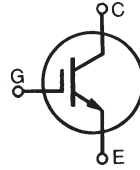


# High Voltage IGBTs

## IXGH6N170A IXGT6N170A



$$V_{CES} = 1700V$$

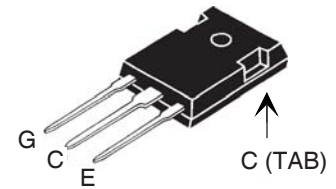
$$I_{C25} = 6A$$

$$V_{CE(sat)} \leq 7.0V$$

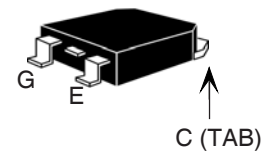
$$t_{fi(typ)} = 32ns$$

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_C = 25^\circ C$ 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
$I_{C25}$	$T_C = 25^\circ C$	6	A
$I_{C110}$	$T_C = 110^\circ C$	3	A
$I_{CM}$	$T_C = 25^\circ C$ , 1ms	14	A
<b>SSOA</b>	$V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 33\Omega$	$I_{CM} = 12$	A
<b>(RBSOA)</b>	Clamped Inductive Load	@ $0.8 \cdot V_{CES}$	
$t_{SC}$	$T_J = 125^\circ C$ , $V_{CE} = 1200V$ , $V_{GE} = 15V$ , $R_G = 33\Omega$	10	$\mu s$
$P_C$	$T_C = 25^\circ C$	75	W
$T_J$		- 55 ... +150	$^\circ C$
$T_{JM}$		150	$^\circ C$
$T_{stg}$		- 55 ... +150	$^\circ C$
$T_L$	1.6mm (0.062 in.) from Case for 10s	300	$^\circ C$
$T_{SOLD}$	Plastic Body for 10 seconds	260	$^\circ C$
$M_d$	Mounting Torque (TO-247)	1.13/10	Nm/lb.in.
<b>Weight</b>	TO-247	6	g
	TO-268	4	g

TO-247 (IXGH)



TO-268 (IXGT)



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

### Features

- International Standard Packages

### Advantages

- High Power Density
- Low Gate Drive Requirement

### Applications

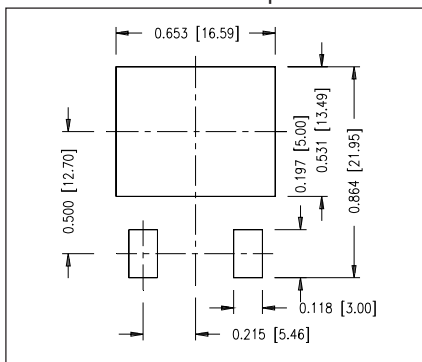
- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Welding Machines

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
$V_{GE(th)}$	$I_C = 250\mu A$ , $V_{CE} = V_{GE}$	3.0		V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ , $V_{GE} = 0V$ $T_J = 125^\circ C$			10 $\mu A$ 500 $\mu A$
$I_{GES}$	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = I_{C110}$ , $V_{GE} = 15V$ , Note 1 $T_J = 125^\circ C$		5.4	7.0 V

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values			
		Min.	Typ.	Max.	
$g_{fs}$	$I_C = 6\text{A}$ , $V_{CE} = 20\text{V}$ , Note 1	2.0	3.5	S	
$C_{ies}$	$V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$		390	pF	
$C_{oes}$			20	pF	
$C_{res}$			7	pF	
$Q_g$	$I_C = 6\text{A}$ , $V_{GE} = 15\text{V}$ , $V_{CE} = 0.5 \cdot V_{CES}$		18.5	nC	
$Q_{ge}$			2.8	nC	
$Q_{gc}$			8.2	nC	
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 6\text{A}$ , $V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}$ , $R_G = 33\Omega$ Note 1		46	ns	
$t_{ri}$			40	ns	
$E_{on}$			0.59	mJ	
$t_{d(off)}$			220	400	ns
$t_{fi}$			32	65	ns
$E_{off}$			0.18	0.36	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = 6\text{A}$ , $V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}$ , $R_G = 33\Omega$ Note 1		48	ns	
$t_{ri}$			43	ns	
$E_{on}$			0.62	mJ	
$t_{d(off)}$			230	ns	
$t_{fi}$			41	ns	
$E_{off}$			0.25	mJ	
$R_{thJC}$			1.65	$^\circ\text{C/W}$	
$R_{thCK}$		0.21		$^\circ\text{C/W}$	

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

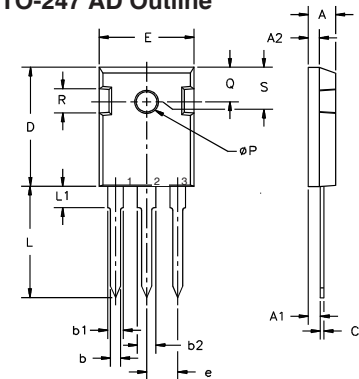
### Min Recommended Footprint



### 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.

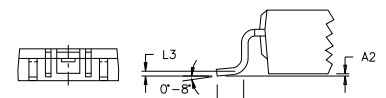
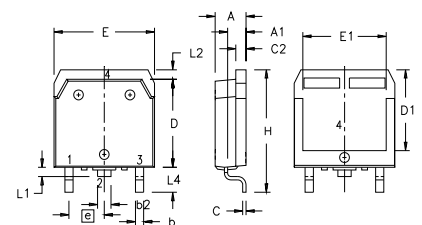
### TO-247 AD Outline



Terminals: 1 - Gate 2 - Drain

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
L <sub>1</sub>		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

### TO-268 Outline



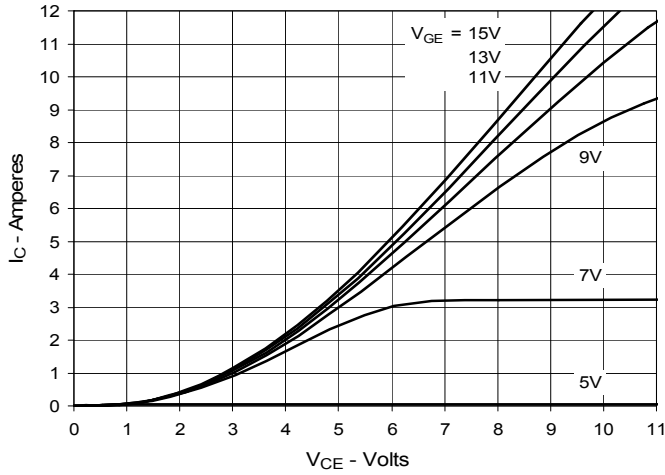
Terminals: 1 - Gate 2 - Drain

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A <sub>1</sub>	.106	.114	2.70	2.90
A <sub>2</sub>	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
b <sub>2</sub>	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C <sub>2</sub>	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D <sub>1</sub>	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E <sub>1</sub>	.524	.535	13.30	13.60
e	.215 BSC		5.45 BSC	
H	.736	.752	18.70	19.10
L	.094	.106	2.40	2.70
L <sub>1</sub>	.047	.055	1.20	1.40
L <sub>2</sub>	.039	.045	1.00	1.15
L <sub>3</sub>	.010 BSC		0.25 BSC	
L <sub>4</sub>	.150	.161	3.80	4.10

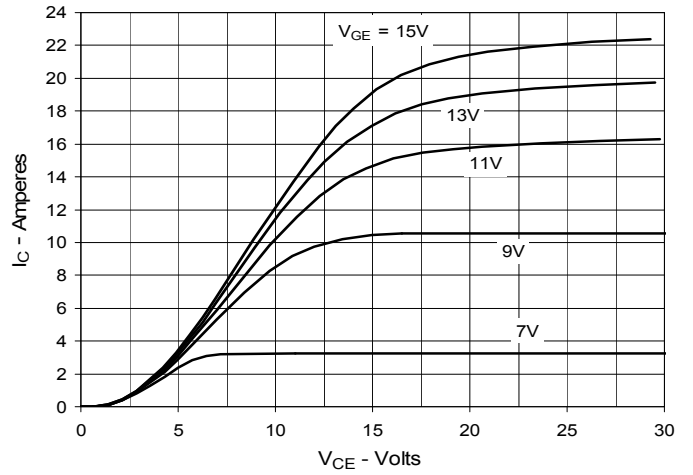
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

IXYS MOSFETs and IGBTs are covered 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  
by one or more of the following U.S. patents: 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

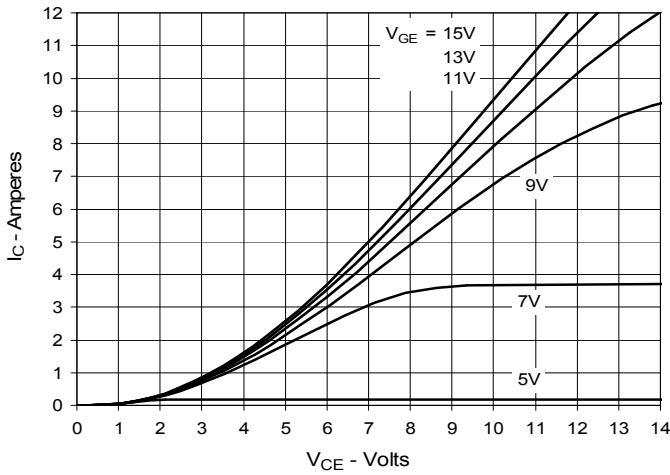
**Fig. 1. Output Characteristics**  
**@ 25°C**



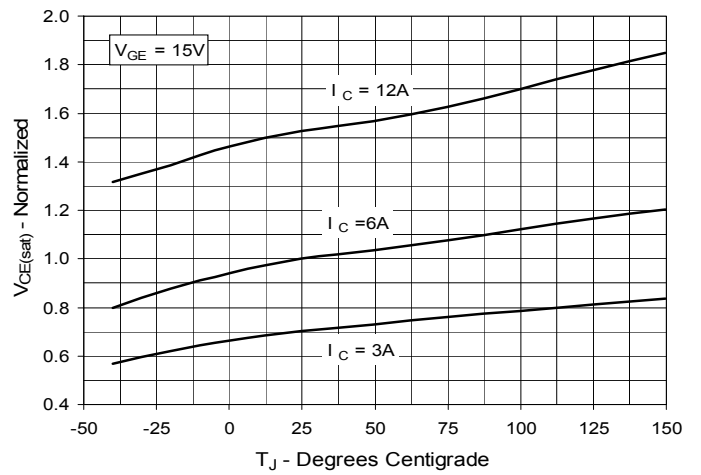
**Fig. 2. Extended Output Characteristics**  
**@ 25°C**



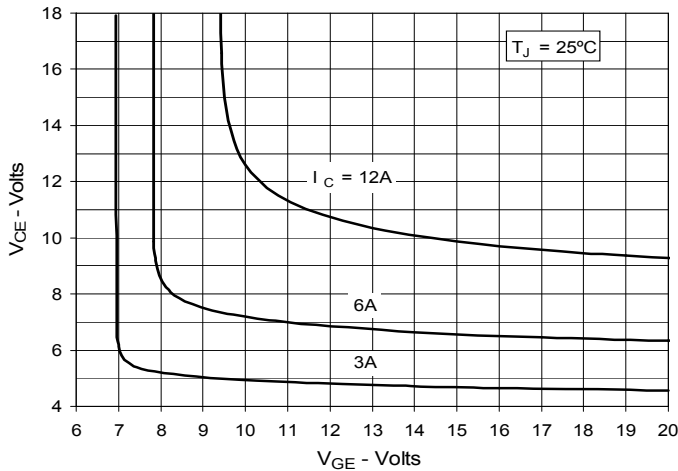
**Fig. 3. Output Characteristics**  
**@ 125°C**



**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**

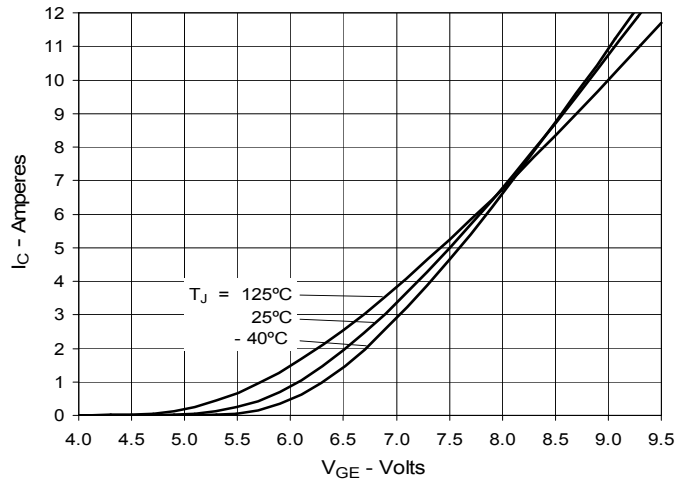


Fig. 7. Transconductance

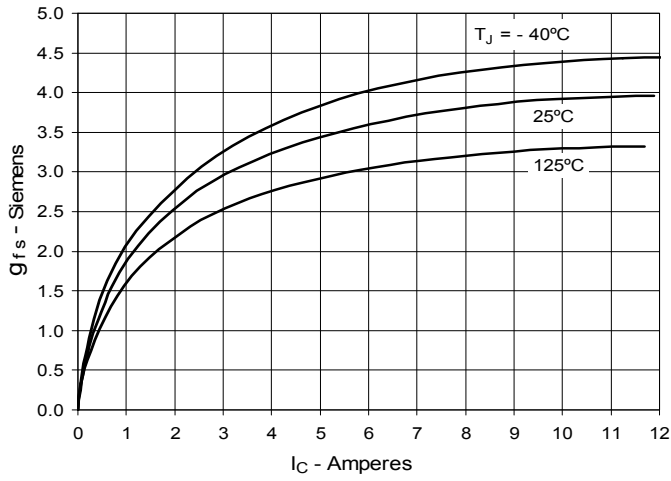


Fig. 8. Gate Charge

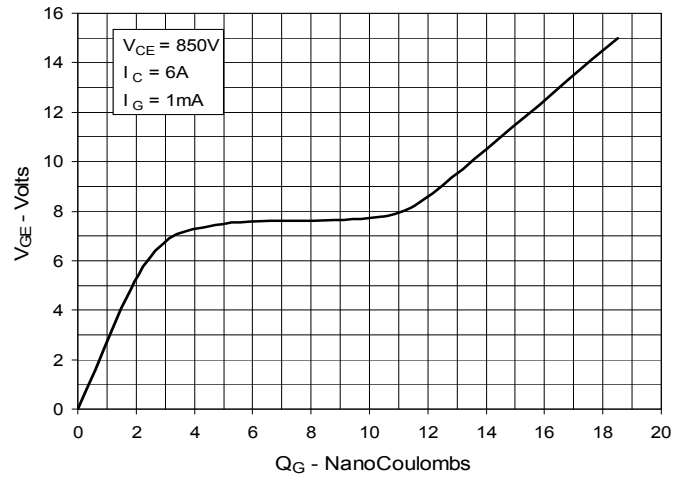


Fig. 9. Reverse-Bias Safe Operating Area

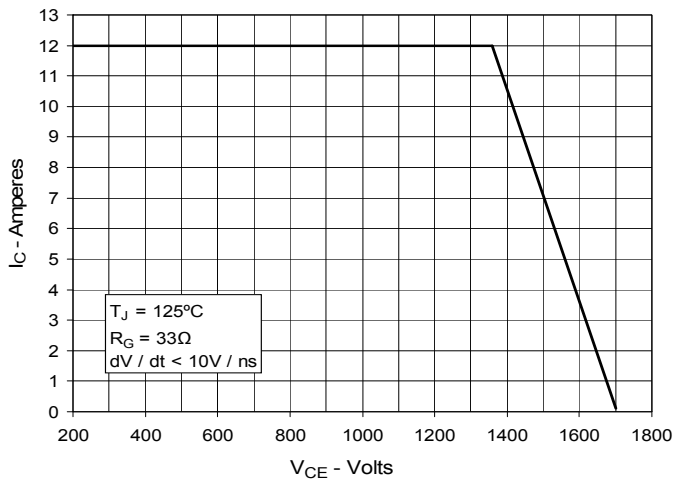


Fig. 10. Capacitance

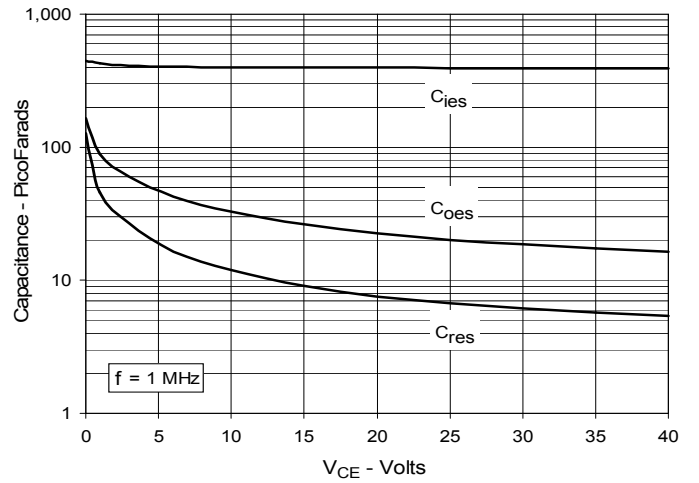
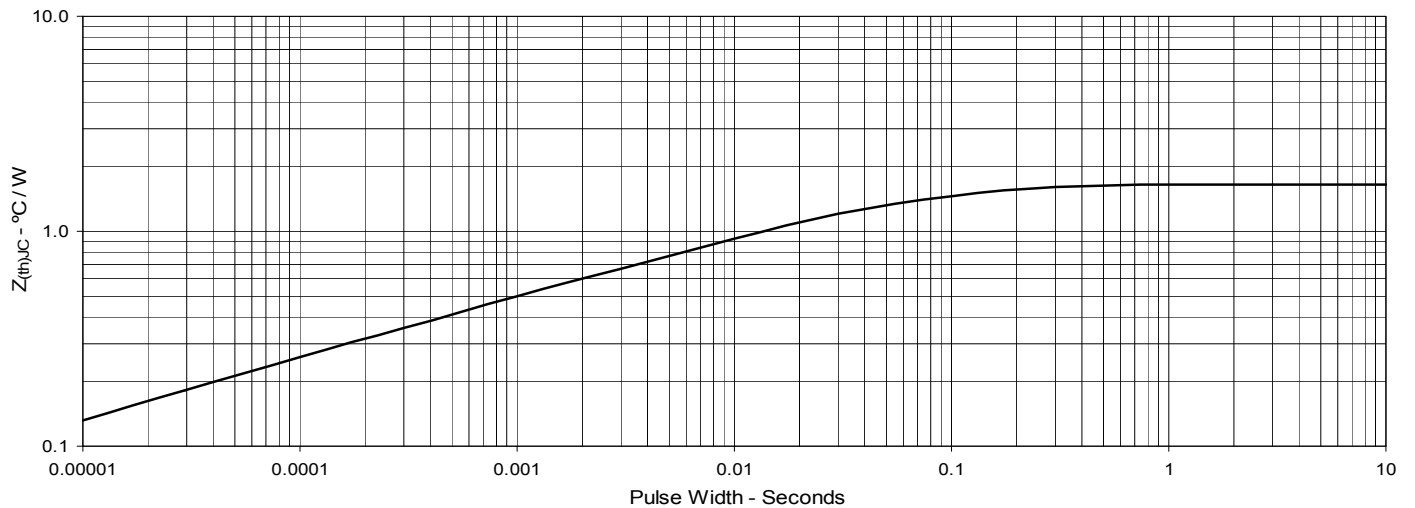
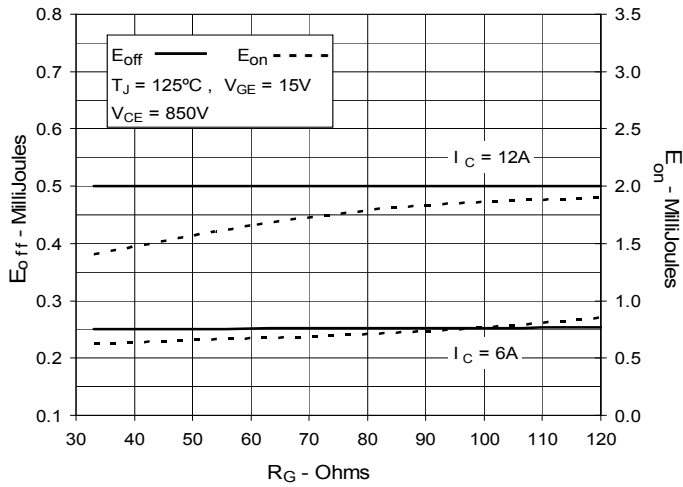


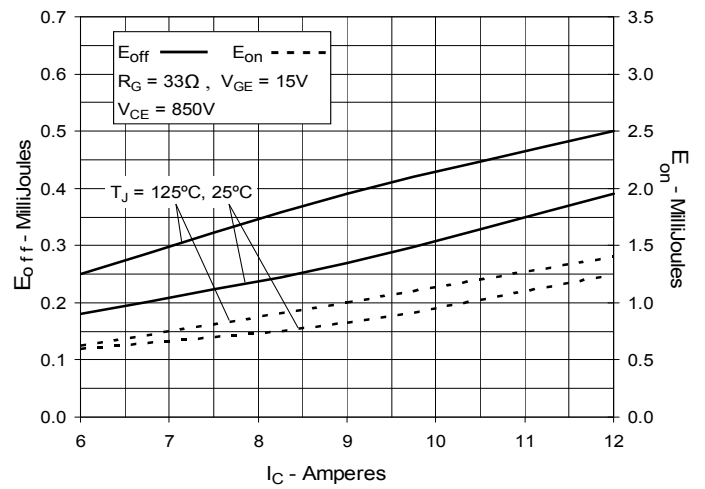
Fig. 11. Maximum Transient Thermal Impedance



**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**

