



# Antenna Composite Gain Test Report

FCC ID	Z8H89FT0085
Equipment	X7-35X Indoor Wi-Fi 7 2x2 Access Point
Brand Name	Cambium Networks
Model Name	X7-35X
Applicant	Cambium Networks Inc. 3800 Golf Road Suite 360 Rolling Meadows IL United States 60008
Manufacturer	Cambium Networks Inc. 3800 Golf Road Suite 360 Rolling Meadows IL United States 60008
Standard	KDB662911 D03 v01
Sample Received	Nov. 24, 2023
Start Test Date	Dec. 04, 2023
Final Test Date	Dec. 04, 2023

Approved by: Sam Chen

**Sporton International Inc. Hsinchu Laboratory**

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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### 1. Operation Mode and Antenna Information

Antenna Position	RF Port	Brand Name	Model Name	Ant. Type	Connector	Modes of Operation
2G 5GAnt1	2	INPAQ	3010001479GD	PIFA Antenna	I-PEX	2.4GHz, 5GHz UNII 1~3
2G 5GAnt2	1	INPAQ	3010001479GD	PIFA Antenna	I-PEX	2.4GHz, 5GHz UNII 1~3

Note:

2.4GHz and 5GHz Operation Mode (2TX/2RX)

2G 5GAnt1~2 can be used as transmitting/receiving antenna.

2G 5GAnt1~2 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	2450
5150-5250	5200
5250-5350	5300
5470-5725	5600
5725-5850	5785

### 3. Testing Location

Testing Location		
Sporton International Inc. Hsinhua Laboratory		
<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	Rofy Chen	23.5-24.5 / 50-55	Dec. 04, 2023

Note:

Testing Site Information

Brand Name: TDK

Dimension: 11m\*6m\*6m

Characteristic: Fully Anechoic Chamber

#### 4. Test Facility and Configuration

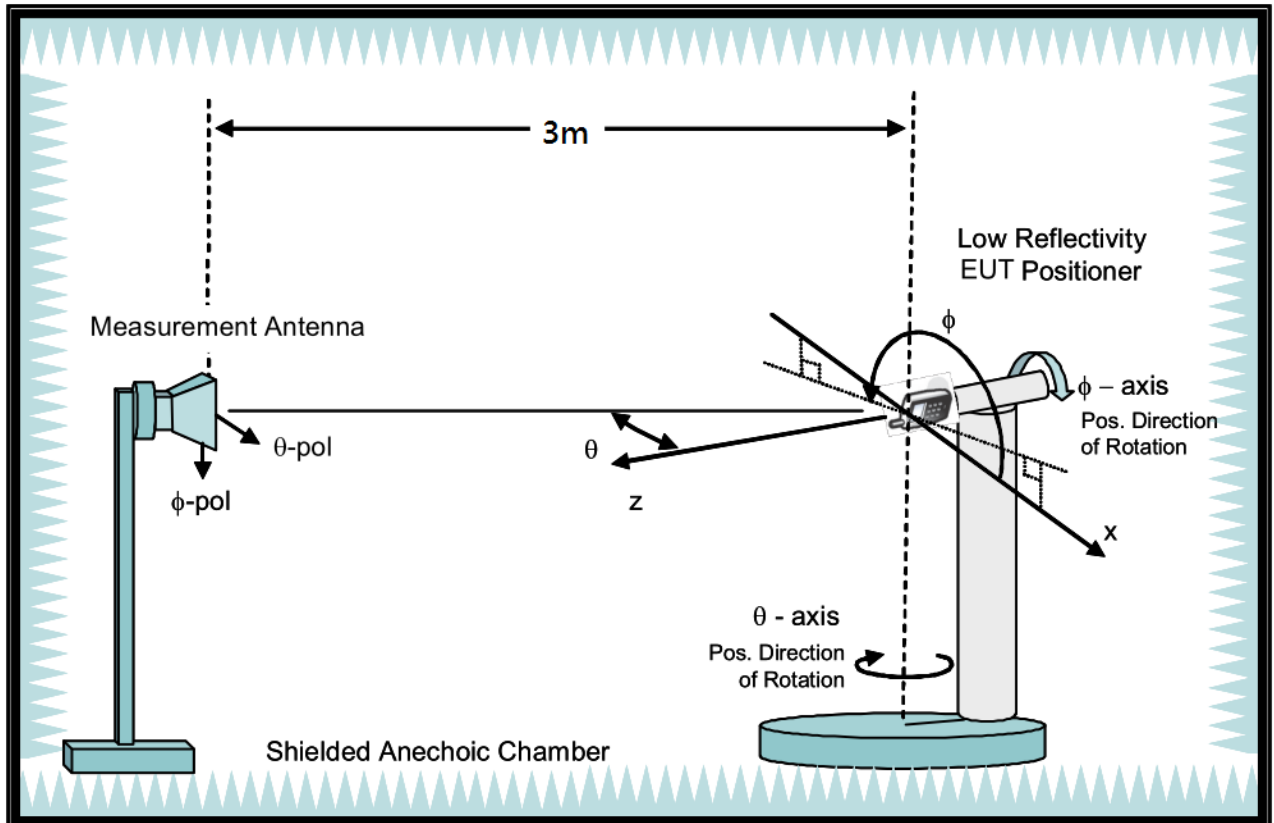
Test configuration: Reference to CITA OTA distributed-axes system configuration.

Chamber: Fully Anechoic Chamber.

Measurement antenna: Dual Polarization Horn antenna

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

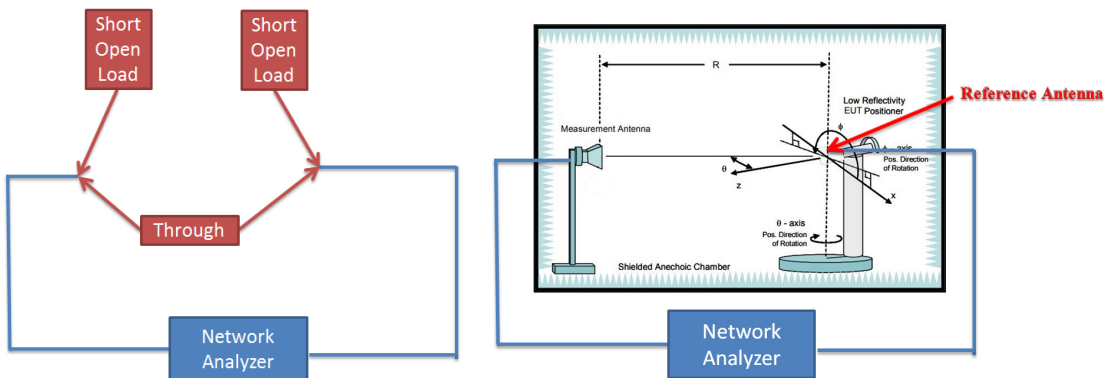
#Reference to CTIA "ctia-test-plan-for-wireless-device-over-the-air-performance-ver-3-7-1"



### 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 G 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 G 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	7200
G(theta) reading (dB)	-33.75	-33.64	-32.91	-32.21	-32.45	-32.33	-32.57	-32.94	-32.78	-33.35	-32.91	-33.81	-34.54	-35.64
G(phi) reading (dB)	-33.19	-32.12	-32.48	-32.51	-32.64	-31.68	-32.24	-32.45	-32.45	-32.85	-32.45	-33.62	-34.48	-35.24
Reference gain (dBi)	10	10.4	10.6	12.3	12.5	13.3	13.3	13.2	13.1	13	13.2	12.4	11.8	11.1
Factor(theta) (dB)	43.75	44.04	43.51	44.51	44.95	45.63	45.87	46.14	45.88	46.35	46.11	46.21	46.34	46.74
Factor(phi) (dB)	43.19	42.52	43.08	44.81	45.14	44.98	45.54	45.65	45.55	45.85	45.65	46.02	46.28	46.34

Note:

$$G \text{ reading (dB)} = 20 \cdot \log(V2/V1) = 10 \cdot \log(P2/P1)$$

V2 is the voltage of VNA port2 is measured, V1 is the voltage of VNA port1 is the reference source.

P2 is the power of VNA port2 is measured, P1 is the power of VNA port1 is the reference source.

$$\text{Factor} = \text{gain factor} + \text{power gain conversion} = (\text{Reference antenna gain}) - (G \text{ reading})$$



## **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 G value every 7.5 degree from 0 to 352.5 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 e) (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.

Note: Antenna gain = G reading + factor, The factor of chapter five includes reference antenna gain factor and power gain conversion.



### 7. Measured Values and Calculation of Maximum Gain Positions

#### DG\_1SS max value position

Frequency (Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 (dBi)	1.77	0.41	0.94	4.08	4.63
Ant. 2 (dBi)	2.23	2.17	3.57	3.67	1.47
DG [1SS] (dBi)	5.01	4.34	5.36	6.89	6.2
Polarization	Phi	Theta	Theta	Theta	Theta
Θ(°)	0	75	60	75	75
Φ(°)	180	120	217.5	157.5	217.5

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)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 [10^(G/20)]	10^(1.77/20)	10^(0.41/20)	10^(0.94/20)	10^(4.08/20)	10^(4.63/20)
Ant. 2 [10^(G/20)]	10^(2.23/20)	10^(2.17/20)	10^(3.57/20)	10^(3.67/20)	10^(1.47/20)
Ant. 1 [10^(G/20)] value	1.226	1.048	1.114	1.6	1.704
Ant. 2 [10^(G/20)] value	1.293	1.284	1.508	1.526	1.184
Sum All Antenna [Amax]	2.519	2.332	2.623	3.125	2.889
DG [10*log(Amax^2/Nant)]	5.01	4.34	5.36	6.89	6.2

Note:

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

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





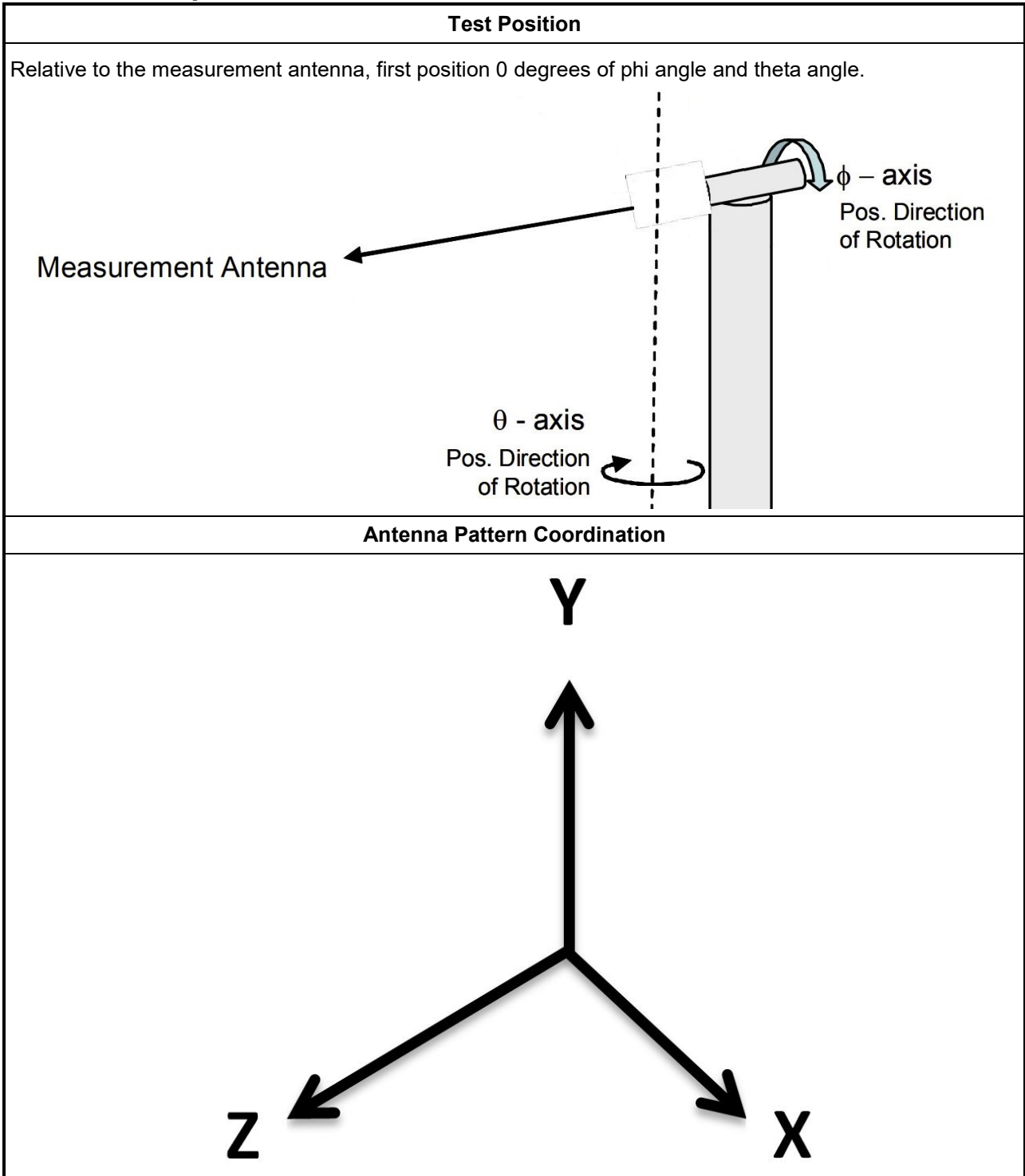
### 8. Summary of Test Result

Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.35	3.32	3.7	4.67	4.73
Ant. 2 Max Gain (dBi)	2.23	3.5	3.57	5.19	4.82
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/15/15	Theta/15/135	Theta/15/127.5	Theta/82.5/157.5	Theta/67.5/210
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/0/180	Phi/15/322.5	Theta/60/217.5	Theta/60/157.5	Theta/60/165
Max Gain (dBi)	2.35	3.5	3.7	5.19	4.82
DG [1SS] (dBi)	5.01	4.34	5.36	6.89	6.2
DG [2SS] (dBi)	2.35	3.5	3.7	5.19	4.82

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.
3. Directional Gain (2SS) = Directional Gain (1SS) – 3dB. If directional gain is less than max gain, use max gain as directional gain. Refer to KDB662911D01 (F) (2) (e) (ii).

### 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-1543	1GHz~18GHz	May 11, 2023	May 10, 2024
Dual Polarization Horn Antenna	Sporton	S0209DP	S0209DP-001	2GHz~9GHz	N.C.R.	N.C.R.
ENA Series Network Analyzer	AGILENT	E5071C	MY46419477	100kHz~8.5GHz	Jul. 28, 2023	Jul. 27, 2024
VNA Calibration Kit	TS RF	TS85033E-F	-	DC~9GHz	N.C.R.	N.C.R.
Multi-axis positioner	Sporton	MAPS01	MAPS01-001	Theta / Phi axis	N.C.R.	N.C.R.
Test Software	SPORTON	SENSE-RDG	V1.0.8	-	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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Appendix C – Test Photos.....	Page 26



<b>Freq(Hz)</b>	<b>2.45G</b>	<b>5.2G</b>	<b>5.3G</b>	<b>5.6G</b>	<b>5.785G</b>
Ant. 1 Max Gain (dBi)	2.35	3.32	3.7	4.67	4.73
Ant. 2 Max Gain (dBi)	2.23	3.5	3.57	5.19	4.82
Ant. 1 Polarization/ $\theta$ (°)/ $\Phi$ (°)	Phi/15/15	Theta/15/135	Theta/15/127.5	Theta/82.5/157.5	Theta/67.5/210
Ant. 2 Polarization/ $\theta$ (°)/ $\Phi$ (°)	Phi/0/180	Phi/15/322.5	Theta/60/217.5	Theta/60/157.5	Theta/60/165
Max Gain (dBi)	2.35	3.5	3.7	5.19	4.82
DG [1SS] (dBi)	5.01	4.34	5.36	6.89	6.2
DG [2SS] (dBi)	2.35	3.5	3.7	5.19	4.82



# Radiated Composite Gain Data

# Appendix A

## DG 1SS Result

Freq(Hz)	2.45GPol.	Phi1	Phi2	Phi3	Phi4	Phi5	Phi6	Phi7	Phi8	Phi9	Phi10	Phi11	Phi12	Phi13	Phi14	Phi15	Phi16	Phi17	Phi18	Phi19	Phi20	Phi21	Phi22	Phi23	Phi24	Phi25	Phi26	Phi27	Phi28	Phi29	Phi30	Phi31	Phi32	Phi33	Phi34	Phi35	
DG(Phi)	Phi(7.5)	Phi(15)	Phi(30)	Phi(45)	Phi(60)	Phi(75)	Phi(90)	Phi(105)	Phi(120)	Phi(135)	Phi(150)	Phi(165)	Phi(180)	Phi(195)	Phi(210)	Phi(225)	Phi(240)	Phi(255)	Phi(270)	Phi(285)	Phi(300)	Phi(315)	Phi(330)	Phi(345)	Phi(360)	Phi(375)	Phi(390)	Phi(405)	Phi(420)	Phi(435)	Phi(450)	Phi(465)	Phi(480)	Phi(495)	Phi(510)		
0(0)	3.2343	3.38317	2.79235	1.72081	-0.241-1.7	-3.46-5.96	-9.05-12.05	-11.42-7.28	-3.97-1.66	0.14153	2.65347	4.04436	<b>5.01434</b>	4.33402	3.47283	1.89063	-0.95-0.32	-5.61-8.42	-10.31-9.23	-6.24-7.38	-2.04-1.72	0.34116	1.78222	2.613													
0(7.5)	4.27438	4.32047	3.58282	2.091	-0.43-2.19	-4.64-7.62	-10.68-12.07	-10.68-7.12	-4.12-2.21	-0.44088	1.87258	3.0533	<b>3.81338</b>	3.33312	2.85246	1.81093	-0.31-1.83	-3.89-6.58	-9.29-9.25	-6.81-3.98	-1.85-0.25	1.03119	2.7325	3.62933													
0(15)	4.36445	4.35405	3.51277	1.71037	-1.18-3.22	-5.68-8.09	-9.42-9.85	-9.71-8.28	-6.21-4.31	-2.51-1.02	0.3213	1.96232	2.43232	2.11188	1.6614	0.9904	-0.31-1.17	-2.41-4.21	-6.91-9.73	-9.71-6.34	-3.31-1.21	0.38162	2.6325	3.68939													
0(22.5)	3.29344	3.37037	2.79222	1.24013	-1.91-4.14	-6.29-6.89	-6.49-6.01	-6.03-6.65	-3.71-2.02	-0.53065	1.42178	1.76149	1.01043	-0.14-0.5	-0.74-0.87	-1.03131	-1.91-2.99	-4.761-4.99	-9.37-8.68	-5.23-2.6	-0.74061	1.63233	2.83318														
0(30)	1.43168	1.7164	1.59116	0.35511	-3.11-5.33	-6.52-6.12	-5.12-4.39	-4.25-4.85	-5.43-5.31	-3.55-2.05	-0.83013	0.8513	1.47118	0.57052	-1.73-2.7	-0.70-0.01	-2.69-2.35	-2.27-2.51	-3.29-4.61	-6.25-6.85	-5.96-4.09	-2.45-1.22	-0.19062	1.24176													
0(37.5)	-1.03-0.78	-0.69-0.51	-0.4-0.64	-1.39-3.1	-5.44-7.84	-8.27-6.95	-5.47-4.37	-3.98-4.16	-4.13-2.83	-1.51-0.69	-0.38-0.41	-0.39-0.36	-0.45-0.8	-1.66-3.01	-4.58-5.74	-6.32-6.11	-5.18-4.23	-3.52-3.3	-3.56-4.14	-4.76-5.05	-5.02-4.53	-3.75-3.02	-2.33-1.63	-0.95-0.29													
0(45)	-3.99-3.91	-3.84-3.53	-3.17-3.26	-4.26-6.68	-10.09-10.39	-9.52-7.44	-5.96-4.97	-4.36-4.01	-3.28-2.01	-0.81-0.12	-0.06-0.66	-1.52-2.08	-2.27-2.49	-3.09-4.48	-6.76-9.28	-10.27-10.47	-9.64-7.33	-5.83-5.21	-5.38-5.45	-5.83-5.62	-5.43-5.08	-4.58-4.29	-4.16-3.91	-3.49-2.86													
0(52.5)	-6.33-6.99	-7.64-7.52	-7.02-6.96	-8.55-12.4	-15.11-14.5	-10.79-8.34	-6.79-8.55	-5.25-4.53	-3.45-2.29	-0.99-0.41	-0.91-2.51	-4.23-5.17	-5.29-5.52	-5.85-6.87	-8.87-11.58	-12.95-12.29	-11.38-9.62	-7.61-6.63	-5.93-6.33	-6.54-6.12	-5.56-5.02	-4.69-4.87	-5.65-6.07	-6.53-6.09													
0(60)	-8.94-11.82	-10.66-15.7	-14.11-15.11	-15.73-15.4	-14.23-13.07	-12.07-11.41	-8.93-7.39	-6.81-5.57	-4.93-4.44	-3.3-2.66	-3.22-5.25	-7.84-7.87	-6.2-6.06	-7.42-9.09	-10.03-12.1	-13.43-13.13	-12.34-12.68	-10.05-7.85	-7.14-7.91	-8.58-7.82	-6.95-8.1	-4.97-8.8	-5.72-7.38	-8.81-9.69													
0(67.5)	-11.79-14.77	-15.79-13.48	-12.88-11.92	-13.12-13.24	-10.98-10.84	-12.21-10.05	-6.97-6.16	-5.77-7.56	-5.75-5.53	-4.15-3.23	-3.78-6.43	-8.91-5.35	-5.17-3.32	-9.02-7.86	-7.53-9.56	-12.55-12.75	-16.06-15.31	-11.81-9.29	-9.33-11.07	-10.78-9.42	-9.31-8.05	-6.45-6.03	-6.87-7.89	-8.27-8.8													
0(75)	-8.91-13.46	-14.54-10.86	-10.25-11.02	-14.77-13.81	-10.48-10.41	-11.08-8.56	-5.33-4.4	-5.39-6.21	-6.47-6.45	-5.68-3.71	-3.3-4.85	-7.75-6.72	-6.36-8.44	-12.19-8.62	-5.55-5.61	-7.53-9.51	-10.97-12.94	-11.61-9.24	-10.34-11.07	-7.91-6.5	-7.45-8.63	-6.67-5.92	-6.41-7.8	-6.51-6.82													
0(82.5)	-7.17-10.66	-12.92-10.57	-10.15-12.63	-15.34-12.17	-8.77-9.22	-13.57-12.03	-8.03-7.83	-8.37-8.23	-6.99-7.67	-7.47-5.4	-5.37-8.18	-7.2-6.18	-8.65-12.62	-11.06-7.69	-5.36-5.7	-6.87-7.09	-7.42-10.59	-11.04-9.48	-10.88-11.97	-7.41-5.89	-7.58-10.56	-8.92-7.44	-7.78-7.8	-7.23-7.94													
0(90)	-7.21-9.91	-11.41-9.07	-8.48-10.7	-13.95-11.87	-9.06-10.11	-14.15-9.96	-6.4-5.75	-7.5-9.19	-8.35-8.59	-7.96-5.58	-4.57-6.03	-9.39-7.17	-6.1-7.02	-11.99-10.17	-6.85-6.56	-6.11-5.66	-5.56-6.33	-9.45-7.5	-9.29-12.95	-7.39-5.14	-6.47-10.41	-11.04-10.08	-10.35-8.13	-6.43-7.17													
0(97.5)	-7.66-10.24	-9.99-7.92	-7.8-7.6	-10.34-8.29	-6.19-6.83	-9.63-8.19	-5.92-6.07	-8.65-10.22	-9.44-9.94	-8.2-5.41	-5.31-8.86	-9.09-7.28	-7.78-11.08	-11.78-8.18	-6.42-6.34	-6.99-6.52	-6.16-6.38	-8.78-7.36	-9.43-15.52	-9.56-6.78	-8.54-12.25	-13.06-13.61	-15.16-10.7	-7.77-7.85													
0(105)	-8.27-9.52	-8.43-5.36	-4.86-6.4	-8.75-7.99	-6.16-6.84	-10.2-8.8	-6.12-5.92	-8.31-10.32	-9.66-9.32	-7.91-6.1	-5.21-7.07	-10.01-7.82	-7.32-6.68	-9.74-10.83	-8.31-6.77	-8.19-9.15	-9.08-10.63	-10.98-8.49	-9.97-15.62	-10.42-7.03	-8.26-12.26	-15.29-15.14	-15.18-11.41	-8.29-8.48													
0(112.5)	-9.17-11.73	-8.64-5.22	-4.85-7	-9.74-11.34	-10.39-10.45	-10.62-7.52	-5.34-5.56	-8.46-12.57	-11.89-11.03	-9.17-8.22	-7.89-9.33	-9.09-8.6	-9.4-9.47	-10.98-9.67	-5.74-8.3	-5.99-7.18	-7.39-8.11	-7.24-9.51	-7.14-11.06	-12.69-10.61	-10.34-10.23	-14.73-15.24	-12.91-7.38	-5.71-4.5													
0(120)	-7.10-8.88	-13.9-6.16	-3.93-3.56	-3.46-3.48	-4.13-5.45	-6.92-6.47	-5.55-6.55	-10.75-14.14	-12.8-10.51	-10.16-9.78	-8.25-8.16	-10.07-7.47	-5.05-5.06	-7.02-9.53	-7.48-5.87	-6.41-7.71	-8.04-8.88	-10.66-9.56	-10.19-13.19	-14.49-13	-12.38-10.29	-11.24-15.12	-14.7-7.36	-4.5-5.24													
0(127.5)	-5.46-6.93	-8.67-6.77	-5.99-6.0	-4.58-4.42	-4.98-6.9	-5.99-9.42	-4.79-4.41	-7.91-5.53	-10.41-6.54	-9.43-9.06	-7.51-7.18	-8.44-7.62	-4.23-3.41	-11.11-9.82	-6.27-5.4	-6.84-8.79	-7.91-11.8	-10.87-10.38	-11.85-13.94	-13.93-13.13	-13.47-11.22	-10.41-12.1	-13.77-10.23	-6.51-5.59													
0(135)	-7.06-8.14	-7.63-5.38	-4.15-4.55	-5.9-7.35	-8.64-10.31	-10.48-8.89	-7.52-6.97	-7.32-8.22	-9.41-10.46	-11.5-10.73	-9.13-7.91	-8.21-8.16	-7.08-7.58	-5.74-6.83	-4.89-8.27	-2.74-4.36	-6.91-7.73	-6.88-6.67	-7.63-9.42	-11.79-13.11	-13.82-11.66	-11.11-8.7	-6.91-6.19	-5.49-5.76													
0(142.5)	-7.14-6.27	-13.9-9.48	-7.45-8.69	-6.45-6.55	-6.75-7.22	-7.69-7.28	-6.62-6.79	-7.78-9.65	-11.64-13.51	-13.75-11.36	-8.47-7.76	-6.13-5.3	-4.11-3.29	-3.24-3.34	-2.77-2.25	-2.79-4.72	-8.06-11.44	-11.08-9.92	-9.58-10.4	-12.51-13.25	-13.43-12.25	-10.13-7.88	-4.4-4.98														
0(150)	-8.69-8.26	-8.92-7.29	-5.51-4.75	-4.95-7.77	-6.79-7.62	-9.44-10.73	-9.47-10.28	-1.17-11.21	-10.51-10.31	-10.44-9.81	-8.77-7.5	-6.84-6.29	-5.91-5.92	-5.79-5.27	-4.23-3.41	-3.48-4.56	-6.04-6.6	-6.9-7.6	-6.81-9.83	-12.57-15.94	-14.24-11.9	-15.29-15.14	-15.18-11.41	-8.75-8.61													
0(157.5)	-8.93-7.03	-5.27-3.99	-3.1-2.91	-3.27-4.12	-5.4-7.39	-10.24-11.86	-12.74-10.53	-8.51-7.24	-6.65-7.09	-8.26-9.4	-8.71-7.89	-7.86-8.58	-9.63-10.27	-9.14-7.12	-5.35-4.17	-3.71-3.73	-4.07-4.39	-4.84-5.48	-6.61-8.43	-11.71-14.47	-14.55-14.63	-12.49-11.88	-11.49-12.81	-13.82-12.61													
0(165)	-11.51-8.64	-6.68-6.46	-4.66-5.4	-4.91-6.47	-6.97-7.6	-8.69-8.51	-7.71-6.96	-6.38-5.98	-6.1-6.53	-7.85-9.45	-10.25-10.18	-10.46-11.73	-12.85-13.69	-11.54-9.27	-8.09-8.55	-5.52-5.1	-5.11-5.25	-5.6-6.11	-6.9-9.23	-10.2-13.02	-14.91-19.4	-13.22-12.82	-12.99-14.31	-15.82-15.37													
0(172.5)	-11.29-9.88	-6.67-5.01	-8.37-7.71	-7.64-7.58	-7.87-9.13	-8.46-8.69	-8.67-8.53	-8.41-7.86	-8.04-8.61	-10.44-11.44	-12.45-13.92	-14.44-14.31	-12.89-10.85	-9.89-9.7	-8.35-8.33	-2.81-7.94	-7.84-8.14	-8.51-9.98	-9.7-10.54	-11.81-13.74	-15.28-15.6	-15.29-15.83	-15.1-14.8	-15.29-13.49													
0(180)	-8.13-8.98	-8.03-9.14	-8.88-8.58	-8.47-9.29	-9.86-10.69	-11.68-12.84	-13.75-14.07	-13.16-13.43	-14.25-14.36	-14.88-14.98	-15.85-15.89	-15.34-15.19	-15.57-14.18	-13.38-12.01	-11.21-10.96	-11.09-11.5	-12.15-12.96	-13.91-14.94	-15.95-15.46	-14.86-15.23	-14.92-13.41	-12.76-12.2	-11.48-10.91	-10.04-9.37													



# Radiated Composite Gain Data

# Appendix A

Theta	27.12/76	2.341/47	0.620/38	0.340/09	-0.83/282	-4.27/841	-3.49/21	-1.51/14	-0.140/63	0.96/123	1.57/144	1.75/186	1.61/11	0.780/64	0.730/31	-0.27/117	-2.63/375	-2.39/042	0.730/94	0.760/77	1.04/127	1.55/175	2.22/296	3.31/11
Theta(30°)	1.71/196	1.65/088	-0.42/-0.77	-0.21/-0.17	-1.12/-2.8	-3.61/-2.29	-0.75/0.01	-0.38/-0.56	-0.14/0.64	1.21/135	1.20/77	0.72/112	1.24/211	0.54/-0.13	-0.55/-0.88	-1.42/-1.71	-2.85/-2.95	-0.67/0.61	0.71/0.03	-1.08/-1.56	-1.22/-0.87	-0.65/-0.3	0.48/0.99	1.19/1.6
Theta(45°)	-3.58/-3.75	-2.84/-0.89	-0.85/-1.97	-1.63/-1.75	-4.66/-6.18	-4.58/-8.23	-4.06/-0.43	-4.41/-5.31	-6.32/-5.86	-3.03/0.96	0.52/0.28	-0.77/-0.85	-1.99/-3.98	-4.05/-3.29	-2.91/-6.8	-0.13/0.51	-0.91/-1.91	-0.73/0.18	-1.63/-6.6	-9.72/-0.8	-3.82/-1.84	-0.77/-0.14	0.60/1.3	-1.19/-2.72
Theta(60°)	-4.54/-4.07	-2.64/0.69	1.03/-0.99	-1.27/-3.04	-6.62/-4.77	-3.95/-6.23	-7.29/-5.44	-4.96/-5.37	-4.64/-0.5	-3.24/-3.42	-2.38/-2.03	-1.61/-3.4	-3.76/-3.11	-2.22/-3.94	-4.41/-2.34	-0.76/0.31	-0.51/-1.9	-1.94/-2.64	-4.58/-5.96	-7.17/-7.24	-4.33/-2.33	-1.81/-2.04	-2.33/-2.69	-3.26/-3.66
Theta(75°)	-5.44/-2.2	-2.92/-0.38	-1.13/-3.4	-2.27/-1.66	-2.58/-4.54	-5.06/-6.56	-5.13/-4.65	-3.09/-2.2	-4.65/-4.36	-2.17/-0.64	-0.54/-2.55	-3.32/-2.76	-3.06/-1.7	-2.68/-2.91	-4.76/-6.4	-2.82/-2.65	-2.73/-2.46	-4.28/-5.4	-8.45/-10.87	-10.5/-5.45	-4.21/-2.42	-4.07/-4.43	-4.06/-5.99	-6.4/-7.61
Theta(90°)	-7.76/-5.7	-3.11/-2.08	-3.86/-4.33	-3.06/-3.4	-4.41/-6.72	-6.08/-8.19	-8.82/-9.42	-4.27/-3.72	-7.15/-7.19	-4.62/-3.75	-3.89/-5.33	-2.57/-4.97	-4.43/-4.56	-5.06/-5.38	-7.2/-6.03	-3.83/-4.63	-4.35/-5.24	-5.99/-6.48	-9.89/-9.48	-8.84/-5.04	-5.78/-7.92	-5.77/-6.22	-4.61/-5.7	-7.57/-9.19
Theta(105°)	-8.17/5.2	-4.96/-3	-5.33/-4.89	-3.93/-4.64	-6.94/-9.24	-7.21/-9.79	-9.49/-10.02	-5.24/-4.89	-8.32/-8.41	-5.6/-3.85	-3.83/-6.33	-5.04/-4.85	-9.28/-5.81	-8.63/-6.35	-6.37/-7.03	-5.15/-4.56	-6.69/-7.32	-8.08/-8.28	-10.41/-7.58	-7.6/-7.27	-5.61/-9.62	-8.94/-10.42	-8.08/-7.74	-9.48/-9.69
Theta(120°)	-9.57/3.8	-8.85/-7.47	-8.18/-5.47	-5.24/-6.89	-9.05/-12.81	-9.8/-11.75	-9.04/-11.45	-7.52/-9.8	-15.99/-10.3	-8.65/-9.47	-8.49/-10.52	-7.09/-6.69	-8.58/-8.47	-11.71/-11.72	-12.63/-9.25	-5.7/-6.76	-13.73/-10.75	-8.35/-9.02	-8.72/-5.75	-9.89/-13.69	-9.39/-11.13	-12.05/-11.17	-12.73/-8.85	-7.97/-14
Theta(135°)	-10.41/8.17	-10.13/6.84	-8.32/-11	-7.82/-8.16	-9.61/-10.87	-11.66/-15.93	-11.12/5.4	-8.71/-13.8	-15.43/-10.2	-8.51/-10.42	-7.44/-11.35	-11.85/-8.99	-12.11/8.4	-14.39/-11.67	-11.13/-11.89	-9.33/-8.7	-12.35/-12.5	-8.63/-7.85	-7.82/-9.47	-8.76/-14.23	-13.94/-8.3	-12.01/-15.69	-12.77/-10.81	-8.15/-15.45
Theta(150°)	-14.36/-15.96	-10.01/-7.44	-10.11/7.98	-8.21/-9.59	-11.4/-12.17	-12.15/-13.23	-10.95/-11.41	-9.82/-14.04	-13.24/-10.68	-10.34/-12.08	-10.98/-12.77	-11.64/-11.07	-12.71/-10.38	-12.73/-12.03	-12.59/-11.05	-6.32/-7.67	-12.15/-15.04	-11.26/-7.58	-7.26/-9.54	-8.92/-9.47	-10.5/-12.91	-11.21/-12.82	-13.9/-12.96	-10.63/-9.69
Theta(165°)	-11.97/-11.64	-12.47/8.43	-11.92/8.83	-6.99/-10.41	-13.45/-13.32	-13.18/-11.52	-10.35/-15.15	-13.52/-14.07	-12.81/-13.15	-12.82/-15.36	-13.68/-12.93	-10.96/-12.24	-10.51/-12.44	-11.25/-13.9	-7.68/-7.75	-11.5/-15.45	-9.19/-9.21	-6.01/-10.06	-13.42/-10.92	-8.12/-13.46	-10.93/-13.04	-12.62/-9.78	-13.18/-11.97	
Theta(180°)	-11.49/-11.48	-12.21/-13.21	-10.11/11.41	-10.78/11.96	-10.21/-11.06	-13.43/-14.18	-10.55/-12.93	-13.52/-14.52	-12.46/-13.61	-15.67/15.09	-16.28/12.93	-11.31/11	-10.71/11.52	-14.42/-9.87	-14.17/14.09	-11.01/13.93	-14.68/-12.03	-10.49/-9.87	-9.18/-7.83	-10.77/13.53	-12.55/-15.8	-14.71/13.28	-11.12/12.17	-10.63/-15.14
Theta(210°)	-11.49/-13.48	-9.93/-10.41	-11.99/-11.19	-9.69/-13.37	-13.68/-12.44	-13.56/-10.49	-10.71/-15.85	-12.71/11.22	-9.15/-12.41	-13.4/-14.6	-12.39/-11.29	-10.93/-10.84	-14.73/-11.53	-14.3/-13.93	-10.75/-9.87	-12.29/-10.79	-14.8/-11.45	-11.11/8.51	-15.9/-10.51	-9.55/-10.08	-14.59/-14.42	-11.21/10.13	-11.57/-12.33	-11.52/-11.17
Theta(225°)	-10.71/-11.76	-16.07/-15.46	-14.27/-14.22	-14.27/-14.26	-11.94/-10.55	-11.96/-12.73	-10.39/-10.23	-12.77/-14.08	-13.52/-14.25	-15.22/-15.56	-14.55/-13.25	-10.08/-10.25	-8.68/-8.28	-11.64/-11.82	-13.43/-15.54	-14.54/-12.02	-14.35/-10.62	-12.23/-14.87	-13.26/-12.67	-11.54/-12.61	-12.79/-11.12	-10.25/-11.06	-15.22/-14.24	
Theta(240°)	-15.21/-12.28	-11.46/-12.22	-14.11/-12.18	-9.55/-10.62	-13.14/0.66	-14.56/-13.26	-12.15/15.19	-12.17/10.26	-9.10/9	-12.17/12.78	-10.91/12.15	-13.17/13.64	-15.93/9.76	-7.01/-9.82	-10.66/-7.99	-8.16/-12.59	-14.44/-14.51	-13.9/-14.84	-12.71/10.59	-10.4/-12.55	-14.26/-12.2	-13.36/-14.78	-14.91/-15.31	-15.55/-15.32
Theta(255°)	-15.67/-12.57	-11.89/-12.82	-13.81/-12.17	-11.88/-11.95	-14.1/-14.93	-14.66/-14.7	-14.6/-15	-15.13/-14.95	-13.65/-12.17	-12.10/7.6	-9.59/-9.83	-10.54/-10.94	-7.89/-6.87	-9.37/-11.4	-10.03/-10.63	-14.27/-13.79	-9.18/-7.31	-7.34/-8.37	-10.41/-11.38	-11.2/-13.24	-14.54/-14.55	-15.08/-14.65	-15.06/-15.17	-15.46/-14.3
Theta(270°)	-9.86/-8.77	-11.31/-13.49	-13.66/-13.02	-12.6/-12.86	-12.99/-13.19	-13.54/-12.47	-13.4/-14.33	-14.39/-13.93	-13.84/-14.35	-13.69/-13.26	-13.9/-12.96	-13.26/-12.23	-14.28/-15.33	-14.63/-10.9	-11.22/-11.47	-11.06/-9.8	-10.68/-12.51	-13.78/-12.56	-11.34/-12.66	-15.67/-15.83	-12.47/-12.98	-14.74/-14.62	-12.75/-11.26	
Theta(285°)	-12.17/-11.98	-12.57/-14.41	-14.74/-14	-12.84/-12.81	-12.51/-12.89	-13.22/-13.75	-14.07/-12.87	-12.6/-11.66	-10.9/-10.12	-9.93/-10.23	-11.25/-11.87	-12.24/-13.65	-14.51/-14.13	-13.17/13.22	-13.69/-14.41	-14.53/-14.9	-13.28/-13.02	-12.67/12.8	-12.97/13.64	-14.18/13.98	-13.27/15.36	-14.79/15.7	-15.04/14.12	
Theta(300°)	-12.98/-11.76	-10.45/-10.57	-11.21/-12.77	-13.78/-14.3	-13.1/-12.94	-12.47/-14.02	-14.26/-14.97	-15.64/-15.86	-15.71/15.88	-15.99/15.21	-15.92/14.71	-15.81/15.02	-13.29/13.03	-13.69/13.65	-13.29/12.7	-12.47/12.38	-11.18/10.85	-11.69/12.91	-13.71/14.06	-13.63/12.92	-12.72/12.64	-12.8/-13.1	-13.26/13.28	
Theta(315°)	5.3/Pol.	Theta	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Theta(330°)	Phi	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Theta(345°)	Phi	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Theta(360°)	Phi	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+



# Radiated Composite Gain Data

# Appendix A

Theta	-2.57/-2.61	-1.09/-2.03	-2.39/-3.6	-5.06/-3.82	-3.61/-5.45	-7.43/-6.04	-4.68/-7.37	-5.41/-4.99	-4.86/-3.16	-0.83/0.3	-1.57/-1.34	-1.96/-1.41	-1.95/-1.55	-1.97/-3.14	-3.61/-4.18	-2.70/-1.1	-1.36/-3.92	-4.94/-8.36	-9.93/-8.02	-8.05/-5.1	-5.15/-4.75	-3.27/-1.57	-2.93/-6.4	-7.31/-3.18
Phi	Phi(0°)	Phi(15°)	Phi(30°)	Phi(45°)	Phi(60°)	Phi(75°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (82.5°)	-3.38/-3.84	-2.84/-2.79	-2.54/-5	-6.99/-4.82	-7.12/-6.23	-8.66/-6.74	-4.61/-8.41	-10.93/-10.5	-5.65/-3.93	-4.22/-3.16	-4.98/-3.97	-4.36/-2.69	-3.22/-3.63	-5.24/-4.98	-4.99/-3.82	-3.89/-3.3	-3.05/-5.47	-6.28/-9	-10.58/-8.1	-9.34/-4.83	-6.17/-4.75	-4.52/-3.23	-3.05/-8.1	-8.04/-4.57
Theta (90°)	-6.04/-5.73	-3.25/-5.08	-4.2/-5.28	-7.6/-5.83	-8.05/-7.09	-10.12/-9.53	-8.06/-9.25	-16.26/-13.01	-8.64/-5.62	-7.29/-5.08	-6.78/-5.97	-5.52/-5.59	-5.3/-5.84	-6.21/-5.56	-6.17/-5.19	-3.61/-4.07	-4.14/-6.9	-6.94/-8.03	-9.13/-7.88	-8.46/-6.49	-6.82/-8.35	-6.41/-5.34	-5.32/-8.39	-7.82/-4.95
Theta (97.5°)	-6.11/-8.18	-6.3/-5.38	-6.71/-6.17	-9.46/-8.26	-11.73/-8.52	-11.67/-7.19	-6.89/-9.87	-15.47/-12.32	-8.53/-7.4	-12.07/-8.53	-9.87/-10.97	-8.66/-8.2	-7.42/-7.41	-7.6/-11.39	-12.44/-8.31	-4.7/-5.95	-10.11/-12.3	-9.68/-8.67	-7.75/-7.04	-10.27/-9.76	-7.01/-10.41	-9.55/-8.62	-9.68/-8.88	-10.06/-6.43
Theta (105°)	-8.82/-9.43	-9.25/-8.48	-7.01/-7.46	-8.02/-6.26	-11.53/-11.45	-13.72/-7.85	-10.3/-13.04	-13.68/-15.04	-10.6/-9.88	-12.98/-10.38	-8.77/-12.19	-10.01/-9.63	-10.23/-8.39	-8.73/-13.56	-10.16/-9.37	-7.23/-7.29	-10.91/-13.11	-9.36/-9.27	-6.91/-7.9	-10.55/-11.47	-11.79/-9.25	-12.59/-8.63	-10.55/-6.52	-8.02/-7.3
Theta (112.5°)	-9.99/-13.14	-10.15/-8.36	-8.95/-9.62	-8.95/-7.52	-13.85/-15.83	-13.74/-11.73	-11.48/-10.93	-15.41/-15.23	-9.2/-10.9	-13.56/-14.86	-12.14/-15.6	-10.86/-10.84	-11.06/-10.12	-10.84/-11.82	-9.13/-9.74	-8.24/-7.8	-9.93/-12.46	-9.48/-11.91	-6.6/-7.66	-11.5/-10.26	-11.38/-10.85	-9.1/-13.2	-15.75/-10.23	-7.86/-10.45
Theta (120°)	-8.12/-16.12	-11.11/-10.87	-10.61/-12.28	-9.76/-7.2	-11.75/-10.58	-13.01/-13.39	-14.5/-11.74	-11.53/-15.04	-13.03/-12.01	-13.31/-13	-15.27/-13.87	-13.26/-11.23	-9.02/-7.48	-9.49/-15.77	-11.71/-10.82	-8.45/-8.82	-13.06/-14.46	-8.14/-7.29	-8.67/-9.18	-10.91/-12.67	-8.16/-15.41	-13.06/-15.4	-13.25/-7.69	-14.91/-11.35
Theta (127.5°)	-13.37/-9.93	-11.85/-14.64	-9.16/-10.54	-7.18/-9.5	-15.15/-12.21	-11.42/-12.93	-11.93/-15.12	-12.36/-12.36	-12.24/-10.53	-11.49/-11.08	-12.55/-11.85	-8.88/-12.44	-15.15/-9.54	-10.78/-8.71	-9.9/-12.02	-8.82/-12.77	-13.84/-14.61	-10.85/-8.85	-9.96/-14.61	-11.44/-14.15	-13.7/-15.87	-13.54/-15.3	-15.46/-8.39	-16.05/-12.1
Theta (135°)	-13.25/-10.94	-11.89/-14.62	-8.97/-11.01	-10.33/-11.58	-14.13/-12.99	-15.52/-9.56	-9.02/-12.67	-11.46/-10.37	-13.62/-11.59	-13.05/-11.75	-11.29/-12.48	-13.23/-13.25	-13.59/-9.4	-12.27/-14.78	-8.66/-5.82	-8.98/-13.46	-15.08/-13.36	-14.42/-12.29	-10.25/-13.32	-9.88/-8.53	-14.8/-13.42	-13.17/-12.18	-12.03/-13.24	-14.19/-13.11
Theta (142.5°)	-12.02/-14.89	-11.7/-10.49	-11.92/-14.06	-11.94/-11.7	-9.22/-8.93	-11.92/-11.21	-13.31/-14.19	-8.84/-9.29	-12.35/-12.26	-10.63/-9.48	-10/-8.44	-10.89/-15.59	-12.55/-8.31	-9.91/-12.19	-15.08/-13.11	-15.03/-13.17	-15.41/-11.14	-12.13/-13.77	-13.62/-9.01	-14.55/-15.14	-12.44/-12.05	-15.28/-14.63	-12.44/-15.01	-12.86/-10.96
Theta (150°)	-15/-13.27	-11.38/-12.19	-15.31/-13.09	-11.12/-14.63	-16/-14.7	-14.47/-13.13	-11.99/-14.84	-13.72/-11.24	-11.47/-11.68	-12.72/-11.16	-9.66/-9.47	-9.49/-11.11	-9.79/-10.54	-14.38/-13.22	-11.28/-12.48	-9.21/-9.09	-11.17/-11.48	-10.01/-11.31	-15.28/-9.58	-8.96/-12.65	-14.94/-11.65	-11.26/-11.75	-14.27/-14.88	-16.11/-14.94
Theta (157.5°)	-12.43/-11.9	-12.44/-14.24	-12.47/-9.27	-9.45/-11.37	-13.17/-13.83	-13.82/-13.55	-13.88/-15.3	-15.62/-14.67	-12.93/-10.94	-11.17/-12.49	-11.93/-12.51	-15.25/-10.78	-11.19/-11.98	-8.25/-6.09	-7.3/-8.83	-10.62/-12.34	-12.08/-9.38	-8.59/-10.81	-15.99/-12.08	-9.47/-12.01	-15.52/-13.29	-10.51/-9.66	-10.46/-13.48	-15.11/-13.53
Theta (165°)	-9.12/-9.98	-12.02/-13.49	-13.75/-12.91	-11.15/-10.05	-10.22/-11.51	-11.5/-12.01	-13.84/-14.68	-15.58/-13.89	-10.68/-9.81	-9.4/-9.28	-8.94/-7.88	-6.45/-6.36	-7.88/-9.52	-8.87/-9.07	-9.33/-10.54	-12.11/-11.64	-11.33/-11.45	-12.66/-14.03	-16.01/-14.31	-13.6/-14.7	-15.66/-12.83	-11.24/-12.16	-14.03/-12.45	-10.93/-9.16
Theta (172.5°)	-11.37/-11.78	-13.23/-14.25	-14.86/-13.97	-11.6/-10.02	-9.56/-9.77	-10.35/-11.7	-12.75/-12.36	-12.13/-10.9	-10.18/-10.42	-11.66/-11.69	-10.66/-8.91	-7.91/-8.03	-10.47/-11.07	-11.25/-11.47	-11.4/-12.37	-13.81/-13.44	-13.23/-13.93	-15.07/-14.22	-15/-15.4	-16.25/-15.1	-15.61/-14.55	-15.42/-15.33	-15.56/-14.38	-12.26/-11.7
Theta (180°)	-12.25/-13.39	-13.29/-12.42	-10.87/-10.44	-10.78/-11.84	-13.43/-15.07	-15.27/-14.5	-15.37/-15.5	-15.86/-15.08	-13.12/-12.14	-12.01/-12.69	-13.67/-13.44	-14.3/-13.97	-12.96/-12.17	-13.31/-14.08	-13.98/-13.94	-13.74/-13.49	-13.58/-12.97	-12.79/-11.75	-10.61/-10.34	-10.99/-10.28	-10.82/-11.06	-11.1/-10.24	-10.13/-12.44	
Freq(Hz)	5.785GPol.	Theta	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi
DG(dB)	Phi(0°)	Phi(15°)	Phi(30°)	Phi(45°)	Phi(60°)	Phi(75°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (7.5°)	-3.93/-3.63	-3.36/-3.23	-2.74/-1.78	-0.52/0.45	1.27/1.96	2.57/3.15	3.61/3.69	3.73/3.84	3.70/3.1	2.68/1.67	0.38/0.54	-1.45/-1.85	-2.2/-2.6	-2.54/-2.63	-2.55/-1.24	0.07/1.11	1.71/1.87	1.91/2.2	2.34/2.31	2.09/1.69	1.32/1.01	0.14/0.97	-1.75/-2.35	-3.38/-4.05
Theta (15°)	-4.78/-4.52	-4.4/-4.26	-3.81/-2.63	-1.81/-1.35	-0.96/-0.63	0.07/1.2	2.05/2.6	3.05/3.16	3.26/3.25	3.05/2.17	1.08/0.2	-0.94/-1.12	-1.18/-1.65	-2.47/-2.75	-3.27/-1.68	0.16/0.19	1.31/1.15	1.41/1.28	1.02/0.73	0.43/0.06	-0.73/-1.87	-3.23/-3.68	-4.09/-4.24	
Theta (22.5°)	-9.14/-9.35	-7.63/-5.52	-3.64/-2.08	-1.78/-2.47	-3.92/-4.82	-3.23/-1.15	-0.12/0.6	0.96/1.29	1.68/1.95	1.81/1.23	-0.15/-2.28	-3.54/-3.62	-2.45/-1.37	-1.21/-1.24	-0.91/0.02	0.44/0.69	0.57/0.11	-0.68/-0.7	-0.98/-1.51	-2.05/-2.49	-2.71/-2.74	-2.52/-3.04	-4.29/-6.04	
Theta (30°)	-6.97/-9.61	-10.95/-9.57	-6.25/-3.3	-2.27/3.1	-4.61/-3.55	-1.45/-0.48	0.25/0.43	-0.16/-1.13	-2.25/-2.4	-2.21/-1.71	-1.57/-3.56	-6.21/-6.13	-2.84/0.06	1.45/2.05	2.06/1.6	1.46/1.73	0.89/-0.64	-1.51/-1.68	-2.18/-3.6	-5.44/-6.35	-7.6/-6.61	-5.2/-3.03	-1.94/-2.1	-3.17/-5.63
Theta (37.5°)	-3.13/-4.06	-4.12/-4.9	-5.89/-5.29	-4.51/-3.99	-3/-1.08	0.17/-0.2	0.02/0.99	1.68/1.52	0.26/-1.26	-1.85/-0.54	0.19/-1.07	-2.38/-1.75	-0.47/0.49	1.88/0.55	4.67/4.28	2.79/1.19	-0.12/-1.65	-3.24/-3.08	-2.09/-2.5	-3.62/-4.7	-4.5/-5.03	-6.85/-6.08	-3.71/-2.27	-1.28/-1.77
Theta (45°)	-1.66/-1.9	-3.62/-5.08	-3.81/-2.92	-2.53/-3.26	-2.18/-0.31	0.33/-0.4	0.64/2.5	3.15/2.7	1.93/1.56	0.86/1.33	2.61/3.6	2.72/4.5	2.35/2.14	1.38/2.93	4.46/4.38	3.76/3.61	1.55/-0.98	-0.95/0.3	-0.27/-2.55	-3.57/-4.51	-5.12/-3.48	-3.66/-3.04	-1.58/-1.44	-1.87/-1.22
Theta (52.5°)	-4.17/-1.39	-2.22/-6.92	-4.09/-0.68	0.3/-1.27	-1.02/-1.34	-0.94/0.7	2.75/4.37	4.18/2.92	2.02/2.41	2.18/2.24	3.08/4.55	4.98/5.41	4.63/3.44	3.53/3.54	4.36/4.21	4.34/4.55	2.95/-0.27	0.57/1.27	-0.56/-3.78	-3.05/-3.87	-3.17/-2.51	-3.76/-2.57	-1.01/-0.19	-1.54/-2.76
Theta (60°)	-0.71/1	0.08/-3.36	-6.22/-0.66	0.68/1.51	1.89/0.5	1.74/3.79	4.23/4.93	4.29/2.83	1.91/1.88	2.27/2.98	3.24/4.63	5.05/6.07	5.42/4.13	4.28/4.13	4.75/7.2	5.13/5.12	3.19/1.22	3.05/2.81	0.56/-1.18	-0.57/-1.57	-3.07/-2.23	-2.39/-0.78	0.21/1.15	0.42/-2.47
Theta (67.5°)	2.03/2.6	0.84/-0.71	-4.73/0.45	1.98/2.86	2.49/0.41	2.29/4.39	4.78/5.78	5.63/4.29	3.37/3.24	2.95/4.1	4.54/5.42	5.25/5.87	4.45/3.32	3.66/4.33	5.96/5.15	4.84/3.6	2.04/2.78	5.09/3.94	2.56/1.26	0.98/-0.96	-2.66/-2.07	-1.34/-0.54	-1.43/-0.27	-0.12/-0.77
Theta (75°)	2.42/3.27	1.25/-0.33	-4.79/-0.64	1.33/2.8	2.55/0.68	1.59/3.5	4.14/5.25	5.01/4.19	3.68/3.62	3.31/3.85	3.68/5.18	5.21/6.19	4.72/3.59	3.27/2.17	4.46/6.2	5.16/4	1.79/2.92	5.41/3.72	3.49/3.22	2.86/0.83	-1.7/-1.98	-1.56/-0.79	-2.27/-2.84	-0.39/-0.43
Theta (82.5°)	1.63/2.05	0.76/-0.34	-5.76/-1.47	0.79/1.88	1.98/0.26	0.55/2.09	3.11/4.75	4.01/3.17	3.01/2.16	2.81/2.75	2.62/4.82	4.16/4.45	2.79/1.56	0.93/0.96	3.35/4.86	4.05/2.97	0.84/2.9	4.95/2.83	3.69/2.75	2.97/1.49	-0.62/-2.43	-0.98/-0.62	-2.25/-4.36	-1.16/0.06
Theta (90°)	0.73/0	-0.54/-0.73	-5.59/-2.48	-0.46/0.72	1.2/-0.49	-0.93/0.7	1.91/3.35	2.31/5.8	2.31/2.4	1.26/0.27	1.72/3.68	2.76/3.11	1.5/1.8	-0.42/-2.16	-0.13/3.6	2.66/1.53	0.37/1.49	3.38/1.26	1.91/2.6	2.52/0.01	-1.98/4.16	-1.49/-1.85	-2.79/-4.13	-2.31/-1.63
Theta (97.5°)	-1.4/-1.76	-2.14/-2.47	-7.1/-3.88	-1.62/-0.96	0.1/-1.68	-1.4/-0.88	-0.62/1.84	0.46/-0.23	1/-1.1	-0.56/-1.57	-0.89/1.87	0.54/1.89	-1.33/-0.33	-2.34/-2.24	-2.38/0.83	0.42/-0.97	-3.42/-1.51	0.76/-2.88	-1.47/-1.42	-0.03/-2.59	-3.21/-5.92	-3.25/-4.96	-4.49/-3.51	-3.31/-2.27
Theta (105°)	-1.67/-2.8	-4.5/-4.42	-8.54/-5.1	-2.58/-3.59	-2.43/-3.66	-4.11/-1.38	-2.1/0.19	-1.33/-1.12	-0.47/-1.5	-1.91/-2.3	-2.74/-0.54	-0.25/-1.12	-2.63/-0.45	-2.96/-4.8	-4.52/-1.41	-1.95/-4.56	-7.69/-3.56	-0.64/-4.73	-6.34/-6.9	-4.98/-5.32	-4.37/-7.11	-8.49/-4.26	-4.82/-6.1	-5.36/-4.23
Theta (112.5°)	-1.87/-4.45	-6.25/-4.88	-8.01/-5.3	-4.04/-6.28	-4.12/-4.89	-4.73/-1.93	-2.61/-1.76	-2.91/-3.97	-3.59/-3.2	-3.3/-3.36	-3.32/-2.21	-2.41/-2.31	-3.74/-1.9	-2.95/-7.18	-									











# Radiated Composite Gain Data

# Appendix A

Theta (°)	-12.44-11.25	-17.39-13.99	-17.19-17.76	-11.99-12.82	-13.92-19.1	-17.33-18.88	-17.46-18.31	-19.28-14.67	-9.99-10.73	-13.26-15.37	-13.77-19.26	-10.22-10.1	-10.62-18.49	-18.66-17.68	-18.17-19.11	-12.55-9.33	-15.22-17.25	-11.47-9.1	-8.95-12.04	-18.41-18.63	-10.43-17.8	-17.42-15.84	-17.87-7	-13.21-18.65
Gain	Φ(10°)Φ(7.5°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Gain	0.021-0.17	0.088-1.78	-2.79-3.83	-5.13-6.8	-8.26-10.14	-10.3-9.48	-7.56-5.73	-4.28-2.81	-1.3-0.4	0.23-0.72	1.13-1.37	1.45-1.28	0.81-1.1	-1.02-2.68	-4.7-4.1	-11.06-15.38	-15.69-11.93	-8.71-5.95	-3.71-2.29	-1.14-4.06	-0.06-0.47	0.92-1.26	1.45-1.31	1.60-1.54
Theta (°)	0	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120	127.5	135	142.5	150	157.5	165	172.5
Gain	0.021-0.17	0.088-1.78	-2.79-3.83	-5.13-6.8	-8.26-10.14	-10.3-9.48	-7.56-5.73	-4.28-2.81	-1.3-0.4	0.23-0.72	1.13-1.37	1.45-1.28	0.81-1.1	-1.02-2.68	-4.7-4.1	-11.06-15.38	-15.69-11.93	-8.71-5.95	-3.71-2.29	-1.14-4.06	-0.06-0.47	0.92-1.26	1.45-1.31	1.60-1.54
Theta (°)	0	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120	127.5	135	142.5	150	157.5	165	172.5
Gain	0.021-0.17	0.088-1.78	-2.79-3.83	-5.13-6.8	-8.26-10.14	-10.3-9.48	-7.56-5.73	-4.28-2.81	-1.3-0.4	0.23-0.72	1.13-1.37	1.45-1.28	0.81-1.1	-1.02-2.68	-4.7-4.1	-11.06-15.38	-15.69-11.93	-8.71-5.95	-3.71-2.29	-1.14-4.06	-0.06-0.47	0.92-1.26	1.45-1.31	1.60-1.54





Total Gain Data

Table with columns for Freq(Hz), TotalAnt, and various gain values for different antenna configurations. The table is organized into multiple sections, each starting with a 'Gain' row and a 'Freq(Hz)' row. Each section contains 20 rows of data for different frequencies and 20 columns of gain values.



# Antenna Pattern

# Appendix B

Frequency (MHz)	Total Ant. 2	Ant. 2	Ant. 3	Ant. 4	Ant. 5	Ant. 6	Ant. 7	Ant. 8	Ant. 9	Ant. 10	Ant. 11	Ant. 12	Ant. 13	Ant. 14	Ant. 15	Ant. 16	Ant. 17	Ant. 18	Ant. 19	Ant. 20	Ant. 21	Ant. 22	Ant. 23	Ant. 24	Ant. 25	Ant. 26	Ant. 27	Ant. 28	Ant. 29	Ant. 30	Ant. 31	Ant. 32	Ant. 33	Ant. 34	Ant. 35	Ant. 36	Ant. 37	Ant. 38	Ant. 39	Ant. 40	Ant. 41	Ant. 42	Ant. 43	Ant. 44	Ant. 45	Ant. 46	Ant. 47	Ant. 48	Ant. 49	Ant. 50	Ant. 51	Ant. 52	Ant. 53	Ant. 54	Ant. 55	Ant. 56	Ant. 57	Ant. 58	Ant. 59	Ant. 60	Ant. 61	Ant. 62	Ant. 63	Ant. 64	Ant. 65	Ant. 66	Ant. 67	Ant. 68	Ant. 69	Ant. 70	Ant. 71	Ant. 72	Ant. 73	Ant. 74	Ant. 75	Ant. 76	Ant. 77	Ant. 78	Ant. 79	Ant. 80	Ant. 81	Ant. 82	Ant. 83	Ant. 84	Ant. 85	Ant. 86	Ant. 87	Ant. 88	Ant. 89	Ant. 90	Ant. 91	Ant. 92	Ant. 93	Ant. 94	Ant. 95	Ant. 96	Ant. 97	Ant. 98	Ant. 99	Ant. 100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
5.250 Pol.	Total Ant. 2	Ant. 2	Ant. 3	Ant. 4	Ant. 5	Ant. 6	Ant. 7	Ant. 8	Ant. 9	Ant. 10	Ant. 11	Ant. 12	Ant. 13	Ant. 14	Ant. 15	Ant. 16	Ant. 17	Ant. 18	Ant. 19	Ant. 20	Ant. 21	Ant. 22	Ant. 23	Ant. 24	Ant. 25	Ant. 26	Ant. 27	Ant. 28	Ant. 29	Ant. 30	Ant. 31	Ant. 32	Ant. 33	Ant. 34	Ant. 35	Ant. 36	Ant. 37	Ant. 38	Ant. 39	Ant. 40	Ant. 41	Ant. 42	Ant. 43	Ant. 44	Ant. 45	Ant. 46	Ant. 47	Ant. 48	Ant. 49	Ant. 50	Ant. 51	Ant. 52	Ant. 53	Ant. 54	Ant. 55	Ant. 56	Ant. 57	Ant. 58	Ant. 59	Ant. 60	Ant. 61	Ant. 62	Ant. 63	Ant. 64	Ant. 65	Ant. 66	Ant. 67	Ant. 68	Ant. 69	Ant. 70	Ant. 71	Ant. 72	Ant. 73	Ant. 74	Ant. 75	Ant. 76	Ant. 77	Ant. 78	Ant. 79	Ant. 80	Ant. 81	Ant. 82	Ant. 83	Ant. 84	Ant. 85	Ant. 86	Ant. 87	Ant. 88	Ant. 89	Ant. 90	Ant. 91	Ant. 92	Ant. 93	Ant. 94	Ant. 95	Ant. 96	Ant. 97	Ant. 98	Ant. 99	Ant. 100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Gain	0°(0°)	15°(15°)	30°(30°)	45°(45°)	60°(60°)	75°(75°)	90°(90°)	105°(105°)	120°(120°)	135°(135°)	150°(150°)	165°(165°)	180°(180°)	195°(195°)	210°(210°)	225°(225°)	240°(240°)	255°(255°)	270°(270°)	285°(285°)	300°(300°)	315°(315°)	330°(330°)	345°(345°)	360°(360°)	375°(375°)	390°(390°)	405°(405°)	420°(420°)	435°(435°)	450°(450°)	465°(465°)	480°(480°)	495°(495°)	510°(510°)	525°(525°)	540°(540°)	555°(555°)	570°(570°)	585°(585°)	600°(600°)	615°(615°)	630°(630°)	645°(645°)	660°(660°)	675°(675°)	690°(690°)	705°(705°)	720°(720°)	735°(735°)	750°(750°)	765°(765°)	780°(780°)	795°(795°)	810°(810°)	825°(825°)	840°(840°)	855°(855°)	870°(870°)	885°(885°)	900°(900°)	915°(915°)	930°(930°)	945°(945°)	960°(960°)	975°(975°)	990°(990°)	1005°(1005°)	1020°(1020°)	1035°(1035°)	1050°(1050°)	1065°(1065°)	1080°(1080°)	1095°(1095°)	1110°(1110°)	1125°(1125°)	1140°(1140°)	1155°(1155°)	1170°(1170°)	1185°(1185°)	1200°(1200°)	1215°(1215°)	1230°(1230°)	1245°(1245°)	1260°(1260°)	1275°(1275°)	1290°(1290°)	1305°(1305°)	1320°(1320°)	1335°(1335°)	1350°(1350°)	1365°(1365°)	1380°(1380°)	1395°(1395°)	1410°(1410°)	1425°(1425°)	1440°(1440°)	1455°(1455°)	1470°(1470°)	1485°(1485°)	1500°(1500°)	1515°(1515°)	1530°(1530°)	1545°(1545°)	1560°(1560°)	1575°(1575°)	1590°(1590°)	1605°(1605°)	1620°(1620°)	1635°(1635°)	1650°(1650°)	1665°(1665°)	1680°(1680°)	1695°(1695°)	1710°(1710°)	1725°(1725°)	1740°(1740°)	1755°(1755°)	1770°(1770°)	1785°(1785°)	1800°(1800°)	1815°(1815°)	1830°(1830°)	1845°(1845°)	1860°(1860°)	1875°(1875°)	1890°(1890°)	1905°(1905°)	1920°(1920°)	1935°(1935°)	1950°(1950°)	1965°(1965°)	1980°(1980°)	1995°(1995°)	2010°(2010°)	2025°(2025°)	2040°(2040°)	2055°(2055°)	2070°(2070°)	2085°(2085°)	2100°(2100°)	2115°(2115°)	2130°(2130°)	2145°(2145°)	2160°(2160°)	2175°(2175°)	2190°(2190°)	2205°(2205°)	2220°(2220°)	2235°(2235°)	2250°(2250°)	2265°(2265°)	2280°(2280°)	2295°(2295°)	2310°(2310°)	2325°(2325°)	2340°(2340°)	2355°(2355°)	2370°(2370°)	2385°(2385°)	2400°(2400°)	2415°(2415°)	2430°(2430°)	2445°(2445°)	2460°(2460°)	2475°(2475°)	2490°(2490°)	2505°(2505°)	2520°(2520°)	2535°(2535°)	2550°(2550°)	2565°(2565°)	2580°(2580°)	2595°(2595°)	2610°(2610°)	2625°(2625°)	2640°(2640°)	2655°(2655°)	2670°(2670°)	2685°(2685°)	2700°(2700°)	2715°(2715°)	2730°(2730°)	2745°(2745°)	2760°(2760°)	2775°(2775°)	2790°(2790°)	2805°(2805°)	2820°(2820°)	2835°(2835°)	2850°(2850°)	2865°(2865°)	2880°(2880°)	2895°(2895°)	2910°(2910°)	2925°(2925°)	2940°(2940°)	2955°(2955°)	2970°(2970°)	2985°(2985°)	3000°(3000°)	3015°(3015°)	3030°(3030°)	3045°(3045°)	3060°(3060°)	3075°(3075°)	3090°(3090°)	3105°(3105°)	3120°(3120°)	3135°(3135°)	3150°(3150°)	3165°(3165°)	3180°(3180°)	3195°(3195°)	3210°(3210°)	3225°(3225°)	3240°(3240°)	3255°(3255°)	3270°(3270°)	3285°(3285°)	3300°(3300°)	3315°(3315°)	3330°(3330°)	3345°(3345°)	3360°(3360°)	3375°(3375°)	3390°(3390°)	3405°(3405°)	3420°(3420°)	3435°(3435°)	3450°(3450°)	3465°(3465°)	3480°(3480°)	3495°(3495°)	3510°(3510°)	3525°(3525°)	3540°(3540°)	3555°(3555°)	3570°(3570°)	3585°(3585°)	3600°(3600°)	3615°(3615°)	3630°(3630°)	3645°(3645°)	3660°(3660°)	3675°(3675°)	3690°(3690°)	3705°(3705°)	3720°(3720°)	3735°(3735°)	3750°(3750°)	3765°(3765°)	3780°(3780°)	3795°(3795°)	3810°(3810°)	3825°(3825°)	3840°(3840°)	3855°(3855°)	3870°(3870°)	3885°(3885°)	3900°(3900°)	3915°(3915°)	3930°(3930°)	3945°(3945°)	3960°(3960°)	3975°(3975°)	3990°(3990°)	4005°(4005°)	4020°(4020°)	4035°(4035°)	4050°(4050°)	4065°(4065°)	4080°(4080°)	4095°(4095°)	4110°(4110°)	4125°(4125°)	4140°(4140°)	4155°(4155°)	4170°(4170°)	4185°(4185°)	4200°(4200°)	4215°(4215°)	4230°(4230°)	4245°(4245°)	4260°(4260°)	4275°(4275°)	4290°(4290°)	4305°(4305°)	4320°(4320°)	4335°(4335°)	4350°(4350°)	4365°(4365°)	4380°(4380°)	4395°(4395°)	4410°(4410°)	4425°(4425°)	4440°(4440°)	4455°(4455°)	4470°(4470°)	4485°(4485°)	4500°(4500°)	4515°(4515°)	4530°(4530°)	4545°(4545°)	4560°(4560°)	4575°(4575°)	4590°(4590°)	4605°(4605°)	4620°(4620°)	4635°(4635°)	4650°(4650°)	4665°(4665°)	4680°(4680°)	4695°(4695°)	4710°(4710°)	4725°(4725°)	4740°(4740°)	4755°(4755°)	4770°(4770°)	4785°(4785°)	4800°(4800°)	4815°(4815°)	4830°(4830°)	4845°(4845°)	4860°(4860°)	4875°(4875°)	4890°(4890°)	4905°(4905°)	4920°(4920°)	4935°(4935°)	4950°(4950°)	4965°(4965°)	4980°(4980°)	4995°(4995°)	5010°(5010°)	5025°(5025°)	5040°(5040°)	5055°(5055°)	5070°(5070°)	5085°(5085°)	5100°(5100°)	5115°(5115°)	5130°(5130°)	5145°(5145°)	5160°(5160°)	5175°(5175°)	5190°(5190°)	5205°(5205°)	5220°(5220°)	5235°(5235°)	5250°(5250°)	5265°(5265°)	5280°(5280°)	5295°(5295°)	5310°(5310°)	5325°(5325°)	5340°(5340°)	5355°(5355°)	5370°(5370°)	5385°(5385°)	5400°(5400°)	5415°(5415°)	5430°(5430°)	5445°(5445°)	5460°(5460°)	5475°(5475°)	5490°(5490°)	5505°(5505°)	5520°(5520°)	5535°(5535°)	5550°(5550°)	5565°(5565°)	5580°(5580°)	5595°(5595°)	5610°(5610°)	5625°(5625°)	5640°(5640°)	5655°(5655°)	5670°(5670°)	5685°(5685°)	5700°(5700°)	5715°(5715°)	5730°(5730°)	5745°(5745°)	5760°(5760°)	5775°(5775°)	5790°(5790°)	5805°(5805°)	5820°(5820°)	5835°(5835°)	5850°(5850°)	5865°(5865°)	5880°(5880°)	5895°(5895°)	5910°(5910°)	5925°(5925°)	5940°(5940°)	5955°(5955°)	5970°(5970°)	5985°(5985°)	6000°(6000°)	6015°(6015°)	6030°(6030°)	6045°(6045°)	6060°(6060°)	6075°(6075°)	6090°(6090°)	6105°(6105°)	6120°(6120°)	6135°(6135°)	6150°(6150°)	6165°(6165°)	6180°(6180°)	6195°(6195°)	6210°(6210°)	6225°(6225°)	6240°(6240°)	6255°(6255°)	6270°(6270°)	6285°(6285°)	6300°(6300°)	6315°(6315°)	6330°(6330°)	6345°(6345°)	6360°(6360°)	6375°(6375°)	6390°(6390°)	6405°(6405°)	6420°(6420°)	6435°(6435°)	6450°(6450°)	6465°(6465°)	6480°(6480°)	6495°(6495°)	6510°(6510°)	6525°(6525°)	6540°(6540°)	6555°(6555°)	6570°(6570°)	6585°(6585°)	6600°(6600°)	6615°(6615°)	6630°(6630°)	6645°(6645°)	6660°(6660°)	6675°(6675°)	6690°(6690°)	6705°(6705°)	6720°(6720°)	6735°(6735°)	6750°(6750°)	6765°(6765°)	6780°(6780°)	6795°(6795°)	6810°(6810°)	6825°(6825°)	6840°(6840°)	6855°(6855°)	6870°(6870°)	6885°(6885°)	6900°(6900°)	6915°(6915°)	6930°(6930°)	6945°(6945°)	6960°(6960°)	6975°(6975°)	6990°(6990°)	7005°(7005°)	7020°(7020°)	7035°(7035°)	7050°(7050°)	7065°(7065°)	7080°(7080°)	7095°(7095°)	7110°(7110°)	7125°(7125°)	7140°(7140°)	7155°(7155°)	7170°(7170°)	7185°(7185°)	7200°(7200°)	7215°(7215°)	7230°(7230°)	7245°(7245°)	7260°(7260°)	7275°(7275°)	7290°(7290°)	7305°(7305°)	7320°(7320°)	7335°(7335°)	7350°(7350°)	7365°(7365°)	7380°(7380°)	7395°(7395°)	7410°(7410°)	7425°(7425°)	7440°(7440°)	7455°(7455°)	7470°(7470°)	7485°(7485°)	7500°(7500°)	7515°(7515°)	7530°(7530°)	7545°(7545°)	7560°(7560°)	7575°(7575°)	7590°(7590°)	7605°(7605°)	7620°(7620°)	7635°(7635°)	7650°(7650°)	7665°(7665°)	7680°(7680°)	7695°(7695°)	7710°(7710°)	7725°(7725°)	7740°(7740°)	7755°(7755°)	7770°(7770°)	7785°(7785°)	7800°(7800°)	7815°(7815°)	7830°(7830°)	7845°(7845°)	7860°(7860°)	7875°(7875°)	7890°(7890°)	7905°(7905°)	7920°(7920°)	7935°(7935°)	7950°(7950°)	7965°(7965°)	7980°(7980°)	7995°(7995°)	8010°(8010°)	8025°(8025°)	8040°(8040°)	8055°(8055°)	8070°(8070°)	8085°(8085°)	8100°(8100°)	8115°(8115°)	8130°(8130°)	8145°(8145°)	8160°(8160°)	8175°(8175°)	8190°(8190°)	8205°(8205°)	8220°(8220°)	8235°(8235°)	8250°(8250°)	8265°(8265°)	8280°(8280°)	8295°(8295°)	8310°(8310°)	8325°(8325°)	8340°(8340°)	8355°(8355°)	8370°(8370°)	8385°(8385°)	8400°(8400°)	8415°(8415°)	8430°(8430°)	8445°(8445°)	8460°(8460°)	8475°(8475°)	8490°(8490°)	8505°(8505°)	8520°(8520°)	8535°(8535°)	8550°(8550°)	8565°(8565°)	8580°(8580°)	8595°(8595°)	8610°(8610°)	8625°(8625°)	8640°(8640°)	8655°(8655°)	8670°(8670°)	8685°(8685°)	8700°(8700°)	8715°(8715°)	8730°(8730°)	8745°(8745°)	8760°(8760°)	8775°(8775°)	8790°(8790°)	8805°(8805°)	8820°(8820°)	8835°(8835°)	8850°(8850°)	8865°(8865°)	8880°(8880°)	8895°(8895°)	8910°(8910°)	8925°(8925°)	8940°(8940°)

Theta (°)	-0.67/-2.49	-3.31/-2.74	-2.39/-0.21	1.21/-0.10	0.55/-0.40	-4.11/-0.96	1.28/2.15	3.23/3.36	2.95/3.53	4.57/5.09	5.83/5.94	5.12/4.09	3.66/2.11	1.05/0.63	1.61/4.25	3.95/2.96	2.04/0.23	-1.87/-0.98	-0.80/-3.87	-6.10/-8.82	-7.97/-3.05	0.52/1.06	-0.79/-0.67	-0.44/-2.03
Theta (67.5°)	0.95/-0.04	-1.32/-0.85	-3.24/-1.10	0.82/0.31	0.48/-1.42	-2.38/2.03	2.53/2.86	3.83/3.10	2.30/2.96	3.94/4.02	4.93/5.46	4.71/3.70	2.23/0.70	1.46/-0.33	0.05/3.01	2.62/2.10	1.07/0.11	-2.08/-0.49	-0.12/-1.56	-2.06/-4.49	-4.50/-5.05	3.18/3.05	0.95/-1.36	0.80/-0.94
Theta (75°)	0.56/-0.98	-1.26/-0.57	-3.02/-2.33	-1.01/-0.76	-0.24/-1.14	-1.58/1.80	1.96/3.12	4.45/3.18	1.58/2.51	3.03/3.06	3.44/4.07	3.73/3.80	3.14/1.05	0.60/0.78	-0.46/0.59	0.89/0.62	0.57/1.32	-1.77/-0.26	0.72/0.99	1.03/-2.49	-4.40/-0.86	3.28/3.14	0.18/-1.06	0.52/-0.15
Theta (82.5°)	-0.92/-1.18	-1.16/-1.69	-5.51/-3.53	-0.71/-0.46	-0.32/-1.62	-3.11/-0.09	-0.39/1.46	3.19/1.21	-0.88/0.93	1.51/1.25	1.85/0.52	3.72/2.15	0.22/-3.21	-0.90/0.35	-0.64/-0.78	-2.13/-2.71	0.33/0.69	-1.10/0.78	1.75/1.42	1.53/-1.65	-4.93/-1.04	2.04/0.47	-0.78/-1.93	0.72/-1.33
Theta (90°)	-1.71/-2.88	-2.84/-4.31	-7.83/-4.16	-1.82/-1.40	-0.80/-1.73	-4.77/-1.34	-1.46/0.55	1.82/-0.39	-2.64/-0.16	0.31/-1.42	-0.18/1.63	2.14/0.53	-0.91/-0.27	-2.95/-0.78	-2.37/-1.77	-3.34/-5.11	-0.87/1.18	-1.37/0.54	0.22/-0.11	0.59/-2.46	-5.03/-4.33	-0.64/-2.15	-2.20/-1.63	-0.81/-2.02
Theta (97.5°)	-2.24/-6.02	-6.16/-6.08	-10.11/-4.77	-1.68/-2.69	-3.70/-4.64	-7.37/-1.65	-1.73/-0.61	0.13/-1.93	-3.14/-1.57	-2.42/-3.27	-2.81/-0.89	0.10/-0.71	-1.41/-4.39	-5.23/-3.60	-4.21/-2.75	-3.96/-9.45	-3.60/-2.76	-2.84/-1.84	-2.59/-0.99	-2.12/-5.17	-4.10/-4.75	-2.51/-4.08	-5.23/-3.67	-2.50/-4.02
Theta (105°)	-4.69/-8.85	-6.04/-6.30	-10.20/-7.93	-5.14/-6.02	-6.37/-5.15	-7.41/-3.24	-3.09/-3.85	-2.11/-3.58	-5.12/-2.87	-3.08/-5.72	-5.27/-2.63	-0.60/-0.72	-3.53/-4.66	-5.26/-5.53	-3.67/-4.36	-4.50/-8.33	-7.30/-5.60	-3.59/-3.19	-3.32/-7.96	-9.60/-5.50	-3.06/-4.24	-9.44/-4.03	-7.44/-5.38	-5.70/-4.15
Theta (112.5°)	-6.64/-8.46	-11.45/-7.97	-10.22/-8.36	-5.78/-5.99	-8.55/-7.11	-7.64/-4.04	-4.53/-5.96	-5.65/-7.62	-7.06/-5.44	-5.75/-6.49	-5.84/-3.66	-1.74/-2.45	-4.43/-6.25	-8.71/-7.90	-5.18/-6.77	-5.89/-6.89	-8.81/-7.98	-3.18/-4.19	-4.04/-7.28	-11.86/-7.92	-3.56/-7.02	-5.71/-6.65	-8.83/-5.52	-7.45/-6.70
Theta (120°)	-5.62/-8.26	-11.92/-8.16	-11.41/-8.96	-7.85/-6.91	-10.19/-10.02	-10.40/-7.35	-5.09/-5.20	-5.81/-7.59	-8.65/-8.50	-7.67/-8.26	-6.10/-3.79	-3.11/-3.75	-4.80/-8.61	-10.71/-6.88	-6.47/-8.37	-11.13/-10.43	-8.20/-9.99	-4.91/-4.63	-3.67/-9.96	-11.35/-6.96	-7.88/-7.50	-8.49/-11.34	-9.60/-5.51	-8.16/-8.57
Theta (127.5°)	-9.25/-10.49	-14.31/-11.82	-9.77/-8.57	-9.08/-12.19	-13.25/-13.26	-10.66/-7.71	-6.50/-5.55	-4.99/-5.93	-7.43/-8.76	-8.45/-7.61	-6.97/-5.58	-7.51/-6.50	-6.88/-10.81	-8.20/-7.56	-7.15/-6.85	-7.40/-9.98	-14.96/-13.72	-10.55/-7.81	-7.24/-8.89	-8.19/-9.20	-8.26/-8.45	-10.68/-5.66	-12.34/-7.16	-10.09/-12.19
Theta (135°)	-14.99/-10.39	-7.76/-9.03	-15.39/-11.95	-9.62/-11.65	-12.37/-9.72	-8.95/-8.25	-7.51/-6.93	-7.00/-8.68	-10.60/-10.68	-9.47/-8.26	-7.61/-6.30	-5.31/-5.04	-5.50/-8.12	-9.85/-8.88	-9.06/-8.05	-9.00/-13.39	-15.11/-10.53	-12.21/-5.02	-7.78/-15.52	-7.24/-5.28	-11.71/-12.47	-11.24/-9.12	-11.30/-13.23	-11.16/-9.01
Theta (142.5°)	-8.67/-15.73	-14.13/-11.67	-11.96/-10.36	-8.82/-13.04	-12.69/-10.22	-10.11/-9.36	-7.92/-6.42	-6.47/-6.91	-9.07/-10.49	-11.09/-10.83	-9.20/-7.24	-8.94/-6.56	-5.63/-5.51	-6.23/-10.51	-13.39/-14.68	-8.18/-10.58	-10.64/-14.47	-14.52/-9.71	-6.04/-8.48	-13.07/-9.15	-10.86/-9.87	-14.59/-15.65	-11.08/-10.04	-11.43/-10.16
Theta (150°)	-9.96/-8.76	-8.14/-10.18	-11.42/-11.57	-11.15/-12.17	-9.57/-6.68	-5.82/-6.16	-7.31/-7.94	-7.44/-6.99	-6.63/-6.09	-6.55/-7.39	-8.62/-10.28	-11.46/-11.83	-8.49/-7.51	-6.22/-6.42	-8.71/-11.31	-8.35/-9.64	-10.85/-9.96	-8.12/-9.23	-11.17/-8.70	-7.21/-6.45	-8.57/-14.93	-15.42/-14.99	-13.29/-8.82	-8.66/-10.87
Theta (157.5°)	-9.98/-8.23	-8.70/-12.24	-13.64/-10.41	-7.75/-3.36	-8.86/-10.61	-11.66/-11.18	-10.79/-12.06	-12.63/-11.78	-10.80/-10.29	-9.38/-8.60	-7.13/-6.60	-5.75/-6.79	-7.88/-9.33	-7.98/-8.11	-9.89/-9.04	-9.19/-10.08	-8.49/-6.34	-5.49/-7.04	-10.57/-11.81	-10.21/-11.89	-15.53/-15.28	-15.11/-12.74	-11.53/-13.93	-14.75/-14.57
Theta (165°)	-7.88/-7.43	-9.20/-13.08	-15.49/-15.65	-12.55/-10.80	-10.84/-11.92	-13.41/-13.95	-14.10/-13.05	-12.51/-11.76	-11.03/-10.11	-9.44/-9.26	-8.18/-6.65	-5.85/-5.65	-6.45/-8.29	-11.25/-11.62	-10.75/-9.03	-7.84/-7.86	-10.24/-15.62	-15.26/-11.72	-9.46/-8.49	-8.29/-8.59	-9.45/-11.58	-13.25/-15.10	-14.96/-11.80	
Theta (172.5°)	-9.34/-9.59	-10.17/-10.36	-12.38/-13.54	-14.41/-14.35	-12.76/-10.63	-9.24/-8.63	-9.10/-8.88	-8.57/-8.35	-8.13/-8.31	-9.34/-10.49	-11.55/-11.75	-11.63/-13.16	-15.75/-15.20	-13.45/-12.10	-11.71/-10.89	-10.76/-10.60	-10.88/-11.72	-13.46/-14.10	-12.41/-10.00	-8.73/-9.09	-9.91/-10.10	-10.99/-12.00	-11.70/-11.75	-10.56/-10.33
Theta (180°)	-10.96/-10.36	-10.11/-10.24	-10.39/-10.37	-9.67/-9.72	-9.77/-9.93	-9.54/-9.07	-8.76/-9.02	-9.05/-9.29	-10.10/-10.25	-10.96/-13.06	-13.99/-14.99	-15.53/-15.90	-15.61/-14.90	-12.98/-13.12	-14.97/-14.84	-15.71/-14.26	-13.69/-13.60	-12.55/-11.18	-10.55/-10.93	-11.27/-12.49	-14.55/-14.47	-13.04/-12.01	-11.47/-10.24	-9.53/-9.35
Freq(Hz)	5.785GPol	TotalAnt 2	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
Gain	Phi(0°)/Phi(7.5°)	Phi(15°)/Phi(22.5°)	Phi(30°)/Phi(37.5°)	Phi(45°)/Phi(52.5°)	Phi(60°)/Phi(67.5°)	Phi(75°)/Phi(82.5°)	Phi(90°)/Phi(97.5°)	Phi(105°)/Phi(112.5°)	Phi(120°)/Phi(127.5°)	Phi(135°)/Phi(142.5°)	Phi(150°)/Phi(157.5°)	Phi(165°)/Phi(172.5°)	Phi(180°)/Phi(187.5°)	Phi(195°)/Phi(202.5°)	Phi(210°)/Phi(217.5°)	Phi(225°)/Phi(232.5°)	Phi(240°)/Phi(247.5°)	Phi(255°)/Phi(262.5°)	Phi(270°)/Phi(277.5°)	Phi(285°)/Phi(292.5°)	Phi(300°)/Phi(307.5°)	Phi(315°)/Phi(322.5°)	Phi(330°)/Phi(337.5°)	Phi(345°)/Phi(352.5°)
Theta (0°)	2.17/2.01	2.01/2.04	1.90/1.70	1.72/1.52	1.61/1.69	1.46/1.38	1.16/1.05	1.14/1.10	0.97/0.98	0.73/0.37	0.31/0.57	1.01/1.23	1.17/1.11	1.17/1.40	1.26/1.31	1.32/1.37	1.49/1.55	1.70/1.93	2.03/2.00	1.95/1.98	2.25/2.36	2.25/2.33	2.48/2.48	2.52/2.39
Theta (7.5°)	0.51/0.78	0.74/0.85	0.69/0.79	1.04/1.16	1.22/1.31	1.34/1.41	1.34/1.41	1.72/2.19	2.34/2.26	2.10/2.07	1.95/1.98	2.00/2.02	1.97/1.72	1.61/1.66	1.58/1.41	1.31/1.34	1.22/0.86	0.51/0.65	0.84/0.83	0.50/0.28	0.52/0.73	0.61/0.46	0.78/0.75	0.42/0.76
Theta (15°)	-0.91/-1.59	-1.55/-1.54	-1.61/-1.48	-1.41/-1.09	-0.81/-0.94	-0.74/-0.10	0.47/0.82	1.14/1.35	1.86/2.13	2.20/1.84	1.66/1.73	1.66/1.42	0.99/0.61	0.78/0.83	0.72/0.60	0.55/0.41	0.08/-0.53	-0.72/-0.55	-0.41/-0.40	-0.30/-0.09	0.15/0.26	0.27/0.31	0.36/0.27	-0.19/-0.67
Theta (22.5°)	-0.57/-1.42	-2.23/-3.17	-3.48/-3.71	-4.15/-4.07	-4.18/-4.17	-3.82/-3.47	-2.79/-1.62	-1.18/-1.10	-0.93/-0.82	-0.71/-0.72	-1.26/-1.72	-1.58/-1.31	-0.18/0.57	0.74/0.83	0.80/0.54	0.15/0.18	0.16/-0.34	-0.57/-0.58	-0.77/-1.14	-1.09/-0.94	-0.78/-0.51	0.35/1.09	1.42/1.24	0.91/0.26
Theta (30°)	1.30/0.00	-2.33/-3.96	-4.26/-4.42	-4.71/-5.30	-5.61/-4.19	-2.73/-2.39	-2.07/-2.12	-2.53/-3.30	-4.40/-4.61	-3.71/-2.35	-1.61/-1.86	-1.88/-1.86	-1.26/-0.03	1.23/2.10	2.26/1.54	0.78/0.30	-0.62/-1.52	-1.38/-1.12	-1.47/-1.46	-0.52/-0.03	-0.70/-1.96	-2.39/-1.15	-0.24/0.37	1.53/1.81
Theta (37.5°)	1.24/-0.45	-2.95/-4.91	-5.35/-5.70	-6.29/-5.84	-3.15/-0.69	-0.22/-0.63	-0.53/-0.40	0.22/0.70	0.35/0.11	0.19/0.25	1.14/1.51	0.66/-0.29	-0.45/0.45	1.46/2.34	3.13/2.79	1.18/-1.52	-3.68/-4.97	-5.13/-4.52	-4.39/-3.88	-2.15/-0.91	-0.17/0.06	0.28/0.82	1.40/1.46	2.07/2.00
Theta (45°)	-1.11/-2.55	-5.66/-8.14	-5.76/-4.36	-5.02/-4.92	-0.97/0.99	-0.04/-0.73	-0.03/0.85	1.62/2.15	2.97/3.08	2.50/2.47	3.38/4.31	3.69/2.64	1.32/0.73	0.51/0.90	2.10/2.97	2.43/0.60	-1.57/-2.35	-2.51/-3.24	-4.89/-11.07	-9.10/-5.07	-2.90/-1.86	-1.39/0.27	1.49/1.66	0.25/-0.43
Theta (52.5°)	-5.59/-5.57	-5.56/-5.93	-3.89/-2.23	-2.25/-2.52	-0.41/-1.43	-3.06/0.01	1.52/2.48	2.89/2.60	2.84/3.84	4.05/3.98	4.53/5.13	5.06/4.43	3.49/2.26	2.04/0.49	0.84/2.48	3.27/2.56	1.71/0.22	-1.00/-1.13	-3.02/-8.63	-12.36/-7.67	-5.33/-5.17	-4.30/-3.03	-0.44/0.72	-1.45/-3.76
Theta (60°)	-1.90/-1.18	-1.78/-3.10	-2.97/-0.99	-1.23/-0.25	0.96/2.26	-0.61/2.86	3.33/3.80	3.24/2.57	2.93/3.79	4.69/4.53	4.45/5.09	5.48/5.35	4.57/3.16	2.00/1.45	0.64/3.21	4.29/3.75	2.32/1.38	0.90/0.14	-2.08/-5.47	-7.42/-8.47	-6.85/-4.84	-2.32/-0.99	-1.33/0.16	-0.02/-2.73
Theta (67.5°)	1.13/0.68	-1.12/-1.57	-1.83/0.36	0.28/0.93	0.24/-3.23	0.78/3.22	3.50/4.08	3.69/3.15	3.64/4.06	4.03/3.55	2.95/3.95	4.50/4.47	2.91/1.36	0.86/0.83	1.38/2.56	2.92/2.88	1.54/1.15	1.17/-0.18	-0.01/-0.85	-2.15/-5.30	-5.30/-1.55	1.65/1.95	-0.43/-0.66	-0.13/-1.17
Theta (75°)	0.97/0.84	-0.30/-1.70	-2.73/-0.54	-0.55/0.86	0.12/4.21	-0.84/1.12	2.10/3.31	2.82/2.58	2.31/2.65	2.38/2.10	0.28/1.00	3.11/3.93	3.19/2.17	-0.07/-0.25	0.63/1.68	1.52/1.70	0.76/0.58	0.66/-0.52	1.60/1.91	1.11/-2.06	-3.59/-1.38	2.00/2.73	0.09/-1.97	-0.23/-0.76
Theta (82.5°)	0.22/-1.26	-1.49/-2.23	-4.18/-1.10	-1.39/-0.36	-1.51/-5.19	-1.62/-0.40	1.15/2.72	1.51/1.18	0.90/0.71	0.27/-0.34	-2.02/0.07	1.97/2.47	1.74/-0.93	-3.26/-1.22	-0.67/0.39	-0.24/-0.61	-1.37/-0.44	-0.48/-0.51	2.28/1.70	2.10/-0.93	-2.73/-0.80	1.54/0.96	-0.47/-4.56	-1.48/-1.08
Theta (90°)	-1.22/-4.17	-2.61/-4.44	-5.31/-1.94	-2.59/-1.90	-2.27/-6.59	-2.83/-1.38	0.03/1.18	-0.60/-0.42	-0.21/-0.39	-1.44/-1.91	-2.81/-2.44	-1.30/-0.39	1.03/1.04	-4.25/-2.96	-3.12/-1.46	-1.65/-2.56	-1.60/-0.03	-1.07/-0.73	1.08/0.93	1.98/-1.36	-3.67/-2.09	0.60/-1.20	-2.55/-5.68	-3.21/-2.32
Theta (97.5°)	-2.24/-6.61	-5.05/-6.01	-8.70/-3.02	-3.73/-4.25	-3.54/-7.31	-2.72/-2.29	-1.44/-0.06	-2.25/-2.32	-1.50/-2.13	-2.77/-3.46	-4.56/-2.41	-1.28/-1.36	-0.97/-3.08	-6.64/-3.22	-5.50/-3.02	-2.32/-4.62	-5.92/-3.11	-3.75/-3.62	-0.82/-1.14	-0.79/-3.99	-3.67/-3.64	-2.01/-5.37	-6.92/-5.45	-5.29/-2.62
Theta (105°)	-4.06/-9.46	-7.18/-8.33	-9.50/-4.63	-5.24/-6.35	-7.18/-10.22	-4.53/-2.24	-2.69/-1.89	-3.09/-2.57	-2.87/-2.60	-3.21/-3.38	-5.65/-5.56	-4.18/-4.08	-3.29/-1.25	-4.90/-6.36	-6.34/-5.54	-3.40/-5.37	-7.28/-3.81	-3.70/-4.74	-3.53/-7.28	-7.30/-6.21	-5.22/-4.19	-7.00/-4.10	-6.60/-5.69	-6.70/-4.09
Theta (112.5°)	-4.69/-10.38	-11.36/-8.28	-9.09/-5.76	-6.55/-8.90	-9.70/-9.43	-4.56/-3.01	-4.32/-5.26	-4.90/-4.28	-4.71/-4.43	-5.17/-5.82														



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  $\Theta(0-180)\Phi(270)$

