BGS13SL9

Wideband RF SP3T Switch

Data Sheet

Revision 2.4, 2014-05-27

Power Management & Multimarket

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Revision History

Previous Version: v2.3, 2014-02-13	
Page	**Subjects (major changes since last revision)**
10	Updated Temperature range (Table 6)
13	Updated Tape Drawing for TSLP-9-3 (Figure 5)

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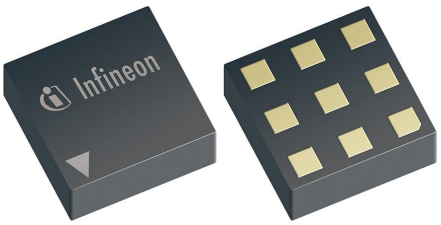
BGS13SL9 Wideband RF SP3T Switch

1 Features



- 3 high-linearity TRx paths with power handling capability of up to 30 dBm
- High switching speed, ideal for WLAN and Bluetooth applications
- All ports fully bi-directional
- No decoupling capacitors required if no DC applied on RF lines
- Low insertion loss
- Low harmonic generation
- High port-to-port-isolation
- 0.1 to 3 GHz coverage
- High ESD robustness
- On-chip control logic
- Very small leadless and halogen free package TSLP-9-3 (1.15x1.15mm^2) with super low height of 0.31mm
- RoHS compliant package

RoHS

2 Product Description

The BGS13SL9 RF MOS switch is specifically designed for WLAN and Bluetooth applications. Any of the 3 ports can be used as termination of the diversity antenna handling up to 30 dBm.

This SP3T offers low insertion loss and high robustness against interferer signals at the antenna port and low harmonic generation in termination mode. The on-chip controller integrates CMOS logic and level shifters, driven by control inputs from 1.5 V to V_{dd}. The BGS13SL9 RF Switch is manufactured in Infineon's patented MOS technology, offering the performance of GaAs with the economy and integration of conventional CMOS including the inherent higher ESD robustness. The device has a very small size of only 1.15 x 1.15 mm^2 and a maximum height of 0.31 mm.

No decoupling capacitors are required in typical applications as long as no DC is applied to any RF port.

Table 1: Ordering Information

Type	Package	Marking
BGS13SL9	TSLP-9-3	AA

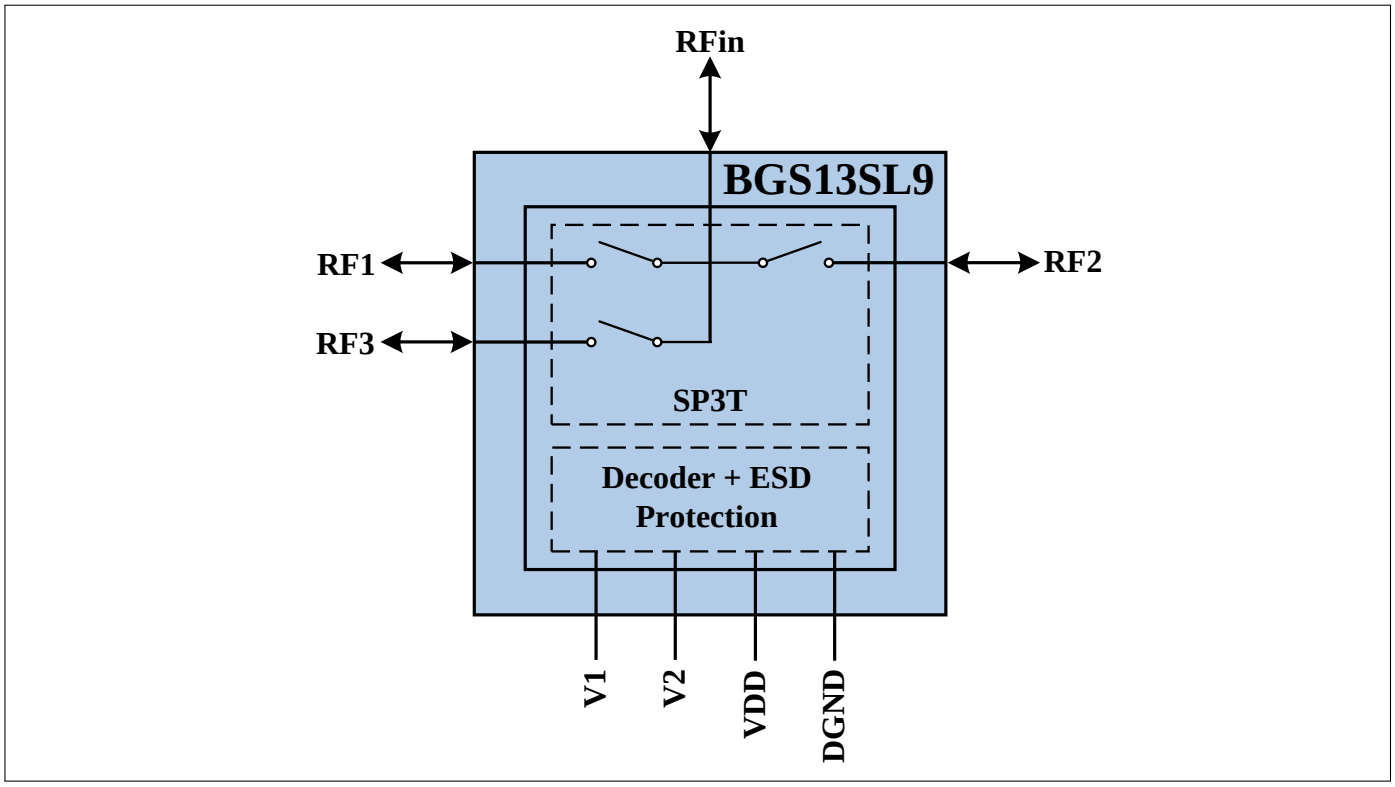


Figure 1: BGS13SL9 Block Diagram

Table 2: Truth Table

Switched Paths	V1	V2
Isolation / All Paths Open	0	0
RFin - RF1	1	0
RFin - RF2	0	1
RFin - RF3	1	1

3 Maximum Ratings

Table 3: Maximum Ratings at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Supply Voltage	V_{DD}	-0.5	–	5.5	V	–
Maximum DC-Voltage on Other Pins	V_{DC}	-0.3	–	3.6	V	–
Storage Temperature Range	T_{STG}	-55	–	150	°C	–
RF Input Power	P_{RF_TRx}	–	–	32	dBm	–
Junction Temperature	T_j	–	–	125	°C	–
ESD Capability						
Human Body Model [1]	V_{ESD_HBM}	−1	–	+1	kV	–
ESD Capability RFin Port [2]	V_{ESD_RFin}	−8	–	+8	kV	RFin versus GND, with 27 nH shunt inductor

[1] Human Body Model ANSI/ESDA/JEDEC JS-001-2012 (R = 1.5 kΩ, C = 100 pF).
[2] IEC 61000-4-2 (R = 330 Ω, C = 150 pF), contact discharge.

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 Operation Ranges

Table 4: Operation Ranges

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Ambient Temperature	T_A	-40	25	85	°C	–
RF Frequency	f	0.1	–	3	GHz	–
Supply Voltage	V_{DD}	2.3	–	3.6	V	–
Control Voltage Low	V_{Ctrl_L}	-0.3	–	0.3	V	–
Control Voltage High	V_{Ctrl_H}	1.5	–	V_{DD}	V	V_{DD} < 3.3 V

Table 5: RF Input Power

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
RF Input Power (50Ω)	P_{In}	–	–	30	dBm	–

5 RF Characteristics

Table 6: RF Characteristics

Test Conditions (unless otherwise specified):

- Terminating port impedance: Z_0 = 50 Ω
- Temperature range: T_A = -40 ... +85 °C
- Supply voltage: V_{DD} = 2.3 ... 3.6 *V*
- Input power: P_{IN} = 0 *dBm*

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Insertion Loss						
All RF Ports	*IL*	0.24	0.35	0.55	dB	824 - 915 MHz
		0.28	0.44	0.65	dB	1710 - 1910 MHz
		0.30	0.50	0.80	dB	2170 - 2500 MHz
		0.35	0.54	0.90	dB	2700 MHz
Insertion Loss[1]						
All RF Ports	*IL*	0.30	0.35	0.40	dB	824 - 915 MHz
		0.37	0.44	0.50	dB	1710 - 1910 MHz
		0.40	0.50	0.60	dB	2170 - 2500 MHz
		0.44	0.54	0.70	dB	2700 MHz
Return Loss						
All RF Ports	*RL*	21	25	28	dB	824 - 915 MHz
		15	18	24	dB	1710 - 1910 MHz
		12	16	22	dB	2170 - 2500 MHz
		12	14	20	dB	2700 MHz
Isolation						
RFin to RF1/RF2/RF3	ISO_{In-RFx}	32	37	44	dB	824 - 915 MHz
		22	27	33	dB	1710 - 1910 MHz
		19	24	29	dB	2170 - 2500 MHz
		18	22	27	dB	2700 MHz
RF1 to RF2 / RF2 to RF1 RF1 to RF3 / RF3 to RF1 RF2 to RF3 / RF3 to RF2	$ISO_{Port-Port}$	32	42	49	dB	824 - 915 MHz
		24	31	36	dB	1710 - 1910 MHz
		21	27	32	dB	2170 - 2500 MHz
		20	26	31	dB	2700 MHz

[1] T_A = *+25 °C*, V_{DD} = 3 *V*

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Harmonic Generation up to 12.75 GHz						
Any Path	P_{Harm}	–	-80	-70	dBc	P_{in} = 27 *dBm*, 50 % Duty Cycle, 50Ω
Intermodulation Distortion in Rx Band[1,2]						
IMD2	*IMD*2	–	-110	-105	dBm	Tx = 10 dBm,
IMD3	*IMD*3	–	-115	-105	dBm	Interferer = -15 dBm, 50Ω
Switching Time and Current Consumption						
RF Rise Time	$t_{10\%-90\%}$	–	23	90	ns	10% - 90% of RF Signal
Ctrl to RF Time	$t_{Ctrl-RF}$	–	95	250	ns	50% of Ctrl Signal to 90% of RF Signal
Supply Current	I_{DD}	–	140	270	µA	–
Control Current	I_{Ctrl}	–	1	10	µA	–

Note: All electrical characteristics are measured with all RF ports terminated by 50 Ω loads.

[1] T_A = *+25 °C*, V_{DD} = *3 V*

[2] *With external shunt L*

6 Pin Description and Package Outline

Table 7: Mechanical Data

Parameter	Symbol	Value	Unit
X-Dimension	X	1.15 ± 0.05	*mm*
Y-Dimension	Y	1.15 ± 0.05	*mm*
Size	Size	1.3225	mm^2
Height	H	0.31 +0.01/−0.02	*mm*

Table 8: Pin Description

Pin No.	Name	Pin Type	Buffer Type	Function
1	V1	I		Control Pin 1
2	RF3	I/O		RF-Port 3
3	RF1	I/O		RF-Port 1
4	RFin	I/O		RF Input
5	RF2	I/O		RF-Port 2
6	DGND	GND		Digital Ground
7	VDD	PWR		Power Supply
8	V2	I		Control Pin 2
9	GND	GND		Ground

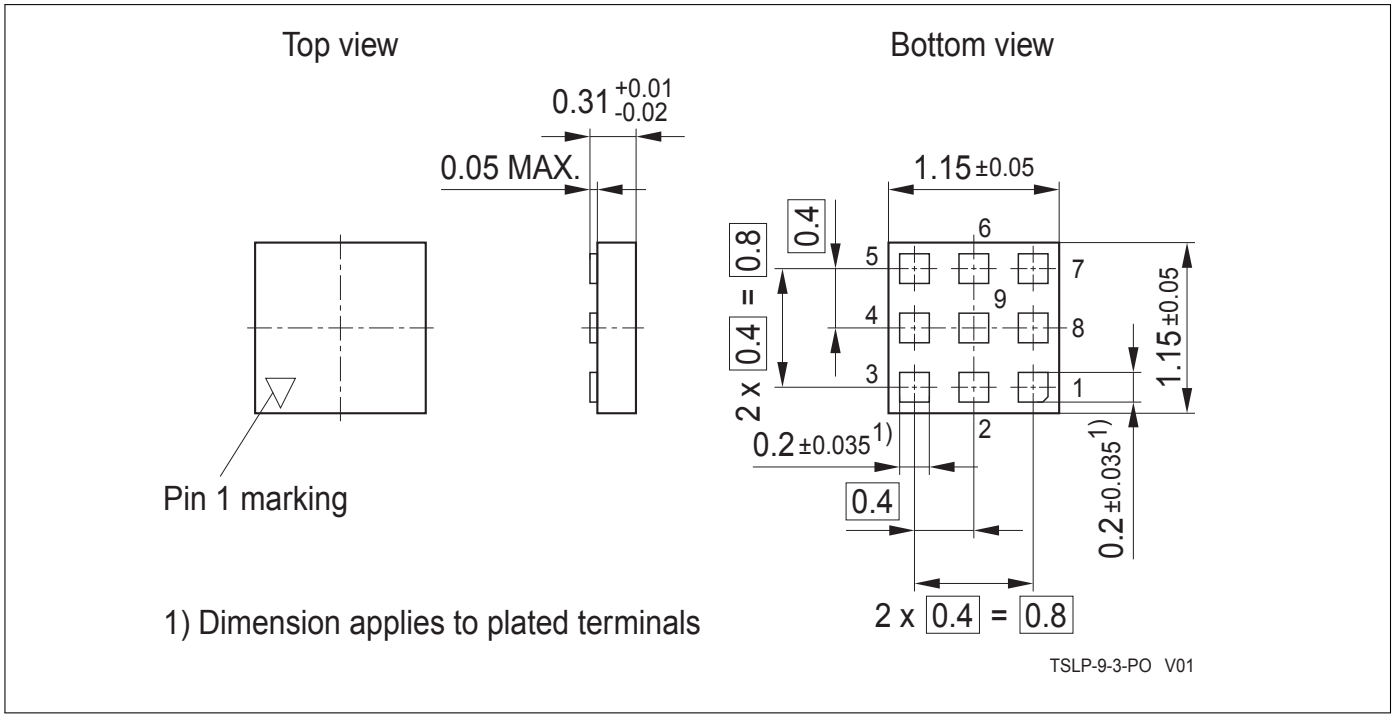


Figure 2: Package Outline

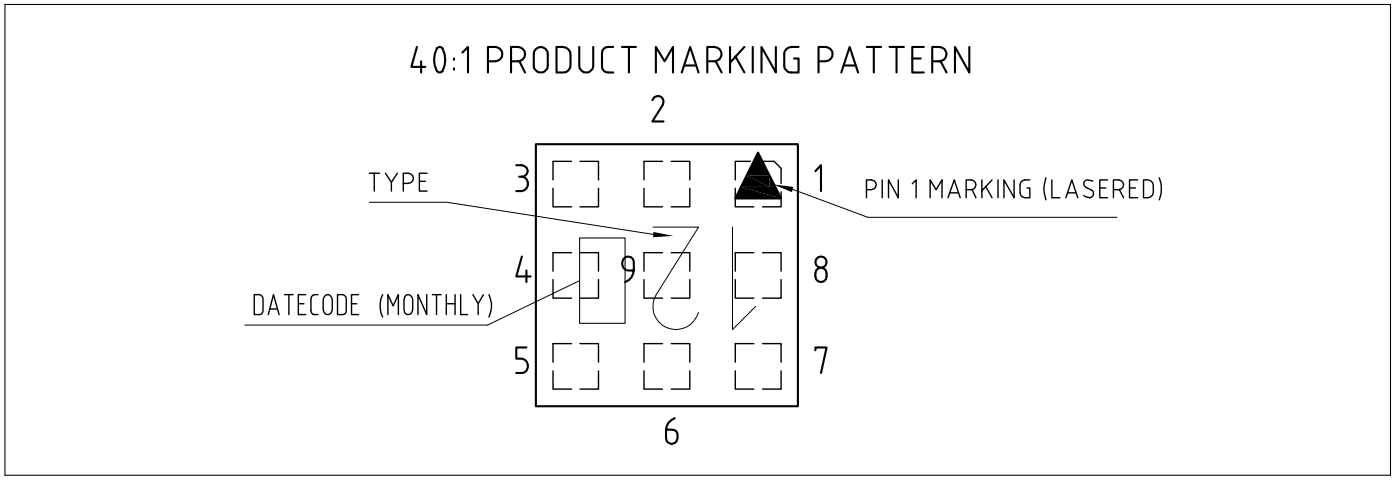


Figure 3: Pin 1 Marking (top view)

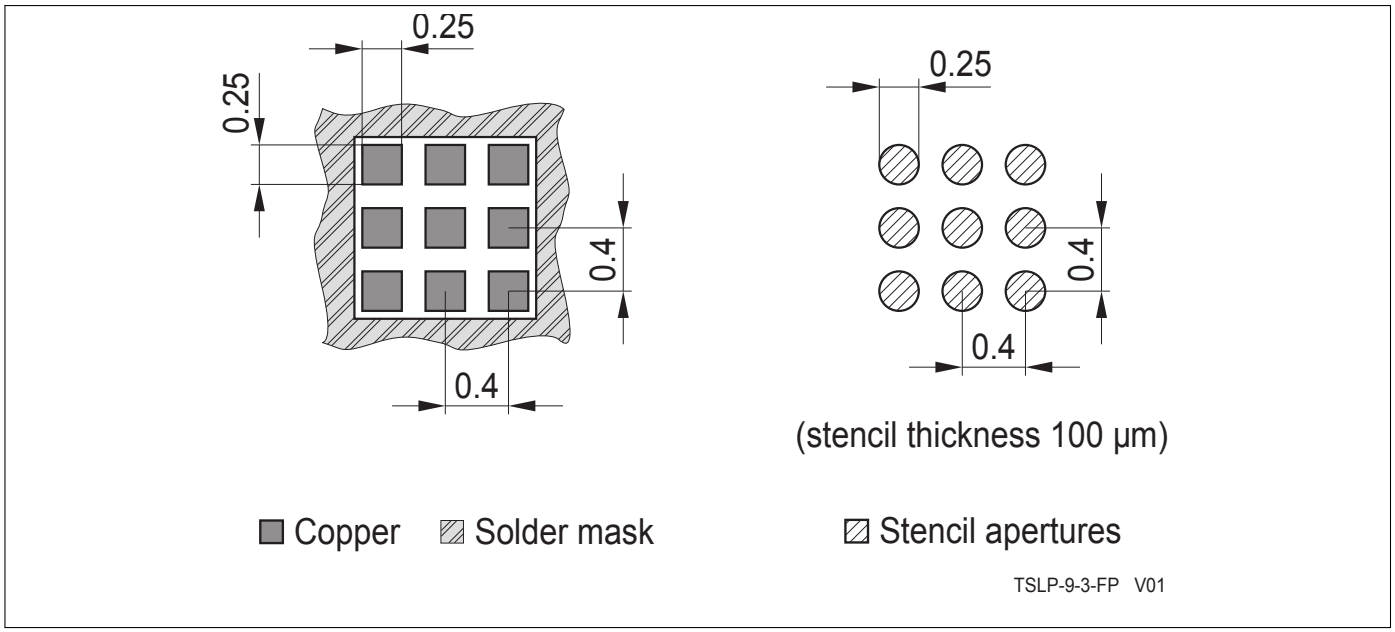


Figure 4: Footprint TSLP-9-3

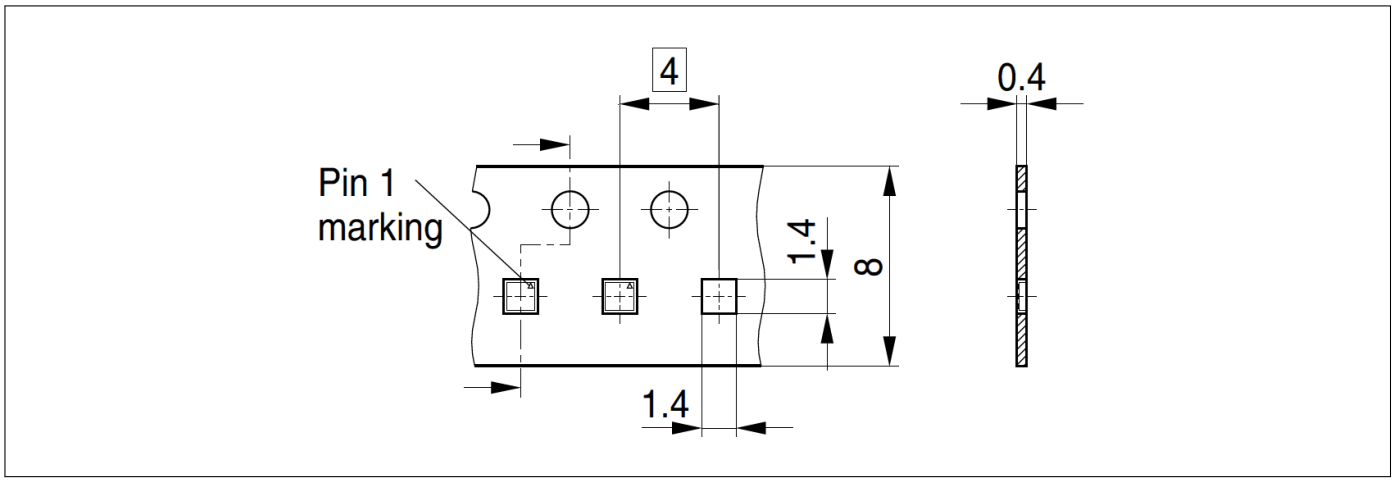


Figure 5: Tape Drawing for TSLP-9-3

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