BGB719L7ESD

SiGe:C Low Noise Amplifier MMIC for FM Radio Applications

Data Sheet

Revision 1.1, 2011-02-01
Preliminary

RF & Protection Devices

Edition 2011-02-01

Published by
Infineon Technologies AG
81726 Munich, Germany

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 (**www.infineon.com**).

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.

Revision History	
Page / Item	**Subjects (major changes since last revisions)**
Revision 1.1, 2011-02-01	
7	ESD values updated
12	AC Characteristics updated

Trademarks of Infineon Technologies AG

BlueMoon™, COMNEON™, C166™, CROSSAVE™, CanPAK™, CIPOS™, CoolMOS™, CoolSET™, CORECONTROL™, DAVE™, EasyPIM™, EconoBRIDGE™, EconoDUAL™, EconoPACK™, EconoPIM™, EiceDRIVER™, EUPEC™, FCOS™, HITFET™, HybridPACK™, ISOFACE™, I²RF™, IsoPACK™, MIPAQ™, ModSTACK™, my-d™, NovalithIC™, OmniTune™, OptiMOS™, ORIGA™, PROFET™, PRO-SIL™, PRIMARION™, PrimePACK™, RASIC™, ReverSave™, SatRIC™, SensoNor™, SIEGET™, SINDRION™, SMARTi™, SmartLEWIS™, TEMPFET™, thinQ!™, TriCore™, TRENCHSTOP™, X-GOLD™, XMM™, X-PMU™, XPOSYS™.

Other Trademarks

Advance Design System™ (ADS) of Agilent Technologies, AMBA™, ARM™, MULTI-ICE™, PRIMECELL™, REALVIEW™, THUMB™ of ARM Limited, UK. AUTOSAR™ is licensed by AUTOSAR development partnership. Bluetooth™ of Bluetooth SIG Inc. CAT-iq™ of DECT Forum. COLOSSUS™, FirstGPS™ of Trimble Navigation Ltd. EMV™ of EMVCo, LLC (Visa Holdings Inc.). EPCOS™ of Epcos AG. FLEXGO™ of Microsoft Corporation. FlexRay™ is licensed by FlexRay Consortium. HYPERTERMINAL™ of Hilgraeve Incorporated. IEC™ of Commission Electrotechnique Internationale. IrDA™ of Infrared Data Association Corporation. ISO™ of INTERNATIONAL ORGANIZATION FOR STANDARDIZATION. MATLAB™ of MathWorks, Inc. MAXIM™ of Maxim Integrated Products, Inc. MICROTEC™, NUCLEUS™ of Mentor Graphics Corporation. Mifare™ of NXP. MIPI™ of MIPI Alliance, Inc. MIPS™ of MIPS Technologies, Inc., USA. muRata™ of MURATA MANUFACTURING CO., MICROWAVE OFFICE™ (MWO) of Applied Wave Research Inc., OmniVision™ of OmniVision Technologies, Inc. Openwave™ Openwave Systems Inc. RED HAT™ Red Hat, Inc. RFMD™ RF Micro Devices, Inc. SIRIUS™ of Sirius Sattelite Radio Inc. SOLARIS™ of Sun Microsystems, Inc. SPANSION™ of Spansion LLC Ltd. Symbian™ of Symbian Software Limited. TAIYO YUDEN™ of Taiyo Yuden Co. TEAKLITE™ of CEVA, Inc. TEKTRONIX™ of Tektronix Inc. TOKO™ of TOKO KABUSHIKI KAISHA TA. UNIX™ of X/Open Company Limited. VERILOG™, PALLADIUM™ of Cadence Design Systems, Inc. VLYNQ™ of Texas Instruments Incorporated. VXWORKS™, WIND RIVER™ of WIND RIVER SYSTEMS, INC. ZETEX™ of Diodes Zetex Limited.

Last Trademarks Update 2010-03-2212

Table of Contents

	Table of Contents	4
	List of Figures	5
	List of Tables	6
1	**Features**	7
2	**Product Brief**	8
3	**Maximum Ratings**	10
4	**Thermal Characteristics**	11
5	**Operation Conditions**	11
6	**Electrical Characteristics**	12
6.1	DC Characteristics	12
6.2	AC Characteristics	12
7	**Package Information**	13

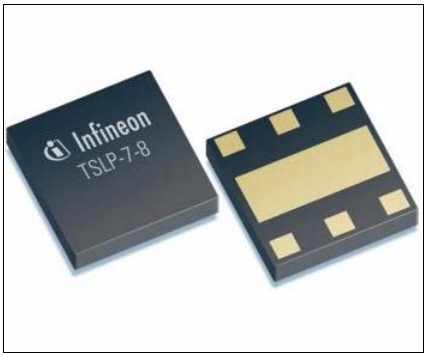
List of Figures

Figure 1 Pinning of BGB719L7ESD (top view) 8
Figure 2 Function Block 9
Figure 3 Application Board Drawing 9
Figure 4 Total Power Dissipation $P_{tot} = f(T_s)$ 11
Figure 5 Package Outline TSLP-7-8 (bottom view) 13
Figure 6 Footprint 13
Figure 7 Marking Layout (top view) 13
Figure 8 Tape Dimensions 13

List of Tables

Table 1 Pinning Table 8
Table 2 Bill of Materials 9
Table 3 Maximum Ratings at TA = 25°C 10
Table 4 ESD Capability 10
Table 5 Thermal Resistance 11
Table 6 Operation Conditions at T_A = 25°C 11
Table 7 DC Characteristics at T_A = 25 °C 12
Table 8 AC characteristics: T_A = 25 °C, V_{CC} = 3 V, V_{ctrl} = 3 V, f = 100 MHz 12

1 Features



Main features:

- High performance FM Radio LNA with integrated biasing
- Worldwide FM band support (76 MHz to 108 MHz)
- Low external parts count
- Super miniature low profile leadless package TSLP-7-8, 1.26 x 1.4 x 0.31 mm
- High gain at only 2.5 mA current consumption
- Integrated active biasing circuit enables stable operation point against temperature-, supply voltage- and processing-variations
- Integrated ESD protection for all pins (2 kV, HBM)
- High input compression point
- High input impedance
- Excellent noise figure from latest SiGe:C technology
- Operation voltage: 1.5 V to 4.0 V
- Power-off function
- Pb-free (RoHS compliant) and halogen-free (WEEE compliant) product

RoHS

Applications

- Active matching for small FM radio antennas
- Portable headphone radio

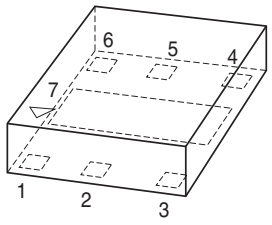
Attention: ESD (Electrostatic discharge) sensitive device, observe handling precautions

Product Name	Package	Marking
BGB719L7ESD	TSLP-7-8	AW

2 Product Brief

The BGB719L7ESD is an advanced low noise amplifier MMIC with integrated ESD protection and active biasing specifically designed for FM antenna systems requiring high gain, reduced power consumption and low distortion.

The device is based upon Infineon Technologies cost effective SiGe:C technology and comes in a low profile TSLP-7-8 leadless green package.



TSLP-7-8

Figure 1 Pinning of BGB719L7ESD (top view)

Table 1 Pinning Table

Pin	Name	Function
1	V_{Ctrl}	On/Off control voltage
2	RF_{IN}	RF input
3	GND_{RF}	RF GND
4	NC	Not connected
5	RF_{OUT}	RF output
6	V_{CC}	Supply voltage
7	GND_{DC}	DC GND

The following function block in **Figure 2** shows the principal schematic how the BGB719L7ESD is used in a circuit. The Power On/Off function is controlled by applying V_{Ctrl}. Base- and collector voltages are applied internally.

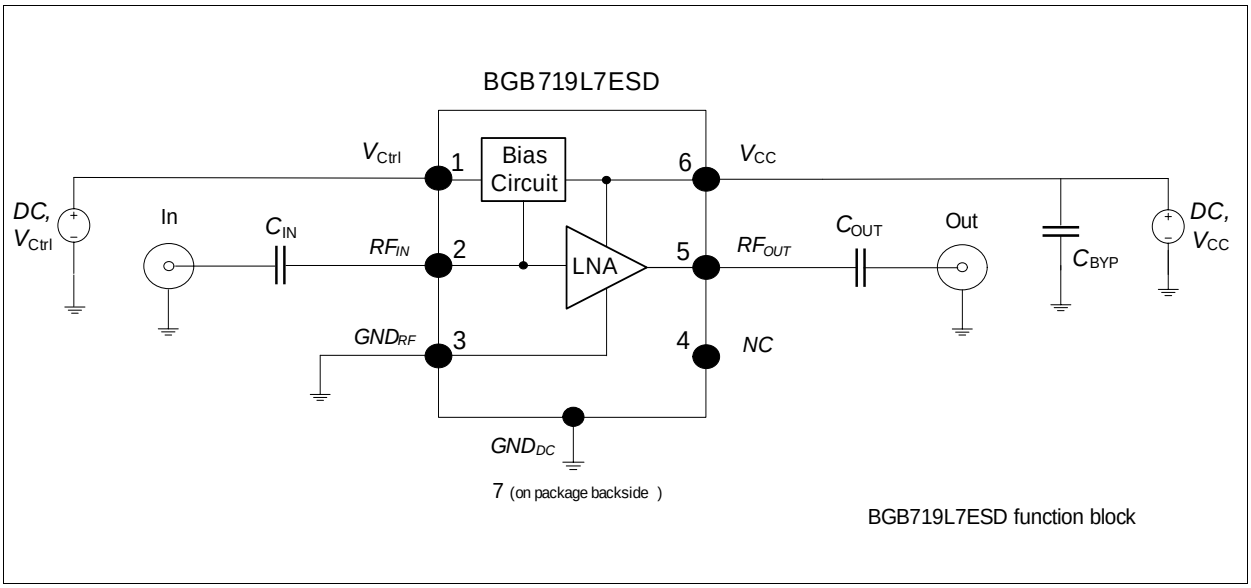


Figure 2 Function Block

The function of each component is explained in **Table 2**.

Table 2 Bill of Materials

Component	Value	Manufacturer / Type	Function
C_{IN}	330 pF	Various / 0402	DC blocking
C_{OUT}	330 pF	Various / 0402	DC blocking
C_{BYP}	47 nF	Various / 0402	Bypass capacitor

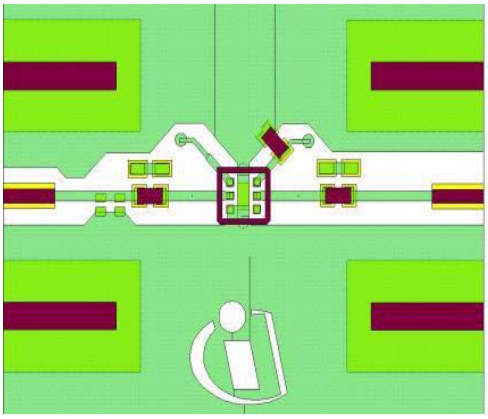


Figure 3 Application Board Drawing

3 Maximum Ratings

Table 3 Maximum Ratings at TA = 25°C

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Supply voltage	V_{CC}	–	–	4.0	V	–
Supply current at V_{CC} pin	I_{CC}	–	–	25	mA	–
DC current at RF_{IN} Pin	I_B	–	–	3	mA	–
On/Off control voltage	V_{ctrl}	–	–	V_{CC}	V	–
Total power dissipation $T_S \leq 112$ °C[1)]	P_{tot}	–	–	100	mW	–
Operation junction temperature	T_{JOp}	-55	–	150	°C	–
Storage temperature	T_{Stg}	-55	–	150	°C	–

1) T_S is the soldering point temperature. T_S is measured at the GND pin (7) at the soldering point to the pcb

Table 4 ESD Capability

Testing Model	Standard	Value	Unit
Human Body Model	JESD22-A114-B	2000	V
Machine Model	JESD22-A115-A	100	V
Charge Device Model	JESD22-C101-C	1500	V

Attention: Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit.

4 Thermal Characteristics

Table 5 Thermal Resistance

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Junction - soldering point[1)]	R_{thJS}	–	375	–	K/W	

1) For calculation of R_{thJA} please refer to Application Note Thermal Resistance

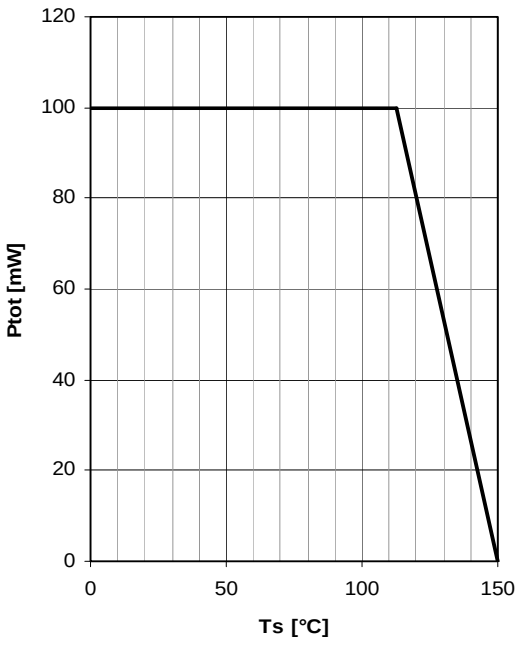


Figure 4 Total Power Dissipation $P_{tot} = f(T_S)$

5 Operation Conditions

Table 6 Operation Conditions at T_A = 25°C

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Supply voltage	V_{CC}	1.5	3.0	4.0	V	–
Voltage Ctrl On/Off pin in On mode	$V_{ctrl-on}$	1.2	3.0	V_{CC}	V	–
Voltage Ctrl On/Off pin in Off mode	$V_{ctrl-off}$	-0.3	0	0.3	V	–

6 Electrical Characteristics

6.1 DC Characteristics

Table 7 DC Characteristics at T_A = 25 °C

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Supply current	I_{CC}	2.0	2.5	3.2	mA	V_{CC} = 3 V V_{ctrl} = 3 V Small signal operation
Supply current in Off mode	$I_{CC\text{-}off}$	–	1	6	µA	V_{CC} = 4.0 V V_{ctrl} = 0 V
Current into Ctrl On/Off pin in On mode	$I_{ctrl\text{-}on}$	–	14	20	µA	V_{CC} = 3 V V_{ctrl} = 3 V
Current into Ctrl On/Off pin in Off mode	$I_{ctrl\text{-}off}$	–	–	0.1	µA	V_{CC} = 4.0 V V_{ctrl} = 0 V

6.2 AC Characteristics

Table 8 AC characteristics[1]: T_A = 25 °C, V_{CC} = 3 V, V_{ctrl} = 3 V, f = 100 MHz

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Insertion power gain	$\|S_{21}\|$		13		dB	–
Input return loss[2]	RL_{IN}	–	0.5[3]	–	dB	–
Output return loss[2]	RL_{OUT}	–	11	–	dB	–
Noise figure[4]	$F_{50\Omega}$	–	1.2	–	dB	Zs = 50 Ω
Input 1dB gain compression point[2]	IP_{-1dB}	–	-6	–	dBm	–
Input 3rd Order Intercept Point[2]	IIP_3	–	-14.5	–	dBm	P_{RFIN} = -40 dBm

1) Measured on BGB719L7ESD application board according to application schematic on **Figure 2**, including PCB losses (unless noted otherwise)
2) Verified by random sampling
3) High LNA input impedance leads to power matching with high ohmic antennas
4) An aggressive low pass filter prevents radio broadcast signals from distorting the NF measurement

7 Package Information

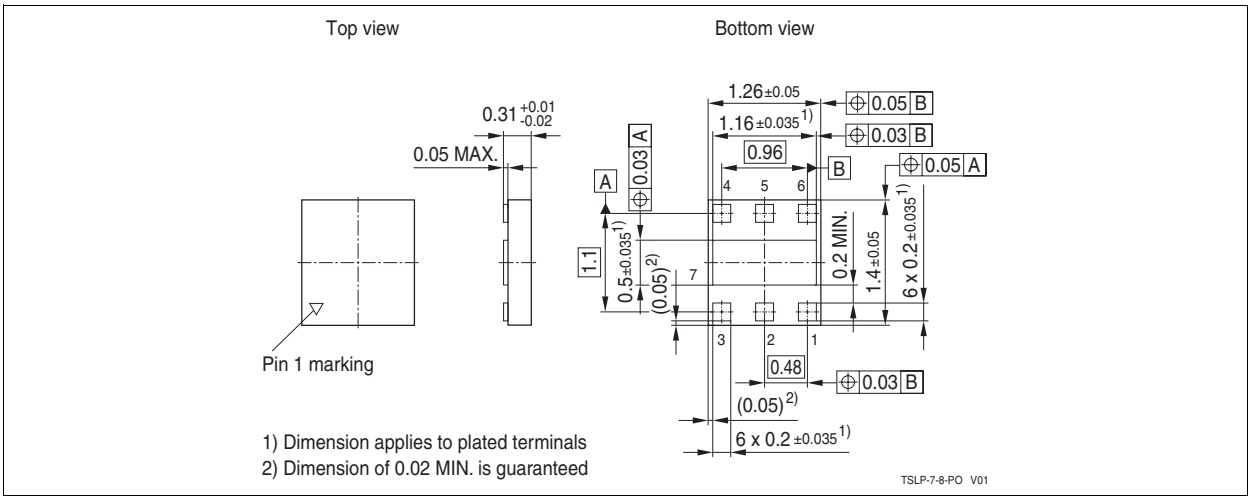


Figure 5 Package Outline TSLP-7-8 (bottom view)

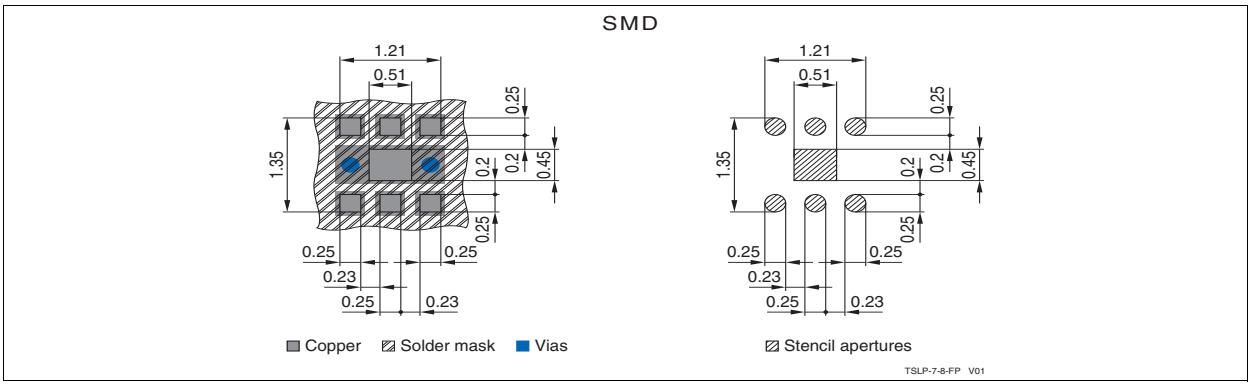


Figure 6 Footprint

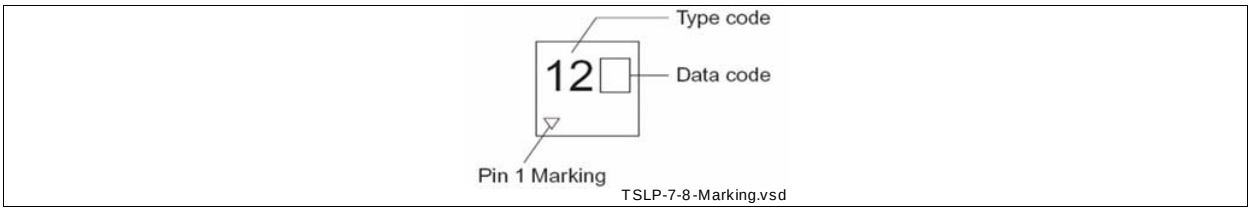


Figure 7 Marking Layout (top view)

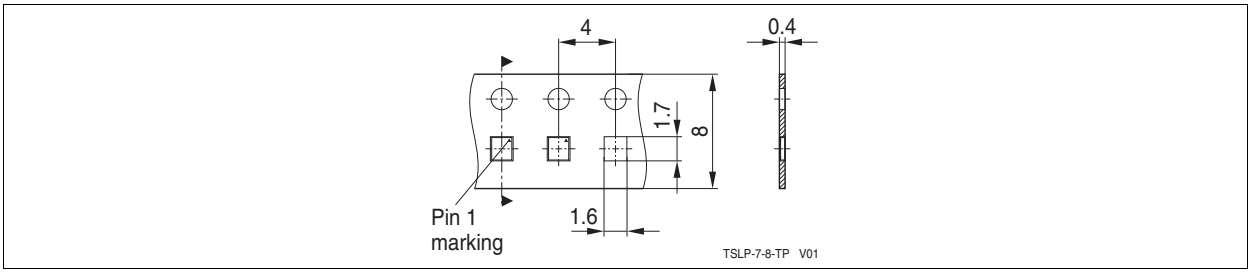


Figure 8 Tape Dimensions

www.infineon.com

Published by Infineon Technologies AG