

DATA SHEET

AS179-92LF: 20 MHz to 4.0 GHz GaAs SPDT Switch

Applications

- General purpose medium-power switches in telecommunication
 applications
- \bullet Transmit/receive switches in 802.11 b/g WLAN Bluetooth $^{\circledast}$ 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)

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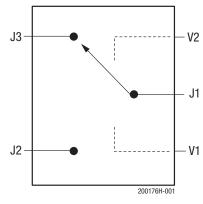


Figure 1. AS179-92LF Block Diagram

Description

The AS179-92LF is a pHEMT GaAs FET single-pole, double-throw (SPDT) switch. The device features low insertion loss and positive voltage operation with very low DC power consumption. The AS179-92LF is manufactured in a compact, low-cost 2.00 x 1.25 mm, 6-pin SC-70 package.

A functional block diagram is shown in Figure 1. The pin configuration and package are shown in Figure 2. Signal pin assignments and functional pin descriptions are provided in Table 1.

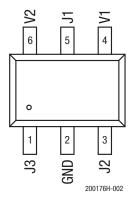


Figure 2. AS179-92LF Pinout (Top View)

Table 1. AS179-92LF Signal Descriptions¹

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

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

Electrical and Mechanical Specifications

The absolute maximum ratings of the AS179-92LF are provided in Table 2. Electrical specifications are provided in Table 3. Typical performance characteristics are shown in Figures 3, 4, and 5.

Table 2. AS179-92LF Absolute Maximum Ratings¹

Parameter	Symbol	Minimum	Maximum	Units
Control voltage	VCTL	-1.2	+8.0	V
RF input power (VcrL = 0 to 7 V): >500 MHz <500 MHz			6 500	W mW
Operating temperature	Тор	-40	+85	°C
Operating temperature (Pinmax < +32 dBm for ToP = 105 $^{\circ}$ C)	Тор	-40	+105	°C
Storage temperature	Tstg	-65	+150	°C

¹ 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.

Table 3. AS179-92LF Electrical Specifications¹ (1 of 2) (VcrL = 0 to3 V, ToP = +25 °C, Characteristic Impedance = 50 Ω , Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Insertion loss ^{2,3}	IL	0.02 to 1.0 GHz 1.0 to 2.0 GHz 2.0 to 3.0 GHz 3.0 to 4.0 GHz		0.3 0.4 0.4 0.5	0.4 0.5 0.6 0.7	dB dB dB dB
Isolation ³	ISO	0.02 to 1.0 GHz 1.0 to 2.0 GHz 2.0 to 3.0 GHz	22 22 20	25 25 23		dB dB dB
Return loss ^{3,4}	RL	0.02 to 1.0 GHz 1.0 to 2.0 GHz 2.0 to 3.0 GHz 3.0 to 4.0 GHz	15 15 14 13		20 20 17 15	dB dB dB dB
Switching characteristics: Rise/fall On/off Video feedthrough		10/90% or 90/10% RF 50% control to 90/10% RF t _R = 1 ns, bandwidth = 500 MHz		10 100 25		ns ns mV

Table 3. AS179-92LF Electrical Specifications¹ (2 of 2) (VcrL = 0 to 3 V, Top = +25 °C, Characteristic Impedance = 50 Ω , Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
1 dB input compression point	IP1dB	@ 0.5 to 3.0 GHz				
		$V_{CTL} = 0$ to 2 V		+26		dBm
		$V_{CTL} = 0$ to 3 V		+30		dBm
		$V_{CTL} = 0$ to 5 V		+34		dBm
		@ 48 MHz				
		$V_{CTL} = 0$ to 3 V		+28.9		dBm
		$V_{CTL} = 0$ to 5 V		+29.5		dBm
		@ 3.0 to 4.0 GHz				
		$V_{CTL} = 0$ to 3 V		+29		dBm
		$V_{CTL} = 0$ to 5 V		+32		dBm
hird order intercept point	IP3	+5 dBm two-tone input power				
		@ 0.5 to 3.0 GHz				
		$V_{CTL} = 0$ to 2 V		+43		dBm
		$V_{CTL} = 0$ to 3 V		+43		dBm
		$V_{CTL} = 0$ to 5 V		+50		dBm
		+5 dBm two-tone input power				
		@3.0 to 4.0 GHz				
		Vctl = 5 V		+45		dBm
Thermal resistance				25		°C/W
Control voltage:						
Low (@ 20 µA max)	VCTL_L		0		0.2	V
High (@100 μA max)	Vctl_h				2.0	V
High (@ 200 µA max)	VCTL_H				5.0	V

¹ Performance is guaranteed only under the conditions listed in this table.

² Insertion loss changes by 0.003 dB/°C.

 3 Typical performance maintained with VcTL = 0.2 V.

⁴ Insertion loss state.

Typical Performance Characteristics

(VCTL = 0 to 3 V, TOP = +25 °C, PIN = 0 dBm, Characteristic Impedance [Zo] = 50 Ω , CBL = 100 pF, Unless Otherwise Noted)

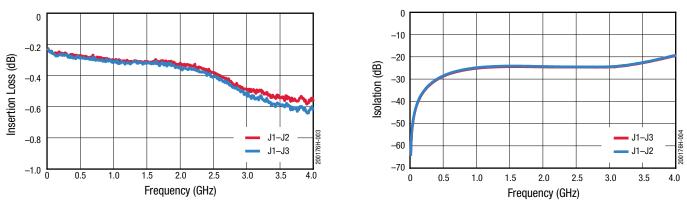


Figure 3. Insertion Loss vs Frequency

Figure 4. Isolation vs Frequency

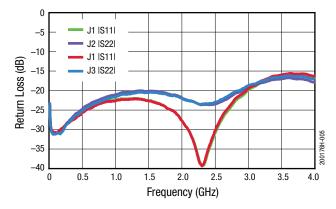


Figure 5. Return Loss vs Frequency

Table 4. Truth Table (VHIGH = 2 to 5 V)¹

V1	V2	J1-J2	J1-J3
Vhigh	0	Isolation	Insertion loss
0	Vнigh	Insertion loss	Isolation

¹ Any state other than described in this table places the device in an undefined state. An undefined state does not damage the device.

Evaluation Board Description

The AS179-92LF Evaluation Board is used to test the performance of the AS179-92LF 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

Package dimensions are shown in Figure 8, and tape and reel dimensions are provided in Figure 9.

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 AS179-92LF is rated to Moisture Sensitivity Level 1 (MSL1) at 260 $^{\circ}$ C. It can be used for lead or lead-free soldering.

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.

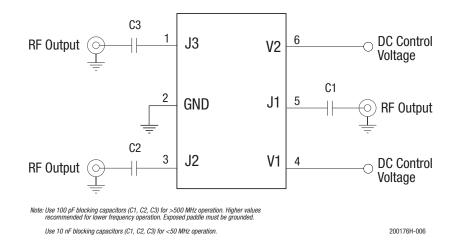


Figure 6. AS179-92LF Evaluation Board Schematic

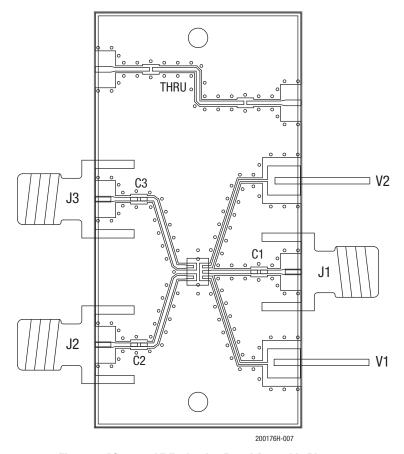
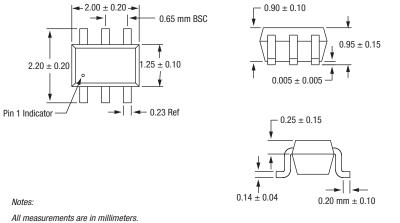


Figure 7. AS179-92LF Evaluation Board Assembly Diagram



Dimensions and tolerances according to ASME Y14.5M-1994.

200176H-008

Figure 8. AS179-92LF Package Dimensions

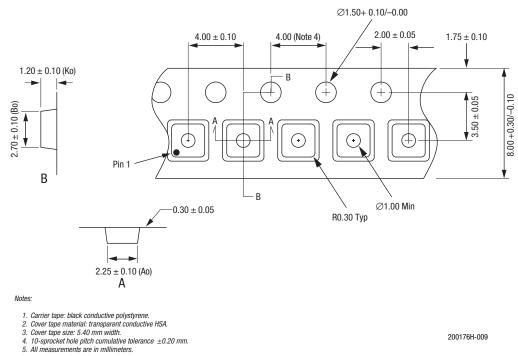


Figure 9. AS179-92LF Tape and Reel Dimensions

Ordering Information

Model Name	Manufacturing Part Number	Evaluation Board Part Number
AS179-92LF: SPDT Switch	AS179-92LF	AS179-92LF-EVB

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