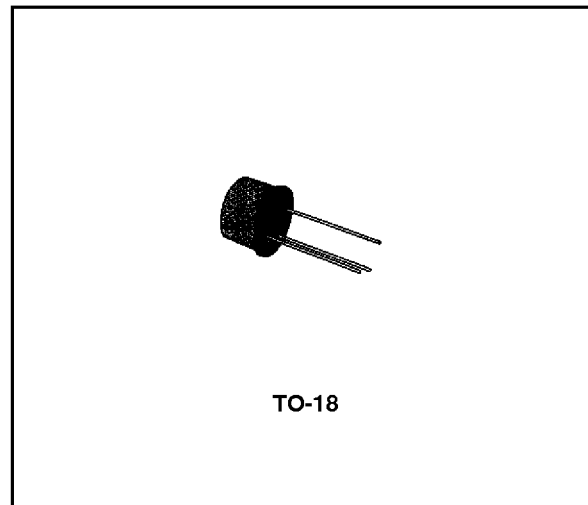
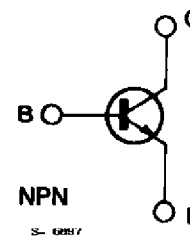


HIGH-SPEED SATURATED SWITCHES

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.


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 ($t = 10 \mu s$)	0.5	A
P_{tot}	Total Power Dissipation at $T_{amb} \leq 25 \text{ }^\circ\text{C}$ at $T_{case} \leq 25 \text{ }^\circ\text{C}$	0.36	W
		1.2	W
T_{stg}, T_j	Storage and Junction Temperature	- 65 to 200	$^\circ\text{C}$

BSX19-BSX20

THERMAL DATA

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

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector Cutoff Current ($I_E = 0$)	$V_{CB} = 20\text{ V}$ $V_{CB} = 20\text{ V}$ $T_{amb} = 150\text{ °C}$			0.4 30	μA μA
I_{CES}	Collector Cutoff Current ($V_{BE} = 0$)	$V_{CE} = 15\text{ V}$ $T_{amb} = 55\text{ °C}$ $V_{CE} = 40\text{ V}$			0.4 1	μA μA
I_{CEX}	Collector Cutoff Current ($V_{BE} = -3\text{ V}$)	$V_{CE} = 15\text{ V}$ $T_{amb} = 55\text{ °C}$			0.6	μA
I_{EBO}	Emitter Cutoff Current ($I_C = 0$)	$V_{EB} = 4.5\text{ V}$			10	μA
I_{BEX}	Base Cutoff Current ($V_{BE} = -3\text{ V}$)	$V_{CE} = 15\text{ V}$ $T_{amb} = 55\text{ °C}$			0.6	μA
$V_{CER(sus)}^*$	Collector-emitter Sustaining Voltage ($R_{BE} = 10\ \Omega$)	$I_C = 10\text{ mA}$	20			V
$V_{(BR)CEO}^*$	Collector-emitter Breakdown Voltage ($I_B = 0$)	$I_C = 10\text{ mA}$	15			V
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = 10\text{ mA}$ $I_B = 1\text{ mA}$ $I_C = 100\text{ mA}$ $I_B = 10\text{ mA}$ for BSX19 $I_C = 10\text{ mA}$ $I_B = 0.6\text{ mA}$ for BSX20 $I_C = 10\text{ mA}$ $I_B = 0.3\text{ mA}$			0.25 0.6 0.3 0.3	V V V V
V_{BE}	Base-emitter Voltage	$I_C = 30\ \mu\text{A}$ $V_{CE} = 20\text{ V}$ $T_{amb} = 100\text{ °C}$	0.35			V
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = 10\text{ mA}$ $I_B = 1\text{ mA}$ $I_C = 100\text{ mA}$ $I_B = 10\text{ mA}$	0.7		0.85 1.5	V V
h_{FE}^*	DC Current Gain	for BSX19 $I_C = 10\text{ mA}$ $V_{CE} = 1\text{ V}$ $I_C = 100\text{ mA}$ $V_{CE} = 2\text{ V}$ $I_C = 10\text{ mA}$ $V_{CE} = 1\text{ V}$ $T_{amb} = -55\text{ °C}$ for BSX20 $I_C = 10\text{ mA}$ $V_{CE} = 1\text{ V}$ $I_C = 100\text{ mA}$ $V_{CE} = 2\text{ V}$ $I_C = 10\text{ mA}$ $V_{CE} = 1\text{ V}$ $T_{amb} = -55\text{ °C}$	20 10 10 40 20 20		60 120	
f_T	Transition Frequency	$I_C = 10\text{ mA}$ $V_{CE} = 10\text{ V}$ for BSX19 for BSX20	400 500	500 600		MHz MHz
C_{EBO}	Emitter–base Capacitance	$I_C = 0$ $V_{EB} = 1\text{ V}$			4.5	pF
C_{BO}	Collector–base Capacitance	$I_E = 0$ $V_{CB} = 5\text{ V}$			4	pF
t_s^{**}	Storage Time	$I_C = 10\text{ mA}$ $V_{CC} = 10\text{ V}$ $I_{B1} = -I_{B2} = 10\text{ mA}$ for BSX19 for BSX20		5 6	10 13	ns ns

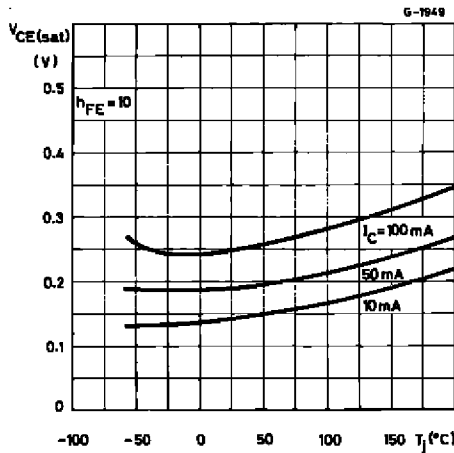
* Pulsed : pulse duration = 300 μs , duty cycle = 1%

** See test circuit.

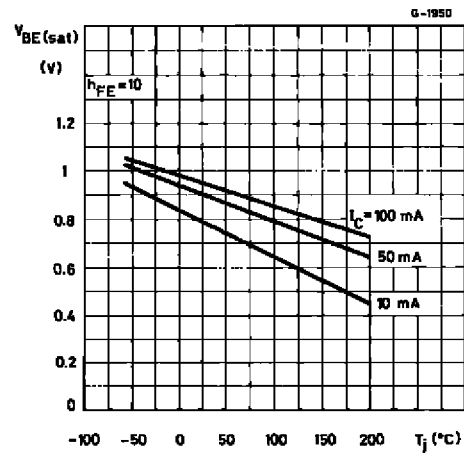
ELECTRICAL CHARACTERISTICS (continued)

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
					18	ns
		$I_C = 100\text{ mA}$ $V_{CC} = 6\text{ V}$ $I_{B1} = 40\text{ mA}$			18	ns
					21	ns

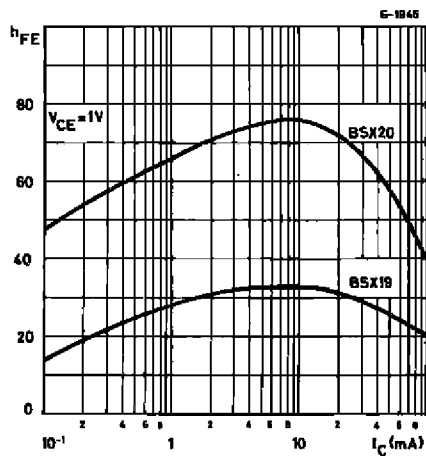
Collector-emitter Saturation Voltage.



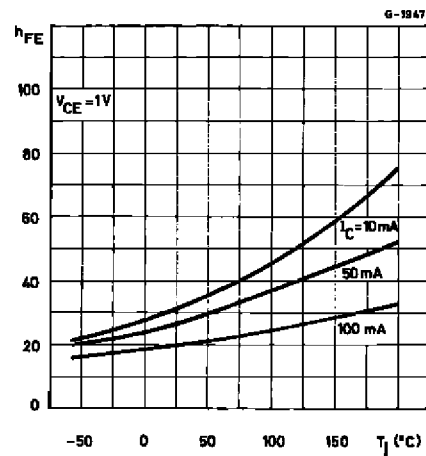
Base-emitter Saturation Voltage.



DC Current Gain.

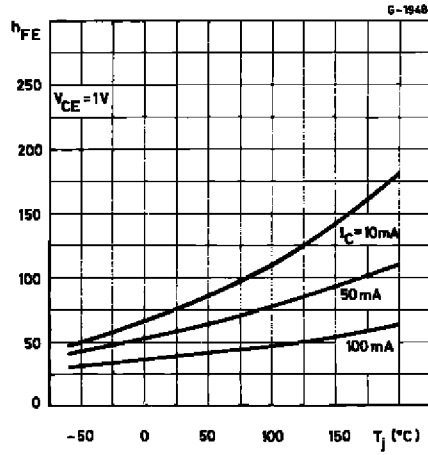


DC Current Gain (for BSX19 only).

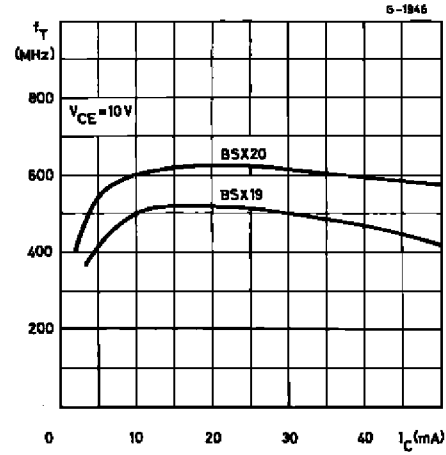


BSX19-BSX20

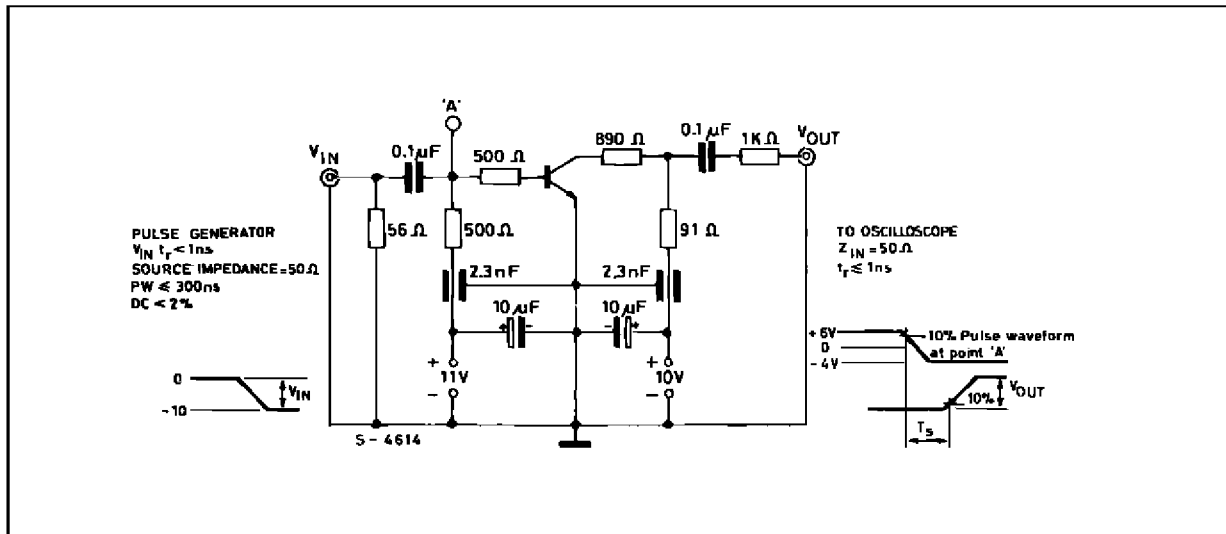
DC Current Gain (for BSX20 only).



Transition Frequency.

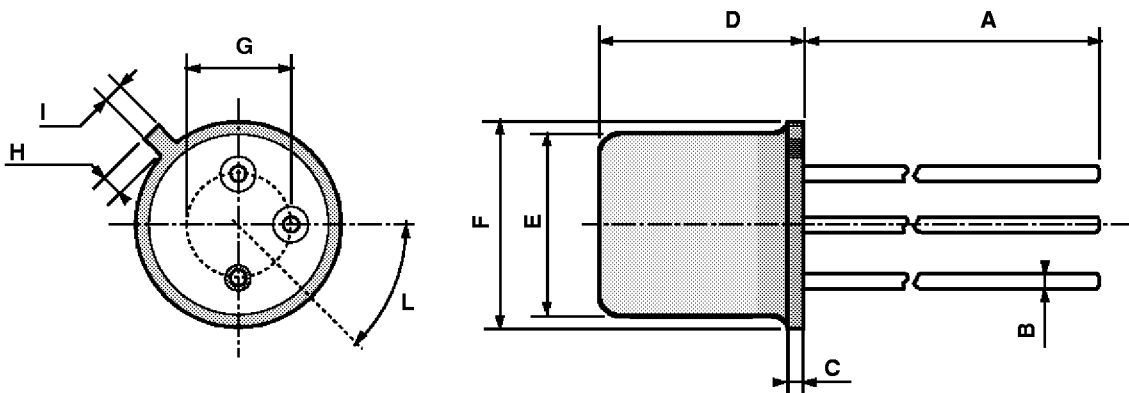


Test circuit for t_s .



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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