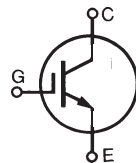
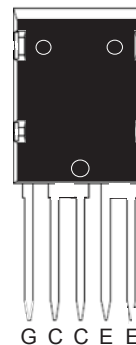


Medium speed low V<sub>sat</sub> PT  
IGBTs 5-40 kHz switching



**V<sub>CES</sub> = 600V**  
**I<sub>C110</sub> = 90A**  
**V<sub>CE(sat)</sub> ≤ 1.50V**  
**t<sub>fi(typ)</sub> = 183ns**



G = Gate      C = Collector  
E = Emitter

| Symbol                        | Test Conditions  | Maximum Ratings       |       |
|-------------------------------|--|-----------------------|-------|
| V <sub>CES</sub>              | T <sub>J</sub> = 25°C to 150°C   | 600                   | V     |
| V <sub>CGR</sub>              | T <sub>J</sub> = 25°C to 150°C, R <sub>GE</sub> = 1MΩ  | 600                   | V     |
| V <sub>GES</sub>              | Continuous   | ±20                   | V     |
| V <sub>GEM</sub>              | Transient  | ±30                   | V     |
| I <sub>C25</sub>              | T <sub>C</sub> = 25°C (limited by leads)   | 150                   | A     |
| I <sub>C110</sub>             | T <sub>C</sub> = 110°C (chip capability)   | 90                    | A     |
| I <sub>CM</sub>               | T <sub>C</sub> = 25°C, 1ms   | 600                   | A     |
| <b>SSOA</b><br><b>(RBSOA)</b> | V <sub>GE</sub> = 15V, T <sub>vj</sub> = 125°C, R <sub>G</sub> = 1Ω<br>Clamped inductive load @ V <sub>CE</sub> ≤ 600V | I <sub>CM</sub> = 300 | A     |
| P <sub>C</sub>                | T <sub>C</sub> = 25°C  | 400                   | W     |
| T <sub>J</sub>                |  | -55 ... +150          | °C    |
| T <sub>JM</sub>               |  | 150                   | °C    |
| T <sub>stg</sub>              |  | -55 ... +150          | °C    |
| T <sub>L</sub>                | Maximum lead temperature for soldering   | 300                   | °C    |
| T <sub>SOLD</sub>             | Plastic body for 10s   | 260                   | °C    |
| V <sub>ISOL</sub>             | 50/60Hz, RMS, 1 minute   | 2500                  | V~    |
|                               | I <sub>ISOL</sub> ≤ 1mA      t = 1s  | 3000                  | V~    |
| F <sub>C</sub>                | Mounting force   | 20..120/4.5..27       | N/lb. |
| <b>Weight</b>                 |  | 8                     | g     |

| Symbol                     | Test Conditions<br>(T <sub>J</sub> = 25°C, unless otherwise specified)                                    | Characteristic Values |                      |                |
|----------------------------|---|-----------------------|----------------------|----------------|
|                            |   | Min.                  | Typ.                 | Max.           |
| <b>BV<sub>CES</sub></b>    | I <sub>C</sub> = 250μA, V <sub>GE</sub> = 0V  | 600                   |                      | V              |
| <b>V<sub>GE(th)</sub></b>  | I <sub>C</sub> = 250μA, V <sub>CE</sub> = V <sub>GE</sub>   | 3.0                   |                      | V              |
| <b>I<sub>CES</sub></b>     | V <sub>CE</sub> = V <sub>CES</sub><br>V <sub>GE</sub> = 0V      T <sub>J</sub> = 125°C                    |                       |                      | 200 μA<br>2 mA |
| <b>I<sub>GES</sub></b>     | V <sub>CE</sub> = 0V, V <sub>GE</sub> = ±20V  |                       |                      | ±100 nA        |
| <b>V<sub>CE(sat)</sub></b> | I <sub>C</sub> = 100A, V <sub>GE</sub> = 15V, Note 1<br>I <sub>C</sub> = 200A      T <sub>J</sub> = 125°C |                       | 1.35<br>1.65<br>1.75 | V<br>V<br>V    |

### Features

- Silocon chip on Direct-Copper Bond (DCB) substrate
- Isolated mounting surface
- Square RBSOA
- High current handling capability
- 2500V electrical isolation

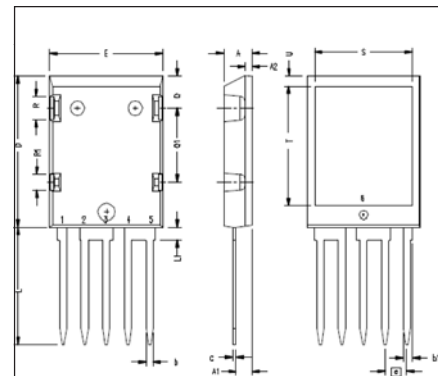
### Advantages

- High power density
- Low gate drive requirement

### Applications

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

| 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   | 95                    | 160  | S                  |
| $C_{ies}$    | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$   |                       | 26   | nF                 |
| $C_{oes}$    |  |                       | 1260 | pF                 |
| $C_{res}$    |  |                       | 97   | pF                 |
| $Q_g$        | $I_C = 100\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$   |                       | 750  | nC                 |
| $Q_{ge}$     |  |                       | 115  | nC                 |
| $Q_{gc}$     |  |                       | 245  | 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>$V_{CE} = 300\text{V}, R_G = 1\Omega$  |                       | 44   | ns                 |
| $t_{ri}$     |  |                       | 83   | ns                 |
| $E_{on}$     |  |                       | 1.6  | mJ                 |
| $t_{d(off)}$ |  |                       | 310  | 450 ns             |
| $t_{fi}$     |  |                       | 183  | 300 ns             |
| $E_{off}$    |  |                       | 2.9  | 4.5 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>$V_{CE} = 300\text{V}, R_G = 1\Omega$ |                       | 42   | ns                 |
| $t_{ri}$     |  |                       | 80   | ns                 |
| $E_{on}$     |  |                       | 2.4  | mJ                 |
| $t_{d(off)}$ |  |                       | 430  | ns                 |
| $t_{fi}$     |  |                       | 300  | ns                 |
| $E_{off}$    |  |                       | 4.2  | mJ                 |
| $R_{thJC}$   |  |                       | 0.31 | $^\circ\text{C/W}$ |
| $R_{thCS}$   |  | 0.11                  |      | $^\circ\text{C/W}$ |



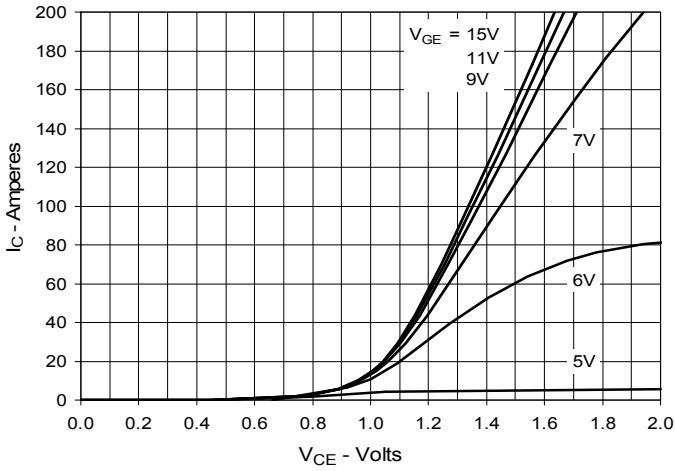
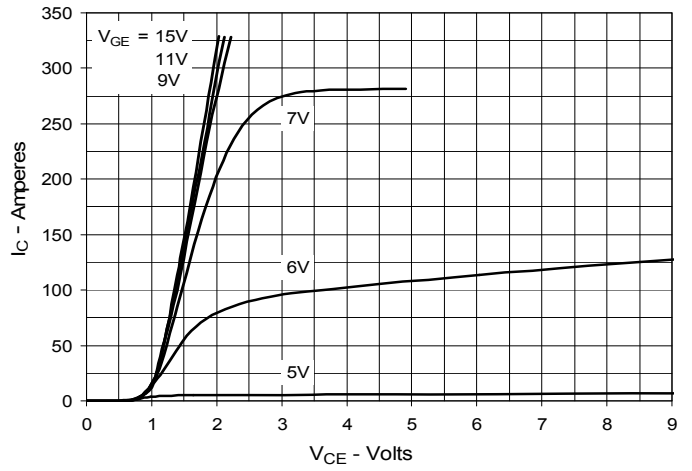
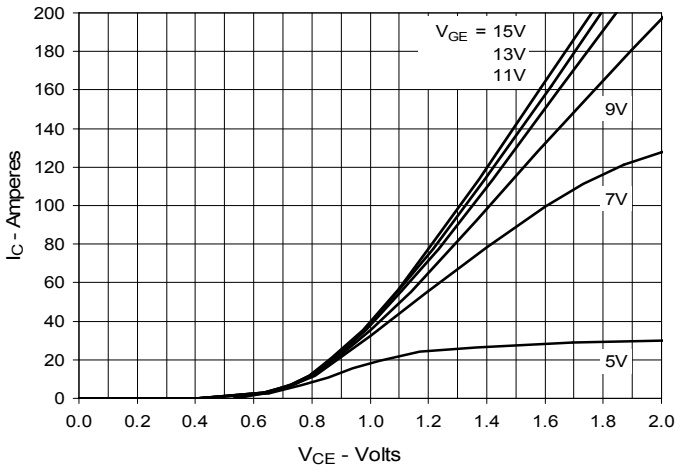
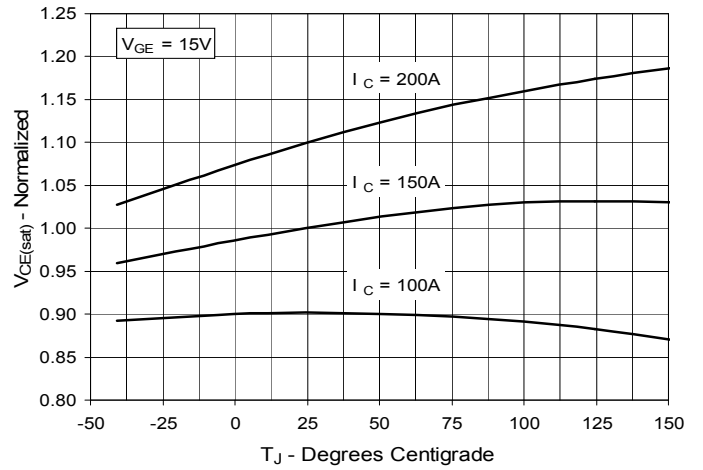
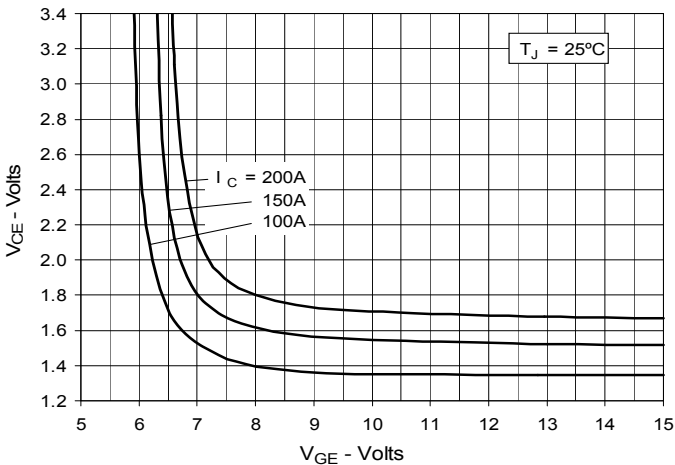
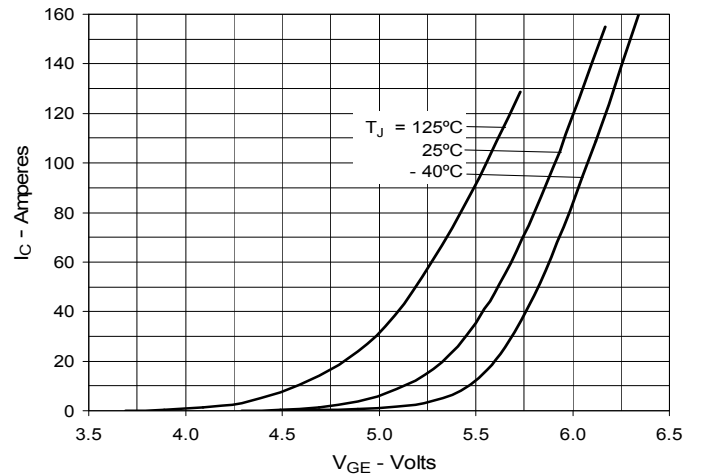
| SYM | INCHES   |       | MILLIMETERS |       |
|-----|----------|-------|-------------|-------|
|     | MIN      | MAX   | MIN         | MAX   |
| A   | .190     | .205  | 4.83        | 5.21  |
| A1  | .102     | .118  | 2.59        | 3.00  |
| A2  | .046     | .055  | 1.17        | 1.40  |
| b   | .045     | .055  | 1.14        | 1.40  |
| b1  | .063     | .072  | 1.60        | 1.83  |
| c   | .020     | .029  | 0.51        | 0.74  |
| D   | 1.020    | 1.040 | 25.91       | 26.42 |
| E   | .770     | .799  | 19.56       | 20.29 |
| e   | .150 BSC |       | 3.81 BSC    |       |
| L   | .780     | .820  | 19.81       | 20.83 |
| L1  | .050     | .102  | 2.03        | 2.59  |
| Q   | .210     | .235  | 5.33        | 5.97  |
| Q1  | .490     | .513  | 12.45       | 13.03 |
| R   | .150     | .180  | 3.81        | 4.57  |
| R1  | .100     | .130  | 2.54        | 3.30  |
| S   | .608     | .690  | 15.47       | 17.53 |
| T   | .801     | .821  | 20.34       | 20.85 |
| U   | .085     | .060  | 1.65        | 2.03  |

NOTE: BOTTOM HEATSINK MEETS 2,500Vrms ISOLATION TO THE OTHER PINS.

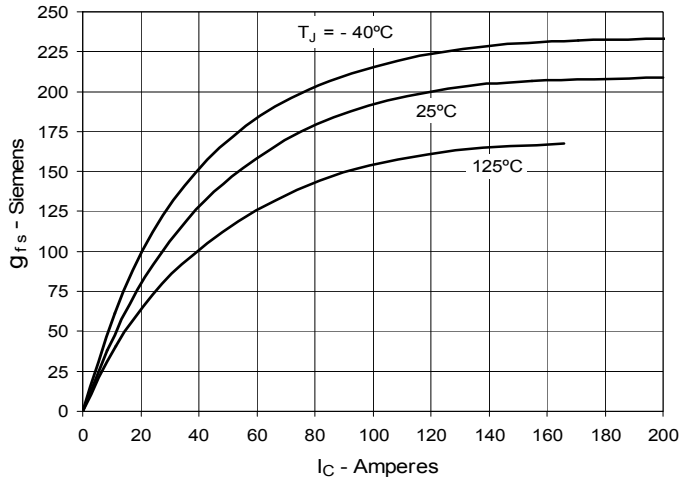
Note 1: Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .

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

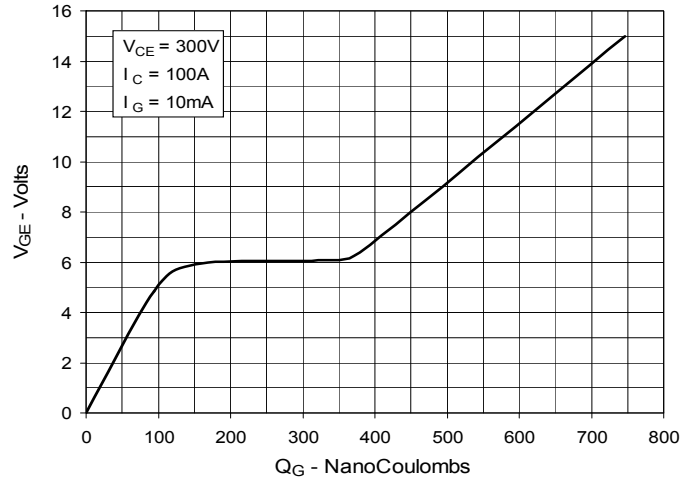
|  |           |           |           |           |              |              |              |              |              |             |
|--|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| IXYS MOSFETs and 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**


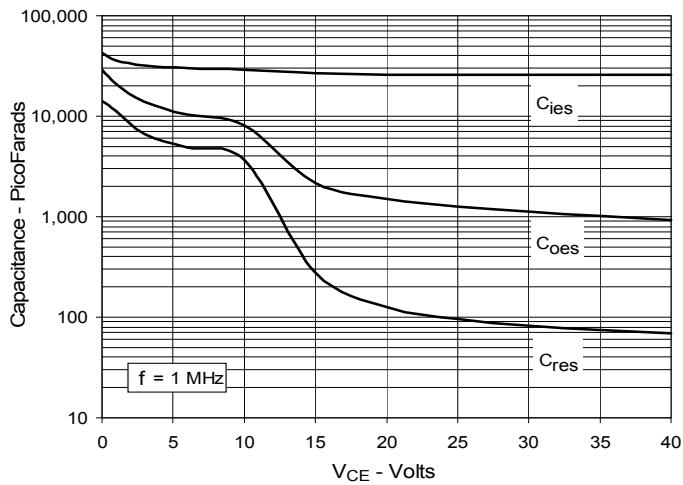
**Fig. 7. Transconductance**



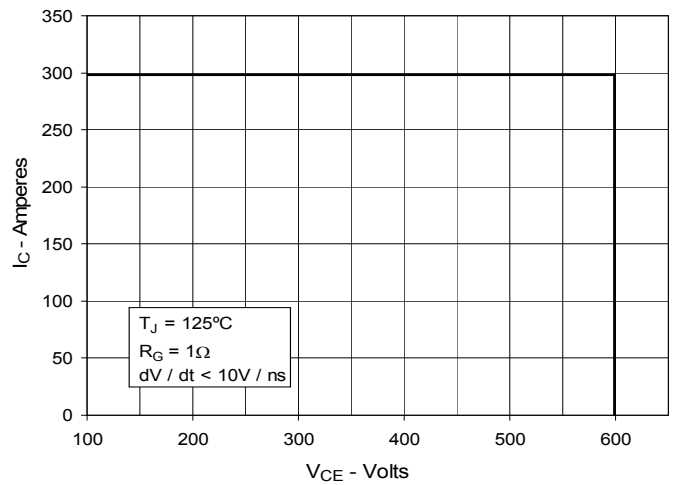
**Fig. 8. Gate Charge**



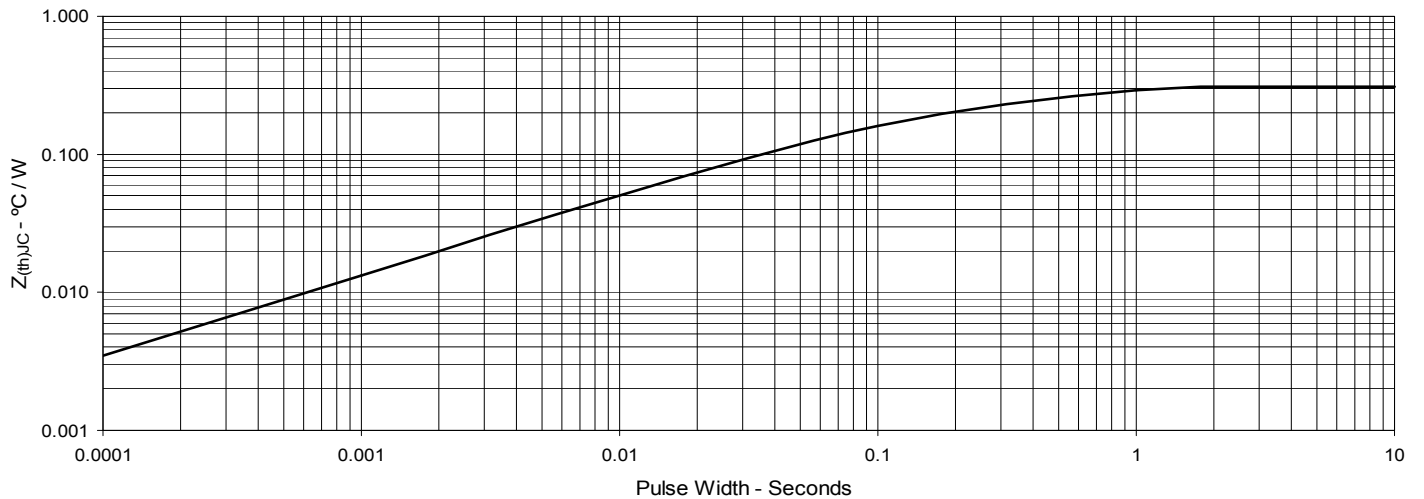
**Fig. 9. Capacitance**



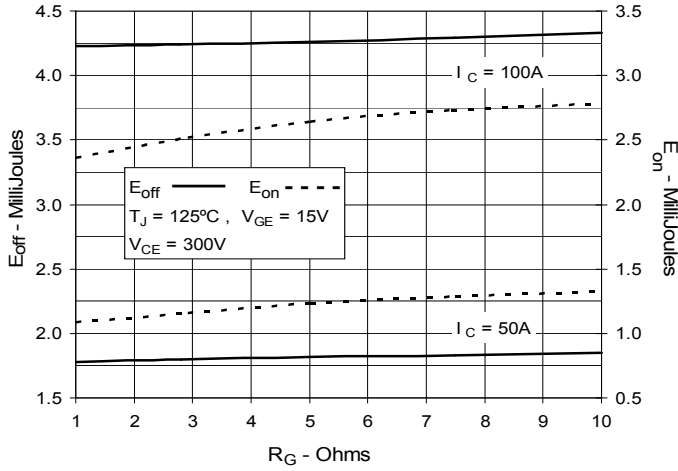
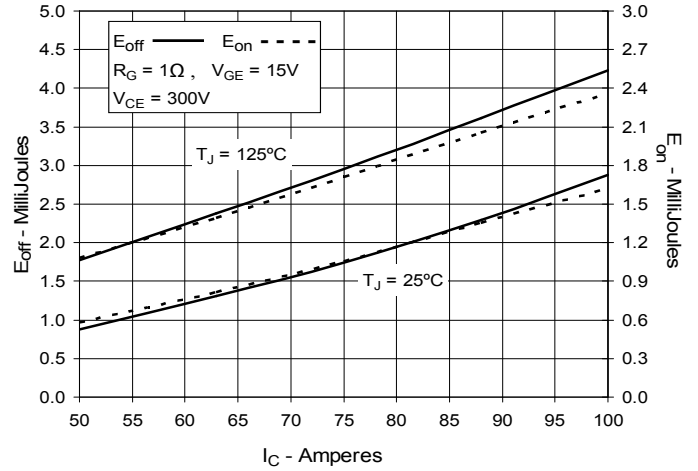
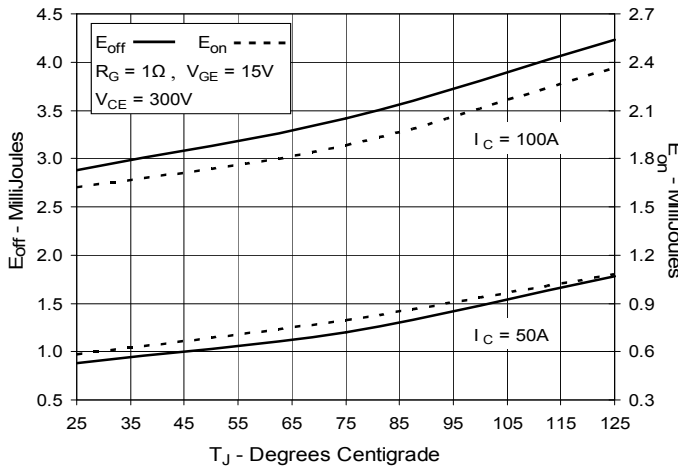
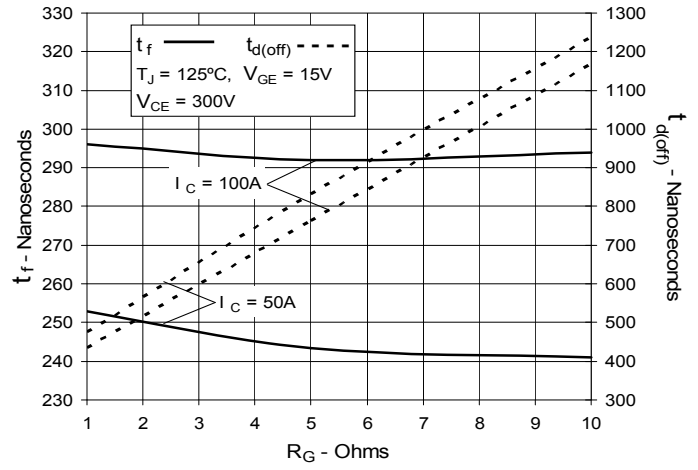
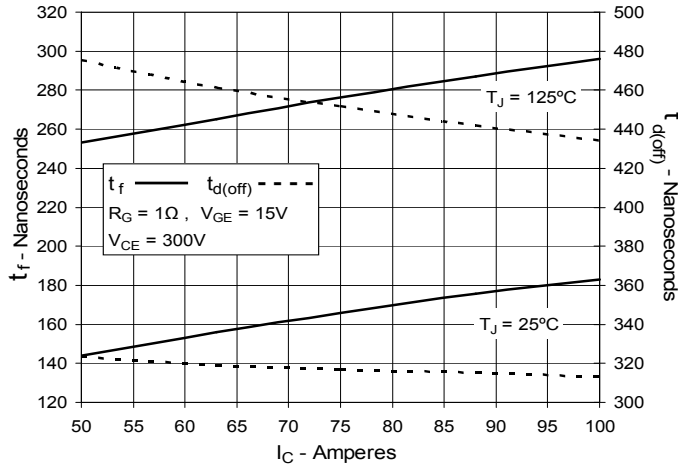
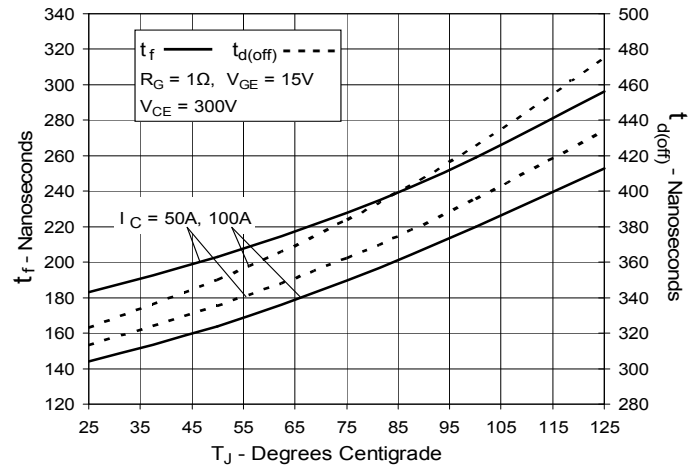
**Fig. 10. Reverse-Bias Safe Operating Area**



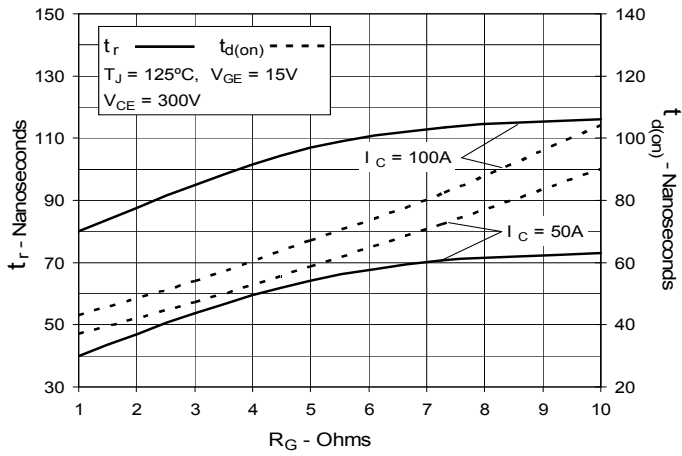
**Fig. 11. Maximum Transient Thermal Impedance**



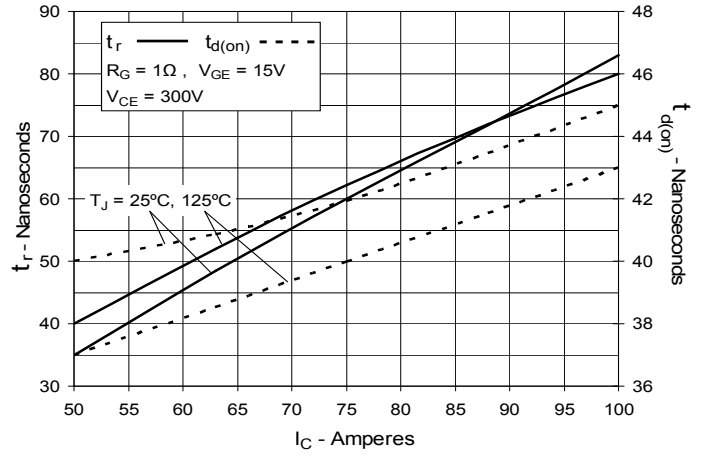
IXYS reserves the right to change limits, test conditions, and dimensions.

**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**


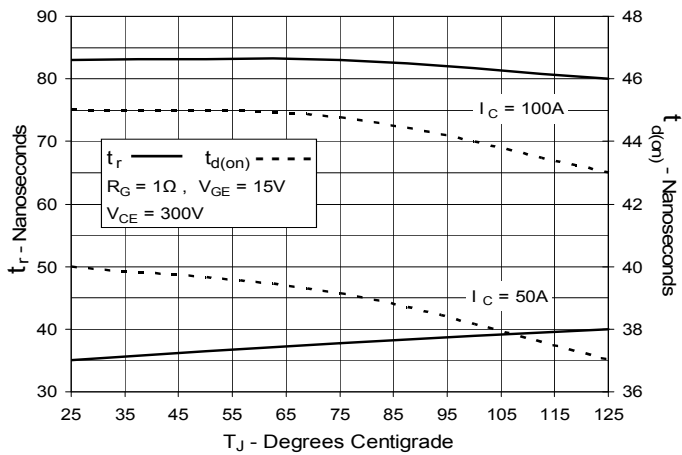
**Fig. 18. Inductive Turn-on  
Switching Times vs. Gate Resistance**



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



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





---

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).