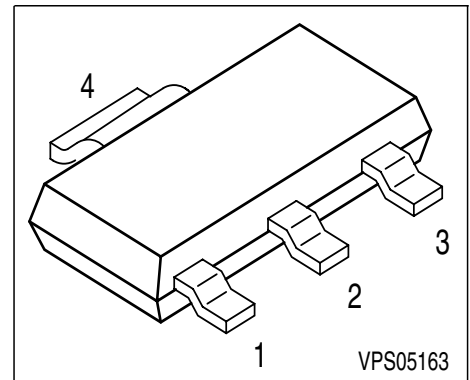


## NPN Silicon RF Transistor

- For low-distortion broadband output amplifier stages in antenna and telecommunication systems up to 2 GHz at collector currents from 120 mA to 250 mA
- Power amplifiers for DECT and PCN systems
- Integrated emitter ballast resistor
- $f_T = 5.5$  GHz



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

| Type    | Marking | Pin Configuration |       |       |       | Package |
|---------|---------|-------------------|-------|-------|-------|---------|
| BFG 235 | BFG235  | 1 = E             | 2 = B | 3 = E | 4 = C | SOT-223 |

### Maximum Ratings

| Parameter                                                | Symbol    | Value       | Unit             |
|----------------------------------------------------------|-----------|-------------|------------------|
| Collector-emitter voltage                                | $V_{CEO}$ | 15          | V                |
| Collector-emitter voltage                                | $V_{CES}$ | 25          |                  |
| Collector-base voltage                                   | $V_{CBO}$ | 25          |                  |
| Emitter-base voltage                                     | $V_{EBO}$ | 2           |                  |
| Collector current                                        | $I_C$     | 300         | mA               |
| Base current                                             | $I_B$     | 40          |                  |
| Total power dissipation, $T_S \leq 80^\circ\text{C}$ (F) | $P_{tot}$ | 2           | W                |
| Junction temperature                                     | $T_j$     | 150         | $^\circ\text{C}$ |
| Ambient temperature                                      | $T_A$     | -65 ... 150 |                  |
| Storage temperature                                      | $T_{stg}$ | -65 ... 150 |                  |

### Thermal Resistance

|                            |            |           |     |
|----------------------------|------------|-----------|-----|
| Junction - soldering point | $R_{thJS}$ | $\leq 35$ | K/W |
|----------------------------|------------|-----------|-----|

<sup>1</sup>  $T_S$  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>$I_C = 1\text{ mA}, I_B = 0$    | $V_{(BR)CEO}$ | 15     | -    | -    | V             |
| Collector-emitter cutoff current<br>$V_{CE} = 25\text{ V}, V_{BE} = 0$ | $I_{CES}$     | -      | -    | 200  | $\mu\text{A}$ |
| Collector-base cutoff current<br>$V_{CB} = 10\text{ V}, I_E = 0$       | $I_{CBO}$     | -      | -    | 100  | nA            |
| Emitter-base cutoff current<br>$V_{EB} = 1\text{ V}, I_C = 0$          | $I_{EBO}$     | -      | -    | 2    | $\mu\text{A}$ |
| DC current gain<br>$I_C = 200\text{ mA}, V_{CE} = 8\text{ V}$          | $h_{FE}$      | 50     | 120  | 250  | -             |

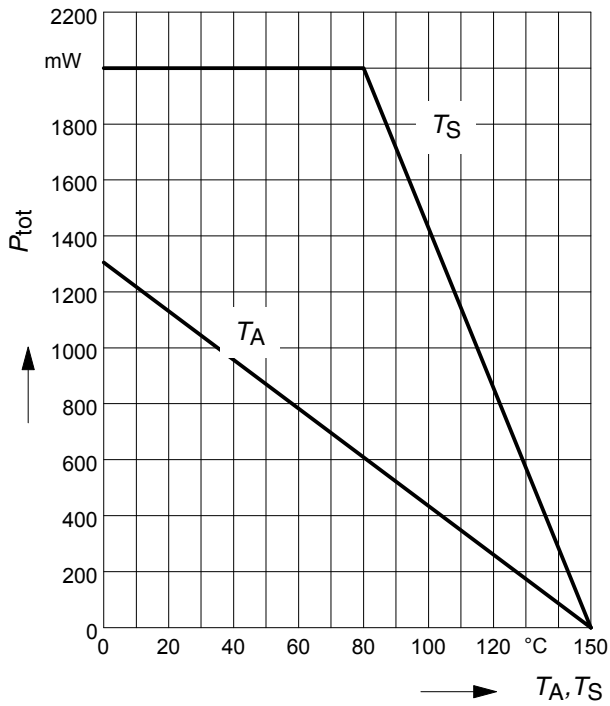
**Electrical Characteristics** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified.

| Parameter                                                                                                                                                    | Symbol        | Values |      |      | Unit |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|------|------|------|
|                                                                                                                                                              |               | min.   | typ. | max. |      |
| AC characteristics (verified by random sampling)                                                                                                             |               |        |      |      |      |
| Transition frequency<br>$I_C = 200\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $f = 200\text{ MHz}$                                                                 | $f_T$         | 4      | 5.5  | -    | GHz  |
| Collector-base capacitance<br>$V_{CB} = 10\text{ V}$ , $f = 1\text{ MHz}$                                                                                    | $C_{cb}$      | -      | 2.6  | 3.6  | pF   |
| Collector-emitter capacitance<br>$V_{CE} = 10\text{ V}$ , $f = 1\text{ MHz}$                                                                                 | $C_{ce}$      | -      | 1.5  | -    |      |
| Emitter-base capacitance<br>$V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$                                                                                     | $C_{eb}$      | -      | 15   | -    |      |
| Noise figure<br>$I_C = 60\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ ,<br>$f = 900\text{ MHz}$                                                    | $F$           | -      | 2.7  | -    | dB   |
| Power gain, maximum available <sup>F)</sup><br>$I_C = 200\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ ,<br>$f = 900\text{ MHz}$ | $G_{ma}$      | -      | 12   | -    |      |
| Transducer gain<br>$I_C = 200\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_L = 50\Omega$ ,<br>$f = 900\text{ MHz}$                                          | $ S_{21e} ^2$ | -      | 6    | -    |      |
| Third order intercept point<br>$I_C = 200\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_L = 50\Omega$ ,<br>$f = 900\text{ MHz}$                              | $IP_3$        | -      | 40   | -    | dBm  |

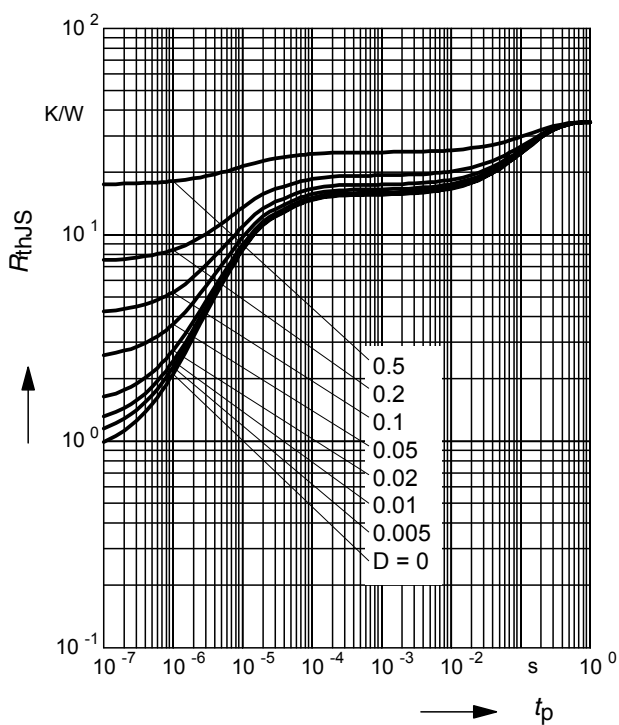
$$^1G_{ma} = |S_{21} / S_{12}| (k - (k^2 - 1)^{1/2})$$

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

\* Package mounted on epoxy

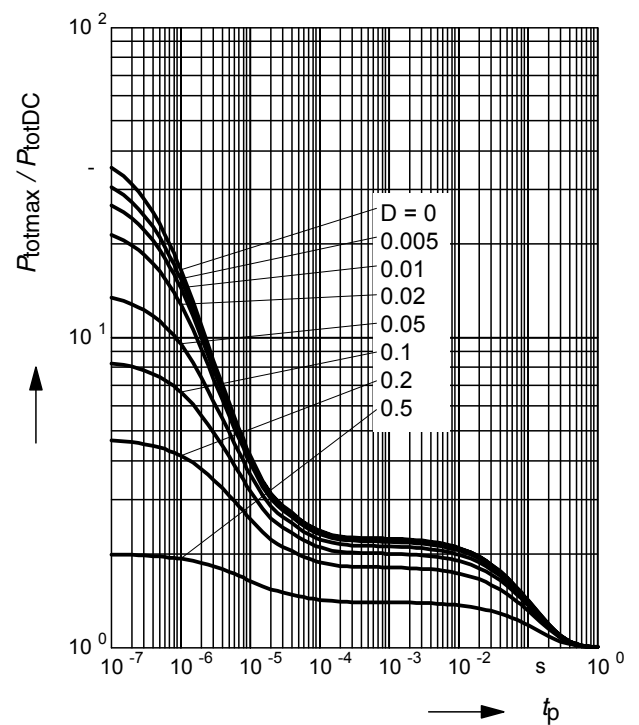


**Permissible Pulse Load**  $R_{\text{thJS}} = f(t_p)$



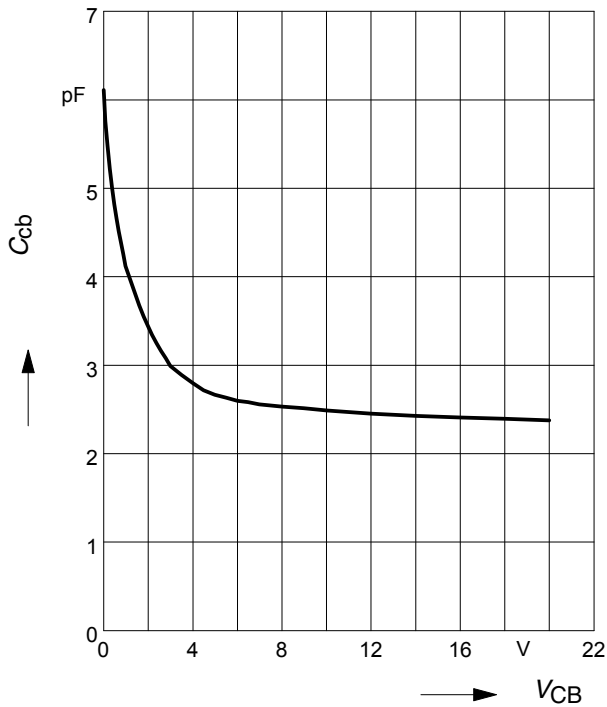
**Permissible Pulse Load**

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



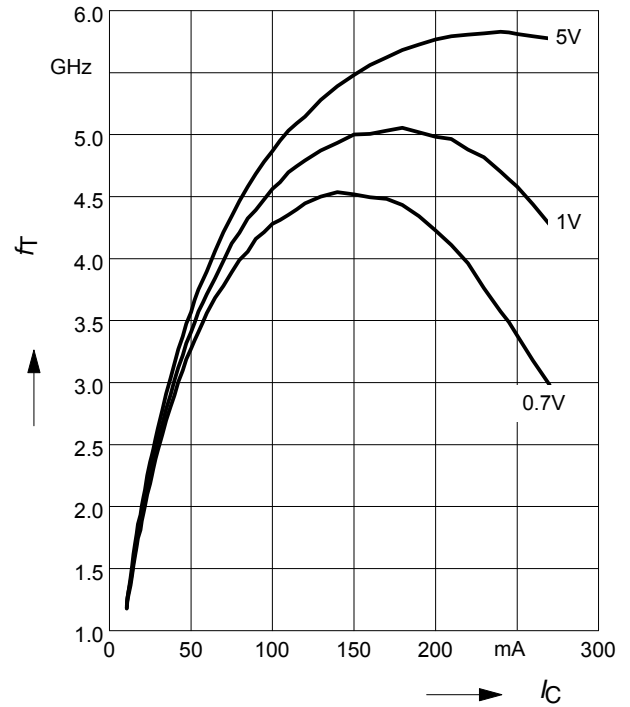
**Collector-base capacitance**  $C_{cb} = f(V_{CB})$

$f = 1\text{MHz}$



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

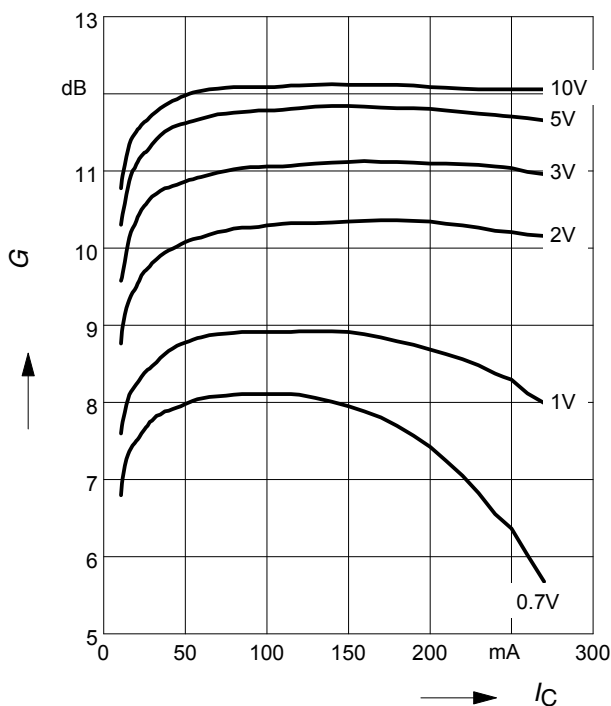
$V_{CE} = \text{Parameter}$



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

$f = 0.9\text{GHz}$

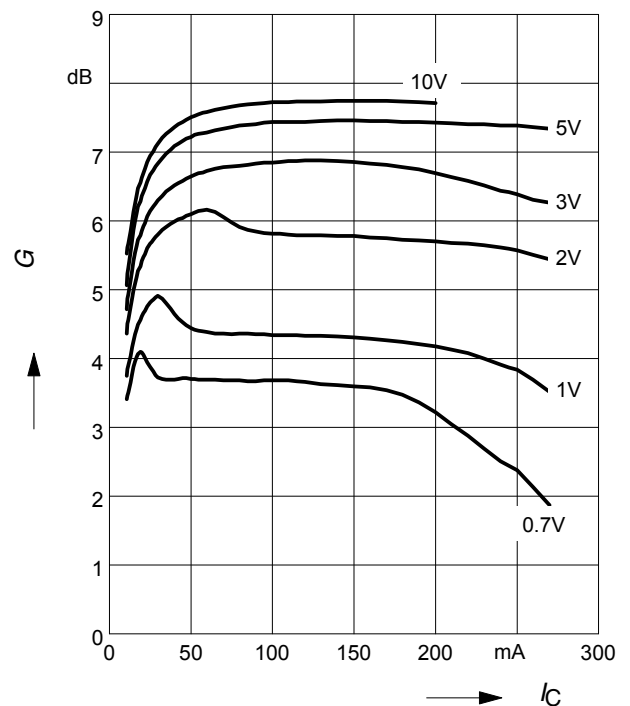
$V_{CE} = \text{Parameter}$



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

$f = 1.8\text{GHz}$

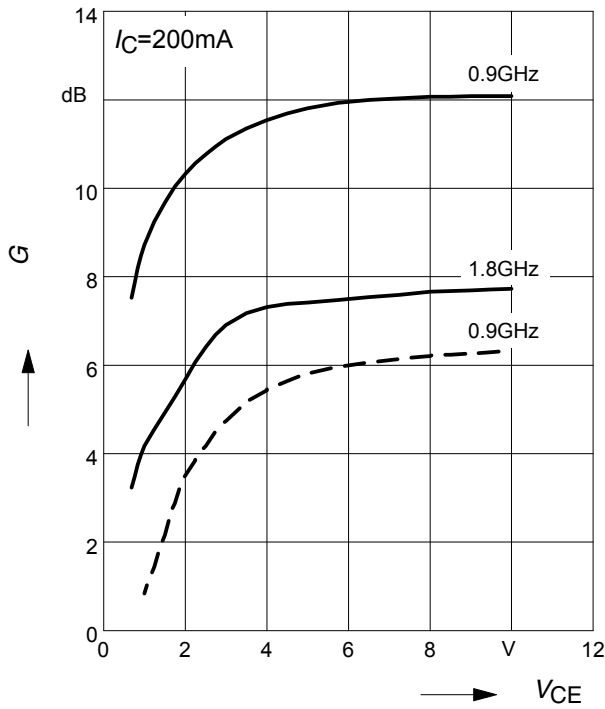
$V_{CE} = \text{Parameter}$



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

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

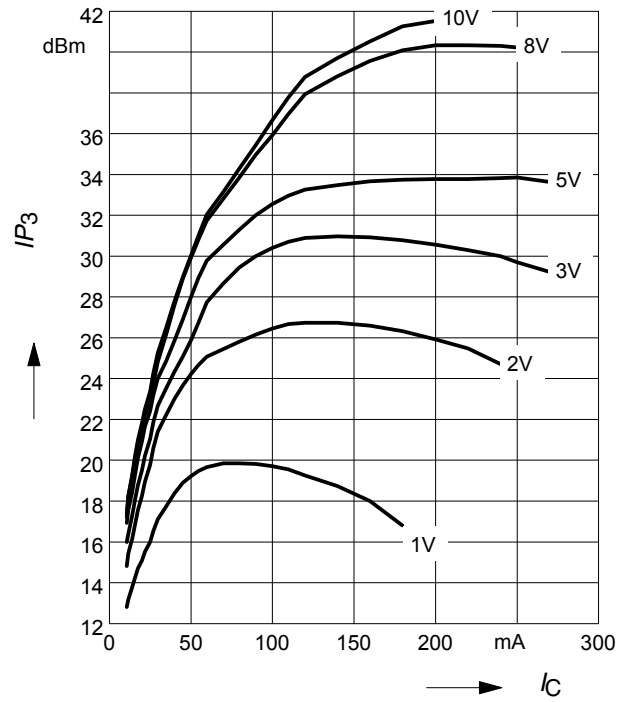
$f$  = Parameter



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

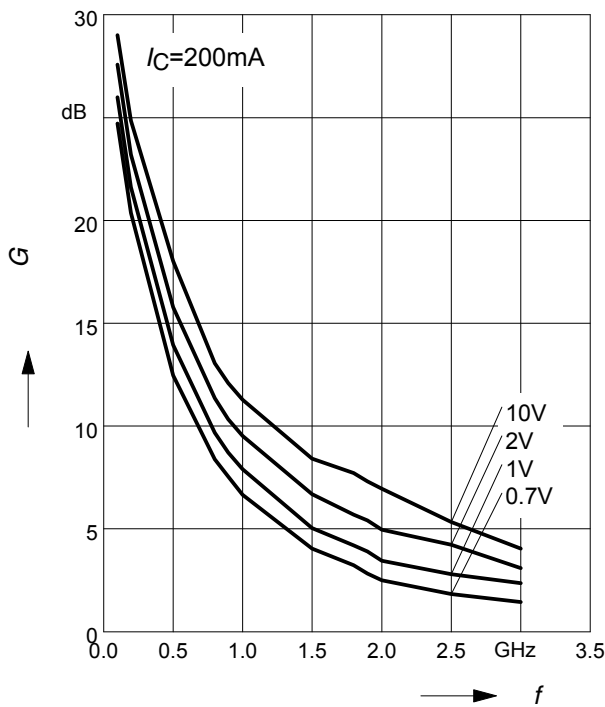
(3rd order, Output,  $Z_S = Z_L = 50\Omega$ )

$V_{CE}$  = 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

