

DATA SHEET

AS221-000: 0.1-2.5 GHz pHEMT GaAs High-Power SP4T Switch

Applications

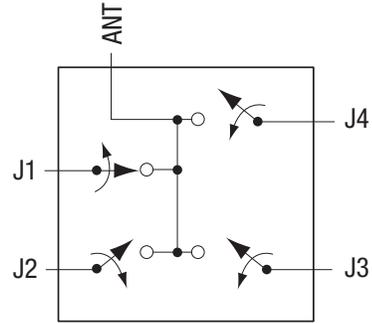
- GSM/EDGE systems

Features

- Broadband frequency range: 0.1-2.5 GHz
- Four symmetric RF paths
- Positive voltage control: 2.6 V
- High IP3
- Excellent harmonic performance
- Handles GSM power levels
- 100% RF tested in die form



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



S2077

Figure 1. AS221-000 Block Diagram

Description

The AS221-000 is a reflective Single-Pole, Four-Throw (SP4T) switch. The device is ideal for higher power applications. It can be used for GSM dual-band handset applications for which low loss, low current, and small size are critical parameters.

The AS221-000 is the RF tested die form of the AS221-306LF SP4T switch (refer to Data Sheet document #200251). A functional block diagram of the AS221-000 is shown in Figure 1. Signal definitions are provided in Table 1.

Table 1. AS221-000 Signal Descriptions

Name	Description	Name	Description
V1	Control voltage 1	J3	RF port. Must be DC blocked.
J1	RF port. Must be DC blocked.	J4	RF port. Must be DC blocked.
J2	RF port. Must be DC blocked.	V4	Control voltage 4
V2	Control voltage 2	ANT	RF common port. Must be DC blocked
V3	Control voltage 3		

Table 2. AS221-000 Absolute Maximum Ratings

Parameter	Symbol	Minimum	Typical	Maximum	Units
RF input power (0/6 V control above 0.5 GHz)	P _{IN}			4	W
Control voltage	V _{CTL}			6	V
Operating temperature	T _{OP}	-40		+85	°C
Storage temperature	T _{STG}	-65		+150	°C
Thermal resistance	Θ _{JC}		25		°C/W

Note: Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

CAUTION: Although this device is designed to be as robust as possible, Electrostatic Discharge (ESD) 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 should be used at all times.

Electrical and Mechanical Specifications

The absolute maximum ratings of the AS221-000 are provided in Table 2. Electrical specifications are provided in Table 3.

Typical performance characteristics of the AS221-000 are illustrated in Figures 2 through 5.

The state of the AS221-000 is determined by the logic provided in Table 4. Die dimensions are shown in Figure 6.

Table 3. AS221-000 Electrical Specifications (Note 1)
(Characteristic Impedance [Z_0] = 50 Ω , Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Insertion loss	IL	ANT-J1/J2/J3/J4				
		0.1 to 0.5 GHz		0.6	0.7	dB
		0.5 to 1.0 GHz		0.7	0.8	dB
		1.0 to 2.0 GHz		0.9	1.1	dB
Isolation	ISO	ANT-J1/J2/J3/J4				
		0.1 to 0.5 GHz	30	34	dB	
		0.5 to 1.0 GHz	25	29	dB	
		1.0 to 2.0 GHz	19	23	dB	
Voltage Standing Wave Ratio	VSWR	0.1 to 1.0 GHz		1.2:1		–
		1.0 to 2.5 GHz		1.3:1		–
Switching characteristics: Rise, fall On, off Video feedthrough		10/90% or 90/10% RF		50		ns
		50% V_{CTL} to 90/10% RF		100		ns
		$T_{RISE} = 1$ ns, bandwidth = 500 MHz		50		mV
3 rd Order Intercept Point	IP3	+13 dBm/tone		+55		dBm
2 nd and 3 rd harmonics	2fo, 3fo	+34 dBm input @ 900 MHz		–65		dBc
Control voltage: Low High	V_{CTL}	@ 200 μ A		0		V
				2.6		V

Note 1: Performance is guaranteed only under the conditions listed in this Table.

Typical Performance Characteristics
 (Characteristic Impedance [Z₀] = 50 Ω, Unless Otherwise Noted)

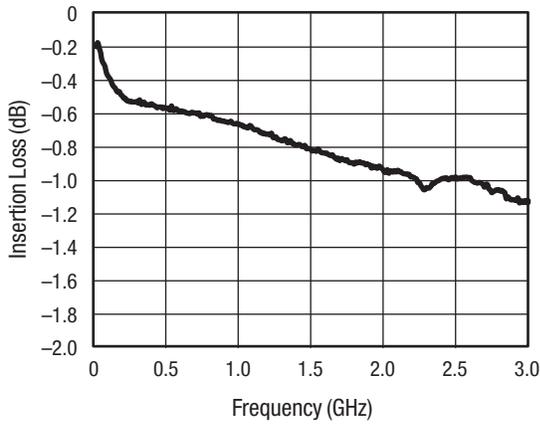


Figure 2. Typical Insertion Loss vs Frequency

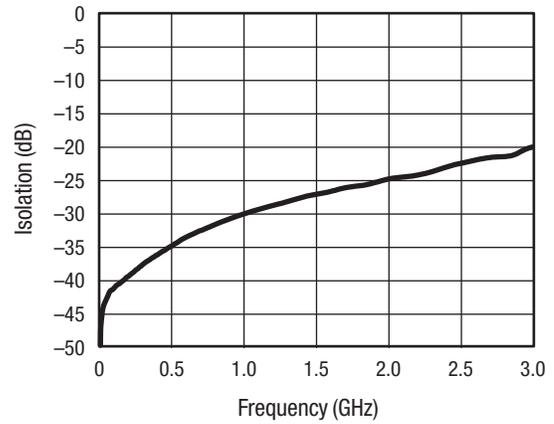


Figure 3. Typical Isolation vs Frequency

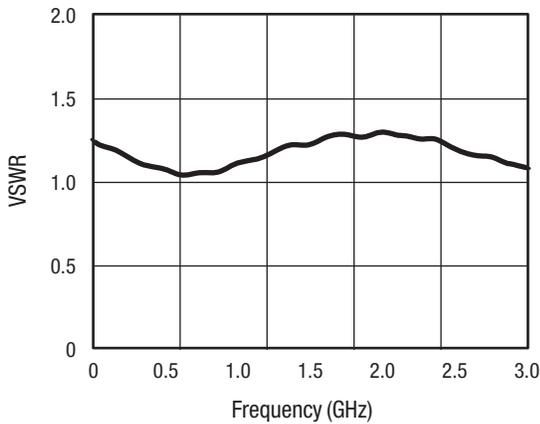


Figure 4. Typical VSWR vs Frequency

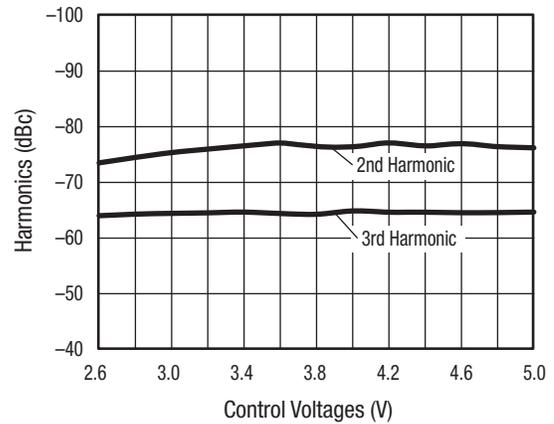


Figure 5. Typical Harmonics vs Control Voltages

Table 4. AS221-000 Truth Table

V1	V2	V3	V4	ANT-J1	ANT-J2	ANT-J3	ANT-J4
V _{HIGH}	V _{LOW}	V _{LOW}	V _{LOW}	Insertion loss	Isolation	Isolation	Isolation
V _{LOW}	V _{HIGH}	V _{LOW}	V _{LOW}	Isolation	Insertion loss	Isolation	Isolation
V _{LOW}	V _{LOW}	V _{HIGH}	V _{LOW}	Isolation	Isolation	Insertion loss	Isolation
V _{LOW}	V _{LOW}	V _{LOW}	V _{HIGH}	Isolation	Isolation	Isolation	Insertion loss

Note: V_{HIGH} = 2.6 V
 V_{LOW} = 0 V
 Any state other than described in this Table places the switch into an undefined state and is not recommended.

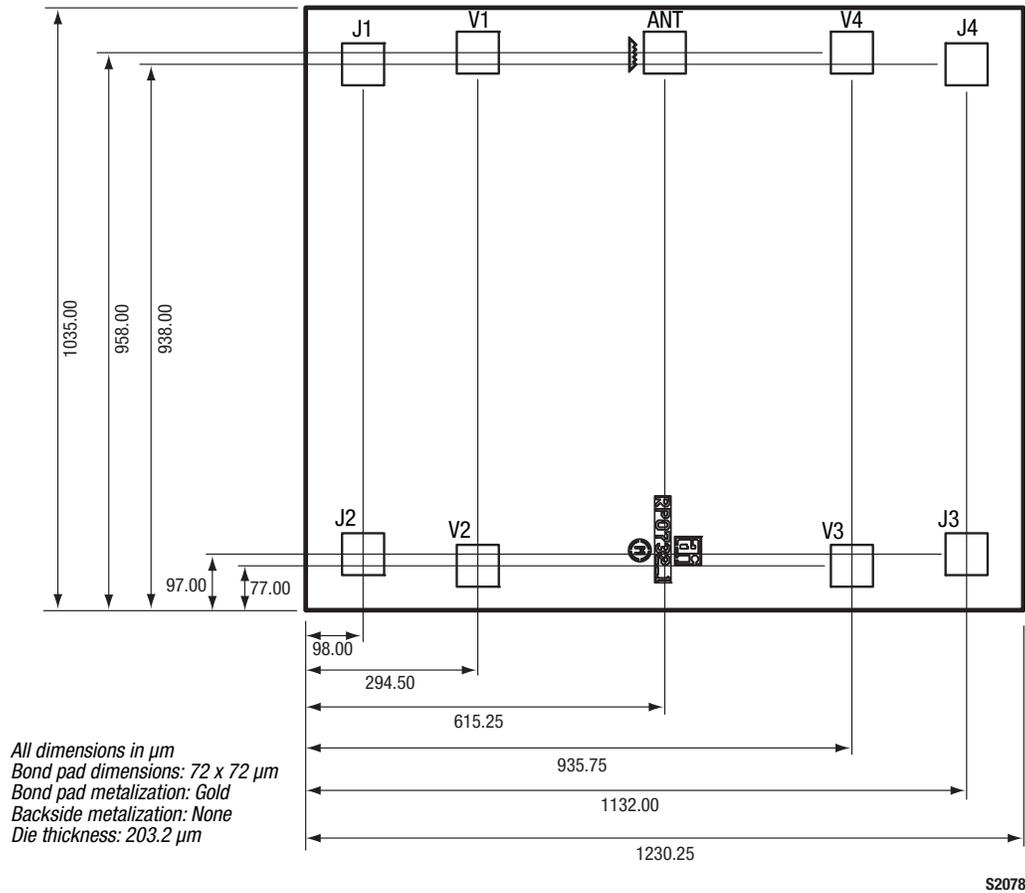


Figure 6. AS221-000 Die Dimensions

Ordering Information

Model Name	Manufacturing Part Number
AS221-000 SP4T Switch	AS221-000

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