

**DATA SHEET**

# AS186-302, AS186-302LF: GaAs IC High-Isolation Positive Control SPDT Nonreflective Switch LF-4 GHz

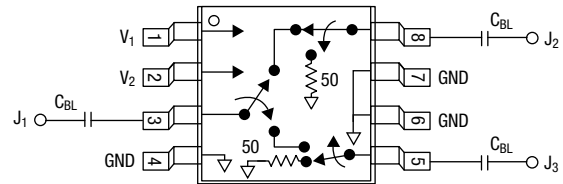
## Applications

- Typical applications include GSM, PCS, WCDMA, 2.4 GHz ISM and 3.5 GHz wireless local loop

## Features

- Positive voltage control (0/3 to 0/5 V)
- High isolation (55 dB @ 0.9 GHz and 1.9 GHz)
- Miniature MSOP-8 exposed pad package
- Three-switch solution for base station synthesizer switch
- Nonreflective
- Operation to 6 GHz
- Available lead (Pb)-free and RoHS-compliant MSL-1 @ 260 °C per JEDEC J-STD-020

## Pin Out




$C_{BL} = 47 \text{ pF}$  for operation > 500 MHz.

## Description

The AS186-302 is a GaAs FET IC SPDT nonreflective switch, packaged in an MSOP-8 exposed pad plastic package for low-cost, high-isolation commercial applications.

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



## Electrical Specifications

**-40 °C ≤ T ≤ +85 °C,  $V_{CTL} = 0/5 \text{ V}$ ,  $Z_0 = 50 \Omega$  unless otherwise noted**

Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Insertion loss		LF-2 GHz		0.8	1.05	dB
		LF-3 GHz		0.9	1.15	dB
		LF-4 GHz		1.0	1.25	dB
Isolation <sup>(1)</sup>		LF-2 GHz	50	55		dB
		LF-3 GHz	45	50		dB
		LF-4 GHz	35	40		dB
VSWR (on state)		LF-2 GHz		1.3:1	1.5:1	
		LF-4 GHz		1.3:1	1.6:1	
VSWR (off state)		0.5-4 GHz		1.35:1	1.7:1	

1. Backside of exposed pad must be connected to RF ground to obtain specified isolation.

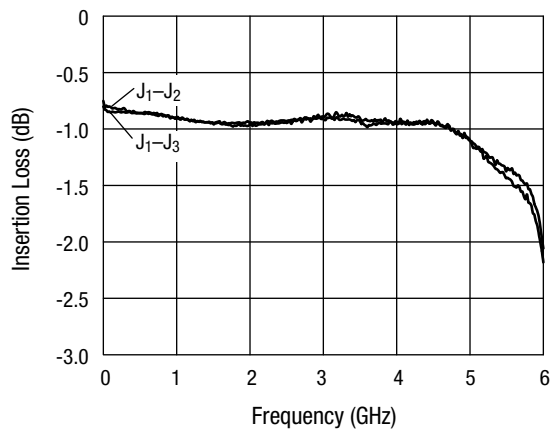
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### Operating Characteristics

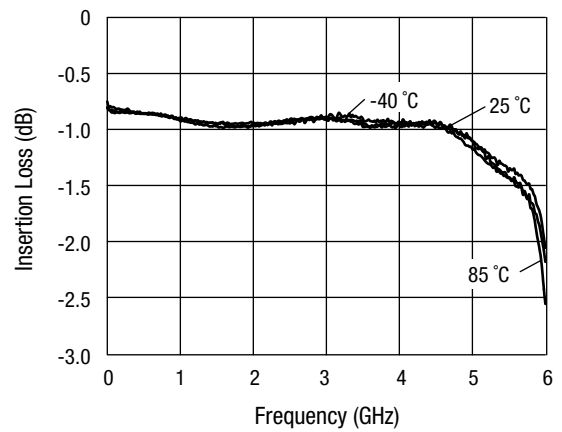
**-40 °C ≤ T ≤ +85 C, V<sub>CTL</sub> = 0/5 V, Z<sub>0</sub> = 50 Ω unless otherwise noted**

Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching characteristics						
Rise, fall	10/90% or 90/10% RF			30		ns
On, off	50% CTL to 90/10% RF			50		ns
Video feedthru	T <sub>RISE</sub> = 3 ns, BW = 500 MHz			25		mV
Input power for 1 dB compression	V <sub>CTL</sub> = 0/3 V V <sub>CTL</sub> = 0/5 V	0.9–4 GHz 0.9–4 GHz	23 27	25 30		 dBm dBm
Input 3rd order intermodulation intercept point (IIP3)	For two-tone input power 8 dBm V <sub>CTL</sub> = 0/3 V V <sub>CTL</sub> = 0/5 V	0.9–4 GHz 0.9–4 GHz	27 42	38 46		 dBm dBm
Thermal resistance				25		°C/W
ESD rating	Human body model		Class 1A			
Control voltages	V <sub>LOW</sub> = 0 to 0.2 V @ 20 μA max. V <sub>HIGH</sub> = 3 V @ 100 μA max. to 5 V @ 200 μA max.					

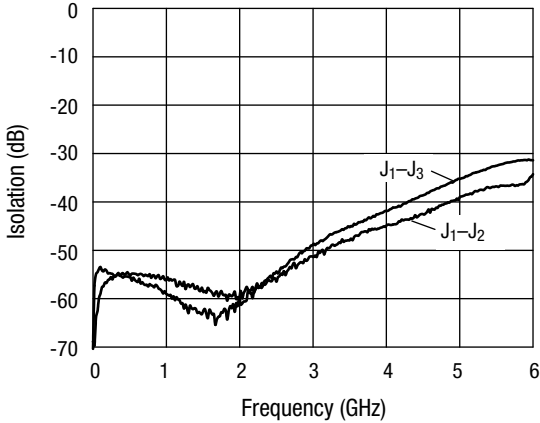
### Typical Performance Data (0, 5 V)



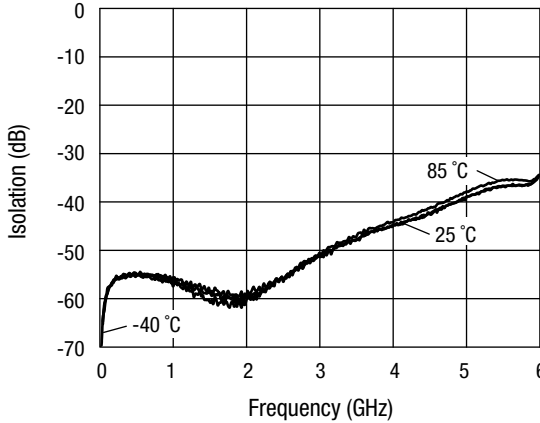
**Insertion Loss vs. Frequency**



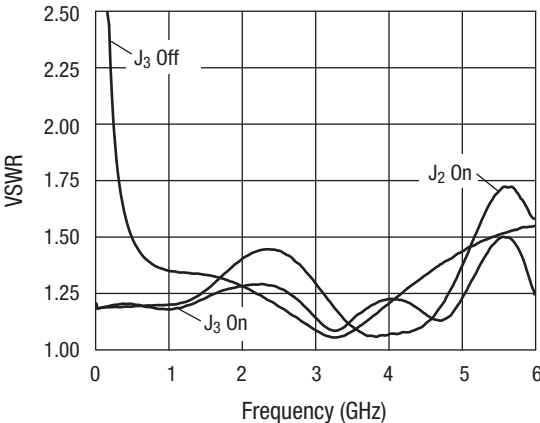
**Insertion Loss vs. Frequency  
-40, 25, 85 °C**



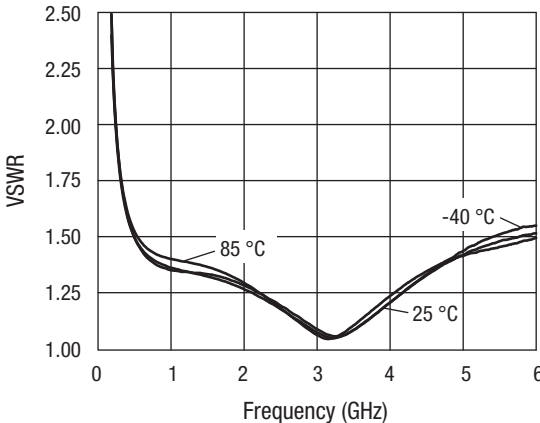
**Isolation vs. Frequency**



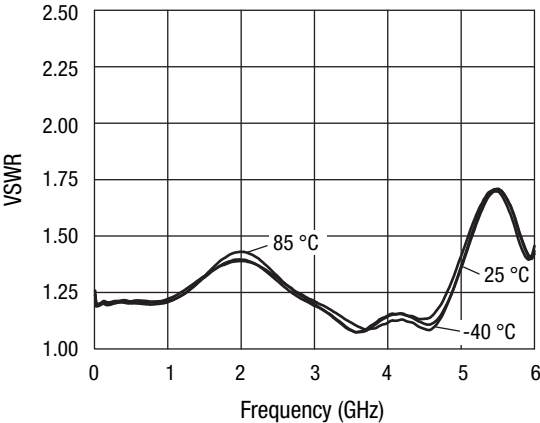
**Isolation vs. Frequency  
-40, 25, 85 °C**



**VSWR vs. Frequency**



**VSWR vs. Frequency  
-40, 25, 85 °C (J<sub>3</sub> Off)**



**Input VSWR vs. Frequency  
-40, 25, 85 °C**

### IP3 vs. Voltage and Temperature

Control Voltage (V)	Temperature (°C)	IP3 @ 8 dBm Each Tone (dBm)
3	-40	44
3	25	38
3	85	29.5
5	-40	47.5
5	25	46.5
5	85	45.5

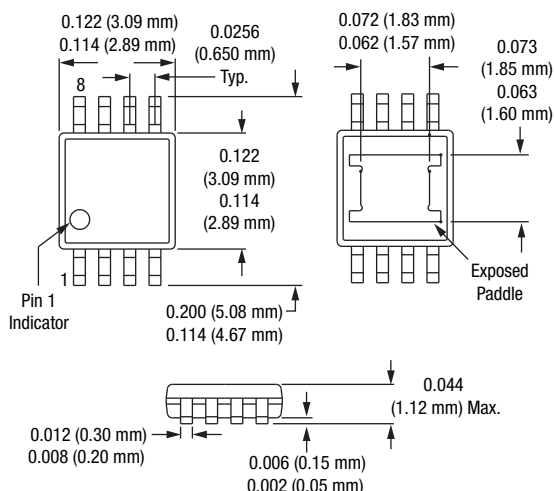
Tone frequencies: 900 and 901 MHz.

### 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> = 3 V to 5 V.

### MSOP-8 Exposed Pad



### 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.

### Compression Point vs. Voltage and Temperature @ 900 MHz

Control Voltage (V)	Temperature (°C)	Input Power @ 1 dB Compression (dBm)	Input power @ 0.1 dB Compression (dBm)
3	-40	20.5	16.5
3	25	20	15.3
3	85	19	14
5	-40	28.5	23
5	25	28	23
5	85	27.5	23

Frequency: 900 MHz.

### Absolute Maximum Ratings

Characteristic	Value
RF input power	1 W max. for f > 500 MHz 100 mW for f < 500 MHz V <sub>CTL</sub> = 0/8 V
Control voltage	-0.2 V, +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.

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