WERBEL MICROWAVE LLC
628 State Route 10, Unit 14
Whippany, New Jersey 07981
Sales@WerbelMicrowave.com - www.WerbelMicrowave.com

High Power Directional Coupler, 1000-4000MHz, 40dB, N-Male or Female Input, 50Ω

HIGH DIRECTIVITY… 30dB TYPICAL PERFORMANCE!

WMADC-1-4-40DB-SERIES

The WMADC-1-4-40DB-SERIES is a high-power 40 dB directional coupler covering 1 to 4 GHz, supporting L-Band, S-Band, GPS, GLONASS, and other satellite navigation and communications systems. Built on an air dielectric coaxial structure, this design delivers low insertion loss, excellent power handling, and exceptional directivity for accurate forward and reverse power discrimination.

Unlike many broadband couplers that prioritize ultra-flat coupling, this model is engineered to maximize directivity across the band, providing cleaner separation between forward and reflected signals—especially critical in precision L-Band and navigation-related systems. In most real-world applications, coupling variation can be calibrated out, while poor directivity cannot, making this approach better aligned with high-power measurement accuracy and system protection.

Typical applications include RF power monitoring, transmitter protection, VSWR measurement, satellite communications, navigation system testing, and general-purpose RF test setups requiring reliable sampling of high-power signals.

The series is configurable in single or dual configurations. The input connector is offered with a standard N-Female, or optionally an N-Male for direct amplifier connection—eliminating unnecessary adapters, reducing mismatch, and preserving system integrity at high power.

Electrical Specifications at +25°C, Sea Level

Parameter		Low Band	Mid Band	High Band	Unit
Frequency Range		1 – 2	2 – 3.5	3.5 – 4	GHz
Impedance		50			Ω
Coupling Nominal Value		40.0	39.0	39.0	dB
Coupling Accuracy (±) deviation from nominal		3.0	2.0	2.0	dB, typ.
Coupling Flatness (±)		1.5	1.0	1.0	dB, typ.
Directivity		25	25	23	dB, min.
Mainline Loss[1]	+25°C +85°C	0.10 0.15	0.15 0.20	0.20 0.25	dB, max.
Return Loss (Input, Output)		25	22	20	dB, min.
Return Loss (Coupled)		20	20	20	dB, min.
Forward or Reverse Power, at +25°C, Sea Level (CW)[2]		375	300	250	W, max.
Forward or Reverse Power, at +85°C, Sea Level (CW)[2]		300	240	200	W, max.
Termination Power (Coupled Port max power)		1			W, max.
DC Current (Input-Output)		5			A max.

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Mechanical and Environmental Specifications

Connector Interface	N Male or Female, SMA Female	RoHS Status[4]	RoHS3 Compliant
Operating Temperature[3]	-55 to +85 °C	REACH Status[4]	REACH Unaffected
Storage Temperature	-55 to +100 °C	Enclosure Material	Aluminum
Nominal Weight	169 g (single) 173 g (dual)	Connectors Material	N: Brass, Tri-Alloy Plated
Operating Humidity	10-90% (non-condensing)		SMA: Brass, Gold Plated
Operating Environment	Indoor Use Only	Contacts Material	Beryllium Copper, Gold Plated
HTSUS Code	8548.00.0000	Insulators Material	Virgin PTFE
ECCN	EAR99	Finish	Green Paint

1. Mainline loss includes coupling loss.
2. All output ports must be terminated in a 50-ohm load with 1.2:1 max VSWR. Ratings assume adequate thermal conduction to mounting surface.
3. Electrical specifications are tested at +25 °C.
4. To the best of our knowledge at the time of publication.

Explanation of Part Numbers

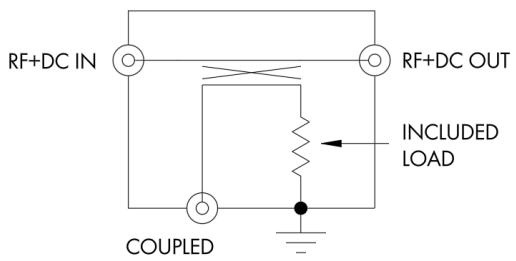
WMADC-	1-4-	40DB-	1-	NF
Product Series	Frequency (GHz)	Nominal dB Value	Configuration: 1 = Single Coupler 2 = Dual Coupler	Input Connector: NF = N Female NM = N Male

Currently available as standard models:

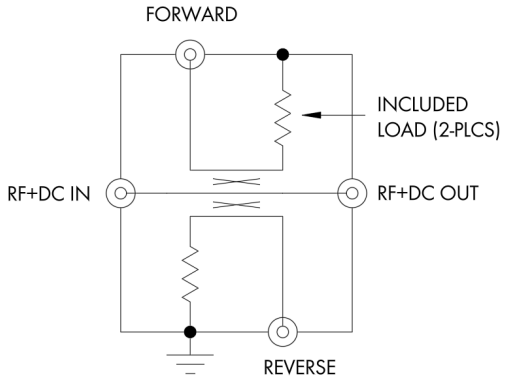
WMADC-1-4-40DB-1-NF	1000-4000MHz, 40dB, Single Coupler,	N-Female Input,	N-Female Output,	SMA-F Coupled
WMADC-1-4-40DB-1-NM	1000-4000MHz, 40dB, Single Coupler,	N-Male Input,	N-Female Output,	SMA-F Coupled
WMADC-1-4-40DB-2-NF	1000-4000MHz, 40dB, Dual Coupler,	N-Female Input,	N-Female Output,	SMA-F Coupled
WMADC-1-4-40DB-2-NM	1000-4000MHz, 40dB, Dual Coupler,	N-Male Input,	N-Female Output,	SMA-F Coupled

Functional Schematic

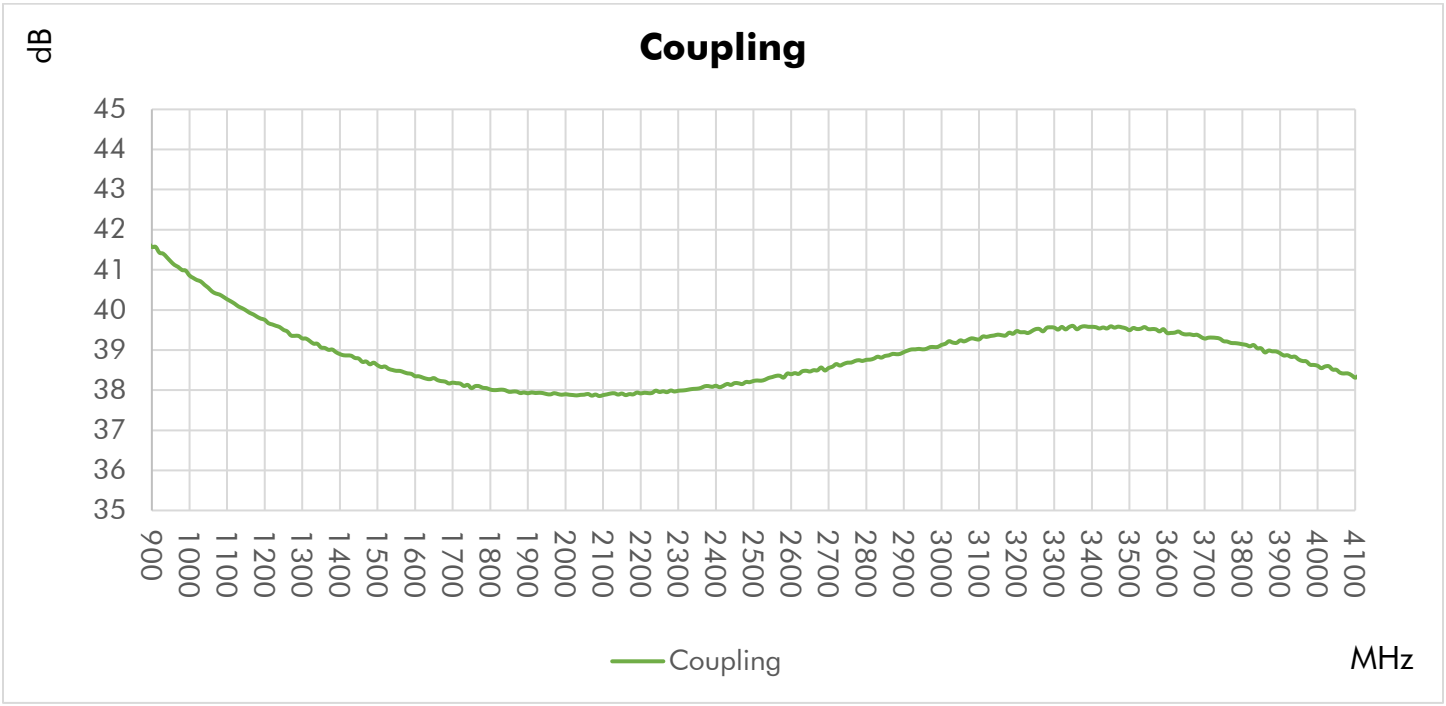
Single Coupler

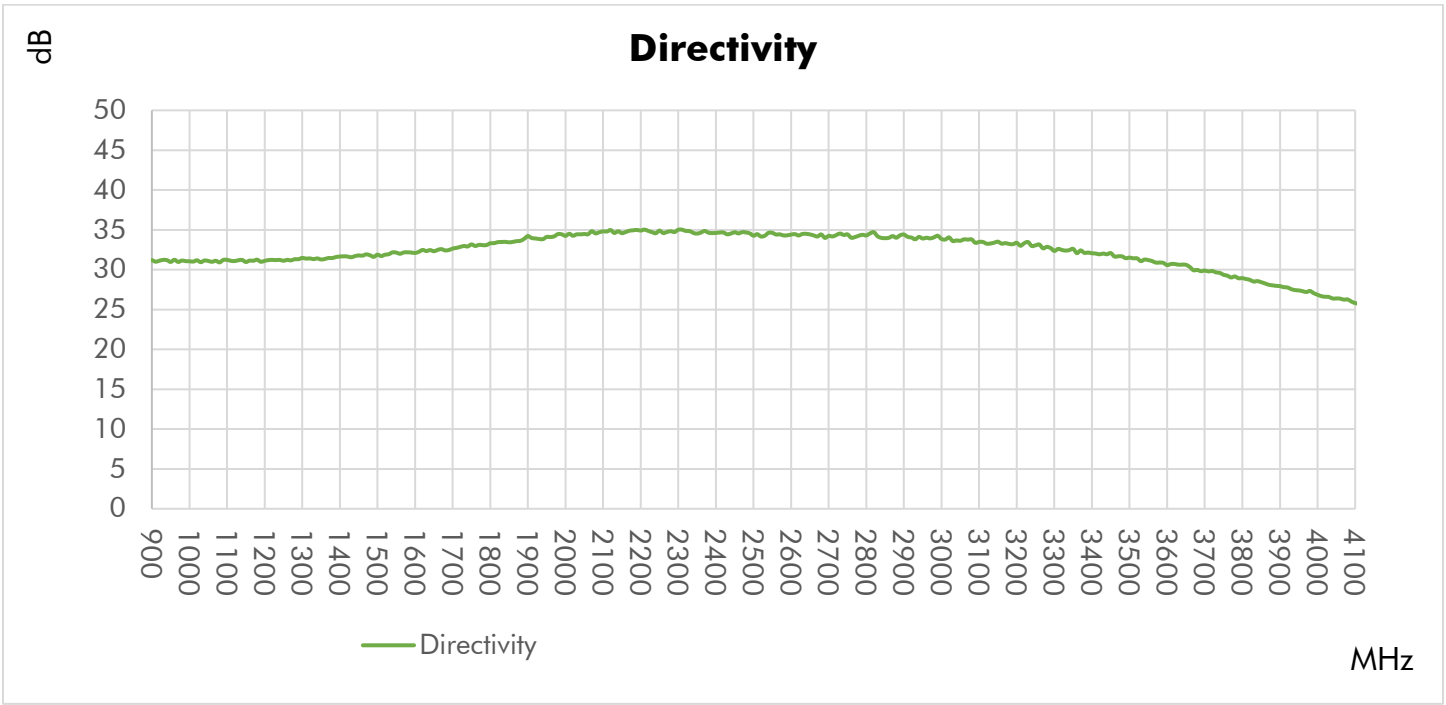


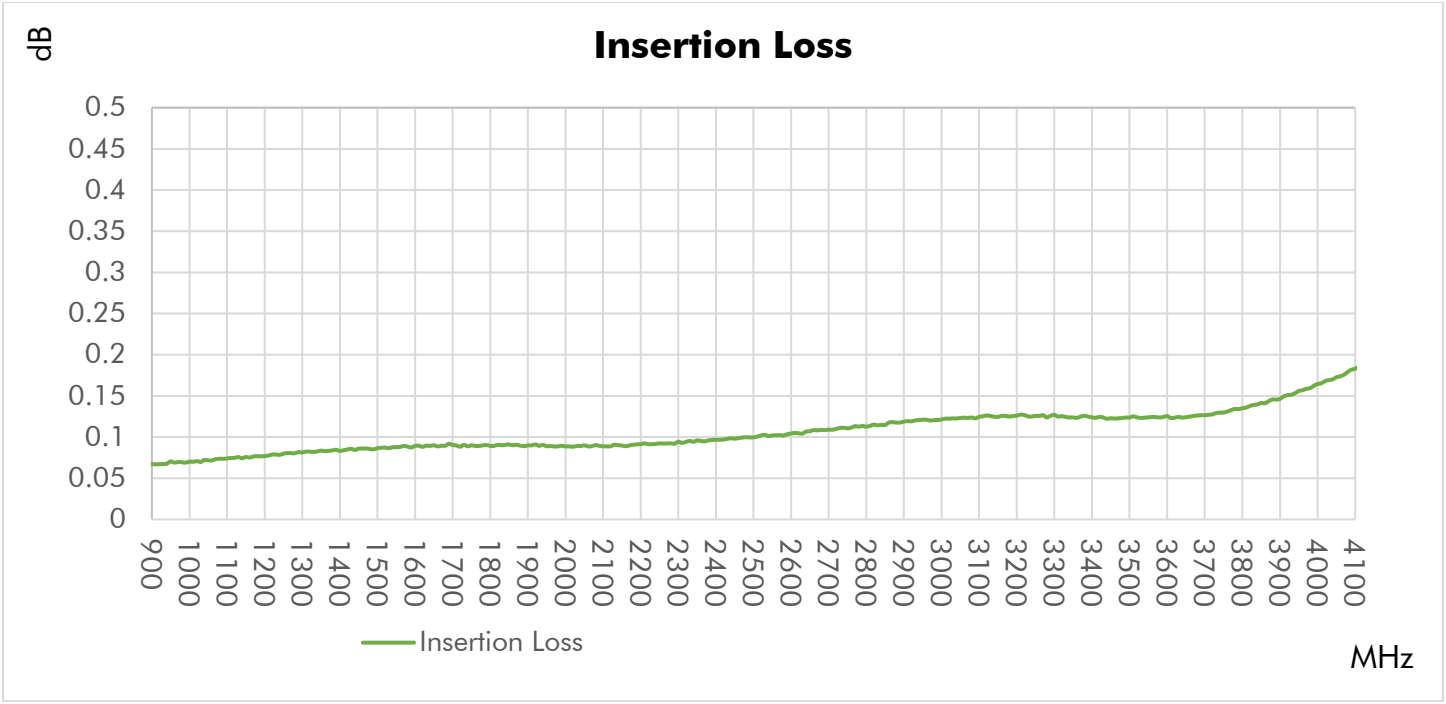
Dual Coupler

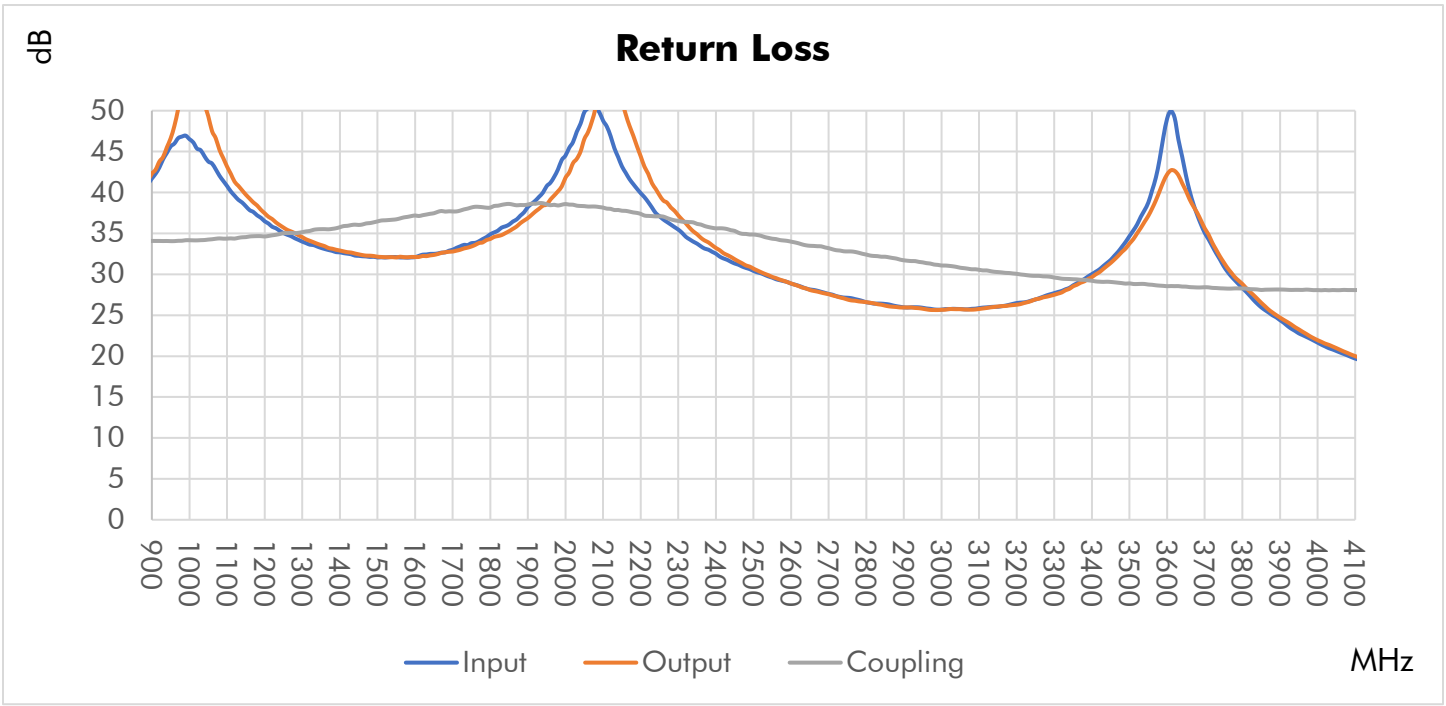


Typical Performance at +25 °C

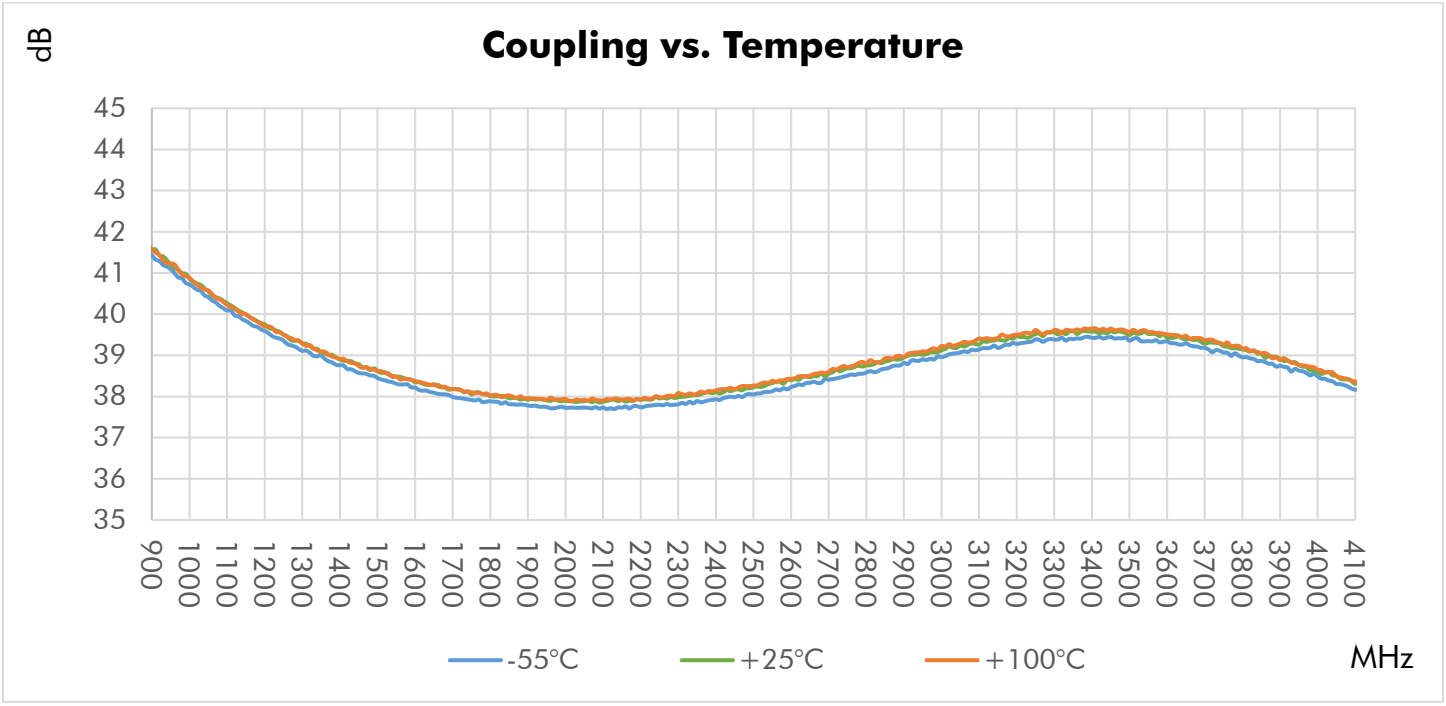


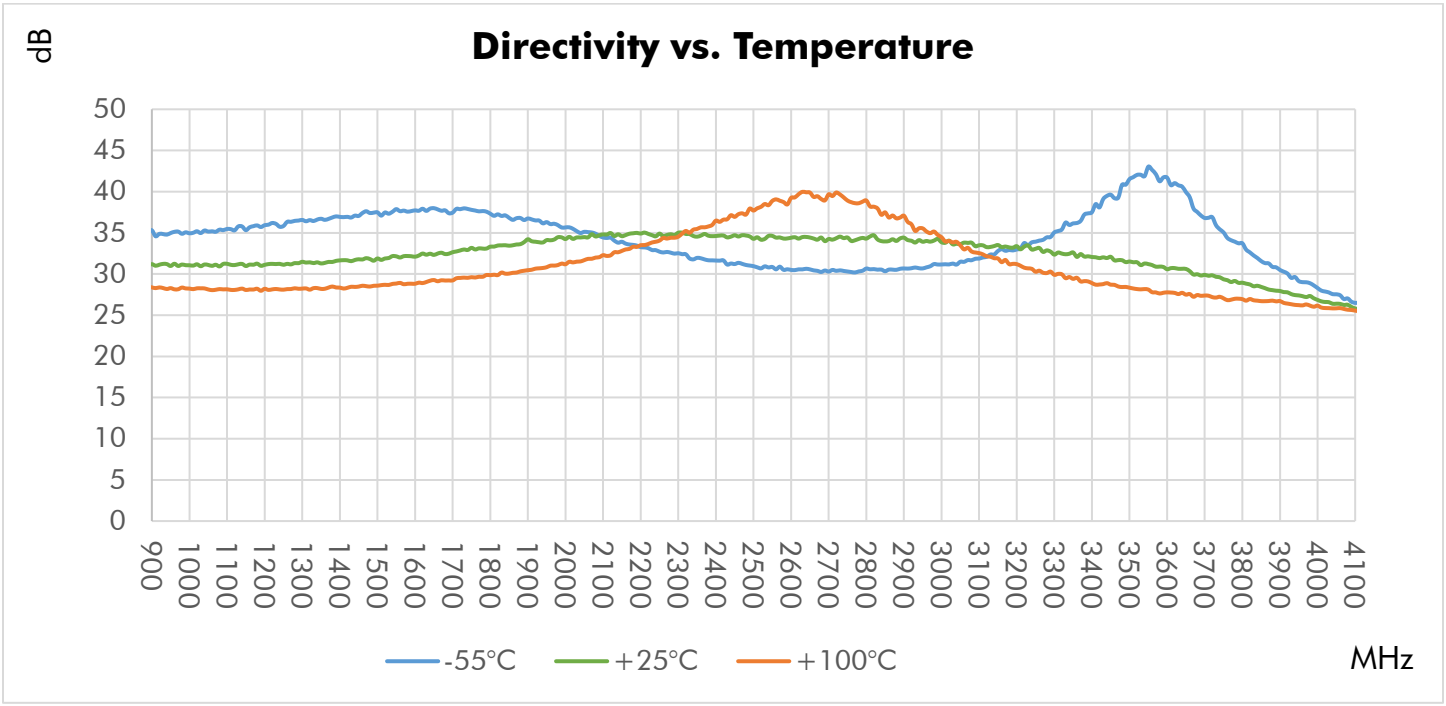


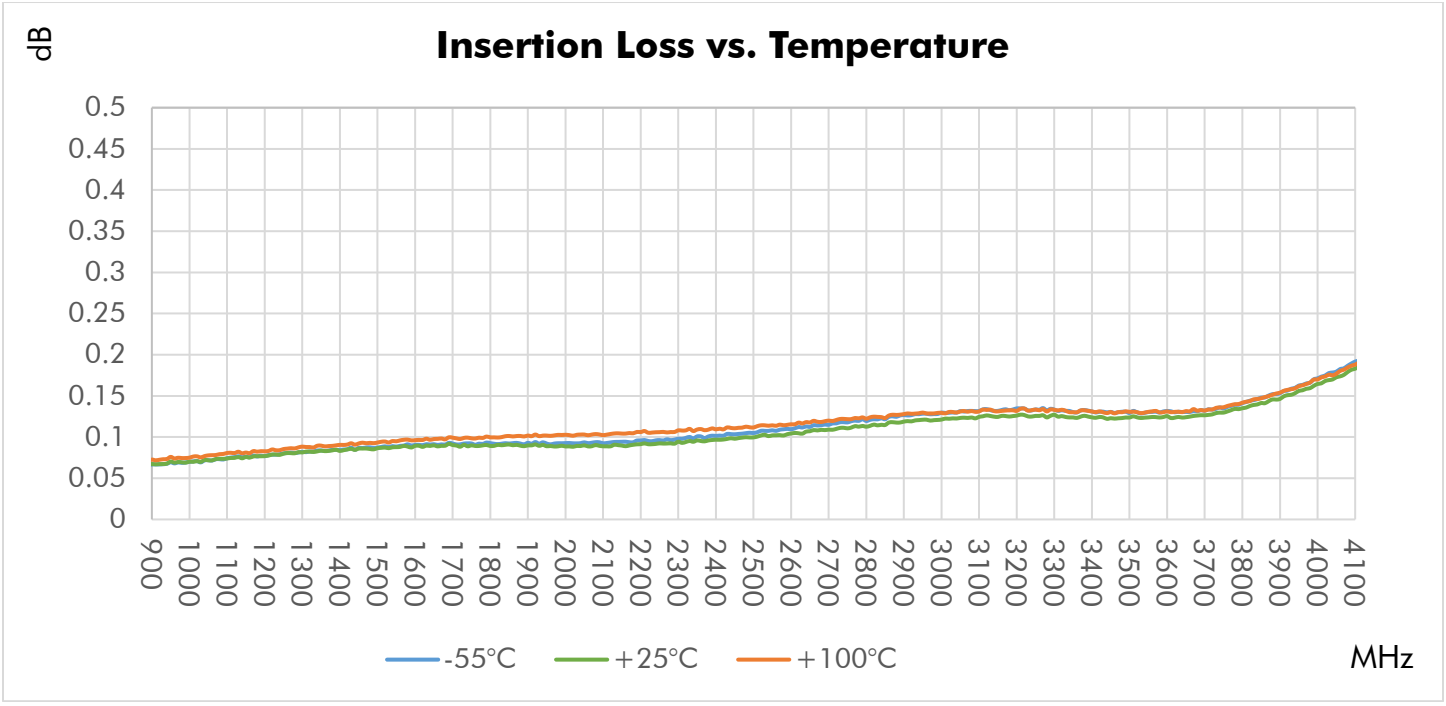

Insertion Loss
dB
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100
Insertion Loss
MHz

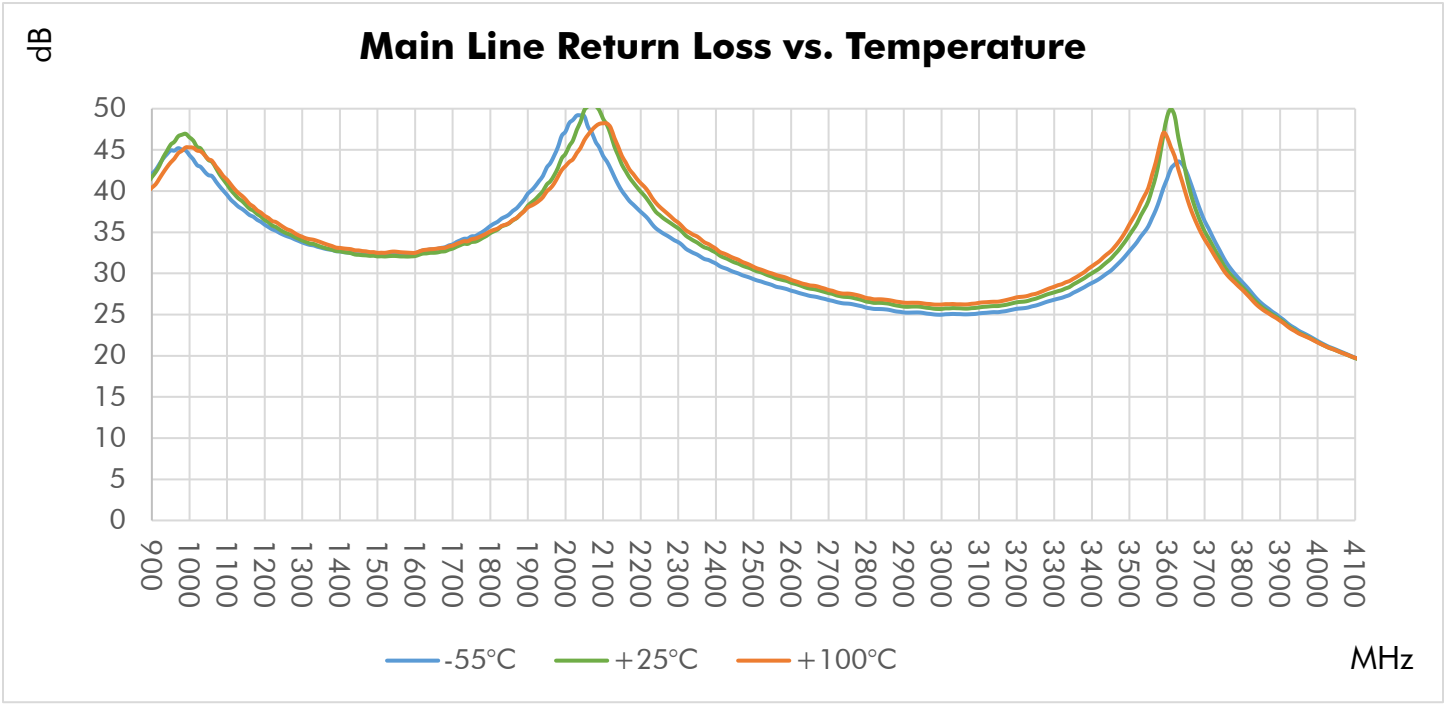

Return Loss
dB
50
45
40
35
30
25
20
15
10
5
0
900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100
Input
Output
Coupling
MHz

Typical Performance Over Temperature






Insertion Loss vs. Temperature
dB
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100
-55°C
+25°C
+100°C
MHz


Main Line Return Loss vs. Temperature
dB
50
45
40
35
30
25
20
15
10
5
0
900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100
-55°C
+25°C
+100°C
MHz

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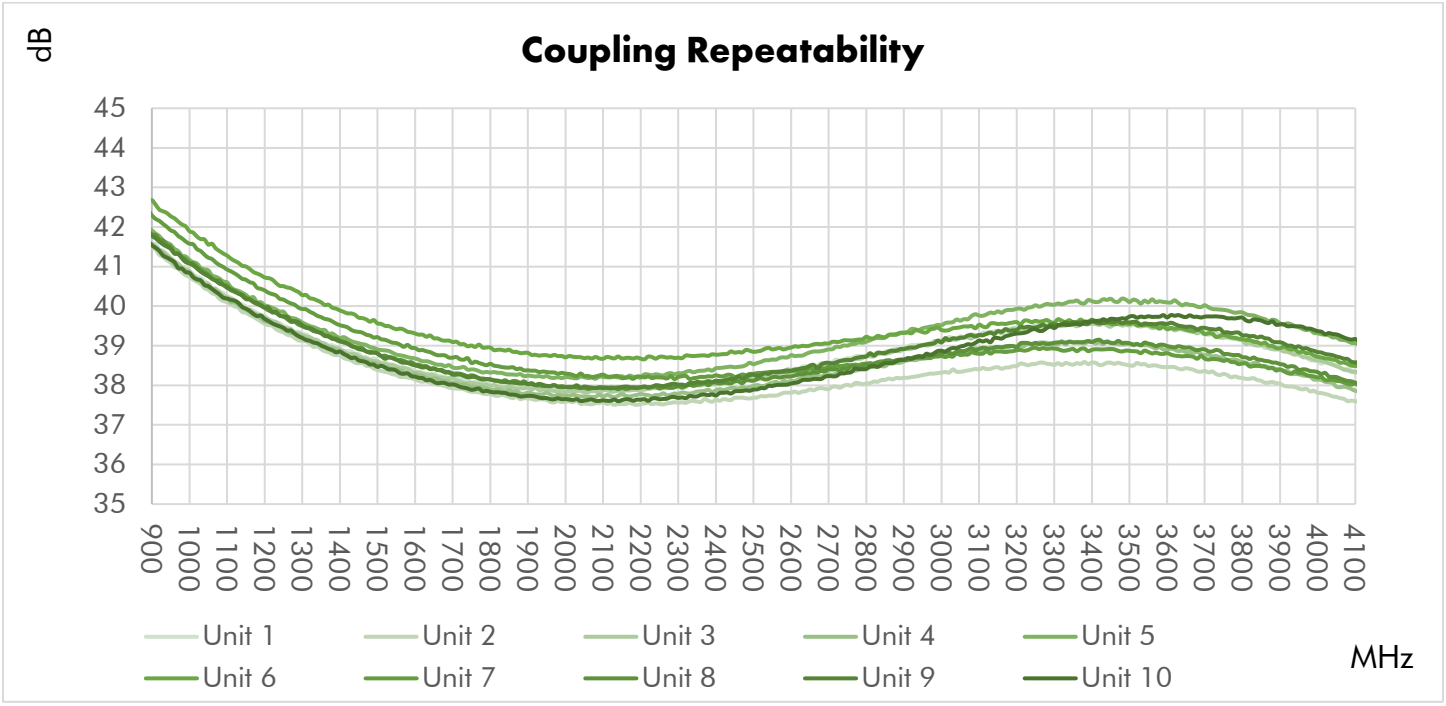
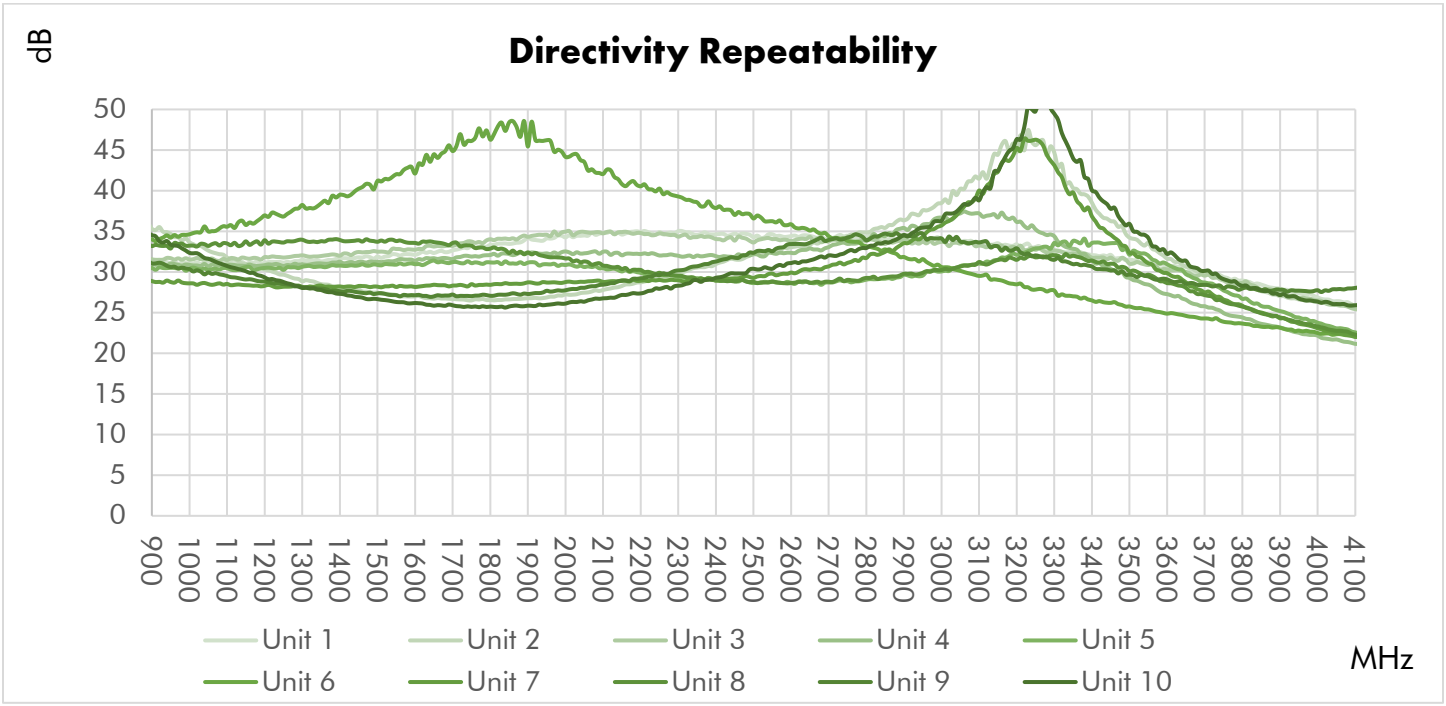
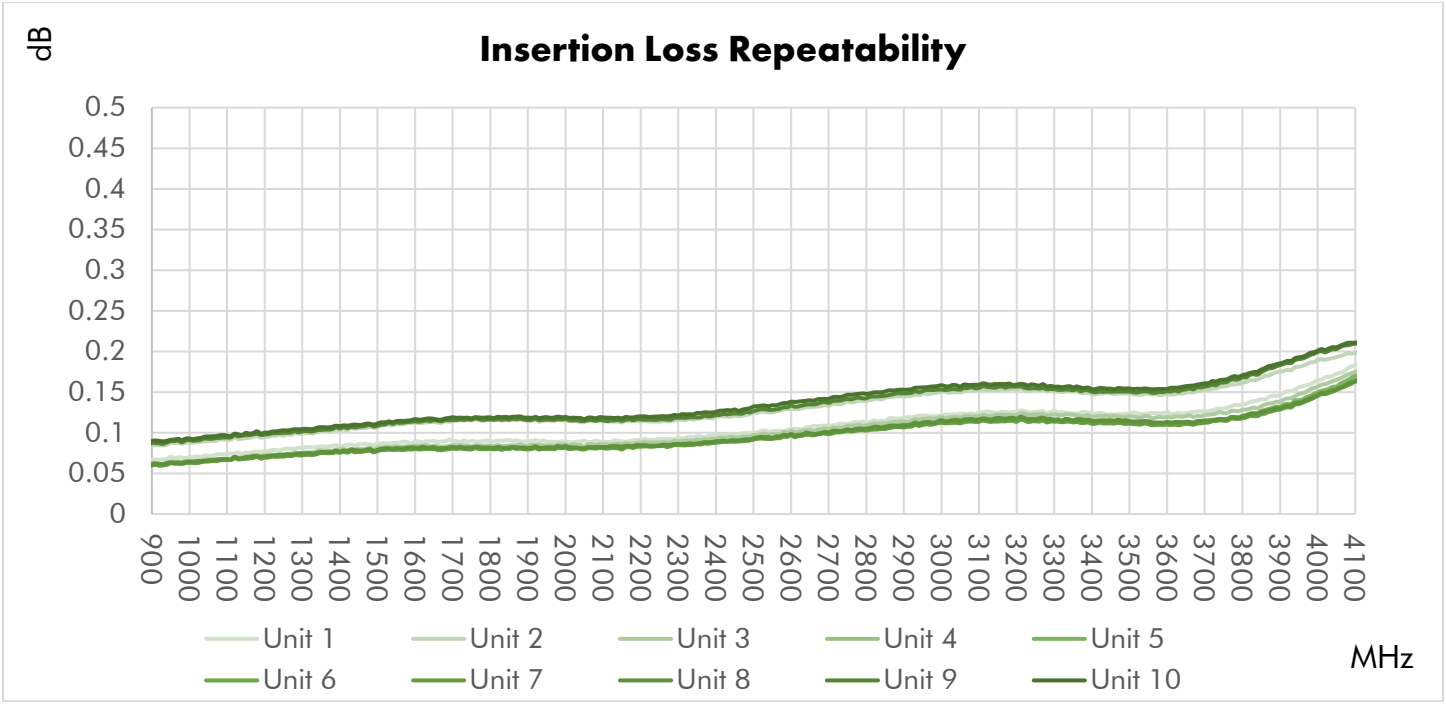
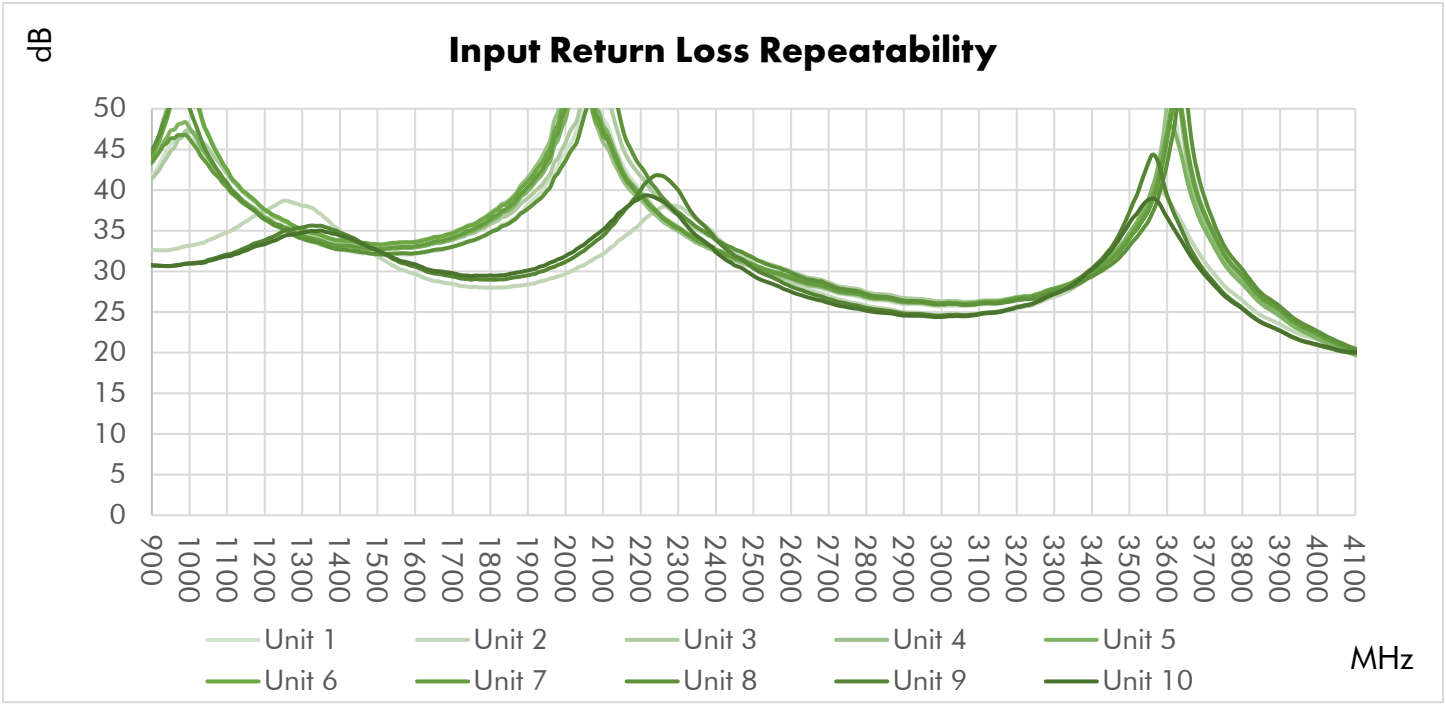
Repeatability in Production






Insertion Loss Repeatability
dB
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100
Unit 1
Unit 2
Unit 3
Unit 4
Unit 5
Unit 6
Unit 7
Unit 8
Unit 9
Unit 10
MHz

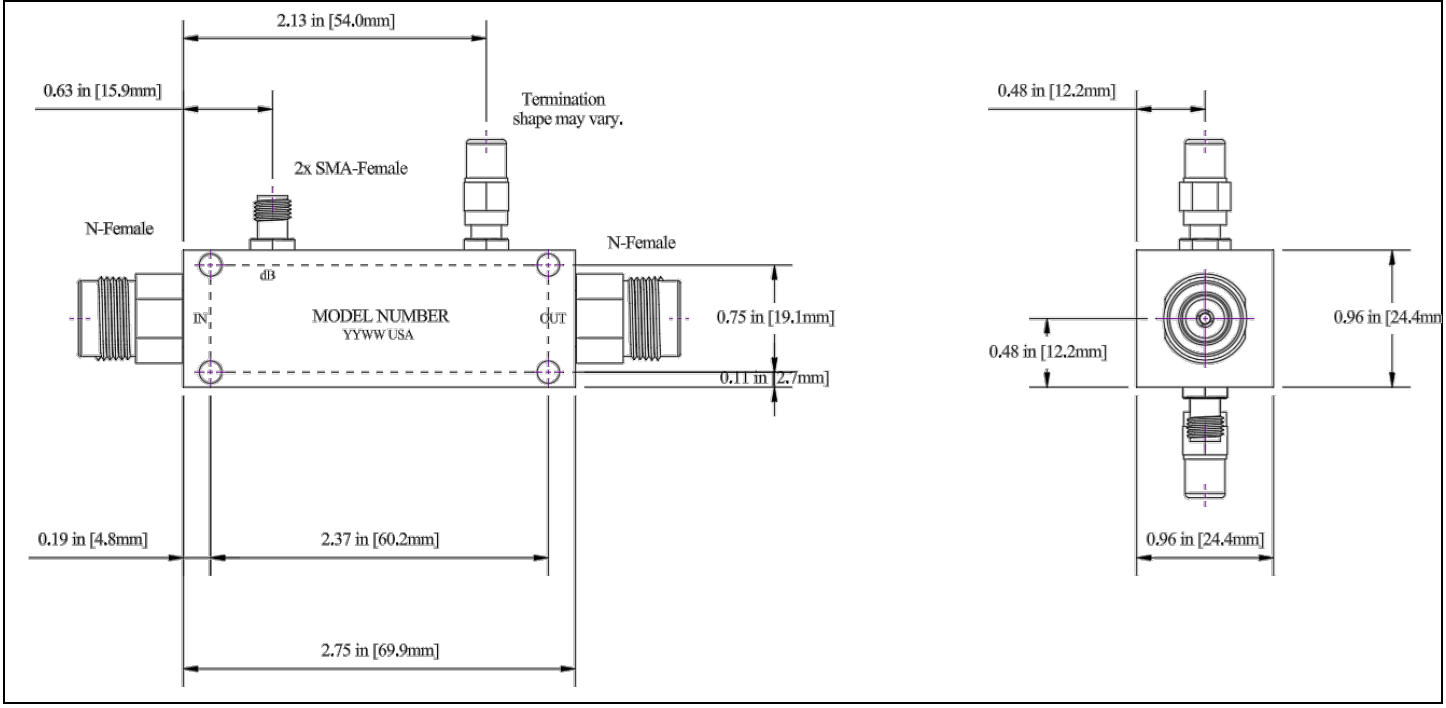

Input Return Loss Repeatability
dB
50
45
40
35
30
25
20
15
10
5
0
900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100
Unit 1
Unit 2
Unit 3
Unit 4
Unit 5
Unit 6
Unit 7
Unit 8
Unit 9
Unit 10
MHz

Typical Performance Data

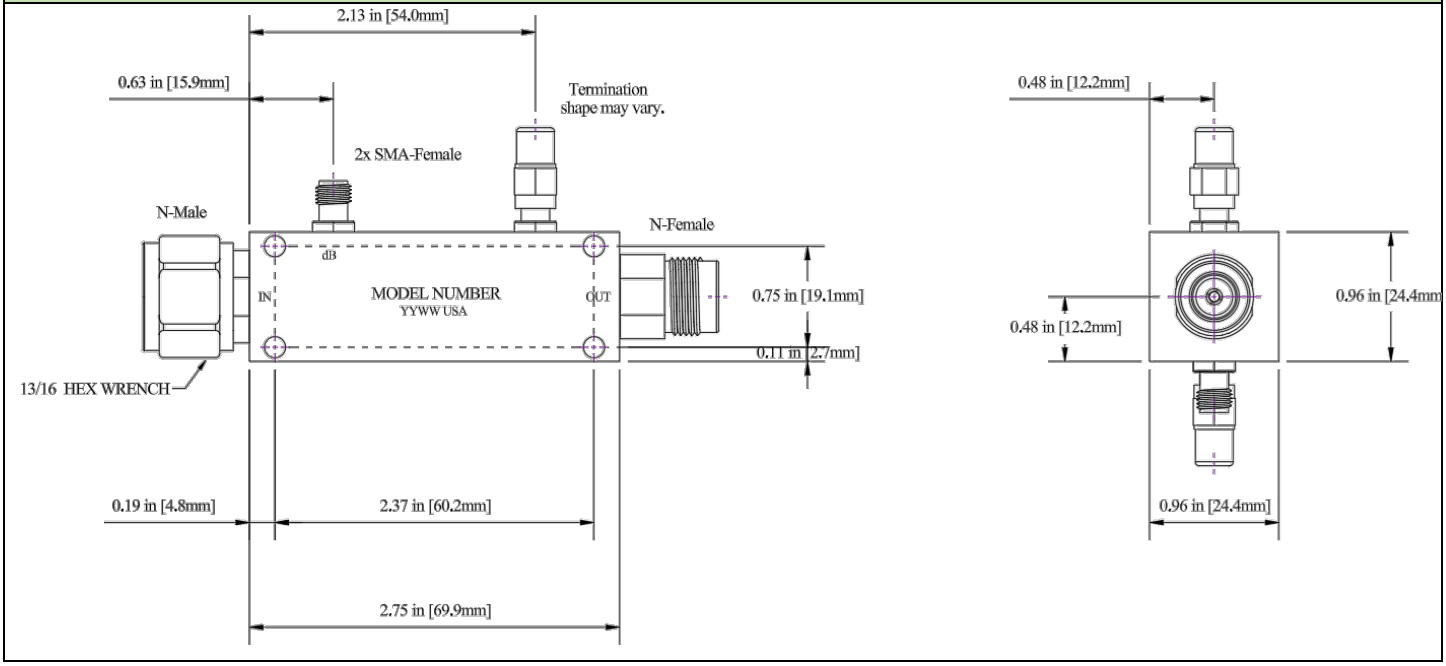
Frequency (MHz)	Return Loss (dB)			Mainline Loss (dB)	Coupling (dB)	Directivity (dB)
	In	Out	Cpl.	In-Out	In-Cpl.	
900	41.70	42.30	34.08	0.07	41.57	31.20
1000	46.52	55.81	34.17	0.07	40.86	31.06
1100	40.79	43.16	34.37	0.07	40.27	31.24
1200	36.48	37.47	34.63	0.08	39.75	31.11
1300	34.00	34.54	35.16	0.08	39.29	31.48
1400	32.69	32.91	35.76	0.08	38.90	31.65
1500	32.06	32.15	36.47	0.09	38.62	31.89
1600	32.10	32.12	37.19	0.09	38.35	32.10
1700	33.01	32.79	37.69	0.09	38.19	32.65
1800	34.89	34.32	38.15	0.09	38.01	33.32
1900	38.23	36.88	38.52	0.09	37.92	34.22
2000	44.52	41.81	38.59	0.09	37.90	34.25
2100	48.77	55.80	38.15	0.09	37.88	34.82
2200	39.92	44.42	37.38	0.09	37.92	34.91
2300	35.47	37.20	36.53	0.09	37.99	35.02
2400	32.52	33.22	35.62	0.10	38.11	34.62
2500	30.42	30.69	34.87	0.10	38.23	34.27
2600	28.86	28.89	33.99	0.10	38.40	34.40
2700	27.61	27.57	33.19	0.11	38.55	34.25
2800	26.58	26.60	32.41	0.11	38.76	34.30
2900	25.96	25.95	31.71	0.12	38.95	34.41
3000	25.68	25.67	31.08	0.12	39.13	33.86
3100	25.87	25.77	30.55	0.12	39.26	33.49
3200	26.49	26.29	30.06	0.13	39.47	33.38
3300	27.70	27.51	29.60	0.13	39.56	32.35
3400	30.03	29.66	29.21	0.12	39.58	32.06
3500	34.68	33.77	28.89	0.12	39.49	31.52
3600	49.04	42.22	28.55	0.13	39.42	30.58
3700	35.06	35.61	28.42	0.13	39.29	29.90
3800	28.33	28.82	28.27	0.14	39.14	28.94
3900	24.40	24.72	28.14	0.15	38.92	27.94
4000	21.66	21.95	28.08	0.16	38.61	26.86
4100	19.70	20.00	28.08	0.18	38.31	25.81

Outline Drawings

Single Coupler, N-Female Input, Model Shown: **WMADC-1-4-40DB-1-NF**



Single Coupler, N-Male Input, Model Shown: **WMADC-1-4-40DB-1-NM**



Dimensions are in inches, [mm] shown for convenience. Tolerances on 2-pl decimals: ±.03. 3-pl decimals: ± .015.

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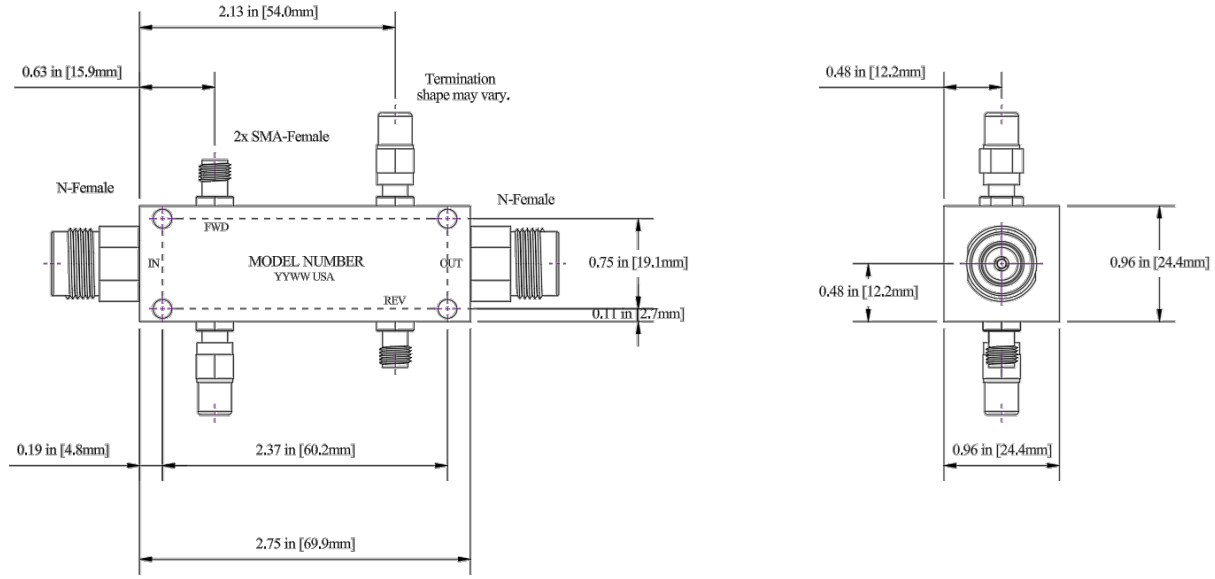
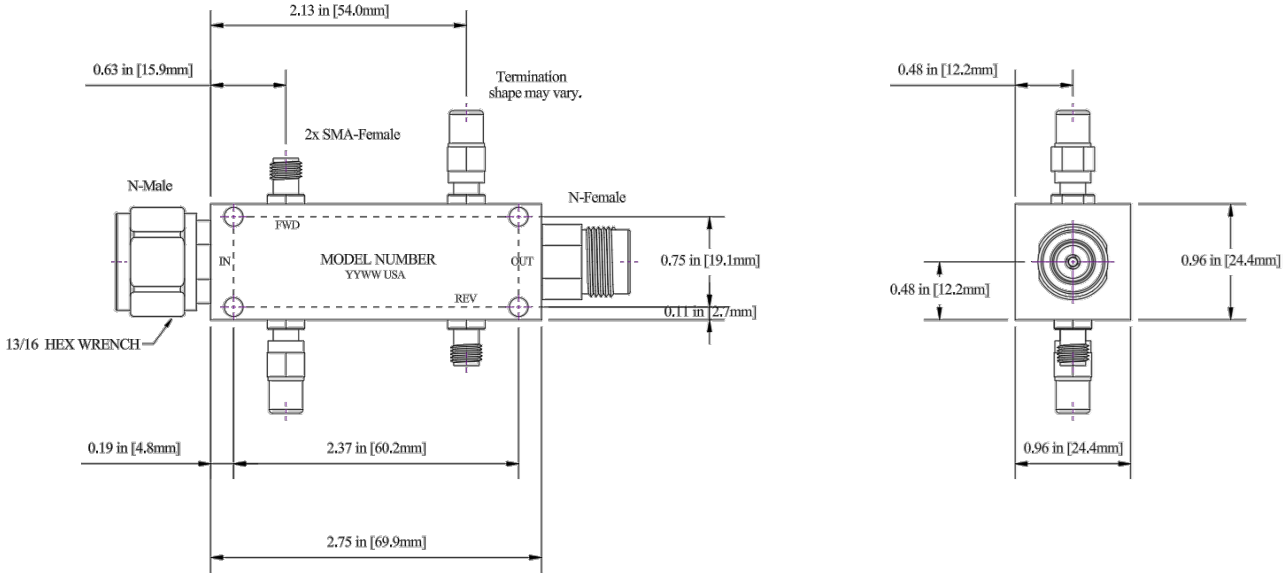
Dual Coupler, N-Female Input, Model Shown: **WMADC-1-4-40DB-2-NF**



Dual Coupler, N-Male Input, Model Shown: **WMADC-1-4-40DB-2-NM**



Dimensions are in inches, [mm] shown for convenience. Tolerances on 2-pl decimals: ±.03. 3-pl decimals: ± .015.