

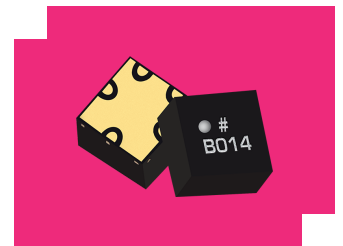
MBALH-0R520CSP2

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](#)

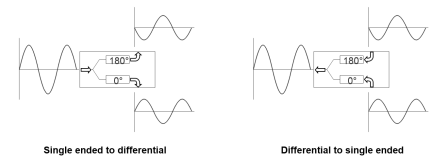
Features

- 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

Table Of Contents

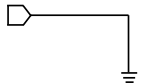
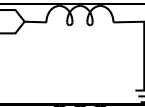
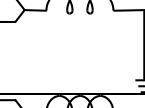
■ Device Overview	- General Description - Features - Applications - Functional Block Diagram
■ Port Configuration and Functions	Port Functions
■ Revision History	
■ Specifications	- Absolute Maximum Ratings - Package Information - Electrical Specifications - Mixed Mode Scattering Parameters in 50 Ohm Differential System - Typical Performance Scattering Parameters in 50 Ohm Differential System - Mixed Mode Scattering Parameters in 100 Ohm Differential System - Typical Performance Scattering Parameters in 100 Ohm Differential System
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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
C	2026-06-03	Updated Port Description

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 open.	
Pins 2,5	NC	Pins 2 and 5 are not internally connected. They can be connected to ground for normal operation.	

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

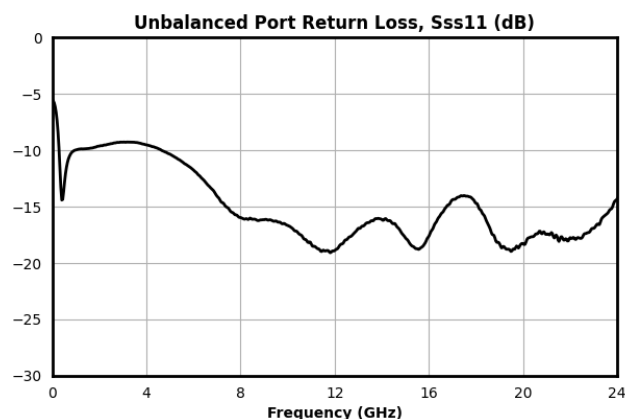
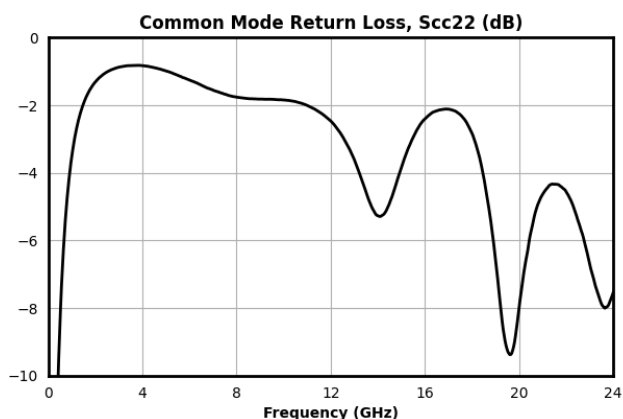
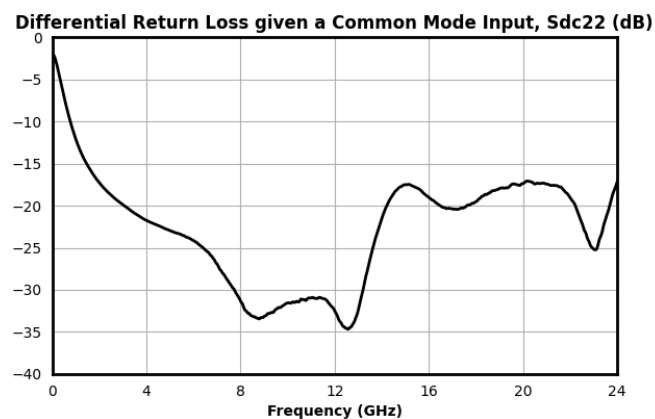
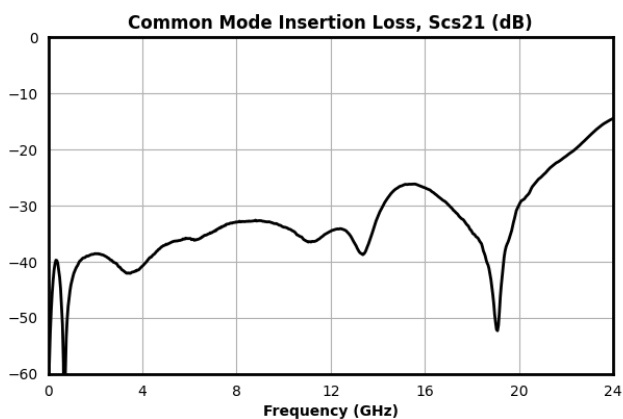
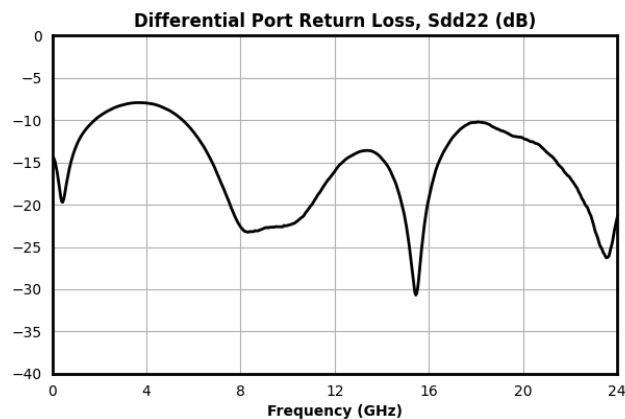
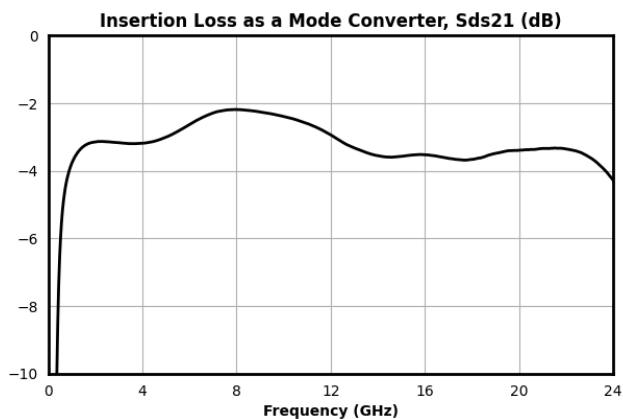
0.5-20 GHz Passive MMIC Chip Scale Package 1:1
Balun

Electrical Specifications

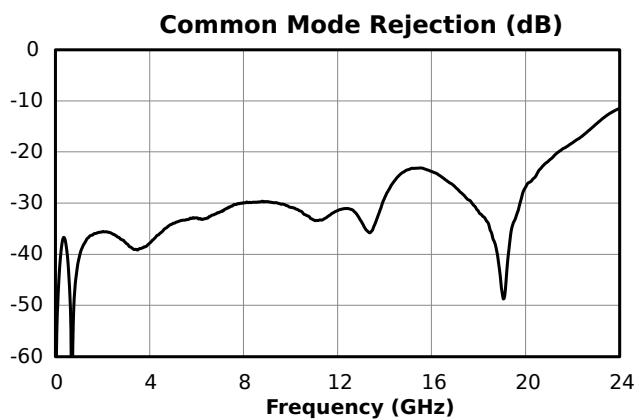
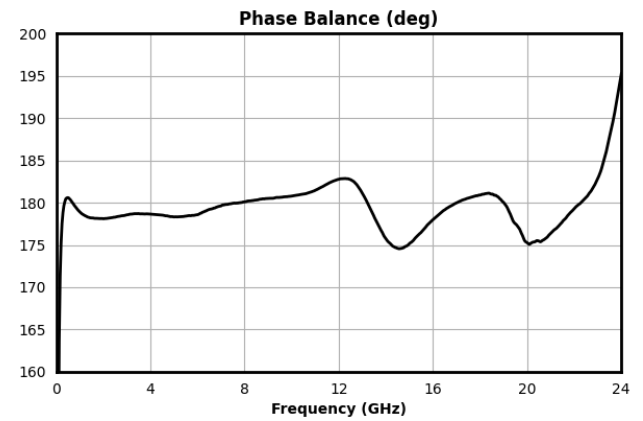
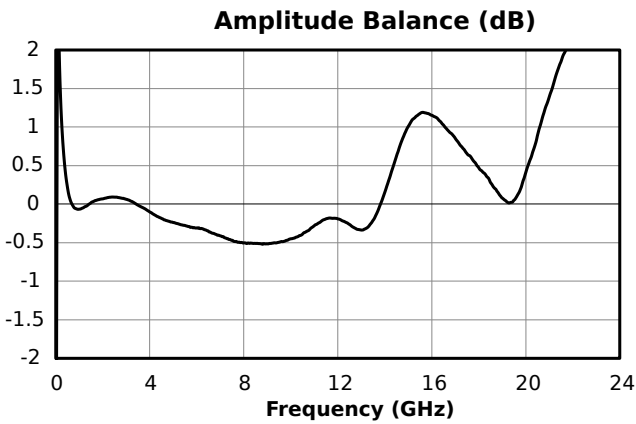
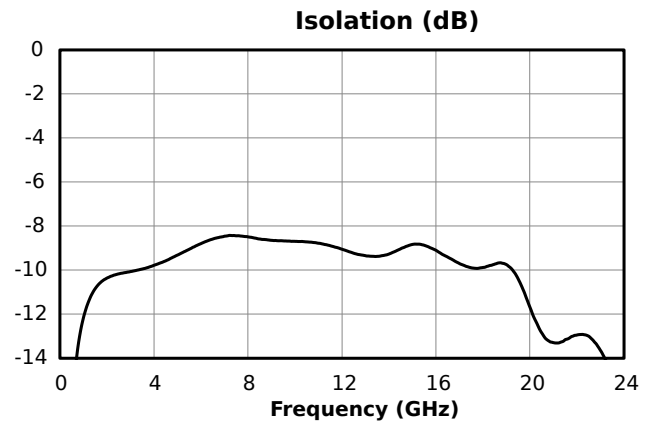
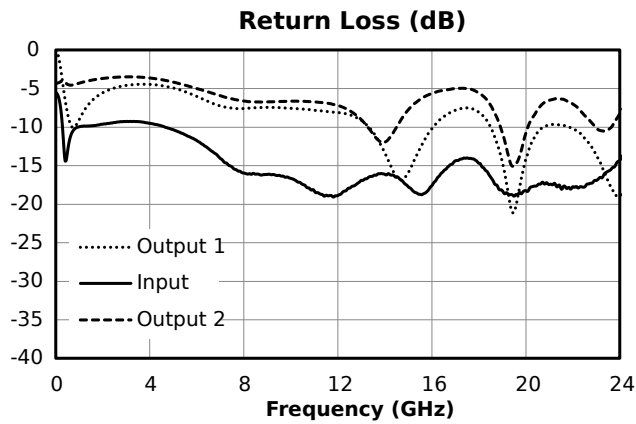
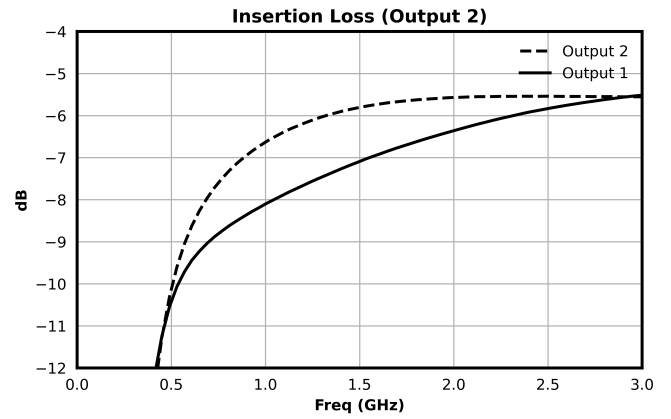
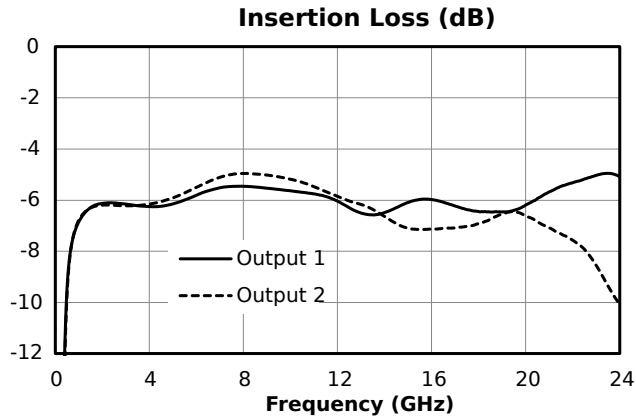
Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Amplitude Balance	25°C	0.5	20	-	0.3	-	dB
Common Mode Rejection	25°C	0.5	20	-	32	-	dB
Common Port Return Loss	25°C	0.5	20	-	16	-	dB
Impedance	25°C	0.5	20	-	50	-	Ω
Insertion Loss as a Mode Converter	25°C	0.5	20	-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

Mixed Mode Scattering Parameters in 50 Ohm Differential System

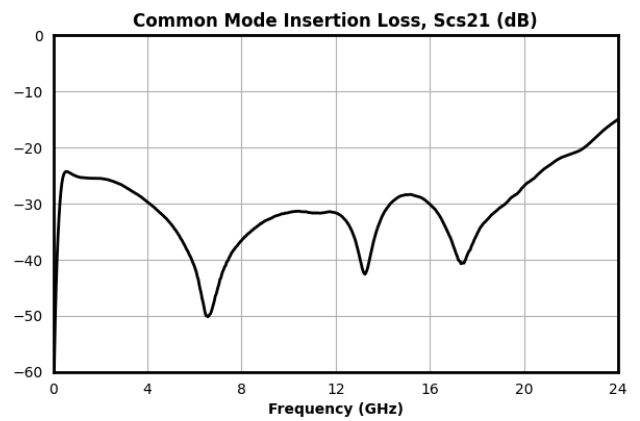
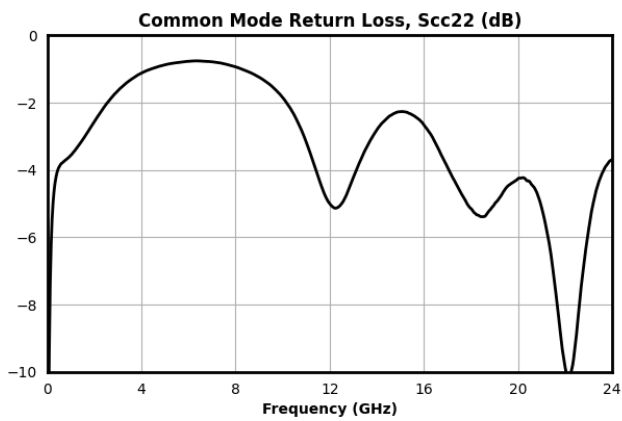
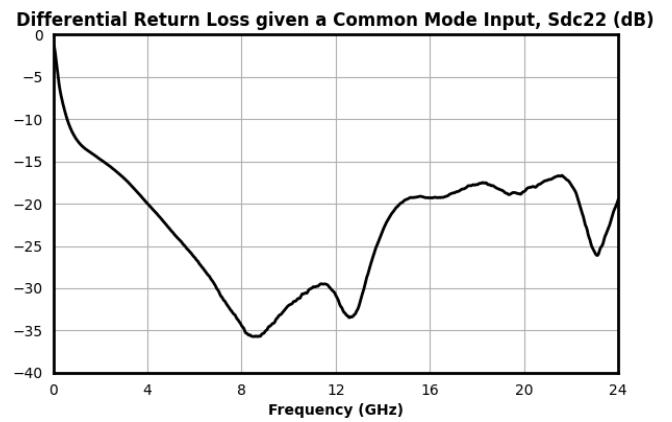
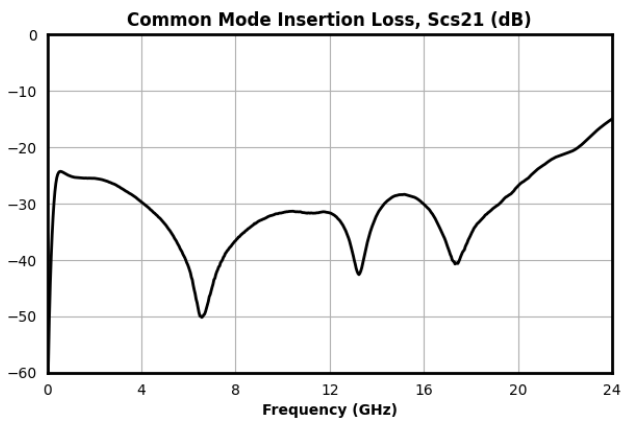
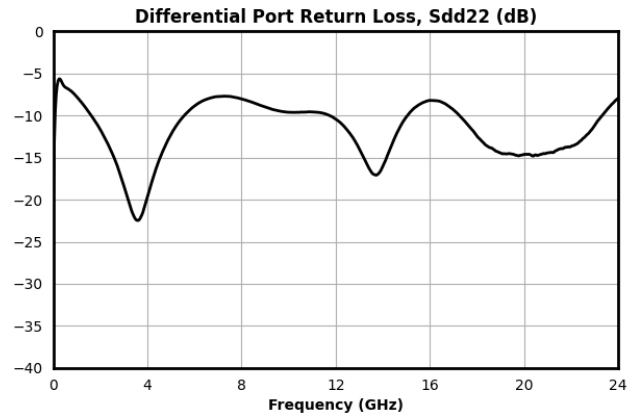
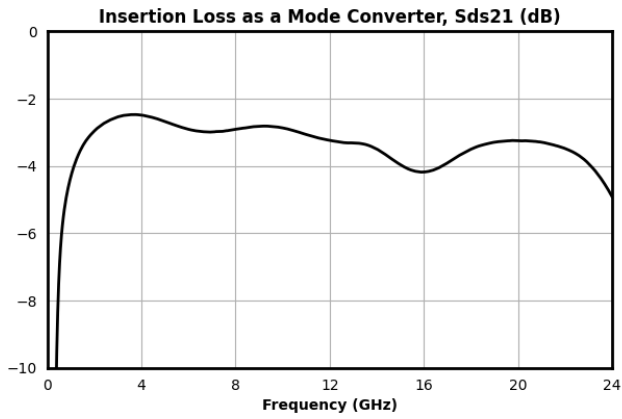
Mixed mode scattering parameters are used to characterize differential circuits. For baluns, this means that the 0° and 180° ports become a single 50Ω differential port and the common port remains the same 50Ω common port. For more information about 1:1 balun data, visit [MBAL vs. MBALH Data](#). The two-port s-parameters of the balun are then characterized based on differential (d), common mode (c), or single-ended (s) signals. For example: Scs12 is the Common output response given a single ended input.



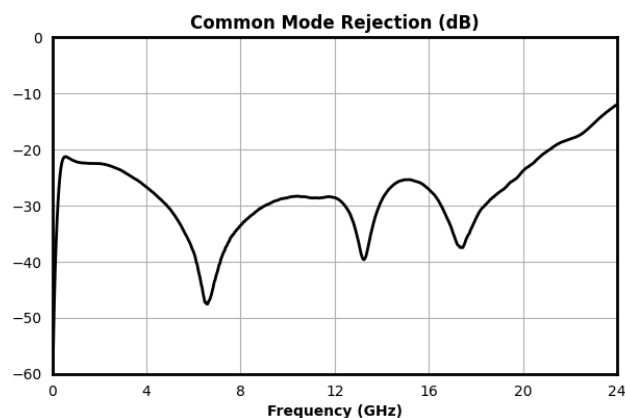
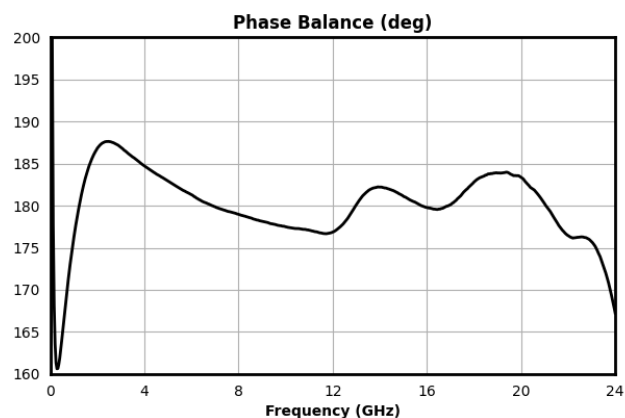
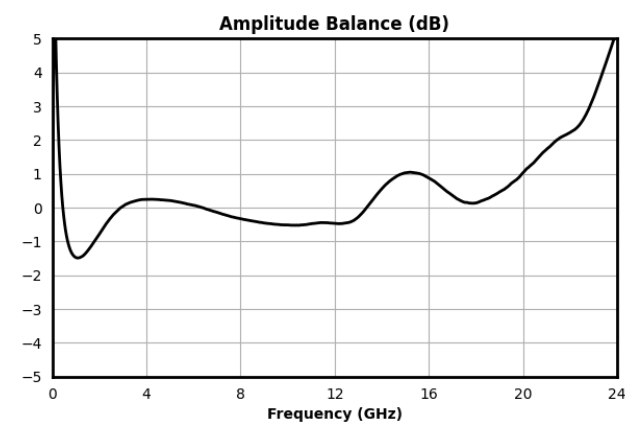
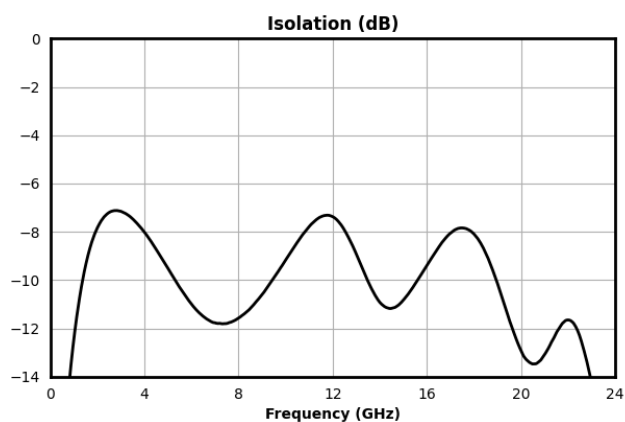
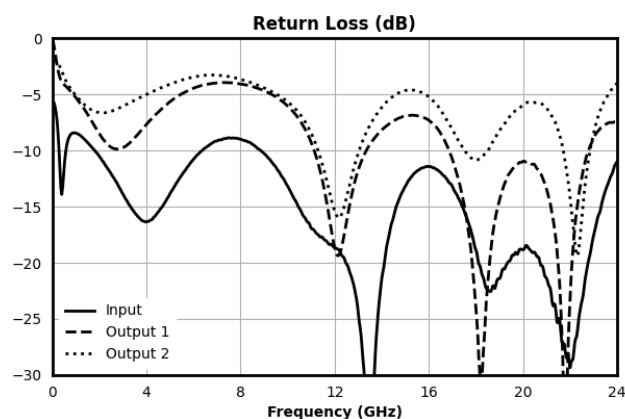
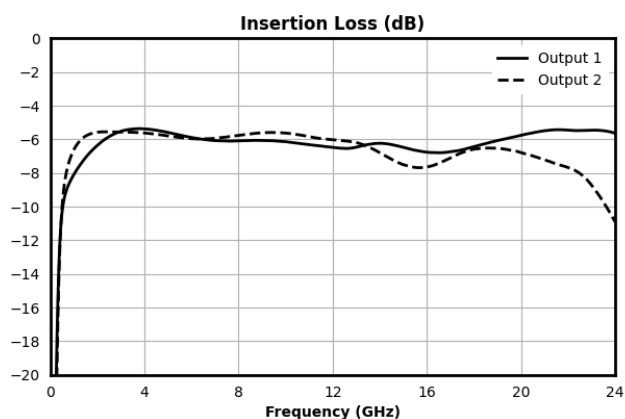
Typical Performance Scattering Parameters in 50 Ohm Differential System



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).

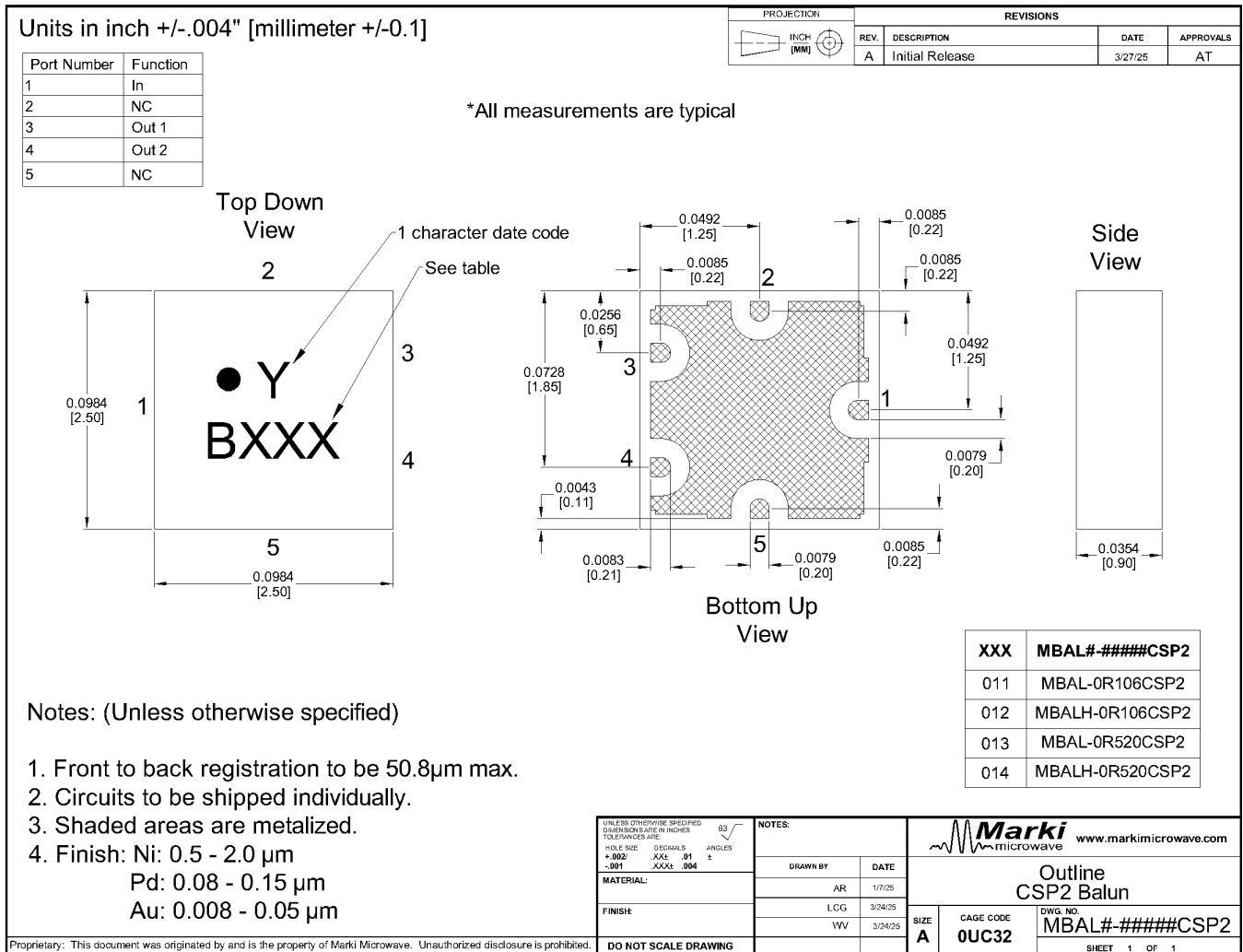
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Balun

Mechanical Data

Outline Drawing

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



EVb Out- refers to output Out 1

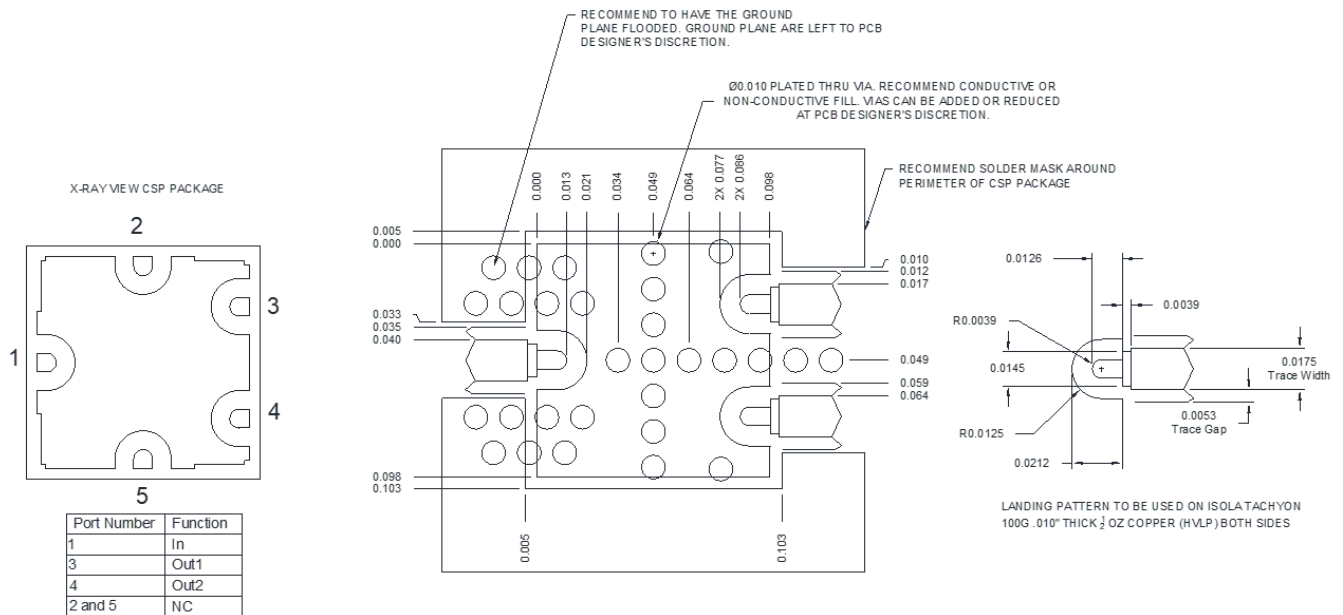
EVb Out+ refers to output Out 2

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Balun

Footprint Image

Download : [Footprint Drawing](#)



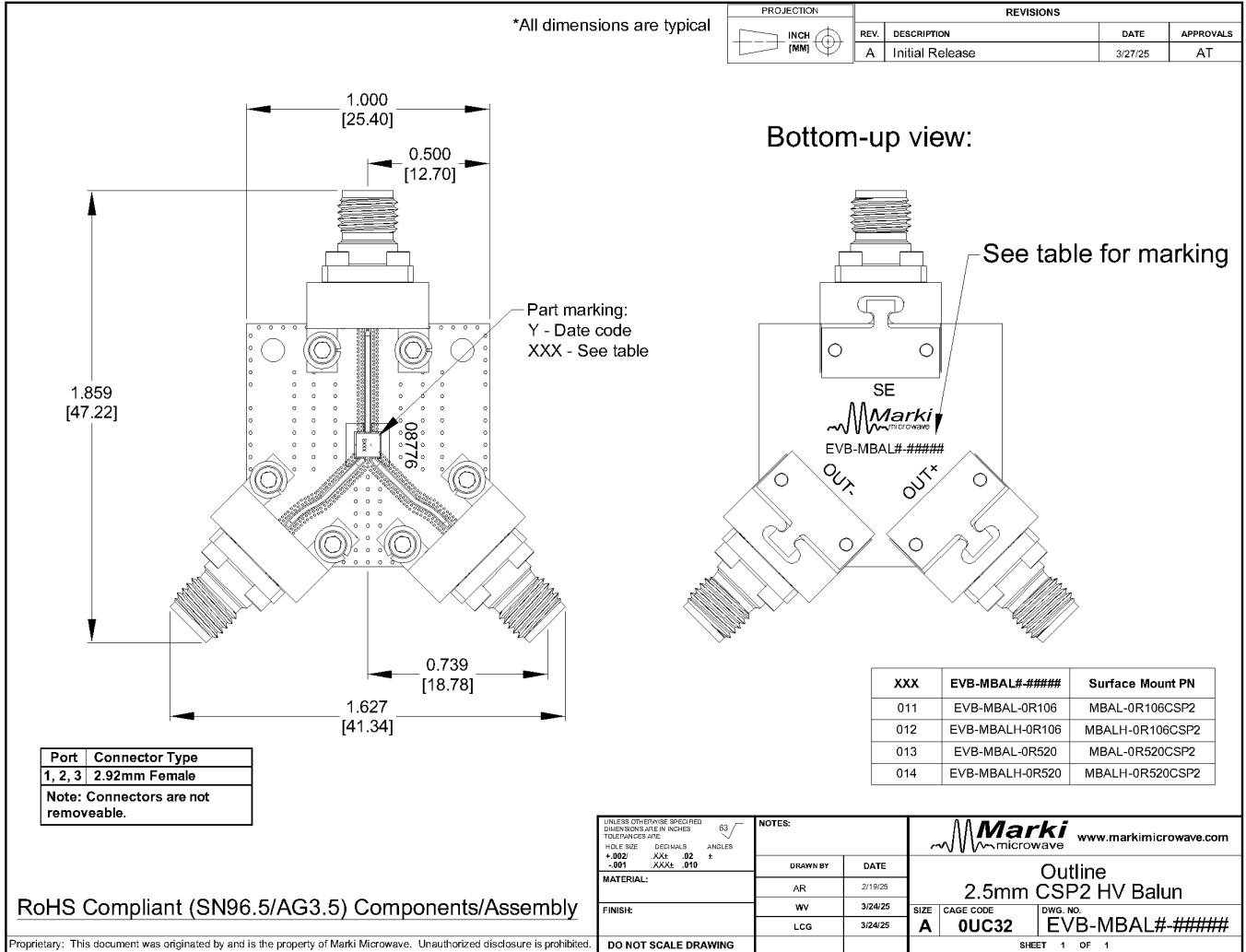
Evaluation Board - Performance Data

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

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

Evaluation Board - Outline Drawing



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