



Antenna Composite Gain Test Report

Equipment	AXE5400 Tri-band Mesh WiFi
Brand Name	Motorola
Model Name	Q14
Applicant	MTRLC LLC 275 Turnpike St., Suite 101, Canton, MA 02021
Manufacturer	MTRLC LLC 275 Turnpike St., Suite 101, Canton, MA 02021
Sample Received	Nov. 12, 2021
Start Test Date	Apr. 06, 2022
Final Test Date	Apr. 06, 2022



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1. Operation Mode and Antenna Information

Antenna Position	RF Port	Brand Name	Model Name	Ant. Type	Connector	Modes of Operation
2GAnt1	1	Antenna Company	AC10244-01A	PCB	I-PEX	2.4GHz
2GAnt2	2	Antenna Company	AC10244-01A	PCB	I-PEX	2.4GHz
5GAnt1	2	Antenna Company	AC10503-01A	PCB	I-PEX	5GHz UNII 1~3
5GAnt2	1	Antenna Company	AC10503-01A	PCB	I-PEX	5GHz UNII 1~3

Note:

2.4GHz Operation Mode (2TX/2RX)

2GAnt1~2GAnt2 can be used as transmitting/receiving antenna.

2GAnt1~2GAnt2 could transmit/receive simultaneously.

5GHz Operation Mode (2TX/2RX)

5GAnt1~5GAnt2 can be used as transmitting/receiving antenna.

5GAnt1~5GAnt2 could transmit/receive simultaneously.

2. Test Frequency

The listed frequency of each bands are selected to represent each frequency bands

Band [MHz]	Test Frequency [MHz]
2400-2483.5	2400
2400-2483.5	2450
2400-2483.5	2483.5
5150-5250	5200
5250-5350	5300
5470-5725	5600
5725-5850	5785

3. Testing Location

Testing Location		
<input checked="" type="checkbox"/>	HWA YA	ADD : No.13-1 & 14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333, Taiwan R.O.C.

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
Radiated	05CH03-HY	Rex Liao	23.5-24.5 / 45-55	Apr. 06, 2022

Note:

Testing Site Information

Brand Name: TDK

Dimension: 11m*6m*6m

Characteristic: Fully Anechoic Chamber

4. Test Facility and Configuration

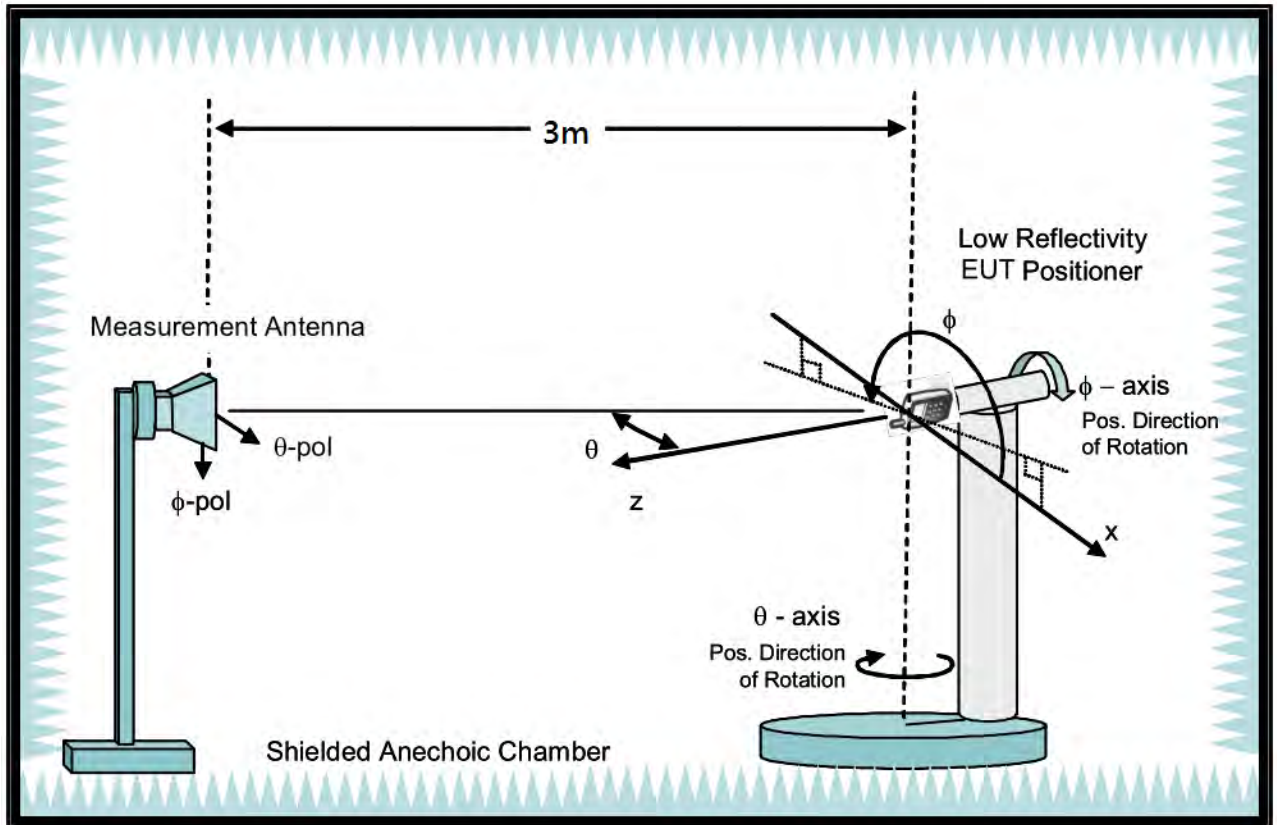
Test configuration: Reference to CITA OTA distributed-axes system configuration.

Chamber: Fully Anechoic Chamber.

Measurement antenna: Single Polarization Horn antenna calibrated according to ANSI C63.5.

Turntable: Multi-axis positioner (Theta and Phi angle).

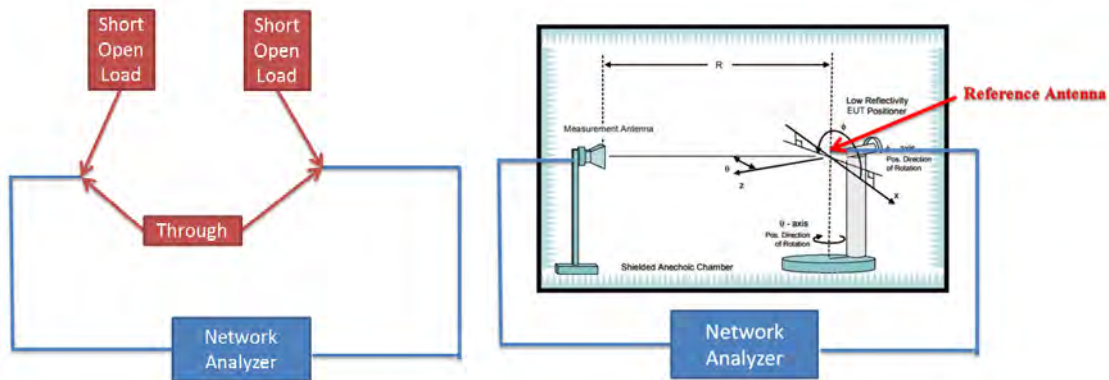
#Reference to CTIA “ctia-test-plan-for-wireless-device-over-the-air-performance-ver-3-7-1”



5. Reference Calibration

Connected cables to VNA calibration kit and use network analyzer internal function to do calibration. Do short, open and load to each side. Then connect through to both side and calibrate S21 values. The cable loss is calibrated and set inside the network analyzer.

Measurement Antenna is connected to port1 of Network analyzer and reference antenna connected to port 2 of Network Analyzer. Record S21 values and used with reference antenna gain to calculate gain factor.



Frequency (MHz)	2400	2450	2500	5150	5200	5300	5600	5750	5800	5900	6000	6500	7000	7500
S21 values (dBi)	-31.4	-31.4	-31.3	-31.3	-31	-30.7	-30.1	-30.5	-30.5	-30.8	-31.3	-32.8	-34.4	-35.4
Reference gain (dBi)	10.2	10.4	10.6	12.4	12.8	13.4	13.4	13.3	13.3	13.1	13.2	12.3	11.7	11.1
Factor (dB)	41.63	41.81	41.89	43.72	43.78	44.12	43.5	43.78	43.76	43.88	44.45	45.14	46.08	46.51



6. Test Method

EUT set on multi-axis positioner and adjust EUT's physical center to measurement reference center. Measurement antenna set at phi polarization and 1.5 meter height. Port 1 of Network analyzer connect to antenna 1 of EUT. Record S21 value every 15 degree from 0 to 345 degree on Phi angle and 0 to 180 on theta angle of multi-axis positioner. Then set measurement antenna to theta polarization and repeat process. Repeat process to each antenna of EUT.

DG steps:

1. Each Phi and Theta polarization antenna gain are measured for all test angles.
2. Composite Phi and Theta antenna gain are computed, using formula in KDB662911 D01 d) (i) and (ii), for all angles.
3. Composite antenna gain are examined for all angles to determine max gain and Phi/Theta position. Max gain and phi/theta position are listed in section 7 tables.



7. Measured Values and Calculation of Maximum Gain Positions

For 2.4GHz

DG_1SS Max Value Position

Frequency (Hz)	2.4G	2.45G	2.4835G
Ant. 1 (dBi)	1.2	-3.37	-3.88
Ant. 2 (dBi)	1.05	3.64	3.63
DG [1SS] (dBi)	4.14	3.83	3.67
Polarization	Theta	Theta	Theta
$\Theta(^{\circ})$	110	90	100
$\Phi(^{\circ})$	280	350	340

Note: The DG 1SS max value position is the maximum value of section 11 table DG 1SS Result.

DG_1SS Max Value Position Calculation

Frequency (Hz)	2.4G	2.45G	2.4835G
Ant. 1 [$10^{(G/20)}$]	$10^{(1.2/20)}$	$10^{(-3.37/20)}$	$10^{(-3.88/20)}$
Ant. 2 [$10^{(G/20)}$]	$10^{(1.05/20)}$	$10^{(3.64/20)}$	$10^{(3.63/20)}$
Ant. 1 [$10^{(G/20)}$] value	1.148	0.678	0.64
Ant. 2 [$10^{(G/20)}$] value	1.128	1.521	1.519
Sum All Antenna [Amax]	2.277	2.199	2.159
DG [$10 \cdot \log(A_{max}^2/N_{ant})$]	4.14	3.83	3.67

Note:

Directional Gain (1SS) is the max value of every look angle. Each position value is calculated by KDB662911 D01 d) (i).

$$\text{Directional gain (1SS)} = 10 \cdot \log(10^{(G_{ant1}/20)} + 10^{(G_{ant2}/20)} + 10^{(G_{ant3}/20)} + 10^{(G_{ant4}/20)} + \dots)^2 / N_{ant}$$



DG_2SS Max Value Position

Frequency (Hz)	2.4G	2.45G	2.4835G
Ant. 1 (dBi)	-3.59	-3.37	-3.88
Ant. 2 (dBi)	3.46	3.64	3.63
DG [2SS] (dBi)	1.23	1.42	1.33
Polarization	Theta	Theta	Theta
$\Theta(^{\circ})$	110	90	100
$\Phi(^{\circ})$	20	350	340

Note: The DG 2SS max value position is the maximum DG 2SS value calculated from section 11 table Gain Result.

DG_2SS Max Value Position Calculation

Frequency (Hz)	2.4G	2.45G	2.4835G
Ant. 1 $((10^{(G/20)})^2)$	0.4375	0.4603	0.4093
Ant. 2 $((10^{(G/20)})^2)$	2.2182	2.3121	2.3067
Sum All Antenna	2.6557	2.7723	2.716
DG $[10*\log(\text{sum all}/N_{\text{ant}})]$	1.23	1.42	1.33

Note: Directional Gain (2SS) is the max value of all position. Each position value is calculated by KDB662911 D01 (e) (ii).

$g_{j,k} = 10^{(G/20)}$

Directional Gain (2SS) = $10*\log((10^{(G_{\text{ant}1}/20)})^2+(10^{(G_{\text{ant}2}/20)})^2+ (10^{(G_{\text{ant}3}/20)})^2 +(10^{(G_{\text{ant}4}/20)})^2+.....)/N_{\text{ant}})$



For 5GHz

DG_1SS Max Value Position

Frequency (Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 1 (dBi)	-0.79	0.37	0.55	0.35
Ant. 2 (dBi)	2.36	1.08	2.12	2.52
DG [1SS] (dBi)	3.94	3.74	4.38	4.51
Polarization	Theta	Theta	Theta	Theta
Θ(°)	100	100	100	110
Φ(°)	280	260	270	280

Note: The DG 1SS max value position is the maximum value of section 11 table DG 1SS Result.

DG_1SS Max Value Position Calculation

Frequency (Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 1 [10^(G/20)]	10^(-0.79/20)	10^(0.37/20)	10^(0.55/20)	10^(0.35/20)
Ant. 2 [10^(G/20)]	10^(2.36/20)	10^(1.08/20)	10^(2.12/20)	10^(2.52/20)
Ant. 1 [10^(G/20)] value	0.913	1.044	1.065	1.041
Ant. 2 [10^(G/20)] value	1.312	1.132	1.276	1.337
Sum All Antenna [Amax]	2.225	2.176	2.342	2.378
DG [10*log(Amax^2/Nant)]	3.94	3.74	4.38	4.51

Note:

Directional Gain (1SS) is the max value of every look angle. Each position value is calculated by KDB662911 D01 d) (i).

$$\text{Directional gain (1SS)} = 10 \cdot \log(10^{(G_{ant1}/20)} + 10^{(G_{ant2}/20)} + 10^{(G_{ant3}/20)} + 10^{(G_{ant4}/20)} + \dots)^2 / N_{ant}$$



DG_2SS Max Value Position

Frequency (Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 1 (dBi)	-0.79	0.37	0.55	0.35
Ant. 2 (dBi)	2.36	1.08	2.12	2.52
DG [2SS] (dBi)	1.06	0.74	1.41	1.57
Polarization	Theta	Theta	Theta	Theta
$\Theta(^{\circ})$	100	100	100	110
$\Phi(^{\circ})$	280	260	270	280

Note: The DG 2SS max value position is the maximum DG 2SS value calculated from section 11 table Gain Result.

DG_2SS Max Value Position Calculation

Frequency (Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 1 $((10^{(G/20)})^2)$	0.8337	1.0889	1.135	1.0839
Ant. 2 $((10^{(G/20)})^2)$	1.7219	1.2823	1.6293	1.7865
Sum All Antenna	2.5555	2.3713	2.7643	2.8704
DG $[10*\log(\text{sum all}/N_{\text{ant}})]$	1.06	0.74	1.41	1.57

Note: Directional Gain (2SS) is the max value of all position. Each position value is calculated by KDB662911 D01 (e) (ii).

$$g_{j,k} = 10^{(G/20)}$$

$$\text{Directional Gain (2SS)} = 10*\log((10^{(G_{\text{ant1}}/20)})^2+(10^{(G_{\text{ant2}}/20)})^2+ (10^{(G_{\text{ant3}}/20)})^2 +(10^{(G_{\text{ant4}}/20)})^2+.....)/N_{\text{ant}})$$



8. Summary of Test Result

Freq(Hz)	2.4G	2.45G	2.4835G
Ant. 1 Max Gain (dBi)	2.73	2.56	2.24
Ant. 2 Max Gain (dBi)	3.7	3.68	3.69
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/80/190	Theta/110/200	Theta/110/200
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/120/350	Theta/120/350	Theta/80/340
Max Gain (dBi)	3.7	3.68	3.69
DG [1SS] (dBi)	4.14	3.83	3.67
DG [2SS] (dBi)	1.23	1.42	1.33

Note:

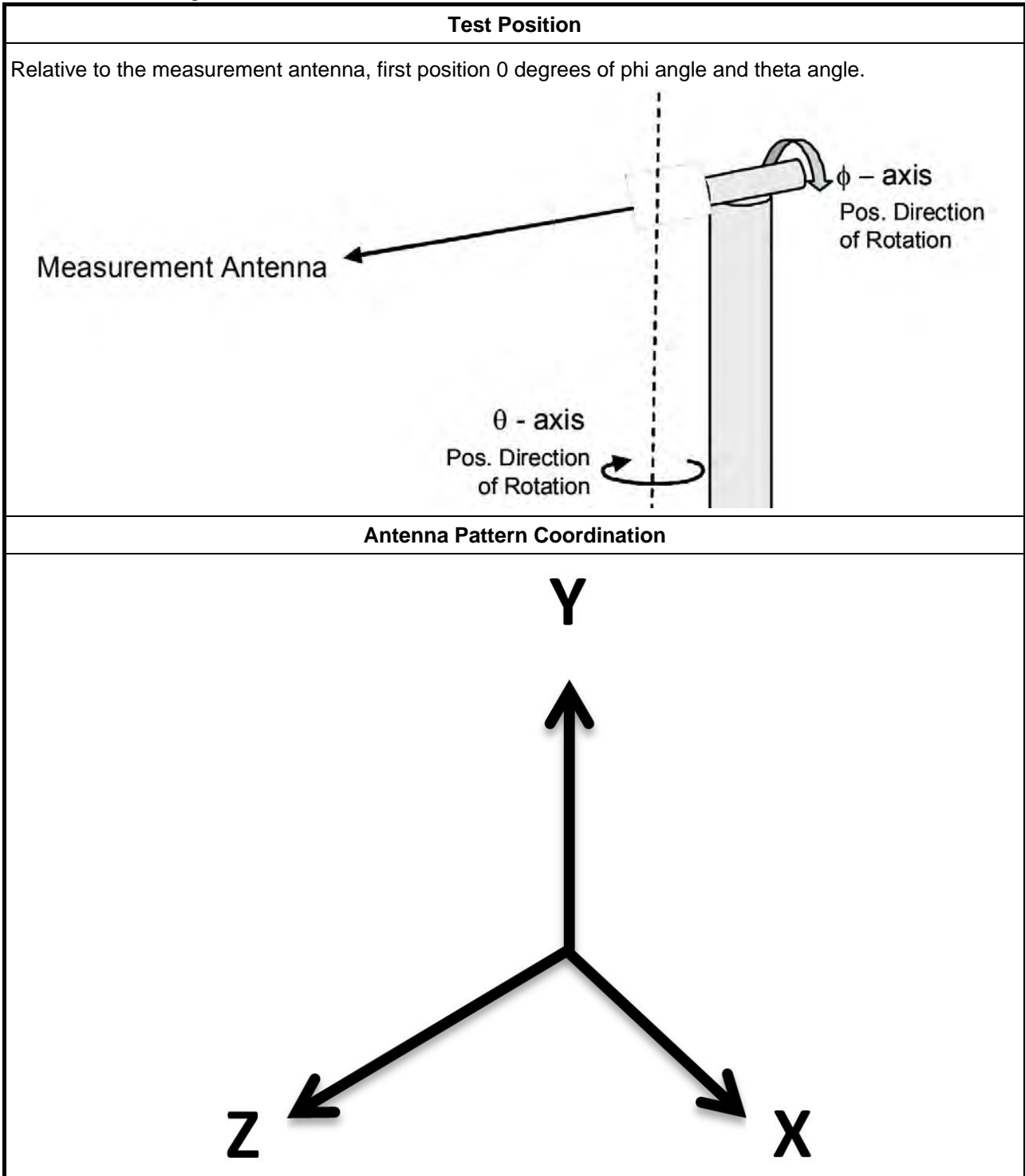
1. Antenna max gain is the max value of each individual antenna through all measurement angles.
2. The max gain is the max value of all antennas.

Freq(Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.01	2.57	3.17	2.97
Ant. 2 Max Gain (dBi)	2.43	2.92	2.12	2.52
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/120/320	Theta/120/320	Theta/120/320	Theta/100/310
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/60/200	Theta/60/210	Theta/100/270	Theta/110/280
Max Gain (dBi)	2.43	2.92	3.17	2.97
DG [1SS] (dBi)	3.94	3.74	4.38	4.51
DG [2SS] (dBi)	1.06	0.74	1.41	1.57

Note:

1. Antenna max gain is the max value of each individual antenna through all measurement angles.
2. The max gain is the max value of all antennas.

9. Test Setup



Note:

Photos of Test Position: Please refer to the test photos in the appendix.



10. Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Horn Antenna	SCHWARZBECK	BBHA9120D	BBHA 9120D-1292	1GHz~18GHz	Aug. 04, 2021	Aug. 03, 2022
ENA Series Network Analyzer	AGILENT	E5071C	MY46419201	100kHz~8.5GHz	Feb. 21, 2022	Feb. 20, 2023
Test Software	SPORTON	SENSE-RDG	V1.0.6	-	N.C.R.	N.C.R.

Note: Calibration Interval of instruments listed above is one year.

NCR means Non-Calibration required.



11. Test Results

Please refer to the appendix.

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Freq(Hz)	2.4G	2.45G	2.4835G
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Ant. 2 Max Gain (dBi)	3.7	3.68	3.69
Ant. 1 Polarization/ θ (°)/ ϕ (°)	Theta/80/190	Theta/110/200	Theta/110/200
Ant. 2 Polarization/ θ (°)/ ϕ (°)	Theta/120/350	Theta/120/350	Theta/80/340
Max Gain (dBi)	3.7	3.68	3.69
DG [1SS] (dBi)	4.14	3.83	3.67
DG [2SS] (dBi)	1.23	1.42	1.33



Radiated Composite Gain of 2.4GHz

Appendix A

Model	16.51-16.62	16.63-16.74	16.75-16.86	16.87-16.98	16.99-17.10	17.11-17.22	17.23-17.34	17.35-17.46	17.47-17.58	17.59-17.70	17.71-17.82	17.83-17.94	17.95-18.06	18.07-18.18	18.19-18.30	18.31-18.42	18.43-18.54	18.55-18.66	18.67-18.78	18.79-18.90	18.91-19.02	19.03-19.14	19.15-19.26	19.27-19.38	19.39-19.50	19.51-19.62	19.63-19.74	19.75-19.86	19.87-19.98	20.00-20.11	20.12-20.23	20.24-20.35	20.36-20.47	20.48-20.59	20.60-20.71	20.72-20.83	20.84-20.95	20.96-21.07	21.08-21.19	21.20-21.31	21.32-21.43	21.44-21.55	21.56-21.67	21.68-21.79	21.80-21.91	21.92-22.03	22.04-22.15	22.16-22.27	22.28-22.39	22.40-22.51	22.52-22.63	22.64-22.75	22.76-22.87	22.88-22.99	23.00-23.11	23.12-23.23	23.24-23.35	23.36-23.47	23.48-23.59	23.60-23.71	23.72-23.83	23.84-23.95	23.96-24.07	24.08-24.19	24.20-24.31	24.32-24.43	24.44-24.55	24.56-24.67	24.68-24.79	24.80-24.91	24.92-25.03	25.04-25.15	25.16-25.27	25.28-25.39	25.40-25.51	25.52-25.63	25.64-25.75	25.76-25.87	25.88-25.99	26.00-26.11	26.12-26.23	26.24-26.35	26.36-26.47	26.48-26.59	26.60-26.71	26.72-26.83	26.84-26.95	26.96-27.07	27.08-27.19	27.20-27.31	27.32-27.43	27.44-27.55	27.56-27.67	27.68-27.79	27.80-27.91	27.92-28.03	28.04-28.15	28.16-28.27	28.28-28.39	28.40-28.51	28.52-28.63	28.64-28.75	28.76-28.87	28.88-28.99	29.00-29.11	29.12-29.23	29.24-29.35	29.36-29.47	29.48-29.59	29.60-29.71	29.72-29.83	29.84-29.95	29.96-30.07	30.08-30.19	30.20-30.31	30.32-30.43	30.44-30.55	30.56-30.67	30.68-30.79	30.80-30.91	30.92-31.03	31.04-31.15	31.16-31.27	31.28-31.39	31.40-31.51	31.52-31.63	31.64-31.75	31.76-31.87	31.88-31.99	32.00-32.11	32.12-32.23	32.24-32.35	32.36-32.47	32.48-32.59	32.60-32.71	32.72-32.83	32.84-32.95	32.96-33.07	33.08-33.19	33.20-33.31	33.32-33.43	33.44-33.55	33.56-33.67	33.68-33.79	33.80-33.91	33.92-34.03	34.04-34.15	34.16-34.27	34.28-34.39	34.40-34.51	34.52-34.63	34.64-34.75	34.76-34.87	34.88-34.99	35.00-35.11	35.12-35.23	35.24-35.35	35.36-35.47	35.48-35.59	35.60-35.71	35.72-35.83	35.84-35.95	35.96-36.07	36.08-36.19	36.20-36.31	36.32-36.43	36.44-36.55	36.56-36.67	36.68-36.79	36.80-36.91	36.92-37.03	37.04-37.15	37.16-37.27	37.28-37.39	37.40-37.51	37.52-37.63	37.64-37.75	37.76-37.87	37.88-37.99	38.00-38.11	38.12-38.23	38.24-38.35	38.36-38.47	38.48-38.59	38.60-38.71	38.72-38.83	38.84-38.95	38.96-39.07	39.08-39.19	39.20-39.31	39.32-39.43	39.44-39.55	39.56-39.67	39.68-39.79	39.80-39.91	39.92-40.03	40.04-40.15	40.16-40.27	40.28-40.39	40.40-40.51	40.52-40.63	40.64-40.75	40.76-40.87	40.88-40.99	41.00-41.11	41.12-41.23	41.24-41.35	41.36-41.47	41.48-41.59	41.60-41.71	41.72-41.83	41.84-41.95	41.96-42.07	42.08-42.19	42.20-42.31	42.32-42.43	42.44-42.55	42.56-42.67	42.68-42.79	42.80-42.91	42.92-43.03	43.04-43.15	43.16-43.27	43.28-43.39	43.40-43.51	43.42-43.63	43.64-43.85	43.86-44.07	44.08-44.29	44.30-44.51	44.52-44.73	44.74-44.95	44.96-45.17	45.18-45.39	45.40-45.61	45.62-45.83	45.84-46.05	46.06-46.27	46.28-46.49	46.50-46.71	46.72-46.93	46.94-47.15	47.16-47.37	47.38-47.59	47.60-47.81	47.82-48.03	48.04-48.25	48.26-48.47	48.48-48.69	48.70-48.91	48.92-49.13	49.14-49.35	49.36-49.57	49.58-49.79	49.80-49.91	49.92-50.03	50.04-50.15	50.16-50.27	50.28-50.39	50.40-50.51	50.52-50.63	50.64-50.75	50.76-50.87	50.88-50.99	51.00-51.11	51.12-51.23	51.24-51.35	51.36-51.47	51.48-51.59	51.60-51.71	51.72-51.83	51.84-51.95	51.96-52.07	52.08-52.19	52.20-52.31	52.32-52.43	52.44-52.55	52.56-52.67	52.68-52.79	52.80-52.91	52.92-53.03	53.04-53.15	53.16-53.27	53.28-53.39	53.40-53.51	53.42-53.63	53.64-53.85	53.86-54.07	54.08-54.29	54.30-54.51	54.52-54.73	54.74-54.95	54.96-55.17	55.18-55.39	55.40-55.61	55.62-55.83	55.84-56.05	56.06-56.27	56.28-56.49	56.50-56.71	56.72-56.93	56.94-57.15	57.16-57.37	57.38-57.59	57.60-57.81	57.82-58.03	58.04-58.25	58.26-58.47	58.48-58.69	58.70-58.91	58.92-59.13	59.14-59.35	59.36-59.57	59.58-59.79	59.80-59.91	59.92-60.03	60.04-60.15	60.16-60.27	60.28-60.39	60.40-60.51	60.52-60.63	60.64-60.75	60.76-60.87	60.88-60.99	61.00-61.11	61.12-61.23	61.24-61.35	61.36-61.47	61.48-61.59	61.60-61.71	61.72-61.83	61.84-61.95	61.96-62.07	62.08-62.19	62.20-62.31	62.32-62.43	62.44-62.55	62.56-62.67	62.68-62.79	62.80-62.91	62.92-63.03	63.04-63.15	63.16-63.27	63.28-63.39	63.40-63.51	63.42-63.63	63.64-63.85	63.86-64.07	64.08-64.29	64.30-64.51	64.52-64.73	64.74-64.95	64.96-65.17	65.18-65.39	65.40-65.61	65.62-65.83	65.84-66.05	66.06-66.27	66.28-66.49	66.50-66.71	66.72-66.93	66.94-67.15	67.16-67.37	67.38-67.59	67.60-67.81	67.82-68.03	68.04-68.25	68.26-68.47	68.48-68.69	68.70-68.91	68.92-69.13	69.14-69.35	69.36-69.57	69.58-69.79	69.80-69.91	69.92-70.03	70.04-70.15	70.16-70.27	70.28-70.39	70.40-70.51	70.52-70.63	70.64-70.75	70.76-70.87	70.88-70.99	71.00-71.11	71.12-71.23	71.24-71.35	71.36-71.47	71.48-71.59	71.60-71.71	71.72-71.83	71.84-71.95	71.96-72.07	72.08-72.19	72.20-72.31	72.32-72.43	72.44-72.55	72.56-72.67	72.68-72.79	72.80-72.91	72.92-73.03	73.04-73.15	73.16-73.27	73.28-73.39	73.40-73.51	73.42-73.63	73.64-73.85	73.86-74.07	74.08-74.29	74.30-74.51	74.52-74.73	74.74-74.95	74.96-75.17	75.18-75.39	75.40-75.61	75.62-75.83	75.84-76.05	76.06-76.27	76.28-76.49	76.50-76.71	76.72-76.93	76.94-77.15	77.16-77.37	77.38-77.59	77.60-77.81	77.82-78.03	78.04-78.25	78.26-78.47	78.48-78.69	78.70-78.91	78.92-79.13	79.14-79.35	79.36-79.57	79.58-79.79	79.80-79.91	79.92-80.03	80.04-80.15	80.16-80.27	80.28-80.39	80.40-80.51	80.52-80.63	80.64-80.75	80.76-80.87	80.88-80.99	81.00-81.11	81.12-81.23	81.24-81.35	81.36-81.47	81.48-81.59	81.60-81.71	81.72-81.83	81.84-81.95	81.96-82.07	82.08-82.19	82.20-82.31	82.32-82.43	82.44-82.55	82.56-82.67	82.68-82.79	82.80-82.91	82.92-83.03	83.04-83.15	83.16-83.27	83.28-83.39	83.40-83.51	83.42-83.63	83.64-83.85	83.86-84.07	84.08-84.29	84.30-84.51	84.52-84.73	84.74-84.95	84.96-85.17	85.18-85.39	85.40-85.61	85.62-85.83	85.84-86.05	86.06-86.27	86.28-86.49	86.50-86.71	86.72-86.93	86.94-87.15	87.16-87.37	87.38-87.59	87.60-87.81	87.82-88.03	88.04-88.25	88.26-88.47	88.48-88.69	88.70-88.91	88.92-89.13	89.14-89.35	89.36-89.57	89.58-89.79	89.80-89.91	89.92-90.03	90.04-90.15	90.16-90.27	90.28-90.39	90.40-90.51	90.52-90.63	90.64-90.75	90.76-90.87	90.88-90.99	91.00-91.11	91.12-91.23	91.24-91.35	91.36-91.47	91.48-91.59	91.60-91.71	91.72-91.83	91.84-91.95	91.96-92.07	92.08-92.19	92.20-92.31	92.32-92.43	92.44-92.55	92.56-92.67	92.68-92.79	92.80-92.91	92.92-93.03	93.04-93.15	93.16-93.27	93.28-93.39	93.40-93.51	93.42-93.63	93.64-93.85	93.86-94.07	94.08-94.29	94.30-94.51	94.52-94.73	94.74-94.95	94.96-95.17	95.18-95.39	95.40-95.61	95.62-95.83	95.84-96.05	96.06-96.27	96.28-96.49	96.50-96.71	96.72-96.93	96.94-97.15	97.16-97.37	97.38-97.59	97.60-97.81	97.82-98.03	98.04-98.25	98.26-98.47	98.48-98.69	98.70-98.91	98.92-99.13	99.14-99.35	99.36-99.57	99.58-99.79	99.80-99.91	99.92-100.03	100.04-100.15	100.16-100.27	100.28-100.39	100.40-100.51	100.52-100.63	100.64-100.75	100.76-100.87	100.88-100.99	101.00-101.11	101.12-101.23	101.24-101.35	101.36-101.47	101.48-101.59	101.60-101.71	101.72-101.83	101.84-101.95	101.96-102.07	102.08-102.19	102.20-102.31	102.32-102.43	102.44-102.55	102.56-102.67	102.68-102.79	102.80-102.91	102.92-103.03	103.04-103.15	103.16-103.27	103.28-103.39	103.40-103.51	103.42-103.63	103.64-103.85	103.86-104.07	104.08-104.29	104.30-104.51	104.52-104.73	104.74-104.95	104.96-105.17	105.18-105.39	105.40-105.61	105.62-105.83	105.84-106.05	106.06-106.27	106.28-106.49	106.50-106.71	106.72-106.93	106.94-107.15	107.16-107.37	107.38-107.59	107.60-107.81	107.82-108.03	108.04-108.25	108.26-108.47	108.48-108.69	108.70-108.91	108.92-109.13	109.14-109.35	109.36-109.57	109.58-109.79	109.80-109.91	109.92-110.03	110.04-110.15	110.16-110.27	110.28-110.39	110.40-110.51	110.52-110.63	110.64-110.75	110.76-110.87	110.88-110.99	111.00-111.11	111.12-111.23	111.24-111.35	111.36-111.47	111.48-111.59	111.60-111.71	111.72-111.83	111.84-111.95	111.96-112.07	112.08-112.19	112.20-112.31	112.32-112.43	112.44-112.55	112.56-112.67	112.68-112.79	112.80-112.91	112.92-113.03	113.04-113.15	113.16-113.27	113.28-113.39	113.40-113.51	113.42-113.63	113.64-113.85	113.86-114.07	114.08-114.29	114.30-114.51	114.52-114.73	114.74-114.95	114.96-115.17	115.18-115.39	115.40-115.61	115.62-115.83	115.84-116.05	116.06-116.27	116.28-116.49	116.50-116.71	116.72-116.93	116.94-117.15	117.16-117.37	117.38-117.59	117.60-117.81	117.82-118.03	118.04-118.25	118.26-118.47	118.48-118.69	118.70-118.91	118.92-119.13	119.14-119.35	119.36-119.57	119.58-119.79	119.80-119.91	119.92-120.03	120.04-120.15	120.16-120.27	120.28-120.39	120.40-120.51	120.52-120.63	120.64-120.75	120.76-120.87	120.88-120.99	121.00-121.11	121.12-121.23	121.24-121.35	121.36-121.47	121.48-121.59	121.60-121.71	121.72-121.83	121.84-121.95	121.96-122.07	122.08-122.19	122.20-122.31	122.32-122.43	122.44-122.55	122.56-122.67	122.68-122.79	122.80-122.91	122.92-123.03	123.04-1
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Freq(Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.01	2.57	3.17	2.97
Ant. 2 Max Gain (dBi)	2.43	2.92	2.12	2.52
Ant. 1 Polarization/ θ (°)/ ϕ (°)	Theta/120/320	Theta/120/320	Theta/120/320	Theta/100/310
Ant. 2 Polarization/ θ (°)/ ϕ (°)	Theta/60/200	Theta/60/210	Theta/100/270	Theta/110/280
Max Gain (dBi)	2.43	2.92	3.17	2.97
DG [1SS] (dBi)	3.94	3.74	4.38	4.51
DG [2SS] (dBi)	1.06	0.74	1.41	1.57



Antenna Pattern of 2.4GHz

Appendix C

Total Gain Data

Freq(Hz)	24GPol.	TotalAnt. 1	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
Gain	Φ(0°)Φ(10°)	Φ(20°)Φ(30°)	Φ(40°)Φ(50°)	Φ(60°)Φ(70°)	Φ(80°)Φ(90°)	Φ(100°)Φ(110°)	Φ(120°)Φ(130°)	Φ(140°)Φ(150°)	Φ(160°)Φ(170°)	Φ(180°)Φ(190°)	Φ(200°)Φ(210°)	Φ(220°)Φ(230°)	Φ(240°)Φ(250°)	Φ(260°)Φ(270°)	Φ(280°)Φ(290°)	Φ(300°)Φ(310°)	Φ(320°)Φ(330°)	Φ(340°)Φ(350°)
θ(0°)	-5.04/-5.46	-5.46/-5.68	-5.56/-5.16	-4.73/-4.67	-4.30/-4.08	-4.53/-4.36	-4.46/-4.71	-4.65/-4.54	-4.70/-4.80	-5.28/-4.93	-5.06/-5.78	-5.15/-5.27	-5.42/-5.11	-4.19/-4.44	-4.37/-4.49	-4.19/-4.54	-4.60/-4.72	-4.60/-4.72
θ(10°)	-6.86/-6.53	-6.24/-5.74	-4.75/-4.00	-3.64/-3.12	-2.98/-2.61	-2.68/-2.84	-2.75/-2.43	-2.83/-2.62	-3.16/-3.61	-3.98/-4.46	-5.07/-5.66	-6.19/-6.51	-7.45/-7.85	-8.60/-8.28	-8.52/-7.82	-7.62/-7.00	-6.89/-7.09	-7.02/-7.52
θ(20°)	-7.60/-6.76	-6.12/-4.72	-3.73/-2.74	-2.37/-1.91	-1.80/-2.02	-1.58/-1.20	-1.41/-1.29	-1.21/-1.44	-1.91/-2.65	-3.02/-3.88	-4.71/-5.49	-6.22/-7.10	-8.45/-9.92	-10.55/-10.58	-10.47/-9.86	-9.61/-8.53	-7.82/-7.89	-7.61/-7.76
θ(30°)	-8.86/-4.82	-3.95/-3.22	-2.69/-2.44	-1.87/-1.62	-1.35/-1.01	-1.02/-1.02	-0.72/-0.66	-0.69/-0.56	-1.24/-1.68	-2.41/-3.08	-4.20/-5.28	-6.76/-8.54	-9.19/-9.11	-9.63/-9.56	-9.19/-8.68	-8.63/-8.52	-7.80/-7.71	-5.86/-5.92
θ(40°)	-4.15/-3.48	-2.60/-2.77	-2.74/-2.86	-2.74/-1.96	-1.14/-0.43	-0.44/-0.29	-0.34/-0.40	-0.010.04	-0.02/-0.57	-1.20/-1.62	-2.49/-3.95	-5.46/-5.69	-5.33/-4.92	-4.35/-3.93	-3.47/-3.53	-3.77/-4.47	-4.37/-3.93	-4.10/-4.50
θ(50°)	-6.02/-5.23	-4.17/-4.33	-4.82/-5.21	-4.68/-3.99	-3.63/-2.43	-2.04/-1.45	-1.12/-0.98	-0.49/-0.04	0.00/-0.05	-0.21/-0.23	-1.02/-2.48	-3.72/-3.57	-3.91/-4.26	-4.25/-4.26	-4.73/-5.22	-5.73/-6.38	-6.39/-6.16	-6.65/-6.20
θ(60°)	-5.02/-5.04	-3.81/-3.41	-4.47/-4.97	-3.56/-3.56	-3.70/-3.70	-3.70/-3.70	-0.94/-0.74	-0.350.25	0.510.55	-2.70/-1.88	-2.56/-3.76	-2.42/-2.20	-2.79/-3.88	-4.06/-2.72	-2.79/-3.88	-4.43/-4.38	-4.43/-4.38	-4.43/-4.38
θ(70°)	-7.40/-6.04	-4.14/-2.73	-3.49/-4.01	-2.85/-3.30	-4.34/-3.64	-2.70/-1.42	-0.35/-0.04	0.180.67	1.461.67	2.332.70	2.371.55	0.081.56	-1.96/-0.91	-0.390.36	0.580.09	-0.87/-3.03	-5.08/-7.07	-9.51/-9.81
θ(80°)	-5.88/-4.23	-2.74/-1.55	-2.30/-3.00	-2.20/-2.79	-4.10/-3.89	-3.13/-2.04	-0.96/-0.83	-0.610.50	1.852.25	3.184.12	4.012.97	1.530.29	-0.31/-0.13	0.180.20	0.211.18	-0.67/-2.75	-5.76/-6.93	-7.02/-7.67
θ(90°)	-3.80/-4.03	-3.13/-2.88	-4.28/-4.55	-3.72/-4.30	-4.25/-3.24	-2.19/-1.04	-0.68/-1.32	-1.81/-0.95	-2.510.11	3.182.73	2.251.34	0.591.52	0.241.74	0.150.22	-2.49/-3.00	-2.78/-2.38	-4.01/-4.02	-3.38/-4.02
θ(100°)	-5.45/-4.54	-4.22/-4.58	-8.28/-10.45	-10.36/-12.72	-10.96/-6.61	-4.33/-2.03	-0.95/-0.64	-1.09/-1.17	-0.540.43	2.223.03	3.253.14	1.920.55	-1.06/-2.88	-3.66/-4.54	-4.81/-3.23	-1.77/-1.65	-3.75/-4.75	-4.78/-5.41
θ(110°)	-6.38/-7.02	-3.38/-1.38	-2.56/-5.34	-5.27/-5.54	-9.36/-13.47	-12.92/-7.94	-4.11/-2.59	-2.77/-1.37	0.391.63	2.593.45	3.662.30	0.36/-0.63	-1.66/-0.28	0.600.86	1.321.76	2.261.80	-0.34/-4.78	-6.40/-5.05
θ(120°)	-3.88/-6.89	-10.21/-4.18	-3.56/-6.97	-7.28/-5.36	-6.64/-7.85	0.772.30	6.57/-6.86	-5.85/-3.02	-1.23/-0.66	-7.24/-6.99	1.762.15	1.762.15	0.55/-3.14	-2.85/-3.14	0.371.01	-4.67/-6.15	-4.67/-6.15	-4.67/-6.15
θ(130°)	-2.34/-3.39	-4.68/-1.42	-0.52/-2.39	-5.31/-5.94	-6.67/-7.61	-9.49/-9.99	-11.47/-11.85	-8.32/-5.54	-4.31/-2.75	-0.690.43	-0.47/-1.19	-0.63/-1.43	-2.45/-1.34	-1.15/-1.60	-1.72/-2.03	-1.93/-1.03	-0.44/-1.83	-4.69/-3.96
θ(140°)	-6.81/-6.85	-7.21/-6.84	-5.57/-6.81	-6.60/-6.58	-9.06/-7.41	-8.66/-7.49	-7.29/-7.60	-6.74/-6.12	-4.67/-2.87	-1.35/-0.69	0.441.68	2.141.74	1.341.12	-0.01/-3.25	-8.45/-13.79	-12.74/-11.14	-8.57/-6.81	-6.50/-4.14
θ(150°)	-3.84/-4.79	-5.74/-6.57	-6.97/-7.64	-7.73/-7.71	-7.00/-6.49	-5.93/-4.78	-4.23/-3.80	-3.32/-2.17	-0.890.09	0.621.08	1.431.43	0.94/-0.10	-1.66/-3.15	-6.45/-11.57	-12.23/-8.39	-6.15/-4.54	-5.16/-4.54	-3.63/-3.44
θ(160°)	-10.48/-11.28	-12.86/-13.35	-13.96/-13.55	-12.21/-10.14	-8.75/-8.05	-7.71/-7.18	-6.81/-6.29	-5.84/-5.16	-4.12/-3.26	-2.97/-2.76	-1.83/-3.33	-0.56/-4.47	-3.19/-9.89	-11.22/-11.55	-10.83/-9.86	-9.81/-10.01	-10.74/-9.83	-9.00/-8.31
θ(170°)	-6.39/-7.72	-8.06/-10.0	-7.66/-7.26	-6.97/-7.35	-6.85/-6.87	-7.04/-7.43	-7.86/-8.09	-7.70/-7.57	-7.29/-7.21	-7.03/-7.15	-7.37/-7.34	-7.38/-6.92	-6.42/-5.75	-5.11/-4.59	-4.16/-4.29	-4.27/-4.94	-5.18/-5.53	-5.83/-6.96
θ(180°)	-4.10/-4.08	-4.13/-4.13	-3.84/-3.60	-3.90/-4.21	-4.34/-4.54	-5.02/-5.28	-5.16/-5.32	-5.80/-5.72	-5.37/-5.33	-5.34/-4.93	-4.93/-4.60	-4.09/-3.74	-3.62/-3.33	-2.99/-2.95	-2.96/-3.13	-3.19/-3.31	-3.62/-3.34	-3.20/-3.54
Freq(Hz)	2.45GPol.	TotalAnt. 1	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
Gain	Φ(0°)Φ(10°)	Φ(20°)Φ(30°)	Φ(40°)Φ(50°)	Φ(60°)Φ(70°)	Φ(80°)Φ(90°)	Φ(100°)Φ(110°)	Φ(120°)Φ(130°)	Φ(140°)Φ(150°)	Φ(160°)Φ(170°)	Φ(180°)Φ(190°)	Φ(200°)Φ(210°)	Φ(220°)Φ(230°)	Φ(240°)Φ(250°)	Φ(260°)Φ(270°)	Φ(280°)Φ(290°)	Φ(300°)Φ(310°)	Φ(320°)Φ(330°)	Φ(340°)Φ(350°)
θ(0°)	-3.78/-3.77	-3.74/-3.77	-3.56/-3.88	-4.02/-3.93	-4.28/-4.69	-5.25/-5.75	-6.03/-6.00	-5.82/-5.52	-5.34/-4.98	-5.59/-5.94	-5.89/-5.94	-5.62/-5.19	-4.78/-4.30	-3.99/-3.97	-4.09/-4.30	-4.48/-4.51	-4.79/-4.58	-4.31/-4.27
θ(10°)	-5.46/-4.70	-4.12/-3.31	-3.04/-2.62	-2.62/-2.33	-3.02/-3.41	-3.19/-3.41	-3.13/-3.41	-3.19/-3.29	-2.80/-3.41	-3.99/-4.67	-5.45/-6.18	-6.34/-6.93	-6.81/-6.50	-6.32/-6.36	-6.54/-6.81	-6.57/-8.72	-7.22/-7.81	-7.46/-6.36
θ(20°)	-7.76/-5.89	-4.48/-3.37	-2.49/-1.90	-1.62/-1.58	-1.93/-1.65	-1.85/-1.92	-1.78/-1.74	-1.62/-1.37	-1.49/-1.85	-2.60/-3.43	-4.43/-5.50	-6.25/-7.08	-7.16/-6.98	-6.76/-7.01	-6.88/-6.95	-7.23/-7.99	-8.55/-11.52	-11.63/-10.61
θ(30°)	-7.77/-5.57	-3.97/-3.01	-2.43/-2.04	-1.79/-1.89	-1.84/-1.72	-1.75/-2.03	-1.21/-1.92	-1.85/-1.56	-1.29/-1.35	-1.91/-2.54	-3.59/-4.45	-6.10/-7.10	-6.64/-6.35	-6.27/-7.33	-8.18/-9.32	-9.45/-9.22	-9.67/-11.44	-10.41/-8.92
θ(40°)	-5.29/-4.10	-3.43/-3.32	-3.36/-3.14	-2.47/-1.73	-1.23/-1.10	-1.21/-1.12	-1.23/-1.08	-0.55/-0.48	-0.63/-1.17	-1.07/-1.26	-1.96/-3.43	-5.24/-5.99	-5.46/-4.58	-4.73/-5.26	-5.64/-5.89	-6.36/-6.55	-6.34/-5.88	-6.15/-6.21
θ(50°)	-7.61/-5.55	-5.85/-4.66	-7.47/-6.52	-4.59/-3.60	-2.54/-2.13	-1.66/-1.44	-1.55/-1.78	-1.76/-1.08	-0.50/-0.06	0.03/-0.22	-0.66/-1.69	-3.11/-3.15	-2.73/-2.78	-2.75/-2.50	-2.88/-3.67	-4.97/-6.95	-7.76/-7.65	-7.80/-6.68
θ(60°)	-6.52/-6.62	-5.05/-4.43	-5.97/-5.88	-4.68/-4.52	-4.56/-3.60	-2.62/-2.10	-2.14/-2.94	-3.10/-2.14	-1.29/-0.57	0.030.60	0.221.01	-2.26/-3.44	-4.69/-5.47	-6.25/-7.17	-8.35/-8.23	-6.99/-6.09	-6.21/-6.16	-6.16/-5.82
θ(70°)	-5.76/-5.81	-4.90/-3.70	-5.60/-4.65	-2.88/-2.74	-2.60/-1.95	-1.63/-0.94	-0.74/-1.10	-1.09/-0.45	-0.61/-1.24	1.570.36	1.44/-2.54	-1.06/-1.87	-0.64/-1.14	-1.22/-3.87	-1.12/-3.08	-4.76/-3.58	-3.56/-2.53	-7.45/-6.85
θ(80°)	-4.69/-3.25	-2.52/-1.80	-3.39/-3.47	-2.31/-3.15	-3.04/-2.49	-1.90/-1.63	-0.97/-1.02	-0.740.05	1.382.10	2.843.58	3.771.97	0.211.40	-1.09/-0.04	0.520.24	-0.54/-1.86	-3.66/-5.83	-7.08/-6.88	-5.95/-5.35
θ(90°)	-3.10/-3.64	-4.08/-4.61	-6.20/-6.47	-3.12/-3.65	-3.25/-2.39	-2.12/-1.74	-1.93/-2.31	-2.40/-1.21	0.070.47	1.792.54	2.181.15	0.23/-0.15	0.030.15	0.490.01	-1.36/-3.47	-4.62/-4.40	-2.98/-1.98	-2.36/-2.54
θ(100°)	-3.28/-3.90	-4.77/-6.43	-11.28/-11.03	-8.54/-8.87	-6.59/-4.87	-7.20/-7.00	-2.91/-1.88	-2.13/-1.82	-0.720.70	2.243.09	2.912.46	-1.15/-2.93	-0.67/-1.05	-0.76/-3.08	-6.16/-6.88	-4.76/-3.52	-3.56/-2.53	-2.36/-3.04
θ(110°)	-3.25/-4.01	-2.77/-1.68	-3.99/-6.65	-9.60/-9.42	-12.62/-13.63	-11.78/-7.93	-4.89/-3.62	-3.58/-2.33	0.141.70	2.663.59	3.732.46	0.011.29	-2.35/-1.04	-0.35/-1.31	-1.59/-1.17	-0.120.28	-1.75/-3.87	-3.05/-2.71
θ(120°)	-5.19/-7.75	-7.02/-3.64	-3.84/-7.88	-9.05/-7.25	-7.73/-8.45	-7.73/-7.68	-7.46/-8.23	-7.17/-3.45	-0.82/-0.09	0.852.24	1.96/-0.07	-0.580.07	0.200.99	0.871.10	-3.57/-4.72	-4.02/-1.99	-0.85/-1.94	-5.71/-6.12
θ(130°)	-2.61/-3.77	-3.56/-1.06	-0.67/-2.39	-4.79/-6.12	-7.17/-8.75	-0.211.81	-0.021.18	-1.95/-1.55	-0.211.55	-3.80/-2.73	-3.16/-3.32	-3.44/-2.52	-3.44/-2.52	-3.44/-2.52	-3.44/-2.52	-3.44/-2.52	-3.44/-2.52	-3.44/-2.52
θ(140°)	-7.48/-6.70	-5.59/-4.94	-5.26/-6.12	-8.10/-9.57	-10.92/-12.72	-12.80/-11.75	-10.60/-8.57	-6.66/-4.32	-2.81/-1.35	-0.220.22	0.500.79	0.930.39	-0.52/-0.90	-2.46/-6.37	-13.47/-12.43	-8.93/-7.99	-6.87/-5.92	-6.60/-7.97
θ(150°)	-4.64/-5.32	-5.66/-5.55	-5.36/-5.83	-5.97/-7.13	-8.17/-8.62	-7.90/-6.61	-5.29/-4.46	-3.12/-1.63	-0.390.45	1.141.38	1.331.08	0.241.15	-3.39/-5.22	-8.21/-12.91	-11.86/-6.65	-5.05/-6.40	-4.24/-3.74	-3.35/-3.92
θ(160°)	-9.85/-12.29	-13.25/-13.70	-13.53/-13.58	-13.20/-13.32	-11.91/-10.77	-9.41/-8.60	-7.24/-6.20	-5.08/-4.38	-3.34/-4.22	-2.90/-2.86	-1.07/-12.11	-10.79/-12.11	-11.90/-10.77	-10.20/-10.52	-10.14/-8.86	-9.13/-8.30	-9.13/-8.30	-9.13/-8.30
θ(170°)	-6.72/-6.72	-7.00/-7.04	-7.59/-7.67	-7.70/-7.82	-7.52/-7.42	-6.93/-7.08	-7.08/-6.87	-7.29/-7.59	-8.23/-8.26	-8.42/-8.54	-8.79/-9.04	-8.86/-9.07	-8.27/-7.29	-6.81/-6.41	-6.42/-6.29	-6.91/-7.30	-7.11/-6.81	-6.19/-6.10
θ(180°)	-4.53/-4.45	-4.46/-4.03	-4.74/-4.46	-4.63/-5.05	-4.95/-4.99	-5.53/-5.45	-5.99/-6.29	-6.34/-6.49	-6.80/-6.21	-6.28/-6.24	-5.59/-5.39	-4.95/-4.90	-4.41/-4.25	-4.05/-3.79	-3.99/-4.15	-4.37/-4.71	-4.65/-4.47	-4.36/-4.46
Freq(Hz)	2.4835GPol.	TotalAnt. 1	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
Gain	Φ(0°)Φ(10°)	Φ(20°)Φ(30°)	Φ(40°)Φ(50°)	Φ(60°)Φ(70°)	Φ(80°)Φ(90°)	Φ(100°)Φ(110°)	Φ(120°)Φ(130°)	Φ(140°)Φ(150°										



Antenna Pattern of 2.4GHz

Appendix C

θ(60°)	0.68/-0.35	-0.56/-0.94	-1.79/-1.34	-1.18/-1.27	-1.87/-2.73	-3.96/-5.11	-4.86/-4.98	-5.77/-5.65	-5.50/-7.18	-10.20/-10.91	-10.52/-8.55	-7.38/-4.62	-2.89/-1.66	-1.21/-0.83	-1.11/-1.27	-0.85/-0.11	0.44/0.95	1.70/1.39
θ(70°)	2.15/1.57	1.22/0.63	-0.54/-0.59	-1.01/-1.67	-2.21/-2.71	-3.52/-4.17	-3.67/-3.76	-4.55/-4.24	-4.68/-8.24	-12.01/-12.73	-11.02/-9.09	-6.63/-4.81	-2.82/-1.46	-0.79/-0.89	-1.10/-1.42	-0.69/0.41	1.62/2.62	3.03/2.90
θ(80°)	2.70/1.70	1.64/0.97	0.15/0.01	-0.25/-1.48	-1.76/-1.75	-2.67/-3.77	-3.05/-3.17	-4.79/-4.35	-5.27/-8.45	-12.28/-13.05	-9.50/-6.93	-5.36/-2.79	-1.25/-0.54	-0.04/0.07	-0.26/-1.00	-0.48/1.00	2.23/3.22	3.73/3.44
θ(90°)	3.01/1.82	1.74/1.39	0.35/0.07	0.10/-0.81	-1.49/-1.53	-3.04/-5.66	-4.55/-3.98	-4.36/-3.10	-4.44/-9.05	-11.48/-10.70	-8.91/-5.40	-3.46/-2.13	-0.96/-0.53	0.08/0.06	-0.82/-2.07	-1.38/0.53	2.09/3.29	3.69/3.66
θ(100°)	3.19/2.32	1.67/1.08	0.25/-0.49	-0.80/-1.83	-2.52/-2.40	-3.46/-4.93	-3.19/-2.93	-5.40/-4.97	-7.47/-13.31	-10.20/-8.29	-5.33/-3.28	-2.75/-1.13	-0.23/0.06	-0.25/-0.04	-0.63/-2.56	-1.93/0.16	1.97/3.31	3.70/3.68
θ(110°)	2.69/2.43	2.52/1.88	1.07/1.06	0.73/0.16	-1.12/-2.47	-5.09/-7.45	-5.25/-6.67	-9.63/-6.33	-9.67/-11.13	-8.39/-7.35	-6.36/-5.07	-1.92/0.28	0.48/-0.35	-0.46/-0.53	-1.33/-3.18	-3.24/-1.15	-0.05/1.81	3.05/3.24
θ(120°)	2.68/2.25	2.54/2.40	1.31/0.57	0.02/-1.03	-2.99/-5.66	-9.44/-8.92	-8.22/-9.01	-5.73/-4.43	-8.97/-7.18	-4.19/-5.11	-6.33/-3.89	-2.16/-2.05	-3.02/-3.36	-2.74/-3.22	-3.41/-4.27	-3.30/-0.96	-0.08/0.86	2.28/3.06
θ(130°)	2.11/1.13	0.99/0.82	-0.20/-1.46	-2.25/-3.37	-4.95/-6.21	-7.18/-7.66	-9.99/-8.97	-5.72/-7.64	-11.33/-5.61	-4.66/-6.32	-7.04/-5.31	-6.17/-7.04	-7.66/-8.01	-8.84/-9.40	-7.59/-6.25	-3.28/-0.61	0.39/0.81	1.83/2.48
θ(140°)	-1.09/-1.74	-2.04/-2.24	-2.69/-3.93	-4.97/-5.54	-7.05/-7.69	-9.58/-11.67	-11.77/-11.68	-10.92/-11.16	-7.41/-5.01	-5.01/-5.95	-6.60/-7.70	-9.49/-10.92	-11.68/-13.42	-13.39/-10.95	-8.37/-6.59	-4.61/-2.77	-2.14/-2.38	-1.92/-1.00
θ(150°)	-2.46/-2.99	-4.25/-4.89	-5.70/-6.61	-8.09/-9.19	-11.57/-12.14	-11.65/-10.36	-9.73/-9.91	-10.07/-7.74	-6.44/-5.99	-5.88/-6.03	-6.83/-7.72	-8.46/-10.73	-12.47/-13.31	-12.00/-8.90	-7.29/-5.73	-4.32/-3.49	-3.00/-2.50	-2.34/-2.29
θ(160°)	-6.64/-7.35	-7.90/-8.99	-8.82/-9.54	-11.01/-11.78	-13.13/-13.24	-12.56/-12.60	-12.99/-13.29	-13.02/-11.76	-11.29/-11.43	-10.74/-11.89	-11.64/-10.88	-11.65/-11.74	-11.82/-11.16	-10.91/-10.28	-9.78/-9.44	-8.29/-7.78	-6.94/-5.96	-5.88/-6.39
θ(170°)	-12.37/-11.46	-11.20/-10.76	-10.86/-12.29	-13.55/-13.40	-13.33/-13.73	-13.51/-13.47	-13.81/-13.00	-13.05/-13.91	-13.08/-13.32	-13.26/-13.72	-13.34/-12.99	-12.73/-13.13	-14.12/-13.00	-12.72/-13.06	-13.48/-13.17	-13.91/-12.79	-13.67/-13.76	-13.12/-12.30
θ(180°)	-9.30/-9.71	-9.98/-10.48	-10.97/-12.13	-12.07/-12.71	-12.19/-12.47	-12.44/-13.71	-13.23/-11.48	-10.61/-10.66	-9.79/-9.89	-10.15/-10.24	-11.03/-11.77	-11.72/-11.73	-11.41/-11.17	-11.22/-11.03	-12.62/-12.66	-11.62/-10.21	-10.15/-9.56	-9.04/-9.04

E1(XY plane) – $\Theta(90)\Phi(0-360)$
 E2(XZ plane) – $\Theta(0-180)\Phi(0)$ and $\Theta(0-180)\Phi(180)$
 E3(YZ plane) – $\Theta(0-180)\Phi(90)$ and $\Theta(0-180)\Phi(270)$





Antenna Pattern of 5GHz U-NII 1~U-NII 3

Appendix D

Total Gain Data

Freq(Hz)	5.2GPol.	TotalAnt. 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gain	Φ(0°)Φ(10°)	Φ(20°)Φ(30°)	Φ(40°)Φ(50°)	Φ(60°)Φ(70°)	Φ(80°)Φ(90°)	Φ(100°)Φ(110°)	Φ(120°)Φ(130°)	Φ(140°)Φ(150°)	Φ(160°)Φ(170°)	Φ(180°)Φ(190°)	Φ(200°)Φ(210°)	Φ(220°)Φ(230°)	Φ(240°)Φ(250°)	Φ(260°)Φ(270°)	Φ(280°)Φ(290°)	Φ(300°)Φ(310°)	Φ(320°)Φ(330°)	Φ(340°)Φ(350°)
θ(0°)	-11.79/-11.10	-10.04/-8.45	-8.90/-8.54	-9.30/-9.39	-8.92/-8.91	-9.93/-10.00	-8.41/-8.41	-9.31/-9.36	-9.93/-10.00	-8.41/-8.41	-9.21/-8.89	-8.36/-8.13	-8.16/-8.16	-8.43/-8.59	-7.06/-8.14	-8.16/-8.16	-9.90/-11.36	-11.91/-11.22
θ(10°)	-8.45/-8.74	-9.49/-8.50	-7.82/-8.34	-9.95/-11.16	-12.63/-11.90	-10.72/-9.99	-10.08/-11.59	-11.56/-11.61	-12.36/-11.88	-11.77/-10.41	-10.44/-9.17	-8.73/-7.77	-8.22/-7.52	-7.31/-7.33	-6.57/-6.87	-6.57/-6.55	-6.43/-6.56	-7.02/-7.24
θ(20°)	-7.51/-8.84	-9.84/-11.1	-9.13/-9.20	-9.37/-10.56	-11.08/-10.94	-10.97/-11.35	-10.48/-9.53	-9.10/-10.14	-11.49/-10.13	-9.02/-8.49	-8.30/-8.31	-8.34/-6.67	-6.18/-6.79	-8.12/-8.86	-8.80/-8.89	-7.89/-6.78	-6.16/-6.22	-6.10/-6.55
θ(30°)	-4.41/-4.67	-6.48/-7.15	-8.55/-9.09	-7.41/-7.49	-7.49/-9.66	-10.32/-9.77	-9.35/-9.45	-8.32/-7.51	-6.85/-5.99	-5.91/-7.01	-6.33/-6.69	-6.42/-5.67	-6.03/-6.28	-5.16/-4.13	-6.02/-7.80	-9.08/-7.17	-5.16/-4.13	-3.63/-3.84
θ(40°)	-5.31/-6.36	-6.86/-5.98	-5.03/-5.51	-6.34/-7.92	-8.43/-8.10	-7.93/-8.68	-7.76/-7.57	-8.13/-7.54	-6.43/-6.42	-6.00/-6.42	-6.37/-6.78	-5.08/-4.78	-5.82/-5.25	-7.86/-10.50	-7.45/-6.77	-7.94/-4.56	-3.95/-4.04	-3.99/-4.73
θ(50°)	-5.11/-6.67	-6.00/-4.78	-4.08/-4.00	-4.99/-5.36	-7.07/-7.21	-7.21/-6.58	-6.57/-6.32	-6.03/-7.51	-6.11/-6.76	-5.27/-7.19	-6.92/-5.05	-6.07/-4.91	-6.80/-8.87	-7.37/-8.42	-6.78/-6.44	-4.76/-3.50	-4.76/-3.50	-4.69/-4.58
θ(60°)	-4.86/-4.91	-4.07/-2.80	-2.71/-4.36	-4.92/-6.24	-4.82/-4.77	-5.50/-7.40	-6.32/-6.01	-5.68/-7.31	-5.68/-7.31	-7.02/-7.46	-8.84/-11.10	-8.52/-6.53	-5.16/-5.79	-6.16/-6.23	-8.06/-9.14	-5.98/-4.76	-3.31/-3.39	-3.30/-4.14
θ(70°)	-2.75/-3.48	-3.10/-3.34	-3.02/-3.97	-4.12/-4.42	-3.78/-4.43	-5.12/-5.46	-4.95/-3.89	-5.00/-6.60	-7.28/-6.29	-6.27/-6.35	-9.36/-7.31	-5.72/-6.41	-6.40/-6.46	-6.90/-5.73	-6.94/-7.00	-4.24/-2.93	-0.52/-0.66	-1.10/-1.58
θ(80°)	-3.56/-3.23	-3.33/-2.85	-2.72/-2.88	-2.57/-3.19	-3.51/-7.40	-5.18/-4.88	-3.76/-3.67	-5.20/-8.54	-7.04/-6.39	-5.77/-7.16	-10.02/-6.66	-6.11/-6.55	-5.98/-7.59	-5.31/-6.07	-5.69/-3.82	-3.19/-1.83	-0.79/-0.47	-1.57/-3.36
θ(90°)	-2.82/-4.19	-3.34/-2.18	-1.25/-1.30	-1.95/-1.85	-3.44/-4.18	-1.95/-1.30	-3.88/-4.33	-6.85/-7.40	-4.52/-7.52	-9.33/-6.48	-5.65/-7.40	-2.72/-2.18	-6.51/-5.91	-2.72/-2.18	-6.51/-5.91	-2.72/-2.18	-0.250/95	-1.85/-2.05
θ(100°)	-0.80/-2.47	-2.28/-1.40	-0.85/-1.93	-2.03/-1.85	-2.57/-1.90	-2.11/-3.89	-4.34/-4.97	-4.24/-7.61	-8.51/-6.85	-9.11/-6.28	-6.81/-7.80	-8.23/-7.91	-12.36/-4.21	-0.32/-0.76	-0.65/-1.06	-0.320/08	1.140/94	-1.58/-0.46
θ(110°)	-1.97/-2.32	-1.68/-0.58	0.23/-1.38	-1.40/-2.40	-2.57/-2.48	-3.69/-4.20	-6.08/-4.96	-6.25/-11.93	-6.20/-7.52	-7.05/-5.35	-9.56/-7.22	-6.79/-13.35	-13.38/-1.79	-2.30/-2.10	-4.50/-3.08	-1.40/-0.02	0.51/-0.51	-2.23/-0.72
θ(120°)	-2.73/-2.07	-1.15/-1.51	-0.83/-0.96	-1.32/-3.02	-3.16/-2.87	-4.06/-5.09	-6.54/-5.35	-7.96/-9.77	-7.25/-11.89	-9.47/-4.48	-7.27/-9.31	-6.99/-2.95	-5.19/-6.36	-4.18/-3.14	-6.02/-2.75	2.670/37	-2.670/37	-2.670/37
θ(130°)	0.05/-2.04	-1.16/-0.75	0.12/-0.27	-0.60/-1.44	-1.53/-2.34	-2.85/-3.99	-5.28/-8.49	-10.51/-7.77	-10.97/-13.43	-8.55/-13.23	-5.69/-5.34	-6.82/-12.22	-2.52/-2.49	-8.84/-6.60	-1.26/-1.74	-2.79/-3.70	-1.81/-1.92	0.06/-0.54
θ(140°)	-2.60/-3.23	-2.66/-1.53	-1.46/-1.28	-1.91/-2.52	-3.03/-3.67	-4.56/-6.05	-7.20/-9.21	-12.89/-13.15	-11.77/-11.47	-11.62/-14.24	-9.36/-9.48	-9.56/-12.44	-8.97/-4.23	-6.80/-5.84	-4.87/-4.17	-2.41/-6.05	-5.06/-2.94	-5.06/-2.94
θ(150°)	-6.02/-6.95	-6.16/-4.01	-2.25/-2.28	-2.21/-2.88	-4.97/-6.08	-6.72/-4.70	-8.60/-9.64	-11.79/-13.67	-12.01/-10.56	-12.19/-13.06	-10.40/-7.99	-6.15/-4.84	-4.30/-7.30	-13.74/-13.34	-9.03/-7.84	-4.47/-6.36	0.04/-1.15	-2.67/-3.56
θ(160°)	-5.95/-6.1	-4.79/-4.17	-3.97/-3.80	-3.14/-2.83	-3.14/-2.83	-3.71/-3.89	-3.91/-4.30	-4.44/-6.42	-8.50/-10.97	-13.31/-13.49	-13.53/-11.42	-5.18/-3.74	-6.90/-9.34	-10.40/-8.27	-5.18/-3.74	-6.90/-9.34	-3.23/-3.86	-3.23/-3.86
θ(170°)	-4.20/-4.59	-4.98/-4.91	-4.60/-4.94	-4.08/-3.91	-3.61/-3.27	-4.46/-4.50	-6.60/-8.07	-9.62/-12.43	-13.15/-13.24	-10.98/-8.83	-8.84/-9.55	-10.29/-10.62	-11.12/-10.81	-10.54/-10.88	-9.74/-8.78	-8.09/-7.61	-6.19/-4.30	-4.01/-3.82
θ(180°)	-9.53/-10.35	-11.24/-11.54	-10.13/-9.81	-10.50/-11.55	-12.31/-10.43	-9.10/-7.66	-7.32/-7.90	-8.28/-9.94	-10.14/-9.93	-9.95/-9.20	-10.43/-11.61	-12.03/-12.82	-12.13/-10.59	-9.62/-9.01	-8.57/-8.32	-8.24/-9.26	-9.31/-10.20	-9.56/-8.89



Antenna Pattern of 5GHz U-NII 1~U-NII 3

Appendix D

Theta (°)	-3.79/-4.28	-4.86/-5.73	-5.97/-4.57	-4.77/-5.80	-8.42/-11.20	-10.27/-7.22	-4.08/-1.23	0.16/1.12	1.16/1.23	1.18/1.00	0.83/1.04	0.85/-0.45	-1.76/-3.01	-3.94/-3.57	-5.37/-7.46	-8.72/-6.55	-4.35/-5.25	-7.09/-5.19
Theta (0°)	-6.25/-7.34	-5.71/-5.38	-4.82/-3.87	-4.59/-5.05	-6.10/-8.08	-8.15/-5.55	-3.79/-1.43	-0.30/0.06	-0.37/-0.72	-2.08/-2.51	-1.43/-0.62	-0.15/-1.28	-3.54/-1.51	-1.62/-3.04	-2.60/-5.63	-9.86/-11.42	-9.21/-12.41	-12.30/-6.49
Theta (10°)	-8.82/-3.45	-3.33/-5.71	-6.83/-4.73	-4.91/-4.96	-4.94/-7.45	-8.88/-5.96	-2.98/-0.07	0.57/0.57	-1.22/-0.53	0.80/1.27	-1.21/-0.53	0.91/-0.90	-1.22/-0.01	-1.33/-2.70	-2.37/-3.76	-5.43/-6.01	-5.74/-5.23	-6.27/-5.72
Theta (20°)	-8.62/-6.06	-4.29/-6.88	-7.96/-6.00	-5.65/-7.17	-7.78/-9.83	-10.07/-8.49	-4.24/-1.56	-0.82/-1.53	-2.77/-4.29	-6.29/-4.35	-4.49/-2.76	-2.53/-5.84	-4.97/0.36	1.53/0.60	0.49/-3.81	-11.14/-8.72	-10.45/-13.35	-11.62/-7.62
Theta (30°)	-4.50/-6.24	-4.40/-9.17	-9.43/-6.70	-6.19/-6.16	-7.30/-10.06	-9.07/-5.82	-3.65/-1.03	-0.28/0.16	-1.96/-5.19	-4.53/-2.04	-2.89/-3.27	-1.60/-3.65	-3.84/-1.56	-3.19/-3.64	-0.51/-3.40	-7.63/-7.39	-6.96/-6.68	-8.75/-4.18
Theta (40°)	-6.48/-9.32	-9.11/-8.68	-10.72/-8.48	-7.52/-8.07	-9.83/-11.65	-13.80/-12.68	-7.25/-3.70	-3.48/-4.06	-5.86/-8.78	-7.99/-7.99	-5.26/-5.56	-3.25/-7.60	-10.25/-5.18	-5.73/-7.06	-3.63/-7.90	-12.65/-7.00	-8.77/-4.80	-6.87/-6.81
Theta (50°)	-4.30/-8.86	-12.96/-9.64	-9.80/-7.88	-5.96/-5.88	-7.53/-8.82	-8.04/-7.69	-7.03/-5.75	-5.30/-5.81	-8.29/-8.21	-3.54/-3.67	-3.54/-4.36	-5.67/-8.11	-7.08/-6.34	-9.54/-12.67	-7.57/-5.01	-7.21/-8.51	-7.30/-10.61	-12.11/-7.87
Theta (60°)	-7.63/-9.43	-10.82/-11.29	-8.95/-7.67	-8.68/-10.31	-11.78/-13.80	-13.19/-11.01	-7.69/-6.06	-5.07/-5.21	-7.85/-12.85	-7.86/-7.53	-5.79/-4.53	-2.94/-5.15	-8.46/-12.93	-12.89/-13.56	-13.94/-13.62	-13.40/-10.54	-6.83/-6.64	-6.74/-9.08
Theta (70°)	-8.94/-10.43	-7.84/-5.84	-4.47/-4.73	-6.19/-7.85	-10.17/-12.26	-12.17/-12.08	-13.22/-12.97	-10.87/-11.50	-12.12/-12.26	-13.54/-12.43	-10.98/-11.03	-9.40/-7.92	-11.27/-9.97	-10.42/-13.06	-13.52/-13.53	-9.58/-9.88	-10.20/-6.59	-7.78/-10.06
Theta (80°)	-7.33/-8.25	-9.73/-9.01	-7.45/-5.62	-5.41/-5.65	-7.20/-8.96	-8.77/-7.80	-8.21/-9.17	-8.44/-7.44	-8.69/-10.75	-13.27/-13.09	-12.27/-11.43	-12.90/-13.03	-9.86/-8.57	-10.58/-13.61	-13.00/-13.29	-12.20/-10.51	-8.95/-6.26	-6.17/-6.83
Theta (90°)	-9.15/-8.56	-8.72/-7.20	-6.23/-5.97	-5.89/-5.90	-5.51/-6.21	-6.35/-7.00	-7.63/-8.35	-9.95/-11.97	-9.95/-9.60	-8.03/-7.58	-7.53/-8.49	-9.38/-9.66	-10.44/-11.78	-11.03/-9.85	-9.86/-10.38	-11.34/-12.25	-11.42/-12.71	-11.95/-9.72
Theta (100°)	-13.24/-13.74	-12.77/-13.59	-13.60/-12.06	-12.89/-13.21	-13.26/-13.54	-14.18/-13.70	-13.08/-13.37	-13.31/-11.26	-10.34/-10.68	-11.30/-11.00	-12.04/-12.49	-12.97/-13.27	-13.02/-14.03	-13.87/-13.13	-13.34/-13.17	-13.28/-13.85	-13.98/-13.60	-13.72/-13.74
Freq(Hz)	5.6GPol.	TotalAnt. 2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Gain	Phi(0°)Phi(10°)	Phi(20°)Phi(30°)	Phi(40°)Phi(50°)	Phi(60°)Phi(70°)	Phi(80°)Phi(90°)	Phi(100°)Phi(110°)	Phi(120°)Phi(130°)	Phi(140°)Phi(150°)	Phi(160°)Phi(170°)	Phi(180°)Phi(190°)	Phi(200°)Phi(210°)	Phi(220°)Phi(230°)	Phi(240°)Phi(250°)	Phi(260°)Phi(270°)	Phi(280°)Phi(290°)	Phi(300°)Phi(310°)	Phi(320°)Phi(330°)	Phi(340°)Phi(350°)
Theta (0°)	-8.91/-10.26	-9.77/-9.66	-9.75/-9.67	-9.12/-8.20	-8.45/-9.27	-11.19/-11.10	-8.91/-9.27	-8.92/-9.01	-9.10/-9.23	-8.51/-8.16	-8.00/-8.60	-9.59/-9.22	-9.22/-9.38	-9.91/-8.70	-8.08/-8.36	-8.44/-9.70	-8.80/-8.66	-8.80/-8.66
Theta (10°)	-6.79/-7.65	-7.32/-7.25	-7.37/-8.22	-9.19/-9.73	-9.38/-9.72	-9.27/-9.51	-9.86/-9.35	-8.36/-8.47	-8.84/-8.66	-8.24/-7.83	-8.19/-9.04	-11.03/-10.87	-11.15/-11.94	-12.61/-12.30	-11.95/-11.54	-12.47/-12.07	-12.17/-11.77	-10.41/-10.03
Theta (20°)	-7.80/-7.04	-7.68/-6.80	-6.92/-6.80	-9.66/-9.22	-10.30/-11.17	-12.01/-12.65	-11.23/-9.73	-8.04/-7.45	-7.99/-7.92	-7.05/-7.53	-7.48/-8.42	-9.18/-9.73	-9.45/-9.89	-10.25/-10.94	-13.13/-13.37	-13.85/-11.69	-13.65/-13.53	-11.23/-8.82
Theta (30°)	-10.66/-10.90	-8.29/-8.39	-8.24/-9.88	-8.90/-8.88	-7.22/-7.53	-5.08/-4.85	-5.76/-4.27	-4.41/-4.82	-4.03/-3.95	-3.73/-4.54	-5.12/-6.16	-7.09/-9.64	-9.58/-9.44	-10.75/-12.07	-8.40/-8.66	-11.29/-10.44	-9.99/-10.71	-9.99/-10.71
Theta (40°)	-7.44/-5.64	-5.22/-5.60	-5.89/-5.58	-5.24/-5.72	-5.88/-7.96	-7.85/-7.19	-5.77/-3.20	-1.78/-0.87	-0.70/-0.38	-0.60/-0.54	-0.61/-1.69	-1.71/-2.65	-6.07/-6.80	-7.49/-5.83	-6.78/-7.71	-8.51/-10.61	-9.85/-9.10	-11.68/-10.24
Theta (50°)	-5.62/-8.89	-5.19/-7.03	-6.98/-6.77	-6.18/-6.64	-7.04/-8.64	-10.17/-8.39	-6.69/-4.32	-2.23/-0.97	-0.20/-0.33	-0.05/-0.7	0.32/0.11	-0.42/-2.11	-3.79/-4.10	-1.91/-3.46	-5.02/-6.17	-9.01/-8.25	-6.87/-5.78	-5.05/-6.05
Theta (60°)	-7.52/-7.36	-7.16/-6.77	-8.16/-7.99	-7.22/-8.21	-8.55/-9.46	-8.84/-6.45	-0.77/-2.97	-0.01/-0.36	-0.54/-0.06	0.05/0.00	0.05/0.00	0.02/0.11	-1.61/-1.07	-5.31/-5.07	-4.14/-4.31	-5.44/-6.24	-5.72/-10.19	-7.42/-6.24
Theta (70°)	-3.90/-3.59	-3.95/-6.26	-8.34/-7.72	-6.17/-5.01	-5.80/-7.87	-8.17/-6.54	-4.02/-1.50	-0.69/0.03	0.59/1.02	1.57/2.09	2.31/2.03	1.98/-0.92	-1.55/-2.42	-2.04/-2.76	-4.98/-9.19	-10.12/-8.27	-5.41/-7.18	-5.76/-3.63
Theta (80°)	-3.44/-4.44	-5.64/-6.34	-7.69/-7.87	-7.72/-6.56	-6.34/-6.87	-7.11/-5.87	-3.44/-2.07	-0.82/-0.69	-0.64/-0.05	-0.39/-0.86	-1.16/-1.35	-0.27/-2.13	-1.88/-2.27	-4.47/-9.27	-9.94/-8.76	-8.39/-12.05	-10.64/-5.04	-10.64/-5.04
Theta (90°)	-1.99/-3.46	-4.07/-5.73	-6.47/-6.52	-5.99/-3.69	-4.35/-5.36	-6.77/-4.85	-2.82/-0.58	-0.21/-0.49	-0.01/-0.32	-0.67/0.17	1.19/1.14	0.87/0.73	-1.16/0.41	-1.65/-5.97	-5.84/-4.29	-5.06/-1.59	-5.06/-1.59	-5.06/-1.59
Theta (100°)	-3.76/-5.46	-4.77/-5.63	-7.13/-7.10	-8.51/-5.88	-6.70/-6.86	-8.70/-6.88	-6.00/-2.59	-2.22/-2.01	-1.45/-1.77	-3.30/-5.67	-5.36/-3.39	-2.78/-3.11	-4.10/-1.80	0.15/2.21	1.22/-3.78	-10.54/-9.47	-9.74/-9.20	-9.23/-3.43
Theta (110°)	-2.77/-1.60	-3.74/-6.91	-6.44/-11.01	-8.77/-7.48	-6.97/-7.13	-6.27/-6.12	-4.05/-2.33	-1.85/-2.04	-1.52/-2.44	-4.18/-3.37	-3.12/-2.99	-2.21/-5.16	-3.37/-1.75	-1.77/-1.97	0.29/0.03	-13.66/-8.27	-6.08/-7.78	-5.40/-2.80
Theta (120°)	-5.09/-4.99	-4.88/-10.61	-11.05/-10.12	-10.35/-9.29	-9.13/-7.88	-10.77/-9.06	-4.76/-4.04	-1.75/-7.17	-4.37/-6.34	-9.31/-6.53	-5.09/-4.75	-1.75/-7.17	-3.24/-4.43	-2.04/-8.36	-13.19/-8.12	-5.74/-6.67	-5.74/-6.67	-5.74/-6.67
Theta (130°)	-2.85/-5.82	-6.31/-8.50	-9.75/-10.48	-10.75/-9.79	-8.29/-7.75	-7.74/-6.31	-5.55/-4.27	-4.02/-5.82	-5.95/-7.69	-5.96/-3.88	-3.34/-4.91	-3.81/-6.71	-7.26/-5.86	-8.14/-8.22	-4.87/-4.23	-7.25/-9.78	-4.46/-5.87	-7.38/-4.26
Theta (140°)	-6.34/-6.66	-8.08/-8.00	-12.42/-12.47	-11.05/-11.69	-10.80/-9.93	-9.68/-8.45	-6.74/-6.20	-4.80/-4.35	-5.62/-7.71	-8.36/-6.42	-5.62/-7.71	-8.36/-6.42	-5.62/-7.71	-8.36/-6.42	-5.62/-7.71	-8.36/-6.42	-5.62/-7.71	-8.36/-6.42
Theta (150°)	-6.46/-10.19	-7.18/-5.20	-4.49/-5.58	-7.88/-9.56	-11.41/-9.97	-8.84/-9.83	-11.35/-13.63	-12.94/-12.67	-12.79/-12.47	-11.97/-11.62	-13.12/-12.67	-10.64/-7.79	-8.57/-12.08	-8.71/-13.01	-13.60/-12.11	-7.62/-9.13	-8.96/-6.88	-5.88/-6.99
Theta (160°)	-9.08/-10.48	-11.83/-7.75	-5.66/-4.57	-4.26/-4.95	-6.11/-7.45	-8.77/-9.56	-9.55/-9.95	-11.77/-11.01	-10.07/-9.86	-9.61/-8.65	-9.01/-7.72	-9.17/-11.94	-13.42/-11.72	-11.11/-13.37	-14.09/-12.68	-10.95/-11.94	-8.47/-6.54	-6.62/-7.75
Theta (170°)	-12.46/-10.77	-9.77/-8.51	-7.67/-8.38	-9.20/-8.84	-8.61/-7.25	-6.52/-6.40	-6.18/-7.03	-7.36/-8.50	-10.42/-10.25	-9.93/-8.62	-7.86/-7.97	-8.64/-10.08	-10.86/-12.03	-13.88/-13.03	-12.88/-13.31	-13.39/-12.59	-11.89/-12.32	-10.89/-10.73
Theta (180°)	-13.03/-13.62	-13.11/-13.17	-13.28/-12.63	-12.38/-11.82	-12.48/-13.45	-13.09/-13.88	-13.73/-13.85	-13.60/-12.99	-12.54/-11.67	-12.65/-12.98	-13.02/-12.66	-12.92/-13.32	-13.61/-12.37	-12.33/-12.64	-13.34/-13.28	-13.25/-11.37	-13.29/-13.01	-12.88/-13.73
Freq(Hz)	5.785GPol.	TotalAnt. 2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Gain	Phi(0°)Phi(10°)	Phi(20°)Phi(30°)	Phi(40°)Phi(50°)	Phi(60°)Phi(70°)	Phi(80°)Phi(90°)	Phi(100°)Phi(110°)	Phi(120°)Phi(130°)	Phi(140°)Phi(150°)	Phi(160°)Phi(170°)	Phi(180°)Phi(190°)	Phi(200°)Phi(210°)	Phi(220°)Phi(230°)	Phi(240°)Phi(250°)	Phi(260°)Phi(270°)	Phi(280°)Phi(290°)	Phi(300°)Phi(310°)	Phi(320°)Phi(330°)	Phi(340°)Phi(350°)
Theta (0°)	-11.48/-10.62	-12.69/-11.06	-11.13/-10.77	-10.51/-10.25	-11.72/-12.09	-11.76/-11.54	-10.33/-11.52	-11.29/-11.76	-13.37/-12.35	-10.80/-10.10	-10.91/-10.35	-11.24/-10.50	-11.56/-12.61	-10.98/-11.60	-11.11/-11.67	-11.02/-10.91	-11.02/-10.91	-10.58/-12.81
Theta (10°)	-10.84/-11.20	-11.08/-10.76	-10.32/-10.04	-9.92/-9.56	-10.21/-10.34	-9.44/-10.18	-12.01/-9.97	-9.74/-10.92	-10.25/-9.46	-8.52/-8.11	-8.33/-9.53	-9.58/-10.52	-11.43/-12.47	-12.44/-12.35	-11.73/-12.75	-12.53/-11.36	-11.66/-9.75	-10.22/-9.65
Theta (20°)	-8.25/-7.62	-6.91/-7.11	-7.94/-8.10	-8.97/-9.09	-9.23/-8.66	-7.37/-6.63	-6.46/-6.72	-5.45/-5.40	-5.87/-5.36	-4.37/-4.08	-4.13/-5.65	-7.44/-11.07	-12.76/-14.23	-14.34/-12.98	-13.62/-14.10	-12.91/-10.53	-10.59/-9.45	-8.33/-7.05
Theta (30°)	-5.73/-5.86	-6.98/-6.98	-6.39/-7.44	-8.14/-9.56	-10.21/-9.69	-8.96/-6.62	-4.37/-3.17	-2.69/-2.72	-3.23/-3.78	-3.98/-3.54	-3.68/-3.35	-4.82/-6.37	-8.01/-8.31	-8.22/-10.85	-13.25/-13.47	-10.59/-8.80	-10.69/-8.45	-6.95/-6.12
Theta (40°)	-7.31/-5.26	-4.52/-4.74	-5.66/-6.10	-7.75/-7.22	-7.97/-7.84	-7.59/-6.56	-5.01/-2.45	-0.65/-1.05	-2.40/-2.58	-1.94/-2.25	-1.36/-1.01	-2.04/-3.08	-4.51/-8.77	-10.85/-12.76	-9.41/-5.92	-6.38/-7.86	-8.17/-8.95	-8.99/-8.71
Theta (50°)	-4.37/-3.34	-2.61/-4.15	-4.90/-5.34	-6.28/-5.34	-6.13/-9.60	-8.22/-6.28	-4.90/-3.83	-1.22/0.40	-0.33/-1.24	-0.23/0.40	0.51/0.73	0.82/-0.69	-3.32/-6.65	-6.40/-5.11	-6.08/-8.57	-6.16/-6.87	-7.89/-6.63	-6.52/-4.84
Theta (60°)	-3.79/-4.49	-5.27/-6.02	-7.71/-6.87	-7.39/-7.81	-8.02/-8.78	-8.55/-5.46	-4.13/-3.27	-2.01/-0.56	-1.03/-1.68	-1.71/-1.37	-0.23/0.10	-0.07/-0.87	-3.31/-5.77	-3.37/-2.96	-3.84/-6.44	-6.39/-6.01		

E1(XY plane) – $\Theta(90)\Phi(0-360)$
 E2(XZ plane) – $\Theta(0-180)\Phi(0)$ and $\Theta(0-180)\Phi(180)$
 E3(YZ plane) – $\Theta(0-180)\Phi(90)$ and $\Theta(0-180)\Phi(270)$

