Connectorized Millimeter Wave Reflective SP2T Switch with TTL Driver, 7.5 - 50 GHz

MASW-011131-CS0185
Rev. V3

Features

- Hermetic SP2T Reflective Switch
- 1.85 mm Field Replaceable RF Connectors
- Unique Dual RF Port Isolation State
- +5 V, -10 V, TTL Driver
- 2.2 dB Insertion Loss @ 30 GHz
- 35 dB Isolation @ 30 GHz
- 1.3:1 VSWR @ 30 GHz
- 28 ns T_{ON} Switching Speed
- Weight: 32 grams
- Non-RoHS Part

Applications

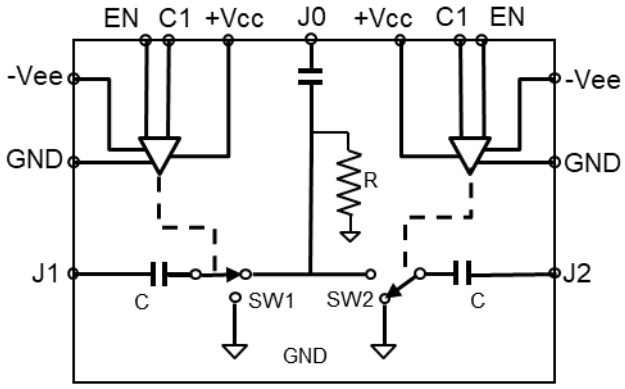
- Aerospace and Defense
- Space

Description

The MASW-011131 is a 7.5 - 50 GHz reflective SP2T that uses 1.85 mm RF replaceable connectors with an integrated TTL driver operating with +5 VDC and -10 VDC. The additional enable logic control provides for a unique state where both RF ports can be placed into simultaneous isolation. This product provides an exceptional isolation to insertion loss ratio, with 28 ns switching speed in a compact,1.2” x 1.0” x 0.5” metal housing. It is ideally suited for applications requiring hermetic hardware enclosures.

Upon request available as a fully RoHS compliant module for commercial applications.

Functional Schematic



Port Configuration[1]

Port Description	Function
J0	RF Input
J1	RF Output 1
J2	RF Output 2
C1	TTL Logic Control
EN	TTL Enable Logic Control
$+V_{CC}$	+5 VDC
$-V_{EE}$	-10 VDC
GND	RF & DC Voltage Ground Return

1. The RF ground is provided through the RF connectors and the metal housing. The driver ground is provided through the DC feedthrus and the metal housing.

Ordering Information

Part Number	Package
MASW-011131-CS0185	bulk

Electrical Specifications: T_A = 25°C, P_{IN} = 0 dBm (unless otherwise defined), Z_0 = 50 Ω, DC Power = +5 V @ +10 mA, -10 V @ -10 mA

Parameter	Test Conditions	Units	Min.	Typ.	Max.
J0-J1 and J0-J2 Insertion Loss	7.5 - 30 GHz 30 - 40 GHz 40 - 50 GHz	dB	—	2.1 2.5 5.4	3 3 6
J0-J1 and J0-J2 Return Loss	7.5 - 50 GHz	dB	—	15	—
J0-J1 and J0-J2 Isolation	7.5 - 50 GHz, 1 port in Insertion Loss 7.5 - 50 GHz, both ports off	dB	32 26	37 31	—
Switching Speed (T_{ON})	11.1 GHz, 100 kHz TTL Repetition Rate (50% Control Voltage, 90% RF Voltage)	ns	—	28	—
Switching Speed (T_{OFF})	11.1 GHz, 100 kHz TTL Repetition Rate (50% Control Voltage, 10% RF Voltage)	ns	—	15	—
CW Incident Power[1]	—	dBm	—	27	—
P-0.1dB	@ 29 GHz	dBm	—	29	—
VEEB = -10 V DC Bias Current	C1 = “1”, EN = “0” C1 = “0”, EN = “0” C1 = “1”, EN = “1”	mA	12.5 12.5 0	11 11 0.4	9.5 9.5 1
VCC = +5 V DC Bias Current	C1 = “1”, EN = “0” C1 = “0”, EN = “0” C1 = “1”, EN = “1”	mA	8.5 8.5 17	10 10 20	11.5 11.5 23

1. Maximum source and load VSWR = 1.2:1

Nominal Operating Conditions[2]

Parameter	Nominal Value
CW Input Power	27 dBm @ +25°C
DC Operating Voltage $+V_{CC}$ $-V_{EE}$	 +5 V -10 V
TTL Logic Voltage “0” “1”	 0.0 V to +0.8 V +2.0 V to +5.0 V
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

2. Operating at nominal conditions with $T_J \leq$ +150°C will ensure MTTF > 1 x 10^6 hours.

Maximum Survivability Ratings[3, 4]

Parameter	Absolute Maximum
CW Input Power	29 dBm @ +85°C
DC Operating Voltage $+V_{CC}$ $-V_{EE}$	 +4.5 V to +5.5 V -11 V to -10 V
TTL Logic Voltage “0” “1”	 0.0 V to +0.8 V +2.0 V to +5.0 V
Operating Temperature	-55°C to +95°C
Storage Temperature	-65°C to +150°C

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

TTL Logic to RF Truth Table (Logic 0 = 0 V, Logic 1 = +5 V)

Insertion Loss Bias State = -10 V @ -10 mA
Isolation Bias State = +5 V @ +10 mA

RF State	TTL Logic Control (C1)	TTL Logic Enable (EN)
J0-J1 Insertion Loss & J0-J2 Isolation	1	0
J0-J2 Insertion Loss & J0-J1 Isolation	0	0
J0-J1 & J0-J2 Isolation	0 or 1	1

IMPORTANT:
The TTL driver in the MASW-011131 SP2T does NOT use reverse polarity protection for the $+V_{CC}$ and $-V_{EE}$ voltage inputs. The MASW-011131 can be damaged if $+V_{CC}$ and $-V_{EE}$ voltage inputs are reversed.

Handling Procedures

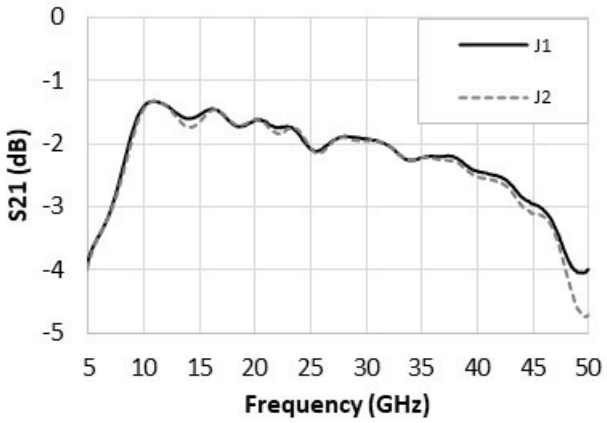
Please observe the following precautions to avoid damage:

Static Sensitivity

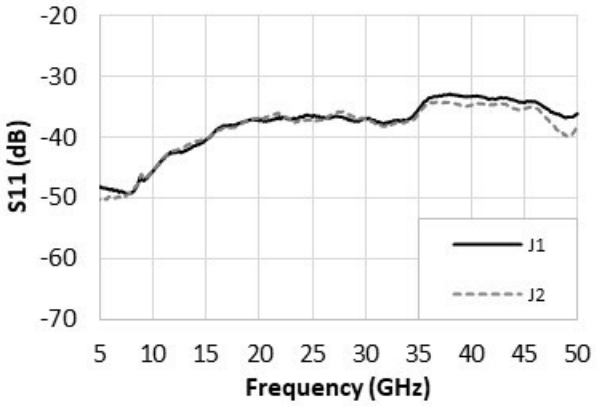
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Typical Performance Curves

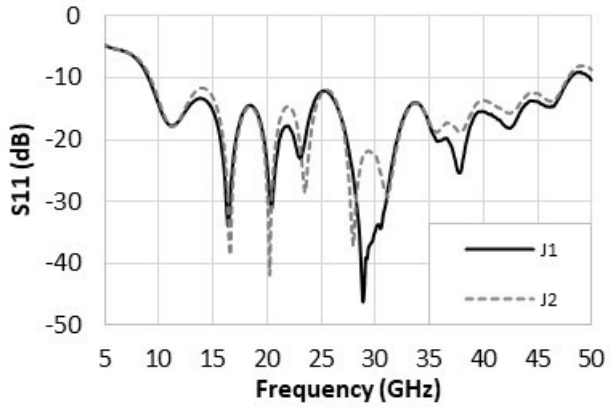
J0 to J1 & J2 Insertion Loss



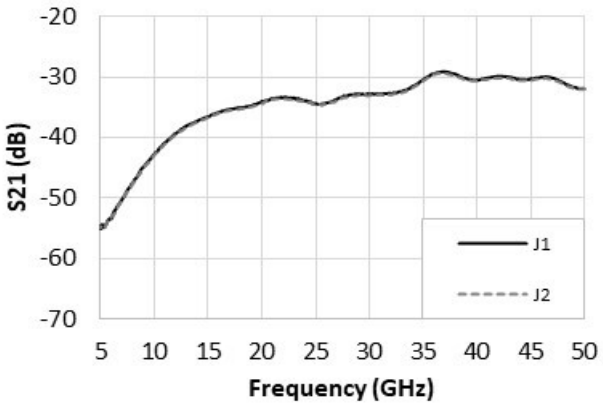
J0 to J1 & J2 Isolation



J0 Input Return Loss J1 ON & J2 ON

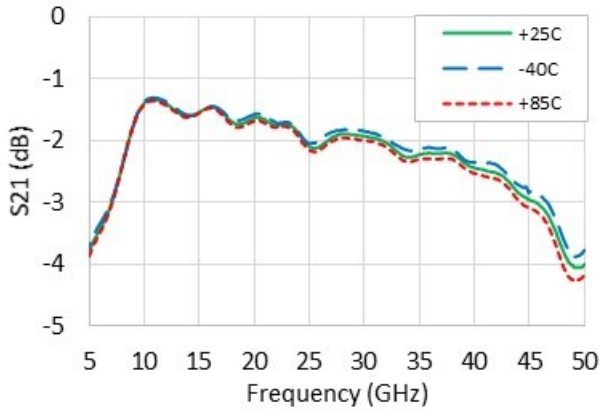


J0 to J1 and J2 In Unbiased Condition

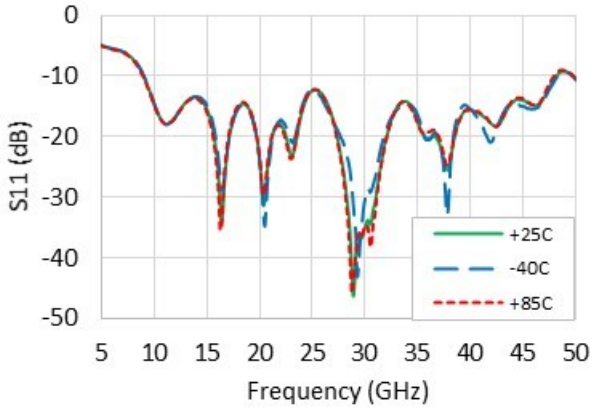


Typical Performance Curves

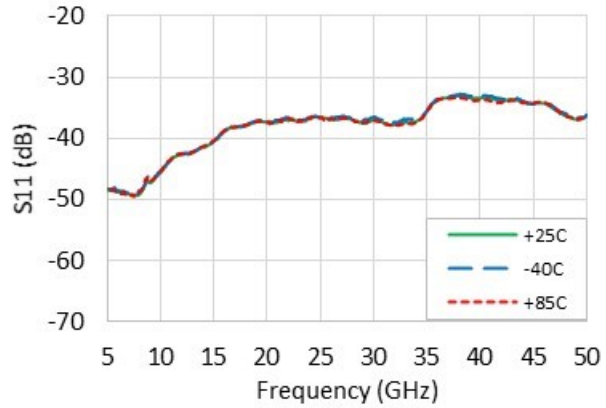
J0 to J1/J2 Insertion Loss over Temp



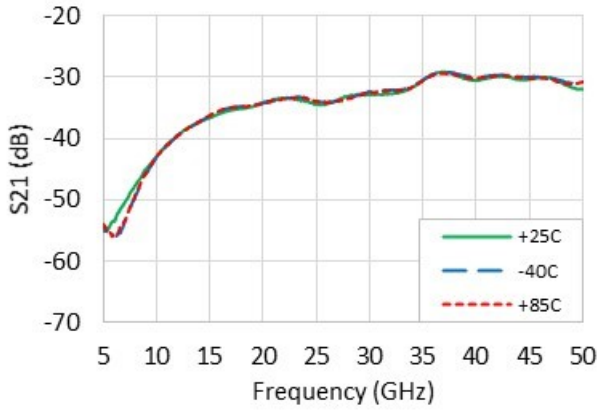
J0 Input Return Loss in ON state over Temp



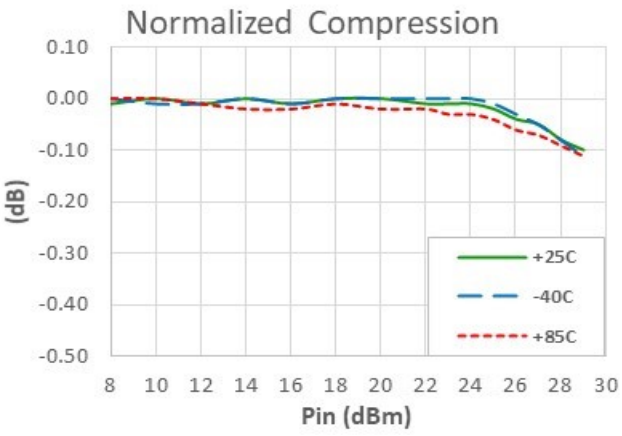
J0 to J1/J2 Isolation over Temp



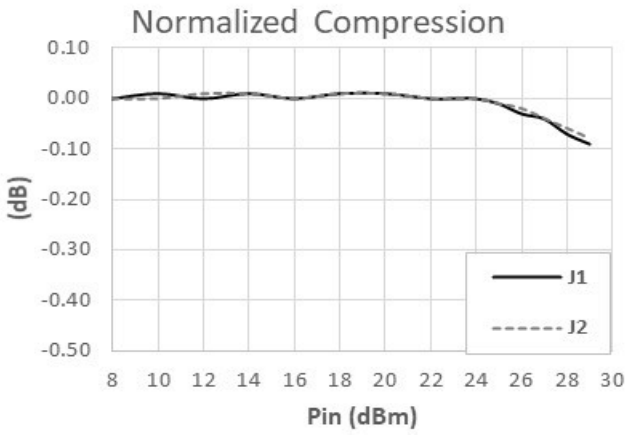
J0 to J1/J2 Unbiased Switch



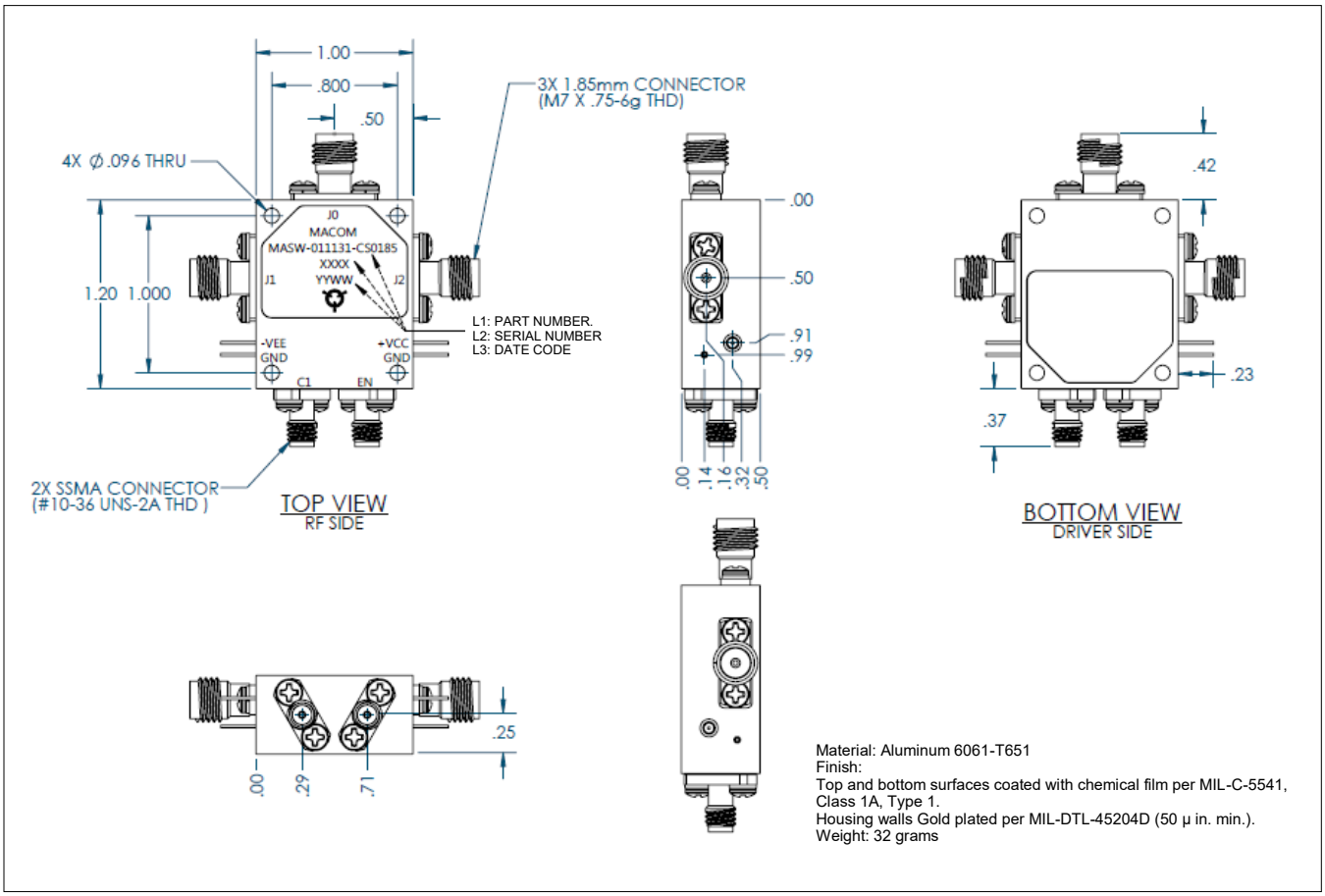
Normalized Compression over Temp @ 29GHz



Normalized Compression J1 & J2 @ 29GHz, 25°C



Outline Drawing



† Meets JEDEC moisture sensitivity level (MSL) 1 requirements.