

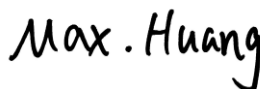
# ANTENNA PASSIVE TEST REPORT

Application No. ZEWM2308001289OA  
Applicant Minut AB  
Manufacturer Minut AB  
Product Name Minut Eureka wireless module  
Model No. Eureka\_2.4GHz\_Left/Right  
Standards ANSI/IEEE Std 149-2008  
Date Initial Sample(s) Received 2023.08.31  
Testing Start Date 2023.08.31  
Testing Finish Date 2023.08.31  
Report Issue Date 2023.09.11

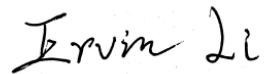
\* In the configuration tested, the EUT detailed in this report complied with the standards specified above.



Prepared by



Reviewed By



Approved by



SGS-CSTC Standards Technical Services Co., Ltd.  
Shenzhen Branch Wireless Laboratory

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## Revision Version

| Report No.       | Version | Date       | Memo                       |
|------------------|---------|------------|----------------------------|
| ZEWM2308001289OA | 00      | 2023.09.11 | Initial creation of report |



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## 1 General Information

### 1.1 Testing Laboratory

|          |  |
|----------|--|
| Test Lab | SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch  |
| Address  | No. 1 Workshop, M-10, Middle section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China 518057 |
| Contact  | Ervin Li   |
| Tel.     | +86 18823369694  |
| Fax      | +86-755-25328600   |
| E-mail   | Ervin.Li@sgs.com   |

### 1.2 Details of Applicant

|                     |  |
|---------------------|--|
| Applicant's Name    | Minut AB                               |
| Applicant's Address | Baltzarsgatan 23, 211 36 Malmö, Sweden |
| Contact             | HW Design Group                        |
| Tel.                | N/A                                    |
| Fax                 | N/A                                    |
| E-mail              | hardware@minut.com                     |

### 1.3 Details of Manufacturer

|                        |  |
|------------------------|--|
| Manufacturer's Name    | Minut AB                               |
| Manufacturer's Address | Baltzarsgatan 23, 211 36 Malmö, Sweden |
| Contact                | HW Design Group                        |
| Tel.                   | N/A                                    |
| Fax                    | N/A                                    |
| E-mail                 | hardware@minut.com                     |



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## 1.4 General Description of EUT

|                      |  |
|----------------------|--|
| Device Description:  | Minut Eureka wireless module                                   |
| Device Manufacturer: | Minut AB   |
| Device Model:        | Eureka_2.4GHz_Left/Right                                       |
| Hardware Version:    | N/A  |
| Software Version:    | N/A  |
| Antenna Dimensions:  | Left : 14.40 x 4.90 x 0.68 mm    Right: 14.45 x 4.88 x 0.68 mm |

## 1.5 Test Procedure

Testing is performed according to the **ANSI/IEEE Std 149-2008**.



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## 1.6 Test Specification

| Identity               | Document Title                             |
|------------------------|--|
| ANSI/IEEE Std 149-2008 | IEEE Standard Test Procedures for Antennas |

## 1.7 Laboratory Environment

|                   |                          |         |
|-------------------|--------------------------|---------|
| Temperature       | Min. =19°C , Max. = 25°C |         |
| Relative humidity | Min. =40% , Max. =72%    |         |
| Shield effect     | 0.7-6GHz                 | > 100dB |
| Ground resistance | <0.5Ω                    |         |

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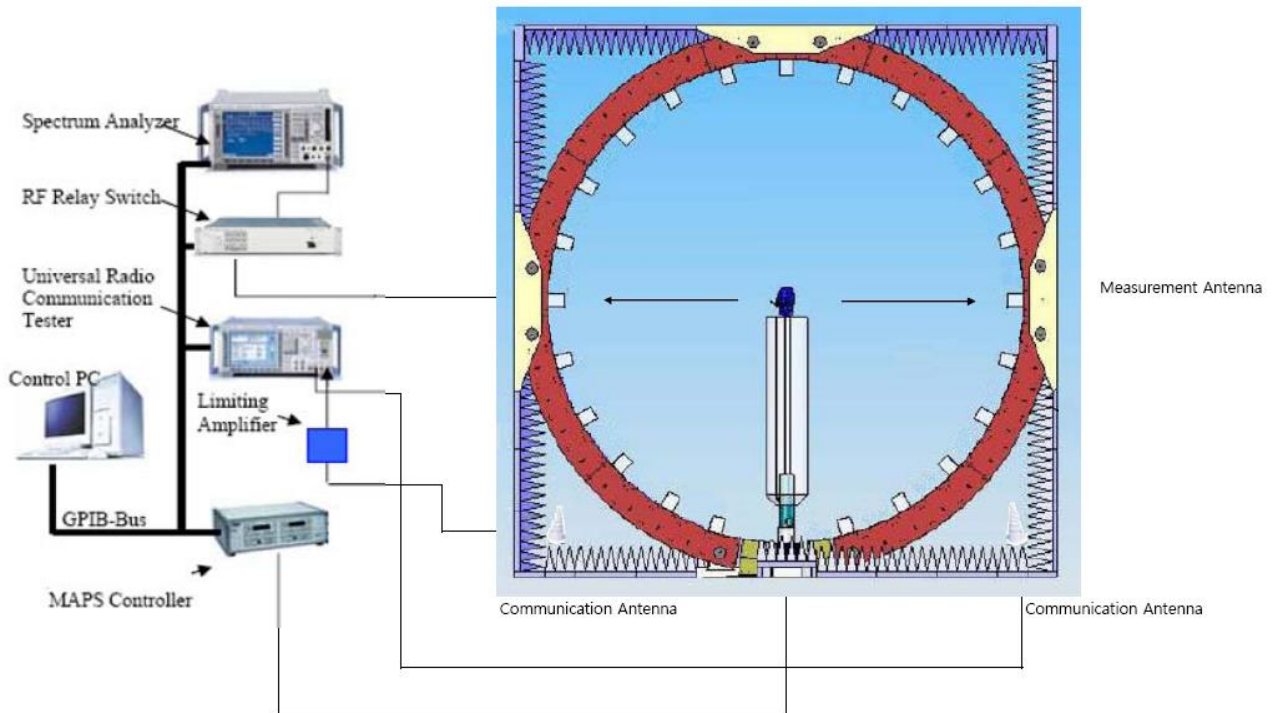
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## 2 OTA Measurements System Configuration

### 2.1 Test Configuration

Great-Circle-Cut method is used to measure the antenna 3D GAIN of EUT in OTA qualified anechoic chamber. Equipment Under Test (EUT) geometry centre vertical projection at the centre of platform, the distance from EUT to measurement antenna is 5m



F-1. OTA Measurement System Configuration



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### 3 Test Equipment List

| Type of Equipment                         | Model Number               | Manufacture       | Calibration Date | Valid Period |
|---|----------------------------|-------------------|------------------|--------------|
| Network Analyzer                          | E5071C<br>S/N MY46523591   | Keysight          | 2023/2/16        | 2024/2/15    |
| Quad-Ridge Horn Antenna<br>700 MHz-10 GHz | EMCO 3164-08<br>S/N 161915 | ETS-Lindgren L.P. | N/A              | N/A          |
| MAPS Controller                           | EMCENTER<br>S/N 160485     | ETS-Lindgren L.P. | N/A              | N/A          |



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## 4 Measurement Uncertainty

| Item  | 2400-2500 MHz (dB) |
|---|--------------------|
| Gain  | 0.88               |
| Efficiency  | 0.88               |
| Measurement Uncertainty (95% CONFIDENCE INTERVAL) K=2 |                    |



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## 5 Test Results

| Eureka_2.4GHz_Right |                 |                |            |
|---------------------|-----------------|----------------|------------|
| Frequency (MHz)     | Efficiency (dB) | Efficiency (%) | Gain (dBi) |
| 2350                | -5.39           | 28.94          | -1.10      |
| 2355                | -5.55           | 27.88          | -1.57      |
| 2360                | -5.22           | 30.08          | -1.30      |
| 2365                | -5.30           | 29.53          | -1.62      |
| 2370                | -5.60           | 27.52          | -1.99      |
| 2375                | -5.85           | 26.03          | -2.25      |
| 2380                | -6.32           | 23.36          | -2.81      |
| 2385                | -6.34           | 23.25          | -2.75      |
| 2390                | -6.59           | 21.93          | -3.09      |
| 2395                | -6.44           | 22.68          | -2.73      |
| 2400                | -6.54           | 22.18          | -2.75      |
| 2402                | -6.69           | 21.44          | -2.96      |
| 2405                | -6.66           | 21.59          | -2.80      |
| 2410                | -6.43           | 22.73          | -2.30      |
| 2415                | -6.51           | 22.33          | -2.29      |
| 2420                | -6.33           | 23.31          | -2.19      |
| 2425                | -6.51           | 22.35          | -2.21      |
| 2430                | -6.74           | 21.16          | -2.60      |
| 2435                | -6.66           | 21.58          | -2.44      |
| 2440                | -6.54           | 22.16          | -2.52      |
| 2441                | -6.46           | 22.59          | -2.49      |
| 2445                | -5.96           | 25.36          | -1.89      |
| 2450                | -5.58           | 27.67          | -1.63      |
| 2455                | -5.08           | 31.04          | -1.22      |
| 2460                | -4.83           | 32.91          | -1.11      |

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|      |       |       |       |
|------|-------|-------|-------|
| 2465 | -4.67 | 34.13 | -0.93 |
| 2470 | -4.69 | 34.00 | -1.03 |
| 2475 | -4.70 | 33.86 | -1.05 |
| 2480 | -4.65 | 34.29 | -1.14 |
| 2482 | -4.58 | 34.87 | -1.23 |
| 2485 | -4.49 | 35.54 | -1.20 |
| 2490 | -4.19 | 38.15 | -0.94 |
| 2495 | -3.77 | 41.99 | -0.56 |
| 2500 | -3.37 | 45.99 | -0.24 |
| 2505 | -2.99 | 50.23 | 0.26  |
| 2510 | -2.80 | 52.50 | 0.56  |
| 2515 | -2.88 | 51.56 | 0.52  |
| 2520 | -3.07 | 49.32 | 0.40  |
| 2525 | -3.23 | 47.56 | 0.16  |
| 2530 | -3.33 | 46.41 | 0.16  |
| 2535 | -3.32 | 46.52 | 0.13  |
| 2540 | -3.21 | 47.73 | 0.07  |
| 2545 | -2.94 | 50.86 | 0.24  |
| 2550 | -2.80 | 52.44 | 0.25  |
| 2555 | -2.68 | 53.96 | 0.29  |
| 2560 | -2.72 | 53.48 | 0.36  |
| 2565 | -2.69 | 53.77 | 0.54  |
| 2570 | -2.69 | 53.83 | 0.66  |
| 2575 | -2.65 | 54.38 | 0.92  |
| 2580 | -2.45 | 56.89 | 0.93  |



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| Eureka_2.4GHz_Left |                 |                |            |
|--------------------|-----------------|----------------|------------|
| Frequency (MHz)    | Efficiency (dB) | Efficiency (%) | Gain (dBi) |
| 2350               | -7.32           | 18.55          | -2.74      |
| 2355               | -7.62           | 17.31          | -3.13      |
| 2360               | -7.38           | 18.28          | -2.86      |
| 2365               | -7.53           | 17.68          | -3.02      |
| 2370               | -7.85           | 16.40          | -3.29      |
| 2375               | -8.14           | 15.34          | -3.61      |
| 2380               | -8.69           | 13.53          | -4.10      |
| 2385               | -8.77           | 13.27          | -4.14      |
| 2390               | -9.07           | 12.38          | -4.25      |
| 2395               | -8.88           | 12.93          | -3.82      |
| 2400               | -8.88           | 12.95          | -3.57      |
| 2402               | -8.96           | 12.69          | -3.60      |
| 2405               | -8.82           | 13.12          | -3.38      |
| 2410               | -8.38           | 14.51          | -2.80      |
| 2415               | -8.21           | 15.10          | -2.56      |
| 2420               | -7.81           | 16.55          | -2.10      |
| 2425               | -7.86           | 16.36          | -2.05      |
| 2430               | -8.03           | 15.74          | -2.28      |
| 2435               | -8.01           | 15.82          | -2.01      |
| 2440               | -7.95           | 16.05          | -1.92      |
| 2441               | -7.88           | 16.29          | -1.95      |
| 2445               | -7.47           | 17.90          | -1.30      |
| 2450               | -7.15           | 19.26          | -0.91      |
| 2455               | -6.70           | 21.39          | -0.51      |
| 2460               | -6.49           | 22.46          | -0.25      |
| 2465               | -6.29           | 23.52          | -0.26      |



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|      |       |       |       |
|------|-------|-------|-------|
| 2470 | -6.33 | 23.29 | -0.30 |
| 2475 | -6.35 | 23.16 | -0.39 |
| 2480 | -6.36 | 23.14 | -0.42 |
| 2482 | -6.32 | 23.31 | -0.49 |
| 2485 | -6.28 | 23.56 | -0.36 |
| 2490 | -6.05 | 24.84 | -0.16 |
| 2495 | -5.69 | 26.96 | 0.37  |
| 2500 | -5.32 | 29.40 | 0.84  |
| 2505 | -4.90 | 32.32 | 1.28  |
| 2510 | -4.62 | 34.53 | 1.45  |
| 2515 | -4.62 | 34.49 | 1.38  |
| 2520 | -4.76 | 33.43 | 1.06  |
| 2525 | -4.93 | 32.12 | 0.84  |
| 2530 | -5.08 | 31.06 | 0.61  |
| 2535 | -5.13 | 30.68 | 0.56  |
| 2540 | -5.06 | 31.21 | 0.71  |
| 2545 | -4.77 | 33.37 | 1.04  |
| 2550 | -4.57 | 34.92 | 1.36  |
| 2555 | -4.33 | 36.91 | 1.55  |
| 2560 | -4.26 | 37.49 | 1.59  |
| 2565 | -4.18 | 38.17 | 1.52  |
| 2570 | -4.16 | 38.37 | 1.60  |
| 2575 | -4.15 | 38.48 | 1.71  |
| 2580 | -4.02 | 39.64 | 1.96  |



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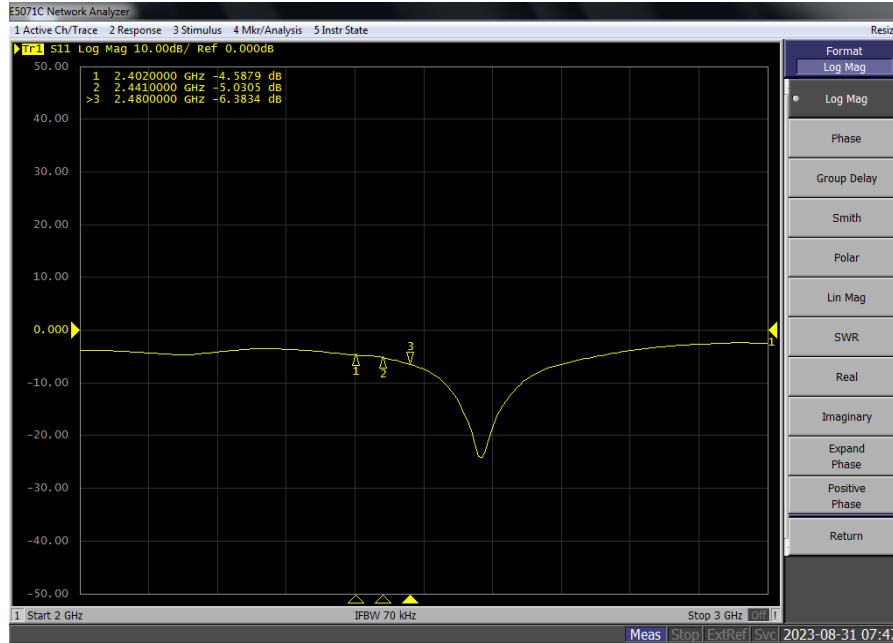
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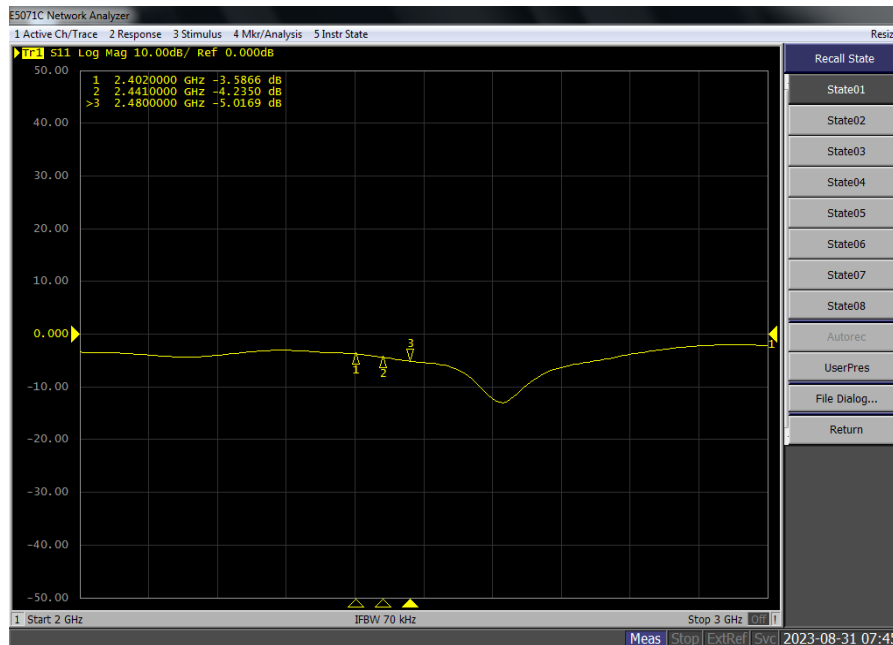
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## 6 Pattern Plots

### 6.1 Return Loss



Eureka\_2.4GHz\_Right



Eureka\_2.4GHz\_Left



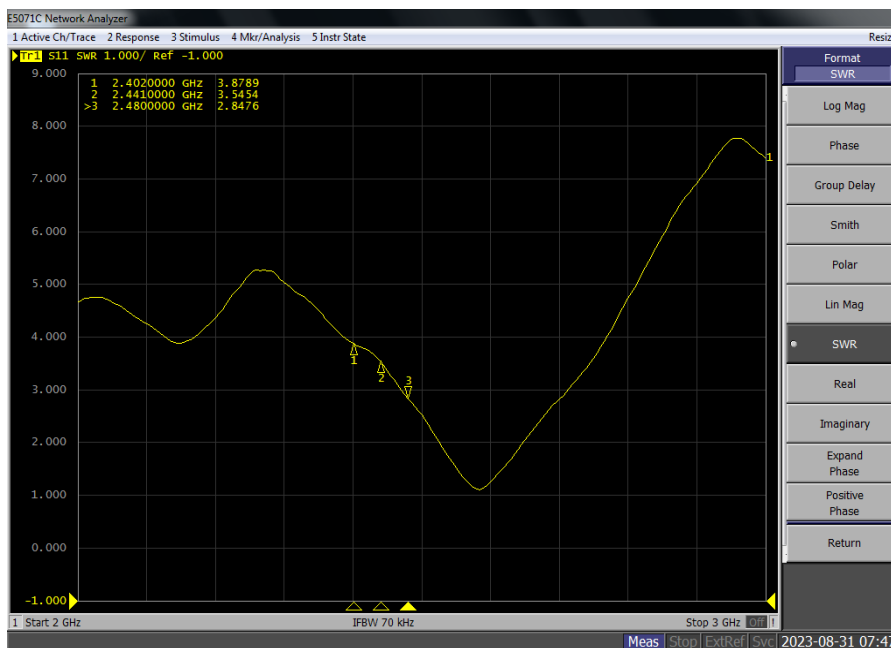
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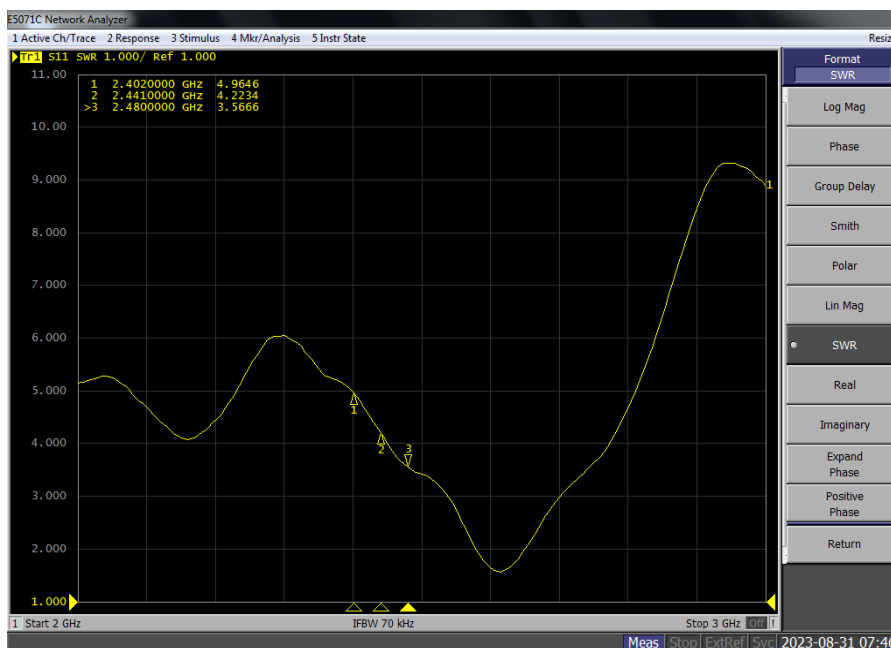
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## 6.2 VSWR



Eureka\_2.4GHz\_Right



Eureka\_2.4GHz\_Left



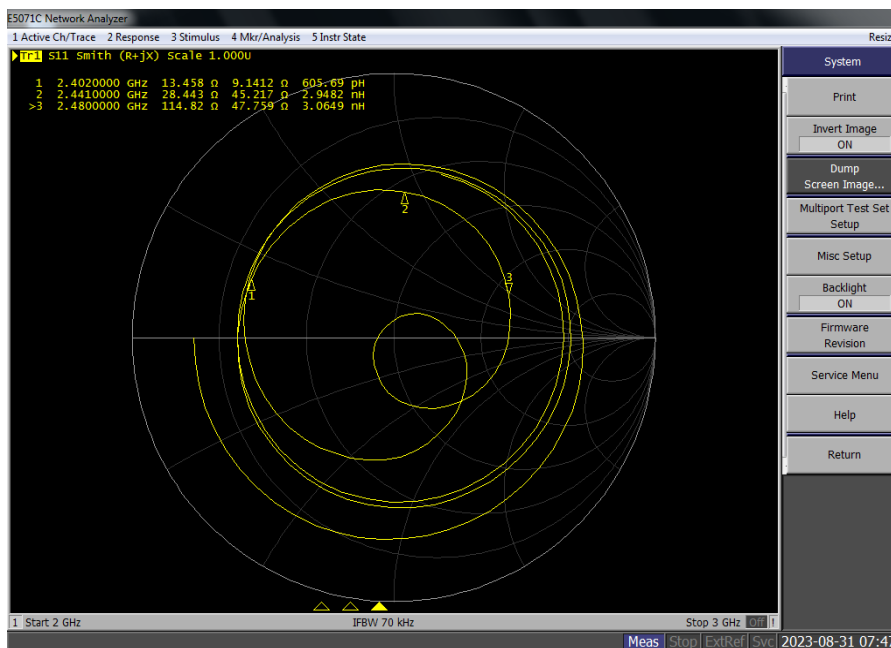
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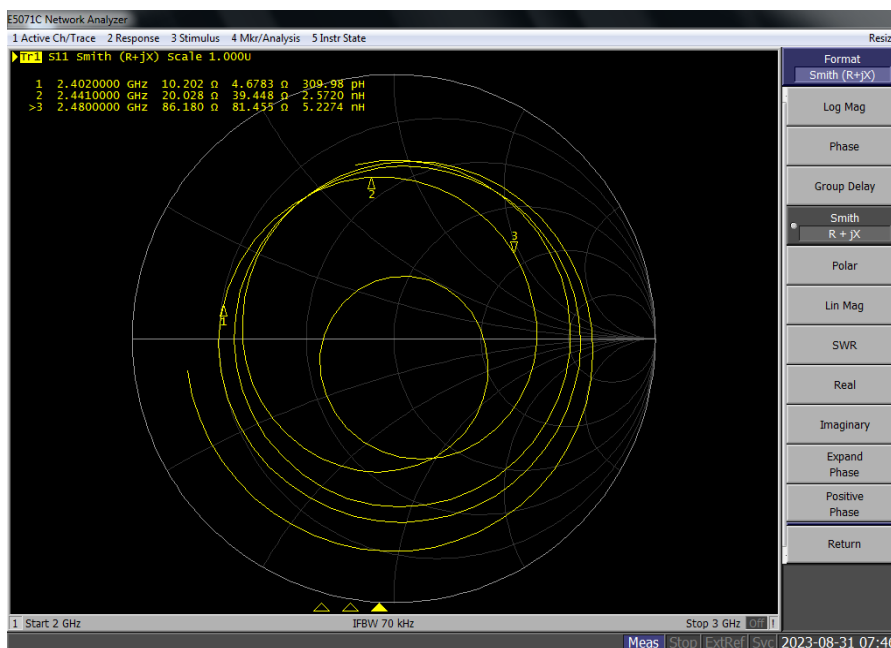
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## 6.3 Stimulus



Eureka\_2.4GHz\_Right



Eureka\_2.4GHz\_Left

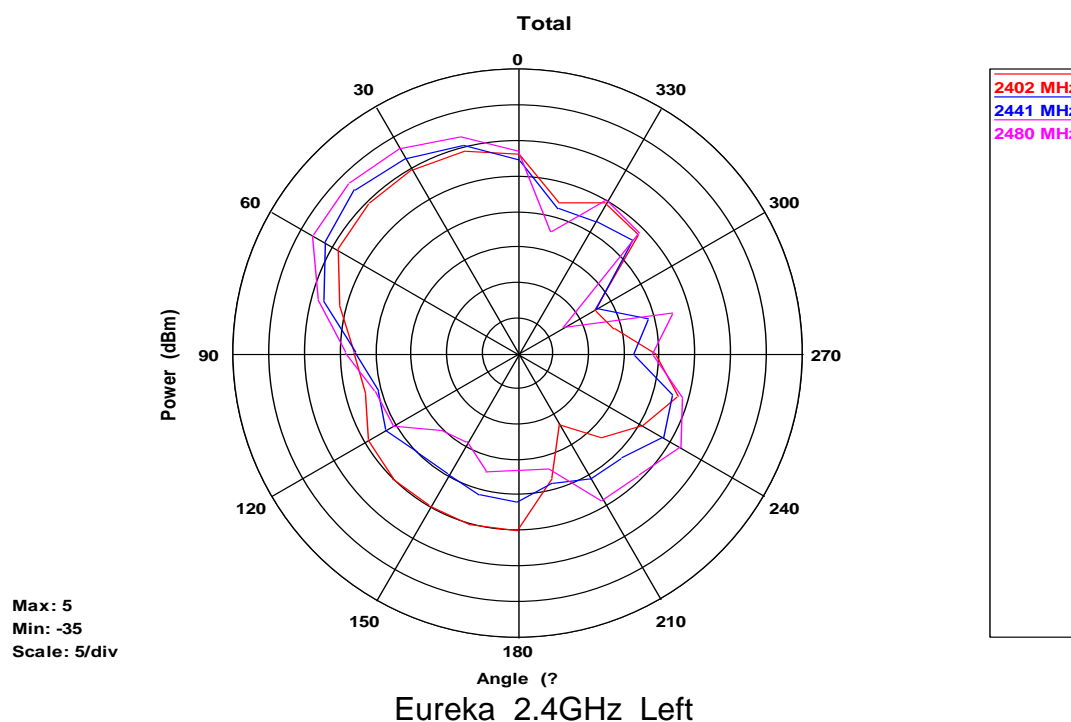
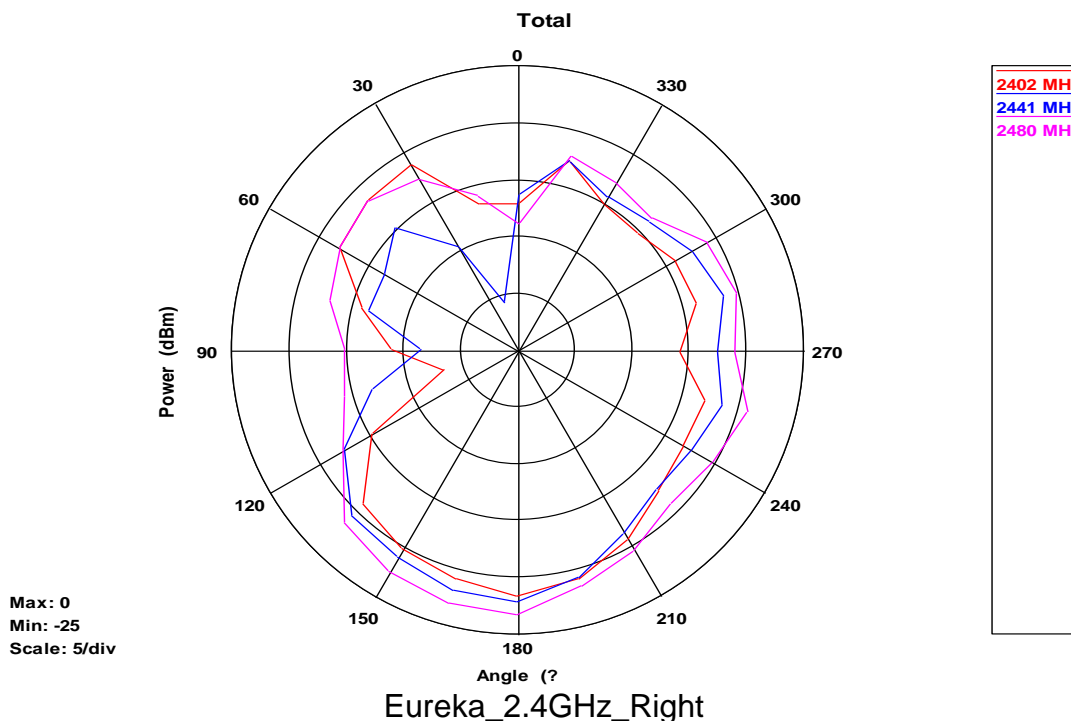


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## 7 2-D Antenna Pattern(Theta=90°)



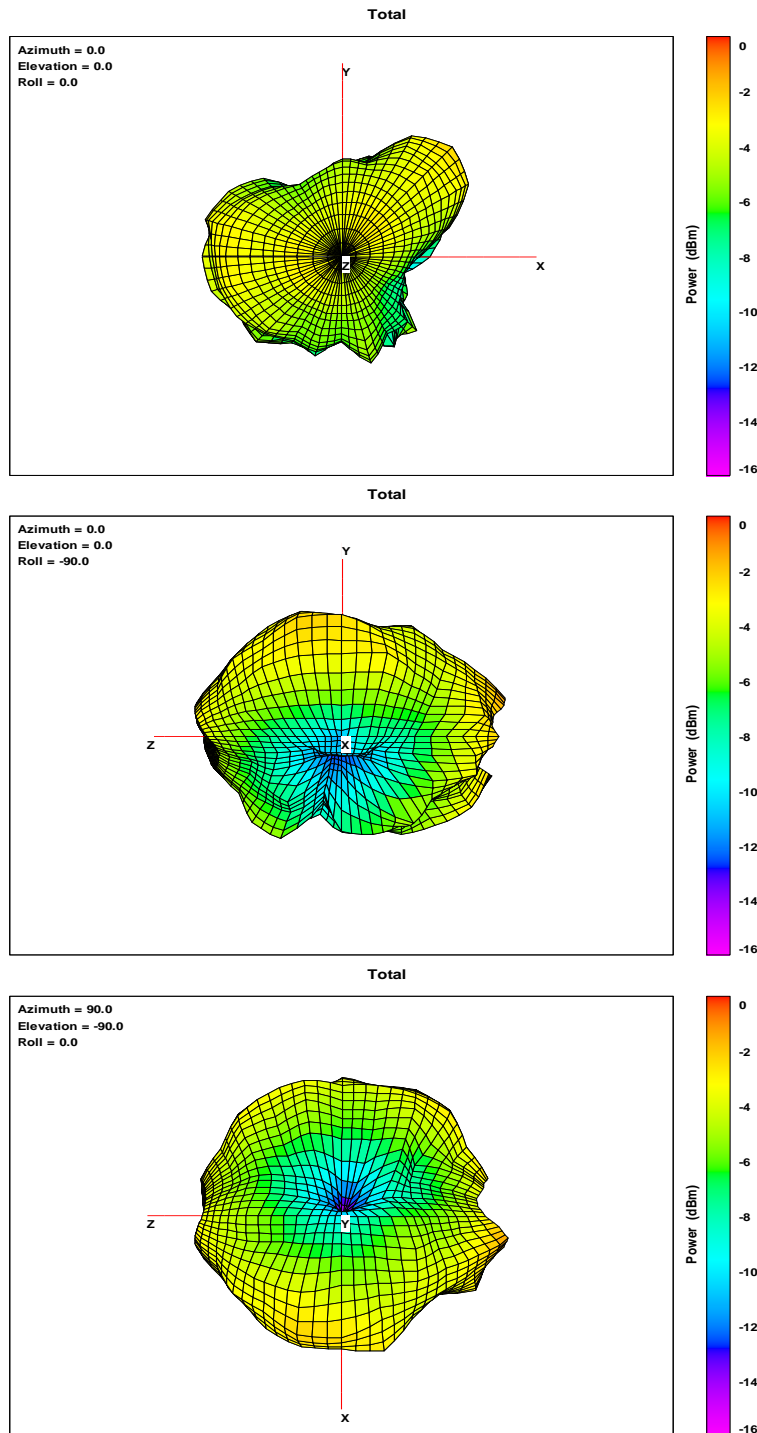
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## 8 3-D Antenna Pattern



Eureka\_2.4GHz\_Right



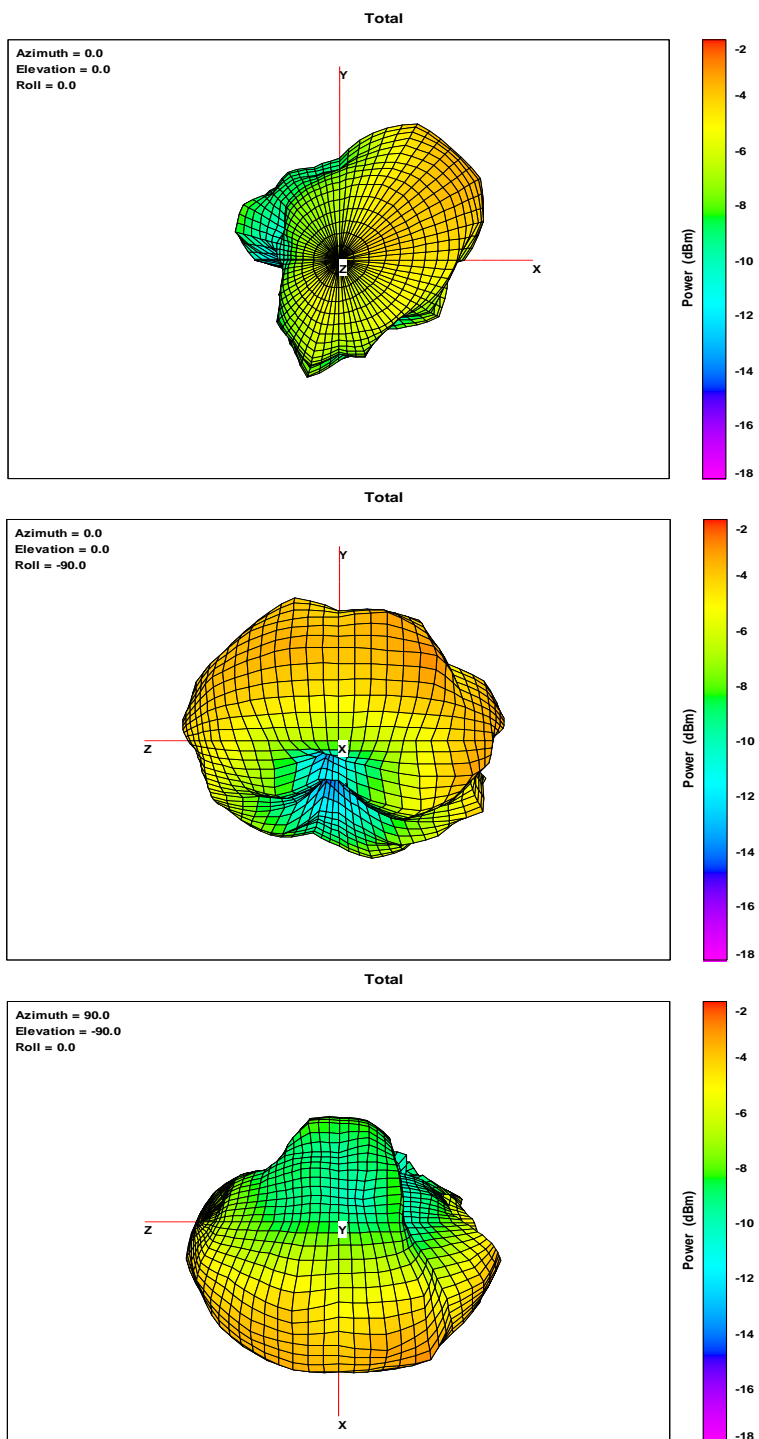
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Eureka\_2.4GHz\_Left



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## 9 The EUT and Test Configuration

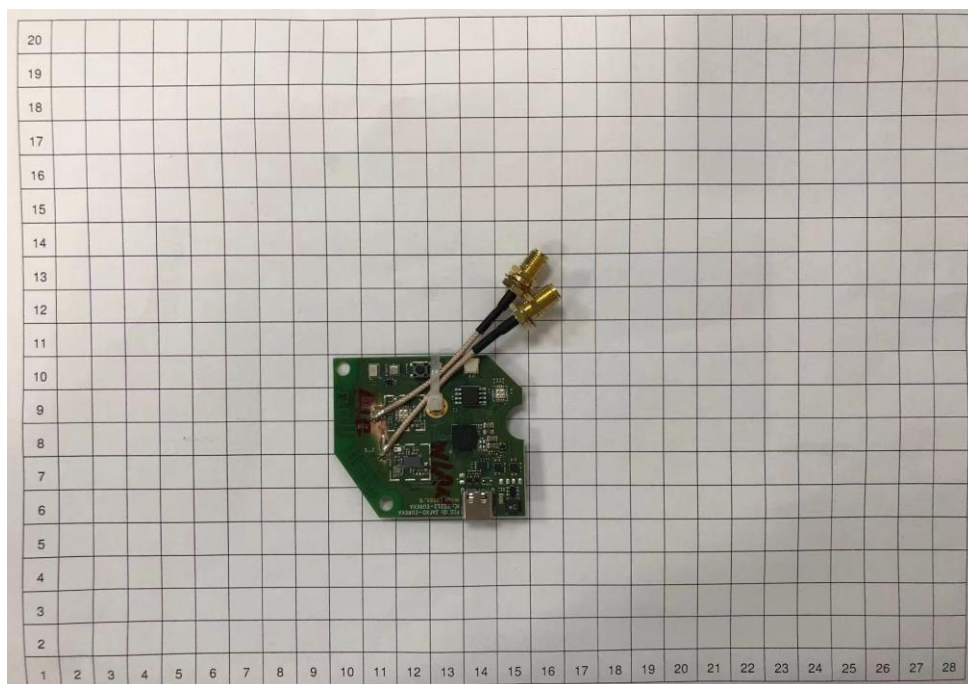


Photo of EUT



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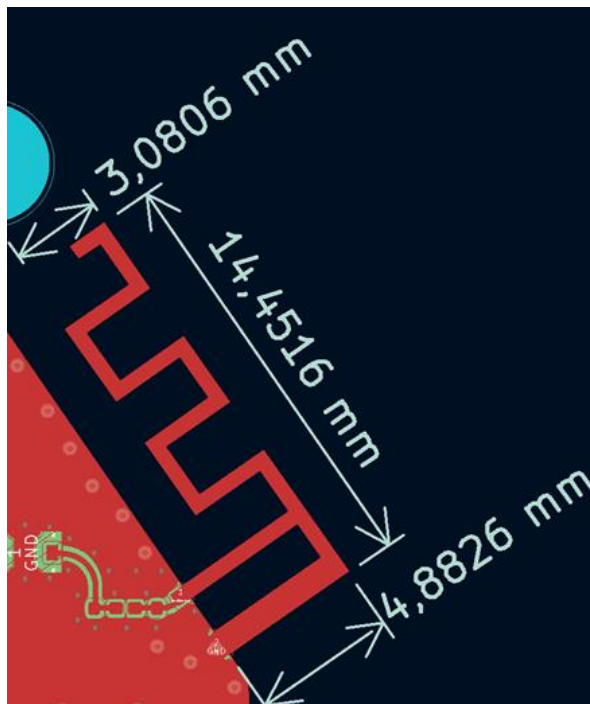
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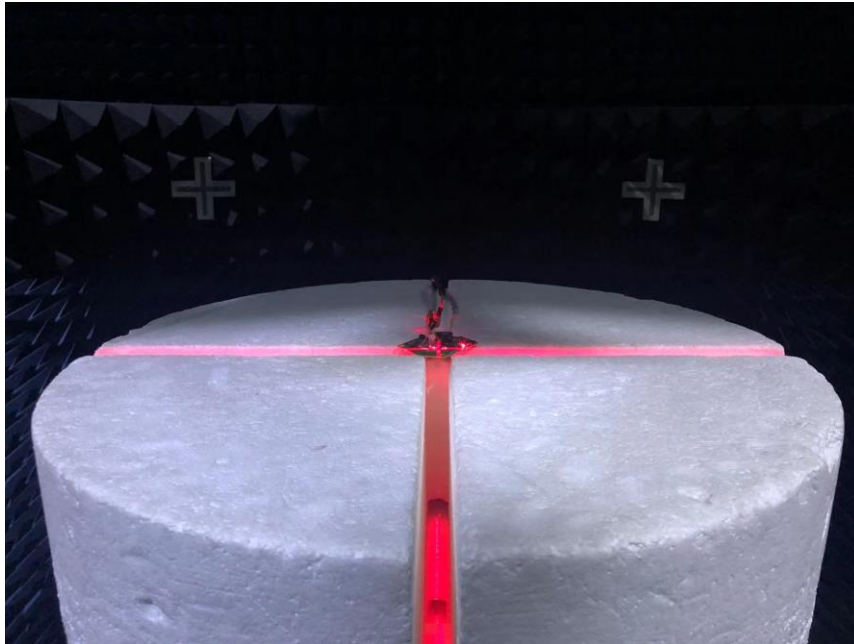




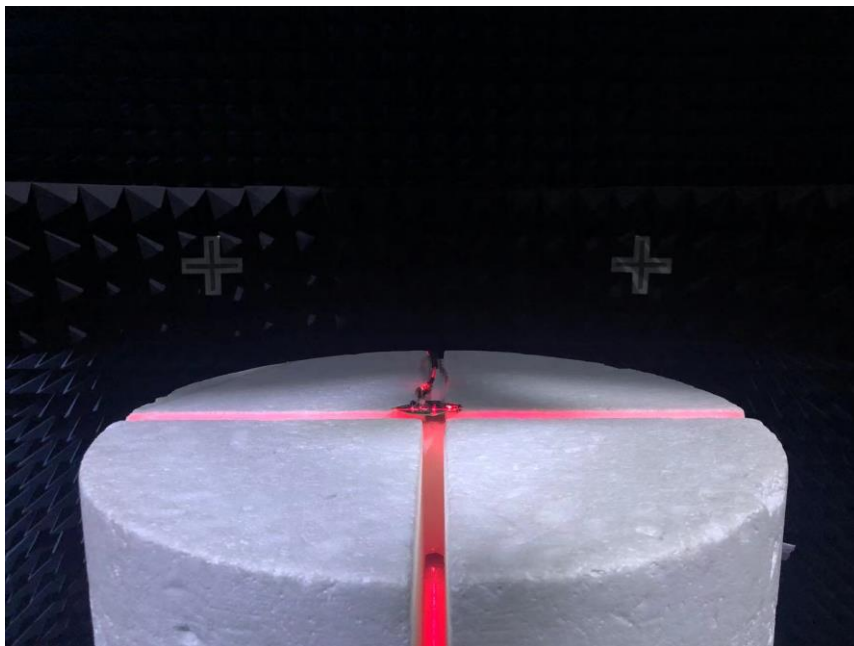
Antenna Dimensions (Eureka\_2.4GHz\_Right)



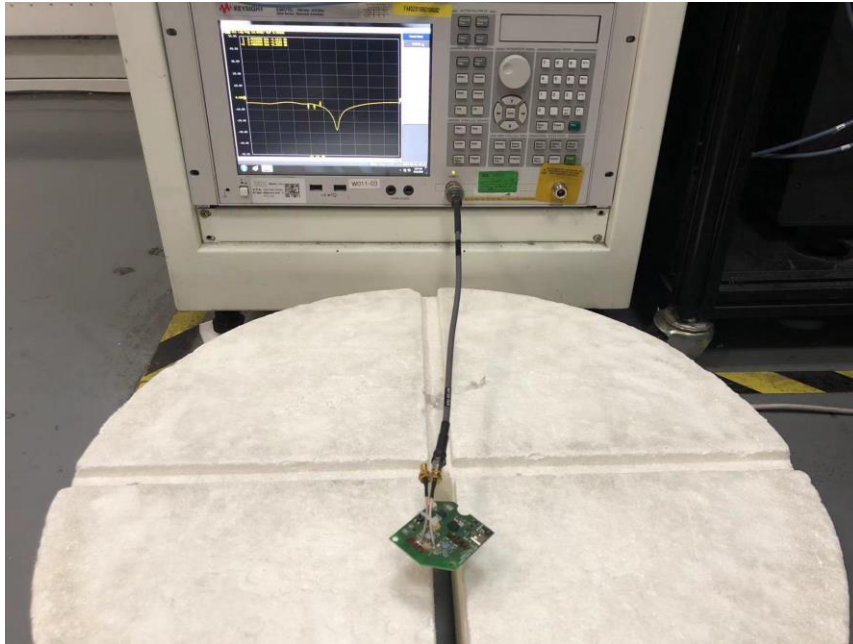
Antenna Dimensions (Eureka\_2.4GHz\_Left)



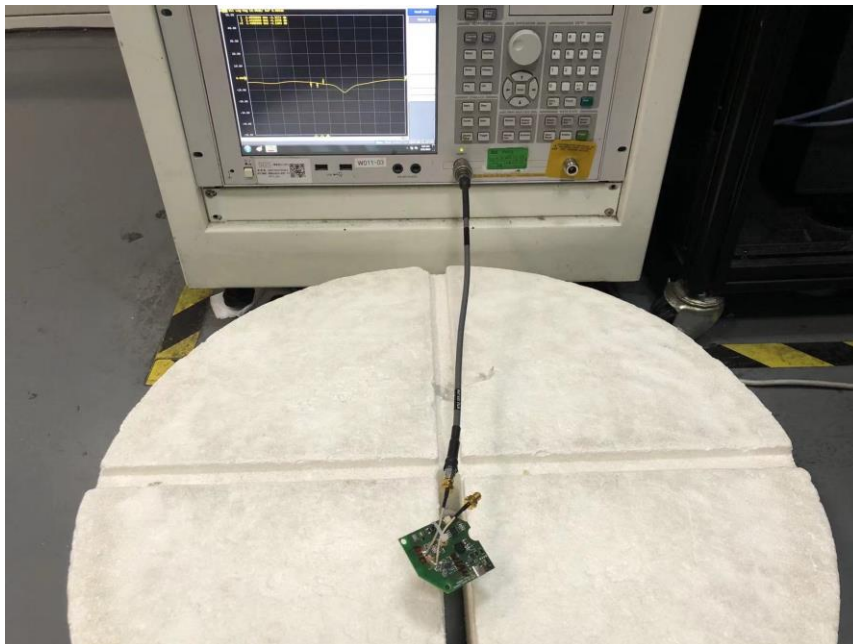
Eureka\_2.4GHz\_Right Free Space View



Eureka\_2.4GHz\_Left Free Space View



Eureka\_2.4GHz\_Right Impedance Setup



Eureka\_2.4GHz\_Left Impedance Setup

---END---



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