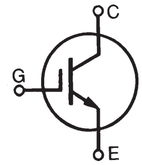
IXYS

# GenX3™ 1200V IGBTs

# IXGA30N120B3
# IXGP30N120B3
# IXGH30N120B3

| | | |
|---|---|---|
| $V_{CES}$ | = | 1200V |
| $I_{C110}$ | = | 30A |
| $V_{CE(sat)}$ | ≤ | 3.5V |
| $t_{fi(typ)}$ | = | 204ns |

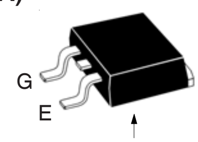
High-Speed Low-Vsat PT IGBTs 3-20 kHz Switching



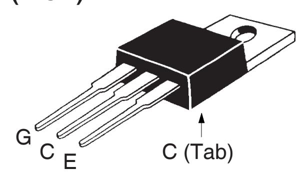

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{CES}$ | $T_C$ = 25°C to 150°C | 1200 | V |
| $V_{CGR}$ | $T_J$ = 25°C to 150°C, $R_{GE}$ = 1MΩ | 1200 | V |
| $V_{GES}$ | Continuous | ± 20 | V |
| $V_{GEM}$ | Transient | ± 30 | V |
| $I_{C25}$ | $T_C$ = 25°C | 60 | A |
| $I_{C110}$ | $T_C$ = 110°C | 30 | A |
| $I_{CM}$ | $T_C$ = 25°C, 1ms | 150 | A |
| **SSOA (RBSOA)** | $V_{GE}$ = 15V, $T_{VJ}$ = 125°C, $R_G$ = 5Ω<br>Clamped Inductive Load | $I_{CM}$ = 60<br>$V_{CE} \le V_{CES}$ | A |
| $P_C$ | $T_C$ = 25°C | 300 | W |
| $T_J$ | | - 55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | - 55 ... +150 | °C |
| $T_L$ | 1.6mm (0.062 in.) from Case for 10s | 300 | °C |
| $T_{SOLD}$ | Plastic Body for 10 seconds | 260 | °C |
| $M_d$ | Mounting Torque (TO-220 & TO-247) | 1.13/10 | Nm/lb.in. |
| **Weight** | TO-263 | 2.5 | g |
| | TO-220 | 3.0 | g |
| | TO-247 | 6.0 | g |

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{CES}$ | $I_C$ = 250μA, $V_{GE}$ = 0V | 1200 | | | V |
| $V_{GE(th)}$ | $I_C$ = 250μA, $V_{CE}$ = $V_{GE}$ | 3.0 | | 5.0 | V |
| $I_{CES}$ | $V_{CE}$ = $V_{CES}$, $V_{GE}$ = 0V | | | 100 | μA |
| | $T_J$ = 125°C | | | 1 | mA |
| $I_{GES}$ | $V_{CE}$ = 0V, $V_{GE}$ = ±20V | | | ±100 | nA |
| $V_{CE(sat)}$ | $I_C$ = 30A, $V_{GE}$ = 15V, Note 1 | | 2.96 | 3.5 | V |
| | $T_J$ = 125°C | | 2.95 | | V |

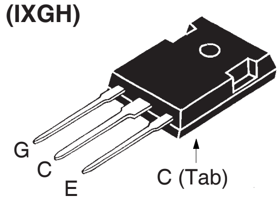
**TO-263 (IXGA)**




**TO-220 (IXGP)**




**TO-247 (IXGH)**




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

### Features

- Optimized for Low Conduction and Switching Losses
- Square RBSOA
- International Standard Packages

### Advantages

- High Power Density
- Low Gate Drive Requirement

### Applications

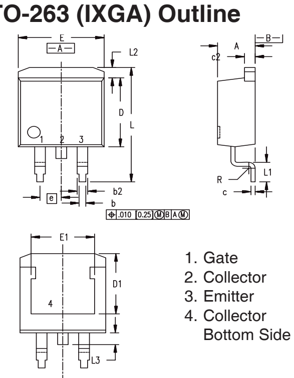
- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Welding Machines

| **Symbol** | **Test Conditions** ($T_J$ = 25°C, Unless Otherwise Specified) | **Characteristic Values** Min. | Typ. | Max. |
|---|---|---|---|---|
| $g_{fs}$ | $I_C$ = 30A, $V_{CE}$ = 10V, Note 1 | 11 | 19 | S |
| $C_{ies}$ | $V_{CE}$ = 25V, $V_{GE}$ = 0V, f = 1MHz | | 1750 | pF |
| $C_{oes}$ | | | 120 | pF |
| $C_{res}$ | | | 46 | pF |
| $Q_g$ | $I_C$ = 30A, $V_{GE}$ = 15V, $V_{CE}$ = 0.5 • $V_{CES}$ | | 87 | nC |
| $Q_{ge}$ | | | 15 | nC |
| $Q_{gc}$ | | | 39 | nC |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 25°C** | | 16 | ns |
| $t_{ri}$ | $I_C$ = 30A, $V_{GE}$ = 15V | | 37 | ns |
| $E_{on}$ | $V_{CE}$ = 0.8 • $V_{CES}$, $R_G$ = 5Ω | | 3.47 | mJ |
| $t_{d(off)}$ | Notes 2 | | 127 | 200 ns |
| $t_{fi}$ | | | 204 | 380 ns |
| $E_{off}$ | | | 2.16 | 4.0 mJ |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 125°C** | | 18 | ns |
| $t_{ri}$ | $I_C$ = 30A, $V_{GE}$ = 15V | | 38 | ns |
| $E_{on}$ | $V_{CE}$ = 0.8 • $V_{CES}$, $R_G$ = 5Ω | | 6.70 | mJ |
| $t_{d(off)}$ | Notes 2 | | 216 | ns |
| $t_{fi}$ | | | 255 | ns |
| $E_{off}$ | | | 5.10 | mJ |
| $R_{thJC}$ | | | | 0.42 °C/W |
| $R_{thCS}$ | TO-220 | | 0.50 | °C/W |
| $R_{thCS}$ | TO-247 | | 0.21 | °C/W |

Notes:

1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.
2. Switching times & energy losses may increase for higher $V_{CE}$(Clamp), $T_J$ or $R_G$.

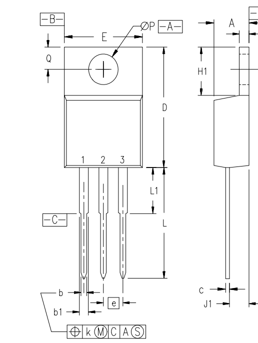
**TO-263 (IXGA) Outline**



1. Gate
2. Collector
3. Emitter
4. Collector
   Bottom Side

| Dim. | Millimeter Min. | Millimeter Max. | Inches Min. | Inches Max. |
|---|---|---|---|---|
| A | 4.06 | 4.83 | .160 | .190 |
| b | 0.51 | 0.99 | .020 | .039 |
| b2 | 1.14 | 1.40 | .045 | .055 |
| c | 0.40 | 0.74 | .016 | .029 |
| c2 | 1.14 | 1.40 | .045 | .055 |
| D | 8.64 | 9.65 | .340 | .380 |
| D1 | 8.00 | 8.89 | .280 | .320 |
| E | 9.65 | 10.41 | .380 | .405 |
| E1 | 6.22 | 8.13 | .270 | .320 |
| e | 2.54 | BSC | .100 | BSC |
| L | 14.61 | 15.88 | .575 | .625 |
| L1 | 2.29 | 2.79 | .090 | .110 |
| L2 | 1.02 | 1.40 | .040 | .055 |
| L3 | 1.27 | 1.78 | .050 | .070 |
| L4 | 0 | 0.13 | 0 | .005 |

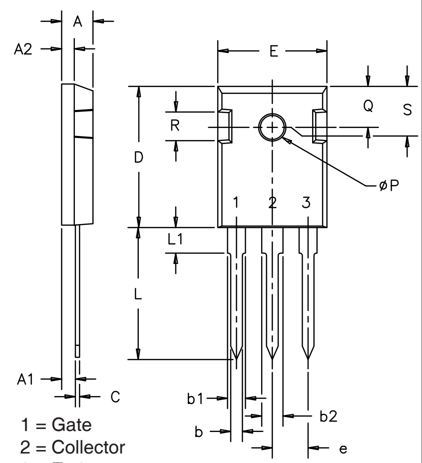
**TO-220 (IXGP) Outline**



Pins: 1 - Gate 2 - Drain
3 - Source 4 - Drain

| SYM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS 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 |

**TO-247 (IXGH) AD Outline**



1 = Gate
2 = Collector
3 = Emitter

| SYM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS MAX |
|---|---|---|---|---|
| A | .185 | .209 | 4.7 | 5.3 |
| $A_1$ | .087 | .102 | 2.2 | 2.54 |
| $A_2$ | .059 | .098 | 2.2 | 2.6 |
| b | .040 | .055 | 1.0 | 1.4 |
| $b_1$ | .065 | .084 | 1.65 | 2.13 |
| $b_2$ | .113 | .123 | 2.87 | 3.12 |
| C | .016 | .031 | .4 | .8 |
| D | .819 | .845 | 20.80 | 21.46 |
| E | .610 | .640 | 15.75 | 16.26 |
| e | .215 BSC | | 5.45 BSC | |
| L | .780 | .800 | 19.81 | 20.32 |
| L1 | | .177 | | 4.50 |
| øP | .140 | .144 | 3.55 | 3.65 |
| Q | .212 | .244 | 5.4 | 6.2 |
| R | .170 | .216 | 4.32 | 5.49 |
| S | .242 BSC | | 6.15 BSC | |

**Fig. 1. Output Characteristics @ $T_J$ = 25ºC**

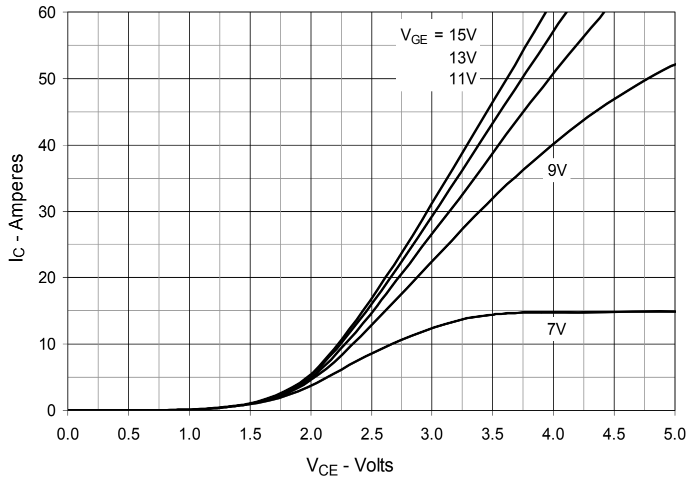



**Fig. 2. Extended Output Characteristics @ $T_J$ = 25ºC**

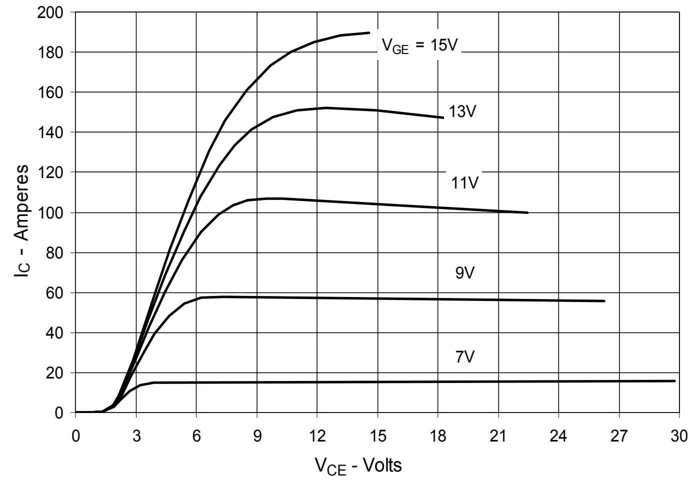



**Fig. 3. Output Characteristics @ $T_J$ = 125ºC**

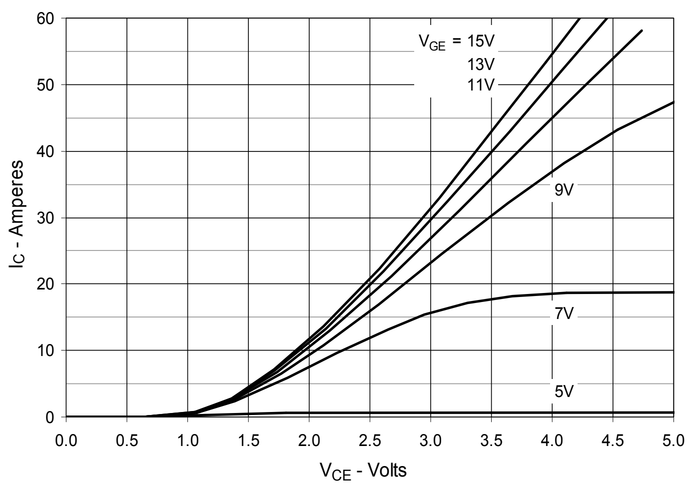



**Fig. 4. Dependence of $V_{CE(sat)}$ on JunctionTemperature**

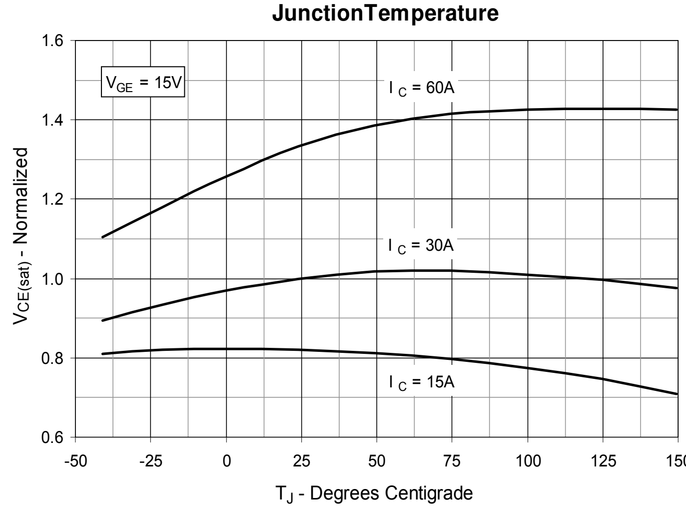



**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**

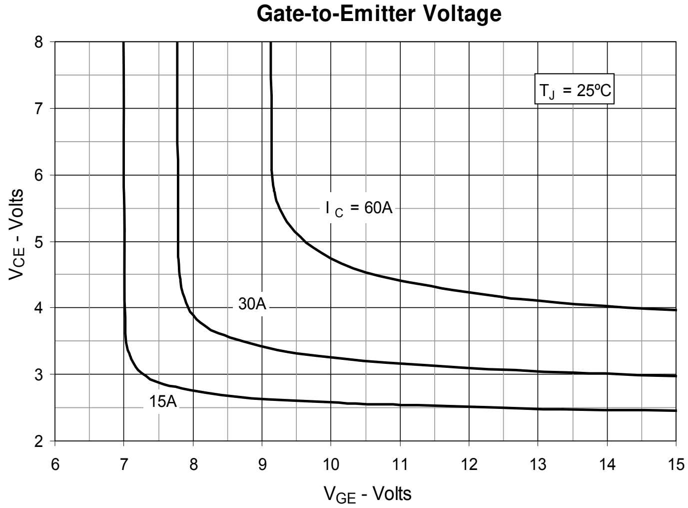



**Fig. 6. Input Admittance**

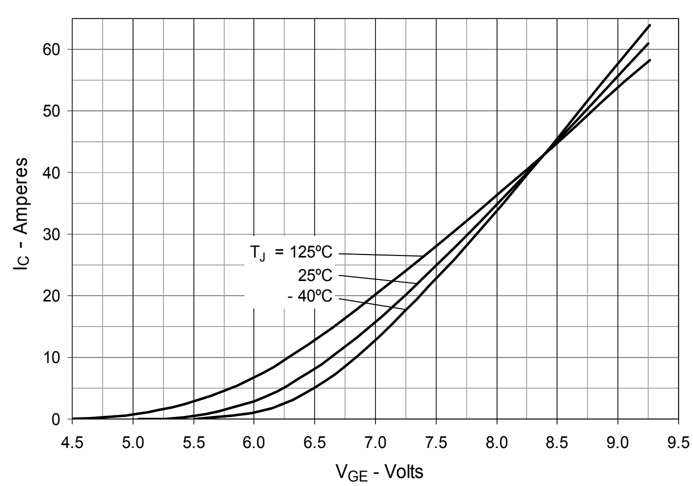


**Fig. 7. Transconductance**

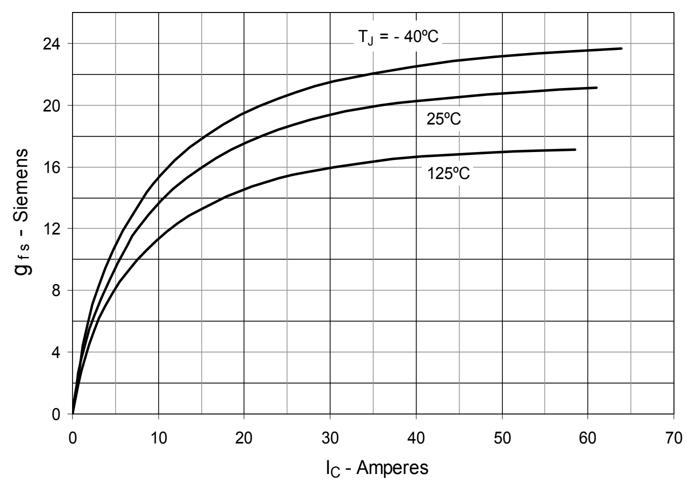



**Fig. 8. Gate Charge**

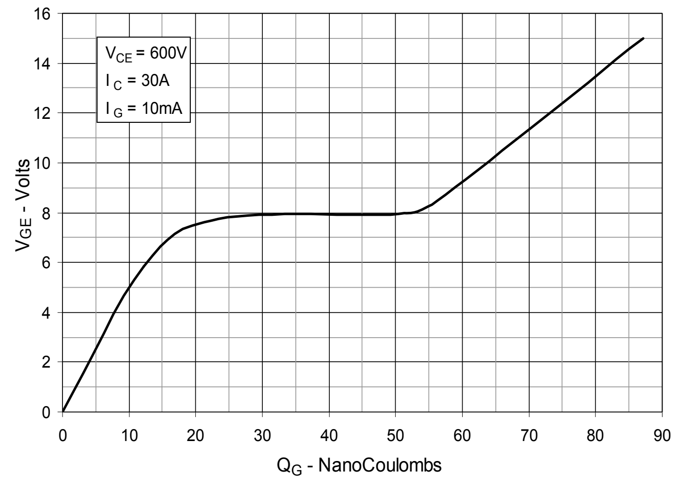



**Fig. 9. Capacitance**

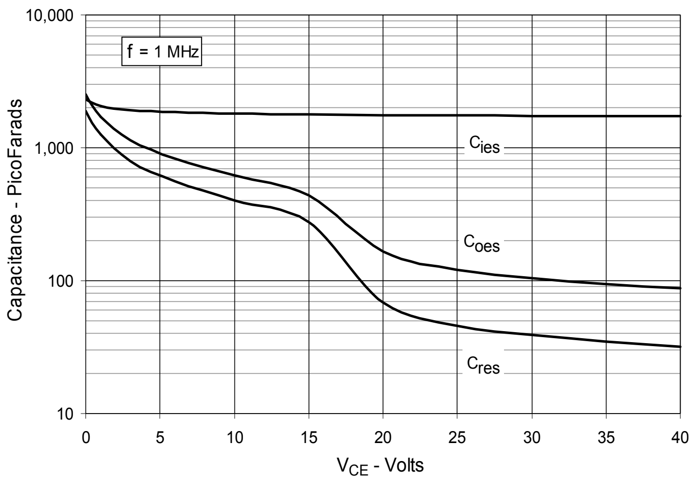



**Fig. 10. Reverse-Bias Safe Operating Area**

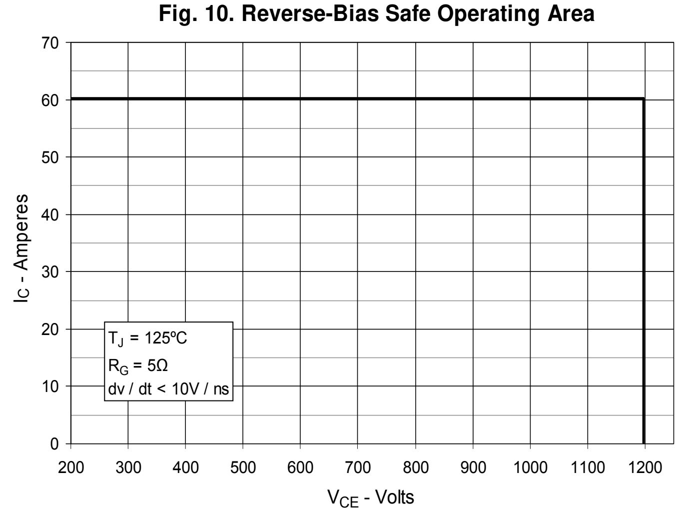
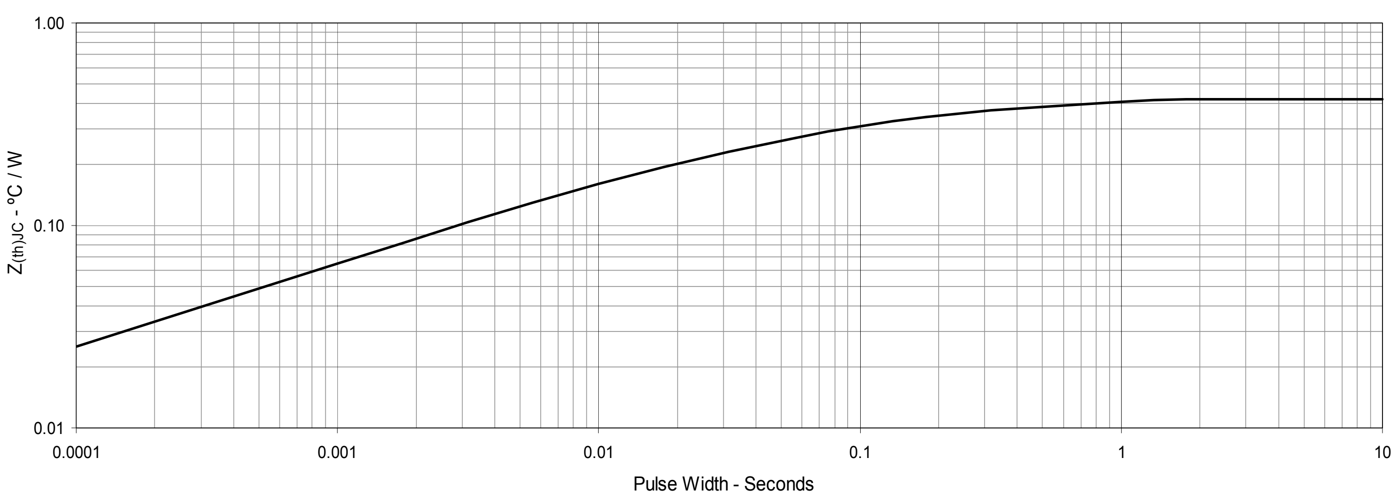



**Fig. 11. Maximum Transient Thermal Impedance**




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

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

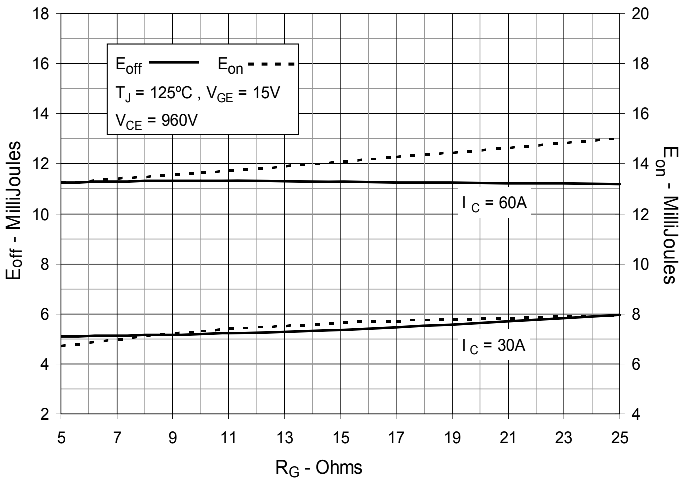



**Fig. 13. Inductive Switching Energy Loss vs. Collector Current**

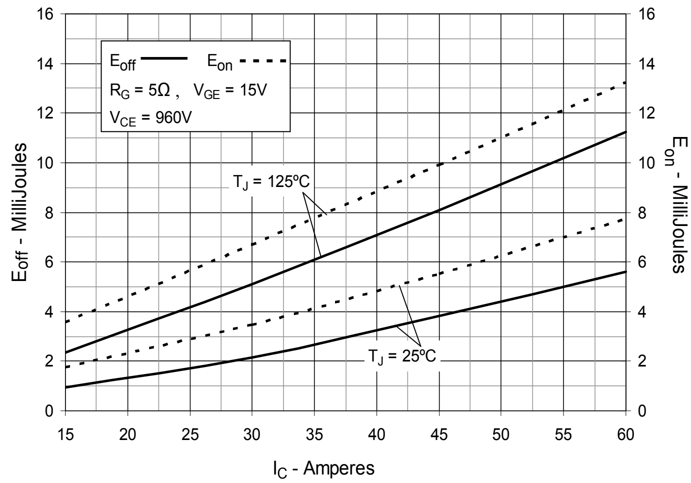



**Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature**

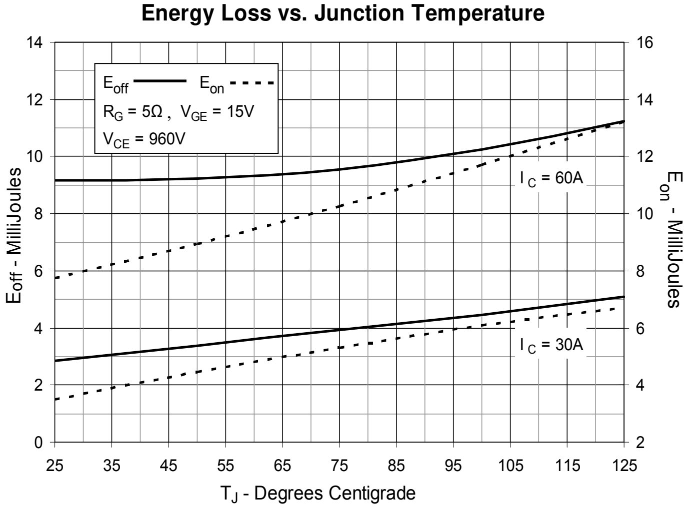



**Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance**

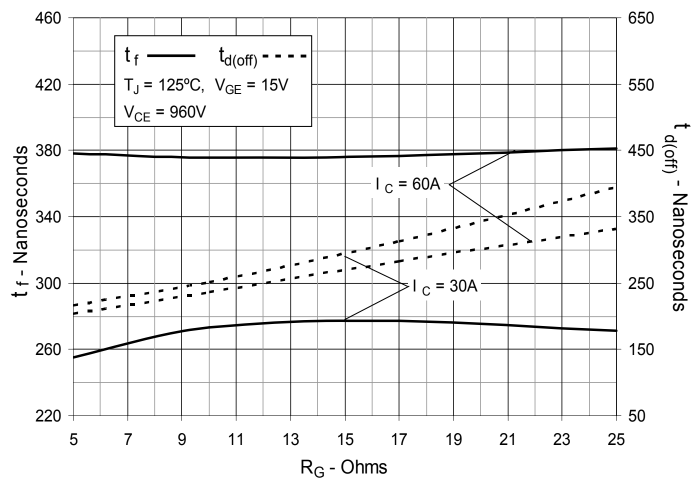



**Fig. 16. Inductive Turn-off Switching Times vs. Collector Current**

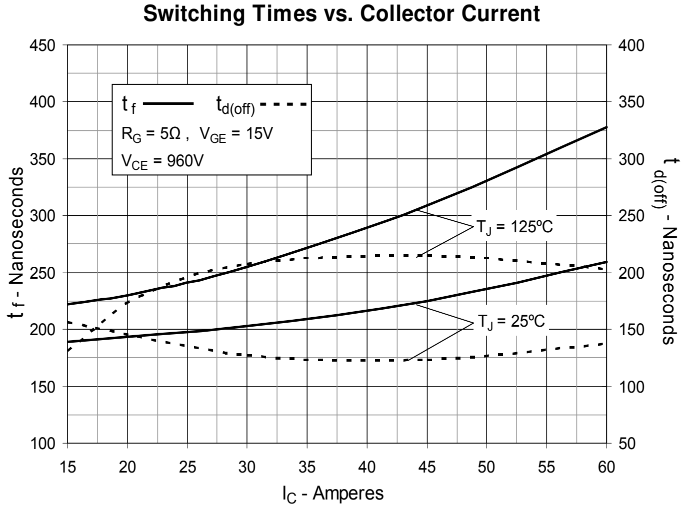



**Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature**

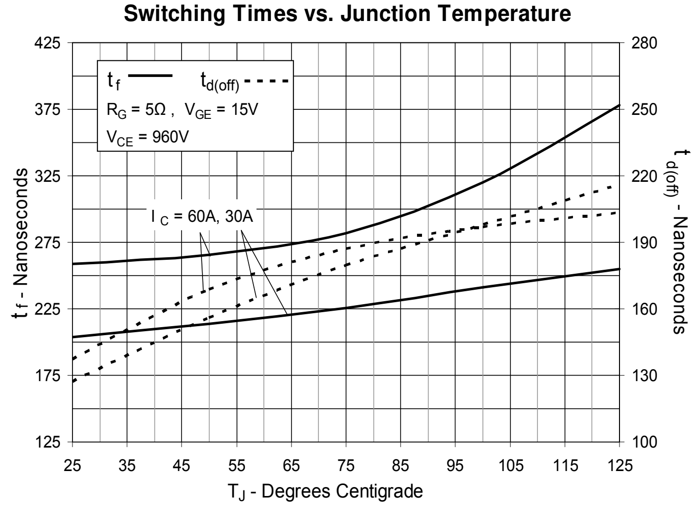


**Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance**

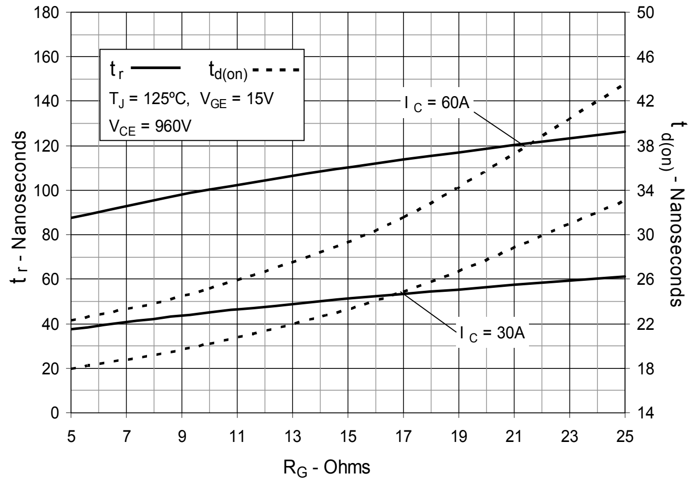



**Fig. 19. Inductive Turn-on Switching Times vs. Collector Current**

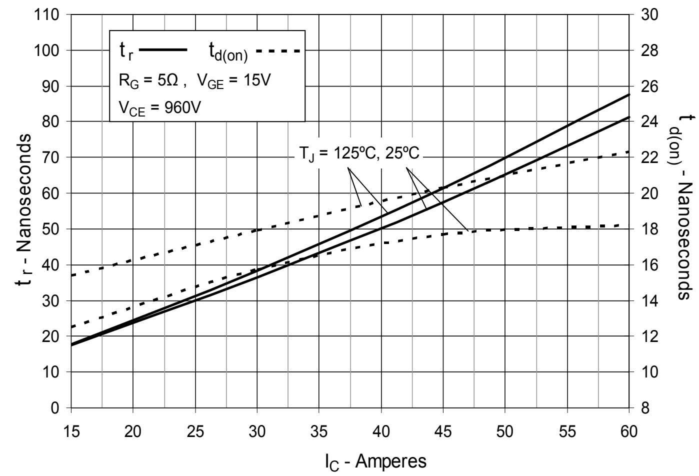



**Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature**