

# GaAs SPDT 2.5 V High Power Switch DC - 3.0 GHz

Rev. V3

#### **Features**

- Low Voltage Operation: 2.5 V
- Harmonics: <-67 dBc @ +34 dBm & 1 GHz
- Low Insertion Loss: 0.40 dB @ 1 GHz
- High Isolation: 20 dB @ 2 GHz
- 0.5 micron GaAs pHEMT Process
- Lead-Free SOT-26 Package
- 100% Matte Tin Plating over Copper
- · Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS\* Compliant Version of MASWSS0006

### **Description**

The MASWSS0181 is a GaAs PHEMT MMIC single pole two throw (SPDT) high power switch in a lead-free SOT-26 package. The MASWSS0181 is ideally suited for applications where high power, low control voltage, low insertion loss, high isolation, small size and low cost are required.

Typical applications are for GSM and DCS handset systems that connect separate transmit and receive functions to a common antenna, as well as other related handset and general purpose applications. This part can be used in all systems operating up to 3 GHz requiring high power at low control voltage.

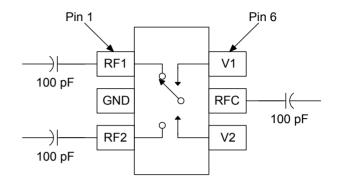
The MASWSS0181 is fabricated using a 0.5 micron gate length GaAs pHEMT process. The process features full passivation for performance and reliability.

# Ordering Information<sup>1</sup>

Part Number	Package
MASWSS0181	Bulk Packaging
MASWSS0181TR-3000	3000 piece reel
MASWSS0181SMB	Sample Test Board

1. Reference Application Note M513 for reel size information.

#### **Functional Schematic**



### **Pin Configuration**

Pin#	Pin Name	Description		
1	RF1	RF Port 1		
2	GND	RF Ground		
3	RF2	RF Port 2		
4	V2	Control 2		
5	RFC	RF Common Port		
6	V1	Control 1		

# **Absolute Maximum Ratings<sup>2,3</sup>**

Parameter	Absolute Maximum		
Input Power (0.5 - 3 GHz, 2.5 V Control)	38 dBm		
Voltage	±8.5 V		
Operating Temperature	-40°C to +85°C		
Storage Temperature	-65°C to +150°C		

- 2. Exceeding any one or combination of these limits may cause permanent damage to this device.
- MACOM does not recommend sustained operation near these survivability limits.

\* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

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## Electrical Specifications: $T_A = 25^{\circ}C$ , $V_C = 0 \text{ V} / 2.5 \text{ V}$ , $Z_0 = 50 \Omega^4$

Parameter	Test Conditions Units		Min.	Тур.	Max.
Insertion Loss <sup>5</sup>	DC - 1 GHz 1 - 2 GHz 2 - 3 GHz	z dB —		0.40 0.50 0.75	0.65 — —
Isolation	DC - 1 GHz 1 - 2 GHz 2 - 3 GHz	1 - 2 GHz dB		26 20 16	_
Return Loss	DC - 2 GHz 2 - 3 GHz	ar ar		20 16	_
IP3	Two Tone, +26 dBm / tone, 5 MHz Spacing, >50 MHz		_	57	_
P0.1dB	— dBm		_	39	_
2 <sup>nd</sup> Harmonic	1 GHz, P <sub>IN</sub> = 34 dBm dBc		_	-75	_
3 <sup>rd</sup> Harmonic	1 GHz, P <sub>IN</sub> = 34 dBm	1 GHz, P <sub>IN</sub> = 34 dBm dBc		-75	-67
T <sub>RISE</sub> , T <sub>FALL</sub>	10% to 90% RF, 90% to 10% RF μs		_	0.04	_
T <sub>ON</sub> , T <sub>OFF</sub>	50% control to 90% RF, and 50% control to 10% RF		_	0.06	_
Transients	In Band		_	50	_
Control Current	μΑ		_	_	50

<sup>4.</sup> For positive voltage control, external DC blocking capacitors are required on all RF ports.

#### Qualification

Qualified to MACOM specification REL-201, Process Flow -2.

#### **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.

### Truth Table<sup>6,7</sup>

V1	V2	ANT- RF1	ANT - RF2
1	0	On	Off
0	1	Off	On

Differential voltage, V (state 1) - V (state 0), must be +2.5 V minimum and must not exceed +8 V.

<sup>5.</sup> Insertion loss can be optimized by varying the DC blocking capacitor value, e.g. 1000 pF for 100 - 500 MHz, 100 pF for 0.5 - 3 GHz.

<sup>7.</sup> 0 = -5 V to 2.5 V, 1 = -2.5 V to +5 V.

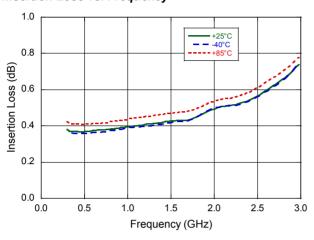


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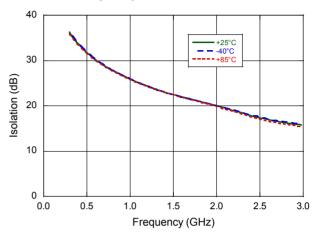
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## Typical Performance Curves vs. Temperature, 100 pF blocking capacitors

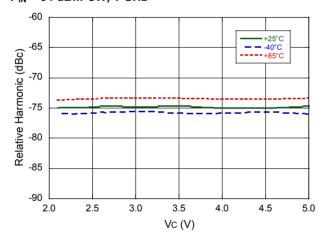
#### Insertion Loss vs. Frequency



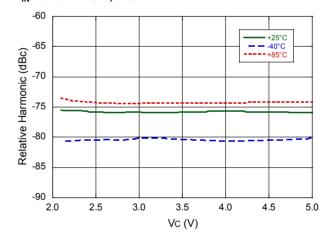
#### Isolation vs. Frequency



#### 2nd Harmonic vs. Control Voltage, P<sub>IN</sub> = 34 dBm CW, 1 GHz



#### 3rd Harmonic vs. Control Voltage, $P_{IN}$ = 34 dBm CW, 1 GHz

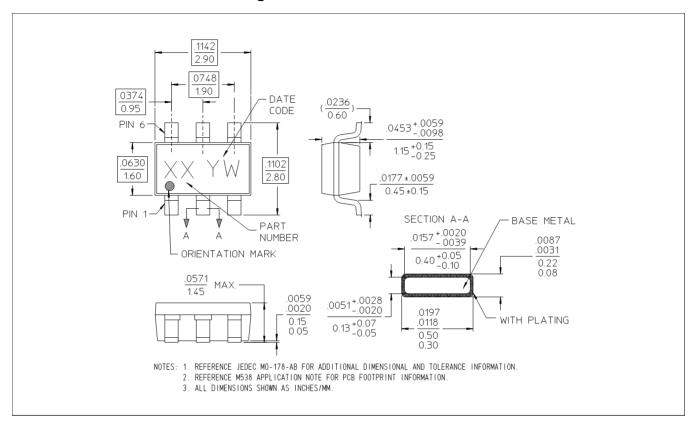




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## Lead-Free SOT-26 Plastic Package<sup>†</sup>



<sup>&</sup>lt;sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations.



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