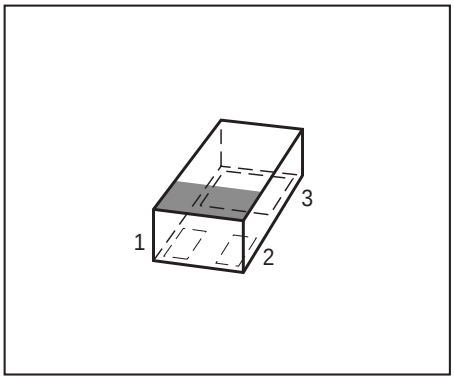
NPN Silicon Germanium RF Transistor*



- 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 dB at 1.8 GHz, G_{ma} = 11.5 dB at 6 GHz
- 150 GHz f_T-Silicon Germanium technology
- Extremly small and flat leadless package, reduced height 0.32 mm max.
- Pb-free (RoHS compliant) package[1)]
- Qualified according AEC Q101

* Short term description

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

Type	Marking	Pin Configuration			Package
BFR750L3RH	R8	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	90	mA
Base current	I_B	9	
Total power dissipation[1)] $T_S \leq 96°C$	P_{tot}	360	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}	≤ 150	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 = 3 mA, I_B = 0	$V_{(BR)CEO}$	4	4.7	-	V
Collector-emitter cutoff current V_{CE} = 13 V, V_{BE} = 0	I_{CES}	-	-	100	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}	-	-	10	µA
DC current gain I_C = 60 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

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

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

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

[2] IP3 value depends on termination of all intermodulation frequency components.
Termination used for this measurement is 50Ω from 0.1 MHz to 6 GHz

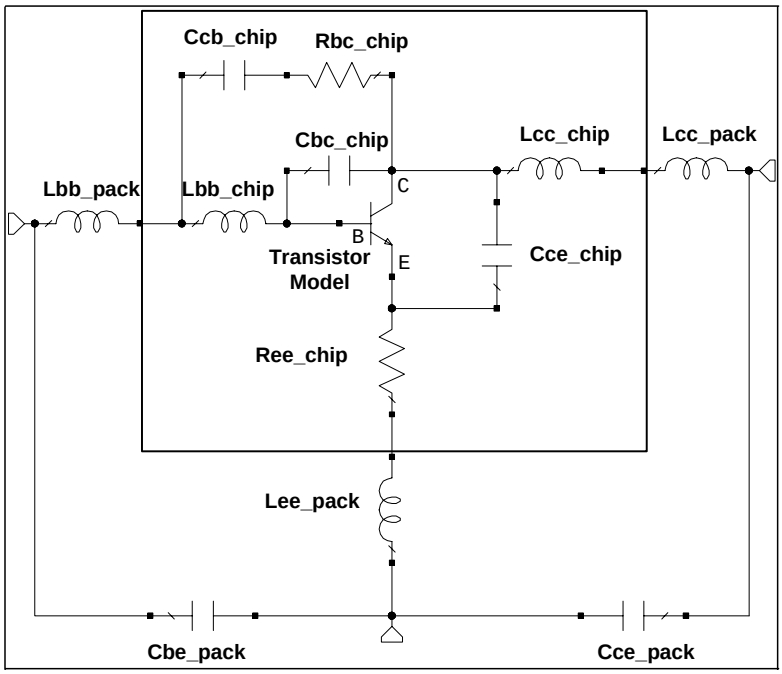
SPICE Parameter (Gummel-Poon Model, Berkley-SPICE 2G.6 Syntax):

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	mΩ	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	°C
AF =	1	-	KF =	0	-			

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

Package Equivalent Circuit:

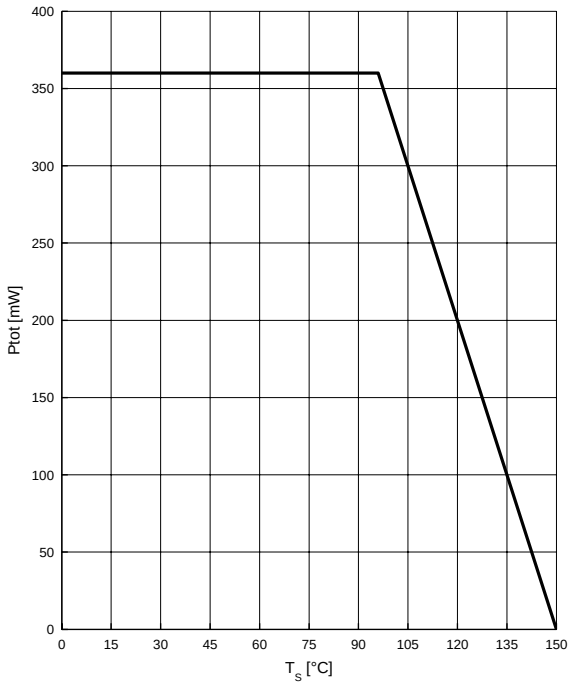


L_{bb_chip} =	0.212	nA
L_{cc_chip} =	0.07472	nH
L_{bb_pack} =	0.0184	nH
L_{cc_pack} =	0.277	nH
L_{ee_pack} =	0.239	nH
C_{bc_chip} =	0.015	pF
C_{cb_chip} =	0.013	pF
C_{ce_chip} =	0.282	pF
C_{be_pack} =	0.064	pF
C_{ce_pack} =	0.0492	pF
R_{bc_chip} =	7	Ω
R_{ee_chip} =	0.566	Ω

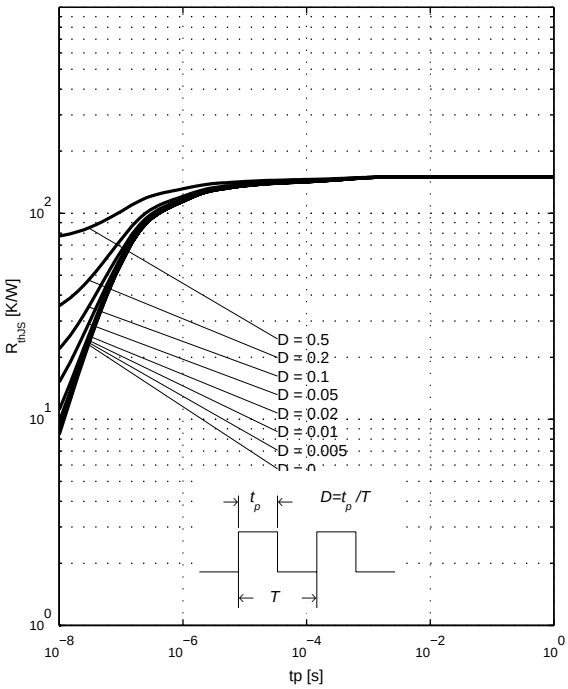
Valid up to 6GHz

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 $P_{tot} = f(T_S)$

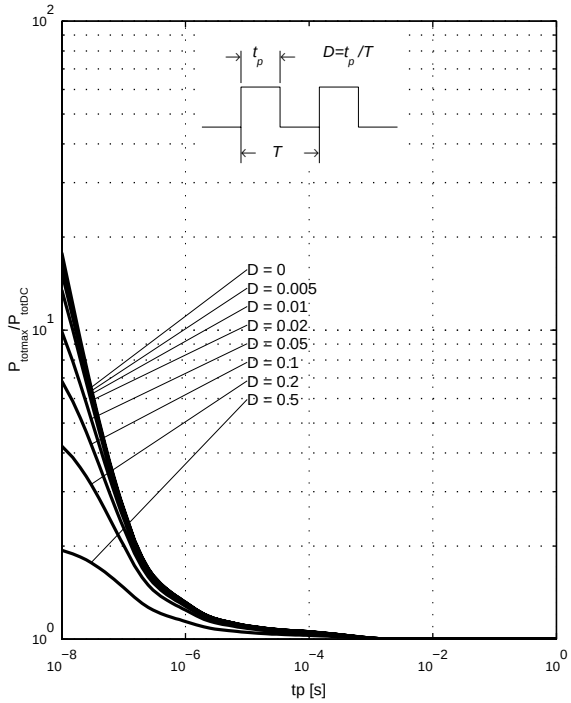


Permissible Puls Load $R_{thJS} = f(t_p)$



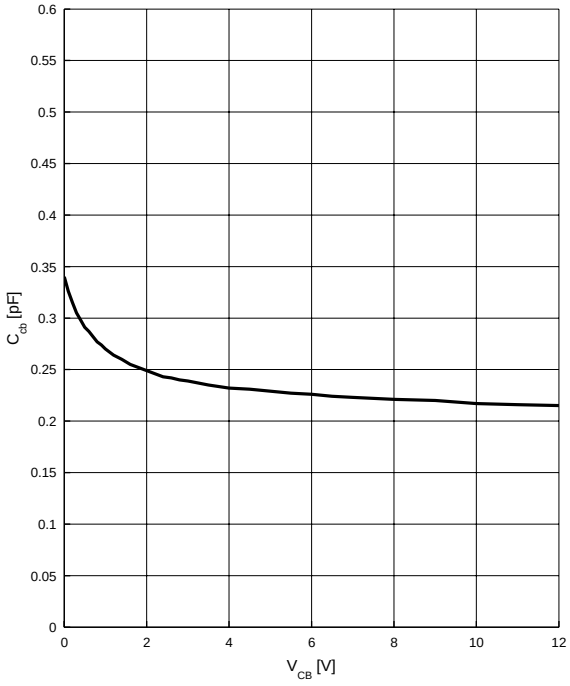
Permissible Pulse Load

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



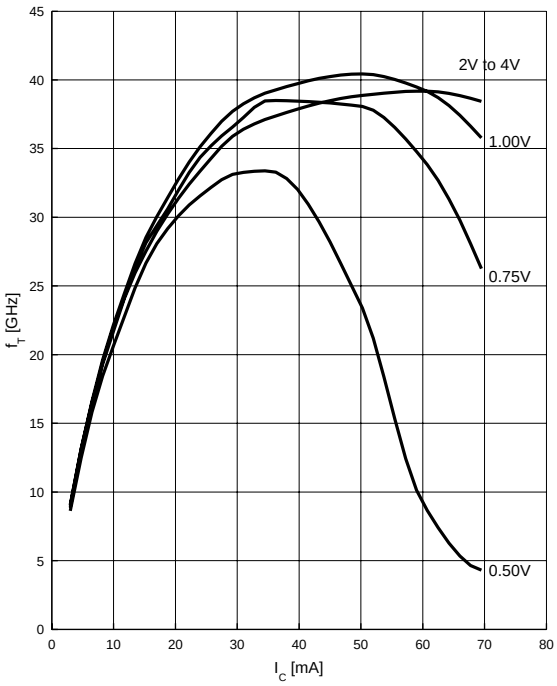
Collector-base capacitance $C_{cb} = f(V_{CB})$

f = 1 MHz



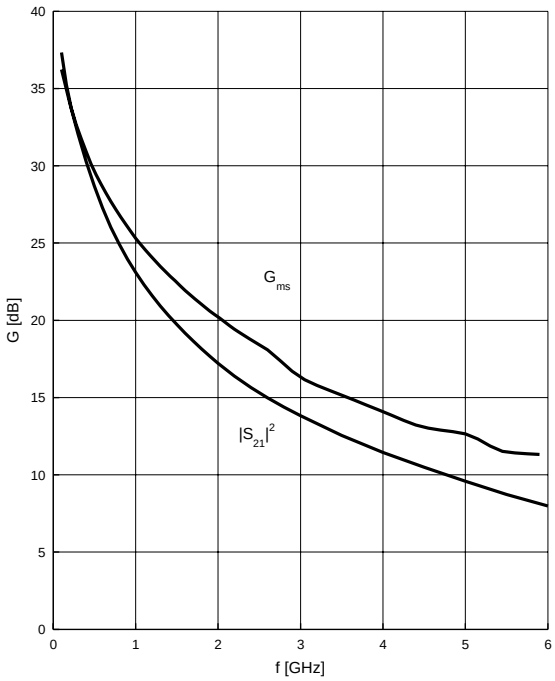
Transition frequency $f_T = f(I_C)$

V_{CE} = parameter, f = 1 GHz



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

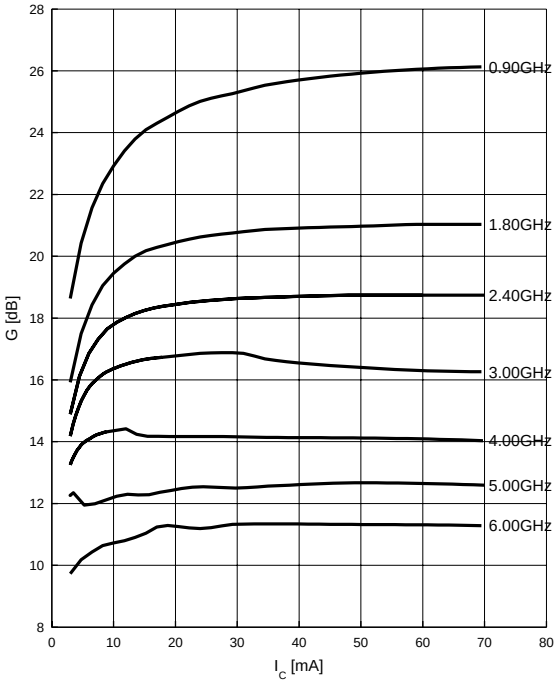
V_{CE} = 3 V, I_C = 60 mA



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

V_{CE} = 3 V

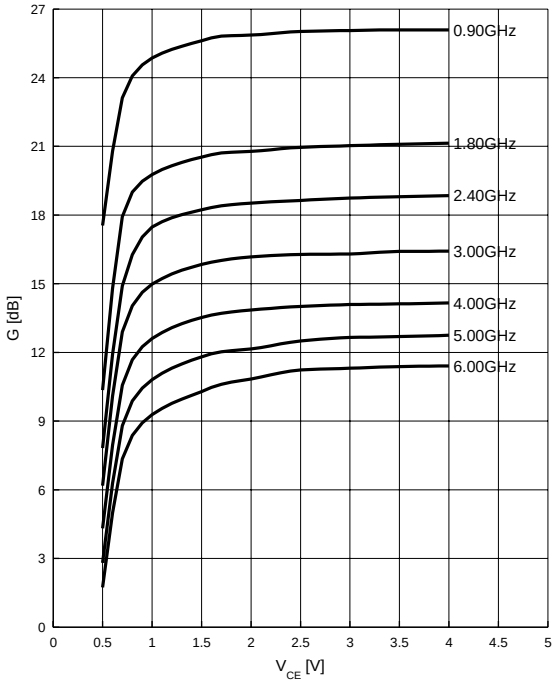
f = parameter



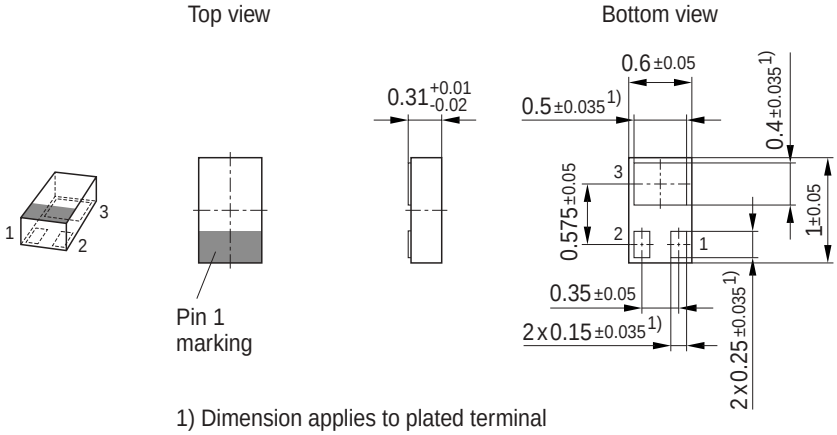
Power gain G_{ma}, $G_{ms} = f(V_{CE})$

I_C = 60 mA

f = parameter



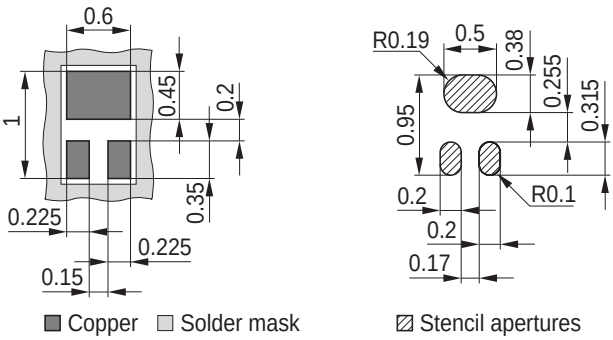
Package Outline



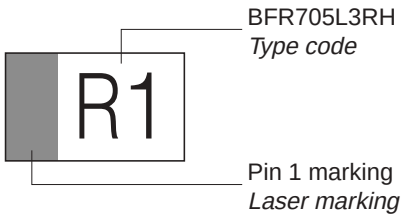
1) Dimension applies to plated terminal

Foot Print

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

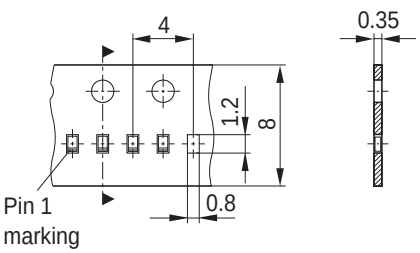


Marking Layout (Example)



Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel



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