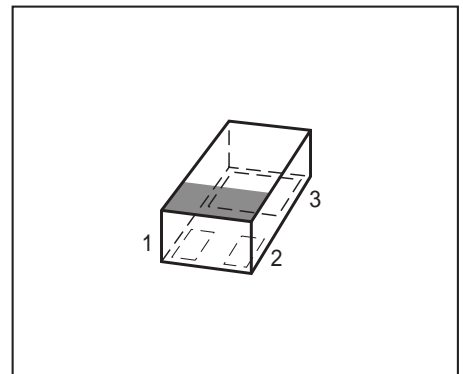


**NPN Silicon Germanium RF Transistor\***

- High gain ultra low noise RF transistor for low current operation
- Ideal for low power consumption LNA design
- Provides outstanding performance for a wide range of wireless applications up to 10 GHz and more
- 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 at only 7m.  
 $G_{ms} = 25$  dB at 1.8 GHz,  $G_{ma} = 18$  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<sup>1)</sup>
- Qualified according AEC Q101

\* Short term description



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

Type	Marking	Pin Configuration			Package
BFR705L3RH	R1	1=B	2=C	3=E	TSLP-3-9

<sup>1</sup>Pb-containing package may be available upon special request

**Maximum Ratings**

Parameter	Symbol	Value	Unit
Collector-emitter voltage $T_A > 0^\circ\text{C}$ $T_A \leq 0^\circ\text{C}$	$V_{\text{CEO}}$	4 3.5	V
Collector-emitter voltage	$V_{\text{CES}}$	13	
Collector-base voltage	$V_{\text{CBO}}$	13	
Emitter-base voltage	$V_{\text{EBO}}$	1.2	
Collector current	$I_{\text{C}}$	10	mA
Base current	$I_{\text{B}}$	1	
Total power dissipation <sup>1)</sup> , $T_S \leq 123^\circ\text{C}$	$P_{\text{tot}}$	40	mW
Junction temperature	$T_{\text{j}}$	150	$^\circ\text{C}$
Ambient temperature	$T_{\text{A}}$	-65 ... 150	
Storage temperature	$T_{\text{stg}}$	-65 ... 150	

**Thermal Resistance**

Parameter	Symbol	Value	Unit
Junction - soldering point <sup>2)</sup>	$R_{\text{thJS}}$	$\leq 665$	K/W

**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 $I_{\text{C}} = 1 \text{ mA}$ , $I_{\text{B}} = 0$	$V_{(\text{BR})\text{CEO}}$	4	4.7	-	V
Collector-emitter cutoff current $V_{\text{CE}} = 13 \text{ V}$ , $V_{\text{BE}} = 0$	$I_{\text{CES}}$	-	-	30	$\mu\text{A}$
Collector-base cutoff current $V_{\text{CB}} = 5 \text{ V}$ , $I_{\text{E}} = 0$	$I_{\text{CBO}}$	-	-	100	nA
Emitter-base cutoff current $V_{\text{EB}} = 0.5 \text{ V}$ , $I_{\text{C}} = 0$	$I_{\text{EBO}}$	-	-	1	$\mu\text{A}$
DC current gain $I_{\text{C}} = 7 \text{ mA}$ , $V_{\text{CE}} = 3 \text{ V}$ , pulse measured	$h_{\text{FE}}$	160	250	400	-

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

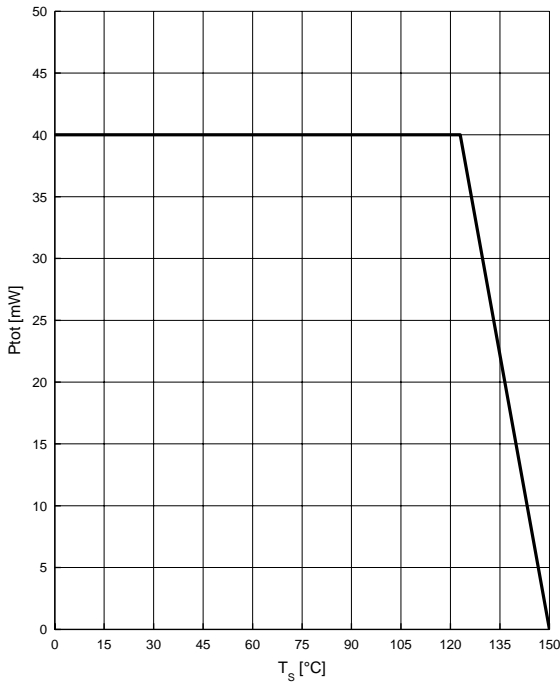
<sup>2</sup> For calculation of  $R_{\text{thJA}}$  please refer to Application Note Thermal Resistance

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

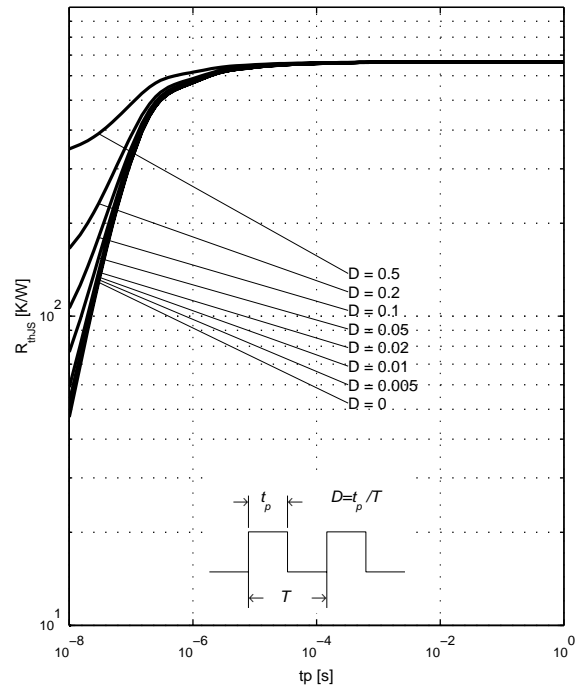
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics</b> (verified by random sampling)					
Transition frequency $I_C = 7\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $f = 1\text{ GHz}$	$f_T$	-	39	-	GHz
Collector-base capacitance $V_{CB} = 3\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ , emitter grounded	$C_{cb}$	-	0.04	0.08	pF
Collector emitter capacitance $V_{CE} = 3\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ , base grounded	$C_{ce}$	-	0.15	-	
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$ , $V_{CB} = 0$ , collector grounded	$C_{eb}$	-	0.18	-	
Noise figure $I_C = 3\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $f = 1.8\text{ GHz}$ , $Z_S = Z_{Sopt}$ $I_C = 3\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $f = 6\text{ GHz}$ , $Z_S = Z_{Sopt}$	$F$	-	0.5 0.8	-	dB
Power gain, maximum stable <sup>1)</sup> $I_C = 7\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ , $f = 1.8\text{ GHz}$	$G_{ms}$	-	25	-	dB
Power gain, maximum available <sup>1)</sup> $I_C = 7\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ , $f = 6\text{ GHz}$	$G_{ma}$	-	18	-	dB
Transducer gain $I_C = 7\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_L = 50\ \Omega$ , $f = 1.8\text{ GHz}$ $f = 6\text{ GHz}$	$ S_{21e} ^2$	-	21 14	-	dB

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

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

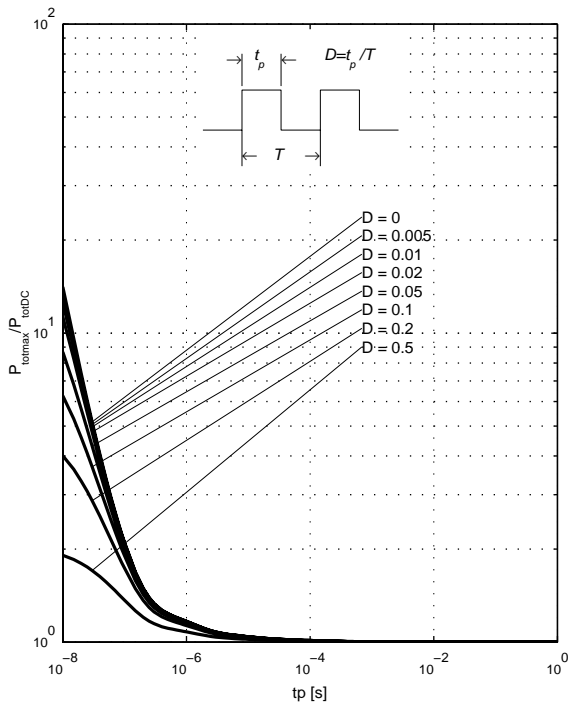


Permissible Puls Load  $R_{thJS} = f(t_p)$



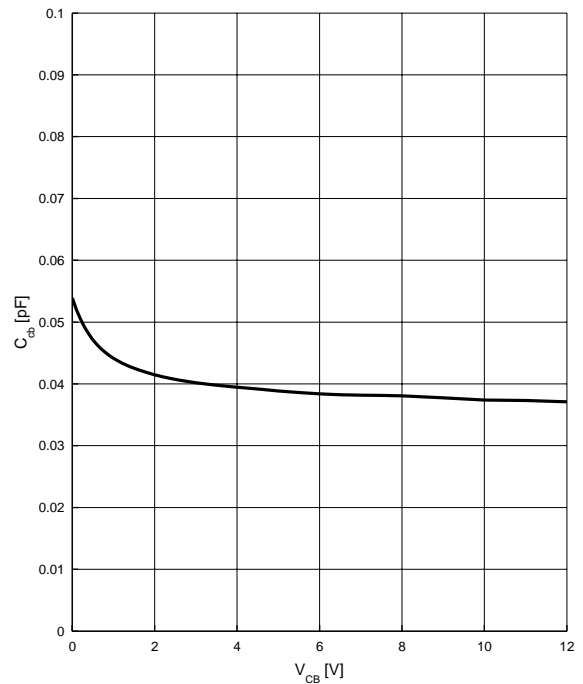
Permissible Pulse Load

$P_{totmax}/P_{totDC} = f(t_p)$



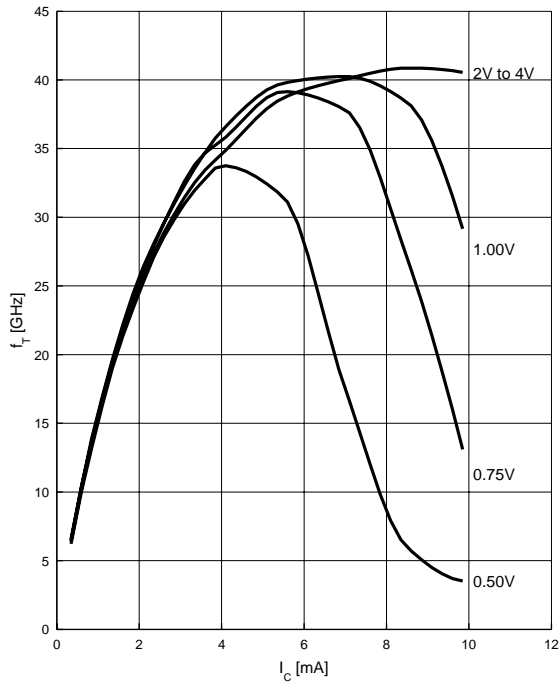
Collector-base capacitance  $C_{cb} = f(V_{CB})$

$f = 1$  MHz



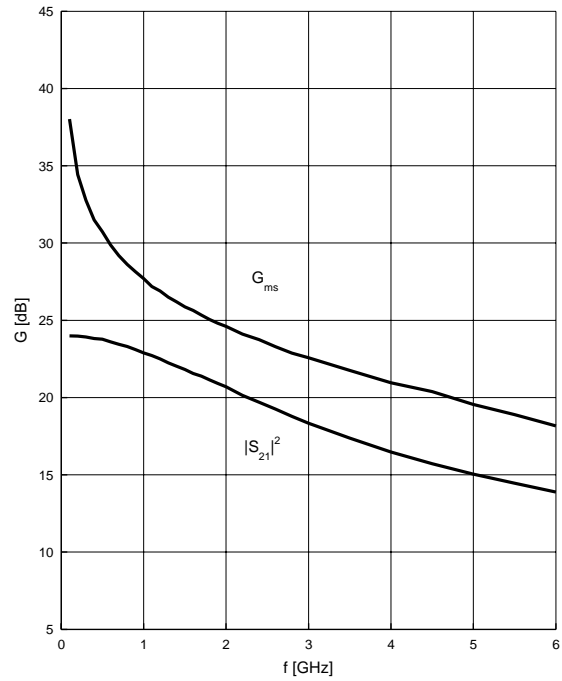
Transition frequency  $f_T = f(I_C)$

$V_{CE} = \text{parameter}$ ,  $f = 1 \text{ GHz}$



Power gain  $G_{ma}$ ,  $G_{ms} = f(f)$

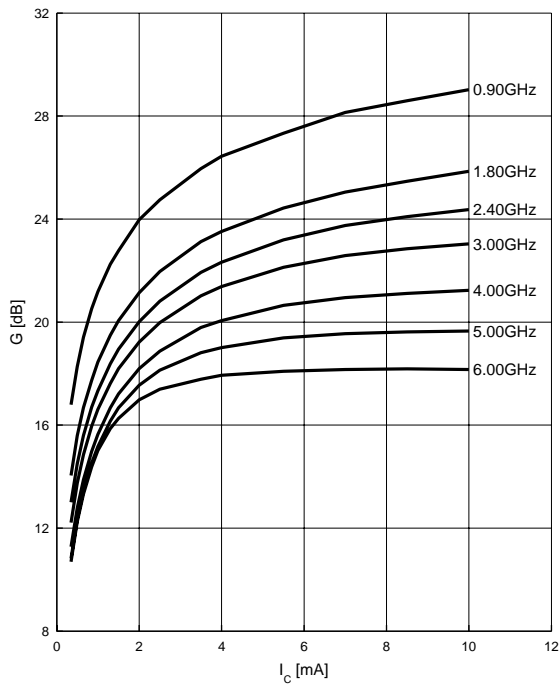
$V_{CE} = 2 \text{ V}$ ,  $I_C = 7 \text{ mA}$



Power gain  $G_{ma}$ ,  $G_{ms} = f(I_C)$

$V_{CE} = 3 \text{ V}$

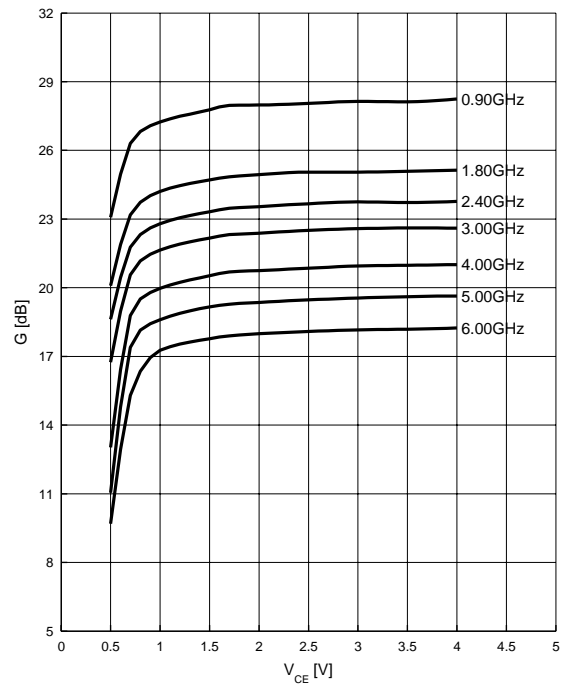
$f = \text{parameter}$



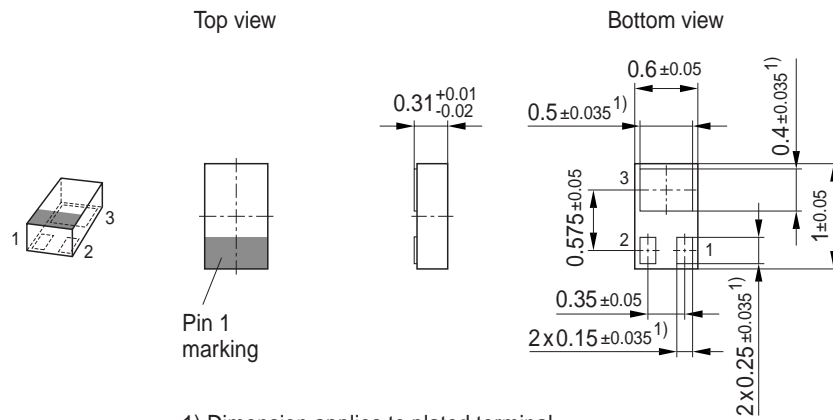
Power gain  $G_{ma}$ ,  $G_{ms} = f(V_{CE})$

$I_C = 7 \text{ mA}$

$f = \text{parameter}$



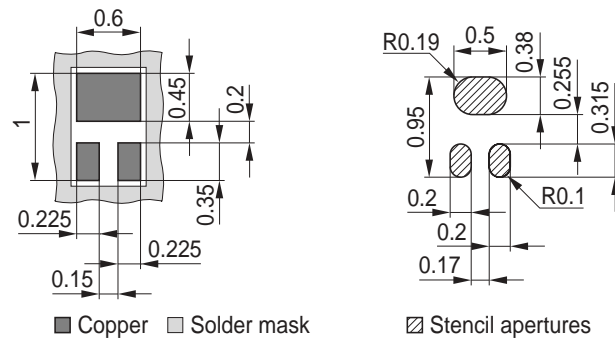
### Package Outline



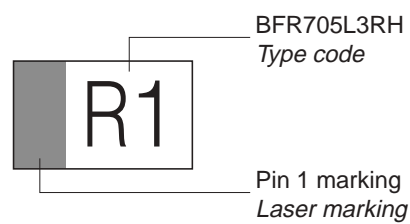
1) Dimension applies to plated terminal

### Foot Print

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

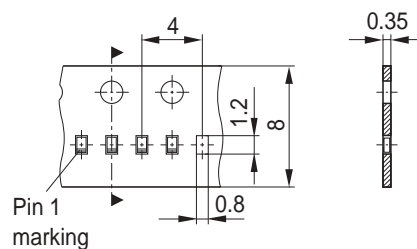


### Marking Layout (Example)



### Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel



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