High-voltage, high-current switch

The BSX 33 is an NPN silicon planar epitaxial transistor designed for high voltage and high current switching applications. It features a useful current gain range from 100 μA to 500 mA and a low saturation voltage allowing switching operation at 1 A.

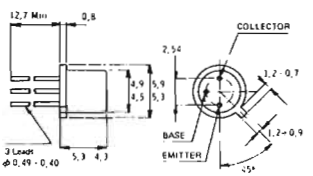
ELECTRICAL CHARACTERISTICS
(T_A = 25°C unless otherwise noted)

Symbol	Characteristic and test conditions		Min.	Typ.	Max.	Unit
h_{FE}	DC Current Gain (5)					
	I_C = 100 μA	V_{CE} = 1 V	20	50		
	I_C = 5 mA	V_{CE} = 1 V	50	85		
	I_C = 50 mA	V_{CE} = 1 V	50	95		
	I_C = 150 mA	V_{CE} = 1 V	40	80		
	I_C = 500 mA	V_{CE} = 1 V	20	45		
V_{BEsat}	Base Saturation Voltage (5)					
	I_C = 50 mA	I_B = 5 mA		0.76		V
	I_C = 150 mA	I_B = 15 mA		0.85	1.1	V
	I_C = 1 A	I_B = 0.1 A		1.2	1.6	V
V_{CEsat}	Collector Saturation Voltage (5)					
	I_C = 50 mA	I_B = 5 mA		0.08		V
	I_C = 150 mA	I_B = 15 mA		0.15	0.30	V
	I_C = 1 A	I_B = 0.1 A		0.6	1	V
I_{EBO}	Emitter Reverse Current					
	V_{EB} = 5V	I_C = 0		0.1	10	nA
I_{CBO}	Collector Reverse Current					
	V_{CB} = 60V	I_E = 0		0.2	10	nA
	V_{CB} = 60V I_E = 0	(150°C)		0.2	10	μA
BV_{CBO}	Collector to Base Breakdown Voltage					
	I_C = 100 μA	I_E = 0	85			V
BV_{EBO}	Emitter to Base Breakdown Voltage					
	I_E = 100 μA	I_C = 0	7			V
LV_{CEO}	Collector to Emitter Sustaining Voltage (4 and 5)					
	I_C = 30 mA	I_B = 0	55			V
h_{fe}	Small Signal Current Gain					
	I_C = 1 mA V_{CE} = 5V	f = 1 kHz		85		
h_{ie}	Input Resistance					
	I_C = 1 mA V_{CE} = 5V	f = 1 kHz		2		KΩ
h_{oe}	Output Conductance					
	I_C = 1 mA V_{CE} = 5V	f = 1 kHz		8		μmho
h_{re}	Voltage Feedback Ratio					
	I_C = 1 mA V_{CE} = 5 V	f = 1 kHz		2.2		$x10^{-4}$
h_{fe}	High Freq. Current Gain					
	I_C = 50 mA V_{CE} = 10V	f = 20 MHz	3	4.5		
C_{TE}	Emitter Transition Capacitance					
	I_C = 0 V_{EB} = 0.5V			50	80	pF
C_{obo}	Base-Collector Capacitance					
	I_E = 0 V_{CB} = 10V			12	20	pF
t_{on}	Turn On Time					
	I_C = 150 mA	I_{B1} = 7.5mA		120	200	ns
t_{off}	Turn Off Time					
	I_C = 150 mA I_{B1} = 7.5mA	I_{B2} = 7.5mA		350	800	ns

ABSOLUTE MAXIMUM RATINGS (1)
(T_A = 25° C unless otherwise noted)

Voltages		
Collector to Base	V_{CBO}	85 V
Collector to Emitter (4)	V_{CEO}	55 V
Emitter to Base	V_{EBO}	7 V
Temperatures		
Storage Temperature Range	T_{STG}	-55° C to 200° C
Operating Junction Temperature	T_J	200° C
Lead Temperature (Soldering, 10 sec.)	T_L	260° C
Power (2-3)		
Dissipation at 25° C Case Temperature	P_D	1.8 W
Dissipation at 25° C Ambient Temperature	P_D	0.5 W

PHYSICAL DIMENSIONS
Similar to Jedec TO-18

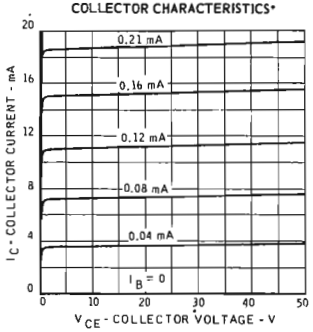


Note - All dimensions are in mm

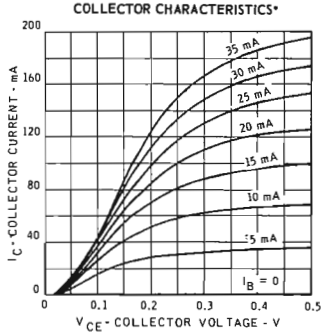
NOTES :
1) These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
3) These ratings give a maximum junction temperature of 200°C and junction-to-case thermal resistance of 97°C/W (derating factor of 10.3 mW/°C); junction-to-ambient thermal resistance of 350°C/W (derating factor of 2.85 mW/°C).
4) These ratings refer to a high-current point where collector-to-emitter voltage is lowest. For more information send for SGS AR 5.
5) Measured under pulse conditions : pulse length = 300 μsec; duty cycle 1%.

TYPICAL ELECTRICAL CHARACTERISTICS (25° C free air temperature unless otherwise noted)

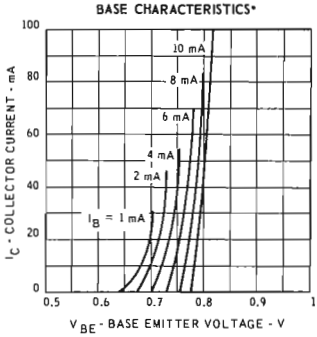
COLLECTOR CHARACTERISTICS*



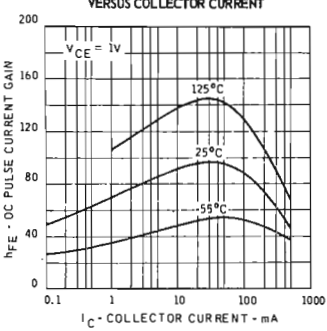
COLLECTOR CHARACTERISTICS*



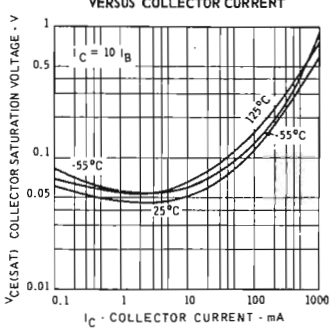
BASE CHARACTERISTICS*



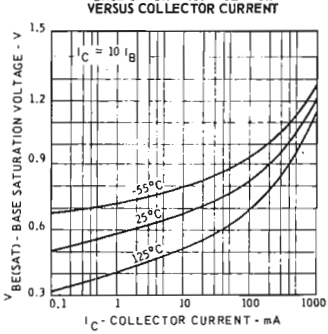
DC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT



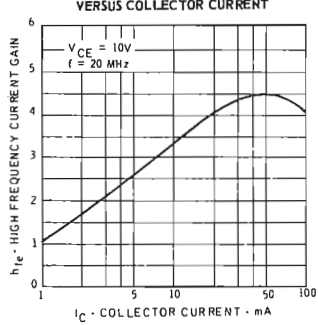
COLLECTOR SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



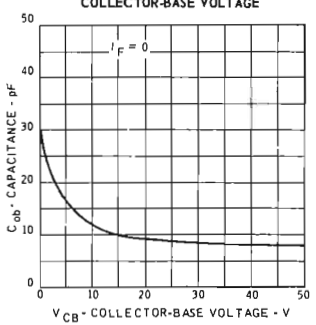
BASE SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



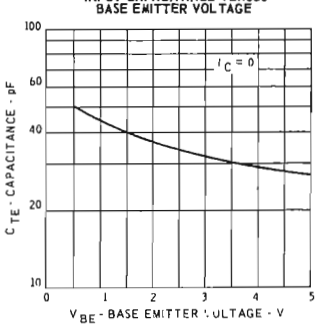
HIGH FREQUENCY CURRENT GAIN VERSUS COLLECTOR CURRENT



OUTPUT CAPACITANCE VERSUS COLLECTOR-BASE VOLTAGE



INPUT CAPACITANCE VERSUS BASE EMITTER VOLTAGE



* Single family characteristics on Transistor Curve Tracer.

TYPICAL ELECTRICAL CHARACTERISTICS (25° C free air temperature unless otherwise noted)