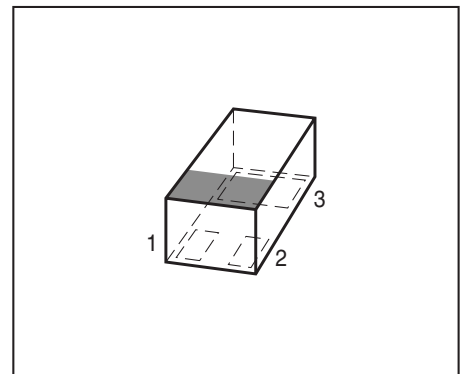


NPN Silicon RF Transistor

- High current capability and low noise figure for wide dynamic range
- Low voltage operation
- Ideal for low phase noise oscillators up to 3.5 GHz
- Low noise figure: 1.1 dB at 1.8 GHz
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101



ESD (Electrostatic discharge) sensitive device, observe handling precaution!

| Type | Marking | Pin Configuration | | | Package |
|----------|---------|-------------------|-------|-------|----------|
| BFR380L3 | FC | 1 = B | 2 = E | 3 = C | TSLP-3-1 |

Maximum Ratings at $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

| Parameter | Symbol | Value | Unit |
|--|-----------|-------------|------------------|
| Collector-emitter voltage | V_{CEO} | 6 | V |
| Collector-emitter voltage | V_{CES} | 15 | |
| Collector-base voltage | V_{CBO} | 15 | |
| Emitter-base voltage | V_{EBO} | 2 | |
| Collector current | I_C | 80 | mA |
| Base current | I_B | 14 | |
| Total power dissipation ¹⁾ $T_S \leq 96\text{ }^\circ\text{C}$ | P_{tot} | 380 | mW |
| Junction temperature | T_J | 150 | $^\circ\text{C}$ |
| Storage temperature | T_{Stg} | -55 ... 150 | |

Thermal Resistance

| Parameter | Symbol | Value | Unit |
|--|------------|------------|------|
| Junction - soldering point ²⁾ | R_{thJS} | ≤ 140 | 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 AN077 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 $I_C = 1\text{ mA}, I_B = 0$ | $V_{(BR)CEO}$ | 6 | 9 | - | V |
| Collector-emitter cutoff current $V_{CE} = 5\text{ V}, V_{BE} = 0$ $V_{CE} = 15\text{ V}, V_{BE} = 0$ | I_{CES} | - | 1 | 30 | nA |
| | | - | - | 1000 | |
| Collector-base cutoff current $V_{CB} = 5\text{ V}, I_E = 0$ | I_{CBO} | - | - | 30 | |
| Emitter-base cutoff current $V_{EB} = 1\text{ V}, I_C = 0$ | I_{EBO} | - | 10 | 500 | |
| DC current gain $I_C = 40\text{ mA}, V_{CE} = 3\text{ V}$, pulse measured | h_{FE} | 90 | 120 | 160 | - |

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 $I_C = 40\text{ mA}$, $V_{CE} = 3\text{ V}$, $f = 1\text{ GHz}$ | f_T | 11 | 14 | - | GHz |
| Collector-base capacitance $V_{CB} = 5\text{ V}$, $f = 1\text{ MHz}$, $V_{BE} = 0$, emitter grounded | C_{cb} | - | 0.45 | 0.8 | pF |
| Collector emitter capacitance $V_{CE} = 5\text{ V}$, $f = 1\text{ MHz}$, $V_{BE} = 0$, base grounded | C_{ce} | - | 0.18 | - | |
| Emitter-base capacitance $V_{EB} = 0.5\text{ V}$, $f = 1\text{ MHz}$, $V_{CB} = 0$, collector grounded | C_{eb} | - | 1 | - | |
| Minimum Noise figure $I_C = 8\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_{Sopt}$, $f = 1.8\text{ GHz}$ | NF_{min} | 0.5 | 1.1 | 2.1 | dB |
| Power gain, maximum available ¹⁾ $I_C = 40\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 1.8\text{ GHz}$ $f = 3\text{ GHz}$ | G_{ma} | 11.5 7.5 | 14 10 | 16.5 12.5 | |
| Transducer gain $I_C = 40\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_L = 50\Omega$, $f = 1.8\text{ GHz}$ $f = 3\text{ GHz}$ | $ S_{21e} ^2$ | 9.5 5.5 | 11.5 7.5 | 13.5 9.5 | dB |
| Third order intercept point at output ²⁾ $V_{CE} = 3\text{ V}$, $I_C = 40\text{ mA}$, $f = 1.8\text{ GHz}$, $Z_S = Z_L = 50\Omega$ | IP_3 | - | 29.5 | - | dBm |
| 1dB compression point at output $I_C = 40\text{ mA}$, $V_{CE} = 3\text{ V}$, $f = 1.8\text{ GHz}$ $Z_S = Z_L = 50\Omega$ $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$ | P_{-1dB} | - - | 16 19.5 | - - | |

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

²IP3 value depends on termination of all intermodulation frequency components.

Termination used for this measurement is 50Ω from 0.1 MHz to 6 GHz

SPICE Parameter

For the SPICE model as well as for the S-parameters (including noise parameters) please refer to our internet website www.infineon.com/rf.models.

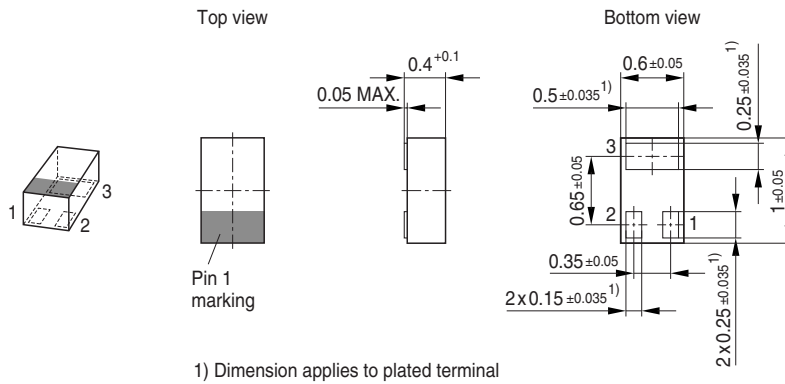
Please consult our website and download the latest versions before actually starting your design.

You find the BFR380L3 SPICE model in the internet in MWO- and ADS- format which you can import into these circuit simulation tools very quickly and conveniently.

The simulation data have been generated and verified using typical devices.

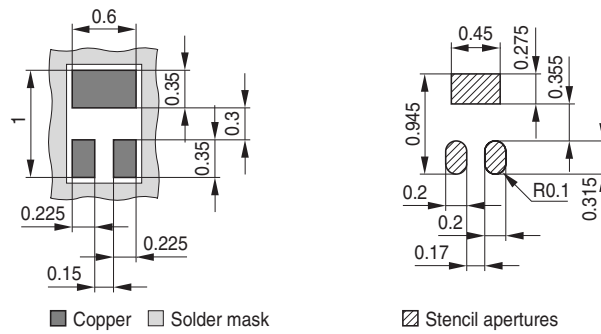
The BFR380L3 SPICE model reflects the typical DC- and RF-performance with high accuracy.

Package Outline

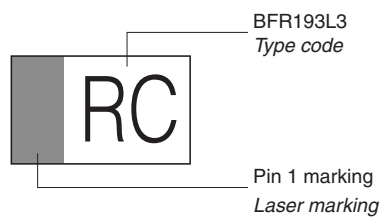


Foot Print

For board assembly information please refer to Infineon website "Packages"

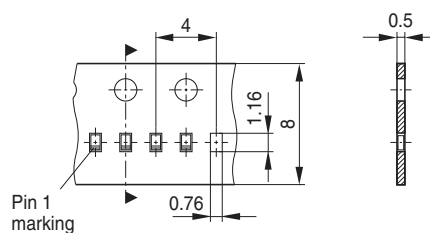


Marking Layout (Example)



Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel



Datasheet Revision History: 27 May 2010

This datasheet replaces the revisions from 10 July 2008 and 30 March 2007. The product itself has not been changed and the device characteristics remain unchanged. Only the product description and information available in the datasheet has been expanded and updated.

| Previous Revisions: 10 July 2008 and 30 March 2007 | |
|---|---|
| Page | Subject (changes since last revision) |
| 1 | Datasheet has final status |
| 2 | Typical values for leakage currents included, values for maximum leakage currents reduced |

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