



SIEGET®45 BFP520F

NPN Silicon RF Transistor

Preliminary data

- For highest gain low noise amplifier at 1.8 GHz and 2 mA / 2 V

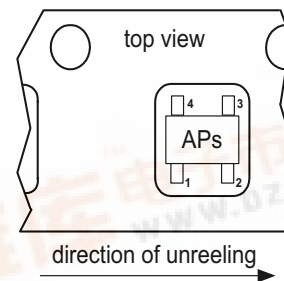
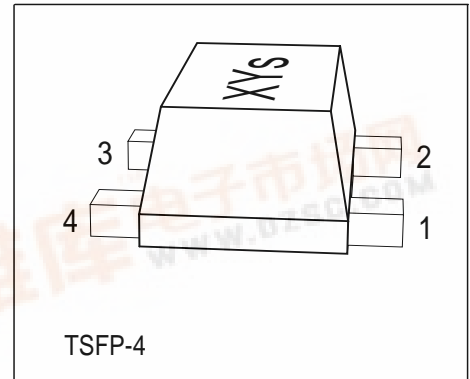
Outstanding $G_{ms} = 23$ dB

Noise Figure $F = 0.95$ dB

- For oscillators up to 15 GHz
- Transition frequency $f_T = 45$ GHz
- Gold metallization for high reliability

• SIEGET® 45 - Line

45 GHz f_T - Line



ESD: Electrostatic discharge sensitive device, observe handling precaution!

| Type | Marking | Pin Configuration | | | | Package |
|---------|---------|-------------------|-------|-------|-------|---------|
| BFP520F | APs | 1 = B | 2 = E | 3 = C | 4 = E | TSFP-4 |

Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|-----------|-------------|------------------|
| Collector-emitter voltage | V_{CEO} | 2.5 | V |
| Collector-base voltage | V_{CBO} | 10 | |
| Emitter-base voltage | V_{EBO} | 1 | |
| Collector current | I_C | 40 | mA |
| Base current | I_B | 4 | |
| Total power dissipation $T_S \leq 107^\circ\text{C}$ | P_{tot} | 100 | 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} | ≤ 430 | K/W |
|--|------------|------------|-----|

¹⁾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 $I_C = 1 \text{ mA}, I_B = 0$ | $V_{(BR)CEO}$ | 2.5 | 3 | 3.5 | V |
| Collector-base cutoff current $V_{CB} = 5 \text{ V}, I_E = 0$ | I_{CBO} | - | - | 200 | nA |
| Emitter-base cutoff current $V_{EB} = 1 \text{ V}, I_C = 0$ | I_{EBO} | - | - | 35 | μA |
| DC current gain $I_C = 20 \text{ mA}, V_{CE} = 2 \text{ V}$ | h_{FE} | 70 | 110 | 200 | - |
| AC characteristics (verified by random sampling) | | | | | |
| Transition frequency $I_C = 30 \text{ mA}, V_{CE} = 2 \text{ V}, f = 2 \text{ GHz}$ | f_T | - | 45 | - | GHz |
| Collector-base capacitance $V_{CB} = 2 \text{ V}, f = 1 \text{ MHz}$ | C_{cb} | - | 0.07 | - | pF |
| Collector-emitter capacitance $V_{CE} = 2 \text{ V}, f = 1 \text{ MHz}$ | C_{ce} | - | 0.25 | - | |
| Emitter-base capacitance $V_{EB} = 0.5 \text{ V}, f = 1 \text{ MHz}$ | C_{eb} | - | 0.31 | - | |
| Noise figure $I_C = 2 \text{ mA}, V_{CE} = 2 \text{ V}, Z_S = Z_{Sopt}, f = 1.8 \text{ GHz}$ | F | - | 0.95 | - | dB |
| Power gain, maximum stable ¹⁾ $I_C = 20 \text{ mA}, V_{CE} = 2 \text{ V}, Z_S = Z_{Sopt}, Z_L = Z_{Lopt}, f = 1.8 \text{ GHz}$ | G_{ms} | - | 23 | - | |
| Insertion power gain $I_C = 20 \text{ mA}, V_{CE} = 2 \text{ V}, f = 1.8 \text{ GHz}, Z_S = Z_L = 50\Omega$ | $ S_{21} ^2$ | - | 20.5 | - | dB |
| Third order intercept point at output ²⁾ $V_{CE} = 2 \text{ V}, f = 1.8 \text{ GHz}, Z_S = Z_L = 50\Omega, I_C = 20 \text{ mA}$ | IP_3 | - | 23.5 | - | dBm |
| 1dB compression point ³⁾ $V_{CE} = 2 \text{ V}, f = 1.8 \text{ GHz}, Z_S = Z_L = 50\Omega, I_C = 20 \text{ mA}$ | P_{-1dB} | - | 10.5 | - | |

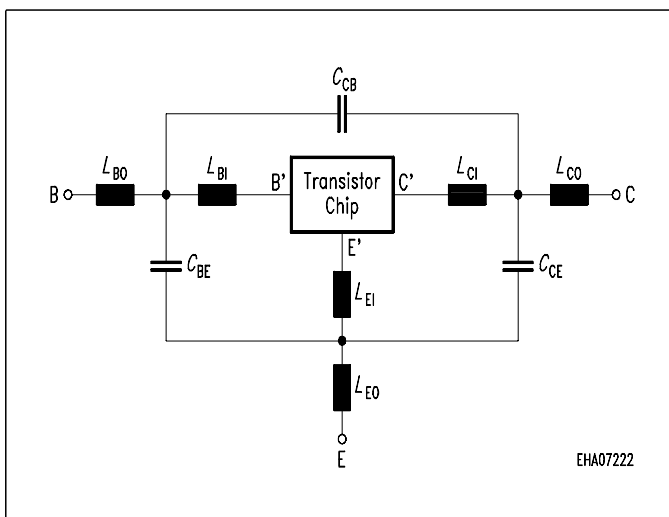
$$^1 G_{ms} = |S_{21} / S_{12}|$$

²⁾ IP_3 value depends on termination of all intermodulation frequency components. Termination used for this measurement is 50Ω from 0.1MHz to 6GHz.

³⁾DC current at no input power

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

| | | | | | | | | |
|-------|-------|----|-------|-------|-----|--------|-------|----|
| IS = | 15 | aA | BF = | 235 | - | NF = | 1 | - |
| VAF = | 25 | V | IKF = | 0.4 | A | ISE = | 25 | fA |
| NE = | 2 | - | BR = | 1.5 | - | NR = | 1 | - |
| VAR = | 2 | V | IKR = | 0.01 | A | ISC = | 20 | fA |
| NC = | 2 | - | RB = | 11 | Ω | IRB = | - | A |
| RBM = | 7.5 | Ω | RE = | 0.6 | | RC = | 7.6 | Ω |
| CJE = | 235 | fF | VJE = | 0.958 | V | MJE = | 0.335 | - |
| TF = | 1.7 | ps | XTF = | 10 | - | VTF = | 5 | V |
| ITF = | 0.7 | mA | PTF = | 50 | deg | CJC = | 93 | fF |
| VJC = | 0.661 | V | MJC = | 0.236 | - | XCJC = | 1 | - |
| TR = | 50 | ns | CJS = | 0 | fF | VJS = | 0.75 | V |
| MJS = | 0.333 | - | XTB = | -0.25 | - | EG = | 1.11 | eV |
| XTI = | 0.035 | - | FC = | 0.5 | - | TNOM | 298 | K |

Package Equivalent Circuit:


| | | | | | |
|---------------|------|----|---------------|-------|----|
| $L_{BO} =$ | 0.22 | nH | $L_{BI} =$ | 0.42 | nH |
| $L_{EO} =$ | 0.28 | nH | $R_{LBI} =$ | 0.15 | Ω |
| $L_{CO} =$ | 0.22 | nH | $L_{EI} =$ | 0.26 | nH |
| $K_{BO-EO} =$ | 0.10 | - | $R_{LEI} =$ | 0.11 | Ω |
| $K_{BO-CO} =$ | 0.01 | - | $L_{CI} =$ | 0.35 | nH |
| $K_{EO-CO} =$ | 0.11 | - | $R_{LCI} =$ | 0.13 | Ω |
| $C_{BE} =$ | 34 | fF | $K_{CI-EI} =$ | -0.05 | - |
| $C_{BC} =$ | 2 | fF | $K_{BI-CI} =$ | -0.08 | - |
| $C_{CE} =$ | 33 | fF | $K_{BI-EI} =$ | 0.20 | - |

Valid up to 6GHz

The TSFP-4 package has two emitter leads. To avoid high complexity of the package equivalent circuit, both leads are combined in one electrical connection.

R_{LxI} are series resistors for the inductances L_{xI} and K_{xa-yb} are the coupling coefficients between the inductances L_{xa} and L_{yb} . The referencepins for the coupled ports are B, E, C, B', E', C'.

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/silicondiscretetes>