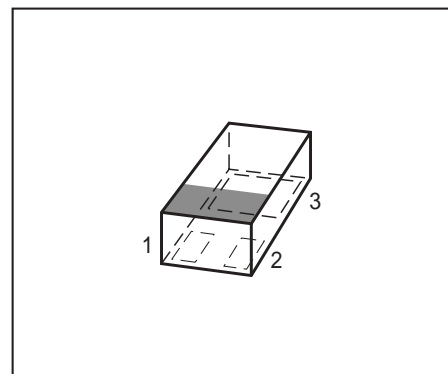


NPN Silicon Germanium RF Transistor*

- High gain ultra low noise RF transistor
- Provides outstanding performance for a wide range of wireless applications up to 10 GHz
- Ideal for WLAN and all 5-6 GHz applications
- High OIP_3 and P_{1dB} for driver stages
- High maximum stable and available gain
 $G_{ms} = 21 \text{ dB}$ at 1.8 GHz, $G_{ma} = 11.5 \text{ dB}$ at 6 GHz
- 150 GHz f_T -Silicon Germanium technology
- Extremely small and flat leadless package, reduced height 0.32 mm max.
- Pb-free (RoHS compliant) package¹⁾
- Qualified according AEC Q101

* Short term description



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

Type	Marking	Pin Configuration			Package
BFR750L3RH	R8	1=B	2=C	3=E	TSLP-3-9

¹Pb-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_{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}	90	mA
Base current	I_{B}	9	
Total power dissipation ¹⁾ $T_S \leq 96^\circ\text{C}$	P_{tot}	360	mW
Junction temperature	T_{j}	150	$^\circ\text{C}$
Ambient temperature	T_{A}	-65 ... 150	
Storage temperature	T_{stg}	-65 ... 150	

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point ²⁾	R_{thJS}	≤ 150	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 $I_{\text{C}} = 3 \text{ mA}$, $I_{\text{B}} = 0$	$V_{(\text{BR})\text{CEO}}$	4	4.7	-	V
Collector-emitter cutoff current $V_{\text{CE}} = 13 \text{ V}$, $V_{\text{BE}} = 0$	I_{CES}	-	-	100	μA
Collector-base cutoff current $V_{\text{CB}} = 5 \text{ V}$, $I_{\text{E}} = 0$	I_{CBO}	-	-	100	nA
Emitter-base cutoff current $V_{\text{EB}} = 0.5 \text{ V}$, $I_{\text{C}} = 0$	I_{EBO}	-	-	10	μA
DC current gain $I_{\text{C}} = 60 \text{ mA}$, $V_{\text{CE}} = 3 \text{ V}$, 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

 R_{thJS} demanded by P_{tot} and T_{S} , to be fulfilled by design

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 $I_C = 60\text{ mA}$, $V_{CE} = 3\text{ V}$, $f = 2\text{ GHz}$	f_T	-	37	-	GHz
Collector-base capacitance $V_{CB} = 3\text{ V}$, $f = 1\text{ MHz}$, emitter grounded	C_{cb}	-	0.24	0.42	pF
Collector emitter capacitance $V_{CE} = 3\text{ V}$, $f = 1\text{ MHz}$, base grounded	C_{ce}	-	0.31	-	
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$, $f = 1\text{ MHz}$, collector grounded	C_{eb}	-	0.97	-	
Noise figure $I_C = 25\text{ mA}$, $V_{CE} = 3\text{ V}$, $f = 1.8\text{ GHz}$, $Z_S = Z_{Sopt}$ $I_C = 25\text{ mA}$, $V_{CE} = 3\text{ V}$, $f = 6\text{ GHz}$, $Z_S = Z_{Sopt}$	F	- -	0.6 1.1	- -	dB
Power gain, maximum stable ¹⁾ $I_C = 60\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 1.8\text{ GHz}$	G_{ms}	-	21	-	dB
Power gain, maximum available ¹⁾ $I_C = 60\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 6\text{ GHz}$	G_{ma}	-	11.5	-	dB
Transducer gain $I_C = 60\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_L = 50\text{ }\Omega$, $f = 1.8\text{ GHz}$ $I_C = 60\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_L = 50\text{ }\Omega$, $f = 6\text{ GHz}$	$ S_{21e} ^2$	- -	18 8	- -	dB
Third order intercept point at output ²⁾ $V_{CE} = 3\text{ V}$, $I_C = 60\text{ mA}$, $f = 1.8\text{ GHz}$, $Z_S = Z_L = 50\text{ }\Omega$	IP_3	-	29.5	-	dBm
1dB Compression point at output $I_C = 60\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_L = 50\text{ }\Omega$, $f = 1.8\text{ GHz}$	P_{-1dB}	-	16.5	-	

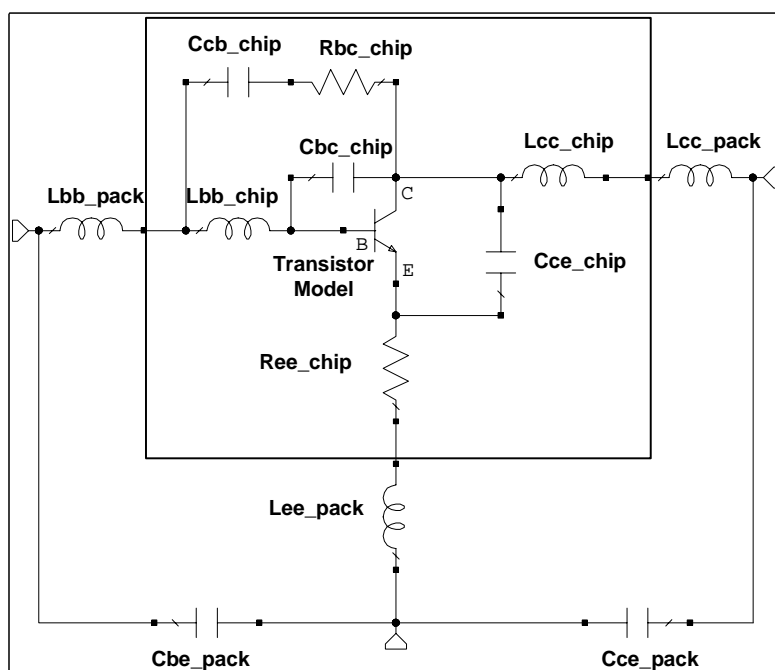
¹⁾ $G_{ma} = |S_{21e} / S_{12e}| (k - (k^2 - 1)^{1/2})$, $G_{ms} = |S_{21e} / S_{12e}|$
²⁾ IP_3 value depends on termination of all intermodulation frequency components.

Termination used for this measurement is $50\ \Omega$ from 0.1 MHz to 6 GHz

SPICE Parameter (Gummel-Poon Model, Berkley-SPICE 2G.6 Syntax):
Transistor Chip Data:

IS =	2.66 e-12	mA	BF =	753	-	NF =	1.015	-
VAF =	95	V	IKF =	292	mA	ISE =	1.54 e-11	mA
NE =	1.8	-	BR =	76	-	NR =	1	-
VAR =	1.33	V	IKR =	1.33	mA	ISC =	1 e-27	mA
NC =	2	-	RB =	1	Ω	IRB =	1 e15	A
RBM =	0.9	Ω	RE =	20	m Ω	RC =	0.9	Ω
CJE =	0.475	pF	VJE =	0.69	V	MJE =	0.085	-
TF =	0.0021	ns	XTF =	3	-	VTF =	2.1	V
ITF =	2540	mA	PTF =	0.5		CJC =	0.173	pF
VJC =	0.45	V	MJC =	0.31		XCJC =	0.01	-
TR =	1.2	ns	CJS =	0.325	pF	VJS =	0.65	V
MJS =	0.25	-	XTB =	-2.2	-	EG =	1.11	
XTI =	0.436	-	FC =	0.5		TNOM	25	$^{\circ}\text{C}$
AF =	1	-	KF =	0	-			

All parameters are ready to use, no scaling is necessary.

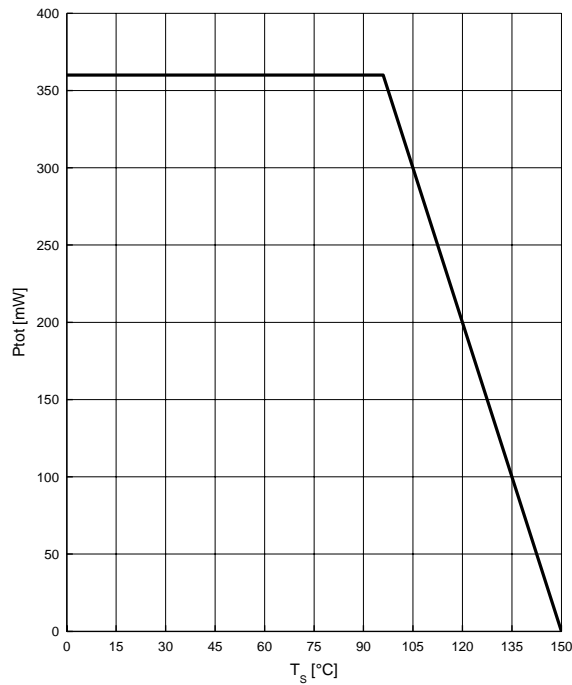
Package Equivalent Circuit:


L_{bb_chip}	=	0.212	nA
L_{cc_chip}	=	0.07472	nH
L_{bb_pack}	=	0.0184	nH
L_{cc_pack}	=	0.277	nH
L_{ee_pack}	=	0.239	nH
C_{bc_chip}	=	0.015	pF
C_{cb_chip}	=	0.013	pF
C_{ce_chip}	=	0.282	pF
C_{be_pack}	=	0.064	pF
C_{ce_pack}	=	0.0492	pF
R_{bc_chip}	=	7	Ω
R_{ee_chip}	=	0.566	Ω

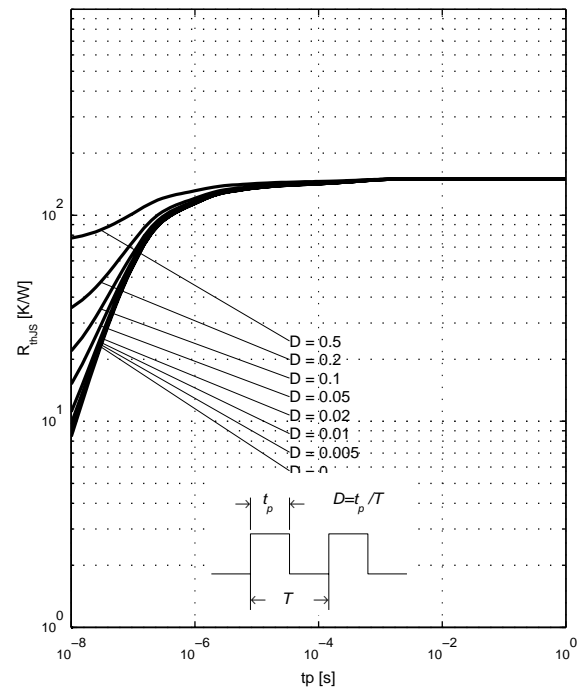
Valid up to 6GHz

For examples and ready to use parameters please contact your local Infineon Technologies distributor or sales office to obtain a Infineon Technologies CD-ROM or see Internet: <http://www.infineon.com>

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

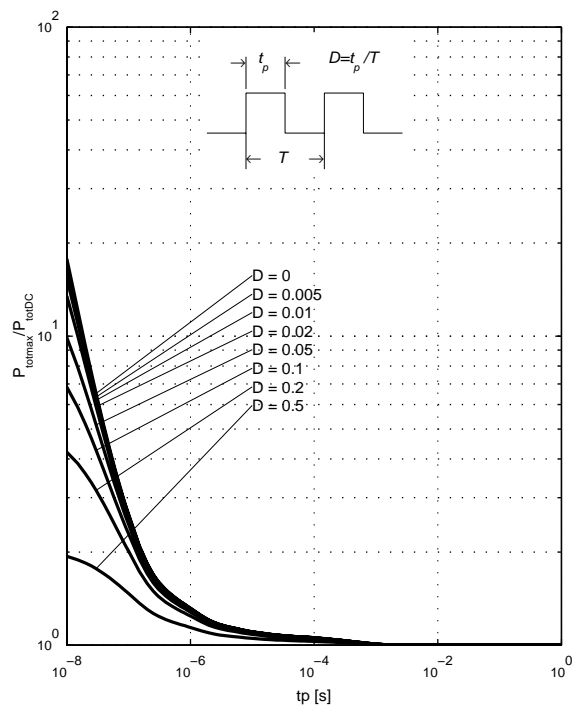


Permissible Puls Load $R_{\text{thJS}} = f(t_p)$



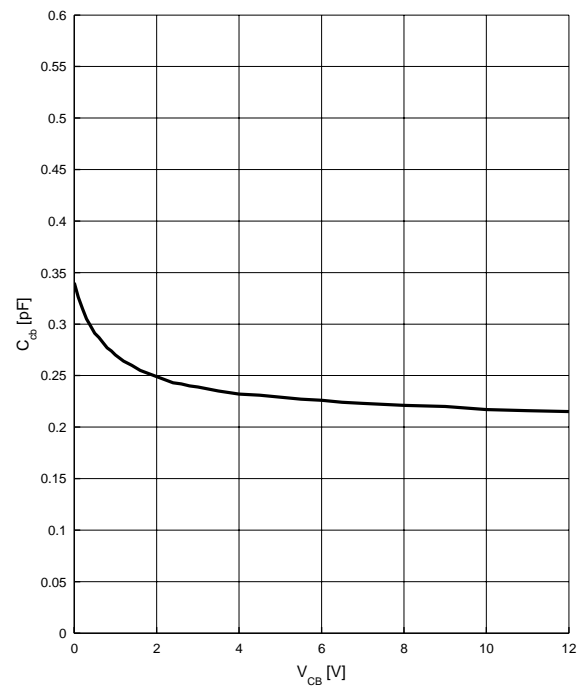
Permissible Pulse Load

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



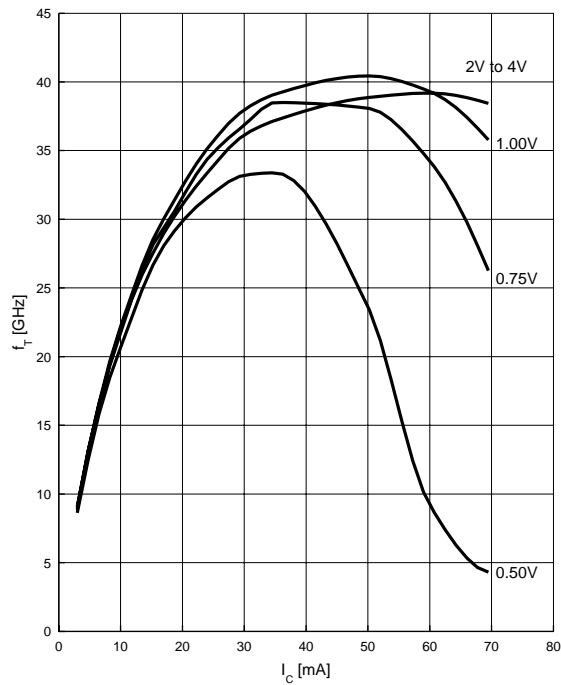
Collector-base capacitance $C_{\text{cb}} = f(V_{\text{CB}})$

$f = 1 \text{ MHz}$



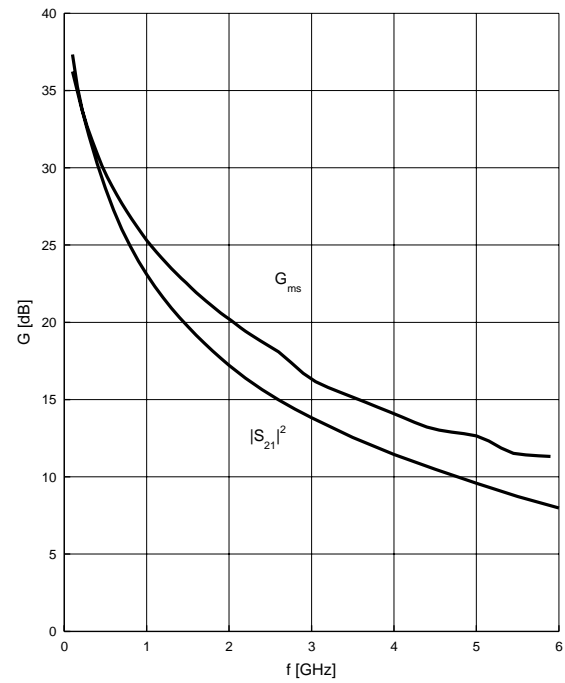
Transition frequency $f_T = f(I_C)$

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



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

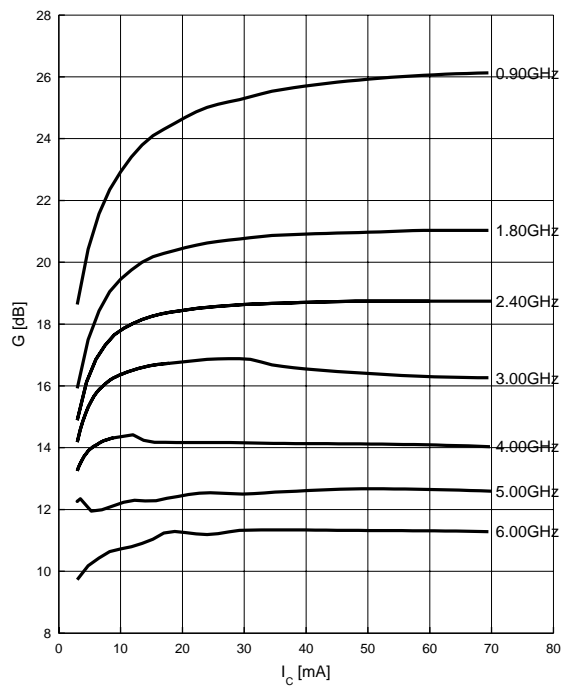
$V_{CE} = 3 \text{ V}, I_C = 60 \text{ mA}$



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

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

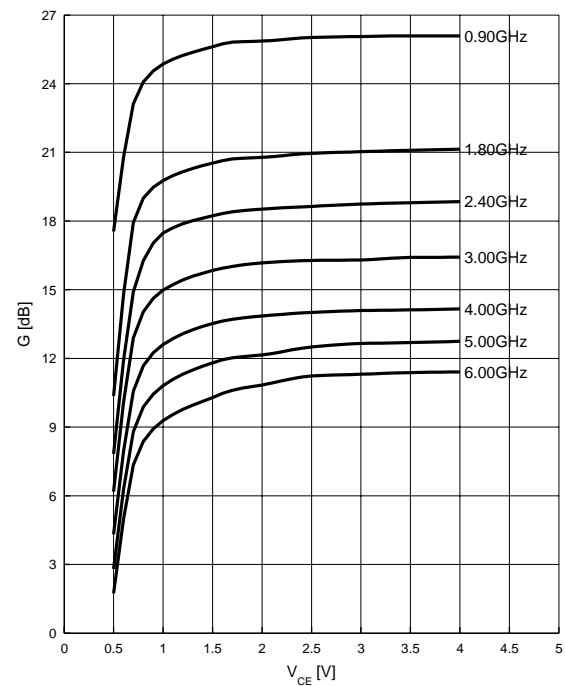
$f = \text{parameter}$



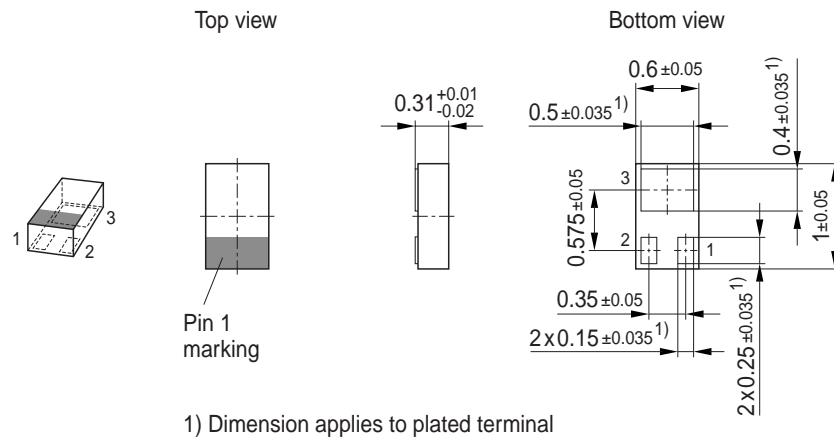
Power gain $G_{ma}, G_{ms} = f(V_{CE})$

$I_C = 60 \text{ mA}$

$f = \text{parameter}$

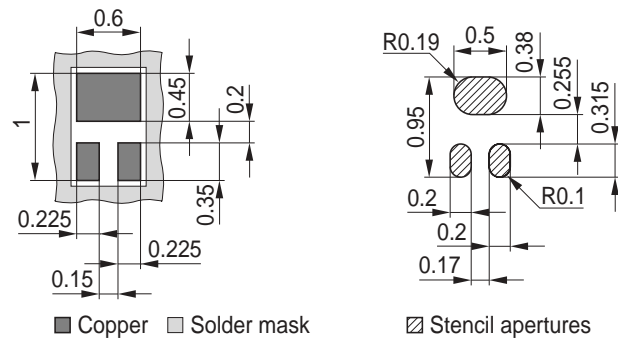


Package Outline

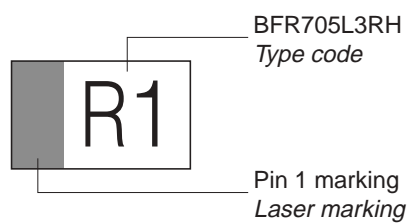


Foot Print

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

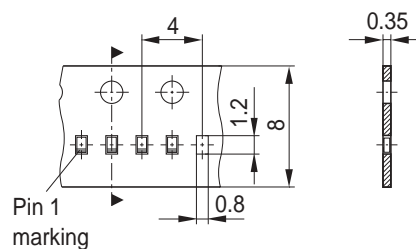


Marking Layout (Example)



Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel



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