PNP diffused silicon planar transistor

BFR 99

Wide band VHF-UHF amplifier

The BFR 99 is a PNP silicon planar epitaxial transistor particularly designed for wide band linear amplifier applications up to 1GHz. It features: very high fT (2.3GHz typ).

- very low feedback capacitance
- very good cross modulation properties
- very low noise

ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted)

Symbol	Characteristic and test conditions	Min.	Typ.	Max.	Unit
h_{FE}	DC Current Gain (5)				
	I_C = 1 mA V_{CE} = -10V		75		
	I_C = 10mA V_{CE} = -10V	25	80		
	I_C = 20mA V_{CE} = -10V	20			
V_{BEon}	Base-Emitter On Voltage				
	I_C = 10mA V_{CE} = -10V		0.75		V
I_{CBO}	Collector Reverse Current				
	V_{CB} = -15V I_E = 0			50	nA
BV_{CBO}	Collector to Base Breakdown Voltage				
	I_C = 100 µA I_E = 0	-30			V
BV_{EBO}	Emitter to Base Breakdown Voltage				
	I_E = 10 µA I_C = 0	-3			V
LV_{CEO}	Collector to Emitter Sustaining Voltage (4 and 5)				
	I_C = 5 mA I_B = 0	-25			V
C_{obo}	Base-Collector Capacitance				
	I_E = 0 V_{CB} = -15V f = 1 MHz		1.1		pF
C_{re}	Reverse Transfer Capacitance				
	I_C = 0 V_{CE} = -15V f = 1 MHz		0.4		pF
G	Power Gain				
	I_C = 10 mA V_{CE} = -15V 800 MHz		10		dB
P_o	Power Output				
	I_C = 10 mA V_{CE} = -15V f = 800MHz		14		mW
V_{CEK}	Knee Voltage				
	I_C = 20 mA I_B value for which I_C = 22 mA at V_{CE} = -1V		0.8		V
f_T	Gain Bandwidth Product				
	I_C = 10 mA V_{CE} = -15V	1.4	2.3		GHz
f_{max}	Maximum Oscillation Frequency				
	I_C = 10 mA V_{CE} = -15V		6.5		GHz
NF	Noise Figure (R_S = 50Ω)				
	I_C = 3 mA V_{CE} = -15V f = 200MHz		2.5		dB
	I_C = 3 mA V_{CE} = -15V f = 800MHz		3.5		dB
	I_C = 10 mA V_{CE} = -15V f = 200MHz		3		dB
	I_C = 10 mA V_{CE} = -15V f = 800MHz		4	6	dB
PG	Wide-Band Power Gain (see fig. 1)				
	f=40÷860 MHz $R_S = R_l$ = 75Ω		16		dB
$\lvert S_{21e}\rvert^2$	Trasducer Gain ($R_S = R_l$ = 50Ω)				
	I_C = 10 mA V_{CE} = -15V f = 800MHz		8		dB

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 485°C/W, junction-to-ambient thermal resistance of 775°C/W.
4) These 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%.

ABSOLUTE MAXIMUM RATINGS (1)

(T_A = 25°C unless otherwise noted)

Voltages and Currents

Collector to Base	V_{CBO}	-30V
Collector to Emitter (4)	V_{CEO}	-25V
Emitter to Base	V_{EBO}	-3V
DC Collector Current	I_C	50mA

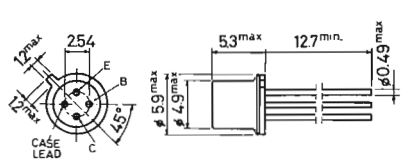
Temperatures

Storage Temperature Range	T_{STG}	-55°C to + 200°C
Operating Junction Temperature	T_J	200°C

Power (2 and 3)

Dissipation at 25°C Case Temperature	P_D	360mW
Dissipation at 25°C Ambient Temperature	P_D	225mW

PHYSICAL DIMENSIONS
in accordance with
JEDEC TO-72 outline



Note : all dimensions in mm.

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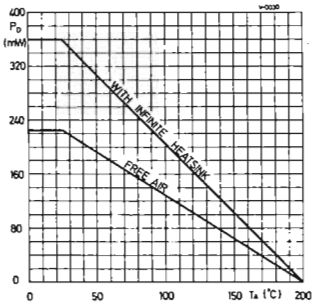
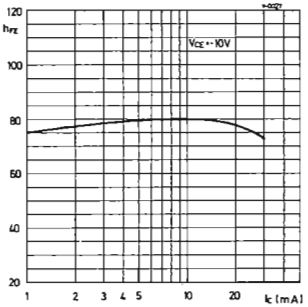
TYPICAL ELECTRICAL CHARACTERISTICS (25°C free air temperature unless otherwise noted)

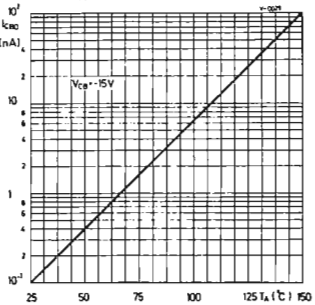
DERATING FACTOR



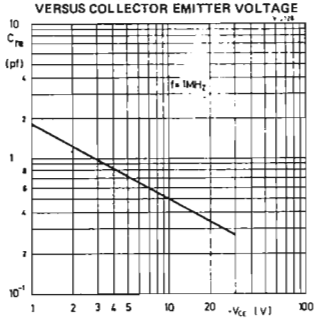
DC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT



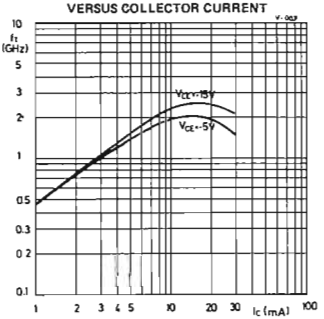
COLLECTOR CUTOFF CURRENT VERSUS AMBIENT TEMPERATURE



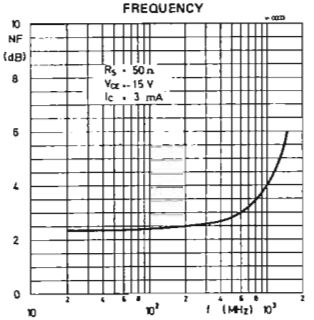
REVERSE TRANSFER CAPACITANCE VERSUS COLLECTOR EMITTER VOLTAGE



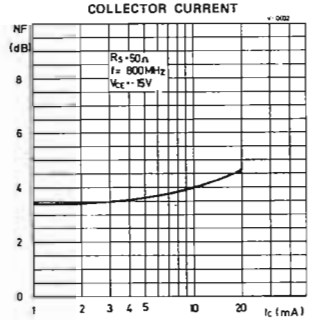
GAIN BANDWIDTH PRODUCT VERSUS COLLECTOR CURRENT



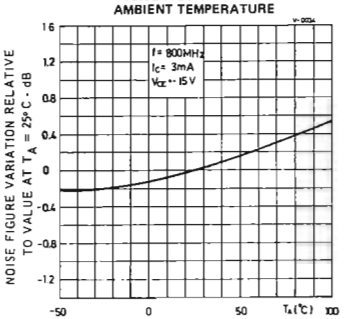
NOISE FIGURE VERSUS FREQUENCY



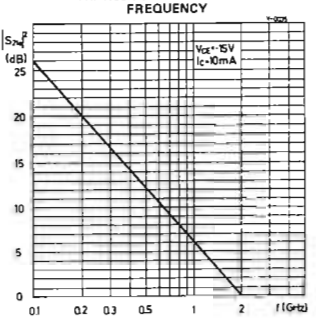
NOISE FIGURE VERSUS COLLECTOR CURRENT



NOISE FIGURE VERSUS AMBIENT TEMPERATURE

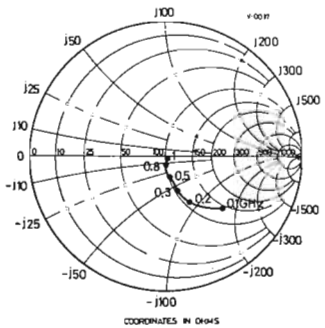


TRANSDUCER GAIN VERSUS FREQUENCY

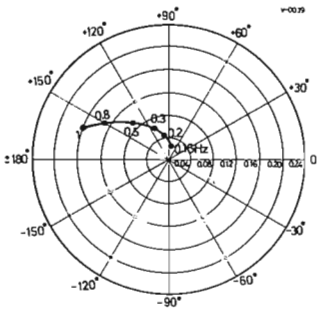


TYPICAL COMMON EMITTER S - PARAMETERS
(V_{CE} = -15V; I_C = 10mA; T_A = 25°C)

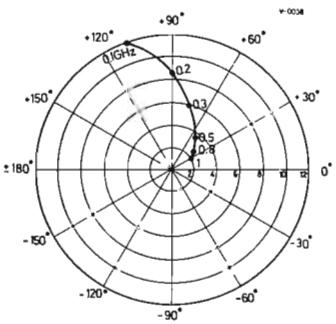
INPUT IMPEDANCE S_{11E}



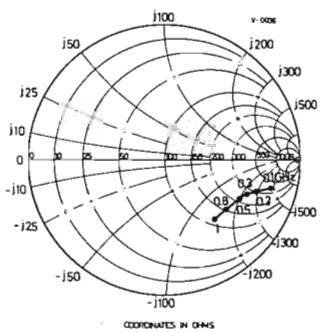
REVERSE TRANSFER COEFFICIENT S_{12E}



FORWARD TRANSFER COEFFICIENT S_{21E}

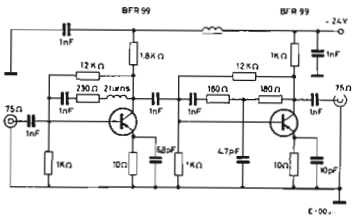


OUTPUT IMPEDANCE S_{22E}



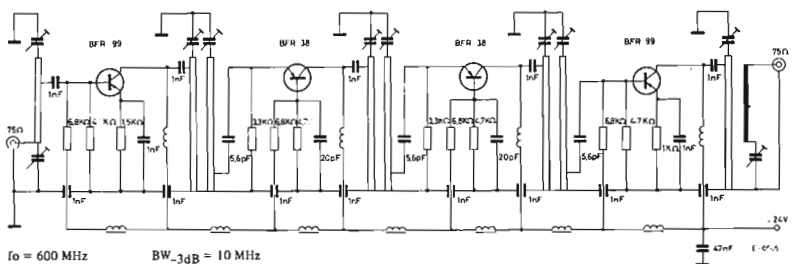
TYPICAL APPLICATIONS :

FIG. 1 - WIDE BAND MATV AMPLIFIER



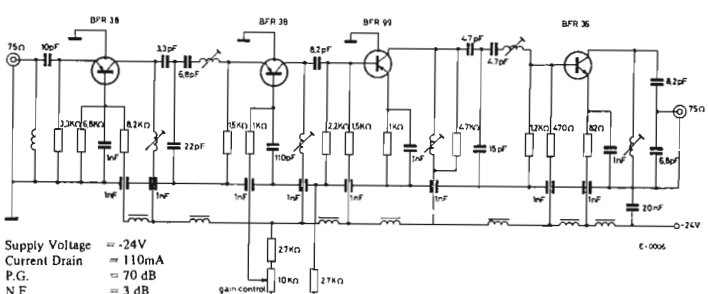
BW = 40 ÷ 860 MHz
G_T = 16 dB
NF < 5 dB
V.S.W.R.$_{IN}$ < 2
V.S.W.R.$_{OUT}$ < 2
V_{OUT} = 100 mV for 1% Crossmodulation

FIG. 2 - MATV CHANNEL AMPLIFIER



fo = 600 MHz
G_T = 40 dB
V.S.W.R.$_{IN}$ < 1,5
V.S.W.R.$_{OUT}$ < 1,5
BW_3dB = 10 MHz
N.F. = 4 dB
P_{OUT} = 15 mW @ dim = -30 dB

FIG. 3 - 200 MHz MATV CHANNEL AMPLIFIER



Supply Voltage = -24V
Current Drain = 110mA
P.G. = 70 dB
N.F. = 3 dB
V.S.W.R.$_{IN}$ < 1,5
V.S.W.R.$_{OUT}$ < 2
P_{OUT} = 120 mW at dim -30 dB
Gain Control > 30 dB