MASW-007107

GaAs Broadband SPDT Switch
DC - 8.0 GHz

Rev. V5

Features

- 802.11a + b/g and MIMO Applications
- Test and Measurement and Low/Medium Power Telecommunication Applications up to 8.0 GHz
- Broadband Performance: DC - 8.0 GHz
- Low Insertion Loss: 0.5 dB from 2.0 - 6.0 GHz
- High Isolation: 30 dB from 2.0 - 6.0 GHz
- Fast Settling for Low Gate Lag Requirements
- Lead-Free 2 mm 8-Lead PDFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- RoHS Compliant* and 260°C Reflow Compatible

Description

M/A-COM's 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 8.0 GHz.

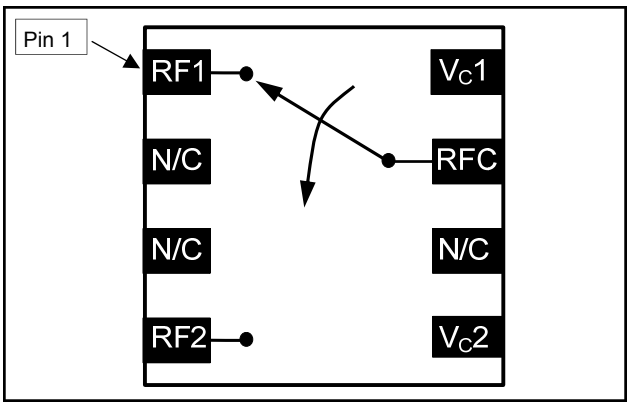
The MASW-007107 is fabricated using a 0.5 micron gate length GaAs pHEMT process. The process features full passivation for performance and reliability.

Ordering Information [1,2]

Part Number	Package
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	N/C	No Connection
3	N/C	No Connection
4	RF2	RF Output 2
5	V_C2	Voltage Control 2
6	N/C	No Connection
7	RFC	RF Common
8	V_C1	Voltage Control 1
9	Paddle[5]	RF and DC Ground

4. M/A-COM recommends connecting unused package pins to ground.
5. The exposed pad centered on the package bottom must be connected to RF and DC ground.

Absolute Maximum Ratings [6,7]

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

6. Exceeding any one or combination of these limits may cause permanent damage to this device.
7. M/A-COM does not recommend sustained operation near these survivability limits.

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

- **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.macomtech.com for additional data sheets and product information.

Electrical Specifications: T_A = 25°C, Z_0 = 50 Ω, V_C = 0 V / 3 V, 8 pF Capacitor [8,9]

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss [10]	2.0 - 6.0 GHz 6.0 - 8.0 GHz	dB dB	— —	0.50 0.75	0.8 —
Isolation	2.4 GHz 5.3 GHz 5.8 GHz 6.0 - 8.0 GHz	dB dB dB 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 dBm dBm	 — — —	 92 83 85	 — — —
Input IP3	Two Tone, +5 dBm / Tone, 10 MHz Spacing 2.4 GHz (3V) 5.8 GHz (3V) 2.4 GHz (5V) 5.8 GHz (5V)	 dBm dBm dBm dBm	 — — — —	 54 49 55 51	 — — — —
	Two Tone, +15 dBm / Tone, 10 MHz Spacing 2.4 GHz (3V) 5.8 GHz (3V) 2.4 GHz (5V) 5.8 GHz (5V)	 dBm dBm dBm dBm	 — — — —	 57 54 59 58	 — — — —
Input P0.1dB	2.4 GHz 5.3 GHz 5.8 GHz	dBm dBm dBm	— — —	26 26 25	— — —
Input P1dB	2.4 GHz 5.3 GHz 5.8 GHz	dBm dBm dBm	— — —	30.5 29.5 27	— — —
Linear Pout	2.4 GHz, OFDM, QAM-64,54 Mbps, EVM = 2.5% 3 V 5 V 8 V	 dBm dBm dBm	 — — —	 21 27.5 30	 — — —
2nd Harmonic	2.4 GHz, PIN = +20 dBm 5.3 GHz, PIN = +20 dBm 5.8 GHz, PIN = +20 dBm	dBc dBc dBc	— — —	-80 -71 -71	— — —
3rd Harmonic	2.4 GHz, PIN = +20 dBm 5.3 GHz, PIN = +20 dBm 5.8 GHz, PIN = +20 dBm	dBc dBc dBc	— — —	-83 -71 -72	— — —
T-rise, T-fall	10% to 90% RF and 90% to 10% RF	ns	—	13	—
Ton, Toff	50% control to 90% RF and 50% control to 10% RF	ns	—	35	—
Transients		mV	—	14	—
Control Current	|VC| = 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	—

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

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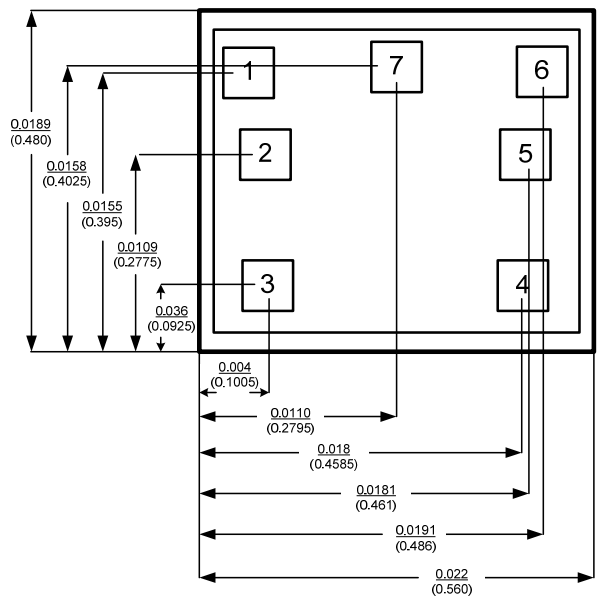
Die Outline Drawing [11,12,13,14]



Die Size - Inches (mm)

0.022 x 0.0189 x 0.006 (0.56 x 0.48 x 0.152)

11. Typical dimensions in inches (millimeters)
12. Die thickness is 0.006" (0.152 mm)
13. Typical bond pad is 0.003" square (0.076 mm square)
14. Bond pad metallization is gold.

Qualification

Qualified to M/A-COM specification REL-201, Process Flow –2.

Handling Procedures

Please observe the following precautions to avoid damage:

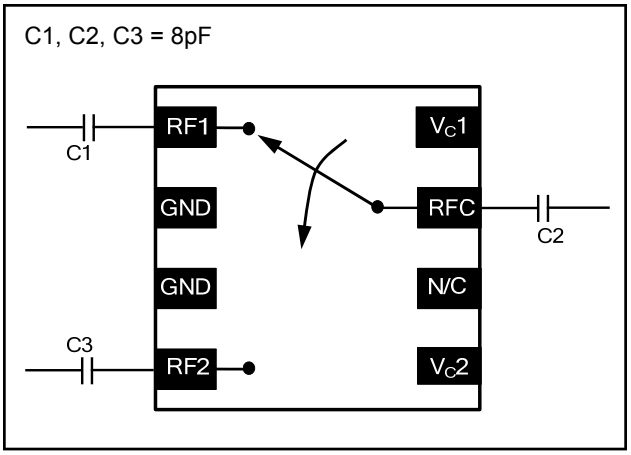
Static Sensitivity

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.

Die Bond Pad Configuration

Pad No.	Name	Description
1	V_C1	Voltage Control 1
2	RF1	RF Output 1
3	GND	Ground
4	GND	Ground
5	RF2	RF Output 2
6	V_C2	Voltage Control 2
7	RFC	RF Common

Application Schematic



Truth Table [15]

Control V_C1	Control V_C2	RFC– RF1	RFC—RF2
1	0	On	Off
0	1	Off	On

15. 1 = +2.9 V to +5 V, 0 = 0 V ± 0.2 V.

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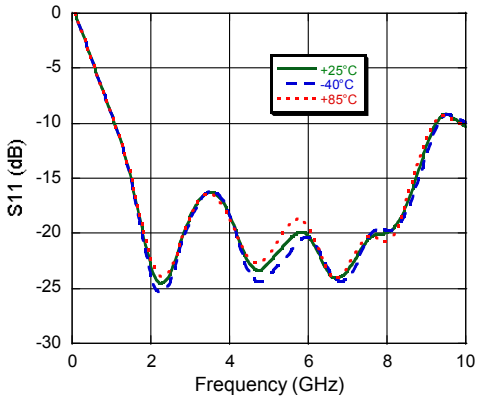
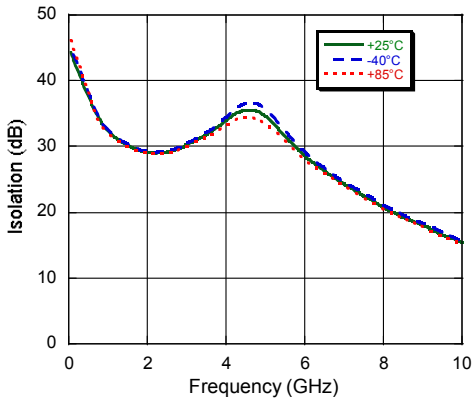
Typical Performance Curves

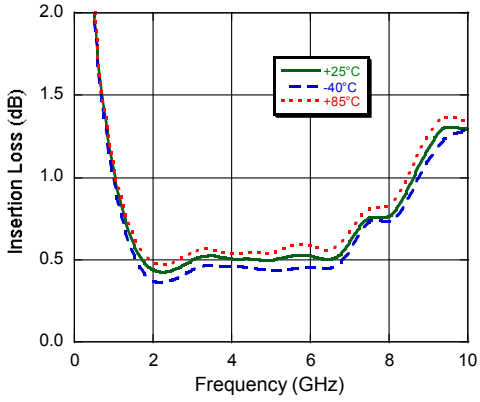
Return Loss vs. Frequency



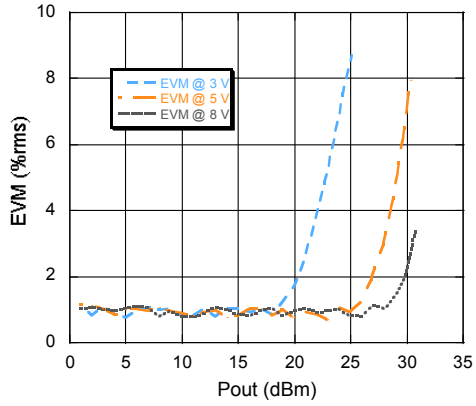
Isolation vs. Frequency



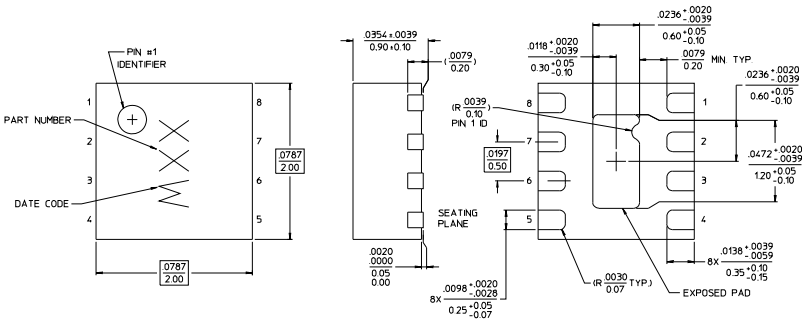
Insertion Loss vs. Frequency



EVM vs. Pout @ 2.4 GHz



Lead Free 2 mm 8-lead PDFN †



† Reference Application Note M538 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.

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