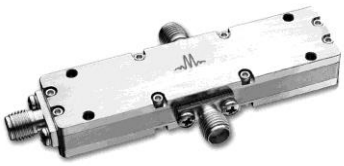
LEAD-FREE / RoHS-COMPLIANT

BROADBAND BALUN (200 kHz to 3 GHz) BAL-0003

Features



- 200 kHz to 3 GHz Balun (Balanced to Unbalanced Transformer)
- Matched 50 Ohm Impedance on Input and Output Ports
- Tuned for Optimal Phase/Amplitude Balance
- Applications: Analog to Digital Converters, Balanced Receivers, Baseband Digital Modulation, Signal Integrity
- BAL-0003.s3p

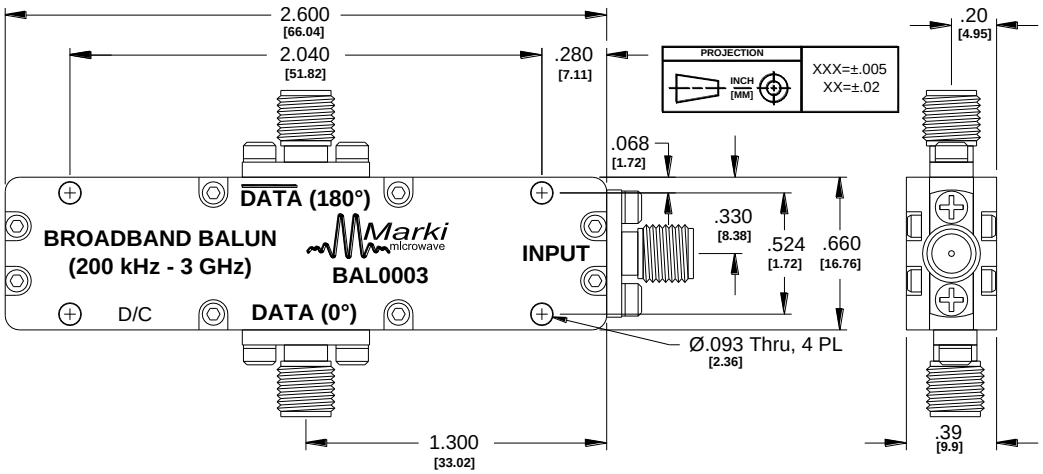
Electrical Specifications - Specifications guaranteed from -55 to +100°C, measured in a 50Ω system.

Parameter	Frequency Range	Min	Typ	Max
Insertion Loss as a mode converter (dB)	200 kHz to 3 GHz		4	5
Nominal Phase Shift (Degrees)			180	
Amplitude Balance (dB)			0.05	0.5
Phase Balance (Degrees)			1	5
Common Mode Rejection (dB)		35	45	
Isolation (dB)			8	
VSWR (Input) VSWR (Output)			1.35 1.7	
Risetime /Falltime (ps)[1]			48	
Total Input Power (W)				1
Weight (g)			27	

[1]Specified as 90%/10%. Calculated from $\tau_{balun}^2 = (\tau_{out}^2 - \tau_{in}^2)$

Model Number	Description
BAL-0003	200 kHz to 3 GHz Balun with SMA connectors[2], LEAD-FREE/RoHS COMPLIANT

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



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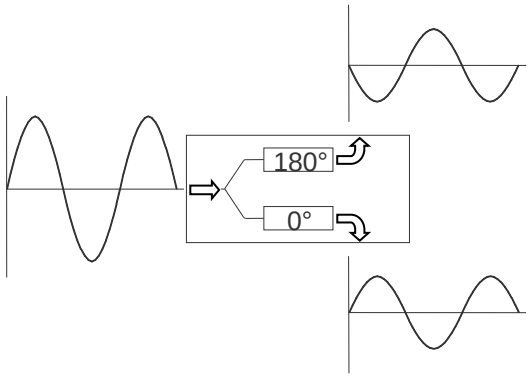
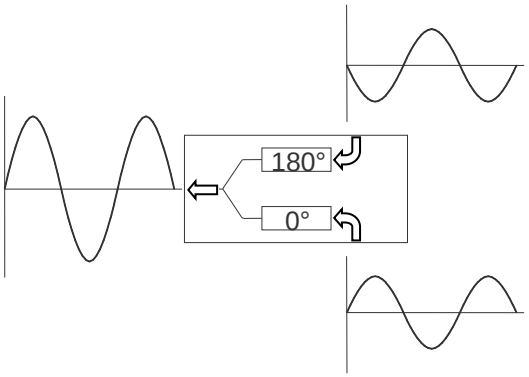
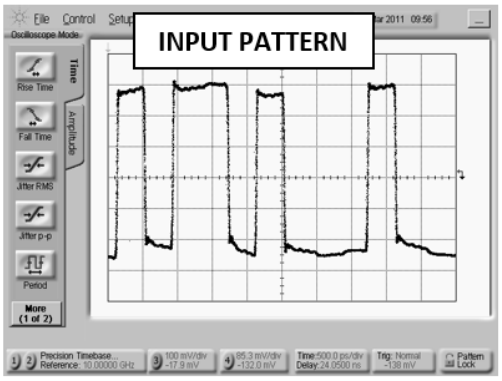
Block Diagram

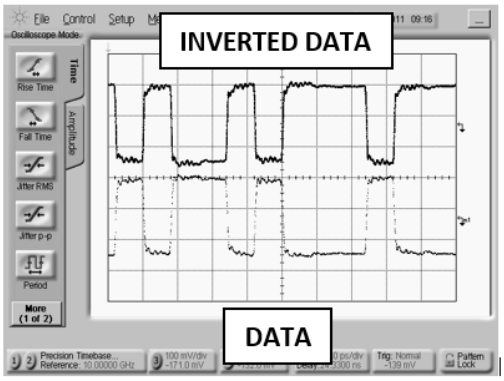


Single ended to differential



Differential to single ended





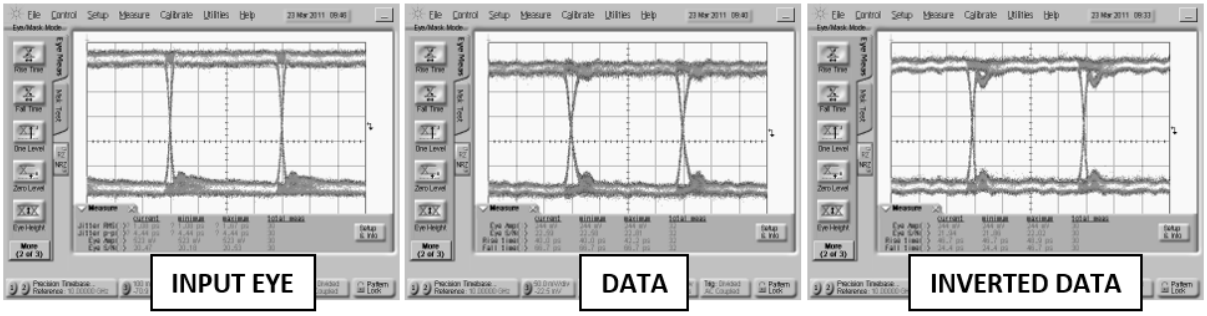


Fig. 1. Oscilloscope measurements of the BAL-0003 with a 2.5 Gb/s PBRS pattern. Bit pattern is measured with a 2^7-1 PBRS input demonstrating extremely good pulse fidelity for both inverted and non-inverted output. Eye diagrams are taken with 2^{31}-1 PBRS input demonstrating minimal eye distortion/closure afforded by the extremely low frequency operation of the balun (<200 kHz).

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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.

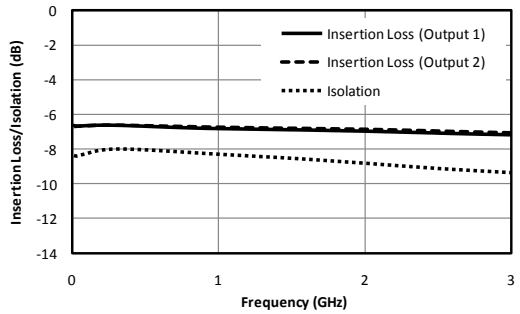

Fig. 2. Common to output port insertion loss and output to output port Isolation.

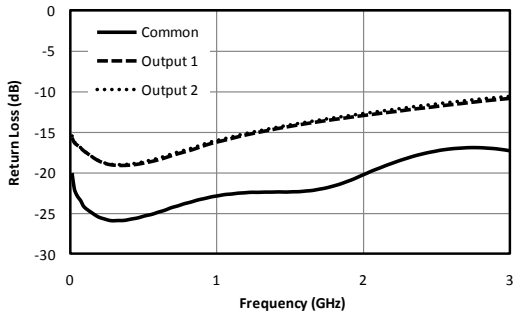

Fig. 3. Return loss for common port and output ports.

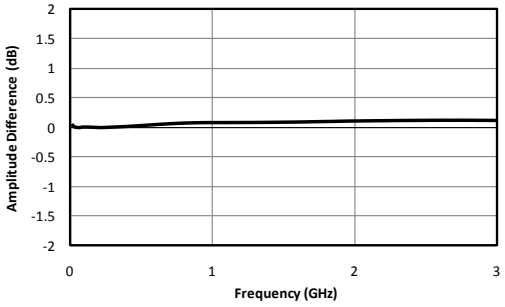

Fig. 4. Amplitude balance between output ports.

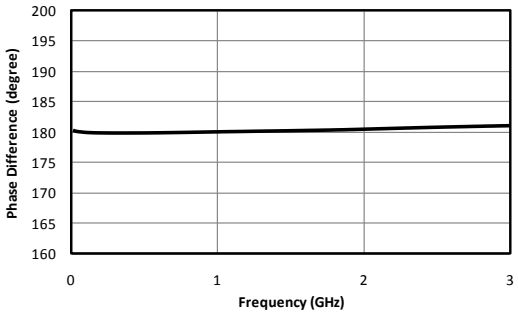

Fig. 5. Phase balance between output ports.

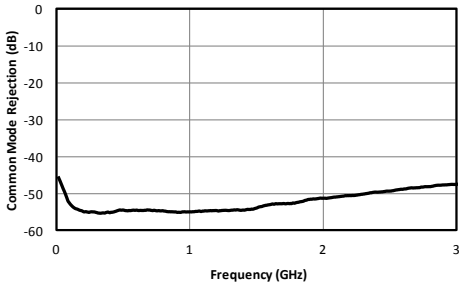

Fig. 6. Common mode rejection.

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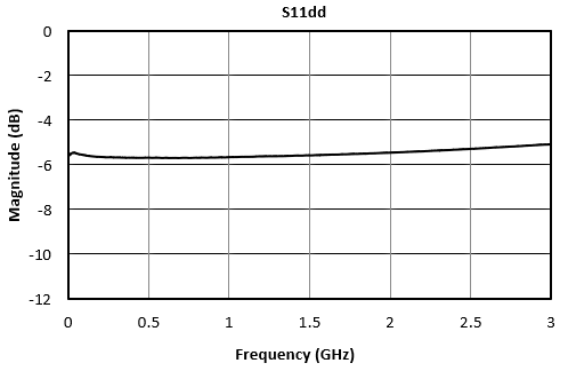
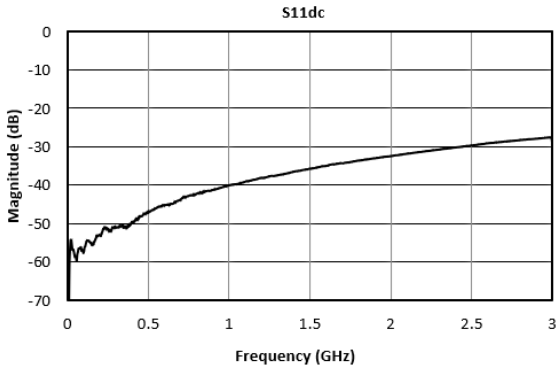
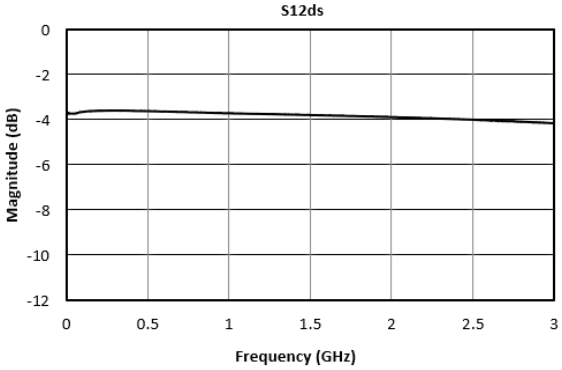
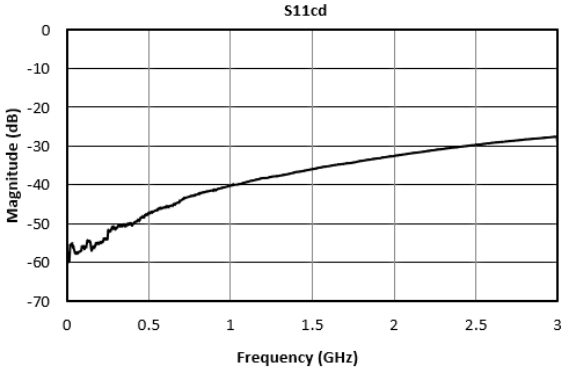
Mixed Mode Scattering Parameters

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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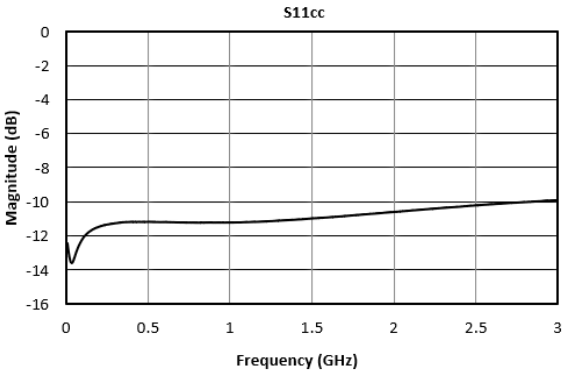

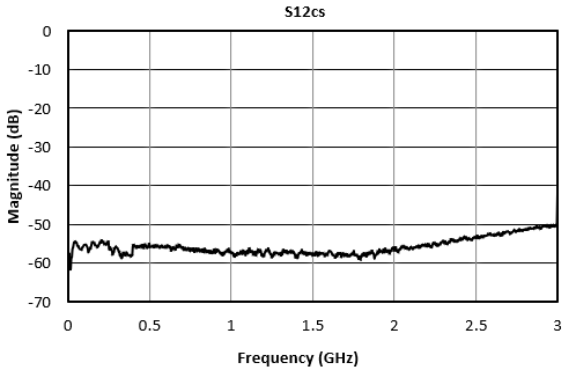

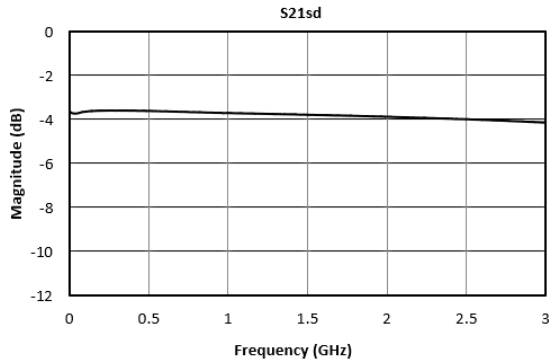

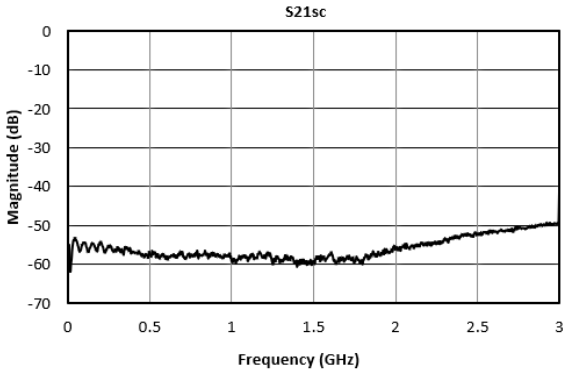

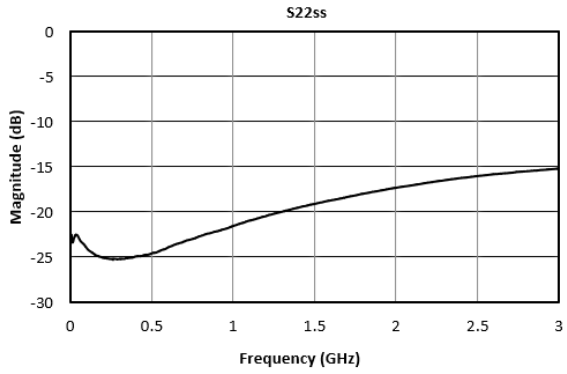

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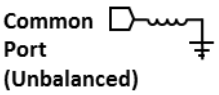
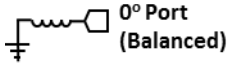
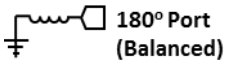
DC Interface

Port	Description	DC Interface Schematic
Common Port / In (Unbalanced)	The common port is DC 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.	

Revision History

Revision code	Revision Date	Comment
-	2011	Datasheet initial Release
A	2014	Typical Performance plots added
B	October 2019	Mixed Mode Scattering Parameters added
C	November 2019	RoHs Compliant assembly
D	July 2020	Specs Table Update
E	October 2020	Specs Table Update