

# GaAs SPDT Reflective Switch

## DC-3 GHz with TTL/CMOS Control Input

### SW-110

V 2.00

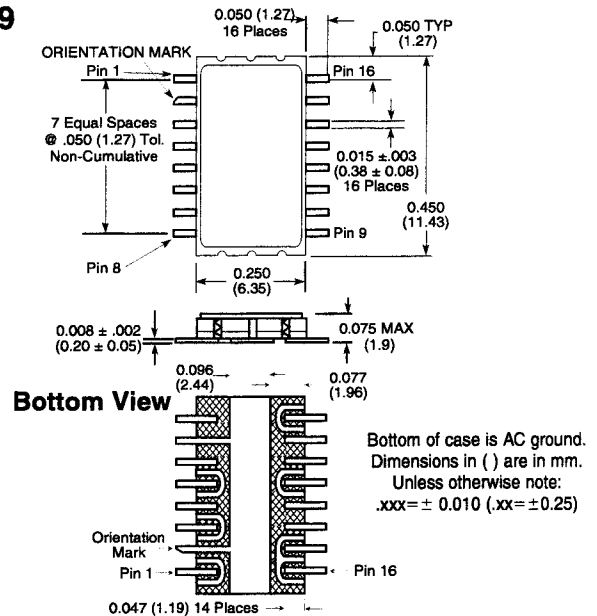
#### Features

- 1 dB Compression Point: +39 dBm Typ., -8V Control
- IP<sub>3</sub>: +65 dBm, Typ., -8V Control
- Insertion Loss: 0.45 dB Typ.
- Low Power Consumption
- Fast Switching Speed
- 50Ω Nominal Impedance

#### Description

M/A-COM's SW-110 is a GaAs MMIC SPDT reflective switch with an integral silicon ASIC driver. This device is in a 16 lead ceramic surface mount package. These switches exhibit excellent performance and repeatability from DC to 3.0 GHz, with very low DC power dissipation. The SW-110 is ideally suited for RF/IF communications applications. Environmental screening is available. Contact the factory for information.

#### CR-9



#### Electrical Specifications, T<sub>A</sub> = +25°C<sup>1, 2, 3</sup>

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Reference Insertion Loss	DC - 0.5 GHz	dB			0.6
	DC - 1.0 GHz	dB			0.7
	DC - 2.0 GHz	dB			0.9
	DC - 3.0 GHz	dB			1.1
Isolation	DC - 0.5 GHz	dB	40		
	DC - 1.0 GHz	dB	35		
	DC - 2.0 GHz	dB	24		
	DC - 3.0 GHz	dB	18		
VSWR	DC - 0.5 GHz				1.2:1
	DC - 1.0 GHz				1.4:1
	DC - 2.0 GHz				1.4:1
	DC - 3.0 GHz				1.5:1
Trise, Tfall Ton, Toff Transients	10% to 90%	nS		12	
	1.3V Control to 90/10% RF	nS		35	
	In-band (peak-peak)	mV		30	
1 dB Compression	Input Power, 0.1 dB, -5V Control	0.9 GHz		+32.5	
	Input Power, 1.0 dB, -5V Control	0.9 GHz		+32.5	
	Input Power, 0.1 dB, -8V Control	0.9 GHz		+32.5	
	Input Power, 1.0 dB, -8V Control	0.9 GHz		+39.5	
Input IP <sub>3</sub>	For two-tone input power up to +10 dBm				
	-5V Control	0.9 GHz		+61	
	-8V Control	0.9 GHz		+65	
V <sub>CC</sub>		V	4.5	5.0	5.5
V <sub>EE</sub>		V	-8.0		-5.0
I <sub>CC</sub>	V <sub>CC</sub> = 4.5 to 5.5 V V <sub>ctl</sub> = 0 to 0.8 V, or V <sub>CC</sub> - 2.1 V to V <sub>CC</sub>	mA			1.0
I <sub>EE</sub>	V <sub>EE</sub> = -5.0 to -8.0 V	mA			1.0
V <sub>ctl</sub>	Logic 0 (TTL)	V	0.0		0.8
V <sub>ctl</sub>	Logic 1 (TTL)	V	2.0		5.0
Input Leakage Current (Low)	0 to 0.8 V	μA			1.0
	Input Leakage Current (High)	2.0 to 5.0 V	μA		1.0

1. All specifications apply when operated with bias voltages of +5 V for V<sub>CC</sub> and -5.0 V to -8.0 V for V<sub>EE</sub>, and 50Ω impedance at all RF ports unless otherwise specified.  
 2. For this switch to meet the guaranteed specifications, it is necessary to have a DC return on either RF1 or RF2. The DC return can be either a 10k Ω resistor, Specifications Subject to Change Without Notice.

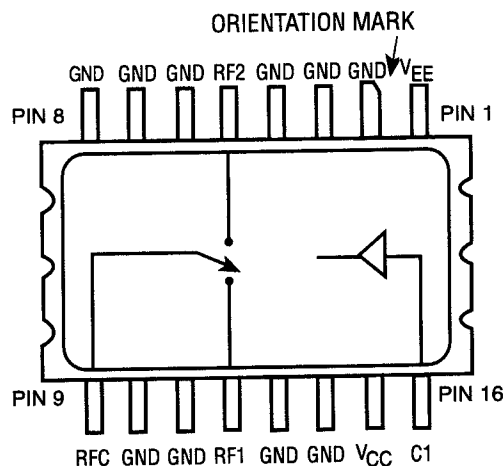
or an RF choke.  
 3. High power (greater than 1W) handling specifications apply to cold switching only. For input powers under 1 W, hot switching can be used.

**Absolute Maximum Ratings**

Parameter	Absolute Maximum
Maximum Input Power	+35 dBm
0.05 GHz	
0.5 - 3.0 GHz	
-5V Control	+36 dBm
-8V Control	+39 dBm
Power Dissipation <sup>2,3</sup>	2.0W
Control Voltage	-0.5 V to V <sub>CC</sub> to 0.5 V
Operating Temperature	-55°C to +125°C
Storage Temperature	-65°C to +150°C
Junction Temperature	+175°C
Thermal Resistance <sup>2</sup> : $\theta_{jC}$	+50°C/W

1. Operation of this device above any one of these parameters may cause permanent damage.
2. T<sub>case</sub> = 25°C, where T<sub>case</sub> is the temperature at the bottom of the case.
3. Special consideration must be given to the mounting of the switch to minimize the thermal resistance. The bottom of the case should be thermally attached to the mounting surface to maintain the junction temperature under the absolute maximum rating.

**Functional Schematic (Top View)**



**Truth Table**

Control Inputs	Condition of Switch	
	RF Common to Each RF Port	
C1	RF1	RF2
Low	On	Off
High	Off	On

0 = TTL Low

1 = TTL High

**Two Tone IP<sub>3</sub> Measurements**

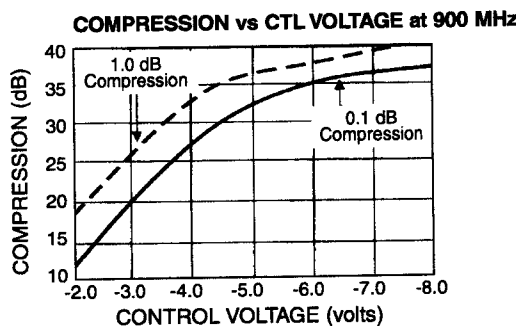
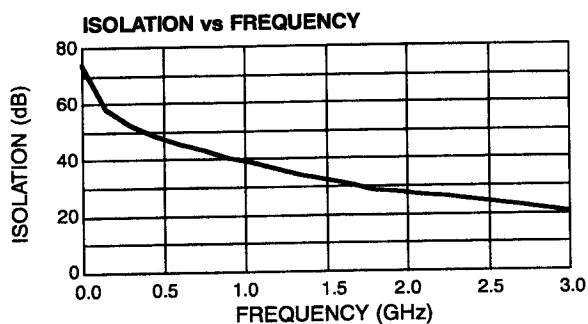
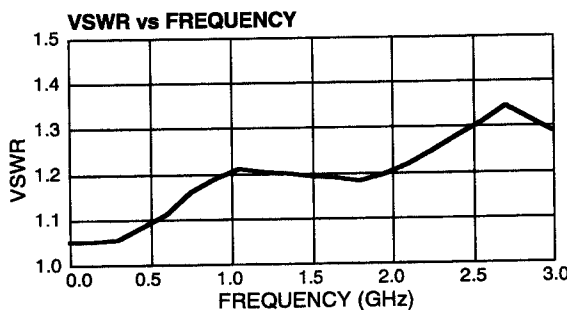
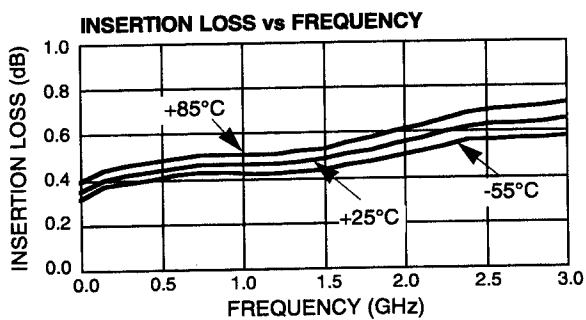
Bias Voltage	Input Power for Each Tone (dBm)	3rd Order Intermodulation Products (dBc)	IP <sub>3</sub> (dBm)	Second Harmonic (dBc)
0, -5V	+27	-34	+44	-61
0, -6V	+27	-49	+51	-61
0, -7V	+27	-64	+59	-63
0, -8V	+27	-65	+59	-63
0, -5V	+28	-30	+43	-58
0, -6V	+28	-41	+48	-58
0, -7V	+28	-52	+54	-57
0, -8V	+28	-60	+58	-57
0, -5V	+29	-28	+43	-54
0, -6V	+29	-34	+46	-54
0, -7V	+29	-44	+51	-54
0, -8V	+29	-52	+55	-54
0, -5V	+30	-26	+43	-52
0, -6V	+30	-32	+46	-51
0, -7V	+30	-38	+49	-51
0, -8V	+30	-44	+52	-51

**Ordering Information<sup>4</sup>**

Part Number	Package
SW-110 PIN	Ceramic

4. Contact the factory for standard or custom screening requirements.

**Typical Performance @ +25°C**



Specifications Subject to Change Without Notice.

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