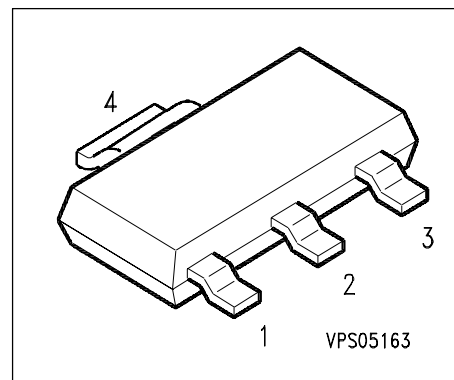


## NPN Silicon RF Transistor

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



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

| Type    | Marking | Ordering Code | Pin Configuration |       |       |       | Package |
|---------|---------|---------------|-------------------|-------|-------|-------|---------|
| BFG 196 | BFG196  | Q62702-F1292  | 1 = E             | 2 = B | 3 = E | 4 = C | SOT-223 |

### Maximum Ratings

| Parameter                                          | Symbol    | Values         | 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>$T_S \leq 90\text{ °C}$ | $P_{tot}$ | 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>1)</sup> | $R_{thJS}$ | $\leq 75$ | K/W |
|------------------------------------------|------------|-----------|-----|

1)  $T_S$  is measured on the collector lead at the soldering point to the pcb.

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

| Parameter                                                              | Symbol        | Values |      |      | Unit          |
|------------------------------------------------------------------------|---------------|--------|------|------|---------------|
|                                                                        |               | min.   | typ. | max. |               |
| DC Characteristics                                                     |               |        |      |      |               |
| Collector-emitter breakdown voltage<br>$I_C = 1\text{ mA}, I_B = 0$    | $V_{(BR)CEO}$ | 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  | -             |

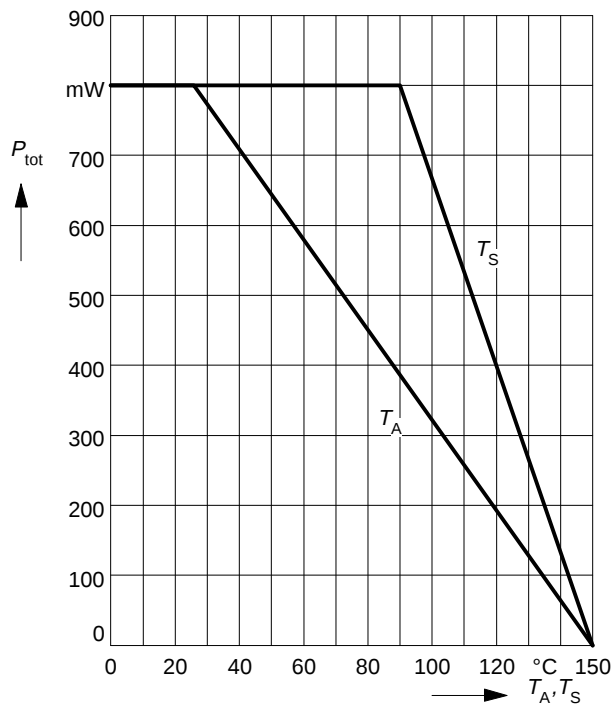
**Electrical Characteristics** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified.

| Parameter                                                                                                                                                | Symbol        | Values |            |        | Unit |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|------------|--------|------|
|                                                                                                                                                          |               | min.   | typ.       | max.   |      |
| AC Characteristics                                                                                                                                       |               |        |            |        |      |
| 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>$I_C = 20 \text{ mA}$ , $V_{CE} = 8 \text{ V}$ , $Z_S = Z_{Sopt}$<br>$f = 900 \text{ MHz}$<br>$f = 1.8 \text{ GHz}$                      | $F$           | -<br>- | 1.5<br>2.5 | -<br>- | dB   |
| Power gain 2)<br>$I_C = 50 \text{ mA}$ , $V_{CE} = 8 \text{ V}$ , $Z_S = Z_{Sopt}$<br>$Z_L = Z_{Lopt}$<br>$f = 900 \text{ MHz}$<br>$f = 1.8 \text{ GHz}$ | $G_{ma}$      | -<br>- | 14<br>8.5  | -<br>- |      |
| 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$ | -<br>- | 11.5<br>6  | -<br>- |      |

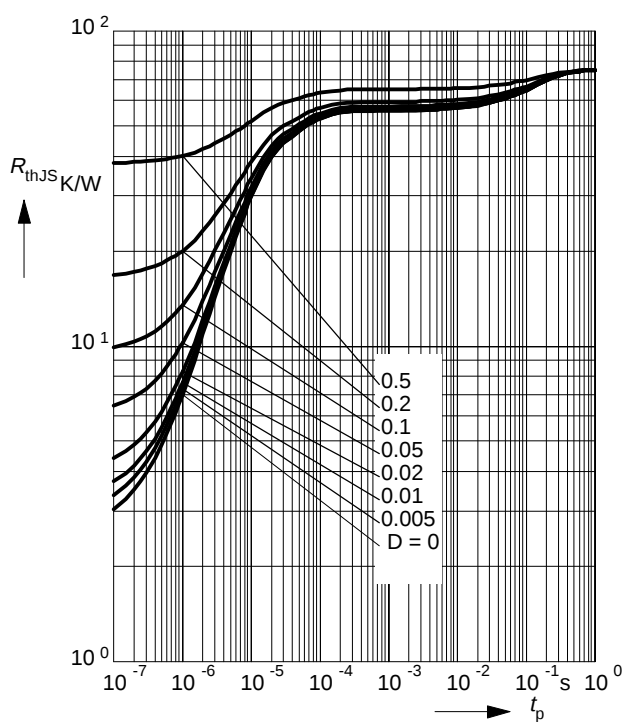
2)  $G_{ma} = |S_{21}/S_{12}| (k - (k^2 - 1)^{1/2})$

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

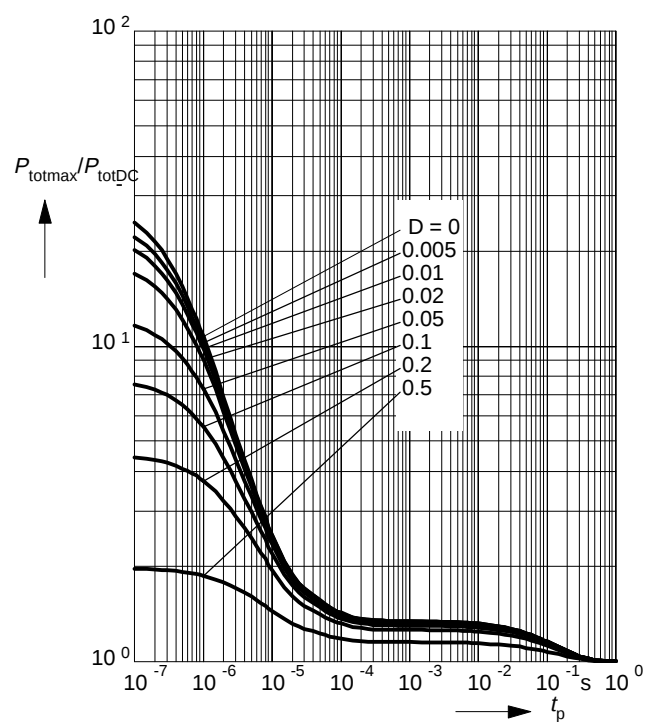
\* Package mounted on epoxy



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

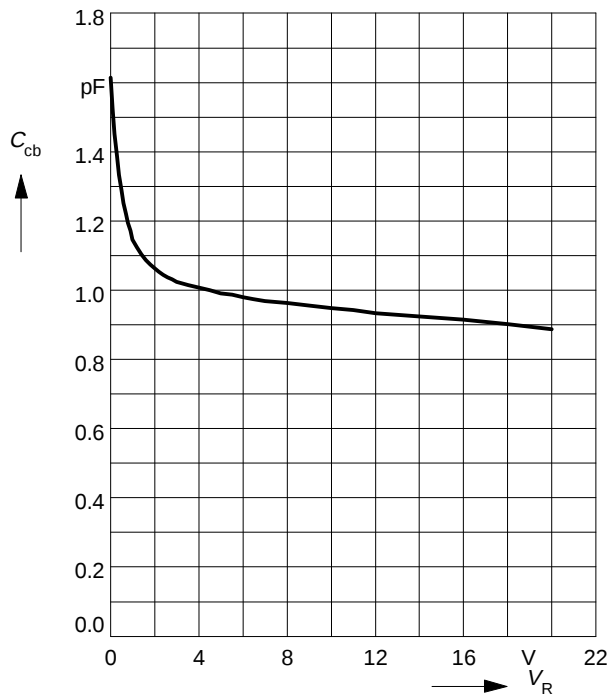


## Permissible Pulse Load $P_{\text{totmax}}/P_{\text{totDC}} = f(t_p)$



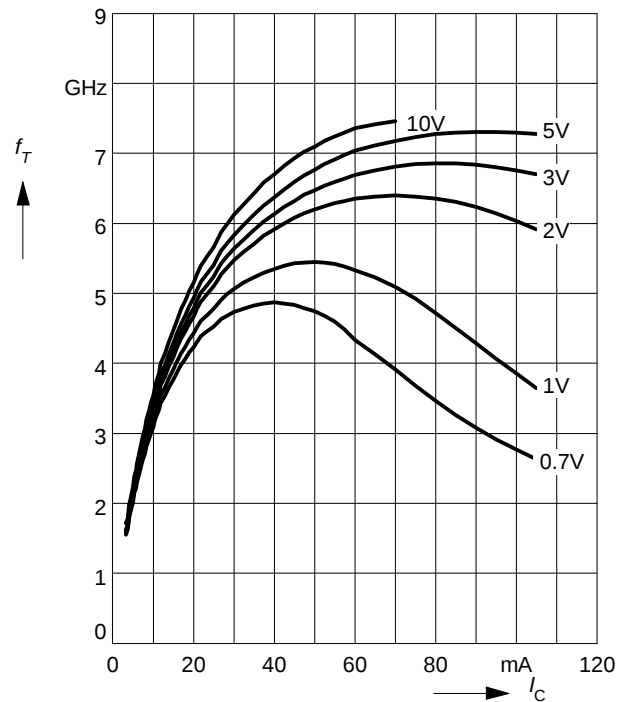
**Collector-base capacitance**  $C_{cb} = f(V_{CB})$

$V_{BE} = v_{be} = 0, f = 1\text{MHz}$



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

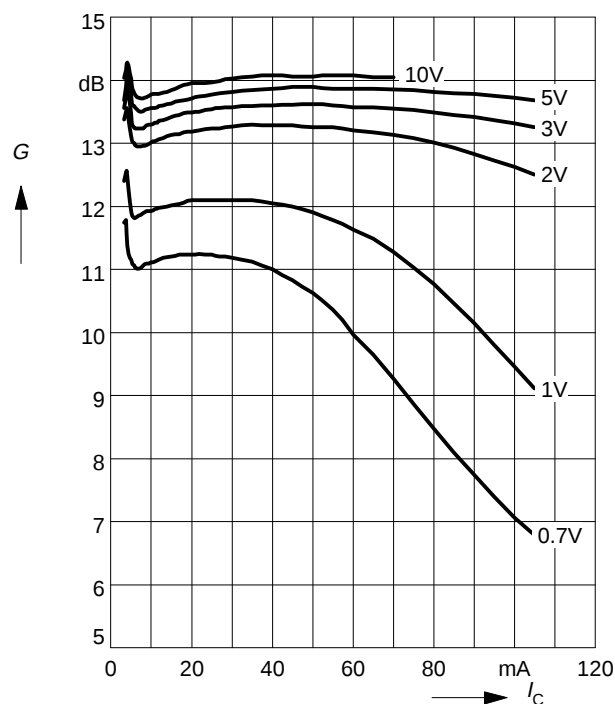
$V_{CE} = \text{Parameter}$



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

$f = 0.9\text{GHz}$

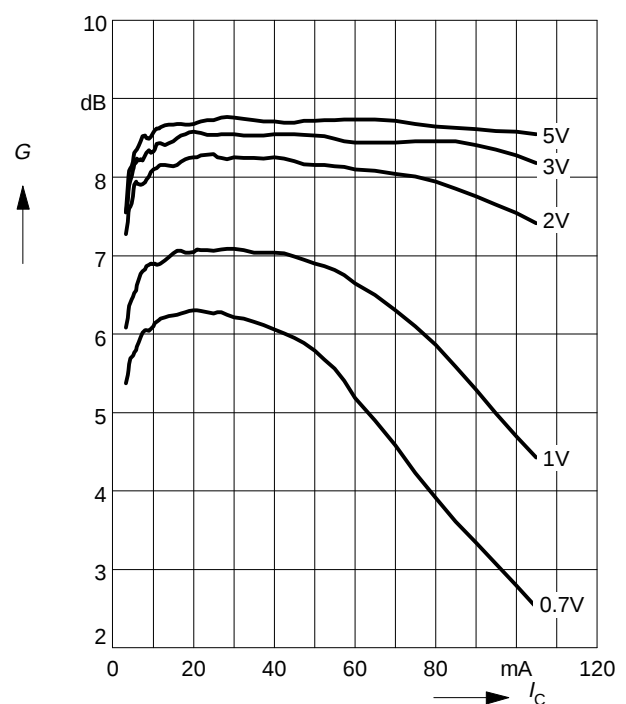
$V_{CE} = \text{Parameter}$



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

$f = 1.8\text{GHz}$

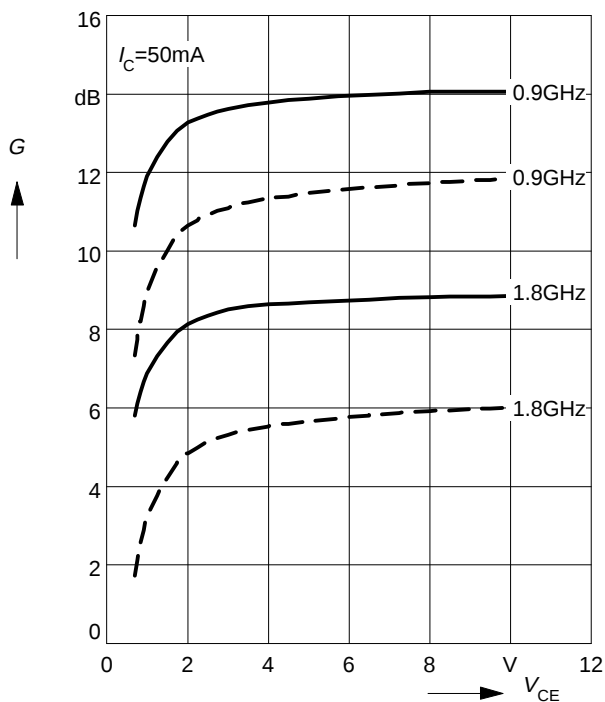
$V_{CE} = \text{Parameter}$



**Power Gain**  $G_{ma}$ ,  $G_{ms} = f(V_{CE})$ : \_\_\_\_\_

$|S_{21}|^2 = f(V_{CE})$ : -----

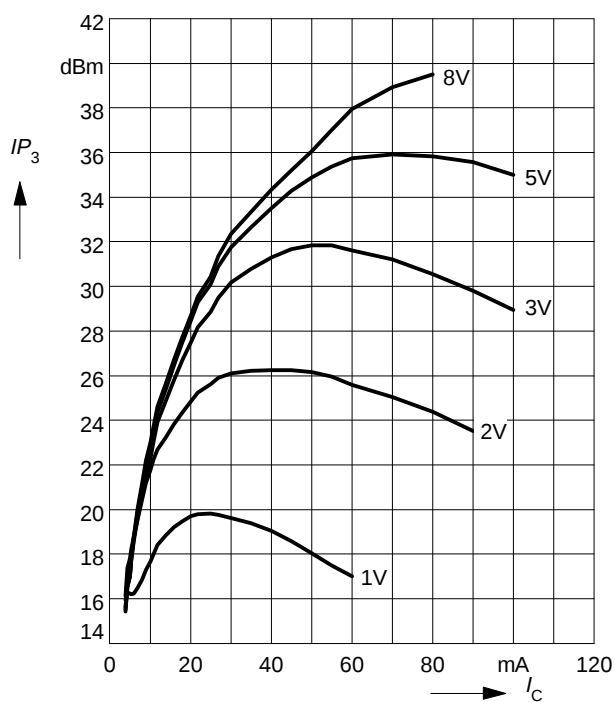
$f$  = Parameter



**Intermodulation Intercept Point**  $IP_3 = f(I_C)$

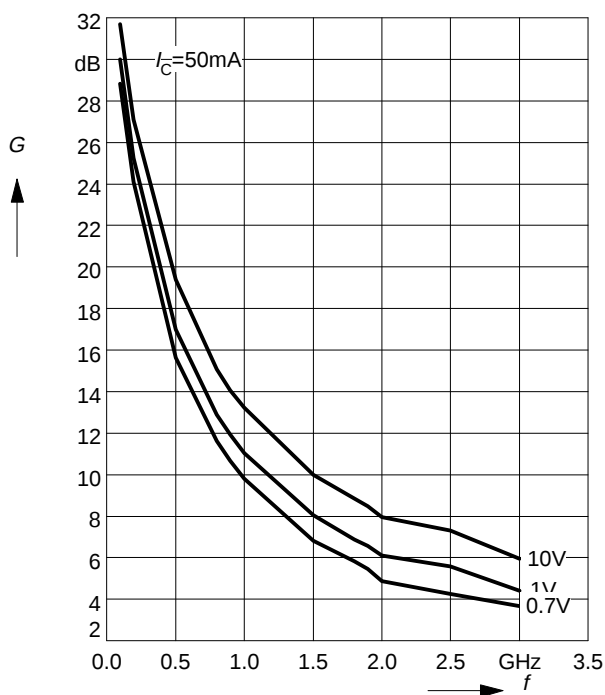
(3rd order, Output,  $Z_S = Z_L = 50\Omega$ )

$V_{CE}$  = 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

