APPROVAL SHEET

RF Switch Series – RoHS Compliance

SP6T GPIO Switch

Halogens Free Product

Any 2G/3G/4G Antenna Diversity For Receive System

P/N: RFASWHH1416BTF09

*Contents in this sheet are subject to change without prior notice.

FEATURES

- Low Insertion Loss：0.50dB typ. @ 2.7GHz
- High Isolation：27dB typ. @ 2.7GHz
- Low control voltage：1.35 to 3.0 V
- Miniature footprint：2.0 x 2.0 x 0.55 mm^3
- **M**oisture **S**ensitive **L**evel 3 (MSL3)
- High ESD tolerance of 1kV HBM at all pins

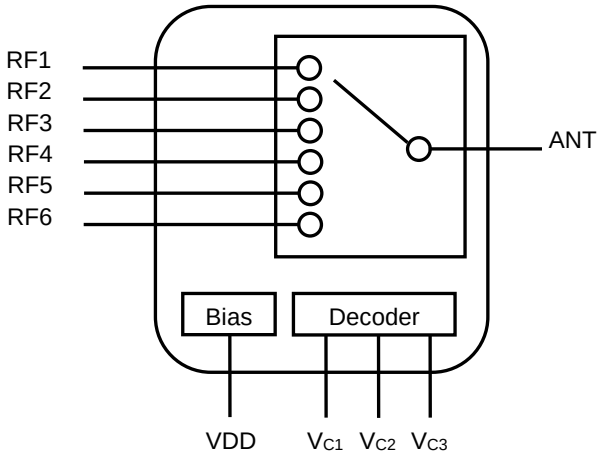
Description

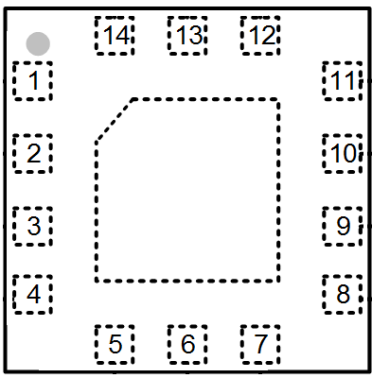
- The RFASWHH1416BTF09 is a SOI (Silicon On Insulator) Single Pole, Six Throw (SP6T) switch that operating at 0.1-2.7 GHz. The RFASWHH1416BTF09 is manufactured in a QFN-14 (2.0 x 2.0 x 0.55mm^3) package.
- The RFASWHH1416BTF09 features very high isolation with very low DC power consumption.

Application

- Multi-mode 2G/3G, LTE application receive system.

Block Diagram and Pin Out (Top View)

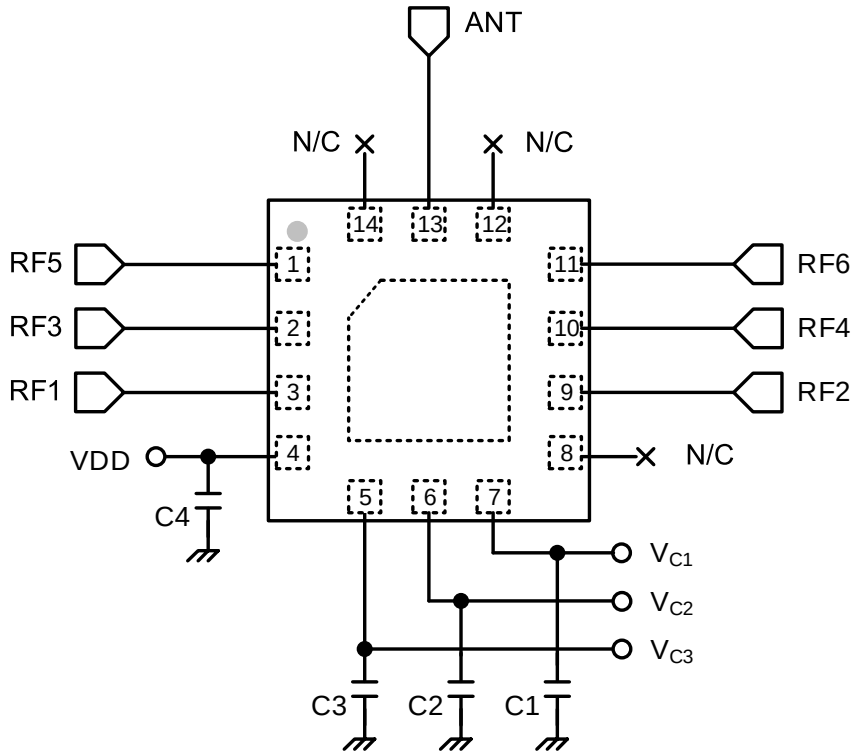




Pin Names and Descriptions

Pin	Name	Description	Pin	Name	Description
1	RF5	RF path 5	8	NC	Not connected
2	RF3	RF path 3	9	RF2	RF path 2
3	RF1	RF path 1	10	RF4	RF path 4
4	VDD	DC power supply	11	RF6	RF path 6
5	V_{C3}	DC control voltage 3	12	NC	Not connected
6	V_{C2}	DC control voltage 2	13	ANT	Antenna port
7	V_{C1}	DC control voltage 1	14	NC	Not connected

Application Circuit



Parts List

Parts No.	Value
C1-C4	1000 pF

Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
RFx Input Power (f = 824 ~ 915 MHz, 50Ω, CW)	PIN		+25	dBm
RFx Input Power (f = 1710 ~ 1910 MHz, 50Ω, CW)			+24	dBm
RFx Input Power (f = 1910 ~ 2690 MHz, 50Ω, CW)			+23	dBm
DC Supply Voltage	VDD	+2.5	+3.0	V
DC Control Voltage	V_{CTL}	0	+3.0	V
Storage temperature	T_{STG}	-40	+125	°C
HBM ESD Voltage, All Pins	V_{ESD}[1]	-	+1000	V

Note 1：Human Body Model ESD Voltage, Class 1C

Exceeding absolute maximum ratings may cause permanent damage. Operation between operating range maximum and absolute maximum for extended periods may reduce reliability.

Electrical Specifications

(Top= 25°C, VDD=2.8V, V_{CTL}=0/1.8V, Characteristic Impedance ZO= 50 Ω, Unless Otherwise Noted)

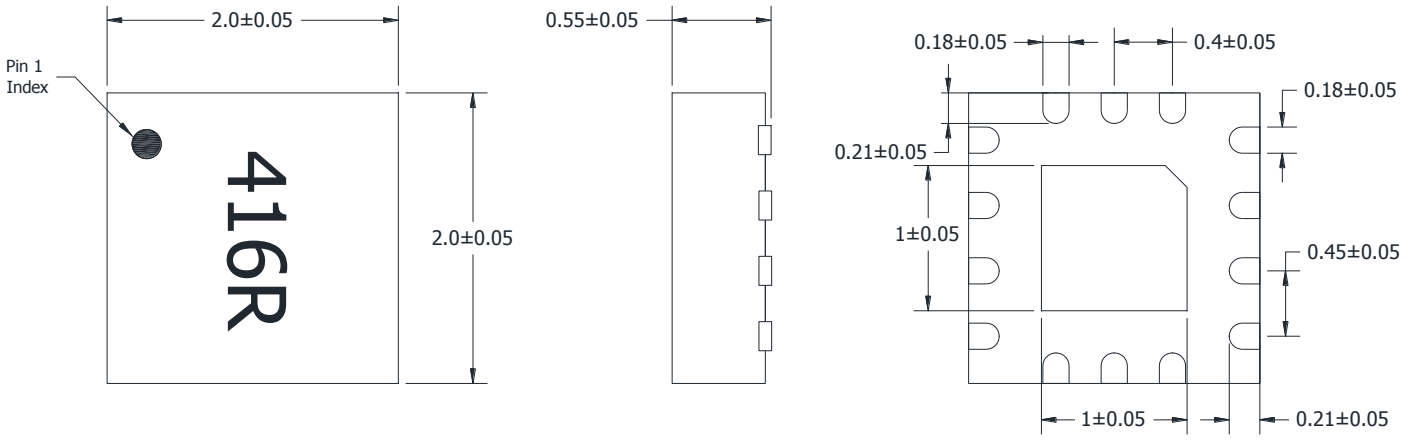
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Units
RF Specifications						
Operating frequency	f		0.1		2.7	GHz
Insertion Loss (ANT port to RFx port)	IL	0.1 ~ 1.0GHz 1.0 ~ 2.0GHz 2.0 ~ 2.7GHz		0.40 0.45 0.50	0.50 0.55 0.60	dB dB dB
Isolation (ANT port to RFx port)	Iso	0.1 ~ 1.0GHz 1.0 ~ 2.0GHz 2.0 ~ 2.7GHz	30 23 21	37 29 27		dB dB
On state match	VSWR	0.1 ~ 2.7GHz		1.22	1.67	-
RFx Harmonics	$2f_0$	PIN = +25dBm, f = 0.1 to 2.7GHz		-85		dBc
	$3f_0$	PIN = +25dBm, f = 0.1 to 2.7GHz		-90		dBc
3rd Order Input Intercept Point	IIP3	PIN = +25dBm, f = 2.0GHz, Δf = 1MHz		-60		dBm
DC Specification (Decoder)						
Supply Voltage	VDD		2.5	2.8	3.0	V
Supply Current	I_{DD}	VDD=2.8V		70	90	μA
Control Voltage(High)	V_{CTL}		1.35	1.8	3.0	V
Control Voltage(Low)	V_{CTL}		0		0.3	V
Control Current	I_{CTL}	V_{CTL}=1.8V		0.5	1.0	μA
Switching Specification						
Switching speed	T_{SW}	50% V_{CTL} to 90/10% RF		0.5	1	μs

Note：All measurements made in a 50Ω system with 0/+1.8V control voltages, unless otherwise specified.

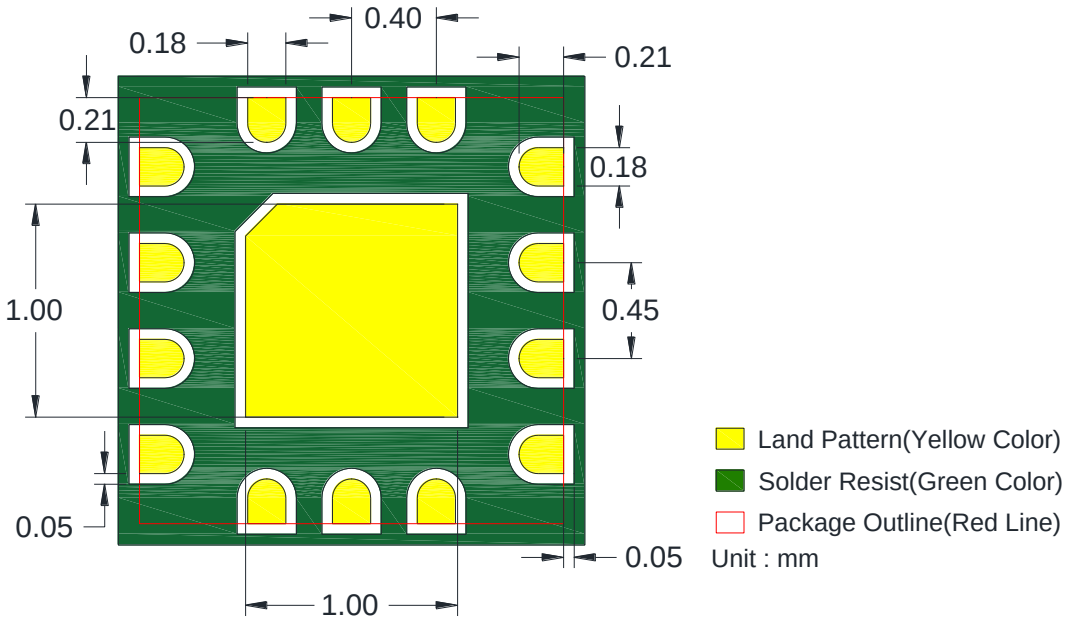
Logic Table for Switch On-Path (High=1.8V ,Low= 0V)

V_{C1}	V_{C2}	V_{C3}	RF1	RF2	RF3	RF4	RF5	RF6
0	0	0	On	Off	Off	Off	Off	Off
0	0	1	Off	On	Off	Off	Off	Off
0	1	0	Off	Off	On	Off	Off	Off
0	1	1	Off	Off	Off	On	Off	Off
1	0	0	Off	Off	Off	Off	On	Off
1	0	1	Off	Off	Off	Off	Off	On

Package Dimensions



Solder Land Pattern



Reliability test

TEST	PROCEDURE / TEST METHOD	REQUIREMENT
Solderability JIS C 0050-4.6 JESD22-B102D	*Solder bath temperature：255 ± 5°C *Immersion time：5 ± 0.5 sec Solder：Sn3Ag0.5Cu for lead-free	At least 95% of a surface of each terminal electrode must be covered by fresh solder.
High temperature JIS C 0021	*Temperature：90°C±2°C *Test duration：1000+24/-0 hours Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -30 ~ 90°C.
Low temperature JIS C 0020	*Temperature：-30°C±2°C *Test duration：1000+24/-0 hours Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -30 ~ 90°C.
Temperature cycle JIS C 0025	1. 30±3 minutes at -30±3°C, 2. 10~15 minutes at room temperature, 3. 30±3 minutes at +90±3°C, 4. 10~15 minutes at room temperature, Total 100 continuous cycles Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -30 ~ 90°C.
High temperature operation life (HTOL)	*Temperature：90°C *VDD = 4.8V *Time：1000+24/-0 hrs. Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -30 ~ 90°C.

Soldering condition

Typical examples of soldering processes that provide reliable joints without any damage are given in Figure 11.

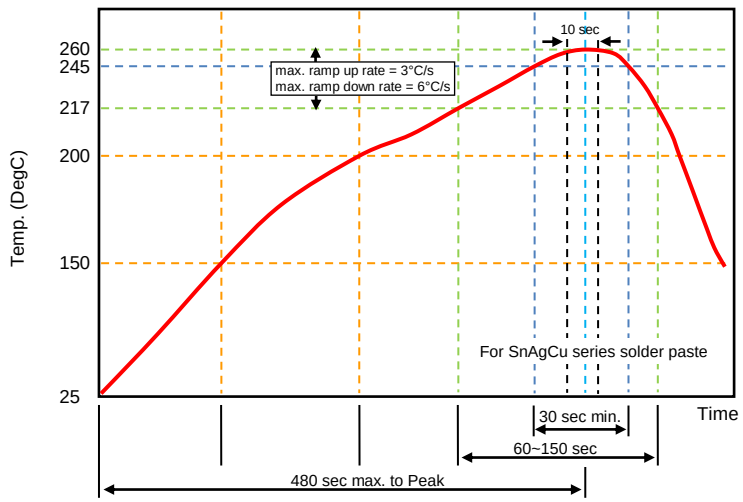


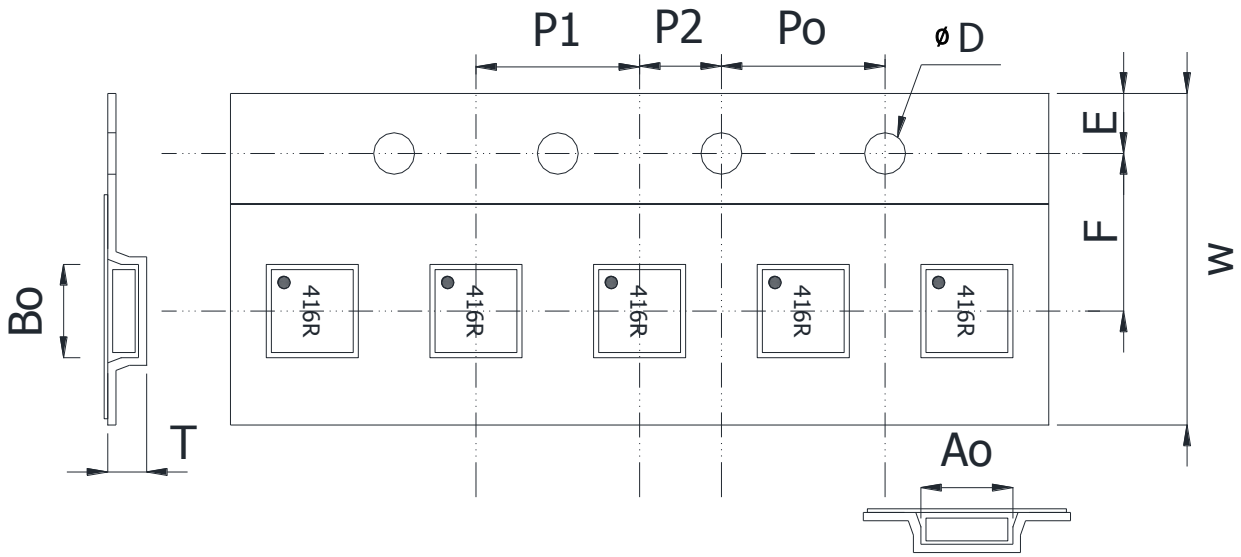
Figure 11. Infrared soldering profile

Ordering code

RF	ASW	H	H1416B	T
RF module RF: Walsin RF Switch Device	**Module type** ASW: Antenna Switch	**Application** H: SP6T	**Design Code**	**Packing** T: Taping

Minimum Ordering Quantity: 3000 pcs per reel.

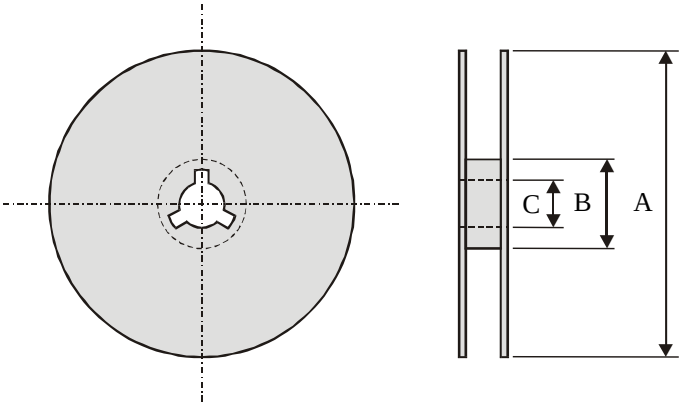
Packaging



Plastic Tape specifications (unit :mm)

Index	Ao	Bo	ΦD	T	W
Dimension (mm)	2.30 ± 0.10	2.30 ± 0.10	1.50 ± 0.05	0.70 ± 0.10	8.0 ± 0.30
Index	E	F	Po	P1	P2
Dimension (mm)	1.75 ± 0.10	3.50 ± 0.05	4.00 ± 0.20	4.00 ± 0.10	2.00 ± 0.05

Reel dimensions



Index	A	B	C
Dimension (mm)	Φ178.0	Φ54.0	Φ13.2

Taping Quantity : 3000 pieces per 7” reel

Caution of handling

Limitation of Applications

Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects, which might directly cause damage to the third party's life, body or property.

(1) Aircraft equipment
(2) Aerospace equipment
(3) Undersea equipment
(4) Medical equipment
(5) Disaster prevention / crime prevention equipment
(6) Traffic signal equipment
(7) Transportation equipment (vehicles, trains, ships, etc.)
(8) Applications of similar complexity and /or reliability requirements to the applications listed in the above.

Storage condition

(1) Products should be used in 6 months from the day of WALSIN outgoing inspection, which can be confirmed.

(2) Storage environment condition.

- Products should be storage in the warehouse on the following conditions.
- Temperature : -10 to +40°C
- Humidity : 30 to 70% relative humidity
- Don't keep products in corrosive gases such as sulfur. Chlorine gas or acid or it may cause oxidization of electrode, resulting in poor solderability.
- Products should be storage on the palette for the prevention of the influence from humidity, dust and son on.
- Products should be storage in the warehouse without heat shock, vibration, direct sunlight and so on.
- Products should be storage under the airtight packaged condition.