



# Multi-Antenna Systems

## Directional Gain measurement

APPLICANT : Nokia Shanghai Bell Co., Ltd.  
EQUIPMENT : NOKIA WiFi Beacon 19  
BRAND NAME : NOKIA  
MODEL NAME : Beacon 19  
ANTENNA TYPE : Dipole Antenna  
TEST DATE(S) : May 28, 2024 ~ Jun. 06, 2024

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

***Sporton International Inc. (Kunshan)***

***No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province  
215300 People's Republic of China***



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History of this test report

| Report No.  | Version | Description             | Issued Date   |
|-------------|---------|-------------------------|---------------|
| OQ452305-01 | 01      | Initial issue of report | Aug. 13, 2024 |
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# 1 General Description

## 1.1 Applicant

Nokia Shanghai Bell Co., Ltd.

No.388, Ningqiao Rd, Pilot Free Trade Zone, Shanghai, 201206 P.R. China

## 1.2 Manufacturer

Nokia of America Corporation

2301 Sugar Bush Rd. Raleigh, NC 27612

## 1.3 Testing Laboratory

|                    |                                                                                                                                                |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Firm          | Sporton International Inc. (Kunshan)                                                                                                           |
| Test Site Location | No. 1098, Pengxi North Road, Kunshan Economic Development Zone<br>Jiangsu Province 215300 People's Republic of China<br>TEL : +86-512-57900158 |
| Test Site No.      | TH01-KS; 03CH08-KS;                                                                                                                            |

## 1.4 Support Unit used in test configuration and system

| Item | Equipment             | Brand Name | Model Name    | FCC ID | Data Cable | Power Cord                                         |
|------|-----------------------|------------|---------------|--------|------------|----------------------------------------------------|
| 1.   | Notebook              | DELL       | Inspiron 3501 | N/A    | N/A        | AC I/P: Unshielded, 1.8m<br>DC O/P: shielded, 1.8m |
| 2.   | Mobilephone (station) | N/A        | N/A           | N/A    | N/A        | NCR                                                |

## 1.5 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC KDB 662911 D3 MIMO Antenna Gain Measurement v01.
- ♦ ANSI C63.10-2013 - Clause 13
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01.

## 2 Test Result

### 2.1 Antenna information

| Frequency(MHz) |           | Ant A(dBi) | Ant B(dBi) | Ant C(dBi) | Ant D(dBi) |
|----------------|-----------|------------|------------|------------|------------|
| UNII 5         | 5925-6425 | 3.59       | 3.60       | 3.52       | 3.12       |
| UNII 6         | 6425-6525 | 2.44       | 2.60       | 2.52       | 2.78       |
| UNII 7         | 6525-6875 | 2.44       | 2.60       | 2.52       | 2.78       |
| UNII 8         | 6875-7125 | 3.34       | 3.50       | 3.32       | 3.66       |

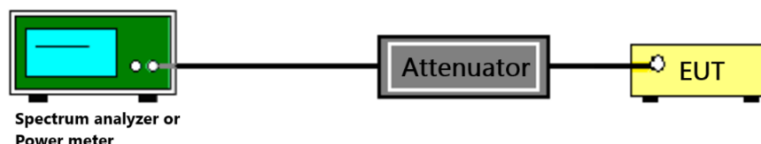
**Remark :** Please refer to the specific details in Antenna Test report which is separately.

### 2.2 Conducted Output Power measurement

#### 2.2.1 Test Procedures

1. Configuration EUT transmitting packages to the communication emulator in Tx-beamforming mode.
2. Connect EUT to spectrum analyzer or power meter and record the power setting and frequency of EUT
3. The RF output of EUT is connected to the power meter or spectrum analyzer by RF cable and attenuator to measurement conducted power.
4. The pathloss is compensated to the results for each measurement.

#### 2.2.2 Test Setup



#### 2.2.3 Test Result of Conducted Power

| Channel | Power Setting | Frequency (MHz) | Power Meter Read Level(dBm) |       |       |       | Cable Loss(dB) | Sum Power (dBm) | DT Factor (dB) | Final Power (dBm) |
|---------|---------------|-----------------|-----------------------------|-------|-------|-------|----------------|-----------------|----------------|-------------------|
|         |               |                 | Port1                       | Port2 | Port3 | Port4 |                |                 |                |                   |
| 93      | 20            | 6415            | 7.55                        | 7.23  | 7.17  | 7.14  | 8.1            | 21.4            | 0.25           | 21.65             |
| 117     | 20            | 6535            | 7.68                        | 8.17  | 7.79  | 7.37  | 8.2            | 21.98           | 0.25           | 22.23             |
| 185     | 20            | 6875            | 6.76                        | 6.53  | 6.78  | 7.04  | 8.3            | 21.1            | 0.25           | 21.35             |
| 229     | 20            | 7095            | 6.72                        | 6.81  | 6.95  | 6.27  | 8.23           | 20.95           | 0.25           | 21.20             |

Test mode:6GHz, 802.11be EHT20,Beamforming mode,4Tx,NSS=1

## 2.3 Radiated EIRP Measurement

### 2.3.1 Test environment and Procedures

Radiated Measurement Environment:

The semi anechoic chamber with the following specifications:

- Overall dimensions (L x W x H) : 9m x 6m x 6m (rectangular chamber)
- Antenna measured frequency range: 1GHz to 18GHz
- Radiated measurement test sites conform to the site validation criteria called out in CISPR16-1-4:2019 over the frequency range 1 GHz to 18 GHz. The test object is mounted on a positioner; The positioner is used to move the test object according to the sampling grid. A measurement antenna is placed in the chamber at 3m measurement antenna far-field distance.

### 2.3.2 Test Setup

The EIRP Pattern measurement is using the conical circle cut test system (refer to Figure 1). The EUT is positioned on center of turntable, Data (channel power level) is recorded using the spectrum analyzer for both theta and phi polarizations at each position (refer to Figure 2).

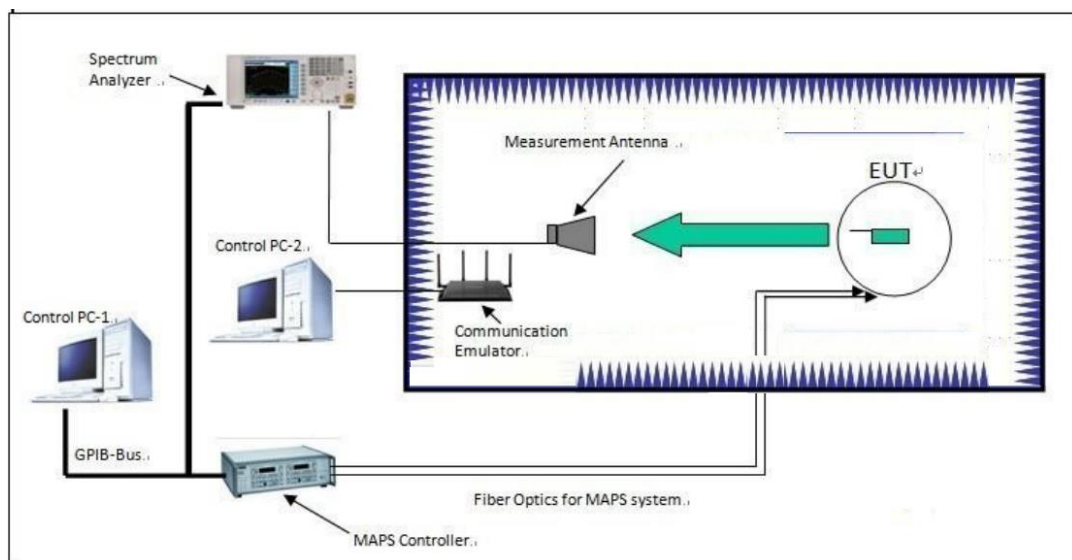


Figure 1-Conical circle cut test system.

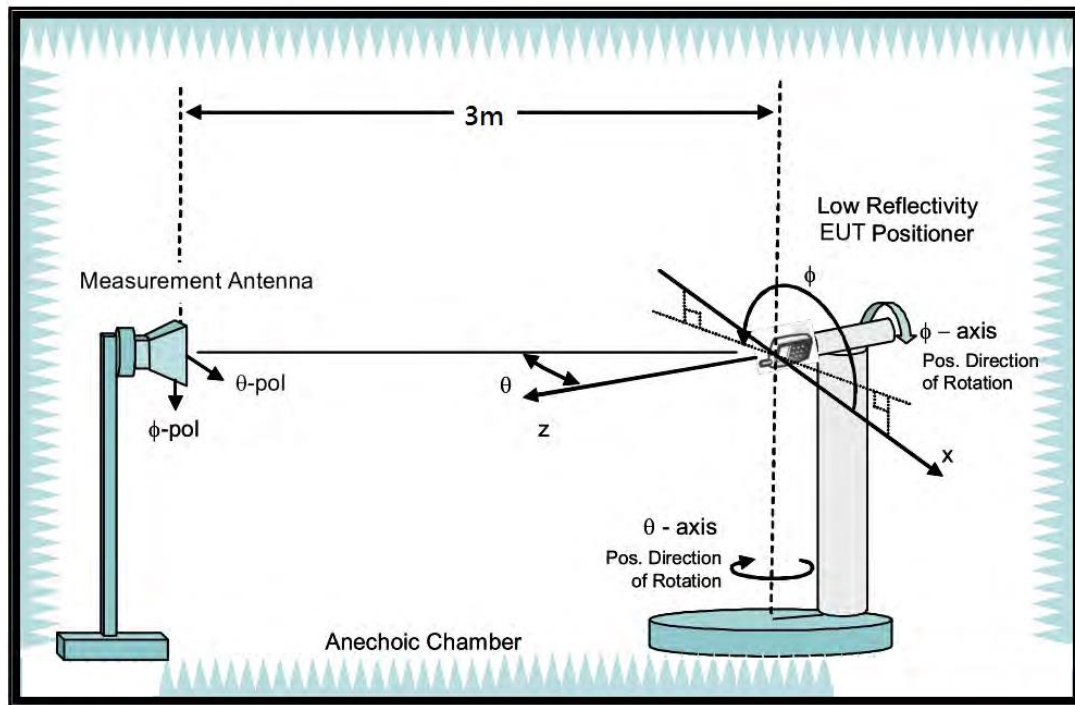


Figure 2-Configuration of Conical circle cut test system.

The figures (refer to section 4.2 Set up for Radiated EIRP Figure) illustrate that EUT operates as an AP (labeled as EUT), while the Communication Emulator serves as a station (labeled as Sta). EUT and Sta communicate with each other using the Tx-beamforming feature. STA is positioned at the same height and location in close proximity to the measurement antenna, ensuring that as EUT rotates along the Phi or Theta axis, EUT's Tx-Beamforming data stream consistently points towards STA and the measurement antenna.

- a. Fix the EUT on the Positioner at center of turntable
- b. Configuration EUT transmitting packages to the communication emulator in Tx-beamforming mode. Please refer to figure 1 for detail configuration.
- c. Make sure that the power settings and frequency are the same as those used for conducted power measurement.
- d. Setup the channel power function by spectrum analyzer. Refer C63.10-2013 11.9.2.2.7 AVGSA-3A:

- 1) Set RBW=1MHz
- 2) Set VBW=1/T (where T is duty cycle on time)
- 3) Sweep point  $\geq [2 \times \text{span} / \text{RBW}]$ .
- 4) Detector = peak
- 5) Sweep time=auto
- 6) average-VBW type=rms
- 7) Trace mode=max hold
- 8) Unit= dB $\mu$ V

9) Compute power by integrating the spectrum across the 26 dB OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.

e. Read the channel power level on spectrum analyzer and record in following positions.

The following test positions are formulated with reference to clause 13 of ANSI C63.10-2013-Procedures for measuring device operating using antenna arrays with beam-steering and/or beamforming capability, to ensure that the maximum EIRP Power is obtained from the 3D Plane.

1) The EUT is then stepped between 0 to 360 degrees along the phi axis in 10-degree increments. At each phi position, the theta axis is continuous running from 0 to 360 degrees or from 360 to 0 degrees.

2) Data (channel power level) is recorded using the spectrum analyzer for every phi position of the EUT.

3) Further fine-tuning validation based on the Worst of Pre-Scan, adjusting the increment to 2-degree /Step to ensure measurement accuracy.

4) Change the polarization of the measurement antenna, repeat the above steps, and record the corresponding spectrum readings of the measurement antenna at theta and phi, respectively.

f. According to ANSI C63.10-2013 clause 10.3.8 Required corrections to the measured signal amplitude levels and clause 10.3.9 Determination of EIRP:

$EIRP = [Reading\ Level + Correction\ Factor(Ant\ Factor + Cable\ loss - Amp\ Gain)] - 95.2$

### 2.3.3 Test Results of Max. Radiated EIRP

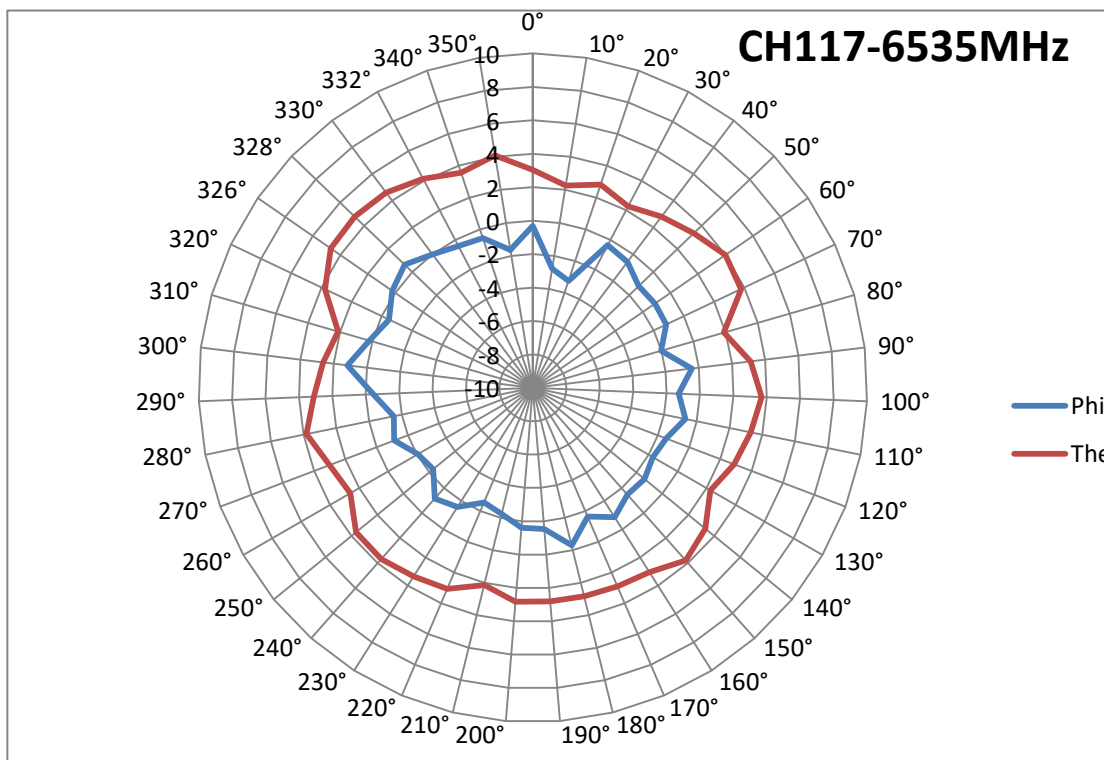
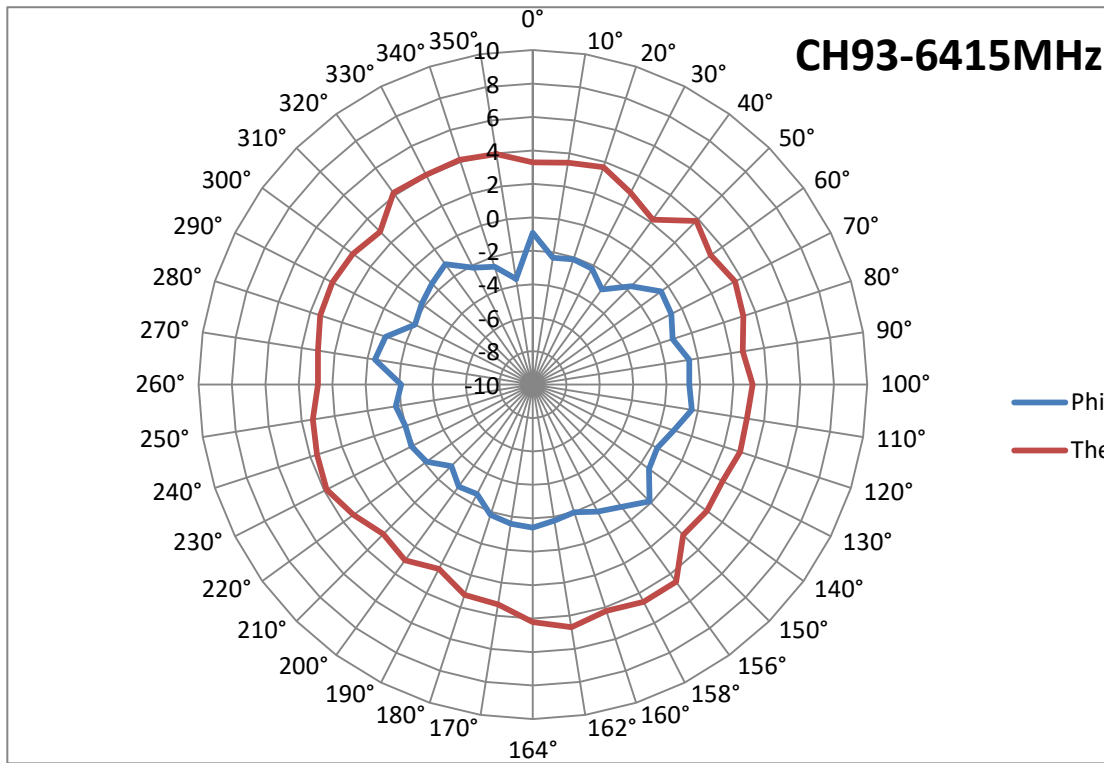
| Channel                                                    | Power Setting | Frequency (MHz) | Polarization (For Measurement Antenna) | Phi degree (For EUT) | Read Level (dBμV) | Max EIRP (dBm) |
|------------------------------------------------------------|---------------|-----------------|----------------------------------------|----------------------|-------------------|----------------|
| 93                                                         | 20            | 6415            | Theta                                  | 162°                 | 92.36             | 26.35          |
| 117                                                        | 20            | 6535            | Theta                                  | 328°                 | 92.57             | 27.01          |
| 185                                                        | 20            | 6875            | Theta                                  | 320°                 | 91.66             | 26.13          |
| 229                                                        | 20            | 7095            | Theta                                  | 70°                  | 91.33             | 26.23          |
| Test mode: 6GHz, 802.11be EHT20,Beamforming mode,4Tx,NSS=1 |               |                 |                                        |                      |                   |                |

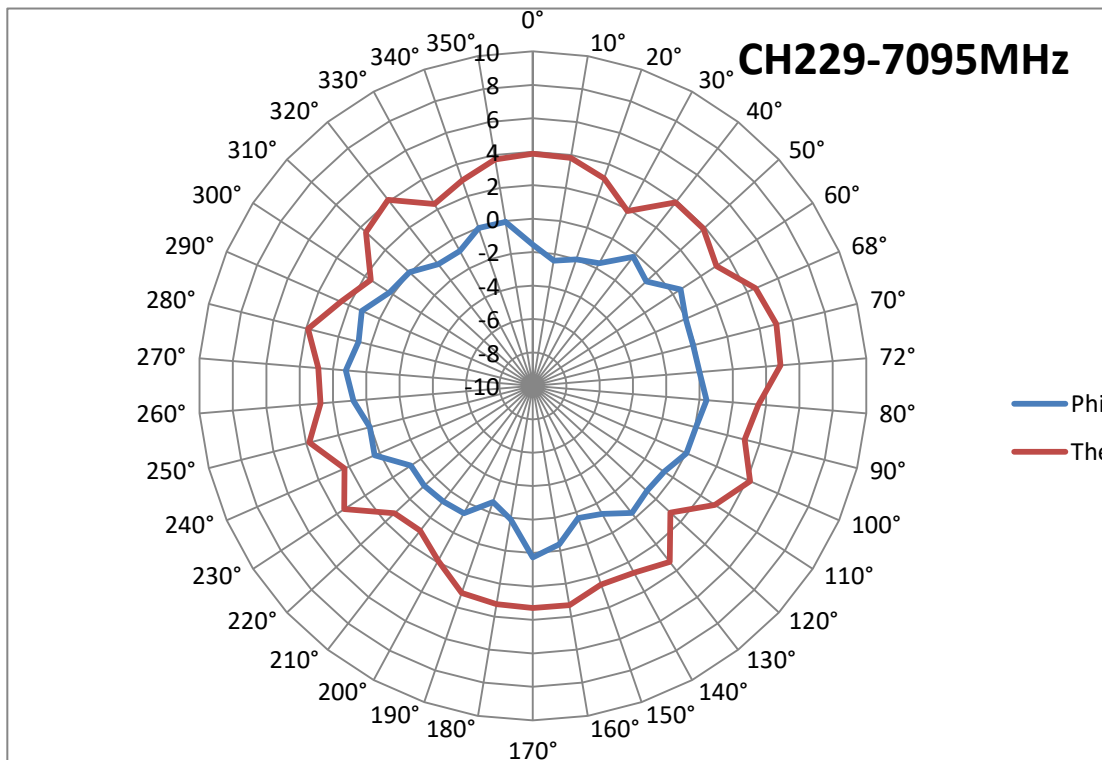
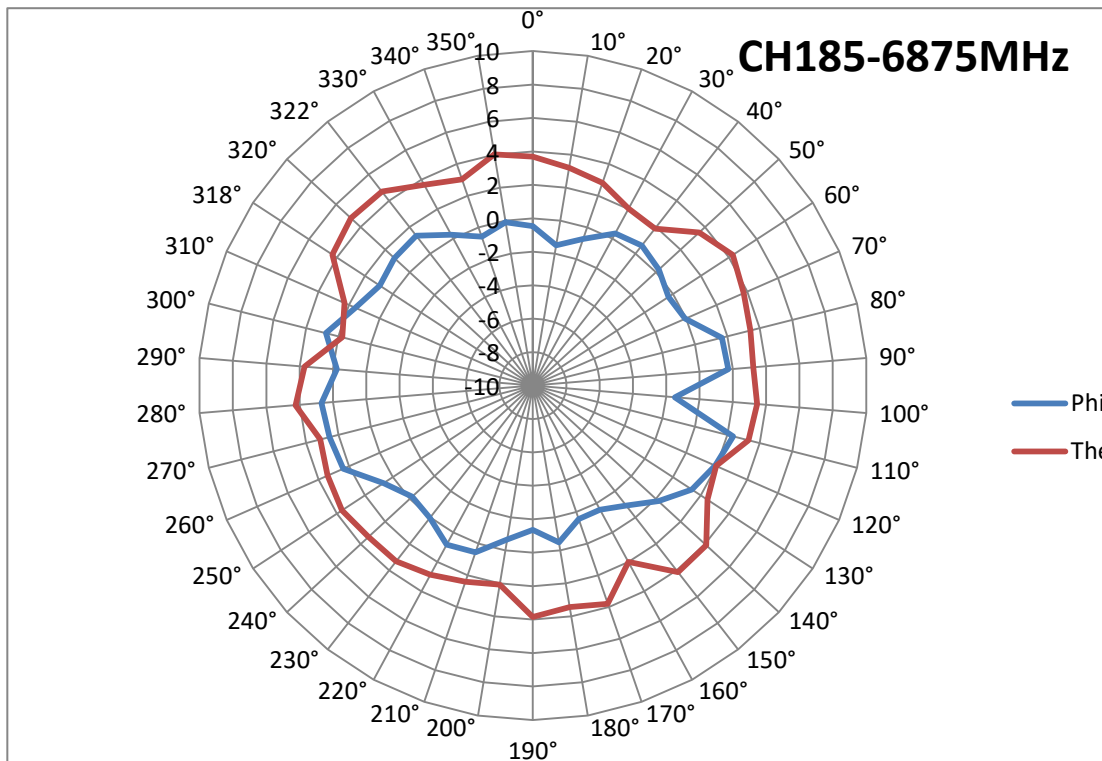
## 2.4 Directional Gain calculation

Directional Antenna Gain (dBi) = Max EIRP (dBm) – Total Conducted Power (dBm)

| Channel                                                                | Power Setting | Frequency (MHz) | Conducted Power (dBm) | Max EIRP (dBm) | Max Directional Gain (dBi) |
|------------------------------------------------------------------------|---------------|-----------------|-----------------------|----------------|----------------------------|
| 93                                                                     | 20            | 6415            | 21.65                 | 26.35          | 4.70                       |
| 117                                                                    | 20            | 6535            | 22.23                 | 27.01          | 4.78                       |
| 185                                                                    | 20            | 6875            | 21.35                 | 26.13          | 4.78                       |
| 229                                                                    | 20            | 7095            | 21.20                 | 26.23          | 5.03                       |
| Max Directional Gain: 6GHz, 802.11 be EHT20,Beamforming mode,4Tx,NSS=1 |               |                 |                       |                |                            |

## 2.5 Directivity plots in 2D cuts







## 2.6 Raw Data

### 2.6.1 6415MHz-CH93

| Polarization<br>(For Measurement Antenna) | Phi degree<br>(For EUT) | Read Level<br>(dBμV) | Ant Factor<br>dB/m | Cable loss<br>(dB) | Preamp Factor<br>(dB) | Pre-Att<br>(dB) | Measuremet EIRP Power<br>(dBm) | Conductd Power<br>(dBm) | Directional Gain<br>(dBi) |
|-------------------------------------------|-------------------------|----------------------|--------------------|--------------------|-----------------------|-----------------|--------------------------------|-------------------------|---------------------------|
| Phi                                       | 0°                      | 86.74                | 35.7               | 14.14              | 30.65                 | 10              | 20.73                          | 21.65                   | -0.92                     |
| Phi                                       | 10°                     | 85.33                | 35.7               | 14.14              | 30.65                 | 10              | 19.32                          | 21.65                   | -2.33                     |
| Phi                                       | 20°                     | 85.53                | 35.7               | 14.14              | 30.65                 | 10              | 19.52                          | 21.65                   | -2.13                     |
| Phi                                       | 30°                     | 85.44                | 35.7               | 14.14              | 30.65                 | 10              | 19.43                          | 21.65                   | -2.22                     |
| Phi                                       | 40°                     | 84.68                | 35.7               | 14.14              | 30.65                 | 10              | 18.67                          | 21.65                   | -2.98                     |
| Phi                                       | 50°                     | 85.97                | 35.7               | 14.14              | 30.65                 | 10              | 19.96                          | 21.65                   | -1.69                     |
| Phi                                       | 60°                     | 87.15                | 35.7               | 14.14              | 30.65                 | 10              | 21.14                          | 21.65                   | -0.51                     |
| Phi                                       | 70°                     | 86.95                | 35.7               | 14.14              | 30.65                 | 10              | 20.94                          | 21.65                   | -0.71                     |
| Phi                                       | 80°                     | 86.44                | 35.7               | 14.14              | 30.65                 | 10              | 20.43                          | 21.65                   | -1.22                     |
| Phi                                       | 90°                     | 87.13                | 35.7               | 14.14              | 30.65                 | 10              | 21.12                          | 21.65                   | -0.53                     |
| Phi                                       | 100°                    | 87.01                | 35.7               | 14.14              | 30.65                 | 10              | 21.00                          | 21.65                   | -0.65                     |
| Phi                                       | 110°                    | 87.29                | 35.7               | 14.14              | 30.65                 | 10              | 21.28                          | 21.65                   | -0.37                     |
| Phi                                       | 120°                    | 86.53                | 35.7               | 14.14              | 30.65                 | 10              | 20.52                          | 21.65                   | -1.13                     |
| Phi                                       | 130°                    | 86                   | 35.7               | 14.14              | 30.65                 | 10              | 19.99                          | 21.65                   | -1.66                     |
| Phi                                       | 140°                    | 86.24                | 35.7               | 14.14              | 30.65                 | 10              | 20.23                          | 21.65                   | -1.42                     |
| Phi                                       | 150°                    | 87.54                | 35.7               | 14.14              | 30.65                 | 10              | 21.53                          | 21.65                   | -0.12                     |
| Phi                                       | 156°                    | 86.69                | 35.7               | 14.14              | 30.65                 | 10              | 20.68                          | 21.65                   | -0.97                     |
| Phi                                       | 158°                    | 86.18                | 35.7               | 14.14              | 30.65                 | 10              | 20.17                          | 21.65                   | -1.48                     |
| Phi                                       | 160°                    | 85.68                | 35.7               | 14.14              | 30.65                 | 10              | 19.67                          | 21.65                   | -1.98                     |
| Phi                                       | 162°                    | 85.9                 | 35.7               | 14.14              | 30.65                 | 10              | 19.89                          | 21.65                   | -1.76                     |
| Phi                                       | 164°                    | 86.21                | 35.7               | 14.14              | 30.65                 | 10              | 20.20                          | 21.65                   | -1.45                     |
| Phi                                       | 170°                    | 86.09                | 35.7               | 14.14              | 30.65                 | 10              | 20.08                          | 21.65                   | -1.57                     |
| Phi                                       | 180°                    | 85.85                | 35.7               | 14.14              | 30.65                 | 10              | 19.84                          | 21.65                   | -1.81                     |
| Phi                                       | 190°                    | 85.01                | 35.7               | 14.14              | 30.65                 | 10              | 19.00                          | 21.65                   | -2.65                     |
| Phi                                       | 200°                    | 85.2                 | 35.7               | 14.14              | 30.65                 | 10              | 19.19                          | 21.65                   | -2.46                     |
| Phi                                       | 210°                    | 84.56                | 35.7               | 14.14              | 30.65                 | 10              | 18.55                          | 21.65                   | -3.10                     |
| Phi                                       | 220°                    | 85.52                | 35.7               | 14.14              | 30.65                 | 10              | 19.51                          | 21.65                   | -2.14                     |
| Phi                                       | 230°                    | 85.81                | 35.7               | 14.14              | 30.65                 | 10              | 19.80                          | 21.65                   | -1.85                     |
| Phi                                       | 240°                    | 85.67                | 35.7               | 14.14              | 30.65                 | 10              | 19.66                          | 21.65                   | -1.99                     |
| Phi                                       | 250°                    | 85.96                | 35.7               | 14.14              | 30.65                 | 10              | 19.95                          | 21.65                   | -1.70                     |
| Phi                                       | 260°                    | 85.53                | 35.7               | 14.14              | 30.65                 | 10              | 19.52                          | 21.65                   | -2.13                     |
| Phi                                       | 270°                    | 87.23                | 35.7               | 14.14              | 30.65                 | 10              | 21.22                          | 21.65                   | -0.43                     |
| Phi                                       | 280°                    | 86.92                | 35.7               | 14.14              | 30.65                 | 10              | 20.91                          | 21.65                   | -0.74                     |
| Phi                                       | 290°                    | 85.57                | 35.7               | 14.14              | 30.65                 | 10              | 19.56                          | 21.65                   | -2.09                     |
| Phi                                       | 300°                    | 85.87                | 35.7               | 14.14              | 30.65                 | 10              | 19.86                          | 21.65                   | -1.79                     |
| Phi                                       | 310°                    | 86.19                | 35.7               | 14.14              | 30.65                 | 10              | 20.18                          | 21.65                   | -1.47                     |
| Phi                                       | 320°                    | 86.56                | 35.7               | 14.14              | 30.65                 | 10              | 20.55                          | 21.65                   | -1.10                     |
| Phi                                       | 330°                    | 85.5                 | 35.7               | 14.14              | 30.65                 | 10              | 19.49                          | 21.65                   | -2.16                     |
| Phi                                       | 340°                    | 85.07                | 35.7               | 14.14              | 30.65                 | 10              | 19.06                          | 21.65                   | -2.59                     |



|       |      |       |      |       |       |    |       |       |       |
|-------|------|-------|------|-------|-------|----|-------|-------|-------|
| Phi   | 350° | 84.06 | 35.7 | 14.14 | 30.65 | 10 | 18.05 | 21.65 | -3.60 |
| Theta | 0°   | 90.95 | 35.7 | 14.14 | 30.65 | 10 | 24.94 | 21.65 | 3.29  |
| Theta | 10°  | 91.09 | 35.7 | 14.14 | 30.65 | 10 | 25.08 | 21.65 | 3.43  |
| Theta | 20°  | 91.32 | 35.7 | 14.14 | 30.65 | 10 | 25.31 | 21.65 | 3.66  |
| Theta | 30°  | 90.53 | 35.7 | 14.14 | 30.65 | 10 | 24.52 | 21.65 | 2.87  |
| Theta | 40°  | 89.86 | 35.7 | 14.14 | 30.65 | 10 | 23.85 | 21.65 | 2.20  |
| Theta | 50°  | 91.49 | 35.7 | 14.14 | 30.65 | 10 | 25.48 | 21.65 | 3.83  |
| Theta | 60°  | 90.81 | 35.7 | 14.14 | 30.65 | 10 | 24.80 | 21.65 | 3.15  |
| Theta | 70°  | 91.24 | 35.7 | 14.14 | 30.65 | 10 | 25.23 | 21.65 | 3.58  |
| Theta | 80°  | 90.9  | 35.7 | 14.14 | 30.65 | 10 | 24.89 | 21.65 | 3.24  |
| Theta | 90°  | 90.36 | 35.7 | 14.14 | 30.65 | 10 | 24.35 | 21.65 | 2.70  |
| Theta | 100° | 90.81 | 35.7 | 14.14 | 30.65 | 10 | 24.80 | 21.65 | 3.15  |
| Theta | 110° | 90.62 | 35.7 | 14.14 | 30.65 | 10 | 24.61 | 21.65 | 2.96  |
| Theta | 120° | 90.69 | 35.7 | 14.14 | 30.65 | 10 | 24.68 | 21.65 | 3.03  |
| Theta | 130° | 90.4  | 35.7 | 14.14 | 30.65 | 10 | 24.39 | 21.65 | 2.74  |
| Theta | 140° | 90.53 | 35.7 | 14.14 | 30.65 | 10 | 24.52 | 21.65 | 2.87  |
| Theta | 150° | 90.38 | 35.7 | 14.14 | 30.65 | 10 | 24.37 | 21.65 | 2.72  |
| Theta | 156° | 92.23 | 35.7 | 14.14 | 30.65 | 10 | 26.22 | 21.65 | 4.57  |
| Theta | 158° | 92.25 | 35.7 | 14.14 | 30.65 | 10 | 26.24 | 21.65 | 4.59  |
| Theta | 160° | 91.9  | 35.7 | 14.14 | 30.65 | 10 | 25.89 | 21.65 | 4.24  |
| Theta | 162° | 92.36 | 35.7 | 14.14 | 30.65 | 10 | 26.35 | 21.65 | 4.70  |
| Theta | 164° | 91.87 | 35.7 | 14.14 | 30.65 | 10 | 25.86 | 21.65 | 4.21  |
| Theta | 170° | 90.97 | 35.7 | 14.14 | 30.65 | 10 | 24.96 | 21.65 | 3.31  |
| Theta | 180° | 90.88 | 35.7 | 14.14 | 30.65 | 10 | 24.87 | 21.65 | 3.22  |
| Theta | 190° | 90.04 | 35.7 | 14.14 | 30.65 | 10 | 24.03 | 21.65 | 2.38  |
| Theta | 200° | 90.66 | 35.7 | 14.14 | 30.65 | 10 | 24.65 | 21.65 | 3.00  |
| Theta | 210° | 90.31 | 35.7 | 14.14 | 30.65 | 10 | 24.30 | 21.65 | 2.65  |
| Theta | 220° | 90.91 | 35.7 | 14.14 | 30.65 | 10 | 24.90 | 21.65 | 3.25  |
| Theta | 230° | 91.5  | 35.7 | 14.14 | 30.65 | 10 | 25.49 | 21.65 | 3.84  |
| Theta | 240° | 91.24 | 35.7 | 14.14 | 30.65 | 10 | 25.23 | 21.65 | 3.58  |
| Theta | 250° | 90.98 | 35.7 | 14.14 | 30.65 | 10 | 24.97 | 21.65 | 3.32  |
| Theta | 260° | 90.52 | 35.7 | 14.14 | 30.65 | 10 | 24.51 | 21.65 | 2.86  |
| Theta | 270° | 90.68 | 35.7 | 14.14 | 30.65 | 10 | 24.67 | 21.65 | 3.02  |
| Theta | 280° | 91.04 | 35.7 | 14.14 | 30.65 | 10 | 25.03 | 21.65 | 3.38  |
| Theta | 290° | 91.12 | 35.7 | 14.14 | 30.65 | 10 | 25.11 | 21.65 | 3.46  |
| Theta | 300° | 90.96 | 35.7 | 14.14 | 30.65 | 10 | 24.95 | 21.65 | 3.30  |
| Theta | 310° | 90.58 | 35.7 | 14.14 | 30.65 | 10 | 24.57 | 21.65 | 2.92  |
| Theta | 320° | 91.84 | 35.7 | 14.14 | 30.65 | 10 | 25.83 | 21.65 | 4.18  |
| Theta | 330° | 91.74 | 35.7 | 14.14 | 30.65 | 10 | 25.73 | 21.65 | 4.08  |
| Theta | 340° | 91.8  | 35.7 | 14.14 | 30.65 | 10 | 25.79 | 21.65 | 4.14  |
| Theta | 350° | 91.62 | 35.7 | 14.14 | 30.65 | 10 | 25.61 | 21.65 | 3.96  |



## 2.6.2 6535MHz-CH117

| Polarization<br>(For Measurement Antenna) | Phi degree<br>(For EUT) | Read Level<br>(dBμV) | Ant Factor<br>dB/m | Cable loss<br>(dB) | Preamp Factor<br>(dB) | Pre-Att<br>(dB) | Measuremet EIRP Power<br>(dBm) | Conductd Power<br>(dBm) | Directional Gain<br>(dBi) |
|-------------------------------------------|-------------------------|----------------------|--------------------|--------------------|-----------------------|-----------------|--------------------------------|-------------------------|---------------------------|
| Phi                                       | 0°                      | 87.47                | 35.7               | 14.65              | 30.71                 | 10              | 21.91                          | 22.23                   | -0.32                     |
| Phi                                       | 10°                     | 85                   | 35.7               | 14.65              | 30.71                 | 10              | 19.44                          | 22.23                   | -2.79                     |
| Phi                                       | 20°                     | 84.54                | 35.7               | 14.65              | 30.71                 | 10              | 18.98                          | 22.23                   | -3.25                     |
| Phi                                       | 30°                     | 87.43                | 35.7               | 14.65              | 30.71                 | 10              | 21.87                          | 22.23                   | -0.36                     |
| Phi                                       | 40°                     | 87.21                | 35.7               | 14.65              | 30.71                 | 10              | 21.65                          | 22.23                   | -0.58                     |
| Phi                                       | 50°                     | 86.57                | 35.7               | 14.65              | 30.71                 | 10              | 21.01                          | 22.23                   | -1.22                     |
| Phi                                       | 60°                     | 86.67                | 35.7               | 14.65              | 30.71                 | 10              | 21.11                          | 22.23                   | -1.12                     |
| Phi                                       | 70°                     | 86.62                | 35.7               | 14.65              | 30.71                 | 10              | 21.06                          | 22.23                   | -1.17                     |
| Phi                                       | 80°                     | 85.77                | 35.7               | 14.65              | 30.71                 | 10              | 20.21                          | 22.23                   | -2.02                     |
| Phi                                       | 90°                     | 87.37                | 35.7               | 14.65              | 30.71                 | 10              | 21.81                          | 22.23                   | -0.42                     |
| Phi                                       | 100°                    | 86.51                | 35.7               | 14.65              | 30.71                 | 10              | 20.95                          | 22.23                   | -1.28                     |
| Phi                                       | 110°                    | 87.11                | 35.7               | 14.65              | 30.71                 | 10              | 21.55                          | 22.23                   | -0.68                     |
| Phi                                       | 120°                    | 86.33                | 35.7               | 14.65              | 30.71                 | 10              | 20.77                          | 22.23                   | -1.46                     |
| Phi                                       | 130°                    | 86.08                | 35.7               | 14.65              | 30.71                 | 10              | 20.52                          | 22.23                   | -1.71                     |
| Phi                                       | 140°                    | 86.4                 | 35.7               | 14.65              | 30.71                 | 10              | 20.84                          | 22.23                   | -1.39                     |
| Phi                                       | 150°                    | 86.31                | 35.7               | 14.65              | 30.71                 | 10              | 20.75                          | 22.23                   | -1.48                     |
| Phi                                       | 160°                    | 86.95                | 35.7               | 14.65              | 30.71                 | 10              | 21.39                          | 22.23                   | -0.84                     |
| Phi                                       | 170°                    | 86.16                | 35.7               | 14.65              | 30.71                 | 10              | 20.60                          | 22.23                   | -1.63                     |
| Phi                                       | 180°                    | 87.48                | 35.7               | 14.65              | 30.71                 | 10              | 21.92                          | 22.23                   | -0.31                     |
| Phi                                       | 190°                    | 86.25                | 35.7               | 14.65              | 30.71                 | 10              | 20.69                          | 22.23                   | -1.54                     |
| Phi                                       | 200°                    | 86.19                | 35.7               | 14.65              | 30.71                 | 10              | 20.63                          | 22.23                   | -1.60                     |
| Phi                                       | 210°                    | 85.56                | 35.7               | 14.65              | 30.71                 | 10              | 20.00                          | 22.23                   | -2.23                     |
| Phi                                       | 220°                    | 85.24                | 35.7               | 14.65              | 30.71                 | 10              | 19.68                          | 22.23                   | -2.55                     |
| Phi                                       | 230°                    | 86.22                | 35.7               | 14.65              | 30.71                 | 10              | 20.66                          | 22.23                   | -1.57                     |
| Phi                                       | 240°                    | 86.65                | 35.7               | 14.65              | 30.71                 | 10              | 21.09                          | 22.23                   | -1.14                     |
| Phi                                       | 250°                    | 85.48                | 35.7               | 14.65              | 30.71                 | 10              | 19.92                          | 22.23                   | -2.31                     |
| Phi                                       | 260°                    | 85.73                | 35.7               | 14.65              | 30.71                 | 10              | 20.17                          | 22.23                   | -2.06                     |
| Phi                                       | 270°                    | 86.66                | 35.7               | 14.65              | 30.71                 | 10              | 21.10                          | 22.23                   | -1.13                     |
| Phi                                       | 280°                    | 86.28                | 35.7               | 14.65              | 30.71                 | 10              | 20.72                          | 22.23                   | -1.51                     |
| Phi                                       | 290°                    | 87.33                | 35.7               | 14.65              | 30.71                 | 10              | 21.77                          | 22.23                   | -0.46                     |
| Phi                                       | 300°                    | 88.97                | 35.7               | 14.65              | 30.71                 | 10              | 23.41                          | 22.23                   | 1.18                      |
| Phi                                       | 310°                    | 87.96                | 35.7               | 14.65              | 30.71                 | 10              | 22.40                          | 22.23                   | 0.17                      |
| Phi                                       | 320°                    | 87.31                | 35.7               | 14.65              | 30.71                 | 10              | 21.75                          | 22.23                   | -0.48                     |
| Phi                                       | 326°                    | 88.01                | 35.7               | 14.65              | 30.71                 | 10              | 22.45                          | 22.23                   | 0.22                      |
| Phi                                       | 328°                    | 88.43                | 35.7               | 14.65              | 30.71                 | 10              | 22.87                          | 22.23                   | 0.64                      |
| Phi                                       | 330°                    | 87.77                | 35.7               | 14.65              | 30.71                 | 10              | 22.21                          | 22.23                   | -0.02                     |
| Phi                                       | 332°                    | 87.36                | 35.7               | 14.65              | 30.71                 | 10              | 21.80                          | 22.23                   | -0.43                     |
| Phi                                       | 340°                    | 87.23                | 35.7               | 14.65              | 30.71                 | 10              | 21.67                          | 22.23                   | -0.56                     |
| Phi                                       | 350°                    | 86.15                | 35.7               | 14.65              | 30.71                 | 10              | 20.59                          | 22.23                   | -1.64                     |
| Theta                                     | 0°                      | 90.82                | 35.7               | 14.65              | 30.71                 | 10              | 25.26                          | 22.23                   | 3.03                      |



|       |      |       |      |       |       |    |       |       |      |
|-------|------|-------|------|-------|-------|----|-------|-------|------|
| Theta | 10°  | 90.05 | 35.7 | 14.65 | 30.71 | 10 | 24.49 | 22.23 | 2.26 |
| Theta | 20°  | 90.61 | 35.7 | 14.65 | 30.71 | 10 | 25.05 | 22.23 | 2.82 |
| Theta | 30°  | 90.04 | 35.7 | 14.65 | 30.71 | 10 | 24.48 | 22.23 | 2.25 |
| Theta | 40°  | 90.6  | 35.7 | 14.65 | 30.71 | 10 | 25.04 | 22.23 | 2.81 |
| Theta | 50°  | 91.14 | 35.7 | 14.65 | 30.71 | 10 | 25.58 | 22.23 | 3.35 |
| Theta | 60°  | 91.79 | 35.7 | 14.65 | 30.71 | 10 | 26.23 | 22.23 | 4.00 |
| Theta | 70°  | 91.57 | 35.7 | 14.65 | 30.71 | 10 | 26.01 | 22.23 | 3.78 |
| Theta | 80°  | 89.69 | 35.7 | 14.65 | 30.71 | 10 | 24.13 | 22.23 | 1.90 |
| Theta | 90°  | 90.91 | 35.7 | 14.65 | 30.71 | 10 | 25.35 | 22.23 | 3.12 |
| Theta | 100° | 91.48 | 35.7 | 14.65 | 30.71 | 10 | 25.92 | 22.23 | 3.69 |
| Theta | 110° | 91.08 | 35.7 | 14.65 | 30.71 | 10 | 25.52 | 22.23 | 3.29 |
| Theta | 120° | 90.67 | 35.7 | 14.65 | 30.71 | 10 | 25.11 | 22.23 | 2.88 |
| Theta | 130° | 90.04 | 35.7 | 14.65 | 30.71 | 10 | 24.48 | 22.23 | 2.25 |
| Theta | 140° | 91.1  | 35.7 | 14.65 | 30.71 | 10 | 25.54 | 22.23 | 3.31 |
| Theta | 150° | 91.57 | 35.7 | 14.65 | 30.71 | 10 | 26.01 | 22.23 | 3.78 |
| Theta | 160° | 90.83 | 35.7 | 14.65 | 30.71 | 10 | 25.27 | 22.23 | 3.04 |
| Theta | 170° | 90.7  | 35.7 | 14.65 | 30.71 | 10 | 25.14 | 22.23 | 2.91 |
| Theta | 180° | 90.63 | 35.7 | 14.65 | 30.71 | 10 | 25.07 | 22.23 | 2.84 |
| Theta | 190° | 90.6  | 35.7 | 14.65 | 30.71 | 10 | 25.04 | 22.23 | 2.81 |
| Theta | 200° | 90.62 | 35.7 | 14.65 | 30.71 | 10 | 25.06 | 22.23 | 2.83 |
| Theta | 210° | 89.93 | 35.7 | 14.65 | 30.71 | 10 | 24.37 | 22.23 | 2.14 |
| Theta | 220° | 90.85 | 35.7 | 14.65 | 30.71 | 10 | 25.29 | 22.23 | 3.06 |
| Theta | 230° | 91.12 | 35.7 | 14.65 | 30.71 | 10 | 25.56 | 22.23 | 3.33 |
| Theta | 240° | 91.46 | 35.7 | 14.65 | 30.71 | 10 | 25.90 | 22.23 | 3.67 |
| Theta | 250° | 91.44 | 35.7 | 14.65 | 30.71 | 10 | 25.88 | 22.23 | 3.65 |
| Theta | 260° | 90.4  | 35.7 | 14.65 | 30.71 | 10 | 24.84 | 22.23 | 2.61 |
| Theta | 270° | 90.81 | 35.7 | 14.65 | 30.71 | 10 | 25.25 | 22.23 | 3.02 |
| Theta | 280° | 91.61 | 35.7 | 14.65 | 30.71 | 10 | 26.05 | 22.23 | 3.82 |
| Theta | 290° | 90.9  | 35.7 | 14.65 | 30.71 | 10 | 25.34 | 22.23 | 3.11 |
| Theta | 300° | 90.43 | 35.7 | 14.65 | 30.71 | 10 | 24.87 | 22.23 | 2.64 |
| Theta | 310° | 89.91 | 35.7 | 14.65 | 30.71 | 10 | 24.35 | 22.23 | 2.12 |
| Theta | 320° | 91.55 | 35.7 | 14.65 | 30.71 | 10 | 25.99 | 22.23 | 3.76 |
| Theta | 326° | 92.49 | 35.7 | 14.65 | 30.71 | 10 | 26.93 | 22.23 | 4.70 |
| Theta | 328° | 92.57 | 35.7 | 14.65 | 30.71 | 10 | 27.01 | 22.23 | 4.78 |
| Theta | 330° | 92.41 | 35.7 | 14.65 | 30.71 | 10 | 26.85 | 22.23 | 4.62 |
| Theta | 332° | 91.92 | 35.7 | 14.65 | 30.71 | 10 | 26.36 | 22.23 | 4.13 |
| Theta | 340° | 91.36 | 35.7 | 14.65 | 30.71 | 10 | 25.80 | 22.23 | 3.57 |
| Theta | 350° | 91.88 | 35.7 | 14.65 | 30.71 | 10 | 26.32 | 22.23 | 4.09 |



## 2.6.3 6875MHz-CH185

| Polarization<br>(For Measurement Antenna) | Phi degree<br>(For EUT) | Read Level<br>(dBμV) | Ant Factor<br>dB/m | Cable loss<br>(dB) | Preamp Factor<br>(dB) | Pre-Att<br>(dB) | Measuremet EIRP Power<br>(dBm) | Conductd Power<br>(dBm) | Directional Gain<br>(dBi) |
|-------------------------------------------|-------------------------|----------------------|--------------------|--------------------|-----------------------|-----------------|--------------------------------|-------------------------|---------------------------|
| Phi                                       | 0°                      | 86.41                | 35.75              | 14.53              | 30.61                 | 10              | 20.88                          | 21.35                   | -0.47                     |
| Phi                                       | 10°                     | 85.38                | 35.75              | 14.53              | 30.61                 | 10              | 19.85                          | 21.35                   | -1.50                     |
| Phi                                       | 20°                     | 86.16                | 35.75              | 14.53              | 30.61                 | 10              | 20.63                          | 21.35                   | -0.72                     |
| Phi                                       | 30°                     | 87.23                | 35.75              | 14.53              | 30.61                 | 10              | 21.70                          | 21.35                   | 0.35                      |
| Phi                                       | 40°                     | 87.49                | 35.75              | 14.53              | 30.61                 | 10              | 21.96                          | 21.35                   | 0.61                      |
| Phi                                       | 50°                     | 87.11                | 35.75              | 14.53              | 30.61                 | 10              | 21.58                          | 21.35                   | 0.23                      |
| Phi                                       | 60°                     | 86.57                | 35.75              | 14.53              | 30.61                 | 10              | 21.04                          | 21.35                   | -0.31                     |
| Phi                                       | 70°                     | 86.83                | 35.75              | 14.53              | 30.61                 | 10              | 21.30                          | 21.35                   | -0.05                     |
| Phi                                       | 80°                     | 88.54                | 35.75              | 14.53              | 30.61                 | 10              | 23.01                          | 21.35                   | 1.66                      |
| Phi                                       | 90°                     | 88.61                | 35.75              | 14.53              | 30.61                 | 10              | 23.08                          | 21.35                   | 1.73                      |
| Phi                                       | 100°                    | 85.41                | 35.75              | 14.53              | 30.61                 | 10              | 19.88                          | 21.35                   | -1.47                     |
| Phi                                       | 110°                    | 89.24                | 35.75              | 14.53              | 30.61                 | 10              | 23.71                          | 21.35                   | 2.36                      |
| Phi                                       | 120°                    | 88.78                | 35.75              | 14.53              | 30.61                 | 10              | 23.25                          | 21.35                   | 1.90                      |
| Phi                                       | 130°                    | 88.24                | 35.75              | 14.53              | 30.61                 | 10              | 22.71                          | 21.35                   | 1.36                      |
| Phi                                       | 140°                    | 87.09                | 35.75              | 14.53              | 30.61                 | 10              | 21.56                          | 21.35                   | 0.21                      |
| Phi                                       | 150°                    | 85.98                | 35.75              | 14.53              | 30.61                 | 10              | 20.45                          | 21.35                   | -0.90                     |
| Phi                                       | 160°                    | 85.32                | 35.75              | 14.53              | 30.61                 | 10              | 19.79                          | 21.35                   | -1.56                     |
| Phi                                       | 170°                    | 85.32                | 35.75              | 14.53              | 30.61                 | 10              | 19.79                          | 21.35                   | -1.56                     |
| Phi                                       | 180°                    | 86.39                | 35.75              | 14.53              | 30.61                 | 10              | 20.86                          | 21.35                   | -0.49                     |
| Phi                                       | 190°                    | 85.52                | 35.75              | 14.53              | 30.61                 | 10              | 19.99                          | 21.35                   | -1.36                     |
| Phi                                       | 200°                    | 86.22                | 35.75              | 14.53              | 30.61                 | 10              | 20.69                          | 21.35                   | -0.66                     |
| Phi                                       | 210°                    | 87.43                | 35.75              | 14.53              | 30.61                 | 10              | 21.90                          | 21.35                   | 0.55                      |
| Phi                                       | 220°                    | 87.7                 | 35.75              | 14.53              | 30.61                 | 10              | 22.17                          | 21.35                   | 0.82                      |
| Phi                                       | 230°                    | 86.91                | 35.75              | 14.53              | 30.61                 | 10              | 21.38                          | 21.35                   | 0.03                      |
| Phi                                       | 240°                    | 86.7                 | 35.75              | 14.53              | 30.61                 | 10              | 21.17                          | 21.35                   | -0.18                     |
| Phi                                       | 250°                    | 87.54                | 35.75              | 14.53              | 30.61                 | 10              | 22.01                          | 21.35                   | 0.66                      |
| Phi                                       | 260°                    | 89.27                | 35.75              | 14.53              | 30.61                 | 10              | 23.74                          | 21.35                   | 2.39                      |
| Phi                                       | 270°                    | 89.43                | 35.75              | 14.53              | 30.61                 | 10              | 23.90                          | 21.35                   | 2.55                      |
| Phi                                       | 280°                    | 89.57                | 35.75              | 14.53              | 30.61                 | 10              | 24.04                          | 21.35                   | 2.69                      |
| Phi                                       | 290°                    | 88.64                | 35.75              | 14.53              | 30.61                 | 10              | 23.11                          | 21.35                   | 1.76                      |
| Phi                                       | 300°                    | 89.64                | 35.75              | 14.53              | 30.61                 | 10              | 24.11                          | 21.35                   | 2.76                      |
| Phi                                       | 310°                    | 88.48                | 35.75              | 14.53              | 30.61                 | 10              | 22.95                          | 21.35                   | 1.60                      |
| Phi                                       | 318°                    | 87.82                | 35.75              | 14.53              | 30.61                 | 10              | 22.29                          | 21.35                   | 0.94                      |
| Phi                                       | 320°                    | 88.12                | 35.75              | 14.53              | 30.61                 | 10              | 22.59                          | 21.35                   | 1.24                      |
| Phi                                       | 322°                    | 88.23                | 35.75              | 14.53              | 30.61                 | 10              | 22.70                          | 21.35                   | 1.35                      |
| Phi                                       | 330°                    | 87.13                | 35.75              | 14.53              | 30.61                 | 10              | 21.60                          | 21.35                   | 0.25                      |
| Phi                                       | 340°                    | 86.3                 | 35.75              | 14.53              | 30.61                 | 10              | 20.77                          | 21.35                   | -0.58                     |
| Phi                                       | 350°                    | 86.78                | 35.75              | 14.53              | 30.61                 | 10              | 21.25                          | 21.35                   | -0.10                     |
| Theta                                     | 0°                      | 90.57                | 35.75              | 14.53              | 30.61                 | 10              | 25.04                          | 21.35                   | 3.69                      |
| Theta                                     | 10°                     | 90.08                | 35.75              | 14.53              | 30.61                 | 10              | 24.55                          | 21.35                   | 3.20                      |



|       |      |       |       |       |       |    |       |       |      |
|-------|------|-------|-------|-------|-------|----|-------|-------|------|
| Theta | 20°  | 89.7  | 35.75 | 14.53 | 30.61 | 10 | 24.17 | 21.35 | 2.82 |
| Theta | 30°  | 88.91 | 35.75 | 14.53 | 30.61 | 10 | 23.38 | 21.35 | 2.03 |
| Theta | 40°  | 88.77 | 35.75 | 14.53 | 30.61 | 10 | 23.24 | 21.35 | 1.89 |
| Theta | 50°  | 90.4  | 35.75 | 14.53 | 30.61 | 10 | 24.87 | 21.35 | 3.52 |
| Theta | 60°  | 91.17 | 35.75 | 14.53 | 30.61 | 10 | 25.64 | 21.35 | 4.29 |
| Theta | 70°  | 90.64 | 35.75 | 14.53 | 30.61 | 10 | 25.11 | 21.35 | 3.76 |
| Theta | 80°  | 90.3  | 35.75 | 14.53 | 30.61 | 10 | 24.77 | 21.35 | 3.42 |
| Theta | 90°  | 90.1  | 35.75 | 14.53 | 30.61 | 10 | 24.57 | 21.35 | 3.22 |
| Theta | 100° | 90.33 | 35.75 | 14.53 | 30.61 | 10 | 24.80 | 21.35 | 3.45 |
| Theta | 110° | 90.19 | 35.75 | 14.53 | 30.61 | 10 | 24.66 | 21.35 | 3.31 |
| Theta | 120° | 88.85 | 35.75 | 14.53 | 30.61 | 10 | 23.32 | 21.35 | 1.97 |
| Theta | 130° | 89.35 | 35.75 | 14.53 | 30.61 | 10 | 23.82 | 21.35 | 2.47 |
| Theta | 140° | 90.97 | 35.75 | 14.53 | 30.61 | 10 | 25.44 | 21.35 | 4.09 |
| Theta | 150° | 91.03 | 35.75 | 14.53 | 30.61 | 10 | 25.50 | 21.35 | 4.15 |
| Theta | 160° | 88.88 | 35.75 | 14.53 | 30.61 | 10 | 23.35 | 21.35 | 2.00 |
| Theta | 170° | 90.68 | 35.75 | 14.53 | 30.61 | 10 | 25.15 | 21.35 | 3.80 |
| Theta | 180° | 90.31 | 35.75 | 14.53 | 30.61 | 10 | 24.78 | 21.35 | 3.43 |
| Theta | 190° | 90.72 | 35.75 | 14.53 | 30.61 | 10 | 25.19 | 21.35 | 3.84 |
| Theta | 200° | 88.96 | 35.75 | 14.53 | 30.61 | 10 | 23.43 | 21.35 | 2.08 |
| Theta | 210° | 89.29 | 35.75 | 14.53 | 30.61 | 10 | 23.76 | 21.35 | 2.41 |
| Theta | 220° | 89.75 | 35.75 | 14.53 | 30.61 | 10 | 24.22 | 21.35 | 2.87 |
| Theta | 230° | 90.2  | 35.75 | 14.53 | 30.61 | 10 | 24.67 | 21.35 | 3.32 |
| Theta | 240° | 90.25 | 35.75 | 14.53 | 30.61 | 10 | 24.72 | 21.35 | 3.37 |
| Theta | 250° | 90.51 | 35.75 | 14.53 | 30.61 | 10 | 24.98 | 21.35 | 3.63 |
| Theta | 260° | 90.29 | 35.75 | 14.53 | 30.61 | 10 | 24.76 | 21.35 | 3.41 |
| Theta | 270° | 90    | 35.75 | 14.53 | 30.61 | 10 | 24.47 | 21.35 | 3.12 |
| Theta | 280° | 91.12 | 35.75 | 14.53 | 30.61 | 10 | 25.59 | 21.35 | 4.24 |
| Theta | 290° | 90.59 | 35.75 | 14.53 | 30.61 | 10 | 25.06 | 21.35 | 3.71 |
| Theta | 300° | 88.64 | 35.75 | 14.53 | 30.61 | 10 | 23.11 | 21.35 | 1.76 |
| Theta | 310° | 89.19 | 35.75 | 14.53 | 30.61 | 10 | 23.66 | 21.35 | 2.31 |
| Theta | 318° | 91.2  | 35.75 | 14.53 | 30.61 | 10 | 25.67 | 21.35 | 4.32 |
| Theta | 320° | 91.66 | 35.75 | 14.53 | 30.61 | 10 | 26.13 | 21.35 | 4.78 |
| Theta | 322° | 91.59 | 35.75 | 14.53 | 30.61 | 10 | 26.06 | 21.35 | 4.71 |
| Theta | 330° | 90.52 | 35.75 | 14.53 | 30.61 | 10 | 24.99 | 21.35 | 3.64 |
| Theta | 340° | 89.92 | 35.75 | 14.53 | 30.61 | 10 | 24.39 | 21.35 | 3.04 |
| Theta | 350° | 90.9  | 35.75 | 14.53 | 30.61 | 10 | 25.37 | 21.35 | 4.02 |



## 2.6.4 7095MHz-CH229

| Polarization<br>(For<br>Measurement<br>Antenna) | Phi<br>degree<br>(For<br>EUT) | Read Level<br>(dBμV) | Ant Factor<br>dB/m | Cable loss<br>(dB) | Preamp<br>Factor<br>(dB) | Pre-Att<br>(dB) | Measuremet<br>EIRP Power<br>(dBm) | Conductd<br>Power<br>(dBm) | Directional<br>Gain<br>(dBi) |
|-------------------------------------------------|-------------------------------|----------------------|--------------------|--------------------|--------------------------|-----------------|-----------------------------------|----------------------------|------------------------------|
| Phi                                             | 0°                            | 84.74                | 35.81              | 14.86              | 30.57                    | 10              | 19.64                             | 21.20                      | -1.56                        |
| Phi                                             | 10°                           | 83.89                | 35.81              | 14.86              | 30.57                    | 10              | 18.79                             | 21.20                      | -2.41                        |
| Phi                                             | 20°                           | 84.29                | 35.81              | 14.86              | 30.57                    | 10              | 19.19                             | 21.20                      | -2.01                        |
| Phi                                             | 30°                           | 84.64                | 35.81              | 14.86              | 30.57                    | 10              | 19.54                             | 21.20                      | -1.66                        |
| Phi                                             | 40°                           | 86.09                | 35.81              | 14.86              | 30.57                    | 10              | 20.99                             | 21.20                      | -0.21                        |
| Phi                                             | 50°                           | 85.52                | 35.81              | 14.86              | 30.57                    | 10              | 20.42                             | 21.20                      | -0.78                        |
| Phi                                             | 60°                           | 86.85                | 35.81              | 14.86              | 30.57                    | 10              | 21.75                             | 21.20                      | 0.55                         |
| Phi                                             | 68°                           | 86.29                | 35.81              | 14.86              | 30.57                    | 10              | 21.19                             | 21.20                      | -0.01                        |
| Phi                                             | 70°                           | 86.18                | 35.81              | 14.86              | 30.57                    | 10              | 21.08                             | 21.20                      | -0.12                        |
| Phi                                             | 72°                           | 86.31                | 35.81              | 14.86              | 30.57                    | 10              | 21.21                             | 21.20                      | 0.01                         |
| Phi                                             | 80°                           | 86.73                | 35.81              | 14.86              | 30.57                    | 10              | 21.63                             | 21.20                      | 0.43                         |
| Phi                                             | 90°                           | 86.36                | 35.81              | 14.86              | 30.57                    | 10              | 21.26                             | 21.20                      | 0.06                         |
| Phi                                             | 100°                          | 86.33                | 35.81              | 14.86              | 30.57                    | 10              | 21.23                             | 21.20                      | 0.03                         |
| Phi                                             | 110°                          | 85.69                | 35.81              | 14.86              | 30.57                    | 10              | 20.59                             | 21.20                      | -0.61                        |
| Phi                                             | 120°                          | 85.57                | 35.81              | 14.86              | 30.57                    | 10              | 20.47                             | 21.20                      | -0.73                        |
| Phi                                             | 130°                          | 85.94                | 35.81              | 14.86              | 30.57                    | 10              | 20.84                             | 21.20                      | -0.36                        |
| Phi                                             | 140°                          | 85                   | 35.81              | 14.86              | 30.57                    | 10              | 19.90                             | 21.20                      | -1.30                        |
| Phi                                             | 150°                          | 84.66                | 35.81              | 14.86              | 30.57                    | 10              | 19.56                             | 21.20                      | -1.64                        |
| Phi                                             | 160°                          | 85.9                 | 35.81              | 14.86              | 30.57                    | 10              | 20.80                             | 21.20                      | -0.40                        |
| Phi                                             | 170°                          | 86.56                | 35.81              | 14.86              | 30.57                    | 10              | 21.46                             | 21.20                      | 0.26                         |
| Phi                                             | 180°                          | 84.4                 | 35.81              | 14.86              | 30.57                    | 10              | 19.30                             | 21.20                      | -1.90                        |
| Phi                                             | 190°                          | 83.64                | 35.81              | 14.86              | 30.57                    | 10              | 18.54                             | 21.20                      | -2.66                        |
| Phi                                             | 200°                          | 84.97                | 35.81              | 14.86              | 30.57                    | 10              | 19.87                             | 21.20                      | -1.33                        |
| Phi                                             | 210°                          | 85.05                | 35.81              | 14.86              | 30.57                    | 10              | 19.95                             | 21.20                      | -1.25                        |
| Phi                                             | 220°                          | 85.12                | 35.81              | 14.86              | 30.57                    | 10              | 20.02                             | 21.20                      | -1.18                        |
| Phi                                             | 230°                          | 85.02                | 35.81              | 14.86              | 30.57                    | 10              | 19.92                             | 21.20                      | -1.28                        |
| Phi                                             | 240°                          | 86.64                | 35.81              | 14.86              | 30.57                    | 10              | 21.54                             | 21.20                      | 0.34                         |
| Phi                                             | 250°                          | 86.37                | 35.81              | 14.86              | 30.57                    | 10              | 21.27                             | 21.20                      | 0.07                         |
| Phi                                             | 260°                          | 87.06                | 35.81              | 14.86              | 30.57                    | 10              | 21.96                             | 21.20                      | 0.76                         |
| Phi                                             | 270°                          | 87.52                | 35.81              | 14.86              | 30.57                    | 10              | 22.42                             | 21.20                      | 1.22                         |
| Phi                                             | 280°                          | 87.06                | 35.81              | 14.86              | 30.57                    | 10              | 21.96                             | 21.20                      | 0.76                         |
| Phi                                             | 290°                          | 87.47                | 35.81              | 14.86              | 30.57                    | 10              | 22.37                             | 21.20                      | 1.17                         |
| Phi                                             | 300°                          | 86.53                | 35.81              | 14.86              | 30.57                    | 10              | 21.43                             | 21.20                      | 0.23                         |
| Phi                                             | 310°                          | 86.34                | 35.81              | 14.86              | 30.57                    | 10              | 21.24                             | 21.20                      | 0.04                         |
| Phi                                             | 320°                          | 85.52                | 35.81              | 14.86              | 30.57                    | 10              | 20.42                             | 21.20                      | -0.78                        |
| Phi                                             | 330°                          | 85.47                | 35.81              | 14.86              | 30.57                    | 10              | 20.37                             | 21.20                      | -0.83                        |
| Phi                                             | 340°                          | 86.29                | 35.81              | 14.86              | 30.57                    | 10              | 21.19                             | 21.20                      | -0.01                        |
| Phi                                             | 350°                          | 86.24                | 35.81              | 14.86              | 30.57                    | 10              | 21.14                             | 21.20                      | -0.06                        |
| Theta                                           | 0°                            | 90.18                | 35.81              | 14.86              | 30.57                    | 10              | 25.08                             | 21.20                      | 3.88                         |
| Theta                                           | 10°                           | 90.13                | 35.81              | 14.86              | 30.57                    | 10              | 25.03                             | 21.20                      | 3.83                         |



|       |      |       |       |       |       |    |       |       |      |
|-------|------|-------|-------|-------|-------|----|-------|-------|------|
| Theta | 20°  | 89.42 | 35.81 | 14.86 | 30.57 | 10 | 24.32 | 21.20 | 3.12 |
| Theta | 30°  | 88.18 | 35.81 | 14.86 | 30.57 | 10 | 23.08 | 21.20 | 1.88 |
| Theta | 40°  | 90.2  | 35.81 | 14.86 | 30.57 | 10 | 25.10 | 21.20 | 3.90 |
| Theta | 50°  | 90.17 | 35.81 | 14.86 | 30.57 | 10 | 25.07 | 21.20 | 3.87 |
| Theta | 60°  | 89.41 | 35.81 | 14.86 | 30.57 | 10 | 24.31 | 21.20 | 3.11 |
| Theta | 68°  | 90.85 | 35.81 | 14.86 | 30.57 | 10 | 25.75 | 21.20 | 4.55 |
| Theta | 70°  | 91.33 | 35.81 | 14.86 | 30.57 | 10 | 26.23 | 21.20 | 5.03 |
| Theta | 72°  | 91.16 | 35.81 | 14.86 | 30.57 | 10 | 26.06 | 21.20 | 4.86 |
| Theta | 80°  | 89.84 | 35.81 | 14.86 | 30.57 | 10 | 24.74 | 21.20 | 3.54 |
| Theta | 90°  | 89.37 | 35.81 | 14.86 | 30.57 | 10 | 24.27 | 21.20 | 3.07 |
| Theta | 100° | 90.48 | 35.81 | 14.86 | 30.57 | 10 | 25.38 | 21.20 | 4.18 |
| Theta | 110° | 89.31 | 35.81 | 14.86 | 30.57 | 10 | 24.21 | 21.20 | 3.01 |
| Theta | 120° | 87.48 | 35.81 | 14.86 | 30.57 | 10 | 22.38 | 21.20 | 1.18 |
| Theta | 130° | 89.63 | 35.81 | 14.86 | 30.57 | 10 | 24.53 | 21.20 | 3.33 |
| Theta | 140° | 89.01 | 35.81 | 14.86 | 30.57 | 10 | 23.91 | 21.20 | 2.71 |
| Theta | 150° | 88.86 | 35.81 | 14.86 | 30.57 | 10 | 23.76 | 21.20 | 2.56 |
| Theta | 160° | 89.6  | 35.81 | 14.86 | 30.57 | 10 | 24.50 | 21.20 | 3.30 |
| Theta | 170° | 89.59 | 35.81 | 14.86 | 30.57 | 10 | 24.49 | 21.20 | 3.29 |
| Theta | 180° | 89.53 | 35.81 | 14.86 | 30.57 | 10 | 24.43 | 21.20 | 3.23 |
| Theta | 190° | 89.39 | 35.81 | 14.86 | 30.57 | 10 | 24.29 | 21.20 | 3.09 |
| Theta | 200° | 88.2  | 35.81 | 14.86 | 30.57 | 10 | 23.10 | 21.20 | 1.90 |
| Theta | 210° | 87.27 | 35.81 | 14.86 | 30.57 | 10 | 22.17 | 21.20 | 0.97 |
| Theta | 220° | 87.56 | 35.81 | 14.86 | 30.57 | 10 | 22.46 | 21.20 | 1.26 |
| Theta | 230° | 89.78 | 35.81 | 14.86 | 30.57 | 10 | 24.68 | 21.20 | 3.48 |
| Theta | 240° | 88.6  | 35.81 | 14.86 | 30.57 | 10 | 23.50 | 21.20 | 2.30 |
| Theta | 250° | 90.09 | 35.81 | 14.86 | 30.57 | 10 | 24.99 | 21.20 | 3.79 |
| Theta | 260° | 89.04 | 35.81 | 14.86 | 30.57 | 10 | 23.94 | 21.20 | 2.74 |
| Theta | 270° | 89.18 | 35.81 | 14.86 | 30.57 | 10 | 24.08 | 21.20 | 2.88 |
| Theta | 280° | 90.18 | 35.81 | 14.86 | 30.57 | 10 | 25.08 | 21.20 | 3.88 |
| Theta | 290° | 88.84 | 35.81 | 14.86 | 30.57 | 10 | 23.74 | 21.20 | 2.54 |
| Theta | 300° | 87.89 | 35.81 | 14.86 | 30.57 | 10 | 22.79 | 21.20 | 1.59 |
| Theta | 310° | 89.88 | 35.81 | 14.86 | 30.57 | 10 | 24.78 | 21.20 | 3.58 |
| Theta | 320° | 90.39 | 35.81 | 14.86 | 30.57 | 10 | 25.29 | 21.20 | 4.09 |
| Theta | 330° | 88.67 | 35.81 | 14.86 | 30.57 | 10 | 23.57 | 21.20 | 2.37 |
| Theta | 340° | 89.29 | 35.81 | 14.86 | 30.57 | 10 | 24.19 | 21.20 | 2.99 |
| Theta | 350° | 90.02 | 35.81 | 14.86 | 30.57 | 10 | 24.92 | 21.20 | 3.72 |



### 3 List of Measuring Equipment

| Instrument                  | Brand Name      | Model No.        | Serial No.               | Characteristics                                | Calibration Date | Test Date                 | Due Date      | Remark                |
|-----------------------------|-----------------|------------------|--------------------------|------------------------------------------------|------------------|---------------------------|---------------|-----------------------|
| Power Meter                 | Anritsu         | ML2495A          | 1005002                  | 50MHz Bandwidth                                | Jan. 02, 2024    | May 28, 2024~Jun 06, 2024 | Jan. 01, 2025 | Conducted (TH01-KS)   |
| Combiner                    | MTJ Cooperation | MTJ7018-N        | 16072602                 | 50ohm N RESISTIVE POWER DIVIDER 2WAY DC-18 GHZ | NCR              | May 28, 2024~Jun 06, 2024 | NCR           | Conducted (TH01-KS)   |
| 10dB attenuator             | TOJOIN          | SMA(JK)          | TH01KS01                 | 2W/DC-18G                                      | NCR              | May 28, 2024~Jun 06, 2024 | NCR           | Conducted (TH01-KS)   |
| EXA Spectrum Analyzer       | Keysight        | N9010A           | MY55370528               | 10Hz-44G,MAX 30dB                              | Oct. 10, 2023    | May 28, 2024~Jun 06, 2024 | Oct. 10, 2024 | Radiation (03CH08-KS) |
| Double Ridge Horn Antenna   | ETS-Lindgren    | 3117             | 75959                    | 1GHz~18GHz                                     | Mar. 01, 2024    | May 28, 2024~Jun 06, 2024 | Mar. 01, 2025 | Radiation (03CH08-KS) |
| Amplifier                   | Keysight        | 83017A           | MY53270319               | 500MHz~26.5G Hz                                | Oct. 10, 2023    | May 28, 2024~Jun 06, 2024 | Oct. 09, 2024 | Radiation (03CH08-KS) |
| AC Power Source             | Chroma          | 61601            | 616010002473             | N/A                                            | NCR              | May 28, 2024~Jun 06, 2024 | NCR           | Radiation (03CH08-KS) |
| Antenna Mast                | EM              | EM 1000-A        | N/A                      | 1 m~4 m                                        | NCR              | May 28, 2024~Jun 06, 2024 | NCR           | Radiation (03CH08-KS) |
| RF Cable                    | HUBER+SUHNER    | SUCOFLEX102E     | 03CH08KS01               | 30Mhz-40Ghz                                    | Mar. 30, 2024    | May 28, 2024~Jun 06, 2024 | Mar. 30, 2025 | Radiation (03CH08-KS) |
| RF Cable                    | HUBER+SUHNER    | SUCOFLEX102E     | 03CH08KS02               | 30Mhz-40Ghz                                    | Mar. 30, 2024    | May 28, 2024~Jun 06, 2024 | Mar. 30, 2025 | Radiation (03CH08-KS) |
| RF Cable                    | HUBER+SUHNER    | SUCOFLEX102E     | 03CH08KS03               | 30Mhz-40Ghz                                    | Mar. 30, 2024    | May 28, 2024~Jun 06, 2024 | Mar. 30, 2025 | Radiation (03CH08-KS) |
| 10dB attenuator             | TOJOIN          | SMA(JK)          | 03CH08KS07<br>03CH08KS08 | 2W/DC-18G                                      | NCR              | May 28, 2024~Jun 06, 2024 | NCR           | Radiation (03CH08-KS) |
| Phi & Theta axis instrument | EM              | Phi1600 Theta800 | 060947                   | N/A                                            | NCR              | May 28, 2024~Jun 06, 2024 | NCR           | Radiation (03CH08-KS) |
| Turn Table Master           | ChainTek        | EM2000           | 060947                   | N/A                                            | NCR              | May 28, 2024~Jun 06, 2024 | NCR           | Radiation (03CH08-KS) |

NCR: No Calibration Required