

DATA SHEET

SKY13276-334: 0.1-6.0 GHz GaAs 1 W Low Loss pHEMT SPDT Switch

Applications

- WLAN 802.11 a/b/g/n networks

Features

- Positive low voltage control: 0 and 3 V
- Low insertion loss: 0.7 dB typical over 0.1 to 6.0 GHz
- High linearity: IIP3 = +53 dBm @ 3 V
- High isolation, 20 dB typical @ 2.4 GHz
- Small footprint, LGA (6-pin, 1.5 x 1.2 x 0.8 mm) package (MSL1, 260 °C per JEDEC J-STD-020)

NEW

Skyworks Green™ products are RoHS (Restriction of Hazardous Substances)-compliant, conform to the EIA/EICTA/JEITA Joint Industry Guide (JIG) Level A guidelines, are halogen free according to IEC-61249-2-21, and contain <1,000 ppm antimony trioxide in polymeric materials.

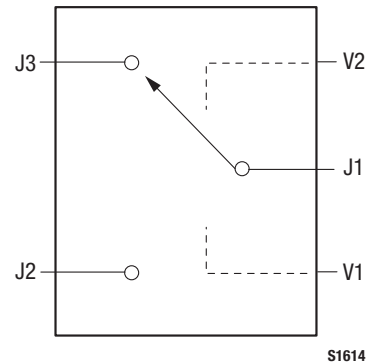


Figure 1. SKY13276-334 Block Diagram

Description

The SKY13276-334 is a GaAs pHEMT Single-Pole, Double-Throw (SPDT) antenna switch. Designed for WLAN applications, this switch is capable of switching 1 W microwave signals with a 3 V control voltage while maintaining high-linearity performance.

The SKY13276-334 covers the entire 802.11a/b/g/n frequency ranges, the public service band at 4.9 GHz, and several Industrial, Scientific, Medical (ISM) and WiMAX bands. The low loss, high isolation, high linearity, and low cost features make this switch ideal for transmit/receive or antenna diversity switching.

The switch is manufactured in a compact, 1.5 x 1.2 x 0.8 mm, 6-pin Land Grid Array (LGA) 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.

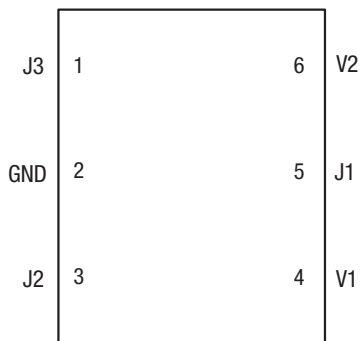


Figure 2. SKY13276-334 Pinout – 6-Pin LGA (Top View)

Table 1. SKY13276-334 Signal Descriptions

| Pin # | Name | Description | Pin # | Name | Description |
|-------|------|-------------|-------|------|--------------------------|
| 1 | J3 | RF output | 4 | V1 | Positive control voltage |
| 2 | GND | Ground | 5 | J1 | RF common/antenna port |
| 3 | J2 | RF output | 6 | V2 | Positive control voltage |

Table 2. SKY13276-334 Absolute Maximum Ratings

| Parameter | Symbol | Minimum | Typical | Maximum | Units |
|------------------------|------------------|---------|---------|---------|-------|
| Input power @ 0 to 3 V | P _{IN} | | | +32 | dBm |
| Input power @ 0 to 5 V | P _{IN} | | | +35 | dBm |
| Operating voltage | V _{CTL} | | 8 | | 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.

Electrical and Mechanical Specifications

The absolute maximum ratings of the SKY13276-334 are provided in Table 2. Electrical specifications are provided in Table 3.

Typical performance characteristics of the SKY13276-334 are illustrated in Figures 3 through 5.

The state of the SKY13276-334 is determined by the logic provided in Table 4.

Table 3. SKY13276-334 Electrical Specifications (Note 1)
($V_{CTL} = 0$ to 3 V, $T_{OP} = +25$ °C, Characteristic Impedance [Z_0] = 50 Ω , Unless Otherwise Noted)

| Parameter | Symbol | Test Condition | Min | Typical | Max | Units |
|---|--------------|--|-----|------------|-------|------------|
| Insertion loss (J1 to J2 and J1 to J3) | IL | 1.00 to 6.00 GHz | | 0.70 | 0.85 | dB |
| | | 2.40 to 2.50 GHz | | 0.60 | 0.70 | dB |
| | | 5.15 to 5.85 GHz | | 0.70 | 0.80 | dB |
| Isolation (J1 to J2 and J1 to J3) | ISO | 1.00 to 6.00 GHz | 16 | 20 | | dB |
| | | 2.40 to 2.50 GHz | 18 | 20 | | dB |
| | | 5.15 to 5.85 GHz | 16 | 21 | | dB |
| Return loss (J1 to J2 and J1 to J3) | IS11I | 1.00 to 6.00 GHz | 15 | 20 | | dB |
| | | 2.40 to 2.50 GHz | 23 | 25 | | dB |
| | | 5.15 to 5.85 GHz | 18 | 23 | | dB |
| 1 dB input compression point @ 5.2 GHz | IP1dB | @ 3 V | | +30 | | dBm |
| | | @ 5 V | | +34 | | dBm |
| 2 nd harmonic @ 2.45 GHz | 2fo | $P_{IN} = +22$ dBm, $V_{CTL} = 3$ V | | -70 | | dBc |
| | | $V_{CTL} = 5$ V | | -75 | | dBc |
| 3 rd harmonic @ 2.45 GHz | 3fo | $P_{IN} = +22$ dBm, $V_{CTL} = 3$ V | | -68 | | dBc |
| | | $V_{CTL} = 5$ V | | -70 | | dBc |
| 3 rd Order Input Intercept Point @ 5.2 GHz | IIP3 | Two-tone +15 dBm, 5 MHz spacing | | | | |
| | | $V_{CTL} = 0$ and 3 V $V_{CTL} = 0$ and 5 V | | +53 +55 | | dBm dBm |
| Control voltage: Low High | V_{CTL_L} | | | -0.25 | +0.25 | V |
| | V_{CTL_H} | | 2.5 | 3.0 | 5.0 | V |
| Gate leakage | | $V_{CTL} = 3$ V | | 10 | 100 | μ A |
| | | $V_{CTL} = 5$ V | | 15 | 200 | μ A |

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

Typical Performance Characteristics

($V_{CTL} = 0\text{ V}$ to 3 V , $T_{OP} = +25\text{ }^{\circ}\text{C}$, Characteristic Impedance [Z_0] = $50\text{ }\Omega$, Unless Otherwise Noted)

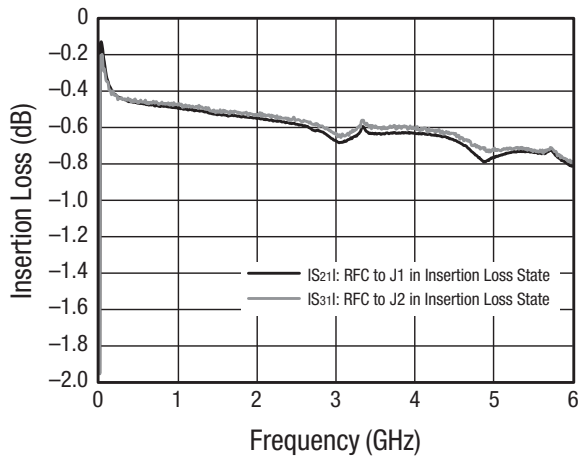


Figure 3. Insertion Loss vs Frequency

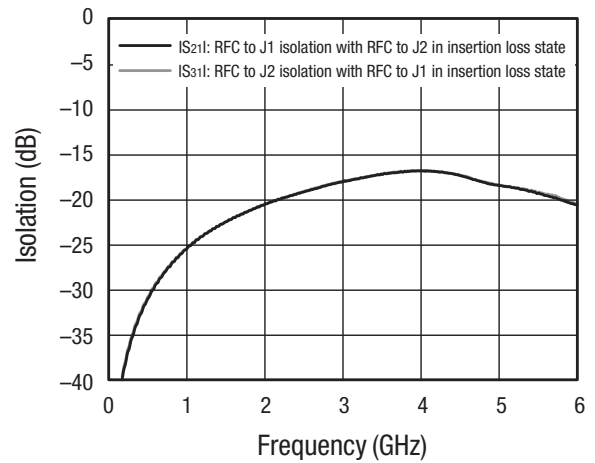


Figure 4. Isolation vs Frequency

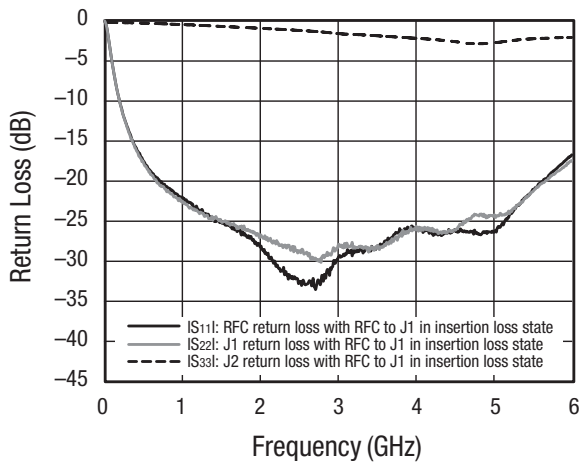


Figure 5. Return Loss vs Frequency (RFC to J1)

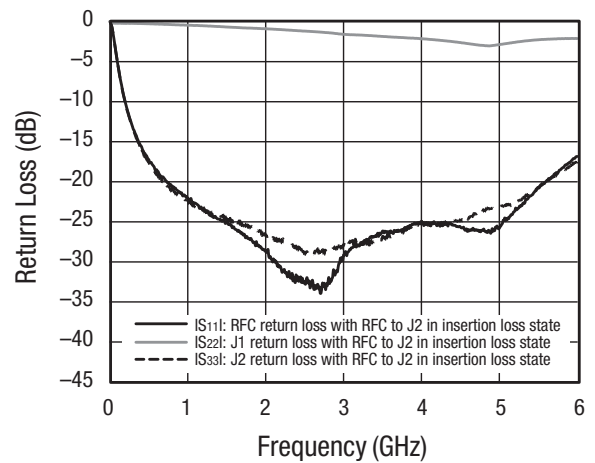


Figure 6. Return Loss vs Frequency (RFC to J2)

Table 4. SKY13276-334 Truth Table

| V1 (Pin 4) | V2 (Pin 6) | J1 to J2 Path | J1 to J3 Path |
|-------------------|-------------------|----------------|----------------|
| 0 | V _{HIGH} | Isolation | Insertion loss |
| V _{HIGH} | 0 | Insertion loss | Isolation |

Note: V_{high} = +2.5 V to +5 V. "0" = 0 V to +0.25 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 SKY13276-334 Evaluation Board is used to test the performance of the SKY13276-334 SPDT Switch. An assembly drawing for the Evaluation Board is shown in Figure 7. The Evaluation Board schematic diagram is provided in Figure 8.

Package Dimensions

The PCB layout footprint for the SKY13276-334 is provided in Figure 9. Typical case markings are shown in Figure 10. Package dimensions for the 6-pin LGA are shown in Figure 11, and tape and reel dimensions are provided in Figure 12.

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 SKY13276-334 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. For packaging details, refer to the Skyworks Application Note, *Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation*, document number 200083.

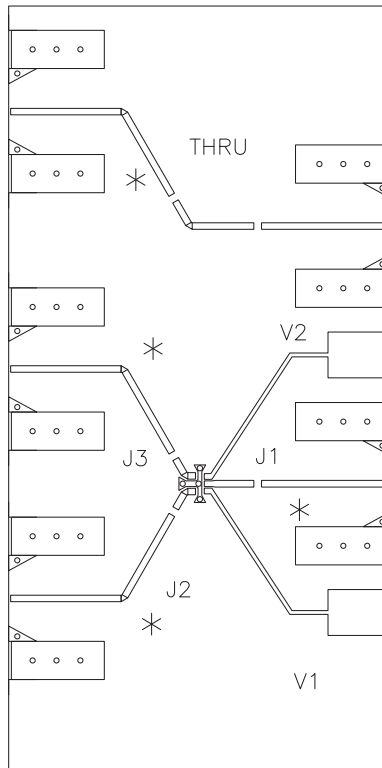
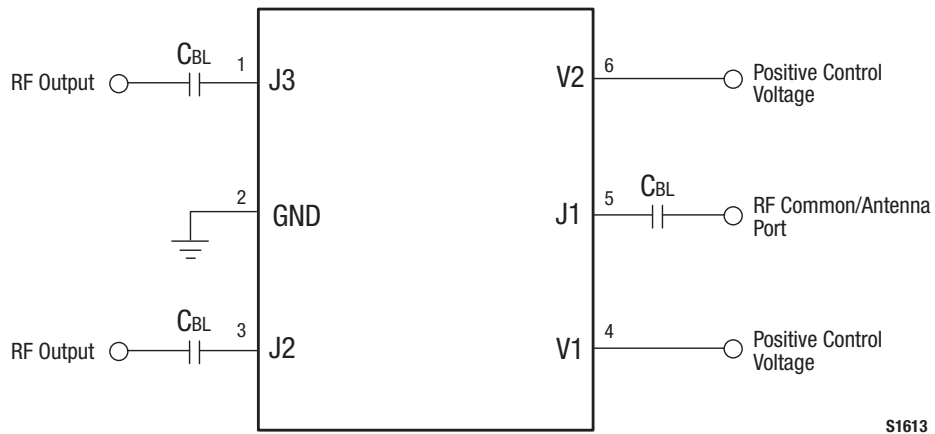
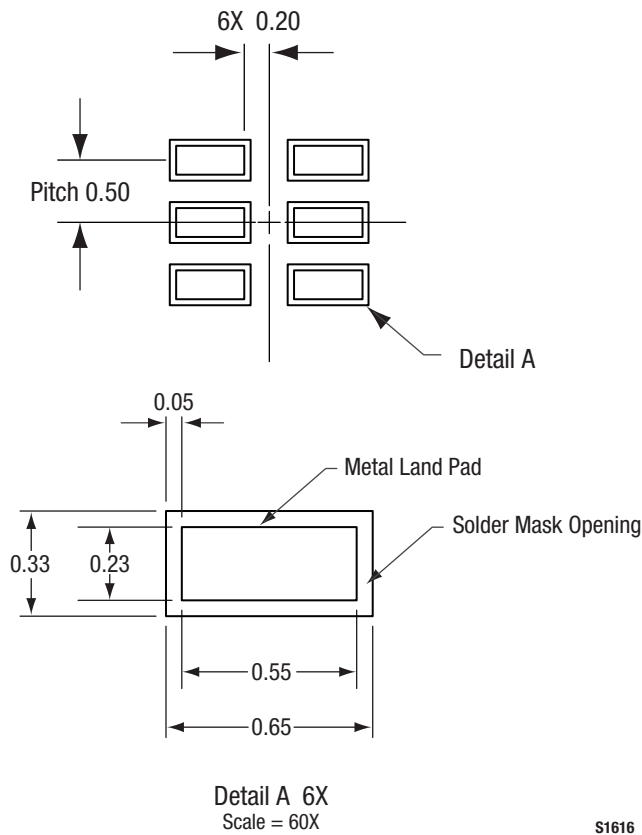


Figure 7. SKY13276-334 Evaluation Board Assembly Diagram



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Figure 8. SKY13276-334 Evaluation Board Schematic



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Figure 9. SKY13276-334 PCB Layout Footprint (Top View)

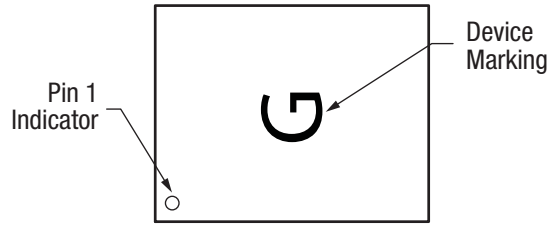
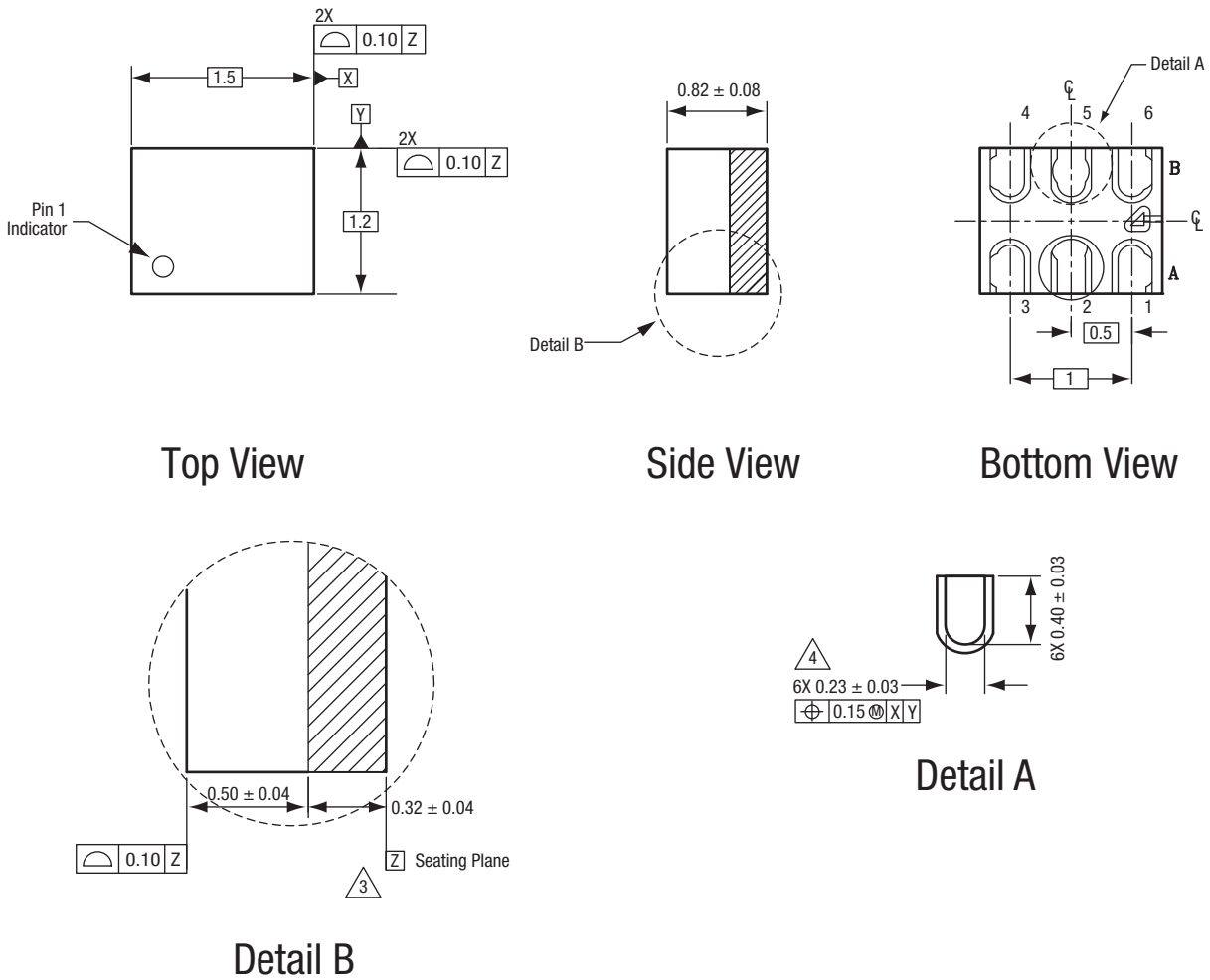


Figure 10. Typical Part Markings (Top View)



All measurements are in millimeters.
 Dimensioning and tolerancing according to ASME Y14.5M-1994.
 Primary datum -Z- is seating plane.
 Lead width is measured at the maximum land diameter, parallel to primary datum -Z-.
 Termination metalization is gold.

S1615

Figure 11. SKY13276-334 6-Pin LGA Package Dimensions

Ordering Information

| Model Name | Manufacturing Part Number | Evaluation Board Part Number |
|--------------------------|---------------------------|------------------------------|
| SKY13276-334 SPDT Switch | SKY13276-334 | SK39653, rev. 2 |

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