RTC6617SP : 0.1 GHz – 6.0 GHz SP3T Switch

Description

The RTC6617SP is a CMOS silicon-on-insulation (SOI),single-pole, triple-throw (SP3T) antenna switch operating in 0.1 to 6.0 GHz frequency range. The features of low loss, high isolation, high linearity make the device ideal to be applied in wireless application for Bluetooth®, wireless LAN 802.11a/b/g/n/ac systems operated at 2.4 to 2.5 GHz and 4.9 to 5.9 GHz bands. The RTC6617SP is housed in a compact 8L QFN- 1.5X1.5X0.45 mm^3 plastic package.

Features

- Broadband Frequency Range : 0.1 to 6.0 GHz
- Positive Low Control Voltage : 1.8 to 3.6V
- Low Insertion Loss : 0.5 dB at 2.45 GHz, 0.9 dB at 5.9 GHz
- High Isolation : 25 dB at 2.45 GHz, 24dB at 5.9GHz
- Excellent Linearity Performance : P1dB = +32 dBm at 3.3V, +29dBm at 1.8V for 2.4GHz
- Excellent ESD Protection : 1000 V HBM for all pins
- 8L QFN-1.5X1.5X0.45mm^3 Plastic Package
- RoHS / Halogen Free Compliant
- Moisture Sensitivity Level : MSL-3

Application

- IEEE 802.11a/b/g/n/ac WLAN networks
- Bluetooth®

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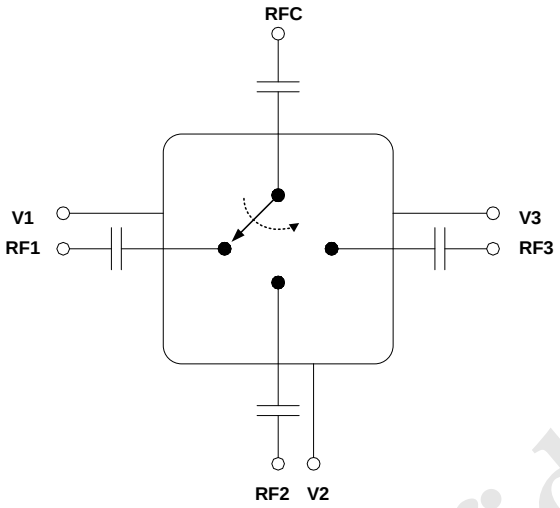
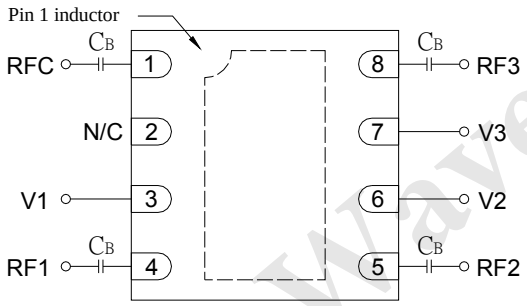
Functional Block Diagram



Pin Out & Evaluation Circuit (Top View)



Note :

1. C_B = 22pF for operation > 500 MHz
2. C_B = 220pF for operation <500 MHz
3. Larger Capacitance recommended for lower frequency operation.
4. Exposed paddle in the bottom must be grounded

Pin Description

Pin No.	Name	Description	Pin No.	Name	Description
1	RFC	Antenna Port, DC blocking needed	5	RF2	RF Signal, DC blocking needed
2	N/C	No connect	6	V2	DC control voltage
3	V1	DC control voltage	7	V3	DC control voltage
4	RF1	RF Signal, DC blocking needed	8	RF3	RF Signal, DC blocking needed
Exposed Pad		Exposed pad must be connected to GND.			

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Truth Table

Low Insertion Loss Path	V1	V2	V3
RFC-RF1	H	L	L
RFC-RF2	L	H	L
RFC-RF3	L	L	H

Recommended Operating Range

Parameter	Min	Max	Unit
Operation Frequency	0.1	6	GHz
Switch Control Voltage (H)	1.8	3.6	V
Switch Control Voltage (L)	0	0.4	V

Absolute Maximum Rating

Parameter	Min	Max	Unit
Control voltage (V1,V2,V3)	–	5.0	V
Input power	–	+33	dBm
Operating temperature	-40	+85	℃
Storage temperature	-40	+125	℃
ESD (HBM, JESD22-A114, All pin)	–	1000	V

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.

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Electrical Specification

T_A = +25℃, 50Ω system with V_H = 3.3 V, V_L = 0 V, C_B = 22 pF, unless otherwise noted

Parameter	Test Condition	Min	Typ	Max	Unit
Insertion Loss	2.4 – 2.5 GHz 4.9 – 5.9 GHz		0.50 0.90	0.60 1.20	dB dB
Isolation	2.4 – 2.5 GHz 4.9 – 5.9 GHz	20 19	25 24		dB dB
Return loss (Insertion loss stage)	2.4 – 2.5 GHz 4.9 – 5.9 GHz	15 15	20 20		dB dB
Input power for 0.1dB compression	2.45 GHz @ 3.3 V 2.45 GHz @ 1.8 V 5.8 GHz @ 3.3V 5.8 GHz @ 1.8V		32 29 TBD TBD		dBm dBm dBm dBm
2nd harmonic	f = 2.45 GHz Pin = +24 dBm		75		dBc
3rd harmonic	f = 2.45 GHz Pin = +24 dBm		80		dBc
Error Vector Magnitude, WLAN	f = 2.45 GHz, WLAN,802.11g,OFDM, 54Mbps,64QAM, P_{in} for 2.5% error		27		dBm
Switching Rise Time Switching Fall Time Switching On Time Switching Off Time	10/90% RF 90/10% RF 50% Control to 10/90% RF 50% Control to 90/10% RF		80 30 152 54		ns ns ns ns
Switch Control Current	RF None		15	80	μA

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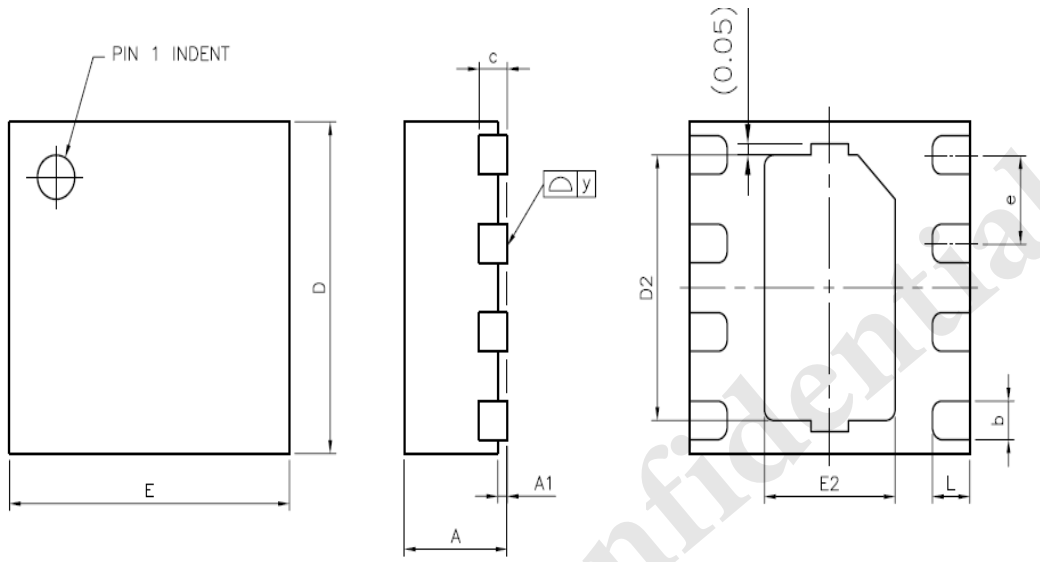
Package Outline (unit : mm)

8L QFN-1.5X1.5X0.45 mm^3



SYMBOL	DIMENSION IN MILLIMETERS		
	MIN	NOM	MAX
A	0.41	0.45	0.5
A1	0	0.02	0.05
c	-	0.15 REF	-
b	0.15	0.2	0.25
D	1.4	1.5	1.6
D2	1.05	1.2	1.3
E	1.4	1.5	1.6
E2	0.55	0.7	0.8
e	-	0.4	-
L	0.125	0.175	0.225
y	0	-	0.075

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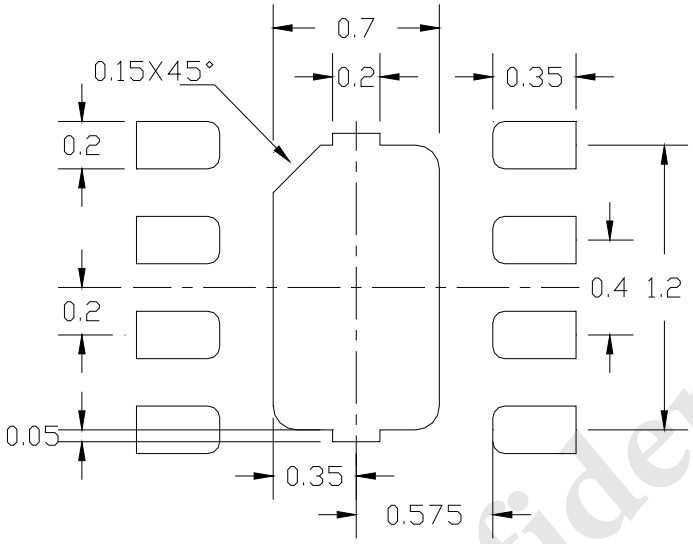
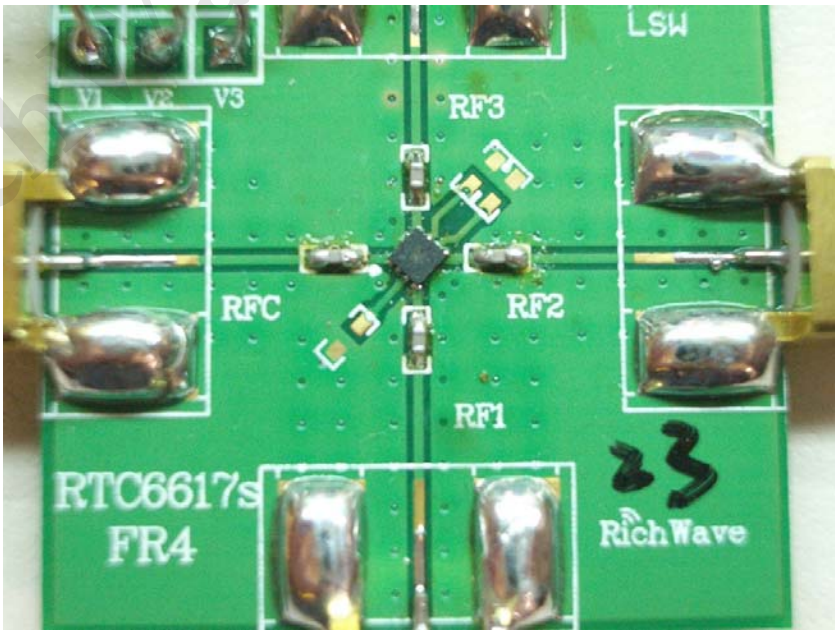
Land Pattern (unit : mm)



Evaluation Board

The RTC6617SP evaluation circuit is applied to evaluate the characteristics of RTC6617SP device. The evaluation board schematic is provided in page 2. The PCB drawing for the evaluation board is shown in below.



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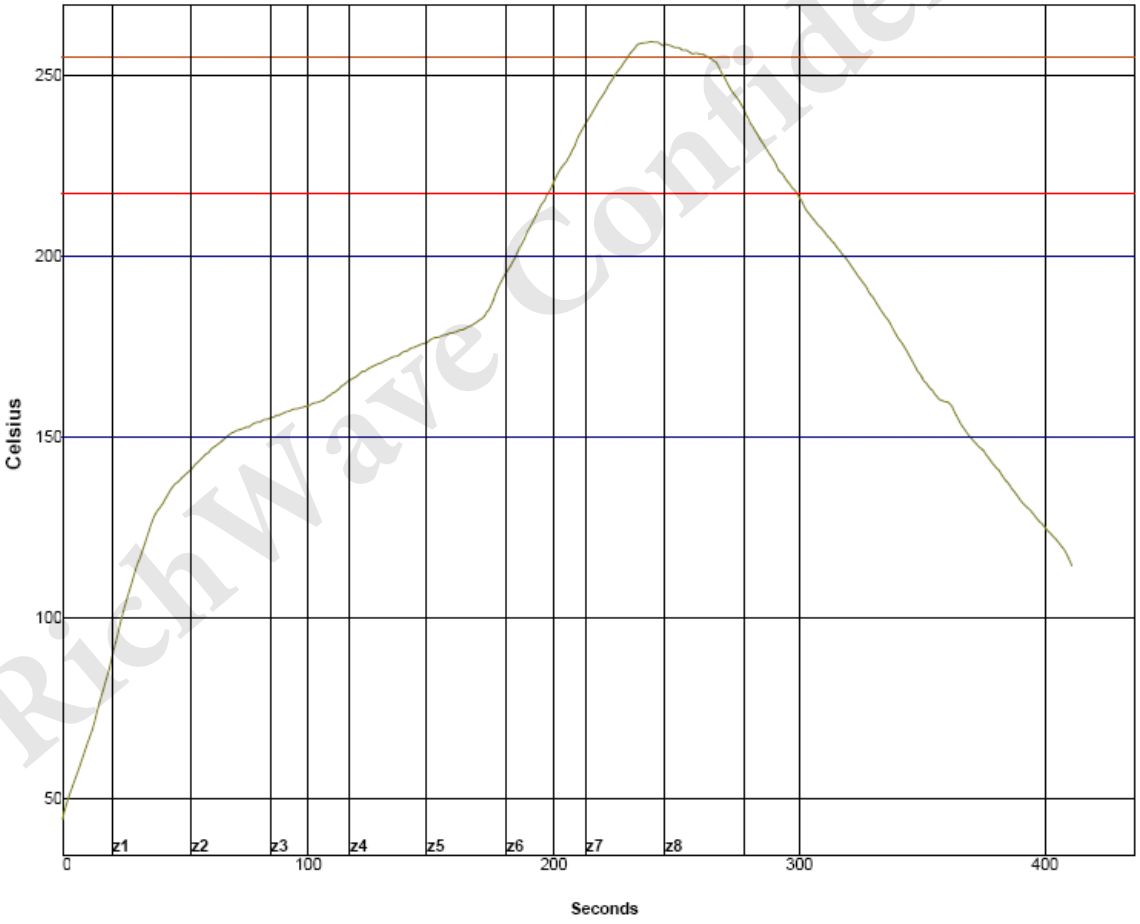
Recommended Solder Reflow Profiles

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



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