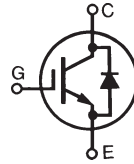


BiMOSFET™ Monolithic Bipolar MOS Transistor

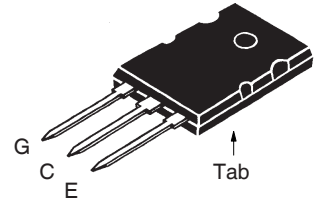
IXBK75N170A IXBX75N170A



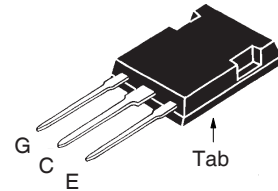
$V_{CES} = 1700V$
 $I_{C90} = 65A$
 $V_{CE(sat)} \leq 6.00V$
 $t_{fi(typ)} = 60ns$

| Symbol | Test Conditions | Maximum Ratings | |
|----------------|---|---------------------------------|------------|
| V_{CES} | $T_J = 25^\circ C$ to $150^\circ C$ | 1700 | V |
| V_{CGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$ | 1700 | V |
| V_{GES} | Continuous | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ C$ | 110 | A |
| I_{C90} | $T_C = 90^\circ C$ | 65 | A |
| I_{CM} | $T_C = 25^\circ C$, 1ms | 300 | A |
| SSOA | $V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 1\Omega$ | $I_{CM} = 100$ | A |
| (RBSOA) | Clamped Inductive Load | $V_{CE} \leq 0.8 \cdot V_{CES}$ | |
| P_C | $T_C = 25^\circ C$ | 1040 | 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 (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 (IXBK)



PLUS247™ (IXBX)



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

Features

- International Standard Packages
- High Blocking Voltage
- Fast Switching
- High Current Handling Capability
- Anti-Parallel Diode

Advantages

- High Power Density
- Low Gate Drive Requirement
- Intergrated Diode Can Be Used for Protection

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- UPS
- AC Motor Drives
- Substitutes for High Voltage MOSFET

| Symbol | Test Conditions ($T_J = 25^\circ C$, Unless Otherwise Specified) | Characteristic Values | | |
|---------------|---|-----------------------|------|--------------------|
| | | Min. | Typ. | Max. |
| BV_{CES} | $I_C = 250\mu A$, $V_{GE} = 0V$ | 1700 | | V |
| $V_{GE(th)}$ | $I_C = 1.5mA$, $V_{CE} = V_{GE}$ | 2.5 | | 5.5 V |
| I_{CES} | $V_{CE} = 0.8 \cdot V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ C$ | | | 50 μA 3 mA |
| I_{GES} | $V_{CE} = 0V$, $V_{GE} = \pm 20V$ | | | ± 100 nA |
| $V_{CE(sat)}$ | $I_C = 42A$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ C$ | 4.95 5.15 | | 6.00 V V |

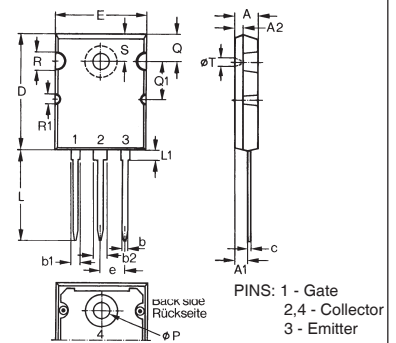
Symbol Test Conditions

($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)

Characteristic Values

| Symbol | Test Conditions | Characteristic Values | | | |
|--------------|---|-----------------------|------|--------------------|----|
| | | Min. | Typ. | Max. | |
| g_{fs} | $I_C = 42\text{A}, V_{CE} = 10\text{V}$, Note 1 | 28 | 48 | S | |
| C_{ies} | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$ | | 7200 | pF | |
| C_{oes} | | | 450 | pF | |
| C_{res} | | | 150 | pF | |
| Q_g | $I_C = 42\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$ | | 358 | nC | |
| Q_{ge} | | | 46 | nC | |
| Q_{gc} | | | 148 | nC | |
| $t_{d(on)}$ | Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 42\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.8 \cdot V_{CES}, R_G = 1\Omega$ Note 2 | | 26 | ns | |
| t_{ri} | | | 40 | ns | |
| $t_{d(off)}$ | | | 418 | ns | |
| t_{fi} | | | 60 | 110 | ns |
| E_{off} | | | 3.80 | 7.00 | mJ |
| $t_{d(on)}$ | Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 42\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.8 \cdot V_{CES}, R_G = 1\Omega$ Note 2 | | 27 | ns | |
| t_{ri} | | | 38 | ns | |
| $t_{d(off)}$ | | | 420 | ns | |
| t_{fi} | | | 175 | ns | |
| E_{off} | | | 6.35 | mJ | |
| R_{thJC} | | | 0.12 | $^\circ\text{C/W}$ | |
| R_{thCS} | | 0.15 | | $^\circ\text{C/W}$ | |

TO-264 AA (IXBK) 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 |

Reverse Diode

Symbol Test Conditions

($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)

Characteristic Values

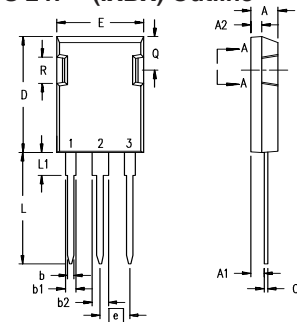
| Symbol | Test Conditions | Characteristic Values | | |
|----------|--|-----------------------|------|---------------|
| | | Min. | Typ. | Max. |
| V_F | $I_F = 42\text{A}, V_{GE} = 0\text{V}$, Note 1 | | | 5.5 V |
| t_{rr} | $I_F = 42\text{A}, V_{GE} = 0\text{V}, -di_F/dt = 100\text{A}/\mu\text{s}$ | | 360 | ns |
| I_{RM} | | | 19 | A |
| Q_{RM} | $V_R = 100\text{V}, V_{GE} = 0\text{V}$ | | 3.5 | μC |

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 .

Additional provisions for lead-to-lead isolation are required at $V_{CE} > 1200\text{V}$.

PLUS 247™ (IXBX) 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 | 7,157,338 B2 |
| | 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 | |

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

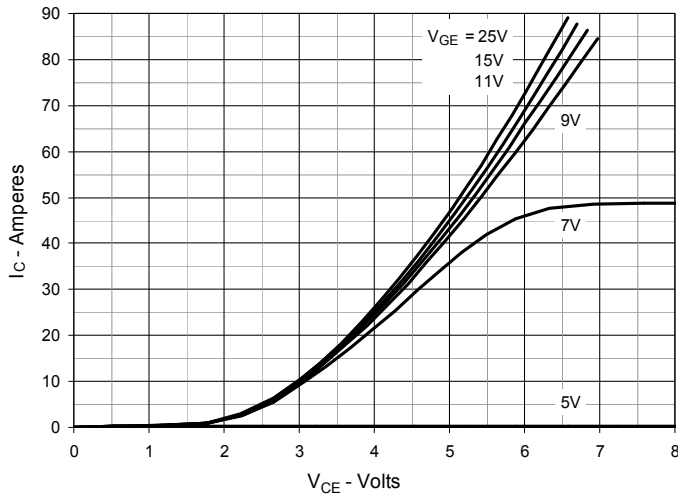


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

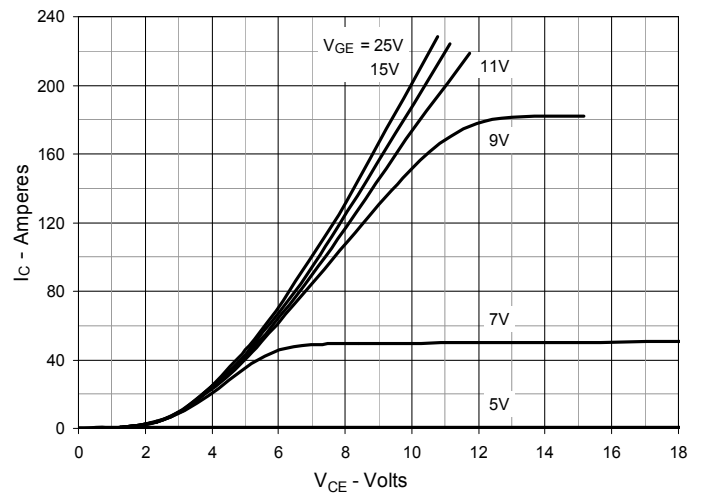


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

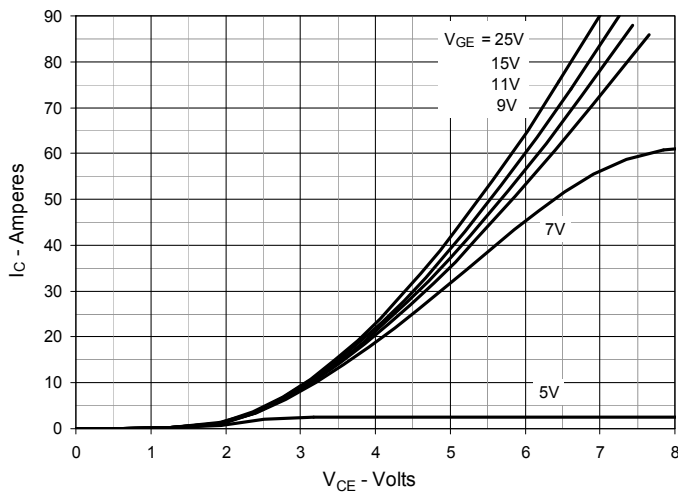


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

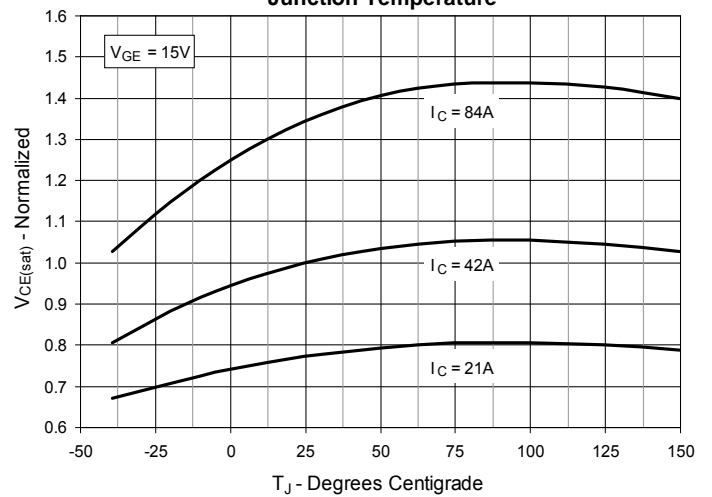


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

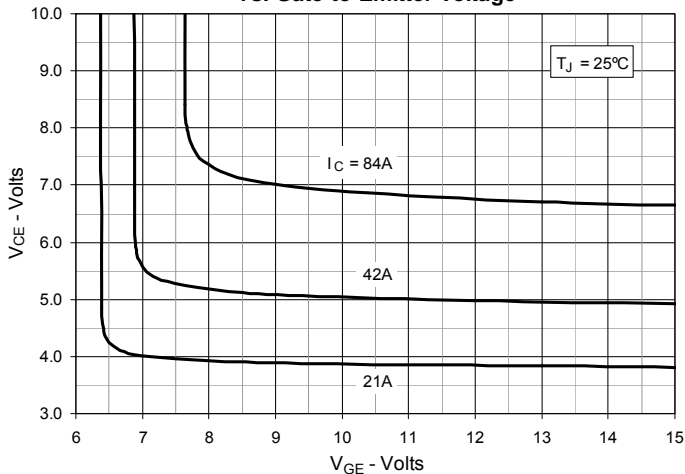


Fig. 6. Input Admittance

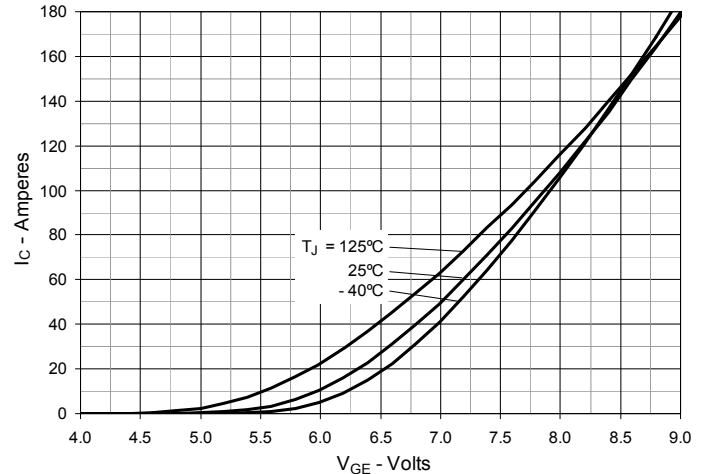


Fig. 7. Transconductance

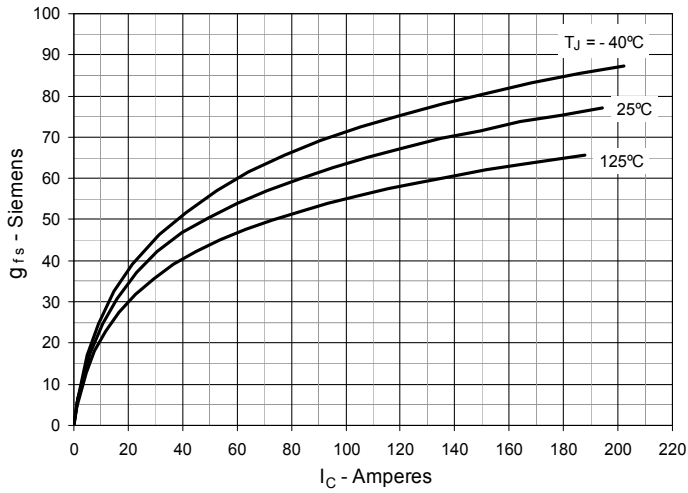


Fig. 8. Gate Charge

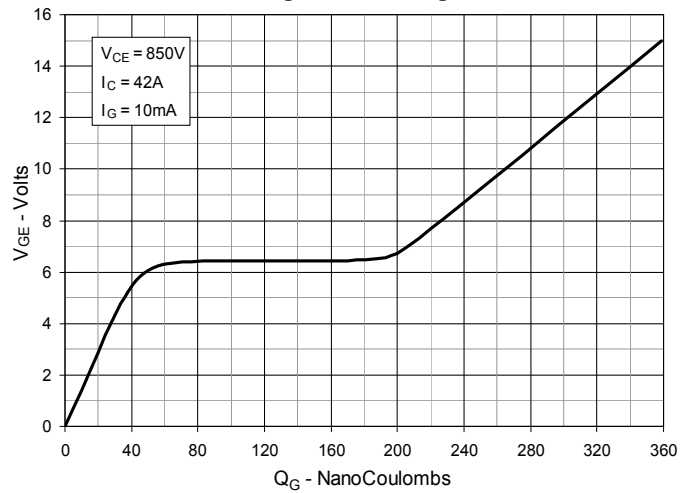


Fig. 9. Forward Voltage Drop of Intrinsic Diode

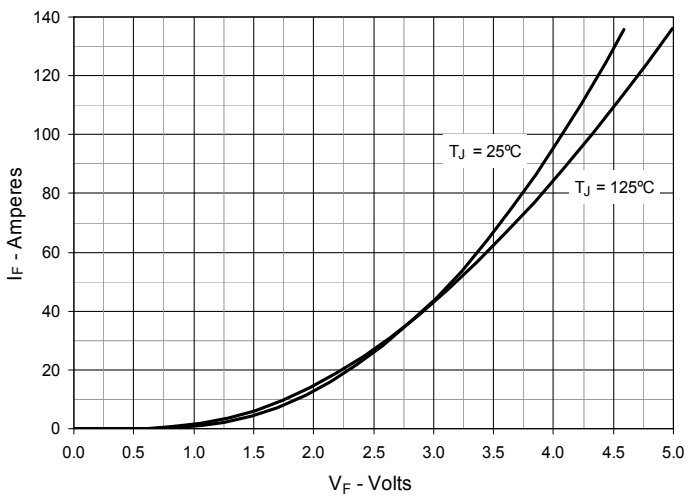


Fig. 10. Capacitance

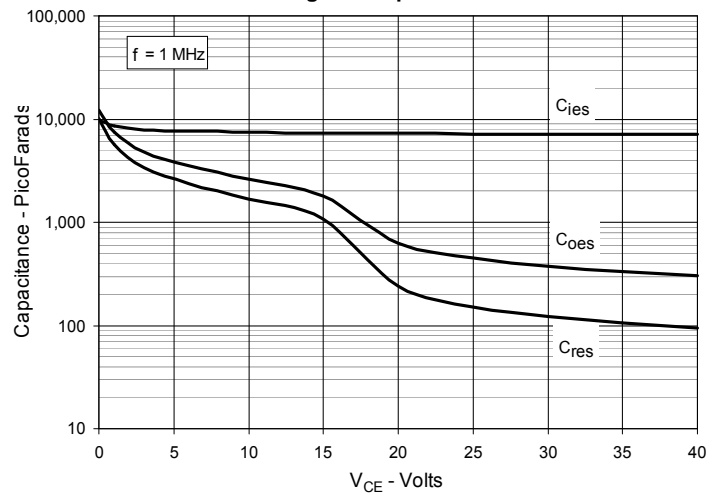


Fig. 11. Reverse-Bias Safe Operating Area

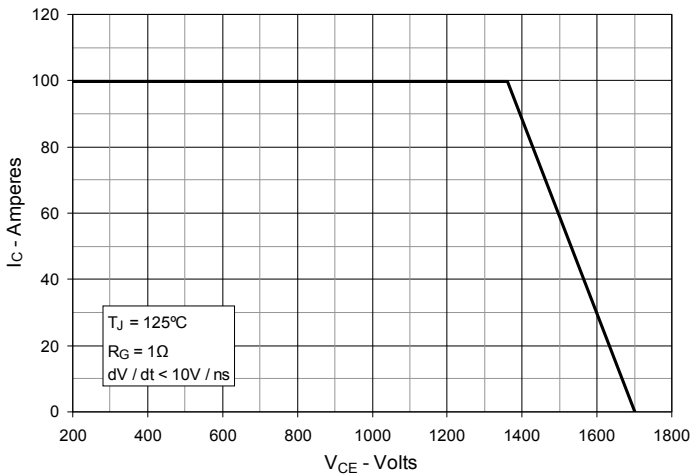


Fig. 12. Maximum Transient Thermal Impedance

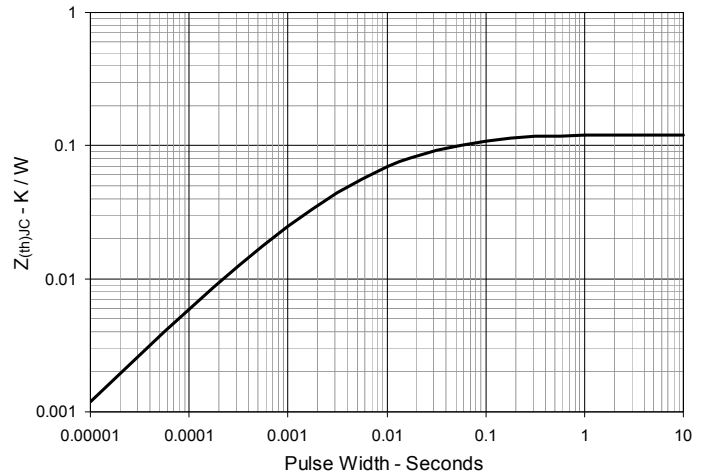


Fig. 13. Inductive Turn-off
Switching Energy Loss vs. Gate Resistance

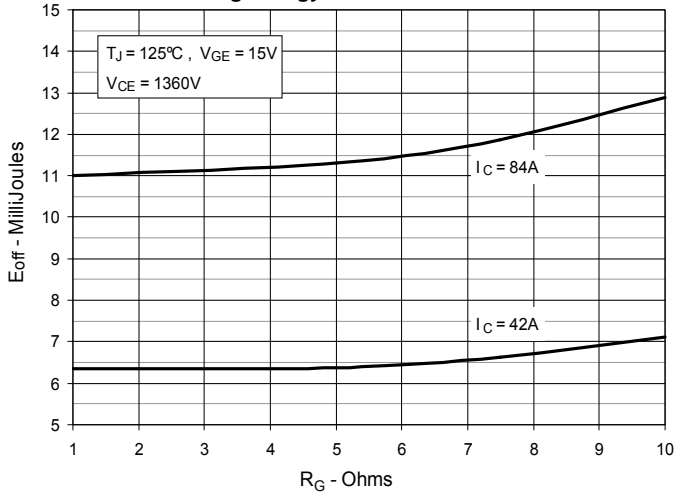


Fig. 14. Inductive Turn-off
Switching Energy Loss vs. Collector Current

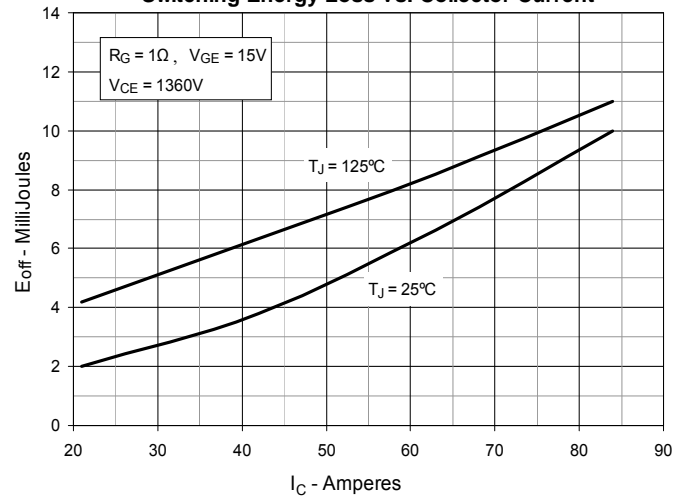


Fig. 15. Inductive Turn-off
Switching Energy Loss vs. Junction Temperature

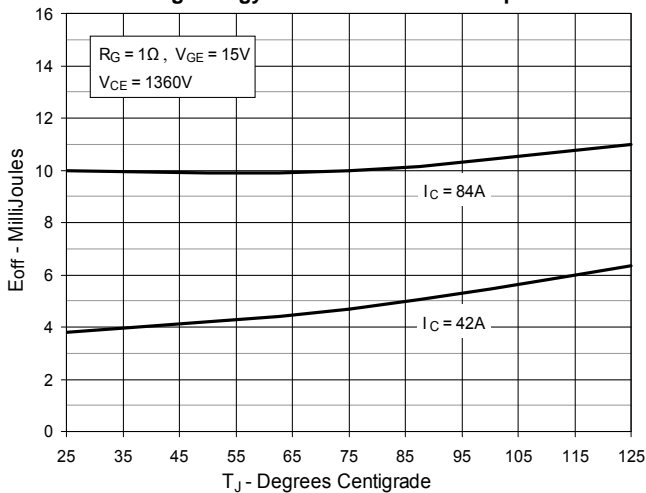


Fig. 16. Inductive Turn-off
Switching Times vs. Gate Resistance

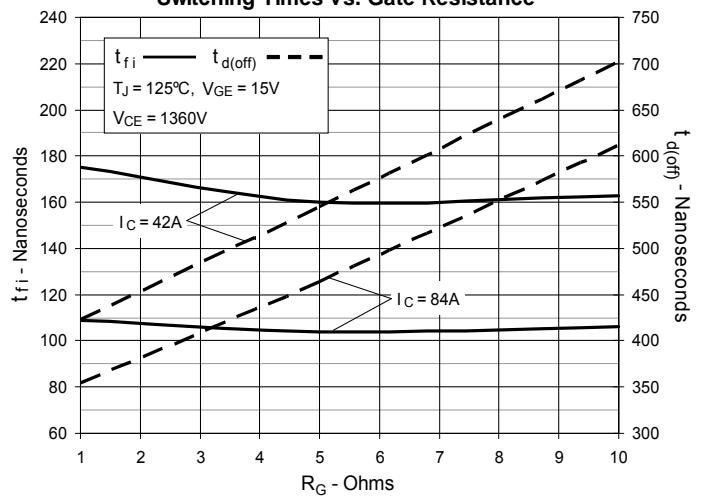


Fig. 17. Inductive Turn-off
Switching Times vs. Collector Current

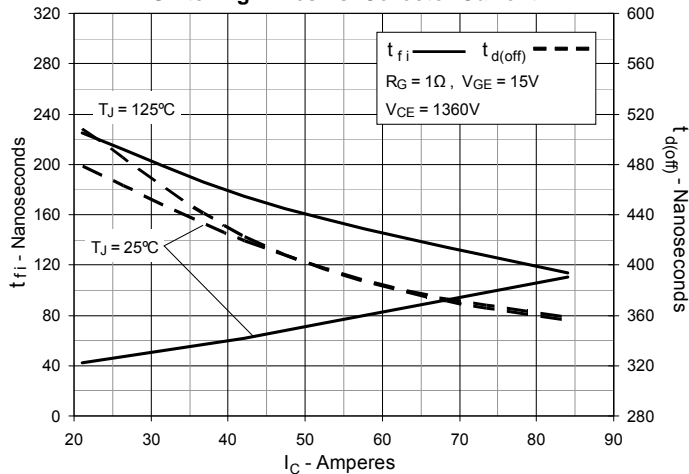
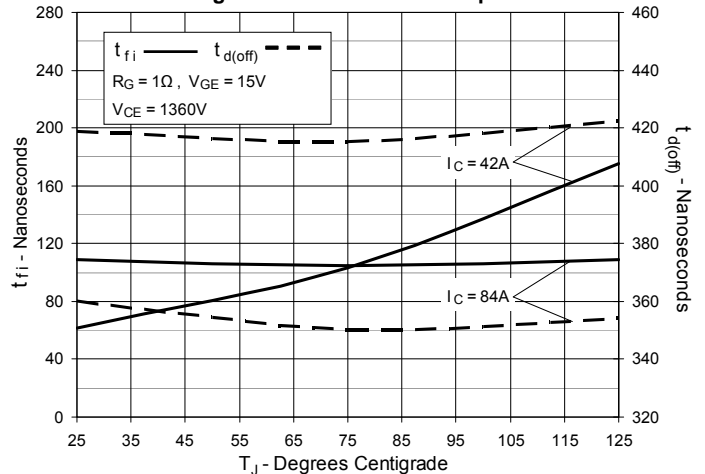
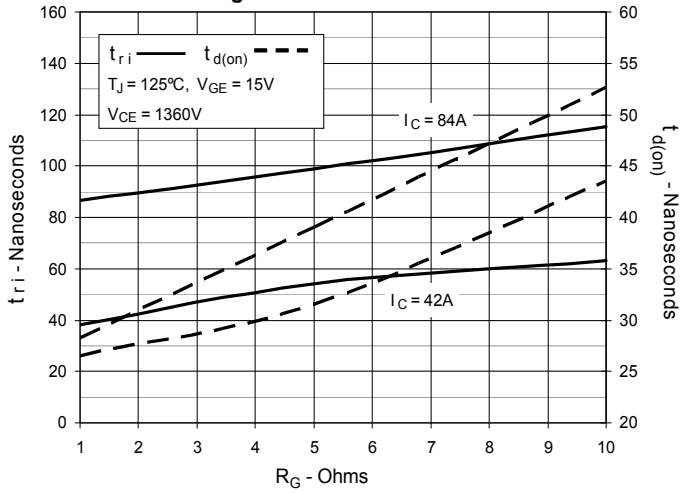


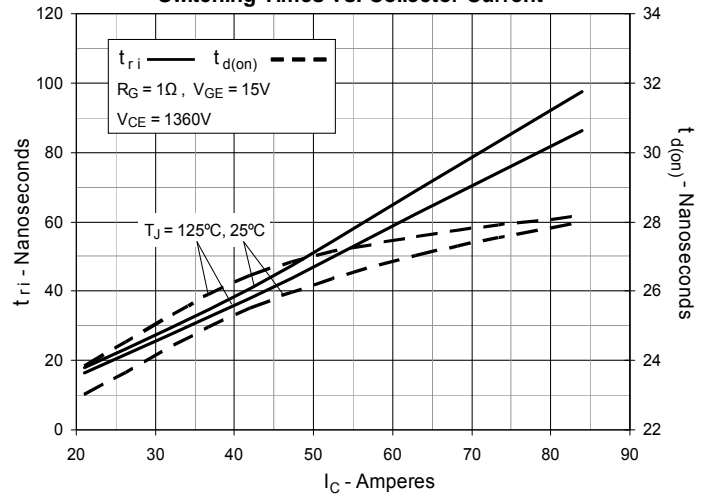
Fig. 18. Inductive Turn-off
Switching Times vs. Junction Temperature



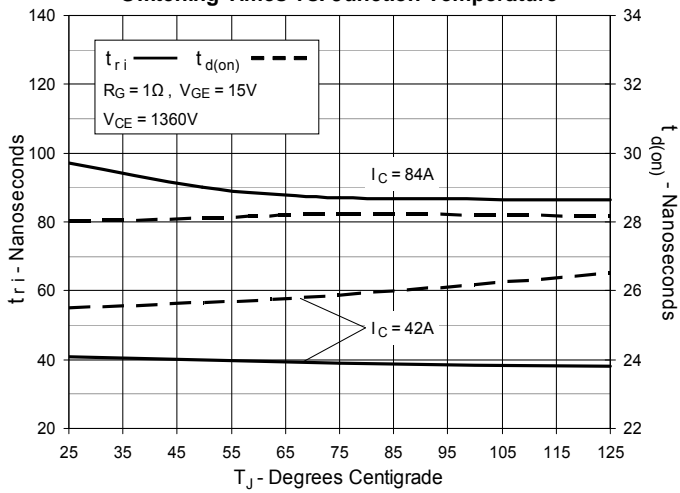
**Fig. 19. Inductive Turn-on
Switching Times vs. Gate Resistance**



**Fig. 20. Inductive Turn-on
Switching Times vs. Collector Current**



**Fig. 21. Inductive Turn-on
Switching Times vs. Junction Temperature**





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