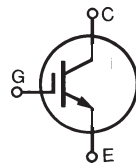
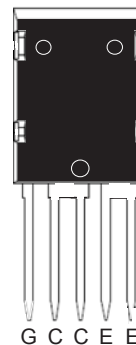


Medium speed low V<sub>sat</sub> PT  
IGBTs 5-40 kHz switching



**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

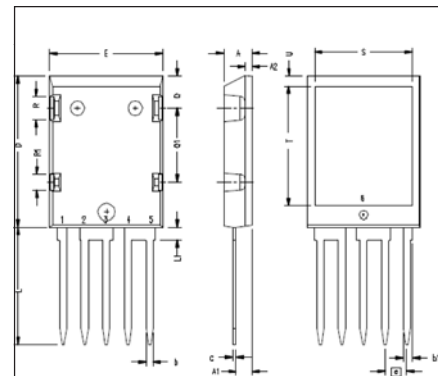
### Advantages

- 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                 |
| $R_{thJC}$   |  | 0.11                  | 0.31 $^\circ\text{C/W}$ | $^\circ\text{C/W}$ |
| $R_{thCS}$   |  |                       |                         |                    |



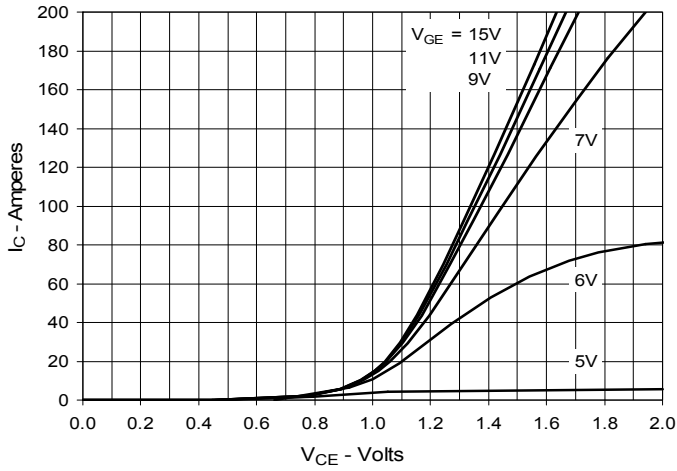
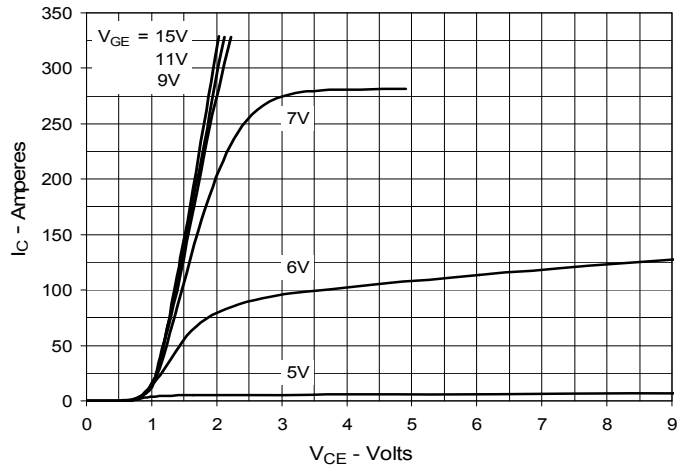
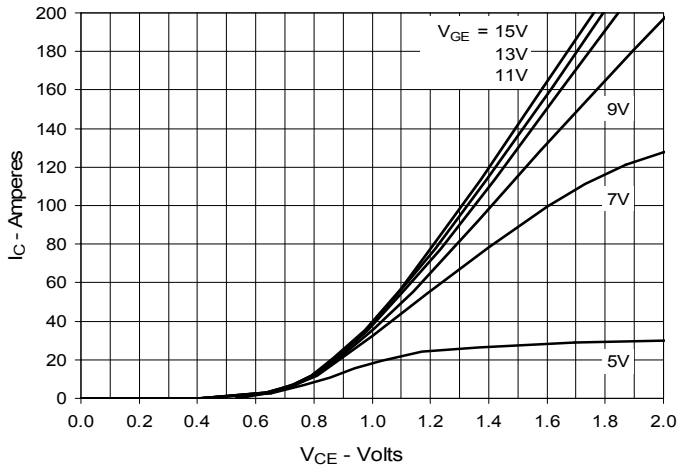
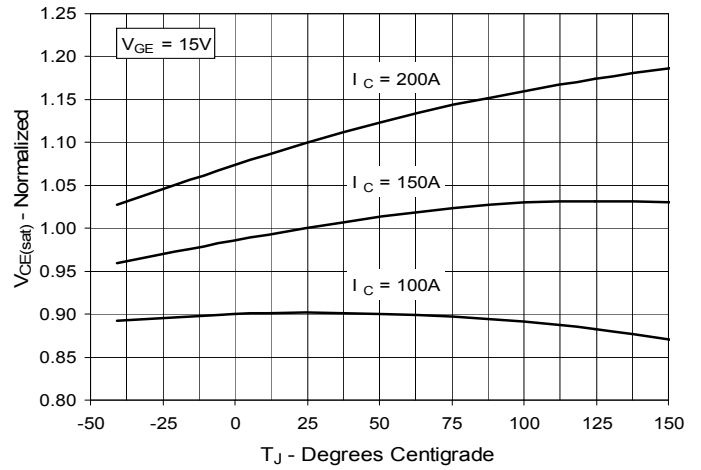
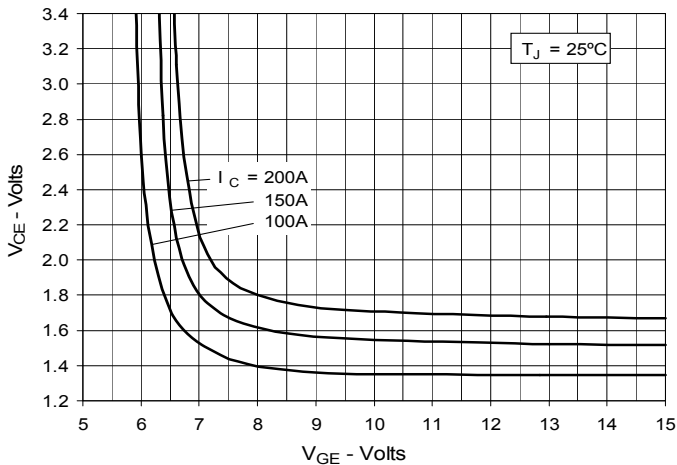
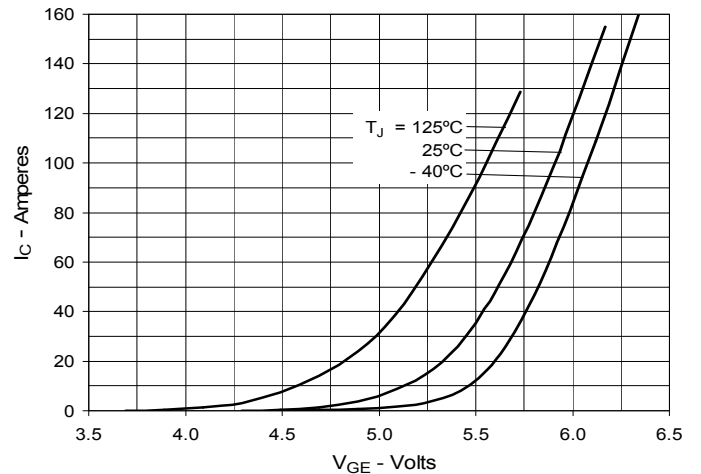
| SYM | INCHES   |       | MILLIMETERS |       |
|-----|----------|-------|-------------|-------|
|     | MIN      | MAX   | MIN         | MAX   |
| A   | .190     | .205  | 4.83        | 5.21  |
| A1  | .102     | .118  | 2.59        | 3.00  |
| A2  | .046     | .055  | 1.17        | 1.40  |
| b   | .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.

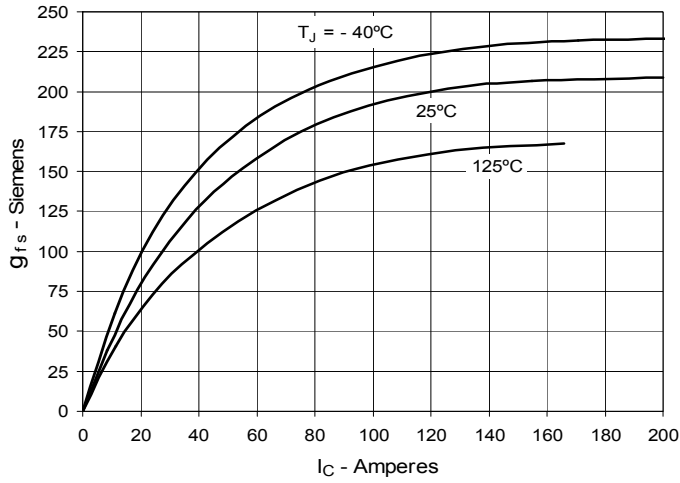
Note 1: Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .

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

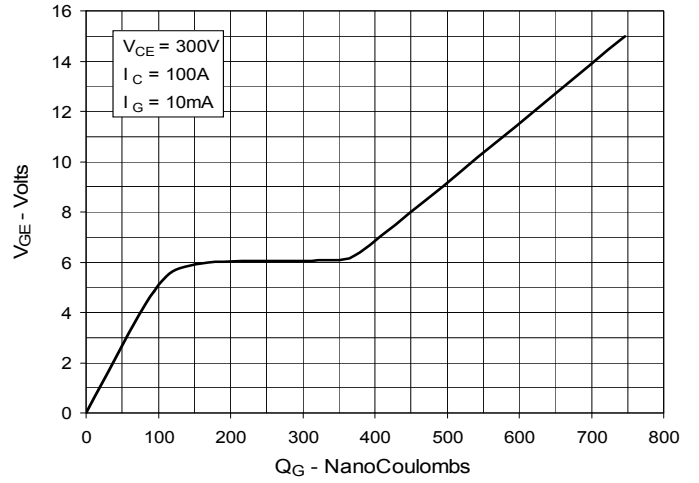
|  |           |           |           |           |              |              |              |              |              |             |
|--|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| IXYS MOSFETs and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


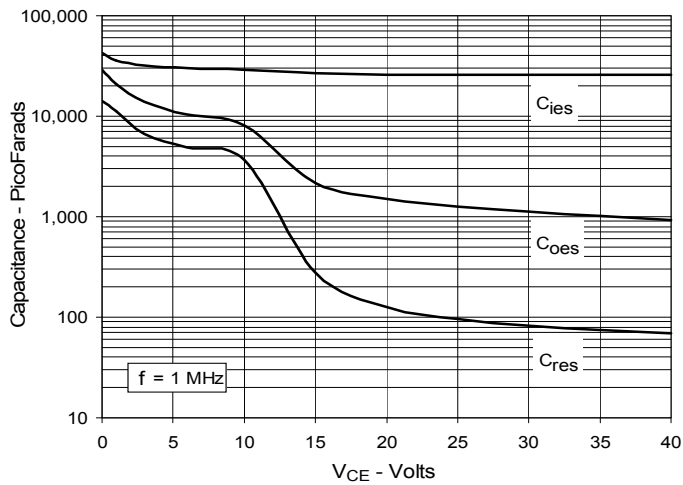
**Fig. 7. Transconductance**



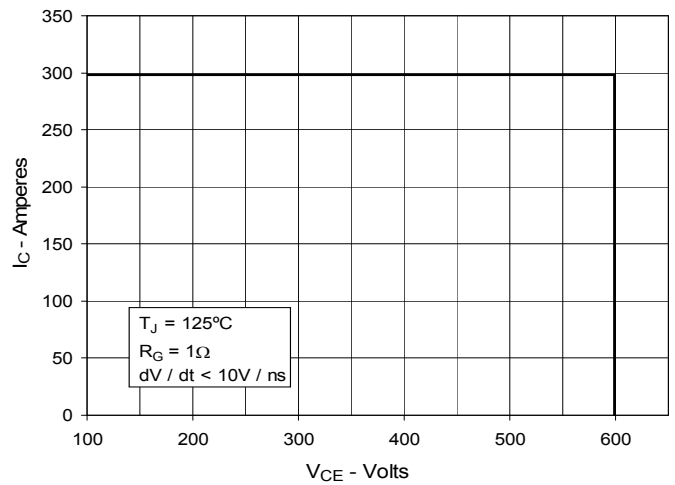
**Fig. 8. Gate Charge**



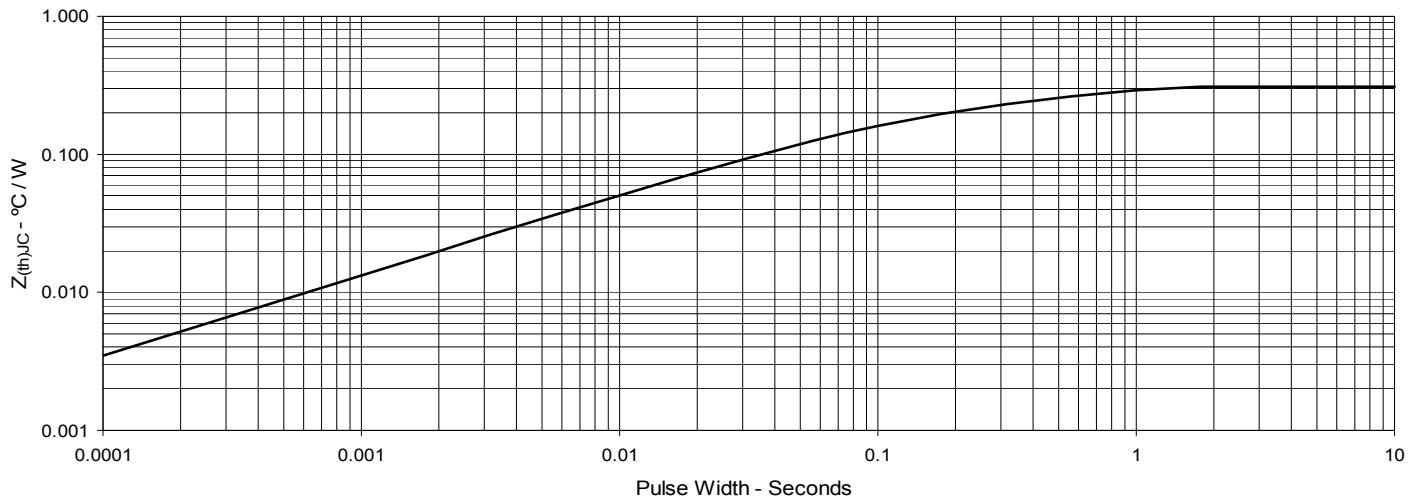
**Fig. 9. Capacitance**



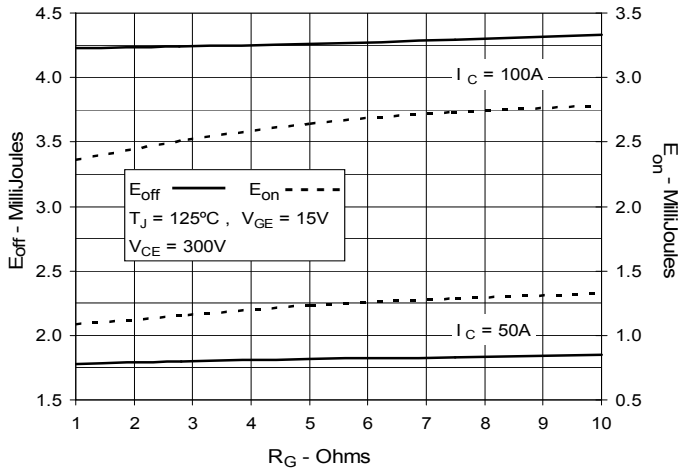
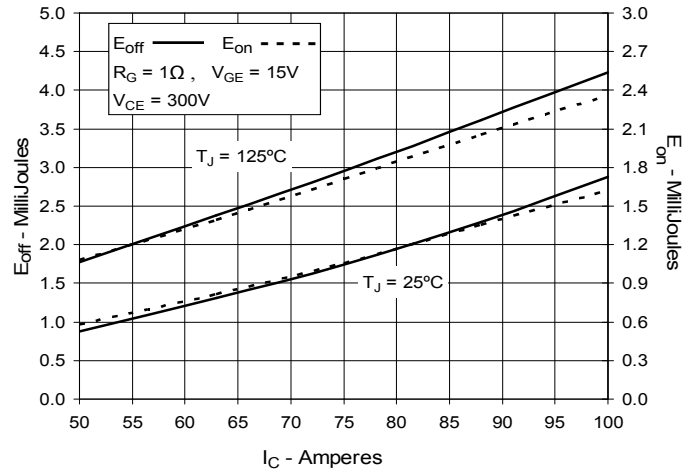
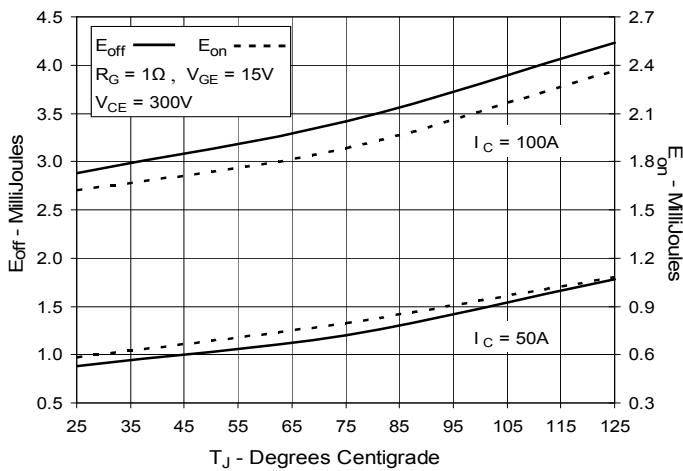
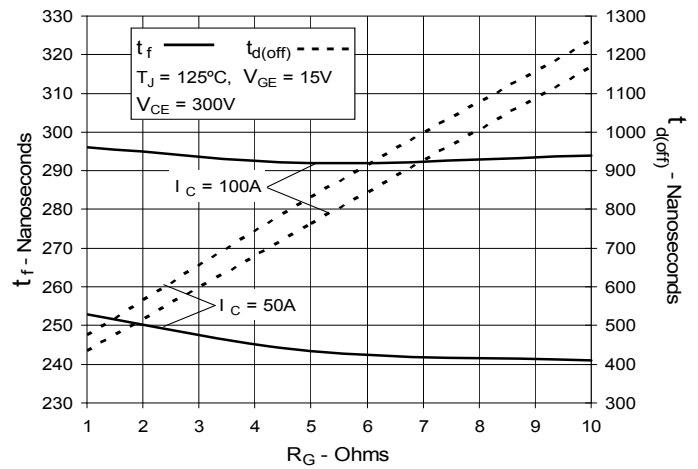
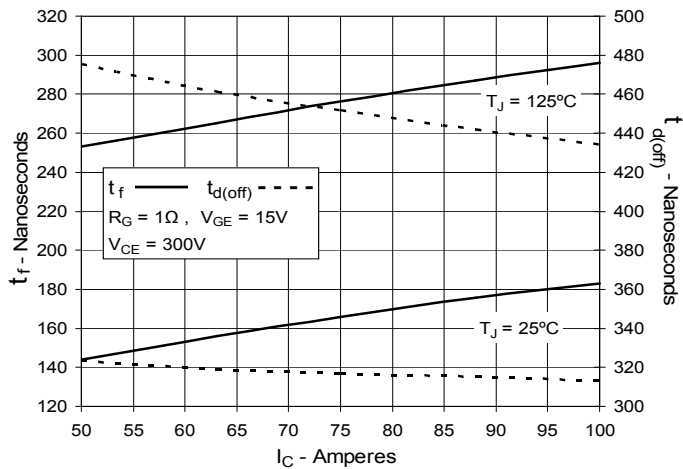
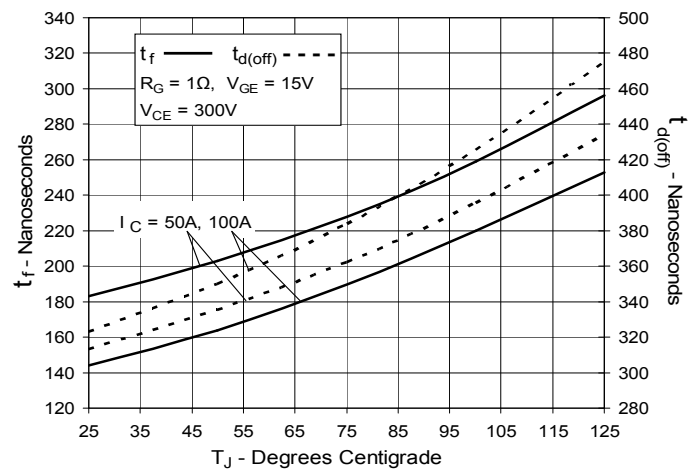
**Fig. 10. Reverse-Bias Safe Operating Area**



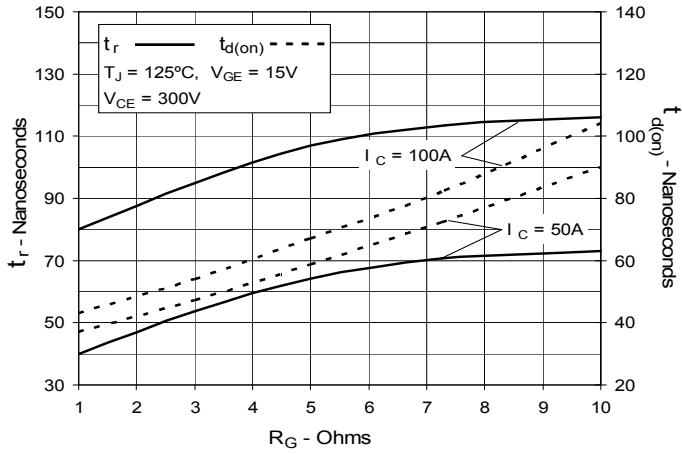
**Fig. 11. Maximum Transient Thermal Impedance**



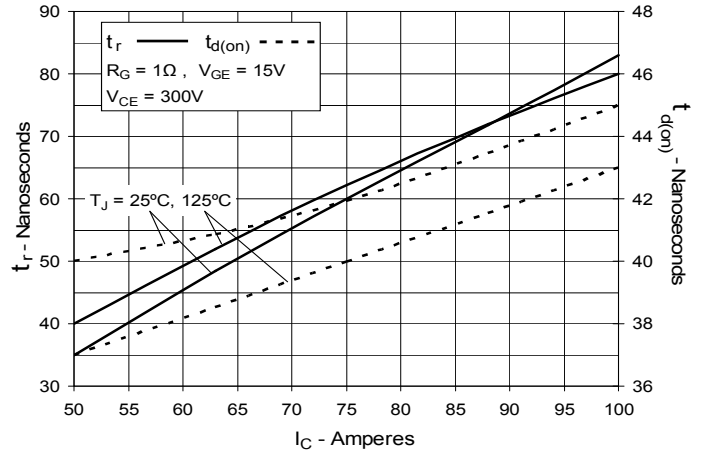
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**Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance**

**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**


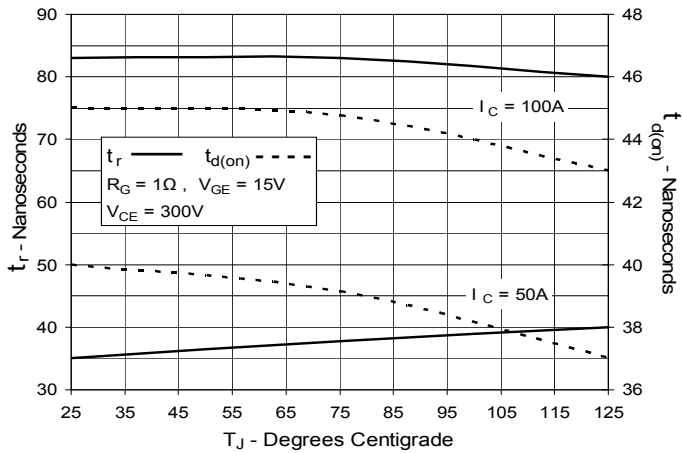
**Fig. 18. Inductive Turn-on  
Switching Times vs. Gate Resistance**



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



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





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