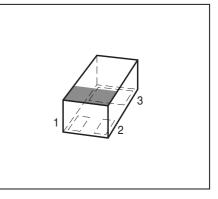


## BFR193L3

### NPN Bipolar RF Transistor

- For low noise, high-gain amplifiers up to 2 GHz
- For linear broadband amplifiers
- $f_{\rm T}$  = 8 GHz,  $NF_{\rm min}$  = 1 dB at 900 MHz
- Pb-free (RoHS compliant) package
- Qualification report according to AEC-Q101 available





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

Туре	Marking		Pin	Configu	Package		
BFR193L3	RC	1 = B	2 = E 3 = C		3 = C	TSLP-3-1	
<b>Maximum Ratings</b> at $T_A = 25$	5 °C, unless	otherwis	se sp	pecified			
Parameter			Syr	nbol	Value		Unit
Collector-emitter voltage			VCE	EO	12		V
Collector-emitter voltage			VCE	ES	20		
Collector-base voltage			VCE	30	20		
Emitter-base voltage			VEE	30	2		7
Collector current			I <sub>C</sub>		80		mA
Base current			I <sub>B</sub>		10		
Total power dissipation <sup>1)</sup>			Ptot	t	580		mW
$T_{\rm S} \le 89^{\circ}{\rm C}$							
unction temperature			T <sub>J</sub> 1		150	150	
Storage temperature			T <sub>Ste</sub>	a	-55 15	0	

#### **Thermal Resistance**

Parameter	Symbol	Value	Unit
Junction - soldering point <sup>2)</sup>	R <sub>thJS</sub>	105	K/W

 $^{1}T_{S}$  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 AN077 (Thermal Resistance Calculation)



Parameter	Symbol	Values			Unit
		min.	typ.	max.	]
DC Characteristics				•	
Collector-emitter breakdown voltage	V <sub>(BR)CEO</sub>	12	-	-	V
<i>I</i> <sub>C</sub> = 1 mA, <i>I</i> <sub>B</sub> = 0					
Collector-emitter cutoff current	I <sub>CES</sub>	-	-	100	μA
$V_{\rm CE}$ = 20 V, $V_{\rm BE}$ = 0					
Collector-base cutoff current	I <sub>CBO</sub>	-	-	100	nA
$V_{\rm CB}$ = 10 V, $I_{\rm E}$ = 0					
Emitter-base cutoff current	I <sub>EBO</sub>	-	-	1	μA
<i>V</i> <sub>EB</sub> = 1 V, <i>I</i> <sub>C</sub> = 0					
DC current gain	h <sub>FE</sub>	70	100	140	-
$I_{\rm C}$ = 30 mA, $V_{\rm CE}$ = 8 V, pulse measured					

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



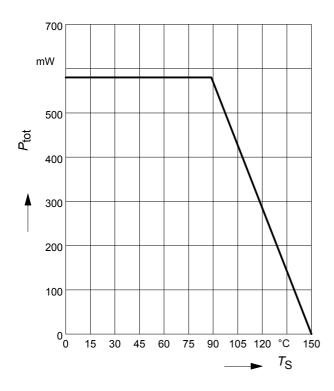
Parameter	Symbol	Values			Unit	
		min.	typ.	max.		
AC Characteristics (verified by random sampling)						
Transition frequency	f <sub>T</sub>	6	8	-	GHz	
$I_{\rm C}$ = 50 mA, $V_{\rm CE}$ = 8 V, f = 500 MHz						
Collector-base capacitance	C <sub>cb</sub>	-	0.63	0.9	pF	
$V_{CB} = 10 \text{ V}, f = 1 \text{ MHz}, V_{BE} = 0$ ,						
emitter grounded						
Collector emitter capacitance	C <sub>ce</sub>	-	0.22	-		
$V_{CE} = 10 \text{ V}, f = 1 \text{ MHz}, V_{BE} = 0$ ,						
base grounded						
Emitter-base capacitance	C <sub>eb</sub>	-	2.25	-		
$V_{\rm EB}$ = 0.5 V, <i>f</i> = 1 MHz, $V_{\rm CB}$ = 0 ,						
collector grounded						
Minimum noise figure	NF <sub>min</sub>				dB	
$I_{\rm C}$ = 10 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm Sopt}$ ,						
<i>f</i> = 900 MHz		-	1	-		
$I_{\rm C}$ = 10 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm Sopt}$ ,						
<i>f</i> = 1.8 GHz		-	1.6	-		
Power gain, maximum available <sup>1)</sup>	G <sub>ma</sub>					
$I_{\rm C}$ = 30 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm Sopt}$ ,						
$Z_{\rm L} = Z_{\rm Lopt}$ , $f = 900  \rm MHz$		-	19	-		
$I_{\rm C}$ = 30 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm Sopt}$ ,						
$Z_{\rm L} = Z_{\rm Lopt}$ , $f = 1.8  \rm GHz$		-	12.5	-		
Transducer gain	S <sub>21e</sub>   <sup>2</sup>				dB	
$I_{\rm C}$ = 30 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm L}$ = 50 $\Omega$ ,						
<i>f</i> = 900 MHz		-	14.5	-		
$I_{\rm C}$ = 30 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm L}$ = 50 $\Omega$ ,						
<i>f</i> = 1.8 GHz		-	9	-		

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

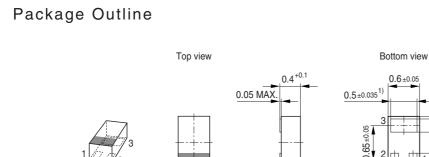
 ${}^{1}G_{\mathsf{ma}} = |S_{21} / S_{12}| \; (\mathsf{k}\text{-}(\mathsf{k}^{2}\text{-}1)^{1/2})$ 

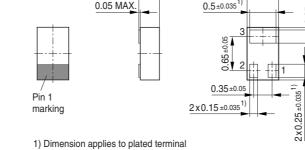


## Total power dissipation $P_{tot} = f(T_S)$



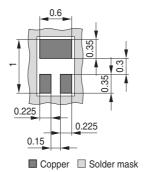


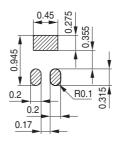




## Foot Print

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

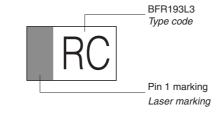




52

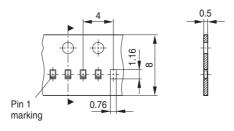
Stencil apertures

## Marking Layout (Example)



### Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel





Edition 2009-11-16

Published by Infineon Technologies AG 81726 Munich, Germany

© 2009 Infineon Technologies AG All Rights Reserved.

#### Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. 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 the nearest Infineon Technologies Office (<<u>www.infineon.com</u>>).

### Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.

Infineon Technologies components may be used in life-support devices or systems only 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.