Data Sheet

RTC66006

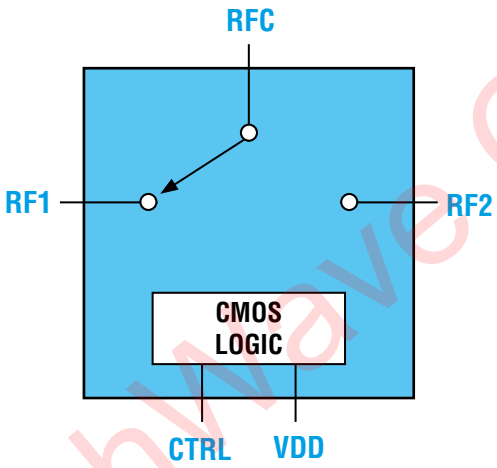
0.1 to 2.7 GHz Medium Power SPDT RF Switch

AUG 2021 - Ver. 0.4

Description

The RTC66006 is a high performance single-pole double-throw (SPDT) RF switch operating from 0.1 to 2.7 GHz which is ideal for use in general-purpose RF switching applications. This device is processed in advanced CMOS technology featuring low insertion loss, low control voltage, and high isolation. The RTC66006 is packaged in 6-pin ultra-small SC-70 package with lead-free RoHS compliant.

Functional Block Diagram



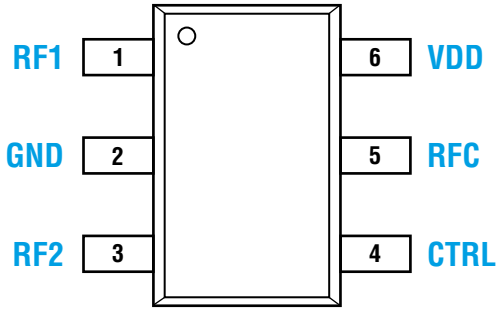
Features

- Operating Frequency : 0.1 – 2.7 GHz
- Single supply voltage : 3.0 V
- Low insertion loss :
  - 0.55 dB @ 1 GHz
  - 0.75 dB @ 2 GHz
- High isolation :
  - 31 dB @ 1 GHz
  - 22 dB @ 2 GHz
- High input P0.1dB : 32 dBm
- Ultra-small SC-70 6-pin package
- RoHS Compliant, Pb-free, Halogen Free
- Moisture Sensitivity Level : MSL 3

Applications

- General purpose medium-power switch applications

Pin Assignments



Top View Through Package

Pin No.	Pin Name	Description
1	RF1	RF Port 1, DC blocking capacitor is needed
2	GND	Ground
3	RF2	RF Port 2, DC blocking capacitor is needed
4	CTRL	DC control pin
5	RFC	Antenna port, DC blocking capacitor is needed
6	VDD	Supply voltage

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Supply Voltage	VDD	+5	V
Control Voltage	CTRL	+4	V
Max Input Power (T_A = +25 °C)	P_{IN}	+32	dBm
Operating temperature	T_A	-40 to +105	°C
Storage temperature	T_{STG}	-65 to +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		2.7	GHz
Supply Voltage	VDD	1.8	3.0	3.6	V
Control Voltage High	CTRL(H)	1.35	1.8	3.3(*)	V
Control Voltage Low	CTRL(L)	-0.4	0	0.4	V

(*) VC should not exceed VDD.

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

Truth Table

CTRL	Low Insertion Loss Path
H	RFC – RF1
L	RFC – RF2

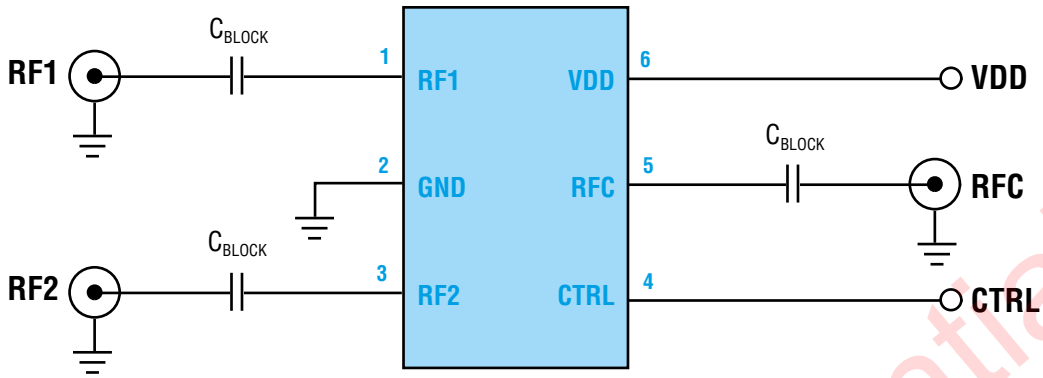
NOTE: Any modes other than those listed above are not supported.

Electrical Specifications

T_A = +25 °C, 50 Ω system with VDD = 3.0 V, CTRL = 0/1.8 V, P_{IN} = 0 dBm, unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Operating Frequency	f		0.1		2.7	GHz
Insertion Loss (RFC to RF1/RF2)	IL_1	0.1 – 0.5 GHz		0.50		dB
	IL_2	0.5 – 1.0 GHz		0.55		dB
	IL_3	1.0 – 2.0 GHz		0.75		dB
	IL_4	2.0 – 2.7 GHz		0.85		dB
Isolation (RFC to RF1/RF2)	Iso_1	0.1 – 0.5 GHz		36		dB
	Iso_2	0.5 – 1.0 GHz		31		dB
	Iso_3	1.0 – 2.0 GHz		22		dB
	Iso_4	2.0 – 2.7 GHz		22		dB
Isolation (RF1 to RF2)	Iso_5	0.1 – 0.5 GHz		38		dB
	Iso_6	0.5 – 1.0 GHz		33		dB
	Iso_7	1.0 – 2.0 GHz		25		dB
	Iso_8	2.0 – 2.7 GHz		25		dB
Return Loss (RFC to RF1/RF2)	RL_1	0.1 – 0.5 GHz		28		dB
	RL_2	0.5 – 1.0 GHz		23		dB
	RL_3	1.0 – 2.0 GHz		19		dB
	RL_4	2.0 – 2.7 GHz		18		dB
2nd Harmonics (RFC to RF1/RF2)	2fo_1	P_{IN} = +25 dBm, CW, @ 900 MHz		-50		dBm
	2fo_2	P_{IN} = +25 dBm, CW, @ 1800 MHz		-45		dBm
	2fo_3	P_{IN} = +25 dBm, CW, @ 2450 MHz		-50		dBm
3rd Harmonics (RFC to RF1/RF2)	3fo_1	P_{IN} = +25 dBm, CW, @ 900 MHz		-56		dBm
	3fo_2	P_{IN} = +25 dBm, CW, @ 1800 MHz		-45		dBm
	3fo_3	P_{IN} = +25 dBm, CW, @ 2450 MHz		-52		dBm
Spurious Performance (RFC to RF1/RF2)	P_{SPUR}	108 to1218 MHz@100kHz offset		-167		dBm/ Hz
Input Power for 0.1 dB Compression	$P_{0.1dB}$	@ 900 MHz, 1800 MHz, and 2700 MHz		32		dBm
Switching Time	tsw	50% VC to 90/10% RF		210		ns
Supply Current	Idd	VDD = 3 V, CTRL = 1.8 V		5		μA
Control Current	Ictl	VDD = 3 V, CTRL = 1.8 V		1		μA

Application Circuits



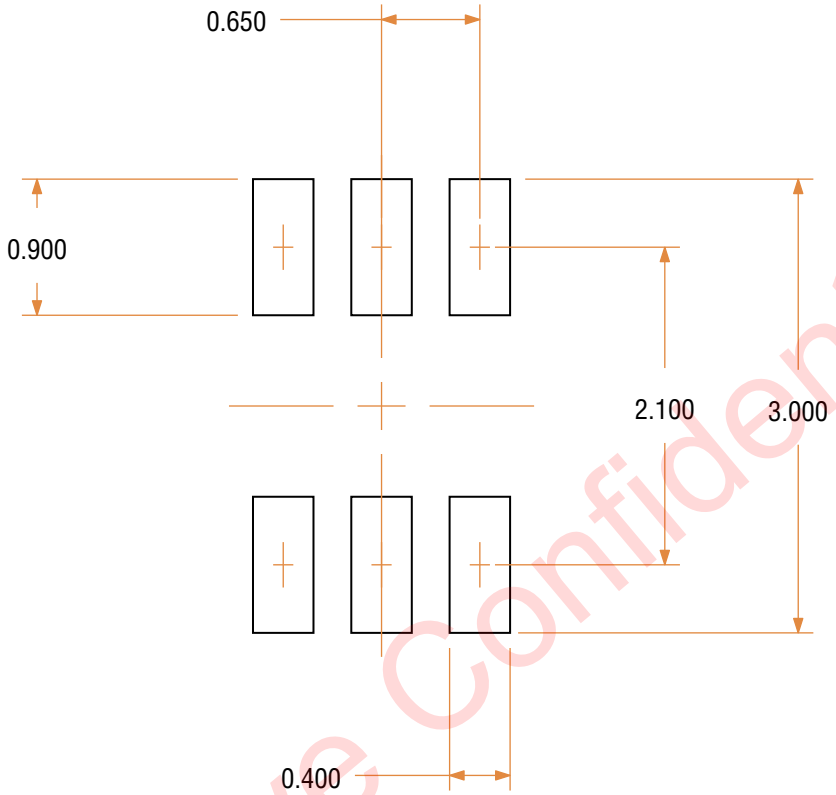
NOTE :

1. DC blocking capacitors C_{BLOCK} = 68 pF are required on all RF ports for operating frequency 0.5 ~ 2.7 GHz. C_{BLOCK} = 10 nF for operating frequency 0.1 ~ 0.5 GHz.
2. 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		RTC66006	RichWave	
C_{BLOCK}	68 pF	DC blocking capacitor	Walsin	0402N680J500LT
	10 nF	DC blocking capacitor	Walsin	0402B103K250CT

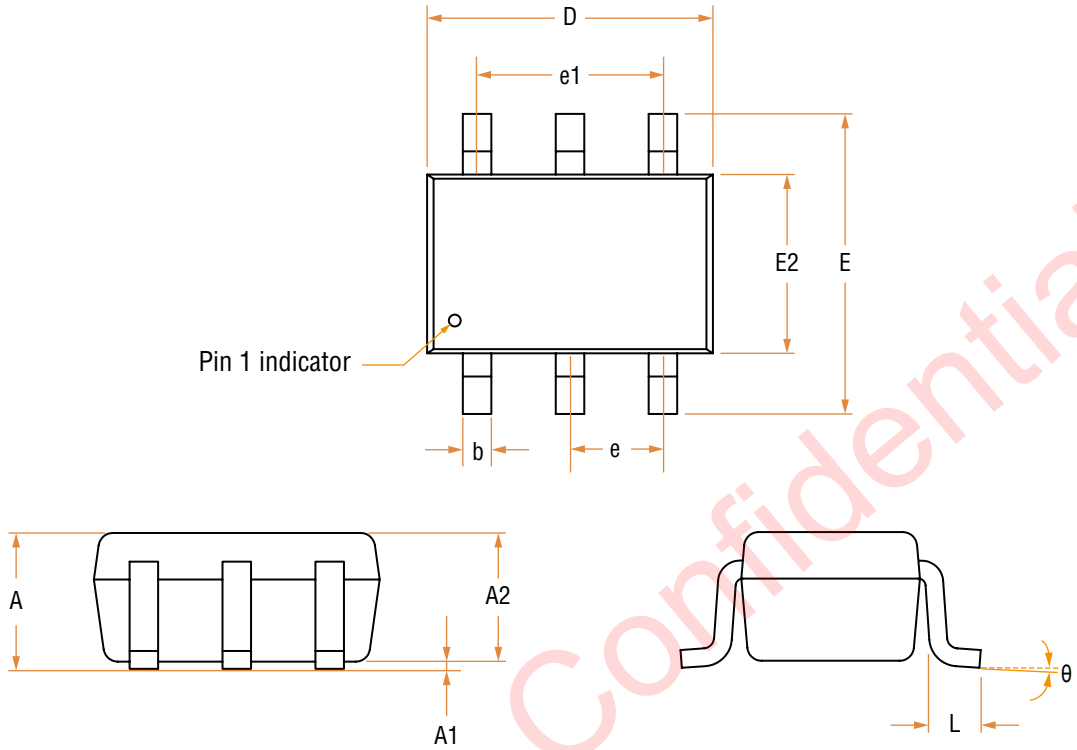
Recommended Footprint Patterns



NOTE :

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

Package Dimensions



6L SC-70			
SYMBOL	**MIN**	**TYP**	**MAX**
A	0.800	0.950	1.100
A1	0.000	0.050	0.100
A2	0.700	0.900	1.000
b	0.150	0.250	0.350
D	1.800	2.000	2.200
L	0.260	0.360	0.460
e		0.650 BSC	
e1	1.200	1.300	1.400
E	1.950	2.200	2.450
E2	1.150	1.250	1.350
θ	0°	4°	8°

NOTE :

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

Customer Service

RichWave Technology Corp.
3F, No.1, Alley 20, Lane 407. Sec.2, Tiding Bvd., Neihu Dist., Taipei City 114, Taiwan, R.O.C.
TEL +886-2-87511358 FAX +886-2-66006887
www.richwave.com.tw

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