DATA SHEET

SKY13575-639LF: Dual-Band Matched SP4T Wi-Fi Switch

Applications

- Dual-band WLAN
- 3G/4G LTE systems
- WLAN 802.11a/b/g/n/ac

Features

- Off ports matched to 50 Ω
- Low insertion loss: 0.6 dB at 2.5 GHz, 1.1 dB at 6 GHz (typical)
- High isolation: 40 dB at 2.5 GHz, 30 dB at 6 GHz (typical)
- Integrated GPIO interface
- Small QFN (14-pin, 1.6 × 1.6 × 0.45 mm) package (MSL1, 260 °C per JEDEC J-STD-020)

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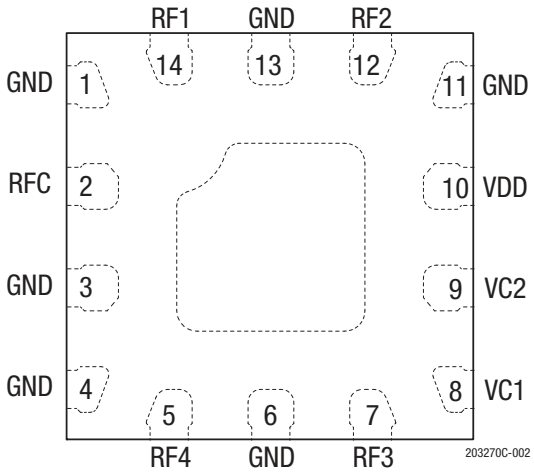


Figure 2. SKY13575-639LF Pinout (Top View)

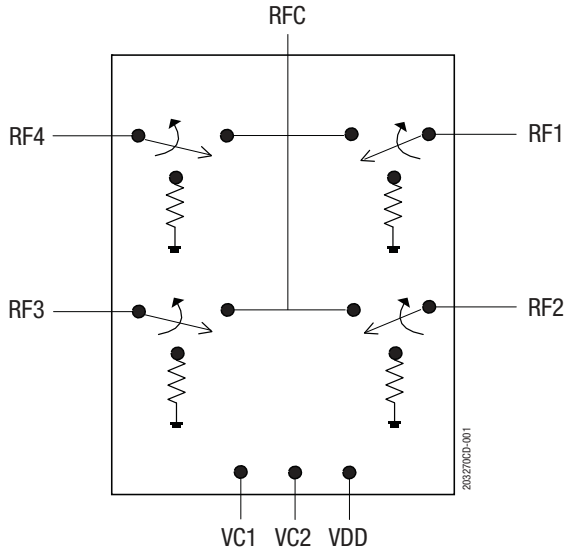


Figure 1. SKY13575-639LF Block Diagram

Description

The SKY13575-639LF is a dual-band single-pole, four-throw switch with an integrated 50 Ω match on all RF output ports. External DC blocking capacitors are required on the RF paths. The switch can operate over the temperature range of -40°C to 90 °C.

Switching is controlled by two CMOS/TTL compatible control voltage inputs: VC1 and VC2. Depending upon the logic voltage level applied to the control pins, the RFC pin is connected to one of four switched RF outputs (RF1 to RF4) by a low insertion loss path, while the path between the RFC pin and the other RF pins is in isolation. The isolated ports are terminated to a 50 Ω load.

The SKY13575-639LF is packaged in a small, 14-pin, 1.6 × 1.6 × 0.45 mm QFN package.

A functional block diagram is shown in Figure 1. The pin configuration and package are shown in Figure 2. Signal pin assignments and functional descriptions are provided in Table 1.

Table 1. SKY13575-639LF Pin Descriptions[1]

Pin	Name	Description	Pin	Name	Description
1	GND	Ground	8	VC1	Control voltage 1
2	RFC	RF common port	9	VC2	Control voltage 2
3	GND	Ground	10	VDD	Battery voltage
4	GND	Ground	11	GND	Ground
5	RF4	RF output port 4	12	RF2	RF output port 2
6	GND	Ground	13	GND	Ground
7	RF3	RF output port 3	14	RF1	RF output port 1

[1] Exposed pads must be grounded

Electrical and Mechanical Specifications

The absolute maximum ratings of the SKY13575-639LF are provided in Table 2.

Electrical specifications are provided in Table 3. The SKY13575-639LF logic truth is shown in Table 4.

Table 2. SKY13575-639LF Absolute Maximum Ratings[1]

Parameter	Symbol	Condition	Minimum	Maximum	Units
Supply voltage	V_{DD}	T = 25 °C		3.7	V
Control voltage	V_{C1}, V_{C2}	T = 25 °C	-0.5	3.3	V
RF input power	RF_{IN}	Peak power at RFC port, T = 25 °C; 50 Ω		+32	dBm
Output port 50 Ω power handling	50 Ω P_{MAX}	Maximum power applied to the output port in isolation mode		+15	dBm
Operating case temperature	$T_{CASEMAX}$		-40	+90	°C
Storage temperature	T_{STORE}		-55	+150	°C

[1] Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

***ESD HANDLING**: Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD when handling or transporting. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD handling precautions should be used at all times.*

Table 3. SKY13575-639LF Electrical Specifications[1]
(V_{DD} = 3.3 V, V_{C1} = V_{C2} = High = 3.0 V, P_{IN} = 0 dBm, T_{OP} = +25 °C, Characteristic Impedance [Z_0] = 50 Ω, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Small Signal						
Insertion loss (RFC to RF1,2,3,4)	IL	0.1 to 2.4 GHz 2.4 to 2.5 GHz 4.8 to 6.0 GHz		0.6 0.6 1.1	0.8 0.9 1.4	dB dB dB
Isolation (RFC to RF1,2,3,4)	Iso	0.1 to 2.4 GHz 2.4 to 2.5 GHz 4.8 to 6.0 GHz	35 35 26	40 40 30		dB dB dB
Output return loss in isolation state (RF1,2,3,4)	RL_Off Port	2.4 to 2.5 GHz 4.8 to 6.0 GHz	14	17 10.5		dB dB
Large Signal						
LB 2nd harmonics (RFC to RF1,2,3,4)	2fo	fo = 2.4 to 2.5 GHz, P_{IN} = + 20 dBm	65	80		dBc
LB 3nd harmonics (RFC to RF1,2,3,4)	3fo	fo = 2.4 to 2.5 GHz, P_{IN} = + 20 dBm	70	80		dBc
HB 2nd harmonics (RFC to RF1,2,3,4)	2fo	fo = 4.8 to 6.0 GHz, P_{IN} = + 20 dBm	52	70		dBc
HB 3nd harmonics (RFC to RF1,2,3,4)	3fo	fo = 4.8 to 6.0 GHz, P_{IN} = + 20 dBm	60	70		dBc
LB EVM power (RFC to RF1,2,3,4)	P_EVM_LB	fo = 2.45 GHz, input power for 2.5% error, 802.11g, 54 Mbps	25	27		dBm
HB EVM power (RFC to RF1,2,3,4)	P_EVM_HB	fo = 5.8 GHz, input power for 2.5% error, 802.11g, 54 Mbps	25	27		dBm
LB input IP3 (RFC to RF1,2,3,4), +20 dBm input power	LB_IIP3	Two tones, 1 MHz spacing, fo = 2.4 to 2.5 GHz	+52	+55		dBm
HB Input IP3 (RFC to RF1,2,3,4), +20 dBm input power	HB_IIP3	Two tones, 1 MHz spacing fo = 4.8 to 6.0 GHz	+52	+55		dBm
DC Operating						
Supply voltage	V_{DD}	T = 25 °C	2.5	3.3	3.5	V
Control voltage high	V_{C1_H}, V_{C2_H}	T = 25 °C	2.5	3.0	3.3	V
Control voltage low	V_{C1_L}, V_{C2_L}	T = 25 °C		0	0.45	V
Supply current	I_{DD}	T = 25 °C		8	10	µA
Switching speed	SS	50 % CTL to 90 % RF 50 % CTL to 10 % RF		400	500	ns
Rise/fall time	t_{ON}/t_{OFF}	10% RF to 90 % RF 90 % RF to 10 % RF			500	ns
Startup time	t_{START}	From V_{DD} off to V_{DD} on		500	1000	ns

[1] Performance is guaranteed only under the conditions listed in this table.

Table 4. Logic Truth Table[1]

Low-Loss Path	VC1	VC2
RFC to RF1	L	L
RFC to RF2	L	H
RFC to RF3	H	L
RFC to RF4	H	H

[1] H = 2.5 to 3.3 V
L = 0 to 0.45 V

Evaluation Board Description

The SKY13575-639LF Evaluation Board is used to test the performance of the SKY13575-639LF.

An Evaluation Board schematic diagram is provided in Figure 3. Figure 4 shows the Evaluation Board assembly diagram.

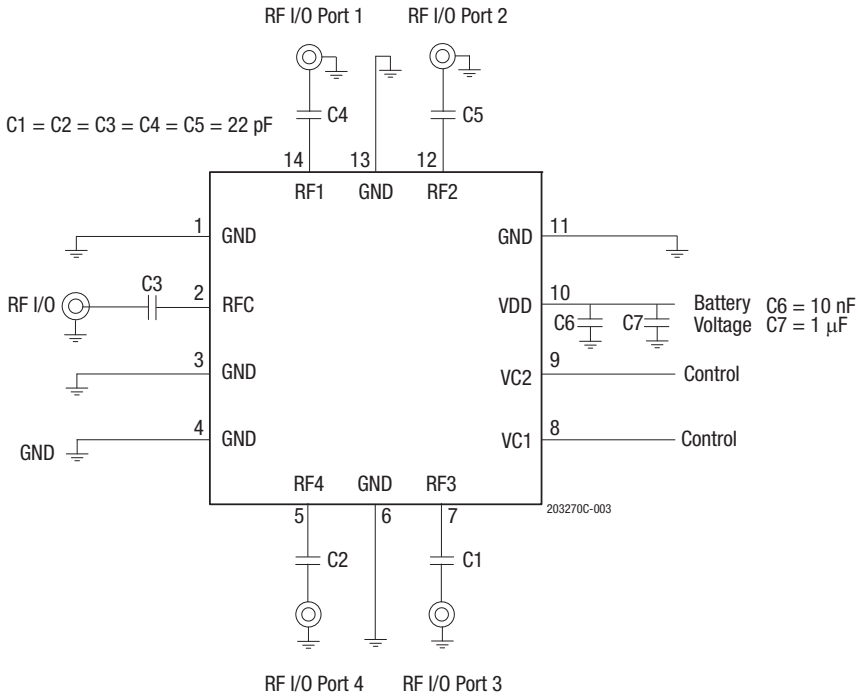


Figure 3. SKY13575-639LF Evaluation Board Schematic

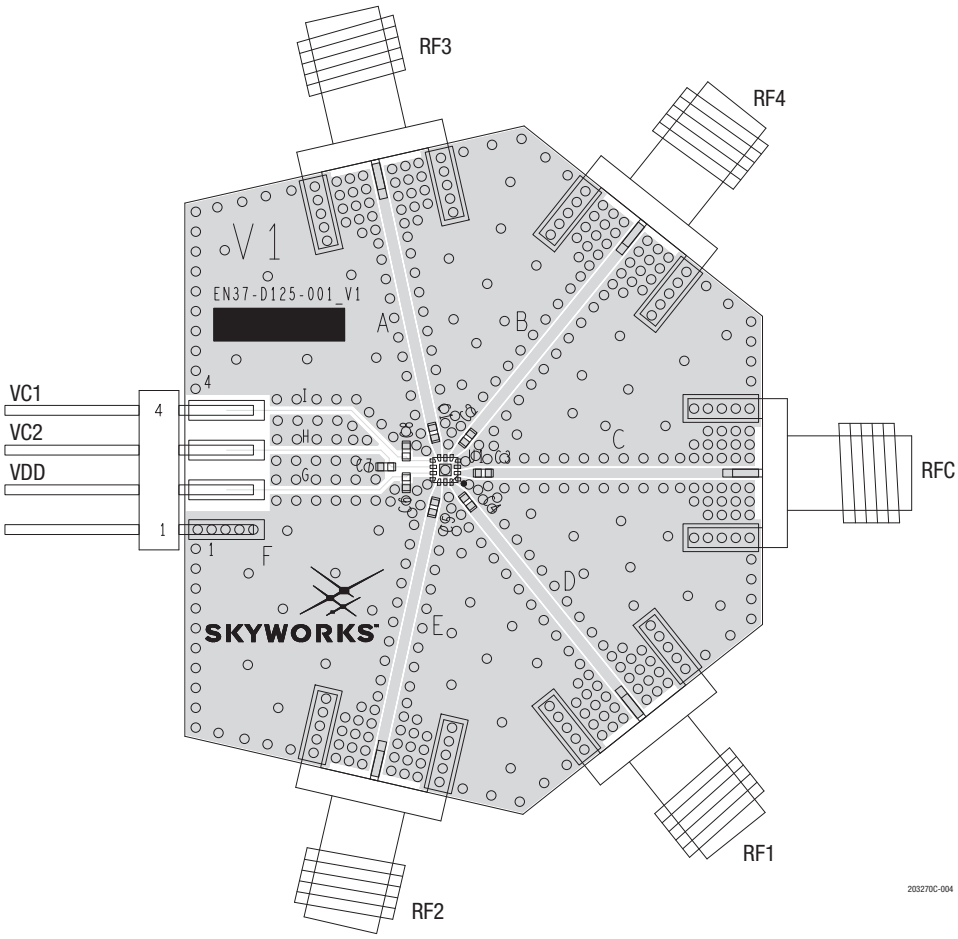


Figure 4. SKY13575-639LF Evaluation Board Assembly Diagram

Package Dimensions

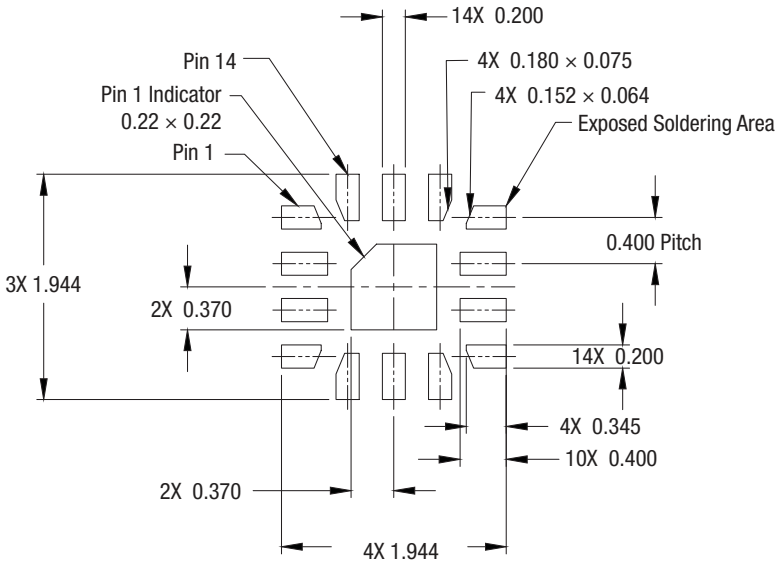
The PCB layout footprint for the SKY13575-639LF is provided in Figure 5. Typical part markings are shown in Figure 6. Package dimensions are shown in Figure 7, and tape and reel dimensions are provided in Figure 8.

Package and Handling Information

Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The SKY13575-639LF is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C. It can be used for lead or lead-free soldering. For additional information, refer to the Skyworks Application Note, *Solder Reflow Information*, document number 200164.

Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.



All dimensions are in millimeters.

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Figure 5. SKY13575-639LF PCB Layout Footprint (Bump Side Down)

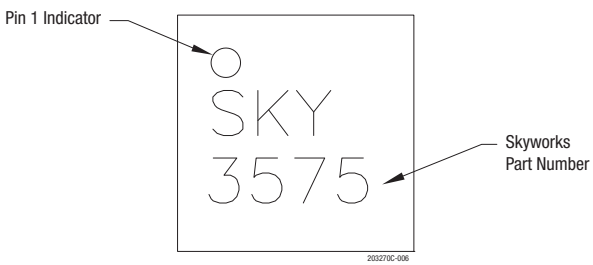
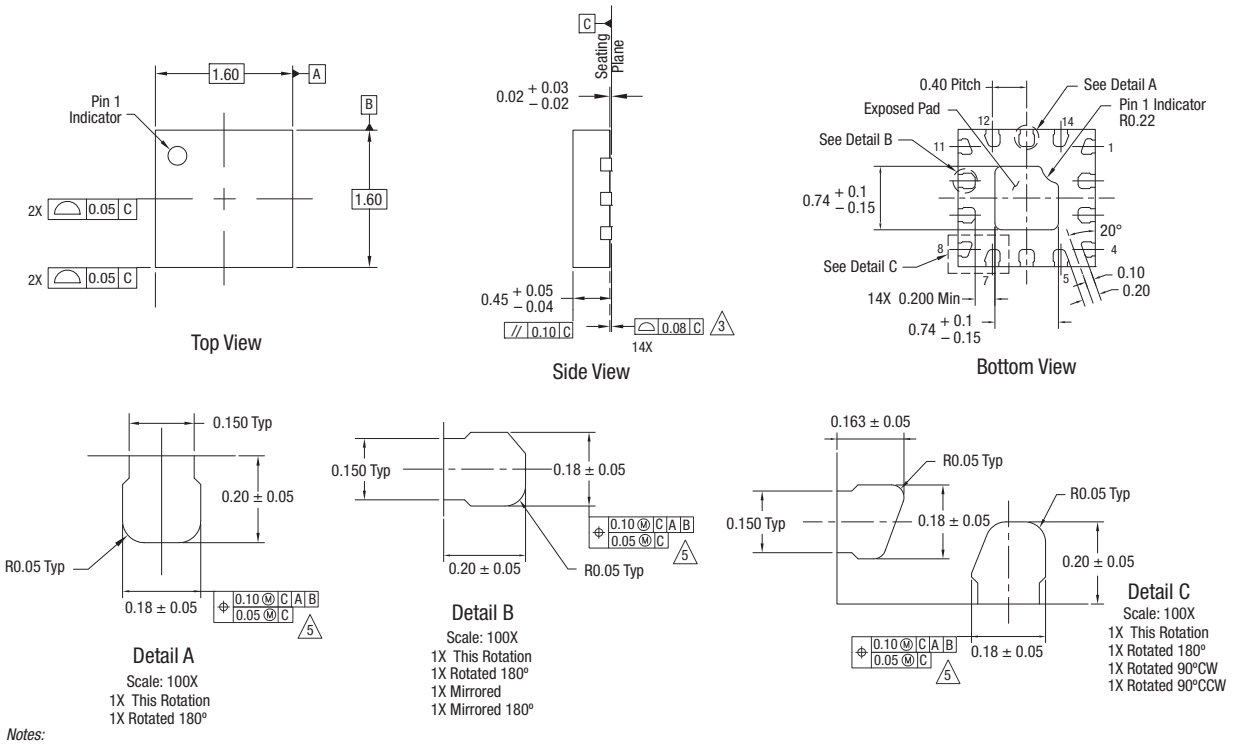


Figure 6. Typical Part Markings (Top View)



Notes:

1. All dimensions are in millimeters.
2. Dimensions and tolerances per ASME Y14.5M-1994.
3. Coplanarity applies to the terminal and all other bottom surface metallization.
4. Plating requirements per source control drawing (SCD) 2504.
5. Dimension applies to metallized terminal. If the terminal has a radius on its end, the width dimension should not be measured in the radius area.

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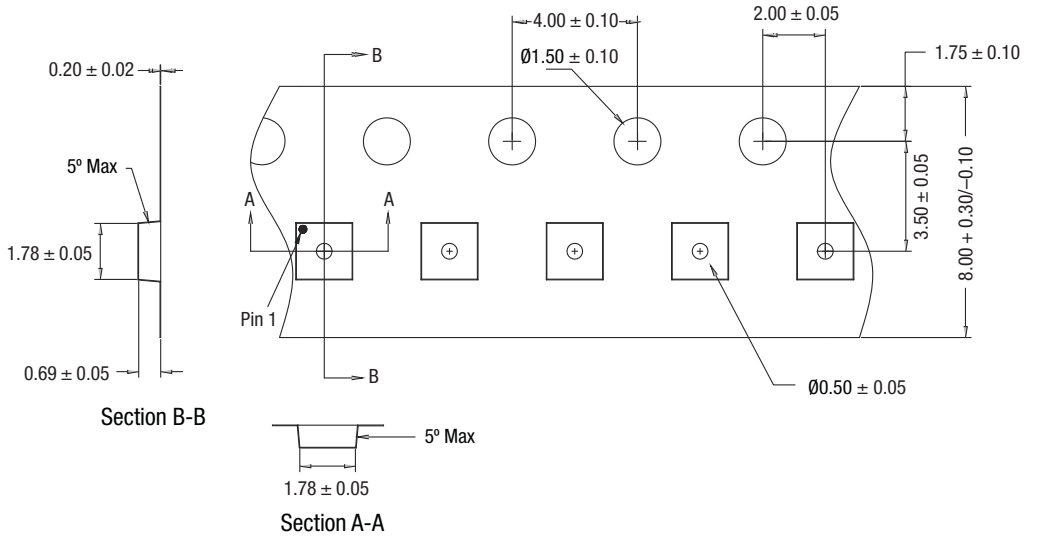
Figure 7. SKY13575-639LF Package Dimensions



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All measurements are in millimeters unless otherwise stated.

Figure 8. SKY13575-639LF Tape and Reel Dimensions

Ordering Information

Part Number	Product Description	Evaluation Board Part Number
SKY13575-639LF	Dual-Band Matched SP4T Wi-Fi Switch	SKY13575-639LF-EVB

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