Features

- 802.11a + b/g and MIMO Applications
- Test and Measurement and Low/Medium Power Telecommunication Applications up to 8 GHz
- Broadband Performance: DC - 8 GHz
- Low Insertion Loss: 0.5 dB from 2 - 6 GHz
- High Isolation: 30 dB from 2 - 6 GHz
- Positive or Negative Control
- Fast Settling for Low Gate Lag Requirements
- Lead-Free 2 mm 8-Lead PDFN Package
- RoHS* Compliant

Applications

- Aerospace & Defense
- ISM

Description

The MASW-007107 is a broadband GaAs pHEMT MMIC SPDT switch in a lead-free 2 mm 8-lead PDFN package. Typical applications are for WLAN IEEE 802.11a + b/g, and MIMO. Other applications include test equipment requiring ultra fast switching speeds. Designed for low insertion loss, this SPDT switch maintains low loss up to 8 GHz.

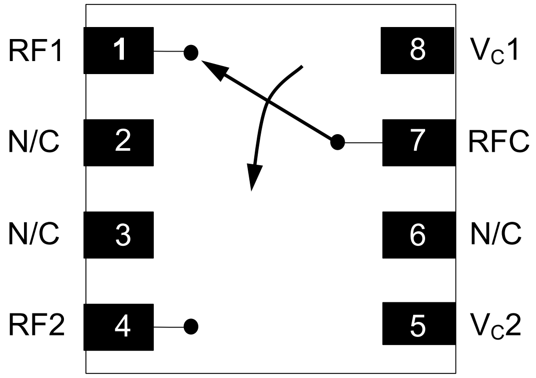
The MASW-007107 is fabricated using a 0.5 micron gate length GaAs pHEMT process. This process features full passivation for performance and reliability.

Ordering Information[1,2]

Part Number	Package
MASW-007107-TR3000	3000 piece reel
MASW-007107-000SMB	Sample Test Board
MASW-007107-000DIE[3]	Separated die on grip ring
MASW-007107-0GPDIE	100 piece gel pack

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[4]

Pin No.	Pin Name	Description
1	RF1	RF Output 1
2, 3, 6	N/C	No Connection
4	RF2	RF Output 2
5	V_C2	Voltage Control 2
7	RFC	RF Common
8	V_C1	Voltage Control 1
9	Paddle[5]	RF and DC Ground

4. MACOM recommends connecting unused package pins to ground.
5. The exposed pad centered on the package bottom must be connected to RF, DC and thermal ground.

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

Electrical Specifications: T_A = +25°C, V_C = 0 V / 3 V, Z_0 = 50 Ω, 8 pF Capacitor[6,7]

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss[8]	2.0 - 6.0 GHz 6.0 - 8.0 GHz	dB	—	0.50 0.75	0.8 —
Isolation	2.4 GHz 5.3 GHz 5.8 GHz 6.0 - 8.0 GHz	dB	24 28 25 —	29 33 30 20	—
Return Loss	DC - 8.0 GHz	dB	—	16	—
Input IP2	Two Tone, 5 dBm / Tone, 5 MHz Spacing 2.4 GHz 5.3 GHz 5.8 GHz	dBm	—	92 83 85	—
Input IP3	Two Tone, 5 dBm / Tone, 10 MHz Spacing 2.4 GHz (3 V) 5.8 GHz (3 V) 2.4 GHz (5 V) 5.8 GHz (5 V)	dBm	— —	54 49 55 51	— —
	Two Tone, 15 dBm / Tone, 10 MHz Spacing 2.4 GHz (3 V) 5.8 GHz (3 V) 2.4 GHz (5 V) 5.8 GHz (5 V)	dBm	— —	57 54 59 58	— —
Input P0.1dB	2.4 GHz 5.3 GHz 5.8 GHz	dBm	—	26 26 25	—
Input P1dB	2.4 GHz 5.3 GHz 5.8 GHz	dBm	—	30.5 29.5 27.0	—
Linear Pout	2.4 GHz, OFDM, QAM-64,54 Mbps, EVM = 2.5% 3 V 5 V 8 V	dBm	—	21.0 27.5 30.0	—
2nd Harmonic	2.4 GHz, P_{IN} = 20 dBm 5.3 GHz, P_{IN} = 20 dBm 5.8 GHz, P_{IN} = 20 dBm	dBc	—	-80 -71 -71	—
3rd Harmonic	2.4 GHz, P_{IN} = 20 dBm 5.3 GHz, P_{IN} = 20 dBm 5.8 GHz, P_{IN} = 20 dBm	dBc	—	-83 -71 -72	—
T_{RISE}, T_{FALL}	10% to 90% RF and 90% to 10% RF	ns	—	13	—
T_{ON}, T_{OFF}	50% control to 90% RF and 50% control to 10% RF	ns	—	35	—
Transients	—	mV	—	14	—
Control Current	$\|V_C\|$ = 3 V	µA	—	1	5
RON	t > 90 ms after OFF to ON Switching (settled)	Ω	—	2.50	—
Gate Lag	|ΔRon| between 15 µs and 90 ms after OFF to ON Switching	Ω	—	0.15	—

6. For positive voltage control, external DC blocking capacitors are required on all RF ports.
7. Electrical minimum and maximum specifications are guaranteed in final package assembly only.
8. Insertion loss can be optimized by varying the DC blocking capacitor value.

Absolute Maximum Ratings[9,10]

Parameter	Absolute Maximum
Input Power @ 3 V Control	32 dBm
Input Power @ 5 V Control	34 dBm
Operating Voltage	8.5 volts
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

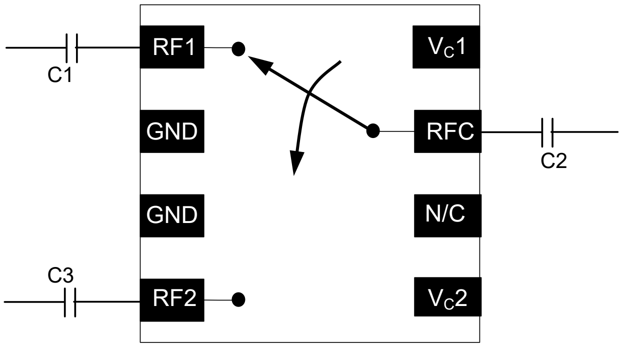
9. Exceeding any one or combination of these limits may cause permanent damage to this device.
10. MACOM does not recommend sustained operation near these survivability limits.

Truth Table[11,12]

Control V_C1	Control V_C2	RFC - RF1	RFC - RF2
1	0	On	Off
0	1	Off	On

11. Positive Control: 1 = +2.9 V to +8.0 V, 0 = 0 V ± 0.2 V.
    Negative Control: 1 = 0 V ± 0.2 V, 0 = -2.9 V to -8.0 V
12. If using negative control, external DC blocking capacitors can be omitted on RF ports, provided that the DC level of the external circuit on the RF port is 0 VDC.

Application Schematic



C1, C2, C3 = 8 pF

Qualification

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

Handling Procedures

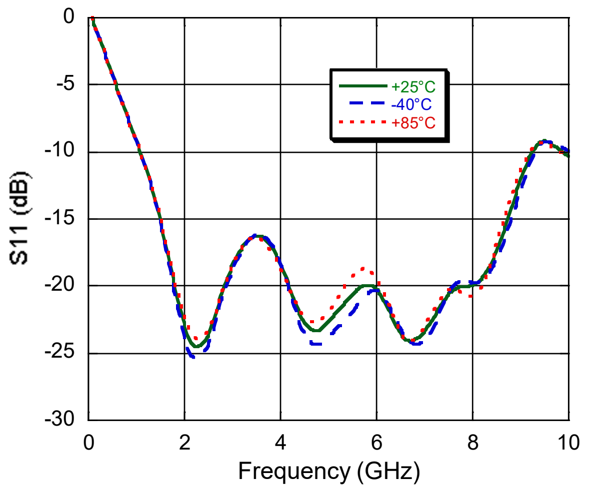
Please observe the following precautions to avoid damage:

Static Sensitivity

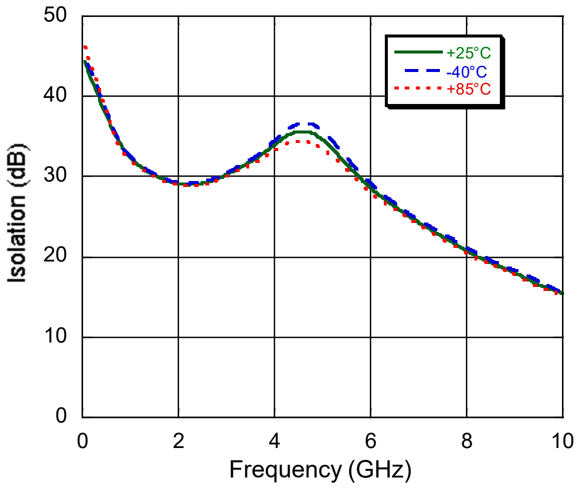
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Typical Performance Curves

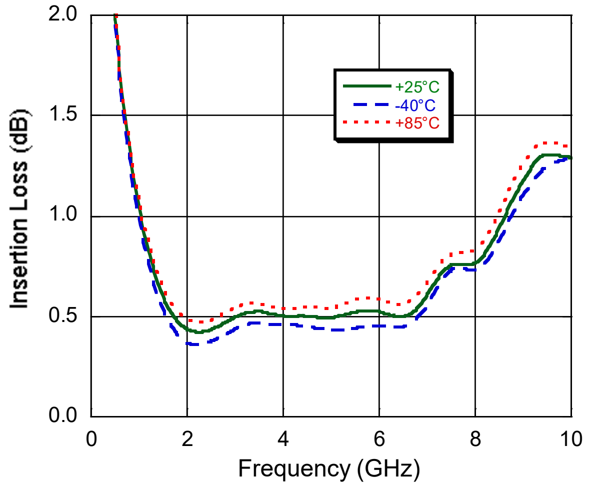
Return Loss vs. Frequency



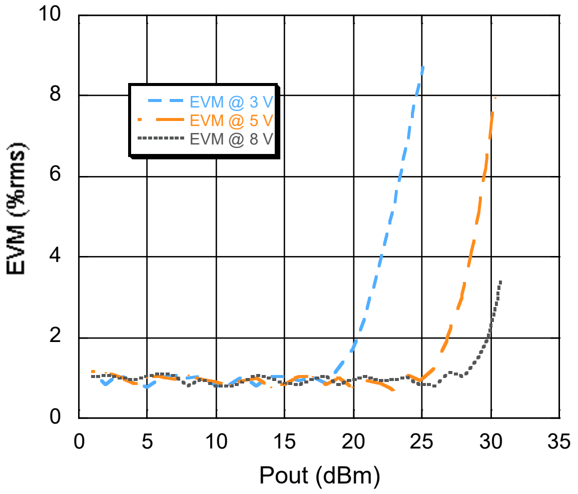
Isolation vs. Frequency



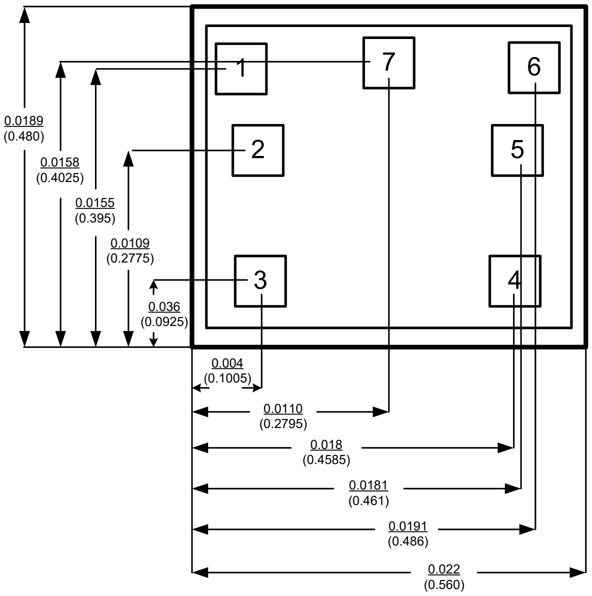
Insertion Loss vs. Frequency



EVM vs. Pout @ 2.4 GHz



Die Outline Drawing[13,14,15,16]



Die Size - Inches (mm)

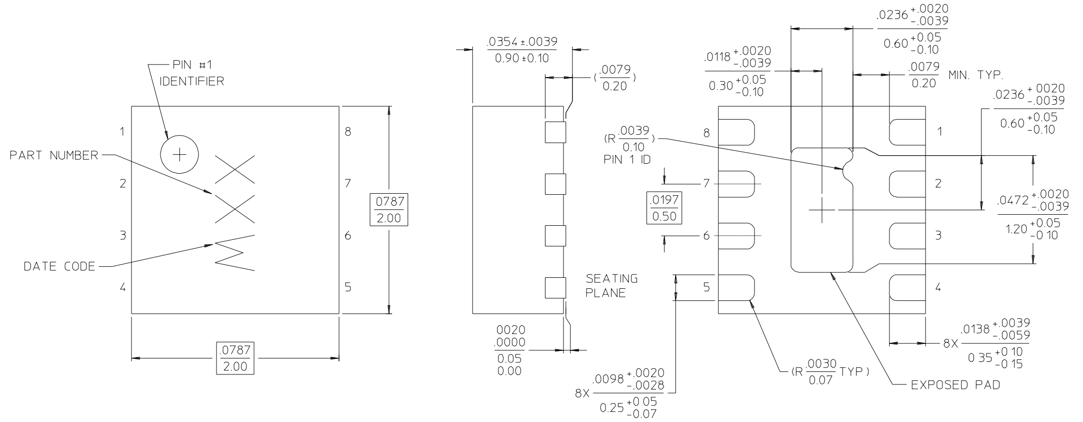
0.022 x 0.0189 x 0.008 (0.56 x 0.48 x 0.203)

13. Typical dimensions in inches (millimeters).
14. Die thickness is 0.008” (0.203 mm).
15. Typical bond pad is 0.003” square (0.076 mm square).
16. Bond pad metallization is gold.

Die Bond Pad Configuration

Pad #	Name	Description
1	V_C1	Voltage Control 1
2	RF1	RF Output 1
3, 4	GND	Ground
5	RF2	RF Output 2
6	V_C2	Voltage Control 2
7	RFC	RF Common

Lead Free 2 mm 8-lead PDFN †



NOTES: 1. REFERENCE JEDEC MO-229, VAR. VCCD-3 FOR ADDITIONAL DIMENSIONAL AND TOLERANCE INFORMATION.
2. REFERENCE S2083 APPLICATION NOTE FOR PCB FOOTPRINT INFORMATION.
3. ALL DIMENSIONS SHOWN AS INCHES/MM

† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.

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