

# RF Report

Aguardio ApS

H2O Leak Sensor, Model: H2O Leak Sensor

## Antenna Gain Measurements

Prepared for: Aguardio Aps  
The Spring  
Hasselager Allé 8  
8260 Viby J  
Denmark



Add value.  
Inspire trust.

## COMMERCIAL-IN-CONFIDENCE

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### SIGNATURE

A handwritten signature in black ink, appearing to read 'S Marshall'.

| NAME           | JOB TITLE       | RESPONSIBLE FOR      | ISSUE DATE   |
|----------------|-----------------|----------------------|--------------|
| Steve Marshall | Senior Engineer | Authorised Signatory | 30 June 2023 |

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

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# 1 Report Summary

## 1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

| Issue | Description of Change | Date of Issue |
|-------|-----------------------|---------------|
| 1     | First Issue           | 30-June-2023  |

**Table 1**

## 1.2 Introduction

|                          |                                  |
|--------------------------|----------------------------------|
| Applicant                | TÜV SÜD Danmark ApS              |
| Manufacturer             | Aguardio ApS                     |
| Model Number(s)          | H20 Leak Sensor                  |
| Serial Number(s)         | Not serialised (FAR 0724725-003) |
|                          | Not serialised (FAR 0724725-004) |
|                          | Not serialised (FAR 0724725-008) |
|                          | Not serialised (FAR 0724725-011) |
|                          | Not serialised (FAR 0724725-012) |
|                          | Not serialised (FAR 0724725-014) |
| Hardware Version(s)      | 1.5B                             |
| Software Version(s)      | 1.0.1                            |
| Number of Samples Tested | 6                                |
| Order Number             | Signed QAF detailing             |
| Date                     | 12-April-2023                    |
| Date of Receipt of EUT   | 24-April-2023                    |
| Start of Test            | 02-June-2023                     |
| Finish of Test           | 27-June -2023                    |
| Name of Engineer(s)      | Aakash Rawal                     |



### 1.3 Product Information

#### 1.3.1 Technical Description

The Equipment under test (EUT) was a H2O Leak Sensor.

The primary function of the EUT is to detect water leaks by measuring the temperature difference between the water inlet pipe temperature and the ambient room temperature. The difference in temperature triggers the alarm.

#### 1.3.2 Test Configuration

| Configuration               | Description                                                 |
|-----------------------------|-------------------------------------------------------------|
| Battery Powered Leak Sensor | The EUT was powered by a 3.6V Li-SOCl <sub>2</sub> Battery. |

**Table 2**

#### 1.4 EUT Modification Record

The table below details modifications made to the EUT during the test programme.

The modifications incorporated during each test are recorded on the appropriate test pages.

| Modification State                                                                                                                                                                                                                                | Description of Modification still fitted to EUT | Modification Fitted By | Date Modification Fitted |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------------------------|--------------------------|
| Model: H2O Leak Sensor, Serial Number: Not serialised (FAR 0724725-003), Not serialised (FAR 0724725-004), Not serialised (FAR 0724725-008), Not serialised (FAR 0724725-011), Not serialised (FAR 0724725-012), Not serialised (FAR 0724725-014) |                                                 |                        |                          |
| 0                                                                                                                                                                                                                                                 | As supplied by the customer                     | Not Applicable         | Not Applicable           |

**Table 3**



## 1.5 Test Location

TÜV SÜD conducted the following tests at our Octagon House Test Laboratory.

|                                                                 |                     |
|-----------------------------------------------------------------|---------------------|
| Test Name                                                       | Name of Engineer(s) |
| Configuration and Mode: Battery Powered Leak Sensor - Operating |                     |
| Radiated Disturbance                                            | Aakash Rawal        |

**Table 4**

Office Address:

TÜV SÜD  
Octagon House  
Concorde Way  
Fareham  
Hampshire  
PO15 5RL  
United Kingdom

## 2 Test Details

### 2.1 Antenna Gain Measurements

#### 2.1.1 Equipment Under Test and Modification State

Not serialised (FAR 0724725-003)  
Not serialised (FAR 0724725-004)  
Not serialised (FAR 0724725-008)  
Not serialised (FAR 0724725-011)  
Not serialised (FAR 0724725-012)  
Not serialised (FAR 0724725-014)

#### 2.1.2 Date of Test

02-June-2023 to 27-June-2023

#### 2.1.3 Test Method

The manufacturer provided a modified sample with a temporary 50 ohm SMA connector in place of the antenna which was used to perform a conducted power measurement in accordance with ANSI C63.10 clause 11.9.1.1.

The non-modified sample was then placed in a fully anechoic chamber on a turntable at 1.5m height at a measurement distance of 1m. The equipment under test (EUT) was placed in both flat and upright positions to establish which plane provided the maximum EIRP.

The chamber is calibrated to make EIRP measurements thus for each frequency point the total loss from the centre of the turntable is known and set as a correction factor on the measuring equipment. The EUT was oriented in flat and upright positions and rotated in azimuth in 10 degree steps and the EIRP recorded as shown on the polar plots in the test result section below.

#### 2.1.4 Environmental Conditions

|                     |                |
|---------------------|----------------|
| Ambient Temperature | 22.1 – 24.5 °C |
| Relative Humidity   | 39.9 – 44.7 %  |

#### 2.1.5 Test Equipment Diagram

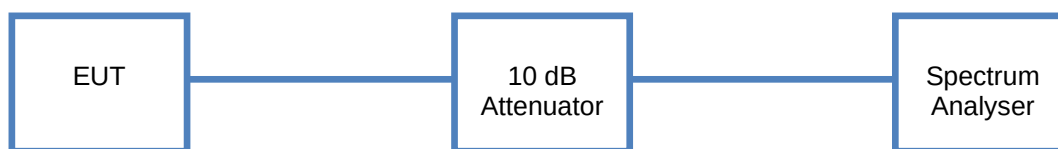


Figure 1 – Conducted Test Setup

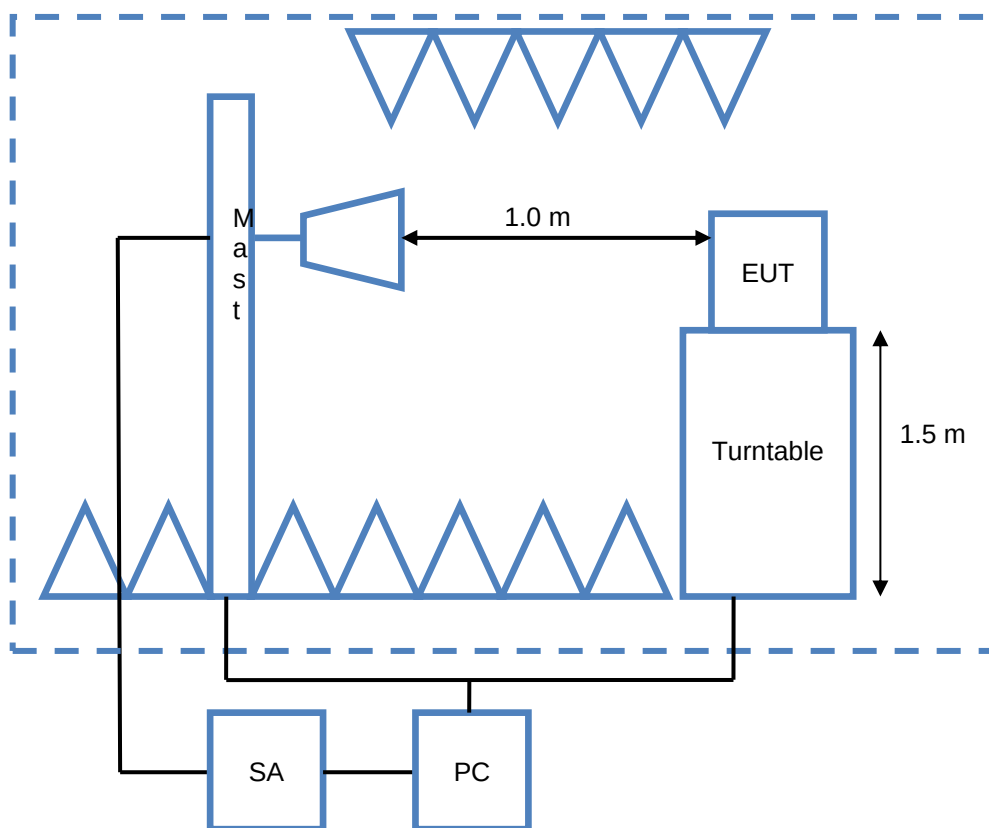


Figure 2 – Radiated Test Setup



## 2.1.6 Test Results

### Antenna gain BLE DID

#### Summary of Results

| Frequency (MHz) | Antenna Gain (dBi) |
|-----------------|--------------------|
| 2402            | 0.15               |
| 2441            | 1.18               |
| 2480            | -0.44              |

**Table 5 – Antenna Gain Results**

#### Conducted Results

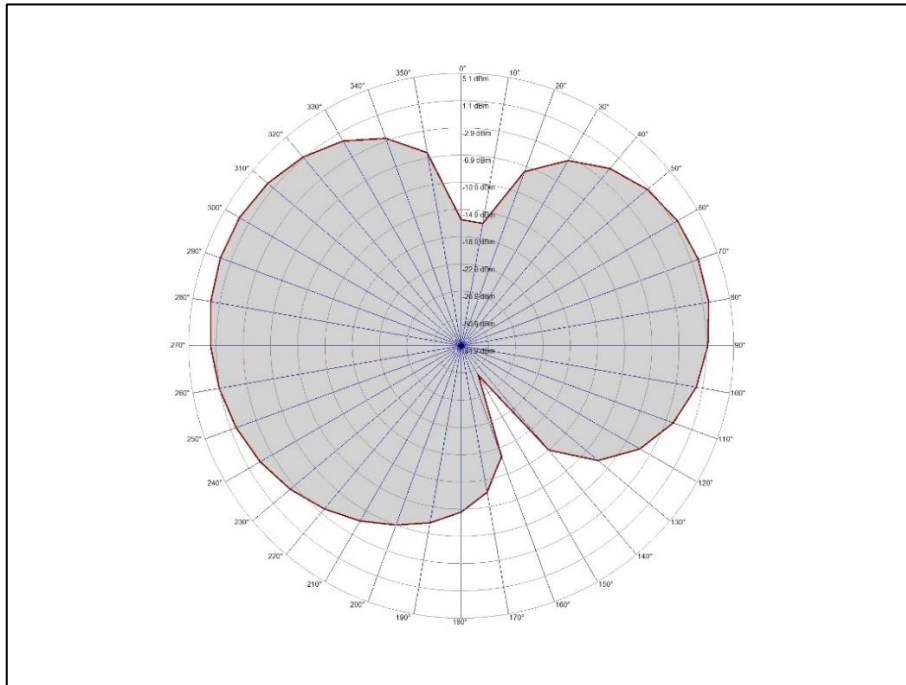
| Frequency (MHz) | Result (dBm) |
|-----------------|--------------|
| 2402            | 2.61         |
| 2441            | 2.80         |
| 2480            | 2.71         |

**Table 6 – Maximum Conducted Output Power Results**

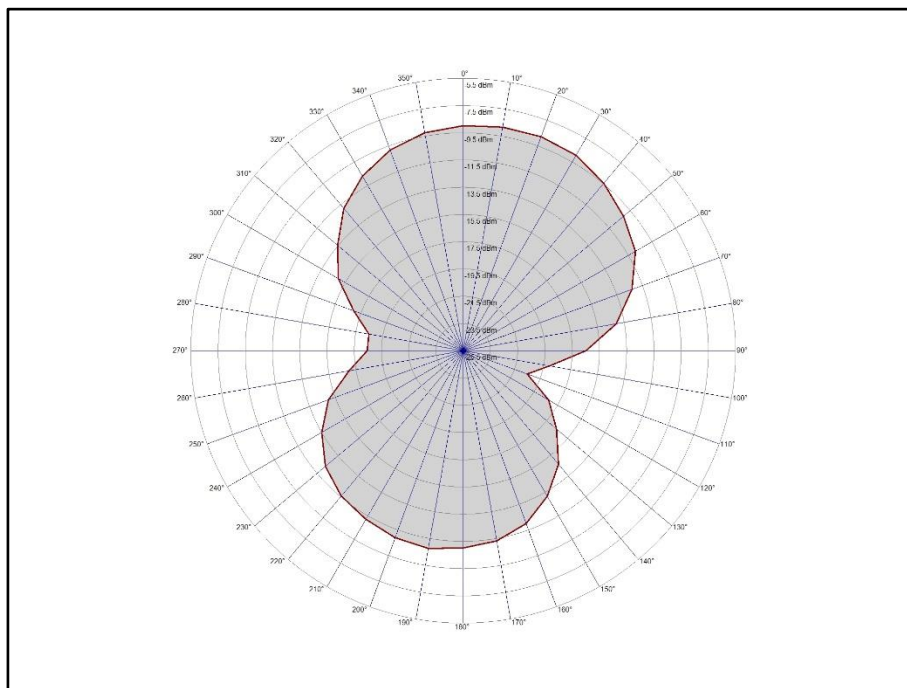
#### Radiated Results

| Frequency (MHz) | Result (dBm EIRP) |
|-----------------|-------------------|
| 2402            | 2.76              |
| 2441            | 3.98              |
| 2480            | 2.27              |

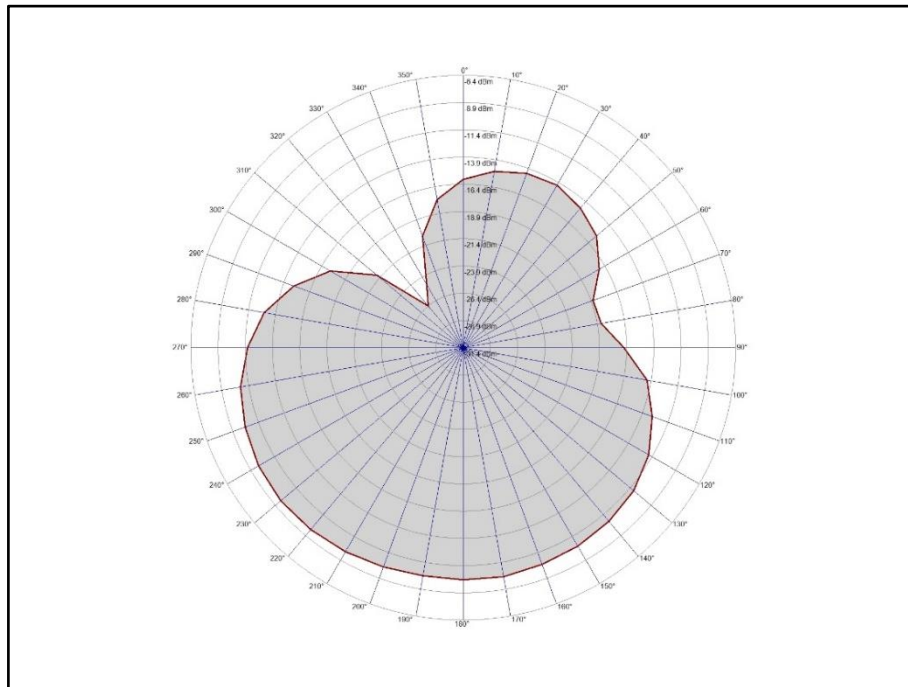
**Table 7 – Maximum Radiated Output Power Results**



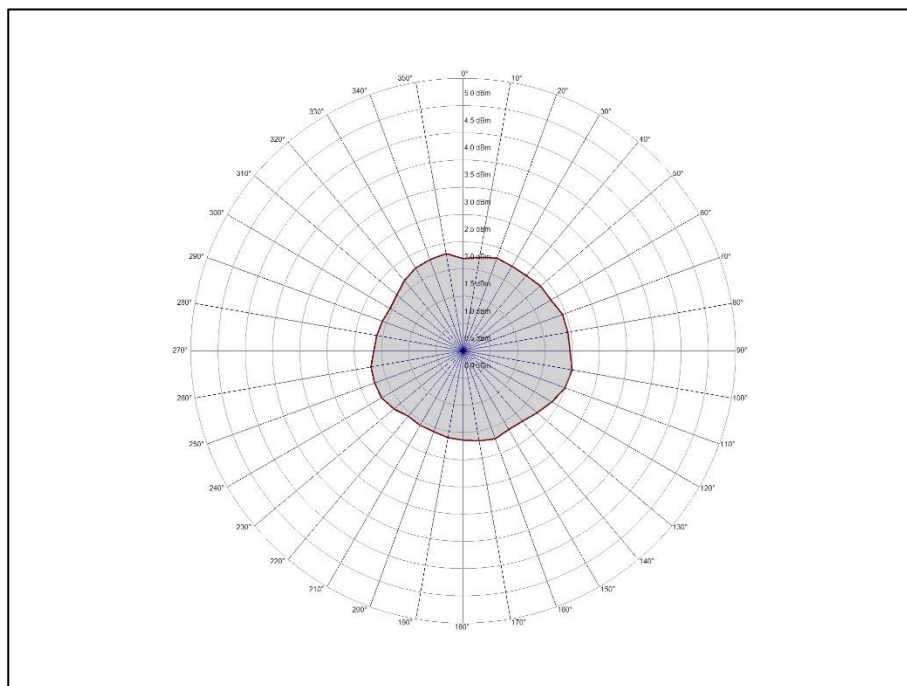
**Figure 3 – 2402 MHz, Horizontal Flat**



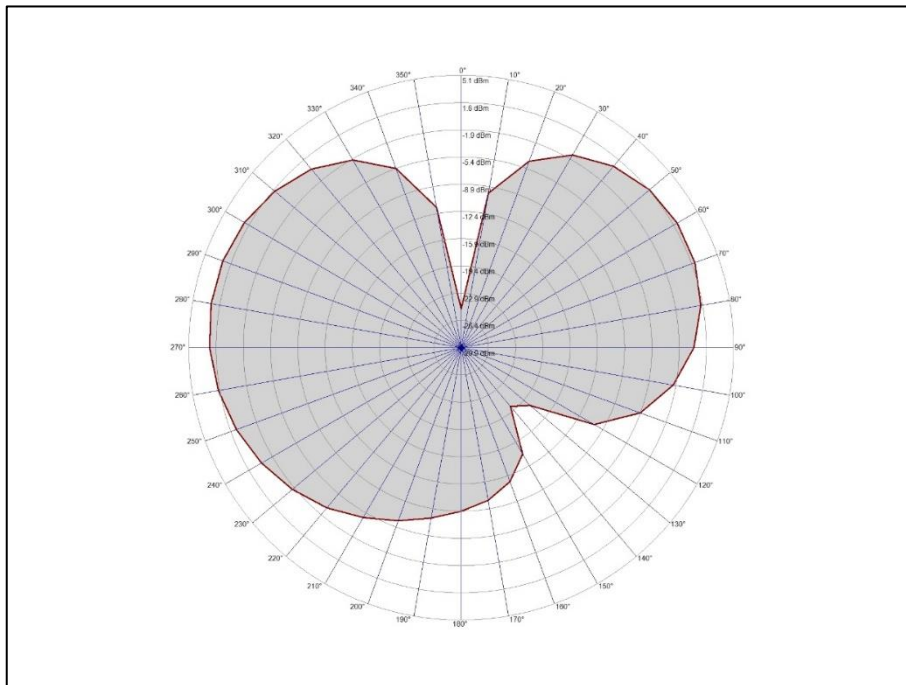
**Figure 4 – 2402 MHz, Horizontal Upright**



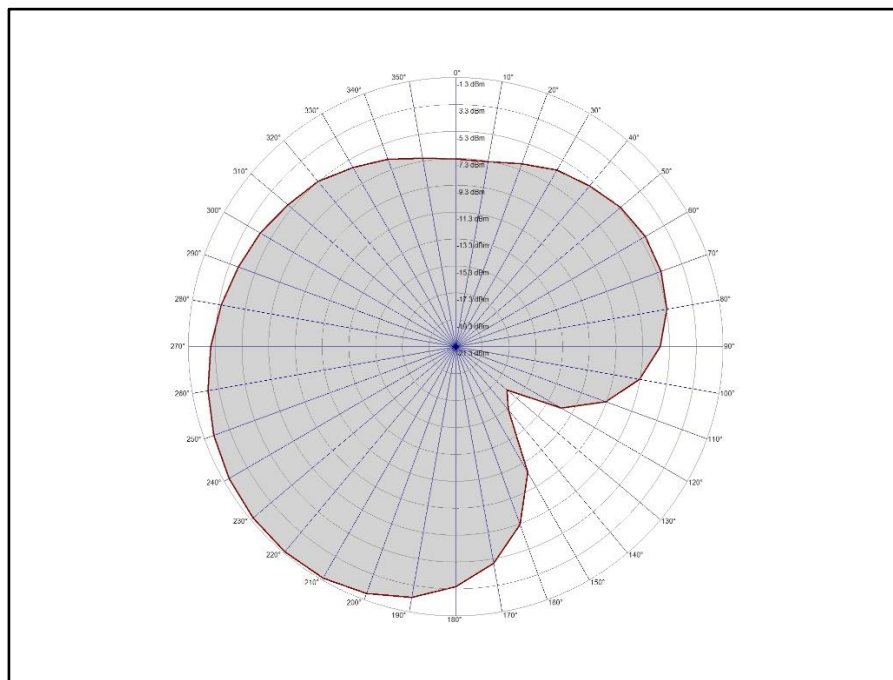
**Figure 5 – 2402 MHz, Vertical Flat**



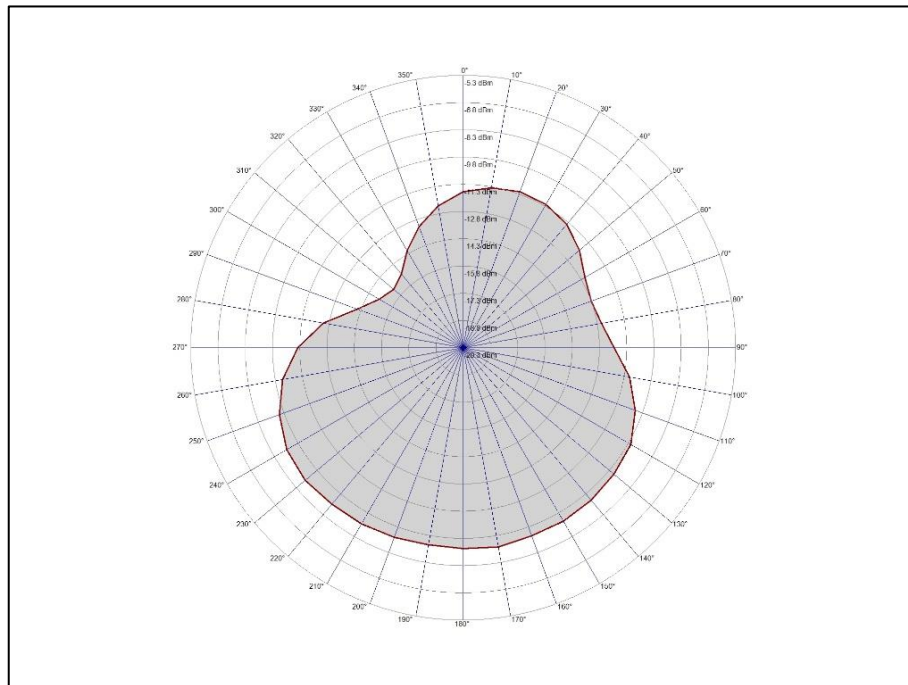
**Figure 6 – 2402 MHz, Vertical Upright**



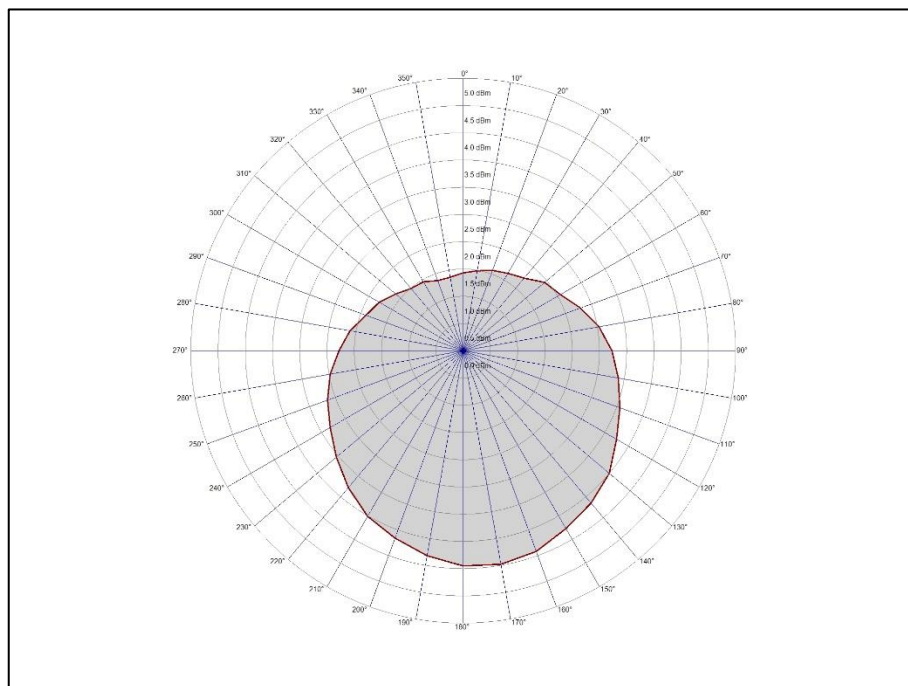
**Figure 7 – 2441 MHz, Horizontal Flat**



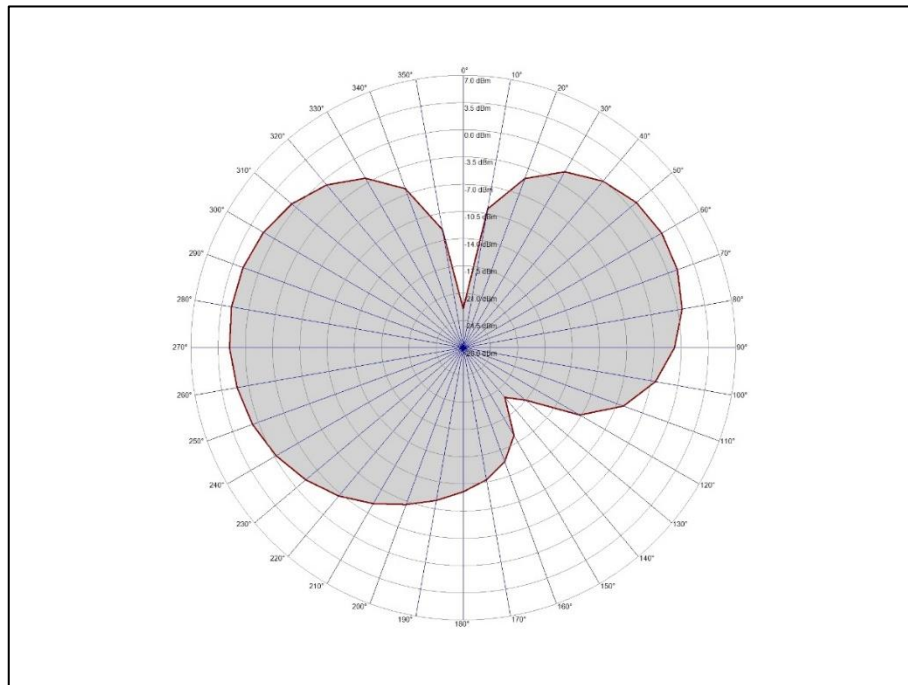
**Figure 8 – 2441 MHz, Horizontal Upright**



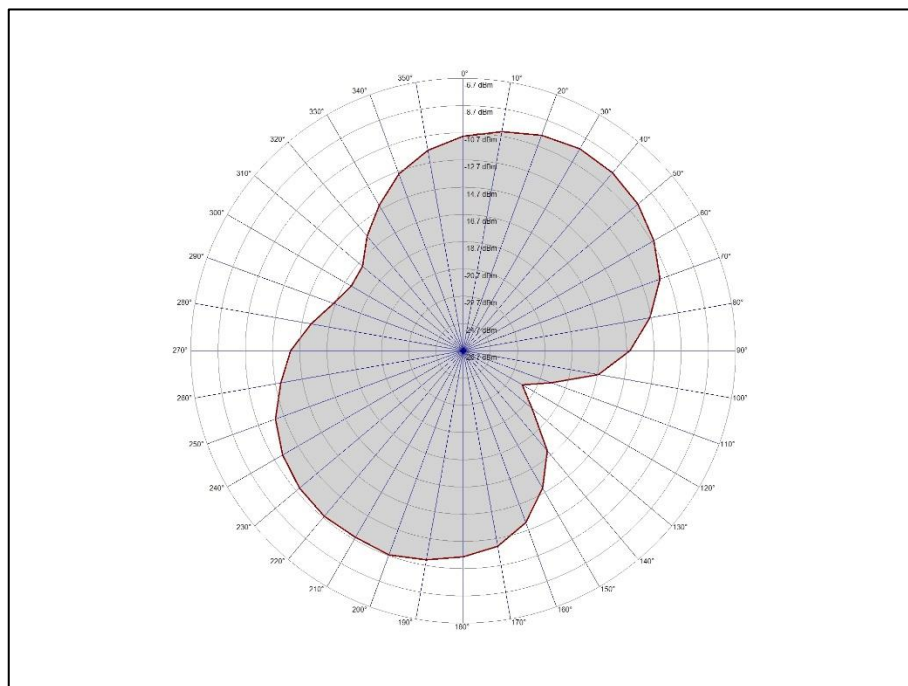
**Figure 9 – 2441 MHz, Vertical Flat**



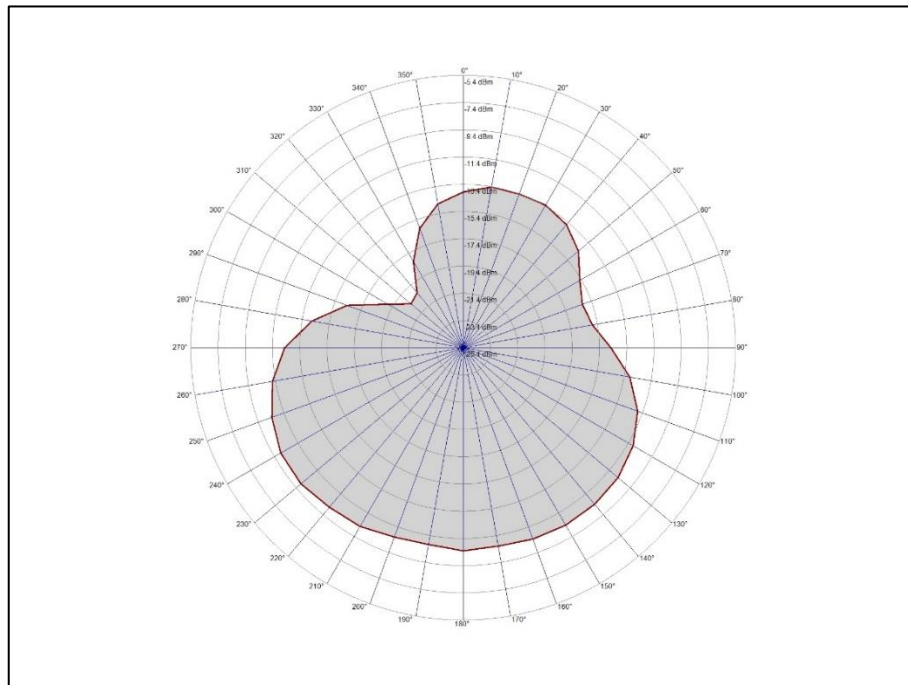
**Figure 10 – 2441 MHz, Vertical Upright**



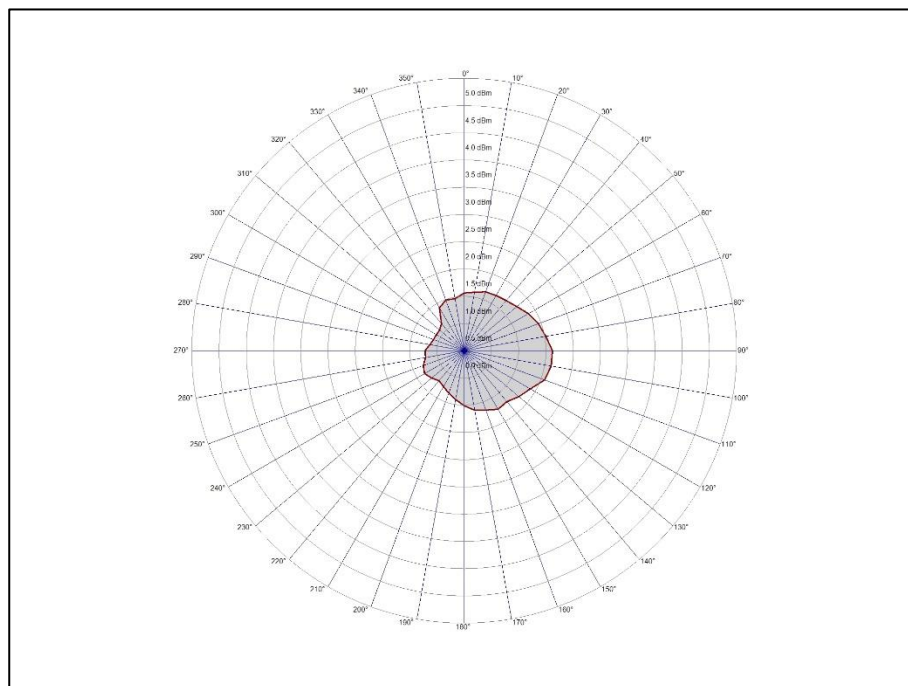
**Figure 11 – 2480 MHz, Horizontal Flat**



**Figure 12 – 2480 MHz, Horizontal Upright**



**Figure 13 – 2480 MHz, Vertical Flat**



**Figure 14 – 2480 MHz, Vertical Upright**



## 2.1.7 Test Location and Test Equipment Used

This test was carried out in RF Chamber 8.

| Instrument                                | Manufacturer          | Type No.              | TE No. | Calibration Period (months) | Calibration Expiry Date |
|-------------------------------------------|-----------------------|-----------------------|--------|-----------------------------|-------------------------|
| Antenna (Double Ridge Guide)              | EMCO                  | 3115                  | 34     | 12                          | 16-Oct-2023             |
| Screened Room (8)                         | Rainford              | Rainford              | 1548   | 12                          | 05-May-2024             |
| Network Analyser                          | Rohde & Schwarz       | ZVA 40                | 3548   | 12                          | 24-May-2024             |
| 2m N(m) - N(m) RF Cable                   | Rhophase              | NPS-2303-2000-NPS     | 3604   | -                           | TU                      |
| Calibration Unit                          | Rohde & Schwarz       | ZV-Z54                | 4368   | 12                          | 06-Mar-2024             |
| PXA Signal Analyser                       | Keysight Technologies | N9030A                | 4653   | 12                          | 16-Mar-2024             |
| 2 metre N-Type Cable                      | Florida Labs          | NMS-235SP-78.8-NMS    | 4508   | 12                          | 05-Jun-2024             |
| Quad Power Supply                         | Rohde & Schwarz       | HMP4040               | 4955   | -                           | O/P Mon                 |
| Cable (40 GHz)                            | Rosenberger           | LU1-001-1000          | 5023   | -                           | O/P Mon                 |
| Cable (18 GHz)                            | Rosenberger           | LU7-096-4000          | 5040   | -                           | O/P Mon                 |
| Emissions Software                        | TUV SUD               | EmX V3.1.6 V.         | 5125   | -                           | Software                |
| Cable (SMA to SMA 2m)                     | Junkosha              | MWX221-02000DMS       | 5427   | 12                          | 21-May-2024             |
| Coaxial Fixed Attenuator DC-18GHz 5W 10dB | RF-Lambda             | RFS5G18B10SMP         | 6179   | 12                          | 07-Jul-2023             |
| Coaxial Cable Assy 1m                     | Junkosha              | MWX221-01000DMSDMS/A  | 6409   | -                           | O/P Mon                 |
| Coaxial Cable Assy 2m                     | Junkosha              | MWX221-02000NMSNMS/A  | 6414   | -                           | O/P Mon                 |
| Coaxial Cable Assy 1m                     | Junkosha              | MWX221-02000NMSSNMS/A | 6408   | 12                          | 02-Feb-2024             |
| Coaxial Cable Assy 4m                     | Junkosha              | MWX221-04000NMSNMS/A  | 6410   | 12                          | 02-Feb-2024             |
| Coaxial Cable Assy 4m                     | Junkosha              | MWX221-04000NMSSNMS/A | 6411   | -                           | O/P Mon                 |
| Signal Generator (250MHz – 67 GHz)        | Keysight Technologies | E8257D                | 6090   | 12                          | 30-Feb-2024             |

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment

### 3 Photographs

#### 3.1.1 Test Setup Photos

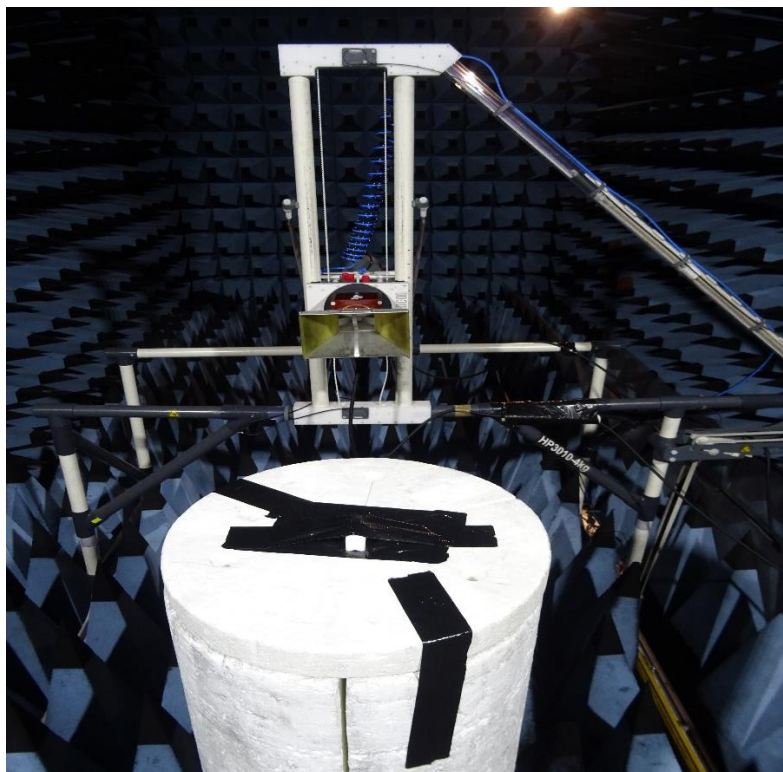
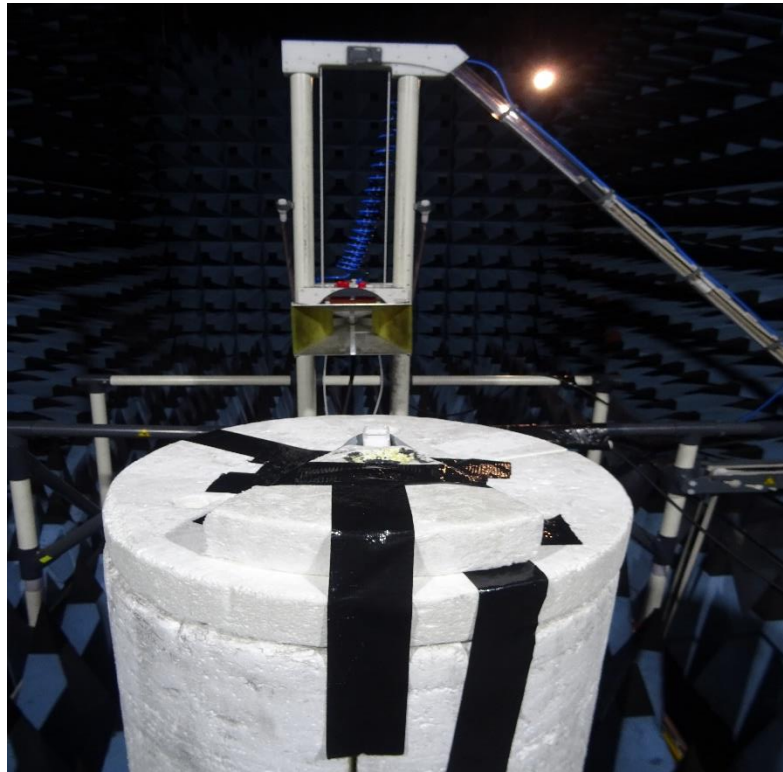


Figure 15 – Test Setup Photo – Orientation Flat



**Figure 16 - Test Setup Photo – Orientation Upright**



**Figure 17 – Photograph of Conducted Sample**