

SPDT High Isolation CATV and Satellite Communications Switch, 5 – 3000 MHz

Rev. V1

Features

- 75 Ω Impedance
- Input Terminated
- Positive Voltage Control
- High Isolation: 50 dB at 2500 MHz
- 0.5 micron GaAs pHEMT Process
- Achieve 80 dB isolation at 216 MHz
- Lead-Free 3 mm 16-Lead PQFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free “Green” Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

Description

The MASW-008801 is a GaAs pHEMT MMIC single pole double throw (SPDT) switch in a lead-free 3 mm 16-lead PQFN package. The MASW-008801 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 and satellite systems. This part can be used in all 75 Ω systems operating up to 3 GHz.

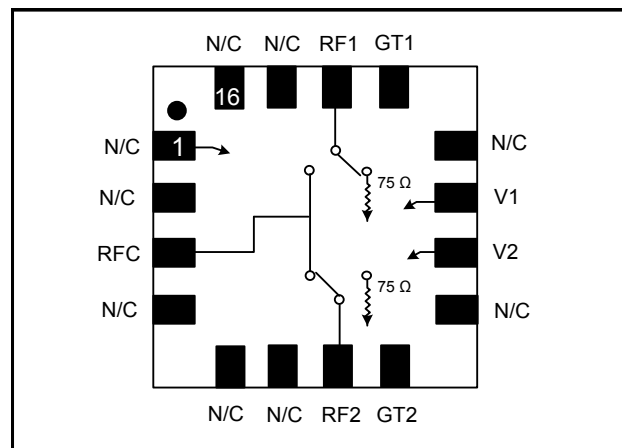
The MASW-008801 is fabricated using a 0.5 micron gate length GaAs pHEMT process. The process features full passivation for performance and reliability.

Ordering Information ^{1,2}

Part Number	Package
MASW-008801-TR3000	3000 piece reel
MASW-008801-001SMB	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 No.	Pin Name	Description
1	N/C	No Connection
2	N/C	No Connection
3	RFC	RF Common Port
4	N/C	No Connection
5	N/C	No Connection
6	N/C	No Connection
7	RF2	RF Port 2
8	GT2	RF Ground
9	N/C	No Connection
10	V2	Vcontrol 2
11	V1	Vcontrol 1
12	N/C	No Connection
13	GT1	RF Ground
14	RF1	RF Port 1
15	N/C	No Connection
16	N/C	No Connection

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

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

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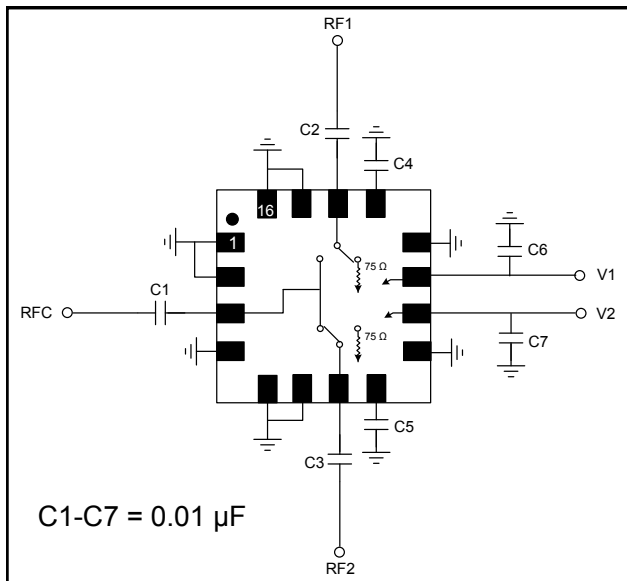
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Electrical Specifications: $T_A = 25^\circ\text{C}$, $Z_0 = 75 \Omega$, $V_C = 0 \text{ V} / 2.9 \text{ V}$, $P_{IN} = 5 \text{ dBm}$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	216 MHz	dB	—	0.6	—
	550 MHz	dB	—	0.65	—
	810 MHz	dB	—	0.7	—
	1000 MHz	dB	—	0.75	—
	2200 MHz	dB	—	0.85	—
	2500 MHz	dB	—	0.9	1.2
	3000 MHz	dB	—	1	—
Isolation RFC-RF1,RF2	216 MHz	dB	65	69	—
	550 MHz	dB	—	61	—
	810 MHz	dB	—	58	—
	1000 MHz	dB	52	56	—
	2200 MHz	dB	—	52	—
	2500 MHz	dB	50	54	—
	3000 MHz	dB	—	56	—
Isolation RF1-RF2	216 MHz	dB	80	85	—
	550 MHz	dB	—	83	—
	810 MHz	dB	—	74	—
	1000 MHz	dB	70	72	—
Return Loss (on-state)	5 - 1000 MHz	dB	—	14	—
	5 - 2500 MHz	dB	—	12	—
Return Loss (off-state)	5 - 1000 MHz	dB	—	18	—
	5 - 2500 MHz	dB	—	18	—
Input P1dB	1000 MHz	dBm	—	24	—
IIP3	2 tone, 5 dBm/tone, 6MHz spacing, f1 & f2 = 988 & 994 MHz	dBm	—	47	—
IIP2	2 tone, 5 dBm/tone, 6MHz spacing, f1 & f2 = 988 & 994 MHz	dBm	—	90	—
CSO	132 channels, 18 dBmV/channel at the input	dBm	—	80	—
CTB	132 channels, 18 dBmV/channel at the input	dBm	—	80	—
Trise, Tfall	10% to 90% RF, 90% to 10% RF	ns	—	16	—
Ton, Toff	50% control to 90% RF, 50% control to 10% RF	ns	—	8	—
Transients	In Band	mV	—	70	—
Control Current	$ V_{cl} = 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.

Application Schematic



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 \pm 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 devices.

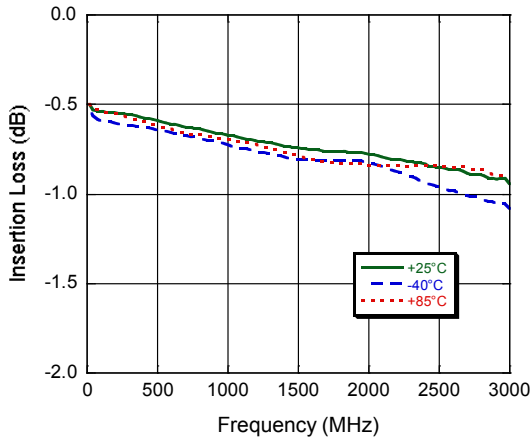
Absolute Maximum Ratings ^{5,6}

Parameter	Absolute Maximum
Input Power (5 - 3000 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

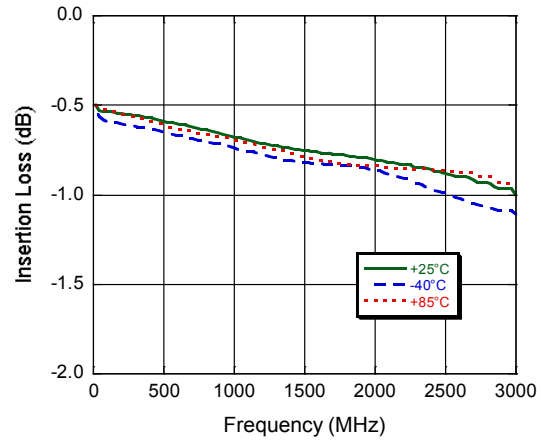
- Exceeding any one or combination of these limits may cause permanent damage.
- Tyco Electronics does not recommend sustained operation near these survivability limits.

Typical Performance Curves

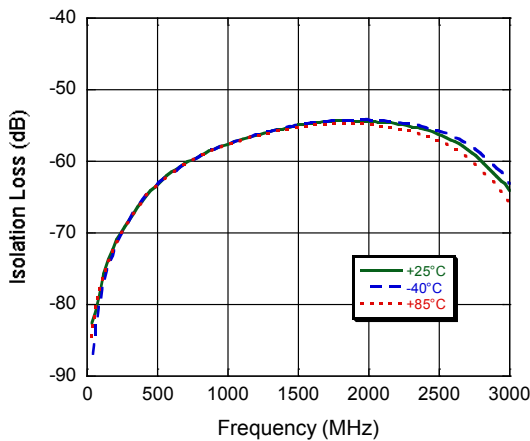
Insertion Loss RFC - RF1



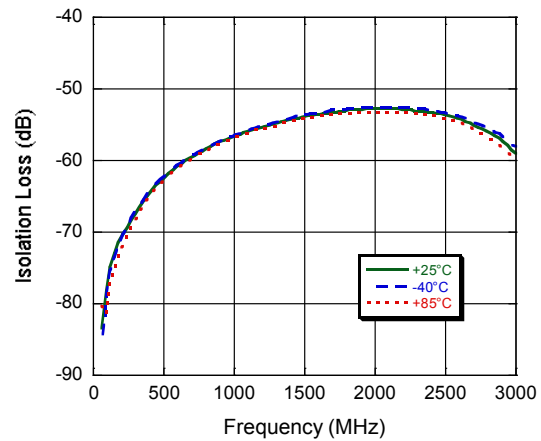
Insertion Loss RFC - RF2



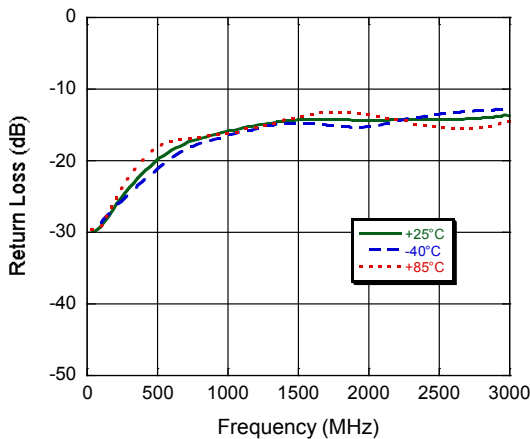
Isolation RFC - RF1



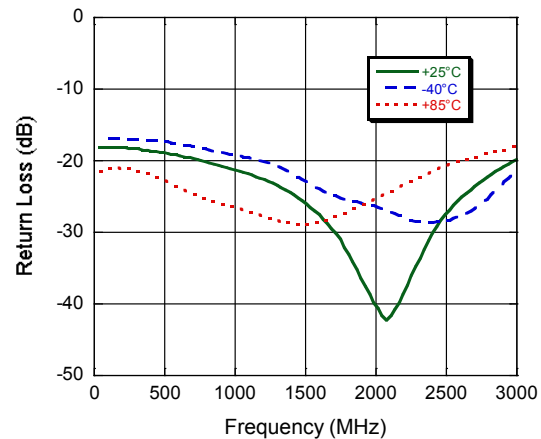
Isolation RFC - RF2



Return Loss On-state match



Return Loss Off-state match

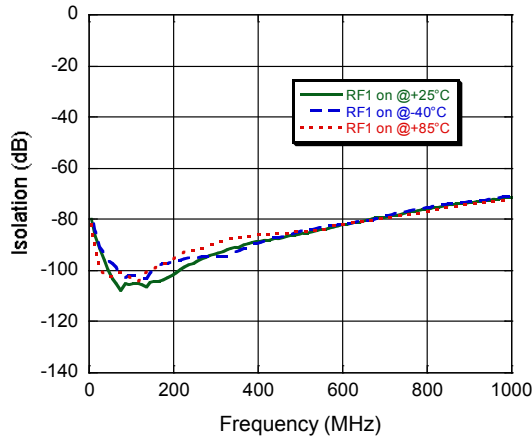


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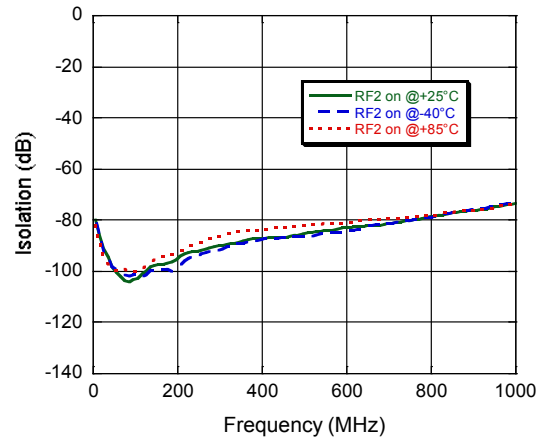
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Typical Performance Curves

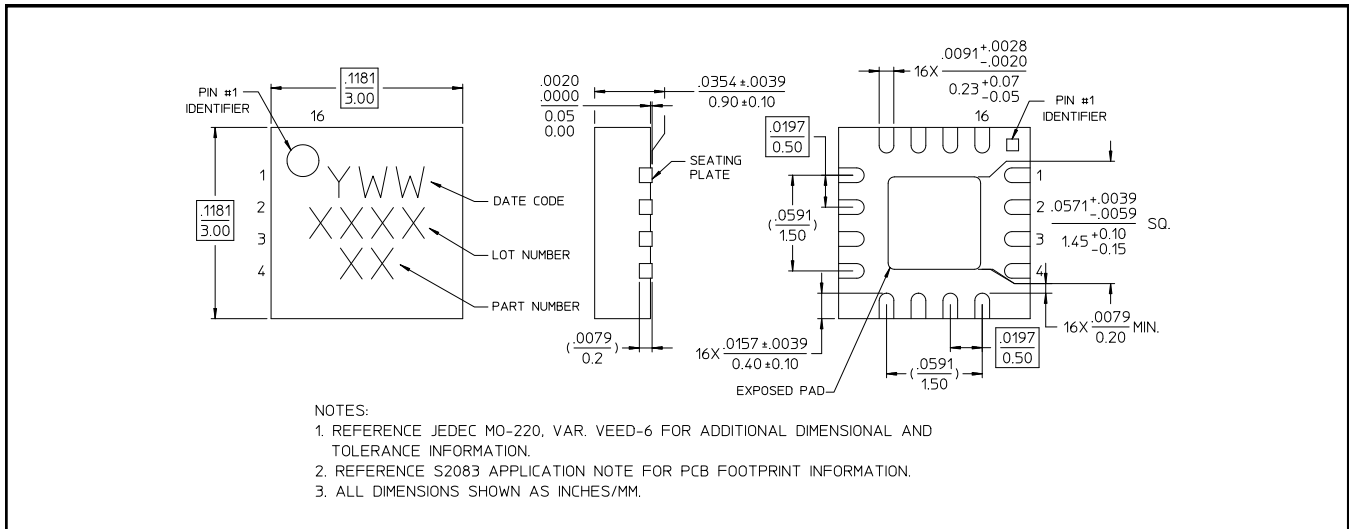
Isolation RF1 to RF2 (RF1 on)



Isolation RF1 to RF2 (RF2 on)



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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