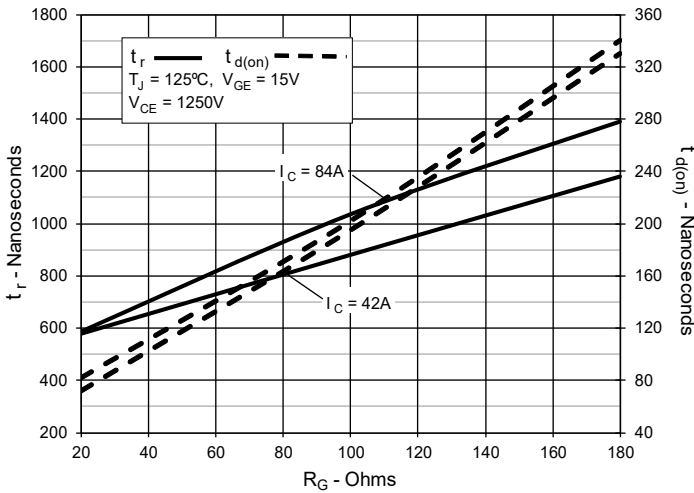
**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**



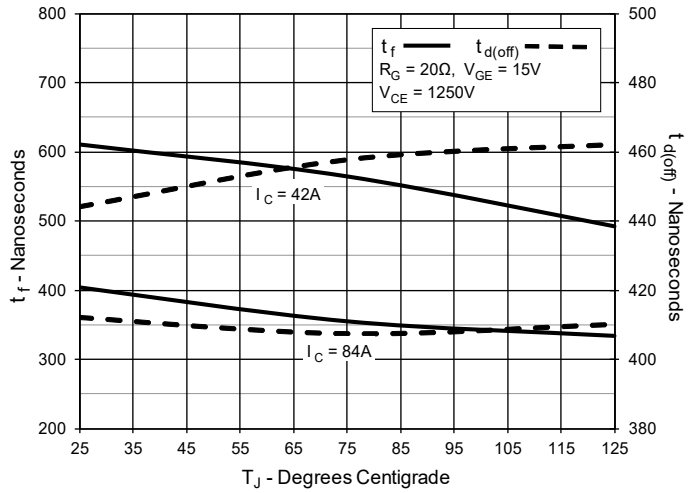
**Fig. 14. Resistive Turn-on Rise Time vs. Collector Current**



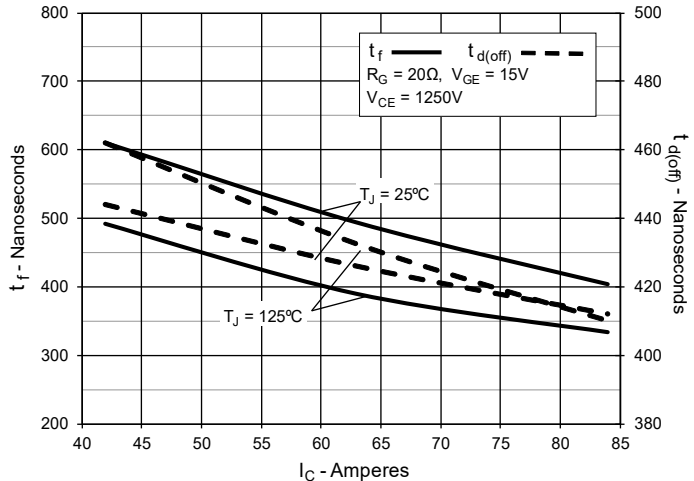
**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**



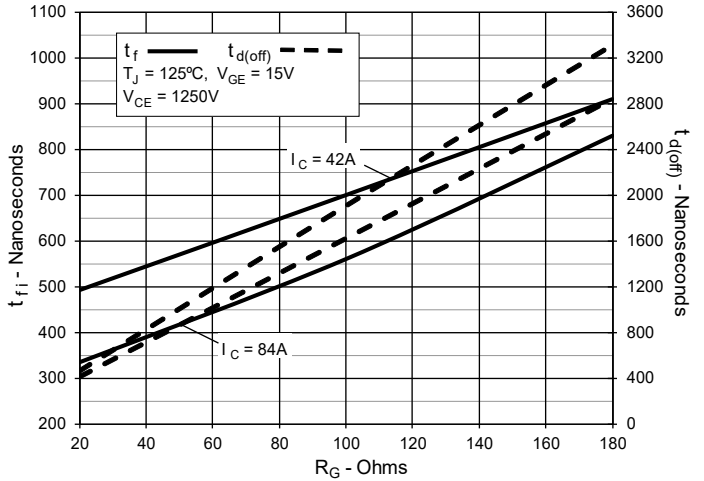
**Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature**



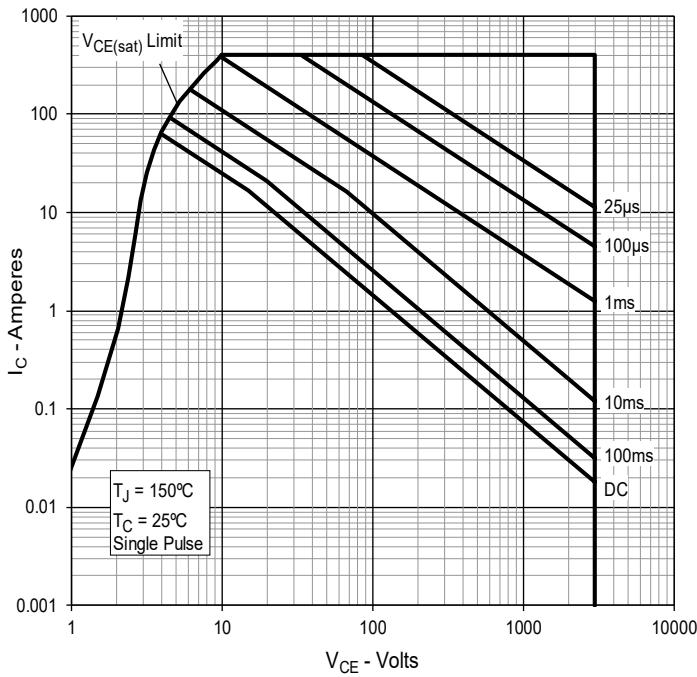
**Fig. 17. Resistive Turn-off Switching Times vs. Collector Current**



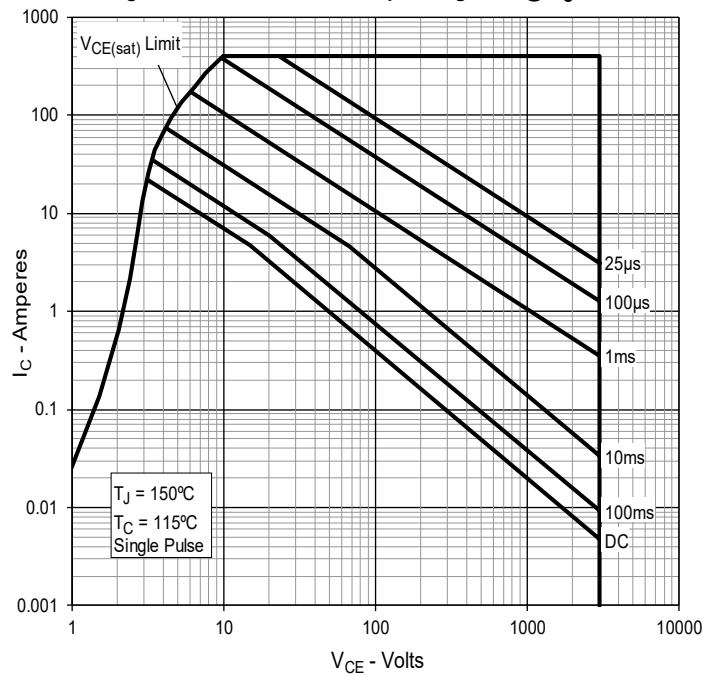
**Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance**



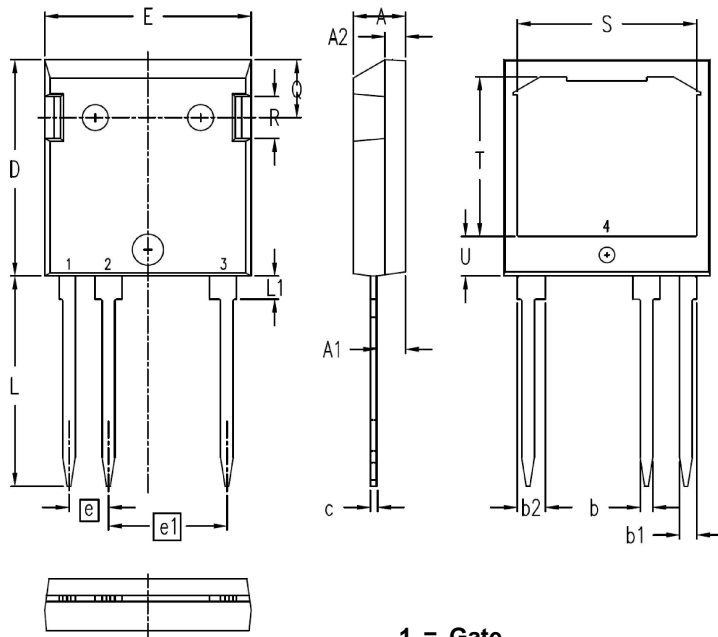
**Fig. 19. Forward-Bias Safe Operating Area @  $T_C = 25^\circ\text{C}$**



**Fig. 20. Forward-Bias Safe Operating Area @  $T_C = 115^\circ\text{C}$**



### ISOPLUS i4-Pak Outline



**1 = Gate**  
**2 = Emitter**  
**3,4 = Colector**

| 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  |