BGS13SN8

Wideband RF SP3T Switch

Data Sheet

Revision 2.2 - 2015-11-11
Final

Power Management & Multimarket

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Information

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Revision History

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Page	**Subjects (major changes since last revision)**
1	Status updated
5	Marking updated

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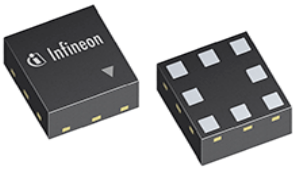
BGS13SN8 Wideband RF SP3T Switch

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
- Low insertion loss
- Low harmonic generation
- High port-to-port-isolation
- Suitable for Edge / CDMA2000 / LTE / WCDMA applications
- 0.1 to 6 GHz coverage
- No decoupling capacitors required if no DC applied on RF lines
- On-chip control logic including ESD protection
- General Purpose Input-Output (GPIO) Interface
- Small form factor 1.1 mm x 1.1 mm
- No power supply blocking required
- High EMI robustness
- RoHS and WEEE compliant package

RoHS

2 Product Description

The BGS13SN8 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 1.35 V to VDD . The BGS13SN8 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 1.1 x 1.1 mm^2 and a maximum height of 0.4 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
BGS13SN8	TSNP-8-1	R

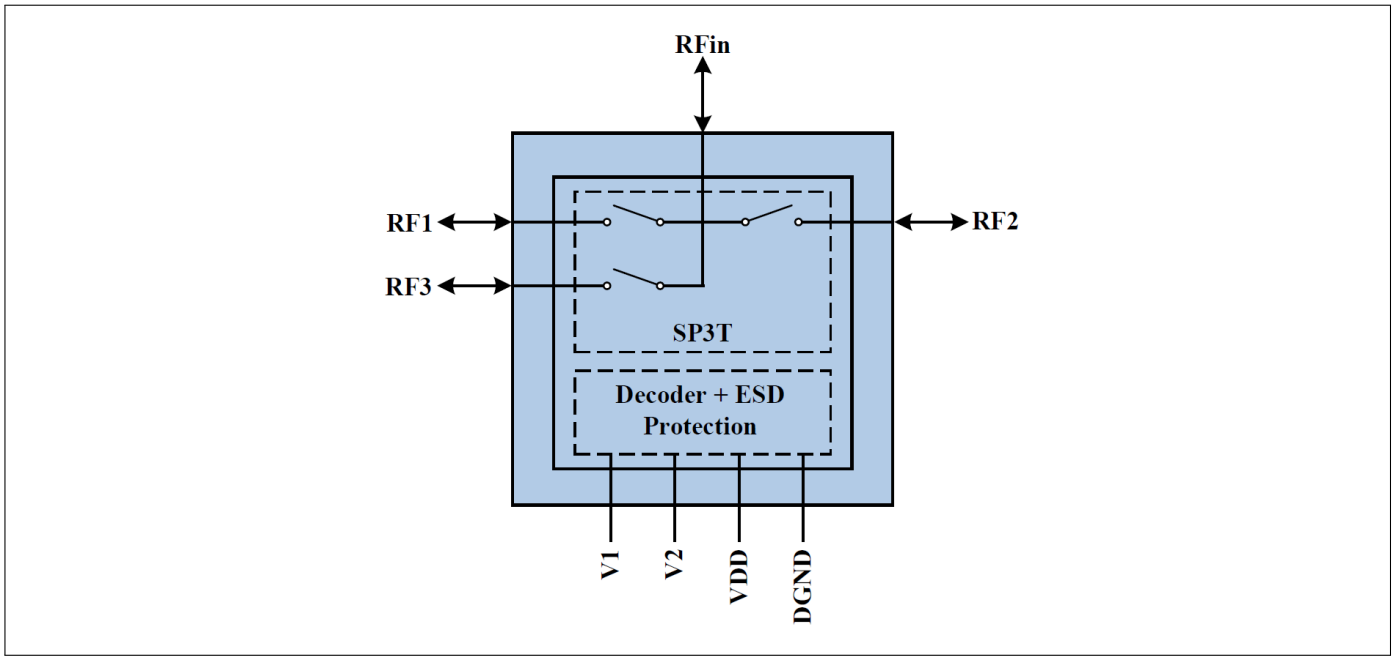


Figure 1: BGS13SN8 Block Diagram

3 Maximum Ratings

Stresses above the maximum 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.

Table 2: Maximum Ratings, Table I at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Frequency Range	f	0.1	–	6	GHz	[1]
Supply voltage	V_{DD}	-0.5	–	3.6	V	–
Storage temperature range	T_{STG}	-55	–	150	°C	–
Junction temperature	T_j	–	–	125	°C	–
RF input power at all Rx ports	P_{RF_Rx}	–	–	32	dBm	CW
ESD capability, CDM[2]	V_{ESD_CDM}	-1000	–	+1000	V	All pins
ESD capability, HBM[3]	V_{ESD_HBM}	-1000	–	+1000	V	Digital versus RF interface
		-1000	–	+1000	V	RF interface
ESD capability, system level[4]	V_{ESD_ANT}	-8000	–	+8000	V	ANT versus system GND, with 27 nH shunt inductor

[1] There is also a DC connection between switched paths. The DC voltage at RF ports V_{RFDC} has to be 0V.
[2] Field-Induced Charged-Device Model JESD22-C101. Simulates charging/discharging events that occur in production equipment and processes. Potential for CDM ESD events occurs whenever there is metal-to-metal contact in manufacturing.
[3] Human Body Model ANSI/ESDA/JEDEC JS-001-2012 (R=1.5 kΩ, C=100 pF).
[4] IEC 61000-4-2 (R=330 Ω, C=150 pF), contact discharge.

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

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Maximum DC-voltage on RF-Ports and RF-Ground	V_{RFDC}	0	–	0	V	No DC voltages allowed on RF-Ports

4 Operation Ranges

Table 4: Operation Ranges

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Supply voltage	V_{DD}	1.8	–	3.4	V	–
Supply current[1)]	I_{BAT}	–	80	–	µA	–
GPIO control voltage high	V_{Ctrl_H}	1.35	–	V_{BAT} + 0.3	V	–
GPIO control voltage low	V_{Ctrl_L}	-0.3	–	0.45	V	–
GPIO control input capacitance	C_{Ctrl}	–	–	2	pF	Guaranteed by design
Ambient temperature	T_A	-40	25	85	°C	–

[1)] T_A = –40 °C - 85 °C, V_{DD}= 1.8 - 3.4 V

Table 5: RF Input Power

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Rx ports (50 Ω)	P_{RF_Rx}	–	–	30	dBm	–

5 RF Characteristics

Table 6: RF Characteristics at T_A = –40 °C–85 °C, P_{IN} = 0 dBm, Supply Voltage V_{DD}= 1.8 V–3.4 V, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Insertion Loss (T_A = 25 °C)						
All Rx Ports	IL	0.15	0.22	0.42	dB	698–960 MHz
		0.18	0.25	0.45	dB	1428–1990 MHz
		0.18	0.28	0.63	dB	1920–2170 MHz
		0.20	0.33	0.63	dB	2170–2690 MHz
		0.30	0.65	1.10	dB	5150–5725 MHz
Return Loss						
All Rx Ports	RL	20	30	40	dB	698–960 MHz
		19	23	38	dB	1428–1990 MHz
		17	21	35	dB	1920–2170 MHz
		15	19	32	dB	2170–2690 MHz
		12	14	28	dB	5150–5725 MHz
Isolation						
All Rx Ports	ISO	30	35	48	dB	698–960 MHz
		22	30	38	dB	1428–1990 MHz
		18	27	38	dB	1920–2170 MHz
		18	25	35	dB	2170–2690 MHz
		10	15	30	dB	5150–5725 MHz
P0.1 dB Compression Point, Extrapolated						
All Rx Ports [1]	$P_{0.1dB}$	34	–	–	dBm	824–960 MHz
Harmonic Generation up to 12.75 GHz						
H2	P_{Harm}	–	-90	-75	dBc	23 dBm, 50 Ω, CW mode
H3	P_{Harm}	–	-95	-80	dBc	23 dBm, 50 Ω, CW mode
Intermodulation Distortion in Rx Band [2] (T_A = 25 °C)						
IMD2, low	$IMD2_{low}$	–	–	-105	dBm	Tx = 10 dBm, Interferer = –15 dBm, 50 Ω
IMD3	IMD3	–	–	-115	dBm	
IMD2, high	$IMD2_{high}$	–	–	-105	dBm	
Switching Time						
RF Rise Time [3]	$t_{on/off}$	–	90	150	ns	90 % OFF to 90 % ON; 90 % ON to 90 % OFF
Ctrl to RF Time [3]	$t_{Ctrl-RF}$	–	500	1000	ns	50 % of Ctrl Signal to 90 % of RF Signal

[1] Guaranteed by design.
[2] On application board with shunt inductor, Min/Max-values measured with phase shifter.
[3] Guaranteed by characterization.

6 GPIO Specification

Table 7: Modes of Operation (Truth Table)

		Control Inputs	
State	**Mode**	**V1**	**V2**
1	Isolation	0	0
2	RFin - RF1	1	0
3	RFin - RF2	0	1
4	RFin - RF3	1	1

7 Pin Definition and Package Outline

Table 8: Pin Configuration

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

Table 9: Mechanical Data

Parameter	Symbol	Value	Unit
X-Dimension	X	1.1 $\pm$ 0.05	*mm*
Y-Dimension	Y	1.1 $\pm$ 0.05	*mm*
Size	Size	1.21	mm^2
Height	H	0.375	*mm*

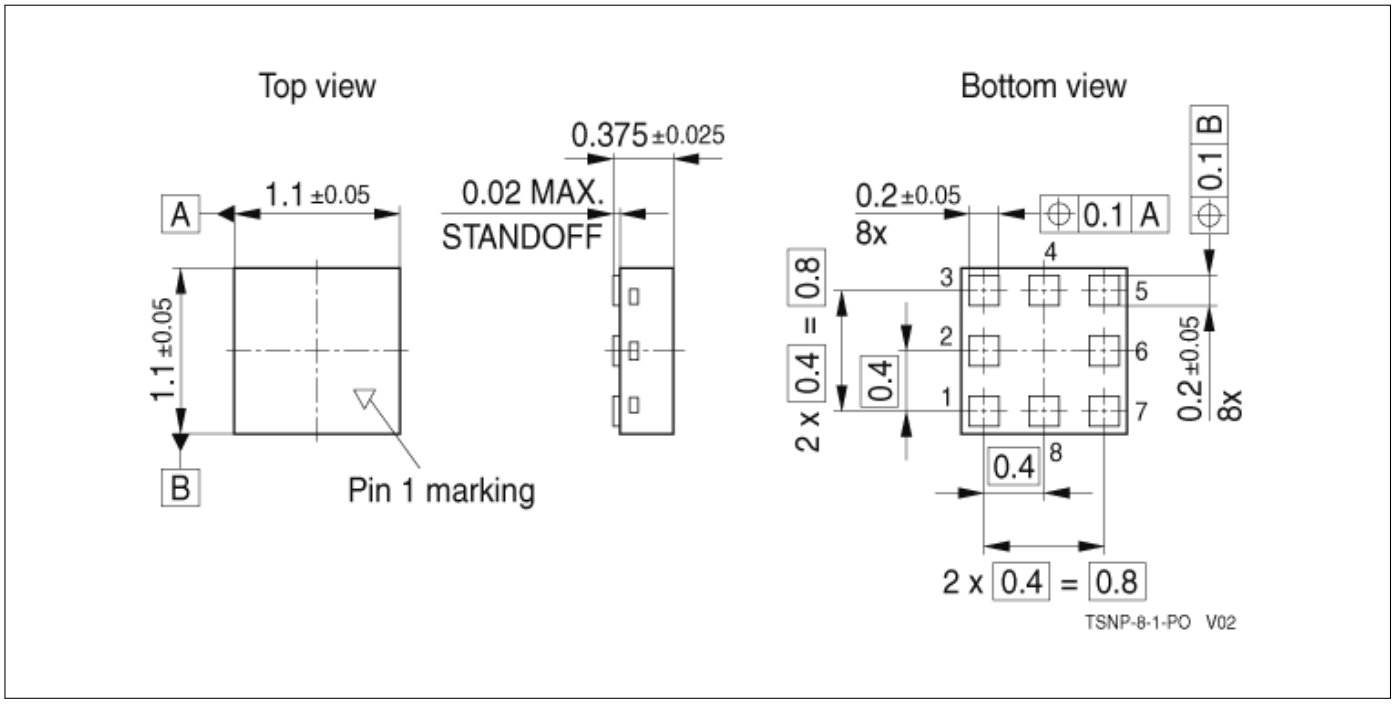


Figure 2: Package Outline (bottom and side view)

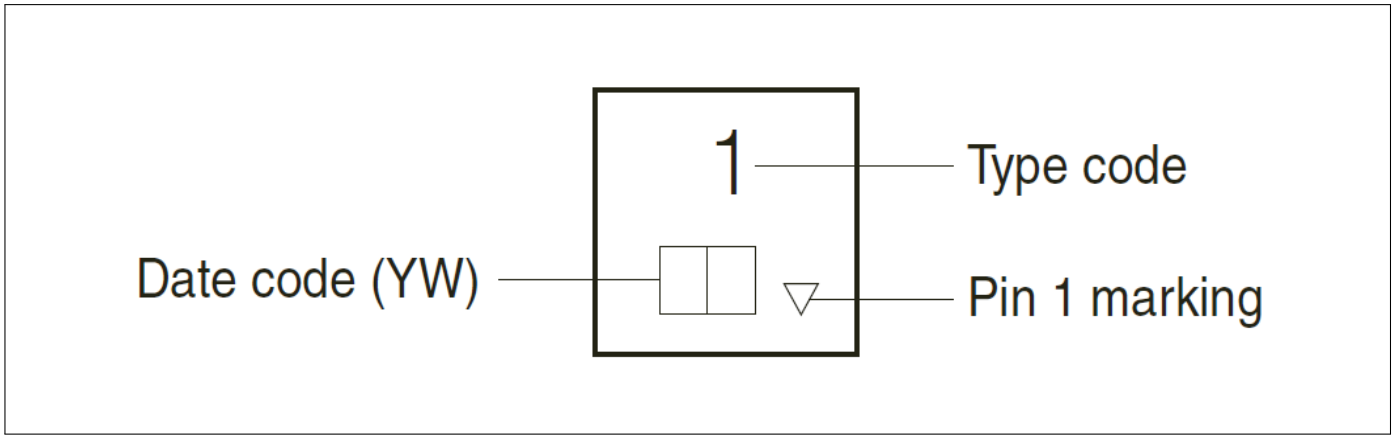


Figure 3: Marking Pattern

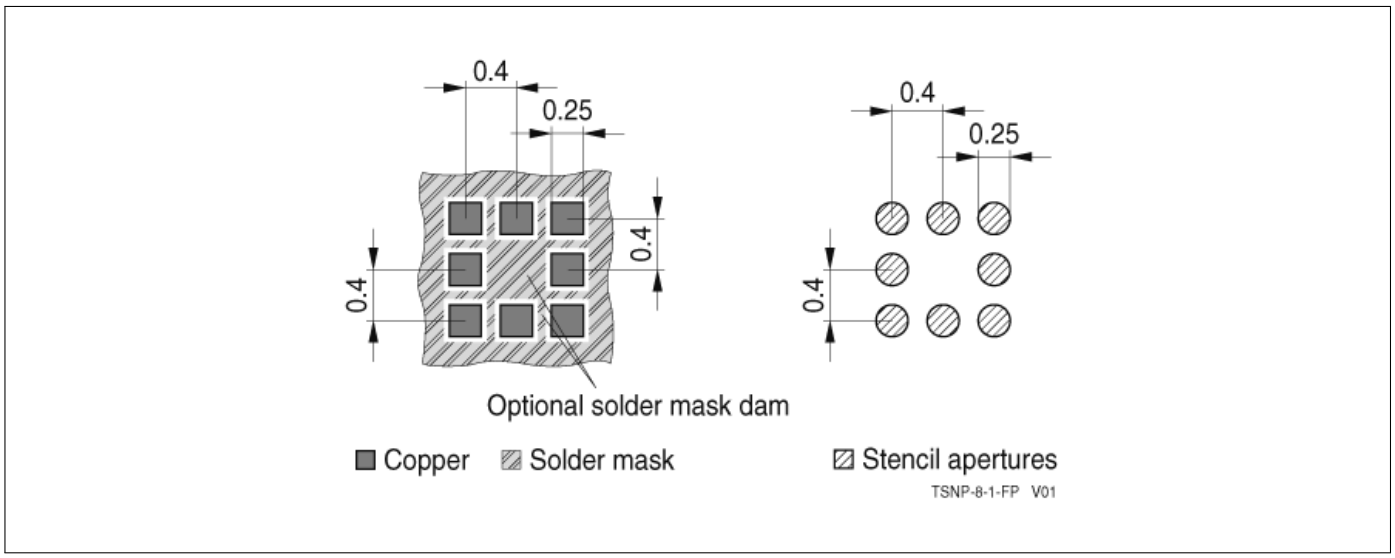


Figure 4: Land pattern and stencil mask

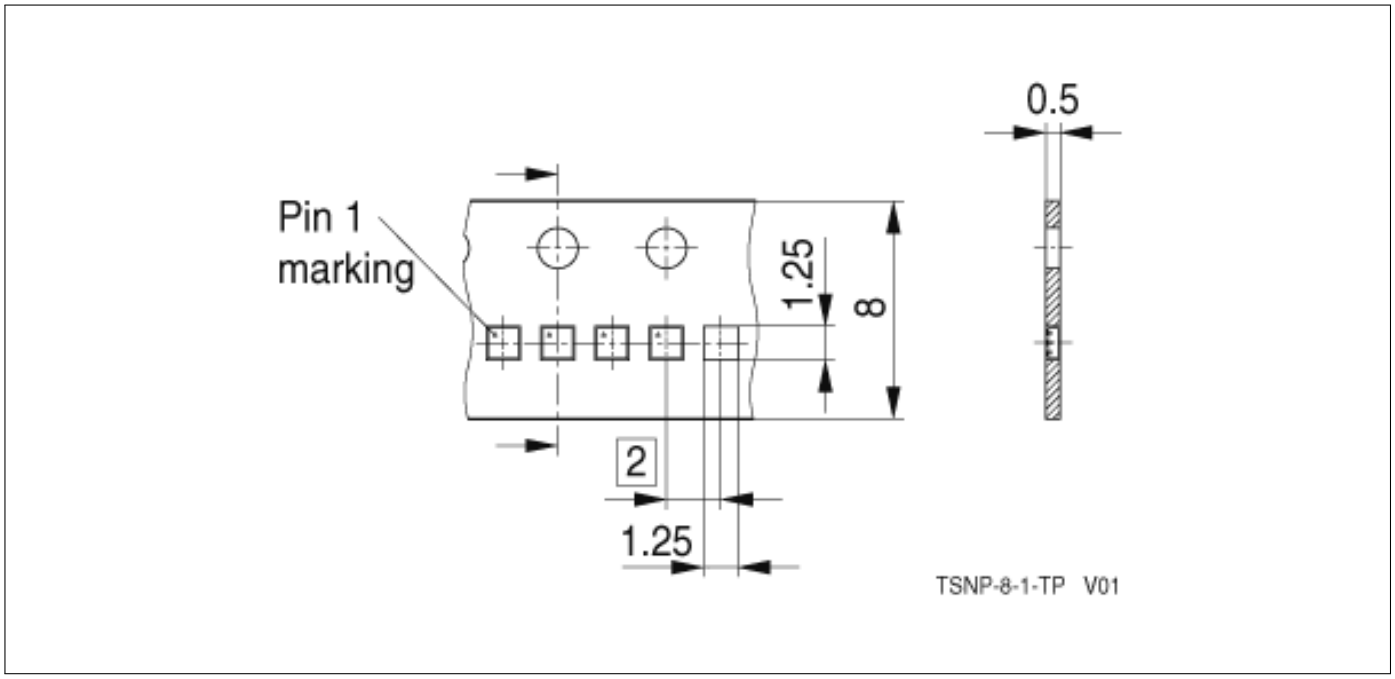


Figure 5: Packing (Tape)

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