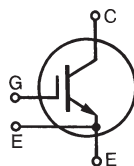


### GenX3™ 600V IGBT

### IXGN72N60A3

Ultra Low V<sub>sat</sub> PT IGBT for  
up to 5kHz switching



$$V_{CES} = 600V$$

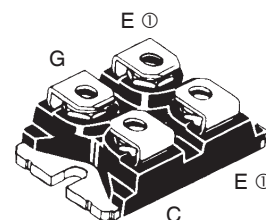
$$I_{C110} = 68A$$

$$V_{CE(sat)} \leq 1.35V$$

| Symbol                        | Test Conditions                                                                      | Maximum Ratings                         |                          |
|-------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------|--------------------------|
| $V_{CES}$                     | $T_J = 25^{\circ}C$ to $150^{\circ}C$                                                | 600                                     | V                        |
| $V_{CGR}$                     | $T_J = 25^{\circ}C$ to $150^{\circ}C$ , $R_{GE} = 1M\Omega$                          | 600                                     | V                        |
| $V_{GES}$                     | Continuous                                                                           | $\pm 20$                                | V                        |
| $V_{GEM}$                     | Transient                                                                            | $\pm 30$                                | V                        |
| $I_{C25}$                     | $T_C = 25^{\circ}C$ (Chip capability)                                                | 160                                     | A                        |
| $I_{C110}$                    | $T_C = 110^{\circ}C$                                                                 | 68                                      | A                        |
| $I_{LRMS}$                    | Terminal Current Limit                                                               | 100                                     | A                        |
| $I_{CM}$                      | $T_C = 25^{\circ}C$ , 1ms                                                            | 400                                     | A                        |
| <b>SSOA</b><br><b>(RBSOA)</b> | $V_{GE} = 15V$ , $T_{VJ} = 125^{\circ}C$ , $R_G = 3\Omega$<br>Clamped inductive load | $I_{CM} = 150$<br>@ $0.8 \cdot V_{CES}$ | A                        |
| $P_C$                         | $T_C = 25^{\circ}C$                                                                  | 360                                     | W                        |
| $T_J$                         |                                                                                      | -55 ... +150                            | $^{\circ}C$              |
| $T_{JM}$                      |                                                                                      | 150                                     | $^{\circ}C$              |
| $T_{stg}$                     |                                                                                      | -55 ... +150                            | $^{\circ}C$              |
| $V_{ISOL}$                    | 50/60Hz<br>$I_{ISOL} \leq 1mA$                                                       | $t = 1min$<br>$t = 1s$                  | 2500<br>3000<br>V~<br>V~ |
| $M_d$                         | Mounting torque<br>Terminal connection torque (M4)                                   | 1.5/13<br>1.3/11.5                      | Nm/lb.in.<br>Nm/lb.in.   |
| <b>Weight</b>                 |                                                                                      | 30                                      | g                        |

SOT-227B, miniBLOC

E153432



G = Gate, C = Collector, E = Emitter

① Either emitter terminal can be used as  
Main or Kelvin Emitter

#### Features

- Optimized for low conduction losses
- Isolation voltage 3000 V~
- Square RBSOA
- International standard package

#### Advantages

- High power density
- Low gate drive requirement

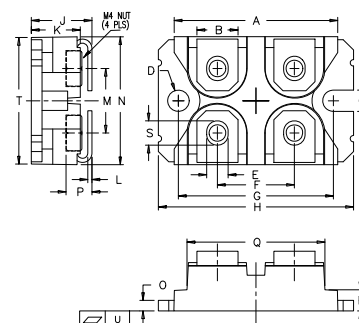
#### Applications

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

| Symbol        | Test Conditions<br>( $T_J = 25^{\circ}C$ , unless otherwise specified) | Characteristic Values |      |                           |
|---------------|------------------------------------------------------------------------|-----------------------|------|---------------------------|
|               |                                                                        | Min.                  | Typ. | Max.                      |
| $BV_{CES}$    | $I_C = 250\mu A$ , $V_{GE} = 0V$                                       | 600                   |      | V                         |
| $V_{GE(th)}$  | $I_C = 250\mu A$ , $V_{CE} = V_{GE}$                                   | 3.0                   |      | 5.0 V                     |
| $I_{CES}$     | $V_{CE} = V_{CES}$<br>$V_{GE} = 0V$<br>$T_J = 125^{\circ}C$            |                       |      | 75 $\mu A$<br>750 $\mu A$ |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                     |                       |      | $\pm 100$ nA              |
| $V_{CE(sat)}$ | $I_C = 60A$ , $V_{GE} = 15V$ , Note 1                                  |                       |      | 1.35 V                    |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                                                           | Characteristic Values |      |                         |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------------|
|              |                                                                                                                                                       | Min.                  | Typ. | Max.                    |
| $g_{fs}$     | $I_C = 60\text{A}$ , $V_{CE} = 10\text{V}$ , Note 1                                                                                                   | 48                    | 76   | S                       |
| $C_{ies}$    | $V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$                                                                                      |                       | 6600 | pF                      |
| $C_{oes}$    |                                                                                                                                                       |                       | 360  | pF                      |
| $C_{res}$    |                                                                                                                                                       |                       | 80   | pF                      |
| $Q_{g(on)}$  | $I_C = 60\text{A}$ , $V_{GE} = 15\text{V}$ , $V_{CE} = 0.5 \cdot V_{CES}$                                                                             |                       | 230  | nC                      |
| $Q_{ge}$     |                                                                                                                                                       |                       | 40   | nC                      |
| $Q_{gc}$     |                                                                                                                                                       |                       | 78   | nC                      |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = 50\text{A}$ , $V_{GE} = 15\text{V}$<br>$V_{CE} = 480\text{V}$ , $R_G = 3\Omega$  |                       | 31   | ns                      |
| $t_{ri}$     |                                                                                                                                                       |                       | 34   | ns                      |
| $E_{on}$     |                                                                                                                                                       |                       | 1.38 | mJ                      |
| $t_{d(off)}$ |                                                                                                                                                       |                       | 320  | ns                      |
| $t_{fi}$     |                                                                                                                                                       |                       | 250  | ns                      |
| $E_{off}$    |                                                                                                                                                       |                       | 3.5  | mJ                      |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = 50\text{A}$ , $V_{GE} = 15\text{V}$<br>$V_{CE} = 480\text{V}$ , $R_G = 3\Omega$ |                       | 29   | ns                      |
| $t_{ri}$     |                                                                                                                                                       |                       | 32   | ns                      |
| $E_{on}$     |                                                                                                                                                       |                       | 2.6  | mJ                      |
| $t_{d(off)}$ |                                                                                                                                                       |                       | 510  | ns                      |
| $t_{fi}$     |                                                                                                                                                       |                       | 375  | ns                      |
| $E_{off}$    |                                                                                                                                                       |                       | 6.5  | mJ                      |
| $R_{thJC}$   |                                                                                                                                                       |                       |      | 0.35 $^\circ\text{C/W}$ |
| $R_{thCK}$   |                                                                                                                                                       |                       | 0.05 | $^\circ\text{C/W}$      |

## SOT-227B miniBLOC (IXGN)



| SYM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 1.240  | 1.255 | 31.50       | 31.88 |
| B   | .307   | .323  | 7.80        | 8.20  |
| C   | .161   | .169  | 4.09        | 4.29  |
| D   | .161   | .169  | 4.09        | 4.29  |
| E   | .161   | .169  | 4.09        | 4.29  |
| F   | .587   | .595  | 14.91       | 15.11 |
| G   | 1.186  | 1.193 | 30.12       | 30.30 |
| H   | 1.496  | 1.505 | 38.00       | 38.23 |
| J   | .460   | .481  | 11.68       | 12.22 |
| K   | .351   | .378  | 8.92        | 9.60  |
| L   | .030   | .033  | 0.76        | 0.84  |
| M   | .496   | .506  | 12.60       | 12.85 |
| N   | .990   | 1.001 | 25.15       | 25.42 |
| O   | .078   | .084  | 1.98        | 2.13  |
| P   | .195   | .235  | 4.95        | 5.97  |
| Q   | 1.045  | 1.059 | 26.54       | 26.90 |
| R   | .155   | .174  | 3.94        | 4.42  |
| S   | .186   | .191  | 4.72        | 4.85  |
| T   | .968   | .987  | 24.59       | 25.07 |
| U   | -.002  | .004  | -0.05       | 0.1   |

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

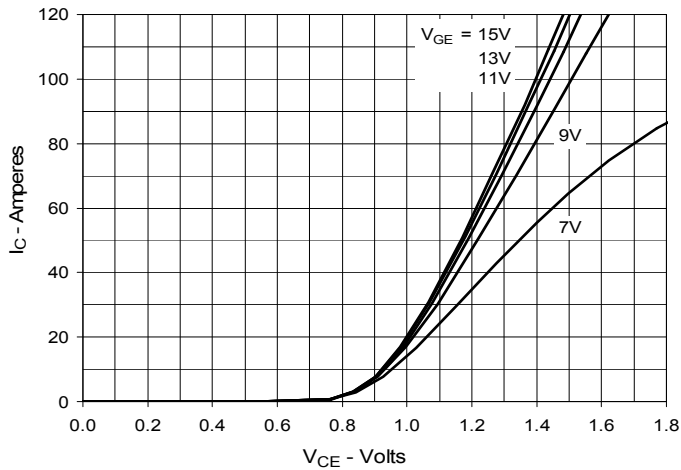
**PRELIMINARY TECHNICAL INFORMATION**

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.

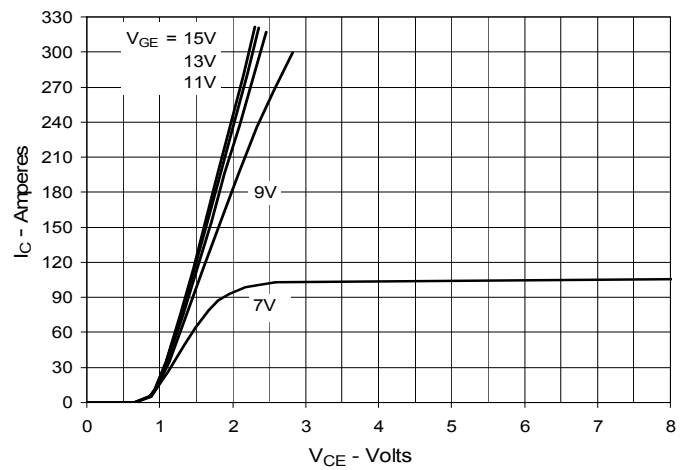
IXYS reserves the right to change limits, test conditions, and dimensions.

|                                                                                  |           |           |           |           |              |              |              |              |              |             |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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 | 7,157,338B2 |
|                                                                                  | 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    |             |

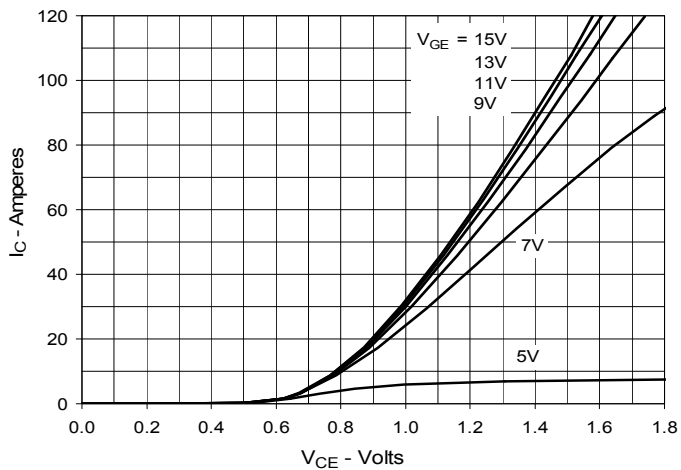
**Fig. 1. Output Characteristics  
@ 25°C**



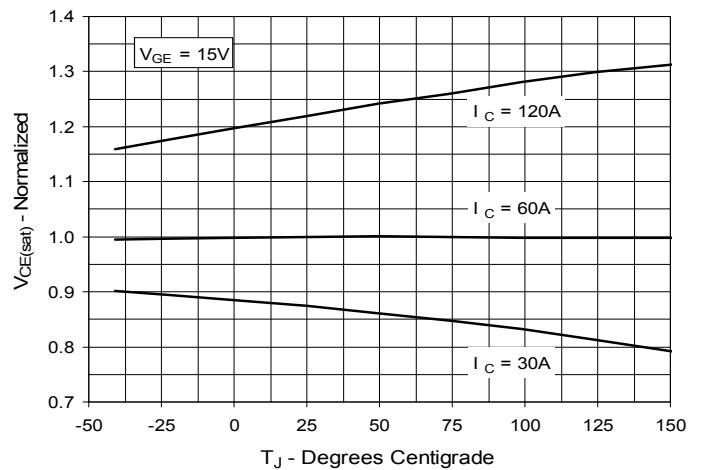
**Fig. 2. Extended Output Characteristics  
@ 25°C**



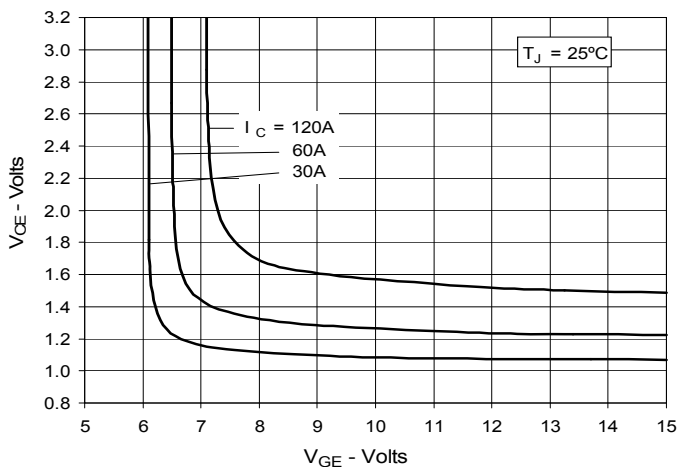
**Fig. 3. Output Characteristics  
@ 125°C**



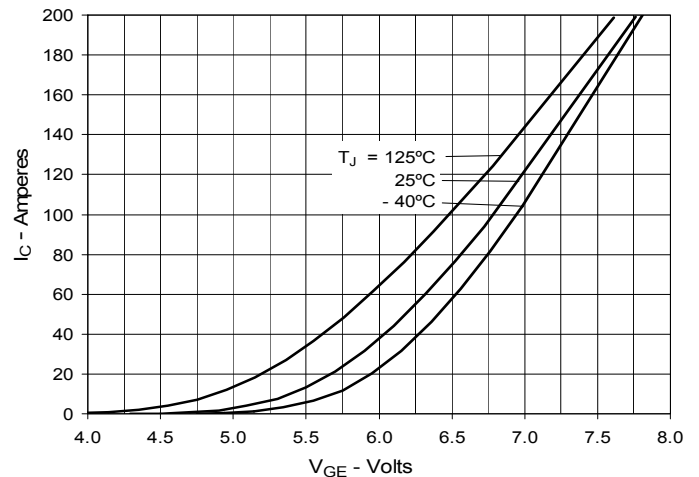
**Fig. 4. Dependence of  $V_{CE(sat)}$  on  
Junction Temperature**



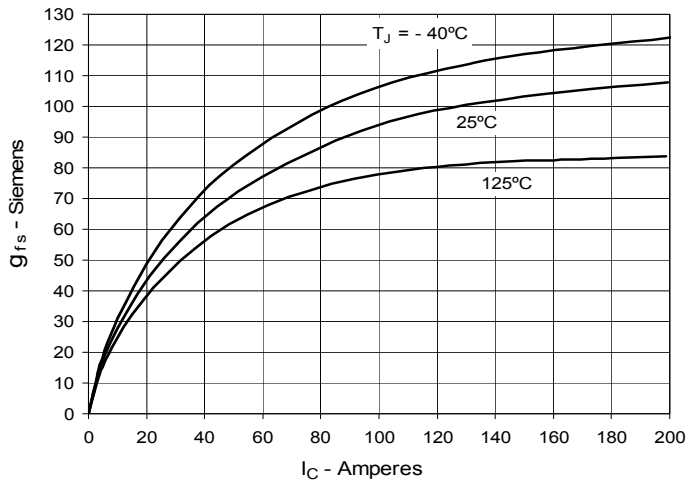
**Fig. 5. Collector-to-Emitter Voltage  
vs. Gate-to-Emitter Voltage**



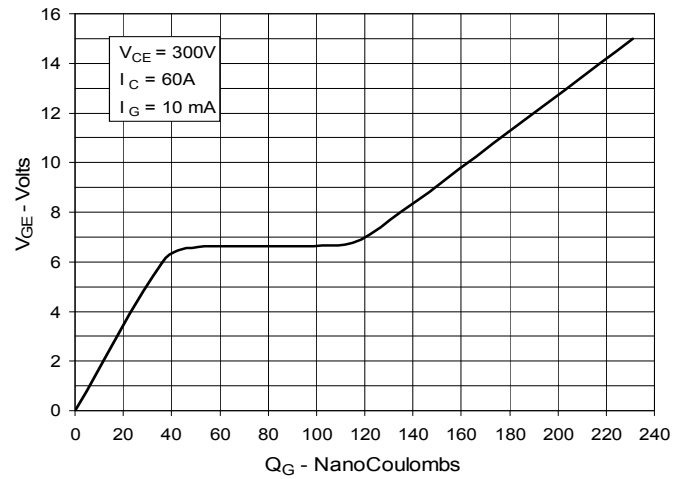
**Fig. 6. Input Admittance**



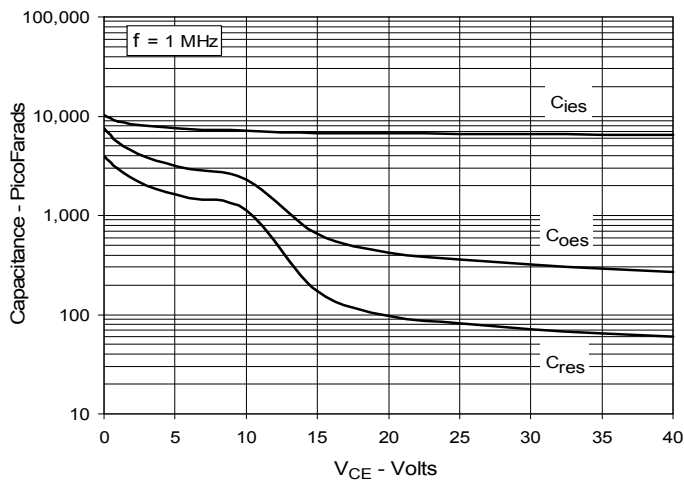
**Fig. 7. Transconductance**



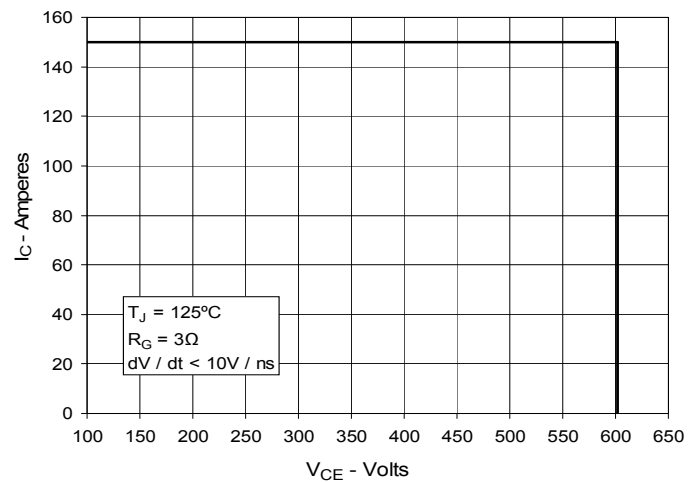
**Fig. 8. Gate Charge**



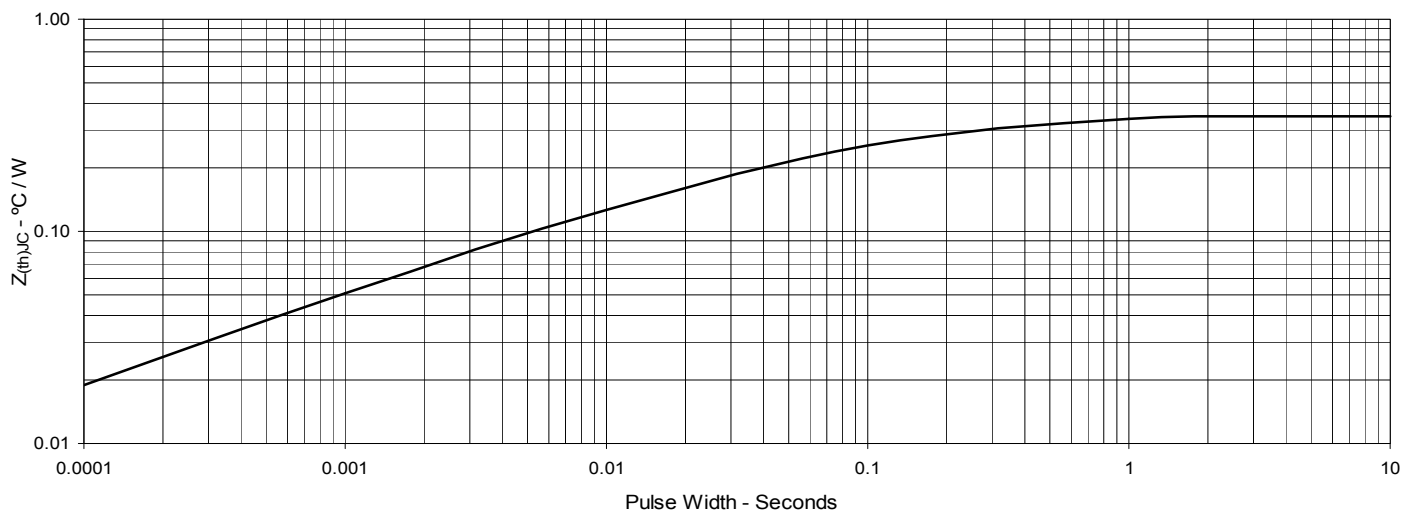
**Fig. 9. Capacitance**



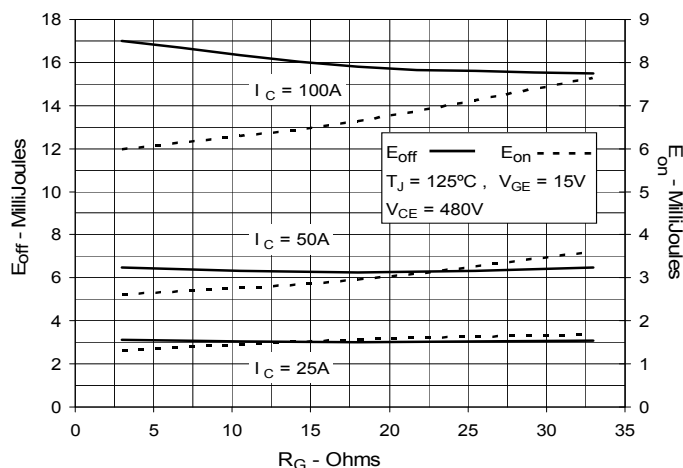
**Fig. 10. Reverse-Bias Safe Operating Area**



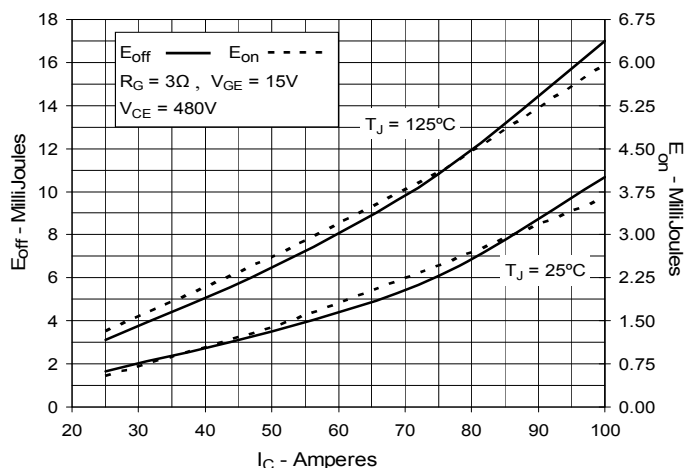
**Fig. 11. Maximum Transient Thermal Impedance**



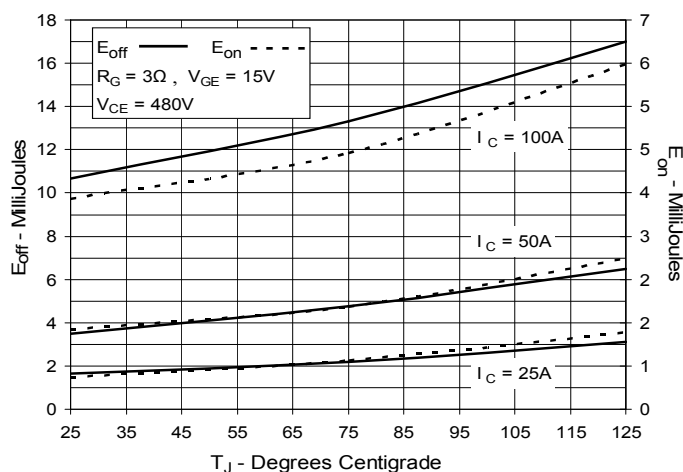
**Fig. 12. Inductive Switching  
Energy Loss vs. Gate Resistance**



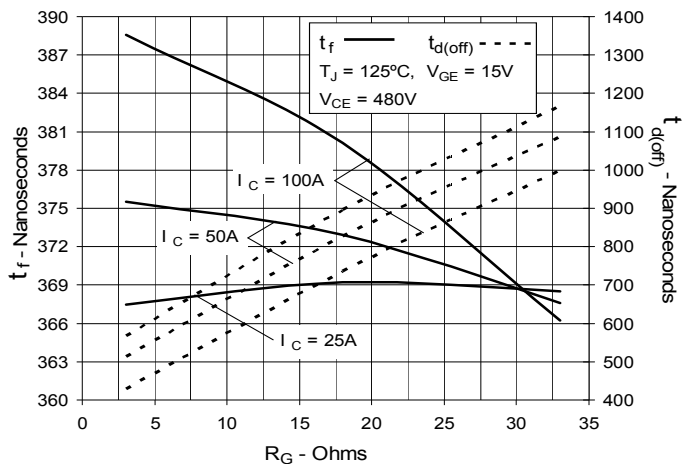
**Fig. 13. Inductive Switching  
Energy Loss vs. Collector Current**



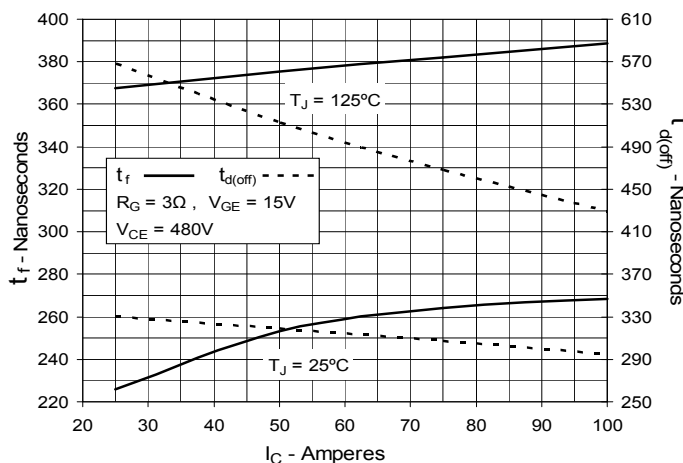
**Fig. 14. Inductive Switching  
Energy Loss vs. Junction Temperature**



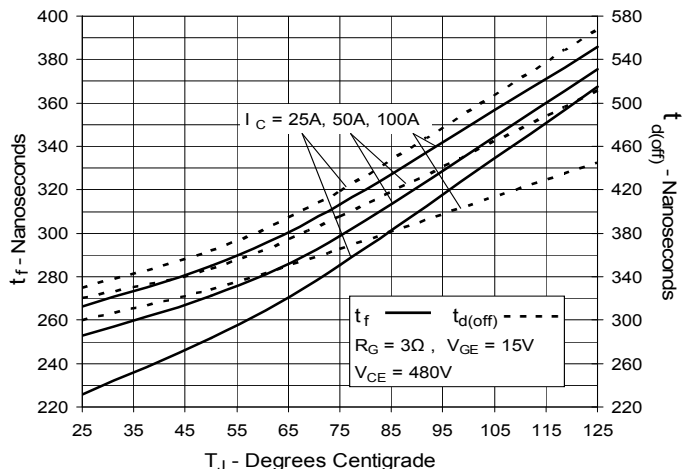
**Fig. 15. Inductive Turn-off  
Switching Times vs. Gate Resistance**



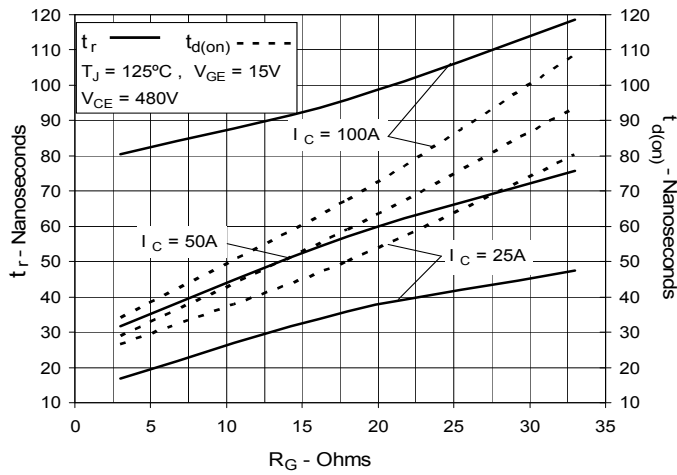
**Fig. 16. Inductive Turn-off  
Switching Times vs. Collector Current**



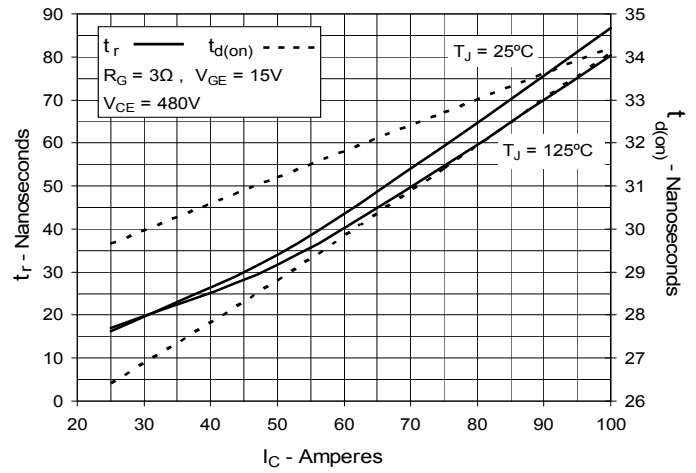
**Fig. 17. Inductive Turn-off  
Switching Times vs. Junction Temperature**



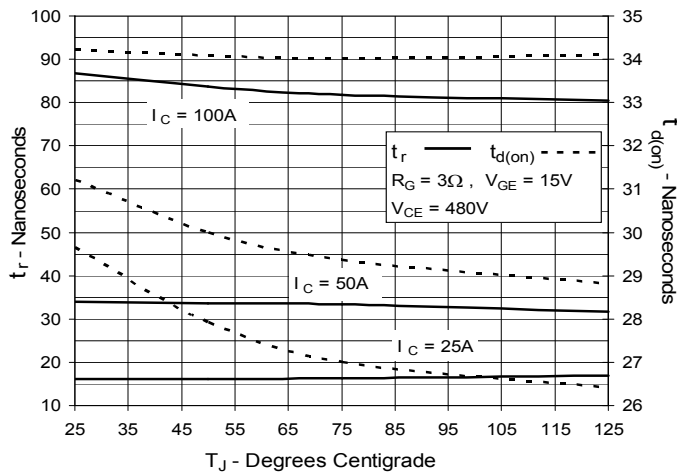
**Fig. 18. Inductive Turn-on  
Switching Times vs. Gate Resistance**



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



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





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