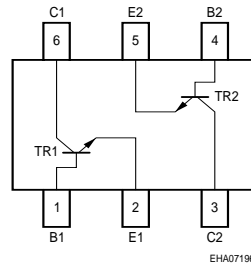
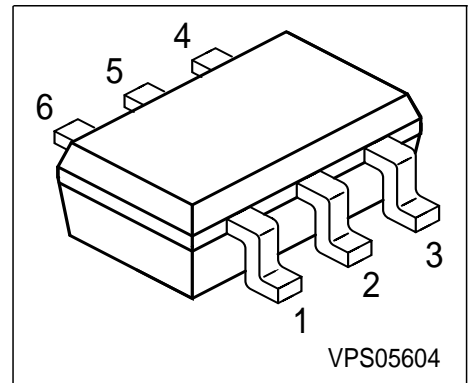


NPN Silicon RF Transistor

- For low-noise, high-gain broadband amplifier at collector currents from 0.5 mA to 12 mA
- $f_T = 8$ GHz
 $F = 1.4$ dB at 900 MHz
- Two (galvanic) internal isolated Transistors in one package



ESD: Electrostatic discharge sensitive device, observe handling precaution!

| Type | Marking | Pin Configuration | | | | | | Package |
|--------|---------|-------------------|-----|-----|-----|-----|-----|---------|
| BFS481 | RFs | 1=B | 2=E | 3=C | 4=B | 5=E | 6=C | SOT363 |

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 | 20 | mA |
| Base current | I_B | 2 | |
| Total power dissipation ($T_S \leq 83$ °C 1) | P_{tot} | 175 | mW |
| Junction temperature | T_j | 150 | °C |
| Ambient temperature | T_A | -65 ... 150 | |
| Storage temperature | T_{stg} | -65 ... 150 | |

Thermal Resistance

| | | | |
|--|------------|------------|-----|
| Junction - soldering point ²⁾ | R_{thJS} | ≤ 380 | K/W |
|--|------------|------------|-----|

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

² 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. | |
| DC characteristics | | | | | |
| Collector-emitter breakdown voltage $I_C = 1 \text{ mA}, I_B = 0$ | $V_{(BR)CEO}$ | 12 | - | - | V |
| Collector-emitter cutoff current $V_{CE} = 20 \text{ V}, V_{BE} = 0$ | I_{CES} | - | - | 100 | μA |
| Collector-base cutoff current $V_{CB} = 10 \text{ V}, I_E = 0$ | I_{CBO} | - | - | 100 | nA |
| Emitter-base cutoff current $V_{EB} = 1 \text{ V}, I_C = 0$ | I_{EBO} | - | - | 1 | μA |
| DC current gain $I_C = 5 \text{ mA}, V_{CE} = 8 \text{ V}$ | h_{FE} | 50 | 100 | 200 | - |

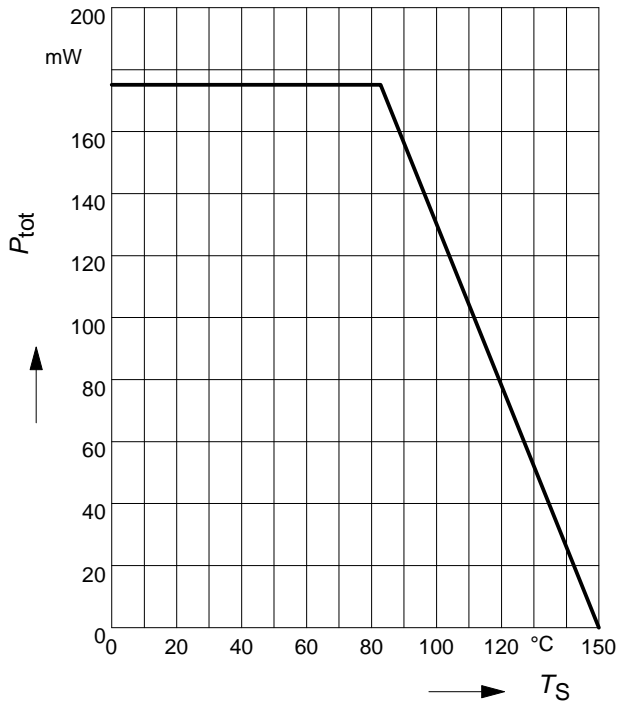
Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified.

| Parameter | Symbol | Values | | | Unit |
|--|---------------|--------|--------------|------|------|
| | | min. | typ. | max. | |
| AC characteristics (verified by random sampling) | | | | | |
| Transition frequency $I_C = 10\text{ mA}$, $V_{CE} = 8\text{ V}$, $f = 500\text{ MHz}$ | f_T | 6 | 8 | - | GHz |
| Collector-base capacitance $V_{CB} = 10\text{ V}$, $f = 1\text{ MHz}$ | C_{cb} | - | 0.24 | 0.4 | pF |
| Collector-emitter capacitance $V_{CE} = 10\text{ V}$, $f = 1\text{ MHz}$ | C_{ce} | - | 0.11 | - | |
| Emitter-base capacitance $V_{EB} = 0.5\text{ V}$, $f = 1\text{ MHz}$ | C_{eb} | - | 0.35 | - | |
| Noise figure $I_C = 2\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_{Sopt}$, $f = 900\text{ MHz}$ $f = 1.8\text{ GHz}$ | F | - | 1.45 1.8 | - | dB |
| Power gain, maximum stable ¹⁾ $I_C = 5\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 900\text{ MHz}$ | G_{ms} | - | 19 | - | |
| Power gain, maximum available ²⁾ $I_C = 5\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 1.8\text{ GHz}$ | G_{ma} | - | 14.5 | - | |
| Transducer gain $I_C = 5\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_L = 50\Omega$, $f = 900\text{ MHz}$ $f = 1.8\text{ GHz}$ | $ S_{21e} ^2$ | - | 15.5 10.5 | - | |

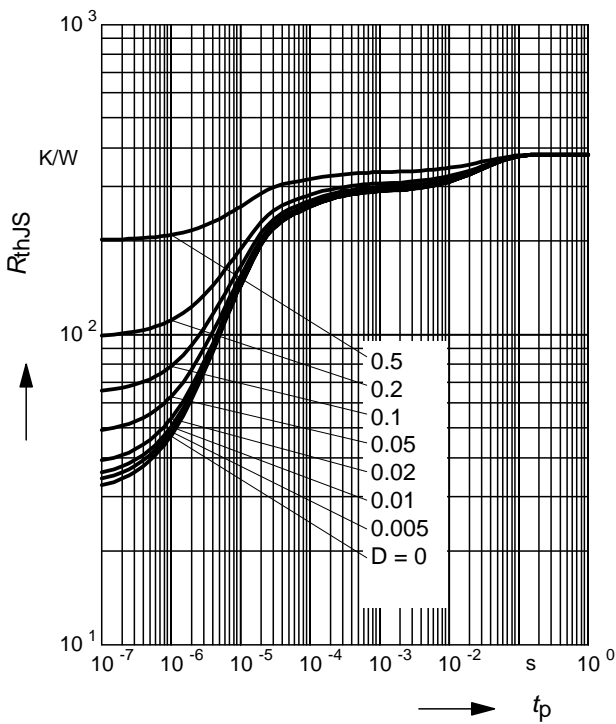
$$^1G_{ms} = |S_{21} / S_{12}|$$

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

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

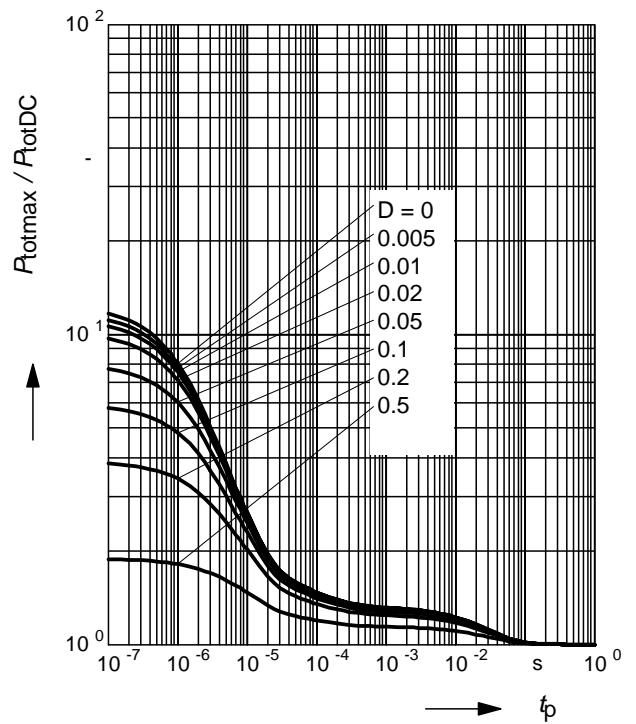


Permissible Pulse Load $R_{thJS} = f(t_p)$



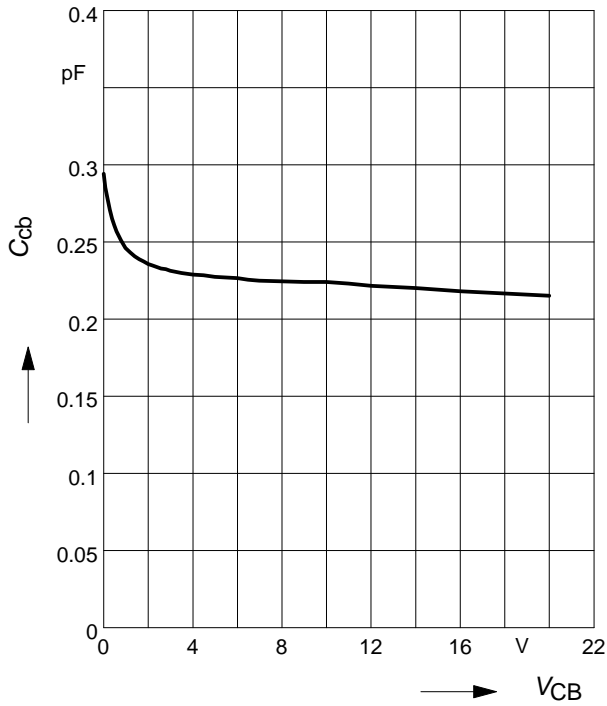
Permissible Pulse Load

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



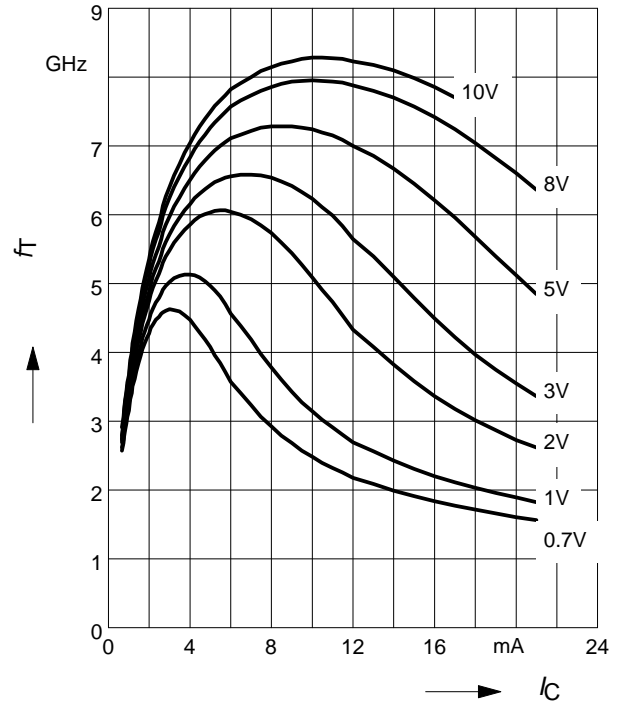
Collector-base capacitance $C_{cb} = f(V_{CB})$

$f = 1\text{MHz}$



Transition frequency $f_T = f(I_C)$

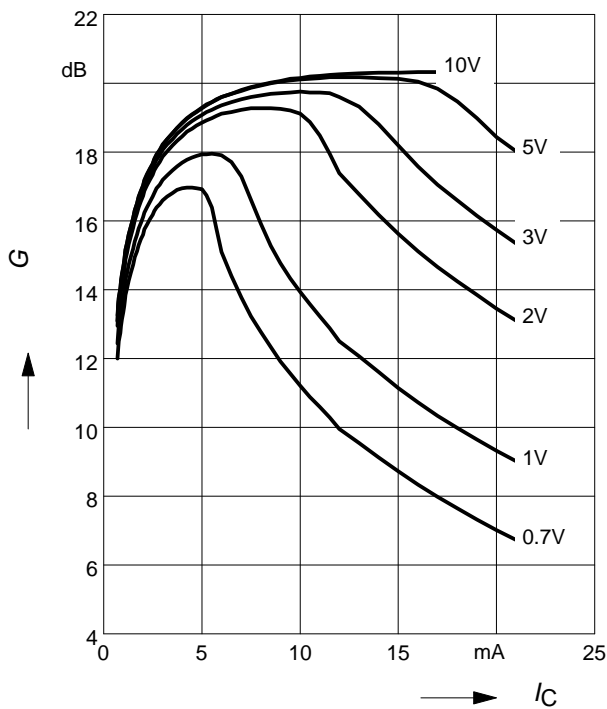
$V_{CE} = \text{Parameter}$



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

$f = 0.9\text{GHz}$

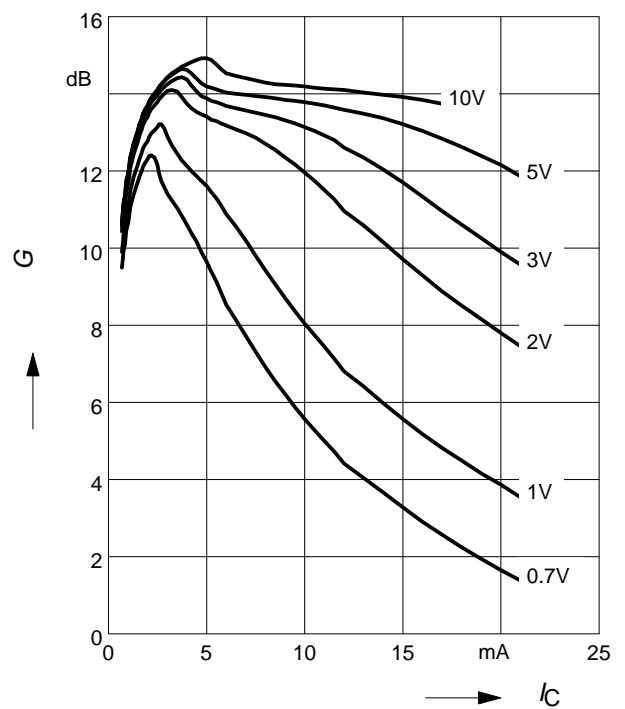
$V_{CE} = \text{Parameter}$



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

$f = 1.8\text{GHz}$

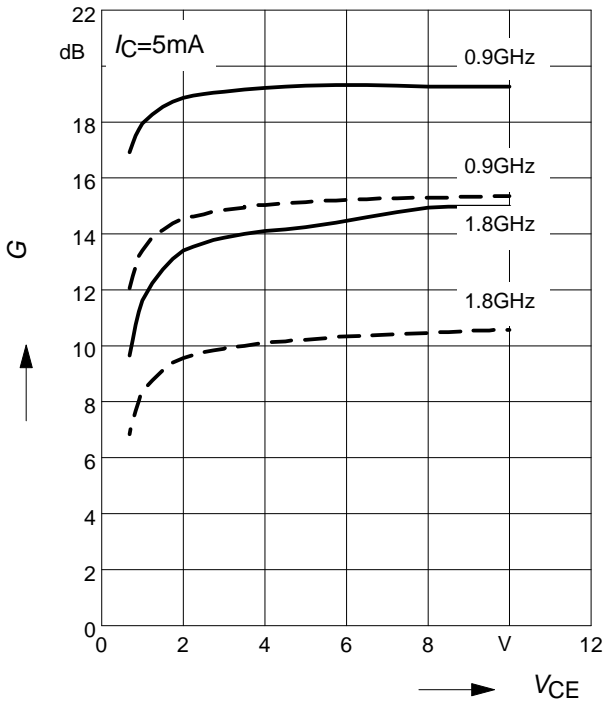
$V_{CE} = \text{Parameter}$



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

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

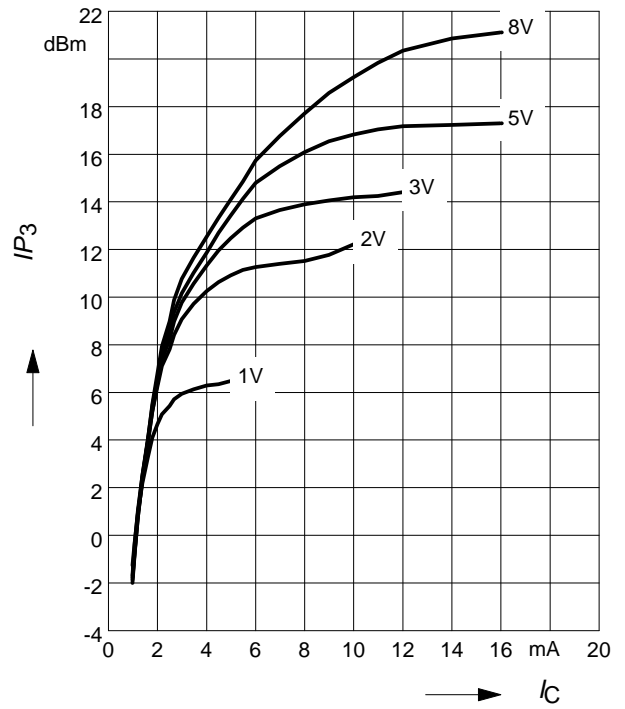
f = Parameter



Intermodulation Intercept Point $IP_3 = f(I_C)$

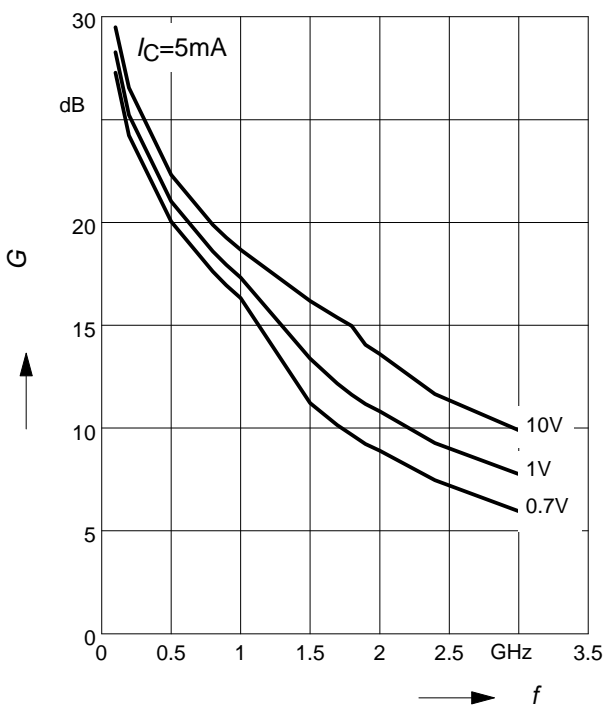
(3rd order, Output, $Z_S = Z_L = 50\Omega$)

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

