SW-438

GaAs SPDT Switch
DC - 3.0 GHz

Rev. V6

Features

- Low Insertion Loss, 0.7 dB @ 2.4 GHz[1]
- High Isolation, 25 dB @ 2.4 GHz[1]
- Low Power Consumption, < 10 µA @ +3 V
- Low Cost Plastic SOT-363 Package

1. For best results at 2.4 GHz, use 8 pF 0402 profile SMT capacitors on RF ports and 100 pF bypassing on pins 4 and 6.

Description

The SW-438 is a GaAs MMIC SPDT switch in a low cost SOT-363 surface mount plastic package. Typical applications include transmit/receive switching for Bluetooth and WLAN equipment. The SW-438 can also be used in applications up to 500 mW in systems such as cellular, PCS, DCS1800, GSM, CDMA and other analog and digital wireless communications systems.

M/A-COM fabricates the SW-438 using a 0.5 micron gate length GaAs p-HEMT process. The process features full passivation for increased performance and reliability.

External Component Requirements

Please note the values of the external capacitors. The capacitors at each of the RF ports are used as for achieving optimum insertion loss. They also provide DC blocking for positive control. The 8 pF (0402) capacitor is recommended for 2 - 3 GHz operation. If this value is changed or the capacitor placed too far from the switch, the performance will be affected. We also recommend 100 pF bypass capacitors on pins 4 and 6.

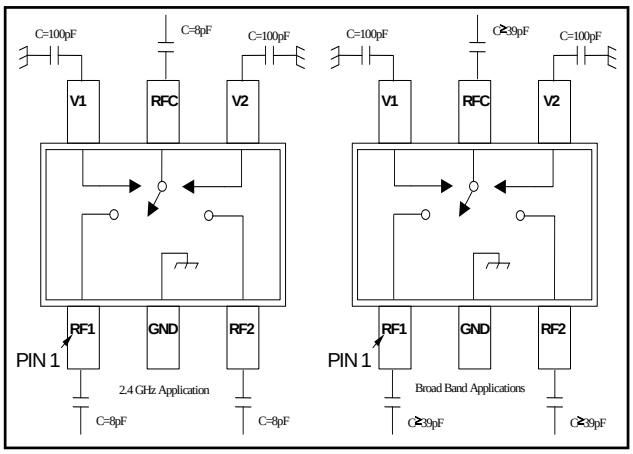
For broadband applications with positive control voltages, use DC blocking capacitors with value of 39 pF or more.

Ordering Information [2]

Part Number	Package
SW-438TR-3000	SW-438 on 13 Inch, 3000 piece reel
SW-438SMB	SW-438 sample test board

2. Reference Application Note M513 for reel size information.

Functional Schematic



Pin Configuration

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

Absolute Maximum Ratings [3]

Parameter	Absolute Maximum
Input (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

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

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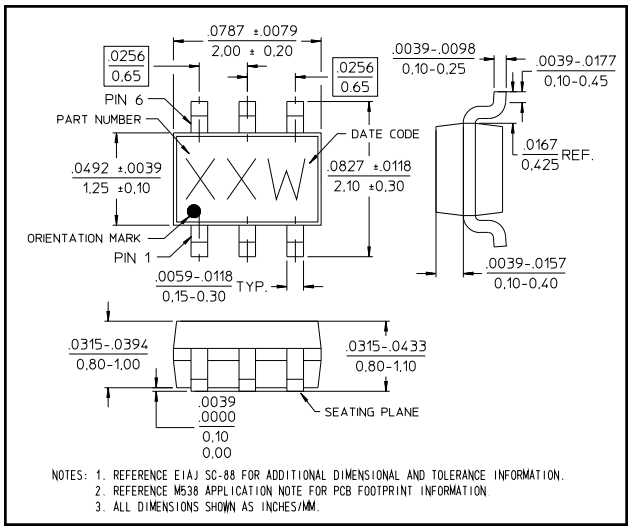
Electrical Specifications: T_A = 25°C, 3V Control

Parameter	Test Conditions	Units	Min	Typ	Max
Insertion Loss	DC-3.0 GHz	dB		0.7	0.8
Isolation	DC-1.0 GHz 1.0-2.0 GHz 2.0-3.0 GHz	dB dB dB	29 23 21	31 25 23	
Return Loss	DC-1.5 GHz 1.5-3.0 GHz	dB dB	18 16	22 20	
P1dB (2.3 V supply)	500 MHz-2.0 GHz	dBm	23	26	
P1dB (3V supply)	500 MHz-2.0 GHz	dBm	28	31	
IP2	2-tone 900 MHz, 5 MHz spacing (2.3V)	dBm		81	
IP3	2-tone 900 MHz, 5 MHz spacing (2.3V)	dBm		55	
2nd Harmonic	2.4 GHz Pin = 20 dBm, Vc = 2.3V	dBc		70	
3rd Harmonic	2.4 GHz Pin = 20 dBm, Vc = 2.3V	dBc		60	
Ton, Toff	50% ctl to 10/90% RF	ns		20	
Trise, Tfall	10% to 90% RF	ns		10	
Gate Leakage	|Vctl| = 5V	µA		5	10

SC-70 (SOT-363) Plastic Package



Truth Table

Mode (Control)	V1	V2	RFC-RF1	RFC-RF2
Positive[4]	0 ± 0.2V +2.3 to +5V	+2.3 to +5V 0 ± 0.2V	On Off	Off On
Negative[5]	0 ± 0.2V -2.3 to -5V	-2.3 to -5V 0 ± 0.2V	Off On	On Off

4. For positive voltage control, external DC blocking capacitors are required on all RF ports.
5. If negative control is used, DC blocking capacitors are not required on RF ports. This switch is not intended to pass or switch a DC voltage.

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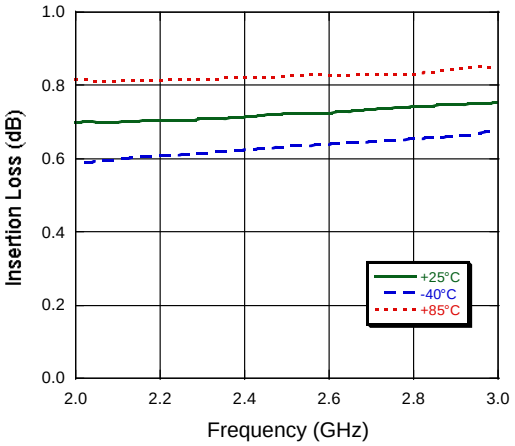
Typical Performance Curves

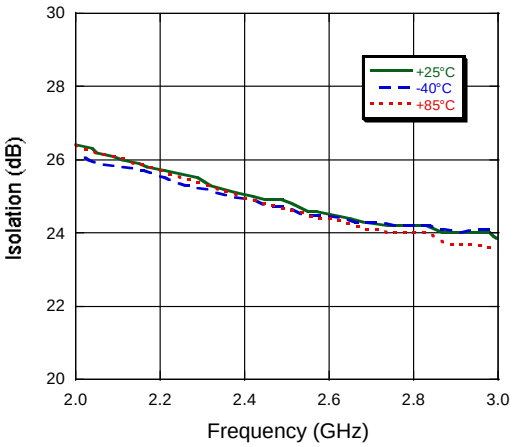
Bluetooth Applications

(8 pF DC Blocking Capacitors, +2.3V Control)

Insertion Loss vs. Frequency Over Temperature



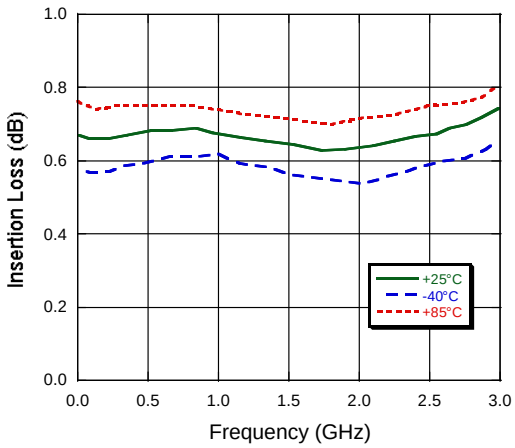
Isolation vs. Frequency Over Temperature



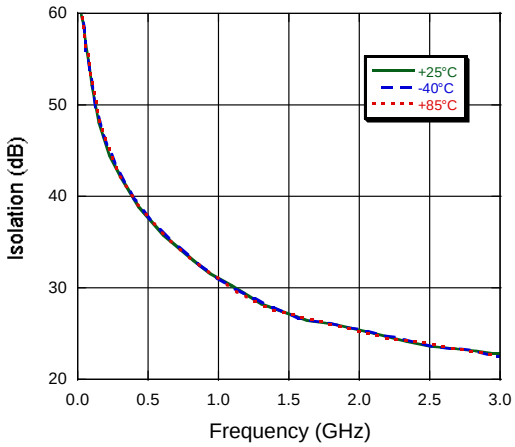
Broadband Applications

(No DC Blocking Capacitors, -2.3 V Control)

Insertion Loss vs. Frequency Over Temperature



Isolation vs. Frequency Over Temperature



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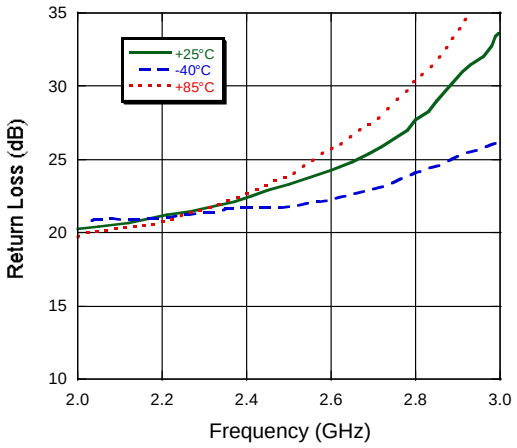
Typical Performance Curves

Bluetooth Applications

(8 pF DC Blocking Capacitors, +2.3V Control)

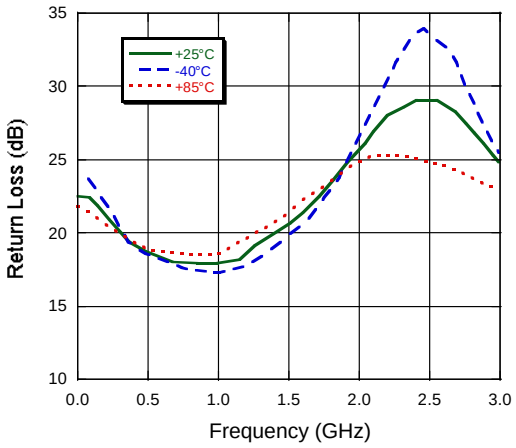
Return Loss vs. Frequency Over Temperature



Broadband Applications

(No DC Blocking Capacitors, -2.3 V Control)

Return Loss vs. Frequency Over Temperature



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