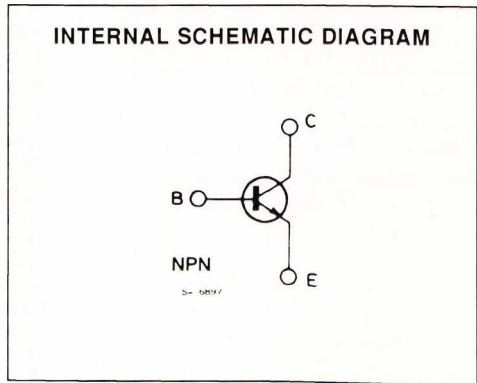
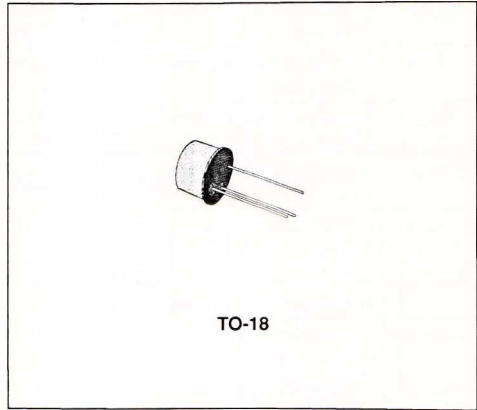


HIGH-SPEED SATURATED SWITCHES

DESCRIPTION

The BSX19 and BSX20 are silicon planar epitaxial NPN transistors in Jedec TO-18 metal case. They are primarily intended for very high speed saturated switching applications.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base Voltage ($I_E = 0$)	40	V
V_{CES}	Collector-emitter Voltage ($V_{BE} = 0$)	40	V
V_{CEO}	Collector-emitter Voltage ($I_B = 0$)	15	V
V_{EBO}	Emitter-base Voltage ($I_C = 0$)	4.5	V
I_{CM}	Collector Peak Current ($t = 10 \mu s$)	0.5	A
P_{tot}	Total Power Dissipation at $T_{amb} \leq 25^\circ C$ at $T_{case} \leq 25^\circ C$	0.36	W
		1.2	W
T_{stg}, T_j	Storage and Junction Temperature	- 65 to 200	$^\circ C$

THERMAL DATA

$R_{th\ j-case}$	Thermal Resistance Junction-case	Max	146	$^{\circ}C/W$
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	Max	486	$^{\circ}C/W$

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\ ^{\circ}C$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
I_{CBO}	Collector Cutoff Current ($I_E = 0$)	$V_{CB} = 20\ V$ $V_{CB} = 20\ V$ $T_{amb} = 150\ ^{\circ}C$			0.4 30	μA μA	
I_{CES}	Collector Cutoff Current ($V_{BE} = 0$)	$V_{CE} = 15\ V$ $T_{amb} = 55\ ^{\circ}C$ $V_{CE} = 40\ V$			0.4 1	μA μA	
I_{CEX}	Collector Cutoff Current ($V_{BE} = -3\ V$)	$V_{CE} = 15\ V$ $T_{amb} = 55\ ^{\circ}C$			0.6	μA	
I_{EBO}	Emitter Cutoff Current ($I_C = 0$)	$V_{EB} = 4.5\ V$			10	μA	
I_{BEX}	Base Cutoff Current ($V_{BE} = -3\ V$)	$V_{CE} = 15\ V$ $T_{amb} = 55\ ^{\circ}C$			0.6	μA	
$V_{CER(sus)}^*$	Collector-emitter Sustaining Voltage ($R_{BE} = 10\ \Omega$)	$I_C = 10\ mA$	20			V	
$V_{(BR)CEO}^*$	Collector-emitter Breakdown Voltage ($I_B = 0$)	$I_C = 10\ mA$	15			V	
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = 10\ mA$ $I_B = 1\ mA$			0.25	V	
		$I_C = 100\ mA$ $I_B = 10\ mA$			0.6	V	
		$I_C = 10\ mA$ $I_B = 0.6\ mA$			0.3	V	
		$I_C = 10\ mA$ $I_B = 0.3\ mA$			0.3	V	
V_{BE}	Base-emitter Voltage	$I_C = 30\ \mu A$ $V_{CE} = 20\ V$ $T_{amb} = 100\ ^{\circ}C$	0.35			V	
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = 10\ mA$ $I_B = 1\ mA$	0.7		0.85	V	
		$I_C = 100\ mA$ $I_B = 10\ mA$			1.5	V	
h_{FE}^*	DC Current Gain	for BSX19 $I_C = 10\ mA$ $V_{CE} = 1\ V$	20		60		
		$I_C = 100\ mA$ $V_{CE} = 2\ V$	10				
		$I_C = 10\ mA$ $V_{CE} = 1\ V$					
		$T_{amb} = -55\ ^{\circ}C$	10				
		for BSX20 $I_C = 10\ mA$ $V_{CE} = 1\ V$	40				
		$I_C = 100\ mA$ $V_{CE} = 2\ V$	20				
$I_C = 10\ mA$ $V_{CE} = 1\ V$							
$T_{amb} = -55\ ^{\circ}C$	20						
f_T	Transition Frequency	$I_C = 10\ mA$ $V_{CE} = 10\ V$ for BSX19 for BSX20	400 500	500 600		MHz MHz	
C_{EBO}	Emitter-base Capacitance	$I_C = 0$ $V_{EB} = 1\ V$			4.5	pF	
C_{BO}	Collector-base Capacitance	$I_E = 0$ $V_{CB} = 5\ V$			4	pF	
t_s^{**}	Storage Time	$I_C = 10\ mA$ $V_{CC} = 10\ V$ $I_{B1} = -I_{B2} = 10\ mA$ for BSX19 for BSX20			5	10	ns
					6	13	ns

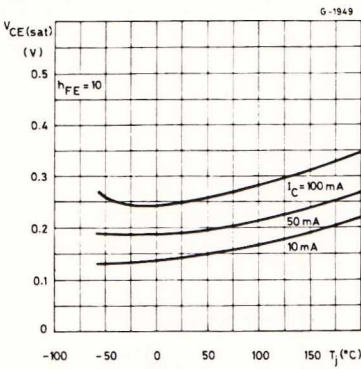
* Pulsed : pulse duration = 300 μs , duty cycle = 1%

** See test circuit.

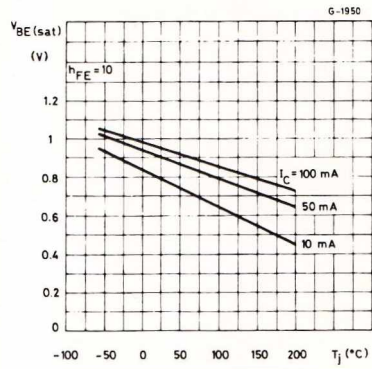
ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_{on}	Turn-on Time	$I_C = 10\text{ mA}$ $V_{CC} = 3\text{ V}$ $I_{B1} = 3\text{ mA}$			12	ns
		$I_C = 100\text{ mA}$ $V_{CC} = 6\text{ V}$ $I_{B1} = 40\text{ mA}$			7	ns
t_{off}	Turn-off Time	$I_C = 10\text{ mA}$ $V_{CC} = 3\text{ V}$ $I_{B1} = 3\text{ mA}$			15	ns
			$I_{B2} = -1.5\text{ mA}$ for BSX19 for BSX20	18	ns	
		$I_C = 100\text{ mA}$ $V_{CC} = 6\text{ V}$ $I_{B1} = 40\text{ mA}$	$I_{B2} = -20\text{ mA}$ for BSX19 for BSX20	18	ns	
				21	ns	

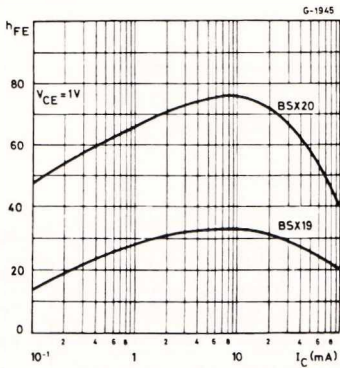
Collector-emitter Saturation Voltage.



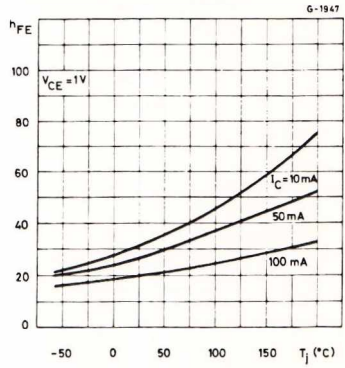
Base-emitter Saturation Voltage.



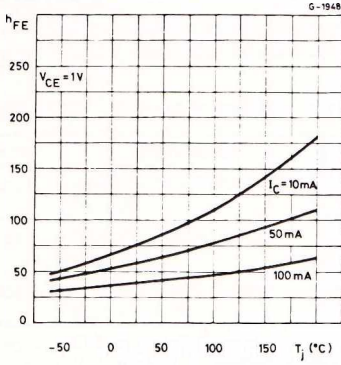
DC Current Gain.



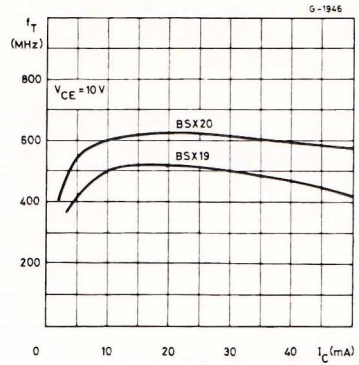
DC Current Gain (for BSX19 only).



DC Current Gain (for BSX20 only).



Transition Frequency.



Test circuit for t_s .

