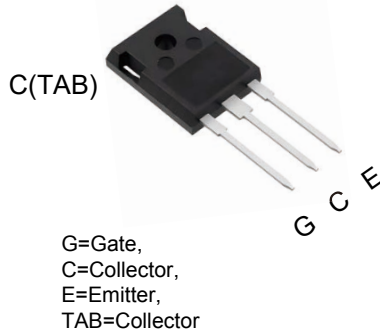
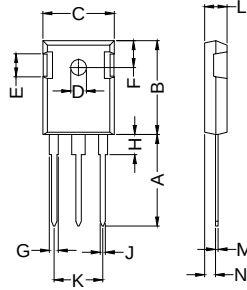


SG15N135RCB2

Discrete Reverse Conducting IGBTs



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	0.099

SG15N135RCB2

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	1350	V
DC collector current $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	I_C	30 15	A
Pulsed collector current, t_p limited by T_{jmax}	$I_{Cpul s}$	45	
Turn off safe operating area $V_{CE} \leq 1200\text{V}$, $T_j \leq 150^\circ\text{C}$	-	45	
Gate-emitter voltage	V_{GE}	± 30	V
Avalanche energy, single pulse $I_C = 15\text{A}$, $V_{CC} = 50\text{V}$, $R_{GE} = 25\Omega$, start at $T_j = 25^\circ\text{C}$	E_{AS}	85	mJ
Short circuit withstand time ¹⁾ $V_{GE} = 15\text{V}$, $100\text{V} \leq V_{CC} \leq 1200\text{V}$, $T_j \leq 150^\circ\text{C}$	t_{SC}	10	μs
Power dissipation $T_C = 25^\circ\text{C}$	P_{tot}	195	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	$^\circ\text{C}$
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}		0.54	K/W
Thermal resistance, junction – ambient	R_{thJA}	TO-247AD	40	

Sirectifier®

SG15N135RCB2

Discrete Reverse Conducting IGBTs

Electrical Characteristic, at $T_j = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE}=0V$, $I_C=1000\mu A$	1350	1400	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE} = 15V$, $I_C=15A$ $T_J=25^{\circ}C$ $T_J=150^{\circ}C$	-	2.70 3.10	3.30 3.70	
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C=250\mu A, V_{CE}=V_{GE}$	3.00	5.00	6.00	
Zero gate voltage collector current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V$ $T_J=25^{\circ}C$ $T_J=150^{\circ}C$	- -	- -	200 1000	μA
Gate-emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V$	-	-	100	nA
Transconductance	g_{fs}	$V_{CE}=20V, I_C=15A$		11	-	S
Dynamic Characteristic						
Input capacitance	C_{iss}	$V_{CE}=25V$, $V_{GE}=0V$, $f=1MHz$	-	694	900	pF
Output capacitance	C_{oss}		-	64	90	
Reverse transfer capacitance	C_{rss}		-	15	20	
Gate charge	Q_{Gate}	$V_{CC}=960V, I_C=15A$ $V_{GE}=15V$	-	120	170	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E	TO-247AD	-	13	-	nH
Short circuit collector current ²⁾	$I_{C(SC)}$	$V_{GE}=15V, t_{SC}\leq 5\mu s$ $100V\leq V_{CC}\leq 1\,200V$, $T_J\leq 150^{\circ}C$	-	145	-	A

¹⁾ Device on 50mm*50mm*1.5mm epoxy PCB FR4 with 6cm² (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.



Sirectifier®

SG15N135RCB2

Discrete Reverse Conducting IGBTs

Switching Characteristic, Inductive Load, at $T_J=25^\circ\text{C}$

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 =15A, V _{GE} =15V/0V, R _G =33Ω, L _σ ¹⁾ =180nH, C _σ ¹⁾ =40pF Energy losses include “tail” and diode reverse recovery.	-	34	45	ns
Rise time	t _r		-	22	36	
Turn-off delay time	t _{d(off)}		-	227	307	
Fall time	t _f		-	152	252	
Turn-on energy	E _{on}		-	0.82	1.40	mJ
Turn-off energy	E _{off}		-	0.89	1.20	
Total switching energy	E _{ts}		-	1.71	2.60	

Reverse Diode (Reverse conducting Diode)

($T_J=25^\circ\text{C}$, unless otherwise specified)

Symbol	Test Conditions	Characteristic Values			Unit
		min.	typ.	max.	
V_F	$I_F=15\text{A}$; $V_{GE}=0\text{V}$		2.50	3.30	V
I_F	$T_C=25^\circ\text{C}$ $T_C=90^\circ\text{C}$			30 15	A
I_{RM}	$I_F=20\text{V}$; $-di_F/dt=400\text{A}/\mu\text{s}$; $V_R=600\text{V}$		15		A
t_{rr}	$V_{GE}=0\text{V}$; $T_J=125^\circ\text{C}$ $I_F=1\text{A}$; $-di_F/dt=100\text{A}/\mu\text{s}$; $V_R=30\text{V}$; $V_{GE}=0\text{V}$		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 paralleling
- MOS input, voltage controlled
- Reverse conducting IGBT with monolithic body diode

Application

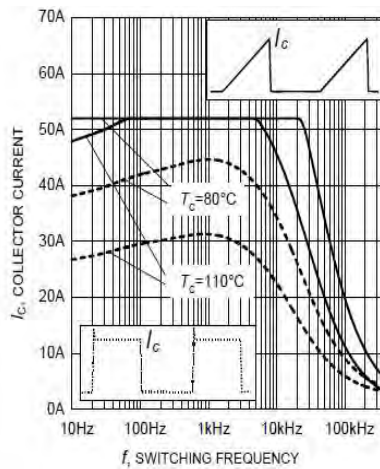
- Inductive cooking
- Inverterized microwave oven
- Resonant converter
- Soft switching application

Advantages

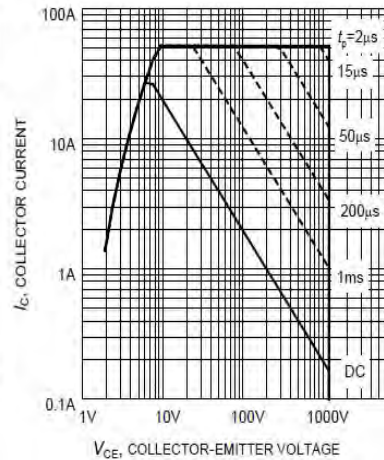
- space and weight savings
- reduced protection circuits

SG15N135RCB2

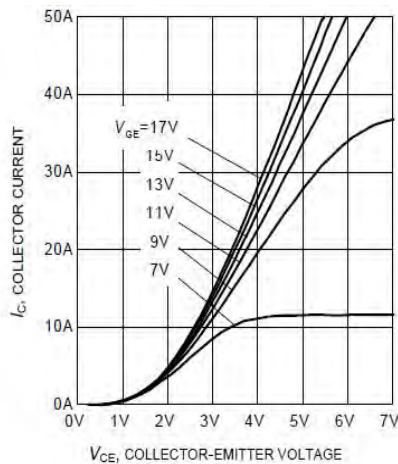
Discrete Reverse Conducting IGBTs



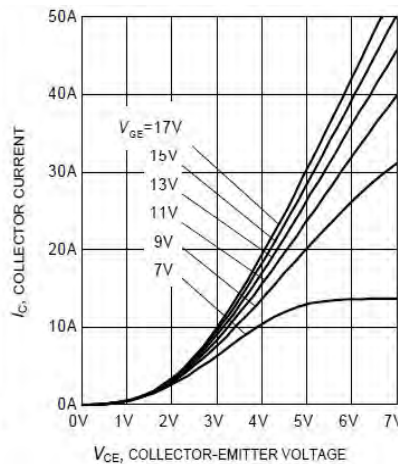
Collector current versus switching frequency



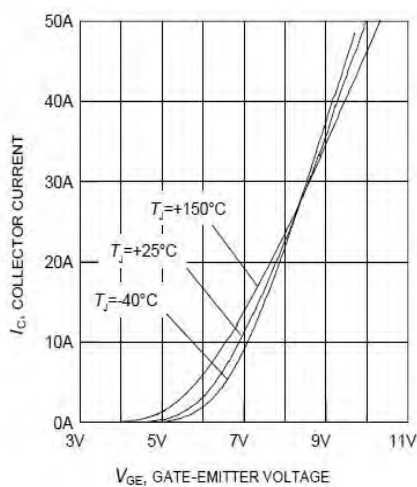
Safe working area



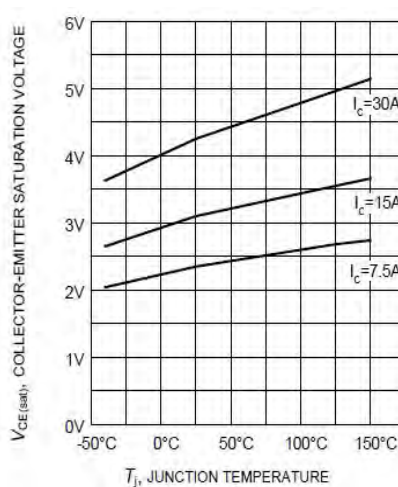
Output characteristic ($T_c=25^\circ\text{C}$)



Output characteristic ($T_c=150^\circ\text{C}$)



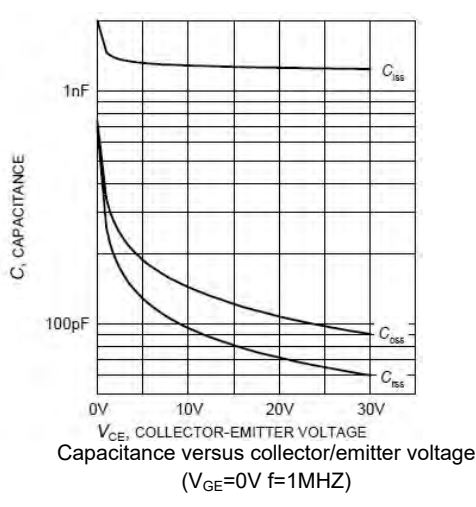
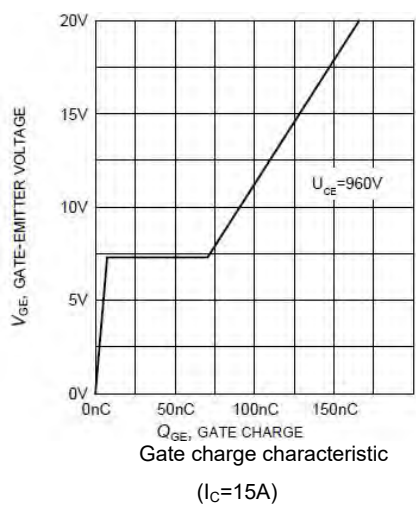
Transmission characteristic



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

SG15N135RCB2

Discrete Reverse Conducting IGBTs



SG15N135RCB2

Discrete Reverse Conducting IGBTs

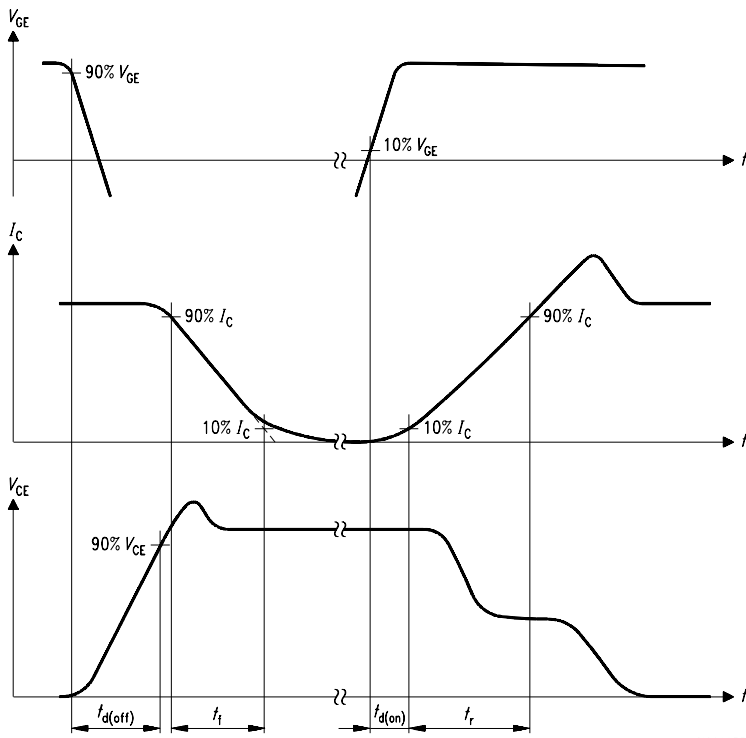


Figure A. Definition of switching times

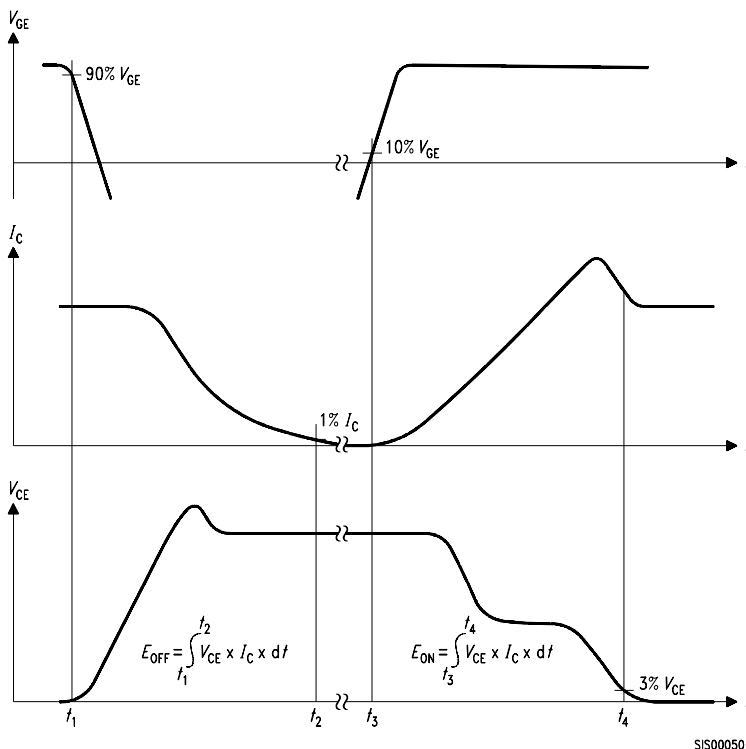


Figure B. Definition of switching losses

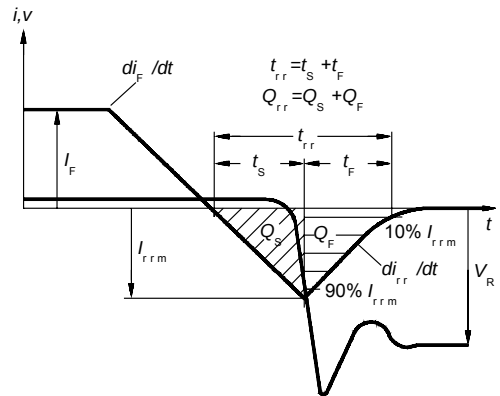


Figure C. Definition of diodes switching characteristics

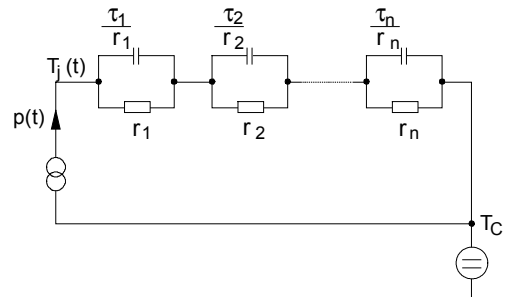


Figure D. Thermal equivalent circuit

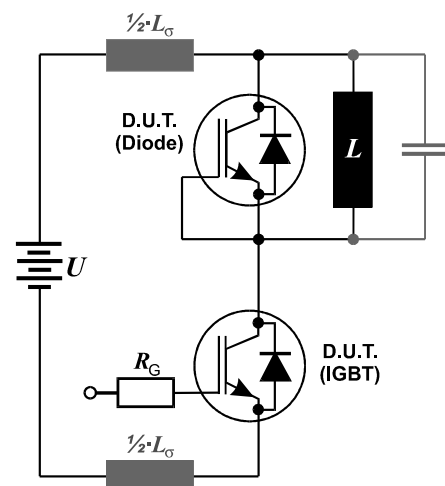


Figure E. Dynamic test circuit
Leakage inductance $L_\sigma = 180\text{nH}$,
and stray capacity $C_\sigma = 40\text{pF}$.