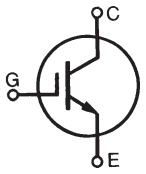
IXYS

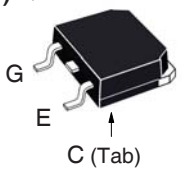
High Voltage IGBT

IXGT6N170A
IXGH6N170A

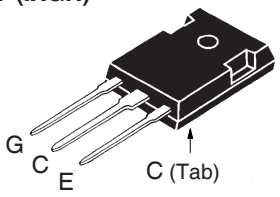
V_{CES} = 1700V
I_{C25} = 6A
$V_{CE(sat)}$ ≤ 7.0V
$t_{fi(typ)}$ = 32ns



TO-268 (IXGT)



TO-247 (IXGH)



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

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_C = 25°C to 150°C	1700	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	1700	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	T_C = 25°C	6	A
I_{C110}	T_C = 110°C	3	A
I_{CM}	T_C = 25°C, 1ms	14	A
SSOA	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 33Ω	I_{CM} = 12	A
(RBSOA)	Clamped Inductive Load	@ 0.8 • V_{CES}	
t_{SC}	T_J = 125°C, V_{CE} = 1200 V, V_{GE} = 15 V, R_G = 33Ω	10	µs
P_C	T_C = 25°C	75	W
T_J		- 55 ... +150	°C
T_{JM}		150	°C
T_{stg}		- 55 ... +150	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
M_d	Mounting Torque (TO-247)	1.13/10	Nm/lb.in.
Weight	TO-268	4	g
	TO-247	6	g

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250µA, V_{GE} = 0V	1700			V
$V_{GE(th)}$	I_C = 250µA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = 0.8 • V_{CES}, V_{GE} = 0V			10	µA
	T_J = 125°C			500	µA
I_{GES}	V_{CE} = 0V, V_{GE} = ± 20V			±100	nA
$V_{CE(sat)}$	I_C = I_{C110}, V_{GE} = 15V, Note 1			7.0	V
	T_J = 125°C		5.4		

Features

- International Standard Packages
- High Voltage Package

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

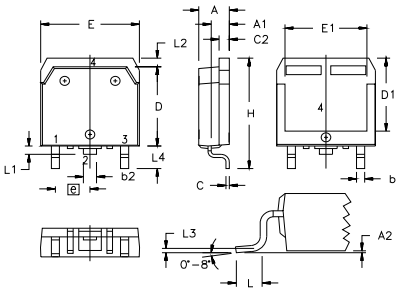
- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Welding Machines

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 6A, V_{CE} = 20V, Note 1	2.0	3.5		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		390		pF
C_{oes}			20		pF
C_{res}			7		pF
Q_g	I_C = 6A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		18.5		nC
Q_{ge}			2.8		nC
Q_{gc}			8.2		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		46		ns
t_{ri}	I_C = 6A, V_{GE} = 15V		40		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 33Ω		0.59		mJ
$t_{d(off)}$	Note 2		220	400	ns
t_{fi}			32	65	ns
E_{off}			0.18	0.36	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		48		ns
t_{ri}	I_C = 6A, V_{GE} = 15V		43		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 33Ω		0.62		mJ
$t_{d(off)}$	Note 2		230		ns
t_{fi}			41		ns
E_{off}			0.25		mJ
R_{thJC}				1.65	°C/W
R_{thCK}	TO-247		0.21		°C/W

Notes:

1. Pulse test, t ≤ 300µs, duty cycle, d ≤ 2%.
2. Switching times & energy losses may increase for higher V_{CE}(clamp), T_J or R_G.

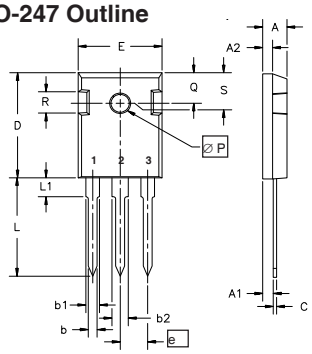
TO-268 Outline



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

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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 Min.	Millimeter Max.	Inches Min.	Inches Max.
A	4.7	5.3	.185	.209
A_1	2.2	2.54	.087	.102
A_2	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b_1	1.65	2.13	.065	.084
b_2	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	

Fig. 1. Output Characteristics @ T_J = 25ºC

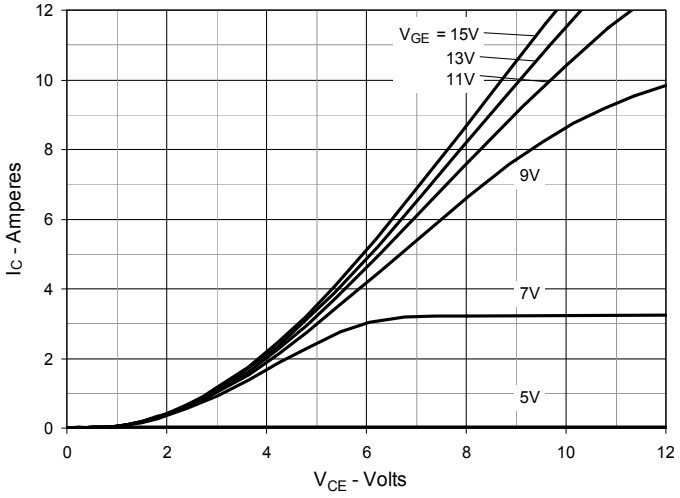


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

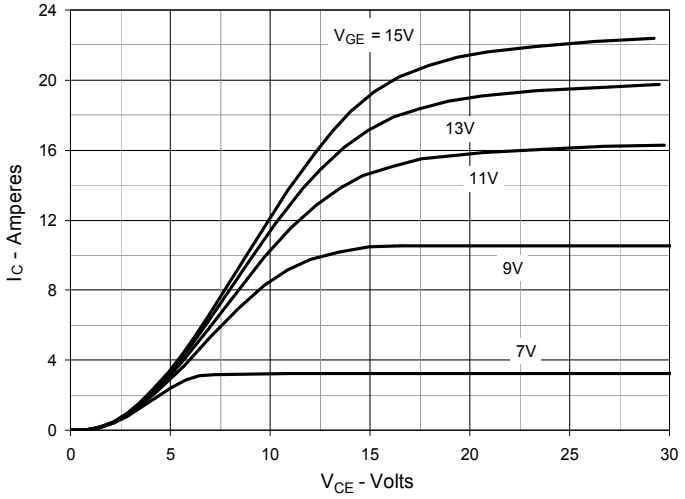


Fig. 3. Output Characteristics @ T_J = 125ºC

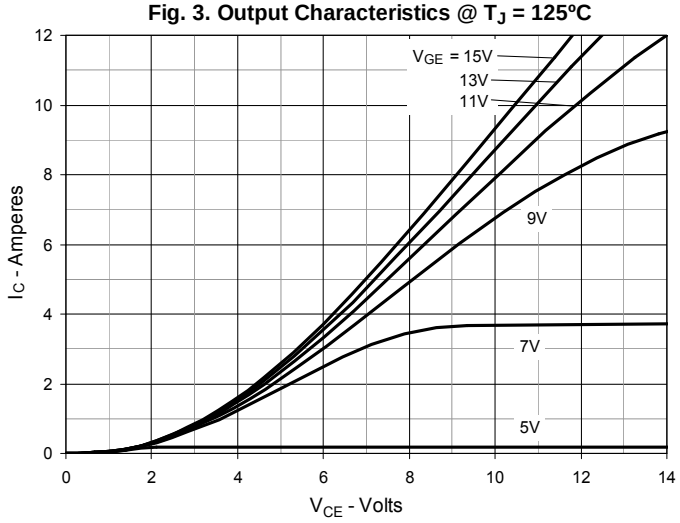


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

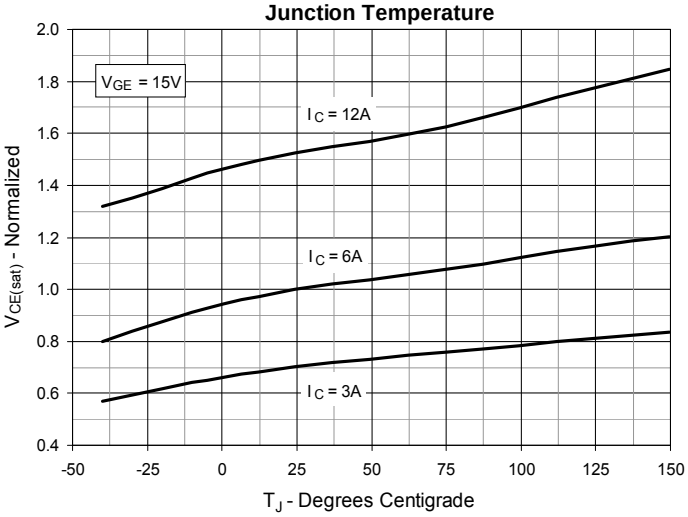


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

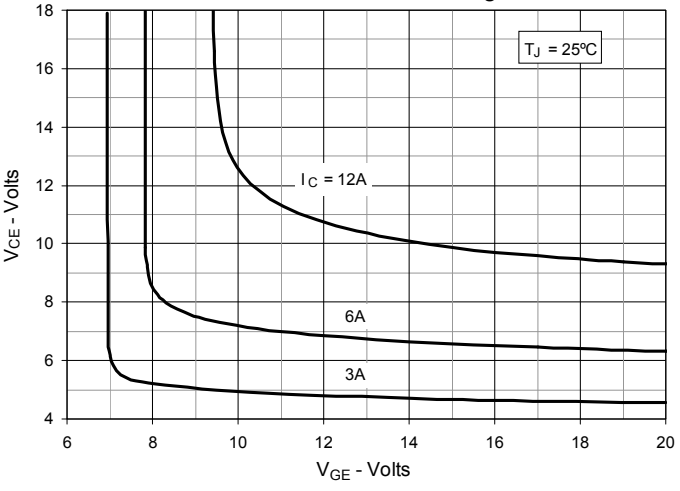


Fig. 6. Input Admittance

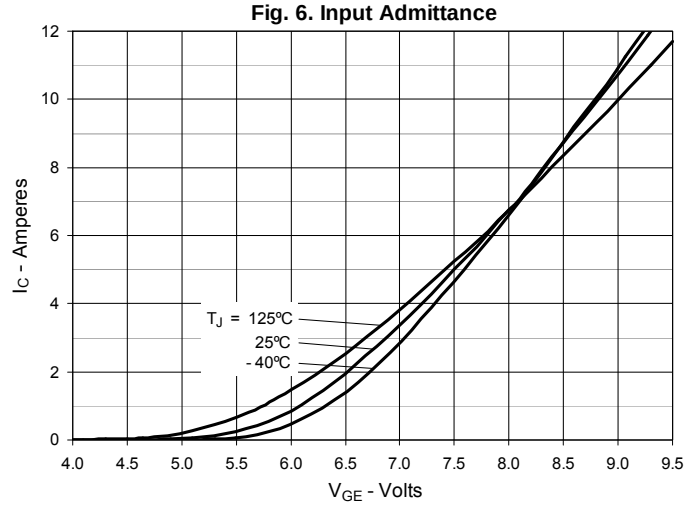


Fig. 7. Transconductance

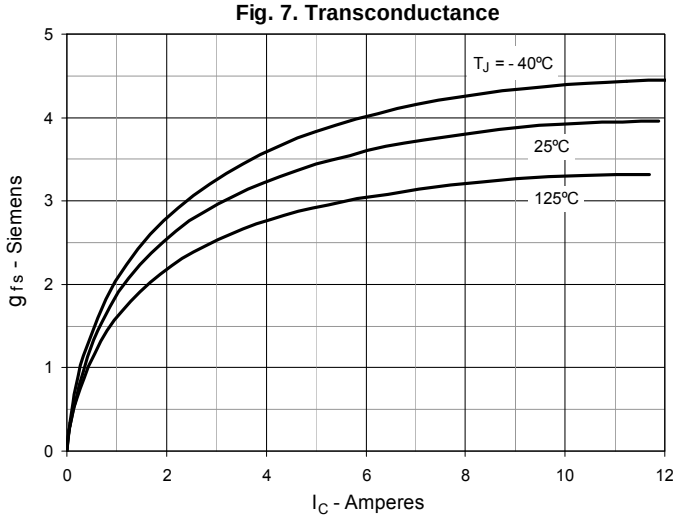


Fig. 8. Gate Charge

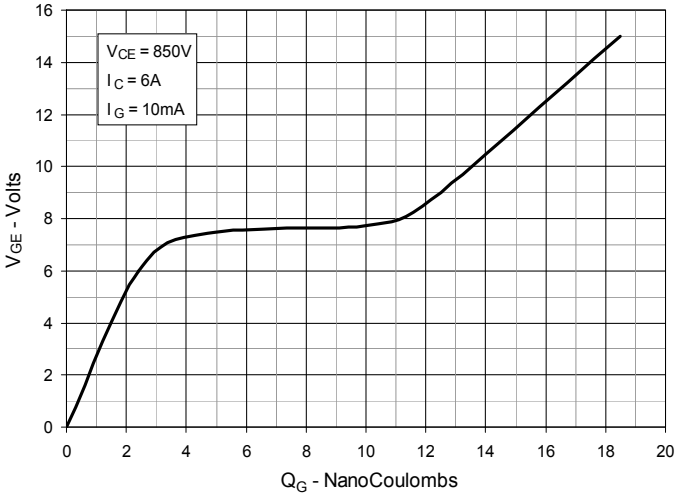


Fig. 9. Reverse-Bias Safe Operating Area

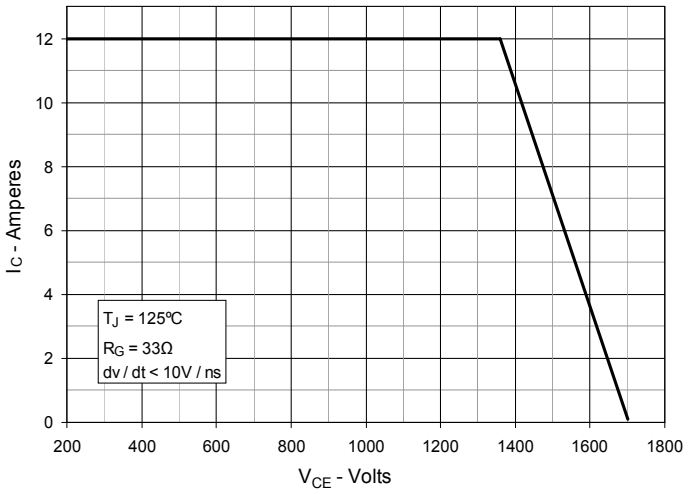


Fig. 10. Capacitance

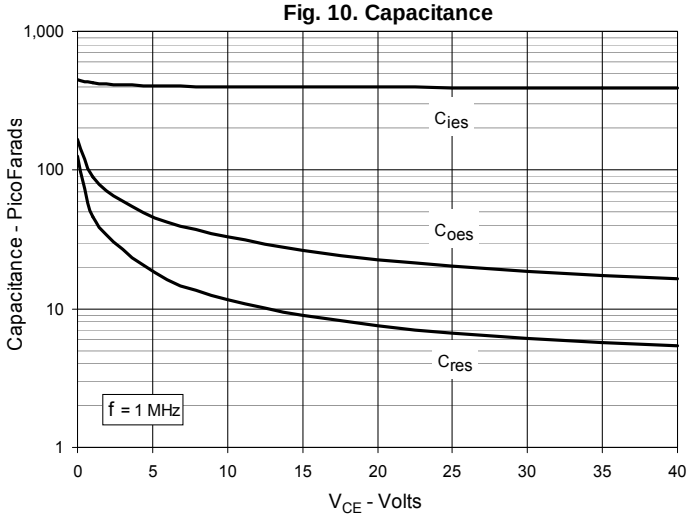


Fig. 11. Forward-Bias Safe Operating Area

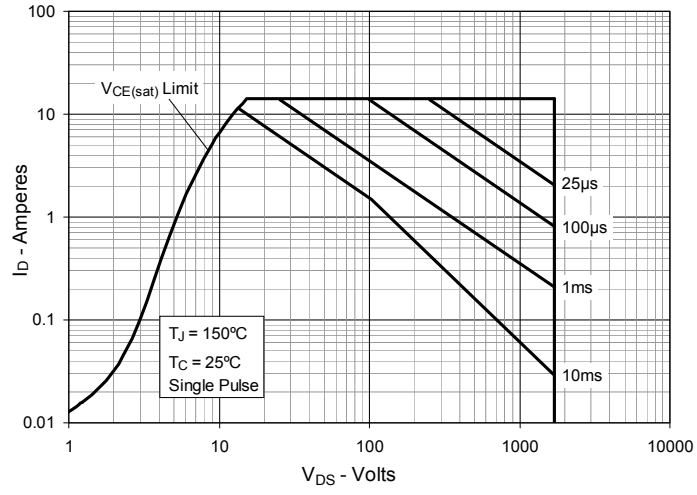


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

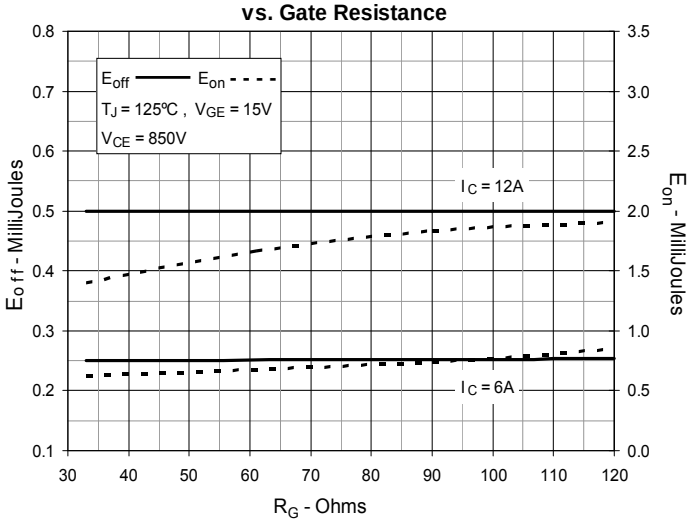


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

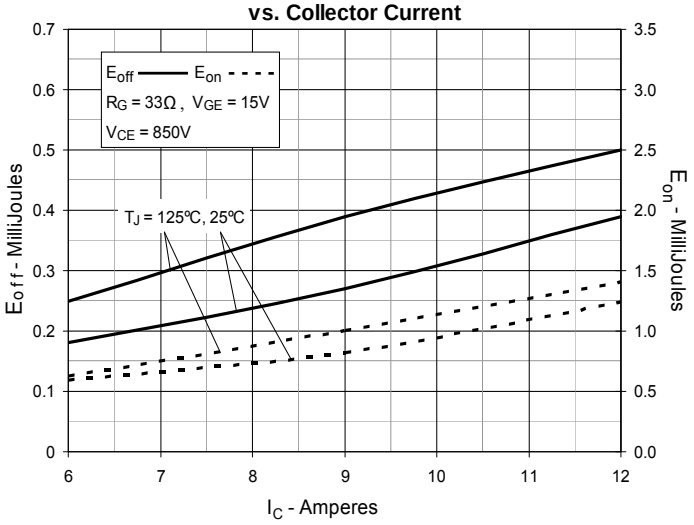


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

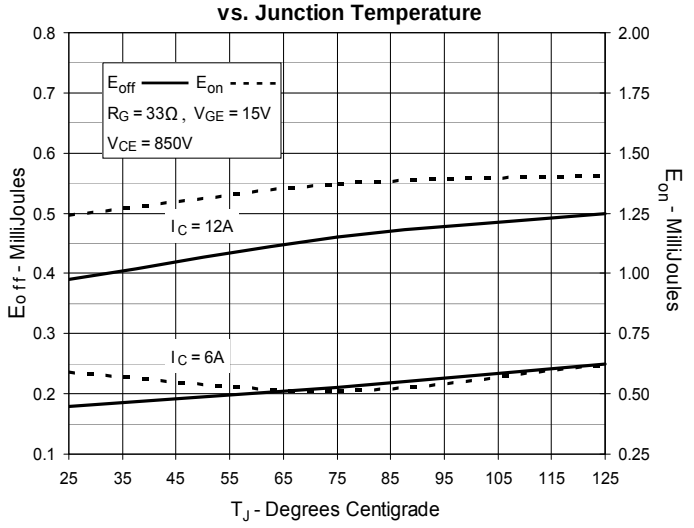


Fig. 15. Maximum Transient Thermal Impedance

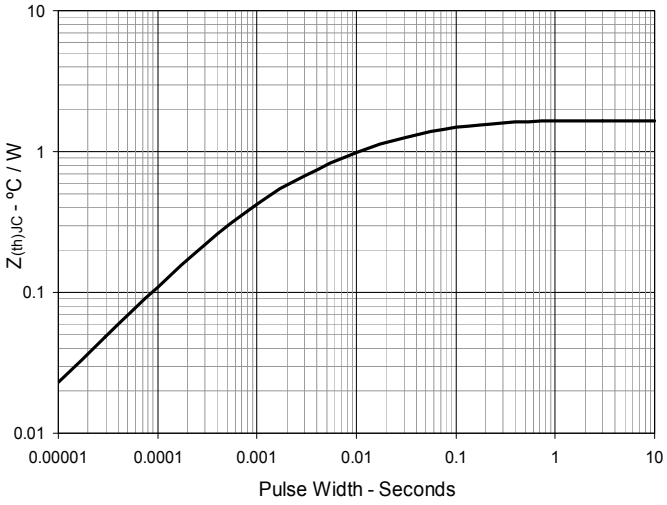
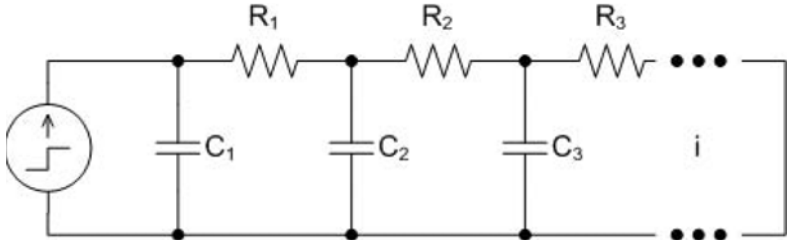


Fig. 16. Cauer Thermal Network



i	Ri (°C/W)	Ci (J/°C)
1	0.11615	0.0019257
2	0.29930	0.0016574
3	0.26377	0.0262960