0.1-3.0GHz SP4T Diversity Switch

Features

- Broadband frequency range: 0.1 to 3.0 GHz
- Low insertion loss: 0.56dB typical @ 2.7 GHz
- High isolation: >20dB @ 2.7 GHz
- Integrated logic
- Small QFN 2mmX2mmX0.55mm-14L package

Applications

- 2G/3G/4G antenna diversity and primary
- Cellular modems , tablets and USB Devices
- Other RF front-end modules

General Description

The AW13414RQNR 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 2G/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 AW13414RQNR is provided in a compact QFN 2mmX2mmX0.55mm-14L.
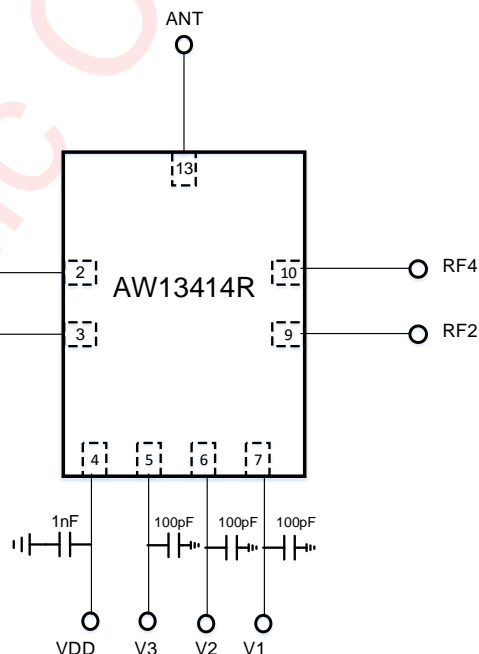
Typical Application Circuit

Figure 1   Typical Application Circuit of AW13414RQNR

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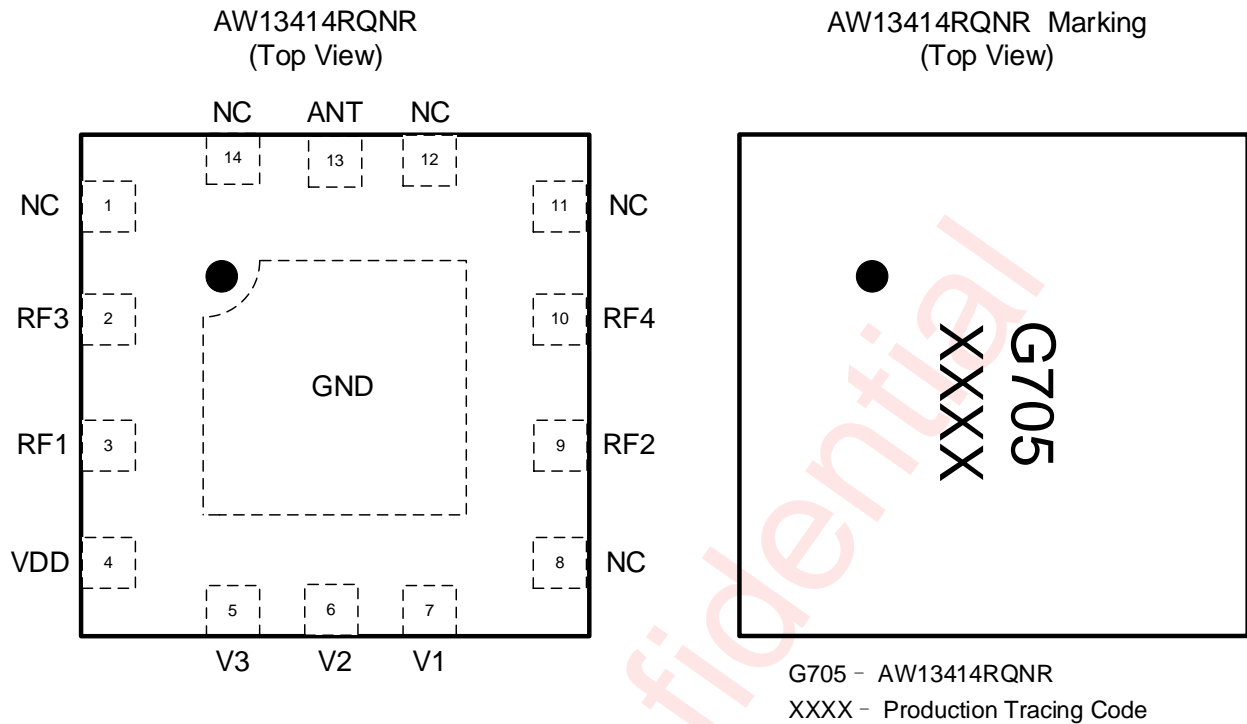
Pin Configuration And Top Mark

AW13414RQNR
(Top View)

AW13414RQNR Marking
(Top View)

G705 - AW13414RQNR

XXXX - Production Tracing Code

Figure 2　Pin Configuration and Top Mark

Pin Definition

No.	NAME	DESCRIPTION
1	NC	Not connected
2	RF3	RF I/O path 3
3	RF1	RF I/O path 1
4	VDD	DC power supply
5	V3	DC control voltage 3
6	V2	DC control voltage 2
7	V1	DC control voltage 1
8	NC	Not connected
9	RF2	RF I/O path 2
10	RF4	RF I/O path 4
11	NC	Not connected
12	NC	Not connected
13	ANT	Antenna port
14	NC	Not connected

Note: Bottom ground paddles must be connected to ground.
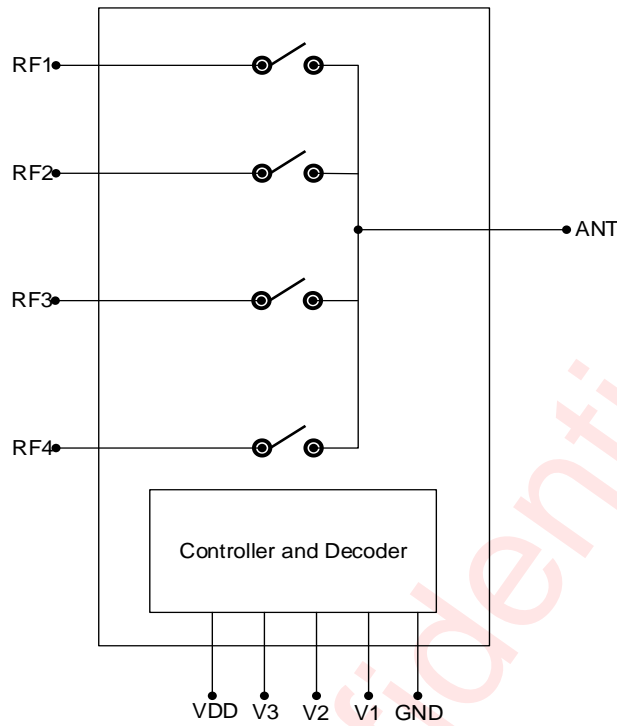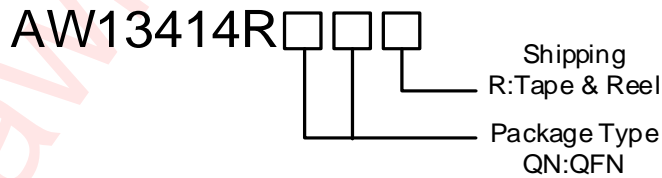
Functional Block Diagram

Figure 3   Functional Block Diagram

Ordering Information

Part Number	Temperature	Package	Marking	Moisture Sensitivity Level	Environmental Information	Delivery Form
AW13414RQNR	-40°C～85°C	QFN 2mmX2mm X0.55mm-14L	G705	MSL1	ROHS+HF	3000 units/ Tape and Reel

AW13414R☐☐☐

Shipping
R:Tape & Reel

Package Type
QN:QFN

Absolute Maximum Ratings(NOTE1)

PARAMETERS		RANGE
Supply Voltage Range VDD		-0.3V to +3.6V
Control Voltage Range	V1,V2,V3	-0.3V to +3.6V
RF input power(RF1 to RF8)		31dBm
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		
HBM (NOTE 2)		±1.5kV
CDM (NOTE 3)		±1kV

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

NOTE3: All pins. Test Condition: ESDA/JEDEC JS-002-2018

Electrical Characteristics

VDD=2.8V, V1=V2=V3=0/1.8V, PIN=0dBm, Temp=+25℃, Z_0=50Ω. (unless otherwise noted)

PARAMETER		TEST CONDITION	MIN	TYP	MAX	UNIT
DC Specifications						
VDD	Supply Voltage		2.4	2.8	3	V
IDD	Supply Current			45	80	μA
VCTL_H VCTL_L	Control Voltage High Low		1.35 0	1.8 0	3 0.45	V
I_{CTL}	Control Current	V_{CTL} = 1.8V		0.1	1	μA
t_{ON}	Turn-on Switching Time	50% of final control voltage to 90% of final RF power, switching between RF1/2/3/4/5/6/7/8		0.5	1	μS
RF Specifications						
IL	Insertion loss(ANT pin to RF1-RF4)	0.1-1.0GHz 1.0-2.0GHz 2.0-2.7GHz		0.31 0.43 0.56	0.46 0.57 0.73	dB dB dB
ISO	Isolation (ANT pin to RF1-RF4)	0.1-1.0GHz 1.0-2.0GHz 2.0-2.7GHz	30 23 20	40 30 24		dB dB dB
RL	Input return loss (ANT pin to RF1-RF4)	0.1-1.0GHz 1.0-2.0GHz 2.0-2.7GHz	20 16 12	27 22 20		dB dB dB
2fo	Second harmonics (ANT pin to RF1-RF4)	PIN=+26dBm, 0.1-2.7GHz		90		dBc
3fo	Third harmonics (ANT pin to RF1-RF4)	PIN=+26dBm, 0.1-2.7GHz		75		dBc
$P_{0.1dB}$	0.1dB Compression Point (ANT pin to RF1-RF4)	0.1-2.7GHz		30		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, V3 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, V3
3) Apply RF input

Change switch position from one RF port to another:
1) Remove RF input
2) Change control voltages V1, V2, V3 to set the switch to desired RF port
3) Apply RF input

Power OFF:
1) Remove RF input
2) Remove control voltages-V1, V2, V3
3) Remove VDD input

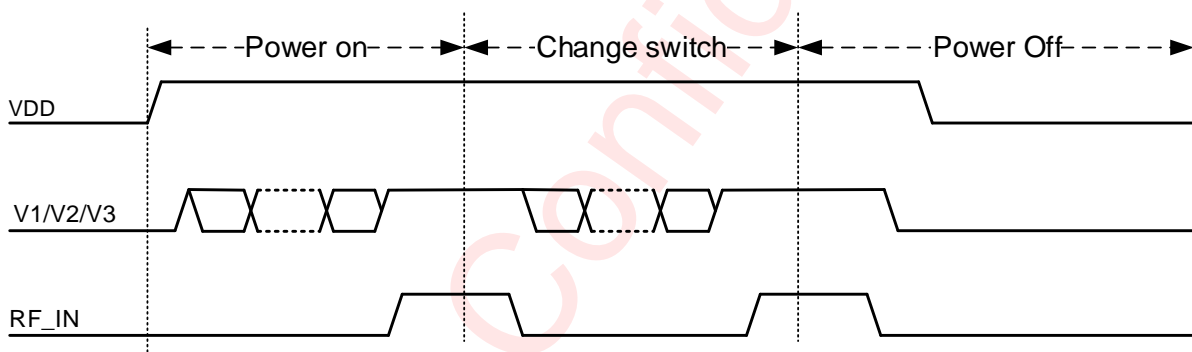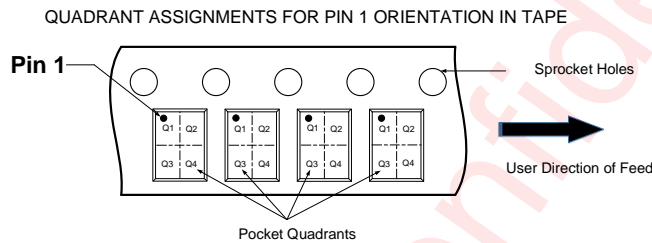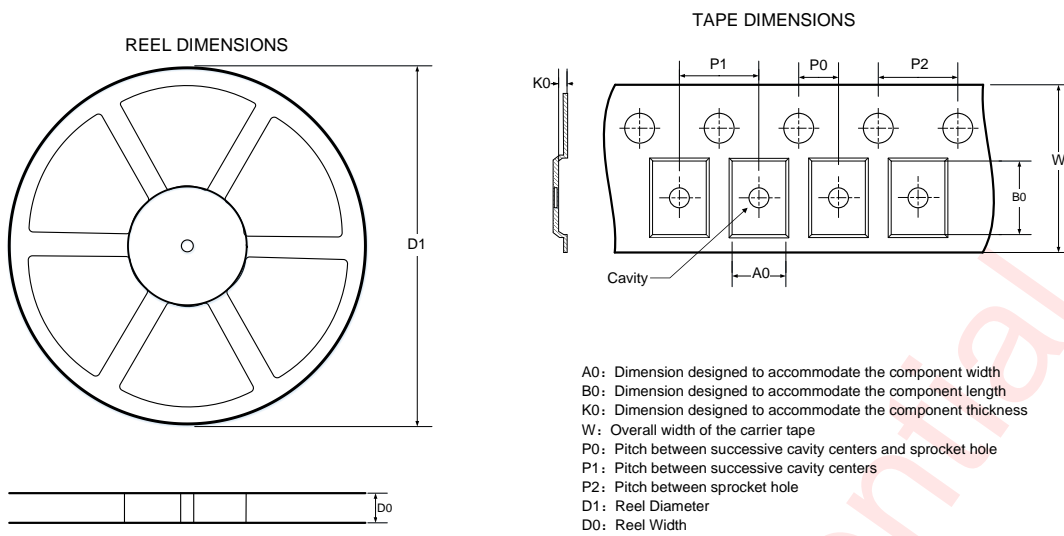**Figure 4　Power on/Change switch/Power off sequence**

AW13414RQNR Contral Logic

Control Pins			Switch RF I/O			
V1	V2	V3	RF1	RF2	RF3	RF4
0	0	0	**ON**	Isolation	Isolation	Isolation
0	0	1	Isolation	**ON**	Isolation	Isolation
0	1	0	Isolation	Isolation	**ON**	Isolation
0	1	1	Isolation	Isolation	Isolation	**ON**

AW13414RQNR Contral Logic

Tape and Reel Information

REEL DIMENSIONS

TAPE DIMENSIONS

A0：Dimension designed to accommodate the component width
B0：Dimension designed to accommodate the component length
K0：Dimension designed to accommodate the component thickness
W：Overall width of the carrier tape
P0：Pitch between successive cavity centers and sprocket hole
P1：Pitch between successive cavity centers
P2：Pitch between sprocket hole
D1：Reel Diameter
D0：Reel Width

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

Pin 1

Sprocket Holes

User Direction of Feed

Pocket Quadrants

DIMENSIONS AND PIN1 ORIENTATION

D1 (mm)	D0 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
178	8.4	2.25	2.25	0.75	2	4	4	8	Q1

All dimensions are nominal

Figure 5   Tape and Reel

Package Description

PIN1 CORNER

2.00±0.05

2.00±0.05

Top View

0.15 REF

0~0.05

0.55±0.05

Side View

0.8 TYP

14X(0.18±0.05)

0.45 TYP

SYMM

1.00±0.10

SYMM

1.00±0.10

14X(0.235±0.05)

5 7 4 8 1 11 14 12

Bottom View
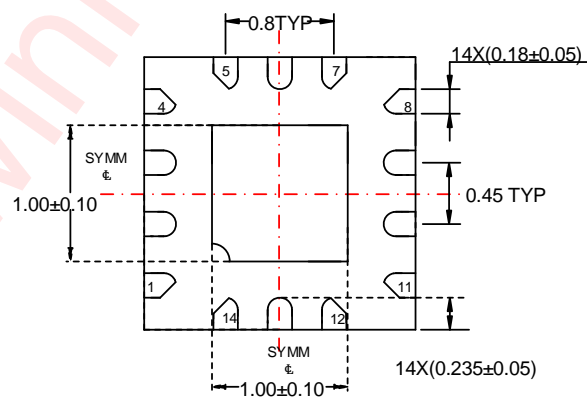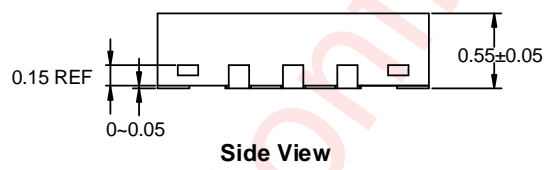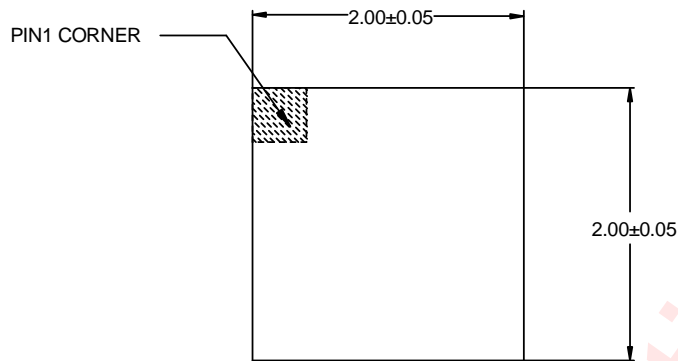
Unit：mm

Figure 6 Package Description

Land Pattern Data
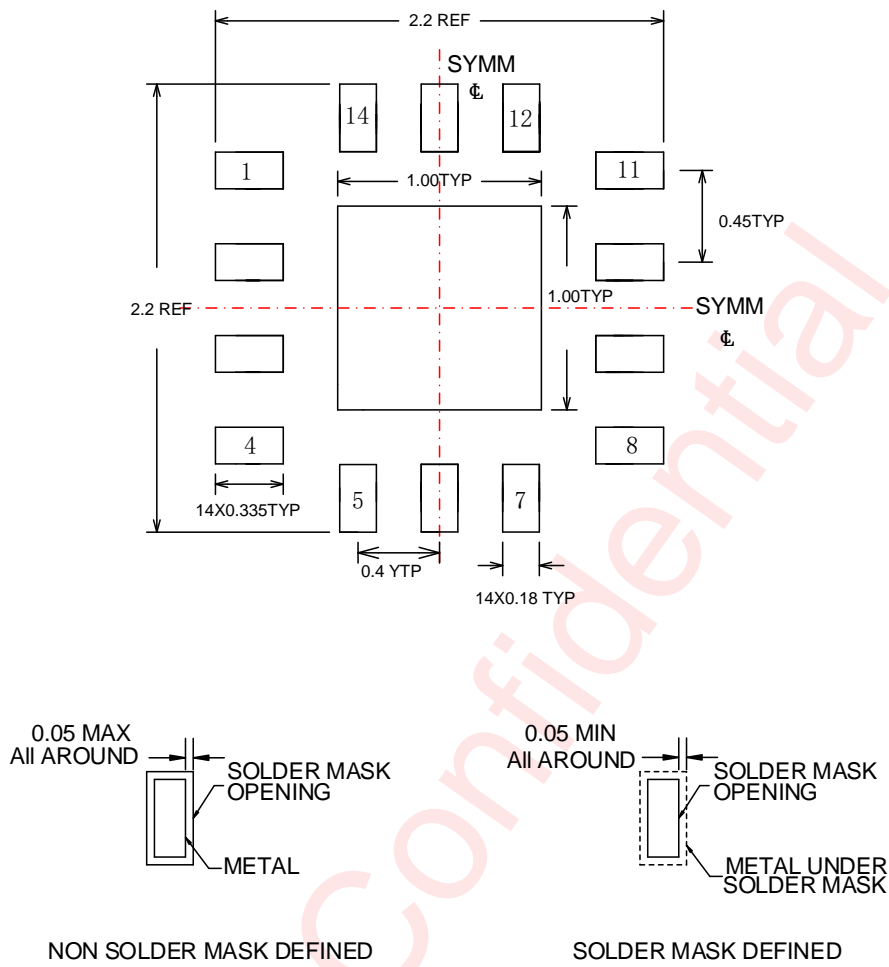
Unit：mm

Figure 7   Land Pattern Data

Revision History

Vision	Date	Change Record
V1.0	Oct. 2021	Officially Released
V1.1	Aug. 2022	Modify Formats
V1.2	Aug. 2022	Update Absolute Maximum Ratings

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