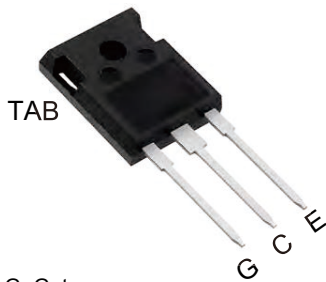


SG25N135RCB2

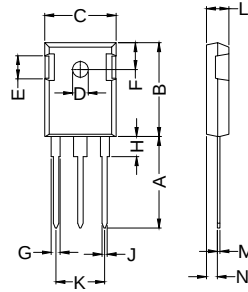
Discrete Reverse Conducting IGBTs



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	0.098

SG25N135RCB2

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	1350	V
DC collector current $T_C = 25^\circ\text{C}$	I_C	50	A
$T_C = 100^\circ\text{C}$		25	
Pulsed collector current, t_p limited by T_{jmax}		65	
Turn off safe operating area $V_{CE} \leq 1200\text{V}$, $T_j \leq 150^\circ$	-	35	
Gate-emitter voltage	V_{GE}	± 30	V
Avalanche energy, single pulse $I_C = 25\text{A}$, $V_{CC} = 50\text{V}$, $R_{GE} = 25\Omega$, start at $T_j = 25^\circ\text{C}$	E_{AS}	105	mJ
Short circuit withstand time ¹⁾ $V_{GE} = 15\text{V}$, $100\text{V} \leq V_{CC} \leq 1200\text{V}$, $T_j \leq 150^\circ$	t_{SC}	10	μs
PC over dissipation $T_C = 25^\circ\text{C}$	P_{tot}	235	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}		0.42	K/W
Thermal resistance, junction – ambient	R_{thJA}	TO-247AD	33	

Sirectifier®

SG25N135RCB2

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	$V_{CE(sat)}$	$V_{GE} = 15V$, $I_C=25A$ $T_j=25^{\circ}C$ $T_j=150^{\circ}C$	-	2.70 3.10	3.30 3.70	
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C=600\mu A, V_{CE}=V_{GE}$	3.00	5.00	6.00	
Zero gate voltage collector current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V$ $T_j=25^{\circ}C$ $T_j=150^{\circ}C$	- -	- -	300 1000	μA
Gate-emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V$	-	-	100	nA
Transconductance	g_{fs}	$V_{CE}=20V, I_C=25A$		10	-	S
Dynamic Characteristic						
Input capacitance	C_{iss}	$V_{CE}=25V$,	-	1350	1700	pF
Output capacitance	C_{oss}	$V_{GE}=0V$,	-	125	140	
Reverse transfer capacitance	C_{rss}	$f=1MHz$	-	75	90	
Gate charge	Q_{Gate}	$V_{CC}=960V$, $I_C=25A$ $V_{GE}=15V$	-	130	180	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E	TO-247AD	-	14	-	nH
Short circuit collector current ²⁾	$I_{C(SC)}$	$V_{GE}=15V, t_{SC}\leq 5\ \mu s$ $100V\leq V_{CC}\leq 1\ 200V$, $T_j\leq 150^{\circ}C$	-	175	-	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.

SG25N135RCB2

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 =25A, V _{GE} =15V/0V, R _G =33Ω, L _σ ¹⁾ =180nH, C _σ ¹⁾ =40pF	-	22	38	ns
Rise time	t _r		-	29	37	
Turn-off delay time	t _{d(off)}		-	152	300	
Fall time	t _f		-	158	267	
Turn-on energy	E _{on}	Energy losses include “tail” and diode reverse recovery.	-	0.86	1.45	mJ
Turn-off energy	E _{off}		-	0.95	1.25	
Total switching energy	E _{ts}		-	1.77	2.65	

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	$I_F=25\text{A}$; $V_{GE}=0\text{V}$		2.50	3.30	V
I_F	$T_C=25^\circ\text{C}$ $T_C=90^\circ\text{C}$			50 25	A
I_{RM}	$I_F=20\text{V}$; $-di_F/dt=400\text{A}/\mu\text{s}$; $V_R=600\text{V}$		25		A
t_{rr}	$V_{GE}=0\text{V}$; $T_J=125^\circ\text{C}$ $I_F=1\text{A}$; $-di_F/dt=100\text{A}/\mu\text{s}$; $V_R=30\text{V}$; $V_{GE}=0\text{V}$		220 45		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

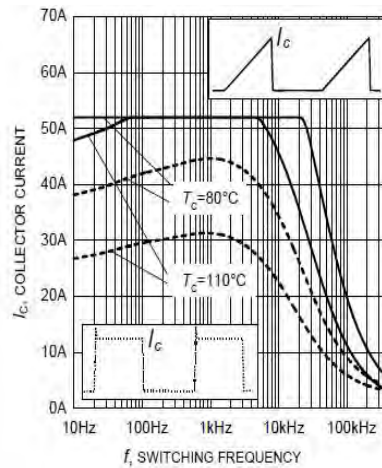
- Inductive cooking
- Inverterized microwave oven
- Resonant converter
- Soft switching application

Advantages

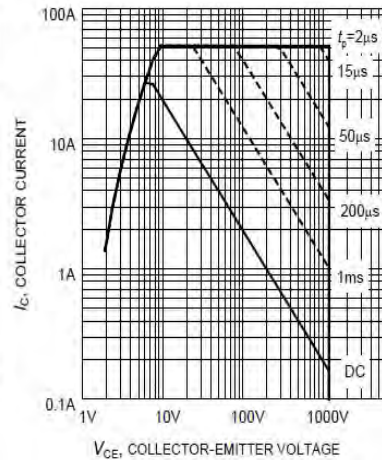
- space and weight savings
- reduced protection circuits

SG25N135RCB2

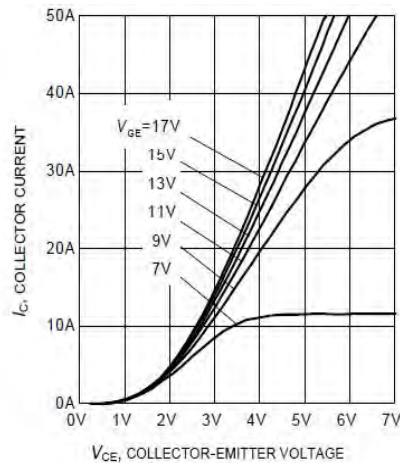
Discrete Reverse Conducting IGBTs



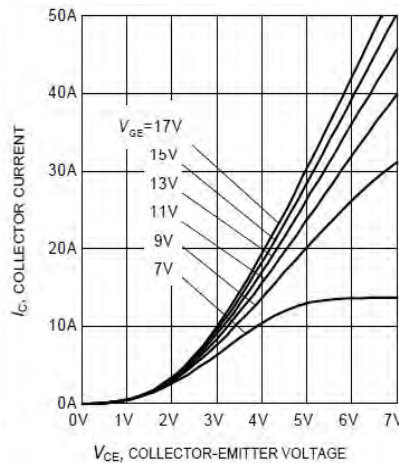
Collector current versus switching frequency



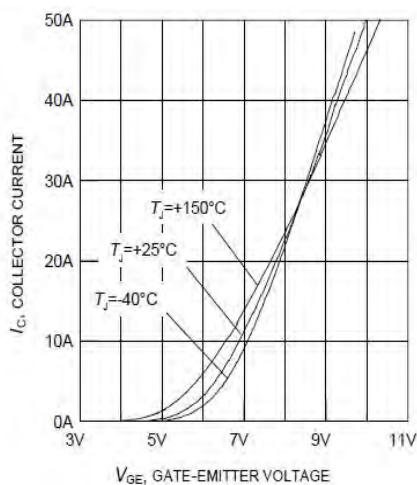
Safe working area



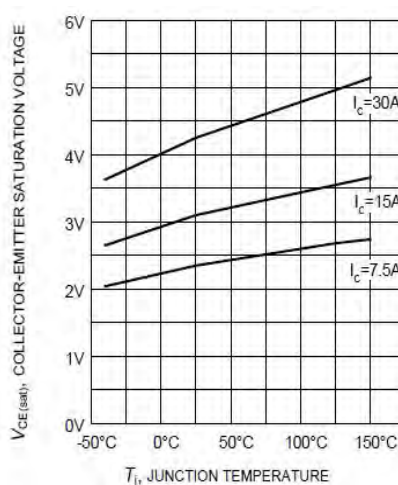
Output characteristic ($T_c = 25^\circ\text{C}$)



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



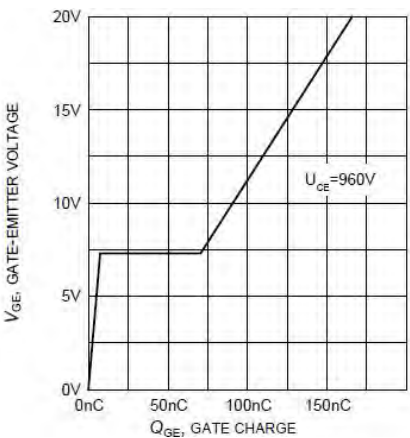
Transmission characteristic



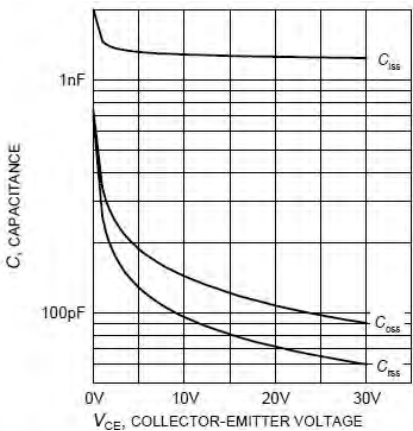
Relationship between $V_{CE(sat)}$ and T_J

SG25N135RCB2

Discrete Reverse Conducting IGBTs



Gate charge characteristic
($I_C=20A$)



Capacitance versus collector/emitter voltage
($V_{GE}=0V$ $f=1MHz$)

SG25N135RCB2

Discrete Reverse Conducting IGBTs

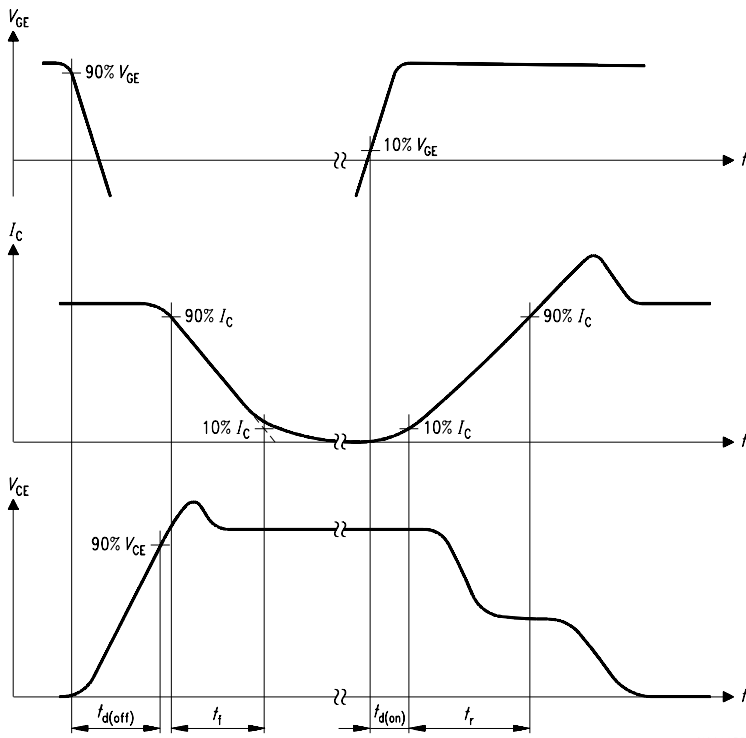


Figure A. Definition of switching times

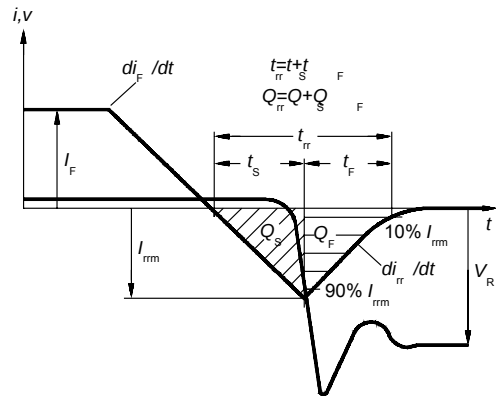


Figure C. Definition of diodes switching characteristics

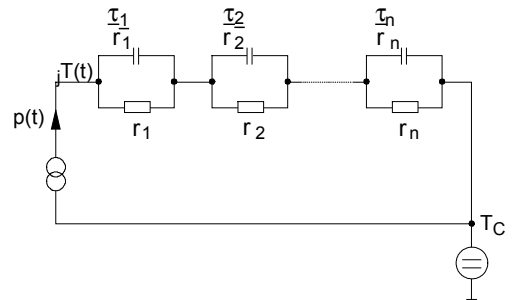


Figure D. Thermal equivalent circuit

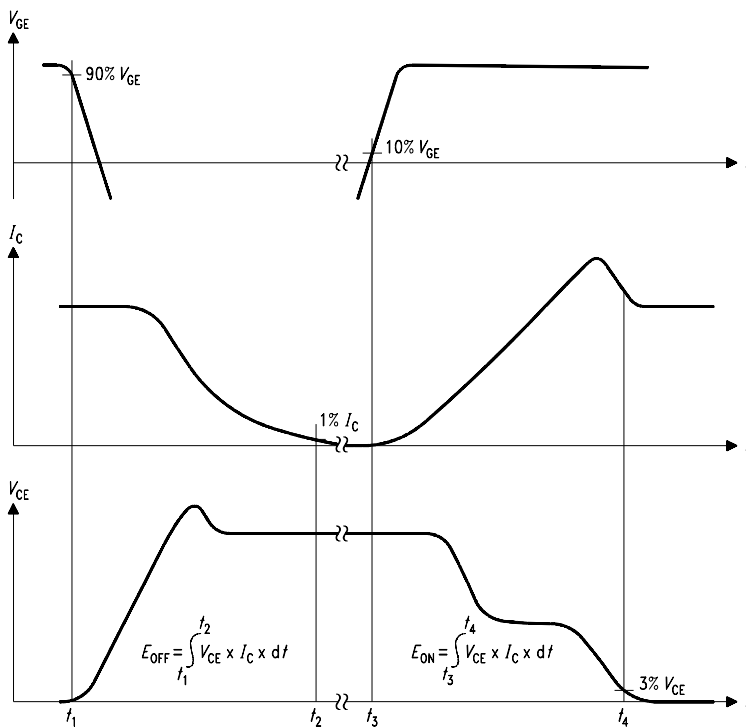


Figure B. Definition of switching losses

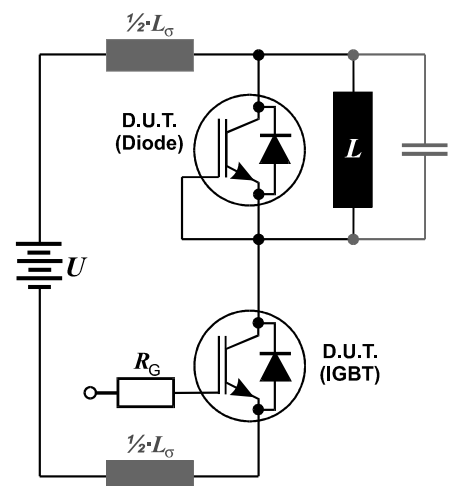


Figure E. Dynamic test circuit
Leakage inductance $L_\sigma = 180\text{nH}$,
and stray capacity $C_\sigma = 40\text{pF}$.