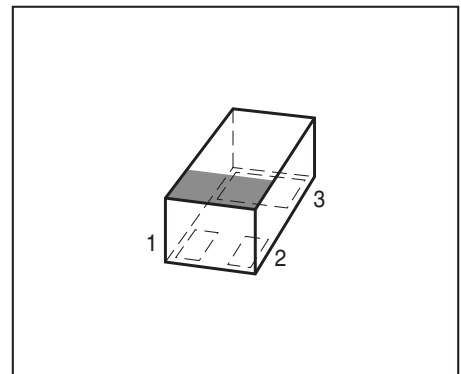**NPN Bipolar RF Transistor**

- For low noise, high-gain amplifiers up to 2 GHz

- For linear broadband amplifiers

- $f_T$ = 8 GHz, $NF_{min}$ = 1 dB at 900 MHz

- Pb-free (RoHS compliant) package

- Qualification report according to AEC-Q101 available

**RoHS**

**ESD** (**E**lectro**s**tatic **d**ischarge) sensitive device, observe handling precaution!

| Type | Marking | Pin Configuration | | | Package |
|------|---------|------|------|------|---------|
| BFR193L3 | RC | 1 = B | 2 = E | 3 = C | TSLP-3-1 |

**Maximum Ratings** at $T_A$ = 25 °C, unless otherwise specified

| 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 | $I_C$ | 80 | mA |
| Base current | $I_B$ | 10 | |
| Total power dissipation[1] $T_S \leq 89°C$ | $P_{tot}$ | 580 | mW |
| Junction temperature | $T_J$ | 150 | °C |
| Storage temperature | $T_{Stg}$ | -55 ... 150 | |

**Thermal Resistance**

| Parameter | Symbol | Value | Unit |
|-----------|--------|-------|------|
| Junction - soldering point[2] | $R_{thJS}$ | 105 | 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 Calculation)

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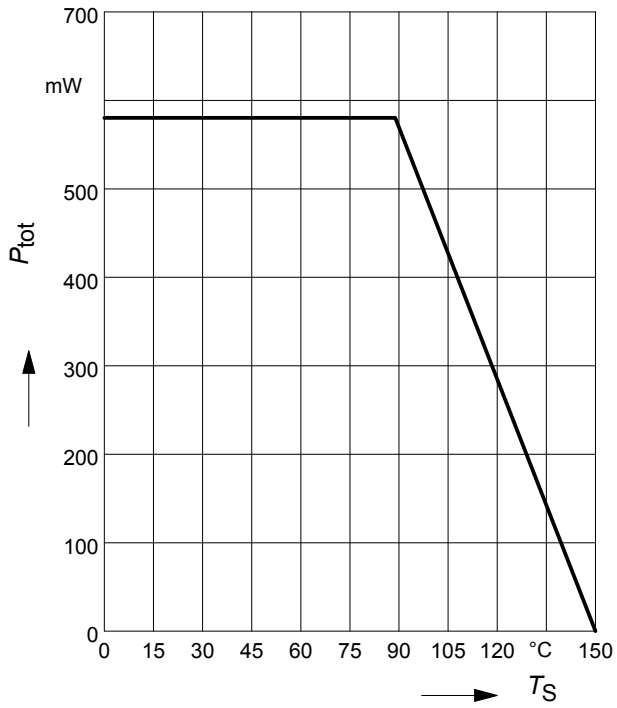**Electrical Characteristics** at $T_A$ = 25°C, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **DC Characteristics** | | | | | |
| Collector-emitter breakdown voltage<br>$I_C$ = 1 mA, $I_B$ = 0 | $V_{(BR)CEO}$ | 12 | - | - | V |
| Collector-emitter cutoff current<br>$V_{CE}$ = 20 V, $V_{BE}$ = 0 | $I_{CES}$ | - | - | 100 | µA |
| Collector-base cutoff current<br>$V_{CB}$ = 10 V, $I_E$ = 0 | $I_{CBO}$ | - | - | 100 | nA |
| Emitter-base cutoff current<br>$V_{EB}$ = 1 V, $I_C$ = 0 | $I_{EBO}$ | - | - | 1 | µA |
| DC current gain<br>$I_C$ = 30 mA, $V_{CE}$ = 8 V, pulse measured | $h_{FE}$ | 70 | 100 | 140 | - |

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**Electrical Characteristics** at $T_A$ = 25°C, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **AC Characteristics** (verified by random sampling) | | | | | |
| Transition frequency<br>$I_C$ = 50 mA, $V_{CE}$ = 8 V, $f$ = 500 MHz | $f_T$ | 6 | 8 | - | GHz |
| Collector-base capacitance<br>$V_{CB}$ = 10 V, $f$ = 1 MHz, $V_{BE}$ = 0 ,<br>emitter grounded | $C_{cb}$ | - | 0.63 | 0.9 | pF |
| Collector emitter capacitance<br>$V_{CE}$ = 10 V, $f$ = 1 MHz, $V_{BE}$ = 0 ,<br>base grounded | $C_{ce}$ | - | 0.22 | - | |
| Emitter-base capacitance<br>$V_{EB}$ = 0.5 V, $f$ = 1 MHz, $V_{CB}$ = 0 ,<br>collector grounded | $C_{eb}$ | - | 2.25 | - | |
| Minimum noise figure<br>$I_C$ = 10 mA, $V_{CE}$ = 8 V, $Z_S$ = $Z_{Sopt}$ ,<br>$f$ = 900 MHz | $NF_{min}$ | - | 1 | - | dB |
| $I_C$ = 10 mA, $V_{CE}$ = 8 V, $Z_S$ = $Z_{Sopt}$ ,<br>$f$ = 1.8 GHz | | - | 1.6 | - | |
| Power gain, maximum available[1]<br>$I_C$ = 30 mA, $V_{CE}$ = 8 V, $Z_S$ = $Z_{Sopt}$ ,<br>$Z_L$ = $Z_{Lopt}$ , $f$ = 900 MHz | $G_{ma}$ | - | 19 | - | |
| $I_C$ = 30 mA, $V_{CE}$ = 8 V, $Z_S$ = $Z_{Sopt}$ ,<br>$Z_L$ = $Z_{Lopt}$ , $f$ = 1.8 GHz | | - | 12.5 | - | |
| Transducer gain<br>$I_C$ = 30 mA, $V_{CE}$ = 8 V, $Z_S$ = $Z_L$ = 50Ω ,<br>$f$ = 900 MHz | $\|S_{21e}\|^2$ | - | 14.5 | - | dB |
| $I_C$ = 30 mA, $V_{CE}$ = 8 V, $Z_S$ = $Z_L$ = 50Ω ,<br>$f$ = 1.8 GHz | | - | 9 | - | |

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

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



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## Package Outline

Top view
Bottom view

0.4 $^{+0.1}$
0.05 MAX.

0.6 ±0.05
0.5 ±0.035 $^{1)}$
0.25 ±0.035 $^{1)}$

0.65 ±0.05
1 ±0.05

0.35 ±0.05
2 x 0.25 ±0.035 $^{1)}$
2 x 0.15 ±0.035 $^{1)}$

Pin 1
marking

1) Dimension applies to plated terminal
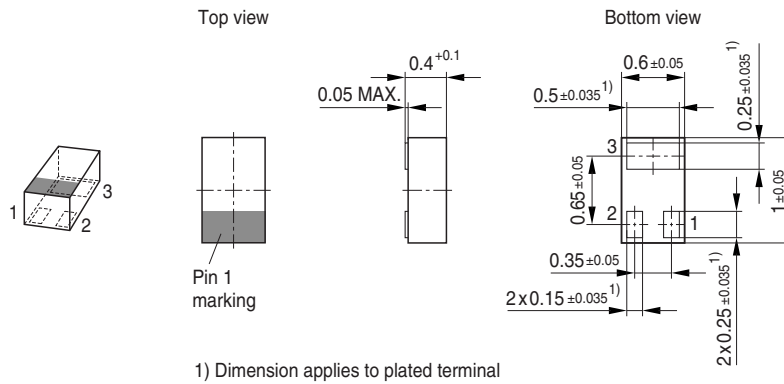
## Foot Print

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

0.6
0.35
0.3
0.35
0.225
0.225
0.15

0.45
0.275
0.355
0.945
0.2
0.2
R0.1
0.315
0.17

Copper ☐ Solder mask ☒ Stencil apertures

## Marking Layout (Example)

BFR193L3
*Type code*

RC

Pin 1 marking
*Laser marking*
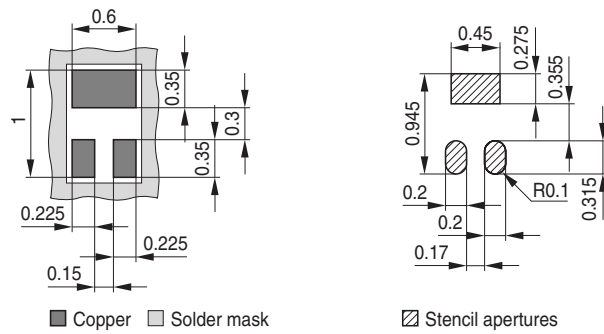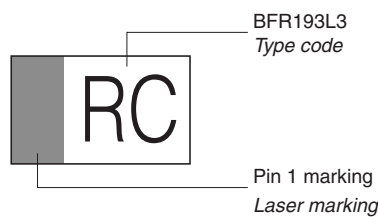
## Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel
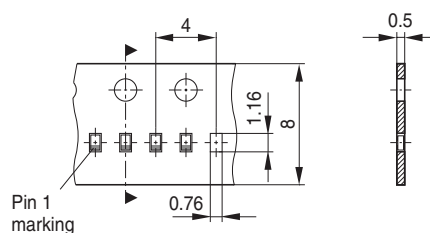
4
0.5
1.16
8
Pin 1
marking
0.76

**Edition 2009-11-16**

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