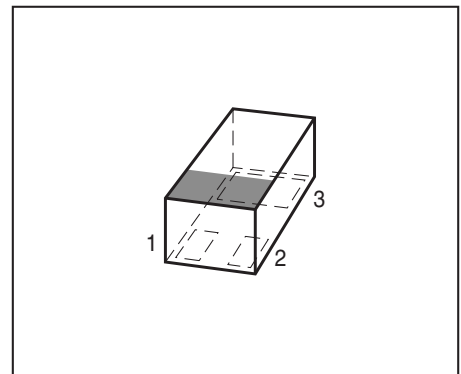


## NPN Bipolar RF Transistor

- For low noise, high-gain amplifiers up to 2 GHz
- For linear broadband amplifiers
- $f_T = 8 \text{ GHz}$ ,  $NF_{\min} = 1 \text{ dB}$  at 900 MHz
- Pb-free (RoHS compliant) package
- Qualification report according to AEC-Q101 available



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

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

**Maximum Ratings** at  $T_A = 25^\circ\text{C}$ , 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 <sup>1)</sup><br>$T_S \leq 89^\circ\text{C}$ | $P_{\text{tot}}$ | 580         | mW               |
| Junction temperature                                                 | $T_J$            | 150         | $^\circ\text{C}$ |
| Storage temperature                                                  | $T_{\text{Stg}}$ | -55 ... 150 |                  |

## Thermal Resistance

| Parameter                                | Symbol            | Value | Unit |
|------------------------------------------|-------------------|-------|------|
| Junction - soldering point <sup>2)</sup> | $R_{\text{thJS}}$ | 105   | K/W  |

<sup>1)</sup>  $T_S$  is measured on the collector lead at the soldering point to the pcb

<sup>2)</sup> For calculation of  $R_{\text{thJA}}$  please refer to Application Note AN077 (Thermal Resistance Calculation)

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

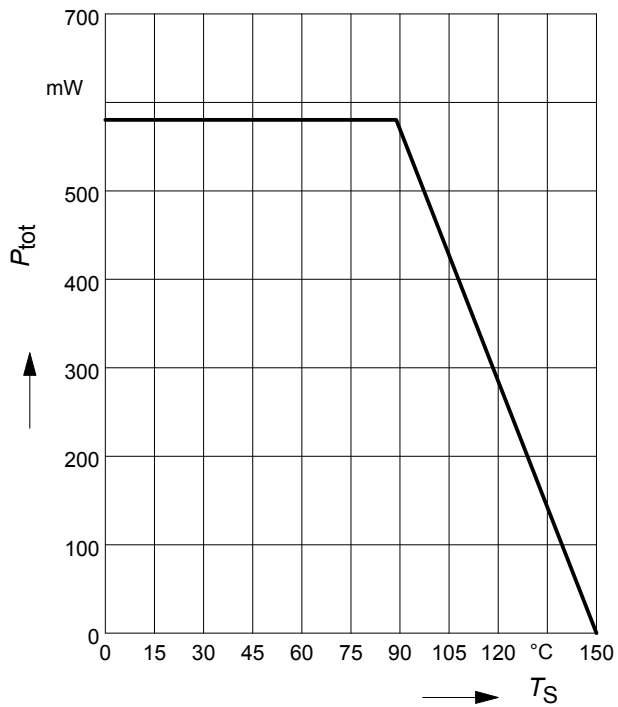
| Parameter                                                                           | Symbol        | Values |      |      | Unit          |
|-------------------------------------------------------------------------------------|---------------|--------|------|------|---------------|
|             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

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

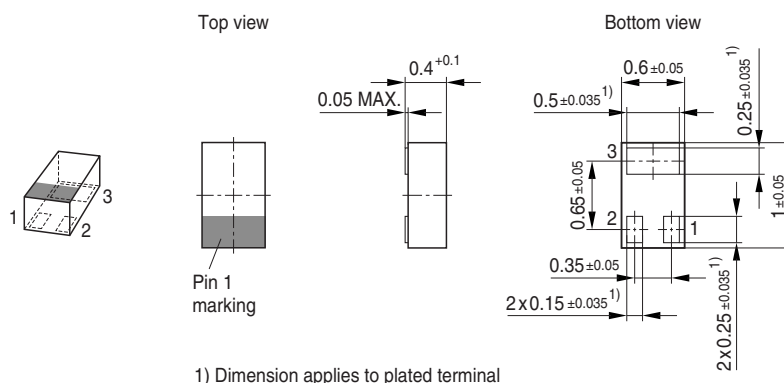
| Parameter                                                                                                                                                                                                                                                                   | Symbol        | Values |    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

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

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

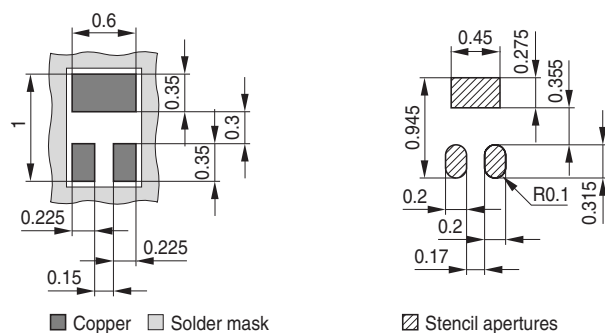


## Package Outline

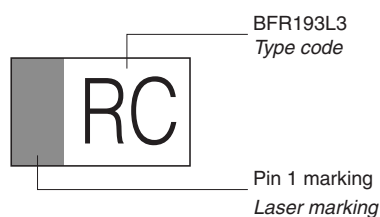


## Foot Print

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

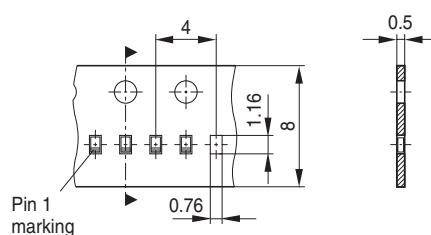


## Marking Layout (Example)



## Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel



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