

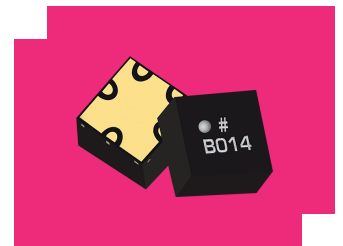
# MBALH-0R520CSP2

## 0.5-20 GHz Passive MMIC Chip Scale Package 1:1 Balun

### DEVICE OVERVIEW

#### General Description

The MBALH-0R520CSP2 is a GaAs passive MMIC 1:1 balun that features excellent 32 dB common mode rejection over a 0.5 to 20 GHz operational bandwidth. The MBALH-0R520CSP2 is footprint compatible with the 2:1 MBAL-0R520CSP2, offering flexibility in system design. For ADC and DAC interface applications, the choice between the 1:2 and 1:1 configurations will depend on specific system requirements. This device is an ideal solution for digital beamforming and other higher-order Nyquist sampling applications, as well as clock distribution and balanced amplifier interfaces. Available in a lead-free, RoHS compliant 2.5 x 2.5 mm CSP2 package, it is compatible with standard pick-and-place assembly processes.



[Download s-parameters here](#)

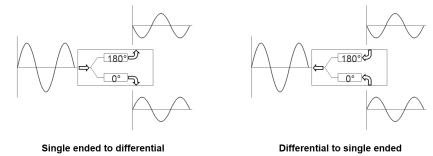
#### Features

- 0.5 GHz to 20 GHz
- 1:1 Balun (50Ω Common to 50Ω Differential)
- Optimal Phase and Amplitude Balance of 2° and 0.3 dB
- 32 dB Common Mode Rejection
- Compact 2.5mm chip scale package
- This product embodies Marki Microwave's U.S. Pat. 11,869,858.

#### Applications

- Balanced Receivers
- Signal Integrity
- Analog to Digital Converters
- Balanced Amplifiers
- Clock Distribution

#### Functional Block Diagram



#### Part Ordering Options

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
MBALH-0R520CSP2	0.5-20 GHz Passive MMIC Chip Scale Package 1:1 Balun	CSP2	REACH RoHS	Released	EAR99
EVB-MBALH-0R520	Evaluation Board, 0.5-20 GHz Passive MMIC Chip Scale Package 1:1 Balun	EVB	REACH RoHS	Released	EAR99

## MBALH-0R520CSP2

### 0.5-20 GHz Passive MMIC Chip Scale Package 1:1 Balun

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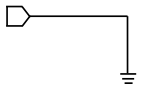
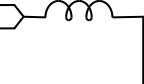
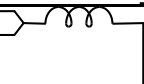
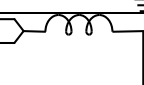
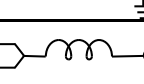
- **Device Overview**
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#### Revision History

Revision Code	Revision Date	Comment
-	2025-04-21	Initial Release
A	2025-04-28	Updated Moisture Sensitivity from MSL3 to MSL1
B	2026-04-23	Updated RF Power Handling

## Port Configuration and Functions

### Port Functions

Port	Function	Description	DC Equivalent Circuit
GND	Ground	Ground pad should be connected to RF/DC ground with low electrical and thermal resistance.	
Pin 1	Common Port / In (Unbalanced)	The common port is DC short to ground.	
Pin 3	Out 1 / 0° Port (Balanced)	The 0° port is DC short to ground.	
Pin 4	Out 2 / 180° Port (Balanced)	The 180° port is DC short to ground.	
Pins 2,5	NC	Pins 2 and 5 are not internally connected. They can be connected to ground for normal operation.	

## MBALH-0R520CSP2

0.5-20 GHz Passive MMIC Chip Scale Package 1:1  
Balun

### Specifications

#### Absolute Maximum Ratings

Parameter	Maximum Rating	Unit
Maximum Operating Temperature	100	°C
Maximum Storage Temperature	125	°C
Minimum Operating Temperature	-55	°C
Minimum Storage Temperature	-65	°C
RF Power Handling	37	dBm

#### Package Information

Parameter	Details	Rating
ESD	250 to < 500 Volts	HBM Class 1A
Dimensions	-	2.50 x 2.50 mm
Moisture Sensitivity Level	-	MSL 1

## MBALH-0R520CSP2

0.5-20 GHz Passive MMIC Chip Scale Package 1:1  
Balun

### Electrical Specifications

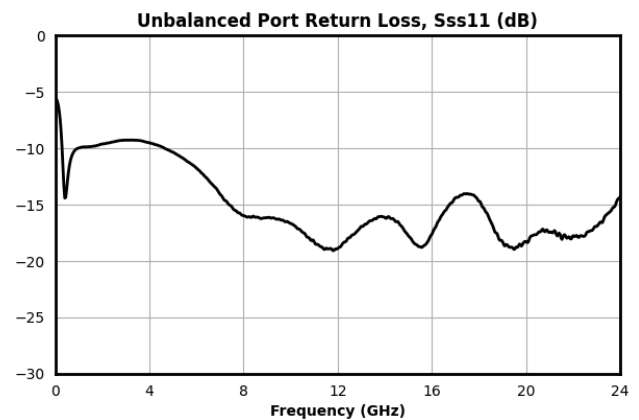
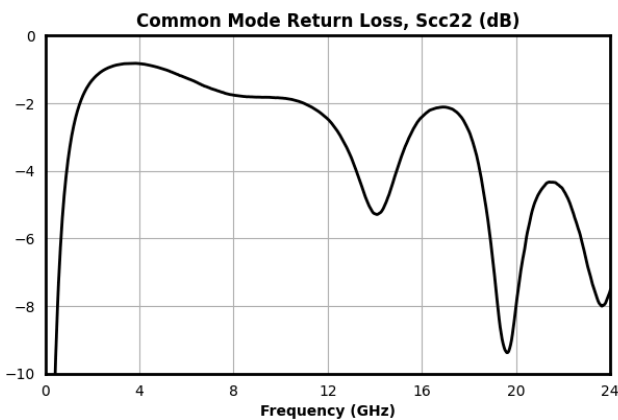
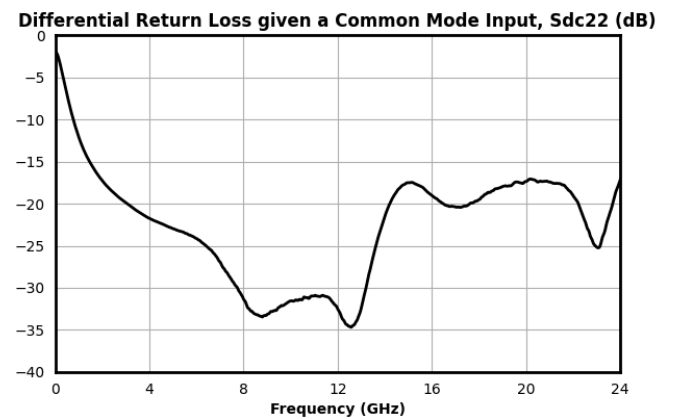
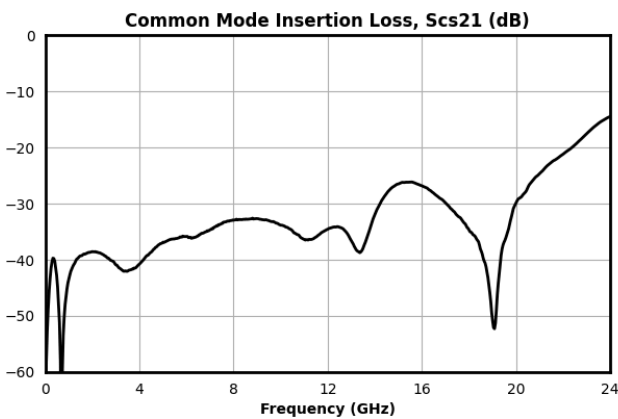
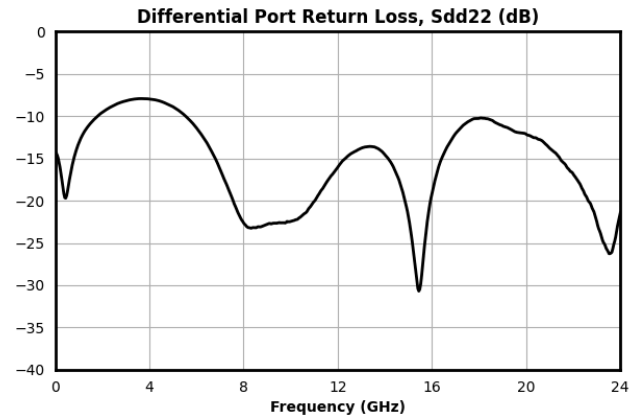
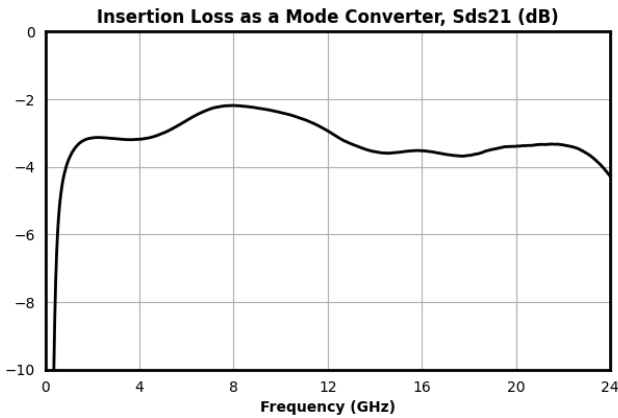
Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Amplitude Balance	Configuration A, 25°C	0.5	20	-	0.3	-	dB
Common Mode Rejection	Configuration A, 25°C	0.5	20	-	32	-	dB
Common Port Return Loss	Configuration A, 25°C	0.5	20	-	16	-	dB
Impedance	Configuration A, 25°C	0.5	20	-	50	-	Ω
Insertion Loss as a Mode Converter	Configuration A, 25°C	0.5	20	-	3.6	-	dB
Isolation	Configuration A, 25°C	0.5	20	-	9	-	dB
Nominal Phase Shift	Configuration A, 25°C	0.5	20	-	180	-	°
Output Return Loss	Configuration A, 25°C	0.5	20	-	7	-	dB
Phase Balance	Configuration A, 25°C	0.5	20	-	2	-	°
Impedance Ratio	-	-	-	-	1:1	-	

## MBALH-0R520CSP2

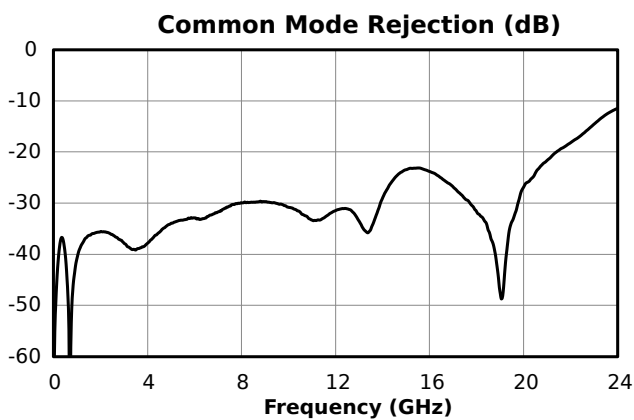
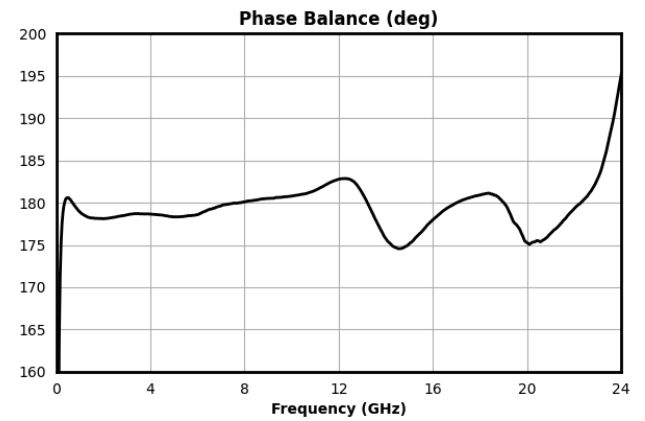
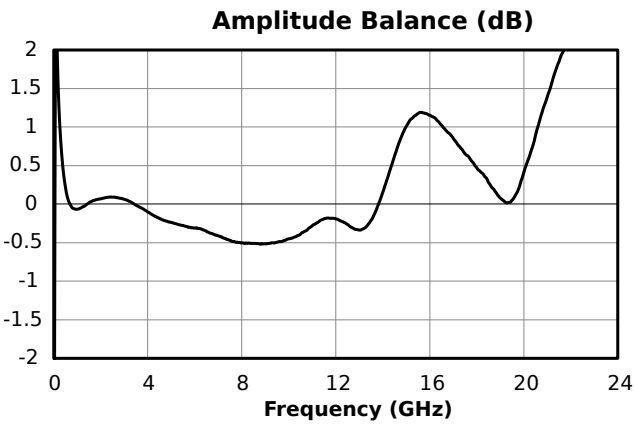
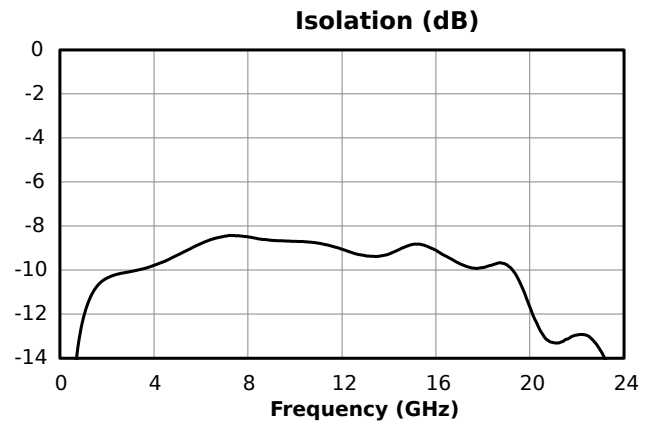
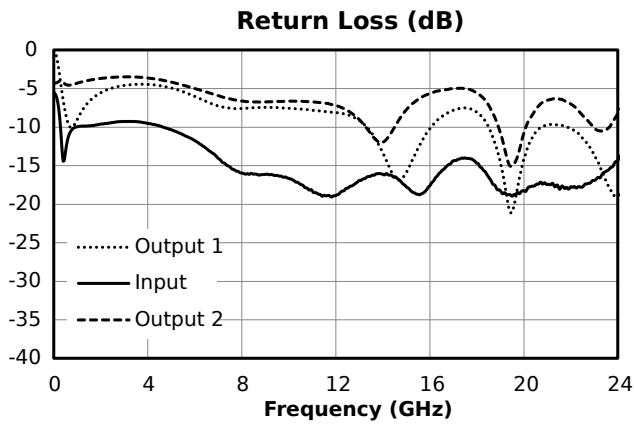
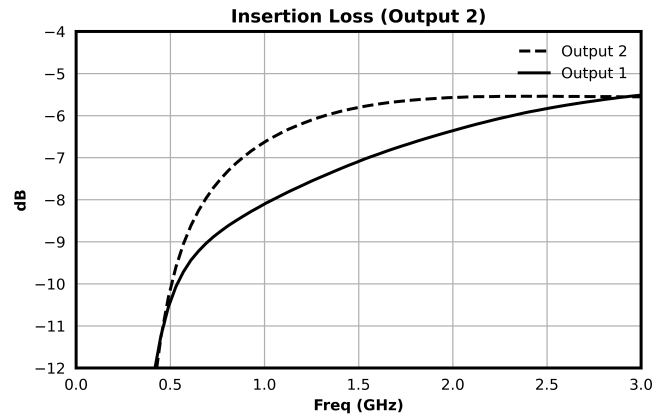
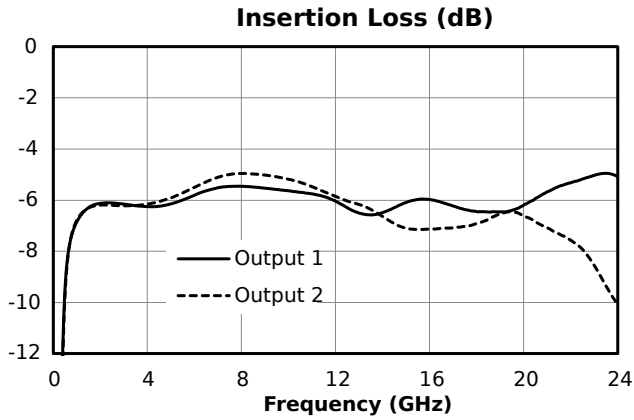
### 0.5-20 GHz Passive MMIC Chip Scale Package 1:1 Balun

#### Mixed Mode Scattering Parameters in 50 Ohm Differential System

Mixed mode scattering parameters are used to characterize differential circuits. For baluns, this means that the  $0^\circ$  and  $180^\circ$  ports become a single  $50\Omega$  differential port and the common port remains the same  $50\Omega$  common port. For more information about 1:1 balun data, visit [MBAL vs. MBALH Data](#). The two-port s-parameters of the balun are then characterized based on differential (d), common mode (c), or single-ended (s) signals. For example: S<sub>cs12</sub> is the Common output response given a single ended input.



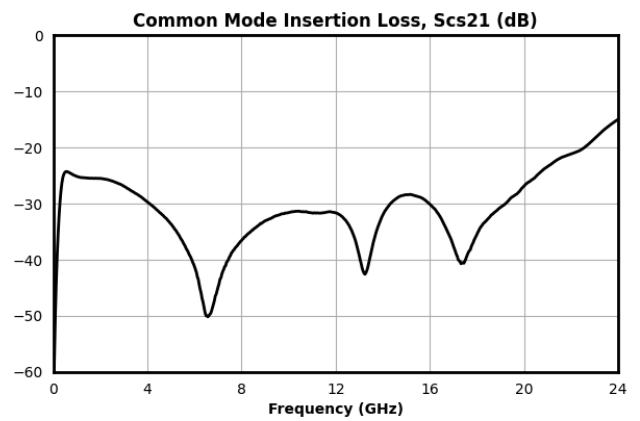
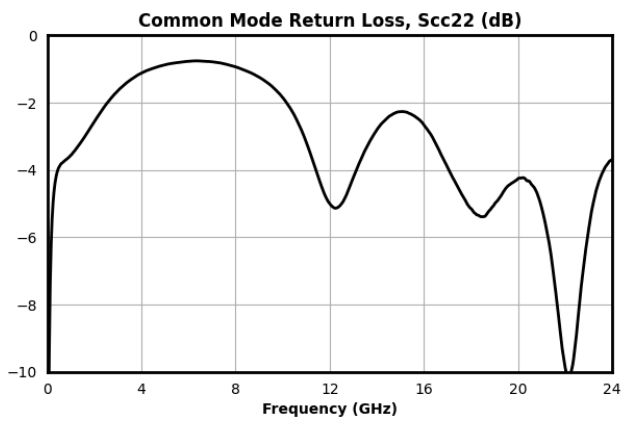
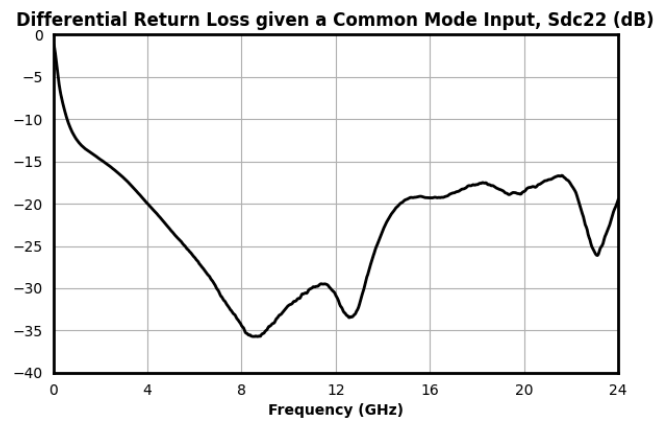
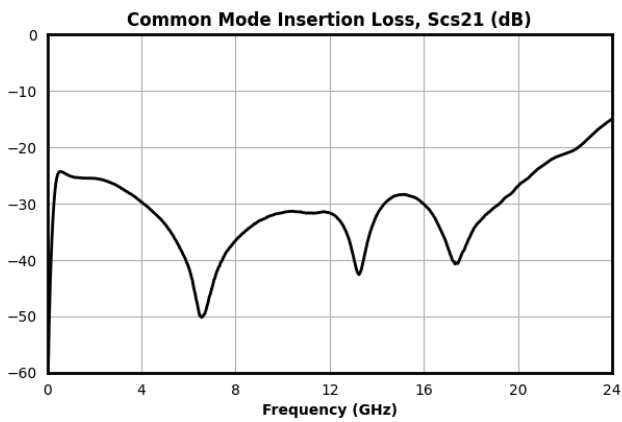
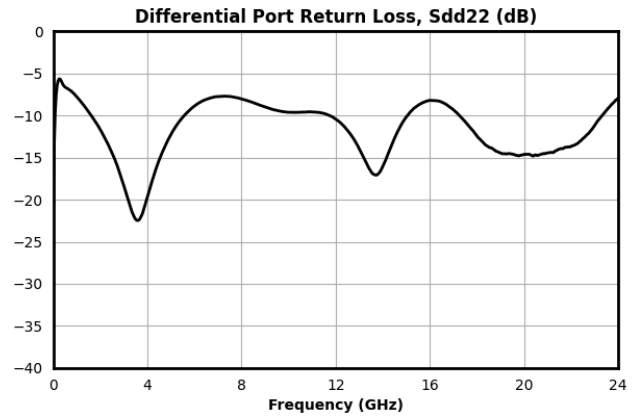
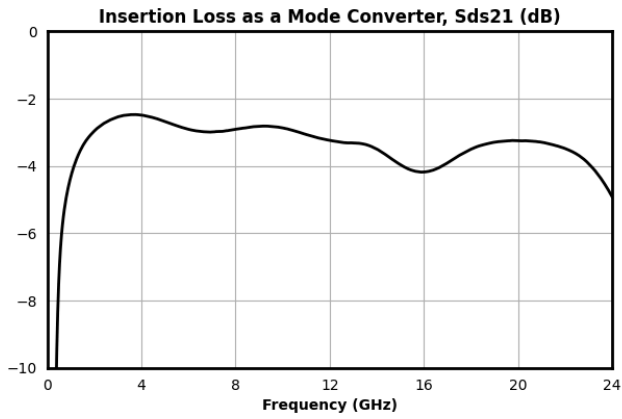
### Typical Performance Scattering Parameters in 50 Ohm Differential System



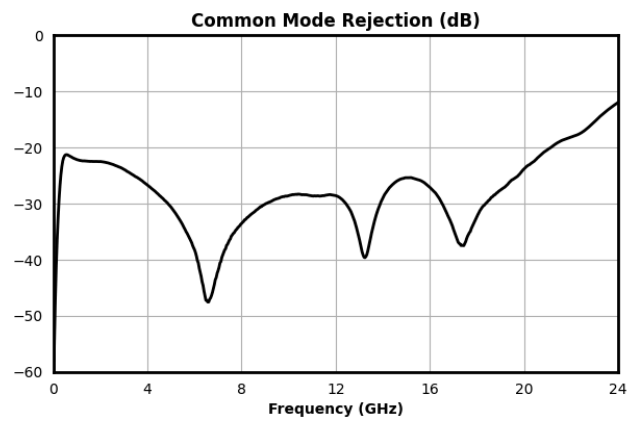
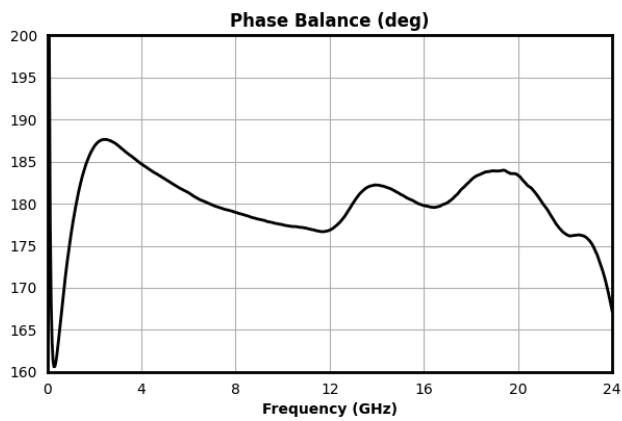
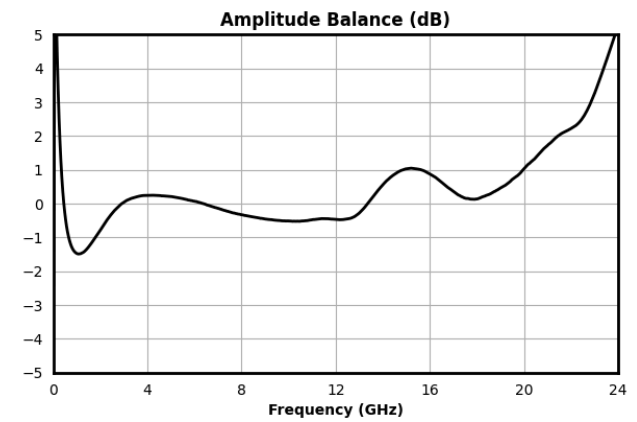
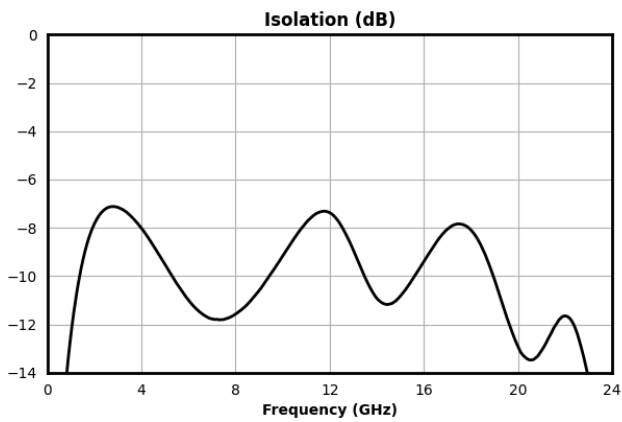
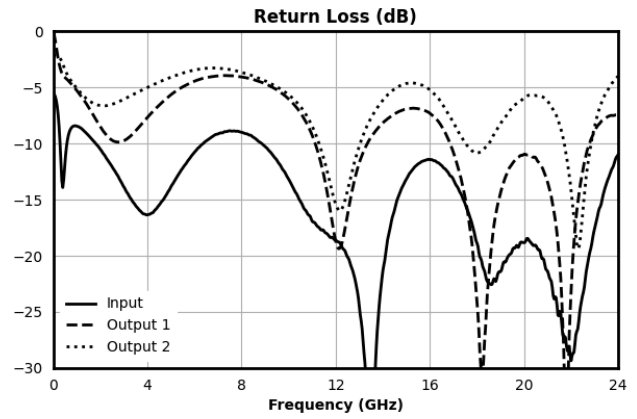
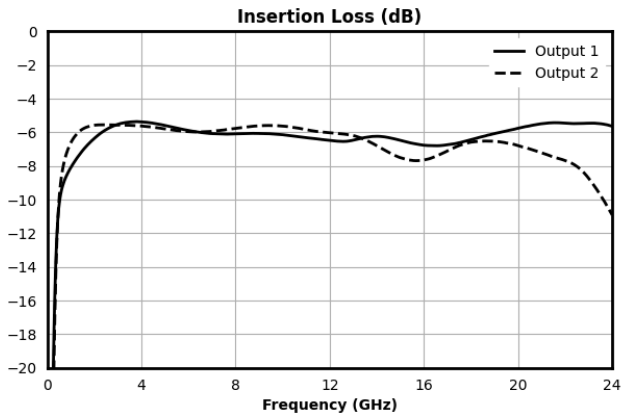
## MBALH-0R520CSP2

0.5-20 GHz Passive MMIC Chip Scale Package 1:1 Balun

### Mixed Mode Scattering Parameters in 100 Ohm Differential System



### Typical Performance Scattering Parameters in 100 Ohm Differential System



All measurements are de-embedded from the fixture with Automatic Fixture Removal (AFR).

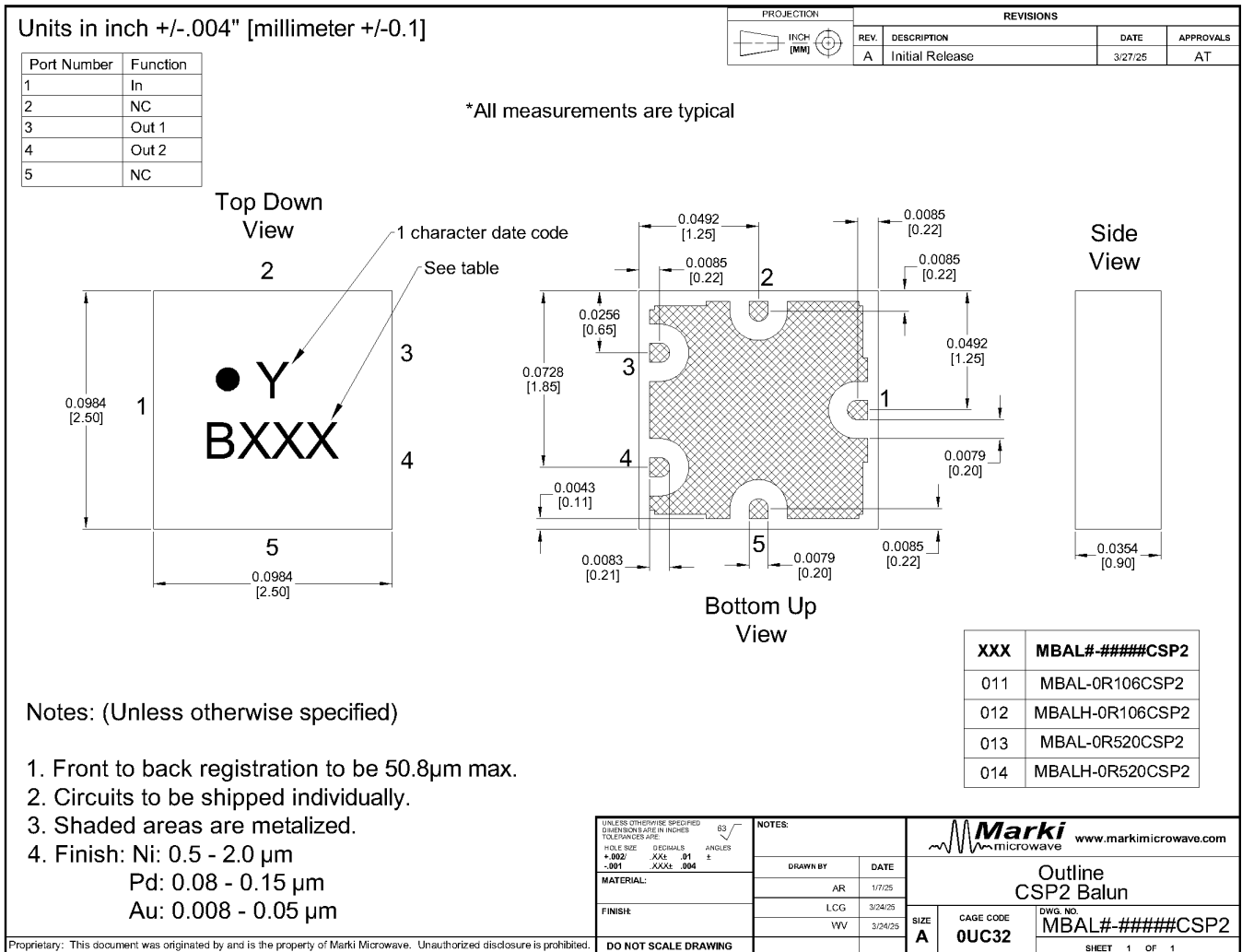
# MBALH-0R520CSP2

## 0.5-20 GHz Passive MMIC Chip Scale Package 1:1 Balun

### Mechanical Data

### Outline Drawing

Download : [Outline 2D Drawing](#) | [Outline 3D Drawing](#) | [Outline 3D STP](#)



EVb Out- refers to output Out 1

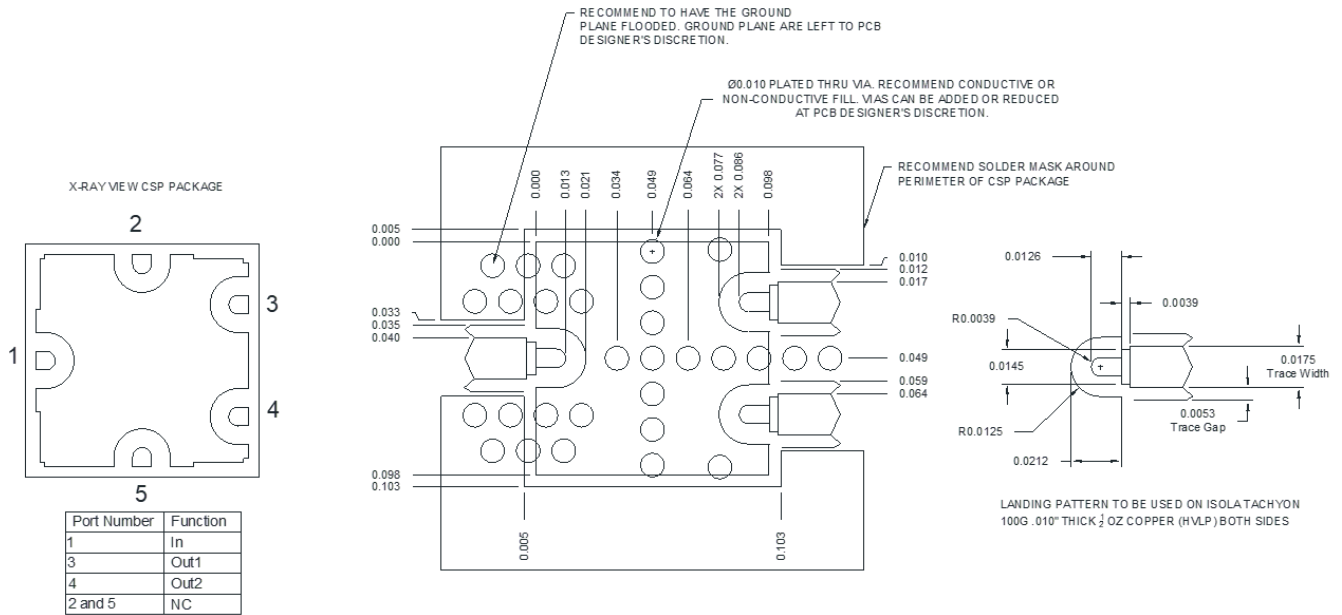
EVb Out+ refers to output Out 2

## MBALH-0R520CSP2

### 0.5-20 GHz Passive MMIC Chip Scale Package 1:1 Balun

#### Footprint Image

Download: [Footprint Drawing](#)



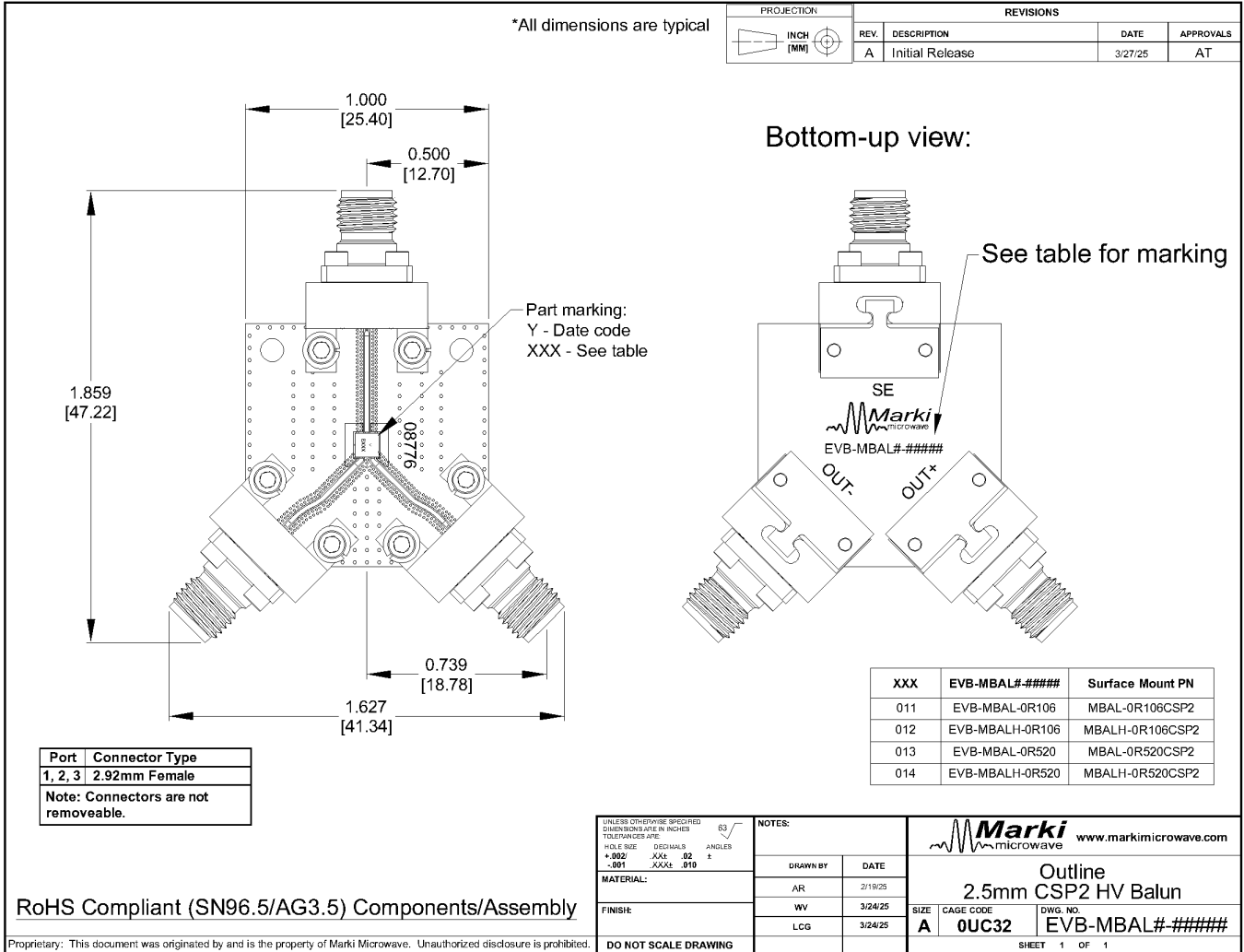
**Evaluation Board - Performance Data**

Parameter	Test Conditions	Frequency Range (GHz)	Min	Typ	Max	Unit
Impedance Ratio	-	-	-	1	-	

# MBALH-0R520CSP2

## 0.5-20 GHz Passive MMIC Chip Scale Package 1:1 Balun

### Evaluation Board - Outline Drawing



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