Features

- Low Loss: 0.6 dB @ 12 GHz
- High Isolation: 44 dB @ 12 GHz
- Up to 14 W CW Power Handling, +85°C
- Switching Speed: <115 ns
- Integrated DC Blocks and RF Bias Networks
- Optional Bias Resistors
- Die with G-S RF Pads and DC Bias Pads
- RoHS* Compliant

Applications

- Point-to-Point , Radar, Radiometers, Test & Instrumentation Equipment and High Frequency Applications

Description

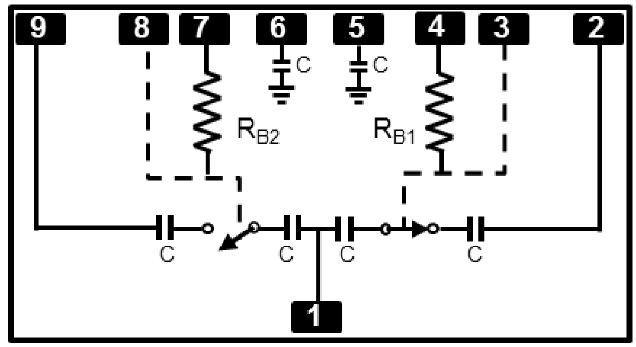
The MASW-011108-DIE is a high power symmetrical SPDT PIN diode switch. This broadband, reflective, high linearity, switch was developed for 6 - 18 GHz applications that require up to 14 W of power handling while maintaining low insertion loss and high isolation.

The SPDT MMIC utilizes MACOM's proven AlGaAs PIN diode technology. The switch is fully passivated with silicon nitride and has an added polymer layer for scratch protection. The protective coating prevents damage to the junctions and the anode air-bridges during handling and assembly. The die has backside metallization to facilitate an epoxy die attach process.

Ordering Information

Part Number	Package
MASW-011108-DIE	Gel Pack

Functional Schematic



Pin Configuration[1]

Pin #	Function
1	RF Common
2	RF1
3	Bias 3
4	Bias 1
5, 6	DC, N/C, RF GND
7	Bias 2
8	Bias 4
9	RF2

1. The die backside must be connected to RF, DC and thermal ground.

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

Electrical Specifications: T_A = +25°C, V_F[2] = 5 V, V_R[3] = -15 V, Z_0 = 50 Ω

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss (RF_{COMMON} to RFx ON state)	6 GHz 8 GHz 12 GHz 14 GHz 18 GHz	dB	—	0.80 0.55 0.60 0.70 0.90	1.25 0.95 1.00 — —
Isolation (RF_{COMMON} to RFx OFF state)[4]	6 GHz 8 GHz 12 GHz 14 GHz 18 GHz	dB	35 35 35 — —	42 44 44 42 38	—
Return Loss (RF_{COMMON})	6 GHz 8 GHz 12 GHz 14 GHz 18 GHz	dB	—	12 16 19 18 18	8 12 15 — —
Return Loss (RF1, RF2 ON state)	6 GHz 8 GHz 12 GHz 14 GHz 18 GHz	dB	—	12 18 17 17 19	10 14 14 — —
CW Power Handling (ON state)[3]	6.2 GHz, +85°C @ V_R = -15 V 6.2 GHz, +85°C @ V_R = -33 V	dBm / W	—	39 / 8 41.5 / 14	—
Switching Speed T_{ON} / T_{OFF} T_{RISE} / T_{FALL}	50% DC to 90% RF / 50% DC to 10% RF 10% to 90% RF / 90% to 10% RF	ns	—	115 / 25 75 / 16	—
Reverse Bias Current	V_R = -15 V	nA	—	25	—

2. Forward bias current (I_F) is set to 10 mA @ 5 V with internal bias resistors R_{B1} = R_{B2} = 98 Ohm
3. Reverse bias voltage (V_R) should be determined based on working conditions. For example, -33 V @ 41.5 dBm input power. For lower power applications, a less negative voltage can be used. R. Caverly and G. Hiller, "Establishing the Minimum Reverse Bias for a PIN Diode in a High Power Switch," IEEE Transactions on Microwave Theory and Techniques, Vol.38, No.12, December 1990.
4. Isolation defined with 1 port in low loss state.

Absolute Maximum Ratings[5,6]

Parameter	Absolute Maximum
Reverse Bias Voltage	-50 V
Forward Bias Current	25 mA
CW Incident Power	42 dBm @ +85°C
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

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

Truth Table

RF_{COMMOM} Path	Bias 1	Bias 2
RF1 Insertion Loss RF2 Isolation	-15 V	5 V
RF2 Insertion Loss RF1 Isolation	5 V	-15 V

Handling Procedures

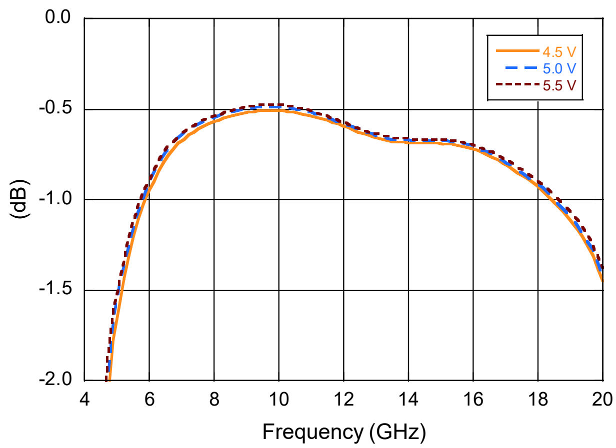
Please observe the following precautions to avoid damage:

Static Sensitivity

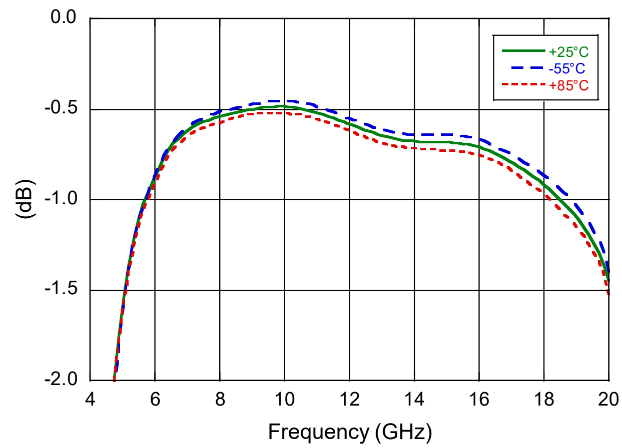
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these HBM class 1A devices.

Typical Performance Curves of a Die including Bond Wires (probed on a test PCB)
Reverse Bias Voltage = -15 V

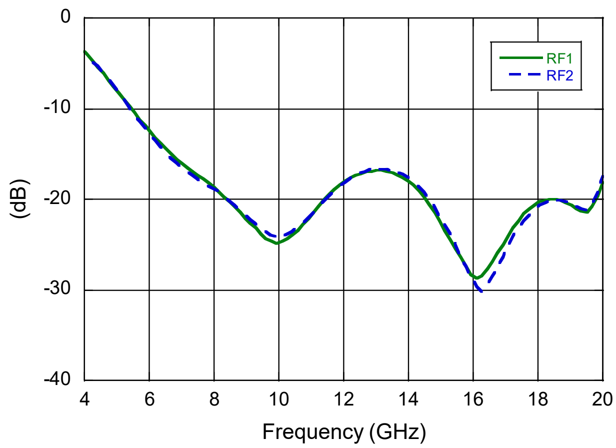
Insertion Loss over Forward Bias Voltage



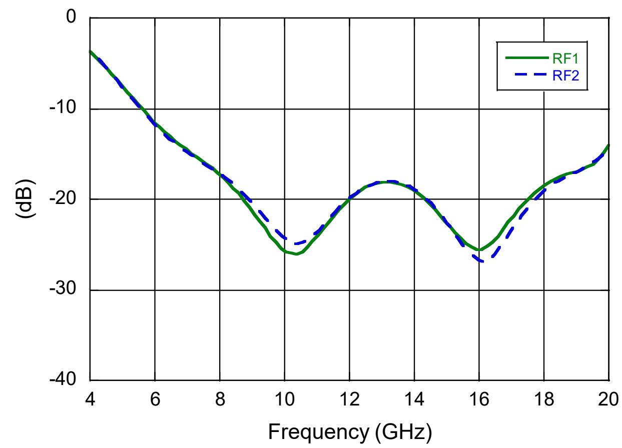
Insertion Loss over Temp



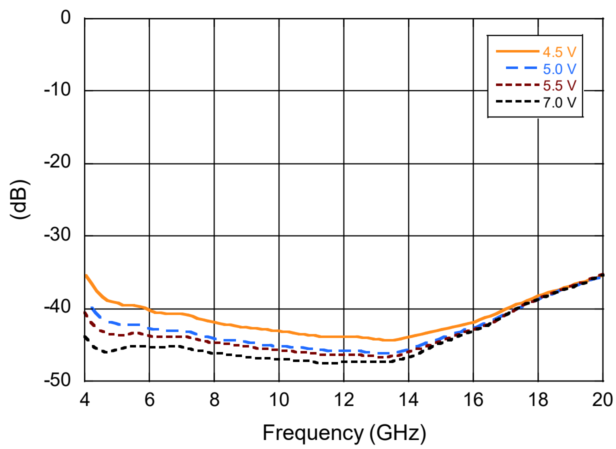
RF-C to RF1/2 Return Loss



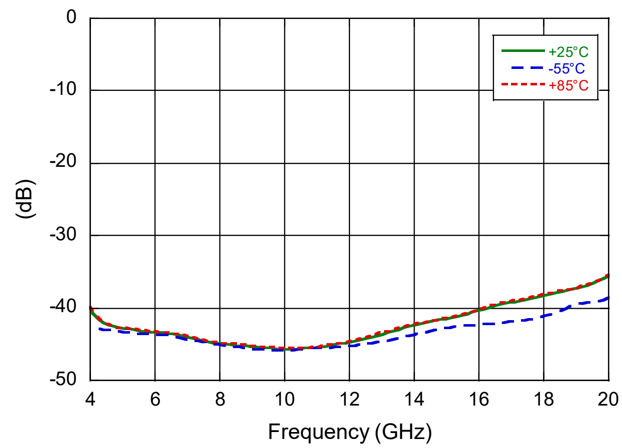
RF1/2 Return Loss



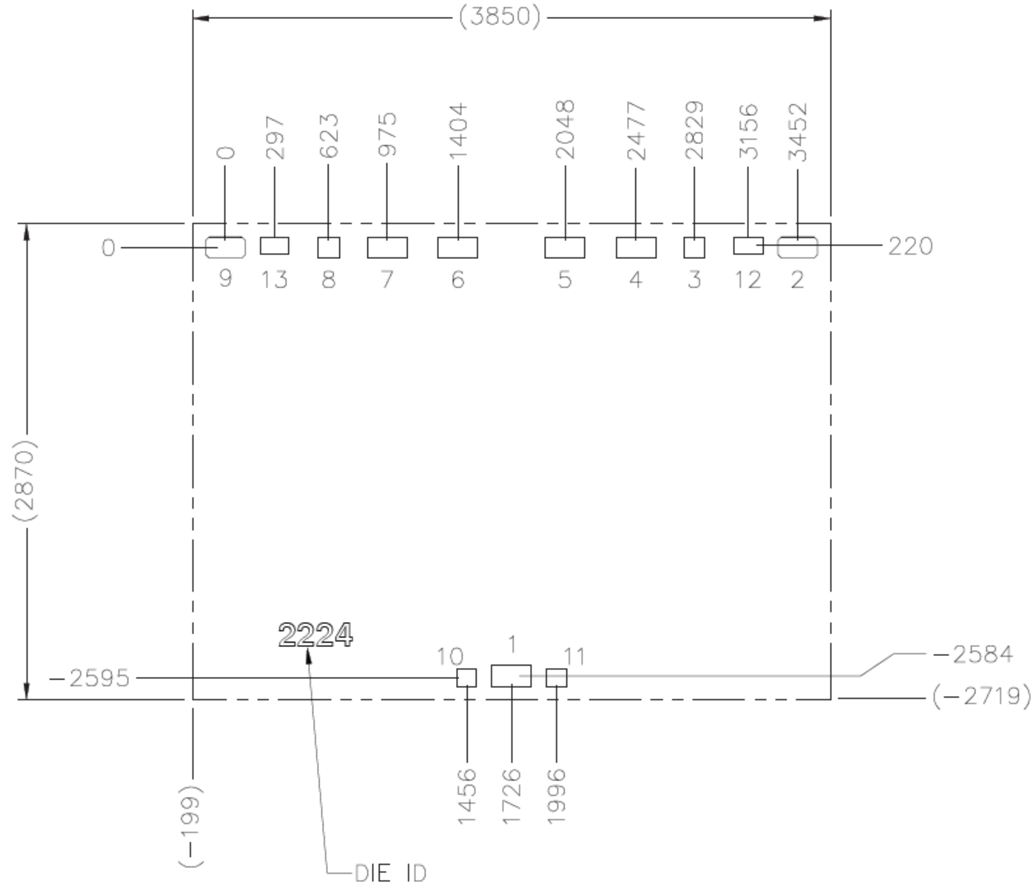
Isolation over Forward Bias Voltage



Isolation over Temp



Die Outline Drawing†



Notes:

- Unless otherwise specified all dimensions shown as µm with a tolerance of +/- 5 µm
- Die thickness is 100 +/- 10 µm
- Bond Pad/backside metallization: Gold

Bond Pad Dimensions (µm)

Pad	X	Y
1, 2, 9	238	126
3, 8	126	126
4, 5, 6, 7	240	126
10, 11	120	104
12, 13	175	104