

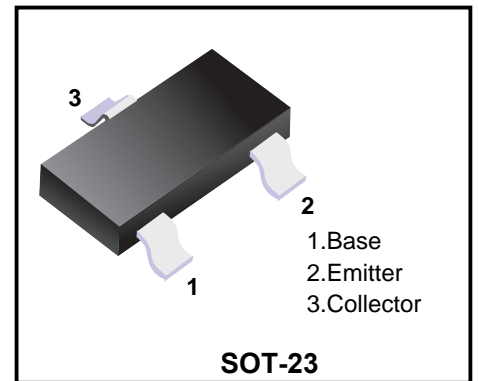
**NPN Plastic-Encapsulate**

**Applications**

➤ Wide band amplifier up to GHz range.

**Features**

- High power gain
- Low noise figure
- High transition frequency



**Marking Code**

BFR93A	R2
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**Absolute Maximum Ratings (Ta=25°C)**

Parameter	Symbol	Value	Unit
Collector-Base Voltage	$BV_{CBO}$	20	V
Collector-Emitter Voltage	$BV_{CEO}$	12	V
Emitter-Base Voltage	$BV_{EBO}$	2	V
Collector Current	$I_C$	50	mA
Total Power Dissipation ( $T_{amb} \leq 60^\circ\text{C}$ )	$P_{tot}$	200	mW
Junction Temperature	$T_j$	150	°C
Storage Temperature	$T_{stg}$	-65 ~ +150	°C

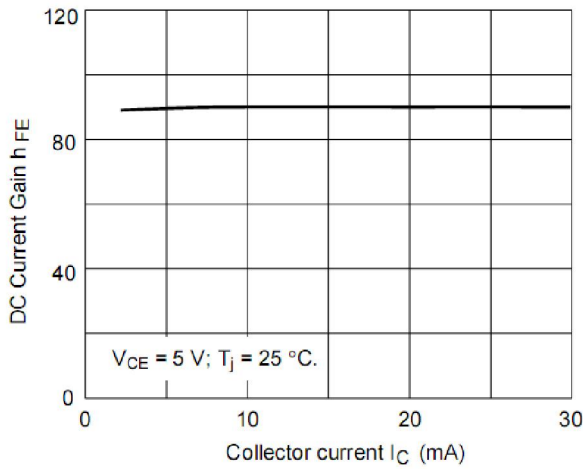
**Thermal characteristics**

Parameter	Symbol	Conditions	Value	Unit
Junction ambient	$R_{thJA}$	on glass fibre printed board (25×20×1.5) mm <sup>3</sup> plated with 35µm Cu	450	KW

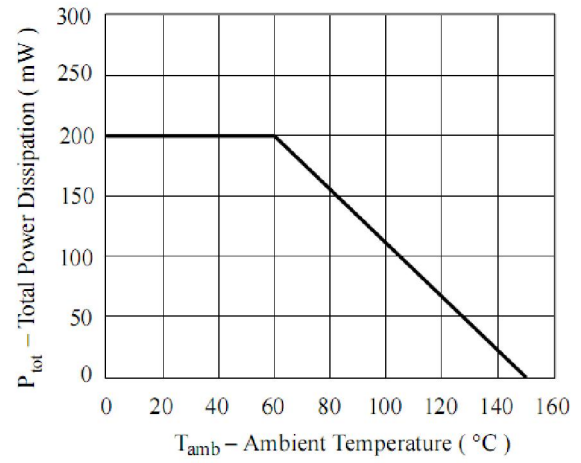
**Electrical Characteristics (Ta=25°C unless otherwise specified.)**

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Collector-emitter voltage	$BV_{CEO}$	$I_C = 1\text{mA}, I_B = 0$	12			V
Collector-base cut-off current	$I_{CBO}$	$V_{CB} = 10\text{V}, I_E = 0$			100	nA
Collector cut-off current	$I_{CES}$	$V_{CE} = 20\text{V}, I_E = 0$			100	nA
Emitter-base cut-off current	$I_{EBO}$	$V_{EB} = 2\text{V}, I_C = 0$			10	nA
DC current gain	$h_{FE}$	$V_{CE} = 5\text{V}, I_C = 30\text{mA}$	40		150	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 50\text{mA}, I_B = 5\text{mA}$			0.4	V
Transition frequency	$f_T$	$V_{CE} = 5\text{V}, I_C = 30\text{mA}, f = 500\text{MHz}$	4.5	6		GHz
Collector-base capacitance	$C_{cb}$	$V_{CB} = 10\text{V}, f = 1\text{MHz}$		0.45		pF
Collector-emitter capacitance	$C_{ce}$	$V_{CE} = 5\text{V}, f = 1\text{MHz}$		0.2		pF
Emitter-base capacitance	$C_{eb}$	$V_{EB} = 0.5\text{V}, f = 1\text{MHz}$		1.5		pF
Power gain	$G_{pe}$	$V_{CE} = 8\text{V}, I_C = 25\text{mA}, Z_S = 50\Omega$ $Z_L = Z_{Lopt}, f = 800\text{MHz}$		14		dB
Noise Figure	NF	$V_{CE} = 8\text{V}, I_C = 5\text{mA},$ $Z_S = 50\Omega, f = 800\text{MHz}$		1.6		dB
		$V_{CE} = 8\text{V}, I_C = 25\text{mA},$ $Z_S = 50\Omega, f = 800\text{MHz}$		2.1		
Linear output voltage – two tone intermodulation test	$V_1 = V_2$	$V_{CE} = 8\text{V}, I_C = 25\text{mA}, d_{IM} = 60\text{dB}$ $f_1 = 806\text{MHz}, f_2 = 810\text{MHz}$ $Z_S = Z_L = 50\Omega$		260		mV
Third order intercept point	$IP_3$	$V_{CE} = 8\text{V}, I_C = 25\text{mA}, f = 800\text{MHz}$		31		dBm

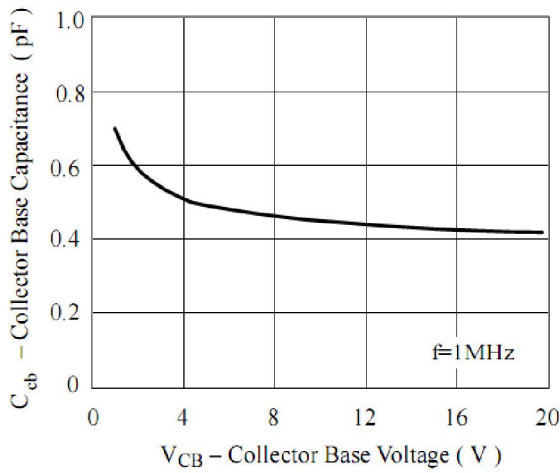
Typical Characteristics



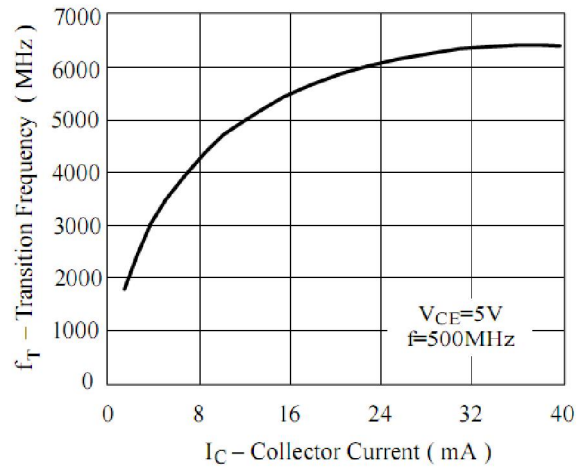
**Figure 2. DC Current Gain**



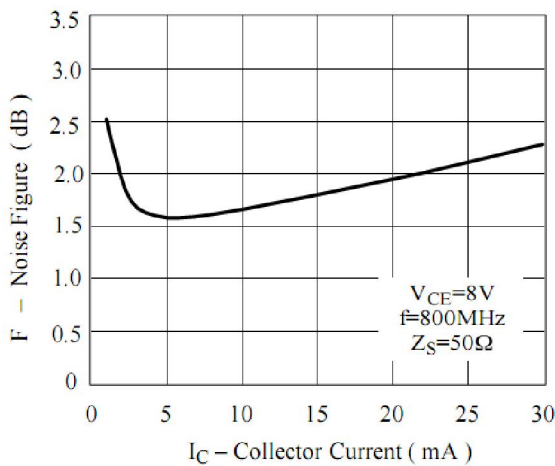
**Figure 2. Total Power Dissipation vs. Ambient Temperature**



**Figure 3. Collector Base Capacitance vs. Collector Base Voltage**



**Figure 4. Transition Frequency vs. Collector Current**



**Figure 5. Noise Figure vs. Collector Current**

Typical Characteristics (VCE = 8 V, IC = 25 mA , Z0 = 50Ω )

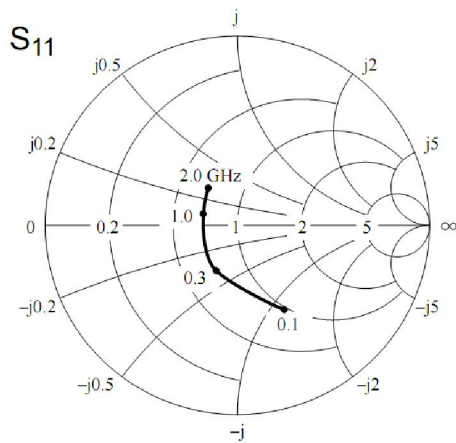


Figure 6. Input reflection coefficient

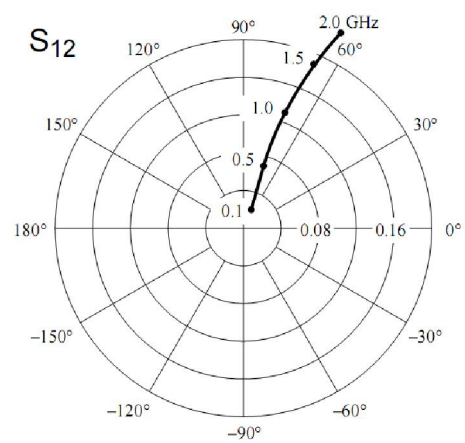


Figure7. Reverse transmission coefficient

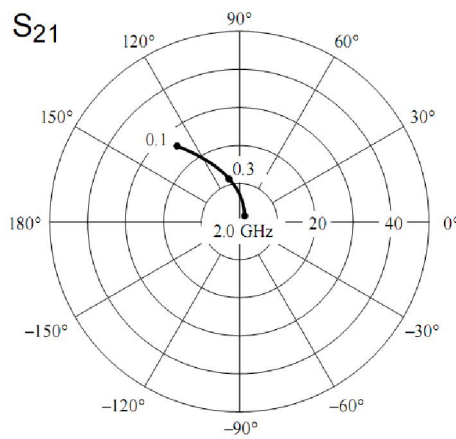


Figure 8. Forward transmission coefficient

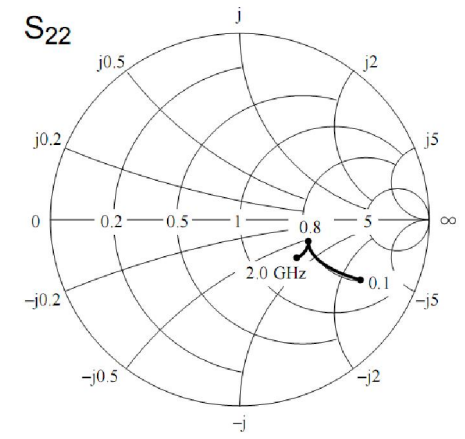


Figure 9. Output reflection coefficient

**Ordering information**

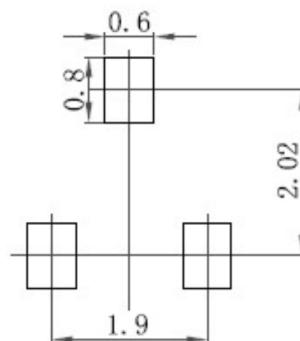
Package	Packing Description	Base Quantity	Packing Quantity
SOT-23	Tape/Reel,7"reel	3000pcs/Reel	24000PCS/Box 120000PCS/Carton

**Package Dimensions**

**SOT-23**

Dim.	Millimeter (mm)		mil	
	Min.	Max.	Min.	Max.
A	0.9	1.15	35	45
A1	0.1		3.9	
bp	0.38	0.48	15	19
C	0.09	0.15	3.54	5.9
D	2.8	3.0	110	118
E	1.2	1.4	47	55
E	1.9		75	
E1	0.95		37	
HE	2.1	2.55	83	100
Lp	0.15	0.45	5.9	18
Q	0.45	0.55	18	22
v	0.2		7.9	
W	0.1		4	

**The recommended mounting pad size**



## Disclaimer

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