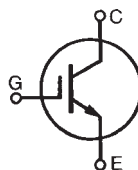


# GenX3™ 300V IGBT IXGH85N30C3

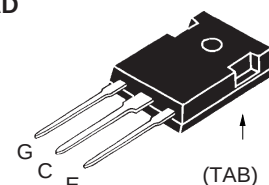
High Speed PT IGBTs for  
50-150kHz switching



$$\begin{aligned} V_{CES} &= 300V \\ I_{C110} &= 85A \\ V_{CE(sat)} &\leq 1.9V \\ t_{fi \text{ typ}} &= 70ns \end{aligned}$$

| Symbol                        | Test Conditions                                                                                           | Maximum Ratings |                  |
|-------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------|------------------|
| $V_{CES}$                     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                                           | 300             | V                |
| $V_{CGR}$                     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GE} = 1M\Omega$                                     | 300             | V                |
| $V_{GES}$                     | Continuous                                                                                                | $\pm 20$        | V                |
| $V_{GEM}$                     | Transient                                                                                                 | $\pm 30$        | V                |
| $I_{C25}$                     | $T_C = 25^\circ\text{C}$ (limited by leads)                                                               | 75              | A                |
| $I_{C110}$                    | $T_C = 110^\circ\text{C}$ (chip capability)                                                               | 85              | A                |
| $I_{CM}$                      | $T_C = 25^\circ\text{C}$ , 1ms                                                                            | 420             | A                |
| $I_A$                         | $T_C = 25^\circ\text{C}$                                                                                  | 85              | A                |
| $E_{AS}$                      | $T_C = 25^\circ\text{C}$                                                                                  | 400             | mJ               |
| <b>SSOA</b><br><b>(RBSOA)</b> | $V_{GE} = 15V$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 3.3\Omega$<br>Clamped inductive load @ $\leq 300V$ | $I_{CM} = 170$  | A                |
| $P_C$                         | $T_C = 25^\circ\text{C}$                                                                                  | 333             | W                |
| $T_J$                         |                                                                                                           | -55 ... +150    | $^\circ\text{C}$ |
| $T_{JM}$                      |                                                                                                           | 150             | $^\circ\text{C}$ |
| $T_{stg}$                     |                                                                                                           | -55 ... +150    | $^\circ\text{C}$ |
| $T_L$                         | Maximum lead temperature for soldering                                                                    | 300             | $^\circ\text{C}$ |
| $T_{SOLD}$                    | 1.6 mm (0.062 in.) from case for 10s                                                                      | 260             | $^\circ\text{C}$ |
| $M_d$                         | Mounting torque (TO-247)                                                                                  | 1.13/10         | Nm/lb.in.        |
| <b>Weight</b>                 |                                                                                                           | 6               | g                |

TO-247 AD  
(IXGH)



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

## Features

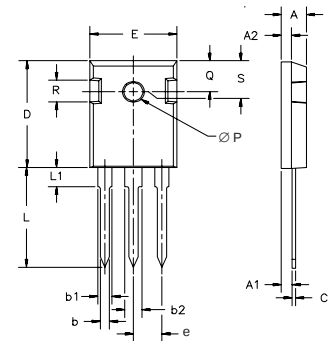
- High Frequency IGBT
- Square RBSOA
- High avalanche capability
- Drive simplicity with MOS Gate Turn-On
- High current handling capability

## Applications

- PFC Circuits
- PDP Systems
- Switched-mode and resonant-mode converters and inverters
- SMPS
- AC motor speed control
- DC servo and robot drives
- DC choppers

| Symbol        | Test Conditions                                                  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                                       |
|---------------|------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------------------------------|
|               |                                                                  | Min.                                                                              | Typ. | Max.                                  |
| $BV_{CES}$    | $I_C = 250\mu\text{A}$ , $V_{GE} = 0V$                           | 300                                                                               |      | V                                     |
| $V_{GE(th)}$  | $I_C = 250\mu\text{A}$ , $V_{CE} = V_{GE}$                       | 2.5                                                                               |      | V                                     |
| $I_{CES}$     | $V_{CE} = V_{CES}$<br>$V_{GE} = 0V$<br>$T_J = 125^\circ\text{C}$ |                                                                                   |      | 30 $\mu\text{A}$<br>750 $\mu\text{A}$ |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                               |                                                                                   |      | $\pm 100$ nA                          |
| $V_{CE(sat)}$ | $I_C = 85A$ , $V_{GE} = 15V$<br>$T_J = 125^\circ\text{C}$        | 1.64<br>1.67                                                                      | 1.9  | V<br>V                                |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                                                   | Characteristic Values |      |                          |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|--------------------------|
|              |                                                                                                                                               | Min.                  | Typ. | Max.                     |
| $g_{fs}$     | $I_C = 0.5 \cdot I_{C110}$ , $V_{CE} = 10\text{V}$ ,<br>Pulse test, $t \leq 300\mu\text{s}$ ; duty cycle, $d \leq 2\%$ .                      | 35                    | 60   | S                        |
| $C_{ies}$    | $V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$                                                                              |                       | 5100 | pF                       |
| $C_{oes}$    |                                                                                                                                               |                       | 310  | pF                       |
| $C_{res}$    |                                                                                                                                               |                       | 80   | pF                       |
| $Q_g$        | $I_C = I_{C110}$ , $V_{GE} = 15\text{V}$ , $V_{CE} = 0.5 \cdot V_{CES}$                                                                       |                       | 136  | nC                       |
| $Q_{ge}$     |                                                                                                                                               |                       | 22   | nC                       |
| $Q_{gc}$     |                                                                                                                                               |                       | 48   | nC                       |
| $t_{d(on)}$  | Inductive Load, $T_J = 25^\circ\text{C}$<br>$I_C = 0.5 \cdot I_{C110}$ , $V_{GE} = 15\text{V}$<br>$V_{CE} = 200\text{V}$ , $R_G = 3.3\Omega$  |                       | 25   | ns                       |
| $t_{ri}$     |                                                                                                                                               |                       | 34   | ns                       |
| $E_{on}$     |                                                                                                                                               |                       | 0.20 | mJ                       |
| $t_{d(off)}$ |                                                                                                                                               |                       | 100  | 160 ns                   |
| $t_{fi}$     |                                                                                                                                               |                       | 70   | ns                       |
| $E_{off}$    |                                                                                                                                               |                       | 0.39 | 0.75 mJ                  |
| $t_{d(on)}$  | Inductive Load, $T_J = 125^\circ\text{C}$<br>$I_C = 0.5 \cdot I_{C110}$ , $V_{GE} = 15\text{V}$<br>$V_{CE} = 200\text{V}$ , $R_G = 3.3\Omega$ |                       | 22   | ns                       |
| $t_{ri}$     |                                                                                                                                               |                       | 33   | ns                       |
| $E_{on}$     |                                                                                                                                               |                       | 0.36 | mJ                       |
| $t_{d(off)}$ |                                                                                                                                               |                       | 120  | ns                       |
| $t_{fi}$     |                                                                                                                                               |                       | 101  | ns                       |
| $E_{off}$    |                                                                                                                                               |                       | 0.48 | mJ                       |
| $R_{thJC}$   |                                                                                                                                               |                       |      | 0.375 $^\circ\text{C/W}$ |
| $R_{thCK}$   |                                                                                                                                               | 0.21                  |      | $^\circ\text{C/W}$       |

**TO-247 AD Outline**


| Dim.           | Millimeter |       | Inches |       |
|----------------|------------|-------|--------|-------|
|                | Min.       | Max.  | Min.   | Max.  |
| A              | 4.7        | 5.3   | .185   | .209  |
| A <sub>1</sub> | 2.2        | 2.54  | .087   | .102  |
| A <sub>2</sub> | 2.2        | 2.6   | .059   | .098  |
| b              | 1.0        | 1.4   | .040   | .055  |
| b <sub>1</sub> | 1.65       | 2.13  | .065   | .084  |
| b <sub>2</sub> | 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  |
| ØP             | 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   |

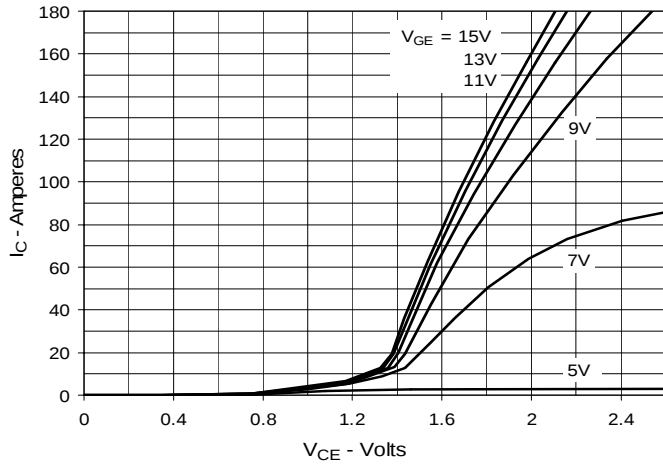
### PRELIMINARY TECHNICAL INFORMATION

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.

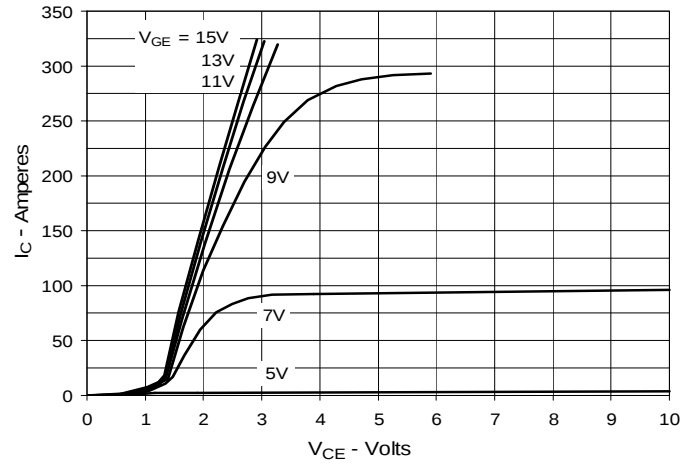
IXYS reserves the right to change limits, test conditions, and dimensions.

|                                                                                  |           |           |           |           |              |              |              |              |              |              |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|--------------|
| 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    |              |

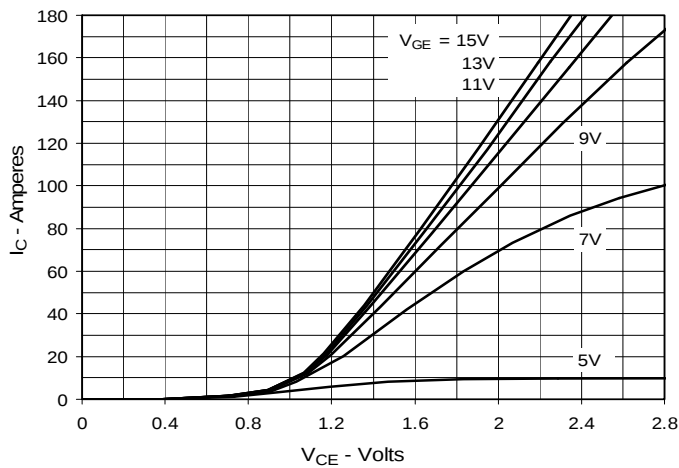
**Fig. 1. Output Characteristics  
@ 25°C**



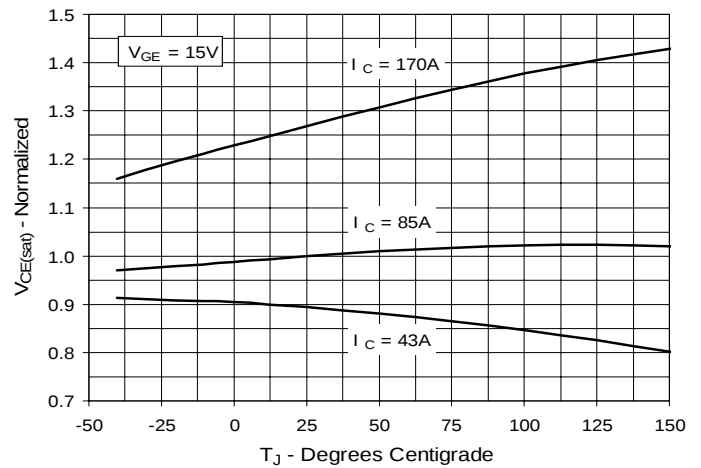
**Fig. 2. Extended Output Characteristics  
@ 25°C**



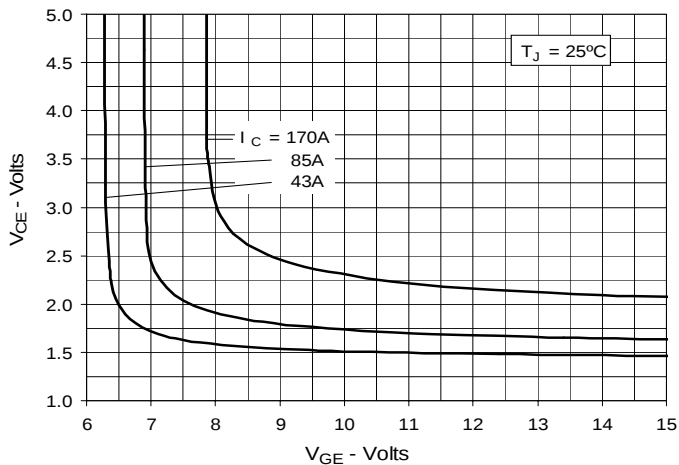
**Fig. 3. Output Characteristics  
@ 125°C**



**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**

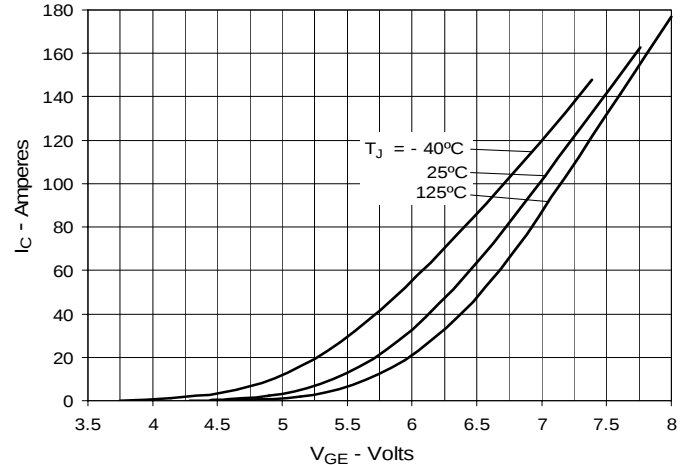


Fig. 7. Transconductance

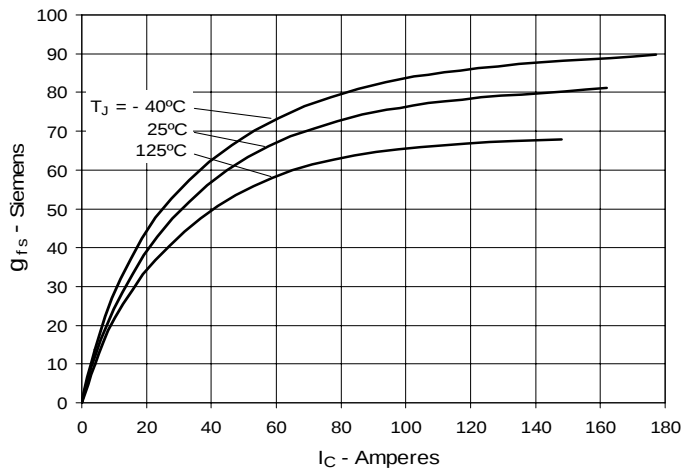


Fig. 8. Gate Charge

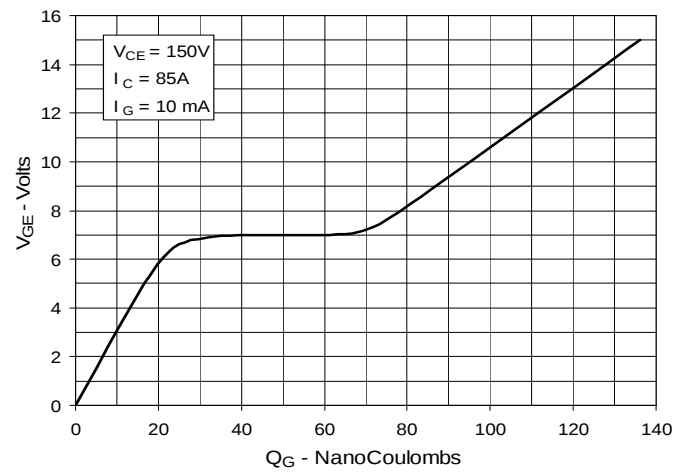


Fig. 9. Capacitance

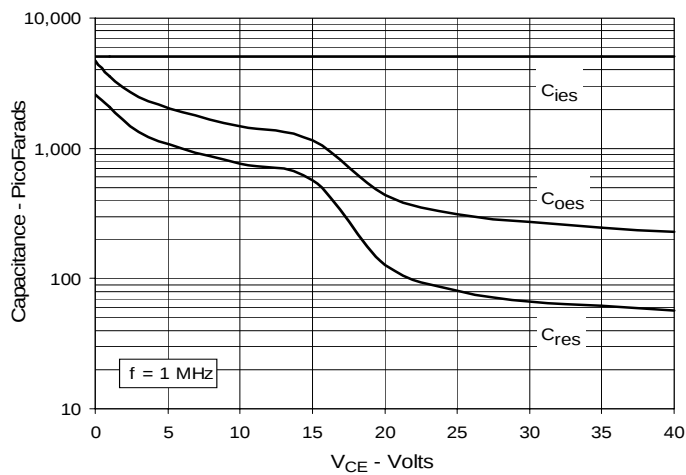


Fig. 10. Reverse-Bias Safe Operating Area

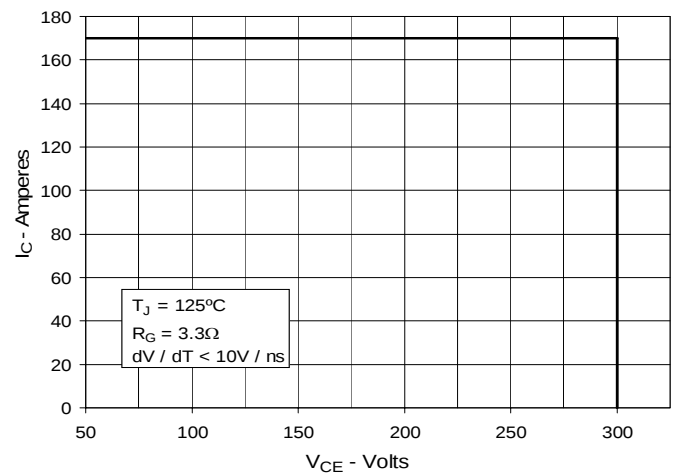
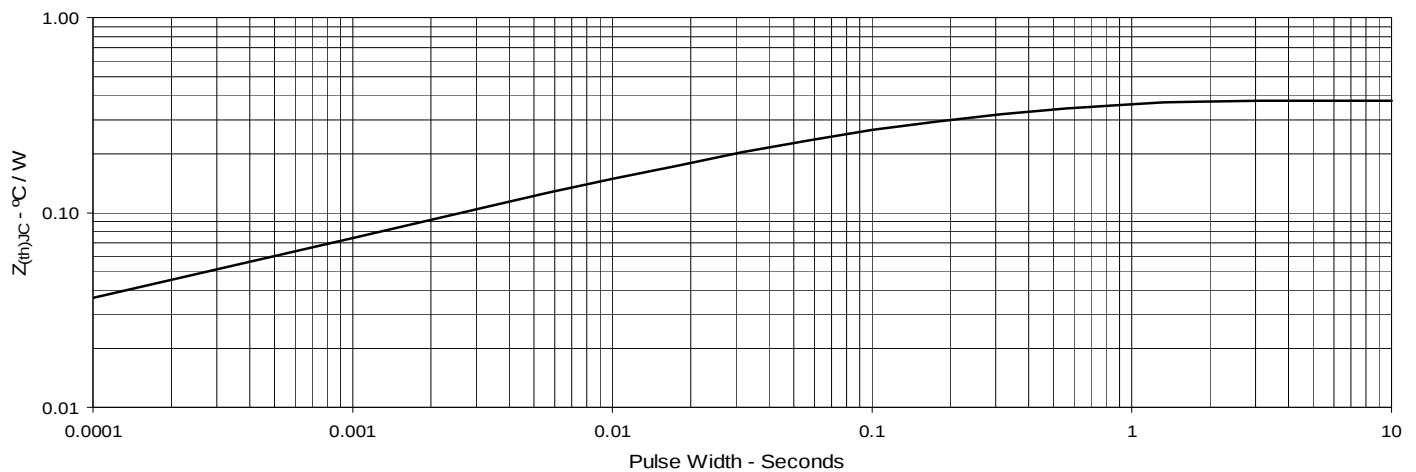
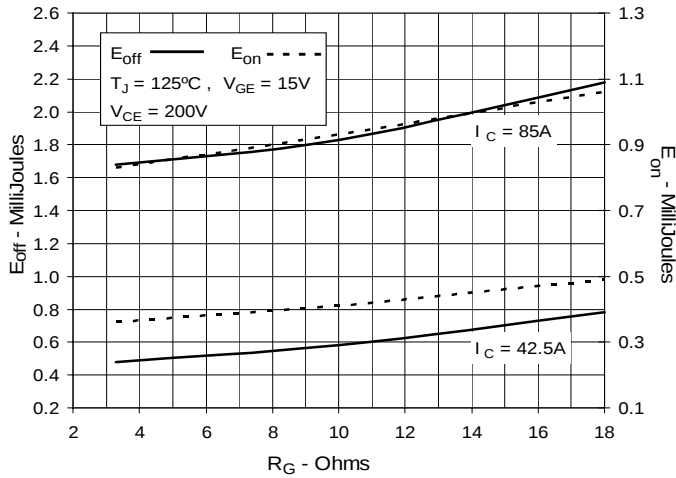


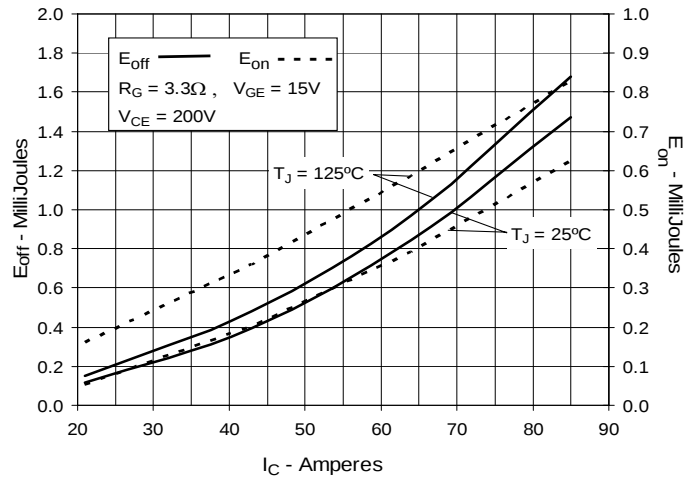
Fig. 11. Maximum Transient Thermal Impedance



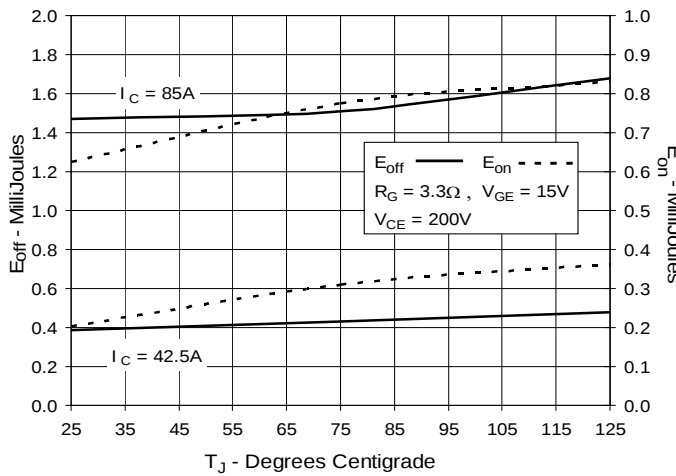
**Fig. 12. Inductive Switching  
Energy Loss vs. Gate Resistance**



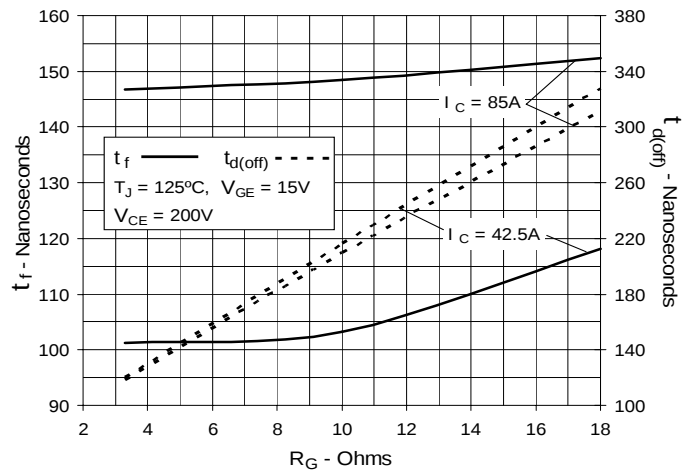
**Fig. 13. Inductive Switching  
Energy Loss vs. Collector Current**



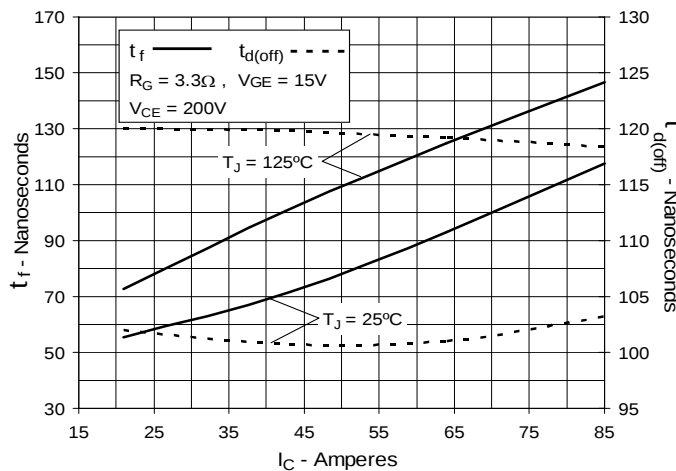
**Fig. 14. Inductive Switching  
Energy Loss vs. Junction Temperature**



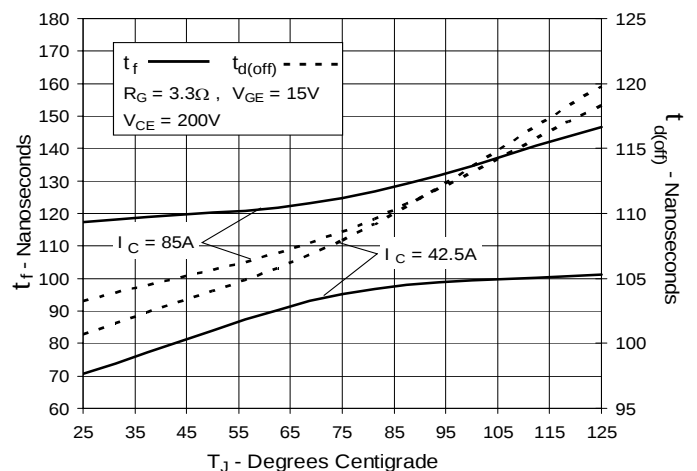
**Fig. 15. Inductive Turn-off  
Switching Times vs. Gate Resistance**



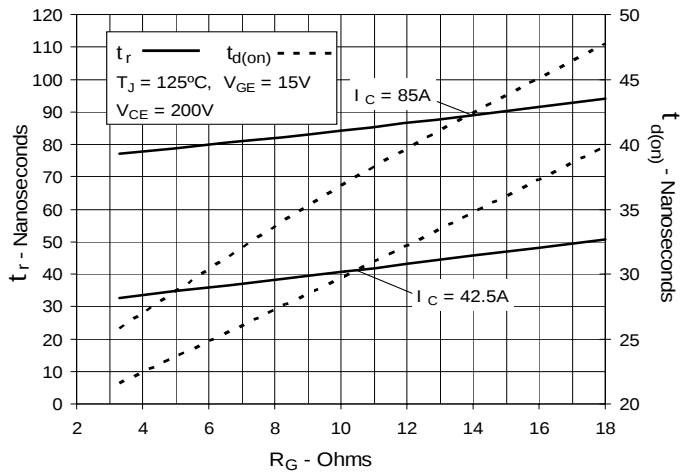
**Fig. 16. Inductive Turn-off  
Switching Times vs. Collector Current**



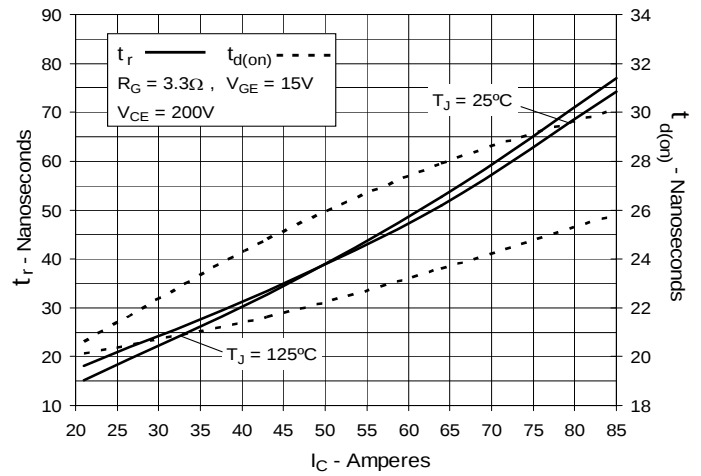
**Fig. 17. Inductive Turn-off  
Switching Times vs. Junction Temperature**



**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**

