



Antenna Composite Gain Test Report

FCC ID	LDKIW9167IH
Equipment	Cisco Catalyst IW9167I Heavy Duty Access Point
Brand Name	CISCO
Model Name	IW9167IH-B , IW9167IH-ROW
Applicant	Cisco Systems Inc 125 West Tasman Drive San Jose California United States 95134-1706
Manufacturer	Cisco Systems Inc 125 West Tasman Drive San Jose California United States 95134-1706
Sample Received	Feb. 16, 2023
Start Test Date	Mar. 08, 2023
Final Test Date	Jun. 08, 2023

Approved by: Sam Chen

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1. Operation Mode and Antenna Information

Antenna Position	RF Port		Brand Name	Model Name	Ant. Type	Connector	Modes of Operation
	WLAN 2.4GHz	WLAN 5GHz					
2G5G Ant1	3	2	WNC	95XEAK15.G66	PIFA	I-PEX	2.4GHz, 5GHz UNII 1~3
2G5G Ant2	2	3	WNC	95XEAK15.G67	PIFA	I-PEX	2.4GHz, 5GHz UNII 1~3
2G5G Ant3	1	4	WNC	95XEAK15.G68	PIFA	I-PEX	2.4GHz, 5GHz UNII 1~3
2G5G Ant4	4	1	WNC	95XEAK15.G69	PIFA	I-PEX	2.4GHz, 5GHz UNII 1~3

Antenna Position	RF Port	Brand Name	Model Name	Ant. Type	Connector	Modes of Operation
6G Ant1	3	WNC	95XEAK15.G70	PIFA	I-PEX	6GHz UNII 5~8
6G Ant2	1	WNC	95XEAK15.G71	PIFA	I-PEX	6GHz UNII 5~8
6G Ant3	2	WNC	95XEAK15.G72	PIFA	I-PEX	6GHz UNII 5~8
6G Ant4	4	WNC	95XEAK15.G73	PIFA	I-PEX	6GHz UNII 5~8
Scan Ant1	2	WNC	95XEAK15.G74	PIFA	I-PEX	2.4GHz, 5GHz UNII 1~3, 6GHz UNII 5~8
Scan Ant2	1	WNC	95XEAK15.G75	PIFA	I-PEX	2.4GHz, 5GHz UNII 1~3, 6GHz UNII 5~8
BLE Ant3	1	WNC	95XEAK15.G76	PIFA	I-PEX	Bluetooth

Note:

For Iron Radio 1

2.4GHz Operation Mode (1TX/4RX)

Only 2G5G Ant3 can be use as transmitting antenna.

2G5G Ant1~4 can be used as receiving antenna.

2G5G Ant1~4 can receive simultaneously.

2.4GHz Operation Mode (2TX/4RX)

2G5G Ant3 and 2G5G Ant2 can be use as transmitting antenna.

2G5G Ant1~4 can be used as receiving antenna.

2G5G Ant1~4 can receive simultaneously.

2.4GHz Operation Mode (4TX/4RX)

2G5G Ant1~4 can be used as transmitting/receiving antenna.

2G5G Ant1~4 can transmit/receive simultaneously.

5GHz Operation Mode (1TX/4RX)

Only 2G5G Ant4 can be use as transmitting antenna.

2G5G Ant1~4 can be used as receiving antenna.

2G5G Ant1~4 can receive simultaneously.

5GHz Operation Mode (2TX/4RX)

2G5G Ant4 and 2G5G Ant1 can be use as transmitting antenna.



2G5G Ant1~4 can be used as receiving antenna.

2G5G Ant1~4 can receive simultaneously.

5GHz Operation Mode (4TX/4RX)

2G5G Ant1~4 can be used as transmitting/receiving antenna.

2G5G Ant1~4 can transmit/receive simultaneously.

For Radio 2

6GHz Operation Mode (1TX/4RX)

Only 6G Ant2 can be use as transmitting antenna.

6G Ant1~4 can be used as receiving antenna.

6G Ant1~4 can receive simultaneously.

5GHz Operation Mode (2TX/4RX)

6G Ant2 and 6G Ant3 can be use as transmitting antenna.

6G Ant1~4 can be used as receiving antenna.

6G Ant1~4 can receive simultaneously.

5GHz Operation Mode (4TX/4RX)

6G Ant1~4 can be used as transmitting/receiving antenna.

6G Ant1~4 could transmit/receive simultaneously.

For Scanning Radio 3

2.4GHz/5GHz Operation Mode (1TX/2RX)

Only Scan Ant2 can be use as transmitting antenna.

Scan Ant1~2 can be used as receiving antenna.

Scan Ant1~2 can receive simultaneously.

6GHz Operation Mode (2RX)

Scan Ant1~2 can be used as receiving antenna.

Scan Ant1~2 can receive simultaneously.

For Radio 4

Bluetooth Operation Mode (1TX/1RX):

Only BLE Ant3 can be used as transmitting/receiving antenna.



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

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	Rex Liao	23.5~24.5 / 45~55	Mar. 08, 2023~Jun. 08, 2023

Note:

Testing Site Information

Brand Name: TDK

Dimension: 11m*6m*6m

Characteristic: Fully Anechoic Chamber

4. Test Facility and Configuration

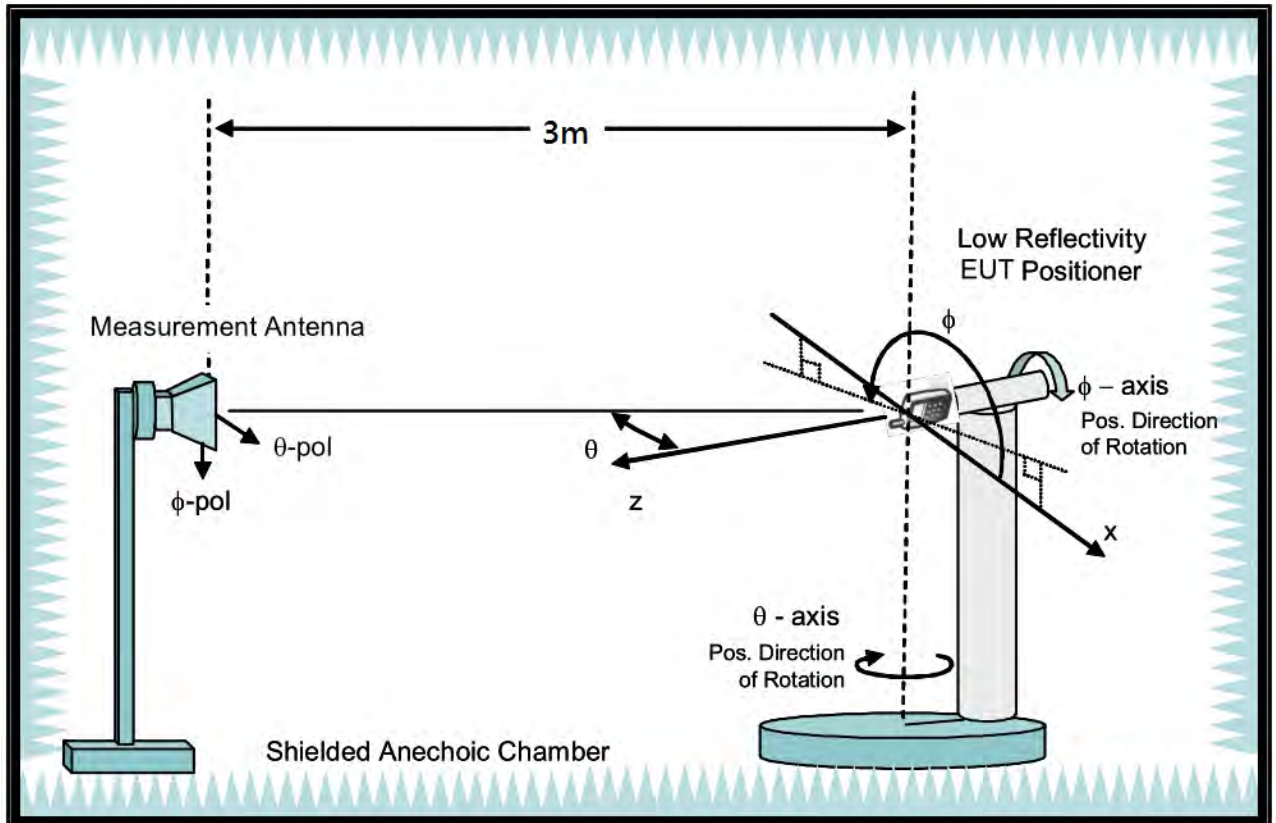
Test configuration: Reference to CITA OTA distributed-axes system configuration.

Chamber: Fully Anechoic Chamber.

Measurement antenna: Dual Polarization Horn antenna

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

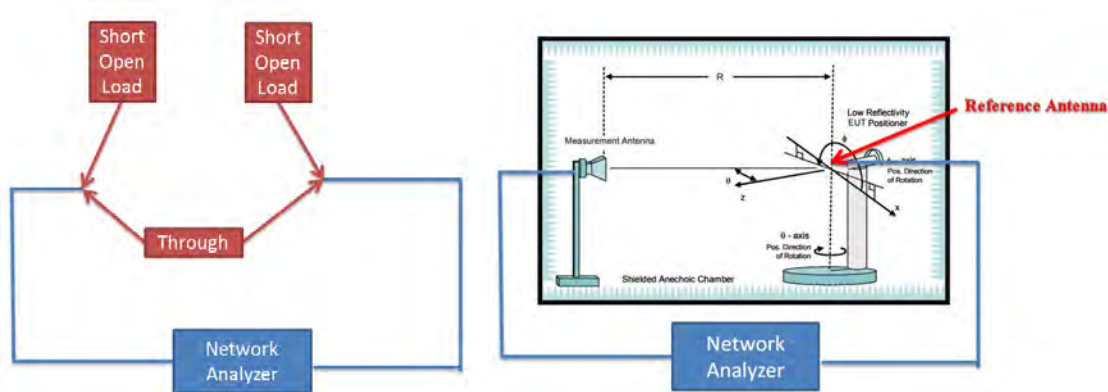
#Reference to CTIA "ctia-test-plan-for-wireless-device-over-the-air-performance-ver-3-7-1"



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.



Before May 31, 2023

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.

Factor = gain factor + power gain conversion= (Reference antenna gain)-(G reading)



After May 30, 2023

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 reading (dB) =20*log(V2/V1)=10*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.

Factor = gain factor + power gain conversion= (Reference antenna gain)-(G 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

For Iron Radio 1:

<4TX>

DG_1SS max value position

Frequency (Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 (dBi)	0.85	-1.88	-0.18	-5.95	1.25
Ant. 2 (dBi)	1.93	1.89	-0.72	2.67	1.64
Ant. 3 (dBi)	3.95	2.1	1.84	3.49	0.83
Ant. 4 (dBi))	0.98	-0.49	-0.7	0.43	1.56
DG [1SS] (dBi)	8.04	6.58	6.15	6.87	7.35
Polarization	Theta	Theta	Theta	Theta	Theta
$\Theta(^{\circ})$	60	82.5	82.5	60	60
$\Phi(^{\circ})$	0	270	270	217.5	7.5

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 [$10^{(G/20)}$]	$10^{(0.85/20)}$	$10^{(-1.88/20)}$	$10^{(-0.18/20)}$	$10^{(-5.95/20)}$	$10^{(1.25/20)}$
Ant. 2 [$10^{(G/20)}$]	$10^{(1.93/20)}$	$10^{(1.89/20)}$	$10^{(-0.72/20)}$	$10^{(2.67/20)}$	$10^{(1.64/20)}$
Ant. 3 [$10^{(G/20)}$]	$10^{(3.95/20)}$	$10^{(2.1/20)}$	$10^{(1.84/20)}$	$10^{(3.49/20)}$	$10^{(0.83/20)}$
Ant. 4 [$10^{(G/20)}$]	$10^{(0.98/20)}$	$10^{(-0.49/20)}$	$10^{(-0.7/20)}$	$10^{(0.43/20)}$	$10^{(1.56/20)}$
Ant. 1 [$10^{(G/20)}$] value	1.103	0.805	0.979	0.504	1.155
Ant. 2 [$10^{(G/20)}$] value	1.249	1.243	0.92	1.36	1.208
Ant. 3 [$10^{(G/20)}$] value	1.576	1.274	1.236	1.495	1.1
Ant. 4 [$10^{(G/20)}$] value	1.119	0.945	0.923	1.051	1.197
Sum All Antenna [Amax]	5.047	4.267	4.058	4.409	4.66
DG [$10 \cdot \log(A_{max}^2/N_{ant})$]	8.04	6.58	6.15	6.87	7.35

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



<2TX>

DG_1SS max value position

Frequency (Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 (dBi)	-	-1.32	1.11	3.09	3.45
Ant. 2 (dBi)	3	-	-	-	-
Ant. 3 (dBi)	3.53	-	-	-	-
Ant. 4 (dBi)	-	0.87	-1.46	0.93	1.23
DG [1SS] (dBi)	6.28	2.85	2.93	5.09	5.42
Polarization	Theta	Theta	Theta	Theta	Theta
Θ (°)	60	82.5	52.5	60	60
Φ (°)	7.5	37.5	60	45	45

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 ^(-1.32/20)	10 ^(1.11/20)	10 ^(3.09/20)	10 ^(3.45/20)
Ant. 2 [10 ^(G/20)]	10 ^(3/20)	-	-	-	-
Ant. 3 [10 ^(G/20)]	10 ^(3.53/20)	-	-	-	-
Ant. 4 [10 ^(G/20)]	-	10 ^(0.87/20)	10 ^(-1.46/20)	10 ^(0.93/20)	10 ^(1.23/20)
Ant. 1 [10 ^(G/20)] value	-	0.859	1.136	1.427	1.488
Ant. 2 [10 ^(G/20)] value	1.413	-	-	-	-
Ant. 3 [10 ^(G/20)] value	1.501	-	-	-	-
Ant. 4 [10 ^(G/20)] value	-	1.105	0.845	1.113	1.152
Sum All Antenna [Amax]	2.914	1.964	1.982	2.54	2.64
DG [10*log(Amax ² /Nant)]	6.28	2.85	2.93	5.09	5.42

Note:

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

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



For Radio 2:

<4TX>

DG_1SS max value position

Frequency (Hz)	6.175G	6.475G	6.695G	6.995G
Ant. 1 (dBi)	3.07	2.83	1.61	0.09
Ant. 2 (dBi)	0.32	3.28	5.81	4.76
Ant. 3 (dBi)	2.99	1.24	1	1.59
Ant. 4 (dBi)	2.65	1.61	1.03	3.67
DG [1SS] (dBi)	8.35	8.3	8.63	8.73
Polarization	Theta	Theta	Theta	Theta
$\Theta(^{\circ})$	75	67.5	67.5	75
$\Phi(^{\circ})$	97.5	97.5	97.5	97.5

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 [$10^{(G/20)}$]	$10^{(3.07/20)}$	$10^{(2.83/20)}$	$10^{(1.61/20)}$	$10^{(0.09/20)}$
Ant. 2 [$10^{(G/20)}$]	$10^{(0.32/20)}$	$10^{(3.28/20)}$	$10^{(5.81/20)}$	$10^{(4.76/20)}$
Ant. 3 [$10^{(G/20)}$]	$10^{(2.99/20)}$	$10^{(1.24/20)}$	$10^{(1/20)}$	$10^{(1.59/20)}$
Ant. 4 [$10^{(G/20)}$]	$10^{(2.65/20)}$	$10^{(1.61/20)}$	$10^{(1.03/20)}$	$10^{(3.67/20)}$
Ant. 1 [$10^{(G/20)}$] value	1.424	1.385	1.204	1.01
Ant. 2 [$10^{(G/20)}$] value	1.038	1.459	1.952	1.73
Ant. 3 [$10^{(G/20)}$] value	1.411	1.153	1.122	1.201
Ant. 4 [$10^{(G/20)}$] value	1.357	1.204	1.126	1.526
Sum All Antenna [Amax]	5.229	5.201	5.404	5.467
DG [$10 \cdot \log(A_{max}^2/N_{ant})$]	8.35	8.3	8.63	8.73

Note:

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

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



<2TX>

DG_1SS max value position

Frequency (Hz)	6.175G	6.475G	6.695G	6.995G
Ant. 2 (dBi)	1.21	3.28	5.81	4.76
Ant. 3 (dBi)	2.76	1.24	1	1.59
DG [1SS] (dBi)	5.03	5.33	6.74	6.33
Polarization	Theta	Theta	Theta	Theta
$\Theta(^{\circ})$	60	67.5	67.5	75
$\Phi(^{\circ})$	45	97.5	97.5	97.5

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. 2 [$10^{(G/20)}$]	$10^{(1.21/20)}$	$10^{(3.28/20)}$	$10^{(5.81/20)}$	$10^{(4.76/20)}$
Ant. 3 [$10^{(G/20)}$]	$10^{(2.76/20)}$	$10^{(1.24/20)}$	$10^{(1/20)}$	$10^{(1.59/20)}$
Ant. 2 [$10^{(G/20)}$] value	1.149	1.459	1.952	1.73
Ant. 3 [$10^{(G/20)}$] value	1.374	1.153	1.122	1.201
Sum All Antenna [Amax]	2.524	2.612	3.074	2.931
DG [$10*\log(Amax^2/Nant)$]	5.03	5.33	6.74	6.33

Note:

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

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



8. Summary of Test Result

For Iron Radio 1:

<4TX>

Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.17	1.39	1.71	3.09	3.45
Ant. 2 Max Gain (dBi)	3.28	3.37	3.54	4.2	4.12
Ant. 3 Max Gain (dBi)	3.95	3.42	3.05	3.92	4.41
Ant. 4 Max Gain (dBi)	2.63	1.47	1.36	2.39	2.26
Ant. 1 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/45/0	Theta/52.5/60	Theta/67.5/45	Theta/60/45	Theta/60/45
Ant. 2 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/52.5/7.5	Theta/52.5/225	Theta/60/217.5	Theta/52.5/232.5	Theta/67.5/60
Ant. 3 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/60/0	Theta/52.5/232.5	Theta/67.5/217.5	Theta/67.5/225	Theta/60/225
Ant. 4 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/67.5/112.5	Theta/82.5/45	Theta/82.5/255	Theta/82.5/247.5	Theta/52.5/345
Max Gain (dBi)	3.95	3.42	3.54	4.2	4.41
DG [1SS] (dBi)	8.04	6.58	6.15	6.87	7.35
DG [2SS] (dBi)	5.04	3.58	3.54	4.2	4.41
DG [4SS] (dBi)	3.95	3.42	3.54	4.2	4.41

<2TX>

Freq(Hz)	2.45G
Ant. 2 Max Gain (dBi)	3.28
Ant. 3 Max Gain (dBi)	3.95
Ant. 2 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/52.5/7.5
Ant. 3 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/60/0
Max Gain (dBi)	3.95
DG [1SS] (dBi)	6.28
DG [2SS] (dBi)	3.95

Freq(Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	1.39	1.71	3.09	3.45
Ant. 4 Max Gain (dBi)	1.47	1.36	2.39	2.26
Ant. 1 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/52.5/60	Theta/67.5/45	Theta/60/45	Theta/60/45
Ant. 4 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/82.5/45	Theta/82.5/255	Theta/82.5/247.5	Theta/52.5/345
Max Gain (dBi)	1.47	1.71	3.09	3.45
DG [1SS] (dBi)	2.85	2.93	5.09	5.42
DG [2SS] (dBi)	1.47	1.71	3.09	3.45



For Radio 2:

<4TX>

Freq(Hz)	6.175G	6.475G	6.695G	6.995G
Ant. 1 Max Gain (dBi)	3.66	2.95	5.16	5.06
Ant. 2 Max Gain (dBi)	3.38	4	5.81	4.76
Ant. 3 Max Gain (dBi)	3.54	2.54	3.51	3.97
Ant. 4 Max Gain (dBi)	4.27	3.5	5.5	5.22
Ant. 1 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/75/90	Theta/75/120	Theta/60/82.5	Theta/75/127.5
Ant. 2 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/67.5/0	Theta/67.5/157.5	Theta/67.5/97.5	Theta/75/97.5
Ant. 3 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/82.5/307.5	Theta/75/135	Theta/82.5/270	Theta/82.5/300
Ant. 4 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/75/82.5	Theta/67.5/82.5	Theta/75/262.5	Theta/75/262.5
Max Gain (dBi)	4.27	4	5.81	5.22
DG [1SS] (dBi)	8.35	8.3	8.63	8.73
DG [2SS] (dBi)	5.35	5.3	5.81	5.73
DG [4SS] (dBi)	4.27	4	5.81	5.22

<2TX>

Freq(Hz)	6.175G	6.475G	6.695G	6.995G
Ant. 2 Max Gain (dBi)	3.38	4	5.81	4.76
Ant. 3 Max Gain (dBi)	3.54	2.54	3.51	3.97
Ant. 2 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/67.5/0	Theta/67.5/157.5	Theta/67.5/97.5	Theta/75/97.5
Ant. 3 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/82.5/307.5	Theta/75/135	Theta/82.5/270	Theta/82.5/300
Max Gain (dBi)	3.54	4	5.81	4.76
DG [1SS] (dBi)	5.03	5.33	6.74	6.33
DG [2SS] (dBi)	3.54	4	5.81	4.76



For Scanning Radio 3:

Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	3.06	3.81	3.38	3.2	2.54
Ant. 2 Max Gain (dBi)	2.52	3.21	2.86	3.11	3.78
Ant. 1 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/60/270	Theta/67.5/60	Theta/67.5/60	Theta/75/37.5	Theta/52.5/0
Ant. 2 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/60/90	Theta/75/142.5	Theta/82.5/217.5	Theta/60/120	Theta/60/127.5

Freq(Hz)	6.175G	6.475G	6.695G	6.995G
Ant. 1 Max Gain (dBi)	3.32	3	4.97	4.81
Ant. 2 Max Gain (dBi)	3.22	4.16	3	3.45
Ant. 1 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/67.5/75	Theta/67.5/75	Theta/75/75	Theta/75/75
Ant. 2 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/75/255	Theta/75/255	Theta/75/105	Theta/82.5/202.5

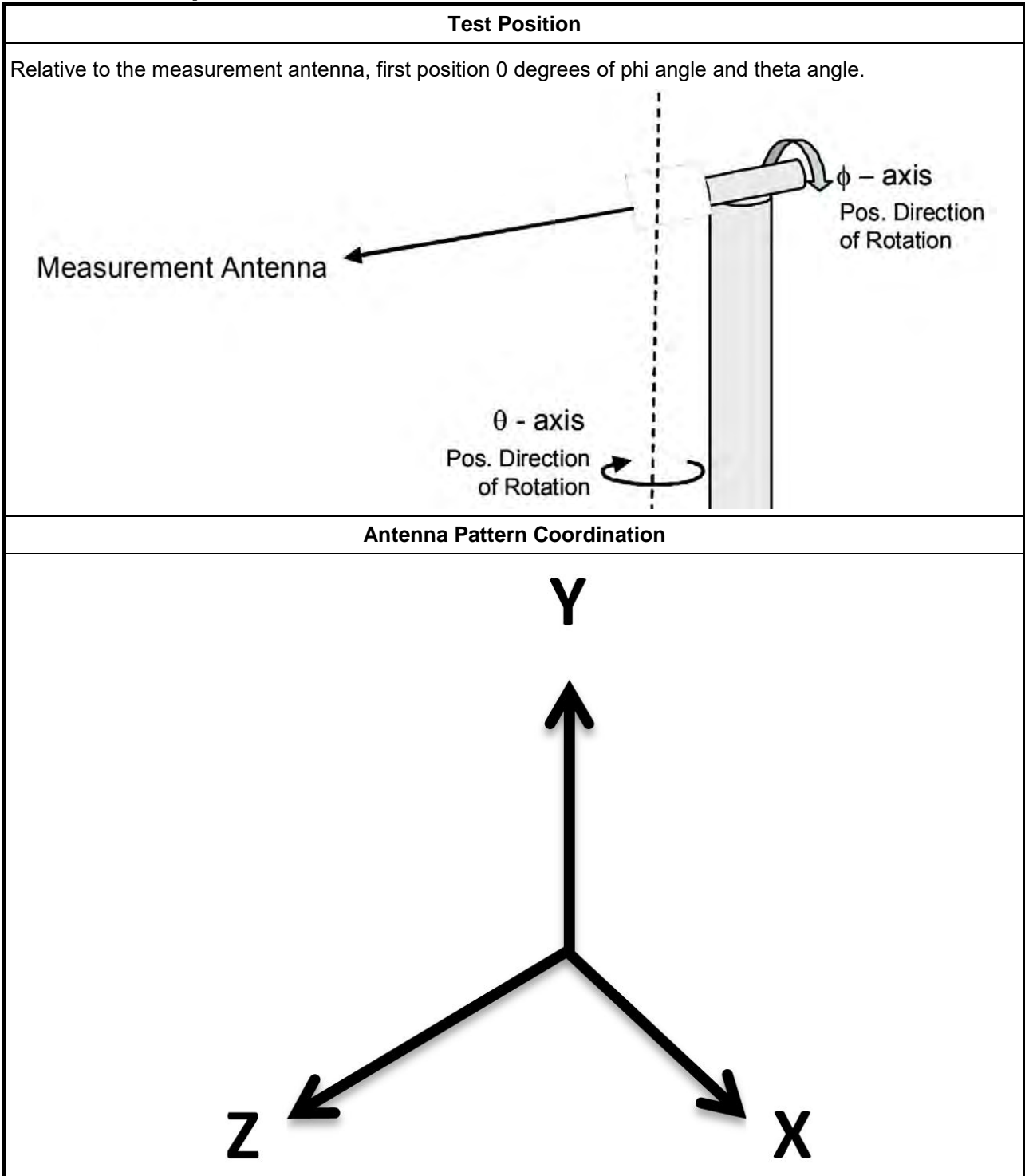
For Radio 4:

Freq(Hz)	2.45G
Ant. 3 Max Gain (dBi)	3.05
Ant. 3 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/60/262.5

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)
4. Directional Gain (4SS) = Directional Gain (1SS) – 6dB. 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 31, 2022	May 30, 2023
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. 20, 2022	Jul. 19, 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: Calibration Interval of instruments listed above is one year.

NCR means Non-Calibration required.



11. Test Results

Please refer to the appendix.

Appendix A - Radiated Composite Gain of 2.4GHz/5GHz in Radio 1.....	Page 21
Appendix B - Radiated Composite Gain of 6GHz in Radio 2.....	Page 44
Appendix C - Radiated Composite Gain of 2.4GHz/5GHz/6GHz in Radio 3 and Bluetooth in Radio 4..	Page 58
Appendix D - Antenna Pattern of 2.4GHz/2.4GHz/5GHz in Radio 1.....	Page 72
Appendix E - Antenna Pattern of 6GHz in Radio 2.....	Page 79
Appendix F - Antenna Pattern of of 2.4GHz/5GHz/6GHz in Radio 3 and Bluetooth in Radio 4.....	Page 85
Appendix G - Test Photos.....	Page 92



Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.17	1.39	1.71	3.09	3.45
Ant. 2 Max Gain (dBi)	3.28	3.37	3.54	4.2	4.12
Ant. 3 Max Gain (dBi)	3.95	3.42	3.05	3.92	4.41
Ant. 4 Max Gain (dBi)	2.63	1.47	1.36	2.39	2.26
Ant. 1 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/45/0	Theta/52.5/60	Theta/67.5/45	Theta/60/45	Theta/60/45
Ant. 2 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/52.5/7.5	Theta/52.5/225	Theta/60/217.5	Theta/52.5/232.5	Theta/67.5/60
Ant. 3 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/60/0	Theta/52.5/232.5	Theta/67.5/217.5	Theta/67.5/225	Theta/60/225
Ant. 4 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/67.5/112.5	Theta/82.5/45	Theta/82.5/255	Theta/82.5/247.5	Theta/52.5/345
Max Gain (dBi)	3.95	3.42	3.54	4.2	4.41
DG [1SS] (dBi)	8.04	6.58	6.15	6.87	7.35
DG [2SS] (dBi)	5.04	3.58	3.54	4.2	4.41
DG [4SS] (dBi)	3.95	3.42	3.54	4.2	4.41



Radiated Composite Gain Data_Radio 1 (4TX)

Appendix A.1

θ(75°)	-2.15/-1.99	-6.17/-7.21	-7.34/-5.67	-5.95/-6.82	-5.77/-6.4	-8.2/-6.47	-5.47/-8.8	-8.35/-6.66	-4.77/-4.13	-4.4/-3.06	-5.61/-5.59	-4.19/-4.5	-3.4/-3.61	-6.4/-5.19	-6.28/-6.65	-6.65/-10.03	-6.62/-9.39	-8.37/-8.86	-8.72/-10.6	-6.82/-3.94	-3.46/-3.7	-5.17/-4.37	-8.14/-6.04	-3.82/-2.58	
θ(75°)	0.44/-0.11	-3.31/-5.67	-6.52/-5.57	-7.71/-5.45	-6.68/-7.8	-8.95/-7.6	-7.69/-7.02	-10.21/-7.61	-3.57/-4.53	-4.34/-4.71	-8.26/-7.99	-2.93/-1.98	-2.05/-0.79	-4.56/-4.79	-6.84/-6.05	-8.76/-6.8	-7.36/-8.49	-7.74/-5.88	-9.33/-8.52	-7.74/-4.57	-1.36/-5.61	-3.6/-6.56	-6.81/-5.89	-4.46/-0.63	
θ(82.5°)	1.43/0.4	-2.18/-5.17	-5.69/-6.52	-8.18/-5.27	-7.71/-9.21	-7.43/-8.93	9.07/-7.73	-9.8/-8.32	-2.91/-4.86	-4.63/-4.8	6.22/-7.37	-1.99/-0.33	0.02/-0.6	-2.86/-6.05	-7.64/-5.8	-7.56/-6.87	-7.8/-8.15	-6.43/-3.02	-6.86/-7.04	-6.04/-5.42	-2.05/-5.81	-4.53/-9.49	-3.29/-4.43	-3.55/-0.31	
θ(90°)	1.1/-1.1	-1.8/-5.04	-6.04/-6.21	-7.48/-4.64	-7.69/-8.91	-7.44/-7.69	-7.63/-8.01	-9.58/-10.32	-4.89/-4.89	-4.92/-4.79	-5.12/-8.45	-1.71/-0.14	-0.23/-0.44	-1.56/-7.64	-7.27/-5.79	-5.94/-6.93	-7.33/-7.71	-8.24/-4.78	-8.23/-8.07	-6.72/-5.93	-3.31/-5.84	-5.68/-9.96	-3.5/-4.85	-2.9/-0.84	
θ(97.5°)	-0.36/-3.14	-2.82/-5.62	-6.9/-7.6	-7.87/-5.2	-7.86/-8.11	-8.08/-8.43	-9.79/-7.06	-9.12/-10.56	-5.66/-4.89	-7.54/-4.54	-5.35/-7.09	-1.26/-1.12	0.01/-2.05	-2.55/-7.11	-6.79/-7.7	-5.03/-6.24	-7.09/-8.49	-7.07/-5.13	-9.96/-9.76	-6.59/-7.31	-5.45/-4.88	-6.47/-8.07	-4.44/-5.78	-3.78/-1.81	
θ(105°)	-3.03/-4.41	-5.09/-7.85	-6.52/-8.01	-8.2/-4.93	-6.4/-8.63	-8.94/-9.71	-9.9/-9.65	-10.07/-11.48	-6.84/-6.09	-9.19/-6.63	-7.64/-7.92	-2.83/-3.13	-1.74/-2.29	-4.34/-8.6	-7.22/-6.68	-7.98/-6.47	-7.38/-9.4	-10.15/-7.91	-12.08/-10.74	-9.82/-6.87	-6.92/-6.28	-8.47/-9.98	-7.17/-6.4	-3.51/-3.82	
θ(112.5°)	-5.69/-9.53	-8.03/-8.82	-7.56/-9.32	-8.1/-6.46	-7.63/-7.24	-9.36/-10.87	-8.49/-11.48	-11.11/-8.59	-7.69/-7.38	-10.48/-6.77	-8.98/-11.99	-5.61/-5.24	-6.06/-7.21	-8.63/-10.06	-9.77/-7.49	-6.23/-6.07	-6.68/-8.89	-11.83/-10.7	-11.62/-9.98	-9.14/-6.99	-9.34/-5.4	-7.69/-8	-10/-7.08	-5.96/-6.88	
θ(120°)	-7.98/-9.12	-9.48/-8.86	-7.72/-8.88	-7.43/-8.21	-8.2/-7.5	-8.66/-10.7	-7.37/-11.18	-10.54/-7.95	-7.25/-8.74	-8.95/-5.96	-8.46/-10.85	-8.73/-9.87	-8.81/-9.6	-8.14/-10.46	-7.82/-6.46	-8.57/-6.37	-4.75/-8.92	-11.91/-10.12	-11.91/-6.89	-9.22/-10.36	-6.57/-7.96	-9.85/-6.22	-9.34/-11.1	-7.75/-8.07	
θ(127.5°)	-9.38/-8.88	-8.22/-9.11	-8.08/-8.94	-4.74/-6.16	-8.28/-10.55	-10.44/-8.93	-8.72/-8.51	-11.02/-9.71	-5.48/-7.14	-9.19/-7.71	-6.71/-10.38	-8.47/-8.59	-8.02/-6.57	-7.19/-10.48	-8.85/-8.77	-7.65/-6.97	-7.71/-9.73	-8.62/-5.92	-9.85/-8.45	-8.46/-9.73	-8.39/-6.88	-9.04/-10.26	-8.09/-11.86	-10.93/-8.3	
θ(135°)	-7.35/-11.2	-9.02/-10.07	-10.63/-7.18	-7.07/-6.36	-7.51/-8.99	-8.47/-10.44	-9.93/-9.56	-6.59/-10.33	-7.42/-5.43	-6.42/-11.1	-8.63/-5.49	-8.28/-11.68	-10.91/-7	-11.32/-10.51	-9.13/-6.15	-6.45/-9.73	-10.16/-10.29	-5.82/-7.74	-4.14/-8.7	-5.93/-11.14	-8.51/-7.84	-8.56/-6.38	-8.64/-10.86	-9.74/-9.04	
θ(142.5°)	-6.02/-8.61	-7.33/-7.6	-6.08/-5.32	-7.62/-7.64	-9.55/-8.99	-6.62/-8.82	-8.85/-10.87	-8.25/-10.83	-9.99/-8.52	-8.7/-6.79	-7.23/-9.56	-7.95/-9.02	-9.93/-9.02	-8.7/-10.35	-10.71/-10.63	-10.51/-10.56	-10.71/-11.63	-11.81/-10.43	-8.53/-8.99	-8.75/-9.78	-11.92/-12.16	-11.6/-11.39	-11.13/-11.47	-12.18/-11.8	-11.19/-5.6
θ(150°)	-6.11/-8.16	-7.85/-8.04	-8.51/-8.8	-11.2/-12.2	-10.77/-10.35	-11.24/-12.43	-11.39/-11.3	-11.14/-10.91	-11.33/-9.23	-10.18/-11.05	-9.02/-8.25	-8.46/-7.4	-5.56/-9.48	-9.69/-7.42	-12.59/-7.83	-7.54/-8.64	-10.51/-12.2	-11.72/-11.58	-10.62/-12.4	-10.87/-9.31	-9.98/-11.16	-9.96/-11.66	-11.14/-9.46	-8.91/-7.89	
θ(157.5°)	-9.75/-10.91	-12.19/-10.44	-10.92/-11.46	-10.69/-9.33	-8.29/-6.85	-9.06/-8.78	-9.81/-10.07	-7.88/-6.58	-8.16/-9.48	-10.53/-10.61	-8.98/-8.81	-10.46/-12.19	-12.74/-9.79	-9.38/-10.62	-12.05/-10.2	-10.35/-9.92	-11.19/99	-9.56/-11.03	-11.78/-11.13	-10.18/-9.06	-10.71/-11.1	-9.68/-10.08	-10.07/-11.45	-10.56/-9.29	
θ(165°)	-9.38/-10.07	-10.23/-11.17	-11.11/-10.87	-11.56/-10.82	-8.33/-7.75	-8.4/-9.42	-11.71/-10.96	-9.41/-9.36	-9.68/-9.42	-9.03/-9.39	-9.79/-8.5	-8.91/-9.83	-10.10/-10.03	-10.51/-10.56	-10.71/-11.63	-11.81/-10.43	-8.53/-8.99	-8.75/-9.78	-11.92/-12.16	-11.6/-11.39	-11.13/-11.47	-12.18/-11.8	-11.19/-5.6	-11.19/-5.6	
θ(172.5°)	-9.02/-10.03	-11.19/-9.54	-10.04/-9.63	-9.16/-10.33	-10.81/-11.68	-11.31/-10.38	-9.67/-9.07	-8.2/-8.39	-9.28/-10.11	-10.41/-10.32	-10.06/-10.21	-9.53/-10.48	-11.53/-12.29	-12.12/-11.47	-11.01/-9.86	-9.01/-8.77	-8.65/-8.36	-8.28/-7.83	-7.95/-7.72	-8.9/-8.52	-7.83/-7.55	-7.54/-7.97	-8.82/-9.3	-9.29/-9.2	
θ(180°)	-9.63/-10.07	-9/-9.76	-10.28/-10.21	-10.59/-10.49	-11.25/-9.9	-9.2/-8.86	-8.93/-9.02	-8.5/-9.79	-9.16/-8.92	-8.14/-8.96	-9.86/-10.48	-10.83/-10.02	-10.42/-9.63	-9.18/-9.57	-9.04/-9.49	-10.97/-11.76	-12.13/-11.18	-9.86/-9.69	-8.83/-9.37	-8.74/-9.29	-9.3/-9.88	-9.3/-10.48	-10.18/-9.79	-10.31/-9.9	
Freq(Hz)	5.785GPol. <td>Theta_{ref}</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td>	Theta _{ref}	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DC(90dB)	Φ(0°)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°)	
θ(0°)	-8.32/-7.93	-8.17/-8.5	-7.83/-8.38	-7.77/-6.86	-6.38/-5.68	-5.82/-5.97	-5.75/-5.72	4.91/4.71	-5.17/-4.9	-4.72/-4.6	-4.96/-5.08	-5.09/-5.61	-5.33/-5.39	-5.36/-5.72	-4.94/-4.71	-5.23/-4.86	-4.88/-4.21	-4.38/-4.69	-4.87/-4.54	-4.65/-5.03	-5.25/-5.24	-5.55/-5.84	-6.54/-6.64	-7.61/-8.98	
θ(7.5°)	-5.58/-4.82	-4.82/-4.61	-4.05/-3.7	-4.3/-4.7	-5.02/-5.03	-4.82/-4.35	-4.25/-4.1	-4.02/-3.74	-3.61/-3.95	-4.46/-4.65	-5.25/-5.89	-6.56/-7.37	-7.64/-8.56	-8.96/-8.55	-9.29/-8.29	-7.62/-6.74	-5.95/-5.4	-4.81/-4.84	-4.39/-4.72	-3.96/-3.8	-3.29/-2.7	-3.11/-3.06	-3.43/-3.98	-4.73/-5.29	
θ(15°)	-8.32/-8.94	-8.27/-7.23	-6.57/-6.11	-6.28/-7.25	-7.16/-6.5	-5.96/-4.73	-3.42/-4.02	-5.23/-4.87	-4.93/-4.23	-3.8/-3.96	-4.38/-5.13	-5.44/-4.78	-6.44/-7.8	-7.54/-8.64	-9.01/-8.77	-8.65/-8.36	-8.28/-7.83	-7.95/-7.72	-8.9/-8.52	-7.83/-7.55	-7.54/-7.97	-8.82/-9.3	-9.29/-9.2	-8.93/-8.32	
θ(22.5°)	-1.49/-1.16	-1.62/-2.42	-3.85/-3.78	-3.37/-1.91	-0.160/46	-0.7/-0.4	0.61/0.7	0.270/37	0.11/-1.61	-2.42/-2.79	4.06/-5.16	-5.13/-5.35	-4.25/-3.96	-5.03/-5.08	-3.55/-2.39	-0.770/76	0.730/38	0.88/74	1.390/3	0.671/09	0.12/-2.66	-5.4/-4.92	-2.83/-0.97	-0.54/-0.8	
θ(30°)	-1.18/-1.62	-1.77/-0.58	0.52/1.6	1.47/1.22	1.420/46	-1.970/52	1.991/69	-0.3/-0.09	2.181/54	-0.49/-1.5	-1.78/-1.5	-1.24/-1.97	-1.37/-0.34	0.210/98	1.421/17	1.22/46	1.92/26	3.21/3.5	2.842/66	3.013/46	3.492/51	1.260/84	1.071/49	0.49/-0.76	
θ(37.5°)	3.593/53	2.452/29	1.922/78	3.62/76	3.062/98	3.142/6	3.082/95	3.064/22	4.362/84	3.262/46	1.361/85	0.881/23	1.210/89	1.12/08	2.564/1	4.54/03	4.224/25	4.494/09	4.775/15	5.124/81	3.933/47	4.093/03	2.093/82	4.714/56	
θ(45°)	4.364/53	3.514/65	5.434/78	5.474/36	4.4/36	2.840/57	2.26/65	3.235/16	3.983/42	4.464/46	4.374/29	4.434/66	3.444/91	4.794/4	4.15/23	4.414/49	4.985/08	3.864/22	4.184/39	5.415/76	5.434/86	6.456/68	6.666/02	5.775/43	
θ(52.5°)	5.616/23	5.264/73	5.385/19	6.115/96	5.615/98	4.453/75	4.053/16	4.424/95	5.735/92	6.316/03	6.976/09	6.265/64	4.343/66	4.965/92	6.246/67	6.796/5	6.86/13	5.035/52	5.536/51	5.976/28	6.466/08	6.976/74	7.126/15	5.795/47	
θ(60°)	6.067/35	6.315/55	5.655/62	6.586/96	5.454/3	3.832/63	1.842/71	4.484/05	5.026/13	6.716/44	6.285/81	6.967/09	5.975/58	4.865/06	4.816/51	7.36/84	5.815/12	4.634/44	4.685/97	4.954/89	5.036/24	7.176/02	6.025/03	5.436/27	
θ(67.5°)	3.935/43	4.996/24	5.945/89	5.036/7	4.512/95	3.09/-2.21	-0.22/0.48	3.353/27	5.16/15	5.696/29	6.865/53	5.856/33	5.035/87	5.265/12	4.966/79	6.215/66	4.432/91	2.681/61	2.352/92	4.094/09	4.195/6	6.456/1	5.145/62	4.445/31	
θ(75°)	2.373/95	4.24/6	5.66/1	4.175/46	3.812/38	3.27/-1.13	1.360/07	2.963/45	54/86	3.845/65	6.845/17	4.194/31	2.4/6	5.245/52	5.167/04	5.714/48	4.323/84	2.422/86	3.573/16	4.4/39	3.454/97	5.316/29	4.245/42	4.094/14	
θ(82.5°)	1.732/67	3.324/93	4.465/26	3.424/52	3.071/43	2.840/83	1.931/34	2.432/71	4.113/75	3.125/09	5.684/04	3.513/37	2.273/82	5.134/76	4.86/45	4.254/23	4.274/76	3.364/51	5.044/1	4.363/66	3.417/93	4.35/46	3.694/43	2.782/55	
θ(90°)	-0.180/77	1.672/7	2.763/59	1.83/25	1.83/0.65	1.791/2	0.951/83	1.141/47	3.142/06	1.714/34	4.252/87	2.482/26	1.951/71	4.353/41	3.575/27	4.283/88	2.834/14	2.764/25	4.624/44	3.072/64	2.662/65	3.143/98	2.392/37	1.170/6	
θ(97.5°)	-2.83/-1.77	-0.36/-0.05	1.192/05	0.71/1.72	0.85/-2.46	0.371/15	-0.44/1.38	-0.35/-0.14	1.410/39	0.872/92	2.471/22	1.110/6	0.390/16	2.581/07	1.1/26	2.42/42	0.851/25	0.543/2	1.862/34	0.470	1.241/01	1.712/11	0.08/-0.54	-1.15/-0.43	
θ(105°)	-4.06/-4.54	-3.35/-3	-1.01/-0.38	-0.320/17	-1.04/-4.39	-0.770/07	-1.75/-0.45	-1.65/-1.19	-0.77/-1.5	-1.0/57	0.43/-0.6	-1.21/-3.8	-1.98/-1.24	0.940/23	-1.071/33	0.860/7	-2.58/-2.21	-1.630/94	-2.950/83	-3.09/-3.57	-0.871/1.95	-1.290/05	-2.49/-1.28	-3.3/-3.38	
θ(112.5°)	-6.24/-7.2	-5.99/-4.86	-2.86/-2.24	-2.18/-0.63	-1.98/-4.03	-3.52/-1.22	-3.87/-2.37	-3.72/-3.76	-2.39/-1.61	-2.810/13	0.96/-4.13	-3.29/-3.56	-4.17/-4.28	-2.3/-1.53	-2.47/0.23	-0.020/21	-5.884/04	-2.57/0.6	-4.8/-2.1	-3.55/-3.46	-4.19/-2.58	-1.72/-0.89	-3.64/-1.48	-4.79/-5.65	
θ(120°)	-6.55/-7.06	-8.14/-5.33	-5.74/-3.81	-3.11/-1.88	-3.43/-4.02	-3.78/-2.43	-4.3/-4.67	-3.87/-2.69	-3.71/-1.1	-4.41/-2.69	-3.38/-4.39	-3.63/-6.47	-2.88/-6.25	-3.63/-2.73	-3.82/-3.09	-2.46/-1.68	-2.391/1.92	-4.8/-3.46	-4.77/-5.04	-3.94/-2.97	-3.73/-1.9	-2.45/-3.81	-4.18/-1.33	-4.75/-7.21	
θ(127.5°)	-6.52/-7.01	-11.44/-6.8	-6.53/-3.86	-3.47/-3.62	-4.34/-5.38	-7.31/-6.52	-6.11/-8.57	-5.44/-2.13	-3.46/-2.79	-2.87/-4.85															



Radiated Composite Gain Data Radio 1 (4TX)

Appendix A.1

Freq(Hz)	Theta(Ant. 1)	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°)
9.08/7.66	-6.20/7.09	-7.24/7.33	-7.93/8.88	-9.23/7.68	-8.19/10.79	15.02/16.94	-15.31/18.75	-12.28/11.98	-11.19/11.19	-11.26/12.01	-10.28/8.02	8.58/11.1	-14.22/13.32	-10.51/9.56	-10.82/15.06	-18.48/16.67	-13.42/15.17	-18.17/18.29	-18.53/19.23	-18.33/18.98	-18.77/17.01	-16.3/12.41	-10.25/9.26																										
9.08/7.66	-6.20/7.09	-7.24/7.33	-7.93/8.88	-9.23/7.68	-8.19/10.79	15.02/16.94	-15.31/18.75	-12.28/11.98	-11.19/11.19	-11.26/12.01	-10.28/8.02	8.58/11.1	-14.22/13.32	-10.51/9.56	-10.82/15.06	-18.48/16.67	-13.42/15.17	-18.17/18.29	-18.53/19.23	-18.33/18.98	-18.77/17.01	-16.3/12.41	-10.25/9.26																										
9.08/7.66	-6.20/7.09	-7.24/7.33	-7.93/8.88	-9.23/7.68	-8.19/10.79	15.02/16.94	-15.31/18.75	-12.28/11.98	-11.19/11.19	-11.26/12.01	-10.28/8.02	8.58/11.1	-14.22/13.32	-10.51/9.56	-10.82/15.06	-18.48/16.67	-13.42/15.17	-18.17/18.29	-18.53/19.23	-18.33/18.98	-18.77/17.01	-16.3/12.41	-10.25/9.26																										



Radiated Composite Gain Data Radio 1 (4TX)

Appendix A.1

Freq(Hz)	Theta Ant 1	Theta Ant 2	Theta Ant 3	Theta Ant 4	Theta Ant 5	Theta Ant 6	Theta Ant 7	Theta Ant 8	Theta Ant 9	Theta Ant 10	Theta Ant 11	Theta Ant 12	Theta Ant 13	Theta Ant 14	Theta Ant 15	Theta Ant 16	Theta Ant 17	Theta Ant 18	Theta Ant 19	Theta Ant 20	Theta Ant 21	Theta Ant 22	Theta Ant 23	Theta Ant 24	Theta Ant 25	Theta Ant 26	Theta Ant 27	Theta Ant 28	Theta Ant 29	Theta Ant 30	Theta Ant 31	Theta Ant 32	Theta Ant 33	Theta Ant 34	Theta Ant 35	Theta Ant 36	Theta Ant 37	Theta Ant 38	Theta Ant 39	Theta Ant 40																																																																																																																																																																																																																																																																																																																																											
Theta(75°)	-10.09/12.36	-17.21/15.99	-16.03/10.16	-7.7/8.53	8.92/10.68	-16.56/18.13	-15.51/14.92	-18.94/15.05	-6.34/19.06	-17.7/18.16	-18.98/14.6	-9.81/4.6	5.35/3.94	5.82/8.4	-10.66/18.47	-15.53/11.53	-19.09/16.28	-13.8/12.9	-14.55/13.42	-17.8/12.09	-6.94/9.13	-8.47/8.82	-18.54/14.41	-16.69/13.68	Theta(82.5°)	9.52/12.15	-16.83/14.1	-15.49/15.65	-8.18/8.51	9.33/14.59	-16.91/18.11	-14.14/11.95	-18.85/19.24	-5.91/18.01	-12.26/12.97	-10.11/17.42	-9.88/3.12	-2.92/3.79	-4.25/8.22	-8.22/12.1	-18.96/12.29	-17.41/16.94	-13.7/12.94	-15.04/12.23	-19.27/14.5	-7.62/9.13	-11.65/11.48	-18.54/15.34	-19.09/13.09	Theta(90°)	9.31/11.42	-13.23/12.47	-16.08/17.13	-8.04/7.55	9.32/13.39	-15.83/19	-10.55/10.05	-18.88/17.25	-10.74/11.4	-13.15/9.26	-7.58/17.29	-7.21/2.22	-3.72/3.8	-4.52/10.23	9.01/11.09	-18.62/18.61	-17.21/18.94	-13.89/18.47	-17.96/11.86	-9.38/11.03	-13.43/16.64	-18.38/16.03	-19.21/14.53	Theta(97.5°)	-10.5/13.81	-12.77/12.28	-18.54/17.84	9.87/8.75	-10.15/10.8	-14.56/18.45	-15.51/8.5	-17.72/17.23	-13.8/8.69	-16.97/7.23	-7.84/16.76	-6.14/3.71	2.98/6.51	6.6/11.19	9.65/14.43	-18.53/18.05	-17.81/18.74	-18.47/17.74	-18.48/18	-18.28/12.19	-11.5/11.4	-12.77/16.51	-17.77/18.18	-18.7/14.33	Theta(105°)	-11.47/11.38	-13.85/14.1	-18.23/18.25	-13.19/8.7	-10.19/12.16	-17.18/18.69	-15.76/13.43	-13.55/19.3	-13.15/9.14	-17.38/12.59	-11.51/14.67	6.59/4.97	-6.21/11.12	-9.67/12.56	-12.12/16.96	-17.46/16.35	-17.17/18.79	-19.19/18.32	-18.44/19.07	-19.03/12.34	-12.97/11.81	-15.76/19.51	-18.14/17.64	-14.8/15	Theta(112.5°)	-12.44/12.32	-18.42/17.57	-18.69/17.01	-16.89/11.38	-13.63/10.06	-16.55/17.21	-15.38/18.24	-19.25/12.43	-12.86/11.38	-19.5/11.75	-10.78/17.9	-8.82/9.81	-6.45/16.41	-13.92/16.32	-17.46/18.84	-16.73/17.83	-18.97/18.69	-17.98/16.6	-17.66/11.08	-15.65/10.29	-18.69/16.58	-18.99/13.07	-14.18/16.35	Theta(120°)	-11.2/11.33	-14.63/18.37	-17.38/19.14	-16.29/17.32	-18.78/10.05	-12.68/18.7	-12.05/18.45	-18.88/12.39	-11.65/13.89	-14.56/11.6	-10.27/17.89	-9.94/18.39	-18.16/18.86	-18.02/17.25	-18.88/12.61	-18.33/17.86	-12.73/19.3	-18.96/18.41	-18.73/13.67	-15.41/12.03	-17.63/11.4	-13.75/13.93	-17.3/19	-11.53/11.55	Theta(127.5°)	-11.15/9.24	-12.09/18.21	-16.13/18.85	-11.08/17.18	-17.14/18.65	-13.54/15.54	-18/11.69	-15.61/17.96	-8.46/15.2	-14.85/12.96	-16.13/13.82	-14.51/15.19	-15.84/15.2	-18.12/18.18	-18.13/16.35	-19.05/15.91	-16.81/17.68	-18.74/19.25	-19.37/17.75	-18.53/14.11	-17.17/11.41	-9.33/19.63	-17.83/18.05	-18.42/12.87	Theta(135°)	-12.43/15.44	-11.41/13.81	-17.28/15.24	-19.33/13.87	-8.42/18.57	-14.79/16.36	-15.02/16.46	-9.8/16.45	-11.75/8.59	-9.14/17.08	-11.36/11.56	-10.39/18.05	-19.35/18.6	-18.12/17.54	-13.93/17.67	-18.59/18.54	-18.08/17.44	-17.36/19.05	-15.85/17.37	-18.44/17.12	-16.3/11.72	-8.26/9.72	-16.68/19.39	-18.48/11.98	Theta(142.5°)	7.38/12.8	-15.2/9.22	-16.4/17.7	-16.21/10.43	-11.91/12.35	-10.81/18.6	-14.59/17.51	-14.13/14.54	-17.63/11.76	-17.26/12.9	-11.66/18.88	-10.13/17.81	-16.84/11.08	-15.73/17.92	-18.18/18.07	-18.01/12.09	-15.04/16.16	-18.75/15.9	-14.53/15.3	-12.95/18.19	-17.63/13.58	-10.07/10.47	-17.9/17.91	-16.92/16.85	Theta(150°)	9.92/10.26	-16.12/15.77	-12.63/15.13	-18.85/18.98	-17.89/19.29	-19.22/18.98	-18.18/18.36	-19.22/18.98	-18.87/11.58	-15.69/18.45	-18.27/18.21	-14.06/14.65	-16.49/14.99	-19.1/17.88	-18.33/18.44	-15.37/13.23	-17.09/19.04	-18.89/15.19	-18.34/18.89	-13.5/15.25	-18.7/18.46	-16.86/19.1	-18.74/15.71	-11.3/12.66	Theta(157.5°)	-11.07/14.14	-19.33/16.34	-14.3/15.27	-14.4/15.12	-19.85/17.38	-15.97/14.1	-16.89/17.64	-10.71/8.37	-12.74/17.92	-18.18/17.56	-17.83/18.32	-15.51/17.79	-19.0/18.54	-18.06/16.88	-19.02/18.25	-17.51/17.08	-18.5/19.09	-19.3/17.85	-15.59/13.63	-15.59/19.09	-18.11/18.41	-19.07/19.05	-15/11.25	Theta(165°)	-12.82/12.58	-15.7/17.16	-15.24/16.88	-17.06/14.01	-10.2/8.13	-8.34/11.17	-18.11/17.26	-12.39/11.92	-14.75/18.04	-17.68/18.41	-18.16/17.99	-17.63/17.97	-18.7/16.44	-14.7/16.82	-18.26/17.21	-17.38/19.11	-17.86/18.97	-17.36/13.47	-12.08/15.12	-19.2/17.33	-16.36/15.96	-15.1/15.73	-17.46/19.09	-17.37/15.21	Theta(172.5°)	-10.2/11.59	-14.22/15.08	-16.21/18.62	-18.89/17.55	-17.04/16.36	-16.98/16.44	-14.86/13.78	-12.66/13.46	-16.44/17.65	-17.27/18.47	-16.47/18.85	-18.91/18.1	-18.06/17.51	-18.24/18.61	-17.78/17.75	-18.91/18.96	-15.45/13.78	-12.91/12.29	-12.14/12.49	-13.84/13.57	-11.31/10.7	-11.08/12.76	-18.07/19.18	-15.28/11.44	Theta(180°)	-17.41/19.37	-17.37/19.02	-17.33/18.66	-17.84/19.14	-18.61/18.34	-18.9/17.47	-19.55/18.79	-17.65/16.8	-18.17/18.29	-17.85/18.56	-18.56/18.79	-19.21/18.43	-17.77/18.16	-19.18/18.94	-18.25/18.53	-17.82/17.55	-17.67/19.23	-18.68/17.68	-18.19/17.64	-18.68/17.36	-18.99/17.8	-17.73/18.59	-17.51/18.17	-18.66/18.67



Radiated Composite Gain Data Radio 1 (4TX)

Appendix A.1

Theta	9:08:10.74	-17:05:12.6	-8:01:6.52	-8:57:10.09	-18:04:19.27	-18:34:17.97	-16:43:15.75	-17:58:12.87	-15:13:18	-8:68:11.68	-17:08:19.32	-18:94:17.7	-18:91:18.53	-14:91:18.1	-6:16:18.8	-14:21:15.05	-18:13:13.88	-10:41:11.9	-9:14:16.5	-12:34:15.29	-9:68:11.27	-15:58:18.04	-10:94:10.11	-10:12:14.42	
Theta	9:54:18.81	-18:44:9.75	-9:66:6.66	-6:66:9.02	-13:94:13.02	-18:46:15.7	-17:74:15.31	-18:51:17.02	-13:88:18.93	-12:43:11.27	-10:91:15.98	-12:94:18.06	-13:16:17.8	-10:43:12.71	-17:51:11.12	-12:62:12.91	-11:81:12.22	-10:33:8.87	-8:44:10.46	-10:88:11.91	-11:81:17.95	-18:41:9.03	-11:95:14.45	-10:94:10.91	
Theta	17:14:18.9	-17:61:12.7	-10:75:8.96	-9:31:9.56	-6:82:8.69	-18:29:11.04	-16:37:18.28	-18:39:18.42	-13:07:15.88	-17:66:13.09	-10:62:10.99	-16:69:15.58	-18:25:15.2	-18:97:17.26	-16:75:9.43	-12:66:14.86	-8:37:11.12	-19:19:8.54	-11:12:9.44	-11:47:11.52	-13:39:16.23	-17:89:9.83	-14:51:19.61	-11:47:14.88	
Theta	-17:31:17.14	-18:21:17.19	-12:12:11.17	-10:28:7.15	-6:46:8.76	-7:69:8.24	-14:95:18.29	-12:15:38	-13:44:14.46	-16:31:12.32	-13:36:15.94	-14:97:10.65	-18:09:13.62	-10:01:12.99	-17:81:10.53	-9:01:17.19	-14:36:17.94	-18:68:13.06	-17:13:13.8	-14:86:18.09	-17:18:15.7	-18:89:18.1	-13:91:13.52	-11:22:15.19	
Theta	-17:41:18	-16:46:12.64	-9:87:8.6	-8:73:8.71	-9:41:9.04	-7:16:6.93	-11:03:17.76	-18:56:15.2	-15:38:16.68	-13:77:14.1	-19:03:18.64	-16:41:12.11	-18:51:16.34	-10:73:11.59	-17:91:16.96	-15:23:15.28	-13:87:18.16	-14:03:16.32	-15:02:19.01	-18:72:17.22	-16:47:15.7	-14:02:12.12	-11:89:14.03	-15:07:17.47	
Theta	-18:11:16.67	-18:91:13.51	-10:21:8.82	-9:03:1.64	-7:13:1.74	-7:27:9.7	-13:13:18.58	-14:86:12.11	-11:11:13.27	-16:51:18.13	-18:81:17.67	-18:07:15.79	-18:91:18.98	-18:25:15.92	-17:81:19.12	-19:22:13.89	-8:69:10.64	-9:65:12.12	-15:33:14.25	-11:99:12.31	-12:12:12.02	-11:77:11.63	-10:96:9.75		
Theta	-13:33:16.66	-13:72:11.44	-9:97:7.63	-6:85:7.04	-7:25:7.05	-7:82:8.97	-10:53:13.62	-14:86:16.64	-18:58:18.28	-17:71:18.38	-18:37:17.34	-18:51:18.3	-19:22:18.81	-18:96:17.58	-15:85:18.05	-18:71:16.52	-16:22:14.13	-16:91:14.96	-11:87:10.57	-10:54:11.89	-14:24:18.04	-18:55:17.56	-15:03:13.08	-11:88:11.59	
Theta	-18:02:17.49	-17:91:13.65	-11:89:12.8	-9:68:1.92	-8:32:6.95	-6:42:5.9	-6:35:1.01	-7:81:9.63	-13:11:16.39	-15:95:14.88	-13:79:15.32	-17:46:17.68	-18:15:18.4	-18:38:15.78	-15:09:14.18	-11:81:12.73	-11:64:11.59	-9:91:8	-8:14:8.37	-9:09:9.44	-9:85:11.03	-12:25:13.25	-14:92:16.24	-17:92:17.19	
Freq(Hz)	5.2GPol	Theta/Ant 2	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
Gain	Phi(0)/Phi(75)	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	4.7515.99	5.6216.47	5.1315.4	5.9415.49	6.9916.65	6.4216.92	7.9817.67	7.9919.54	9.6818.26	10.8717.79	11.5110.7	11.0919.98	9.6919.17	8.3718.29	9.0417.14	7.8517.71	6.0917.73	5.6616.94	8.4217.21	8.6218.35	10.2319.4	9.5818.39	8.6518.03	8.217.17	
Theta	-10.2518.96	-7.9418.61	-8.7818.14	-7.9917.98	-8.9717.05	-10.1819.55	-10.74110.06	-9.4319.13	-9.0319.71	-10.5512.55	-10.8917.10	-10.2519.61	-10.2210.97	-9.7819.04	-10.7111.06	-8.95110.79	-12.0610.48	-11.7910.43	-10.45110.73	-10.8112.1	-13.8516.66	-19.0417.35	-19.4217.11	-14.8510.82	
Theta	9.6519.57	9.6719.02	-7.9216.01	-5.4915.08	-3.9113.84	-3.8913.38	-4.3615.3	-5.716.48	-7.3118.68	-8.9117.83	-6.5916.16	-5.1716.43	-7.6918.3	-7.6116.41	-5.4814.12	-3.9514.48	-4.5415.53	-4.413.72	-4.0115.55	-9.1313.05	-19.1918.43	-14.3711.11	-9.5718.88		
Theta	-11.0910.66	-10.2510.61	-11.2219.26	-5.9114.21	-3.414.3	-6.417.7	-7.6218.27	-6.2816.13	-4.814.19	-4.617.7	-8.1717.12	-6.3616.08	-4.614.74	-3.5112.51	-2.211.54	-1.5712.23	-2.9614.45	-5.4315.07	-5.7514.36	-3.7214.13	-6.4717.28	-6.3417.55	-11.0111.67	-10.8711.16	
Theta	-16.1413.49	-7.0415.26	-5.1515.57	-7.7510.49	-7.271.27	-1.6412.09	-2.2612.08	-2.913.55	-5.6816.83	-7.7619.93	-11.7217.9	-6.516.68	-6.3416.67	-6.2918.52	-4.3410.7	0.49110.7	-1.0310.79	-0.6112.6	-3.0113.24	-2.2313.24	-1.410.91	-1.2814.31	-7.74110.16	-14.0715.44	
Theta	-3.113.17	4.8615.97	4.9514.96	4.4214.52	5.0318.86	0.9911.27	3.1413.9	3.1413.9	3.916.63	-3.3210.68	1.7414.25	0.7711.63	1.1711.26	2.3412.77	1.7411.83	0.9210.34	-1.8711.31	0.9213.09	3.5812.3	-3.671.24	-1.2512.44	4.2514.41	1.5213.95	-1.0415.46	
Theta	-4.0712.85	-2.9312.51	-3.0314.58	-3.1310.59	-1.4614.19	0.4901.74	-0.9912.95	4.4613.31	-4.5312.84	-1.5613.39	0.6316.72	-1.9213.62	-2.6812.86	-2.1411.88	1.0701.9	0.6611.53	2.8701.2	-1.7118.3	0.6901.61	1.1901.59	1.5701.05	-4.1410.42	-0.4913.99	5.1115.3	
Theta	-4.7715.89	-6.1912.39	-0.5411.24	-2.0110.37	0.6811.95	-0.2801.41	0.5011.64	-0.5811.71	-1.8601.17	-1.9710.13	-2.0810.33	0.5711.46	0.6513.26	-4.9913.32	1.8513.28	3.3718.2	2.381.71	1.0310.49	1.1301.97	1.5401.63	2.1711.45	-1.1413	-3.3315.58	-1.4914.91	
Theta	-2.6414.34	-5.4112.44	-1.0113.15	0.2413.6	0.9311.11	-1.3611.39	-2.912.27	0.210.68	0.0210.82	-1.1117.87	-0.1611.46	0.3911.84	-0.1210.11	1.4711.16	1.021.98	3.218.3	-1.1311.23	0.4612.28	-4.612.04	0.0811.24	0.0210.07	0.8910.11	-4.9910.18	0.819.2	
Theta	-3.8413.04	-2.0911.37	-1.0319.8	-1.5712.67	-1.7411.7	-0.5411.31	4.2211.57	0.5601.33	1.6701.63	-1.611.93	0.9701.41	-0.8812.2	-3.8610.88	1.3511.5	0.5710.57	0.7710.99	-3.9212.75	-2.4314.42	-8.5712.96	-1.0911.31	-1.0914.3	1.511.82	-4.5611.39	0.512.3	
Theta	-3.612.48	-0.3511.41	-2.2210.7	1.9117.14	-3.1413.33	0.2710.16	-3.7612.33	-1.8512.02	1.5211.92	-0.9313.54	-1.4411.64	-0.2810.32	3.5214.13	-3.5310.7	2.3413	1.4611.83	-0.3311.27	-5.7711.25	-0.4114.45	0.6411.81	-1.5414.87	0.32137	-4.5213.97	-0.9313.34	
Theta	-2.7812.07	-0.2612.19	-4.6110.06	1.2711.97	-3.711.48	0.3710.46	4.0512.98	2.9613.79	-0.2114.23	-2.2113.72	-3.1110.9	0.5711.76	-2.2219.42	6.6313.37	2.6701.2	1.4931.09	1.2401.08	-5.0510.52	1.8910.06	0.5611.78	-2.310.88	-1.0511.31	-4.1718.15	-1.8813.6	
Theta	-3.5212.81	-1.7413.53	-5.5911.1	0.0713.34	-3.8713.22	-0.3711.89	5.0114.65	-3.1915.93	-2.6715.83	-1.0314.74	-4.611.95	0.1711.76	-3.1219.78	-10.9916.05	0.9710.99	-1.9218.8	1.0710.75	-3.2510.57	1.6911.65	-0.6915.15	-4.3518.36	-2.6101.1	-5.8310.61	-3.9817.56	
Theta	-3.7814.08	-2.6316.1	-6.7711.57	-0.6314.27	-3.7814.37	-0.7513.12	-7.2516.65	-4.4214.61	-5.6814.73	-2.8314.84	-7.2414.84	-1.0121.39	-4.2113.43	-13.7418.07	-2.0613.8	-6.6814.99	0.0612.69	-4.7811.62	-0.2113.85	-3.6711.83	-6.65110.31	-3.2412.23	-6.1716.61	-5.6917.16	
Theta	-5.5916.89	-5.6717.98	-6.3913.05	-2.0713.57	-4.8415.1	-2.0115.09	-8.9315.06	-4.8415.81	-6.3414.89	-3.1316.3	-10.08110.18	-3.5115.69	-7.7314.55	-18.4711.2	-3.5913.58	-8.812.59	-3.515.88	-11.9116.31	-3.68113.09	-8.24117.62	-8.9118.3	-2.1913.7	-7.68118.3	-9.7319.84	
Theta	-11.3610.11	-81.702	-7.0415.44	-5.7312.36	-4.8114.95	-2.2817.93	-7.0511.19	-5.6618.18	-5.0417.6	-8.0517.2	-12.7811.91	-9.4110.66	-13.8118.89	-7.3215.24	-8.5215.79	-8.451.61	-9.1710.67	-18.0713.41	-3.68117.15	-18.4718.02	-9.7176.5	-2.8914.47	-10.2518.36	-12.5810.31	
Theta	-16.1210.74	-6.317.67	-11.9812.05	-5.8314.5	-5.6314.23	-3.9916.62	-11.3812.79	-7.2310.53	-7.5718.31	-9.6215.79	-7.0518.07	-15.9716.73	-17.94118.4	-16.9110.63	-6.7712.73	-7.2215.88	9.9612.46	-10.74113.6	-9.616.21	-12.1115.36	-7.3113.68	-4.217.56	-12.4710.02	-12.6917.29	
Theta	-12.9914.64	-12.4616.8	-10.3315.65	-6.4318.78	-7.0614.21	-6.3312.6	-17.9113.12	-13.4116.65	-10.1713.57	-19.4119.9	9.9110.1	-9.5119.95	-9.4617.99	-18.313.91	-19.3815.58	-7.5418.79	-5.419.84	-17.76115.3	-6.68111.66	-7.5113.33	-6.2911.81	-4.3218.96	-16.3117.76	-11.8417.147	
Theta	-18.4215.86	-11.7818.78	-8.4112.15	-15.9610.34	-1.817.98	-8.2515.18	-14.0516.78	-17.4711.69	-18.3613.33	-9.8211.92	-12.6817.77	-11.4718.21	-13.4917.59	-17.101.98	-18.3917.67	9.99112	-8.9719.12	-17.7411.82	-5.3517.08	-4.6514.16	-6.2914.73	-11.5917.19	-9.7718.43	-14.1112.72	
Theta	-13.7212.14	-12.3713.62	-13.6911.12	-11.3311.14	-11.4819.41	-12.6313.85	-14.5718.53	-17.2116.26	-16.8314.59	-14.6713.42	-12.7811.62	-9.8414.39	-17.7816.32	-18.3216.13	-15.6517.25	-15.3915.88	14.7616.08	-19.3515.98	-11.2915.64	-12.4819.07	-7.2113.98	-8.1416.92	-8.3617.15	-10.2117.19	
Theta	-12.2911.41	-12.2213.63	-10.8811.55	-11.5610.71	-9.4518.75	-9.4111.08	-10.7114.62	-13.1917.18	-18.7615.08	-10.8710.58	-11.0114.14	-18.1314.94	-18.3917.88	-17.8514.17	-16.6611.85	-16.6612.59	-17.3717.17	-18.0916.91	-13.7519.92	-8.8212.12	-9.1418.12	-8.817.85	-8.4817.88	-14.0719.84	
Theta	-9.2619.66	-10.4714.04	-17.4611.5	-16.4116.99	-11.9710.47	-11.5111.67	-10.4110.93	-11.3714.33	-17.6516.75	-17.5115.88	-18.3614.77	-10.8111	-10.5510.19	-18.6215.88	-15.3518.75	-18.1513.99	-16.7918.41	-14.8815.53	-14.4312.95	-11.6212.19	-12.0316.58	-14.96113	-15.2512.59	-13.2810.31	
Theta	-10.1419.09	-11.7313.54	-13.4617.27	-17.9515.86	-18.4718.8	-18.4719.5	-18.3617.67	-16.4113.03	-11.4310.69	-13.5318.49	-15.1212.99	-15.5619.17	-18.8318.12	-18.9714.28	-17.9718.09	-18.7417.96	-17.9416.46	-17.7416.84	-18.1217.67	-18.7318.66	-18.2517.69	-17.6216.32	-14.7913.97	-12.6312.65	
Theta	-14.9315.8	-13.3712.67	-14.4716.62	-17.4817.95	-18.116.91	-13.4411.11	-10.6711.06	-11.6811.56	-12.6914.94	-17.9515.39	-14.7111.48	-11.0613.12	-16.0217.95	-17.2416.84	-18.8811.91	-18.2719.18	-19.0619.48	-18.4218.73	-18.65116.44	-13.9513.77	-13.7413.17	-17.2118.08	-18.1518.75	-18.6115.7	
Theta	-7.2716.59	-7.7818.56	-8.6510.43	-12.2413.64	-16.1917.74	-18.2117.42	-18.6718.77	-																	



Radiated Composite Gain Data Radio 1 (4TX)

Appendix A.1

Theta	Phi	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(15°)	-8.2/7.6	-7.26/7.04	-7.13/7.88	-8.87/9.49	-9.7/8.66	-6.68/5.12	-4.69/5.7	-7.9/7.81	-6.07/5.25	-5.24/5.2	-4.61/4.1	-4.01/4.17	-4.42/4.61	-4.84/5.12	-5.4/5.63	-5.83/6.14	-6.49/6.78	-7.08/7.44	-7.78/7.73	-7.26/7.16	-7.29/7.34	-7.59/8.24	-9.44/10.45	-10.31/9.19
Theta(22.5°)	3.1/-4.26	2.1/-2.1	-2.81/-4.27	-6.06/-7.12	-6.99/-5.77	-3.91/-2.29	-1.66/-2.23	4.37/-6.51	-6.18/-4.38	-3.27/-2.86	-2.31/-1.62	-1.21/-1.37	-1.94/-2.67	-3.23/-3.67	-4.15/-4.87	-6.7/4.6	9.03/-10.78	-11.05/-12.08	-13.15/-13.35	-12.22/-11.24	-10.12/-9.13	-8.2/-7.65	-7.17/-6.38	-5.19/-4.06
Theta(30°)	2.97/-2.3	-1.77/-1.74	-2.47/-3.63	-4.24/-4.4	-3.47/-2.64	-1.61/0.66	0.09/0.13	-1.13/-2.92	-5.4/-7.7	-2.53/0.94	-1.07/0.33	0.85/0.97	-0.42/0.56	-1.62/2.44	-3.09/4.04	-5.79/8.43	-11.99/15.67	-18.41/18.8	-17.58/16.68	-16.07/15.4	-13.61/11.05	-8.62/7.01	-5.93/5.07	-4.43/3.71
Theta(37.5°)	3.62/3.41	2.97/3.02	4.07/4.89	4.08/2.94	-2.27/1.73	-1.3/1	0.67/0.38	0.53/-1.2	2.63/4.08	-2.89/0.62	0.67/1.76	1.43/1.47	0.99/0.07	-1.14/2.56	-3.8/4.95	-6.91/9.66	-12.82/14.4	-13.28/11.1	9.88/9.84	-10.78/12	-12.52/11.22	-8.95/7.46	-6.22/5.12	-4.22/3.77
Theta(45°)	0.37/0.8	-1.38/-1.97	-3.99/-6.5	-5.53/-8.3	-2.92/-2.1	-1.64/-1.57	-1.51/-1.29	-1.12/-0.99	-1.28/-2.33	-2.95/-1.51	0.21/1.08	1.27/1.01	0.68/0.39	-0.45/-2.48	-5.19/-6.87	-8.47/8.47	-8.04/-8.42	-8.42/-6.53	-5.17/-5.43	-6.97/-8.66	-9.85/-10.53	-9.44/-8.13	-6.95/-5.21	-2.91/-1.04
Theta(52.5°)	2.57/0.21	1.02/0.21	-2.06/5.76	-6.62/5.76	-4.3/2.37	-1.32/-1.17	-1.31/-1.47	-1.48/-1.09	-0.79/-1.32	-1.12/2.21	-0.34/1.14	1.67/1.07	0.64/0.85	0.41/-1.97	-1.61/8.91	-8.44/-6.44	-4.79/-6.76	-5.22/5.85	-2.93/3.16	-4.79/6.76	-8.56/10.99	-11.26/9.19	-6.74/-4	-0.88/5.5
Theta(60°)	3.92/3.53	2.57/1.55	-0.71/4.33	-6.44/7.12	-5.28/2.68	-1.42/1.14	-1.25/1.32	-1.14/0.7	-0.5/-1.36	-2.89/3.03	-1.10/8.2	1.83/1.68	1.17/1.11	0.71/1.34	-5.2/8.84	-8.62/6.19	-4.57/4.83	-5.22/3.63	-2.06/1.91	-3.01/4.37	-5.82/8.96	-13.28/11.41	-6.77/3.04	0.12/2.82
Theta(67.5°)	3.77/3.65	2.98/1.9	0.51/4.12	6.72/7.45	-4.93/-2.6	-2.18/1.79	-1.54/1.25	0.94/0.68	-0.92/-2.27	-3.77/3.33	-1.44/0.6	2.14/2.36	1.46/0.69	0.11/1.47	-4.14/4.75	-9.05/6.94	-4.8/4.43	-4.55/2.39	-1.92/1.94	-3.1/4.28	-5.52/7.69	-11.82/11.75	-6.42/2.46	0.42/0.69
Theta(75°)	2.64/2.49	2.22/1.37	-0.78/3.96	-7.58/8.52	-5.56/3.97	-3.03/2.06	-1.54/1.38	-1.39/1.47	-1.76/2.97	-4.38/4.09	-2.33/0.13	1.82/0.6	0.80/1	0.15/1.47	-3.76/7.09	-9.81/7.48	-4.9/4.45	-4.77/3.38	-2.08/2.57	-4.31/5.51	-6.25/8.05	-10.78/10.91	-6.36/2.55	0.11/2.06
Theta(82.5°)	1.52/0.82	0.39/0.35	-2.02/4.18	-7.75/8.55	-6.04/5.24	-3.95/2.39	-1.88/2.06	2.31/2.23	-2.19/3.21	-5.31/5.64	-3.28/0.87	0.91/1.09	0.03/0.3	-1.07/1.27	-4.97/7.48	-8.35/7.59	-5.83/5.37	-5.15/3.38	-2.46/3.22	-4.23/4.5	-5.48/8.05	-11.02/10.6	-6.65/3.77	-1.10/0.98
Theta(90°)	-0.19/0.64	-1.69/3.04	-4.49/5.51	-8.03/-7.67	-5.93/-6.42	-5.51/-3.47	-2.63/2.53	-2.43/2.23	-2.47/1.4	-1.78/6.78	-4.18/2.58	-0.69/0.36	-0.46/-1.47	-2.39/3.62	-5.4/6.98	-7.44/9.17	-6.13/4.55	-4.11/4.6	-4.63/4.3	-4.96/7.52	-13.19/9.78	-6.44/5.26	-3.66/1.4	
Theta(97.5°)	-2.88/2.56	-3.63/6.3	-8.27/8.17	-10.58/7.51	-5.19/5.89	-5.81/4.03	-2.88/2.36	-2.16/2.46	-6.65/5.91	-7.58/8.68	-6.07/4.99	-1.19/3.77	-1.91/3.71	-4.19/5.62	-6.18/8.16	-6.71/11.27	-11.93/9.19	-7.09/5.78	-5.79/5.94	-5.58/5.11	-5.43/7.83	-11.39/9.81	-6.53/6.86	-6.37/4.33
Theta(105°)	5.4/4.41	4.56/7.69	-13.66/10.49	-12.66/9.21	-5.34/5.14	-5.03/3.99	-3.6/3.72	-4.15/5.21	-6.16/6.62	-7.29/9.13	-7.54/3.86	-2.02/2.32	-4.77/6.47	-4.83/4.34	-5.55/6.33	-7.66/15.77	-17.23/9.65	-6.84/6.58	-7.42/7.24	-6.81/6.58	-6.47/8.2	-15.88/12.08	-7.83/8.69	-10.07/7.59
Theta(112.5°)	7.5/5.58	-5.55/7.43	-17.97/13.47	-12.67/10.09	-5.91/5.69	-6.24/5.61	-5.37/5.62	-5.93/5.94	-5.74/6.57	-6.68/4.68	-4.07/4.43	-5.44/4.68	-3.44/4.59	-7.81/8.13	-9.77/18.06	-14.05/7.92	-6.27/7.87	-9.03/7.1	-6.23/6.17	-6.13/4.55	-4.11/4.6	-4.63/4.3	-4.96/7.52	-13.19/9.78
Theta(120°)	-6.75/7.63	-8.57/9.13	-17.43/15.52	-11.74/11.43	-7.13/4.43	-5.69/6.27	-6.73/6.69	-6.31/5.95	-6.53/8.64	-11.98/10.73	-6.91/5.45	-4.02/3.3	-4.22/5.08	-4.92/6.56	-8.81/7.76	-9.01/16.64	-18.79/10.94	-9.87/13.67	-7.69/8.4	-10.16/14.94	-17.93/16.52	-16.08/11.56	-14.14/9.13	
Theta(127.5°)	9.13/8.39	-11.32/14.66	-19.08/12.24	-8.7/10.03	-9.15/6.59	-5.58/5.74	-6.63/7.17	-6.98/6.54	-7.05/9.03	-11.49/10.3	-7.64/5.81	-4.34/4.51	-6.02/5.59	-4.86/6.25	-7.76/7.67	-9.26/14.28	-18.8/18.83	-18.42/18.7	-15.2/12.04	-12.17/12.67	-13.67/17.57	-17.46/17.23	-18.08/17.45	-14.12/14.21
Theta(135°)	-18.18/18.06	-18.85/18.14	-15.47/9.52	-6.62/6.78	-8.51/9.19	-8.76/9.22	-10.53/11	-9.34/7.58	-7.74/10.39	-12.96/10.61	-8.47/7.27	-6.84/6.95	-6.26/4.99	-5.11/6.93	-8.76/9.26	-14.30/13.51	-18.97/18.97	-17.31/18.45	-17.96/18.28	-18.99/17.7	-18.65/15.81	-17.87/17.7	-18.27/15.44	-11.17/9.2
Theta(142.5°)	-12.41/13.16	-12.28/13.07	-8.19/6.53	-5.76/6.21	-7.61/8.81	-9.11/9.27	-8.91/8.22	-7.89/7.69	-9.10/8.5	-9.62/7.34	-7.24/6.51	-6.02/6.65	-8.21/11.14	-14.11/15.22	-14.69/14.12	-12.92/11.14	-13.68/13.98	-11.62/10.76	-11.92/13.51	-11.87/14.77	-11.87/14.77	-14.93/15.9	-14.95/12.9	
Theta(150°)	-9.77/8.42	-7.42/6.67	-5.94/4.57	-5.64/6.61	-8.01/9.11	-9.43/9	-8.02/7.02	-6.46/6.76	-8.37/9.76	-8.46/7.02	-6.93/7.36	-6.77/6.22	-8.84/8.64	-11.75/15.34	-16.18/14.45	-12.32/10.73	-9.49/8.45	-8.27/9.22	-10.66/10.68	-9.25/8.34	-9.18/11.1	-12.68/12.4	-11.13/10.69	-11.08/11.03
Theta(157.5°)	-9.15/8.94	-8.83/8.84	-8.39/7.16	-7.16/6.92	-7.18/7.86	-8.51/8.78	-8.96/9.27	-10.17/12.2	-17.55/16.02	-11.28/9.96	-9.03/7.37	-5.87/5.75	-6.67/8.18	-9.69/10.92	-11.62/11.89	-11.99/11.98	-11.84/11.61	-11.99/13.13	-14.36/14.21	-12.82/11.86	-12.89/12.66	-17.72/14.16	-11.66/10.25	-9.63/9.29
Theta(165°)	-15.52/15.61	-15.12/14.28	-12.87/10.97	-9.28/7.92	-7.28/7.25	-7.23/7.64	-9.03/11.75	-16.22/16.35	-13.15/11.48	-10.81/9.83	-8.24/7.05	-6.69/7.15	-8.67/10.15	-11.94/13.81	-15.68/17.14	-18.39/18.83	-18.17/18.84	-18.14/18.23	-17.75/17.86	-17.54/18.86	-17.99/18.6	-18.21/18.14	-17.58/16.51	-15.77/15.36
Theta(172.5°)	-13.94/12.09	-10.43/9.61	-9.31/9.13	-8.85/8.39	-8.27/8.6	-8.62/8.98	-9.53/10.04	-10.33/9.78	-9/9.02	-9.53/9.7	-9.3/9.29	-10.1/11.1	-13.21/14.91	-15.24/15.31	-14.71/14.28	-13.91/13.84	-13.41/13.13	-12.95/13.21	-13.71/14.36	-14.93/14.68	-13.62/13.25	-11.85/12.18	-14.73/15.19	
Theta(180°)	8.91/8.38	-7.17/7.27	-7.37/7.81	-8.05/8.23	-8.69/9.59	-10.01/10.21	-10.28/10.08	-9.77/9.42	-9.36/9.94	-10.5/10.41	-9.92/10.1	-10.45/10.27	-9.58/8.85	-8.49/8.49	-8.77/9.15	-9.6/9.88	-10.09/10.46	-10.92/11.45	-11.67/11.19	-10.49/9.95	-9.67/9.41	-9.06/8.93	-8.77/8.55	-8.55/8.85
Freq(Hz)	5.2GPol	ThetaAnt 3	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Gain	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°)
Theta(0°)	-4.44/4.25	-4.13/4.11	-4.4/4.46	-4.33/4.06	-4.45/5.95	-7.08/8.24	-9.63/10.12	-12.24/18.37	-19.47/17.47	-17.89/14.66	-11.51/10.22	-8.54/6.76	-5.56/4.81	-4.33/3.8	-3.66/4.05	-4.07/4.23	-4.57/5.03	-6.81/8.1	-9.11/11	-13.85/16.61	-18.37/18.27	-18.52/11.47	-8.76/8.67	-7.45/5.74
Theta(7.5°)	-4.84/4.9	-4.78/4.8	-5.26/5	-5.11/5.16	-6.07/7.07	-7.97/10.48	-12.17/14.94	-18.38/19.97	-15.84/14.1	-11.72/9.28	-7.77/6.91	-6.83/6.66	-6.26/5.94	-6.89/7.22	-7.14/7.38	-7.28/7.18	-7.39/6.44	-10.18/12.05	-12.3/12.12	-11.81/12.24	-13.36/11.36	-12.12/9.99	-8.9/7.59	-6.69/6.45
Theta(15°)	-5.61/6.27	-6.54/8.14	-9.63/10.34	-11.78/11.49	-11.47/10.84	-10.97/11.14	-12.46/16.15	-16.25/18.79	-14.72/18.71	-14.97/13.49	-11.23/9.14	-8.64/7.74	-6.54/5.78	-4.68/4.03	-3.25/3.19	-3.71/4.74	-7.39/9.97	-12.71/6.6	-12.56/18.9	-17.94/12.95	-8.82/8.41	-7.38/8.32	-8.32/9.21	-8.92/6.06
Theta(22.5°)	-7.56/7.22	-6.61/8.56	-10.74/10	-8.1/8.17	-9.42/14.54	-17.34/13.93	-14.85/15.85	-17.57/18.72	-15.86/16.2	-18.02/18.4	-14.29/9.84	-8.79/8.26	-7.42/6.54	-4.29/3.37	-3.61/4.78	-4.99/5.16	-7.2/11.21	-15.62/13.09	-11.13/11.34	-12.86/18.4	-10.54/11.17	-10.88/7.82	-6.99/4.89	-6.02/8.48
Theta(30°)	-5.94/10.26	-8.37/8.08	-11.51/16.02	-10.75/10.44	-11.62/18.08	-17.89/12.9	-10/11.91	-13.77/13.94	-18.12/18.85	-18.62/18.03	-17.85/13.38	-10.21/8.37	-6.78/4.5	-4.06/4.44	-4.2/4.68	-6.53/6.44	-5.67/6.24	-7.44/11.96	-9.63/11.42	-17.27/14.7	-14.08/16.69	-14.05/7.17	-6.01/5.07	-3.64/4.17
Theta(37.5°)	-5.01/7.83	-8.74/8.6	-9.41/11.02	-13.96/17.96	-14.72/15.8	-18.84/10.37	-14.91/12.97	-18.64/9.45	-7.29/8.95	-9.71/14.46	-17.89/15.88	-11.93/11.19	-17.19/5.44	-4.15/4.54	-3.64/3.48	-4.87/6.33	-9.07/5.12	-5.24/9.12	-5.43/7.19	-17.42/9.37	-15.97/13.68	-10.29/6.78	-7.29/9.72	-9.83/5.7
Theta(45°)	-8.73/4.22	-14.72/12.48	-12.99/9.92	-10.02/18.26	-13.88/13.48	-17.39/11.95	-13.43/17.83	-10.68/8.32	-7.66/5.13	-6.09/8.88	-12.85/13.92	-12.83/18.2	-12.57/6.94	-5.69/3.95	-5									



Radiated Composite Gain Data Radio 1 (4TX)

Appendix A.1

Θ(7.5°)	-11.2/3.3	5.76/4.91	-2.44/5.82	-7.03/6.08	-3.33/6.44	-4.78/4.6	-4.9/2.38	-2.97/0.14	-1.67/4.09	-2.34/1.85	-1.35/0.01	-0.49/2.52	-2.96/4.11	-1.15/3.22	0.29/3.05	0.56/0.3	0.09/3.05	3.11/4.53	-7.84/6.54	-6.55/4.07	-3.09/0.36	0.45/0.74	0.91/5.9	-2.88/5.23
Θ(7.5°)	5.67/-7.3	-3.29/5.26	-3.59/-7.2	-3.78/-6.43	-5.46/-8.06	-5.69/3.45	-3.25/0.89	-0.95/-1.14	-3.01/3.65	-4.06/4.01	-3.42/-1.05	0.13/3	-5.16/5.65	-5.19/-4.45	-3.36/2.37	0.98/-1.97	0.86/5.19	-1.46/-1.94	-0.51/-8.97	-11.68/-9.05	-1.15/1.33	0.56/0.97	0.97/-3.18	-6.7/-7.41
Θ(82.5°)	-6.25/-4.98	-3.32/3.32	-4.36/9.06	-3.11/7.16	-7.48/8.2	-6.17/3.03	-3.59/0.64	-1.37/1.79	-4.36/3.22	5.26/5.75	5.27/1.47	-0.8/4.32	-5.89/6.34	-7.39/7.3	-4.36/1.14	-0.29/2.99	-0.26/7	0.29/1.22	1.84/6.38	6.82/1.24	-1.31/94	0.02/53	0.45/6.65	-16.44/8.92
Θ(90°)	-8.07/5.98	-5.02/6.54	6.45/-10.81	3.98/7.55	-12.44/9.15	-6.86/3.49	-4.93/1.95	-2.61/2.15	-3.91/3.97	5.26/8.46	6.11/3.25	-1.84/5.05	-5.91/7.51	-7.38/9.59	5.83/1.32	-0.41/5.49	-1/1.907	2.53/2.37	1.4/3.93	-7.32/3.51	-2.31/0.08	-1.64/1.31	-1.09/11.44	-17.71/9.39
Θ(97.5°)	-9.63/7.07	-7.78/9.13	8.95/13.66	5.41/9.24	-11.78/3.3	-7.79/4.86	-6.86/3.06	-4.77/3.94	-4.16/4.44	5.54/8.73	6.77/4.45	-3.85/6.3	-6.86/7.29	-8.09/8.66	-7.39/2.47	-1.32/6.79	-4.62/10.2	5.15/5.04	-0.21/5.69	-10.53/8.2	-5.46/2.33	4.39/3.16	-2.4/15.41	-18.06/-10.26
Θ(105°)	-9.01/-11.06	-10.36/13.94	-10.36/12.28	-8.36/11.97	-11.73/9.16	-1.97/6.35	-7.68/5.41	-5.95/6.1	-4.88/5.14	-1.97/6.84	-8.27/5.74	-5.36/6.05	-6.05/6.39	-8.19/9.25	-7.54/4.4	-2.28/6.84	8.24/12.61	-14.19/10.63	-4.67/8.77	-12.49/16.29	-8.86/5.39	-8.15/5.5	-5.96/13.23	-17.63/10.26
Θ(112.5°)	-12.29/16.65	-14.97/18.11	-10.81/9.93	-11.98/17.11	-11.39/9.97	-8.18/8.52	-8.57/8.04	-9.28/8.21	-6.24/6.71	-6.06/8.66	-7.08/9.71	-6.82/7.07	-7.64/8.11	-7.82/14.08	-8.64/7.3	-3.61/8.17	-7.2/15.74	-17.62/18.35	-7.76/13.25	-13.58/14.26	-12.79/6.59	-7.89/8.19	-11.75/16.52	-13.64/13.82
Θ(120°)	-15.57/19.18	-18.39/15.67	-8.79/13.87	-15.41/14.69	-12.41/12.33	-7.79/8.49	-11.66/9.4	-11.32/8.86	-6.82/6.72	9.64/8.39	6.27/10.7	-8.46/10.7	-13.7/12.07	-13.7/12.07	-12.99/7.73	-5.52/4.14	-10.68/14.55	-12.72/14.93	6.79/12.51	-11.65/16.43	-18.21/11.51	-9.5/11.2	-18.57/12.5	-14.03/15.52
Θ(127.5°)	-10.2/14.06	-15.76/14.22	-16.4/17.87	-14.41/15.85	-16.09/18.92	-15.13/9.96	-18.19/9.83	8.96/11.12	-6.39/5.96	-8.91/8.86	9.57/9.28	-10.47/10.6	-11.48/9.9	-10.7/7.89	-12.2/12.4	-5.52/3.14	-8.76/16.75	-10.37/14.21	-9.67/18.65	-17.13/13.63	-9.92/12.77	-12.42/9.76	-17.98/18.43	-18.25/14.47
Θ(135°)	-16.17/15.99	-17.78/17.8	-18.49/17.01	-15.23/16.51	-16.09/15.39	-12.05/11.35	-10.15/10.3	-8.31/9.84	-11.64/10.59	-7.49/8.64	-12.19/14.17	-7.95/11.69	-8.57/11.48	-12.65/10.09	-11.77/9.44	-13.96/5.62	-8.79/12.65	-8.67/8.68	9.5/13.7	-15.85/15.88	-15.91/17.83	-12.18/18.32	-17.24/10.45	-18.07/17.74
Θ(142.5°)	-11.96/12.87	-12.36/13.94	-17.32/17.92	-18.47/18.12	-18.4/18.81	-19.04/13.57	-11.94/11.44	-11.86/10.45	-10.83/10.86	-11.81/12.81	-10.06/8.48	-12.04/13.55	-16.51/12.79	-12.14/11.51	-10.43/8.74	-10.13/14.92	-16.69/18.74	-10.72/10.88	-17.89/17.77	-16.13/13.23	-19.24/18.89	-16.06/19.32	-17.16/10.58	-18.54/17.58
Θ(150°)	-18.58/17.76	-17.95/17.52	-13.14/10.5	-15.2/17.79	-17.91/13.08	-11.57/11.53	-10.74/11.51	-10.46/11.54	-10.76/10.11	-10.81/12.67	-10.06/10.88	-13.49/11.2	-9.83/11.54	-8.03/10.58	-9.32/12.9	-16.44/17.98	-13.73/16.02	-18.14/18.76	-17.57/18.47	-18.09/17.33	-18.64/18.73	-15.52/15.25	-19.29/18.46	-18.25/14.47
Θ(157.5°)	-16.09/12.18	-12.04/14.15	-18.05/17.81	-16.75/12.31	-10.38/11.76	-11.53/14.3	-12.45/10.4	-10.74/14.89	-18.17/17.52	-17.74/13.05	-13.12/13.41	-15.37/17.76	-18.66/18.16	-14.49/12.3	-13.68/11.87	-10.96/16.78	-17.85/13.73	-12.67/13.94	-15.73/15.36	-18.01/17.66	-17.82/18.91	-17.67/18.72	-18.97/18.96	-16.34/14.79
Θ(165°)	-17.45/15.67	-14.5/13.56	-11.32/9.6	-8.18/8.59	-11.13/10.5	-13.77/14.58	-16.37/17.11	-14.62/10.57	-10.64/11.14	-12.06/13.97	-13.88/14.88	-15.94/14.76	-13.54/16.57	-17.7/18.42	-19.01/15.03	-17.89/19.19	-17.85/17.61	-17.82/18.22	-17.05/14.98	-11.87/12.31	-14.68/17.84	-19.33/17.37	-18.18/19.26	-17.63/10.26
Θ(172.5°)	-17.96/19.04	-17.89/18.31	-15.61/15.51	-15.39/16.12	-18.97/15.64	-16.63/18.63	-16.83/18.88	-19.04/17.89	-18.12/18.85	-18.48/18.12	-15.42/14.5	-14.21/16.86	-18.28/16.7	-14.34/18.42	-15.97/16.52	-17.79/18.26	-17.75/16.95	-16.31/17.86	-18.92/17.77	-16.69/17.61	-19.31/17.61	-17.74/18.03	-18.44/18.57	-19.18/43
Θ(180°)	-18.04/19.18	-18.43/17.44	-19.27/17.82	-18.23/18.13	-18.61/15.54	-17.53/15.74	-14.93/18.77	-17.92/14.89	-13.23/13.95	-14.91/16.02	-18.38/18.7	-18.59/19.37	-19.16/18.34	-18.77/19.03	-17.65/18.6	-18.89/18.07	-18.64/14.5	-12.79/15.62	-17.65/16.91	-18.46/17.93	-16.3/17.7	-17.24/18.29	-16.86/17.53	-18.26/18.85
Freq[Hz]	5.65GPol.	PhiAnt.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gain	Φ(0°)/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°)
Θ(0°)	9.52/8.87	9.04/9.01	8.05/8.21	9.14/9.79	10.87/12.06	-15.06/14.49	-19.27/18.93	19.03/18.8	-18.49/12.88	-12.71/11.29	9.92/8.29	-7.59/7.48	-6.74/6.67	-7.17/6.89	-6.54/6.83	-8.35/9.82	-10.02/10.13	-11.43/15.35	-15.91/16.17	-18.69/19.24	-19.12/16.63	-14/14.36	-11.86/9.63	-10/10.22
Θ(7.5°)	6.64/6.61	6.49/6.76	6.98/6.02	-10.14/12.24	-13.3/12.68	-14.06/18.47	-18.22/17.39	-18.03/18.7	-17.92/15.21	-13.92/10.43	-11.46/10.71	-9.26/8.71	-9.51/8.87	-8.14/7.76	-7.09/7.79	-7.98/9.1	-9.61/10.63	-12.69/16.2	-18.5/14.76	-18.4/18.24	-15.88/18.28	-17.85/12.45	-12.32/8.14	6.47/7.59
Θ(15°)	-13.88/17.93	-14.88/12.77	-12.71/12.6	-13.69/12.34	-12.92/14.56	-17.25/17.68	-17.53/17.46	-17.79/17.57	-18.23/16.55	-15.27/15.29	-12.94/11.49	-10.47/9.85	-9.87/10.1	-10.63/10.29	-9.65/7.68	-6.59/5.09	-4.87/6.21	-9.37/12.74	-17.32/17.97	-18.64/18	-15.79/12.71	-12.70/10.27	-9.26/8.88	-8.99/11.85
Θ(22.5°)	-9.59/12.54	-14.52/13.87	-15.16/16.79	-18.88/17.48	-19/19.4	-18.23/18.98	-17.74/19.11	-15.77/14.92	-14.56/15.07	-17.9/17.49	-17.17/17.83	-14.08/13.48	-13.86/9.93	-8.53/7.84	-7.15/6.9	-8.54/10.39	-8.96/7.19	-8.33/14.06	-18.94/15.74	-10.78/17.46	-16.67/9.16	9.27/11.65	-10.59/9.55	-7.59/9.52
Θ(30°)	-16.78/12.69	-12.32/18.46	-19.04/18.21	-17.86/19.4	-15.12/17.32	-15.55/13.32	-16.35/19	-16.81/11.65	-10.81/10.12	-11.34/18.17	-19.14/14.83	-17.04/10.82	-10.25/13.7	-11.31/13.2	-8.88/8.04	-7.53/9.39	-8.58/11.03	-14.97/15.23	-17.53/18.13	-12.34/11.12	-14.11/15.32	-14.89/9.5	-10.25/10.59	-5.15/11.42
Θ(37.5°)	-10.25/17	-10.49/17.12	-18.47/18.58	-15.66/14.44	-15.95/15.53	-14.17/17.61	-17.66/18.66	-14.51/13.23	-12.37/8.2	-8.71/13.82	-18.91/18.52	-17.31/11.85	-12.8/12.67	-9.67/9.75	-10.49/7.42	-6.89/8.46	-5.89/1.66	-11.51/7.65	-12.65/9.47	-16.58/10.87	-15.17/10.7	6.88/3.88	-7.54/16.12	-19.19/8.05
Θ(45°)	-10.79/14.21	-19/16.37	-16.48/18.48	-17.04/11.12	-14.57/16.54	-18.48/18.45	-17.53/17.84	-13.77/9.57	-6.42/5.74	-6.79/8.3	-15.27/18.29	-18.7/16.86	-15.31/17.75	-10.76/13.4	-7.21/10.55	-8.44/16	-14.74/7.38	-8.86/8.39	-3.65/5.52	-5.78/18.81	-18.42/7.31	-10.18/11.97	-11.28/6.43	-5.49/12.69
Θ(52.5°)	-11.45/11.67	-16.87/15.99	-17.31/18.51	-18.65/13.83	-11.5/15.81	-18.54/16.59	-18.19/17.66	-10.52/8.11	-6.69/7.15	-7.62/7.03	9.42/16.26	-18.73/18.61	-12.19/15.58	-8.87/10.78	-16.49/14.21	-14.76/18.86	-10.46/16.35	-4.46/11.16	-4.61/17.93	-18.82/5.64	-12.46/12.04	-7.85/9.47	-6.92/9.45	-6.92/9.45
Θ(60°)	-11.19/15.03	-12.92/12.05	-18.48/18.44	-13.25/18.34	-13.17/13.18	-16.15/9.74	-17.75/17.22	-18.38/16.67	6.22/5.76	-7.27/6.2	-9.99/12.49	-12.91/13.72	-15.87/19.22	-16.59/15.24	-13.43/17.82	-7.56/15.73	-18.53/18.16	-11.63/17.51	-13.27/18.57	5.04/18.95	-9.76/14.21	-15.51/12.56	-6.17/15.52	-7.28/14.51
Θ(67.5°)	-12.68/17.58	-10.13/9.19	-13.03/15.8	-10.12/13.91	-19.33/14.63	-18.91/9.17	-11.88/18.15	-19.2/14.02	-5.92/7.18	-8.45/9.45	-8.3/11.62	-12.18/8.81	-11.14/18.62	-14.95/13.38	-14.9/17.19	-9.01/13.71	-14.35/17.39	-10.93/15.53	-11.05/16.78	-9.89/9.18	-6.1/18.46	9.87/11.02	-15.98/10.21	-6.45/14.51
Θ(75°)	-6.43/3.7	-5.73/6.24	-15.24/19.02	-15.13/6.1	-17.95/17.21	-18.12/10.76	-9.42/17.94	-11.72/17.47	-7.1/7.53	-8.44/9.97	9.14/9.89	-12.57/9.2	-10.81/15.15	-18.68/15.1	-18.44/8.41	-14.8/9.38	-17.99/10.88	-10.06/18.48	-12.36/11.82	-18.91/9.25	-4.68/16.46	-5.73/13.43	-12.29/11.48	-7.06/7.33
Θ(82.5°)	-4.17/3.23	-4.54/5.28	9.68/16.87	-19.11/14.91	-15.64/18.98	-16.56/10.72	-10.98/14.34	-11.01/18.28	-10.12/7.15	-10.29/8.82	-8.45/12.79	-13.14/11.21	-11.05/16.92	-17.91/18.67	-17.91/10.38	-12.09/7.28	-14.8/13.15	-12.44/10.47	-9.7/14.01	-11.72/9.71	-8.58/13.37	-6.18/18.08	-6.88/12.74	-9.2/4.7
Θ(90°)	-3.49/4.26	-4.21/5.54	9.28/13.96	-17.98/18.64	-16.57/18.96	-16.84/11.18	-12.12/15.35	-11.97/18.36	-10.45/6.65	-11.11/10.19	-9.8/13.94	-14.24/13.02	-11.72/14.44	-17.64/18.15	-14.65/9.24	-13.45/8.88	-8.97/10.72	-11.13/9.51	-17.69/15.18	-12.91/12.71	-11.26/10.51	-8.46/14.9	-6.88/10.74	-9.36/4.33
Θ(97.5°)	-4.73/5.69	-5.21/8.78	-10.24/10.63	-19.37/18.9	-12.69/18.72	-16.57/13.31	-13.18/15.53	-13.49/18.03	-10.46/7	-13.56/10.29	-11.94/12.32	-13.99/11.41	-11.65/14.67	-18.42/19.13	-16.83/11.01	-13.56/9.05	-7.65/9.32	-10.74/10.59	-15.05/17.54	-11.69/10.62	-17.77/10.38	-10.68/11.14	-7.26/13.59	-8.23/55
Θ(105°)	-8/7.49	-8.81/10.23	-12.84/17.61	-17.51/18.28	-12.17/17.34	-18/18.58	-16.2/19.12	-16.02/19.66	-10.6/8.35	-16.7/13.93	-12.17/15.79	-13.04/11.56	-12.											



Radiated Composite Gain Data Radio 1 (4TX)

Appendix A.1

Theta	180°	175°	170°	165°	160°	155°	150°	145°	140°	135°	130°	125°	120°	115°	110°	105°	100°	95°	90°	85°	80°	75°	70°	65°	60°	55°	50°	45°	40°	35°	30°	25°	20°	15°	10°	5°	0°
Gain	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Theta	180°	175°	170°	165°	160°	155°	150°	145°	140°	135°	130°	125°	120°	115°	110°	105°	100°	95°	90°	85°	80°	75°	70°	65°	60°	55°	50°	45°	40°	35°	30°	25°	20°	15°	10°	5°	0°