

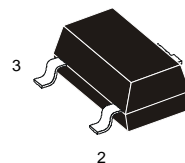
## The RF Line NPN Silicon High-Frequency Transistor

### 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  
 $G_{pS}=14.0$  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

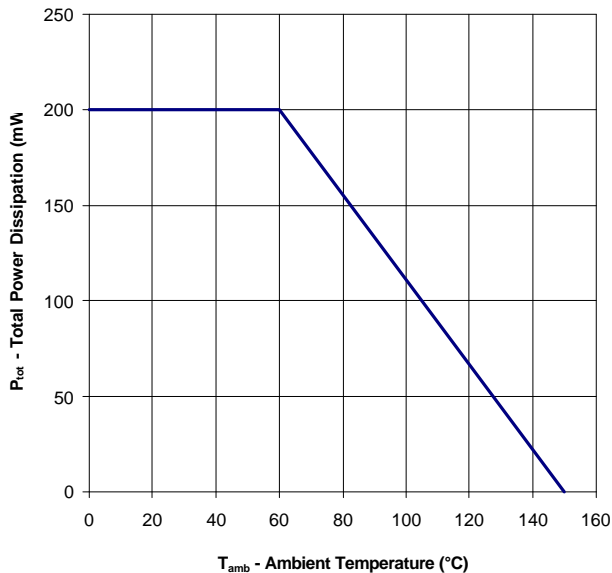
## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>DC CHARACTERISTICS</b>					
Collector – Base Cutoff Current, I <sub>E</sub> = 0mA, V <sub>CB</sub> = 10V	I <sub>CBO</sub>	–	–	100	nA
Emitter – Base Cutoff Current, I <sub>C</sub> = 0mA, V <sub>EB</sub> = 2V	I <sub>EBO</sub>	–	–	10.0	μA
Collector – Emitter Breakdown Voltage, I <sub>C</sub> = 1mA, I <sub>B</sub> = 0mA	V <sub>(BR)CEO</sub>	12	–	–	V
Collector – Emitter Saturation Voltage, I <sub>C</sub> = 50mA, I <sub>B</sub> = 5mA	V <sub>CE(sat)</sub>	–	100	400	mV
DC Current Gain, I <sub>E</sub> = 30mA, V <sub>CB</sub> = 5V	h <sub>FE</sub>	40	90	150	–

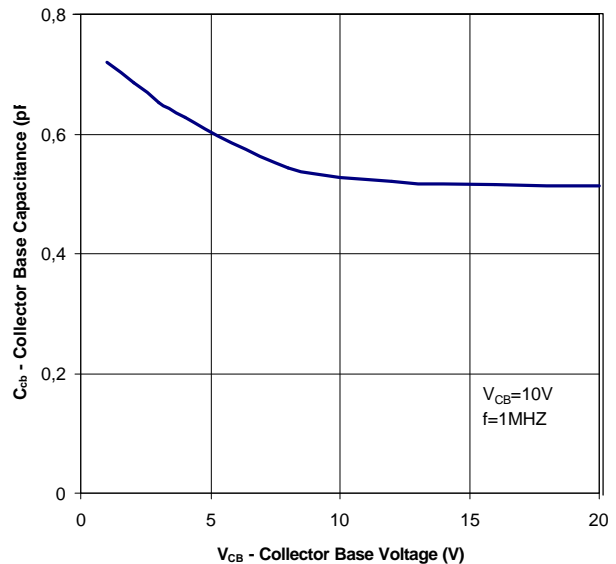
## AC CHARACTERISTICS

Transition Frequency, I <sub>C</sub> = 30mA, V <sub>CB</sub> = 5V, f = 300MHz	f <sub>T</sub>	4.6	6.0	–	GHz
Collector-Base Capacitance, I <sub>E</sub> = 0mA, V <sub>CB</sub> = 10V, f = 1MHz	C <sub>cb</sub>	–	0.45	0.9	pF
Noise Figure, I <sub>E</sub> = 5mA, V <sub>CE</sub> = 8V, f = 800MHz, Z <sub>S</sub> = 50Ω	N <sub>F</sub>	–	1.6	–	dB
Power Gain, I <sub>E</sub> = 30mA, V <sub>CE</sub> = 8V, f = 800MHz, Z <sub>S</sub> = 50Ω, Z <sub>L</sub> = Z <sub>Lopt</sub>	G <sub>PS</sub>	12.5	14.0	–	dB

## TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C unless otherwise noted)

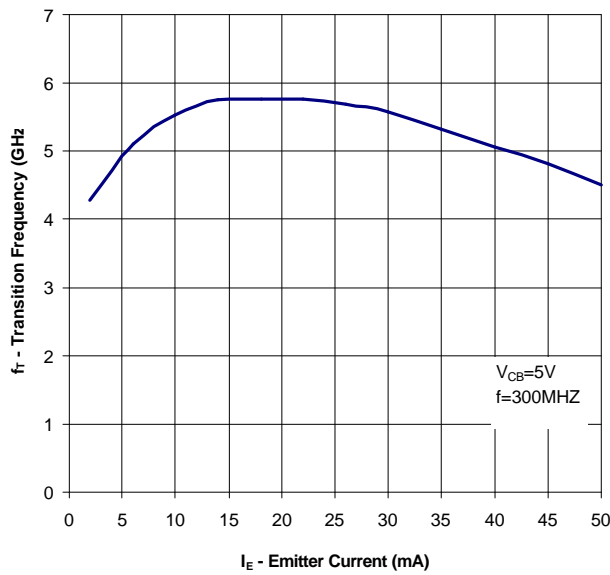


**Figure 1.** Total Power Dissipation vs. Ambient Temperature

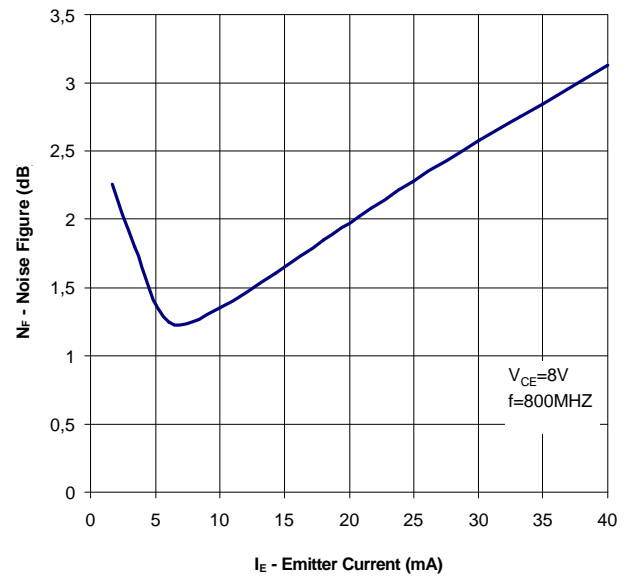


**Figure 2.** Collector – Base Capacitance vs. Collector – Base Voltage

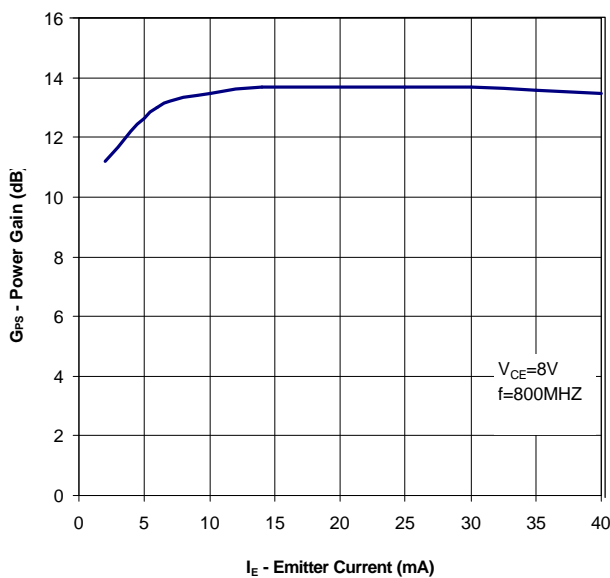
## TYPICAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)



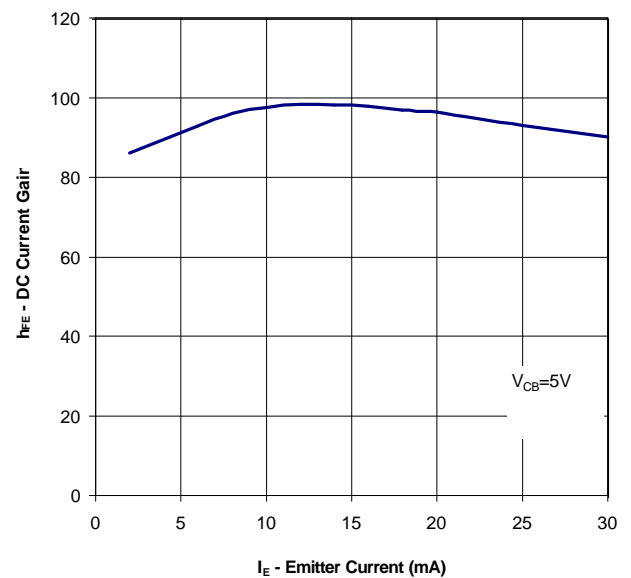
**Figure 3.** Transition Frequency vs. Emitter Current



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



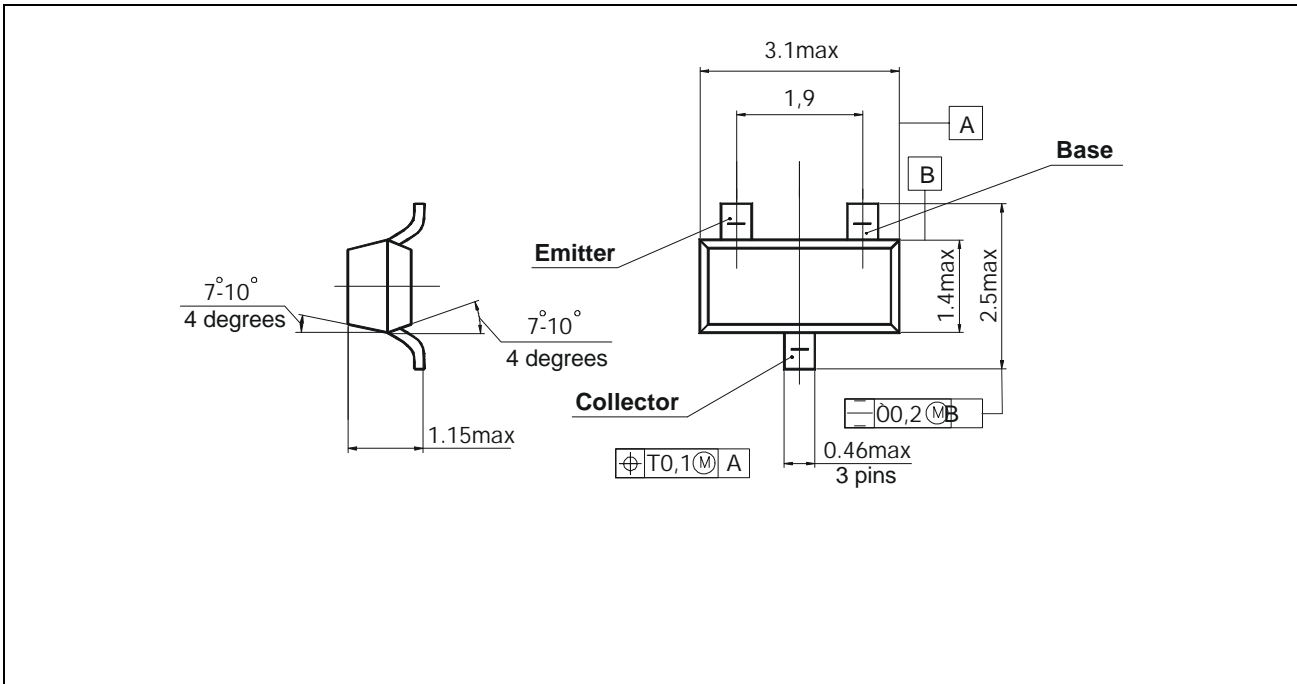
**Figure 5.** Power Gain vs. Emitter Current



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

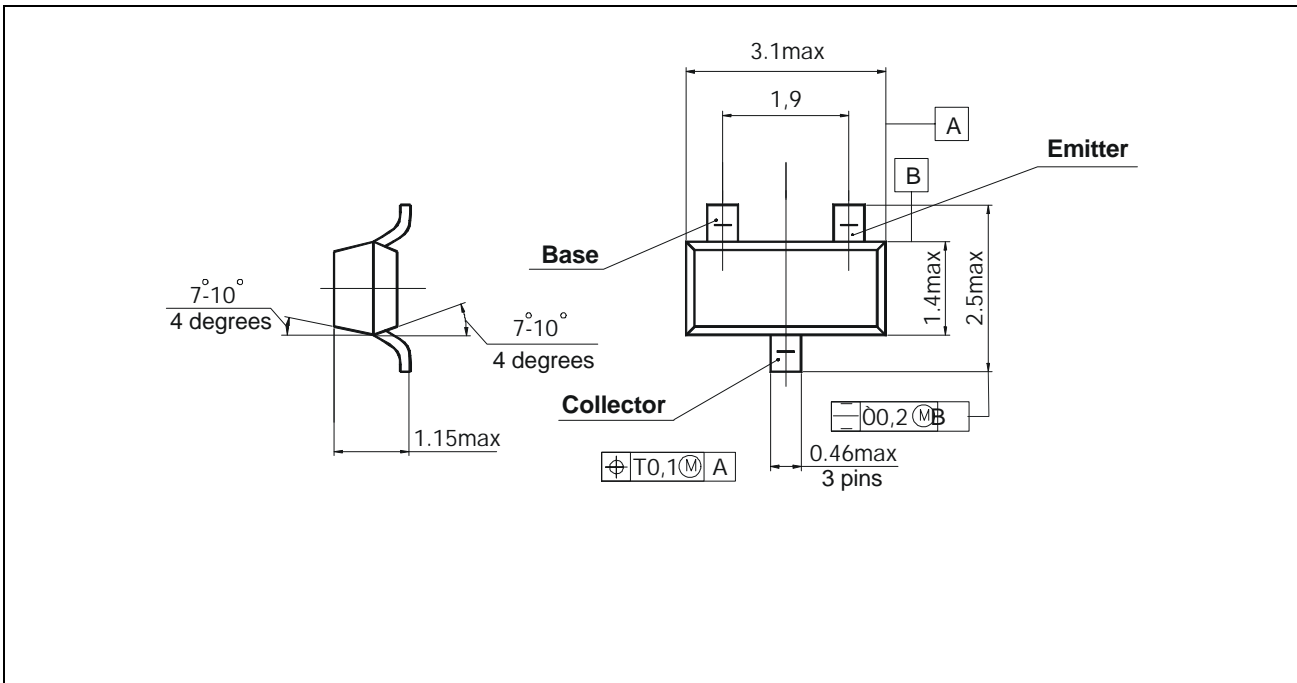
# BFR93A/BFR93AR

## PACKAGE DIMENSIONS of BFR93A in mm



PLASTIC CASE KT-46

## PACKAGE DIMENSIONS of BFR93AR in mm



PLASTIC CASE KT-46