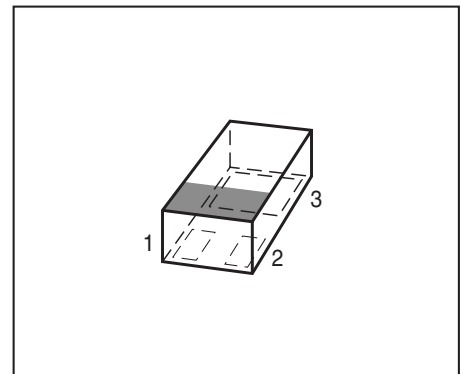


**NPN Silicon Germanium RF Transistor**

Target data sheet

- High gain ultra low noise RF transistor for low current operation
- Provides outstanding performance for a wide range of wireless applications up to 10 GHz and more
- Optimum gain and noise figure at low current operation
- Ideal for WLAN applications
- Outstanding noise figure  $F = 0.5$  dB at 1.8 GHz  
Outstanding noise figure  $F = 0.8$  dB at 6 GHz
- High maximum stable and available gain  
 $G_{ms} = 24$  dB at 1.8 GHz,  $G_{ma} = 16.5$  dB at 6 GHz
- 150 GHz  $f_T$ -Silicon Germanium technology
- Extremely small and flat leadless package height 0.32 mm max.
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101



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

Type	Marking	Pin Configuration			Package
BFR720L3RH	R3	1 = B	2 = C	3 = E	TSLP-3-9

**Maximum Ratings**

Parameter	Symbol	Value	Unit
Collector-emitter voltage $T_A > 0\text{ °C}$ $T_A \leq 0\text{ °C}$	$V_{CEO}$	4 3.5	V
Collector-emitter voltage	$V_{CES}$	13	
Collector-base voltage	$V_{CBO}$	13	
Emitter-base voltage	$V_{EBO}$	1.2	
Collector current	$I_C$	20	mA
Base current	$I_B$	2	
Total power dissipation <sup>1)</sup> $T_S \leq \text{tbd}$	$P_{\text{tot}}$	80	mW
Operating junction temperature range	$T_{jO}$	-65 ... 150	°C
Storage junction temperature range	$T_{j\text{stg}}$	-65 ... 150	

**Thermal Resistance**

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

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

**DC Characteristics**

Collector-emitter breakdown voltage $I_C = 1\text{ mA}, I_B = 0$	$V_{(\text{BR})CEO}$	4	4.7	-	V
Collector-emitter cutoff current $V_{CE} = 13\text{ V}, V_{BE} = 0$	$I_{CES}$	-	-	30	$\mu\text{A}$
Collector-base cutoff current $V_{CB} = 5\text{ V}, I_E = 0$	$I_{CBO}$	-	-	100	nA
Emitter-base cutoff current $V_{EB} = 0.5\text{ V}, I_C = 0$	$I_{EBO}$	-	-	2	$\mu\text{A}$
DC current gain- $I_C = 13\text{ mA}, V_{CE} = 3\text{ V}$ , pulse measured	$h_{FE}$	160	250	400	-

<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 Thermal Resistance

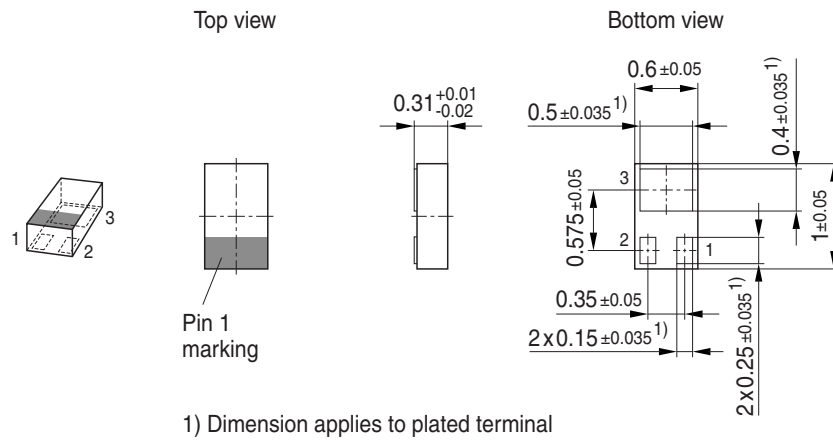
**Electrical Characteristics at  $T_A = 25^\circ\text{C}$ , unless otherwise specified**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics (verified by random sampling)</b>					
Transition frequency $I_C = 13\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $f = 1\text{ GHz}$	$f_T$	-	45	-	GHz
Collector-base capacitance $V_{CB} = 3\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ , emitter grounded	$C_{cb}$	-	0.07	-	pF
Collector emitter capacitance $V_{CE} = 3\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ , based grounded	$C_{ce}$	-	0.26	-	
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$ , $V_{CB} = 0$ , collector grounded	$C_{eb}$	-	0.27	-	
Noise figure $I_C = 5\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $f = 1.8\text{ GHz}$ , $Z_S = Z_{Sopt}$ $I_C = 5\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $f = 6\text{ GHz}$ , $Z_S = Z_{Sopt}$	$NF$	-	0.5 0.8	-	dB
Power gain <sup>1)</sup> $I_C = 13\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ , $f = 1.8\text{ GHz}$	$G_{ms}$	-	24	-	dB
Power gain, maximum available <sup>1)</sup> $I_C = 13\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ , $f = 6\text{ GHz}$	$G_{ma}$	-	16.5	-	dB
Transducer gain $I_C = 13\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_L = 50\ \Omega$ , $f = 1.8\text{ GHz}$ $f = 6\text{ GHz}$	$ S_{21e} ^2$	-	22 13.5	-	dB
Third order intercept point at output <sup>2)</sup> $V_{CE} = 3\text{ V}$ , $I_C = 10\text{ mA}$ , $Z_S = Z_L = 50\ \Omega$ , $f = 1.8\text{ GHz}$	$IP_3$	-	20.5	-	dBm
1dB Compression point $I_C = 13\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_L = 50\ \Omega$ , $f = 1.8\text{ GHz}$	$P_{-1dB}$	-	6	-	

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

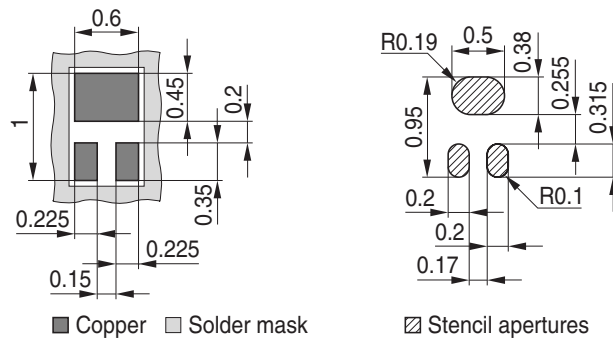
<sup>2</sup>IP3 value depends on termination of all intermodulation frequency components.  
Termination used for this measurement is  $50\ \Omega$  from 0.1 MHz to 6 GHz

### Package Outline

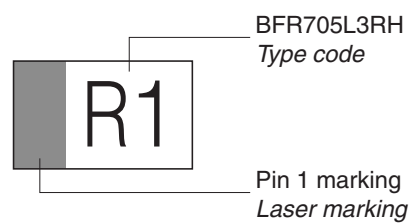


### Foot Print

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

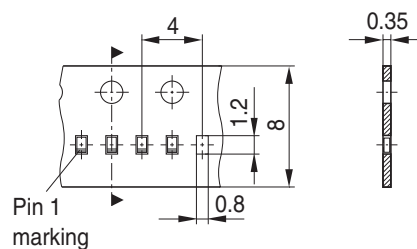


### Marking Layout (Example)



### Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel



Edition 2006-02-01

Published by

Infineon Technologies AG

81726 München, Germany

© Infineon Technologies AG 2007.

All Rights Reserved.

### **Attention please!**

The information given in this dokument shall in no event be regarded as a guarantee of conditions or characteristics (“Beschaffenheitsgarantie”). With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

### **Information**

For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office ([www.infineon.com](http://www.infineon.com)).

### **Warnings**

Due to technical requirements components may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies Office.

Infineon Technologies Components may only be used in life-support devices or systems with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system.

Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.