

# The RF Line NPN Silicon High-Frequency Transistors

Designed primarily for use in high-gain, low-noise, small-signal UHF and microwave amplifiers constructed with thick and thin-film circuits using surface mount components.

- T1 Suffix Indicates Tape and Reel Packaging of 3,000 Units per Reel.

## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	12	Vdc
Collector-Base Voltage	$V_{CBO}$	15	Vdc
Emitter-Base Voltage	$V_{EBO}$	2.0	Vdc
Collector Current — Continuous	$I_C$	35	mAdc
Maximum Junction Temperature	$T_{Jmax}$	150	°C
Power Dissipation, $T_{case} = 75^\circ\text{C}$ (2) Derate linearly above $T_{case} = 75^\circ\text{C}$ @	$P_{D(max)}$	0.306 4.08	W mW/°C

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Storage Temperature	$T_{stg}$	-55 to +150	°C
Thermal Resistance Junction to Case	$R_{\theta JC}$	245	°C/W

## DEVICE MARKING

BFR93ALT1 = R2
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## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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## OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage (1) ( $I_C = 10\text{ mA}$ )	$V_{(BR)CEO}$	12	—	Vdc
Collector-Base Breakdown Voltage ( $I_C = 10\ \mu\text{A}$ )	$V_{(BR)CBO}$	15	—	Vdc
Emitter-Base Breakdown Voltage ( $I_C = 100\ \mu\text{A}$ )	$V_{(BR)EBO}$	2.0	—	Vdc
Collector Cutoff Current ( $V_{CE} = 10\text{ V}$ )	$I_{CEO}$	—	50	nA
Collector Cutoff Current ( $V_{CB} = 10\text{ V}$ )	$I_{CBO}$	—	50	nA

## ON CHARACTERISTICS

DC Current Gain (1) ( $I_C = 30\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )	$h_{FE}$	40	—	—
Collector-Emitter Saturation Voltage (1) ( $I_C = 35\text{ mA}$ , $I_B = 7.0\text{ mA}$ )	$V_{CE(sat)}$	—	0.5	Vdc
Base-Emitter Saturation Voltage (1) ( $I_C = 35\text{ mA}$ , $I_B = 7.0\text{ mA}$ )	$V_{BE(sat)}$	—	1.2	Vdc

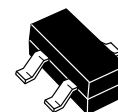
## NOTES:

1. Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .
2. Case temperature measured on collector lead immediately adjacent to body of package.

REV 7

**BFR93ALT1**

RF TRANSISTORS  
NPN SILICON



CASE 318-08, STYLE 6  
SOT-23  
LOW PROFILE

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

Characteristic	Symbol	Min	Max	Unit
<b>SMALL-SIGNAL CHARACTERISTICS</b>				
Current-Gain — Bandwidth Product ( $I_C = 30\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ , $f = 500\text{ MHz}$ )	$f_T$	3.0	—	GHz
Noise Figure ( $V_{CE} = 5.0\text{ V}$ , $I_C = 2.0\text{ mA}$ , $R_S = 50\ \Omega$ , $f = 30\text{ MHz}$ )	NF	—	3.0	dB

**PACKAGE DIMENSIONS**

NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60

STYLE 6:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

**CASE 318-08**  
**ISSUE AE**

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