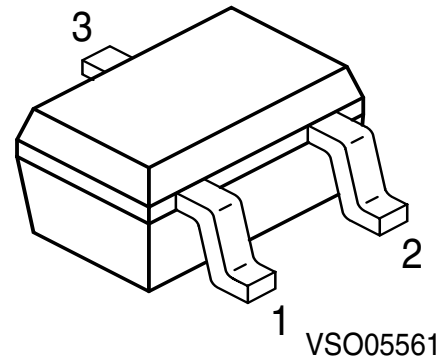


## NPN Silicon RF Transistor

- For broadband amplifiers up to 2 GHz and fast non-saturated switches at collector currents from 0.5 mA to 20 mA
- Complementary type BFT 92 (PNP)



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

| Type    | Marking | Pin Configuration |       |       | Package |
|---------|---------|-------------------|-------|-------|---------|
| BFR 92W | P1s     | 1 = B             | 2 = E | 3 = C | SOT-323 |

### Maximum Ratings

| Parameter                                                 | Symbol    | Value       | Unit             |
|-----------------------------------------------------------|-----------|-------------|------------------|
| Collector-emitter voltage                                 | $V_{CEO}$ | 15          | V                |
| Collector-emitter voltage                                 | $V_{CES}$ | 20          |                  |
| Collector-base voltage                                    | $V_{CBO}$ | 20          |                  |
| Emitter-base voltage                                      | $V_{EBO}$ | 2.5         |                  |
| Collector current                                         | $I_C$     | 30          | mA               |
| Base current                                              | $I_B$     | 4           |                  |
| Total power dissipation<br>TS $\leq 86^\circ\text{C}^1$ ) | $P_{tot}$ | 280         | mW               |
| Junction temperature                                      | $T_j$     | 150         | $^\circ\text{C}$ |
| Ambient temperature                                       | $T_A$     | -65 ... 150 |                  |
| Storage temperature                                       | $T_{stg}$ | -65 ... 150 |                  |

### Thermal Resistance

| Parameter                  | Symbol     | Value      | Unit |
|----------------------------|------------|------------|------|
| Junction - soldering point | $R_{thJS}$ | $\leq 230$ | K/W  |

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

**Electrical Characteristics**

| Parameter                                                                 | Symbol        | Values |      |      | Unit          |
|---------------------------------------------------------------------------|---------------|--------|------|------|---------------|
|                                                                           |               | min.   | typ. | max. |               |
| Characteristics                                                           |               |        |      |      |               |
| Collector-emitter breakdown voltage<br>$I_C = 1\text{ mA}$ , $I_B = 0$    | $V_{(BR)CEO}$ | 15     | -    | -    | V             |
| Collector-emitter cutoff current<br>$V_{CE} = 20\text{ V}$ , $V_{BE} = 0$ | $I_{CES}$     | -      | -    | 10   | $\mu\text{A}$ |
| Collector -base cutoff current<br>$V_{CB} = 10\text{ V}$ , $I_E = 0$      | $I_{CBO}$     | -      | -    | 100  | nA            |
| Emitter-base cutoff current<br>$V_{EB} = 2.5\text{ V}$ , $I_C = 0$        | $I_{EBO}$     | -      | -    | 100  | $\mu\text{A}$ |
| DC current gain<br>$I_C = 10\text{ mA}$ , $V_{CE} = 8\text{ V}$           | $h_{FE}$      | 40     | 100  | 200  | -             |

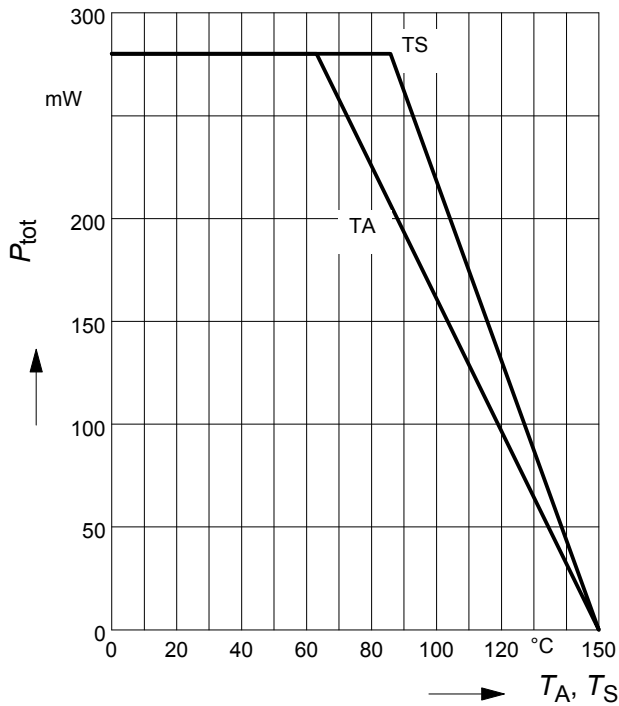
**Electrical Characteristics**

| Parameter                                                                                                                                                                           | Symbol        | Values |            |        | Unit |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|------------|--------|------|
|                                                                                                                                                                                     |               | min.   | typ.       | max.   |      |
| AC Characteristics                                                                                                                                                                  |               |        |            |        |      |
| Transition frequency<br>$I_C = 10\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $f = 500\text{ MHz}$                                                                                         | $f_T$         | 3.5    | 5.5        | -      | GHz  |
| Collector-base capacitance<br>$V_{CB} = 10\text{ V}$ , $f = 1\text{ MHz}$                                                                                                           | $C_{cb}$      | -      | 0.4        | 0.6    | pF   |
| Collector emitter capacitance<br>$V_{CE} = 10\text{ V}$ , $f = 1\text{ MHz}$                                                                                                        | $C_{ce}$      | -      | 0.25       | -      |      |
| Emitter-base capacitance<br>$V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$                                                                                                            | $C_{eb}$      | -      | 0.5        | -      |      |
| Noise figure<br>$I_C = 2\text{ mA}$ , $V_{CE} = 6\text{ V}$ , $Z_S = Z_{Sopt}$ ,<br>$f = 900\text{ MHz}$<br>$f = 1.8\text{ GHz}$                                                    | $F$           | -<br>- | 1<br>1.6   | -<br>- | dB   |
| Power gain, maximum available <sup>1)</sup><br>$I_C = 10\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ ,<br>$Z_L = Z_{Lopt}$ , $f = 900\text{ MHz}$<br>$f = 1.8\text{ GHz}$ | $G_{ma}$      | -<br>- | 17<br>11.5 | -<br>- |      |
| Transducer gain<br>$I_C = 10\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_L = 50\Omega$ ,<br>$f = 900\text{ MHz}$<br>$f = 1.8\text{ GHz}$                                          | $ S_{21e} ^2$ | -<br>- | 13.5<br>8  | -<br>- |      |

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

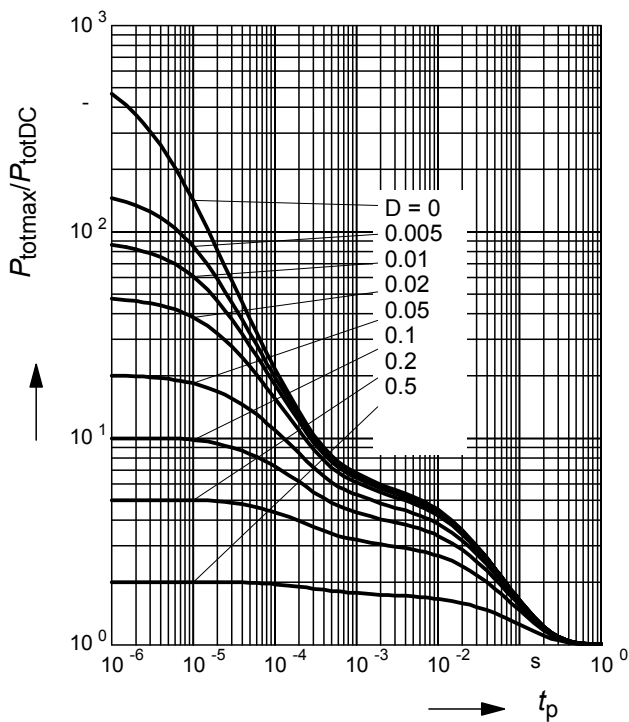
**Total power dissipation**  $P_{\text{tot}} = (T_A^*; T_S)$

\* Package mounted on epoxy

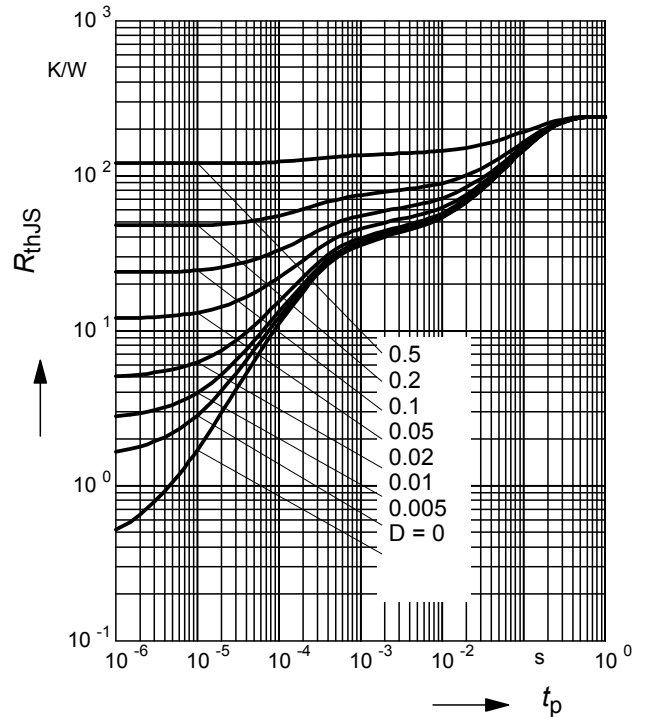


**Permissible Pulse Load**

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

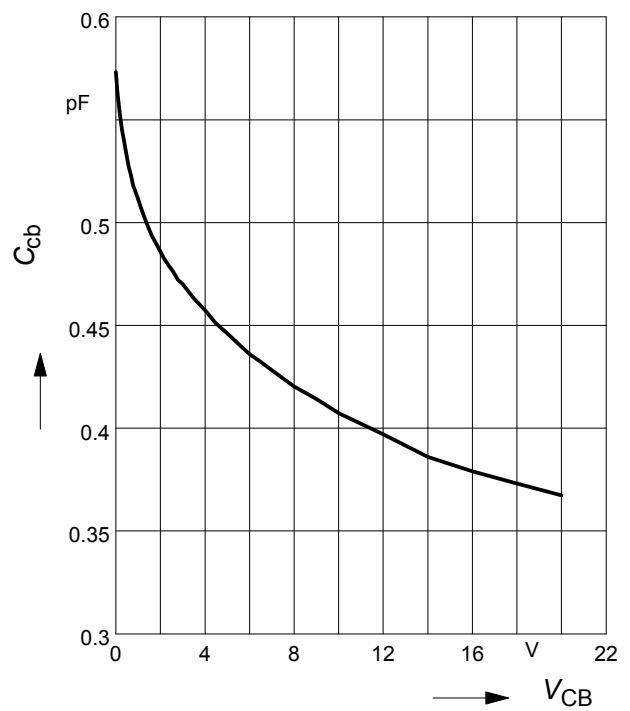


**Permissible Pulse Load**  $R_{\text{thJS}} = f(t_p)$



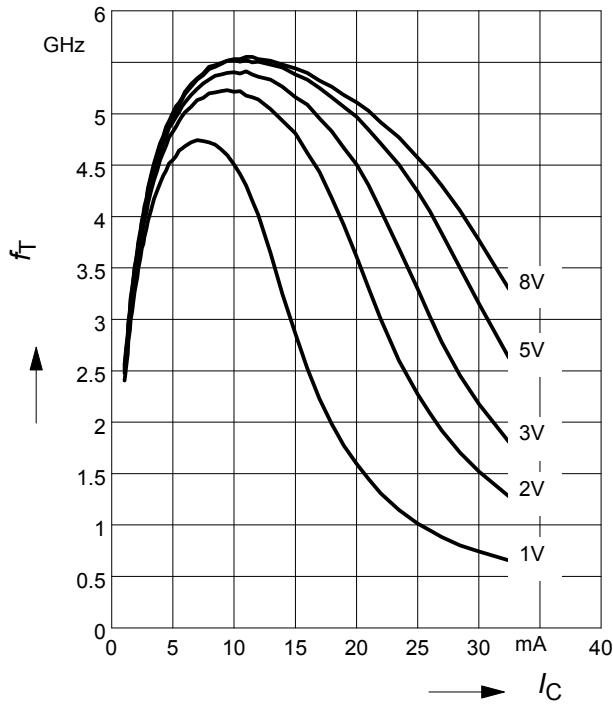
**Collector-base capacitance**  $C_{\text{cb}} = f(V_{\text{CB}})$

$f = 1\text{MHz}$



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

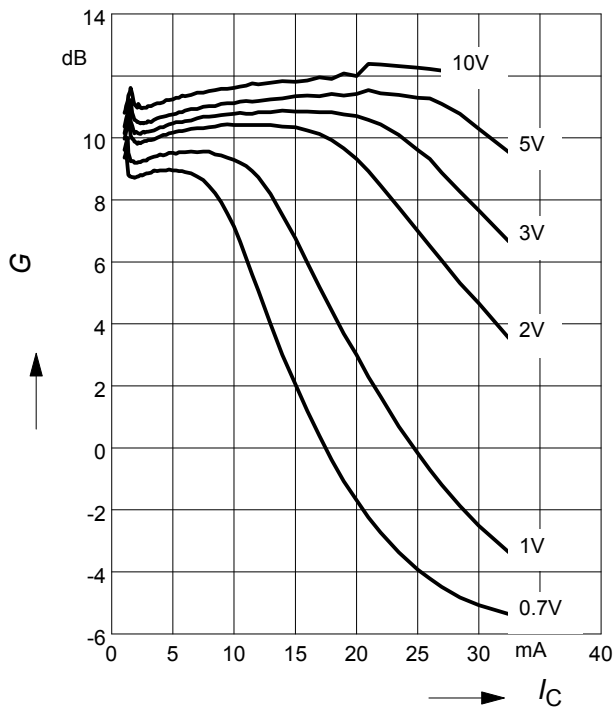
$V_{CE} = 5\text{ V}$



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

$f = 1.8\text{GHz}$

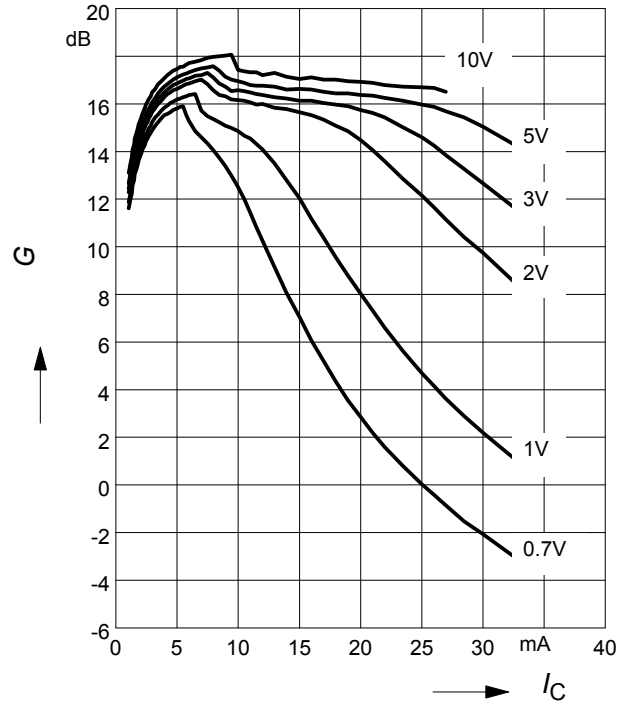
$V_{CE} = \text{Parameter}$



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

$f = 0.9\text{GHz}$

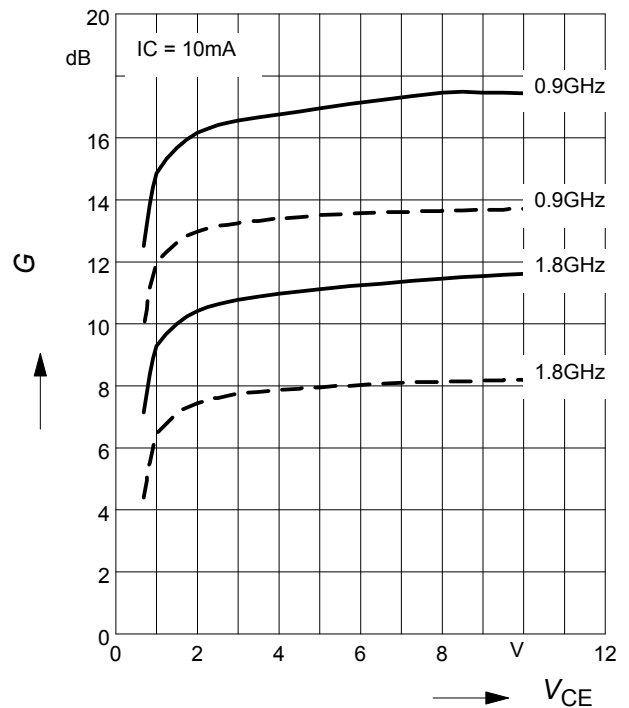
$V_{CE} = \text{Parameter}$



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

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

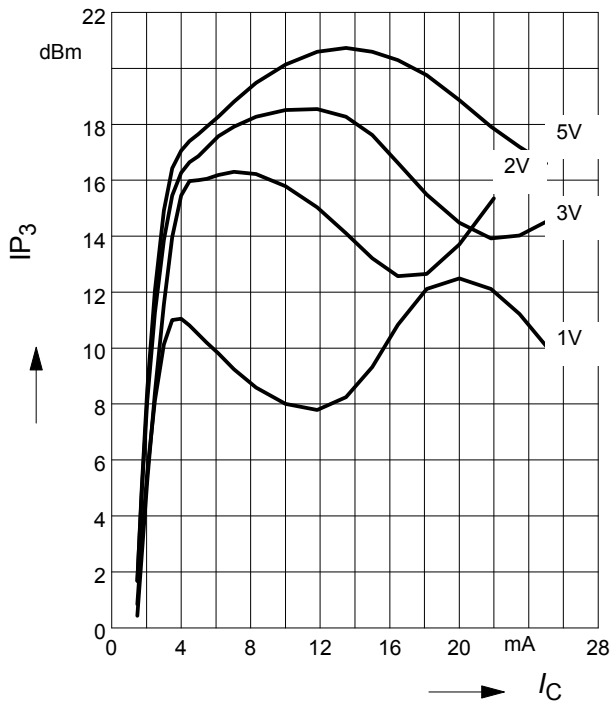
$f = \text{Parameter}$



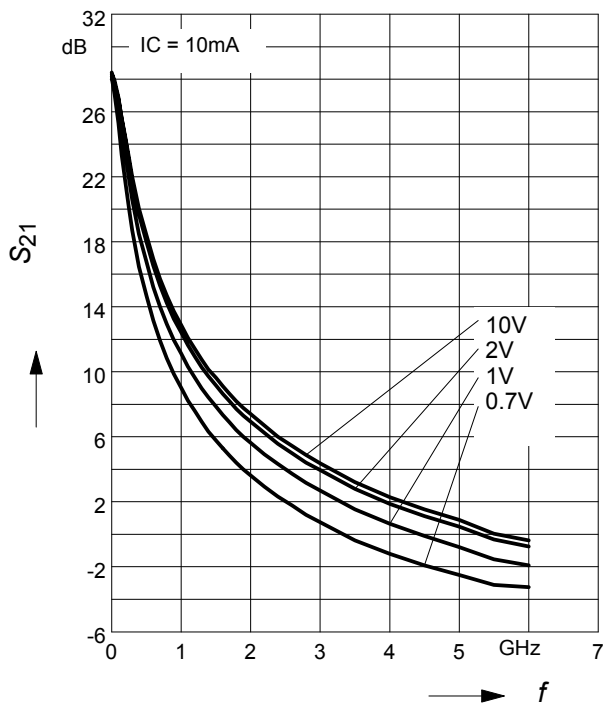
**Intermodulation Intercept Point  $IP_3 = f(I_C)$** 

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

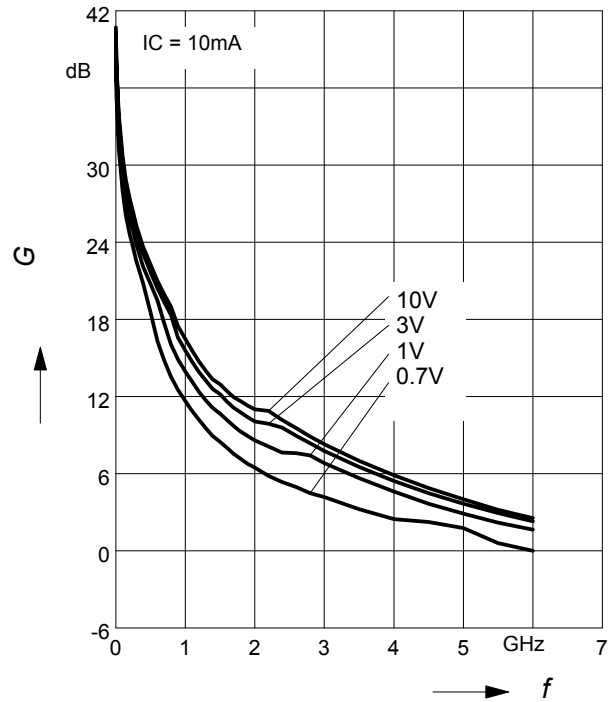
$V_{CE}$  = Parameter,  $f = 900\text{MHz}$  <sup>1)</sup>


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

$V_{CE}$  = Parameter


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

$V_{CE}$  = Parameter



<sup>1)</sup>  $IP_3$  value depends on termination of all intermodulation frequency components.

Termination used for this measurement is  $50\Omega$  from 0.1MHz to 6GHz.