

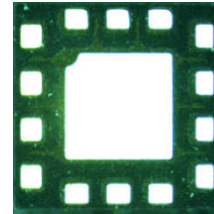
## WS7806Q

### 0.1GHz – 3GHz SP6T Antenna Switch

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

#### Descriptions

The WS7806Q is a Single Pole, Six-Throw (SP6T) switch, consisting of an SP6T switch that has 6 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 WS7806Q is manufactured in a compact 2.0mm x 2.0 mm, 14-pin QFN package.



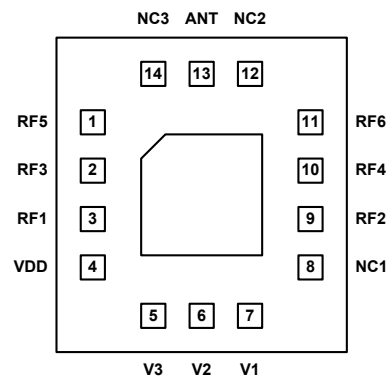
**QFN2X2-14L (Bottom view)**

#### Features

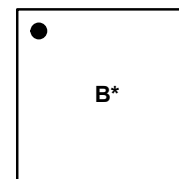
- Small, low profile package 2.0mm x 2.0mm x 0.55mm
- Working frequency up to 3GHz
- Very low insertion loss
- Excellent isolation performance
- Low power consumption
- Exceptional linearity performance for 3G/4G application
- Low harmonic generation
- Very good ESD performance

#### Applications

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



**Pin configuration (Top view)**



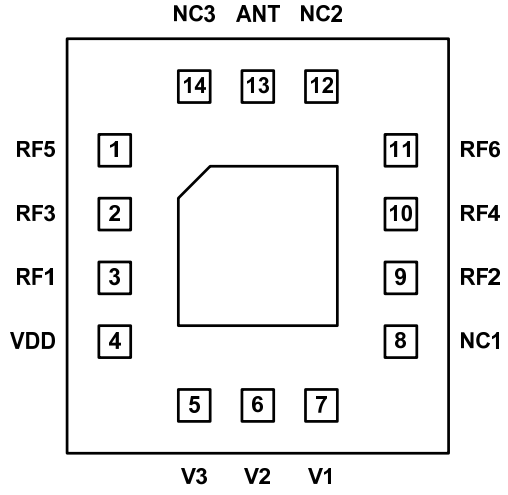
B = Device code  
\* = Month code (A~Z)

**Marking(Top view)**

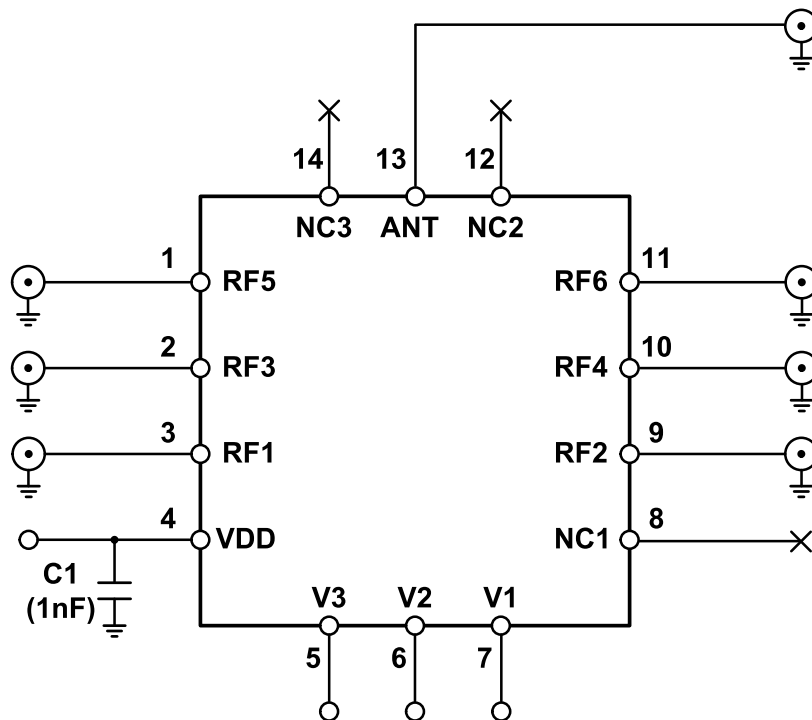
#### Order information

Device	Package	Shipping
WS7806Q-14/TR	QFN2X2-14L	3000/Reel&Tape

**Pinning information**

Pin	Function	Description	Transparent top view
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 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	RF6	RF I/O path 6	
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.	
<b>ESD Rating</b>					
ESD All Pins	HBM, JESD22-A114			1000	V
<b>Power Supply</b>					
Power Supply Voltage	Operating Voltage	2.4	2.8	3.0	V
Power Supply Current (Standby)	VDD≤3.0V	20	28	70	μA
Shutdown Mode Supply Current	V1/2/3=1.8V, VDD=3V		7		μA
<b>Control Voltage</b>					
Logic Control "Low"		0	0	0.3	V
Logic Control "High"		1.2	1.8	2.7	V
<b>RF Impedance</b>					
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	°C
Storage Temperature	-65 to +150	°C

**Characteristics (RF spec)**

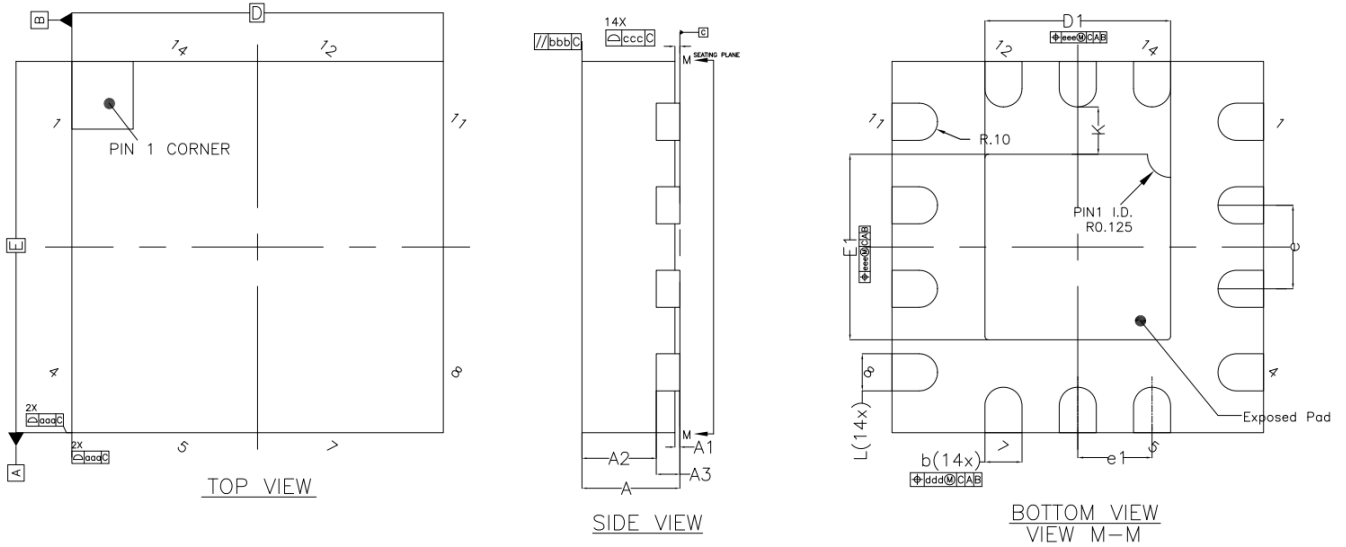
Nominal test condition unless otherwise stated. All unused ports are 50Ω terminated. VDD = 2.8V, Temp = +25°C, P<sub>IN</sub>=0dBm. Insertion loss in V1/V2/V3 = 110 state is 3 dB lower than typical insertion loss.

Parameters	Conditions	Specifications			Unit
		Min.	Typ.	Max.	
Insertion Loss (RF1/RF2/RF3/RF4/RF5/RF6)	0.1GHz to 1.0GHz 1.0GHz to 2.0GHz 2.0GHz to 2.7GHz		0.40 0.50 0.70	0.55 0.65 0.85	dB
Isolation (ANT to RF1/RF2/RF3/RF4/RF5/RF6)	0.1GHz to 1.0GHz 1.0GHz to 2.0GHz 2.0GHz to 2.7GHz	30 25 18			dB
Return Loss (ANT/RF1/RF2/RF3/RF4/RF5/RF6)	0.1GHz to 1.0GHz 1.0GHz to 2.0GHz 2.0GHz to 2.7GHz	20 15 15			dB
Second Harmonics (RF1/RF2/RF3/RF4/RF5/RF6)	P <sub>IN</sub> =+26dBm@0.88G		84		dBc
Third Harmonics (RF1/RF2/RF3/RF4/RF5/RF6)	P <sub>IN</sub> =+26dBm@0.88G		87		dBc
0.1dB Compression Point (RF1/RF2/RF3/RF4/RF5/RF6)	@0.7GHz @2.7GHz		30 32		dBm
3 <sup>rd</sup> Order Input Intercept Point (RF1/RF2/RF3/RF4/RF5/RF6)	P <sub>2</sub> = +20dBm, P <sub>1</sub> = -15dBm, Note 1		63		dBm

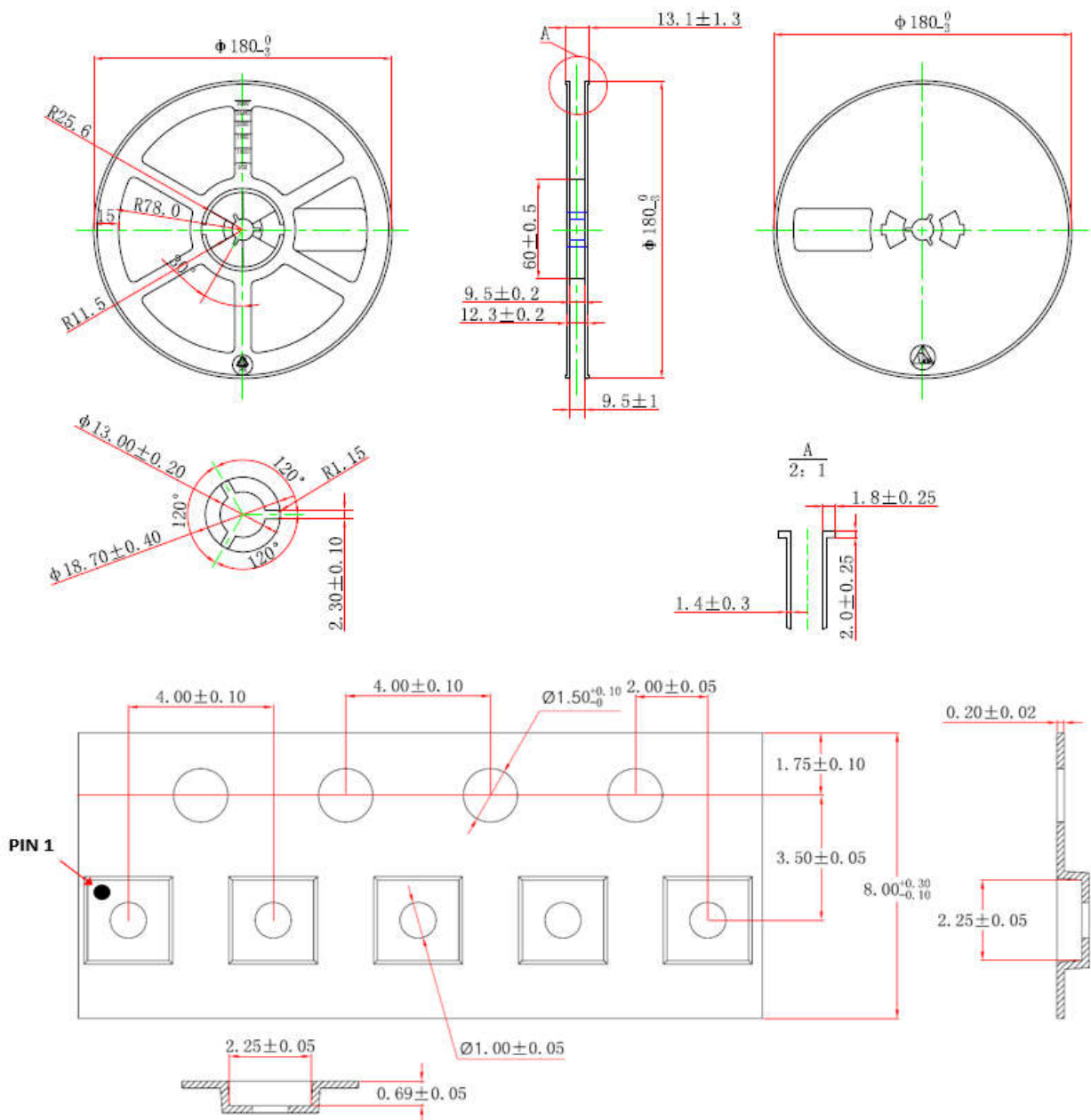
Note 1:  $f_2=836.5\text{MHz}$ ,  $f_1=791.5\text{MHz}$ ,  $f_{\text{IMD3}}=881.5\text{MHz}$

**Truth Table for Operation**

SP6T Mode	V1	V2	V3
RF1	0	0	0
RF2	0	0	1
RF3	0	1	0
RF4	0	1	1
RF5	1	0	0
RF6	1	0	1
RF3/RF5	1	1	0
Shutdown	1	1	1

**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:  $9.50 \pm 0.1$ .
3. COVER TAPE COLOR IS WHITE.
4. ESD-SURFACE RESISTIVITY MEET EIA/JEDEC TNR SPECIFICATION.
5. ALL DEMENSIONS ARE IN MILLIMETER.