

RTC6607SP : 0.1 GHz – 3.0 GHz SPDT Switch

Description

The RTC6607SP is a SPDT antenna switch designed for frequency range from 0.1 GHz up to 3.0 GHz range. The RTC6607SP is processed in advanced CMOS SOI(silicon-on-insulator) technology featuring low insertion loss, high isolation, high ESD protection level and sustain high linearity at low supply voltage. The excellent performance of RTC6607SP make it ideal to be applied in wireless application for WLAN, Bluetooth® and IEEE 802.11b/g/n/ac transmit / receive function. The RTC6607SP is housed in a compact 6L QFN1.0x1.0 plastic package.

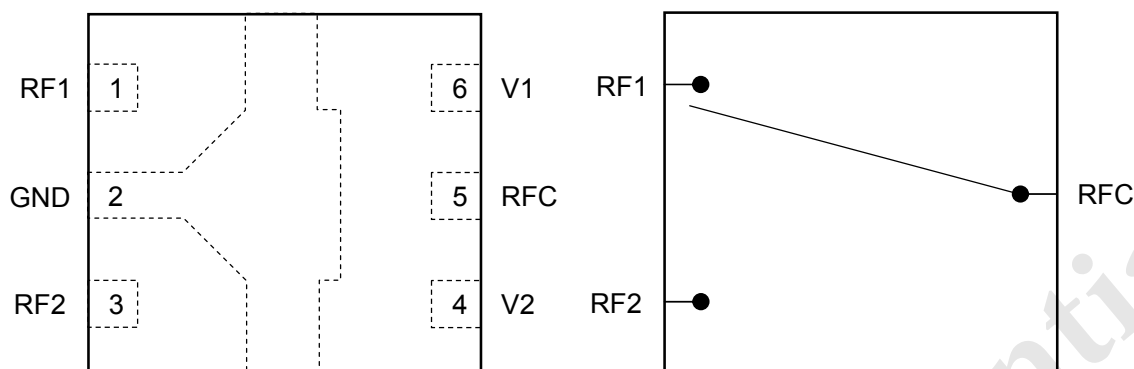
Feature

- ◆ Frequency Range : 0.1 – 3.0 GHz
- ◆ Low Control Voltage : 1.8 ~ 3.6 V
- ◆ Low Insertion Loss : 0.4 dB @ 2.45 GHz
- ◆ High Isolation : 30 dB @ 2.45 GHz
- ◆ High P1dB : +32 dBm
- ◆ Excellent ESD Protection : 1000 V HBM and CDM on all pins
- ◆ Small and Low Profile Package : 6L QFN 1.0x1.0x0.375(typ) mm³
- ◆ RoHS, Pb-free, Halogen Free Compliant
- ◆ Moisture Sensitivity Level : MSL 3

Application

- ◆ IEEE 802.11b/g/n WLAN networks
- ◆ Bluetooth®
- ◆ L, S band digital cellular or cordless telephone

Functional Block Diagram & Pin Out (top view through package)



Pin Function Description

Pin No.	Name	Description	Pin No.	Name	Description
1	RF1	RF Signal, DC blocking needed	4	V2	DC control voltage
2	GND	Ground	5	RFC	RF Signal, DC blocking needed
3	RF2	RF Signal, DC blocking needed	6	V1	DC control voltage
Exposed Pad		Must be connected to GND for best performance			

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Control voltage	V1, V2	+5	V
Maximum Input Power	P _{IN}	+33	dBm
Operating Temperature	T _A	-40 ~ +85	°C
Storage Temperature	T _{ST}	-40 ~ +150	°C
ESD (HBM, JESD22-A114, All pin)	ESD _{HBM}	1000	V
ESD (CDM, JESD22-C101, All pin)	ESD _{CDM}	1000	V
Maximum junction temperature	T _J	+125	°C

Note : Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only, functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation between operation range maximum and absolute maximum for extended periods may affect device reliability.

Truth Table

V1	V2	RFC – RF1	RFC – RF2
Low	High	OFF	ON
High	Low	ON	OFF

Recommended Operating Range

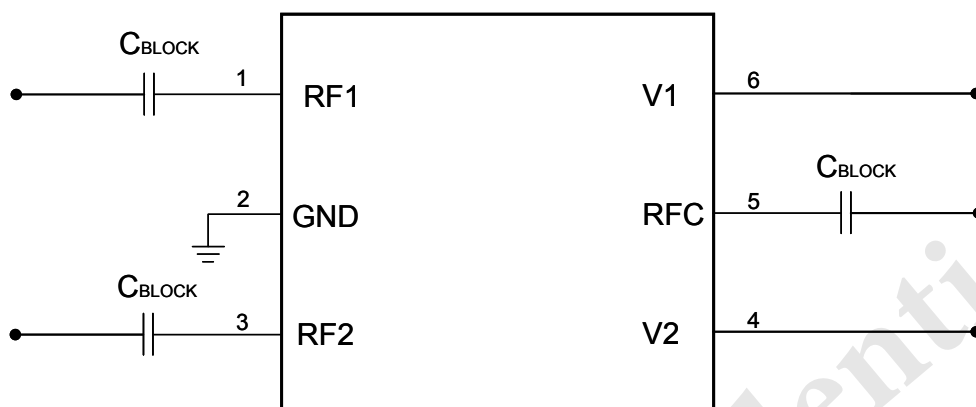
Parameter	Symbol	Min	Typ	Max	Unit
Operation Frequency	f1	0.1	–	3.0	GHz
Control Voltage High	V1, V2	1.8	3.3	3.6	V
Control Voltage Low	V1, V2	0	0	0.4	V

Electrical Specification

$T_A = 25\text{ }^{\circ}\text{C}$, $50\text{ }\Omega$ system with control voltage = 0/3.3 V, $P_{IN} = 0\text{ dBm}$, unless otherwise noted.

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Insertion Loss	IL_1	0.1 – 1.0 GHz	–	0.29	0.40	dB
	IL_2	1.0 – 2.0 GHz	–	0.33	0.45	dB
	IL_3	2.0 – 2.5 GHz	–	0.37	0.50	dB
	IL_4	2.5 – 3.0 GHz	–	0.41	0.55	dB
Isolation RF1, 2 to RFC	Iso_1	0.1 – 1.0 GHz	34	38	–	dB
	Iso_2	1.0 – 2.0 GHz	26	29	–	dB
	Iso_3	2.0 – 2.5 GHz	26	29	–	dB
	Iso_4	2.5 – 3.0 GHz	24	27	–	dB
Isolation RF1 to RF2	Iso_5	0.1 – 1.0 GHz	38	43	–	dB
	Iso_6	1.0 – 2.0 GHz	32	35	–	dB
	Iso_7	2.0 – 2.5 GHz	28	31	–	dB
	Iso_8	2.5 – 3.0 GHz	26	29	–	dB
Return loss (Insertion loss state)	RL_1	0.1 – 1.0 GHz	15	29	–	dB
	RL_2	1.0 – 2.0 GHz	15	25	–	dB
	RL_3	2.0 – 2.5 GHz	15	23	–	dB
	RL_4	2.5 – 3.0 GHz	15	18	–	dB
Input power for 1dB compression	P1dB	0.5 – 3.0 GHz @ 3.0V	–	32	–	dBm
2 nd harmonic	2fo	f = 2.45 GHz $P_{IN} = +25\text{ dBm}$	–	70	–	dBc
3 rd harmonic	3fo	f = 2.45 GHz $P_{IN} = +25\text{ dBm}$	–	95	–	dBc
Error Vector Magnitude, WLAN	EVM_2.5%	f = 2.45 GHz, WLAN, 802.11g, OFDM, 54Mbps, 64QAM, P_{IN} for 2.5% error	–	26	–	dBm
Switching rise/fall time	tr	rise, fall (10/90% or 90/10% RF)	–	50	–	ns
Switching on/off time	tc	on, off (50% CTL 90/10% RF)	–	170	–	ns
Control Current	Ictl	control voltage = 3 V	–	10	–	μA

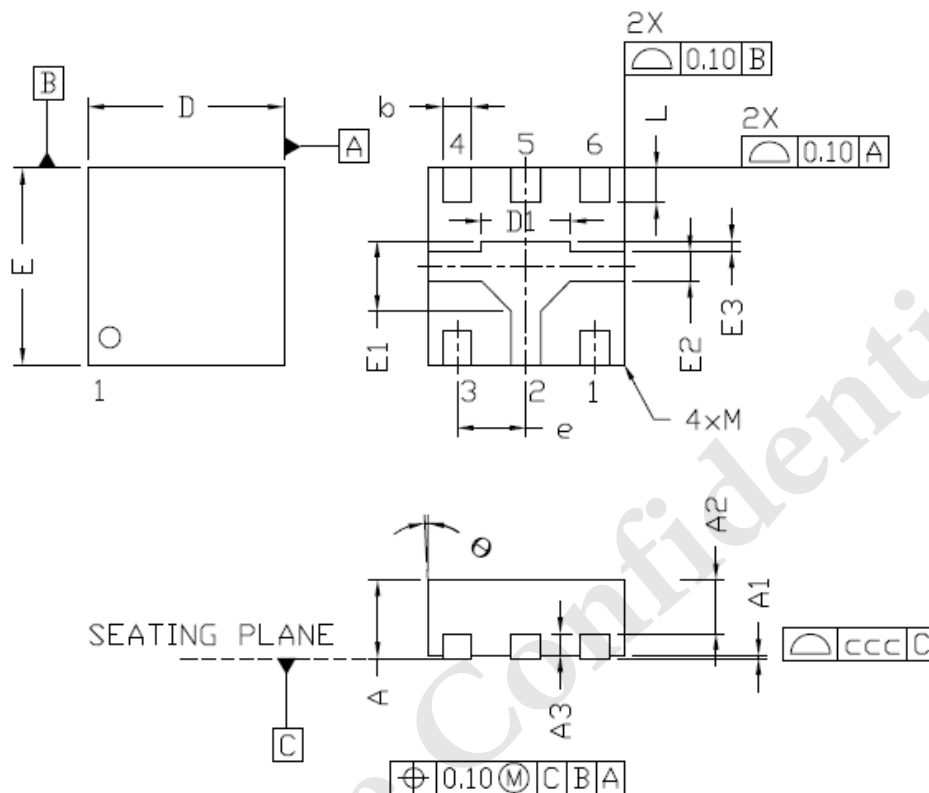
Application Circuit



Note:

1. $C_{BLOCK} = 100 \text{ pF}$ for operation 0.1 ~ 3.0 GHz are required on all RF ports.
2. Larger Capacitance recommended for lower frequency operation.
3. Exposed paddle in the bottom must be grounded.

Package Outline Dimension



Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX
A	0.35	---	0.40
A1	0.00	---	0.05
A2	0.223	---	0.273
A3	---	0.127REF	---
b	0.10	0.15	0.20
D	0.95	1.00	1.03
D1	---	0.45BSC	---
E	0.95	1.00	1.03
E1	---	0.36BSC	---
E2	0.10	0.15	0.20
E3	---	0.055BSC	---
e	---	0.35BSC	---
L	0.125	0.175	0.225
θ	-12	---	0
ccc	---	0.05	---
M	---	---	0.05
Burr	0.00	0.03	0.06

Recommended Solder Reflow Profiles

Average ramp-up rate (200°C to peak)	3°C/second max.
Preheat temperature 175 (+/-25) °C	60~120secs
Temperature maintained above 217°C	60~150secs
Time within 5°C of actual peak temperature	30 seconds min.
Peak temperature range	(260 +2/-2)°C
Ramp down rate	6°C/second max.
Time 25°C to peak temperature	8 minutes max.

* Follow JEDEC spec J-STD-020D

