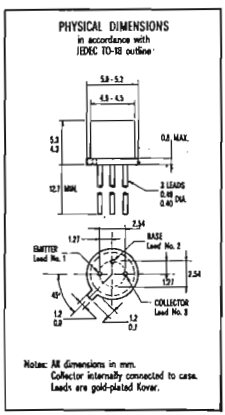
BSX28

HIGH-SPEED SATURATED SWITCH

NPN DIFFUSED SILICON PLANAR EPITAXIAL TRANSISTOR

GENERAL DESCRIPTION - The BSX28 is an NPN silicon PLANAR epitaxial transistor designed specifically for high-speed saturated switching applications in the 50-100 Mc/s range at current levels from 100 microamperes to 100 milliamperes. It is suitable for most small-signal, RF, and digital type 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 100°C Case Temperature (Notes 2 and 3)	0.68 Watt
at 25°C Ambient Temperature (Notes 2 and 3)	0.36 Watt

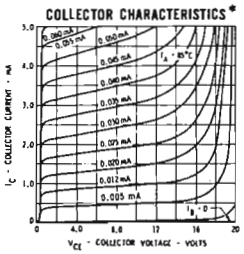
Maximum Voltages

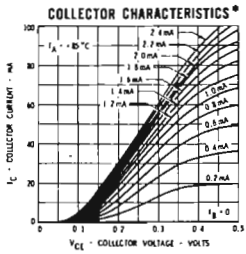
V_{CBO}	Collector to Base Voltage	30 Volts
V_{CES}	Collector to Emitter Voltage	30 Volts
V_{CEO}	Collector to Emitter Voltage (Note 4)	12 Volts
V_{EBO}	Emitter to Base Voltage	4.5 Volts

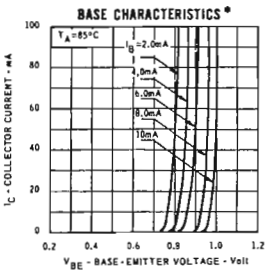
ELECTRICAL CHARACTERISTICS (25°C free air temperature unless otherwise noted)

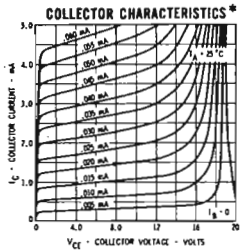
SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
h_{FE}	DC Pulse Current Gain (Note 5)	30	70	120		I_C = 10 mA V_{CE} = 0.35 V
h_{FE}	DC Pulse Current Gain (Note 5)	25	70			I_C = 30 mA V_{CE} = 0.4 V
h_{FE}	DC Pulse Current Gain (Note 5)	12	50			I_C = 100 mA V_{CE} = 1.0 V
V_{BE} (sat)	Base Saturation Voltage	0.72	0.8	0.87	V	I_C = 10 mA I_B = 1.0 mA
V_{BE} (sat)	Base Saturation Voltage		0.9	1.15	V	I_C = 30 mA I_B = 3.0 mA
V_{BE} (sat)	Base Saturation Voltage		1.1	1.6	V	I_C = 100 mA I_B = 10 mA
V_{CE} (sat)	Collector Saturation Voltage		0.15	0.2	V	I_C = 10 mA I_B = 1.0 mA
V_{CE} (sat)	Collector Saturation Voltage		0.18	0.25	V	I_C = 30 mA I_B = 3.0 mA
V_{CE} (sat)	Collector Saturation Voltage		0.3	0.5	V	I_C = 100 mA I_B = 10 mA
V_{CE} (sat) (85°C)	Collector Saturation Voltage		0.17	0.3	V	I_C = 10 mA I_B = 1.0 mA
I_{CES}	Collector Reverse Current		0.05	0.4	µA	V_{CE} = 20 V V_{BE} = 0
I_{CES} (85°C)	Collector Reverse Current		1.0	10	µA	V_{CE} = 20 V V_{BE} = 0
BV_{CBO}	Collector to Base Breakdown Voltage	30			V	I_C = 10 µA I_E = 0
BV_{CES}	Collector to Emitter Breakdown Voltage	30			V	I_C = 10 µA V_{EB} = 0
BV_{EBO}	Emitter to Base Breakdown Voltage	4.5			V	I_E = 100 µA I_C = 0
V_{CEO} (sust)	Collector to Emitter Sustaining Voltage (Note 5)	12			V	I_C = 10 mA (pulsed) I_B = 0
h_{fe}	High Frequency Current Gain (f = 100 Mc/s)	4.0	6.5			I_C = 20 mA V_{CE} = 10 V
C_{ob}	Output Capacitance		2.3	4.0	pF	I_E = 0 V_{CB} = 5.0 V
τ_s	Charge Storage Time Constant (Note 6)		6.5	13	nsec	$I_C = I_{B1}$ = 10 mA, I_{B2} = - 10 mA
t_{on}	Turn On Time (Note 6)		9.0	15	nsec	I_C = 30 mA I_{B1} = 3.0 mA
t_{off}	Turn Off Time (Note 6)		13	20	nsec	I_C = 30 mA, I_{B1} = 3.0 mA, I_{B2} = -3.0 mA

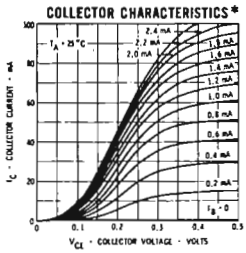
TYPICAL ELECTRICAL CHARACTERISTICS

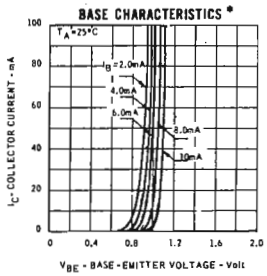


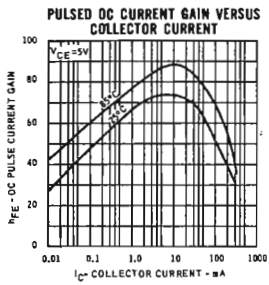


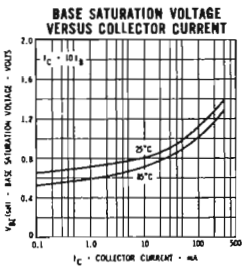


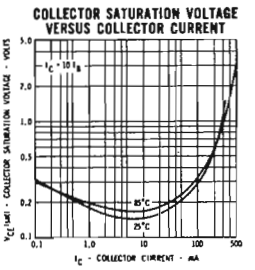








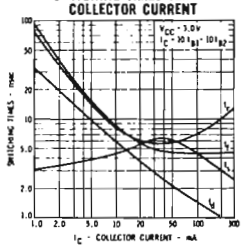




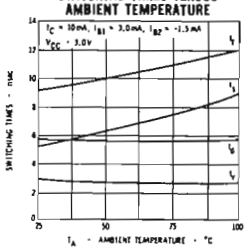
*Single family characteristics on Transistor Curve Tracer.

TYPICAL ELECTRICAL CHARACTERISTICS

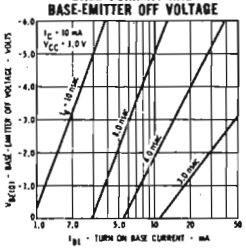
SWITCHING TIMES VERSUS COLLECTOR CURRENT



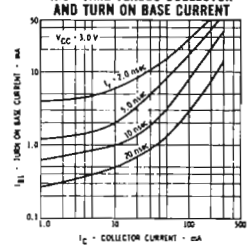
SWITCHING TIMES VERSUS AMBIENT TEMPERATURE



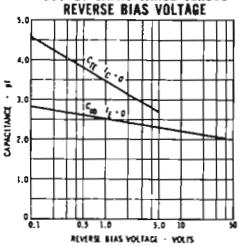
DELAY TIME VERSUS TURN ON BASE CURRENT AND BASE-EMITTER OFF VOLTAGE



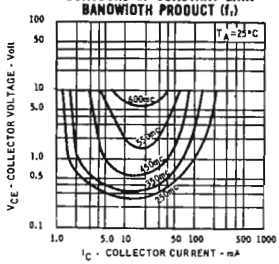
RISE TIME VERSUS COLLECTOR AND TURN ON BASE CURRENT



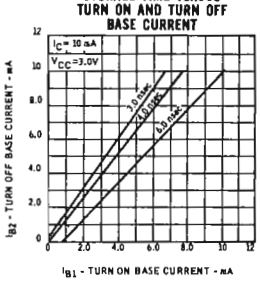
EMITTER TRANSITION AND OUTPUT CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



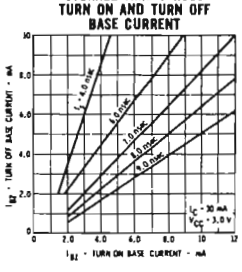
CONTOURS OF CONSTANT GAIN BANDWIDTH PRODUCT (f_t)



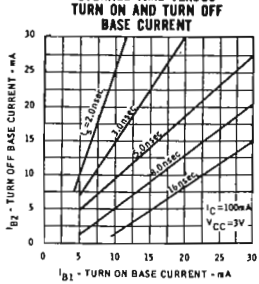
STORAGE TIME VERSUS TURN ON AND TURN OFF BASE CURRENT



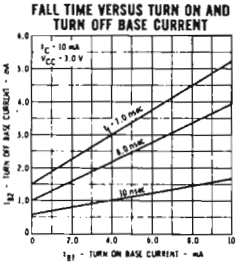
STORAGE TIME VERSUS TURN ON AND TURN OFF BASE CURRENT



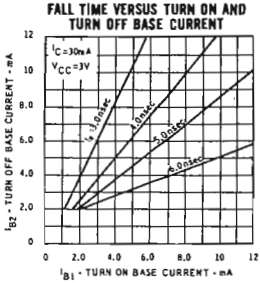
STORAGE TIME VERSUS TURN ON AND TURN OFF BASE CURRENT



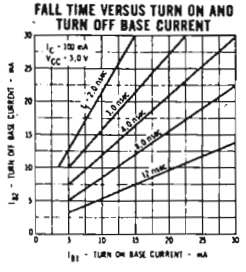
FALL TIME VERSUS TURN ON AND TURN OFF BASE CURRENT

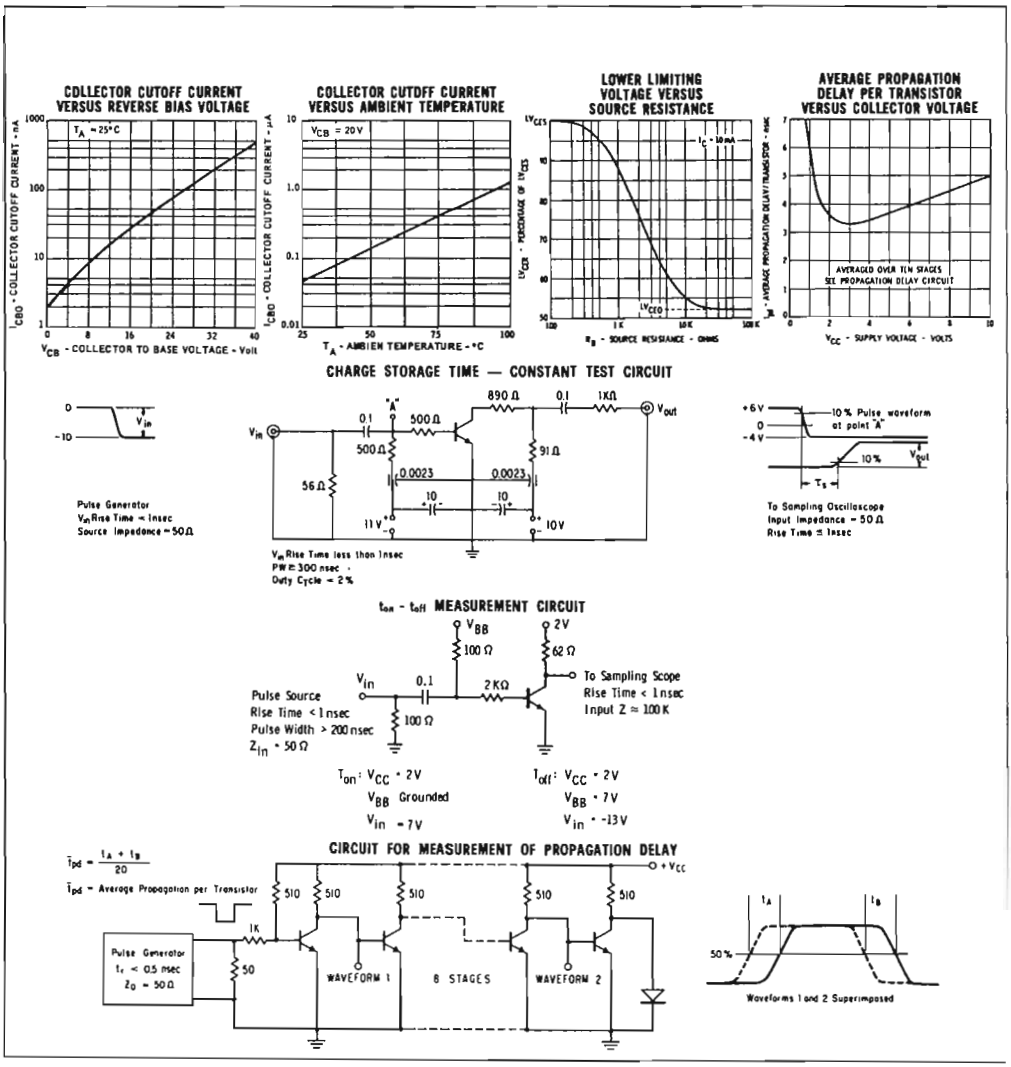


FALL TIME VERSUS TURN ON AND TURN OFF BASE CURRENT



FALL TIME VERSUS TURN ON AND TURN OFF BASE CURRENT





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 µsec; duty cycle = 1%.

(6) See switching circuits for exact values of I_C, I_{B1}, and I_{B2}.