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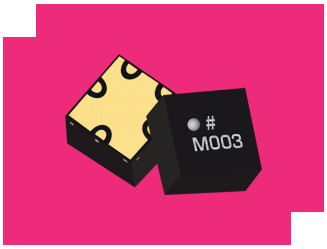
MBAL-0220CSP2

2-20 GHz Passive MMIC Chip Scale Package Balun

DEVICE OVERVIEW

General Description

Obtain die-level balun performance in a compact surface mount package using Marki Microwave's CSP2 chip scale package technology. The MBAL-0220CSP2 is a GaAs passive MMIC balun featuring a frequency range of 2 to 20 GHz. Designed in a leadfree, RoHS compliant CSP2 package, it is compatible with standard pick and place assembly. It is an ideal solution to interface into dataconverters for S-K band digital beamforming and other higher order Nyquist sampling applications, clock distribution, and balanced amplifiers.



Download s-parameters here

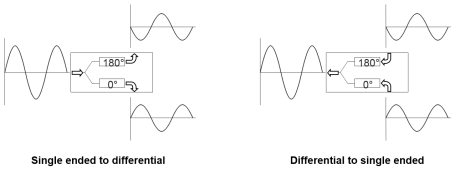
Features

- 2 GHz to 20 GHz 1:2 Balun (Balanced to Unbalanced Transformer)
- Tuned for Optimal Phase/Amplitude Balance
- Compact 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-0220CSP2	2-20 GHz Passive MMIC Chip Scale Package Balun	CSP2	REACH RoHS	Released	EAR99
EVB-MBAL-0220	Evaluation Board, 2-20 GHz Passive MMIC Chip Scale Package Balun	EVB	REACH RoHS	Released	EAR99

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Table Of Contents

Revision History

Revision Code	Revision Date	Comment
-	2024-02-28	Datasheet Initial Release

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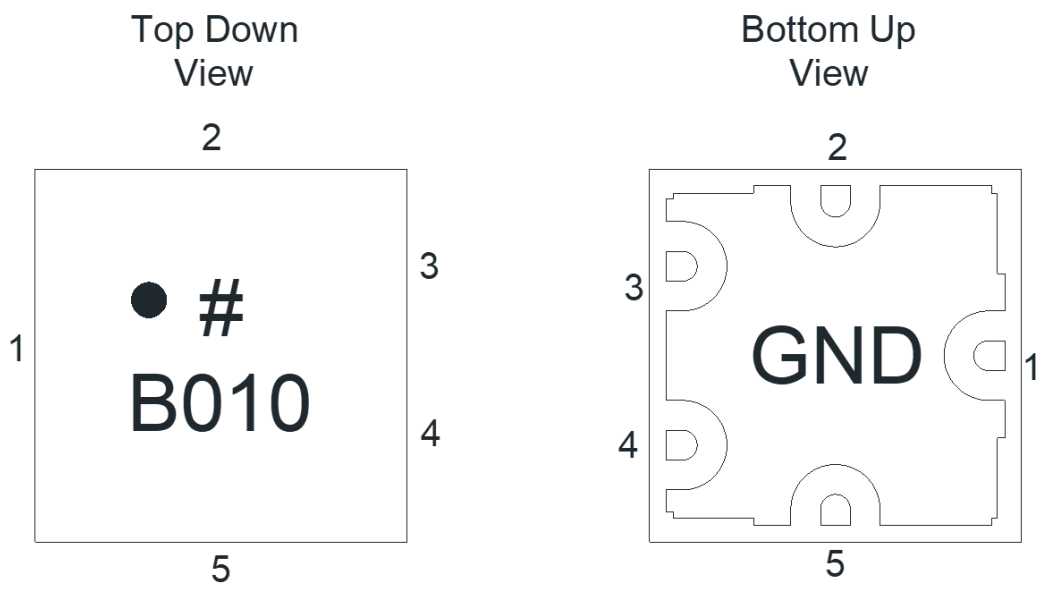
Port Configuration and Functions

Port Diagram



Port Functions

Port	Function	Description	Equivalent Circuit for Package
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 open 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.	NC

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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

Package Information

Parameter	Details	Rating
Dimensions	-	2.50 x 2.50 mm
Moisture Sensitivity Level	-	MSL 3

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Electrical Specifications

Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Insertion Loss as a Mode Converter	-	2	3	-	1.4	6	dB
Insertion Loss as a Mode Converter	-	3	20	-	1.9	4	dB
Nominal Phase Shift	-	2	20	-	180	-	°
Amplitude Balance	-	2	20	-	0.3	1	dB
Phase Balance	-	2	20	-	3	10	°
Common Mode Rejection	-	2	20	20	27	-	dB
Output Return Loss	-	2	20	-	7	-	dB
Common Port Return Loss	-	2	20	-	13	-	dB
Impedance	-	2	20	-	50	-	Ω
Isolation between differential ports	-	2	20	-	5.3	-	dB

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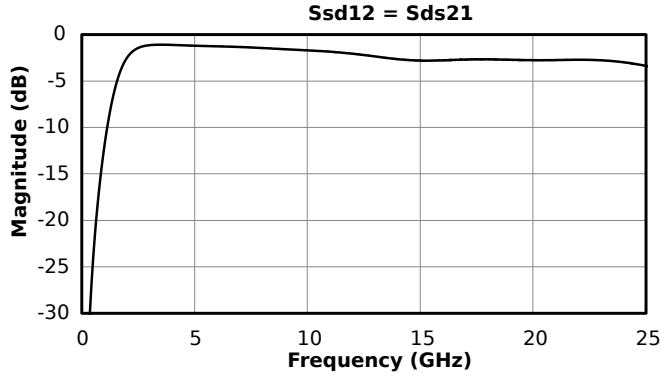
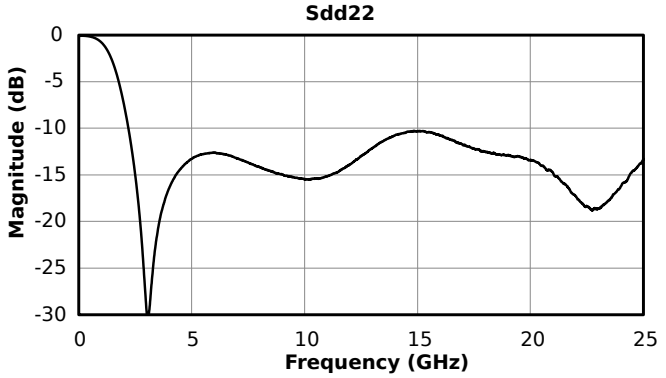
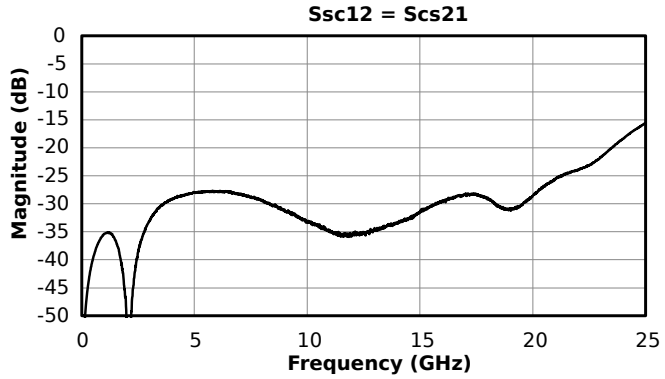
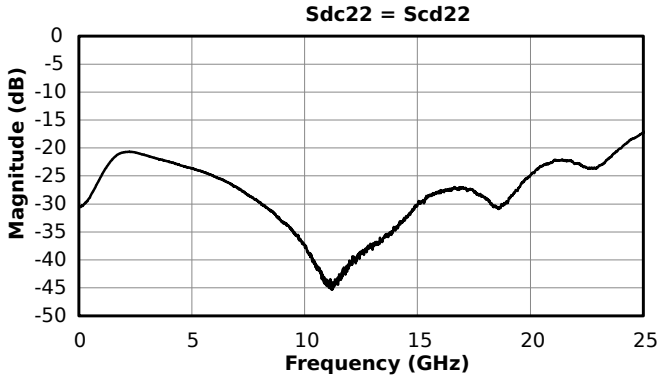
Mixed Mode Scattering Parameters

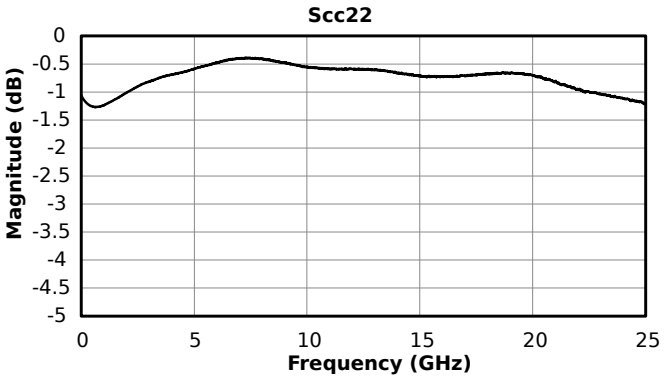
Mixed mode scattering parameters are used to characterize differential circuits. For baluns, this means that the 0° and 180° ports become a single 100Ω differential port and the common port remains the same 50Ω common port. The two-port s-parameters of the balun are then characterized based on differential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

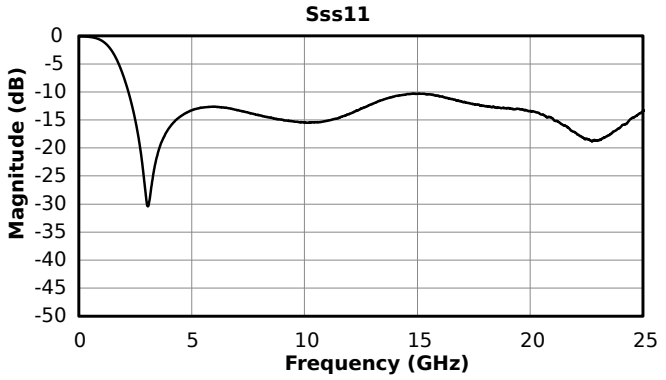












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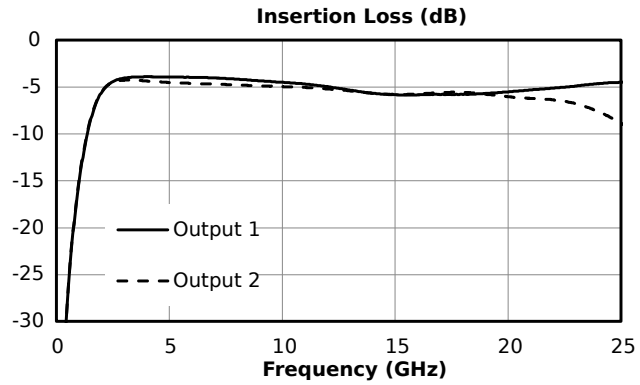
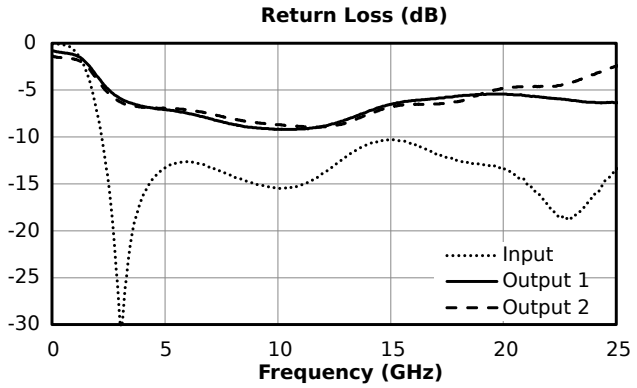
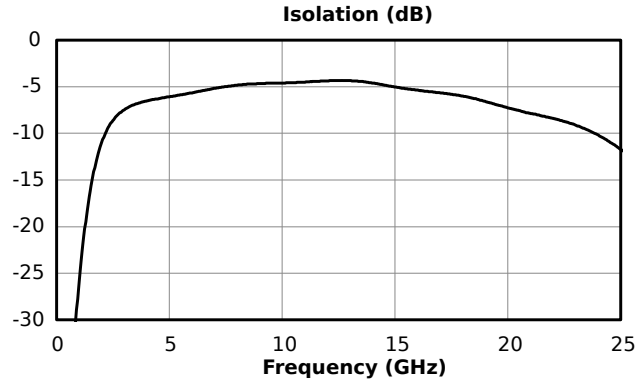
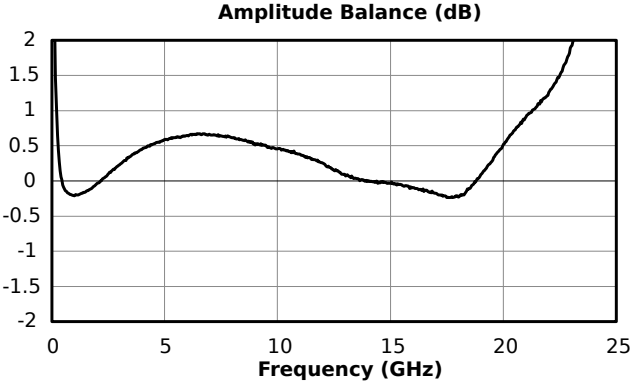
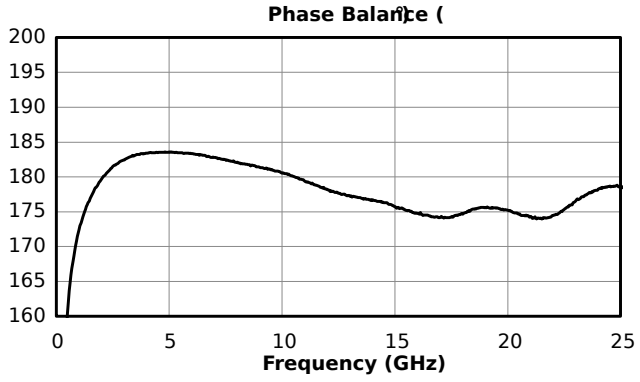
Typical Performance Scattering Parameters

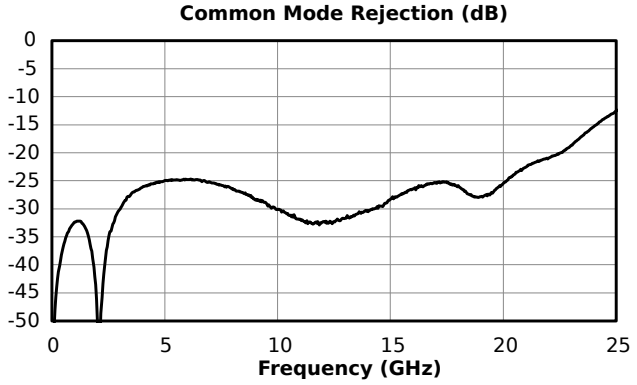












Measured data is de-embedded from fixture using AFR.

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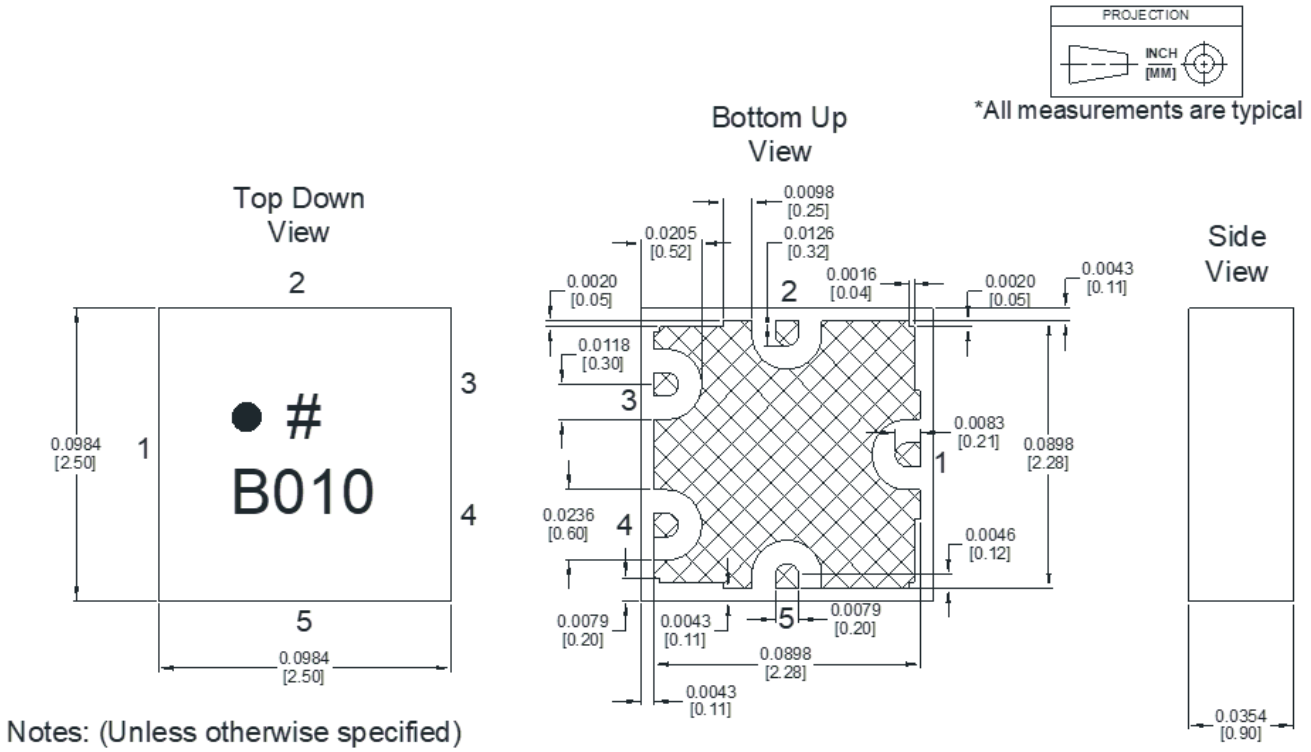
Mechanical Data

Outline Drawing

Download : Outline 2D Drawing | Outline 3D Drawing | Outline 3D STP



Notes: (Unless otherwise specified)

1. Front to back registration to be 50.8µm max.
2. Circuits to be shipped individually.
3. Shaded areas are metalized.
4. Finish: Ni: 0.5 - 2.0 µm
   Pd: 0.08 - 0.15 µm
   Au: 0.008 - 0.05 µm

Port Number	Function
1	In
3	Out1
4	Out2
2 and 5	NC

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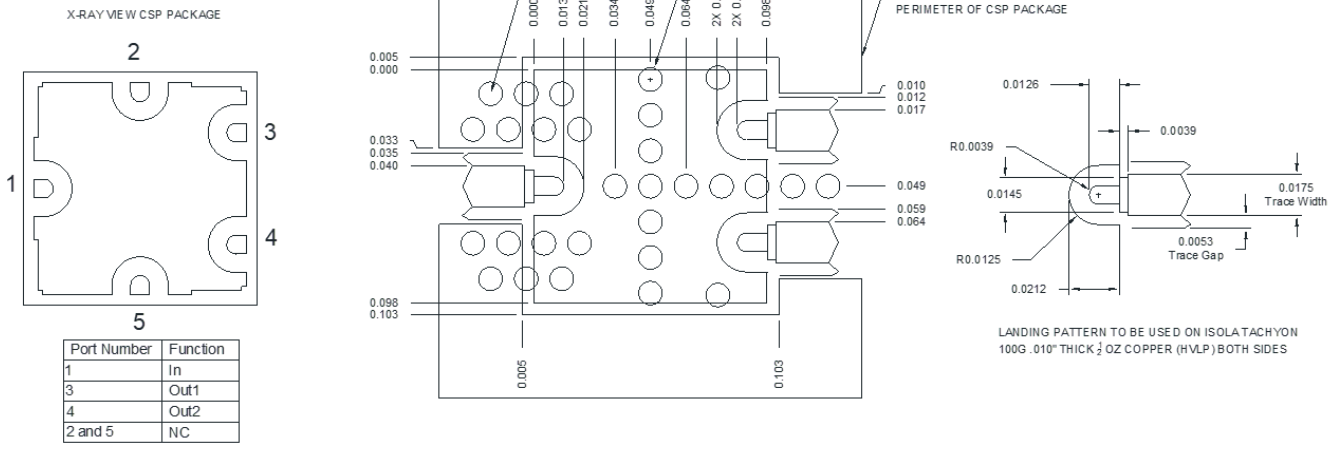
Footprint Image

Download : Footprint Drawing



Port Number	Function
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2 and 5	NC

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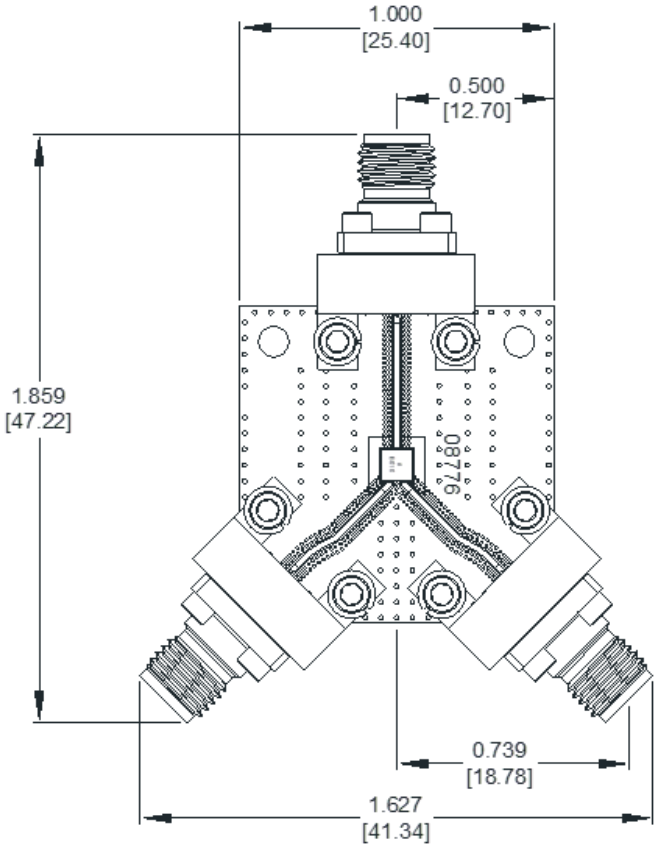
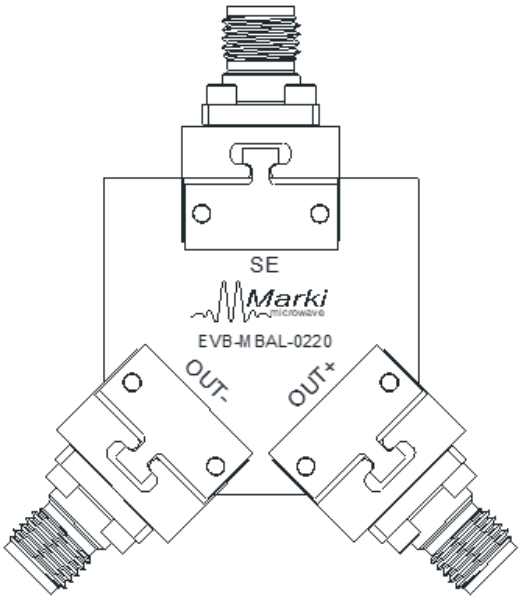
Evaluation Board - Outline Drawing

*All dimensions are typical



Bottom-up view:



Port	Connector Type
1, 2, 3	2.92mm Female
Note: Connectors are not removeable.	

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