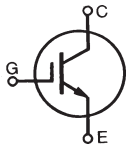
# IXYS

## GenX3™ 600V IGBT

**IXGH72N60A3**
**IXGT72N60A3**

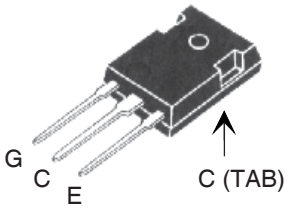
$V_{CES}$ = 600V
$I_{C110}$ = 72A
$V_{CE(sat)}$ ≤ 1.35V
$t_{fi(typ)}$ = 250ns

Ultra Low Vsat PT IGBT for
up to 5kHz switching

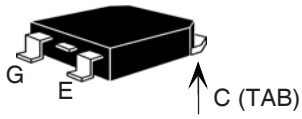



| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{CES}$ | $T_C$ = 25°C to 150°C | 600 | V |
| $V_{CGR}$ | $T_J$ = 25°C to 150°C, $R_{GE}$ = 1MΩ | 600 | V |
| $V_{GES}$ | Continuous | ± 20 | V |
| $V_{GEM}$ | Transient | ± 30 | V |
| $I_{C25}$ | $T_C$ = 25°C (limited by leads) | 75 | A |
| $I_{C110}$ | $T_C$ = 110°C | 72 | A |
| $I_{CM}$ | $T_C$ = 25°C, 1ms | 400 | A |
| **SSOA (RBSOA)** | $V_{GE}$ = 15V, $T_{VJ}$ = 125°C, $R_G$ = 3Ω<br>Clamped inductive load @ ≤ 600V | $I_{CM}$ = 150 | A |
| $P_C$ | $T_C$ = 25°C | 540 | 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-247) | 1.13/10 | Nm/lb.in. |
| **Weight** | TO-247 | 6 | g |
| | TO-268 | 4 | g |

**TO-247 (IXGH)**




**TO-268 (IXGT)**




G = Gate C = Collector
E = Emitter TAB = Collector

**Features**

- Optimized for low conduction losses
- Square RBSOA
- International standard packages

**Advantages**

- High power density
- Low gate drive requirement

**Applications**

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts
- Inrush Current Protection Circuits

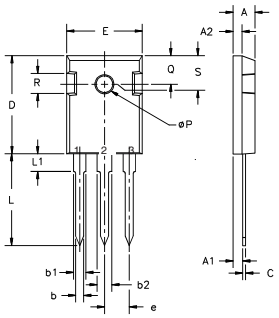
| Symbol | Test Conditions ($T_J$ = 25°C unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{CES}$ | $I_C$ = 250μA, $V_{GE}$ = 0V | 600 | | | V |
| $V_{GE(th)}$ | $I_C$ = 250μA, $V_{CE}$ = $V_{GE}$ | 3.0 | | 5.0 | V |
| $I_{CES}$ | $V_{CE}$ = $V_{CES}$ | | | 75 | μA |
| | $V_{GE}$ = 0V $T_J$ = 125°C | | | 750 | μA |
| $I_{GES}$ | $V_{CE}$ = 0V, $V_{GE}$ = ± 20V | | | ±100 | nA |
| $V_{CE(sat)}$ | $I_C$ = 60A, $V_{GE}$ = 15V, Note 1 | | | 1.35 | V |

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| Symbol | Test Conditions ($T_J$ = 25°C unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $I_C$ = 60A, $V_{CE}$ = 10V, Note 1 | 48 | 76 | | S |
| $C_{ies}$ | $V_{CE}$ = 25V, $V_{GE}$ = 0V, f = 1MHz | | 6600 | | pF |
| $C_{oes}$ | | | 360 | | pF |
| $C_{res}$ | | | 80 | | pF |
| $Q_g$ | $I_C = I_{C110}$, $V_{GE}$ = 15V, $V_{CE} = 0.5 \bullet V_{CES}$ | | 230 | | nC |
| $Q_{ge}$ | | | 40 | | nC |
| $Q_{gc}$ | | | 78 | | nC |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 25°C** $I_C$ = 50A, $V_{GE}$ = 15V $V_{CE}$ = 480V, $R_G$ = 3Ω | | 31 | | ns |
| $t_{ri}$ | | | 34 | | ns |
| $E_{on}$ | | | 1.38 | | mJ |
| $t_{d(off)}$ | | | 320 | | ns |
| $t_{fi}$ | | | 250 | | ns |
| $E_{off}$ | | | 3.5 | | mJ |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 125°C** $I_C$ = 50A, $V_{GE}$ = 15V $V_{CE}$ = 480V, $R_G$ = 3Ω | | 29 | | ns |
| $t_{ri}$ | | | 32 | | ns |
| $E_{on}$ | | | 2.6 | | mJ |
| $t_{d(off)}$ | | | 510 | | ns |
| $t_{fi}$ | | | 375 | | ns |
| $E_{off}$ | | | 6.5 | | mJ |
| $R_{thJC}$ | | | | 0.23 | °C/W |
| $R_{thCS}$ | | | 0.15 | | °C/W |

Note 1: Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.

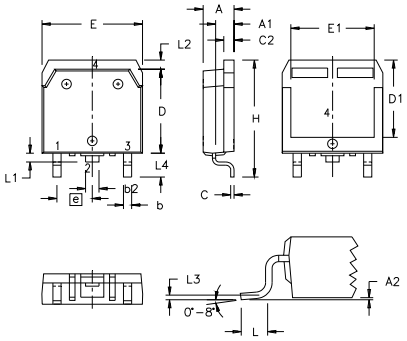
**TO-247 AD Outline**




Terminals: 1 - Gate 2 - Drain

| Dim. | Millimeter Min. | Max. | Inches Min. | Max. |
|---|---|---|---|---|
| A | 4.7 | 5.3 | .185 | .209 |
| $A_1$ | 2.2 | 2.54 | .087 | .102 |
| $A_2$ | 2.2 | 2.6 | .059 | .098 |
| b | 1.0 | 1.4 | .040 | .055 |
| $b_1$ | 1.65 | 2.13 | .065 | .084 |
| $b_2$ | 2.87 | 3.12 | .113 | .123 |
| C | .4 | .8 | .016 | .031 |
| D | 20.80 | 21.46 | .819 | .845 |
| E | 15.75 | 16.26 | .610 | .640 |
| e | 5.20 | 5.72 | 0.205 | 0.225 |
| L | 19.81 | 20.32 | .780 | .800 |
| L1 | | 4.50 | | .177 |
| ØP | 3.55 | 3.65 | .140 | .144 |
| Q | 5.89 | 6.40 | 0.232 | 0.252 |
| R | 4.32 | 5.49 | .170 | .216 |

**TO-268 Outline**




Terminals: 1 - Gate 2 - Drain

| SYM | INCHES MIN | MAX | MILLIMETERS MIN | MAX |
|---|---|---|---|---|
| A | .193 | .201 | 4.90 | 5.10 |
| A1 | .106 | .114 | 2.70 | 2.90 |
| A2 | .001 | .010 | 0.02 | 0.25 |
| b | .045 | .057 | 1.15 | 1.45 |
| b2 | .075 | .083 | 1.90 | 2.10 |
| C | .016 | .026 | 0.40 | 0.65 |
| C2 | .057 | .063 | 1.45 | 1.60 |
| D | .543 | .551 | 13.80 | 14.00 |
| D1 | .488 | .500 | 12.40 | 12.70 |
| E | .624 | .632 | 15.85 | 16.05 |
| E1 | .524 | .535 | 13.30 | 13.60 |
| e | .215 BSC | | 5.45 BSC | |
| H | .736 | .752 | 18.70 | 19.10 |
| L | .094 | .106 | 2.40 | 2.70 |
| L1 | .047 | .055 | 1.20 | 1.40 |
| L2 | .039 | .045 | 1.00 | 1.15 |
| L3 | .010 BSC | | 0.25 BSC | |
| L4 | .150 | .161 | 3.80 | 4.10 |

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 4,850,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

**Fig. 1. Output Characteristics @ 25ºC**

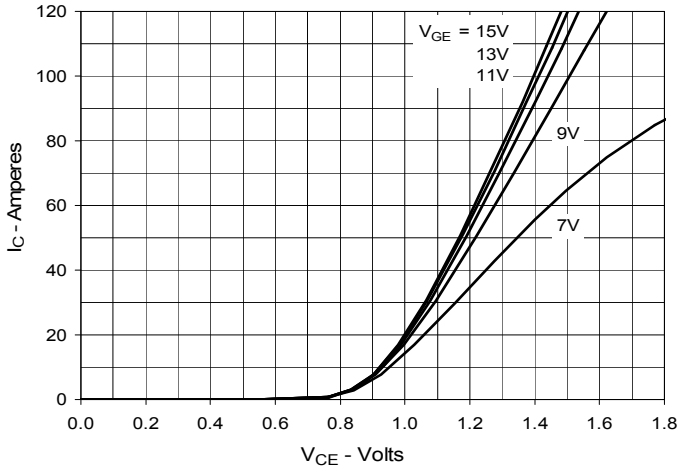



**Fig. 2. Extended Output Characteristics @ 25ºC**

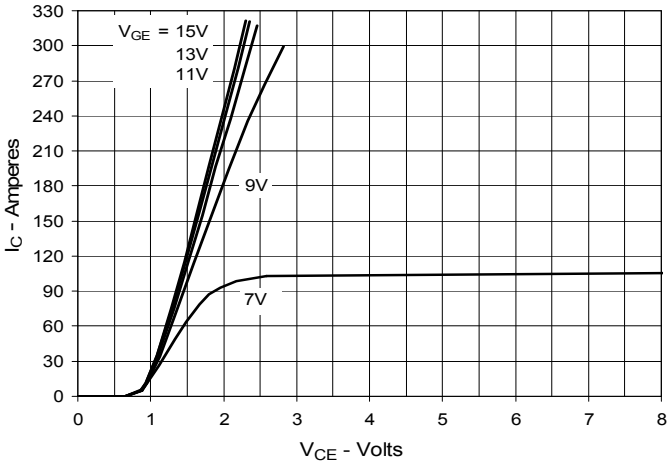



**Fig. 3. Output Characteristics @ 125ºC**

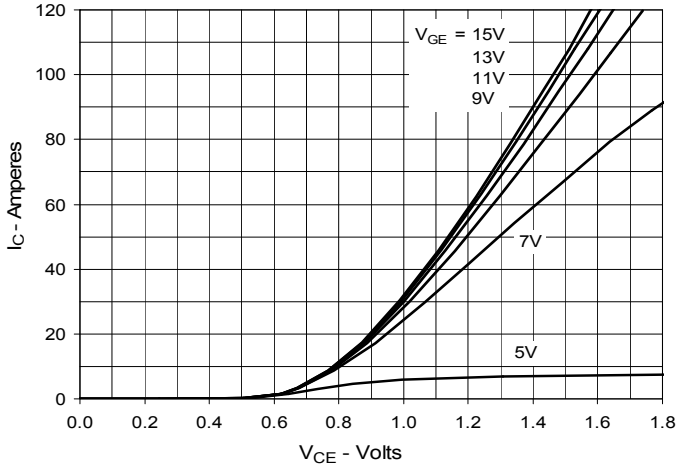



**Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature**

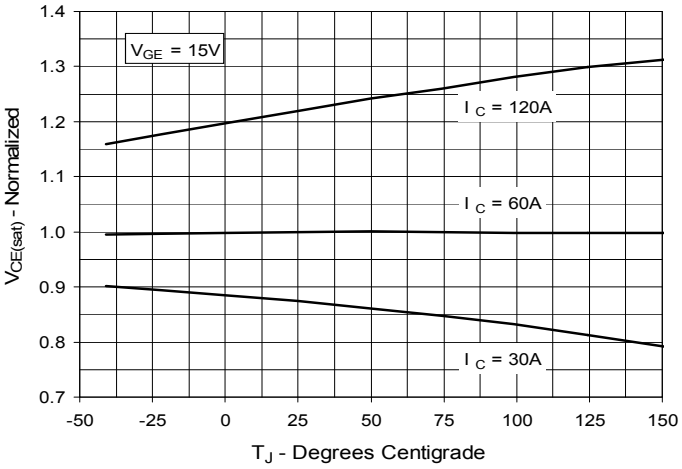



**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**

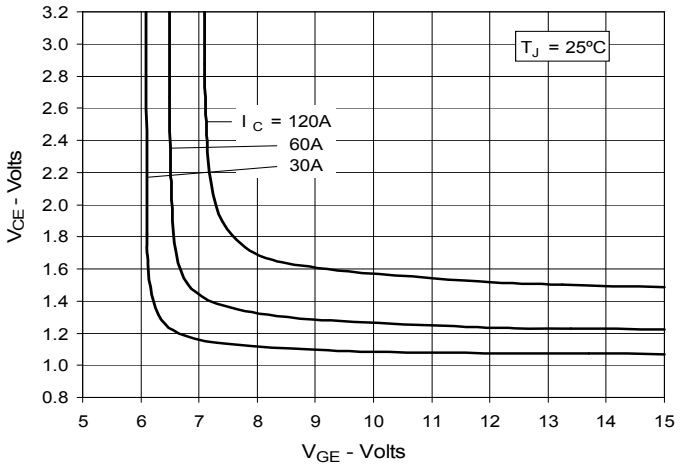
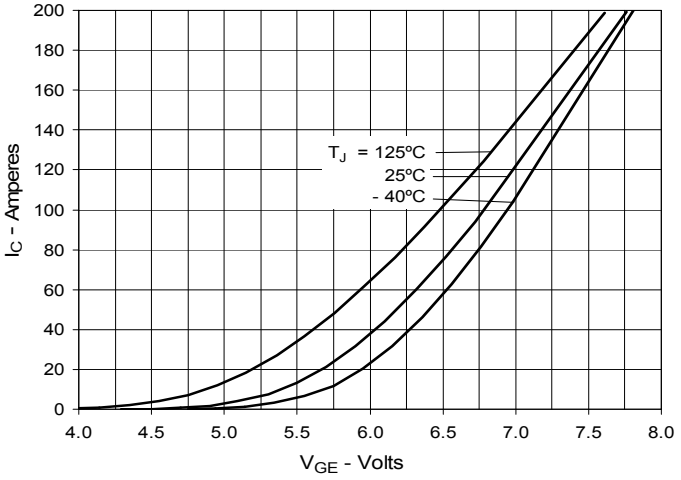



**Fig. 6. Input Admittance**




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**Fig. 7. Transconductance**

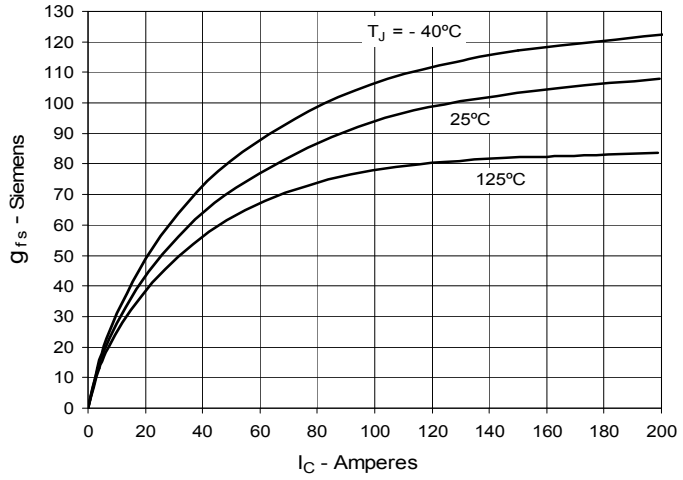



**Fig. 8. Gate Charge**

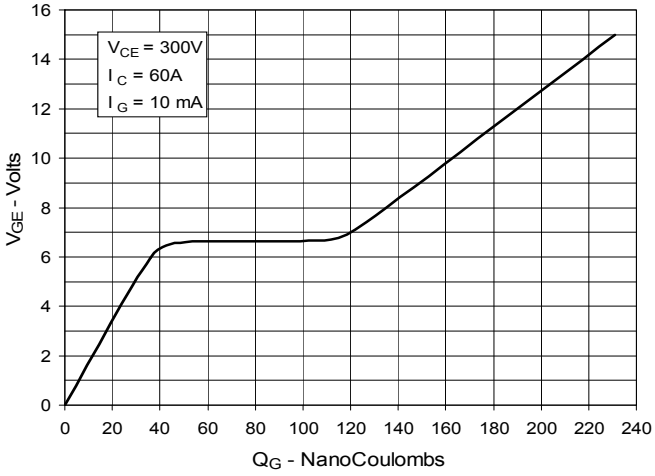



**Fig. 9. Capacitance**

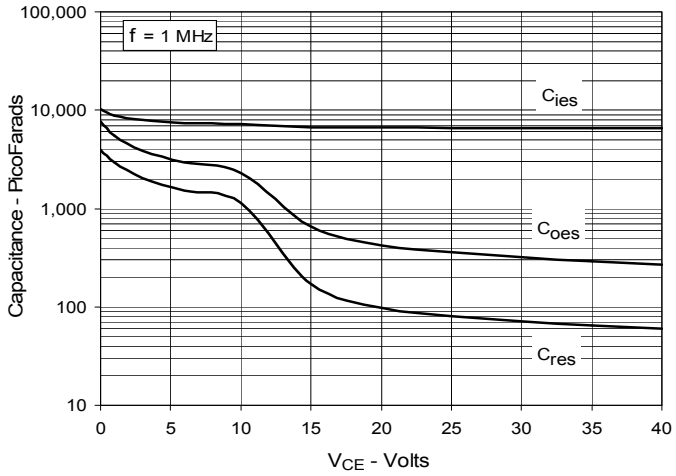



**Fig. 10. Reverse-Bias Safe Operating Area**

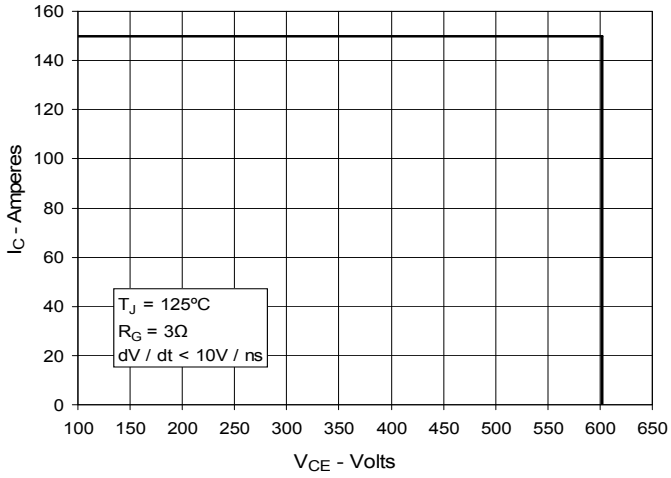
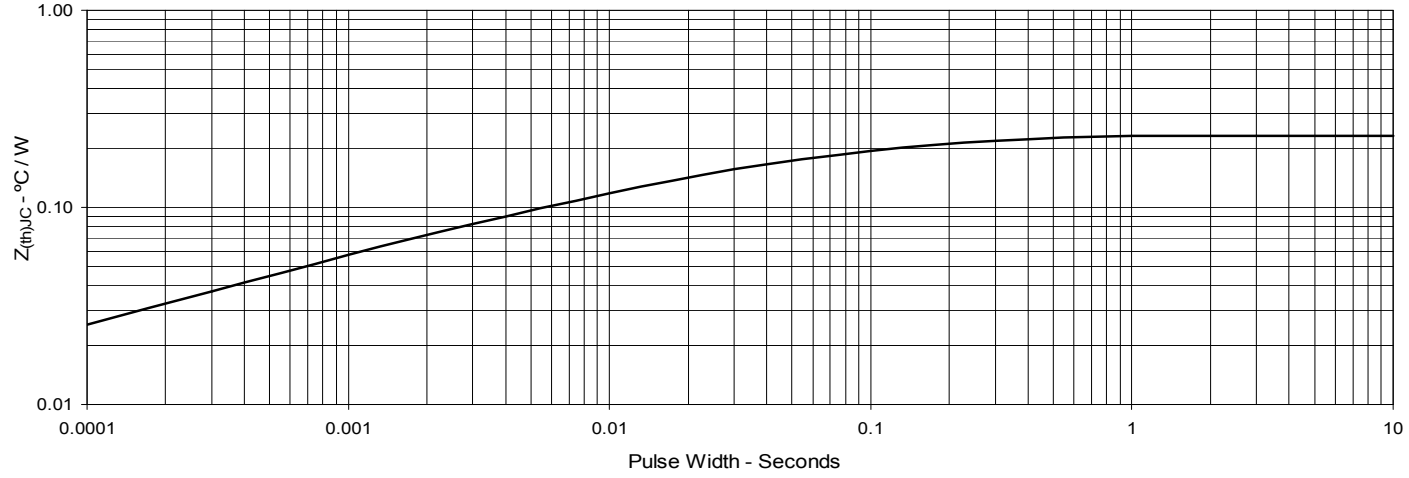



**Fig. 11. Maximum Transient Thermal Impedance**




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

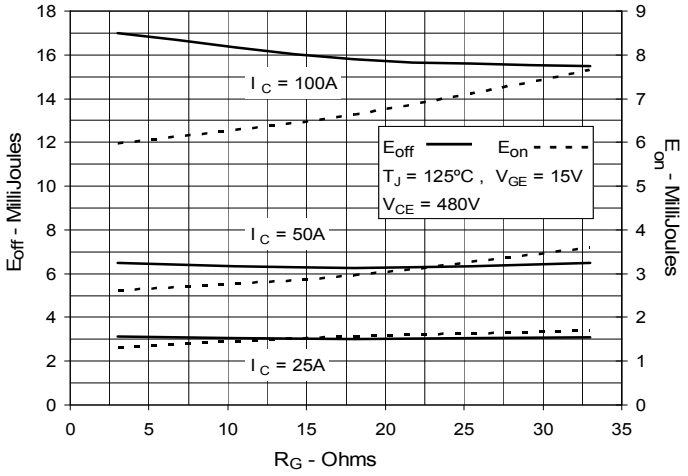



**Fig. 13. Inductive Switching Energy Loss vs. Collector Current**

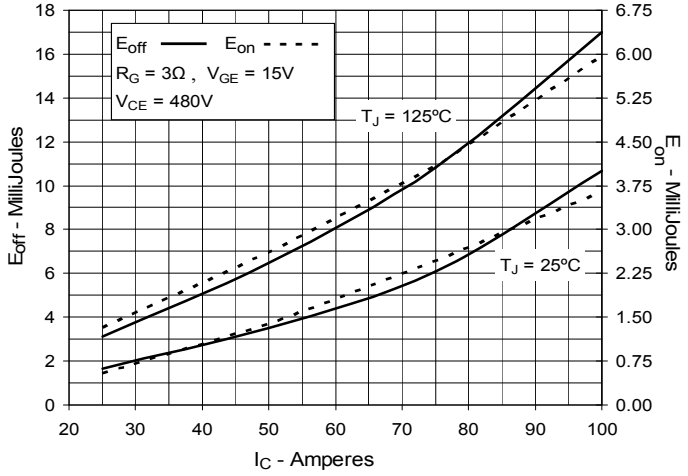



**Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature**

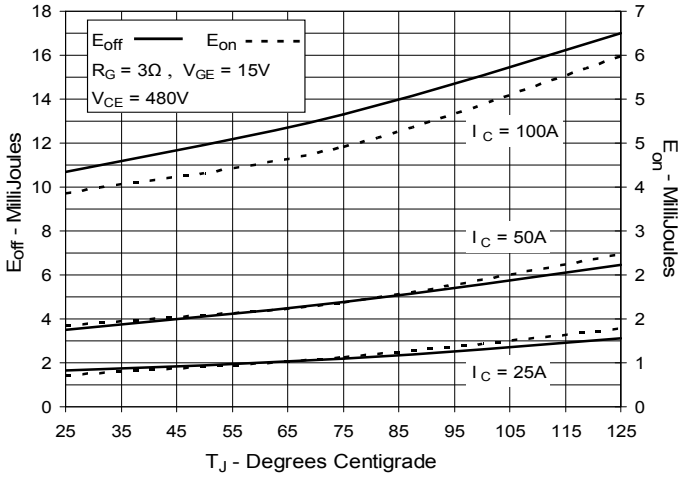



**Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance**

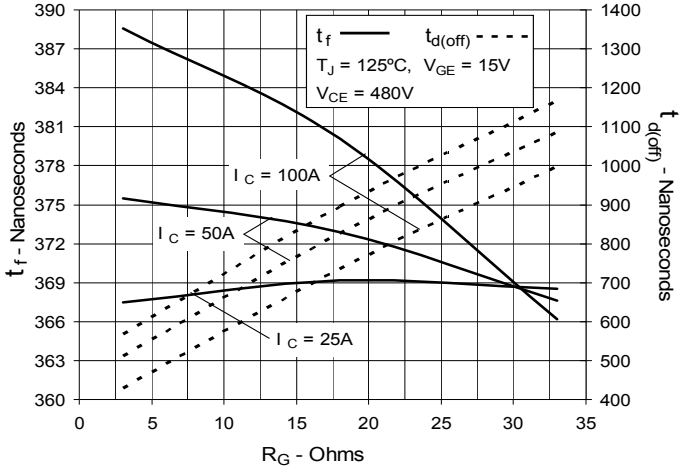



**Fig. 16. Inductive Turn-off Switching Times vs. Collector Current**

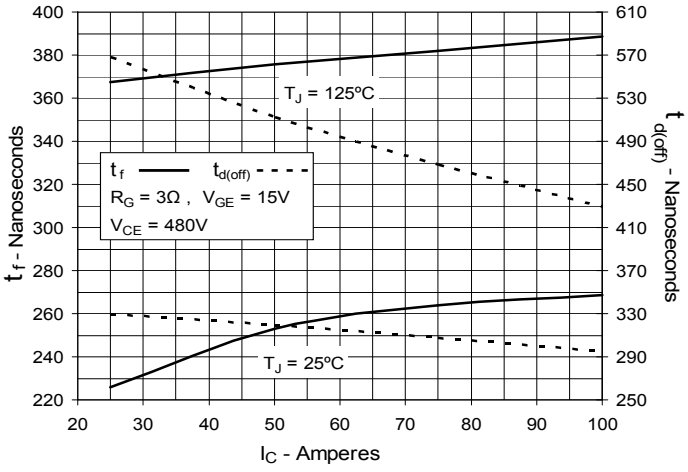
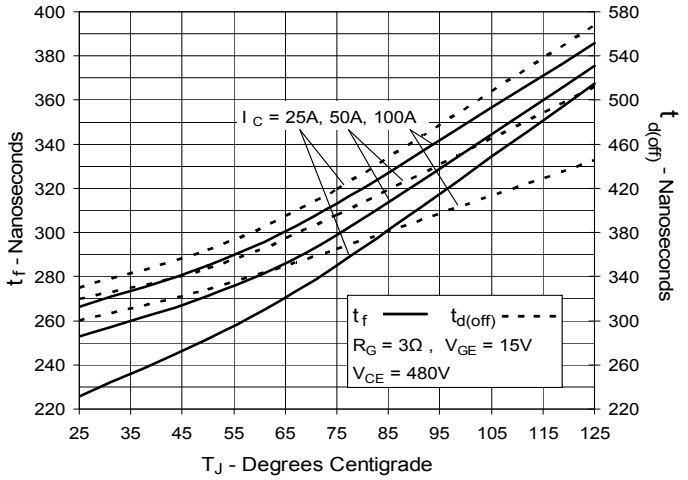



**Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature**




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

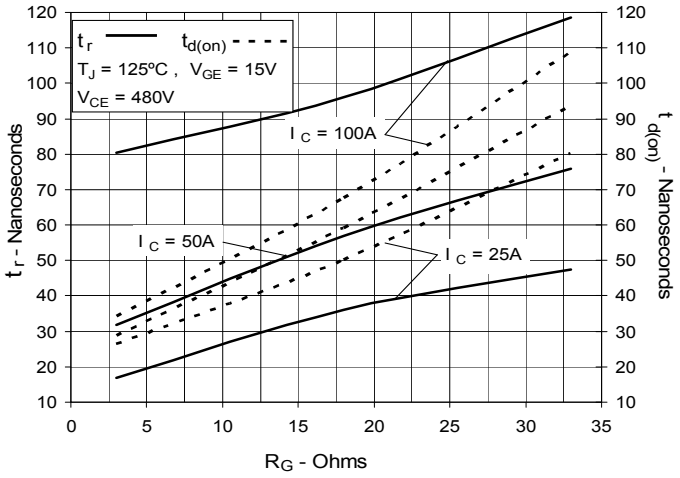



**Fig. 19. Inductive Turn-on Switching Times vs. Collector Current**

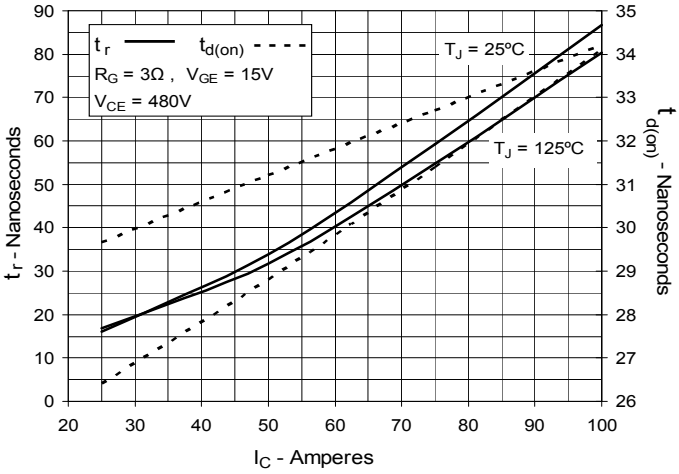
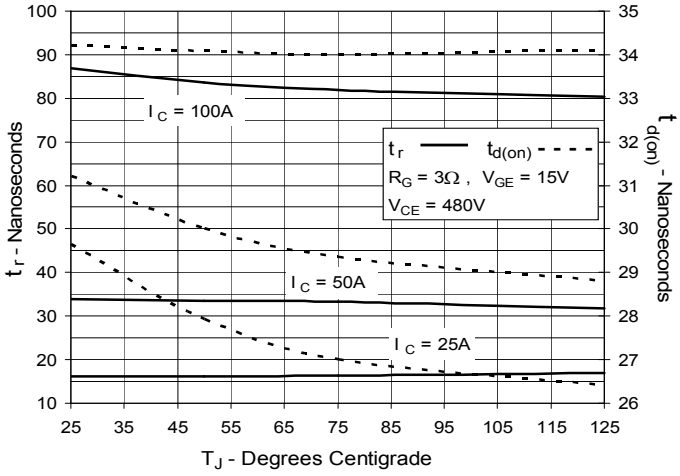



**Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature**




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