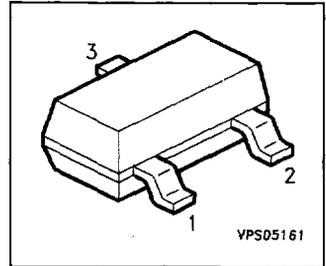


NPN Silicon RF Transistor

- For low noise, high-gain broadband amplifiers at collector currents from 1mA to 20mA
- $f_T = 8\text{GHz}$
 $F = 1.2\text{dB}$ at 900MHz



ESD: Electrostatic discharge sensitive device, observe handling precaution!

| Type | Marking | Ordering Code | Pin Configuration | | | Package |
|---------|---------|---------------|-------------------|-------|-------|---------|
| BFR 182 | RGs | Q62702-F1315 | 1 = B | 2 = E | 3 = C | SOT-23 |

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 | 35 | mA |
| Base current | I_B | 4 | |
| Total power dissipation $T_S \leq 93\text{ }^\circ\text{C}$ | P_{tot} | 250 | mW |
| 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 ¹⁾ | R_{thJS} | ≤ 230 | 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 $I_C = 1 \text{ mA}, I_B = 0$ | $V_{(BR)CEO}$ | 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 $I_C = 10 \text{ mA}, V_{CE} = 8 \text{ V}$ | h_{FE} | 50 | 100 | 200 | - |

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

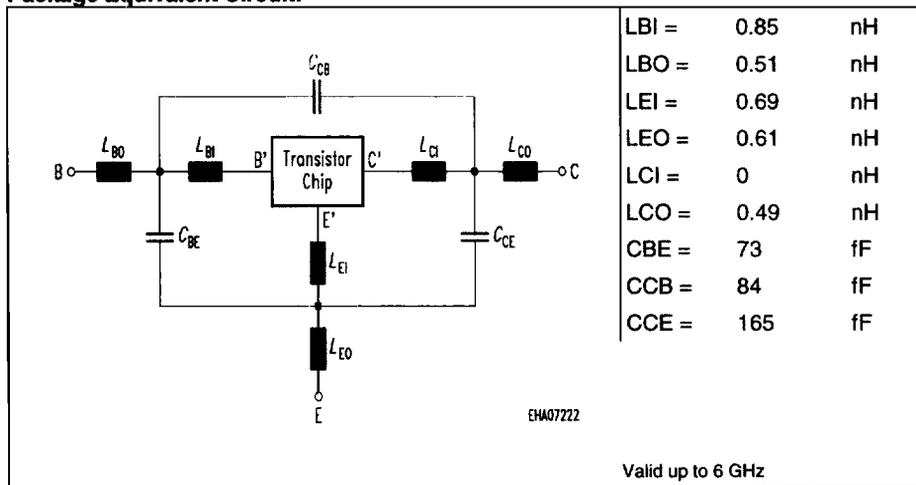
| Parameter | Symbol | Values | | | Unit |
|---|---------------|--------|--------------|------|------|
| | | min. | typ. | max. | |
| AC Characteristics | | | | | |
| Transition frequency $I_C = 15 \text{ mA}$, $V_{CE} = 8 \text{ V}$, $f = 500 \text{ MHz}$ | f_T | 6 | 8 | - | GHz |
| Collector-base capacitance $V_{CB} = 10 \text{ V}$, $V_{BE} = v_{be} = 0$, $f = 1 \text{ MHz}$ | C_{cb} | - | 0.33 | 0.5 | pF |
| Collector-emitter capacitance $V_{CE} = 10 \text{ V}$, $V_{BE} = v_{be} = 0$, $f = 1 \text{ MHz}$ | C_{ce} | - | 0.2 | - | |
| Emitter-base capacitance $V_{EB} = 0.5 \text{ V}$, $V_{CB} = v_{cb} = 0$, $f = 1 \text{ MHz}$ | C_{eb} | - | 0.6 | - | |
| Noise figure $I_C = 3 \text{ mA}$, $V_{CE} = 8 \text{ V}$, $Z_S = Z_{Sopt}$ $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$ | F | - | 1.2 1.9 | - | dB |
| Power gain ²⁾ $I_C = 10 \text{ mA}$, $V_{CE} = 8 \text{ V}$, $Z_S = Z_{Sopt}$ $Z_L = Z_{Lopt}$ $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$ | G_{ma} | - | 17.5 11.5 | - | |
| Transducer gain $I_C = 10 \text{ mA}$, $V_{CE} = 8 \text{ V}$, $Z_S = Z_L = 50 \Omega$ $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$ | $ S_{21e} ^2$ | - | 14.5 9 | - | |

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

SPICE Parameters (Gummel-Poon Model, Berkeley-SPICE 2G.6 Syntax) :
Transistor Chip Data

| | | | | | | | | |
|-------|---------|----------|-------|---------|----------|--------|----------|----------|
| IS = | 4.8499 | fA | BF = | 84.113 | - | NF = | 0.56639 | - |
| VAF = | 21.742 | V | IKF = | 0.14414 | A | ISE = | 8.4254 | fA |
| NE = | 0.91624 | - | BR = | 10.004 | - | NR = | 0.54818 | - |
| VAR = | 2.2595 | V | IKR = | 0.03978 | A | ISC = | 5.9438 | fA |
| NC = | 0.5641 | - | RB = | 2.8263 | Ω | IRB = | 0.071955 | mA |
| RBM = | 3.4217 | Ω | RE = | 2.1858 | Ω | RC = | 1.8159 | Ω |
| CJE = | 8.8619 | fF | VJE = | 1.0378 | V | MJE = | 0.40796 | - |
| TF = | 22.72 | ps | XTF = | 0.43147 | - | VTF = | 0.34608 | V |
| ITF = | 6.5523 | mA | PTF = | 0 | deg | CJC = | 490.25 | fF |
| VJC = | 1.0132 | V | MJC = | 0.31068 | - | XCJC = | 0.19281 | - |
| TR = | 1.7541 | ns | CJS = | 0 | fF | VJS = | 0.75 | V |
| MJS = | 0 | - | XTB = | 0 | - | EG = | 1.11 | eV |
| XTI = | 3 | - | FC = | 0.64175 | - | TNOM | 300 | K |

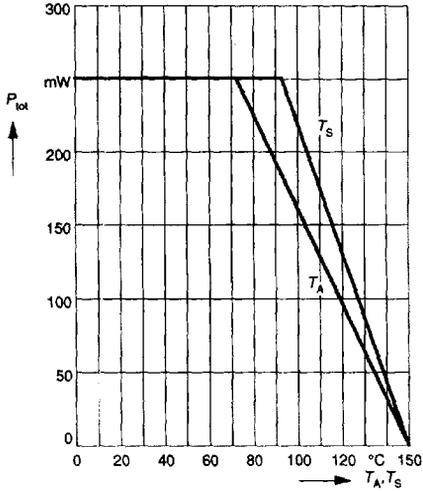
All parameters are ready to use, no scaling is necessary.
 Extracted on behalf of SIEMENS Small Signal Semiconductors by:
 Institut für Mobil-und Satellitenfunktechnik (IMST)
 © 1996 SIEMENS AG

Package Equivalent Circuit:


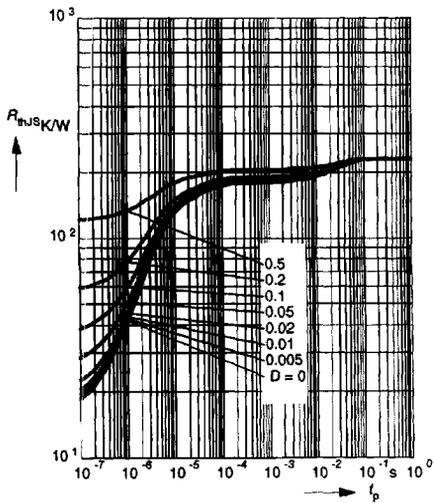
For examples and ready to use parameters please contact your local Siemens distributor or sales office to obtain a Siemens CD-ROM or see Internet: <http://www.siemens.de/Semiconductor/products/35/357.htm>

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

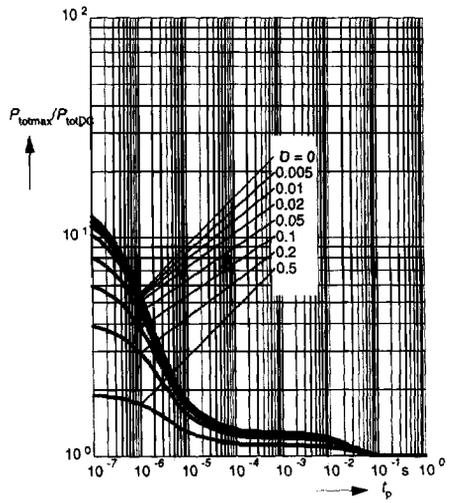
* Package mounted on epoxy



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

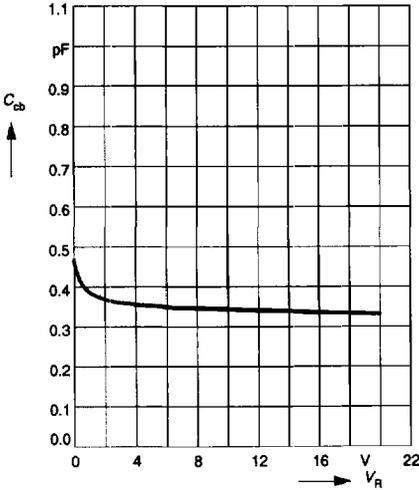


Permissible Pulse Load $P_{totmax}/P_{totDC} = f(t_p)$



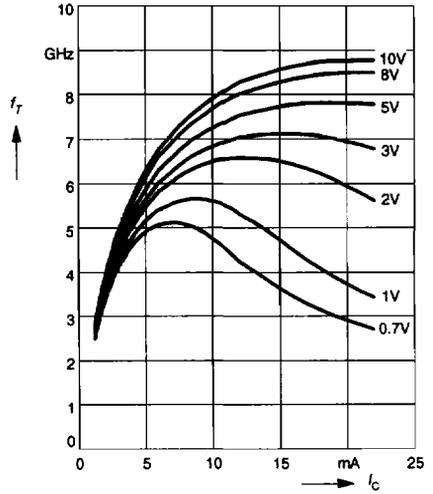
Collector-base capacitance $C_{cb} = f(V_{CB})$

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



Transition frequency $f_T = f(I_C)$

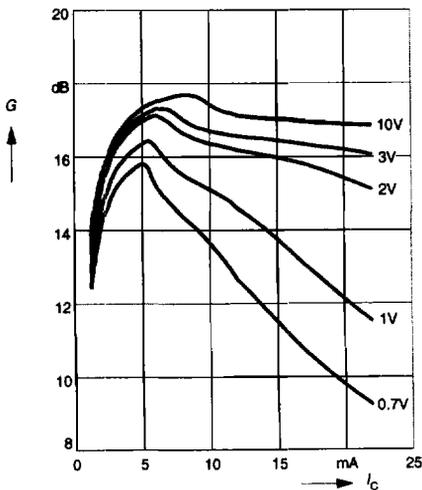
$V_{CE} = \text{Parameter}$



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

$f = 0.9\text{GHz}$

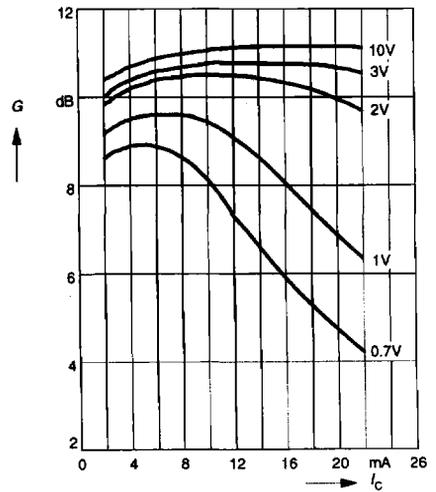
$V_{CE} = \text{Parameter}$



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

$f = 1.8\text{GHz}$

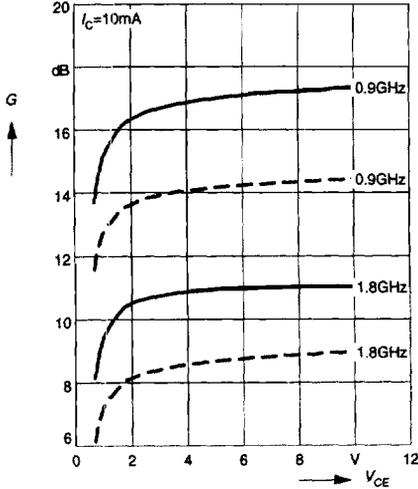
$V_{CE} = \text{Parameter}$



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

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

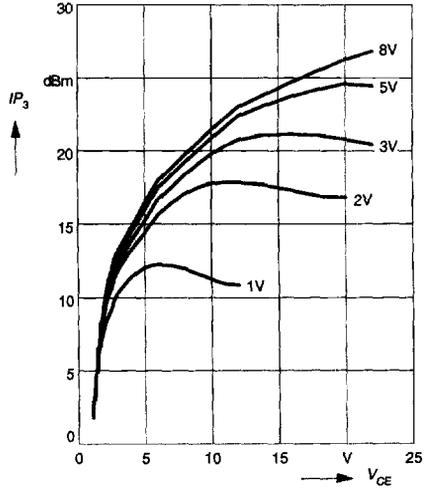
$f =$ Parameter



Intermodulation Intercept Point $IP_3 = f(I_C)$

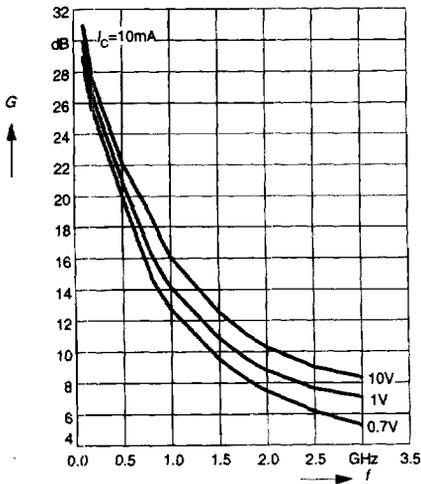
(3rd order, Output, $Z_S = Z_L = 50\Omega$)

$V_{CE} =$ 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

