

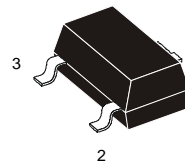
## The RF Line NPN Silicon High-Frequency Transistor

### DESCRIPTION

The BFR93A/BFR93AR is an NPN silicon epitaxial transistor designed for low noise amplifier at VHF, UHF and CATV band.

It has dynamic range and good current characteristic.

This small-signal transistor in 3-Pin surface-mountable plastic package SOT23 offers superior quality and performance at low cost.



BFR93A	BFR93AR
1 – Collector	1 – Collector
2 – Emitter	2 – Base
3 – Base	3 – Emitter

### FEATURES

- High Gain-Bandwidth Products  
 $f_T=6$  GHz (Typ) @ 30 mA
- Low Noise Figure  
 $N_F=1.6$  dB (Typ) @ 800 MHz
- High Gain  
 $G_{P_0}=14.0$  dB (Typ) @ 800 MHz

	SOT23
JEDEC	TO-236
EIAJ	SC-59
GOST	É0-46
Weight:	0.01g

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$ °C)

Rating	Symbol	Value	Unit
Collector – Emitter Voltage	$V_{CEO}$	12	V
Collector – Base Voltage	$V_{CBO}$	20	V
Emitter – Base Voltage	$V_{EBO}$	2	V
Collector Current	$I_C$	50	mA
Power Dissipation	$P_{tot}$	200	mW
Junction Temperature	$T_{JMAX}$	150	°C
Operating Junction Temperature Range	$T_J$	-45 to +70	°C
Storage Temperature Range	$T_{STG}$	-65 to +150	°C

### THERMAL CHARACTERISTIC

Thermal Resistance, Junction to Case	$R_{\theta JC}$	450	°C/W
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### ORDERING INFORMATION

Device	Marking	Package	Quantity	Packing Style
BFR93A-T1	R2	SOT-23	3 Kpcs / Reel	Embossed tape 8-mm wide 7" dia. Pin 1 (Collector) face to perforation side of the tape.
BFR93A-T3	R2	SOT-23	10 Kpcs / Reel	Embossed tape 8-mm wide 13" dia. Pin 1 (Collector) face to perforation side of the tape.
BFR93AR-T1	R5	SOT-23	3 Kpcs / Reel	Embossed tape 8-mm wide 7" dia. Pin 1 (Collector) face to perforation side of the tape.
BFR93AR-T3	R5	SOT-23	10 Kpcs / Reel	Embossed tape 8-mm wide 13" dia. Pin 1 (Collector) face to perforation side of the tape.

# BFR93A/BFR93AR

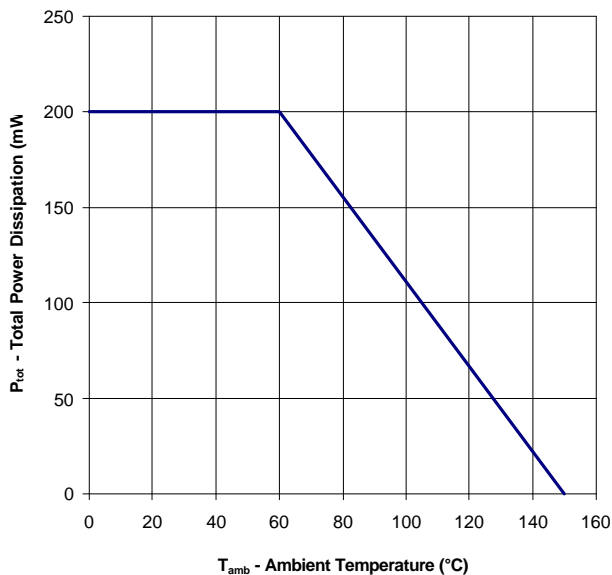
## ELECTRICAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>DC CHARACTERISTICS</b>					
Collector – Base Cutoff Current, $I_E = 0\text{mA}, V_{CB} = 10\text{V}$	$I_{CBO}$	–	–	<b>100</b>	nA
Emitter – Base Cutoff Current, $I_C = 0\text{mA}, V_{EB} = 2\text{V}$	$I_{EBO}$	–	–	<b>10.0</b>	$\mu\text{A}$
Collector – Emitter Breakdown Voltage, $I_C = 1\text{mA}, I_B = 0\text{mA}$	$V_{(BR)CEO}$	<b>12</b>	–	–	V
Collector – Emitter Saturation Voltage, $I_C = 50\text{mA}, I_B = 5\text{mA}$	$V_{CE(sat)}$	–	<b>100</b>	<b>400</b>	mV
DC Current Gain, $I_E = 30\text{mA}, V_{CB} = 5\text{V}$	$h_{FE}$	<b>40</b>	<b>90</b>	<b>150</b>	–

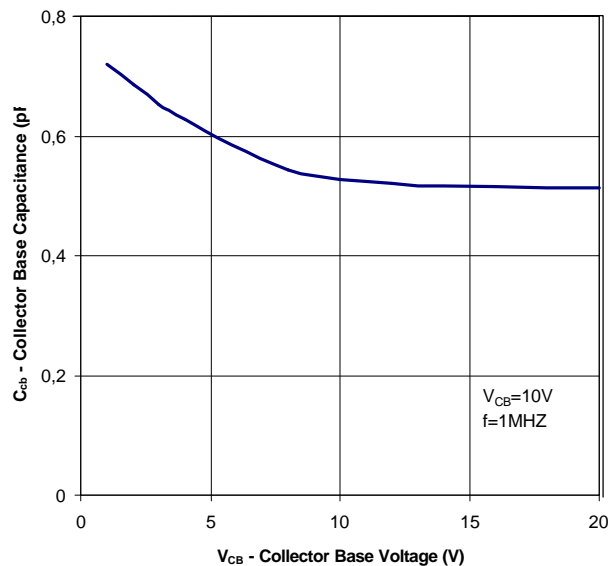
## AC CHARACTERISTICS

Transition Frequency, $I_C = 30\text{mA}, V_{CB} = 5\text{V}, f = 300\text{MHz}$	$f_T$	<b>4.6</b>	<b>6.0</b>	–	GHz
Collector-Base Capacitance, $I_E = 0\text{mA}, V_{CB} = 10\text{V}, f = 1\text{MHz}$	$C_{cb}$	–	<b>0.45</b>	<b>0.9</b>	pF
Noise Figure, $I_E = 5\text{mA}, V_{CE} = 8\text{V}, f = 800\text{MHz}, Z_S = 50\Omega$	$N_F$	–	<b>1.6</b>	–	dB
Power Gain, $I_E = 30\text{mA}, V_{CE} = 8\text{V}, f = 800\text{MHz}, Z_S = 50\Omega, Z_L = Z_{Lopt}$	$G_{PS}$	<b>12.5</b>	<b>14.0</b>	–	dB

## TYPICAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

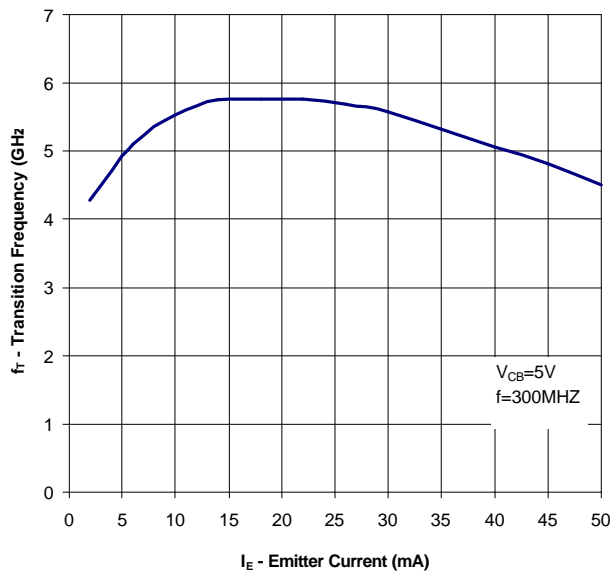


**Figure 1.** Total Power Dissipation vs. Ambient Temperature

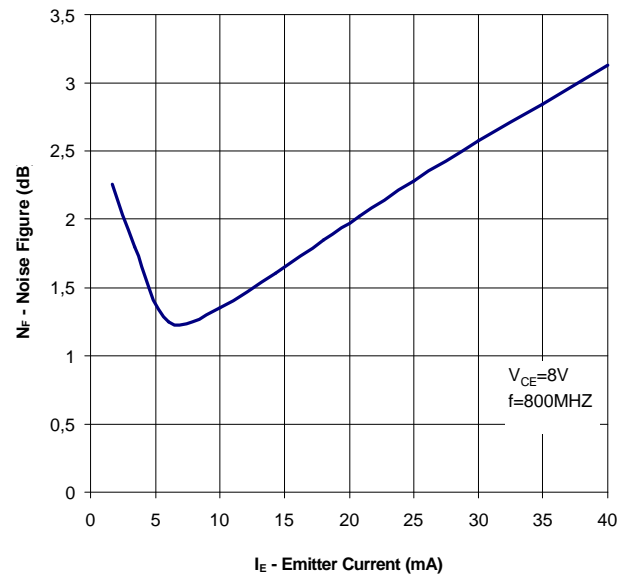


**Figure 2.** Collector – Base Capacitance vs. Collector – Base Voltage

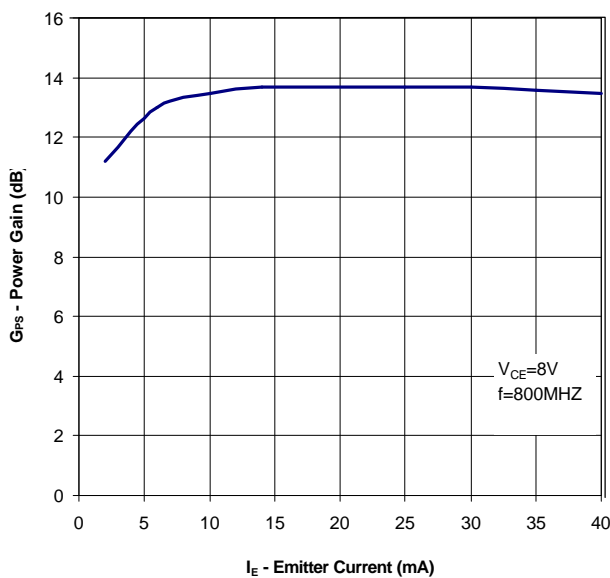
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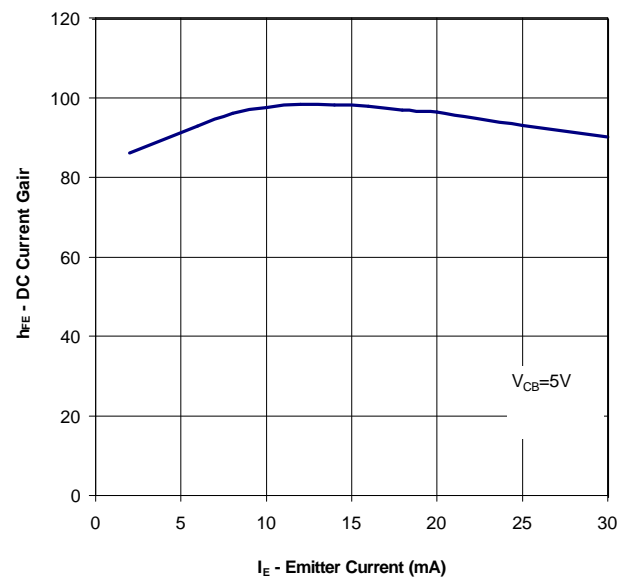
**Figure 3.** Transition Frequency vs. Emitter Current



**Figure 4.** Noise Figure vs. Emitter Current



**Figure 5.** Power Gain vs. Emitter Current



**Figure 6.** DC Current Gain vs. Emitter Current

