

## GaAs SPDT Switch DC - 3.0 GHz

Rev. V6

### Features

- Insertion Loss: 0.3 dB @ 2.4 GHz
- Isolation: 22 dB @ 2.4 GHz
- Power Consumption: <math><5 \mu\text{A}</math> @ +2.3V
- Lead-Free SOT-363 Package
- Halogen-Free Mold Compound
- 260°C Reflow Compatible
- RoHS\* Compliant Version of SW-485

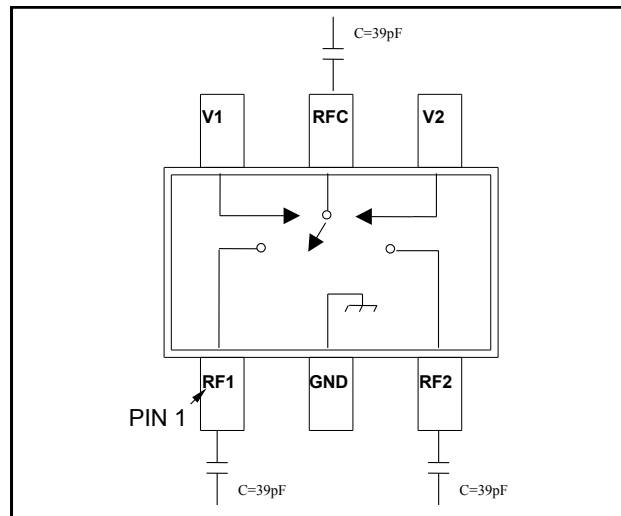
### Description

M/A-COM's MASWSS0115 is a GaAs PHEMT MMIC single pole, double throw (SPDT) switch in a low cost, lead-free SC-70 (SOT-363) surface mount plastic package. The MASWSS0115 is ideally suited for applications where very small size and low cost are required.

Typical applications are dual band systems which require switching between small signal components such as filter banks, single-band LNAs, converters, etc. This part can be used for low power, low loss requirements in all systems operating up to 3 GHz, including PCS, GSM, DCS, Blue Tooth, and other receive chain applications.

The MASWSS0115 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

### Functional Schematic



### Pin Configuration

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

### Ordering Information<sup>1,2</sup>

Part Number	Package
MASWSS0115	Bulk packaging
MASWSS0115TR-3000	3000 piece reel
MASWSS0115SMB	Sample Board
MASWSS0115-DIE	Separated Die on Grip Ring <sup>3</sup>

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

### Absolute Maximum Ratings<sup>4,5</sup>

Parameter	Absolute Maximum
Input Power (0.5 - 3.0 GHz) 2.5 V Control 5 V Control	+27 dBm +34 dBm
Voltage	± 8.5 volts
Operating Temperature	-40 °C to +85 °C
Storage Temperature	-65 °C to +150 °C

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.

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

## GaAs SPDT Switch DC - 3.0 GHz

Rev. V6

**Electrical Specifications:  $T_A = 25^\circ\text{C}$ ,  $V_C = 0\text{ V}/2.5\text{ V}$ ,  $Z_0 = 50\ \Omega$  <sup>6</sup>**

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss <sup>7</sup>	DC - 1 GHz	dB	—	0.25	0.40
	1 - 3 GHz	dB	—	0.30	0.55
Isolation	DC - 1 GHz	dB	20	24	—
	1 - 3 GHz	dB	—	22	—
Return Loss	0.05 - 3 GHz	dB	—	20	—
IP2	Two Tone, +5 dBm/tone, 5 MHz Spacing, >50 MHz	dBm	—	90	—
IP3	Two Tone, +5 dBm/tone, 5 MHz Spacing, >50 MHz	dBm	—	46	—
P1dB	$V_C = 0\text{ V}/2.5\text{ V}$	dBm	—	21	—
	$V_C = 0\text{ V}/3.0\text{ V}$	dBm	—	25	—
Trise, Tfall	10% to 90% RF, 90% to 10% RF	ns	—	35	—
Ton, Toff	50% control to 90% RF, 50% control to 10% RF	ns	—	40	—
Transients	In band	mV	—	10	—
Control Current	$V_C = 2.5\text{ V}$	$\mu\text{A}$	—	5	20

6. External DC blocking capacitors are required on all RF ports.

7. 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 - 3 GHz.

### Truth Table <sup>8,9</sup>

Control V1	Control V2	RFC-RF1	RFC-RF2
0	1	On	Off
1	0	Off	On

8. Differential voltage,  $V(\text{state } 1) - V(\text{state } 0)$ , must be +2.3 V minimum.

9. 0 = 0 V  $\pm$  0.2 V, 1 = +2.3 V to 5.0 V

### Qualification

Qualified to M/A-COM specification REL-201, Process Flow -2.

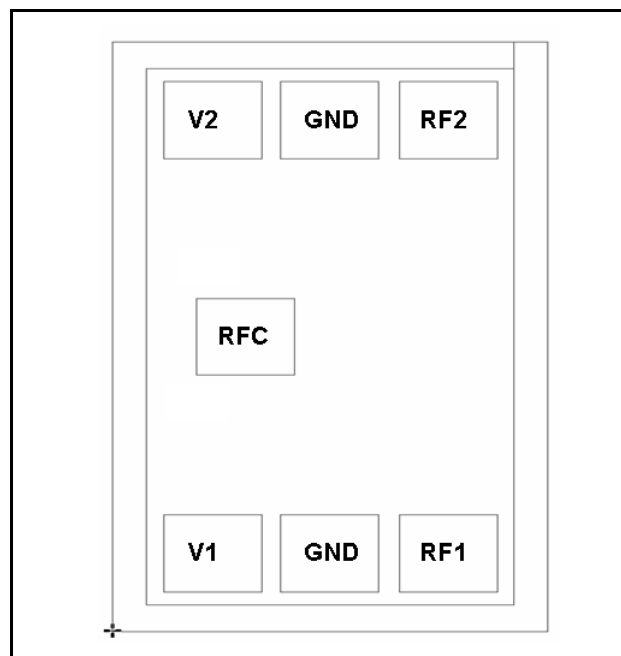
### Handling Procedures

The following precautions should be observed to avoid damage:

### Static Sensitivity

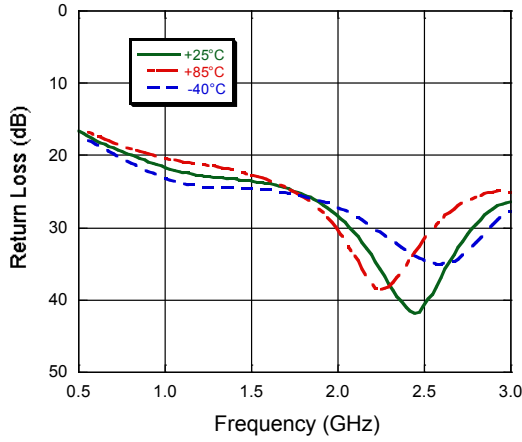
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

### Die Bond Pad Layout

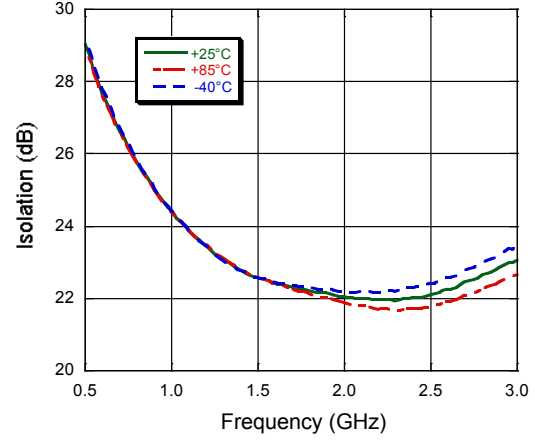


## Typical Performance Curves

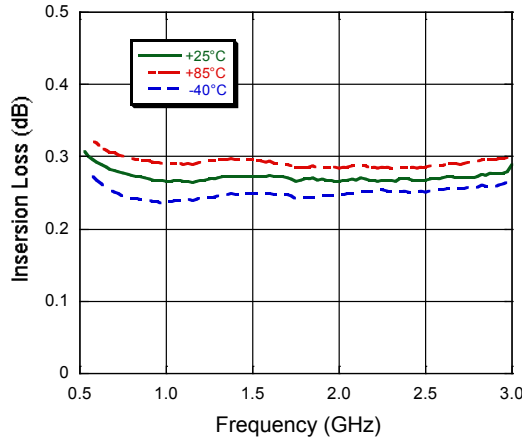
**Return Loss vs. Frequency**



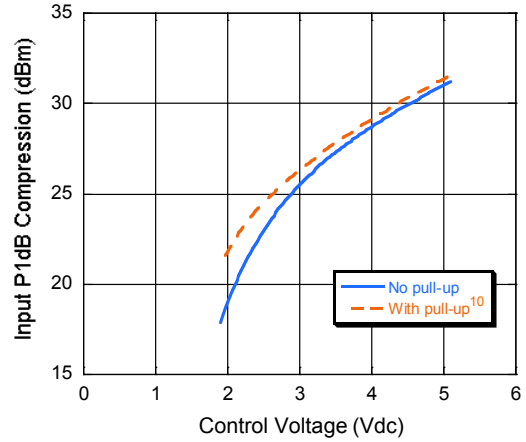
**Isolation vs. Frequency**



**Insertion Loss vs. Frequency**

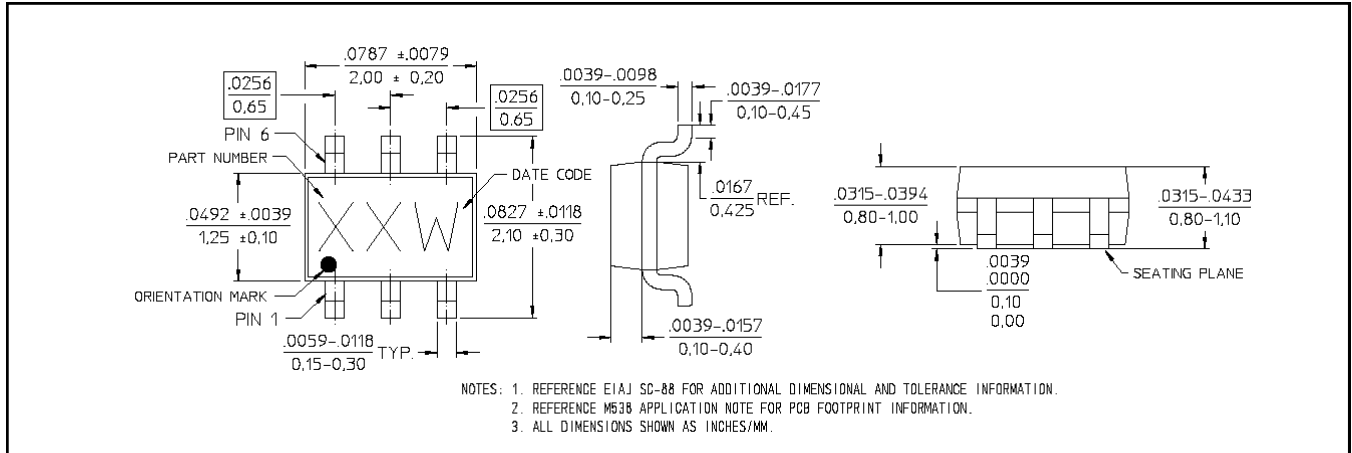


**Input P1dB Compression vs. Control Voltage @ 2.4 GHz, T=+25°C**



10. RFC port is pulled up with a 5.1K resistor to fixed  $V_{DD}$  equal  $V_{CTL}$  high level.

## Lead-Free SC-70 (SOT-363)<sup>†</sup>



<sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations.  
Meets JEDEC moisture sensitivity level 1 requirements.  
Plating is 100% matte tin over copper.

M/A-COM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with M/A-COM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.

5