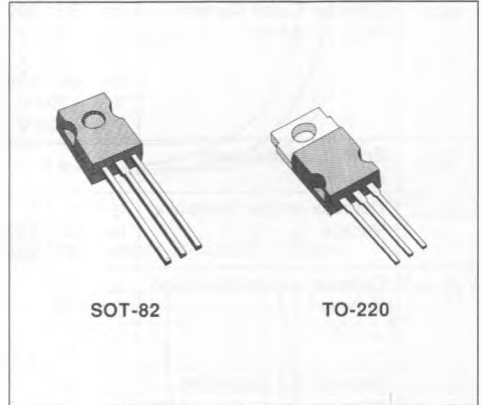


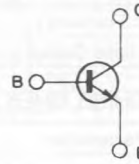
HIGH VOLTAGE SWITCHING APPLICATIONS

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 ($V_{BE} = 1.5 \text{ V}$)	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 ($t_p < 5 \text{ ms}$)	3		A
I_B	Base Current	0.75		A
I_{BM}	Base Peak Current ($t_p < 5 \text{ ms}$)	1.5		A
P_{Tcl}	Total Power Dissipation at $T_{case} \leq 25 \text{ }^\circ\text{C}$ at $T_{amb} \leq 25 \text{ }^\circ\text{C}$	50		W
		2		W
T_{stg}	Storage Temperature	- 65 to 150		$^\circ\text{C}$
T_j	Junction Temperature	150		$^\circ\text{C}$

THERMAL DATA

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

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

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

RESISTIVE SWITCHING TIMES

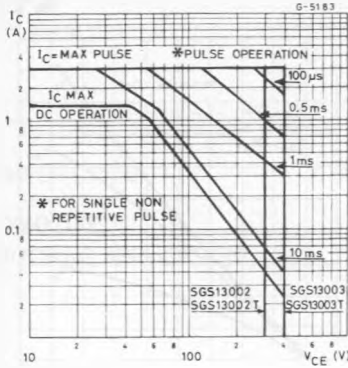
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
t_r	Rise Time	$V_{CC} = 125\text{ V}$ $I_C = 1\text{ A}$ $2I_{B1} = -I_{B2} = 0.2\text{ A}$		0.3	0.8	μs
t_s	Storage Time			1.1	2.5	μs
t_f	Fall Time			0.12	0.5	μs

INDUCTIVE SWITCHING TIMES

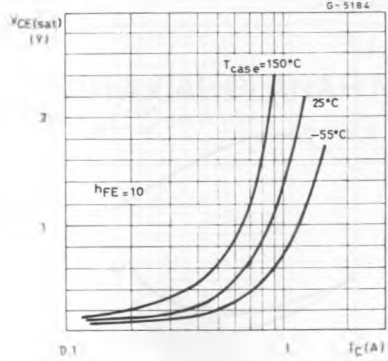
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
t_{sv}	Storage Time	$I_C = 1\text{ A}$ $I_{B1} = 0.2\text{ A}$ $V_{BE} = -5\text{ V}$ $L = 50\text{ mH}$		0.8	2.5	μs
t_c	Crossover Time	$V_{clamp} = 300\text{ V}$		0.1	0.75	μs

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

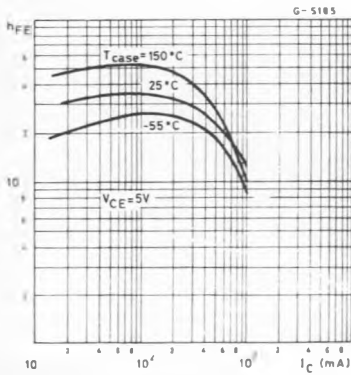
Safe Operating Areas.



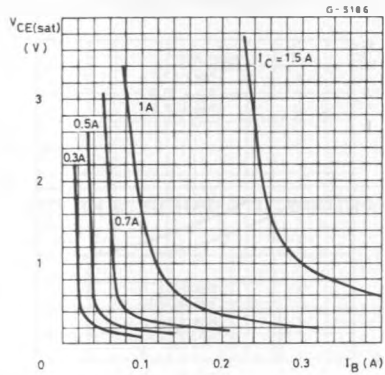
Collector-emitter Saturation Voltage.



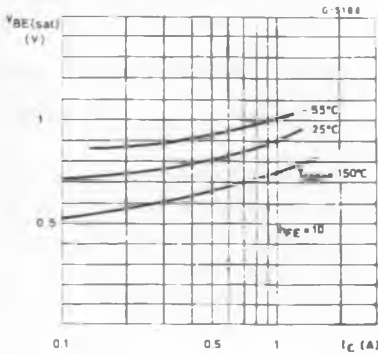
DC Current Gain.



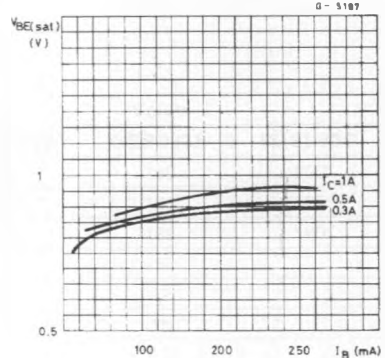
Collector-emitter Saturation Voltage.



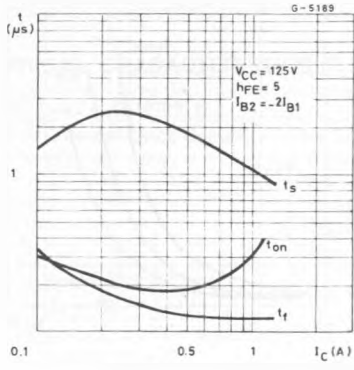
Base-emitter Saturation Voltage.



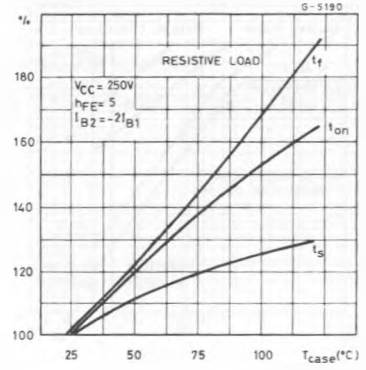
Base-emitter Saturation Voltage.



Resistive Load Switching Times.



Switching Times Percentage Variation vs. case Temperature.



Clamped Reverse Bias Safe Operating Areas.

