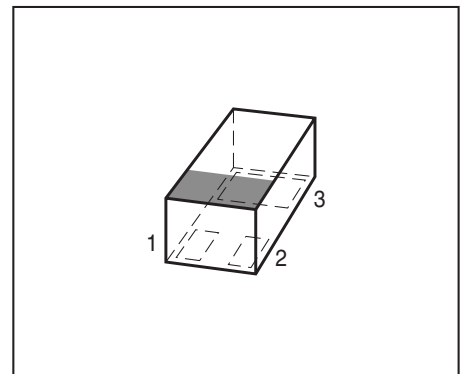


NPN Silicon RF Transistor*

- For low voltage / low current applications
- Ideal for VCO modules and low noise amplifiers
- Low noise figure: 1.1 dB at 1.8 GHz
- SMD leadless package
- Excellent ESD performance
typical value 1500V (HBM)
- High f_T of 22 GHz
- 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
BFR460L3	AB	1 = B	2 = E	3 = C	TSLP-3-1

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}		V
$T_A > 0\text{ °C}$		4.5	
$T_A \leq 0\text{ °C}$		4.2	
Collector-emitter voltage	V_{CES}	15	
Collector-base voltage	V_{CBO}	15	
Emitter-base voltage	V_{EBO}	1.5	
Collector current	I_C	50	mA
Base current	I_B	5	
Total power dissipation ²⁾	P_{tot}	200	mW
$T_S \leq 108\text{ °C}$			
Junction temperature	T_j	150	°C
Operation junction temperature range	T_{j0}	- ... -	-
Ambient temperature	T_A	-65 ... 150	°C
Storage temperature	T_{stg}	-65 ... 150	

¹Pb-containing package may be available upon special request

² T_S is measured on the collector lead at the soldering point to the pcb

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point ¹⁾	R_{thJS}	≤ 210	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 $I_C = 1 \text{ mA}, I_B = 0$	$V_{(BR)CEO}$	4.5	5.8	-	V
Collector-emitter cutoff current $V_{CE} = 15 \text{ V}, V_{BE} = 0$	I_{CES}	-	-	10	μA
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}	-	-	1	μA
DC current gain $I_C = 20 \text{ mA}, V_{CE} = 3 \text{ V}, \text{ pulse measured}$	h_{FE}	90	120	160	-

¹⁾For calculation of R_{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.	
AC Characteristics (verified by random sampling)					
Transition frequency $I_C = 30\text{ mA}$, $V_{CE} = 3\text{ V}$, $f = 1\text{ GHz}$	f_T	16	22	-	GHz
Collector-base capacitance $V_{CB} = 3\text{ V}$, $f = 1\text{ MHz}$, $V_{BE} = 0$, emitter grounded	C_{cb}	-	0.28	0.45	pF
Collector emitter capacitance $V_{CE} = 3\text{ V}$, $f = 1\text{ MHz}$, $V_{BE} = 0$, base grounded	C_{ce}	-	0.14	-	
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$, $f = 1\text{ MHz}$, $V_{CB} = 0$, collector grounded	C_{eb}	-	0.55	-	
Noise figure $I_C = 5\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_{Sopt}$, $f = 1.8\text{ GHz}$ $f = 3\text{ GHz}$	F	-	1.1	-	dB
Power gain, maximum stable ¹⁾ $I_C = 20\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 1.8\text{ GHz}$	G_{ms}	-	16.0	-	dB
Power gain, maximum available ¹⁾ $I_C = 20\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 3\text{ GHz}$	G_{ma}	-	11	-	dB
Transducer gain $I_C = 20\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_L = 50\Omega$, $f = 1.8\text{ GHz}$ $f = 3\text{ GHz}$	$ S_{21e} ^2$	-	14	-	dB
Third order intercept point at output ²⁾ $V_{CE} = 3\text{ V}$, $I_C = 20\text{ mA}$, $f = 1.8\text{ GHz}$	IP_3	-	27	-	dBm
1dB Compression point at output $I_C = 20\text{ mA}$, $V_{CE} = 3\text{ V}$, $f = 1.8\text{ GHz}$	P_{-1dB}	-	11.5	-	

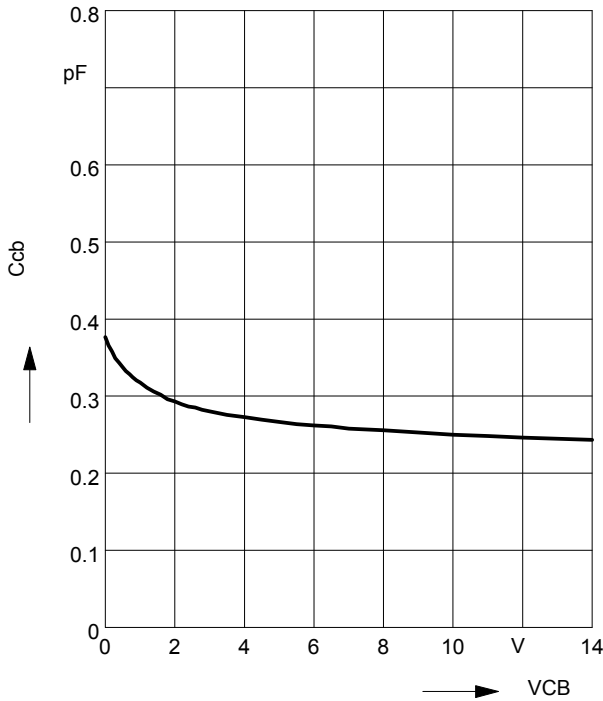
$$^1 G_{ma} = |S_{21} / S_{12}| (k - (k^2 - 1)^{1/2}), G_{ms} = |S_{21} / S_{12}|$$

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

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

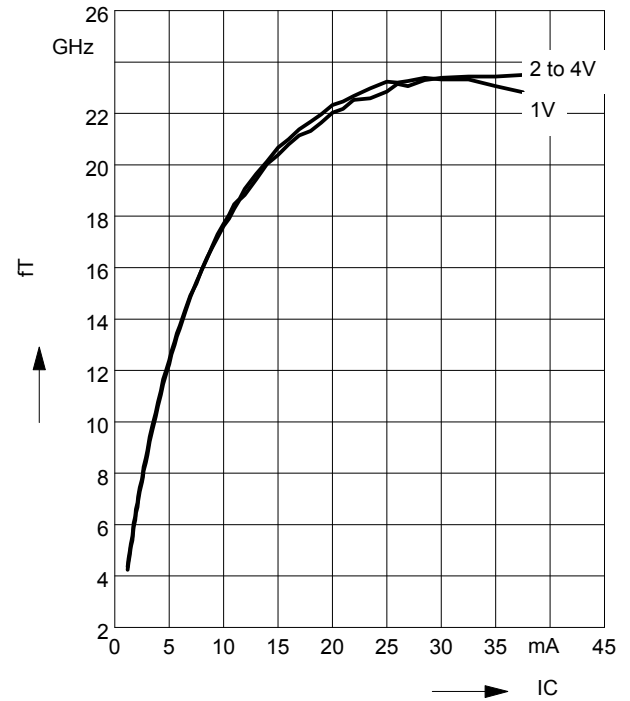
$f = 1\text{MHz}$



Transition frequency $f_T = f(I_C)$

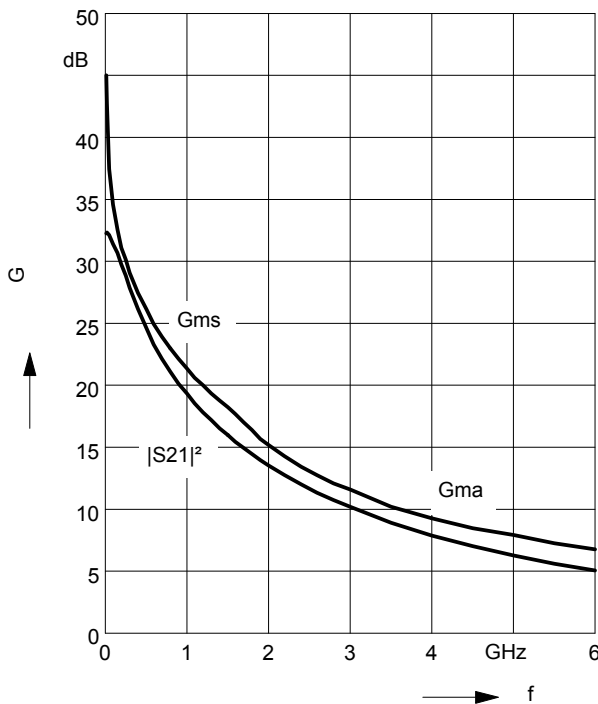
$f = 1\text{GHz}$

$V_{CE} = \text{parameter in V}$



Power gain $G_{ma}, G_{ms}, |S_{21}|^2 = f(f)$

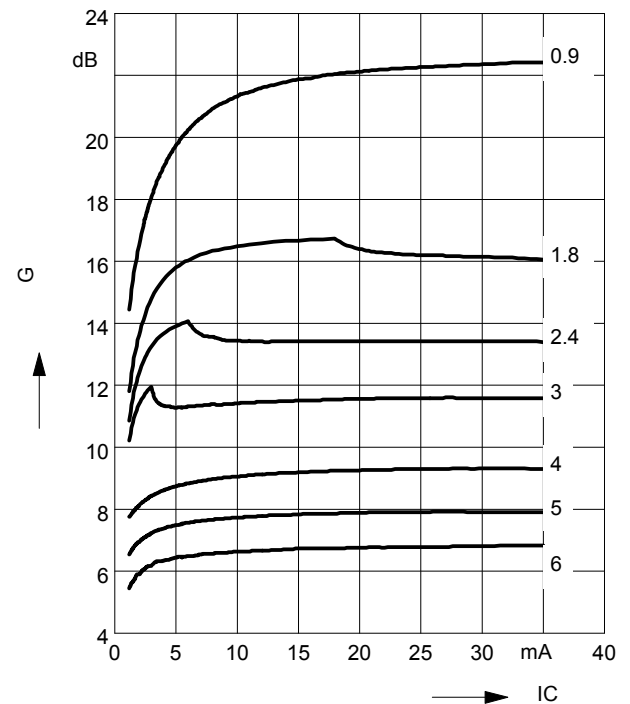
$V_{CE} = 3\text{V}, I_C = 20\text{mA}$



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

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

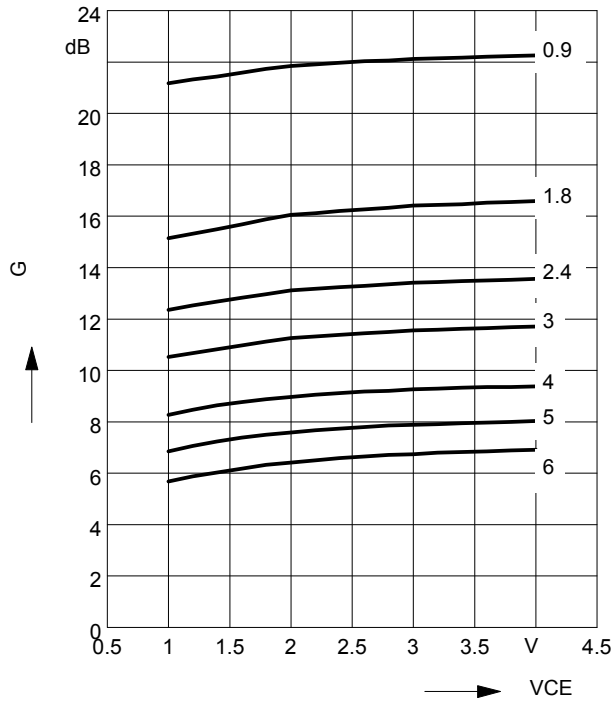
$f = \text{parameter in GHz}$



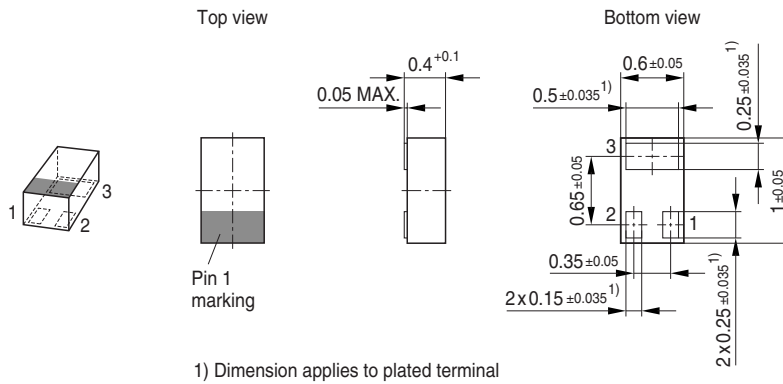
Power gain G_{ma} , $G_{ms} = f(V_{CE})$

$I_C = 20 \text{ mA}$

$f =$ parameter in GHz

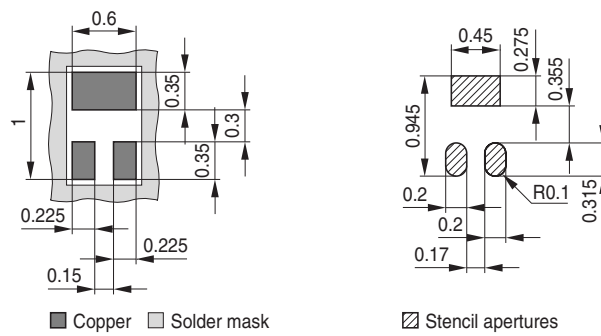


Package Outline

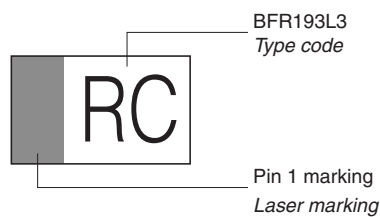


Foot Print

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

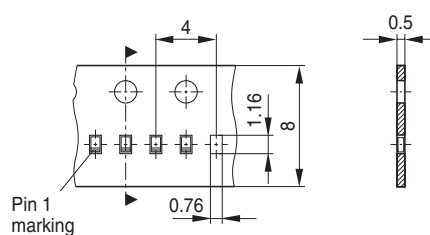


Marking Layout (Example)



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).

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.