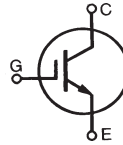


# GenX3™ 600V IGBT

# IXGR64N60A3

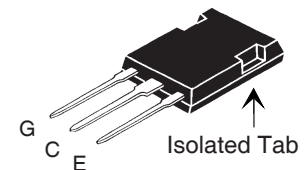
Ultra-low  $V_{sat}$  PT IGBTs for  
up to 5kHz switching



$$\begin{aligned} V_{CES} &= 600V \\ I_{C110} &= 47A \\ V_{CE(sat)} &\leq 1.35V \end{aligned}$$

| Symbol                        | Test Conditions                                                                                                | Maximum Ratings              |                  |
|-------------------------------|----------------------------------------------------------------------------------------------------------------|------------------------------|------------------|
| $V_{CES}$                     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                                                | 600                          | V                |
| $V_{CGR}$                     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GE} = 1M\Omega$                                          | 600                          | V                |
| $V_{GES}$                     | Continuous                                                                                                     | $\pm 20$                     | V                |
| $V_{GEM}$                     | Transient                                                                                                      | $\pm 30$                     | V                |
| $I_{C110}$                    | $T_C = 110^\circ\text{C}$                                                                                      | 47                           | A                |
| $I_{CM}$                      | $T_C = 25^\circ\text{C}$ , 1ms                                                                                 | 350                          | A                |
| <b>SSOA</b><br><b>(RBSOA)</b> | $V_{GE} = 15V$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 3\Omega$<br>Clamped inductive load @ $V_{CE} \leq 600V$ | $I_{CM} = 100$               | A                |
| $P_C$                         | $T_C = 25^\circ\text{C}$                                                                                       | 200                          | W                |
| $T_J$                         |                                                                                                                | -55 ... +150                 | $^\circ\text{C}$ |
| $T_{JM}$                      |                                                                                                                | 150                          | $^\circ\text{C}$ |
| $T_{stg}$                     |                                                                                                                | -55 ... +150                 | $^\circ\text{C}$ |
| $F_C$                         | Mounting Force                                                                                                 | 20..120/4.5..27              | N/lb.            |
| $T_L$                         | 1.6mm (0.063 in.) from case for 10s                                                                            | 300                          | $^\circ\text{C}$ |
| $T_{SOLD}$                    | Plastic body for 10s                                                                                           | 260                          | $^\circ\text{C}$ |
| $V_{ISOL}$                    | 50/60 Hz, RMS                                                                                                  | t = 1min 2500<br>t = 1s 3000 | V~<br>V~         |
|                               | $I_{ISOL} \leq 1mA$                                                                                            |                              |                  |
| <b>Weight</b>                 |                                                                                                                | 6                            | g                |

ISOPLUS247™ (IXGR)  
E153432



G = Gate                      E = Emitter  
C = Collector

## Features

- Silicon chip on Direct-Copper Bond (DCB) substrate
- Isolated mounting surface
- 2500V electrical isolation

## Advantages

- High power density
- Low gate drive requirement

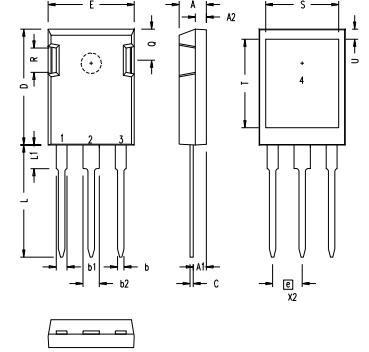
## Applications

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts
- Inrush Current Protection Circuits

| Symbol        | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) | Characteristic Values |      |                                       |
|---------------|-----------------------------------------------------------------------------|-----------------------|------|---------------------------------------|
|               |                                                                             | Min.                  | Typ. | Max.                                  |
| $BV_{CES}$    | $I_C = 250\mu\text{A}$ , $V_{GE} = 0V$                                      | 600                   |      | V                                     |
| $V_{GE(th)}$  | $I_C = 250\mu\text{A}$ , $V_{CE} = V_{GE}$                                  | 3.0                   |      | 5.0 V                                 |
| $I_{CES}$     | $V_{CE} = V_{CES}$<br>$V_{GE} = 0V$ $T_J = 125^\circ\text{C}$               |                       |      | 50 $\mu\text{A}$<br>500 $\mu\text{A}$ |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                          |                       |      | $\pm 100$ nA                          |
| $V_{CE(sat)}$ | $I_C = 50A$ , $V_{GE} = 15V$ , Note 1                                       |                       |      | 1.35 V                                |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified)                                                                 | Characteristic Values |      |                         |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------------|
|              |                                                                                                                                           | Min.                  | Typ. | Max.                    |
| $g_{fs}$     | $I_C = 50\text{A}$ , $V_{CE} = 10\text{V}$ , Note 1                                                                                       | 40                    | 70   | S                       |
| $C_{ies}$    | $V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$                                                                          |                       | 4850 | pF                      |
| $C_{oes}$    |                                                                                                                                           |                       | 270  | pF                      |
| $C_{res}$    |                                                                                                                                           |                       | 66   | pF                      |
| $Q_g$        | $I_C = I_{C110}$ , $V_{GE} = 15\text{V}$ , $V_{CE} = 0.5 \cdot V_{CES}$                                                                   |                       | 167  | nC                      |
| $Q_{ge}$     |                                                                                                                                           |                       | 28   | nC                      |
| $Q_{gc}$     |                                                                                                                                           |                       | 60   | nC                      |
| $t_{d(on)}$  | Inductive Load, $T_J = 25^\circ\text{C}$<br>$I_C = 50\text{A}$ , $V_{GE} = 15\text{V}$<br>$V_{CE} = 0.8 \cdot V_{CES}$ , $R_G = 3\Omega$  |                       | 26   | ns                      |
| $t_{ri}$     |                                                                                                                                           |                       | 40   | ns                      |
| $E_{on}$     |                                                                                                                                           |                       | 1.42 | mJ                      |
| $t_{d(off)}$ |                                                                                                                                           |                       | 268  | ns                      |
| $t_{fi}$     |                                                                                                                                           |                       | 222  | ns                      |
| $E_{off}$    |                                                                                                                                           |                       | 3.28 | mJ                      |
| $t_{d(on)}$  | Inductive Load, $T_J = 125^\circ\text{C}$<br>$I_C = 50\text{A}$ , $V_{GE} = 15\text{V}$<br>$V_{CE} = 0.8 \cdot V_{CES}$ , $R_G = 3\Omega$ |                       | 25   | ns                      |
| $t_{ri}$     |                                                                                                                                           |                       | 40   | ns                      |
| $E_{on}$     |                                                                                                                                           |                       | 2.76 | mJ                      |
| $t_{d(off)}$ |                                                                                                                                           |                       | 415  | nS                      |
| $t_{fi}$     |                                                                                                                                           |                       | 362  | ns                      |
| $E_{off}$    |                                                                                                                                           |                       | 6.03 | mJ                      |
| $R_{thJC}$   |                                                                                                                                           |                       |      | 0.62 $^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                           |                       | 0.15 | $^\circ\text{C/W}$      |

## ISOPLUS247 (IXGR) 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 - DRAIN (COLLECTOR)  
3 - SOURCE (EMITTER)  
4 - NO CONNECTION

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

Notes: 1. Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .

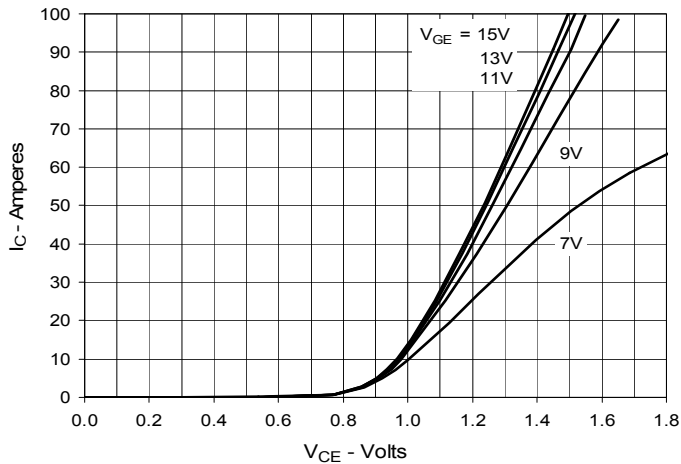
## PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

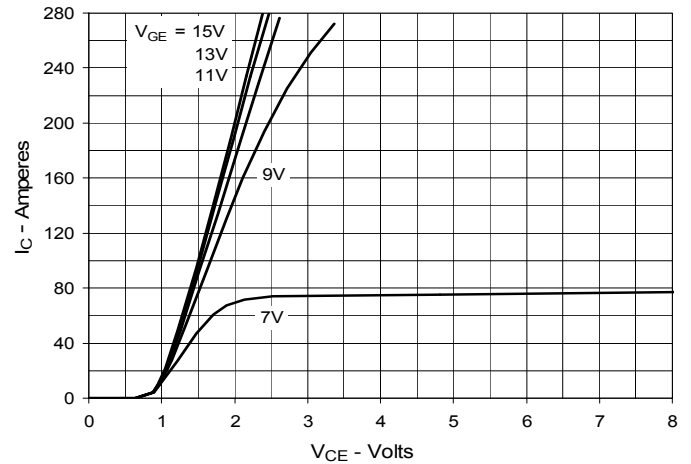
IXYS reserves the right to change limits, test conditions, and dimensions.

|                                                                                  |           |           |           |           |              |              |              |              |              |              |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|--------------|
| 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 | 7,157,338 B2 |
|                                                                                  | 4,850,072 | 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    |              |

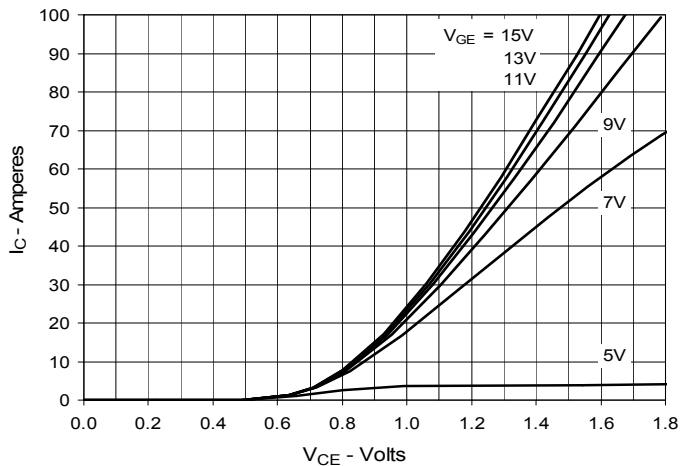
**Fig. 1. Output Characteristics  
@ 25°C**



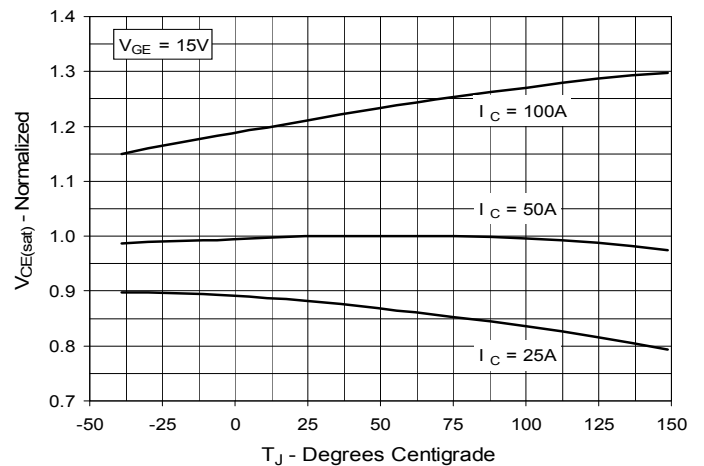
**Fig. 2. Extended Output Characteristics  
@ 25°C**



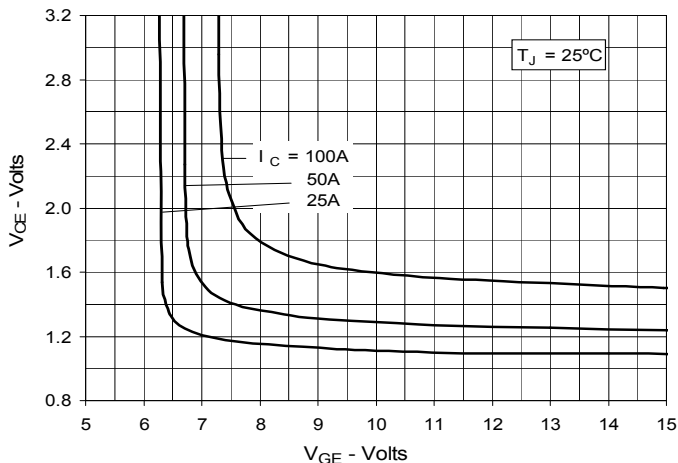
**Fig. 3. Output Characteristics  
@ 125°C**



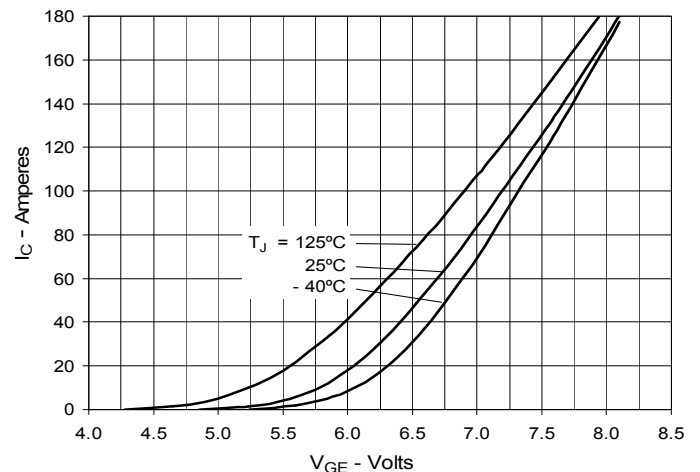
**Fig. 4. Dependence of  $V_{CE(sat)}$  on  
Junction Temperature**

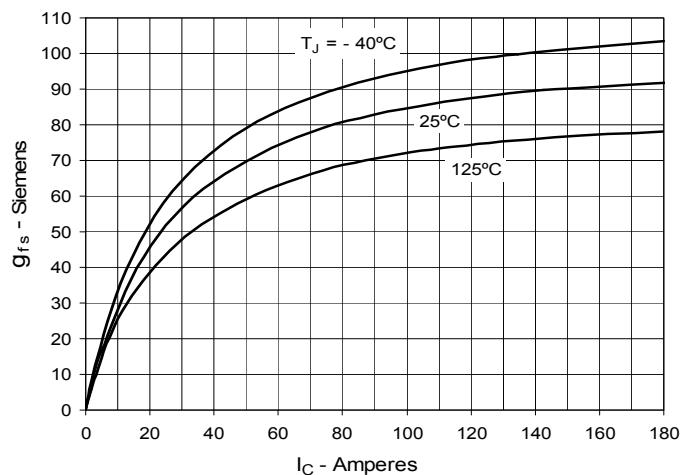
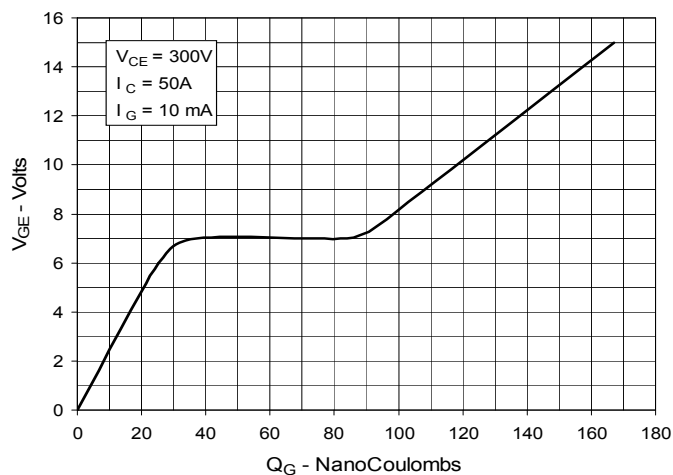
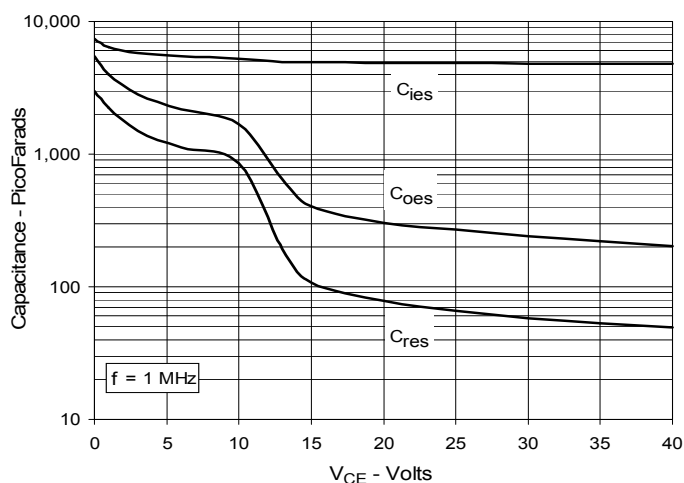
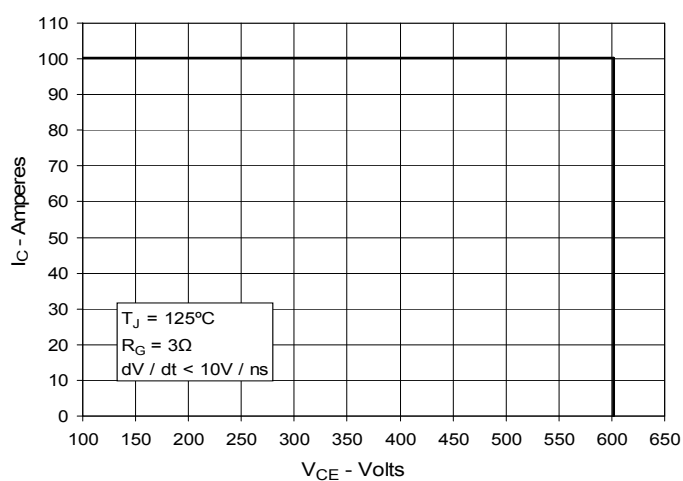
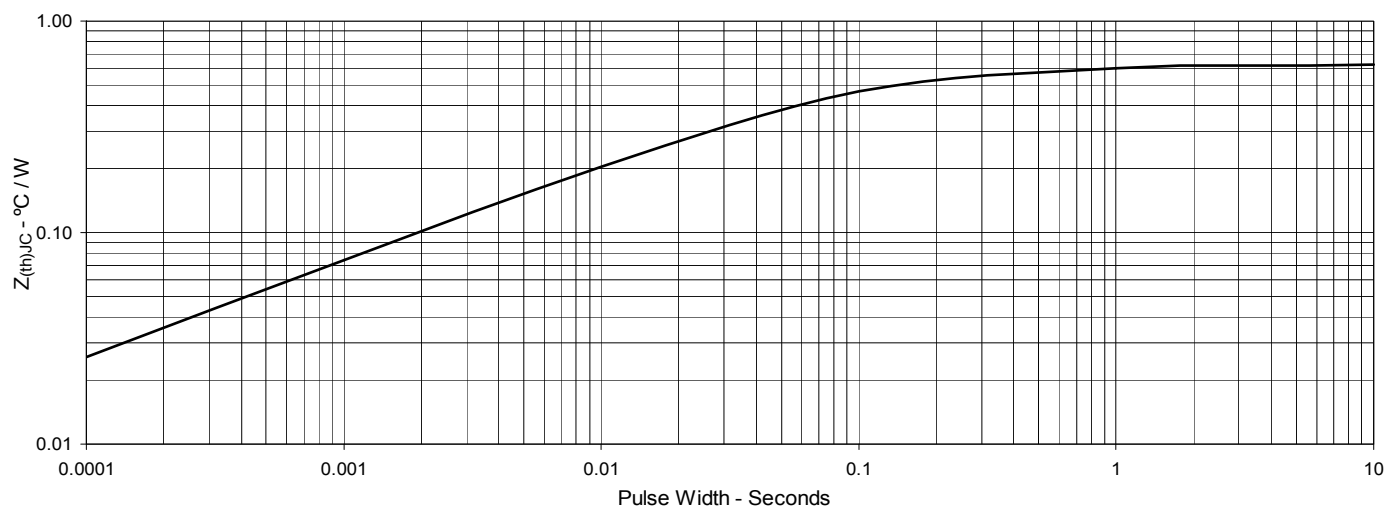


**Fig. 5. Collector-to-Emitter Voltage  
vs. Gate-to-Emitter Voltage**

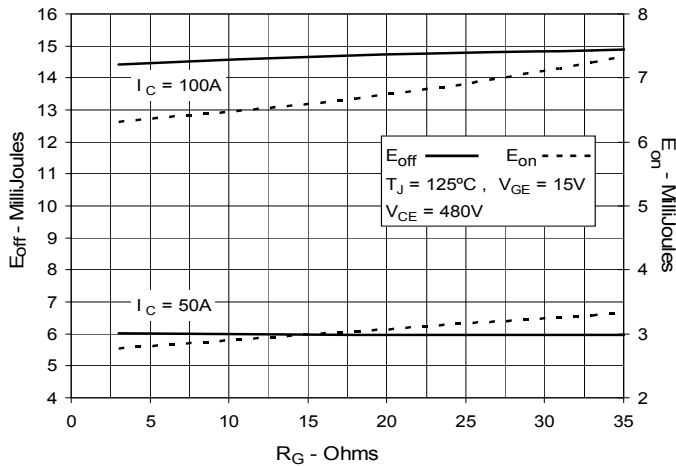


**Fig. 6. Input Admittance**

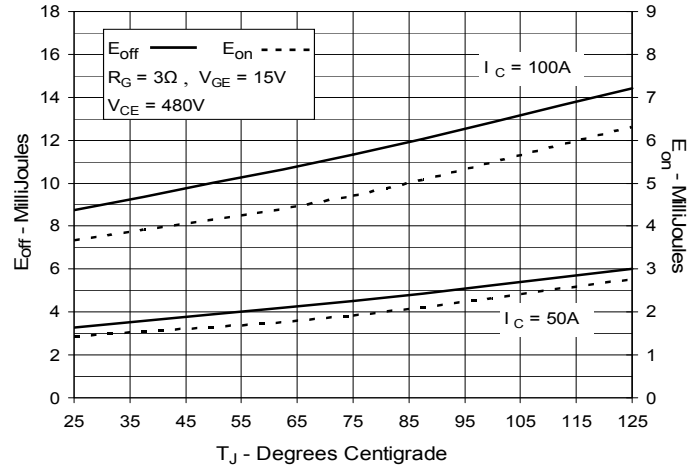


**Fig. 7. Transconductance**

**Fig. 8. Gate Charge**

**Fig. 9. Capacitance**

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

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


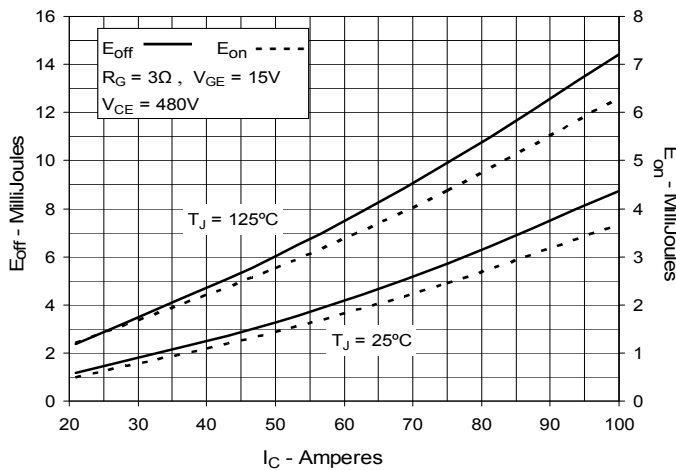
**Fig. 12. Inductive Switching  
Energy Loss vs. Gate Resistance**



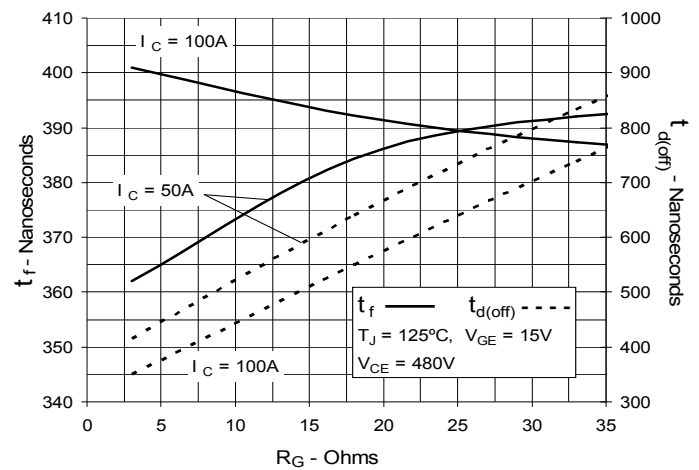
**Fig. 13. Inductive Switching  
Energy Loss vs. Junction Temperature**



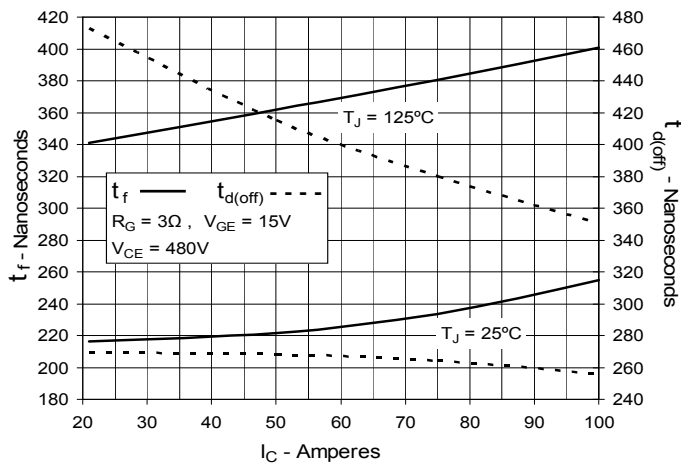
**Fig. 14. Inductive Switching  
Energy Loss vs. Collector Current**



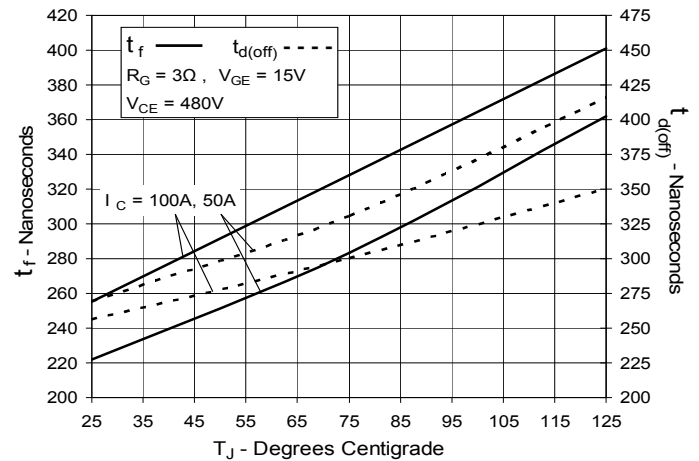
**Fig. 15. Inductive Turn-off  
Switching Times vs. Gate Resistance**



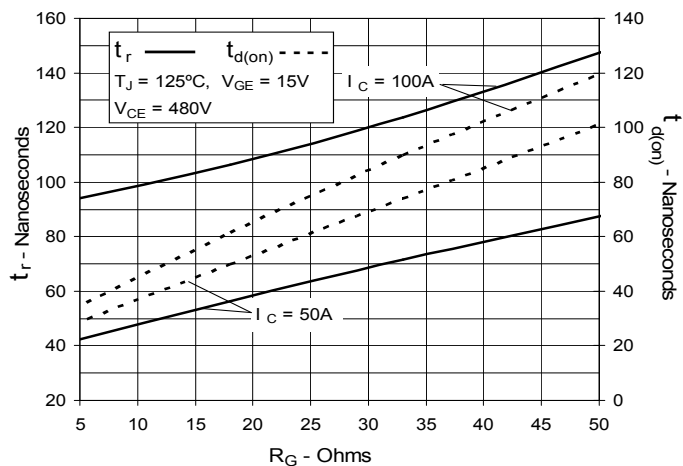
**Fig. 16. Inductive Turn-off  
Switching Times vs. Collector Current**



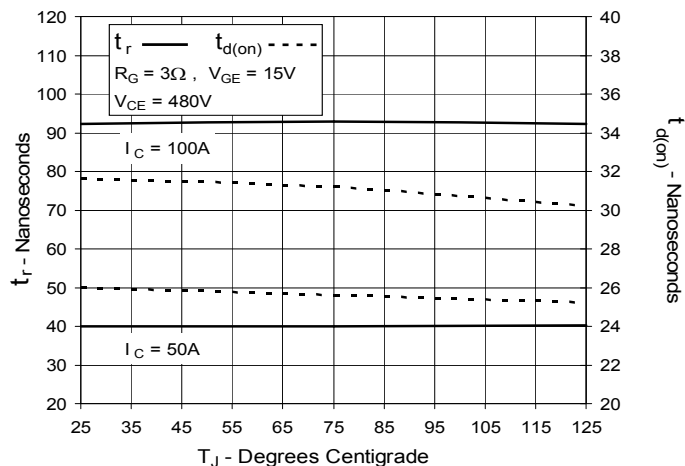
**Fig. 17. Inductive Turn-off  
Switching Times vs. Junction Temperature**



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



**Fig. 19. Inductive Turn-on  
Switching Times vs. Junction Temperature**



**Fig. 20. Inductive Turn-on  
Switching Times vs. Collector Current**

