High Power GaAs SPDT Switch
DC - 3.0 GHz

SW-276
V3

Features

- 1 dB Compression Point: +39 dBm @ -8 V
- 3rd Order Intercept: +65 dBm @ -8 V
- Insertion Loss: 0.4 dB
- Low Power Consumption
- Fast Switching Speed
- Lead-Free High Performance Ceramic Package
- RoHS* Compliant and 260°C Reflow Compatible

Description

M/A-COM's SW-276 is a broadband GaAs SPDT switch available in a lead-free, 7-lead ceramic package. The package is hermetically sealed, making this switch ideal for space, military radios and other environmentally harsh applications.

Typical applications include synthesizer switching, transmit / receive switching, switch matrices and filter banks in systems such as radio and cellular equipment, PCM, GPS and fiber optic modules.

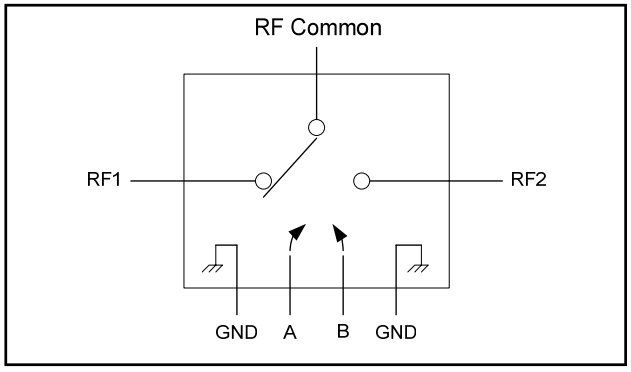
M/A-COM fabricates the SW-276 using a 1.0-micron gate length MESFET process. The process features full chip passivation for performance and reliability.

Ordering Information

Part Number	Package
SW-276	Bulk Packaging (CR-2)
SW-276G	Gull Wing (CR-2 w/gull wing)
SW-276B[1]	Bulk Packaging (CR-2)
SW-276T1[2]	Bulk Packaging (CR-2)

1. Table B Screening
2. Table 1 Screening

Functional Schematic/Pin Configuration



Absolute Maximum Ratings [3,4]

Parameter	Absolute Maximum
Input Power 0.05 GHz 0.5 - 2.0 GHz, -5 V Control 0.5 - 2.0 GHz, -8 V Control 0.5 - 2.0 GHz, -10 V Control	 +35 dBm +36 dBm +39 dBm +40 dBm
Power Dissipation [5,6]	2.0 W
Control Voltage	-12 V, +1 V
Operating Temperature	-55°C to +125°C
Storage Temperature	-65°C to +150°C
Maximum Junction Temperature	+175°C
Thermal Resistance[5]: θjc	+50°C/W

3. Exceeding any one or combination of these limits may cause permanent damage to this device.
4. M/A-COM does not recommend sustained operation near these survivability limits.
5. T_{CASE} = +25°C, where T_{CASE} is the temperature at the bottom of the case.
6. 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.

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

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Electrical Specifications: T_A = -55 to +85°C, Z_0 = 50 Ω [7,8]

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz DC - 3.0 GHz	dB dB dB dB	— — — —	0.4 0.5 0.7 0.9	0.5 0.65 0.8 1.0
Isolation	DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz DC - 3.0 GHz	dB dB dB dB	37 31 24 19	— — — —	— — — —
VSWR	DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz DC - 3.0 GHz	Ratio Ratio Ratio Ratio	— — — —	— — — —	1.3:1 1.5:1 1.5:1 1.6:1
Trise, Tfall	10% to 90% RF, 90% to 10% RF	nS	—	30	—
Ton, Toff	50% control to 90% RF, and 50% control to 10% RF	nS	—	35	—
Transients	In Band	mV	—	12	—
Input Power for P0.1dB	0.9 GHz (-5 V Control) 0.9 GHz (-8 V Control)	dBm dBm	— —	32 35	— —
Input Power for P1dB	0.9 GHz (-5 V Control) 0.9 GHz (-8 V Control)	dBm dBm	— —	35 39	— —
Third Order Intercept Point	Two +10 dBm Input tones 0.9 GHz (-5 V Control) 0.9 GHz (-8 V Control)	 dBm dBm	 — —	 61 65	 — —

7. All specifications apply when operated with bias voltages of 0 V for V_{IN} Low and -5 to -10 V for V_{IN} High, and 50 ohm impedance at all RF ports, unless otherwise specified.
8. High power (greater than 1W) handling specifications apply to cold switching only. For input powers under 1W hot switching can be used.

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[9]

Control		Condition of Switch, RF Common to each RF Port	
A	B	RF1	RF2
1	0	On	Off
0	1	Off	On

9. 0 = Low = 0 to -0.2 V @ 20 µA max.,
1 = High = -5 V @ 50 µA typ. to -10 V @ 800 µA max.

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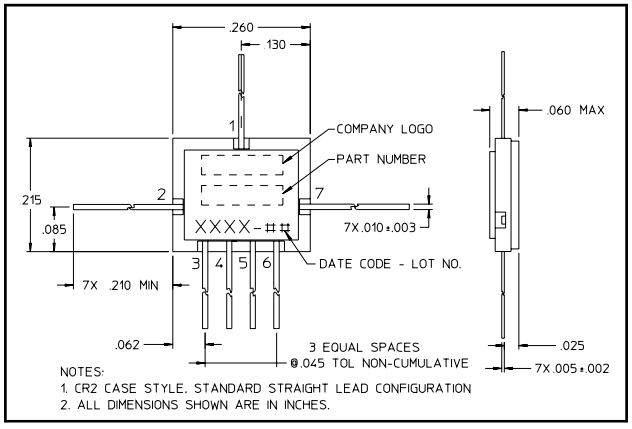
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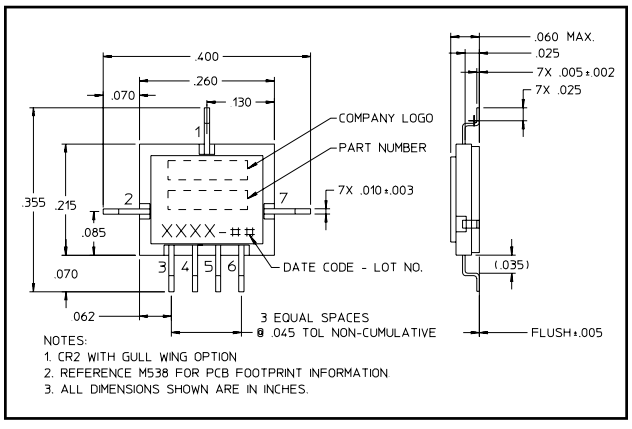
Two Tone IP3 Measurements

Bias Voltage	Input Power for each tone (dBm)	3rd Order Intermodulation Products (dBc)	IP3 (dBm)	Second Harmonic (dBc)
0, -5 V	+27	-34	+44	-61
0, -6 V	+27	-49	+51	-61
0, -7 V	+27	-64	+59	-63
0, -8 V	+27	-65	+59	-63
0, -5 V	+28	-30	+43	-58
0, -6 V	+28	-41	+48	-58
0, -7 V	+28	-52	+54	-57
0, -8 V	+28	-60	+58	-57
0, -5 V	+29	-28	+43	-54
0, -6 V	+29	-34	+46	-54
0, -7 V	+29	-44	+51	-54
0, -8 V	+29	-52	+55	-54
0, -5 V	+30	-26	+43	-52
0, -6 V	+30	-32	+46	-51
0, -7 V	+30	-38	+49	-51
0, -8 V	+30	-44	+52	-51

Lead-Free CR-2 Package†



Lead-Free CR-2 w/ Gull Wing Package†



† Reference Application Note M538 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.

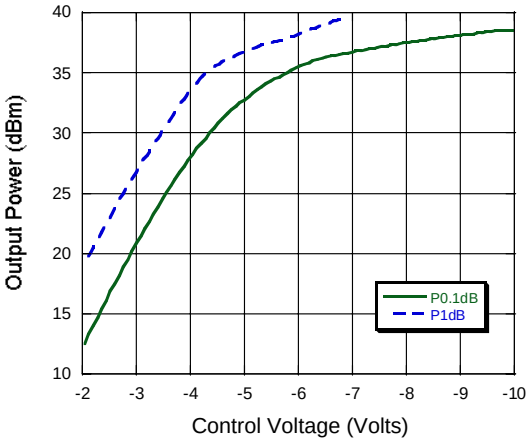
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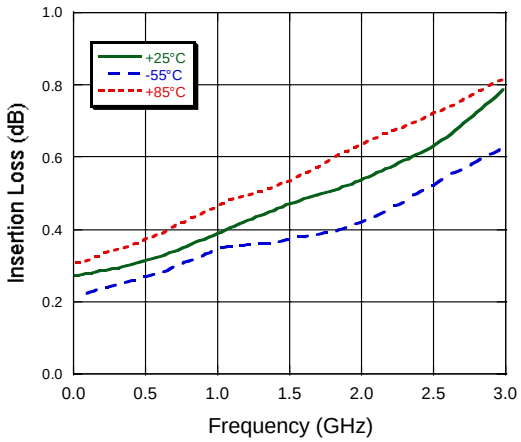
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Typical Performance Curves

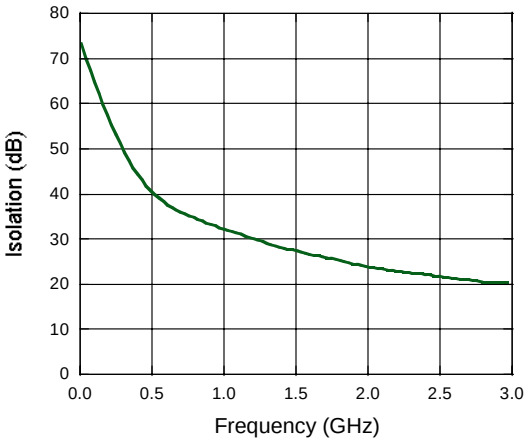
Compression vs. Control Voltage at 900 MHz



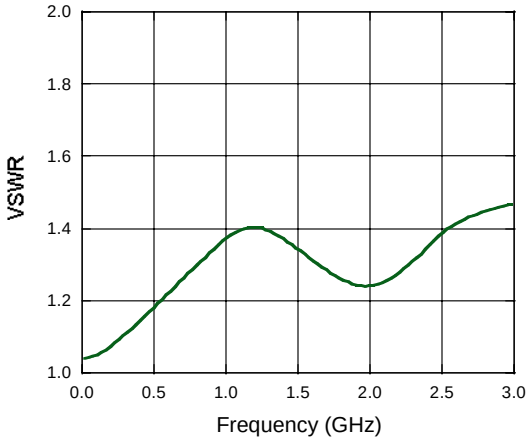
Insertion Loss vs. Frequency



Isolation vs. Frequency



VSWR vs. Frequency



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Table 1 - Screening [10] (Reference Document MIL-STD-883D)

Test	Sample Size	Method/Condition
Internal Visual [11]	1%	M/A-COM Workmanship Standard
Stabilization Bake	100%	1008/C, 150°C for 24 hours
Temperature Cycling	100%	1010/C, -65°C, 150°C
Constant Acceleration	100%	2001/A, 5000G, Y1 Plane only
Burn-In [12]	100%	1015, 125°C for 160 hours
Final Electrical	100%	Product Data Sheet Guaranteed Parameters
Seal Test - Fine Leak	100%	1014/A
Seal Test - Gross Leak	100%	1014/C
External Visual [13]	100%	M/A-COM Workmanship Standard

10. This test does not apply to connectorized units. Connectorized units using hermetically sealed hybrid microcircuits will be screened to Table 1 at the hybrid level.
11. Sample size for internal visual will be per MIL-STD-105, AQL 1%.
12. Burn-in temperature will be reduced as necessary to keep the internal junction temperatures from exceeding their absolute maximum ratings.
13. Parts will be marked with their standard marking, plus a screening date and “T1” to signify that they were screened.

Table B - Screening (Reference Document MIL-STD-883D), Includes 100% Internal Visual

Test	Sample Size	Method/Condition
Internal Visual	100%	2017
Stabilization Bake	100%	1008/C, 150°C for 24 hours
Temperature Cycling	100%	1010/C, -65°C, 150°C
Constant Acceleration	100%	2001/A, 5000G, Y1 Plane only
Burn-In [14]	100%	1015, 125°C for 160 hours
Final Electrical	100%	Product Data Sheet Guaranteed Parameters
Seal Test - Fine Leak	100%	1014/A
Seal Test - Gross Leak	100%	1014/C
External Visual [15]	100%	2009

14. Burn-In temperature will be reduced as necessary to keep the internal junction temperatures from exceeding their absolute maximum ratings.
15. Parts will be marked with their standard marking, plus a “B” suffix.

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