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IXYS Corporation
IXGH64N60A3

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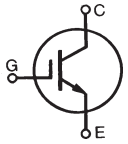
IXYS Preliminary Technical Information

# GenX3™ 600V IGBT

**IXGH64N60A3**
**IXGT64N60A3**

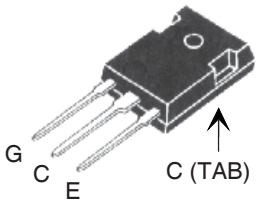
$V_{CES}$ = 600V
$I_{C110}$ = 64A
$V_{CE(sat)} \leq$ 1.35V

**Ultra-lowVsat PT IGBTs for up to 5 kHz switching**

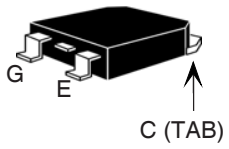



| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{CES}$ | $T_C$ = 25°C to 150°C | 600 | V |
| $V_{CGR}$ | $T_J$ = 25°C to 150°C, $R_{GE}$ = 1MΩ | 600 | V |
| $V_{GES}$ | Continuous | ± 20 | V |
| $V_{GEM}$ | Transient | ± 30 | V |
| $I_{C110}$ | $T_C$ = 110°C | 64 | A |
| $I_{CM}$ | $T_C$ = 25°C, 1ms | 400 | A |
| SSOA (RBSOA) | $V_{GE}$ = 15V, $T_{VJ}$ = 125°C, $R_G$ = 3Ω<br>Clamped inductive load @ ≤ 600V | $I_{CM}$ = 100 | A |
| $P_C$ | $T_C$ = 25°C | 460 | 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 | 5 | g |

**TO-247 (IXGH)**




**TO-268 (IXGT)**




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

| 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 |
| $I_{CES}$ | $V_{CE}$ = $V_{CES}$ | | | | 50 | μA |
| | $V_{GE}$ = 0V | $T_J$ = 125°C | | | 500 | μA |
| $I_{GES}$ | $V_{CE}$ = 0V, $V_{GE}$ = ± 20V | | | | ±100 | nA |
| $V_{CE(sat)}$ | $I_C$ = 50A, $V_{GE}$ = 15V, Note 1 | | | 1.20 | 1.35 | V |

**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

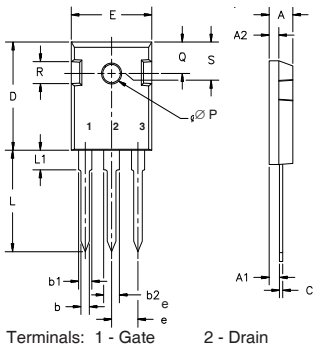
| Symbol | Test Conditions ($T_J$ = 25°C unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $I_C$ = 50A, $V_{CE}$ = 10V, Note 1 | 40 | 70 | | S |
| $C_{ies}$ | $V_{CE}$ = 25V, $V_{GE}$ = 0V, f = 1MHz | | 4850 | | pF |
| $C_{oes}$ | | | 270 | | pF |
| $C_{res}$ | | | 66 | | pF |
| $Q_g$ | $I_C$ = 50A, $V_{GE}$ = 15V, $V_{CE}$ = 0.5 • $V_{CES}$ | | 167 | | nC |
| $Q_{ge}$ | | | 28 | | nC |
| $Q_{gc}$ | | | 60 | | nC |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 25°C** $I_C$ = 50A, $V_{GE}$ = 15V $V_{CE}$ = 480V, $R_G$ = 3Ω | | 26 | | ns |
| $t_{ri}$ | | | 40 | | ns |
| $E_{on}$ | | | 1.42 | | mJ |
| $t_{d(off)}$ | | | 268 | | ns |
| $t_{fi}$ | | | 222 | | ns |
| $E_{off}$ | | | 3.28 | | mJ |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 125°C** $I_C$ = 50A, $V_{GE}$ = 15V $V_{CE}$ = 480V, $R_G$ = 3Ω | | 25 | | ns |
| $t_{ri}$ | | | 40 | | ns |
| $E_{on}$ | | | 2.76 | | mJ |
| $t_{d(off)}$ | | | 415 | | ns |
| $t_{fi}$ | | | 362 | | ns |
| $E_{off}$ | | | 6.00 | | mJ |
| $R_{thJC}$ | | | | 0.27 | °C/W |
| $R_{thCS}$ | | | 0.25 | | °C/W |

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

**PRELIMINARY TECHNICAL INFORMATION**

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

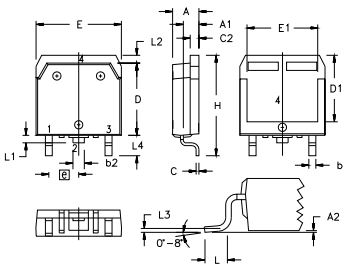
**TO-247 (IXGH) Outline**




Terminals: 1 - Gate 2 - Drain
3 - Source Tab - 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 |
| S | 6.15 BSC | | 242 BSC | |

**TO-268 (IXGT) Outline**




| 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 |

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

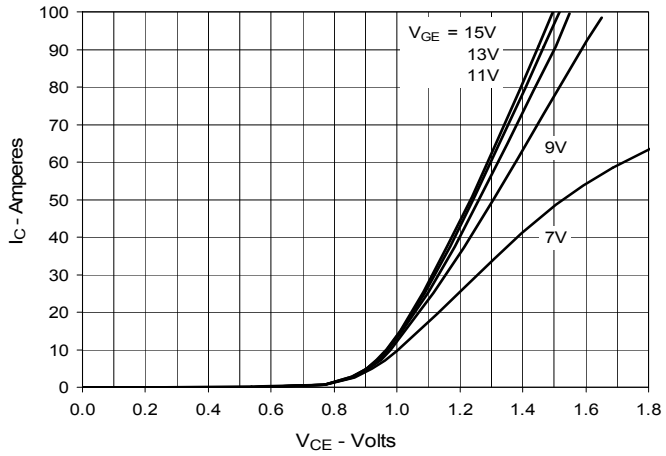


**Fig. 2. Extended Output Characteristics @ 25ºC**

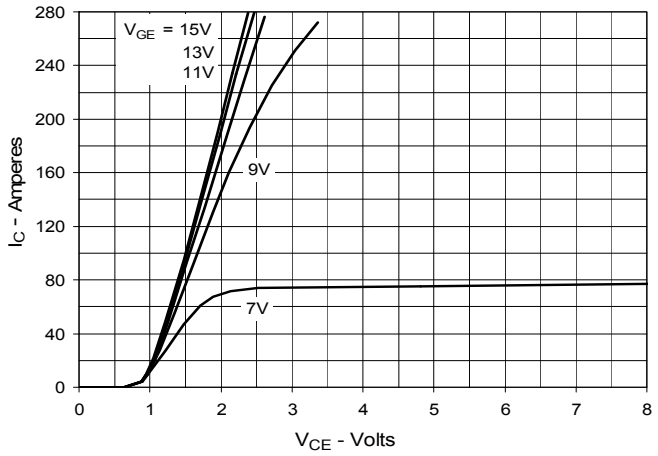


**Fig. 3. Output Characteristics @ 125ºC**

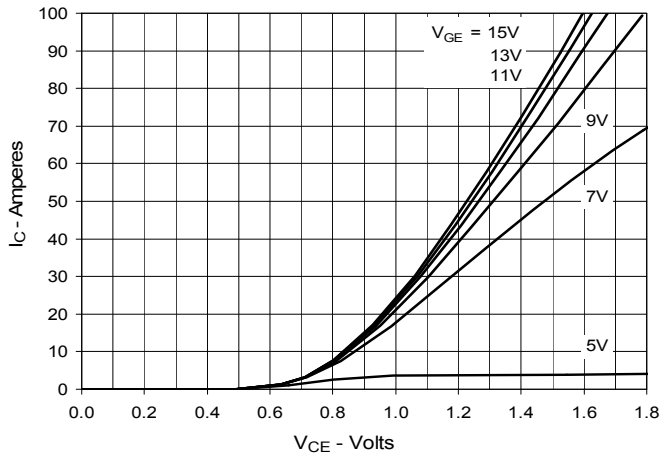


**Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature**

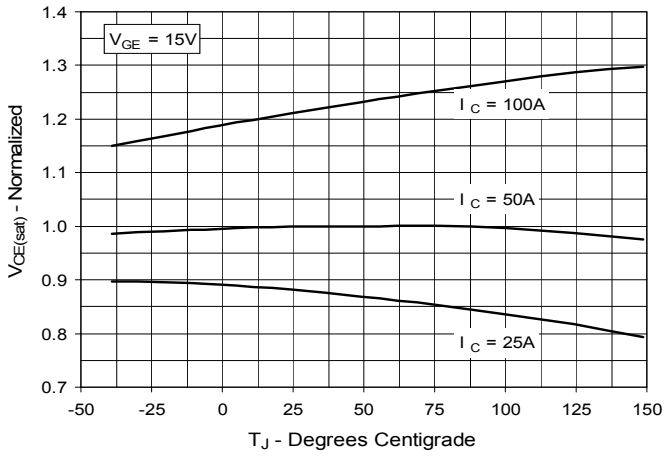


**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**

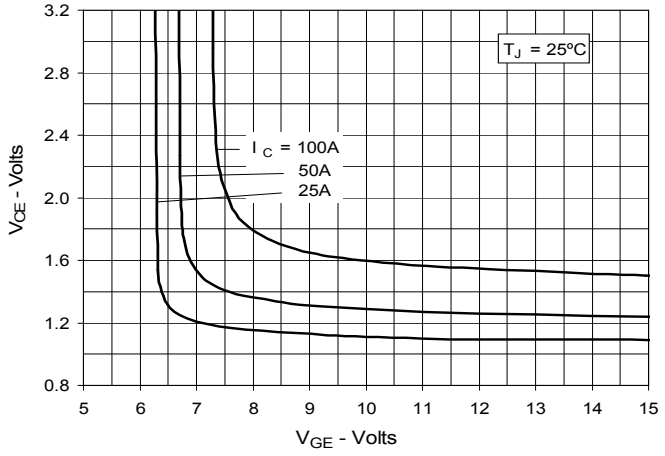


**Fig. 6. Input Admittance**

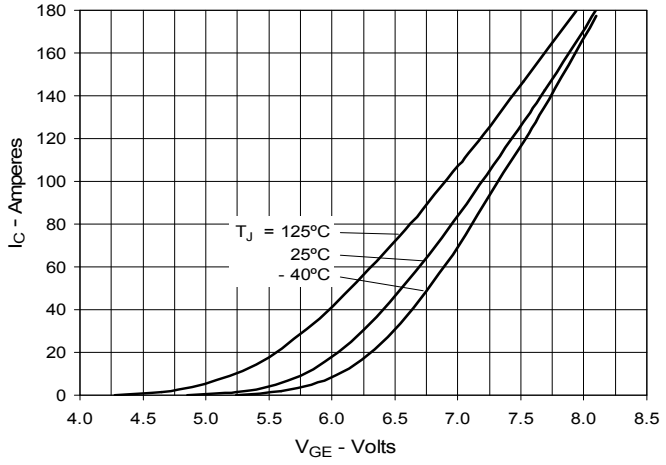

**Fig. 7. Transconductance**

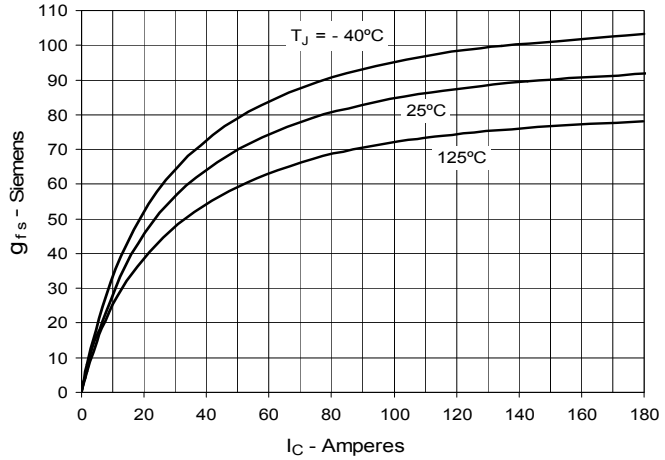


**Fig. 8. Gate Charge**

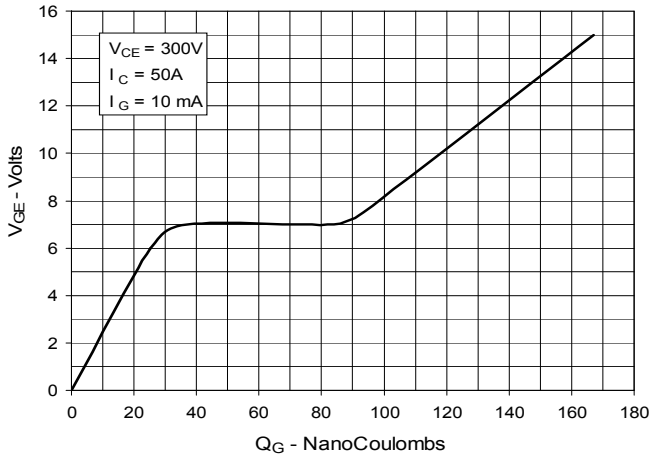


**Fig. 9. Capacitance**

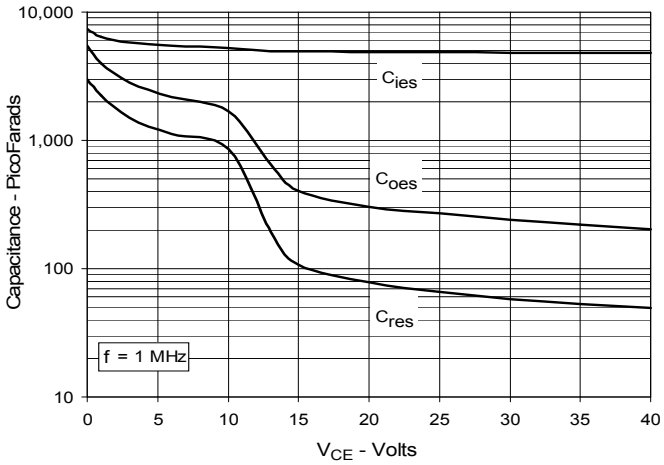


**Fig. 10. Reverse-Bias Safe Operating Area**

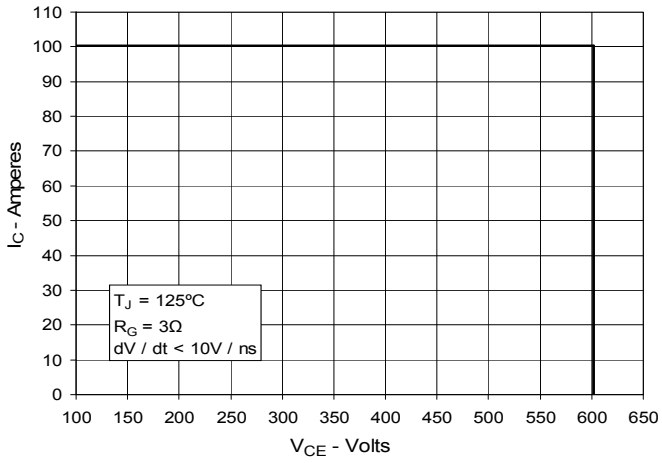


**Fig. 11. Maximum Transient Thermal Impedance**

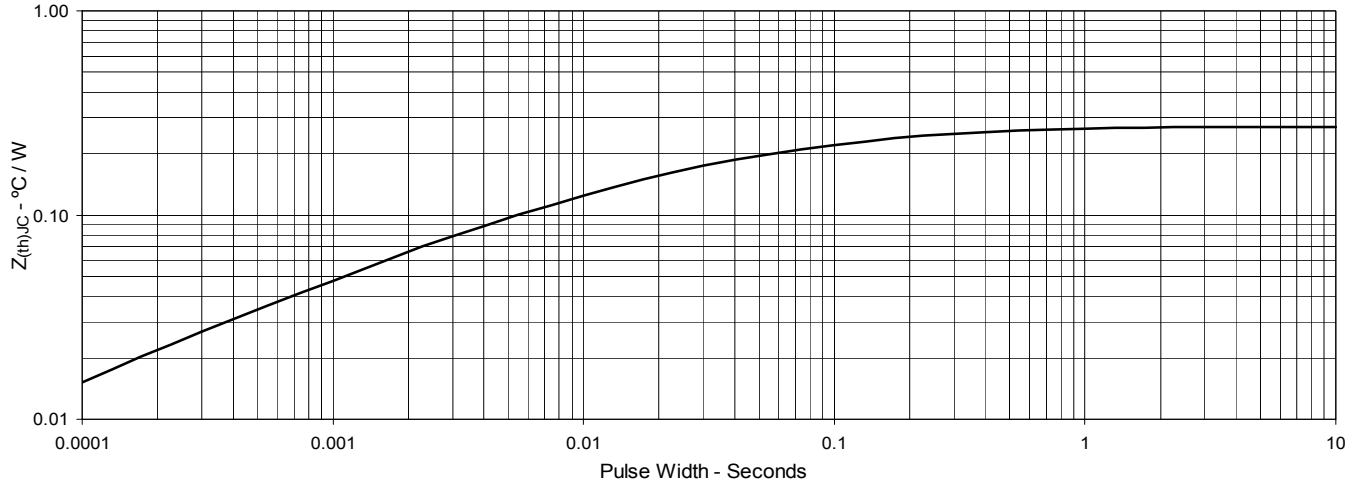


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**Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance**

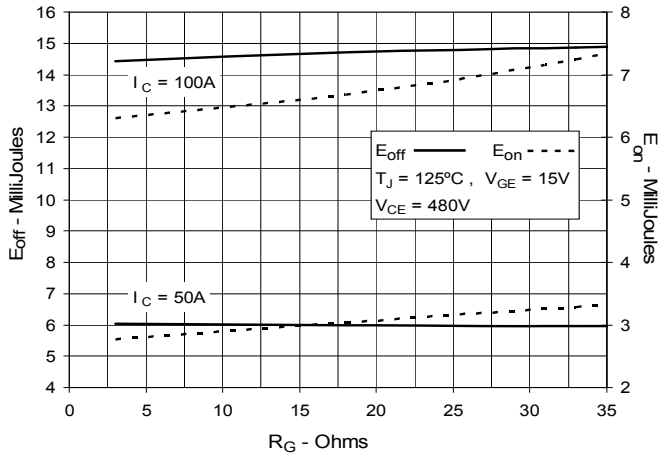


**Fig. 13. Inductive Switching Energy Loss vs. Junction Temperature**

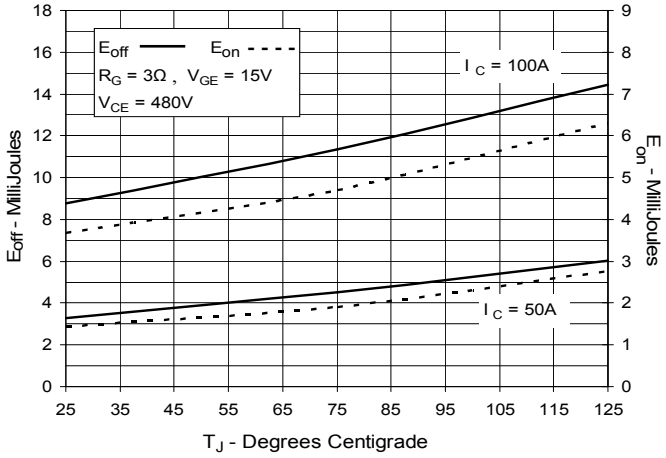


**Fig. 14. Inductive Switching Energy Loss vs. Collector Current**

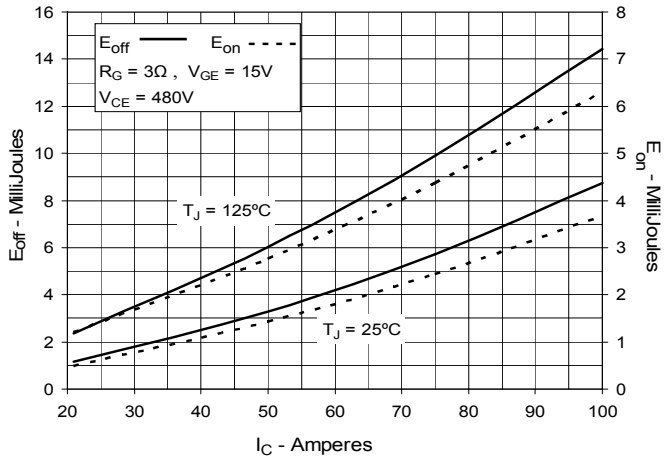


**Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance**

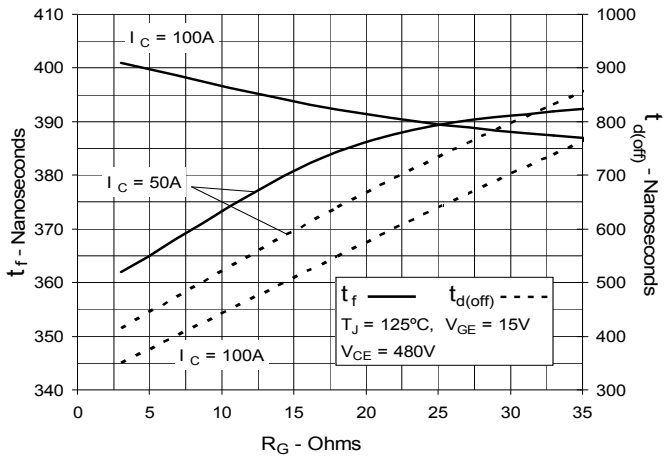


**Fig. 16. Inductive Turn-off Switching Times vs. Collector Current**

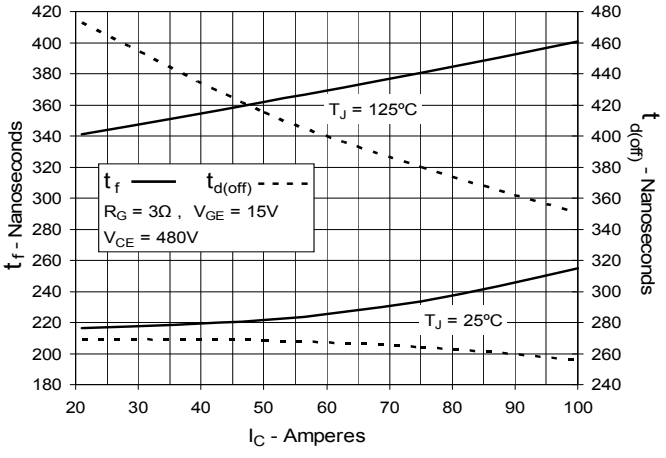


**Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature**

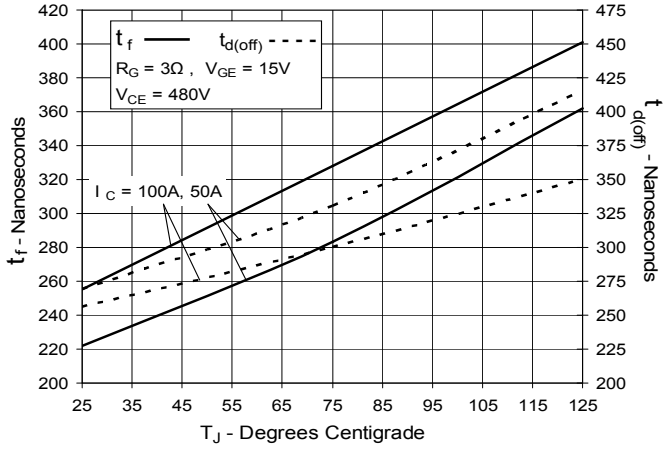

**Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance**

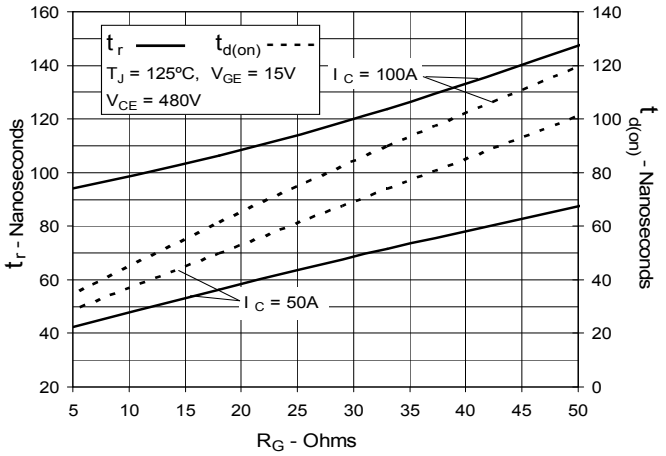


**Fig. 19. Inductive Turn-on Switching Times vs. Junction Temperature**

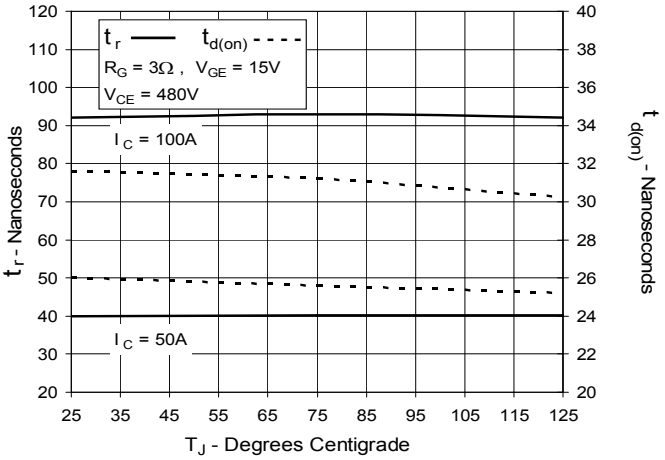


**Fig. 20. Inductive Turn-on Switching Times vs. Collector Current**