# MASWSS0115



# 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: <5 μA @ +2.3V</li>
- 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.

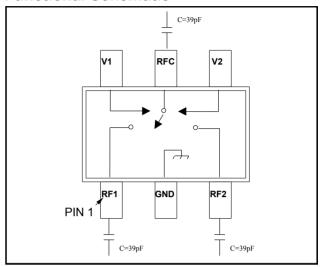
The MASWSS0115 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

# 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.

#### **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	

# Absolute Maximum Ratings 4,5

Parameter	Absolute Maximum		
Input Power (0.5 - 3.0 GHz)			
2.5 V Control	+27 dBm		
5 V Control	+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.
- M/A-COM does not recommend sustained operation near these survivability limits.

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



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

Parameter	Test Conditions		Min.	Тур.	Max.
Insertion Loss <sup>7</sup>	DC - 1 GHz 1 - 3 GHz		_	0.25 0.30	0.40 0.55
Isolation	DC - 1 GHz 1 - 3 GHz		20 —	24 22	_
Return Loss	0.05 - 3 GHz		_	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	$V_{c} = 0 \text{ V/2.5 V}$ $V_{c} = 0 \text{ V/3.0 V}$	dBm dBm	_	21 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 <sub>c</sub> = 2.5 V	μA	_	5	20

<sup>6.</sup> External DC blocking capacitors are required on all RF ports.

# Truth Table 8,9

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

Differential voltage, V(state 1) - V(state 0), must be +2.3 V minimum.

#### Qualification

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

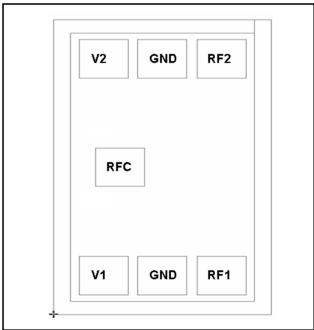
#### **Handling Procedures**

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



<sup>7.</sup> 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.

<sup>9.</sup>  $0 = 0 \text{ V} \pm 0.2 \text{ V}$ , 1 = +2.3 V to 5.0 V

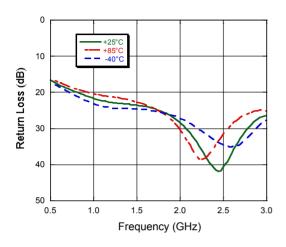


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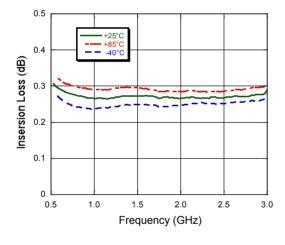
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### **Typical Performance Curves**

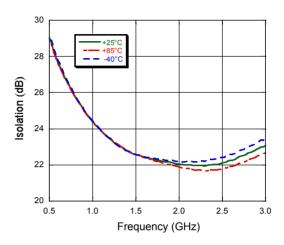
#### Return Loss vs. Frequency



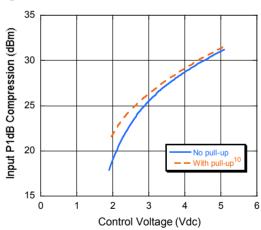
#### Insertion Loss vs. Frequency



#### Isolation 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  $V_{\text{DD}}$  equal  $V_{\text{CTL}}$  high level.

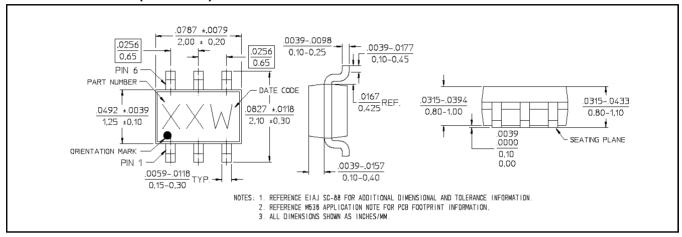
# **MASWSS0115**



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# Lead-Free SC-70 (SOT-363)†



<sup>&</sup>lt;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.

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