WERBEL MICROWAVE LLC
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Directional Coupler, 0.5-2GHz, 30dB, SMA Female

WMC-0.5-2-30dB-S

Description

Model WMC-0.5-2-30dB-S from Werbel Microwave is a directional coupler that covers 500 MHz to 2 GHz with broadband flat coupling response, high directivity, and excellent return loss performance. The L-band applications for military radio are covered, as well as cellular 800-900MHz and the upper portion of UHF. The high coupling value allows for accurate measurements with minimal power diversion from the system. Return loss is typically better than 1.15:1, making it almost electrically invisible in your system. USA assembled, design and tested. The device is RoHS compliant, but lead solder is available on special order for military applications.

Photo is representative.

Specifications	Min.	Typ.	Max.	Units
Frequency	500	--	2000	MHz
Impedance	--	50	--	Ohm
Coupling	--	30 ± 1.0	--	dB
Frequency Sensitivity (Flatness)	--	± 0.50	± 0.75	dB
Mainline Loss[1]	--	0.25	0.40	dB
Directivity	20	26	--	dB
Return Loss (In and Out)	20	24	--	dB
Return Loss (Coupling)	20	23	--	dB
Isolation	--	56	--	dB
Input Power (CW)[2]	--	--	50	Watts
Termination Power	--	--	1	Watt

Mechanical

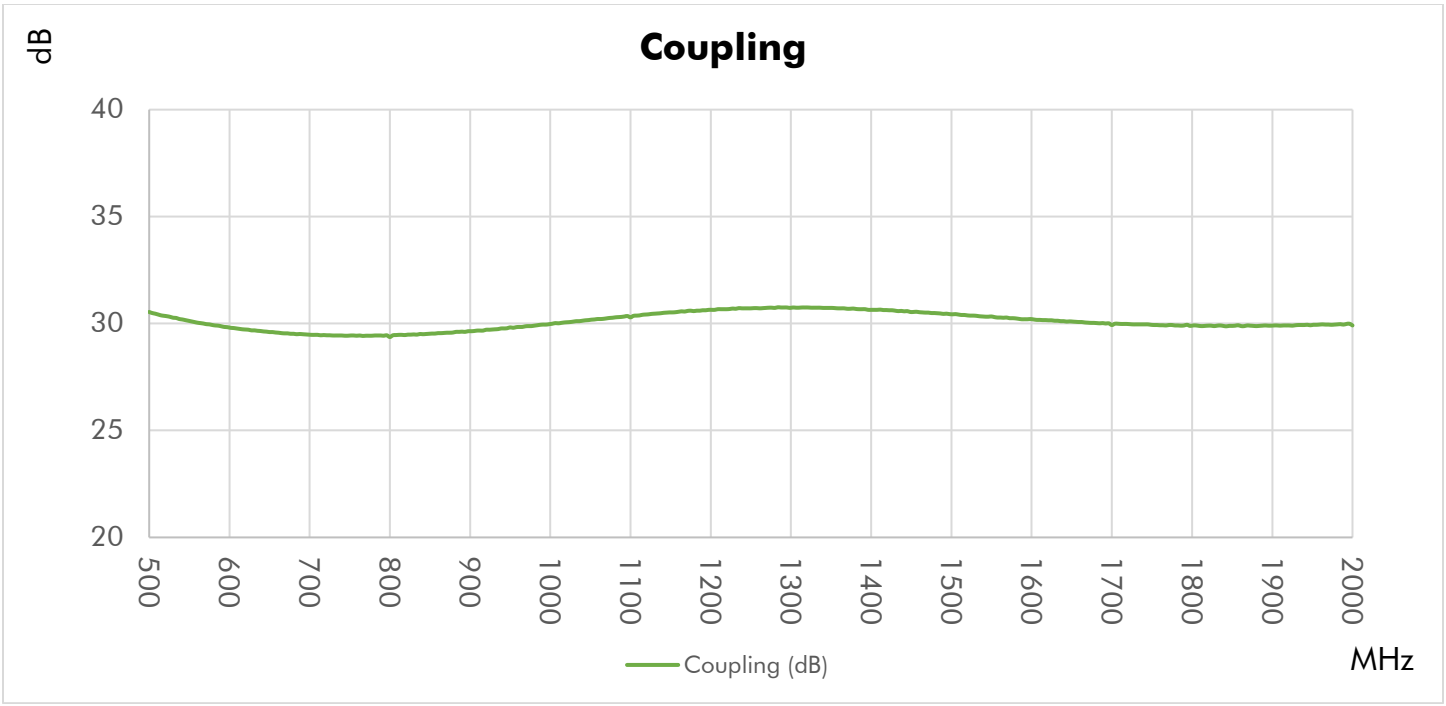
Connector Interface	SMA-Female
Operating Temperature[3]	-55 to +85 °C
Storage Temperature	-55 to +100 °C
Weight	1.6 oz (45 g)
Humidity	10-90% non-condensing
Environment	Indoor use only.
CAGE Code	78YZ0

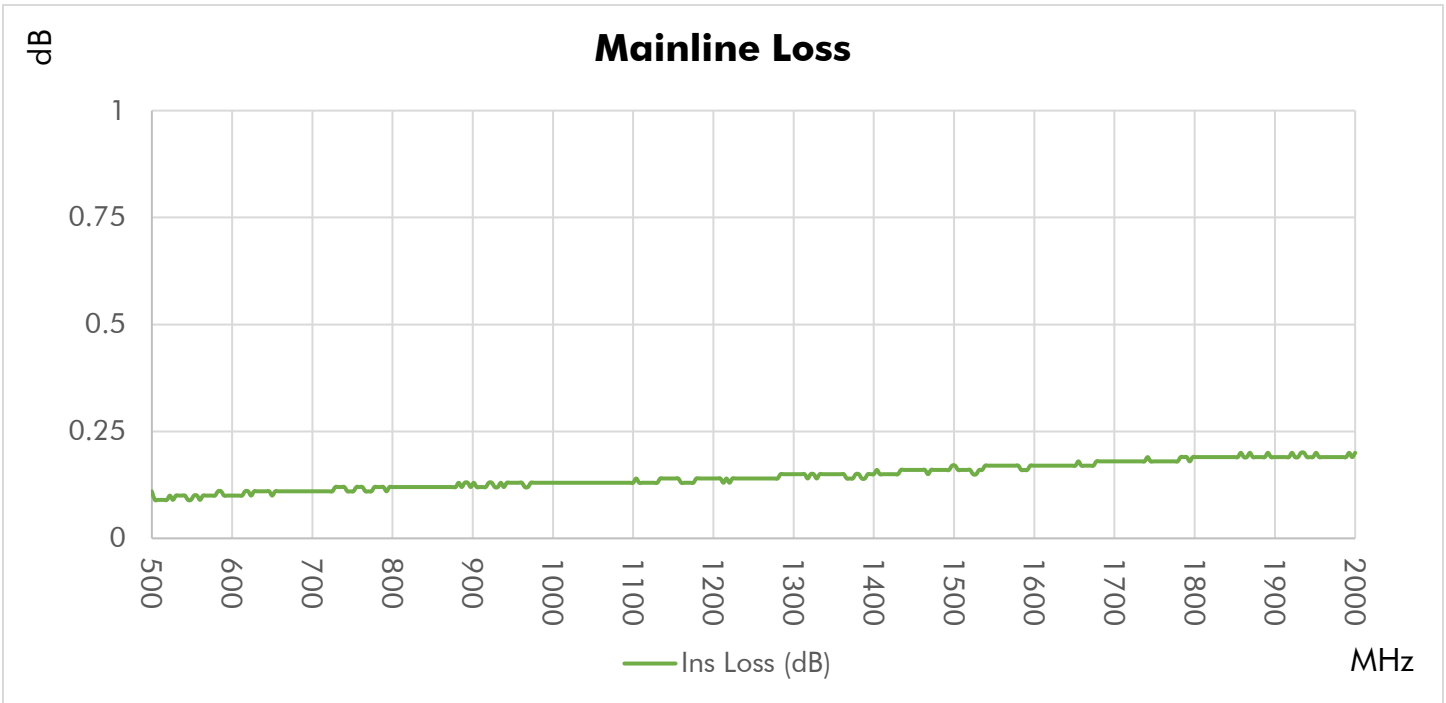
Materials

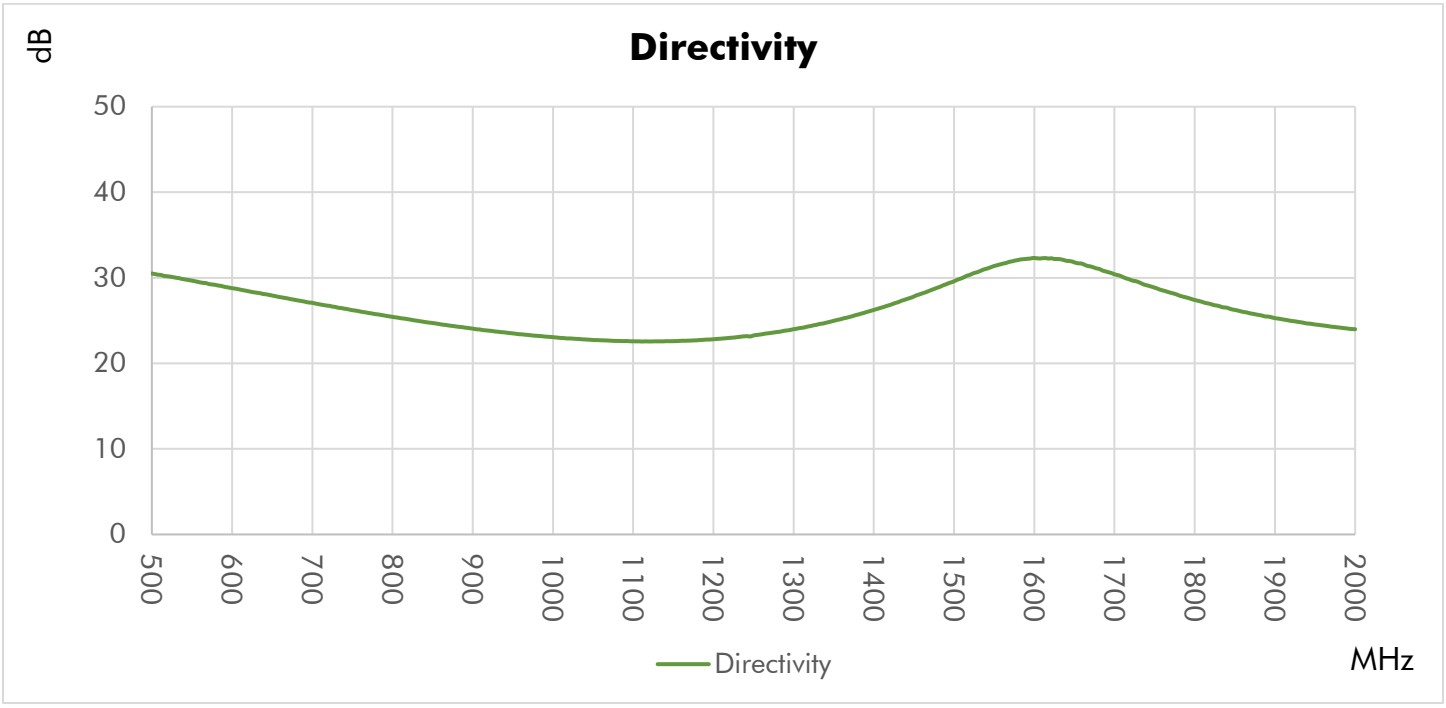
RoHS Compliant[4]	Yes
REACH Compliant[4]	Yes
Enclosure	Aluminum
Connectors	Stainless Steel
Contacts	Be Cu, Gold Plated
Insulators	PTFE
Finish	Green Paint

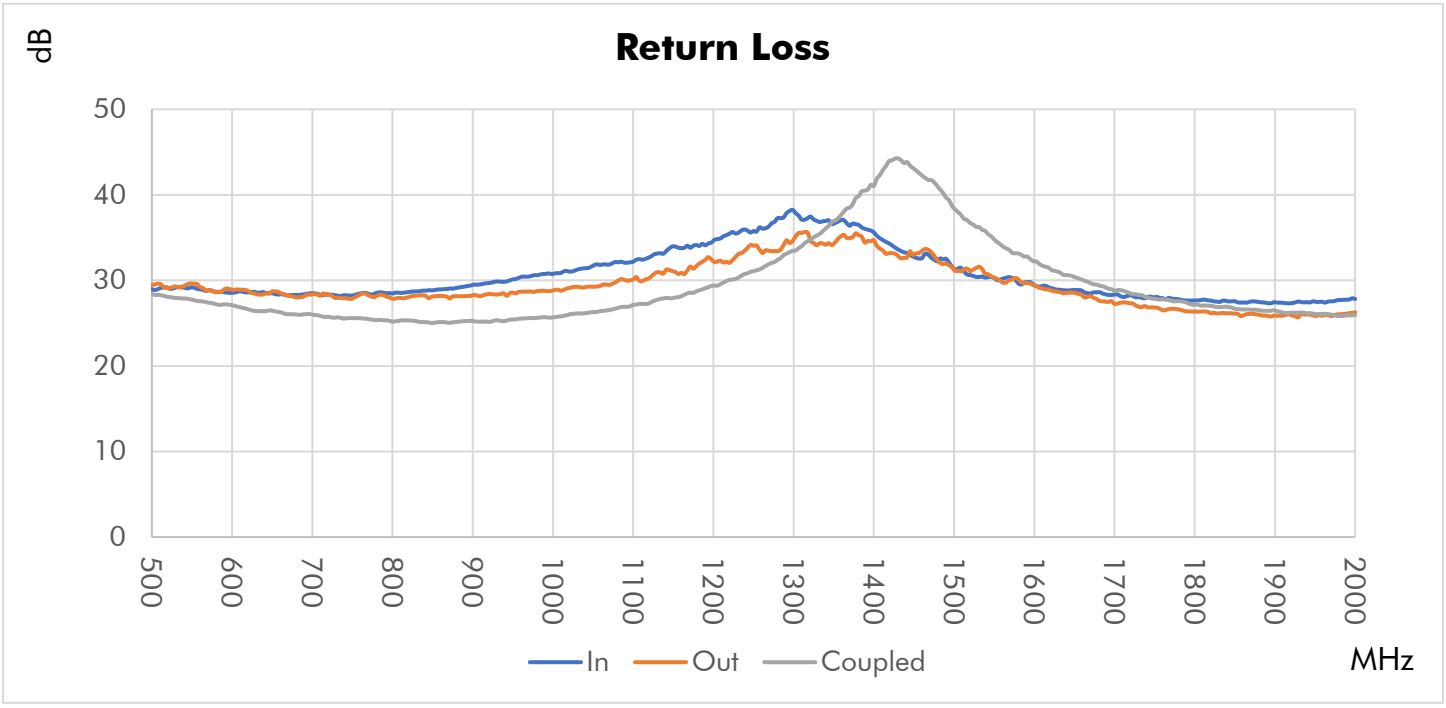
1. Mainline loss includes coupling loss.
2. All output ports should be terminated in a 50-ohm load with 1.2.1 max VSWR.
3. Electrical specifications at +25 °C only.
4. To the best of our knowledge at the time of publication.

Typical Performance at +25 °C

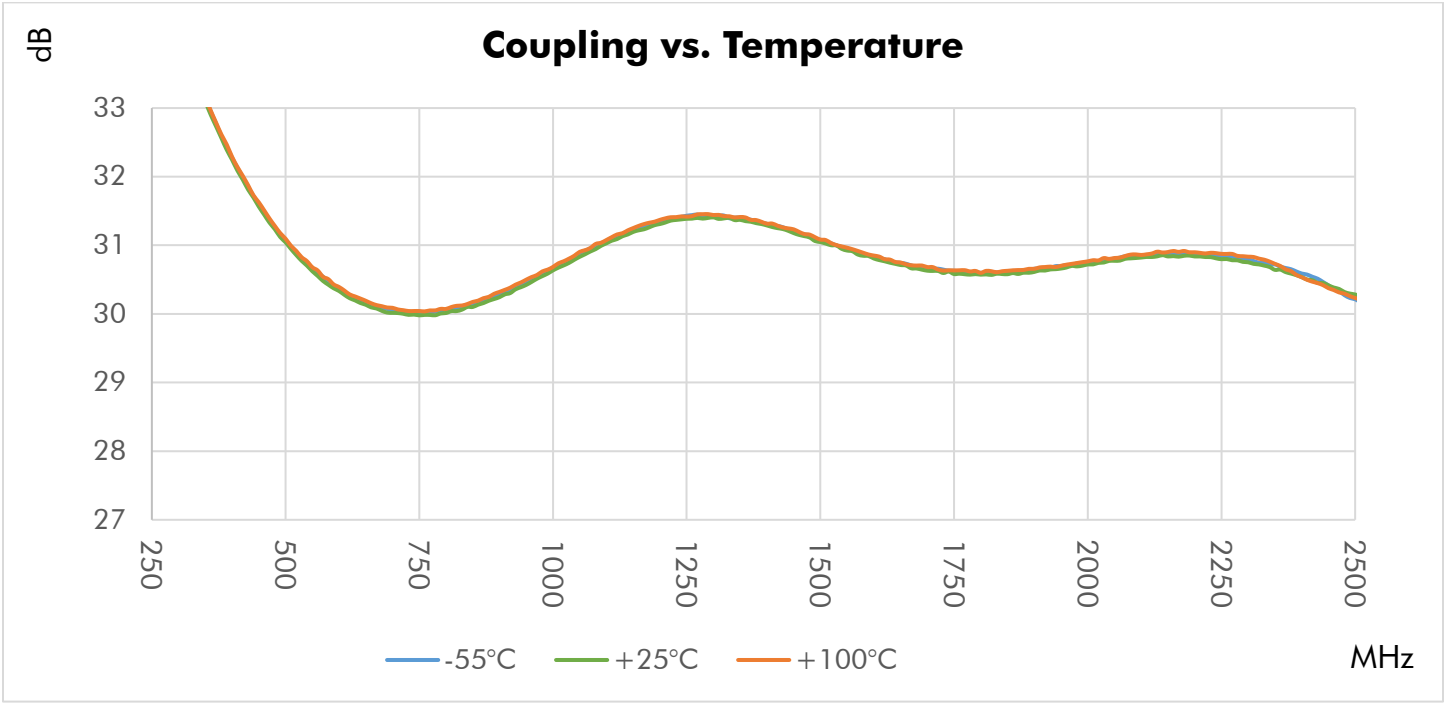


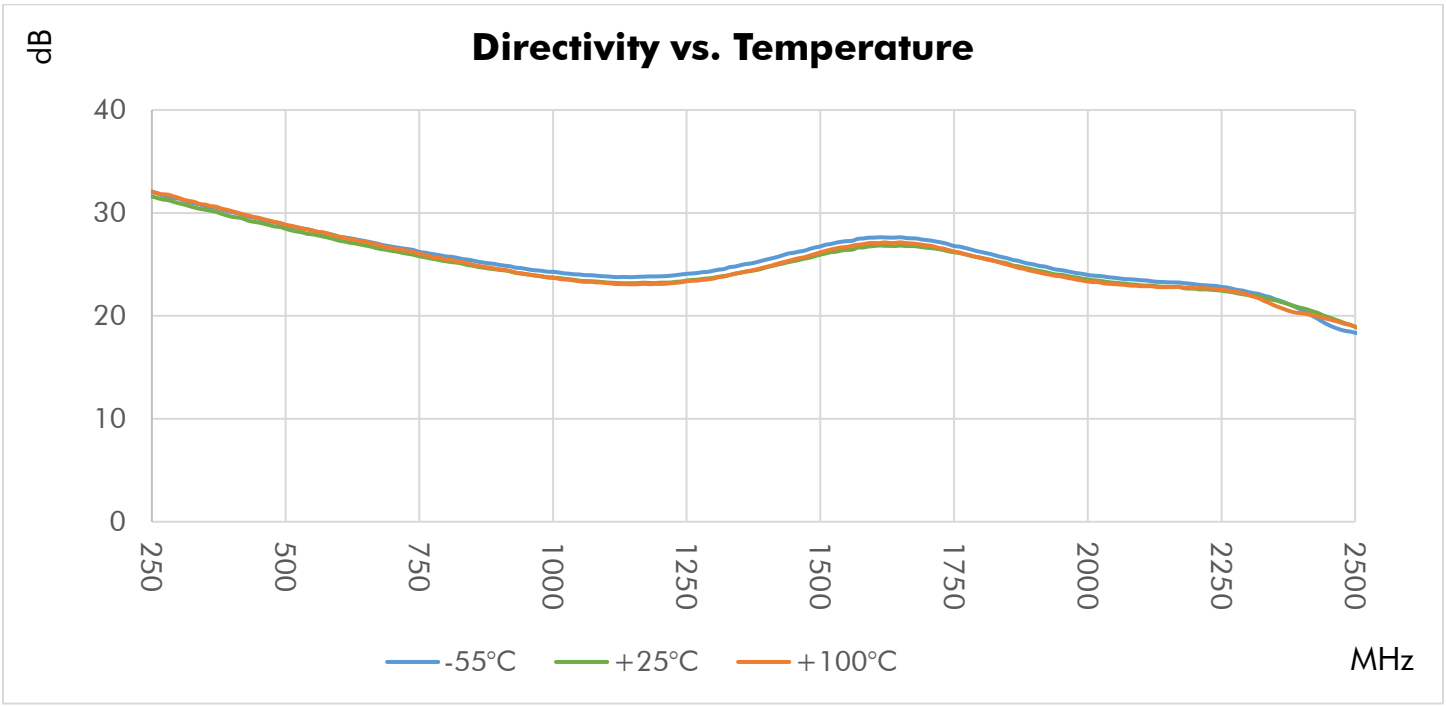


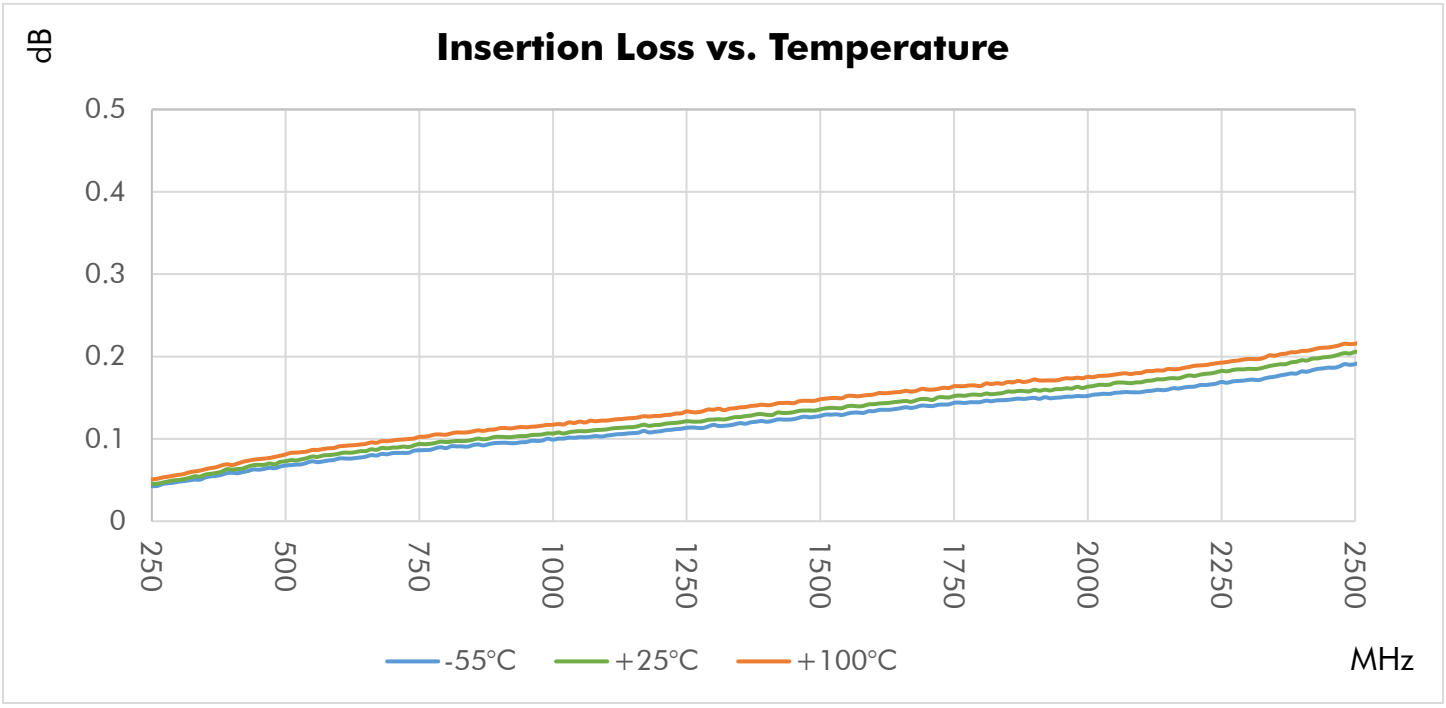

Directivity
dB
50
40
30
20
10
0
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
Directivity
MHz

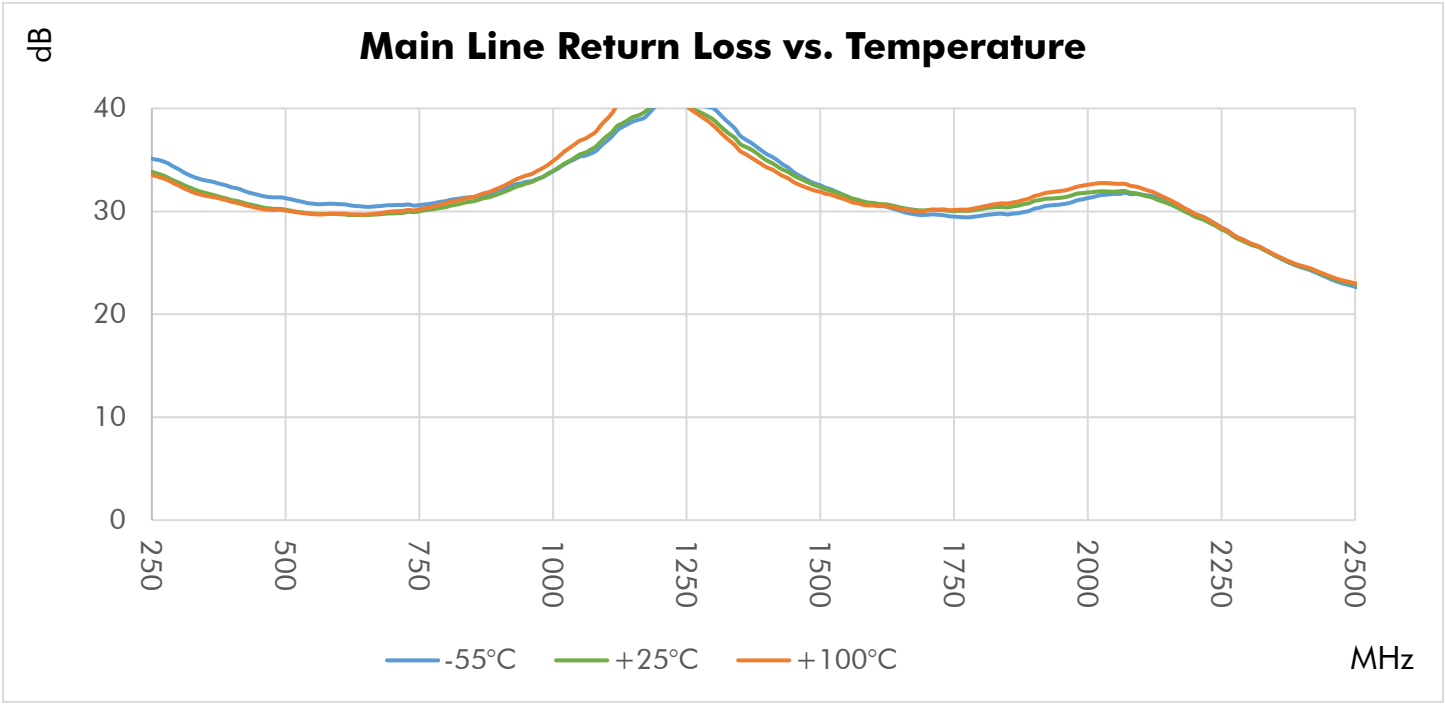

Return Loss
dB
50
40
30
20
10
0
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
In
Out
Coupled
MHz

Typical Performance Over Temperature



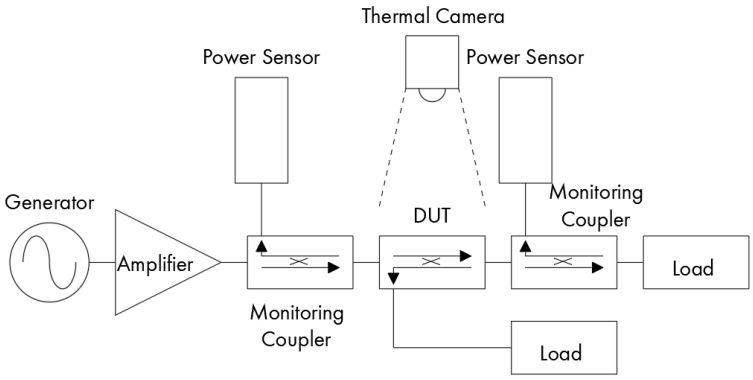
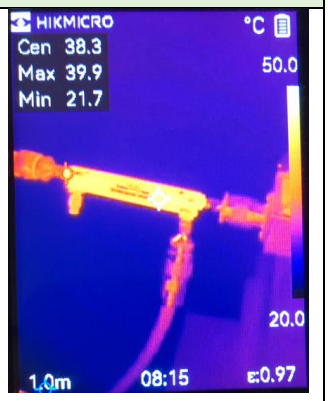



Insertion Loss vs. Temperature
dB
0.5
0.4
0.3
0.2
0.1
0
250
500
750
1000
1250
1500
1750
2000
2250
2500
-55°C
+25°C
+100°C
MHz

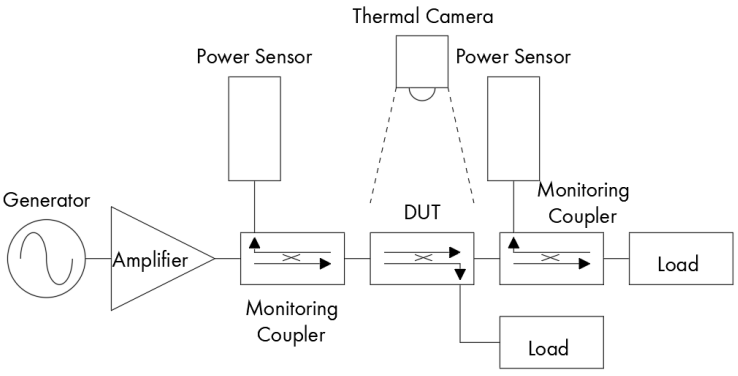

Main Line Return Loss vs. Temperature
dB
40
30
20
10
0
250
500
750
1000
1250
1500
1750
2000
2250
2500
-55°C
+25°C
+100°C
MHz

Reliability Testing

RF power test was performed to determine the input power required to produce a nominal temperature rise of 20°C at the hottest point. The test was performed at room temperature without forced air. A heatsink was not used unless it came standard with the product.

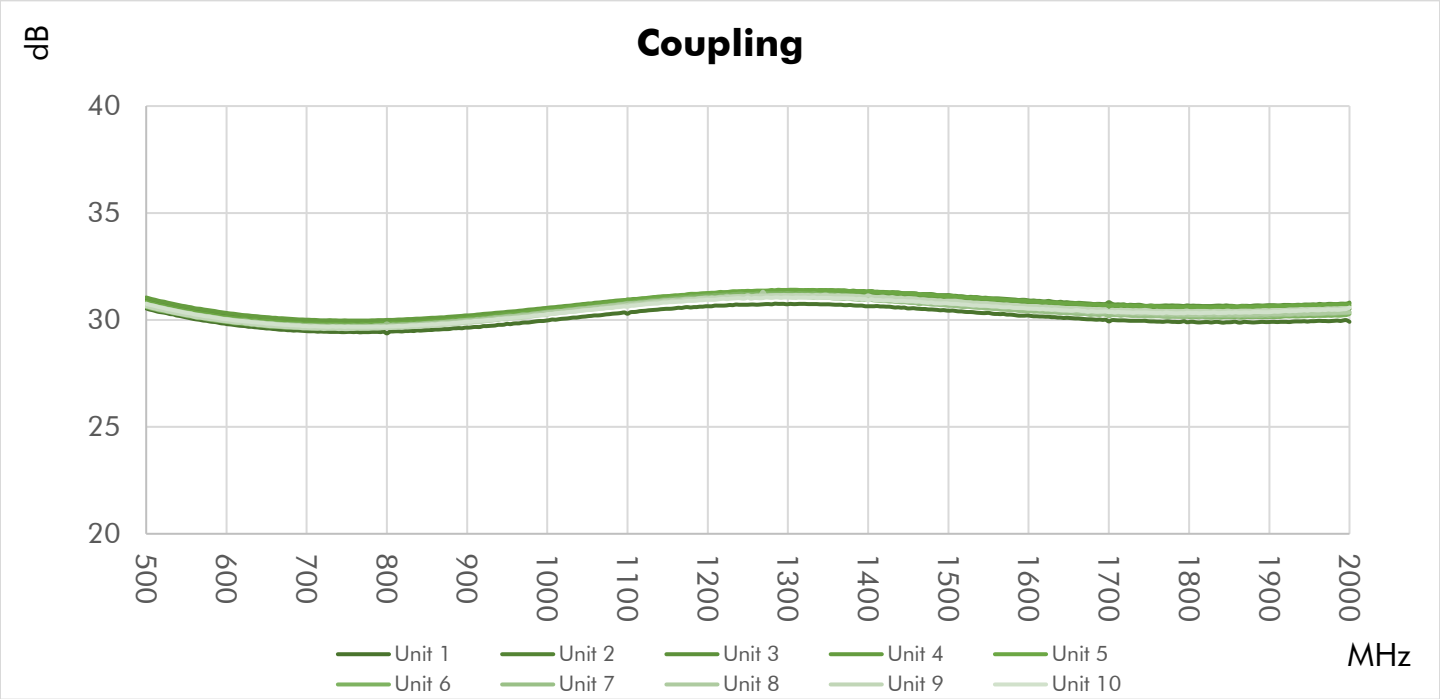
Forward Direction RF Power Test Setup Diagram	Initial Temperature	Final Temperature
	 (RF power applied from the right)	 (RF power applied from the right)

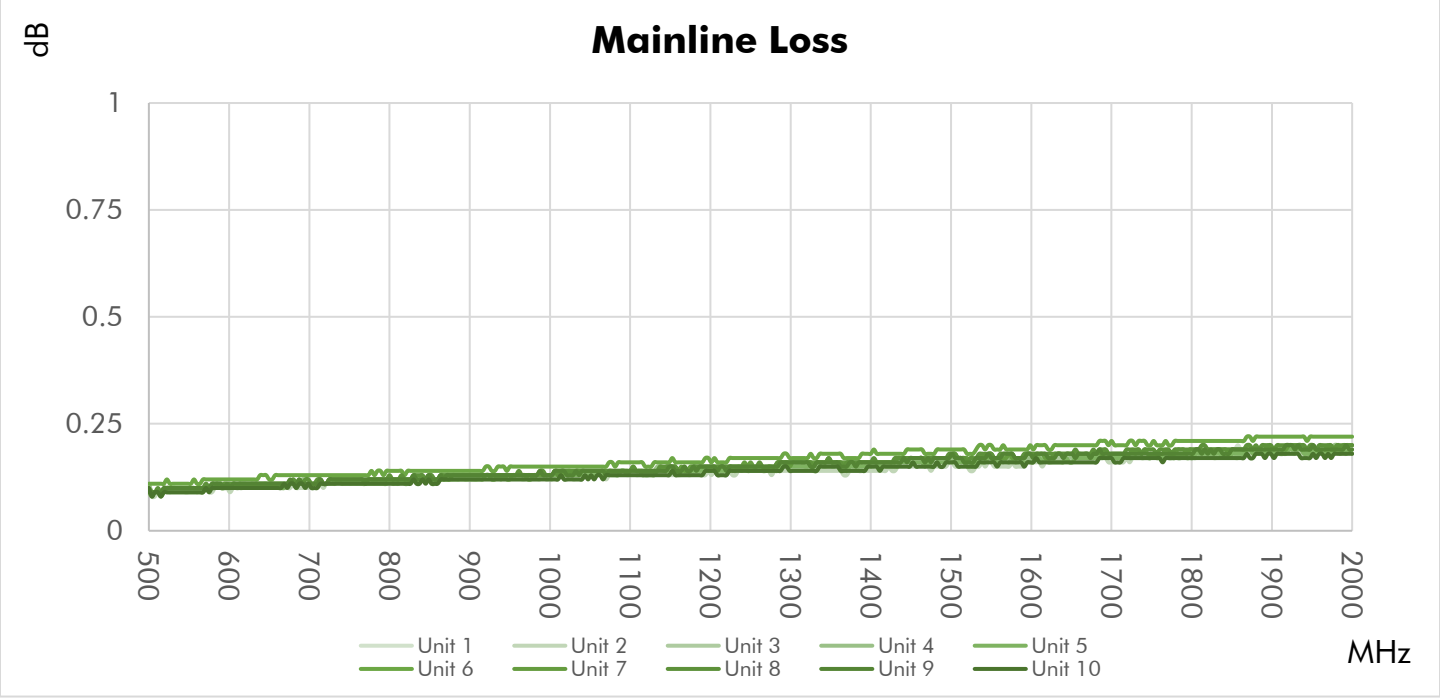
- 100 watts CW at 500MHz was applied to the DUT input for a duration of 10 minutes.
- The DUT temperature increased from 25.5°C (initial, center marker) to 39.9°C (final, max marker), resulting in a 14.4°C rise.

Reverse Direction RF Power Test Setup Diagram	Initial Temperature	Final Temperature
	 (RF power applied from the right)	 (RF power applied from the right)

- 100 watts CW at 500MHz was applied to the DUT output for a duration of 10 minutes.
- The DUT temperature increased from 26.6°C (initial, center marker) to 47.3°C (final, max marker), resulting in a 20.7°C rise.
- The DUT termination was receiving an estimated power of 0.1W, based on a 30dB coupling factor.

Repeatability in Production

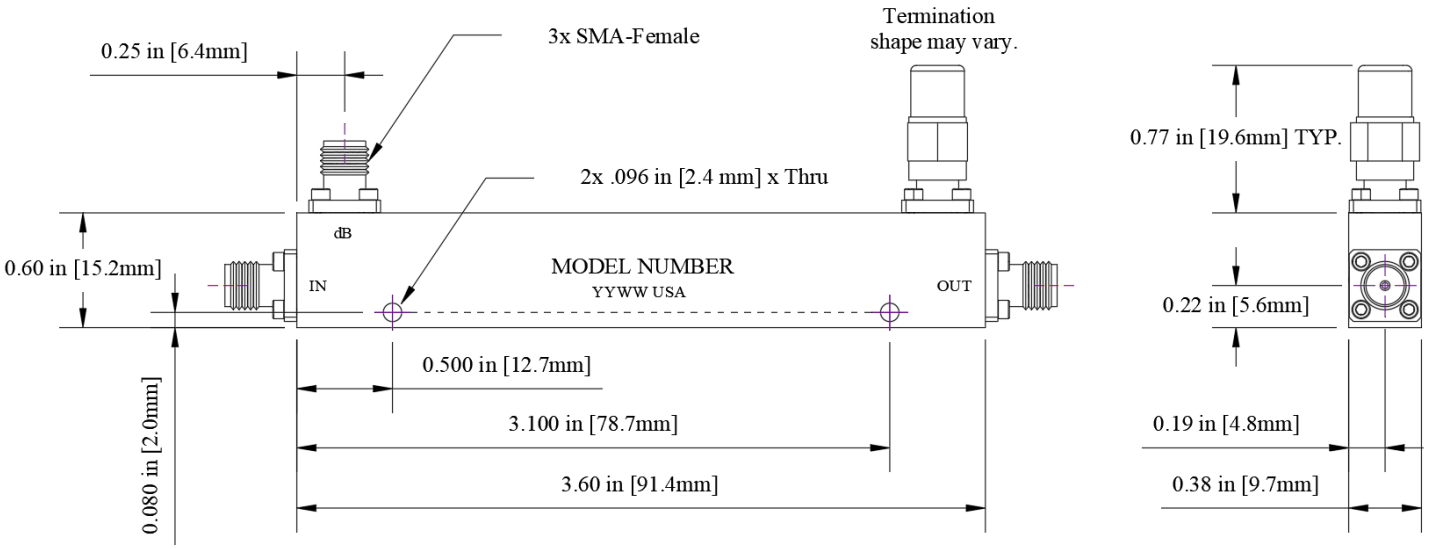




Typical Performance Data

Frequency (MHz)	Return Loss (dB)			Mainline Loss (dB)	Coupling (dB)	Directivity (dB)
	In	Out	Cpl.	In-Out	In-Cpl.	
500	26.9	27.5	24.9	0.1	30.6	26.8
530	27.0	27.2	24.6	0.1	30.3	26.5
560	27.0	27.3	24.4	0.1	30.1	26.1
590	26.8	27.2	24.4	0.1	29.9	25.8
620	26.9	27.2	24.2	0.1	29.8	25.5
650	27.0	27.3	24.3	0.1	29.7	25.1
680	27.0	27.0	24.2	0.1	29.6	24.8
710	27.3	27.4	24.3	0.1	29.5	24.5
740	27.5	27.4	24.4	0.1	29.5	24.2
770	27.8	28.0	24.7	0.1	29.5	23.9
800	28.3	28.0	24.8	0.1	29.5	23.6
830	28.7	28.7	25.2	0.1	29.5	23.4
860	29.2	28.8	25.6	0.1	29.6	23.2
890	29.8	29.2	26.1	0.1	29.6	23.0
920	30.4	29.6	26.5	0.1	29.7	22.8
950	31.2	30.2	27.3	0.1	29.8	22.6
980	31.8	30.6	27.9	0.1	29.9	22.5
1010	32.6	30.7	28.8	0.1	30.1	22.4
1040	33.2	31.4	29.9	0.1	30.2	22.4
1070	33.6	31.4	31.0	0.1	30.3	22.4
1100	33.9	31.8	32.6	0.1	30.4	22.5
1130	34.6	32.4	34.0	0.1	30.5	22.6
1160	33.9	31.9	35.6	0.1	30.6	22.8
1190	33.6	32.4	37.2	0.1	30.6	23.0
1220	33.3	31.2	37.9	0.1	30.7	23.3
1250	32.2	32.0	37.7	0.1	30.7	23.6
1280	32.1	30.3	36.4	0.1	30.8	24.0
1310	30.7	30.9	34.6	0.1	30.8	24.4
1340	30.2	29.3	33.0	0.1	30.7	24.7
1370	29.6	29.2	31.7	0.1	30.7	25.1
1400	28.8	28.6	30.4	0.1	30.7	25.4
1430	27.9	27.8	29.5	0.1	30.6	25.7
1460	27.8	28.0	28.9	0.1	30.5	25.8
1490	27.5	27.2	28.2	0.1	30.4	25.8
1520	26.5	26.7	27.5	0.1	30.4	25.7
1550	26.5	26.4	27.0	0.1	30.3	25.6
1580	26.3	26.4	26.7	0.1	30.2	25.4
1640	26.0	25.8	26.1	0.1	30.0	24.8
1700	25.9	25.4	25.6	0.2	30.0	24.3
1760	25.8	25.0	25.4	0.2	29.8	24.0
1820	25.9	24.9	25.2	0.2	29.8	23.7
1880	25.9	24.8	24.7	0.2	29.8	23.6
1940	25.7	24.7	24.1	0.2	29.8	23.7
2000	25.5	24.5	23.3	0.2	29.8	23.7

Outline Dimensions



Outline # OL-1002
Dimensions are in inches, [mm] shown for convenience.
Tolerances on 2-pl decimals: ±.03. 3-pl decimals: ± .015.