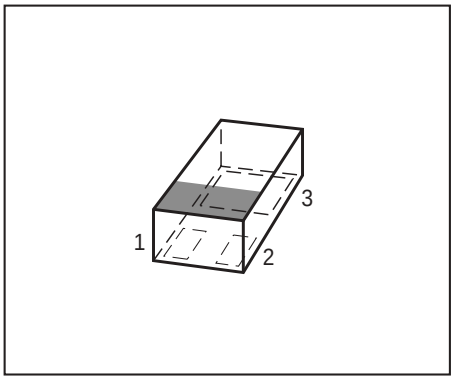
NPN Silicon Germanium RF Transistor*



- 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[1)]
- Qualified according AEC Q101

* Short term description

AEC Qualified RoHS

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

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

[1]Pb-containing package may be available upon special request

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}		V
$T_A > 0°C$		4	
$T_A \leq 0°C$		3.5	
Collector-emitter voltage	V_{CES}	13	
Collector-base voltage	V_{CBO}	13	
Emitter-base voltage	V_{EBO}	1.2	
Collector current	I_C	10	mA
Base current	I_B	1	
Total power dissipation[1], $T_S \leq 123$ °C	P_{tot}	40	mW
Junction temperature	T_j	150	°C
Ambient temperature	T_A	-65 ... 150	
Storage temperature	T_{stg}	-65 ... 150	

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point[2]	R_{thJS}	≤ 665	K/W

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Collector-emitter breakdown voltage I_C = 1 mA, I_B = 0	$V_{(BR)CEO}$	4	4.7	-	V
Collector-emitter cutoff current V_{CE} = 13 V, V_{BE} = 0	I_{CES}	-	-	30	µA
Collector-base cutoff current V_{CB} = 5 V, I_E = 0	I_{CBO}	-	-	100	nA
Emitter-base cutoff current V_{EB} = 0.5 V, I_C = 0	I_{EBO}	-	-	1	µA
DC current gain I_C = 7 mA, V_{CE} = 3 V, pulse measured	h_{FE}	160	250	400	-

[1] T_S is measured on the collector lead at the soldering point to the pcb

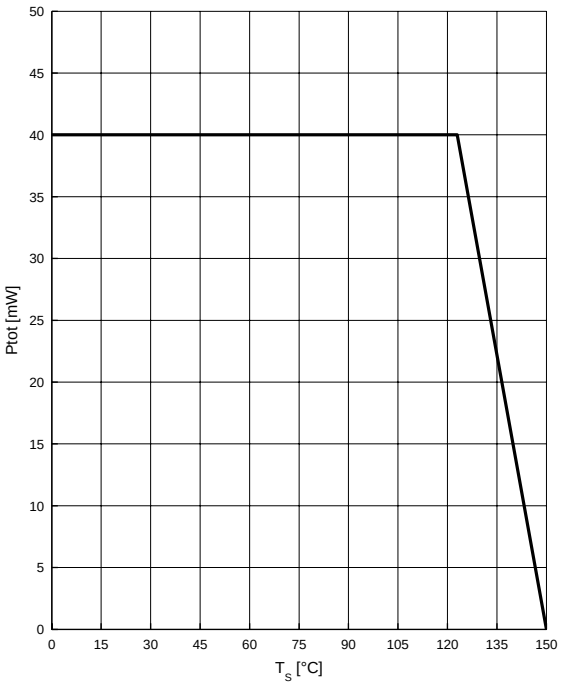
[2] For calculation of R_{thJA} please refer to Application Note Thermal Resistance

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

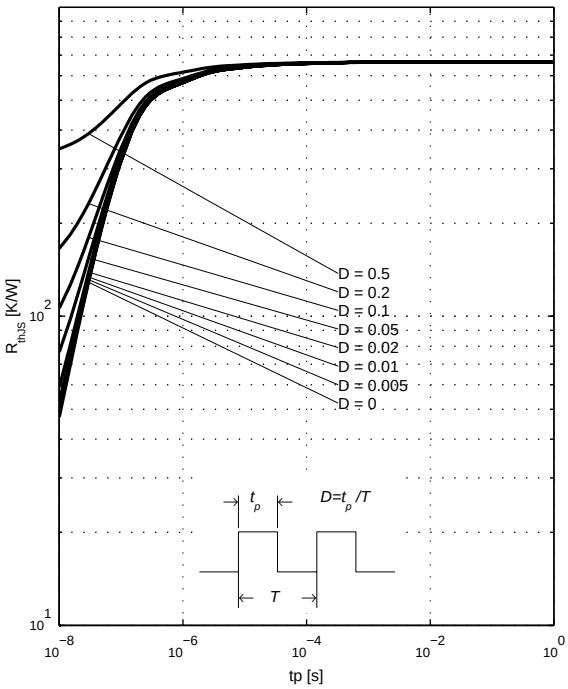
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics (verified by random sampling)					
Transition frequency I_C = 7 mA, V_{CE} = 3 V, f = 1 GHz	f_T	-	39	-	GHz
Collector-base capacitance V_{CB} = 3 V, f = 1 MHz, V_{BE} = 0 , emitter grounded	C_{cb}	-	0.04	0.08	pF
Collector emitter capacitance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

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

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

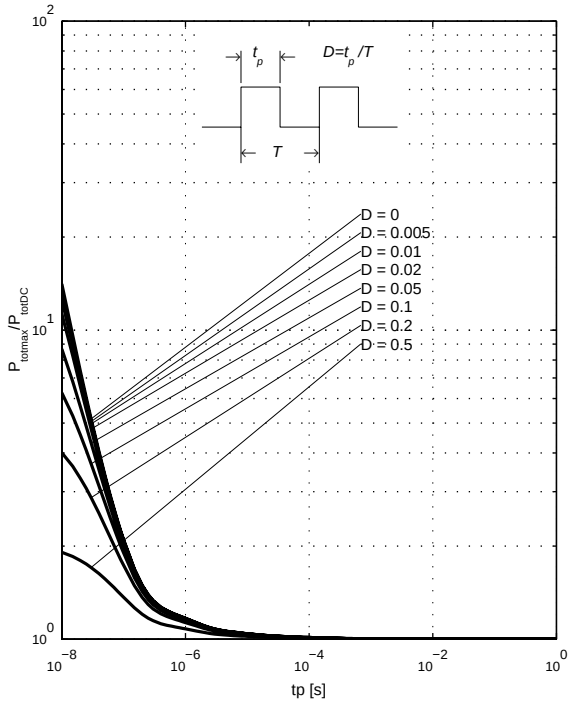


Permissible Puls Load $R_{thJS} = f(t_p)$



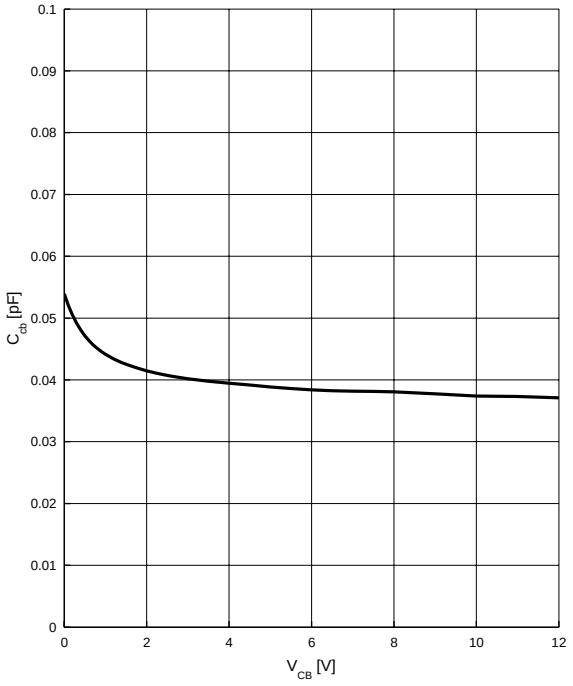
Permissible Pulse Load

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



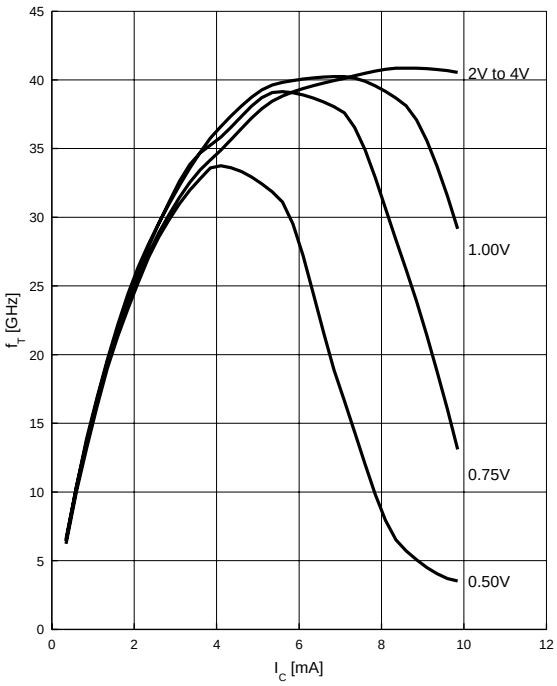
Collector-base capacitance $C_{cb} = f(V_{CB})$

f = 1 MHz



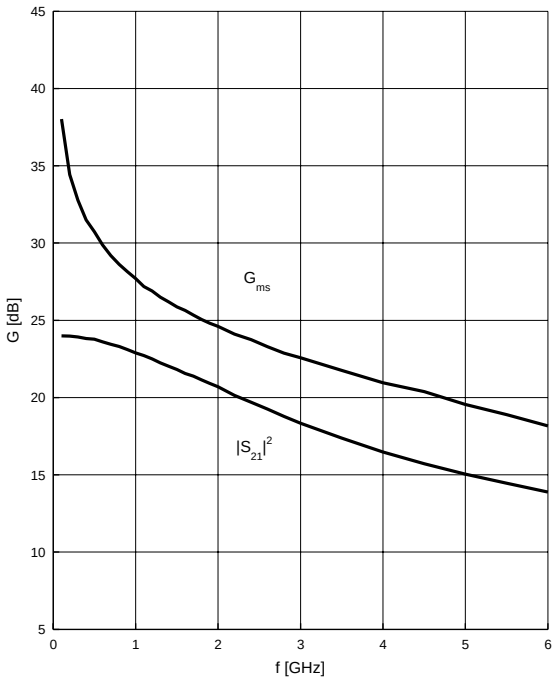
Transition frequency $f_T = f(I_C)$

V_{CE} = parameter, f = 1 GHz



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

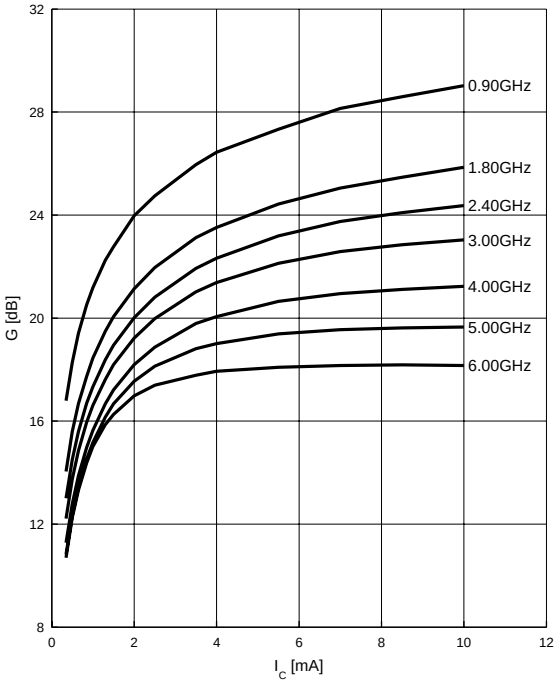
V_{CE} = 2 V, I_C = 7 mA



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

V_{CE} = 3 V

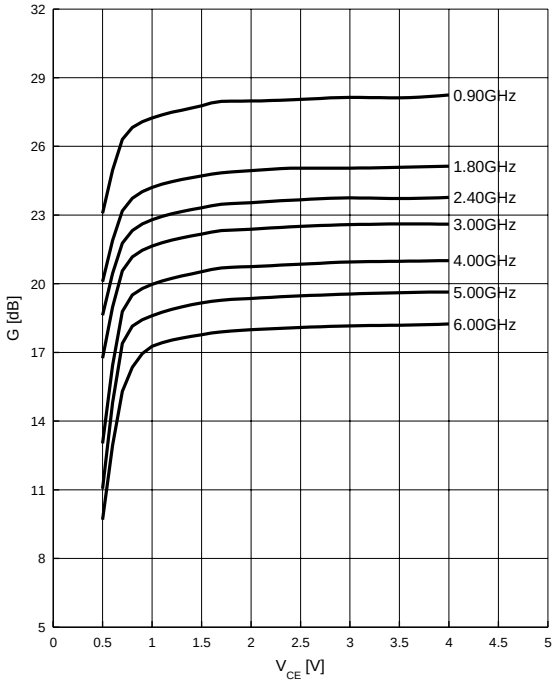
f = parameter



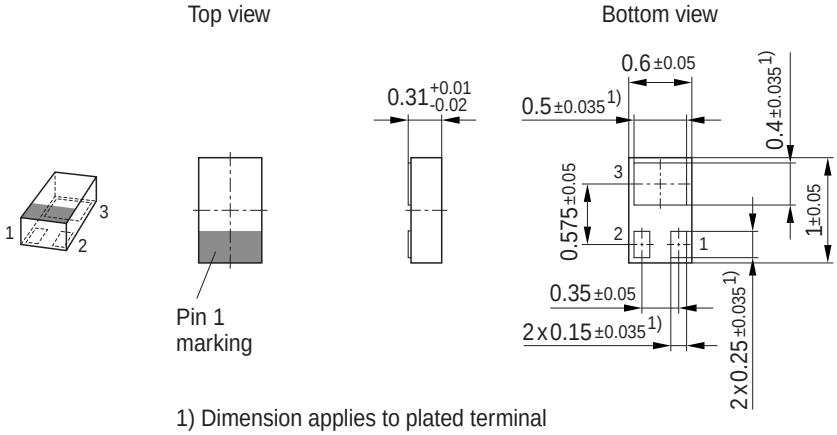
Power gain G_{ma}, $G_{ms} = f(V_{CE})$

I_C = 7 mA

f = parameter



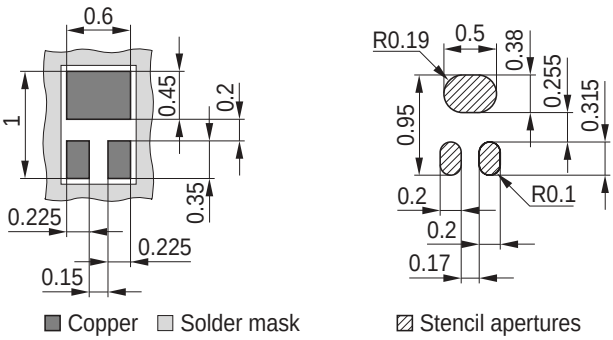
Package Outline



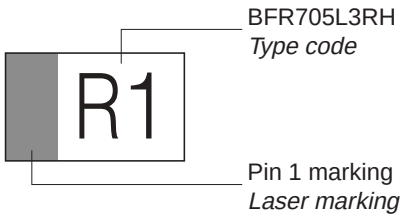
1) Dimension applies to plated terminal

Foot Print

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

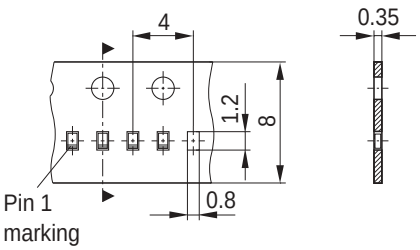


Marking Layout (Example)



Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel



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