

DATA SHEET

AS221-306, AS221-306LF: PHEMT GaAs IC High-Power SP4T Switch 0.1–2.5 GHz

Features

- Four symmetric RF paths
- Positive voltage control @ 2.6 V
- High IP3
- Excellent harmonic performance
- Handles GSM power Levels
- Available in QFN-16 (4 x 4 mm) package
- Available lead (Pb)-free and RoHS-compliant MSL-1 @ 260 °C per JEDEC J-STD-020

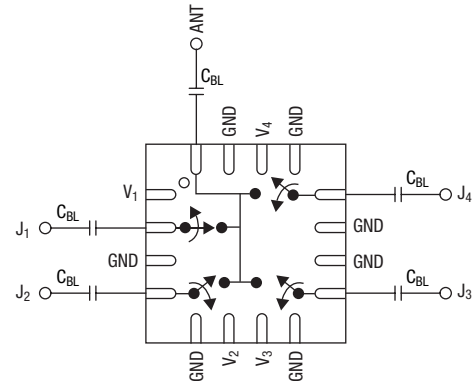
Description

The AS221-306 is a reflective SP4T switch. It is an ideal switch for higher power applications. It can be used for GSM dual-band handset applications where low loss, low current, and small size are critical parameters.

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



Pin Out



DC blocking capacitors (C_{BL}) must be supplied externally.
 $C_{BL} = 47$ pF for operating frequency >500 MHz.

Electrical Specifications at 25 °C (0, 2.6 V)

$Z_0 = 50 \Omega$, unless otherwise noted

| Parameter | Condition | Frequency | Min. | Typ. | Max. | Unit |
|----------------|-----------------------------------------------------------------------|-------------|------|-------|------|------|
| Insertion loss | Ant-J ₁ , J ₂ , J ₃ , J ₄ | 0.1–0.5 GHz | | 0.6 | 0.7 | dB |
| | | 0.5–1.0 GHz | | 0.7 | 0.8 | dB |
| | | 1.0–2.0 GHz | | 0.9 | 1.1 | dB |
| | | 2.0–2.5 GHz | | 1.1 | 1.2 | dB |
| Isolation | Ant-J ₁ , J ₂ , J ₃ , J ₄ | 0.1–0.5 GHz | 30 | 34 | | dB |
| | | 0.5–1.0 GHz | 25 | 29 | | dB |
| | | 1.0–2.0 GHz | 19 | 23 | | dB |
| | | 2.0–2.5 GHz | 18 | 22 | | dB |
| VSWR | | 0.1–1.0 GHz | | 1.2:1 | | |
| | | 1.0–2.5 GHz | | 1.3:1 | | |

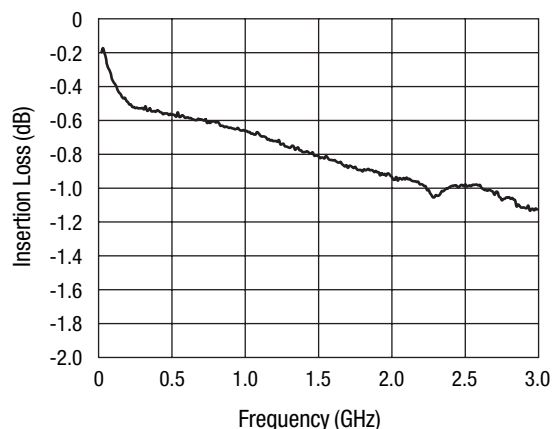
Operating Characteristics at 25 °C (0, 2.6 V)

$Z_0 = 50 \Omega$, unless otherwise noted

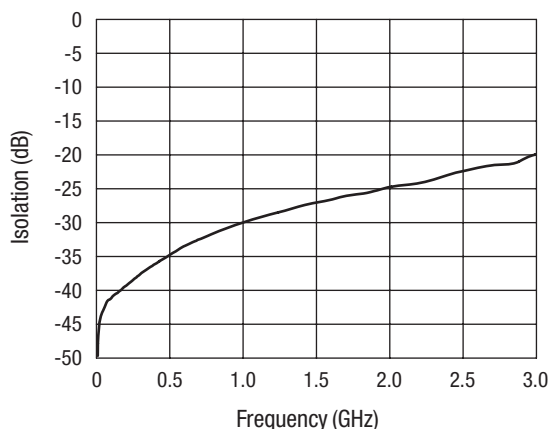
| Parameter | Condition | Frequency | Min. | Typ. | Max. | Unit |
|---------------------------|----------------------------------------------------------------|-----------|------|------|------|------|
| Switching characteristics | | | | | | |
| Rise, fall | 10/90% or 90/10% RF | | | 50 | | ns |
| On, off | 50% CTL to 90/10% RF | | | 100 | | ns |
| Video feedthru | $T_{RISE} = 1 \text{ ns}$, BW = 500 MHz | | | 50 | | mV |
| IP3 | 13 dBm/tone | | | 55 | | dBm |
| 2nd and 3rd harmonics | 34 dBm input 900 MHz | | | -65 | | dBc |
| Thermal resistance | | | | 25 | | °C/W |
| Control voltages | $V_{LOW} = 0$ $V_{HIGH} = 2.6 \text{ V @ } 200 \mu\text{A}$ | | | | | |

Typical Performance Data

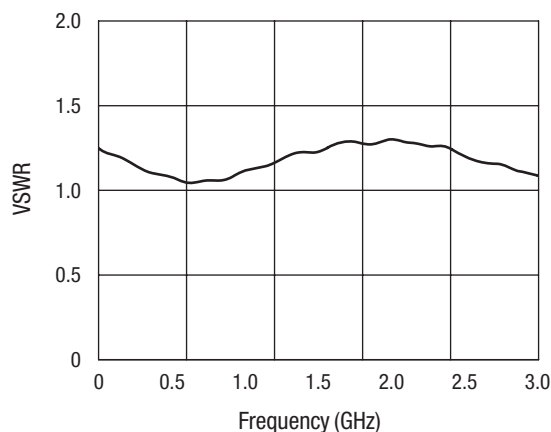
$Z_0 = 50 \Omega$, unless otherwise noted



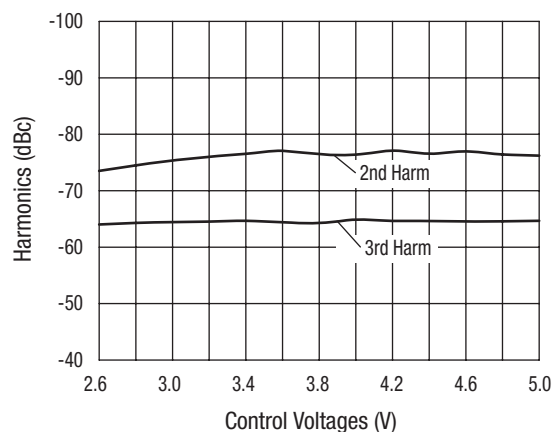
Typical Insertion Loss vs. Frequency



Typical Isolation vs. Frequency



Typical VSWR vs. Frequency



Typical Harmonics vs. Control Voltages

Absolute Maximum Ratings

| Characteristic | Value |
|-----------------------|--------------------------------|
| RF input power | 4 W > 0.5 GHz 0/6 V control |
| Control voltage | 6 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.

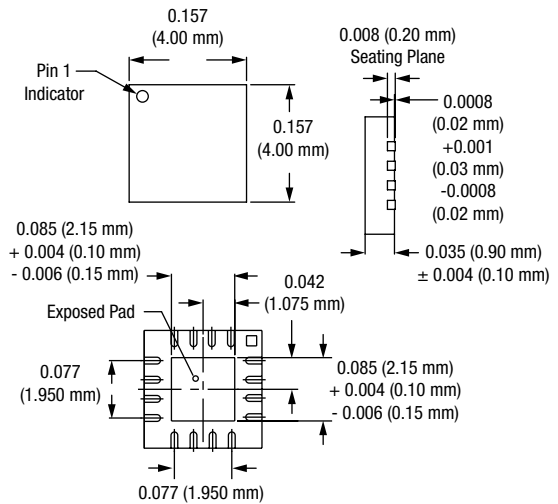
Truth Table

| V ₁ | V ₂ | V ₃ | V ₄ | Ant-J ₁ | Ant-J ₂ | Ant-J ₃ | Ant-J ₄ |
|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|
| V _{HIGH} | V _{LOW} | V _{LOW} | V _{LOW} | Ins. Loss | Isolation | Isolation | Isolation |
| V _{LOW} | V _{HIGH} | V _{LOW} | V _{LOW} | Isolation | Ins. loss | Isolation | Isolation |
| V _{LOW} | V _{LOW} | V _{HIGH} | V _{LOW} | Isolation | Isolation | Ins. loss | Isolation |
| V _{LOW} | V _{LOW} | V _{LOW} | V _{HIGH} | Isolation | Isolation | Isolation | Ins. loss |

All other conditions not recommended.

V_{LOW} = 0.
V_{HIGH} = 2.6 V.

QFN-16 (4 x 4 mm)



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