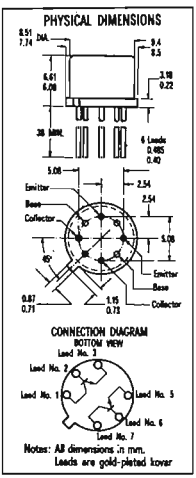
BFX 15

EXTREMELY LOW DRIFT DIFFERENTIAL AMPLIFIER

DUAL NPN SILICON PLANAR TRANSISTORS

GENERAL DESCRIPTION - The BFX 15 is an extremely low-drift differential amplifier especially suitable for low source impedance applications. In such circuits the differential V_{BE} temperature drift is guaranteed to be less than 2.5 μV/°C over a temperature range 0°C/ to 70°C.



ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

Storage Temperature	-65°C to + 200°C
Operating Junction Temperature	200°C Maximum
Lead Temperature (Soldering, No Time Limit)	300°C Maximum

Maximum Power Dissipations

	One Side Only	Both Sides
Total Dissipation at 25°C Case Temperature (Note 2)	1.2 Watt	1.8 Watt
at 100°C Case Temperature (Note 2)	0.68 Watt	1.2 Watt
at 25°C Ambient Temperature (Note 2)	0.5 Watt	0.6 Watt

Maximum Voltages

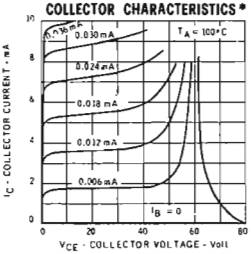
BV_{CBO}	Collector to Base Voltage	80 Volts
LV_{CER}	Collector to Emitter Voltage ($R_{BE} > 10\Omega$)	60 Volts
LV_{CEO}	Collector to Emitter Voltage	40 Volts
BV_{EBO}	Emitter to Base Voltage	5.0 Volts

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

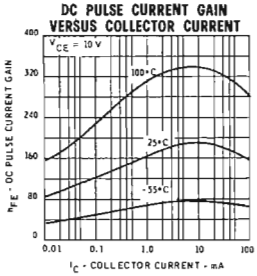
SYMBOL	CHARACTERISTIC	MIN.	MAX.	UNIT	TEST CONDITIONS
h_{FE}	DC Current Gain	30			I_C = 0.01 mA V_{CE} = 5.0 V
h_{FE}	DC Current Gain	60			I_C = 0.1 mA V_{CE} = 5.0 V
h_{FE}	DC Pulse Current Gain (Note 3)	90			I_C = 10 mA V_{CE} = 5.0 V
h_{FE}/h_{FE2}	DC Current Gain Ratio	0.9	1.0		I_C = 0.1 mA V_{CB} = 5.0 V
V_{BE} (sat)	Base Saturation Voltage		0.6	V	I_C = 1.0 mA I_B = 0.1 mA
(V_{BE1}/V_{BE2})	Base Voltage Differential		5.0	mV	I_C = 0.1 mA V_{CE} = 5.0 V
$\Delta V_{BE}/\Delta T$	Base Voltage Differential Change (Note 4)		2.5	μV/°C	$I_{C1} + I_{C2}$ = 200μA T=0°C to+70°C
$\Delta V_{BE}/\Delta T$	Base Voltage Differential Change (Note 5)		10	μV/°C	$I_{C1} = I_{C2}$ = 100 μA V_{CE} = 5.0 V
V_{CE} (sat)	Collector Saturation Voltage		1.0	V	I_C = 1.0 mA I_B = 0.1 mA
I_{CBO}	Collector Cutoff Current		10	nA	I_E = 0 V_{CB} = 40 V
I_{CBO} (150°C)	Collector Cutoff Current		10	μA	I_E = 0 V_{CB} = 40 V
I_{EBO}	Emitter Cutoff Current		10	nA	I_C = 0 V_{EB} = 4.0 V
BV_{CBO}	Collector to Base Breakdown Voltage	80		V	I_C = 0.1 mA I_E = 0
BV_{EBO}	Emitter Breakdown Voltage	5.0		V	I_C = 0 I_E = 0.1 mA
LV_{CER}	Collector to Emitter Sust. Voltage (Note 3)	60		V	I_C = 100 mA R_{BE} = 10 Ω
LV_{CEO}	Collector to Emitter Sust. Voltage (Note 3)	40		V	I_C = 30 mA I_B = 0
h_{fe}	Small Signal Current Gain (f = 1 Kc/s)	30			I_C = 1.0 mA V_{CE} = 5.0 V
h_{fe}	High Frequency Current Gain (f = 20 Mc/s)	2.5			I_C = 50 mA V_{CE} = 10 V
C_{ob}	Output Capacitance (f = 1 Kc/s)		15	pF	I_E = 0 V_{CB} = 10 V
C_{TE}	Input Capacitance (f = 1 Kc/s)		85	pF	I_C = 0 V_{EB} = 0.5 V

TYPICAL ELECTRICAL CHARACTERISTICS

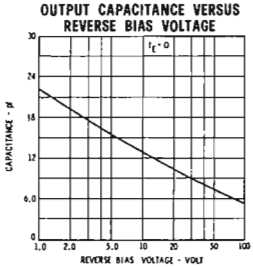
COLLECTOR CHARACTERISTICS *



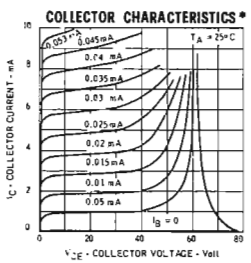
DC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT



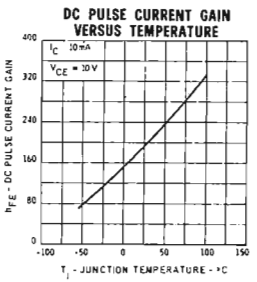
OUTPUT CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



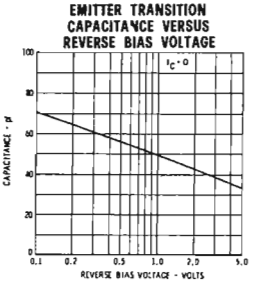
COLLECTOR CHARACTERISTICS *



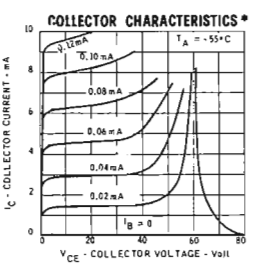
DC PULSE CURRENT GAIN VERSUS TEMPERATURE



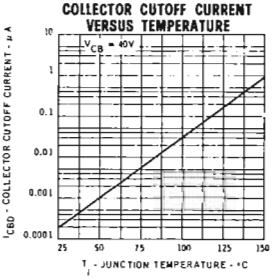
EMITTER TRANSITION CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



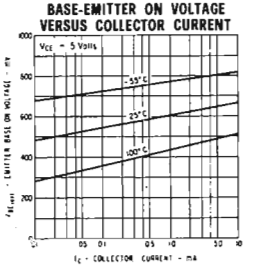
COLLECTOR CHARACTERISTICS *



COLLECTOR CUTOFF CURRENT VERSUS TEMPERATURE



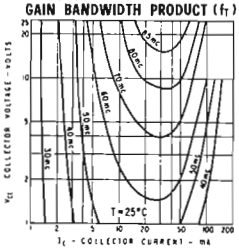
BASE-EMITTER ON VOLTAGE VERSUS COLLECTOR CURRENT



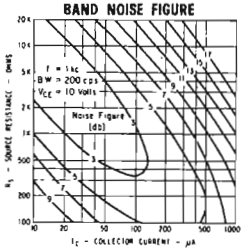
* Single family characteristics on Transistor Curve Tracer

TYPICAL ELECTRICAL CHARACTERISTICS

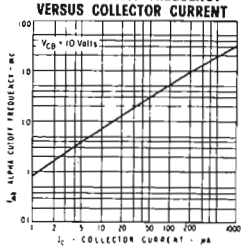
CONTOURS OF CONSTANT GAIN BANDWIDTH PRODUCT (f_T)



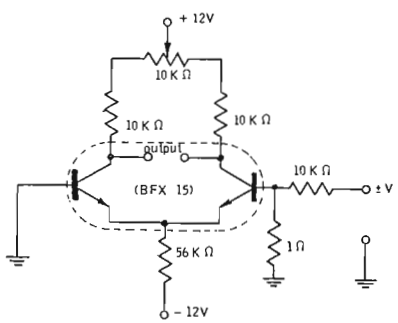
CONTOURS OF NARROW BAND NOISE FIGURE



ALPHA CUTOFF FREQUENCY VERSUS COLLECTOR CURRENT



TEST CIRCUIT



NOTES:

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

(2) These ratings give a maximum junction temperature of 200°C and junction-to-case thermal resistance of 146°C/watt for one side and 97°C/watt for both sides.

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

(4) See circuit for test conditions.
Care should be taken to avoid spurious effects due to thermoelectric contacts, component temperature differences, temperature coefficient, etc....

(5) T_A = - 55°C to + 25°C or + 25°C to + 125°C