GaAs Broadband DPDT Diversity Switch, DC - 6.0 GHz

MASWSS0107
V2P

Features

- 802.11a + b/g Broadband Applications
- Broadband Performance: DC-6.0 GHz
- Low Insertion Loss: 1.2 dB Typical @ 6.0 GHz
- High Isolation: 32 dB Typical at 6.0 GHz
- Fast Switching Speed - 0.5 um GaAs PHEMT Process
- Lead Free PQFN 3mm 12 Lead Package
- 100% Matte Tin Plating
- Halogen-Free "Green" Mold Compound
- 260°C Re-flow Compatible

Description

M/A-COM's MASWSS0107 is a Broadband GaAs PHEMT MMIC DPDT diversity switch in a low cost miniature 3 mm PQFN 12 Lead package (JEDEC). The MASWSS0107 is ideally suited for applications where very small size and low cost are required. Typical applications are for WLAN IEEE 802.11a and 802.11b/g systems that employ two antennas for transmit and receive diversity. This topology allows for all RF traces to be routed on the top PCB layer. The MASWSS0107 can be controlled with either two or four control signals. With four control signals, each of the four insertion paths can be controlled individually. If a simpler control scheme is desired, pairs of control lines can be tied together so that the switch is controlled with only two signals.

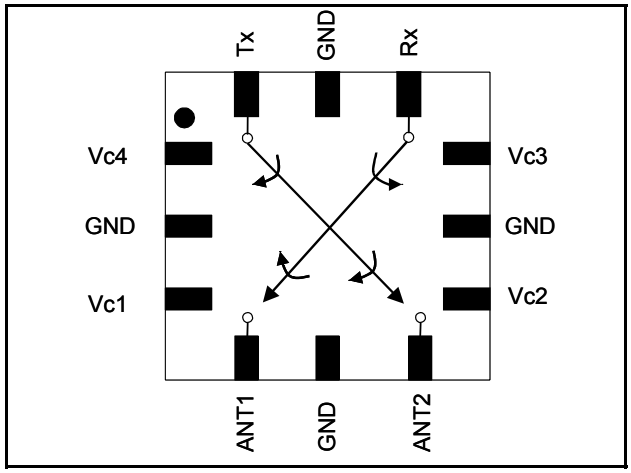
This part delivers isolation greater than 20 dB and insertion loss about 1 dB. Designed for high power, this DPDT switch maintains high linearity up to 6.0 GHz. The MASWSS0107 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

Ordering Information [1,2]

Part Number	Package
MASWSS0107	Bulk Packaging
MASWSS0107TR	1000 piece reel
MASWSS0107SMB	Sample Test Board (Includes 5 Samples)
MASWSS0107-DIE	Separated DIE on Grip Ring [2]

1. Reference Application Note M513 for reel size information.
2. DIE quantity varies.

Functional Schematic



Pin Configuration

PIN No.	PIN Name	Description
1	Vc4	Control 4
2	GND	Ground
3	V_C1	Control 1
4	ANT1	Antenna Port 1
5	GND	Ground
6	ANT2	Antenna Port 2
7	Vc2	Control 2
8	GND	Ground
9	Vc3	Control 3
10	Rx	Receive Port
11	GND	Ground
12	Tx	Transmit Port
13	Paddle*	DC and RF Ground

*The exposed pad centered on the package bottom must be connected to RF and DC ground.

This PRELIMINARY Data Sheet contains information regarding a product M/A-COM has under development. Performance is based on measured results and target specifications. Commitment to produce in volume is not guaranteed.

- **North America** Tel: 800.366.2266 / Fax: 978.366.2266
- **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
- **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298

Visit www.macom.com for additional data sheets and product information.

Electrical Specifications: T_A = 25°C, Z_0 = 50Ω [3,4], VC = 0 V / 3 V, 5 pF Capacitor

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	2.4 - 2.5 GHz	dB	—	1.0	—
	2 - 4 GHz	dB	—	1.1	—
	4 - 5 GHz	dB	—	1.2	—
	4.9 - 6 GHz	dB	—	1.2	—
Isolation (One RF Path Active)	2.4 - 2.5 GHz	dB	—	37	—
	4.9 - 6 GHz	dB	—	32	—
Isolation (Two RF Paths Active)	2.4 - 2.5 GHz	dB	—	33	—
	4.9 - 6 GHz	dB	—	27	—
Isolation	Single Active Control				
(Antenna to Antenna)	2.4 - 2.5 GHz	dB	—	31	—
(Antenna to Antenna)	4.9 - 6 GHz	dB	—	22	—
(TX - RX)	2.4 - 2.5 GHz	dB	—	30	—
(RX - RX)	4.9 - 6 GHz	dB	—	27	—
Isolation	Dual Active Control				
(Antenna to Antenna)	2.4 - 2.5 GHz	dB	—	25	—
(Antenna to Antenna)	4.9 - 6 GHz	dB	—	20	—
(TX - RX)	2.4 - 2.5 GHz	dB	—	25	—
(RX - RX)	4.9 - 6 GHz	dB	—	27	—
Return Loss	2.4 - 2.5 GHz	dB	—	25	—
	4.9 - 6 GHz	dB	—	19	—
	2.4 - 6 GHz	dB	—	18	—
IP2	Two Tone +15 dBm, 5 MHz Spacing				
	2.4 GHz, Vc = 0 V/3 V	dBm	—	91	—
	4.9 - 6 GHz, Vc = 0 V/3 V	dBm	—	90	—
	2.4 GHz, Vc = 0 V/2.7 V	dBm	—	90	—
	4.9 - 6 GHz, Vc = 0 V/2.7 V	dBm	—	89	—
	2.4 GHz, Vc = 0 V/2.5 V	dBm	—	89	—
	4.9 - 6 GHz, Vc = 0 V/2.5 V	dBm	—	88	—
IIP3	Two Tone +15 dBm, 5 MHz Spacing				
	2.4 GHz, Vc = 0 V/3 V	dBm	—	53	—
	4.9 - 6 GHz, Vc = 0 V/3 V	dBm	—	51	—
	2.4 GHz, Vc = 0 V/2.7 V	dBm	—	53	—
	4.9 - 6 GHz, Vc = 0 V/2.7 V	dBm	—	52	—
	2.4 GHz, Vc = 0 V/2.5 V	dBm	—	53	—
	4.9 - 6 GHz, Vc = 0 V/2.5 V	dBm	—	51	—
Input P0.1dB	2.4 GHz, Vc = 0 V/3 V	dBm	—	26.8	—
	4.9 - 6 GHz, Vc = 0 V/3 V	dBm	—	29	—
Input P1dB	2.4 GHz, Vc = 0 V/3 V	dBm	—	32.9	—
	4.9 - 6 GHz, Vc = 0 V/3 V	dBm	—	32	—
2nd Harmonic	5 GHz, P_{IN} = 20 dBm, Vc = 0 V / 3 V				
	2.4 GHz	dBm	—	77	—
	5.3 GHz	dBm	—	84	—
	5.8 GHz	dBm	—	75	—
3rd Harmonic	5 GHz, P_{IN} = 20 dBm, Vc = 0 V / 3 V				
	2.4 GHz	dBm	—	76	—
	5.3 GHz	dBm	—	77	—
	5.8 GHz	dBm	—	78	—

3. External DC blocking capacitors are required on all RF ports.
4. Insertion loss can be optimized by varying the DC blocking capacitor value.

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Electrical Specifications: T_A = 25°C, Z_0 = 50Ω, VC = 0 V / 3 V, 5 pF Capacitor (cont'd)

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Trise, Tfall	10% to 90% RF 90% to 10% RF	nS nS	— —	80 70	— —
Ton, Toff	50% Control to 90% RF 50% Control to 10% RF	nS nS	— —	97 98	— —
Transients		mV	—	14	—
Gate Leakage	|Vc| = 3 V	uA	—	6	—

Truth Table [5]

Control Vc1	Control Vc2	Control Vc3	Control Vc4	A1 - Rx	A1 - Tx	A2 - Rx	A2 - Tx
1	0	0	0	Off	On	Off	Off
0	1	0	0	Off	Off	On	Off
0	0	1	0	On	Off	Off	Off
0	0	0	1	Off	Off	Off	On
0	0	1	1	On	Off	Off	On
1	1	0	0	Off	On	On	Off

5. 1 = +2.5 V to +5 V, 0 = 0 V ± 0.2 V.

Absolute Maximum Ratings [6]

Parameter	Absolute Maximum
Max Input Power @ 3V Control 0.5 - 6.0 GHz	+34 dBm
Max Input Power @ 5V Control	+35 dBm
Operating Voltage	+8.5 volts
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

6. Exceeding any one or combination of these limits may cause permanent damage.

Qualification

Qualified to M/A-COM 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.

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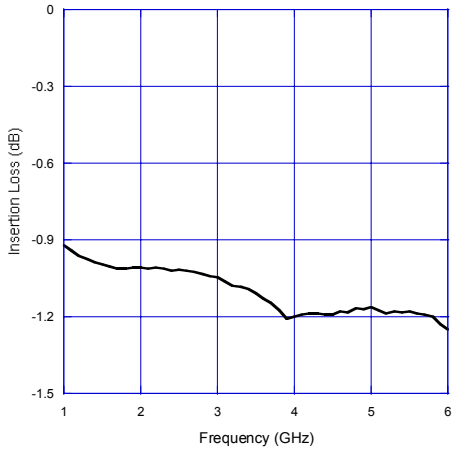
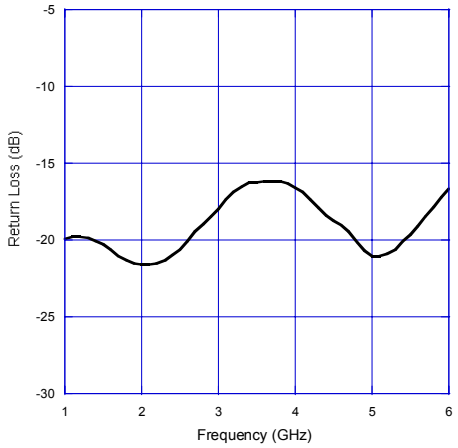
Typical Performance Curves, VC = 0 / 3 V, C = 5 pF

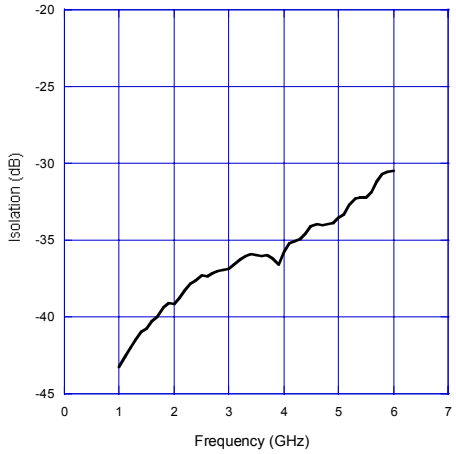
Insertion Loss



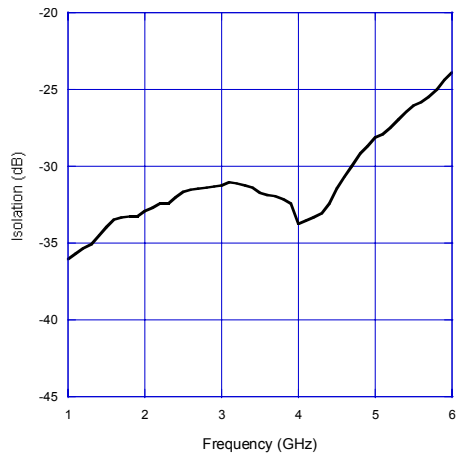
Typical Return Loss



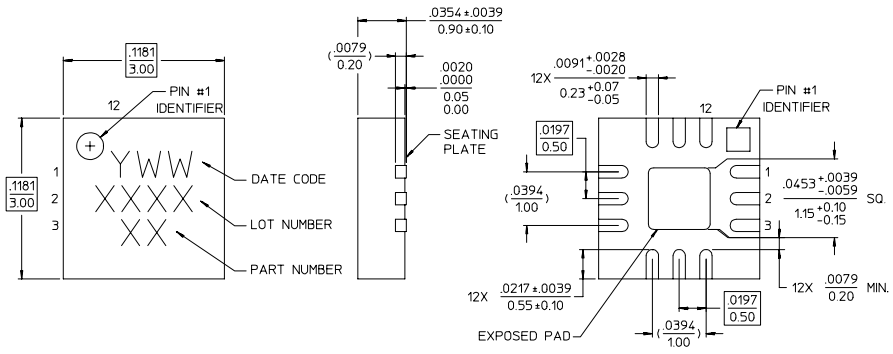
Single Path Active Isolation



Dual Path Active Isolation



PQFN 3 mm 12 Lead



NOTES: 1. REFERENCE JEDEC MO-220, VAR. VEED-1 FOR ADDITIONAL DIMENSIONAL AND TOLERANCE INFORMATION.
2. REFERENCE S2083 APPLICATION NOTE FOR PCB FOOTPRINT INFORMATION.
3. ALL DIMENSIONS SHOWN AS INCHES/MM.

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