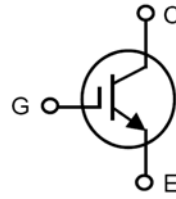


# 900V XPT™ IGBT GenX3™

## IXYY8N90C3 IXYP8N90C3

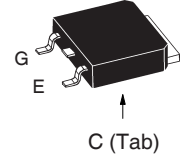
High-Speed IGBT  
for 20-50 kHz Switching



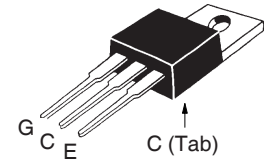
$V_{CES} = 900V$   
 $I_{C110} = 8A$   
 $V_{CE(sat)} \leq 3.0V$   
 $t_{fi(typ)} = 130ns$

| Symbol                        | Test Conditions  | Maximum Ratings                          |            |
|-------------------------------|--|--|------------|
| $V_{CES}$                     | $T_J = 25^\circ C$ to $175^\circ C$  | 900                                      | V          |
| $V_{CGR}$                     | $T_J = 25^\circ C$ to $175^\circ C$ , $R_{GE} = 1M\Omega$                            | 900                                      | V          |
| $V_{GES}$                     | Continuous   | $\pm 20$                                 | V          |
| $V_{GEM}$                     | Transient  | $\pm 30$                                 | V          |
| $I_{C25}$                     | $T_C = 25^\circ C$   | 20                                       | A          |
| $I_{C110}$                    | $T_C = 110^\circ C$  | 8  | A          |
| $I_{CM}$                      | $T_C = 25^\circ C$ , 1ms   | 48                                       | A          |
| $I_A$                         | $T_C = 25^\circ C$   | 4  | A          |
| $E_{AS}$                      | $T_C = 25^\circ C$   | 15                                       | mJ         |
| <b>SSOA</b><br><b>(RBSOA)</b> | $V_{GE} = 15V$ , $T_{VJ} = 150^\circ C$ , $R_G = 30\Omega$<br>Clamped Inductive Load | $I_{CM} = 16$<br>@ $V_{CE} \leq V_{CES}$ | A          |
| $P_C$                         | $T_C = 25^\circ C$   | 125                                      | W          |
| $T_J$                         |  | -55 ... +175                             | $^\circ C$ |
| $T_{JM}$                      |  | 175                                      | $^\circ C$ |
| $T_{stg}$                     |  | -55 ... +175                             | $^\circ C$ |
| $T_L$                         | Maximum Lead Temperature for Soldering   | 300                                      | $^\circ C$ |
| $T_{SOLD}$                    | 1.6 mm (0.062in.) from Case for 10s  | 260                                      | $^\circ C$ |
| $M_d$                         | Mounting Torque (TO-220)   | 1.13/10                                  | Nm/lb.in.  |
| <b>Weight</b>                 | TO-252   | 0.35                                     | g          |
|                               | TO-220   | 3.00                                     | g          |

### TO-252 (IXYY)



### TO-220 (IXYP)



G = Gate      C = Collector  
E = Emitter    Tab = Collector

### Features

- Optimized for Low Switching Losses
- Square RBSOA
- Positive Thermal Coefficient of  $V_{ce(sat)}$
- Avalanche Rated
- International Standard Packages

### Advantages

- High Power Density
- Low Gate Drive Requirement

### Applications

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

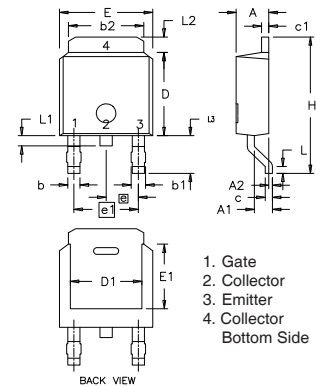
| Symbol        | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                           |
|---------------|---|-----------------------|------|---------------------------|
|               |   | Min.                  | Typ. | Max.                      |
| $BV_{CES}$    | $I_C = 250\mu A$ , $V_{GE} = 0V$                                      | 950                   |      | V                         |
| $V_{GE(th)}$  | $I_C = 250\mu A$ , $V_{CE} = V_{GE}$                                  | 3.5                   |      | 6.0 V                     |
| $I_{CES}$     | $V_{CE} = V_{CES}$ , $V_{GE} = 0V$<br>$T_J = 150^\circ C$             |                       |      | 10 $\mu A$<br>150 $\mu A$ |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                    |                       |      | $\pm 100$ nA              |
| $V_{CE(sat)}$ | $I_C = 8A$ , $V_{GE} = 15V$ , Note 1<br>$T_J = 150^\circ C$           | 2.15<br>2.75          |      | 3.00 V<br>V               |

**Symbol Test Conditions**
 $(T_J = 25^\circ\text{C Unless Otherwise Specified})$ 
**Characteristic Values**

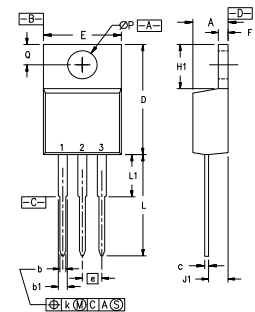
|              |   | Min. | Typ. | Max. |                    |
|--------------|---|------|------|------|--------------------|
| $g_{fs}$     | $I_C = 8A, V_{CE} = 10V, \text{Note 1}$   | 2.9  | 4.8  |      | S                  |
| $C_{ies}$    | $V_{CE} = 25V, V_{GE} = 0V, f = 1\text{MHz}$  |      | 400  |      | pF                 |
| $C_{oes}$    |   |      | 24   |      | pF                 |
| $C_{res}$    |   |      | 7.8  |      | pF                 |
| $Q_{g(on)}$  | $I_C = 8A, V_{GE} = 15V, V_{CE} = 0.5 \cdot V_{CES}$  |      | 13.3 |      | nC                 |
| $Q_{ge}$     |   |      | 3.4  |      | nC                 |
| $Q_{gc}$     |   |      | 5.8  |      | nC                 |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = 8A, V_{GE} = 15V$<br>$V_{CE} = 0.5 \cdot V_{CES}, R_G = 30\Omega$<br>Note 2  |      | 16   |      | ns                 |
| $t_{ri}$     |   |      | 20   |      | ns                 |
| $E_{on}$     |   |      | 0.46 |      | mJ                 |
| $t_{d(off)}$ |   |      | 40   |      | ns                 |
| $t_{fi}$     |   |      | 130  |      | ns                 |
| $E_{off}$    |   | 0.18 | 0.50 |      | mJ                 |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = 8A, V_{GE} = 15V$<br>$V_{CE} = 0.5 \cdot V_{CES}, R_G = 30\Omega$<br>Note 2 |      | 17   |      | ns                 |
| $t_{ri}$     |   |      | 22   |      | ns                 |
| $E_{on}$     |   |      | 1.00 |      | mJ                 |
| $t_{d(off)}$ |   |      | 75   |      | ns                 |
| $t_{fi}$     |   |      | 163  |      | ns                 |
| $E_{off}$    |   | 0.22 |      | mJ   |                    |
| $R_{thJC}$   |   |      |      | 1.20 | $^\circ\text{C/W}$ |
| $R_{thCS}$   | TO-252  | 0.35 |      |      | $^\circ\text{C/W}$ |
|              | TO-220  | 0.50 |      |      | $^\circ\text{C/W}$ |

**Notes:**

1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .
2. Switching times & energy losses may increase for higher  $V_{CE}$  (clamp),  $T_J$  or  $R_G$ .

**TO-252 AA Outline**


| Dim. | Millimeter |       | Inches    |       |
|------|------------|-------|-----------|-------|
|      | Min.       | Max.  | Min.      | Max.  |
| A    | 2.19       | 2.38  | 0.086     | 0.094 |
| A1   | 0.89       | 1.14  | 0.035     | 0.045 |
| A2   | 0          | 0.13  | 0         | 0.005 |
| b    | 0.64       | 0.89  | 0.025     | 0.035 |
| b1   | 0.76       | 1.14  | 0.030     | 0.045 |
| b2   | 5.21       | 5.46  | 0.205     | 0.215 |
| c    | 0.46       | 0.58  | 0.018     | 0.023 |
| c1   | 0.46       | 0.58  | 0.018     | 0.023 |
| D    | 5.97       | 6.22  | 0.235     | 0.245 |
| D1   | 4.32       | 5.21  | 0.170     | 0.205 |
| E    | 6.35       | 6.73  | 0.250     | 0.265 |
| E1   | 4.32       | 5.21  | 0.170     | 0.205 |
| e    | 2.28 BSC   |       | 0.090 BSC |       |
| e1   | 4.57 BSC   |       | 0.180 BSC |       |
| H    | 9.40       | 10.42 | 0.370     | 0.410 |
| L    | 0.51       | 1.02  | 0.020     | 0.040 |
| L1   | 0.64       | 1.02  | 0.025     | 0.040 |
| L2   | 0.89       | 1.27  | 0.035     | 0.050 |
| L3   | 2.54       | 2.92  | 0.100     | 0.115 |

**TO-220 Outline**


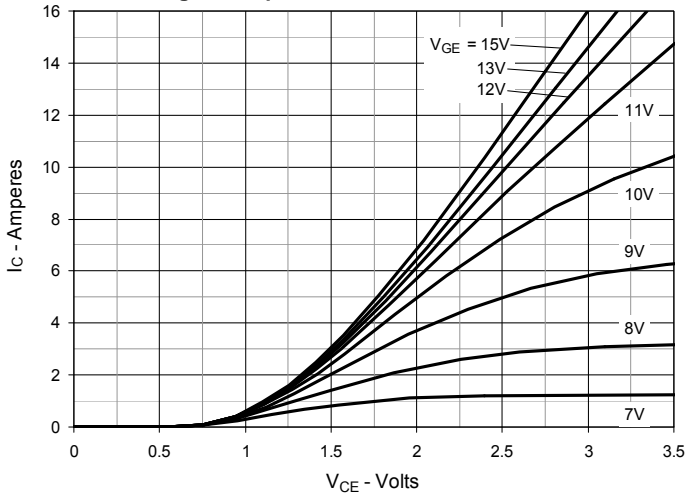
Pins: 1 - Gate 2 - Collector  
3 - Emitter

| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .170     | .190 | 4.32        | 4.83  |
| b   | .025     | .040 | 0.64        | 1.02  |
| b1  | .045     | .065 | 1.15        | 1.65  |
| c   | .014     | .022 | 0.35        | 0.56  |
| D   | .580     | .630 | 14.73       | 16.00 |
| E   | .390     | .420 | 9.91        | 10.66 |
| e   | .100 BSC |      | 2.54 BSC    |       |
| F   | .045     | .055 | 1.14        | 1.40  |
| H1  | .230     | .270 | 5.85        | 6.85  |
| J1  | .090     | .110 | 2.29        | 2.79  |
| k   | 0        | .015 | 0           | 0.38  |
| L   | .500     | .550 | 12.70       | 13.97 |
| L1  | .110     | .230 | 2.79        | 5.84  |
| ØP  | .139     | .161 | 3.53        | 4.08  |
| Q   | .100     | .125 | 2.54        | 3.18  |

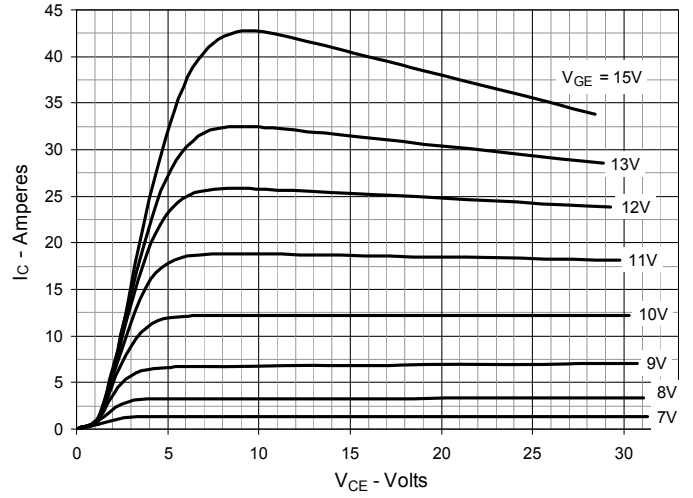
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

|  |           |           |           |           |              |              |              |              |              |             |
|--|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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 |
|  | 4,860,072 | 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    |             |

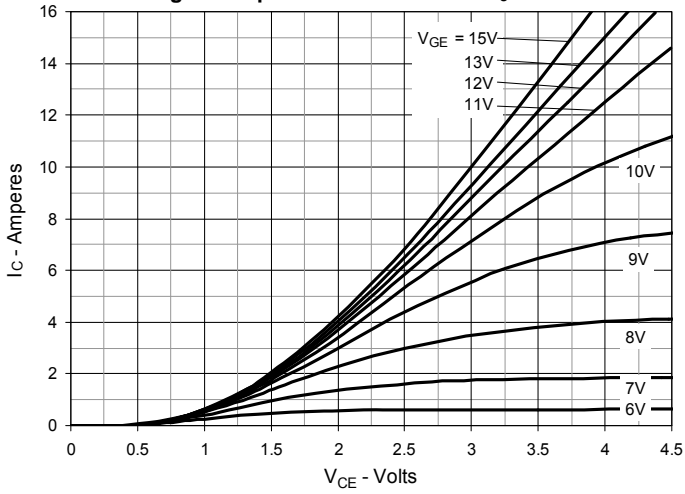
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



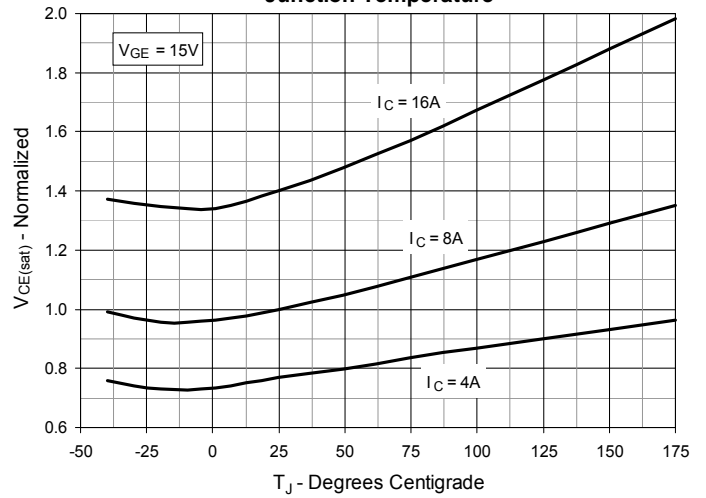
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



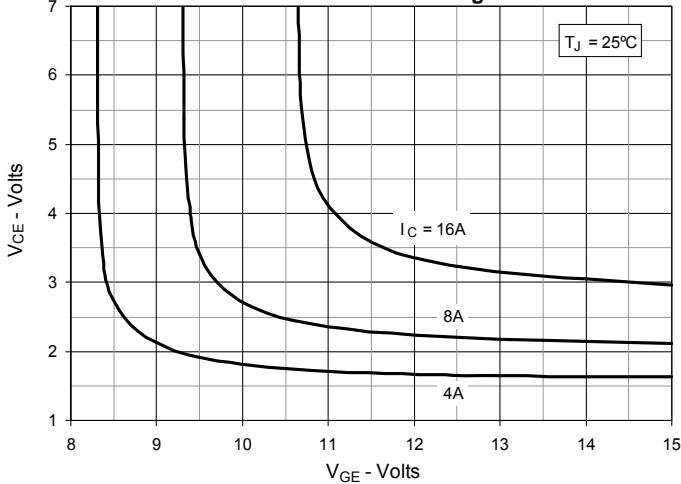
**Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$**



**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**

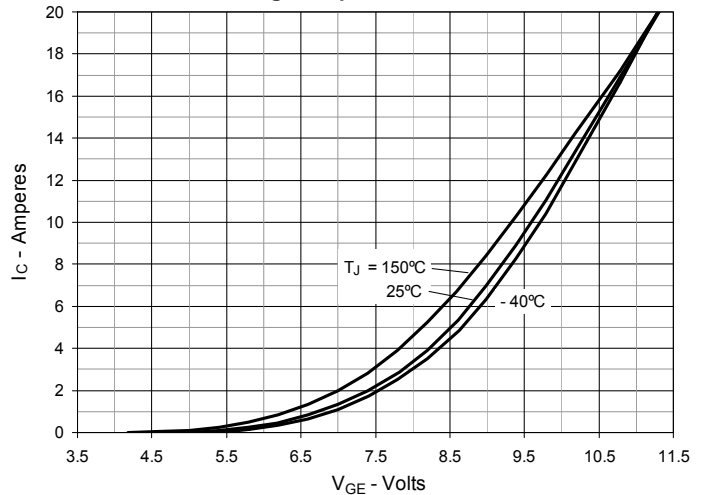


Fig. 7. Transconductance

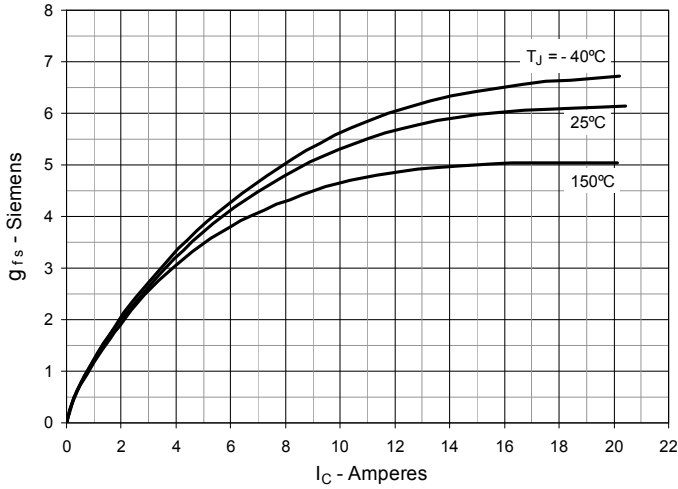


Fig. 8. Gate Charge

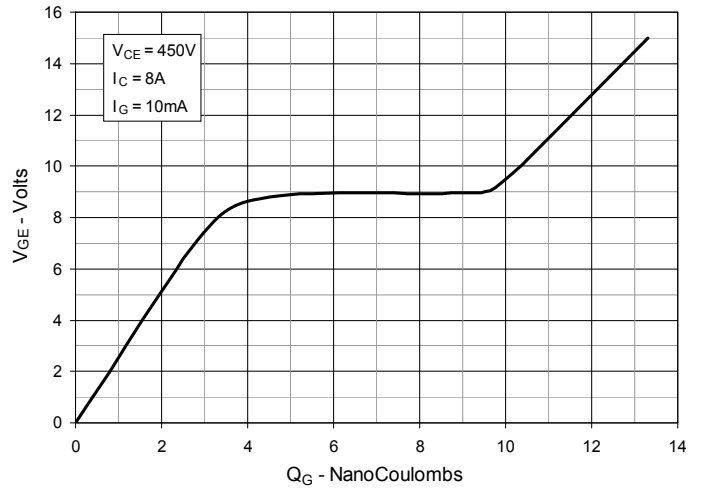


Fig. 9. Capacitance

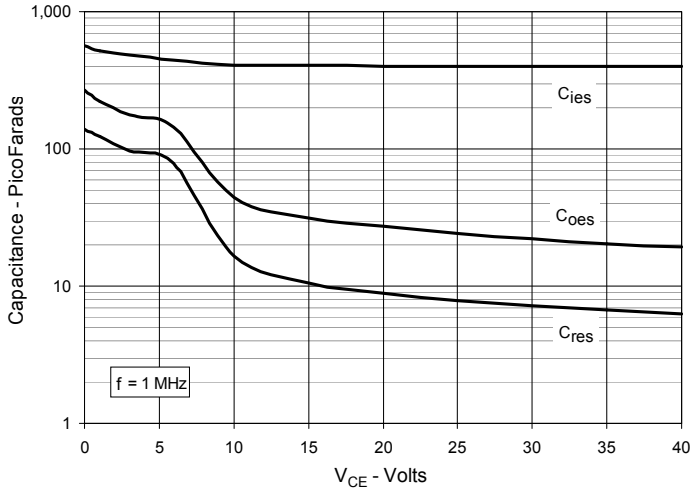


Fig. 10. Reverse-Bias Safe Operating Area

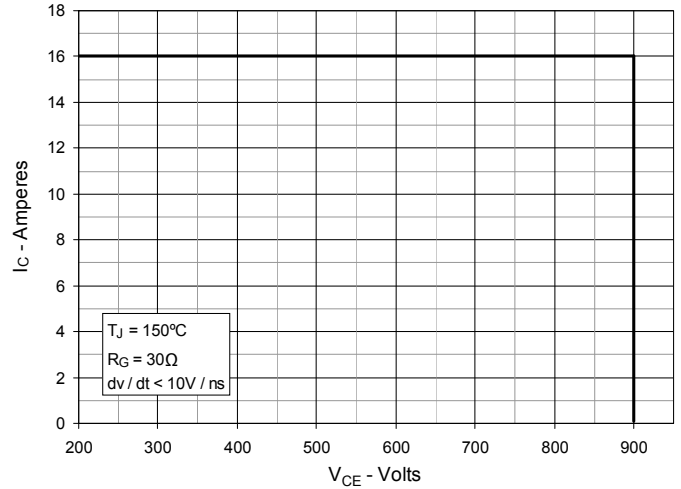
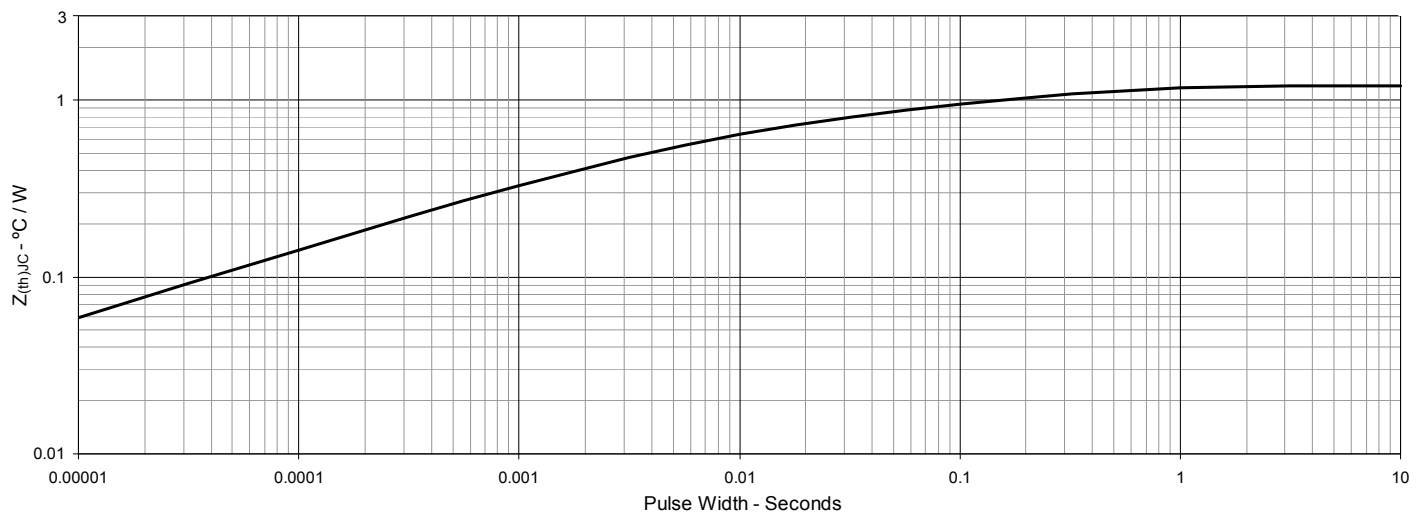
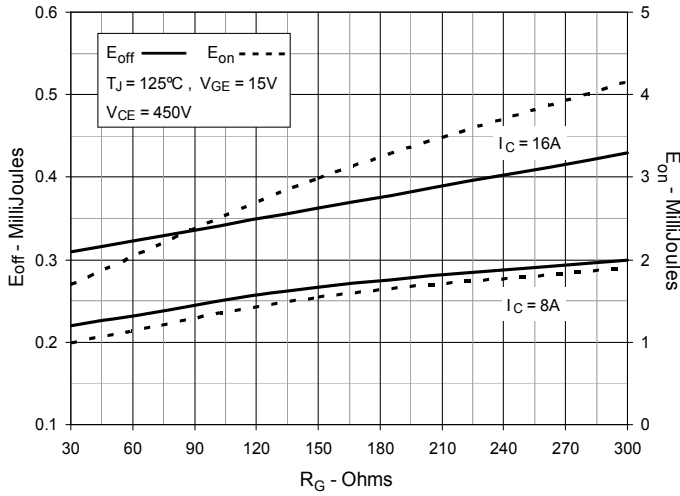


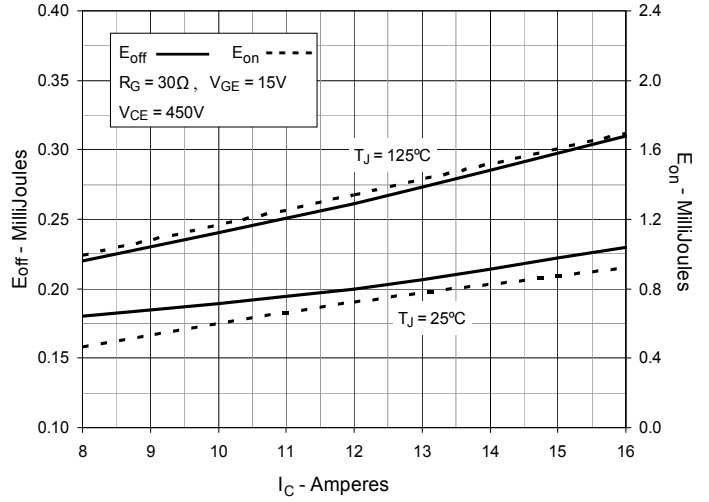
Fig. 11. Maximum Transient Thermal Impedance



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



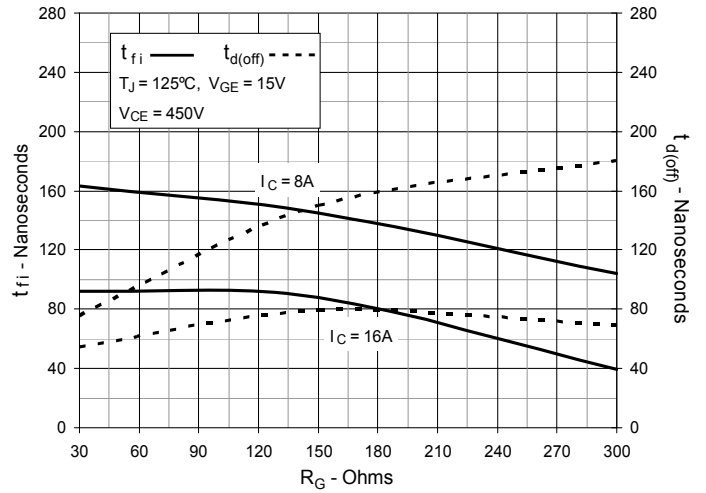
**Fig. 13. Inductive Switching Energy Loss vs. Collector Current**



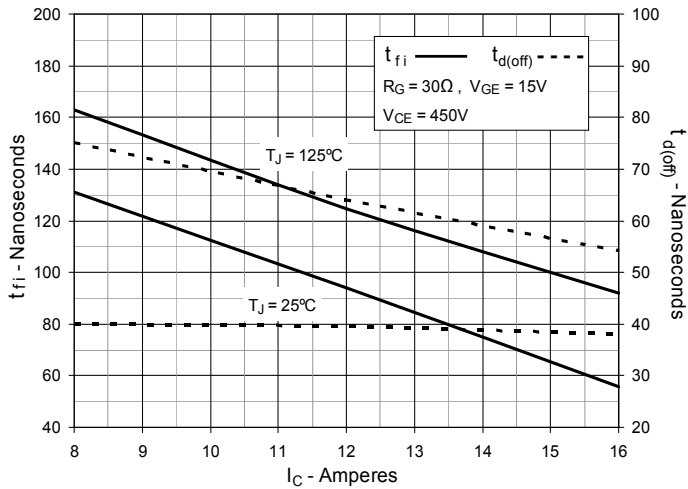
**Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature**



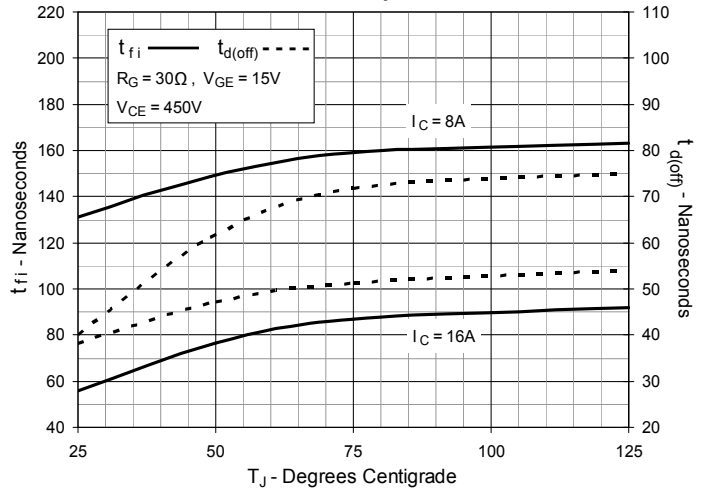
**Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance**



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



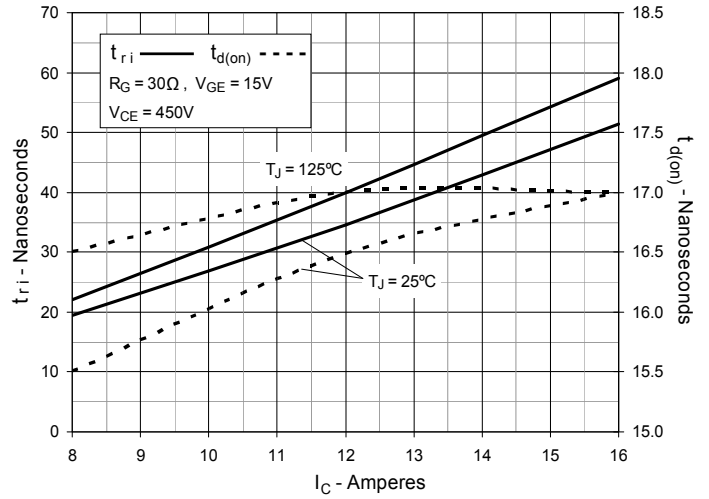
**Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature**



**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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