

## RTC5606H

### 0.1 GHz – 6.0 GHz SPDT Switch

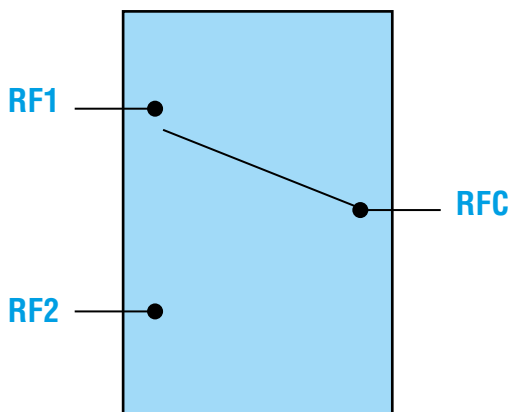


AUG 2017 - Ver. 1.4

### Description

The RTC5606H is a SPDT antenna switch in GaAs pHEMT technology operating from 0.1 GHz up to 6.0 GHz frequency range. This device exhibits low insertion loss, high isolation and low DC power consumption characteristics over broadband range. Due to the excellent performance, RTC5606H undertakes the wonderful choice of transmit/receive function in wireless applications such as mobile phones, Bluetooth®, WLAN, and IEEE 802.11 a/b/g/n/ac.

### Functional Block Diagram



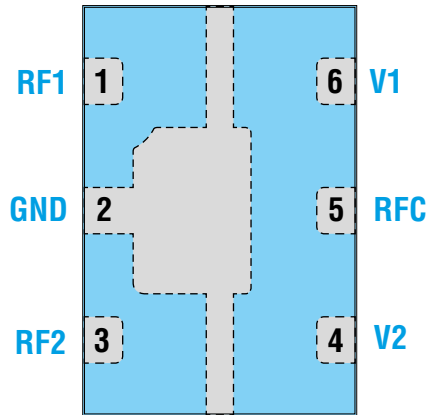
### Features

- Frequency Range : 0.1 – 6.0 GHz
- Low Insertion Loss :
  - 0.8 dB @ 2.5 GHz
  - 1.0 dB @ 5.9 GHz
- High Isolation :
  - 33 dB @ 2.5 GHz
  - 29 dB @ 5.9 GHz
- High Power Handling :
  - P1dB = +36 dBm @ 2.5 GHz
  - P1dB = +34 dBm @ 5.9 GHz
- 6L QFN-2.0mm x 3.0mm x 0.8mm(max) Plastic Package
- RoHS Compliant, Pb-free, Halogen Free
- Moisture Sensitivity Level : MSL 3

### Applications

- IEEE 802.11a/b/g/n/ac WLAN Networks
- WiMAX 802.16
- Bluetooth®
- L, S Band Digital Cellular Or Cordless Telephones

**Pin Assignments**



**Top View Through Package**

Pin No.	Pin Name	Description
1	RF1	RF port 1. A DC blocking capacitor is needed
2	GND	Ground
3	RF2	RF port 2. A DC blocking capacitor is needed
4	V2	DC control voltage 2
5	RFC	Antenna port. A DC blocking capacitor is needed
6	V1	DC control voltage 1
	Exposed Paddle	It must be connected to a ground through PCB via for best performance

## Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Control Voltage	V1, V2	+6.0	V
Input power	$P_{IN}$	+36	dBm
Operating Ambient Temperature	$T_A$	-40 ~ +85	°C
Storage Temperature	$T_{STG}$	-40 ~ +150	°C

**NOTE:** Stresses above those conditions listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only. Functional operation of the device above those conditions indicated in the Absolute Maximum Ratings is not implied. The functional operation of the device at the conditions in between Recommended Operating Ranges and Absolute Maximum Ratings for extended periods may affect device reliability.

## Recommended Operating Ranges

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency	f	0.1		6.0	GHz
Control Voltage High (H)	V1(H), V2(H)	2.5	3.3	5.0	V
Control Voltage Low (L)	V1(L), V2(L)	0		0.3	V

**NOTE:** Recommended Operating Ranges indicate conditions for which the device is intended to be functional, but does not guarantee specific performance limits.

## Truth Table

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

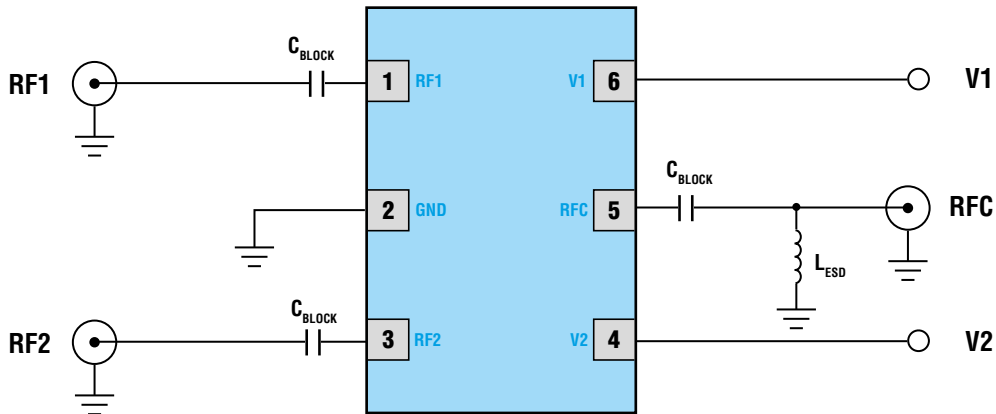
**NOTE:** High = 2.5 ~ 5.0 V, Low = 0 ~ 0.3 V

## Electrical Specifications

$T_A = +25^\circ\text{C}$ ,  $50\Omega$  system with control voltage  $V = 3.3\text{ V} / 0\text{ V}$ ,  $P_{IN} = 0\text{ dBm}$ ,  $C_{Block} = 47\text{ pF}$ , unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Insertion Loss RFC to RF1 or RF2	IL_1	0.1 – 0.5 GHz		0.60		dB
	IL_2	0.5 – 2.0 GHz		0.65	0.85	dB
	IL_3	2.0 – 2.5 GHz		0.80	1.0	dB
	IL_4	2.5 – 3.5 GHz		0.95	1.15	dB
	IL_5	3.5 – 6.0 GHz		1.0	1.25	dB
Isolation RFC to RF1 or RF2	Iso_1	0.1 – 0.5 GHz		39		dB
	Iso_2	0.5 – 2.0 GHz	30	35		dB
	Iso_3	2.0 – 2.5 GHz	28	33		dB
	Iso_4	2.5 – 3.5 GHz	27	32		dB
	Iso_5	3.5 – 6.0 GHz	24	29		dB
Isolation RF1 to RF2	Iso_6	0.1 – 0.5 GHz	35	39		dB
	Iso_7	0.5 – 2.0 GHz	31	35		dB
	Iso_8	2.0 – 2.5 GHz	29	34		dB
	Iso_9	2.5 – 3.5 GHz	28	33		dB
	Iso_10	3.5 – 6.0 GHz	25	30		dB
Return Loss (Insertion Loss State)	RL_1	0.1 – 0.5 GHz	15	25		dB
	RL_2	0.5 – 2.0 GHz	15	23		dB
	RL_3	2.0 – 2.5 GHz	15	21		dB
	RL_4	2.5 – 3.5 GHz	13	17		dB
	RL_5	3.5 – 6.0 GHz	12	14		dB
Input Power for 1dB Compression	P1dB	2.5 GHz		+36		dBm
		5.9 GHz		+34		dBm
2nd Harmonic	2fo	f = 2.5 GHz, CW		71		dBc
3rd Harmonic	3fo	Pin = +25 dBm		73		dBc
Linear Power	$P_{IN-2G}$	f = 2.45 GHz, 802.11g, OFDM, 54Mbps, 64QAM, $P_{IN}$ for 2.5% EVM		24		dBm
Switch Rise/Fall Time	tr, tf	Rise, Fall (10%/90% RF to 90%/10% RF)		100		ns
Switch On/Off Time	ton, toff	On, Off (50% V to 90%/10% RF)		150		ns
Control Current	Ictl	No RF		3	50	$\mu\text{A}$

### Application Circuits



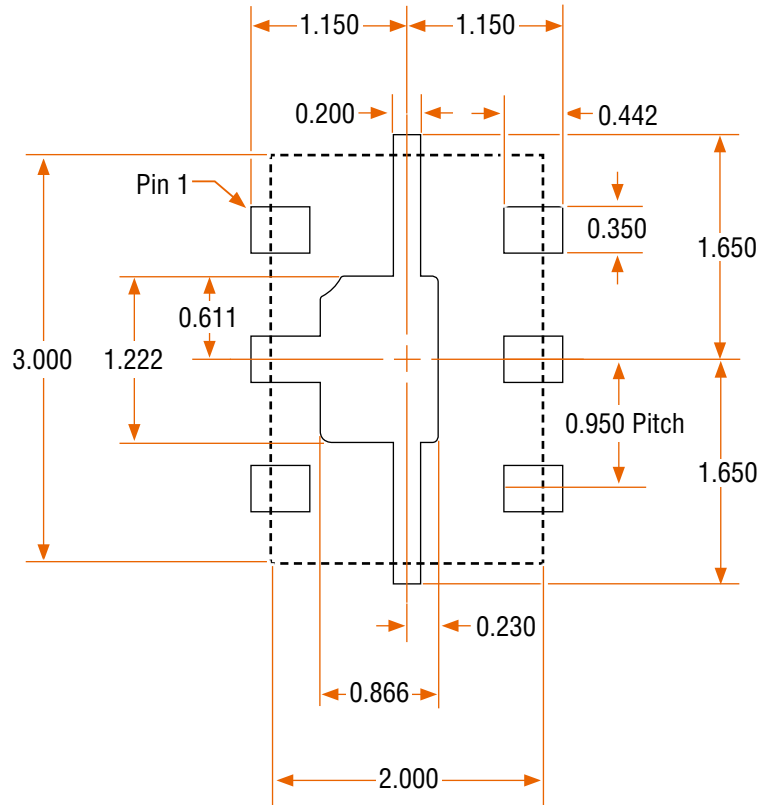
**NOTE :**

1.  $C_{BLOCK} = 47 \text{ pF}$  for operation 0.1 ~ 6.0 GHz is required on all RF ports.
2. Larger Capacitance recommended for lower frequency operation.
3. Exposed paddle in the bottom must be grounded.
4. It is recommended to add  $L_{ESD}$  to provide a good approach for increasing the ESD protection on a specific RF port, typically the port attached to the antenna.
5. The  $L_{ESD}$  value may be tailored to provide specific electrical responses.
6. The RF ground connections should be kept as short as possible and directly connected to a good RF ground for best performance.
7. Information in the above application is for reference only, and does not guarantee the mass production design of the device.

### Evaluation Board Bill of Material

Component	Value	Description	Supplier	Part Number
IC		RTC5606H	RichWave	
$C_{BLOCK}$	47 pF	DC block capacitor	Walsin	0402N470J500LT

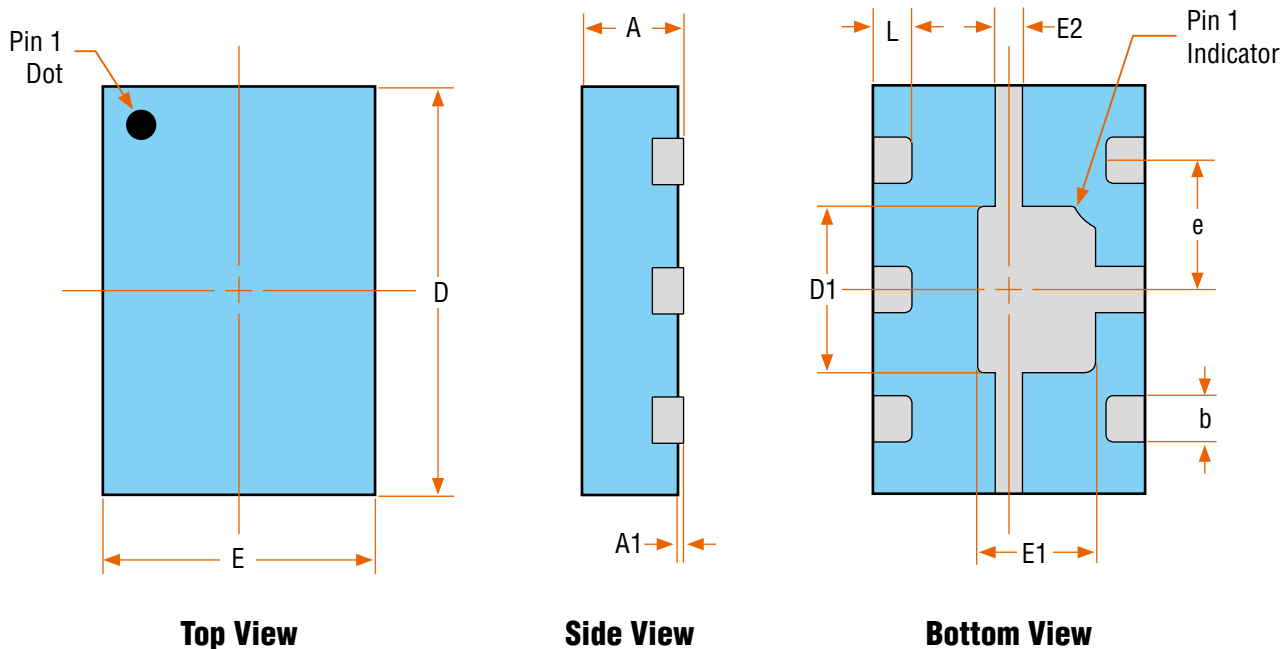
Recommended Footprint Patterns



NOTE :

1. All dimensions are measured in millimeters.
2. Drawing is not to scale.

### Package Dimensions


**Top View**
**Side View**
**Bottom View**

6L QFN 2 X 3 X 0.8 - A		
SYMBOL	MIN	MAX
A	0.700	0.800
A1	0.000	0.050
b	0.250	0.450
D	2.900	3.100
D1	1.072	1.372
e	0.950 BSC	
E	1.900	2.100
E1	0.691	1.041
E2	0.150	0.250
L	0.217	0.367

**NOTE :**

1. All dimensions are measured in millimeters.
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## Customer Service

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