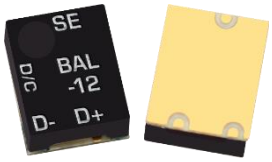
LEAD-FREE / RoHS-COMPLIANT

SURFACE-MOUNT BROADBAND BALUN BAL-0012SSG

Features

- 10 MHz to 12 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
- BAL-0012SSG.s3p



SMT

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

Parameter	Frequency Range	Min	Typ	Max
Insertion Loss as a mode converter (dB)	10 MHz to 12 GHz		5	6.5
Nominal Phase Shift (Degrees)			180	
Amplitude Balance (dB)			0.6	1.8
Phase Balance (Degrees)			5	12
Common Mode Rejection (dB)		18	26	
Isolation (dB)			8	
VSWR			1.6	
Total Input Power (W)				1

Model Number	Description
BAL-0012SSG	10 MHz to 12 GHz Balun, Surface Mount, LEAD-FREE/RoHS COMPLIANT
EVAL-BAL-0012	Connectorized Evaluation Fixture, LEAD-FREE/RoHS COMPLIANT

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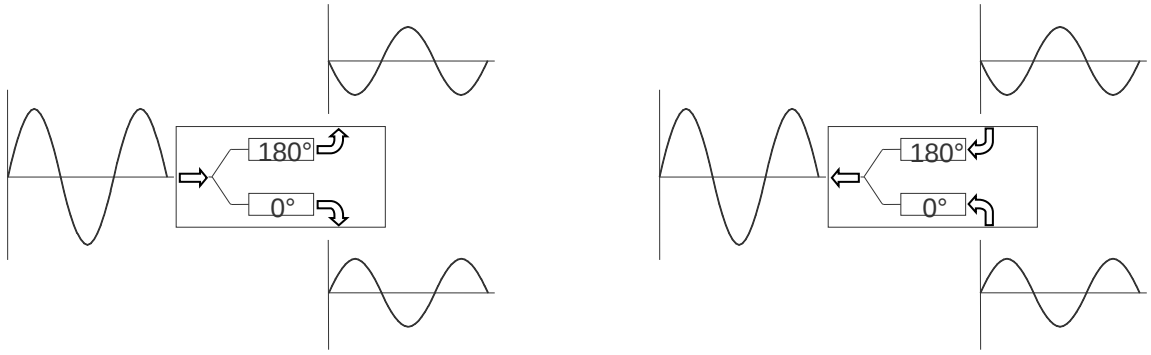
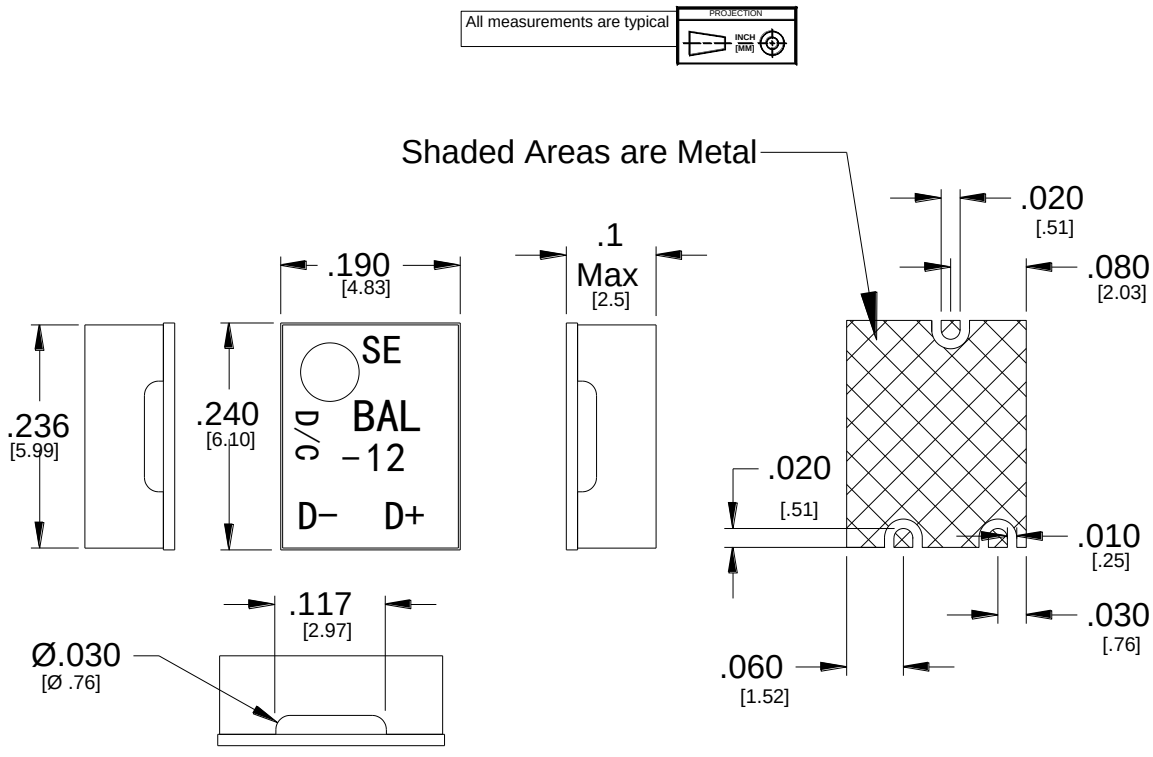
SURFACE-MOUNT BROADBAND BALUN BAL-0012SSG

Block Diagram



Single ended to differential **Differential to single ended**

Outline Drawing



Substrate material is 8-mil thick Rogers 4003, 1 Oz Rolled Cu. I/O Pads & Ground Plane Finish is Gold, 2 to 8 µ-inches, over solderable Electroplated Nickel, 100-200 µ-inches per QQ-N_290A. Or ENIG

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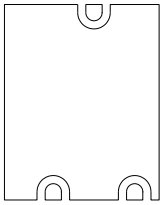
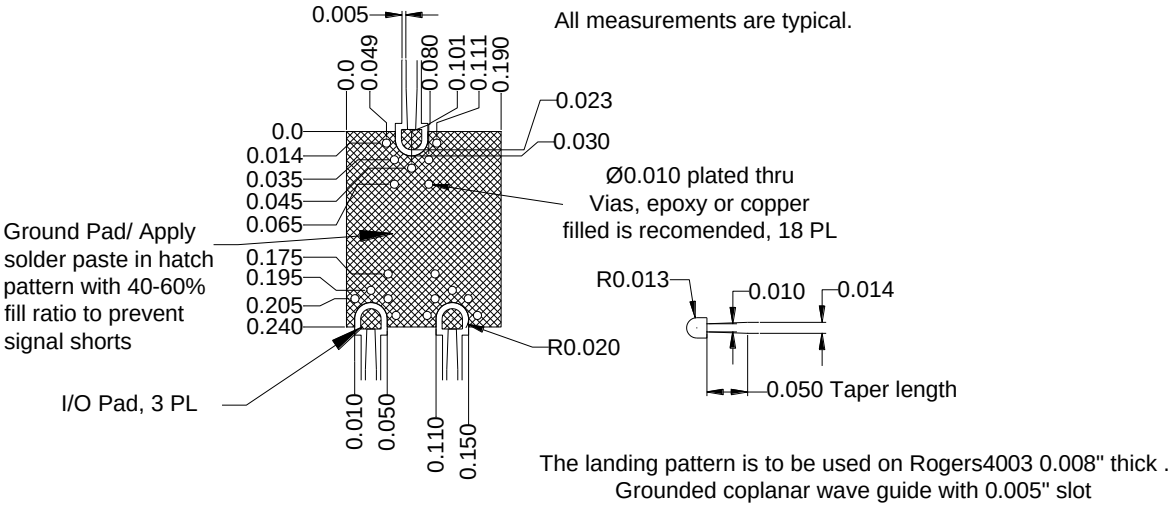
PCB Footprint Drawing

BALSSG Package
Bottom View

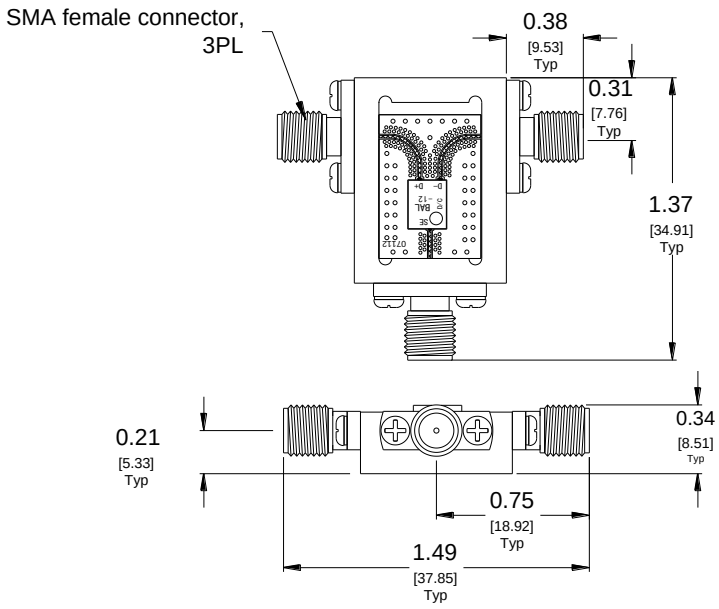




The landing pattern is to be used on Rogers4003 0.008" thick .
Grounded coplanar wave guide with 0.005" slot

Click here for a DXF of the above layout.

Eval Package Outline Drawing



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Mixed Mode Scattering Parameters²

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: Sds21 is the differential output response given a single ended input.

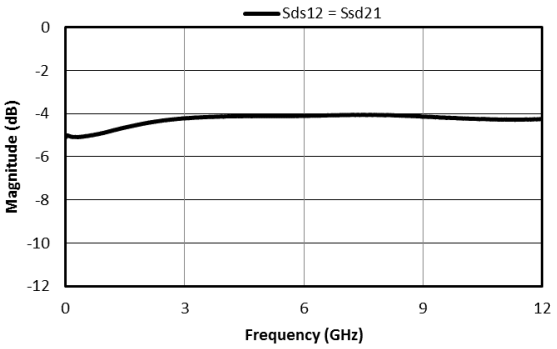

Fig. 1. Insertion loss as a mode converter

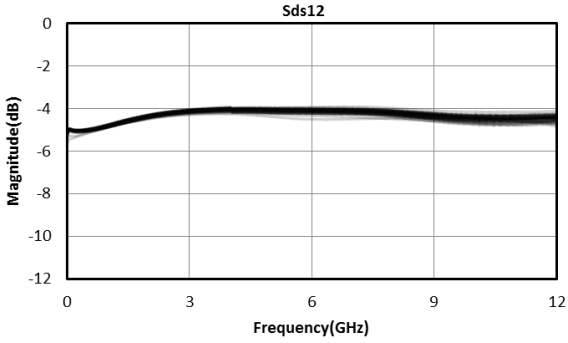

Fig. 2. Insertion loss as a mode converter,50 units spread

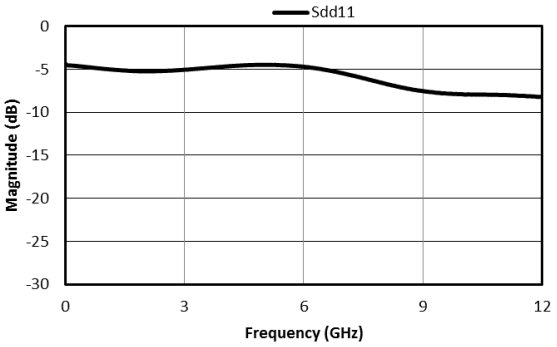

Fig. 3. Differential port return loss

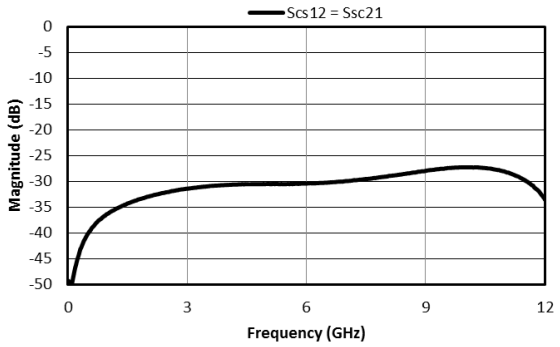

Fig. 4. Insertion loss of a common mode signal

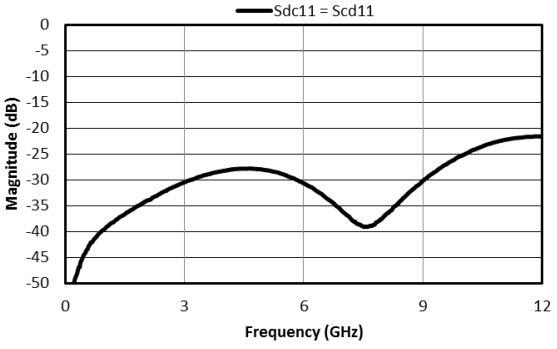

Fig. 5. Reflection converted between differential and common modes

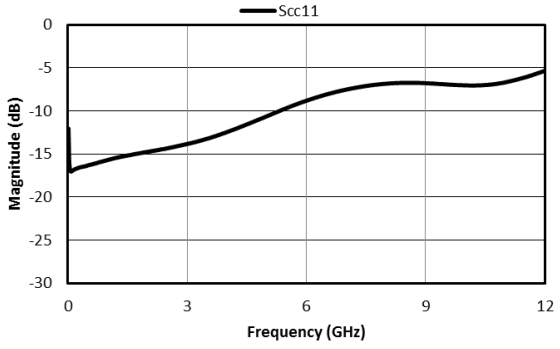

Fig. 6. Return loss of a common mode signal

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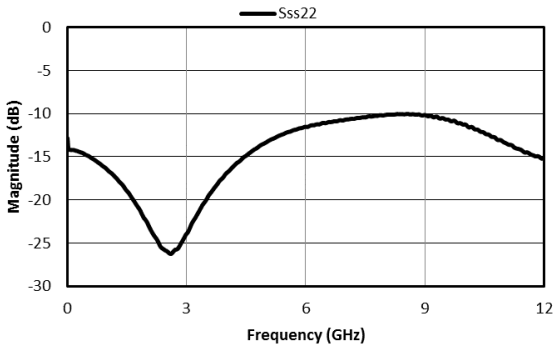


Fig. 7. Unbalanced port return loss

Typical Performance Scattering Parameter

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

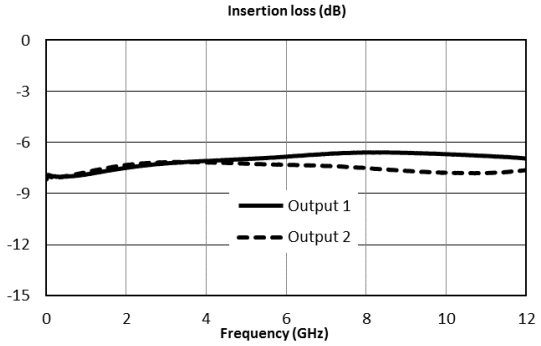


Fig. 8. Common to output port insertion loss

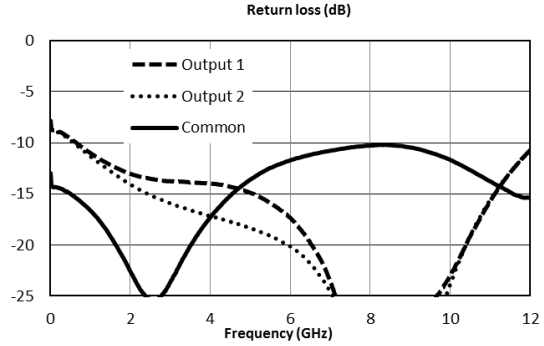


Fig. 9. Return loss for common port and output ports.

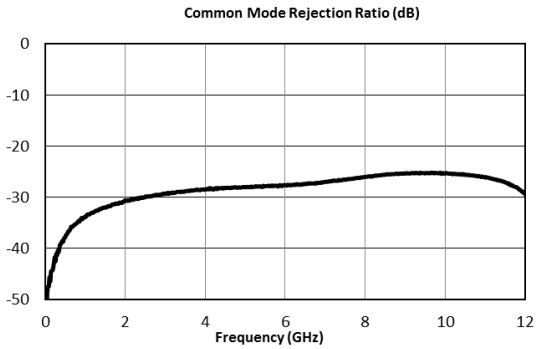


Fig. 10. Common mode rejection.

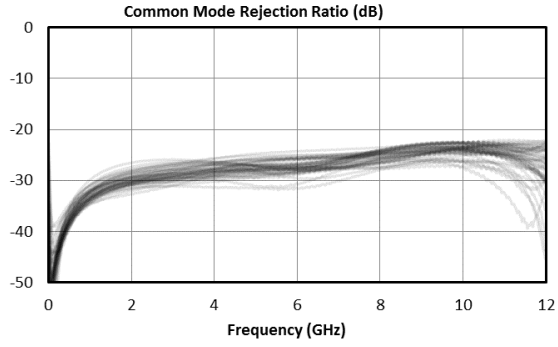


Fig. 11. Common mode rejection, 50 units spread.

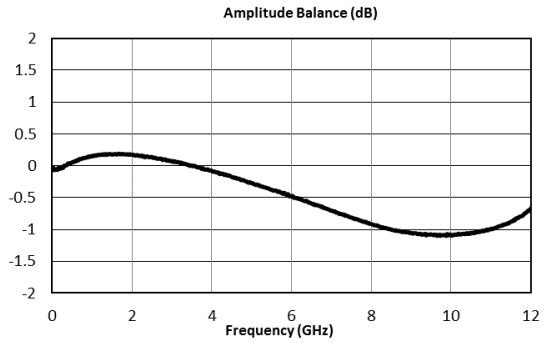


Fig. 12. Amplitude balance between output ports.

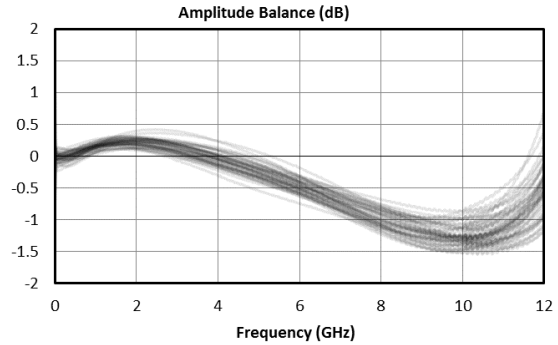


Fig. 13. Amplitude balance between output ports, 50 unit spread.

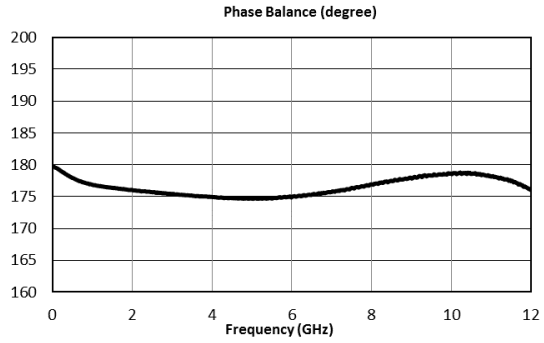


Fig. 14. Phase balance between output ports.

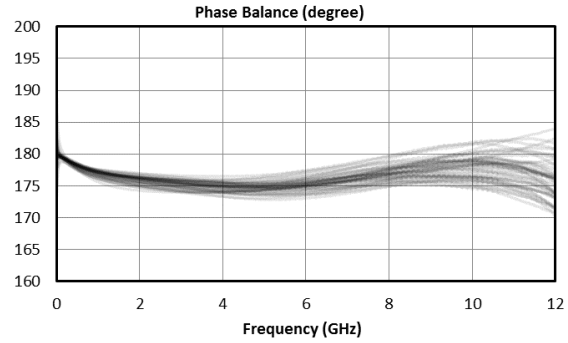
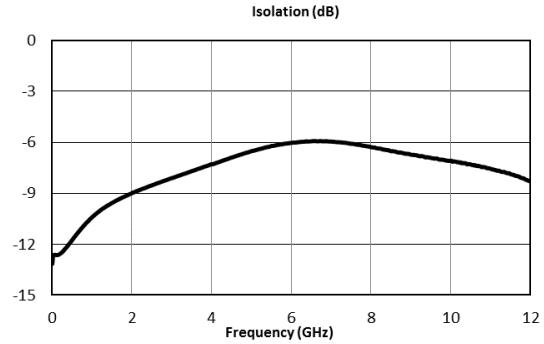


Fig. 15. Phase balance between output ports, 50 unit spread.



. Fig. 16. Isolation between output ports

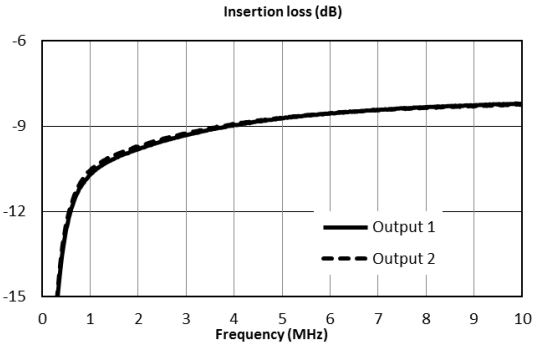
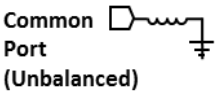
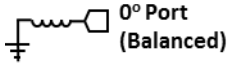
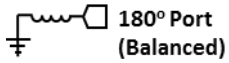


Fig. 17. Low Frequency Insertion Loss

DC Interface

Port	Description	DC Interface Schematic
Common Port / In (Unbalanced)	The common port is DC short to ground.	
Out 1 / 0° Port (Balanced)	The 0° port is DC short to ground.	
Out 2 / 180° Port (Balanced)	The 180° port is DC short to ground.	

Absolute Maximum Ratings	
Parameter	**Maximum Rating**
DC Current	TBD
RF Power Handling	30 dBm
Operating Temperature	-55ºC to +100ºC
Storage Temperature	-65ºC to +125ºC

DATASHEET NOTES:

1. Excess Insertion Loss = (Common Port to Output Port Insertion Loss) – 6 dB.
2. Sdd11: differential return loss of the differential port driven with a differential signal
   Sdc11: differential return loss of the differential port driven with a common signal
   Sds12: insertion loss from a single ended input to a differential output
   Scc11: common mode return loss of the differential port driven with a common signal
   Scd11: common mode return loss of the differential port driven with a differential signal
   Scs12: insertion loss from a single ended input to a common output
   Sss22: single ended return loss
   Ssd21: insertion loss from a differential signal to single ended output
   Ssc12: insertion loss from a common signal to single ended output

Revision History

Revision code	Revision Date	Comment
-	June 2020	Initial Datasheet Release