



LEAD-FREE / RoHS-COMPLIANT

SURFACE-MOUNT BROADBAND BALUN

BAL-0620SMG

The BAL-0620SMG is a Surface Mount Microlithic™ balun. As with all Microlithic™ baluns, it features excellent amplitude balance, phase balance, and common mode rejection across a broad bandwidth and in a miniaturized form factor. It has significant isolation, reducing the reflection of unwanted common mode signals. The BAL-0620SMG is a lead free, RoHS compliant package compatible with standard leaded and lead-free solder reflows. SMA connectorized evaluation packages are available. The BAL-0620SMG is an excellent choice for balanced amplifiers, clock distribution, and higher order Nyquist sampling in analog to digital converters



Features

- 6 GHz to 20 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, Balanced Amplifiers, Mixers, Clock Distribution, Signal Integrity
- [BAL-0620SMG.s3p](#)

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) ¹	6 GHz to 20 GHz		2.6	4.2
Nominal Phase Shift (Degrees)			180	
Amplitude Balance (dB)			0.2	0.6
Phase Balance (Degrees)	6 GHz to 18 GHz		1	5
	18 GHz to 20 GHz		4	15
Common Mode Rejection (dB)	6 GHz to 18 GHz	28	34	
	18 GHz to 20 GHz	20	31	
Isolation (dB)			14	
VSWR			2	
Total Input Power (W)				1

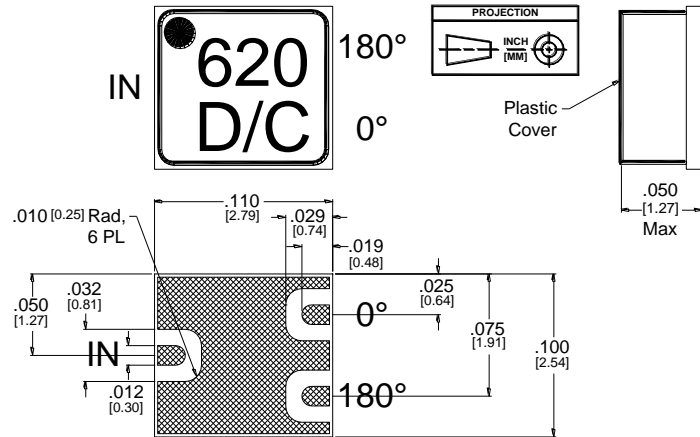
¹Includes fixture losses.

Model Number	Description
BAL-0620SMG	6 GHz to 20 GHz Balun, Surface Mount, LEAD-FREE/RoHS COMPLIANT

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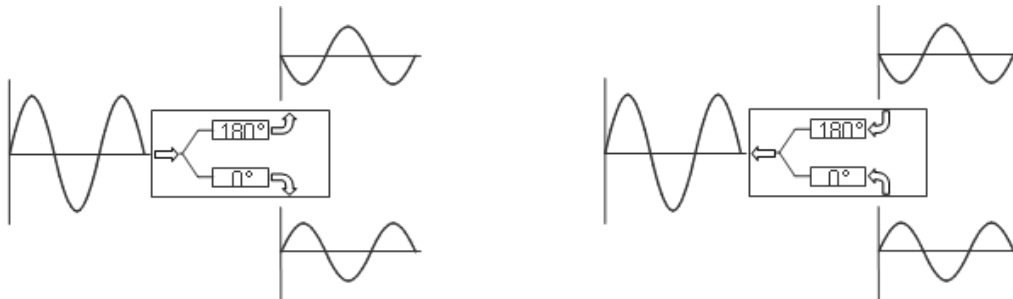
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I/O traces and ground plane finish is TiW/NiAu, 0.5 microns Au max over 0.15 microns Ni.
See [BALSM-ML-PCB](#) for suggested PCB layout.

Block Diagram



Single ended to differential

Differential to single ended

Typical Performance

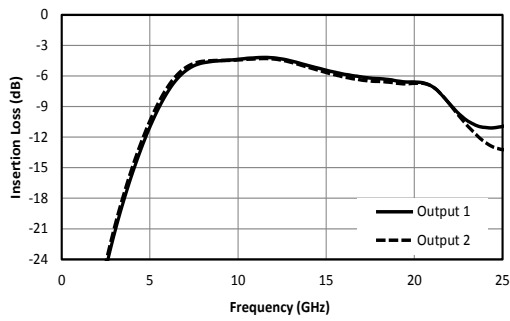


Fig. 1. Common to balanced port insertion loss¹

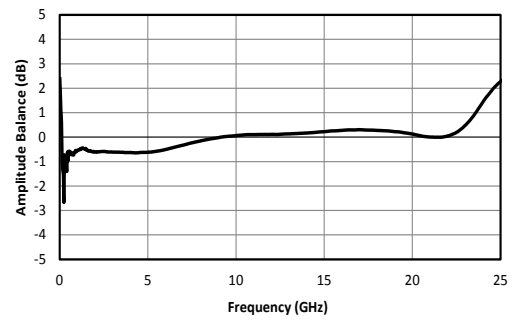


Fig. 2. Amplitude balance between balanced ports

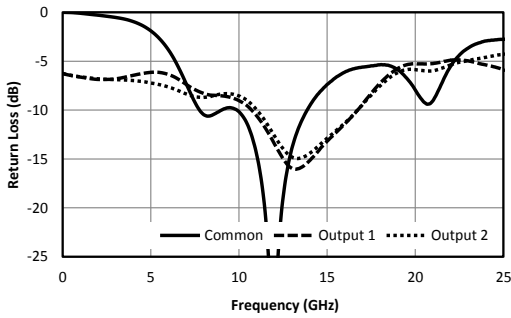


Fig. 3. Return loss for common port and balanced ports.

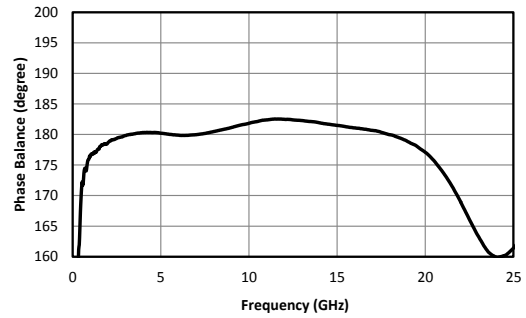


Fig. 4. Phase balance between balanced ports.

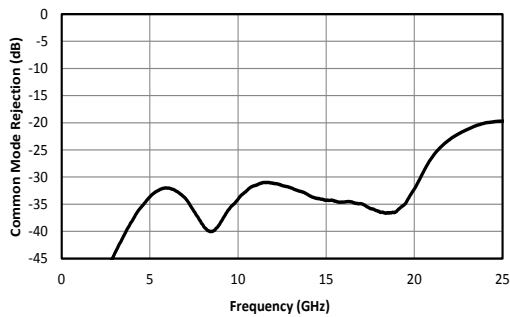


Fig. 5. Common mode rejection

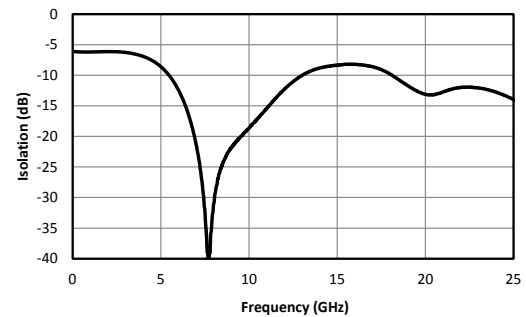


Fig. 6. Balanced port to balanced port isolation

¹Includes test fixture loss. Results are not de-embedded.

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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: S_{cs12} is the Common output response given a single ended input.

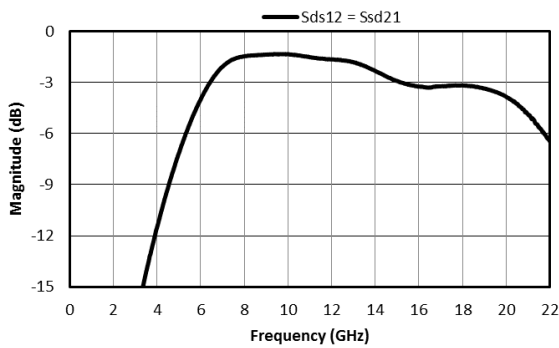


Fig. 7. Insertion loss as a mode converter

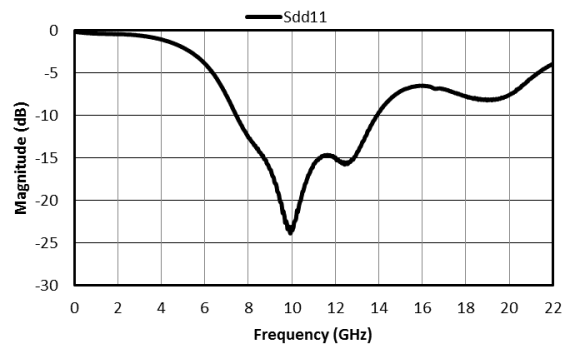


Fig. 8. Differential port return loss

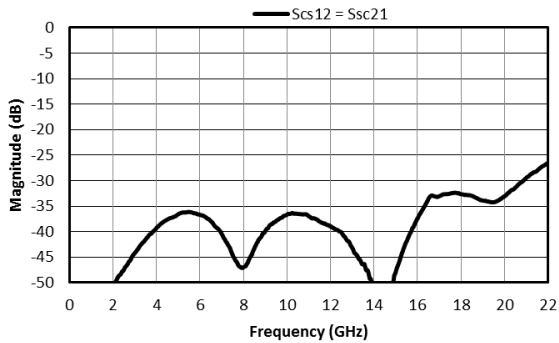


Fig. 9. Insertion loss of a common mode signal

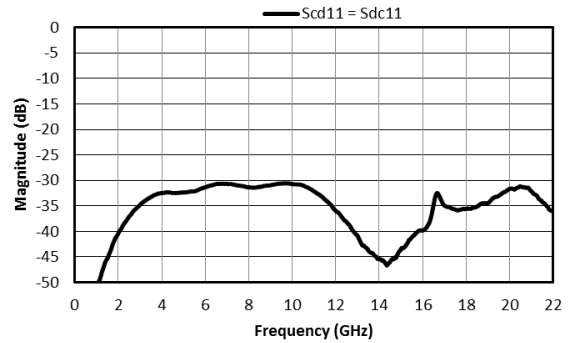


Fig. 10. Reflection converted between differential and common modes

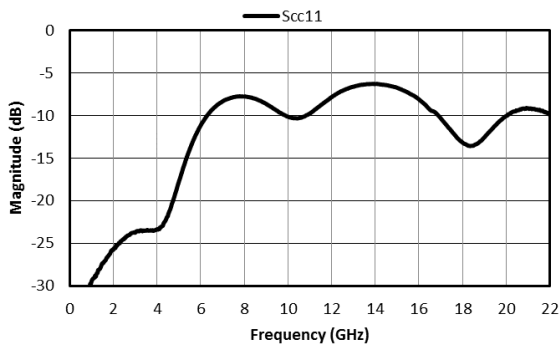


Fig. 11. Return loss of a common mode signal

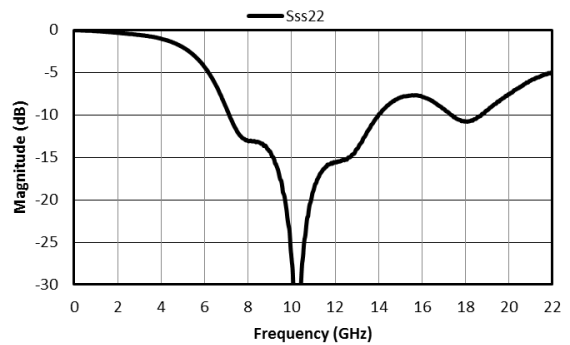


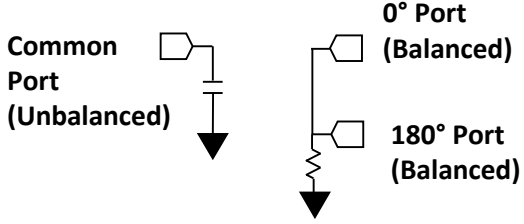
Fig. 12. Unbalanced port return loss

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DC Interface

Port	Description	DC Interface Schematic
Common Port (Unbalanced)	The common port is DC open to ground.	
0° Port (Balanced)	The 0° port is DC short to the 180° port and passes through a resistor to ground.	
180° Port (Balanced)	The 180° port is DC short to the 0° port and passes through a resistor to ground.	

Revision History

Revision code	Revision Date	Comment
-	2014	Datasheet initial Release
A	2016	Typical Performance Plots Updated
B	July 2020	Specs table update
C	October 2020	Specs table update

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