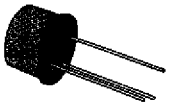
SGS-THOMSON MICROELECTRONICS

BSX19
BSX20

HIGH-SPEED SATURATED SWITCHES

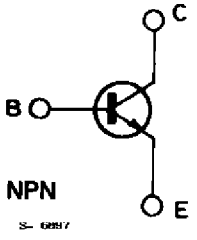
DESCRIPTION

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.



TO-18

INTERNAL SCHEMATIC DIAGRAM



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 µs)	0.5	A
P_{tot}	Total Power Dissipation at $T_{amb} \leq 25$ °C at $T_{case} \leq 25$ °C	0.36 1.2	W W
T_{stg}, T_j	Storage and Junction Temperature	– 65 to 200	°C

THERMAL DATA

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

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

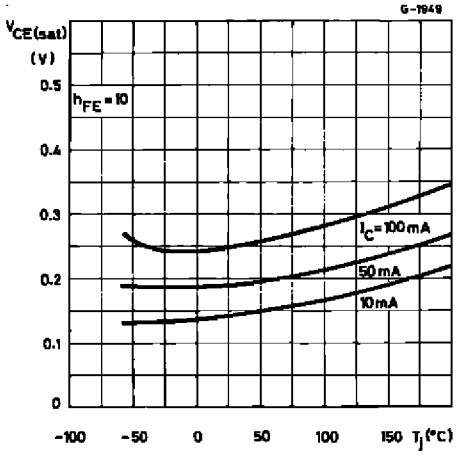
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector Cutoff Current (I_E = 0)	V_{CB} = 20 V V_{CB} = 20 V T_{amb} = 150 °C			0.4 30	µA µA
I_{CES}	Collector Cutoff Current (V_{BE} = 0)	V_{CE} = 15 V T_{amb} = 55 °C V_{CE} = 40 V			0.4 1	µA µA
I_{CEX}	Collector Cutoff Current (V_{BE} = – 3 V)	V_{CE} = 15 V T_{amb} = 55 °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 °C			0.6	µA
$V_{CER\ (sus)}$*	Collector-emitter Sustaining Voltage (R_{BE} = 10 Ω)	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 I_C = 100 mA I_B = 10 mA for **BSX19** I_C = 10 mA I_B = 0.6 mA for **BSX20** I_C = 10 mA I_B = 0.3 mA			0.25 0.6 0.3 0.3	V V V V
V_{BE}	Base-emitter Voltage	I_C = 30 µA V_{CE} = 20 V T_{amb} = 100 °C	 0.35			 V
$V_{BE(sat)}$*	Base-emitter Saturation Voltage	I_C = 10 mA I_B = 1 mA I_C = 100 mA I_B = 10 mA	0.7		0.85 1.5	V V
h_{FE}*	DC Current Gain	for **BSX19** I_C = 10 mA V_{CE} = 1 V I_C = 100 mA V_{CE} = 2 V I_C = 10 mA V_{CE} = 1 V T_{amb} = – 55 °C for **BSX20** I_C = 10 mA V_{CE} = 1 V I_C = 100 mA V_{CE} = 2 V I_C = 10 mA V_{CE} = 1 V T_{amb} = – 55 °C	 20 10 10 40 20 20		 60 120	
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 6	 10 13	 ns ns

* Pulsed : pulse duration = 300µs, duty cycle = 1% ** See test circuit.

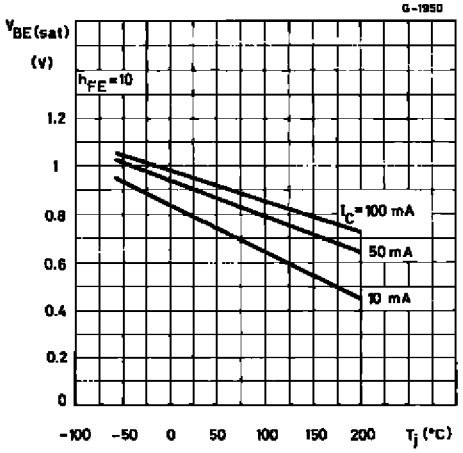
ELECTRICAL CHARACTERISTICS (continued)

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

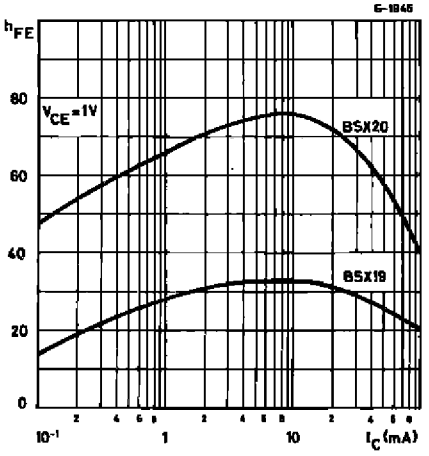
Collector-emitter Saturation Voltage.



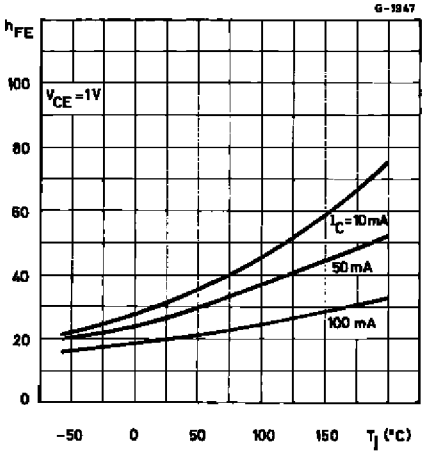
Base-emitter Saturation Voltage.



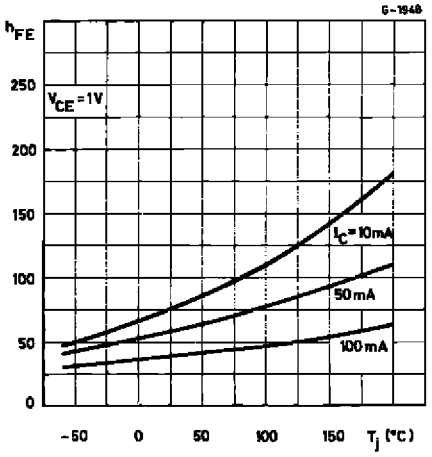
DC Current Gain.



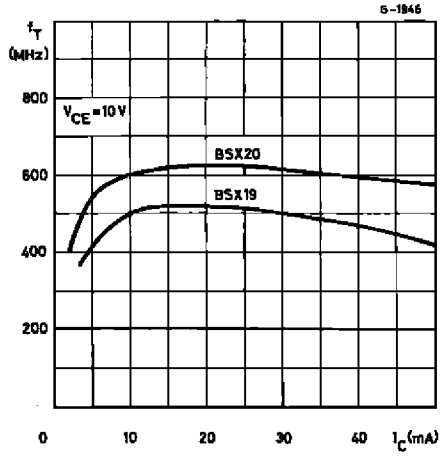
DC Current Gain (for BSX19 only).



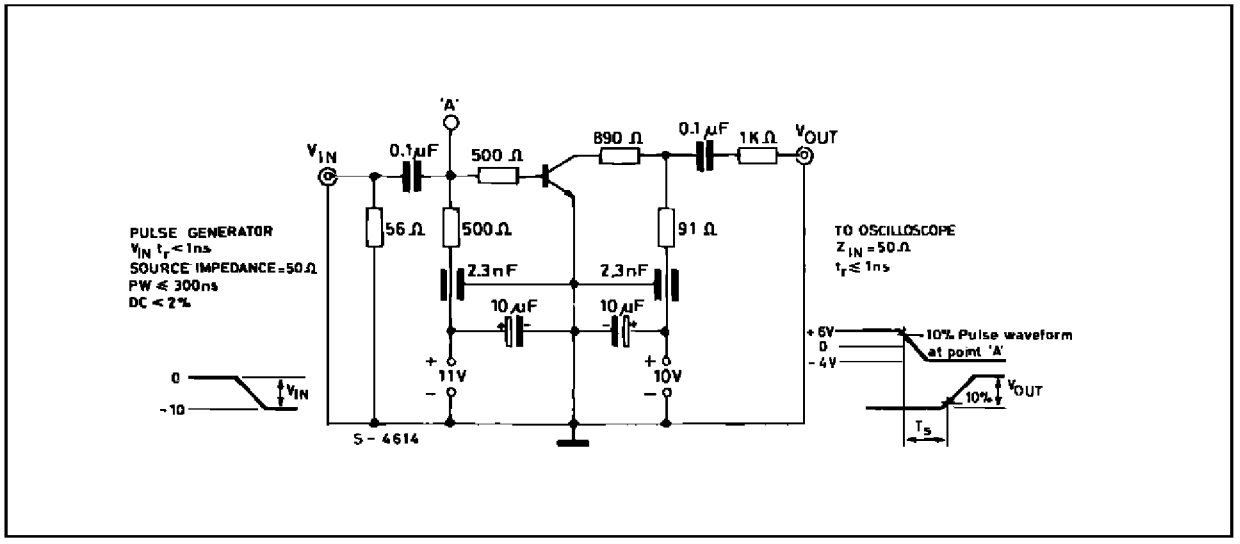
DC Current Gain (for BSX20 only).



Transition Frequency.

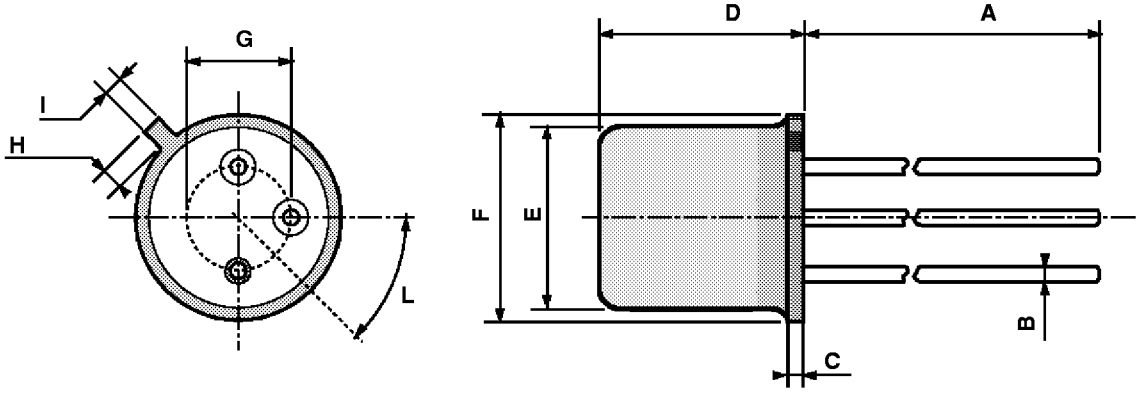


Test circuit for ts.



TO-18 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		12.7			0.500	
B			0.49			0.019
D			5.3			0.208
E			4.9			0.193
F			5.8			0.228
G	2.54			0.100		
H			1.2			0.047
I			1.16			0.045
L	45°			45°		



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