

PHEMT GaAs IC High Linearity 3 V Control SPDT Switch 0.1–2.5 GHz



AS193-73

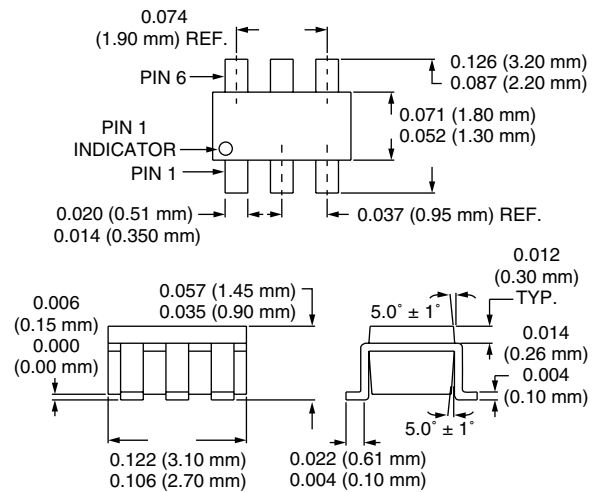
Features

- +2.5 to +5 V Linear Operation
- Harmonics $H_2, H_3 > 65$ dBc @ $P_{IN} = 34.5$ dBm
- Low Insertion Loss (0.35 dB @ 0.9 GHz)
- High Isolation (24 dB @ 0.9 GHz)
- Ultra Miniature SOT-6 Package
- PHEMT Process

Description

The AS193-73 is a PHEMT GaAs FET IC high linearity SPDT switch in a SOT-6 plastic package. This switch has been designed for use where extremely high linearity, low control voltage, high isolation, low insertion loss and ultra miniature package size are required. It can be controlled with positive, negative or a combination of both voltages. Some standard implementations include antenna changeover, T/R and diversity switching over 3 W. The

SOT-6



AS193-73 switch can be used in many analog and digital wireless communication systems including cellular, GSM and UMTS applications.

Electrical Specifications at 25°C (0, +3 V)

| Parameter ¹ | Frequency | Min. | Typ. | Max. | Unit |
|-----------------------------|-------------|------|-------|------|------|
| Insertion Loss ² | 0.1–0.5 GHz | | 0.30 | 0.4 | dB |
| | 0.5–1.0 GHz | | 0.35 | 0.5 | dB |
| | 1.0–2.0 GHz | | 0.45 | 0.6 | dB |
| | 2.0–2.5 GHz | | 0.55 | 0.7 | dB |
| Isolation | 0.1–0.5 GHz | 28 | 30 | | dB |
| | 0.5–1.0 GHz | 22 | 24 | | dB |
| | 1.0–2.0 GHz | 17 | 19 | | dB |
| | 2.0–2.5 GHz | 15 | 17 | | dB |
| VSWR ³ | 0.1–1.0 GHz | | 1.2:1 | | dB |
| | 1.0–2.5 GHz | | 1.3:1 | | dB |

Operating Characteristics at 25°C (0, +3 V)

| Parameter | Condition | Frequency | Min. | Typ. | Max. | Unit |
|--|---|-----------|------|------|------|------|
| Switching Characteristics ⁴ | Rise, Fall (10/90% or 90/10% RF) | | | 60 | | ns |
| | On, Off (50% CTL to 90/10% RF) | | | 100 | | ns |
| | Video Feedthru | | | 50 | | mV |
| Input Power for -0.1 dB Compression | 0/+3 V | 0.9 GHz | | +37 | | dBm |
| Harmonics H_2, H_3 | $P_{IN} = 34.5$ dBm | 0.9 GHz | | +65 | | dBc |
| Control Voltages | $V_{Low} = 0$ to 0.2 V @ 20 μ A Max. $V_{High} = +2.5$ V @ 100 μ A Max. to +5 V @ 200 μ A Max. | | | | | |

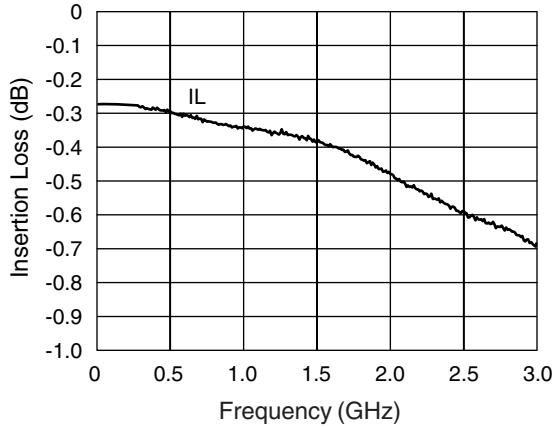
1. All measurements made in a 50 Ω system, unless otherwise specified.

2. Insertion loss changes by 0.003 dB/°C.

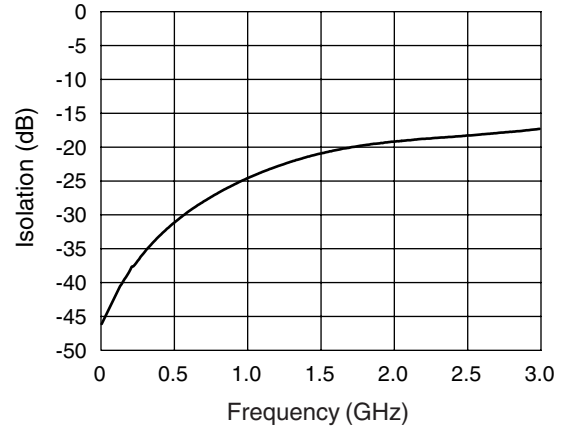
3. Insertion loss state.

4. Video feedthru measured with 1 ns risetime pulse and 500 MHz bandwidth.

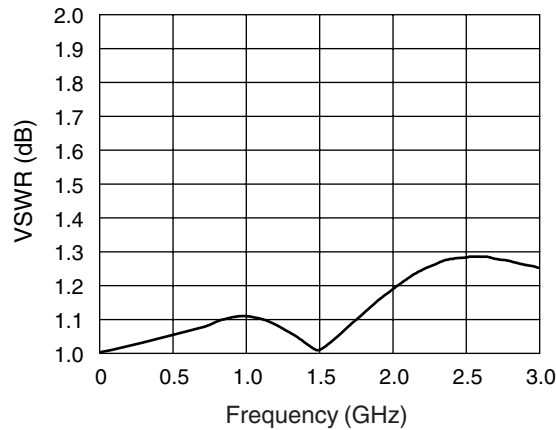
Typical Performance Data



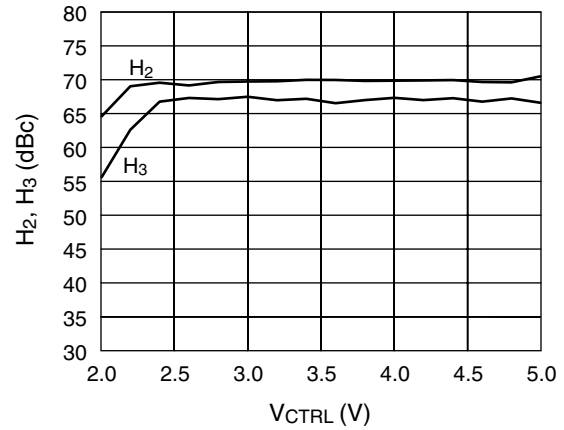
Insertion Loss vs. Frequency



Isolation vs. Frequency



VSWR vs. Frequency



AS193-73 Harmonics vs. Control Voltage
 $P_{IN} = 34.5 \text{ dBm}, 900 \text{ MHz}, \text{ GSM Pulsed}$

Truth Table

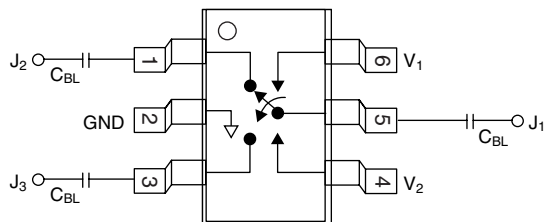
| V_1 | V_2 | J_1-J_2 | J_1-J_3 |
|------------|------------|----------------|----------------|
| 0 | V_{High} | Isolation | Insertion Loss |
| V_{High} | 0 | Insertion Loss | Isolation |

$V_{High} = +2.5 \text{ to } +5 \text{ V}.$

Absolute Maximum Ratings

| Characteristic | Value |
|-----------------------|---------------------------------------|
| RF Input Power | 6 W Max. > 900 MHz, 0/+5 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



DC blocking capacitors (C_{BL}) must be supplied externally.
 $C_{BL} = 100 \text{ pF}$ for operating frequency >500 MHz.