

GaAs SPDT Terminated Switch DC - 3.0 GHz

M/A-COM Products
Rev. V4

Features

- Low Insertion Loss: 0.5 dB typical up to 1 GHz
- High Isolation: > 38 dB @ 900 MHz
- Low Power Consumption: < 10 μ A @ -3 V
- Positive or Negative 2.5 to 8 V Control
- Low cost SOT-26 Package
- Available in a lead free version: MASW-007935

Description

M/A-COM's SW-442 is a GaAs monolithic switch in a low cost SOT-26 surface mount plastic package. The SW-442 is ideally suited for applications where very low power consumption, low insertion loss and very small size are required.

Typical application is in dual band systems which require switching between small signal components such as filter banks, single band LNA's, converters etc. The SW-442 can be used in applications up to 0.25 Watts in systems such as CDMA, W-CDMA, PCS, DCS1800, GSM and other analog/digital wireless communications systems.

The SW-442 is fabricated using a mature 0.5 micron GaAs PHEMT process. The process features full passivation for increased performance and reliability.

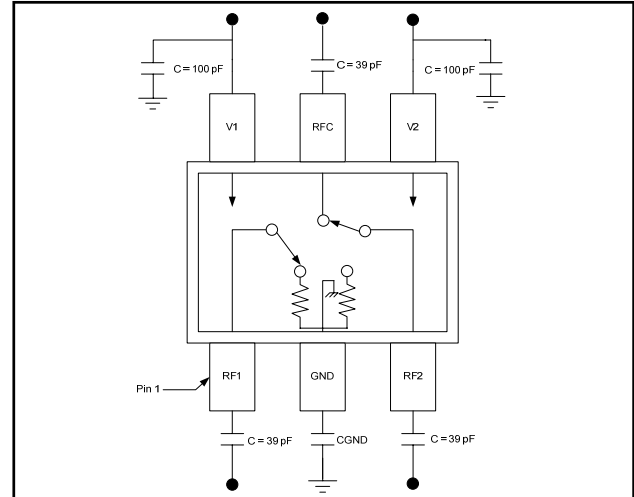
Ordering Information ^{1,2}

Part Number	Package
SW-442-PIN	Bulk Packaging
SW-442TR	1000 piece reel
SW-442SMB	Sample Board DC - 3.0 GHz tuning

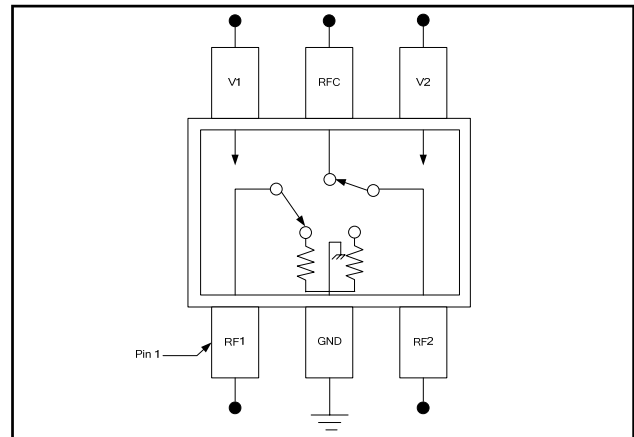
1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.

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

Functional Schematic Positive Control Voltage



Functional Schematic Negative Control Voltage



Pin Configuration

Pin No.	Function	Description
1	RF1	RF Input/Output
2	GND	RF Ground
3	RF2	RF Input/Output
4	V2	V Control 2
5	RFC	RF Common
6	V1	V Control 1

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Electrical Specifications: $T_A = 25^\circ\text{C}$, $Z_0 = 50 \Omega$ ³, $V_{CTL} = -3\text{V}$ (unless otherwise specified)

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss ⁴	DC-1 GHz	dB	—	0.5	0.7
	1-2 GHz	dB	—	0.8	1.0
	2-3 GHz	dB	—	1.1	1.25
Isolation	DC-1 GHz	dB	36	38	—
	1-2 GHz	dB	25	28	—
	2-3 GHz	dB	21	22	—
VSWR	DC-2 GHz	Ratio	—	1.4:1	1.5:1
	2-3 GHz	Ratio	—	1.6:1	1.7:1
P_{1dB} (2.7 V supply)	500 MHz - 3 GHz	dBm	—	24	—
P_{1dB} (5 V supply)	500 MHz - 3 GHz	dBm	—	28	—
IP_2 (2.7 V supply)	2-Tone 900 MHz, 5 MHz spacing, 10 dBm each tone	dBm	—	80	—
IP_3 (2.7 V supply)	2-Tone 900 MHz, 5 MHz spacing, 10 dBm each tone	dBm	—	50	—
T_{rise}, T_{fall} T_{on}, T_{off} Transients	10% to 90% RF, 90% to 10% RF	nS	—	40	—
	50% Control to 90% RF, 50% Control to 10% RF	nS	—	60	—
	In-Band	mV	—	10	—
Control Current	VCTL = -3V	μA	—	6	15

3. External DC blocking capacitors are required on all RF ports when using positive voltage control.

4. Insertion loss can be optimized by varying the DC blocking capacitor value, e.g. 1000 pF for 100 MHz - 1 GHz, 39 pF for 0.5 GHz - 3 GHz.

Absolute Maximum Ratings^{5,6}

Parameter	Absolute Maximum
Input Power (0.5 - 3.0 GHz) 3 V Control 5 V Control	+30 dBm +33 dBm
Operating Voltage	+8.5 Volts
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

5. Exceeding any one or combination of these limits may cause permanent damage to this device.

6. M/A-COM does not recommend sustained operation near these survivability limits.

Truth Table

Mode (Control)	V1	V2	RFC - RF1	RFC - RF2
Positive ⁷	$0 \pm 0.2 \text{ V}$ $+2.5 \text{ to } +8 \text{ V}$	$+2.5 \text{ to } +8 \text{ V}$ $0 \pm 0.2 \text{ V}$	On Off	Off On
Negative ⁸	$0 \pm 0.2 \text{ V}$ $-2.5 \text{ to } -8 \text{ V}$	$-2.5 \text{ to } -8 \text{ V}$ $0 \pm 0.2 \text{ V}$	Off On	On Off

7. External DC blocking capacitors are required on all RF ports and GND. GND capacitors can be used with positive control voltage to resonate lead inductance for improved isolation.

8. If negative control is used, DC blocking capacitors and GND capacitors are not required.

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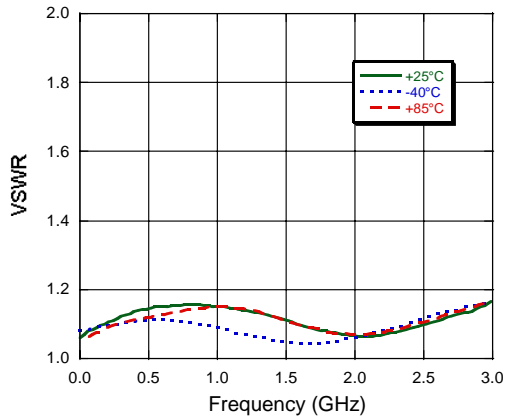
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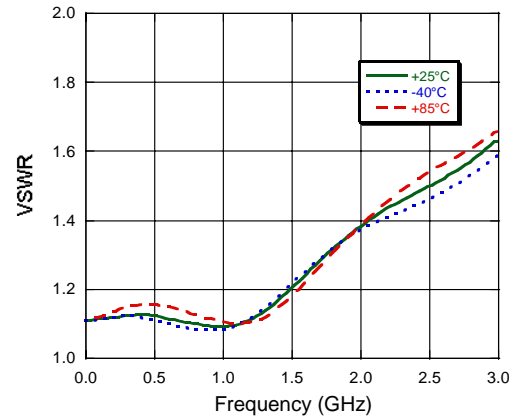
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Typical Performance Curves

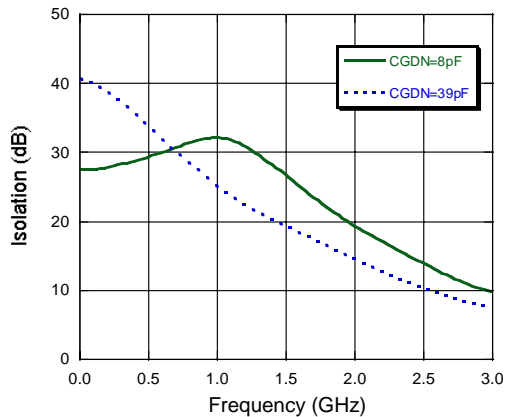
Output VSWR vs. Frequency over Temperature



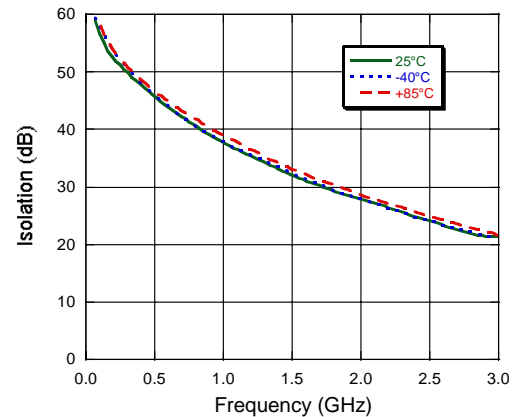
Input VSWR vs. Frequency over Temperature



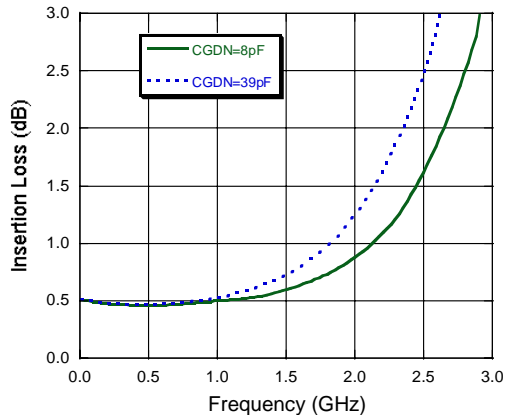
Isolation vs. Frequency over Temperature (Positive Control)



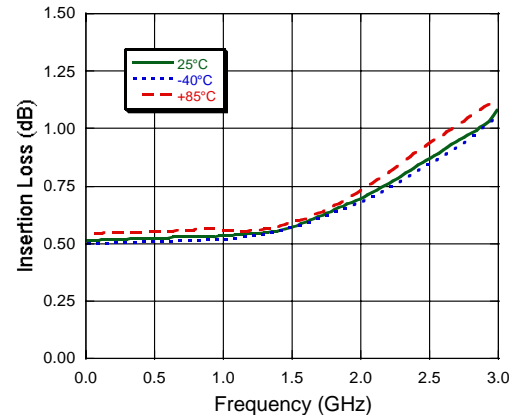
Isolation vs. Frequency over Temperature (Negative Control)



Insertion Loss vs. Frequency over Temperature (Positive Control)



Insertion Loss vs. Frequency over Temperature (Negative Control)



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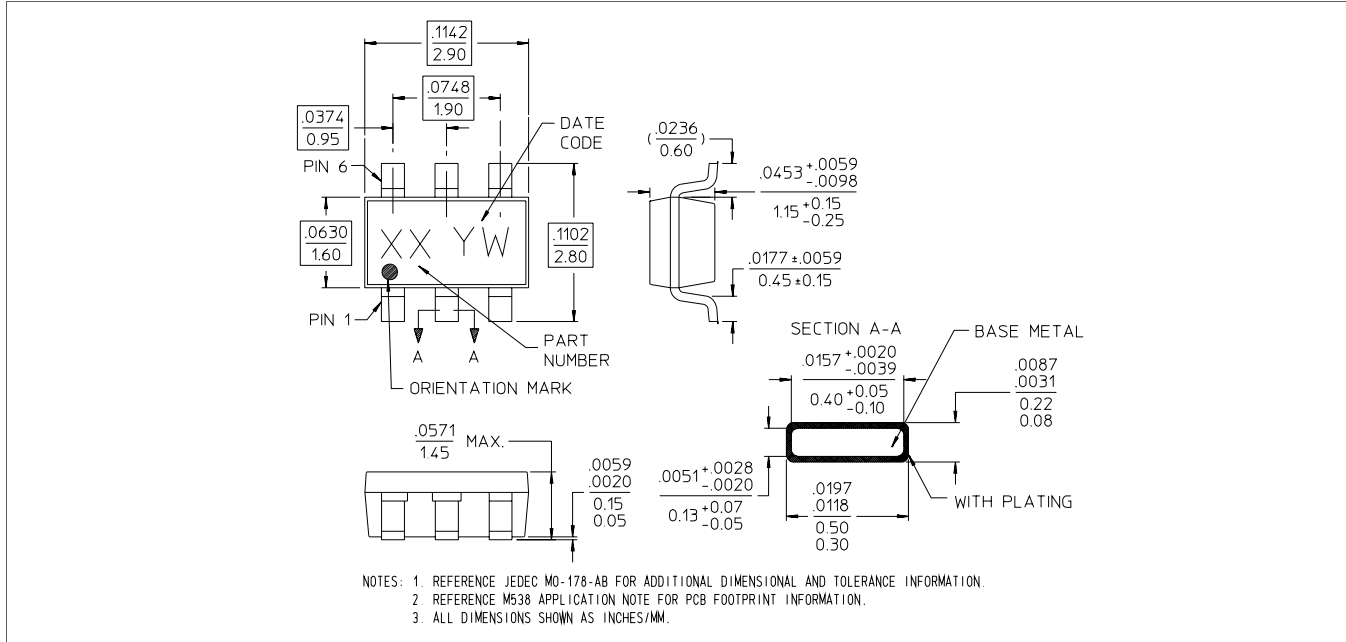
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SOT-26 Plastic Package[†]



[†] Meets JEDEC moisture sensitivity level 1 requirements.

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.