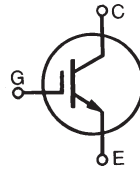


# High Voltage IGBT

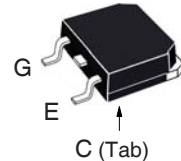
# IXGT6N170A IXGH6N170A

$V_{CES} = 1700V$   
 $I_{C25} = 6A$   
 $V_{CE(sat)} \leq 7.0V$   
 $t_{fi(typ)} = 32ns$

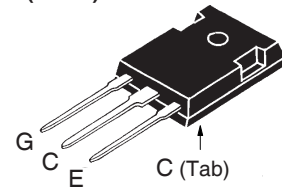


Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_C = 25^\circ C$ to $150^\circ C$	1700	V
$V_{CGR}$	$T_J = 25^\circ C$ to $150^\circ C$ , $R_{GE} = 1M\Omega$	1700	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ C$	6	A
$I_{C110}$	$T_C = 110^\circ C$	3	A
$I_{CM}$	$T_C = 25^\circ C$ , 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	$^\circ C$
$T_L$	Maximum Lead Temperature for Soldering	300	$^\circ C$
$T_{SOLD}$	1.6 mm (0.062in.) from Case for 10s	260	$^\circ C$
$M_d$	Mounting Torque (TO-247)	1.13/10	Nm/lb.in.
<b>Weight</b>	TO-268	4	g
	TO-247	6	g

TO-268 (IXGT)



TO-247 (IXGH)



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

## Features

- International Standard Packages
- High Voltage Package

## Advantages

- High Power Density
- Low Gate Drive Requirement

## Applications

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

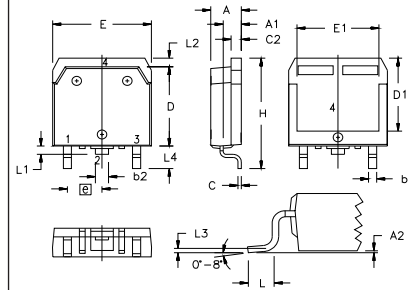
Symbol	Test Conditions ( $T_J = 25^\circ C$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{CES}$	$I_C = 250\mu A$ , $V_{GE} = 0V$	1700		V
$V_{GE(th)}$	$I_C = 250\mu A$ , $V_{CE} = V_{GE}$	3.0		V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ , $V_{GE} = 0V$ $T_J = 125^\circ C$			10 $\mu A$ 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 2		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 2		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	
$R_{thJC}$	TO-247		1.65	$^\circ\text{C/W}$	
$R_{thCK}$			0.21	$^\circ\text{C/W}$	

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  $R_G$ .

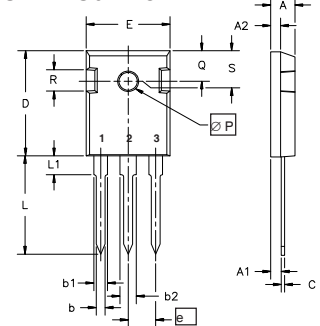
### TO-268 Outline



Terminals: 1 - Gate, 2,4 - Collector, 3 - Emitter

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A1	.106	.114	2.70	2.90
A2	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
b2	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C2	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D1	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E1	.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
L1	.047	.055	1.20	1.40
L2	.039	.045	1.00	1.15
L3	.010 BSC		0.25 BSC	
L4	.150	.161	3.80	4.10

### TO-247 Outline



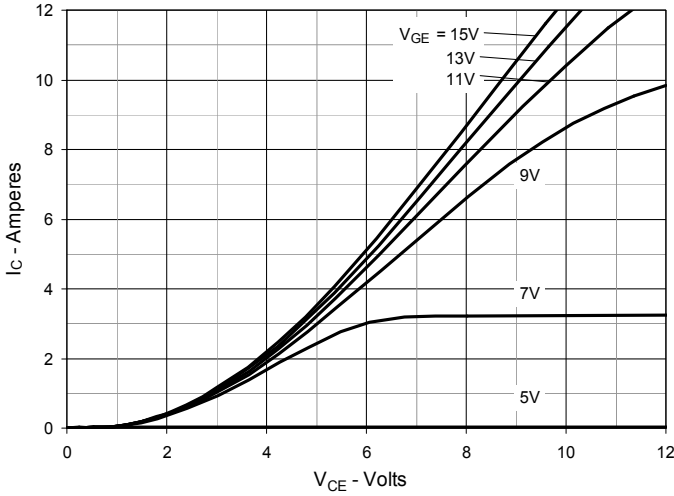
Terminals: 1 - Gate, 2 - Collector, 3 - Emitter

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
∅P	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

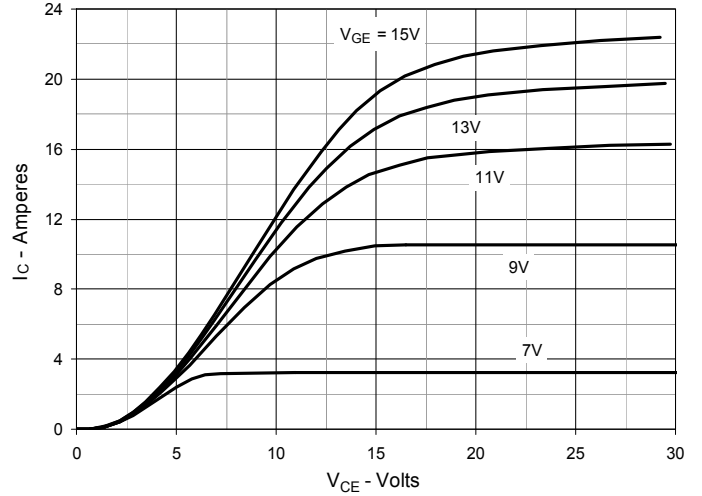
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

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
	4,860,072	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	

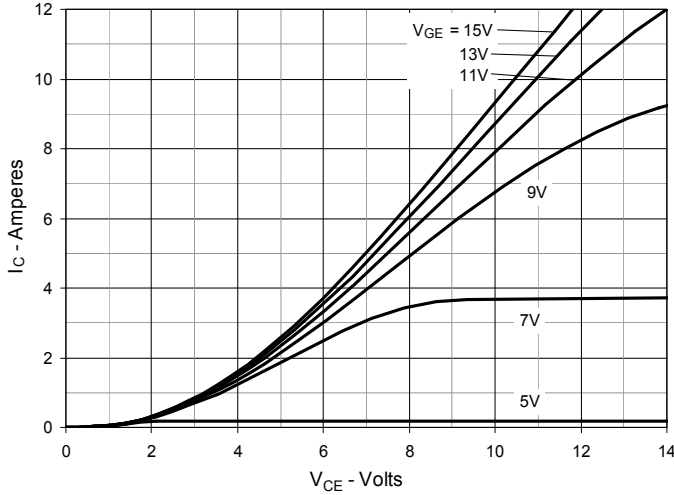
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



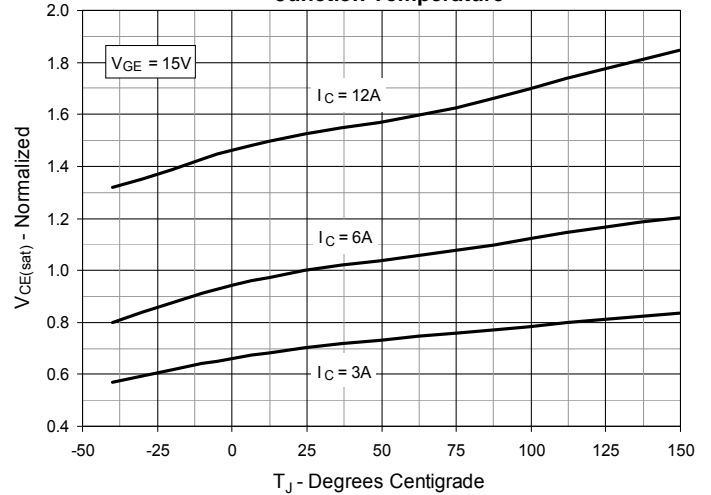
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



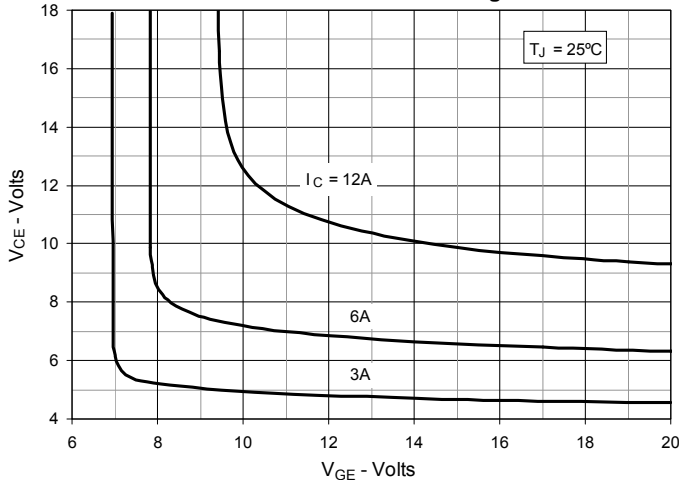
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



**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**

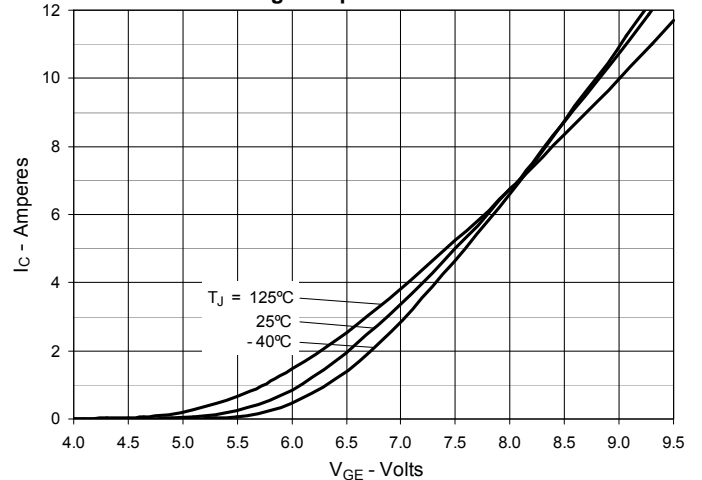


Fig. 7. Transconductance

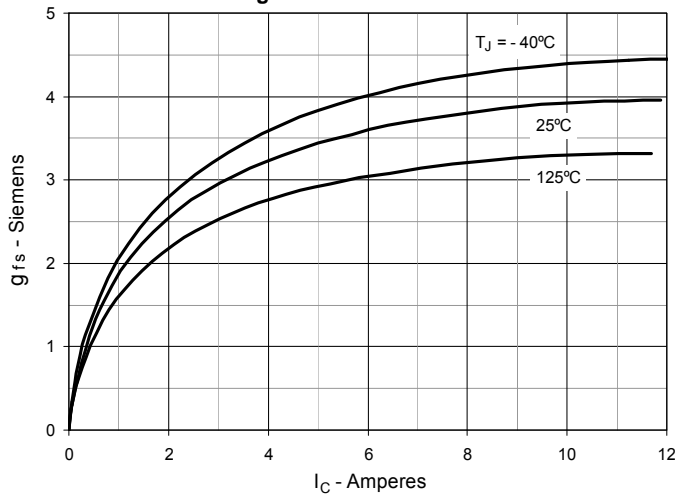


Fig. 8. Gate Charge

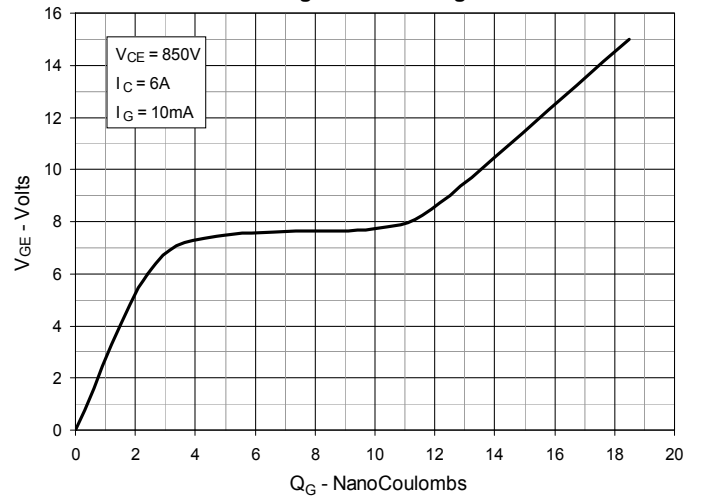


Fig. 9. Reverse-Bias Safe Operating Area

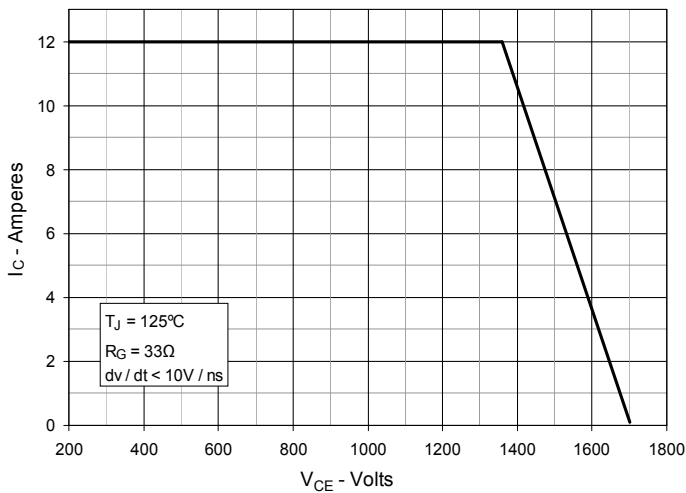


Fig. 10. Capacitance

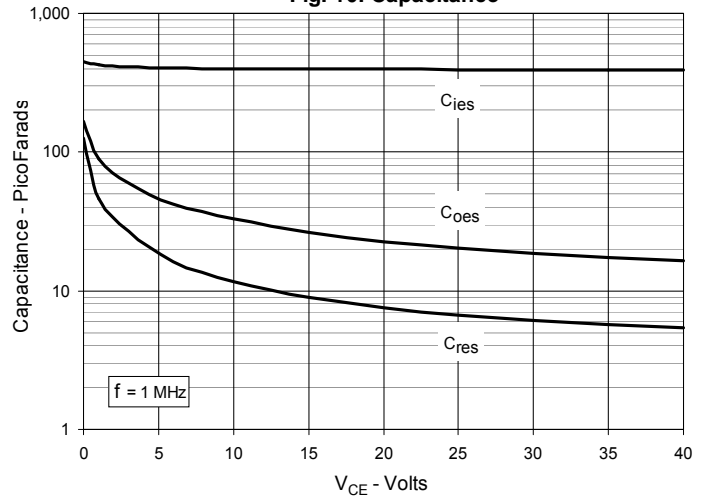
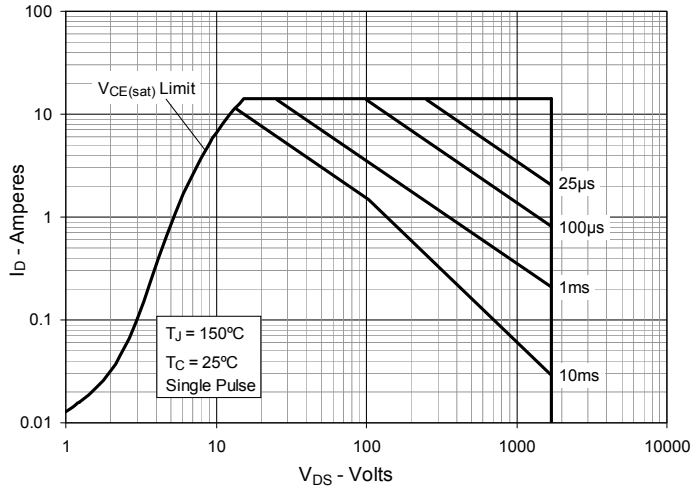
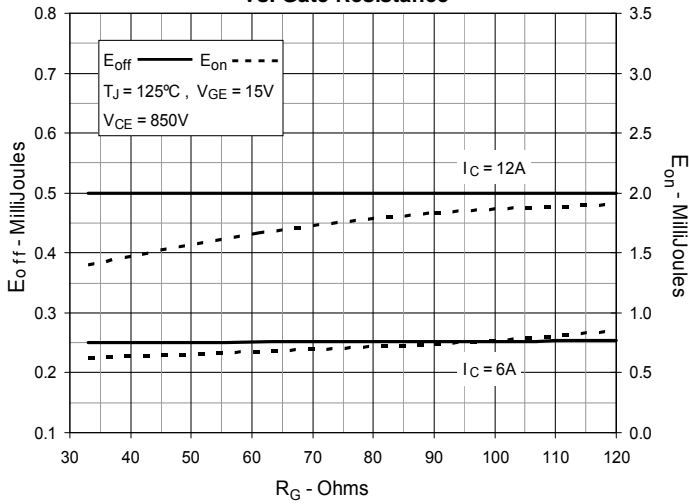


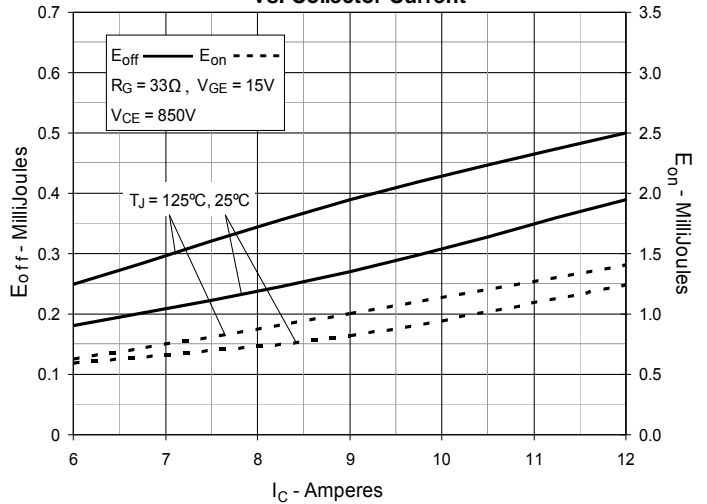
Fig. 11. Forward-Bias Safe Operating Area



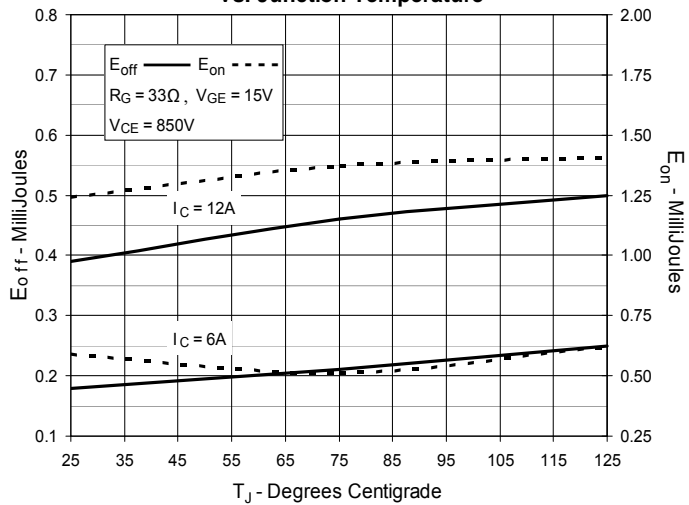
**Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance**



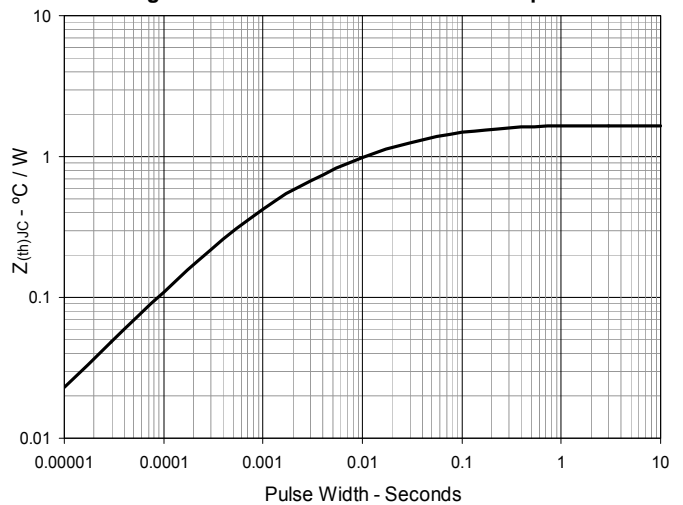
**Fig. 13. Inductive Switching Energy Loss vs. Collector Current**



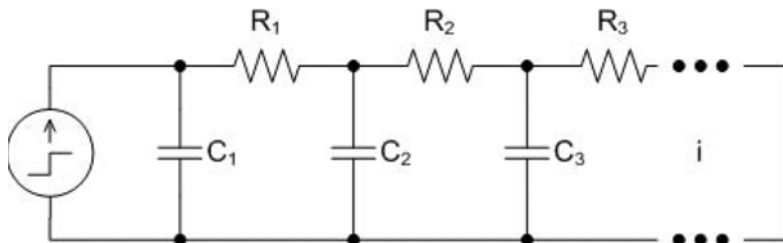
**Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature**



**Fig. 15. Maximum Transient Thermal Impedance**



**Fig. 16. Cauer Thermal Network**



i	R <sub>i</sub> (°C/W)	C <sub>i</sub> (J/°C)
1	0.11615	0.0019257
2	0.29930	0.0016574
3	0.26377	0.0262960



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