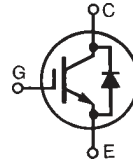


GenX3™ 1400V IGBTs w/ Diode

IXGH28N140B3H1
IXGX28N140B3H1
IXGK28N140B3H1

$V_{CES} = 1400V$
 $I_{C110} = 28A$
 $V_{CE(sat)} \leq 3.60V$

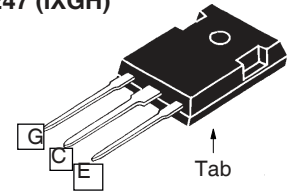
Avalanche Rated



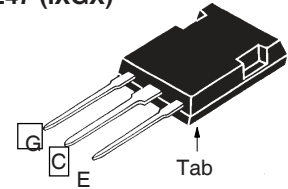
| Symbol | Test Conditions | Maximum Ratings | |
|-------------------------------|---|--|------------|
| V_{CES} | $T_J = 25^\circ C$ to $150^\circ C$ | 1400 | V |
| V_{CGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$ | 1400 | V |
| V_{GES} | Continuous | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ C$ | 60 | A |
| I_{C110} | $T_C = 110^\circ C$ | 28 | A |
| I_{F110} | $T_C = 110^\circ C$ | 15 | A |
| I_{CM} | $T_C = 25^\circ C$, 1ms | 150 | A |
| I_A | $T_C = 25^\circ C$ | 28 | A |
| E_{AS} | $T_C = 25^\circ C$ | 360 | mJ |
| SSOA (RBSOA) | $V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 5\Omega$ Clamped Inductive Load | $I_{CM} = 120$ @ $V_{CES} < V_{CE}$ | A |
| P_C | $T_C = 25^\circ C$ | 300 | 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 (IXGH & IXGK) | 1.13/10 | Nm/lb.in. |
| F_C | Mounting Force (IXGX) | 20..120/4.5..27 | N/lb. |
| Weight | TO-247 & PLUS247 | 6 | g |
| | TO-264 | 10 | g |

| 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} | $V_{CE} = V_{CES}$, $V_{GE} = 0V$ Note 2, $T_J = 125^\circ C$ | | | 50 μA 1 mA |
| I_{GES} | $V_{CE} = 0V$, $V_{GE} = \pm 20V$ | | | ± 100 nA |
| $V_{CE(sat)}$ | $I_C = I_{C110}$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ C$ | | 3.00 3.05 | 3.60 V |

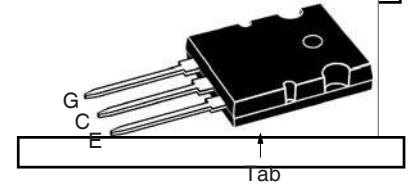
TO-247 (IXGH)



PLUS247 (IXGX)



TO-264 (IXGK)



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

Features

- Optimized for Low Conduction and Switching Losses
- Square RBSOA
- Avalanche Rated
- Anti-Parallel Ultra Fast Diode
- High Current Handling Capability

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

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

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|--------------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $I_C = I_{C110}, V_{CE} = 10\text{V}$, Note 1 | 12 | 19 | S |
| C_{ies} | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{ MHz}$ | | 1830 | pF |
| C_{oes} | | | 163 | pF |
| C_{res} | | | 46 | pF |
| $Q_{g(on)}$ | $I_C = I_{C110}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$ | | 88 | nC |
| Q_{ge} | | | 12 | nC |
| Q_{gc} | | | 38 | nC |
| $t_{d(on)}$ | Inductive load, $T_J = 25^\circ\text{C}$ $I_C = I_{C110}, V_{GE} = 15\text{V}$ $V_{CE} = 960\text{V}, R_G = 5\Omega$ Note 3 | | 16 | ns |
| t_{ri} | | | 36 | ns |
| E_{on} | | | 3.6 | mJ |
| $t_{d(off)}$ | | | 190 | 400 ns |
| t_{fi} | | | 360 | ns |
| E_{off} | | | 3.9 | 6.5 J |
| $t_{d(on)}$ | Inductive load, $T_J = 125^\circ\text{C}$ $I_C = I_{C110}, V_{GE} = 15\text{V}$ $V_{CE} = 960\text{V}, R_G = 5\Omega$ Note 3 | | 16 | ns |
| t_{ri} | | | 50 | ns |
| E_{on} | | | 7.3 | mJ |
| $t_{d(off)}$ | | | 215 | ns |
| t_{fi} | | | 700 | ns |
| E_{off} | | | 6.5 | mJ |
| R_{thJC} | | | 0.42 | $^\circ\text{C/W}$ |
| R_{thCs} | | 0.21 | | $^\circ\text{C/W}$ |
| | | 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 | $I_F = 20\text{A}, V_{GE} = 0\text{V}$, Note 1 $T_J = 150^\circ\text{C}$ | | | 3.0 V |
| | | | 2.65 | V |
| t_{rr} | $I_F = 20\text{A}, V_{GE} = 0\text{V}, -di_F/dt = -200\text{A}/\mu\text{s}$ $V_R = 1200\text{V}, T_J = 125^\circ\text{C}$ | | 350 | ns |
| I_{RM} | | | 18.5 | A |
| R_{thJC} | | | | 0.90 $^\circ\text{C/W}$ |

Notes:

1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.
2. Part must be heatsunk for high-temp I_{ces} measurement.
3. 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.

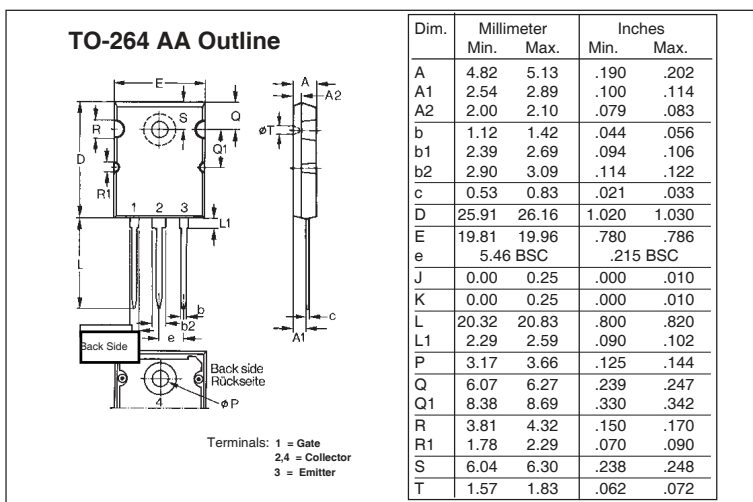
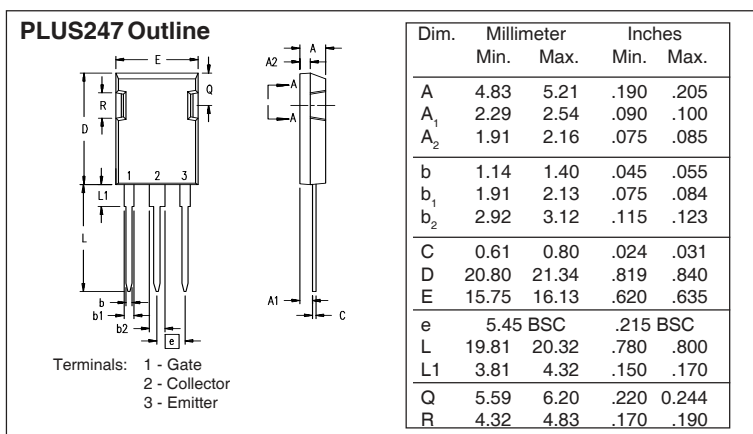
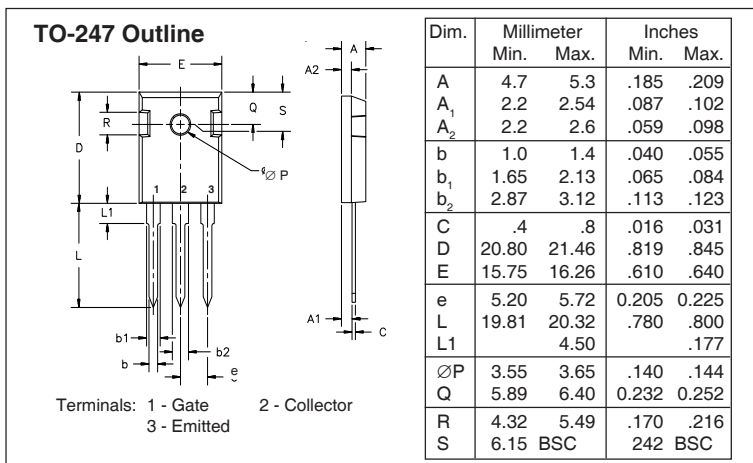


Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

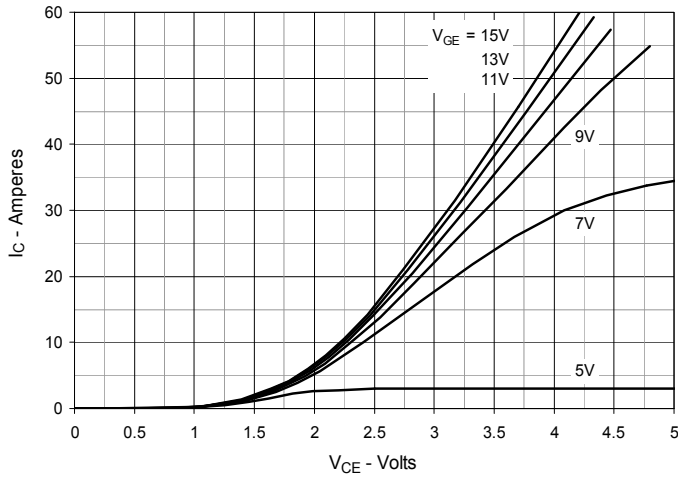


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

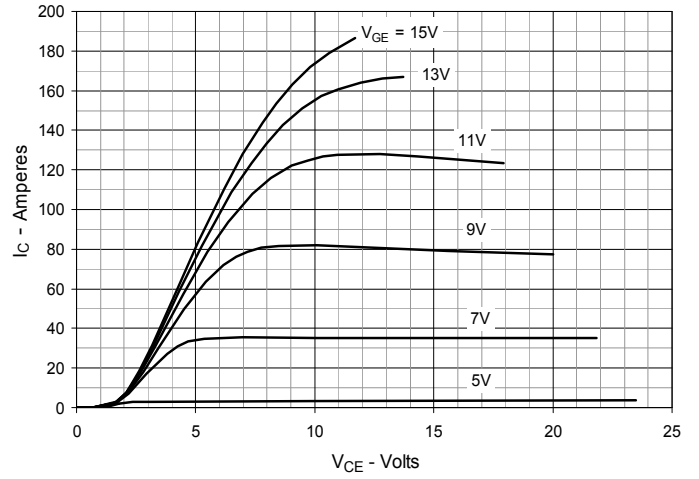


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

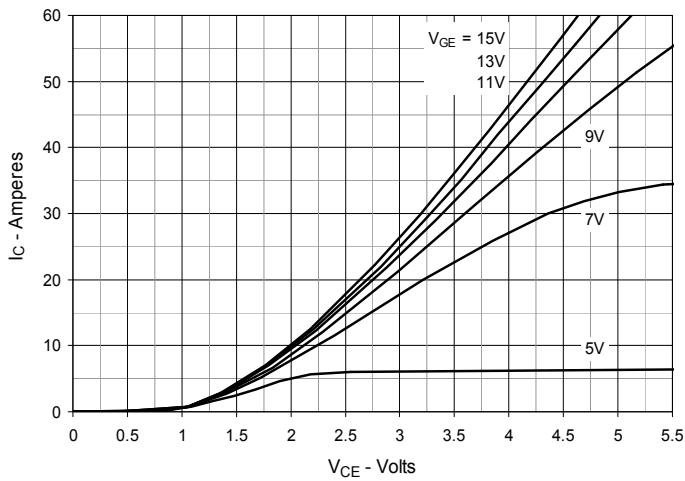


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

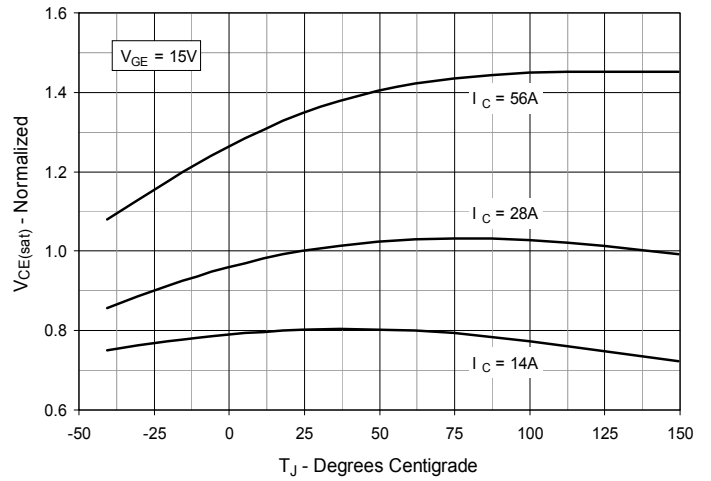


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

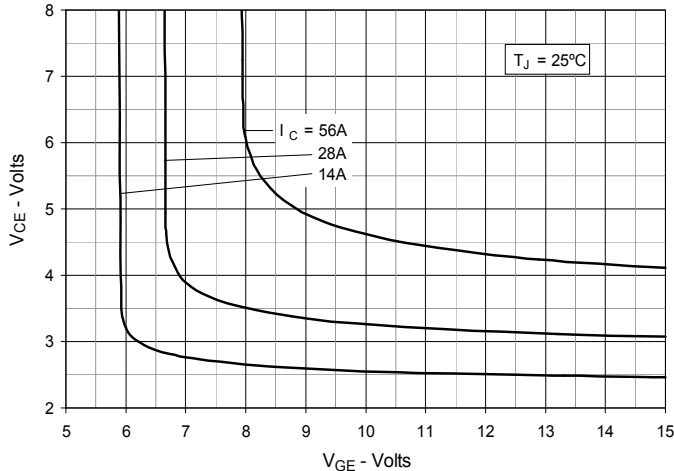


Fig. 6. Input Admittance

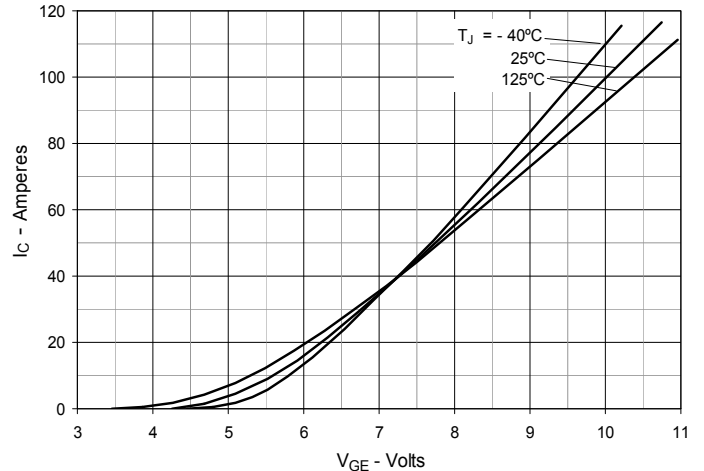


Fig. 7. Transconductance

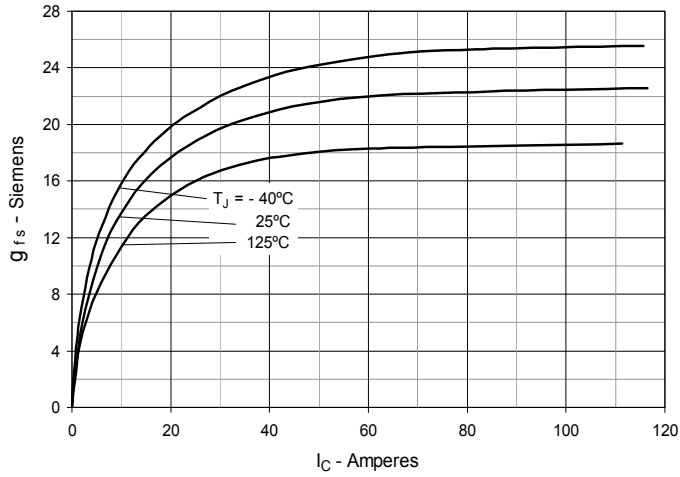


Fig. 8. Gate Charge

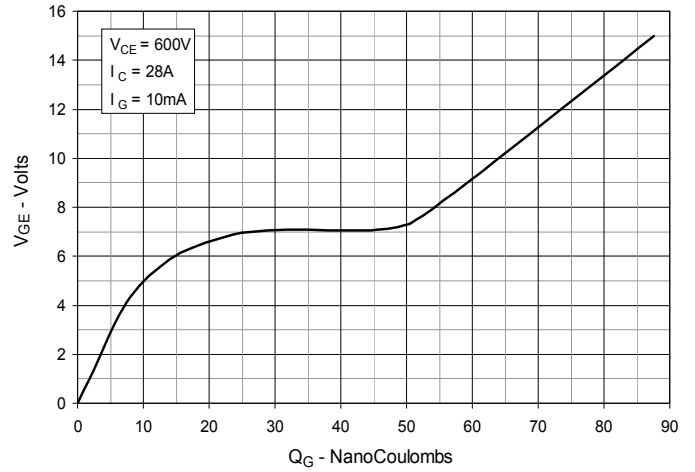


Fig. 9. Capacitance

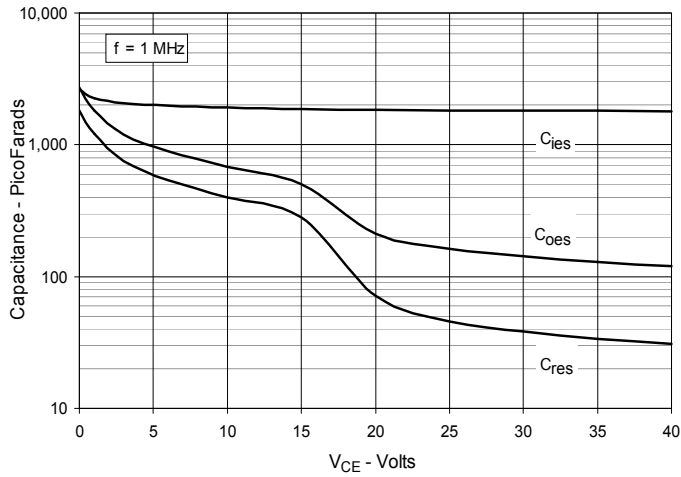


Fig. 10. Reverse-Bias Safe Operating Area

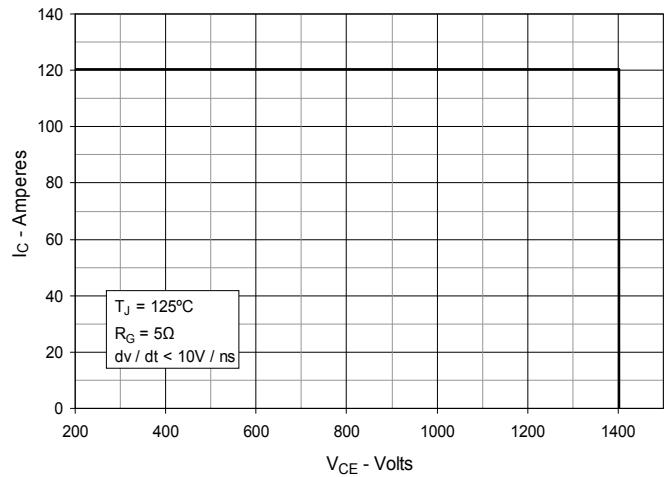


Fig. 11. Maximum Transient Thermal Impedance

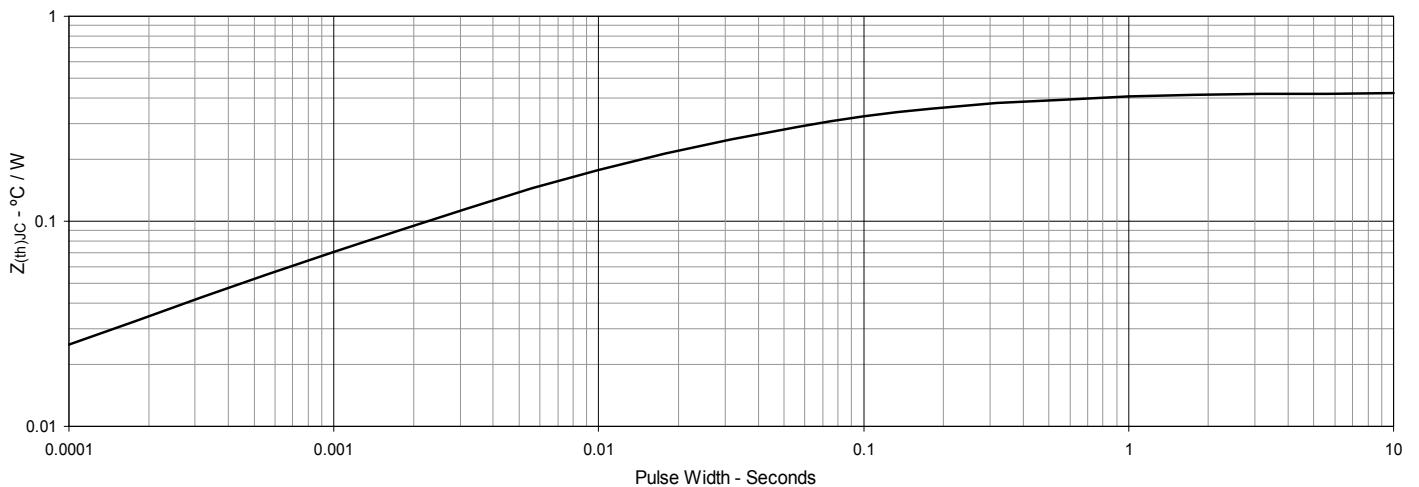


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

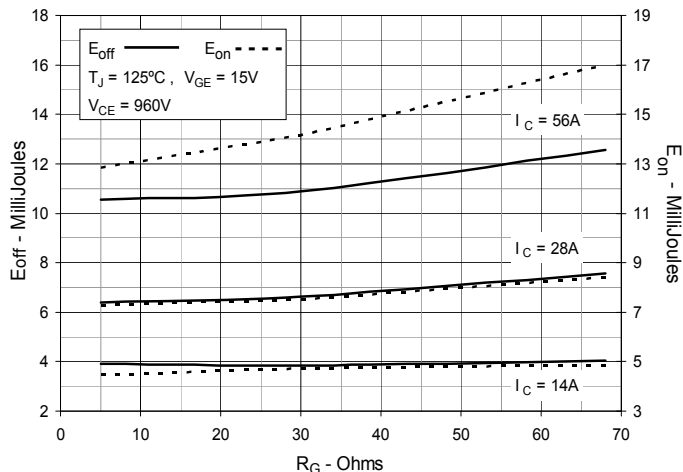


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

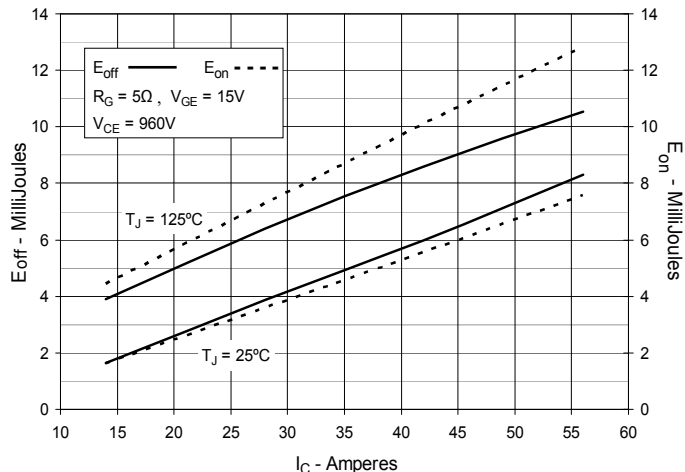


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

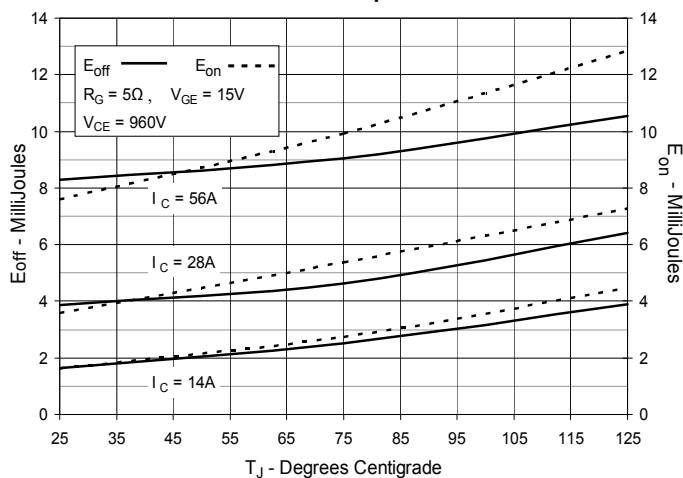


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

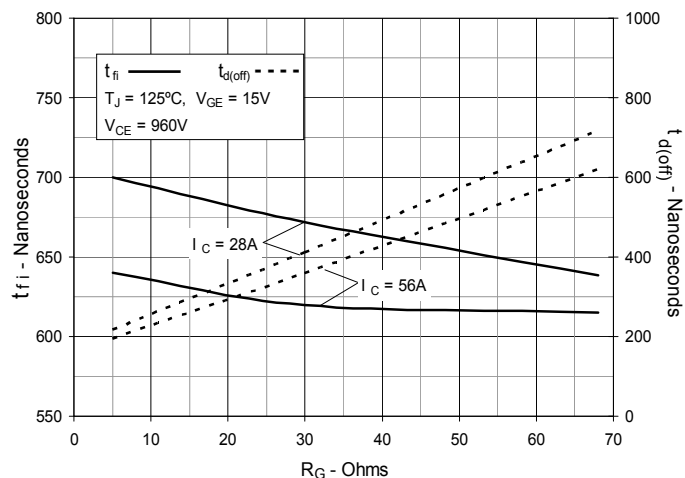


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

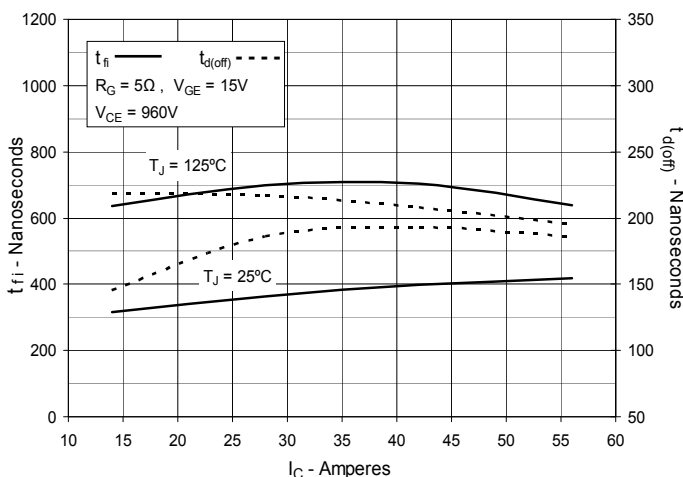


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

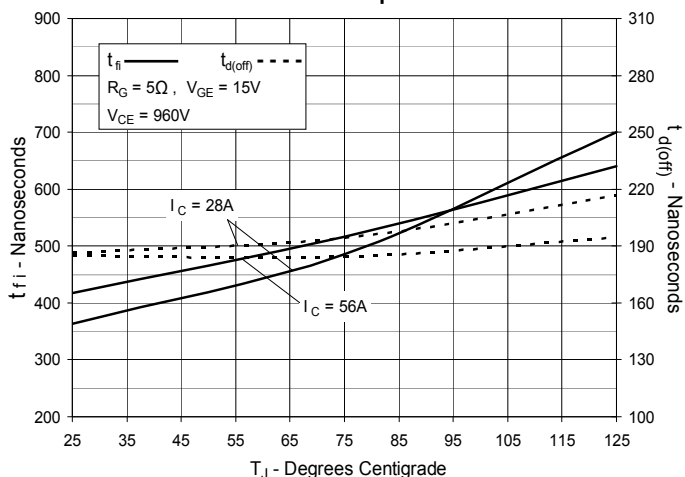


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

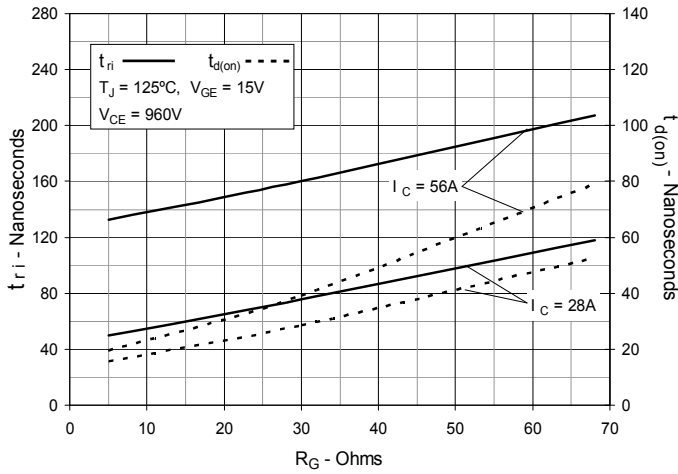


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

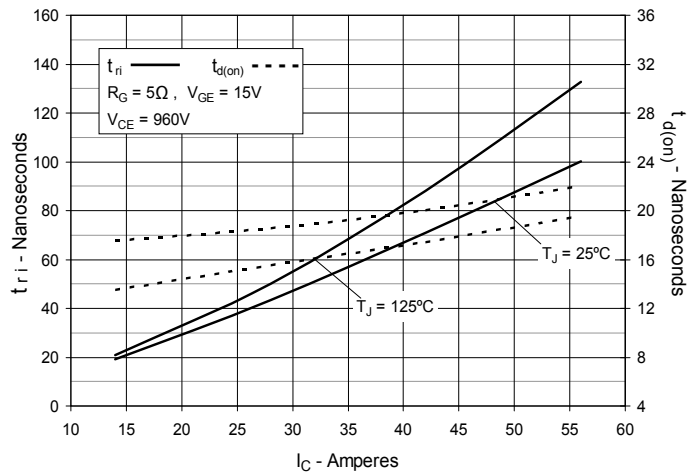
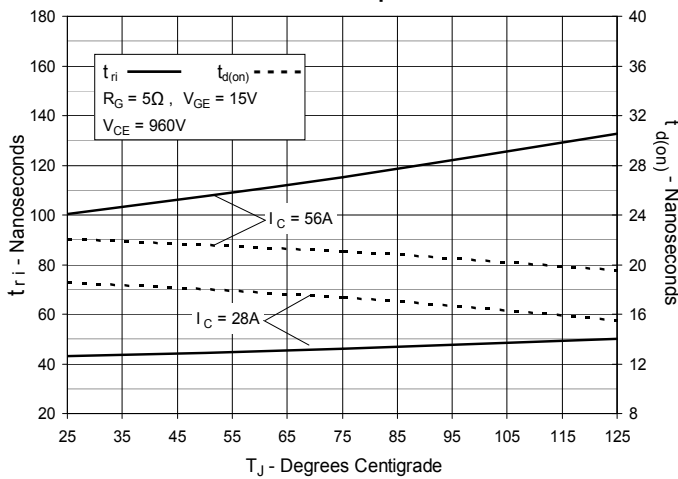


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature





Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.