TAOGLAS®




# Datasheet

**Part No:**
**PCS.55.A**

**Description**

Small OTS LTE Antenna 600-3000 MHz

**Features:**

- Small form factor
- SMD Dielectric Antenna
- 5G/4G/LTE: 600-3000MHz
- GPS / GLONASS / Galileo / BeiDou (1561-1602MHz)
- Available in North America (NA), European Union (EMEA), and World Wide (WW) configurations
- Dimensions: 27 x 10 x 1.6 mm
- RoHS & REACH Compliant



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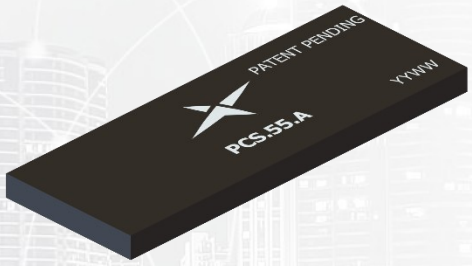
| | | |
|---|---|---|
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# 1. Introduction




The Taoglas PCS.55.A, is a patent pending compact cellular antenna designed specifically for IoT devices with small ground planes. It combines revolutionary antenna design techniques with the antenna integration experience of Taoglas to provide a solution for wideband coverage of both 5G/4G LTE and GNSS bands, including the most challenging 600-700MHz bands.

The PCS.55.A provides a simple off-the-shelf solution for LTE, LTE CAT-M, NB-IoT, and GNSS applications. At only 27 x 10 x 1.6 mm, this compact cellular antenna is the perfect antenna for small IoT devices, where requirements for smaller PCB design are becoming more dependent on the antenna size. This antenna also has a small keep-out area compared to most other compact cellular antennas on the market.

### Typical Applications include:

- Tablets and Smartphones
- Compact Asset Trackers
- Smart Home and Security Devices
- Point-of-Sale (POS) Terminals
- Medical Devices

The PCS.55.A is available in three versions, each tuned for North America (NA), Europe (EMEA), and Worldwide (WW) frequency bands. Each version uses an optimized 3-component matching circuit, making it easy for designers to achieve the best performance for their specific region. The antenna is simple to integrate using standard SMD assembly methods, offering flexibility and fast design implementation.

Taoglas have tested how ground plane size, antenna placement, and MIMO configurations using the PCS.55.A and PCS.55.M effect performance. Results are available in Sections 9 and 10 of this datasheet.

For more information or support with integration and matching, please contact your local Taoglas support team.


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# 2. Specifications

| Electrical | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Band** | Frequency (MHz) | Measurement | Efficiency (%) | Average Gain (dB) | Peak Gain (dBi) | Return Loss (dB) | Impedance | Polarization | Radiation Pattern | Max Input Power |
| **5GNR Band71** | 617-698 | NA | 17.9 | -7.5 | -4.4 | -2.5 | 50 Ω | Linear | Omni directional | 10W |
| | | EMEA | 9.1 | -10.4 | -7.3 | -2.5 | | | | |
| | | WW | 23.9 | -6.2 | -3.3 | -4.7 | | | | |
| **5GNR/4G Band 12,17,28,29,85** | 698-746 | NA | 47.4 | -3.2 | 0.2 | -8.5 | | | | |
| | | EMEA | 23.3 | -6.3 | -2.7 | -4.1 | | | | |
| | | WW | 31.2 | -5.1 | -1.6 | -3.7 | | | | |
| **5GNR/4G Band 13,14,20,28** | 746-800 | NA | 41.7 | -3.8 | -0.3 | -5.1 | | | | |
| | | EMEA | 31.1 | -5.1 | -1.5 | -4.4 | | | | |
| | | WW | 31.7 | -5.0 | -1.5 | -3.3 | | | | |
| **5GNR/4G Band 5,18,19,20,26,27** | 800-880 | NA | 27.4 | -5.6 | -2.2 | -3.1 | | | | |
| | | EMEA | 35.6 | -4.5 | -1.0 | -5.0 | | | | |
| | | WW | 32.6 | -4.9 | -1.6 | -4.1 | | | | |
| **5GNR/4G Band 5,8,19,26** | 880-960 | NA | 16.1 | -7.9 | -4.4 | -2.6 | | | | |
| | | EMEA | 26.6 | -5.7 | -1.8 | -5.6 | | | | |
| | | WW | 23.6 | -6.3 | -2.6 | -4.3 | | | | |
| **5GNR/4G Band 74,75,76** | 1427-1518 | NA | 32.9 | -4.8 | 0.4 | -4.7 | | | | |
| | | EMEA | 24.8 | -6.1 | -1.0 | -3.1 | | | | |
| | | WW | 31.9 | -5.0 | 0.4 | -5.0 | | | | |
| **GNSS** | 1560-1602 | NA | 43.3 | -3.6 | 1.2 | -5.9 | | | | |
| | | EMEA | 35.2 | -4.5 | 0.7 | -4.7 | | | | |
| | | WW | 43.3 | -3.6 | 1.6 | -6.3 | | | | |
| **4G/3G Band 1,2,3,4,25,39,66** | 1710-2155 | NA | 46.6 | -3.3 | 3.7 | -6.3 | | | | |
| | | EMEA | 47.4 | -3.2 | 3.3 | -6.6 | | | | |
| | | WW | 43.0 | -3.7 | 3.5 | -5.9 | | | | |
| **4G/3G Band 7, 38, 41, 69** | 2500-2690 | NA | 14.7 | -8.3 | -2.0 | -1.8 | | | | |
| | | EMEA | 20.9 | -6.8 | -0.4 | -2.2 | | | | |
| | | WW | 18.6 | -7.3 | 0.0 | -2.2 | | | | |

The PCS.55.A antenna performance was measured with Taoglas PCSD.55.A EVB.



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| Mechanical | |
|---|---|
| Antenna Dimensions | 27 x 10 x 1.6mm |
| Material | FR4 |
| Weight | 0.9g |
| Soldering Type | SMD |

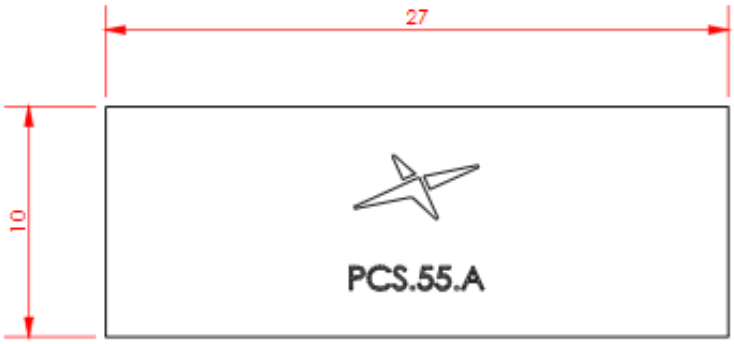
| Environmental | |
|---|---|
| Operation Temperature | -40°C ~ +85°C |
| Storage Temperature | -40°C ~ +85°C |
| Moisture Sensitivity Level | 3 |


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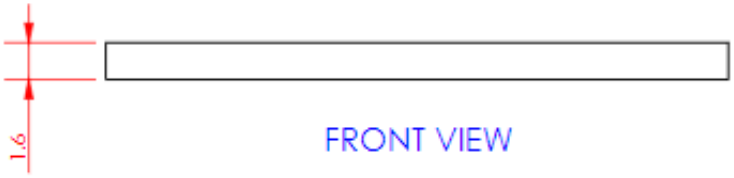
| 5G/4G Bands | | | | | |
|---|---|---|---|---|---|
| Band Number | 5GNR / FR1 / LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA | | | | |
| | Uplink | Downlink | EMEA | NA | WW |
| B1 | 1920 to 1980 | 2110 to 2170 | ✓ | ✓ | ✓ |
| B2 | 1850 to 1910 | 1930 to 1990 | ✓ | ✓ | ✓ |
| B3 | 1710 to 1785 | 1805 to 1880 | ✓ | ✓ | ✓ |
| B4 | 1710 to 1755 | 2110 to 2155 | ✓ | ✓ | ✓ |
| B5 | 824 to 849 | 869 to 894 | ✓ | ✓ | ✓ |
| B7 | 2500 to 2570 | 2620 to 2690 | ✓ | ✗ | ✓ |
| B8 | 880 to 915 | 925 to 960 | ✓ | ✓ | ✓ |
| B9 | 1749.9 to 1784.9 | 1844.9 to 1879.9 | ✓ | ✓ | ✓ |
| B11 | 1427.9 to 1447.9 | 1475.9 to 1495.9 | ✓ | ✓ | ✓ |
| B12 | 699 to 716 | 729 to 746 | ✗ | ✓ | ✓ |
| B13 | 777 to 787 | 746 to 756 | ✓ | ✓ | ✓ |
| B14 | 788 to 798 | 758 to 768 | ✓ | ✓ | ✓ |
| B17 | 704 to 716 | 734 to 746 | ✗ | ✓ | ✓ |
| B18 | 815 to 830 | 860 to 875 | ✓ | ✓ | ✓ |
| B19 | 830 to 845 | 875 to 890 | ✓ | ✓ | ✓ |
| B20 | 832 to 862 | 791 to 821 | ✓ | ✓ | ✓ |
| B21 | 1447.9 to 1462.9 | 1495.9 to 1510.9 | ✓ | ✓ | ✓ |
| B22 | 3410 to 3490 | 3510 to 3590 | ✗ | ✗ | ✗ |
| B23 | 2000 to 2020 | 2180 to 2200 | ✓ | ✓ | ✓ |
| B24 | 1626.5 to 1660.5 | 1525 to 1559 | ✓ | ✓ | ✓ |
| B25 | 1850 to 1915 | 1930 to 1995 | ✓ | ✓ | ✓ |
| B26 | 814 to 849 | 859 to 894 | ✓ | ✓ | ✓ |
| B27 | 807 to 824 | 852 to 869 | ✓ | ✓ | ✓ |
| B28 | 703 to 748 | 758 to 803 | ✓ | ✓ | ✓ |
| B29 | 717 to 728 | | ✓ | ✓ | ✓ |
| B30 | 2305 to 2315 | 2350 to 2360 | ✓ | ✓ | ✓ |
| B31 | 452.5 to 457.5 | 462.5 to 467.5 | ✗ | ✗ | ✗ |
| B32 | 1452 to 1496 | | ✓ | ✓ | ✓ |
| B34 | 2010 to 2025 | | ✓ | ✓ | ✓ |
| B35 | 1850 to 1910 | | ✓ | ✓ | ✓ |
| B36 | 1930 to 1990 | | ✓ | ✓ | ✓ |
| B37 | 1910 to 1930 | | ✓ | ✓ | ✓ |
| B38 | 2570 to 2620 | | ✓ | ✗ | ✓ |
| B39 | 1880 to 1920 | | ✓ | ✓ | ✓ |
| B40 | 2300 to 2400 | | ✓ | ✓ | ✓ |
| B41 | 2496 to 2690 | | ✓ | ✗ | ✓ |
| B42 | 3400 to 3600 | | ✗ | ✗ | ✗ |
| B43 | 3600 to 3800 | | ✗ | ✗ | ✗ |
| B45 | 1447 to 1467 | | ✓ | ✓ | ✓ |
| B46 | 5150 to 5925 | | ✗ | ✗ | ✗ |
| B47 | 5855 to 5925 | | ✗ | ✗ | ✗ |
| B48 | 3550 to 3700 | | ✗ | ✗ | ✗ |
| B49 | 3550 to 3700 | | ✗ | ✗ | ✗ |
| B50 | 1432 to 1517 | | ✓ | ✓ | ✓ |
| B51 | 1427 to 1432 | | ✓ | ✓ | ✓ |
| B52 | 3300 to 3400 | | ✗ | ✗ | ✗ |
| B53 | 2483.5 to 2495 | | ✓ | ✗ | ✓ |
| B65 | 1920 to 2010 | 2110 to 2200 | ✓ | ✓ | ✓ |
| B66 | 1710 to 1780 | 2110 to 2200 | ✓ | ✓ | ✓ |
| B68 | 698 to 728 | 753 to 783 | ✓ | ✓ | ✓ |
| B69 | 2570 to 2620 | | ✓ | ✗ | ✓ |
| B70 | 1695 to 1710 | 1995 to 2020 | ✓ | ✓ | ✓ |
| B71 | 663 to 698 | 617 to 652 | ✗ | ✗ | ✓ |
| B72 | 451 to 456 | 461 to 466 | ✗ | ✗ | ✗ |
| B73 | 450 to 455 | 460 to 465 | ✗ | ✗ | ✗ |
| B74 | 1427 to 1470 | 1475 to 1518 | ✓ | ✓ | ✓ |
| B75 | 1432 to 1517 | | ✓ | ✓ | ✓ |
| B76 | 1427 to 1432 | | ✓ | ✓ | ✓ |
| B77 | 3300 to 4200 | | ✗ | ✗ | ✗ |
| B78 | 3300 to 3800 | | ✗ | ✗ | ✗ |
| B79 | 4400 to 5000 | | ✗ | ✗ | ✗ |
| B85 | 698 to 716 | 728 to 746 | ✗ | ✓ | ✓ |
| B87 | 410 to 415 | 420 to 425 | ✗ | ✗ | ✗ |
| B88 | 412 to 417 | 422 to 427 | ✗ | ✗ | ✗ |


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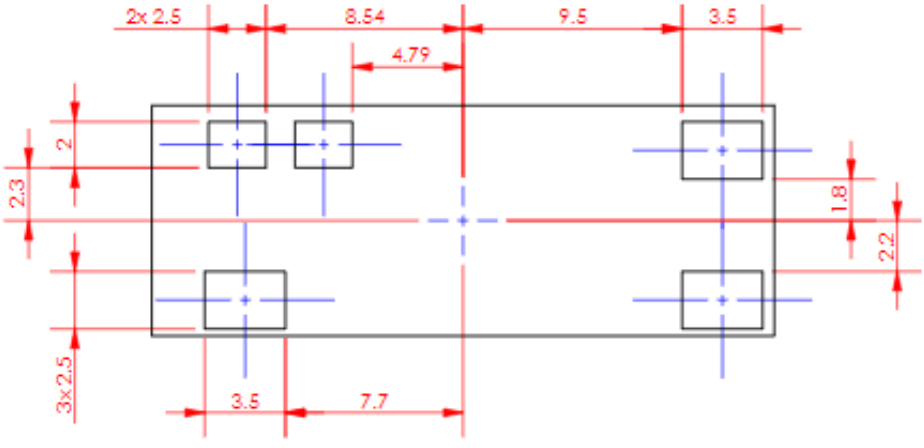
# 3. Mechanical Drawing




TOP VIEW




FRONT VIEW




BOTTOM VIEW



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# 4. Antenna Integration Guide

The following is an example on how to integrate the PCS.55.A into a design. This antenna has 5 pins, where one pin is used for the RF Feed. Taoglas recommends using a minimum of 104x30mm ground plane (PCB) to ensure optimal performance.




Top view of PCB reference design

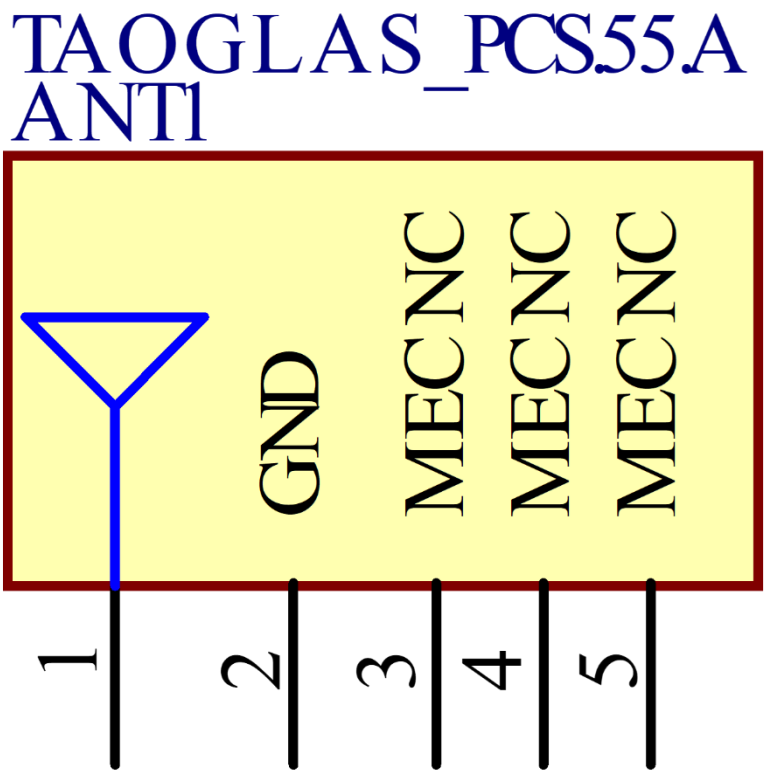
Please find the Integration files in Altium, 2D formats and the 3D model for the PCS.55.A here:
https://www.taoglas.com/product/pcs-55-a-small-fr4-wideband-4g-lte-antenna/


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## 4.1 Schematic and Symbol Definition

The circuit symbol for the PCS.55.A is shown below. The antenna has 5 pins as indicated below.

| Pin | Description |
|---|---|
| 1 | RF Feed |
| 2 | Ground |
| 3, 4, 5 | Mechanical, Not Connected |

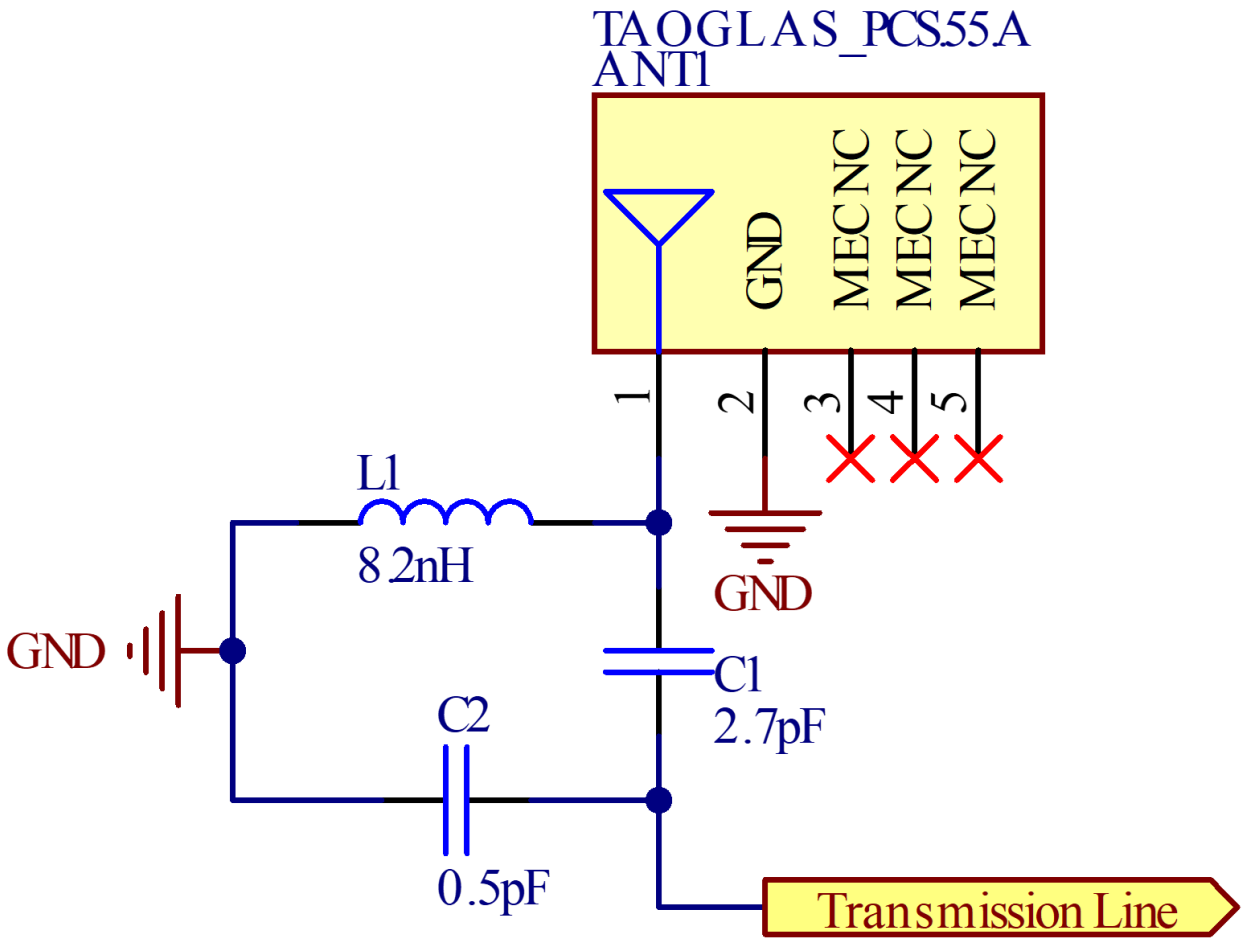




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## 4.2 Schematic Layout - NA

Matching components with the PCS.55.A are required for the antenna to have optimal performance in the spaces specified in the schematic below. Additional matching components may be necessary for your device, Taoglas recommends incorporating extra component footprints, forming a “pi” network, for the PCS.55.A.

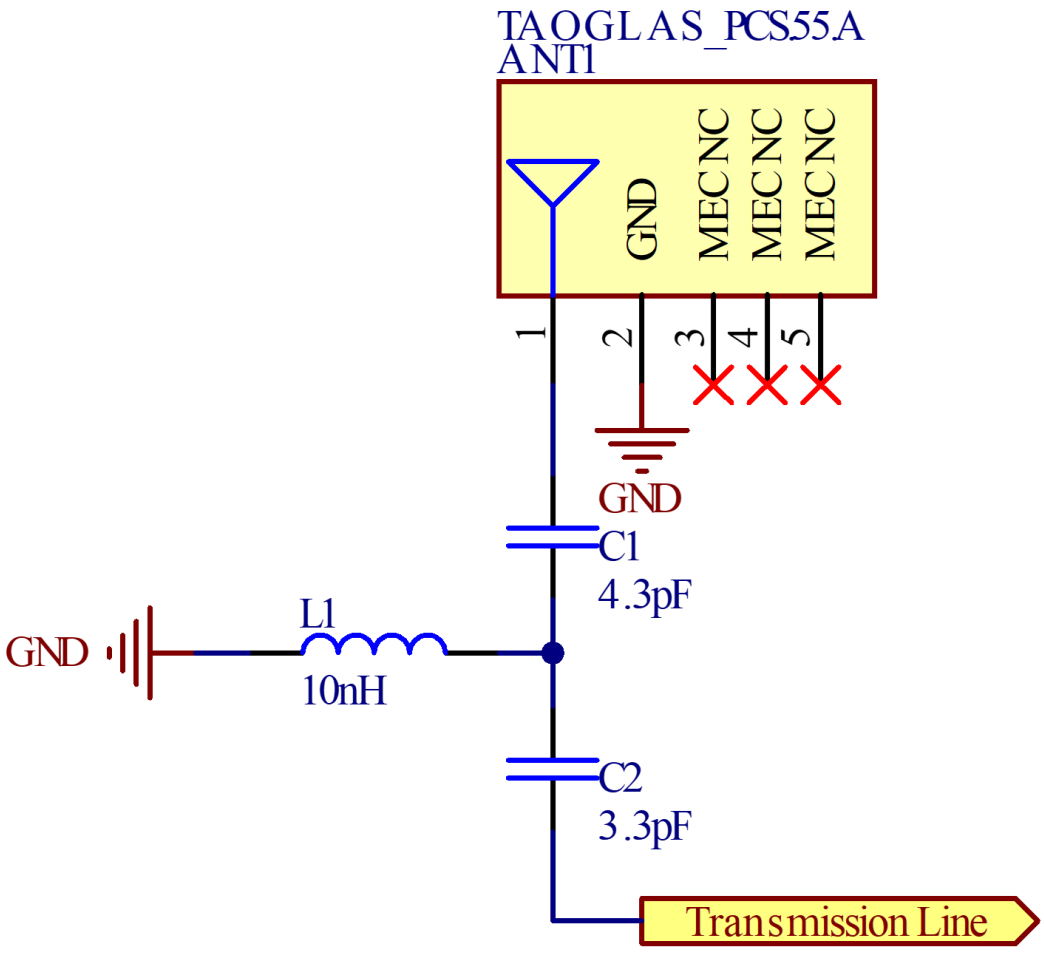



| Designator | Type | Value | Manufacturer | Manufacturer Part Number |
|---|---|---|---|---|
| C1 | Capacitor | 2.7pF | Murata | GJM1555C1H2R7BB01D |
| C2 | Capacitor | 0.5pF | Murata | GRM1555C1HR50WA01D |
| L1 | Inductor | 8.2nH | TDK | MLG1005S8N2JT000 |


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## 4.3 Schematic Layout - EMEA

Matching components with the PCS.55.A are required for the antenna to have optimal performance in the spaces specified in the schematic below. Additional matching components may be necessary for your device, Taoglas recommends incorporating extra component footprints, forming a “T” network, for the PCS.55.A.

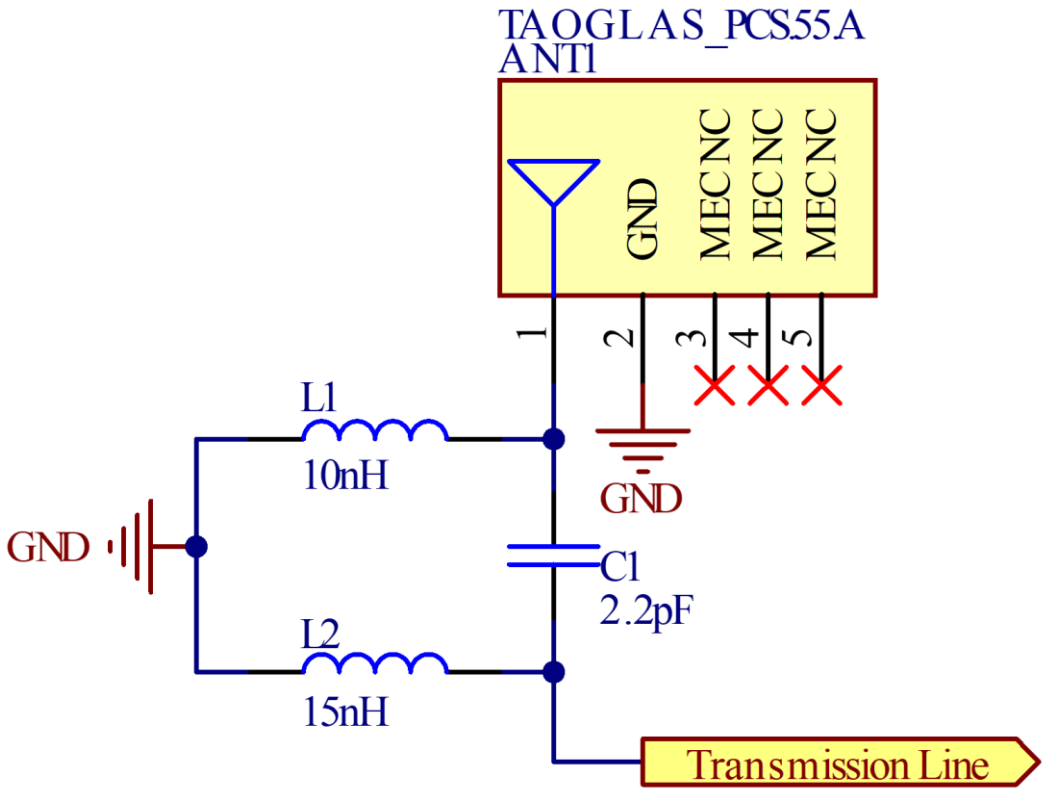



| Designator | Type | Value | Manufacturer | Manufacturer Part Number |
|---|---|---|---|---|
| C1 | Capacitor | 2.7pF | Murata | GJM1555C1H2R7BB01D |
| C2 | Capacitor | 0.5pF | Murata | GRM1555C1HR50WA01D |
| L1 | Inductor | 8.2nH | TDK | MLG1005S8N2JT000 |


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## 4.4 Schematic Layout - WW

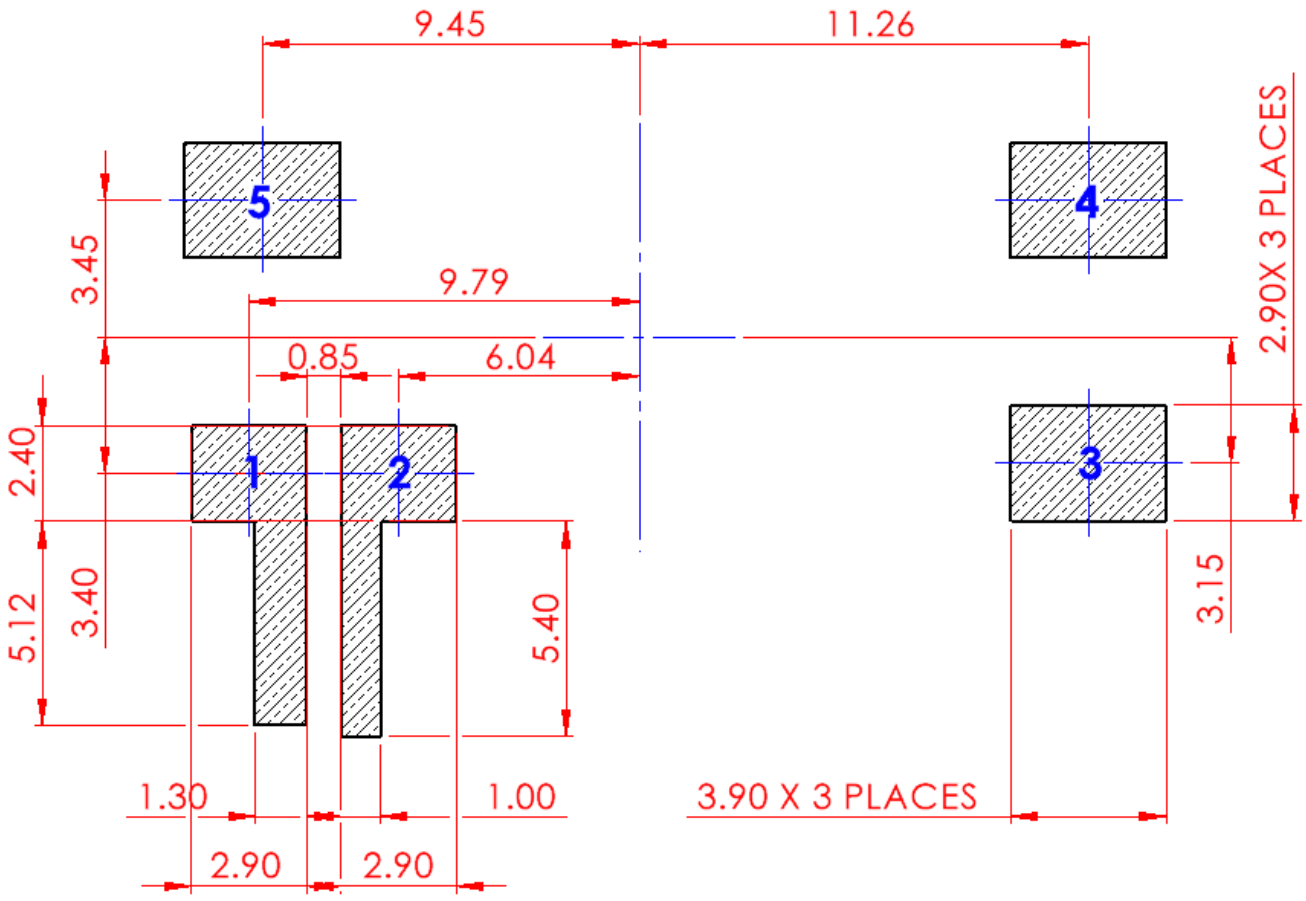
Matching components with the PCS.55.A are required for the antenna to have optimal performance in the spaces specified in the schematic below. Additional matching components may be necessary for your device, Taoglas recommends incorporating extra component footprints, forming a “pi” network, for the PCS.55.A.




| Designator | Type | Value | Manufacturer | Manufacturer Part Number |
|---|---|---|---|---|
| C1 | Capacitor | 2.2pF | Murata | GJM1555C1H2R7BB01D |
| L1 | Inductor | 10nH | TDK | MHQ1005P10NJT000 |
| L2 | Inductor | 15nH | TDK | MHQ1005P15NJT000 |


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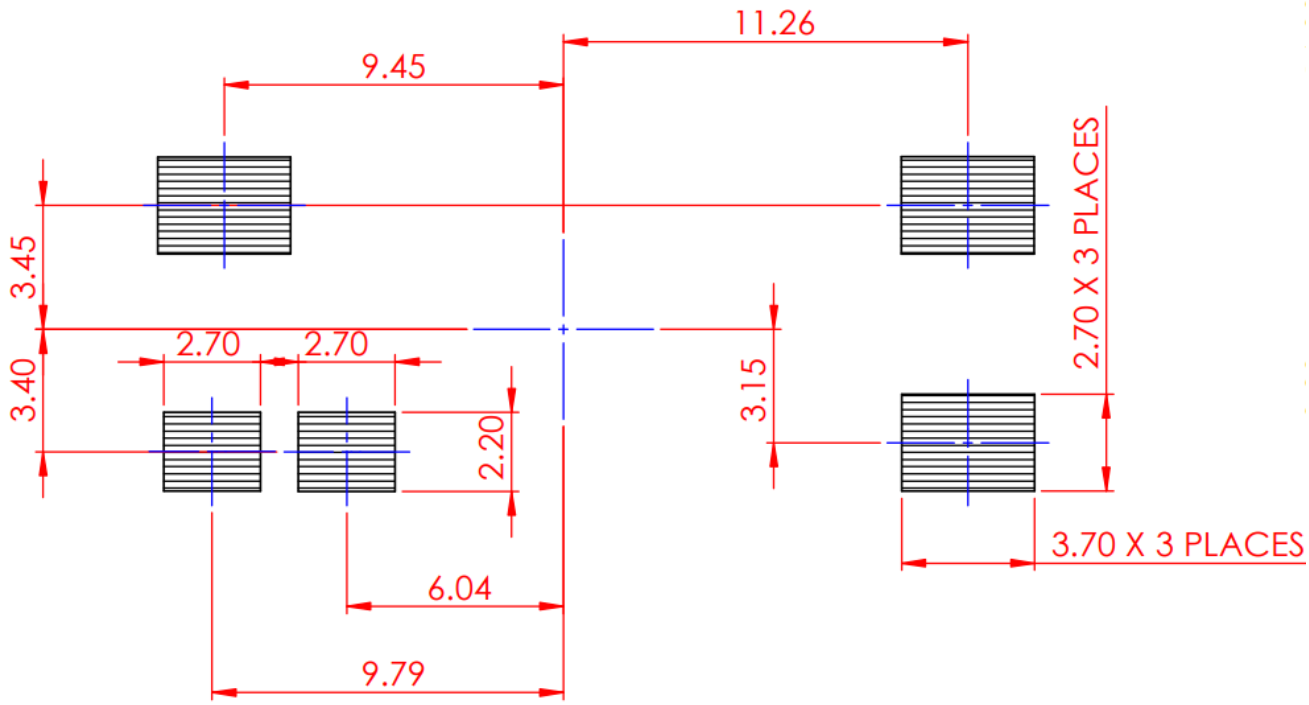
## 4.5 Footprint



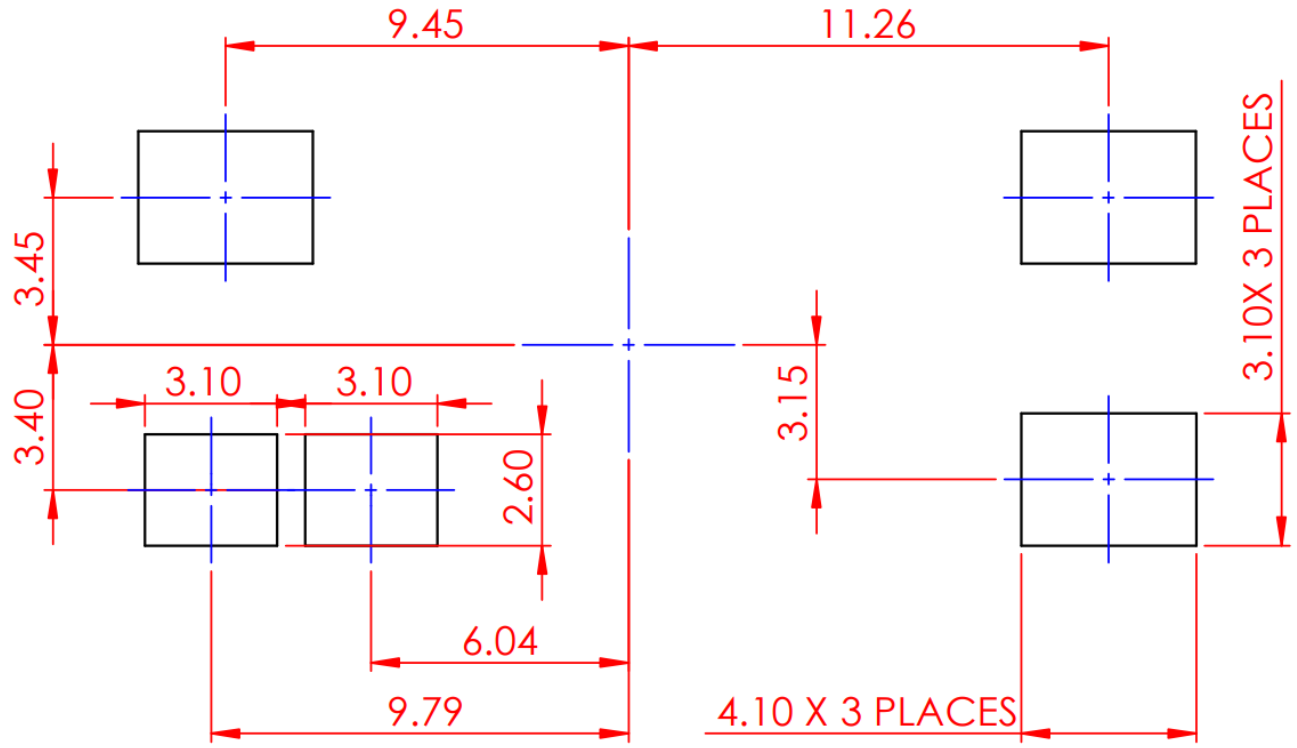

| Pin | Description |
|---|---|
| 1 | RF Feed |
| 2 | Ground |
| 3, 4, 5 | Mechanical, Not Connected |


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## 4.6 Top Solder Paste



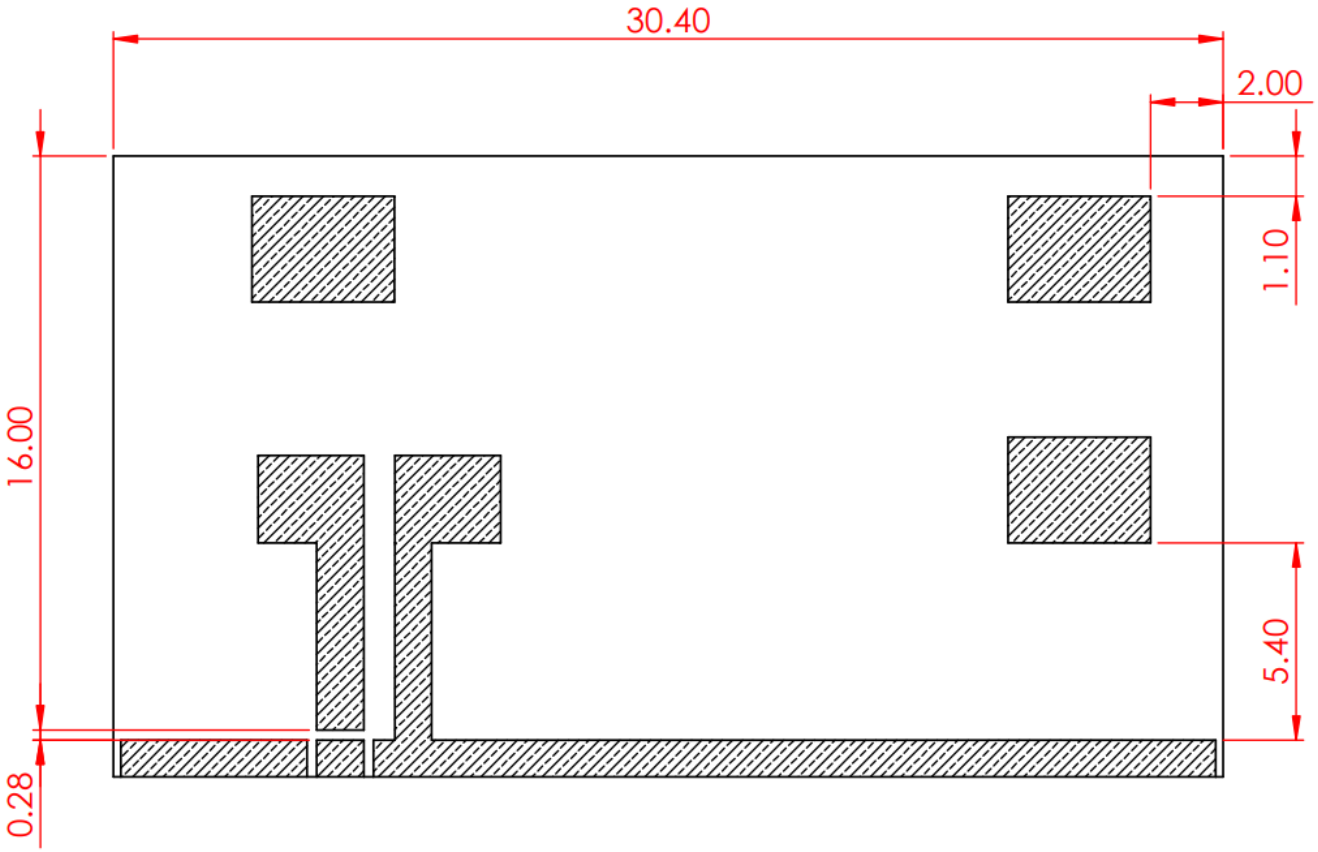

## 4.7 Top Solder Mask





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## 4.8 Copper Keepout

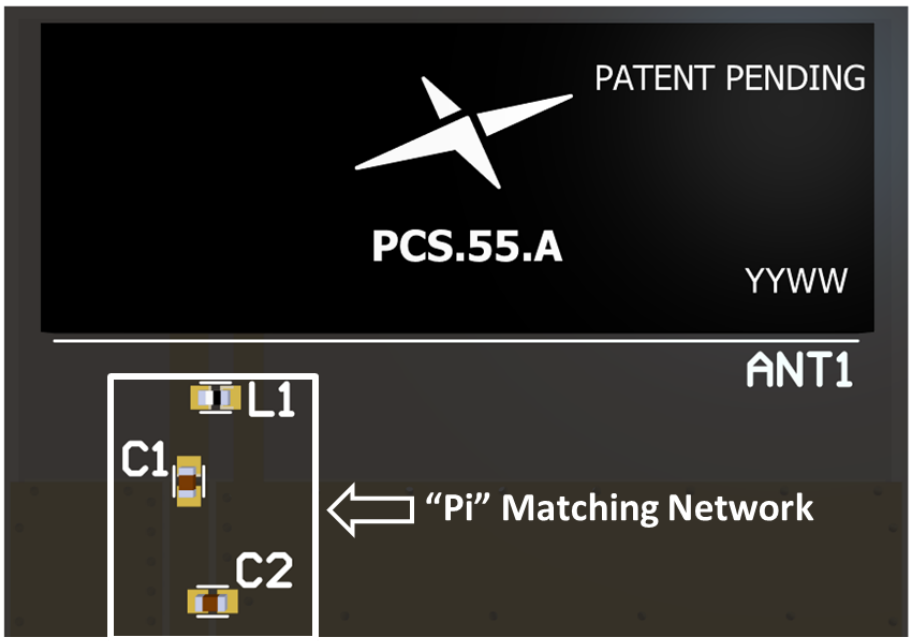


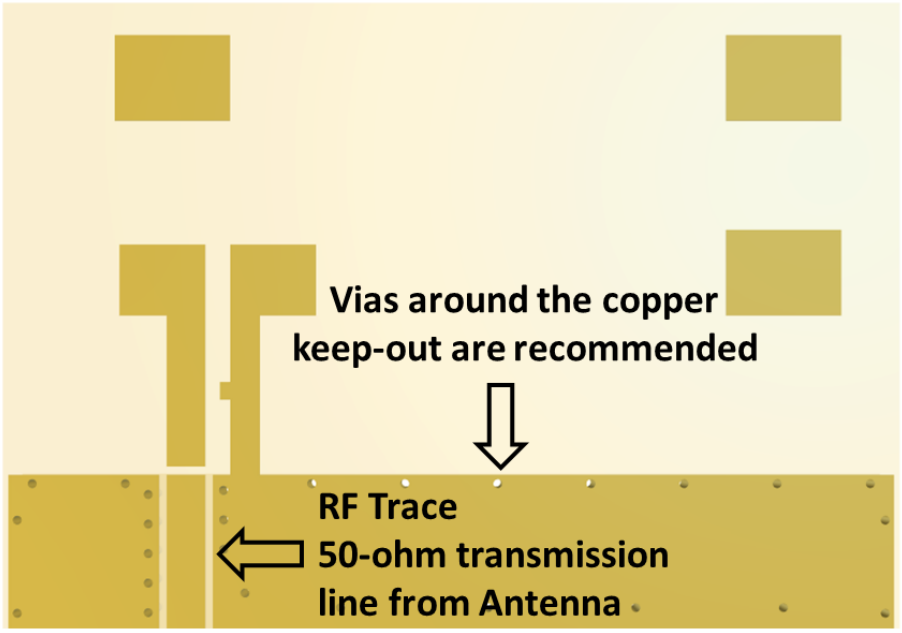


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## 4.9 Antenna Integration

The PCS.55.A should be placed in the centre, as close to the edge on the long side of the PCB as possible, to take advantage of the ground plane. The RF trace must maintain a 50 Ohm transmission line. A “pi” Matching Network is recommended for the RF transmission line, the values and components for the matching circuit will depend on the tuning needed. Ground vias should be placed around the transmission line and the copper keep out area.



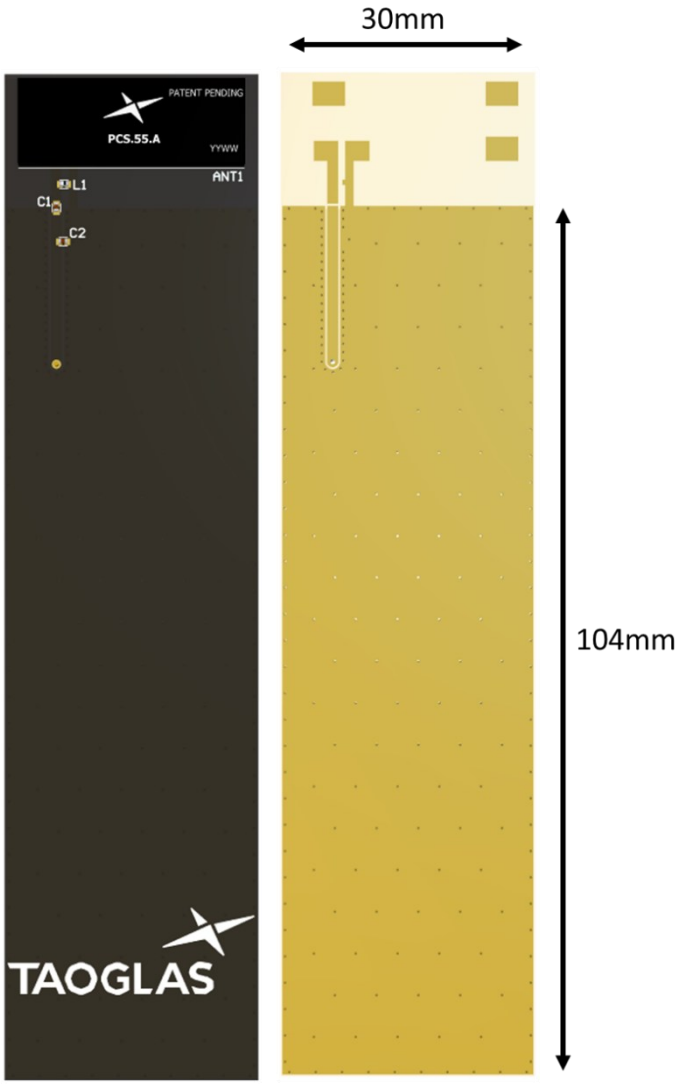





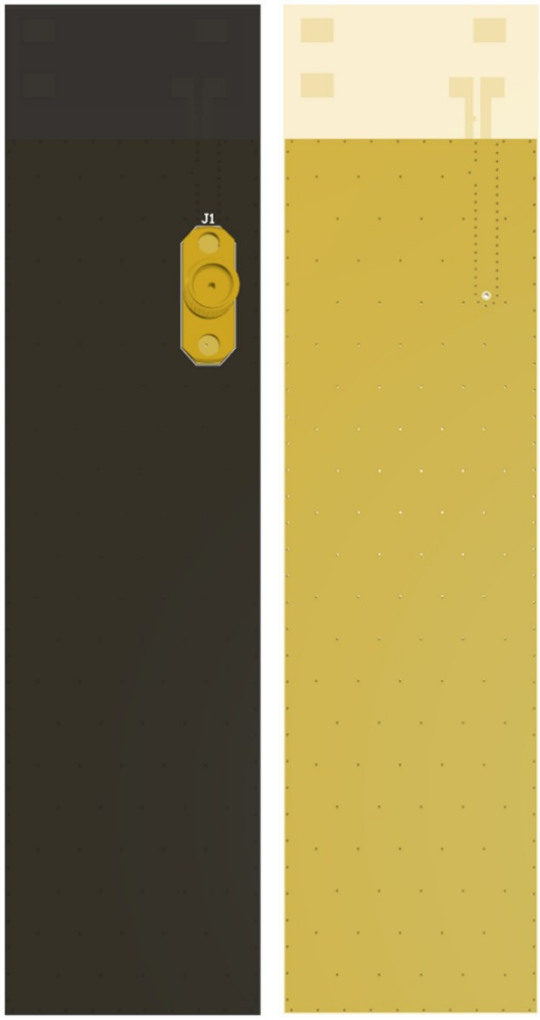
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## 4.10 Final Integration

The top side image shown below highlights the antenna transmission line. Taoglas recommends using a minimum of 104x30mm ground plane (PCB) to ensure optimal performance.



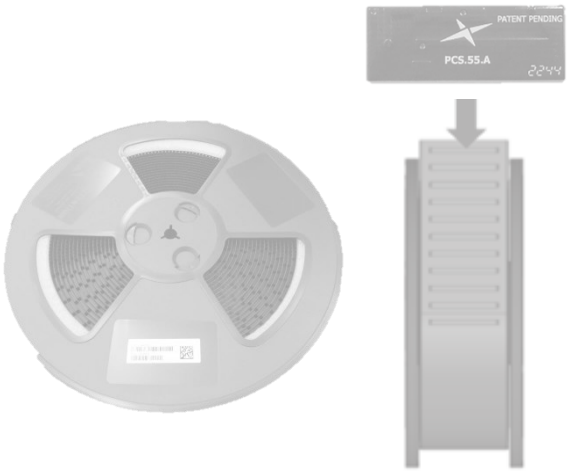

Top Side (PCS.55.A placement on 104x30mm PCB reference design)




Bottom Side


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# 5. Packaging




☑ 1000 PCS / Reel
☑ SPQ Label

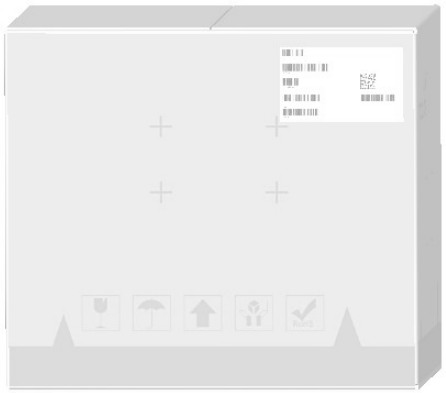


☑ 1 PCS / Vacuum bag
☑ 1 PCS / Humidity Indicator Card
☑ 2 PCS / 3g Desiccant
☑ SPQ Label



☑ 1000 PCS / Box
☑ Box(mm): 335x335x85
☑ SPQ Label
☑ Weight (Kg): 1.8±3%


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☑ 3000 PCS / Carton

☑ Carton(mm): 370x370x300mm

☑ Carton Label

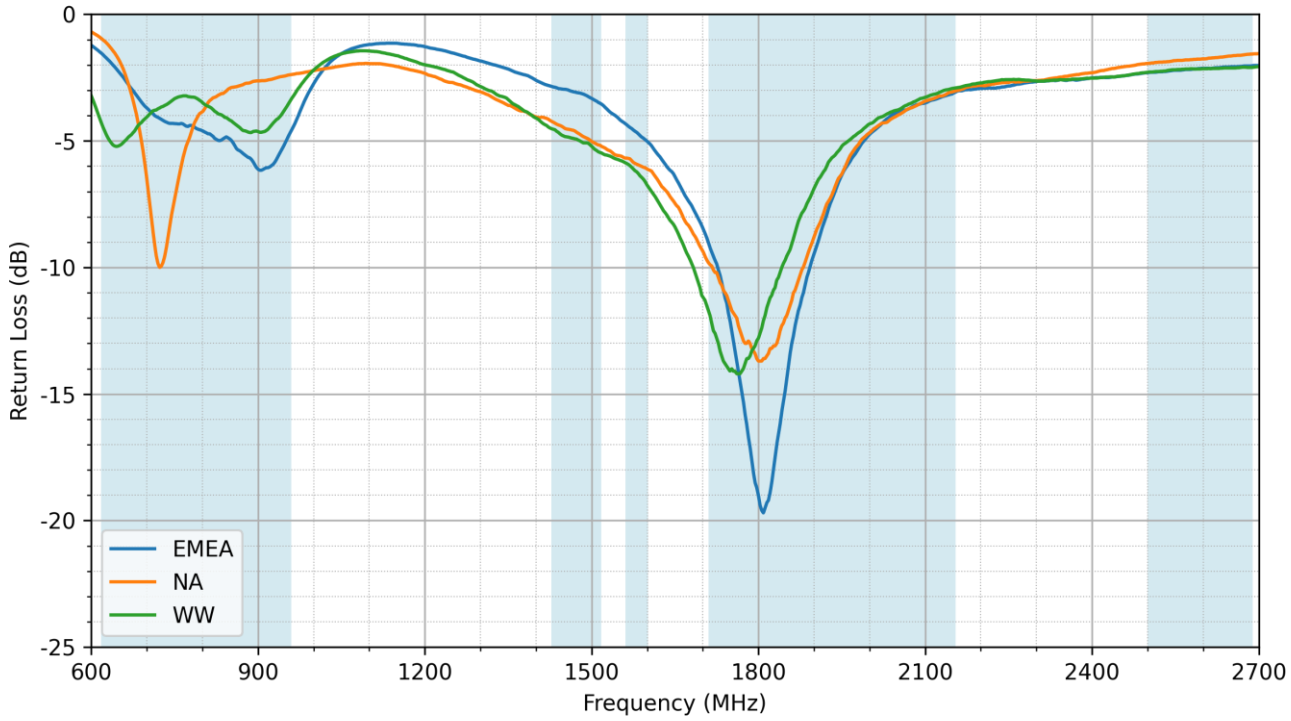
☑ Weight (Kg): 6.15±3%



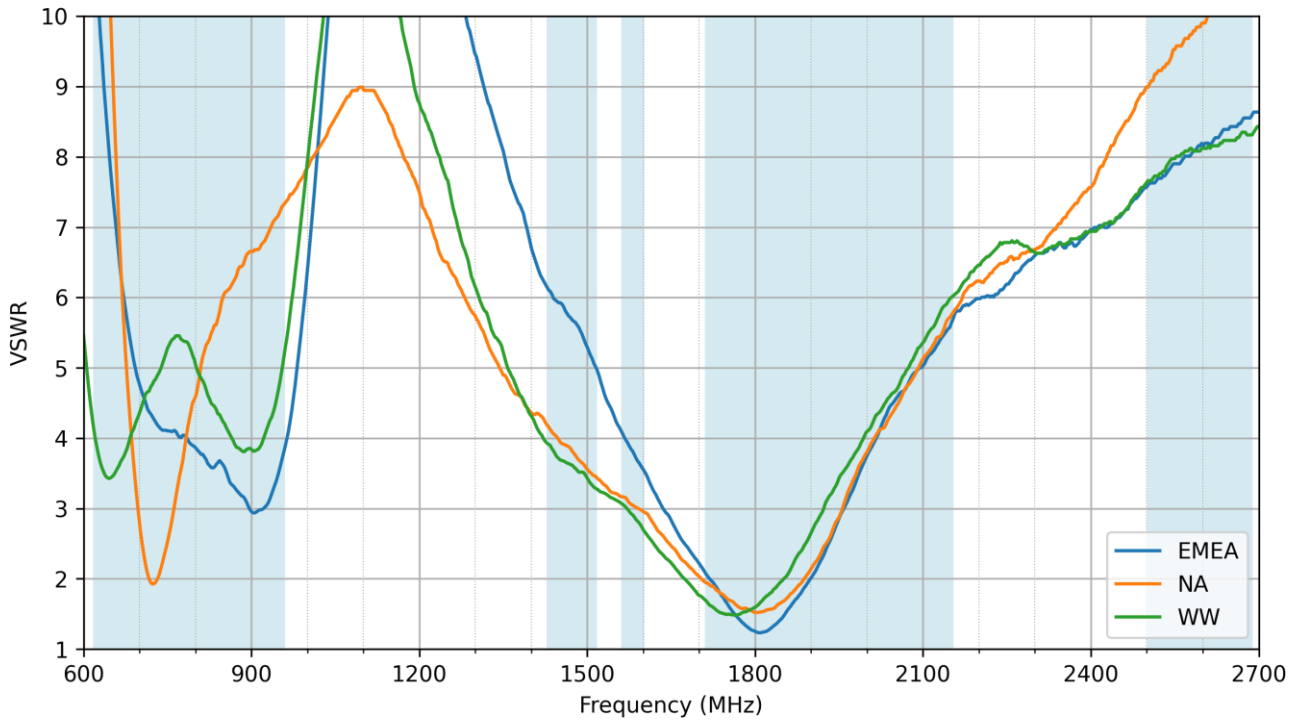
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# 6. Antenna Characteristics

## 6.1 Return Loss



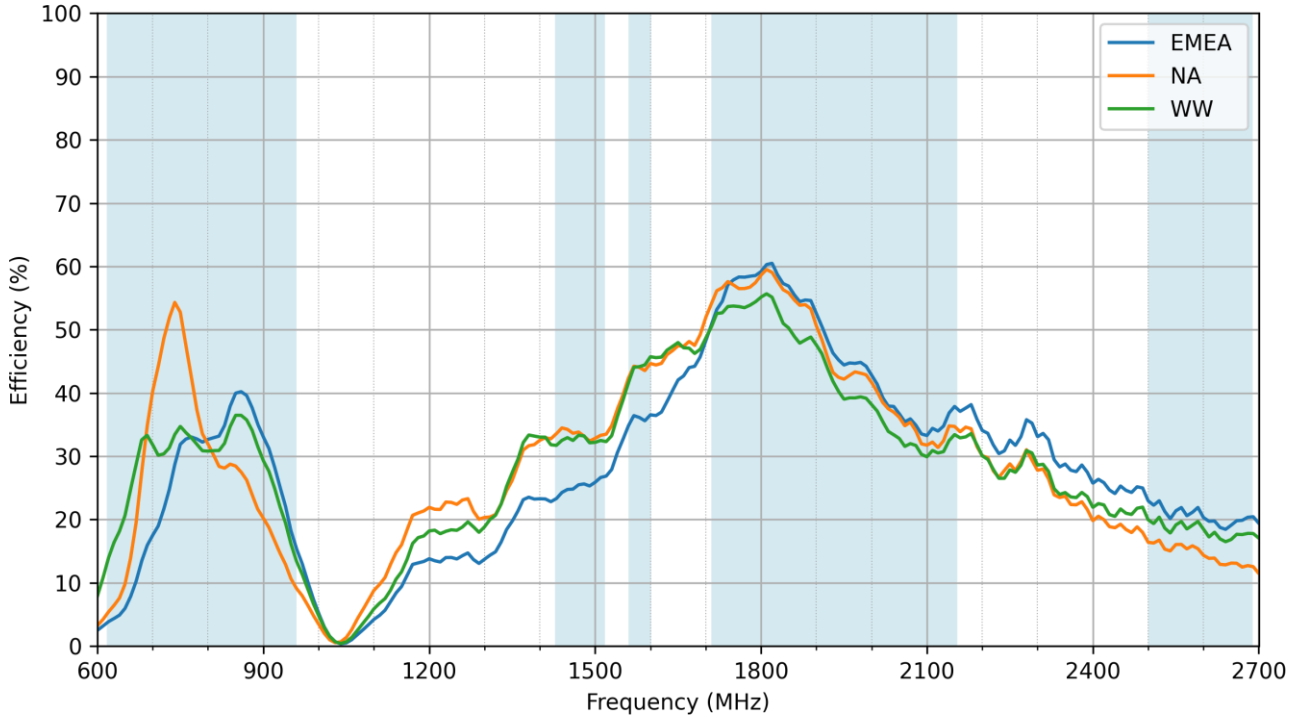

## 6.2 VSWR



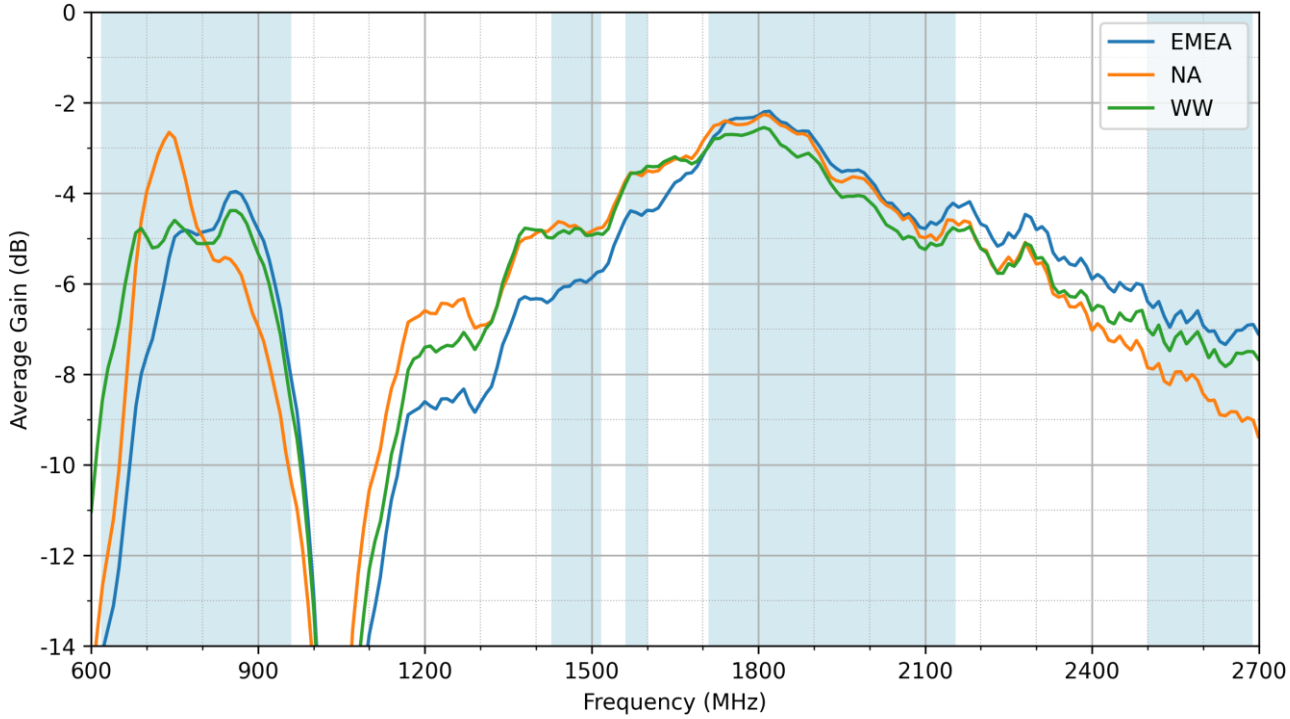


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## 6.3 Efficiency



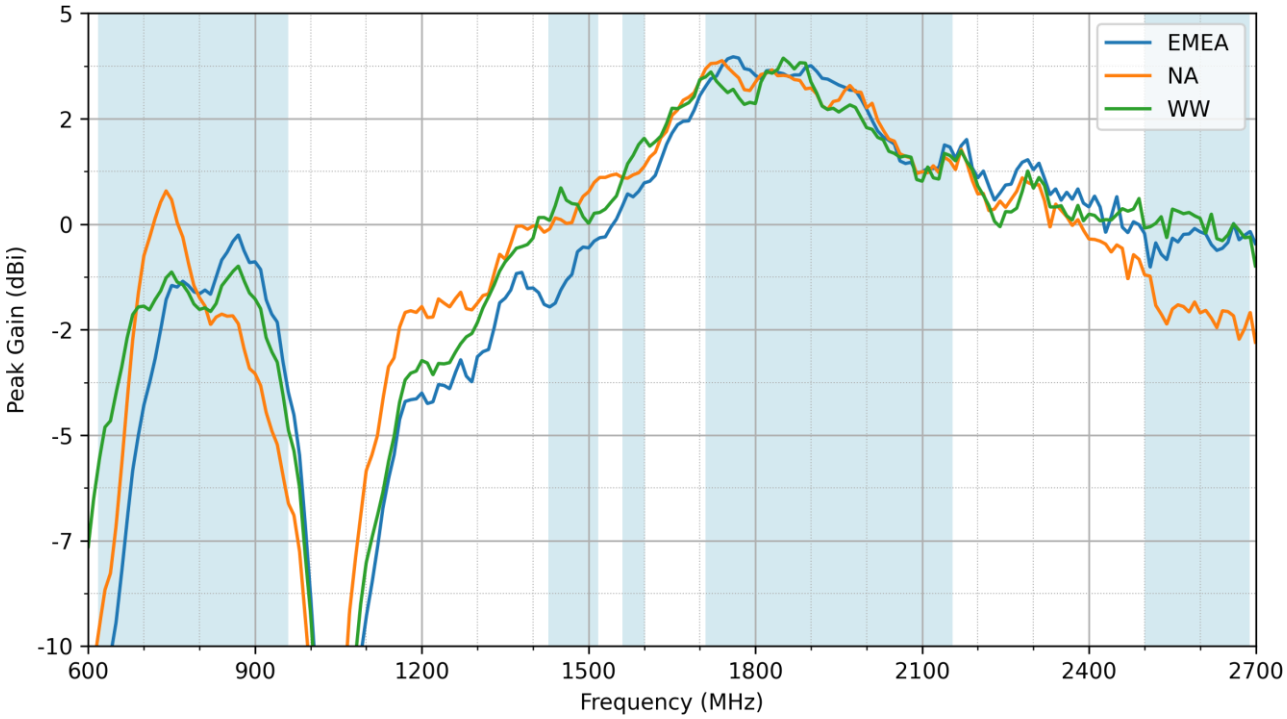

## 6.4 Average Gain





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## 6.5 Peak Gain

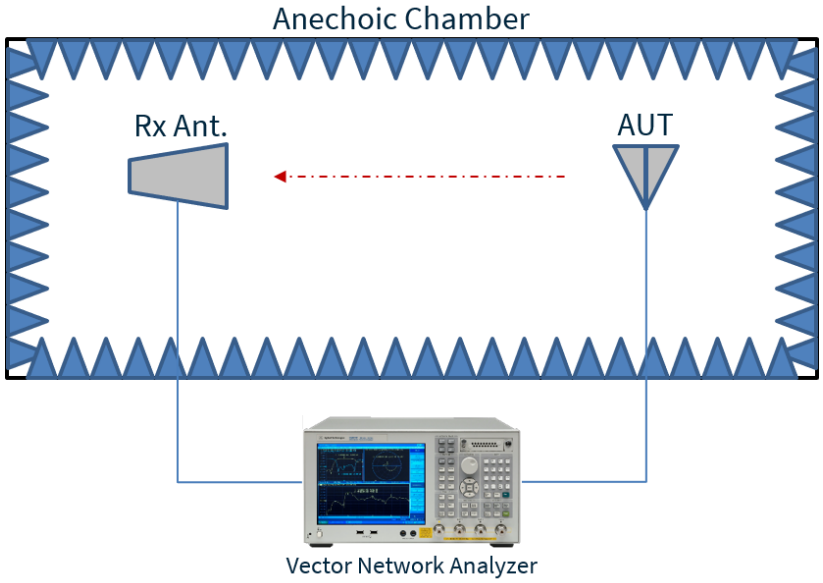


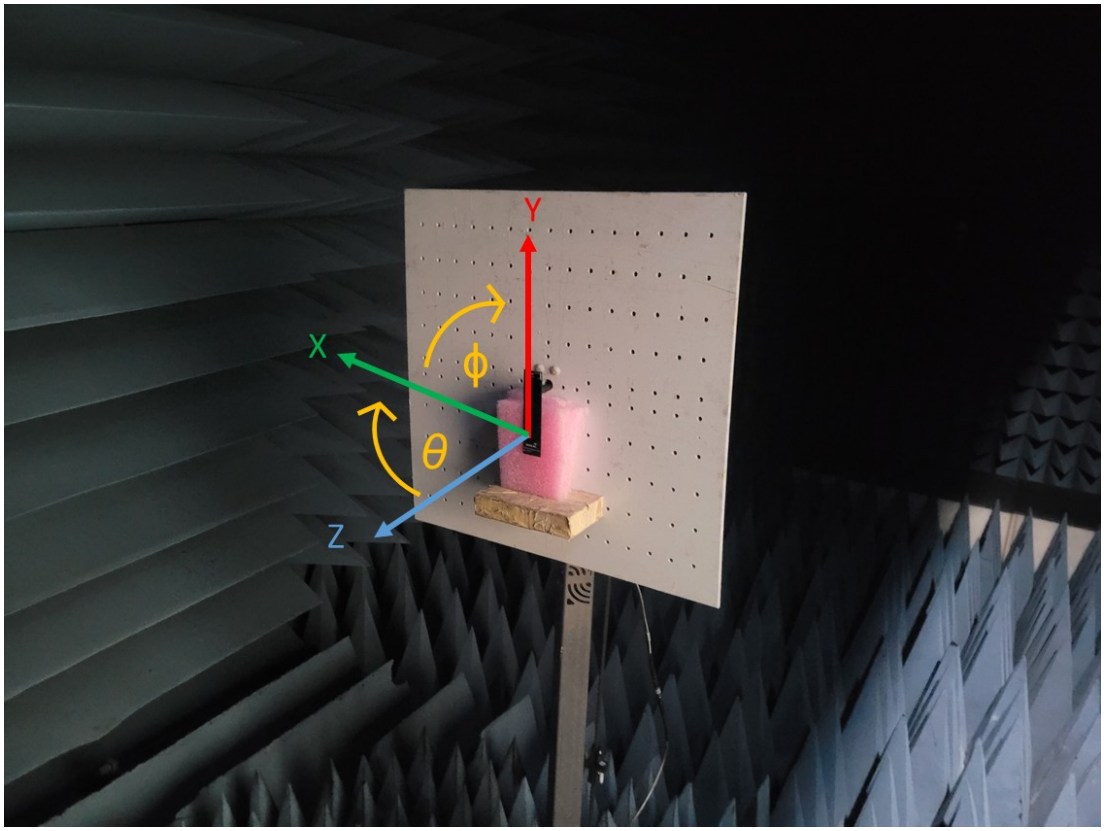


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# 7. Radiation Patterns

## 7.1 Test Setup

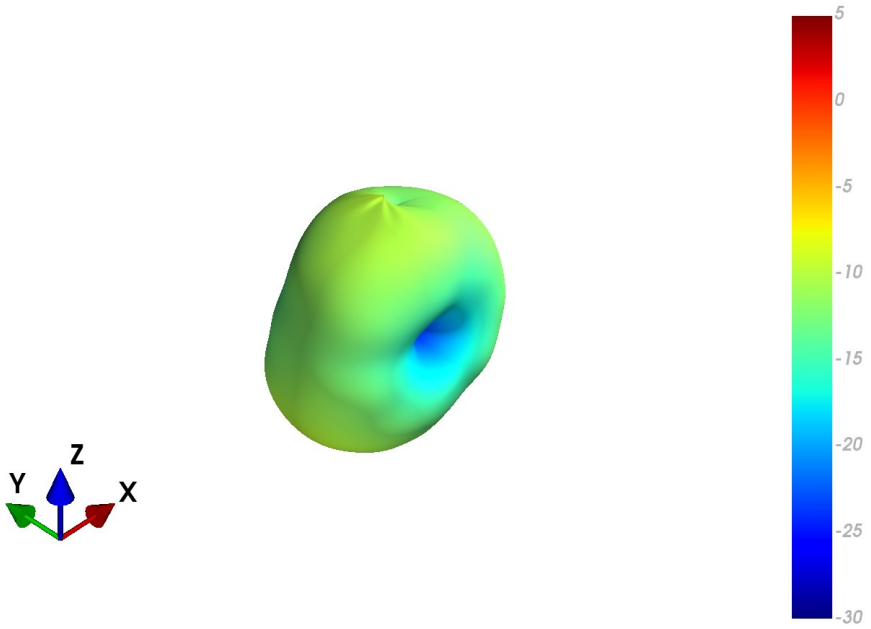


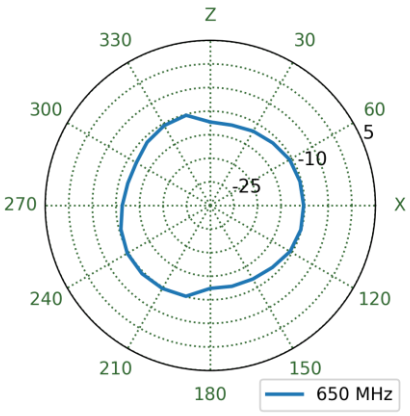
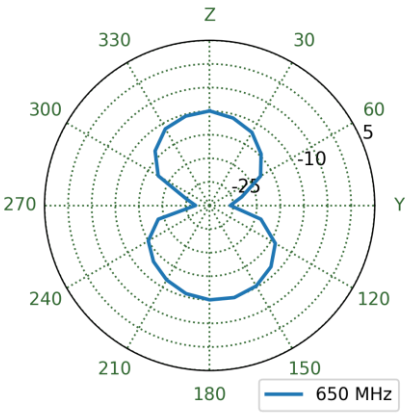
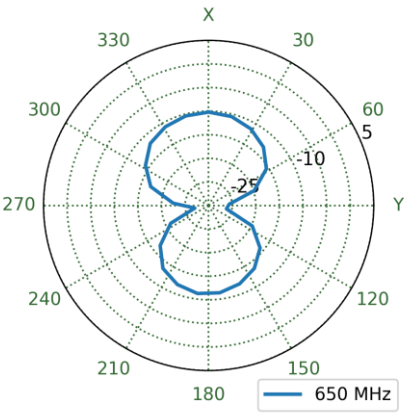




Chamber Test Set-up


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## 7.2 EMEA Patterns at 650 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

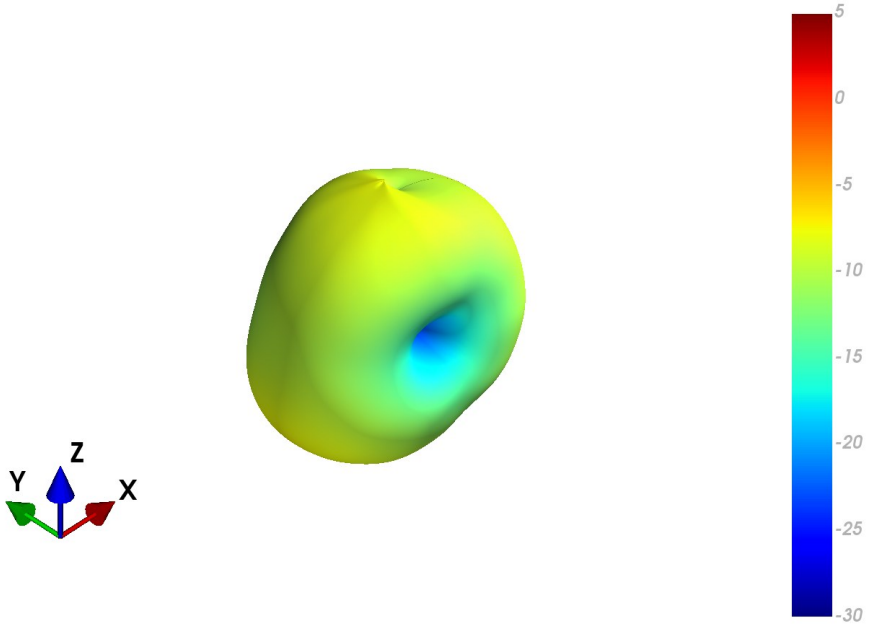


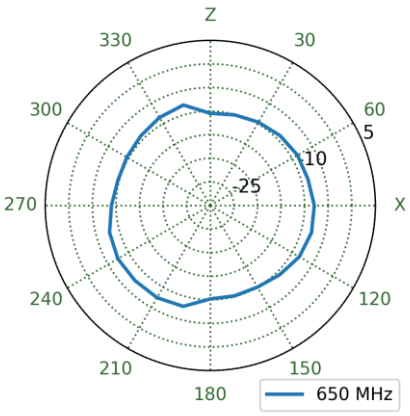
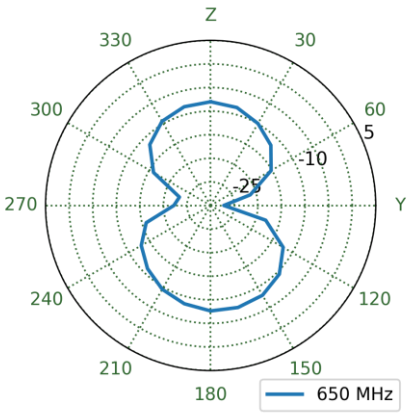
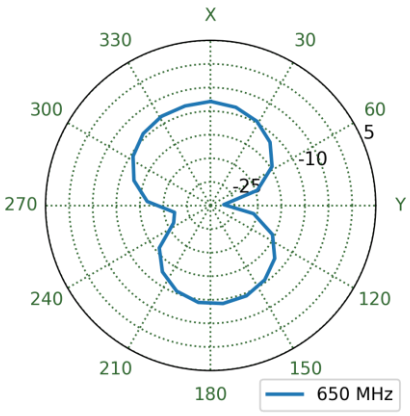





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## 7.3 NA Patterns at 650 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

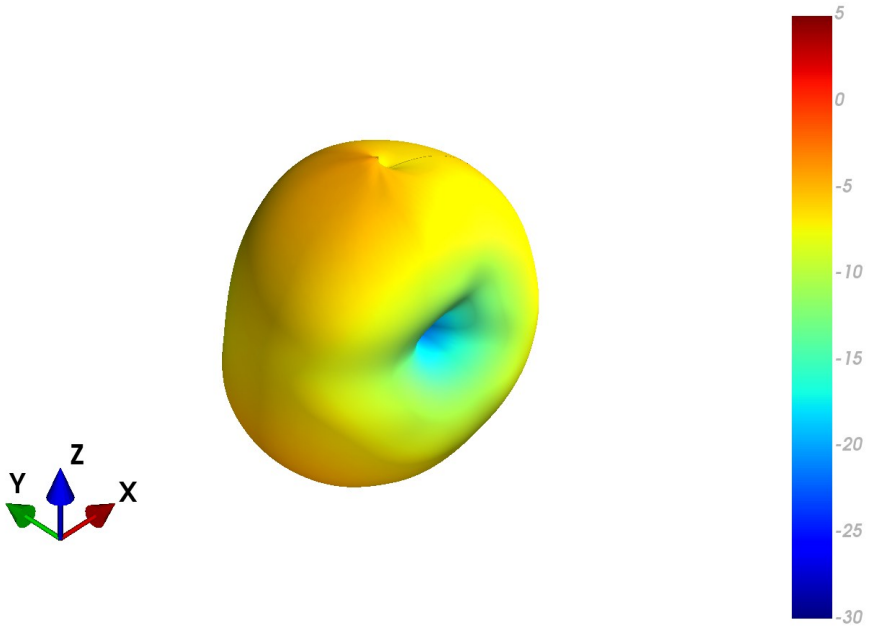


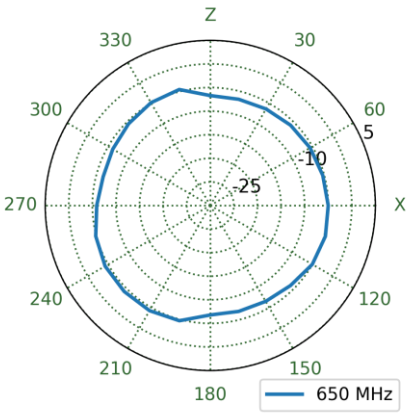
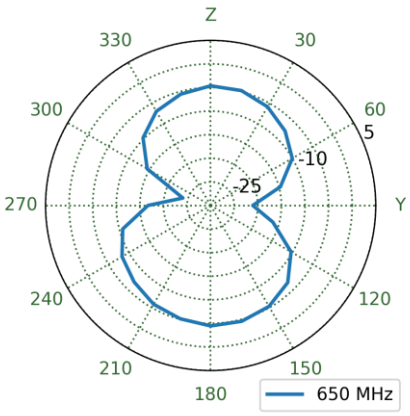
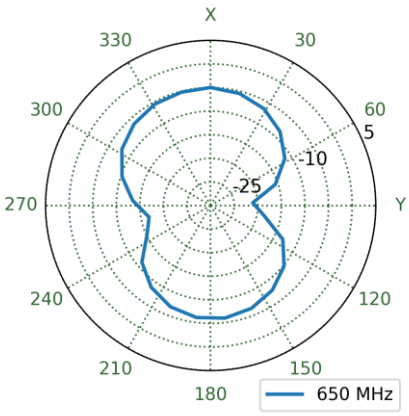





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## 7.4 WW Patterns at 650 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

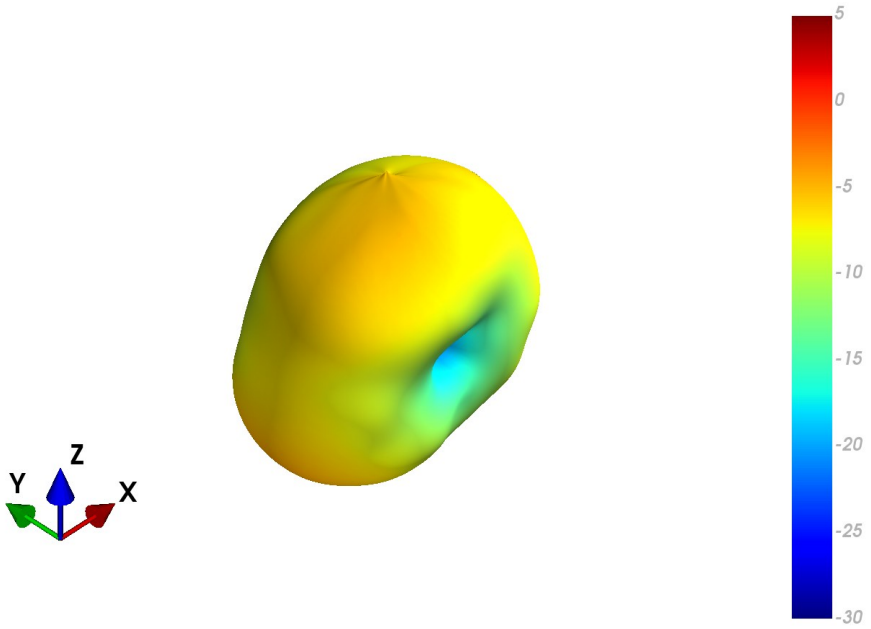


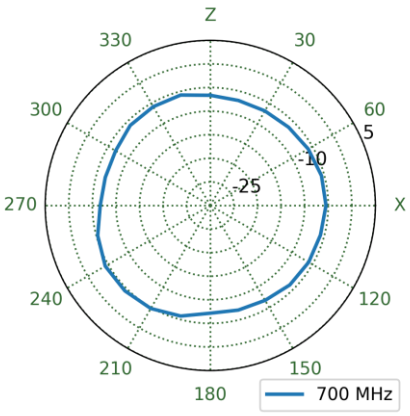
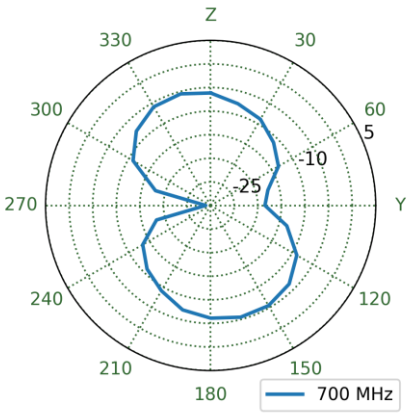
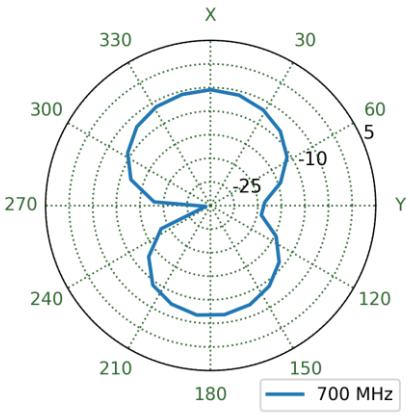





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## 7.5 EMEA Patterns at 700 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

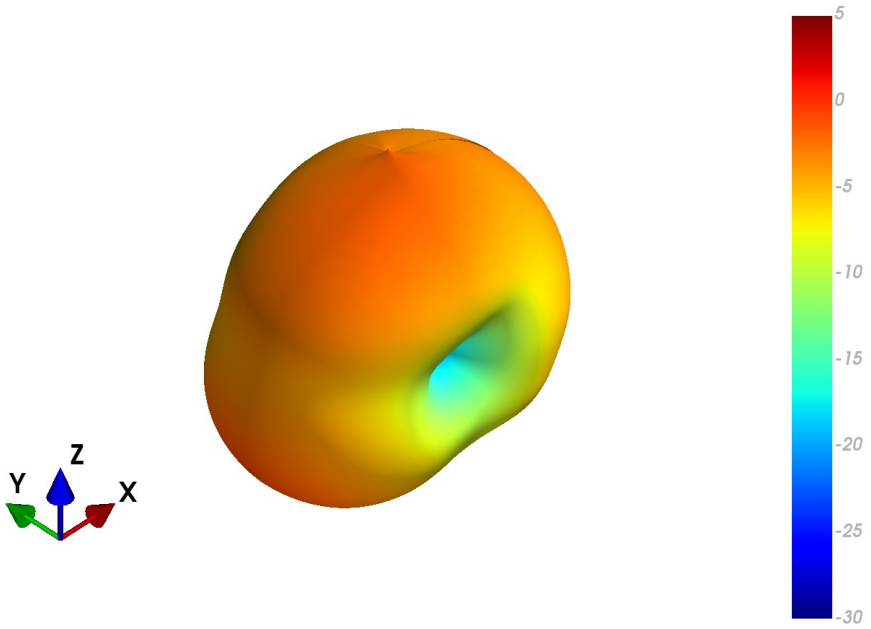


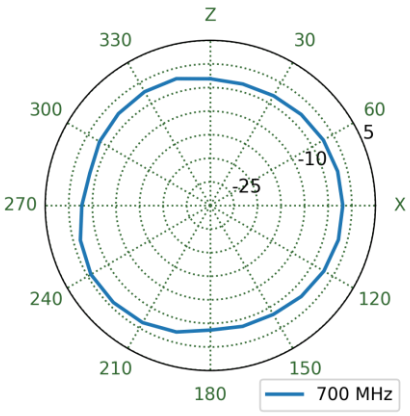
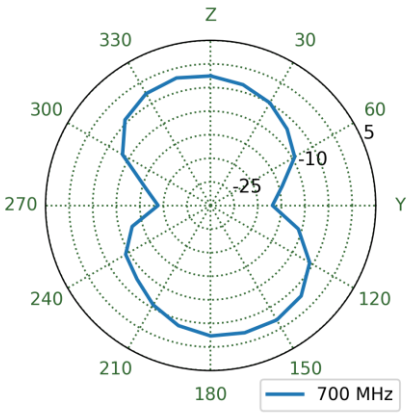
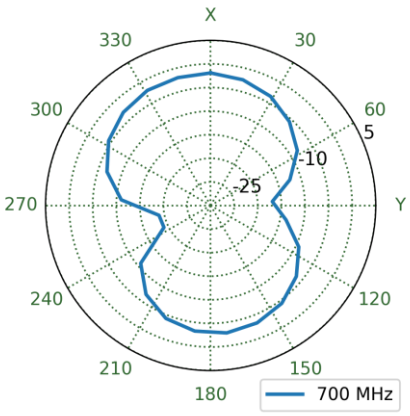





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## 7.6 NA Patterns at 700 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

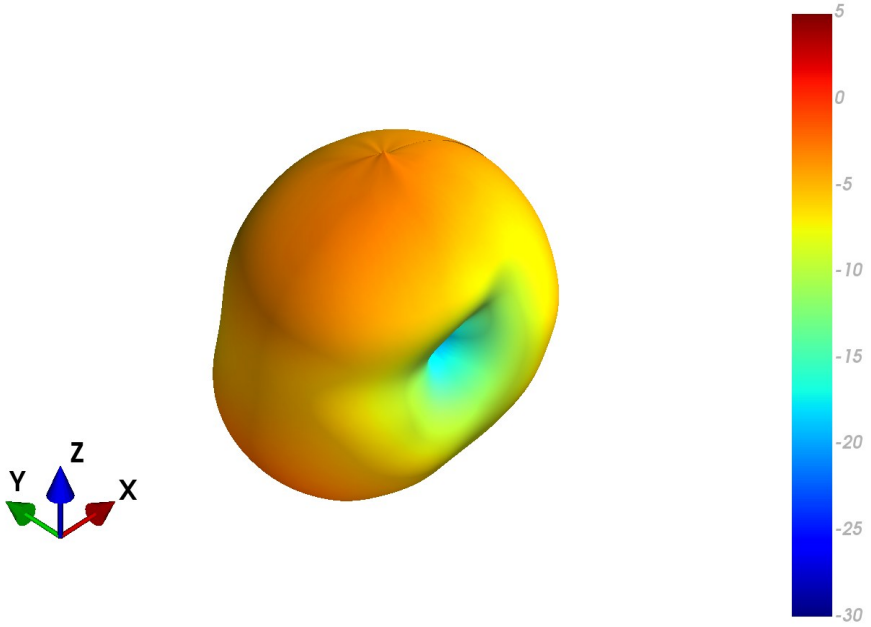


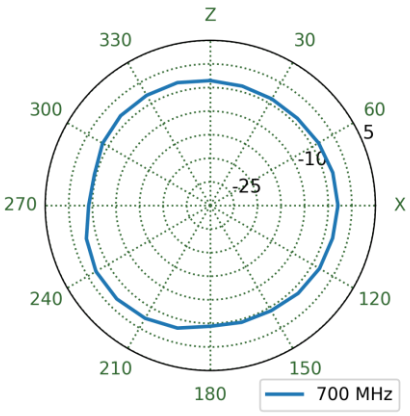
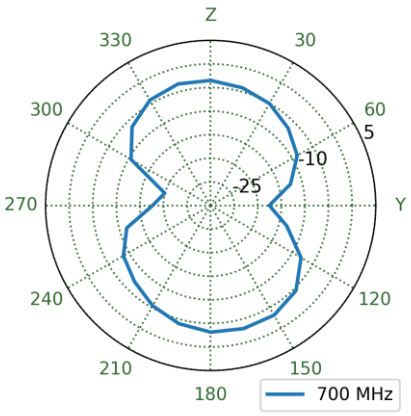
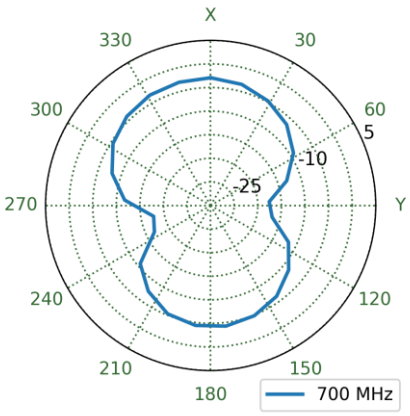





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## 7.7 WW Patterns at 700 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

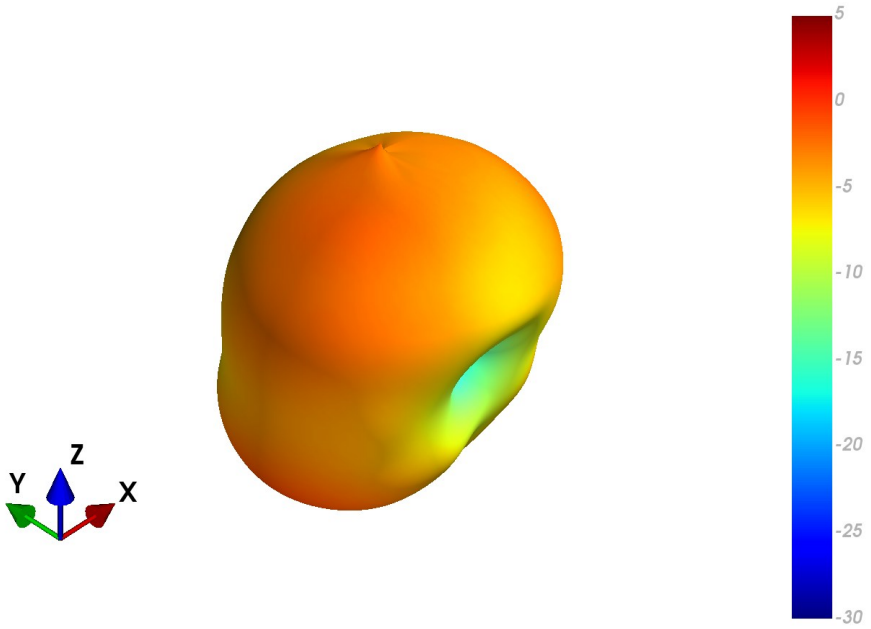


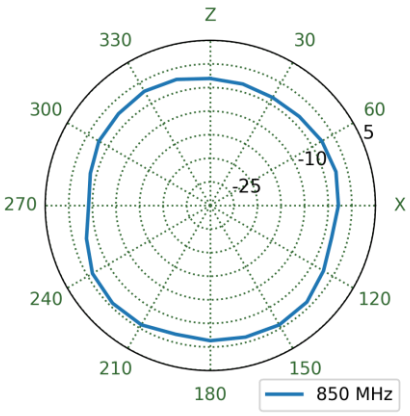
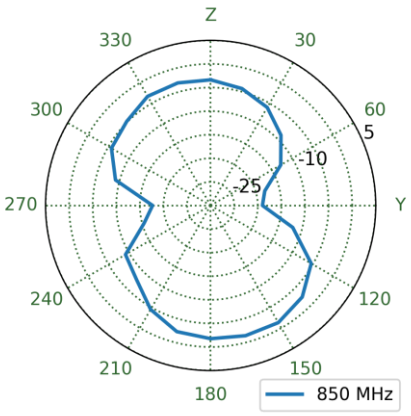
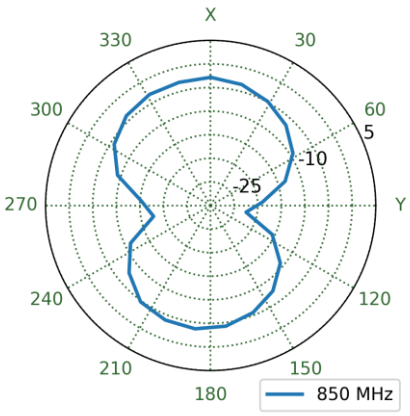





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## 7.8 EMEA Patterns at 850 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

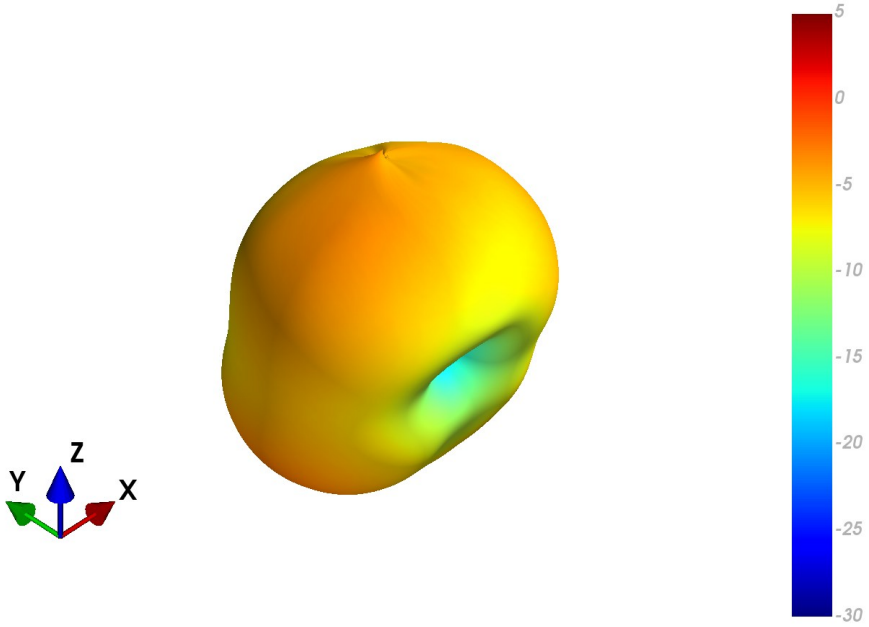


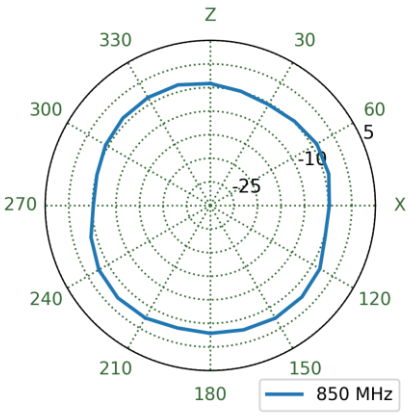
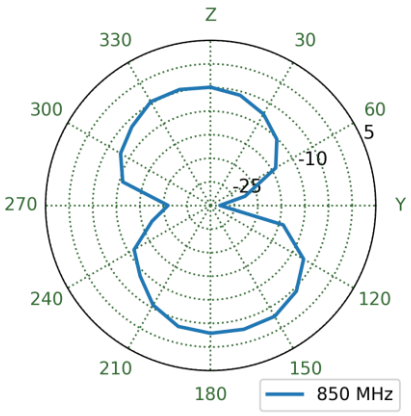
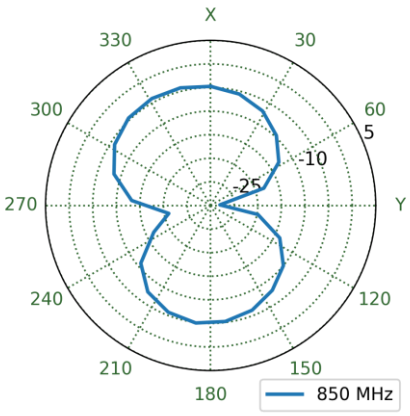





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## 7.9 NA Patterns at 850 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

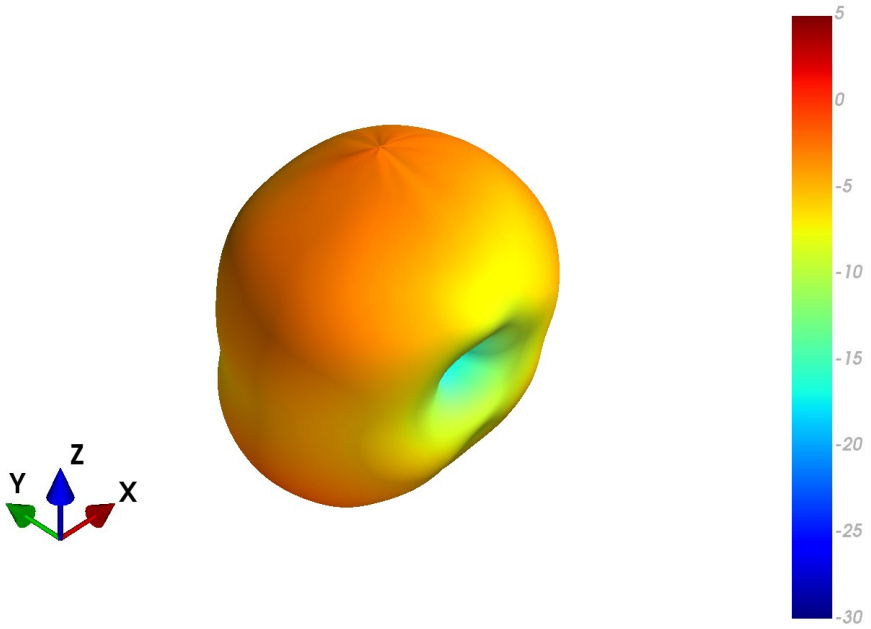


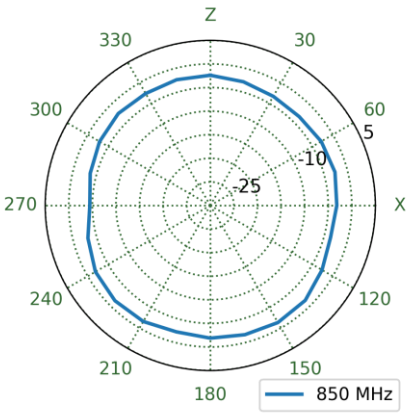
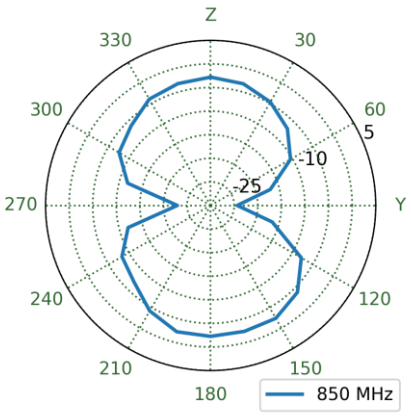
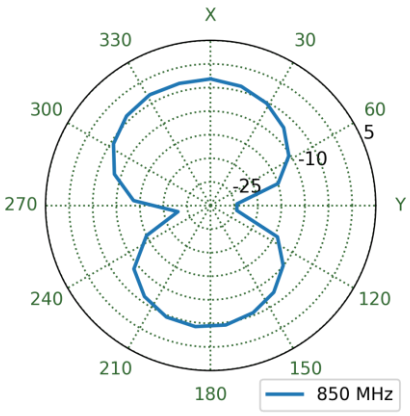





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## 7.10 WW Patterns at 850 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

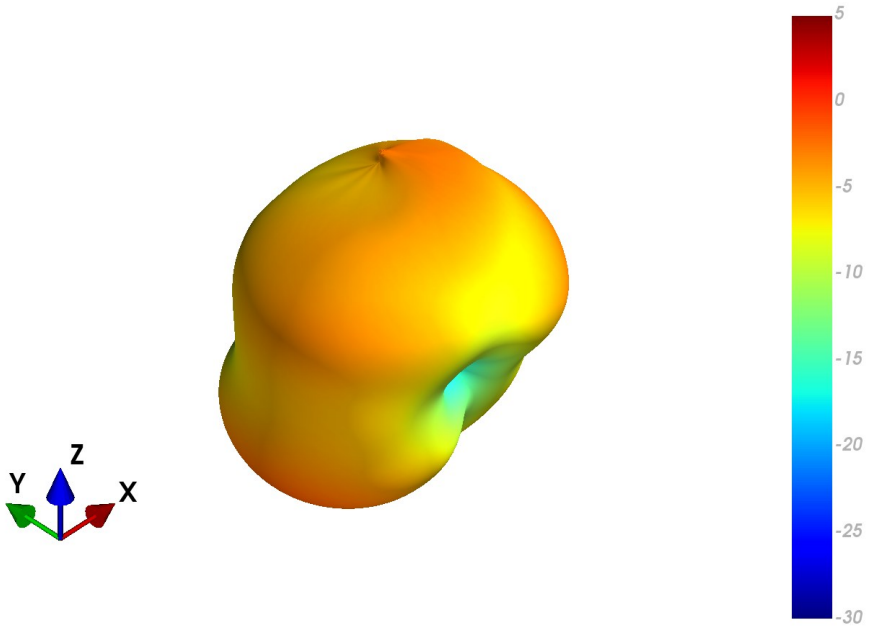


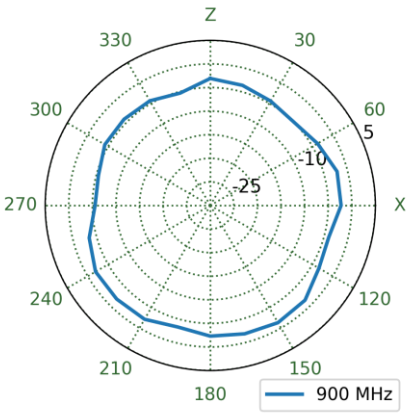
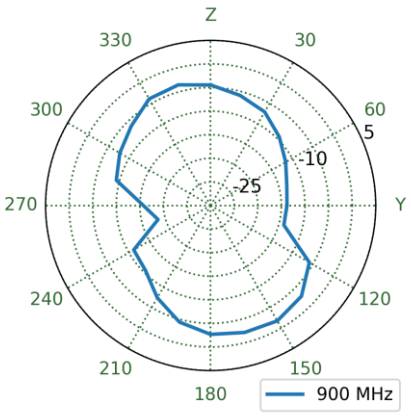
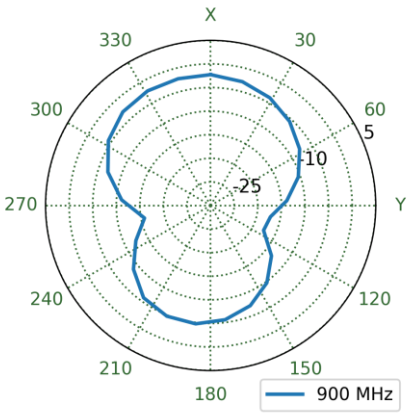





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## 7.11 EMEA Patterns at 900 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

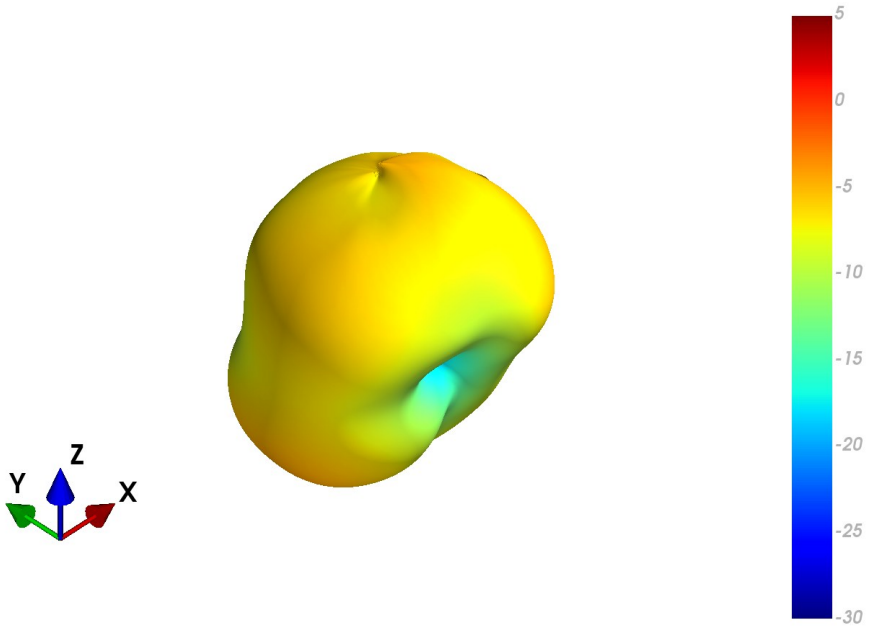


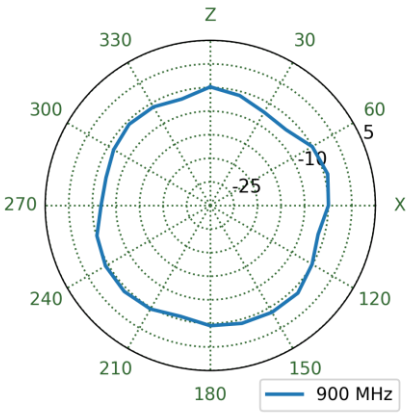
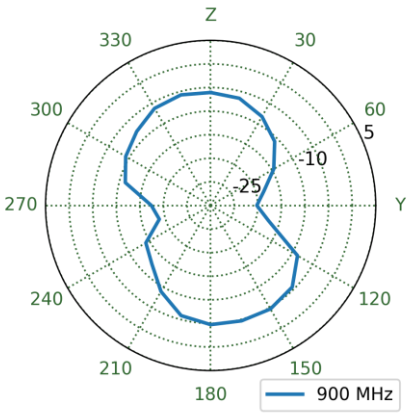
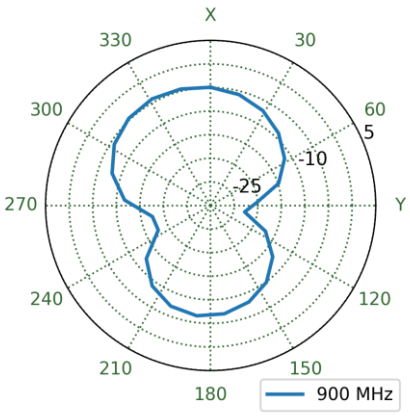





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## 7.12 NA Patterns at 900 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

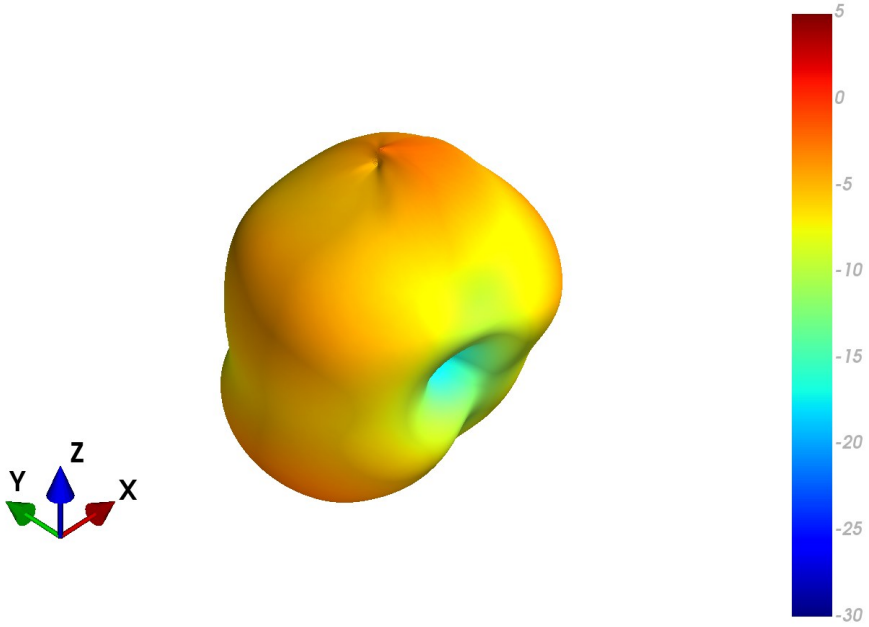


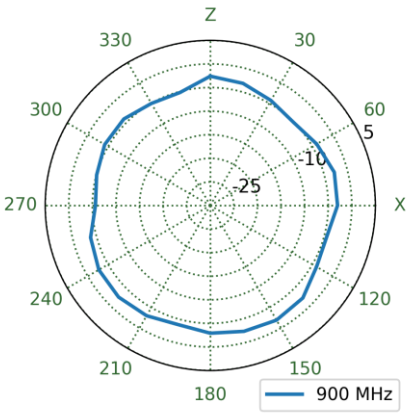
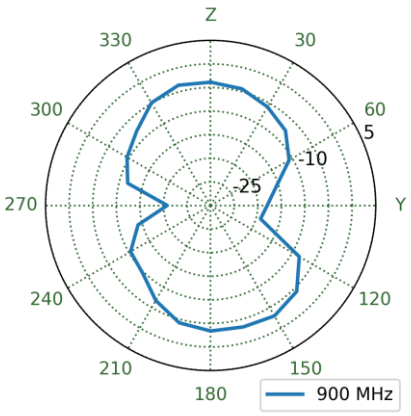
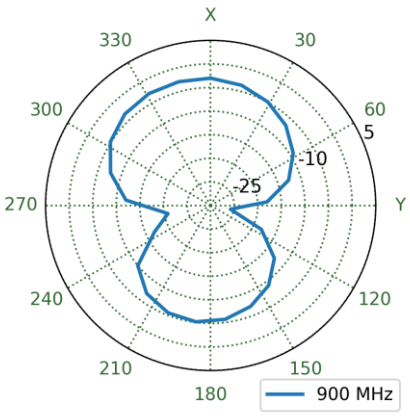





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## 7.13 WW Patterns at 900 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

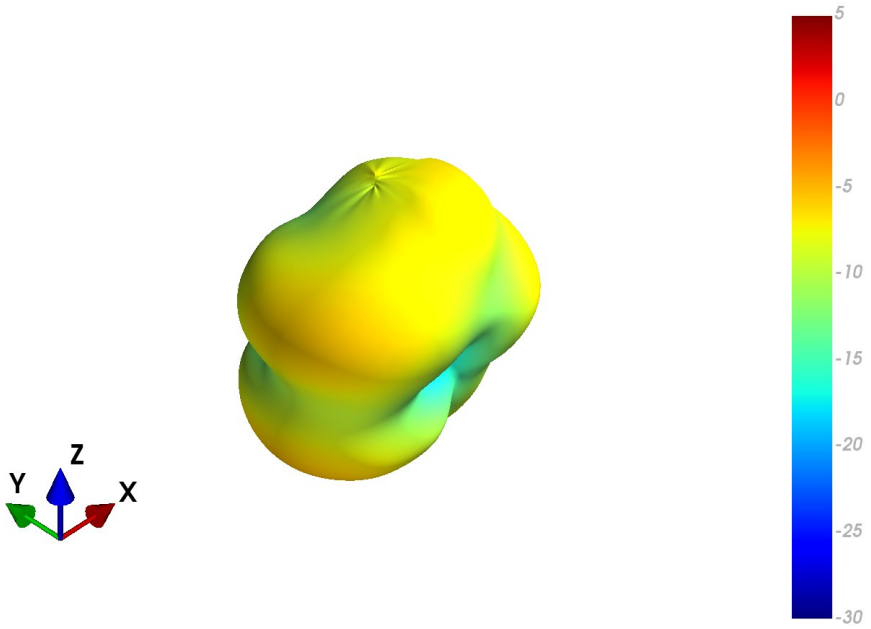


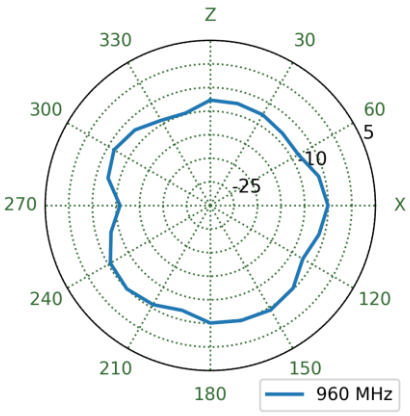
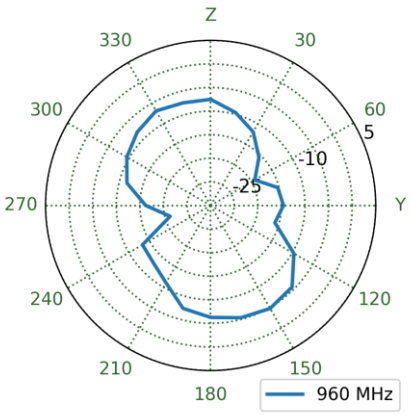
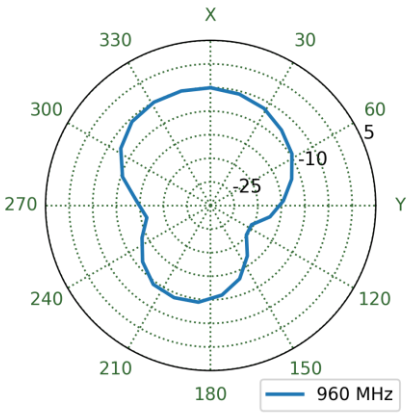





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## 7.14 EMEA Patterns at 960 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

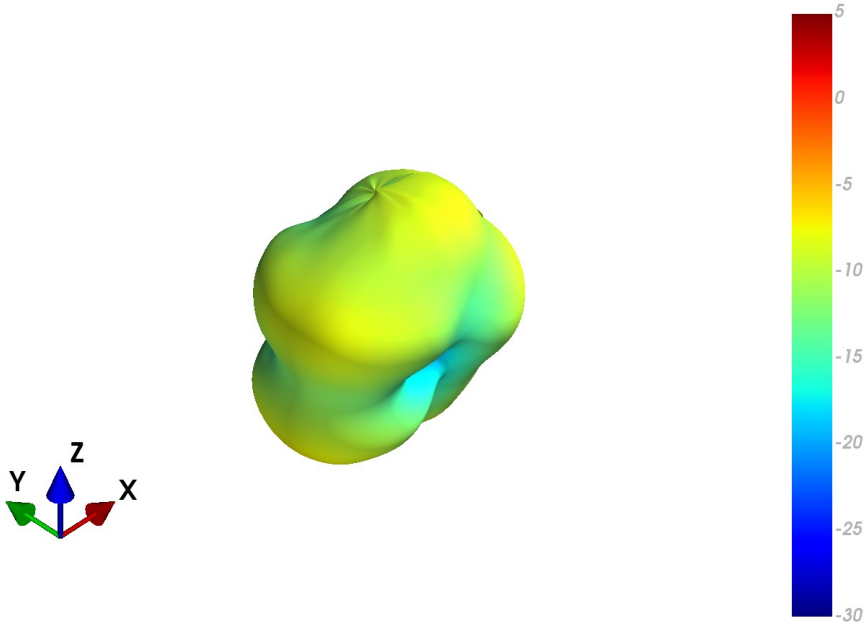


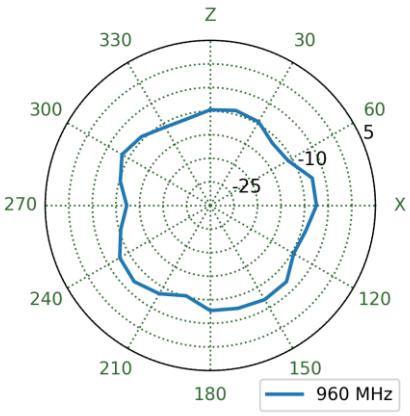
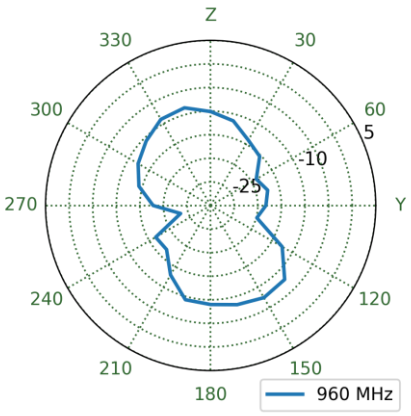
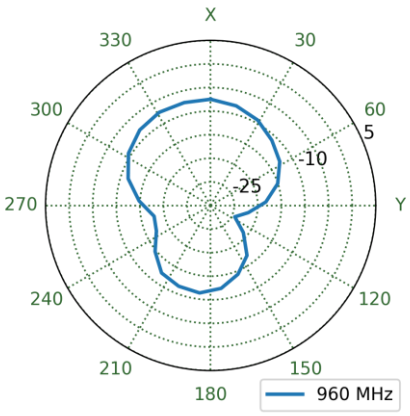





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## 7.15 NA Patterns at 960 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

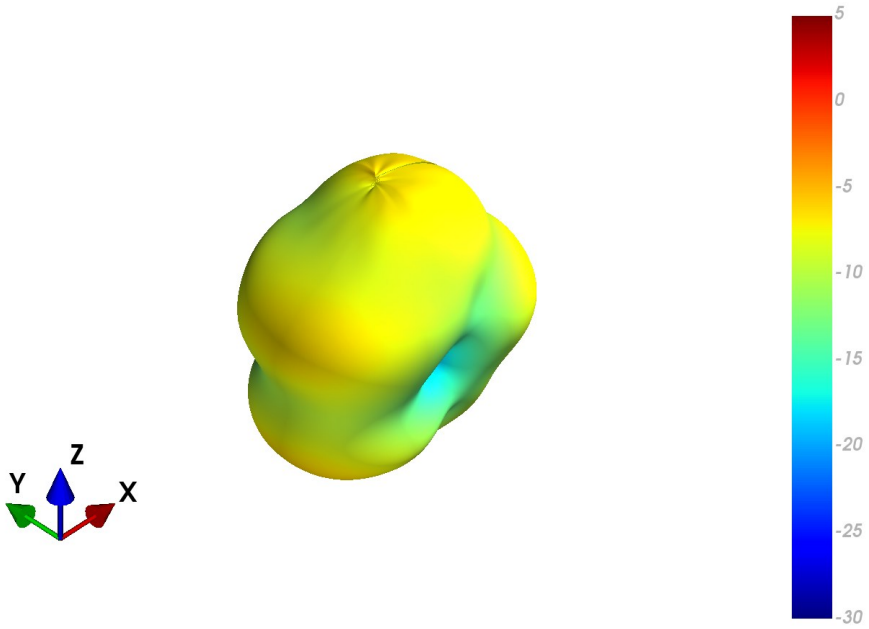


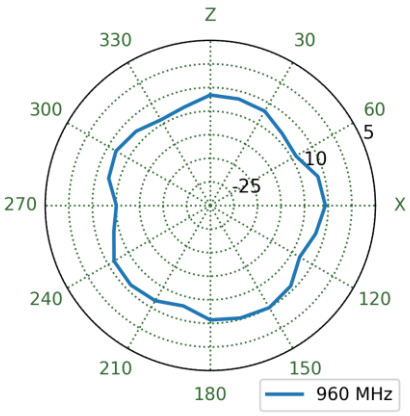
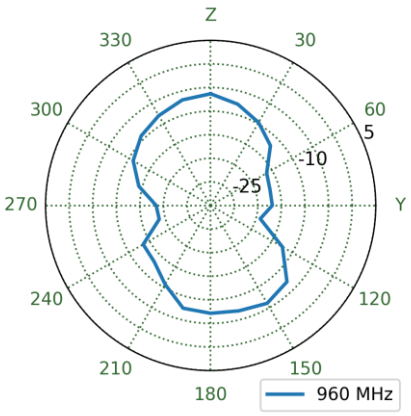
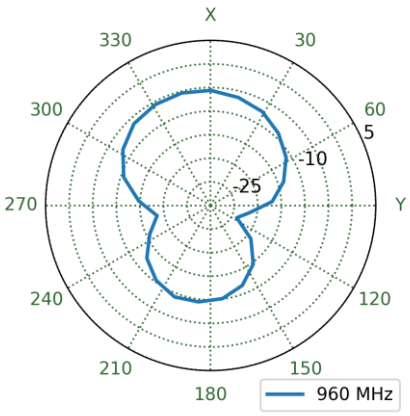





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## 7.16 WW Patterns at 960 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

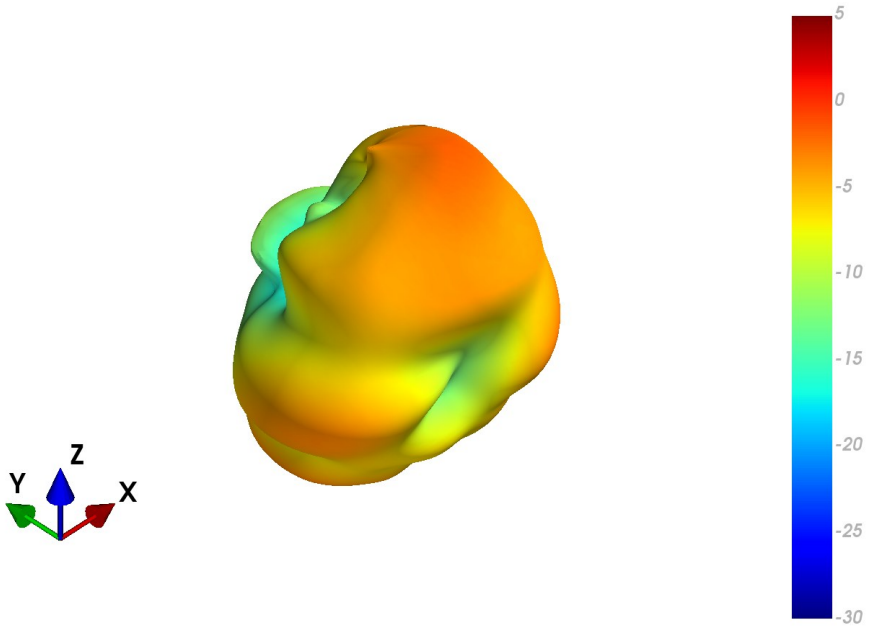


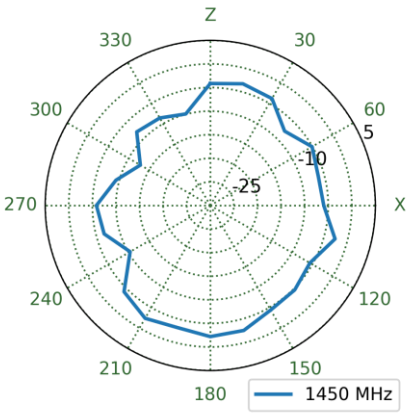
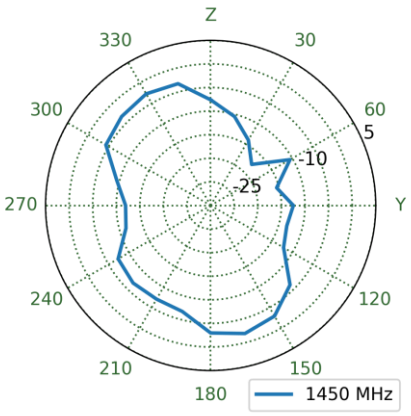
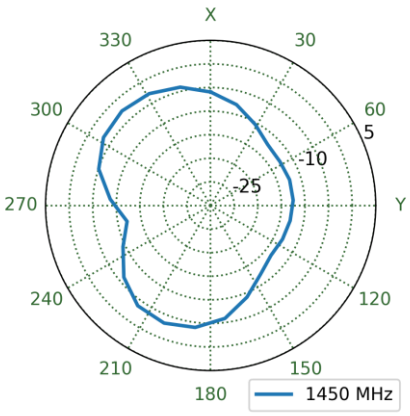





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## 7.17 EMEA Patterns at 1450 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

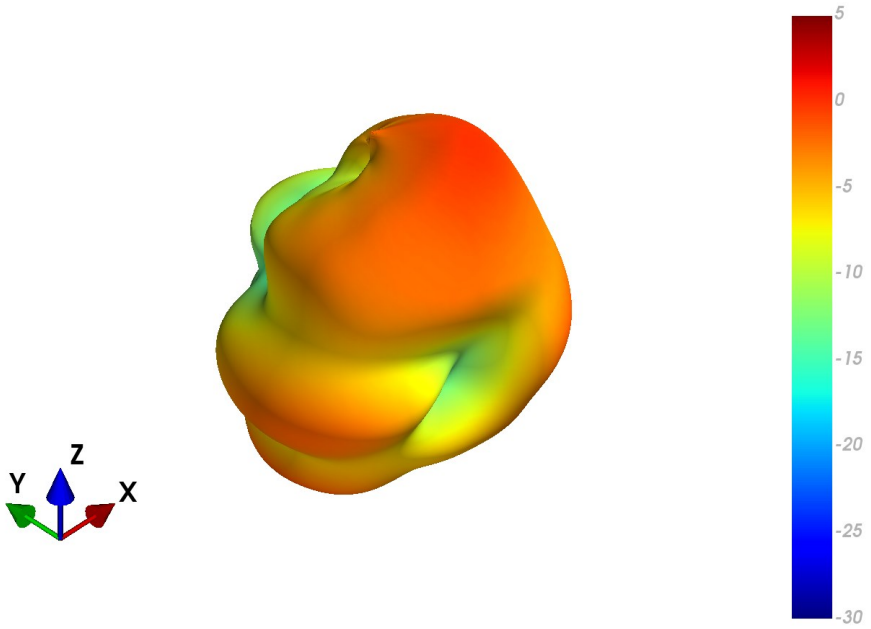




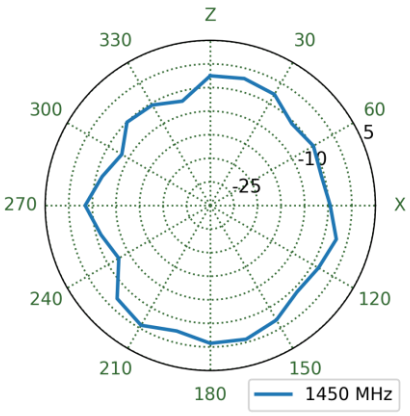


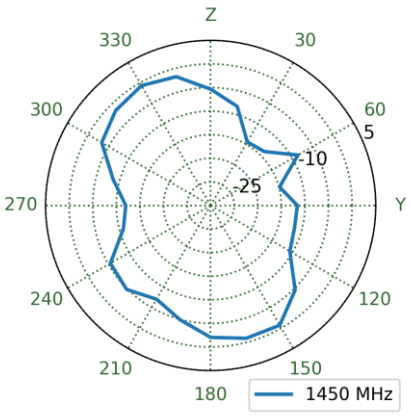

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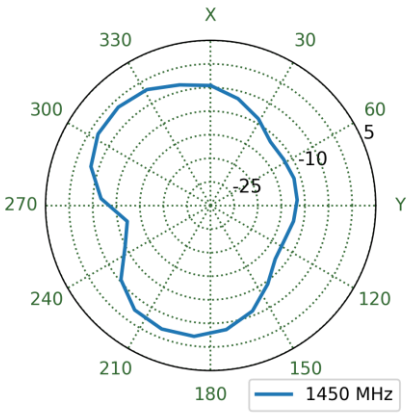
## 7.18 NA Patterns at 1450 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|



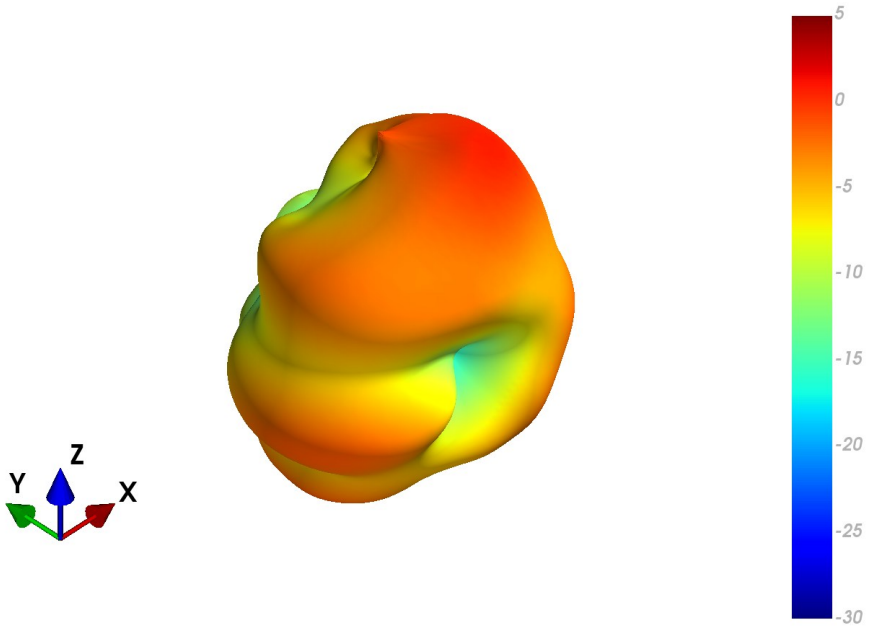



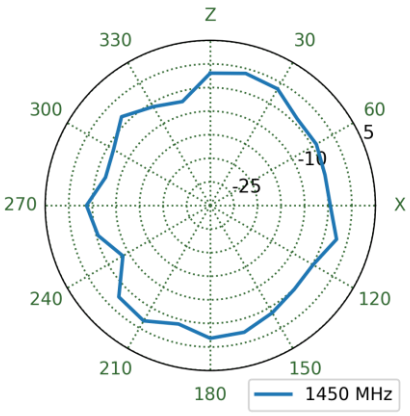
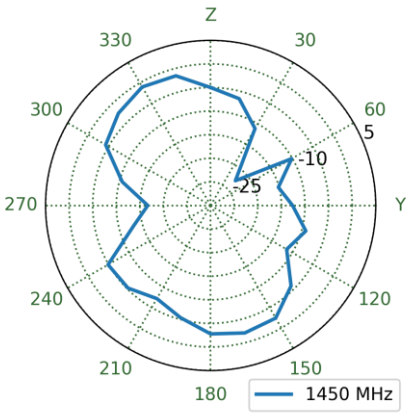
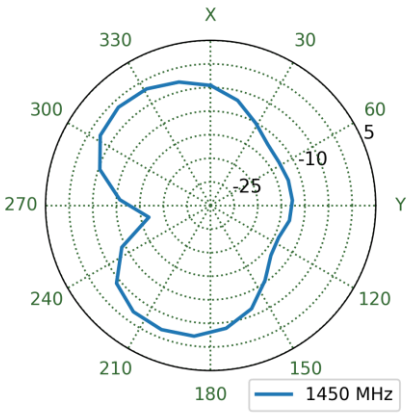





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## 7.19 WW Patterns at 1450 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

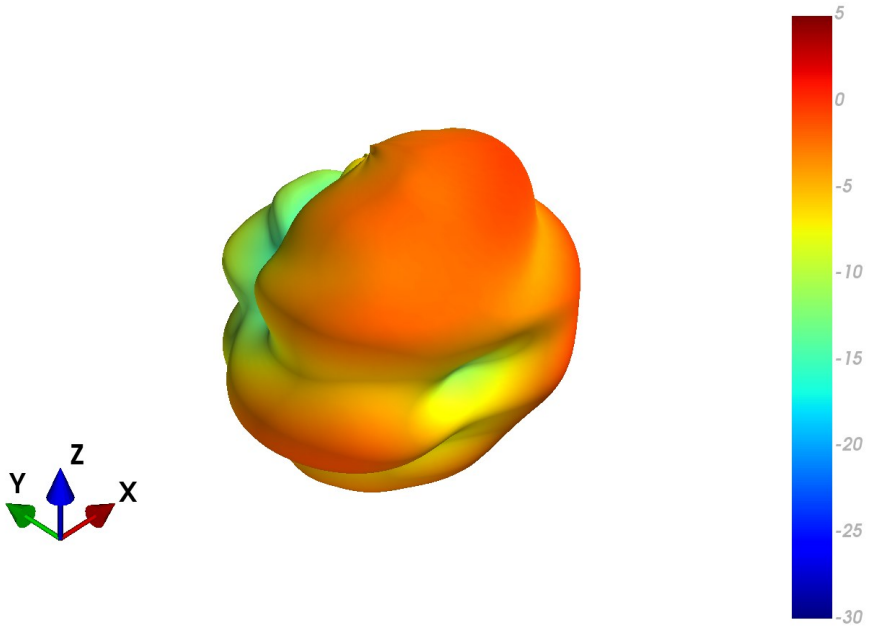


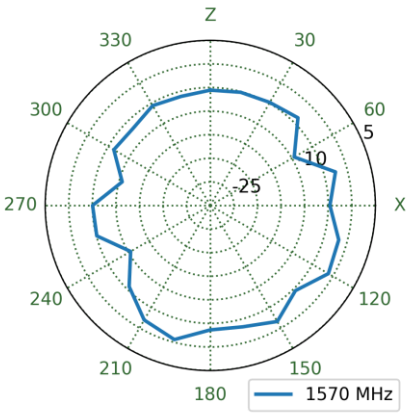
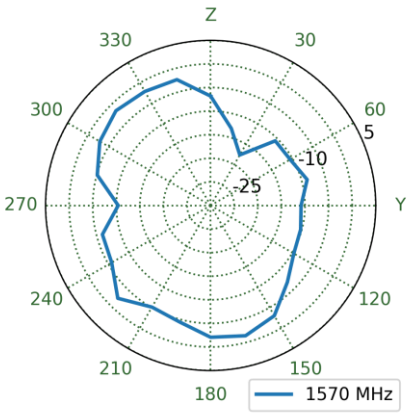
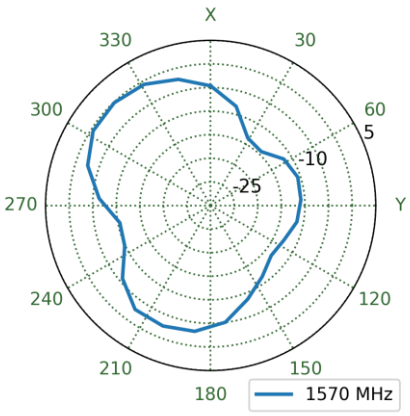





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## 7.20 EMEA Patterns at 1575 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

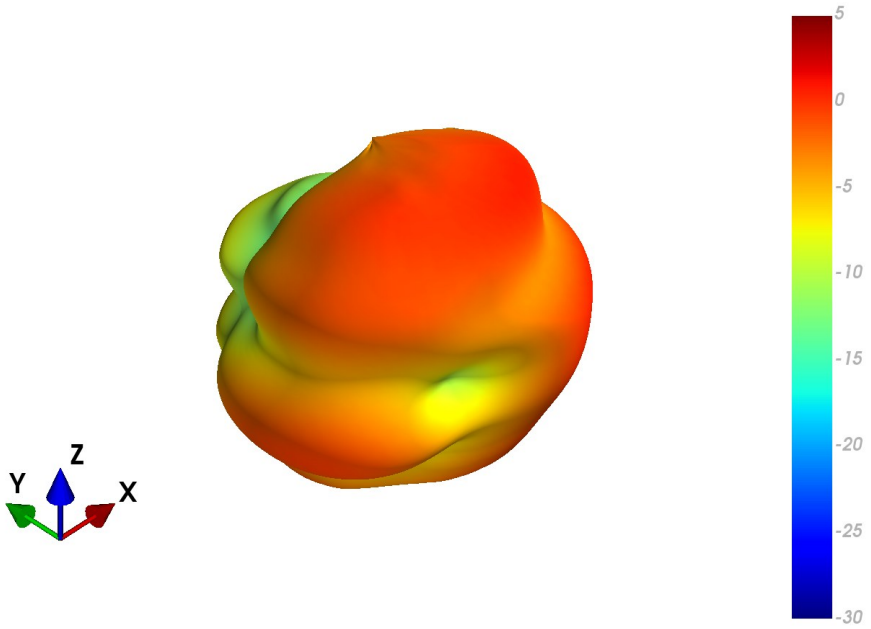


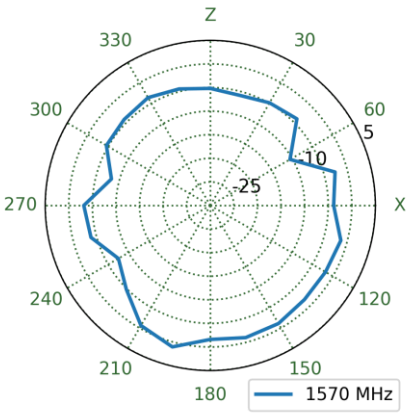
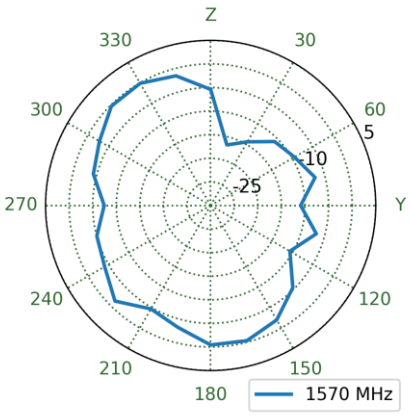
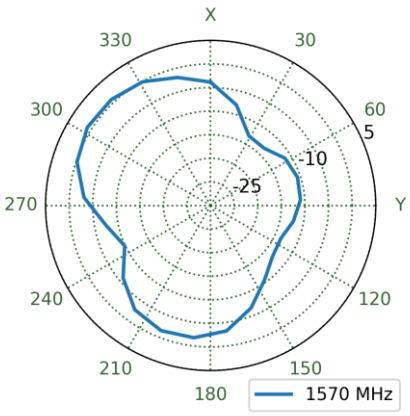





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## 7.21 NA Patterns at 1575 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

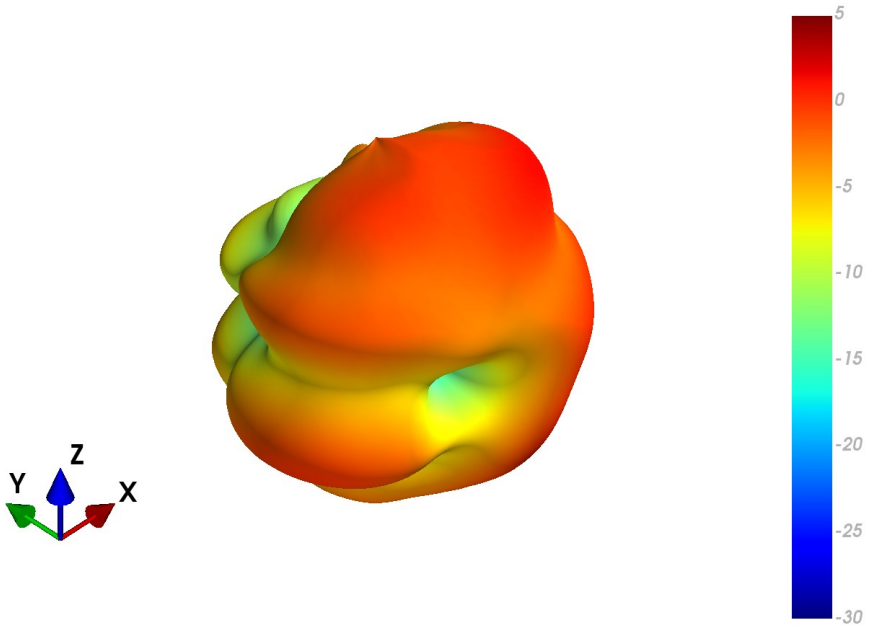


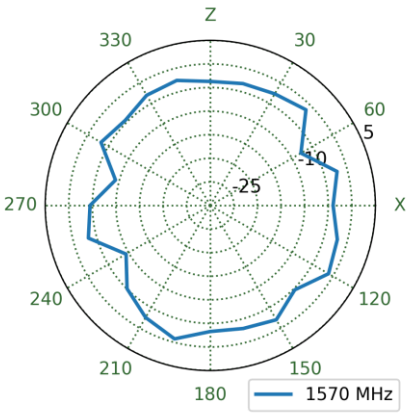
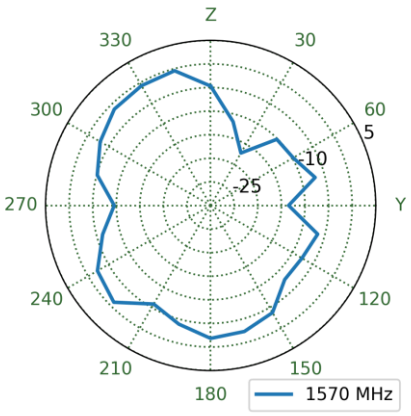
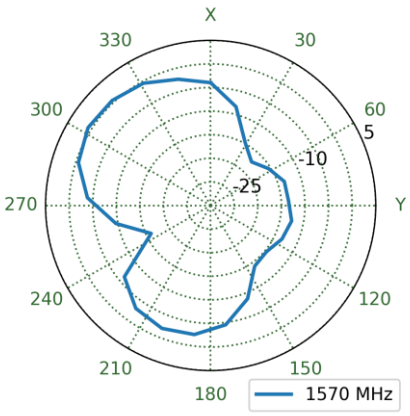





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## 7.22 WW Patterns at 1575 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

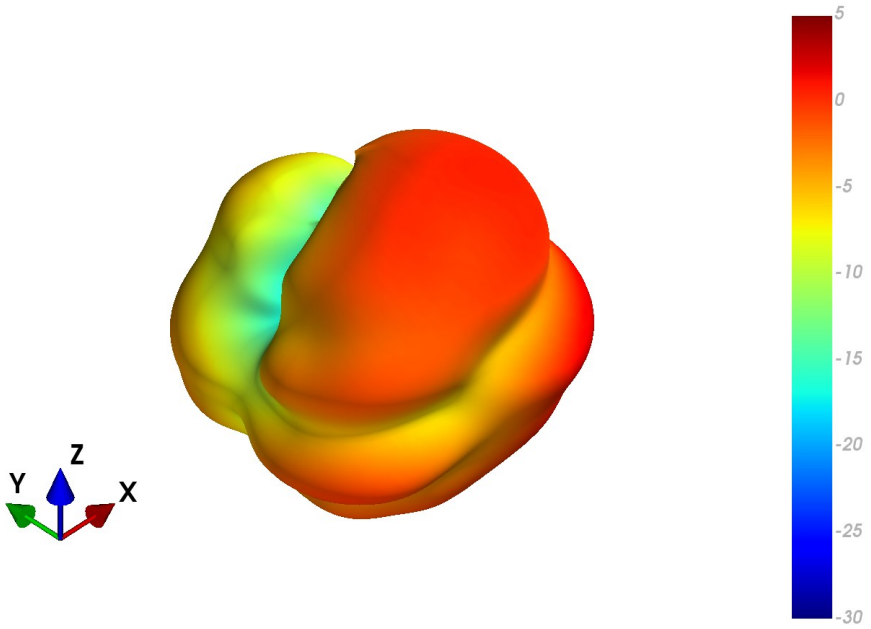


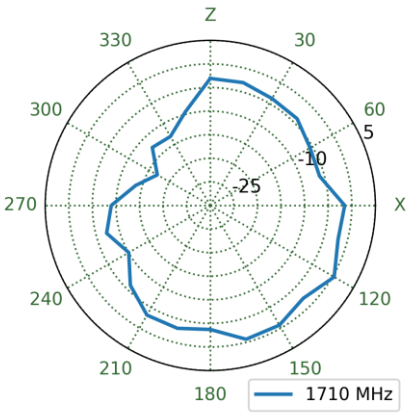
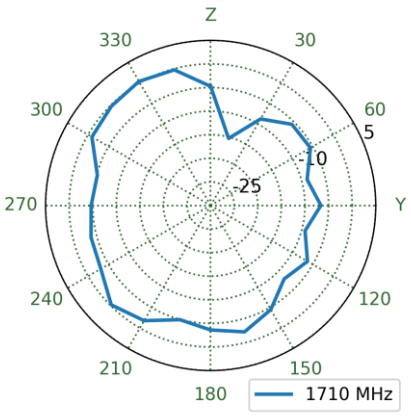
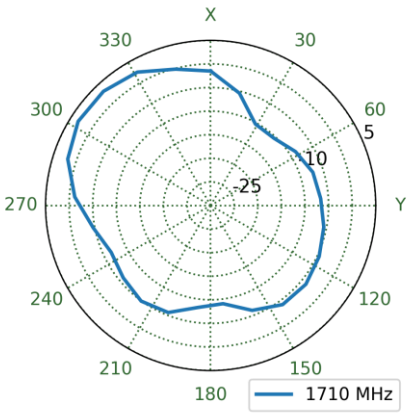





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## 7.23 EMEA Patterns at 1710 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

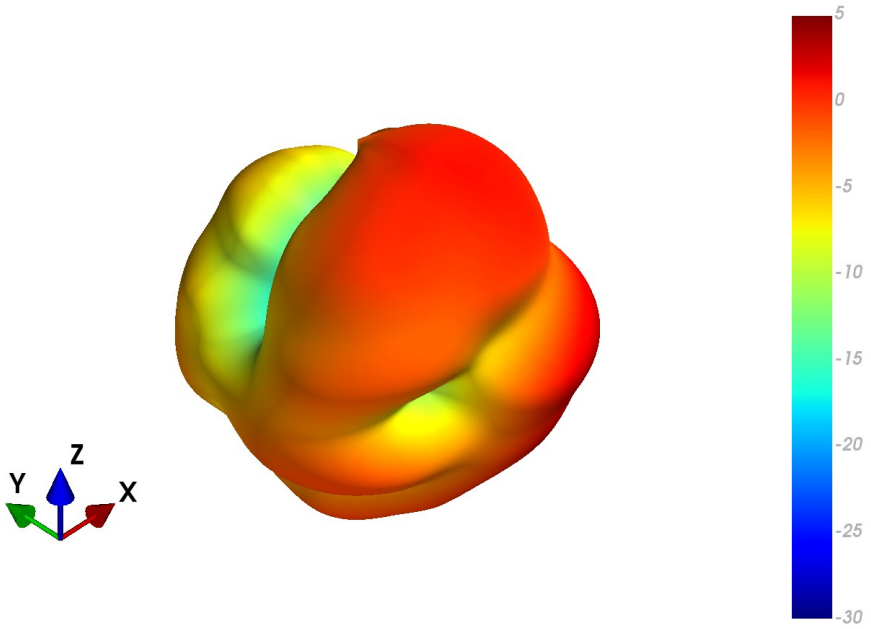


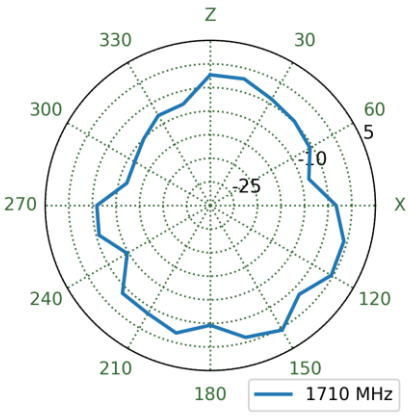
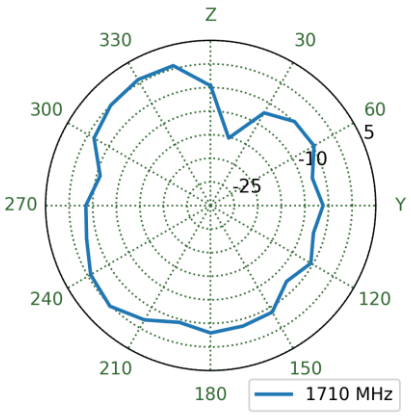
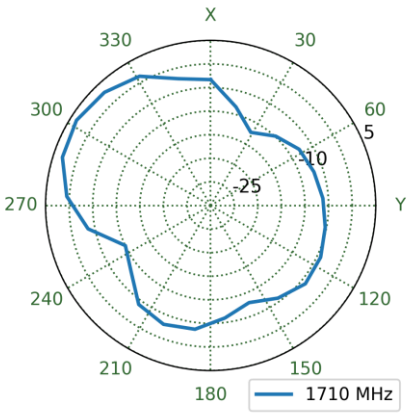





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## 7.24 NA Patterns at 1710 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

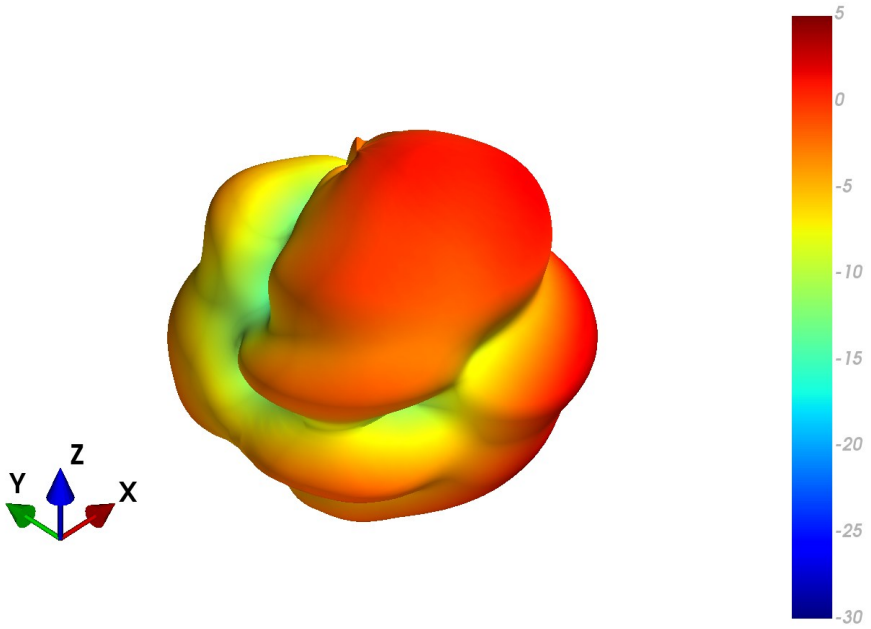


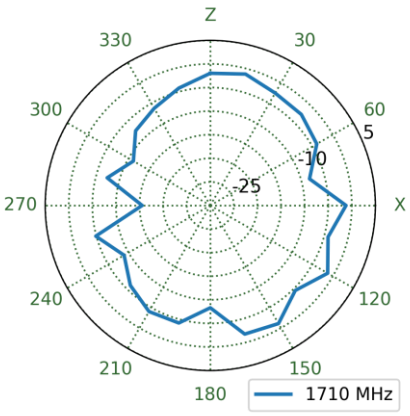
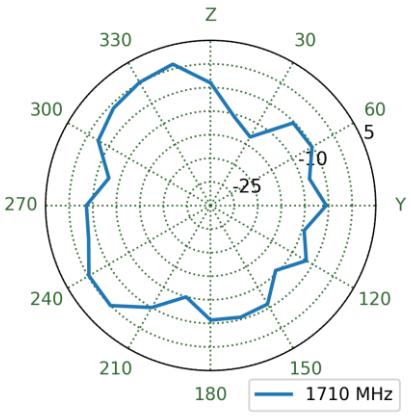
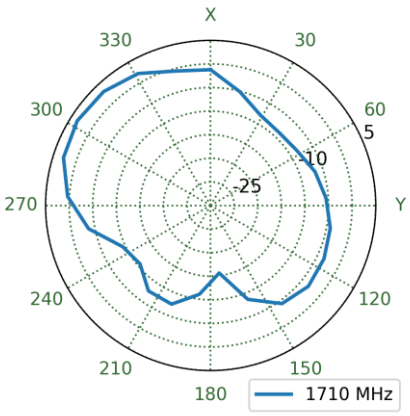





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## 7.25 WW Patterns at 1710 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

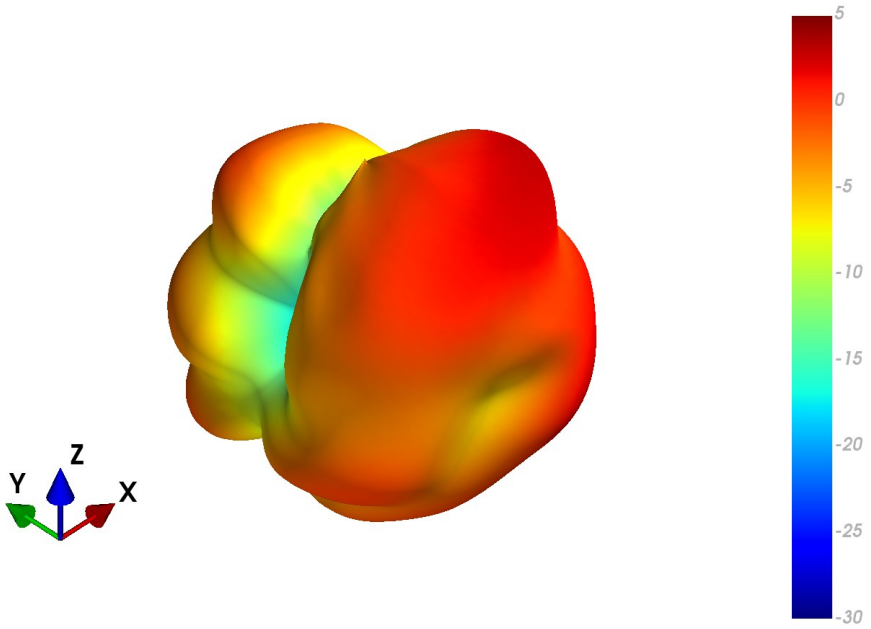


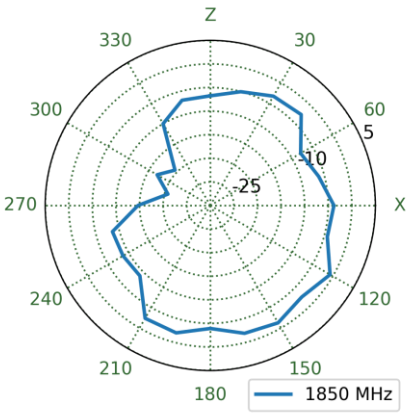
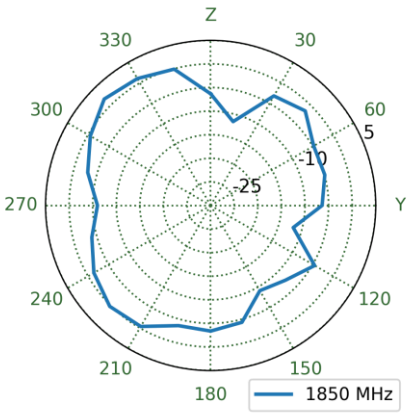
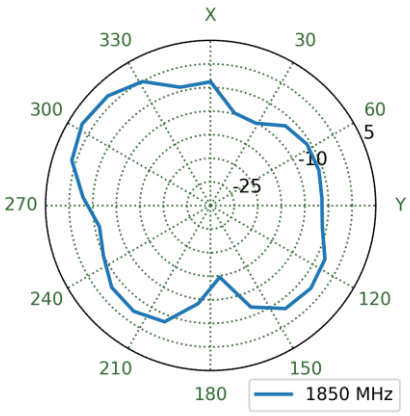





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## 7.26 EMEA Patterns at 1850 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

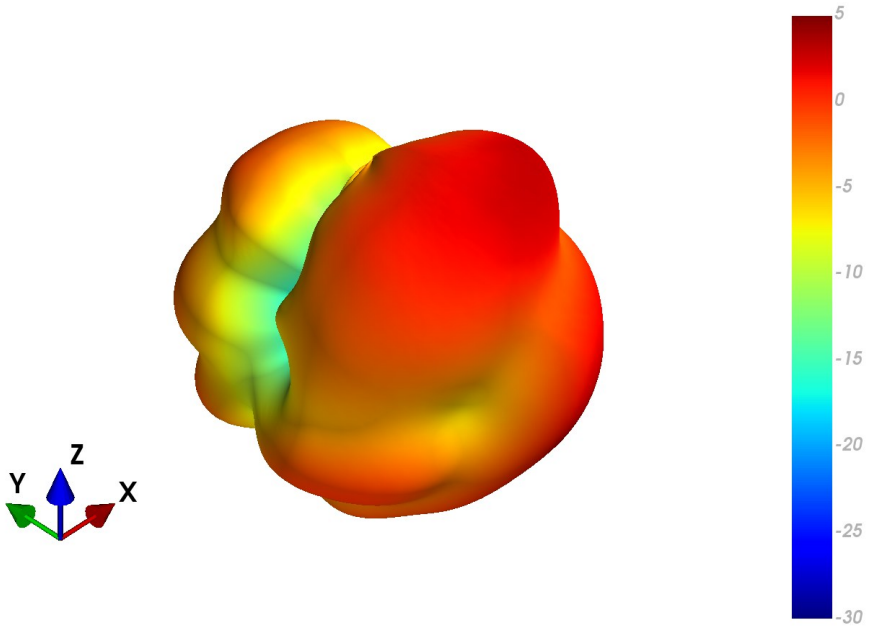


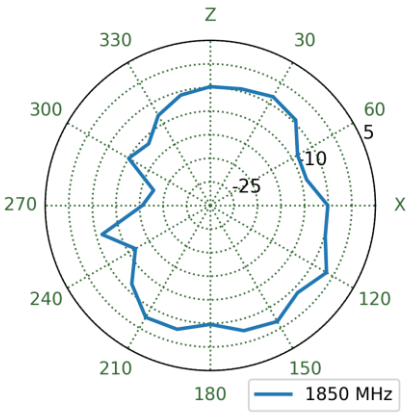
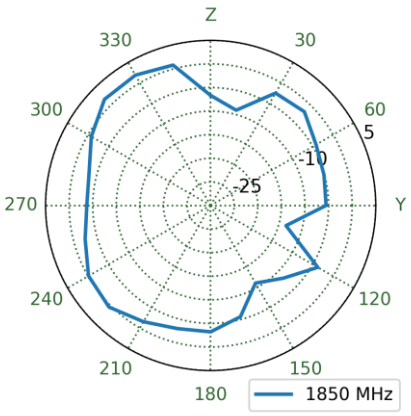
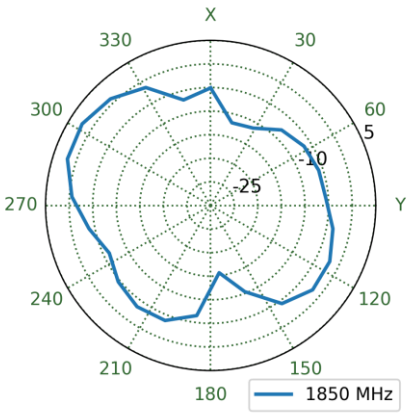





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## 7.27 NA Patterns at 1850 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

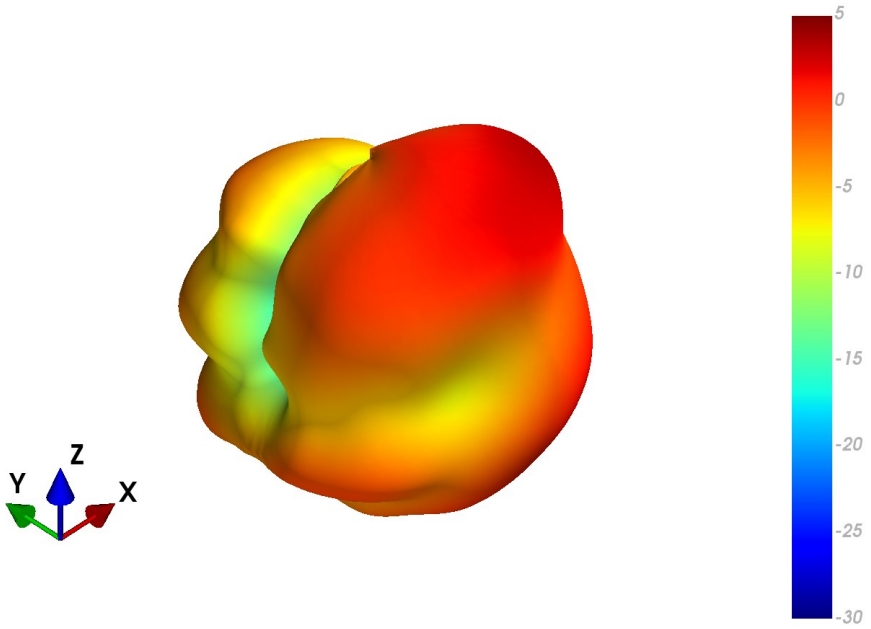


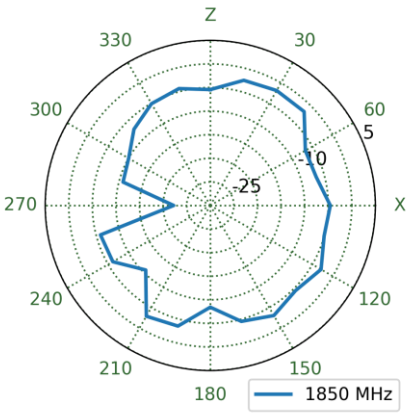
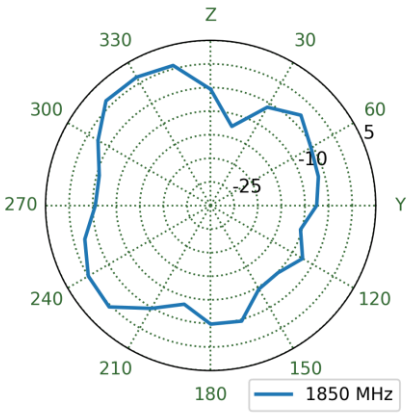
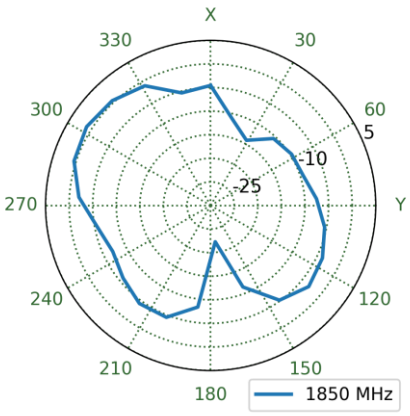





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## 7.28 WW Patterns at 1850 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

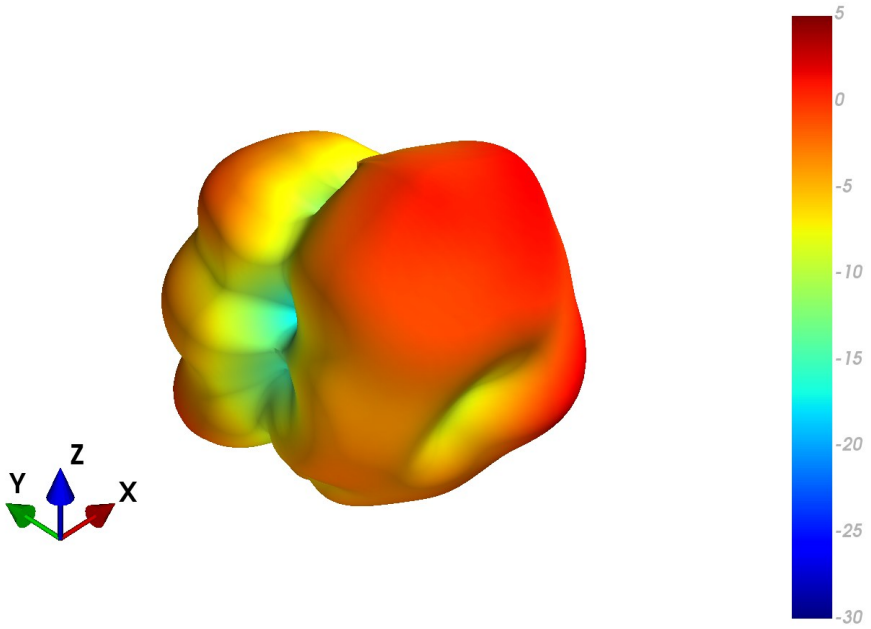


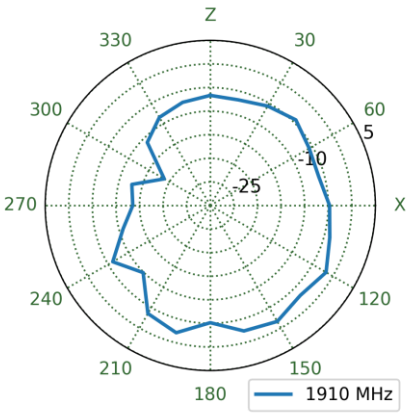
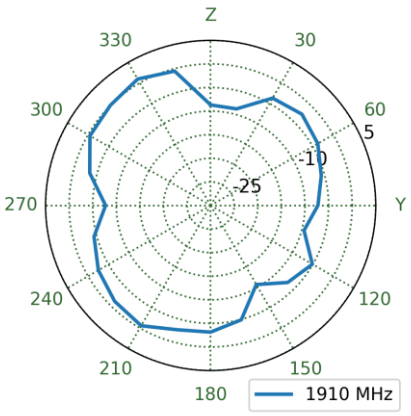
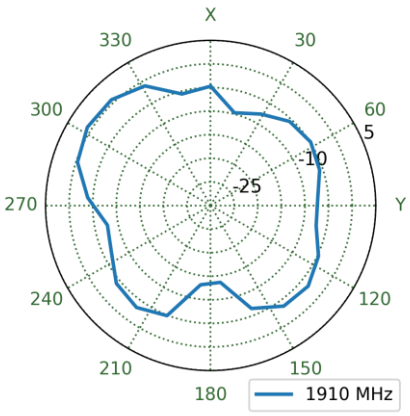





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## 7.29 EMEA Patterns at 1910 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

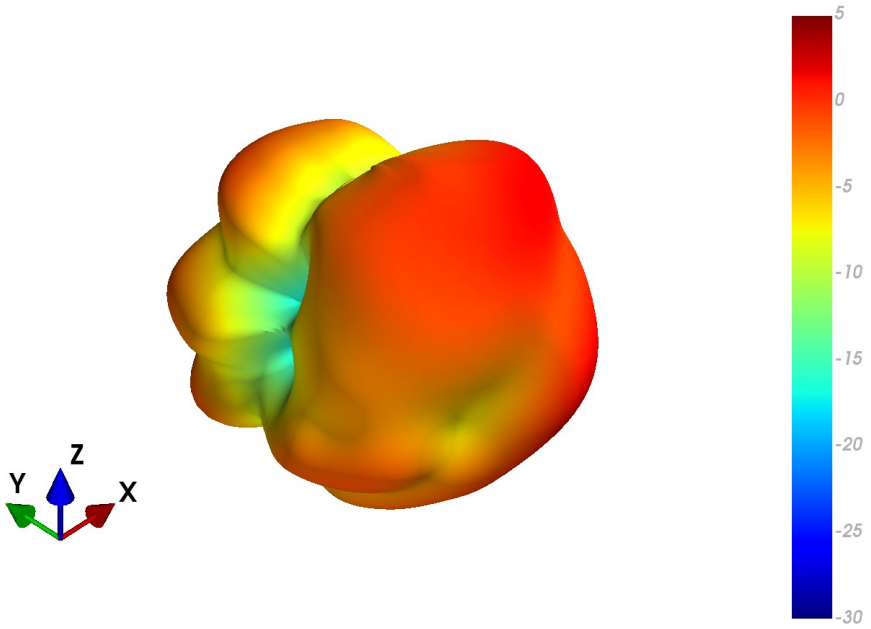


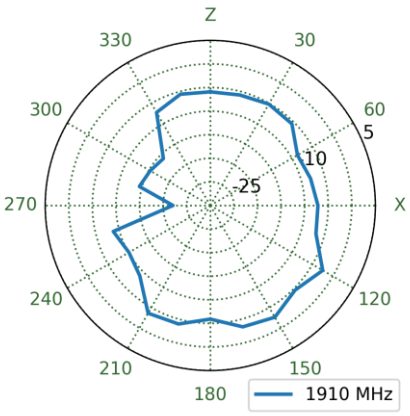
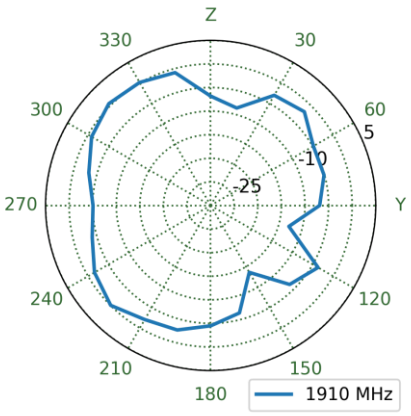
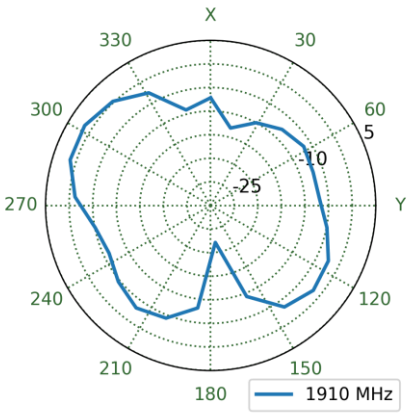





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## 7.30 NA Patterns at 1910 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

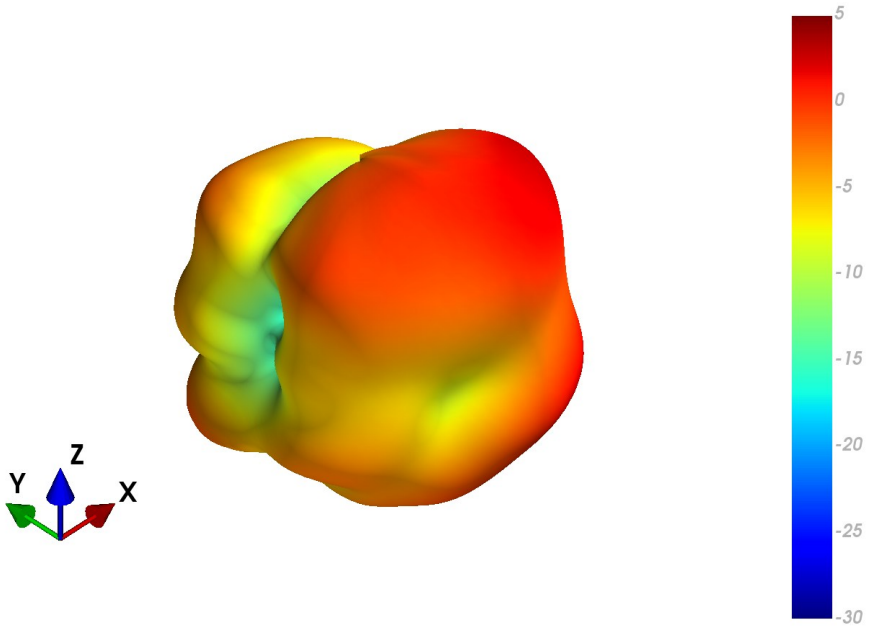


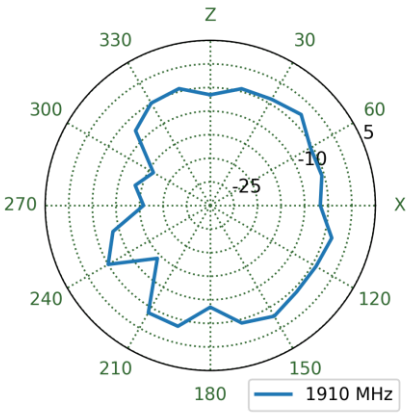
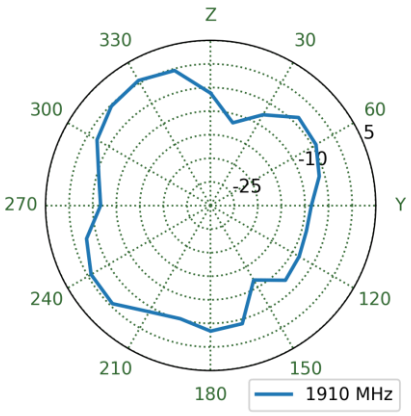
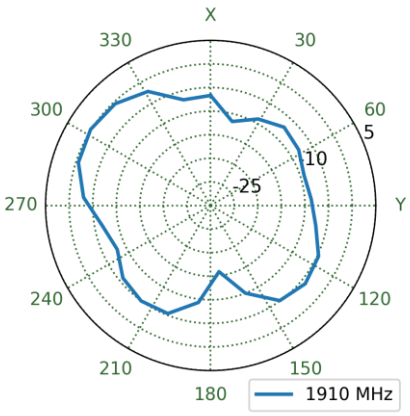





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## 7.31 WW Patterns at 1910 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

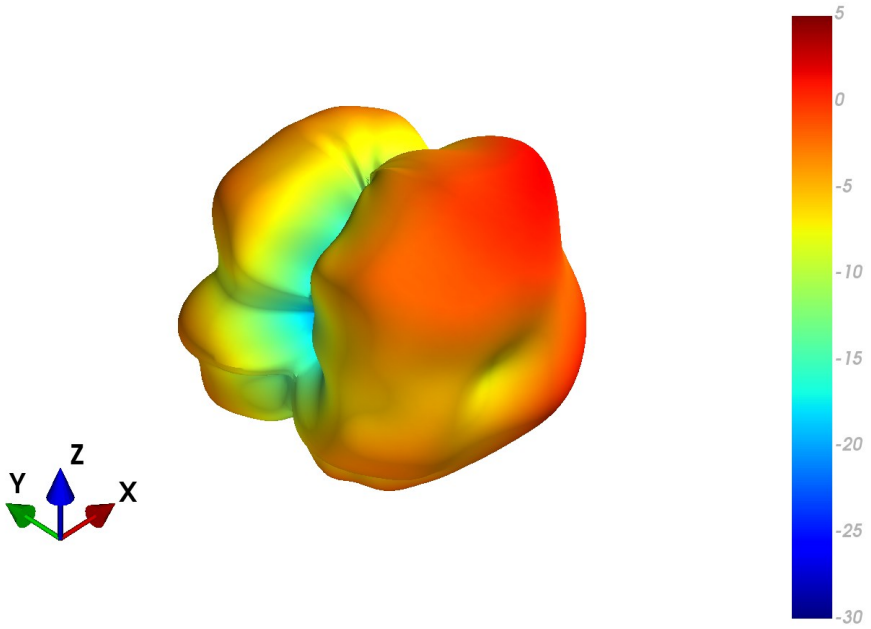


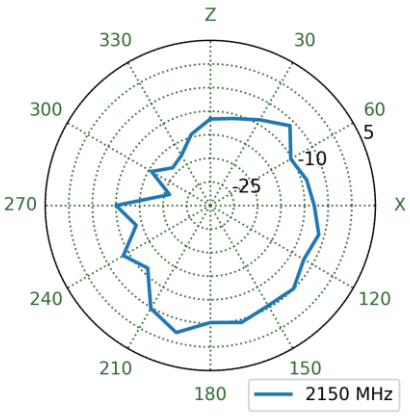
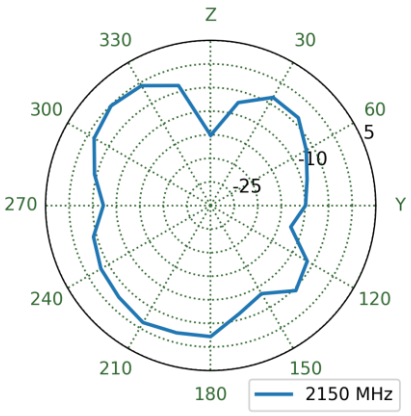
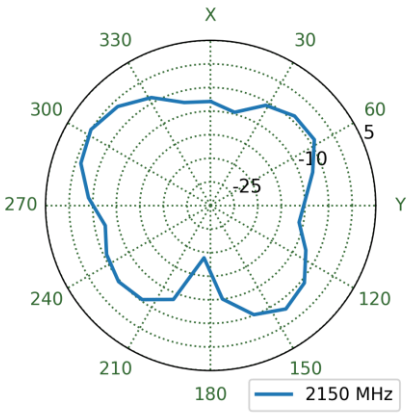





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## 7.32 EMEA Patterns at 2155 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

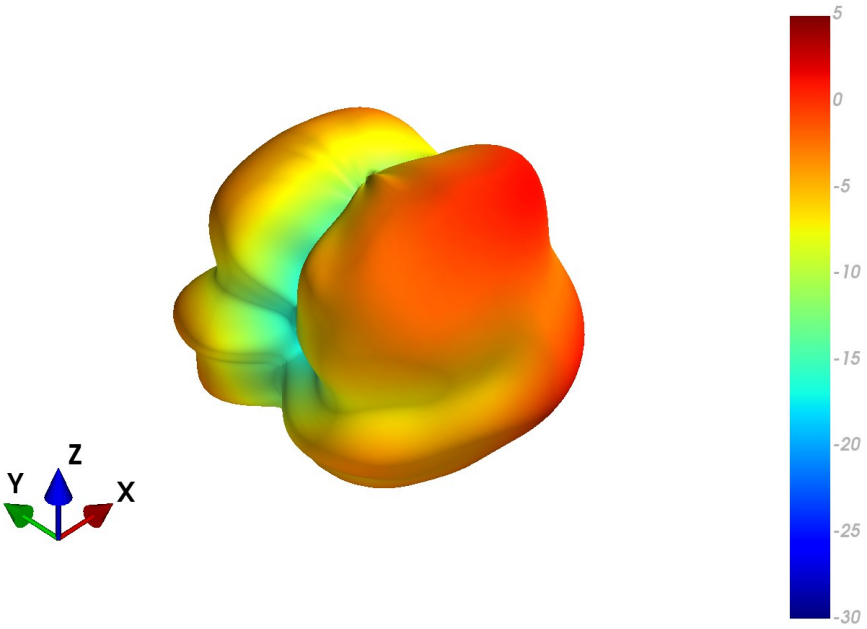


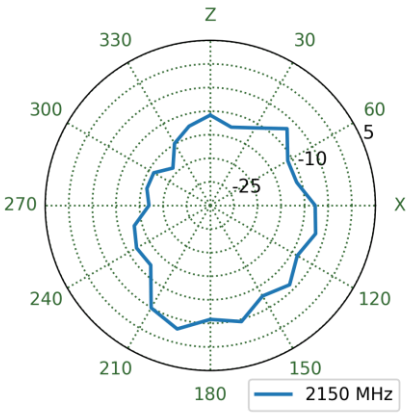
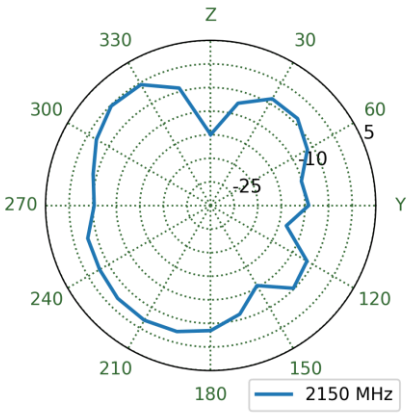
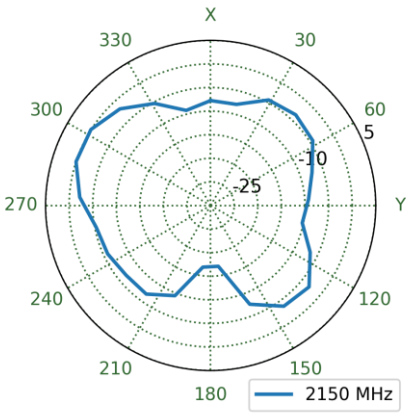





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## 7.33 NA Patterns at 2155 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

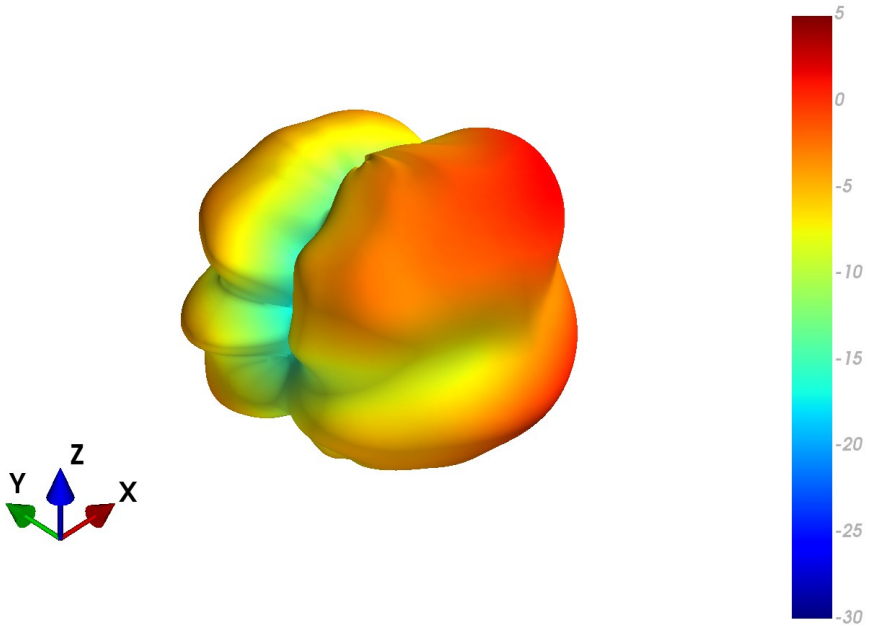


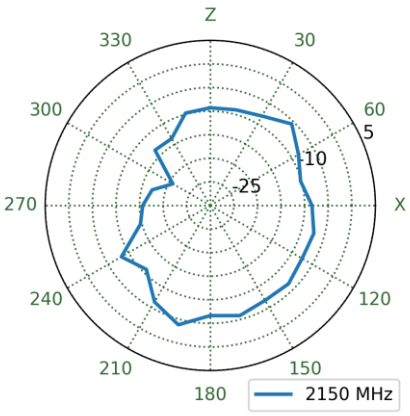
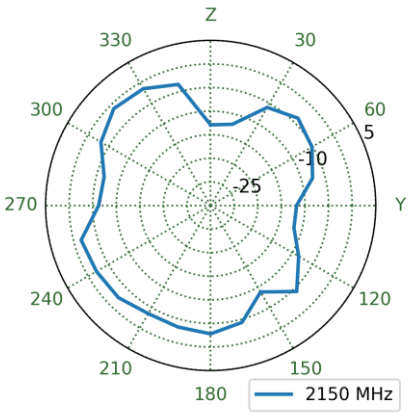
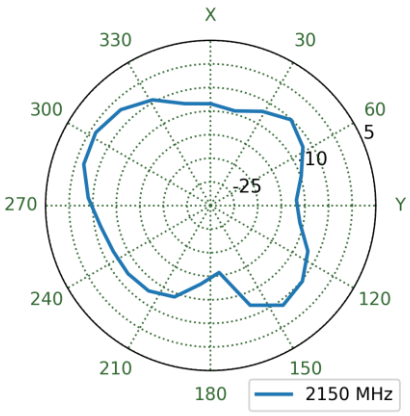





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## 7.34 WW Patterns at 2155 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

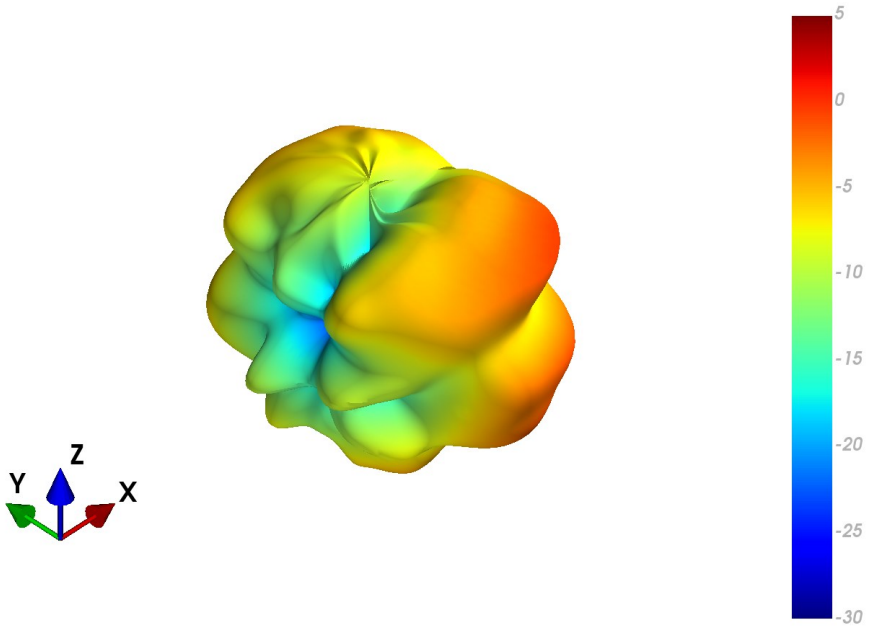


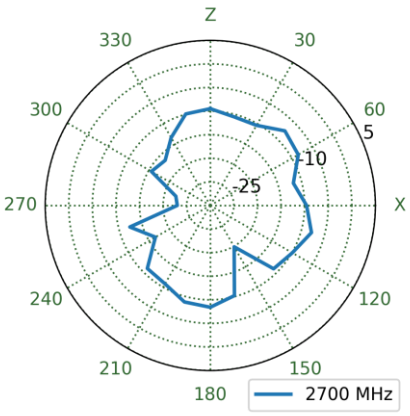
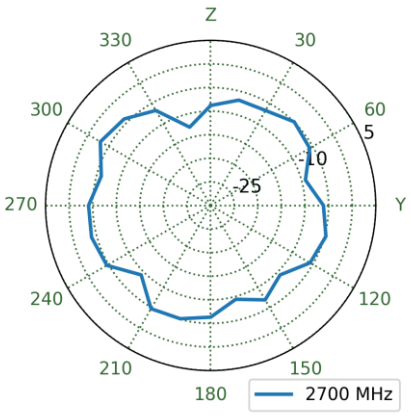
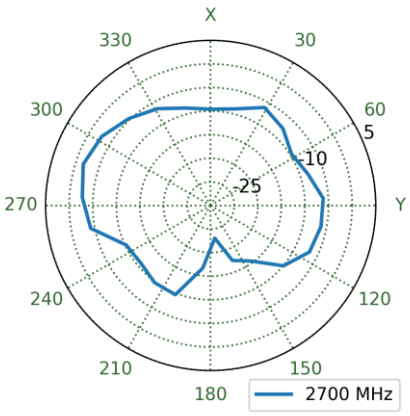





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## 7.35 EMEA Patterns at 2700 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

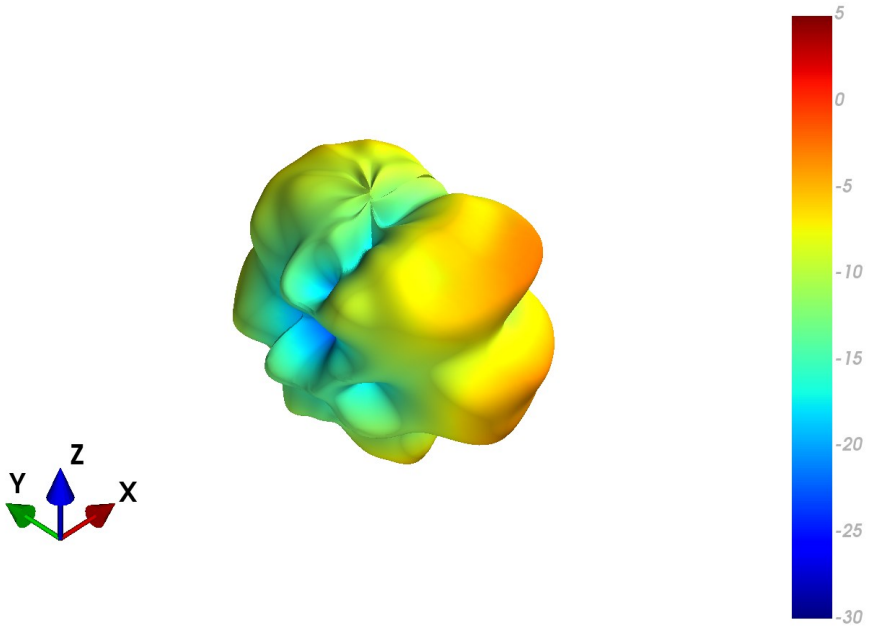


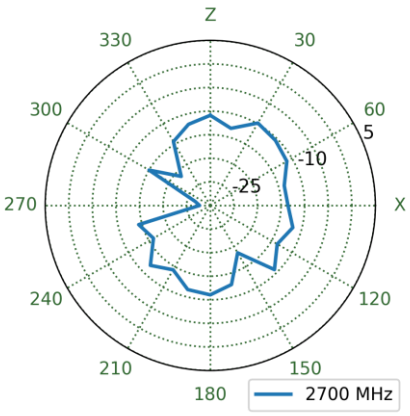
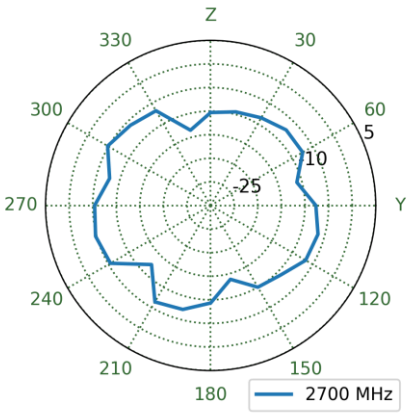
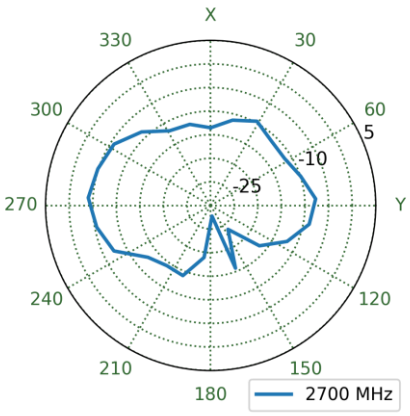





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## 7.36 NA Patterns at 2700 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |

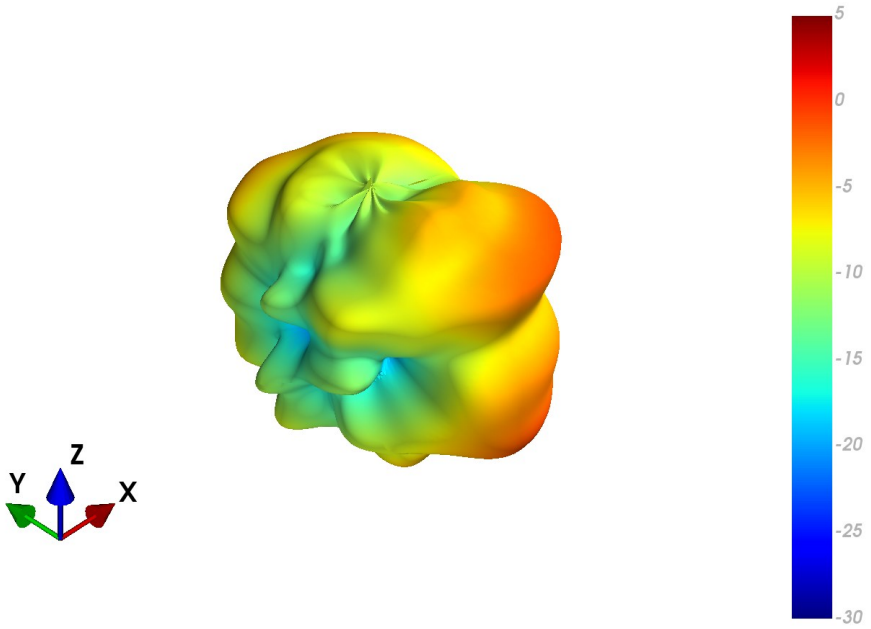


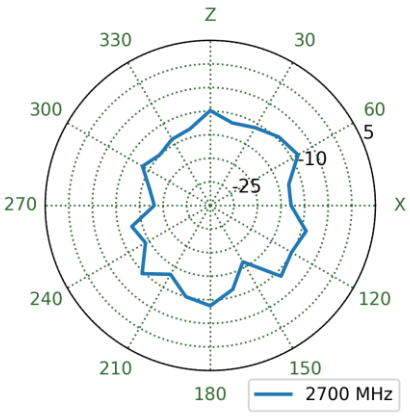
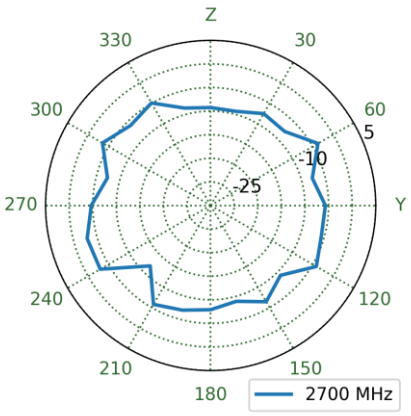
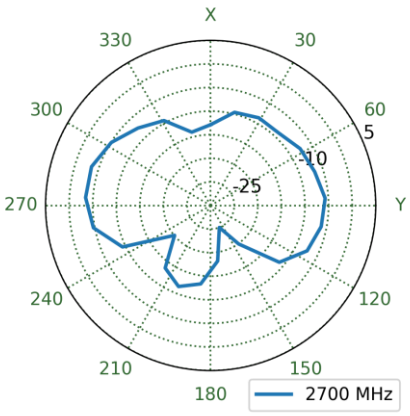





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## 7.37 WW Patterns at 2700 MHz




| XZ Plane | YZ Plane | XY Plane |
|---|---|---|
|  |  |  |



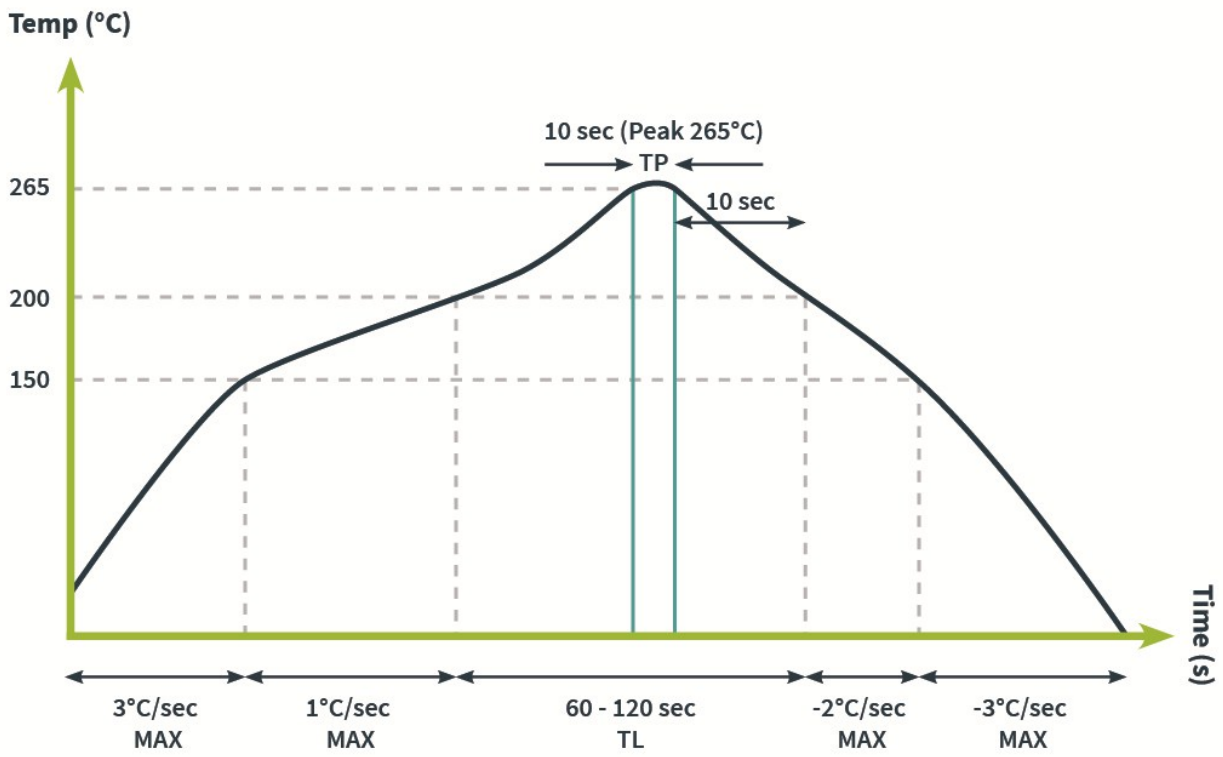





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# 8. Solder Reflow Profile

The PCS.55.A can be assembled by following the recommended soldering temperatures are as follows:




*Temperatures listed within a tolerance of +/- 10º C

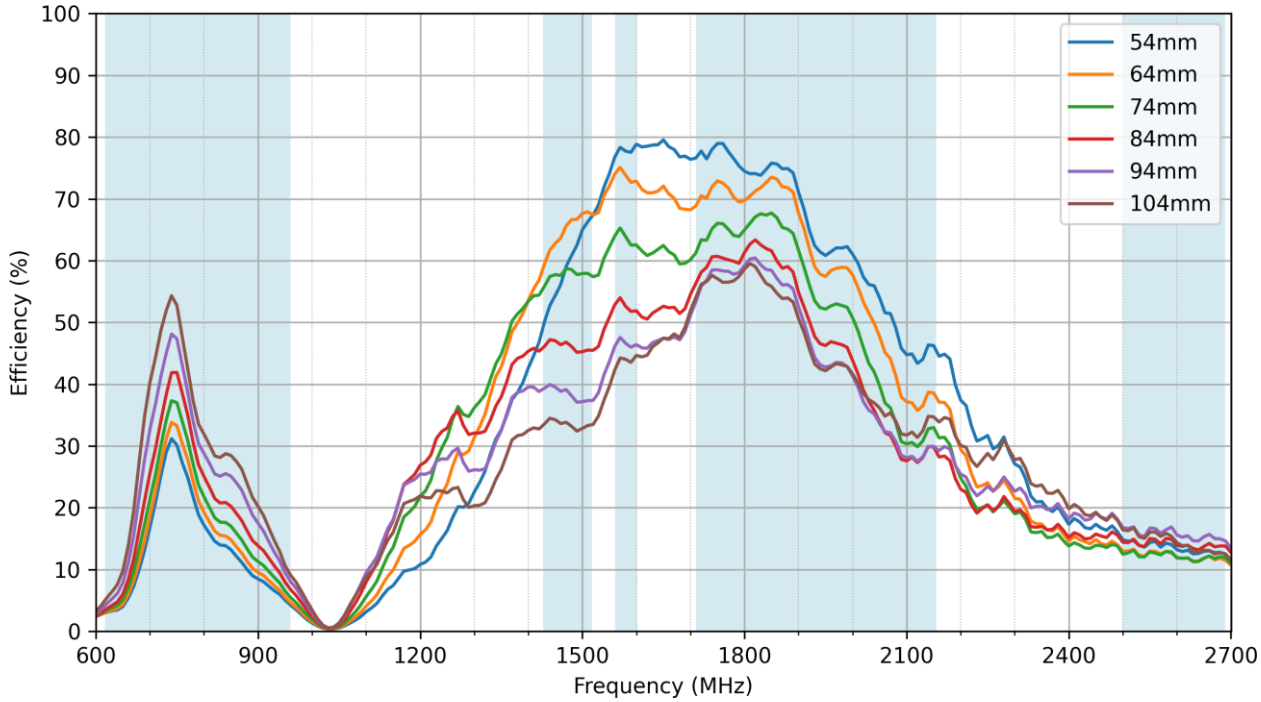
The PCS.55.A is not limited to the number of passes through the reflow process. Smaller components are typically mounted on the first pass, however, we do advise mounting the PCS.55.A when placing larger components on the board during subsequent reflows.


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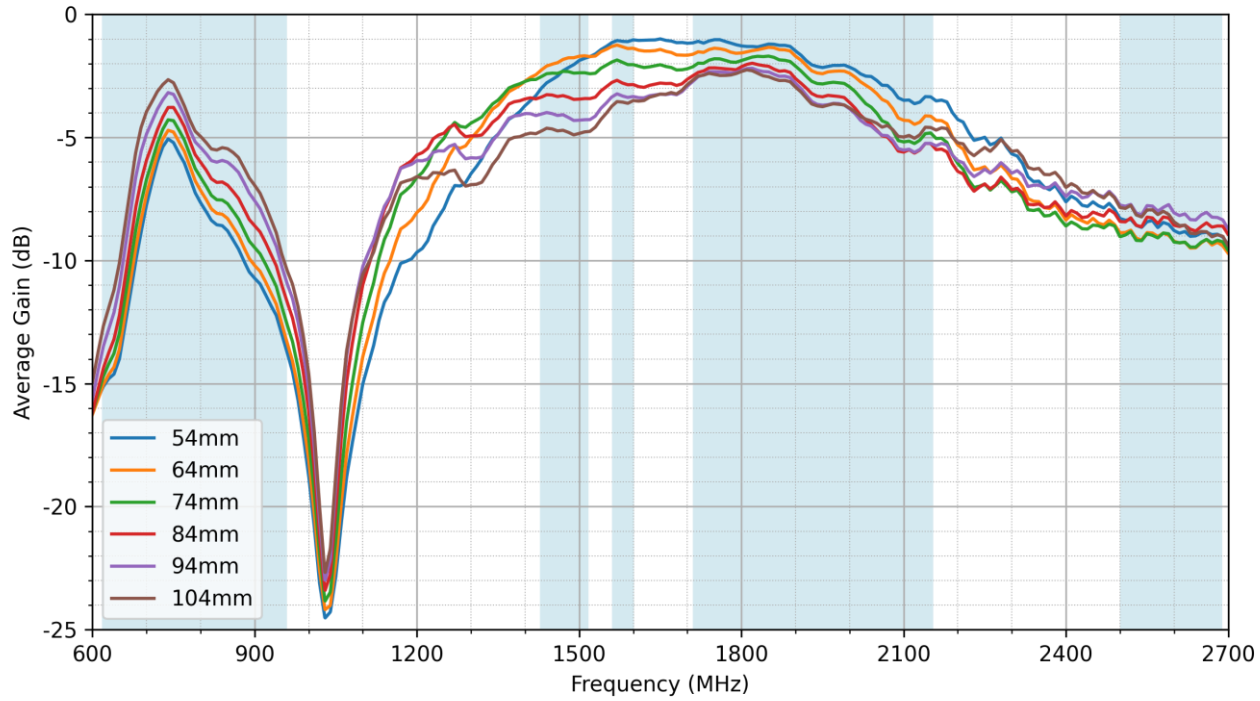
# 9. Application Note

The effect of shortening the ground plane on antenna performance was evaluated. Using the evaluation board of the PCS.55.A, the PCB was cut back 10mm at a time and tested in an anechoic chamber. The results for North America (NA), Europe, Middle East, Africa (EMEA), and Worldwide (WW) are shown here:

## 9.1 Efficiency – North America



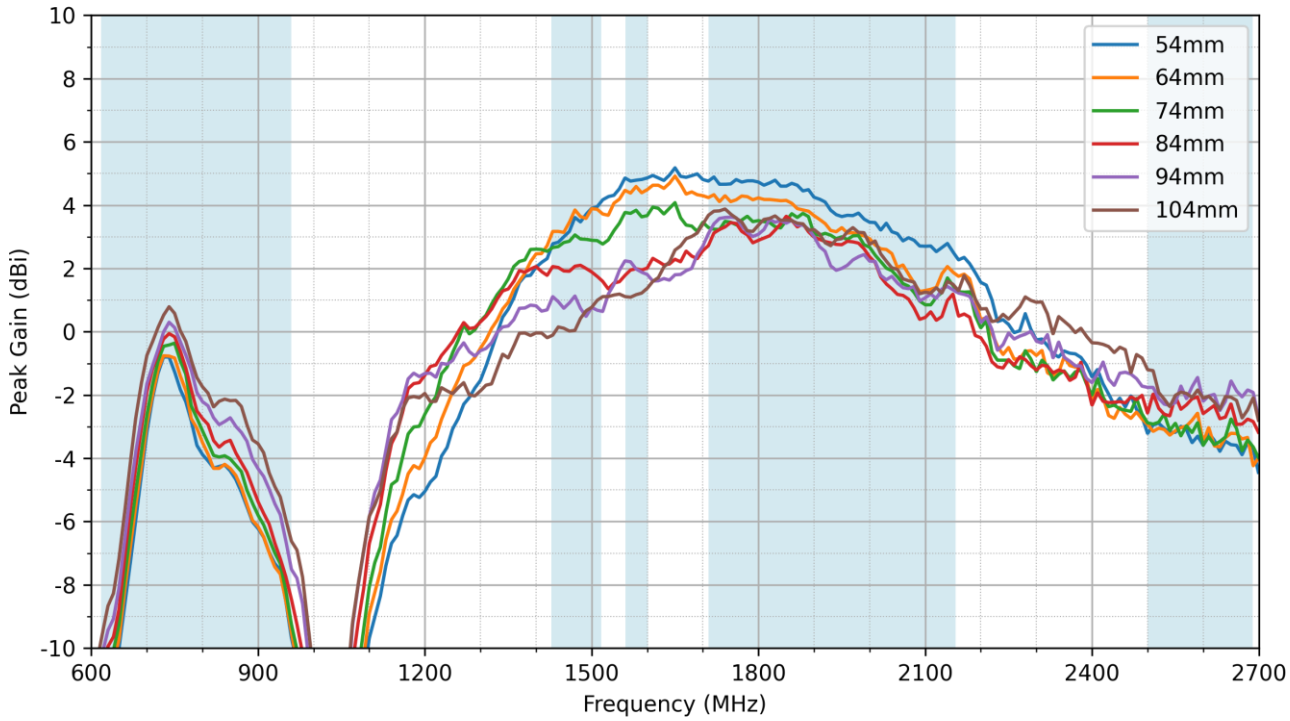

## 9.2 Average Gain – North America



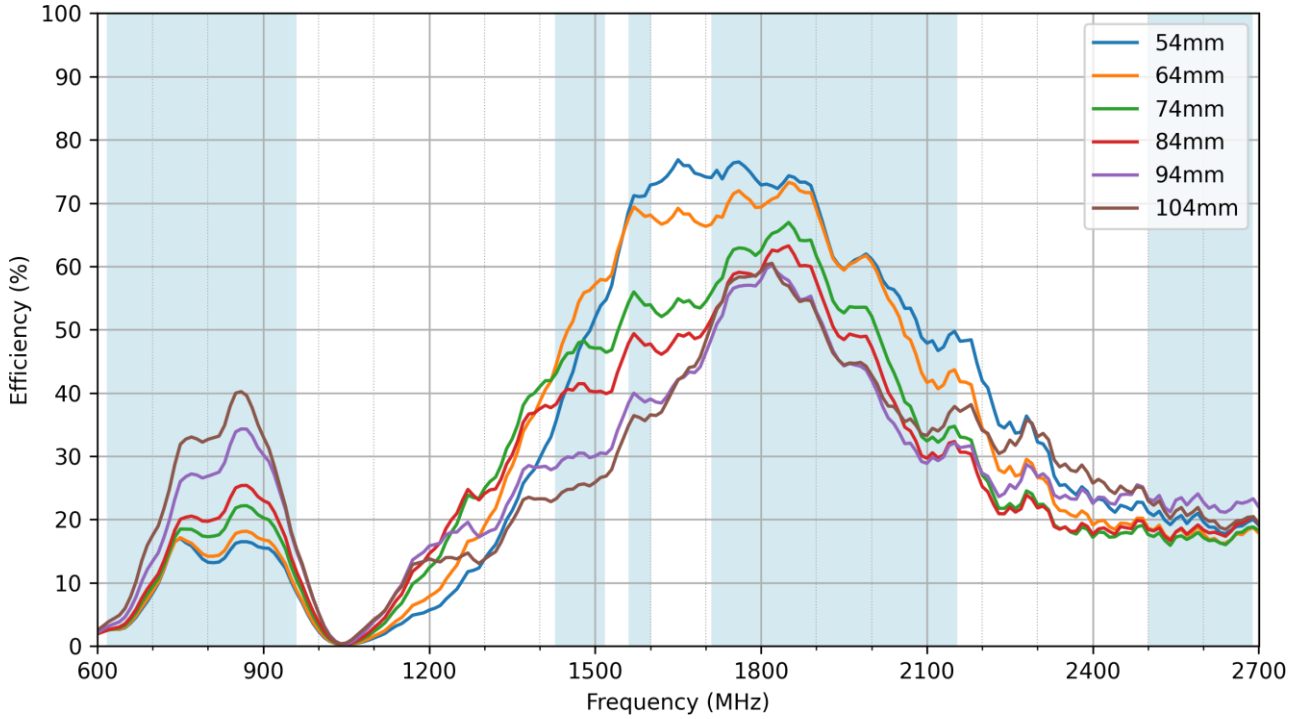


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## 9.3 Peak Gain – North America



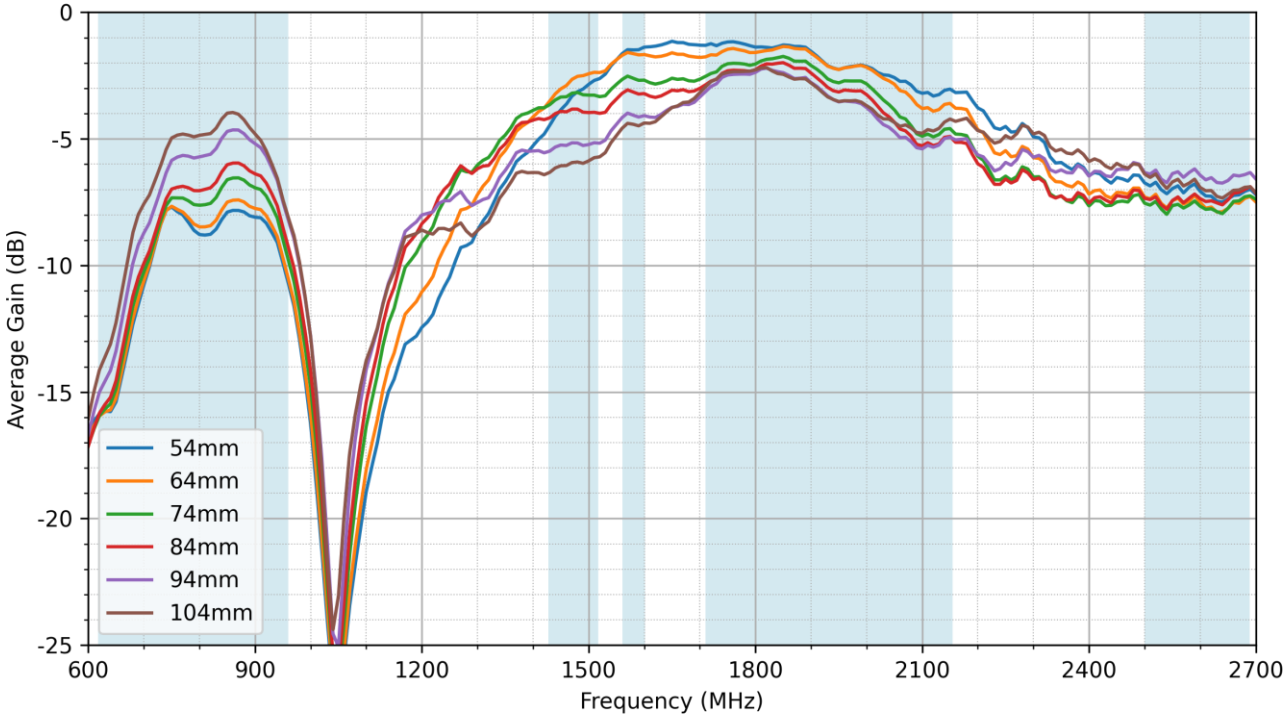

## 9.4 Efficiency – EMEA



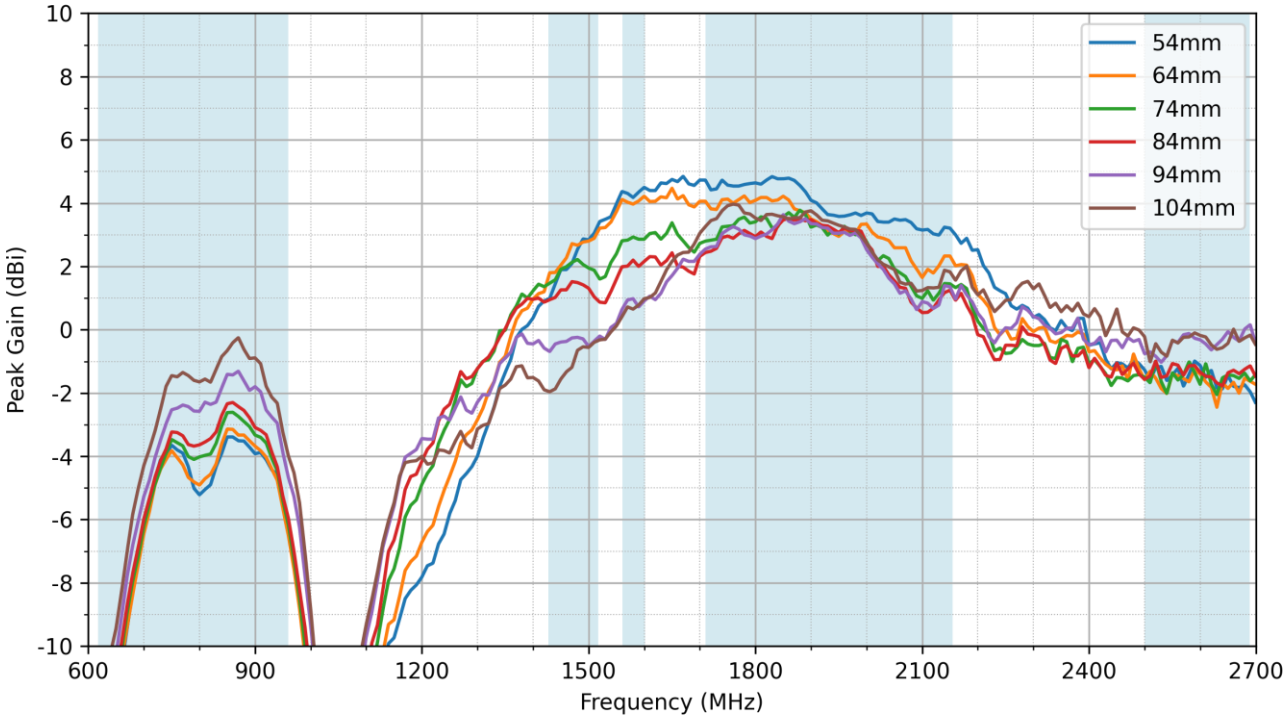


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## 9.5 Average Gain – EMEA



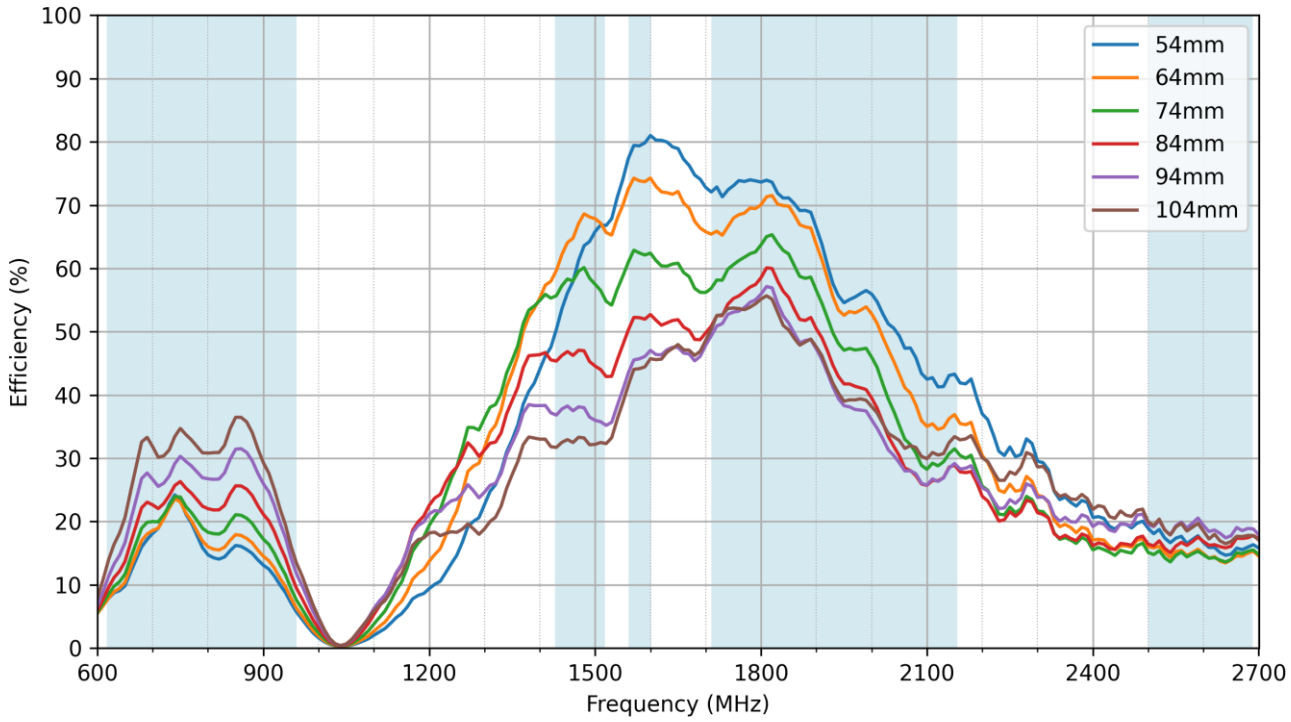

## 9.6 Peak Gain – EMEA



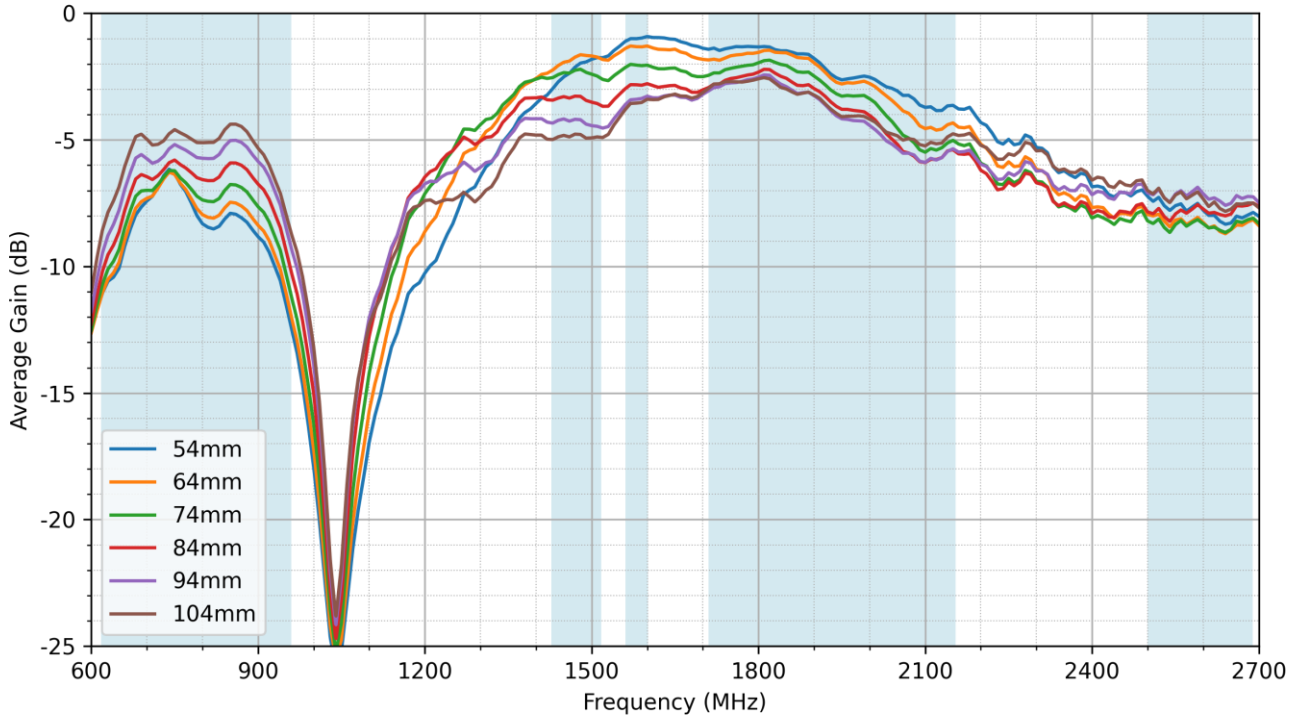


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## 9.7 Efficiency – Worldwide



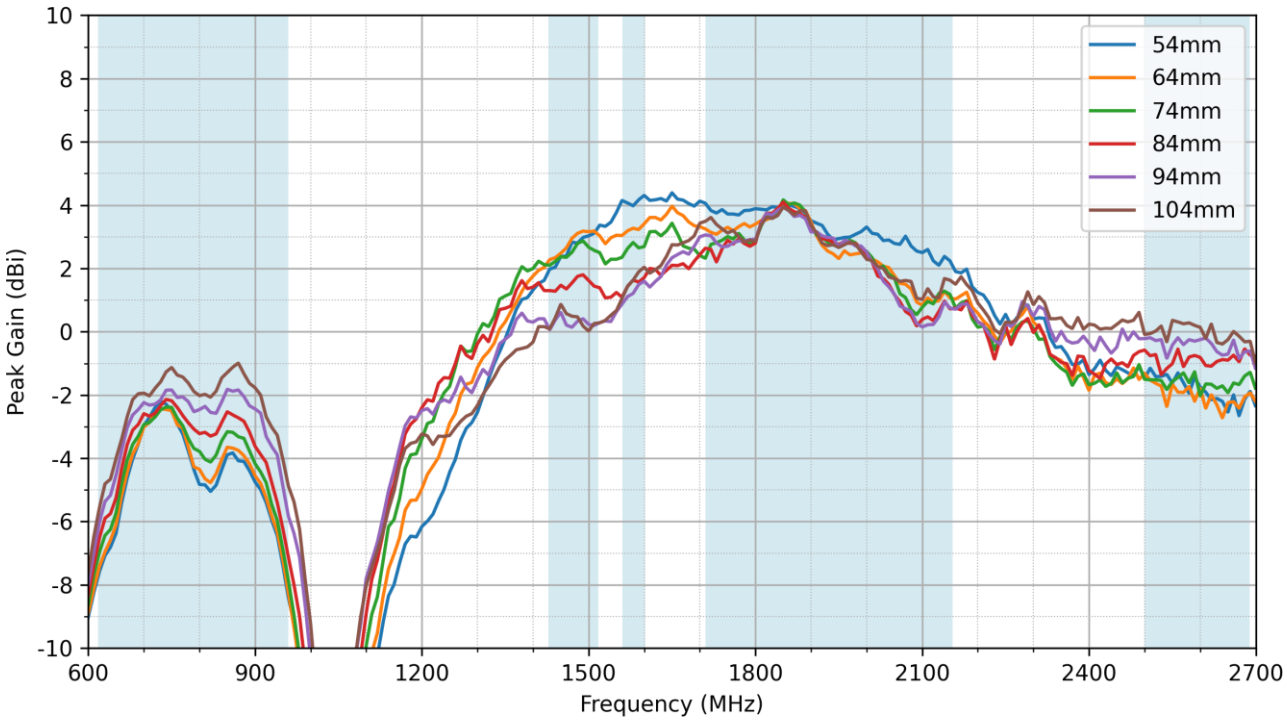

## 9.8 Average Gain – Worldwide





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## 9.9 Peak Gain – Worldwide

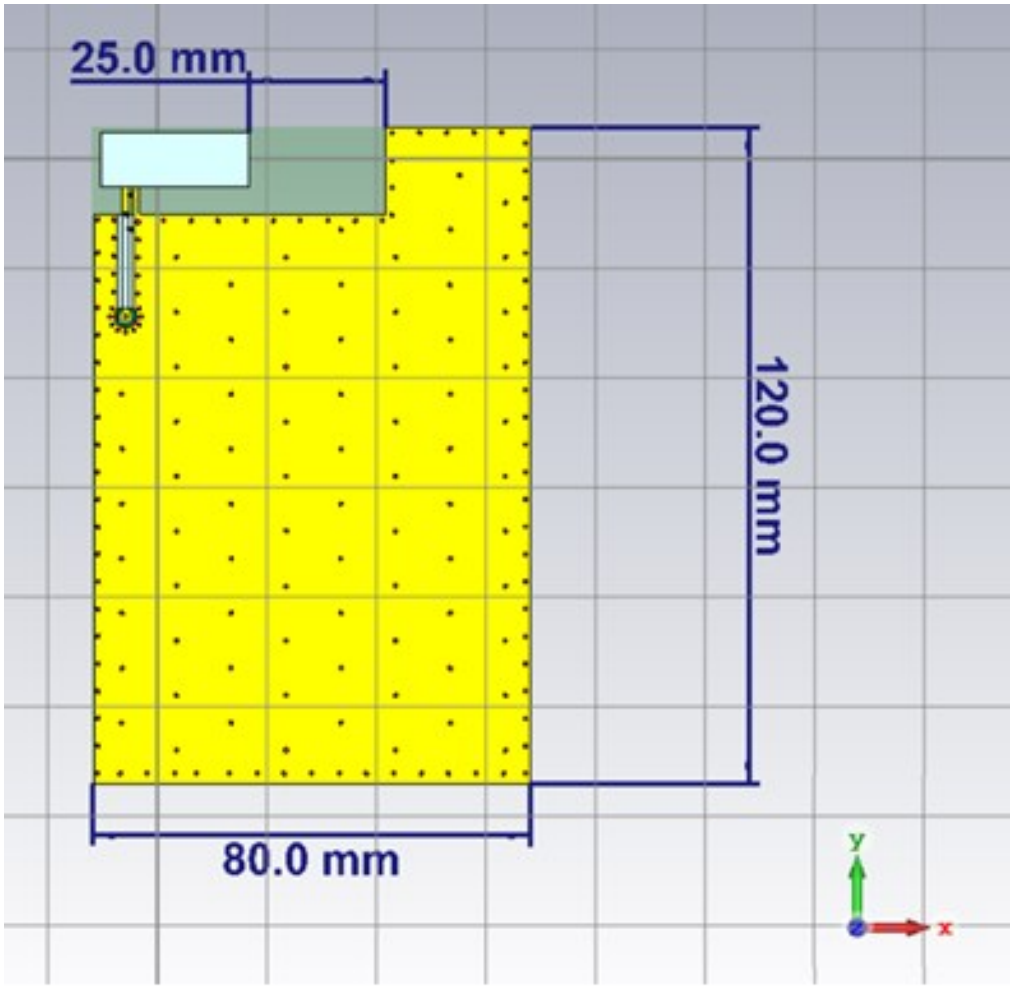




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## 9.10 Effects of Right Side PCB Ground on Antenna Performance

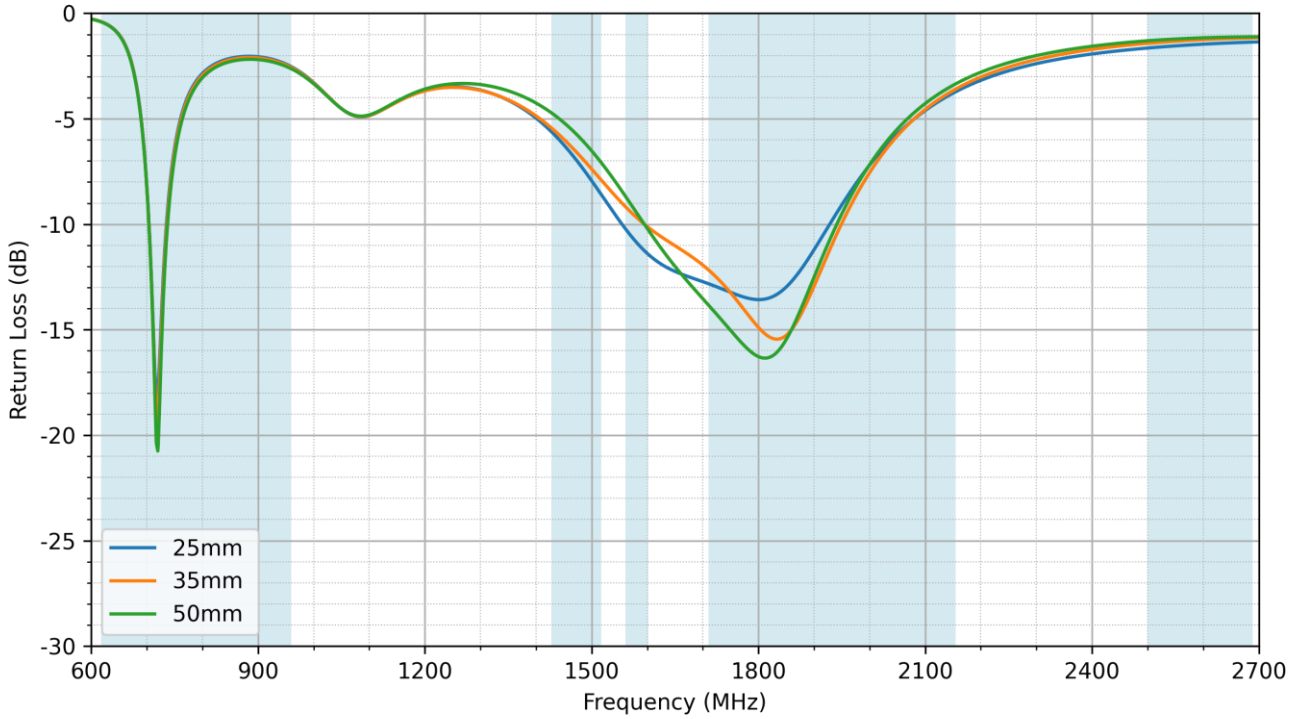
The PCS.55.A antenna was tuned for a 120x80mm ground plane and the distance between the PCB ground on the right side of the antenna was parameterized and swept from 0 to 50 mm. The minimum condition, or 0mm, has the ground right up against the antenna and the maximum condition, or 50mm, has no ground on the right side of the antenna (i.e. a full 80x16mm keep out area). This was done in order to determine the minimum distance that the ground can be placed next to the antenna without affecting performance. The configuration with 25mm is shown below.



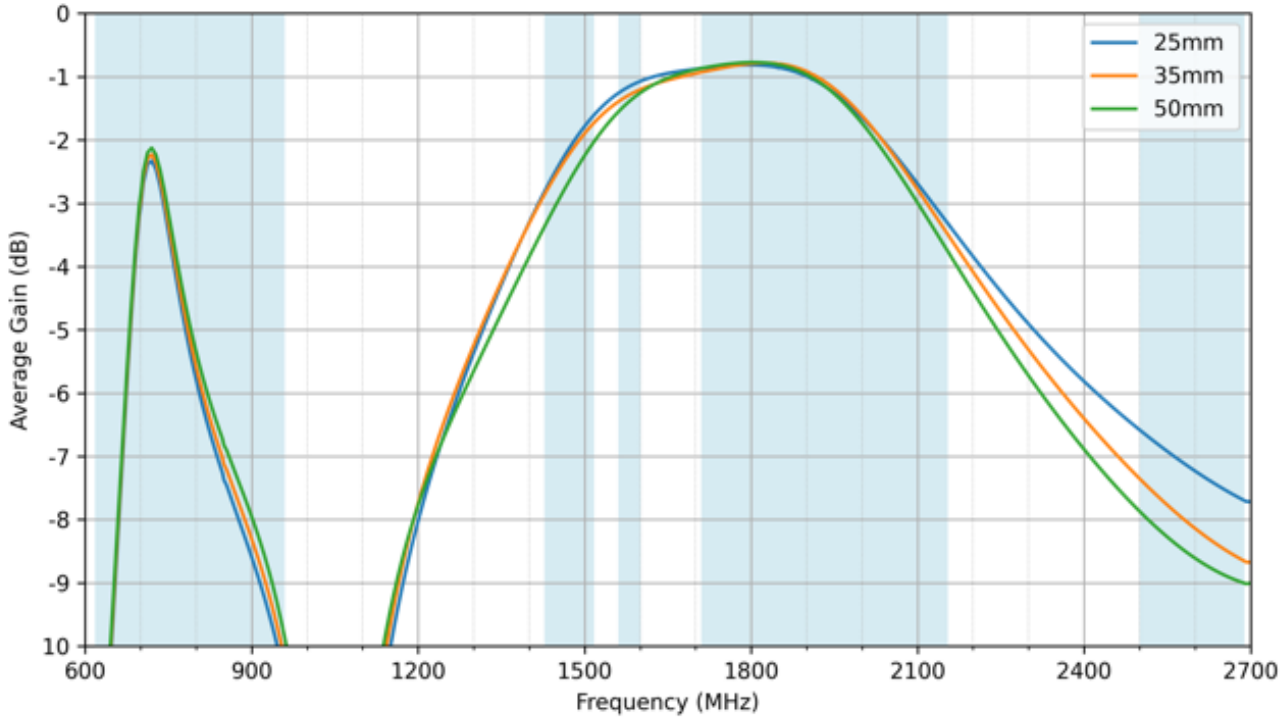

For minimal (0.2 dB) performance impact, a clearance of 25mm is recommended. Return loss and efficiency 25, 35 and 50mm clearance are shown below:


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## 8.10.1 Return Loss




## 8.10.2 Efficiency

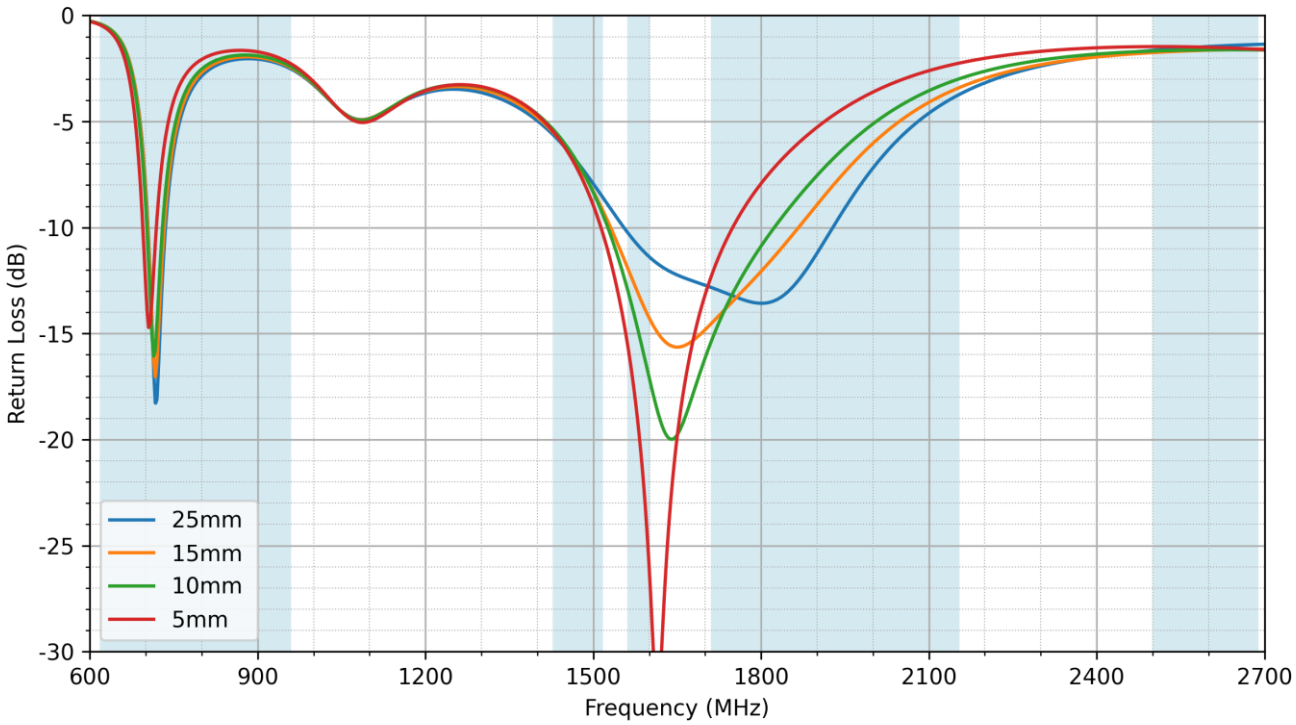




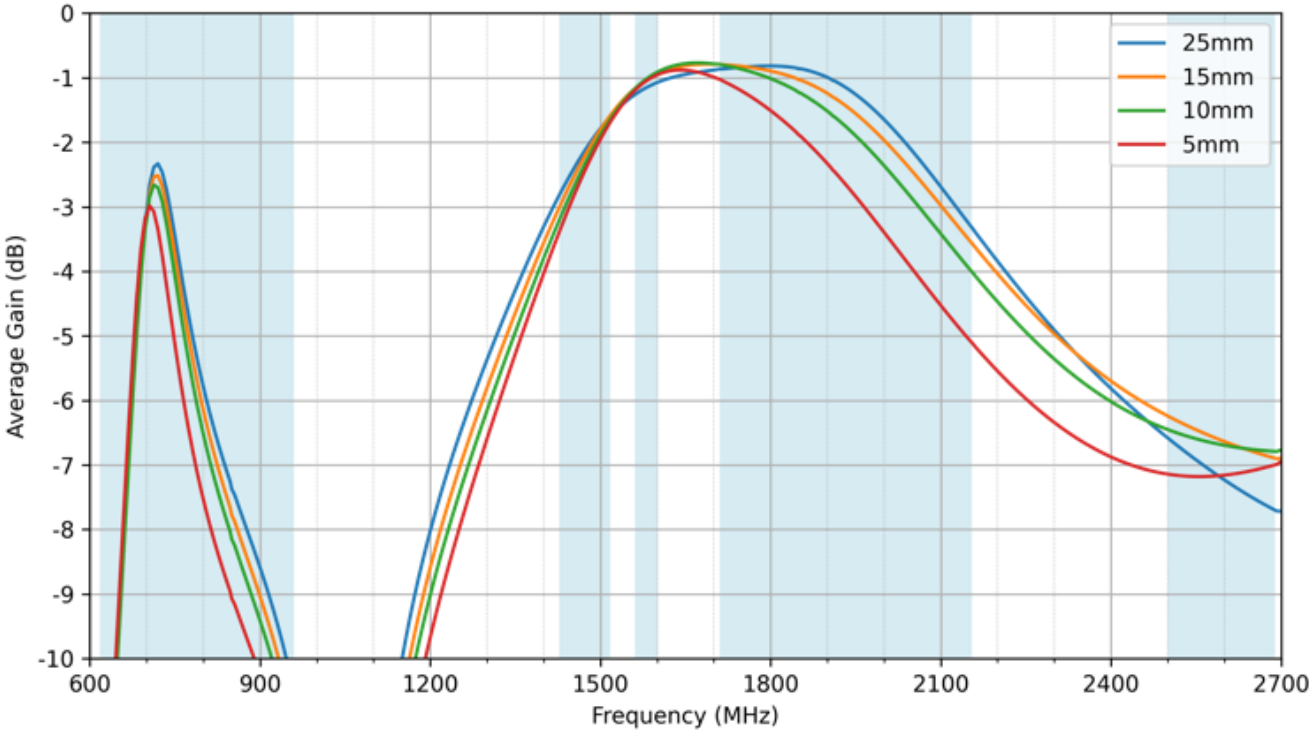
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## 8.10.3 Return Loss

For more compact designs, a distance of 5 or 10mm can be implemented at the cost of efficiency and bandwidth as shown below:




## 8.10.4 Efficiency



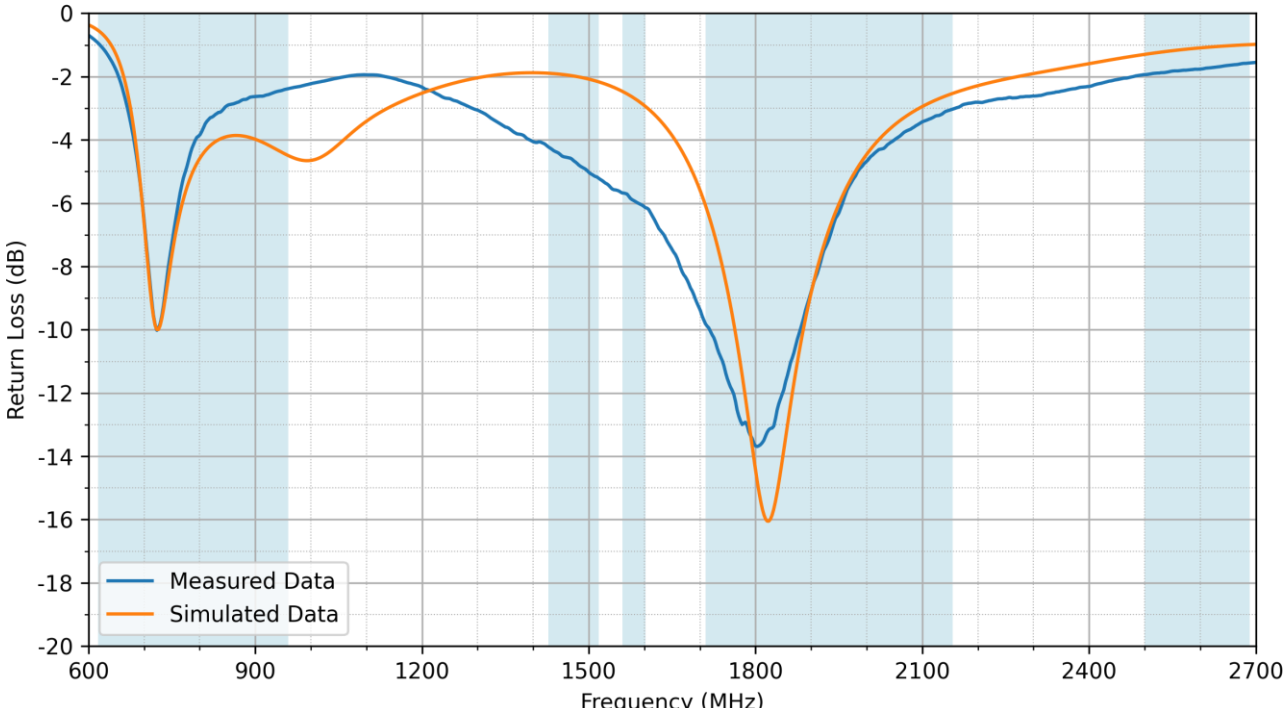


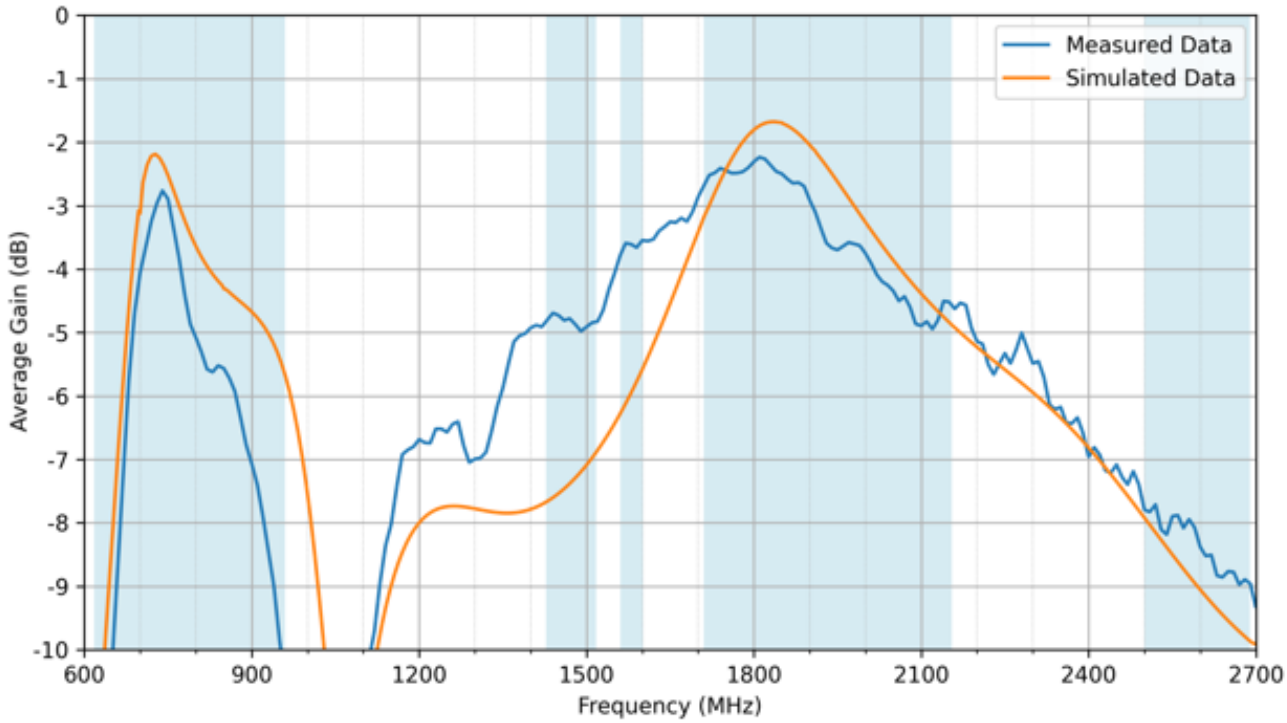
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## 8.11 Correlation of CST Blackbox Model to Measured Results

To evaluate the accuracy of the CST Blackbox Model available to all customers, the following comparisons of return loss and efficiency have been made:

Please note the following simulated results were run at 18 cells/wavelength and with a -80 dB accuracy criterion. The measured results are for the PCS.55.A evaluation board with the NA tuning in place.



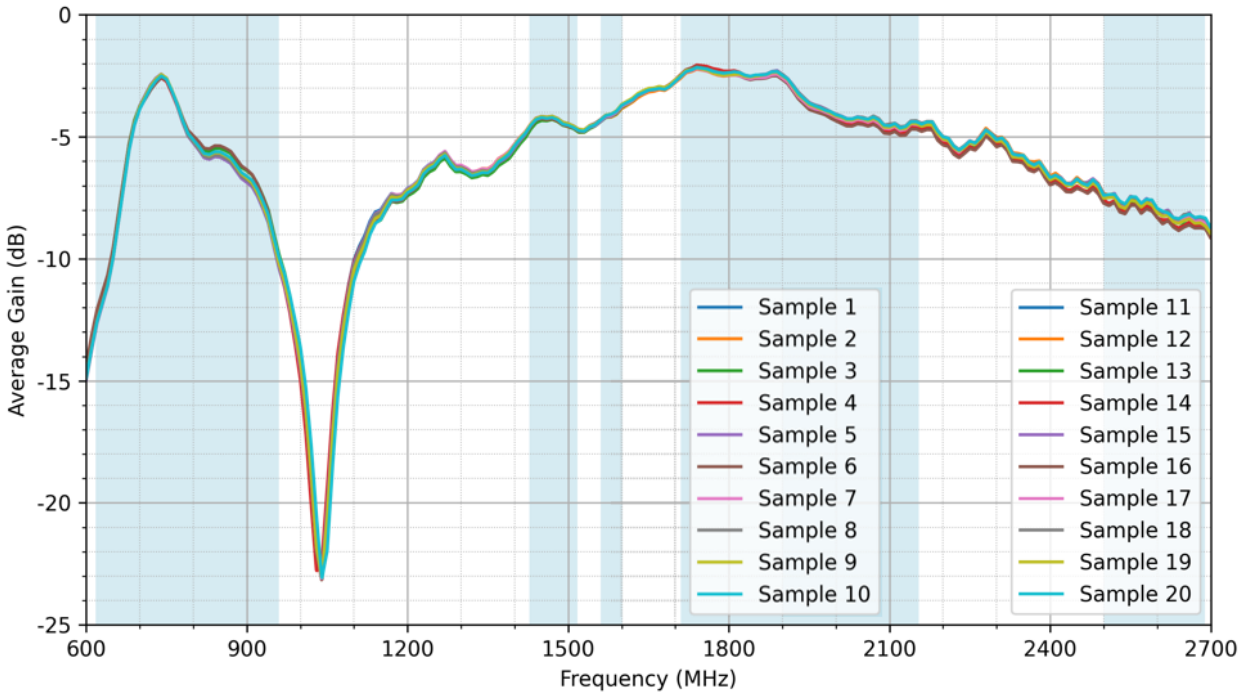





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## 8.12 Repeatability Study

In order to verify the repeatability of the design, 20 production samples of the evaluation board for the PCS.55.A were tested in an anechoic chamber on the same day with standard SMA torque of 1 N·m





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# 10. Application Note (PCS.55.M – PCS.55.A)

## 10.1 Ground Plane Study for PCS.55 MIMO Board 65mm Wide (8mm SEP)

The influence of the long side of the ground plane, while the short side is constantly 65mm (maintaining the 8mm gap between 2 antennas), is evaluated following the methodology presented below. The following lengths are tested: 120mm, 110mm, 100mm, 90mm, 80mm and 70mm.

**70mm x 65mm**

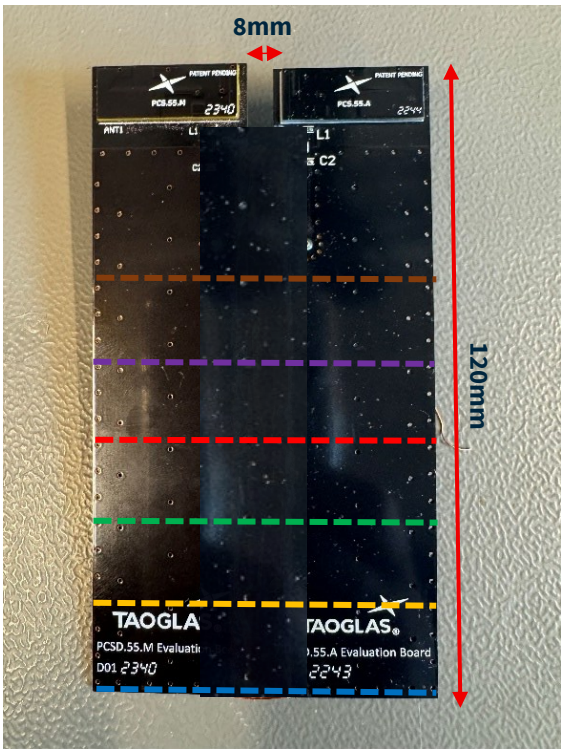
**80mm x 65mm**

**90mm x 65mm**

**100mm x 65mm**

**110mm x 65mm**

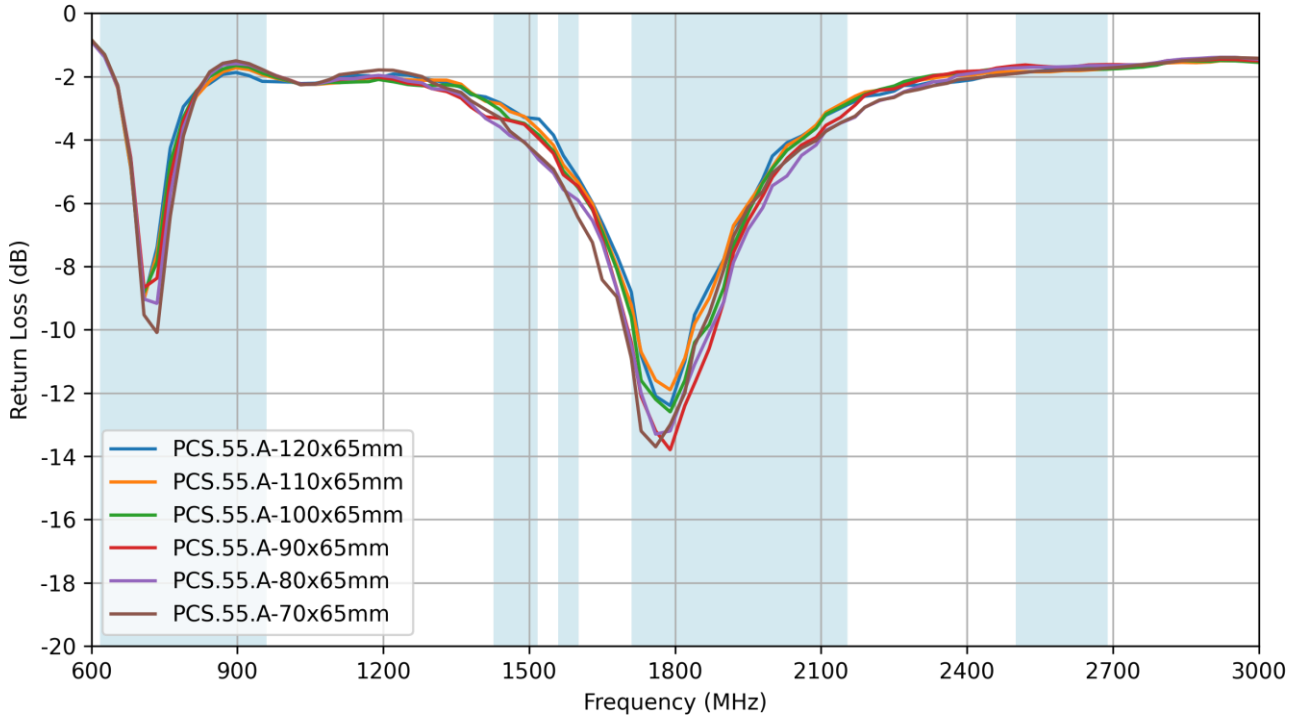
**120mm x 65mm**



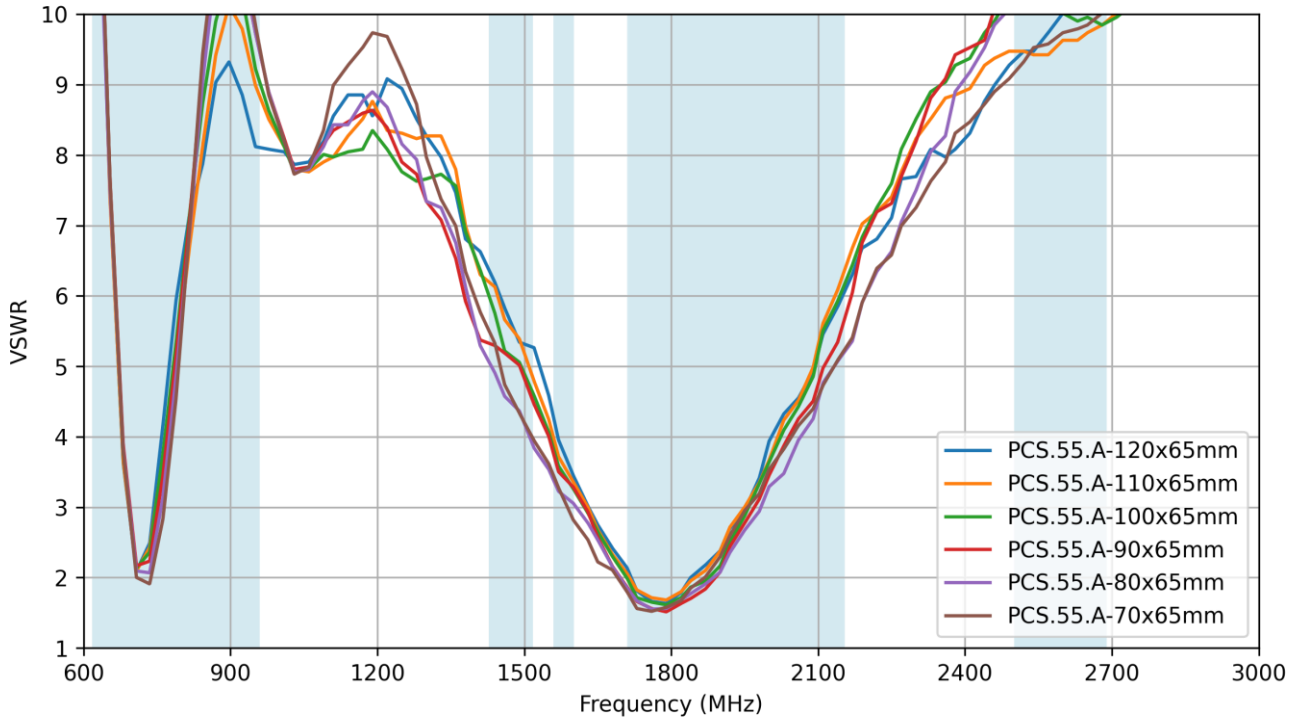


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## 10.2 PCS.55.A - Return Loss



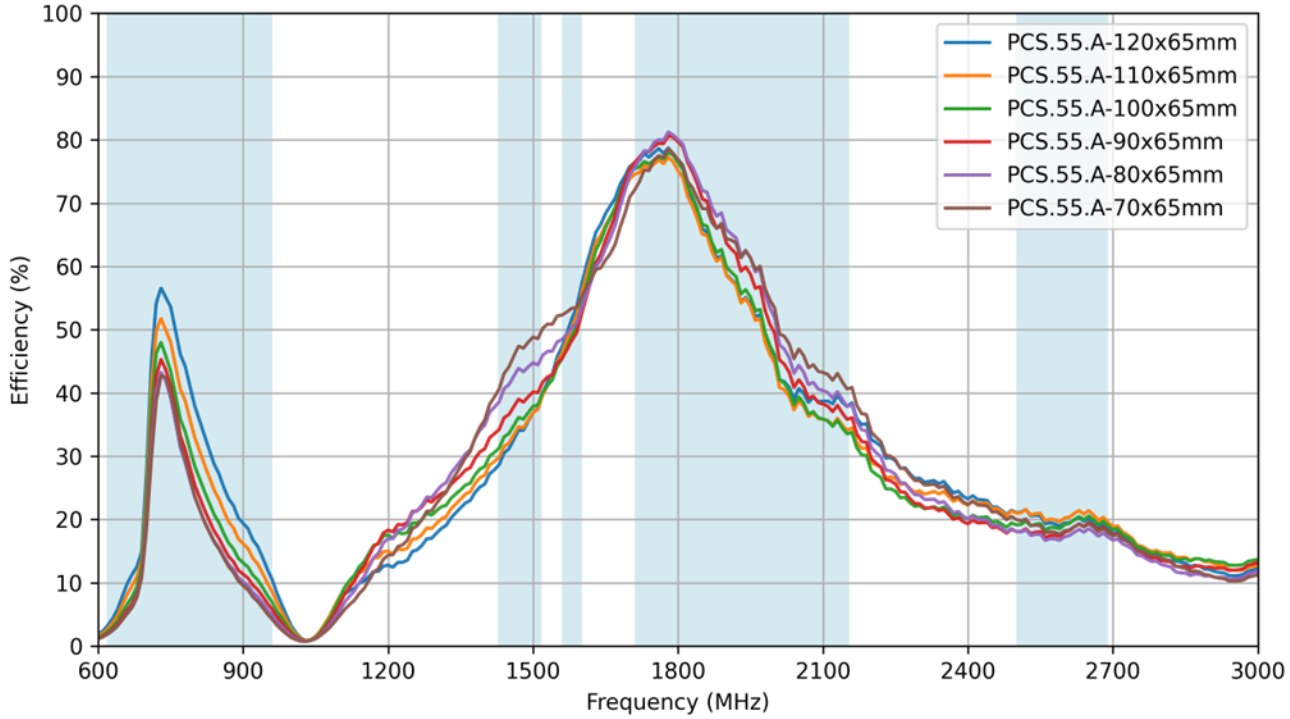

## 10.3 PCS.55.A - VSWR



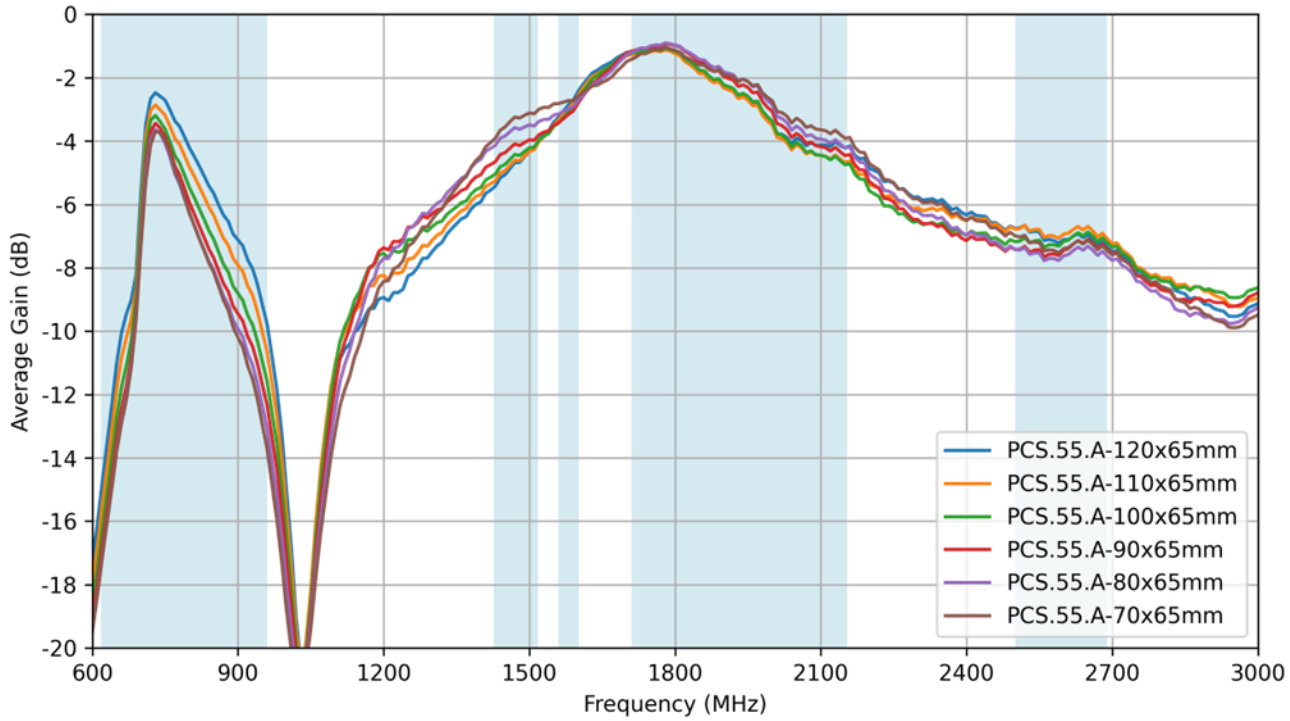


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## 10.4 PCS.55.A - Efficiency



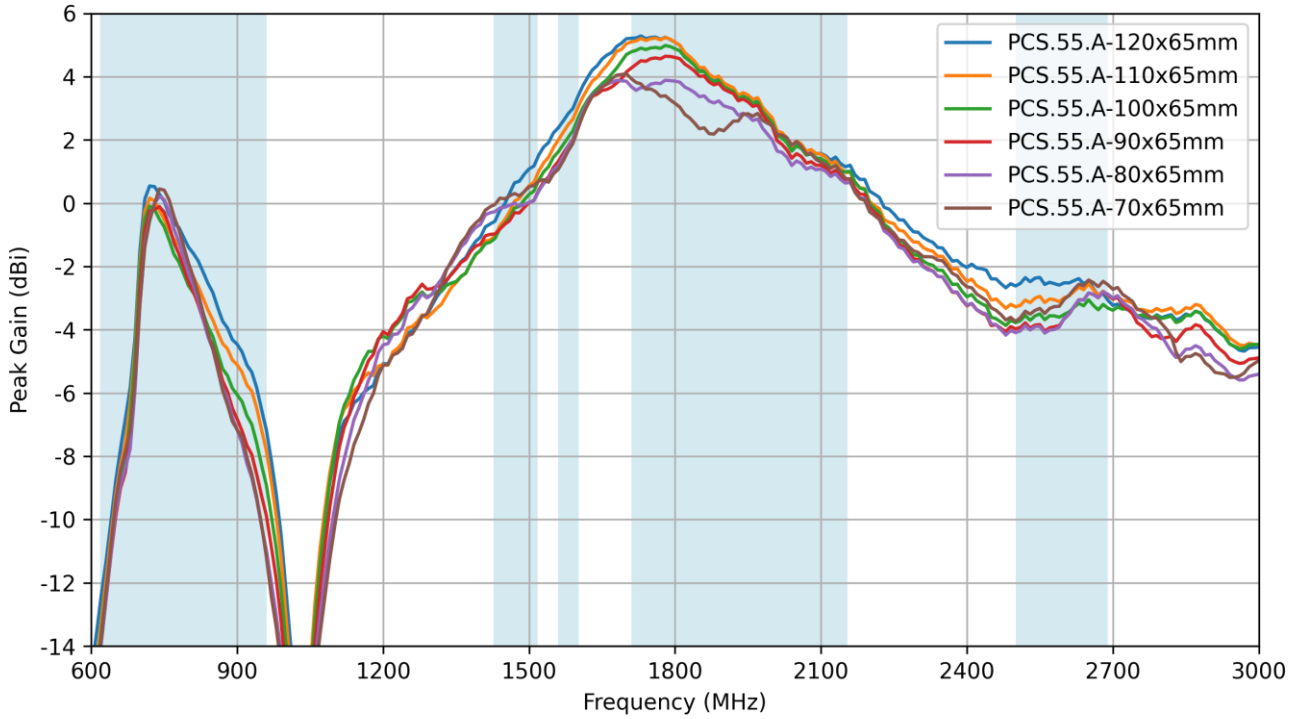

## 10.5 PCS.55.A - Average Gain



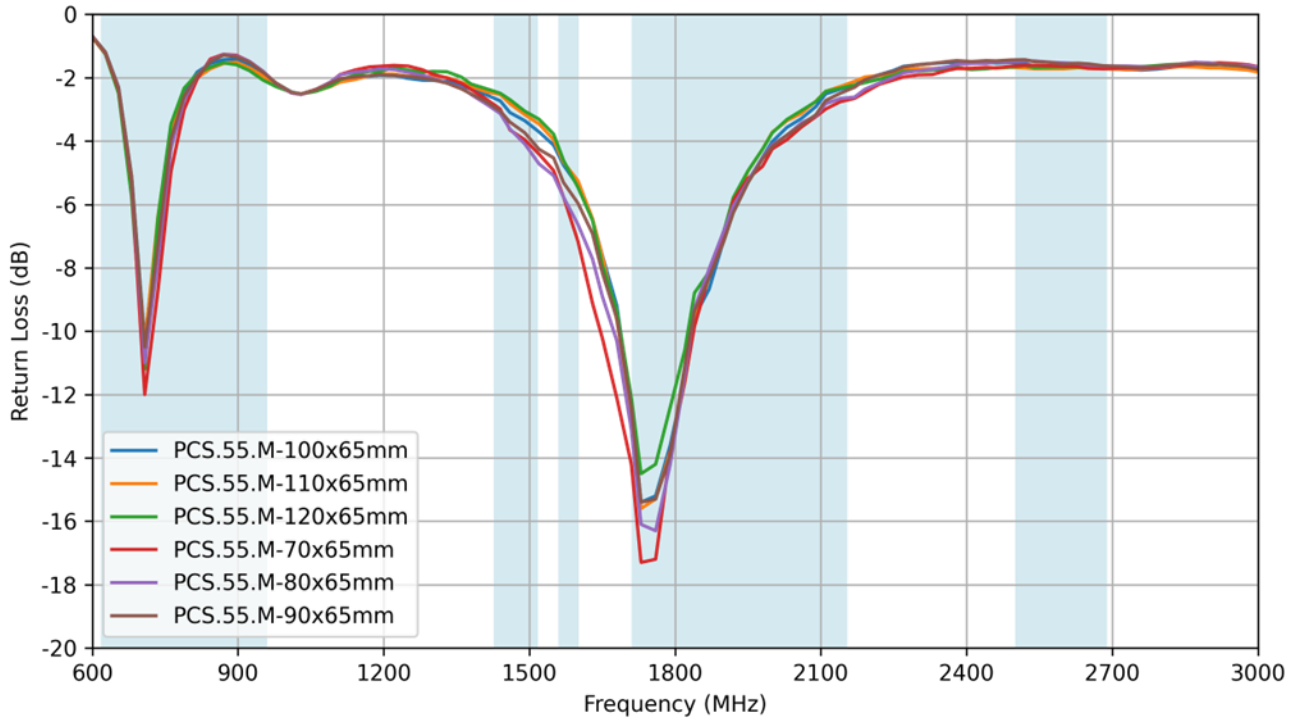


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## 10.6 PCS.55.A - Peak Gain



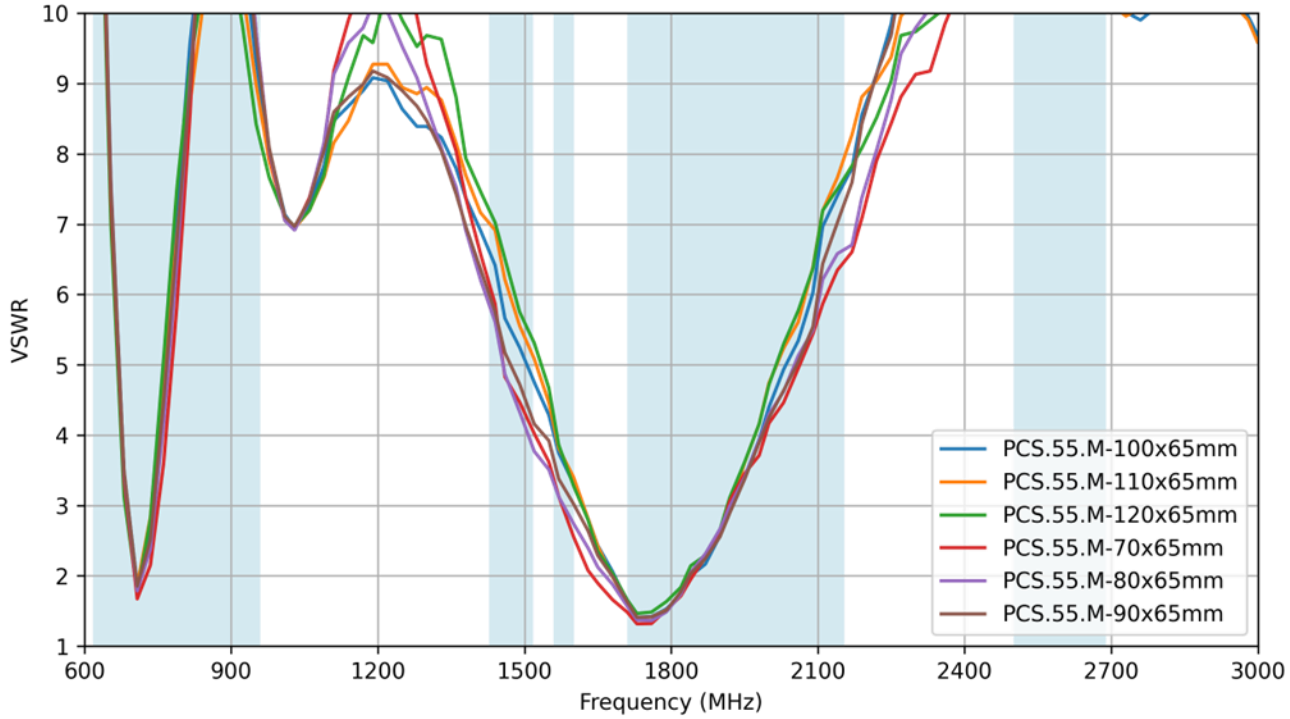

## 10.7 PCS.55.M - Return Loss



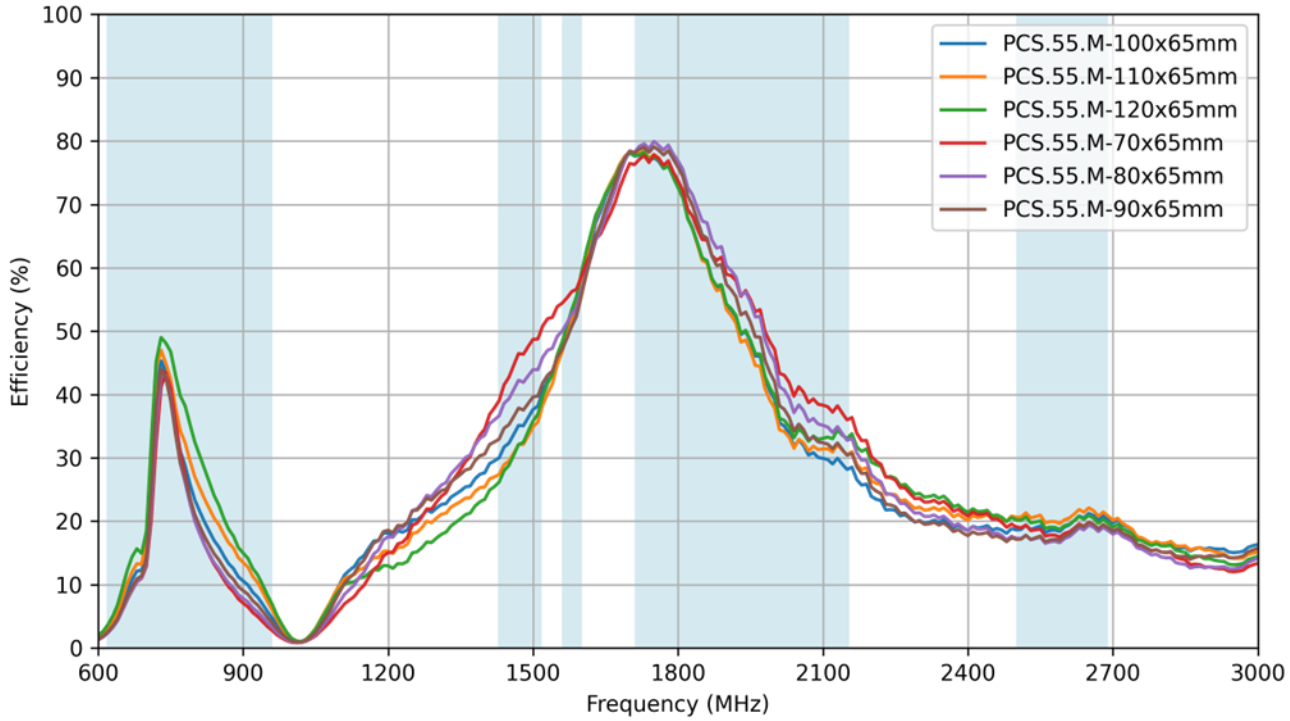


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## 10.8 PCS.55.M - VSWR



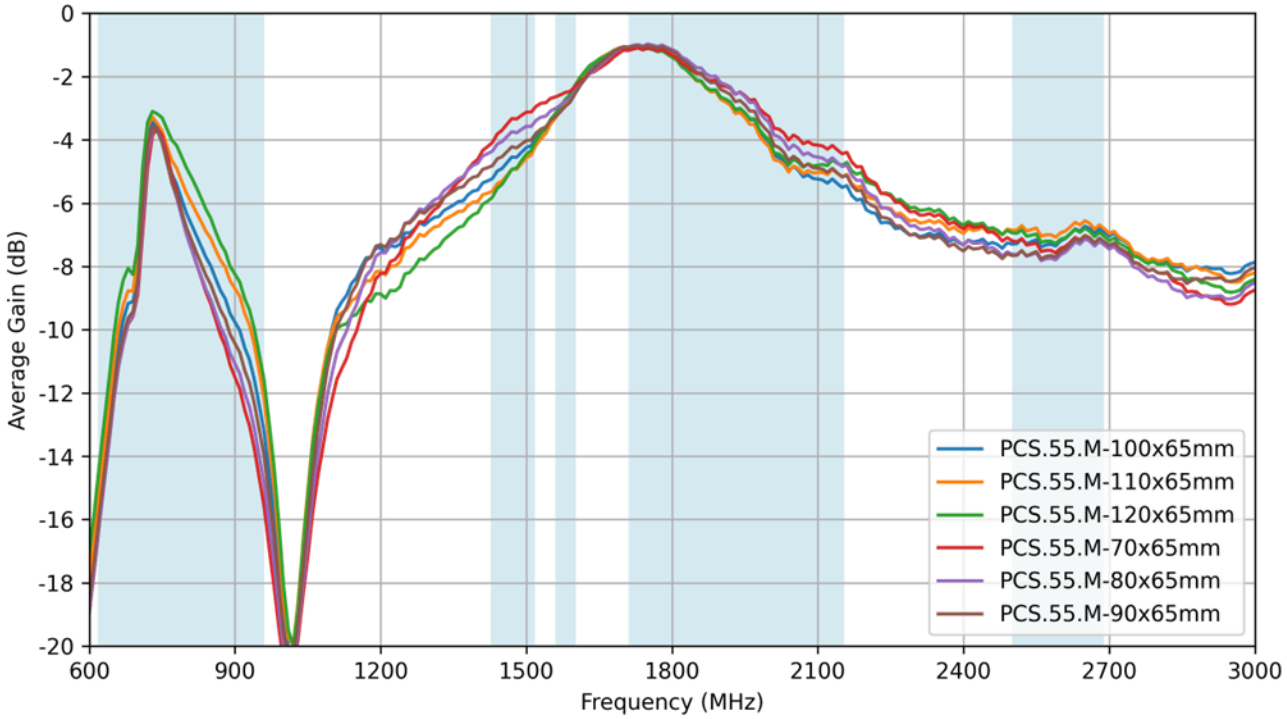

## 10.9 PCS.55.M - Efficiency



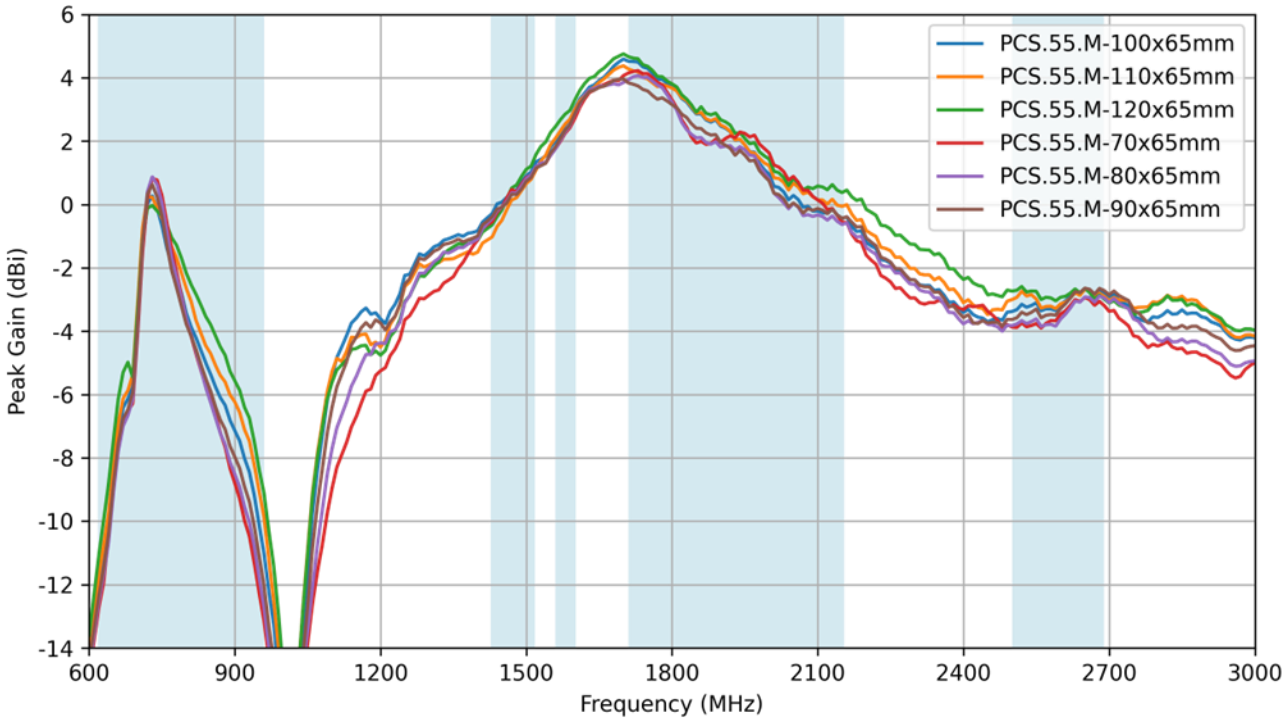


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## 10.10 PCS.55.M - Average Gain



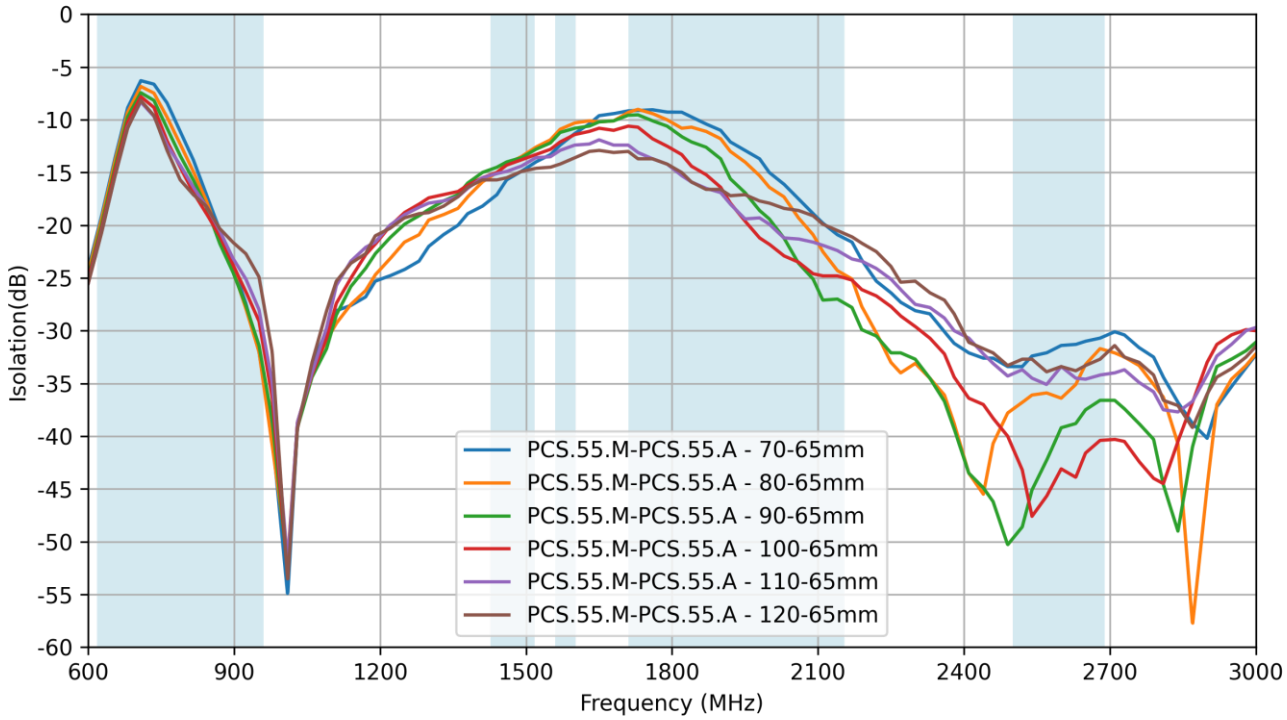

## 10.11 PCS.55.M - Peak Gain





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## 10.12 Isolation





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## 10.13 Ground Plane Study for PCS.55 MIMO Board 70mm Wide (13mm SEP)

The influence of the long side of the ground plane, while the short side is constantly 70mm (maintaining the 13mm gap between 2 antennas), is evaluated following the methodology presented below. The following lengths are tested: 120mm, 110mm, 100mm, 90mm, 80mm and 70mm.

**70mm x 70mm**

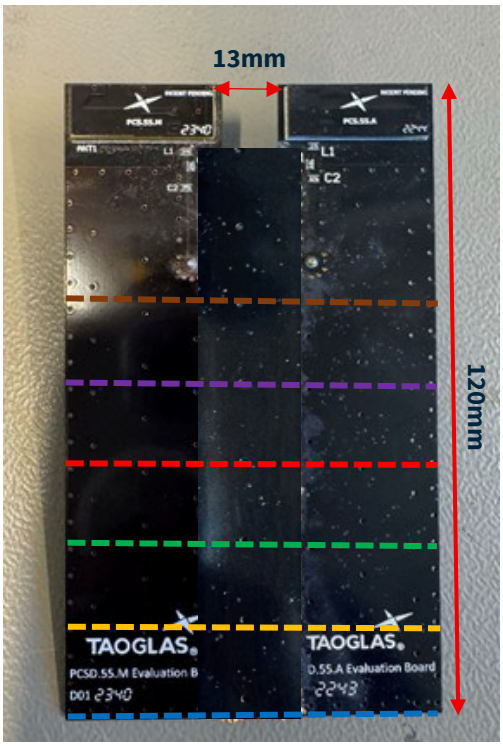
**80mm x 70mm**

**90mm x 70mm**

**100mm x 70mm**

**110mm x 70mm**

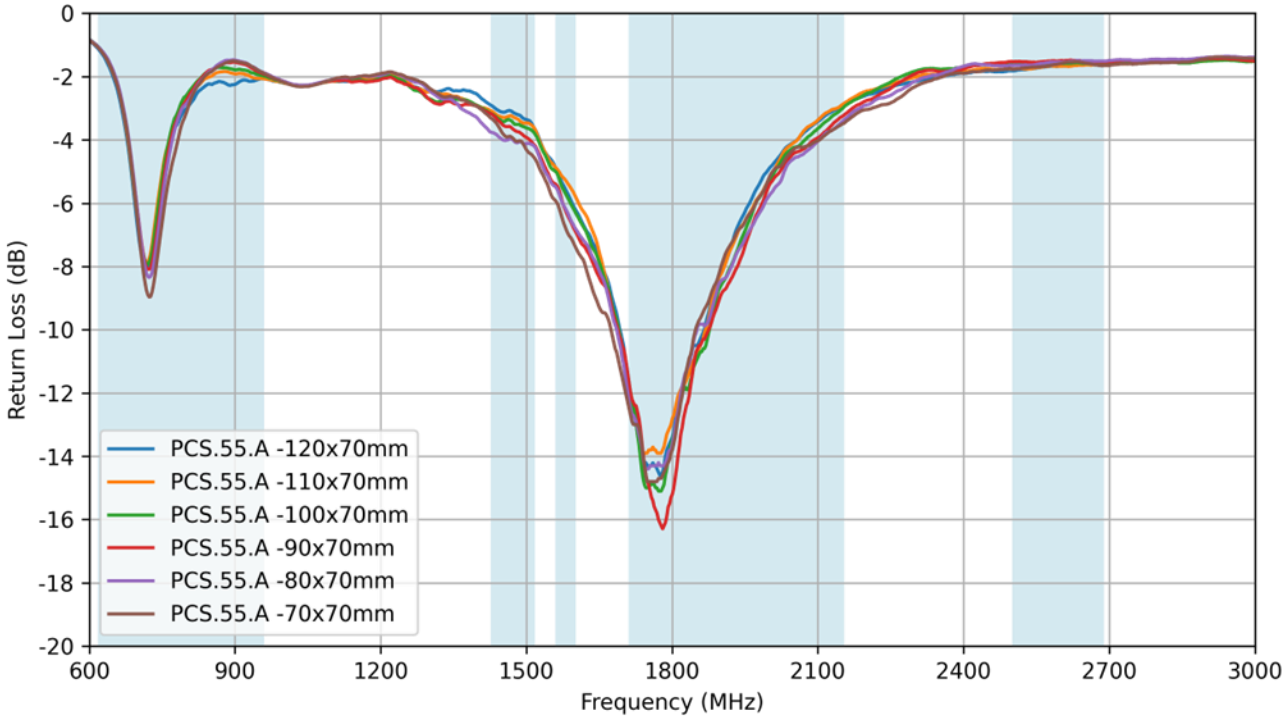
**120mm x 70mm**



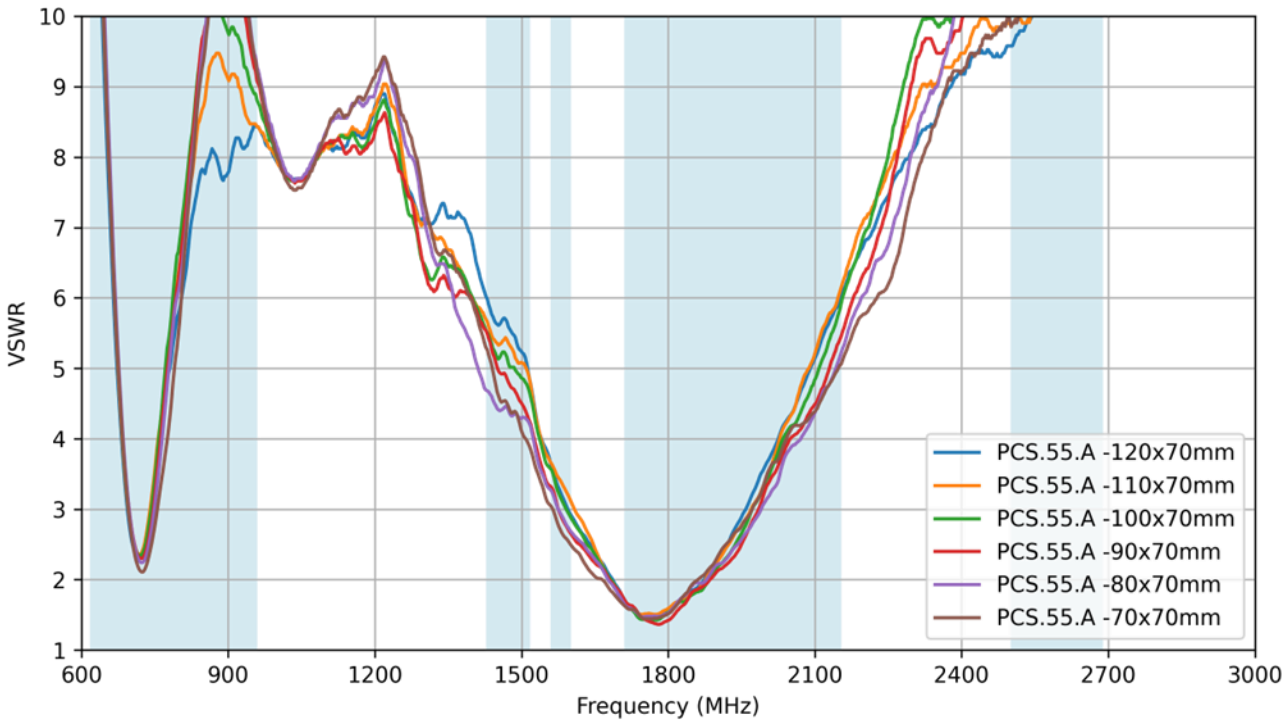


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## 10.14 PCS.55.A - Return Loss



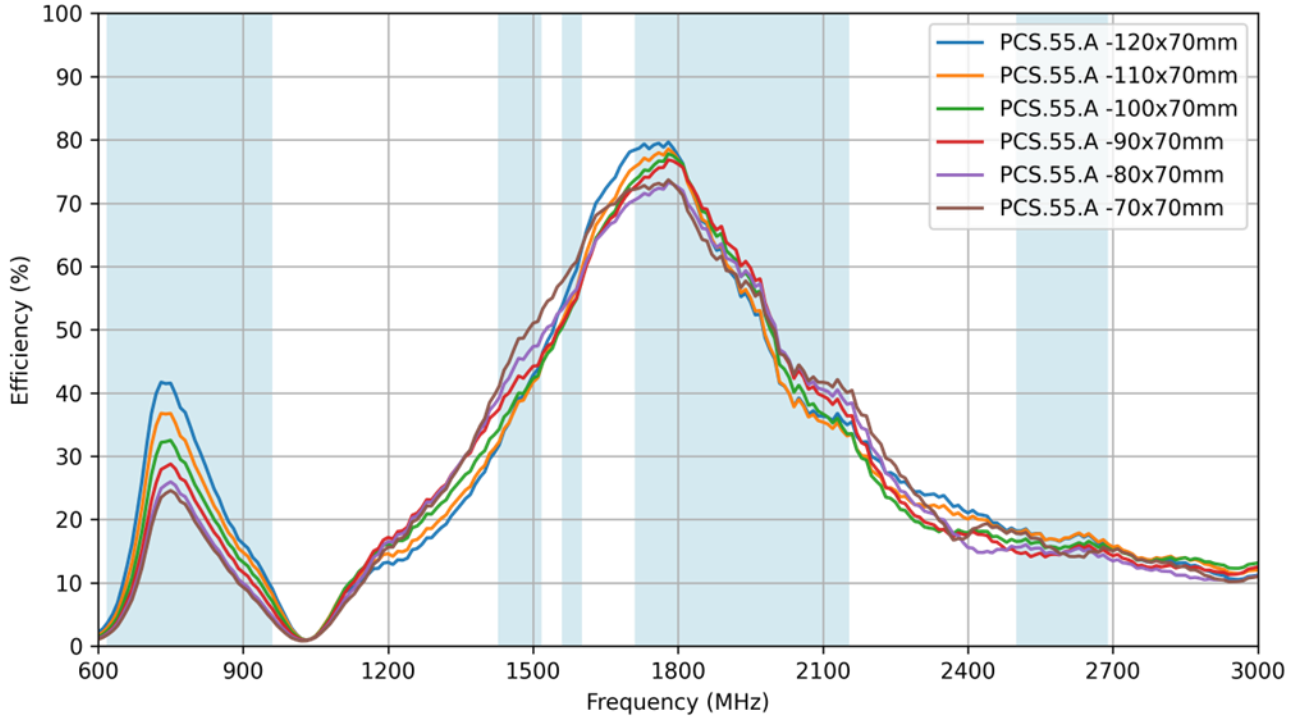

## 10.15 PCS.55.A - VSWR



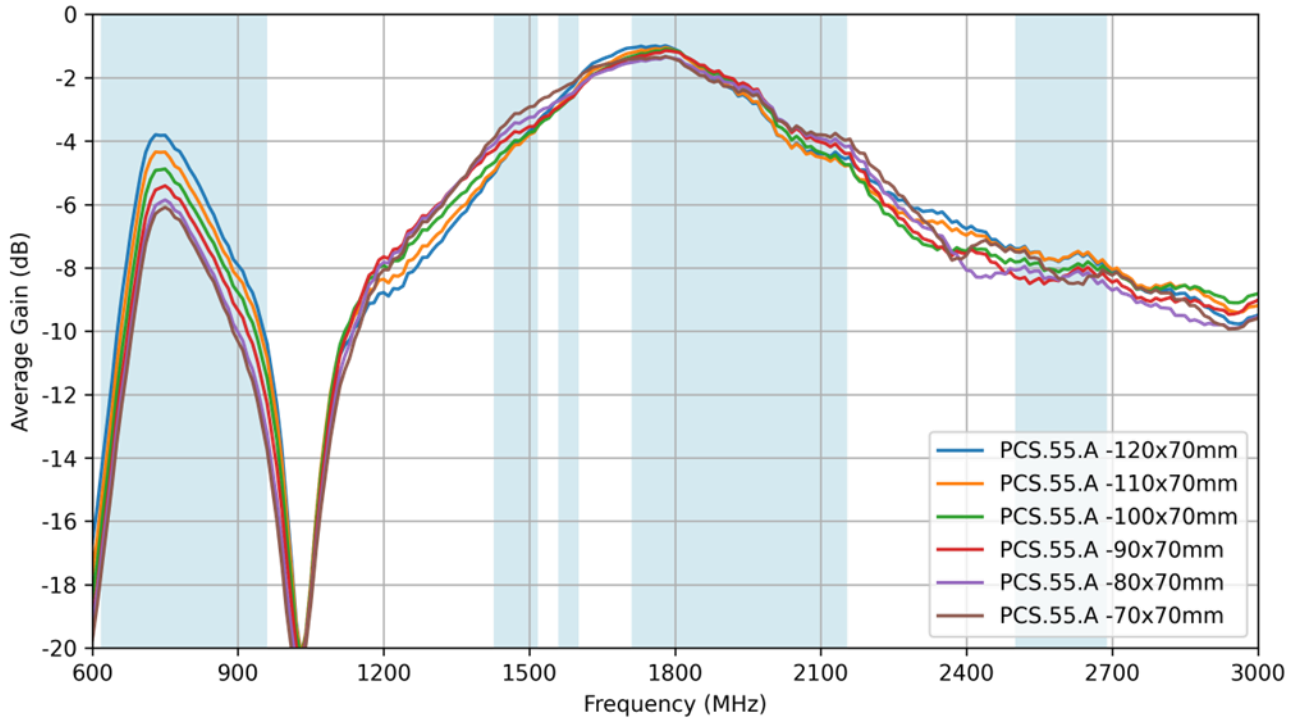


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## 10.16 PCS.55.A - Efficiency



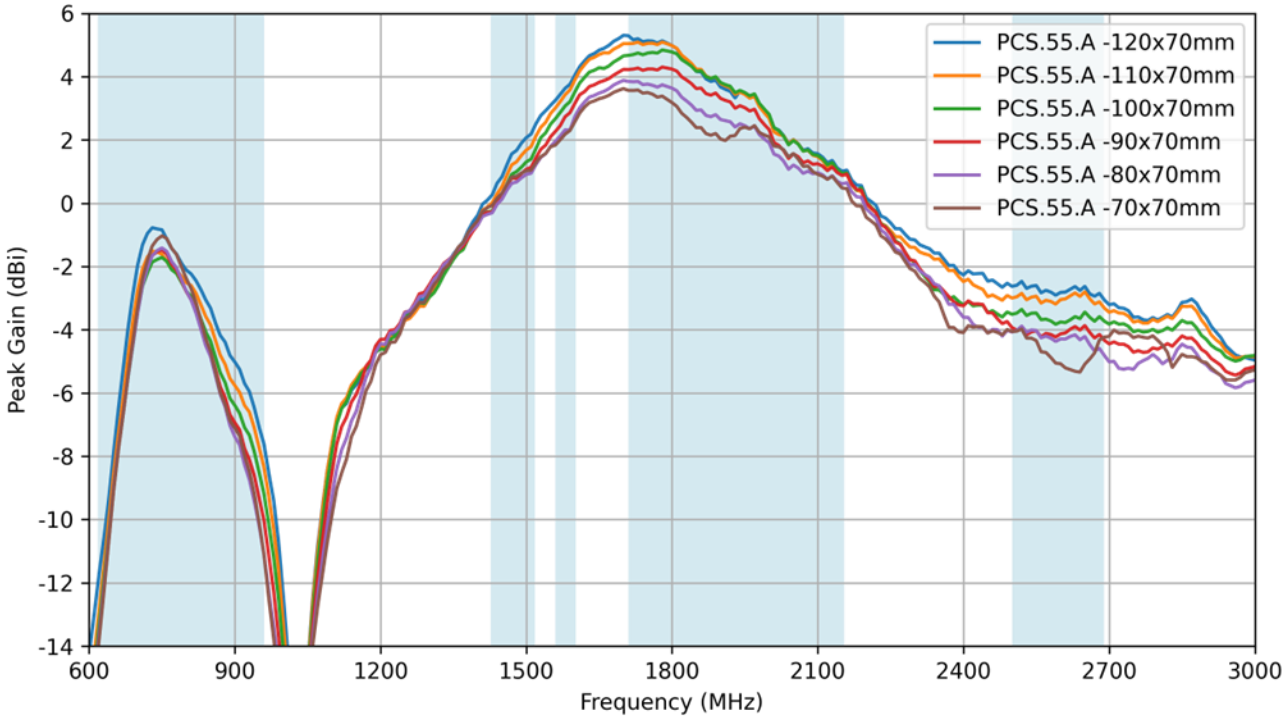

## 10.17 PCS.55.A - Average Gain



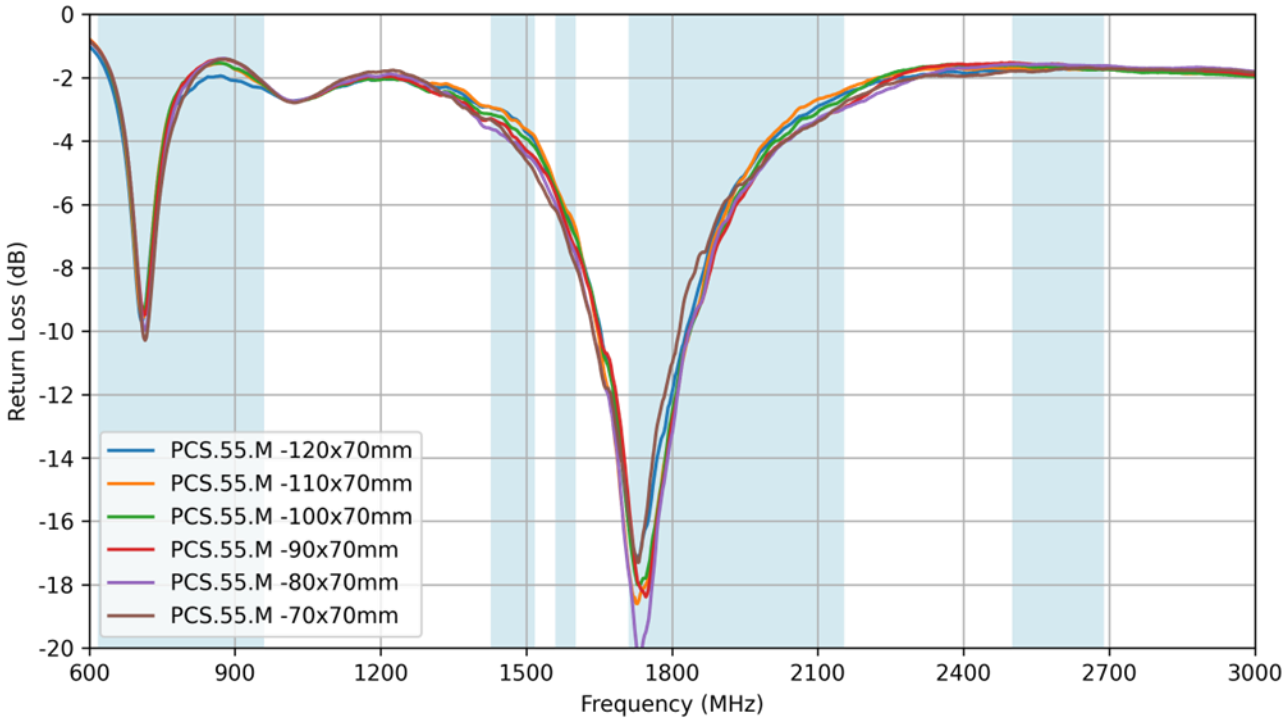


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## 10.18 PCS.55.A - Peak Gain



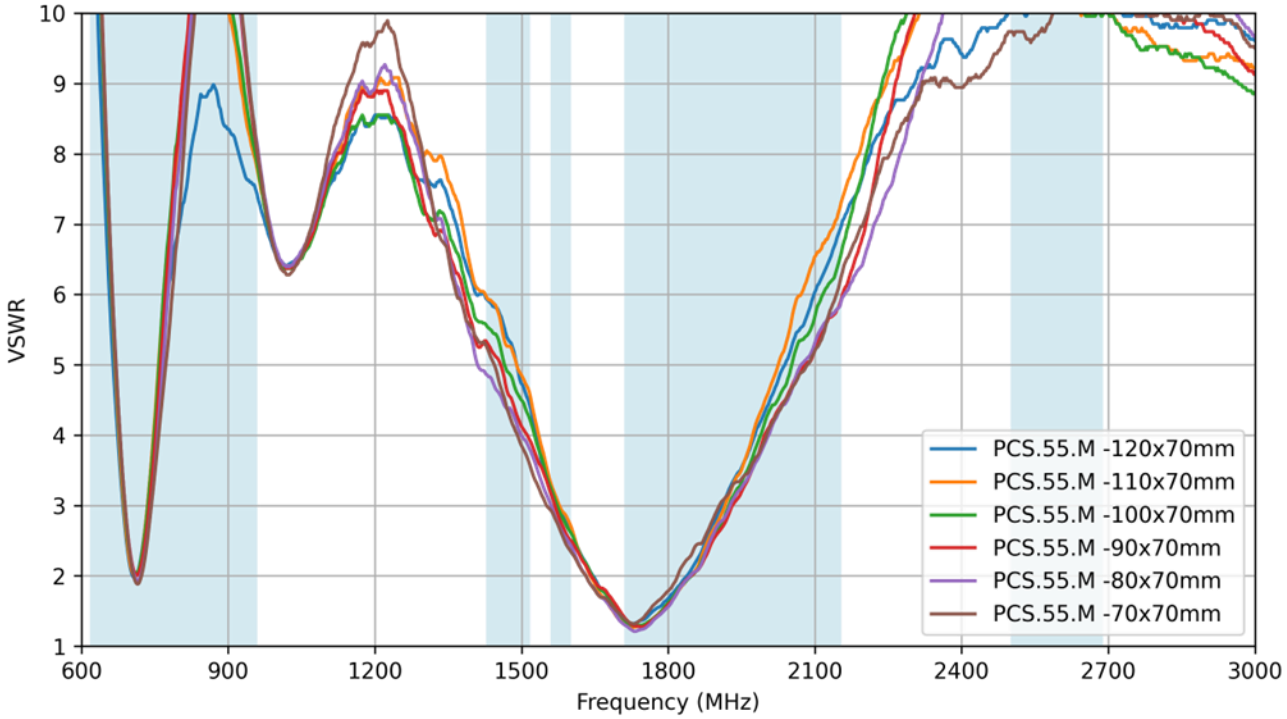

## 10.19 PCS.55.M - Return Loss



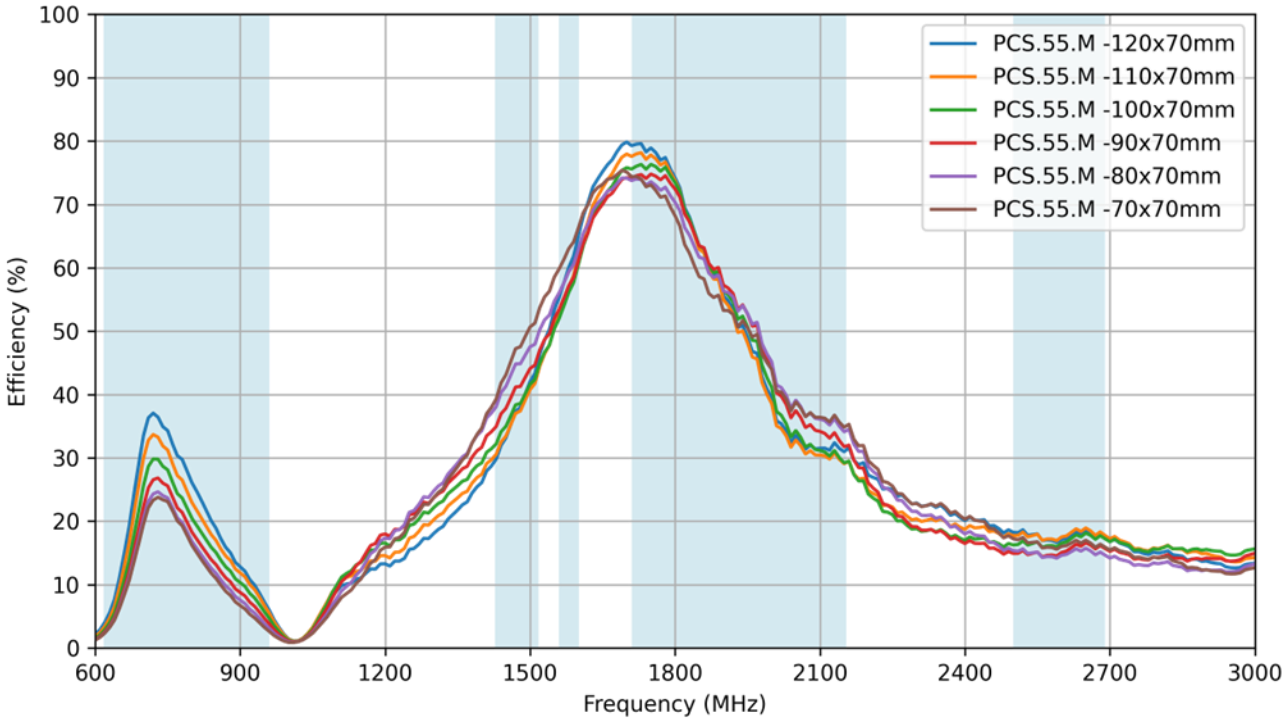


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## 10.20 PCS.55.M - VSWR



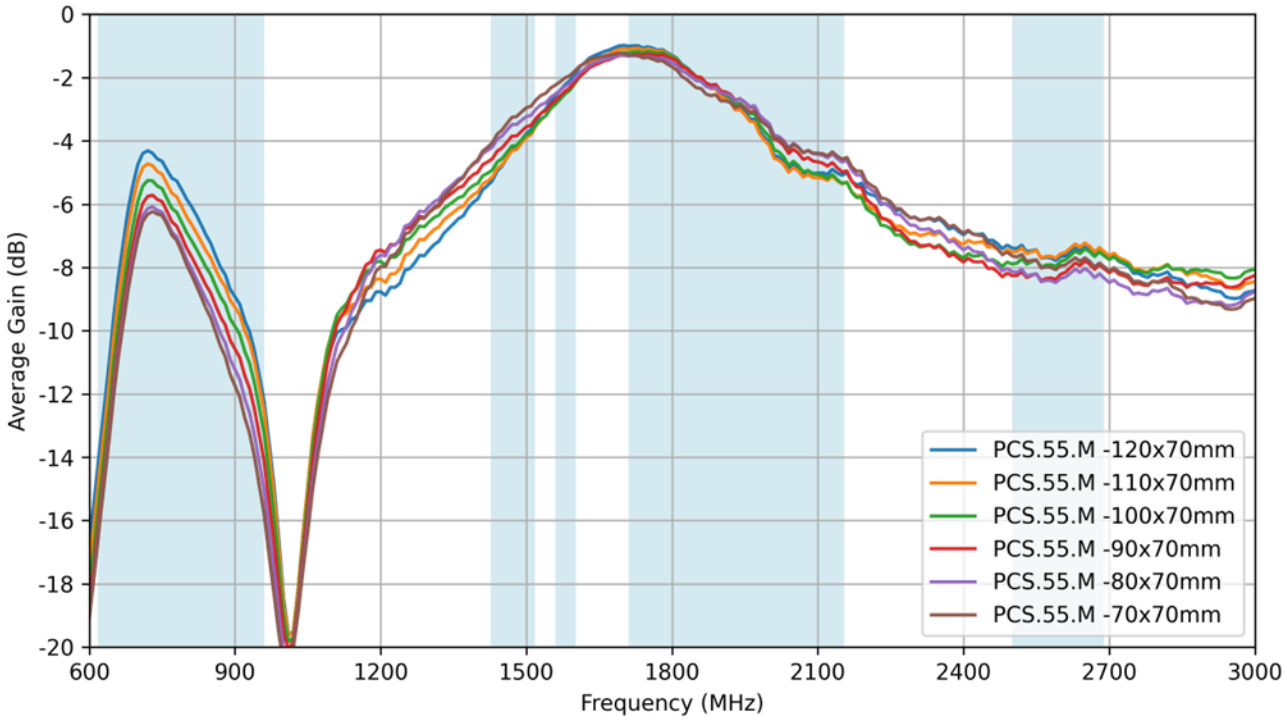

## 10.21 PCS.55.M - Efficiency



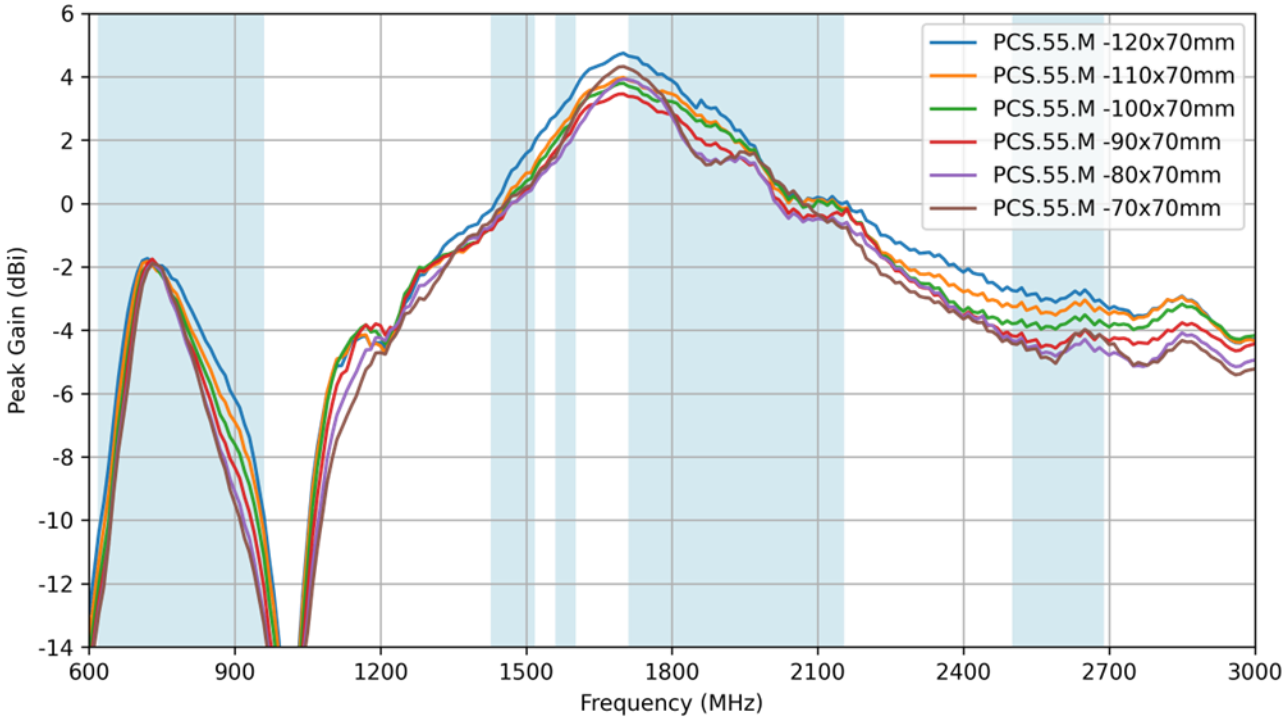


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## 10.22 PCS.55.M - Average Gain



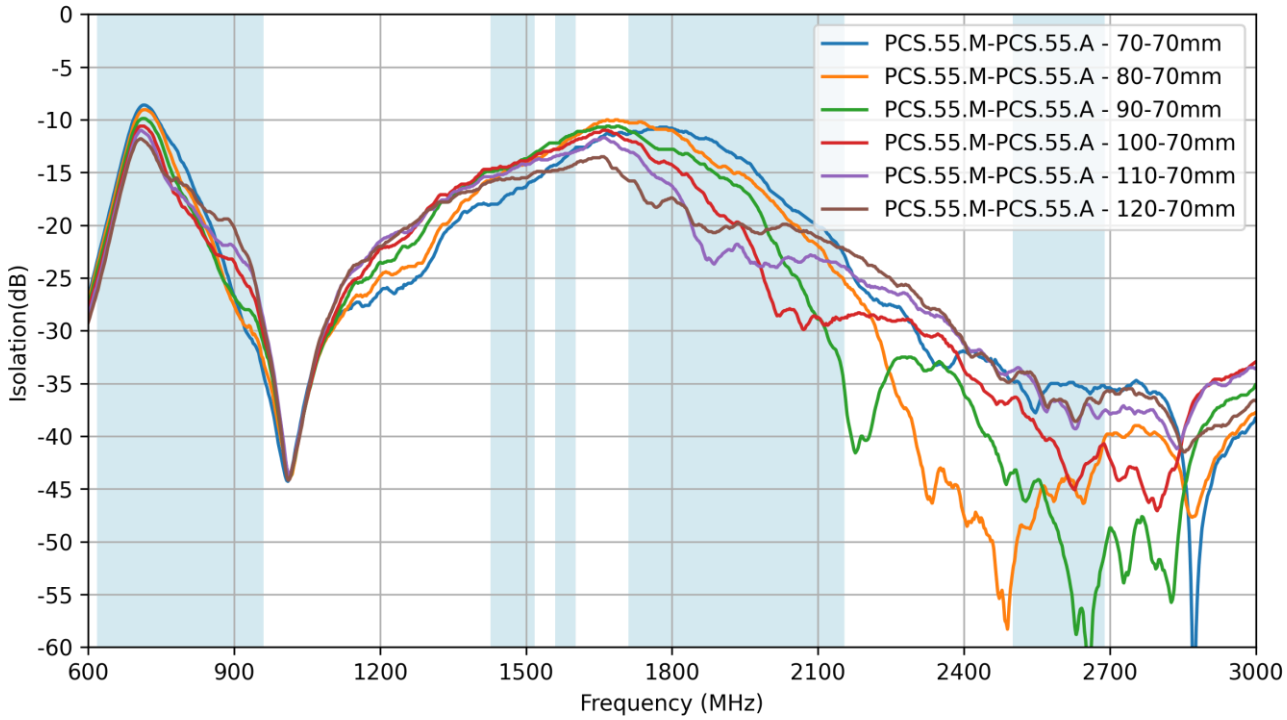

## 10.23 PCS.55.M - Peak Gain





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## 10.24 Isolation





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## Changelog for the datasheet

**SPE-23-8-012 – PCS.55.A**

| **Revision: C (Current Version)** | |
|---|---|
| Date: | 2025-07-18 |
| Changes: | Added application note and updated antenna integration guide. |
| Changes Made by: | Gary West |

**Previous Revisions**

| **Revision: B** | |
|---|---|
| Date: | 2025-07-14 |
| Changes: | Updated PSD in datasheet |
| Changes Made by: | Conor McGrath |

| **Revision: A (First Release)** | |
|---|---|
| Date: | 2023-02-10 |
| Changes: | First Release |
| Changes Made by: | Tim Kelley |



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