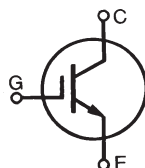


# 1200V XPT™ IGBT GenX3™

# IXYK100N120C3 IXYX100N120C3

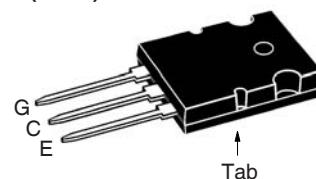
High-Speed IGBT  
for 20-50 kHz Switching



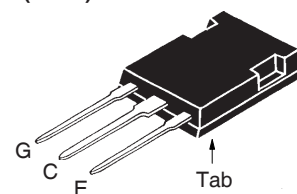
$V_{CES} = 1200V$   
 $I_{C110} = 100A$   
 $V_{CE(sat)} \leq 3.50V$   
 $t_{fi(typ)} = 110ns$

| Symbol                        | Test Conditions   | Maximum Ratings                           |            |
|-------------------------------|---|---|------------|
| $V_{CES}$                     | $T_J = 25^\circ C$ to $175^\circ C$   | 1200                                      | V          |
| $V_{CGR}$                     | $T_J = 25^\circ C$ to $175^\circ C$ , $R_{GE} = 1M\Omega$                           | 1200                                      | V          |
| $V_{GES}$                     | Continuous  | $\pm 20$                                  | V          |
| $V_{GEM}$                     | Transient   | $\pm 30$                                  | V          |
| $I_{C25}$                     | $T_C = 25^\circ C$ (Chip Capability)  | 195                                       | A          |
| $I_{LRMS}$                    | Terminal Current Limit  | 160                                       | A          |
| $I_{C110}$                    | $T_C = 110^\circ C$   | 100                                       | A          |
| $I_{CM}$                      | $T_C = 25^\circ C$ , 1ms  | 460                                       | A          |
| $I_A$                         | $T_C = 25^\circ C$  | 50  | A          |
| $E_{AS}$                      | $T_C = 25^\circ C$  | 1.2                                       | J          |
| <b>SSOA</b><br><b>(RBSOA)</b> | $V_{GE} = 15V$ , $T_{VJ} = 150^\circ C$ , $R_G = 1\Omega$<br>Clamped Inductive Load | $I_{CM} = 200$<br>@ $V_{CE} \leq V_{CES}$ | A          |
| $P_C$                         | $T_C = 25^\circ C$  | 1150                                      | 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-264)  | 1.13/10                                   | Nm/lb.in.  |
| $F_c$                         | Mounting Force (PLUS247)  | 20..120 / 4.5..27                         | N/lb.      |
| <b>Weight</b>                 | TO-264  | 10  | g          |
|                               | PLUS247   | 6   | g          |

TO-264 (IXYK)



PLUS247 (IXYX)



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

### Features

- Optimized for Low Switching Losses
- Square RBSOA
- Positive Thermal Coefficient of  $V_{ce(sat)}$
- Avalanche Rated
- High Current Handling Capability
- 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.                  |
| $BV_{CES}$    | $I_C = 250\mu A$ , $V_{GE} = 0V$                                      | 1200                  |      | V                     |
| $V_{GE(th)}$  | $I_C = 250\mu A$ , $V_{CE} = V_{GE}$                                  | 3.0                   |      | 5.0 V                 |
| $I_{CES}$     | $V_{CE} = V_{CES}$ , $V_{GE} = 0V$<br>$T_J = 150^\circ C$             |                       |      | 10 $\mu A$<br>1.25 mA |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                    |                       |      | $\pm 100$ nA          |
| $V_{CE(sat)}$ | $I_C = I_{C110}$ , $V_{GE} = 15V$ , Note 1<br>$T_J = 150^\circ C$     | 2.96<br>3.78          |      | 3.50 V<br>V           |

| Symbol Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) |   | Characteristic Values |       |                           |
|--|---|-----------------------|-------|---------------------------|
|  |   | Min.                  | Typ.  | Max.                      |
| $g_{fs}$   | $I_C = 60\text{A}, V_{CE} = 10\text{V}, \text{Note 1}$  | 30                    | 50    | S                         |
| $C_{ies}$  | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$  |                       | 4950  | pF                        |
| $C_{oes}$  |   |                       | 356   | pF                        |
| $C_{res}$  |   |                       | 120   | pF                        |
| $Q_{g(on)}$  | $I_C = I_{C110}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$   |                       | 260   | nC                        |
| $Q_{ge}$   |   |                       | 47    | nC                        |
| $Q_{gc}$   |   |                       | 102   | nC                        |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = I_{C110}, V_{GE} = 15\text{V}$<br>$V_{CE} = 0.5 \cdot V_{CES}, R_G = 1\Omega$<br>Note 2  |                       | 27    | ns                        |
| $t_{ri}$   |   |                       | 110   | ns                        |
| $E_{on}$   |   |                       | 12.00 | mJ                        |
| $t_{d(off)}$   |   |                       | 120   | ns                        |
| $t_{fi}$   |   |                       | 110   | ns                        |
| $E_{off}$  |   |                       | 4.90  | mJ                        |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = I_{C110}, V_{GE} = 15\text{V}$<br>$V_{CE} = 0.5 \cdot V_{CES}, R_G = 1\Omega$<br>Note 2 |                       | 27    | ns                        |
| $t_{ri}$   |   |                       | 116   | ns                        |
| $E_{on}$   |   |                       | 15.00 | mJ                        |
| $t_{d(off)}$   |   |                       | 146   | ns                        |
| $t_{fi}$   |   |                       | 125   | ns                        |
| $E_{off}$  |   |                       | 6.15  | mJ                        |
| $R_{thJC}$   |   |                       | 0.13  | $^\circ\text{C}/\text{W}$ |
| $R_{thCS}$   |   | 0.15                  |       | $^\circ\text{C}/\text{W}$ |

**Notes:**

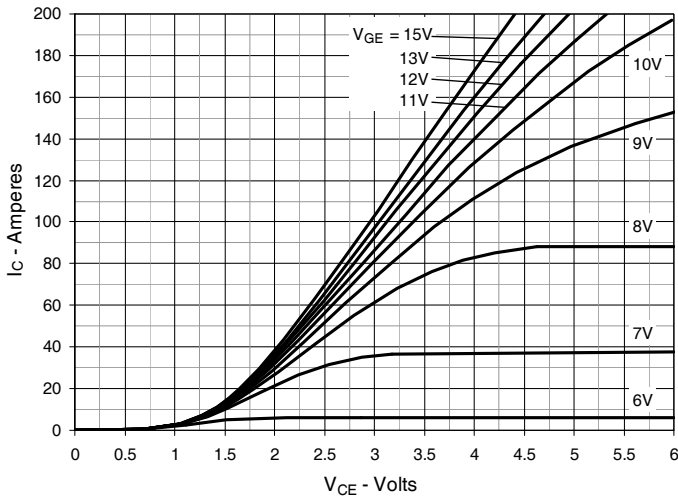
1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .
2. Switching times & energy losses may increase for higher  $V_{CE}$  (clamp),  $T_J$  or  $R_G$ .

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

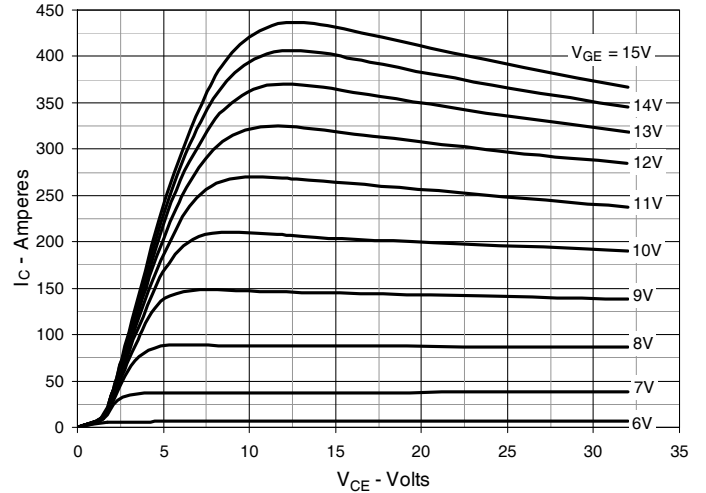
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

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

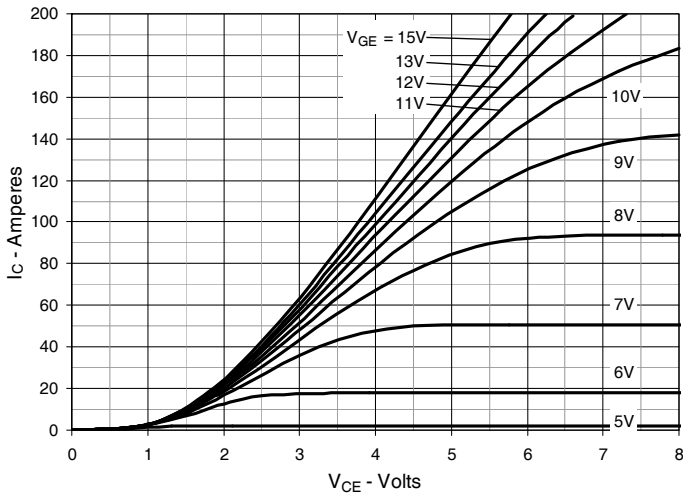
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



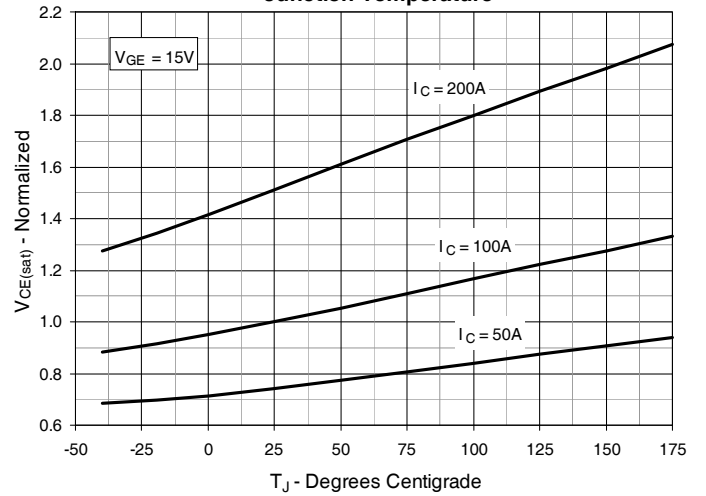
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



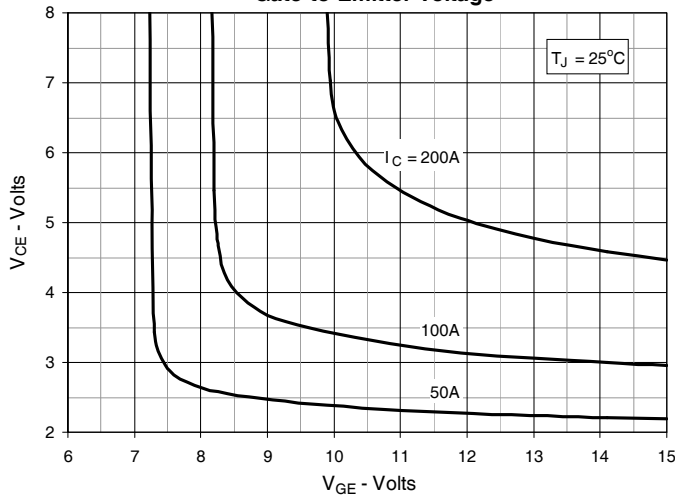
**Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$**



**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**

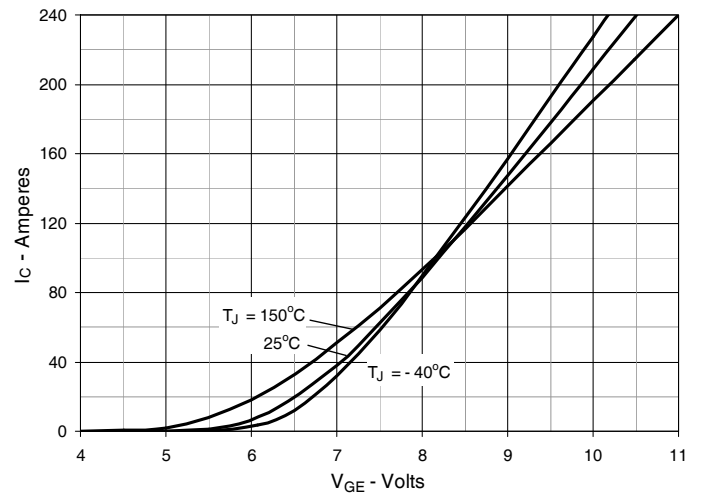


Fig. 7. Transconductance

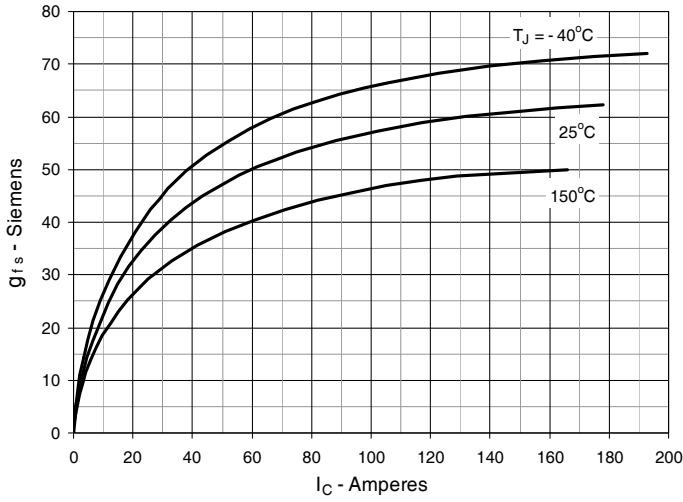


Fig. 8. Gate Charge

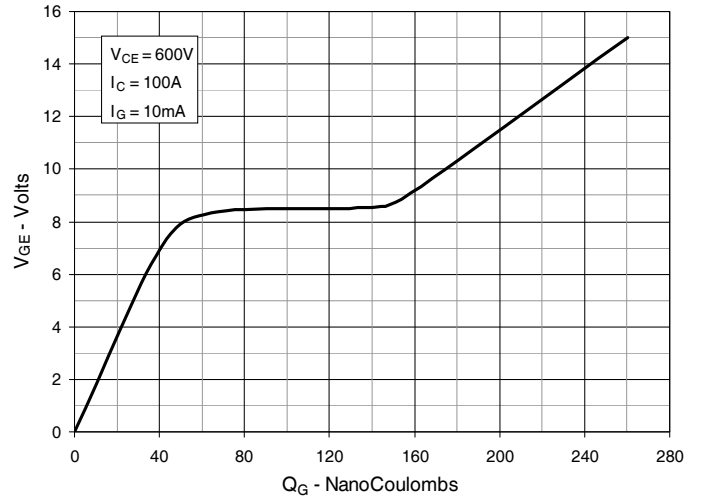


Fig. 9. Capacitance

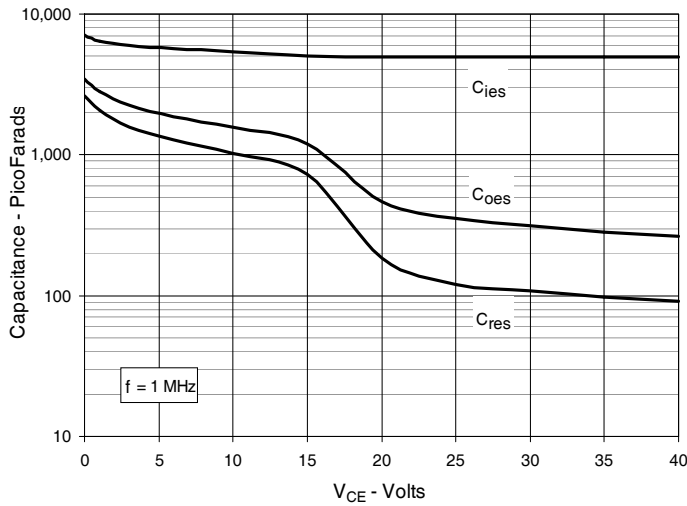


Fig. 10. Reverse-Bias Safe Operating Area

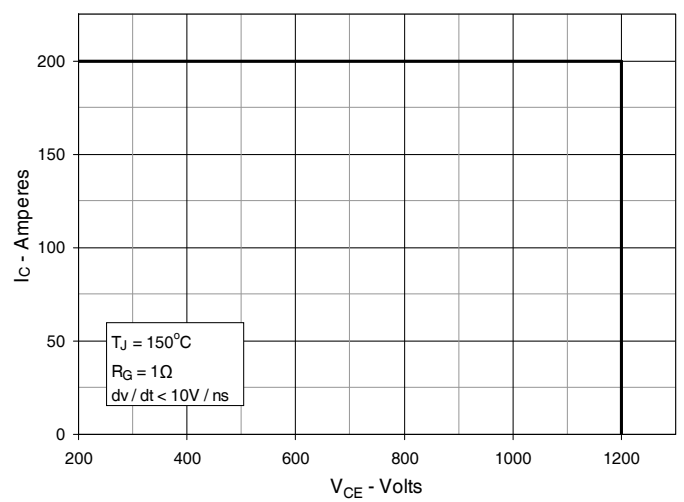
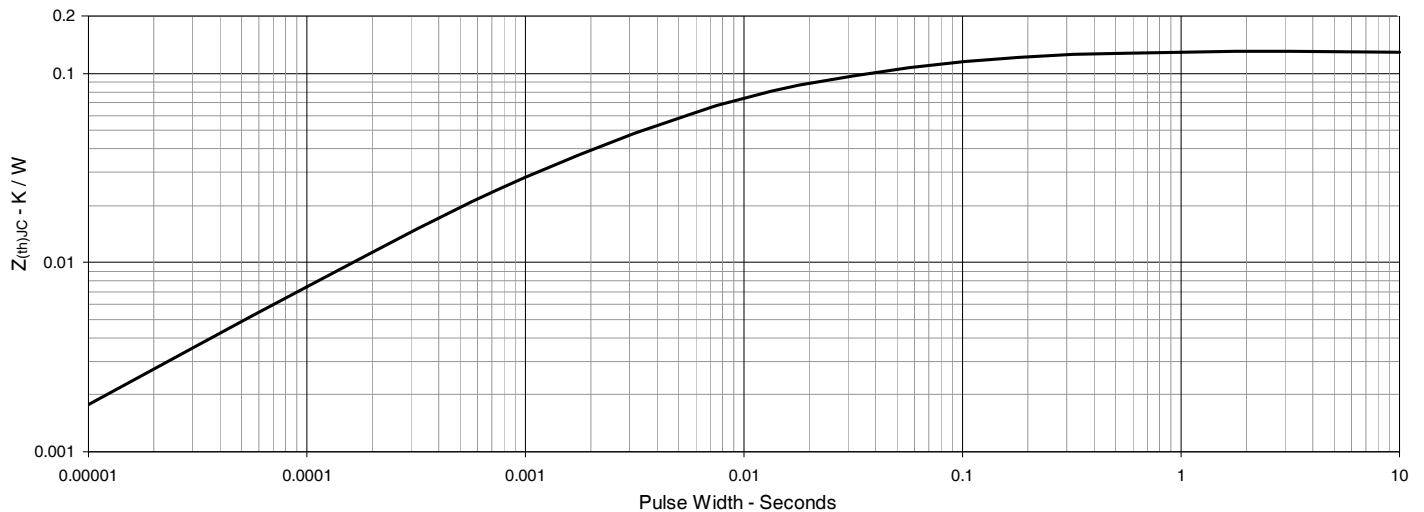
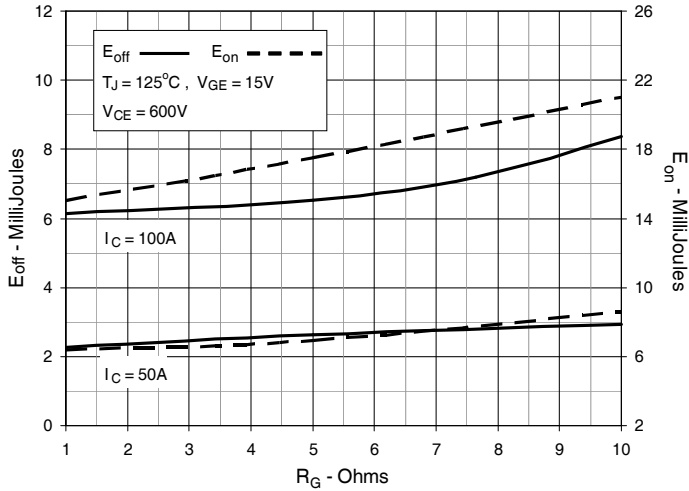


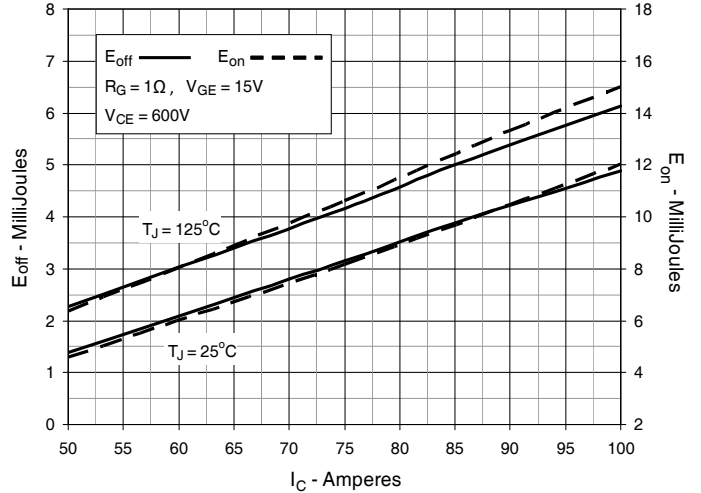
Fig. 11. Maximum Transient Thermal Impedance



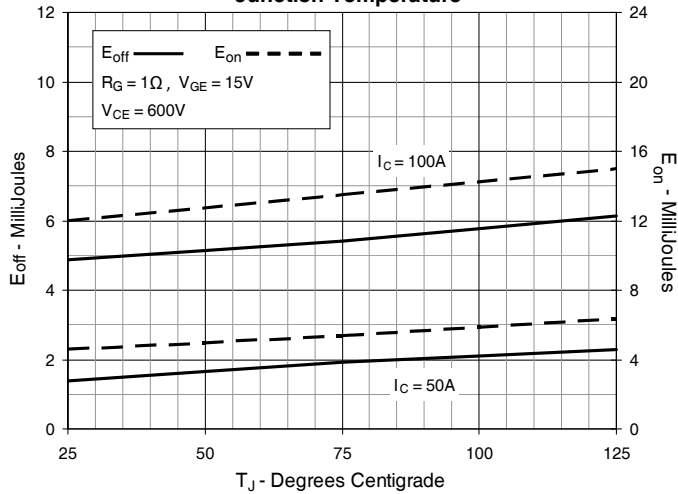
**Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance**



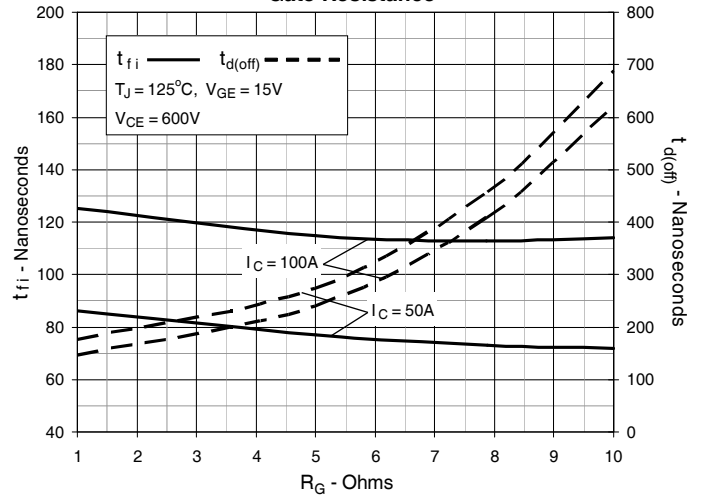
**Fig. 13. Inductive Switching Energy Loss vs. Collector Current**



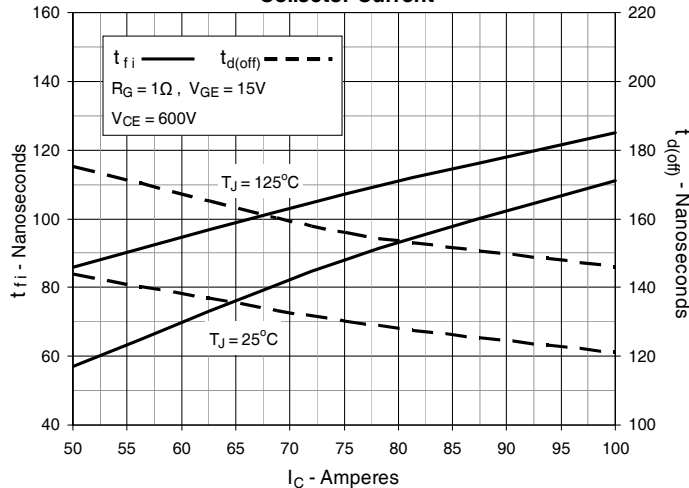
**Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature**



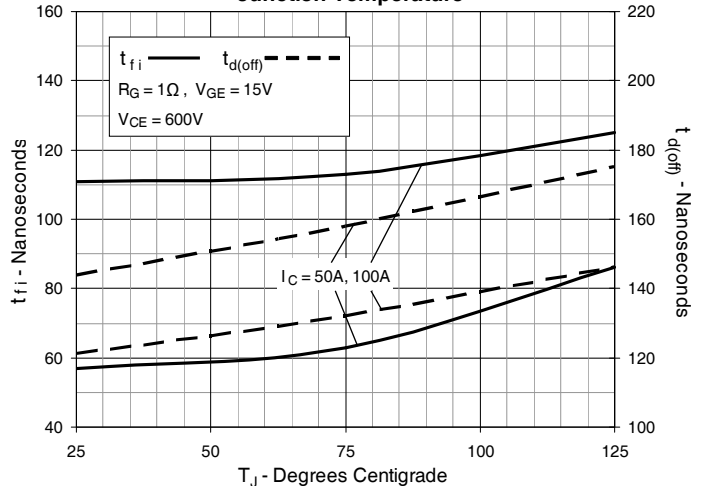
**Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance**



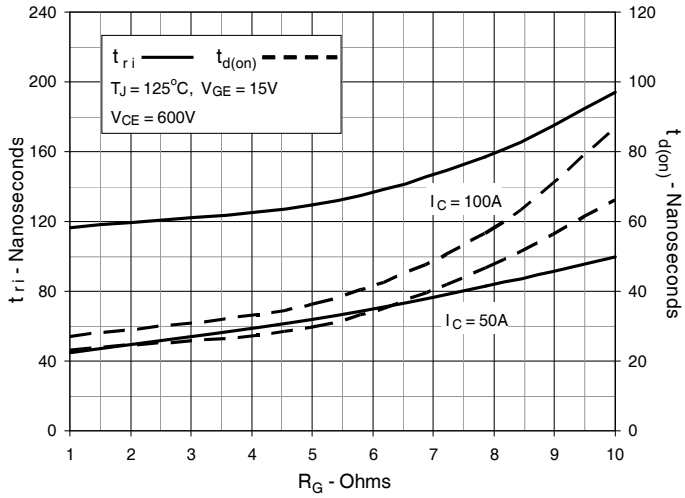
**Fig. 16. Inductive Turn-off Switching Times vs. Collector Current**



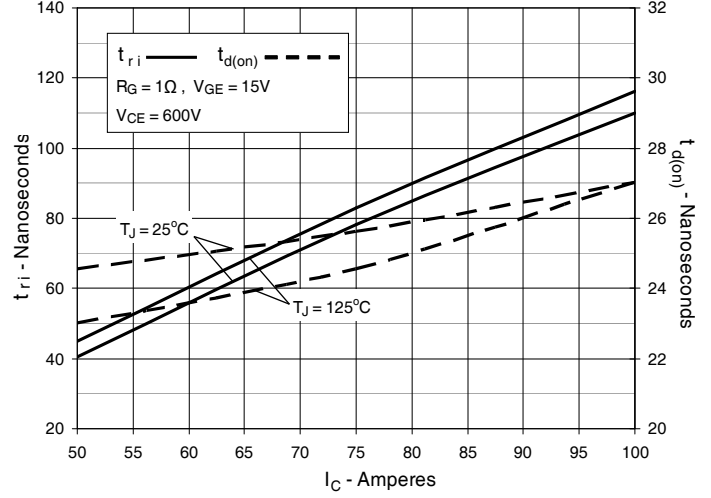
**Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature**



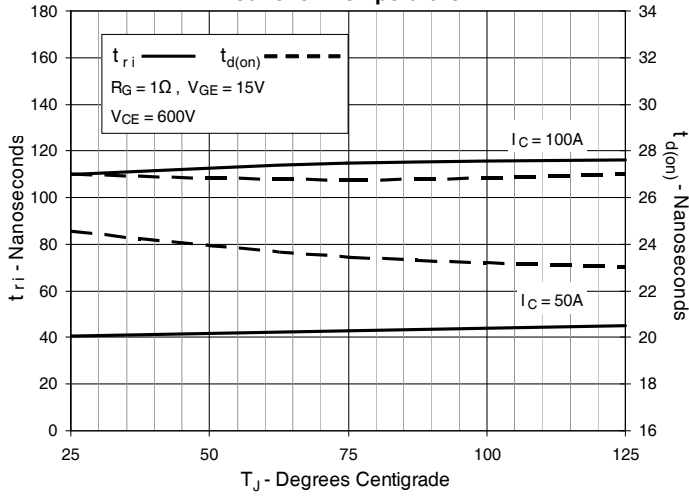
**Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance**



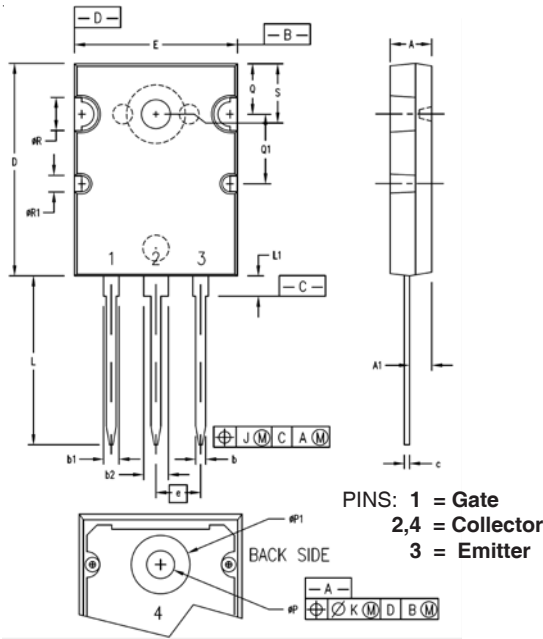
**Fig. 19. Inductive Turn-on Switching Times vs. Collector Current**



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

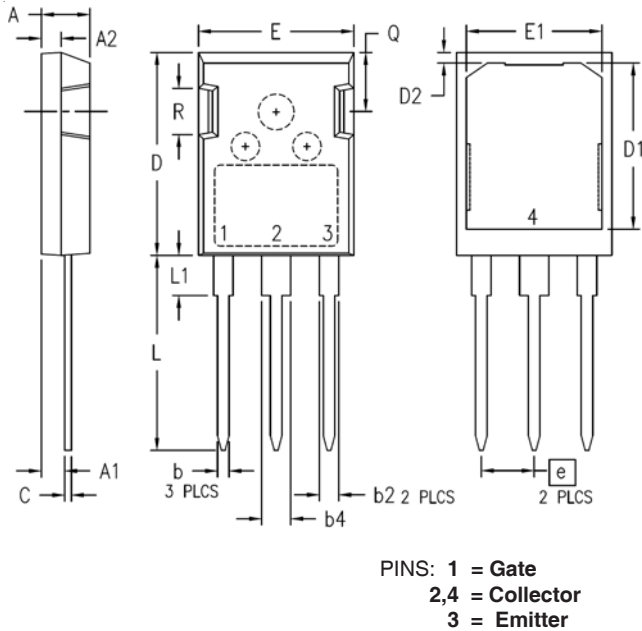


**TO-264 Outline**



| SYMBOL | INCHES  |       | MILLIMETERS |       |
|--------|---------|-------|-------------|-------|
|        | MIN     | MAX   | MIN         | MAX   |
| A      | .185    | .209  | 4.70        | 5.31  |
| A1     | .102    | .118  | 2.59        | 3.00  |
| b      | .037    | .055  | 0.94        | 1.40  |
| b1     | .087    | .102  | 2.21        | 2.59  |
| b2     | .110    | .126  | 2.79        | 3.20  |
| c      | .017    | .029  | 0.43        | 0.74  |
| D      | 1.007   | 1.047 | 25.58       | 26.59 |
| E      | .760    | .799  | 19.30       | 20.29 |
| e      | .215BSC |       | 5.46 BSC    |       |
| J      | .000    | .010  | 0.00        | 0.25  |
| K      | .000    | .010  | 0.00        | 0.25  |
| L      | .779    | .842  | 19.79       | 21.39 |
| L1     | .087    | .102  | 2.21        | 2.59  |
| ØP     | .122    | .138  | 3.10        | 3.51  |
| ØP1    | .270    | .290  | 6.86        | 7.37  |
| Q      | .240    | .256  | 6.10        | 6.50  |
| Q1     | .330    | .346  | 8.38        | 8.79  |
| ØR     | .155    | .187  | 3.94        | 4.75  |
| ØR1    | .085    | .093  | 2.16        | 2.36  |
| S      | .243    | .253  | 6.17        | 6.43  |

**PLUS247 Outline**



| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .190     | .205 | 4.83        | 5.21  |
| A1  | .090     | .100 | 2.29        | 2.54  |
| A2  | .075     | .085 | 1.91        | 2.16  |
| b   | .045     | .055 | 1.14        | 1.40  |
| b2  | .075     | .087 | 1.91        | 2.20  |
| b4  | .115     | .126 | 2.92        | 3.20  |
| C   | .024     | .031 | 0.61        | 0.80  |
| D   | .819     | .840 | 20.80       | 21.34 |
| D1  | .650     | .690 | 16.51       | 17.53 |
| D2  | .035     | .050 | 0.89        | 1.27  |
| E   | .620     | .635 | 15.75       | 16.13 |
| E1  | .520     | .560 | 13.08       | 14.22 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| L   | .780     | .810 | 19.81       | 20.57 |
| L1  | .150     | .170 | 3.81        | 4.32  |
| Q   | .220     | .244 | 5.59        | 6.20  |
| R   | .170     | .190 | 4.32        | 4.83  |