

GaAs SPDT Switch DC - 20 GHz

Rev. V3

Features

- Very Broadband Performance
- Low Insertion Loss: 1.9 dB Typical @ 20 GHz
- High Isolation: 40 dB Typical @ 20 GHz
- Fast Switching Speed
- Reflective Configuration
- Ultra Low DC Power Consumption
- Lead-Free 4 mm 24-Lead PQFN Package
- Halogen-Free "Green" Mold Compound
- RoHS Compliant* and 260°C Reflow Compatible

Description

The MASW-008322 is a versatile, broadband, high isolation SPDT switch offered in a lead-free 4 mm 24-lead PQFN surface mount plastic package. The design incorporates both series and shunt circuit elements with the locations optimized to achieve outstanding broadband performance to 20 GHz. The combination of broadband performance along with very fast switching and excellent settling time make this device ideal for many applications, including Test & Measurement, EW and broadband communication systems.

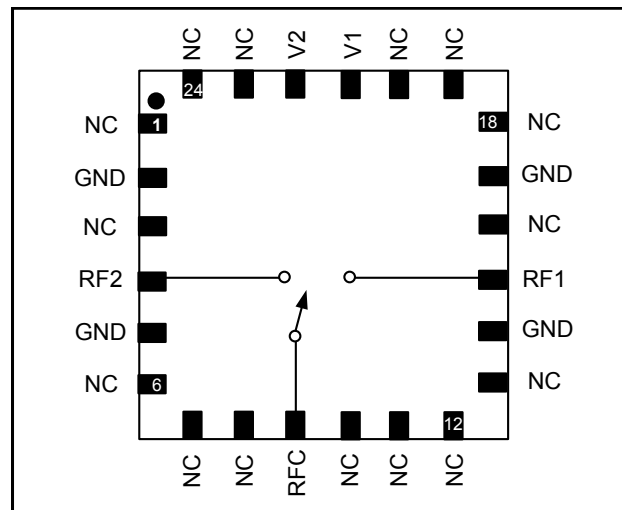
The MASW-008322 is fabricated using M/A-COM Technology's mature 0.5um Low Gate-Lag pHEMT process. This robust process features full surface passivation for a high performance and high reliability.

Ordering Information^{1,2}

Part Number	Package
MASW-008322-TR0500	500 piece reel
MASW-008322-TR1000	1000 piece reel
MASW-008322-001SMB	Sample Board

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

Functional Schematic



Pin Configuration³

Pin No.	Function	Pin No.	Function
1	NC	14	GND
2	GND	15	RF1
3	NC	16	NC
4	RF2	17	GND
5	GND	18	NC
6	NC	19	NC
7	NC	20	NC
8	NC	21	V1
9	RFC	22	V2
10	NC	23	NC
11	NC	24	NC
12	NC	25	Paddle ⁴
13	NC		

3. M/A-COM Technology recommends that all unused (N/C) pins be connected to ground. All data on this datasheet was taken with N/C pins connected to ground.
4. 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.

GaAs SPDT Switch DC - 20 GHz

Rev. V3

Electrical Specifications⁵: $T_A = +25^\circ\text{C}$, $Z_0 = 50\Omega$, $V_{1,2} = -5/0\text{V}$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	1 GHz	dB	—	0.4	0.55
	10 GHz		—	1.0	—
	18 GHz		—	1.5	—
	20 GHz		—	1.9	2.5
Isolation	1 GHz	dB	50	52	—
	10 GHz		—	48	—
	18 GHz		—	43	—
	20 GHz		39	40	—
VSWR	1 - 20 GHz	Ratio	—	2.0:1	—
Trise, Tfall	10% to 90% RF and 90% to 10% RF	ns	—	9	—
Ton, Toff	50% control to 90% RF, and 50% control to 10% RF	ns	—	12	25 ⁷
Input P1dB	0.5 - 20 GHz, 0 to -5 V	dBm	—	30	—
IIP3	Two Tone, +5 dBm/Tone, 5 MHz Spacing, >50 MHz 0.5 - 20 GHz	dBm	—	48	—
Settling Time	50% Vctl to 0.1 dB of final value	μs	—	1	—
Control Current (Complementary Logic)	V_{IN} Low, -5 V	μA	—	3	50
	V_{IN} High, 0 V		—	—	20

5. All specifications apply with 50 Ω impedance connected to all RF ports, 0 and -5 VDC control voltages.

6. Loss changes 0.0025 dB/ $^\circ\text{C}$ (from -55 $^\circ\text{C}$ to +85 $^\circ\text{C}$).

7. Max switching speed guaranteed by design.

Absolute Maximum Ratings⁸

Parameter	Absolute Maximum
Control Voltage	-8.5 VDC
Input RF Power	+33 dBm
Operating Temperature	-40 to +85 $^\circ\text{C}$
Storage Temperature	-65 $^\circ\text{C}$ to +150 $^\circ\text{C}$

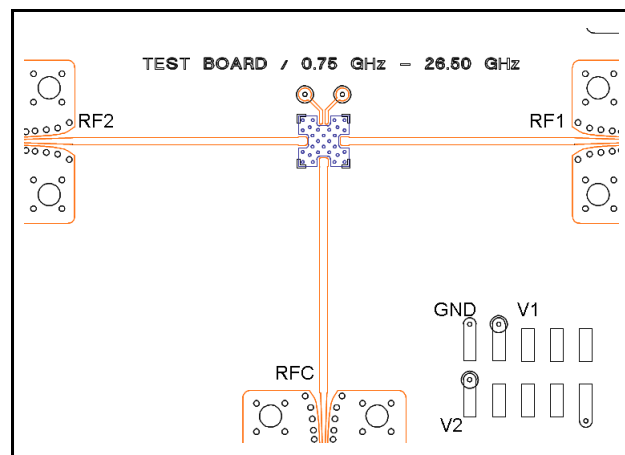
8. Exceeding any one or combination of these limits may cause permanent damage to this device.

Truth Table⁹

Control Inputs		Condition of Switch	
V1	V2	RF1	RF2
High	Low	Off	On
Low	High	On	Off

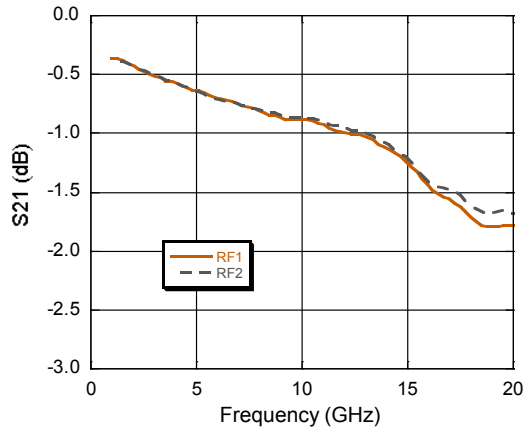
9. $V_{low} = -5\text{ V}$, $V_{high} = 0\text{ V}$

Sample Board

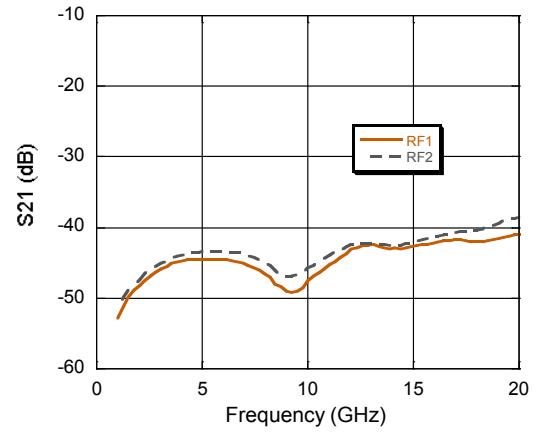


Typical Performance Curves

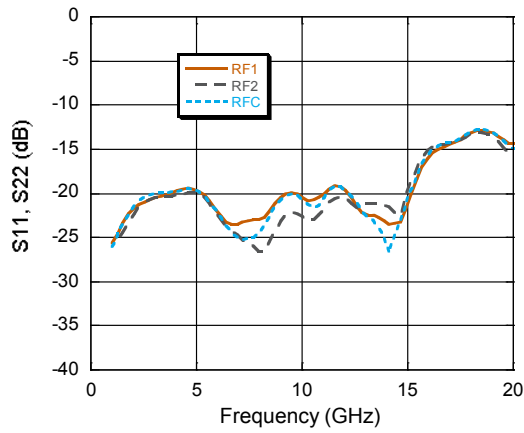
Insertion Loss



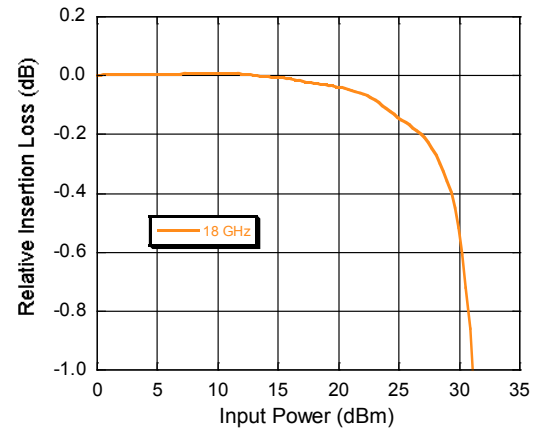
Isolation



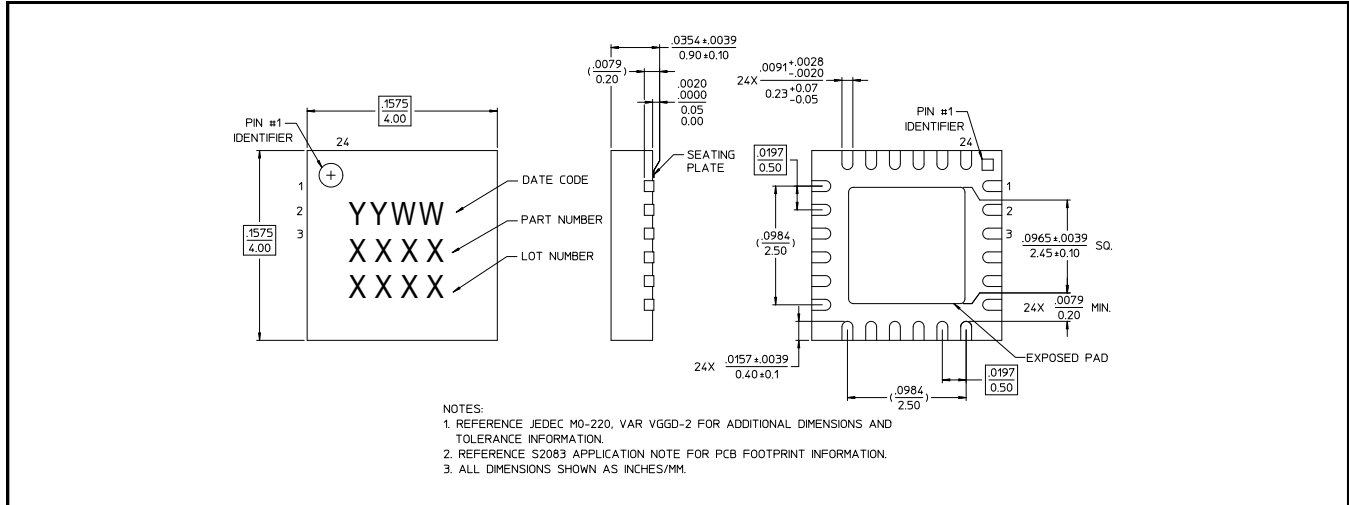
Return Loss



P1dB



Lead Free 4 mm 24-Lead PQFN †



† Reference Application Note S2083 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.

M/A-COM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with M/A-COM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.