

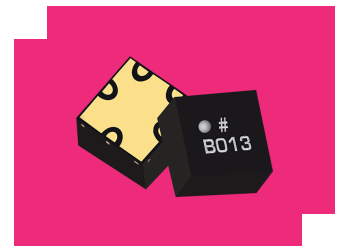
MBAL-0R520CSP2

0.5-20 GHz Passive MMIC Chip Scale Package 1:2 Balun

DEVICE OVERVIEW

General Description

The MBAL-0R520CSP2 is a GaAs passive MMIC 2:1 balun that features excellent 31 dB common mode rejection over a 0.5 to 20 GHz operational bandwidth. The MBAL-0R520CSP2 is footprint compatible with the 1:1 MBALH-0R520CSP2, offering flexibility in system design. For ADC and DAC interface applications, the choice between the 2:1 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](#)

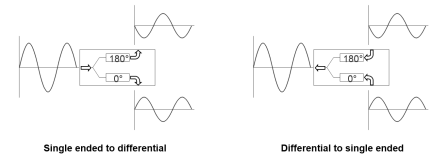
Features

- 2:1 Impedance Ratio
- 0.5 GHz to 20 GHz Balun (50Ω Common to 100Ω Differential)
- Optimal Phase and Amplitude Balance of 2° and 0.2 dB
- 31 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
MBAL-0R520CSP2	0.5-20 GHz Passive MMIC Chip Scale Package 1:2 Balun	CSP2	REACH RoHS	Released	EAR99
<u>EVB-MBAL-0R520</u>	Evaluation Board, 0.5-20 GHz Passive MMIC Chip Scale Package 1:2 Balun	EVB	REACH RoHS	Released	EAR99

MBAL-0R520CSP2

0.5-20 GHz Passive MMIC Chip Scale Package 1:2 Balun

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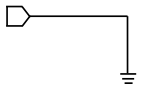
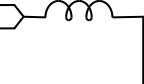
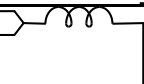
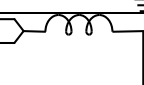
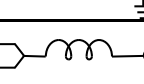
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Revision History

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.	

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0.5-20 GHz Passive MMIC Chip Scale Package 1:2
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

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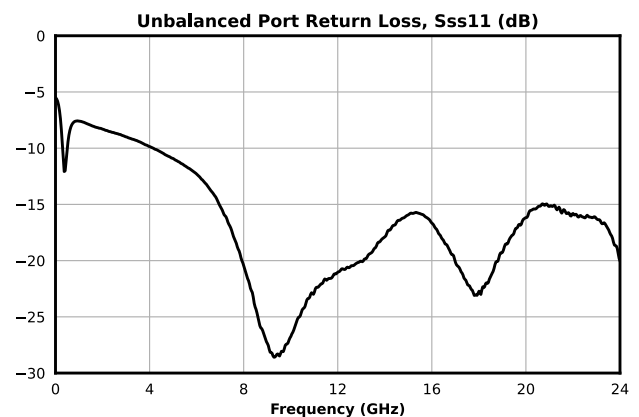
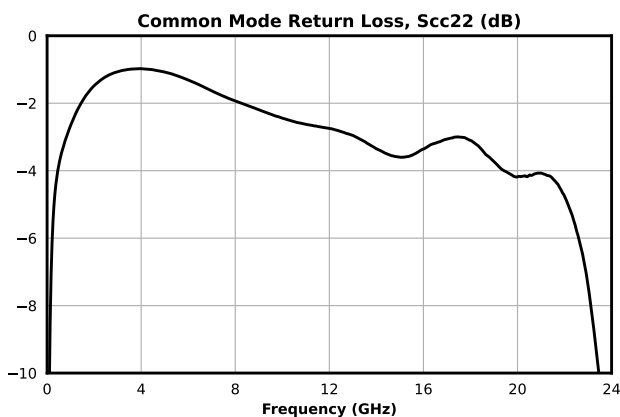
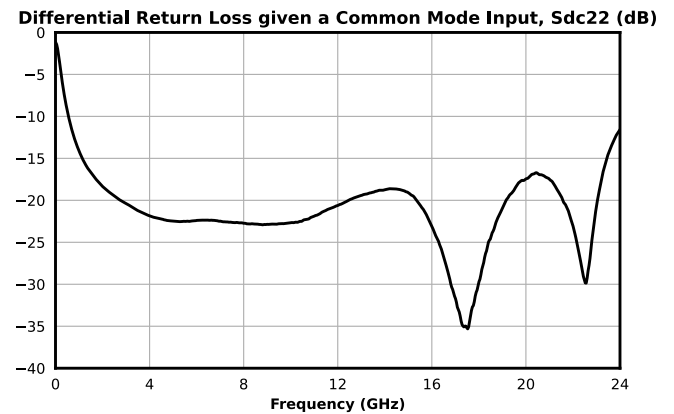
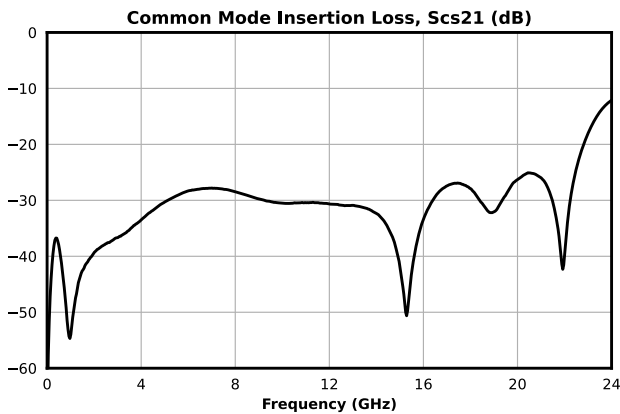
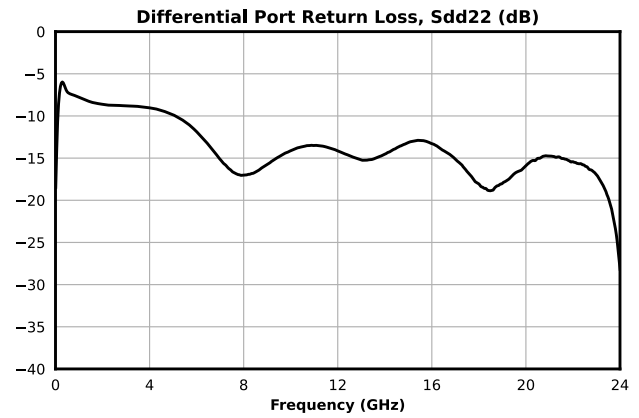
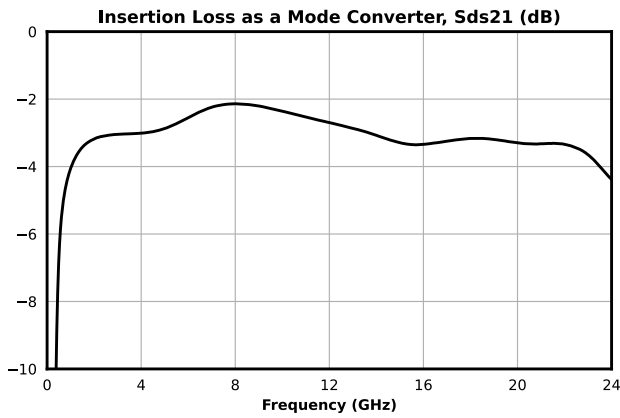
0.5-20 GHz Passive MMIC Chip Scale Package 1:2
Balun

Electrical Specifications

Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Amplitude Balance	25°C	0.5	20	-	0.2	-	dB
Common Mode Rejection	25°C	0.5	20	-	31	-	dB
Common Port Return Loss	25°C	0.5	20	-	18	-	dB
Impedance	25°C	0.5	20	-	50	-	Ω
Insertion Loss as a Mode Converter	25°C	0.5	20	-	3	-	dB
Isolation	25°C	0.5	20	-	7	-	dB
Nominal Phase Shift	25°C	0.5	20	-	180	-	°
Output Return Loss	25°C	0.5	20	-	8	-	dB
Phase Balance	25°C	0.5	20	-	2.3	-	°
Impedance Ratio	-	-	-	-	2:1	-	

Mixed Mode Scattering Parameters

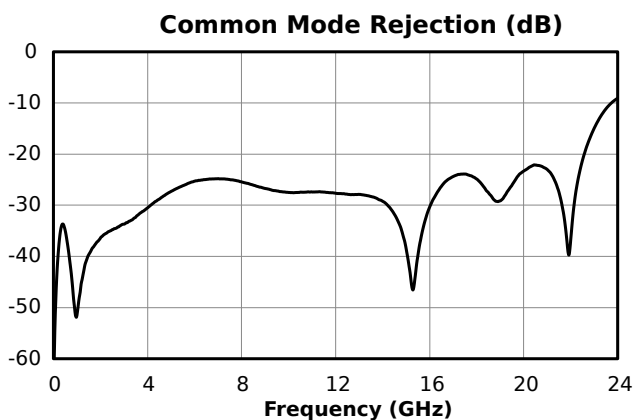
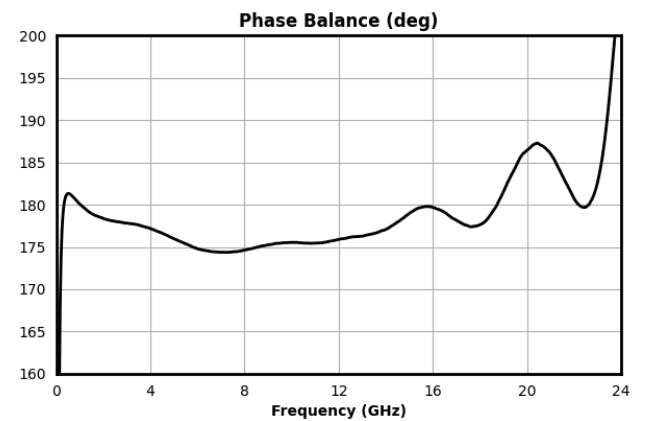
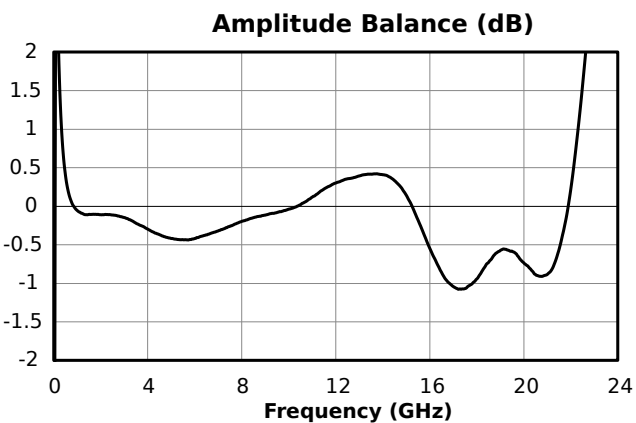
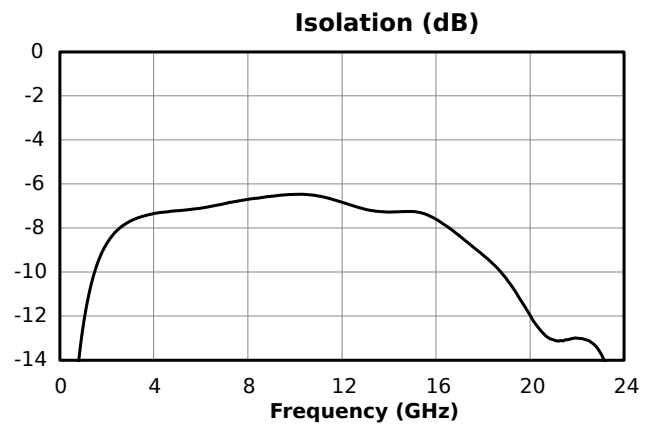
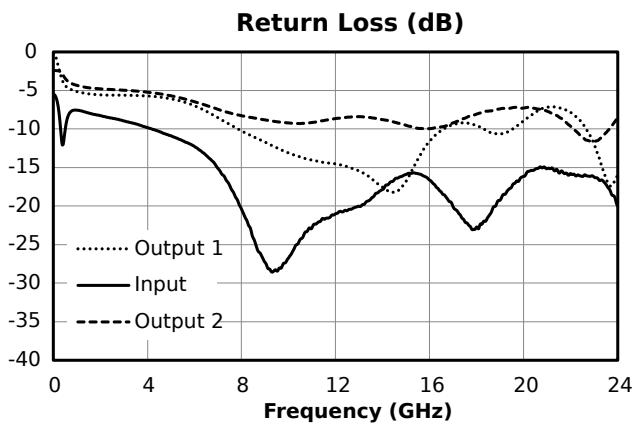
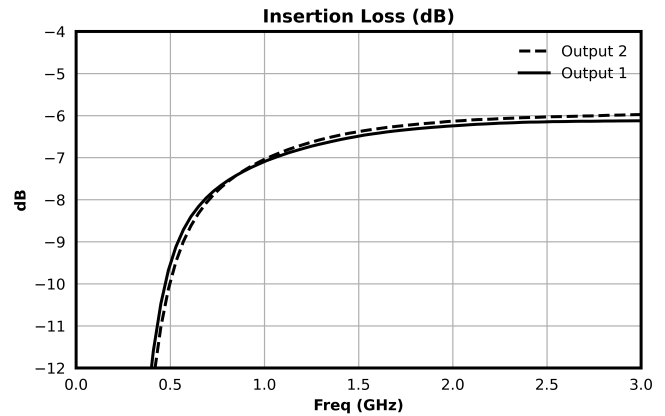
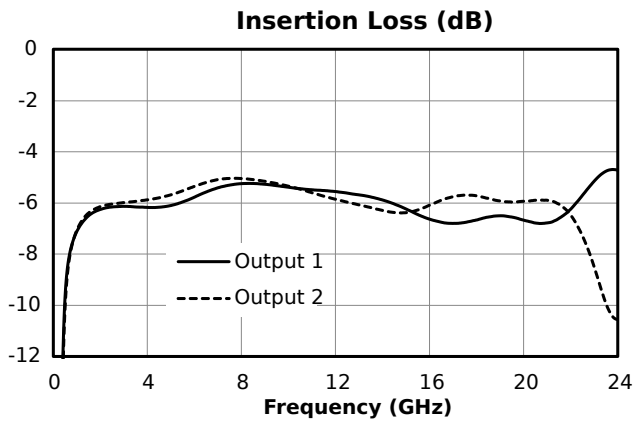
Mixed mode scattering parameters are used to characterize differential circuits. For baluns, this means that the 0° and 180° ports become a single 100Ω differential port and the common port remains the same 50Ω common port. The two-port s-parameters of the balun are then characterized based on differential (d), common mode (c), or single-ended (s) signals. For example: Scs12 is the Common output response given a single ended input.



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Typical Performance Scattering Parameters



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

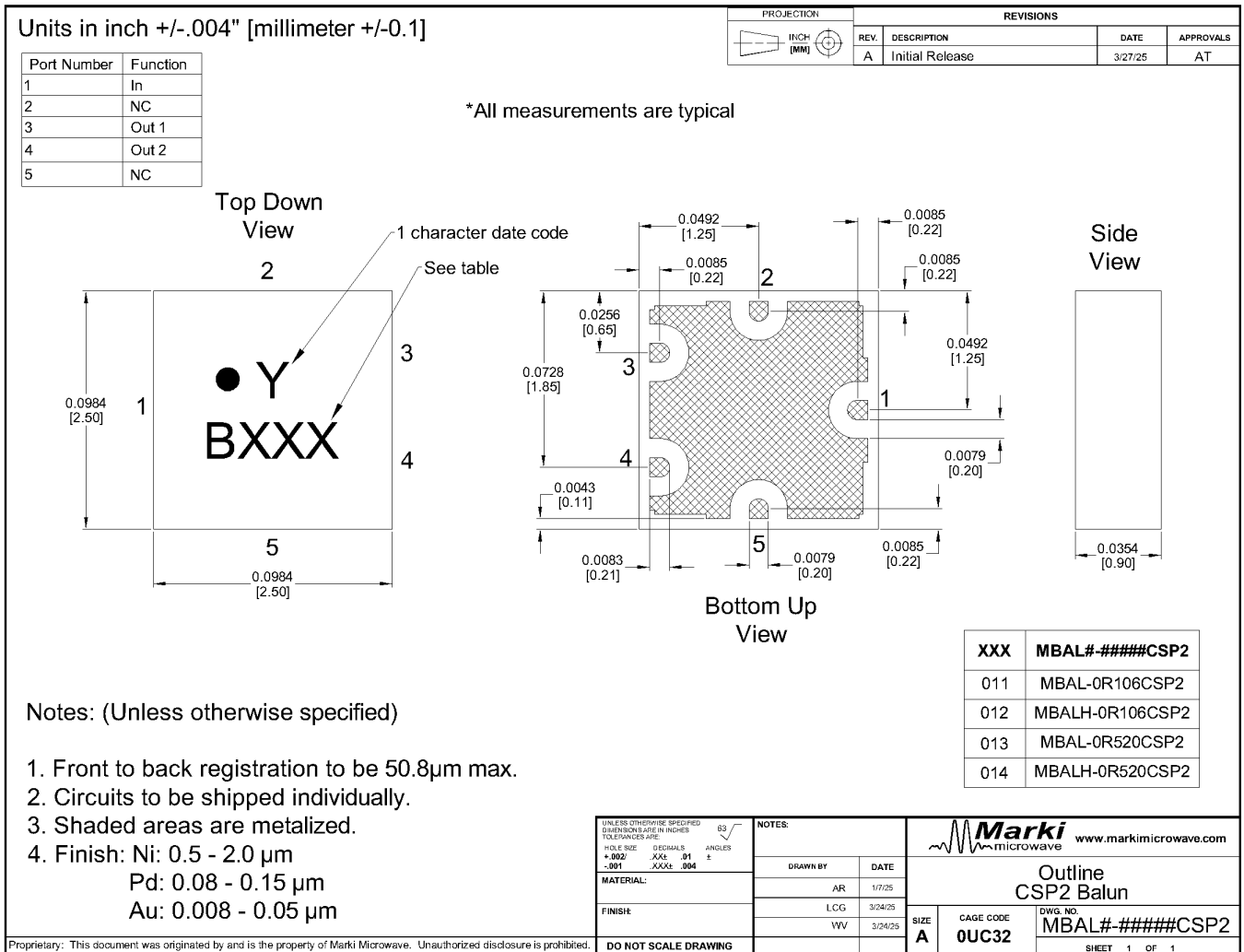
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Mechanical Data

Outline Drawing

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



EVb Out- refers to output Out 1

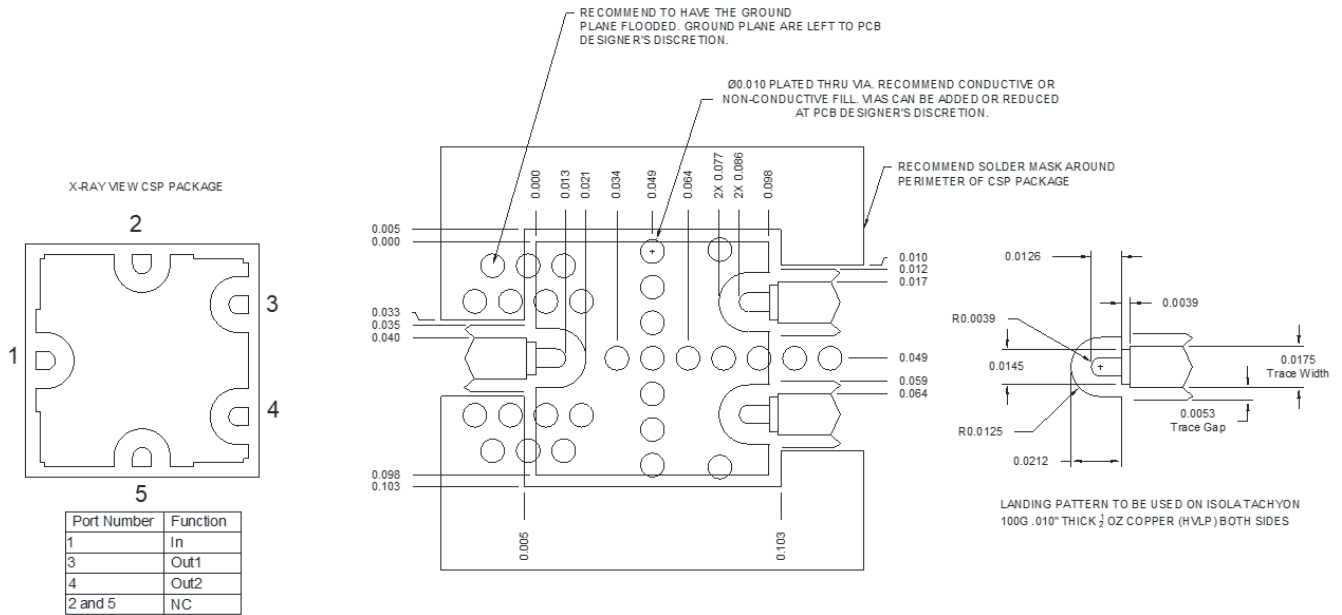
EVb Out+ refers to output Out 2

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Footprint Image

Download : [Footprint Drawing](#)



MBAL-0R520CSP2

0.5-20 GHz Passive MMIC Chip Scale Package 1:2
Balun

Evaluation Board - Performance Data

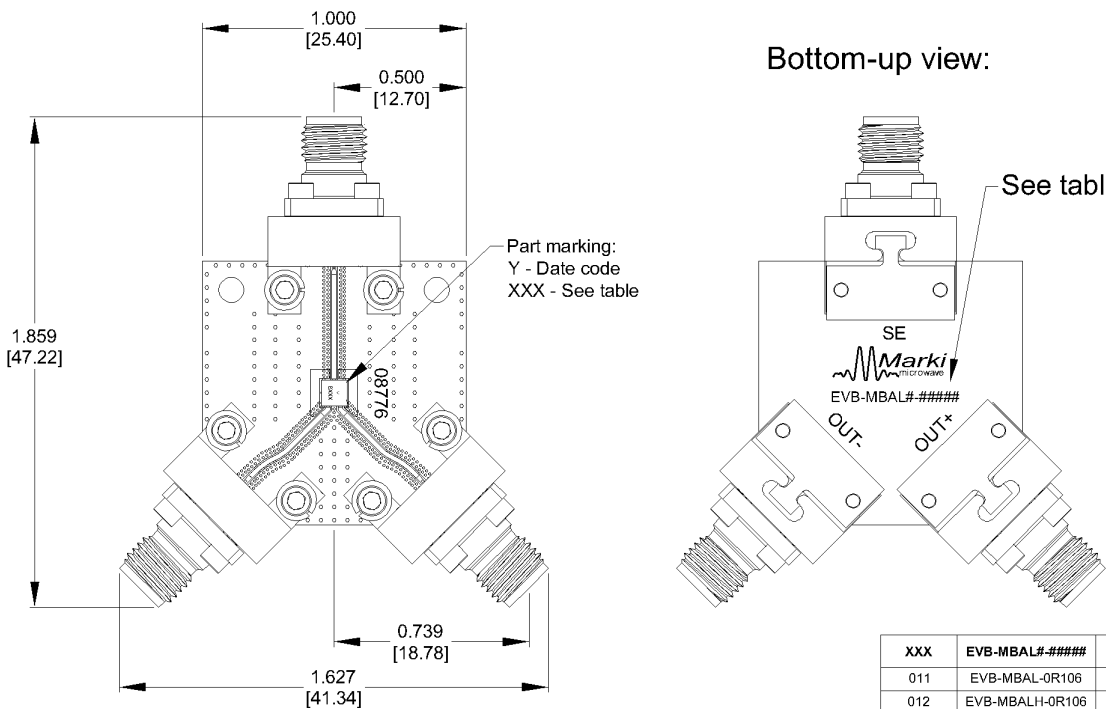
Parameter	Test Conditions	Frequency Range (GHz)	Min	Typ	Max	Unit
Impedance Ratio	-	-	-	2	-	

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0.5-20 GHz Passive MMIC Chip Scale Package 1:2 Balun

Evaluation Board - Outline Drawing

*All dimensions are typical



Bottom-up view:

See table for marking

Part marking:
Y - Date code
XXX - See table

Port	Connector Type
1, 2, 3	2.92mm Female

Note: Connectors are not removable.

XXX	EVB-MBAL#-#####	Surface Mount PN
011	EVB-MBAL-0R106	MBAL-0R106CSP2
012	EVB-MBALH-0R106	MBALH-0R106CSP2
013	EVB-MBAL-0R520	MBAL-0R520CSP2
014	EVB-MBALH-0R520	MBALH-0R520CSP2

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		NOTES:		Marki microwave www.markimicrowave.com	
TOLERANCES ARE:		DRAWN BY	DATE	Outline 2.5mm CSP2 HV Balun	
FRACTIONS DECIMALS ANGLES		AR	2/19/25		
+ .002 .XXX .02 ±		WV	3/24/25		
- .001 .XXX ± .010		LCG	3/24/25		
MATERIAL:		SIZE	CAGE CODE	DWG. NO.	0UC32 EVB-MBAL#-#####
FINISH:		A	0UC32	EVB-MBAL#-#####	
DO NOT SCALE DRAWING		SHEET 1 OF 1			

RoHS Compliant (SN96.5/AG3.5) Components/Assembly

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