

**DATA SHEET**

# AS225-313, AS225-313LF: PHEMT GaAs IC 1 W Low Loss 0.1–6 GHz SPDT Switch

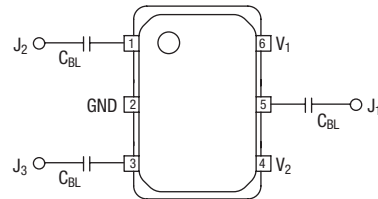
## Applications

- WLAN 802.11a, b, g

## Features

- Positive low voltage control (0/3 V)
- Low insertion loss (0.6 dB, 0.1–6 GHz)
- High linearity (IIP3 = 53 dBm @ 3 V)
- Miniature QFN-6 pin plastic package (2 mm x 3 mm)
- PHEMT process
- Available lead (Pb)-free and RoHS-compliant MSL-1 @ 260 °C per JEDEC J-STD-020

## Pin Out (Top View)



DC blocking capacitors ( $C_{BL}$ ) must be supplied externally.  
 $C_{BL} = 15 \text{ pF}$ .

## Description

The AS225-313 is a 0.1–6 GHz PHEMT GaAs IC SPDT antenna switch. Designed for WLAN applications, this device is capable of switching 1 W microwave signals with 3 V control voltage while maintaining high-linearity performance. The switch covers the entire 802.11a, b and g frequency ranges. The low-loss, high-isolation, high-linearity and low-cost features make this switch ideal for Wireless LAN systems.

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



## Electrical Specifications at 25 °C

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

| Parameter      | Test Condition     | Frequency     | Min. | Typ. | Max. | Unit |
|----------------|--------------------|---------------|------|------|------|------|
| Insertion loss | $J_1-J_2, J_1-J_3$ | 0.10–6.00 GHz |      | 0.60 | 0.75 | dB   |
|                |                    | 2.40–2.50 GHz |      | 0.50 | 0.65 | dB   |
|                |                    | 5.15–5.85 GHz |      | 0.60 | 0.70 | dB   |
| Isolation      | $J_1-J_2, J_1-J_3$ | 0.10–6.00 GHz | 18   | 20   |      | dB   |
|                |                    | 2.40–2.50 GHz | 18   | 20   |      | dB   |
|                |                    | 5.15–5.85 GHz | 19   | 21   |      | dB   |
| Return loss    | $J_1-J_2, J_1-J_3$ | 0.10–6.00 GHz | 18   | 20   |      | dB   |
|                |                    | 2.40–2.50 GHz | 23   | 25   |      | dB   |
|                |                    | 5.15–5.85 GHz | 21   | 23   |      | dB   |

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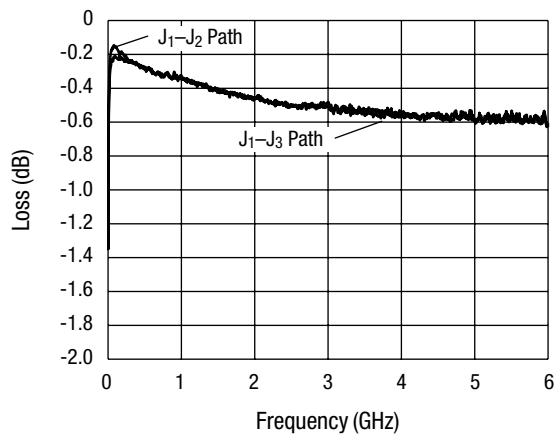
### Operating Characteristics at 25 °C

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

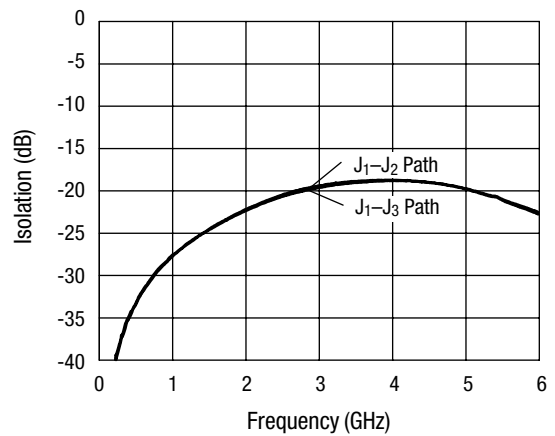
| Parameter         | Condition  | Frequency | Min. | Typ.  | Max. | Unit |
|-------------------|--|-----------|------|-------|------|------|
| P <sub>1</sub> dB | @ 3 V  | 5200 MHz  |      | 30    |      | dBm  |
|                   | @ 5 V  | 5200 MHz  |      | 34    |      | dBm  |
| 2nd harmonic      | P <sub>IN</sub> = 22 dBm, V <sub>C</sub> = 3 V<br>V <sub>C</sub> = 5 V                 | 2450 MHz  |      | 70    |      | dBc  |
|                   |  | 2450 MHz  |      | 75    |      | dBc  |
| 3rd harmonic      | P <sub>IN</sub> = 22 dBm, V <sub>C</sub> = 3 V<br>V <sub>C</sub> = 5 V                 | 2450 MHz  |      | 68    |      | dBc  |
|                   |  | 2450 MHz  |      | 70    |      | dBc  |
| Input IP3         | Two-tone 15 dBm, 5 MHz spacing<br>V <sub>CTL</sub> = 0/3 V<br>V <sub>CTL</sub> = 0/5 V | 5200 MHz  |      | 53    |      | dBm  |
|                   |  | 5200 MHz  |      | 55    |      | dBm  |
| Control voltage   | V <sub>C</sub> HIGH  |           | 2.5  | 3.00  | 5.00 | V    |
|                   | V <sub>C</sub> LOW   |           |      | -0.25 | 0.25 | V    |
| Gate leakage      | V <sub>C</sub> = 3 V   |           |      | 10    | 100  | μA   |
|                   | V <sub>C</sub> = 5 V   |           |      | 15    | 200  | μA   |

### Typical Performance Data

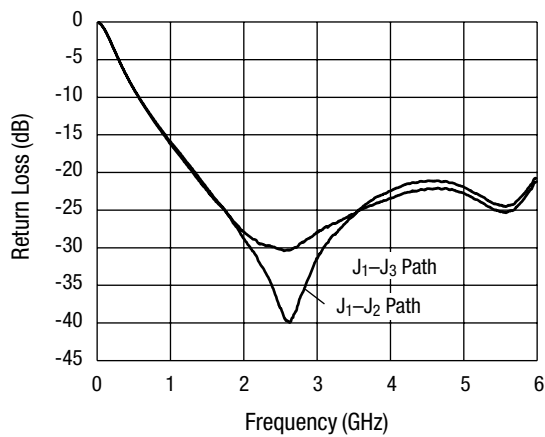
$Z_0 = 50 \Omega$ ,  $V_{CTRL} = 0/3 V$ , unless otherwise noted



Insertion Loss vs. Frequency



Isolation vs. Frequency



Return Loss vs. Frequency

### Absolute Maximum Ratings

| Characteristic          | Value             |
|-------------------------|-------------------|
| Max input power @ 0/3 V | 32 dBm            |
| Max input power @ 0/5 V | 35 dBm            |
| Operating voltage       | 8 V               |
| Operating temperature   | -40 °C to +85 °C  |
| Storage temperature     | -65 °C to +150 °C |

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, ESD (Electrostatic Discharge) 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.

### Recommended Solder Reflow Profiles

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

### Tape and Reel Information

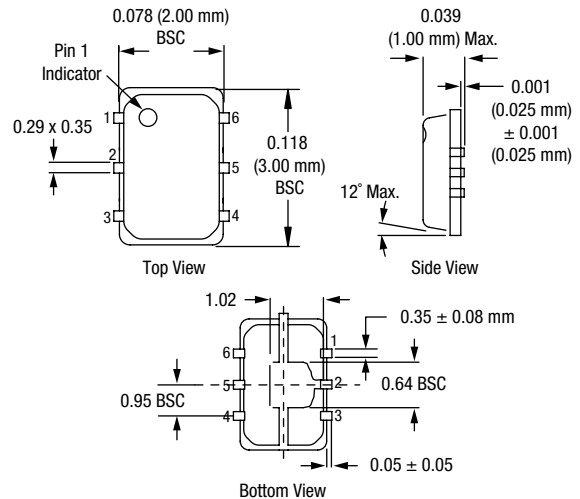
Refer to the [“Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation”](#) Application Note.

### Truth Table

| V <sub>1</sub>    | V <sub>2</sub>    | J <sub>1</sub> -J <sub>2</sub> | J <sub>1</sub> -J <sub>3</sub> |
|-------------------|-------------------|--------------------------------|--------------------------------|
| 0                 | V <sub>HIGH</sub> | Isolation                      | Insertion loss                 |
| V <sub>HIGH</sub> | 0                 | Insertion loss                 | Isolation                      |

All other conditions not recommended.  
V<sub>HIGH</sub> = 2.5 to 5 V.

### QFN-6



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