

GaAs IC High Isolation Positive Control SPDT Non-Reflective Switch DC–4.0 GHz



AS186-302

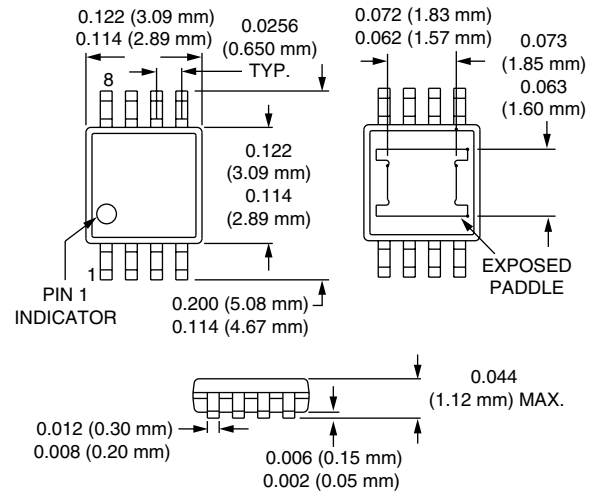
Features

- 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
- Non-Reflective
- Operation to 6 GHz

Description

The AS186-302 is a GaAs FET IC SPDT non-reflective switch packaged in a MSOP-8 exposed pad plastic package for low cost, high isolation commercial applications. Ideal building block for base station applications where synthesizer isolation is critical. Typical applications include GSM, PCS, WCDMA, 2.4 GHz ISM and 3.5 GHz wireless local loop.

MSOP-8 Exposed Pad

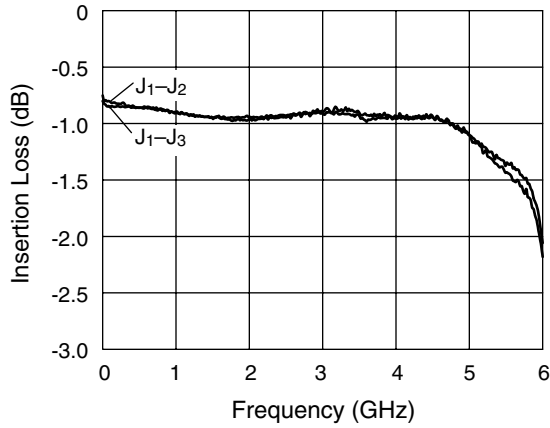


Electrical Specifications (0, +5 V), -40 to +85°C

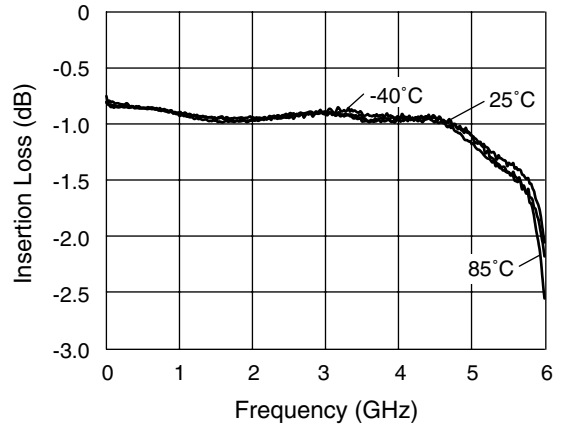
| Parameter ¹ | Condition | Frequency | Min. | Typ. | Max. | Unit |
|--|--|-------------|------|--------|-------|------|
| Insertion Loss | | DC–2.0 GHz | | 0.8 | 1.05 | dB |
| | | DC–3.0 GHz | | 0.9 | 1.15 | dB |
| | | DC–4.0 GHz | | 1.0 | 1.25 | dB |
| Isolation ² | | DC–2.0 GHz | 50 | 55 | | dB |
| | | DC–3.0 GHz | 45 | 50 | | dB |
| | | DC–4.0 GHz | 35 | 40 | | dB |
| VSWR (On State) | | DC–2.0 GHz | | 1.3:1 | 1.5:1 | |
| | | DC–4.0 GHz | | 1.3:1 | 1.6:1 | |
| VSWR (Off State) | | 0.5–4.0 GHz | | 1.35:1 | 1.7:1 | |
| Switching Characteristics ³ | Rise, Fall (10/90% or 90/10% RF) On, Off (50% CTL to 90/10% RF) Video Feedthru | | | 30 | | ns |
| | | | | 50 | | ns |
| | | | | 25 | | mV |
| Input Power for 1 dB Compression | 0/+3 V | 0.9–4.0 GHz | 17 | 21 | | dBm |
| | 0/+5 V | 0.9–4.0 GHz | 24 | 27 | | dBm |
| Intermodulation Intercept Point (IIP3) | For Two-tone Input Power +8 dBm | 0/+3 V | 27 | 38 | | dBm |
| | | 0/+5 V | 42 | 46 | | dBm |
| | | 0/+5 V | 42 | 46 | | dBm |
| Control Voltages | V _{Low} = 0 to 0.2 V @ 20 μA Max. V _{High} = +3 V @ 100 μA Max. to +5 V @ 200 μA Max. | | | | | |

1. All measurements made in a 50 Ω system, unless otherwise specified.
2. Backside of exposed pad must be connected to RF ground to obtain specified isolation.
3. Video feedthru measured with 3 ns risetime pulse.

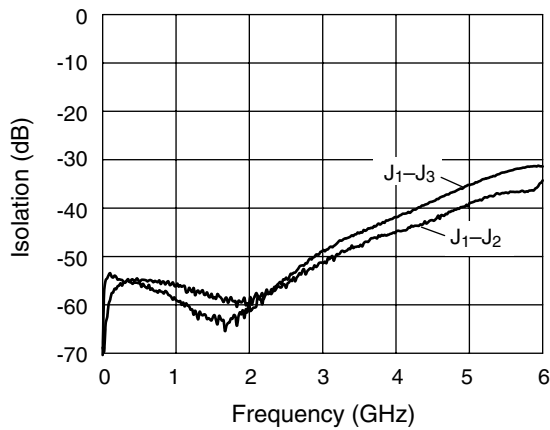
Typical Performance Data (0, +5 V)



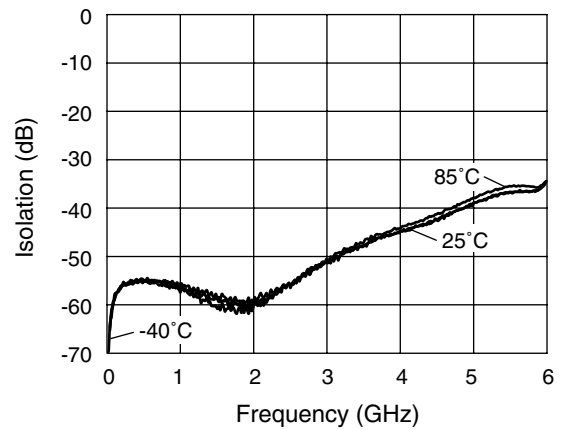
Insertion Loss vs. Frequency



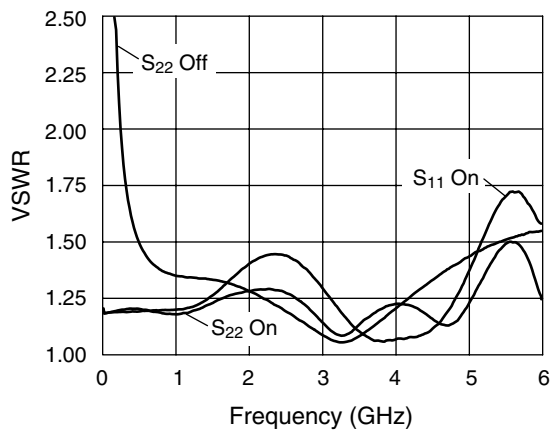
**Insertion Loss vs. Frequency
-40, 25, 85°C**



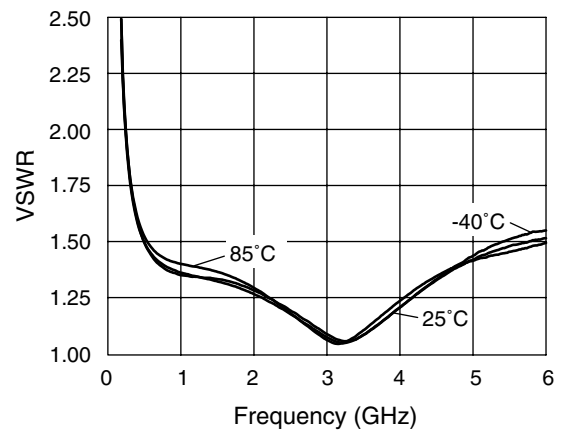
Isolation vs. Frequency



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

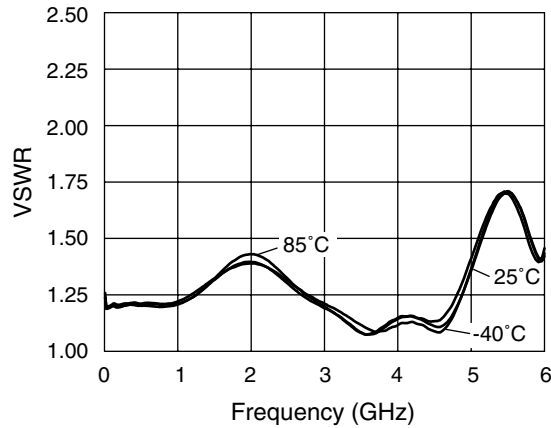


VSWR vs Frequency



**VSWR vs Frequency
-40, 25, 85°C (S22 Off)**

Typical Performance Data (0, +5 V)



VSWR vs Frequency
-40, 25, 85°C (S₁₁ On)

IP3 vs. Voltage and Temperature

| Control Voltage (V) | Temperature (°C) | IP3 @ +8 dBm Each Tone (dBm) |
|---------------------|------------------|------------------------------|
| 3 | -40 | 44.0 |
| 3 | 25 | 38.0 |
| 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 ₁ | V ₂ | J ₁ –J ₂ | J ₁ –J ₃ |
|-------------------|-------------------|--------------------------------|--------------------------------|
| 0 | V _{High} | Isolation | Insertion Loss |
| V _{High} | 0 | Insertion Loss | Isolation |

V_{High} = +3 V to +5 V.

Compression Point vs. Voltage and Temperature

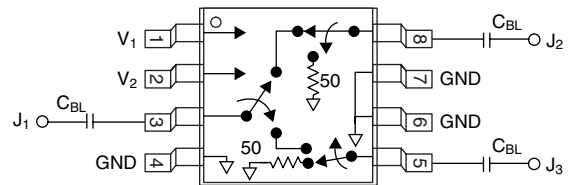
| Control Voltage (V) | Temperature (°C) | Input Power @ 1 dB Compression (dBm) | Input power @ 0.1 dB Compression (dBm) |
|---------------------|------------------|--------------------------------------|--|
| 3 | -40 | 20.5 | 16.5 |
| 3 | 25 | 20.0 | 15.3 |
| 3 | 85 | 19.0 | 14.0 |
| 5 | -40 | 28.5 | 23.0 |
| 5 | 25 | 28.0 | 23.0 |
| 5 | 85 | 27.5 | 23.0 |

Frequency: 900 MHz.

Absolute Maximum Ratings

| Characteristic | Value |
|-----------------------|--------------------------------------|
| RF Input Power | 1 W Max. > 500 MHz 0/+8 V Control |
| Control Voltage | -0.2 V, +8 V |
| Operating Temperature | -40°C to +85°C |
| Storage Temperature | -65°C to +150°C |
| Θ _{JC} | 25°C/W |

Pin Out



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



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