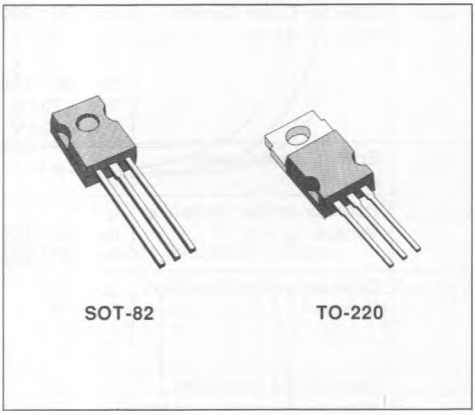
SGS-THOMSON MICROELECTRONICS

SGS13002/13003
SGS13002T/13003T

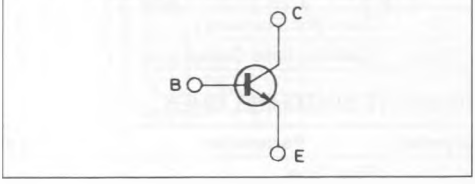
HIGH VOLTAGE SWITCHING APPLICATIONS

DESCRIPTION

The SGS13002, SGS13003 (SOT-82 plastic package) and the SGS13002T, SGS13003T (TO-220 plastic package) are silicon multiepitaxial-mesa NPN transistors, intended for high voltage applications. They are pin to pin replacement to MJE13002 & 13003 (TO-126, with reserved pin out).



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		SGS13002 SGS13002T	SGS13003 SGS13003T	
V_{CEV}	Collector-emitter Voltage (V_{BE} = 1.5 V)	600	700	V
V_{CEO}	Collector-emitter Voltage (I_B = 0)	300	400	V
V_{EBO}	Emitter-base Voltage (I_C = 0)	9		V
I_C	Collector Current	1.5		A
I_{CM}	Collector Peak Current (tp < 5 ms)	3		A
I_B	Base Current	0.75		A
I_{BM}	Base Peak Current (tp < 5 ms)	1.5		A
P_{tot}	Total Power Dissipation at $T_{case} \leq 25$ °C at $T_{amb} \leq 25$ °C	50 2		W W
T_{stg}	Storage Temperature	– 65 to 150		°C
T_j	Junction Temperature	150		°C

THERMAL DATA

$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	Max	62.5	°C/W
$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Max	2.5	°C/W

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CEV}	Collector Cutoff Current (V_{BE} = – 1.5 V)	for **SGS13002/13002T**				
		V_{CE} = 600 V			1	mA
		V_{CE} = 600 V T_{case} = 100 °C			5	mA
		for **SGS13003/13003T**				
		V_{CE} = 700 V			1	mA
		V_{CE} = 700 V T_{case} = 100 °C			5	mA
I_{EBO}	Emitter Cutoff Current (I_C = 0)	V_{EB} = 9 V			1	mA
$V_{CEO(sus)}$*	Collector-emitter Sustaining Voltage (I_B = 0)	I_C = 10 mA				
		for **SGS13002/13002T**	300			V
		for **SGS13003/13003T**	400			V
$V_{CE(sat)}$*	Collector-emitter Saturation Voltage	I_C = 0.5 A I_B = 0.1 A			0.5	V
		I_C = 1 A I_B = 0.25 A			1	V
		I_C = 1.5 A I_B = 0.5 A			3	V
		I_C = 1 A ; I_B = 0.25A ; T_{case} = 100 °C			1	V
$V_{BE(sat)}$*	Base-emitter Saturation Voltage	I_C = 0.5 A I_B = 0.1 A			1	V
		I_C = 1 A I_B = 0.25 A			1.2	V
		I_C = 1 A ; I_B = 0.25 A ; T_{case} = 100 °C			1.1	V
h_{FE}*	DC Current Gain	I_C = 0.5 A V_{CE} = 2 V	8		40	
		I_C = 1 A V_{CE} = 2 V	5		25	
f_T	Transition Frequency	I_C = 100 mA ; V_{CE} = 10 V, f = 1 MHz	5	10		MHz
C_{CBO}	Collector-base Capacitance	V_{CB} = 10 V f = 0.1 MHz		30		pF

RESISTIVE SWITCHING TIMES

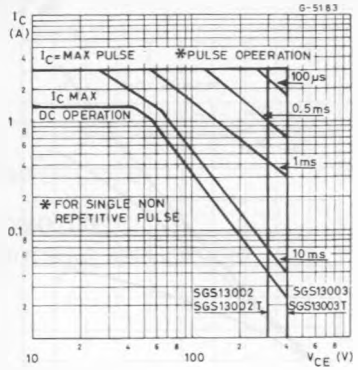
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
t_r	Rise Time	V_{CC} = 125 V I_C = 1 A $2I_{B1}$ = – I_{B2} = 0.2 A		0.3	0.8	µs
t_s	Storage Time			1.1	2.5	µs
t_f	Fall Time			0.12	0.5	µs

INDUCTIVE SWITCHING TIMES

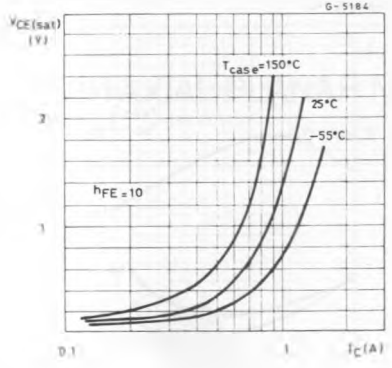
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
t_{sv}	Storage Time	I_C = 1 A I_{B1} = 0.2 A V_{BE} = – 5 V L = 50 mH V_{clamp} = 300 V		0.8	2.5	µs
t_c	Crossover Time			0.1	0.75	µs

* Pulsed : pulse duration = 300µs, duty cycle = 1.5 %.

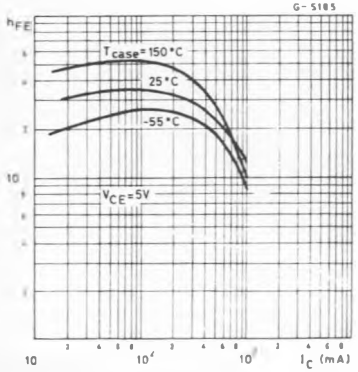
Safe Operating Areas.



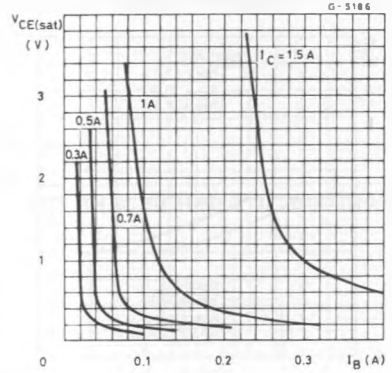
Collector-emitter Saturation Voltage.



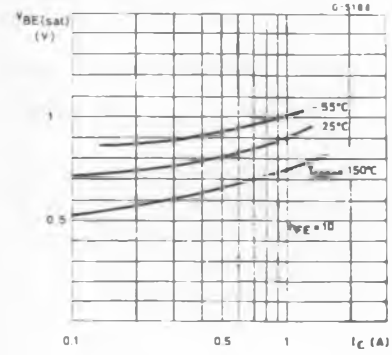
DC Current Gain.



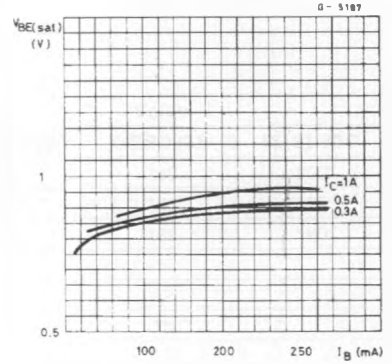
Collector-emitter Saturation Voltage.



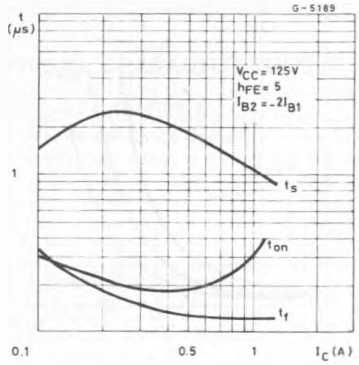
Base-emitter Saturation Voltage.



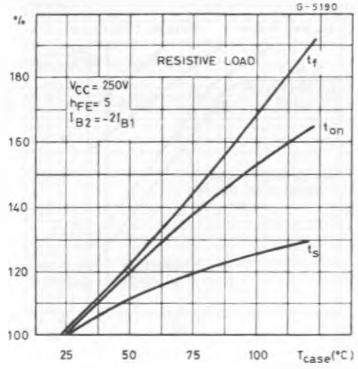
Base-emitter Saturation Voltage.



Resistive Load Switching Times.



Switching Times Percentage Variation vs. case Temperature.



Clamped Reverse Bias Safe Operating Areas.