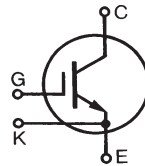


GenX3™ A3-Class IGBTs

IXGK120N60A3
IXGX120N60A3

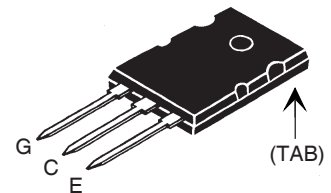
$V_{CES} = 600V$
 $I_{C110} = 120A$
 $V_{CE(sat)} \leq 1.35V$

Ultra-Low V_{sat} PT IGBTs for
up to 5kHz Switching

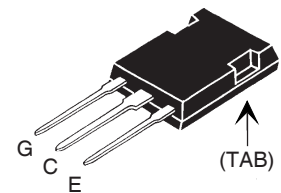


| Symbol | Test Conditions | Maximum Ratings | |
|-------------------------------|---|--------------------------------|------------|
| V_{CES} | $T_J = 25^\circ C$ to $150^\circ C$ | 600 | V |
| V_{CGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$ | 600 | V |
| V_{GES} | Continuous | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ C$ | 200 | A |
| I_{C110} | $T_C = 110^\circ C$ | 120 | A |
| I_{LRMS} | Terminal Current Limit | 75 | A |
| I_{CM} | $T_C = 25^\circ C$, 1ms | 600 | A |
| SSOA (RBSOA) | $V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 1.5\Omega$ Clamped Inductive Load | $I_{CM} = 200$ @ ≤ 600 | A V |
| P_c | $T_C = 25^\circ C$ | 780 | 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)



PLUS 247™ (IXGX)



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

Features

- Optimized for Low Conduction Losses
- Square RBSOA
- High Current Handling Capability
- International Standard Packages

Advantages

- High Power Density
- Low Gate Drive Requirement

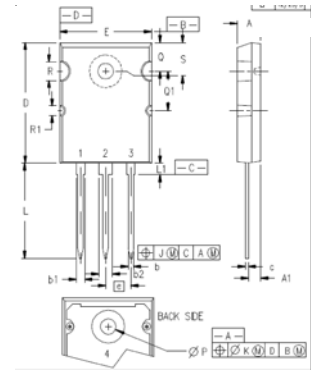
Applications

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

| Symbol | Test Conditions ($T_J = 25^\circ C$, Unless Otherwise Specified) | Characteristic Values | | |
|---------------|---|-----------------------|------|-----------------------|
| | | Min. | Typ. | Max. |
| $V_{GE(th)}$ | $I_C = 500\mu A$, $V_{CE} = V_{GE}$ | 3.0 | | 5.0 V |
| I_{CES} | $V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ C$ | | | 50 μA 1.25 mA |
| I_{GES} | $V_{CE} = 0V$, $V_{GE} = \pm 20V$ | | | ± 400 nA |
| $V_{CE(sat)}$ | $I_C = 100A$, $V_{GE} = 15V$, Note 1 | | 1.20 | 1.35 V |

| Symbol | Test Conditions | Characteristic Values | | |
|--------------|---|-----------------------|------|--------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $I_C = 60A, V_{CE} = 10V$, Note 1 | 65 | 108 | S |
| C_{ies} | $V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$ | | 14.8 | nF |
| C_{oes} | | | 800 | pF |
| C_{res} | | | 140 | pF |
| $Q_{g(on)}$ | $I_C = I_{C110}, V_{GE} = 15V, V_{CE} = 0.5 \cdot V_{CES}$ | | 450 | nC |
| Q_{ge} | | | 67 | nC |
| Q_{gc} | | | 130 | nC |
| $t_{d(on)}$ | Inductive load, $T_J = 25^\circ C$ $I_C = 100A, V_{GE} = 15V$ $V_{CE} = 480V, R_G = 1.5\Omega$ | | 39 | ns |
| t_{ri} | | | 82 | ns |
| E_{on} | | | 2.7 | mJ |
| $t_{d(off)}$ | | | 295 | ns |
| t_{fi} | | | 260 | ns |
| E_{off} | | | 6.6 | mJ |
| $t_{d(on)}$ | Inductive load, $T_J = 125^\circ C$ $I_C = 100A, V_{GE} = 15V$ $V_{CE} = 480V, R_G = 1.5\Omega$ | | 40 | ns |
| t_{ri} | | | 83 | ns |
| E_{on} | | | 3.5 | mJ |
| $t_{d(off)}$ | | | 420 | ns |
| t_{fi} | | | 410 | ns |
| E_{off} | | | 10.4 | mJ |
| R_{thJC} | | | 0.16 | $^\circ C/W$ |
| R_{thCK} | | 0.15 | | $^\circ C/W$ |

TO-264 (IXGK) Outline

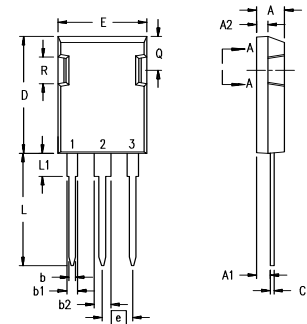


1 - GATE
2, 4 - DRAIN (COLLECTOR)
3 - SOURCE (EMITTER)

| SYM | INCHES | | MILLIMETERS | |
|------------------|---------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .185 | .209 | 4.70 | 5.31 |
| A1 | .102 | .118 | 2.59 | 3.00 |
| b | .037 | .055 | 0.94 | 1.40 |
| b1 | .087 | .102 | 2.21 | 2.59 |
| b2 | .110 | .126 | 2.79 | 3.20 |
| c | .017 | .029 | 0.43 | 0.74 |
| D | 1.007 | 1.047 | 25.58 | 26.59 |
| E | .760 | .799 | 19.30 | 20.29 |
| e | .215BSC | | 5.46 BSC | |
| J | .000 | .010 | 0.00 | 0.25 |
| K | .000 | .010 | 0.00 | 0.25 |
| L | .779 | .842 | 19.79 | 21.39 |
| L1 | .087 | .102 | 2.21 | 2.59 |
| $\varnothing P$ | .122 | .138 | 3.10 | 3.51 |
| Q | .240 | .256 | 6.10 | 6.50 |
| Q1 | .330 | .346 | 8.38 | 8.79 |
| $\varnothing R$ | .155 | .187 | 3.94 | 4.75 |
| $\varnothing R1$ | .085 | .093 | 2.16 | 2.36 |
| S | .243 | .253 | 6.17 | 6.43 |

Note: 1. Pulse Test, $t \leq 300\mu s$; Duty Cycle, $d \leq 2\%$.

PLUS 247™ (IXGX) Outline



Terminals: 1 - Gate
2 - Drain (Collector)
3 - Source (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 |

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 @ 25°C

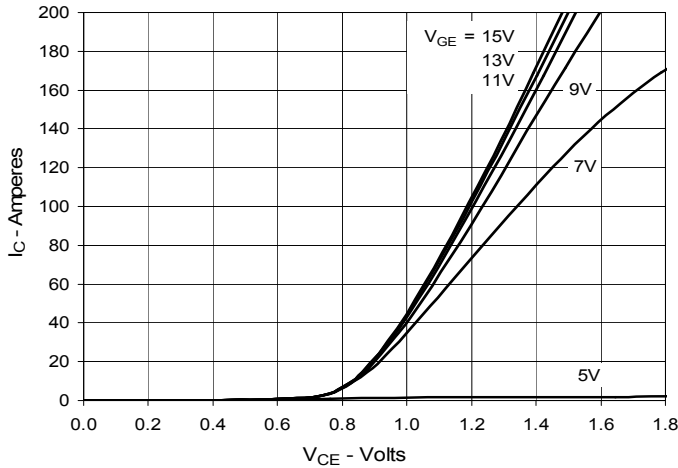


Fig. 2. Extended Output Characteristics @ 25°C

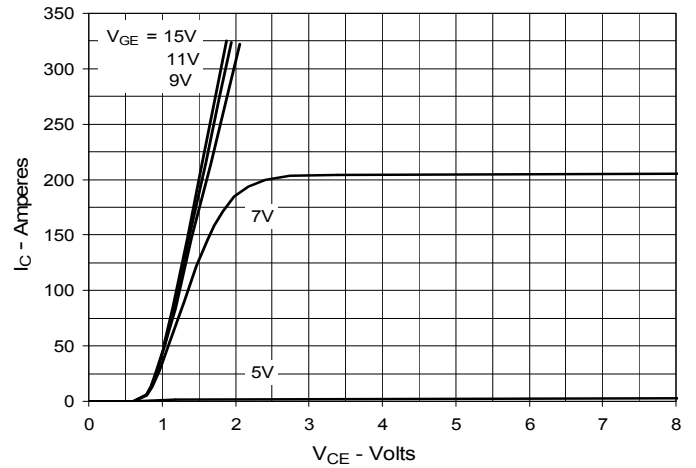


Fig. 3. Output Characteristics @ 125°C

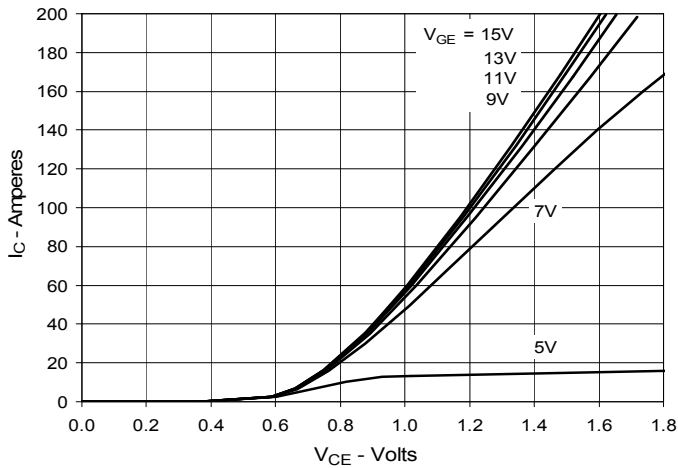


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

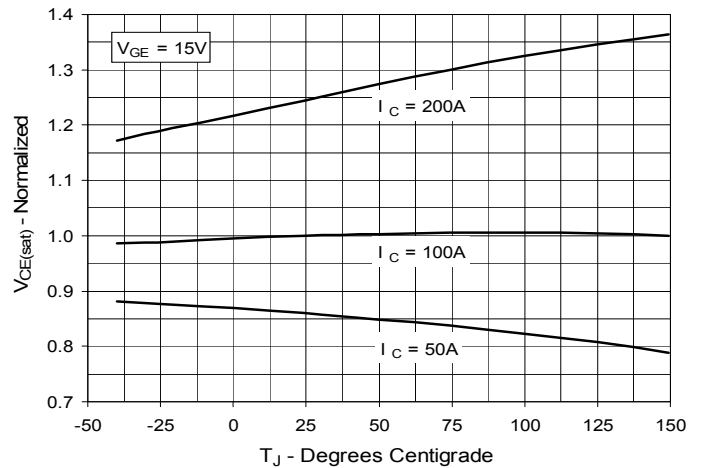


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

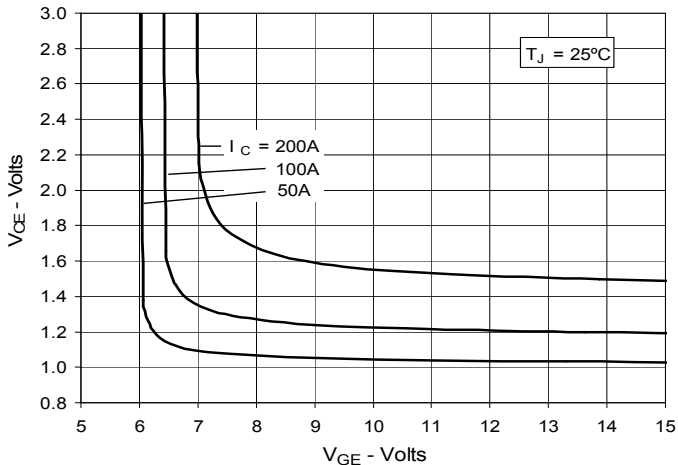


Fig. 6. Input Admittance

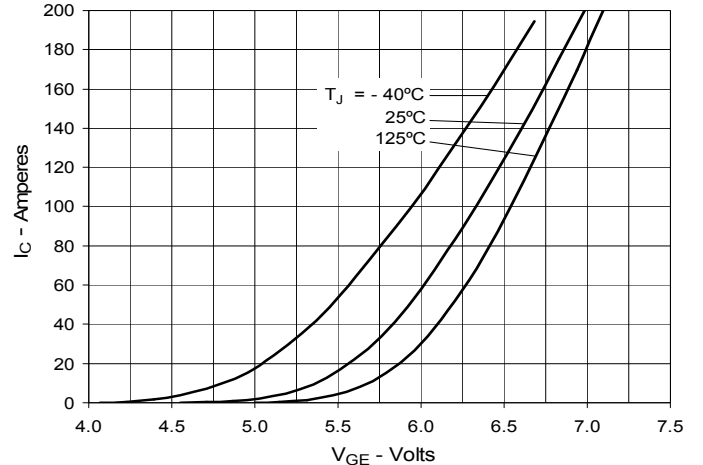


Fig. 7. Transconductance

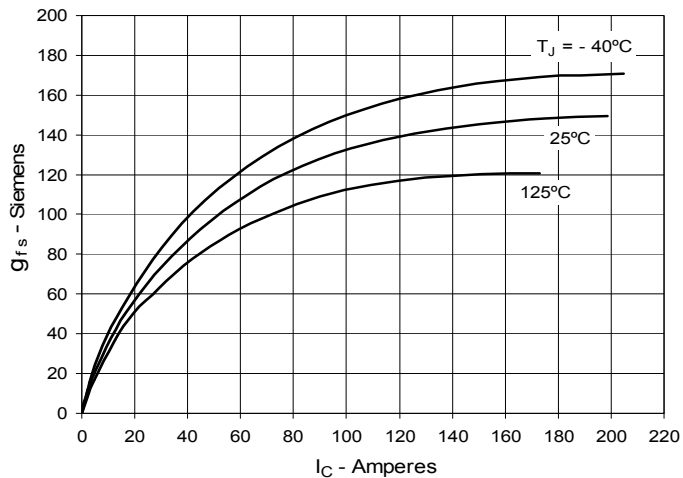


Fig. 8. Gate Charge

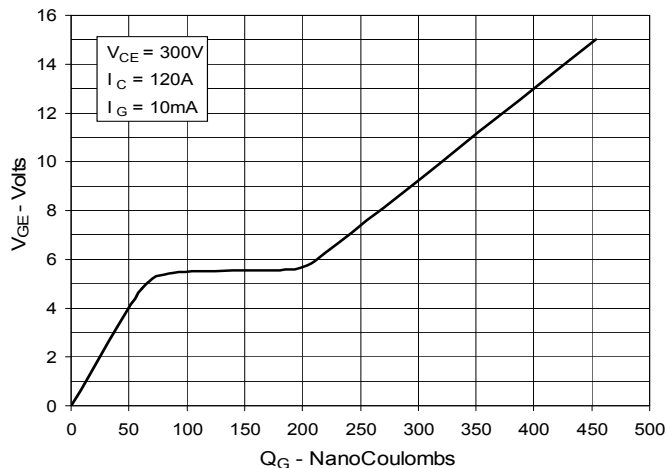


Fig. 9. Capacitance

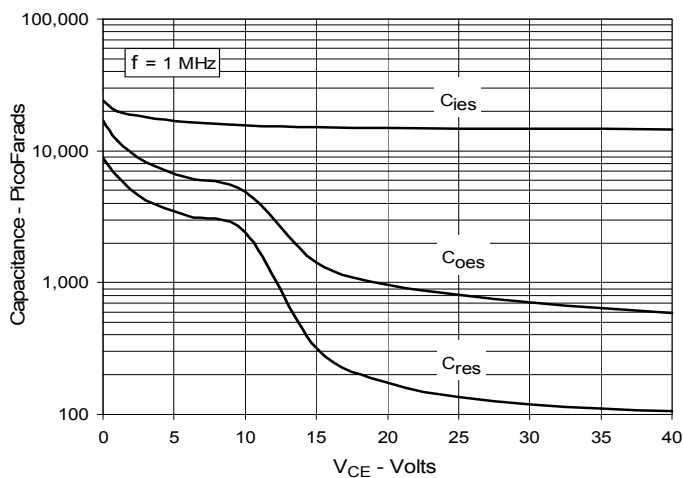


Fig. 10. Reverse-Bias Safe Operating Area

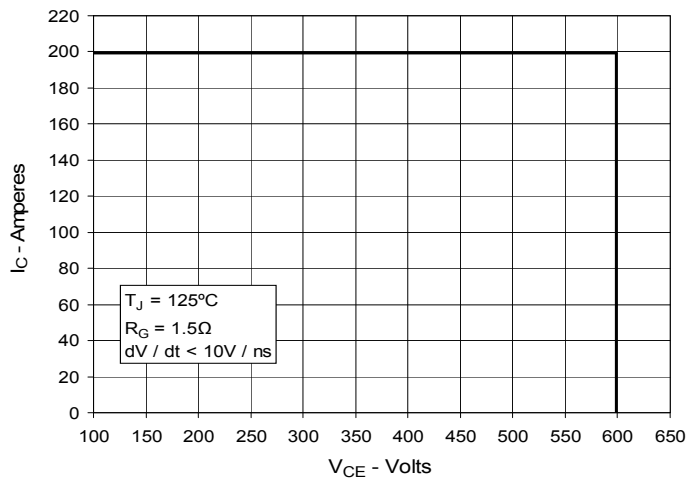


Fig. 11. Maximum Transient Thermal Impedance

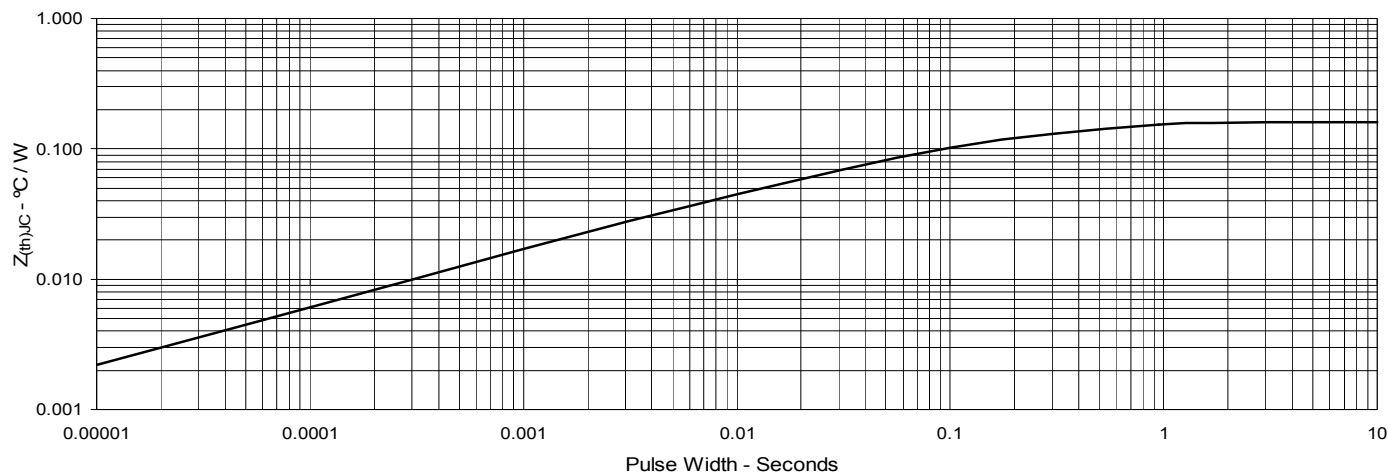


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance



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

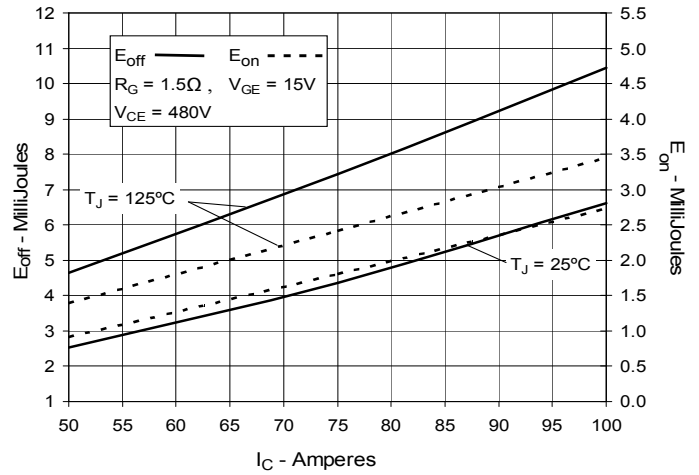


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature



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

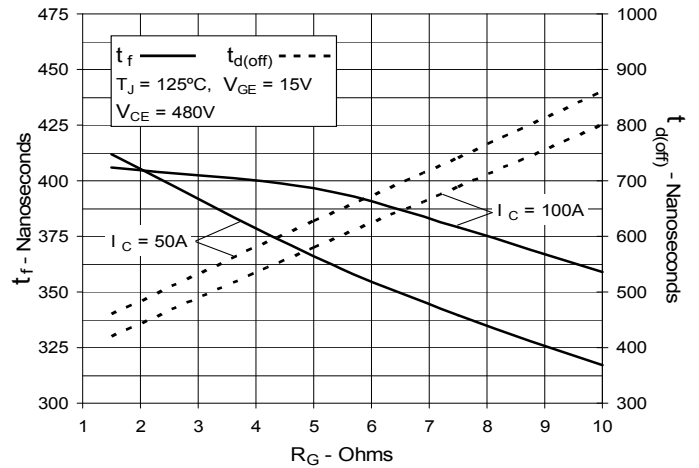


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

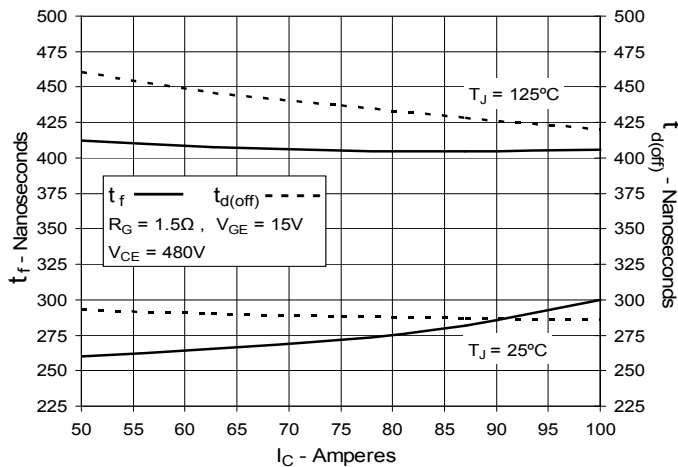
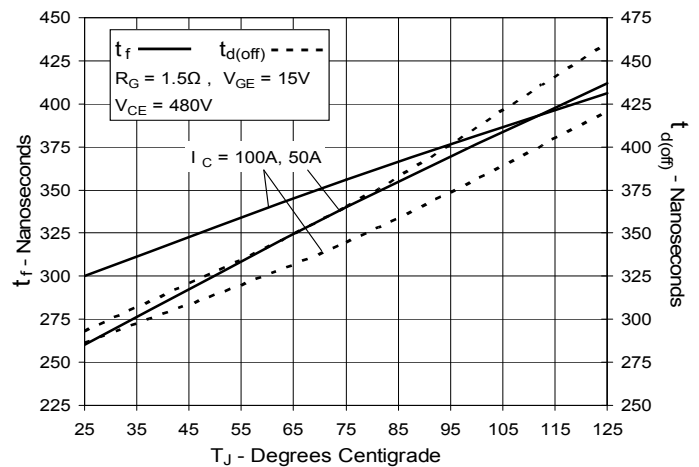
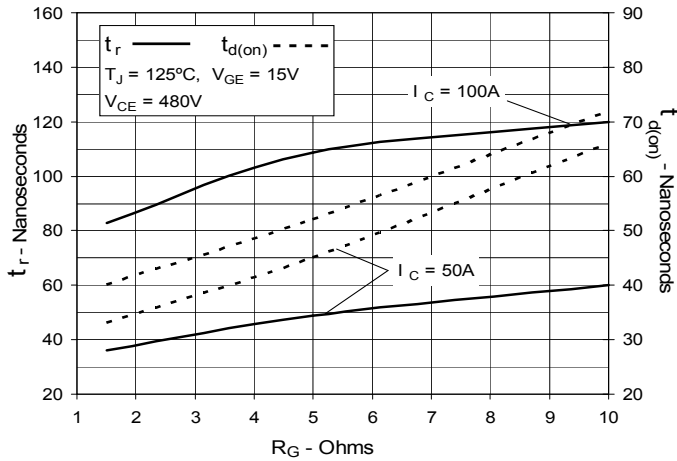


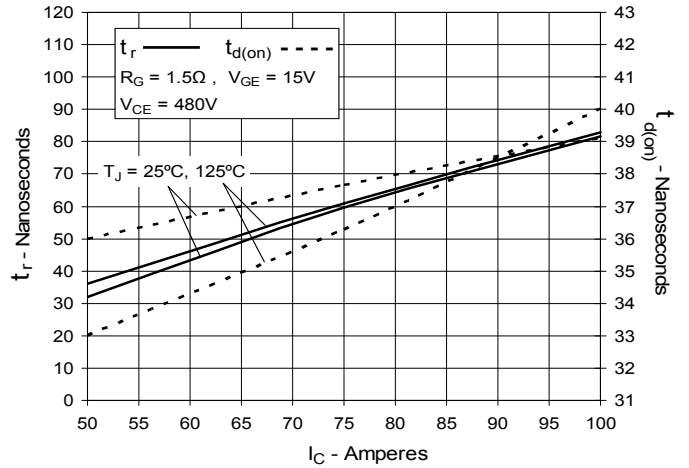
Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature



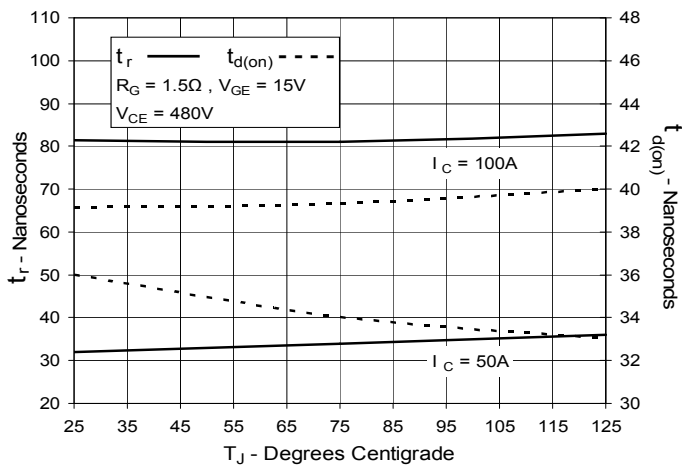
**Fig. 18. Inductive Turn-on
Switching Times vs. Gate Resistance**



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



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





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