

## 0.1-3.8GHz SP8T Switch for High Power Applications

### Features

- Broadband frequency range: 0.1 to 3.8 GHz
- Low insertion loss: 0.81dB typical @ 3.8 GHz
- High isolation: >20dB @ 3.8 GHz
- Integrated logic
- Small QFN (14-pin, 2.0mm x 2.0mm x 0.55mm) package

### Applications

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

### General Description

The AW13418TQNR is a SP8T 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 AW13418TQNR is provided in a compact 2.0mm x 2.0mm x 0.55mm, 14-pin QFN package.

### Typical Application Circuit

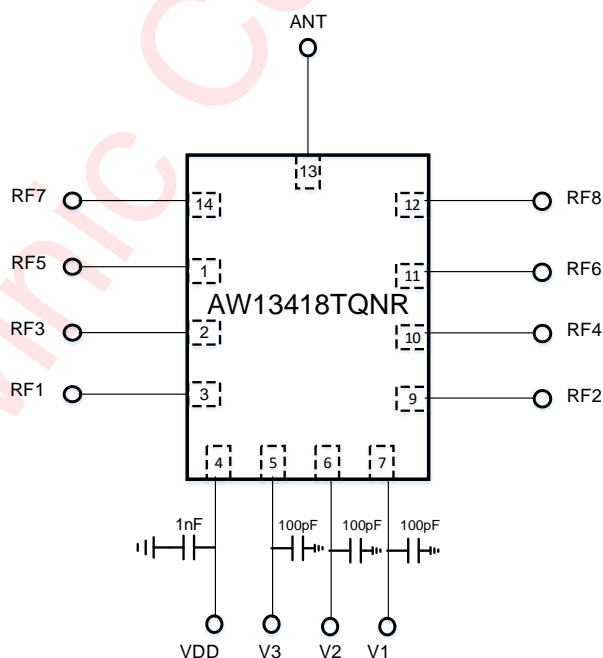


Figure 1 Typical Application Circuit of AW13418TQNR

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## Pin Configuration And Top Mark

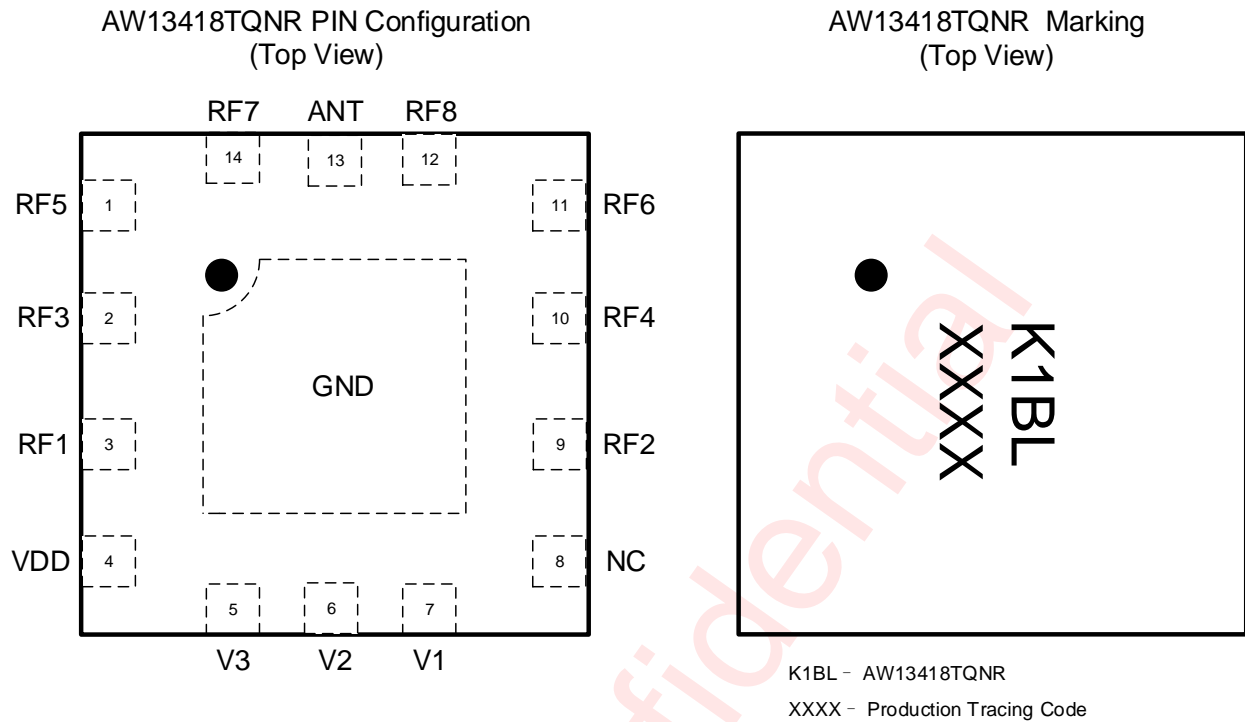


Figure 2 Pin Configuration and Top Mark

## Pin Definition

No.	NAME	DESCRIPTION
1	RF5	RF I/O path 5
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	RF6	RF I/O path 6
12	RF8	RF I/O path 8
13	ANT	Antenna port
14	RF7	RF I/O path 7

**Note: Bottom ground paddles must be connected to ground.**

## Functional Block Diagram

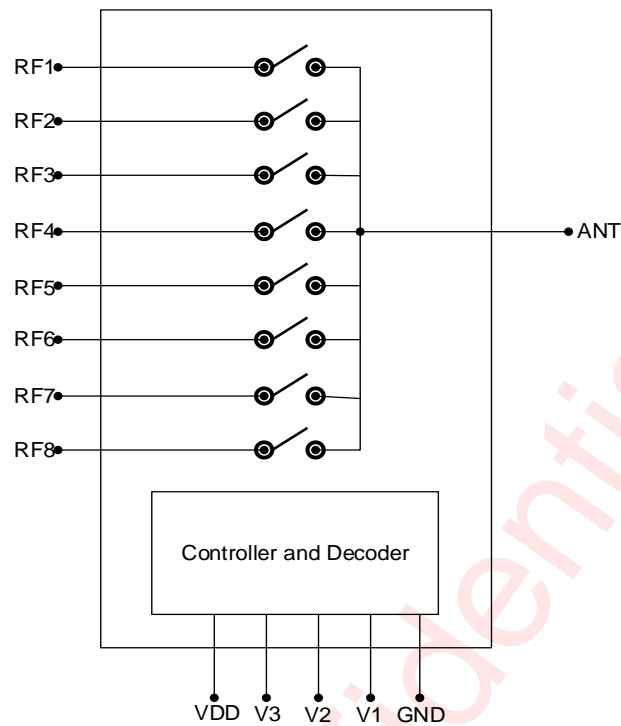
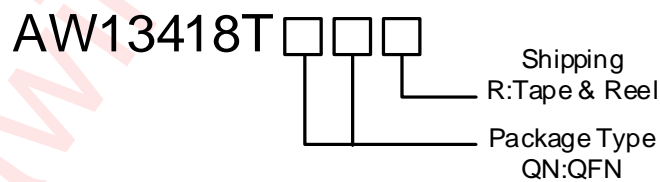


Figure 3 Functional Block Diagram

## Ordering Information

Part Number	Temperature	Package	Marking	Moisture Sensitivity Level	Environmental Information	Delivery Form
AW13418TQNR	-40°C~85°C	QFN 2mmX2mmX 0.55mm-14L	K1BL	MSL1	ROHS+HF	4500 units/ Tape and Reel



**Absolute Maximum Ratings**<sup>(NOTE1)</sup>

PARAMETERS		RANGE
Supply Voltage Range VDD		1.65V to 5V
Control Voltage Range	V1,V2,V3	0V to 3V
RF input power(RF1 to RF8)		37dBm
Operating Free-air Temperature Range		-40°C to 85°C
Storage Temperature T <sub>STG</sub>		-65°C to 150°C
Lead Temperature (Soldering 10 Seconds)		260°C
ESD		
HBM (NOTE 2)		±1kV
CDM (NOTE 3)		±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

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°C, Z<sub>0</sub>=50Ω. (unless otherwise noted)

PARAMETER		TEST CONDITION	MIN	TYP	MAX	UNIT
<b>DC Specifications</b>						
VDD	Supply Voltage		1.65	2.8	5	V
IDD	Supply Current			43	80	μA
VCTL_H VCTL_L	Control Voltage High Low		0.9 0	1.2 0	3 0.3	V
ICTL	Control Current	VCTL = 1.8V		0.5	3	μA
tON	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		0.7	1	μS
<b>RF Specifications</b>						
IL	Insertion loss(ANT pin to RF1-RF8)	0.1-1.0G 1.0-2.0G 2.0-2.7G 2.7-3.8G		0.31 0.42 0.56 0.81	0.46 0.57 0.73 0.9	dB dB dB dB

PARAMETER		TEST CONDITION	MIN	TYP	MAX	UNIT
ISO	Isolation (ANT pin to RF1-RF8)	0.1-1.0G	30	40		dB
		1.0-2.0G	24	33		dB
		2.0-2.7G	20	27		dB
		2.7-3.8G	18	23		dB
RL	Input return loss (ANT pin to RF1-RF8)	0.1-1.0G	23	31		dB
		1.0-2.0G	18	25		dB
		2.0-2.7G	15	21		dB
		2.7-3.8G	10	15		dB
2fo	Second harmonics (ANT pin to RF1-RF8)	PIN=+26dBm, 0.1-3.8GHz		90		dBc
3fo	Third harmonics (ANT pin to RF1-RF8)	PIN=+26dBm, 0.1-3.8GHz		85		dBc
P <sub>0.1dB</sub>	0.1dB Compression Point (ANT pin to RF1-RF8)	0.1GHz-3.8GHz		37		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

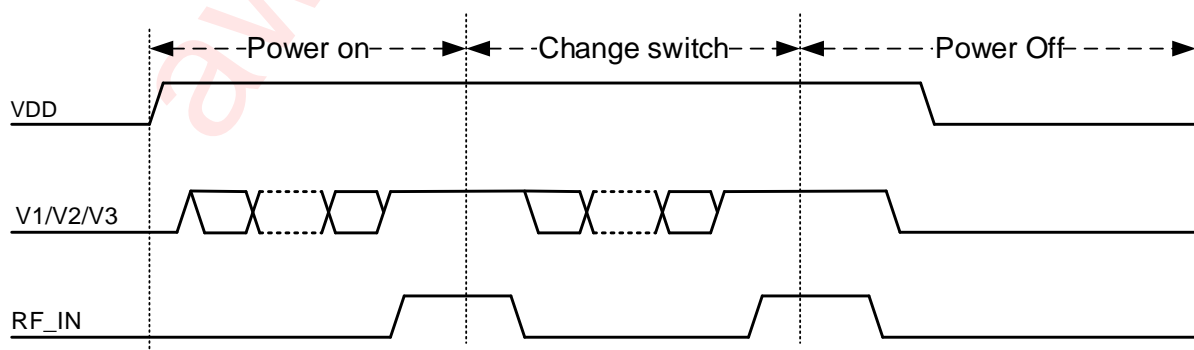
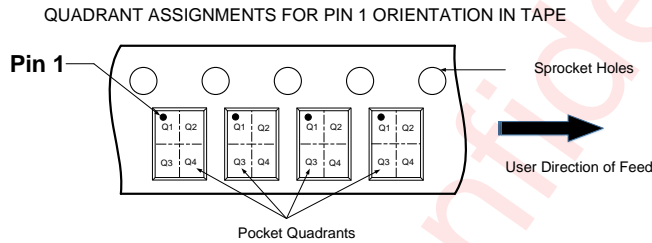
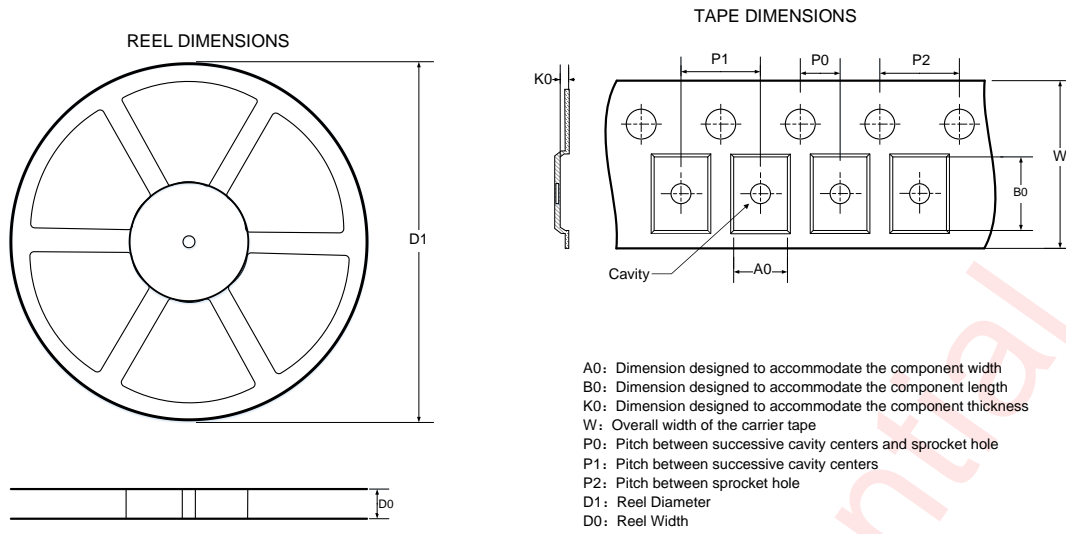


Figure 4 Power on/Change switch/Power off sequence

## AW13418TQNR Control Logic

Control Pins			Switch RF I/O							
V1	V2	V3	RF1	RF2	RF3	RF4	RF5	RF6	RF7	RF8
0	0	0	<b>ON</b>	Isolation	Isolation	Isolation	Isolation	Isolation	Isolation	Isolation
0	0	1	Isolation	<b>ON</b>	Isolation	Isolation	Isolation	Isolation	Isolation	Isolation
0	1	0	Isolation	Isolation	<b>ON</b>	Isolation	Isolation	Isolation	Isolation	Isolation
0	1	1	Isolation	Isolation	Isolation	<b>ON</b>	Isolation	Isolation	Isolation	Isolation
1	0	0	Isolation	Isolation	Isolation	Isolation	<b>ON</b>	Isolation	Isolation	Isolation
1	0	1	Isolation	Isolation	Isolation	Isolation	Isolation	<b>ON</b>	Isolation	Isolation
1	1	0	Isolation	Isolation	Isolation	Isolation	Isolation	Isolation	<b>ON</b>	Isolation
1	1	1	Isolation	Isolation	Isolation	Isolation	Isolation	Isolation	Isolation	<b>ON</b>

### Tape and Reel Information



Note: The above picture is for reference only. Please refer to the value in the table below for the actual size

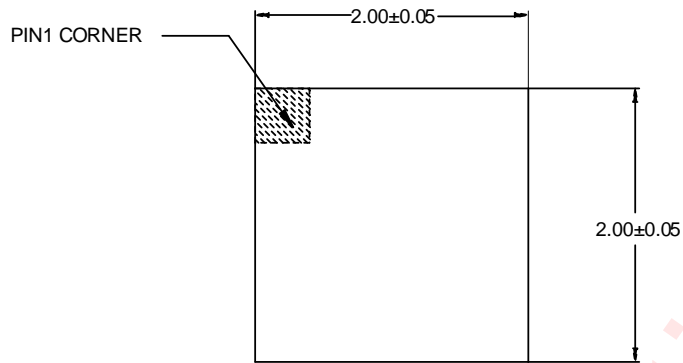
DIMENSIONS AND PIN1 ORIENTATION

D1 (mm)	D0 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
180	8.4	2.25	2.25	0.75	2	4	4	8	Q1

All dimensions are nominal

Figure 5 Tape and Reel

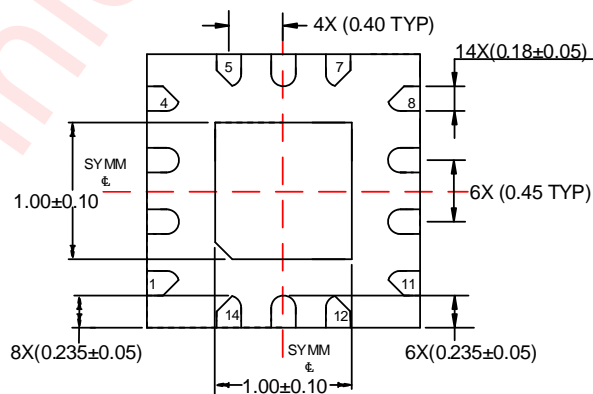
## Package Description



Top View



Side View



Bottom View

Unit: mm

Figure 6 Package Description



## Revision History

Vision	Date	Change Record
V1.0	Aug. 2021	Officially Released
V1.1	Aug. 2022	Update Ordering Information

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