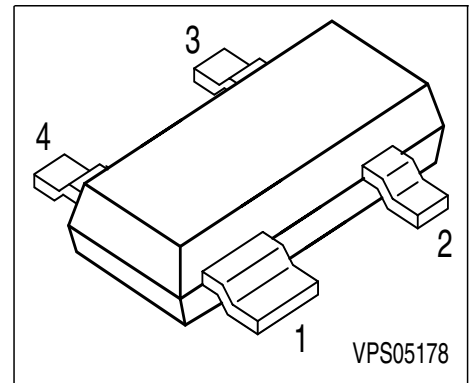


NPN Silicon RF Transistor

- For low-power amplifiers in mobile communication systems (pager) at collector currents from 0.2 mA to 2.5 mA
 $f_T = 7 \text{ GHz}$
- $F = 2.1 \text{ dB}$ at 900 MHz



ESD: Electrostatic discharge sensitive device, observe handling precaution!

| Type | Marking | Pin Configuration | | | | Package |
|---------|---------|-------------------|-------|-------|-------|---------|
| BFP 180 | RDs | 1 = C | 2 = E | 3 = B | 4 = E | SOT-143 |

Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|-----------|-------------|------|
| Collector-emitter voltage | V_{CEO} | 8 | V |
| Collector-emitter voltage | V_{CES} | 10 | |
| Collector-base voltage | V_{CBO} | 10 | |
| Emitter-base voltage | V_{EBO} | 2 | |
| Collector current | I_C | 4 | mA |
| Base current | I_B | 0.5 | |
| Total power dissipation, $T_S \leq 124^\circ\text{C}$ ¹⁾ | P_{tot} | 30 | mW |
| Junction temperature | T_j | 150 | °C |
| Ambient temperature | T_A | -65 ... 150 | |
| Storage temperature | T_{stg} | -65 ... 150 | |

Thermal Resistance

| | | | |
|----------------------------|------------|------------|-----|
| Junction - soldering point | R_{thJS} | ≤ 875 | 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 $I_C = 1\text{ mA}, I_B = 0$ | $V_{(BR)CEO}$ | 8 | - | - | V |
| Collector-emitter cutoff current $V_{CE} = 10\text{ V}, V_{BE} = 0$ | I_{CES} | - | - | 100 | μA |
| Collector-base cutoff current $V_{CB} = 8\text{ V}, I_E = 0$ | I_{CBO} | - | - | 100 | nA |
| Emitter-base cutoff current $V_{EB} = 1\text{ V}, I_C = 0$ | I_{EBO} | - | - | 1 | μA |
| DC current gain $I_C = 1\text{ mA}, V_{CE} = 5\text{ V}$ | h_{FE} | 30 | 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 $I_C = 3 \text{ mA}$, $V_{CE} = 5 \text{ V}$, $f = 500 \text{ MHz}$ | f_T | 5 | 7 | - | GHz |
| Collector-base capacitance $V_{CB} = 5 \text{ V}$, $f = 1 \text{ MHz}$ | C_{cb} | - | 0.19 | 0.35 | pF |
| Collector-emitter capacitance $V_{CE} = 5 \text{ V}$, $f = 1 \text{ MHz}$ | C_{ce} | - | 0.27 | - | |
| Emitter-base capacitance $V_{EB} = 0.5 \text{ V}$, $f = 1 \text{ MHz}$ | C_{eb} | - | 0.13 | - | |
| Noise figure $I_C = 1 \text{ mA}$, $V_{CE} = 5 \text{ V}$, $Z_S = Z_{Sopt}$, $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$ | F | - | 2.1 2.25 | - | dB |
| Power gain, maximum stable ^{F)} $I_C = 1 \text{ mA}$, $V_{CE} = 5 \text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$ | G_{ms} | - | 15 12 | - | |
| Transducer gain $I_C = 1 \text{ mA}$, $V_{CE} = 5 \text{ V}$, $Z_S = Z_L = 50\Omega$, $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$ | $ S_{21e} ^2$ | - | 8.5 7 | - | |

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

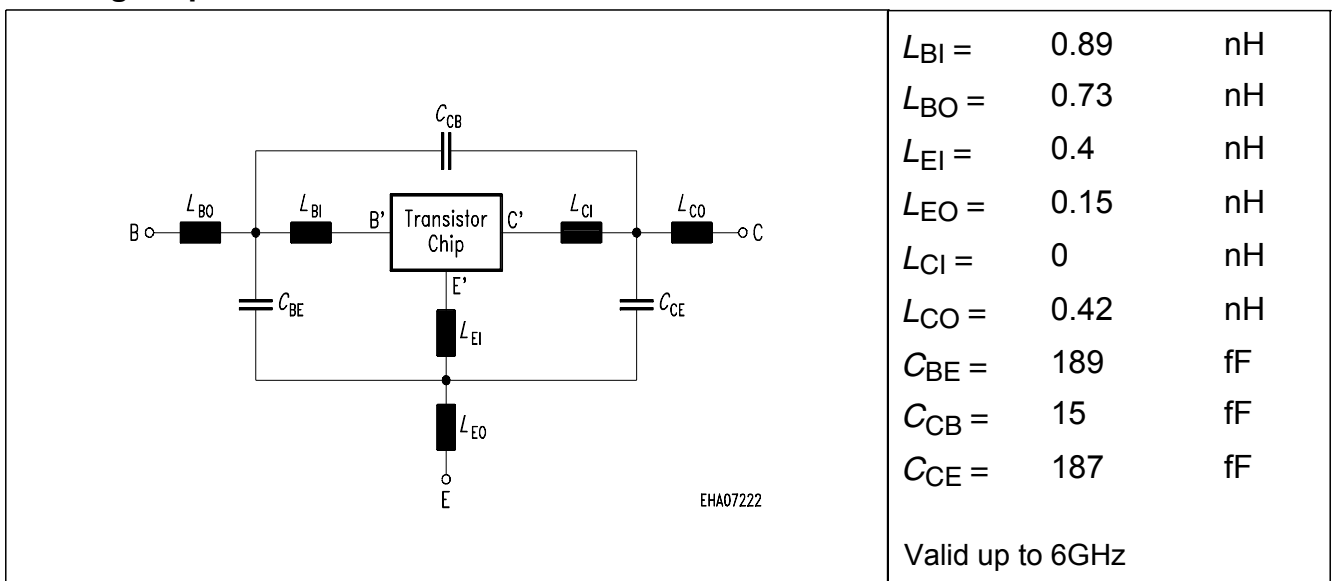
SPICE Parameters (Gummel-Poon Model, Berkley-SPICE 2G.6 Syntax) :

Transistor Chip Data

| | | | | | | | | |
|-------|---------|----------|-------|----------|----------|--------|---------|----------|
| IS = | 0.18519 | fA | BF = | 94.687 | - | NF = | 1.0236 | - |
| VAF = | 26.867 | V | IKF = | 0.025252 | A | ISE = | 130.93 | fA |
| NE = | 1.9818 | - | BR = | 20.325 | - | NR = | 0.93013 | - |
| VAR = | 3.2134 | V | IKR = | 0.012138 | A | ISC = | 6.1852 | fA |
| NC = | 1.6195 | - | RB = | 1.4255 | Ω | IRB = | 0.01 | mA |
| RBM = | 60 | Ω | RE = | 3.7045 | Ω | RC = | 0.56 | Ω |
| CJE = | 3.2473 | fF | VJE = | 1.1812 | V | MJE = | 0.41827 | - |
| TF = | 14.866 | ps | XTF = | 0.3062 | - | VTF = | 0.22023 | V |
| ITF = | 1.0202 | mA | PTF = | 0 | deg | CJC = | 183.69 | fF |
| VJC = | 1.1812 | V | MJC = | 0.30423 | - | XCJC = | 0.08334 | - |
| TR = | 2.2648 | ns | CJS = | 0 | fF | VJS = | 0.75 | V |
| MJS = | 0 | - | XTB = | 0 | - | EG = | 1.11 | eV |
| XTI = | 3 | - | FC = | 0.87906 | - | 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 Satellitentechnik (IMST)
 © 1996 SIEMENS AG

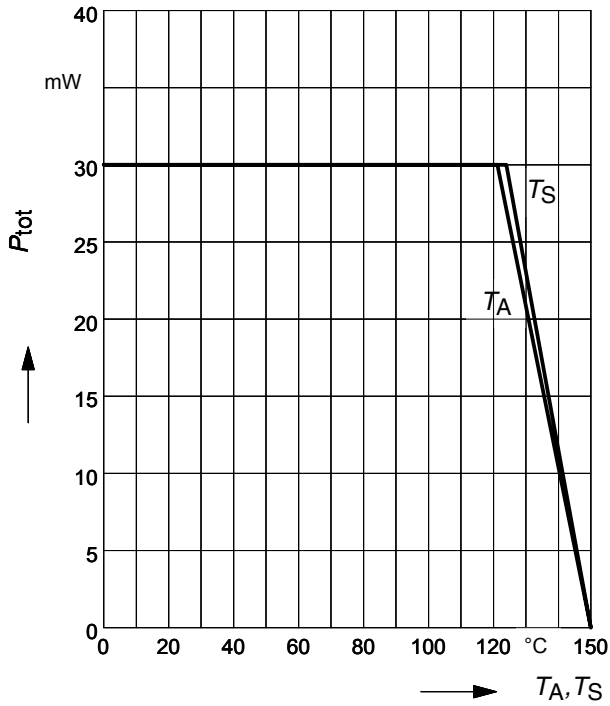
Package Equivalent Circuit:



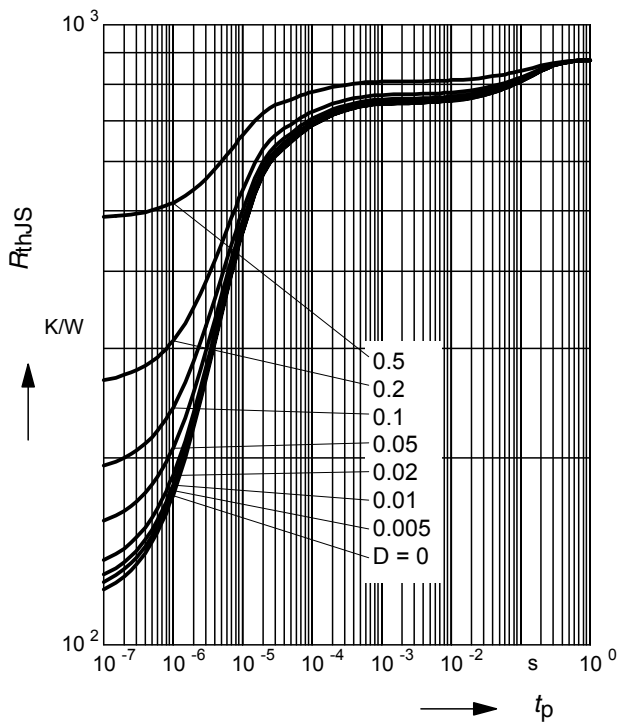
For examples and ready to use parameters please contact your local Infineon Technologies distributor or sales office to obtain a Infineon Technologies CD-ROM or see Internet: <http://www.infineon.com/products/discrete/index.htm>

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

* Package mounted on epoxy

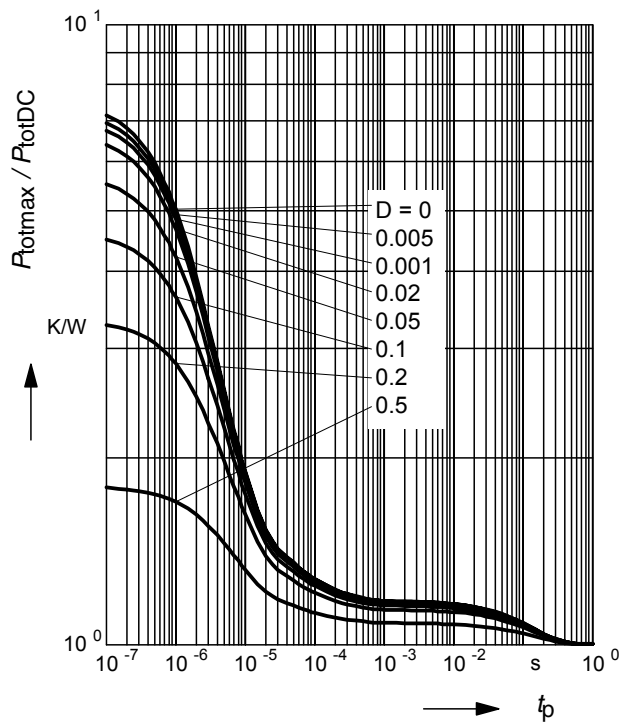


Permissible Pulse Load $R_{thJS} = f(t_p)$



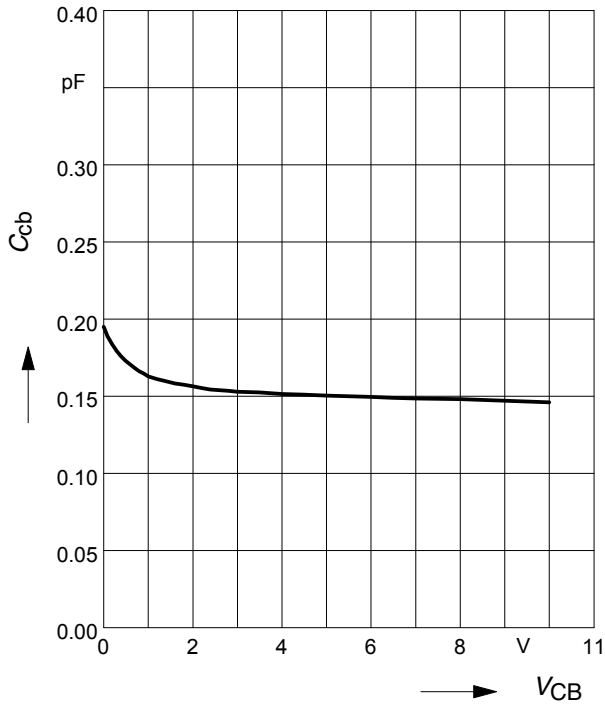
Permissible Pulse Load

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



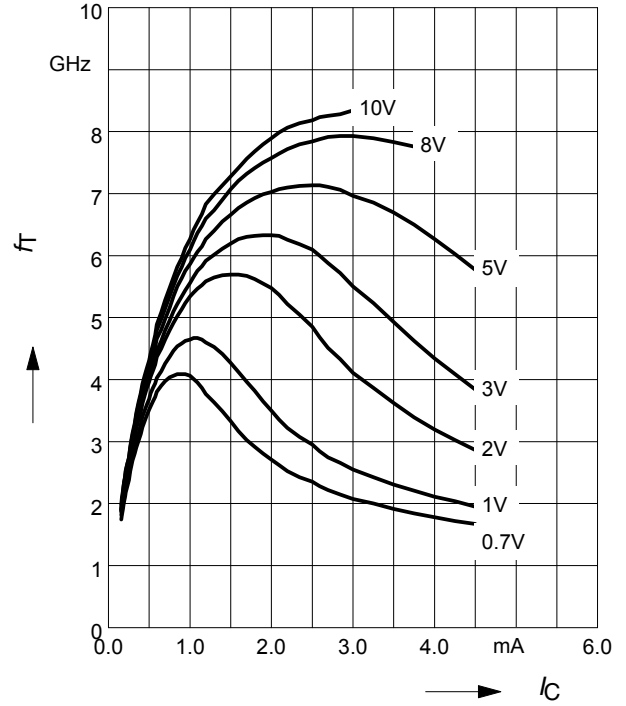
Collector-base capacitance $C_{cb} = f(V_{CB})$

$f = 1\text{MHz}$



Transition frequency $f_T = f(I_C)$

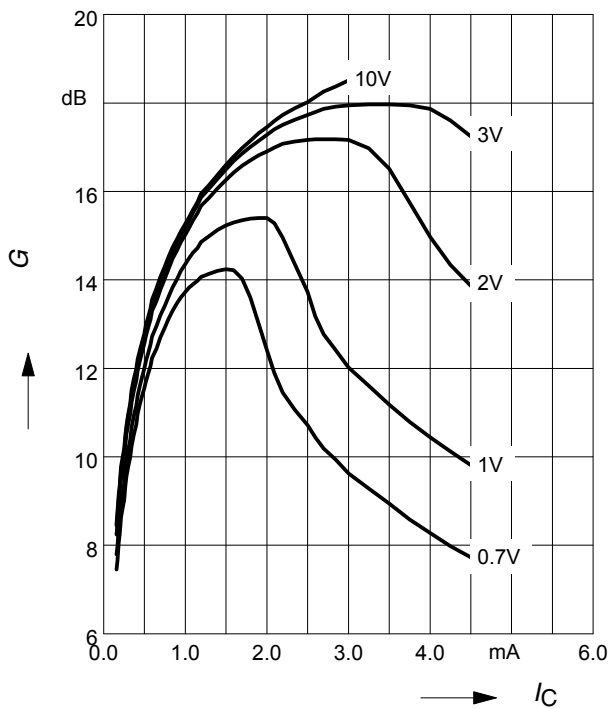
$V_{CE} = \text{Parameter}$



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

$f = 0.9\text{GHz}$

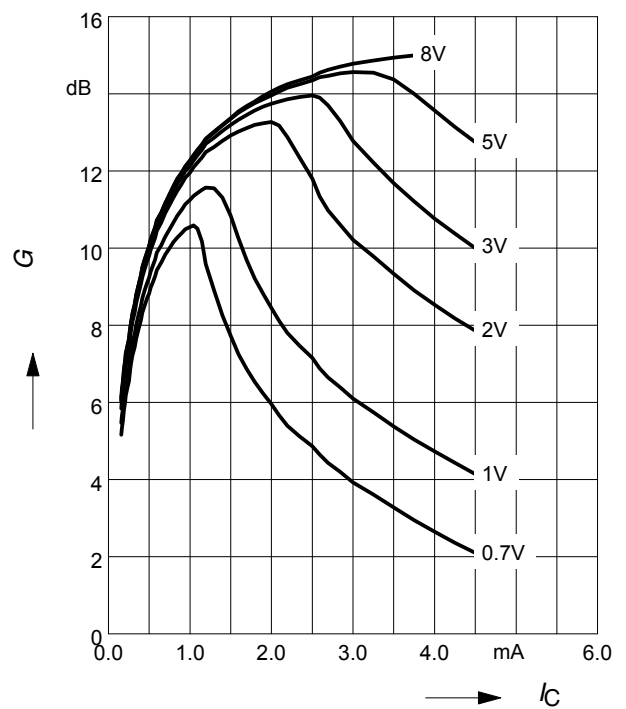
$V_{CE} = \text{Parameter}$



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

$f = 1.8\text{GHz}$

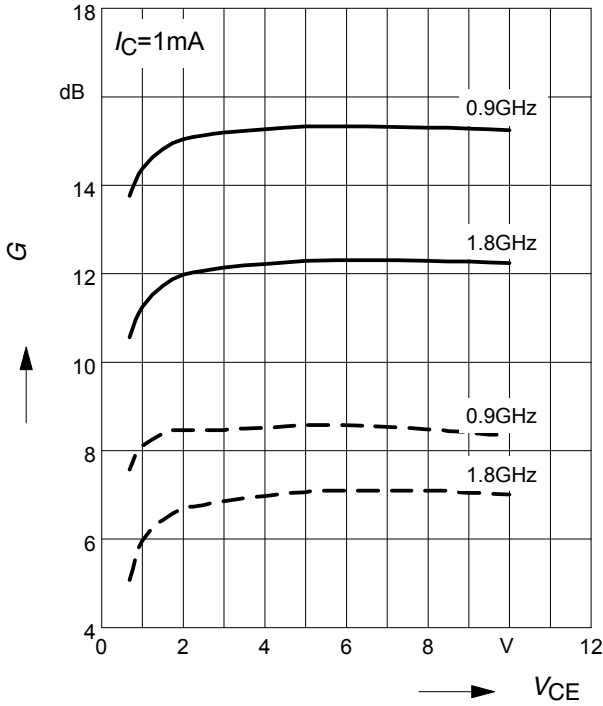
$V_{CE} = \text{Parameter}$



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

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

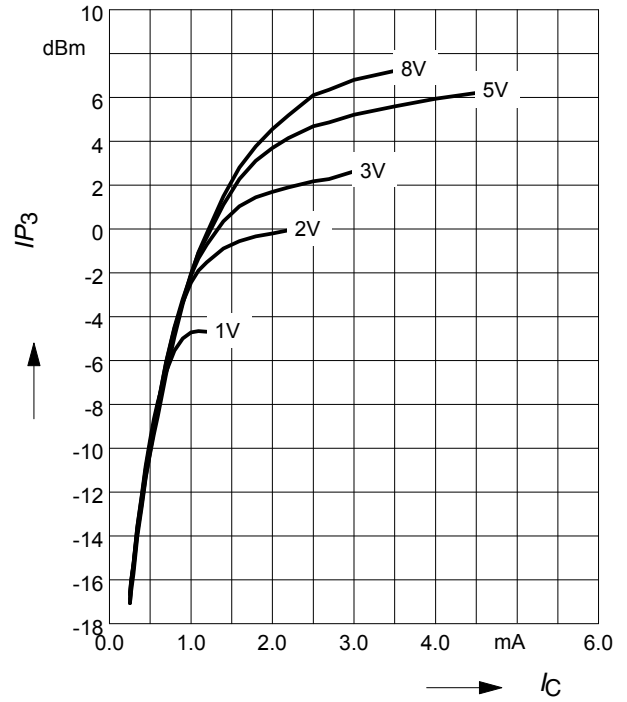
$f =$ Parameter



Intermodulation Intercept Point $IP_3 = f(I_C)$

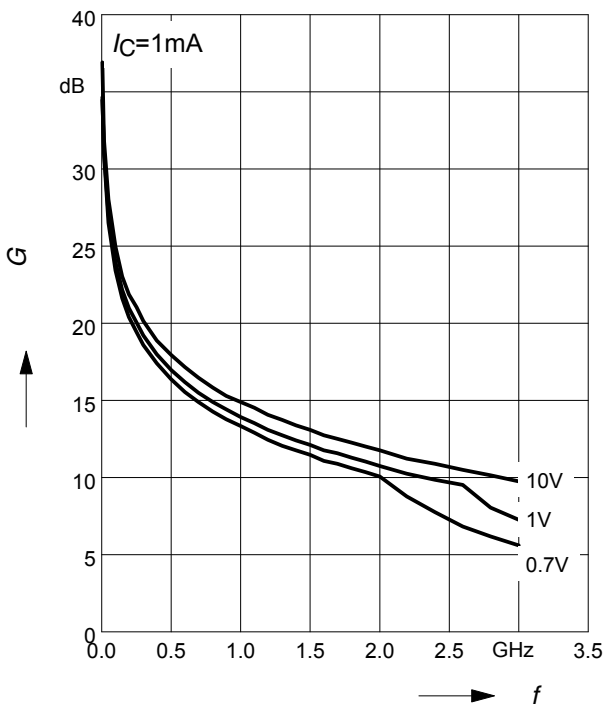
(3rd order, Output, $Z_S = Z_L = 50\Omega$)

$V_{CE} =$ Parameter, $f = 900\text{MHz}$



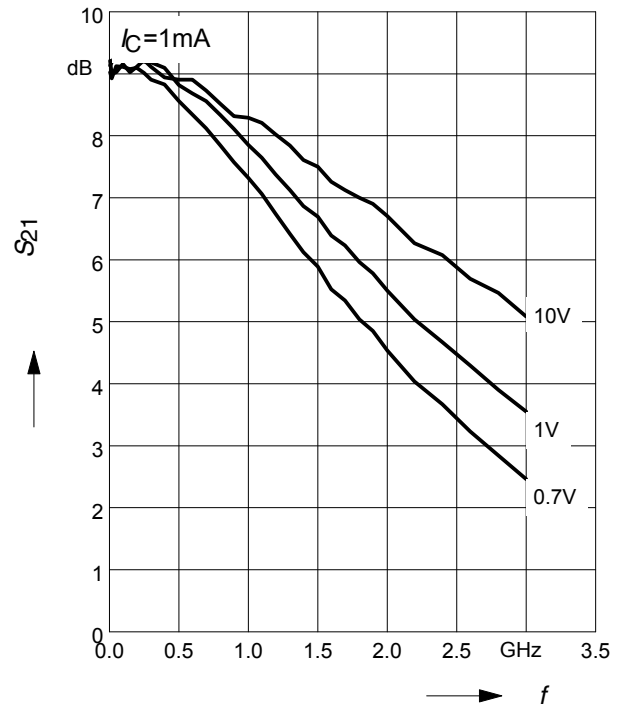
Power Gain $G_{ma}, G_{ms} = f(f)$

$V_{CE} =$ Parameter



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

$V_{CE} =$ Parameter





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