

SPDT High Isolation CATV Switch 5 – 1000 MHz

Rev. V2

Features

- 75 Ω Impedance
- Input Terminated
- Positive Voltage Control
- High Isolation: 65 dB at 870 MHz
- 0.5 micron GaAs PHEMT Process
- Lead-Free 4 mm 20-Lead PQFN Package
- Halogen-Free “Green” Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

Description

M/A-COM’s MASW-008153 is a GaAs PHEMT MMIC single pole double throw (SPDT) switch in a lead-free 4 mm 20-lead PQFN package. The MASW-008153 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 Ω systems operating up to 1 GHz.

The MASW-008153 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

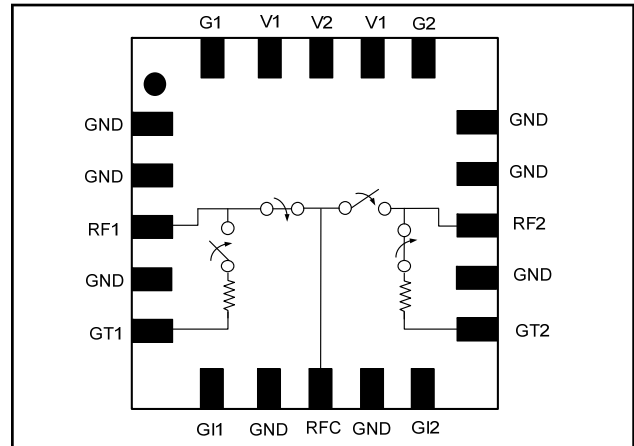
Ordering Information ^{1,2}

Part Number	Package
MASW-008153-TR3000	13 inch, 3000 piece reel
MASW-008153-001SMB	Sample Board 50 - 1000 MHz tuning

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

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

Functional Schematic



Pin Configuration ³

Pin No.	Pin Name	Description
1	GND	Ground
2	GND	Ground
3	RF1	RF Port 1
4	GND	Ground
5	GT1	RF Ground
6	G1	RF Ground
7	GND	Ground
8	RFC	RF Common Port
9	GND	Ground
10	G12	RF Ground
11	GT2	RF Ground
12	GND	Ground
13	RF2	RF Port 2
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

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

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Electrical Specifications: $T_A = 25^\circ\text{C}$, $Z_0 = 75 \Omega^4$, $V_C = 0 \text{ V} / 2.9 \text{ V}$, $P_{IN} = 10 \text{ dBm}$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	5 - 50 MHz	dB	—	0.9	—
	50 - 1000 MHz	dB	—	1.0	1.2
Isolation	5 - 50 MHz	dB	—	80	—
	50 - 1000 MHz	dB	60	63	—
Return Loss (On)	5 - 50 MHz	dB	—	28	—
	50 - 1000 MHz	dB	—	14	—
Return Loss (Off)	5 - 50 MHz	dB	—	26	—
	50 - 1000 MHz	dB	—	20	—
IP3	Two Tone, +10 dBm/tone, 6 MHz spacing, > 50 MHz $V_C = 0 \text{ V} / 2.9 \text{ V}$ $V_C = 0 \text{ V} / 5.0 \text{ V}$	dBm	—	47	—
		dBm	—	52	—
Trise, Tfall	10% to 90% RF, 90% to 10% RF	ns	—	8	—
Ton, Toff	50% control to 90% RF, 50% control to 10% RF	ns	—	18	—
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. See Application Schematic.

Absolute Maximum Ratings^{5,6}

Parameter	Absolute Maximum
Input Power (5 - 1000 MHz, 2.9 V Control)	+32 dBm
Operating Voltage	+8.5 volts
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

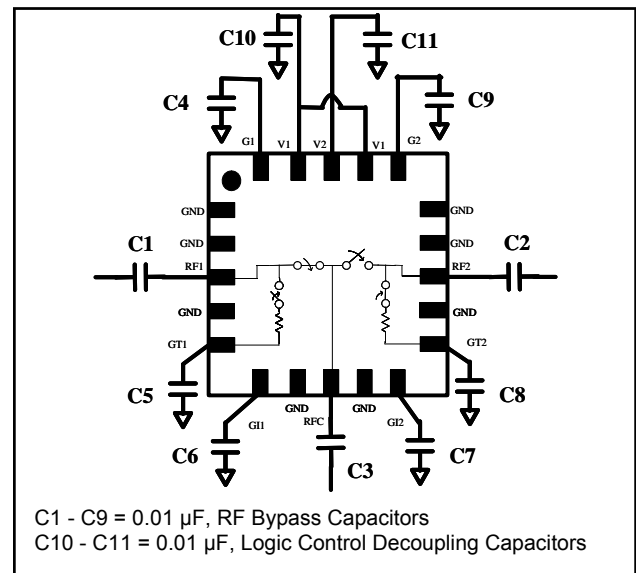
- Exceeding any one or combination of these limits may cause permanent damage.
- M/A-COM does not recommend sustained operation near these survivability limits.

Truth Table⁷

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

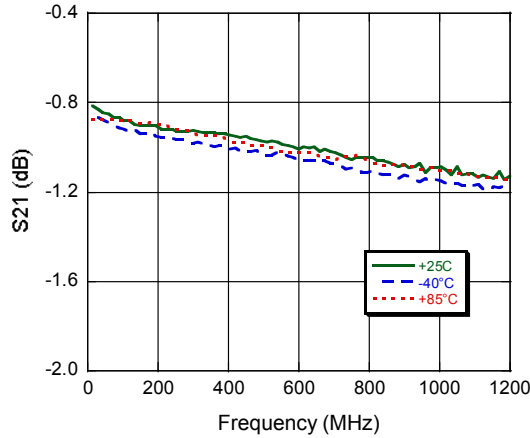
7. 1 = +2.9 to +5 V, 0 = 0 \pm 0.2 V.

Application Schematic

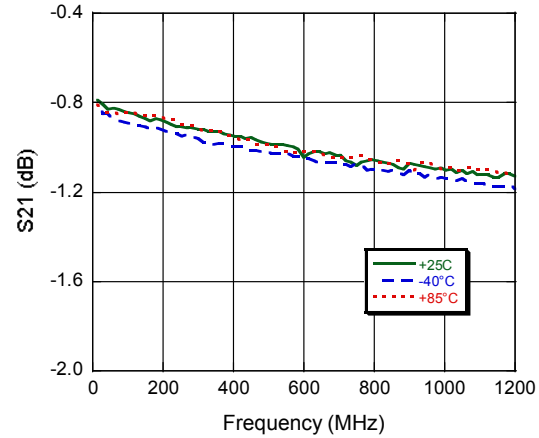


Typical Performance Curves

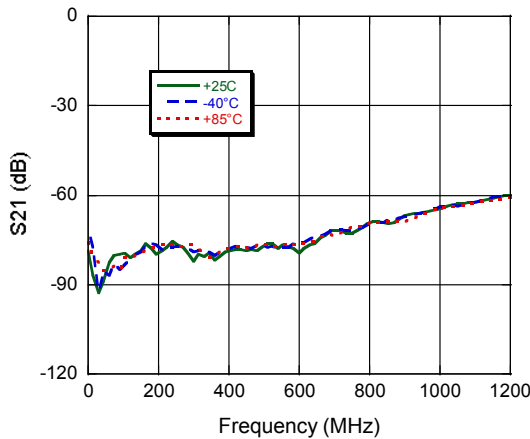
Insertion Loss RFC - RF1



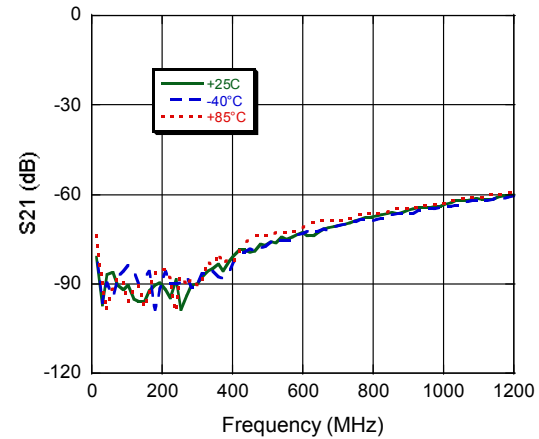
Insertion Loss RFC - RF2



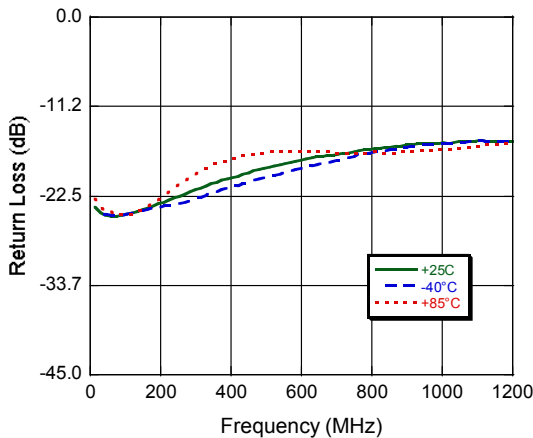
Isolation RFC - RF1



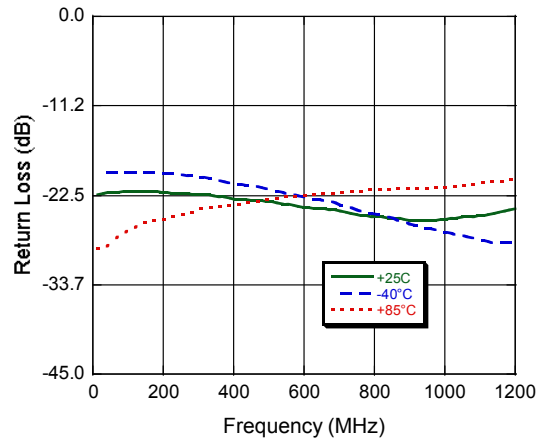
Isolation RFC - RF2



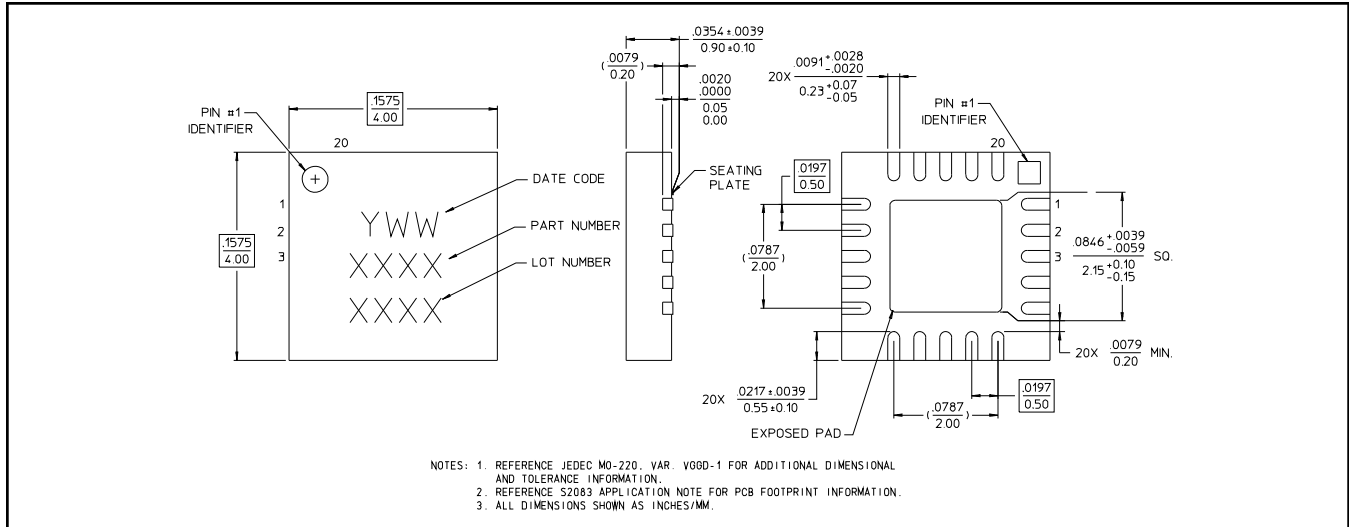
Return Loss On-state match



Return Loss Off-state match



Lead-Free 4 mm 20-Lead PQFN†



† Reference Application Note M538 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.

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.