

## DATA SHEET

# SKY13274-349LF: PHEMT SP2T Switch

## 0.5–6.0 GHz

### Features

- Positive low voltage control (0/+3 V)
- Low insertion loss (0.8 dB typ. @ 6 GHz)
- High Rx isolation (28 dB @ 6 GHz)
- Tx port termination
- Miniature QFN-8 pin plastic package (2 x 2 mm)
- PHEMT process
- Lead (Pb)-free and RoHS-compliant

### Description

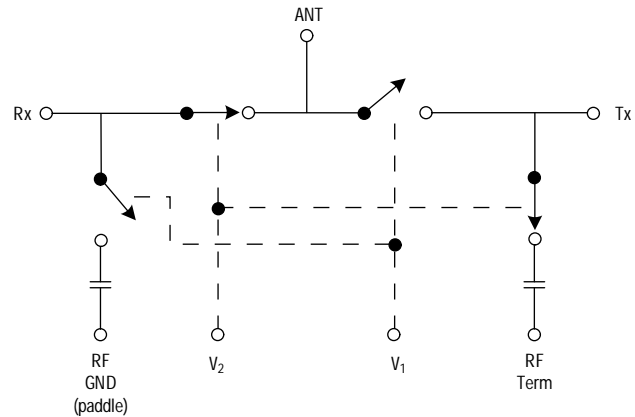
The SKY13274-349LF is a PHEMT AlGaAs single-pole, double-throw switch designed for use as a transmit receive (TR) switch for ultra-wideband (UWB) transceivers. This switch offers excellent insertion loss and isolation over wide bandwidth. It features a terminated transmit input port, which is provided via an external termination resistor for added versatility. The receiver output port is reflective. The switch is controlled with single-polarity control voltage of 3 V and 0 V, and is also compatible with control voltage as high as 7 V.

This switch is packaged in the surface mount QFN-8 package, which is lead (Pb)-free and meets all current RoHS requirements.

**NEW** Skyworks offers lead (Pb)-free, RoHS (Restriction of Hazardous Substances)-compliant packaging.



### Functional Block Diagram



**Electrical Specifications at 25 °C** **$Z_0 = 50 \Omega$ ,  $V_{CTL} = 0/3 V$ , unless otherwise noted**

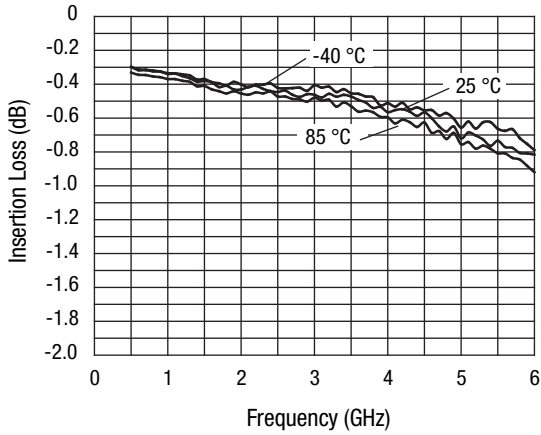
Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit	
Insertion loss	Tx-Ant, Rx-Ant	0.5–3.0 GHz		0.5	0.7	dB	
		3.0–6.0 GHz		0.8	1.0	dB	
Isolation	Tx-Ant	0.5–3.0 GHz	22	25		dB	
		3.0–6.0 GHz	14	17		dB	
	Rx-Ant	0.5–3.0 GHz	27	30		dB	
		3.0–6.0 GHz	23	26		dB	
Return loss	Tx-Ant, Rx-Ant (insertion loss)	0.5–3.0 GHz		20		dB	
		3.0–6.0 GHz		15		dB	
	Tx-Ant (isolation)	0.5–3.0 GHz		20		dB	
		3.0–6.0 GHz		15		dB	
	Rx-Ant (isolation)	0.5–6.0 GHz			Reflective		dB

**Operating Characteristics at 25 °C** **$Z_0 = 50 \Omega$ ,  $V_{CTL} = 0/3 V$ , unless otherwise noted**

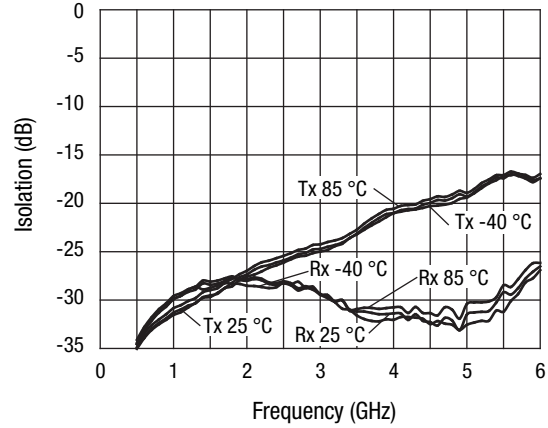
Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching characteristics						
Rise	10/90% RF			100		ns
Fall	90/10% RF			10		ns
On	50% CTL to 90% RF			100		ns
Off	50% CTL to 10% RF			20		ns
Input power for -0.1 dB compression	$V_{CTL} = 0/3 V$	0.5–3 GHz		25		dBm
Input Intermodulation intercept point (IIP3)	2-tone, $\Delta f = 5 \text{ MHz}$ , $V_{CTL} = 0/3 V$	900 MHz		45		dBm
Control voltages	Low ( $V_{LOW}$ )		0		0.2	V
	High ( $V_{HIGH}$ )		2.7		7.0	V
Control Port Current	$V_{CTL} = 3 V$				50	$\mu A$
	$V_{CTL} = 0 V$				20	$\mu A$

**Typical Performance Data**

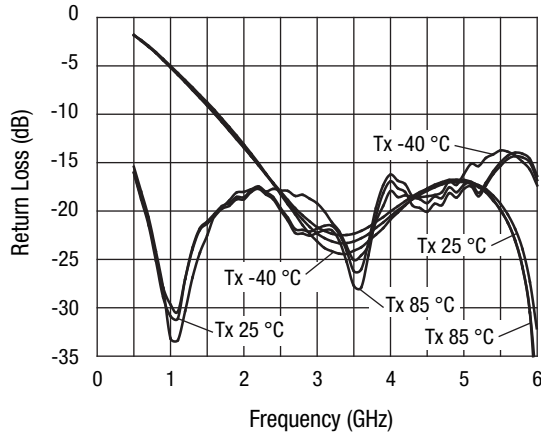
$Z_0 = 50 \Omega$ ,  $V_{CTL} = 0/3 V$ , unless otherwise noted



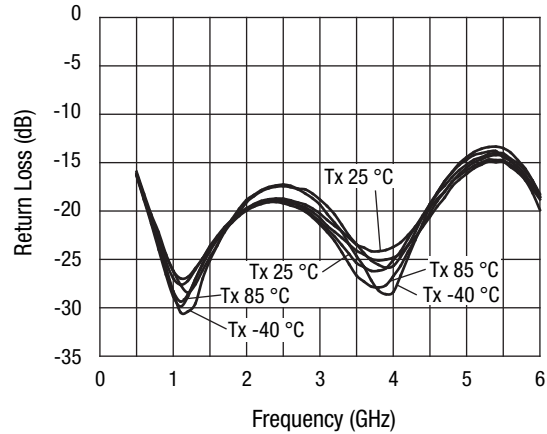
**Insertion Loss vs. Frequency**



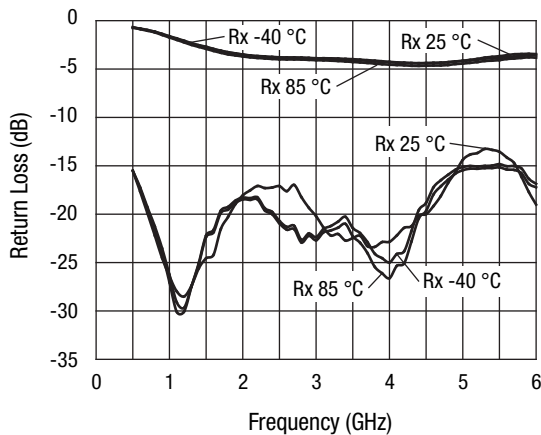
**Isolation vs. Frequency**



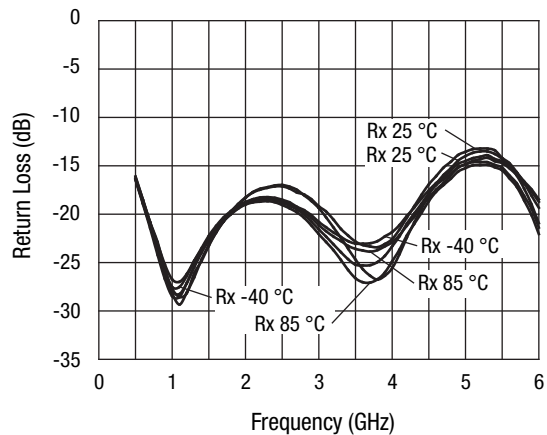
**Return Loss Tx Isolation State vs. Frequency**



**Return Loss Tx Ins. Loss State vs. Frequency**



**Return Loss Rx Isolation State vs. Frequency**



**Return Loss Rx Ins. Loss State vs. Frequency**

### Absolute Maximum Ratings

Characteristic	Value
RF input power	1 W > 500 MHz 0/+7 V control
Control voltage	-0.2 V, +7 V
Operating temperature	-40 °C to +85 °C
Storage temperature	-65 °C to +150 °C
$\Theta_{JC}$	45 °C/W

Performance is guaranteed only under the conditions listed in the specifications table and is not guaranteed under the full range(s) described by the Absolute Maximum specifications. Exceeding any of the absolute maximum/minimum specifications may result in permanent damage to the device and will void the warranty.

**CAUTION:** 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. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.

### Applications

The SKY13274-349LF is designed for use as an UWB TR switch for signal frequencies up to 6 GHz. When the switch is in its receive state with the voltage at pin 1 ( $V_1$ ) low and the voltage at pin 4 ( $V_2$ ) high, the Tx input port is terminated via an external resistor connected between pin 5 ( $R_1$ ) and ground. A 39  $\Omega$  external resistor in this position produces a 50  $\Omega$  (nominal) impedance looking into pin 6.

DC blocking capacitors are required at each of the RF ports. The nominal value for these capacitors is 39 pF. This value should be increased for operation with RF at frequencies below 500 MHz.

The exposed paddle on the back side of the package must be grounded for proper operation.

### Truth Table

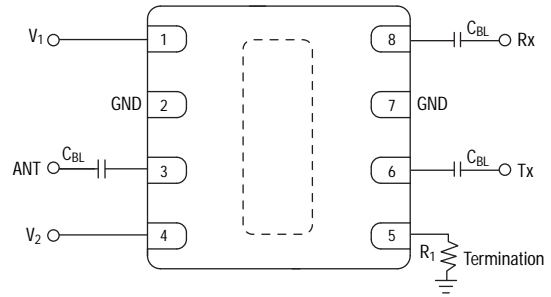
$V_1$	$V_2$	Rx-Ant	Tx-Ant
Low	High	Ins. Loss	Isolation
High	Low	Isolation	Ins. Loss
Low	Low	Not recommended <sup>(1)</sup>	
High	High	Not recommended <sup>(1)</sup>	

Low = 0–0.2 V.

High = 3 V.

1. Switch is in an undefined state.

### Pin Out (Top View)



$C_{BL}$  = 39 pF for operation >500 MHz.

$R_1$  = 39  $\Omega$ .

Exposed paddle on bottom of package needs to be connected to ground.

### Pin Descriptions

Pin Number	Pin Name	Description
1	$V_1$	Control voltage 1 - Control Voltage Input #1. The logic level voltage applied to this pin, along with the level voltage applied to pin 4, determines the states of the RF paths between the Tx, Rx and Ant ports.
2	GND	Equipotential point - Internal circuit common which must be connected to the pcb ground or common via the lowest possible impedance.
3	Ant	RF input/output.
4	$V_2$	Control voltage 2 - Control Voltage Input #2. The logic level voltage applied to this pin, along with the level voltage applied to pin 1, determines the states of the RF paths between the Tx, Rx and Ant ports.
5	Termination	An external termination resistor must be added to this pin for the Tx port to be matched when Tx-Ant path is in its isolation state.
6	Tx	RF input/output.
7	GND	Equipotential point - Internal circuit common which must be connected to the pcb ground or common via the lowest possible impedance.
8	Rx	RF input/output.

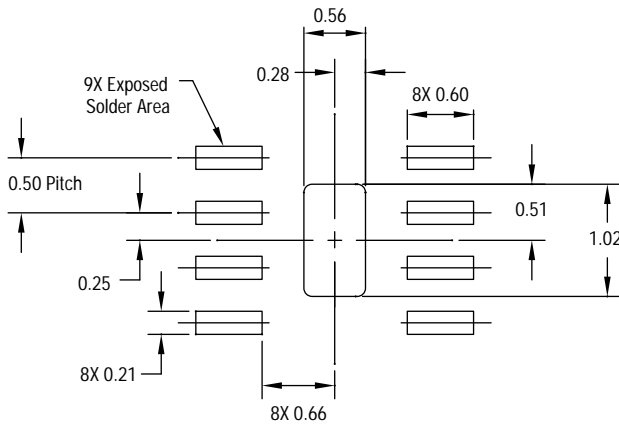
### Recommended Solder Reflow Profiles

Refer to the [“Recommended Solder Reflow Profile”](#) Application Note.

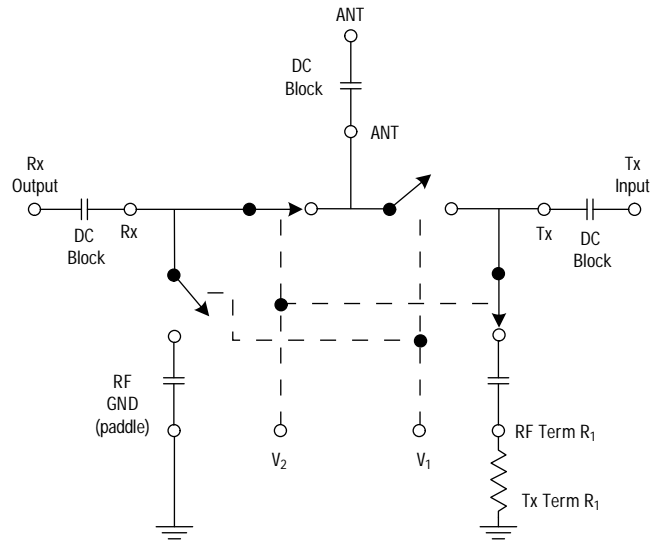
### Tape and Reel Information

Refer to the [“Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation”](#) Application Note.

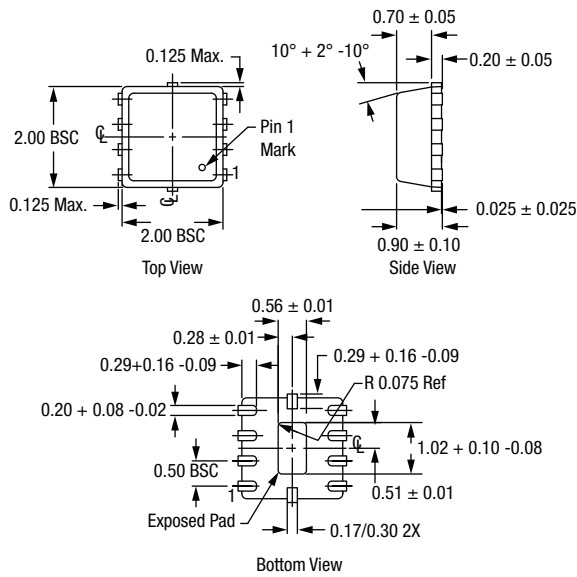
### Suggested Land Pattern



### TR Switch



### QFN-8



All dimensions are in mm.

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