

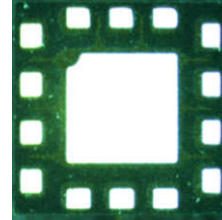
WS7804Q

0.1GHz – 3GHz SP4T Antenna Switch

<http://www.sh-willsemi.com>

Descriptions

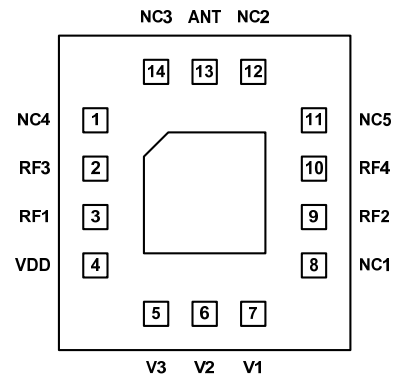
The WS7804Q is a Single Pole, Four-Throw (SP4T) switch, consisting of an SP4T switch that has 4 identical paths, and a GPIO controller. The device is optimized for GSM/EDGE, WCDMA, TD-SCDMA and LTE systems and can be used up to 3GHz applications. The low current consumption makes this device very suitable for battery operated applications. The WS7804Q is manufactured in a compact 2.0mm x 2.0 mm, 14-pin QFN package.



QFN 2X2-14L (Bottom view)

Features

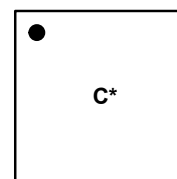
- Small, low profile package 2.0mm x 2.0mm x 0.55mm
- Working frequency up to 3GHz
- Very low insertion loss
- Excellent isolation performance
- Low power consumption
- Exceptional linearity performance for 3G/4G application
- Low harmonic generation
- Very good ESD performance



Pin configuration (Top view)

Applications

- Cell phones
- Tablets
- Other RF front-end modules



C = Device code

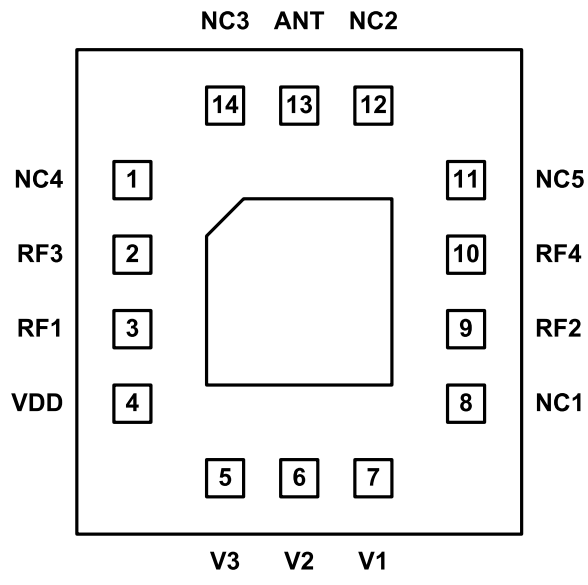
* = Month code (A~Z)

Marking(Top view)

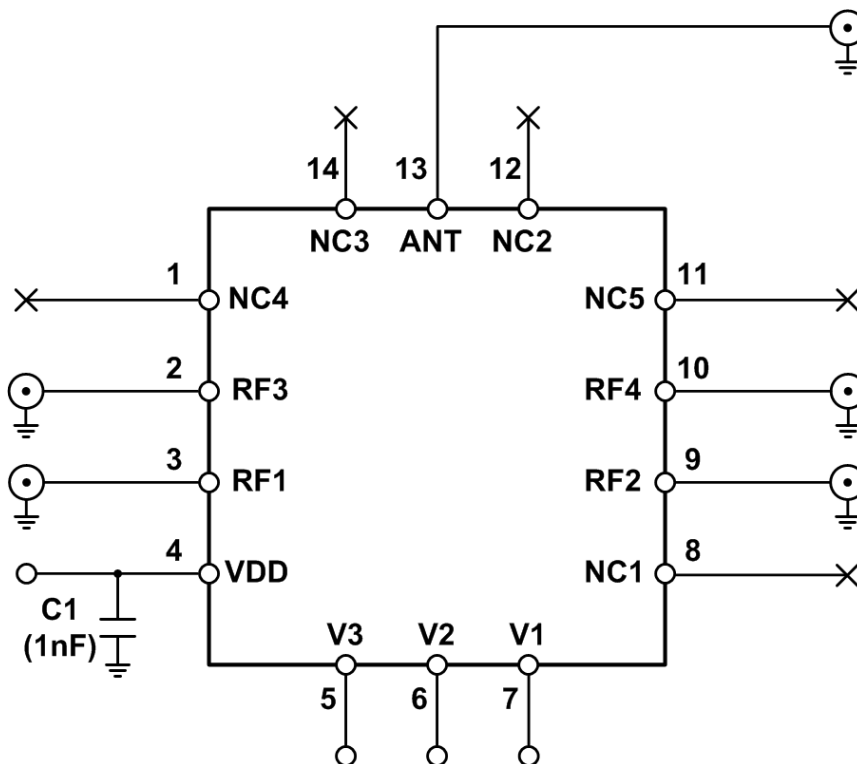
Order information

Device	Package	Shipping
WS7804Q-14/TR	QFN2X2-14L	3000/Reel&Tape

Pinning information

Pin	Function	Description	Transparent top view
1	N/C	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 voltage3	
6	V2	DC control voltage2	
7	V1	DC control voltage1	
8	N/C	Not connected	
9	RF2	RF I/O path 2	
10	RF4	RF I/O path 4	
11	N/C	Not connected	
12	N/C	Not connected	
13	ANT	Antenna port	
14	N/C	Not connected	

Note: Bottom ground paddles must be connected to ground.

Application information


Recommended operating conditions

Parameters	Conditions	Specifications			Unit
		Min.	Typ.	Max.	
ESD Rating					
ESD All Pins	HBM, JESD22-A114			1000	V
Power Supply					
Power Supply Voltage	Operating Voltage	2.4	2.8	3.0	V
Power Supply Current	$V_{DD} \leq 3.0V$	20	28	70	μA
Shutdown Mode Supply Current	$V1/2/3=1.8V, VDD=3V$		7		μA
Control Voltage					
Logic Control "Low"		0	0	0.3	V
Logic Control "High"		1.2	1.8	2.7	V
RF Impedance					
RF Port Input and Output Impedance			50		Ω

Absolute maximum ratings

Maximum ratings are absolute ratings, exceeding only one of these values may cause irreversible damage to the integrated circuit.

Items	Value	Unit
VDD Voltage	-0.3 to +3.0	V
Control Voltage	-0.3 to +2.7	V
Maximum Input Power @ RF ports	31@0.7GHz, 33@2.7GHz	dBm
Operation Temperature	-40 to +85	$^{\circ}C$
Storage Temperature	-65 to +150	$^{\circ}C$

Characteristics (RF spec)

Nominal test condition unless otherwise stated. All unused ports are 50Ω terminated. VDD = 2.8V, Temp = +25°C. P_{IN}=0dBm.

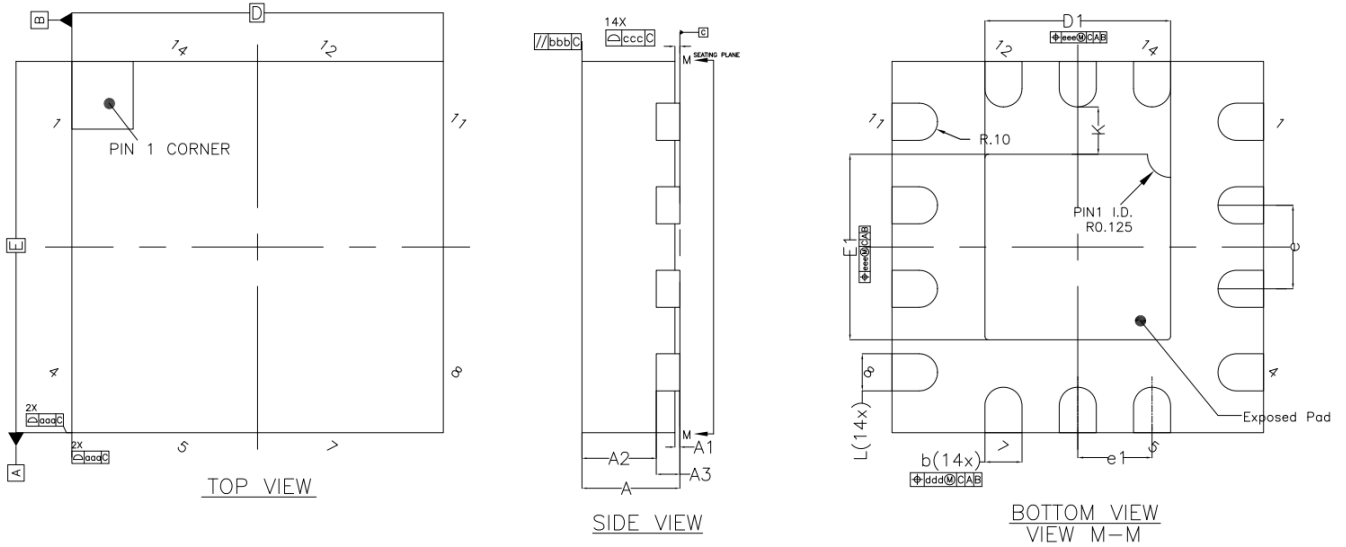
Parameters	Conditions	Specifications			Unit
		Min.	Typ.	Max.	
Insertion Loss (RF1/RF2/RF3/RF4)	0.1GHz to 1.0GHz		0.45	0.60	dB
	1.0GHz to 2.0GHz		0.55	0.70	
	2.0GHz to 2.7GHz		0.75	0.90	
Isolation (ANT to RF1/RF2/RF3/RF4)	0.1GHz to 1.0GHz	30			dB
	1.0GHz to 2.0GHz	25			
	2.0GHz to 2.7GHz	18			
Return Loss (ANT/RF1/RF2/RF3/RF4)	0.1GHz to 1.0GHz	20			dB
	1.0GHz to 2.0GHz	15			
	2.0GHz to 2.7GHz	15			
Second Harmonics (RF1/RF2/RF3/RF4)	P _{IN} =+26dBm@0.88G		84		dBc
Third Harmonics (RF1/RF2/RF3/RF4)	P _{IN} =+26dBm@0.88G		87		dBc
0.1dB Compression Point (RF1/RF2/RF3/RF4)	@0.7GHz		30		dBm
	@2.7GHz		32		
3 rd Order Input Intercept Point (RF1/RF2/RF3/RF4)	P ₂ = +20dBm, P ₁ = -15dBm, Note 1		63		dBm

Note 1: $f_2=836.5\text{MHz}$, $f_1=791.5\text{MHz}$, $f_{\text{IMD3}}=881.5\text{MHz}$

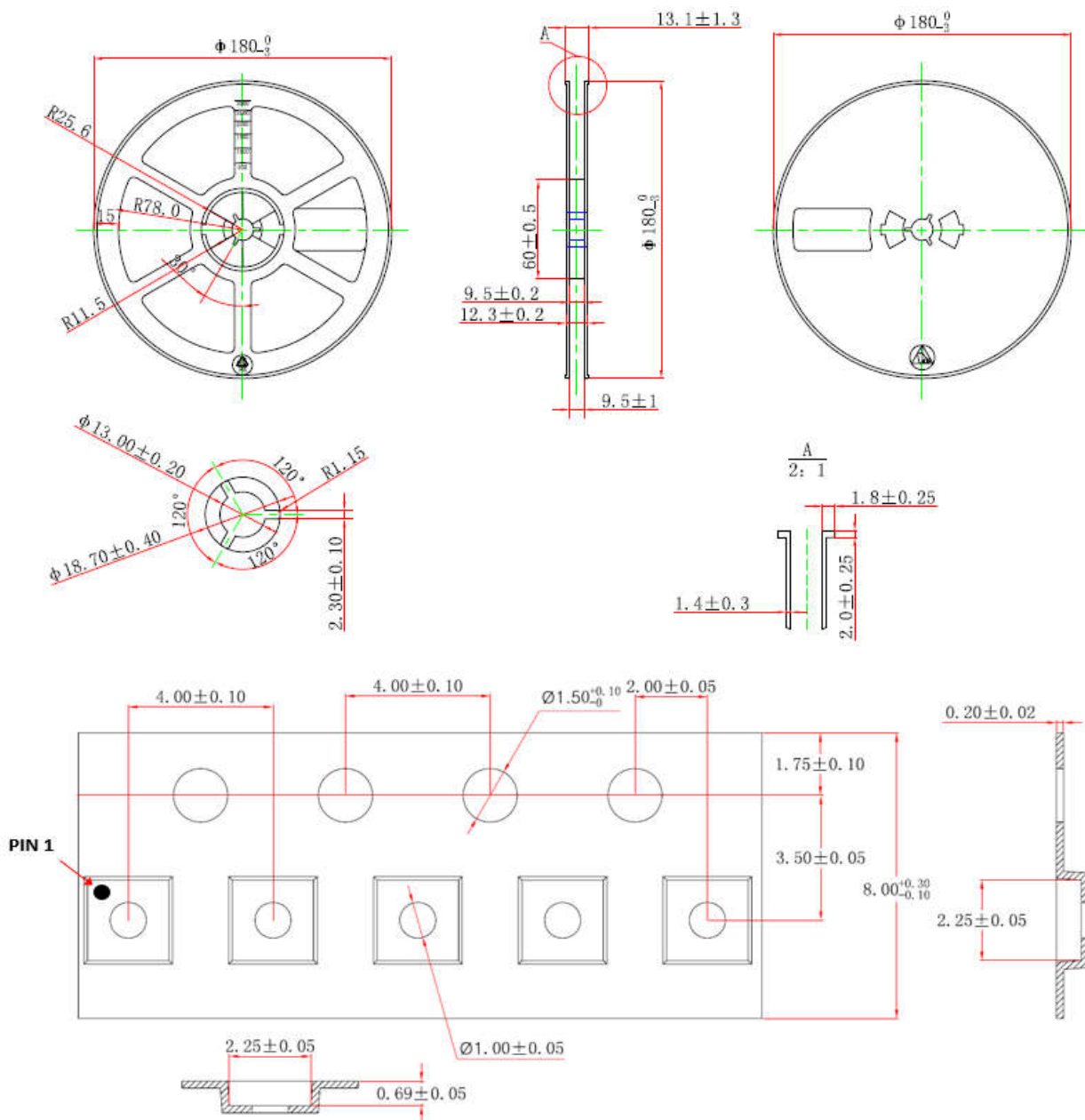
Truth Table for Operation

SP4T Mode	V1	V2	V3
RF1	0	0	0
RF2	0	0	1
RF3	0	1	0
RF4	0	1	1
Shutdown	1	1	1

Note: Any state other than that described in this Table places the switch into an undefined state. An undefined state will not damage the device.

Package outline dimensions
QFN 2X2-14L


DESCRIPTION	SYMBOL	MILLIMETER			
		MIN	NOM	MAX	
TOTAL THICKNESS	A	0.477	0.527	0.577	
STAND OFF	A1	0.00	0.02	0.05	
MOLD THICKNESS	A2	0.35	0.40	0.45	
L/F THICKNESS	A3	0.127 REF			
LEAD WIDTH	b	0.15	0.20	0.25	
BODY SIZE	X	D	1.95	2.00	2.05
	Y	E	1.95	2.00	2.05
LEAD PITCH	e	0.45 BSC			
LEAD PITCH	e1	0.40 BSC			
LEAD LENGTH	L	0.195	0.245	0.295	
EP SIZE	X	D1	0.95	1.00	1.05
	Y	E1	0.95	1.00	1.05
LEAD TO PAD SPACE	K	0.205	0.255	0.305	
Tolerance of form and position					
PACKAGE EDGE TOLERANCE	aaa	0.1			
MOLD FLATNESS	bbb	0.1			
LEAD COPLANARITY	ccc	0.08			
LEAD POSITION OFFSET	ddd	0.1			
EXPOSED PAD OFFSET	eee	0.1			

Tape and Reel Information

Note:

1. CARRIER TAPE COLOR IS BLACK.
2. COVER TAPE WIDTH: 9.50 ± 0.1 .
3. COVER TAPE COLOR IS WHITE.
4. ESD-SURFACE RESISTIVITY MEET EIA/JEDEC TNR SPECIFICATION.
5. ALL DIMENSIONS ARE IN MILLIMETER.