

APPROVAL SHEET

RF Switch Series – RoHS Compliance

SP6T GPIO Switch

Halogens Free Product

Any 3G/4G Band for TRx System

P/N: RFASWH416PTF0G

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

Approval Sheet

FEATURES

- Low Insertion Loss : 0.70 dB typ. @ 2.7GHz
- Low control voltage : 0 to 3.0 V
- Miniature footprint : 2.0 x 2.0 x 0.50 mm³

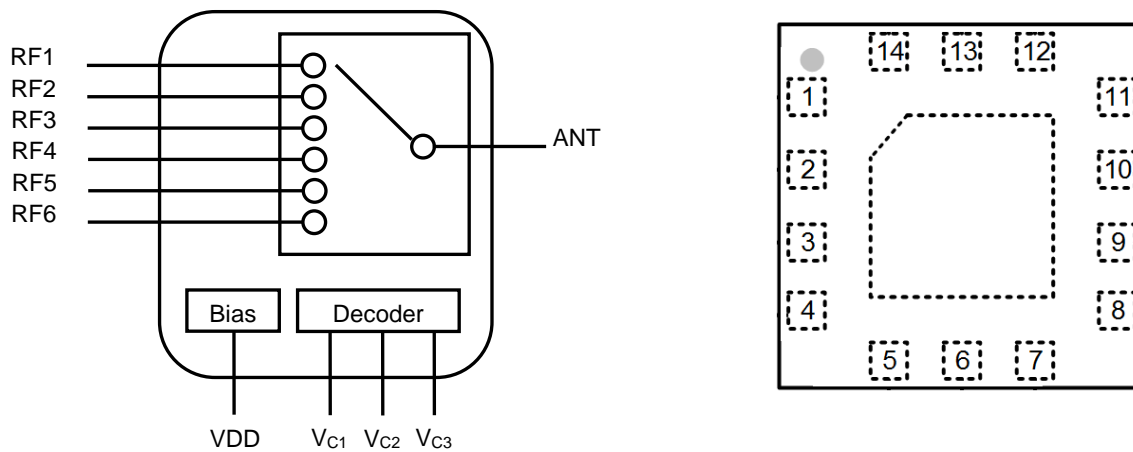
Description

- The RFASWH416PTF0G is a SOI (Silicon On Insulator) Single-Pole, Six-Throw (SP6T) switch that operating at 0.1-2.7 GHz. The RFASWH416PTF0G is manufactured in a QFN-14 (2.0 x 2.0 x 0.50mm³) package.
- The RFASWH416PTF0G features very high isolation with very low DC power consumption.

Application

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

Block Diagram and Pin Out (Top View)

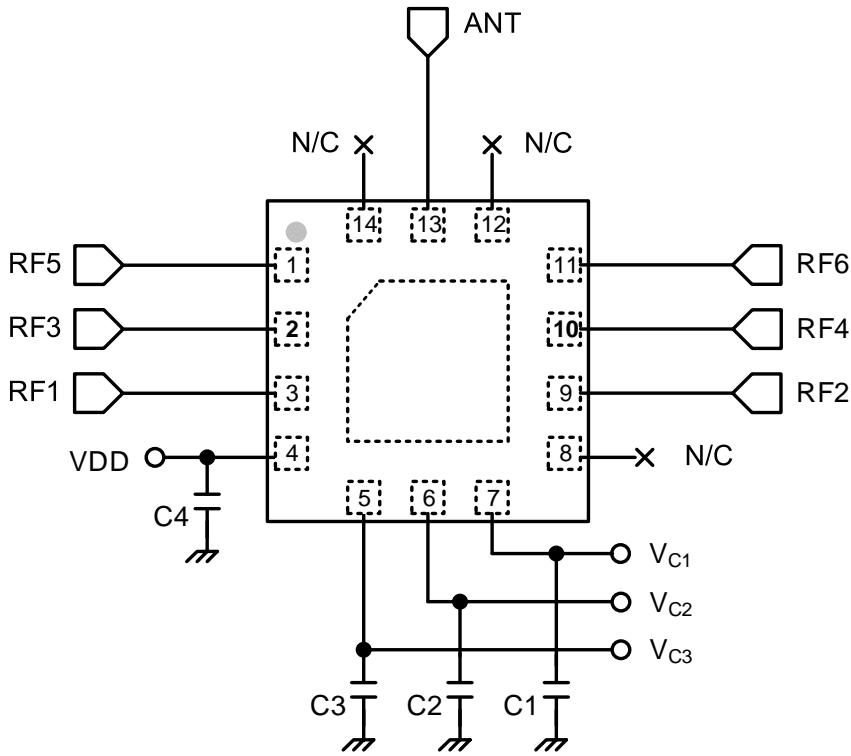


Pin Names and Descriptions

| 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 |

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Application Circuit



Parts List

| Parts No. | Value |
|-----------|--------|
| C1-C4 | 100 pF |

Absolute Maximum Ratings

| Parameter | Symbol | Minimum | Maximum | Units |
|-----------------------|------------------|---------|---------|-------|
| RFx Input Power | PIN | | +33 | dBm |
| Storage temperature | T _{STG} | -55 | +150 | °C |
| Operating temperature | T _{OP} | -40 | +90 | °C |

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Electrical Specifications

(Top= 25°C, VDD=2.8V, VCTL=0/1.8V, Characteristic Impedance Z₀= 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 RF1/2/3/4/5/6 port) | IL | 0.1 ~ 1.0GHz 1.0 ~ 2.0GHz 2.0 ~ 2.7GHz | | 0.45 0.60 0.70 | 0.60 0.75 0.85 | dB dB dB |
| Isolation (ANT port to RF1/2/3/4/5/6 port) | Iso | 0.1 ~ 1.0GHz 1.0 ~ 2.0GHz 2.0 ~ 2.7GHz | 30 24 21 | 34 28 25 | | dB 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 RF1 port | | -38 | | dBm |
| | 2f ₀ | PIN = +25dBm, f = 0.1 to 2.7GHz RF2 to RF6 port | | -55 | | dBm |
| | 3f ₀ | PIN = +25dBm, f = 0.1 to 2.7GHz | | -60 | | dBm |
| DC Specification (Decoder) | | | | | | |
| Supply Voltage | VDD | | 1.6 | 2.8 | 3.3 | V |
| Supply Current | I _{DD} | VDD=2.8V | | 100 | | μA |
| Control Voltage(High) | V _{CTL} | | 1.6 | 1.8 | 3.0 | V |
| Control Voltage(Low) | V _{CTL} | | 0 | | 0.4 | V |
| Switching Specification | | | | | | |
| Switching speed | T _{SW} | 50% V _{CTL} to 90/10% RF | | 0.5 | | μs |

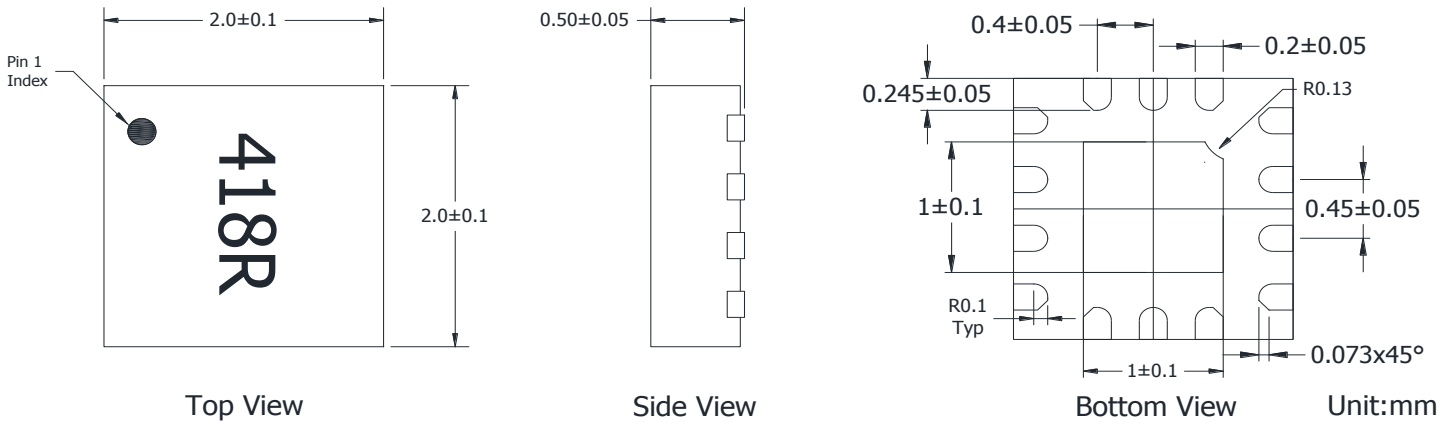
Note : All measurements made in a 50Ω system with 0/+1.8V control voltages, unless otherwise specified.

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

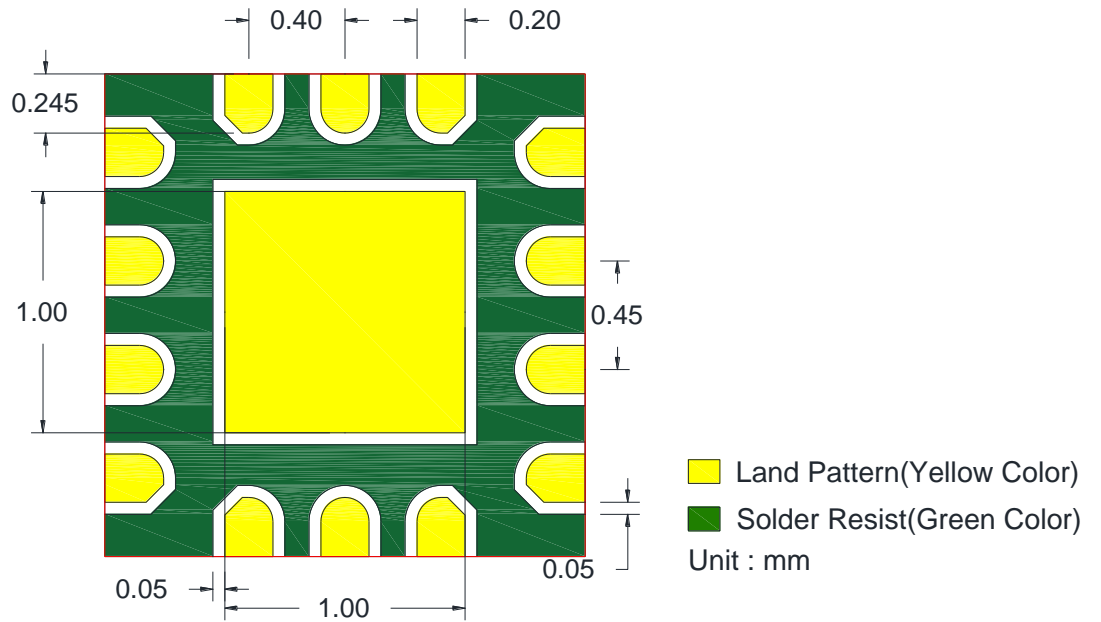
| V _{c1} | V _{c2} | V _{c3} | RF1 | RF2 | RF3 | RF4 | RF5 | RF6 |
|-----------------|-----------------|-----------------|-----|-----|-----|-----|-----|-----|
| 0 | 0 | 0 | On | Off | Off | Off | Off | Off |
| 0 | 0 | 1 | Off | On | Off | Off | Off | Off |
| 0 | 1 | 0 | Off | Off | On | Off | Off | 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 |

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Package Dimensions



Land Pattern



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Reliability test

| TEST | PROCEDURE / TEST METHOD | REQUIREMENT |
|---|--|---|
| Solderability JIS C 0050-4.6 JESD22-B102D | *Solder bath temperature : $255 \pm 5^{\circ}\text{C}$ *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 : $90^{\circ}\text{C} \pm 2^{\circ}\text{C}$ *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 $-30 \sim 90^{\circ}\text{C}$. |
| Low temperature JIS C 0020 | *Temperature : $-30^{\circ}\text{C} \pm 2^{\circ}\text{C}$ *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 $-30 \sim 90^{\circ}\text{C}$. |
| Temperature cycle JIS C 0025 | 1. 30 ± 3 minutes at $-30 \pm 3^{\circ}\text{C}$, 2. 10~15 minutes at room temperature, 3. 30 ± 3 minutes at $+90 \pm 3^{\circ}\text{C}$, 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 $-30 \sim 90^{\circ}\text{C}$. |
| High temperature operation life (HTOL) | *Temperature : 90°C *V = Vmax *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 $-30 \sim 90^{\circ}\text{C}$. |

Soldering condition

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

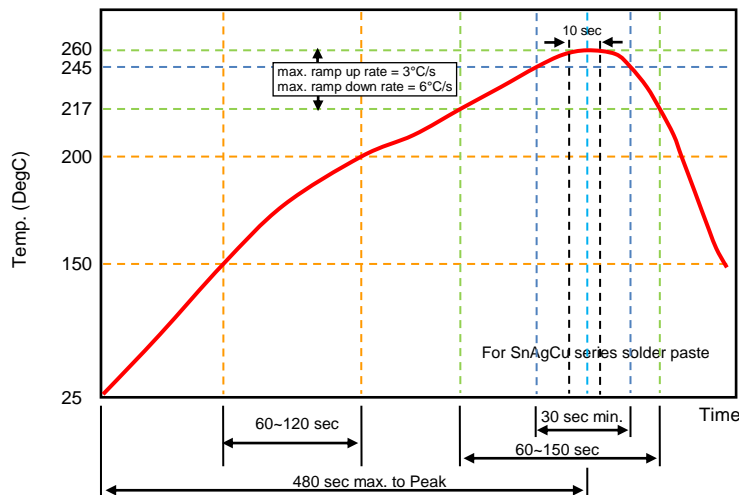


Figure 11. Infrared soldering profile

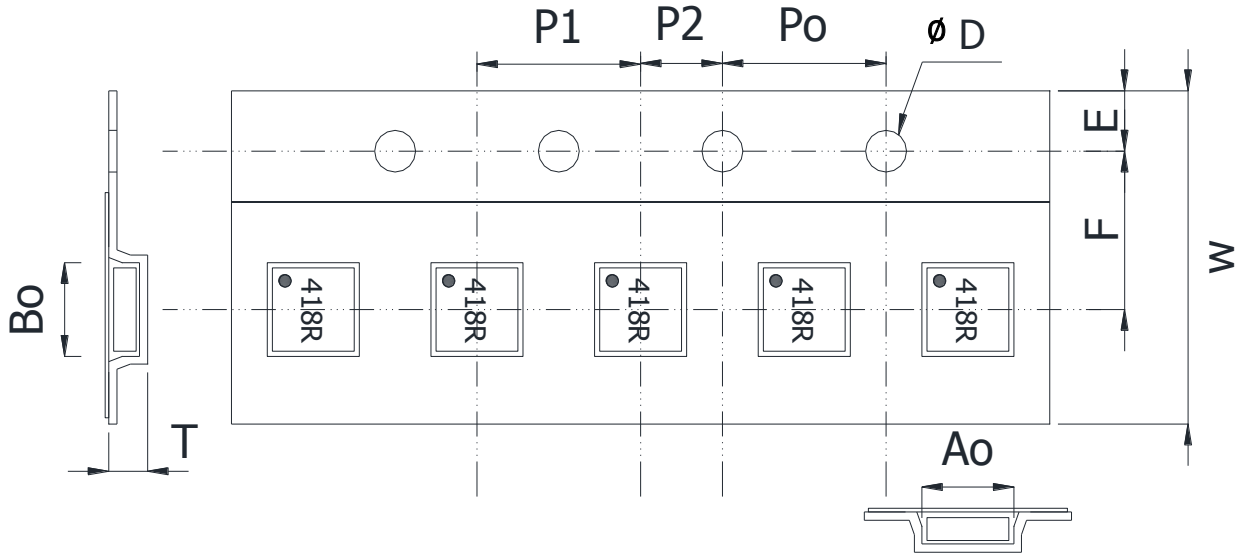
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Ordering code

| | | | | |
|---|---|-------------------------------|--------------------|-----------------------------|
| RF | ASW | H | 416P | T |
| RF module RF: Walsin RF Switch Device | Module type ASW: Antenna Switch | Application H: SP6T | Design Code | Packing T: Taping |

Minimum Ordering Quantity: 5000 pcs per reel.

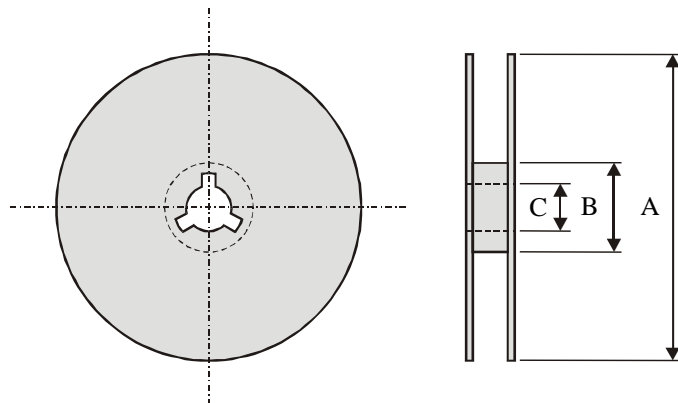
Packaging



Plastic Tape specifications (unit :mm)

| | | | | | |
|----------------|-------------|-------------|-------------|-------------|-------------|
| Index | Ao | Bo | φD | T | W |
| Dimension (mm) | 2.25 ± 0.10 | 2.25 ± 0.10 | 1.55 ± 0.05 | 0.75 ± 0.10 | 8.0 ± 0.30 |
| Index | E | F | Po | P1 | P2 |
| Dimension (mm) | 1.75 ± 0.10 | 3.50 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 | 2.00 ± 0.05 |

Reel dimensions



| | | | |
|----------------|--------|---------|-----------|
| Index | A | B | C |
| Dimension (mm) | Φ180±2 | Φ60.0±1 | Φ13.1±0.2 |

Taping Quantity : 5000 pieces per 7" reel

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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.

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