SKYWORKS®

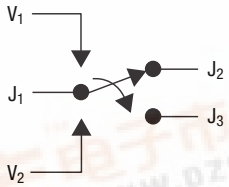
DATA SHEET

AS193-000: PHEMT GaAs IC High-Linearity 3 V Control SPDT 0.1–2.5 GHz Switch Chip

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)
- Lead (Pb)-free, RoHS-compliant, and Green

Functional Block Diagram



Description

The AS193-000 is a PHEMT GaAs FET IC high-linearity SPDT switch. This switch has been designed for use where extremely high linearity, low control voltage, high isolation and low insertion loss are needed. Some standard implementations include antenna changeover, T/R and diversity switching over 3 W. The AS193-000 switch is ideal for GaAs based antenna switch front-end modules.

NEW

Skyworks Green products are lead (Pb)-free, RoHS (Restriction of Hazardous Substances)-compliant, conform to the EIA/EICTA/JEITA Joint Industry Guide (JIG) Level A guidelines, and are free from antimony trioxide and brominated flame retardants.

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

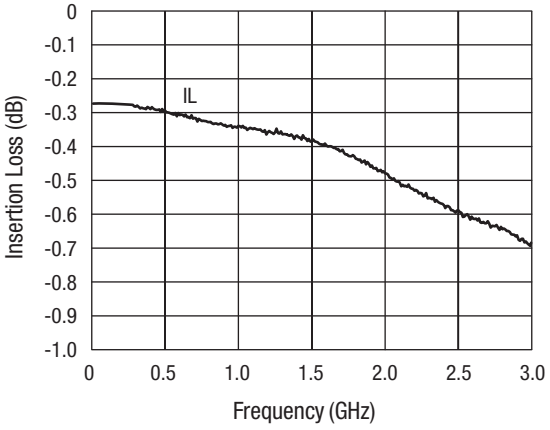
Parameter(1)	Frequency	Min.	Typ.	Max.	Unit
Insertion loss(2)	0.1–0.5 GHz		0.30	0.4	dB
	0.5–1.0 GHz		0.35	0.5	dB
	1.0–2.0 GHz		0.45	0.6	dB
	2.0–2.5 GHz		0.55	0.7	dB
Isolation	0.1–0.5 GHz	28	30		dB
	0.5–1.0 GHz	22	24		dB
	1.0–2.0 GHz	17	19		dB
	2.0–2.5 GHz	15	17		dB
VSWR(3)	0.1–1.0 GHz		1.2:1		dB
	1.0–2.5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

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.

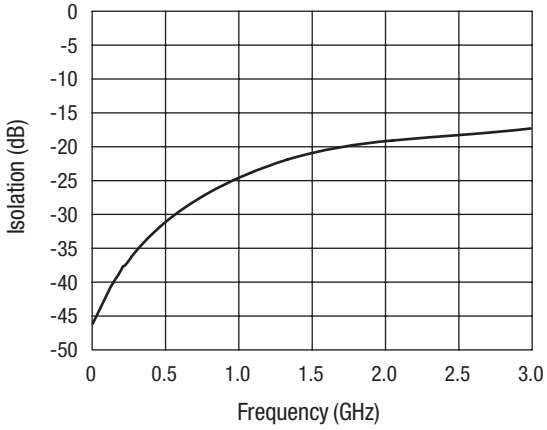
Operating Characteristics at 25 °C (0, 3 V)

Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching characteristics						
Rise, fall	10/90% or 90/10% RF			60		ns
On, off	50% CTL to 90/10% RF			100		ns
Video feedthru	T_{RISE} = 1 ns, BW = 500 MHz			50		mV
Input power for -0.1 dB compression	V_{CTL} = 0/3 V	0.9 GHz		37		dBm
Harmonics H_2, H_3	P_{IN} = 34.5 dBm	0.9 GHz		-65		dBc
Thermal resistance				25		°C/W
Control voltages	V_{LOW} = 0 to 0.2 V @ 20 µA max. V_{HIGH} = 2.5 V @ 50 µA max. to 5 V @ 100 µA max.					

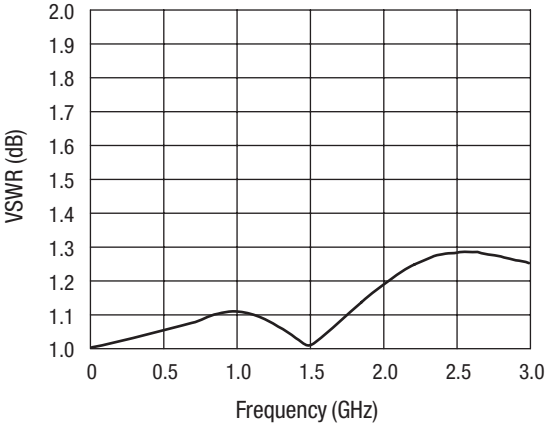
Typical Performance Data



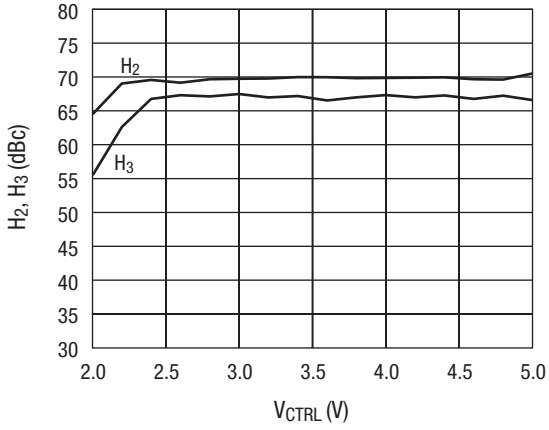
Insertion Loss vs. Frequency



Isolation vs. Frequency



VSWR vs. Frequency



Harmonics vs. Control Voltage
P_{IN} = 34.5 dBm, 900 MHz, GSM Pulsed

Note: Contact factory for S-parameter data.

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

Bond-pad metallization: gold.
Backside metallization: none.
See application note, Handling GaAs MMIC Die.
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.

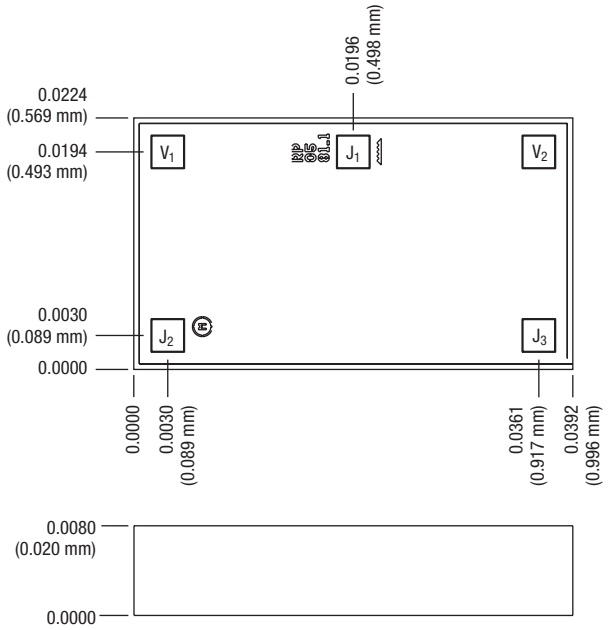
CAUTION: *Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.*

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

All other conditions not recommended.
V_{HIGH} = 2.5 to 5 V.

Outline Drawing



Dimensions in inches (mm). Tolerance ± 0.001 (0.025 mm).
Bond-pad metallization: gold.

Ordering Information

Model Name	Operating Temperature Range	Ordering Part Number	Package Description
AS193-000 GaAs SPDT switch	-40 °C to +85 °C	AS193-000	Wafer on plastic-ring film frame