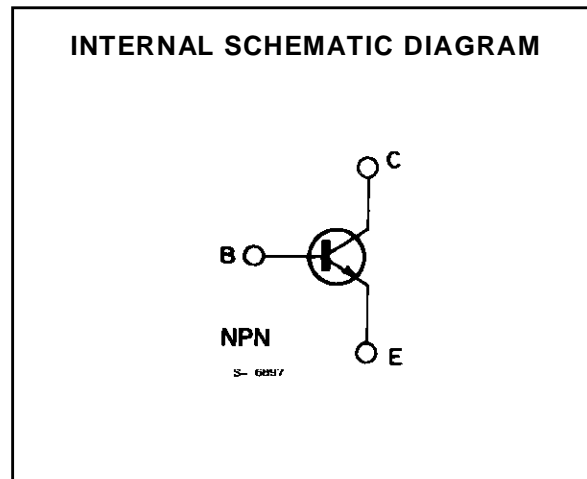
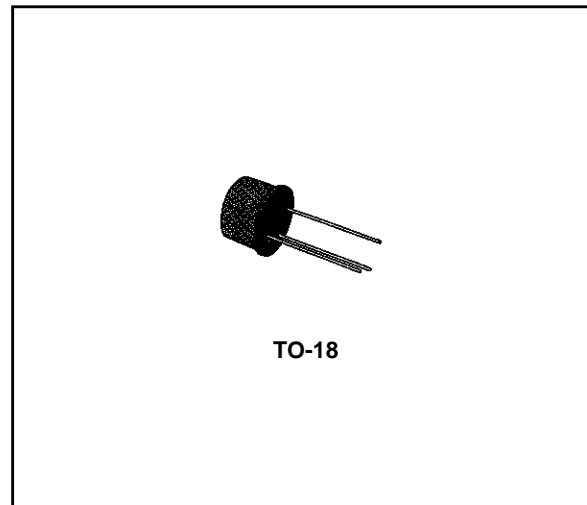


HIGH-SPEED SATURATED SWITCH

DESCRIPTION

The BSX39 is a silicon planar epitaxial NPN transistor in Jedec TO-18 metal case. It is designed for very fast switching applications up to 500 mA.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base Voltage ($I_E = 0$)	45	V
V_{CEO}	Collector-emitter Voltage ($I_B = 0$)	20	V
V_{EBO}	Emitter-base Voltage ($I_C = 0$)	5	V
I_C	Collector Current	500	mA
P_{tot}	Total Power Dissipation at $T_{amb} \leq 25\text{ }^\circ\text{C}$	0.36	W
	at $T_{case} \leq 25\text{ }^\circ\text{C}$	1.2	W
	at $T_{case} \leq 100\text{ }^\circ\text{C}$	0.68	W
T_{stg}, T_j	Storage and Junction Temperature	- 55 to 200	$^\circ\text{C}$

BSX39

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

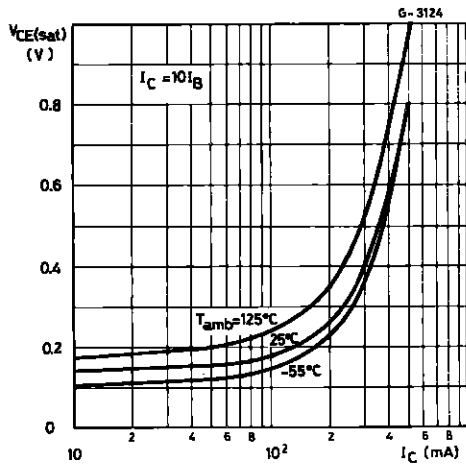
ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ °C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
I_{CES}	Collector Cutoff Current ($V_{BE} = 0$)	$V_{CE} = 20\text{ V}$			0.1	μA	
		$V_{CE} = 20\text{ V}$ $T_{amb} = 125\text{ °C}$			30	μA	
$V_{(BR)CBO}$	Collector-base Breakdown Voltage ($I_E = 0$)	$I_C = 10\text{ }\mu\text{A}$	45			V	
$V_{(BR)CEO}^*$	Collector-emitter Breakdown Voltage ($I_B = 0$)	$I_C = 10\text{ mA}$	20			V	
$V_{(BR)EBO}$	Emitter-base Breakdown Voltage ($I_C = 0$)	$I_E = 100\text{ }\mu\text{A}$	5			V	
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = 30\text{ mA}$ $I_B = 3\text{ mA}$		0.15	0.18	V	
		$I_C = 100\text{ mA}$ $I_B = 10\text{ mA}$		0.18	0.28	V	
		$I_C = 300\text{ mA}$ $I_B = 30\text{ mA}$		0.39	0.5	V	
		$I_C = 30\text{ mA}$ $I_B = 3\text{ mA}$					
		$T_{amb} = 85\text{ °C}$		0.17	0.3	V	
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = 30\text{ mA}$ $I_B = 3\text{ mA}$	0.75	0.8	0.95	V	
		$I_C = 100\text{ mA}$ $I_B = 10\text{ mA}$		0.9	1.2	V	
		$I_C = 300\text{ mA}$ $I_B = 30\text{ mA}$		1.1	1.7	V	
h_{FE}^*	DC Current Gain	$I_C = 30\text{ mA}$ $V_{CE} = 0.4\text{ V}$	40	60	120		
		$I_C = 100\text{ mA}$ $V_{CE} = 0.5\text{ V}$	25	55			
		$I_C = 300\text{ mA}$ $V_{CE} = 1\text{ V}$	15	40			
		$I_C = 30\text{ mA}$ $V_{CE} = 0.4\text{ V}$					
		$T_{amb} = -55\text{ °C}$	12				
f_T	Transition Frequency	$I_C = 30\text{ mA}$ $V_{CE} = 10\text{ V}$ $f = 100\text{ MHz}$	350	600		MHz	
C_{EBO}	Emitter-base Capacitance	$I_C = 0$ $V_{EB} = 0.5\text{ V}$ $f = 1\text{ MHz}$		7	8	pF	
C_{CBO}	Collector-base Capacitance	$I_E = 0$ $V_{CB} = 5\text{ V}$ $f = 1\text{ MHz}$		4	5	pF	
t_s	Storage Time	$I_C = 10\text{ mA}$ $V_{CC} = 10\text{ V}$ $I_{B1} = -I_{B2} = 10\text{ mA}$		8	18	ns	
t_{on}^{**}	Turn-on Time	$I_C = 300\text{ mA}$ $V_{CC} = 10\text{ V}$ $I_{B1} = 30\text{ mA}$		9	15	ns	
t_{off}^{**}	Turn-off Time	$I_C = 300\text{ mA}$ $V_{CC} = 10\text{ V}$ $I_{B1} - I_{B2} = 30\text{ mA}$		15	25	ns	

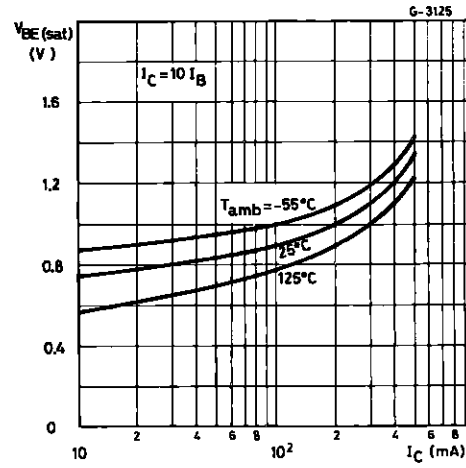
* Pulsed : pulse duration = 300 μs , duty cycle = 1 %.

** See test circuit.

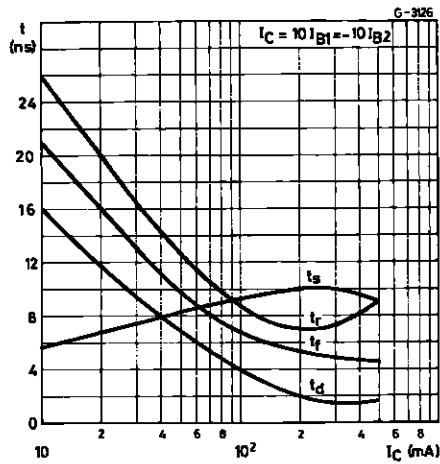
Collector-emitter Saturation Voltage.



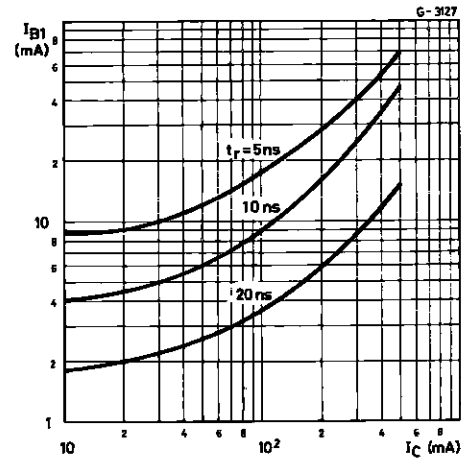
Base-emitter Saturation Voltage.



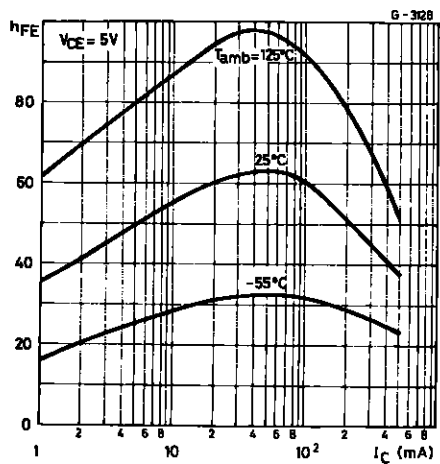
Switching Characteristics.



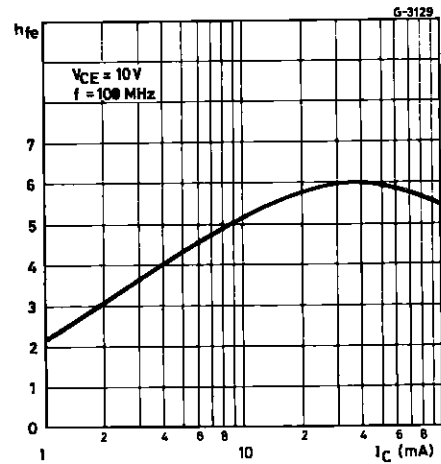
Switching Characteristics.



CD Current Gain.

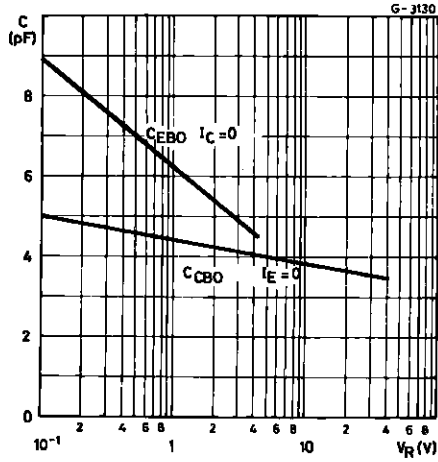


High Frequency Current Gain.

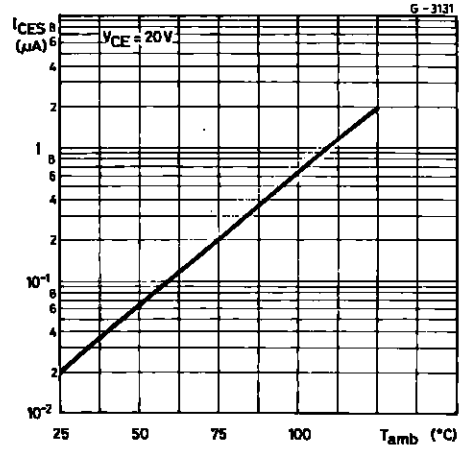


BSX39

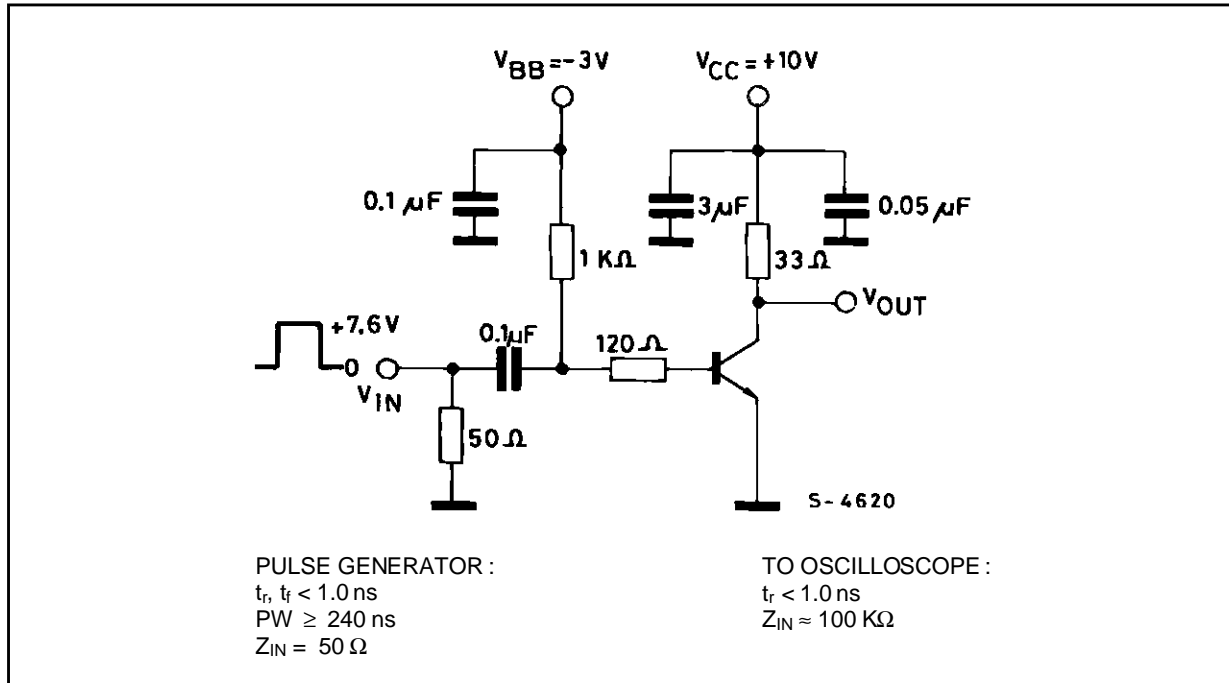
Emitter-base and Collector-base Capacitances.



Collector Cut off Current.

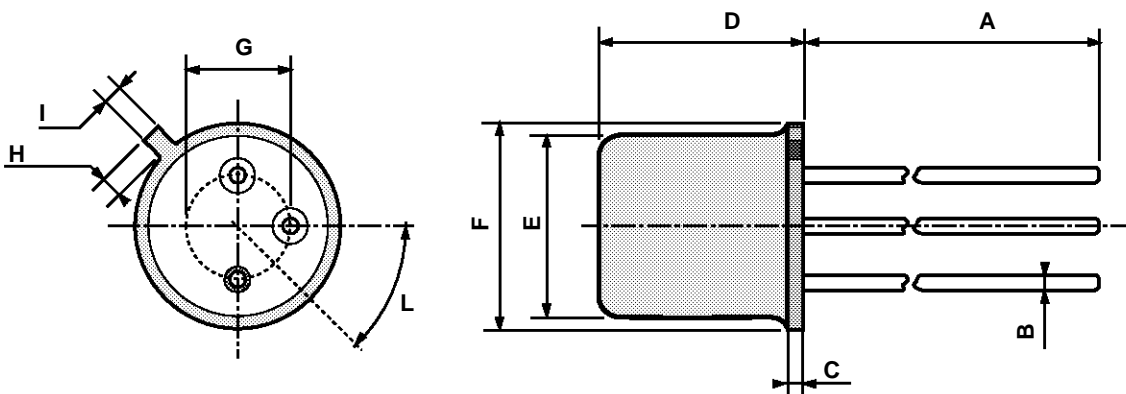


Test circuit for t_{on} , t_{off} .



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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