MASWSS0181

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

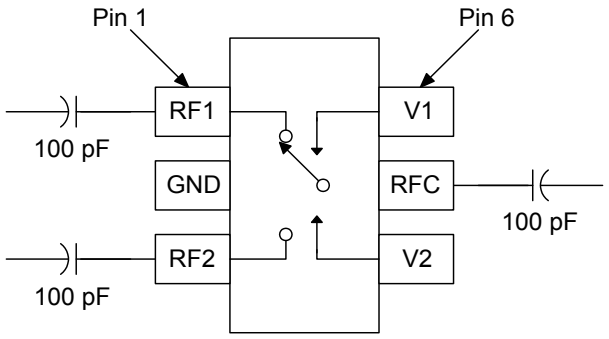
Description

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.

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

Ordering Information[1]

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

1. Reference Application Note M513 for reel size information.

Absolute Maximum Ratings[2,3]

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.
3. 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°C, V_C = 0 V / 2.5 V, Z_0 = 50 Ω[4]

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss[5]	DC - 1 GHz 1 - 2 GHz 2 - 3 GHz	dB	—	0.40 0.50 0.75	0.65 — —
Isolation	DC - 1 GHz 1 - 2 GHz 2 - 3 GHz	dB	23.0 — —	26 20 16	—
Return Loss	DC - 2 GHz 2 - 3 GHz	dB	—	20 16	—
IP3	Two Tone, +26 dBm / tone, 5 MHz Spacing, >50 MHz	dBm	—	57	—
P0.1dB	—	dBm	—	39	—
2nd Harmonic	1 GHz, P_{IN} = 34 dBm	dBc	—	-75	—
3rd Harmonic	1 GHz, P_{IN} = 34 dBm	dBc	—	-75	-67
T_{RISE}, T_{FALL}	10% to 90% RF, 90% to 10% RF	µs	—	0.04	—
T_{ON}, T_{OFF}	50% control to 90% RF, and 50% control to 10% RF	µs	—	0.06	—
Transients	In Band	mV	—	50	—
Control Current	—	µA	—	—	50

4. For positive voltage control, external DC blocking capacitors are required on all RF ports.
5. 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.

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[6,7]

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

6. Differential voltage, V (state 1) - V (state 0), must be +2.5 V minimum and must not exceed +8 V.
7. 0 = -5 V to 2.5 V, 1 = -2.5 V to +5 V.

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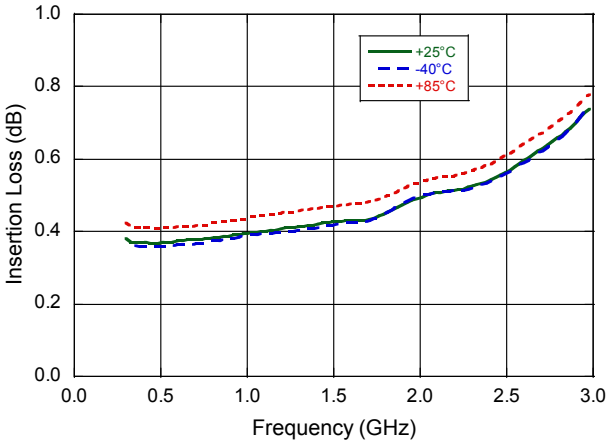
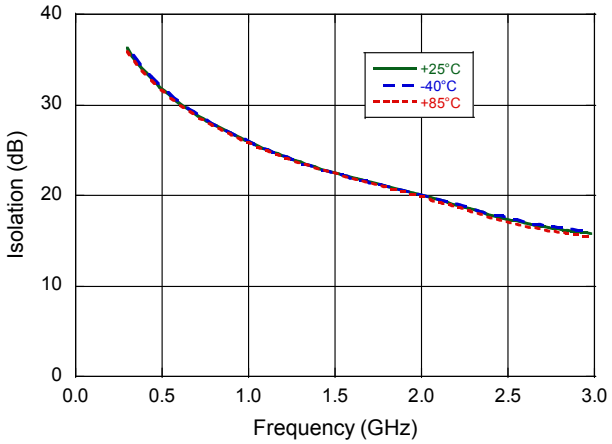
Typical Performance Curves vs. Temperature, 100 pF blocking capacitors

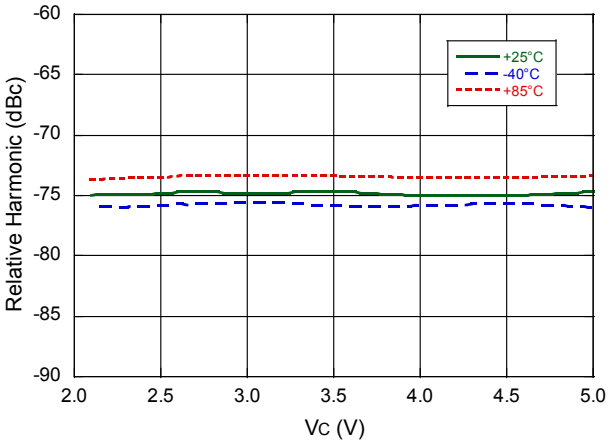
Insertion Loss vs. Frequency



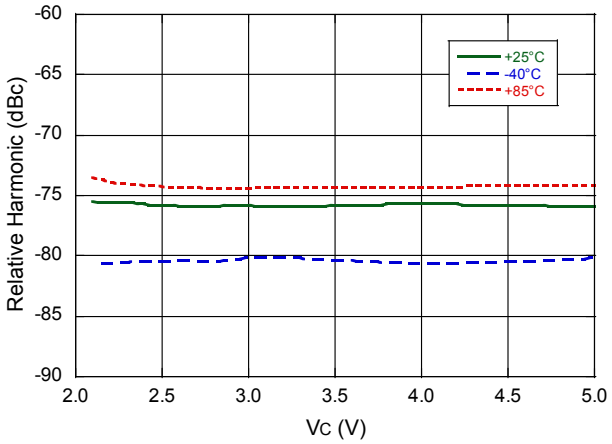
Isolation vs. Frequency



2nd Harmonic vs. Control Voltage, P_{IN} = 34 dBm CW, 1 GHz



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



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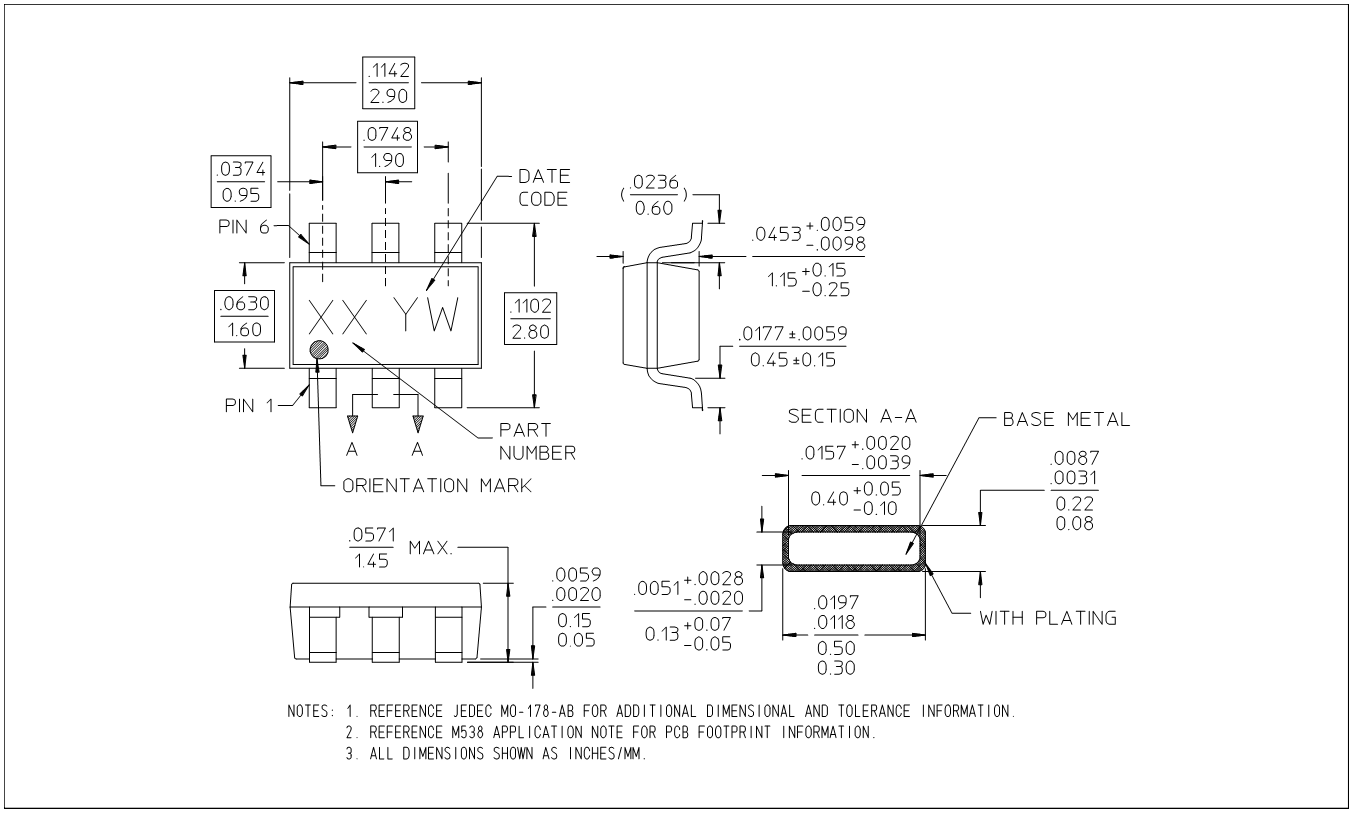
Lead-Free SOT-26 Plastic Package†



† Reference Application Note M538 for lead-free solder reflow recommendations.

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