

GenX3™ 600V IGBTs

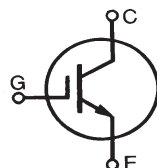
IXGK320N60B3 IXGX320N60B3

$$V_{CES} = 600V$$

$$I_{C90} = 320A$$

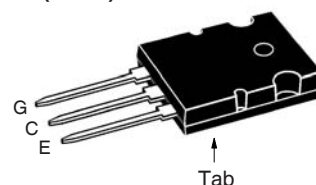
$$V_{CE(sat)} \leq 1.6V$$

Medium-Speed Low-Vsat PT
IGBTs for 5-40 kHz Switching

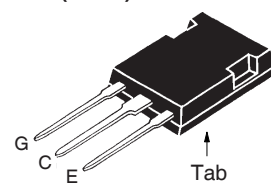


| Symbol | Test Conditions | Maximum Ratings | |
|----------------|---|-----------------------|------------|
| V_{CES} | $T_J = 25^\circ C$ to $150^\circ C$ | 600 | V |
| V_{CGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$ | 600 | V |
| V_{GES} | Continuous | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ C$ (Chip Capability) | 500 | A |
| I_{C90} | $T_C = 90^\circ C$ | 320 | A |
| I_{LRMS} | Terminal Current Limit | 160 | A |
| I_{CM} | $T_C = 25^\circ C$, 1ms | 1200 | A |
| SSOA | $V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 1\Omega$ | $I_{CM} = 320$ | A |
| (RBSOA) | Clamped Inductive Load | $V_{CE} \leq V_{CES}$ | V |
| P_C | $T_C = 25^\circ C$ | 1700 | W |
| T_J | | -55 ... +150 | $^\circ C$ |
| T_{JM} | | 150 | $^\circ C$ |
| T_{stg} | | -55 ... +150 | $^\circ C$ |
| T_L | Maximum Lead Temperature for Soldering | 300 | $^\circ C$ |
| T_{SOLD} | 1.6 mm (0.062 in.) from Case for 10 | 260 | $^\circ C$ |
| M_d | Mounting Torque (IXGK) | 1.13/10 | Nm/lb.in. |
| F_C | Mounting Force (IXGX) | 20..120/4.5..27 | N/lb. |
| Weight | TO-264 | 10 | g |
| | PLUS247 | 6 | g |

TO-264 (IXGK)



PLUS247 (IXGX)



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

Features

- Optimized for Low Conduction and Switching Losses
- High Current Capability
- Square RBSOA

Advantages

- High Power Density
- Low Gate Drive Requirement

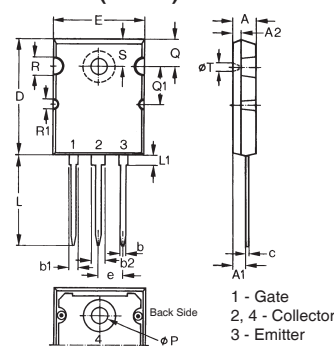
Applications

- 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} | $I_C = 1mA$, $V_{GE} = 0V$ | 600 | | V |
| $V_{GE(th)}$ | $I_C = 4mA$, $V_{CE} = V_{GE}$ | 3.0 | | 5.0 V |
| I_{CES} | $V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ C$ | | | 75 μA 2 mA |
| I_{GES} | $V_{CE} = 0V$, $V_{GE} = \pm 20V$ | | | ± 400 nA |
| $V_{CE(sat)}$ | $I_C = 100A$, $V_{GE} = 15V$, Note 1 $I_C = 320A$ | | 1.4 2.0 | 1.6 V V |

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|--|--|-----------------------|-------|--|
| | | Min. | Typ. | Max. |
| g_{fs} | $I_C = 60\text{A}, V_{CE} = 10\text{V}$, Note 1 | 70 | 125 | S |
| C_{ies} C_{oes} C_{res} | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$ | | 18 | nF |
| | | | 960 | pF |
| | | | 130 | pF |
| Q_g Q_{ge} Q_{gc} | $I_C = 320\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$ | | 585 | nC |
| | | | 105 | nC |
| | | | 215 | nC |
| $t_{d(on)}$ t_{ri} E_{on} $t_{d(off)}$ t_{fi} E_{off} | Inductive Load, $T_J = 25^\circ\text{C}$ $I_C = 100\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.8 \cdot V_{CES}, R_G = 1\Omega$ | | 44 | ns |
| | | | 66 | ns |
| | | | 2.7 | mJ |
| | | | 250 | ns |
| | | | 165 | ns |
| | | | 3.5 | 5.0 |
| $t_{d(on)}$ t_{ri} E_{on} $t_{d(off)}$ t_{fi} E_{off} | Inductive Load, $T_J = 125^\circ\text{C}$ $I_C = 100\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.8 \cdot V_{CES}, R_G = 1\Omega$ | | 40 | ns |
| | | | 67 | ns |
| | | | 3.5 | mJ |
| | | | 330 | ns |
| | | | 265 | ns |
| | | | 5.4 | mJ |
| R_{thJC} R_{thCS} | | 0.15 | 0.073 | $^\circ\text{C/W}$ $^\circ\text{C/W}$ |

TO-264 AA (IXGK) Outline



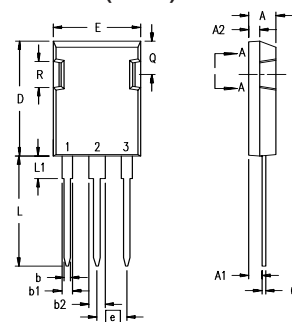
| Dim. | Millimeter | | Inches | |
|------|------------|-------|----------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.82 | 5.13 | .190 | .202 |
| A1 | 2.54 | 2.89 | .100 | .114 |
| A2 | 2.00 | 2.10 | .079 | .083 |
| b | 1.12 | 1.42 | .044 | .056 |
| b1 | 2.39 | 2.69 | .094 | .106 |
| b2 | 2.90 | 3.09 | .114 | .122 |
| c | 0.53 | 0.83 | .021 | .033 |
| D | 25.91 | 26.16 | 1.020 | 1.030 |
| E | 19.81 | 19.96 | .780 | .786 |
| e | 5.46 BSC | | .215 BSC | |
| J | 0.00 | 0.25 | .000 | .010 |
| K | 0.00 | 0.25 | .000 | .010 |
| L | 20.32 | 20.83 | .800 | .820 |
| L1 | 2.29 | 2.59 | .090 | .102 |
| P | 3.17 | 3.66 | .125 | .144 |
| Q | 6.07 | 6.27 | .239 | .247 |
| Q1 | 8.38 | 8.69 | .330 | .342 |
| R | 3.81 | 4.32 | .150 | .170 |
| R1 | 1.78 | 2.29 | .070 | .090 |
| S | 6.04 | 6.30 | .238 | .248 |
| T | 1.57 | 1.83 | .062 | .072 |

Note 1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.

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.

PLUS247™ (IXGX) Outline



Terminals: 1 - Gate
2 - Collector
3 - Emitter

| Dim. | Millimeter | | Inches | |
|----------------|------------|-------|----------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.83 | 5.21 | .190 | .205 |
| A ₁ | 2.29 | 2.54 | .090 | .100 |
| A ₂ | 1.91 | 2.16 | .075 | .085 |
| b | 1.14 | 1.40 | .045 | .055 |
| b ₁ | 1.91 | 2.13 | .075 | .084 |
| b ₂ | 2.92 | 3.12 | .115 | .123 |
| C | 0.61 | 0.80 | .024 | .031 |
| D | 20.80 | 21.34 | .819 | .840 |
| E | 15.75 | 16.13 | .620 | .635 |
| e | 5.45 BSC | | .215 BSC | |
| L | 19.81 | 20.32 | .780 | .800 |
| L1 | 3.81 | 4.32 | .150 | .170 |
| Q | 5.59 | 6.20 | .220 | 0.244 |
| R | 4.32 | 4.83 | .170 | .190 |

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 | 4,931,844 | 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 |
| 4,850,072 | 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 @ $T_J = 25^\circ\text{C}$

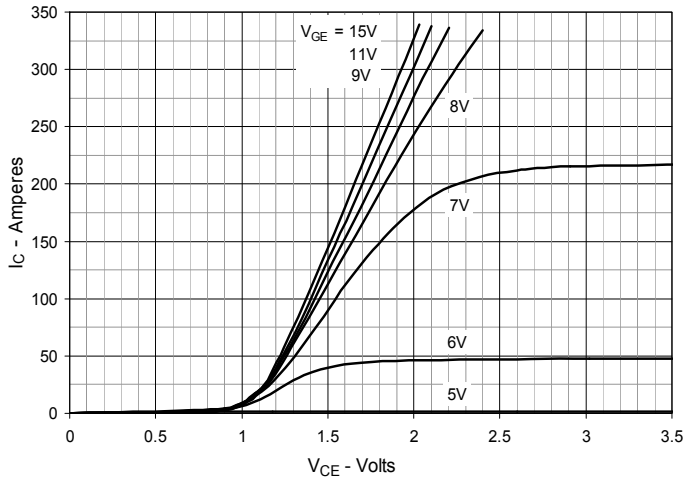


Fig. 2. Output Characteristics @ $T_J = 125^\circ\text{C}$

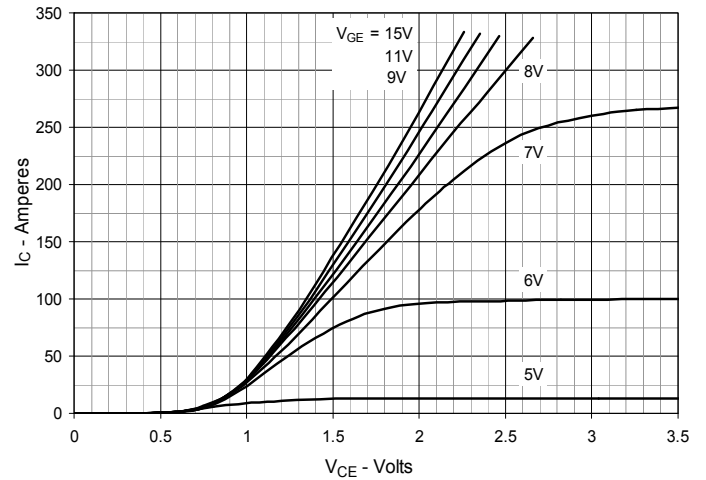


Fig. 3. Dependence of $V_{CE(sat)}$ on Junction Temperature

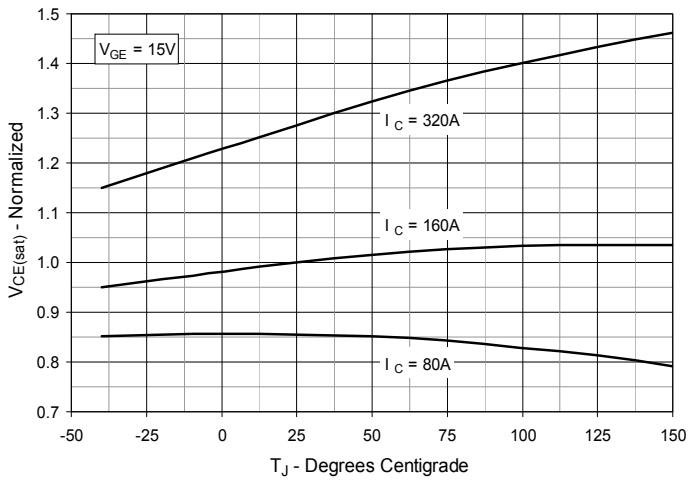


Fig. 4. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

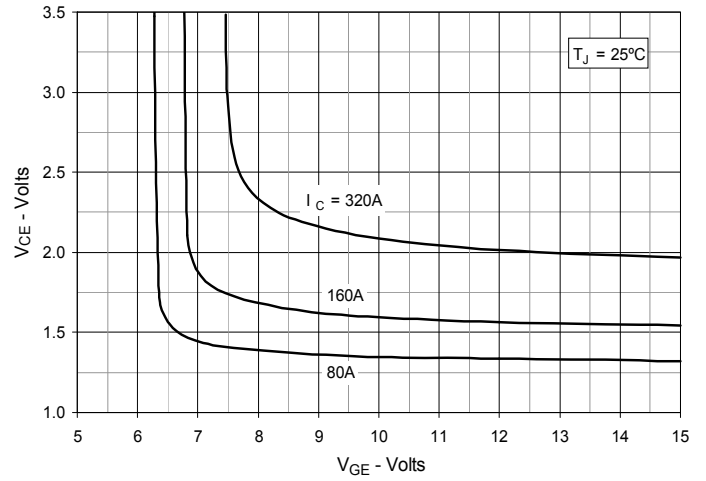


Fig. 5. Input Admittance

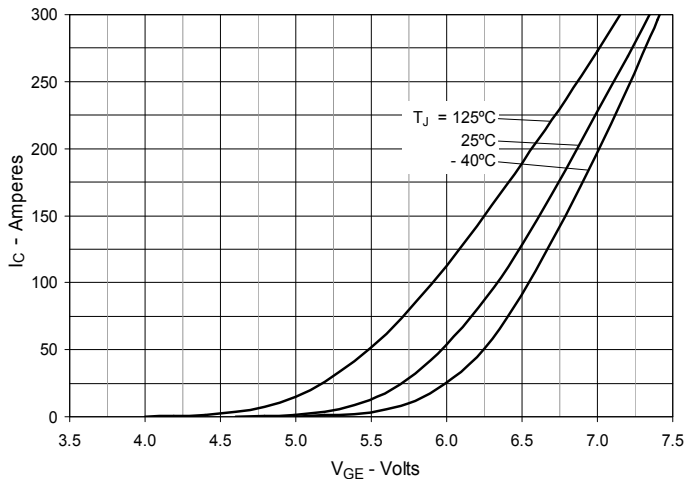


Fig. 6. Transconductance

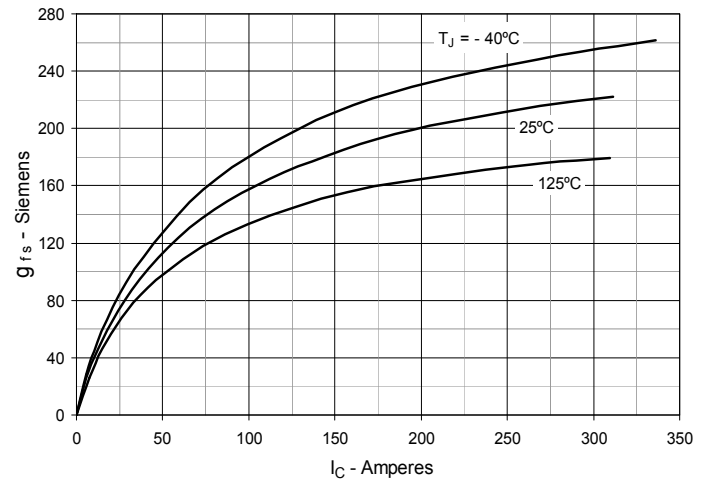


Fig. 7. Gate Charge

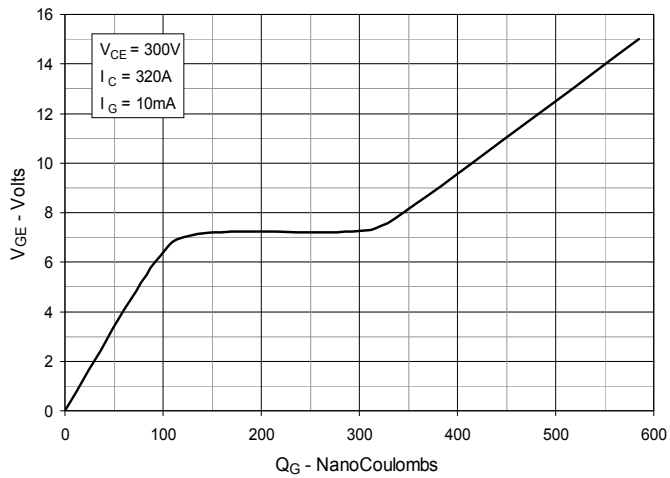


Fig. 8. Capacitance

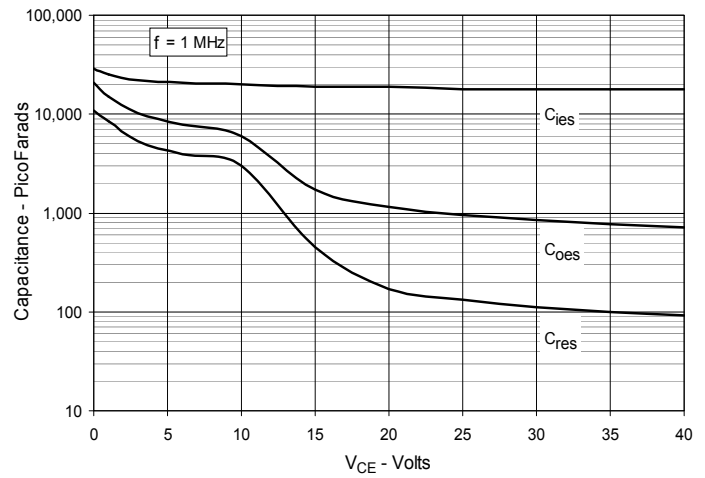


Fig. 9. Reverse-Bias Safe Operating Area

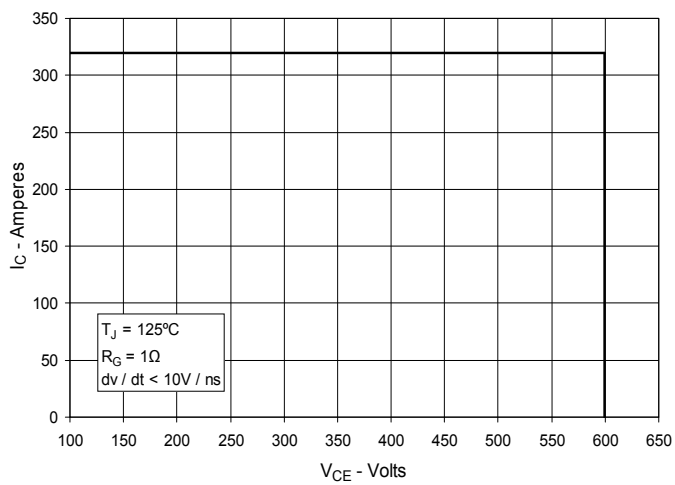


Fig. 10. Maximum Transient Thermal Impedance

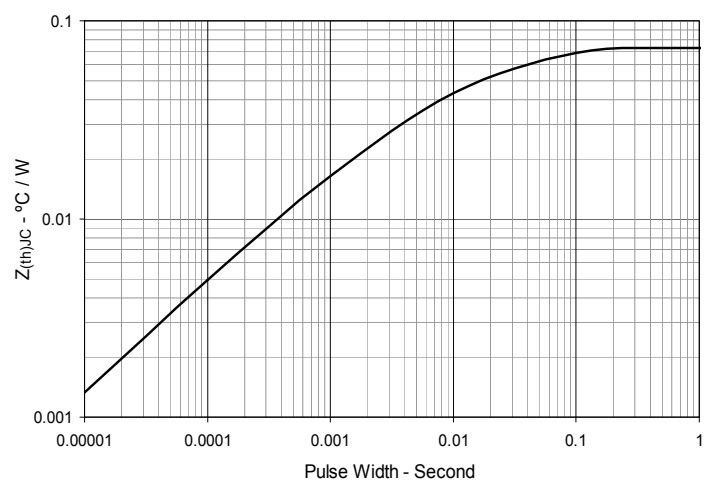


Fig. 11. Inductive Switching Energy Loss vs. Gate Resistance

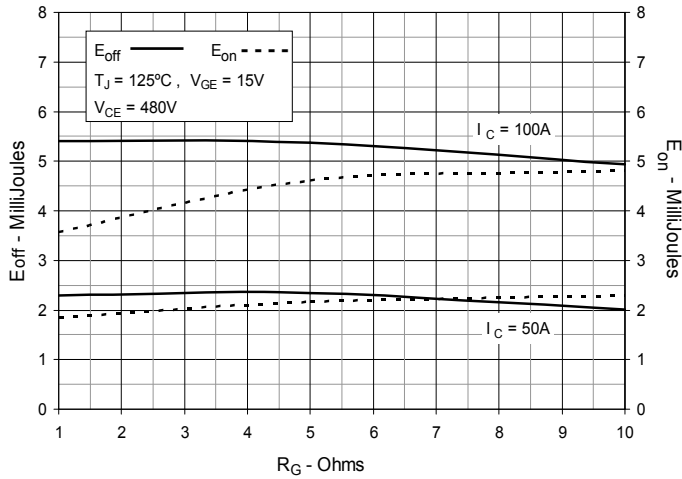


Fig. 12. Inductive Switching Energy Loss vs. Collector Current

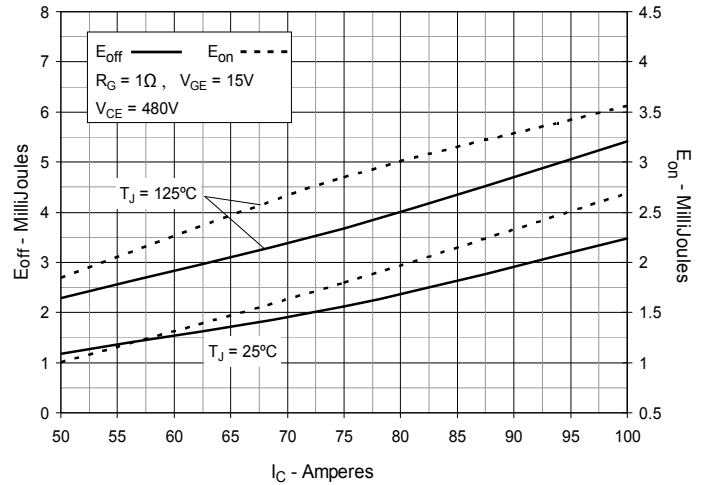


Fig. 13. Inductive Switching Energy Loss vs. Junction Temperature

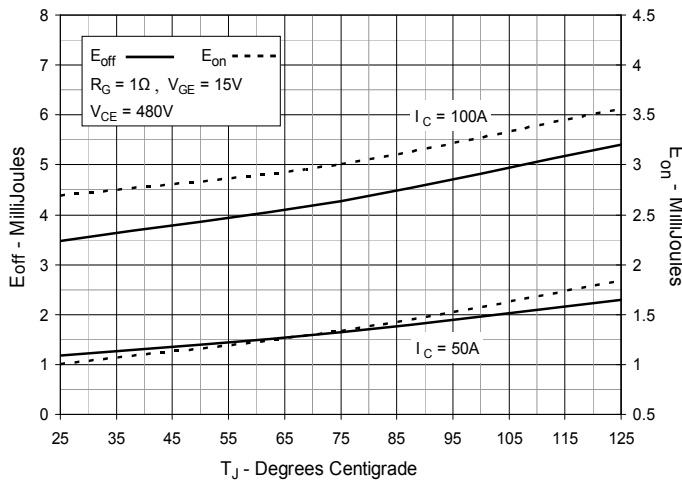


Fig. 14. Inductive Turn-off Switching Times vs. Gate Resistance

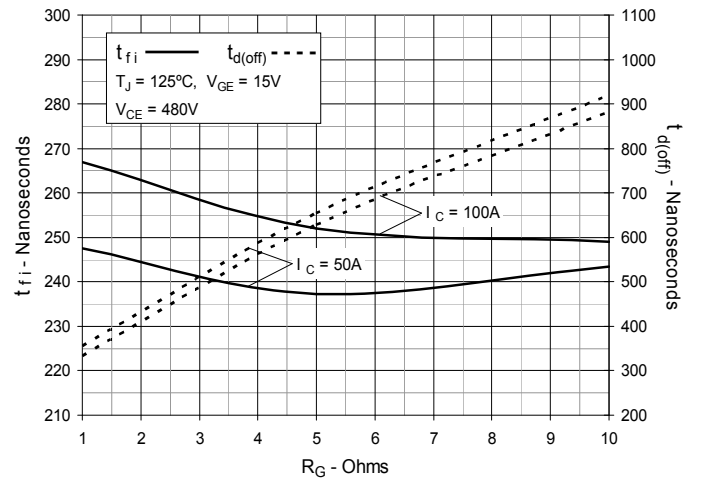


Fig. 15. Inductive Turn-off Switching Times vs. Collector Current

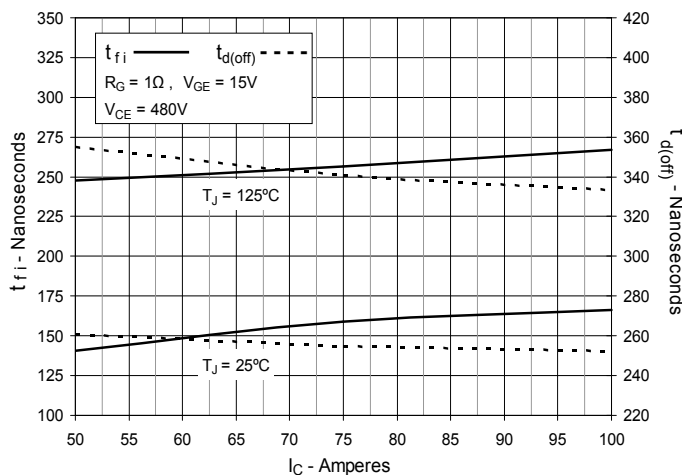


Fig. 16. Inductive Turn-off Switching Times vs. Junction Temperature

