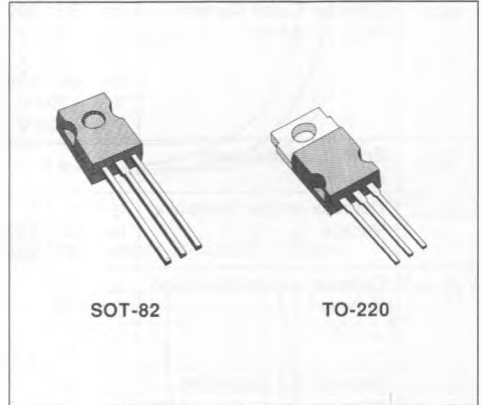


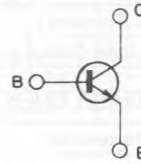
## HIGH VOLTAGE SWITCHING APPLICATIONS

### 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 <b>SGS13002/ 13002T</b> $V_{CE} = 600\text{ V}$ $V_{CE} = 600\text{ V}$ $T_{case} = 100\text{ °C}$ for <b>SGS13003/ 13003T</b> $V_{CE} = 700\text{ V}$ $V_{CE} = 700\text{ V}$ $T_{case} = 100\text{ °C}$			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 <b>SGS13002/ 13002T</b> for <b>SGS13003/ 13003T</b>	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**

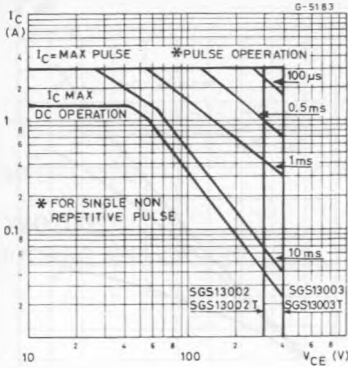
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
$t_r$	Rise Time	$V_{CC} = 125\text{ V}$ $I_C = 1\text{ A}$ $2I_{B1} = -I_{B2} = 0.2\text{ A}$		0.3	0.8	μs
$t_s$	Storage Time			1.1	2.5	μs
$t_f$	Fall Time			0.12	0.5	μs

**INDUCTIVE SWITCHING TIMES**

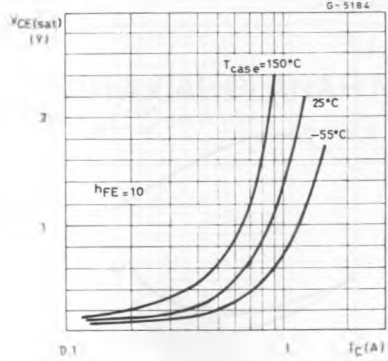
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
$t_{sv}$	Storage Time	$I_C = 1\text{ A}$ $I_{B1} = 0.2\text{ A}$ $V_{BE} = -5\text{ V}$ $L = 50\text{ mH}$		0.8	2.5	μs
$t_c$	Crossover Time	$V_{clamp} = 300\text{ V}$		0.1	0.75	μs

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

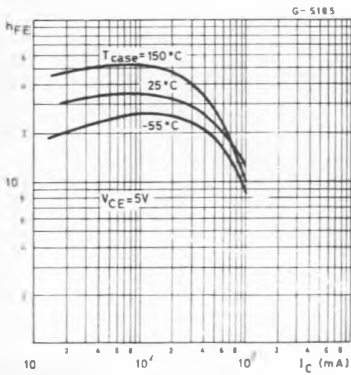
Safe Operating Areas.



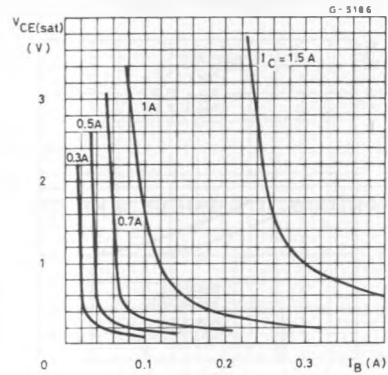
Collector-emitter Saturation Voltage.



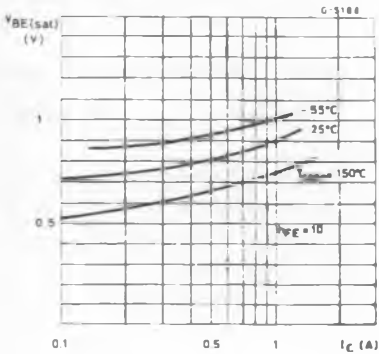
DC Current Gain.



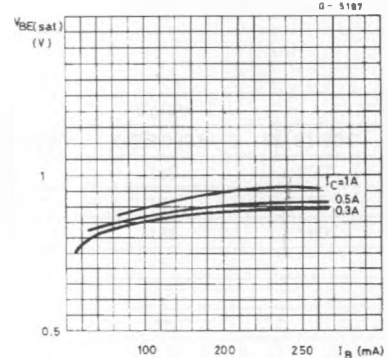
Collector-emitter Saturation Voltage.



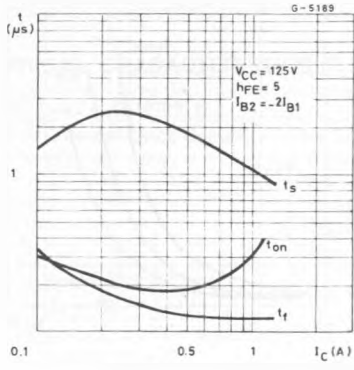
Base-emitter Saturation Voltage.



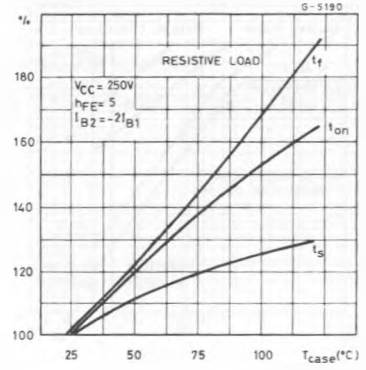
Base-emitter Saturation Voltage.



Resistive Load Switching Times.



Switching Times Percentage Variation vs. case Temperature.



Clamped Reverse Bias Safe Operating Areas.

