APPROVAL SHEET

RF Switch Series – RoHS Compliance

DPDT GPIO Switch

Halogens Free Product

Any 2G/3G/4G Band for TRx System

P/N: RFASWB646BTF09

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

FEATURES

- Low Insertion Loss：0.7dB typ. @ 3.8GHz
- High Isolation：30dB typ. @ 3.8GHz
- Low control voltage：1.3 to 2.7 V
- High ESD tolerance of 1kV HBM at all pins
- Miniature footprint ：QFN package, 1.83 x 1.83 x 0.55 mm^3
- **M**oisture **S**ensitive **L**evel 3 (MSL3)

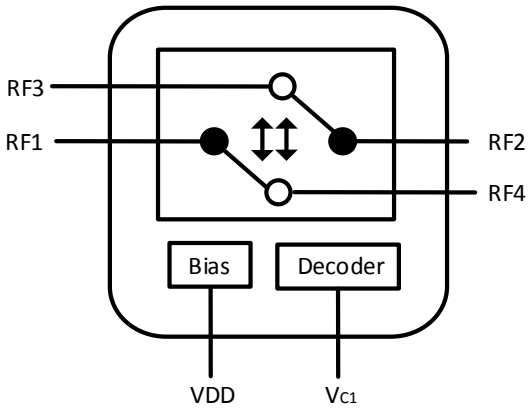
Description

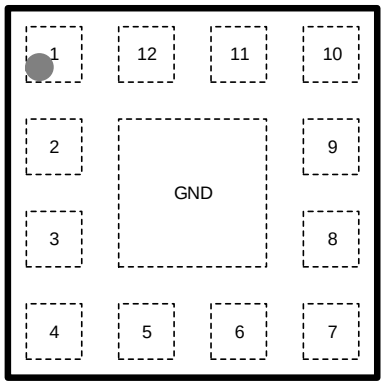
- The RFASWB646BTF09 is a SOI (Silicon On Insulator) double pole double throw (DPDT) switch with an integrated General Purpose Input Output (GPIO) control. The RFASWB646BTF09 maintains low insertion and high isolation, which makes it an idea choice for Multi-Mode, GSM, EDGE, UMTS, and TLE handset applications.
- The RFASWB646BTF09 is ideally suited for applications where high linearity, high isolation, low insertion loss, low current consumption, and small size are required.
- No blocking capacitor requirement on the RF paths ad long as no DC voltage is applied. The RFASWB646BTF09 is manufactured in a compact, 1.83 x 1.83 x 0.55 mm^3 QFN package.

Application

- Multi-mode 3G/4G, LTE TRx system.

Block Diagram and Pin Out (Top View)

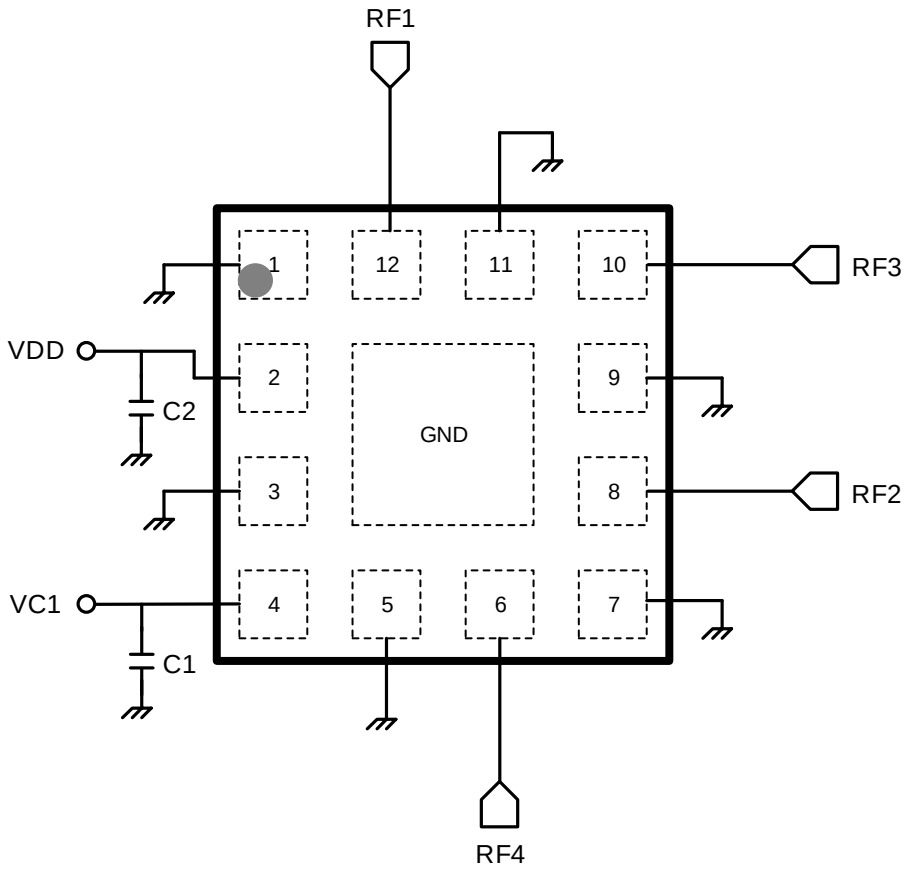




Pin Names and Descriptions

Pin	Name	Description	Pin	Name	Description
1	GND	Ground	7	GND	Ground
2	VDD	DC power supply	8	RF2	RF path 2
3	GND	Ground	9	GND	Ground
4	V_{C1}	Control voltage 1	10	RF3	RF path 3
5	GND	Ground	11	GND	Ground
6	RF4	RF path 4	12	RF1	RF path 1

Application Circuit



Parts List

Parts No.	Value
C1-C2	1000 pF

Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Max Input Power	Pin		+37	dBm
DC Supply Voltage	VDD	+2.6	+4.5	V
DC Control Voltage	V_{C1}	0	+3.0	V
Operating temperature	T_{OP}	-40	+85	°C
Storage temperature	T_{ST}	-65	+150	°C
HBM ESD Voltage, All Pins	V_{ESD}[1]	-	+1000	V

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

Electrical Specifications at 25°C with VDD=2.8V, V_{C1}=0/1.8V, Characteristic Impedance Z_0=50Ω, Pin=0dBm

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Units
RF Specifications						
Operating frequency	f		0.7		3.8	GHz
Insertion loss (Port1/2 to Port3/4)	IL	698 ~ 960 MHz 1427 ~ 2174 MHz 2180 ~ 2690 MHz 2700 ~ 3800 MHz	-	0.40 0.50 0.55 0.70	0.55 0.65 0.70 0.85	dB dB dB dB
Isolation (Port1/2 to Port3/4)	Iso	698 ~ 960 MHz 1427 ~ 2174 MHz 2180 ~ 2690 MHz 2700 ~ 3800 MHz	33 27 25 25	39 32 31 30	- - - -	dB dB dB dB
On state match (Port1/2)	VSWR	698 ~ 3800 MHz	-	1.2	1.4	-
RFx Harmonics	$2f_0$	PIN = +26 dBm, f = 900 MHz PIN = +26 dBm, f = 1800 MHz	-	-65 -60	-	dBm
	$3f_0$	PIN = +26 dBm, f = 900 MHz PIN = +26 dBm, f = 1800 MHz	-	-55 -45	-	dBm
DC Specification (Decoder)						
Supply Voltage	VDD		2.6	2.8	4.5	V
Supply Current	I_{DD}			60	100	μA
Control Voltage(High)	$V_{C1(H)}$		1.3	1.8	2.7	V
Control Voltage(Low)	$V_{C1(L)}$		0	-	0.45	V
Control Current	I_{C1}	V_{C1}= 1.8V	-	0.1	5	μA
Switching Specification						
Switching speed	T_{SW}	50% V_{CTL} to 90/10% RF	-		5	μs

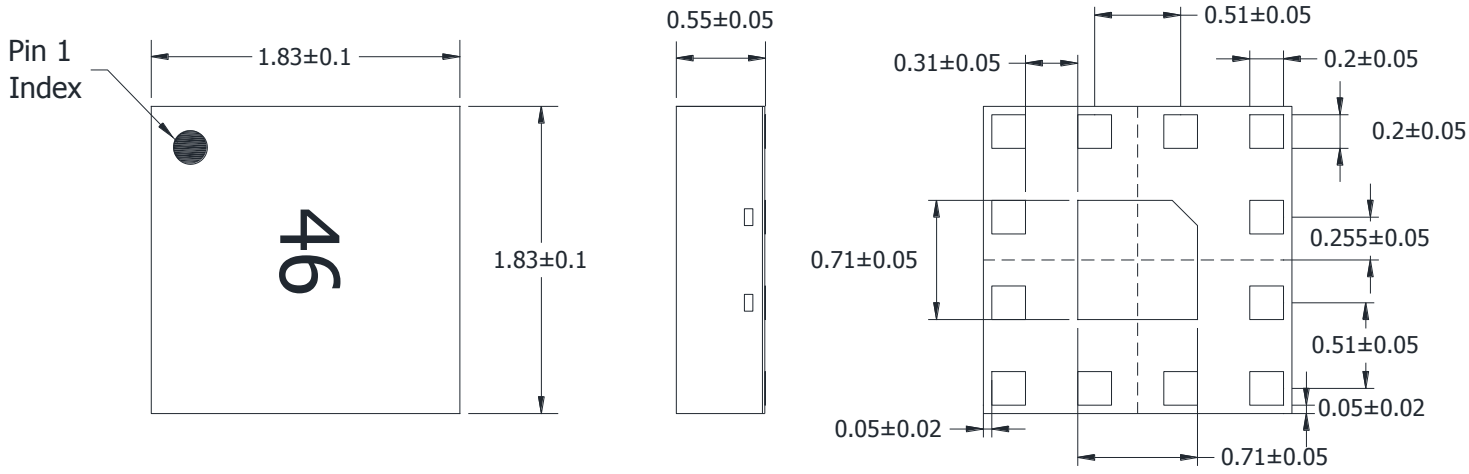
Note：All measurements made in a 50Ω system with 0/+1.8V control voltages, unless otherwise specified.

Logic Table for Switch On-Path

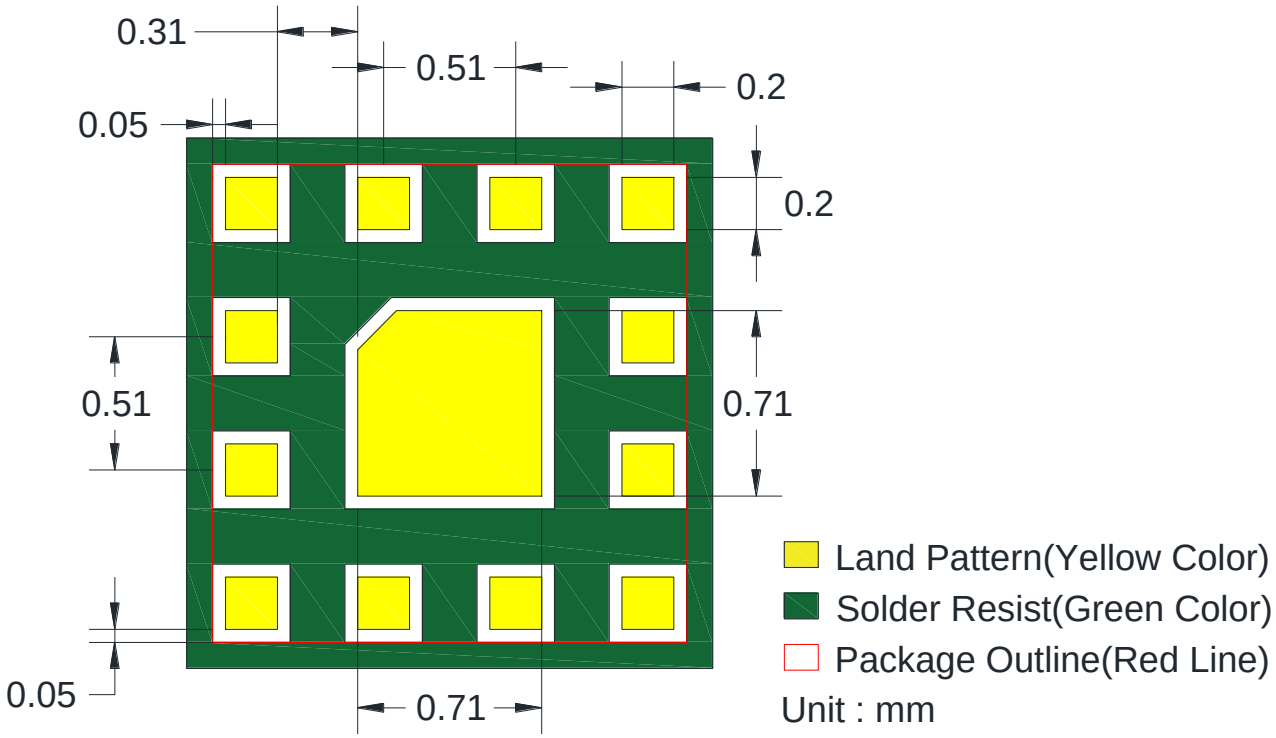
VC1	State
1	PORT3 to PORT1, PORT4 to PORT2
0	PORT3 to PORT2, PORT4 to PORT1

State 1=1.3V to 2.7V；State 0= 0V to 0.45V

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.

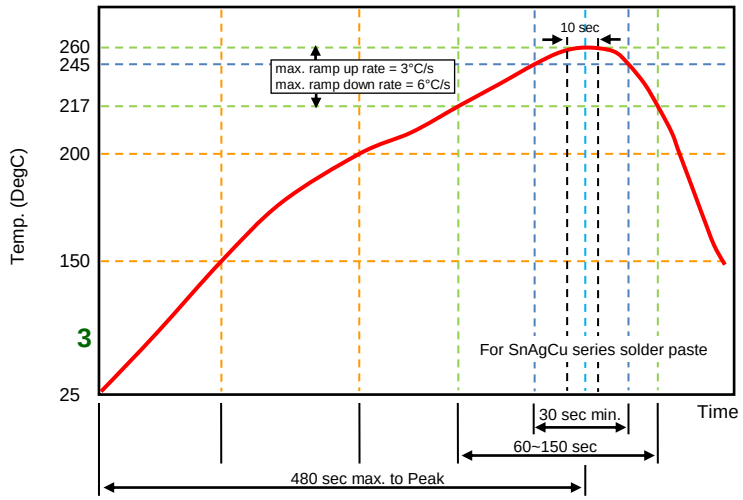


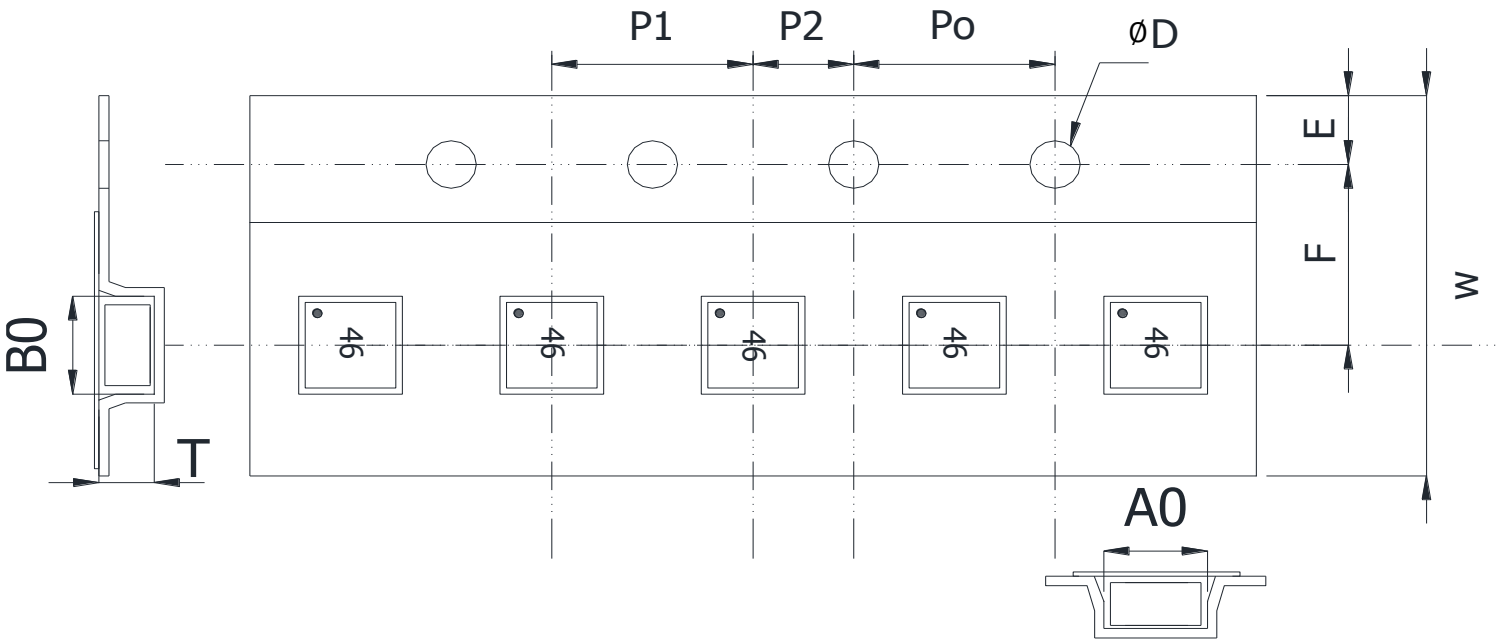
Figure 11. Infrared soldering profile

Ordering code

RF	ASW	B	646B	T
RF module RM: Walsin RF Switch Device	**Module type** ASW: Antenna Switch	**Application** B : DPDT	**Design Code**	**Packing** T: Taping

Minimum Ordering Quantity: 3000 pcs per reel.

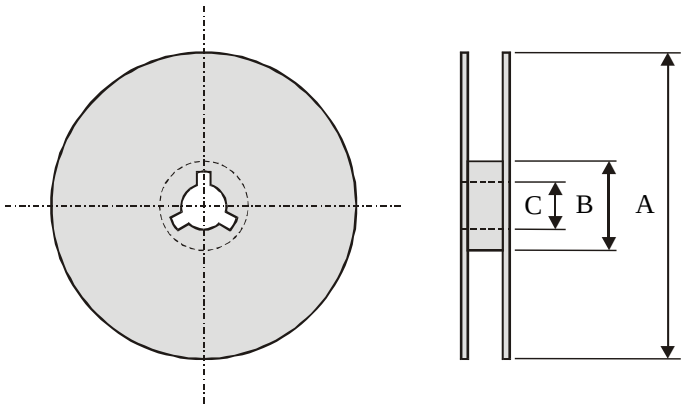
Packaging



Plastic Tape specifications (unit :mm)

Index	Ao	Bo	ΦD	T	W
Dimension (mm)	2.06 ± 0.05	2.06 ± 0.05	1.50 ± 0.10	0.73 ± 0.05	8.0+0.30/-0.10
Index	E	F	Po	P1	P2
Dimension (mm)	1.75 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05

Reel dimensions



Index	A	B	C
Dimension (mm)	Φ179.9	Φ70.55	Φ13.22

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.