

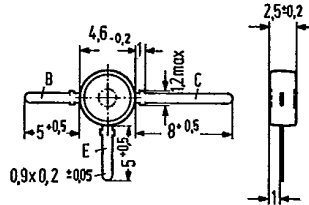
**NPN Silicon Transistor for Low-Noise
RF Broadband Amplifiers**

**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 ($T_{amb} \leq 50^\circ\text{C}$)

| | BFR 34 A 2 N 6620 | |
|-----------|----------------------|------------------|
| 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} | ≤ 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} | ≥ 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 ₁₁ | φ | S ₂₁ | φ | S ₁₂ | φ | S ₂₂ | φ |
|---------|-----------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|-----------|
| 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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