DATA SHEET

SKY13319-374LF: 0.1-3.0 GHz GaAs SPDT Switch

Applications

- Two-way radios
- WiMAX
- WLANs

Features

- Broadband frequency range: 0.1-3.0 GHz
- Low insertion loss: 0.4 dB @ 1 GHz
- High isolation: 25 dB @ 1 GHz
- High P0.1dB: +37 dBm @ 3.3 V
- Operating voltage range from 1.8 to 5.0 V
- Small, MLPD (6-pin, 1.5 x 1.5 mm) Pb-free package (MSL1, 260 °C per JEDEC J-STD-020)

Skyworks Green™ products are compliant with all applicable legislation and are halogen-free. For additional information, refer to *Skyworks Definition of Green™*, document number SQ04-0074.

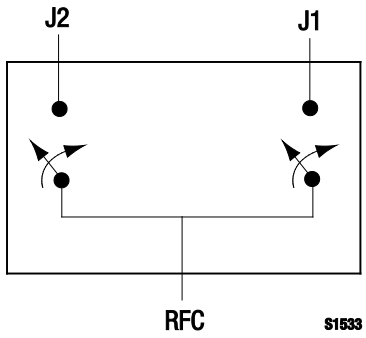


Figure 1. SKY13319-374LF Block Diagram

Description

The SKY13319-374LF is a pHEMT GaAs FET I/C high power switch. The switch is an ideal choice for two-way radios, WiMAX, and WLAN applications where low loss, high isolation, and excellent linearity are key requirements.

The switch is manufactured in a compact, 1.5 x 1.5 mm, 6-pin exposed pad plastic Micro Leadframe Package Dual (MLPD) 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 pin descriptions are provided in Table 1.

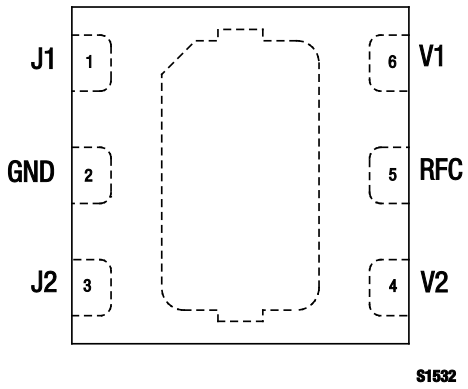


Figure 2. SKY13319-374LF Pinout – 6-Pin MLPD (Top View)

Table 1. SKY13319-374LF Signal Descriptions

Pin #	Name	Description	Pin #	Name	Description
1	J1	RF output (Note 1)	4	V2	DC control voltage
2	GND	Ground	5	RFC	RF common input (Note 1)
3	J2	RF output (Note 1)	6	V1	DC control voltage

Note 1: A 47 pF blocking capacitor is required for >1 GHz operation. Use larger value capacitors for lower frequency operation.

Table 2. SKY13319-374LF Absolute Maximum Ratings

Parameter	Symbol	Minimum	Typical	Maximum	Units
Input power @ 3.3 V (f > 100 MHz)	P_{IN}		+37		dBm
Voltage range	V_{CTL}	1.8		7.0	V
Storage temperature	T_{STG}	–65		+150	°C
Operating temperature	T_{OP}	–40		+85	°C

Note: 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.

***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 should be used at all times.*

Table 3. SKY13319-374LF Recommended Operating Conditions

Parameter	Symbol	Minimum	Typical	Maximum	Units
Frequency	f	0.1		3.0	GHz
Control voltage:					
Low	V_{CTL_L}	0		0.2	V
High	V_{CTL_H}	1.8		5.0	V

Electrical and Mechanical Specifications

The absolute maximum ratings of the SKY13319-374LF are provided in Table 2. The recommended operating conditions are specified in Table 3 and electrical specifications are provided in Table 4.

Typical performance characteristics of the SKY13319-374LF are illustrated in Figures 3 through 7.

The state of the SKY13319-374LF is determined by the logic provided in Table 5.

Table 4. SKY13319-374LF Electrical Specifications (Note 1)
(V_{CTL} = 0 V and +3.3 V, T_{OP} = +25 °C, P_{IN} = 0 dBm, Characteristic Impedance [Z_0] = 50 Ω, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Insertion loss		0.1-1.0 GHz 1.0-2.0 GHz 2.0-3.0 GHz		0.35 0.45 0.60	0.50 0.60 0.75	dB dB dB
Isolation		0.1-1.0 GHz 1.0-2.0 GHz 2.0-3.0 GHz	23 17 15	25 19 17		dB dB dB
Return loss (insertion loss state) (Note 2)		0.1-1.0 GHz 1.0-2.0 GHz 2.0-3.0 GHz		28 26 27		dB dB dB
Switching characteristics: Rise/fall time On/off time		 10/90% or 90/10% RF 50% V_{CTL} to 90/10% RF		 40 80		 ns ns
Video feedthrough				45		mV
Input power for 0.1 dB compression		f = 0.1 to 3.0 GHz: V_{CTL} = 3.3 V V_{CTL} = 3.0 V, V_{CTL} = 1.8 V		 +38 +37 +32		 dBm dBm dBm
Error Vector Magnitude	EVM	Input power for 2.5% error, WLAN 2.45 GHz, 802.11g,b OFDM, 54 Mbps, 64 QAM: 1.8 V 3.0 V 3.3 V		 +21 +32 +33		 dBm dBm dBm
Input IP3	IIP3	P_{IN} = +17 dBm/tone, tone spacing = 1 MHz, f = 0.1 to 3.0 GHz		+60		dBm
2nd harmonic	2fo	P_{IN} = +30 dBm, f = 0.9 GHz		–66		dBc
3rd harmonic	3fo	P_{IN} = +30 dBm, f = 0.9 GHz		–60		dBc
Supply current	I_{CC}			5		µA

Note 1: Performance is guaranteed only under the conditions listed in this Table.

Note 2: Lower frequency return loss is dependent on the DC blocking capacitor value.

Typical Performance Characteristics

(V_{CTL} = 0 V and +3.3 V, T_{OP} = +25 °C, P_{IN} = 0 dBm, Characteristic Impedance [Z_0] = 50 Ω, Blocking Capacitors = 47 pF, Unless Otherwise Noted)

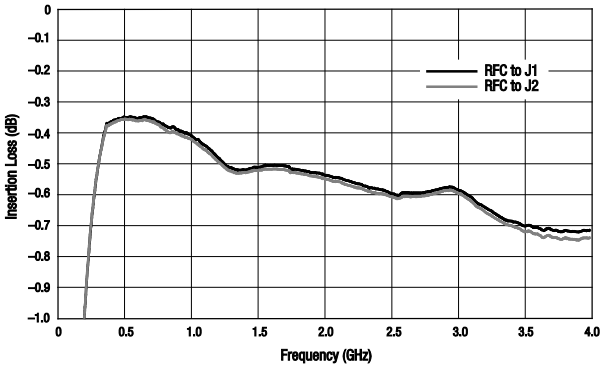


Figure 3. Typical Insertion Loss

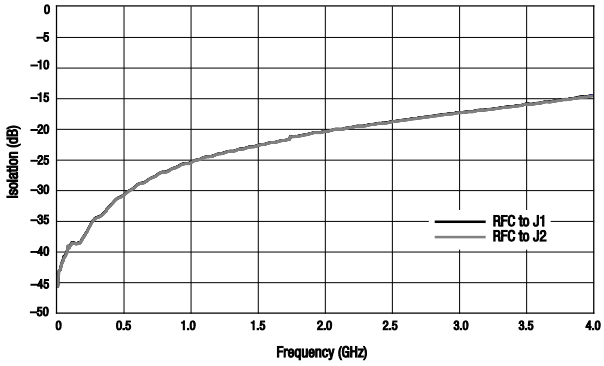


Figure 4. Typical Isolation

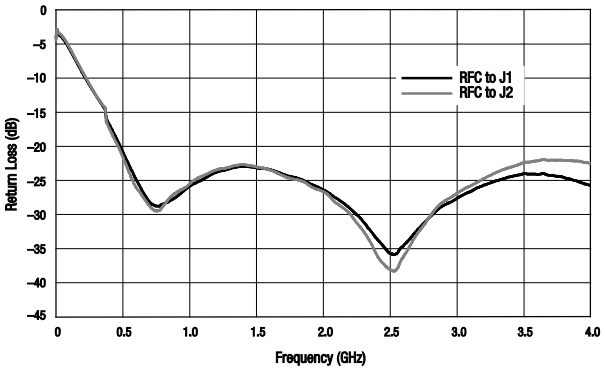


Figure 5. Typical Return Loss

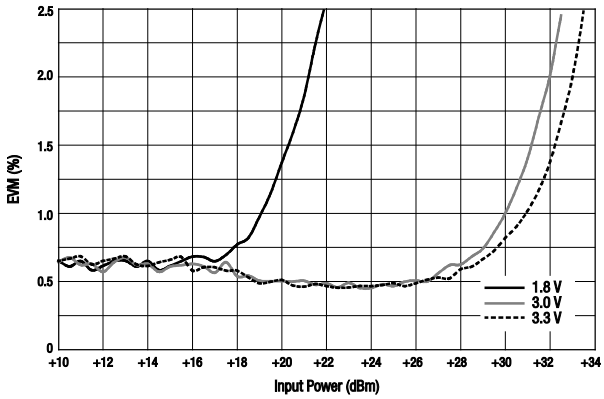


Figure 6. EVM vs Input Power Over Voltage

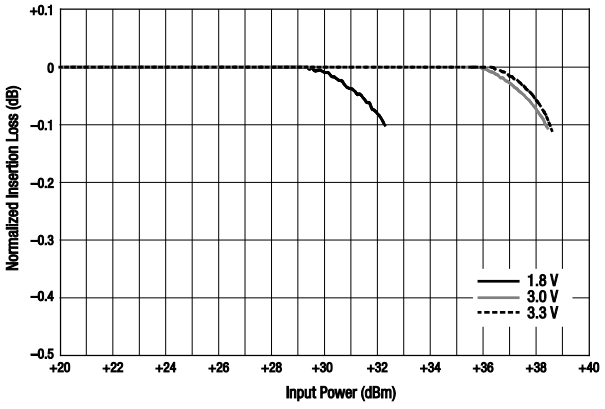


Figure 7. Normalized Insertion Loss vs Input Power Over Voltage

Table 5. SKY13319-374LF Truth Table

V1 (Pin 6)	V2 (Pin 4)	RFC to J1 Path	RFC to J2 Path
1	0	Insertion loss	Isolation
0	1	Isolation	Insertion loss
1	1	undefined	undefined
0	0	undefined	undefined

Note: "1" = +1.8 V to +5 V. "0" = 0 V to +0.2 V. Any state other than described in this Table places the switch into an undefined state. An undefined state will not damage the device.

Evaluation Board Description

The SKY13319-374LF Evaluation Board is used to test the performance of the SKY13319-374LF SPDT Switch. An Evaluation Board schematic diagram is provided in Figure 8. An assembly drawing for the Evaluation Board is shown in Figure 9.

Package Dimensions

The PCB layout footprint for the SKY13319-374LF is provided in Figure 10. Typical case markings are shown in Figure 11. Package dimensions for the 6-pin MLPD are shown in Figure 12, and tape and reel dimensions are provided in Figure 13.

Package and Handling Information

Since the device package is sensitive to moisture absorption, it is baked and vacuum packed before shipping. 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 SKY13319-374LF 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.

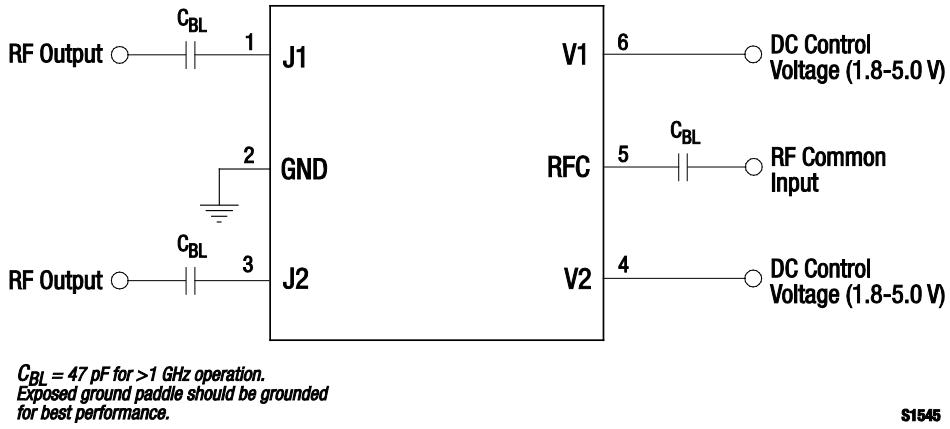


Figure 8. SKY13319-374LF Evaluation Board Schematic

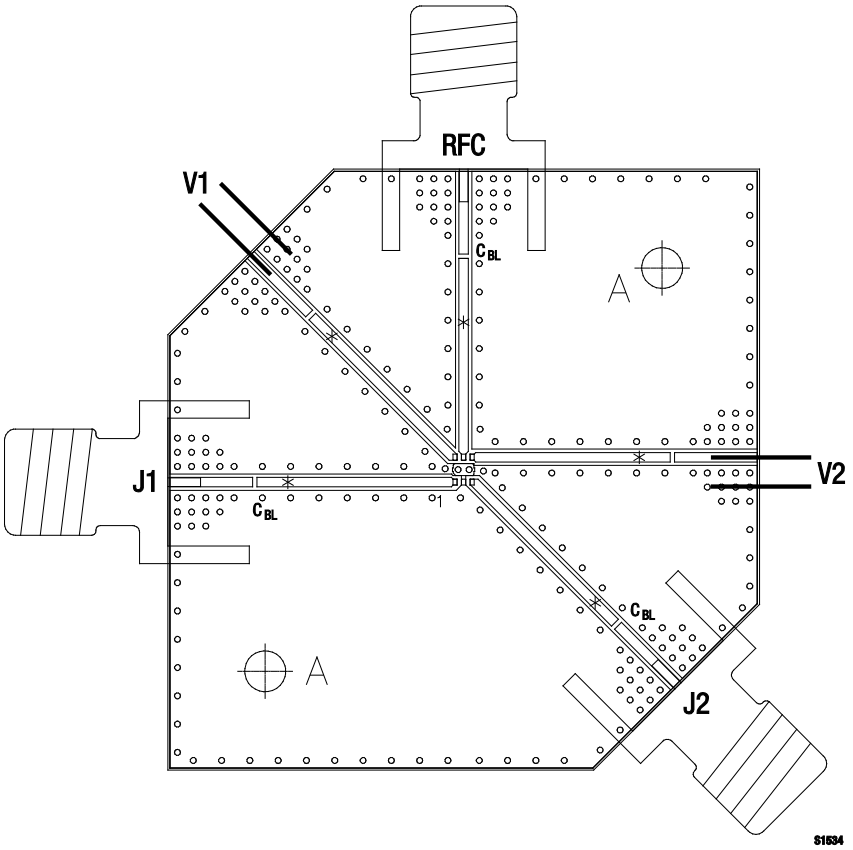


Figure 9. SKY13319-374LF Evaluation Board Assembly Diagram

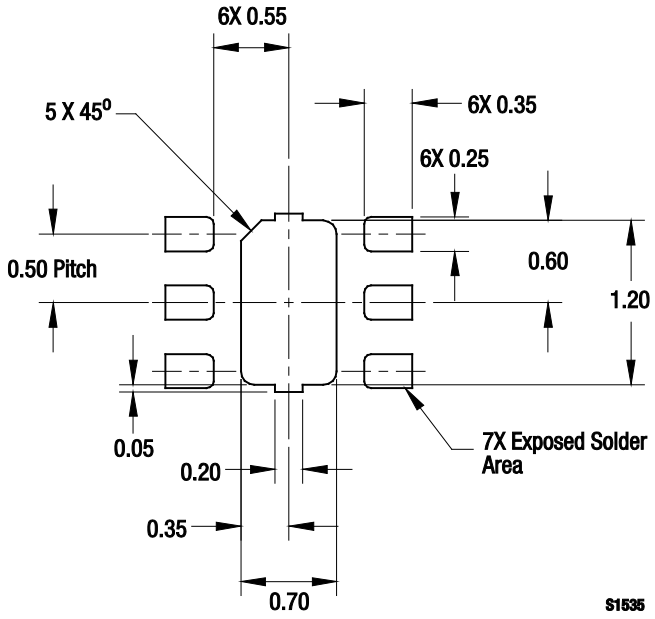


Figure 10. SKY13319-374LF PCB Layout Footprint
(Top View)

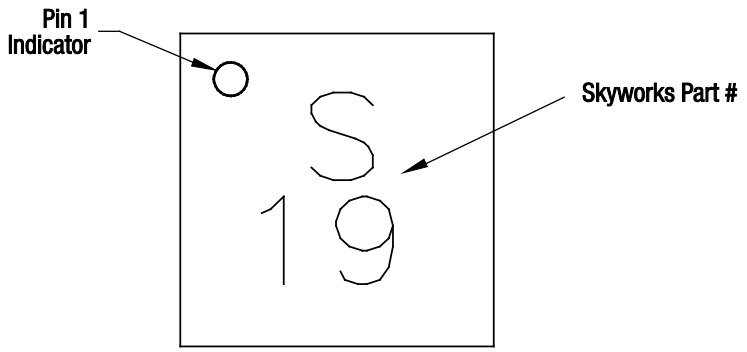
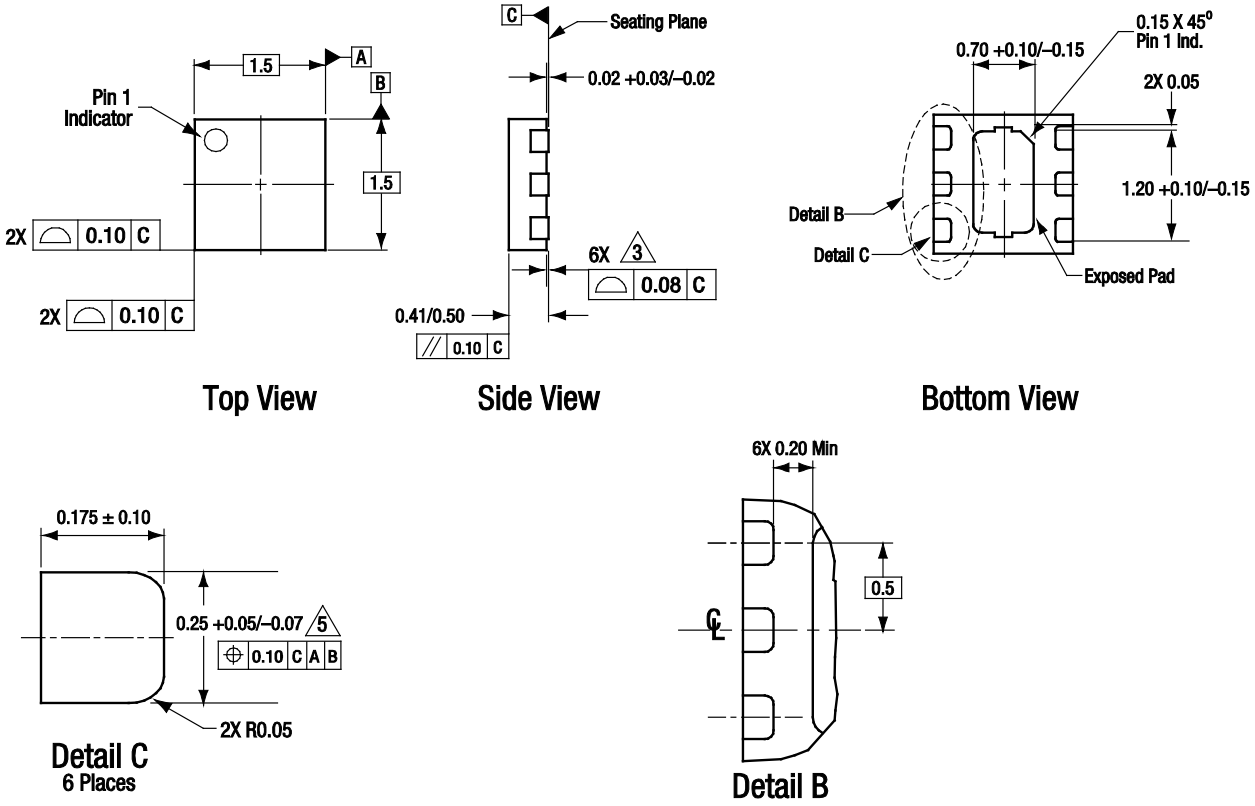


Figure 11. Typical Part Markings (Top View)



All measurements are in millimeters.
Dimensioning and tolerancing according to ASME Y14.5M-1994.
Coplanarity applies to the exposed heat sink slug as well as the terminals..
Plating requirement per source control drawing (SCD) 2504.
Dimension applies to metalized terminal and is measured between 0.15 mm and 0.30 mm from terminal tip.

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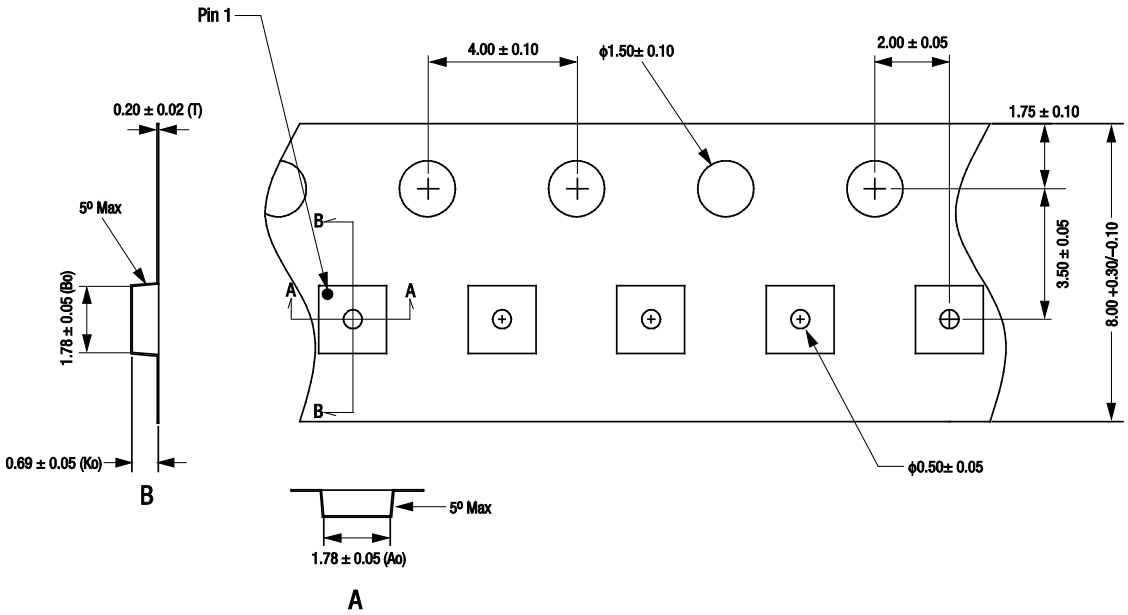
Figure 12. SKY13319-374LF 6-Pin QFN Package Dimensions



Notes:
1. *Carrier tape: black conductive polycarbonate or polystyrene.*
2. *Cover tape material: transparent conductive PSA.*
3. *Cover tape size: 5.4 mm width.*
4. *All measurements are in millimeters.*

S1382a

Figure 13. SKY13319-374LF Tape and Reel Dimensions

Ordering Information

Model Name	Manufacturing Part Number	Evaluation Board Part Number
SKY13319-374LF SPDT Switch	SKY13319-374LF	SK41102-3, Rev. 1