

BAL-0003SMG

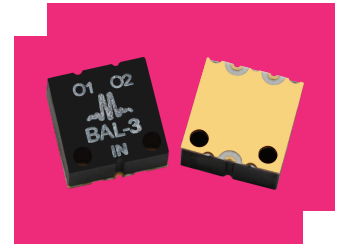
SURFACE-MOUNT BROADBAND BALUN

DEVICE OVERVIEW

General Description

The BAL-0003SMG is a broadband surface mount balun, hand-tuned for optimal phase and amplitude balance over a 500 kHz to 3 GHz bandwidth. It serves as an excellent choice for analog to digital converters, balanced receivers, baseband digital modulations, and signal integrity enhancement.

[Download s-parameters here](#)



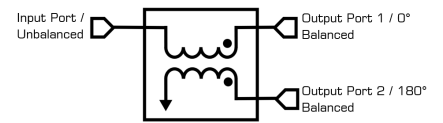
Features

- 500 kHz to 3 GHz 1:2 Balun (Balanced to Unbalanced Transformer)
- Transforms 50 Ω Input to 100 Ω Differential (50 Ohm Single) 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	Packing Size	Green Status	Product Lifecycle	Export Classification
EVAL-BAL-0003	Evaluation Board, High Power 0.0005 - 3 GHz Broadband Balun	-	-	RoHS	Released	EAR99
BAL-0003SMG	SURFACE-MOUNT BROADBAND BALUN	SMG	-	RoHS	Released	EAR99

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Revision History

Revision Code	Revision Date	Comment
-	2013-02-01	Datasheet initial Release
A	2019-03-01	Evaluation board outline added
B	2019-10-01	Mixed Mode Scattering Parameters added
C	2020-04-01	Unit Spread Graphs Added
D	2020-07-01	Update Specs table & low frequency Ssd21 plot added
E	2020-10-01	Update Specs table
F	2022-05-01	Max DC current update, Ground Plane Finish update

Specifications

Package Information

Parameter	Details	Rating
Dimensions	-	8.13 x 8.13 mm

Electrical Specifications

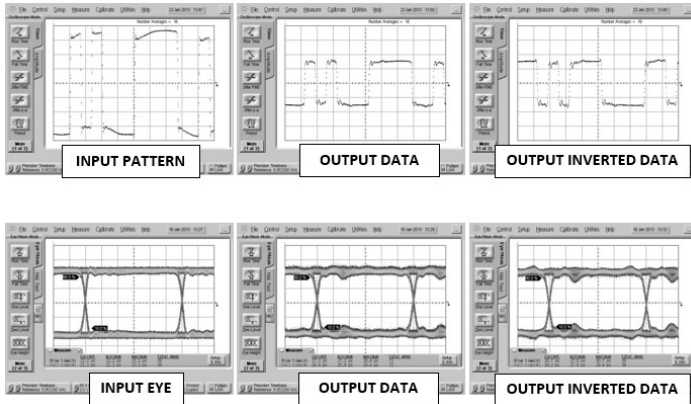
Specifications guaranteed from -55 to +100°C, measured in a 50Ω system.

Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Insertion Loss as a Mode Converter	-	0.0005	3	-	3.8	5	dB
Nominal Phase Shift	-	0.0005	3	-	180	-	°
Amplitude Balance	-	0.0005	3	-	0.3	0.8	dB
Phase Balance	-	0.0005	3	-	3	8	°
Common Mode Rejection	-	0.0005	3	25	35	-	dB
Isolation	-	0.0005	3	-	9	-	dB
VSWR	-	0.0005	3	-	1.5	-	-
Risetime/Falltime ¹	-	-	-	-	17	-	ps
Input Power	-	0.0005	3	-	-	1	W

^[1] Specified as 90%/10%. Calculated from $\tau_{\text{balun2}} = (\tau_{\text{out2}} - \tau_{\text{in2}})$ with a 6 Gb/s input pattern.

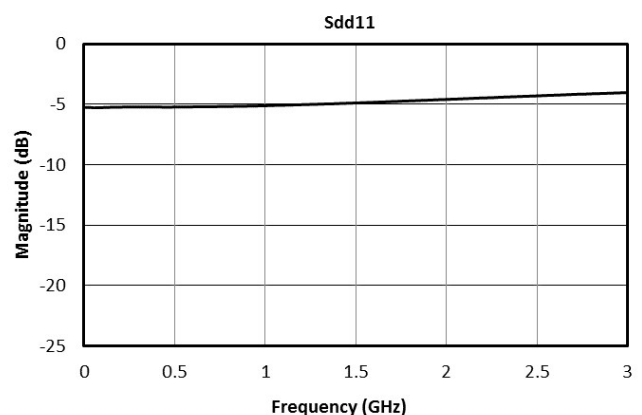
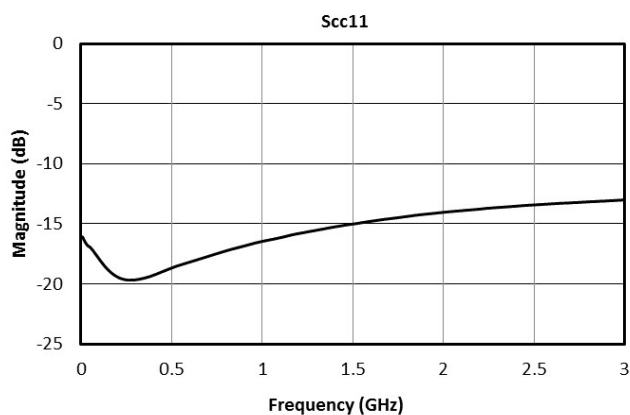
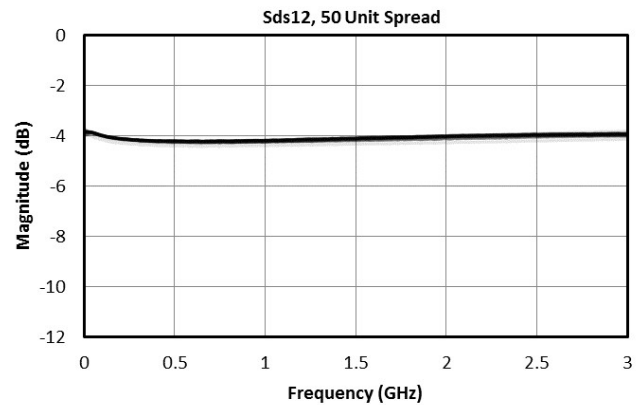
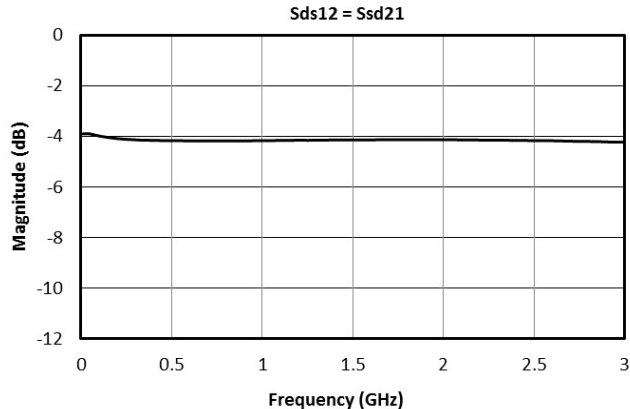
Time Domain Performance Plots

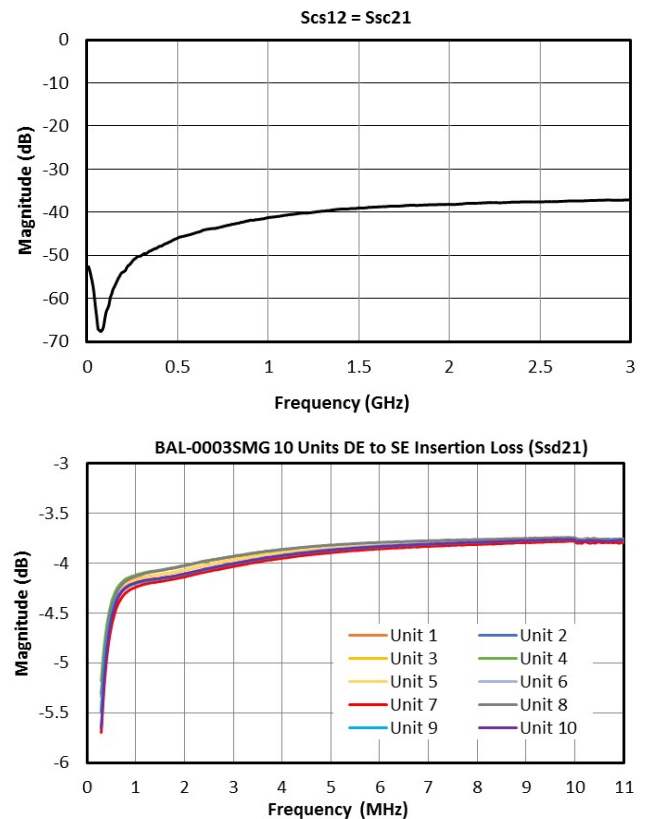
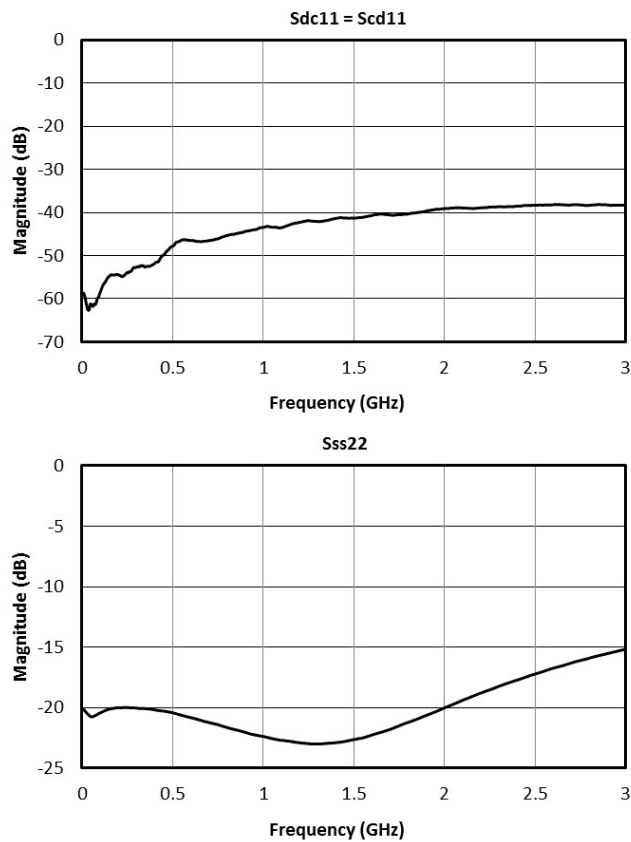
Oscilloscope measurements of the BAL-0003SMG with a 3 Gb/s PRBS pattern. Bit pattern is measured with a 27-1 PRBS input demonstrating extremely good pulse fidelity for both inverted and non-inverted output. Eye diagrams are taken with a 231-1 PRBS input demonstrating minimal eye distortion/closure afforded by the extremely low frequency operation of the balun (<500 kHz).



Mixed Mode Scattering Parameters

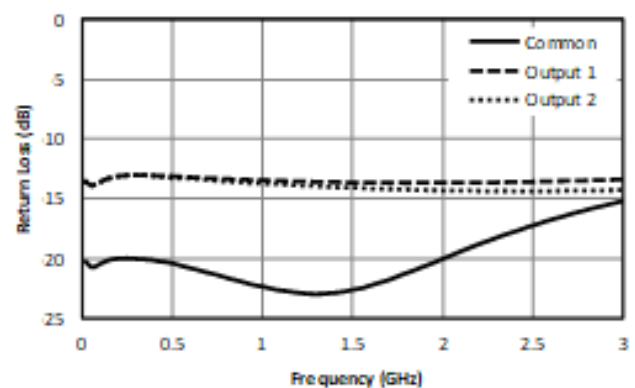
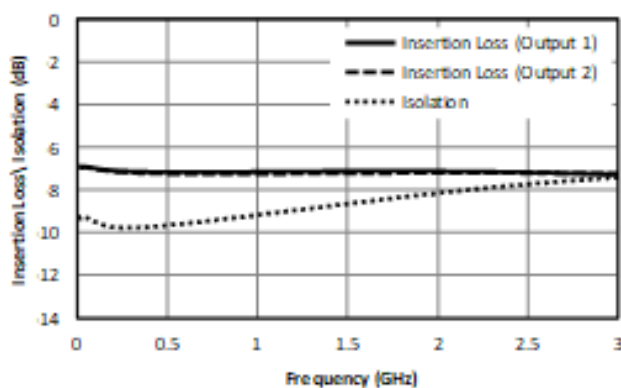
Mixed mode scattering parameters are used to characterize differential circuits. For baluns, this means that the 0° and 180° ports become a single 100Ω differential port and the common port remains the same 50Ω common port. The two-port s-parameters of the balun are then characterized based on differential (d), common mode (c), or single-ended (s) signals. For example: Sds12 is the differential output response given a single ended input.

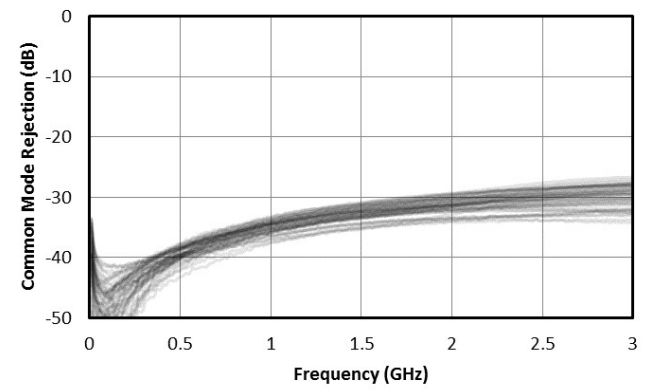
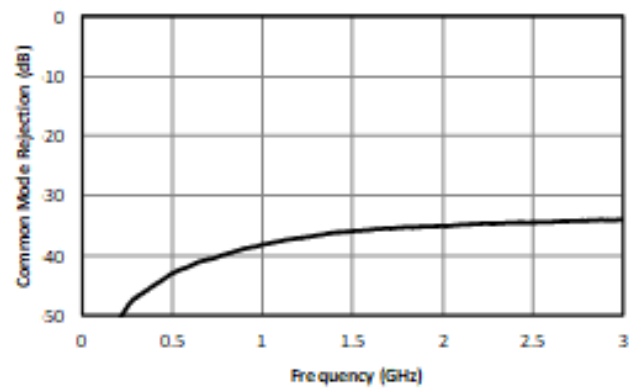
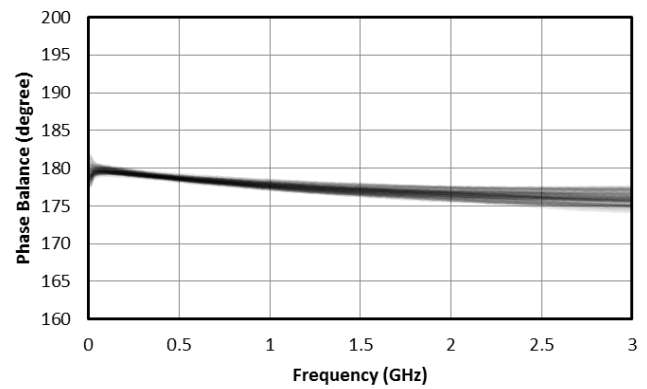
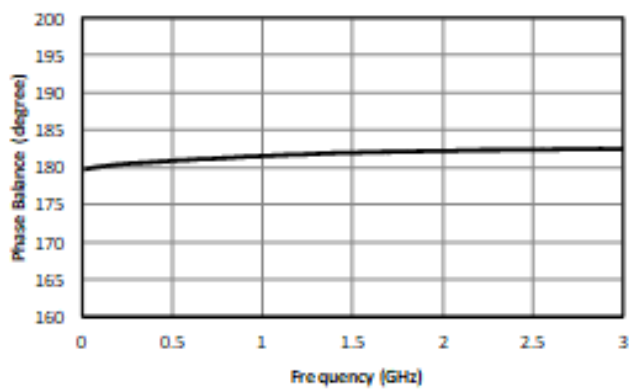
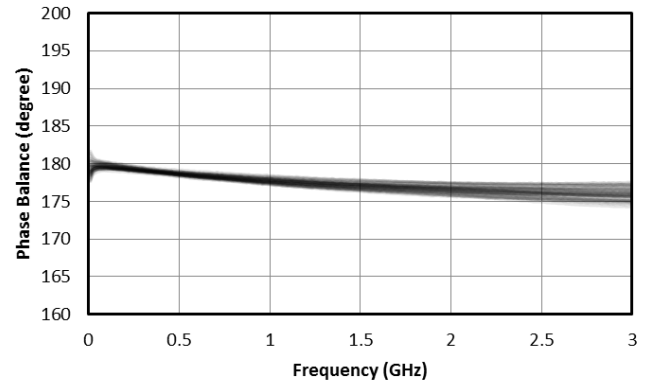
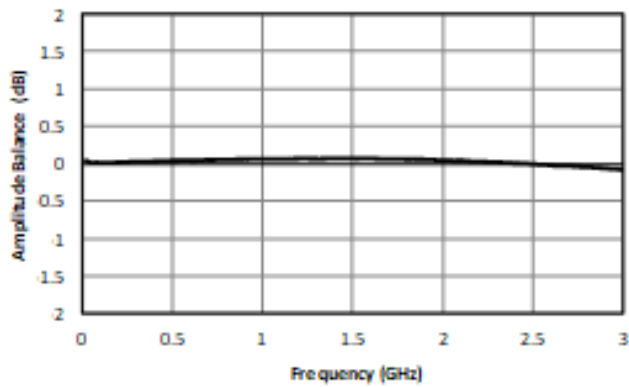


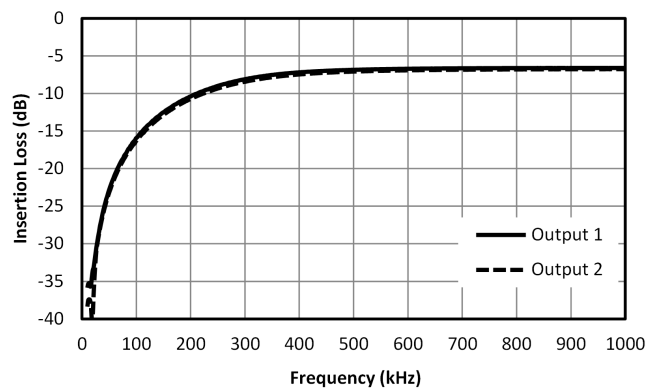


Typical Performance Scattering Parameters

Three port scattering parameters measured as three single-ended 50Ω ports showing relationship between any two ports. For example: S21 and S31, often referred to as insertion loss of a balun, is the output response on ports 2 and 3 with an input stimulus on port 1.

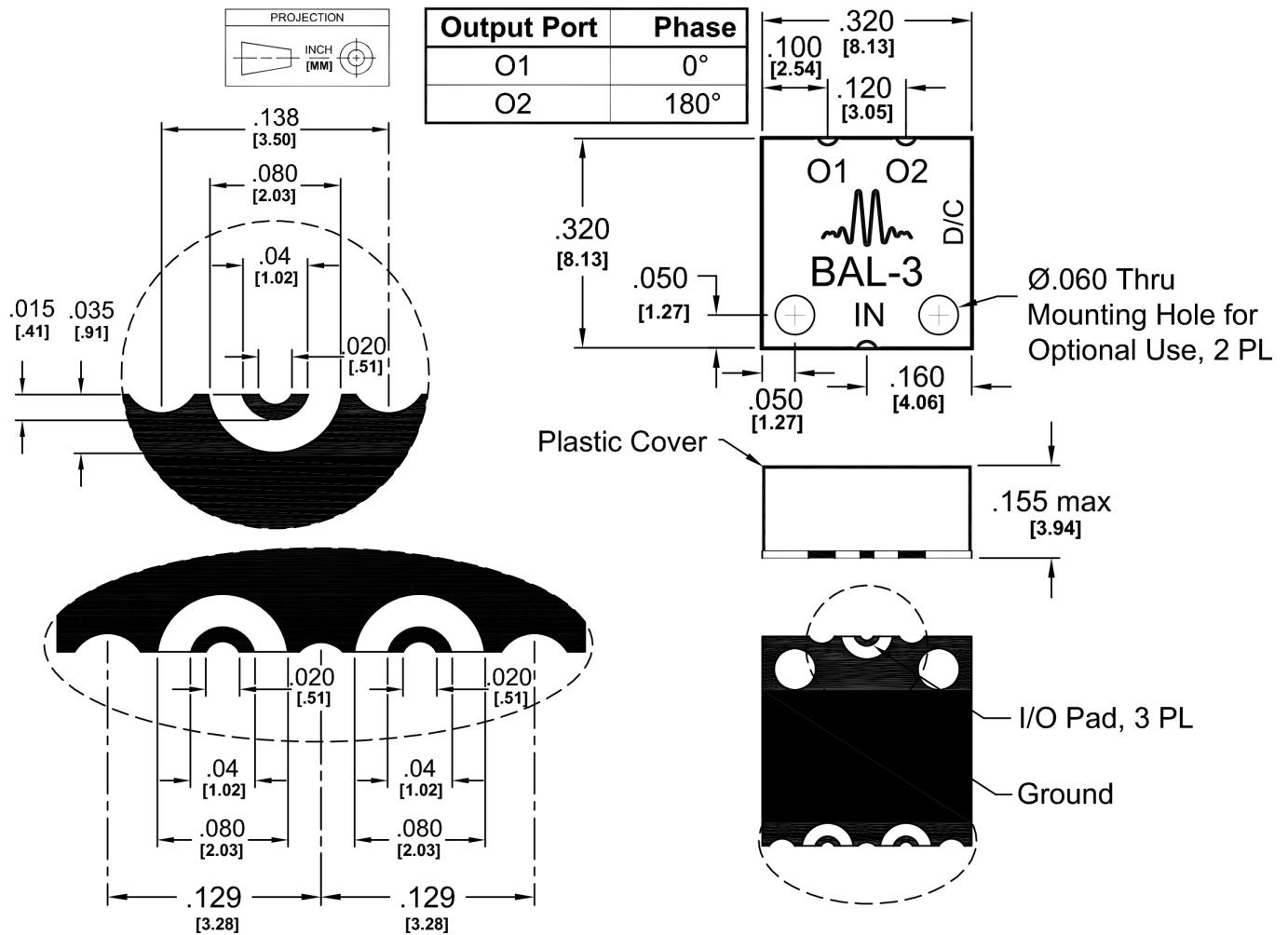






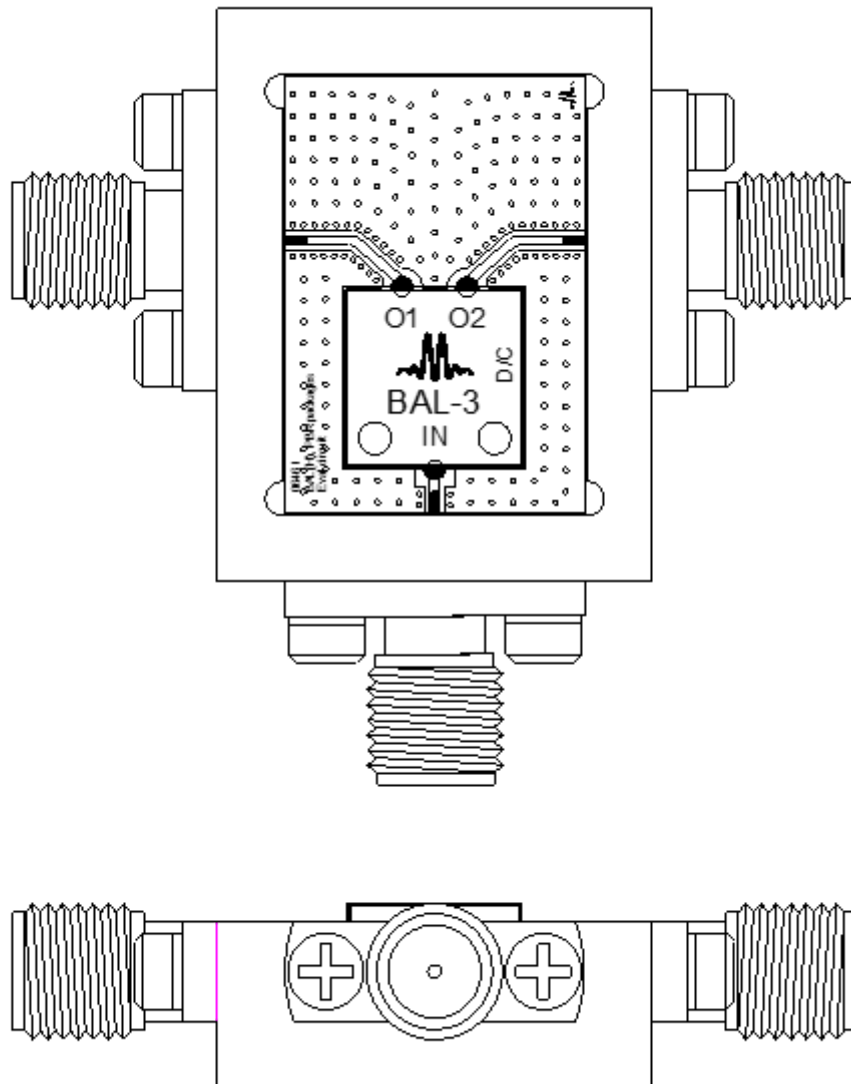
Mechanical Data

Outline Drawing



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SURFACE-MOUNT BROADBAND BALUN



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