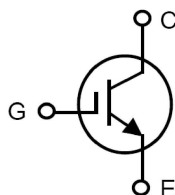


1200V XPT™ Gen 4 IGBT

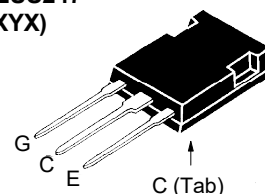
IXYX110N120C4

High Speed IGBT for 20-50kHz Switching



$V_{CES} = 1200V$
 $I_{C110} = 110A$
 $V_{CE(sat)} \leq 2.40V$
 $t_{fi(typ)} = 37ns$

PLUS247 (IXYX)



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

| 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 | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ C$ (Chip Capability) | 310 | A |
| I_{LRMS} | Terminal Current Limit | 160 | A |
| I_{C110} | $T_C = 110^\circ C$ | 110 | A |
| I_{CM} | $T_C = 25^\circ C$, 1ms | 740 | A |
| SSOA (RBSOA) | $V_{GE} = 15V$, $T_{VJ} = 150^\circ C$, $R_G = 2\Omega$ Clamped Inductive Load | $I_{CM} = 220$ $0.8 \cdot V_{CES}$ | A V |
| P_C | $T_C = 25^\circ C$ | 1360 | 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 (0.062 in.) from Case for 10s | 260 | $^\circ C$ |
| F_C | Mounting Force | 20..120 / 4.5..27 | N/lb |
| Weight | | 6 | g |

Features

- Optimized for Low Switching Losses
- Positive Thermal Coefficient of $V_{CE(sat)}$
- International Standard Package

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 ($T_J = 25^\circ C$, Unless Otherwise Specified) | Characteristic Values | | |
|---------------|-----------------------------------------------------------------------|-----------------------|--------------|----------------------|
| | | Min. | Typ. | Max. |
| BV_{CES} | $I_C = 250\mu A$, $V_{GE} = 0V$ | 1200 | | V |
| $V_{GE(th)}$ | $I_C = 3mA$, $V_{CE} = V_{GE}$ | 4.5 | | 6.5 V |
| I_{CES} | $V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 150^\circ C$ | | | 25 μA 1.5 mA |
| I_{GES} | $V_{CE} = 0V$, $V_{GE} = \pm 20V$ | | | ± 100 nA |
| $V_{CE(sat)}$ | $I_C = I_{C110}$, $V_{GE} = 15V$, Note 1 $T_J = 150^\circ C$ | | 1.90 2.27 | 2.40 V V |

| Symbol Test Conditions ($T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | | Characteristic Values | | |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $I_C = 60\text{A}, V_{CE} = 10\text{V}, \text{Note 1}$ | 40 | 68 | S |
| C_{ies} | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$ | | 5420 | pF |
| C_{oes} | | | 335 | pF |
| C_{res} | | | 220 | pF |
| $Q_{g(on)}$ | $I_C = I_{C110}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$ | | 330 | nC |
| Q_{ge} | | | 55 | nC |
| Q_{gc} | | | 138 | nC |
| $t_{d(on)}$ | Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 50\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 2\Omega$ Note 2 | | 40 | ns |
| t_{ri} | | | 48 | ns |
| E_{on} | | | 3.6 | mJ |
| $t_{d(off)}$ | | | 320 | ns |
| t_{fi} | | | 37 | ns |
| E_{off} | | | 1.9 | mJ |
| $t_{d(on)}$ | Inductive load, $T_J = 150^\circ\text{C}$ $I_C = 50\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 2\Omega$ Note 2 | | 36 | ns |
| t_{ri} | | | 37 | ns |
| E_{on} | | | 5.3 | mJ |
| $t_{d(off)}$ | | | 326 | ns |
| t_{fi} | | | 90 | ns |
| E_{off} | | | 3.2 | mJ |
| R_{thJC} | | | | 0.11 $^\circ\text{C/W}$ |
| 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 .

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

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

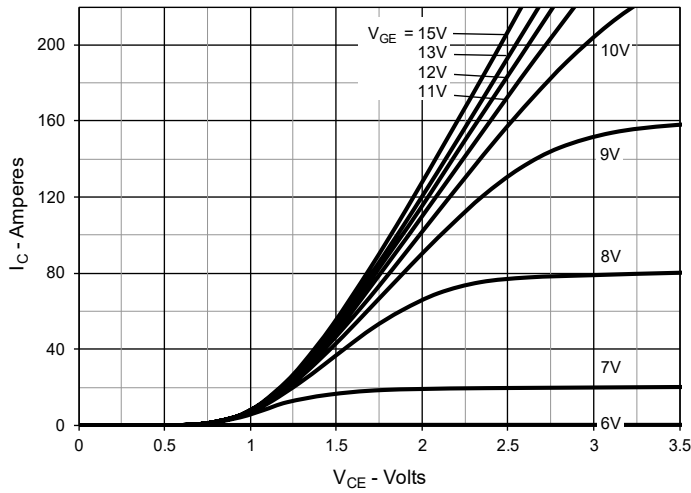
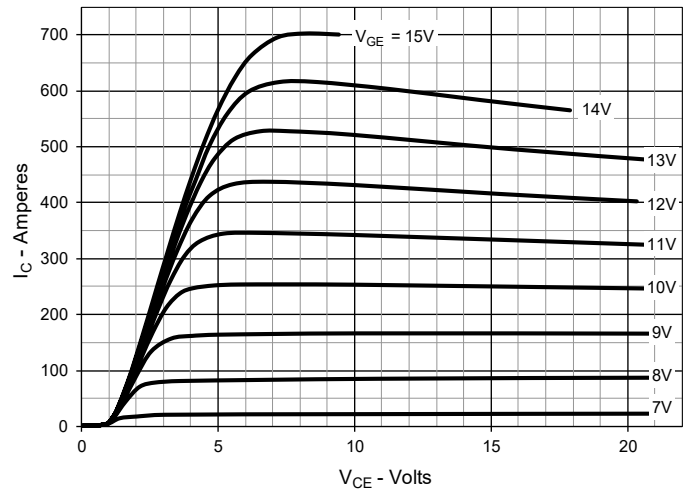
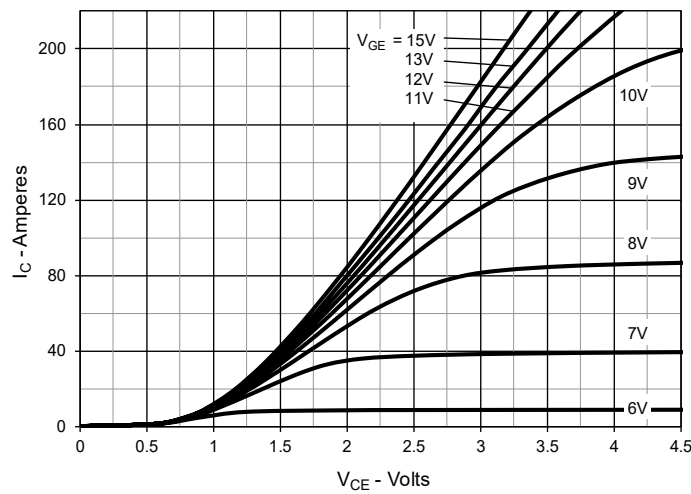
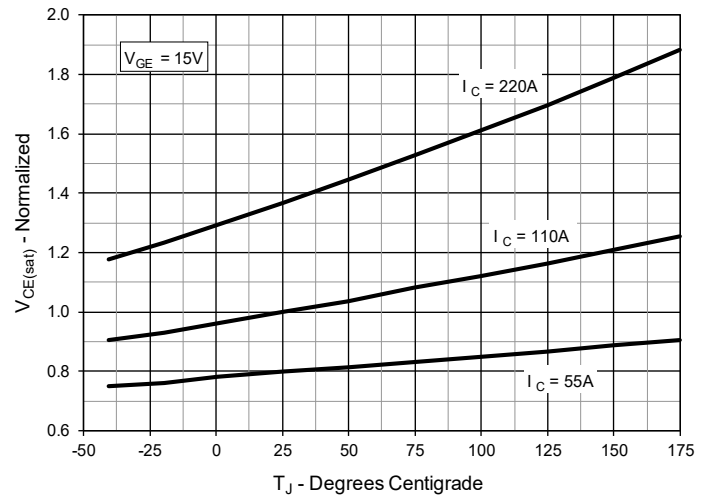
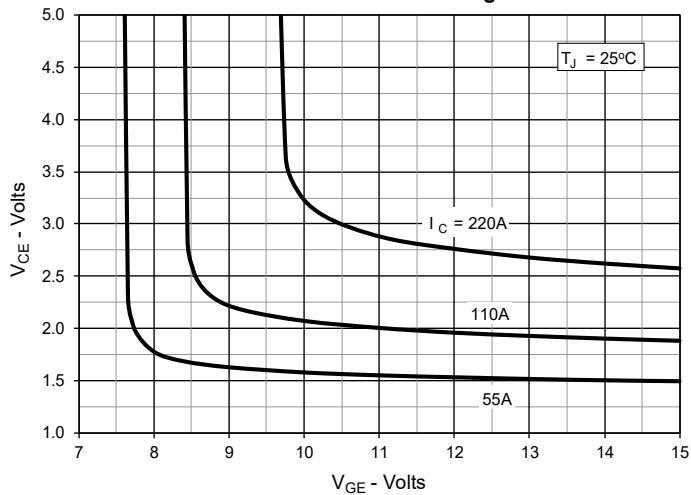
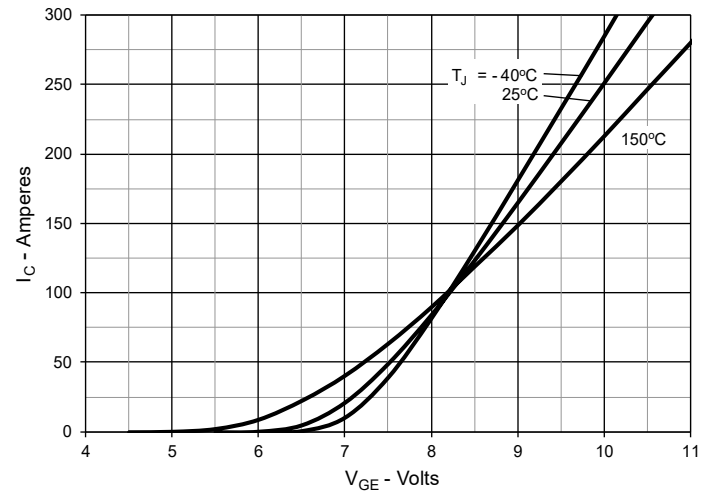
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

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


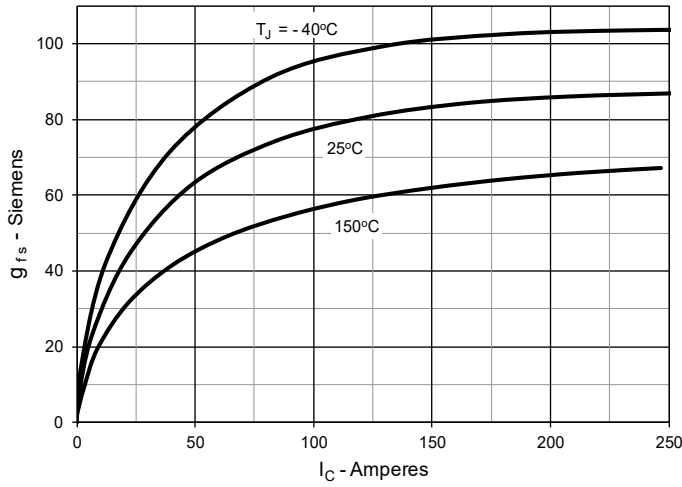
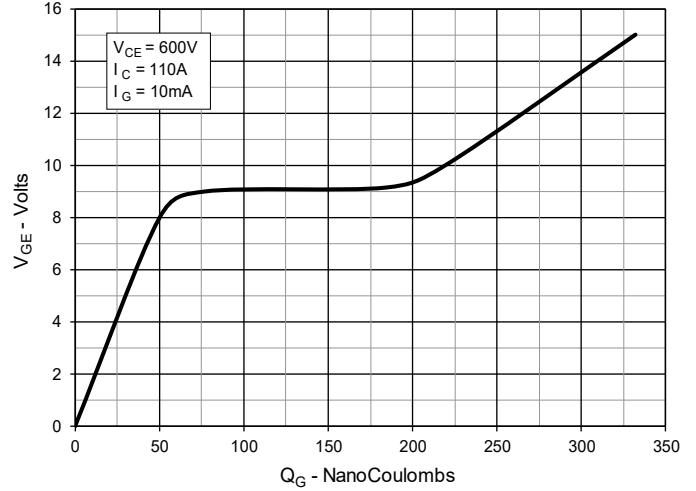
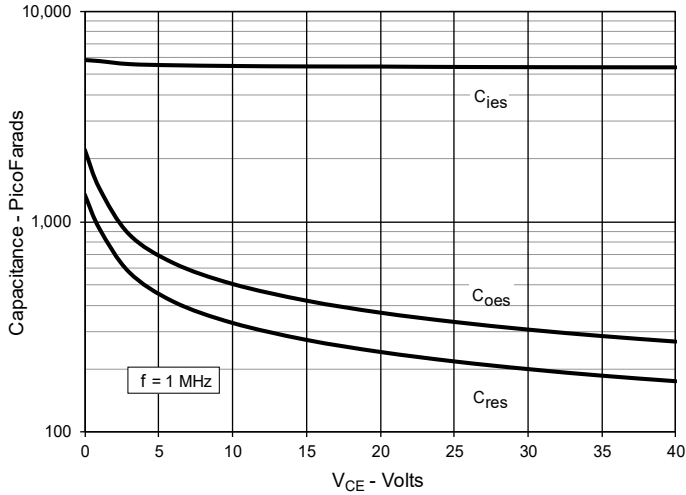
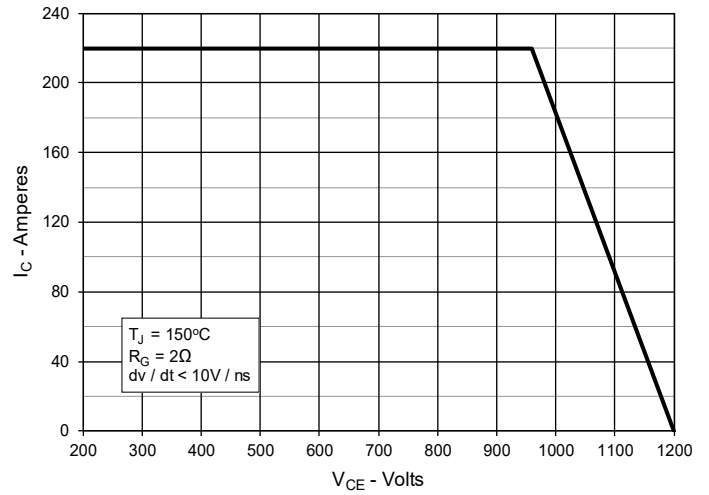
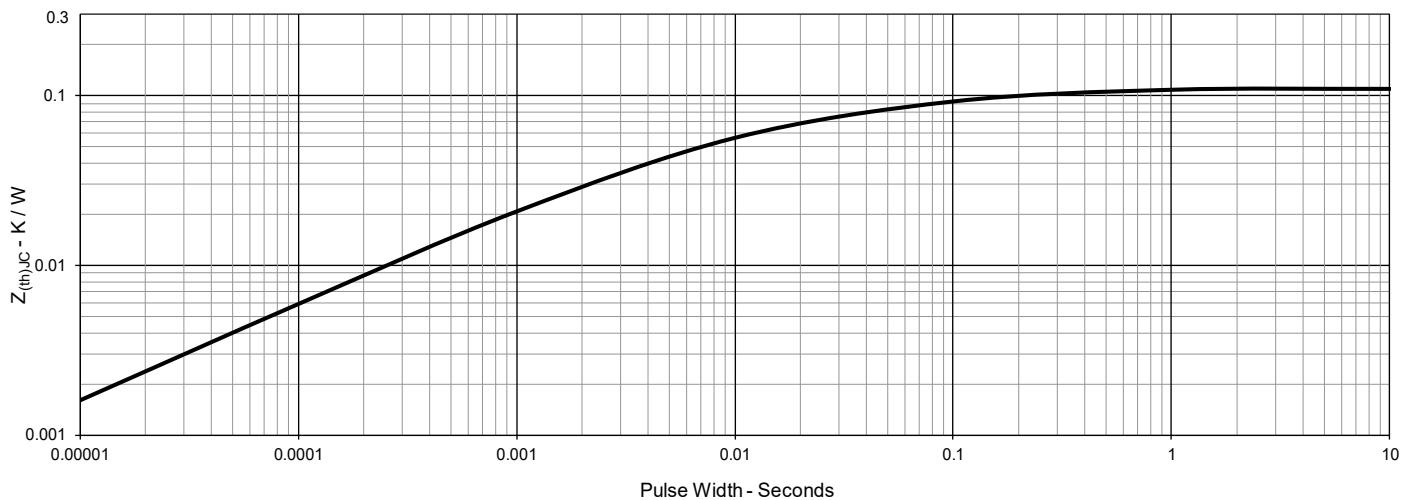
Fig. 7. Transconductance

Fig. 8. Gate Charge

Fig. 9. Capacitance

Fig. 10. Reverse-Bias Safe Operating Area

Fig. 11. Maximum Transient Thermal Impedance


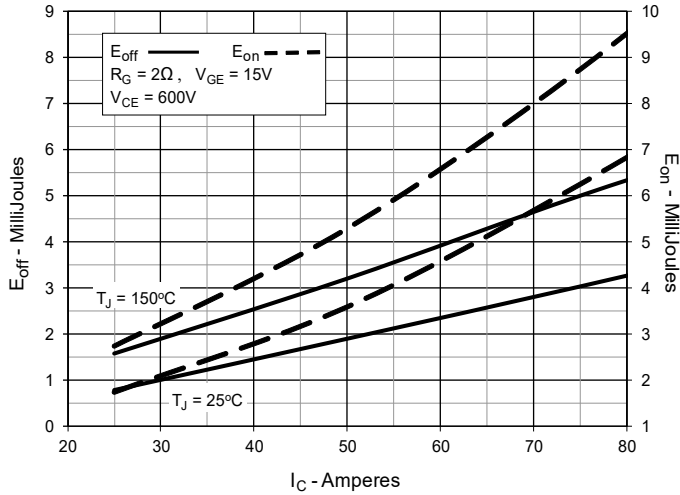
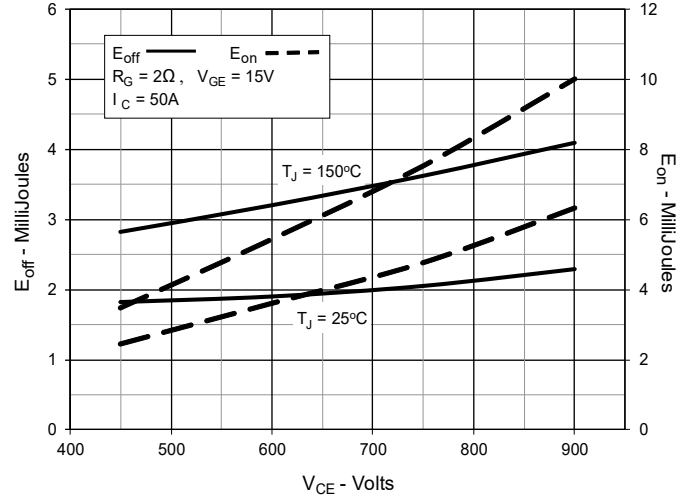
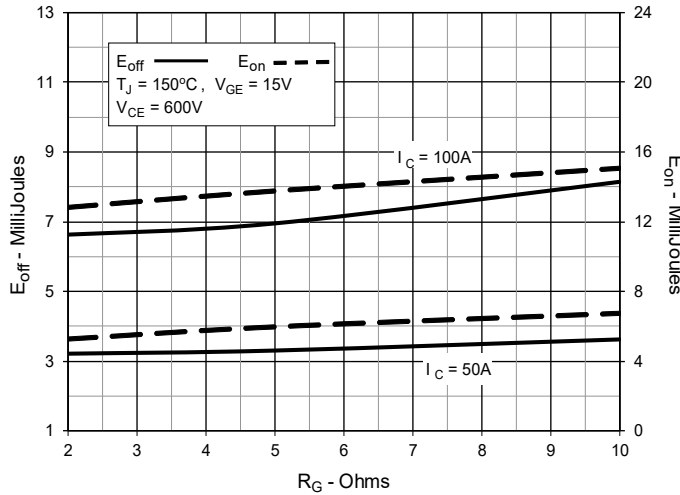
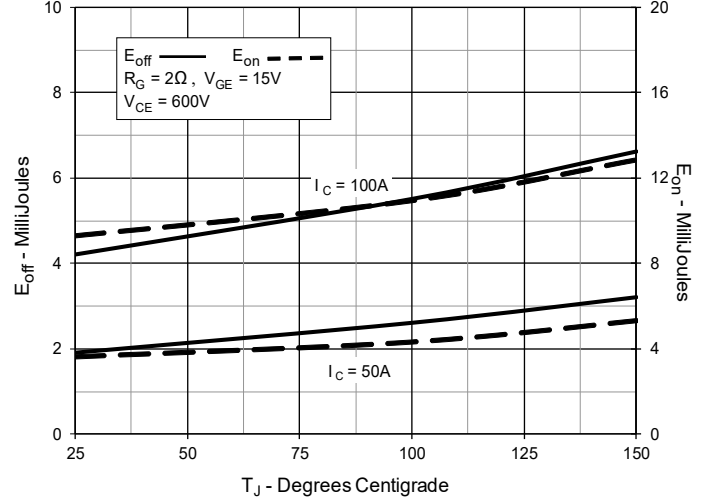
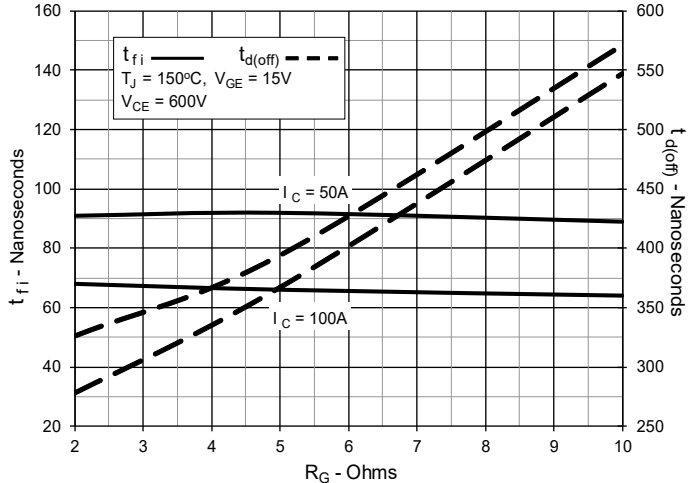
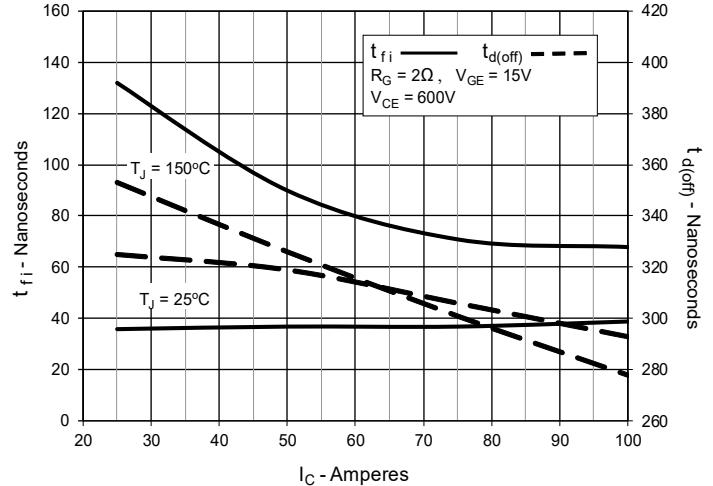
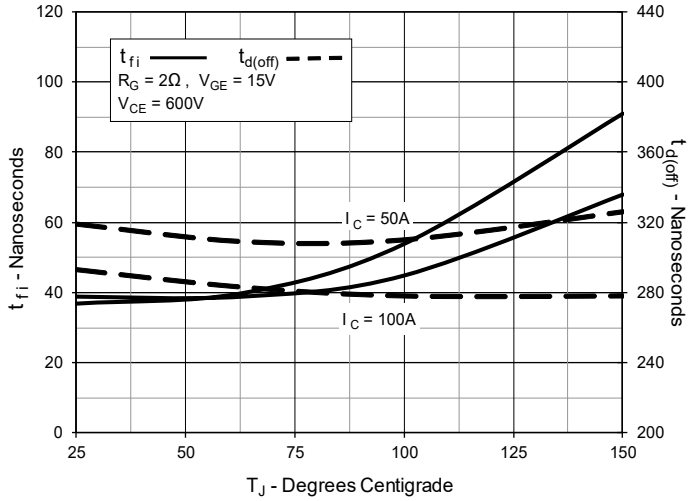
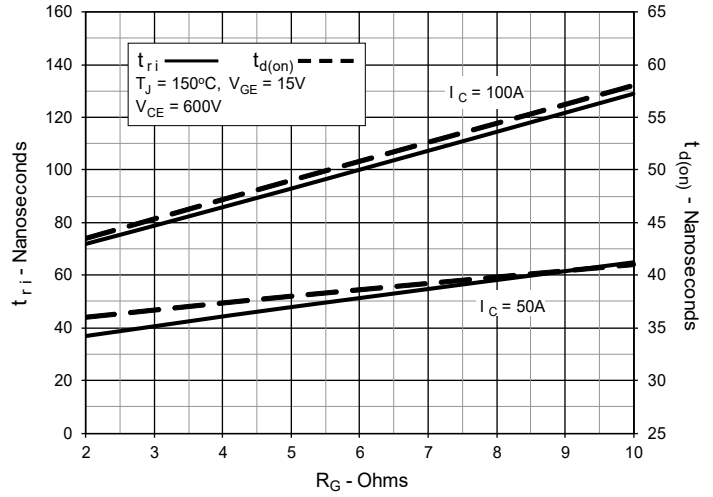
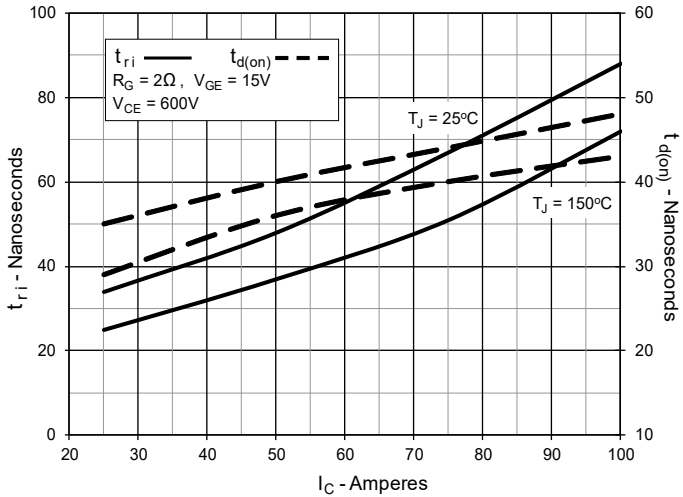
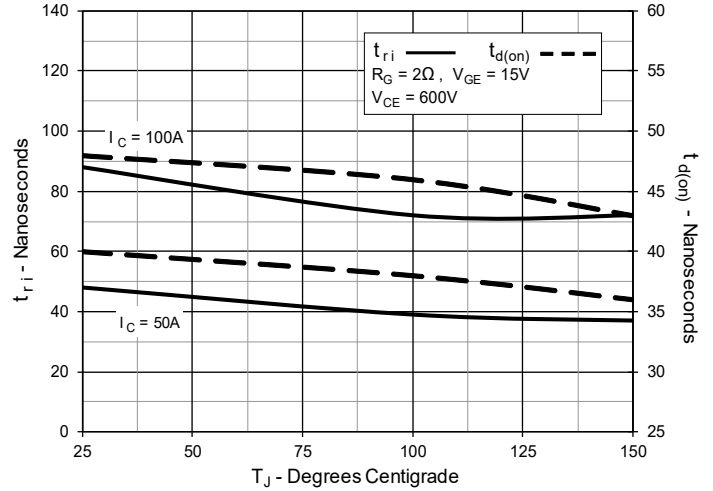
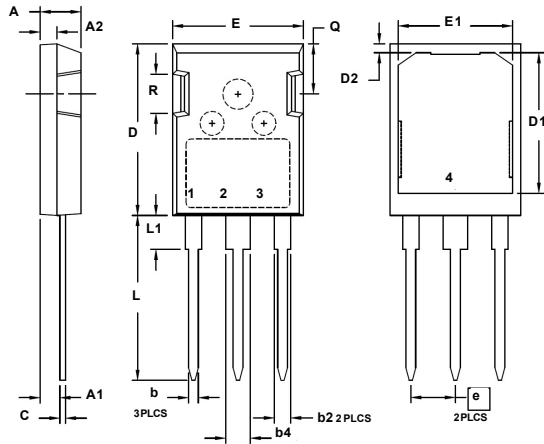
Fig. 12. Inductive Switching Energy Loss vs. Collector Current

Fig. 13. Inductive Switching Energy Loss vs. Collector-Emittor Voltage

Fig. 14. Inductive Switching Energy Loss vs. Gate Resistance

Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

Fig. 17. Inductive Turn-off Switching Times vs. Collector Current


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature

Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature


PLUS247™ Outline


- 1 - Gate
- 2,4 - Collector
- 3 - Emitter

| 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 |