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Sales & Customer Support: sales@markimicrowave.com
Tech Support: support@markimicrowave.com

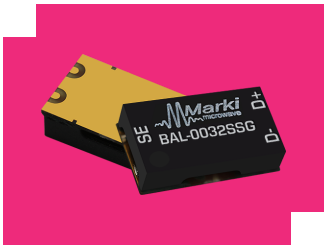
BAL-0032SSG

SURFACE-MOUNT BROADBAND BALUN

DEVICE OVERVIEW

General Description

The BAL-0032SSG is a surface-mount broadband balun, hand-tuned for optimal phase and amplitude balance over an industry leading 10 MHz to 32 GHz bandwidth. The BAL-0032SSG operates as an excellent choice for analog to digital converters, balanced receivers, baseband digital modulations, and signal integrity.



Download s-parameters here

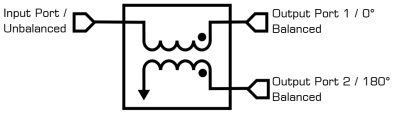
Features

- 2:1 Impedance Ratio
- 10MHz to 32GHz Balun (Balanced to Unbalanced Transformer)
- Transforms 50Ω to 100Ω Differential Output
- Tuned for Optimal Phase/Amplitude Balance

Applications

- Analog to Digital Converters
- Balanced Receivers
- Baseband Digital Modulation
- Signal Integrity

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
BAL-0032SSG	SURFACE-MOUNT BROADBAND BALUN	SSG	REACH RoHS	Released	EAR99
EVB-BAL-0032	Evaluation Board, 0.01 - 32 GHz Surface-Mount Broadband Balun	EVB	REACH RoHS	Released	EAR99

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Table Of Contents

Revision History

Revision Code	Revision Date	Comment
-	2022-06-01	Datasheet Initial Release
A	2023-01-01	Unit Spread Graphs Added
B	2025-05-19	3D model / footprint updated
C	2026-01-09	Power Handling Added

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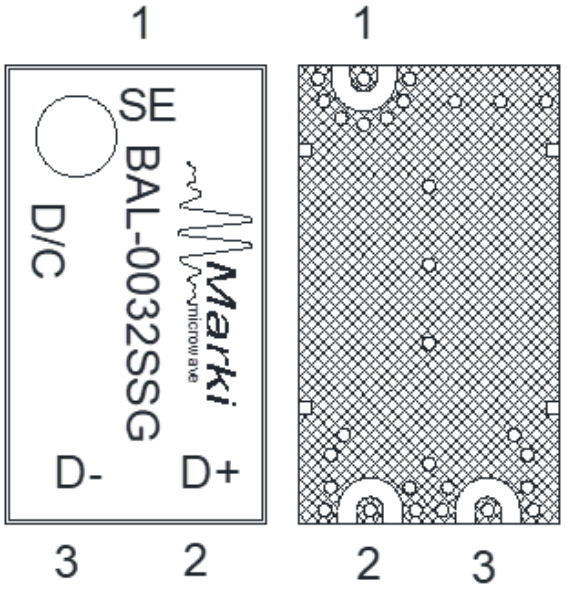
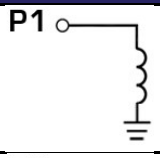
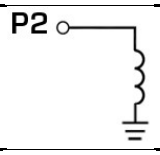
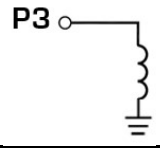
Port Configuration and Functions

Port Diagram

A top-down view of the BAL-0032SSG package outline drawing is shown below. Marki baluns are passive reciprocal devices allowing either single ended to differential or differential to single ended conversion.



Port Functions

Port	Function	Description	DC Equivalent Circuit
Port 1	Common Port / SE (Unbalanced)	The common port is DC short to ground.	
Port 2	D+ / 0° Port (Balanced)	The 0° port is DC short to ground.	
Port 3	D- / 180° Port (Balanced)	The 180° port is DC short to ground.	

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Specifications

Absolute Maximum Ratings

The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. Absolute Maximum Ratings are individual and should not be met in parallel. If these limits are exceeded, the device may be inoperable or have a reduced lifetime.

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 [1]	15	W

[1] Tested at 6GHz

Package Information

Parameter	Details	Rating
Dimensions	-	5.08 x 8.89 mm
Moisture Sensitivity Level	-	MSL 1

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Electrical Specifications

The electrical specifications apply at TA=+25°C in a 50Ω system. Min and Max limits are guaranteed at TA=+25°C.

Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Amplitude Balance	-	0.1	20	-	0.5	1.3	dB
Amplitude Balance	-	20	32	-	0.5	1.5	dB
Common Mode Rejection	-	0.1	20	-	25	22	dB
Common Mode Rejection	-	20	32	-	25	18	dB
Impedance	-	-	-	-	50	-	Ω
Impedance Ratio	-	-	-	-	2:1	-	
Insertion Loss as a Mode Converter	-	0.01	32	-	5	8	dB
Isolation	-	0.01	32	-	8	-	dB
Nominal Phase Shift	-	0.1	32	-	180	-	°
Phase Balance	-	0.01	20	-	5	10	°
Phase Balance	-	20	32	-	5	13	°
Return Loss (Common)	-	0.1	32	-	8	-	dB
Return Loss (Output)	-	0.01	32	-	9	-	dB

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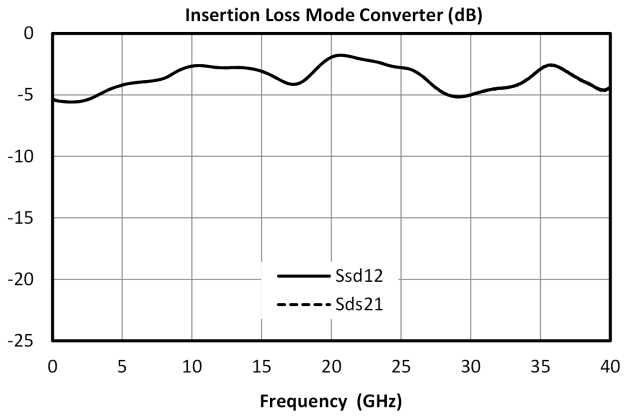
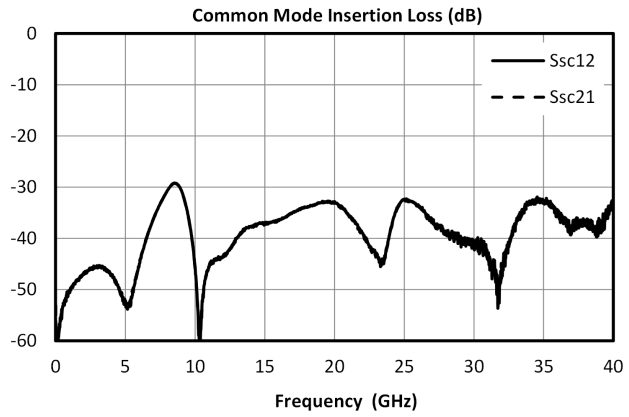
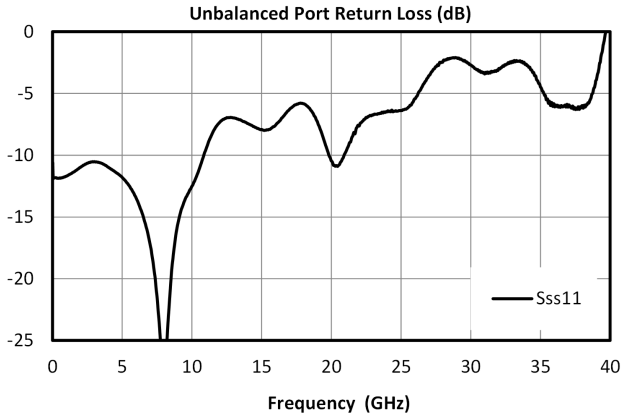
Typical Mixed Mode Performance Plots

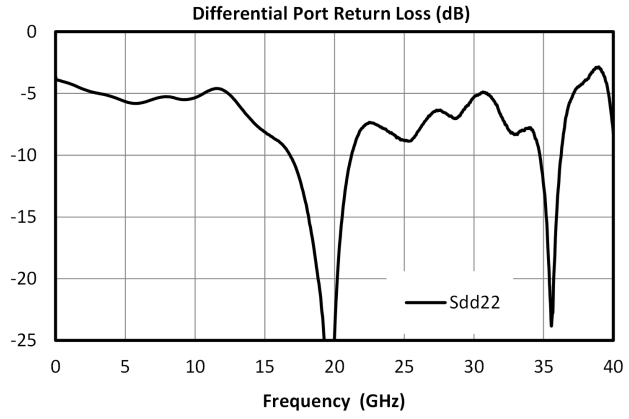
Mixed mode scattering parameters are used to characterize differential circuits. For baluns, this means that the 0° and 180° ports become a single 100Ω differential port and the common port remains the same 50Ω common port. The two-port s-parameters of the balun are then characterized based on differential (d), common mode (c), or single-ended (s) signals. Sds21 is the differential output response given a single ended input.

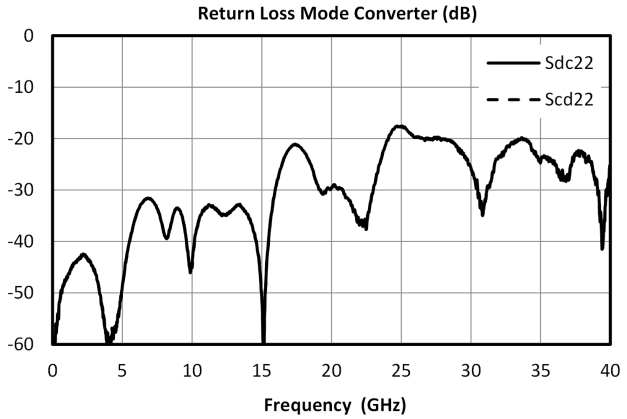
Typical performance plots are evaluation board measurements with fixturing to the device pins de-embedded

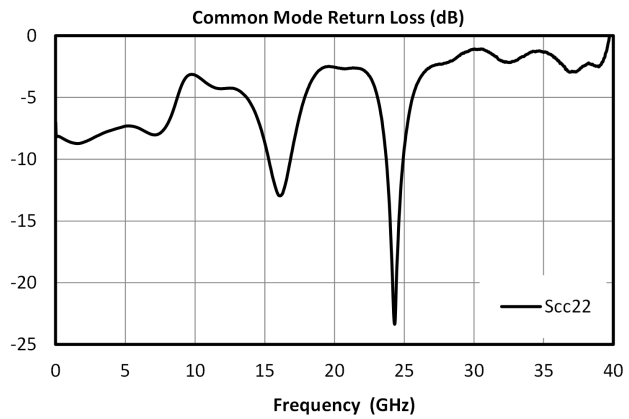












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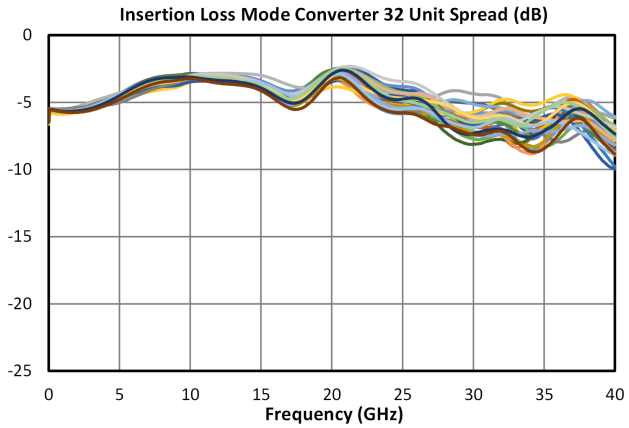

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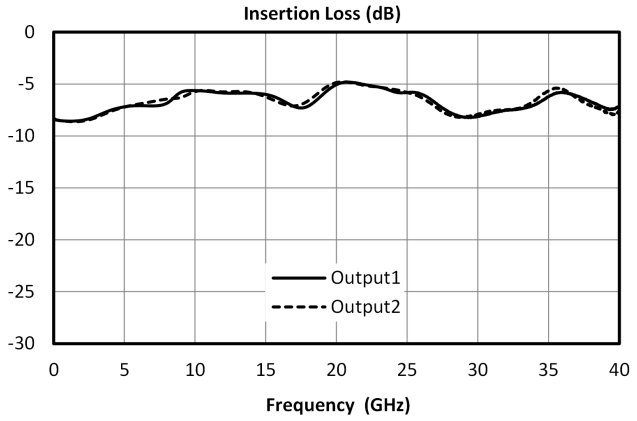
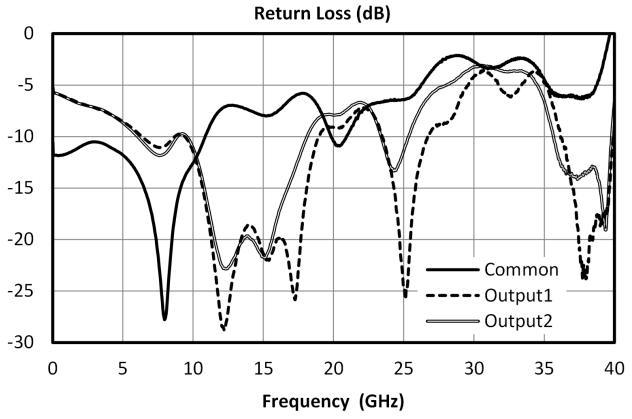
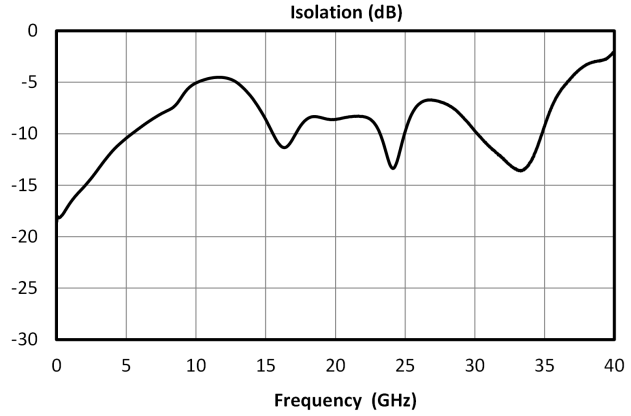
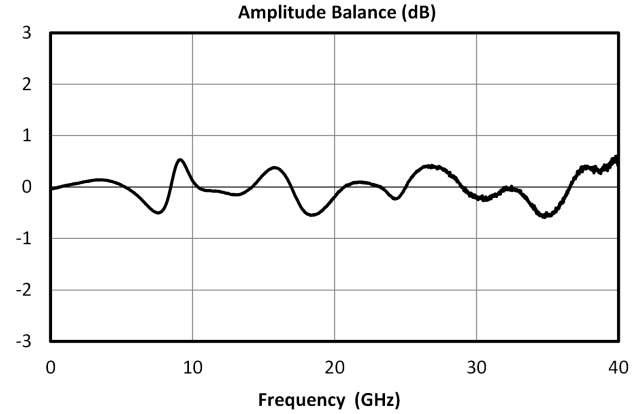
Typical Performance Plots

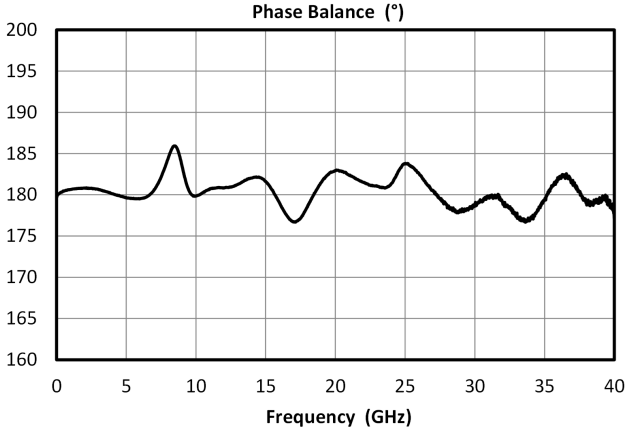
Three port scattering parameters measured as three single-ended 50Ω ports showing relationship between any two ports.

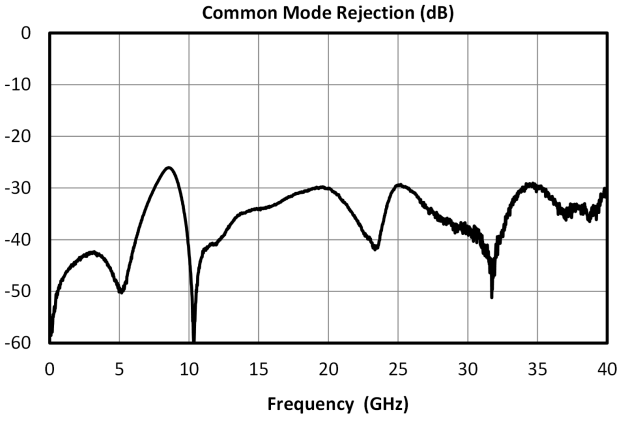












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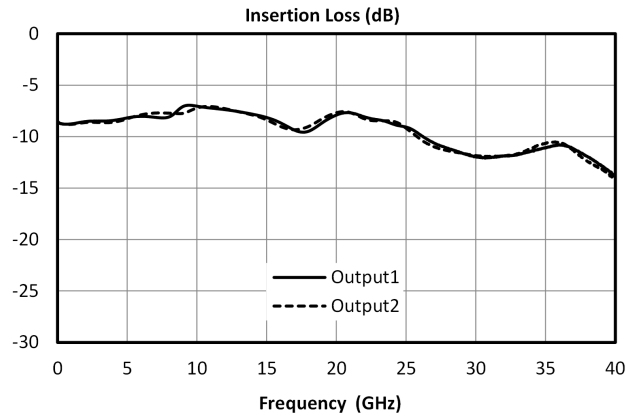
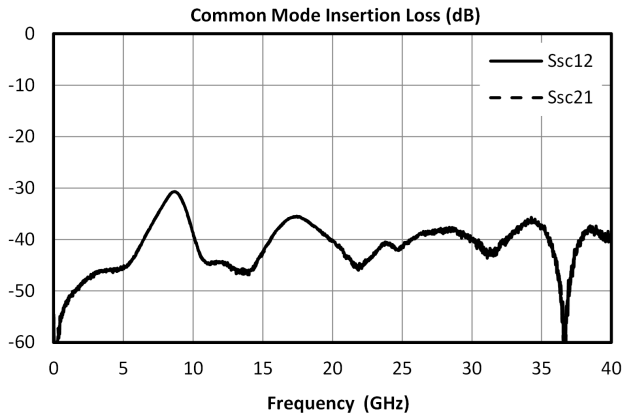
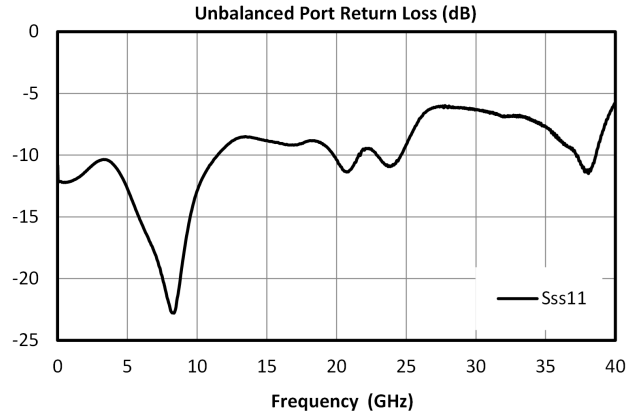
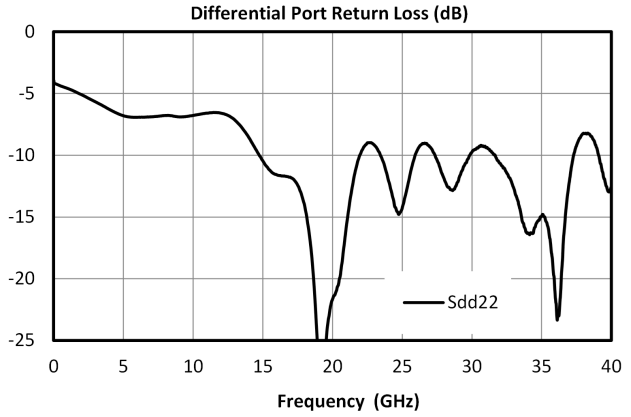
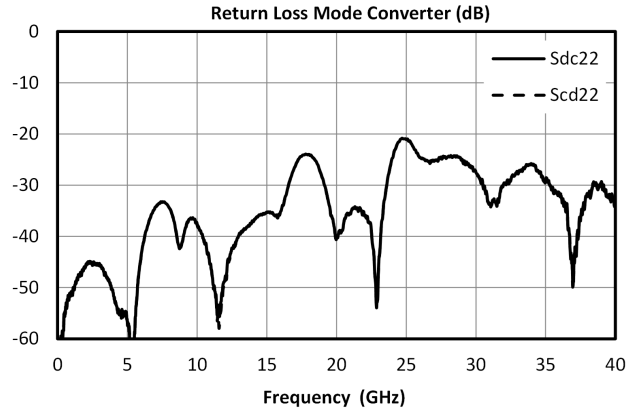
Typical EVB Mixed Mode Performance Plots

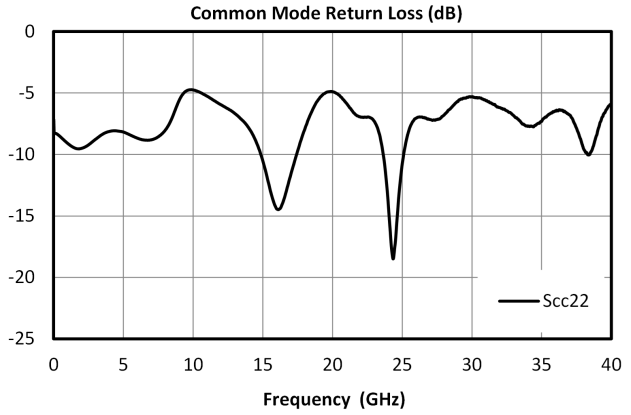












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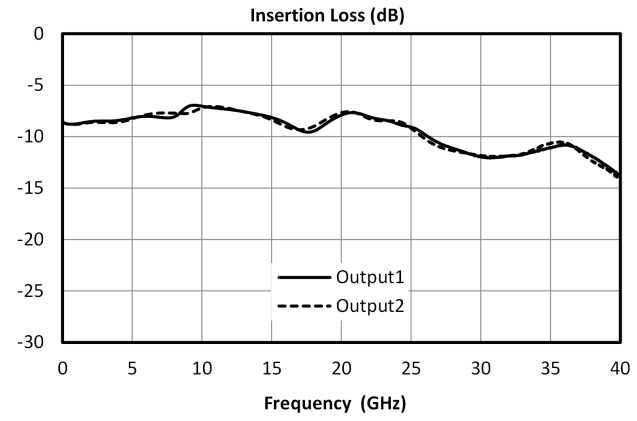
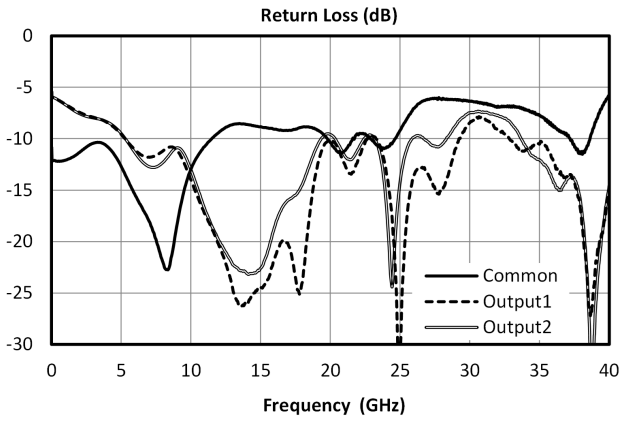
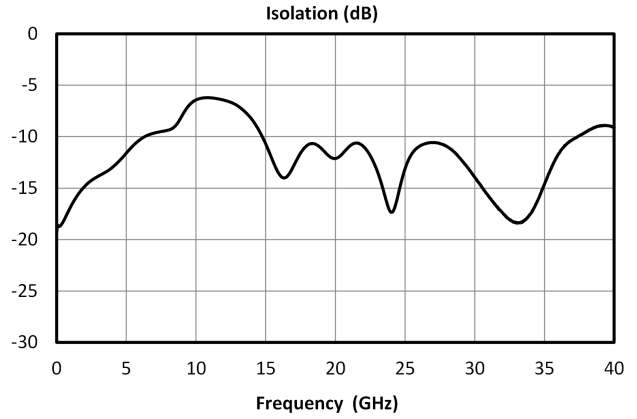
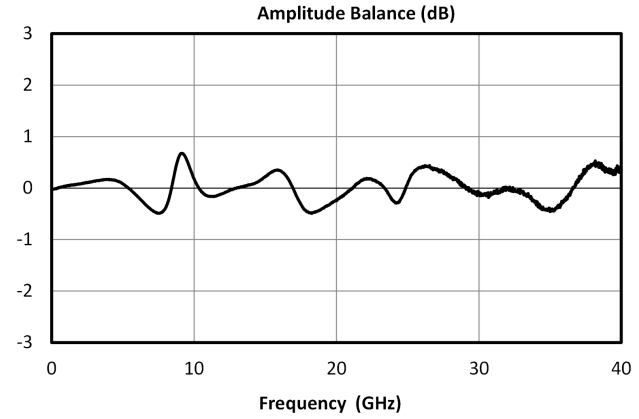
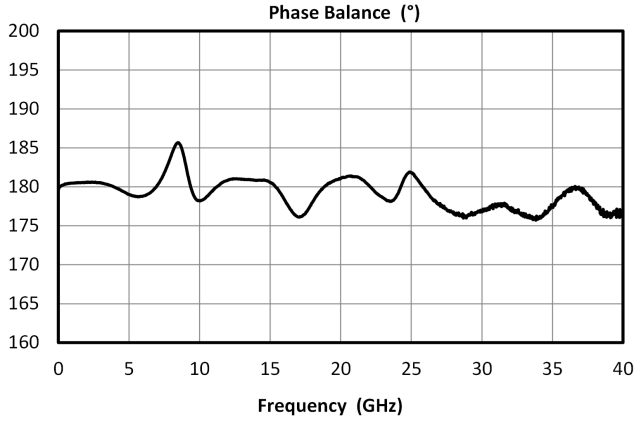
Typical EVB Performance Plots

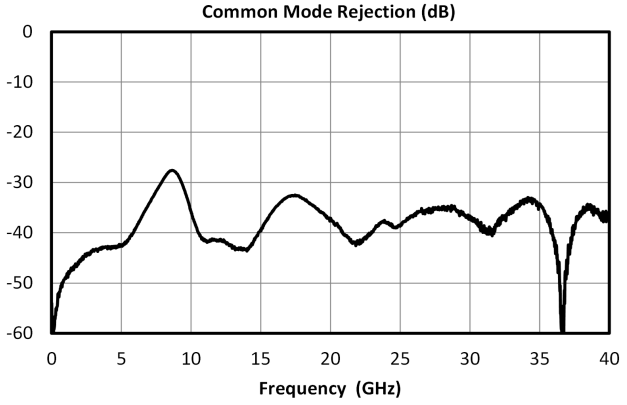












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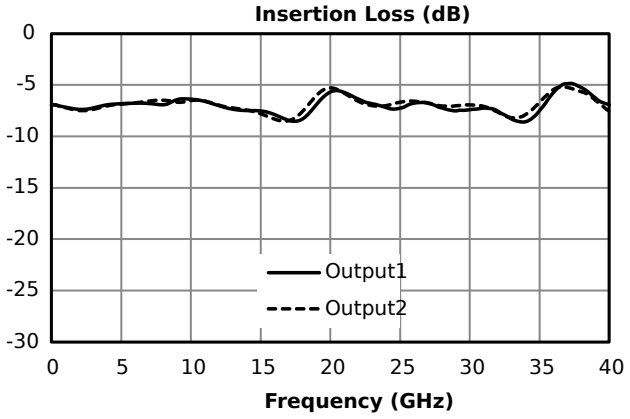
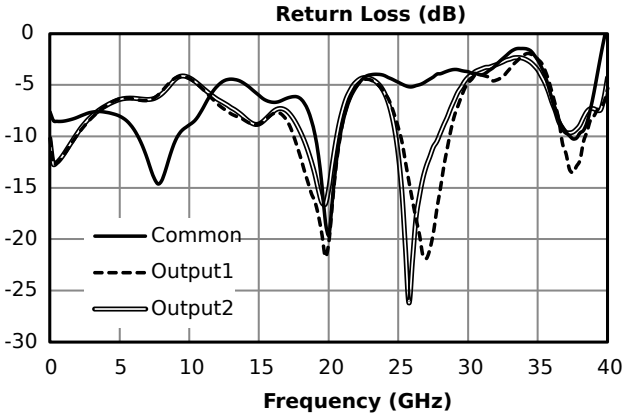
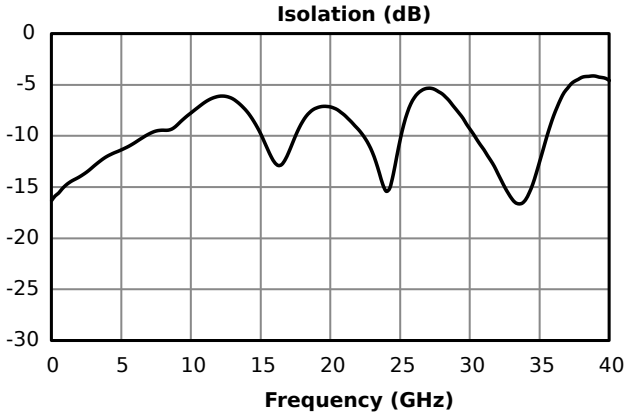
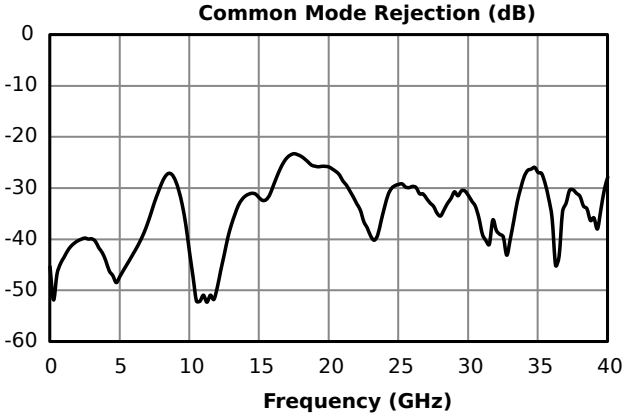
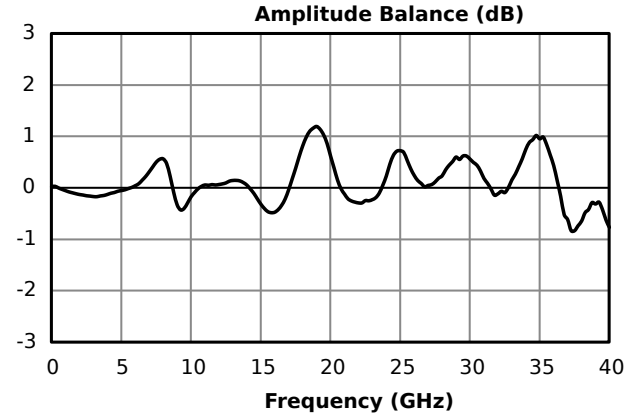
Simulated Performance With 50Ω Differential Impedance - Single Ended Parameters

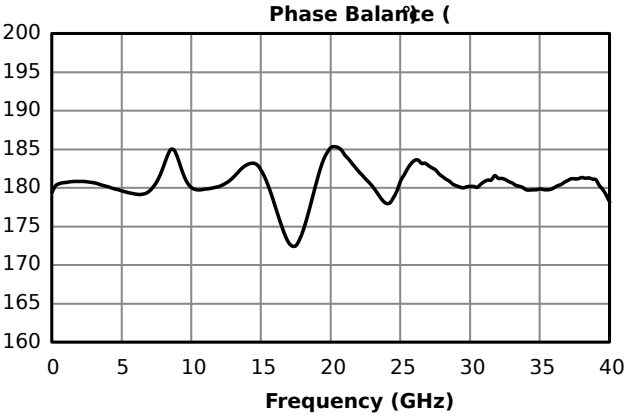












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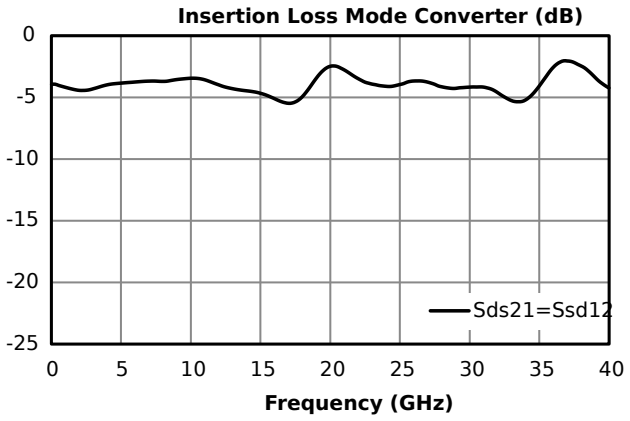
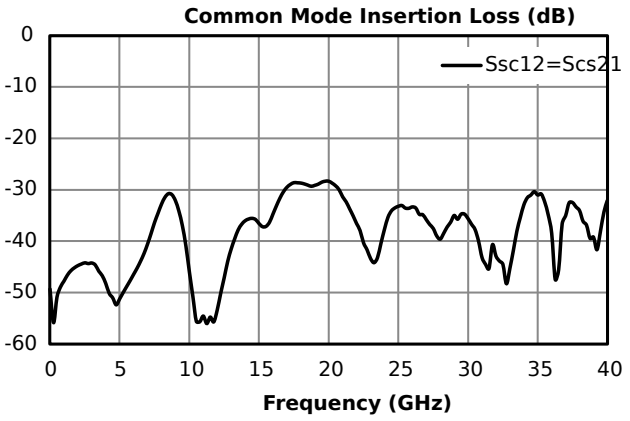
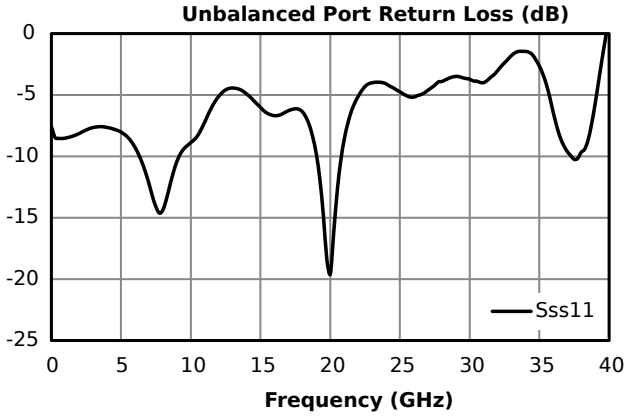
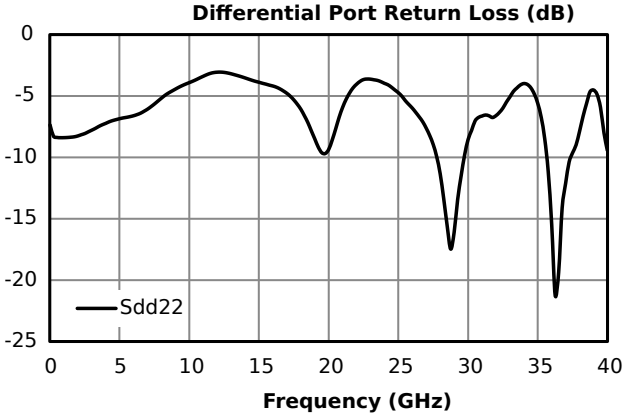
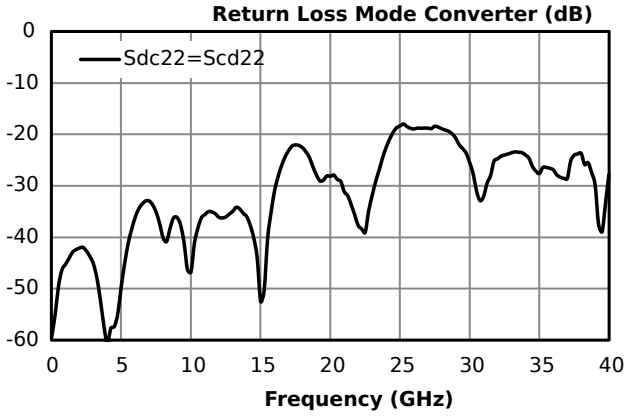
Simulated Performance With 50Ω Differential Impedance - Mixed Mode Parameters

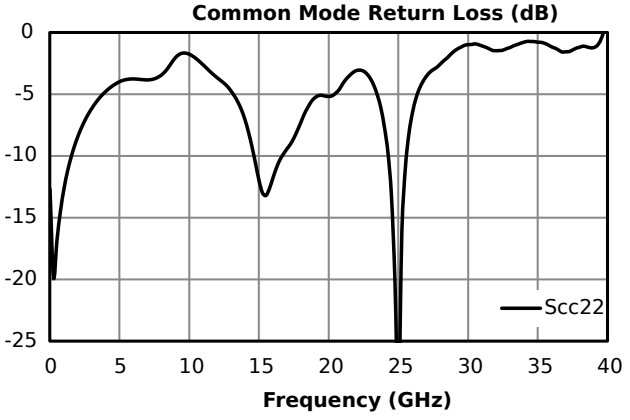












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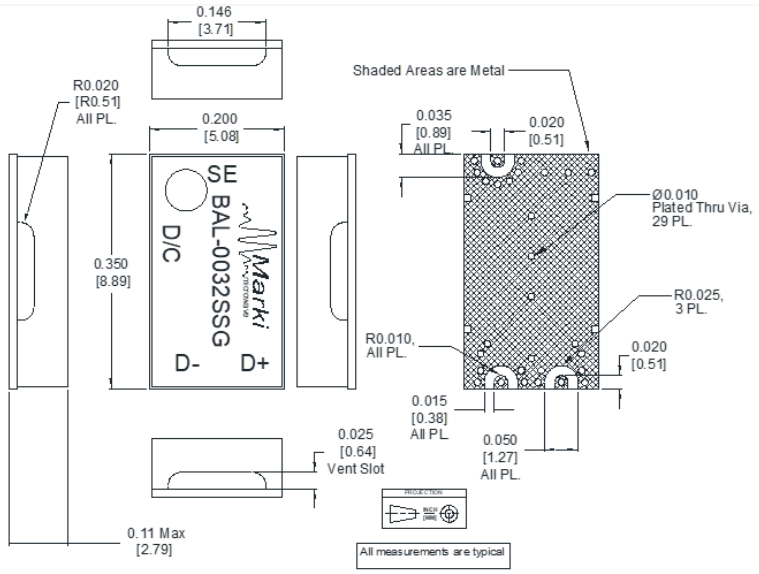
Mechanical Data

Outline Drawing

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



Notes:
1. Finish: 2-8µ-inches of Gold type III Grade A
   Soft Gold over 100-200 µ-inches solderable Nickel. ENIG is acceptable.
2. Material: FR4 0.01" Thick, 1/2 Oz. Copper both sides.

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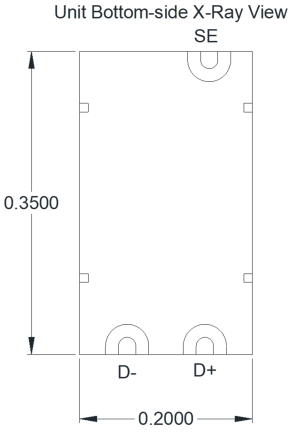
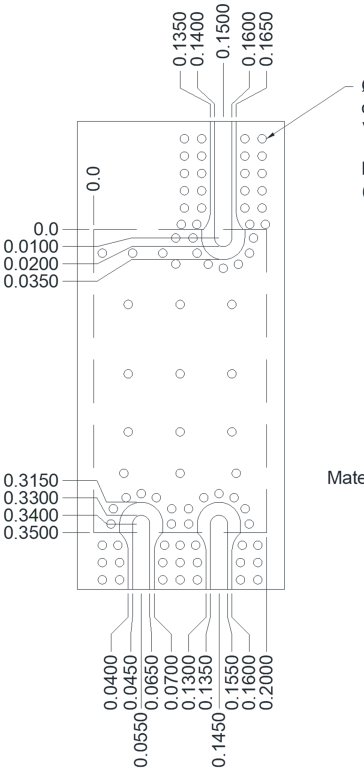
Footprint Image

Download : Footprint Drawing

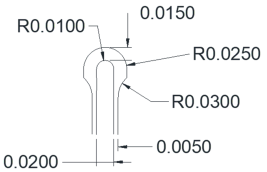




Ø0.010 Plated thru via. Recommended conductive or non-conductive fill, 83 PL. Via spacing is 0.015"-0.02" from center to center. Vias can be added or reduced at PCB designer discretion.

Dashed line indicates flooded ground plane (more via can be added around the unit).

Sample of Trace Dimension and Ground plan gap.



Material: FR4 0.02" thick, 1 to $\frac{1}{2}$ Oz. Copper both sides.

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Evaluation Board - Performance Data

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

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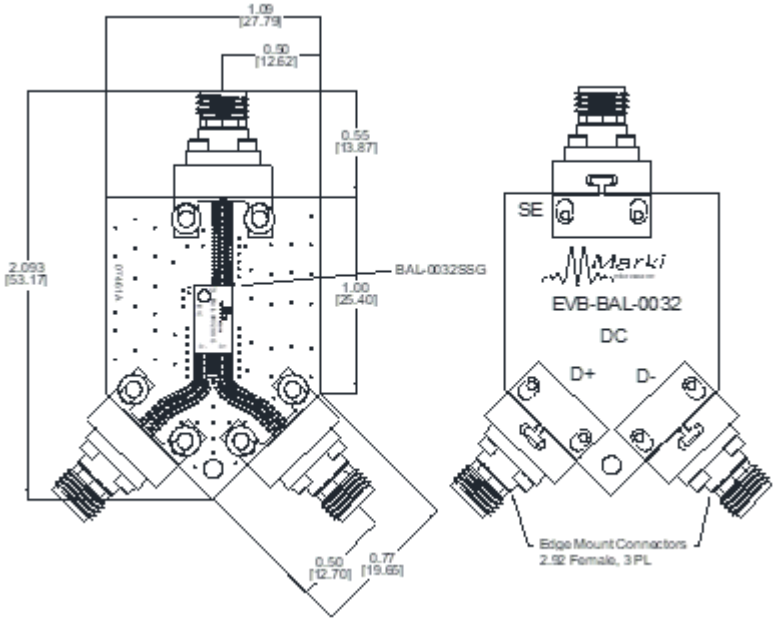
Evaluation Board - Outline Drawing



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