

BSX 29

HIGH-SPEED SWITCH AND RF AMPLIFIER

PNP DIFFUSED SILICON PLANAR EPITAXIAL TRANSISTOR

GENERAL DESCRIPTION—The BSX 29 is a 700 Mc/s PNP silicon PLANAR epitaxial transistor designed for saturated and nonsaturated switching circuits requiring up to 200 milliamperes of collector current. It is suitable for 20 Mc/s amplifiers, 10.7 Mc/s IF amplifiers, and 100 Mc/s oscillator converter circuits.

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

Storage Temperature

-65°C to +200°C

Operating Junction Temperature

200°C Maximum

Lead Temperature (Soldering, 60 sec Time Limit)

300°C Maximum

Maximum Power Dissipations

Total Dissipation at 25°C Case Temperature (Notes 2 and 3)

1.2 Watts

at 25°C Ambient Temperature (Notes 2 and 3)

0.36 Watt

Maximum Voltages

V_{CB0} Collector to Base Voltage

-12 Volts

V_{CEQ} Collector to Emitter Voltage (Note 4)

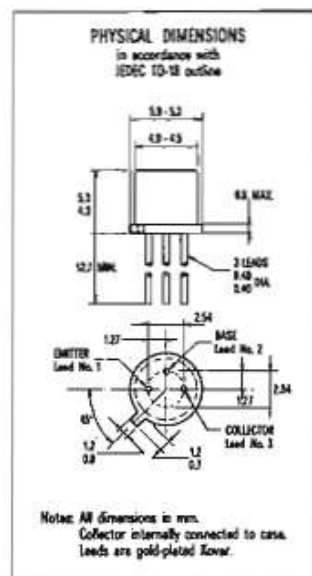
-12 Volts

V_{CE} Collector to Emitter Voltage

-12 Volts

V_{EBQ} Emitter to Base Voltage

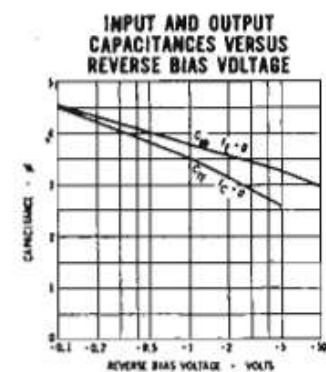
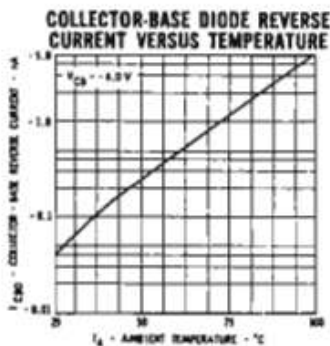
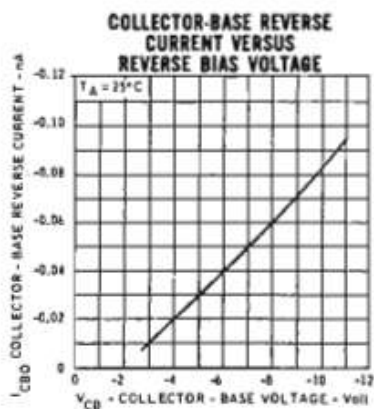
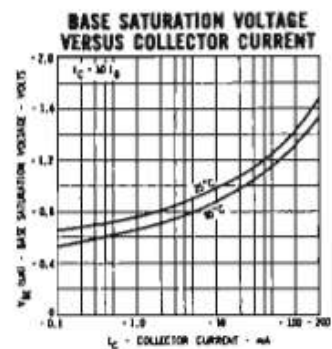
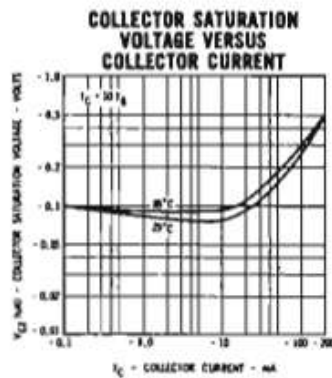
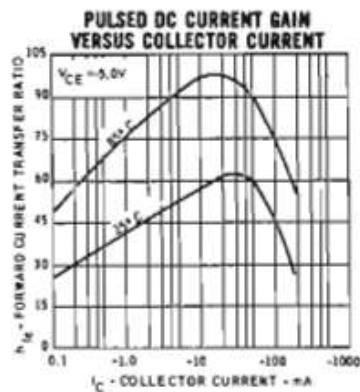
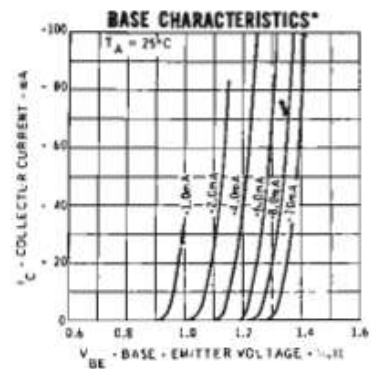
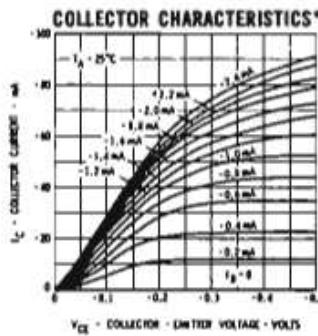
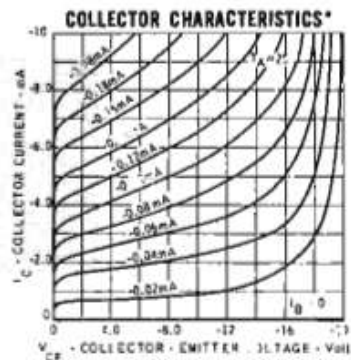
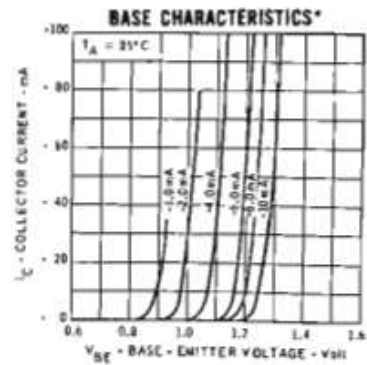
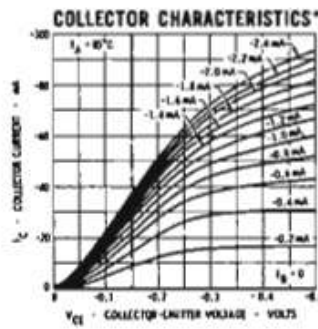
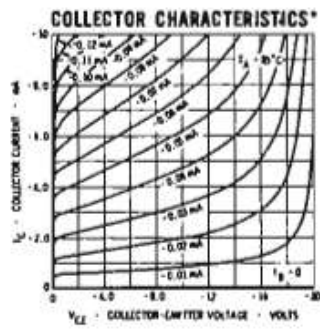
-4.0 Volts



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

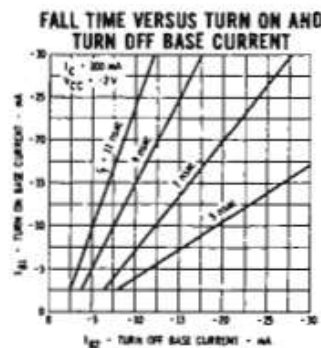
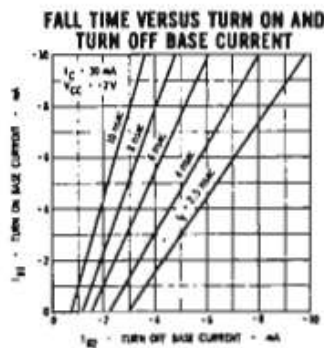
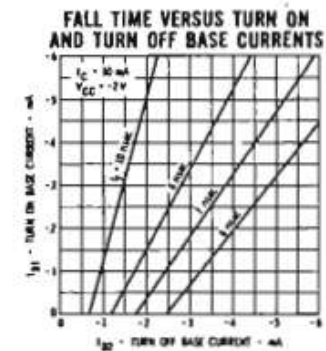
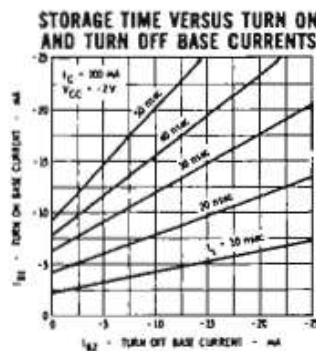
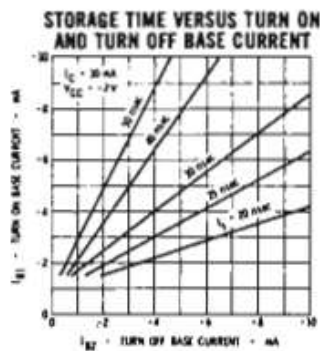
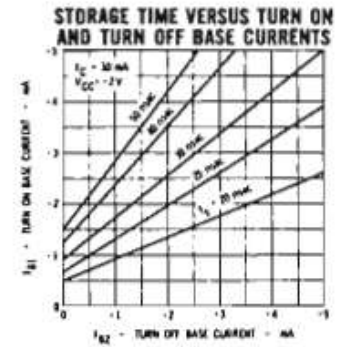
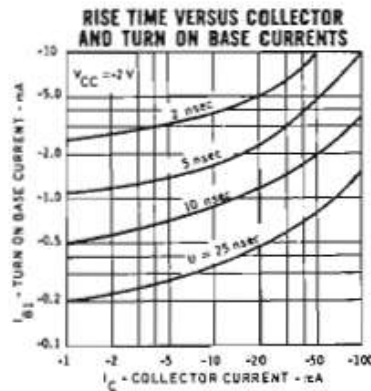
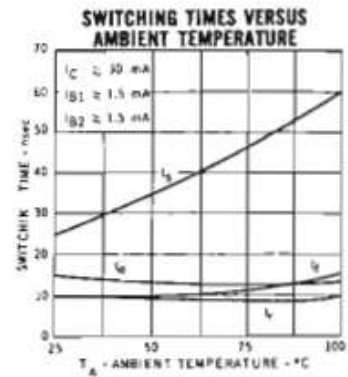
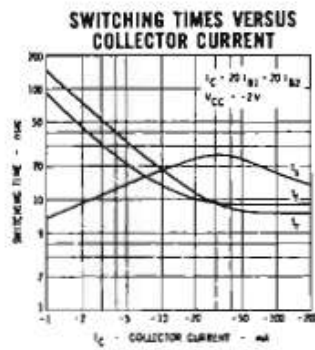
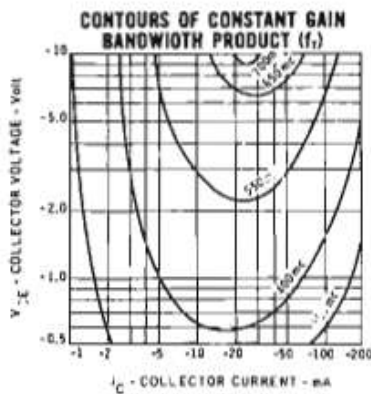
SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
h_{FE}	DC Pulse Current Gain (Note 5)	25	50			$I_C = 10 \text{ mA}$ $V_{CE} = -0.3 \text{ V}$
h_{FE}	DC Pulse Current Gain (Note 5)	30	60	120		$I_C = 30 \text{ mA}$ $V_{CE} = -0.5 \text{ V}$
h_{FE}	DC Pulse Current Gain (Note 5)	20	40			$I_C = 100 \text{ mA}$ $V_{CE} = -1.0 \text{ V}$
$V_{BE}(\text{sat})$	Base Saturation Voltage	-0.78	-0.96	-0.98	V	$I_C = 10 \text{ mA}$ $I_B = 1.0 \text{ mA}$
$V_{BE}(\text{sat})$	Base Saturation Voltage	-0.85	-1.12	-1.2	V	$I_C = 30 \text{ mA}$ $I_B = 3.0 \text{ mA}$
$V_{BE}(\text{sat})$	Base Saturation Voltage		-1.4	-1.7	V	$I_C = 100 \text{ mA}$ $I_B = 10 \text{ mA}$
$V_{CE}(\text{sat})$	Collector Saturation Voltage	-0.07	-0.15		V	$I_C = 10 \text{ mA}$ $I_B = 1.0 \text{ mA}$
$V_{CE}(\text{sat})$	Collector Saturation Voltage		-0.1	-0.2	V	$I_C = 30 \text{ mA}$ $I_B = 3.0 \text{ mA}$
$V_{CE}(\text{sat})$	Collector Saturation Voltage		-0.25	-0.5	V	$I_C = 100 \text{ mA}$ $I_B = 10 \text{ mA}$
$V_{CE}(\text{sat})(85^\circ\text{C})$	Collector Saturation Voltage	-0.15	-0.4		V	$I_C = 30 \text{ mA}$ $I_B = 3.0 \text{ mA}$
I_{CES}	Collector Reverse Current		-0.05	80	nA	$V_{CE} = -6.0 \text{ V}$ $V_{BE} = 0$
$I_{CES}(85^\circ\text{C})$	Collector Reverse Current		0.003	5.0	μA	$V_{CE} = -6.0 \text{ V}$ $V_{BE} = 0$
BV_{CBO}	Collector to Base Breakdown Voltage	-12			V	$I_C = 10 \text{ }\mu\text{A}$ $I_E = 0$
BV_{CES}	Collector to Emitter Breakdown Voltage	-12			V	$I_C = 10 \text{ }\mu\text{A}$ $I_E = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	-4.0			V	$I_E = 100 \text{ }\mu\text{A}$ $I_C = 0$
$V_{CEO}(\text{sust})$	Collector to Emitter Sustaining Voltage (Notes 4 and 5)	-12			V	$I_C = 10 \text{ mA}$ $I_B = 0$ (pulsed)
h_{fe}	High Frequency Current Gain ($f = 100 \text{ Mc/s}$)	4.0	7.0			$I_C = 30 \text{ mA}$ $V_{CE} = -10 \text{ V}$
C_{ob}	Output Capacitance		3.3	6.0	pF	$I_E = 0$ $V_{CB} = -5.0 \text{ V}$
C_{TE}	Emitter Transition Capacitance		3.8	6.0	pF	$I_C = 0$ $V_{EB} = -0.5 \text{ V}$
t_{on}	Turn On Time (Note 6)		25	60	nsec	$I_C = 30 \text{ mA}$ $I_{B1} = 1.5 \text{ mA}$
t_{off}	Turn Off Time (Note 6)		35	90	nsec	$I_C = 30 \text{ mA}$, $I_{B1} = 1.5 \text{ mA}$, $I_{B2} = -1.5 \text{ mA}$

TYPICAL ELECTRICAL CHARACTERISTICS

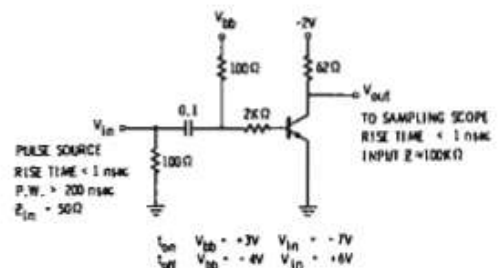


*Single family characteristics on Transistor Curve Tracer.

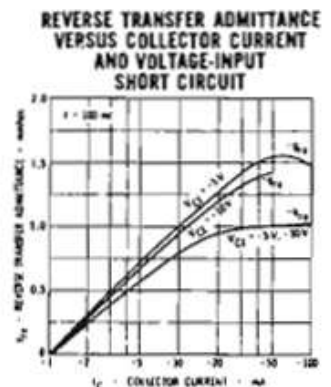
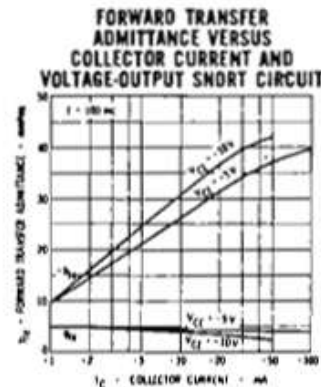
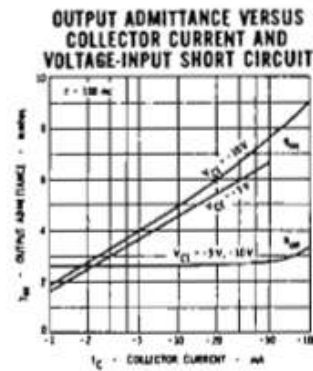
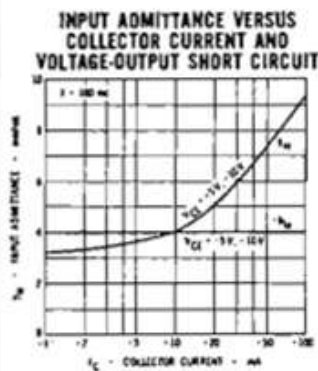
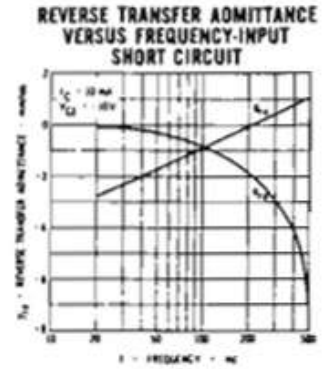
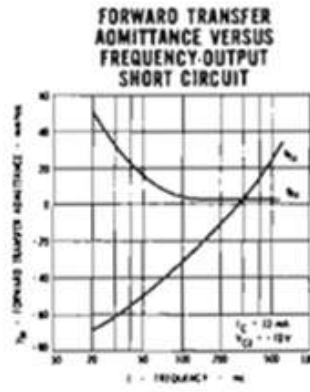
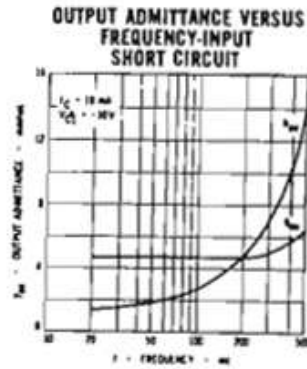
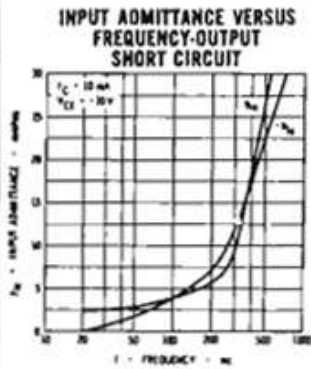
TYPICAL ELECTRICAL CHARACTERISTICS



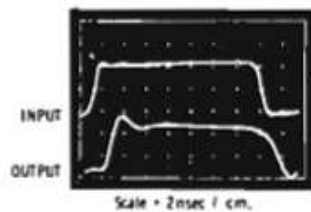
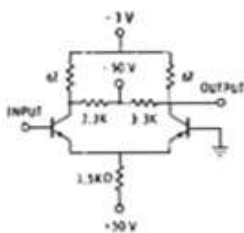
SWITCHING TIME TEST CIRCUIT



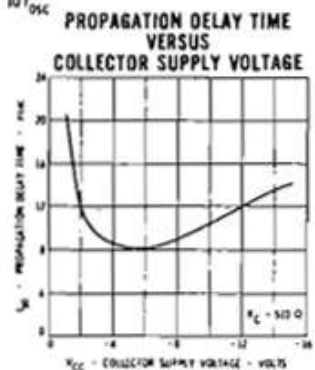
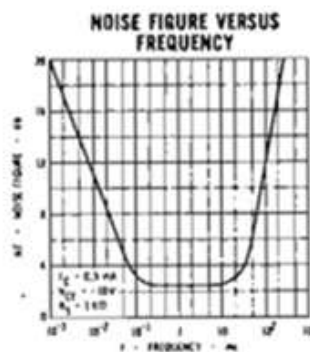
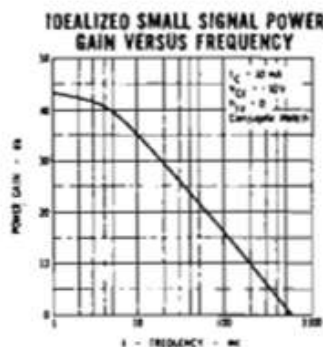
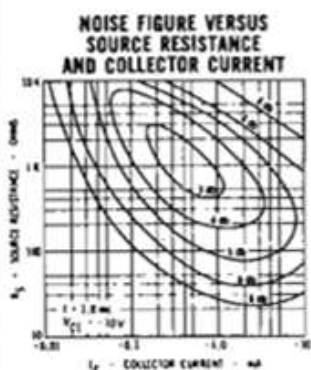
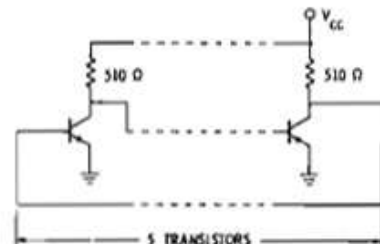
TYPICAL ELECTRICAL CHARACTERISTICS



NON SATURATED SWITCHING PERFORMANCE



FIVE STAGE RING OSCILLATOR FOR MEASUREMENT OF PROPAGATION DELAY



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 146°C/watt (derating factor of 6.85 mW/°C). Junction-to-ambient thermal resistance of 486°C/watt (derating factor of 2.06 mW/°C).
- (4) Rating refers to a high-current point where collector-to-emitter voltage is lowest. For more information send for SGS Publication AR 5.
- (5) Pulse Conditions: length = 300 μ sec; duty cycle = 1%.
- (6) See switching circuits for exact values of I_c , I_{B1} , and I_{B2} .