SW-110-PIN

GaAs SPDT Reflective Switch with TTL/CMOS Control Input, DC-3.0 GHz

Rev. V6

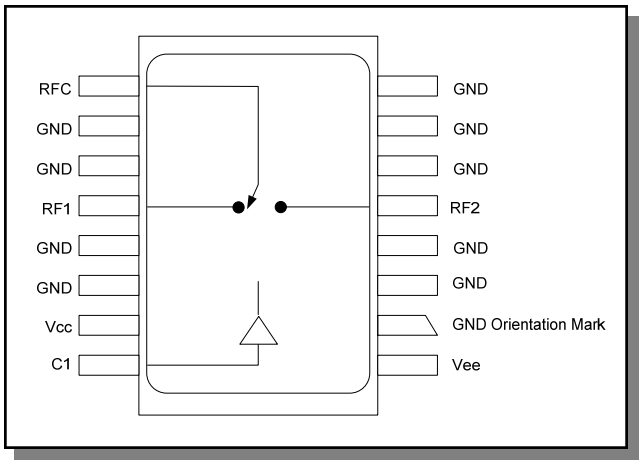
Features

- 1 dB Compression Point: +39 dBm Typical, -8V Control
- IP_3: +65 dBm Typical, -8V Control
- Insertion Loss: 0.45 dB Typical
- Low Power Consumption
- Fast Switching Speed
- Hermetic Surface Mount Package
- 50 Ohm Nominal Impedance
- Lead-Free CR-9 Package
- 260°C Reflow Compatible
- RoHS* Compliant

Description

M/A-COM's SW-110-PIN 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-PIN is ideally suited for RF/IF communications applications. Environmental screening is available. Contract the factory for information.

Functional Block Diagram



Ordering Information

Part Number	Package
SW-110-PIN	Bulk Packaging
MASW-008844-0001TB	Sample Test Board

Note: Reference Application Note M513 for reel size information.

Pin Configuration

Pin No.	Function	Pin No.	Function
1	Vee	9	RFC
2	GND	10	GND
3	GND	11	GND
4	GND	12	RF1
5	RF2	13	GND
6	GND	14	GND
7	GND	15	Vcc
8	GND	16	C1

The metal bottom of the case must be connected to RF and DC ground.

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

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Electrical Specifications: T_A = 25°C[1,2,3]

Parameter	Test Conditions	Frequency	Units	Min	Typ	Max
Reference Insertion Loss	—	DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz DC - 3.0 GHz	dB dB dB dB	— — — —	— — — —	0.6 0.7 0.9 1.1
Isolation	—	DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz DC - 3.0 GHz	dB dB dB dB	40 35 24 18	— — — —	— — — —
VSWR	—	DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz DC - 3.0 GHz	Ratio Ratio Ratio Ratio	— — — —	— — — —	1.2:1 1.4:1 1.4:1 1.5:1
Trise, Tfall Ton, Toff Transients	10% to 90% 1.3V Control to 90/10% RF In-band (peak-peak)	— — —	nS nS mV	— — —	12 35 30	— — —
1 dB Compression	Input Power, 0.1 dB, -5V Control Input Power, 1.0 dB, -5V Control Input Power, 0.1 dB, -8V Control Input Power, 1.0 dB, -8V Control	0.9 GHz 0.9 GHz 0.9 GHz 0.9 GHz	dBm dBm dBm dBm	— — — —	+32.5 +32.5 +32.5 +39.5	— — — —
Input IP_3	For two-tone Input power up to +10 dBm -5V Control -8V Control	 0.9 GHz 0.9 GHz	 dBm dBm	 — —	 +61 +65	 — —
Vcc Vee		— —	V V	4.5 -8.0	5.0 —	5.5 -5.0
Icc	Vcc = 4.5 to 5.5V Vctl = 0 to 0.8V, or VCC - 2.1V to VCC	—	mA	—	—	1.0
Iee	Vee = -5.0 to –8.0V	—	mA	—	—	1.0
Vctl Vctl	Logic 0 (TTL) Logic 1 (TTL)	— —	V V	0.0 2.0	— —	0.8 5.0
Input Leakage Current (Low)	0 to 0.8V	—	µA	—	—	1.0
Input Leakage Current (High)	2.0 to 5.0V	—	µA	—	—	1.0

1. All specifications apply when operated with bias voltages of +5V for Vcc and –5.0V to –8.0V for Vee, and 50 Ohm 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 Ohm resistor, or an RF choke.
3. High Power (greater than 1W) handling specifications apply to cold switching only. For input powers under 1W, hot switching can be used.

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Absolute Maximum Ratings [4,5]

Parameter	Absolute Maximum
Max Input Power 0.05 GHz 0.5 - 3.0 GHz -5V Control -8V Control	 +35 +36 +39
Power Dissipation [6,7]	2.0W
V_{CC}	-0.5V ≤ V_{CC} ≤ +7.0V
V_{EE}	-8.5V ≤ V_{EE} ≤ +0.5V
V_{CC} - V_{EE}	-0.5V ≤ V_{CC} - V_{EE} ≤ 14.5V
Vin[8]	-0.5V ≤ Vin ≤ V_{CC} + 0.5V
Operating Temperature	-55°C to +125°C
Storage Temperature	-65°C to +150°C
Junction Temperature	+175°C
Thermal Resistance θjc	+50°C/W

4. Exceeding any one or combination of these limits may cause permanent damage to this device.
5. M/A-COM does not recommend sustained operation near these survivability limits.
6. Tcase = 25°C, where Tcase is the temperature at the bottom of the case.
7. 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.
8. Standard CMOS TTL interface, latch-up will occur if logic signal is applied prior to power supply.

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Truth Table (Switch)

Control Inputs	Condition of Switch RF Common to each RF Port	
C1	RF1	RF2
0	On	Off
1	Off	On

0 = TTL Low; 1 = TTL High

Two Tone IP_3 Measurements

Bias Voltage	Input Power for Each Tone (dBm)	3rd Order Intermod Products (dBc)	IP3 (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

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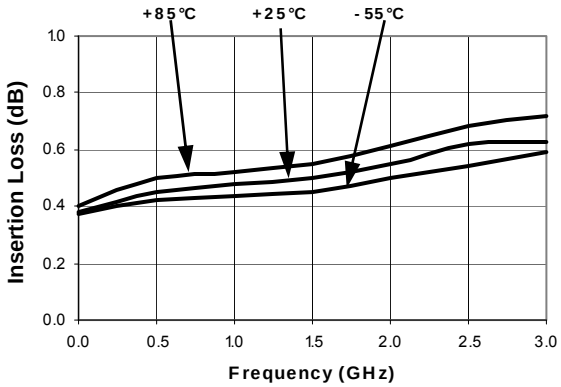
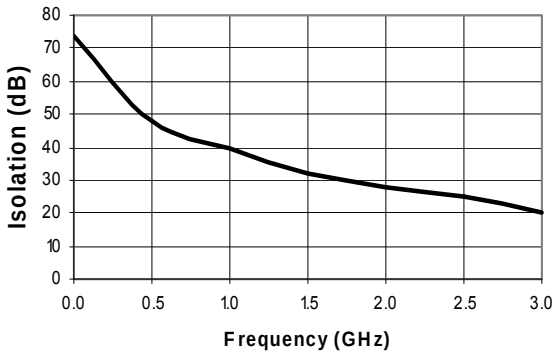
Typical Performance Curves

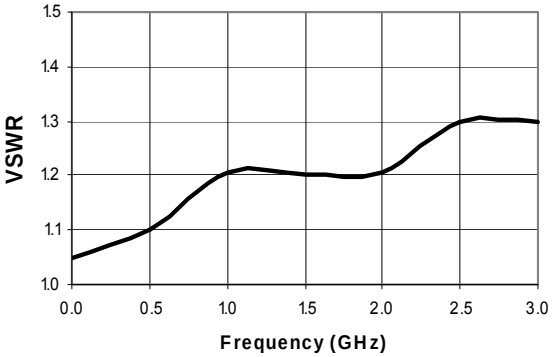
Insertion Loss vs. Frequency



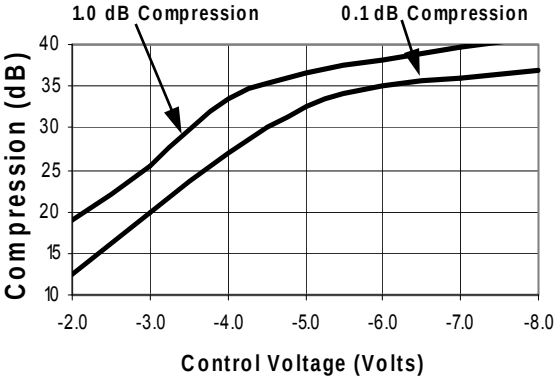
Isolation vs. Frequency



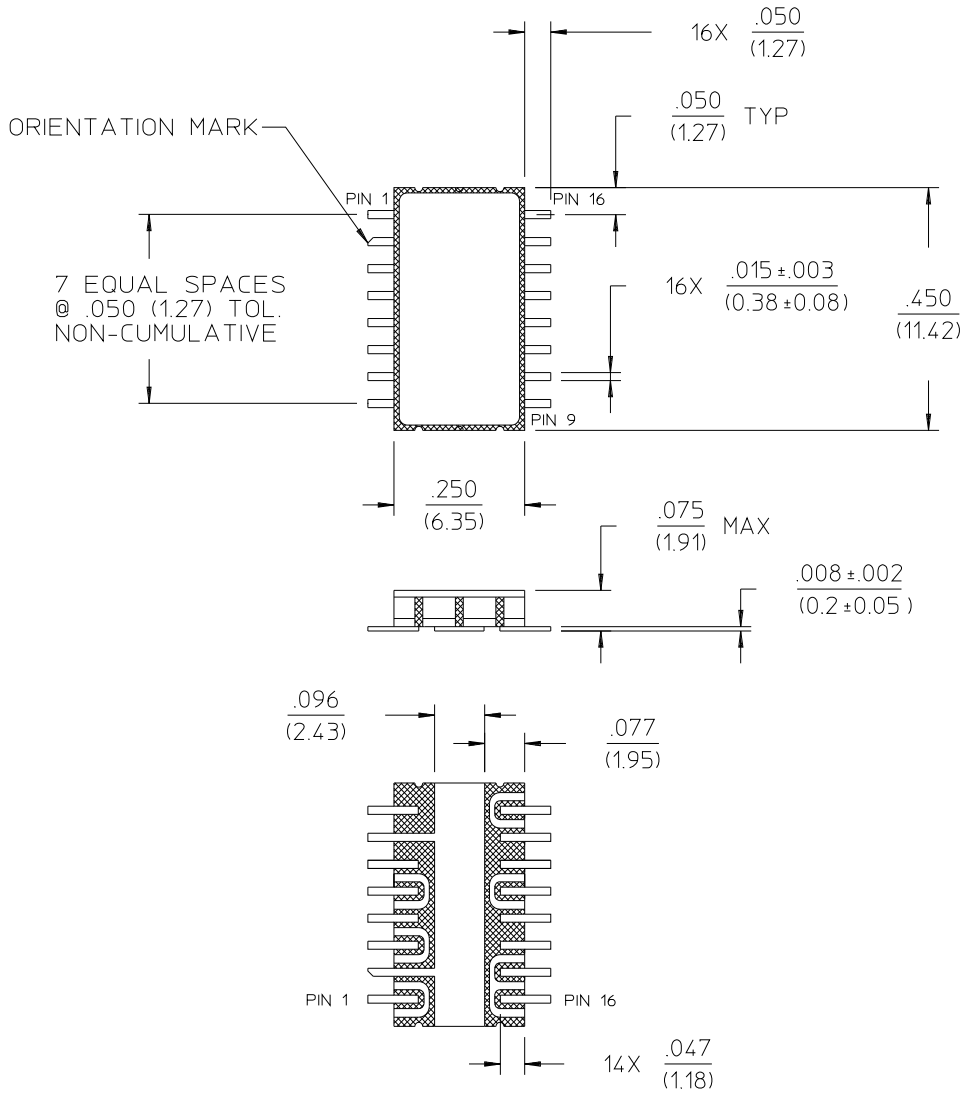
VSWR vs. Frequency



Compression vs. Control Voltage at 900 MHz



Lead-Free, CR-9 Ceramic Package†



Bottom of case is AC ground
Dimensions in () are in mm
Unless Otherwise Noted: .XXX = ±0.010 (.XX = ±0.25)
.XX = ±0.02 (.X = ±0.5)
WEIGHT (APPROX): 0.015 OUNCES 0.42 GRAMS

† Reference Application Note M538 for lead-free solder reflow recommendations.

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