MASWSS0161

High Power GaAs SPDT Switch
DC - 2.0 GHz

Rev. V5

Features

- Positive Supply and Control Voltages
- 1 dB Compression Point: 36 dBm @ 8 V
- 3rd Order Intercept Point: 65 dBm @ 8 V
- Low Insertion Loss: 0.4 dB
- Low Power Consumption: 100 µW
- Fast Switching Speed
- Lead-Free SOIC-8 Plastic Package
- Halogen-Free "Green" Mold Compound
- 260°C Re-flow Compatible
- RoHS* Compliant Version of SW-277

Description

The MASWSS0161 is a GaAs MMIC SPDT switch in a lead free 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.

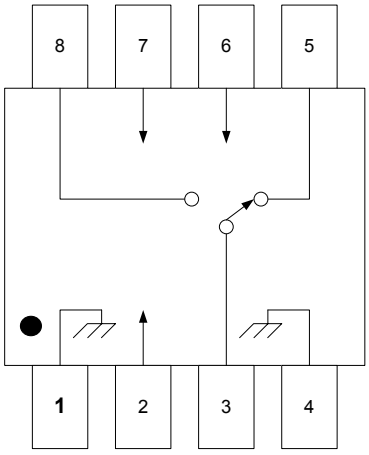
The MASWSS0161 is fabricated using a monolithic GaAs MMIC using a mature 1 micron process. The process features full chip passivation for increased performance and reliability.

Ordering Information[1,2]

Part Number	Package
MASWSS0161	Bulk Packaging
MASWSS0161TR	1000 piece reel
MASWSS0161SMB	Sample Test Board

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

Functional Schematic



Pin Configuration[3]

Pin No.	Pin Name	Description
1	GND	Ground, Thermal Contact
2	V_{DD}	Drain Voltage
3	RFC	RF Common Port
4	GND	Ground, Thermal Contact
5	RF1	RF Port 1
6	V_C1	Control 1
7	V_C2	Control 2
8	RF2	RF Port 2

3. External DC blocking capacitors required on all RF ports.

* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

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Electrical Specifications[4]: T_A = +25°C, V_{DD} = +5 V, V_C = +5 V / 0 V, P_{IN} = +30 dBm

Parameter	Test Conditions	Units	Min.	Typ.[5]	Max.
Insertion Loss	DC - 0.5 GHz 0.5 - 1.0 GHz 1.0 - 2.0 GHz	dB	—	0.45 0.55 0.6	— 0.65 —
Isolation	DC - 0.5 GHz 0.5 - 1.0 GHz 1.0 - 2.0 GHz	dB	— 27 —	30 32 27	—
VSWR	DC - 2.0 GHz	Ratio	—	1.2:1	—
1 dB Compression	Input Power (5 V Supply/Control) 0.9 GHz Input Power (8 V Supply/Control) 0.9 GHz	dBm	—	33 35.8	—
T_{RISE}, T_{FALL}	10% to 90% RF, 90% to 10% RF	ns	—	30	—
T_{ON}, T_{OFF}	50% Control to 90% RF, 50% Control to 10% RF	ns	—	35	—
Transients	In-Band	mV	—	12	—
3rd Order Intercept	Measured Relative to Input Power, 2-tone up to +10 dBm (5 V Supply/Control) 0.9 GHz (8 V Supply/Control) 0.9 GHz	dBm	—	55 65	—
Control Current	V_C = +5 V	µA	—	—	20
Supply Current	V_{DD} = +5 V	µA	—	—	60

4. All specifications apply when operated with control voltages of 0 V for VC low and 5 to 10 V for VC high, and 50 Ω impedance at all RF ports, unless otherwise specified. High power (greater than 1 W) handling specifications apply to cold switching only. For input powers under 1 W, hot switching can be used. The high control voltage must be within ± 0.2 V of the supply voltage. External DC blocking capacitors are required on all RF ports.
5. Typical values listed for middle of frequency range noted.

Absolute Maximum Ratings[6,7]

Parameter	Absolute Maximum
Input Power - 0.5 - 2.0 GHz 5 V Control and Supply 8 V Control and Supply 10 V Control and Supply	 37 dBm 40 dBm 42 dBm
Power Dissipation	1.0 W
Supply Voltage	-1 V ≤ V_{DD} ≤ +12 V
Control Voltage	-1 V ≤ V_C ≤ V_{DD} +0.2 V
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C
Thermal Resistance[8]	θ_{JC} = 87°C/W

6. Exceeding any one or combination of these limits may cause permanent damage to this device.
7. MACOM does not recommend sustained operation near these survivability limits.
8. Thermal resistance is given for T_A = +25°C. T_{CASE} is the temperature of leads 1 and 4.

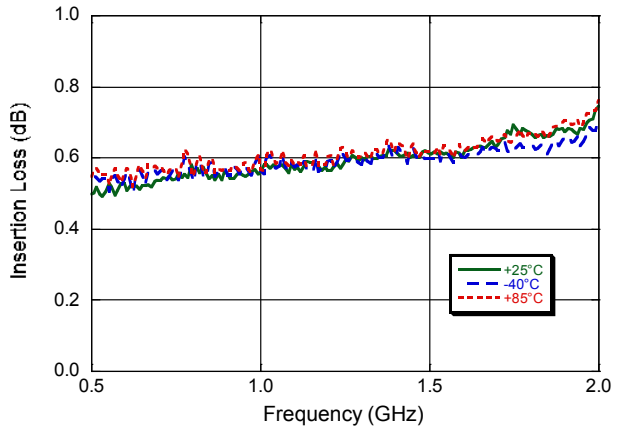
Truth Table[9]

Control Inputs		Condition of Switch RF Common to Each RF Port	
V_C1	V_C2	RF1	RF2
1	0	Off	On
0	1	On	Off

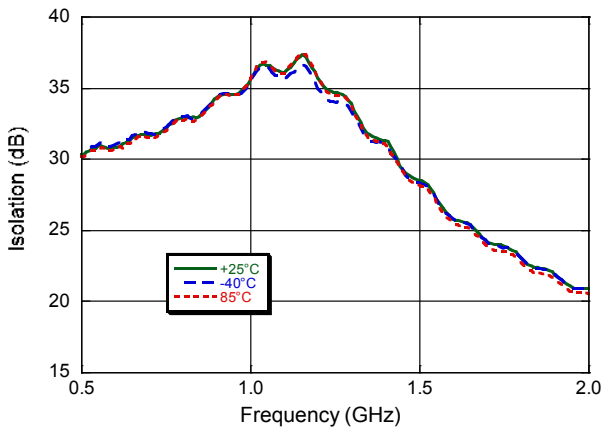
9. "0" = 0 to +0.2 V @ 20 µA maximum.
"1" = +5 V @ 20 µA typical to 10 V @ 500 µA maximum.

Typical Performance Curves

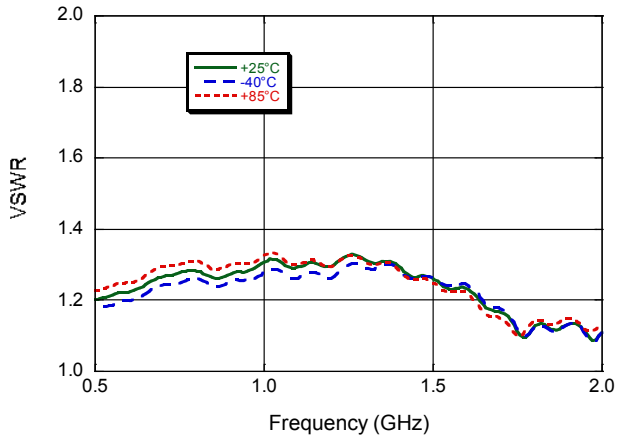
Insertion Loss



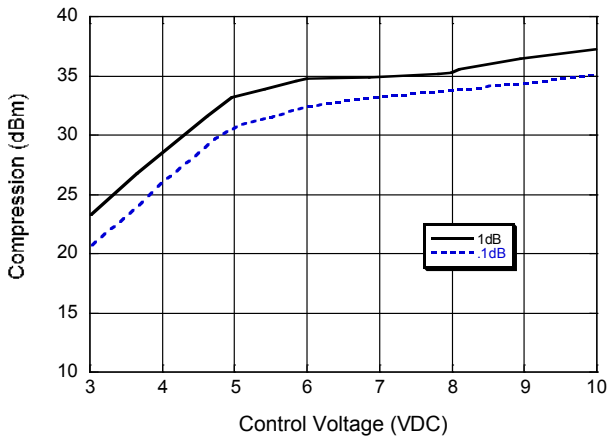
Isolation



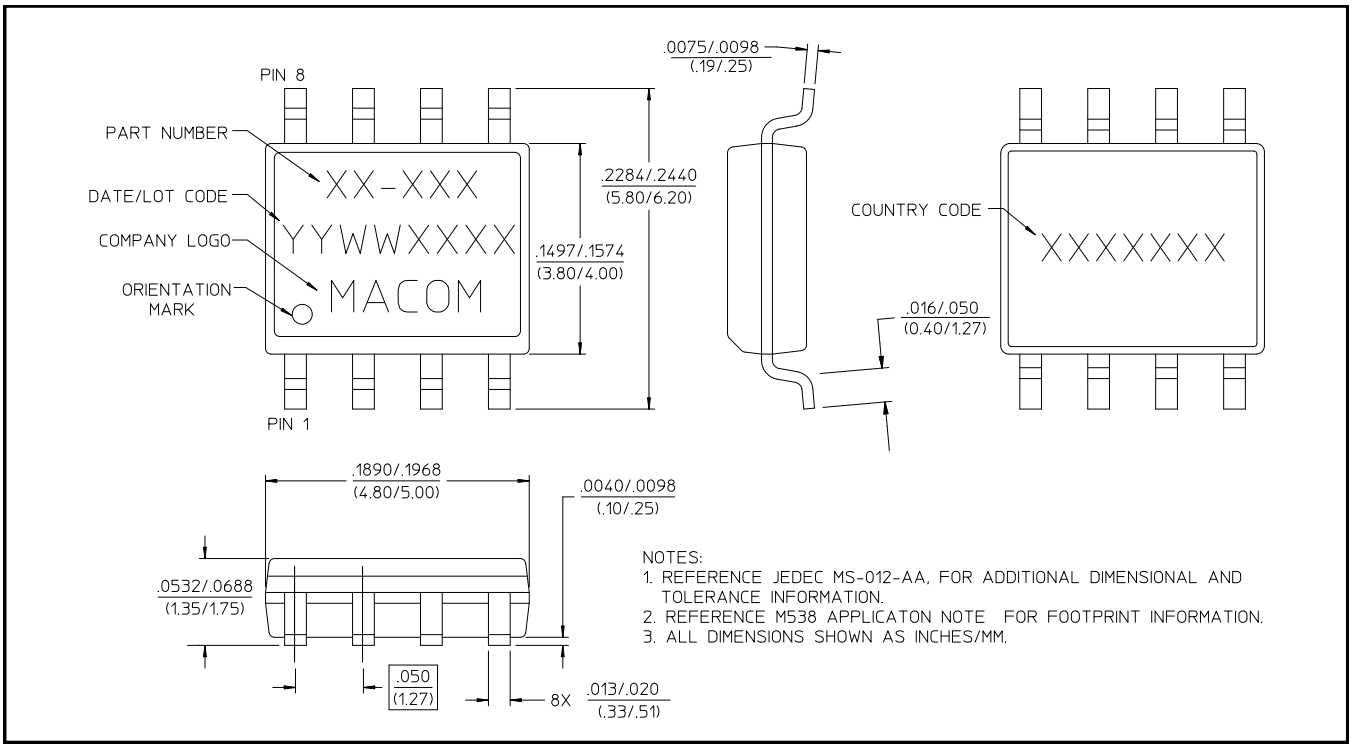
VSWR



Compression vs. Control Voltage @ 900 MHz



Lead-Free SOIC-8†



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

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.