DATA SHEET

SKY13321-360LF: 0.1-3.0 GHz GaAs SPDT Switch

Applications

- Higher power applications with excellent linearity performance
- WiMAX systems

Features

- Positive voltage control (0 to 1.8 V)
- High isolation, 26 dB typical @ 1 GHz
- Low loss, 0.4 dB typical @ 1 GHz
- Excellent linearity performance, P-0.1dB insertion point @ +39 dBm
- Small, QFN (8-pin, 2 x 2 mm) package (MSL1, 260 °C per JEDEC J-STD-020)

NEW

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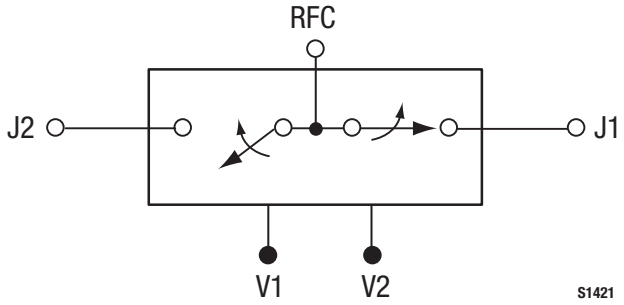


Figure 1. SKY13321-360LF Block Diagram

Description

The SKY13321-360LF is a pHEMT GaAs FET I/C switch. The switch may be used in transmit/receive applications by connecting the RF common port (RFC, pin 7) to either the J1 or J2 port (pin 1 or 4, respectively) using a low loss path (i.e., a positive voltage applied to either V1 or V2 pins).

The switch is manufactured in a compact, 2 x 2 mm, 8-pin exposed pad plastic Quad Flat No-Lead (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 pin descriptions are provided in Table 1.

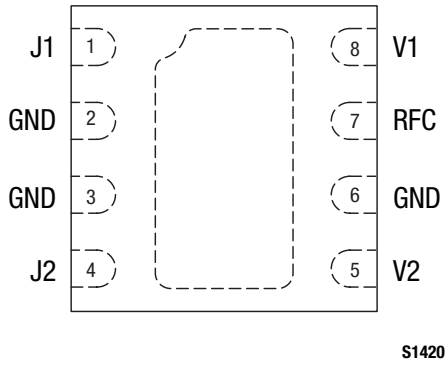


Figure 2. SKY13321-360LF Pinout – 8-Pin QFN (Top View)

Table 1. SKY13321-360LF Signal Descriptions

Pin #	Name	Description	Pin #	Name	Description
1	J1	RF port	5	V2	DC control voltage
2	GND	Ground	6	GND	Ground
3	GND	Ground	7	RFC	RF port
4	J2	RF port	8	V1	DC control voltage

Table 2. SKY13321-360LF Absolute Maximum Ratings

Parameter	Symbol	Minimum	Typical	Maximum	Units
Input power @ 900 MHz, 5 V @ 130 MHz, 5 V	P_{IN}			 +40 +39	 dBm dBm
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. SKY13321-360LF Recommended Operating Conditions

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

Electrical and Mechanical Specifications

The absolute maximum ratings of the SKY13321-360LF 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 SKY13321-360LF are illustrated in Figures 3 through 8.

The state of the SKY13321-360LF is determined by the logic provided in Table 5.

Table 4. SKY13321-360LF Electrical Specifications (Note 1)
(V_{CTL} = 0 V and +3V, 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
Frequency	f		0.1		3.0	GHz
Insertion loss		0.1-1.0 GHz 1.0-2.0 GHz 2.0-2.5 GHz 2.5-3.0 GHz		0.40 0.50 0.55 0.60	0.50 0.60 0.70 0.80	dB dB dB dB
Isolation		0.1-1.0 GHz 1.0-2.0 GHz 2.0-2.5 GHz 2.5-3.0 GHz	23 17 15 13	26 20 18 16		dB dB dB dB
Return loss (insertion loss state)		0.1-3.0 GHz		25		dB
Switching characteristics: Rise/fall time On/off time		 10/90% or 90/10% RF 50% V_{CTL} to 90/10% RF		 650 800		 ns ns
Input power for 0.1 dB compression		130 MHz 900 MHz 2450 MHz		+39 +39 +39		dBm dBm dBm
Second harmonic	2fo	P_{IN} = +34.5 dBm, f = 900 MHz P_{IN} = +32.0 dBm, f = 1800 MHz P_{IN} = +36 dBm, f = 350 to 470 MHz (UHF band),		–75 –70 –80		dBc dBc dBc
Third harmonic	3fo	P_{IN} = +34.5 dBm, f = 900 MHz P_{IN} = +32.0 dBm, f = 1800 MHz P_{IN} = +36 dBm, f = 350 to 470 MHz (UHF band)		–75 –70 –85		dBc dBc dBc
Blocker performance		Tone 1 = 1950 MHz @ +20 dBm, Tone 2 = 1760 MHz @ –15 dBm, IMD3 measured @ 2140 MHz		–105		dBm
Control voltage: Low High	 V_{CTL_L} V_{CTL_H}		 0 1.8		 0.2 5.0	 V V
Control current	I_{CC}	V_{CTL_H} = 5 V		100		µA

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

Typical Performance Characteristics

(V_{CTL} = 0 V and +3 V, T_{OP} = +25 °C, P_{IN} = 0 dBm, Characteristic Impedance [Z_O] = 50 Ω, Blocking Capacitors = 100 pF, Bypass Capacitors = 33 pF, Unless Otherwise Noted)

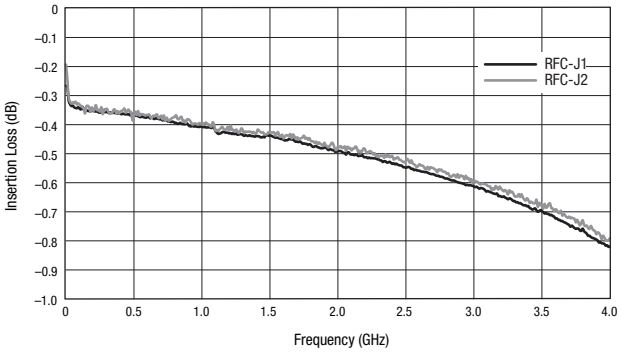


Figure 3. Typical Insertion Loss

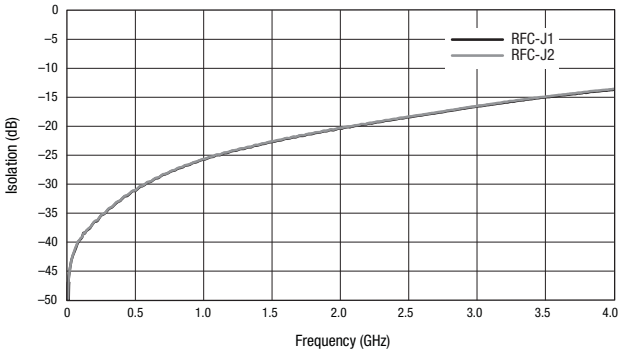


Figure 4. Typical Isolation

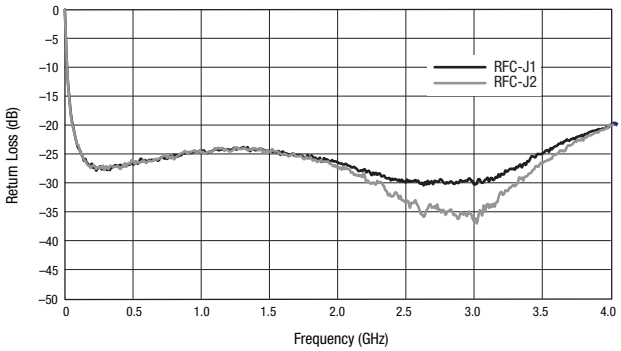


Figure 5. Typical Return Loss

Typical Performance Characteristics

(T_{OP} = +25 °C, Characteristic Impedance [Z_0] = 50 Ω, Unless Otherwise Noted)

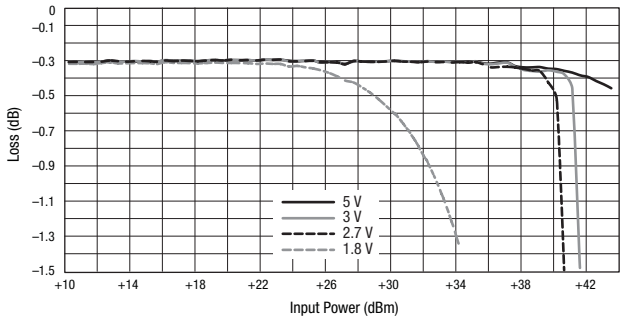


Figure 6. Typical 130 MHz Compression

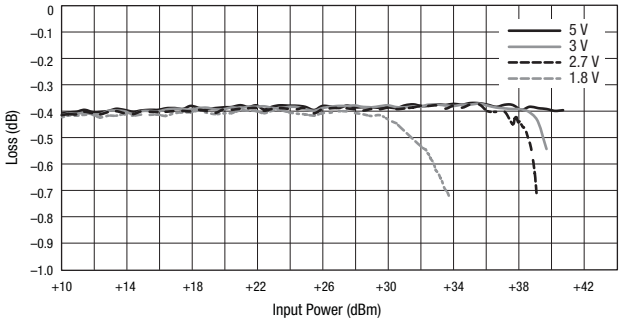


Figure 7. Typical 900 MHz Compression

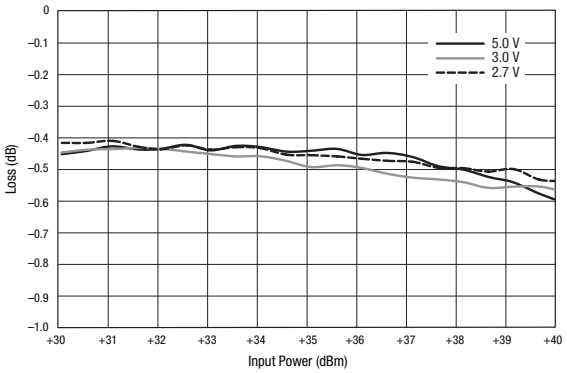


Figure 8. Typical 2450 MHz Compression

Table 5. SKY13321-360LF Truth Table

V1 (Pin 8)	V2 (Pin 5)	RFC to J1 Path	RFC to J2 Path
1	0	Insertion loss	Isolation
0	1	Isolation	Insertion loss

Note: "1" = +1.8 V to +5 V. "0" = 0 V. Any state other than described in this Table places the switch into an undefined state.

Evaluation Board Description

The SKY13321-360LF Evaluation Board is used to test the performance of the SKY13321-360LF SPDT Switch. An assembly drawing for the Evaluation Board is shown in Figure 9.

Package Dimensions

The PCB layout footprint for the SKY13321-360LF is provided in Figure 10. Typical case markings are shown in Figure 11. Package dimensions for the 4-pin QFN are shown in Figure 12, and tape and reel dimensions are provided in Figure 13.

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 SKY13321-360LF is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C. It can be used for lead or lead-free soldering.

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.

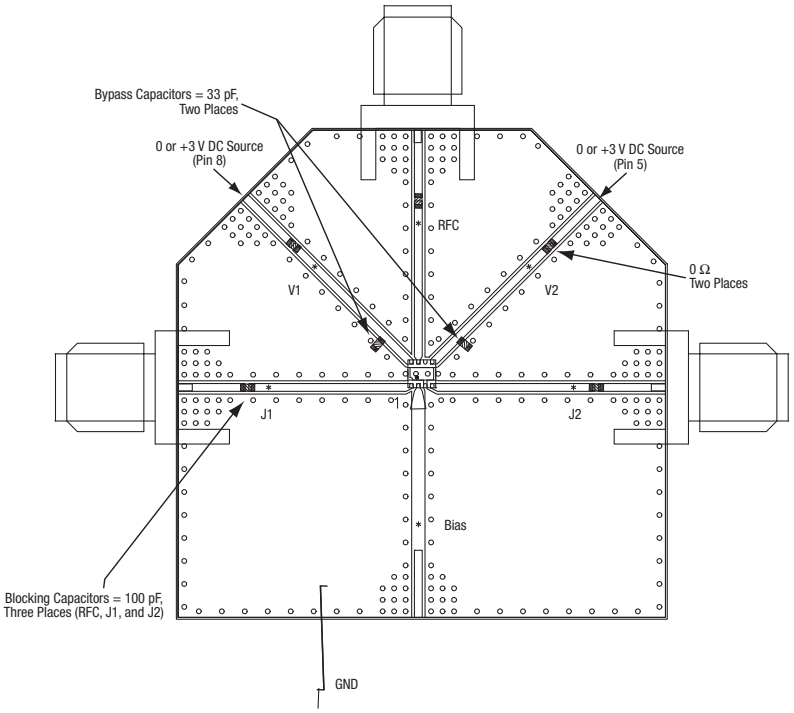


Figure 9. SKY13321-360LF Evaluation Board Assembly Diagram

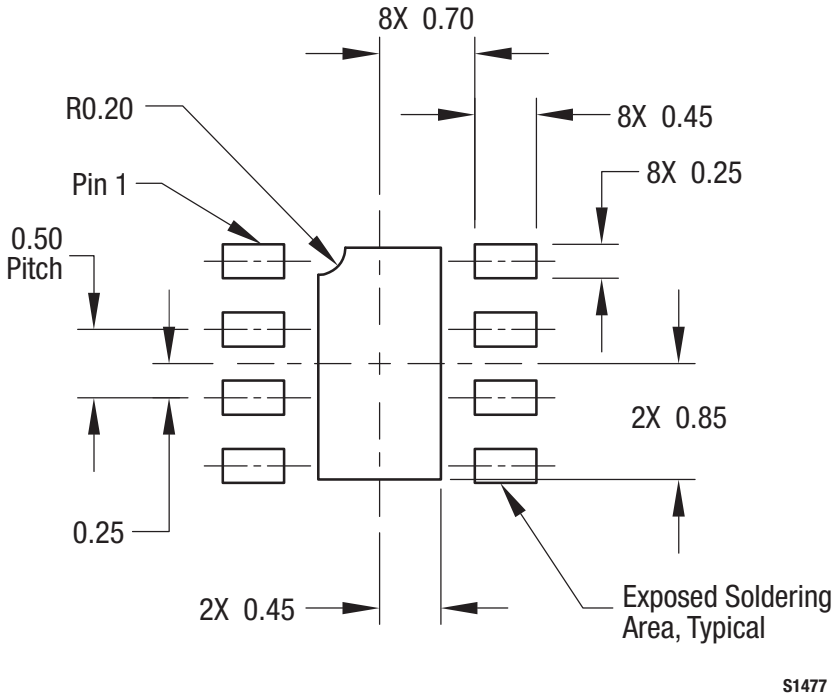


Figure 10. SKY13321-360LF PCB Layout Footprint

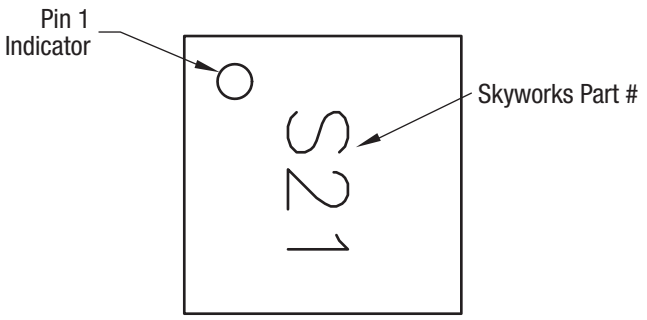
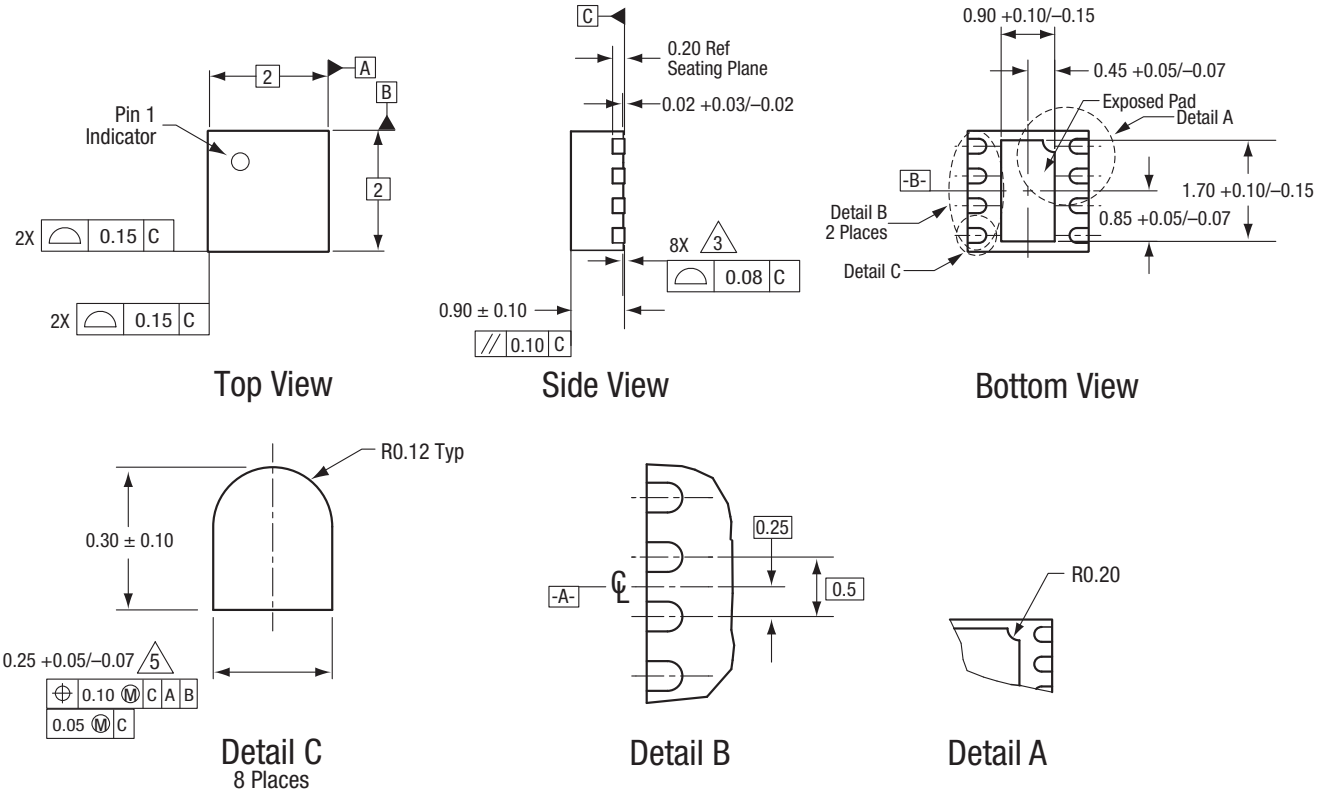


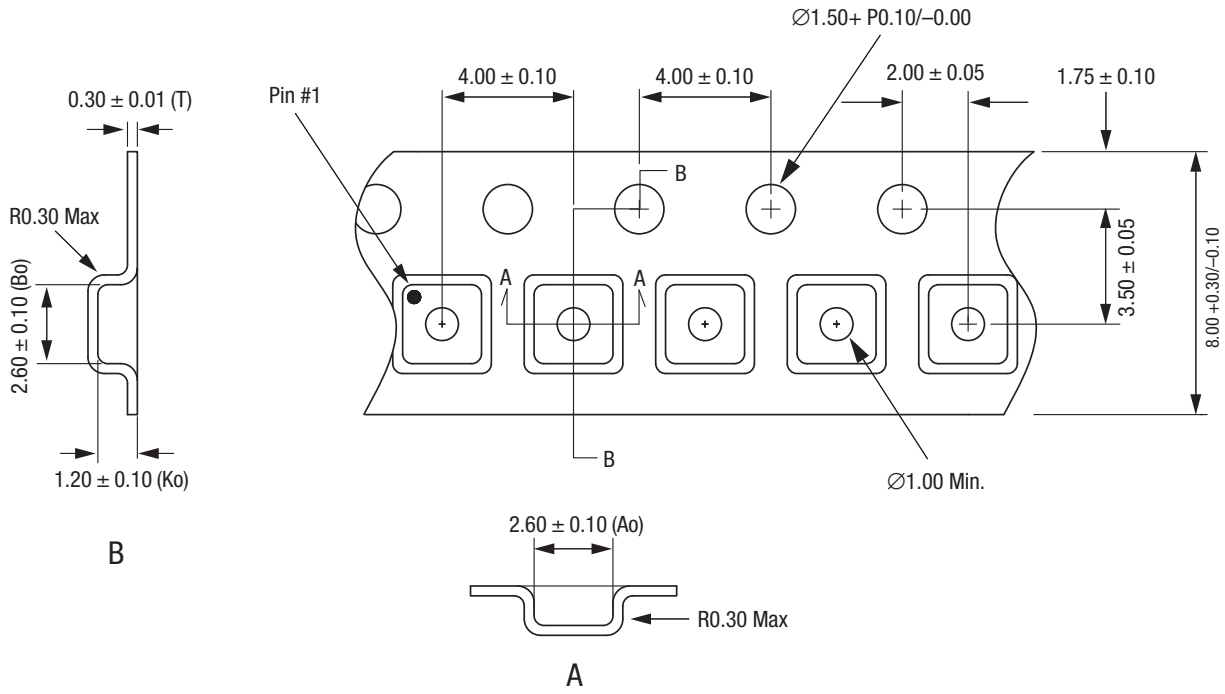
Figure 11. Typical Case Markings (Top View)



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.

S1415

Figure 12. SKY13321-360LF 8-Pin QFN Package Dimensions



Notes:
1. *Carrier tape: black conductive polystyrene.*
2. *Cover tape material: transparent conductive HSA.*
3. *Cover tape size: 5.40 mm width.*
4. *All measurements are in millimeters.*

S1480

Figure 13. SKY13321-360LF Tape and Reel Dimensions

Ordering Information

Model Name	Manufacturing Part Number	Evaluation Kit Part Number
SKY13321-360LF SPDT Switch	SKY13321-360LF	SK40709-1, Rev. 3

LifeElectronics
Живое партнерство

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