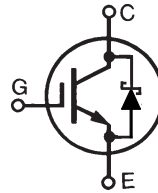


GenX3™ 600V IGBT w/ SiC Anti-Parallel Diode

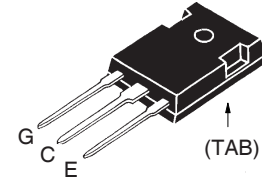
IXGH36N60B3C1

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



$$\begin{aligned} V_{CES} &= 600V \\ I_{C110} &= 36A \\ V_{CE(sat)} &\leq 1.8V \\ t_{fi(typ)} &= 100ns \end{aligned}$$

TO-247



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

| Symbol | Test Conditions | Maximum Ratings | |
|-------------------------------|---|-----------------------------------|------------------|
| V_{CES} | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$ | 600 | V |
| V_{CGR} | $T_J = 25^\circ\text{C to } 150^\circ\text{C}, R_{GE} = 1M\Omega$ | 600 | V |
| V_{GES} | Continuous | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ\text{C}$ (Limited by Leads) | 75 | A |
| I_{C110} | $T_C = 110^\circ\text{C}$ | 36 | A |
| I_{F110} | $T_C = 110^\circ\text{C}$ | 20 | A |
| I_{CM} | $T_C = 25^\circ\text{C}, 1\text{ms}$ | 200 | A |
| SSOA (RBSOA) | $V_{GE} = 15V, T_{VJ} = 125^\circ\text{C}, R_G = 5\Omega$ Clamped Inductive Load | $I_{CM} = 80$ @ $\leq V_{CES}$ | A |
| P_C | $T_C = 25^\circ\text{C}$ | 250 | W |
| T_J | | -55 ... +150 | $^\circ\text{C}$ |
| T_{JM} | | 150 | $^\circ\text{C}$ |
| T_{stg} | | -55 ... +150 | $^\circ\text{C}$ |
| T_L | 1.6mm (0.062 in.) from Case for 10 seconds | 300 | $^\circ\text{C}$ |
| T_{SOLD} | Plastic Body for 10 seconds | 260 | $^\circ\text{C}$ |
| M_d | Mounting Torque | 1.13/10 | Nm/lb.in. |
| Weight | | 6 | g |

Features

- Optimized for Low Conduction and Switching Losses
- Square RBSOA
- Anti-Parallel Schottky Diode
- International Standard Package

Advantages

- High Power Density
- Low Gate Drive Requirement

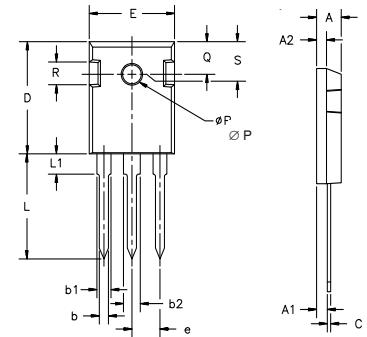
Applications

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

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | Characteristic Values | | |
|---------------|---|-----------------------|------|-----------------------------|
| | | Min. | Typ. | Max. |
| $V_{GE(th)}$ | $I_C = 250\mu\text{A}, V_{CE} = V_{GE}$ | 3.0 | | 5.0 V |
| I_{CES} | $V_{CE} = V_{CES}, V_{GE} = 0V$ $T_J = 125^\circ\text{C}$ | | | 35 μA 1.25 mA |
| I_{GES} | $V_{CE} = 0V, V_{GE} = \pm 20V$ | | | ± 100 nA |
| $V_{CE(sat)}$ | $I_C = 30A, V_{GE} = 15V, \text{Note 1}$ | | 1.5 | 1.8 V |

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|--------------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $I_C = 30\text{A}, V_{CE} = 10\text{V}$, Note 1 | 28 | 42 | S |
| C_{ies} | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$ | | 2430 | pF |
| C_{oes} | | | 390 | pF |
| C_{res} | | | 28 | pF |
| Q_g | $I_C = 30\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$ | | 80 | nC |
| Q_{ge} | | | 12 | nC |
| Q_{gc} | | | 36 | nC |
| $t_{d(on)}$ | Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 30\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 400\text{V}, R_G = 5\Omega$ Note 2 | | 20 | ns |
| t_{ri} | | | 26 | ns |
| E_{on} | | | 0.39 | mJ |
| $t_{d(off)}$ | | | 125 | 200 ns |
| t_{fi} | | | 100 | 160 ns |
| E_{off} | | | 0.80 | 1.50 mJ |
| $t_{d(on)}$ | Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 30\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 400\text{V}, R_G = 5\Omega$ Note 2 | | 20 | ns |
| t_{ri} | | | 27 | ns |
| E_{on} | | | 0.43 | mJ |
| $t_{d(off)}$ | | | 180 | ns |
| t_{fi} | | | 170 | ns |
| E_{off} | | | 1.50 | mJ |
| R_{thJC} | | | 0.50 | $^\circ\text{C/W}$ |
| R_{thCS} | | 0.21 | | $^\circ\text{C/W}$ |

TO-247 Outline



| Dim. | Millimeter | | Inches | |
|----------------|------------|-------|--------|-------|
| | Min. | Max. | 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 |
| ∅P | 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 |

Reverse Diode (SiC)

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | Characteristic Values | | |
|------------|--|-----------------------|------|-------------------------|
| | | Min. | Typ. | Max. |
| V_F | $I_F = 20\text{A}, V_{GE} = 0\text{V}$, Note 1 $T_J = 125^\circ\text{C}$ | | 1.65 | 2.10 V |
| | | | 1.80 | V |
| R_{thJC} | | | | 0.90 $^\circ\text{C/W}$ |

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 .

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.

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 | 7,157,338 B2 |
| | 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 | |

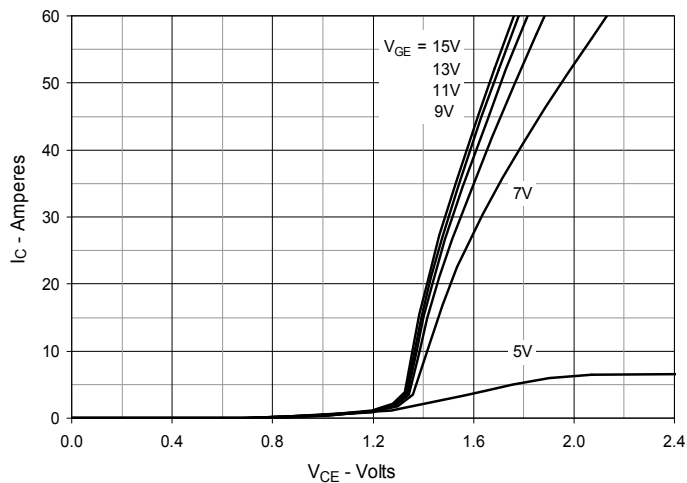
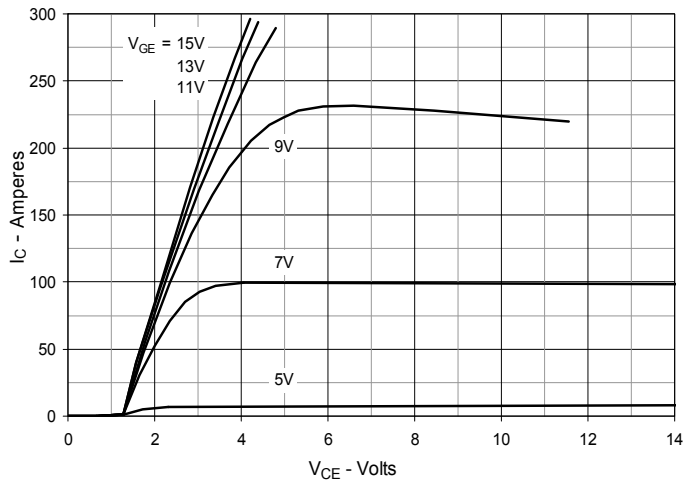
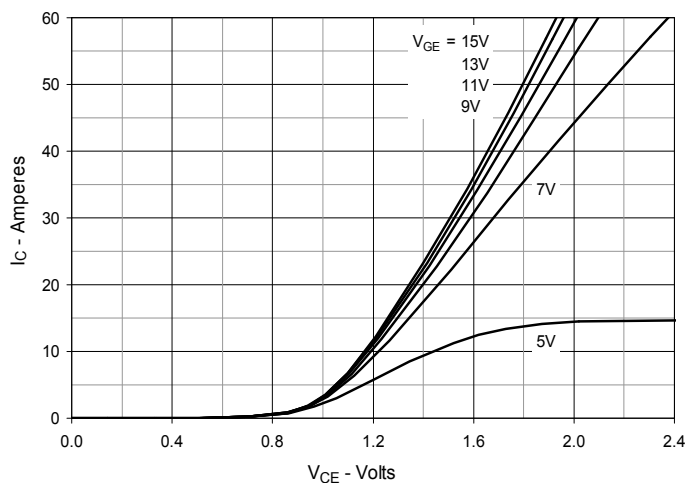
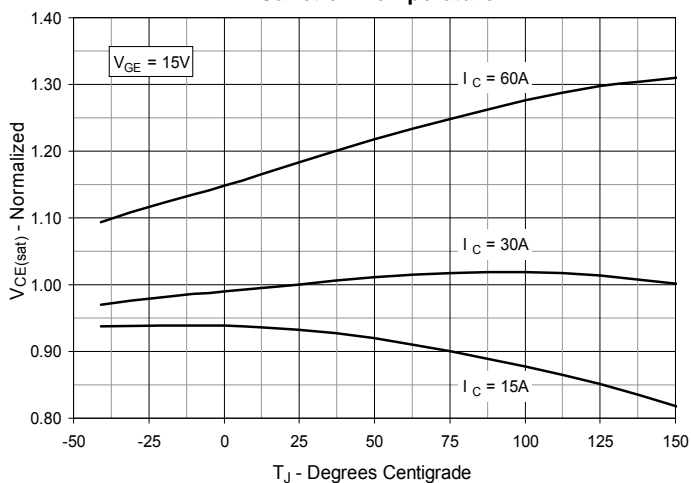
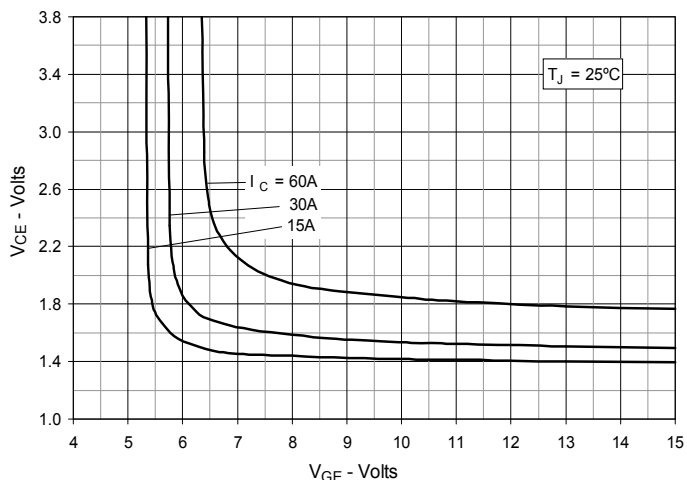
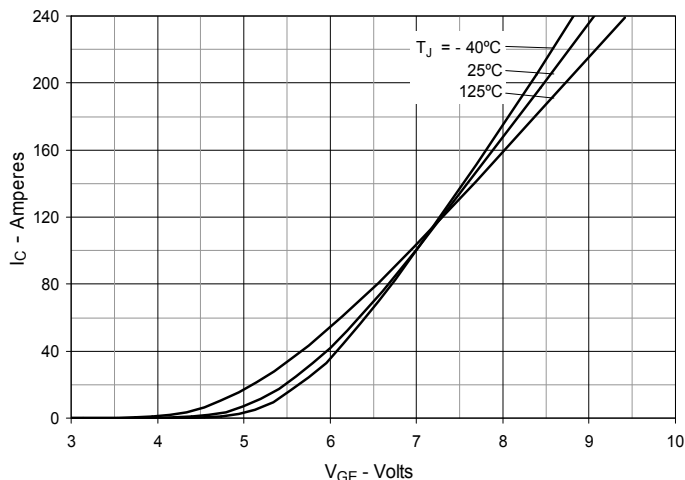
**Fig. 1. Output Characteristics
@ 25°C**

**Fig. 2. Extended Output Characteristics
@ 25°C**

**Fig. 3. Output Characteristics
@ 125°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


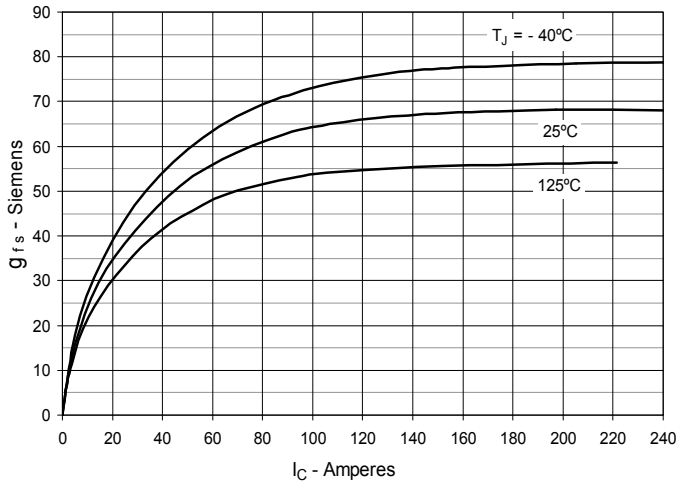
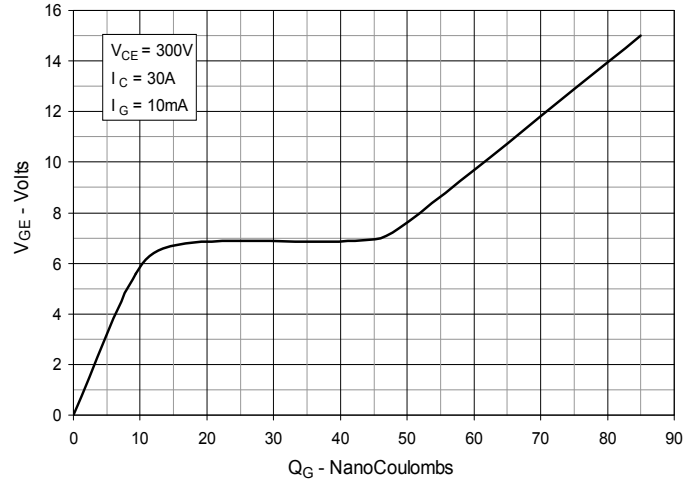
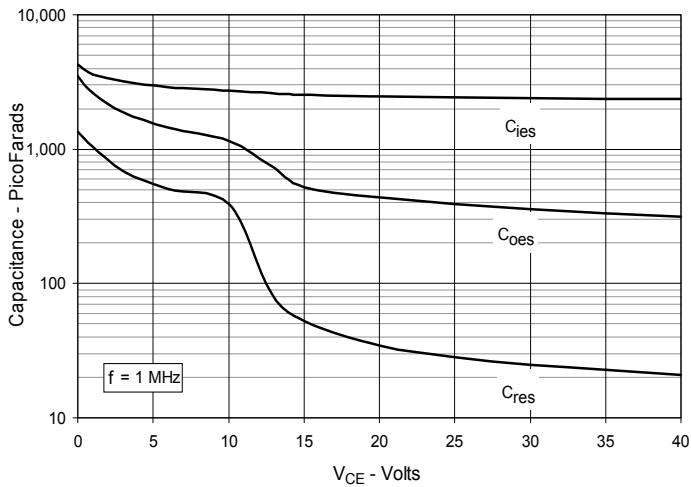
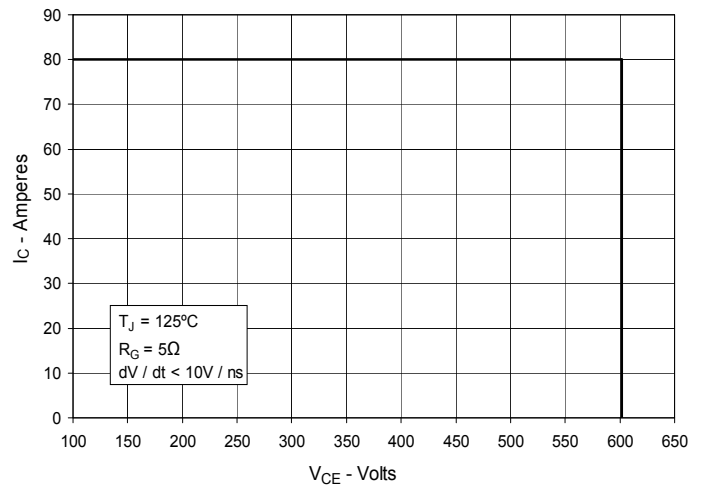
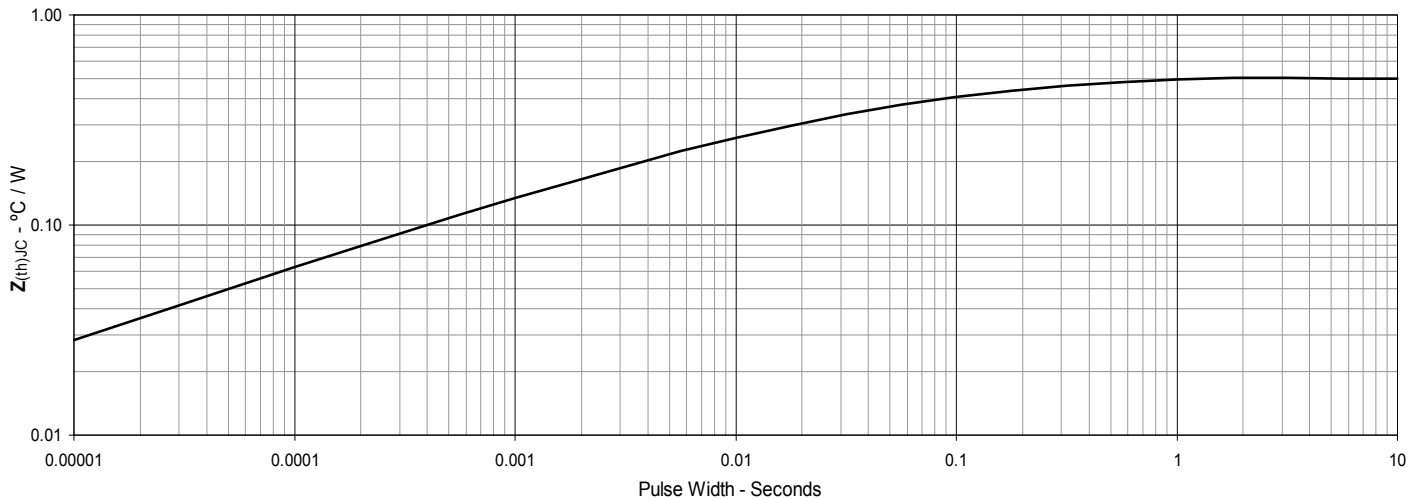
Fig. 7. Transconductance

Fig. 8. Gate Charge

Fig. 9. Capacitance

Fig. 10. Reverse-Bias Safe Operating Area

Fig. 11. Maximum Transient Thermal Impedance


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

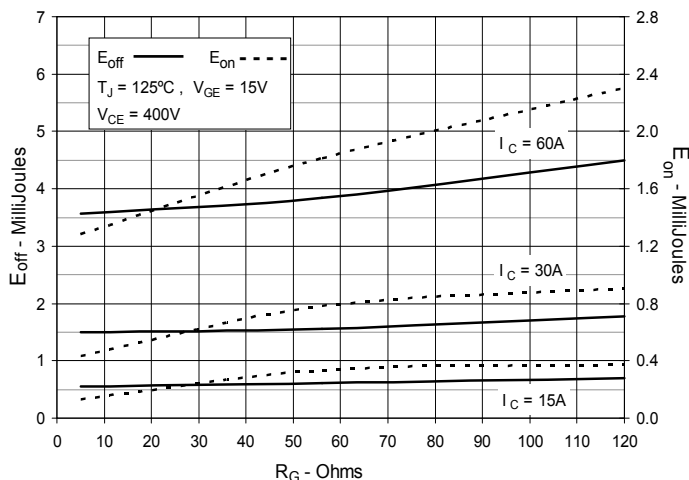


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

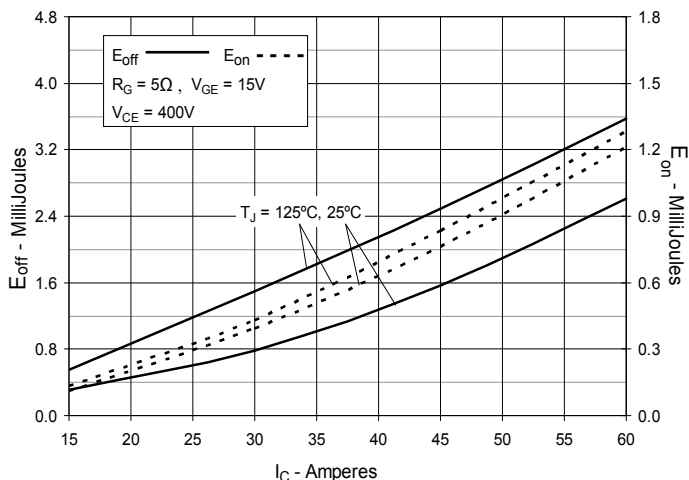


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

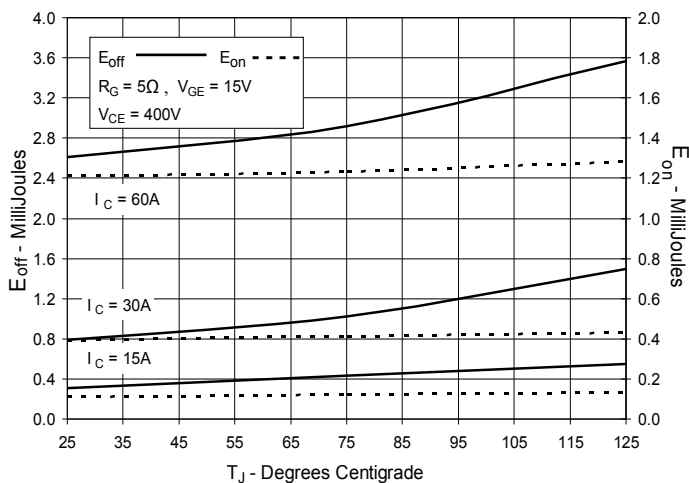


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

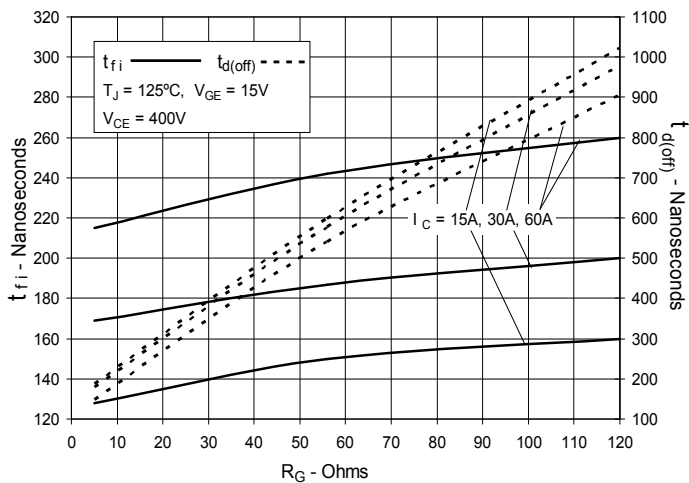


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

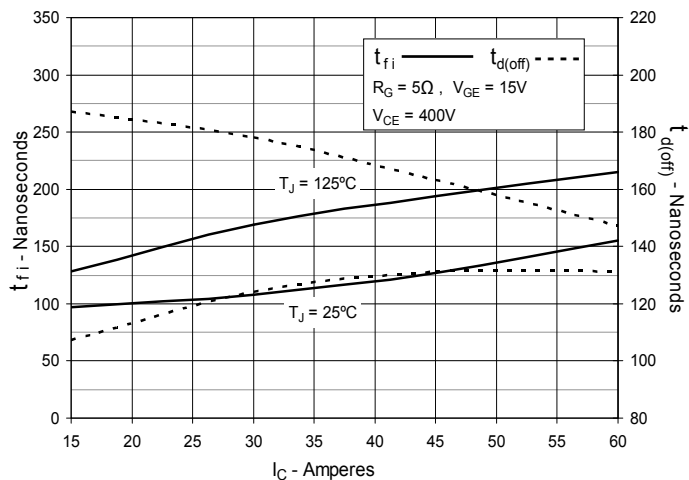


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

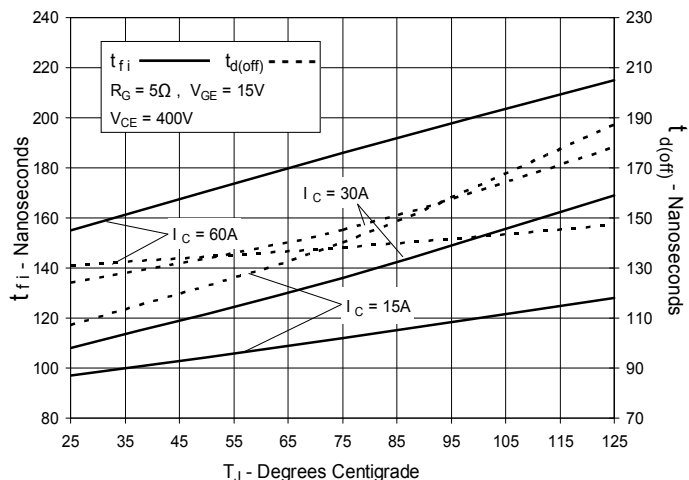
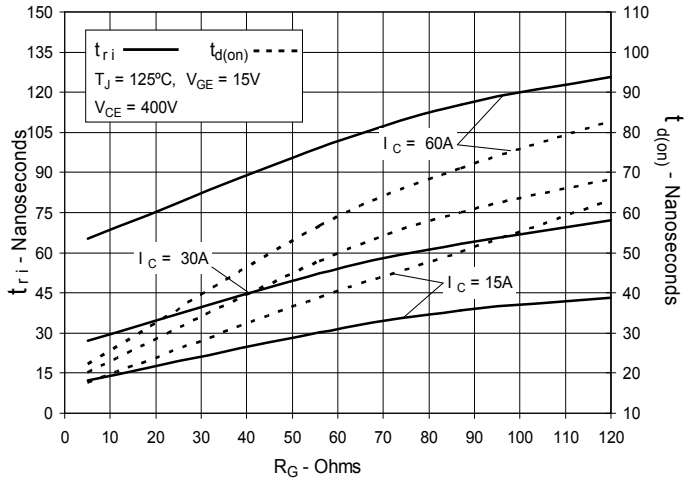
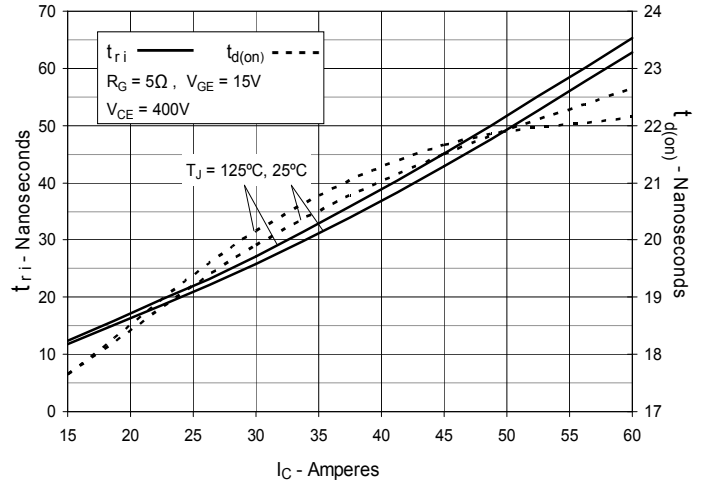
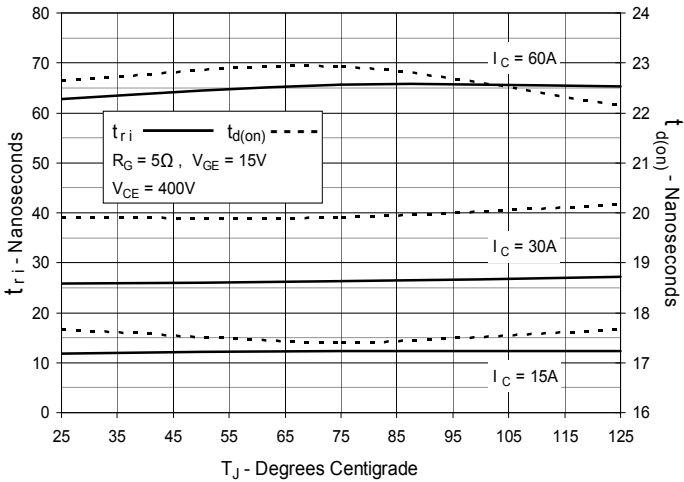
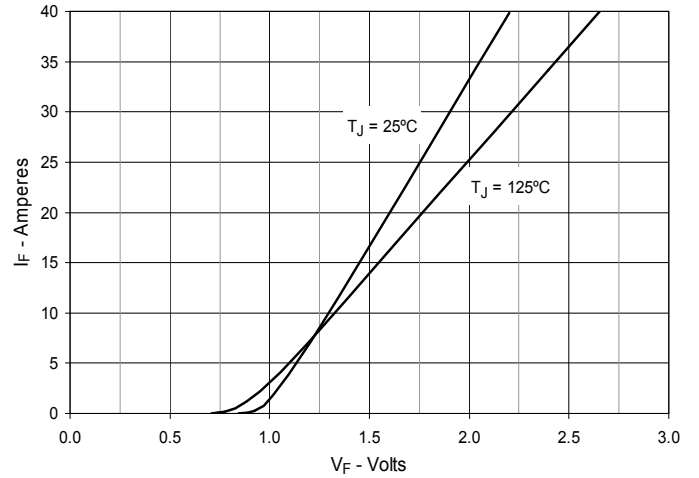
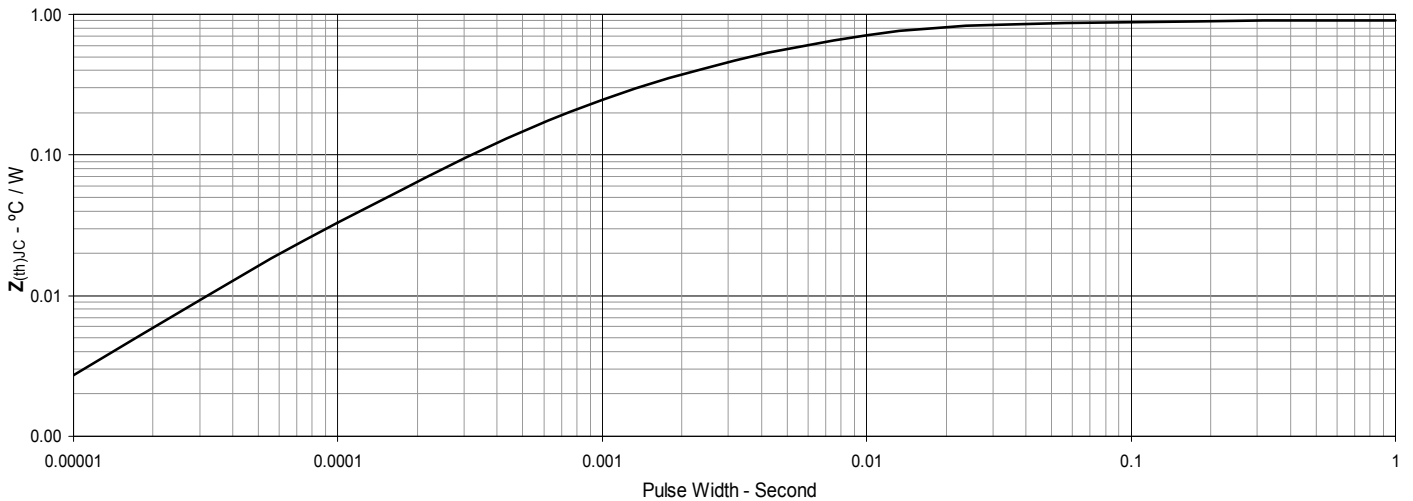


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

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

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

Fig. 21. Forward Current vs. Forward Voltage

Fig. 22. Maximum Transient Thermal Impedance for Diode




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