

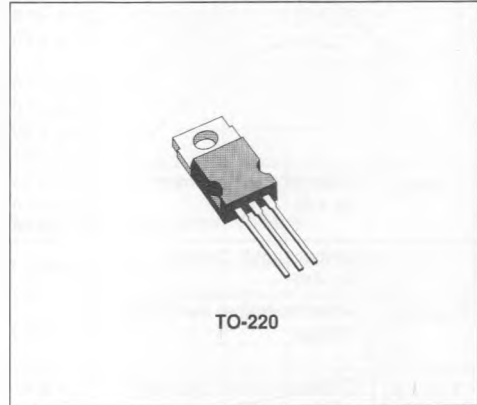
EPITAXIAL PLANAR NPN

ADVANCE DATA

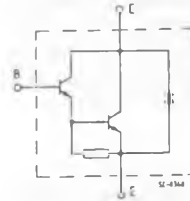
- DAMPER DIODE

AUTOMOTIVE

- SWITCHING APPLICATION



INTERNAL SCHEMATIC DIAGRAM



DESCRIPTION

The SGSD93E/93F/93G are silicon epitaxial planar NPN transistors in Darlington configuration mounted in Jedec TO-220 plastic package.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value			Unit
		SGSD93E	SGSD93F	SGSD93G	
V_{CBO}	Collector-base Voltage ($I_E = 0$)	160	180	200	V
V_{CES}	Collector-emitter Voltage ($V_{BE} = 0$)	140	160	180	V
V_{CEO}	Collector-emitter Voltage ($I_B = 0$)	140	160	180	V
V_{EBO}	Emitter-base Voltage ($I_C = 0$)	5			V
I_C	Collector Current	12			A
I_{CM}	Collector Peak Current	15			A
I_B	Base Current	0.2			A
P_{Tot}	Total Dissipation at $T_c < 25^\circ\text{C}$	80			W
T_{stg}	Storage Temperature	- 65 to 150			$^\circ\text{C}$
T_j	Max. Operating Junction Temperature	150			$^\circ\text{C}$

THERMAL DATA

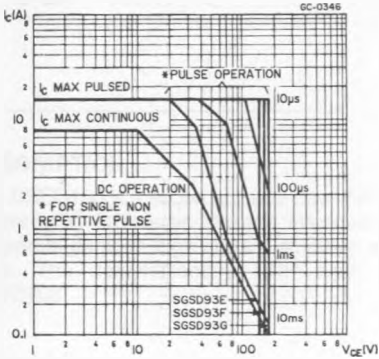
$R_{th\ j\ case}$	Thermal Resistance Junction-case	Max	1.56	°C/W
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ELECTRICAL CHARACTERISTICS ($T_{case} = 25\text{ °C}$ unless otherwise specified)

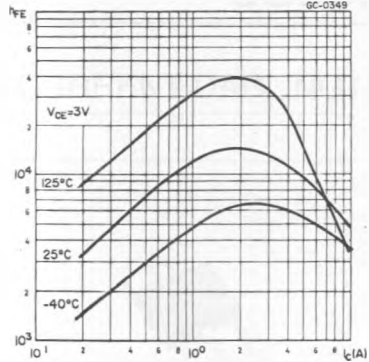
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector Cutoff Current ($I_E = 0$)	$V_{CB} = 160\text{ V}$ for SGSD93E			50	μA
		$V_{CB} = 180\text{ V}$ for SGSD93F			50	μA
		$V_{CB} = 200\text{ V}$ for SGSD93G			50	μA
		$V_{CB} = 160\text{ V}$ for SGSD93E			2	mA
		$V_{CB} = 180\text{ V}$ for SGSD93F			2	mA
		$V_{CB} = 200\text{ V}$ for SGSD93G $T_c = 150\text{ °C}$			2	mA
I_{CEO}	Collector Cutoff Current ($I_B = 0$)	$V_{CE} = 140\text{ V}$ for SGSD93E			0.5	mA
		$V_{CE} = 160\text{ V}$ for SGSD93F			0.5	mA
		$V_{CE} = 180\text{ V}$ for SGSD93G			0.5	mA
I_{EBO}	Emitter Cutoff Current ($I_C = 0$)	$V_{BE} = -5\text{ V}$			0.1	mA
$V_{CEO(sus)}^*$	Collector-emitter Sustaining Voltage	for SGSD93E	140			V
		for SGSD93F	160			V
		for SGSD93G	180			V
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = 5\text{ A } I_B = 5\text{ mA}$			1.4	V
		$I_C = 10\text{ A } I_B = 20\text{ mA}$			2.0	V
		$I_C = 5\text{ A } I_B = 5\text{ mA } T_c = 150\text{ °C}$			1.4	V
		$I_C = 10\text{ A } I_B = 20\text{ mA } T_c = 150\text{ °C}$			2.2	V
		$I_C = 5\text{ A } I_B = 5\text{ mA } T_c = -40\text{ °C}$			1.6	V
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = 5\text{ A } I_B = 5\text{ mA}$			2.0	V
		$I_C = 10\text{ A } I_B = 20\text{ mA}$			2.8	V
		$I_C = 5\text{ A } I_B = 5\text{ mA } T_c = 150\text{ °C}$			2.0	V
		$I_C = 5\text{ A } I_B = 5\text{ mA } T_c = -40\text{ °C}$			2.2	V
h_{FE}^*	DC Current Gain	$I_C = 150\text{ mA } V_{CE} = 1\text{ V}$	500			
		$I_C = 3\text{ A } V_{CE} = 3\text{ V}$	1000			
		$I_C = 5\text{ A } V_{CE} = 3\text{ V}$	1000		20000	
		$I_C = 10\text{ A } V_{CE} = 3\text{ V}$	750			
V_F^*	Diode Forward Voltage	$I_F = 5\text{ A}$			1.8	V
		$I_F = 10\text{ A}$			3.0	V
h_{fe}	Small Signal Current Gain	$I_C = 1\text{ A } V_{CE} = 5\text{ V } f = 5\text{ MHz}$		25		
	RESISTIVE LOAD					
t_{on} t_s t_f	Turn-on Time Storage Time Fall Time	$I_C = 6\text{ A } I_{B1} = -I_{B2} = 24\text{ mA}$	500	700	1100	ns
		$V_{CC} = 30\text{ V}$	1.4	3.2	5.0	μs
			1.5	2.5	4.5	μs

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

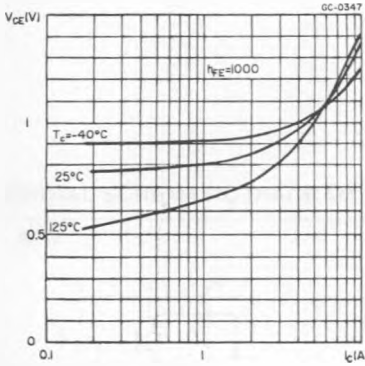
Safe Operating Areas.



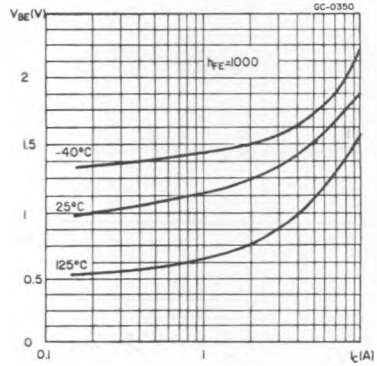
DC Current Gain.



Collector-emitter Saturation Voltage.



Base-emitter Saturation Voltage.



Emitter-collector Voltage.

