**WERBEL MICROWAVE LLC**
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# High Power Dual Directional Coupler, 10-300MHz, 50dB, N Female, 50Ω

## WMHPDDC-10-300-50dB-N


The WMHPDDC-10-300M-50DB-N dual directional coupler is a broadband RF sampling device covering 10 to 300 MHz, designed for high power signal monitoring, reflected power measurement, EMC testing, and laboratory applications requiring simultaneous forward and reverse power sampling. Utilizing a precision dielectric structure with carefully optimized coupling elements, the design delivers excellent directivity, low insertion loss, and highly stable performance across an ultra-wide operating bandwidth.

Engineered for demanding RF environments, the coupler maintains consistent electrical characteristics over temperature while supporting high average power handling. The mechanically robust construction and low loss mainline provide reliable operation for commercial, industrial, and test system integration where long-term stability and repeatability are critical.

The dual directional architecture provides independent forward and reverse coupled ports with nominal 50 dB coupling, enabling accurate monitoring of incident and reflected power without significantly loading the transmission line. The broadband design achieves excellent coupling flatness and impedance match over the full frequency range while preserving smooth frequency response and stable directivity characteristics.

Designed and manufactured using high quality RF materials and precision assembly techniques, the WBDC Series is ideal for HF, VHF, broadband amplifier systems, antenna measurement systems, communications infrastructure, EMC laboratories, and general-purpose RF monitoring applications.

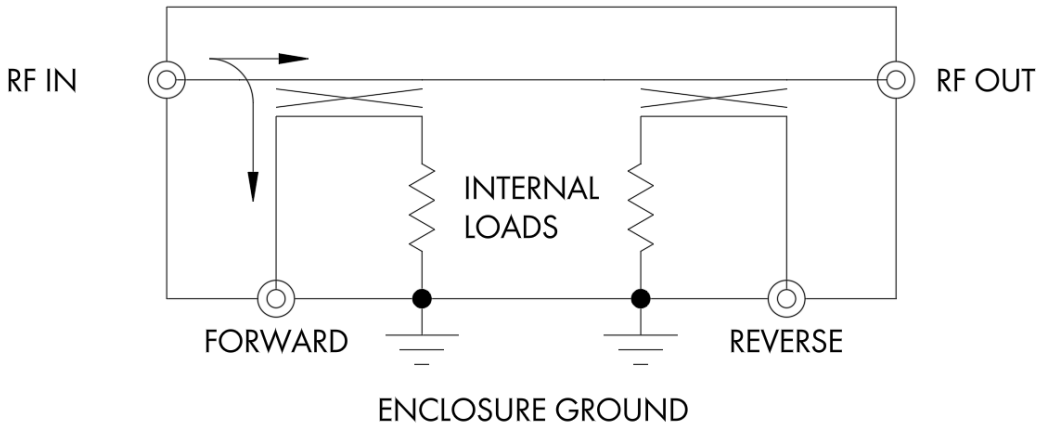
| Parameter | Low Band | Mid Band | High Band | Unit |
|---|---|---|---|---|
| Frequency Range | 10-100 | 100-200 | 200-300 | MHz |
| Impedance | 50 | | | Ω |
| Coupling | 50 ± 2.0 | | | dB |
| Frequency Sensitivity (Flatness) | ± 1.0 | | | dB, typ. |
| Mainline Loss[1] | 0.25 | 0.30 | 0.40 | dB, max. |
| Directivity | 20 | 20 | 20 | dB, min. |
| Mainline (Input, Output) VSWR [min Return Loss] | 1.25 [23.1 dB] | 1.20 [20.8 dB] | 1.25 [19.1 dB] | :1, max |
| Coupling (Forward, Reverse) VSWR [Return Loss] | 1.22 [20 dB] | 1.35 [16.5 dB] | 1.38 [16 dB] | :1, typ. |
| Forward Power (CW)[2] | 200W at +25 °C; derate linearly to 0W at +75°C | | | W, max. |
| Reverse Power (CW)[2] | 200W at +25 °C; derate linearly to 0W at +75°C | | | W, max. |

## Mechanical and Environmental Specifications

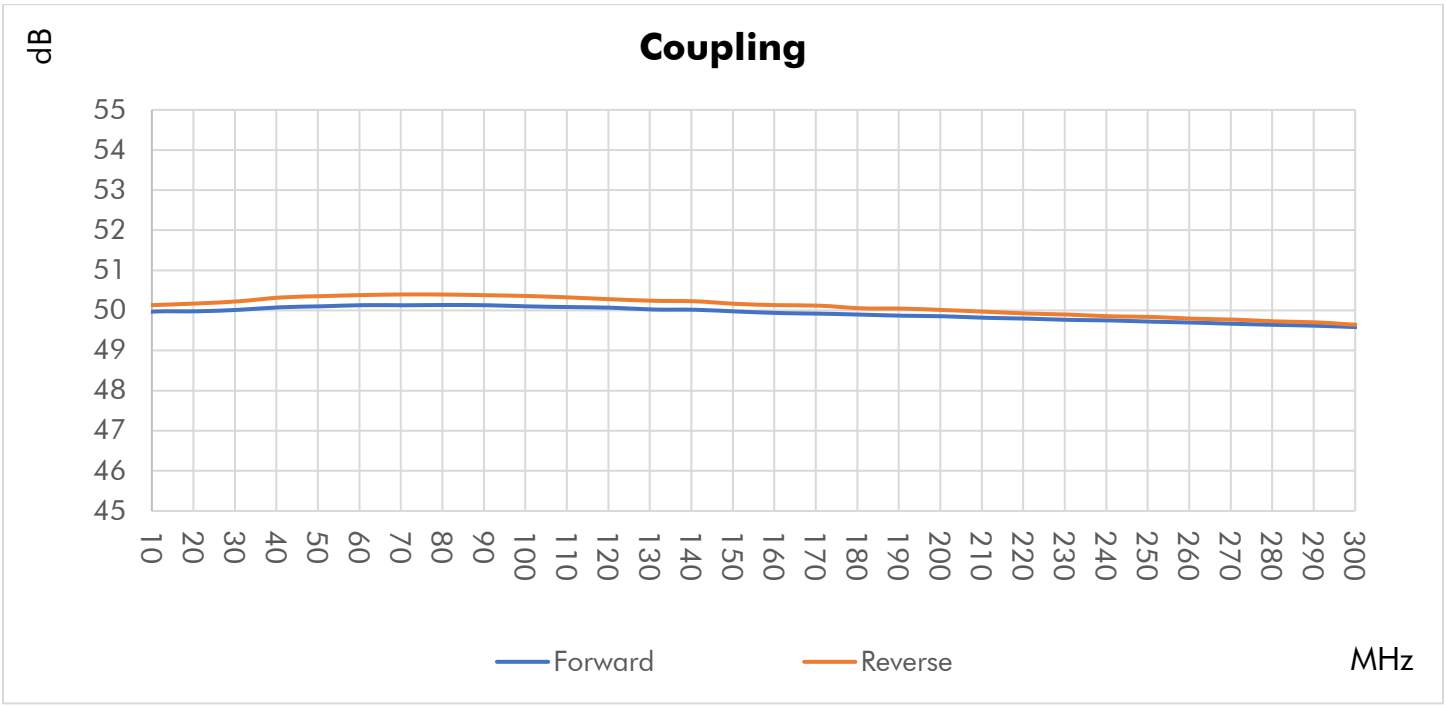
| | | | |
|---|---|---|---|
| Connector Interface | N Female | RoHS Status[4] | RoHS3 Compliant |
| Operating Temperature[3] | -55 to +75 °C | REACH Status[4] | REACH Unaffected |
| Storage Temperature | -55 to +100 °C | Enclosure Material | Aluminum |
| Nominal Weight | 404 g (14.2 oz) | Connectors Material | Brass, Tri-Alloy Plate |
| Operating Humidity | 10-90% (non-condensing) | Contacts Material | Beryllium Copper, Gold Plated |
| Operating Environment | Indoor Use Only | Insulators Material | Virgin PTFE |
| HTSUS Code | 8548.00.0000 | Finish | Green Paint |
| ECCN | EAR99 | Finish (Mounting Surface) | Clear Chem Film |

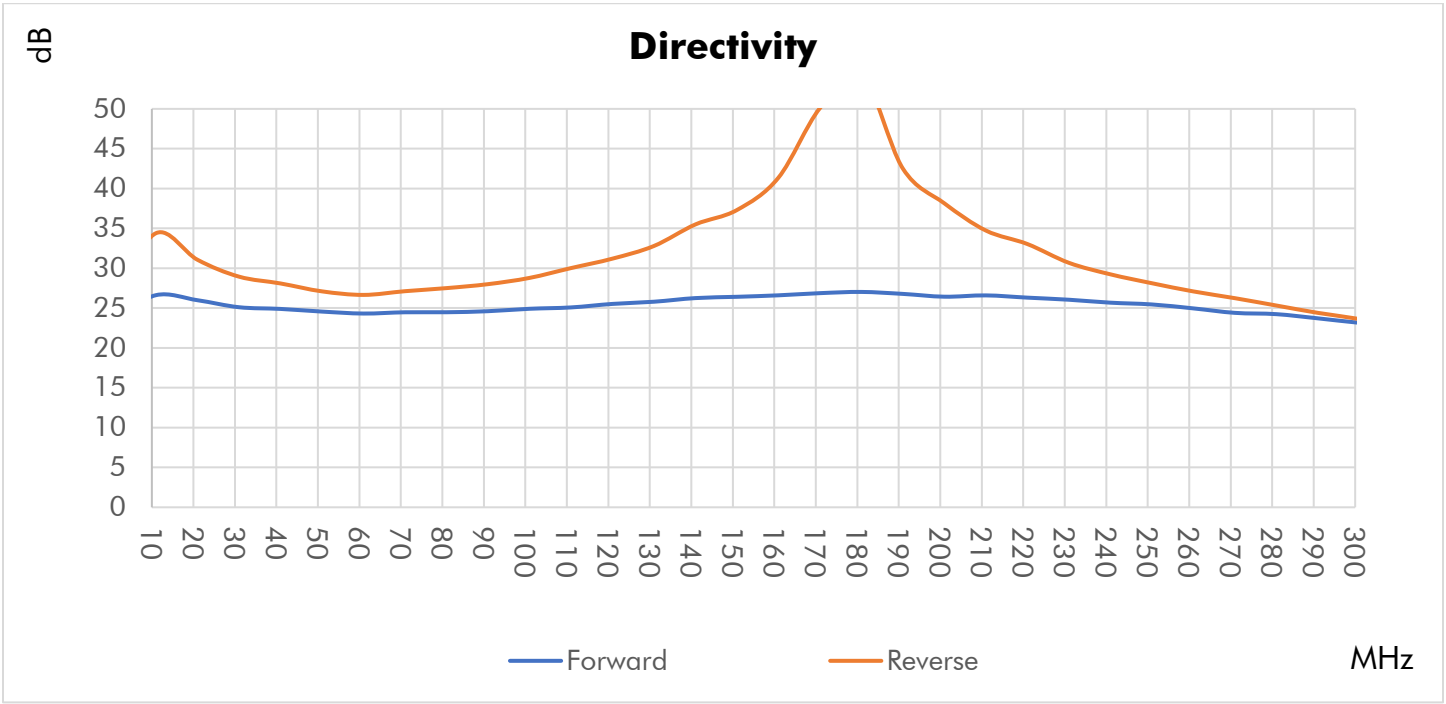
1. Mainline loss includes coupling loss.
2. All output ports should be terminated in a 50-ohm load with 1.2:1 max VSWR.
3. Electrical specifications are tested at +25 °C.
4. To the best of our knowledge at the time of publication.

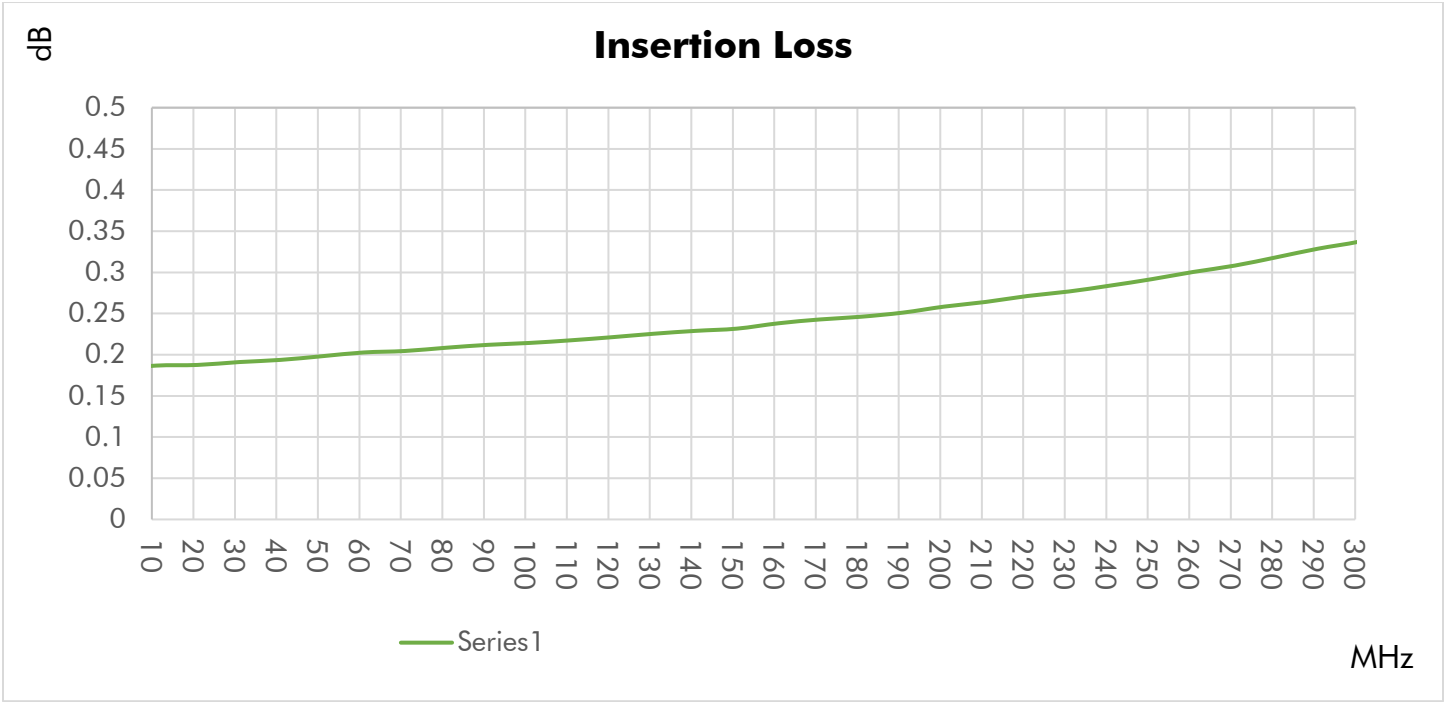
## Simplified Electrical Schematic

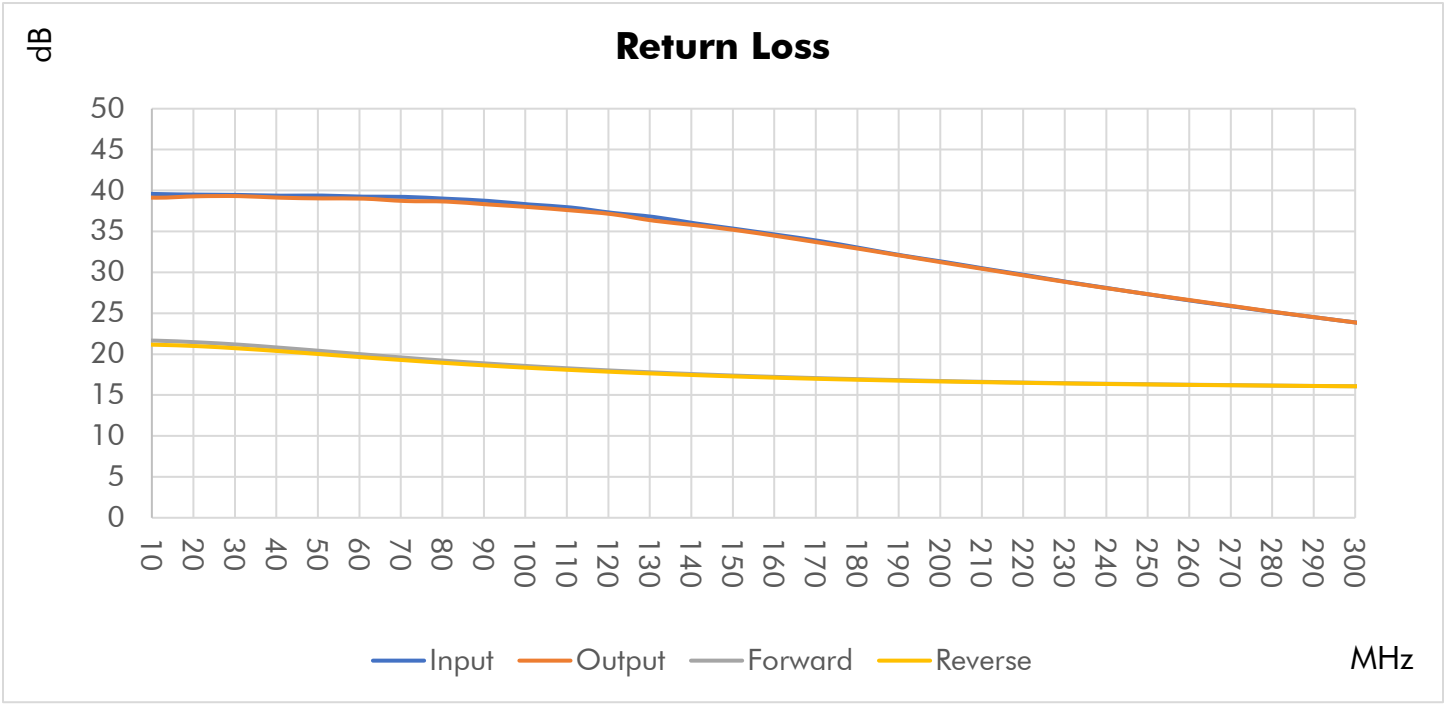


## Typical Performance at +25 °C

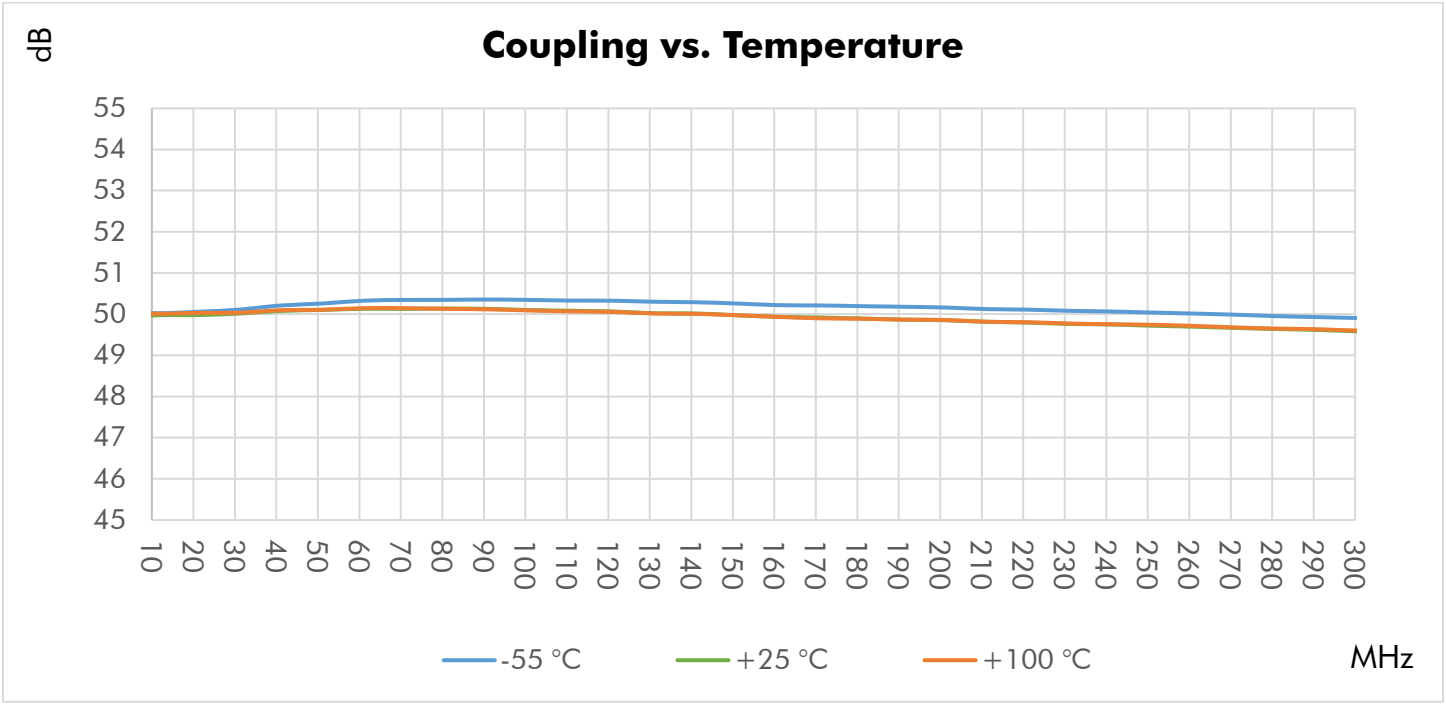


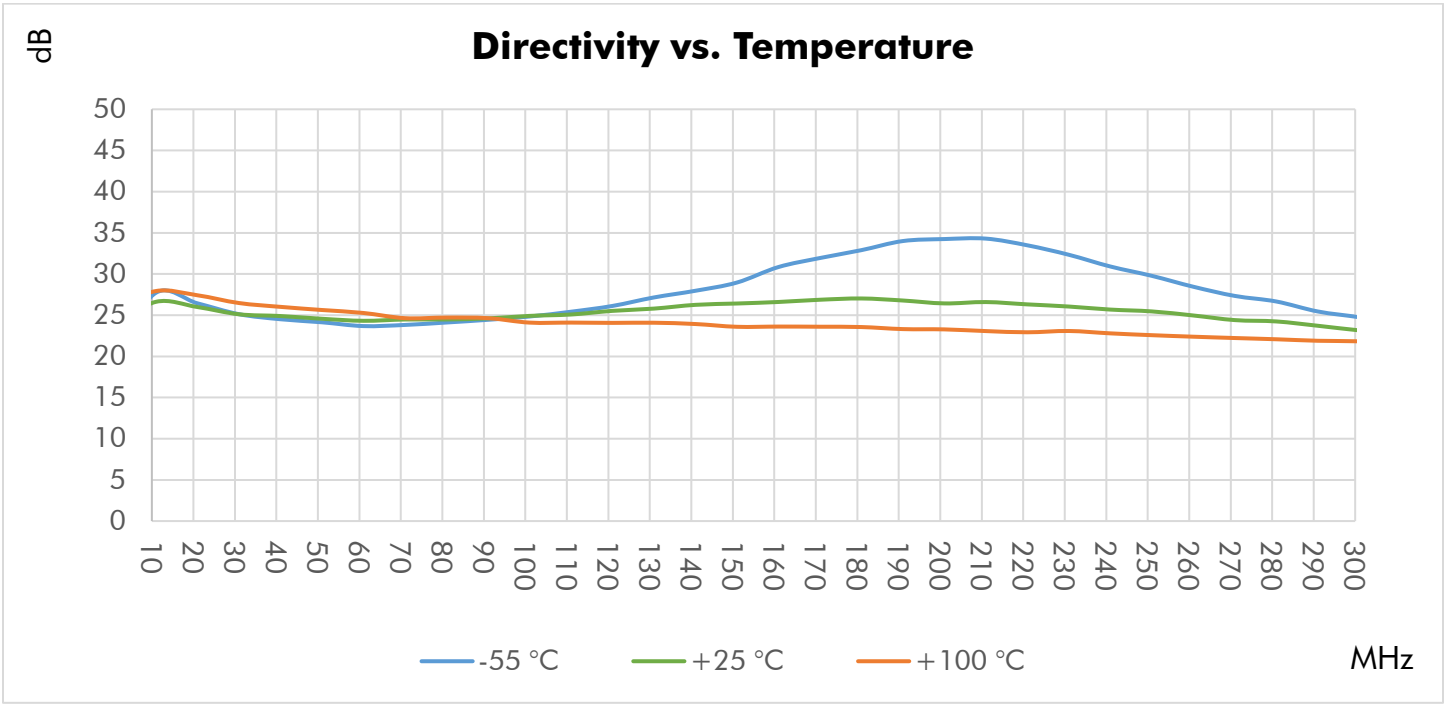



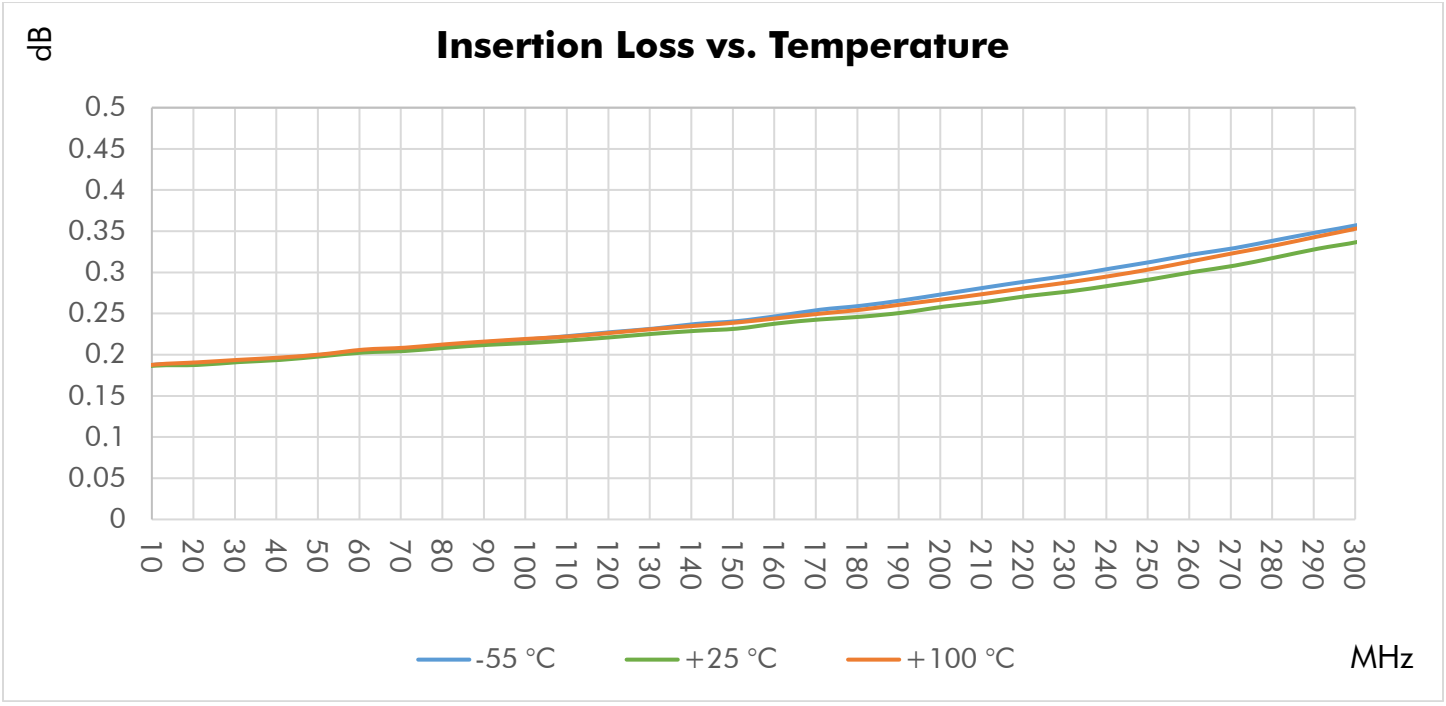

Insertion Loss
dB
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300
Series1
MHz

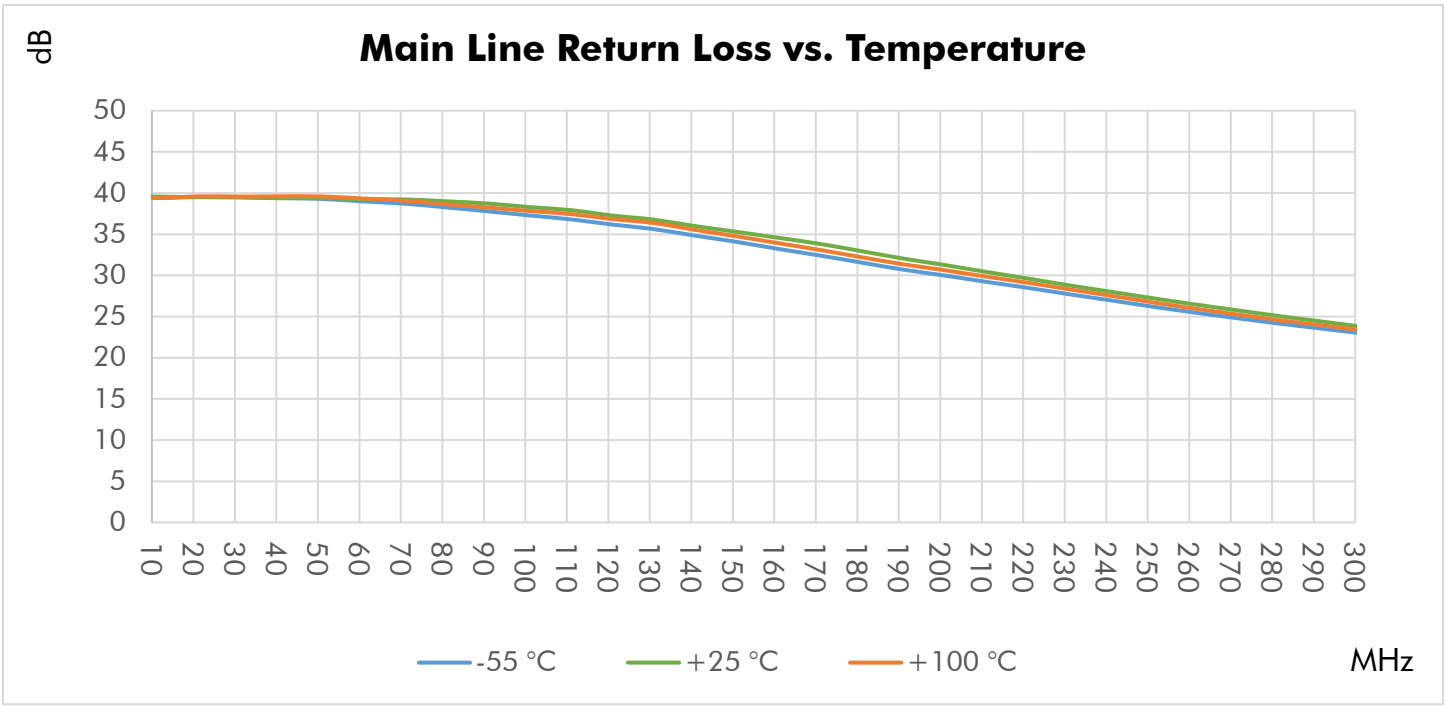

Return Loss
dB
50
45
40
35
30
25
20
15
10
5
0
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300
Input
Output
Forward
Reverse
MHz

## Typical Performance Over Temperature

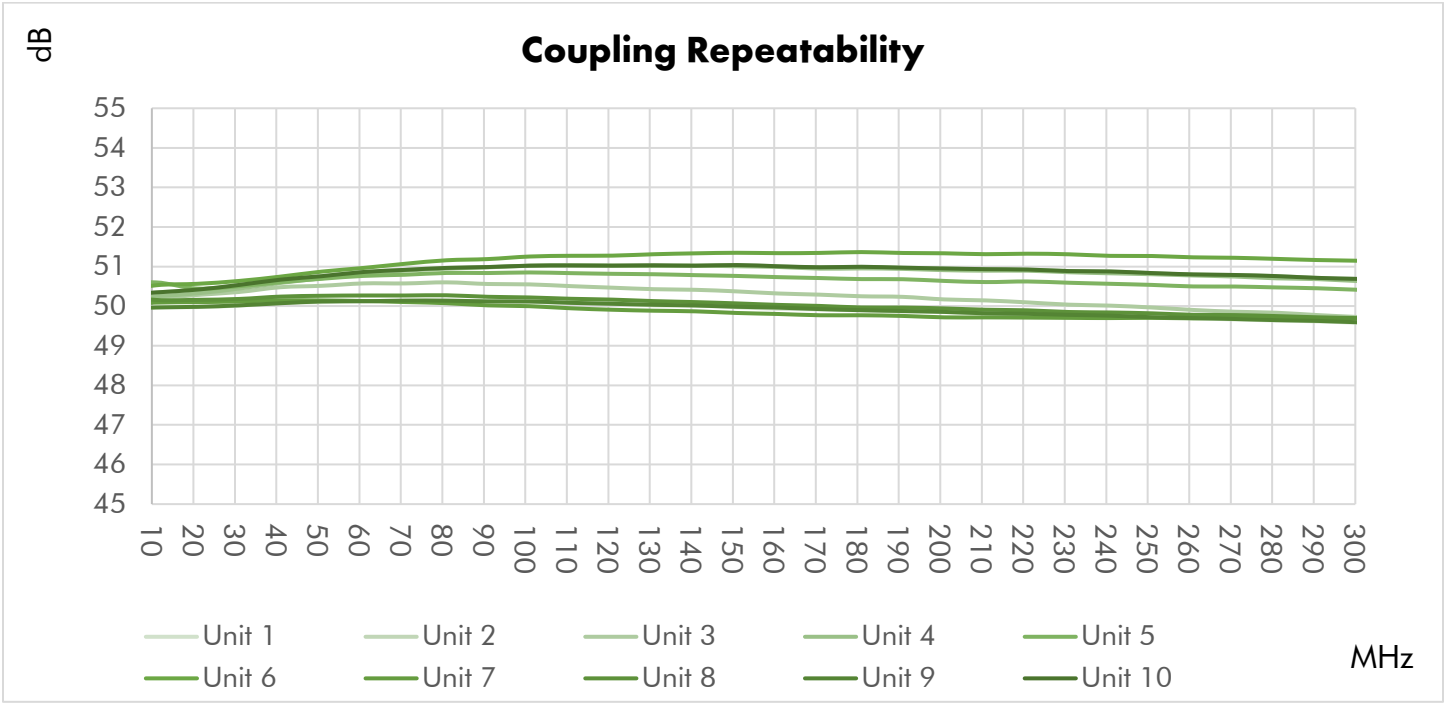


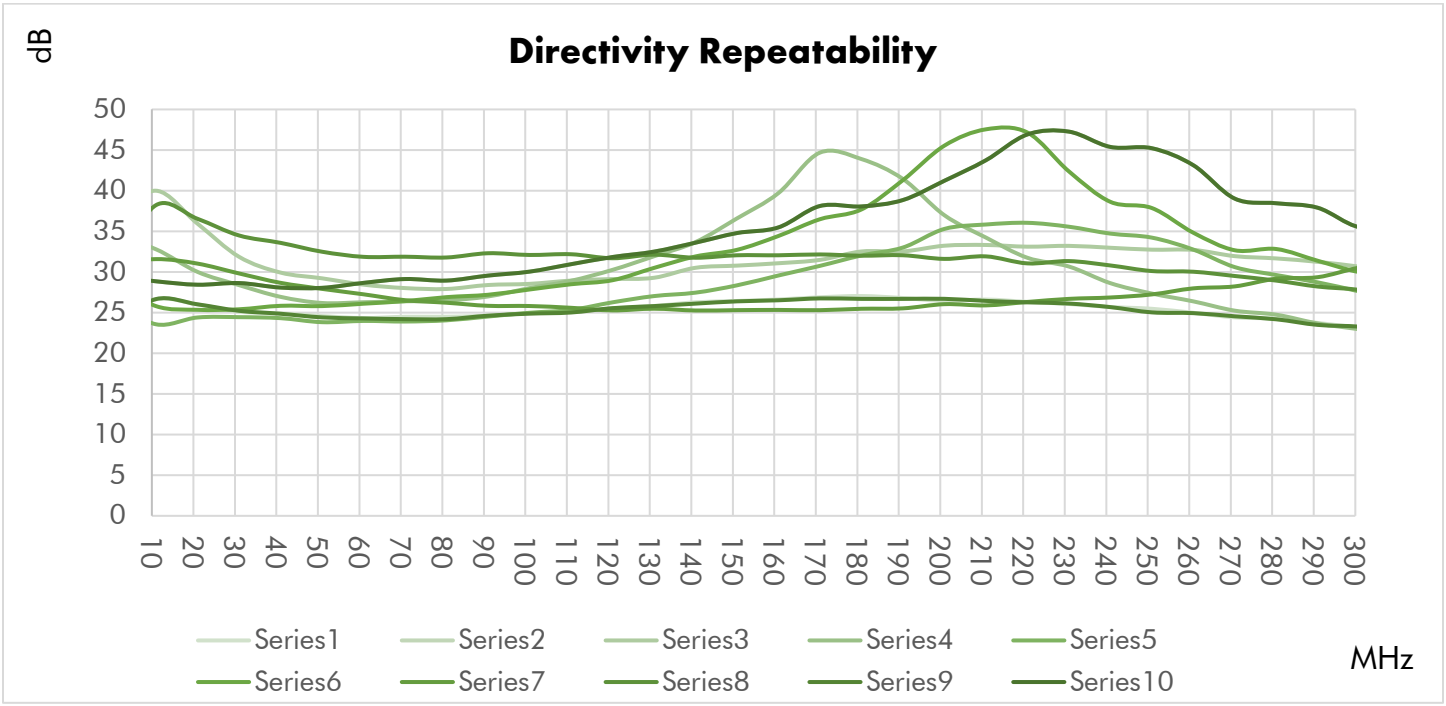



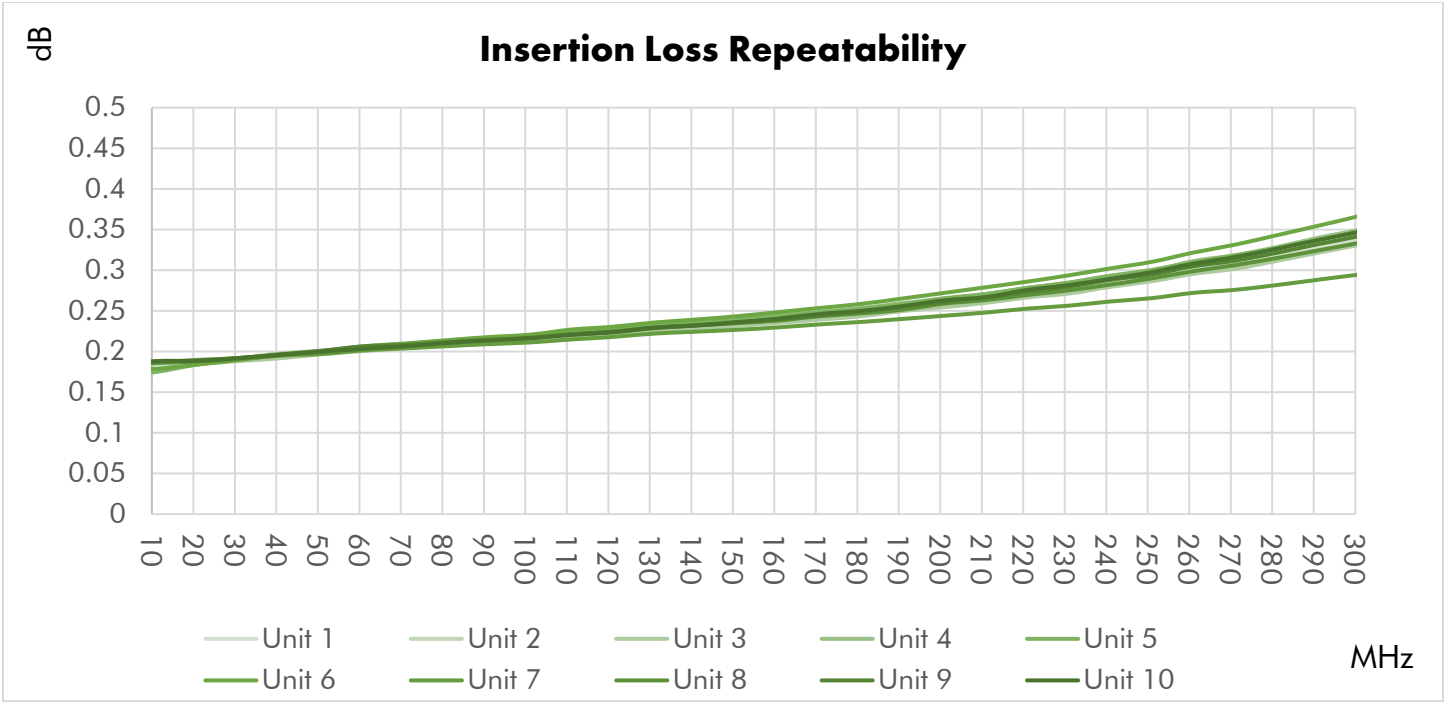

Insertion Loss vs. Temperature
dB
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300
-55 °C
+25 °C
+100 °C
MHz

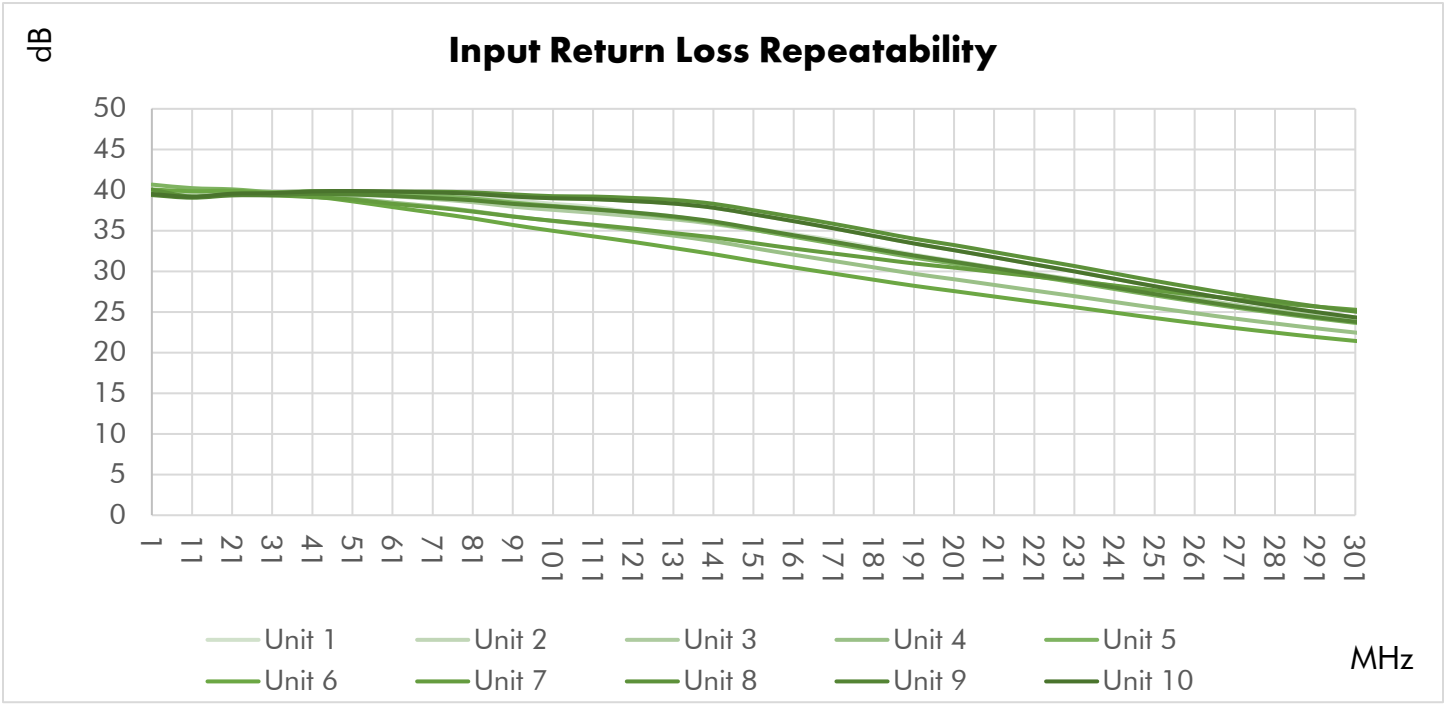

Main Line Return Loss vs. Temperature
dB
50
45
40
35
30
25
20
15
10
5
0
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300
-55 °C
+25 °C
+100 °C
MHz

## 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
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300
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
1 11 21 31 41 51 61 71 81 91 101 111 121 131 141 151 161 171 181 191 201 211 221 231 241 251 261 271 281 291 301
Unit 1
Unit 2
Unit 3
Unit 4
Unit 5
Unit 6
Unit 7
Unit 8
Unit 9
Unit 10
MHz

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# Typical Performance Data

| Frequency (MHz) | Return Loss (dB) | | Mainline Loss (dB) | Coupling (dB) | | Directivity (dB) | |
|---|---|---|---|---|---|---|---|
| | In-Out | Cpl. | In-Out | Forward | Reverse | Forward | Reverse |
| 1 | 39.70 | 21.71 | 0.18 | 49.91 | 50.10 | 23.65 | 26.28 |
| 11 | 39.57 | 21.65 | 0.19 | 49.97 | 50.14 | 26.62 | 34.40 |
| 21 | 39.50 | 21.45 | 0.19 | 49.98 | 50.17 | 25.99 | 31.06 |
| 31 | 39.46 | 21.16 | 0.19 | 50.02 | 50.23 | 25.11 | 28.95 |
| 41 | 39.37 | 20.78 | 0.19 | 50.08 | 50.32 | 24.90 | 28.09 |
| 51 | 39.38 | 20.38 | 0.20 | 50.10 | 50.36 | 24.56 | 27.10 |
| 61 | 39.25 | 19.96 | 0.20 | 50.13 | 50.38 | 24.32 | 26.66 |
| 71 | 39.22 | 19.56 | 0.20 | 50.13 | 50.40 | 24.48 | 27.12 |
| 81 | 38.99 | 19.18 | 0.21 | 50.14 | 50.40 | 24.48 | 27.51 |
| 91 | 38.73 | 18.84 | 0.21 | 50.13 | 50.38 | 24.61 | 28.00 |
| 101 | 38.29 | 18.53 | 0.21 | 50.10 | 50.36 | 24.91 | 28.79 |
| 111 | 37.92 | 18.25 | 0.22 | 50.08 | 50.32 | 25.08 | 30.02 |
| 121 | 37.27 | 17.99 | 0.22 | 50.07 | 50.28 | 25.52 | 31.21 |
| 131 | 36.76 | 17.76 | 0.23 | 50.02 | 50.24 | 25.80 | 32.79 |
| 141 | 35.98 | 17.55 | 0.23 | 50.02 | 50.23 | 26.26 | 35.50 |
| 151 | 35.28 | 17.37 | 0.23 | 49.97 | 50.16 | 26.42 | 37.31 |
| 161 | 34.56 | 17.21 | 0.24 | 49.94 | 50.13 | 26.60 | 41.36 |
| 171 | 33.82 | 17.06 | 0.24 | 49.92 | 50.12 | 26.88 | 50.09 |
| 181 | 32.94 | 16.93 | 0.25 | 49.90 | 50.05 | 27.03 | 54.28 |
| 191 | 32.05 | 16.82 | 0.25 | 49.87 | 50.04 | 26.78 | 42.50 |
| 201 | 31.27 | 16.71 | 0.26 | 49.85 | 50.01 | 26.43 | 38.14 |
| 211 | 30.43 | 16.61 | 0.26 | 49.82 | 49.97 | 26.59 | 34.73 |
| 221 | 29.63 | 16.52 | 0.27 | 49.80 | 49.92 | 26.31 | 33.04 |
| 231 | 28.79 | 16.44 | 0.28 | 49.76 | 49.90 | 26.05 | 30.68 |
| 241 | 28.02 | 16.38 | 0.28 | 49.75 | 49.85 | 25.68 | 29.24 |
| 251 | 27.25 | 16.32 | 0.29 | 49.72 | 49.84 | 25.46 | 28.12 |
| 261 | 26.50 | 16.26 | 0.30 | 49.70 | 49.79 | 24.96 | 27.09 |
| 271 | 25.80 | 16.21 | 0.31 | 49.67 | 49.77 | 24.40 | 26.25 |
| 281 | 25.11 | 16.16 | 0.32 | 49.64 | 49.73 | 24.24 | 25.32 |
| 291 | 24.46 | 16.11 | 0.33 | 49.62 | 49.70 | 23.71 | 24.40 |
| 301 | 23.82 | 16.07 | 0.34 | 49.58 | 49.64 | 23.15 | 23.63 |

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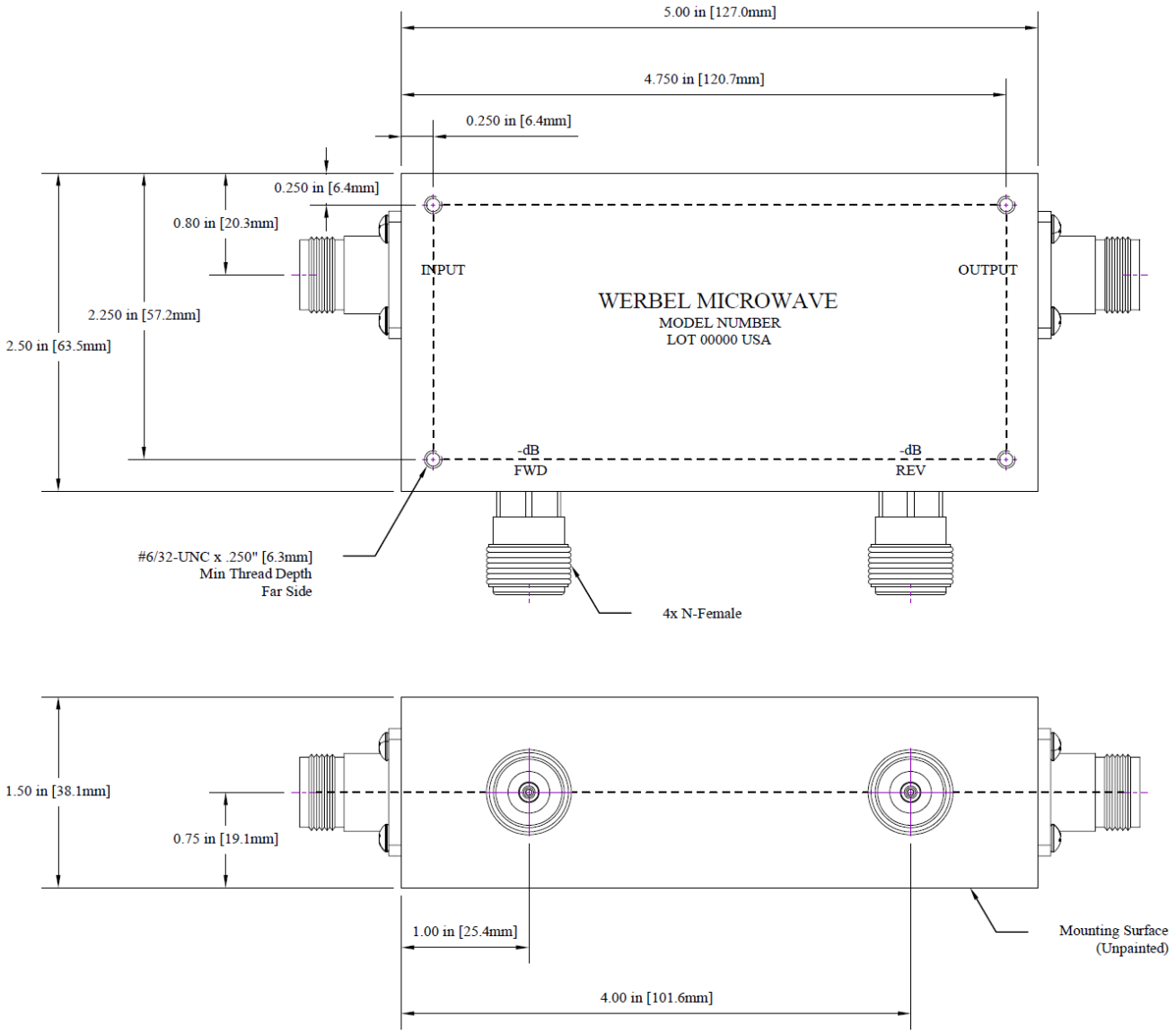
# Outline Dimensions




Outline drawing: OL-5001
Dimensions are in inches, [mm] shown for convenience.
Tolerances on 2-pl decimals: ±.03. 3-pl decimals: ± .015.