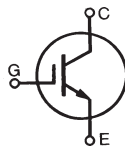


### GenX3™ 600V IGBT

### IXGH64N60B3 IXGT64N60B3

Medium speed low V<sub>sat</sub> PT  
IGBTs for 5 - 40kHz switching



$$V_{CES} = 600V$$

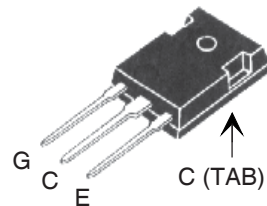
$$I_{C110} = 64A$$

$$V_{CE(sat)} \leq 1.8V$$

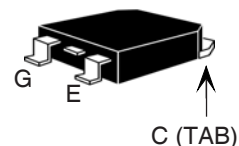
$$t_{fi(typ)} = 88ns$$

| Symbol                        | Test Conditions                                                                                   | Maximum Ratings |            |
|-------------------------------|---------------------------------------------------------------------------------------------------|-----------------|------------|
| $V_{CES}$                     | $T_C = 25^\circ C$ 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          |
| $I_{C110}$                    | $T_C = 110^\circ C$                                                                               | 64              | 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 @ $\leq 600V$ | $I_{CM} = 200$  | A          |
| $P_C$                         | $T_C = 25^\circ C$                                                                                | 460             | W          |
| $T_J$                         |                                                                                                   | -55 ... +150    | $^\circ C$ |
| $T_{JM}$                      |                                                                                                   | 150             | $^\circ C$ |
| $T_{stg}$                     |                                                                                                   | -55 ... +150    | $^\circ C$ |
| $T_L$                         | 1.6mm (0.062 in.) from case for 10s                                                               | 300             | $^\circ C$ |
| $T_{SOLD}$                    | Plastic body for 10 seconds                                                                       | 260             | $^\circ C$ |
| $M_d$                         | Mounting torque (TO-247)                                                                          | 1.13/10         | Nm/lb.in.  |
| <b>Weight</b>                 | TO-247                                                                                            | 6               | g          |
|                               | TO-268                                                                                            | 5               | g          |

#### TO-247 (IXGH)



#### TO-268 (IXGT)



G = Gate    C = Collector  
E = Emitter    TAB = Collector

#### Features

- Optimized for low conduction and switching losses
- Square RBSOA
- International standard packages

#### Advantages

- High power density
- Low gate drive requirement

#### Applications

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

| 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        |
| $I_{CES}$     | $V_{CE} = V_{CES}$                                                  |                       |      | 50 $\mu A$   |
|               | $V_{GE} = 0V$ $T_J = 125^\circ C$                                   |                       |      | 500 $\mu A$  |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                  |                       |      | $\pm 100$ nA |
| $V_{CE(sat)}$ | $I_C = 50A$ , $V_{GE} = 15V$ , Note 1                               | 1.59                  | 1.80 | V            |

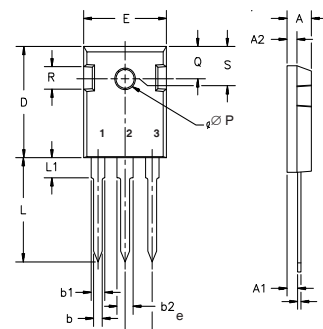
| Symbol       | Test Conditions                                                                                    | Characteristic Values |      |              |
|--------------|----------------------------------------------------------------------------------------------------|-----------------------|------|--------------|
|              |                                                                                                    | Min.                  | Typ. | Max.         |
| $g_{fs}$     | $I_C = 50A, V_{CE} = 10V, \text{Note 1}$                                                           | 38                    | 64   | S            |
| $C_{ies}$    | $V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$                                                              | 4750                  | 260  | pF           |
| $C_{oes}$    |                                                                                                    |                       |      | pF           |
| $C_{res}$    |                                                                                                    |                       |      | pF           |
| $Q_g$        | $I_C = 50A, V_{GE} = 15V, V_{CE} = 0.5 \cdot V_{CES}$                                              | 168                   | 28   | nC           |
| $Q_{ge}$     |                                                                                                    |                       |      | nC           |
| $Q_{gc}$     |                                                                                                    |                       |      | nC           |
| $t_{d(on)}$  | Inductive load, $T_J = 25^\circ C$<br>$I_C = 50A, V_{GE} = 15V$<br>$V_{CE} = 480V, R_G = 3\Omega$  | 25                    | 41   | ns           |
| $t_{ri}$     |                                                                                                    |                       |      | ns           |
| $E_{on}$     |                                                                                                    |                       |      | mJ           |
| $t_{d(off)}$ |                                                                                                    |                       |      | ns           |
| $t_{fi}$     |                                                                                                    |                       |      | ns           |
| $E_{off}$    |                                                                                                    |                       |      | mJ           |
| $t_{d(on)}$  | Inductive load, $T_J = 125^\circ C$<br>$I_C = 50A, V_{GE} = 15V$<br>$V_{CE} = 480V, R_G = 3\Omega$ | 24                    | 40   | ns           |
| $t_{ri}$     |                                                                                                    |                       |      | ns           |
| $E_{on}$     |                                                                                                    |                       |      | mJ           |
| $t_{d(off)}$ |                                                                                                    |                       |      | ns           |
| $t_{fi}$     |                                                                                                    |                       |      | ns           |
| $E_{off}$    |                                                                                                    |                       |      | mJ           |
| $R_{thJC}$   |                                                                                                    |                       | 0.27 | $^\circ C/W$ |
| $R_{thCS}$   |                                                                                                    |                       | 0.15 | $^\circ C/W$ |

Note 1: Pulse test,  $t \leq 300\mu s$ , 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.

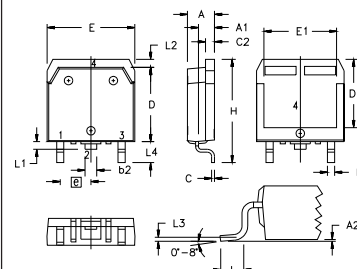
## TO-247 (IXGH) Outline



Terminals: 1 - Gate  
2 - Drain  
3 - Source  
Tab - Drain

| Dim.           | Millimeter |       | Inches |       |
|----------------|------------|-------|--------|-------|
|                | Min.       | Max.  | Min.   | Max.  |
| A              | 4.7        | 5.3   | .185   | .209  |
| A <sub>1</sub> | 2.2        | 2.54  | .087   | .102  |
| A <sub>2</sub> | 2.2        | 2.6   | .059   | .098  |
| b              | 1.0        | 1.4   | .040   | .055  |
| b <sub>1</sub> | 1.65       | 2.13  | .065   | .084  |
| b <sub>2</sub> | 2.87       | 3.12  | .113   | .123  |
| C              | .4         | .8    | .016   | .031  |
| D              | 20.80      | 21.46 | .819   | .845  |
| E              | 15.75      | 16.26 | .610   | .640  |
| e              | 5.20       | 5.72  | 0.205  | 0.225 |
| L              | 19.81      | 20.32 | .780   | .800  |
| L1             |            | 4.50  |        | .177  |
| ØP             | 3.55       | 3.65  | .140   | .144  |
| Q              | 5.89       | 6.40  | 0.232  | 0.252 |
| R              | 4.32       | 5.49  | .170   | .216  |
| S              | 6.15       | BSC   | .242   | BSC   |

## TO-268 (IXGT) Outline



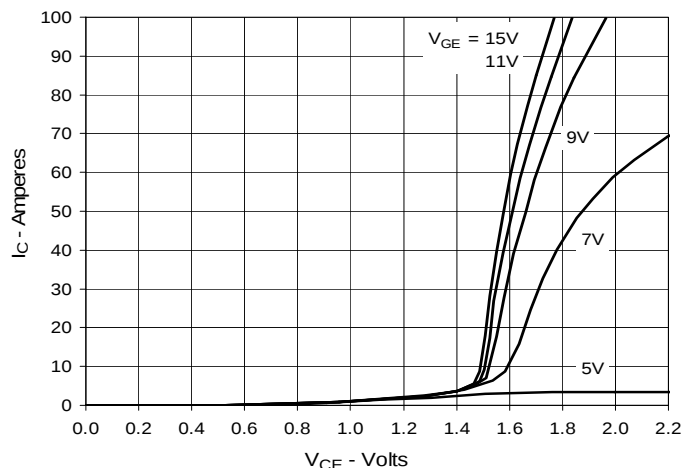
| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .193     | .201 | 4.90        | 5.10  |
| A1  | .106     | .114 | 2.70        | 2.90  |
| A2  | .001     | .010 | 0.02        | 0.25  |
| b   | .045     | .057 | 1.15        | 1.45  |
| b2  | .075     | .083 | 1.90        | 2.10  |
| C   | .016     | .026 | 0.40        | 0.65  |
| C2  | .057     | .063 | 1.45        | 1.60  |
| D   | .543     | .551 | 13.80       | 14.00 |
| D1  | .488     | .500 | 12.40       | 12.70 |
| E   | .624     | .632 | 15.85       | 16.05 |
| E1  | .524     | .535 | 13.30       | 13.60 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| H   | .736     | .752 | 18.70       | 19.10 |
| L   | .094     | .106 | 2.40        | 2.70  |
| L1  | .047     | .055 | 1.20        | 1.40  |
| L2  | .039     | .045 | 1.00        | 1.15  |
| L3  | .010 BSC |      | 0.25 BSC    |       |
| L4  | .150     | .161 | 3.80        | 4.10  |

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

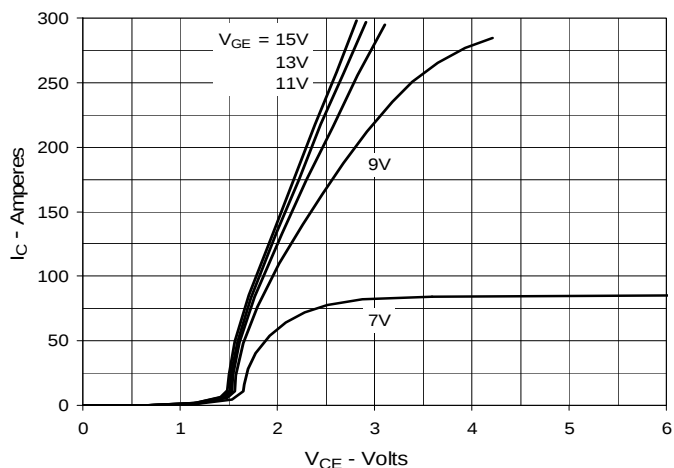
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |              |              |              |              |              |             |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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    |             |

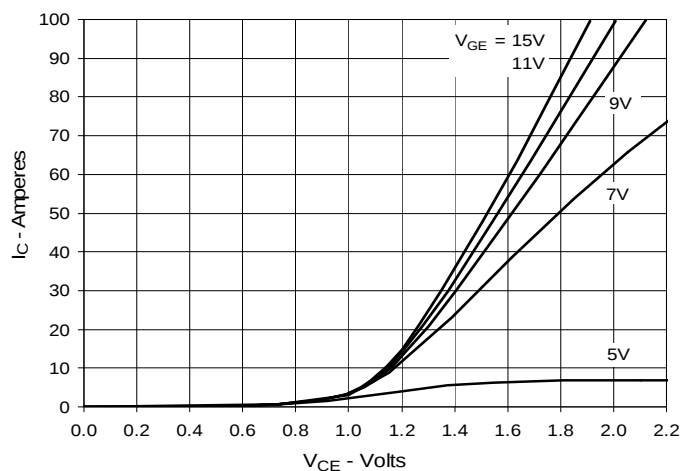
**Fig. 1. Output Characteristics**  
@ 25°C



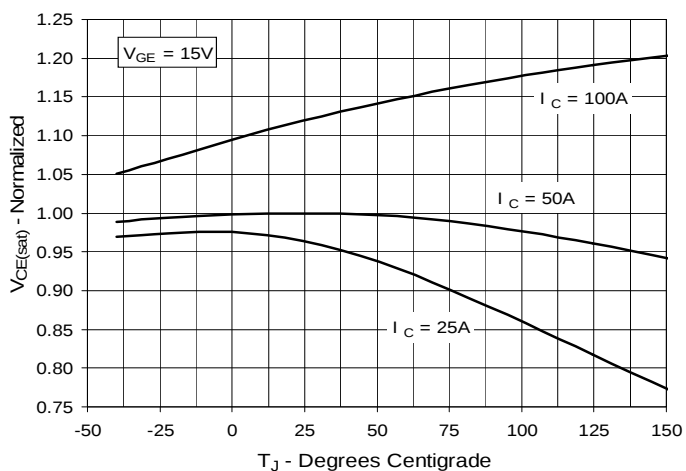
**Fig. 2. Extended Output Characteristics**  
@ 25°C



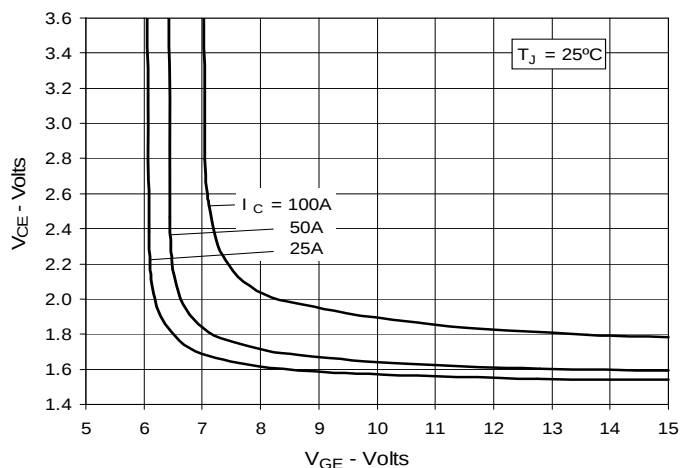
**Fig. 3. Output Characteristics**  
@ 125°C



**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**

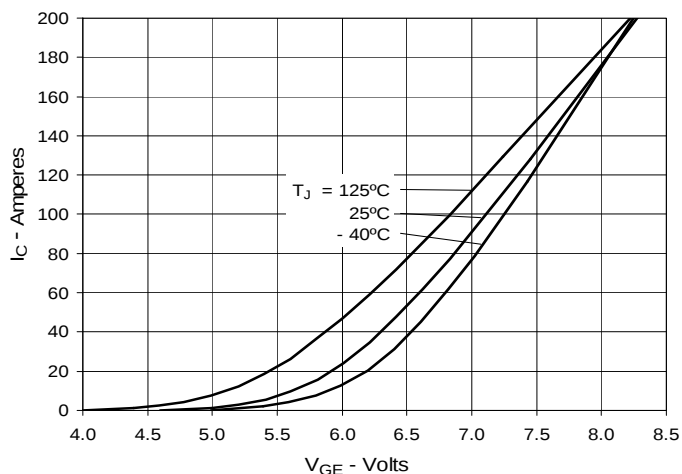


Fig. 7. Transconductance

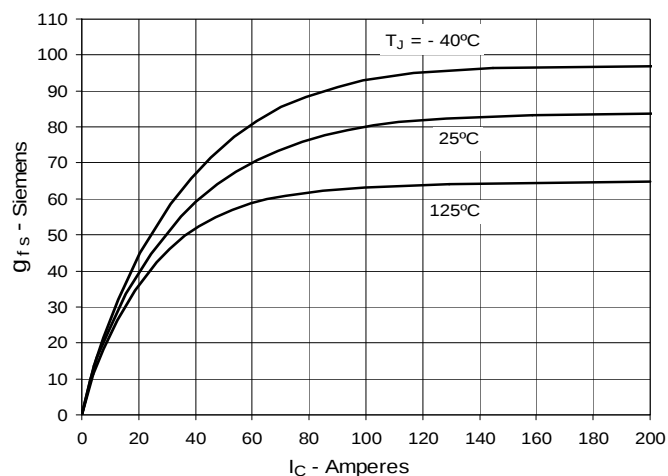


Fig. 8. Gate Charge

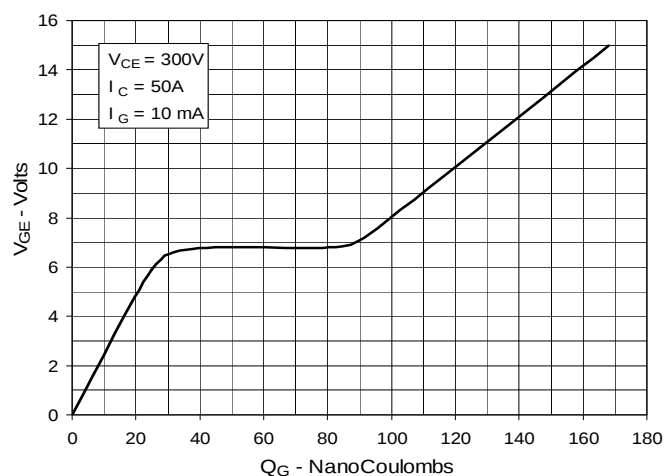


Fig. 9. Reverse-Bias Safe Operating Area

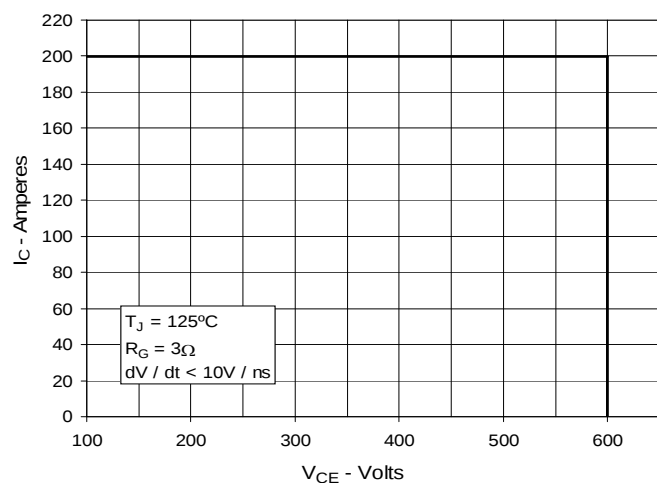


Fig. 10. Capacitance

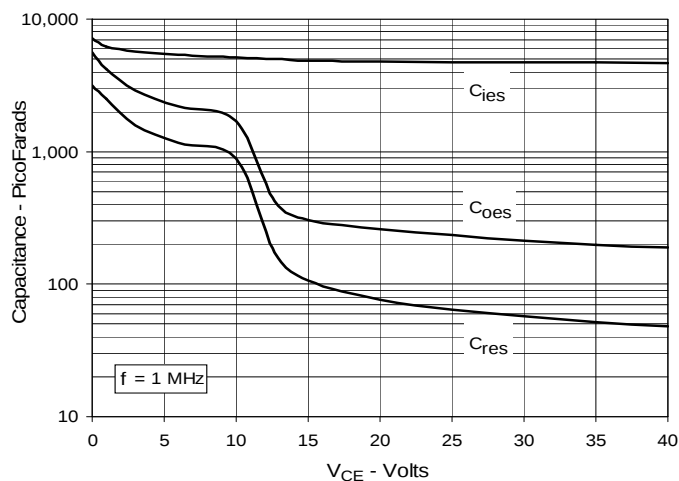
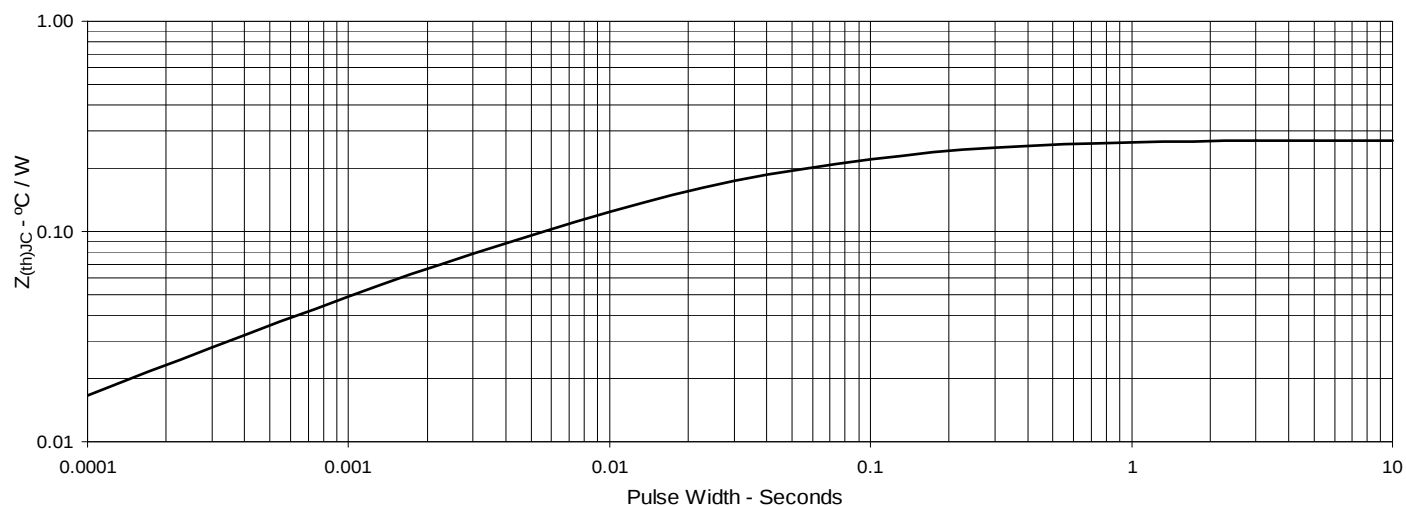
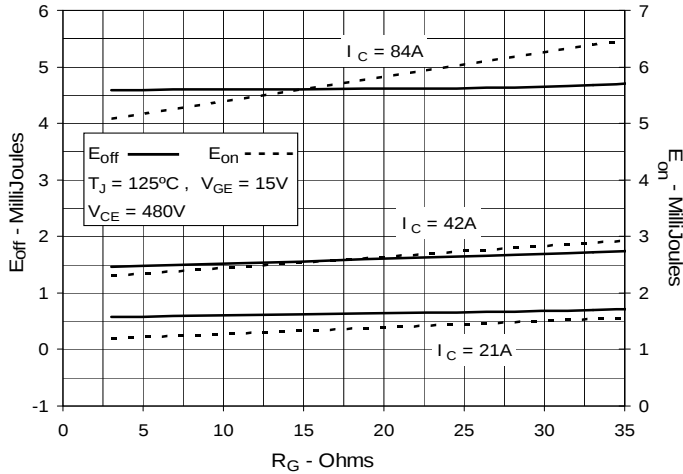
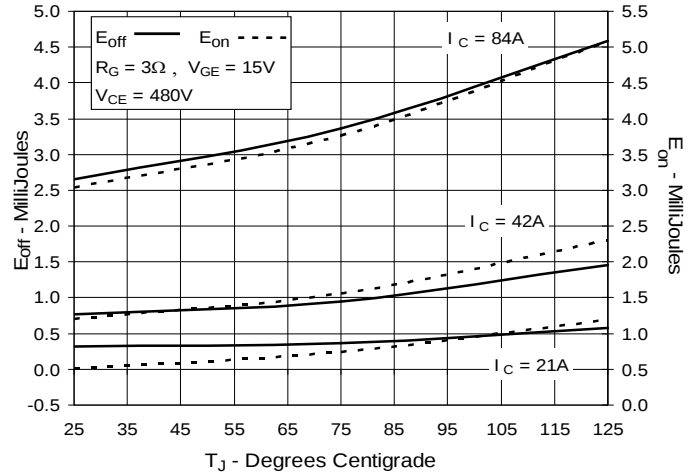
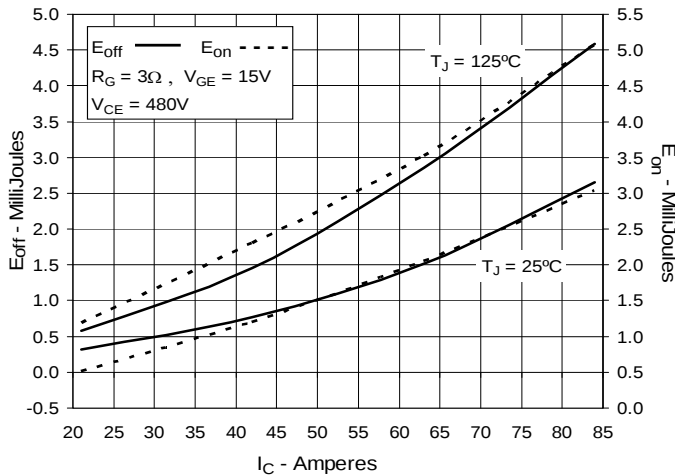
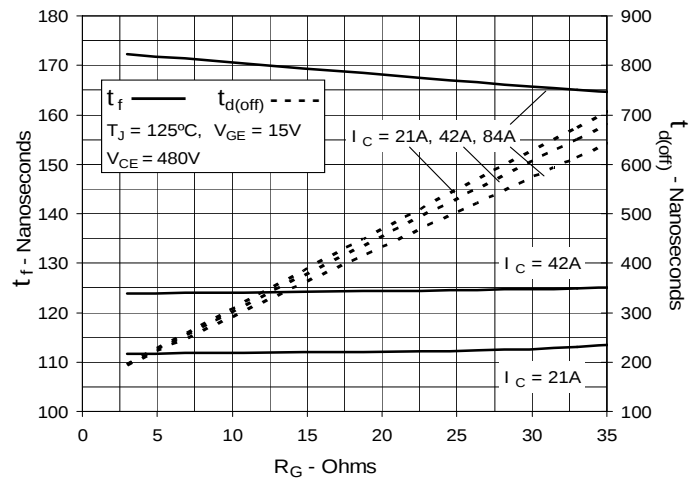
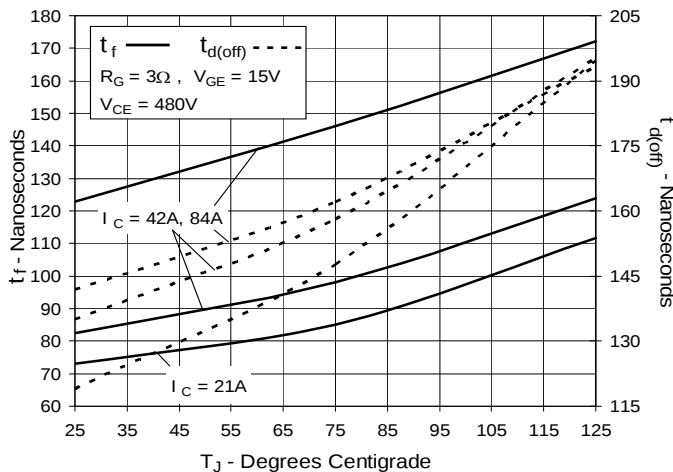
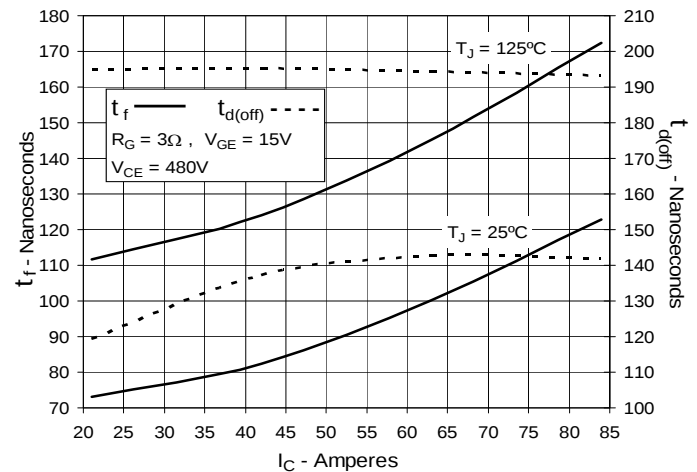
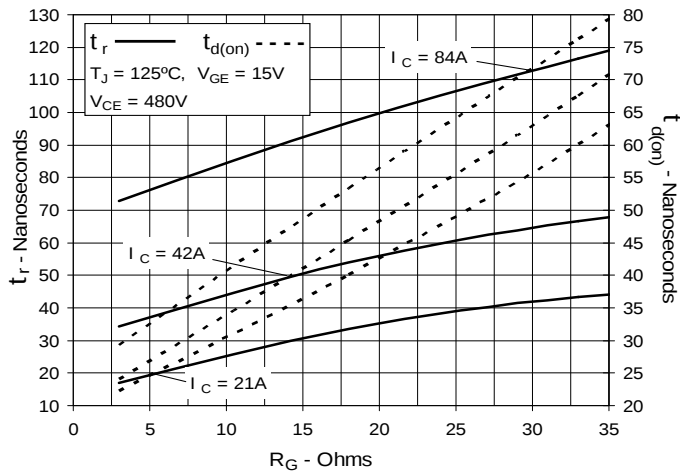


Fig. 11. Maximum Transient Thermal Impedance

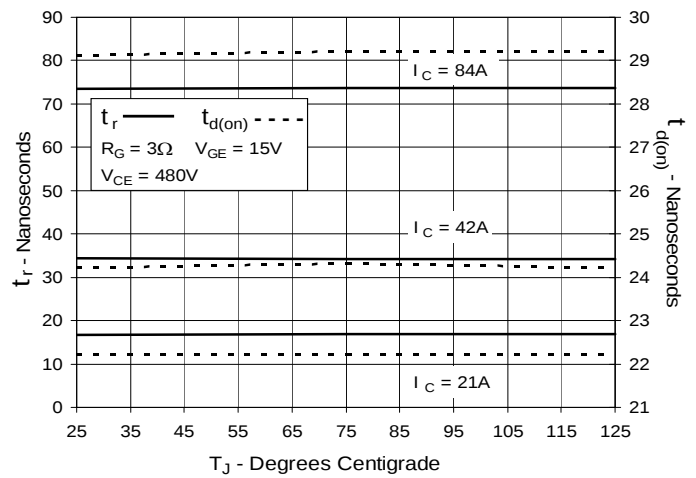


**Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance**

**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. Junction Temperature**

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


**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**

