

### Features

- 75 Ohm
- Positive Voltage Control (0 / +5 V)
- Input Terminated
- High Isolation 70 dB at 1000 MHz
- 4 mm FQFP-N 20 Lead Package
- 0.5 micron GaAs PHEMT Process

### Description

M/A-COM's MASWSS0102 is a GaAs PHEMT MMIC single pole single throw (SPST) switch in a low cost 4 mm FQFP-N 20 lead package. The MASWSS0102 is ideally suited for applications where low control voltage, high isolation, small size and low cost are required. Typical applications are to replace mechanical relays in CATV systems. This part can be used in all 75 ohm systems operating up to 1.0 GHz.

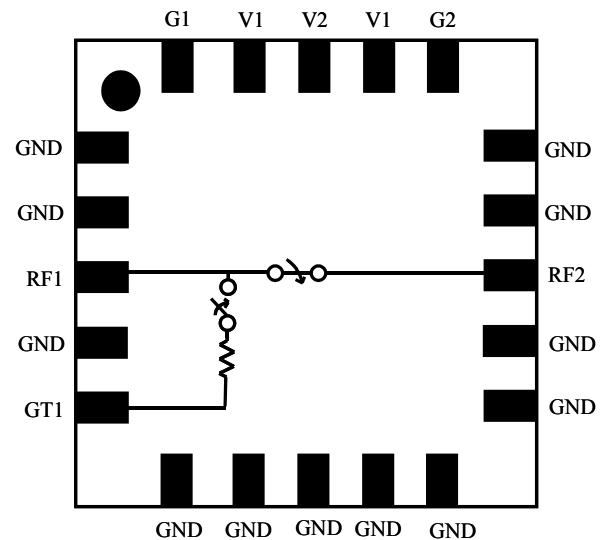
The MASWSS0102 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

### Ordering Information <sup>1</sup>

Part Number	Package
MASWSS0102	FQFP-N 20 Lead Plastic Package
MASWSS0102TR	7 inch, 1000 piece reel
MASWSS0102TR-3000	13 inch, 3000 piece reel
MASWSS0102SMB	Sample Test Board (Includes 5 Samples)

1. Reference Application Note M513 for reel size information.

### Functional Schematic



### Absolute Maximum Ratings <sup>2</sup>

Parameter	Absolute Maximum
Max Input Power (5 - 1000 MHz, 2.5V Control)	+32 dBm
Operating Voltage	+8.5 volts
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.

### Truth Table <sup>3,4</sup>

V1	V2	RF1 - RF2
0	1	On
1	0	Off

3. 0 = +2.9 to +5V, 1 = 0 ± 0.2V

4. External 0.01 uF DC blocking capacitors are required on all RF In/Out and RF Ground ports.

Pin Configuration <sup>5</sup>

PIN No.	PIN Name	Description
1	GND	Ground
2	GND	Ground
3	RF1	RF In/Out
4	GND	Ground
5	GT1	RF Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	GND	Ground
10	GND	Ground
11	GND	Ground
12	GND	Ground
13	RF2	RF In/Out
14	GND	Ground
15	GND	Ground
16	G2	RF Ground
17	V1	Control 1
18	V2	Control 2
19	V1	Control 1
20	G1	RF Ground

5. Center paddle should be connected to ground.

## 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. Use proper ESD control precautions when handling these devices.

Electrical Specifications:  $T_A = 25^\circ\text{C}$ ,  $Z_0 = 75 \Omega$ 

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	5 - 50 MHz	dB		0.7	
	50 - 1000 MHz	dB		0.9	
Isolation	5 - 50 MHz	dB		100	
	50 - 1000 MHz	dB		70	
Return Loss (On)	5 - 50 MHz	dB		30	
	50 - 1000 MHz	dB		16	
Return Loss (Off)	5 - 50 MHz	dB		20	
	50 - 1000 MHz	dB		16	
IP3	Two Tone -10 dBm, 6 MHz Spacing, > 50 MHz $V_c = 0V/5V$	dBm		55	
Trise, Tfall	10% to 90% RF, 90% to 10% RF	nS		20	
Ton, Toff	50% control to 90% RF, and 50% control to 10% RF	nS		30	
Transients	In Band	mV		112	
Gate Leakage	$ V_c  = 2.5V$	uA		12	

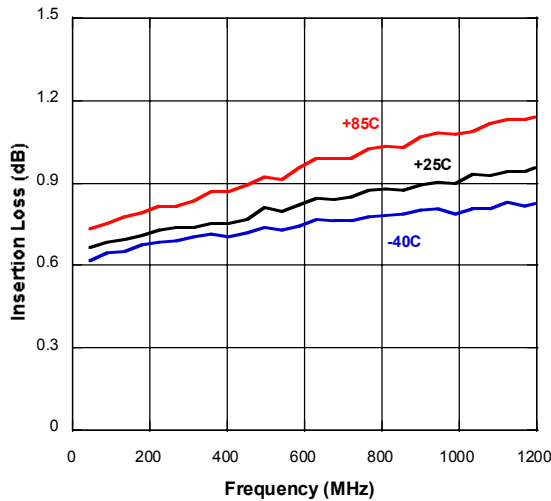
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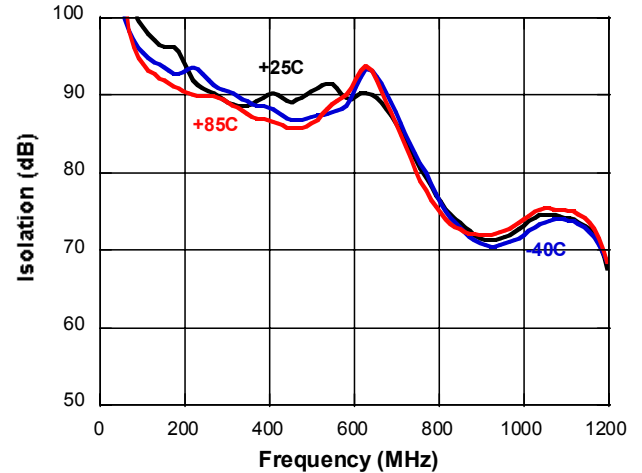
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### Typical Performance Curves

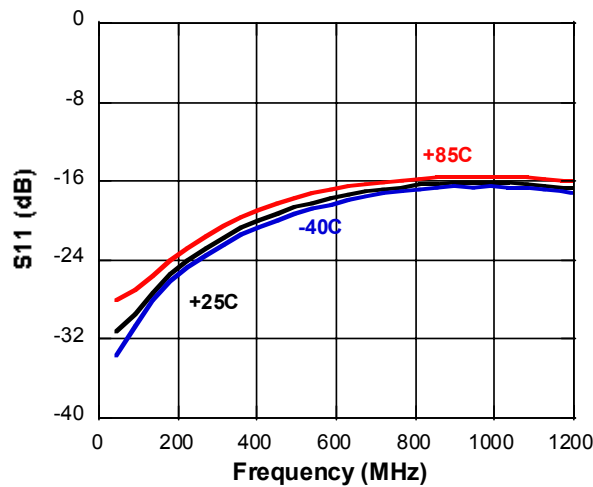
Insertion Loss



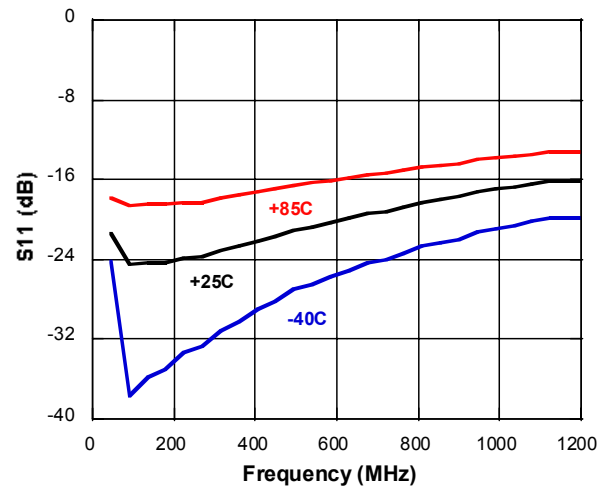
Isolation



On Return Loss



Off Return Loss

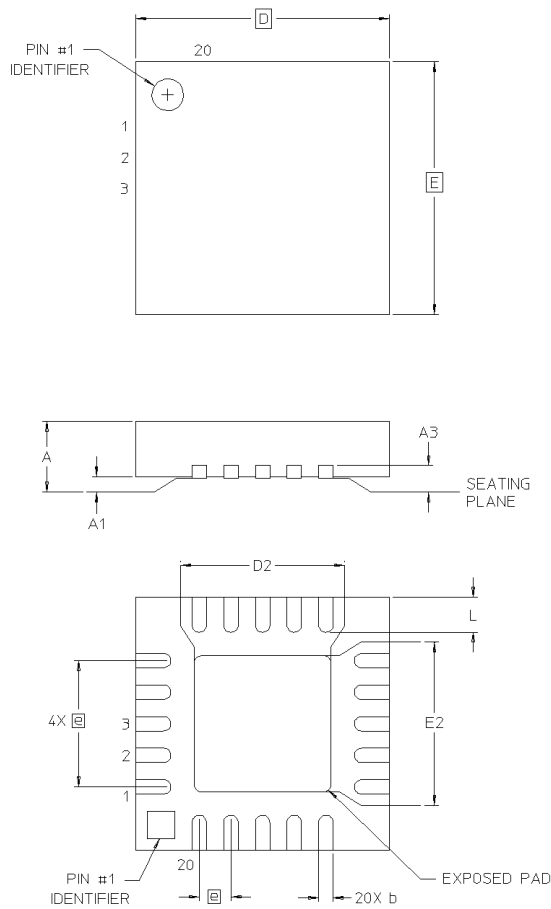


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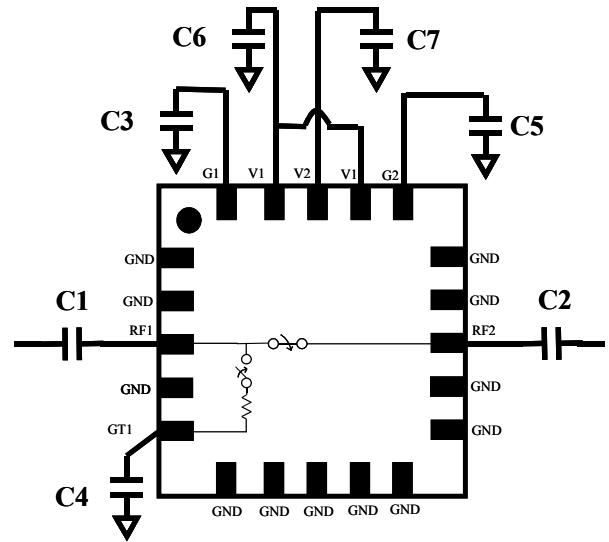
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4 mm FQFP-N 20 Lead Saw Singulated



DIMENSION SYMBOL	MEASUREMENT (mm)		
	MIN	NOM	MAX
A	0.80	0.90	1.00
A1	0	0.02	0.05
A3	0.25 REF		
b	0.18	0.23	0.30
D	4.00 BSC		
D2	0.75	1.70	2.25
e	0.50 BSC		
E	4.00 BSC		
E2	0.75	1.70	2.25
L	0.35	0.55	0.75

Application Schematic



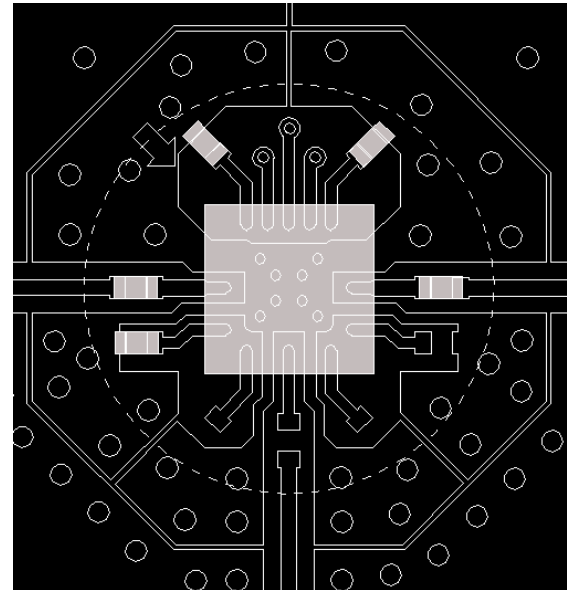
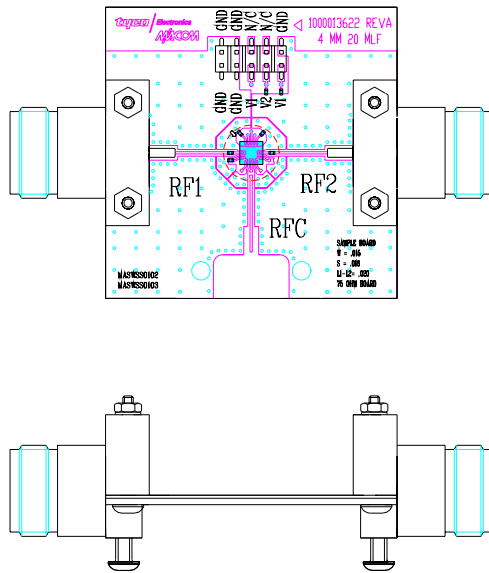
C1 – C5 = 0.01 uF, RF Bypass Capacitors  
 C6 – C7 = 0.01 uF, Logic Control Decoupling Capacitors

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Sample Board



Insertion Loss State:

Freq	+25C			-40C			+85C		
	S11(dB)	S21(dB)	S22(dB)	S11(dB)	S21(dB)	S22(dB)	S11(dB)	S21(dB)	S22(dB)
45	-31.283	-0.666	-31.096	-33.690	-0.616	-33.621	-28.033	-0.735	-28.038
90	-29.391	-0.684	-29.559	-30.707	-0.644	-30.951	-27.052	-0.755	-27.412
135	-27.286	-0.695	-27.694	-28.132	-0.653	-28.496	-25.540	-0.777	-26.147
180	-25.466	-0.711	-25.938	-26.179	-0.677	-26.697	-24.049	-0.790	-24.715
225	-24.028	-0.728	-24.602	-24.740	-0.683	-25.353	-22.761	-0.815	-23.402
270	-22.815	-0.738	-23.428	-23.537	-0.691	-24.188	-21.619	-0.818	-22.195
315	-21.686	-0.740	-22.307	-22.423	-0.702	-23.098	-20.551	-0.838	-21.091
360	-20.733	-0.754	-21.394	-21.460	-0.713	-22.167	-19.635	-0.871	-20.204
405	-19.943	-0.753	-20.622	-20.676	-0.705	-21.388	-18.924	-0.868	-19.448
495	-18.660	-0.810	-19.326	-19.342	-0.739	-20.037	-17.723	-0.921	-18.297
540	-18.152	-0.795	-18.806	-18.779	-0.730	-19.473	-17.259	-0.914	-17.830
585	-17.746	-0.821	-18.427	-18.334	-0.743	-19.019	-16.890	-0.956	-17.506
630	-17.348	-0.846	-18.003	-17.887	-0.769	-18.561	-16.563	-0.990	-17.147
675	-17.023	-0.840	-17.643	-17.526	-0.763	-18.139	-16.279	-0.990	-16.849
720	-16.771	-0.848	-17.443	-17.242	-0.763	-17.866	-16.061	-0.993	-16.705
765	-16.599	-0.874	-17.232	-17.037	-0.779	-17.668	-15.923	-1.023	-16.568
810	-16.387	-0.879	-17.047	-16.817	-0.783	-17.435	-15.767	-1.033	-16.416
855	-16.286	-0.876	-16.916	-16.706	-0.785	-17.307	-15.658	-1.030	-16.331
900	-16.154	-0.892	-16.817	-16.569	-0.802	-17.210	-15.553	-1.069	-16.269
990	-16.152	-0.900	-16.854	-16.557	-0.787	-17.218	-15.559	-1.076	-16.285
1035	-16.169	-0.933	-16.877	-16.609	-0.804	-17.257	-15.572	-1.087	-16.317
1080	-16.295	-0.925	-16.993	-16.729	-0.806	-17.393	-15.685	-1.116	-16.458
1125	-16.458	-0.940	-17.165	-16.912	-0.828	-17.569	-15.821	-1.133	-16.602
1170	-16.616	-0.941	-17.326	-17.085	-0.817	-17.724	-15.966	-1.131	-16.770
1200	-16.834	-0.959	-17.563	-17.317	-0.829	-17.967	-16.180	-1.145	-16.982

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Isolation State:

Freq	+25C			-40C			+85C		
	S11(dB)	S21(dB)	S22(dB)	S11(dB)	S21(dB)	S22(dB)	S11(dB)	S21(dB)	S22(dB)
45	-21.451	-101.859	-0.109	-24.164	-102.004	-0.122	-17.876	-105.151	-0.104
90	-24.416	-101.210	-0.141	-37.610	-95.572	-0.151	-18.569	-93.541	-0.138
135	-24.290	-93.360	-0.163	-35.762	-93.610	-0.172	-18.505	-91.513	-0.162
180	-24.323	-100.100	-0.163	-35.020	-90.697	-0.172	-18.478	-91.189	-0.171
225	-23.798	-88.970	-0.193	-33.274	-96.759	-0.200	-18.251	-88.938	-0.208
270	-23.736	-90.210	-0.210	-32.730	-89.723	-0.216	-18.221	-90.738	-0.227
315	-23.129	-87.977	-0.215	-31.180	-90.210	-0.223	-17.861	-88.980	-0.236
360	-22.696	-87.691	-0.246	-30.194	-88.777	-0.242	-17.570	-86.136	-0.274
405	-22.147	-93.357	-0.261	-29.041	-89.026	-0.259	-17.228	-87.537	-0.291
450	-21.719	-86.196	-0.282	-28.153	-84.886	-0.274	-16.952	-84.794	-0.313
495	-21.105	-90.365	-0.314	-27.022	-87.770	-0.308	-16.567	-84.869	-0.355
540	-20.726	-95.475	-0.328	-26.520	-87.295	-0.319	-16.279	-89.267	-0.371
585	-20.304	-85.779	-0.351	-25.708	-84.513	-0.336	-16.055	-87.403	-0.397
630	-19.866	-92.551	-0.390	-25.068	-100.557	-0.368	-15.768	-101.159	-0.431
675	-19.342	-89.633	-0.415	-24.268	-91.456	-0.394	-15.428	-88.765	-0.461
720	-19.156	-84.750	-0.431	-24.067	-83.970	-0.406	-15.326	-83.477	-0.488
765	-18.706	-79.289	-0.471	-23.342	-80.741	-0.442	-15.051	-77.039	-0.524
810	-18.228	-74.363	-0.487	-22.685	-73.848	-0.456	-14.723	-73.079	-0.547
855	-17.936	-73.453	-0.522	-22.293	-72.746	-0.484	-14.526	-72.057	-0.583
900	-17.699	-70.377	-0.563	-22.013	-69.378	-0.523	-14.352	-71.657	-0.632
945	-17.149	-70.706	-0.587	-21.231	-70.119	-0.556	-13.979	-71.628	-0.663
990	-16.892	-72.148	-0.565	-20.884	-70.863	-0.534	-13.771	-73.305	-0.637
1035	-16.744	-76.185	-0.624	-20.678	-74.109	-0.582	-13.661	-76.465	-0.693
1080	-16.415	-74.735	-0.655	-20.219	-74.578	-0.611	-13.412	-75.304	-0.727
1125	-16.169	-74.252	-0.646	-19.913	-74.338	-0.598	-13.211	-75.860	-0.731
1170	-16.050	-72.245	-0.683	-19.782	-71.390	-0.630	-13.115	-72.601	-0.765
1200	-16.010	-66.832	-0.708	-19.750	-67.853	-0.642	-13.063	-67.603	-0.779

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