BALUN BAL-0520

Features

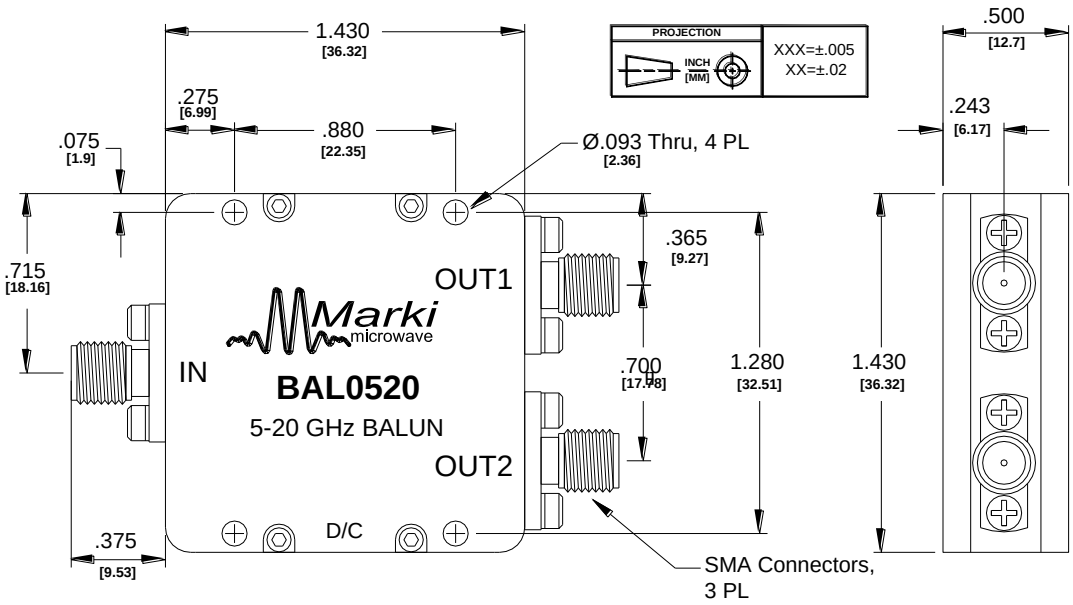
- 5 to 20 GHz Balun (Balanced to Unbalanced Transformer)
- Tuned for Optimal Phase/Amplitude Balance
- Provides 50 Ω to 100 Ω Differential Transformation
- Applications: Antenna Feeds, Device Testing, General Lab Use
- BAL-0520.s3p

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)	5 to 20 GHz		1.5	3.5
Nominal Phase Shift (Degrees)			180	
Amplitude Balance (dB)			0.2	0.6
Phase Balance (Degrees)			3	8
Common Mode Rejection (dB)		22	30	
Isolation (dB)			6	
VSWR (Input) VSWR (Output)			1.4 2.6	
Total Input Power (W)				5
Weight (g)			38	

Model Number	Description
BAL-0520	5 to 20 GHz Balun with SMA connectors[1]

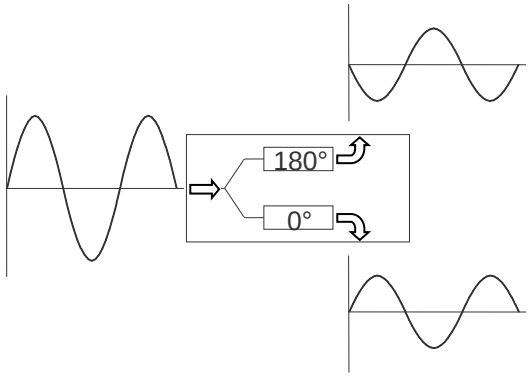
[1]Default is SMA female connectors. Consult factory for other connector options.



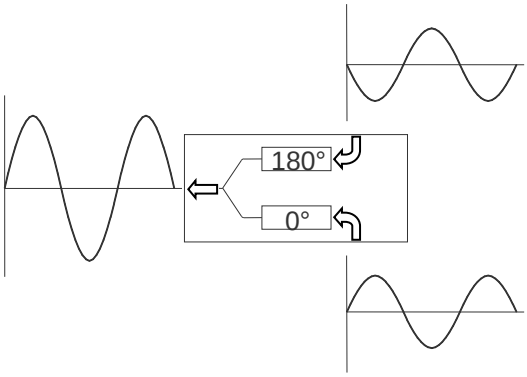
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Block Diagram



Single ended to differential



Differential to single ended

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.

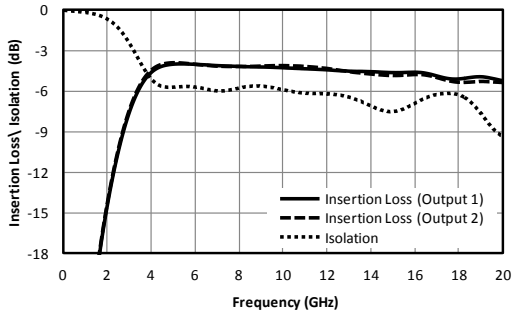


Fig. 1. Common to output port insertion loss and output to output port Isolation.

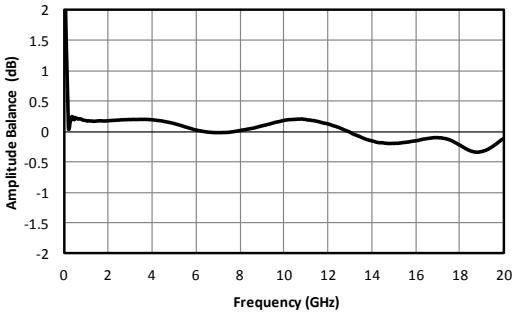


Fig. 3. Amplitude balance between output ports.

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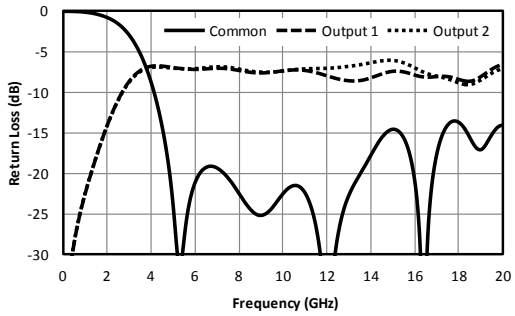


Fig. 2. Return loss for common port and output ports.

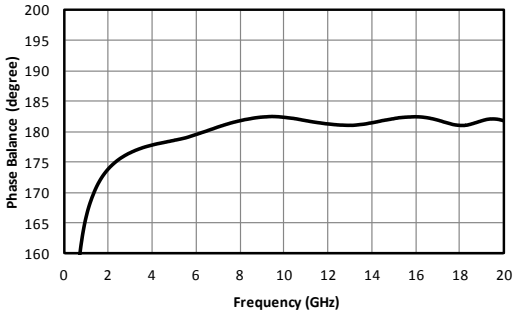


Fig. 4. Phase balance between output ports.

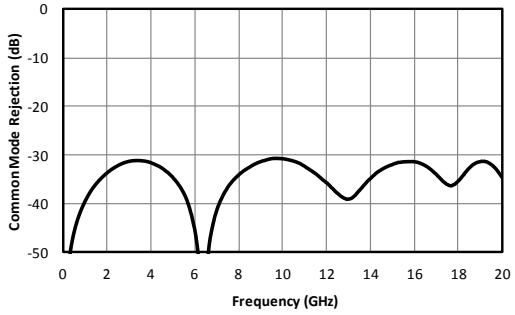


Fig. 5. Common mode rejection.

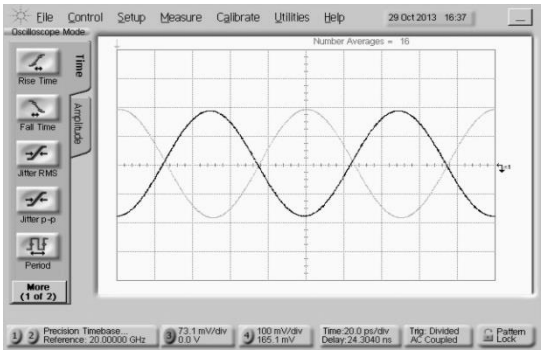
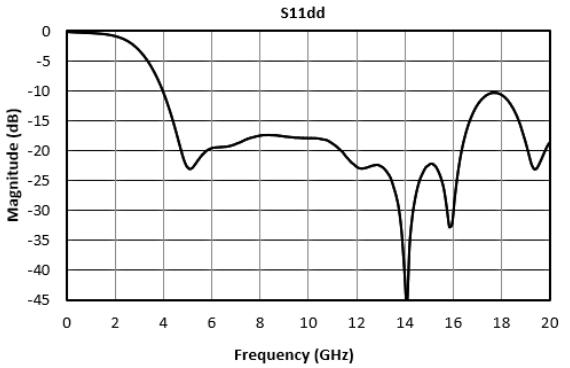


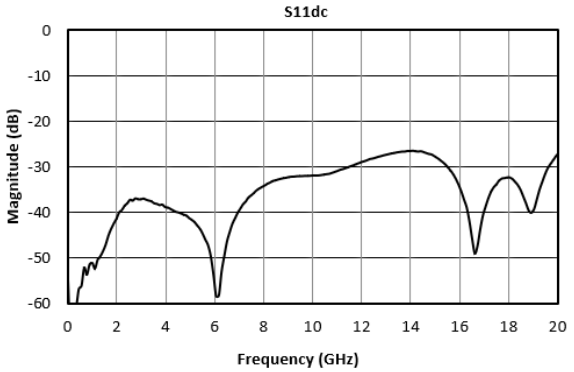
Fig. 6. Oscilloscope measurements with 10 GHz sine wave input. Excellent amplitude and phase balance are apparent. Note that the BAL-0520 is not suitable for baseband data, as any data input will be high pass filtered, perticularly on the inverted side.

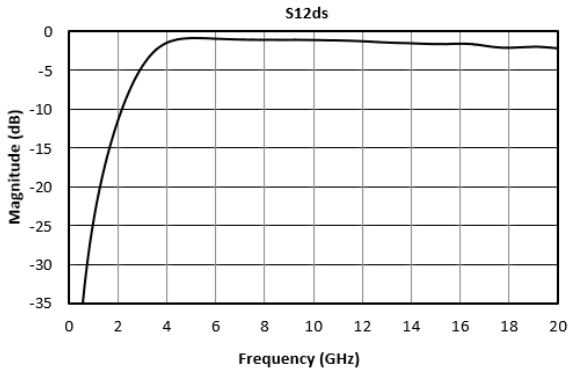
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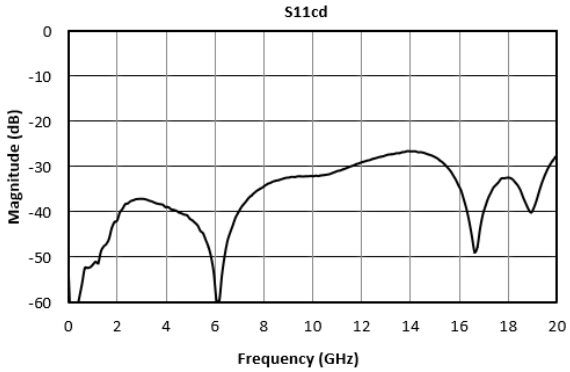
Mixed Mode Scattering Parameters

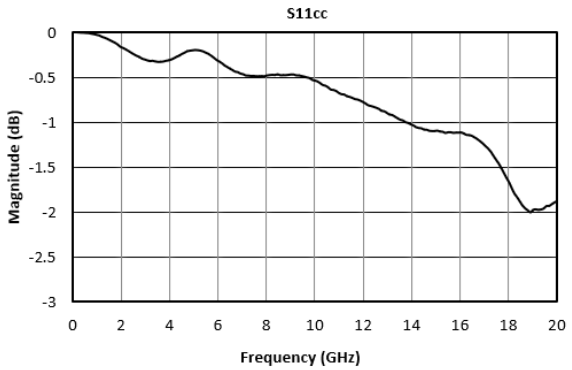
Mixed mode scattering parameters are used to characterize differential circuits. For baluns, this means that the 0° and 180° ports become a single 100Ω differential port and the common port remains the same 50Ω common port. The two-port s-parameters of the balun are then characterized based on differential (d), common mode (c), or single-ended (s) signals. For example: S12ds is the differential output response given a single ended input.

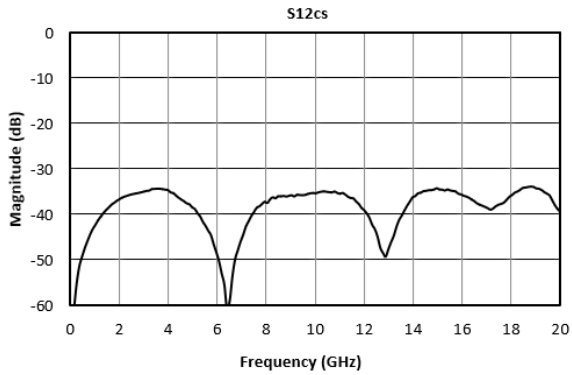




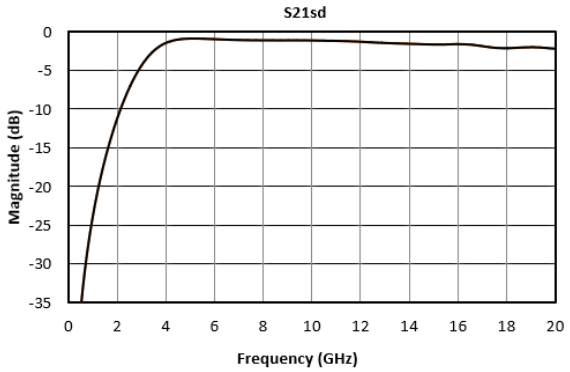


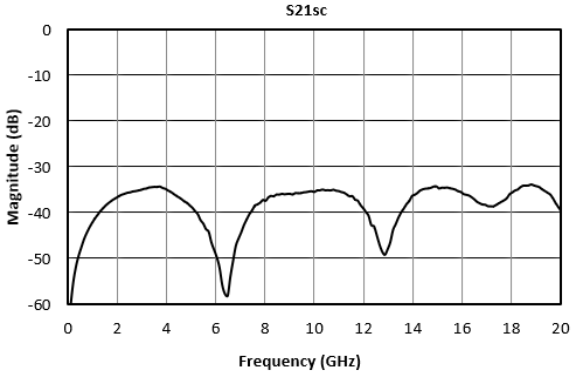


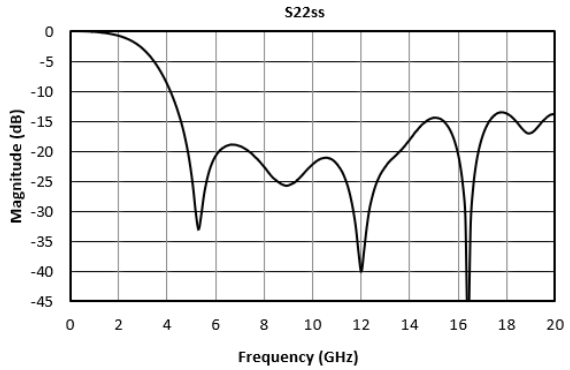




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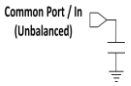
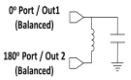
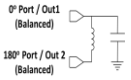






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DC Interface

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

Revision History

Revision code	Revision Date	Comment
-	2013	Datasheet initial Release
A	2014	DC Interface Added
B	October 2019	Mixed Mode Scattering Parameters added
C	July 2020	Specs table update
D	October 2020	Specs table update

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