



Antenna Composite Gain Test Report

Equipment	802.11ax WiFi6E 2+2+2 Indoor AP
Brand Name	Juniper
Model Name	AP24
Applicant	Juniper Networks, Inc. 1133 Innovation Way, Sunnyvale, CA 94089, USA
Manufacturer	Juniper Networks, Inc. 1133 Innovation Way, Sunnyvale, CA 94089, USA
Sample Received	Nov. 25, 2022
Start Test Date	Dec. 13, 2022
Final Test Date	Dec. 13, 2022


Approved by: Jackson Tsai

SPORTON INTERNATIONAL INC. Hsinhua Laboratory

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1. Operation Mode and Antenna Information

Antenna Position	Brand Name	Model Name	Ant. Type	Connector	Modes of Operation
1	Juniper	X51209900486_1	PIFA	I-PEX	Radio 1_2.4G+Radio 1_6G
2	Juniper	X51209900486_2	PIFA	I-PEX	Radio 0_5G+ Radio 4_BT/Thread/Zigbee
3	Juniper	X51209900486_3	PIFA	I-PEX	Radio 1_2.4G+Radio 0_5G
4	Juniper	X51209900486_4	PIFA	I-PEX	Radio 2_2.4G+Radio 1_6G
5	Juniper	X51209900486_5	PIFA	I-PEX	Radio 2_2.4G+ Radio 2_5G+Radio 2_6G

For 2.4GHz function:

For IEEE 802.11 b/g/n/VHT/ax mode (1TX/1RX) (Radio 2)
Ant. 5 could transmit/receive.

For IEEE 802.11 b/g/n/VHT/ax mode (2TX/2RX) (Radio 1)
Ant. 1 and Ant. 3 could transmit/receive simultaneously.

For IEEE 802.11 b/g/n/VHT/ax mode (2TX/2RX) (Radio 2)
Ant. 4 and Ant. 5 could transmit/receive simultaneously.

For 5GHz function:

For IEEE 802.11 a/n/ac/ax mode (1TX/1RX) (Radio 2)
Ant. 5 could transmit/receive.

For IEEE 802.11 a/n/ac/ax mode (2TX/2RX) (Radio 0)
Ant. 2 and Ant. 3 could transmit/receive simultaneously.

For BT function:

For IEEE 802.15.1 Bluetooth mode (1TX/1RX) (Radio 4)
Ant. 2 could transmit/receive.

For 6GHz function:

For IEEE 802.11 a/ax mode (1TX/1RX) (Radio 2)
Ant. 5 could transmit/receive.

For IEEE 802.11 a/ax mode (2TX/2RX) (Radio 1)
Ant. 1 and Ant. 4 could transmit/receive simultaneously.

For Thread function:

For Thread mode (1TX/1RX) (Radio 4)
Ant. 2 could transmit/receive.

For Zigbee function:

For Zigbee mode (1TX/1RX) (Radio 4)
Ant. 2 could transmit/receive.



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
5925-6425	6175
6425-6525	6475
6525-6875	6695
6875-7125	6995



3. Testing Location

Test Lab. : Sporton International Inc. Hsinhua Laboratory				
<input checked="" type="checkbox"/> Wen 33rd.St.	ADD:	No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)		
	TEL:	886-3-318-0787	FAX:	886-3-318-0287
Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
Radiated	05CH03-HY	Rex Liao	23~24°C / 50~55%	13/Dec/2022

Note:

Testing Site Information

Brand Name: TDK

Dimension: 11m*6m*6m

Characteristic: Fully Anechoic Chamber

4. Test Facility and Configuration

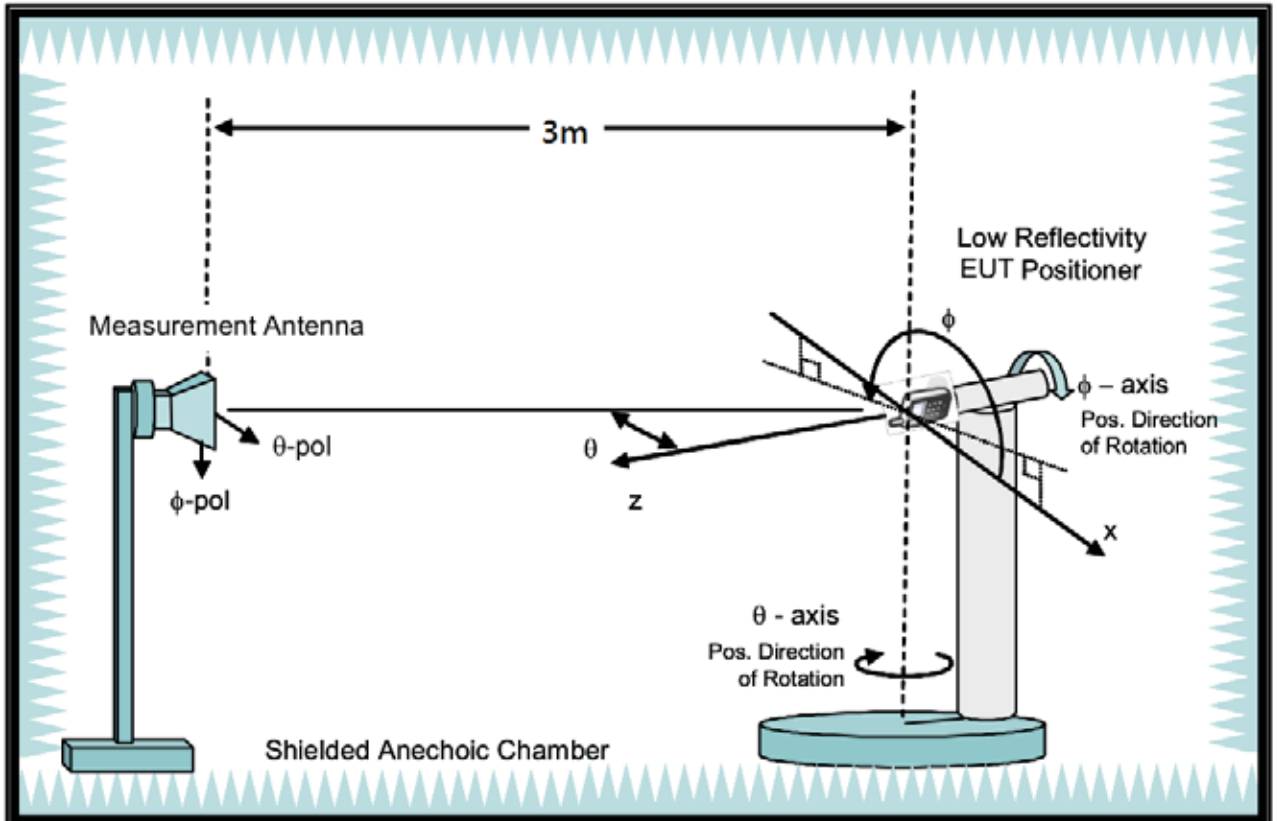
Test configuration: Reference to CITA OTA distributed-axes system configuration.

Chamber: Fully Anechoic Chamber.

Measurement antenna: Dual Polarization Horn antenna

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

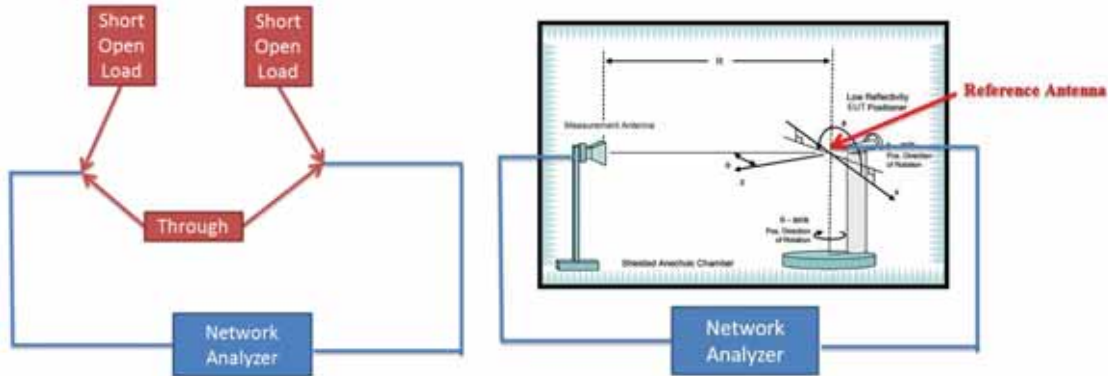
#Reference to CTIA "ctia-test-plan-for-wireless-device-over-the-air-performance-ver-3-7-1"



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)	-33.55	-33.27	-32.92	-32.91	-32.73	-32.02	-32.67	-32.82	-32.98	-33.18	-32.8	-33.92	-34.62	-35.57
G(phi) reading (dB)	-33.15	-32.7	-32.41	-32.61	-32.43	-31.72	-32.37	-32.51	-32.52	-32.66	-32.5	-33.62	-34.32	-35.48
Reference gain (dBi)	10.1	10.4	10.7	12.5	12.7	13.5	13.4	13.3	13.3	13.2	13.4	12.5	12.1	11.4
Factor(theta) (dB)	43.65	43.67	43.62	45.41	45.43	45.52	46.07	46.12	46.28	46.38	46.2	46.42	46.72	46.97
Factor(phi) (dB)	43.25	43.1	43.11	45.11	45.13	45.22	45.77	45.81	45.82	45.86	45.9	46.12	46.42	46.88

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

Dual-band mode 2.4G 2Tx Ant.1 and Ant.3

DG_1SS Max Value Position

Frequency (Hz)	2.45G
Ant. 1 (dBi)	3.04
Ant. 3 (dBi)	-3.25
DG [1SS] (dBi)	3.46
Polarization	Theta
$\Theta(^{\circ})$	52.5
$\Phi(^{\circ})$	0

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
Ant. 1 [$10^{(G/20)}$]	$10^{(3.04/20)}$
Ant. 3 [$10^{(G/20)}$]	$10^{(-3.25/20)}$
Ant. 1 [$10^{(G/20)}$] value	1.419
Ant. 3 [$10^{(G/20)}$] value	0.688
Sum All Antenna [Amax]	2.107
DG [$10 \cdot \log(A_{max}^2/N_{ant})$]	3.46

Note:

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

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



Tri-band mode 2.4G 2Tx Ant.4 and Ant.5

DG_1SS Max Value Position

Frequency (Hz)	2.45G
Ant. 4 (dBi)	-0.89
Ant. 5 (dBi)	2.05
DG [1SS] (dBi)	3.71
Polarization	Theta
$\Theta(^{\circ})$	60
$\Phi(^{\circ})$	307.5

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
Ant. 4 [$10^{(G/20)}$]	$10^{(-0.89/20)}$
Ant. 5 [$10^{(G/20)}$]	$10^{(2.05/20)}$
Ant. 4 [$10^{(G/20)}$] value	0.903
Ant. 5 [$10^{(G/20)}$] value	1.266
Sum All Antenna [Amax]	2.169
DG [$10 \cdot \log(A_{max}^2/N_{ant})$]	3.71

Note:

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

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



Tri-band mode 5G 2Tx Ant.2 and Ant.3

DG_1SS Max Value Position

Frequency (Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 2 (dBi)	2.29	1.88	2.19	2.13
Ant. 3 (dBi)	-0.25	-0.31	1.09	2.29
DG [1SS] (dBi)	4.12	3.86	4.67	5.22
Polarization	Theta	Theta	Theta	Theta
$\Theta(^{\circ})$	52.5	52.5	60	67.5
$\Phi(^{\circ})$	52.5	37.5	45	67.5

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)	5.2G	5.3G	5.6G	5.785G
Ant. 2 [$10^{(G/20)}$]	$10^{(2.29/20)}$	$10^{(1.88/20)}$	$10^{(2.19/20)}$	$10^{(2.13/20)}$
Ant. 3 [$10^{(G/20)}$]	$10^{(-0.25/20)}$	$10^{(-0.31/20)}$	$10^{(1.09/20)}$	$10^{(2.29/20)}$
Ant. 2 [$10^{(G/20)}$] value	1.302	1.242	1.287	1.278
Ant. 3 [$10^{(G/20)}$] value	0.972	0.965	1.134	1.302
Sum All Antenna [Amax]	2.273	2.207	2.42	2.58
DG [$10*\log(Amax^2/Nant)$]	4.12	3.86	4.67	5.22

Note:

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

Directional gain (1SS) = $10*\log(10^{(Gant1/20)}+10^{(Gant2/20)}+ +10^{(Gant3/20)} +10^{(Gant4/20)}+.....)^2/Nant$



Dual-band and Tri-band mode 6G 2Tx Ant.1 and Ant.4

DG_1SS Max Value Position

Frequency (Hz)	6.175G	6.475G	6.695G	6.995G
Ant. 1 (dBi)	0.64	-0.47	2.29	3.34
Ant. 4 (dBi)	2.07	1.01	0.49	0.78
DG [1SS] (dBi)	4.39	3.31	4.45	5.16
Polarization	Theta	Theta	Theta	Theta
$\Theta(^{\circ})$	82.5	75	67.5	37.5
$\Phi(^{\circ})$	315	52.5	150	82.5

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)	6.175G	6.475G	6.695G	6.995G
Ant. 1 [10^(G/20)]	10^(0.64/20)	10^(-0.47/20)	10^(2.29/20)	10^(3.34/20)
Ant. 4 [10^(G/20)]	10^(2.07/20)	10^(1.01/20)	10^(0.49/20)	10^(0.78/20)
Ant. 1 [10^(G/20)] value	1.076	0.947	1.302	1.469
Ant. 4 [10^(G/20)] value	1.269	1.123	1.058	1.094
Sum All Antenna [Amax]	2.346	2.071	2.36	2.563
DG [10*log(Amax^2/Nant)]	4.39	3.31	4.45	5.16

Note:

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

Directional gain (1SS) = 10*log(10^(Gant1/20)+10^(Gant2/20)+ +10^(Gant3/20) +10^(Gant4/20)+.....)^2/Nant)



8. Summary of Test Result

Frequency (Hz)	2.45G
Ant. 1 Max Gain (dBi)	3.04
Ant. 2 Max Gain (dBi)	2.21
Ant. 3 Max Gain (dBi)	2.14
Ant. 4 Max Gain (dBi)	2.5
Ant. 5 Max Gain (dBi)	2.1
Max Gain (dBi)	3.04
DG [1SS] (dBi)_Ant.1 & Ant.3	3.46
DG [1SS] (dBi)_Ant.4 & Ant.5	3.71

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.

Frequency (Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	-	-	-	-
Ant. 2 Max Gain (dBi)	3.08	2.83	3.4	3.66
Ant. 3 Max Gain (dBi)	2.09	2.29	2.27	3
Ant. 4 Max Gain (dBi)	-	-	-	-
Ant. 5 Max Gain (dBi)	3.34	2.61	3.08	3.13
Max Gain (dBi)	3.34	2.83	3.4	3.66
DG [1SS] (dBi)_Ant.2 & Ant.3	4.12	3.86	4.67	5.22

Note:

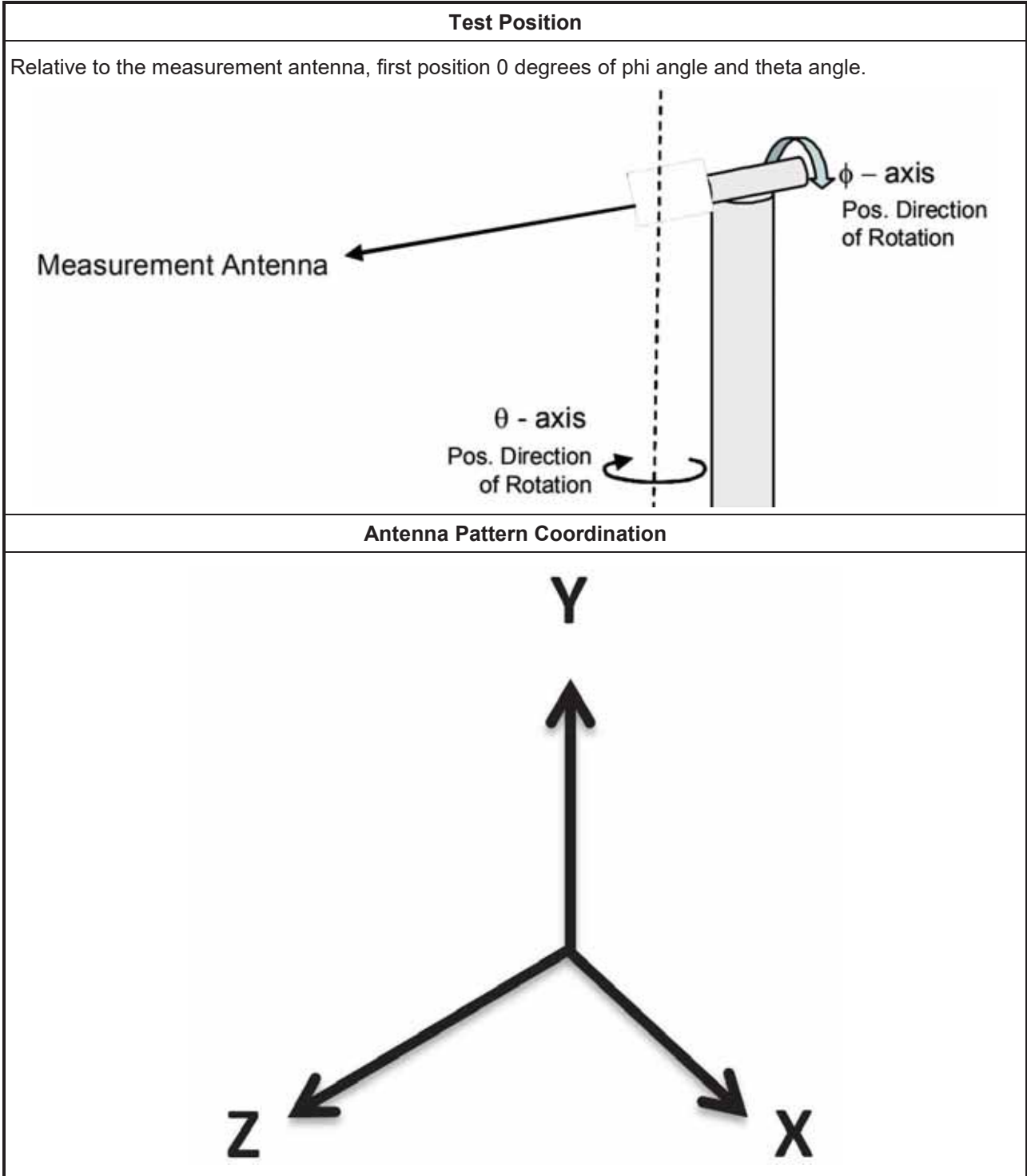
1. Antenna max gain is the max value of each individual antenna through all measurement angles.
2. The max gain is the max value of all antennas.

Frequency (Hz)	6.175G	6.475G	6.695G	6.995G
Ant. 1 Max Gain (dBi)	2.95	3.27	4.44	5.11
Ant. 2 Max Gain (dBi)	-	-	-	-
Ant. 3 Max Gain (dBi)	-	-	-	-
Ant. 4 Max Gain (dBi)	2.44	3.18	3.69	4.55
Ant. 5 Max Gain (dBi)	2.77	3.16	2.88	3.07
Max Gain (dBi)	2.95	3.27	4.44	5.11
DG [1SS] (dBi)_Ant.1 & Ant.4	4.39	3.31	4.45	5.16

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-1543	1GHz~18GHz	May. 31, 2022	May. 30, 2023
Dual Polarization Horn Antenna	Sporton	S0209DP	S0209DP-001	2GHz~9GHz	N.C.R.	N.C.R.
ENA Series Network Analyzer	AGILENT	E5071C	MY46419201	100kHz~8.5GHz	Feb. 21, 2022	Feb. 20, 2023
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: NCR means Non-Calibration required.



11. Test Results

Please refer to the appendix.

Appendix A – Radiated Composite Gain.....Page 17
Appendix B – Antenna PatternPage 37
Appendix C – Test Photos..... Page 47

————THE END————



Radiated Composite Gain Data

Appendix A

Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G	6.175G	6.475G	6.695G	6.995G
Ant. 1 Max Gain (dBi)	3.04					2.95	3.27	4.44	5.11
Ant. 2 Max Gain (dBi)	2.21	3.08	2.83	3.4	3.66				
Ant. 3 Max Gain (dBi)	2.14	2.09	2.29	2.27	3				
Ant. 4 Max Gain (dBi)	2.5					2.44	3.18	3.69	4.55
Ant. 5 Max Gain (dBi)	2.1	3.34	2.61	3.08	3.13	2.77	3.16	2.88	3.07
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/52.5/0					Theta/52.5/345	Theta/52.5/352.5	Theta/37.5/45	Theta/37.5/52.5
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/75/270	Theta/45/15	Theta/37.5/37.5	Theta/75/292.5	Theta/37.5/30				
Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/75/90	Theta/37.5/112.5	Theta/37.5/165	Theta/52.5/135	Theta/52.5/135				
Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/52.5/112.5					Theta/37.5/285	Theta/37.5/277.5	Theta/37.5/262.5	Theta/30/285
Ant. 5 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/45/307.5	Phi/45/292.5	Theta/37.5/97.5	Theta/52.5/67.5	Theta/52.5/60	Phi/52.5/300	Phi/52.5/307.5	Theta/60/345	Phi/75/285
Max Gain (dBi)	3.04	3.34	2.83	3.4	3.66	2.95	3.27	4.44	5.11
Dual-band mode 2.4G 2Tx DG [1SS] (dBi) Ant.1 & Ant.3	3.46								
Tri-band mode 2.4G 2Tx DG [1SS] (dBi) Ant.4 & Ant.5	3.71								
Tri-band mode 5G 2Tx DG [1SS] (dBi) Ant.2 & Ant.3		4.12	3.86	4.67	5.22				
Dual-band mode 6G 2Tx & Tri-band mode 6G 2Tx DG [1SS] (dBi) Ant.1 & Ant.4						4.39	3.31	4.45	5.16



Radiated Composite Gain Data

Appendix A

(82.5)	5.421765	8.51047	-0.01966	-11.11156	-10.59108	-12.42467	-9.57443	-9.69587	-9.09736	-10.79156	-8.73729	-7.432	-6.36329	-12.25131	-11.41779	-13.21114	-12.52103	-8.781219	6.371176	-15.211171	-15.751373	-9.071139	-12.721173	-10.86106		
(87.5)	8.211158	-9.31118	-11.42107	-11.85103	-11.151074	-11.21137	-9.39124	-11.43148	-11.13178	-10.77183	-8.64738	-9.39152	-8.35377	-11.42126	-11.37109	-11.35128	-12.54127	8.911369	9.231398	-15.04124	-13.92149	8.621241	-10.571389	-10.311169	-7.861172	
(92.5)	-10.511294	-11.021329	-11.021346	-11.331342	-10.29131	-12.481078	-10.66133	-12.121295	-11.341294	-10.491688	-7.74157	-10.921113	-10.551442	-13.241548	-13.191418	-13.211539	-13.211539	-13.891124	-14.211539	-12.841245	-12.311593	8.991302	-8.981147	-7.861172	-8.881124	
(97.5)	-11.381494	-12.811245	-8.091147	-14.781136	9.591131	-11.891136	-10.491308	-12.031102	-11.04184	-11.89118	-7.82106	-8.62148	9.341691	9.951149	-8.941108	-14.721162	11.71113	-15.511375	-14.381134	-12.871167	-15.231167	8.721182	-11.311118	-6.861147	-11.311118	-6.861147
(102.5)	-11.661538	-12.251537	-10.411221	-13.111255	-10.891207	-13.231115	-8.481161	-11.361873	-8.811648	-11.711859	-8.65173	-8.841843	-10.341091	-10.951237	-8.771132	-14.531486	-10.451139	-15.581217	-15.371091	-11.861193	-14.53126	-12.071005	-8.911897	6.721033	-8.911897	6.721033
(107.5)	-10.461524	-12.831545	-14.211033	-12.851109	-10.811425	-10.281205	-11.391232	-11.081842	-10.661938	-8.79154	-7.811822	-8.391973	-10.381285	-14.871458	-13.911505	-15.861231	-14.441224	-14.881029	-12.991436	-12.991436	-13.561734	-8.941107	-8.121182	-10.11182	-8.121182	
(112.5)	-10.221415	-15.541229	-12.121008	-13.391098	8.211297	-12.691651	-11.681004	8.441119	-8.931236	8.181309	-10.31138	-11.611313	-11.511403	-8.31172	-14.171521	-13.331217	-15.941509	-11.581386	-14.051094	-14.751174	-14.871182	-14.931891	-12.24181	-8.881124	-8.881124	
(117.5)	-14.511291	-15.341286	7.37185	-10.941416	-10.941416	-10.221681	-12.321681	-11.341214	-7.931379	-12.911236	-10.551383	-14.521136	-14.481144	-15.511421	-11.231191	-12.781192	-12.781192	-15.811429	-15.811429	-13.971436	-13.971436	-11.431197	-11.431197	-12.321162	-10.341129	
(122.5)	-14.761388	-14.081444	-13.521111	-9.791077	-10.341069	-8.351047	-10.151087	-10.611281	-10.431321	-11.781897	-11.651312	-15.531539	-15.141583	-11.931589	-12.791446	-13.841602	-13.841602	-16.181338	-16.181338	-13.971444	-13.971444	-12.231539	-15.781429	-15.781429	-15.781429	-15.781429
(127.5)	-15.751498	-15.511439	-14.531427	-12.661244	-11.321023	-10.811244	9.931179	9.511162	-10.691176	-10.521392	-10.71115	8.191149	-11.951358	-14.611333	-14.54142	-12.11132	-11.691312	-12.391308	-10.851214	-14.42142	-14.42142	-14.42142	-14.42142	-14.42142	-14.42142	-14.42142
(132.5)	-15.911546	-14.591445	-12.791115	-11.101053	-10.521058	-11.441133	-11.251133	-11.411144	-11.921142	-12.221447	-14.951443	-15.291522	-15.981444	-14.991434	-14.121531	-15.981434	-15.981434	-15.121324	-13.771434	-13.771434	-15.291522	-14.111522	-14.111522	-15.291522	-15.291522	
(137.5)	-11.851186	-12.151223	-11.251102	-10.841103	-11.441123	-13.511556	-15.851544	-15.641237	-11.941124	-14.221559	-15.981527	-15.931513	-14.771156	-16.161449	-15.921513	-15.871507	-13.811498	-15.841447	-14.691444	-13.791444	-15.641516	-15.641516	-14.751169	-14.751169	-14.751169	
(142.5)	-11.311538	-12.741451	-13.591129	-13.091138	-14.121198	-13.391168	-14.011411	-12.571208	-11.711215	-12.821317	-14.111399	-13.021326	-12.291322	-13.331261	-12.211912	-13.091452	-14.341438	-15.121534	-15.391589	-15.861448	-14.281315	-13.291205	-11.791124	-13.411219	-13.411219	
FreeGain	6.959074	Theta	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
OD60	(901907.5)	(9151902.5)	(9301907.5)	(9451902.5)	(9601907.5)	(9751902.5)	(9901907.5)	(10051907.5)	(10201907.5)	(10351902.5)	(10501907.5)	(10651902.5)	(10801907.5)	(10951902.5)	(11101907.5)	(11251902.5)	(11401907.5)	(11551902.5)	(11701907.5)	(11851902.5)	(12001907.5)	(12151902.5)	(12301907.5)	(12451902.5)	(12601907.5)	
(87.5)	0.641093	-1.07106	-0.60106	0.51909	1.32107	2.05106	1.79109	1.65107	1.11103	0.97007	0.78006	0.50309	0.36001	-0.191047	-0.60001	0.440073	1.11106	0.93002	0.72007	0.86009	0.99111	10.74	0.560048	0.281008	0.281008	
(92.5)	0.201103	0.370085	1.07113	1.17115	1.16009	0.74009	0.56009	0.72005	0.14101	-0.24101	-1.291144	-1.51177	-1.92119	-1.19101	-1.19001	0.740073	2.42207	2.59208	1.85149	1.61101	0.57001	0.760048	0.510033	0.510033	0.510033	
(97.5)	2.09206	2.23209	1.69104	1.87208	2.16204	1.74104	0.90309	0.220057	-0.161033	-2.34136	-6.17208	-6.89166	-6.17208	-4.43209	-0.160086	1.370056	2.29309	3.19209	3.44208	1.71006	0.49001	1.14109	1.01108	1.01108	1.01108	
(102.5)	1.56117	1.25109	1.86204	2.97008	2.89206	2.11104	0.301032	0.651037	-0.691033	-0.871177	-2.95004	-5.76172	-6.54194	-4.84129	-2.160086	2.03214	2.19208	2.53209	2.44208	1.67101	1.24158	1.63154	1.59109	1.63154	1.63154	
(107.5)	1.45201	2.24179	1.61103	1.230051	0.16105	1.34159	3.10107	0.20109	0.591108	-0.52139	-5.74178	-6.54111	-7.97148	-2.96142	-0.741048	0.48151	2.73145	3.84307	2.89182	2.43101	2.53208	2.26204	2.72207	2.72207	2.72207	
(112.5)	0.481016	1.04107	1.33208	2.91003	3.13103	2.19102	1.77003	1.15107	-1.15107	-1.72106	-0.68104	-1.12106	-0.94004	-0.49109	1.34008	1.07106	1.43108	1.10104	-0.16102	1.34203	1.65105	0.93103	3.42211	1.51101	1.51101	
(117.5)	0.131087	-0.591058	0.39208	2.59104	3.95203	2.93104	1.34106	0.76002	0.34106	2.31107	-1.25102	-2.35126	-2.95109	-0.49109	1.34008	1.07106	1.43108	1.10104	-0.16102	1.34203	1.65105	0.93103	3.42211	1.51101	1.51101	
(122.5)	1.841203	0.73102	0.64117	2.55104	3.80102	-0.62004	-1.13013	0.24006	0.83102	-0.73104	3.04203	-3.27133	-3.27133	-0.83102	1.34008	1.07106	1.43108	1.10104	-0.16102	1.34203	1.65105	0.93103	3.42211	1.51101	1.51101	
(127.5)	2.82104	2.69104	1.86104	1.34204	1.88009	0.07607	0.71003	-0.31025	1.19025	3.52104	3.82106	1.81015	0.72004	-0.991072	0.31029	0.19129	-0.35126	0.63157	-1.461057	-0.23103	-1.32013	-0.391025	0.99127	3.81203	3.81203	
(132.5)	2.07106	2.99203	2.95201	2.71207	2.49107	0.51012	-1.46009	1.98103	1.71009	3.75029	2.90107	1.04008	0.62001	-1.19102	1.24021	1.81125	-1.91029	1.72107	0.43129	-1.57106	0.64026	2.66103	1.14109	1.14109	1.14109	
(137.5)	0.37002	1.07008	1.51026	2.44208	1.96004	0.44155	2.65107	0.92011	0.79013	1.91152	3.59179	1.82025	1.94023	0.36013	1.96005	0.91017	0.69011	2.09104	0.35032	-2.28101	0.92008	2.44109	1.52105	1.52105	1.52105	
(142.5)	1.83114	1.57102	-0.40003	1.71007	1.491022	-0.54154	1.51109	0.181037	0.331078	0.99001	1.17007	0.80001	0.451028	1.02005	1.460073	0.02129	-1.84008	1.51008	0.731065	-3.81103	0.931027	1.39103	2.21104	2.21104	2.21104	
(147.5)	4.04178	5.82180	3.01148	1.13078	3.59124	2.94162	5.9212	4.95147	2.92197	0.79166	-0.16118	-0.71139	9.95142	3.79132	0.31138	-1.51178	3.44104	-1.35129	-2.89143	-5.11403	-1.79003	-1.29113	3.91148	-1.79103	-1.79103	
(152.5)	-1.481624	-0.961048	6.64146	-1.361144	-0.531025	-4.84119	-7.03127	2.191025	-1.910025	-1.910025	-1.910025	-1.910025	-1.910025	-1.910025	-1.910025	-1.910025	-1.910025	-1.910025	-1.910025	-1.910025	-1.910025	-1.910025	-1.910025	-1.910025	-1.910025	-1.910025
(157.5)	5.43147	-7.89171	-7.89174	-3.99143	6.97186	-8.91144	-10.39149	-3.99143	3.99143	-3.971037	-3.971037	-3.971037	-3.971037	-3.971037	-3.971037	-3.971037	-3.971037	-3.971037	-3.971037	-3.971037	-3.971037	-3.971037	-3.971037	-3.971037	-3.971037	
(162.5)	-1.791075	-6.231072	-8.111076	-7.381438	-4.95116	-6.81107	-10.54109	-3.891074	-0.85107	-4.54107	-5.67107	-8.96104	-4.47101	-4.71108	-6.24102	-7.94102	-6.92108	-5.90108	-4.92108	-3.97108	-2.95108	-1.93108	-0.91108	-0.89108	-0.89108	
(167.5)	-10.29103	-8.461015	-11.89106	-7.051034	-5.21104	-10.61101	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	-11.89105	
(172.5)	3.961024	-14.801159	-14.381102	8.861117	-10.041063	8.97184	-9.591033	-12.941113	-11.321075	8.991043	-6.011062	-11.891129	-10.151026	8.521044	-7.531048	8.711036	8.711036	10.121427	-7.261092	-12.111069	-8.511081	-15.631432	8.581441	-10.291103	-10.291103	
(177.5)	1.791162	-12.131386	-14.651181	8.381154	-15.031227	9.73185	-9.19109	-7.91177	-7.73165	-8.161044	-6.441784	-6.871078	8.27161	8.711034	-12.431121	-10.121389	-10.691075	8.671101	-11.931299	-10.74						



Radiated Composite Gain Data

Appendix A

(d22)	-18.95-15.28	-18.95-15.28	-18.95-15.28	-11.02-7.36	5.36-3.48	-1.77-1.72	-3.13-3.37	-2.84-1.75	-1.31-1.59	2.47-3.75	-5.73-7.28	-7.54-6.78	5.77-6.18	5.39-6.17	4.64-4.96	-6.03-6.53	-5.96-4.39	-2.61-3	-2.62-7.2	1.08-0.9	0.52-8	0.09-0.9	-2.13-45	-5.42-829	
(d25)	11.53-12.42	6.41-10.44	-11.91-6.5	8.99-11.4	9.5-4.3	2.32-1.63	2.06-3	-3.19-3.01	-3.24-2.3	3.05-4.13	-6.64-3.67	-6.88-8.52	-10.27-13.3	-10.22-13.3	-10.84-1.76	-4.87-5.04	-6.87-5.5	-3.65-2.35	2.27-1.95	-1.02-0.99	-2.08-3.11	3.09-3.75	3.84-3.51	5.15-9.2	
(d27)	-12.71-10.26	-6.88-6.32	-8.99-8.68	4.58-2.21	-10.02-6.72	2.71-1.11	-1.11-2.08	3.09-3.79	-4.24-3.2	3.05-4.13	-6.64-3.67	-6.88-8.52	-10.27-13.3	-10.22-13.3	-10.84-1.76	-4.87-5.04	-6.87-5.5	-3.65-2.35	2.27-1.95	-1.02-0.99	-2.08-3.11	3.09-3.75	3.84-3.51	5.15-9.2	
(d29)	-12.91-14.74	-7.64-4.8	-15.2-8.02	-10.02-6.95	-8.98	4.18-1.98	-1.461-4.8	-1.82-1.26	1.41-6.54	5.83-7.13	-9.34-6.1	-6.11-10.55	-10.69-10.49	-12.78-10.3	-6.64-7.1	-11.13-11.3	-13.71-9.76	-4.85-8.28	-6.81-7.2	-5.45-6.13	-3.46-4.28	6.49-5.18	6.49-5.18	6.49-5.18	
(d32)	-13.75-17.4	-7.54-4.7	-4.89-7.36	-13.2-12	-11.63-12.74	4.84-3.24	-1.51-1.1	-3.09-3.79	-4.24-3.2	3.05-4.13	-6.64-3.67	-6.88-8.52	-10.27-13.3	-10.22-13.3	-10.84-1.76	-4.87-5.04	-6.87-5.5	-3.65-2.35	2.27-1.95	-1.02-0.99	-2.08-3.11	3.09-3.75	3.84-3.51	5.15-9.2	
(d35)	-13.71-12.31	-7.60-7.76	-8.96-8.83	-14.49-17.52	-15.94-18.06	7.12-4.2	4.46-1.96	3.34-4.89	8.04-10.98	4.89-12.96	-14.42-7.46	-14.42-7.46	-2.91-7.4	2.54-3.13	8.06-11.07	-10.11-8.1	-16.95-19.01	12.15-14.48	6.06-7.4	8.78-11.9	7.49-8.07	4.69-7.56	7.34-11.26	-10.92-9.73	
(d37)	-12.58-9.23	-11.92-12.36	-11.9-14.7	-14.86-17.09	-16.99-17.9	9.99-4.5	4.46-2.55	6.28-7.28	-10.41-10.8	-14.72-10.72	-14.72-10.72	-2.42-2.97	-1.75-2.76	1.72-2.76	10.21-10.7	-12.98-8.99	-16.96-17.1	-11.76-12.88	9.69-12.41	7.8-9.46	11.9-12.06	7.52-9.46	5.94-13.17	-10.21-13.21	
(d40)	-11.66-9.37	-11.29-15.64	-11.81-8.75	-12.56-17.28	-16.59-13.43	-14.48-6.88	6.53-3.92	8.71-11.24	-15.12-12.81	-16.78-1.5	6.26-6.11	7.07-1.13	4.23-4.76	6.59-17.89	-18.02-10.32	-15.81-11.6	-14.54-17.72	-11.74-8.99	5.99-16.28	-14.57-13.37	-17.06-17.37	-13.33-14.21	-15.16-18.12	-10.33-8.83	
(d42)	-12.14-12.19	-16.91-17.4	-12.92-11.34	-14.35-16.51	-16.85-18.45	-14.20-13.1	-13.29-16.2	-10.46-10.78	-13.39-13.42	-11.36-17.27	-6.57-7.46	-8.97-7.21	6.44-8.38	6.38-12.52	-16.36-14.42	-12.98-14.1	-11.65-18.62	-13.71-10.58	8.98-17.38	-13.71-10.58	-17.41-16.39	-14.46-12.24	-11.36-17.85	-13.96-19.33	
(d45)	-17.19-10.27	-16.91-16.7	-12.92-11.34	-14.35-16.51	-16.85-18.45	-14.20-13.1	-13.29-16.2	-10.46-10.78	-13.39-13.42	-11.36-17.27	-6.57-7.46	-8.97-7.21	6.44-8.38	6.38-12.52	-16.36-14.42	-12.98-14.1	-11.65-18.62	-13.71-10.58	8.98-17.38	-13.71-10.58	-17.41-16.39	-14.46-12.24	-11.36-17.85	-13.96-19.33	
(d48)	-17.19-10.27	-16.91-16.7	-12.92-11.34	-14.35-16.51	-16.85-18.45	-14.20-13.1	-13.29-16.2	-10.46-10.78	-13.39-13.42	-11.36-17.27	-6.57-7.46	-8.97-7.21	6.44-8.38	6.38-12.52	-16.36-14.42	-12.98-14.1	-11.65-18.62	-13.71-10.58	8.98-17.38	-13.71-10.58	-17.41-16.39	-14.46-12.24	-11.36-17.85	-13.96-19.33	
(d51)	-18.86-14.97	-15.04-17.74	-14.21-12.35	-12.59-16.16	-18.04-16.63	-18.24-17.2	-17.31-15.9	-17.72-10.12	-10.73-11.5	8.32-8.54	5.89-7.54	8.23-8.69	8.03-8.68	9.51-11.66	4.49-10.22	-18.27-18.7	-17.11-16.69	-17.37-11.69	-17.37-11.69	-17.37-11.69	-17.37-11.69	-17.37-11.69	-17.37-11.69	-17.37-11.69	-17.37-11.69
(d54)	-18.41-18.84	-18.97-18.71	-17.39-12.43	-12.33-18.26	-18.17-18.19	-17.37-10.12	-17.29-18.77	-17.37-10.12	-13.01-9.8	8.32-8.54	5.89-7.54	8.23-8.69	8.03-8.68	9.51-11.66	4.49-10.22	-18.27-18.7	-17.11-16.69	-17.37-11.69	-17.37-11.69	-17.37-11.69	-17.37-11.69	-17.37-11.69	-17.37-11.69	-17.37-11.69	-17.37-11.69
(d57)	-19.38-19.28	-18.73-19.24	-17.02-10.88	-10.71-16.96	-17.02-10.88	-18.27-10.77	-16.41-18.47	-13.72-13.48	-15.26-10.19	-7.41-10.38	-7.94-8.48	4.9-8.07	8.03-8.61	-11.85-12.32	-10.86-15.74	-13.18-13.33	-18.05-15.69	-18.02-17.11	-13.71-13.4	-13.02-10.92	-18.02-17.11	-13.71-13.4	-13.02-10.92	-18.02-17.11	-13.71-13.4
(d60)	-19.41-18.51	-18.93-17.68	-13.02-11.98	-12.29-13.62	-15.23-17.83	-17.45-14.26	-13.03-14.1	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14
(d63)	-19.41-18.51	-18.93-17.68	-13.02-11.98	-12.29-13.62	-15.23-17.83	-17.45-14.26	-13.03-14.1	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14
(d66)	-19.41-18.51	-18.93-17.68	-13.02-11.98	-12.29-13.62	-15.23-17.83	-17.45-14.26	-13.03-14.1	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14
(d69)	-19.41-18.51	-18.93-17.68	-13.02-11.98	-12.29-13.62	-15.23-17.83	-17.45-14.26	-13.03-14.1	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14	-18.72-18.15	-15.77-14
(d72)	-18.81-18.88	-18.41-18.88	-15.02-15.43	-16.62-15.54	-15.53-15.62	-14.62-13.58	-12.5-9.51	-10.42-13.53	-16.14-15.27	-13.45-12.42	-11.76-13.32	-13.35-11.1	-12.41-18.69	-19.12-17.88	-17.83-14.74	-17.41-17.97	-18.83-17.61	-17.73-15.46	-15.79-18.13	-17.86-18.12	-17.73-15.46	-15.79-18.13	-17.86-18.12	-17.73-15.46	-15.79-18.13
(d75)	-18.19-19.05	-18.31-19.25	-15.03-14.1	-15.93-14.25	-15.53-14.25	-13.89-11.23	-11.42-13.84	-14.93-13.49	-14.03-14.19	-18.12-18.72	-17.13-15.74	-17.54-18.55	-18.81-19.61	-19.12-17.88	-17.83-14.74	-17.41-17.97	-18.83-17.61	-17.73-15.46	-15.79-18.13	-17.86-18.12	-17.73-15.46	-15.79-18.13	-17.86-18.12	-17.73-15.46	-15.79-18.13
(d78)	-18.21-15.88	-14.61-13.89	-12.35-10.88	-10.89-10.65	-10.87-11.64	-13.81-14.1	-17.79-19.26	-18.99-18.52	-16.15-18.83	-17.97-17.94	-18.97-17.63	-18.41-17.1	-18.69-18.43	-18.61-17.94	-18.61-17.94	-18.20-14.91	-17.97-17.94	-18.20-14.91	-17.97-17.94	-18.20-14.91	-17.97-17.94	-18.20-14.91	-17.97-17.94	-18.20-14.91	-17.97-17.94
(d81)	-18.86-17.59	-18.05-18.47	-17.79-19.52	-18.11-17.61	-16.45-16.88	-19.06-18.98	-18.18-18.45	-18.18-18.45	-18.68-19.74	-16.81-17.34	-14.99-14.79	-14.05-14.71	-18.11-17.1	-12.97-12.42	-12.52-12.71	-12.40-11.99	-12.49-12.97	-17.37-14.49	-14.26-14.31	-16.51-17.83	-18.92-17.78	-18.11-17.61	-16.45-16.88	-18.11-17.61	-16.45-16.88
Freq(Hz)	6.475(9) Psk	Thesak1.1																							
Gain	0*(90/90)	0*(195/225)	0*(30/30)	0*(45/45)	0*(60/60)	0*(75/75)	0*(90/90)	0*(105/105)	0*(120/120)	0*(135/135)	0*(150/150)	0*(165/165)	0*(180/180)	0*(195/195)	0*(210/210)	0*(225/225)	0*(240/240)	0*(255/255)	0*(270/270)	0*(285/285)	0*(300/300)	0*(315/315)	0*(330/330)	0*(345/345)	
(d1)	1.75-1.44	-1.41-1.06	-0.54-0.3	0.46-0.53	-1.38-1.7	2.23-2.37	4.95-9.59	-7.66-9.57	-10.28-9.68	13.1-6.1	-4.51-3.05	-16.7-10.56	0.12-0.58	0.69-0.85	0.82-0.55	0.8-0.39	-1.15-2.06	-3.33-4.78	-4.36-9.77	-11.51-13.97	-14.11-11.6	0.97-1.75	6.79-4.5	-3.27-3.24	
(d4)	0.34-0.77	0.67-0.77	0.65-0.77	0.35-0.42	-1.39-1.7	2.23-2.37	4.95-9.59	-7.66-9.57	-10.28-9.68	13.1-6.1	-4.51-3.05	-16.7-10.56	0.12-0.58	0.69-0.85	0.82-0.55	0.8-0.39	-1.15-2.06	-3.33-4.78	-4.36-9.77	-11.51-13.97	-14.11-11.6	0.97-1.75	6.79-4.5	-3.27-3.24	
(d7)	0.66-0.69	-0.24-0.09	0.34-0.71	0.76-1.41	1.05-1.18	3.3-3.21	5.91-7.66	8.92-10.39	-7.66-9.57	-10.28-9.68	13.1-6.1	-4.51-3.05	-16.7-10.56	0.12-0.58	0.69-0.85	0.82-0.55	0.8-0.39	-1.15-2.06	-3.33-4.78	-4.36-9.77	-11.51-13.97	-14.11-11.6	0.97-1.75	6.79-4.5	-3.27-3.24
(d10)	0.23-0.06	0.44-0.15	0.59-0.81	0.76-1.41	1.05-1.18	3.3-3.21	5.91-7.66	8.92-10.39	-7.66-9.57	-10.28-9.68	13.1-6.1	-4.51-3.05	-16.7-10.56	0.12-0.58	0.69-0.85	0.82-0.55	0.8-0.39	-1.15-2.06	-3.33-4.78	-4.36-9.77	-11.51-13.97	-14.11-11.6	0.97-1.75	6.79-4.5	-3.27-3.24
(d13)	1.09-0.66	0.88-1.5	1.59-1.54	1.37-1.02	0.67-0.44	0.05-0.98	2.09-2.83	3.61-4.64	4.87-4.46	1.46-1.78	-10.42-12.64	-1.65-12.18	6.64-7.49	6.56-7.59	4.2-4.63	4.69-2.57	1.84-4.32	5.91-7.39	8.54-11.07	-13.43-9.71	3.99-4.56	3.96-1.95	-1.94-0.92	0.80-1.8	
(d16)	0.75-0.35	0.88-1.2	1.41-4.3	1.39-1.26	1.41-4.3	1.39-1.26	1.41-4.3	1.39-1.26	1.41-4.3	1.39-1.26	1.41-4.3	1.39-1.26	1.41-4.3	1.39-1.26	1.41-4.3	1.39-1.26	1.41-4.3	1.39-1.26	1.41-4.3	1.39-1.26	1.41-4.3	1.39-1.26	1.41-4.3	1.39-1.26	1.41-4.3
(d19)	2.01-0.36	0.75-1.17	-0.3-0.39	1.17-1.53	1.51-1.51	1.41-1.02	0.5-3.3	1.06-2.33	3.35-1.2	7.32-2.5	-3.22-6.4	8.29-6.88	6.07-7.2	2.95-2.35	5.42-4.1	7.91-5.55	6.81-8.86	10.47-17.68	-14.27-12.63	-15.28-12.25	-6.8-7.2	6.29-4.37	3.46-2.4	1.88-2.28	
(d22)	2.73-0.72																								



Radiated Composite Gain Data

Appendix A

(H1121)	-8.694.3	-8.737.7	-7.69.20	-8.347.14	7.617.72	9.019.61	-8.717.62	-4.829.26	6.644.01	-4.673.79	-5.024.54	-8.539.23	8.717.85	8.999.48	-5.888.77	-7.594.73	10.444.654	-12.224.244	-11.661.233	-13.158.3	-13.711.279	-13.629.259	8.971.423	8.380.75	
(H121)	-14.117.17	-14.280.178	-11.907.127	9.628.24	7.448.83	-9.071.249	-10.899.81	7.865.53	6.256.95	8.116.9	-5.544.86	7.871.088	-10.267.64	9.266.48	-5.234.46	-10.387.15	10.877.162	-13.131.065	-12.441.181	-13.141.89	9.788	-13.764.46	4.298.89	-14.466.177	8.801.728
(H131)	-18.471.658	-17.341.996	-17.811.108	9.510.609	-11.131.105	-13.844.543	-14.014.954	-7.570.58	5.544.52	-6.833.43	-6.420.47	-10.044.206	-12.666.101	-7.537.18	-7.024.96	-8.920.166	-8.699.852	-13.444.171	-17.930.164	-17.460.877	-17.444.1305	-18.017.34	-14.033.778		
(H141)	-14.014.14	-19.31.16	-18.044.140	8.771.127	-12.571.121	-12.261.139	-15.669.881	8.921.12	5.597.61	-7.098.24	-8.779.102	-12.029.64	8.246.32	-8.051.142	-10.191.137	-14.781.109	-12.761.489	-17.531.189	-16.531.181	-16.191.137	-13.170	-13.760	-18.561.169	-19.171.131	
(H151)	-17.811.912	-17.921.16	-17.461.147	-11.491.157	-17.561.144	-12.251.132	-14.113.12	8.264.81	8.950.122	-10.144.926	8.069	-10.711.076	-12.029.64	-8.621.88	-12.551.72	-10.181.92	-17.481.1306	-17.161.1848	-17.861.165	-16.131.128	-10.171.186	-14.461.152	-17.871.178	-16.471.142	
(H161)	-18.471.167	-18.251.132	-18.151.107	-14.331.161	-18.121.149	-15.321.136	-15.341.136	-15.511.136	6.631.17	-7.954.46	9.251.102	-13.061.1471	-17.431.161	-12.371.132	-12.561.147	-17.171.99	-18.881.1876	-15.121.167	-14.781.178	-18.211.1874	-18.851.173	-17.481.186	-17.291.1761		
(H171)	-17.711.847	-18.071.135	-17.151.111	-16.191.150	-17.841.168	-18.961.148	-12.941.162	-11.621.127	-10.341.861	-10.921.133	-15.511.167	-17.371.97	-17.371.97	-17.311.1506	-17.511.104	-16.291.133	-18.061.181	-17.891.182	-16.591.1823	-10.111.61	-16.191.1426	-16.191.1426	-16.191.1426	-16.191.1426	
(H181)	-18.761.16	-17.511.827	-18.171.171	-18.291.122	-18.631.167	-17.881.125	-17.041.171	-16.351.149	-13.511.147	-17.461.173	-17.331.175	-17.481.197	-18.671.184	-18.991.177	-17.481.143	-14.061.184	-19.21.1866	-18.921.187	-18.321.1838	-18.671.1838	-17.041.1769	-15.581.145	-18.991.1743	-18.111.875	
(H191)	-18.061.182	-18.021.18	-18.561.178	-18.871.173	-17.161.33	-16.481.142	-15.571.143	-13.291.127	-12.451.115	-11.621.128	-14.261.148	-15.71.161	-17.531.189	-17.461.153	-13.761.171	-14.481.178	-18.251.1771	-18.091.185	-18.111.1804	-16.781.188	-18.311.1786	-18.671.1823	-17.831.185	-18.631.185	
(H201)	-15.531.184	-15.721.188	-16.681.188	-18.841.1751	-17.831.178	-18.781.187	-18.671.183	-17.571.1781	-18.841.188	-16.381.186	-16.791.183	-16.161.187	-17.121.189	-18.911.182	-18.221.181	-18.181.184	-16.681.184	-16.351.182	-17.841.184	-18.311.187	-18.761.1849	-18.571.1884	-17.431.1771	-16.521.184	
FreeHd	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	2.450.914	
Gain	0.071(97.5)	0.161(97.5)	0.301(97.5)	0.451(97.5)	0.601(97.5)	0.751(97.5)	0.901(97.5)	1.051(97.5)	1.201(97.5)	1.351(97.5)	1.501(97.5)	1.651(97.5)	1.801(97.5)	1.951(97.5)	2.101(97.5)	2.251(97.5)	2.401(97.5)	2.551(97.5)	2.701(97.5)	2.851(97.5)	3.001(97.5)	3.151(97.5)	3.301(97.5)	3.451(97.5)	
(H1)	5.164.534	5.175.544	5.186.554	5.197.564	5.208.574	5.219.584	5.230.594	5.241.604	5.252.614	5.263.624	5.274.634	5.285.644	5.296.654	5.307.664	5.318.674	5.329.684	5.340.694	5.351.704	5.362.714	5.373.724	5.384.734	5.395.744	5.406.754	5.417.764	
(H2)	5.734.62	5.745.63	5.756.64	5.767.65	5.778.66	5.789.67	5.800.68	5.811.69	5.822.70	5.833.71	5.844.72	5.855.73	5.866.74	5.877.75	5.888.76	5.899.77	5.910.78	5.921.79	5.932.80	5.943.81	5.954.82	5.965.83	5.976.84	5.987.85	
(H3)	6.064.72	6.075.73	6.086.74	6.097.75	6.108.76	6.119.77	6.130.78	6.141.79	6.152.80	6.163.81	6.174.82	6.185.83	6.196.84	6.207.85	6.218.86	6.229.87	6.240.88	6.251.89	6.262.90	6.273.91	6.284.92	6.295.93	6.306.94	6.317.95	
(H4)	6.534.82	6.545.83	6.556.84	6.567.85	6.578.86	6.589.87	6.600.88	6.611.89	6.622.90	6.633.91	6.644.92	6.655.93	6.666.94	6.677.95	6.688.96	6.699.97	6.710.98	6.721.99	6.732.100	6.743.101	6.754.102	6.765.103	6.776.104	6.787.105	
(H5)	6.854.92	6.865.93	6.876.94	6.887.95	6.898.96	6.909.97	6.920.98	6.931.99	6.942.100	6.953.101	6.964.102	6.975.103	6.986.104	6.997.105	7.008.106	7.019.107	7.030.108	7.041.109	7.052.110	7.063.111	7.074.112	7.085.113	7.096.114	7.107.115	
(H6)	7.147.24	7.158.25	7.169.26	7.180.27	7.191.28	7.202.29	7.213.30	7.224.31	7.235.32	7.246.33	7.257.34	7.268.35	7.279.36	7.290.37	7.301.38	7.312.39	7.323.40	7.334.41	7.345.42	7.356.43	7.367.44	7.378.45	7.389.46	7.400.47	
(H7)	7.461.56	7.472.57	7.483.58	7.494.59	7.505.60	7.516.61	7.527.62	7.538.63	7.549.64	7.560.65	7.571.66	7.582.67	7.593.68	7.604.69	7.615.70	7.626.71	7.637.72	7.648.73	7.659.74	7.670.75	7.681.76	7.692.77	7.703.78	7.714.79	
(H8)	7.761.77	7.772.78	7.783.79	7.794.80	7.805.81	7.816.82	7.827.83	7.838.84	7.849.85	7.860.86	7.871.87	7.882.88	7.893.89	7.904.90	7.915.91	7.926.92	7.937.93	7.948.94	7.959.95	7.970.96	7.981.97	7.992.98	8.003.99	8.014.100	
(H9)	8.064.72	8.075.73	8.086.74	8.097.75	8.108.76	8.119.77	8.130.78	8.141.79	8.152.80	8.163.81	8.174.82	8.185.83	8.196.84	8.207.85	8.218.86	8.229.87	8.240.88	8.251.89	8.262.90	8.273.91	8.284.92	8.295.93	8.306.94	8.317.95	
(H10)	8.347.04	8.358.05	8.369.06	8.380.07	8.391.08	8.402.09	8.413.10	8.424.11	8.435.12	8.446.13	8.457.14	8.468.15	8.479.16	8.490.17	8.501.18	8.512.19	8.523.20	8.534.21	8.545.22	8.556.23	8.567.24	8.578.25	8.589.26	8.600.27	
(H11)	8.591.36	8.602.37	8.613.38	8.624.39	8.635.40	8.646.41	8.657.42	8.668.43	8.679.44	8.690.45	8.701.46	8.712.47	8.723.48	8.734.49	8.745.50	8.756.51	8.767.52	8.778.53	8.789.54	8.800.55	8.811.56	8.822.57	8.833.58	8.844.59	
(H12)	8.857.71	8.868.72	8.879.73	8.890.74	8.901.75	8.912.76	8.923.77	8.934.78	8.945.79	8.956.80	8.967.81	8.978.82	8.989.83	9.000.84	9.011.85	9.022.86	9.033.87	9.044.88	9.055.89	9.066.90	9.077.91	9.088.92	9.099.93	9.110.94	
(H13)	9.116.29	9.127.30	9.138.31	9.149.32	9.160.33	9.171.34	9.182.35	9.193.36	9.204.37	9.215.38	9.226.39	9.237.40	9.248.41	9.259.42	9.270.43	9.281.44	9.292.45	9.303.46	9.314.47	9.325.48	9.336.49	9.347.50	9.358.51	9.369.52	
(H14)	9.377.91	9.388.92	9.399.93	9.410.94	9.421.95	9.432.96	9.443.97	9.454.98	9.465.99	9.476.100	9.487.101	9.498.102	9.509.103	9.520.104	9.531.105	9.542.106	9.553.107	9.564.108	9.575.109	9.586.110	9.597.111	9.608.112	9.619.113	9.630.114	
(H15)	9.641.54	9.652.55	9.663.56	9.674.57	9.685.58	9.696.59	9.707.60	9.718.61	9.729.62	9.740.63	9.751.64	9.762.65	9.773.66	9.784.67	9.795.68	9.806.69	9.817.70	9.828.71	9.839.72	9.850.73	9.861.74	9.872.75	9.883.76	9.894.77	
(H16)	9.908.18	9.919.19	9.930.20	9.941.21	9.952.22	9.963.23	9.974.24	9.985.25	9.996.26	10.007.27	10.018.28	10.029.29	10.040.30	10.051.31	10.062.32	10.073.33	10.084.34	10.095.35	10.106.36	10.117.37	10.128.38	10.139.39	10.150.40	10.161.41	
(H17)	10.172.82	10.183.83	10.194.84	10.205.85	10.216.86	10.227.87	10.238.88	10.249.89	10.260.90	10.271.91	10.282.92	10.293.93	10.304.94	10.315.95	10.326.96	10.337.97	10.348.98	10.359.99	10.370.100	10.381.101	10.392.102	10.403.103	10.414.104	10.425.105	
(H18)	10.439.46	10.450.47	10.461.48	10.472.49	10.483.50	10.494.51	10.505.52	10.516.53	10.527.54	10.538.55	10.549.56	10.560.57	10.571.58	10.582.59	10.593.60	10.604.61	10.615.62	10.626.63	10.637.64	10.648.65	10.659.66	10.670.67	10.681.68	10.692.69	
(H19)	10.707.19	10.718.20	10.729.21	10.740.22	10.751.23	10.762.24	10.773.25	10.784.26	10.795.27	10.806.28	10.817.29	10.828.30	10.839.31	10.850.32	10.861.33	10.872.34	10.883.35	10.894.36	10.905.37	10.916.38	10.927.39	10.938.40	10.949.41	10.960.42	
(H20)	10.975.92	10.986.93	10.997.94	11.008.95	11.019.96	11.030.97	11.041.98	11.052.99	11.063.100	11.074.101	11.085.102	11.096.103	11.107.104	11.118.105	11.129.106	11.140.107	11.151.108	11.162.109	11.173.110	11.184.111	11.195.112	11.206.113	11.217.114	11.228.115	
(H21)	11.239.66	11.250.67	11.261.68	11.272.69	11.283.70	11.294.71	11.305.72	11.316.73	11.327.74	11.338.75	11.349.76	11.360.77	11.371.78	11.382.79	11.393.80	11.404.81	11.415.82	11.426.83	11.437.84	11.448.85	11.459.86	11.470.87	11.481.88	11.492.89	
(H22)	11.504.38	11.515.39	11.526.40	11.537.41	11.548.42	11.559.43	11.570.44	11.581.45	11.592.46	11.603.47	11.614.48	11.625.49	11.636.50	11.647.51	11.658.52	11.669.53	11.680.54	11.691.55	11.702.56	11.713.57	11.724.58	11.735.59	11.746.60	11.757.61	
(H23)	11.768.11	11.779.12	11.790.13	11.801.14	11.812.15	11.823.16	11.834.17	11.845.18	11.856.19	11.867.20	11.878.21	11.889.22	11.900.23	11.911.24	11.922.25	11.933.26	11.944.27	11.955.28	11.966.29	11.977.30	11.988.31	11.999.32	12.010.33	12.021.34	
(H24)	12.031.84	12.042.85	12.053.86	12.064.87	12.075.88	12.086.89	12.																		



Radiated Composite Gain Data

Appendix A

(H125)	(H126)	(H127)	(H128)	(H129)	(H130)	(H131)	(H132)	(H133)	(H134)	(H135)	(H136)	(H137)	(H138)	(H139)	(H140)	(H141)	(H142)	(H143)	(H144)	(H145)	(H146)	(H147)	(H148)	(H149)	(H150)	(H151)	(H152)	(H153)	(H154)	(H155)	(H156)	(H157)	(H158)	(H159)	(H160)	(H161)	(H162)	(H163)	(H164)	(H165)	(H166)	(H167)	(H168)	(H169)	(H170)	(H171)	(H172)	(H173)	(H174)	(H175)	(H176)	(H177)	(H178)	(H179)	(H180)	(H181)	(H182)	(H183)	(H184)	(H185)	(H186)	(H187)	(H188)	(H189)	(H190)	(H191)	(H192)	(H193)	(H194)	(H195)	(H196)	(H197)	(H198)	(H199)	(H200)
(H125)	(H126)	(H127)	(H128)	(H129)	(H130)	(H131)	(H132)	(H133)	(H134)	(H135)	(H136)	(H137)	(H138)	(H139)	(H140)	(H141)	(H142)	(H143)	(H144)	(H145)	(H146)	(H147)	(H148)	(H149)	(H150)	(H151)	(H152)	(H153)	(H154)	(H155)	(H156)	(H157)	(H158)	(H159)	(H160)	(H161)	(H162)	(H163)	(H164)	(H165)	(H166)	(H167)	(H168)	(H169)	(H170)	(H171)	(H172)	(H173)	(H174)	(H175)	(H176)	(H177)	(H178)	(H179)	(H180)	(H181)	(H182)	(H183)	(H184)	(H185)	(H186)	(H187)	(H188)	(H189)	(H190)	(H191)	(H192)	(H193)	(H194)	(H195)	(H196)	(H197)	(H198)	(H199)	(H200)



Antenna Pattern

Appendix B

(#25)	4.0830	3.8234	3.4308	2.5320	1.8621	2.3328	2.0144	0.45+0.28	0.47+0.38	0.39+0.58	-1.08+1.66	-1.90+2.44	2.26+1.41	0.68+0.48	-0.54+0.70	-1.13+1.79	-1.50+1.64	-1.09+0.41	0.80+0.48	1.27+1.56	1.67+1.88	2.463.00	3.223.66	3.833.96	
(#26)	2.7320	2.8430	4.8950	5.2049	4.3809	3.8334	3.8302	1.9304	0.34+1.71	0.85+1.01	-0.08+1.13	-2.61+0.49	4.37+1.11	3.11+1.12	0.69+0.48	0.49+0.44	-1.37+1.82	-1.79+1.15	0.48+1.09	-1.42+0.57	1.62+1.61	1.97+2.47	2.51+2.57	3.00+2.89	
(#27)	2.23+85	1.96+87	3.07+82	4.55+82	5.09+84	4.08+86	4.44+20	2.10+84	1.06+86	0.20+85	-0.06+85	-0.60+85	3.10+84	-1.92+80	-2.40+81	-0.17+80	-2.13+89	-6.00+79	4.40+78	-1.20+79	1.28+79	1.89+78	2.16+78	2.62+78	
(#28)	3.27+85	3.31+86	3.84+74	3.14+81	4.42+84	2.90+24	3.95+92	1.19+74	1.11+83	0.53+81	1.70+72	1.43+81	5.56+83	3.26+20	-3.99+26	-8.13+39	-6.61+60	8.47+64	0.41+12	-2.80+08	0.21+15	0.06+11	0.56+17	1.34+26	
(#29)	2.98+31	3.12+34	4.06+82	2.93+91	3.27+84	3.04+20	3.99+49	1.21+03	1.48+03	0.07+01	0.90+03	2.01+50	2.51+65	-7.22+67	-7.68+77	-10.81+71	-9.45+85	3.90+38	8.01+00	-1.31+01	0.16+20	-1.96+28	1.09+15	1.62+41	
(#30)	1.44+08	1.59+26	2.99+73	2.04+08	1.33+20	2.93+24	2.71+94	2.81+00	0.60+03	0.41+38	1.00+36	2.50+16	2.04+38	-5.55+49	-7.02+63	-10.89+37	-9.45+65	3.68+24	0.00+12	-2.40+81	1.95+18	3.16+46	-0.39+56	1.38+12	
(#31)	0.80+40	0.50+40	0.50+40	0.80+11	0.36+17	2.07+26	0.67+01	0.82+17	2.14+72	2.41+08	-0.27+18	-0.37+22	2.41+08	-0.53+49	-0.67+22	-0.57+18	-1.14+60	-0.39+17	-0.46+11	-1.71+25	-1.48+16	3.32+01	3.58+59	2.07+91	1.04+35
(#32)	0.48+17	0.64+37	0.31+06	1.41+37	2.19+02	0.41+22	0.77+16	-1.79+15	3.35+34	0.59+70	0.27+47	0.99+32	3.02+70	0.93+89	-1.39+71	-3.98+70	-3.24+79	-1.50+82	5.84+61	2.84+03	4.27+40	0.22+02	0.53+17	0.83+19	
(#33)	0.31+78	-1.58+34	-1.07+26	-2.39+24	4.05+23	0.52+37	4.40+36	-2.80+46	0.90+15	0.08+58	0.22+64	0.80+42	5.42+14	0.43+12	-1.37+02	3.24+29	-7.79+36	2.81+36	-2.60+32	5.92+29	3.28+02	4.39+49	5.98+82	0.31+21	
(#34)	1.19+41	0.98+24	0.20+16	0.98+37	0.53+40	-1.75+42	4.48+61	0.88+44	0.88+44	0.88+44	0.88+44	0.88+44	0.88+44	0.88+44	0.88+44	0.88+44	0.88+44	0.88+44	0.88+44	0.88+44	0.88+44	0.88+44	0.88+44	0.88+44	
(#35)	3.15+59	5.97+67	3.91+78	4.65+77	7.08+70	2.83+77	5.29+65	7.65+72	4.01+65	3.29+47	-1.84+30	0.93+55	7.68+56	1.10+59	3.39+48	4.60+68	7.89+75	4.28+65	3.39+84	5.93+33	5.94+67	6.11+91	5.98+43	2.94+47	
(#36)	5.05+65	7.54+58	6.88+38	5.91+23	6.80+29	4.72+27	7.14+21	7.91+02	5.48+60	4.71+81	3.11+69	6.93+59	7.69+53	4.51+58	6.48+17	5.93+18	7.10+13	5.23+90	6.80+70	6.96+70	6.96+70	6.96+70	6.96+70	6.96+70	
(#37)	6.32+77	-10.27+118	7.20+44	7.47+88	9.06+104	7.77+63	5.79+70	4.29+82	4.69+82	5.17+60	-2.09+58	4.76+59	7.98+29	4.98+83	6.91+07	6.15+10	10.89+10	8.11+11	7.72+07	1.87+56	9.64+54	10.89+59	3.99+44	-4.72+42	
(#38)	4.63+87	-15.31+128	11.46+129	8.69+89	7.24+82	8.52+106	12.24+132	8.54+87	4.54+90	5.75+60	5.75+60	5.75+60	5.75+60	4.60+50	6.05+07	9.34+15	11.38+76	7.69+75	8.34+15	11.38+76	11.40+72	6.31+66	4.79+62		
(#39)	8.00+127	-14.63+132	-12.88+64	8.67+13	8.81+96	-12.92+138	-11.31+161	-11.71+121	-12.47+63	-7.62+96	-5.97+57	-8.09+106	-11.46+151	-11.43+96	-10.78+10	-12.43+26	-10.69+92	-11.95+103	-11.13+12	-15.89+13	-10.78+60	-11.76+64	8.62+82	-10.13+82	
(#40)	-11.69+122	-10.38+139	-11.60+133	8.69+87	7.57+61	-9.26+106	-14.20+137	-14.10+152	-13.28+165	-10.63+142	-8.71+92	-12.91+104	-13.48+150	-11.50+120	-10.73+10	-12.40+20	-14.88+148	-15.53+148	-15.59+124	-14.50+126	-15.08+75	-15.08+75	-15.08+75		
(#41)	-14.83+150	-13.93+129	-16.90+148	-12.20+143	8.43+73	-8.40+108	-12.12+92	-10.45+129	-10.43+94	-1.09+109	-9.51+84	-14.30+112	-13.59+111	-11.94+145	-14.44+134	-11.91+70	-12.46+117	-10.67+103	-11.85+173	-12.34+103	-15.80+132	-12.91+136	-11.42+139	-14.24+125	
(#42)	-10.89+126	-15.17+148	-12.36+117	10.20+140	-12.78+92	-7.79+13	-8.62+84	8.14+92	-9.04+83	-9.29+123	-12.50+127	-10.27+112	-10.12+116	-10.12+116	-10.12+116	-10.12+116	-10.12+116	-10.12+116	-10.12+116	-10.12+116	-10.12+116	-10.12+116	-10.12+116		
(#43)	-15.91+152	-15.72+133	-10.45+100	-11.21+141	-1.35+118	-10.06+105	-11.42+132	-8.95+82	-10.16+117	-11.71+125	-11.57+146	-14.40+148	-13.51+159	-15.55+144	-14.63+156	-13.74+119	-14.01+135	-11.78+109	-10.46+114	-16.02+111	-15.64+105	-14.69+135	-15.01+149	-14.93+154	
(#44)	-15.13+142	-11.82+119	-12.12+158	-13.15+142	-11.07+126	-13.16+124	-13.71+128	-13.41+143	-15.80+158	-15.20+143	-15.20+143	-15.20+143	-15.20+143	-15.20+143	-15.20+143	-15.20+143	-15.20+143	-15.20+143	-15.20+143	-15.20+143	-15.20+143	-15.20+143	-15.20+143		
(#45)	-11.26+121	-12.20+141	-11.40+179	-10.50+129	-12.03+124	-12.86+142	-14.00+134	-14.78+147	-13.56+149	-15.49+175	-15.57+167	-15.97+141	-15.99+141	-15.77+143	-13.00+134	-13.93+160	-15.90+154	-14.74+155	-15.36+146	-15.49+151	-14.63+182	-13.78+131	-12.90+127	-11.00+178	
(#46)	-14.75+120	-13.91+144	-15.60+148	-15.28+145	-15.76+142	-15.61+162	-14.91+151	-14.54+149	-14.56+154	-14.46+152	-14.71+147	-14.50+137	-14.70+142	-14.70+142	-14.70+142	-14.70+142	-14.70+142	-14.70+142	-14.70+142	-14.70+142	-14.70+142	-14.70+142	-14.70+142		
FreeHd	2.450Pct																								
Gain	0°(150°/0°)	0°(150°/22.5°)	0°(150°/45°)	0°(150°/67.5°)	0°(150°/90°)	0°(150°/112.5°)	0°(150°/135°)	0°(150°/157.5°)	0°(150°/180°)	0°(150°/202.5°)	0°(150°/225°)	0°(150°/247.5°)	0°(150°/270°)	0°(150°/292.5°)	0°(150°/307°)	0°(150°/330°)	0°(150°/352.5°)	0°(150°/375°)	0°(150°/397.5°)	0°(150°/420°)	0°(150°/442.5°)	0°(150°/465°)	0°(150°/487.5°)		
(#1)	6.69+50	5.48+55	4.80+79	4.84+94	5.01+11	5.30+55	5.61+58	5.59+53	5.59+54	5.44+63	5.43+66	5.60+56	5.94+67	6.40+58	6.53+60	6.19+65	6.19+62	6.52+71	6.52+74	6.52+74	6.52+74	6.52+74	6.52+74	6.52+74	
(#2)	5.98+14	6.16+10	6.04+19	6.05+19	6.02+19	6.07+19	6.07+19	6.07+19	6.07+19	6.07+19	6.07+19	6.07+19	6.07+19	6.07+19	6.07+19	6.07+19	6.07+19	6.07+19	6.07+19	6.07+19	6.07+19	6.07+19	6.07+19		
(#3)	5.02+32	5.67+29	6.24+73	7.79+73	6.16+89	6.14+79	7.38+87	6.71+68	6.79+78	6.59+85	6.39+87	6.56+83	6.65+82	6.50+82	6.44+82	6.50+82	6.50+82	6.50+82	6.50+82	6.50+82	6.50+82	6.50+82	6.50+82		
(#4)	3.13+30	3.90+43	4.95+89	7.04+17	6.77+82	6.07+72	6.15+56	5.29+56	5.71+56	6.40+67	6.72+65	6.64+65	6.50+64	6.49+64	6.38+64	6.34+64	6.34+64	6.34+64	6.34+64	6.34+64	6.34+64	6.34+64	6.34+64		
(#5)	1.96+12	2.29+78	3.89+44	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79	6.48+79		
(#6)	0.86+91	-1.27+186	2.97+47	-5.94+07	7.40+79	6.05+13	4.96+40	-4.78+56	3.18+50	0.93+84	-7.28+17	5.10+41	4.14+47	4.20+30	-3.41+34	3.90+34	-3.31+38	3.04+76	2.77+91	3.11+97	4.20+94	4.26+94	3.77+94	-1.70+14	
(#7)	0.97+078	-1.88+242	2.93+24	-5.51+31	6.24+61	-4.98+31	3.75+42	-4.85+51	1.76+55	-9.89+63	-8.00+63	3.26+61	2.92+61	3.04+15	2.95+78	2.95+78	2.95+78	2.95+78	2.95+78	2.95+78	2.95+78	2.95+78	2.95+78		
(#8)	0.97+02	-0.96+184	-3.00+04	-4.77+26	5.25+47	-3.60+03	2.90+36	-3.91+41	-4.90+27	-3.87+79	-5.98+15	-2.71+51	-1.88+36	-2.40+22	-2.50+27	-2.94+30	-3.92+33	2.19+17	-1.24+76	2.89+24	6.10+69	6.52+29	6.67+19	3.53+19	
(#9)	-1.16+78	-1.01+204	-2.91+44	-3.87+40	-4.80+43	-3.80+19	-2.82+28	-3.30+38	-4.22+42	-5.97+60	-7.50+24	-4.00+24	-2.82+23	-2.83+25	-2.92+23	-3.47+27	-2.15+21	-0.91+26	-4.73+22	4.33+58	5.07+68	5.07+68	5.07+68		
(#10)	-1.96+113	-0.85+132	-2.04+25	-3.08+37	4.73+47	4.31+34	-3.47+35	-3.40+78	4.73+43	5.53+48	-3.30+28	-2.89+29	-3.41+66	-3.24+27	-2.65+25	-3.08+26	-1.46+57	0.40+98	-1.06+127	-2.73+28	2.81+11	3.55+05	4.04+32		
(#11)	-1.99+081	-1.59+251	-1.93+251	-2.99+40	6.15+51	5.41+42	-4.11+72	-8.83+56	5.97+50	5.97+54	-4.11+72	-4.11+72	-4.11+72	-4.11+72	-4.11+72	-4.11+72	-4.11+72	-4.11+72	-4.11+72	-4.11+72	-4.11+72	-4.11+72	-4.11+72		
(#12)	-2.00+114	-1.29+204	-2.60+37	-3.78+61	6.66+14	5.90+43	-4.66+84	-6.40+78	5.57+40	-4.91+25	-3.70+73	-3.69+61	6.78+37	5.51+61	4.00+30	-2.41+25	-2.98+23	-1.57+16	-0.46+81	-2.06+13	-1.07+08	1.19+76	2.56+37	-3.73+24	
(#13)	3.05+14	-1.23+217	-2.94+23	-3.88+13	6.21+62	6.66+37	-6.60+34	6.80+10	7.17+55	6.11+62	-4.89+23	-6.14+15	8.41+50	7.89+61	6.51+38	-2.51+38	-2.28+22	-1.26+18	-1.26+18	-1.26+18	-1.26+18	-1.26+18	-1.26+18		
(#14)	2.66+99	-0.76+167																							



Antenna Pattern

Appendix B

(H)°	4.7713-73	-3.8405	1.6314	1.0303	1.3411	-1.1412	-2.0346	-0.3413	3.7934	3.0904	-1.8904	-3.1447	-4.8725	1.0207	-0.7117	-0.9201	-1.0613	2.5311	3.8313	3.4436	0.4103	2.0811	0	12.0227	-1.9319	
(E)25	5.5614	-5.5614	0.7401	0.7401	0.1473	0.2444	-0.2444	-0.6403	1.3947	4.2012	-2.8018	-4.8419	5.6311	0.2042	0.5944	0.4003	-0.5714	-3.5513	0.5316	3.7113	0.1112	2.8927	-1.5020	4.1114		
(H)25	7.2610	-7.2610	-1.1811	0.8910	0.8837	-1.5726	0.2606	-3.8913	-4.0174	-4.8026	-0.5803	-8.8912	8.7702	-1.8814	-1.5102	0.6403	-0.8416	-3.7014	-0.2803	-0.5919	-1.4121	-3.1428	-2.6425	-4.3108		
(E)75	8.8614	-7.3218	-2.3017	2.4318	2.9316	-3.7914	-3.8913	-7.3118	4.8617	7.1114	-6.8218	-11.6719	8.8712	14.1412	-4.3318	-0.8915	-2.7714	4.9110	3.2411	3.0103	-4.3617	-4.6315	-4.8814	-4.8015		
(H)105	-10.2418	-10.2418	-4.8513	-3.3111	-3.5164	-4.3013	-5.4216	-6.8216	-8.4310	-5.3418	-7.3419	-9.3614	-6.4110	-10.4111	-10.4111	-10.4111	-10.4111	-6.0210	7.3712	-2.8213	-7.5714	-5.3319	-4.3714	-4.9615		
(E)125	9.4719	-10.2018	-4.8318	4.8819	6.2219	-8.2219	-4.7013	-7.0218	7.0218	-7.0123	-8.2718	-3.3314	-6.3117	-7.9517	-7.9517	-7.9517	-7.9517	7.9615	8.1419	-3.2616	6.2510	6.5519	8.2419	-5.1714		
(H)135	-10.8015	-10.1418	-6.6917	-7.4311	-8.0319	-8.8617	-7.0614	-11.3615	-13.4718	-13.4718	-13.4718	-13.4718	-13.4718	-13.4718	-13.4718	-13.4718	-13.4718	-13.4718	-13.4718	-13.4718	-13.4718	-13.4718	-13.4718	-13.4718	-13.4718	
(E)175	-10.8713	-8.7112	-6.9815	-1.0510	-1.1610	-0.6614	-1.8219	-1.8219	-1.1610	-1.8219	-0.6715	-1.8219	-0.6715	-1.1610	-1.8219	-0.6715	-1.8219	-0.6715	-1.1610	-1.8219	-0.6715	-1.8219	-0.6715	-1.1610	-1.8219	
(H)185	9.7816	-9.1710	-10.7618	-7.5310	-11.8814	-12.0810	-10.7618	-4.8910	-11.8814	-12.0810	-10.7618	-4.8910	-11.8814	-12.0810	-10.7618	-4.8910	-11.8814	-12.0810	-10.7618	-4.8910	-11.8814	-12.0810	-10.7618	-4.8910	-11.8814	
(E)225	-12.2712	-13.3614	-12.2712	-10.7110	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	-12.2712	
(H)235	-13.3614	-15.4614	-13.3614	-11.0914	-13.3614	-15.4614	-13.3614	-11.0914	-13.3614	-15.4614	-13.3614	-11.0914	-13.3614	-15.4614	-13.3614	-11.0914	-13.3614	-15.4614	-13.3614	-11.0914	-13.3614	-15.4614	-13.3614	-11.0914	-13.3614	
(E)275	-13.9415	-14.8212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	-11.7212	
(H)285	-14.8212	-16.0712	-12.4112	-13.1114	-15.2416	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	-14.5914	
(E)325	-15.1313	-16.2714	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	-15.1313	
FreeHd 2	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	2.6014	
Gain	0.0710(0.57)	0.1510(0.22)	0.3010(0.37)	0.4510(0.52)	0.6010(0.67)	0.7510(0.82)	0.9010(0.97)	1.0510(1.12)	1.2010(1.27)	1.3510(1.42)	1.5010(1.57)	1.6510(1.72)	1.8010(1.87)	1.9510(2.02)	2.1010(2.17)	2.2510(2.32)	2.4010(2.47)	2.5510(2.62)	2.7010(2.77)	2.8510(2.92)	3.0010(3.07)	3.1510(3.22)	3.3010(3.37)	3.4510(3.52)	3.6010(3.67)	
(E)375	3.8118	-3.8118	-3.3413	3.3413	3.3721	-3.3721	2.7413	-2.7413	-3.2024	-2.6013	-2.7413	-2.7424	-2.7424	-2.7424	-2.7424	-2.7424	-2.7424	-2.7424	-2.7424	-2.7424	-2.7424	-2.7424	-2.7424	-2.7424	-2.7424	
(H)385	2.8413	-2.8413	-2.9314	2.9314	2.0017	-2.0017	-1.7014	-1.7403	-2.1610	-2.2316	-2.2316	-2.2316	-2.2316	-2.2316	-2.2316	-2.2316	-2.2316	-2.2316	-2.2316	-2.2316	-2.2316	-2.2316	-2.2316	-2.2316	-2.2316	
(E)425	2.1418	-2.1418	-1.8111	1.8111	1.4203	-1.4203	0.8806	0.9004	0.4203	0.7114	-0.3519	-1.7418	-0.4611	-1.7418	-0.4611	-1.7418	-0.4611	-1.7418	-0.4611	-1.7418	-0.4611	-1.7418	-0.4611	-1.7418	-0.4611	
(H)475	0.7610	0.3013	0.1018	0.2411	1.2216	1.7814	1.0207	0.5110	0.3216	1.3217	-0.5319	-1.1510	-1.2611	-1.0411	-1.0911	-0.4611	-1.1913	0.8912	0.2612	0.3013	0.7216	-0.2110	-0.8510	0.2310	0.8811	
(E)525	2.2310	-2.2310	-1.2819	2.4310	2.7017	-2.7017	2.3917	0.9701	0.6005	-1.0318	-1.3710	-1.3710	-1.3710	-1.3710	-1.3710	-1.3710	-1.3710	-1.3710	-1.3710	-1.3710	-1.3710	-1.3710	-1.3710	-1.3710	-1.3710	
(H)575	0.7910	0.8210	0.5820	3.7413	3.5103	3.5203	1.6401	0.5710	0.5210	1.0713	-0.7218	-0.8910	-0.6512	-0.6212	-0.6012	-0.3816	-1.1710	-0.6310	0.8317	1.8218	1.9619	1.9619	1.9619	1.9619	1.9619	
(E)625	0.1612	1.2913	1.2913	3.6210	3.6210	3.6210	3.9916	3.9916	3.9916	3.9916	3.9916	3.9916	3.9916	3.9916	3.9916	3.9916	3.9916	3.9916	3.9916	3.9916	3.9916	3.9916	3.9916	3.9916	3.9916	
(H)675	0.8410	0.8002	2.4314	2.5613	2.3615	2.3615	0.0718	0.4314	0.1708	0.7143	-0.7314	-0.7314	-0.7314	-0.7314	-0.7314	-0.7314	-0.7314	-0.7314	-0.7314	-0.7314	-0.7314	-0.7314	-0.7314	-0.7314	-0.7314	
(E)725	2.4215	-0.0606	1.8618	1.1618	2.3119	0.8017	1.4316	-1.1916	0.7410	-1.7619	-0.6512	-0.7712	-0.5114	-0.3418	-0.2318	-0.1510	-0.3310	-0.2912	0.2218	0.2610	1.3817	2.1212	2.1212	2.1212	2.1212	
(H)775	3.2310	-2.5210	1.4211	1.6211	1.6211	2.7012	-1.0710	-0.9610	-1.0410	1.6410	-3.2410	-4.4410	-4.4410	-4.4410	-4.4410	-4.4410	-4.4410	-4.4410	-4.4410	-4.4410	-4.4410	-4.4410	-4.4410	-4.4410	-4.4410	
(E)825	3.9914	-3.2614	1.1913	1.3913	1.3913	2.2917	-0.9913	-0.9913	-1.0913	1.6913	-3.2913	-4.4913	-4.4913	-4.4913	-4.4913	-4.4913	-4.4913	-4.4913	-4.4913	-4.4913	-4.4913	-4.4913	-4.4913	-4.4913	-4.4913	
(H)875	5.0914	-4.5114	0.5711	0.3711	0.3711	0.2810	0.5812	0.5210	0.2810	2.1710	-3.3710	-4.1710	-4.1710	-4.1710	-4.1710	-4.1710	-4.1710	-4.1710	-4.1710	-4.1710	-4.1710	-4.1710	-4.1710	-4.1710	-4.1710	
(E)925	4.5710	-4.5710	-4.7819	1.9914	-1.9914	-4.8013	-1.2914	-0.2814	-0.2814	-4.2114	-3.7019	-4.9215	-7.3614	-6.1411	-6.1411	-6.1411	-6.1411	-6.1411	-6.1411	-6.1411	-6.1411	-6.1411	-6.1411	-6.1411	-6.1411	
(H)975	8.0118	-7.8014	2.8217	2.9217	2.9217	2.7412	3.0813	0.9313	0.9313	4.5213	-1.1413	-2.3114	-3.5411	-3.5411	-3.5411	-3.5411	-3.5411	-3.5411	-3.5411	-3.5411	-3.5411	-3.5411	-3.5411	-3.5411	-3.5411	
(E)1025	8.2713	-7.1313	-6.3419	4.6712	-3.7813	7.7714	-3.8517	-0.7013	-0.7013	8.7611	-5.4512	-10.5519	-13.6213	-12.3117	-13.8210	-13.8210	-13.8210	-13.8210	-13.8210	-13.8210	-13.8210	-13.8210	-13.8210	-13.8210	-13.8210	
(H)1075	-11.2912	-10.8214	-6.7910	3.3910	-6.4910	-7.9410	-8.2014	-8.2014	-8.2014	-10.8917	-11.4712	-6.8216	-6.8216	-6.8216	-6.8216	-6.8216	-6.8216	-6.8216	-6.8216	-6.8216	-6.8216	-6.8216	-6.8216	-6.8216	-6.8216	
(E)1125	-11.9514	-11.4411	-8.6812	-7.6812	-7.2810	-10.2810	-7.5712	-10.2810	-10.2810	-10.2810	-10.2810	-10.2810	-10.2810	-10.2810	-10.2810	-10.2810	-10.2810	-10.2810	-10.2810	-10.2810	-10.2810	-10.2810	-10.2810	-10.2810	-10.2810	
(H)1175	-13.9015	-13.5711	-7.9114	-8.5410	-10.1213	-10.2716	-11.5713	-11.5713	-11.5713	-12.0718	-9.4519	-11.5713	-11.5713	-11.5713	-11.5713	-11.5713	-11.5713	-11.5713	-11.5713	-11.5713	-11.5713	-11.5713	-11.5713	-11.5713	-11.5713	
(E)1225	-15.1614	-12.9418	-9.4018	-6.7617	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	
(H)1275	-15.9615	-12.9418	-10.2418	-6.4018	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	
(E)1325	-16.9615	-12.9418	-10.2418	-6.4018	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	-11.3210	
(H)1375	-16.2514	-16.0315	-13.6310	-8.2913	-11.4110	-10.8019	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	
(E)1425	-15.4614	-11.0617	-15.0915	-13.4910	-14.4010	-8.8610	-13.2313	-12.0914	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	-12.2912	-14.7514	
(H)1475	-15.7115	-15.6213	-15.1516	-15.7216	-14.1315	-13.8117	-15.4616	-11.4611	-14.8611	-10.1217	-10.2317	-15.1015	-14.8611	-10.1217	-10.2317	-15.1015	-14.8611	-10.1217	-10.2317	-15.1015	-14.8611	-10.1217	-10.2			



Antenna Pattern

Appendix B

	(H05)	(H10)	(H15)	(H20)	(H25)	(H30)	(H35)	(H40)	(H45)	(H50)	(H55)	(H60)	(H65)	(H70)	(H75)	(H80)	(H85)	(H90)	(H95)	(H100)
Gain	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Theta	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Phi	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Gain	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Theta	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Phi	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Gain	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Theta	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Phi	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000



Antenna Pattern

Appendix B

Theta (°)	2.4325	2.5252	2.6427	2.7827	2.9460	3.1339	3.3463	3.5827	3.8421	4.1134	4.3947	4.6841	4.9795	5.2788	5.5791	5.8783	6.1744	6.4644	6.7454	7.0154	7.2724	7.5134	7.7364	7.9494	8.1504	8.3374	8.5084	8.6614	8.7944	8.9064	8.9964	9.0624	9.1024	9.1244	9.1364	9.1384	9.1304	9.1114	9.0814	9.0394	8.9854	8.9184	8.8384	8.7454	8.6384	8.5174	8.3824	8.2334	8.0704	7.8934	7.7024	7.4974	7.2784	7.0454	6.7984	6.5374	6.2624	5.9734	5.6704	5.3534	5.0224	4.6774	4.3184	3.9454	3.5584	3.1574	2.7424	2.3084	1.8554	1.3834	0.8914	0.3804	-0.1494	-0.6884	-1.0354	-1.3884	-1.7454	-2.1054	-2.4664	-2.8274	-3.1874	-3.5454	-3.9004	-4.2514	-4.5974	-4.9384	-5.2734	-5.6014	-5.9214	-6.2324	-6.5334	-6.8234	-7.1014	-7.3664	-7.6184	-7.8564	-8.0794	-8.2864	-8.4764	-8.6484	-8.8014	-8.9344	-9.0474	-9.1404	-9.2124	-9.2634	-9.2934	-9.3014	-9.2874	-9.2514	-9.1934	-9.1144	-9.0144	-8.8934	-8.7514	-8.5884	-8.4054	-8.2024	-7.9794	-7.7364	-7.4734	-7.1904	-6.8874	-6.5654	-6.2244	-5.8654	-5.4884	-5.0934	-4.6804	-4.2494	-3.8014	-3.3364	-2.8554	-2.3584	-1.8454	-1.3174	-0.7744	-0.2154	0.3594	0.9734	1.6264	2.3184	3.0494	3.8194	4.6274	5.4724	6.3534	7.2694	8.2204	9.2054	10.2244	11.2764	12.3604	13.4754	14.7214	16.0984	17.6064	19.2454	21.0164	22.9184	24.9514	27.1154	29.4104	31.8364	34.3934	37.0814	39.9004	42.8514	45.9344	49.1494	52.4954	55.9724	59.5804	63.3194	67.1904	71.1934	75.3284	79.5964	83.9974	88.5314	93.1894	97.9724	102.8804	107.9134	113.0714	118.3544	123.7624	129.2954	134.9534	140.7364	146.6444	152.6774	158.8354	165.1184	171.5264	178.0594	184.7174	191.5004	198.4084	205.4414	212.5994	219.8824	227.2904	234.8194	242.4674	250.2354	258.1234	266.1314	274.2594	282.5074	290.8754	299.3534	307.9414	316.6394	325.4474	334.3654	343.3934	352.5314	361.7794	371.1374	380.6054	390.1834	399.8714	409.5694	419.2774	429.0954	438.9234	448.7614	458.6094	468.5674	478.6354	488.8134	499.0014	509.2994	519.7074	529.2254	538.8534	548.5914	558.4294	568.3674	578.4054	588.5434	598.7814	609.1194	619.5574	629.9954	640.5334	651.1714	661.9094	672.7474	683.6854	694.7234	705.8614	717.0994	728.4374	739.8754	751.4134	763.0514	774.7894	786.6274	798.5654	810.6034	822.7414	834.9794	847.3174	859.7554	872.2934	884.9314	897.6694	910.5074	923.4454	936.4834	949.6214	962.8594	976.1974	989.6354	1003.1734	1016.8114	1030.5494	1044.3874	1058.3254	1072.3634	1086.5014	1100.7394	1115.0774	1129.5154	1144.0534	1158.6914	1173.4294	1188.2674	1203.2054	1218.2434	1233.3814	1248.6194	1263.9574	1279.3954	1294.9334	1310.5714	1326.3094	1342.1474	1358.0854	1374.1234	1390.2614	1406.4994	1422.8374	1439.2754	1455.8134	1472.4514	1489.1894	1506.0274	1522.9654	1540.0034	1557.1414	1574.3794	1591.7174	1609.1554	1626.6934	1644.3314	1662.0694	1679.9074	1697.8454	1715.8834	1734.0214	1752.2594	1770.5974	1789.0354	1807.5734	1826.2114	1844.9494	1863.7874	1882.7254	1901.7634	1920.8014	1939.9394	1959.1774	1978.5154	1997.9534	2017.4914	2037.1294	2056.8674	2076.6054	2096.4434	2116.3814	2136.4194	2156.5574	2176.7954	2197.1334	2217.5714	2238.1094	2258.7474	2279.4854	2300.3234	2321.2614	2342.2994	2363.4374	2384.6754	2406.0134	2427.4514	2448.9894	2471.6274	2494.3654	2517.2034	2540.2414	2563.4794	2586.9174	2610.5554	2634.3934	2658.4314	2682.6694	2707.1074	2731.7454	2756.5834	2781.6214	2806.8594	2832.2974	2857.9354	2883.7734	2909.8114	2936.0494	2962.4874	2989.1254	3015.9634	3043.0014	3070.2394	3097.6774	3125.3154	3153.1534	3181.1914	3209.4294	3237.8674	3266.5054	3295.3434	3324.3814	3353.6194	3383.0574	3412.6954	3442.5334	3472.5714	3502.8094	3533.2474	3563.8854	3594.7234	3625.7614	3656.9994	3688.4374	3719.0754	3750.0134	3781.2514	3812.7894	3844.6274	3876.7654	3909.1034	3941.7414	3974.5794	4007.6174	4040.9554	4074.5934	4108.5314	4142.7694	4177.3074	4212.1454	4247.2834	4282.7214	4318.4594	4354.4974	4390.8354	4427.4734	4464.4114	4501.6494	4539.1874	4577.0254	4615.1634	4653.6014	4692.3394	4731.3774	4770.7154	4810.3534	4850.2914	4890.5294	4931.0674	4971.9054	5013.0434	5054.3814	5095.9194	5137.6574	5179.5954	5221.7334	5264.0714	5306.6094	5349.3474	5392.2854	5435.4234	5478.7614	5522.2994	5566.0374	5609.9754	5654.1134	5698.4514	5742.9894	5787.7274	5832.6654	5877.8034	5923.1414	5968.6794	6014.4174	6060.3554	6106.4934	6152.8314	6209.3694	6266.1074	6323.0454	6380.1834	6437.5214	6495.0594	6552.7974	6610.7354	6668.9734	6727.4114	6786.0494	6844.8874	6903.9254	6963.1634	7022.5914	7082.2194	7142.0474	7202.0754	7262.3034	7322.7314	7383.3594	7444.1874	7505.2154	7566.4434	7627.8714	7689.4994	7751.3274	7813.3554	7875.5834	7938.0114	7999.7394	8061.7674	8124.0954	8186.7234	8249.5514	8312.5794	8375.8074	8439.2354	8502.8634	8566.6914	8630.7194	8694.9474	8759.3754	8824.0034	8888.8314	8953.8594	9019.0874	9084.5154	9150.1434	9215.9714	9282.0094	9348.2474	9414.6854	9481.3234	9548.1614	9615.1994	9682.4374	9749.8754	9817.5134	9885.3514	9953.3894	10013.6274	10074.0654	10134.7034	10195.5414	10256.5794	10317.8174	10379.2554	10440.8934	10502.7314	10564.7694	10626.9074	10689.2454	10751.7834	10814.5214	10877.4594	10940.5974	11003.9354	11067.4734	11131.2114	11195.1494	11259.2874	11323.6254	11388.1634	11452.9014	11517.8394	11582.9774	11648.3154	11713.8534	11779.5914	11845.5294	11911.6674	11977.9054	12044.3434	12110.9814	12177.8194	12244.8574	12312.0954	12379.5334	12447.1714	12514.9094	12582.7474	12650.6854	12718.7234	12786.8614	12855.0994	12923.4374	12991.8754	13060.4134	13129.0514	13197.7894	13266.6274	13335.5654	13404.6034	13473.7414	13542.9794	13612.3174	13681.7554	13751.2934	13820.9314	13890.6694	13960.5074	14030.4454	14100.4834	14170.6214	14240.8594	14311.1974	14381.6354	14452.1734	14522.8114	14593.5494	14664.3874	14735.3254	14806.3634	14877.4914	14948.7194	15019.9474	15091.2754	15162.7034	15234.2314	15305.8594	15377.5874	15449.4154	15521.3434	15593.3714	15665.4994	15737.7274	15810.0554	15882.4834	15954.9114	16027.4394	16099.9674	16172.5954	16245.3234	16318.1514	16391.0794	16464.1074	16537.2354	16610.4634	16683.7914	16757.2194	16830.7474	16904.3754	16978.1034	17051.9314	17125.8594	17199.8874	17274.0154	17348.2434	17422.5714	17496.9994	17571.5274	17646.1554	17720.8834	17795.7114	17870.6394	17945.6674	18020.7954	18096.0234	18171.3514	18246.7794	18322.3074	18397.9354	18473.6634	18549.4914	18625.4194	18691.4474	18767.5754	18843.8034	18919.9314	19006.1594	19082.4874	19158.9154	19235.4434	19312.0714	19388.7994	19465.6274	19542.5554	19619.5834	19696.7114	19773.9394	19851.2674	19928.6954	20006.2234	20083.8514	20161.5794	20239.4074	20317.3354	20395.3634	20473.4914	20551.7194	20629.9474	20708.2754	20786.7034	20865.2314	20943.8594	21022.5874	21101.4154	21180.3434	21259.3714	21338.4994	21417.7274	21497.0554	21576.4834	21655.9114	21735.4394	21815.0674	21894.7954	21974.6234	22054.5514	22134.5794	22214.7074	22294.9354	22375.2634	22455.6914	22536.2194	22616.8474	22697.5754	22778.4034	22859.3314	22940.3594	23021.4874	23102.7154	23184.0434	23265.4714	23346.9994	23428.6274	23510.3554	23592.1834	23674.1114	23756.1394	23838.2674	23920.4954	24002.8234	24085.2514	24167.7794	24250.4074	24333.1354	24415.9634	24498.8914	24581.9194	24665.0474	24748.2754	24831.6034	24915.1314	25008.8594	25092.6874	25176.6154	25260.7434	25344.9714	25429.3994	25513.9274	25598.5554	25683.2834	25768.1114	25853.0394	25938.0674	26023.1954	26108.4234	26193.7514	26279.1794	26364.7074	26450.3354	26536.0634	26621.8914	26707.8194	26793.8474	26879.9754	26966.2034	27052.5314	27138.9594	27225.4874	27312.1154	27398.8434	27485.6714	27572.5994	27659.6274	27746.7554	27833.9834	27921.3114	28008.7394	28096.2674	28183.8954	28271.6234	28359.4514	28447.3794	28535.4074	28623.5354	28711.7634	28800.0914	28888.5194	28977.0474	29065.6754	29154.4034	29243.2314	29332.1594	29421.1874	29510.3154	29609.5434	29708.8714	29808.2994	29907.8274	30007.4554	30107.1834	30207.0114	30306.9394	30406.9674	30507.0954	30607.3234	30707.6514	30808.0794	30908.6074	31009.2354	31109.9634	31210.7914	31311.7194	31412.7474	31513.8754	31615.1034	31716.4314	31817.8594	31919.3874	32020.9154	32122.5434	32223.2714	32324.0994	32425.0274	32526.0554	32627.1834	32728.4114	32829.7394	32931.1674	33032.6954	33134.3234	33236.0514	33337.8794	33439.8074	33541.8354	33643.9634	33746.1914	33848.5194	33950.9474	34053.4754	34156.1034	34258.8314	34361.6594	34464.5874	34567.6154	34670.7434	34773.9714	34877.2994	34980.7274	35084.2554	35187.8834	35291.6114	35395.4394	35499.3674	35603.3954	35707.5234	35811.7514	35916.0794	36020.5074	36125.0354	36229.6634	36334.3914	36439.2194	36544.1474	36649.1754	36754.3034	36859.5314	36964.8594	37070.2874	37175.8154	37281.4434	37387.1714	37493.0994	37599.2274	37705.5554	37812.0834	37918.8114	38025.7394	38132.8674	38240.1954	38347.7234	38455.4514	38563.2794	38671.2074	38779.3354	38887.5634	38985.9914	39084.6194	39183.4474	39282.4754	39381.7034	39481.1314	39580.7594	39680.5874	39780.6154	39880.8434	39981.2714	40081.8994	40182.62
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Antenna Pattern

Appendix B

Theta (°)	2.042-2.08	-2.071-3.45	-2.192	0.720-80	2.861-45	0.088-0.68	-0.421-44	2.182-20	2.591-85	0.591-52	3.320-30	-0.861-12	0.243-05	-1.781-20	-1.811-54	4.79-12-37	-5.89-320	-5.203-47	0.411-07	1.473-14	3.372-84	1.481-28	0.731-35	1.801-143
(Theta)	3.686-338	-3.298-384	-2.061-133	0.201-21	3.321-153	-0.551-44	-1.361-84	2.541-15	1.411-38	0.026-56	2.452-38	-1.411-16	0.980-20	2.381-10	0.633-42	-4.99-2-25	-5.48-2-32	-4.713-17	0.300-20	0.552-30	3.301-58	0.471-56	0.361-29	0.821-71
(Theta)	4.943-385	-4.703-683	-4.021-661	-1.201-373	-4.642-263	-0.984-406	-2.401-65	2.211-069	0.120-43	-0.940-07	1.610-87	-3.231-170	0.431-109	-5.242-449	-1.804-92	-5.43-8-57	-4.89-3-00	-4.794-249	0.181-25	-0.702-36	2.302-222	-3.397-437	-0.480-95	-0.093-87
(Theta)	5.29-459	-5.017-735	-5.091-425	-2.38-453	-5.511-322	-0.641-26	-4.400-78	1.781-165	2.621-02	-2.461-33	-0.510-48	-4.171-33	-1.592-68	-7.841-76	-3.321-65	-10.801-83	-8.38-346	-5.531-50	-1.052-28	-2.481-37	1.431-44	-5.362-23	-1.771-04	-1.531-92
(Theta)	5.821-695	-6.851-800	-7.614-248	-3.531-533	-7.631-498	-2.211-14	-7.321-630	3.041-058	-4.591-255	-4.811-548	-3.014-648	-6.261-641	-4.471-241	-8.481-489	-5.271-528	-10.781-284	-8.291-611	-6.361-780	-6.831-153	-1.141-682	-5.492-258	-2.841-283	-3.531-708	
(Theta)	7.059-822	-10.881-113	-10.14-867	-6.471-435	-11.148-25	-4.381-28	-9.812-78	-1.281-683	-6.731-140	-4.581-202	-5.201-467	-7.521-79	-6.591-491	-10.071-417	-7.411-173	-11.581-158	-11.052-923	-8.671-151	-7.881-105	-7.801-37	-5.871-103	-8.592-35	-0.021-30	-1.531-92
(Theta)	8.331-1165	-15.101-174	-11.10-885	-5.981-845	-12.881-107	-6.371-63	-12.481-483	-3.201-771	-7.371-30	-6.181-467	-7.311-56	-7.061-717	-7.061-717	-10.031-415	-8.471-102	-10.701-91	-10.761-152	-7.791-102	-10.761-152	-7.791-102	-7.221-678	-4.471-619	-1.971-479	
(Theta)	8.991-1189	-15.531-130	-13.561-178	-8.221-867	-12.891-163	-9.931-83	-12.821-787	-5.361-609	-7.881-807	-6.851-806	-6.931-122	-8.831-683	-6.041-65	-11.821-880	-9.141-880	-9.841-1079	-8.471-1075	-11.311-258	-7.831-02	-11.711-813	-8.761-74	-6.181-884	-8.941-835	-9.021-824
(Theta)	9.321-1059	-12.931-1171	-12.281-1523	-12.931-1111	-12.471-1160	-9.681-911	-11.431-683	-7.151-749	-10.861-107	-10.881-738	-8.531-1333	-14.921-1041	-10.921-128	-14.861-1072	-8.871-35	-11.481-145	-15.271-1068	-14.991-1369	-10.811-1367	-11.101-1033	-11.741-89	-8.831-815	-8.451-1206	-8.361-1015
(Theta)	10.111-1116	-14.221-1384	-12.771-232	-10.751-1133	-10.961-152	-12.981-234	-12.771-1183	-9.581-862	-10.581-1233	-13.131-1199	-8.151-1081	-13.241-1478	-10.981-1233	-14.011-1204	-12.381-1029	-13.381-136	-11.021-1111	-14.681-1472	-10.851-1539	-13.021-1579	-12.481-1340	-9.181-727	-8.811-809	-8.151-136
(Theta)	10.191-1387	-15.581-1587	-14.591-207	-15.521-1175	-8.601-1023	-11.911-1294	-13.971-157	-8.361-823	-2.841-896	-8.071-1814	-15.881-1528	-13.711-1184	-11.781-1133	-11.751-1554	-13.871-1568	-8.441-1258	-14.271-1188	-11.770-1373	-9.321-1304	-15.881-1646	-8.211-824	-11.770-1373	-8.151-918	-8.151-918
(Theta)	10.191-1442	-14.541-1584	-14.591-204	-15.521-1149	-8.431-1184	-10.281-869	-12.111-151	-13.362-25	-8.781-1017	-8.391-239	-9.841-1258	-10.711-151	-12.621-814	-8.921-1243	-12.781-1557	-8.441-1272	-13.151-1638	-15.521-1539	-8.071-1023	-13.971-214	-14.561-1244	-11.681-1111	-13.521-1281	-13.521-1281
(Theta)	10.191-1523	-14.621-1583	-15.431-1586	-16.151-1583	-14.981-1314	-10.511-885	-11.891-135	-16.811-103	-11.471-1257	-11.161-939	-9.891-1411	-12.591-130	-8.231-131	-14.181-1523	-14.141-1528	-15.291-152	-16.741-1517	-14.811-1217	-11.361-1579	-14.891-1713	-15.151-1519	-16.891-1525	-10.770-1373	-15.581-1523
(Theta)	10.191-1551	-15.471-1513	-15.931-1386	-14.831-1526	-15.131-1185	-10.251-102	-10.511-117	-13.301-1410	-11.401-1388	-14.841-1473	-10.841-1488	-15.341-1210	-10.781-1186	-11.841-1528	-15.691-1519	-15.891-1320	-17.891-91	-13.131-1115	-14.871-1478	-15.171-1525	-14.001-1445	-14.271-1391	-14.811-1433	
(Theta)	10.191-1574	-14.971-1528	-14.811-1528	-12.831-1288	-13.571-1384	-13.441-1407	-14.691-1432	-13.471-1328	-12.081-1217	-12.531-1281	-11.621-1432	-14.611-1488	-13.891-1317	-13.081-1267	-12.281-1272	-12.881-1421	-15.991-1427	-11.721-1288	-10.451-1288	-10.871-1212	-12.891-1418	-15.251-1529	-14.421-1515	-14.621-1518
(Theta)	10.191-1574	-13.781-1516	-13.881-1434	-13.731-1358	-13.441-1322	-12.651-1236	-13.071-1330	-14.511-1433	-15.361-1615	-15.481-1528	-15.161-1538	-16.141-1538	-15.471-1528	-15.691-1537	-15.611-1433	-15.901-1444	-14.581-1522	-15.171-1528	-14.841-1438	-13.891-1414	-13.911-1336	-14.561-1370	-12.701-1345	-12.701-1345
FreeHd	6.475(90.5)	TableHd.5																						
(Theta)	1.199-172	-1.821-199	-2.091-224	-2.461-239	-2.281-221	-1.971-179	-1.551-132	-1.211-122	-1.211-120	-1.261-118	-1.151-125	-1.391-142	-1.391-139	-1.441-143	-1.361-136	-1.171-121	-1.191-121	-0.831-87	-0.871-81	-0.581-61	-0.501-46	-0.431-48	-0.671-80	-0.861-103
(Theta)	1.341-127	-1.651-186	-0.861-84	-0.811-89	-0.601-63	-0.421-16	-0.201-26	0.271-22	0.071-05	0.191-13	0.311-28	-0.021-21	0.461-37	-1.791-197	-2.191-221	-2.151-239	-1.981-182	-1.391-127	-1.441-142	-1.261-127	-1.261-127	-1.191-113	-1.191-113	-1.191-113
(Theta)	1.811-210	-2.021-217	-2.141-225	-2.241-217	-1.251-601	0.081-38	0.031-80	0.031-80	0.031-80	0.071-44	0.211-64	0.211-64	0.211-64	0.211-64	0.211-64	0.211-64	0.211-64	0.211-64	0.211-64	0.211-64	0.211-64	0.211-64	0.211-64	0.211-64
(Theta)	4.001-425	-4.051-330	-3.821-330	-2.201-188	-2.281-278	-2.581-187	-0.761-08	0.081-05	-1.471-229	-2.271-171	-1.431-134	-1.041-603	-0.321-004	0.150-41	0.580-41	-0.071-011	-0.211-82	-2.221-93	0.731-44	1.932-21	2.131-88	1.651-57	1.351-57	-1.561-52
(Theta)	5.651-505	-3.181-281	2.991-174	-1.671-235	3.021-145	-0.851-83	4.161-132	-1.501-228	-3.391-144	-3.921-230	-0.601-011	0.080-10	0.311-32	0.340-70	1.070-59	0.461-153	2.251-344	2.251-344	-0.630-64	1.371-85	2.192-36	1.781-34	-1.321-255	-3.761-43
(Theta)	3.831-378	-2.191-178	-1.201-87	-1.491-220	2.8441-030	5.914-132	2.662-70	2.404-141	-0.501-268	0.7061-021	0.611-017	1.792-314	4.121-459	4.081-248	-0.201-145	1.201-149	1.201-149	1.201-149	1.201-149	1.201-149	1.201-149	1.201-149	1.201-149	1.201-149
(Theta)	0.771-194	-2.891-320	-1.981-148	-1.681-179	-1.121-207	2.621-371	4.281-405	2.281-87	1.631-133	-3.321-181	-0.871-020	-0.860-04	0.5121-84	-4.001-544	-2.601-197	-3.421-469	-3.971-176	-1.7721-280	-2.841-260	0.391-63	1.981-50	0.8201-53	-1.291-101	1.371-01
(Theta)	0.831-144	-2.831-292	-1.981-141	-0.411-159	-1.191-114	-1.1321-109	-1.611-113	-0.601-106	-0.4201-200	-1.801-208	-1.961-243	-1.961-243	-1.961-243	-1.961-243	-1.961-243	-1.961-243	-1.961-243	-1.961-243	-1.961-243	-1.961-243	-1.961-243	-1.961-243	-1.961-243	-1.961-243
(Theta)	0.831-204	-2.291-173	-0.611-66	0.6201-17	0.2401-39	0.161-25	0.4031-56	1.391-54	1.501-128	1.6521-28	0.671-081	0.1301-07	-2.581-33	-4.321-380	-1.891-336	-0.831-1259	-7.251-250	-2.741-37	-3.071-103	0.5701-83	2.171-93	3.851-69	1.2681-84	2.681-45
(Theta)	1.841-378	-2.271-106	-0.781-011	-0.191-014	0.7101-83	1.6021-34	1.891-34	0.4501-80	1.891-34	0.4501-80	1.891-34	0.4501-80	1.891-34	0.4501-80	1.891-34	0.4501-80	1.891-34	0.4501-80	1.891-34	0.4501-80	1.891-34	0.4501-80	1.891-34	0.4501-80
(Theta)	3.871-576	-4.231-241	-2.061-120	2.201-31	0.201-28	0.4301-08	1.231-84	0.881-65	-1.601-327	-0.321-35	-0.961-176	0.011-10	0.461-50	-2.861-52	-4.651-448	-6.101-1051	-4.801-180	-2.291-136	0.3161-49	1.6011-82	2.981-97	2.011-49	1.861-50	1.011-57
(Theta)	6.141-47	-5.631-372	-2.791-257	-4.181-101	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179	-0.731-179
(Theta)	7.361-92	-7.421-625	-7.471-96	-6.631-36	1.801-127	3.931-44	-2.181-148	3.91-44	4.841-63	3.201-26	-5.981-48	2.181-04	0.541-60	3.911-74	-7.641-67	-7.191-78	8.321-16	5.091-348	0.971-13	0.281-65	0.411-39	4.301-78	3.481-47	3.701-61
(Theta)	8.281-133	-8.281-133	-7.581-81	-8.921-707	3.821-238	5.411-52	4.101-348	-7.601-74	4.011-308	-7.581-77	4.171-703	7.301-493	0.201-83	6.041-99	8.671-103	-10.111-668	6.521-277	3.201-445	-3.721-154	2.061-442	6.831-111	-11.681-584	-4.771-86	
(Theta)	-0.191-1231	-10.371-1030	-10.171-79	-11.091-115	0.621-326	-4.917-42	7.131-658	6.661-77	8.841-132	6.291-111	-6.881-122	6.931-122	8.871-15	0.271-1050	-0.431-45	-13.111-97	-15.901-845	-10.981-1422	-7.901-47	-10.121-64	5.201-97	8.711-133	0.211-1035	-6.331-90
(Theta)	-1.471-1375	-12.801-1039	-10.821-788	-10.571-1188	-10.021-168	6.481-73	8.461-72	1.581-679	-10.481-934	6.291-102	-13.861-486	7.211-1461	-10.321-102	-11.171-122	-12.881-1421	-15.301-1052	-11.291-1258	-10.781-1183	-12.851-1162	-10.571-1188	-12.851-1162	-10.571-1188	-12.851-1162	-10.571-1188
(Theta)	-0.491-140	-15.101-142	-12.421-897	8.961-183	-0.3321-897	8.051-113	-10.981-881	-9.811-1323	-11.991-058	8.581-181	-13.861-1297	-7.971-894	-11.481-1222	-8.761-701	7.131-914	-13.411-1399	-10.781-1260	-11.481-1311	-7.051-655	-11.891-444	6.581-582	8.441-1188	-7.481-747	-8.801-747
(Theta)	-1.701-1451	-15.151-1154	-15.741-1188	-8.981-1119	-10.731-804	0.821-867	-11.261-108	-8.991-513	-11.501-108	-10.451-1013	-11.721-1533	-14.021-1022	-12.061-128	-12.171-1027	-11.911-914	-12.981-102	-11.891-928	-14.681-1465	-10.671-102	-8.991-46	8.421-1277	8.841-860	-7.801-747	
(Theta)	-1.0201-1234	-16.581-1540	-15.871-1537	-12.941-1277	-11.081-924	-7.981-10	-12.481-107	-9.261-109	-10.681-117	-11.741-1278	-13.851-1038	-15.571-1288												

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

