

GaAs SPDT Switch DC - 2.5 GHz

Rev. V4

Features

- Very Low DC Power Consumption: 100 μ W
- Low Insertion Loss: 0.5 dB
- High Isolation: 25 dB up to 2 GHz
- Very High Intercept Point: 45 dBm IP3
- Nanosecond Switching Speed
- SOIC-8 Plastic Package

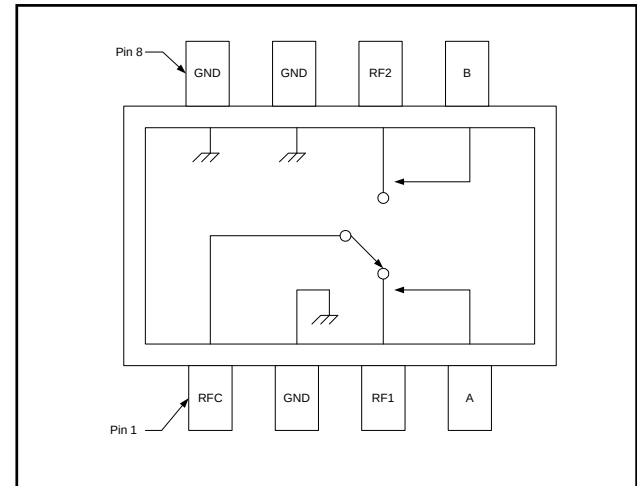
Description

The SW-239 is a GaAs MMIC SPDT switch in a low cost SOIC 8-lead surface mount plastic package. This device is ideally suited for use where low power consumption is required.

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

The SW-239 is fabricated using a monolithic GaAs MMIC using a mature 1 micron process. The process features full chip passivation for increased performance and reliability.

Functional Schematic



Pin Configuration

Pin No.	Function
1	RF Common
2	Ground
3	RF Port 1
4	Control A
5	Control B
6	RF Port 2
7	Ground
8	Ground

Ordering Information ¹

Part Number	Package
SW-239	Bulk Packaging
SW-239TR	1000 piece reel

1. Reference Application Note M513 for reel size information.

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

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Electrical Specifications: $T_A = 25^\circ\text{C}$, $V_c = 0\text{ V} / -5\text{ V}$, $Z_0 = 50\ \Omega$ ²

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	DC - 0.1 GHz	dB	—	0.4	—
	DC - 0.5 GHz		—	0.4	—
	DC - 1.0 GHz		—	0.5	0.8
	DC - 2.0 GHz		—	0.6	—
Isolation	DC - 0.1 GHz	dB	—	56	—
	DC - 0.5 GHz		—	43	—
	DC - 1.0 GHz		30	33	—
	DC - 2.0 GHz		—	24	—
VSWR	DC - 2.0 GHz	Ratio	—	1.4:1	—
Trise, Tfall	10% to 90% RF, 90% to 10% RF	ns	—	2	—
Ton, Toff	50% Control to 90% RF, 50% Control to 10% RF	ns	—	4	—
Transients	In-Band	mV	—	15	—
1 dB Compression Point	Input Power, 0.05 GHz	dBm	—	21	—
	Input Power, 0.5 - 2.0 GHz		—	27	—
2nd Order Intercept	Measured Relative to Input Power (for two-tone input power up to +6 dBm) 0.05 GHz	dBm	—	55	—
	0.5 - 2.0 GHz		—	68	—
3rd Order Intercept	Measured Relative to Input Power (for two-tone input power up to +6 dBm) 0.05 GHz	dBm	—	40	—
	0.5 - 2.0 GHz		—	45	—
Control Current	$\frac{1}{2}V_c\frac{1}{2} = 5\text{ V}$	μA	—	20	25

2. For positive voltage control, external DC blocking capacitors are required on all RF ports as well as the Ground ports which should be pulled up to the positive voltage control level. (Refer to Application Note M521 - "Positive Voltage Control of GaAs MMIC Control Devices").

Absolute Maximum Ratings ^{3,4}

Parameter	Absolute Maximum
Input Power 0.05 GHz 0.5 - 2.0 GHz	+27 dBm +34 dBm
Control Voltage	$-8.5\text{ V} \leq V_c \leq +5\text{ V}$
Operating Temperature	-40°C to $+85^\circ\text{C}$
Storage Temperature	-65°C to $+150^\circ\text{C}$

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.

Truth Table ⁵

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

5. 0 = 0 V to -0.2 V, 1 = -5 V to -8 V

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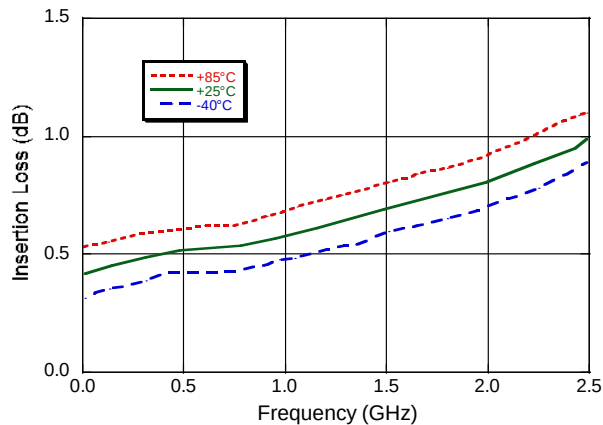
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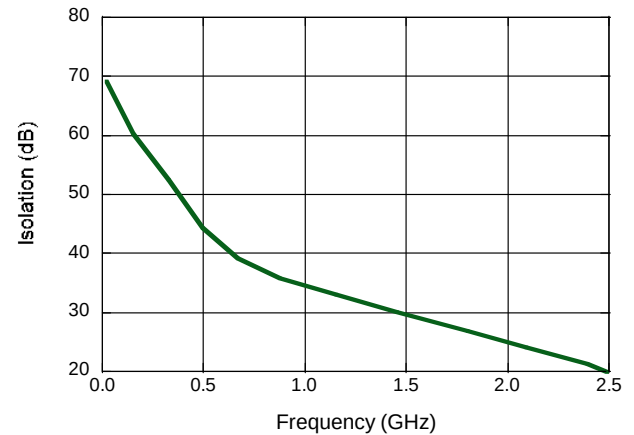
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Typical Performance Curves

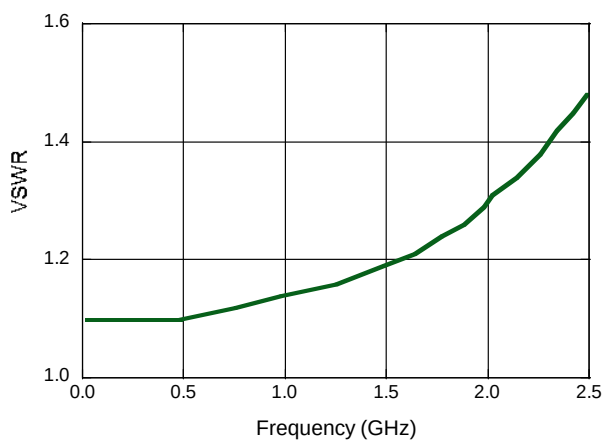
Insertion Loss



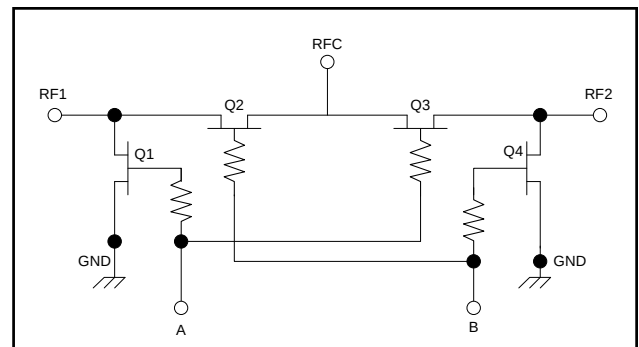
Isolation



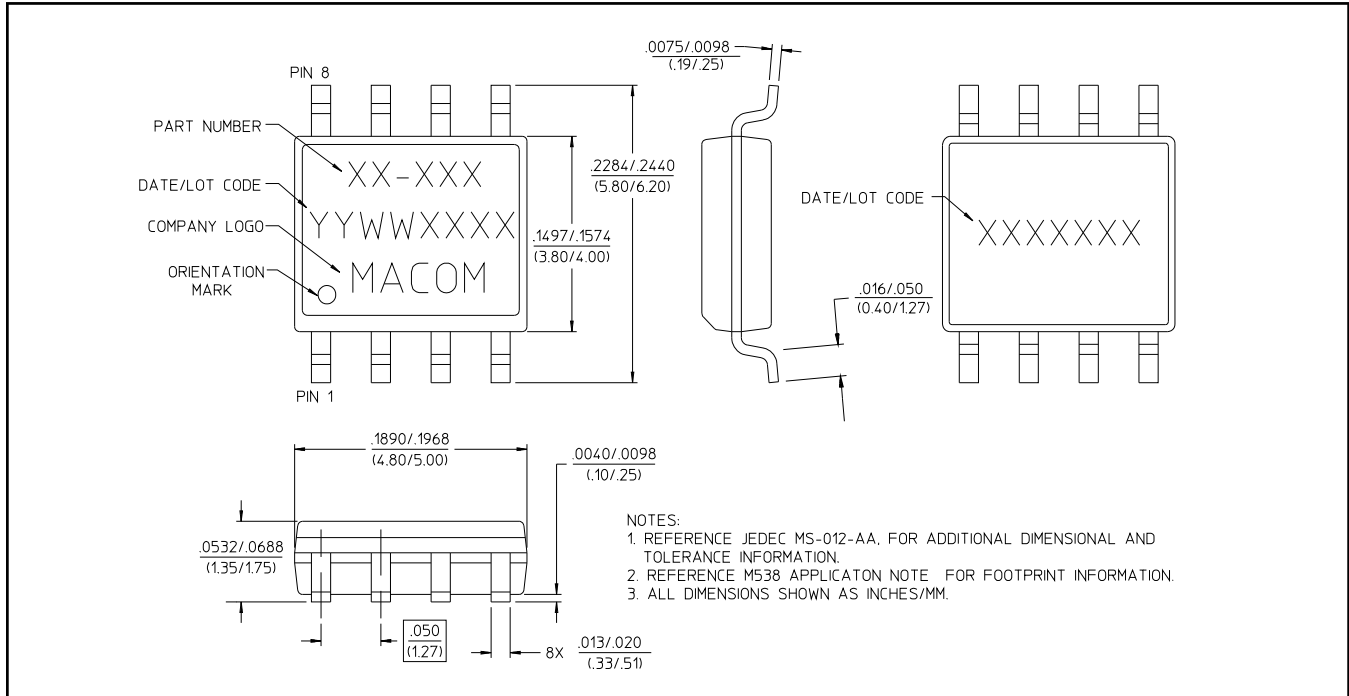
VSWR



Electrical Schematic



SOIC-8



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.