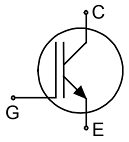
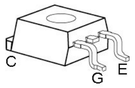
Preliminary Datasheet

SGB15N60HS

High Speed IGBT in NPT-technology



- 30% lower E_{off} compared to previous generation
- Short circuit withstand time – 10 µs
- Designed for operation above 30 kHz
- NPT-Technology for 600V applications offers:
  - parallel switching capability
  - moderate E_{off} increase with temperature
  - very tight parameter distribution
  - high ruggedness, temperature stable behaviour
- Complete product spectrum and PSpice models : http://www.infineon.com/igbt/



P-TO263-3-2

Type	V_{CE}	I_C	E_{off}	T_j	Package	Ordering Code
SGB15N60HS	600V	15A	200µJ	150°C	TO-263AB	Q67040-S4535

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	600	V
DC collector current T_C = 25°C T_C = 100°C	I_C	 30 15	A
Pulsed collector current, t_p limited by T_{jmax}	I_{Cpuls}	60	
Turn off safe operating area $V_{CE} \leq 600V$, $T_j \leq 150°C$	-	60	
Gate-emitter voltage static transient (t_p<1µs, D<0.05)	V_{GE}	±20 ±30	V
Short circuit withstand time[1)] V_{GE} = 15V, $V_{CC} \leq 600V$, $T_j \leq 150°C$	t_{SC}	10	µs
Power dissipation T_C = 25°C	P_{tot}	138	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C
Time limited operating junction temperature for t < 150h	$T_{j(tl)}$	175	
Soldering temperature, 1.6mm (0.063 in.) from case for 10s	-	260	

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1) Allowed number of short circuits: <1000; time between short circuits: >1s.

Thermal Resistance

Parameter	**Symbol**	**Conditions**	**Max. Value**	**Unit**
Characteristic				
IGBT thermal resistance, junction – case	R_{thJC}		0.9	K/W
Thermal resistance, junction – ambient	R_{thJA}	TO-263AB	62	
SMD version, device on PCB[1]	R_{thJA}	TO-263AB	40	

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=500µA	600	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE} = 15V, I_C=15A T_j=25°C T_j=150°C		 2.8 3.5	 3.15 4.00	
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C=300µA,V_{CE}=V_{GE}	3	4	5	
Zero gate voltage collector current	I_{CES}	V_{CE}=600V,V_{GE}=0V T_j=25°C T_j=150°C	 - -	 - -	 40 2000	µA
Gate-emitter leakage current	I_{GES}	V_{CE}=0V,V_{GE}=20V	-	-	100	nA
Transconductance	g_{fs}	V_{CE}=20V, I_C=15A	-	10		S

Dynamic Characteristic

Input capacitance	C_{iss}	V_{CE}=25V, V_{GE}=0V, f=1MHz	-	800		pF
Output capacitance	C_{oss}		-	123		
Reverse transfer capacitance	C_{rss}		-	52		
Gate charge	Q_{Gate}	V_{CC}=480V, I_C=15A V_{GE}=15V	-	76		nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E	TO-263AB	-	7		nH
Short circuit collector current[2]	$I_{C(SC)}$	V_{GE}=15V,t_{SC}≤10µs V_{CC} ≤ 600V, T_j ≤ 150°C	-	150		A

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[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.

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}=400V,I_C=15A, V_{GE}=0/15V, R_G=21Ω L_σ1) =60nH, C_σ1) =40pF Energy losses include “tail” and diode reverse recovery.	-	13		ns
Rise time	t_r		-	14		
Turn-off delay time	$t_{d(off)}$		-	209		
Fall time	t_f		-	12		
Turn-on energy	E_{on}		-	0.28		mJ
Turn-off energy	E_{off}		-	0.20		
Total switching energy	E_{ts}		-	0.48		

Switching Characteristic, Inductive Load, at T_j=150 °C

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-on delay time	$t_{d(on)}$	T_j=150°C V_{CC}=400V,I_C=15A, V_{GE}=0/15V, R_G= 3.3Ω L_σ1) =60nH, C_σ1) =40pF Energy losses include “tail” and diode reverse recovery.	-	11		ns
Rise time	t_r		-	6		
Turn-off delay time	$t_{d(off)}$		-	72		
Fall time	t_f		-	35		
Turn-on energy	E_{on}		-	0.38		mJ
Turn-off energy	E_{off}		-	0.20		
Total switching energy	E_{ts}		-	0.58		
Turn-on delay time	$t_{d(on)}$	T_j=150°C V_{CC}=400V,I_C=15A, V_{GE}=0/15V, R_G= 21Ω L_σ1) =60nH, C_σ1) =40pF Energy losses include “tail” and diode reverse recovery.	-	12		ns
Rise time	t_r		-	15		
Turn-off delay time	$t_{d(off)}$		-	235		
Fall time	t_f		-	15		
Turn-on energy	E_{on}		-	0.45		mJ
Turn-off energy	E_{off}		-	0.29		
Total switching energy	E_{ts}		-	0.74		

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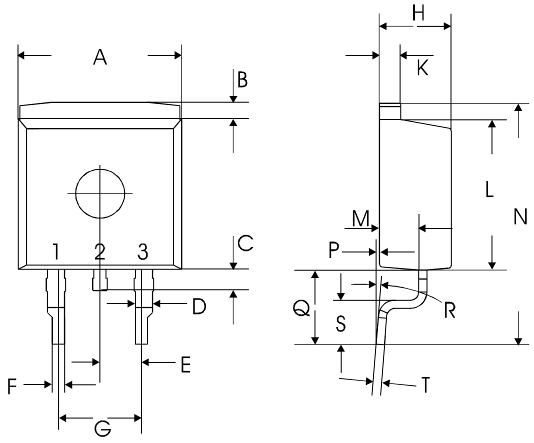
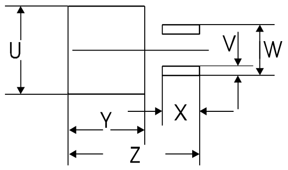
1) Leakage inductance L_σ and Stray capacity C_σ due to test circuit in Figure E.

TO-263AB (D^{2}Pak)



Footprint
(dif. scale)



symbol	dimensions			
	[mm]		[inch]	
	min	max	min	max
A	9.80	10.20	0.3858	0.4016
B	0.70	1.30	0.0276	0.0512
C	1.00	1.60	0.0394	0.0630
D	1.03	1.07	0.0406	0.0421
E	2.54 typ.		0.1 typ.	
F	0.65	0.85	0.0256	0.0335
G	5.08 typ.		0.2 typ.	
H	4.30	4.50	0.1693	0.1772
K	1.17	1.37	0.0461	0.0539
L	9.05	9.45	0.3563	0.3720
M	2.30	2.50	0.0906	0.0984
N	15 typ.		0.5906 typ.	
P	0.00	0.20	0.0000	0.0079
Q	4.20	5.20	0.1654	0.2047
R	8° max		8° max	
S	2.40	3.00	0.0945	0.1181
T	0.40	0.60	0.0157	0.0236
U	10.80		0.4252	
V	1.15		0.0453	
W	6.23		0.2453	
X	4.60		0.1811	
Y	9.40		0.3701	
Z	16.15		0.6358	

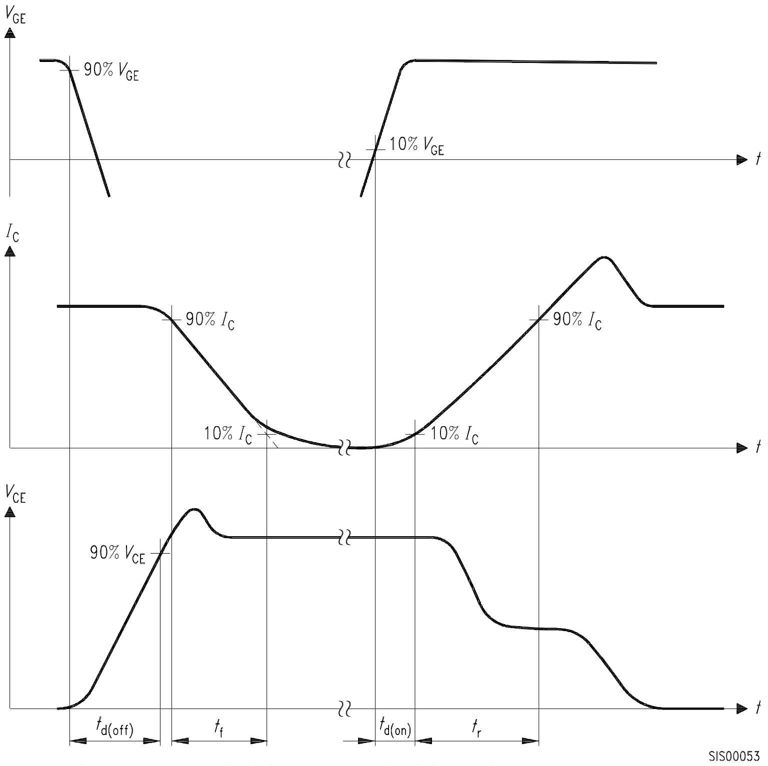


Figure A. Definition of switching times

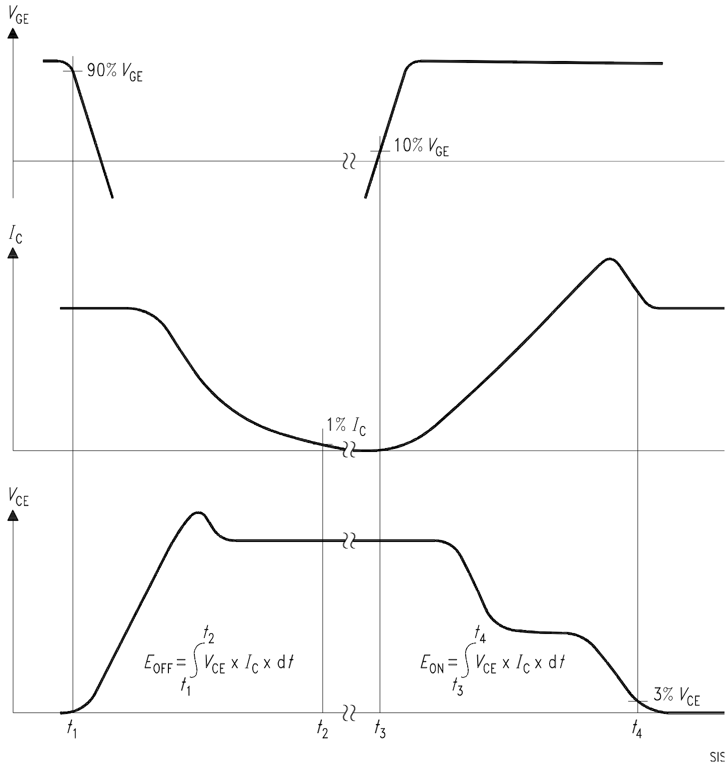


Figure B. Definition of switching losses

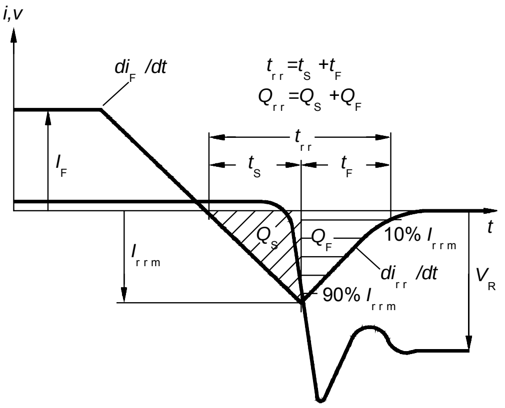


Figure C. Definition of diodes switching characteristics

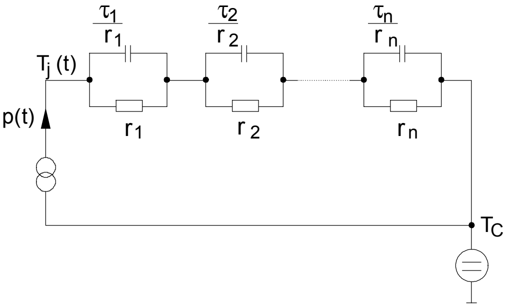


Figure D. Thermal equivalent circuit

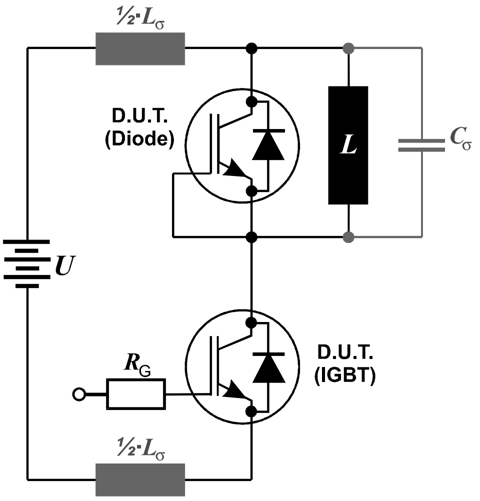


Figure E. Dynamic test circuit
Leakage inductance L_σ =60nH
and Stray capacity C_σ =40pF.

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