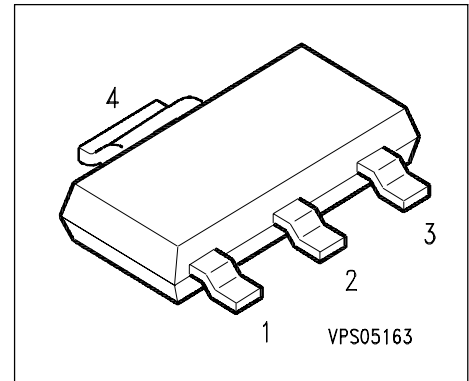


## NPN Silicon RF Transistor

- For low-distortion broadband output amplifier stages in antenna and telecommunications systems up to 2 GHz at collector currents from 70mA to 130mA
- Power amplifiers for DECT and PCN systems
- Integrated emitter ballast resistor
- $f_T = 6$  GHz



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

| Type     | Marking | Ordering Code | Pin Configuration |       |       |       | Package |
|----------|---------|---------------|-------------------|-------|-------|-------|---------|
| BFG 135A | BFG135A | Q62702-F1322  | 1 = E             | 2 = B | 3 = E | 4 = C | SOT-223 |

### Maximum Ratings

| Parameter                                    | Symbol    | Values         | 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                            | $I_C$     | 150            | mA   |
| Base current                                 | $I_B$     | 20             |      |
| Total power dissipation<br>$T_S \leq 100$ °C | $P_{tot}$ | 1000           | 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> | $R_{thJS}$ | $\leq 50$ | 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. |               |
| <b>DC Characteristics</b>   |               |        |      |      |               |
| Collector-emitter breakdown voltage<br>$I_C = 1 \text{ mA}, I_B = 0$    | $V_{(BR)CEO}$ | 15     | -    | -    | V             |
| Collector-emitter cutoff current<br>$V_{CE} = 25 \text{ V}, V_{BE} = 0$ | $I_{CES}$     | -      | -    | 100  | $\mu\text{A}$ |
| Collector-base cutoff current<br>$V_{CB} = 10 \text{ V}, I_E = 0$       | $I_{CBO}$     | -      | -    | 50   | nA            |
| Emitter-base cutoff current<br>$V_{EB} = 1 \text{ V}, I_C = 0$          | $I_{EBO}$     | -      | -    | 1    | $\mu\text{A}$ |
| DC current gain<br>$I_C = 100 \text{ mA}, V_{CE} = 8 \text{ V}$         | $h_{FE}$      | 80     | 120  | 250  | -             |

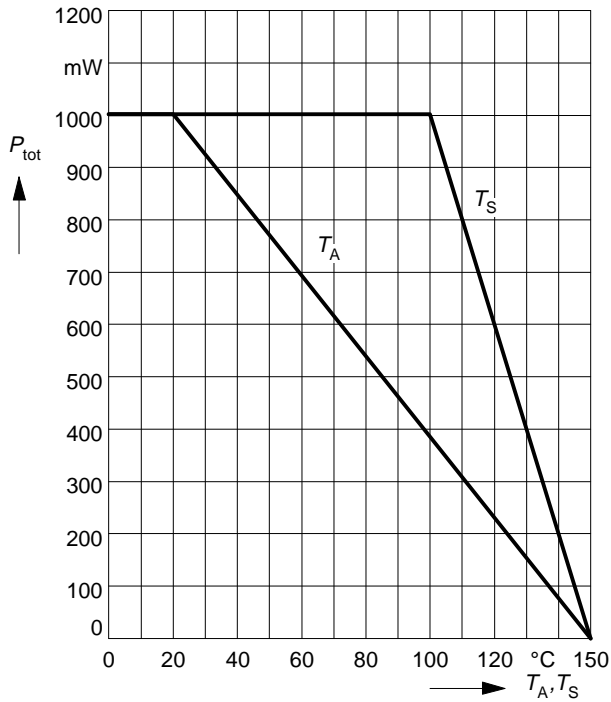
**Electrical Characteristics** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified.

| Parameter  | Symbol          | Values |          |      | Unit |
|--|-----------------|--------|----------|------|------|
|  |                 | min.   | typ.     | max. |      |
| <b>AC Characteristics</b>  |                 |        |          |      |      |
| Transition frequency<br>$I_C = 100 \text{ mA}, V_{CE} = 8 \text{ V}, f = 200 \text{ MHz}$  | $f_T$           | 4.5    | 6        | -    | GHz  |
| Collector-base capacitance<br>$V_{CB} = 10 \text{ V}, f = 1 \text{ MHz}$   | $C_{cb}$        | -      | 1.3      | 1.8  | pF   |
| Collector-emitter capacitance<br>$V_{CE} = 10 \text{ V}, f = 1 \text{ MHz}$  | $C_{ce}$        | -      | 0.8      | -    |      |
| Emitter-base capacitance<br>$V_{EB} = 0.5 \text{ V}, f = 1 \text{ MHz}$  | $C_{eb}$        | -      | 7.5      | -    |      |
| Noise figure<br>$I_C = 30 \text{ mA}, V_{CE} = 8 \text{ V}, Z_S = Z_{\text{Sopt}}$<br>$f = 900 \text{ MHz}$<br>$f = 1.8 \text{ GHz}$   | $F$             | -      | 2<br>3.7 | -    | dB   |
| Power gain <sup>2)</sup><br>$I_C = 100 \text{ mA}, V_{CE} = 8 \text{ V}, Z_S = Z_{\text{Sopt}}$<br>$Z_L = Z_{\text{Lopt}}$<br>$f = 900 \text{ MHz}$<br>$f = 1.8 \text{ GHz}$ | $G_{\text{ma}}$ | -      | 14<br>9  | -    |      |
| Transducer gain<br>$I_C = 100 \text{ mA}, V_{CE} = 8 \text{ V}, Z_S = Z_L = 50 \Omega$<br>$f = 900 \text{ MHz}$<br>$f = 1.8 \text{ GHz}$                                     | $ S_{21e} ^2$   | -      | 10<br>4  | -    |      |
| Third order intercept point<br>$I_C = 100 \text{ mA}, V_{CE} = 8 \text{ V}, f = 900 \text{ MHz}$<br>$Z_S = Z_L = 50 \Omega$  | $IP_3$          | -      | 38       | -    | dBm  |

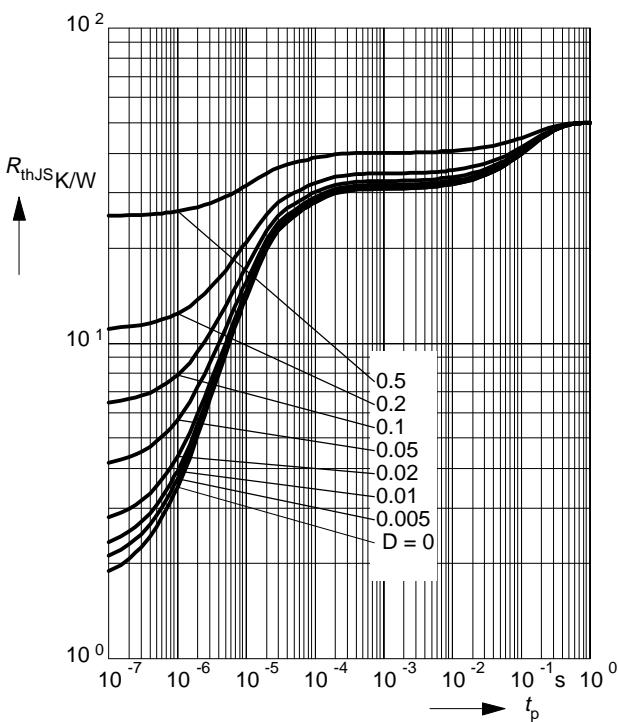
2)  $G_{\text{ma}} = |S_{21}/S_{12}| (k - (k^2 - 1)^{1/2})$

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

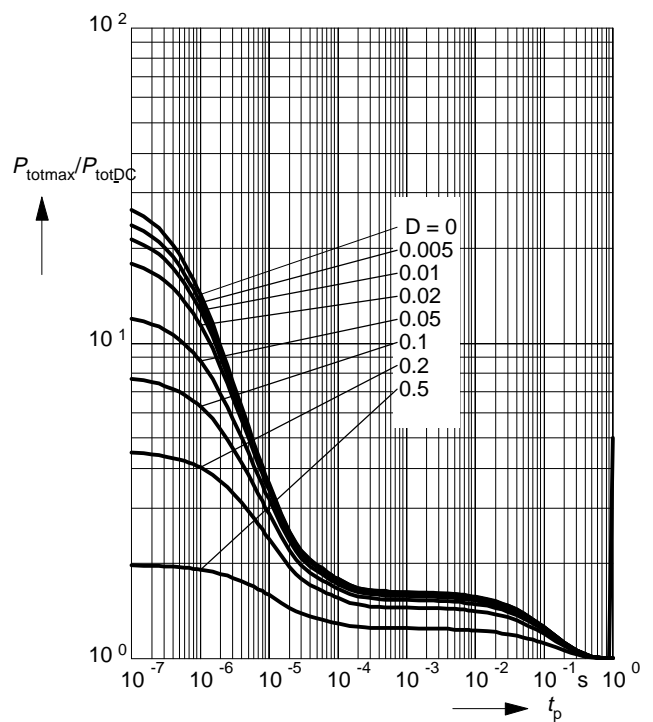
\* Package mounted on epoxy



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

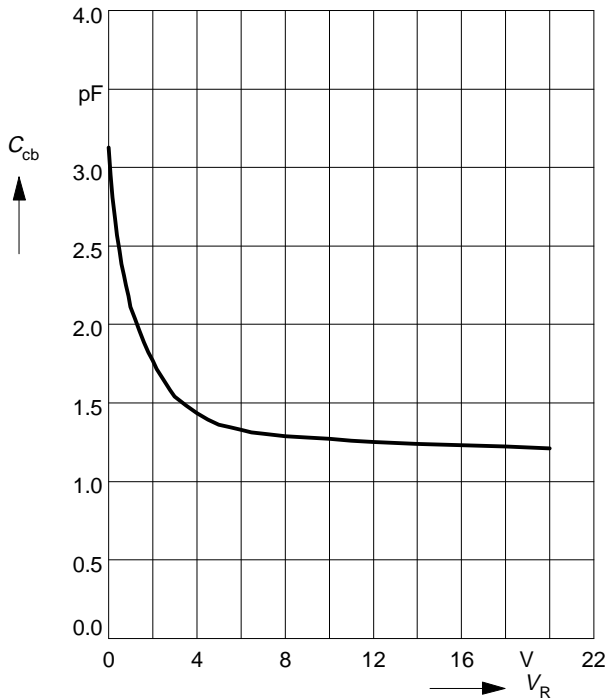


### Permissible Pulse Load $P_{totmax}/P_{totDC} = f(t_p)$



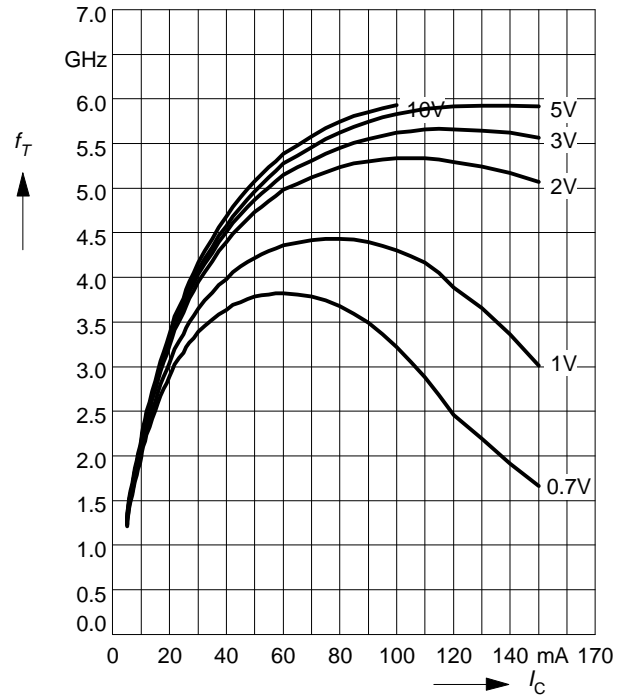
### Collector-base capacitance $C_{cb} = f(V_{CB})$

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



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

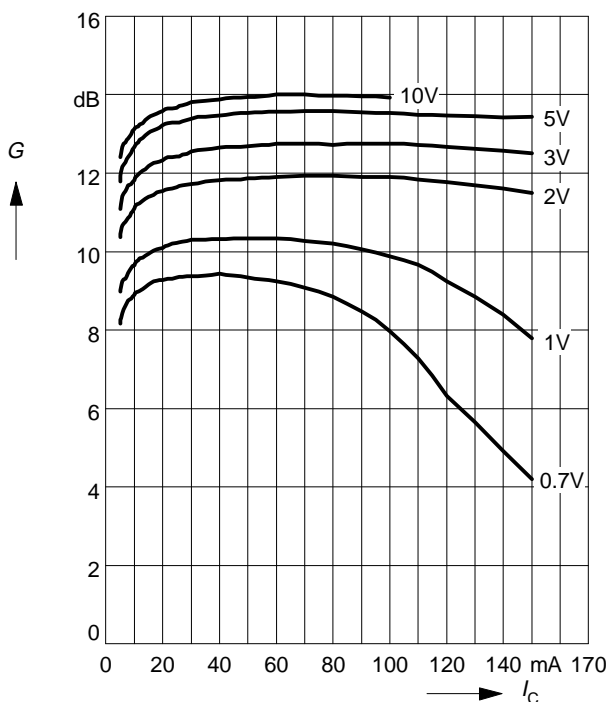
$V_{CE} = \text{Parameter}$



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

$f = 0.9\text{GHz}$

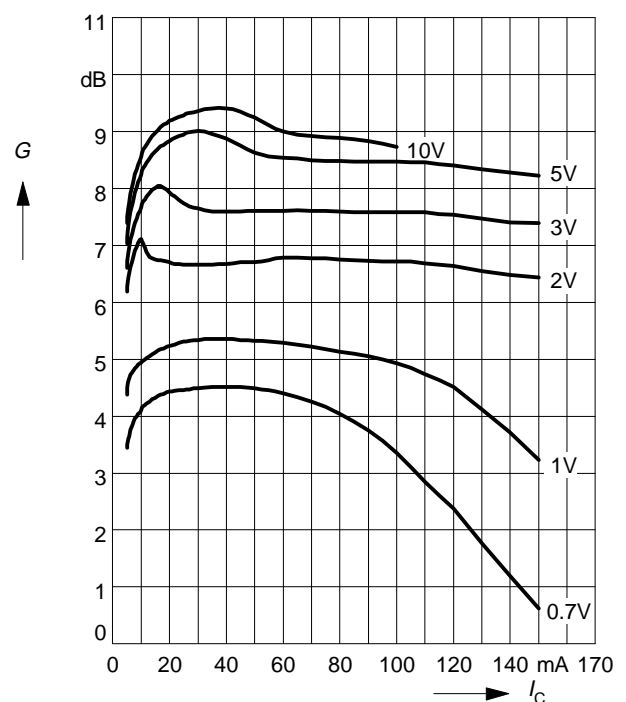
$V_{CE} = \text{Parameter}$



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

$f = 1.8\text{GHz}$

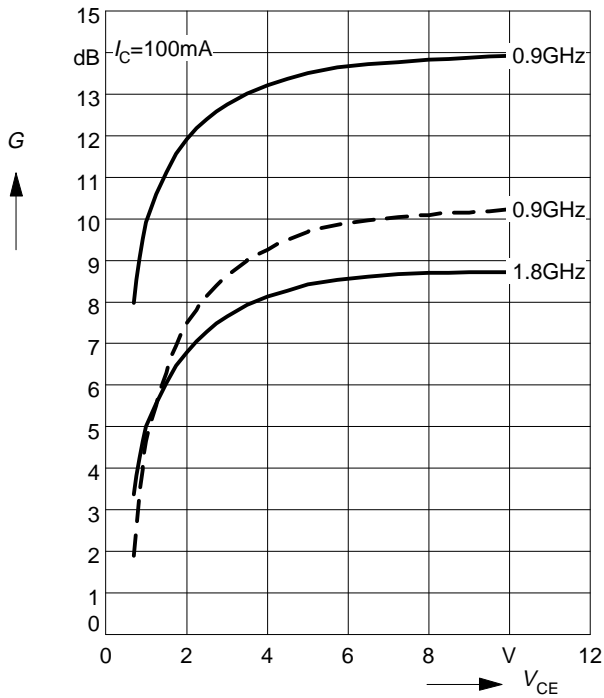
$V_{CE} = \text{Parameter}$



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

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

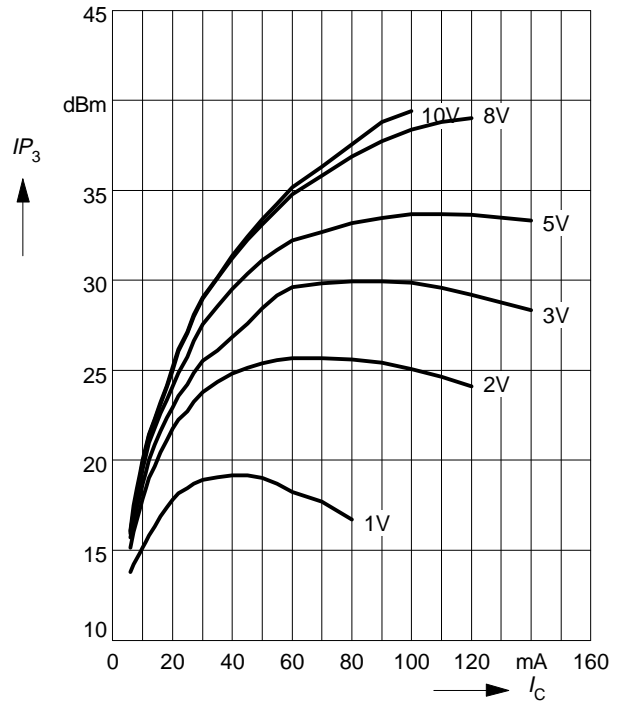
$f =$  Parameter



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

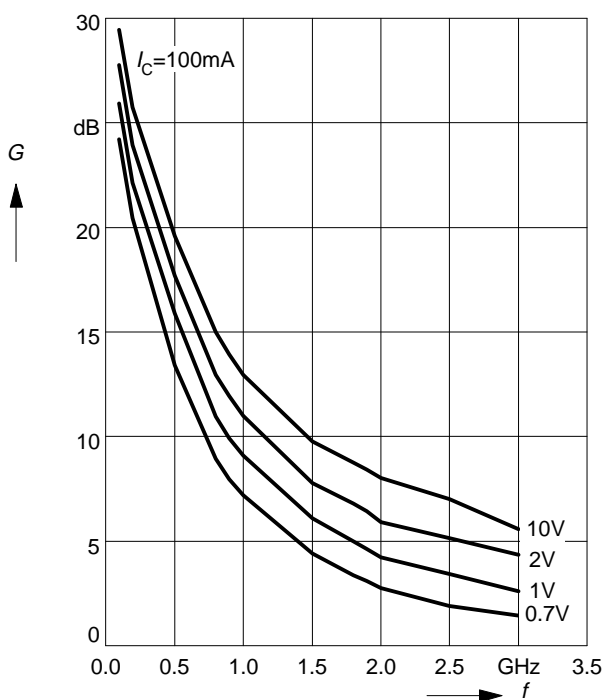
(3rd order, Output,  $Z_S = Z_L = 50\Omega$ )

$V_{CE} =$  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

