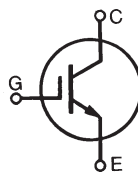


# 1200V XPT™ IGBT GenX3™

## IXYR100N120C3

(Electrically Isolated Tab)

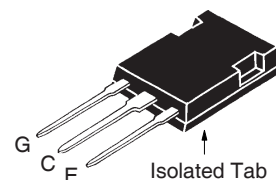
High-Speed IGBT  
for 20-50 kHz Switching



$$\begin{aligned} V_{CES} &= 1200V \\ I_{C110} &= 56A \\ V_{CE(sat)} &\leq 3.50V \\ t_{fi(typ)} &= 110ns \end{aligned}$$

| 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)                                                | 110                                       | A          |
| $I_{C110}$                    | $T_C = 110^\circ C$                                                                 | 56                                        | A          |
| $I_{CM}$                      | $T_C = 25^\circ C$ , 1ms                                                            | 450                                       | 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          |
| $P_C$                         | $T_C = 25^\circ C$                                                                  | 484                                       | 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                                       | $^\circ C$ |
| $V_{ISOL}$                    | 50/60 Hz, 1 Minute                                                                  | 2500                                      | V~         |
| $F_C$                         | Mounting Force                                                                      | 20..120/4.5..27                           | N/lb.      |
| <b>Weight</b>                 |                                                                                     | 5                                         | g          |

### ISOPLUS247™



G = Gate      C = Collector  
E = Emitter

### Features

- Optimized for Low Switching Losses
- Square RBSOA
- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 2500V~ Electrical Isolation
- Positive Thermal Coefficient of  $V_{ce(sat)}$
- Avalanche Rated
- High Current Handling Capability

### Advantages

- High Power Density
- Low Gate Drive Requirement

### Applications

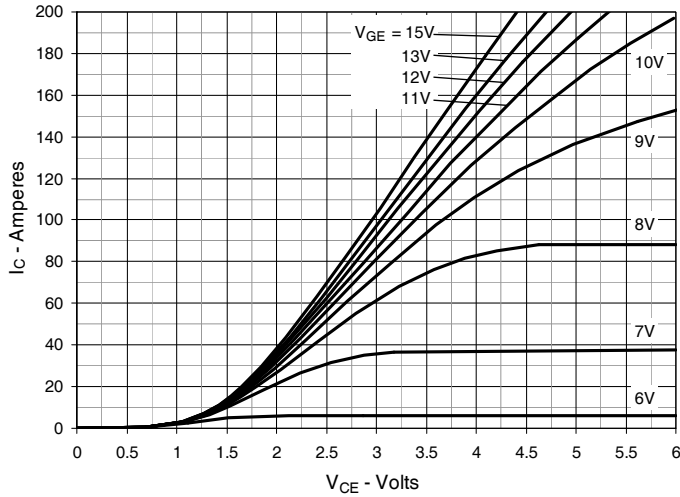
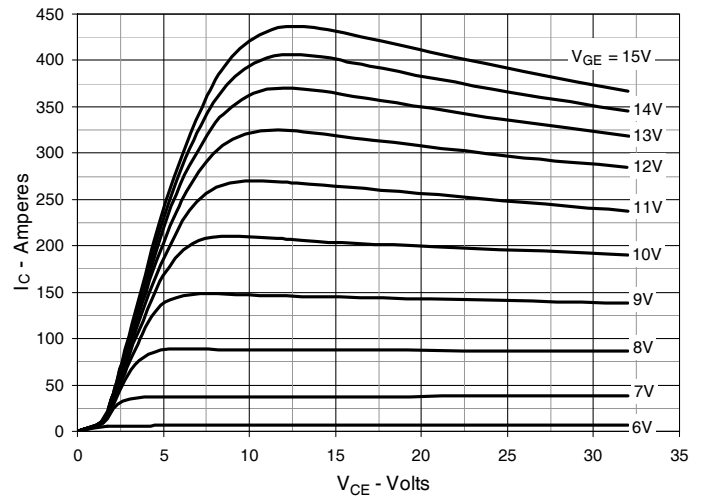
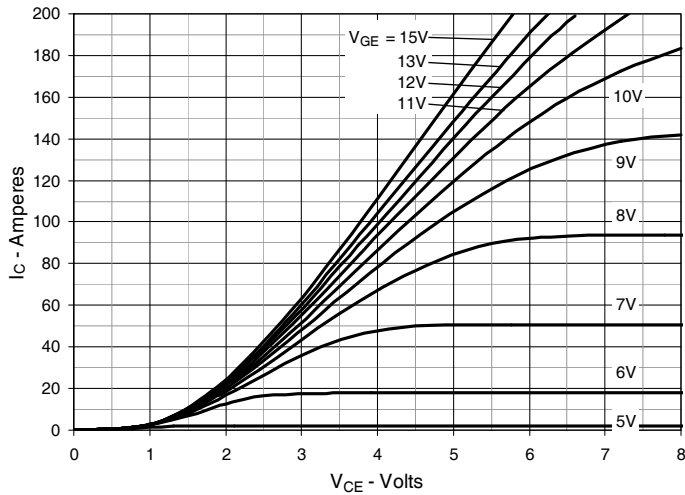
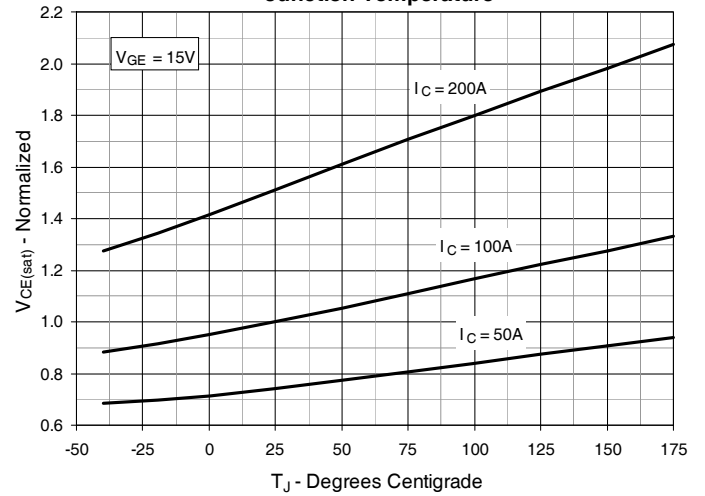
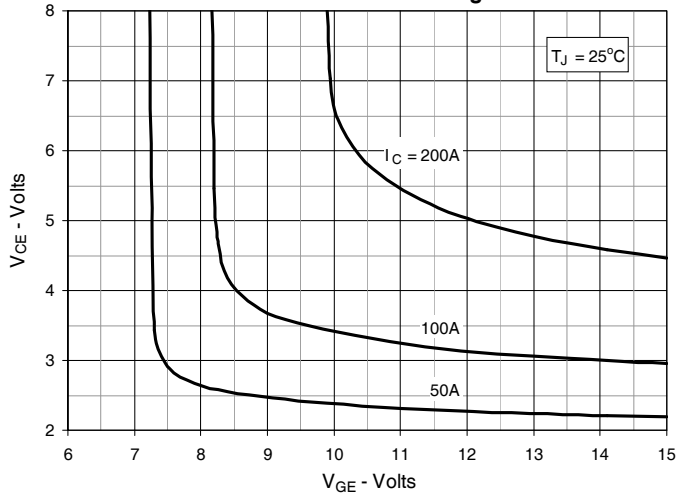
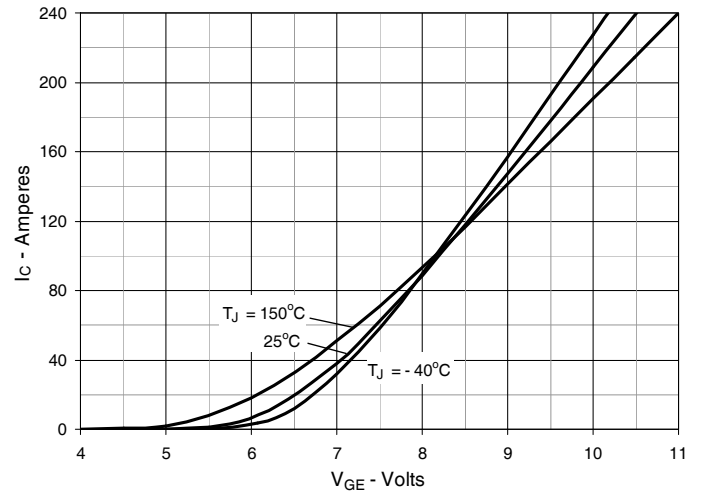
- High Frequency Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

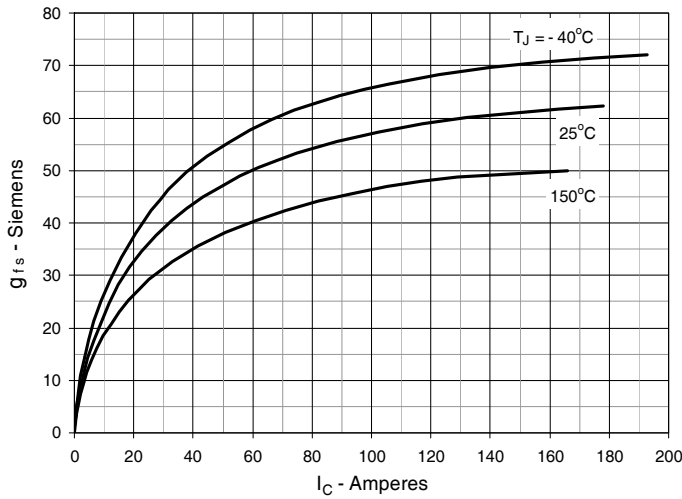
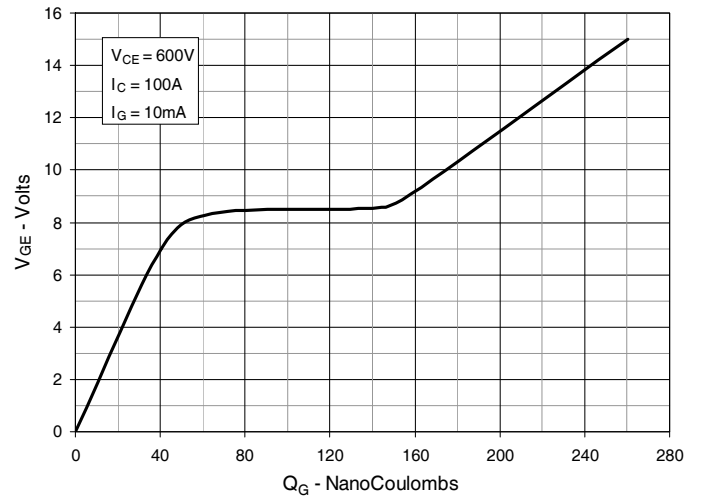
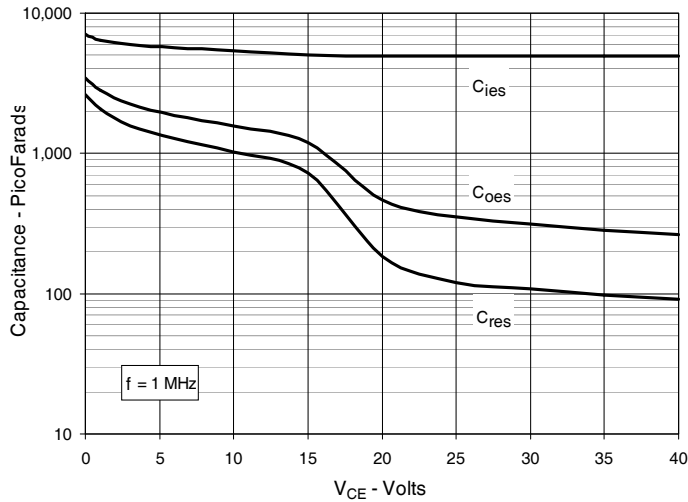
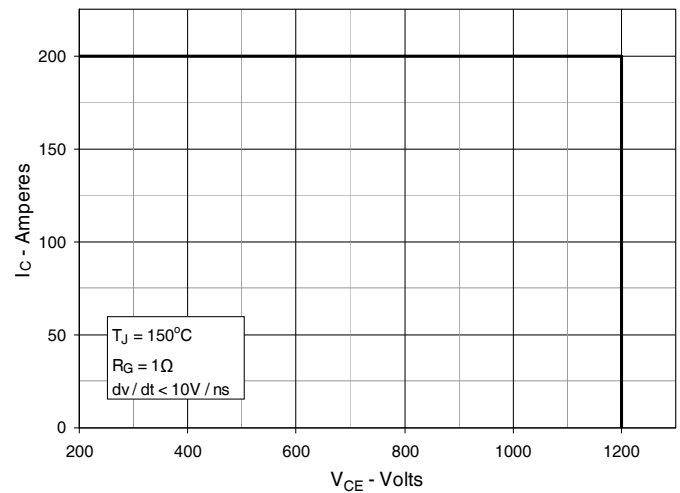
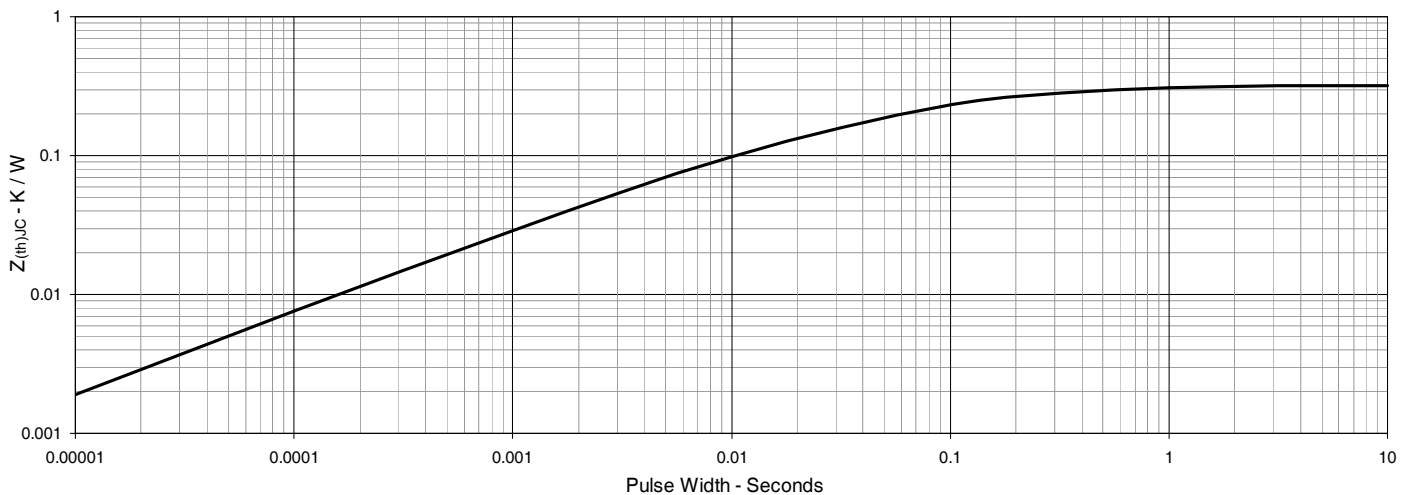
| Symbol        | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                       |
|---------------|-----------------------------------------------------------------------|-----------------------|------|-----------------------|
|               |                                                                       | 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          |
| $V_{CE(sat)}$ | $I_C = 100A$ , $V_{GE} = 15V$ , Note 1<br>$T_J = 150^\circ C$         | 2.96<br>3.78          |      | 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                      |
| $R_{thJC}$                                                                       |                                                                                                                                                               |                       |       | 0.31 $^\circ\text{C/W}$ |
| $R_{thCS}$                                                                       |                                                                                                                                                               | 0.15                  |       | $^\circ\text{C/W}$      |

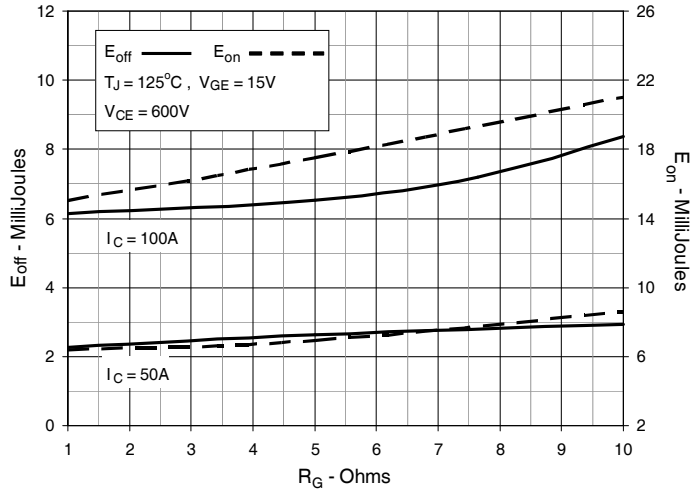
## Notes:

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  $R_G$ .

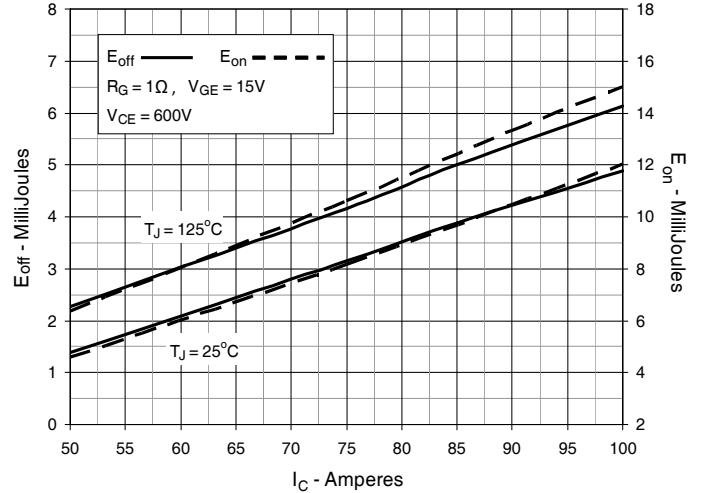
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$** 

**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**


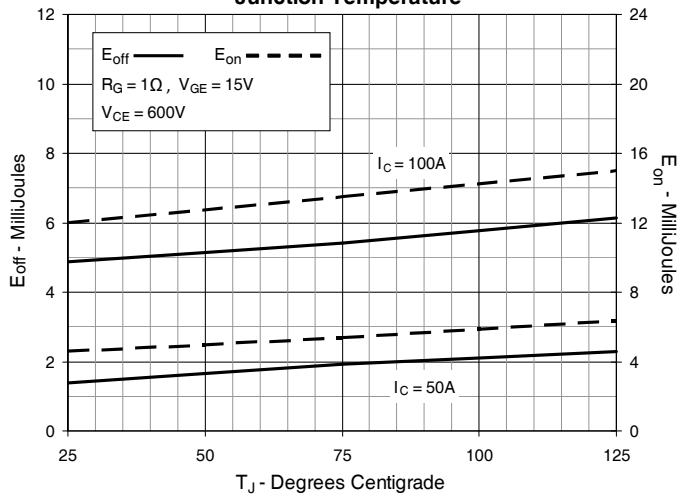
**Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance**



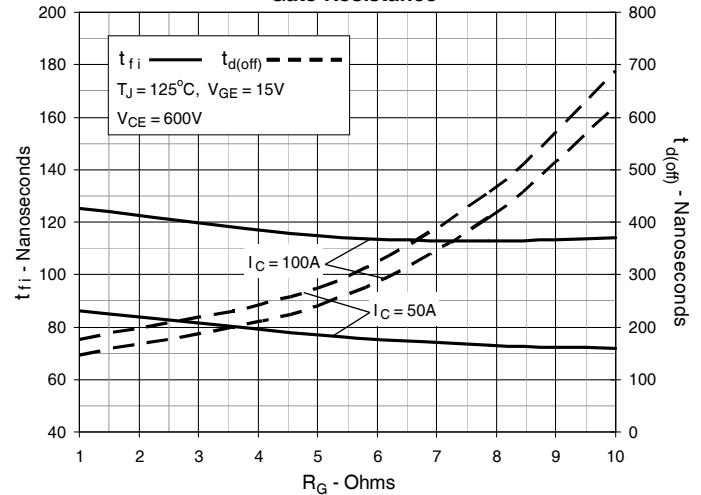
**Fig. 13. Inductive Switching Energy Loss vs. Collector Current**



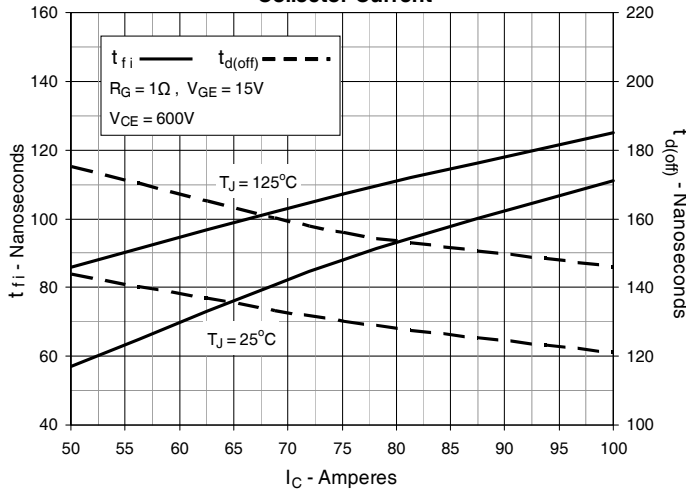
**Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature**



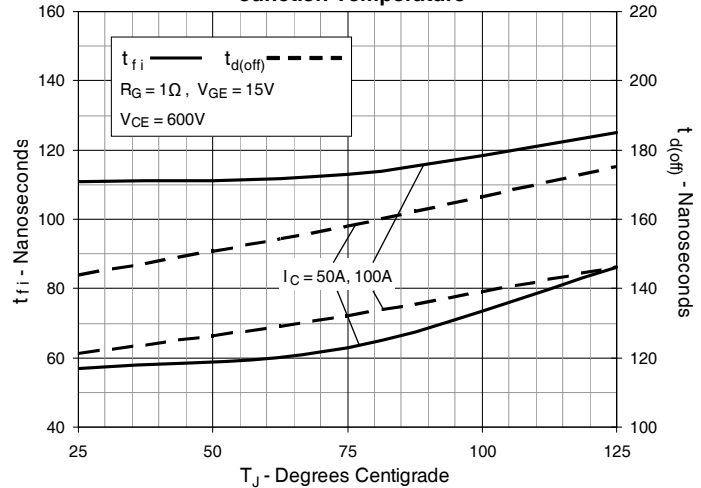
**Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance**



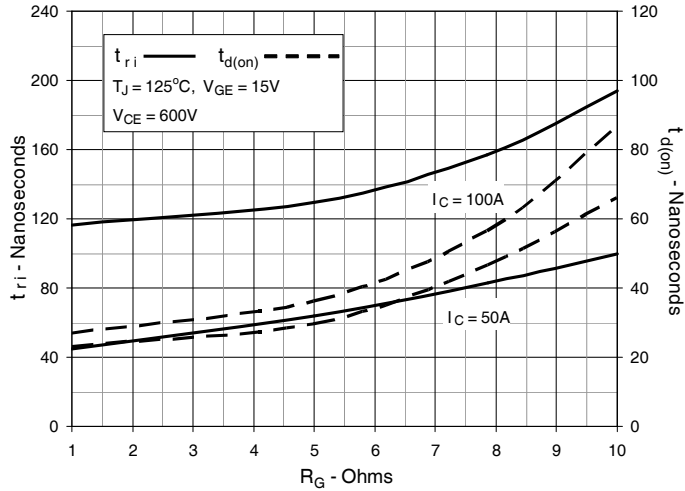
**Fig. 16. Inductive Turn-off Switching Times vs. Collector Current**



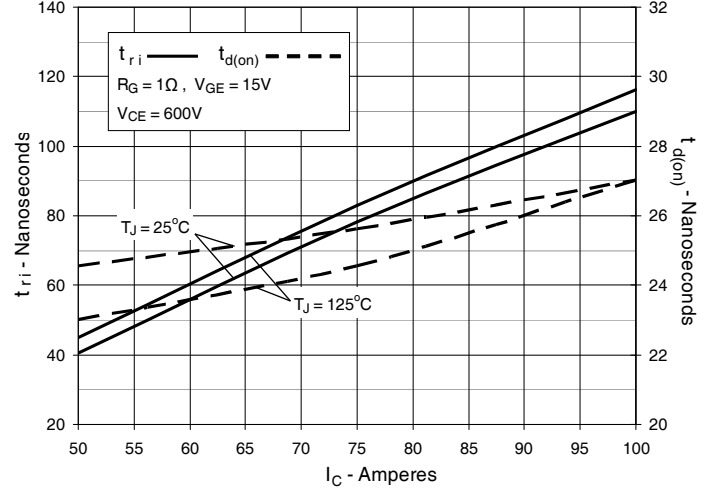
**Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature**



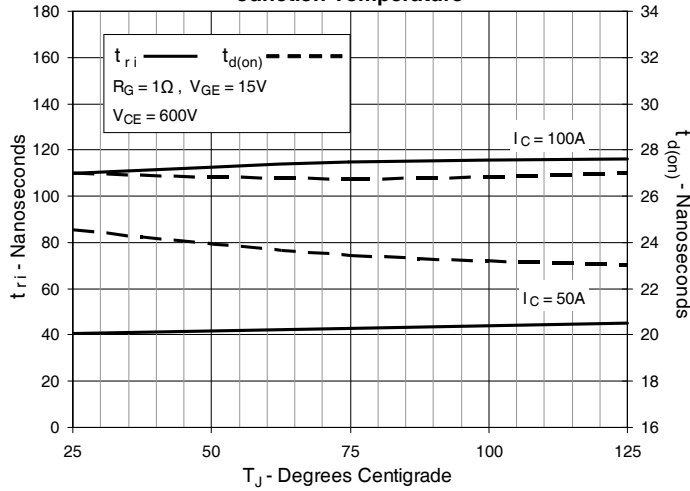
**Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance**

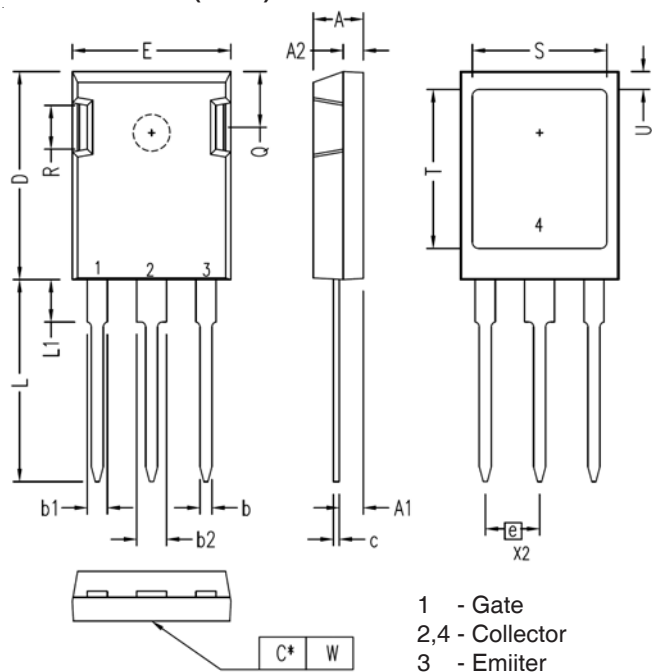


**Fig. 19. Inductive Turn-on Switching Times vs. Collector Current**



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



**ISOPLUS247 (IXYR) 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  |
| b1  | .075     | .085 | 1.91        | 2.15  |
| b2  | .115     | .126 | 2.92        | 3.20  |
| C   | .024     | .033 | 0.61        | 0.83  |
| D   | .819     | .840 | 20.80       | 21.34 |
| E   | .620     | .635 | 15.75       | 16.13 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| L   | .780     | .811 | 19.81       | 20.60 |
| L1  | .150     | .172 | 3.81        | 4.38  |
| Q   | .220     | .244 | 5.59        | 6.20  |
| R   | .170     | .191 | 4.32        | 4.85  |
| S   | .520     | .540 | 13.21       | 13.72 |
| T   | .620     | .640 | 15.75       | 16.26 |
| U   | .065     | .080 | 1.65        | 2.03  |
| W   | 0        | .004 | 0           | 0.10  |

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.  
C\* - Convex bow of substrate is typ<0.04mm over plastic surface level of device bottom side.  
LEAD FINISH - External leads are Pb free solder dip.