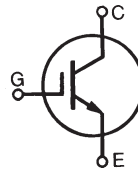


# 1200V XPT™ IGBT GenX3™

## IXYR100N120C3

(Electrically Isolated Tab)

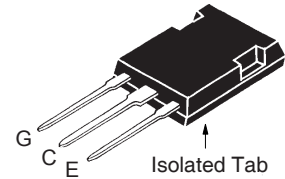
High-Speed IGBT  
for 20-50 kHz Switching



$$\begin{aligned} V_{CES} &= 1200V \\ I_{C110} &= 58A \\ V_{CE(sat)} &\leq 3.5V \\ t_{fi(typ)} &= 110ns \end{aligned}$$

| Symbol                        | Test Conditions                                                                     | Maximum Ratings                           |                  |
|-------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------|------------------|
| $V_{CES}$                     | $T_J = 25^\circ\text{C to } 175^\circ\text{C}$                                      | 1200                                      | V                |
| $V_{CGR}$                     | $T_J = 25^\circ\text{C to } 175^\circ\text{C}, R_{GE} = 1M\Omega$                   | 1200                                      | V                |
| $V_{GES}$                     | Continuous                                                                          | $\pm 20$                                  | V                |
| $V_{GEM}$                     | Transient                                                                           | $\pm 30$                                  | V                |
| $I_{C25}$                     | $T_C = 25^\circ\text{C}$ (Chip Capability)                                          | 104                                       | A                |
| $I_{C110}$                    | $T_C = 110^\circ\text{C}$                                                           | 58                                        | A                |
| $I_{CM}$                      | $T_C = 25^\circ\text{C}, 1\text{ms}$                                                | 480                                       | A                |
| $I_A$                         | $T_C = 25^\circ\text{C}$                                                            | 50                                        | A                |
| $E_{AS}$                      | $T_C = 25^\circ\text{C}$                                                            | 1.2                                       | J                |
| <b>SSOA</b><br><b>(RBSOA)</b> | $V_{GE} = 15V, T_{VJ} = 150^\circ\text{C}, R_G = 1\Omega$<br>Clamped Inductive Load | $I_{CM} = 200$<br>@ $V_{CE} \leq V_{CES}$ | A                |
| $P_C$                         | $T_C = 25^\circ\text{C}$                                                            | 484                                       | W                |
| $T_J$                         |                                                                                     | -55 ... +175                              | $^\circ\text{C}$ |
| $T_{JM}$                      |                                                                                     | 175                                       | $^\circ\text{C}$ |
| $T_{stg}$                     |                                                                                     | -55 ... +175                              | $^\circ\text{C}$ |
| $T_L$                         | 1.6mm (0.062 in.) from Case for 10s                                                 | 300                                       | $^\circ\text{C}$ |
| $T_{SOLD}$                    | Plastic Body for 10s                                                                | 260                                       | $^\circ\text{C}$ |
| $V_{ISOL}$                    | 50/60 Hz, 1 Minute                                                                  | 2500                                      | V~               |
| $F_C$                         | Mounting Force                                                                      | 20..120/4.5..27                           | N/lb.            |
| <b>Weight</b>                 |                                                                                     | 5                                         | g                |

### ISOPLUS247™



G = Gate      C = Collector  
E = Emitter

### Features

- Optimized for Low Switching Losses
- Square RBSOA
- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 2500V~ Electrical Isolation
- Positive Thermal Coefficient of  $V_{ce(sat)}$
- Avalanche Rated
- High Current Handling Capability

### Advantages

- High Power Density
- Low Gate Drive Requirement

### Applications

- High Frequency Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

| Symbol        | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified) | Characteristic Values |            |                             |
|---------------|-----------------------------------------------------------------------------|-----------------------|------------|-----------------------------|
|               |                                                                             | Min.                  | Typ.       | Max.                        |
| $BV_{CES}$    | $I_C = 250\mu\text{A}, V_{GE} = 0V$                                         | 1200                  |            | V                           |
| $V_{GE(th)}$  | $I_C = 250\mu\text{A}, V_{CE} = V_{GE}$                                     | 3.0                   |            | 5.0 V                       |
| $I_{CES}$     | $V_{CE} = V_{CES}, V_{GE} = 0V$<br>$T_J = 150^\circ\text{C}$                |                       |            | 25 $\mu\text{A}$<br>1.25 mA |
| $I_{GES}$     | $V_{CE} = 0V, V_{GE} = \pm 20V$                                             |                       |            | $\pm 100$ nA                |
| $V_{CE(sat)}$ | $I_C = 100A, V_{GE} = 15V$ , Note 1<br>$T_J = 150^\circ\text{C}$            |                       | 2.9<br>4.1 | 3.5 V<br>V                  |

## Symbol Test Conditions

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

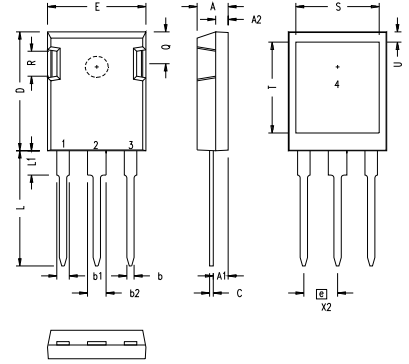
## Characteristic Values

|              |                                                                                                                                                                  | Min. | Typ.  | Max.                    |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|-------------------------|
| $g_{fs}$     | $I_C = 60\text{A}, V_{CE} = 10\text{V}, \text{Note 1}$                                                                                                           | 30   | 52    | S                       |
| $C_{ies}$    | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$                                                                                                       |      | 6000  | pF                      |
| $C_{oes}$    |                                                                                                                                                                  |      | 353   | pF                      |
| $C_{res}$    |                                                                                                                                                                  |      | 130   | pF                      |
| $Q_{g(on)}$  | $I_C = 100\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$                                                                                             |      | 270   | nC                      |
| $Q_{ge}$     |                                                                                                                                                                  |      | 50    | nC                      |
| $Q_{gc}$     |                                                                                                                                                                  |      | 93    | nC                      |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = 100\text{A}, V_{GE} = 15\text{V}$<br>$V_{CE} = 0.5 \cdot V_{CES}, R_G = 1\Omega$<br>Note 2  |      | 32    | ns                      |
| $t_{ri}$     |                                                                                                                                                                  |      | 90    | ns                      |
| $E_{on}$     |                                                                                                                                                                  |      | 6.50  | mJ                      |
| $t_{d(off)}$ |                                                                                                                                                                  |      | 123   | ns                      |
| $t_{fi}$     |                                                                                                                                                                  |      | 110   | ns                      |
| $E_{off}$    |                                                                                                                                                                  |      | 2.90  | mJ                      |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = 100\text{A}, V_{GE} = 15\text{V}$<br>$V_{CE} = 0.5 \cdot V_{CES}, R_G = 1\Omega$<br>Note 2 |      | 32    | ns                      |
| $t_{ri}$     |                                                                                                                                                                  |      | 90    | ns                      |
| $E_{on}$     |                                                                                                                                                                  |      | 10.10 | mJ                      |
| $t_{d(off)}$ |                                                                                                                                                                  |      | 140   | ns                      |
| $t_{fi}$     |                                                                                                                                                                  |      | 125   | ns                      |
| $E_{off}$    |                                                                                                                                                                  |      | 3.55  | mJ                      |
| $R_{thJC}$   |                                                                                                                                                                  |      |       | 0.31 $^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                                                  |      | 0.15  | $^\circ\text{C/W}$      |

## Notes:

1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .
2. Switching times & energy losses may increase for higher  $V_{CE}$  (clamp),  $T_J$  or  $R_G$ .

## ISOPLUS247 (IXYR) Outline

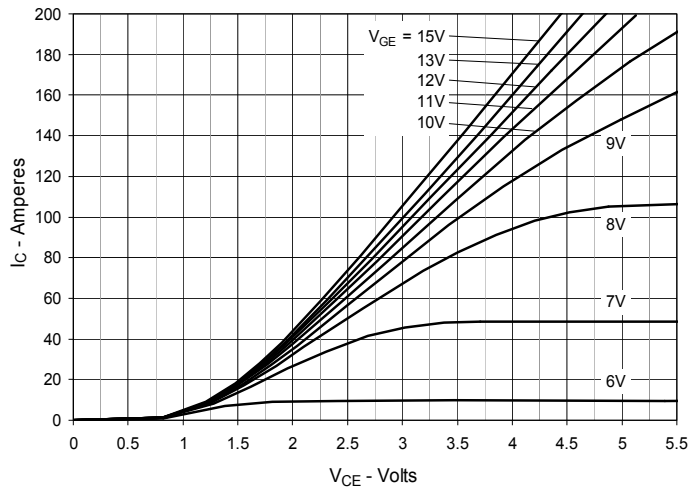


| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .190     | .205 | 4.83        | 5.21  |
| A1  | .090     | .100 | 2.29        | 2.54  |
| A2  | .075     | .085 | 1.91        | 2.16  |
| b   | .045     | .055 | 1.14        | 1.40  |
| b1  | .075     | .084 | 1.91        | 2.13  |
| b2  | .115     | .123 | 2.92        | 3.12  |
| C   | .024     | .031 | 0.61        | 0.80  |
| D   | .819     | .840 | 20.80       | 21.34 |
| E   | .620     | .635 | 15.75       | 16.13 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| L   | .780     | .800 | 19.81       | 20.32 |
| L1  | .150     | .170 | 3.81        | 4.32  |
| Q   | .220     | .244 | 5.59        | 6.20  |
| R   | .170     | .190 | 4.32        | 4.83  |
| S   | .520     | .540 | 13.21       | 13.72 |
| T   | .620     | .640 | 15.75       | 16.26 |
| U   | .065     | .080 | 1.65        | 2.03  |

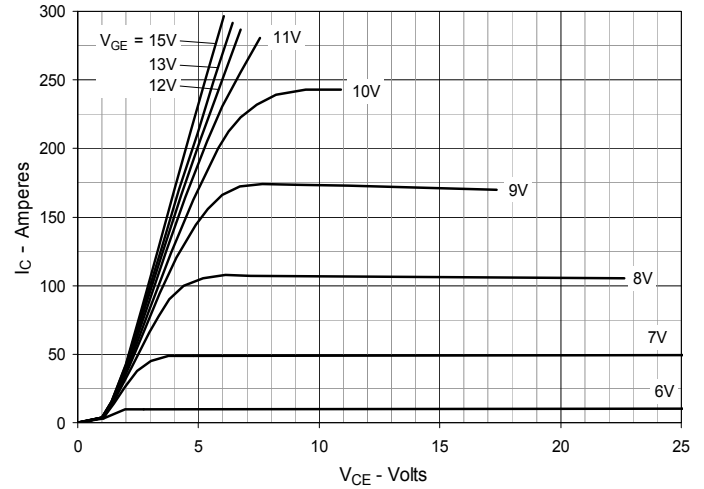
- 1 - Gate  
2,4 - Collector  
3 - Emitter

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

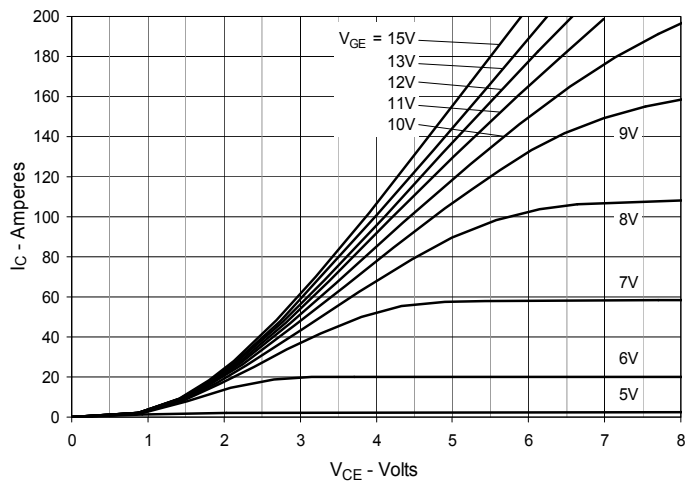
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



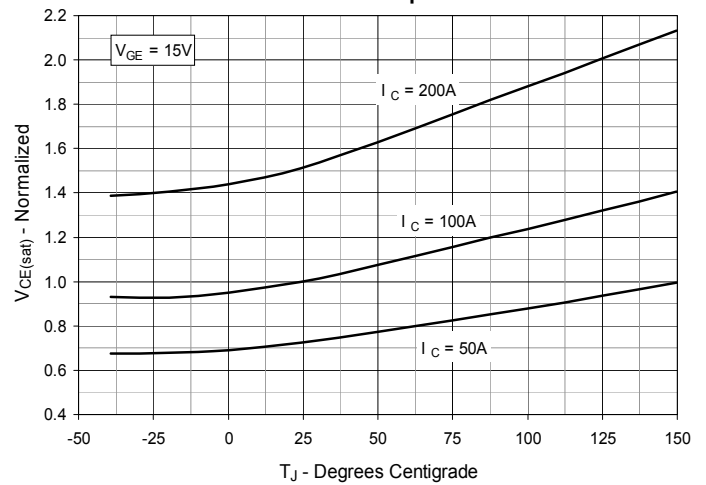
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



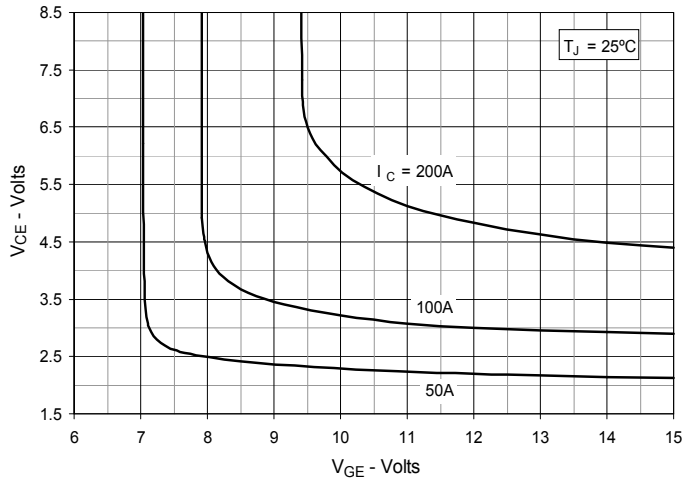
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



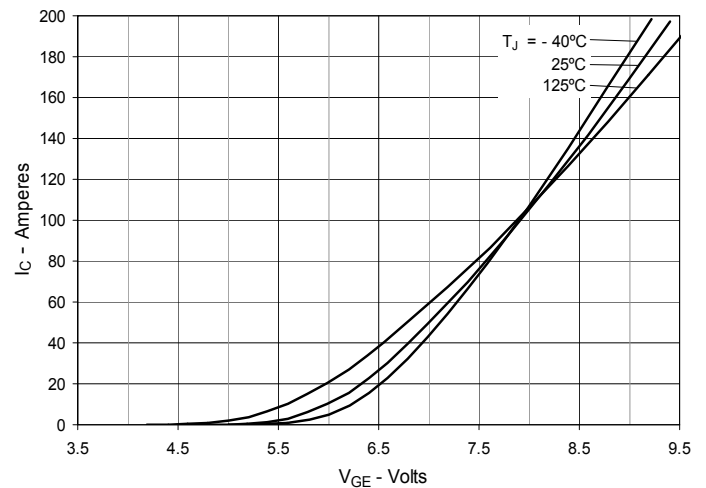
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**

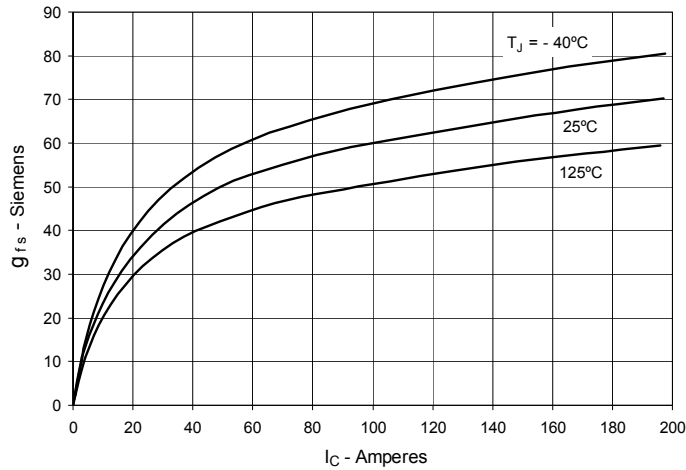
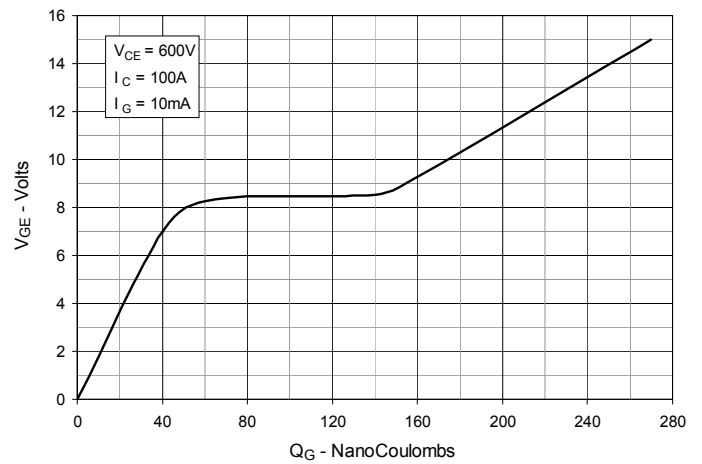
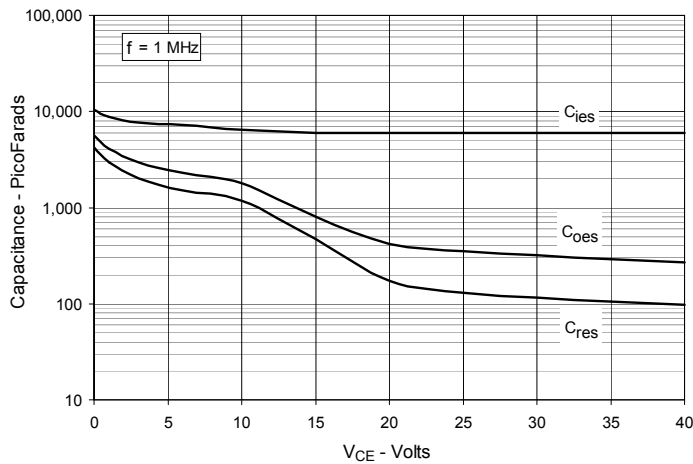
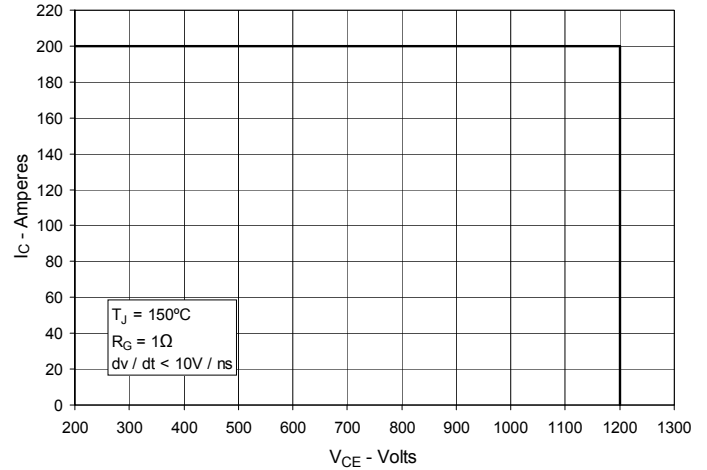
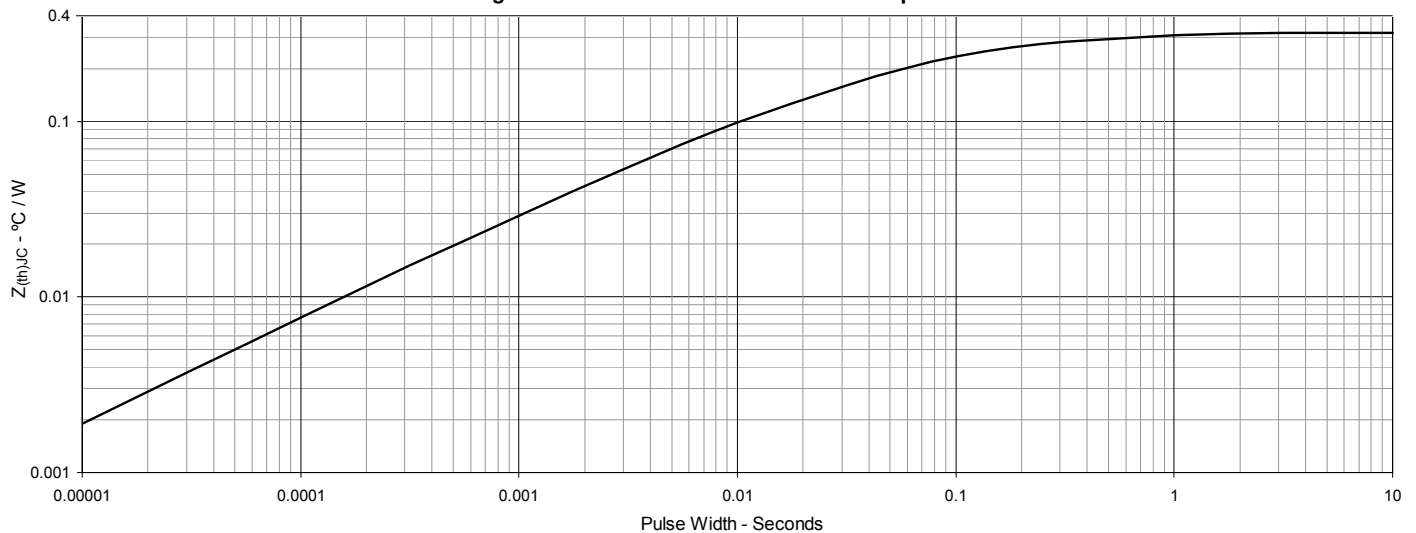


**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**

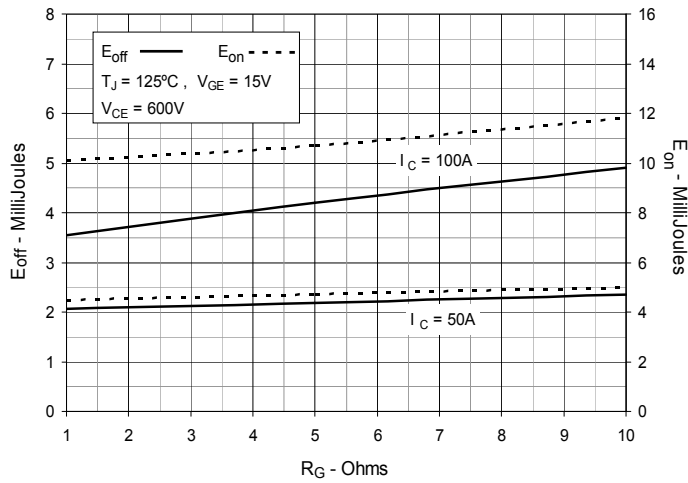


**Fig. 6. Input Admittance**

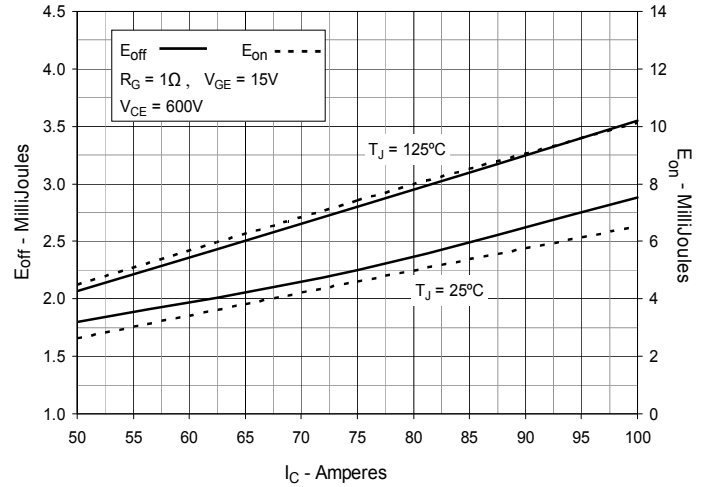


**Fig. 7. Transconductance**

**Fig. 8. Gate Charge**

**Fig. 9. Capacitance**

**Fig. 10. Reverse-Bias Safe Operating Area**

**Fig. 11. Maximum Transient Thermal Impedance**


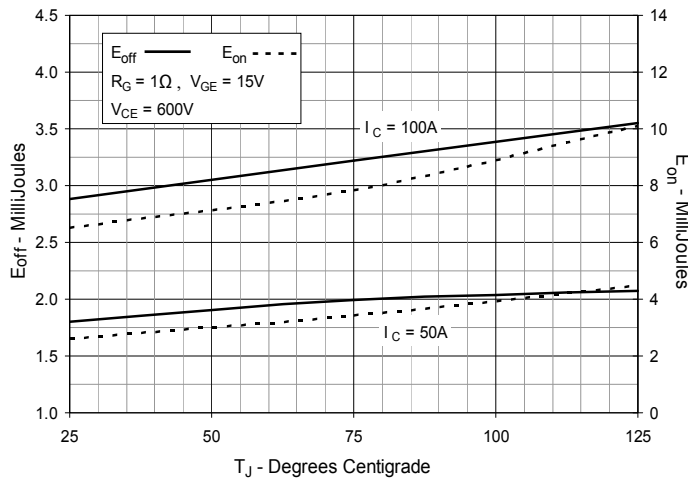
**Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance**



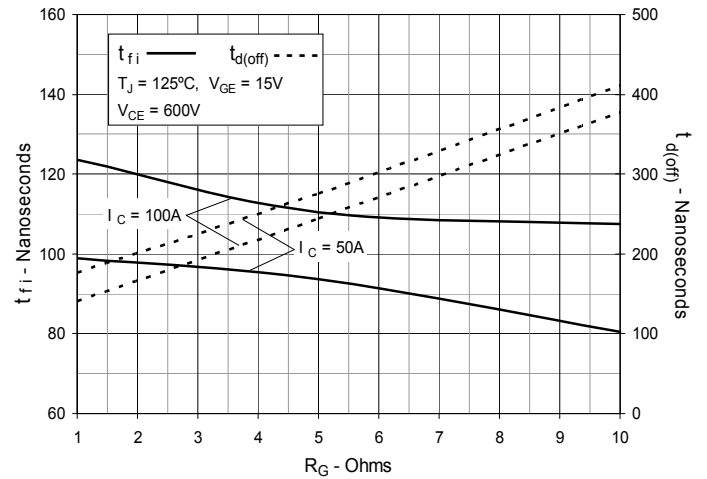
**Fig. 13. Inductive Switching Energy Loss vs. Collector Current**



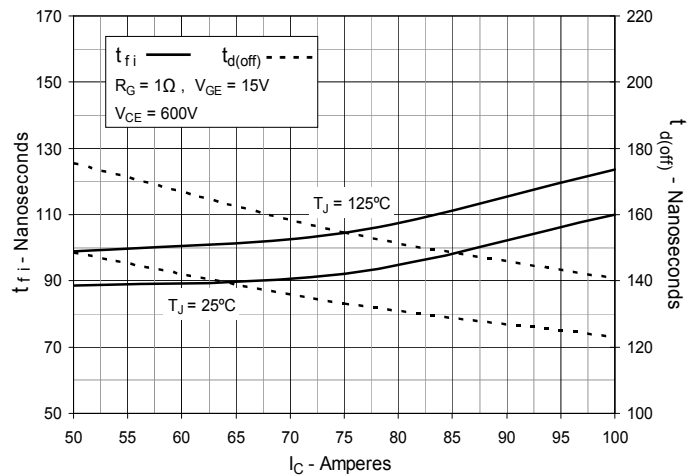
**Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature**



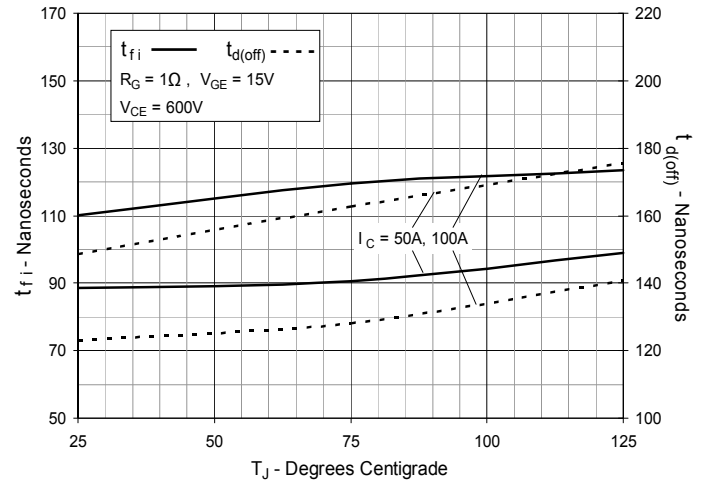
**Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance**

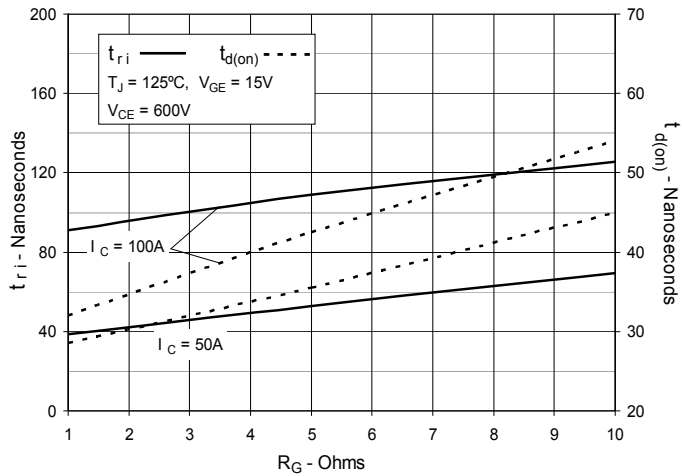
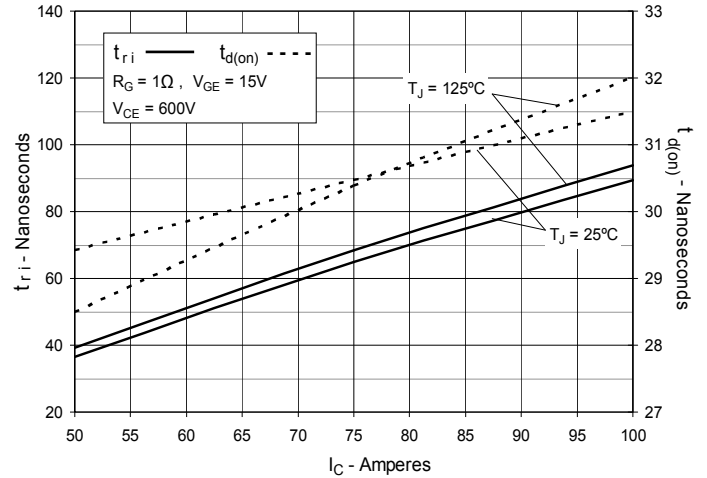


**Fig. 16. Inductive Turn-off Switching Times vs. Collector Current**



**Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature**



**Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance**

**Fig. 19. Inductive Turn-on Switching Times vs. Collector Current**

**Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature**
