Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

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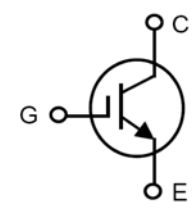
IXYS **Preliminary Technical Information**

XPT™ 650V IGBT GenX3™

IXYA20N65C3
IXYH20N65C3

V_{CES} = 650V
I_{C110} = 20A
$V_{CE(sat)}$ ≤ 2.50V
$t_{fi(typ)}$ = 28ns

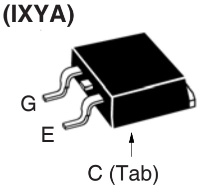
Extreme Light Punch Through
IGBT for 20-60 kHz Switching



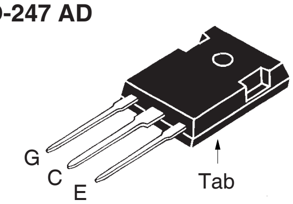
Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	650	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	650	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	50	A
I_{C110}	T_C = 110°C	20	A
I_{CM}	T_C = 25°C, 1ms	105	A
I_A	T_C = 25°C	10	A
E_{AS}	T_C = 25°C	200	mJ
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 20Ω Clamped Inductive Load	I_{CM} = 40 $V_{CE} \leq V_{CES}$	A
t_{sc} (SCSOA)	V_{GE} = 15V, V_{CE} = 360V, T_J = 150°C R_G = 82Ω, Non Repetitive	10	µs
P_C	T_C = 25°C	230	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°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	1.13/10	Nm/lb.in
Weight	TO-263	2.5	g
	TO-247	6.0	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250µA, V_{GE} = 0V	650			V
$V_{GE(th)}$	I_C = 250µA, V_{CE} = V_{GE}	3.5		6.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			10	µA
	T_J = 150°C			150	µA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 20A, V_{GE} = 15V, Note 1		2.27	2.50	V
	T_J = 150°C		2.44		V

TO-263 AA (IXYA)



TO-247 AD



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

Features

- Optimized for 20-60kHz Switching
- Square RBSOA
- Avalanche Rated
- Short Circuit Capability
- International Standard Packages

Advantages

- High Power Density
- Extremely Rugged
- Low Gate Drive Requirement

Applications

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts
- High Frequency Power Inverters

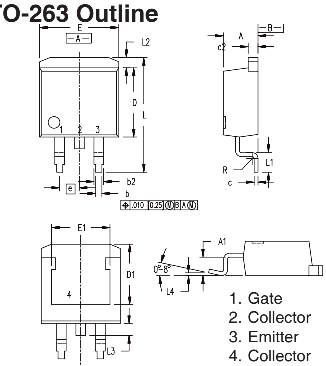
Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 20A, V_{CE} = 10V, Note 1	7	12		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		822		pF
C_{oes}			52		pF
C_{res}			19		pF
$Q_{g(on)}$	I_C = 20A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		30		nC
Q_{ge}			6		nC
Q_{gc}			15		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		19		ns
t_{ri}	I_C = 20A, V_{GE} = 15V		34		ns
E_{on}	V_{CE} = 400V, R_G = 20Ω		0.43		mJ
$t_{d(off)}$	Note 2		80		ns
t_{fi}			28		ns
E_{off}			0.35	0.65	mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		18		ns
t_{ri}	I_C = 20A, V_{GE} = 15V		33		ns
E_{on}	V_{CE} = 400V, R_G = 20Ω		0.70		mJ
$t_{d(off)}$	Note 2		96		ns
t_{fi}			36		ns
E_{off}			0.40		mJ
R_{thJC}				0.65	°C/W
R_{thCS}	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.

PRELIMANARY 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.

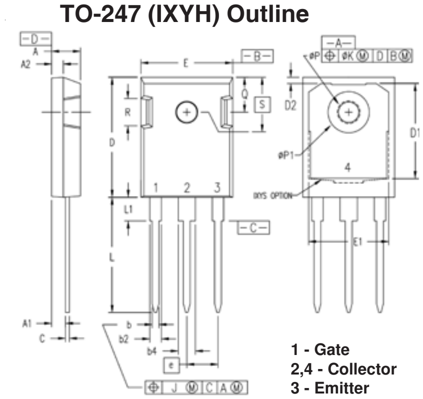
TO-263 Outline



1. Gate
2. Collector
3. Emitter
4. Collector

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.06	4.83	.160	.190
b	0.51	0.99	.020	.039
b2	1.14	1.40	.045	.055
c	0.40	0.74	.016	.029
c2	1.14	1.40	.045	.055
D	8.64	9.65	.340	.380
D1	8.00	8.89	.280	.320
E	9.65	10.41	.380	.405
E1	6.22	8.13	.270	.320
e	2.54	BSC	.100	BSC
L	14.61	15.88	.575	.625
L1	2.29	2.79	.090	.110
L2	1.02	1.40	.040	.055
L3	1.27	1.78	.050	.070
L4	0	0.13	0	.005

TO-247 (IXYH) Outline



1 - Gate
2,4 - Collector
3 - Emitter

Dim.	Millimeter min	max	Inches min	max
A	4.70	5.30	0.185	0.209
A1	2.21	2.59	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	0.99	1.40	0.039	0.055
b2	1.65	2.39	0.065	0.094
b4	2.59	3.43	0.102	0.135
c	0.38	0.89	0.015	0.035
D	20.79	21.45	0.819	0.845
D1	13.07	-	0.515	-
D2	0.51	1.35	0.020	0.053
E	15.48	16.24	0.610	0.640
E1	13.45	-	0.53	-
E2	4.31	5.48	0.170	0.216
e	5.45 BSC		0.215 BSC	
L	19.80	20.30	0.078	0.800
L1	-	4.49	-	0.177
Ø P	3.55	3.65	0.140	0.144
Ø P1	-	7.39	-	0.290
Q	5.38	6.19	0.212	0.244
S	6.14 BSC		0.242 BSC	

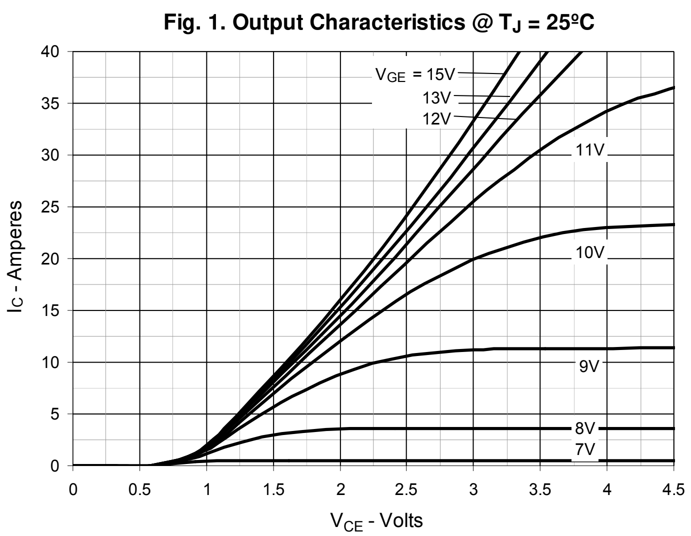


Fig. 1. Output Characteristics @ T_J = 25ºC
V_GE = 15V
13V
12V
11V
10V
9V
8V
7V
I_C - Amperes
V_CE - Volts

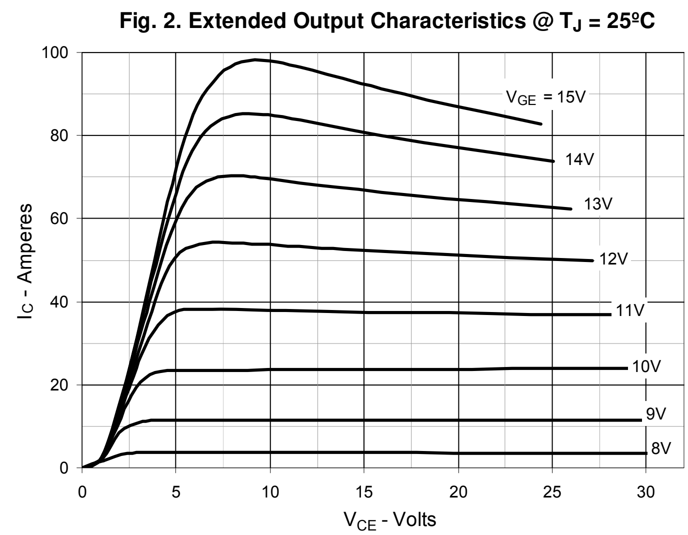


Fig. 2. Extended Output Characteristics @ T_J = 25ºC
V_GE = 15V
14V
13V
12V
11V
10V
9V
8V
I_C - Amperes
V_CE - Volts

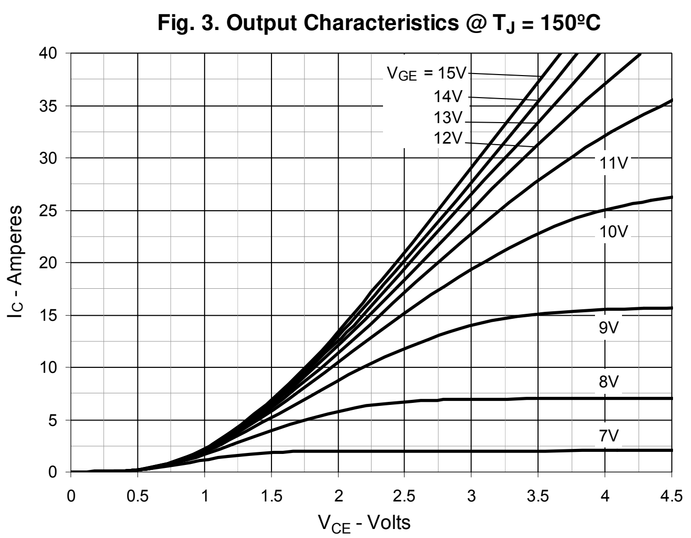


Fig. 3. Output Characteristics @ T_J = 150ºC
V_GE = 15V
14V
13V
12V
11V
10V
9V
8V
7V
I_C - Amperes
V_CE - Volts

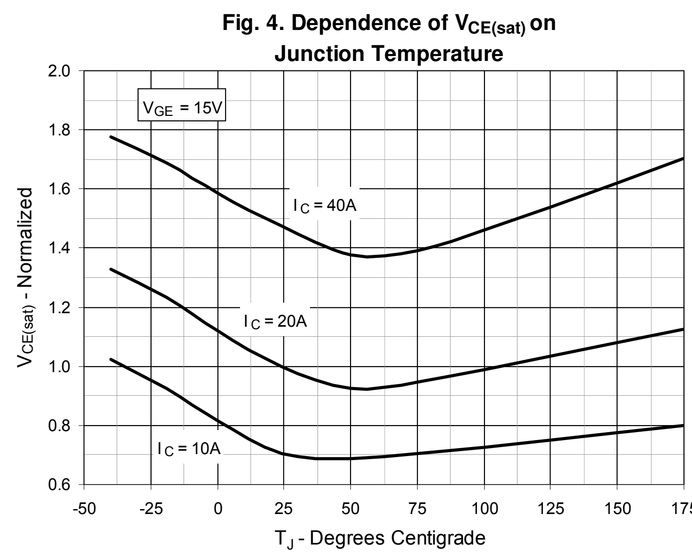


Fig. 4. Dependence of V_CE(sat) on Junction Temperature
V_GE = 15V
I_C = 40A
I_C = 20A
I_C = 10A
V_CE(sat) - Normalized
T_J - Degrees Centigrade

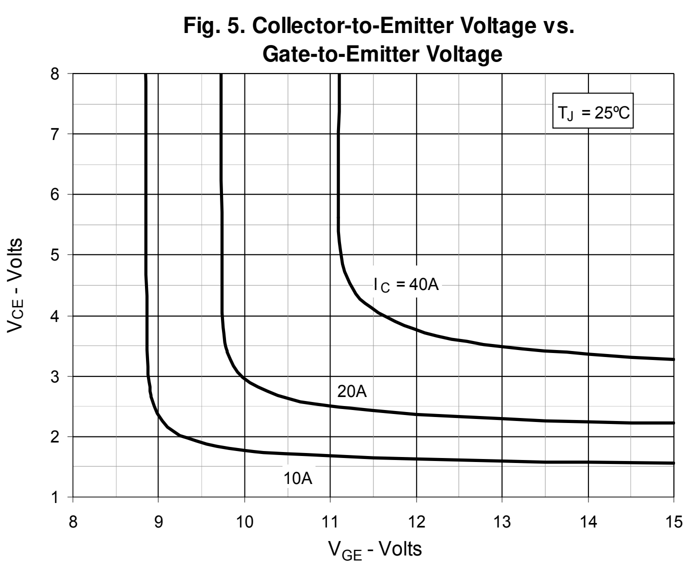


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage
T_J = 25ºC
I_C = 40A
20A
10A
V_CE - Volts
V_GE - Volts

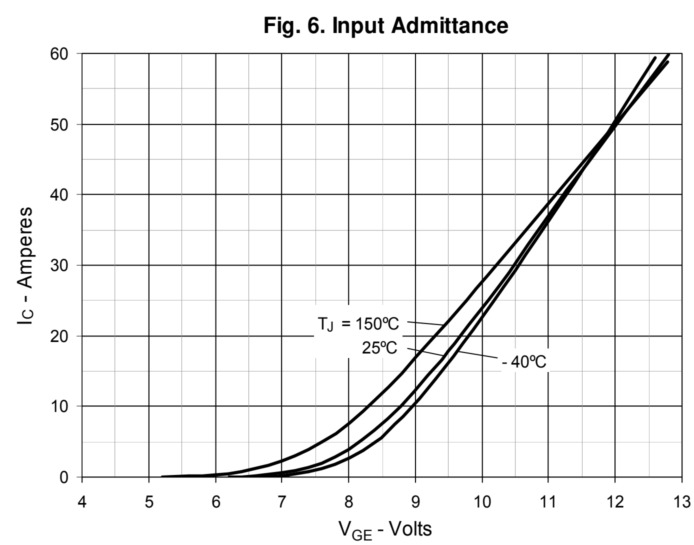


Fig. 6. Input Admittance
T_J = 150ºC
25ºC
- 40ºC
I_C - Amperes
V_GE - Volts

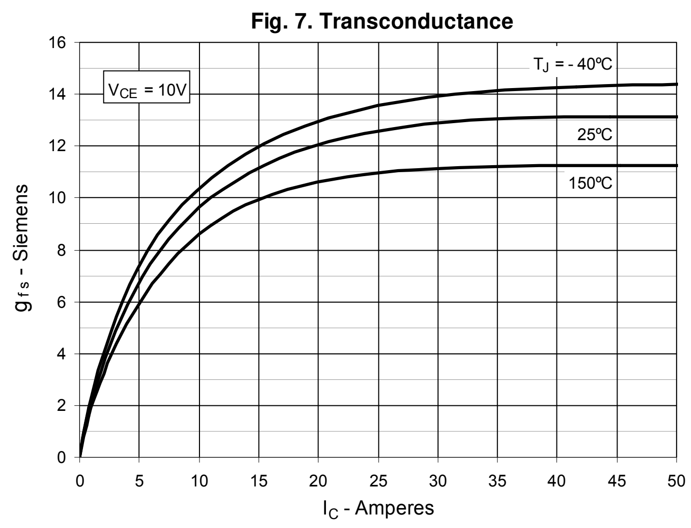


Fig. 7. Transconductance
VCE = 10V
TJ = - 40ºC
25ºC
150ºC
g f s - Siemens
IC - Amperes
0
2
4
6
8
10
12
14
16
0
5
10
15
20
25
30
35
40
45
50

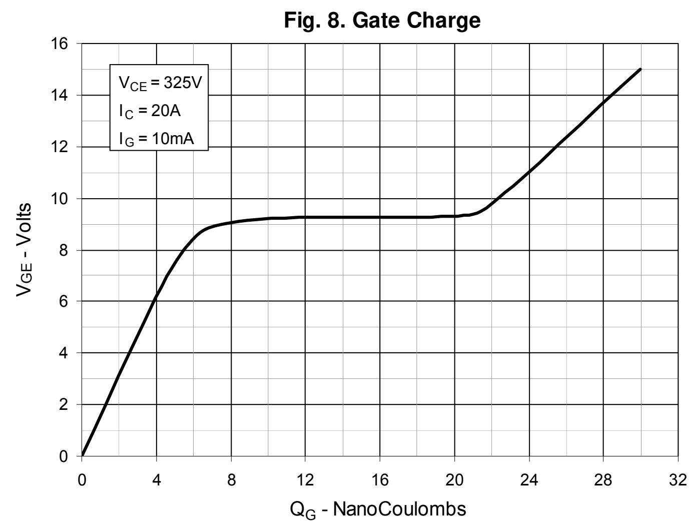


Fig. 8. Gate Charge
VCE = 325V
IC = 20A
IG = 10mA
VGE - Volts
QG - NanoCoulombs
0
2
4
6
8
10
12
14
16
0
4
8
12
16
20
24
28
32

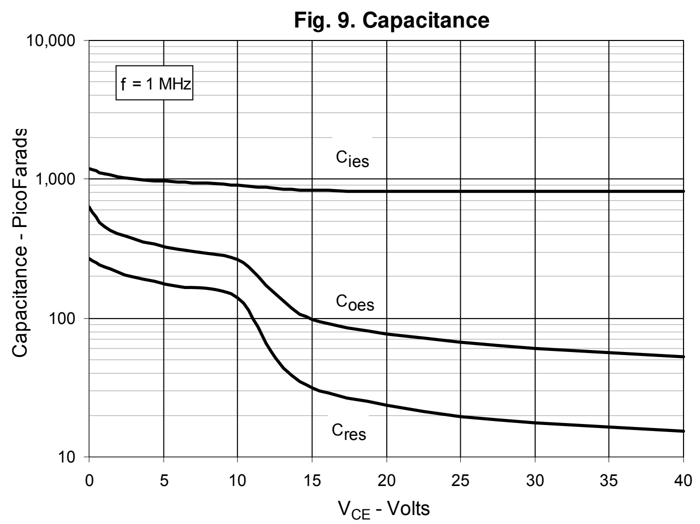


Fig. 9. Capacitance
f = 1 MHz
Cies
Coes
Cres
Capacitance - PicoFarads
VCE - Volts
10
100
1,000
10,000
0
5
10
15
20
25
30
35
40

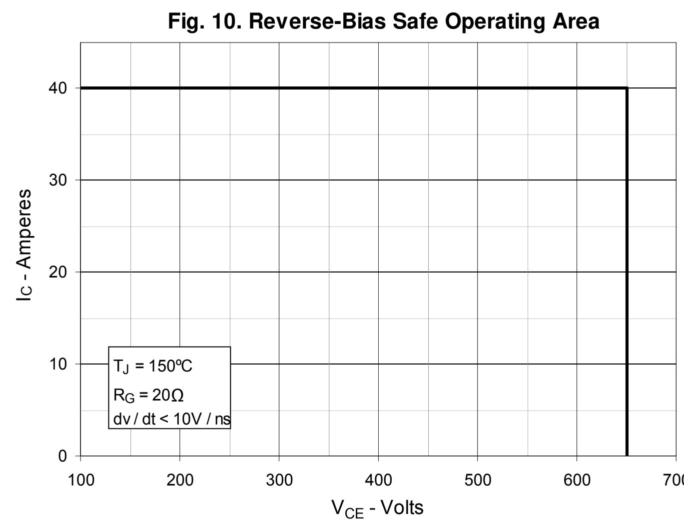


Fig. 10. Reverse-Bias Safe Operating Area
TJ = 150ºC
RG = 20Ω
dv / dt < 10V / ns
IC - Amperes
VCE - Volts
0
10
20
30
40
100
200
300
400
500
600
700

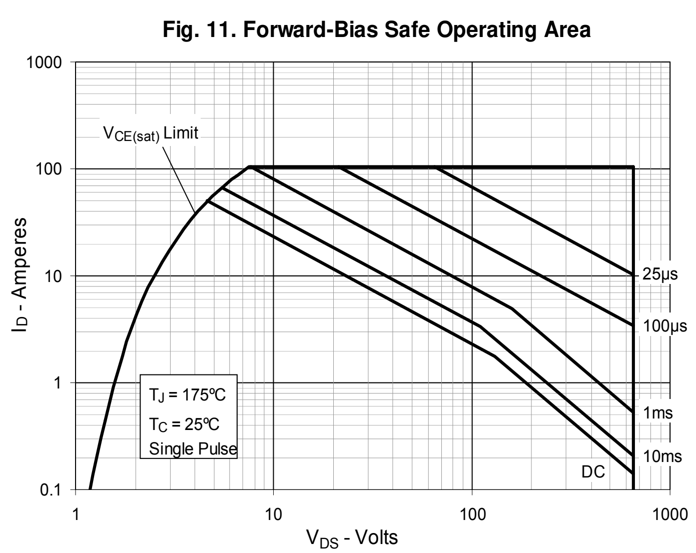


Fig. 11. Forward-Bias Safe Operating Area
VCE(sat) Limit
TJ = 175ºC
TC = 25ºC
Single Pulse
25µs
100µs
1ms
10ms
DC
ID - Amperes
VDS - Volts
0.1
1
10
100
1000
1
10
100
1000

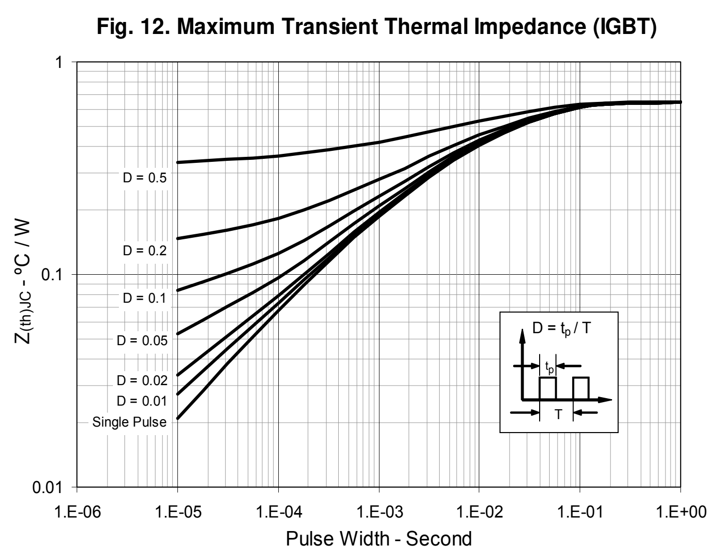


Fig. 12. Maximum Transient Thermal Impedance (IGBT)
D = 0.5
D = 0.2
D = 0.1
D = 0.05
D = 0.02
D = 0.01
Single Pulse
D = tp / T
tp
T
Z(th)JC - ºC / W
Pulse Width - Second
0.01
0.1
1
1.E-06
1.E-05
1.E-04
1.E-03
1.E-02
1.E-01
1.E+00

Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

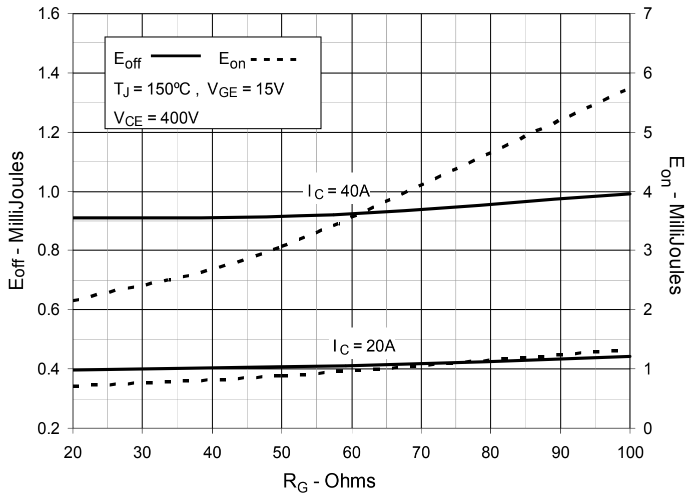


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

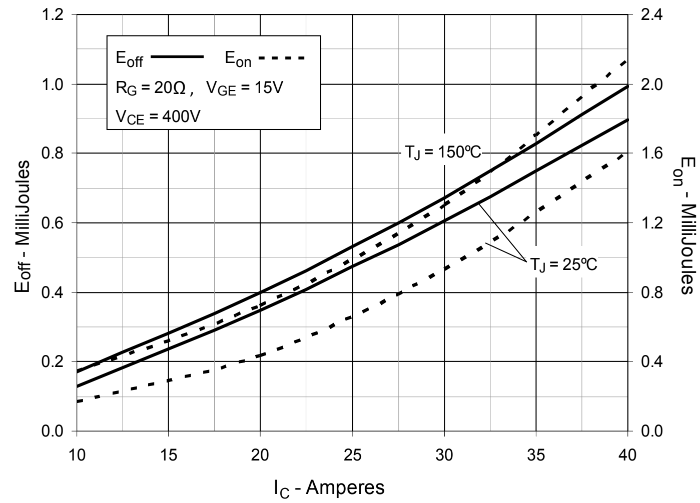


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

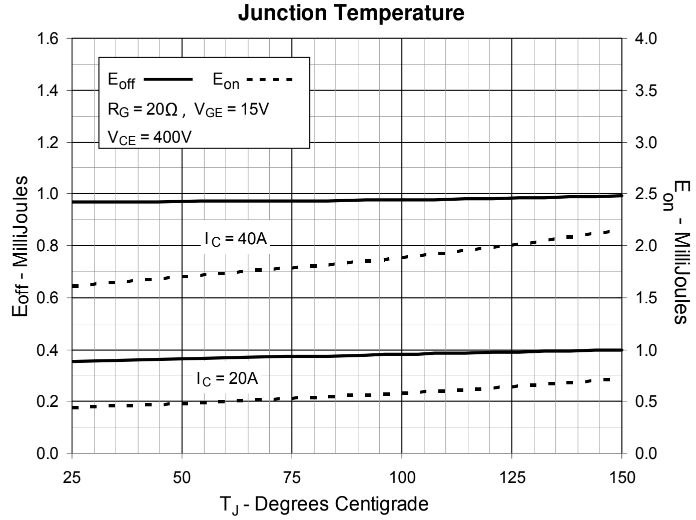


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

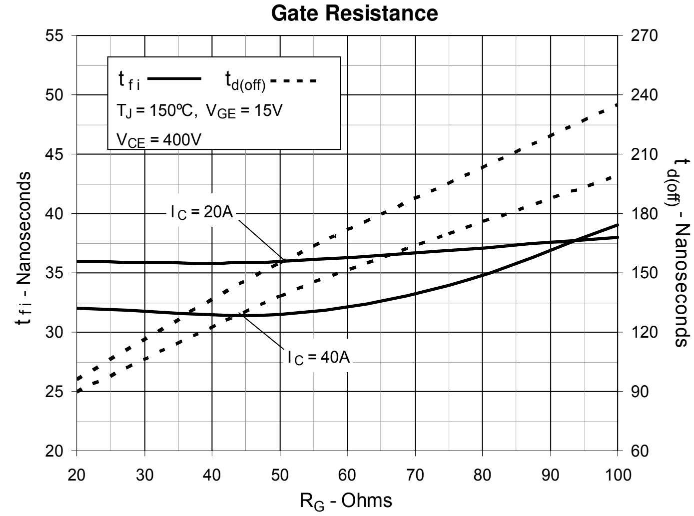


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

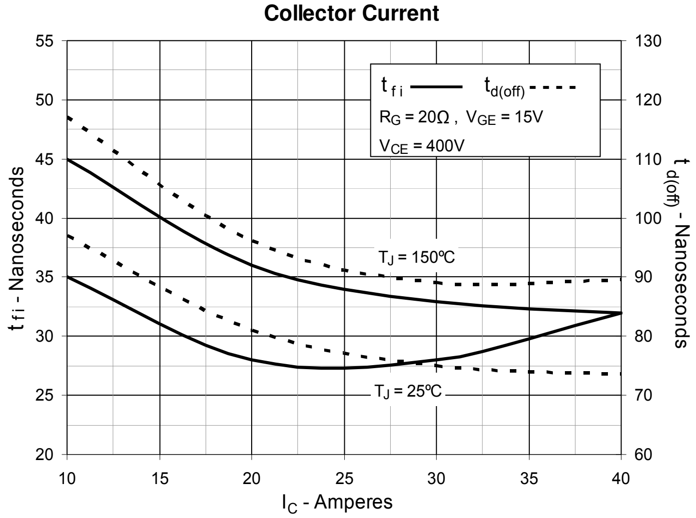


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature

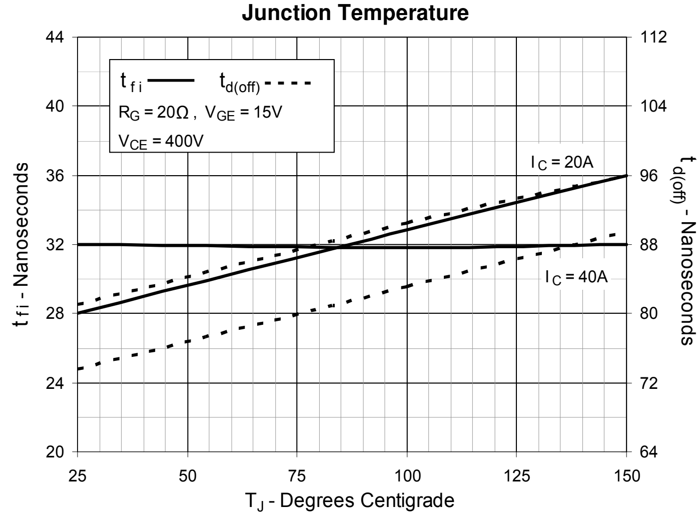


Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

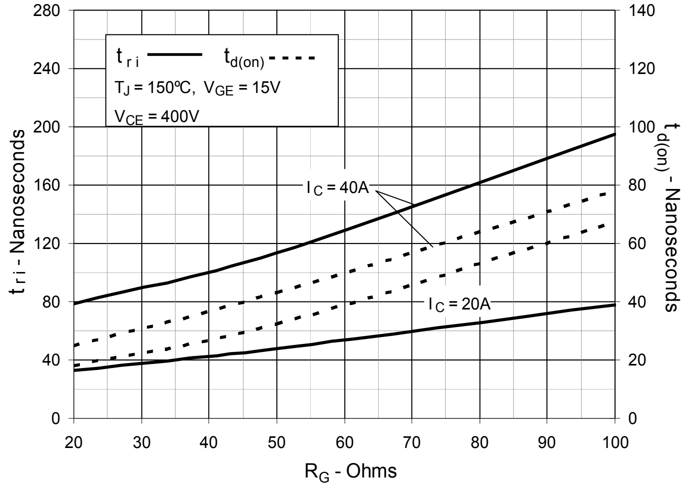


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

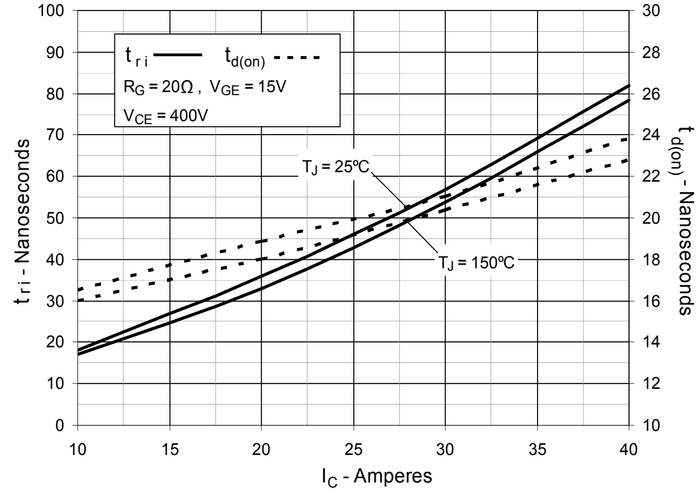


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature

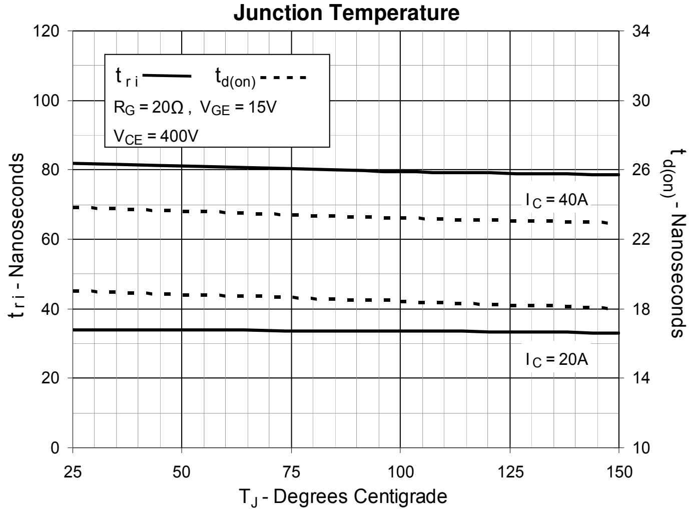
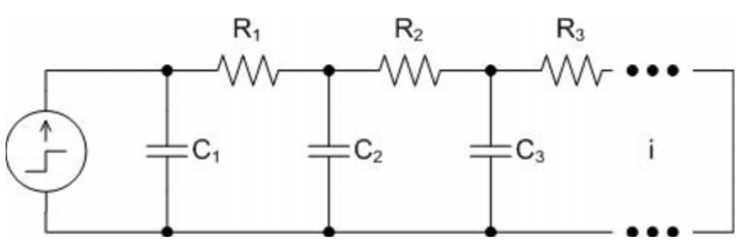


Fig. 22. Cauer Thermal Network



i	Ri (°C/W)	Ci (J/°C)
1	0.170320	0.0017715
2	0.136990	0.0166820
3	0.090011	0.0391660