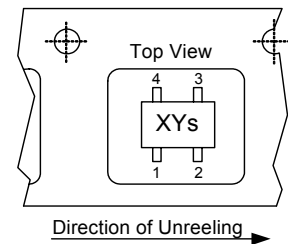
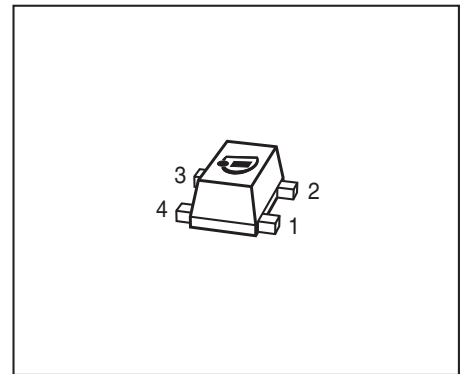


## Low Noise SiGe:C Bipolar RF Transistor

- High gain low noise RF transistor
- Based on Infineon's reliable high volume Silicon Germanium technology
- Outstanding noise figure  $NF_{min} = 0.7$  dB at 1.8 GHz  
Outstanding noise figure  $NF_{min} = 1.3$  dB at 6 GHz
- Maximum stable gain  
 $G_{ms} = 21$  dB at 1.8 GHz  
 $G_{ma} = 10$  dB at 6 GHz
- Pb-free (RoHS compliant) and halogen-free thin small flat package (1.4 x 0.8 x 0.59 mm) with visible leads
- Qualification report according to AEC-Q101 available



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

| Type    | Marking | Pin Configuration |     |     |     |   |   | Package |
|---------|---------|-------------------|-----|-----|-----|---|---|---------|
| BFP620F | R2s     | 1=B               | 2=E | 3=C | 4=E | - | - | TSFP-4  |

**Maximum Ratings** at  $T_A = 25$  °C, unless otherwise specified

| Parameter                             | Symbol    | Value       | Unit |
|---------------------------------------|-----------|-------------|------|
| Collector-emitter voltage             | $V_{CEO}$ | 2.3         | V    |
| $T_A = 25$ °C                         |           | 2.1         |      |
| $T_A = -55$ °C                        |           | 2.1         |      |
| Collector-emitter voltage             | $V_{CES}$ | 7.5         |      |
| Collector-base voltage                | $V_{CBO}$ | 7.5         |      |
| Emitter-base voltage                  | $V_{EBO}$ | 1.2         | mA   |
| Collector current                     | $I_C$     | 80          |      |
| Base current                          | $I_B$     | 3           |      |
| Total power dissipation <sup>1)</sup> | $P_{tot}$ | 185         | mW   |
| $T_S \leq 96$ °C                      |           |             |      |
| Junction temperature                  | $T_J$     | 150         | °C   |
| Storage temperature                   | $T_{Stg}$ | -55 ... 150 |      |

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

**Thermal Resistance**

| Parameter                                | Symbol     | Value | Unit |
|------------------------------------------|------------|-------|------|
| Junction - soldering point <sup>1)</sup> | $R_{thJS}$ | 290   | 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>$V_{CE} = 7.5\text{ V}$ , $V_{BE} = 0$         | $I_{CES}$     | -   | -   | 10  | $\mu\text{A}$ |
| Collector-base cutoff current<br>$V_{CB} = 5\text{ V}$ , $I_E = 0$                 | $I_{CBO}$     | -   | -   | 100 | nA            |
| Emitter-base cutoff current<br>$V_{EB} = 0.5\text{ V}$ , $I_C = 0$                 | $I_{EBO}$     | -   | -   | 3   | $\mu\text{A}$ |
| DC current gain<br>$I_C = 50\text{ mA}$ , $V_{CE} = 1.5\text{ V}$ , pulse measured | $h_{FE}$      | 110 | 180 | 270 | -             |

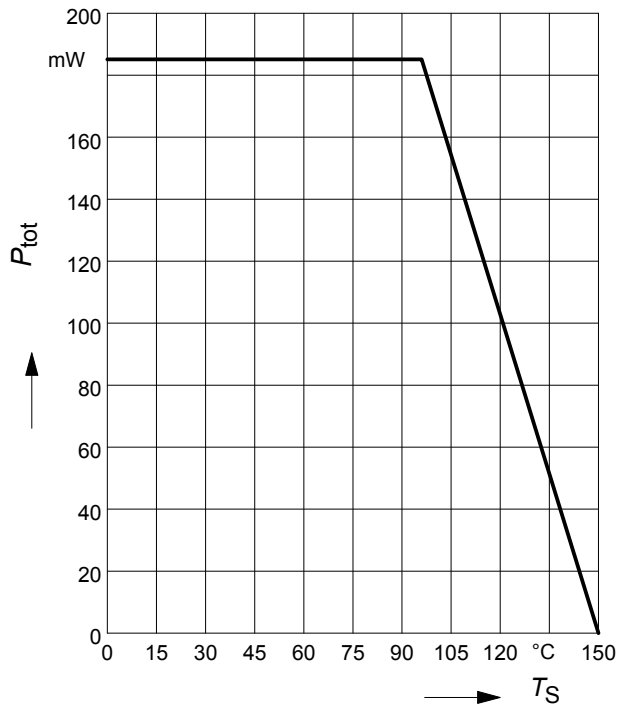
<sup>1)</sup>For the definition of  $R_{thJS}$  please refer to Application Note AN077 (Thermal Resistance Calculation)

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

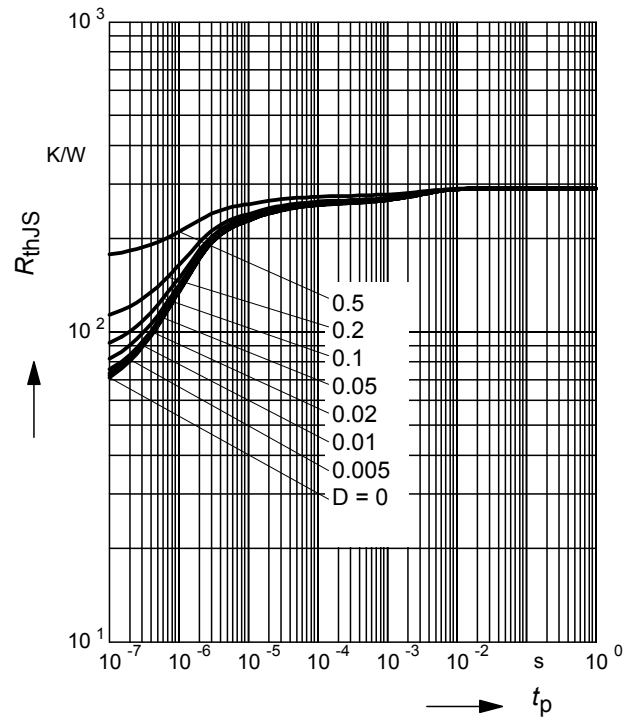
| Parameter                                                                                                                                                                                                | Symbol        | Values |             |        | Unit |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|-------------|--------|------|
|                                                                                                                                                                                                          |               | min.   | typ.        | max.   |      |
| AC Characteristics (verified by random sampling)                                                                                                                                                         |               |        |             |        |      |
| 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                                                                                            | $C_{ce}$      | -      | 0.2         | -      |      |
| Emitter-base capacitance<br>$V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$ , $V_{CB} = 0$ ,<br>collector grounded                                                                                          | $C_{eb}$      | -      | 0.45        | -      |      |
| 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>$I_C = 5\text{ mA}$ , $V_{CE} = 1.5\text{ V}$ , $f = 6\text{ GHz}$ , $Z_S = Z_{Sopt}$ | $NF_{min}$    | -<br>- | 0.7<br>1.3  | -<br>- | 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          | -      | 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>$Z_L = Z_{Lopt}$ , $f = 6\text{ GHz}$                                              | $G_{ma}$      | -      | 10          | -      | 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$ | -<br>- | 19.5<br>9.5 | -<br>- | 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          | -      | 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          | -      |      |

<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  $50\text{ }\Omega$  from  $0.1\text{ MHz}$  to  $6\text{ GHz}$

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

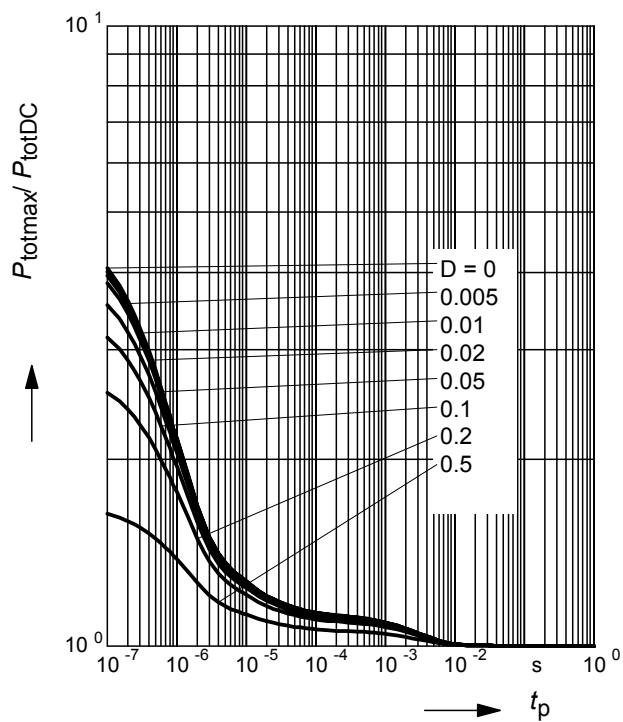


**Permissible Pulse Load  $R_{\text{thJS}} = f(t_p)$**



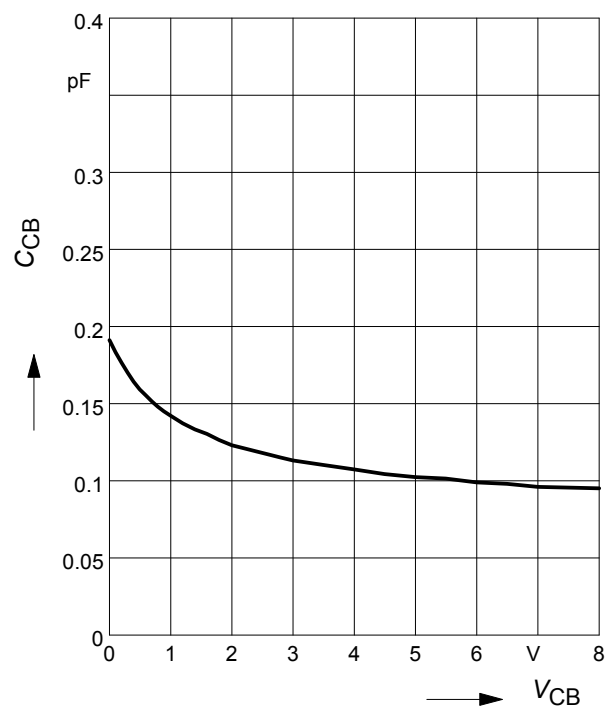
**Permissible Pulse Load**

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



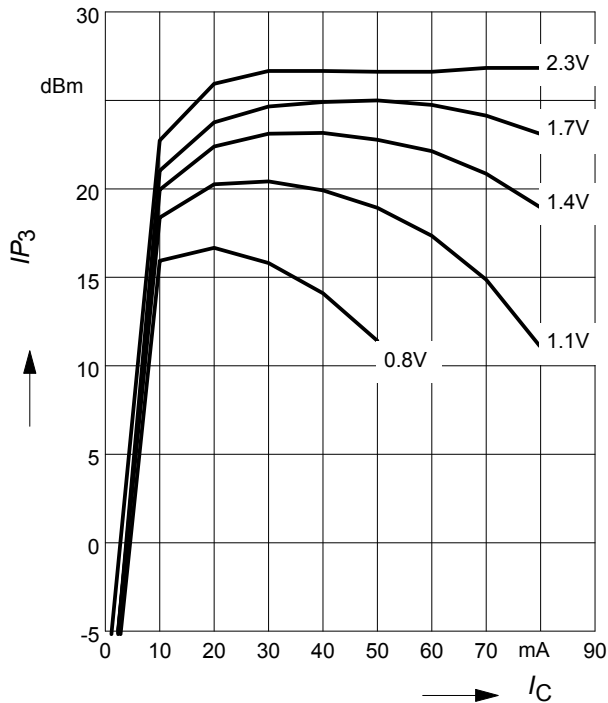
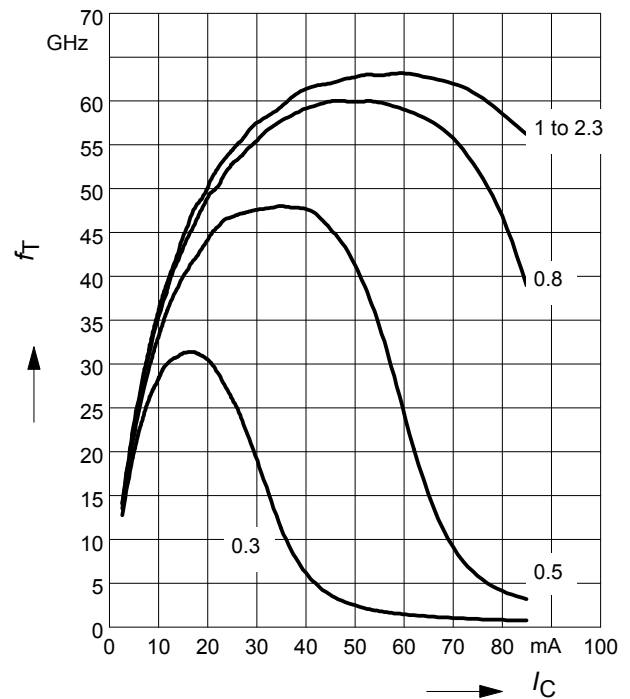
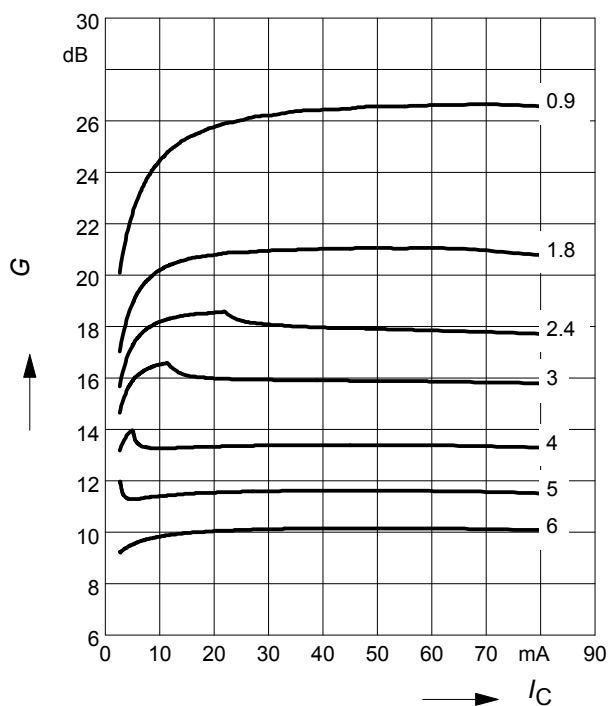
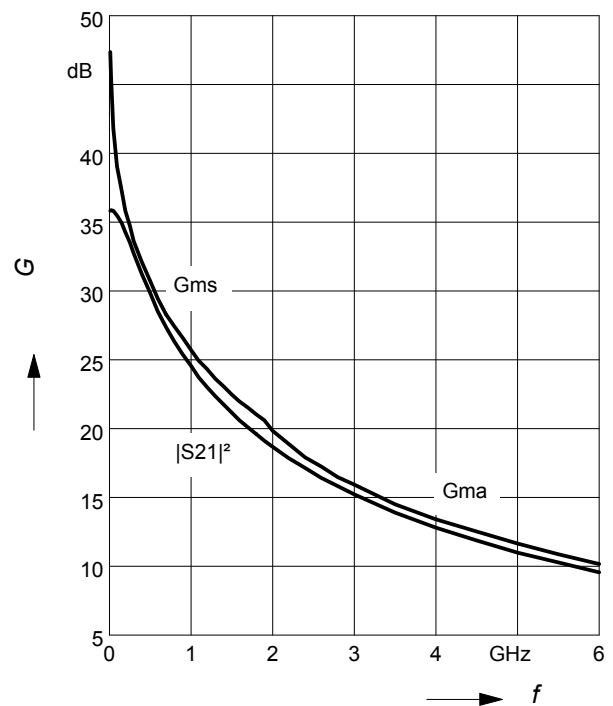
**Collector-base capacitance  $C_{\text{cb}} = f(V_{\text{CB}})$**

$f = 1\text{MHz}$



**Third order Intercept Point  $IP_3 = f(I_C)$** 

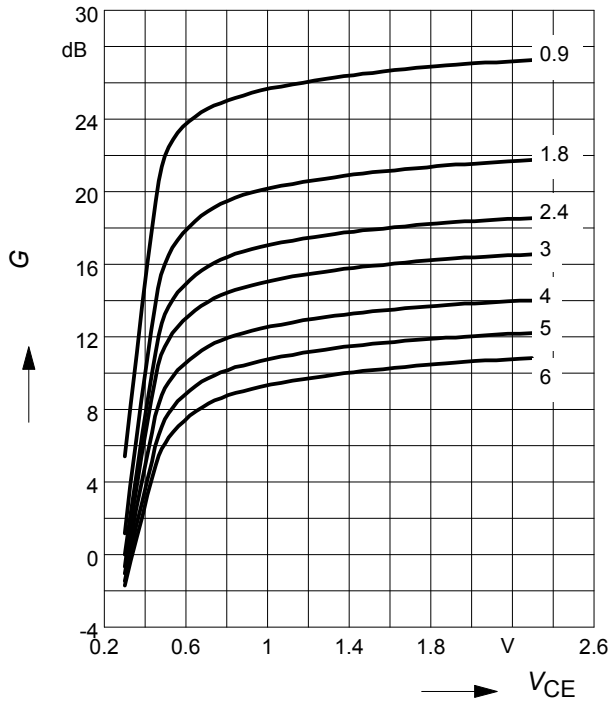
 (Output,  $Z_S = Z_L = 50\Omega$ )

 $V_{CE}$  = parameter,  $f = 1.8\text{GHz}$ 

**Transition frequency  $f_T = f(I_C)$** 
 $f = 1\text{GHz}$ 
 $V_{CE}$  = Parameter in V

**Power gain  $G_{ma}, G_{ms} = f(I_C)$** 
 $V_{CE} = 1.5\text{V}$ 
 $f$  = Parameter in GHz

**Power Gain  $G_{ma}, G_{ms} = f(f)$** 
 $|S_{21}|^2 = f(f)$ 
 $V_{CE} = 1.5\text{V}, I_C = 50\text{mA}$ 


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

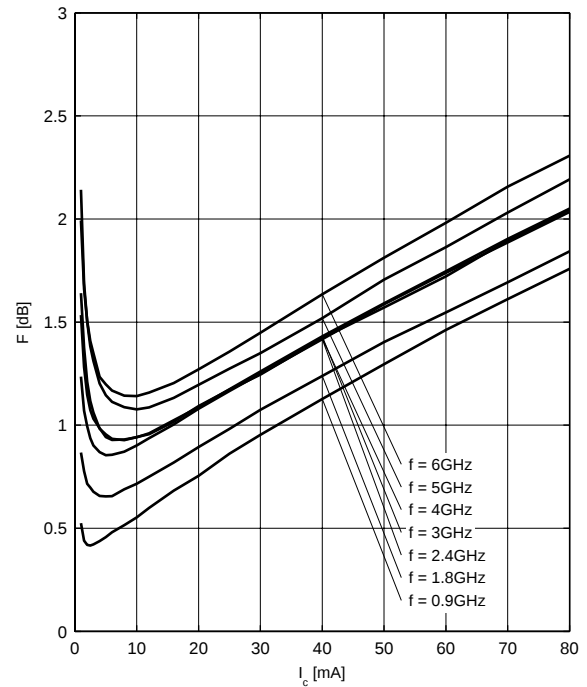
$I_C = 50\text{mA}$

$f = \text{Parameter in GHz}$



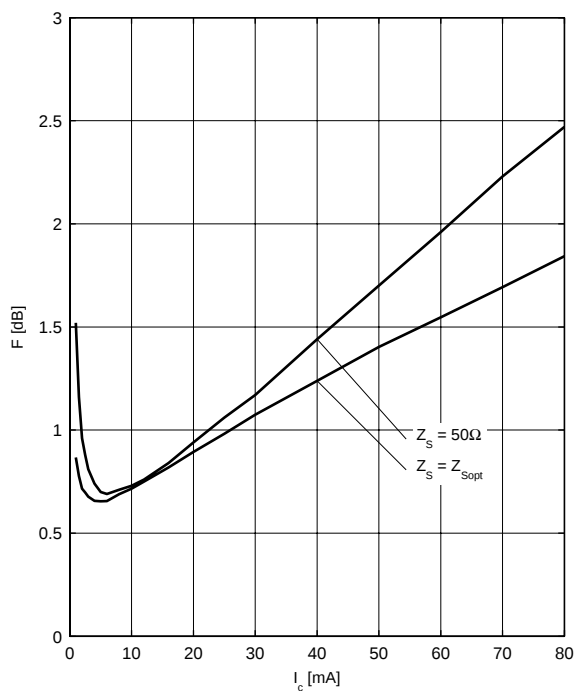
**Noise figure  $F = f(I_C)$**

$V_{CE} = 1.5\text{V}$ ,  $Z_S = Z_{Sopt}$



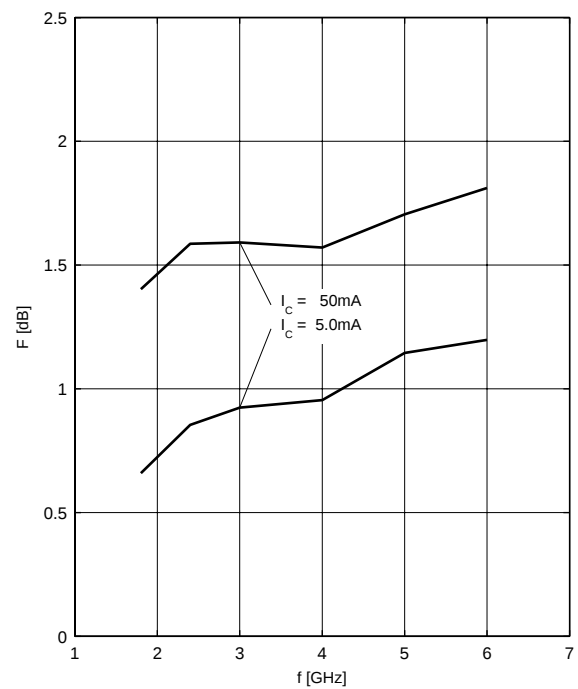
**Noise figure  $F = f(I_C)$**

$V_{CE} = 1.5\text{V}$ ,  $f = 1.8\text{ GHz}$



**Noise figure  $F = f(f)$**

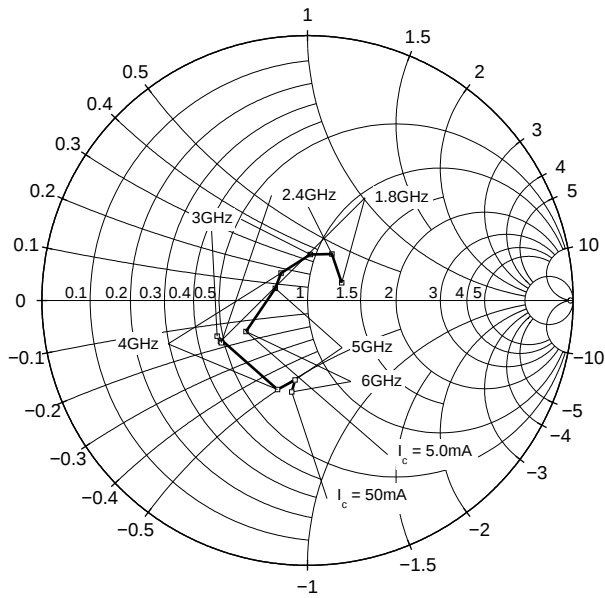
$V_{CE} = 1.5\text{V}$ ,  $Z_S = Z_{Sopt}$



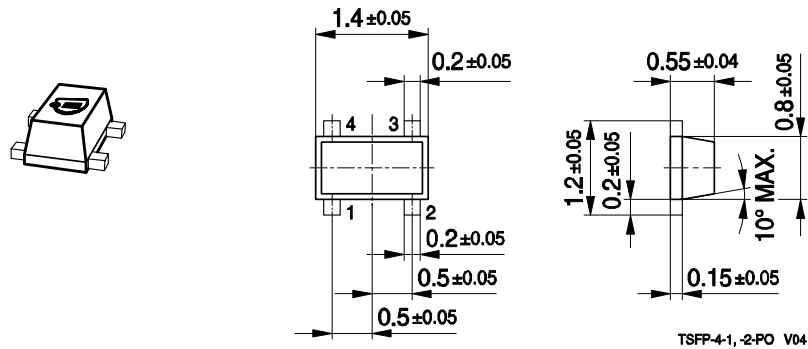
**Source impedance** for min.

noise figure vs. frequency

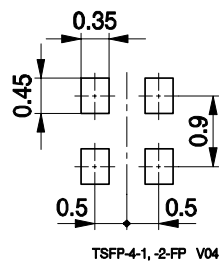
$V_{CE} = 1.5V$ ,  $I_C = 5.0mA/50.0mA$



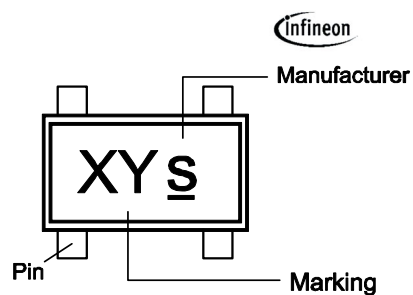
## Package Outline



## Foot Print

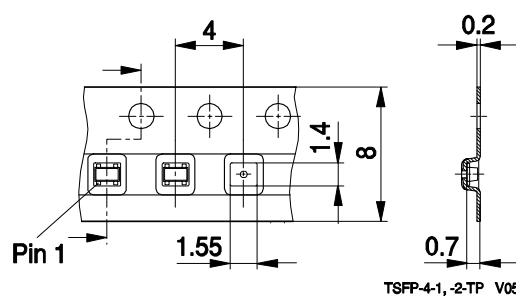


## Marking Layout (Example)



## Standard Packing

Reel  $\varnothing 180 \text{ mm} = 3.000 \text{ Pieces/Reel}$   
 Reel  $\varnothing 330 \text{ mm} = 10.000 \text{ Pieces/Reel}$



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