

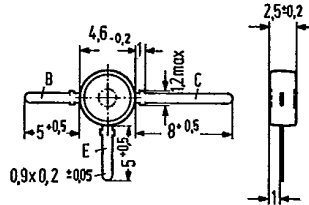
**NPN Silicon Transistor for Low-Noise  
RF Broadband Amplifiers**

**BFR 34 A  
2 N 6620**

SIEMENS AKTIENGESELLSCHAFT 0 D T-31-15

BFR 34 A is an epitaxial NPN silicon planar RF transistor in a plastic package similar to TO 119 (50 B 3 DIN 41867) intended for use in RF amplifiers up to the GHz range, e. g. for low-noise input stages, broadband antenna amplifiers and oscillators. BFR 34 A is also available upon request as JEDEC type under the designation 2N6620.

Type	Ordering code
BFR 34 A	Q62702-F346-S1
2N 6620	Q68000-A4668



Approx. weight 0.25 g Dimensions in mm

**Maximum ratings**

Collector-emitter voltage  
 Collector-emitter voltage ( $R_{BE} \leq 50 \Omega$ )  
 Emitter-base voltage  
 Collector current  
 Base current  
 Junction temperature  
 Storage temperature range  
 Total power dissipation ( $T_{amb} \leq 50^\circ\text{C}$ )

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$V_{CEO}$	12	V
$V_{CER}$	20	V
$V_{EBO}$	2.5	V
$I_C$	30	mA
$I_B$	4	mA
$T_j$	150	$^\circ\text{C}$
$T_{stg}$	-55 to +125	$^\circ\text{C}$
$P_{tot}$	200	mW

**Thermal resistance**

Junction to ambient air  
 (mounted on glass fiber epoxy resin PCB  
 40 mm x 25 mm x 1.5 mm)

$R_{thJA}$	$\leq 500$	K/W
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Static characteristics ( $T_{amb} = 25^{\circ}\text{C}$ )

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Collector-emitter breakdown voltage ( $I_{CEO} = 500 \mu\text{A}$ )	$V_{(BR)CEO}$	> 12 V
Collector-emitter breakdown voltage ( $I_{CER} = 10 \text{ mA}$ ; $R_{BE} = 50 \Omega$ )	$V_{(BR)CER}$	> 20 V
Emitter-base breakdown voltage ( $I_{EBO} = 100 \mu\text{A}$ )	$V_{(BR)EBO}$	> 2.5 V
Collector cutoff current ( $V_{CBO} = 10 \text{ V}$ )	$I_{CBO}$	< 50 nA
DC current gain ( $I_C = 5 \text{ to } 25 \text{ mA}$ ; $V_{CE} = 6 \text{ V}$ )	$h_{FE}$	$\geq 25$

Dynamic characteristics ( $T_{amb} = 25^{\circ}\text{C}$ )

Small signal current gain ( $I_C = 5 \text{ mA}$ ; $V_{CE} = 6 \text{ V}$ ; $f = 1 \text{ kHz}$ )	$h_{fe}$	70	-
Transition frequency ( $I_C = 200 \text{ mA}$ ; $V_{CE} = 10 \text{ V}$ ; $f = 200 \text{ MHz}$ )	$f_T$	5	GHz
Reverse transfer capacitance ( $I_C = 1 \text{ mA}$ ; $V_{CE} = 6 \text{ V}$ ; $f = 1 \text{ MHz}$ )	$C_{12e}$	0.4	pF
Collector-base capacitance ( $V_{CBO} = 10 \text{ V}$ , $f = 1 \text{ MHz}$ )	$C_{CBO}$	0.75	pF
Noise figure ( $I_C = 2 \text{ mA}$ ; $V_{CE} = 6 \text{ V}$ ; $f = 10 \text{ MHz}$ ; $R_g = 75 \Omega$ )	NF	1.8	dB
( $I_C = 2 \text{ mA}$ ; $V_{CE} = 6 \text{ V}$ ; $f = 200 \text{ MHz}$ ; $R_g = 75 \Omega$ )	NF	2	dB
( $I_C = 2 \text{ mA}$ ; $V_{CE} = 6 \text{ V}$ ; $f = 800 \text{ MHz}$ ; $R_g = 60 \Omega$ )	NF	2	dB
( $I_C = 3 \text{ mA}$ ; $V_{CE} = 10 \text{ V}$ ; $f = 2 \text{ GHz}$ ; $Z_g = Z_{g \text{ opt}}$ )	NF	4	dB
Power gain ( $I_C = 15 \text{ mA}$ ; $V_{CE} = 6 \text{ V}$ ; $f = 800 \text{ MHz}$ ; $R_g = 60 \Omega$ )	$G_{pe}$	14	dB
Output voltage (three tone modulation $f$ approx. 800 MHz) ( $I_C = 15 \text{ mA}$ , $V_{CE} = 6 \text{ V}$ ; $d_{IM} = 60 \text{ dB}$ ; $R_g = R_L = 75 \Omega$ )	$V_o$	140	mV

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S parameter

Operating point:  $V_{CE} = 6\text{ V}$ ,  $I_C = 5\text{ mA}$ ,  $Z_o = 50\ \Omega$

f (GHz)	S <sub>11</sub>	$\varphi$	S <sub>21</sub>	$\varphi$	S <sub>12</sub>	$\varphi$	S <sub>22</sub>	$\varphi$
0,1	0,794	- 27	13,08	153	0,021	75	0,930	-13
0,2	0,663	- 52	11,38	136	0,037	62	0,843	-20
0,3	0,535	- 71	9,11	121	0,047	58	0,697	-27
0,4	0,420	- 89	7,70	110	0,054	57	0,691	-27
0,5	0,385	-103	6,50	103	0,062	58	0,595	-26
0,6	0,306	-113	5,57	97	0,068	58	0,577	-30
0,7	0,287	-131	4,95	91	0,076	58	0,546	-31
0,8	0,272	-138	4,35	86	0,084	58	0,539	-33
0,9	0,254	-153	3,96	83	0,089	60	0,543	-34
1,0	0,264	-158	3,51	79	0,095	60	0,520	-33
1,1	0,256	-169	3,29	75	0,104	60	0,502	-37
1,2	0,268	-175	3,03	72	0,111	61	0,504	-38
1,3	0,271	177	2,82	69	0,120	61	0,488	-42
1,4	0,280	171	2,60	66	0,125	60	0,508	-42
1,5	0,236	158	2,30	62	0,121	53	0,439	-46
1,6	0,314	165	2,36	60	0,139	62	0,467	-46
1,7	0,328	161	2,21	59	0,148	64	0,469	-46
1,8	0,345	157	2,07	54	0,154	61	0,439	-50
1,9	0,354	156	1,99	52	0,162	62	0,452	-53
2,0	0,374	153	1,90	49	0,169	60	0,435	-55

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