AS183-92LF-HX 300 kHz-2.5 GHz pHEMT GaAs SPDT Switch

Description

The AS183-92LF-HX is a pHEMT GaAs FET Single Pole Double Throw (SPDT) switch designed to deliver low insertion loss and high performance. It operates with a positive control voltage and features exceptionally low DC power consumption, making it suitable for power-sensitive applications. The device is housed in a compact, cost-effective 2.00 × 1.25 mm, 6-pin SC-70 package.

A functional block diagram of the device is shown in Figure 1. The pin configuration and package outline are illustrated in Figure 2. Signal pin assignments, along with detailed functional descriptions for each pin, are provided in Table 1.

Applications

- General purpose medium-power switches in telecommunication applications
- Transmit/receive switches in 802.11 b/g WLAN Bluetooth™ systems

Features

- IP1dB: +30 dBm typical @ 3 V
- IP3: +43 dBm typical @ 3 V
- Low insertion loss: 0.3 dB @ 0.9 GHz
- Low DC power consumption
- Ultra-miniature, SC-70 (6-pin, 2.00 x 1.25 mm) package (MSL1, 260 °C per JEDEC J-STD-020)

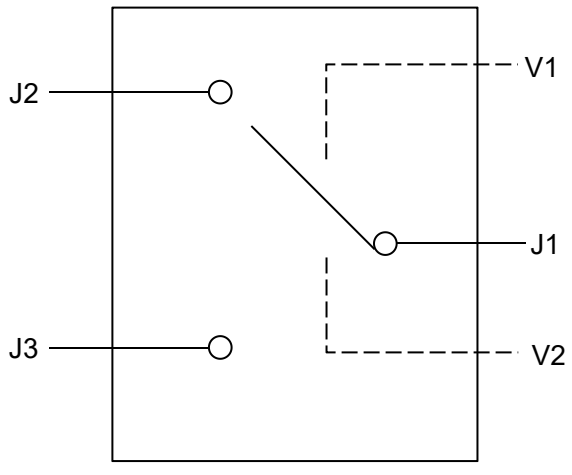


Figure 1. AS183-92LF-HX Block Diagram

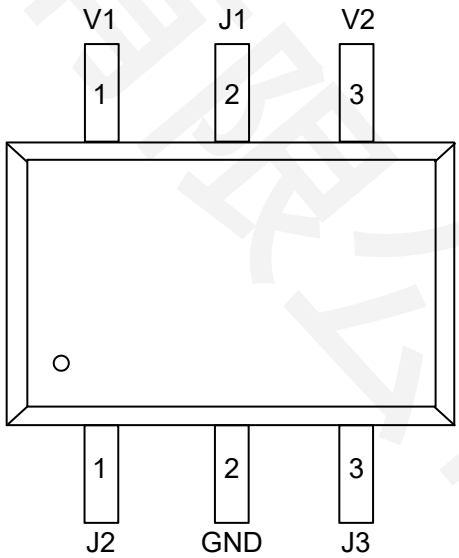


Figure 2. AS183-92LF-HX Pinout –6-Pin SC-70 (Top View)

Table 1. AS183-92LF-HX Signal Descriptions

Pin #	Name	Description	Pin #	Name	Description
1	J2	RF input/output 2 (Note 1)	4	V2	DC control voltage
2	GND	Ground	5	J1	RF input/output 1 (Note 1)
3	J3	RF input/output 3 (Note 1)	6	V1	DC control voltage

Note 1: A 100 pF blocking capacitor is required for >500 MHz operation. Use larger value capacitors for lower frequency operation.

Table 2. AS183-92LF-HX Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Control voltage	V_{CTL}	–0.2	+8.0	V
RF input power (V_{CTL} = 0 to 7 V) @ >500 MHz	P_{IN}		6	W
Operating temperature	T_{OP}	–40	+85	°C
Storage temperature	T_{STG}	–65	+150	°C

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.

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 AS183-92LF-HX are provided in Table 2. Electrical specifications are provided in Table 3.

Performance characteristics for the AS183-92LF-HX are illustrated in Figures 3 through 5.

The state of the AS183-92LF-HX is determined by the logic provided in Table 4.

Table 3. AS183-92LF-HX Electrical Specifications (Note 1)

(V_{CTL} = 0 to 3 V, T_{OP} = +25 。C, Characteristic Impedance = 50 Ω, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Insertion loss (Note 2)		300 kHz to 1.0 GHz 300 kHz to 2.0 GHz 300 kHz to 2.5 GHz		0.30 0.30 0.55	0.40 0.40 0.60	dB dB dB
Isolation		300 kHz to 1.0 GHz 300 kHz to 2.0 GHz 300 kHz to 2.5 GHz	18 12 11	20 14 13		dB dB dB
Voltage Standing Wave Ratio (Note 3)	VSWR	300 kHz to 2.5 GHz		1.2:1	1.6:1	_
Switching characteristics: Rise/fall On/off Video feedthrough		10/90% or 90/10% RF 50% control to 90/10% RF T_{RISE} = 1 ns, bandwidth = 500 MHz		10 20 25		ns ns mV
1 dB Input Compression Point	IP1dB	@ 0.5 to 2.5 GHz V_{CTL} = 0 to 3 V V_{CTL} = 0 to 5 V		 +30 +34		 dBm dBm
3rd Order Intercept Point	IP3	@ 0.5 to 2.5 GHz, for two-tone P_{IN} = +15 dBm V_{CTL} = 0 to 3 V V_{CTL} = 0 to 5 V		 +43 +50		 dBm dBm
Thermal resistance				25		°C/W
Control voltage: Low (@ 20 µA max) High (@ 100 µA max) High (@ 200 µA max)	 V_{CTL_L} V_{CTL_H} V_{CTL_H}		 0		 0.2 3.0 5.0	 V V V

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

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

Note 3: Insertion loss state.

pical Performance Characteristics

(V_{CTL} = 0 to-3 V, T_{OP} = +25。C, Characteristic Impedance [Z_O] = 50 Ω, Unless Otherwise Noted)

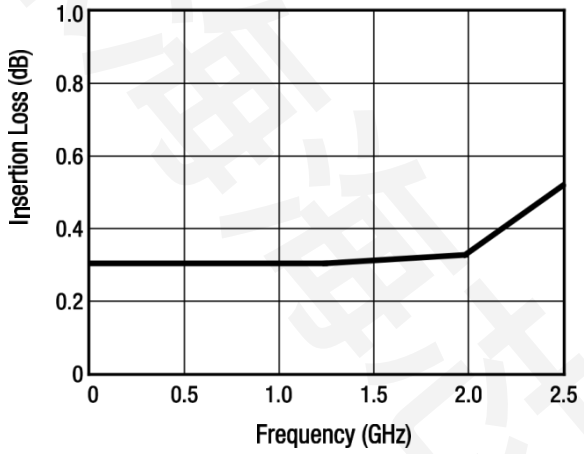


Figure 3. Insertion Loss vs Frequency

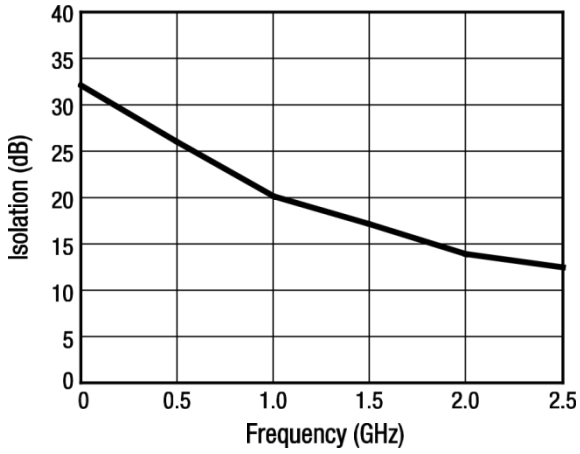


Figure 4. Isolation vs Frequency

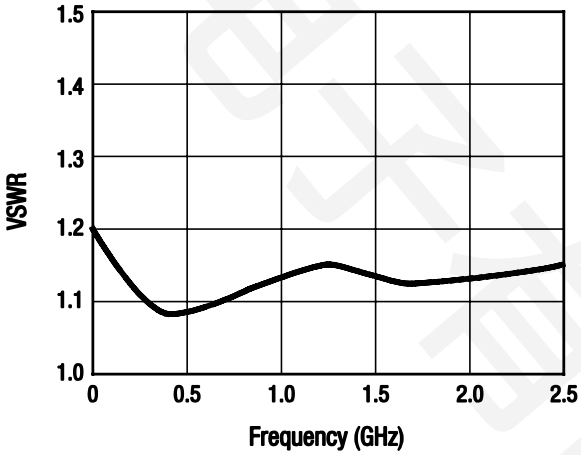


Figure 5. VSWR vs Frequency

4. Truth Table (V_{HIGH} = 3 to 5 V)

V1	V2	J1-J2	J1-J3
V_{HIGH}	0	Insertion loss	Isolation
0	V_{HIGH}	Isolation	Insertion loss

Note: Any state other than described in this Table places the device in an undefined state and is not recommended.

Evaluation Board Description

The AS183-92LF-HX Evaluation Board is used to test the performance of the AS183-92LF-HX SPDT switch. An Evaluation Board schematic diagram is provided in Figure 6. An assembly drawing for the Evaluation Board is shown in Figure 7.

Package Dimensions

The PCB layout footprint for the AS183-92LF-HX is provided in Figure 8. Typical case markings are shown in Figure 9. Package dimensions for the 6-pin SC-70 are shown in Figure 10, and tape and reel dimensions are provided in Figure 11.

Package and Handling Information

Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The AS183-92LF-HX is rated to Moisture Sensitivity Level 1 (MSL1) at 260。C. It can be used for lead or lead-free soldering. It can be used for lead or lead-free soldering. For additional information, refer to the Skyworks Application Note, Solder Reflow Information, document number 200164.

Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment.

Production quantities of this product are shipped in a standard tape and reel format.

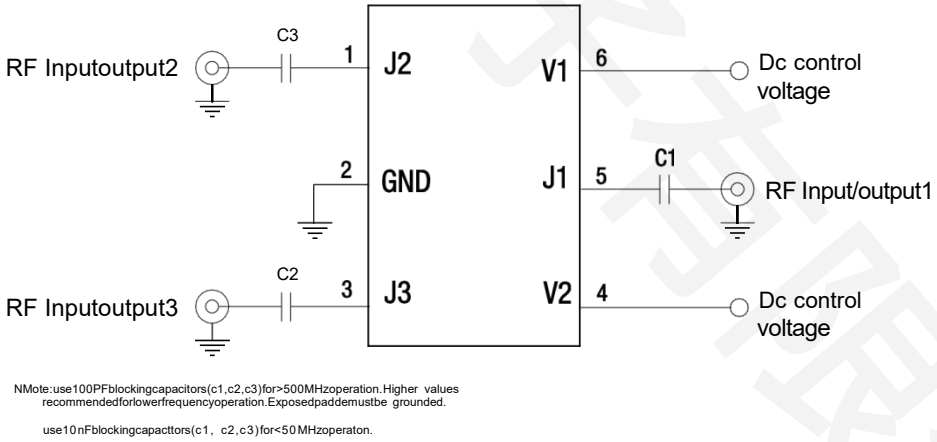


Figure 6. AS183-92LF-HX Evaluation Board Schematic

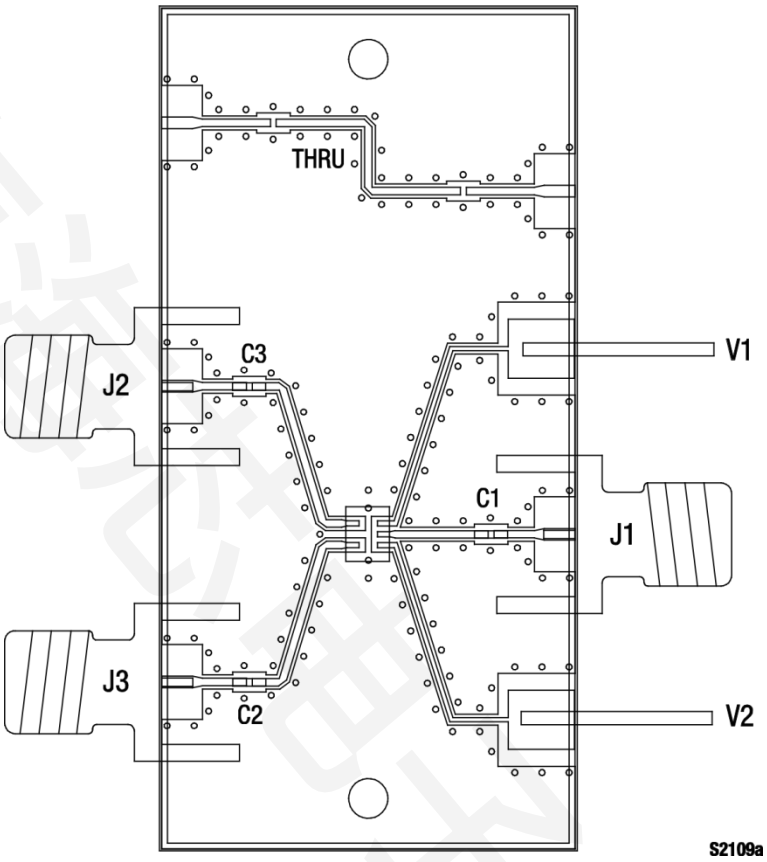


Figure 7. AS183-92LF-HX Evaluation Board Assembly Diagram

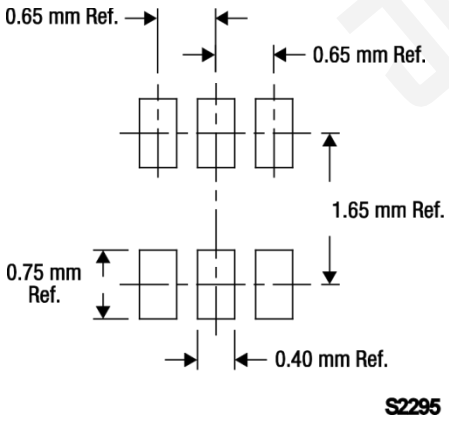
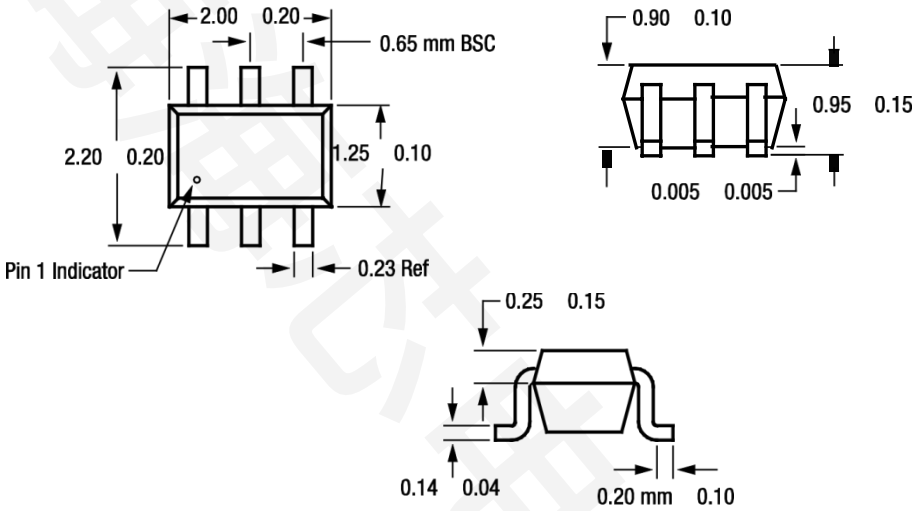


Figure 8. AS183-92LF-HX PCB Layout Footprint
(Top View)

DIMENSIONAL DRAWINGS

SC-70



All measurements are in millimeters

Dimensioning and tolerancing according to ASME Y14.5M-1994

Figure 9. AS183-92LF-HX 6-Pin SC-70 Package Dimensions