5 W Ka-band SPDT, Reflective
27 - 32 GHz

MASW-011275
Rev. V1

Features

- Insertion Loss: 0.6 dB
- Isolation: 45 dB
- Maximum Input Power: 5 W
- P0.1dB: 37 dBm
- P1dB: >38 dBm
- Return Losses: 18 dB
- All RF Ports are Internal DC Grounded
- Compatible with 1.8, 2.5, and 3.3 V CMOS Logic
- Internal Negative Voltage Generator
- 3 mm, 20 Lead Laminate Package
- RoHS* Compliant

Applications

- Satellite Communications
- Defense, Radar

Description

The MASW-011275 is a high power single pole double throw (SPDT) Ka-band switch with 0.6 dB of insertion loss. The power handling capability is >37 dBm. The input and output return losses in the thru path are typically greater than 18 dB over most of the specified frequency band. The logic levels may be standard 1.8, 2.5, or 3.3 V CMOS. The required bias supply is 3.3 V.

This switch designed for high power Ka-band satellite communications between 27 and 32 GHz. The 3 mm, 20 lead laminate package is lead free and RoHS compliant.

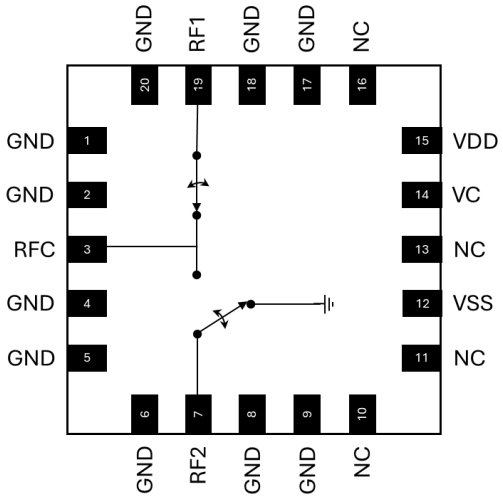
The MASW-011275 includes a negative voltage generator. If VSS (pin 12) is connected to ground, the negative voltage generator will be used to internally supply -3.3 V. If -3.3 V is applied to the VSS pin, the negative voltage generator will be disabled.

Ordering Information[1,2]

Part Number	Package
MASW-011275-TR0500	500 piece reel
MASW-011275-SMB	Sample Board

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

Functional Schematic



Pin Function[3]

Pin #	Pin Name	Description
10,11,13,16	NC	No Connection
1,2,4,5,6,8, 9,17,18,20	GND	Ground
3	RFC	Common RF Input/Output
7	RF2	RF Input/Output 2
12	VSS	-3.3 V or Ground
14	VC	Control Voltage
15	VDD	+3.3 V
19	RF1	RF Input/Output 1
21	Pad	Ground Pad[4]

3. MACOM recommends connecting unused package pins to ground.
4. 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.

Pin Description

Pin #	Name	description
1,2,4,5,6,8, 9,17,18,20	GND	Ground. The GND pins must be connected to the RF and DC ground of the PCB.
3	RFC	RF common port. The RFC port is DC-coupled to 0 V and AC matched to 50 Ω. No DC blocking.
7	RF2	RF port. The RFC port is DC-coupled to 0 V and AC matched to 50 Ω. No DC blocking.
10,11,13,16	NC	No connection. These pins should be left open.
12	VSS	Negative supply input
14	VC	Control voltage input
15	VDD	Positive supply input
19	RF1	RF port. The RFC port is DC-coupled to 0 V and AC matched to 50 Ω. No DC blocking.
21	Pad	Exposed Pad. The exposed pad must be connected to the RF and DC ground of the PCB

Electrical Specifications: V_{DD} = +3.3 V, V_{SS} = -3.3 V[5], T_B = 25°C, Z_0 = 50 Ω

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	27 - 32 GHz	dB	—	0.6	1.7
Isolation	27 - 32 GHz	dB	40	46	—
Input P0.1 dB	27 - 32 GHz	dBm	—	> 38	—
Input P1dB	27 - 32 GHz	dBm	—	> 38	—
Input IP3	27 - 32 GHz +12dBm Pin per tone, 1MHz spacing	dBm	—	60	—
Common Port Return Loss	27 - 32 GHz	dB	—	18	—
RF1/RF2 Return Loss	ON State, 27 - 32 GHz	dB	—	18	—
T_{RISE}, T_{FALL}	10% to 90% RF and 90% to 10% RF	ns	—	40	—
T_{ON}, T_{OFF}	50% control to 90% RF and 50% control to 10% RF	ns	—	200	—
Logic Voltage, Input High (V_{IH})	—	V	1.17	—	3.6
Logic Pin Current (VC)	Pin pulled down to GND with 100 kΩ resistor	µA	—	-33	—
Logic Voltage, Input Low (V_{IL})	—	V	0.0	—	0.8
Voltage Supply, VDD	—	V	3.1	3.3	3.5
Voltage Supply, VSS[6]	When applied	V	-3.5	-3.3	-3.1
Supply Current, VDD	No VSS applied	mA	—	0.2	—
Supply Current, VSS	When applied	µA	—	3	—
Spurious	1 to 10 MHz, when VSS grounded	dBm	—	—	-90
Switching Frequency[7]	—	kHz	—	—	100

5. Apply VDD and VSS before RF signal.
6. If a negative supply is not used, VSS should be connected to ground in order to activate the internal negative voltage generator.
7. Switching frequency is the inverse of the time interval between switching transitions.

Recommended Operating Conditions

Parameter	Symbol	Unit	Min.	Typ.	Max.
Input Power	P_{IN}	dBm	—	—	37 dBm
Positive DC Supply VDD	VDD	V	-0.3	—	3.45
Negative DC Supply VSS	VSS	V	-3.45	—	0.3
Junction Temperature	T_J	°C	—	—	+125
Operating Temperature[8]	T_C	°C	-40	—	+85
Storage Temperature	-	°C	-65	—	+125

8. Exposed paddle temperature.

Absolute Maximum Ratings[9,10]

Parameter	Symbol	Unit	Min.	Max.
Input Power[10]	P_{IN}	dBm	—	38
Positive DC Supply VDD	VDD	V	-0.3	+3.6
Negative DC Supply VSS	VSS	V	-3.6	+0.3
Operating Temperature[10]	T_C	°C	—	+85
Storage Temperature	-	°C	-65	+125

9. Exceeding any one or combination of these limits may cause permanent damage to this device.
10. MACOM does not recommend sustained operation near these survivability limits.

Truth Table

Control Input	Condition of Switch	
VC	RF1	RF2
V_{IH}	On	Off
V_{IL}	Off	On

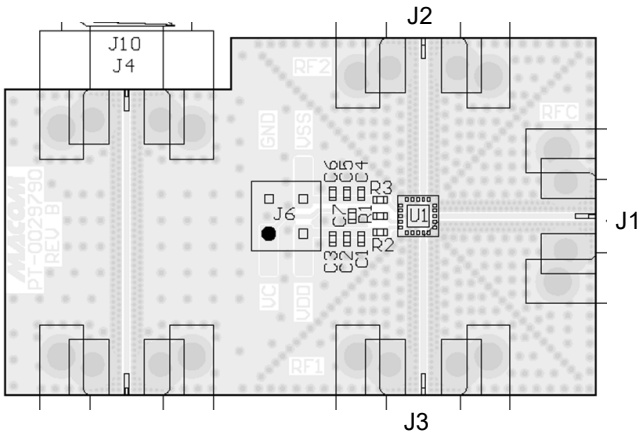
Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

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

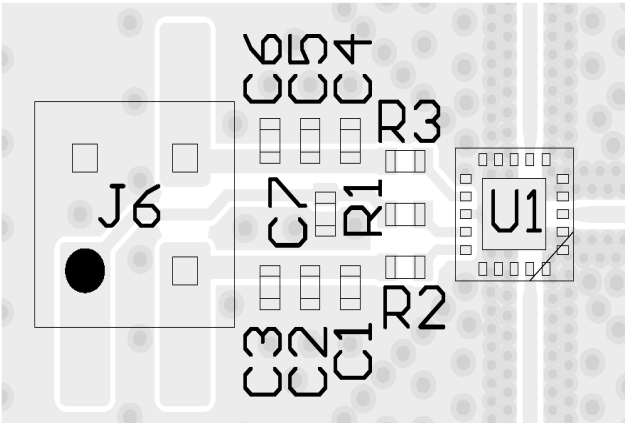
PCB Layout



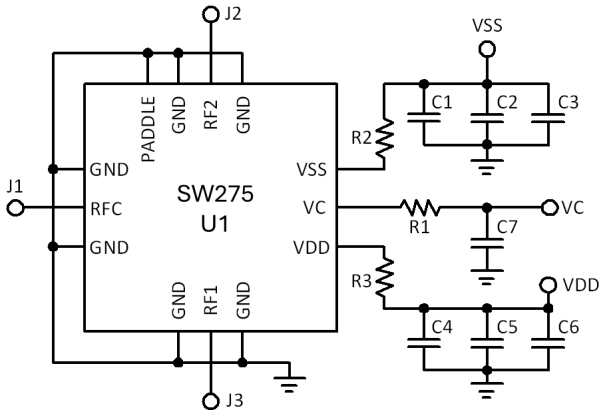
Parts List

Part	Value	Case Style
C1, C4	Cap., 10 pF, 50 V	0402
C2,C5	Cap., 1000 pF, 25 V	0402
C3, C6	Cap., 1 µF, 10 V	0402
C7	Not Populated	0402
R1 - R3	Res., 0 Ω	0402
U1	MASW-011275	3 mm, 20 Lead
J1 - J3	End Launch 2.4mm Female	Southwest 1492-04A-6
J6	DC Connector	Tyco Electronics 5-146130-1

PCB Layout detail near DUT

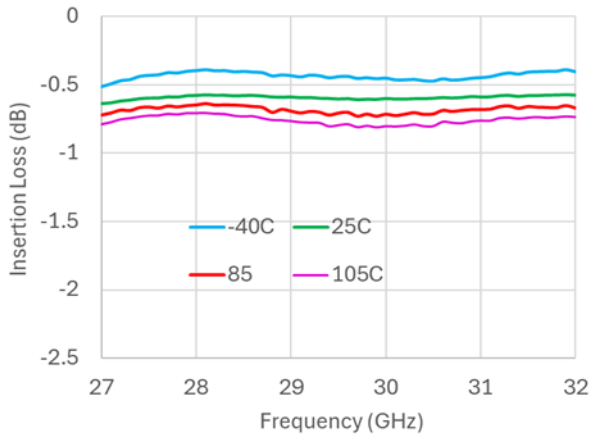


Application Schematic

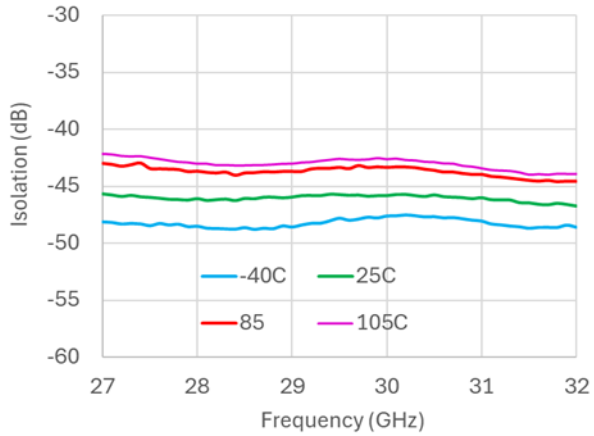


Typical Performance Curves

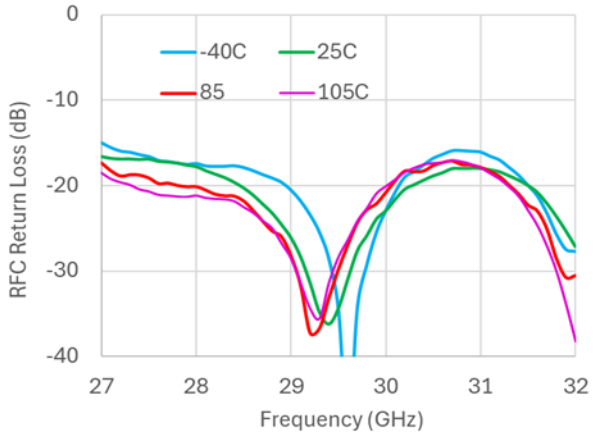
Insertion Loss



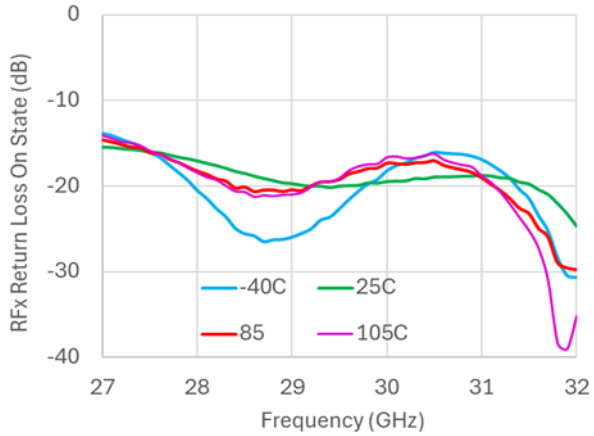
RFC to RF1/RF2 Isolation



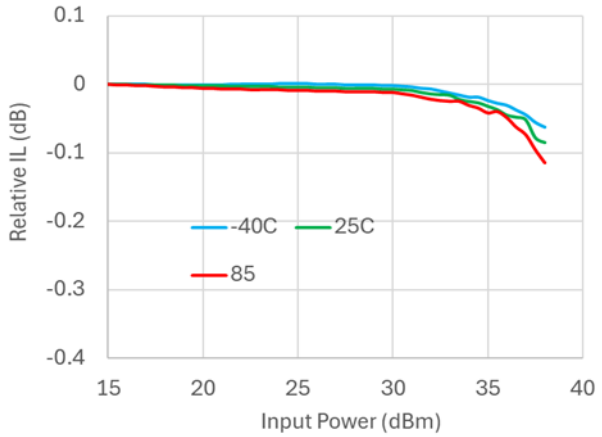
RFC Return Loss (dB)



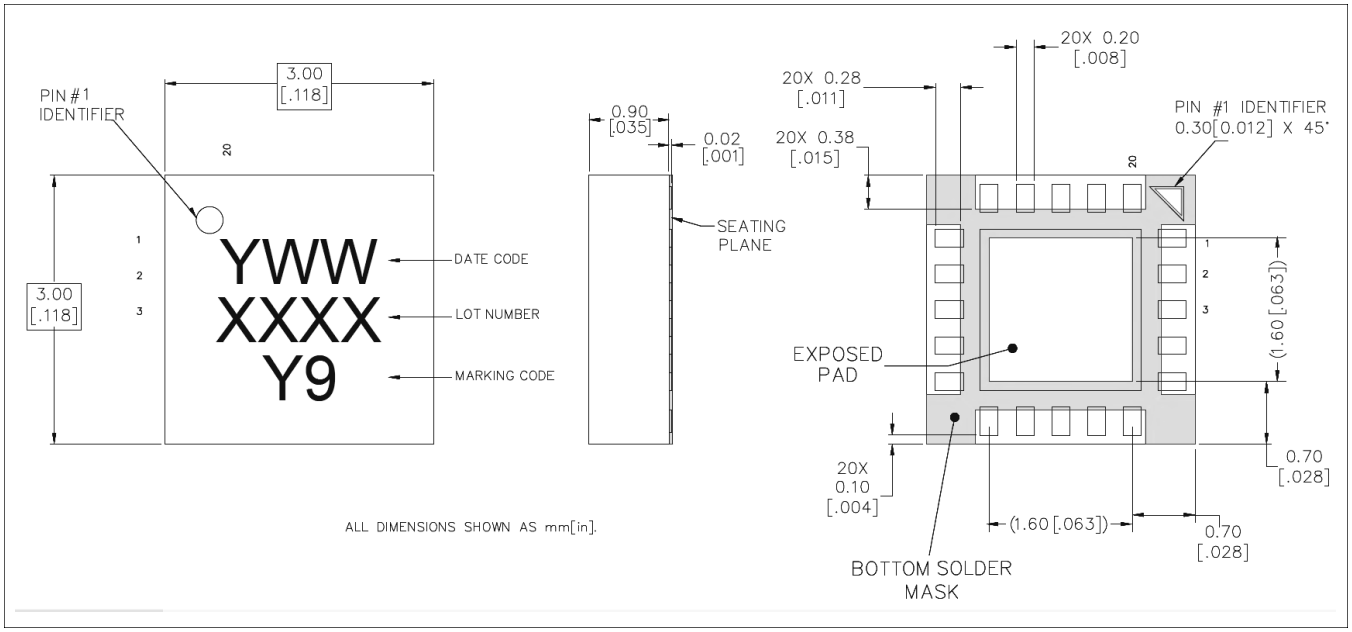
Return Loss: RF1/RF2 (On State)



Relative Insertion Loss Compression @ 30 GHz



Lead-Free 3 mm, 20-Lead Laminate Package†



† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 3 requirements in accordance to JEDEC J-STD-020D .
Plating is 100% NiPdAg over copper.