Multi-Antenna Systems Directional Gain measurement

APPLICANT	**:**	**Nokia Shanghai Bell Co., Ltd.**
EQUIPMENT	**:**	**NOKIA ONT**
BRAND NAME	**:**	**NOKIA**
MODEL NAME	**:**	**XS-2437X-B**
ANTENNA	**:**	**PSA(INPAQ) Antenna**
TEST DATE(S)	**:**	**Jul 04, 2024 ~ Jul. 22, 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
OQ462802-01B	01	Initial issue of report	Dec. 11, 2024

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 Jiangsu Province 215300 People's Republic of China 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 DC O/P: shielded,1.8m
2.	Mobile phone (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)
UNII5	5925-6425	2.58	1.57	2.97	2.82
UNII6	6425-6525	2.33	1.81	2.74	2.67
UNII7	6525-6875	2.33	1.81	2.74	2.67
UNII8	6875-7125	2.38	1.27	3.02	2.56

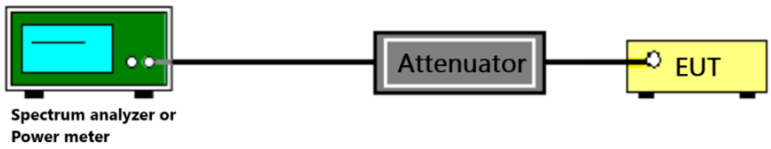
Remark：Please refer to the specific details in Antenna Test report which is separately.

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	7.16	7.09	7.12	7.03	8.42	21.54	0.15	21.69
117	20	6535	7.31	7.82	7.36	7.11	8.93	22.36	0.15	22.51
181	20	6855	7.17	7.07	7.41	7.07	8.48	21.68	0.15	21.83
229	20	7095	6.92	7.24	7.03	7.09	8.72	21.81	0.15	21.96
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).

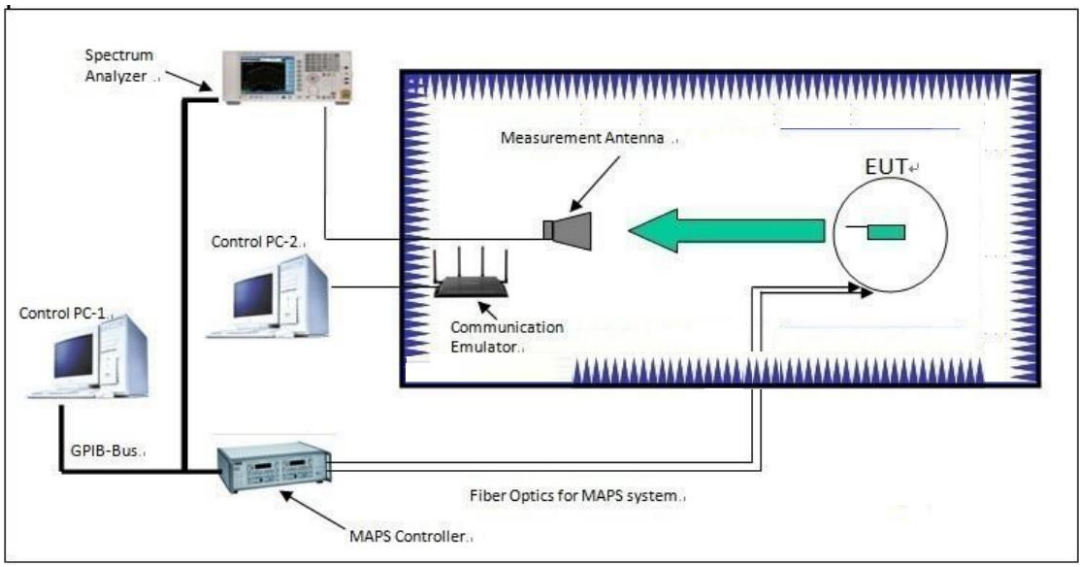


Figure 1-Conical circle cut test system.

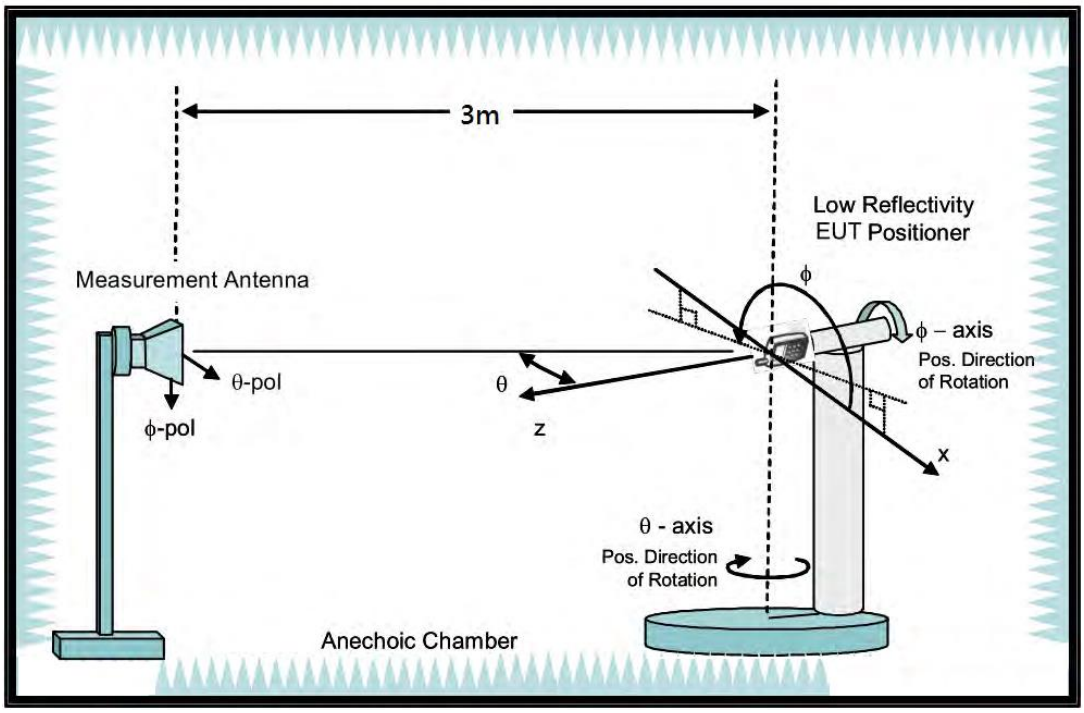


Figure 2-Configuration of Conical circle cut test system.

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≥ [2 × span / RBW].

4) Detector = peak

5) Sweep time=auto

6) average-VBW type=rms

7) Trace mode=max hold

8) Unit= dBµV

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

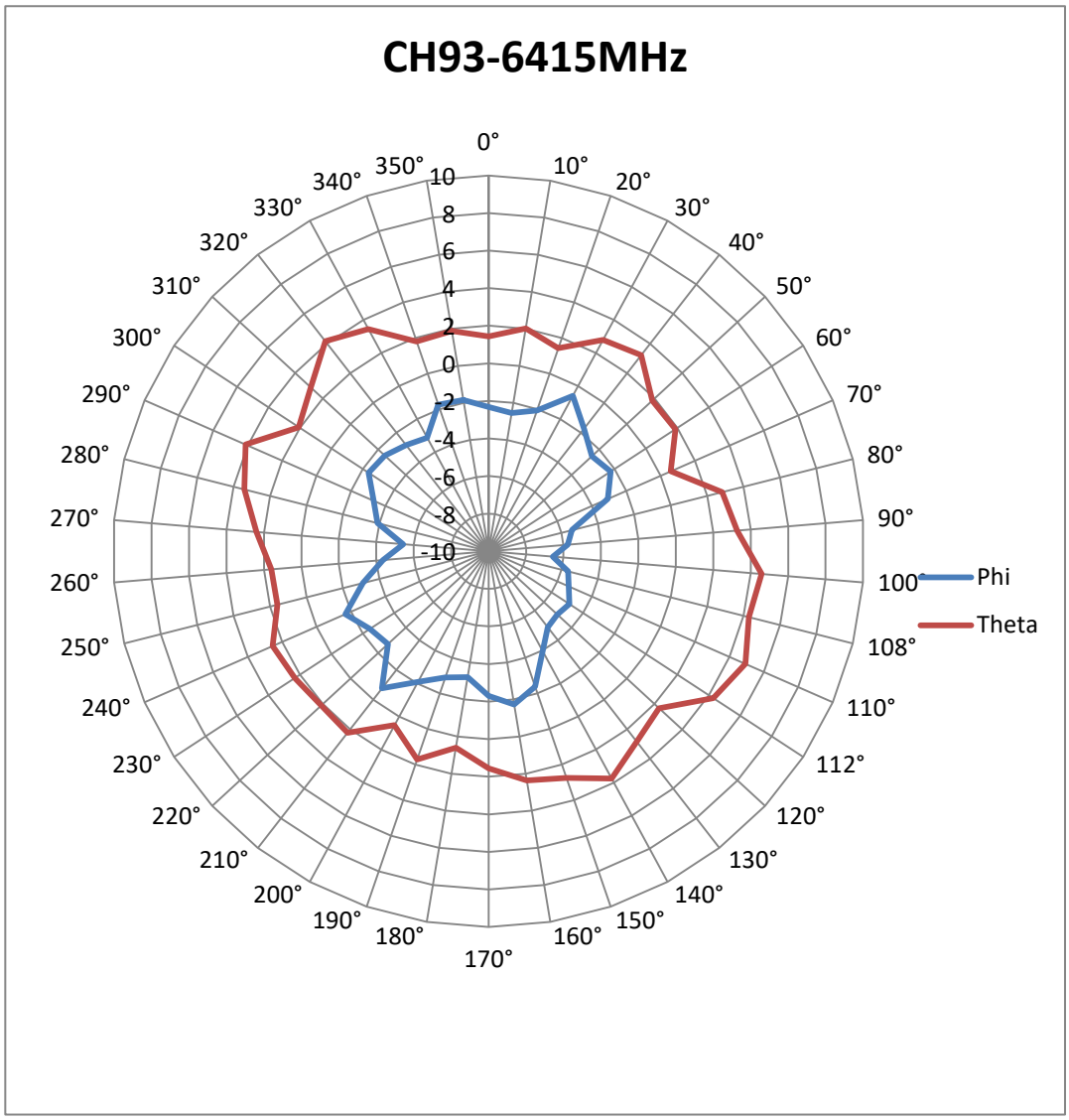
Channel	Power Setting	Frequency (MHz)	Polarization (For Measurement Antenna)	Phi degree (For EUT)	Read Level (dBµV)	Max EIRP (dBm)
93	20	6415	Theta	110°	92.63	26.62
117	20	6535	Theta	288°	92.45	26.89
181	20	6855	Theta	270°	91.23	25.63
229	20	7095	Theta	276°	91.70	26.60
Test mode: 6GHz, 802.11be EHT20,Beamforming mode,4Tx,NSS=1						

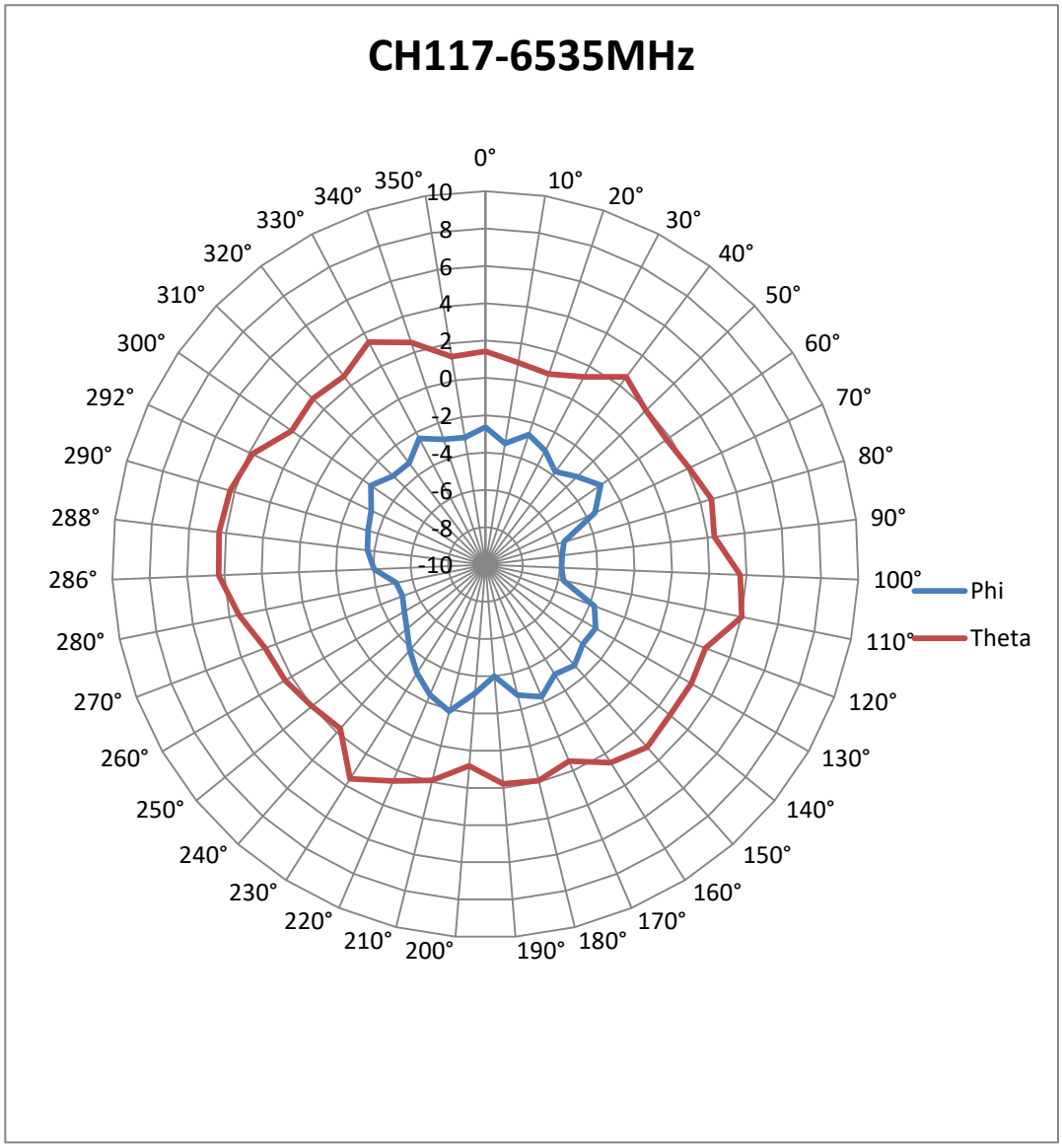
2.4 Directional Gain calculation

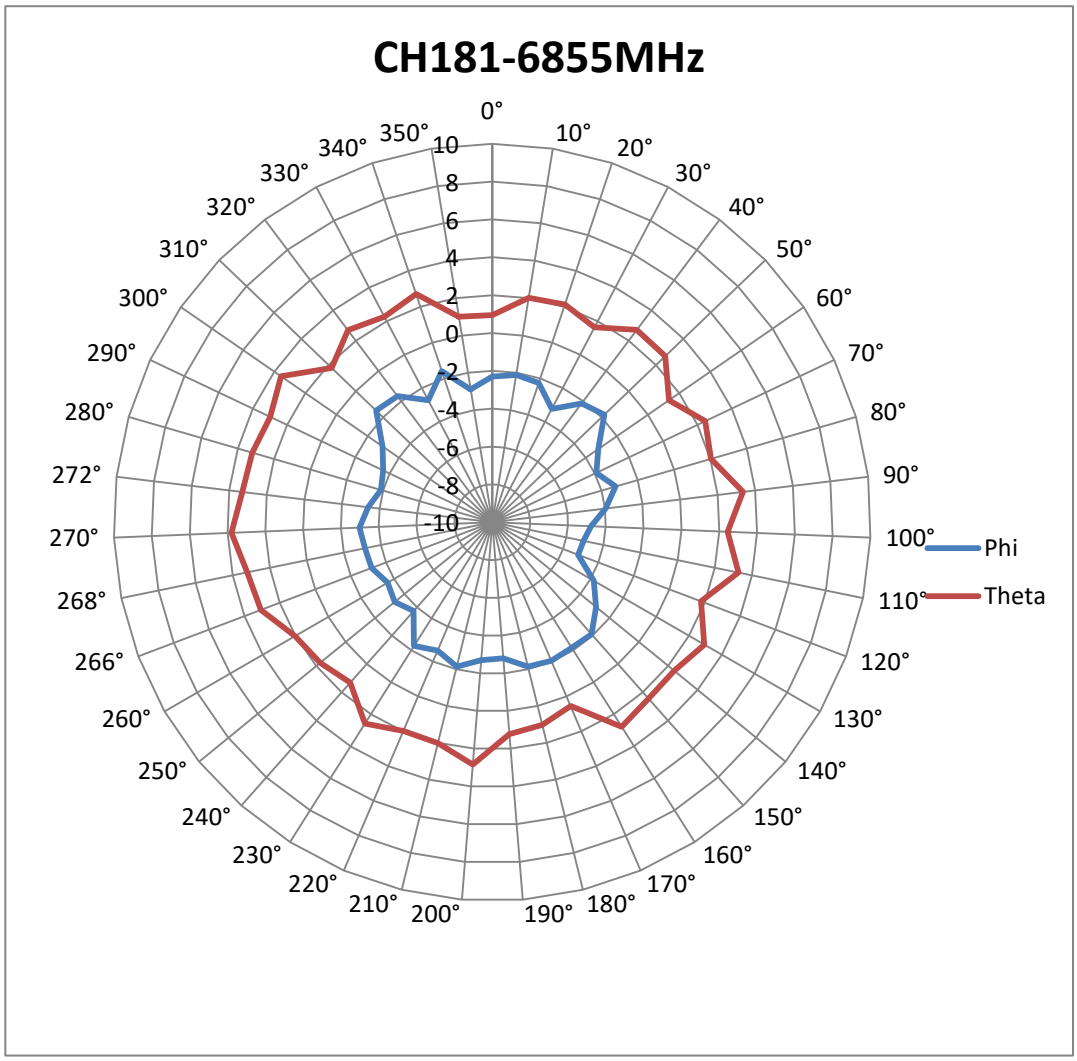
Directional Antenna Gain (dBi) = Max EIRP (dBm) – Total Conducted Power (dBm)

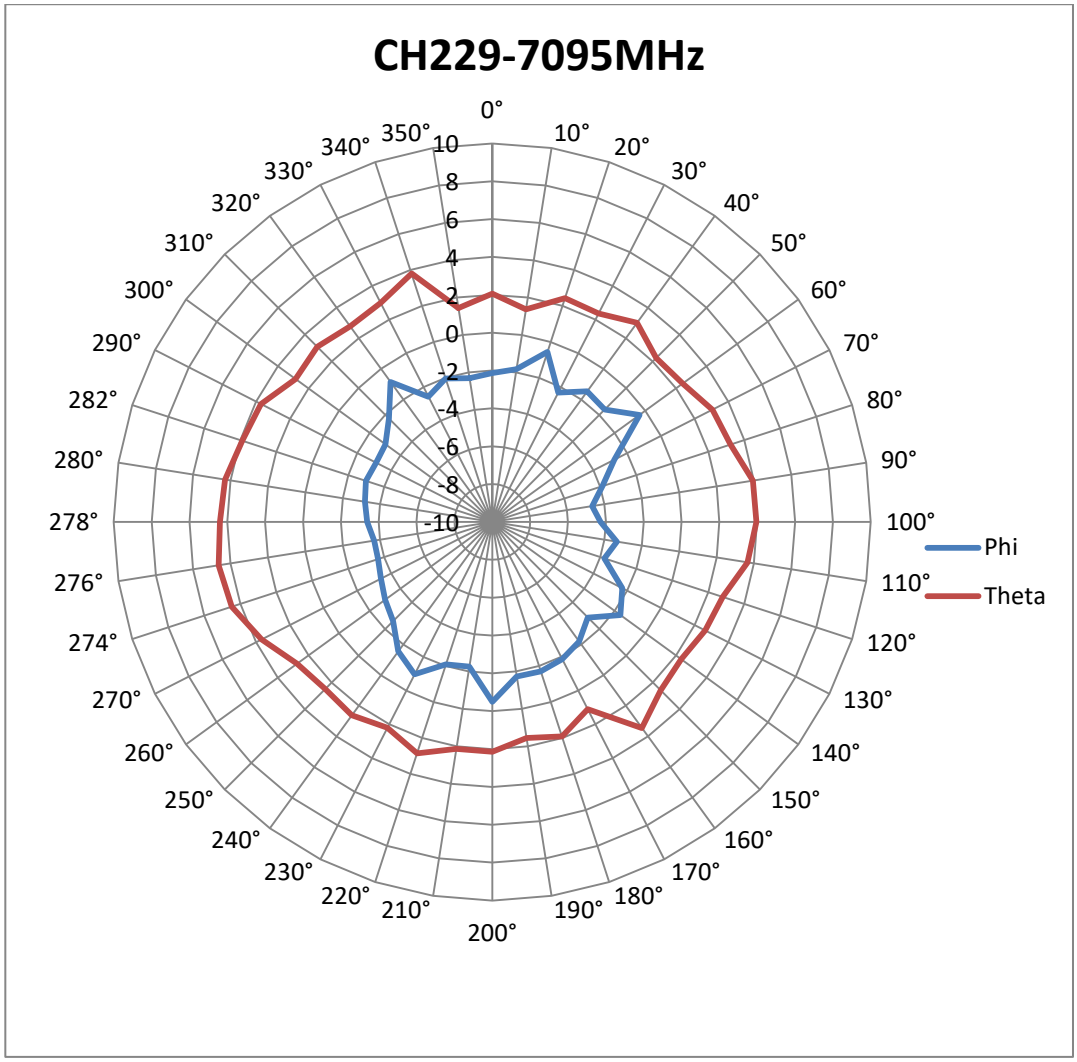
Channel	Power Setting	Frequency (MHz)	Conducted Power (dBm)	Max EIRP (dBm)	Max Directional Gain (dBi)
93	20	6415	21.69	26.62	4.93
117	20	6535	22.51	26.89	4.38
181	20	6855	21.83	25.63	3.80
229	20	7095	21.96	26.60	4.64
Max Directional Gain: 6GHz, 802.11 be EHT20,Beamforming mode,4Tx,NSS=1					

2.5 Directivity plots in 2D cuts




CH117-6535MHz
0°
10°
20°
30°
40°
50°
60°
70°
80°
90°
100°
110°
120°
130°
140°
150°
160°
170°
180°
190°
200°
210°
220°
230°
240°
250°
260°
270°
280°
286°
288°
290°
292°
300°
310°
320°
330°
340°
350°
10
8
6
4
2
0
-2
-4
-6
-8
-10
Phi
Theta


CH181-6855MHz
0°
10°
20°
30°
40°
50°
60°
70°
80°
90°
100°
110°
120°
130°
140°
150°
160°
170°
180°
190°
200°
210°
220°
230°
240°
250°
260°
266°
268°
270°
272°
280°
290°
300°
310°
320°
330°
340°
350°
10
8
6
4
2
0
-2
-4
-6
-8
-10
Phi
Theta


CH229-7095MHz
0°
10°
20°
30°
40°
50°
60°
70°
80°
90°
100°
110°
120°
130°
140°
150°
160°
170°
180°
190°
200°
210°
220°
230°
240°
250°
260°
270°
274°
276°
278°
280°
282°
290°
300°
310°
320°
330°
340°
350°
10
8
6
4
2
0
-2
-4
-6
-8
-10
Phi
Theta

2.6 Raw Data

2.6.1 6415MHz-CH93

Polarization (For Measurement Antenna)	Phi degree (For EUT)	Read Level (dBμV)	Ant Factor dB/m	Cable loss (dB)	Preamp Factor (dB)	Pre-Att (dB)	Measurement EIRP Power (dBm)	Conducted Power (dBm)	Directional Gain (dBi)
Phi	0°	85.37	35.7	14.14	30.65	10	19.36	21.69	-2.33
Phi	10°	85.16	35.7	14.14	30.65	10	19.15	21.69	-2.54
Phi	20°	85.62	35.7	14.14	30.65	10	19.61	21.69	-2.08
Phi	30°	87.11	35.7	14.14	30.65	10	21.10	21.69	-0.59
Phi	40°	85.97	35.7	14.14	30.65	10	19.96	21.69	-1.73
Phi	50°	85.17	35.7	14.14	30.65	10	19.16	21.69	-2.53
Phi	60°	85.46	35.7	14.14	30.65	10	19.45	21.69	-2.24
Phi	70°	84.63	35.7	14.14	30.65	10	18.62	21.69	-3.07
Phi	80°	82.28	35.7	14.14	30.65	10	16.27	21.69	-5.42
Phi	90°	81.93	35.7	14.14	30.65	10	15.92	21.69	-5.77
Phi	100°	81.13	35.7	14.14	30.65	10	15.12	21.69	-6.57
Phi	108°	82.07	35.7	14.14	30.65	10	16.06	21.69	-5.63
Phi	110°	82.36	35.7	14.14	30.65	10	16.35	21.69	-5.34
Phi	112°	82.84	35.7	14.14	30.65	10	16.83	21.69	-4.86
Phi	120°	82.68	35.7	14.14	30.65	10	16.67	21.69	-5.02
Phi	130°	82.83	35.7	14.14	30.65	10	16.82	21.69	-4.87
Phi	140°	83.74	35.7	14.14	30.65	10	17.73	21.69	-3.96
Phi	150°	85.32	35.7	14.14	30.65	10	19.31	21.69	-2.38
Phi	160°	85.96	35.7	14.14	30.65	10	19.95	21.69	-1.74
Phi	170°	85.39	35.7	14.14	30.65	10	19.38	21.69	-2.31
Phi	180°	84.49	35.7	14.14	30.65	10	18.48	21.69	-3.21
Phi	190°	84.8	35.7	14.14	30.65	10	18.79	21.69	-2.90
Phi	200°	85.61	35.7	14.14	30.65	10	19.60	21.69	-2.09
Phi	210°	86.94	35.7	14.14	30.65	10	20.93	21.69	-0.76
Phi	220°	84.99	35.7	14.14	30.65	10	18.98	21.69	-2.71
Phi	230°	85.26	35.7	14.14	30.65	10	19.25	21.69	-2.44
Phi	240°	86.03	35.7	14.14	30.65	10	20.02	21.69	-1.67
Phi	250°	84.6	35.7	14.14	30.65	10	18.59	21.69	-3.10
Phi	260°	83.34	35.7	14.14	30.65	10	17.33	21.69	-4.36
Phi	270°	82.27	35.7	14.14	30.65	10	16.26	21.69	-5.43
Phi	280°	83.8	35.7	14.14	30.65	10	17.79	21.69	-3.90
Phi	290°	84.38	35.7	14.14	30.65	10	18.37	21.69	-3.32
Phi	300°	85.33	35.7	14.14	30.65	10	19.32	21.69	-2.37
Phi	310°	85.21	35.7	14.14	30.65	10	19.20	21.69	-2.49
Phi	320°	84.86	35.7	14.14	30.65	10	18.85	21.69	-2.84
Phi	330°	84.57	35.7	14.14	30.65	10	18.56	21.69	-3.13
Phi	340°	85.95	35.7	14.14	30.65	10	19.94	21.69	-1.75
Phi	350°	85.87	35.7	14.14	30.65	10	19.86	21.69	-1.83
Theta	0°	89.14	35.7	14.14	30.65	10	23.13	21.69	1.44
Theta	10°	89.72	35.7	14.14	30.65	10	23.71	21.69	2.02
Theta	20°	89.13	35.7	14.14	30.65	10	23.12	21.69	1.43
Theta	30°	90.49	35.7	14.14	30.65	10	24.48	21.69	2.79
Theta	40°	90.93	35.7	14.14	30.65	10	24.92	21.69	3.23
Theta	50°	89.54	35.7	14.14	30.65	10	23.53	21.69	1.84

Theta	60°	89.58	35.7	14.14	30.65	10	23.57	21.69	1.88
Theta	70°	88.29	35.7	14.14	30.65	10	22.28	21.69	0.59
Theta	80°	90.53	35.7	14.14	30.65	10	24.52	21.69	2.83
Theta	90°	90.97	35.7	14.14	30.65	10	24.96	21.69	3.27
Theta	100°	92.28	35.7	14.14	30.65	10	26.27	21.69	4.58
Theta	108°	92	35.7	14.14	30.65	10	25.99	21.69	4.30
Theta	110°	92.63	35.7	14.14	30.65	10	26.62	21.69	4.93
Theta	112°	91.99	35.7	14.14	30.65	10	25.98	21.69	4.29
Theta	120°	90.03	35.7	14.14	30.65	10	24.02	21.69	2.33
Theta	130°	90.53	35.7	14.14	30.65	10	24.52	21.69	2.83
Theta	140°	91.46	35.7	14.14	30.65	10	25.45	21.69	3.76
Theta	150°	90.45	35.7	14.14	30.65	10	24.44	21.69	2.75
Theta	160°	90.07	35.7	14.14	30.65	10	24.06	21.69	2.37
Theta	170°	89.26	35.7	14.14	30.65	10	23.25	21.69	1.56
Theta	180°	88.3	35.7	14.14	30.65	10	22.29	21.69	0.60
Theta	190°	89.42	35.7	14.14	30.65	10	23.41	21.69	1.72
Theta	200°	88.23	35.7	14.14	30.65	10	22.22	21.69	0.53
Theta	210°	89.93	35.7	14.14	30.65	10	23.92	21.69	2.23
Theta	220°	89.81	35.7	14.14	30.65	10	23.80	21.69	2.11
Theta	230°	90.03	35.7	14.14	30.65	10	24.02	21.69	2.33
Theta	240°	90.26	35.7	14.14	30.65	10	24.25	21.69	2.56
Theta	250°	89.3	35.7	14.14	30.65	10	23.29	21.69	1.60
Theta	260°	89.3	35.7	14.14	30.65	10	23.29	21.69	1.60
Theta	270°	90.11	35.7	14.14	30.65	10	24.10	21.69	2.41
Theta	280°	91.12	35.7	14.14	30.65	10	25.11	21.69	3.42
Theta	290°	91.83	35.7	14.14	30.65	10	25.82	21.69	4.13
Theta	300°	89.77	35.7	14.14	30.65	10	23.76	21.69	2.07
Theta	310°	90.56	35.7	14.14	30.65	10	24.55	21.69	2.86
Theta	320°	91.86	35.7	14.14	30.65	10	25.85	21.69	4.16
Theta	330°	91.15	35.7	14.14	30.65	10	25.14	21.69	3.45
Theta	340°	89.51	35.7	14.14	30.65	10	23.50	21.69	1.81
Theta	350°	89.58	35.7	14.14	30.65	10	23.57	21.69	1.88

2.6.2 6535MHz-CH117

Polarization (For Measurement Antenna)	Phi degree (For EUT)	Read Level (dBµV)	Ant Factor dB/m	Cable loss (dB)	Preamp Factor (dB)	Pre-Att (dB)	Measurement EIRP Power (dBm)	Conducted Power (dBm)	Directional Gain (dBi)
Phi	0°	85.43	35.7	14.65	30.71	10	19.87	22.51	-2.64
Phi	10°	84.65	35.7	14.65	30.71	10	19.09	22.51	-3.42
Phi	20°	85.41	35.7	14.65	30.71	10	19.85	22.51	-2.66
Phi	30°	84.95	35.7	14.65	30.71	10	19.39	22.51	-3.12
Phi	40°	84.3	35.7	14.65	30.71	10	18.74	22.51	-3.77
Phi	50°	84.88	35.7	14.65	30.71	10	19.32	22.51	-3.19
Phi	60°	85.57	35.7	14.65	30.71	10	20.01	22.51	-2.50
Phi	70°	84.57	35.7	14.65	30.71	10	19.01	22.51	-3.50
Phi	80°	82.46	35.7	14.65	30.71	10	16.90	22.51	-5.61
Phi	90°	82.22	35.7	14.65	30.71	10	16.66	22.51	-5.85
Phi	100°	82.16	35.7	14.65	30.71	10	16.60	22.51	-5.91
Phi	110°	82.34	35.7	14.65	30.71	10	16.78	22.51	-5.73
Phi	120°	84.32	35.7	14.65	30.71	10	18.76	22.51	-3.75
Phi	130°	84.89	35.7	14.65	30.71	10	19.33	22.51	-3.18
Phi	140°	84.81	35.7	14.65	30.71	10	19.25	22.51	-3.26
Phi	150°	85.28	35.7	14.65	30.71	10	19.72	22.51	-2.79
Phi	160°	85.03	35.7	14.65	30.71	10	19.47	22.51	-3.04
Phi	170°	85.77	35.7	14.65	30.71	10	20.21	22.51	-2.30
Phi	180°	85.27	35.7	14.65	30.71	10	19.71	22.51	-2.80
Phi	190°	84.06	35.7	14.65	30.71	10	18.50	22.51	-4.01
Phi	200°	84.98	35.7	14.65	30.71	10	19.42	22.51	-3.09
Phi	210°	86.16	35.7	14.65	30.71	10	20.60	22.51	-1.91
Phi	220°	85.66	35.7	14.65	30.71	10	20.10	22.51	-2.41
Phi	230°	84.94	35.7	14.65	30.71	10	19.38	22.51	-3.13
Phi	240°	84.18	35.7	14.65	30.71	10	18.62	22.51	-3.89
Phi	250°	83.5	35.7	14.65	30.71	10	17.94	22.51	-4.57
Phi	260°	83.09	35.7	14.65	30.71	10	17.53	22.51	-4.98
Phi	270°	82.82	35.7	14.65	30.71	10	17.26	22.51	-5.25
Phi	280°	82.95	35.7	14.65	30.71	10	17.39	22.51	-5.12
Phi	286°	84.04	35.7	14.65	30.71	10	18.48	22.51	-4.03
Phi	288°	84.43	35.7	14.65	30.71	10	18.87	22.51	-3.64
Phi	290°	84.62	35.7	14.65	30.71	10	19.06	22.51	-3.45
Phi	292°	84.85	35.7	14.65	30.71	10	19.29	22.51	-3.22
Phi	300°	85.52	35.7	14.65	30.71	10	19.96	22.51	-2.55
Phi	310°	84.93	35.7	14.65	30.71	10	19.37	22.51	-3.14
Phi	320°	84.88	35.7	14.65	30.71	10	19.32	22.51	-3.19
Phi	330°	85.71	35.7	14.65	30.71	10	20.15	22.51	-2.36
Phi	340°	85.14	35.7	14.65	30.71	10	19.58	22.51	-2.93
Phi	350°	84.96	35.7	14.65	30.71	10	19.40	22.51	-3.11
Theta	0°	89.49	35.7	14.65	30.71	10	23.93	22.51	1.42
Theta	10°	89.03	35.7	14.65	30.71	10	23.47	22.51	0.96
Theta	20°	88.83	35.7	14.65	30.71	10	23.27	22.51	0.76
Theta	30°	89.42	35.7	14.65	30.71	10	23.86	22.51	1.35
Theta	40°	90.64	35.7	14.65	30.71	10	25.08	22.51	2.57
Theta	50°	90	35.7	14.65	30.71	10	24.44	22.51	1.93
Theta	60°	89.86	35.7	14.65	30.71	10	24.30	22.51	1.79

Theta	70°	90.15	35.7	14.65	30.71	10	24.59	22.51	2.08
Theta	80°	90.69	35.7	14.65	30.71	10	25.13	22.51	2.62
Theta	90°	90.43	35.7	14.65	30.71	10	24.87	22.51	2.36
Theta	100°	91.74	35.7	14.65	30.71	10	26.18	22.51	3.67
Theta	110°	92.1	35.7	14.65	30.71	10	26.54	22.51	4.03
Theta	120°	90.68	35.7	14.65	30.71	10	25.12	22.51	2.61
Theta	130°	90.8	35.7	14.65	30.71	10	25.24	22.51	2.73
Theta	140°	90.83	35.7	14.65	30.71	10	25.27	22.51	2.76
Theta	150°	91.14	35.7	14.65	30.71	10	25.58	22.51	3.07
Theta	160°	90.62	35.7	14.65	30.71	10	25.06	22.51	2.55
Theta	170°	89.51	35.7	14.65	30.71	10	23.95	22.51	1.44
Theta	180°	89.99	35.7	14.65	30.71	10	24.43	22.51	1.92
Theta	190°	89.85	35.7	14.65	30.71	10	24.29	22.51	1.78
Theta	200°	88.89	35.7	14.65	30.71	10	23.33	22.51	0.82
Theta	210°	89.98	35.7	14.65	30.71	10	24.42	22.51	1.91
Theta	220°	90.67	35.7	14.65	30.71	10	25.11	22.51	2.60
Theta	230°	91.65	35.7	14.65	30.71	10	26.09	22.51	3.58
Theta	240°	89.8	35.7	14.65	30.71	10	24.24	22.51	1.73
Theta	250°	90.07	35.7	14.65	30.71	10	24.51	22.51	2.00
Theta	260°	90.47	35.7	14.65	30.71	10	24.91	22.51	2.40
Theta	270°	90.69	35.7	14.65	30.71	10	25.13	22.51	2.62
Theta	280°	91.55	35.7	14.65	30.71	10	25.99	22.51	3.48
Theta	286°	92.37	35.7	14.65	30.71	10	26.81	22.51	4.30
Theta	288°	92.45	35.7	14.65	30.71	10	26.89	22.51	4.38
Theta	290°	92.31	35.7	14.65	30.71	10	26.75	22.51	4.24
Theta	292°	91.89	35.7	14.65	30.71	10	26.33	22.51	3.82
Theta	300°	90.69	35.7	14.65	30.71	10	25.13	22.51	2.62
Theta	310°	90.9	35.7	14.65	30.71	10	25.34	22.51	2.83
Theta	320°	90.69	35.7	14.65	30.71	10	25.13	22.51	2.62
Theta	330°	91.52	35.7	14.65	30.71	10	25.96	22.51	3.45
Theta	340°	90.61	35.7	14.65	30.71	10	25.05	22.51	2.54
Theta	350°	89.36	35.7	14.65	30.71	10	23.80	22.51	1.29

2.6.3 6855MHz-CH181

Polarization (For Measurement Antenna)	Phi degree (For EUT)	Read Level (dBµV)	Ant Factor dB/m	Cable loss (dB)	Preamp Factor (dB)	Pre-Att (dB)	Measurement EIRP Power (dBm)	Conducted Power (dBm)	Directional Gain (dBi)
Phi	0°	85.13	35.79	14.44	30.63	10	19.53	21.83	-2.30
Phi	10°	85.32	35.79	14.44	30.63	10	19.72	21.83	-2.11
Phi	20°	85.19	35.79	14.44	30.63	10	19.59	21.83	-2.24
Phi	30°	84.2	35.79	14.44	30.63	10	18.60	21.83	-3.23
Phi	40°	85.28	35.79	14.44	30.63	10	19.68	21.83	-2.15
Phi	50°	85.64	35.79	14.44	30.63	10	20.04	21.83	-1.79
Phi	60°	84.24	35.79	14.44	30.63	10	18.64	21.83	-3.19
Phi	70°	83.51	35.79	14.44	30.63	10	17.91	21.83	-3.92
Phi	80°	84.22	35.79	14.44	30.63	10	18.62	21.83	-3.21
Phi	90°	83.47	35.79	14.44	30.63	10	17.87	21.83	-3.96
Phi	100°	82.65	35.79	14.44	30.63	10	17.05	21.83	-4.78
Phi	110°	82.36	35.79	14.44	30.63	10	16.76	21.83	-5.07
Phi	120°	82.28	35.79	14.44	30.63	10	16.68	21.83	-5.15
Phi	130°	83.63	35.79	14.44	30.63	10	18.03	21.83	-3.80
Phi	140°	84.52	35.79	14.44	30.63	10	18.92	21.83	-2.91
Phi	150°	85.34	35.79	14.44	30.63	10	19.74	21.83	-2.09
Phi	160°	85.28	35.79	14.44	30.63	10	19.68	21.83	-2.15
Phi	170°	85.39	35.79	14.44	30.63	10	19.79	21.83	-2.04
Phi	180°	85.28	35.79	14.44	30.63	10	19.68	21.83	-2.15
Phi	190°	84.64	35.79	14.44	30.63	10	19.04	21.83	-2.79
Phi	200°	84.74	35.79	14.44	30.63	10	19.14	21.83	-2.69
Phi	210°	85.29	35.79	14.44	30.63	10	19.69	21.83	-2.14
Phi	220°	84.81	35.79	14.44	30.63	10	19.21	21.83	-2.62
Phi	230°	85.16	35.79	14.44	30.63	10	19.56	21.83	-2.27
Phi	240°	83.69	35.79	14.44	30.63	10	18.09	21.83	-3.74
Phi	250°	84.08	35.79	14.44	30.63	10	18.48	21.83	-3.35
Phi	260°	83.82	35.79	14.44	30.63	10	18.22	21.83	-3.61
Phi	266°	84.25	35.79	14.44	30.63	10	18.65	21.83	-3.18
Phi	268°	84.3	35.79	14.44	30.63	10	18.70	21.83	-3.13
Phi	270°	84.45	35.79	14.44	30.63	10	18.85	21.83	-2.98
Phi	272°	84.04	35.79	14.44	30.63	10	18.44	21.83	-3.39
Phi	280°	83.55	35.79	14.44	30.63	10	17.95	21.83	-3.88
Phi	290°	83.81	35.79	14.44	30.63	10	18.21	21.83	-3.62
Phi	300°	84.47	35.79	14.44	30.63	10	18.87	21.83	-2.96
Phi	310°	85.95	35.79	14.44	30.63	10	20.35	21.83	-1.48
Phi	320°	85.77	35.79	14.44	30.63	10	20.17	21.83	-1.66
Phi	330°	84.7	35.79	14.44	30.63	10	19.10	21.83	-2.73
Phi	340°	85.84	35.79	14.44	30.63	10	20.24	21.83	-1.59
Phi	350°	84.54	35.79	14.44	30.63	10	18.94	21.83	-2.89
Theta	0°	88.37	35.79	14.44	30.63	10	22.77	21.83	0.94
Theta	10°	89.45	35.79	14.44	30.63	10	23.85	21.83	2.02
Theta	20°	89.55	35.79	14.44	30.63	10	23.95	21.83	2.12
Theta	30°	89.06	35.79	14.44	30.63	10	23.46	21.83	1.63
Theta	40°	90.14	35.79	14.44	30.63	10	24.54	21.83	2.71
Theta	50°	90.1	35.79	14.44	30.63	10	24.50	21.83	2.67
Theta	60°	88.79	35.79	14.44	30.63	10	23.19	21.83	1.36

Theta	70°	89.89	35.79	14.44	30.63	10	24.29	21.83	2.46
Theta	80°	89.46	35.79	14.44	30.63	10	23.86	21.83	2.03
Theta	90°	90.78	35.79	14.44	30.63	10	25.18	21.83	3.35
Theta	100°	89.87	35.79	14.44	30.63	10	24.27	21.83	2.44
Theta	110°	90.71	35.79	14.44	30.63	10	25.11	21.83	3.28
Theta	120°	89.22	35.79	14.44	30.63	10	23.62	21.83	1.79
Theta	130°	90.37	35.79	14.44	30.63	10	24.77	21.83	2.94
Theta	140°	89.84	35.79	14.44	30.63	10	24.24	21.83	2.41
Theta	150°	89.89	35.79	14.44	30.63	10	24.29	21.83	2.46
Theta	160°	90.22	35.79	14.44	30.63	10	24.62	21.83	2.79
Theta	170°	87.99	35.79	14.44	30.63	10	22.39	21.83	0.56
Theta	180°	88.46	35.79	14.44	30.63	10	22.86	21.83	1.03
Theta	190°	88.67	35.79	14.44	30.63	10	23.07	21.83	1.24
Theta	200°	90.28	35.79	14.44	30.63	10	24.68	21.83	2.85
Theta	210°	89.45	35.79	14.44	30.63	10	23.85	21.83	2.02
Theta	220°	89.42	35.79	14.44	30.63	10	23.82	21.83	1.99
Theta	230°	90.01	35.79	14.44	30.63	10	24.41	21.83	2.58
Theta	240°	88.75	35.79	14.44	30.63	10	23.15	21.83	1.32
Theta	250°	89.18	35.79	14.44	30.63	10	23.58	21.83	1.75
Theta	260°	89.46	35.79	14.44	30.63	10	23.86	21.83	2.03
Theta	266°	90.51	35.79	14.44	30.63	10	24.91	21.83	3.08
Theta	268°	90.65	35.79	14.44	30.63	10	25.05	21.83	3.22
Theta	270°	91.23	35.79	14.44	30.63	10	25.63	21.83	3.80
Theta	272°	90.73	35.79	14.44	30.63	10	25.13	21.83	3.30
Theta	280°	90.63	35.79	14.44	30.63	10	25.03	21.83	3.20
Theta	290°	90.42	35.79	14.44	30.63	10	24.82	21.83	2.99
Theta	300°	91	35.79	14.44	30.63	10	25.40	21.83	3.57
Theta	310°	89.2	35.79	14.44	30.63	10	23.60	21.83	1.77
Theta	320°	90.13	35.79	14.44	30.63	10	24.53	21.83	2.70
Theta	330°	89.7	35.79	14.44	30.63	10	24.10	21.83	2.27
Theta	340°	90.14	35.79	14.44	30.63	10	24.54	21.83	2.71
Theta	350°	88.43	35.79	14.44	30.63	10	22.83	21.83	1.00

2.6.4 7095MHz-CH229

Polarization (For Measurement Antenna)	Phi degree (For EUT)	Read Level (dBµV)	Ant Factor dB/m	Cable loss (dB)	Preamp Factor (dB)	Pre-Att (dB)	Measurement EIRP Power (dBm)	Conducted Power (dBm)	Directional Gain (dBi)
Phi	0°	84.93	35.81	14.86	30.57	10	19.83	21.96	-2.13
Phi	10°	85.24	35.81	14.86	30.57	10	20.14	21.96	-1.82
Phi	20°	86.5	35.81	14.86	30.57	10	21.40	21.96	-0.56
Phi	30°	84.74	35.81	14.86	30.57	10	19.64	21.96	-2.32
Phi	40°	85.59	35.81	14.86	30.57	10	20.49	21.96	-1.47
Phi	50°	85.45	35.81	14.86	30.57	10	20.35	21.96	-1.61
Phi	60°	86.69	35.81	14.86	30.57	10	21.59	21.96	-0.37
Phi	70°	84.3	35.81	14.86	30.57	10	19.20	21.96	-2.76
Phi	80°	83.18	35.81	14.86	30.57	10	18.08	21.96	-3.88
Phi	90°	82.4	35.81	14.86	30.57	10	17.30	21.96	-4.66
Phi	100°	82.78	35.81	14.86	30.57	10	17.68	21.96	-4.28
Phi	110°	83.72	35.81	14.86	30.57	10	18.62	21.96	-3.34
Phi	120°	83.29	35.81	14.86	30.57	10	18.19	21.96	-3.77
Phi	130°	84.77	35.81	14.86	30.57	10	19.67	21.96	-2.29
Phi	140°	85.42	35.81	14.86	30.57	10	20.32	21.96	-1.64
Phi	150°	84.2	35.81	14.86	30.57	10	19.10	21.96	-2.86
Phi	160°	84.87	35.81	14.86	30.57	10	19.77	21.96	-2.19
Phi	170°	85.2	35.81	14.86	30.57	10	20.10	21.96	-1.86
Phi	180°	85.36	35.81	14.86	30.57	10	20.26	21.96	-1.70
Phi	190°	85.33	35.81	14.86	30.57	10	20.23	21.96	-1.73
Phi	200°	86.57	35.81	14.86	30.57	10	21.47	21.96	-0.49
Phi	210°	84.79	35.81	14.86	30.57	10	19.69	21.96	-2.27
Phi	220°	84.97	35.81	14.86	30.57	10	19.87	21.96	-2.09
Phi	230°	86.09	35.81	14.86	30.57	10	20.99	21.96	-0.97
Phi	240°	85.5	35.81	14.86	30.57	10	20.40	21.96	-1.56
Phi	250°	84.47	35.81	14.86	30.57	10	19.37	21.96	-2.59
Phi	260°	84.05	35.81	14.86	30.57	10	18.95	21.96	-3.01
Phi	270°	83.66	35.81	14.86	30.57	10	18.56	21.96	-3.40
Phi	274°	83.4	35.81	14.86	30.57	10	18.30	21.96	-3.66
Phi	276°	83.37	35.81	14.86	30.57	10	18.27	21.96	-3.69
Phi	278°	83.67	35.81	14.86	30.57	10	18.57	21.96	-3.39
Phi	280°	83.87	35.81	14.86	30.57	10	18.77	21.96	-3.19
Phi	282°	84.08	35.81	14.86	30.57	10	18.98	21.96	-2.98
Phi	290°	83.95	35.81	14.86	30.57	10	18.85	21.96	-3.11
Phi	300°	84.03	35.81	14.86	30.57	10	18.93	21.96	-3.03
Phi	310°	84.79	35.81	14.86	30.57	10	19.69	21.96	-2.27
Phi	320°	86.2	35.81	14.86	30.57	10	21.10	21.96	-0.86
Phi	330°	84.49	35.81	14.86	30.57	10	19.39	21.96	-2.57
Phi	340°	85.04	35.81	14.86	30.57	10	19.94	21.96	-2.02
Phi	350°	84.75	35.81	14.86	30.57	10	19.65	21.96	-2.31
Theta	0°	89.13	35.81	14.86	30.57	10	24.03	21.96	2.07
Theta	10°	88.44	35.81	14.86	30.57	10	23.34	21.96	1.38
Theta	20°	89.49	35.81	14.86	30.57	10	24.39	21.96	2.43
Theta	30°	89.43	35.81	14.86	30.57	10	24.33	21.96	2.37
Theta	40°	90.07	35.81	14.86	30.57	10	24.97	21.96	3.01
Theta	50°	89.31	35.81	14.86	30.57	10	24.21	21.96	2.25

Theta	60°	89.51	35.81	14.86	30.57	10	24.41	21.96	2.45
Theta	70°	90.12	35.81	14.86	30.57	10	25.02	21.96	3.06
Theta	80°	90.3	35.81	14.86	30.57	10	25.20	21.96	3.24
Theta	90°	91	35.81	14.86	30.57	10	25.90	21.96	3.94
Theta	100°	91.02	35.81	14.86	30.57	10	25.92	21.96	3.96
Theta	110°	90.72	35.81	14.86	30.57	10	25.62	21.96	3.66
Theta	120°	89.86	35.81	14.86	30.57	10	24.76	21.96	2.80
Theta	130°	89.68	35.81	14.86	30.57	10	24.58	21.96	2.62
Theta	140°	89.39	35.81	14.86	30.57	10	24.29	21.96	2.33
Theta	150°	89.64	35.81	14.86	30.57	10	24.54	21.96	2.58
Theta	160°	90.51	35.81	14.86	30.57	10	25.41	21.96	3.45
Theta	170°	88.16	35.81	14.86	30.57	10	23.06	21.96	1.10
Theta	180°	88.98	35.81	14.86	30.57	10	23.88	21.96	1.92
Theta	190°	88.62	35.81	14.86	30.57	10	23.52	21.96	1.56
Theta	200°	89.2	35.81	14.86	30.57	10	24.10	21.96	2.14
Theta	210°	89.2	35.81	14.86	30.57	10	24.10	21.96	2.14
Theta	220°	89.91	35.81	14.86	30.57	10	24.81	21.96	2.85
Theta	230°	89.26	35.81	14.86	30.57	10	24.16	21.96	2.20
Theta	240°	89.69	35.81	14.86	30.57	10	24.59	21.96	2.63
Theta	250°	89.53	35.81	14.86	30.57	10	24.43	21.96	2.47
Theta	260°	89.8	35.81	14.86	30.57	10	24.70	21.96	2.74
Theta	270°	90.74	35.81	14.86	30.57	10	25.64	21.96	3.68
Theta	274°	91.53	35.81	14.86	30.57	10	26.43	21.96	4.47
Theta	276°	91.7	35.81	14.86	30.57	10	26.60	21.96	4.64
Theta	278°	91.45	35.81	14.86	30.57	10	26.35	21.96	4.39
Theta	280°	91.35	35.81	14.86	30.57	10	26.25	21.96	4.29
Theta	282°	90.95	35.81	14.86	30.57	10	25.85	21.96	3.89
Theta	290°	90.78	35.81	14.86	30.57	10	25.68	21.96	3.72
Theta	300°	89.91	35.81	14.86	30.57	10	24.81	21.96	2.85
Theta	310°	90.14	35.81	14.86	30.57	10	25.04	21.96	3.08
Theta	320°	89.84	35.81	14.86	30.57	10	24.74	21.96	2.78
Theta	330°	90.05	35.81	14.86	30.57	10	24.95	21.96	2.99
Theta	340°	90.86	35.81	14.86	30.57	10	25.76	21.96	3.80
Theta	350°	88.51	35.81	14.86	30.57	10	23.41	21.96	1.45

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	Jul. 04, 2024 ~Jul. 22, 2024	Jan. 01, 2025	Conducted (TH01-KS)
Combiner	MTJ Cooperation	MTJ7018-N	16072602	50ohm N RESISTIVE POWER DIVIDER 2WAY DC-18 GHZ	NCR	Jul. 04, 2024 ~Jul. 22, 2024	NCR	Conducted (TH01-KS)
10dB attenuator	TOJOIN	SMA(JK)	TH01KS01	2W/DC-18G	NCR	Jul. 04, 2024 ~Jul. 22, 2024	NCR	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55370528	10Hz-44G,MAX 30dB	Oct 10, 2023	Jul. 04, 2024 ~Jul. 22, 2024	Oct. 10, 2024	Radiation (03CH08-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Mar 01, 2024	Jul. 04, 2024 ~Jul. 22, 2024	Mar. 01, 2025	Radiation (03CH08-KS)
Amplifier	Keysight	83017A	MY53270319	500MHz~26.5GHz	Oct 10, 2023	Jul. 04, 2024 ~Jul. 22, 2024	Oct. 09, 2024	Radiation (03CH08-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Jul. 04, 2024 ~Jul. 22, 2024	NCR	Radiation (03CH08-KS)
Antenna Mast	EM	EM 1000-A	N/A	1 m~4 m	NCR	Jul. 04, 2024 ~Jul. 22, 2024	NCR	Radiation (03CH08-KS)
RF Cable	HUBER+SUHNER	SUCOFLEX102E	03CH08KS01	30Mhz-40Ghz	Mar 30, 2024	Jul. 04, 2024 ~Jul. 22, 2024	Mar. 30, 2025	Radiation (03CH08-KS)
RF Cable	HUBER+SUHNER	SUCOFLEX102E	03CH08KS02	30Mhz-40Ghz	Mar 30, 2024	Jul. 04, 2024 ~Jul. 22, 2024	Mar. 30, 2025	Radiation (03CH08-KS)
RF Cable	HUBER+SUHNER	SUCOFLEX102E	03CH08KS03	30Mhz-40Ghz	Mar 30, 2024	Jul. 04, 2024 ~Jul. 22, 2024	Mar. 30, 2025	Radiation (03CH08-KS)
10dB attenuator	TOJOIN	SMA(JK)	03CH08KS07 03CH08KS08	2W/DC-18G	NCR	Jul. 04, 2024 ~Jul. 22, 2024	NCR	Radiation (03CH08-KS)
Phi & Theta axis instrument	EM	Phi1600 Theta800	060947	N/A	NCR	Jul. 04, 2024 ~Jul. 22, 2024	NCR	Radiation (03CH08-KS)
Turn Table Master	ChainTek	EM2000	060947	N/A	NCR	Jul. 04, 2024 ~Jul. 22, 2024	NCR	Radiation (03CH08-KS)

NCR: No Calibration Required