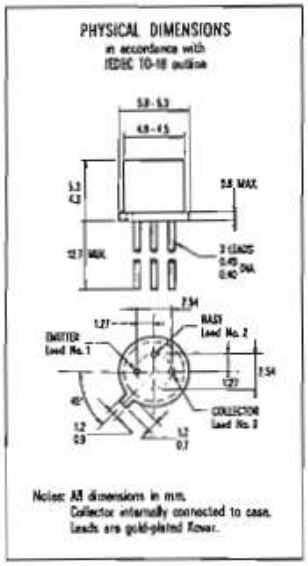
BSX 27

HIGH-SPEED SATURATED SWITCH

NPN DIFFUSED SILICON PLANAR EPITAXIAL TRANSISTOR

GENERAL DESCRIPTION - The BSX 27 is an NPN silicon PLANAR epitaxial transistor designed specifically for high-speed saturated switching applications in the 50-100 Mc/s range at power levels from 100 microwatts to 300 milliwatts. This device 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 Dissipation

Total Dissipation at 25°C Ambient Temperature (Notes 2 and 3)	0.3 Watt

Maximum Voltages

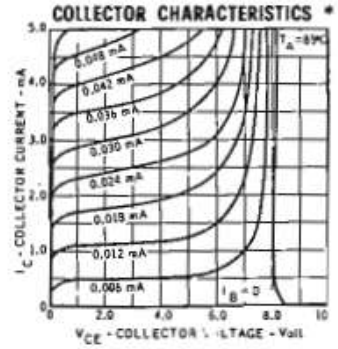
V_{CBO}	Collector to Base Voltage	15 Volts
V_{CES}	Collector to Emitter Voltage	11 Volts
V_{CEO}	Collector to Emitter Voltage (Note 4)	6.0 Volts
V_{EBO}	Emitter to Base Voltage	4.0 Volts

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

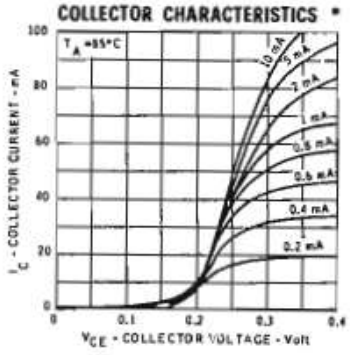
SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
h_{FE}	DC Current Gain	15				I_C = 1.0 mA V_{CE} = 0.4 V
h_{FE}	DC Pulse Current Gain (Note 5)	25	80	125		I_C = 10 mA V_{CE} = 0.4 V
h_{FE}	DC Pulse Current Gain (Note 5)	15	60			I_C = 30 mA V_{CE} = 0.4 V
V_{BE} (sat)	Base Saturation Voltage	0.68	0.74	0.85	V	I_C = 1.0 mA I_B = 0.1 mA
V_{BE} (sat)	Base Saturation Voltage	0.75	0.84	0.95	V	I_C = 10 mA I_B = 1.0 mA
V_{BE} (sat)	Base Saturation Voltage		0.93	1.3	V	I_C = 30 mA I_B = 3.0 mA
V_{CE} (sat)	Collector Saturation Voltage		0.18	0.25	V	I_C = 1.0 mA I_B = 0.1 mA
V_{CE} (sat)	Collector Saturation Voltage		0.19	0.25	V	I_C = 10 mA I_B = 1.0 mA
V_{CE} (sat)	Collector Saturation Voltage		0.23	0.38	V	I_C = 30 mA I_B = 3.0 mA
V_{CE} (sat) (85°C)	Collector Saturation Voltage		0.2	0.4	V	I_C = 10 mA I_B = 1.0 mA
I_{CES}	Collector Reverse Current		4.0	100	nA	V_{CE} = 5.0 V V_{EB} = 0
I_{CES}	Collector Reverse Current		0.013	10	µA	V_{CE} = 11 V V_{BE} = 0
I_{CES} (85°C)	Collector Reverse Current		0.2	5.0	µA	V_{CE} = 5.0 V V_{BE} = 0
BV_{CBO}	Collector to Base Breakdown Voltage	15			V	I_C = 10 µA I_E = 0
BV_{CES}	Collector to Emitter Breakdown Voltage	11			V	I_C = 10 µA V_{EB} = 0
BV_{EBO}	Emitter to Base Breakdown Voltage	4.0			V	I_E = 10 µA I_C = 0
V_{CEO} (sust)	Collector to Emitter Sustainig Voltage (Notes 4 and 5)	6.0			V	I_C = 10 mA (pulsed) I_B = 0
h_{fe}	High Frequency Current Gain (f = 100 Mc/s)	6.0	8.0			I_C = 10 mA V_{CE} = 4.0 V
C_{ob}	Output Capacitance		2.3	3.0	pF	I_E = 0 V_{CB} = 5.0 V
C_{TE}	Emitter Transition Capacitance		1.7	2.0	pF	I_C = 0 V_{EB} = 0.5 V
τ_s	Charge Storage Time Constant (Note 6)		3.0	6.0	nsec	$I_C = I_{B1} = 5.0$ mA, $I_{B2} = -5.0$ mA
t_{on}	Turn On Time (Note 6)			12	nsec	I_C = 10 mA I_{B1} = 2.0 mA
t_{off}	Turn Off Time (Note 6)			12	nsec	I_C = 10 mA, I_{B1} = 1.0 mA, I_{B2} = -1.0 mA

TYPICAL ELECTRICAL CHARACTERISTICS

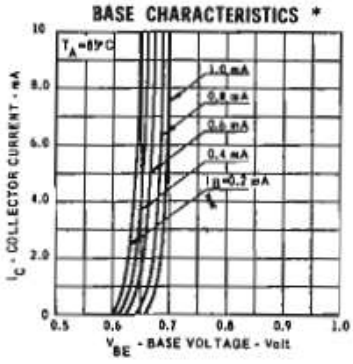
COLLECTOR CHARACTERISTICS *



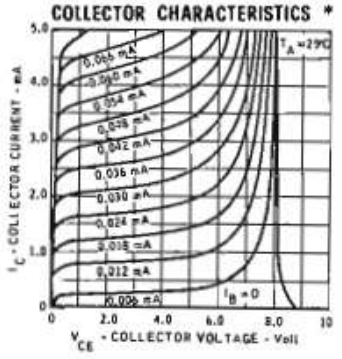
COLLECTOR CHARACTERISTICS *



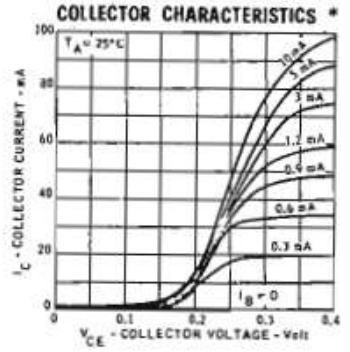
BASE CHARACTERISTICS *



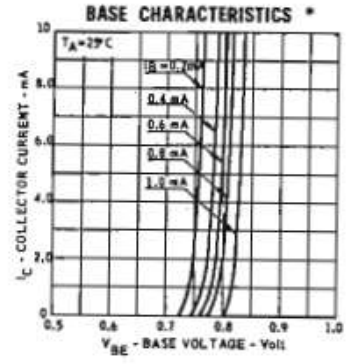
COLLECTOR CHARACTERISTICS *



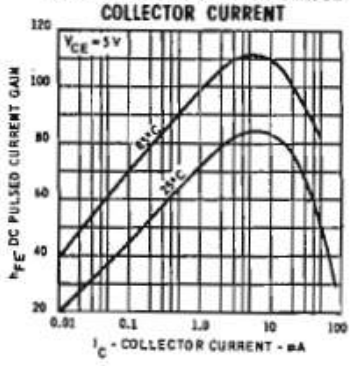
COLLECTOR CHARACTERISTICS *



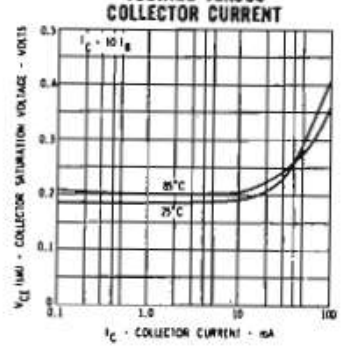
BASE CHARACTERISTICS *



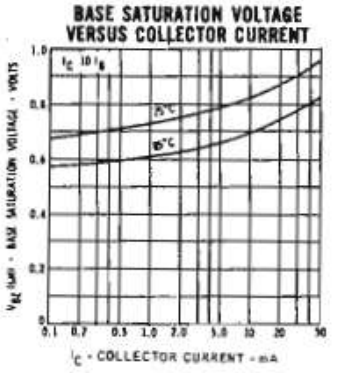
PULSED DC CURRENT GAIN VERSUS COLLECTOR CURRENT



COLLECTOR SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



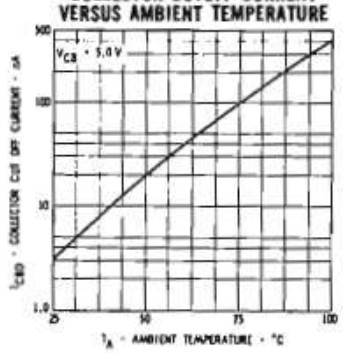
BASE SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



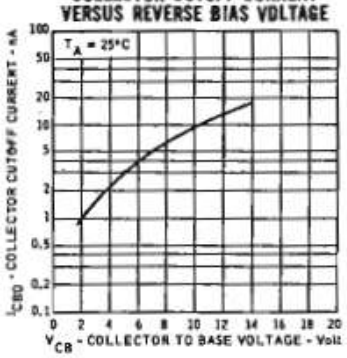
* Single family characteristics on Transistor Curve Tracer.

TYPICAL ELECTRICAL CHARACTERISTICS

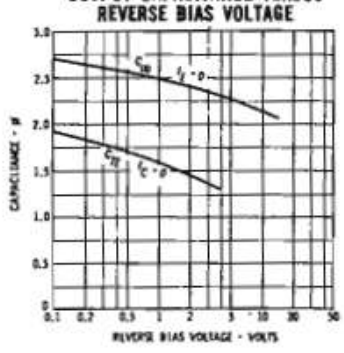
COLLECTOR CUTOFF CURRENT VERSUS AMBIENT TEMPERATURE



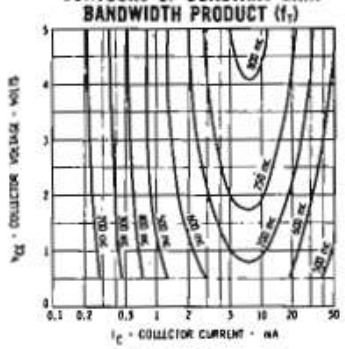
COLLECTOR CUTOFF CURRENT VERSUS REVERSE BIAS VOLTAGE



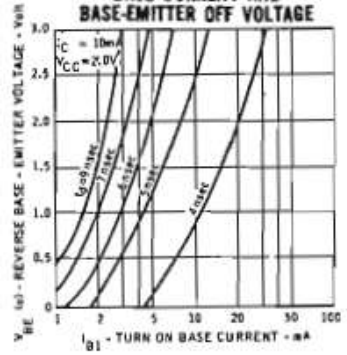
EMITTER TRANSISTION AND OUTPUT CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



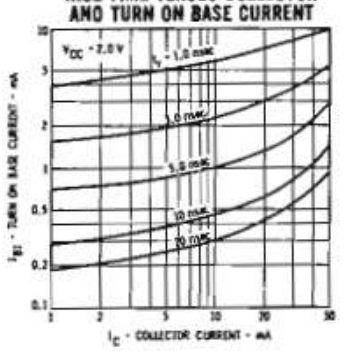
CONTOURS OF CONSTANT GAIN BANDWIDTH PRODUCT (f_T)



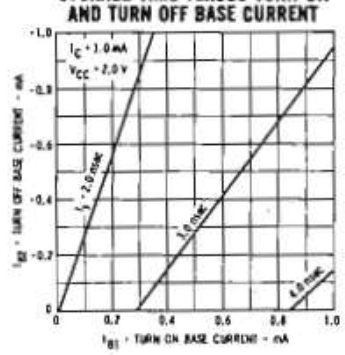
DELAY TIME VERSUS TURN ON BASE CURRENT AND BASE-EMITTER OFF VOLTAGE



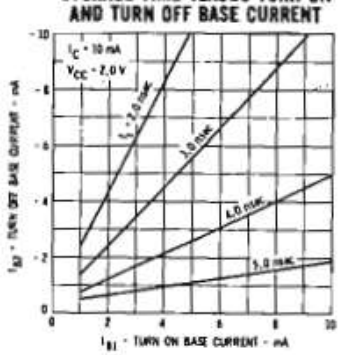
RISE TIME VERSUS COLLECTOR AND TURN ON BASE CURRENT



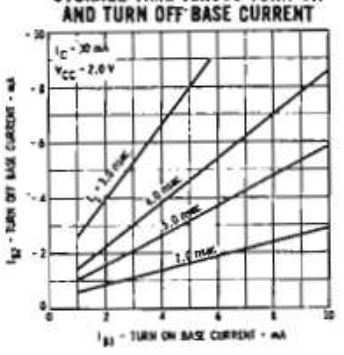
STORAGE TIME VERSUS TURN ON AND TURN OFF BASE CURRENT



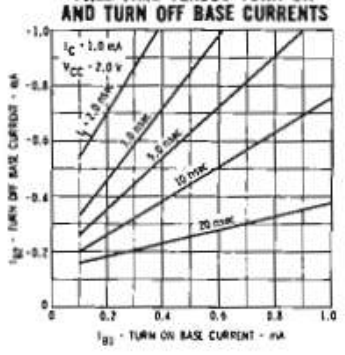
STORAGE TIME VERSUS TURN ON AND TURN OFF BASE CURRENT



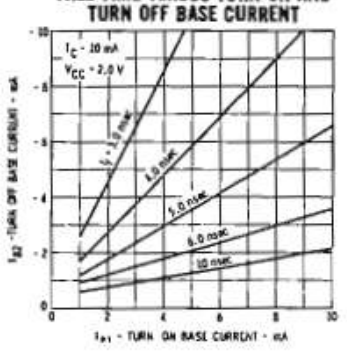
STORAGE TIME VERSUS TURN ON AND TURN OFF BASE CURRENT



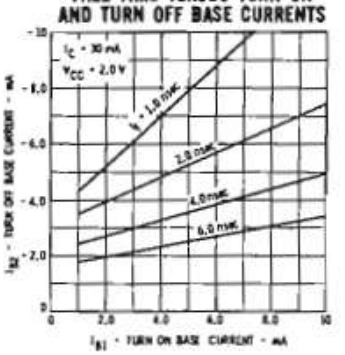
FALL TIME VERSUS TURN ON AND TURN OFF BASE CURRENTS



FALL TIME VERSUS TURN ON AND TURN OFF BASE CURRENT

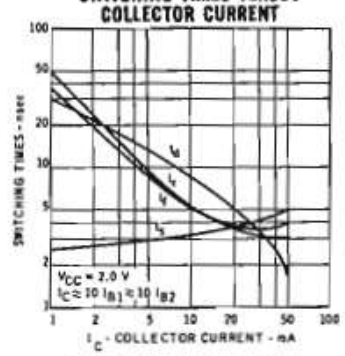


FALL TIME VERSUS TURN ON AND TURN OFF BASE CURRENTS

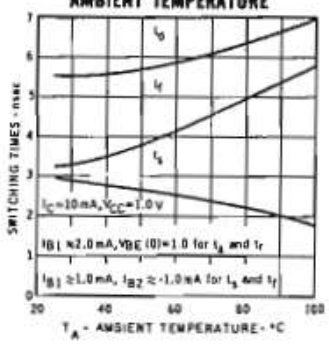


TYPICAL ELECTRICAL CHARACTERISTICS

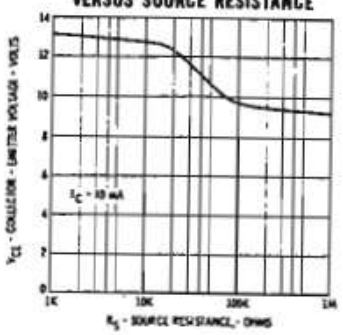
SWITCHING TIMES VERSUS COLLECTOR CURRENT



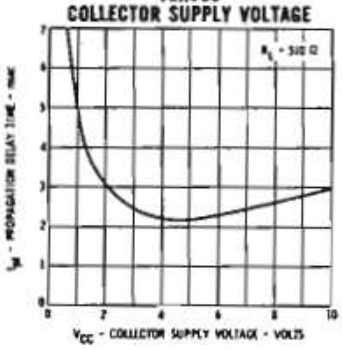
SWITCHING TIMES VERSUS AMBIENT TEMPERATURE



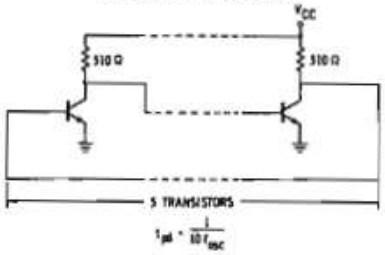
LOWER LIMITING VOLTAGE VERSUS SOURCE RESISTANCE



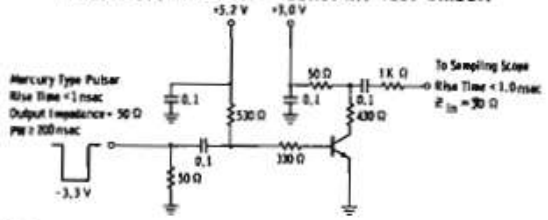
PROPAGATION DELAY TIME VERSUS COLLECTOR SUPPLY VOLTAGE



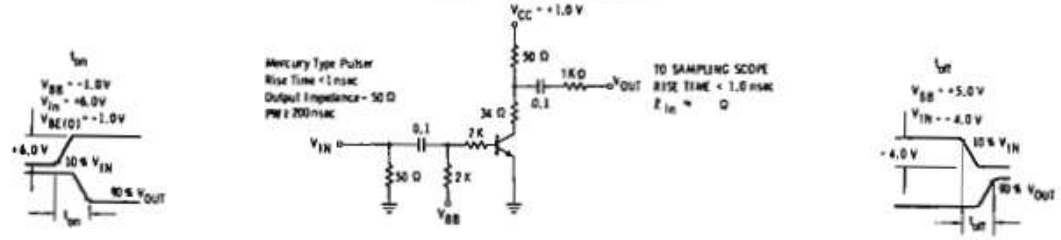
FIVE STAGE RING OSCILLATOR FOR MEASUREMENT OF PROPAGATION DELAY



CHARGE STORAGE TIME — CONSTANT TEST CIRCUIT



t_{on} AND t_{off} TEST CIRCUIT



NOTES:

(1) These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.

(2) This is a steady state limit. The factory should be consulted on applications involving pulsed or low duty cycle operations.

(3) This rating gives a maximum junction temperature of 200°C and junction-to-ambient thermal resistance of 583°C/watt (derating factor of 1.71 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}.