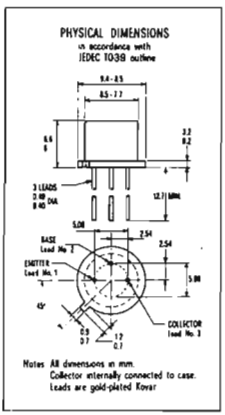
BFX17

CLASS C IF-VHF AMPLIFIER

NPN SILICON PLANAR EPITAXIAL TRANSISTOR

GENERAL DESCRIPTION - The BFX17 is a high-voltage, high-current transistor for applications requiring operating current up to 1A. Its high minimum f_T (250MHz) together with its high P_{out} and Power Gain (1.8W and 6.5dB at 150MHz) make it ideal for use as Class C IF-VHF power amplifier.

This device is covered by Semiconductor Users Reliability Evaluation (SURE) Programme.



ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

T_{STG}	Storage Temperature	- 55°C to 200°C
T_J	Operating Junction Temperature	200°C
T_L	Lead Temperature (Soldering, 10 sec time limit)	260°C

Maximum Power Dissipations (Notes 2 and 3)

P_D	Total Dissipation at 25°C Case Temperature	3.5 W
	at 25°C Ambient Temperature	0.8 W

Maximum Voltages and Current

V_{CBO}	Collector to Base Voltage	60 V
V_{CEO}	Collector to Emitter Valtage (Note 4)	40 V
V_{EBO}	Emitter to Base Voltage	6 V
I_C	Maximum Collector Current (Note 5)	1 A

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

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS	
h_{FE}	DC Current Gain (Note 5)	25	60			I_C = 10 mA	V_{CE} = 1 V
h_{FE}	DC Current Gain (Note 5)	35	80			I_C = 100 mA	V_{CE} = 1 V
h_{FE}	DC Current Gain (Note 5)	20	50			I_C = 500 mA	V_{CE} = 1 V
h_{FE}	DC Current Gain (Note 5)		60			I_C = 1000 mA	V_{CE} = 5 V
$V_{BE\ sat}$	Base Saturation Voltage (Note 5)		0.64		V	I_C = 10 mA	I_B = 1 mA
$V_{BE\ sat}$	Base Saturation Voltage (Note 5)		0.8	0.9	V	I_C = 100 mA	I_B = 10 mA
$V_{BE\ sat}$	Base Saturation Voltage (Note 5)		0.89		V	I_C = 300 mA	I_B = 30 mA
$V_{BE\ sat}$	Base Saturation Voltage (Note 5)		0.95	1.3	V	I_C = 500 mA	I_B = 50 mA
$V_{BE\ sat}$	Base Saturation Voltage (Note 5)		1.05		V	I_C = 800 mA	I_B = 80 mA
$V_{BE\ sat}$	Base Saturation Voltage (Note 5)		1.1		V	I_C = 1000 mA	I_B = 100 mA
$V_{CE\ sat}$	Collector Saturation Voltage (Note 5)		0.17		V	I_C = 10 mA	I_B = 1 mA
$V_{CE\ sat}$	Collector Saturation Voltage (Note 5)		0.17	0.25	V	I_C = 100 mA	I_B = 10 mA
$V_{CE\ sat}$	Collector Soturation Voltage (Note 5)		0.27		V	I_C = 300 mA	I_B = 30 mA
$V_{CE\ sat}$	Collector Saturation Voltage (Note 5)		0.37	0.5	V	I_C = 500 mA	I_B = 50 mA
$V_{CE\ sat}$	Collector Saturotion Voltage (Note 5)		0.5		V	I_C = 800 mA	I_B = 80 mA
$V_{CE\ sat}$	Collector Saturotion Voltage (Note 5)		0.6	1	V	I_C = 1000 mA	I_B = 100 mA

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

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
I_{CBO}	Collector Reverse Current		0.25	2	μA	$I_E = 0$ $V_{CB} = 40$ V
I_{CBO} (100°C)	Collector Reverse Current		25	120	μA	$I_E = 0$ $V_{CB} = 40$ V
BV_{CBO}	Collector to Base Breakdown Voltage	60			V	$I_C = 10$ μA $I_E = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	6			V	$I_C = 0$ $I_E = 10$ μA
LV_{CEO}	Collector to Emitter Sustaining Voltage (Notes 4 and 5)	40			V	$I_C = 10$ mA $I_B = 0$
h_{fe}	High Frequency Current Gain	2.5	4			$I_C = 50$ mA $V_{CE} = 10$ V f = 100 MHz
C_{obo}	Common-Base Output Capacitance, Input Open		6	12	pF	$I_E = 0$ $V_{CB} = 10$ V
C_{ibo}	Common-Base Input Capacitance, Output Open		40	55	pF	$I_C = 0$ $V_{BE} = 0.5$ V
G	Class C Power Gain	8		11	dB	
P_o	Class C Power Out	1.3		2.5	W	f = 60 MHz see test circuit
η	Class C Collector Efficiency	60			%	
G	Class C Power Gain		6.5		dB	
P_o	Class C Power Out	1		1.8	W	f = 150 MHz see test circuit
η	Class C Collector Efficiency		50		%	

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.

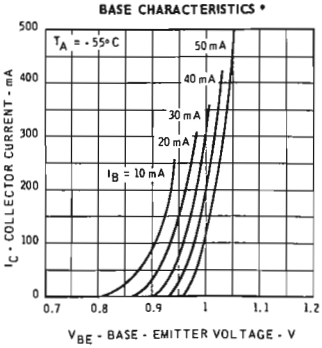
(3) These ratings give a maximum junction temperature of 200°C and junction-to-case thermal resistance of 50°C/W (derating factor of 20 mW/°C); junction-to-ambient thermal resistance of 219°C/W (derating factor of 4.56 mW/°C).

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

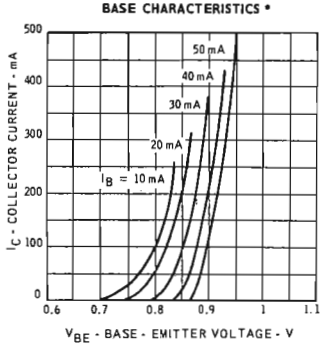
(5) Measured under pulse conditions: pulse length = 300 μsec; duty cycle = 1%.

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

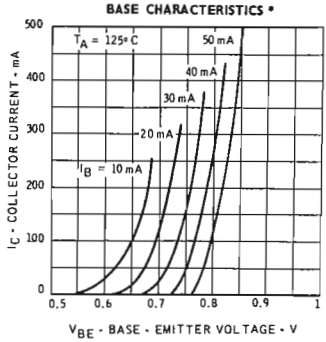
BASE CHARACTERISTICS *



BASE CHARACTERISTICS *



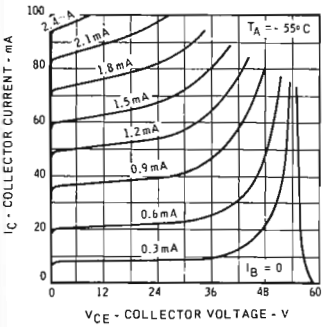
BASE CHARACTERISTICS *



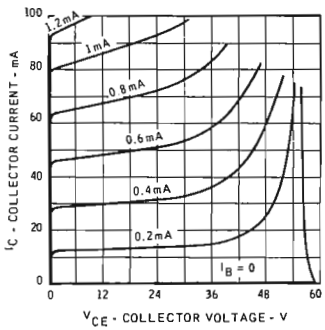
* Single family characteristics on Transistor Curve Tracer.

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

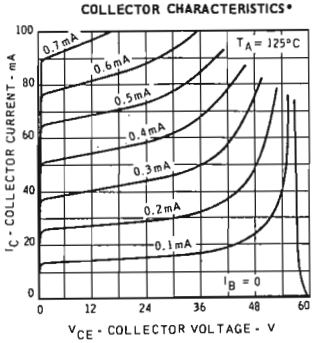
COLLECTOR CHARACTERISTICS *



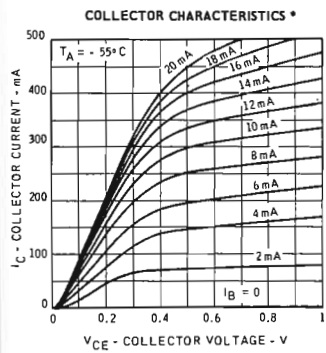
COLLECTOR CHARACTERISTICS *



COLLECTOR CHARACTERISTICS *



COLLECTOR CHARACTERISTICS *



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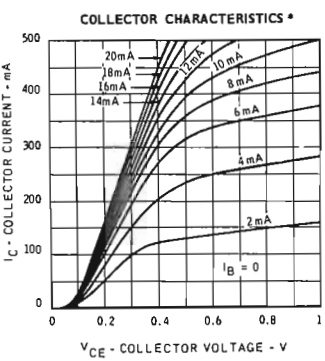

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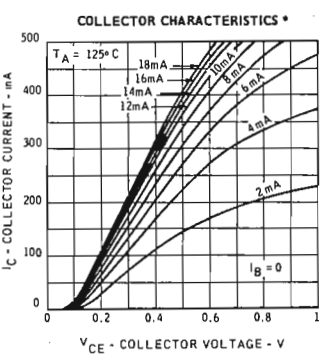
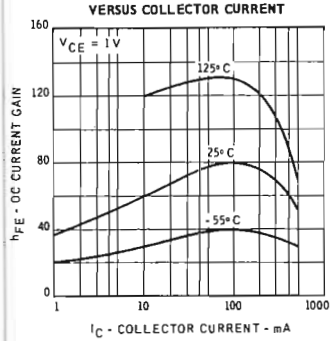
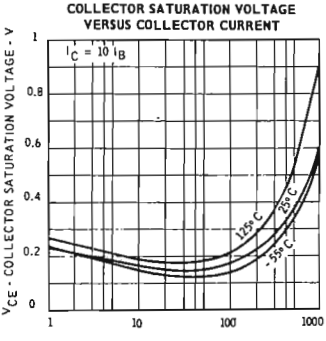


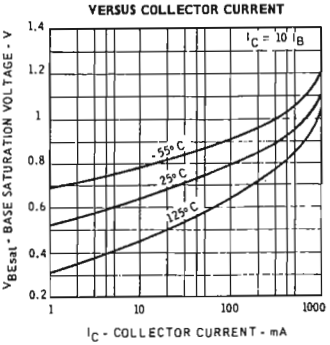
OC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT



COLLECTOR SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



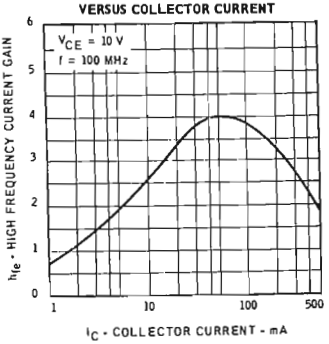
BASE SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



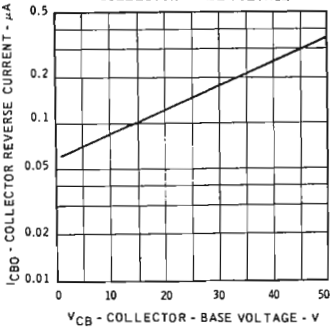
* Single family characteristics on Transistor Curve Tracer.

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

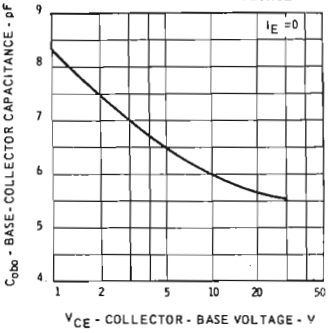
HIGH FREQUENCY CURRENT GAIN VERSUS COLLECTOR CURRENT



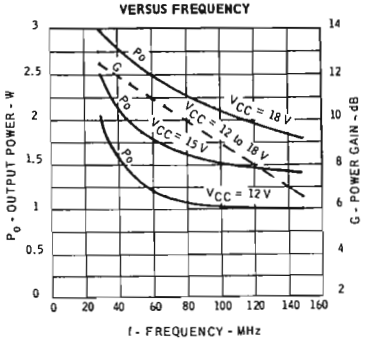
COLLECTOR REVERSE CURRENT VERSUS COLLECTOR - BASE VOLTAGE



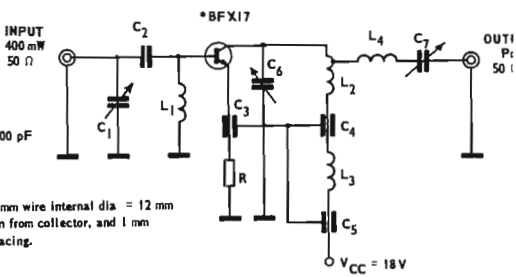
BASE - COLLECTOR CAPACITANCE VERSUS VOLTAGE



OUTPUT POWER AND POWER GAIN VERSUS FREQUENCY

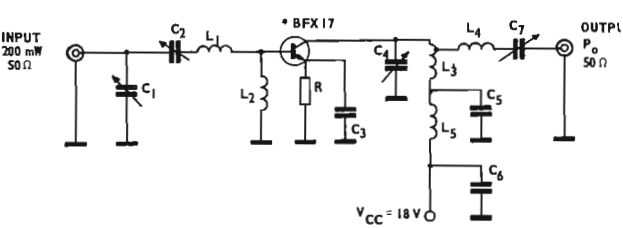


150 MHz CLASS C AMPLIFIER TEST CIRCUIT



C_1 = 10 ÷ 45 pF
C_2 = 150 pF
C_3; C_4; C_5 = 1000 pF
C_6 = 2 ÷ 8 pF
C_7 = 4 ÷ 20 pF
L_1 = 1.8 μH
L_2 = 2t coil, 1.5 mm wire internal dia = 12 mm tapped 1 turn from collector, and 1 mm interturn spacing.
L_3 = 1.8 μH
L_4 = 0.15 μH
R = 2Ω
* = Heat sink is required

60 MHz CLASS C AMPLIFIER TEST CIRCUIT



C_1 = 10 ÷ 45 pF
C_2; C_4; C_7 ∃ 6 ÷ 30 pF
C_3; C_5; C_6 = 5nF
L_1; L_4 = 0.68 μH
L_2 = 3.9 μH
L_3 = 4t coil; 1.5 mm wire internal dia = 12 mm. tapped 1 turn from collector, and 1 mm. interturn spacing.
L_5 = 5.6 μH
R = 5Ω
* = Heat sink is required