

**Low Noise SiGe:C Bipolar RF Transistor**

- Highly linear low noise RF transistor
- Provides outstanding performance for a wide range of wireless applications
- Based on Infineon's reliable high volume Silicon Germanium technology
- Ideal for CDMA and WLAN applications
- Collector design provides high linearity of 14.5 dBm OP1dB for low voltage application
- Maximum stable gain  
 $G_{ms} = 21.5 \text{ dB at } 1.8 \text{ GHz}$   
 $G_{ma} = 11 \text{ dB at } 6 \text{ GHz}$
- Outstanding noise figure  $NF_{min} = 0.7 \text{ dB at } 1.8 \text{ GHz}$   
 Outstanding noise figure  $NF_{min} = 1.3 \text{ dB at } 6 \text{ GHz}$
- Accurate SPICE GP model enables effective design in process
- Pb-free (RoHS compliant) and halogen-free package with visible leads
- Qualification report according to AEC-Q101 available



**ESD (Electrostatic discharge) sensitive device, observe handling precaution!**

| Type   | Marking | Pin Configuration |     |     |     |   | Package |        |
|--------|---------|-------------------|-----|-----|-----|---|---------|--------|
| BFP620 | R2s     | 1=B               | 2=E | 3=C | 4=E | - | -       | SOT343 |

**Maximum Ratings** at  $T_A = 25\text{ °C}$ , unless otherwise specified

| Parameter  | Symbol    | Value       | Unit |
|--|-----------|-------------|------|
| Collector-emitter voltage<br>$T_A = 25\text{ °C}$<br>$T_A = -55\text{ °C}$ | $V_{CEO}$ | 2.3<br>2.1  | V    |
| Collector-emitter voltage  | $V_{CES}$ | 7.5         |      |
| Collector-base voltage   | $V_{CBO}$ | 7.5         |      |
| Emitter-base voltage   | $V_{EBO}$ | 1.2         |      |
| Collector current  | $I_C$     | 80          | mA   |
| Base current   | $I_B$     | 3           |      |
| Total power dissipation <sup>1)</sup><br>$T_S \leq 95\text{ °C}$           | $P_{tot}$ | 185         | mW   |
| Junction temperature   | $T_J$     | 150         | °C   |
| Ambient temperature  | $T_A$     | -65 ... 150 |      |
| Storage temperature  | $T_{Stg}$ | -65 ... 150 |      |

**Thermal Resistance**

| Parameter                                | Symbol     | Value | Unit |
|--|------------|-------|------|
| Junction - soldering point <sup>2)</sup> | $R_{thJS}$ | 300   | K/W  |

**Electrical Characteristics** at  $T_A = 25\text{ °C}$ , unless otherwise specified

| Parameter | Symbol | Values |      |      | Unit |
|-----------|--------|--------|------|------|------|
|           |        | min.   | typ. | max. |      |

**DC Characteristics**

|  |               |     |     |     |    |
|--|---------------|-----|-----|-----|----|
| Collector-emitter breakdown voltage<br>$I_C = 1\text{ mA}$ , $I_B = 0$   | $V_{(BR)CEO}$ | 2.3 | 2.8 | -   | V  |
| Collector-emitter cutoff current<br>$V_{CE} = 7.5\text{ V}$ , $V_{BE} = 0$<br>$V_{CE} = 5\text{ V}$ , $V_{BE} = 0$ | $I_{CES}$     | -   | -   | 10  | μA |
| Collector-base cutoff current<br>$V_{CB} = 5\text{ V}$ , $I_E = 0$   | $I_{CBO}$     | -   | 1   | 40  | nA |
| Emitter-base cutoff current<br>$V_{EB} = 0.5\text{ V}$ , $I_C = 0$   | $I_{EBO}$     | -   | 10  | 900 |    |
| DC current gain<br>$I_C = 50\text{ mA}$ , $V_{CE} = 1.5\text{ V}$ , pulse measured                                 | $h_{FE}$      | 110 | 180 | 270 | -  |

<sup>1</sup> $T_S$  is measured on the emitter lead at the soldering point to the pcb

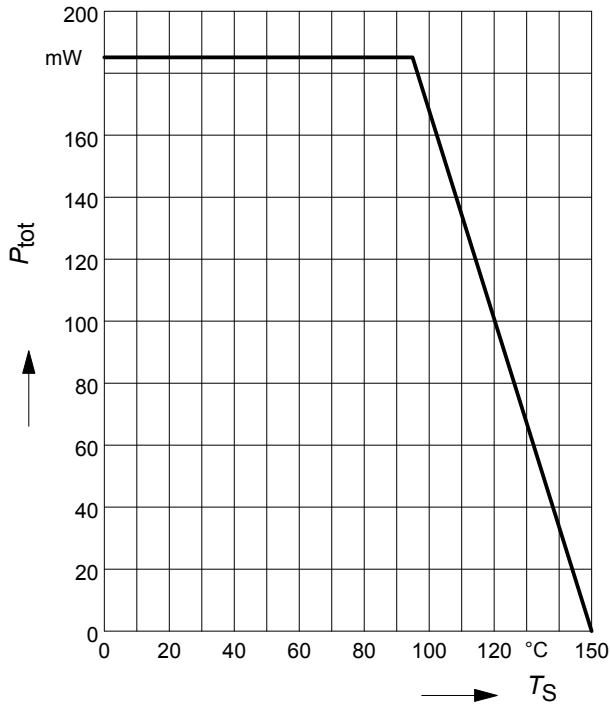
<sup>2</sup>For the definition of  $R_{thJS}$  please refer to Application Note AN077 (Thermal Resistance Calculation)

**Electrical Characteristics at  $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise specified**

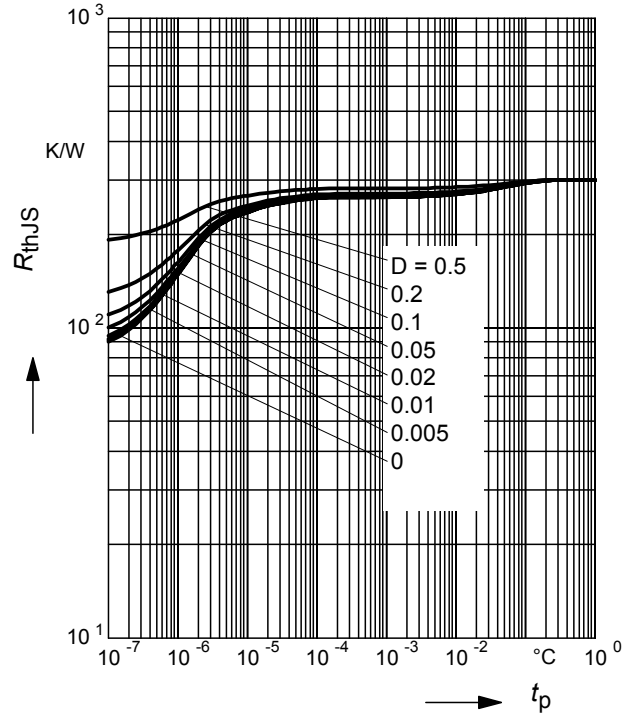
| Parameter  | Symbol        | Values |            |      | Unit |
|--|---------------|--------|------------|------|------|
|  |               | min.   | typ.       | max. |      |
| <b>AC Characteristics (verified by random sampling)</b>  |               |        |            |      |      |
| Transition frequency<br>$I_C = 50\text{ mA}$ , $V_{CE} = 1.5\text{ V}$ , $f = 1\text{ GHz}$  | $f_T$         | -      | 65         | -    | GHz  |
| Collector-base capacitance<br>$V_{CB} = 2\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ ,<br>emitter grounded  | $C_{cb}$      | -      | 0.12       | 0.2  | pF   |
| Collector emitter capacitance<br>$V_{CE} = 2\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ ,<br>base grounded  | $C_{ce}$      | -      | 0.22       | -    |      |
| Emitter-base capacitance<br>$V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$ , $V_{CB} = 0$ ,<br>collector grounded  | $C_{eb}$      | -      | 0.46       | -    |      |
| Minimum noise figure<br>$I_C = 5\text{ mA}$ , $V_{CE} = 1.5\text{ V}$ , $f = 1.8\text{ GHz}$ , $Z_S = Z_{Sopt}$<br>$I_C = 5\text{ mA}$ , $V_{CE} = 1.5\text{ V}$ , $f = 6\text{ GHz}$ , $Z_S = Z_{Sopt}$ | $NF_{min}$    | -      | 0.7<br>1.3 | -    | dB   |
| Power gain, maximum stable <sup>1)</sup><br>$I_C = 50\text{ mA}$ , $V_{CE} = 1.5\text{ V}$ , $Z_S = Z_{Sopt}$ ,<br>$Z_L = Z_{Lopt}$ , $f = 1.8\text{ GHz}$   | $G_{ms}$      | -      | 21.5       | -    | dB   |
| Power gain, maximum available <sup>1)</sup><br>$I_C = 50\text{ mA}$ , $V_{CE} = 1.5\text{ V}$ , $Z_S = Z_{Sopt}$ ,<br>$Z_L = Z_{Lopt}$ , $f = 6\text{ GHz}$  | $G_{ma}$      | -      | 11         | -    | dB   |
| Transducer gain<br>$I_C = 50\text{ mA}$ , $V_{CE} = 1.5\text{ V}$ , $Z_S = Z_L = 50\text{ }\Omega$ ,<br>$f = 1.8\text{ GHz}$<br>$f = 6\text{ GHz}$   | $ S_{21e} ^2$ | -      | 20<br>9.5  | -    | dB   |
| Third order intercept point at output <sup>2)</sup><br>$V_{CE} = 2\text{ V}$ , $I_C = 50\text{ mA}$ , $Z_S = Z_L = 50\text{ }\Omega$ , $f = 1.8\text{ GHz}$  | $IP3$         | -      | 25.5       | -    | dBm  |
| 1dB compression point at output<br>$I_C = 50\text{ mA}$ , $V_{CE} = 2\text{ V}$ , $Z_S = Z_L = 50\text{ }\Omega$ , $f = 1.8\text{ GHz}$  | $P_{-1dB}$    | -      | 14.5       | -    |      |

<sup>1)</sup>  $G_{ma} = |S_{21e} / S_{12e}| (k - (k^2 - 1)^{1/2})$ ,  $G_{ms} = |S_{21e} / S_{12e}|$ 
<sup>2)</sup> IP3 value depends on termination of all intermodulation frequency components.  
Termination used for this measurement is 50Ω from 0.1 MHz to 6 GHz

**Total power dissipation  $P_{tot} = f(T_S)$**

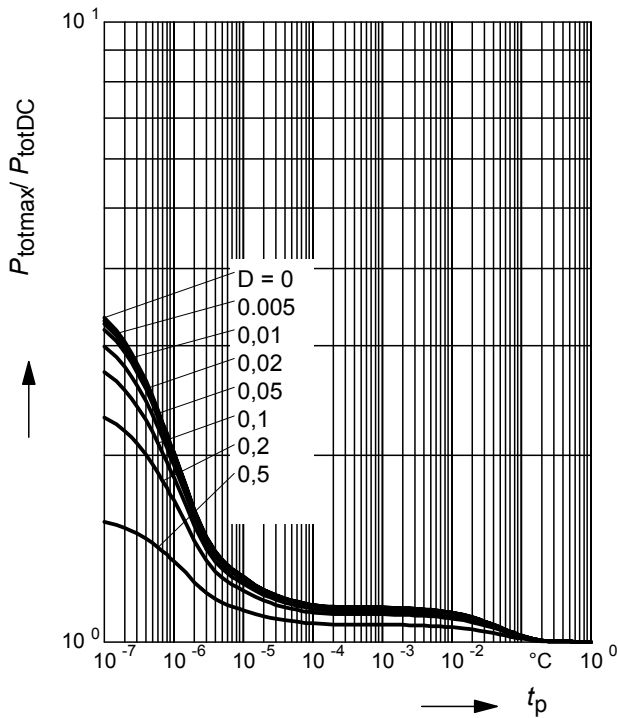


**Permissible Pulse Load  $R_{thJS} = f(t_p)$**



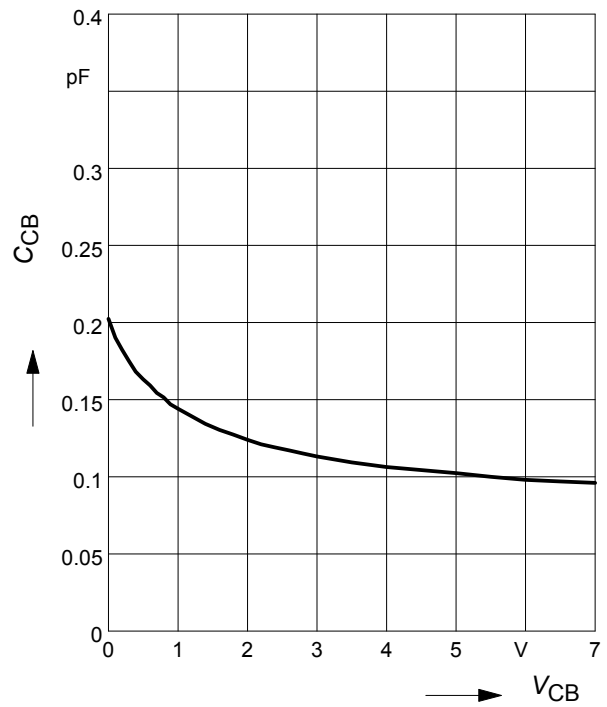
**Permissible Pulse Load**

$P_{totmax}/P_{totDC} = f(t_p)$



**Collector-base capacitance  $C_{cb} = f(V_{CB})$**

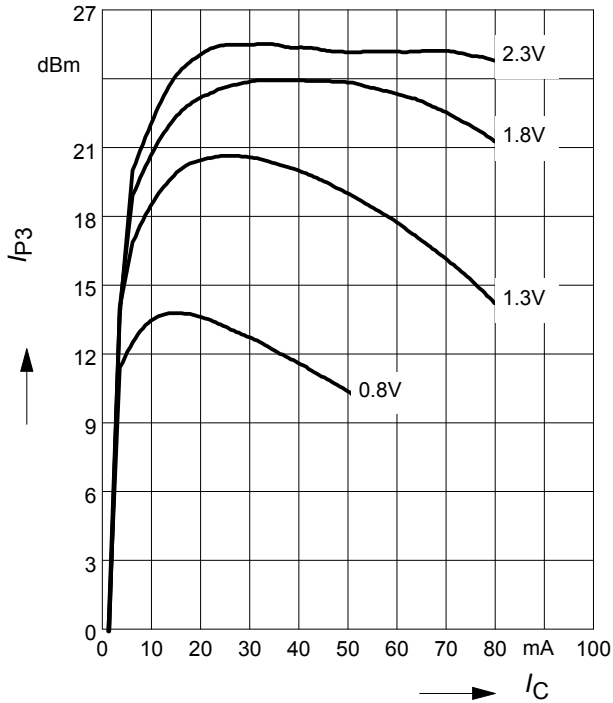
$f = 1\text{MHz}$



**Third order Intercept Point  $IP3 = f(I_C)$**

(Output,  $Z_S = Z_L = 50 \Omega$ )

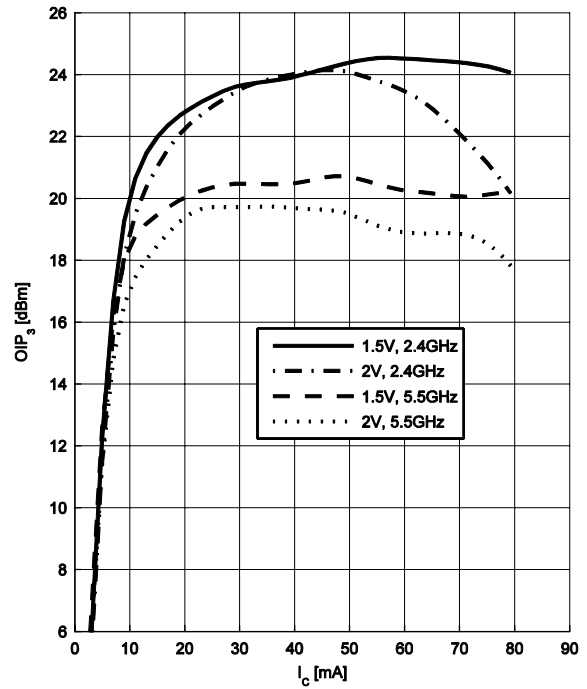
$V_{CE} = \text{parameter}$ ,  $f = 900 \text{ MHz}$



**Third order Intercept Point  $IP3 = f(I_C)$**

(Output,  $Z_S = Z_L = 50 \Omega$ )

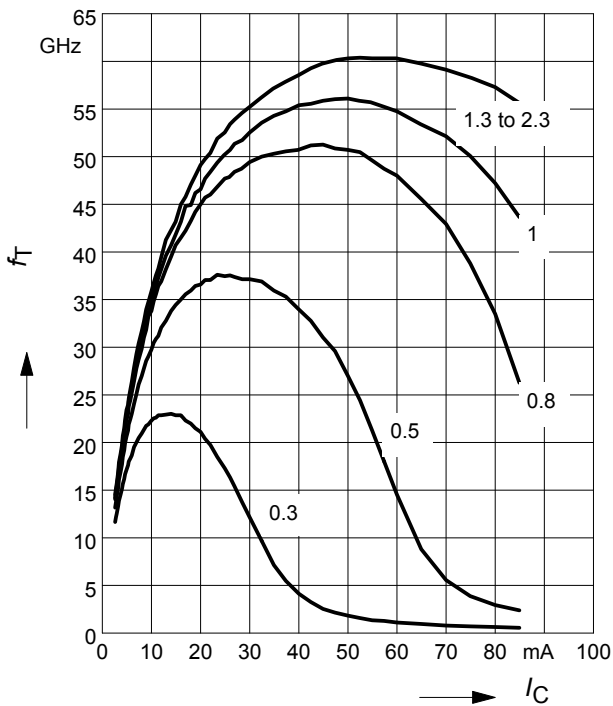
$V_{CE} = \text{parameter}$ ,  $f = \text{parameter}$



**Transition frequency  $f_T = f(I_C)$**

$f = 1 \text{ GHz}$

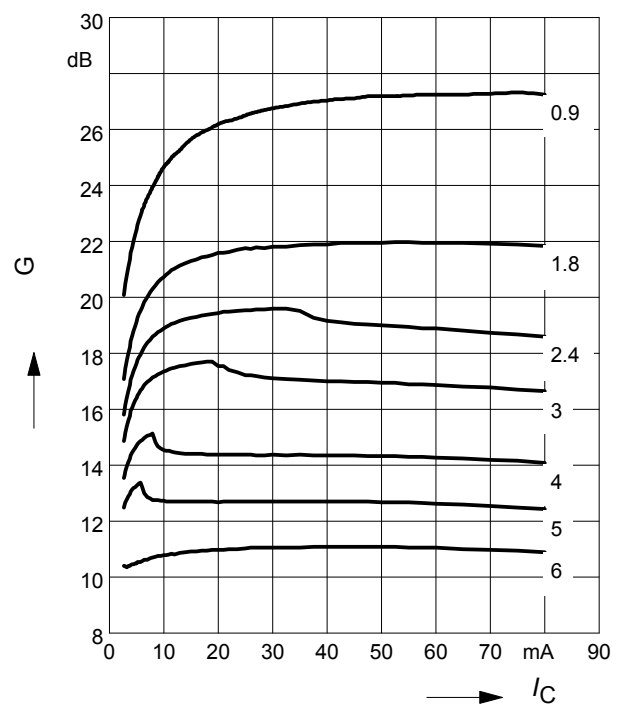
$V_{CE} = \text{Parameter in V}$



**Power gain  $G_{ma}, G_{ms} = f(I_C)$**

$V_{CE} = 1.5 \text{ V}$

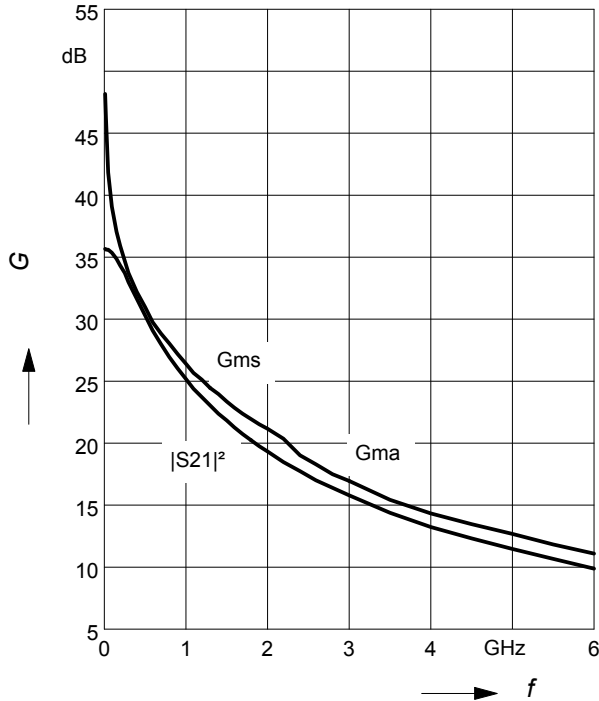
$f = \text{Parameter in GHz}$



**Power Gain**  $G_{ma}, G_{ms} = f(f)$ ,

$|S_{21}|^2 = f(f)$

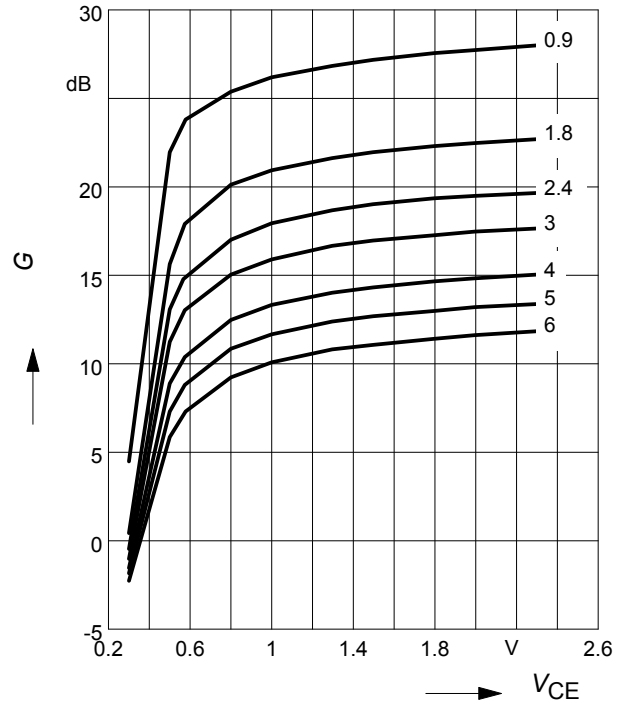
$V_{CE} = 1.5V, I_C = 50mA$



**Power gain**  $G_{ma}, G_{ms} = f(V_{CE})$

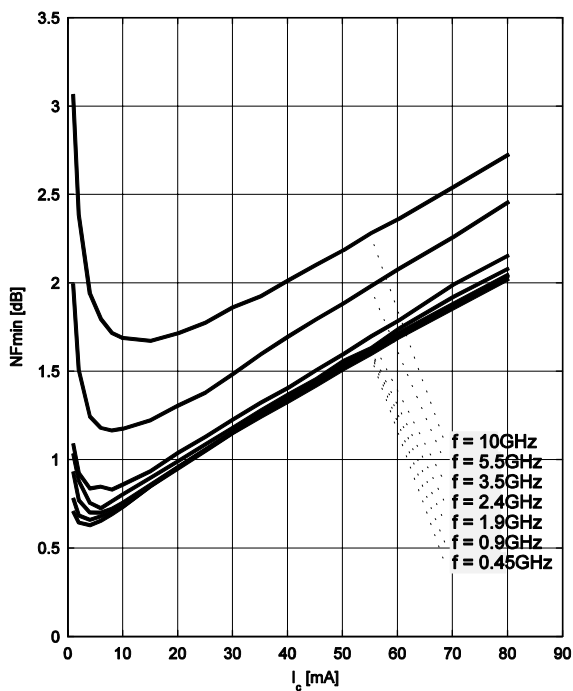
$I_C = 50mA$

$f =$  Parameter in GHz



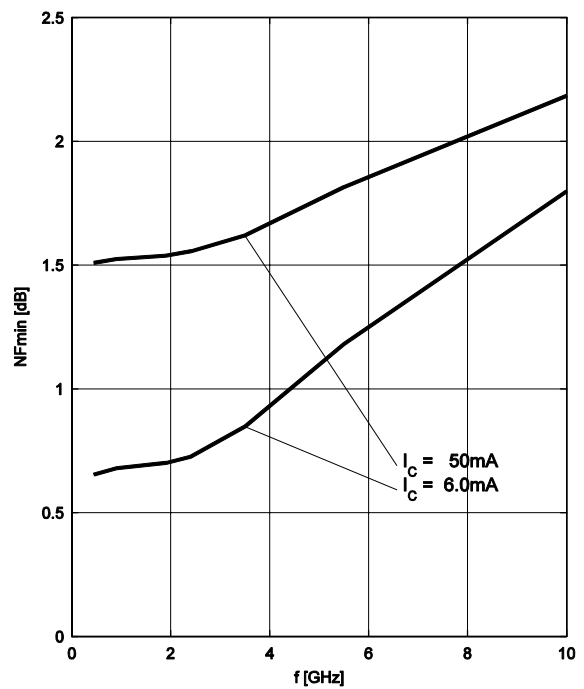
**Minimum noise figure**  $NF_{min} = f(I_C)$

$V_{CE} = 2V, Z_S = Z_{Sopt}$



**Minimum noise figure**  $NF_{min} = f(f)$

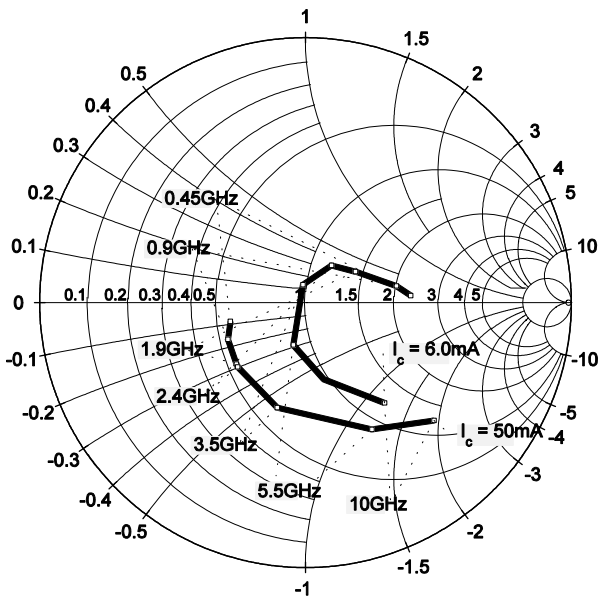
$V_{CE} = 2V, Z_S = Z_{Sopt}$



Source impedance for min.

noise figure vs. frequency

$V_{CE} = 2\text{ V}$ ,  $I_C = 6\text{ mA} / 50\text{ mA}$



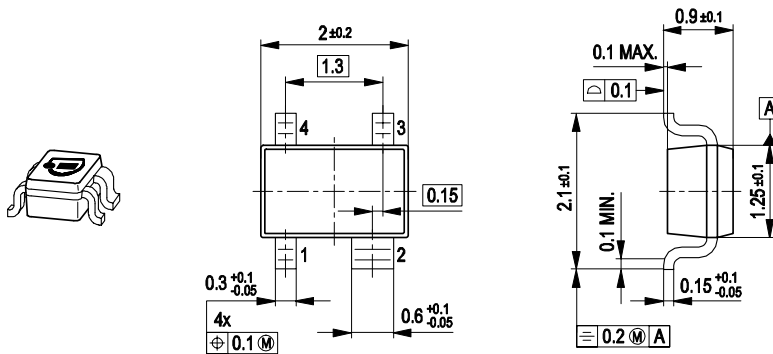
**SPICE GP Model**

For the SPICE Gummel Poon (GP) model as well as for the S-parameters (including noise parameters) please refer to our internet website [www.infineon.com/rf.models](http://www.infineon.com/rf.models).

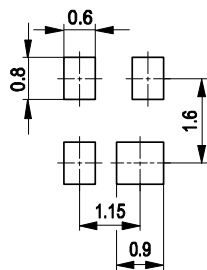
Please consult our website and download the latest versions before actually starting your design. You find the BFP620 SPICE GP model in the internet in MWO- and ADS-format, which you can import into these circuit simulation tools very quickly and conveniently. The model already contains the package parasitics and is ready to use for DC and high frequency simulations. The terminals of the model circuit correspond to the pin configuration of the device. The model parameters have been extracted and verified up to 15 GHz using typical devices. The BFP620 SPICE GP model reflects the typical DC- and RF-performance within the limitations which are given by the SPICE GP model itself. Besides the DC characteristics all S-parameters in magnitude and phase, as well as noise figure (including optimum source impedance, equivalent noise resistance and flicker noise) and intermodulation have been extracted.



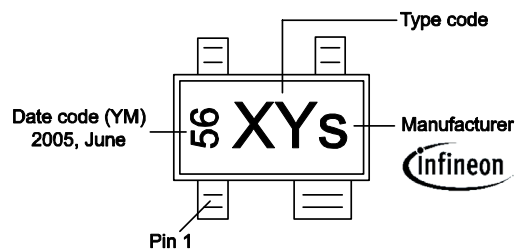
Package Outline



Foot Print

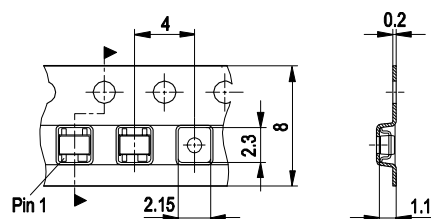


Marking Layout (Example)



Standard Packing

Reel ø180 mm = 3.000 Pieces/Reel  
 Reel ø330 mm = 10.000 Pieces/Reel



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