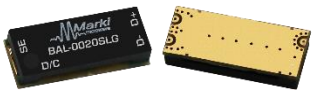
LEAD-FREE / RoHS-COMPLIANT

SURFACE-MOUNT BROADBAND BALUN BAL-0020SLG



SMT

Features

- 10 MHz 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, Baseband Digital Modulation, Signal Integrity
- BAL-0020SLG.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)	10 MHz to 16 GHz		4.5	7
	16 GHz to 20 GHz		5	8
Nominal Phase Shift (Degrees)	10 MHz to 20 GHz		180	
Amplitude Balance (dB)			0.4	1.2
Phase Balance (Degrees)			5	10
Common Mode Rejection (dB)		22	35	
Isolation (dB)			12	
VSWR (Common)			1.5	
VSWR (Output)			1.6	
Total Input Power (W)				TBD

Model Number	Description
BAL-0020SLG	10 MHz to 20 GHz Balun, Surface Mount, LEAD-FREE/RoHS COMPLIANT
EVAL-BAL-0020	Connectorized Evaluation Fixture, LEAD-FREE/RoHS COMPLIANT

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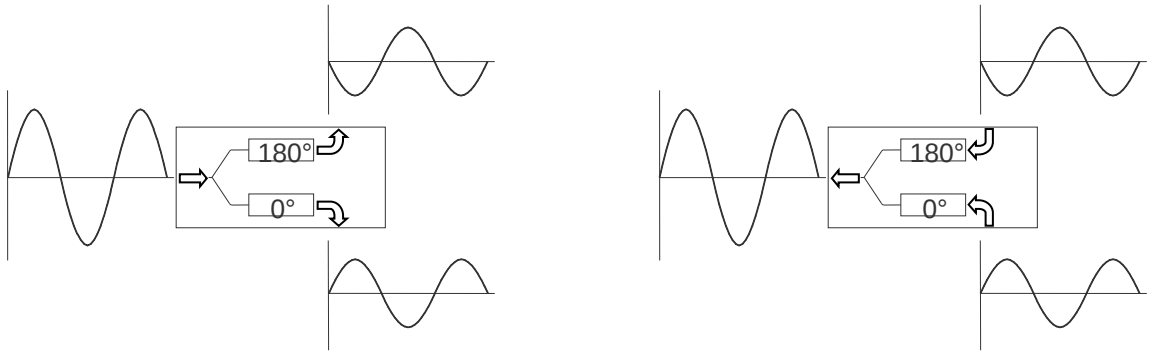
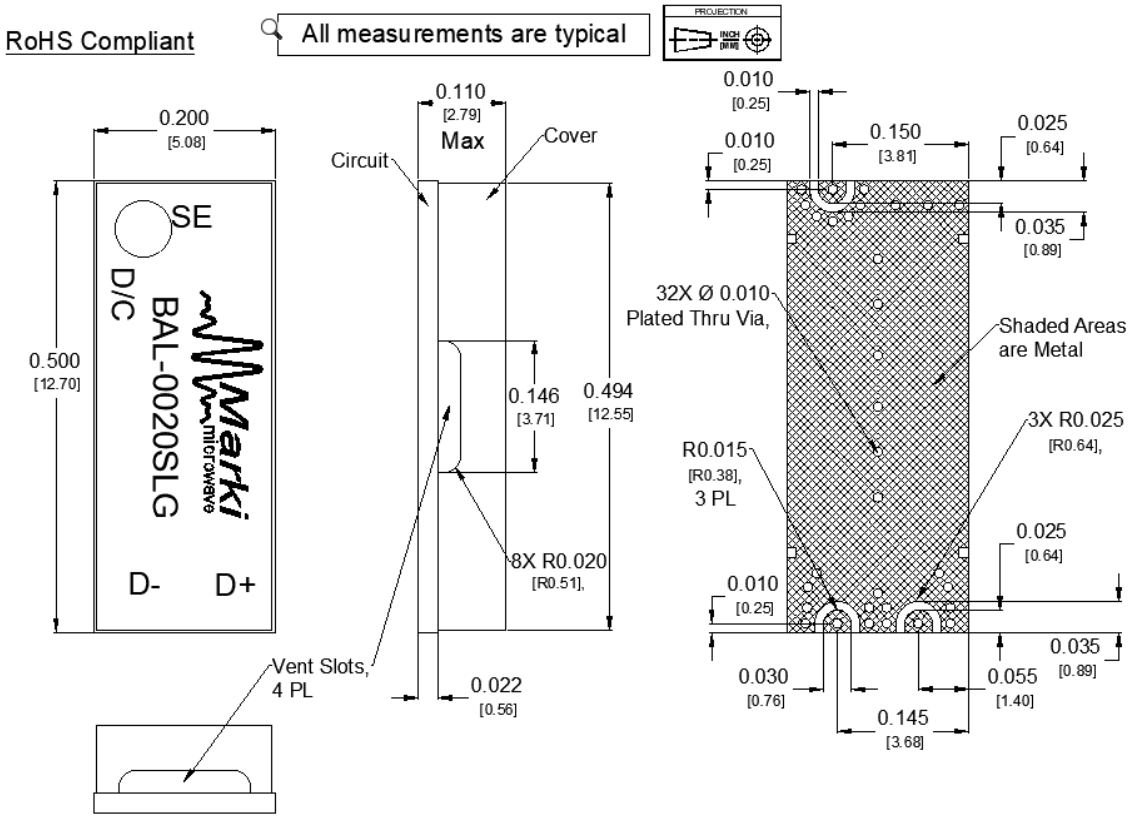
SURFACE-MOUNT BROADBAND BALUN BAL-0020SLG

Block Diagram



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

Surface mount Outline Drawing



Material is FR4, Finish is 2-8 µ-inches of Gold type III Grade A, Soft Gold over 100-200 µ-inches solderable Nickel.

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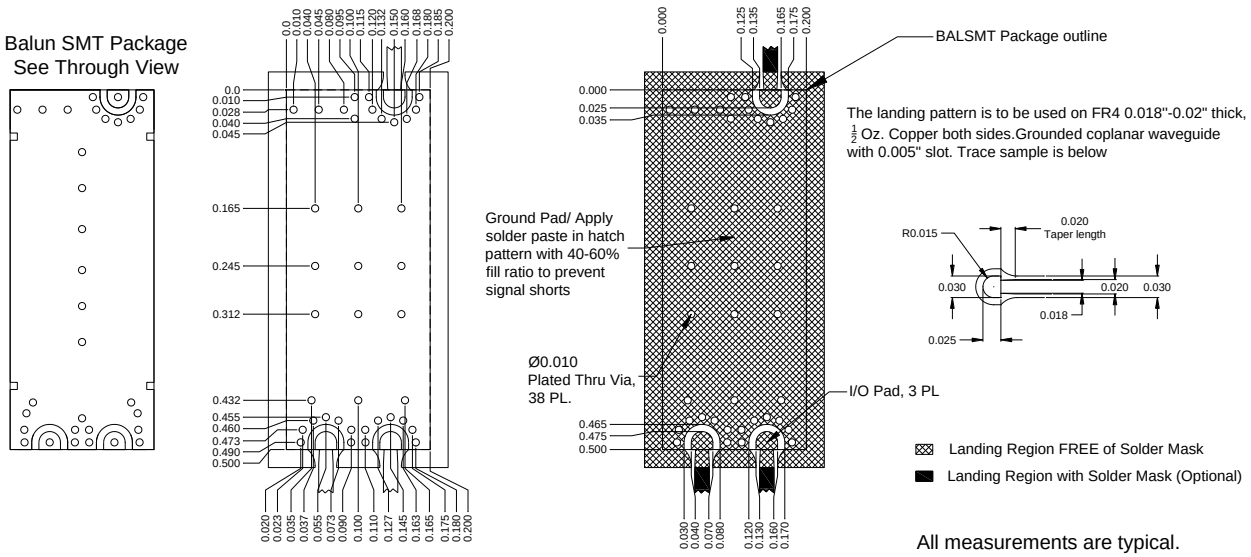
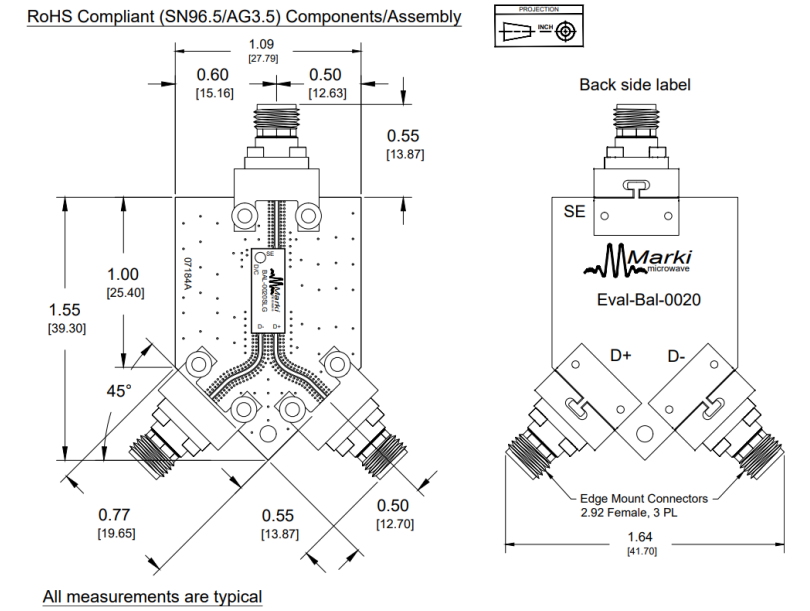
PCB Footprint Outline Drawing



[Click here for a DXF of the above layout.]

Eval Package Outline Drawing



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Mixed Mode Scattering Parameters[1]

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.

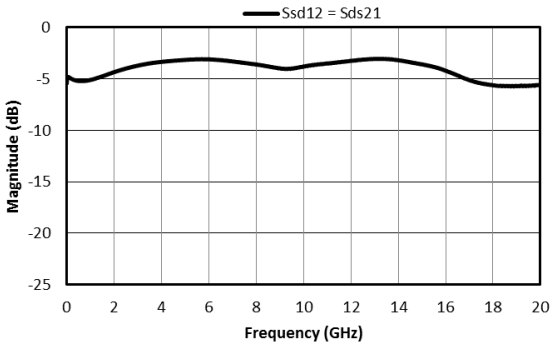


Fig. 1. Insertion loss as a mode converter

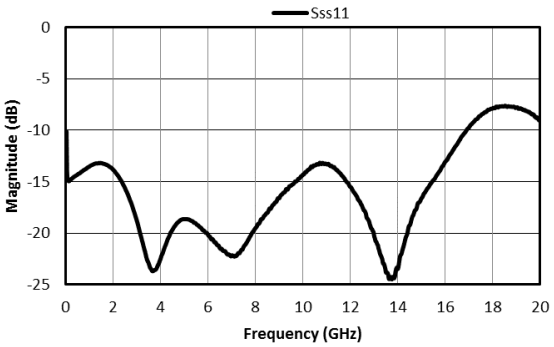


Fig. 2. Unbalanced port return loss

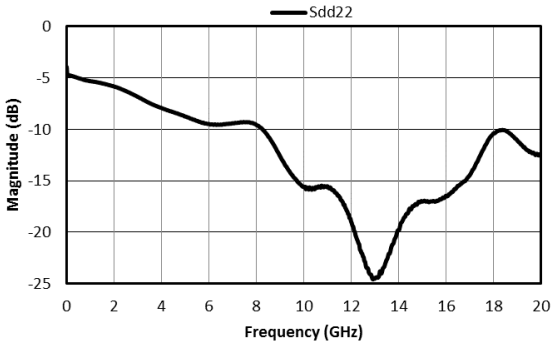


Fig. 3. Differential port return loss

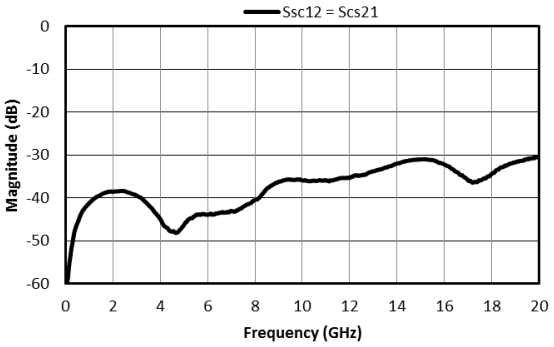


Fig. 4. Insertion loss of a common mode signal

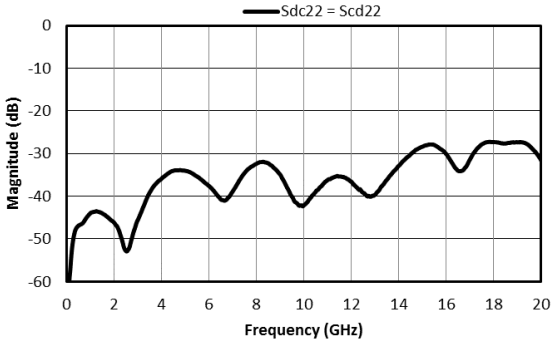


Fig. 5. Reflection converted between differential and common modes

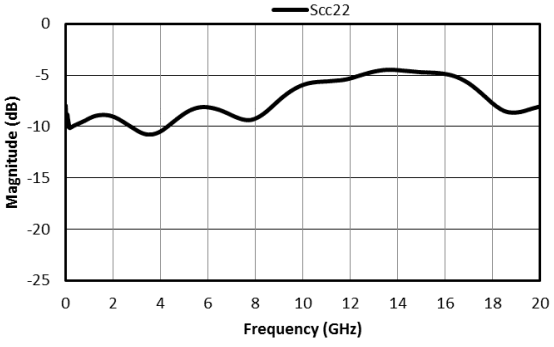


Fig. 6. Return loss of a common mode signal

Typical Performance Scattering Parameter

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

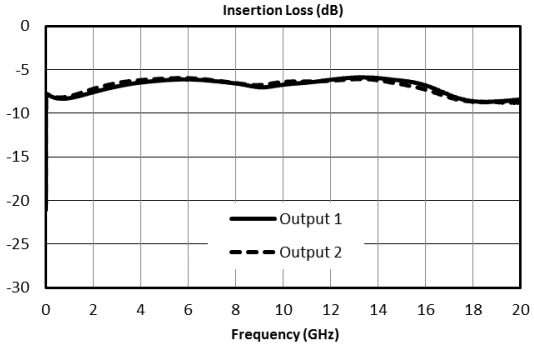


Fig. 7. Common to output port insertion loss

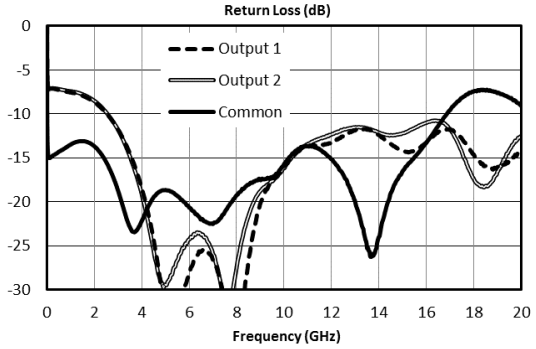


Fig. 8. Return loss for common port and output ports.

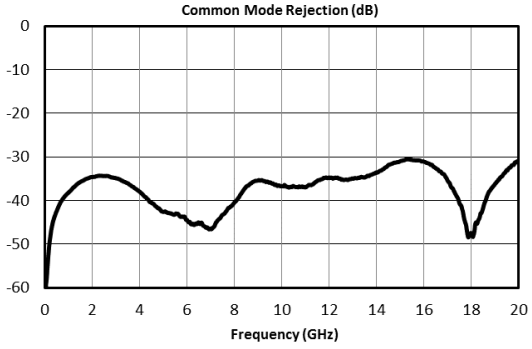


Fig. 9. Common mode rejection.

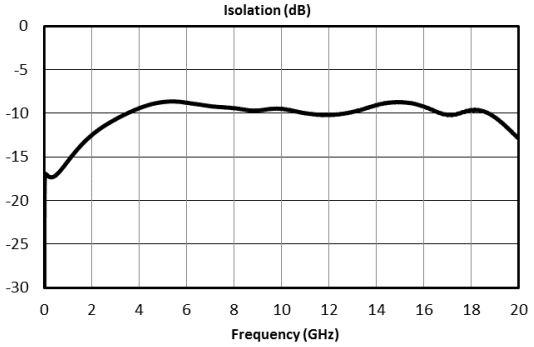


Fig. 10. Isolation between output ports

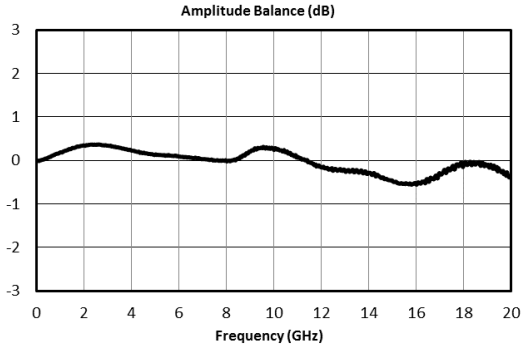


Fig. 11. Amplitude balance between output ports.

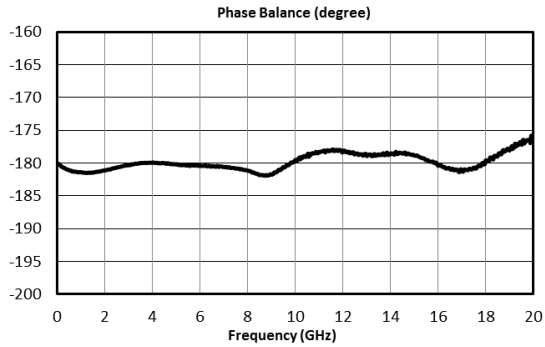


Fig. 12. Phase balance between output ports.

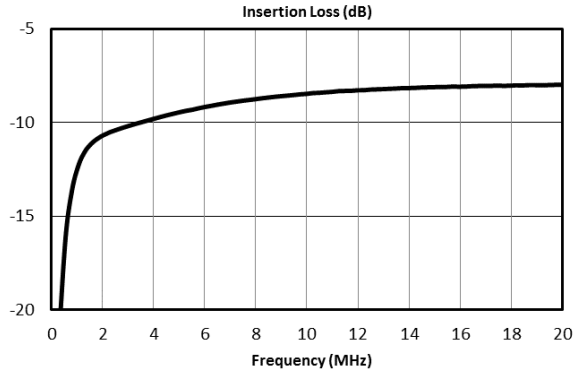
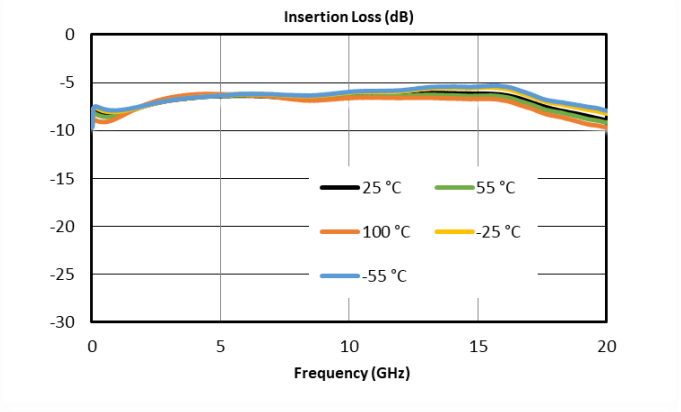
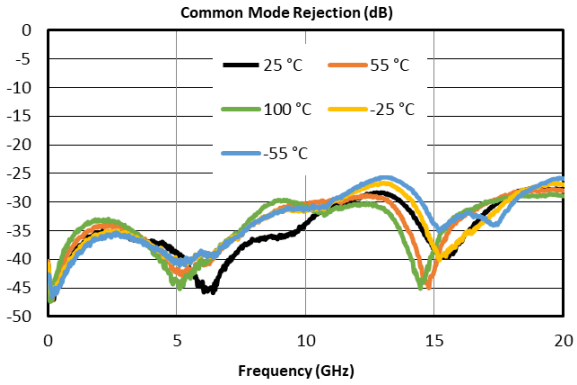
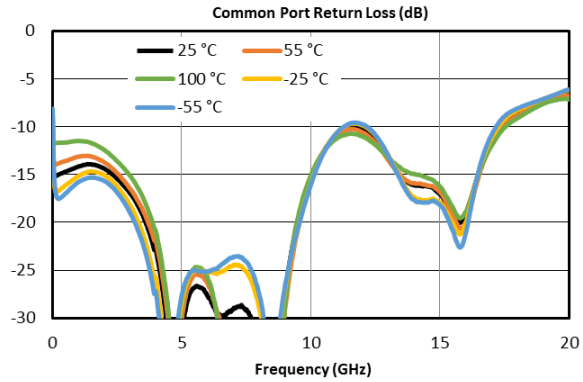


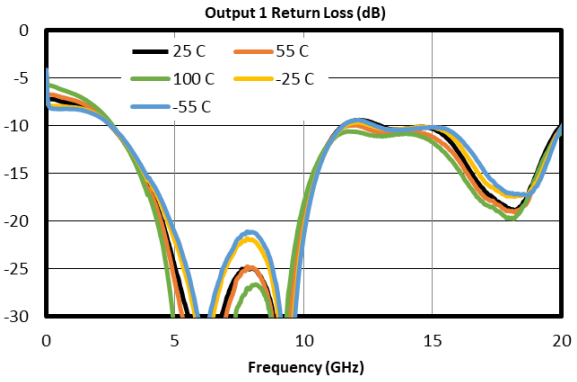
Fig. 13. Low Frequency Insertion Loss

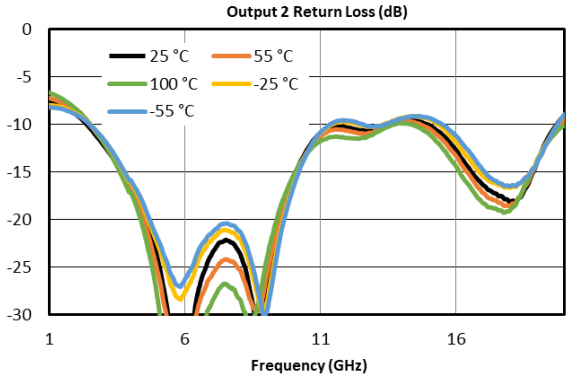
Typical Performance over Temperature

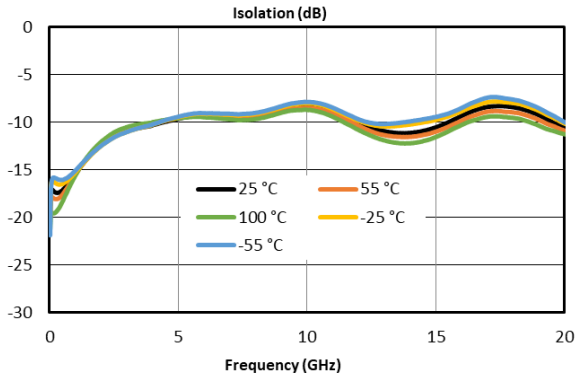


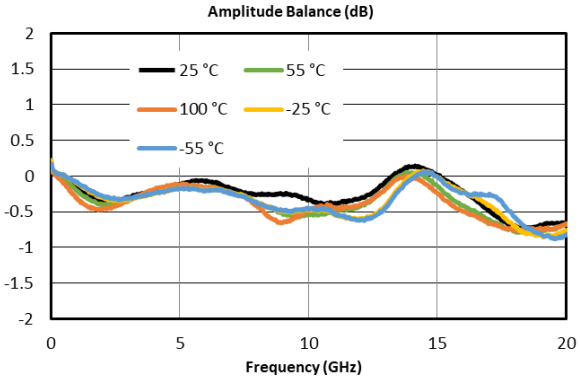


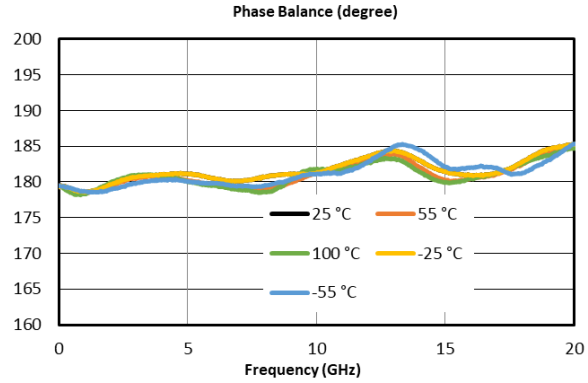




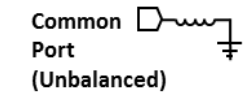
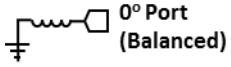
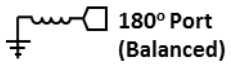








DC Interface

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.	

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

DATASHEET NOTES:

1. Sdd22: differential return loss of the differential port driven with a differential signal
   Sdc22: differential return loss of the differential port driven with a common signal
   Sds21: insertion loss from a single ended input to a differential output
   Scc22: common mode return loss of the differential port driven with a common signal
   Scd22: common mode return loss of the differential port driven with a differential signal
   Scs21: insertion loss from a single ended input to a common output
   Sss11: single ended return loss
   Ssd12: insertion loss from a differential signal to single ended output
   Ssc12: insertion loss from a common signal to single ended output

Revision History

`	Revision Date	Comment
-	September 2020	Initial Release
A	May 2021	Temp data & insertion loss spec change
B	November 2021	Side vent Slot size reduced to 0.146 inch / 3.71 mm was 0.360 inches / 9.14 mm long. See page 2 Surface Mount Outline Drawing

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