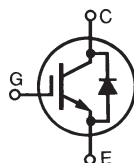


### BiMOSFET™ Monolithic Bipolar MOS Transistor

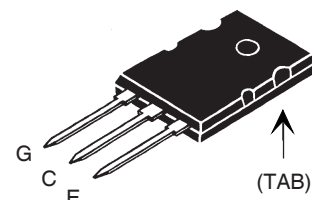
### IXBK75N170A IXBX75N170A



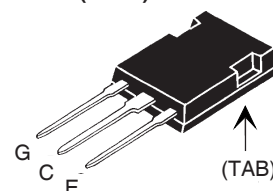
$$\begin{aligned} V_{CES} &= 1700V \\ I_{C90} &= 65A \\ V_{CE(sat)} &\leq 6.00V \\ t_{fi(typ)} &= 60ns \end{aligned}$$

| 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                                                                          | $\pm 20$                                          | V          |
| $V_{GEM}$                     | Transient                                                                           | $\pm 30$                                          | 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          |
| <b>SSOA</b><br><b>(RBSOA)</b> | $V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 1\Omega$<br>Clamped Inductive Load | $I_{CM} = 100$<br>$V_{CE} \leq 0.8 \cdot V_{CES}$ | A          |
| $P_C$                         | $T_C = 25^\circ C$                                                                  | 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.      |
| <b>Weight</b>                 | 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
- Integrated Diode Can Be Used for Protection

#### Applications

- Switched-Mode and Resonant-Mode Power Supplies
- UPS
- AC Motor Drives
- Substitutes for High Voltage MOSFETs

| Symbol        | Test Conditions<br>( $T_J = 25^\circ C$ , 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              |
| $I_{CES}$     | $V_{CE} = 0.8 \cdot V_{CES}$ , $V_{GE} = 0V$<br>$T_J = 125^\circ C$   |                       |              | 50 $\mu A$<br>3 mA |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                    |                       |              | $\pm 100$ nA       |
| $V_{CE(sat)}$ | $I_C = 42A$ , $V_{GE} = 15V$ , Note 1<br>$T_J = 125^\circ C$          |                       | 4.95<br>5.15 | 6.00 V<br>V        |

**Symbol Test Conditions**
 $(T_J = 25^\circ\text{C Unless Otherwise Specified})$ 
**Characteristic Values**

|              |                                                                                                                                                                 | Min. | Typ. | Max.                    |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-------------------------|
| $g_{fs}$     | $I_C = 42\text{A}, V_{CE} = 10\text{V}, \text{Note 1}$                                                                                                          | 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                      |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = 42\text{A}, V_{GE} = 15\text{V}$<br>$V_{CE} = 0.8 \cdot V_{CES}, R_G = 1\Omega$<br>Note 2  |      | 26   | ns                      |
| $t_{ri}$     |                                                                                                                                                                 |      | 40   | ns                      |
| $t_{d(off)}$ |                                                                                                                                                                 |      | 418  | ns                      |
| $t_{fi}$     |                                                                                                                                                                 |      | 60   | ns                      |
| $E_{off}$    |                                                                                                                                                                 |      | 3.80 | mJ                      |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = 42\text{A}, V_{GE} = 15\text{V}$<br>$V_{CE} = 0.8 \cdot V_{CES}, R_G = 1\Omega$<br>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 | $^\circ\text{C/W}$      |

**Reverse Diode**
**Symbol Test Conditions**
 $(T_J = 25^\circ\text{C Unless Otherwise Specified})$ 
**Characteristic Values**

|          |                                                                            | Min. | Typ. | Max           |
|----------|----------------------------------------------------------------------------|------|------|---------------|
| $V_F$    | $I_F = 42\text{A}, V_{GE} = 0\text{V}, \text{Note 1}$                      |      |      | 4.2 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  | $\mu\text{C}$ |

**Notes:**

1. Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .
2. Switching times & energy losses may increase for higher  $V_{CE}(\text{Clamp})$ ,  $T_J$  or  $R_G$ .

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

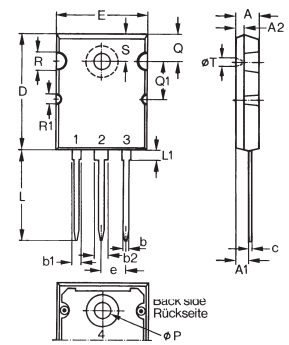
**ADVANCE TECHNICAL INFORMATION**

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

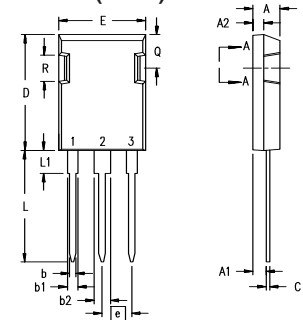
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

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    |              |

**TO-264 AA ( IXBK) Outline**


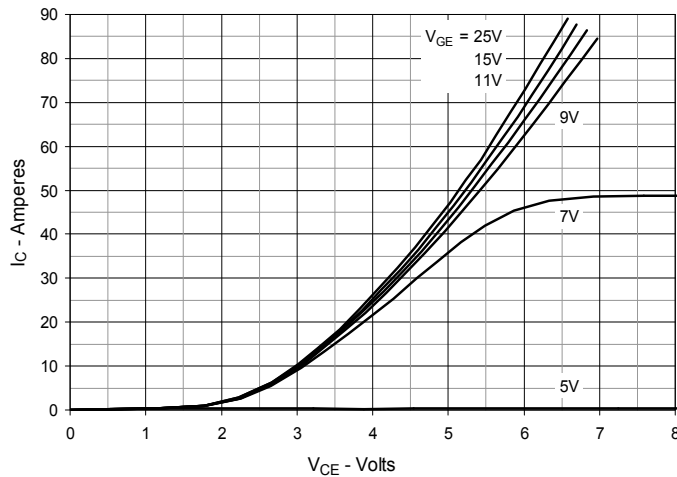
| Dim. | Millimeter Min. | Millimeter Max. | Inches Min. | Inches Max. |
|------|-----------------|-----------------|-------------|-------------|
| A    | 4.82            | 5.13            | .190        | .202        |
| A1   | 2.54            | 2.89            | .100        | .114        |
| A2   | 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        |

**PLUS 247™ (IXBX) Outline**


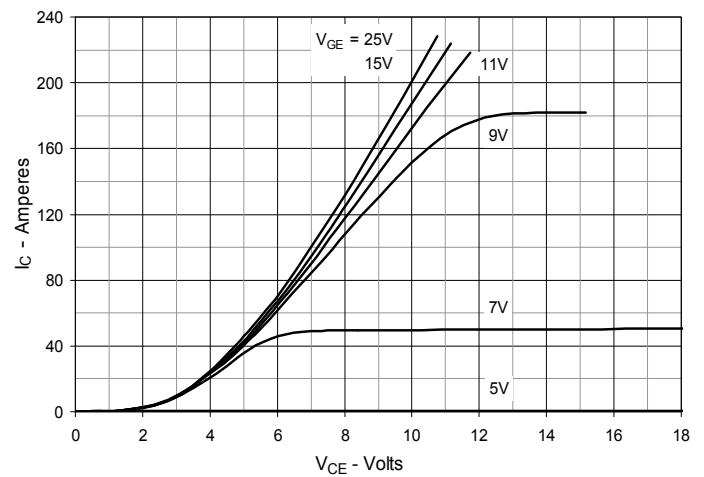
Terminals: 1 - Gate  
2 - Drain (Collector)  
3 - Source (Emitter)

| Dim. | Millimeter Min. | Millimeter Max. | Inches Min. | Inches Max. |
|------|-----------------|-----------------|-------------|-------------|
| A    | 4.83            | 5.21            | .190        | .205        |
| A1   | 2.29            | 2.54            | .090        | .100        |
| A2   | 1.91            | 2.16            | .075        | .085        |
| b    | 1.14            | 1.40            | .045        | .055        |
| b1   | 1.91            | 2.13            | .075        | .084        |
| b2   | 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        | .244        |
| R    | 4.32            | 4.83            | .170        | .190        |

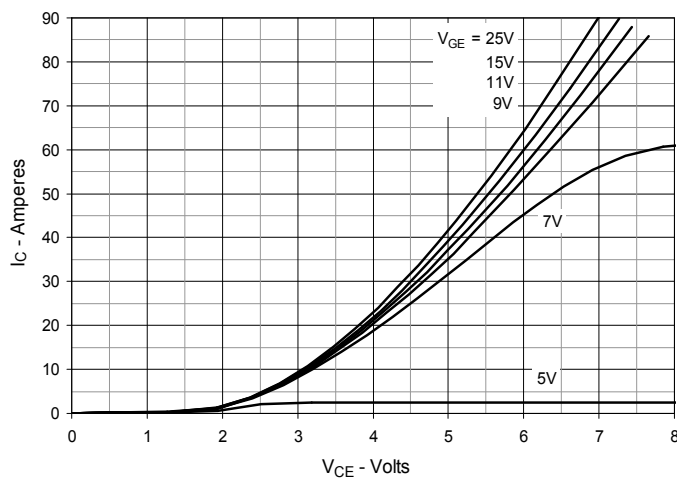
**Fig. 1. Output Characteristics**  
**@ 25°C**



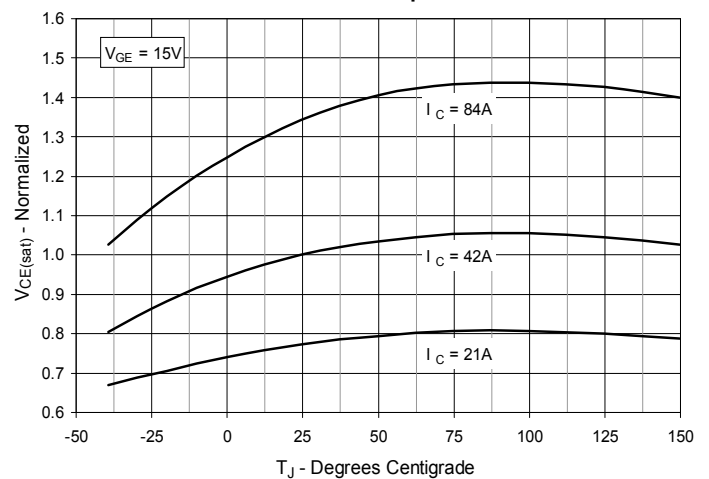
**Fig. 2. Extended Output Characteristics**  
**@ 25°C**



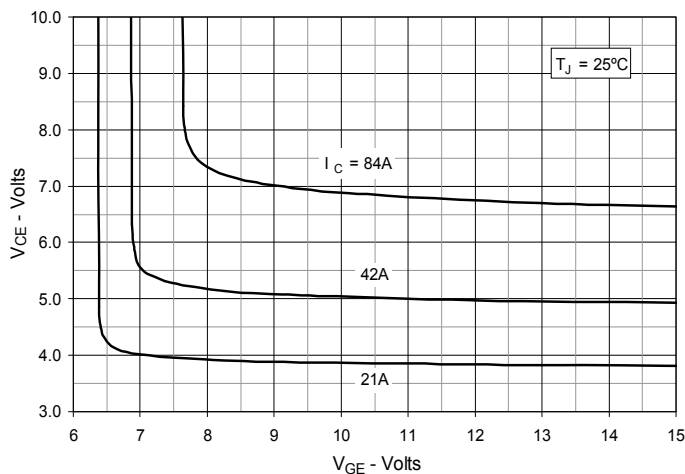
**Fig. 3. Output Characteristics**  
**@ 125°C**



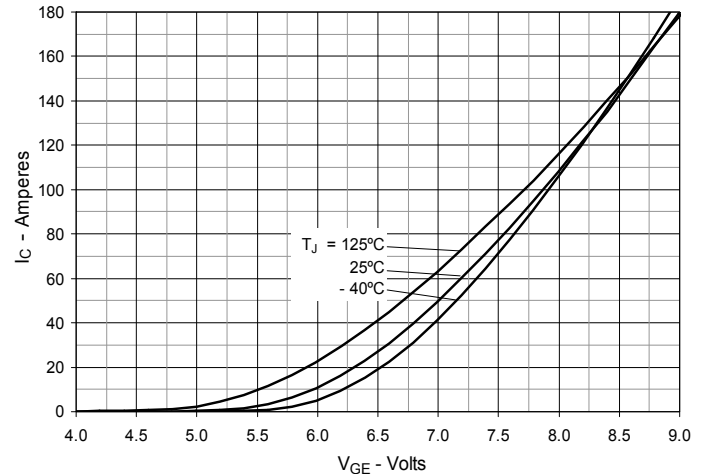
**Fig. 4. Dependence of  $V_{CE(sat)}$  on**  
**Junction Temperature**

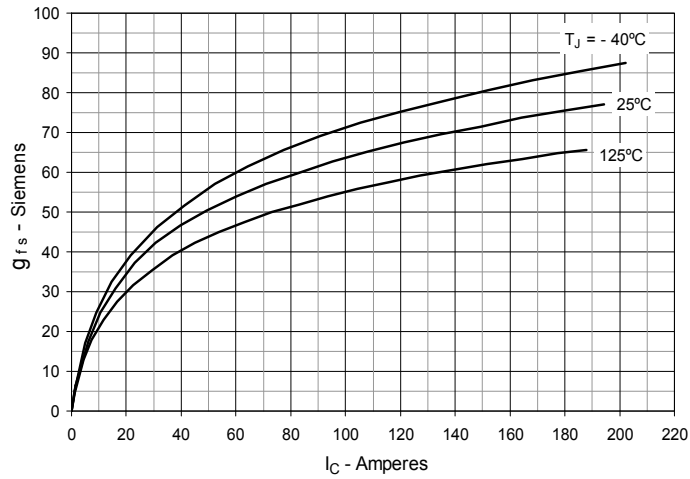
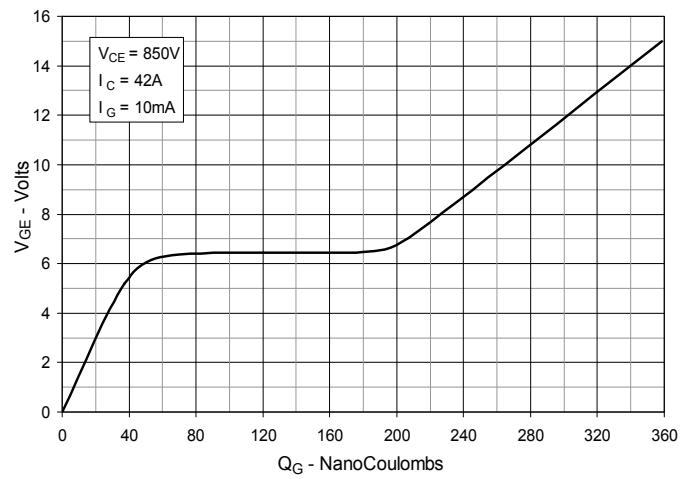
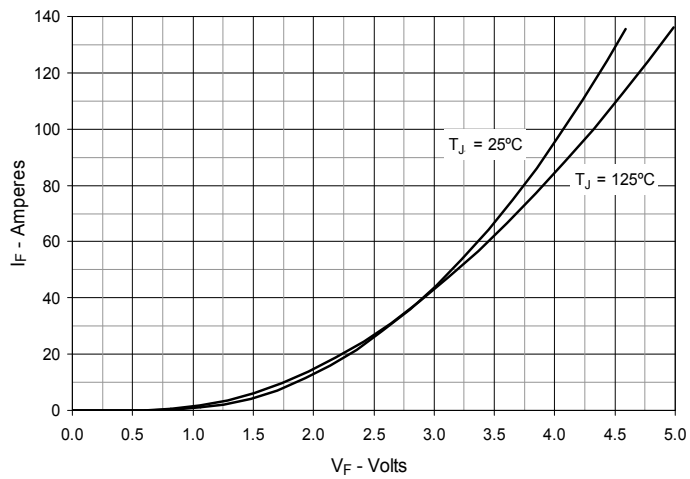
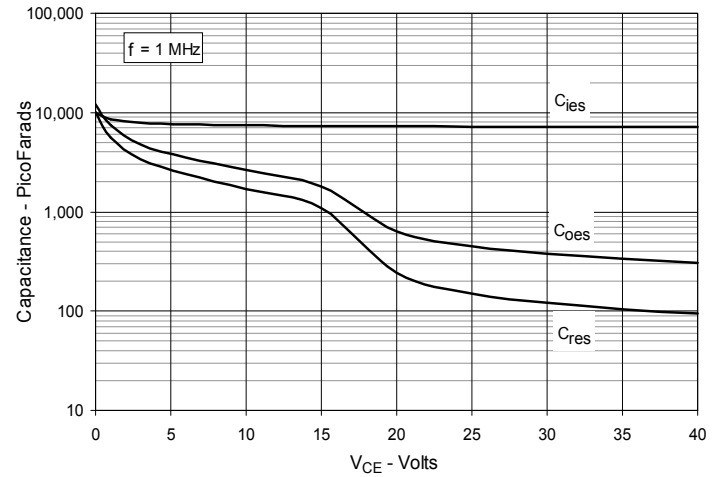
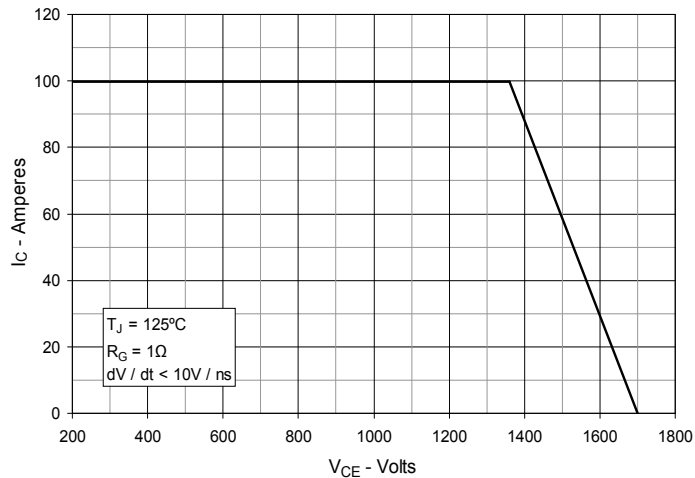
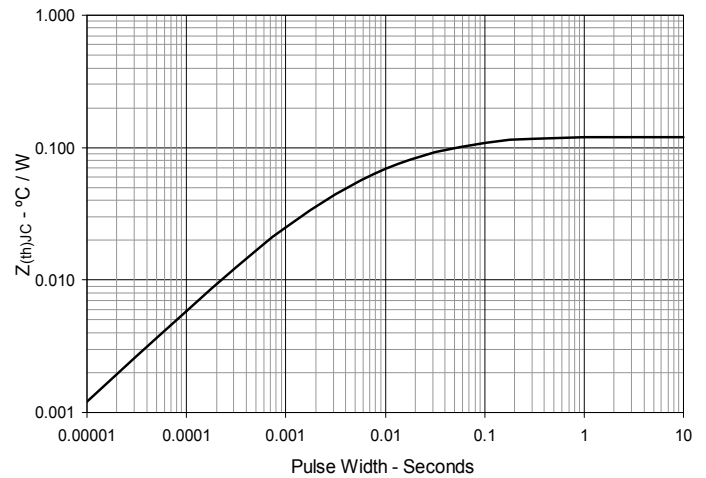


**Fig. 5. Collector-to-Emitter Voltage**  
**vs. Gate-to-Emitter Voltage**

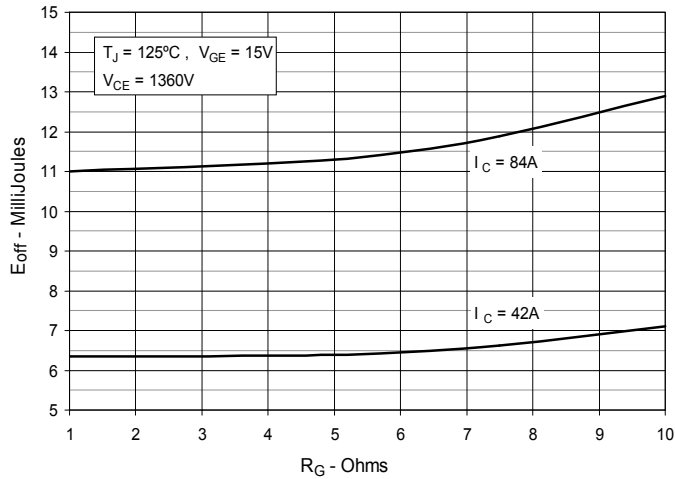


**Fig. 6. Input Admittance**

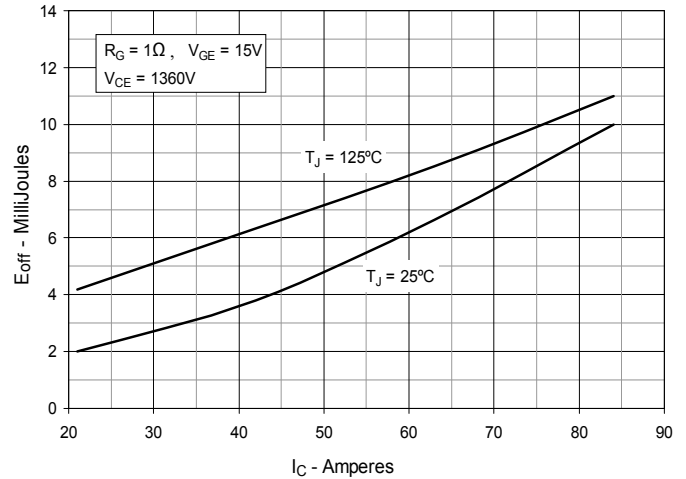


**Fig. 7. Transconductance**

**Fig. 8. Gate Charge**

**Fig. 9. Forward Voltage Drop of Intrinsic Diode**

**Fig. 10. Capacitance**

**Fig. 11. Reverse-Bias Safe Operating Area**

**Fig. 12. Maximum Transient Thermal Impedance**


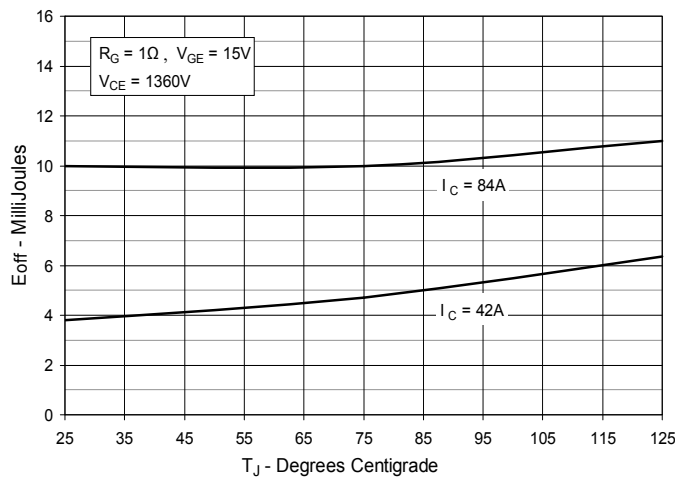
**Fig. 13. Inductive Turn-off**  
Switching Energy Loss vs. Gate Resistance



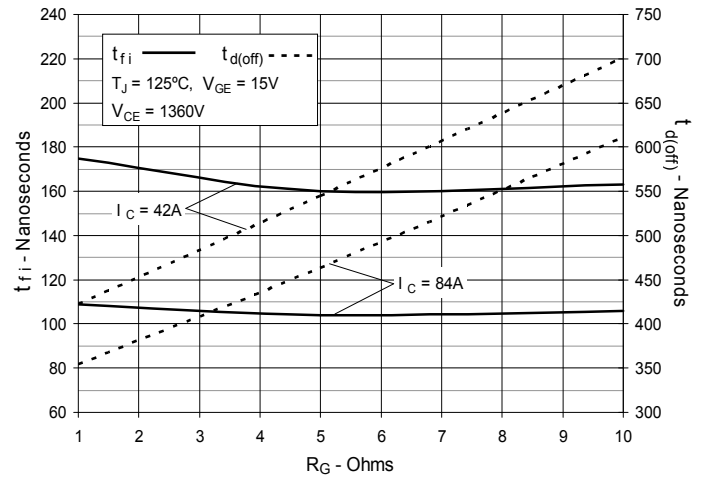
**Fig. 14. Inductive Turn-off**  
Switching Energy Loss vs. Collector Current



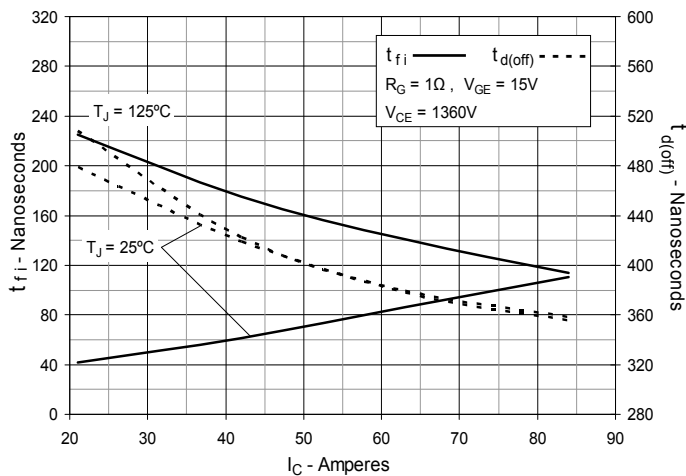
**Fig. 15. Inductive Turn-off**  
Switching Energy Loss vs. Junction Temperature



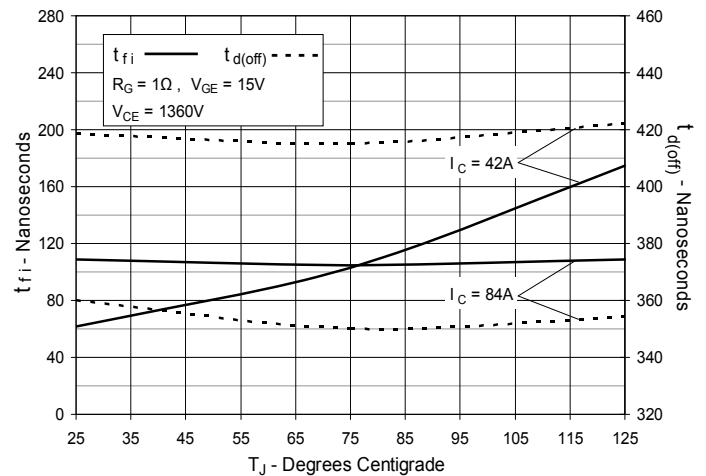
**Fig. 16. Inductive Turn-off**  
Switching Times vs. Gate Resistance



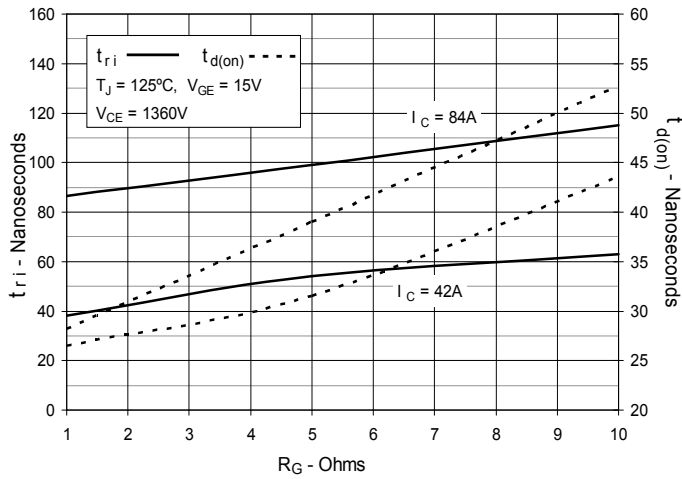
**Fig. 17. Inductive Turn-off**  
Switching Times vs. Collector Current



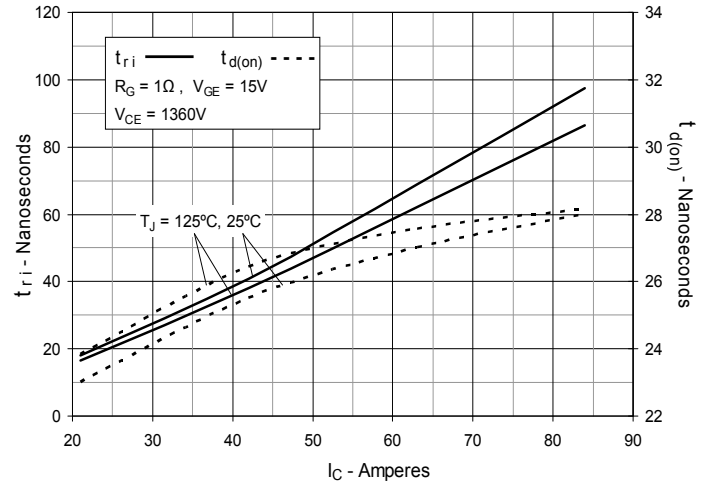
**Fig. 18. Inductive Turn-off**  
Switching Times vs. Junction Temperature



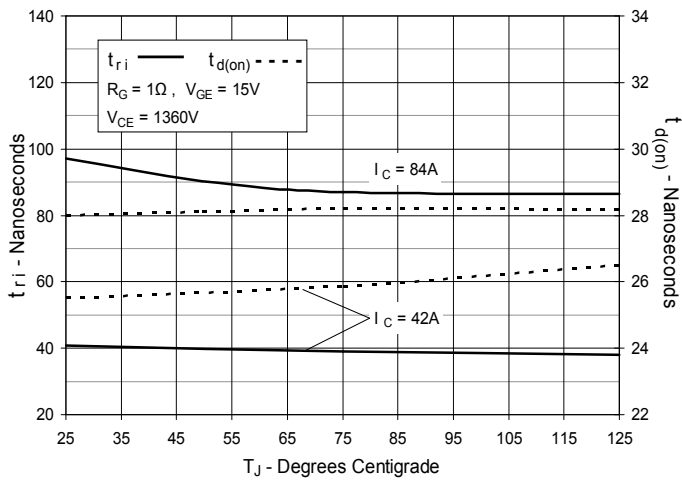
**Fig. 19. Inductive Turn-on  
Switching Times vs. Gate Resistance**



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



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



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