GaAs SPDT Switch DC - 20 GHz



MASW-008322

Rev. V4

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
- RoHS* Compliant

Applications

- Multi Market
- Test & Measurement
- EW
- Broadband Communications

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.

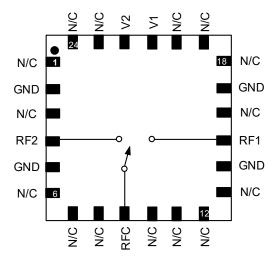
The MASW-008322 is fabricated using MACOM's mature 0.5 µm Low Gate-Lag pHEMT process. This robust process features full surface passivation for high performance & high reliability.

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 #	Function		
1, 3, 6 - 8, 10 - 13, 16, 18 - 20, 23, 24	N/C		
2, 5, 14, 17	GND		
4	RF2		
9	RFC		
15	RF1		
21	V1		
22	V2		
25	Paddle ⁴		

- MACOM 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.
- The exposed pad centered on the package bottom must be connected to RF, DC and thermal ground.

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



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Electrical Specifications⁵: $T_A = +25^{\circ}C^6$, $Z_0 = 50 \Omega$, $V_{1,2} = -5/0 V$

Parameter	Test Conditions		Min.	Тур.	Max.
Insertion Loss	1 GHz 10 GHz 18 GHz 20 GHz	dB	_	0.4 1.0 1.5 1.9	0.55 — — 2.5
Isolation	1 GHz 10 GHz 18 GHz 20 GHz	dB	50 — — 39	52 48 43 40	_
VSWR	1 - 20 GHz	Ratio		2.0:1	_
T _{RISE} , T _{FALL}	10% to 90% RF and 90% to 10% RF	ns		9	_
T _{ON} , T _{OFF}	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		_	48	_
Settling Time	50% Vctl to 0.1 dB of final value	μs	_	1	_
Control Current (Complementary Logic)	V _{IN} Low, -5 V V _{IN} High, 0 V	μΑ	_	3	50 20

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

Absolute Maximum Ratings⁸

Parameter	Absolute Maximum		
Control Voltage	-8.5 VDC		
Input RF Power	+33 dBm		
Operating Temperature	-40 to +85°C		
Storage Temperature	-65°C to +150°C		

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

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

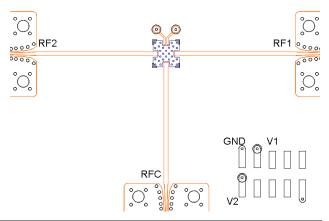
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Truth Table 9

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

^{9.} Vlow = -5 V, Vhigh = 0 V

Sample Test Board 0.75 - 26.50 GHz



^{6.} Loss changes 0.0025 dB/°C (from -55°C to +85°C).

^{7.} Max switching speed guaranteed by design.

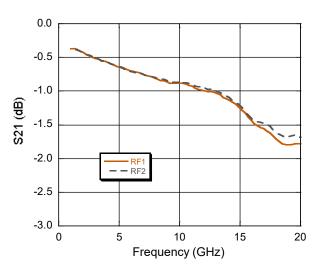


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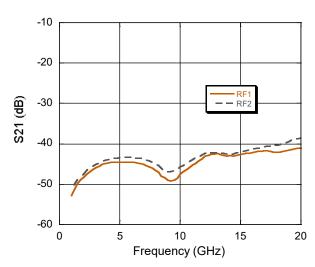
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Typical Performance Curves

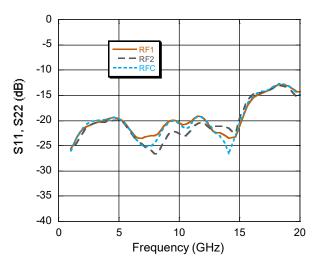
Insertion Loss



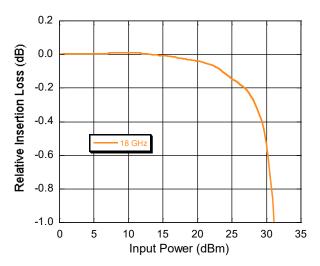
Isolation



Return Loss



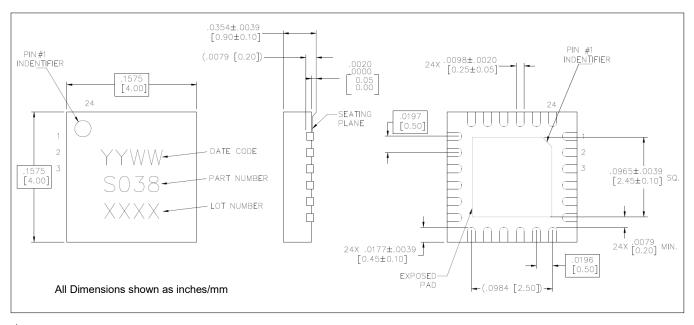
P1dB





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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.