

SPDT High Isolation Switch

5 - 3000 MHz



MASW-011207

Rev. V1

Features

- 50 Ω Impedance
- Input Terminated
- Positive Voltage Control
- High Isolation: 50 dB at 2500 MHz
- 0.5 micron GaAs pHEMT Process
- Lead-Free 3 mm 16-Lead PQFN Package
- 100% Matte Tin Plating over Copper
- RoHS* Compliant

Applications

- Multi Market / MMIC
- Metro Long Haul

Description

The MASW-011207 is a GaAs pHEMT MMIC single pole double throw (SPDT) switch in a lead-free 3 mm 16-lead PQFN package. The MASW-011207 is ideally suited for applications where low control voltage, high isolation, small size and low cost are required. This part can be used in all 50 Ω systems operating up to 3 GHz.

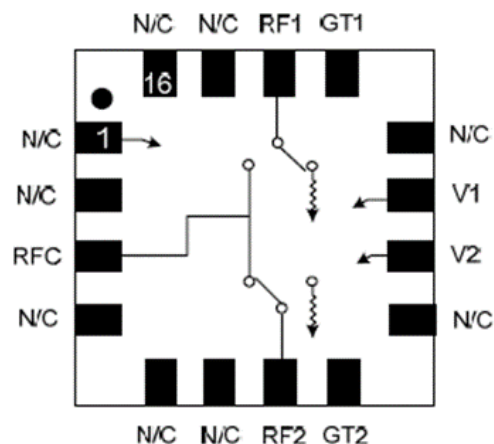
The MASW-011207 is fabricated using a 0.5 micron gate length GaAs pHEMT process. The process features full passivation for performance and reliability.

Ordering Information ^{1,2}

Part Number	Package
MASW-011207-TR1000	1000 piece reel
MASW-011207-TR3000	3000 piece reel
MASW-011207-001SMB	Sample Board

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

Functional Schematic



Pin Configuration ³

Pin #	Pin Name	Description
1,2,4,5,6,9,12,15,16	N/C	No Connection
3	RFC	RF Common Port
7	RF2	RF Port 2
8	GT2	RF Ground
10	V2	Vcontrol 2
11	V1	Vcontrol 1
13	GT1	RF Ground
14	RF1	RF Port 1

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

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

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Electrical Specifications: $T_A = 25^\circ\text{C}$, $Z_0 = 50 \Omega^4$, $V_C = 0 \text{ V} / 2.9 \text{ V}$, $P_{IN} = 5 \text{ dBm}$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	216 MHz	dB	—	0.64	—
	550 MHz			0.65	—
	810 MHz			0.66	—
	1000 MHz			0.67	—
	2200 MHz			0.73	—
	2500 MHz			0.75	1.2
	3000 MHz			0.80	—
Isolation RFC-RF1,RF2	216 MHz	dB	65	70	—
	550 MHz		—	62	
	810 MHz		—	58	
	1000 MHz		52	56	
	2200 MHz		—	53	
	2500 MHz		48	52	
	3000 MHz		—	53	
Isolation RF1-RF2	216 MHz	dB	—	88	—
	550 MHz			80	
	810 MHz			74	
	1000 MHz			70	
Return Loss (on-state)	5 - 1000 MHz	dB	—	27	—
	5 - 2500 MHz			26	
Return Loss (off-state)	5 - 1000 MHz	dB	—	24	—
	5 - 2500 MHz			18	
Input P1dB	2000 MHz	dBm	—	24	—
IIP3	2 tone, 5 dBm/tone, 6 MHz spacing, f1 & f2 = 988 & 994 MHz	dBm	—	51	—
IIP2	2 tone, 5 dBm/tone, 6 MHz spacing, f1 & f2 = 988 & 994 MHz	dBm	—	91	—
T_{RISE} , T_{FALL}	10% to 90% RF, 90% to 10% RF	ns	—	16	—
T_{ON} , T_{OFF}	50% control to 90% RF, 50% control to 10% RF	ns	—	8	—
Transients	In Band	mV	—	70	—
Control Current	$ V_C = 2.9 \text{ V}$	μA	—	5	10

4. External 0.01 μF DC blocking capacitors are required on all RF In/Out and RF ground ports (GT1 and GT2). See Application Schematic.

Absolute Maximum Ratings^{5,6}

Parameter	Absolute Maximum
Input Power (5 - 3000 MHz, 2.9 V Control)	32 dBm
Operating Voltage	8.5 V
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

Maximum Operating Limits

Parameter	Maximum
RF Input Power	24 dBm
$V_{CONTROL}$	5 V
Operating Temperature	-40°C to +85°C

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

6. Macom does not recommend sustained operation near these survivability limits.

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Truth Table ⁷

V1	V2	RFC - RF1	RFC - RF2
1	0	On	Off
0	1	Off	On

7. 1 = +2.9 to +5 V, 0 = 0 ± 0.2 V.

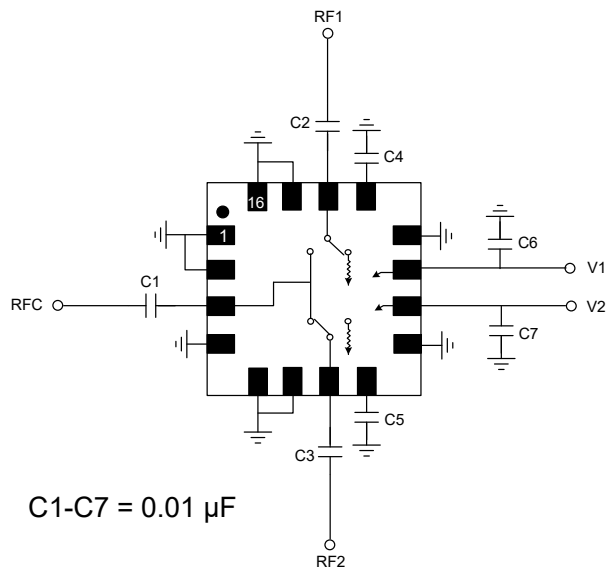
Handling Procedures

Please observe the following precautions to avoid damage:

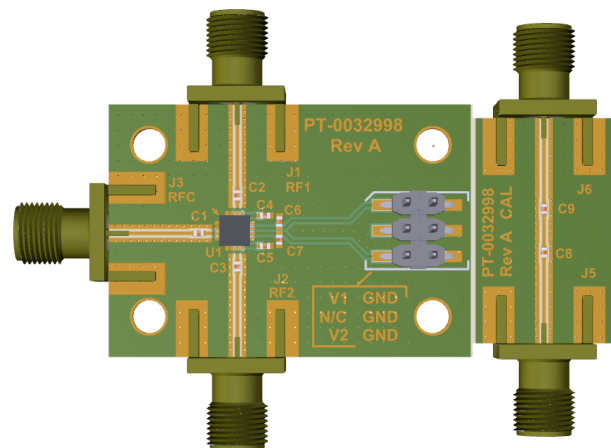
Static Sensitivity

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 Class 0B HBM and Class C3 CDM devices.

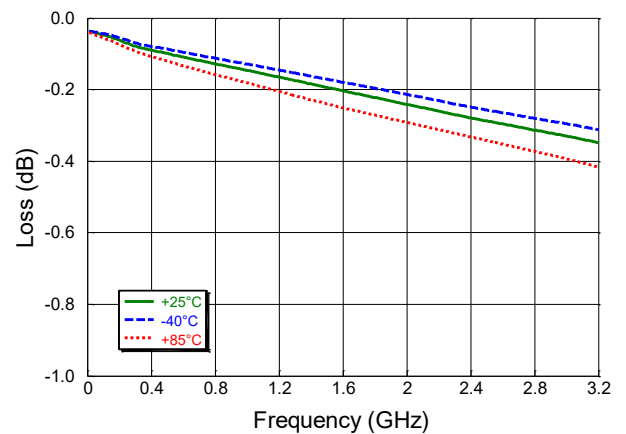
Application Schematic



Evaluation Board



Evaluation Board Losses



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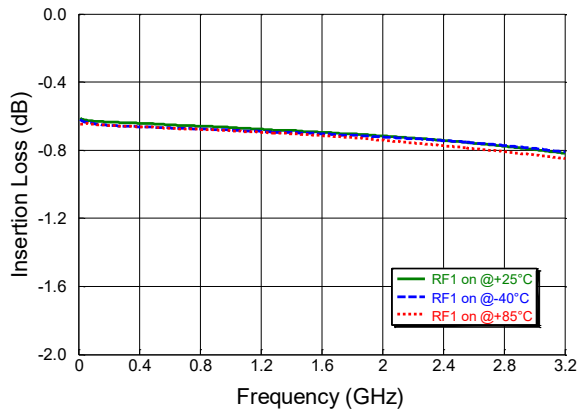
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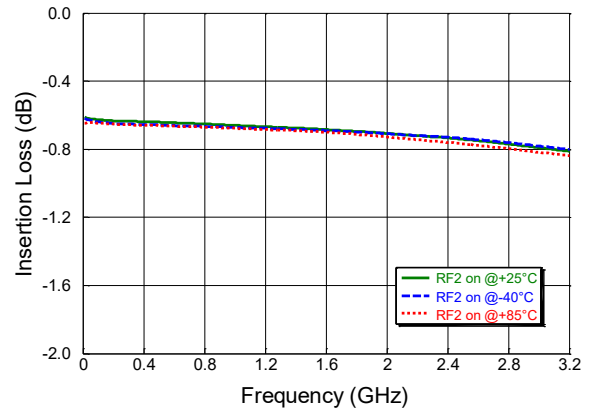
Typical Performance Curves

$P_{IN} = 5 \text{ dBm}$, $V_C = 0 \text{ V} / 2.9 \text{ V}$, $Z_0 = 50 \Omega$ (unless otherwise indicated)

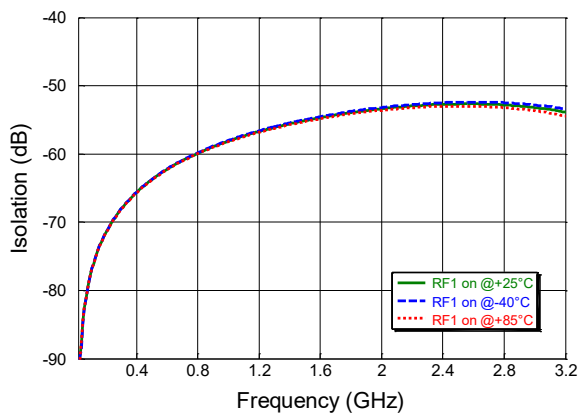
Insertion Loss RFC to RF1



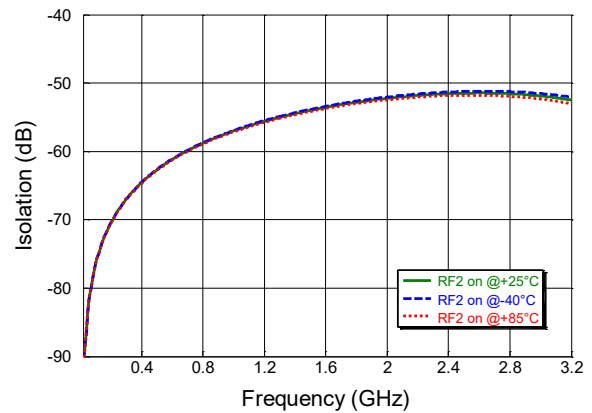
Insertion Loss RFC to RF2



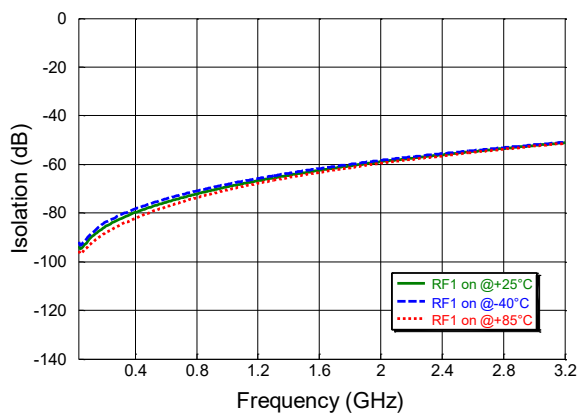
Isolation RFC to RF1



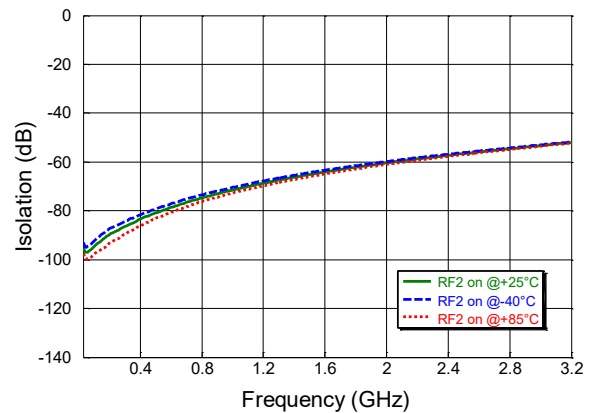
Isolation RFC to RF2



Isolation RF1 to RF2 (RF1 On)



Isolation RF1 to RF2 (RF2 On)



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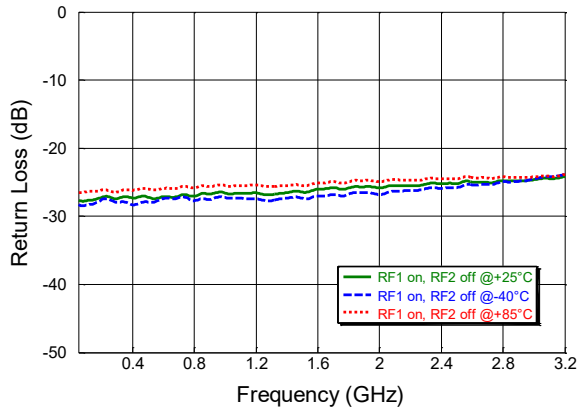
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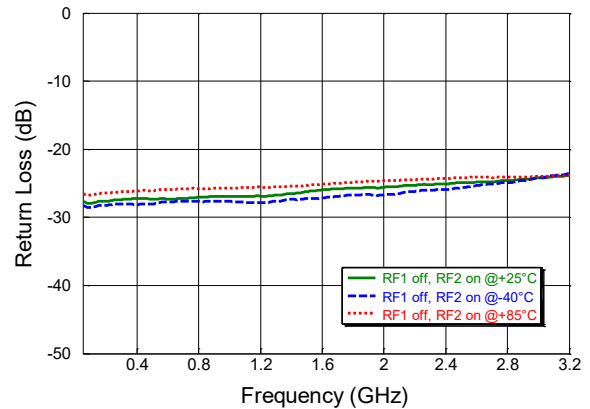
Typical Performance Curves

$P_{IN} = 5 \text{ dBm}$, $V_C = 0 \text{ V} / 2.9 \text{ V}$, $Z_0 = 50 \Omega$ (unless otherwise indicated)

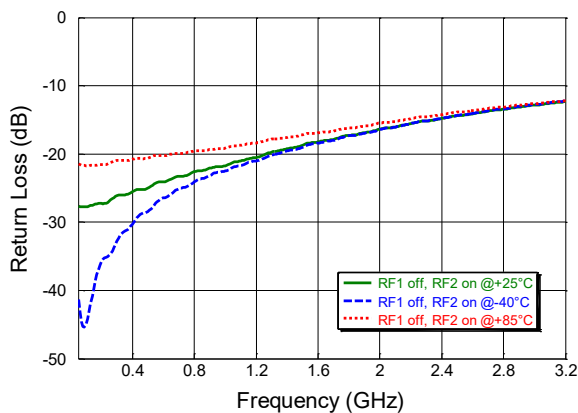
RF1 Return Loss On-state match (RF2 Off)



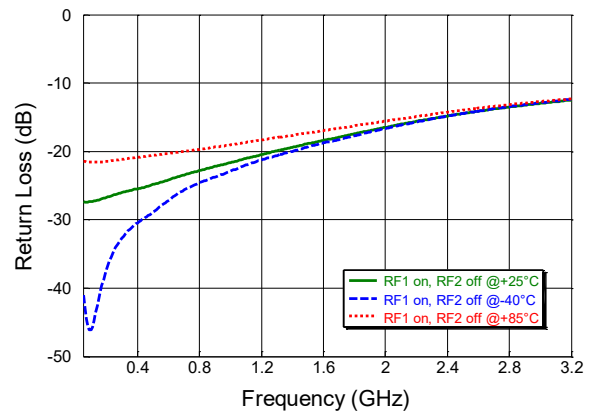
RF2 Return Loss On-state match (RF1 Off)



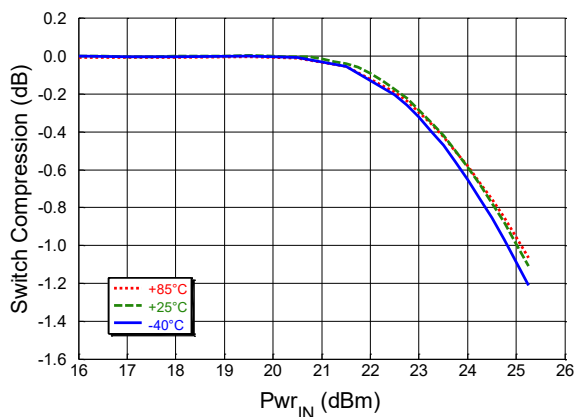
RF1 Return Loss Off-state (RF2 On)



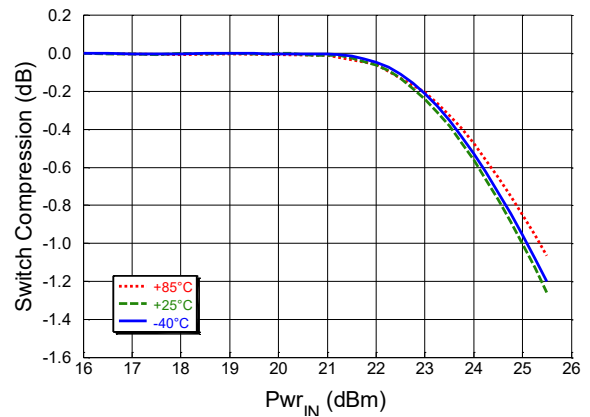
RF2 Return Loss Off-state (RF1 On)



RFC to RF1 Port Switch Compression @ 2 GHz



RFC to RF2 Port Switch Compression @ 2 GHz



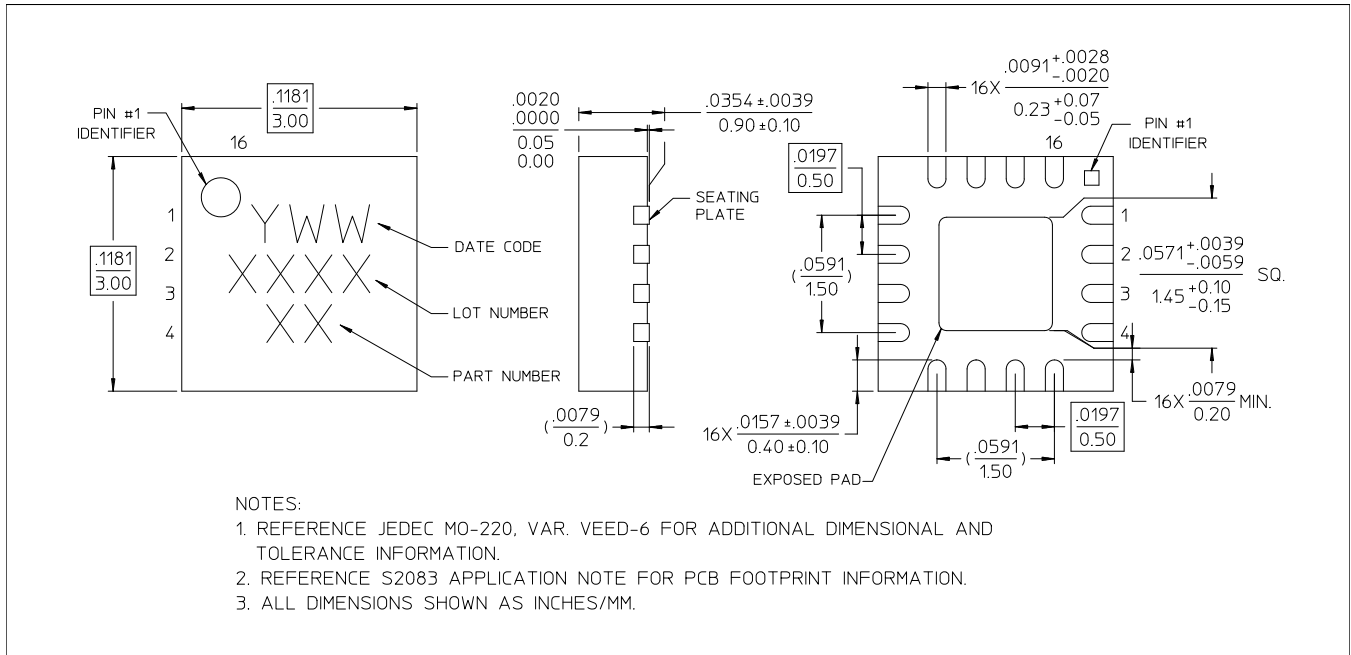
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Lead-Free 3 mm 16-Lead PQFN[†]



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

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