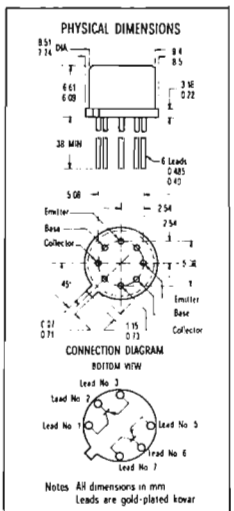
BFX 11

LOW-LEVEL, LOW-NOISE DIFFERENTIAL AMPLIFIER

PNP DIFFUSED SILICON PLANAR EPITAXIAL TRANSISTOR

GENERAL DESCRIPTION - The BFX11 is a six terminal device containing two isolated high gain, low noise PNP silicon PLANAR epitaxial transistors in one hermetically sealed enclosure. The - SGS-ATES Planar process guarantees the stability of the initial match with time and the good thermal tracking over a wide current and temperature range. The BFX11 offers the circuit designer matched transistors with specified performance, for differential amplifier and low level DC amplifier applications.



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

	One Side	Both Sides
Total Dissipation at 25°C Case Temperature (Notes 2 and 3)	0.85 Watt	1.4 Watt
at 100°C Case Temperature (Notes 2 and 3)	0.48 Watt	0.80 Watt
at 25°C Ambient Temperature (Notes 2 and 3)	0.40 Watt	0.50 Watt

Maximum Voltages

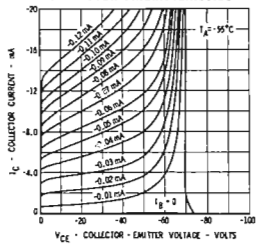
V_{CBO}	Collector to Base Voltage	-45 Volts
V_{CEO}	Collector to Emitter Voltage (Note 4)	-45 Volts
V_{EBO}	Emitter to Base Voltage	-4.5 Volts

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

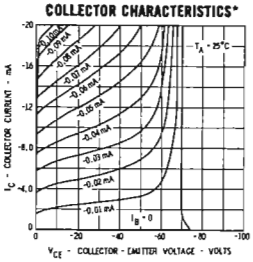
SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS	
h_{FE}	DC Current Gain	50	130			I_C = 10 μA	V_{CE} = - 5 V
h_{FE}	DC Current Gain	80	170			I_C = 100 μA	V_{CE} = - 5 V
h_{FE}	DC Current Gain	90	200			I_C = 1 mA	V_{CE} = - 5 V
h_{FE}	DC Pulse Current Gain (Note 5)	80	170			I_C = 50 mA	V_{CE} = - 5 V
h_{FE1}/h_{FE2}	DC Current Gain Ratio (Note 7)	0.8		1		I_C = 100 μA	V_{CE} = - 5 V
V_{BE} (sat)	Base-Emitter Saturation Voltage			- 1	V	I_C = 50 mA	I_B = 2.5 mA
ΔV_{BE}	Base to Emitter Voltage Differential			5	mV	I_C = 100 μA	V_{CE} = - 5 V
$\Delta V_{BE}/\Delta T$	Base to Emitter Voltage Differential Change			20	μV/°C	I_C = 100 μA T_A = - 55 ÷ + 125°C	V_{CE} = - 5 V
V_{CE} (sat)	Collector-Emitter Saturation Voltage		-0.1	-0.25	V	I_C = 50 mA	I_B = 2.5 mA
I_{EBO}	Emitter Cutoff Current			100	nA	I_C = 0	V_{EB} = - 3 V
I_{CBO}	Collector Cutoff Current		0.05	10	nA	I_E = 0	V_{CB} = - 30 V
I_{CBO} (150°C)	Collector Cutoff Current		0.08	10	μA	I_E = 0	V_{CB} = - 30 V
BV_{CBO}	Collector to Base Breakdown Voltage	-45			V	I_C = 10 μA	I_E = 0
BV_{EBO}	Emitter to Base Breakdown Voltage	-4.5			V	I_C = 0	I_E = 10 μA
V_{CEO} (sust)	Collector to Emitter Sustaining Voltage (Notes 4 and 5)	-45			V	I_C = 10 mA	I_B = 0
h_{fe}	High Frequency Current Gain (f = 100 Mc/s)	1.3				I_C = 50 mA	V_{CE} = - 20 V
C_{ob}	Output Capacitance			8	pF	I_E = 0	V_{CB} = - 10 V
C_{ib}	Input Capacitance			25	pF	I_C = 0	V_{EB} = - 0.5 V
NF	Narrow Band Noise Figure (Note 6)		1.5	5	dB	I_C = 30 μA	V_{CE} = - 5 V

TYPICAL ELECTRICAL CHARACTERISTICS

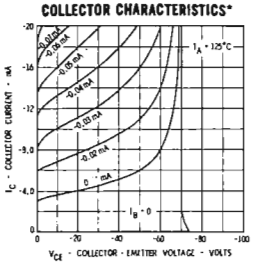
COLLECTOR CHARACTERISTICS*



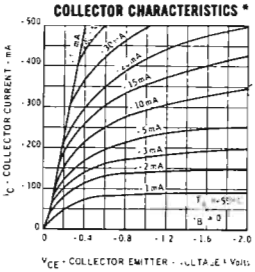
COLLECTOR CHARACTERISTICS*



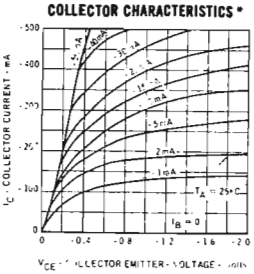
COLLECTOR CHARACTERISTICS*



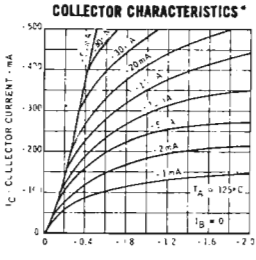
COLLECTOR CHARACTERISTICS *



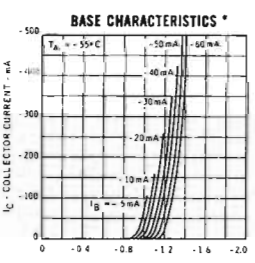
COLLECTOR CHARACTERISTICS *



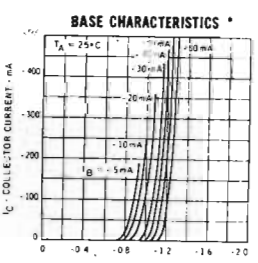
COLLECTOR CHARACTERISTICS*



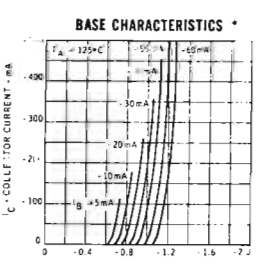
BASE CHARACTERISTICS *



BASE CHARACTERISTICS *



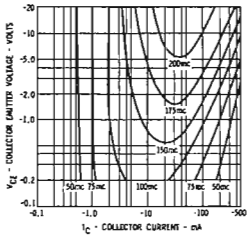
BASE CHARACTERISTICS *



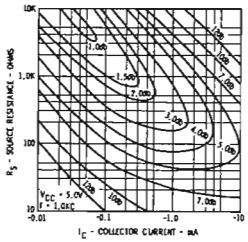
* Single family characteristics on Transistor Curve Tracer.

TYPICAL ELECTRICAL CHARACTERISTICS

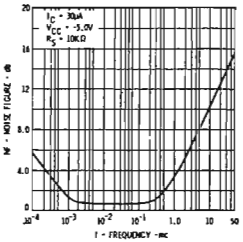
CONTOURS OF CONSTANT GAIN BANDWIDTH PRODUCT (f_T)



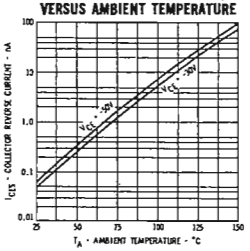
NOISE FIGURE VERSUS SOURCE RESISTANCE AND COLLECTOR CURRENT



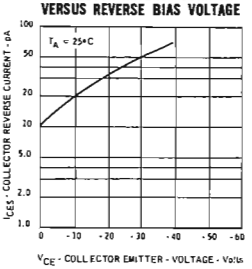
NOISE FIGURE VERSUS FREQUENCY



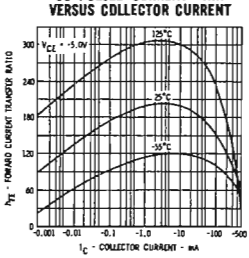
COLLECTOR REVERSE CURRENT VERSUS AMBIENT TEMPERATURE



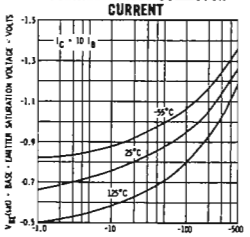
COLLECTOR REVERSE CURRENT VERSUS REVERSE BIAS VOLTAGE



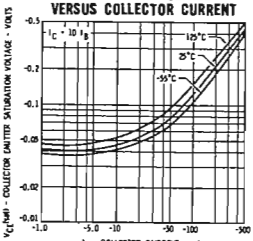
DC PULSED CURRENT GAIN VERSUS COLLECTOR CURRENT



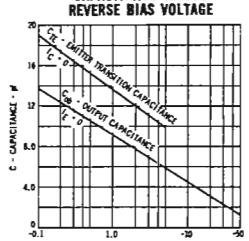
PULSED BASE SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



PULSED COLLECTOR SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



INPUT AND OUTPUT CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



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-ambient thermal resistance of 431°C/Watt (derating factor of 2.29 mW/°C) for one side; 350°C/Watt (derating factor of 2.86 mW/°C) for both sides. Junction-to-case thermal resistance of 206°C/Watt (derating factor of 4.85 mW/°C) for one side; 125°C/Watt (derating factor of 8 mW/°C) for both sides.

(4) Ratings refer to a high current point where collector-to-emitter voltage is lowest. For more information send for SGS-AR 5.

(5) Pulse Conditions: =300 µsec; duty cycle = 1%.

(6) f = 1 Kc/s; R_s = 10 KΩ. BW = 200 cps.

(7) Lowest of two h_{FE} readings is taken as h_{FE1} for purposes of this ratio.