

# Cascadia RF Antenna Specifications

## 1.0 Summary

This document covers the Cascadia C25 and CMT antenna specifications required for regulatory documentation. Cascadia C25 is a DECT base (FP) device and the CMT is a DECT handset (PP) device. The antenna specifications included in this document are:

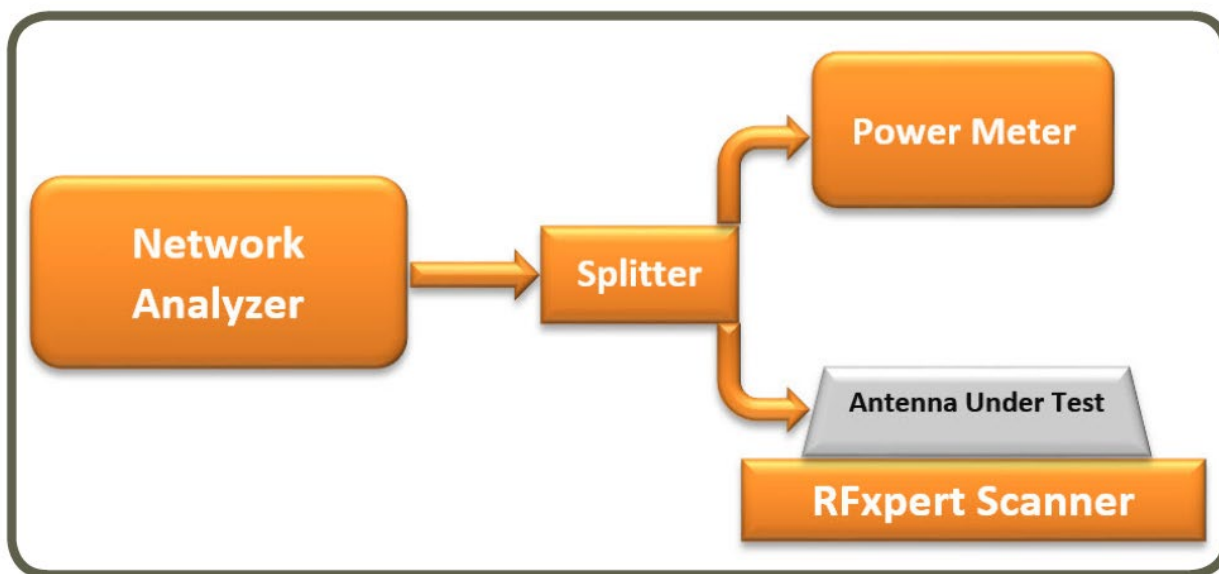
- Physical Description
- Frequency Range
- Antenna Gain
- Antenna Pattern
- S11 measurements (Log Mag, Impedance, SWR)

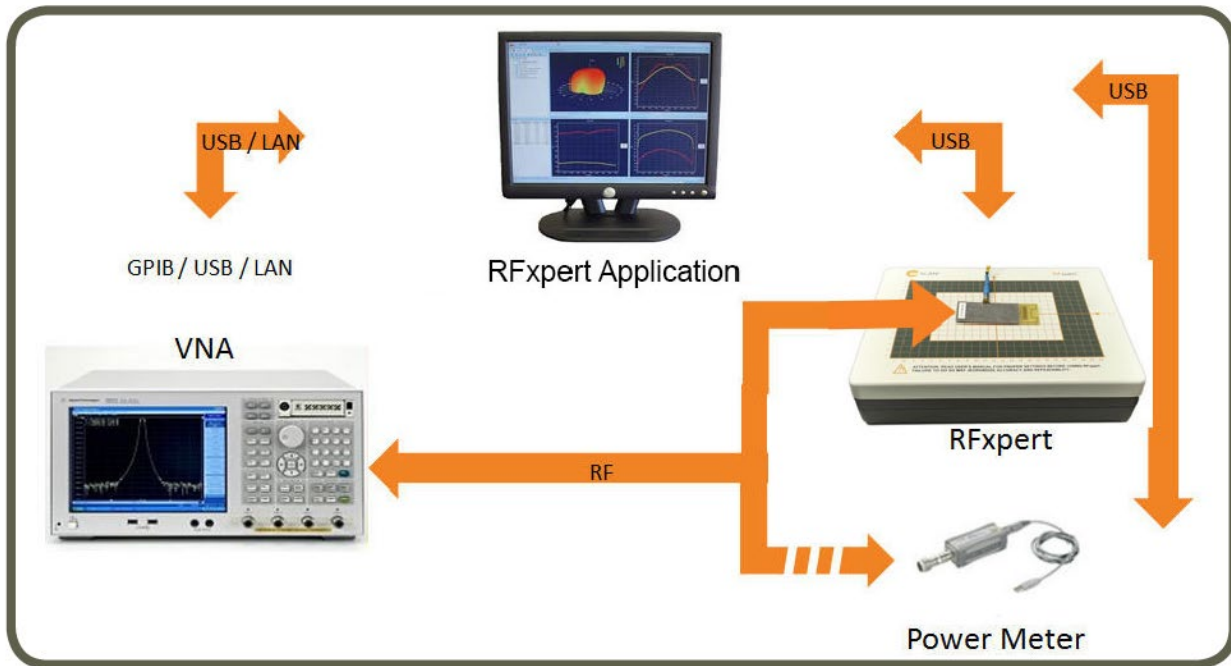
## 1.1 Antenna Measurements

### *Test Setup:*

The antenna measurements were performed inside a non-anechoic RF chamber, with the antenna-under-test integrated into the product, on a near-field antenna scanner. All antenna related measurements were performed radiated, and the pictures below show the actual test setup.

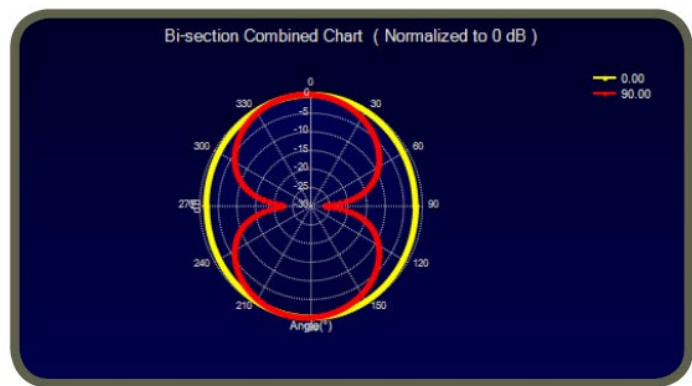
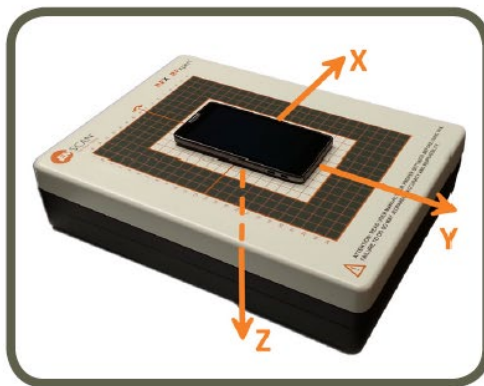
The antenna test setup is comprised of Antenna Scanner (EMSCAN RFX2), a Portable VNA (Fieldfox) and a Power Meter. The instruments are all connected as shown on the diagram below and are automatically controlled by the scanner's manufacturer commercially provided software (RFXpert).





**Antenna Test Setup: Instruments Connection Diagram**

The only required manual step in the antenna measurement process is a needed rotation of the DUT by 180 degrees along the Y-axis to get a full spherical antenna pattern as shown below.



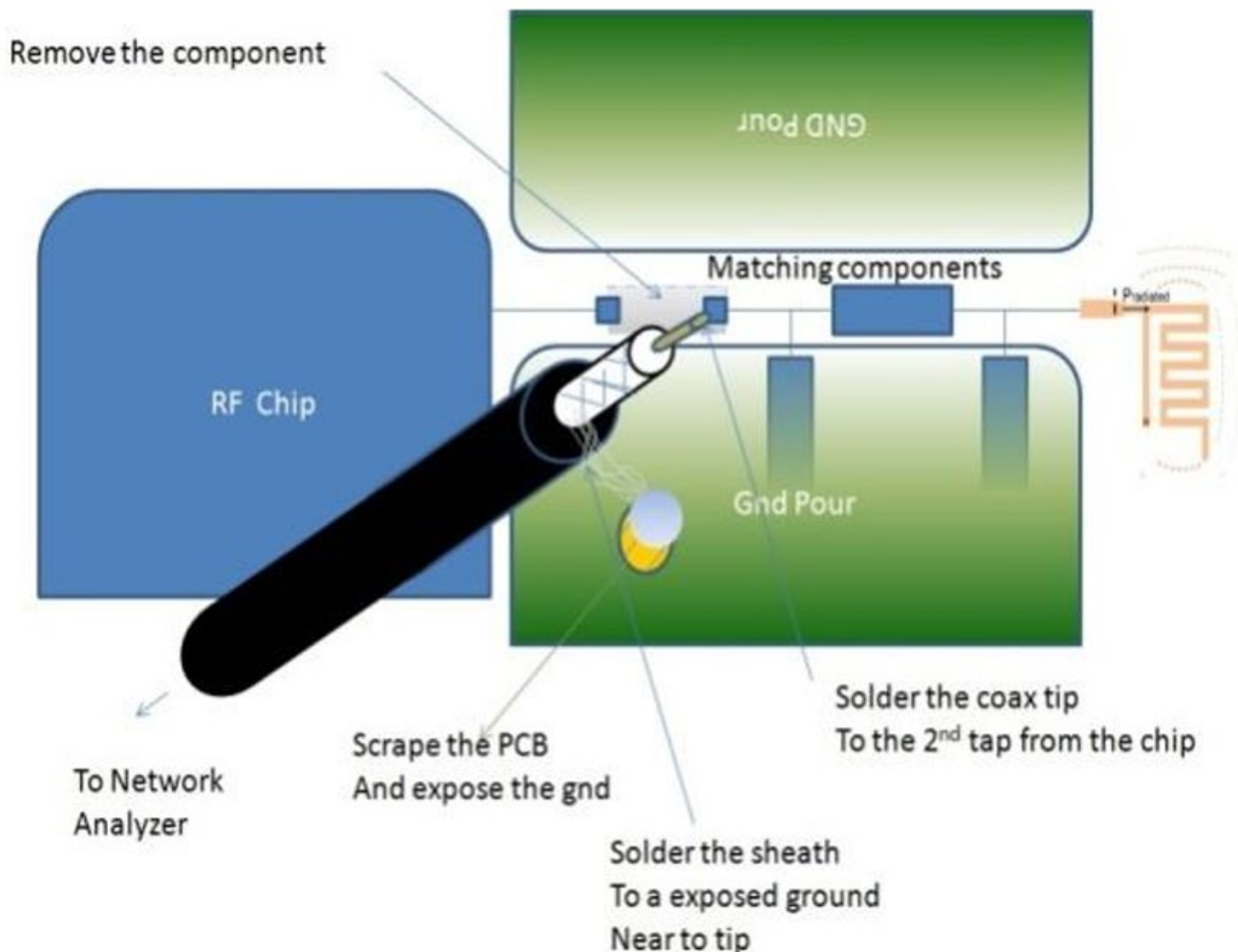
**Antenna Test Setup: Full Spherical Pattern Measurement Method**

Once the frequency range is selected, the scanner will measure and output the following Near-field and Far-field antenna parameters:

- Radiated Power (PRAD and EIRP)
- Efficiency

- Return Loss (S11)
- Gain
- 2D/3D Radiation Patterns

The antennas Return Loss (S11) and SWR were also measured independently on a benchtop Spectrum Analyzer (Siglent SSA 3075X-R). One RF pigtail was connected in line with each antenna to perform the measurement as shown below:



#### Antenna Test Setup: S11 + SWR

*Engineer that performed the test:*

Fabrice Pouani ([fabrice.pouani@synapse.com](mailto:fabrice.pouani@synapse.com)) on 02/27/2023 (CMT) and 03/09/2023 (C25)

Rob D'Angelo ([rob.dangelo@lightspeed-tek.com](mailto:rob.dangelo@lightspeed-tek.com)) on 11/08/2023 (CMT) and 11/09/2023 (C25)

*Test equipment List:*

- EMSCAN RFX2 - Antenna Analyzer | Calibrated by the Manufacturer (EMSCAN) on 08/21/2017
- KEYSIGHT U2001A - USB Power meter | Calibrated by the Manufacturer (KEYSIGHT) on 08/03/2017
- KEYSIGHT FieldFox N9923A – Portable VNA | Calibrated by the Manufacturer (KEYSIGHT) on 08/03/2017
- SIGLENT SSA 3075X-R – Spectrum Analyzer | Calibrated by the Manufacturer (SIGLENT) on 06/01/2023

## 2.0 CMT Antenna Specification

The CMT is a DECT PP device and uses a single monopole quarter wavelength wired antenna.

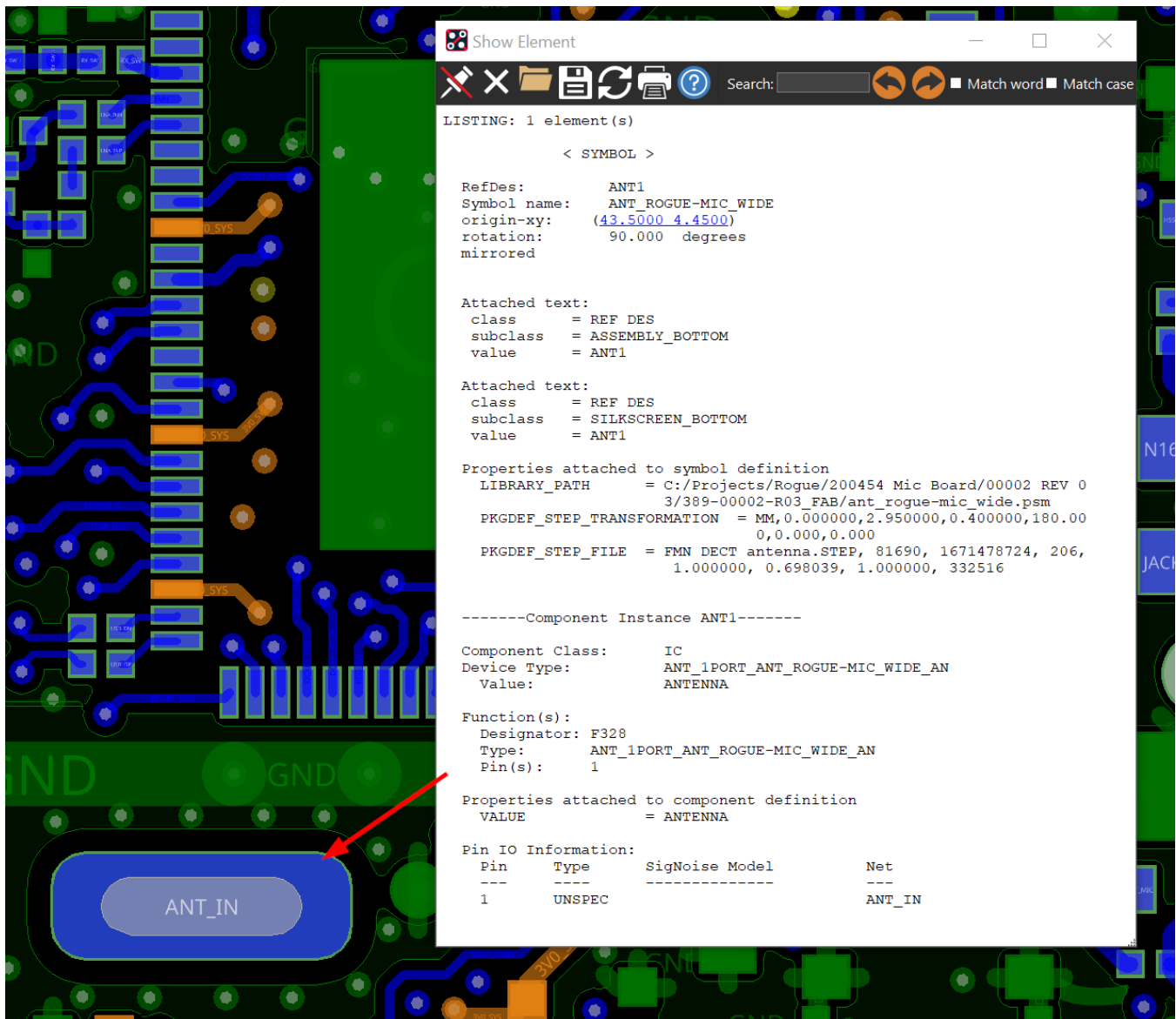
### 2.1 Physical Description

Antenna Type: Single quarter wavelength wired bent monopole.

Figure 1: PCB layout dimension. The figure contains three diagrams. The top diagram shows a 90-degree bend in a line with a diameter of 0.8. The middle diagram shows a U-shaped layout with dimensions 9.3, 18.8, 14, and 6.8. The bottom diagram shows a circular pad with dimensions R0.45, 1.6, and 2.3.

## PCB Footprint

The antenna mounts on the bottom side of the PCBA. This image shows the mounting hole specifications.



## 2.2 Frequency Range

The antenna design is optimized for DECT US and EU carrier frequencies.

- DECT US: 1.92GHz to 1.93GHz (5 carriers)
- DECT EU: 1.88GHz to 1.90GHz (10 carriers)

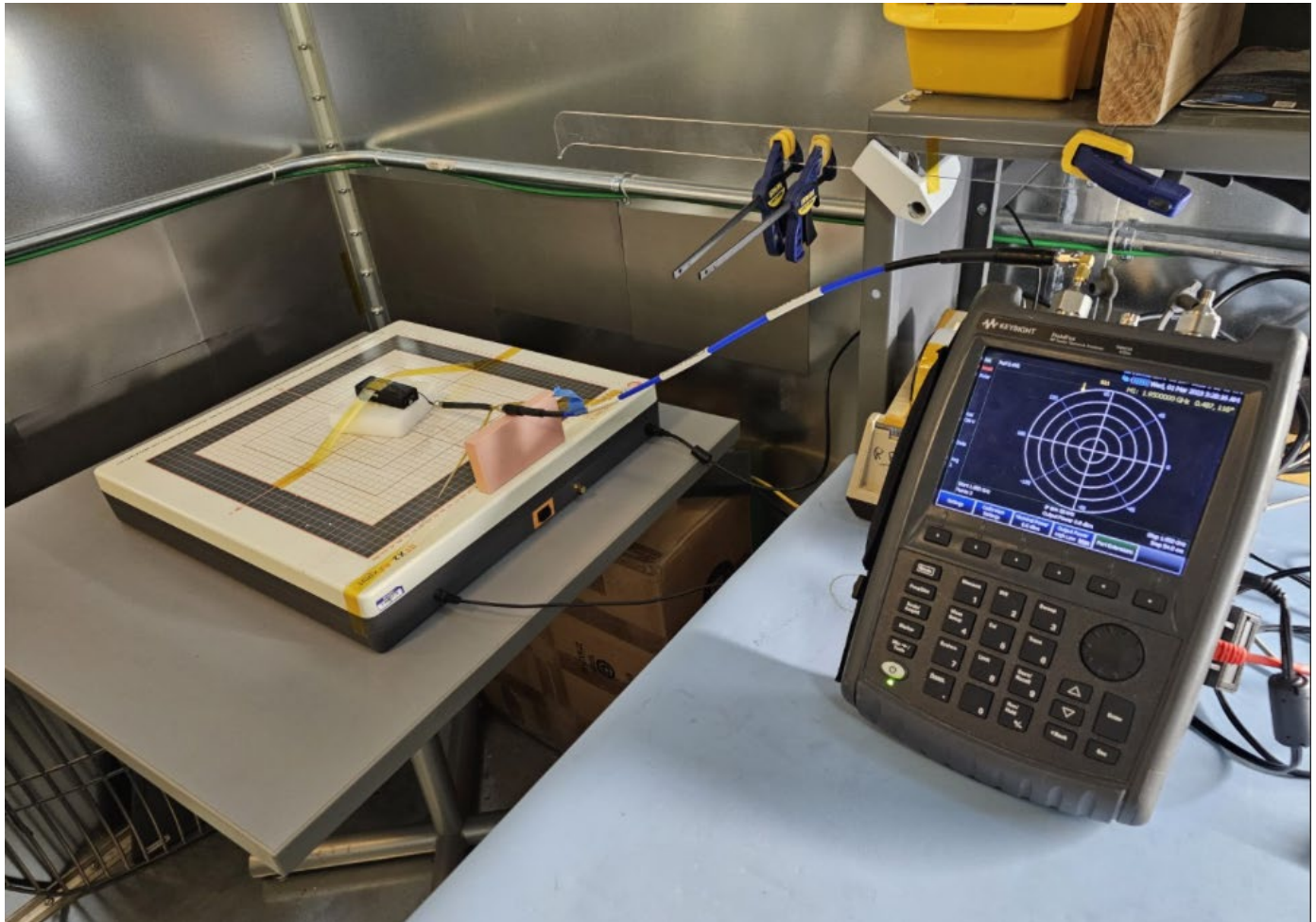


### 2.3 Antenna Gain

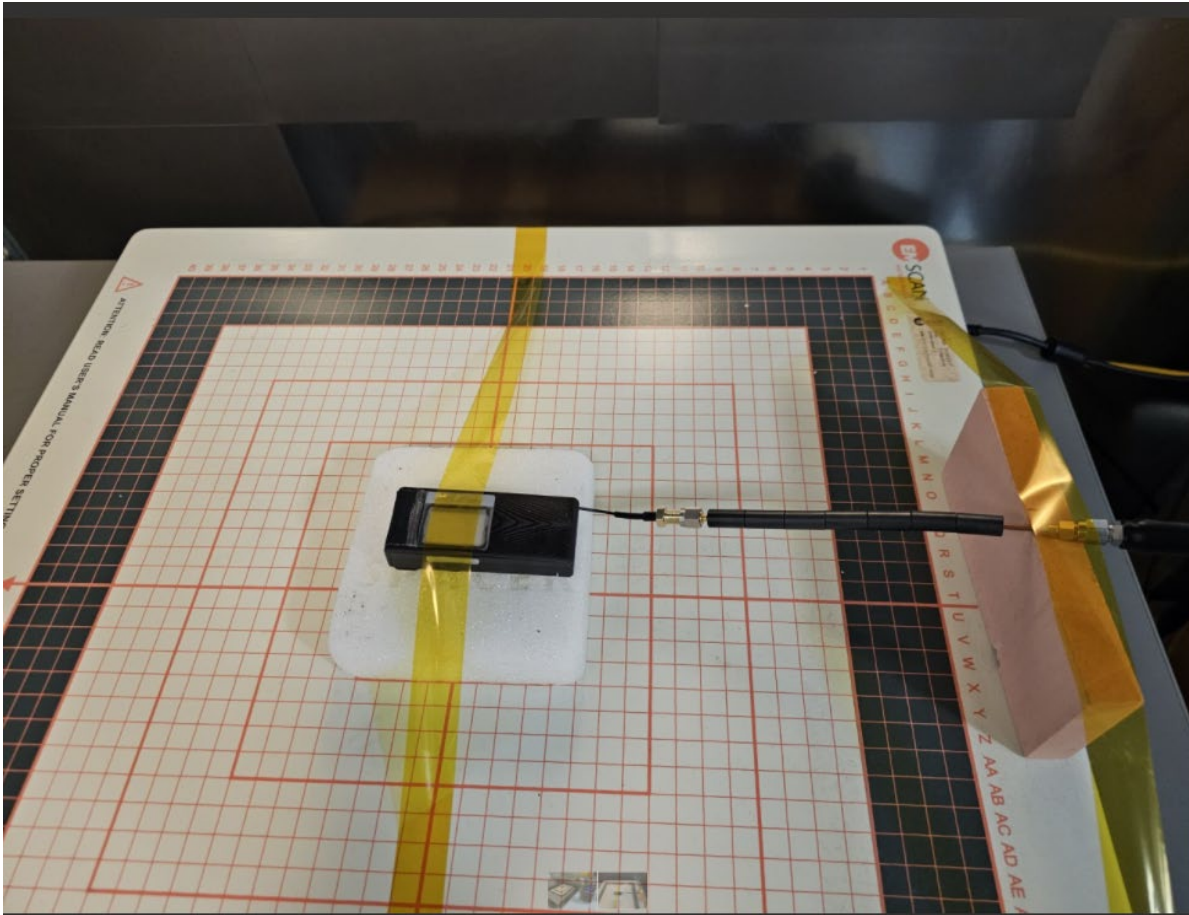
These measurements were made by Synapse as part of the RF lab evaluation.

#### *Test Setup:*

The antenna measurements were performed inside a non-anechoic RF chamber, with the antenna-under-test integrated into the product, on a near-field antenna scanner. The pictures below show the actual test setup



**Antenna Test Setup: DUT (CMT) on Antenna Scanner + Portable VNA**



**Antenna Test Setup: DUT (CMT) on Antenna Scanner**



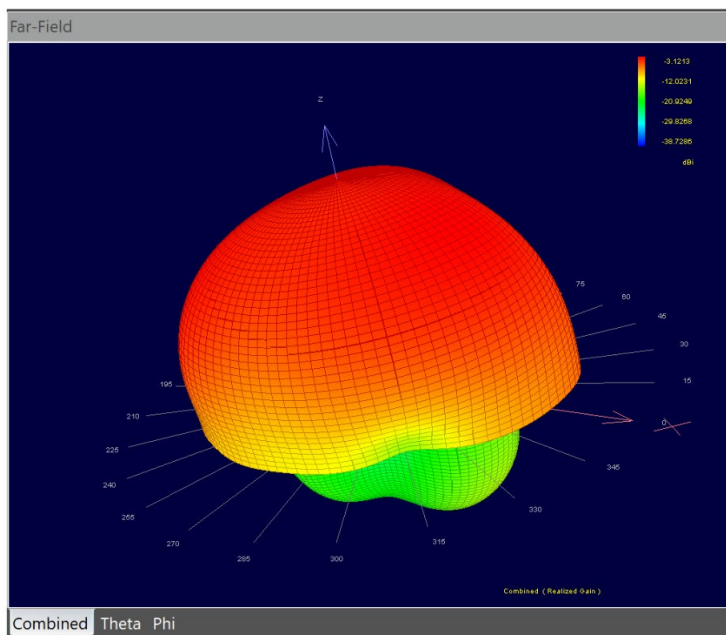
**Average Gain:** -4.6 dBi

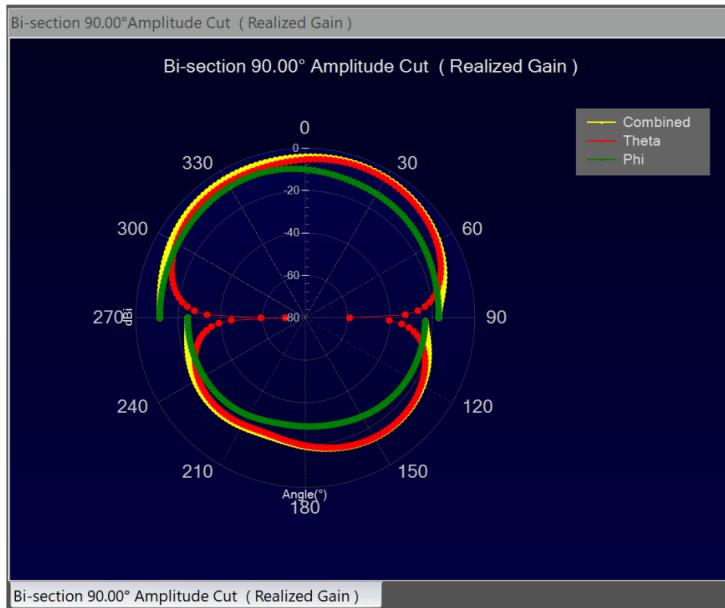
	Low 1921.536 MHz	Middle 1924.992 MHz	High 1928.448 MHz
<b>Efficiency</b>	13 %	13.25 %	13.33 %
<b>Gain</b>	-4.9 dBi	-4.31 dBi	-4.45 dBi

## 2.4 Antenna Patterns

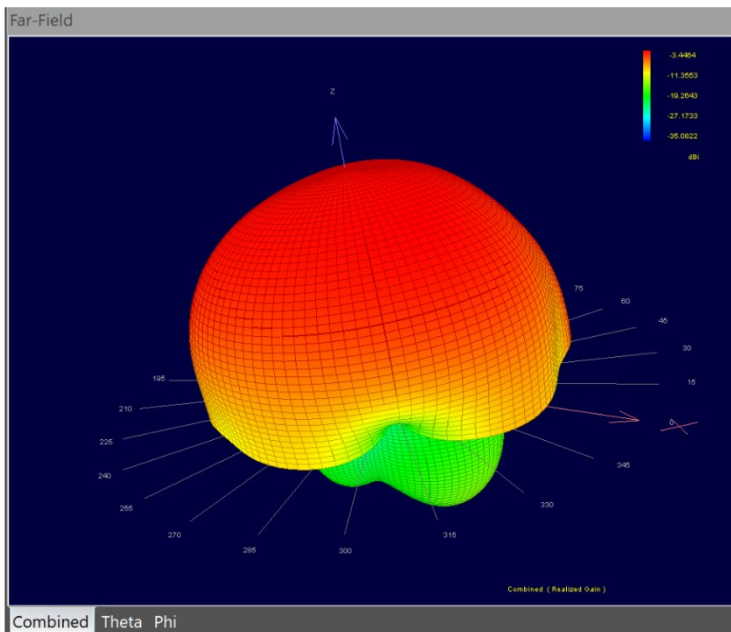
These measurements were made during lab evaluation of the RF performance in a chamber.

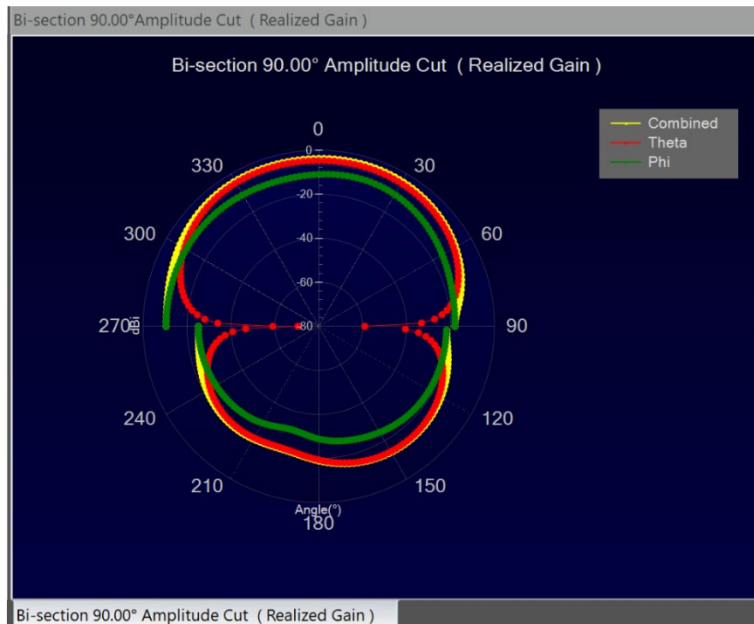
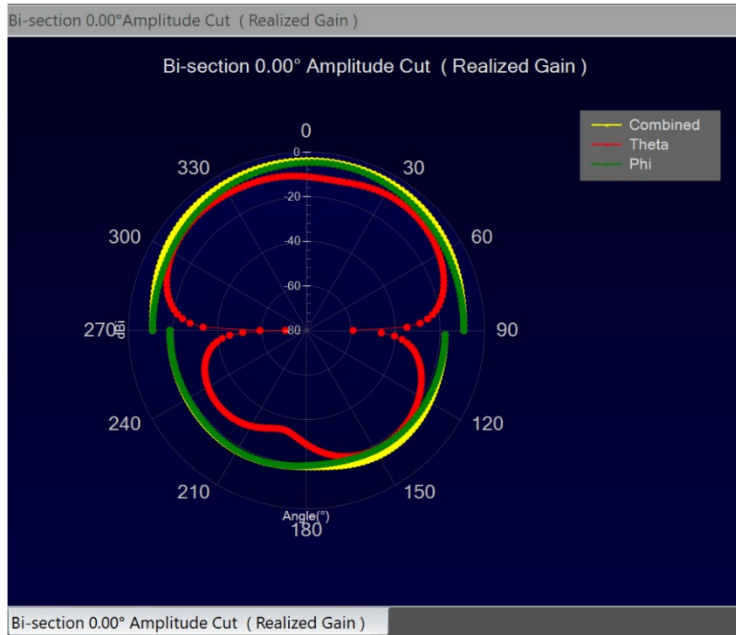
**Low Channel: 1921.536 MHz**



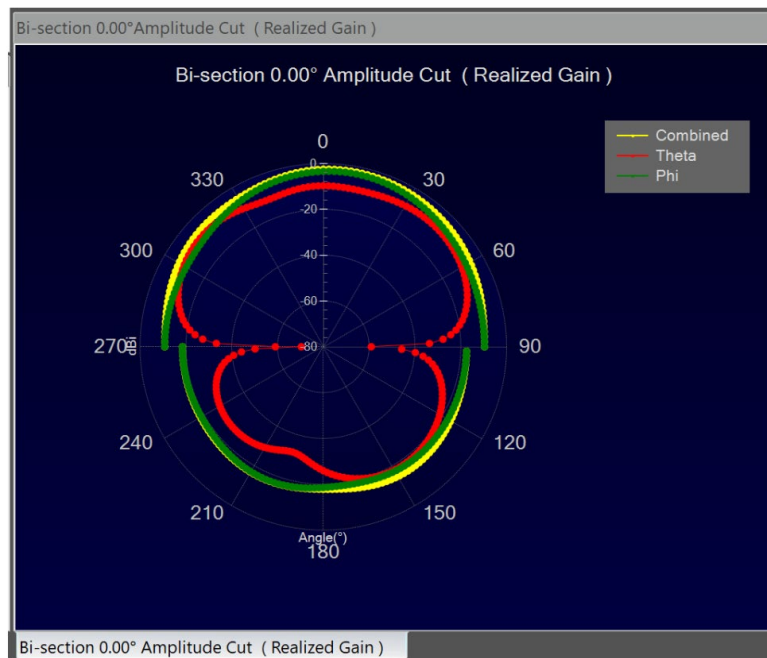
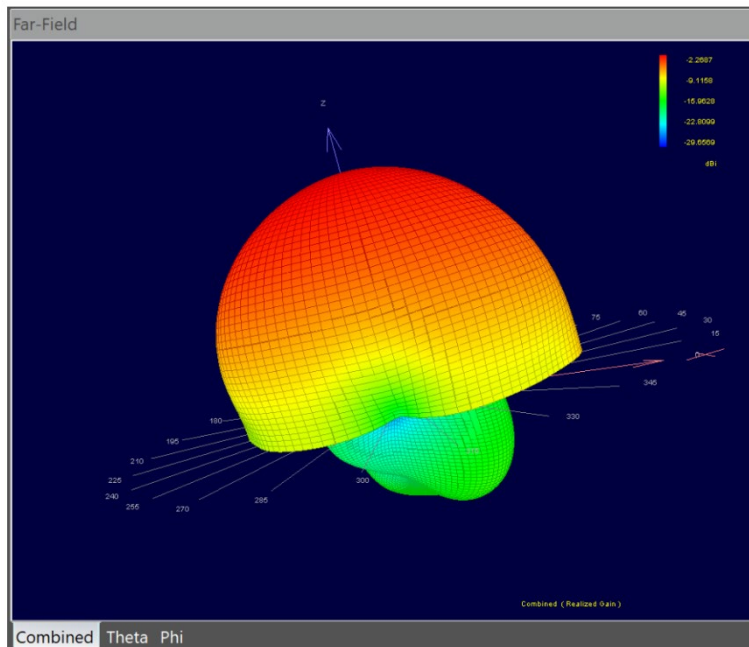


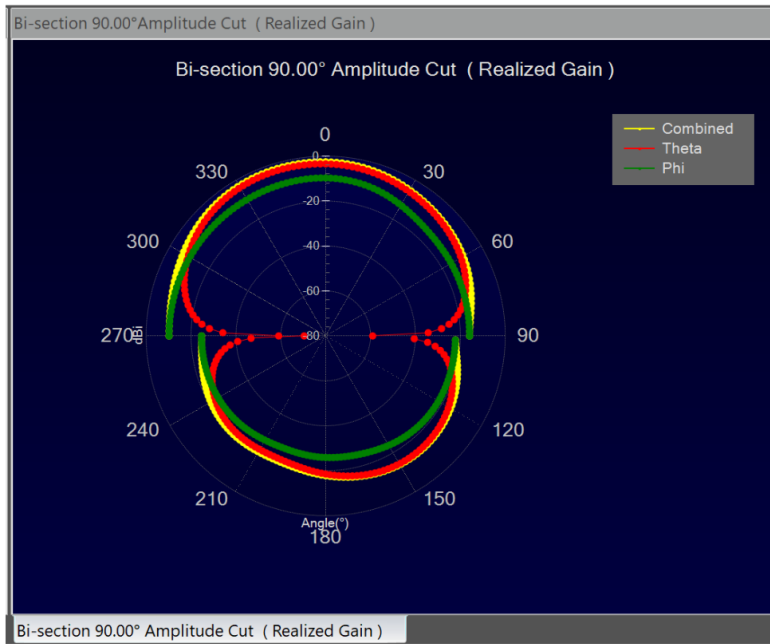
#### Mid Channel: 1924.992 MHz





High Channel: 1928.448 MHz







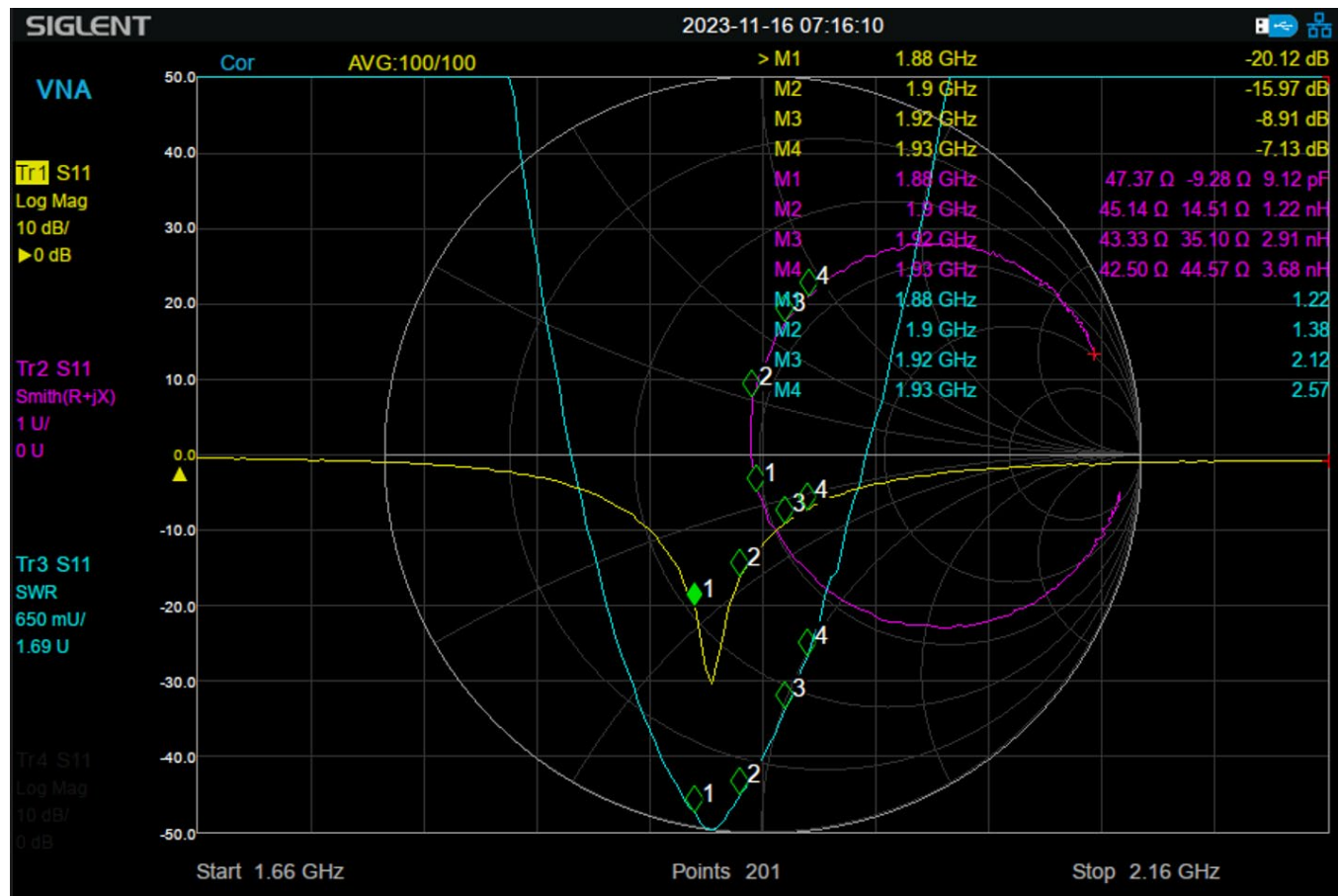
## VNA Measurements

The S11 log magnitude, SWR and Impedance of the antenna is shown below for the CMT.

Measurement Instrument: Siglent SSA 3075X-R

Legend:

- Yellow trace is S11 Log Mag
- Magenta trace is Impedance
- Cyan trace is SWR



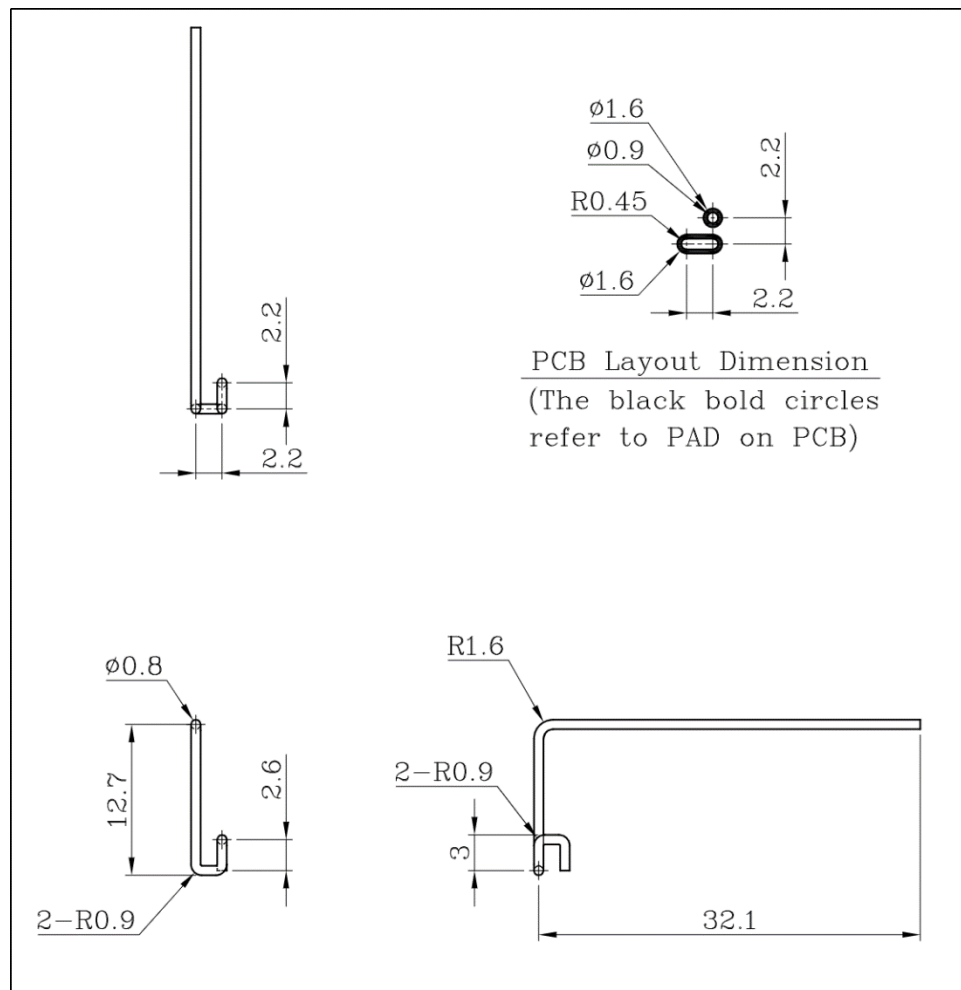
### 3.0 C25 Antenna Specification

The C25 is a DECT FP device and utilizes DECT antenna diversity with dual monopole quarter wavelength wired antennas. Note that ANT1 is defined as the antenna at the front of the C25 and ANT2 is the antenna on the side of the unit.

#### 3.1 Physical Description

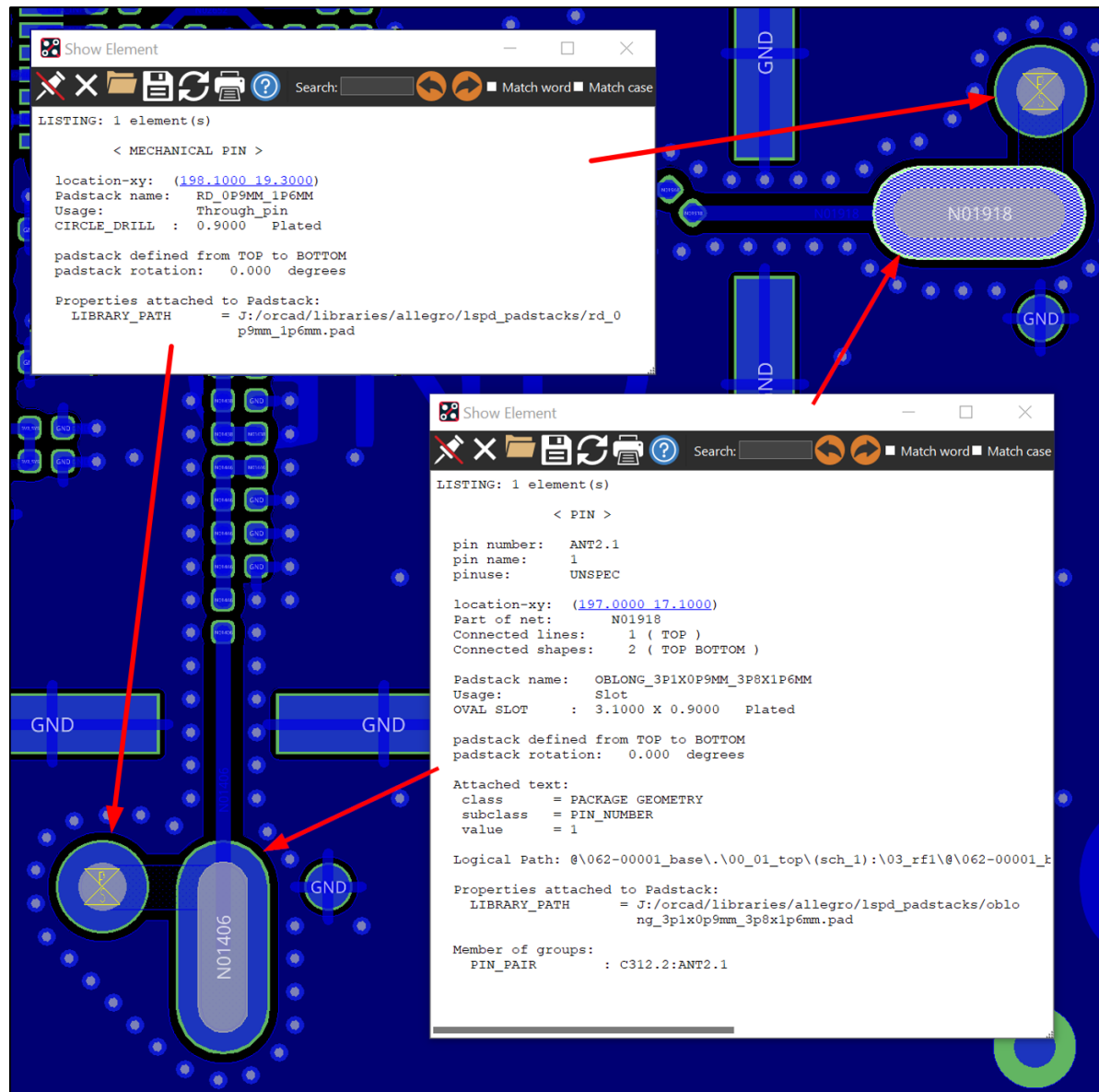
Antenna Type: Dual quarter wavelength wired bent monopole.

Drawing: Dimensions are in mm



## PCB Footprint

The antennas mount on the top side of the PCBA. The image below shows the mounting specifications on the PCB.



## 3.2 Frequency Range

The antenna design is optimized for DECT US and EU carrier frequencies.

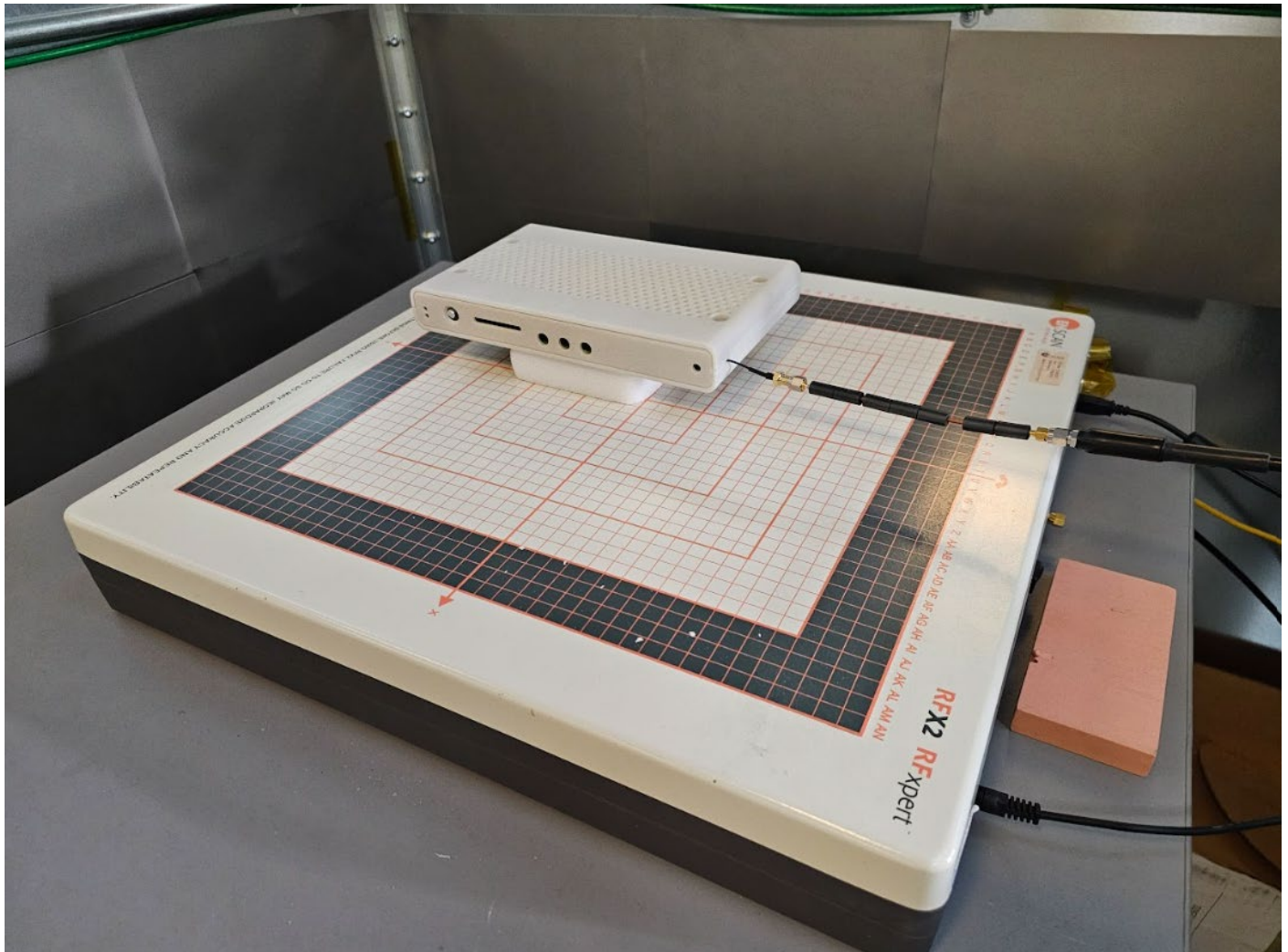
- DECT US: 1.92GHz to 1.93GHz (5 carriers)
- DECT EU: 1.88GHz to 1.90GHz (10 carriers)

### 3.3 Antenna Gain

These measurements were made during lab evaluation of the RF performance.

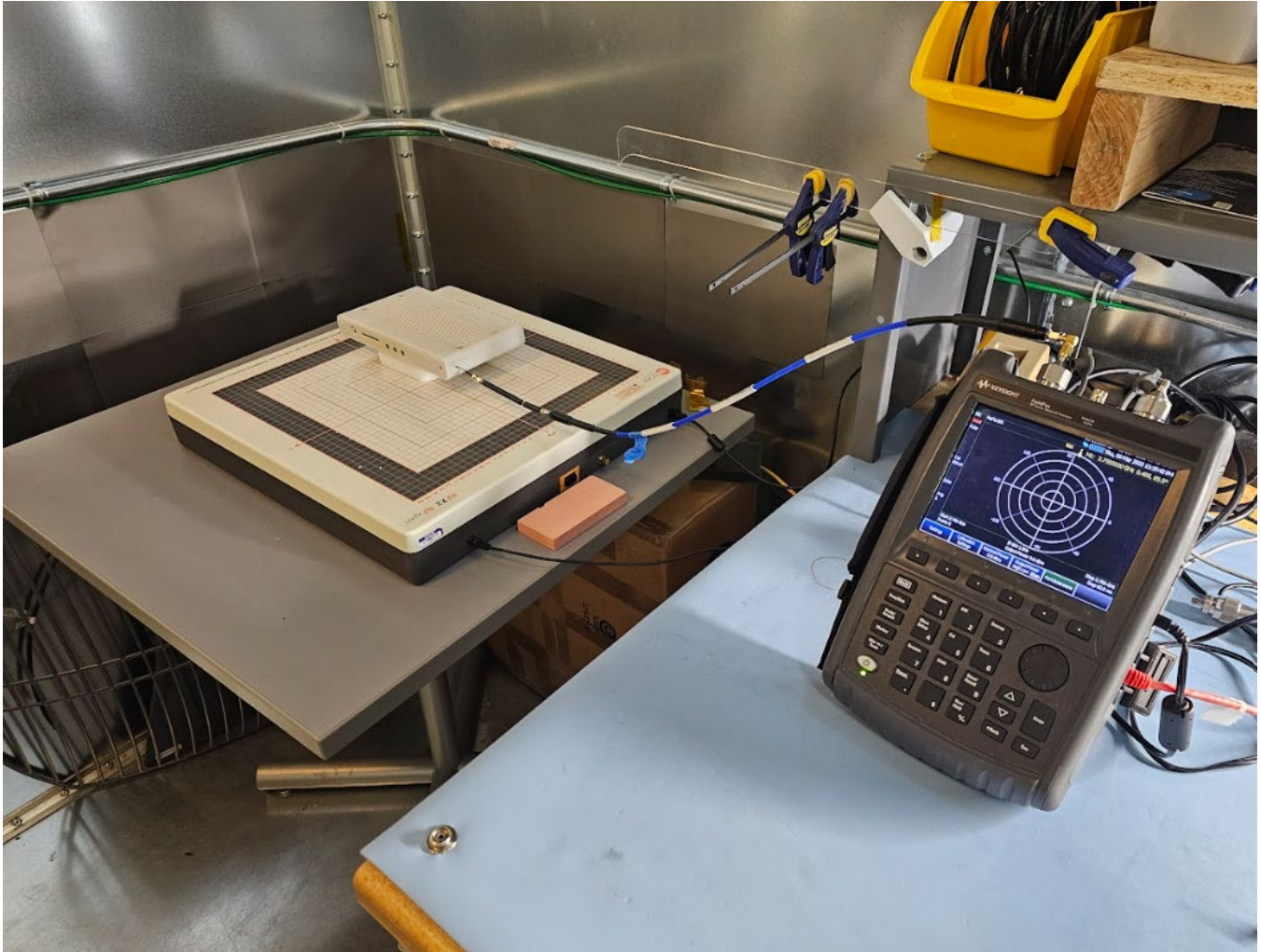
#### *Test Setup:*

The antenna measurements were performed inside a non-anechoic RF chamber, with the antenna-under-test integrated into the product, on a near-field antenna scanner. The pictures below show the actual test setup



**Antenna Test Setup: DUT (C25) on Antenna Scanner**





**Antenna Test Setup: DUT (C25) on Antenna Scanner + Portable VNA**



**Antennas Type:** Bent Monopole  
**Average Gain:** ANT1 (6.7 dBi) ANT2 (6.6 dBi)

<b>ANT1</b>	<b>Low 1921.536 MHz</b>	<b>Middle 1924.992 MHz</b>	<b>High 1928.448 MHz</b>
<b>Efficiency</b>	86 %	84 %	84.3 %
<b>Gain</b>	6.5 dBi	6.7 dBi	6.6 dBi

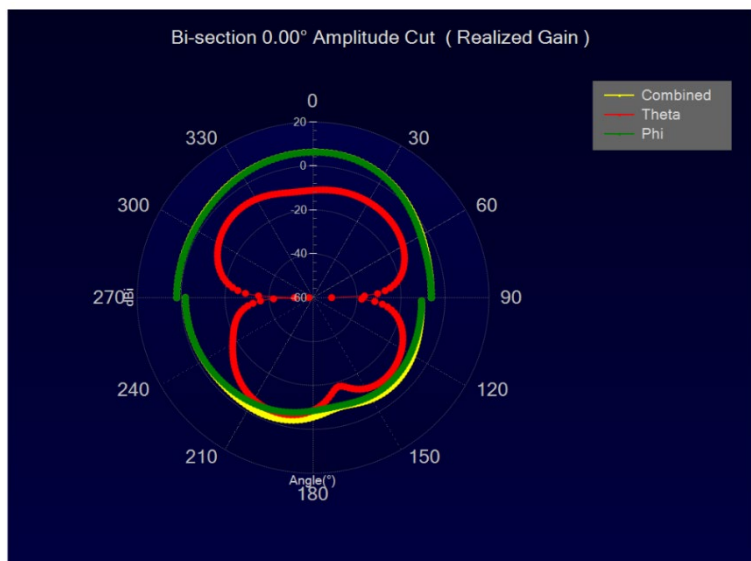
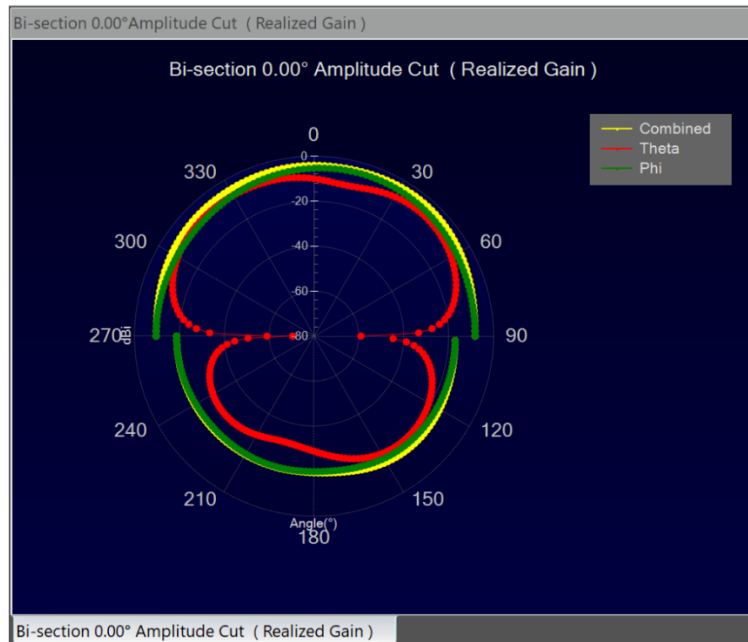
<b>ANT2</b>	<b>Low 1921.536 MHz</b>	<b>Middle 1924.992 MHz</b>	<b>High 1928.448 MHz</b>
<b>Efficiency</b>	99 %	99 %	99.3 %
<b>Gain</b>	6.5 dBi	6.4 dBi	6.6 dBi

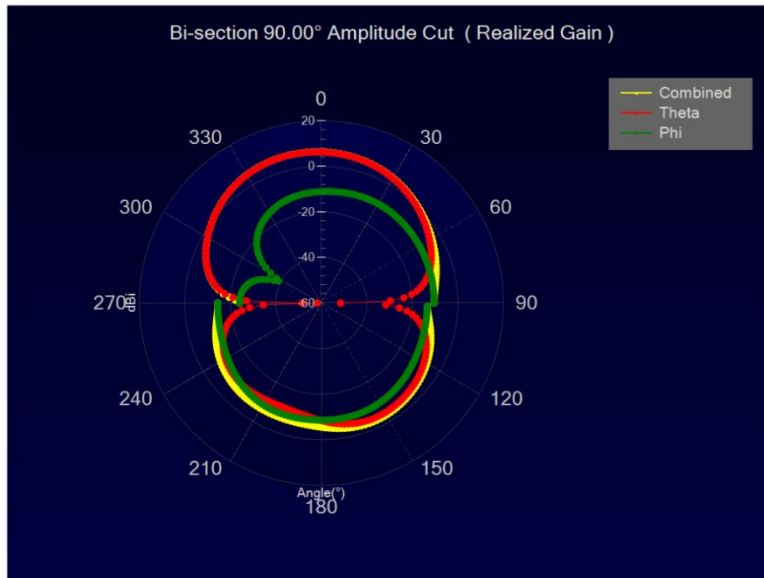
### 3.4 Antenna Pattern

These measurements were made during lab evaluation of the RF performance in a chamber.

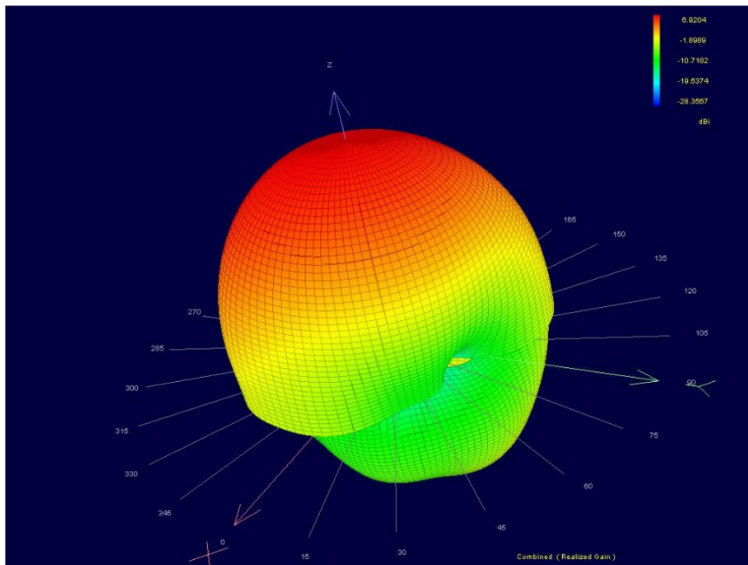
ANT1

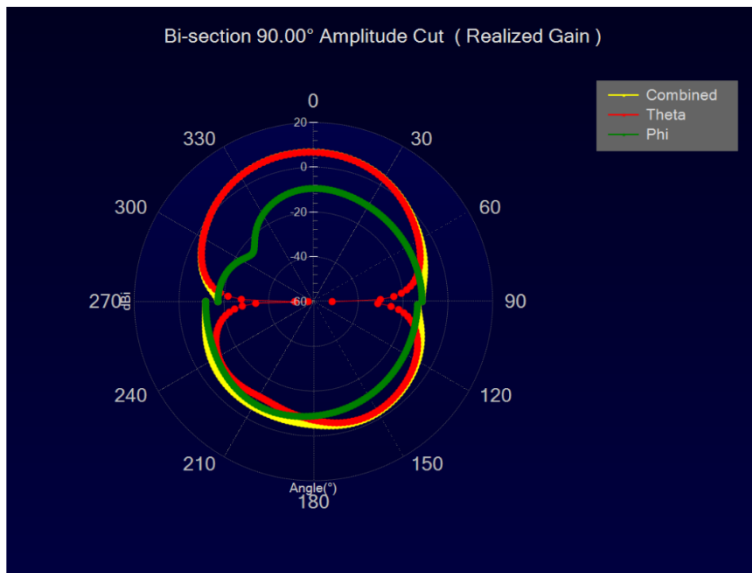
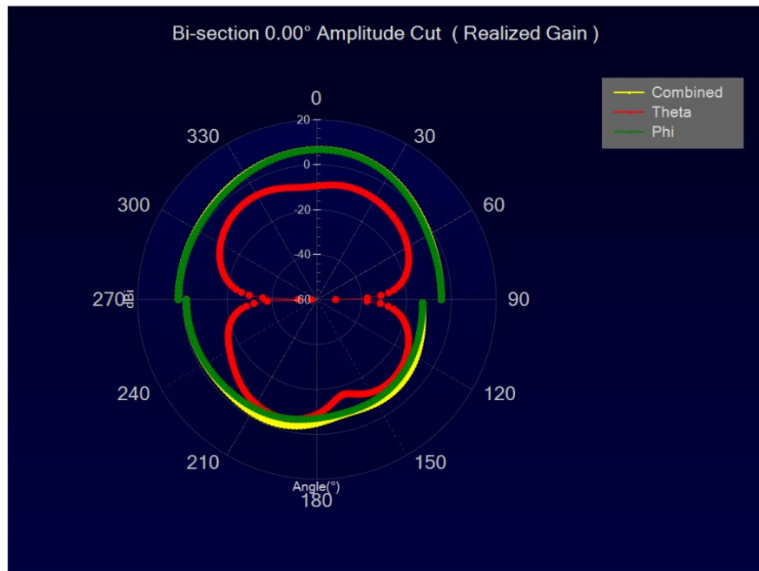
**Low Channel: 1921.536 MHz**



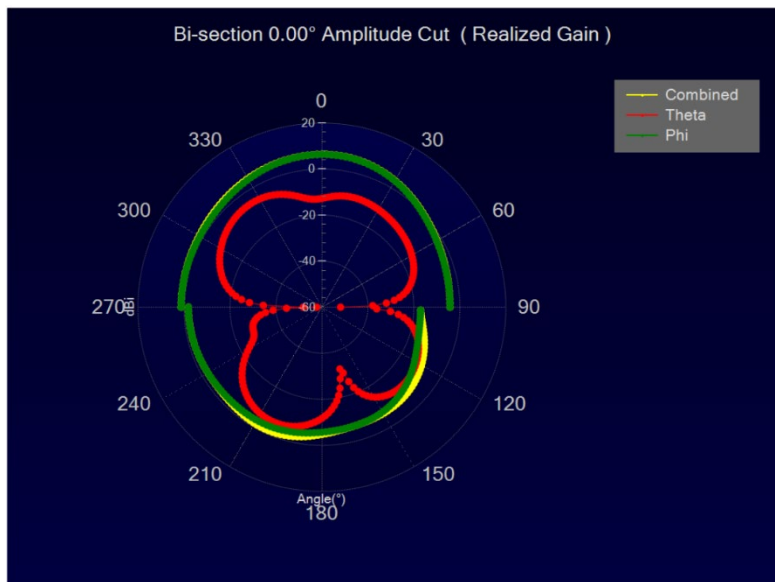
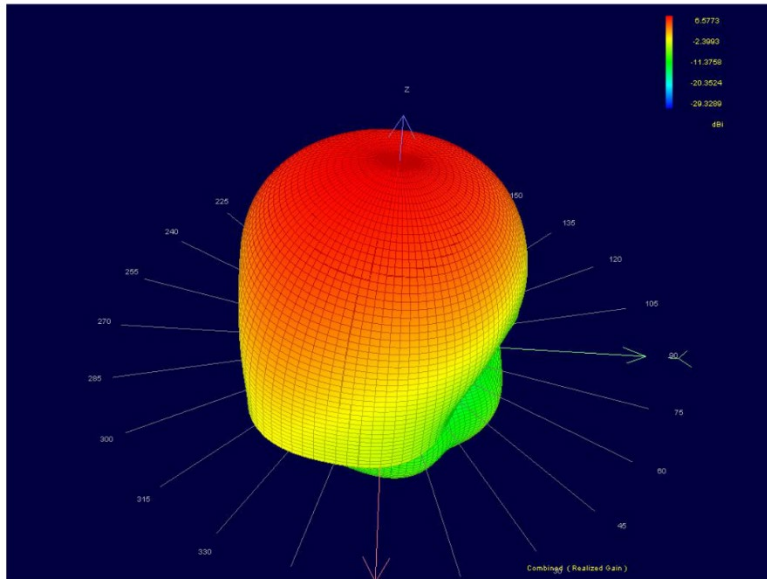


Mid Channel: 1924.992 MHz

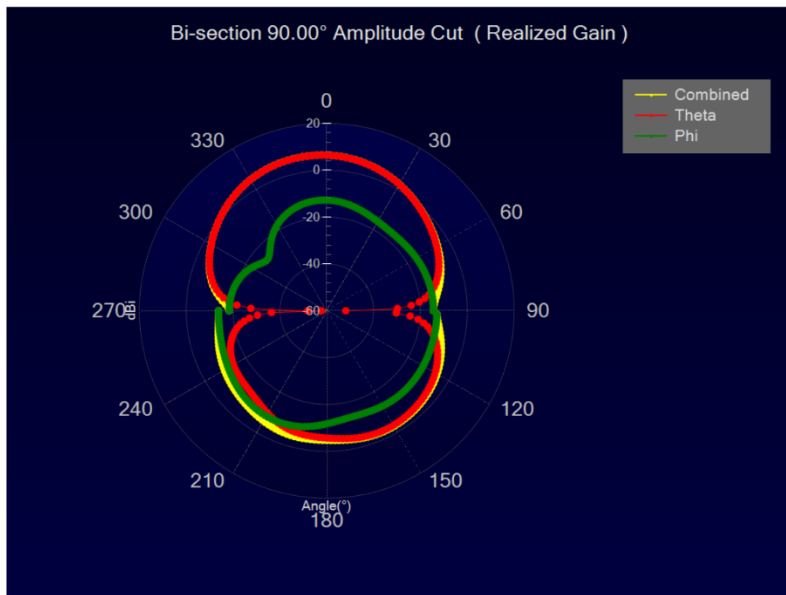




High Channel: 1928.448 MHz

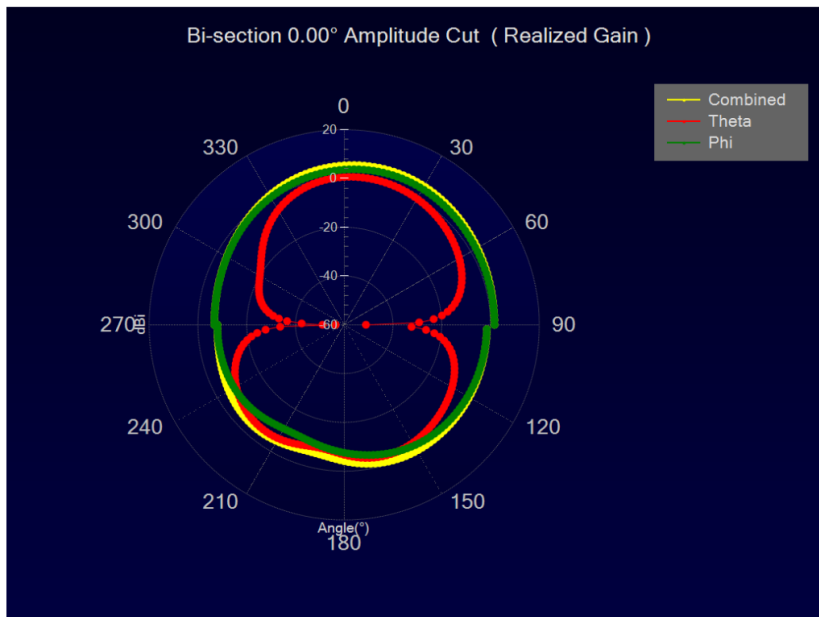
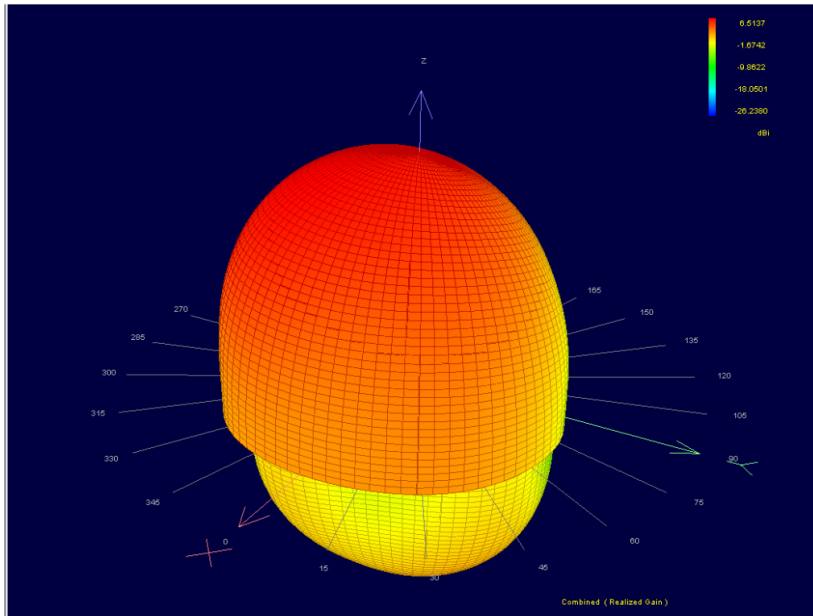


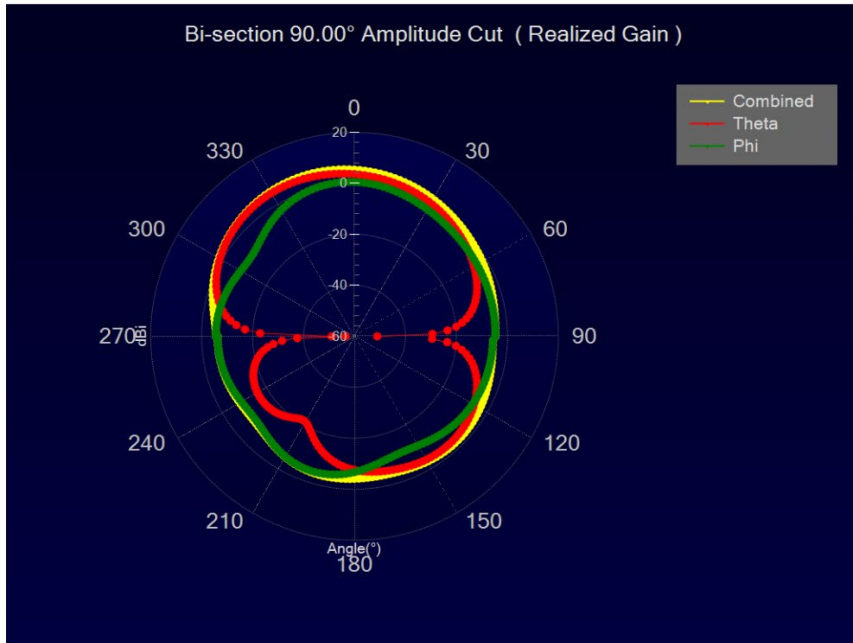




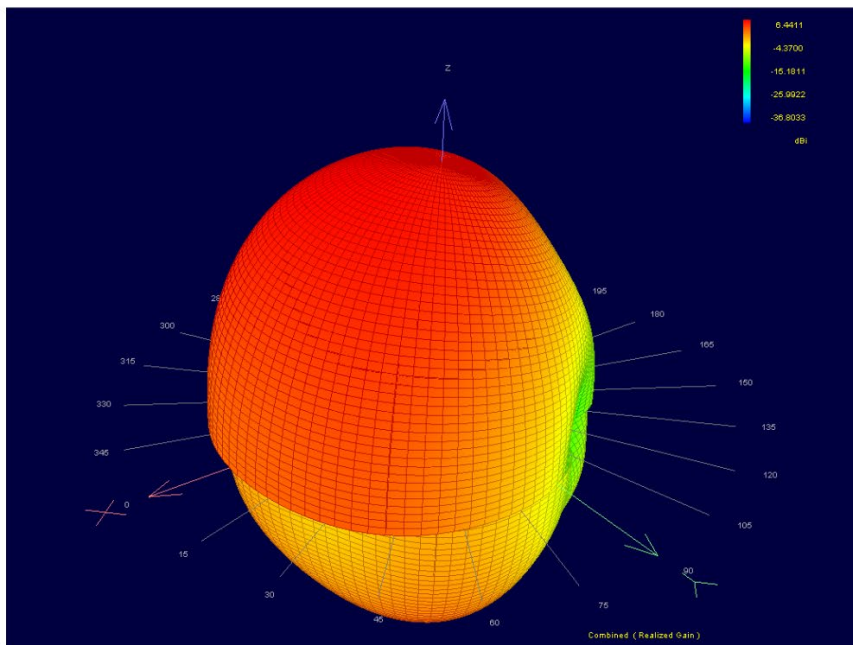
ANT2

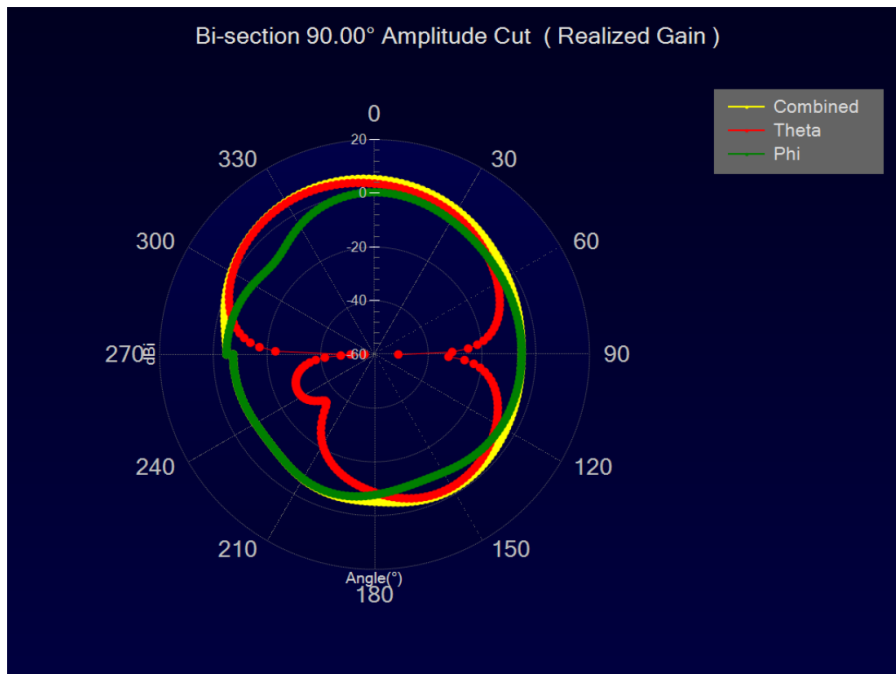
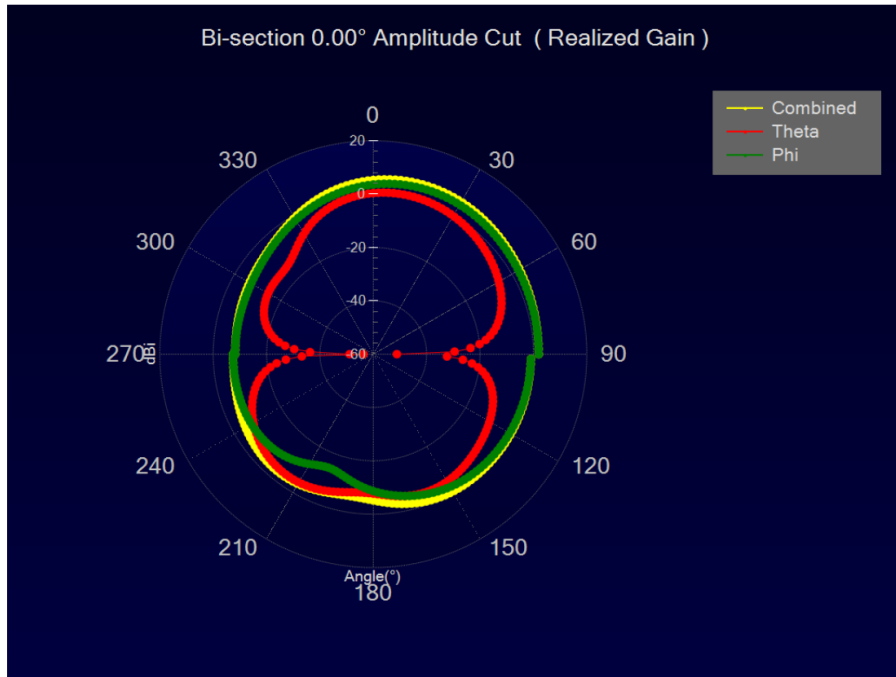
Low Channel: 1921.536 MHz



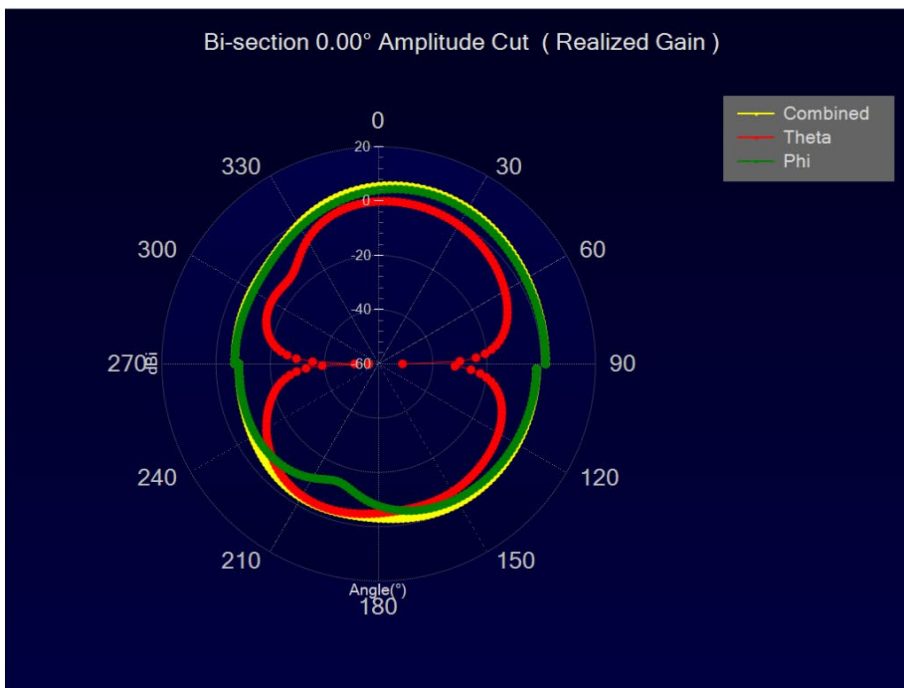
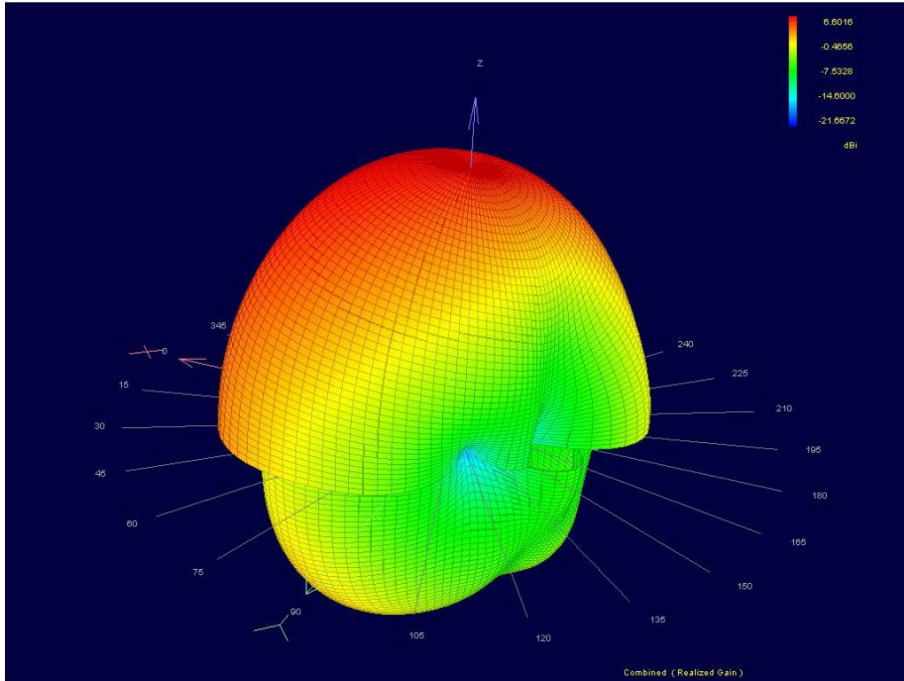


Mid Channel: 1924.992 MHz

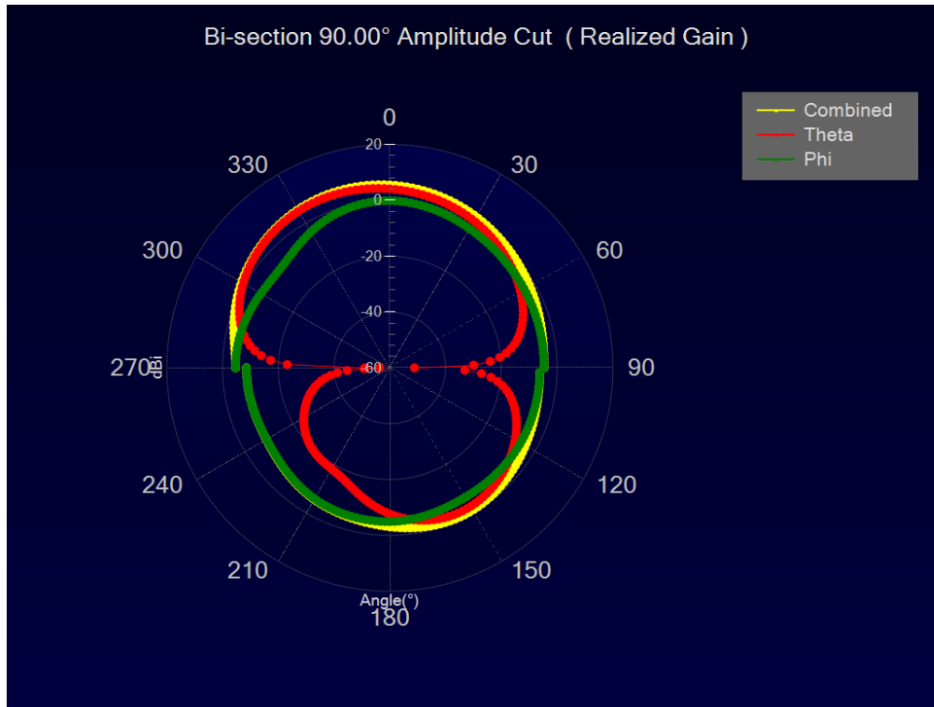




**High Channel: 1928.448 MHz**







## VNA Measurements

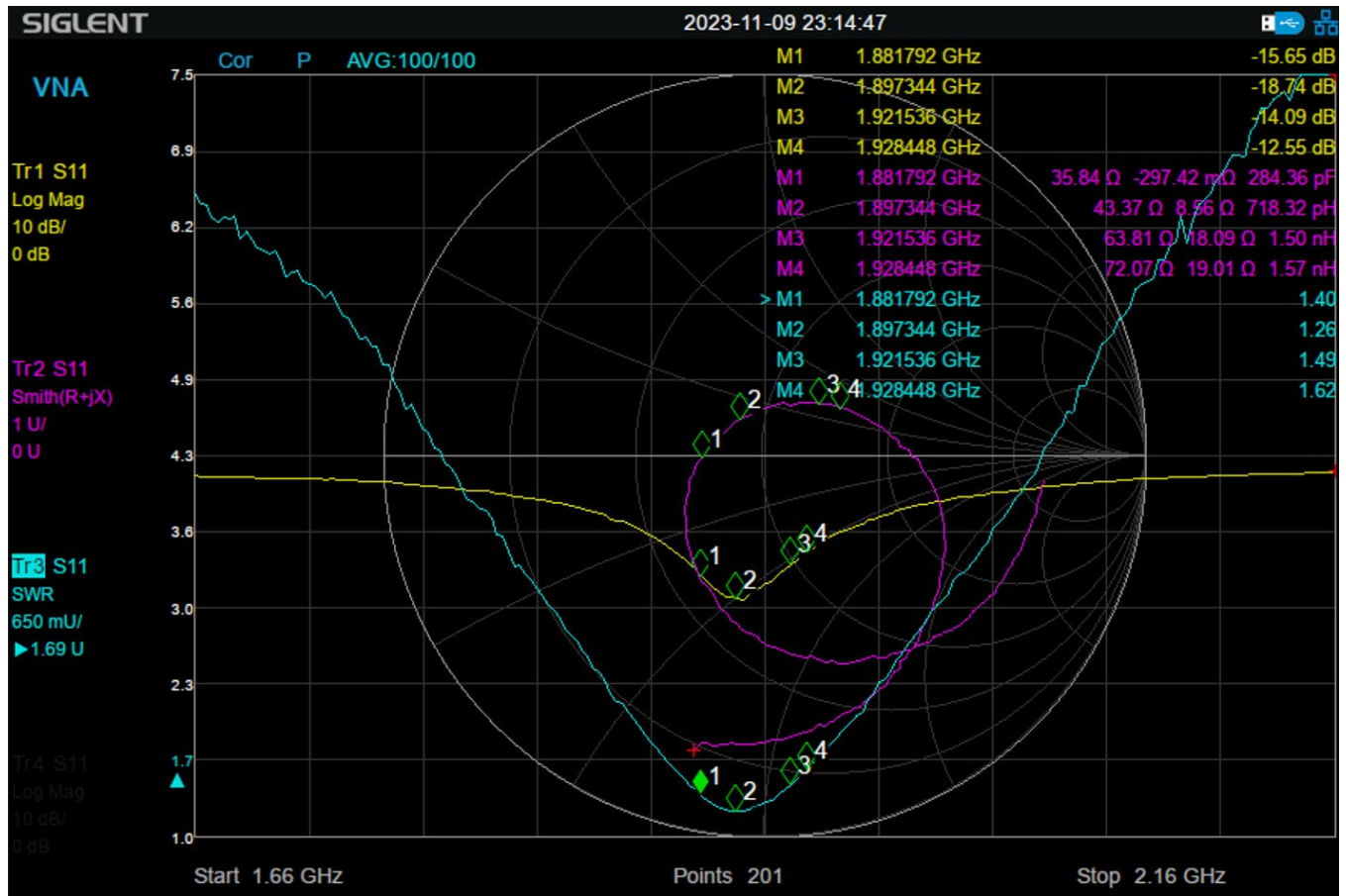
The S11 log magnitude, SWR and Impedance of the antenna is shown below for the C25 ANT1 and ANT2.

Measurement Instrument: Siglent SSA 3075X-R

Legend:

- Yellow trace is S11 Log Mag
- Magenta trace is Impedance
- Cyan trace is SWR

### ANT1



ANT2

