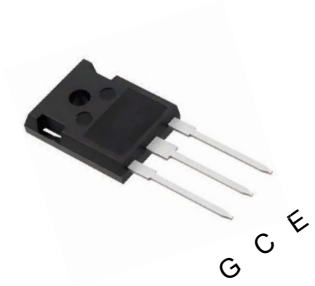
SG20N135RCB2

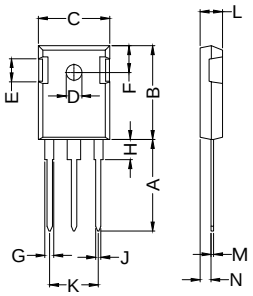
Discrete Reverse Conducting IGBTs

C(TAB)



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

Dimensions TO-247AD



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.620	0.640
ØD	3.15	3.65	0.124	0.144
E	4.32	5.49	0.170	0.216
F	5.40	6.30	0.213	0.248
G	1.65	2.18	0.065	0.086
H	3.80	4.50	0.150	0.177
J	1.00	1.40	0.039	0.055
K	10.80	11.10	0.425	0.437
L	4.70	5.30	0.185	0.209
M	0.40	0.80	0.016	0.031
N	1.50	2.49	0.059	0....

SG20N135RCB2

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	1350	V
DC collector current T_C = 25°C T_C = 100°C	I_C	 40 20	A
Pulsed collector current, t_p limited by T_{jmax}	I_{Cpuls}	55	
Turn off safe operating area V_{CE} ≤ 1200V, T_j ≤ 150°C	-	55	
Gate-emitter voltage	V_{GE}	±30	V
Avalanche energy, single pulse I_C = 20A, V_{CC} = 50V, R_{GE} = 25Ω, start at T_j = 25°C	E_{AS}	95	mJ
Short circuit withstand time[1)] V_{GE} = 15V, 100V ≤ V_{CC} ≤ 1200V, T_j ≤ 150°C	t_{SC}	10	µs
Power dissipation T_C = 25°C	P_{tot}	205	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C
Soldering temperature, 1.6mm (0.063 in.) from case for 10s	-	260	

Thermal Resistance

Parameter	Symbol	Conditions	Max. Value	Unit
Characteristic				
IGBT thermal resistance, junction – case	R_{thJC}		0.45	K/W
Thermal resistance, junction – ambient	R_{thJA}	TO-247AD	36	

www.sirectifier.com Tel: +86-519-86800000 Fax: +86-519-88019919 E-mail: sales@sirectifier.com

SG20N135RCB2

Discrete Reverse Conducting IGBTs

Electrical Characteristic, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE}=0V, I_C=1000μA	1350	1400	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE} = 15V, I_C=20A T_j=25°C T_j=150°C	 -	 2.70 3.10	 3.30 3.70	
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C=600μA,V_{CE}=V_{GE}	3.00	5.00	6.00	
Zero gate voltage collector current	I_{CES}	V_{CE}=1200V,V_{GE}=0V T_j=25°C T_j=150°C	 - -	 - -	 300 1000	μA
Gate-emitter leakage current	I_{GES}	V_{CE}=0V,V_{GE}=20V	-	-	100	nA
Transconductance	g_{fs}	V_{CE}=20V, I_C=20A		10	-	S
Dynamic Characteristic						
Input capacitance	C_{iss}	V_{CE}=25V,	-	1790	2200	pF
Output capacitance	C_{oss}	V_{GE}=0V,	-	77	100	
Reverse transfer capacitance	C_{rss}	f=1MHz	-	13	30	
Gate charge	Q_{Gate}	V_{CC}=960V, I_C=20A V_{GE}=15V	-	120	170	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E	TO-247AD	-	13	-	nH
Short circuit collector current[2)]	$I_{C(SC)}$	V_{GE}=15V,t_{SC}≤5μs 100V≤V_{CC}≤1200V, T_j ≤ 150°C	-	165	-	A

[1)] Device on 50mm*50mm*1.5mm epoxy PCB FR4 with 6cm^2 (one layer, 70μm thick) copper area for collector connection. PCB is vertical without blown air.
[2)] Allowed number of short circuits: <1000; time between short circuits: >1s.

www.sirectifier.com Tel: +86-519-86800000 Fax: +86-519-88019919 E-mail: sales@sirectifier.com

SG20N135RCB2

Discrete Reverse Conducting IGBTs

Switching Characteristic, Inductive Load, at T_j=25 °C

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-on delay time	$t_{d(on)}$	T_j=25°C, V_{CC}=600V,I_C=20A, V_{GE}=15V/0V, R_G=33Ω, L_σ[1)] =180nH, C_σ[1)] =40pF Energy losses include "tail" and diode reverse recovery.	-	18	35	ns
Rise time	t_r		-	28	36	
Turn-off delay time	$t_{d(off)}$		-	147	300	
Fall time	t_f		-	150	262	
Turn-on energy	E_{on}		-	0.83	1.40	mJ
Turn-off energy	E_{off}		-	0.90	1.20	
Total switching energy	E_{ts}		-	1.73	2.60	

Reverse Diode (Reverse conducting Diode)

(T_J=25°C, unless otherwise specified)

Symbol	Test Conditions	Characteristic Values			Unit
		min.	typ.	max.	
V_F	I_F=20A; V_{GE}=0V		2.50	3.30	V
I_F	T_C=25°C T_C=90°C			40 20	A
I_{RM}	I_F=20V; -di$_F$/dt=400A/us; V_R=600V		20		A
t_{rr}	V_{GE}=0V; T_J=125°C I_F=1A; -di$_F$/dt=100A/us; V_R=30V; V_{GE}=0V		210 40		ns

Features

NPT IGBT technology

Low switching losses
Switching frequency up to 20KHz

Square RBSOA, no latch up

High short circuit capability

Positive temperature coefficient for easy parallelling
MOS input, voltage controlled

Reverse conducting IGBT with monolithic body diode

Application

- Inductive cooking
- Inverterized microwave ove
- n Resonant converter
- Soft switching application

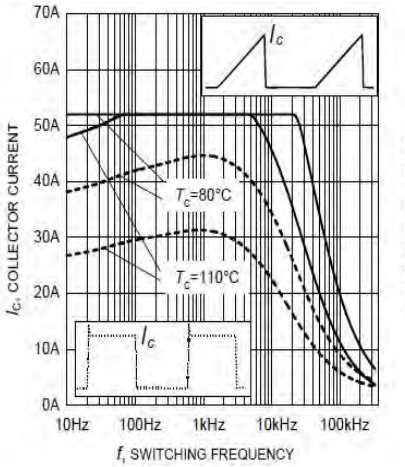
Advantages

- spaceand weight savings
- reduced protectioncircuits

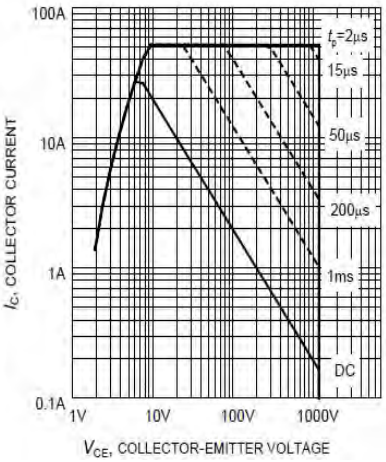
www.sirectifier.com Tel: +86-519-86800000 Fax: +86-519-88019919 E-mail: sales@sirectifier.com

SG20N135RCB2

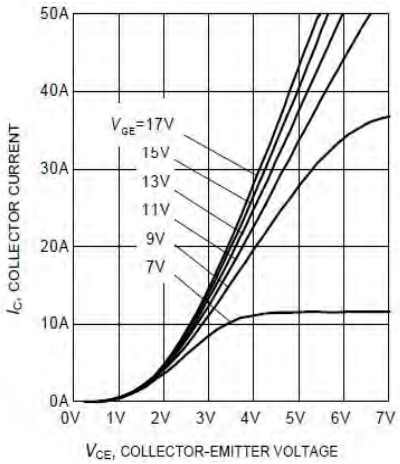
Discrete Reverse Conducting IGBTs



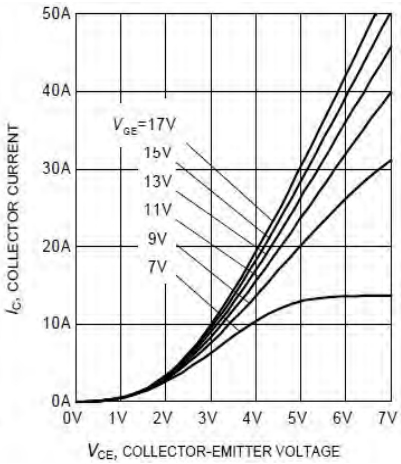
Collector current versus switching frequency



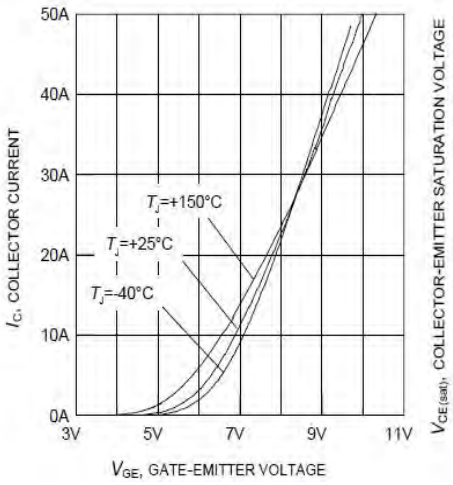
Safe working area



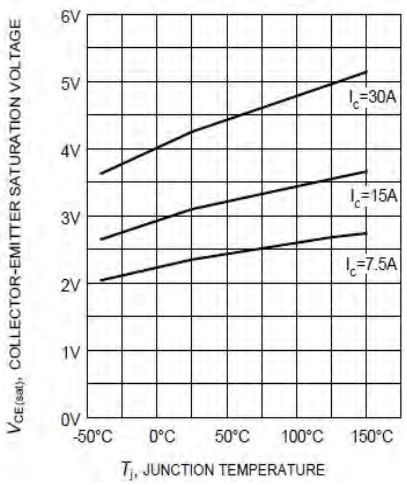
Output characteristic (T_C=25℃)



Output characteristic (T_C=150℃)

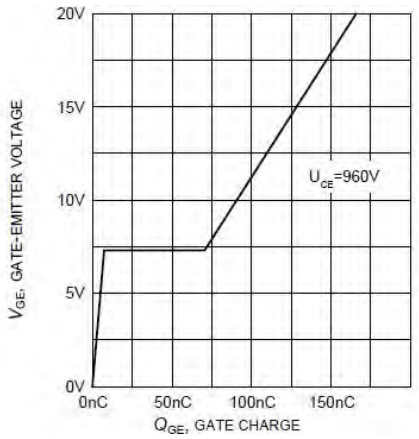


Transmission characteristic



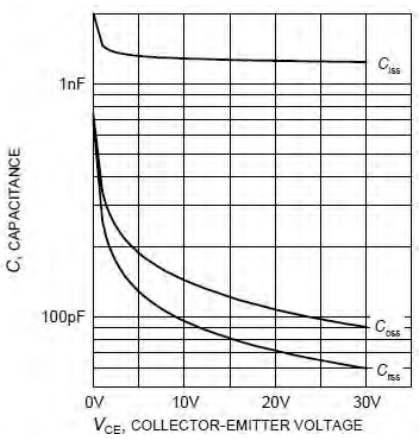
Relationship between $V_{CS(sat)}$ and Tjc

www.sirectifier.com Tel: +86-519-86800000 Fax: +86-519-88019919 E-mail: sales@sirectifier.com



Gate charge characteristic

(I_C=20A)



Capacitance versus collector/emitter voltage

(V_{GE}=0V f=1MHZ)

www.sirectifier.com Tel: +86-519-86800000 Fax: +86-519-88019019 E-mail: sales@sirectifier.com

SG20N135RCB2

Discrete Reverse Conducting IGBTs

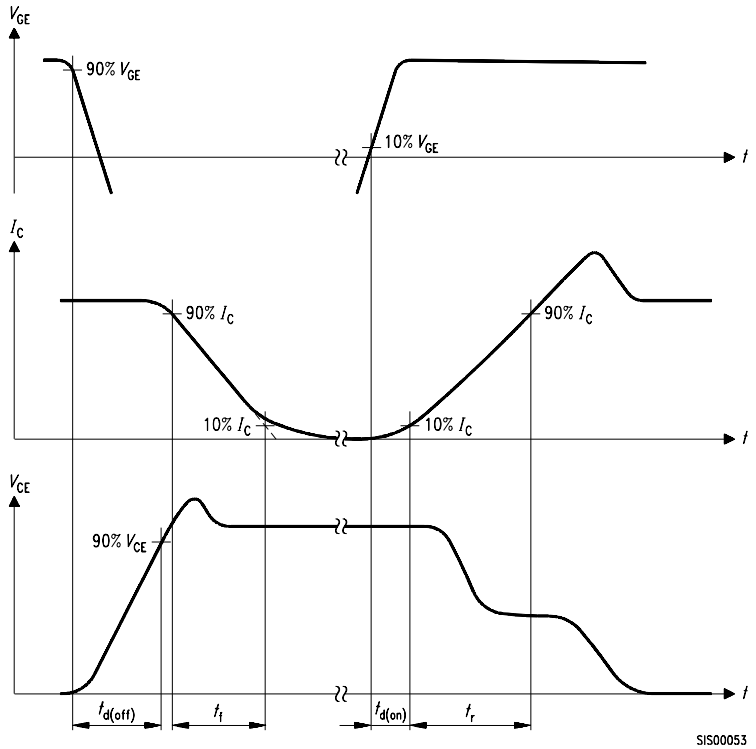


Figure A. Definition of switching times

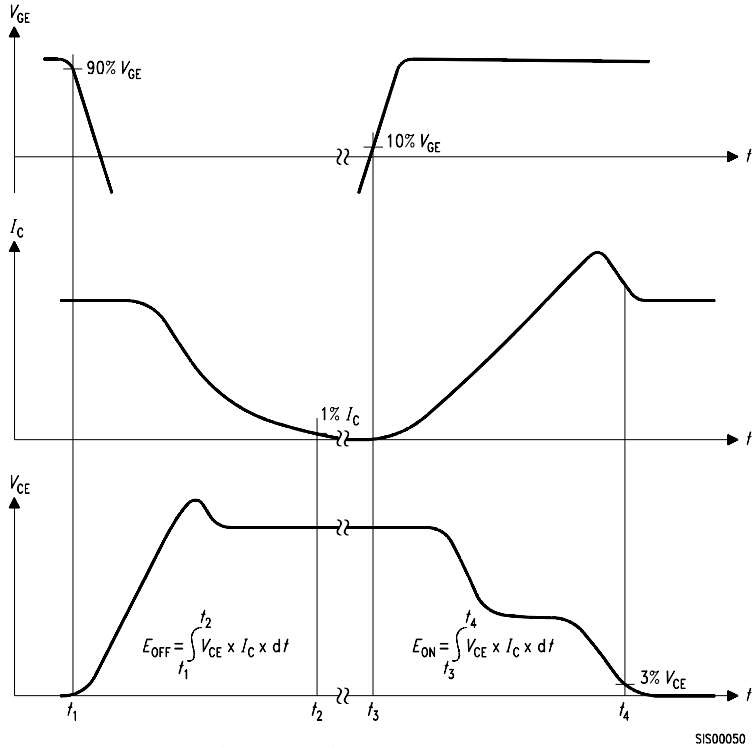


Figure B. Definition of switching losses

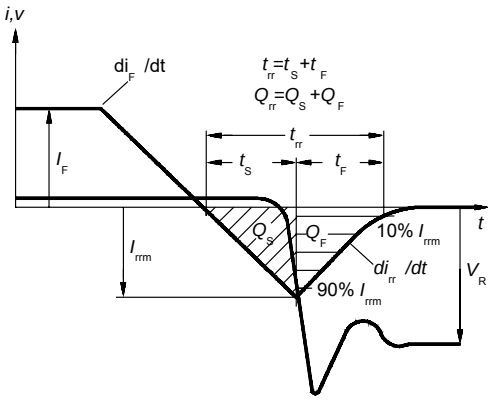


Figure C. Definition of diodes switching characteristics

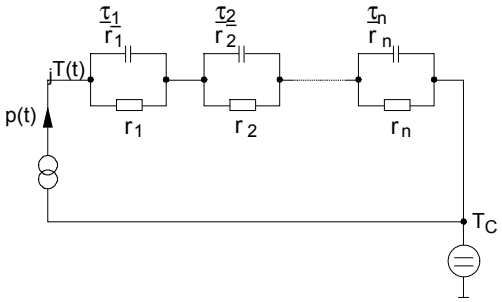


Figure D. Thermal equivalent circuit

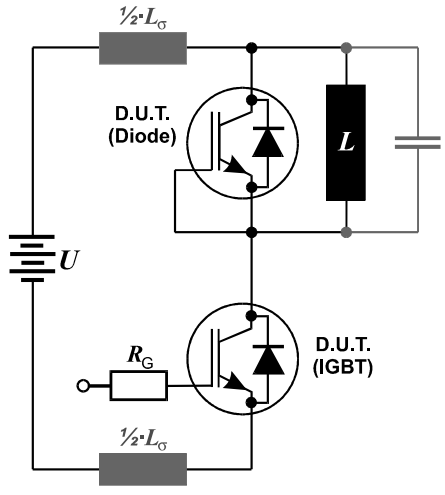


Figure E. Dynamic test circuit
Leakage inductance L_σ=180nH, and stray capacity C_σ=40pF.

www.sirectifier.com Tel: +86-519-86800000 Fax: +86-519-88019919 E-mail: sales@sirectifier.com