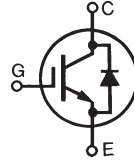


GenX3™ 600V IGBT w/ Diode

IXGK72N60B3H1 IXGX72N60B3H1

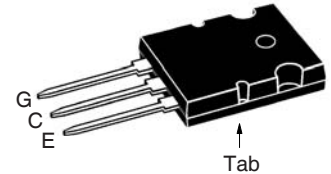
Medium Speed Low V_{sat} PT
IGBTs 5-40 kHz Switching



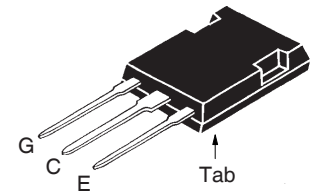
$V_{CES} = 600V$
 $I_{C110} = 72A$
 $V_{CE(sat)} \leq 1.8V$
 $t_{fi(typ)} = 92ns$

| 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) | 178 | A |
| I_{LRMS} | Terminal Current Limit | 160 | A |
| I_{C110} | $T_C = 110^\circ C$ | 72 | A |
| I_{CM} | $T_C = 25^\circ C$, 1ms | 450 | A |
| SSOA (RBSOA) | $V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 3\Omega$ Clamped Inductive Load | $I_{CM} = 240$ @ $V_{CE} \leq V_{CES}$ | A |
| P_C | $T_C = 25^\circ C$ | 540 | 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 (0.062in.) from Case for 10s | 260 | $^\circ C$ |
| M_d | Mounting Torque (TO-264) | 1.13/10 | Nm/lb.in |
| F_C | Mounting Force (PLUS247) | 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
- Square RBSOA
- Anti-Parallel Ultra Fast Diode

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. |
| $V_{GE(th)}$ | $I_C = 250\mu A$, $V_{CE} = V_{GE}$ | 3.0 | | 5.0 V |
| I_{CES} | $V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 150^\circ C$ | | | 300 μA 5 mA |
| I_{GES} | $V_{CE} = 0V$, $V_{GE} = \pm 20V$ | | | ± 100 nA |
| $V_{CE(sat)}$ | $I_C = 60A$, $V_{GE} = 15V$, Note 1 $I_C = 120A$ | 1.50 | 1.75 | V V |

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|--------------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $I_C = 50\text{A}$, $V_{CE} = 10\text{V}$, Note 1 | 45 | 76 | S |
| C_{ies} | $V_{CE} = 25\text{V}$, $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$ | | 6800 | pF |
| C_{oes} | | | 575 | pF |
| C_{res} | | | 80 | pF |
| $Q_{g(on)}$ | $I_C = 60\text{A}$, $V_{GE} = 15\text{V}$, $V_{CE} = 0.5 \cdot V_{CES}$ | | 225 | nC |
| Q_{ge} | | | 40 | nC |
| Q_{gc} | | | 82 | nC |
| $t_{d(on)}$ | Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 50\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 480\text{V}$, $R_G = 3\Omega$ Note 2 | | 31 | ns |
| t_{ri} | | | 33 | ns |
| E_{on} | | | 1.4 | mJ |
| $t_{d(off)}$ | | | 152 | 240 ns |
| t_{fi} | | | 92 | 150 ns |
| E_{off} | | | 1.0 | 2.0 mJ |
| $t_{d(on)}$ | Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 50\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 480\text{V}$, $R_G = 3\Omega$ Note 2 | | 29 | ns |
| t_{ri} | | | 34 | ns |
| E_{on} | | | 2.7 | mJ |
| $t_{d(off)}$ | | | 228 | ns |
| t_{fi} | | | 142 | ns |
| E_{off} | | | 2.2 | mJ |
| R_{thJC} | | | 0.23 | $^\circ\text{C/W}$ |
| R_{thCS} | | 0.15 | | $^\circ\text{C/W}$ |

Reverse Diode (FRED)

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|------------|---|---------------------------|------|-------------------------|
| | | Min. | Typ. | Max. |
| V_F | $I_F = 60\text{A}$, $V_{GE} = 0\text{V}$, Note 1 | | | 2.45 V |
| | $T_J = 150^\circ\text{C}$ | | 1.40 | 1.80 V |
| I_{RM} | $I_F = 60\text{A}$, $V_{GE} = 0\text{V}$, $-di_F/dt = 200\text{A}/\mu\text{s}$, $V_R = 300\text{V}$ | | 8.3 | A |
| t_{rr} | | $T_J = 100^\circ\text{C}$ | | 140 |
| R_{thJC} | | | | 0.30 $^\circ\text{C/W}$ |

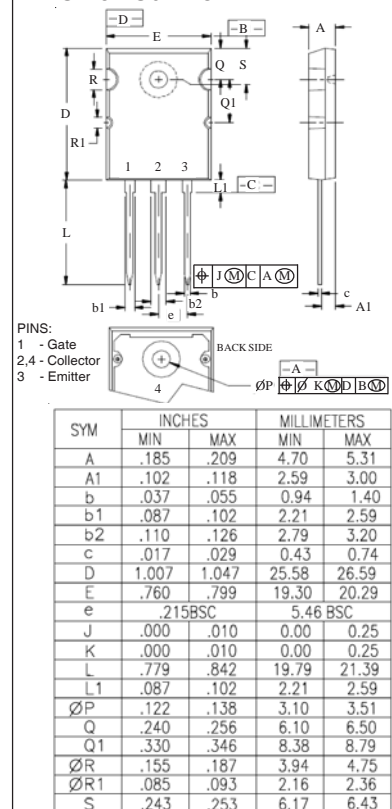
Notes:

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 .

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 |
| | 4,860,072 | 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 | |

TO-264 Outline



PLUS247™ Outline

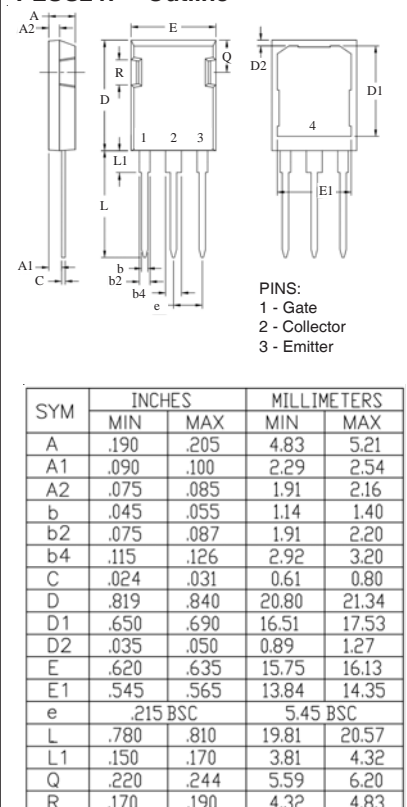


Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

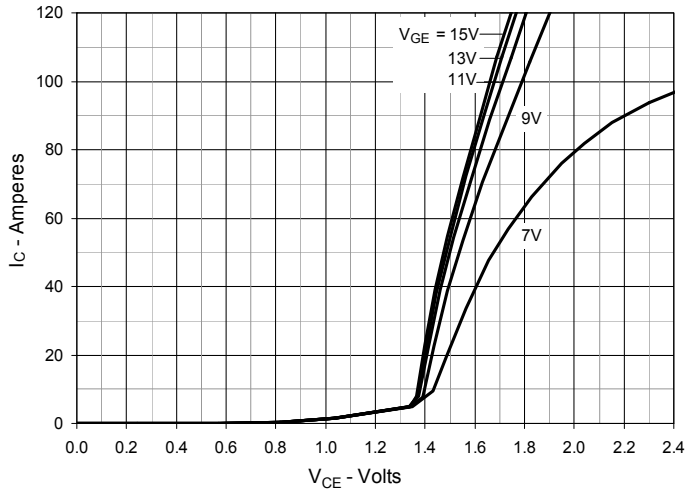


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

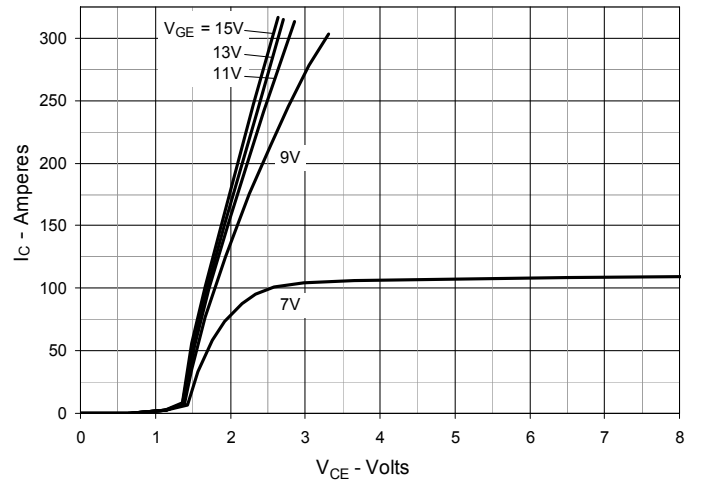


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

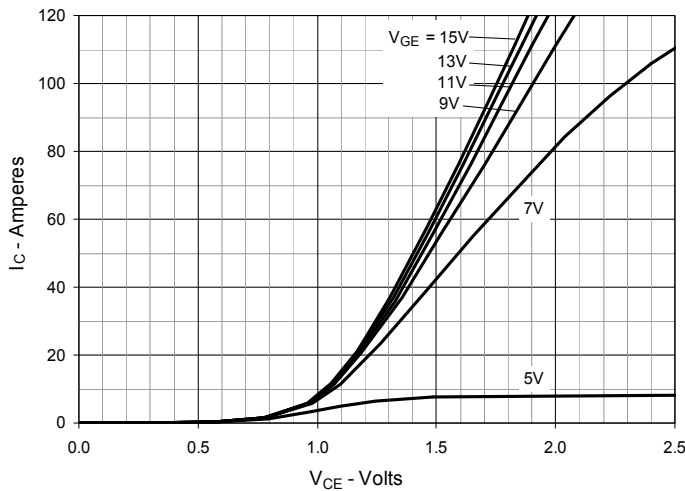


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

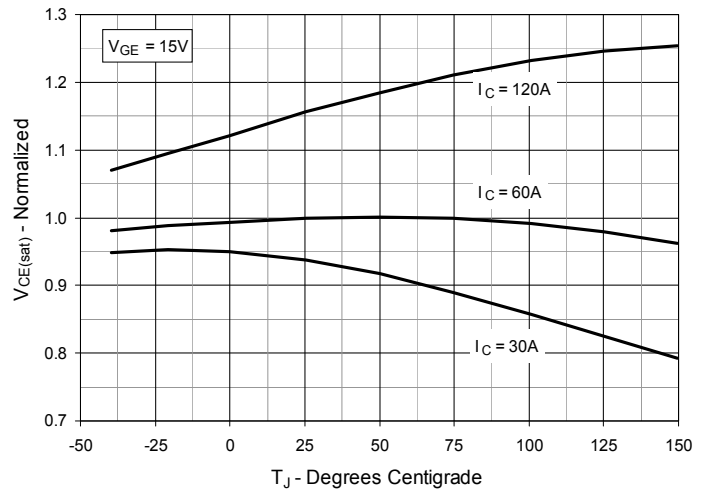


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

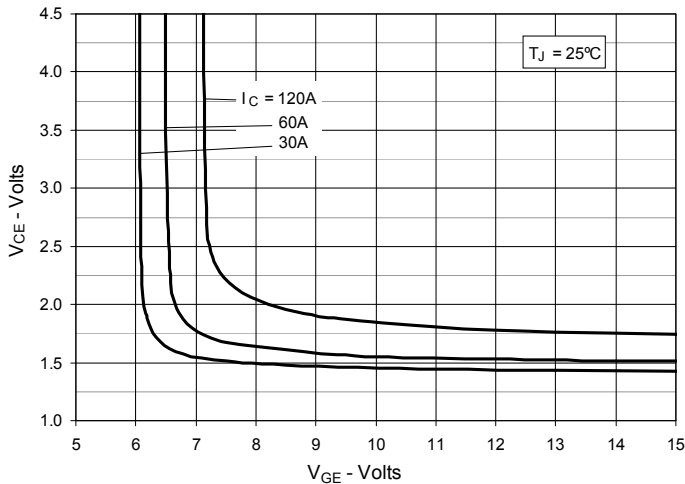


Fig. 6. Input Admittance

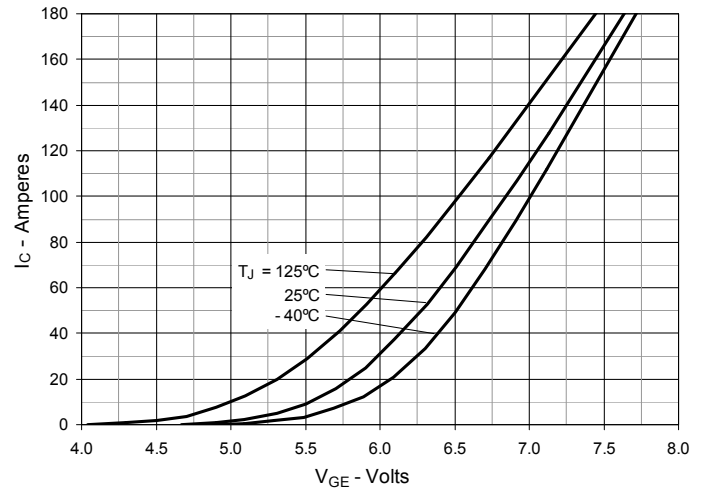


Fig. 7. Transconductance

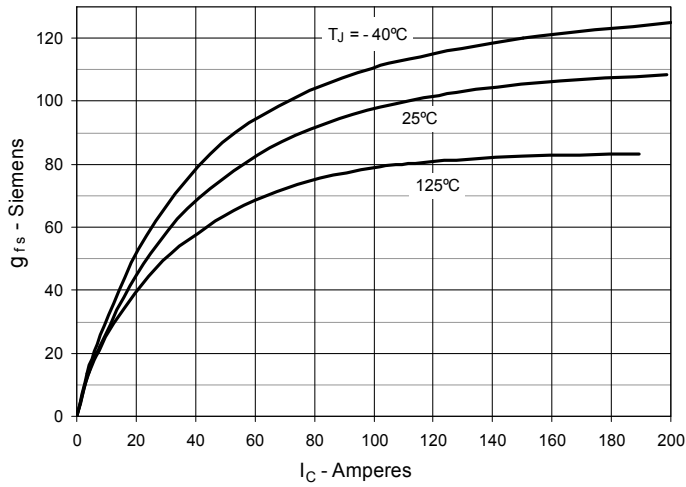


Fig. 8. Gate Charge

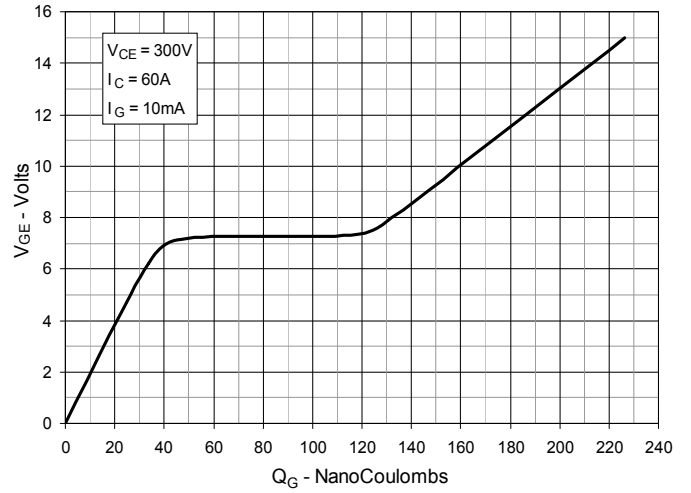


Fig. 9. Capacitance

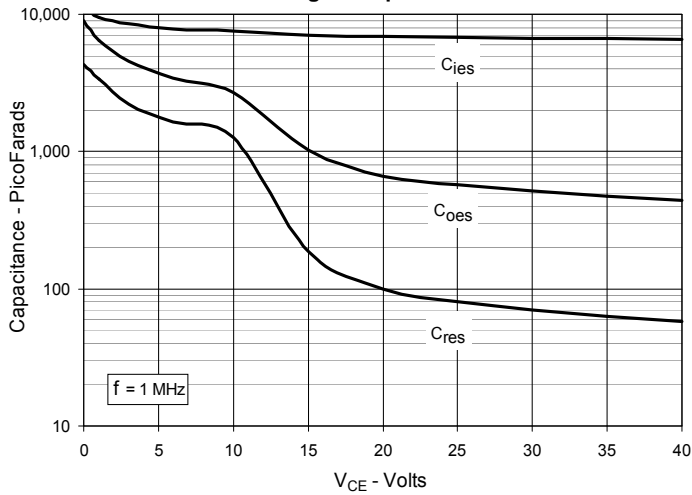


Fig. 10. Reverse-Bias Safe Operating Area

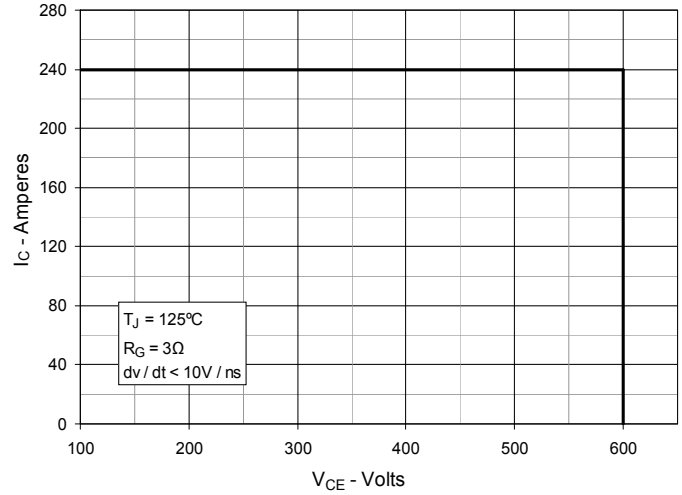


Fig. 11. Maximum Transient Thermal Impedance for IGBT

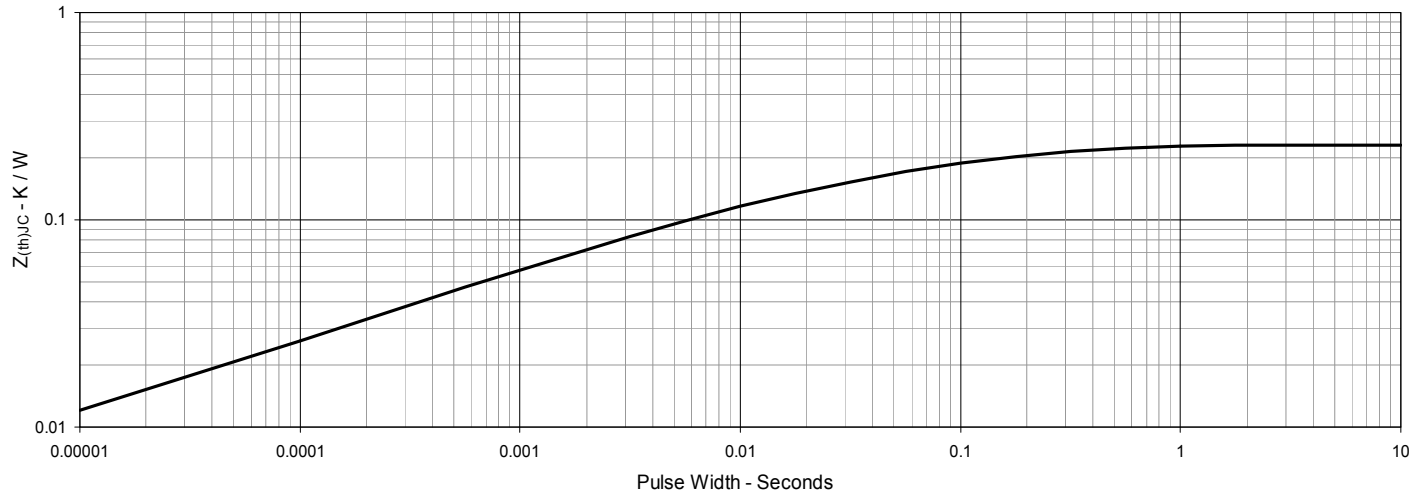


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

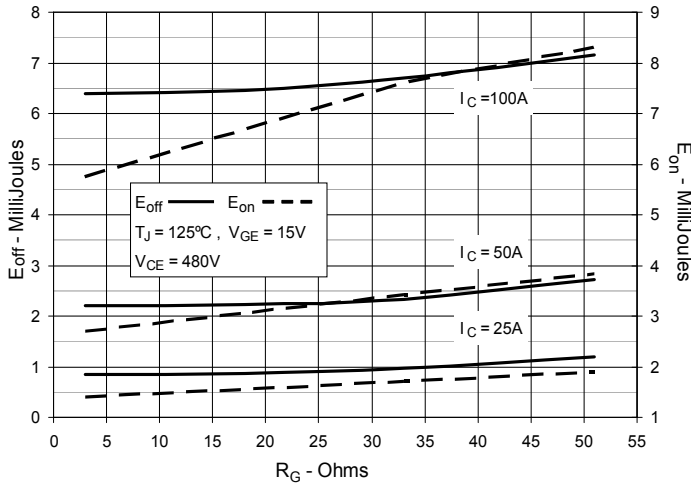


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

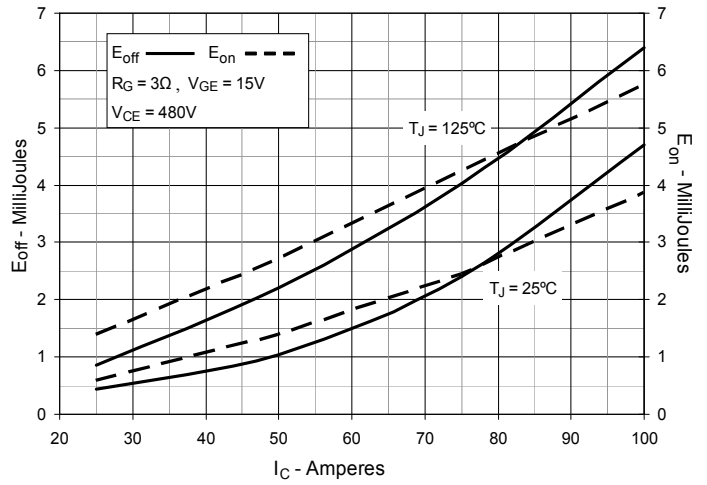


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

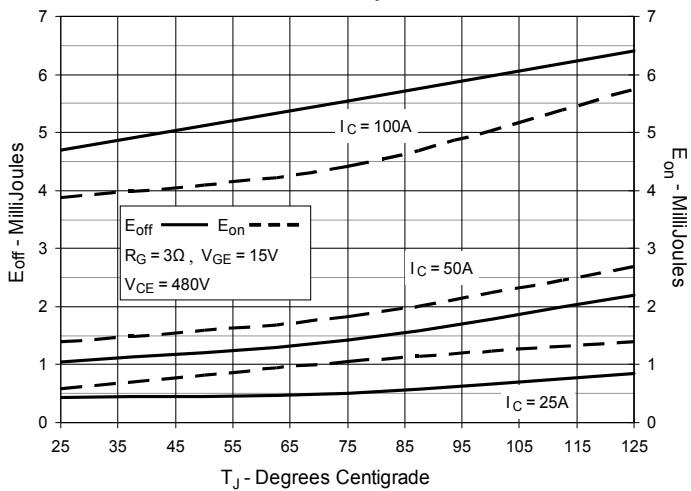


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

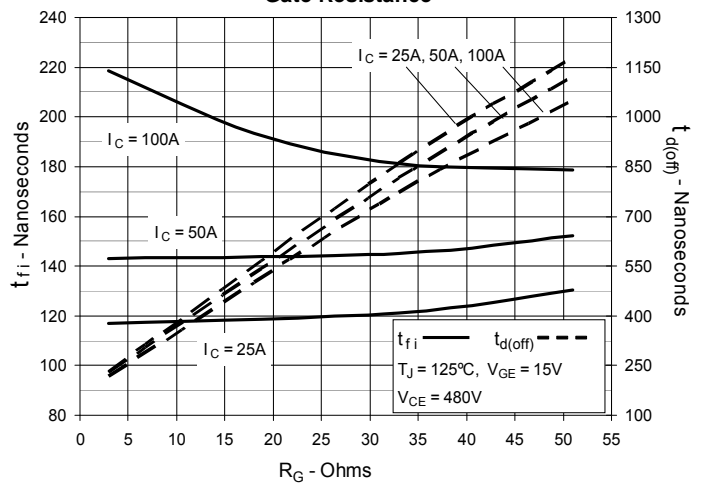


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

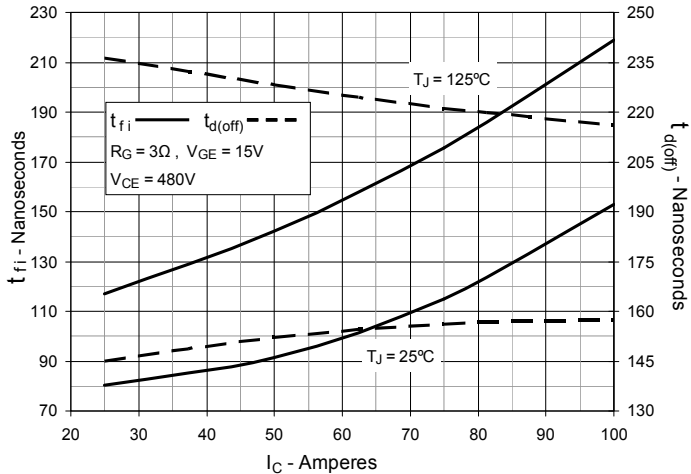


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

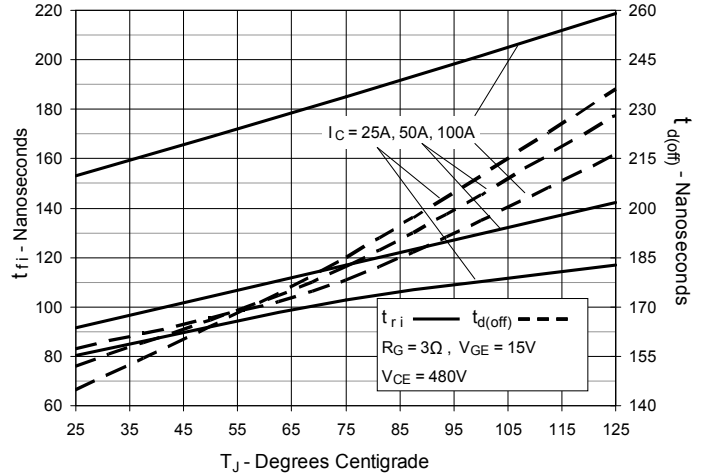


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

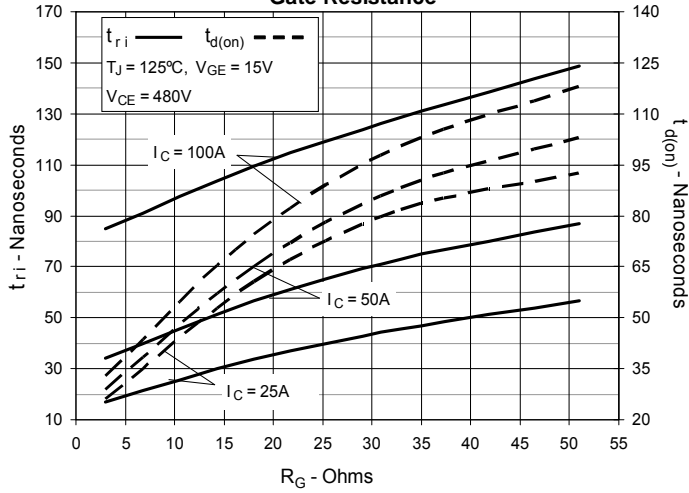


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

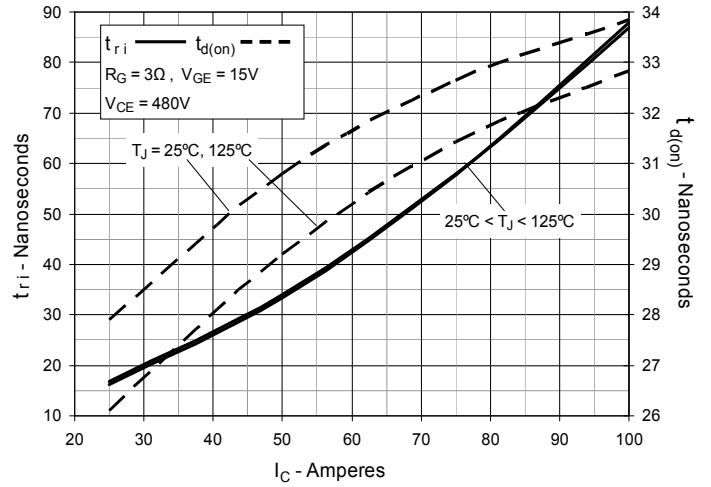


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

