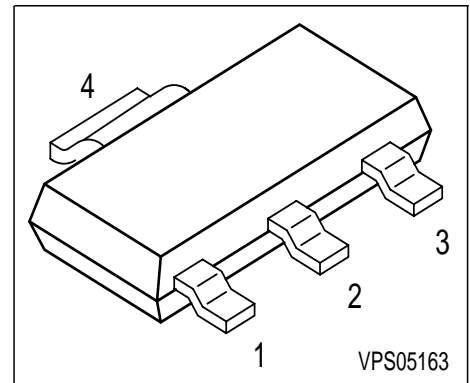


**NPN Silicon RF Transistor**

- For low noise, low distortion broadband amplifiers in antenna and telecommunication systems up to 1.5 GHz at collector currents from 20 mA to 80 mA
- Power amplifier for DECT and PCN Systems
- $f_T = 7.5$  GHz  
 $F = 1.5$  dB at 900 GHz



**ESD:** Electrostatic discharge sensitive device, observe handling precaution!

| Type   | Marking | Pin Configuration |       |       |       | Package |
|--------|---------|-------------------|-------|-------|-------|---------|
| BFG196 | BFG196  | 1 = E             | 2 = B | 3 = E | 4 = C | SOT223  |

**Maximum Ratings**

| Parameter                                      | Symbol    | Value       | Unit |
|--|-----------|-------------|------|
| Collector-emitter voltage                      | $V_{CEO}$ | 12          | V    |
| Collector-emitter voltage                      | $V_{CES}$ | 20          |      |
| Collector-base voltage                         | $V_{CBO}$ | 20          |      |
| Emitter-base voltage                           | $V_{EBO}$ | 2           |      |
| Collector current                              | $I_C$     | 100         | mA   |
| Base current                                   | $I_B$     | 12          |      |
| Total power dissipation<br>$T_S \leq 90$ °C 1) | $P_{tot}$ | 800         | mW   |
| Junction temperature                           | $T_j$     | 150         | °C   |
| Ambient temperature                            | $T_A$     | -65 ... 150 |      |
| Storage temperature                            | $T_{stg}$ | -65 ... 150 |      |

**Thermal Resistance**

|  |            |           |     |
|--|------------|-----------|-----|
| Junction - soldering point <sup>2)</sup> | $R_{thJS}$ | $\leq 75$ | K/W |
|--|------------|-----------|-----|

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

<sup>2</sup> For calculation of  $R_{thJA}$  please refer to Application Note Thermal Resistance

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

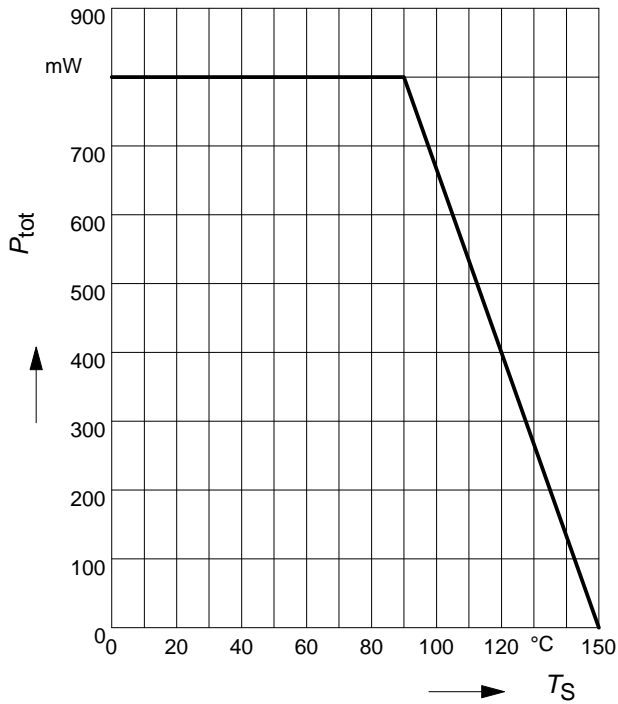
| Parameter   | Symbol        | Values |      |      | Unit          |
|---|---------------|--------|------|------|---------------|
|   |               | min.   | typ. | max. |               |
| <b>DC characteristics</b>   |               |        |      |      |               |
| Collector-emitter breakdown voltage<br>$I_C = 1 \text{ mA}, I_B = 0$    | $V_{(BR)CEO}$ | 12     | -    | -    | V             |
| Collector-emitter cutoff current<br>$V_{CE} = 20 \text{ V}, V_{BE} = 0$ | $I_{CES}$     | -      | -    | 100  | $\mu\text{A}$ |
| Collector-base cutoff current<br>$V_{CB} = 10 \text{ V}, I_E = 0$       | $I_{CBO}$     | -      | -    | 100  | nA            |
| Emitter-base cutoff current<br>$V_{EB} = 1 \text{ V}, I_C = 0$          | $I_{EBO}$     | -      | -    | 1    | $\mu\text{A}$ |
| DC current gain<br>$I_C = 50 \text{ mA}, V_{CE} = 8 \text{ V}$          | $h_{FE}$      | 50     | 100  | 200  | -             |

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

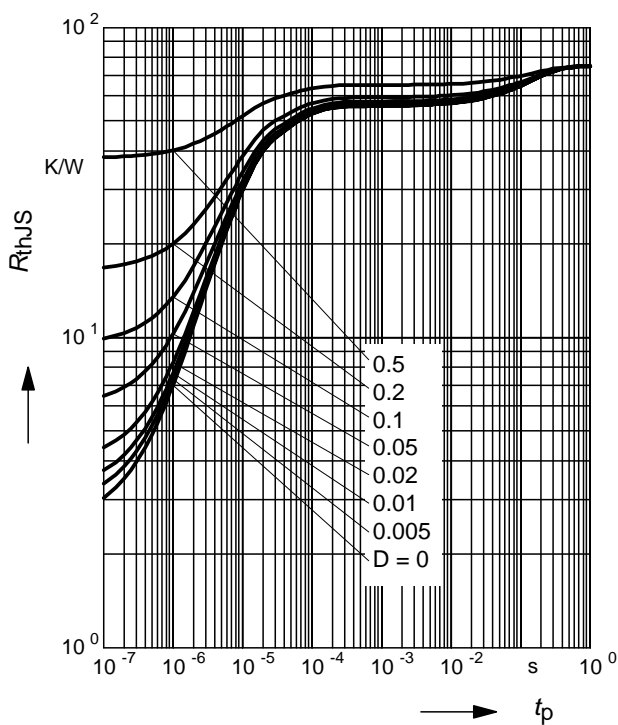
| Parameter   | Symbol          | Values |            |      | Unit |
|---|-----------------|--------|------------|------|------|
|   |                 | min.   | typ.       | max. |      |
| <b>AC characteristics</b> (verified by random sampling)   |                 |        |            |      |      |
| Transition frequency<br>$I_C = 70\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $f = 500\text{ MHz}$   | $f_T$           | 5      | 7.5        | -    | GHz  |
| Collector-base capacitance<br>$V_{CB} = 10\text{ V}$ , $f = 1\text{ MHz}$   | $C_{cb}$        | -      | 0.97       | 1.4  | pF   |
| Collector-emitter capacitance<br>$V_{CE} = 10\text{ V}$ , $f = 1\text{ MHz}$  | $C_{ce}$        | -      | 0.4        | -    |      |
| Emitter-base capacitance<br>$V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$  | $C_{eb}$        | -      | 4          | -    |      |
| Noise figure<br>$I_C = 20\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{\text{Sopt}}$ ,<br>$f = 900\text{ MHz}$<br>$f = 1.8\text{ GHz}$  | $F$             | -      | 1.5<br>2.5 | -    | dB   |
| Power gain, maximum available <sup>1)</sup><br>$I_C = 50\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{\text{Sopt}}$ , $Z_L = Z_{\text{Lopt}}$ ,<br>$f = 900\text{ MHz}$<br>$f = 1.8\text{ GHz}$ | $G_{\text{ma}}$ | -      | 14<br>8.5  | -    |      |
| Transducer gain<br>$I_C = 50\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_L = 50\Omega$ ,<br>$f = 900\text{ MHz}$<br>$f = 1.8\text{ GHz}$  | $ S_{21e} ^2$   | -      | 11.5<br>6  | -    |      |

$$^1G_{\text{ma}} = |S_{21} / S_{12}| (k - (k^2 - 1)^{1/2})$$

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

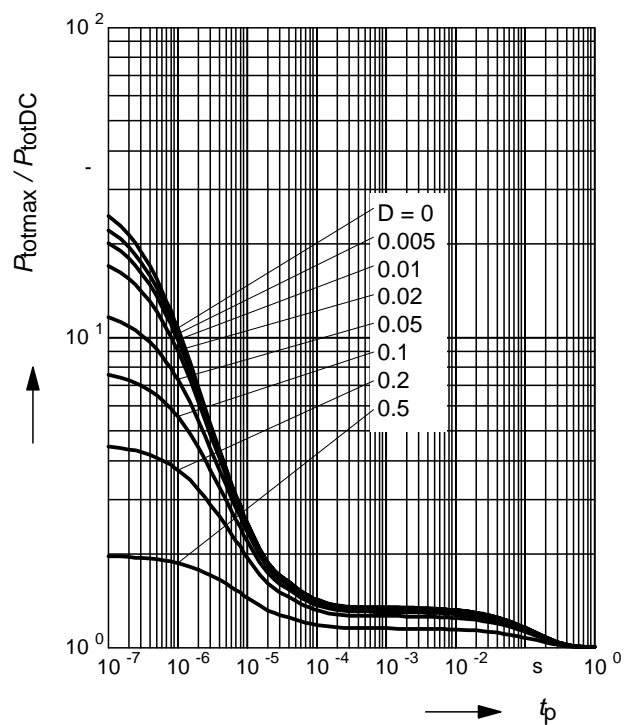


**Permissible Pulse Load  $R_{thJS} = f(t_p)$**



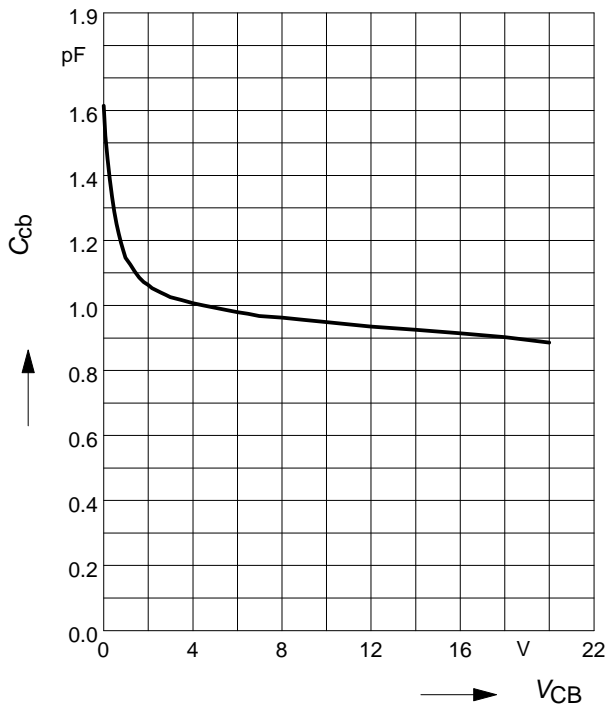
**Permissible Pulse Load**

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



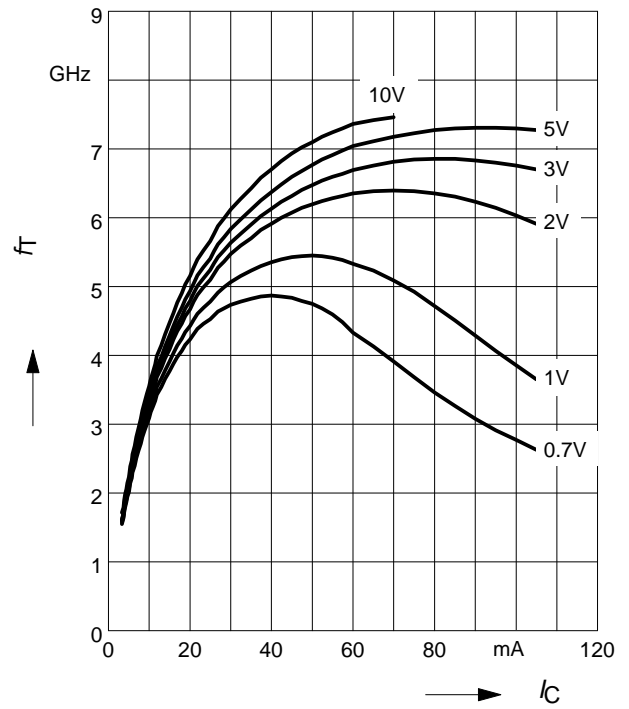
**Collector-base capacitance  $C_{cb} = f(V_{CB})$**

$f = 1\text{MHz}$



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

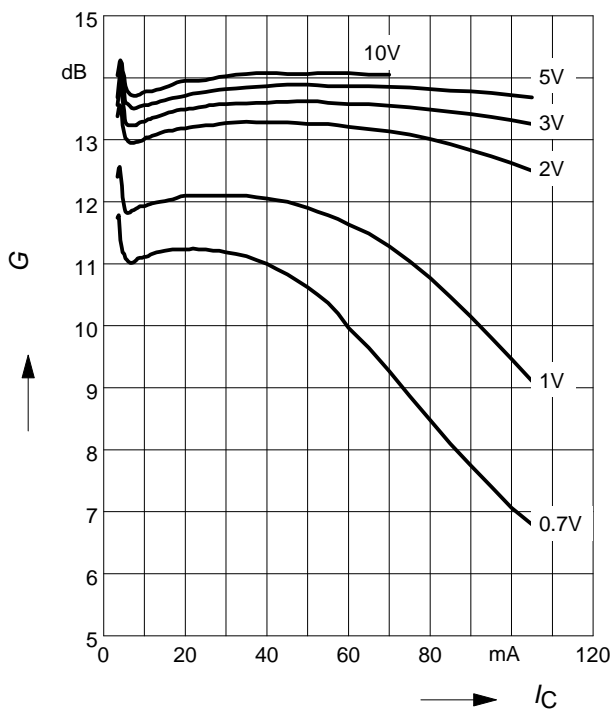
$V_{CE} = \text{Parameter}$



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

$f = 0.9\text{GHz}$

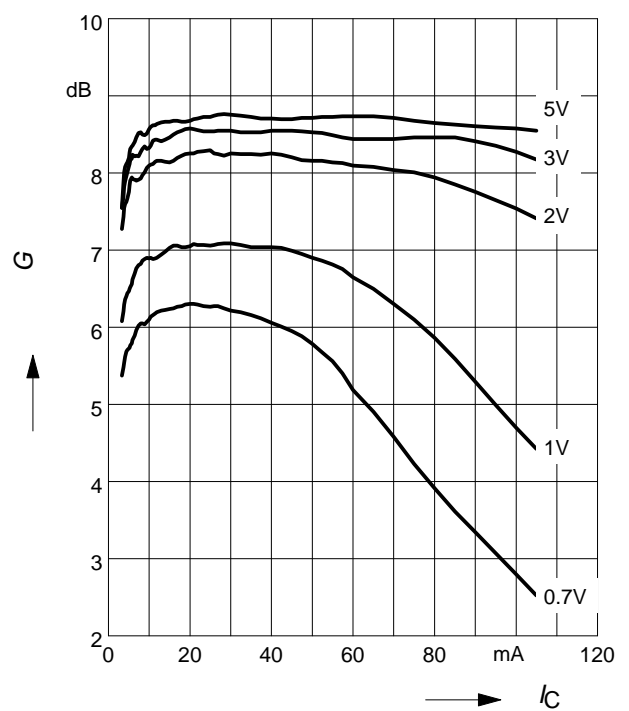
$V_{CE} = \text{Parameter}$



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

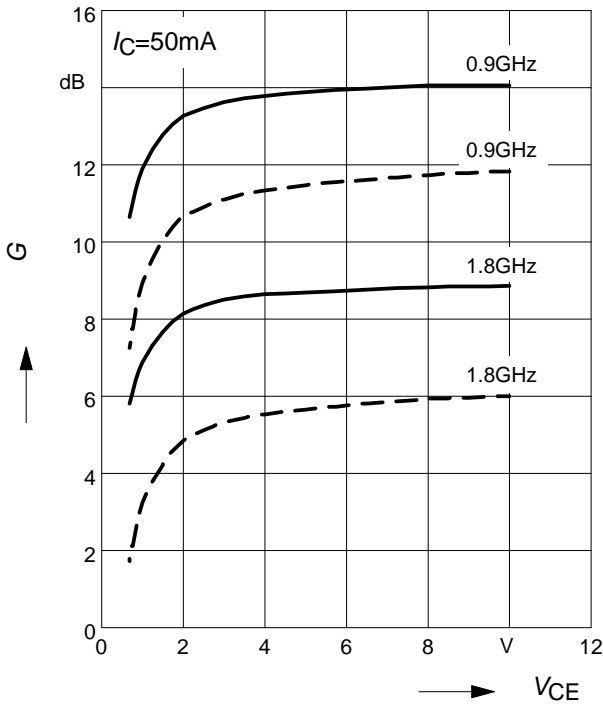
$f = 1.8\text{GHz}$

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



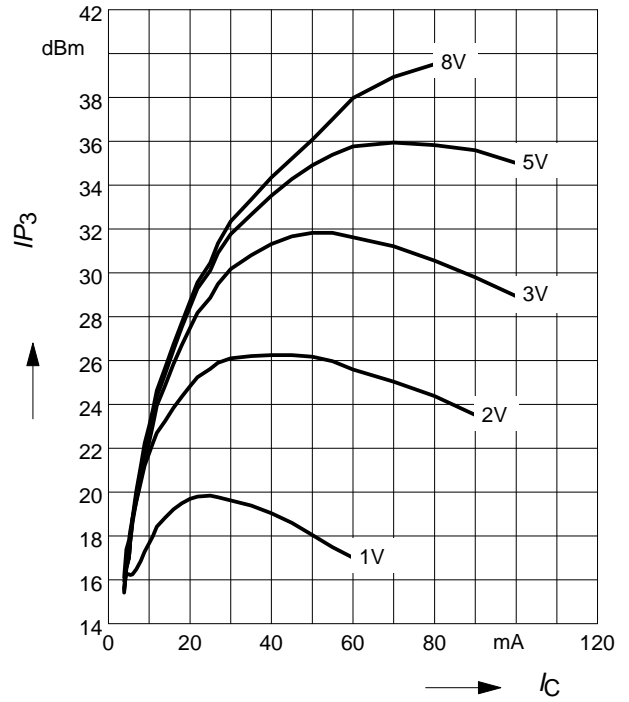
**Power Gain**  $G_{ma}, G_{ms} = f(V_{CE})$ : \_\_\_\_\_  
 $|S_{21}|^2 = f(V_{CE})$ : -----

$f$  = Parameter



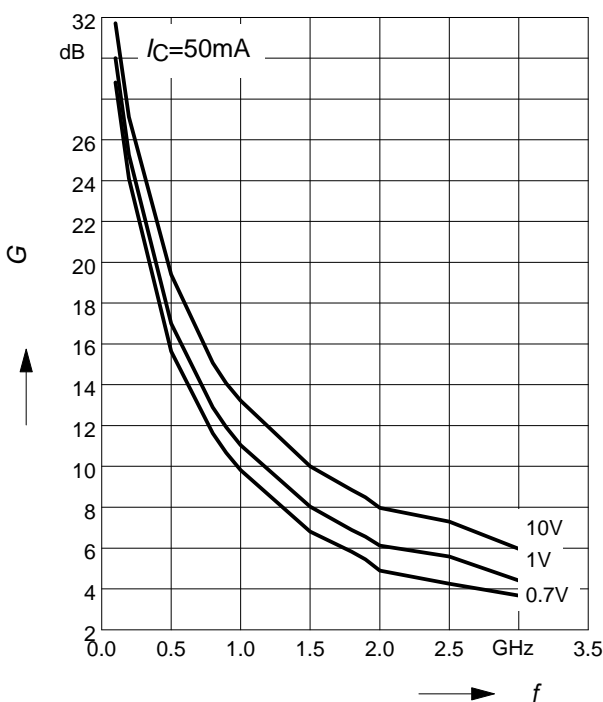
**Intermodulation Intercept Point**  $IP_3 = f(I_C)$   
 (3rd order, Output,  $Z_S = Z_L = 50\Omega$ )

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



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

$V_{CE}$  = Parameter



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

$V_{CE}$  = Parameter

