

0.1-3.8GHz SP4T Switch for 3/4G TRX

Features

- Broadband frequency range: 0.1 to 3.8 GHz
- Low insertion loss: 0.55dB typical @ 2.7GHz
- High isolation: 27dB typical @ 2.7GHz
- P0.1dB of 35dBm
- Integrated logic
- LGA 1.1mm X1.1mm X0.47mm-9L package

Applications

- Cellular 3G/4G TRX
- Cellular modems, tablets and USB Devices
- Other RF front-end modules

General Description

The AW13414TLGR is a SP4T switch with low insertion loss and high Isolation. It can be used to support band switching and mode switching in antenna diversity systems for 3G/4G, data cards and tablets.

The symmetrical design of internal ports makes it convenient for PCB routing and adjustment of receiving and transmitting signals. The band/mode switching is realized by the GPIO pins as referenced in the chip block diagram and the control logic.

The AW13414TLGR is provided in a compact LGA 1.1mm x 1.1mm x 0.47mm-9L package.

Typical Application Circuit

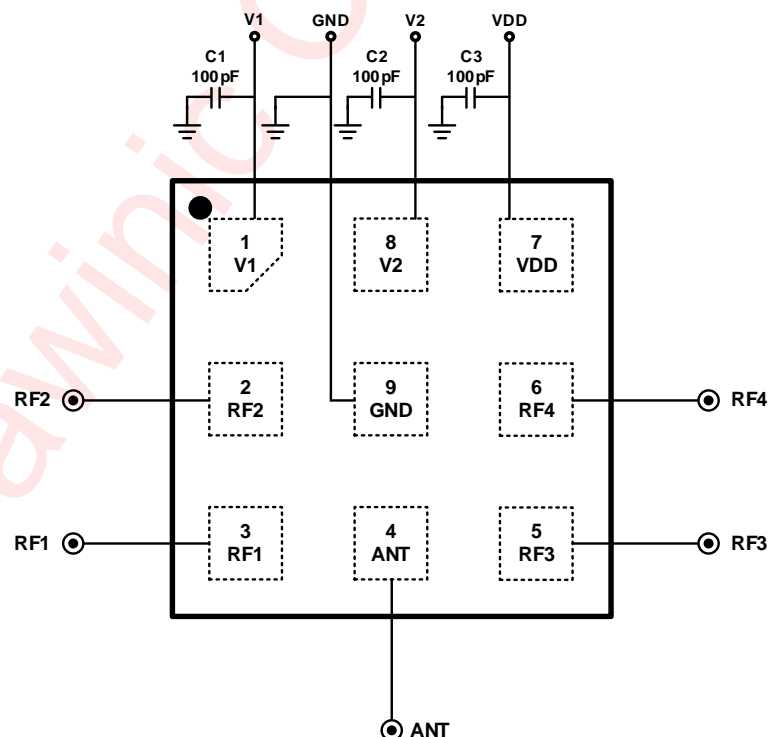


Figure 1 Typical Application Circuit

Pin Configuration and Top Mark

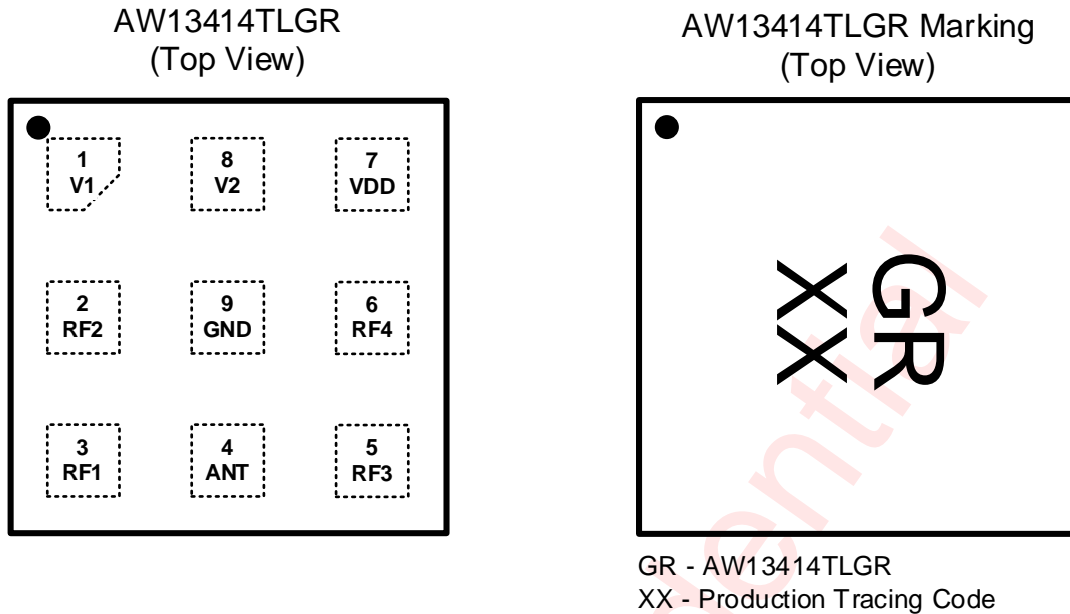


Figure 2 Pin Configuration and Top Mark

Pin Definition

No.	NAME	DESCRIPTION
1	V1	DC control voltage 1
2	RF2	RF Port2
3	RF1	RF Port1
4	ANT	Antenna
5	RF3	RF Port3
6	RF4	RF Port4
7	VDD	DC power supply
8	V2	DC control voltage 2
9	GND	Ground

Functional Block Diagram

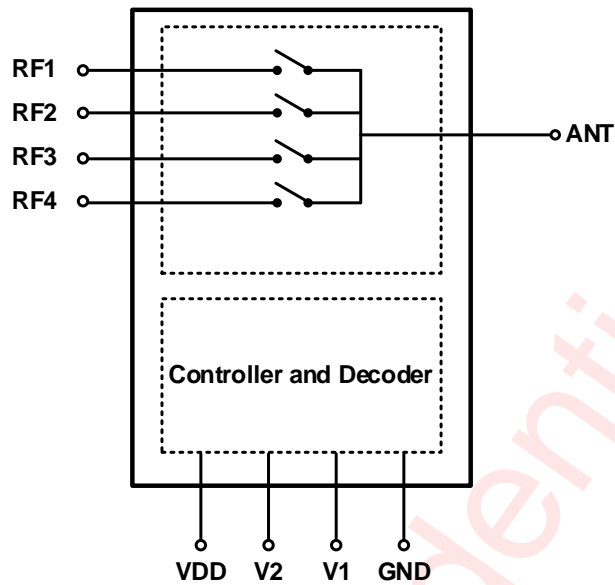


Figure 3 Functional Block Diagram

Ordering Information

Part Number	Temperature	Package	Marking	Moisture Sensitivity Level	Environmental Information	Delivery Form
AW13414TLGR	-40°C~85°C	LGA 1.1mmX1.1mm X0.47mm-9L	GR	MSL3	ROHS+HF	4500 units/ Tape and Reel

Absolute Maximum Ratings (NOTE1)

PARAMETERS		RANGE
Supply Voltage Range VDD		2.4V to 5V
Control Voltage Range	V1,V2	0V to 3V
RF input power(RF1 to RF4)		36dBm
Operating Free-air Temperature Range		-40°C to 85°C
Storage Temperature T _{STG}		-65°C to 150°C
Lead Temperature (Soldering 10 Seconds)		260°C
ESD (NOTE 2)		
HBM		±1kV
CDM		±500V

NOTE1: Conditions out of those ranges listed in "absolute maximum ratings" may cause permanent damages to the device. In spite of the limits above, functional operation conditions of the device should within the ranges listed in "recommended operating conditions". Exposure to absolute-maximum-rated conditions for prolonged periods may affect device reliability.

NOTE2: The human body model is a 100pF capacitor discharged through a 1.5kΩ resistor into each pin. Test method: ESDA/JEDEC JS-001-2017. CDM test method ESDA/JEDEC JS -002-2018.

Electrical Characteristics

VDD=2.8V, V1=V2=0/1.8V, PIN=0dBm, Temp=+25°C, Z₀=50Ω. (unless otherwise noted)

PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT	
DC Specifications						
VDD	Supply Voltage	2.4	2.8	5	V	
IDD	Supply Current		33	60	μA	
VCTL_H VCTL_L	Control Voltage High Low	0.9 0		3 0.3	V	
ICTL	Control Current	VCTL = 1.8V		0.1	1	μA
T _{sw}	Switching Time One RF port to another	50% of final control voltage to 90% of final RF power, switching between RF1/2/3/4		0.7	1	μs
RF Specifications						
IL	Insertion loss(ANT pin to RF1-RF4)	0.1-1.0G 1.0-2.0G 2.0-2.7G 3.3-3.8G		0.28 0.36 0.55 0.64	0.40 0.50 0.65 0.80	dB dB dB dB
ISO	Isolation (ANT pin to RF1-RF4)	0.1-1.0G 1.0-2.0G 2.0-2.7G 3.3-3.8G	35 26 24 20	40 32 28 24		dB dB dB dB
ISO	Isolation (RF pin to other RF pins)	0.1-1.0G 1.0-2.0G 2.0-2.7G 3.3-3.8G	33 25 23 20	38 32 27 22		dB dB dB dB
RL	Input return loss (ANT pin to RF1-RF4)	0.1-1.0G 1.0-2.0G 2.0-2.7G 3.3-3.8G	21 15 12 10	25 20 15 12		dB dB dB dB
2f ₀	Second harmonics (ANT pin to RF1-RF4)	PIN=+26dBm, 0.1-3GHz		92		dBc
3f ₀	Third harmonics (ANT pin to RF1-RF4)	PIN=+26dBm, 0.1-3GHz		95		dBc
P _{0.1dB}	0.1dB Compression Point (ANT pin to RF1-RF4)	0.1GHz-3GHz		35		dBm

Timing Diagram (Power On and Off Sequence)

It is very important that the user adheres to the correct power-on/off sequence in order to avoid damaging the device. The control signal V1, V2 should be set to 0V unless VDD is set in the operating voltage range.

Power ON:

- 1) Apply voltage supply --- VDD
- 2) Set Controls---V1, V2
- 3) Apply RF input

Change switch position from one RF port to another:

- 1) Remove RF input
- 2) Change control voltages V1, V2 to set the switch to desired RF port
- 3) Apply RF input

Power OFF:

- 1) Remove RF input
- 2) Remove control voltages V1, V2
- 3) Remove VDD input

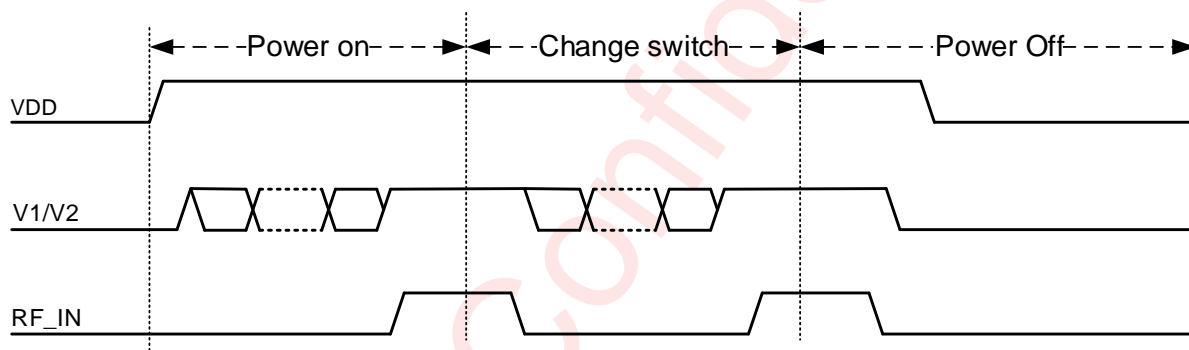
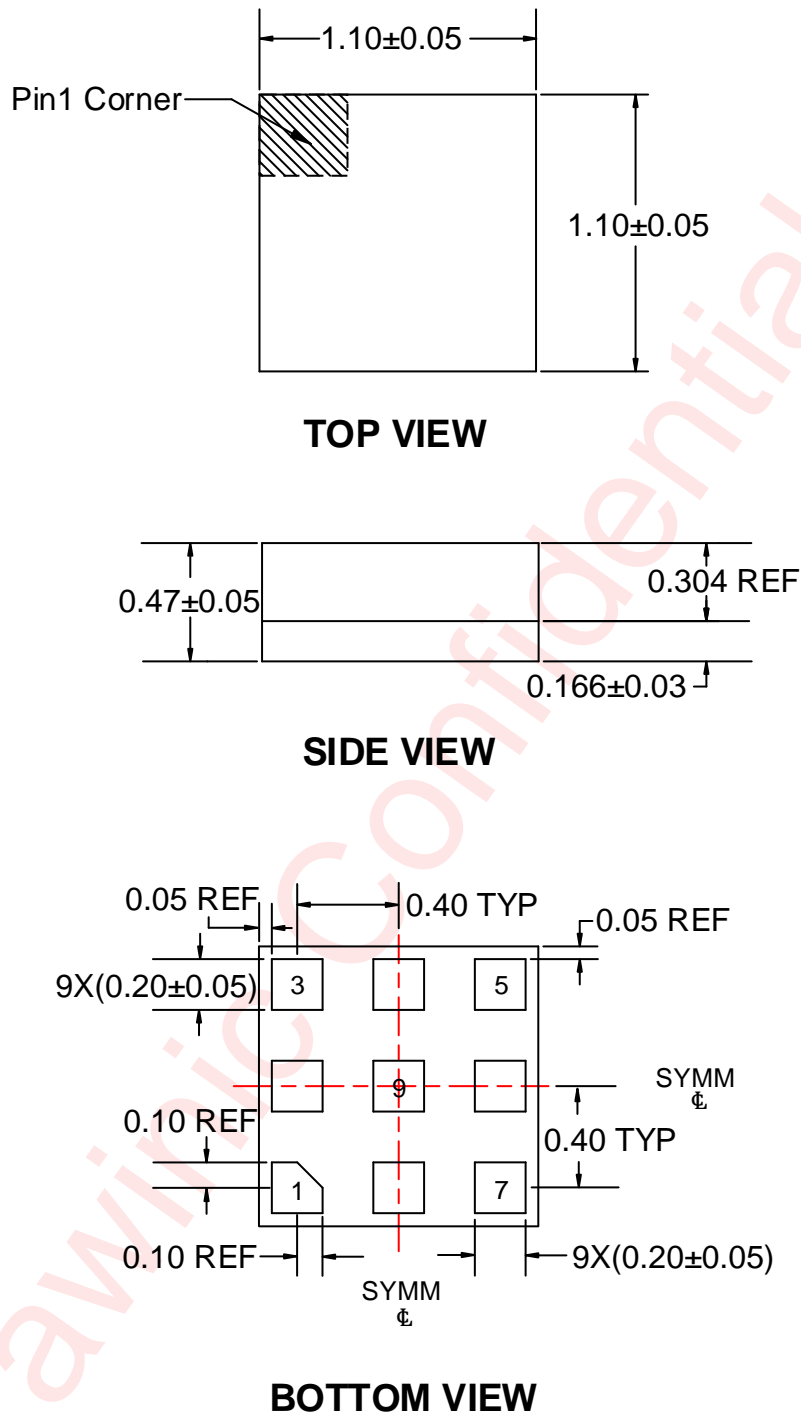


Figure 4 Power on/Change switch/Power off sequence

Control Logic

Control Pins		Switch RF I/O			
V1	V2	RF1	RF2	RF3	RF4
0	1	ON	Isolation	Isolation	Isolation
1	0	Isolation	ON	Isolation	Isolation
1	1	Isolation	Isolation	ON	Isolation
0	0	Isolation	Isolation	Isolation	ON

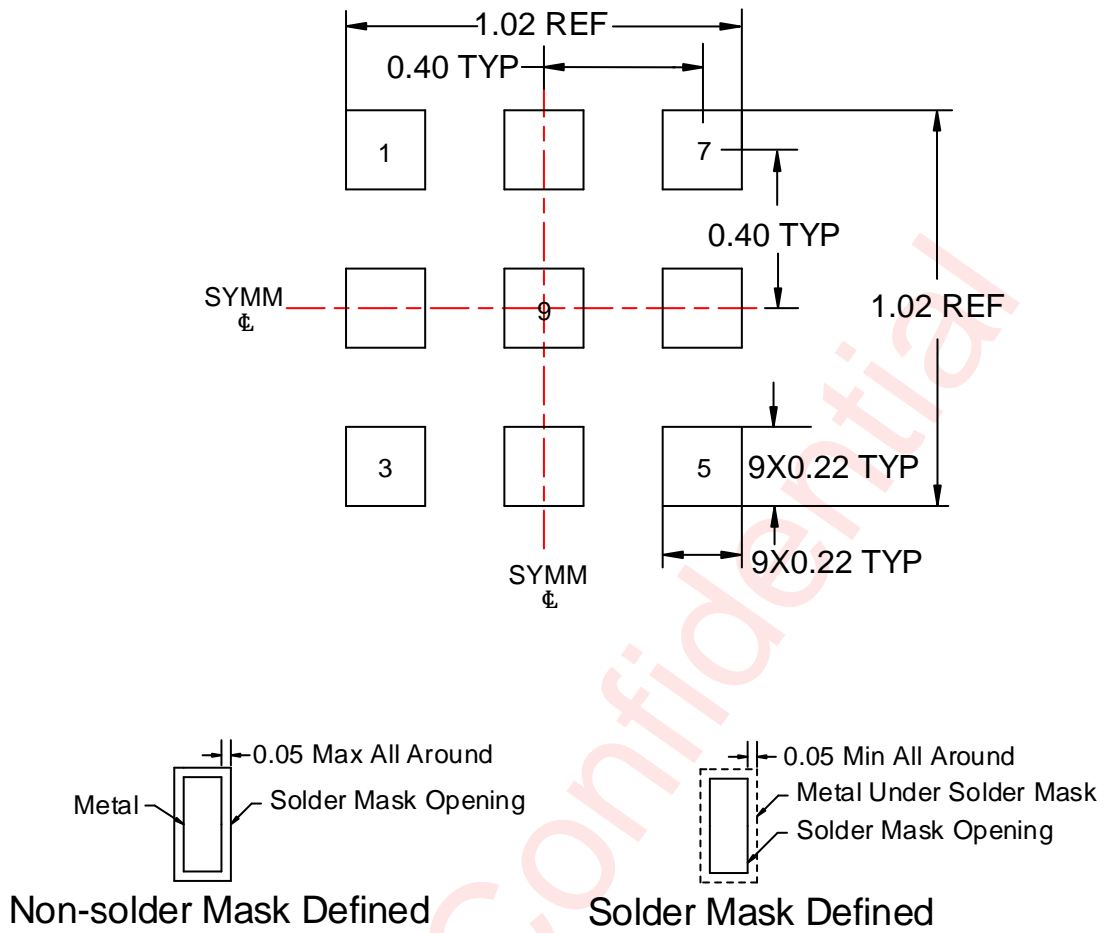
Package Description



Unit:mm

Figure 6 Package Outline

Land Pattern Data



Unit:mm

Figure 7 Land Pattern Data

Revision History

Version	Date	Change Record
V1.0	Sep. 2021	Officially Released
V1.1	Aug. 2022	Revise some formatting issues

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