RTC6603SP : 0.1 GHz – 3.0 GHz SPDT Switch

Description

The RTC6603SP is a SPDT antenna switch designed for frequency range from 0.1 GHz up to 3.0 GHz range. The RTC6603SP is processed in advanced silicon technology featuring low insertion loss, high isolation, high ESD protection level and sustain high linearity at low supply voltage. The excellent performance of RTC6603SP make it ideal to be applied in wireless application for WLAN, Bluetooth® and IEEE 802.11b/g/n transmit / receive function. The RTC6603SP is housed in a compact SC-70 plastic package.

Feature

- Advanced Silicon Process
- Frequency Range : 0.1 – 3.0 GHz
- Low Control Voltage : 1.6 ~ 3.3 V
- Low Insertion Loss : 0.45 dB @ 2.45 GHz
- High Isolation : 25 dB @ 2.45 GHz
- High P1dB : +32 dBm at 3.0V, +31 dBm at 1.8V
- Excellent ESD Protection : 1000 V HBM on all pins
- Small SC-70 Plastic Package
- 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

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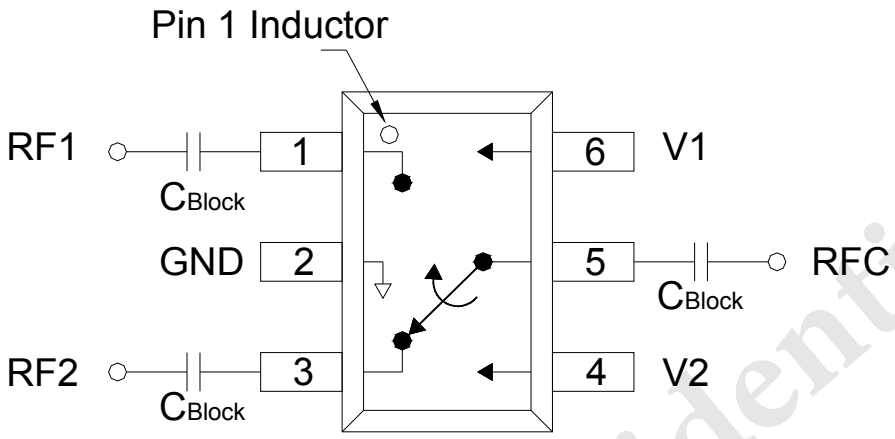
Functional Block Diagram & Pin Out (Top View)



Note:

1. DC blocking capacitors (C_{Block}) must be supplied externally.
2. C_{Block} =100 pF are required on all RF ports.

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

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Recommended Operation Range

Parameter	Symbol	Min	Typ	Max	Unit
Operation Frequency	f1	0.1	–	3.0	GHz
Control Voltage High (H)	V1, V2	1.6	3.0	3.3	V
Control Voltage Low (L)	V1, V2	0	0	0.4	V

Absolute Maximum Rating

Parameter	Symbol	Rating	Unit
Control voltage	V1, V2	+4.0	V
Input power	P_{IN}	+30	dBm
Operating temperature	T_A	-30 ~ +85	℃
Storage temperature	T_{ST}	-30 ~ +125	℃
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	℃

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
L	H	ON	OFF
H	L	OFF	ON

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Electrical Specifications

T_A = 25℃, 50Ω system with control voltage = 0/3 V, P_{IN} = 0 dBm, unless otherwise noted.

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Insertion Loss	IL_1	0.1 – 1.0 GHz	–	0.34	0.4	dB
	IL_2	1.0 – 2.0 GHz	–	0.37	0.43	dB
	IL_3	2.0 – 2.5 GHz	–	0.42	0.46	dB
	IL_4	2.5 – 3.0 GHz	–	0.46	0.5	dB
Isolation RF1, 2 to RFC	Iso_1	0.1 – 1.0 GHz	–	36	–	dB
	Iso_2	1.0 – 2.0 GHz	–	25	–	dB
	Iso_3	2.0 – 2.5 GHz	–	25	–	dB
	Iso_4	2.5 – 3.0 GHz	–	25	–	dB
Isolation RF1 to RF2	Iso_5	0.1 – 1.0 GHz	–	35	–	dB
	Iso_6	1.0 – 2.0 GHz	–	26	–	dB
	Iso_7	2.0 – 2.5 GHz	–	26	–	dB
	Iso_8	2.5 – 3.0 GHz	–	27	–	dB
Return loss (Insertion loss state)	RL_1	0.1 – 1.0 GHz	–	30	–	dB
	RL_2	1.0 – 2.0 GHz	–	27	–	dB
	RL_3	2.0 – 2.5 GHz	–	24	–	dB
	RL_4	2.5 – 3.0 GHz	–	19	–	dB
Input power for 1dB compression	P1dB_1.8	0.5 – 3.0 GHz @ 1.8V	–	31	–	dBm
	P1dB_3.3	0.5 – 3.0 GHz @ 3.0V	–	32	–	dBm
2nd harmonic	2fo	f = 2.45 GHz P_{IN} = +25 dBm	–	73	–	dBc
3rd harmonic	3fo	f = 2.45 GHz P_{IN} = +25 dBm	–	70	–	dBc
Error Vector Magnitude, WLAN	EVM_2.5%	f = 2.45 GHz, WLAN,802.11g,OFDM, 54Mbps, 64QAM, P_{IN} for 2.5% error	–	27	–	dBm
Switching rise/fall time	tr	rise, fall (10/90% or 90/10% RF)	–	130	–	ns
Switching on/off time	tc	on, off (50% CTL 90/10% RF)	–	280	–	ns
Control Current	Ictl	control voltage = 0/3 V	–	10	–	μA

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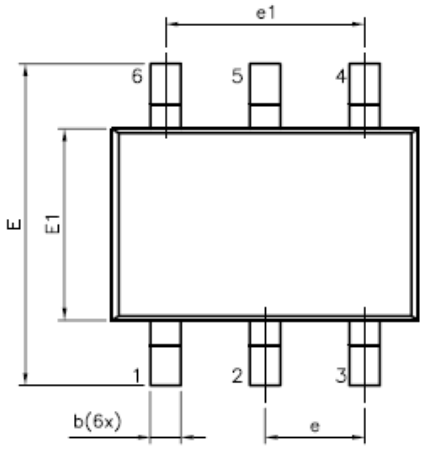
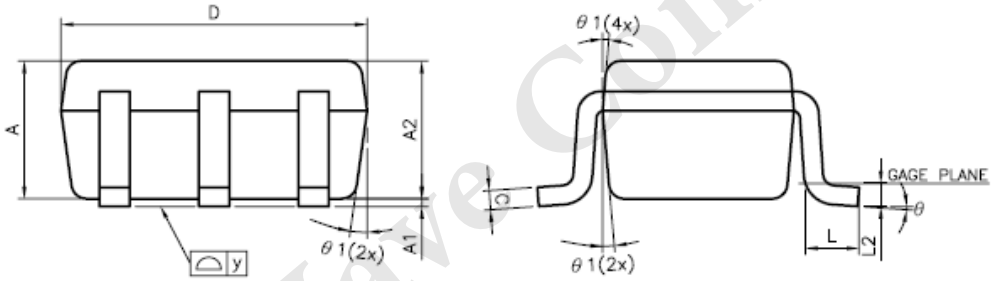
Package Outline Dimension

Package Type : SC-70



NOTE :
1. CONTROLLING DIMENSION : mm
2. DIMENSION D DOES NOT INCLUED MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15mm PER SIDE.
3. DIMENSION E1 DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.15mm PER SIDE.



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	——	1.10	0.031	——	0.043
A1	0.00	——	0.10	0.000	——	0.004
A2	0.70	0.90	1.00	0.028	0.035	0.039
b	0.15	——	0.30	0.006	——	0.012
C	0.08	——	0.22	0.003	——	0.009
D	1.80	2.00	2.20	0.071	0.079	0.087
E	1.95	2.10	2.25	0.077	0.083	0.089
E1	1.15	1.25	1.35	0.045	0.049	0.053
e	——	0.65	——	——	0.026	——
e1	——	1.30	——	——	0.051	——
L	0.26	0.36	0.46	0.010	0.014	0.018
L2	——	0.15	——	——	0.006	——
y	——	——	0.10	——	——	0.004
θ	0°	4°	8°	0°	4°	8°
θ1	4°	——	12°	4°	——	12°

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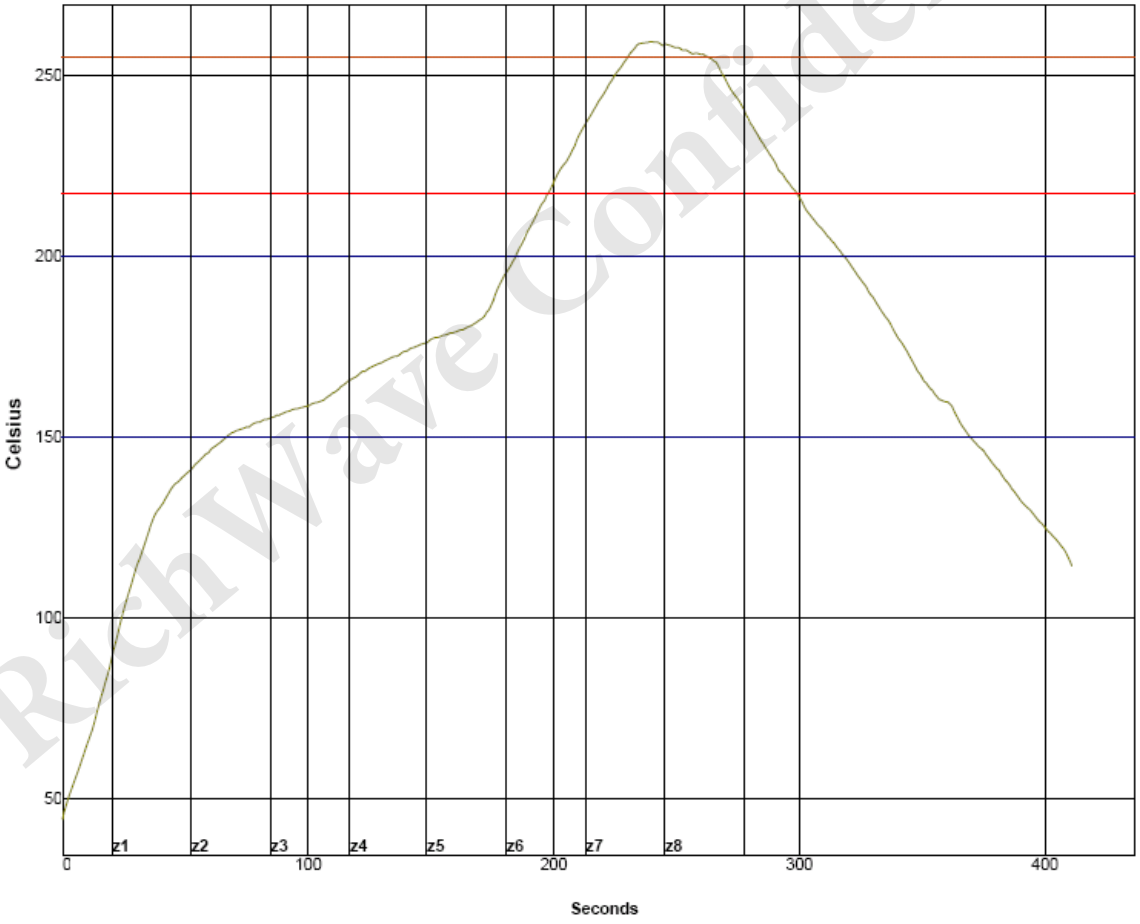
Recommended Solder Reflow Profiles

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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