Antenna Test Report

The each antenna gain is respectively measured in an antenna (fully anechoic) chamber SATIMO SG24, and then individual antenna gain of all antennae is mathematically summed each other at same spatial position (azimuth and elevation) across all the points in a spherical antenna pattern by using the FCC KDB 662911 D01 to compute the directional antenna gain.

1. Test Information

Equipment	Wireless Router
Brand Name	eero
Model Name	SN10001
Applicant	eero LLC
Manufacturer	eero LLC

2. Test Location

Test Site	Luxshare-ICT
Test Site Location	No.158 Jinchang Road, Jinxi Town, Kunshan City, Suzhou City, Jiangsu Province
Test Site No.	Luxshare-ICT
	OTA-SATIMO

Test Condition	Test Engineer	Test Environment (℃/%)	Test Date
Radiated	Xucheng Hu	22~24/ 57~58	Apr. 26. 2024

3. Test Frequency

Band (MHz)	Test Frequency (MHz)
2400-2480	**2400, 2440, 2460, 2480**
5150-5350	**5150, 5200, 5250, 5300, 5350**
5470-5725	**5500, 5650, 5700, 5750**
5725-5925	**5750, 5800, 5850**

4. Antenna Information

Ant. Position	Brand Name	Model Name	Ant. Type	Connector
Antenna #1 (5G_Ant0)	Luxshare-ICT	833-00053	Dipole	IPEX
Antenna #2 (2.4G_Ant0 and 5G_Ant1)	Luxshare-ICT	833-00051	Dipole	IPEX
Antenna #3 (2.4G_Ant1)	Luxshare-ICT	833-00052	Dipole	IPEX
Antenna #4 (Bluetooth & ZigBee)	Luxshare-ICT	833-00054	Dipole	IPEX

5. Test Results:

5.1 Individual Antenna Gain

Maximum antenna gain for individual antenna				
Antenna	Frequency (MHz)	Antenna gain (dBi)	Theta	Phi
#1	5150	2.92	135	70
#1	5200	2.99	135	70
#1	5250	3.81	135	65
#1	5300	3.91	135	65
#1	5350	3.60	135	65
#1	5500	3.74	140	60
#1	5650	4.18	140	60
#1	5700	4.23	140	60
#1	5750	3.71	140	55
#1	5800	4.22	140	55
#1	5850	4.65	135	95
#2	2400	1.39	115	150
#2	2440	2.13	-100	30
#2	2460	1.59	-100	30
#2	2480	1.87	-65	15
#2	5150	2.76	140	115
#2	5200	3.24	140	110
#2	5250	3.40	140	110
#2	5300	3.37	140	110
#2	5350	3.52	110	110
#2	5500	3.53	110	110
#2	5650	2.39	55	165
#2	5700	2.65	55	160
#2	5750	2.42	50	160
#2	5800	2.63	90	110
#2	5850	2.99	90	110
#3	2400	2.71	-65	95
#3	2440	2.81	-85	95
#3	2460	3.14	150	110
#3	2480	3.06	145	125
#4	2400	1.68	130	115

#4	2440	1.81	130	120
#4	2460	1.49	130	115
#4	2480	1.21	130	110
Max Gain		4.65	135	95

Maximum antenna gain of individual antenna for elevation angle above 30 degrees				
Antenna	Frequency (MHz)	Antenna gain (dBi)	Theta	Phi
#1	5150	-0.90	25	125
#1	5200	-0.60	25	125
#1	5250	-0.39	25	120
#2	5150	1.41	55	140
#2	5200	1.28	55	125
#2	5250	1.45	50	140
Max Gain		1.45	50	140

5.2 Directional Antenna Gain

Directional gain						
Frequency (MHz)	2400	2440	2460	2480		
Antenna #2 Gain (dBi)	-1.27	-0.08	0.32	0.42		
Antenna.#3 Gain (dBi)	0.72	1.61	1.92	1.15		
(Theta, Phi)	(145,75)	(140,85)	(140,80)	(140,80)		
Antenna Corr. DG (dBi)	2.79	3.82	4.21	3.80		
Antenna Uncorr. DG (dBi)	0.25	0.85	1.30	0.80		
Frequency (MHz)	5150	5200	5250	5300	5350	5500
Antenna #1 Gain (dBi)	2.84	2.81	3.57	3.73	3.41	3.74
Antenna #2 Gain (dBi)	-2.00	-3.25	-3.57	-4.05	-3.95	-2.74
(Theta, Phi)	(140,65)	(140,65)	(140,65)	(140,65)	(140,65)	(140,60)
Antenna Corr. DG (dBi)	3.76	3.31	3.72	3.70	3.50	4.10
Antenna Uncorr. DG (dBi)	1.06	0.76	1.33	1.39	1.14	1.61
Frequency (MHz)	5650	5700	5750	5800	5850	
Antenna #1 Gain (dBi)	4.12	4.16	3.71	4.22	4.58	
Antenna #2 Gain (dBi)	-1.14	-1.52	-2.64	-2.61	-3.40	
(Theta, Phi)	(140,55)	(140,55)	(140,55)	(140,55)	(140,55)	
Antenna Corr. DG (dBi)	4.89	4.79	4.11	4.47	4.48	
Antenna Uncorr. DG (dBi)	2.24	2.19	1.60	2.03	2.21	

Directional gain for elevation angle above 30 degrees						
Frequency (MHz)	5150	5200	5250			
Antenna #1 Gain (dBi)	-2.93	-2.85	-2.00			
Antenna #2 Gain (dBi)	1.01	1.17	1.19			
(Theta, Phi)	(45,145)	(50,140)	(-60,165)			
Antenna Corr. DG (dBi)	2.27	2.40	2.76			
Antenna Uncorr. DG (dBi)	-0.50	-0.40	-0.12			

The composited gain of antenna is computed by using the formula in the clause F)2)d) of KDB 662911 D01 v02r01 to get the measured directional gain at the same spatial position, (Theta, Phi), after each antenna is measured. The overall measured directional gain comprising from all antennae at every spatial position can be found at the Appendix B, Composited gain.

The F)2)d)i)and F)2)d)ii) of KDB 662911 D01 v02r01:
d) *Unequal antenna gains, with equal transmit powers.* For antenna gains given by G_1, G_2, …, G_N dBi (i) If transmit signals are *correlated*, then Directional gain = $10 \log[(10^{G_1/20} + 10^{G_2/20} + \ldots + 10^{G_N/20})^2 / N_{ANT}]$ dBi [Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.] (ii) If all transmit signals are *completely uncorrelated*, then Directional gain = $10 \log[(10^{G_1/10} + 10^{G_2/10} + \ldots + 10^{G_N/10})/N_{ANT}]$ dBi

6. Radiated Measurement Method and Environment:

The directional gain is measured via gain-comparison method and the antenna under test is placed inside with the following specifications:

- Overall dimensions (L x W x H) : 4m x 4m x 4m (rectangular chamber)
- Antenna measured frequency range: 600MHz to 6GHz
- Quiet zone (cylindrical volume): diameter: 50cm, height: 36cm

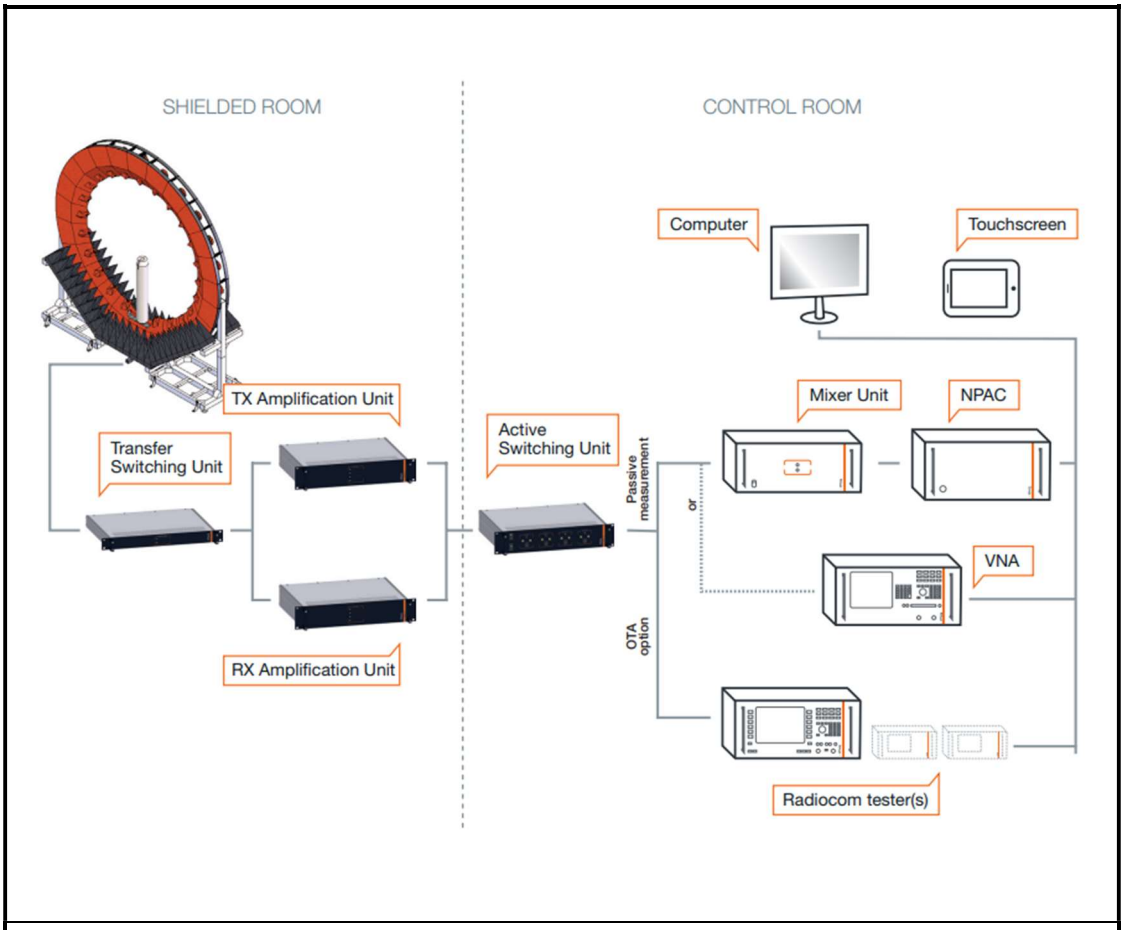


Fig.1 Anechoic Chamber : SATIMO SG24

6.1 Radiated Test Procedure:

i. The radiation pattern and gain measurements were done in a fully anechoic chamber. The chamber is calibrated by using a reference calibration dipole with known antenna gain by substitution method. A calibration file is generated that includes offset values for each frequency to adjust the losses of the test system.

ii. The antenna under test is tested in the same way as the calibration dipole, and the calibration file is used to calculate the gain of each antenna. The individual antenna gain reported is the maximum measured in both horizontal and vertical polarizations. The measurement step size in both the Phi and Theta measurement axes was 5 degrees.

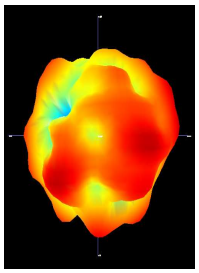
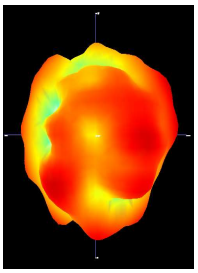
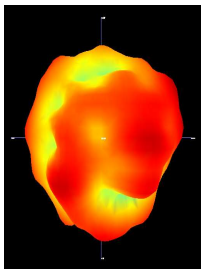
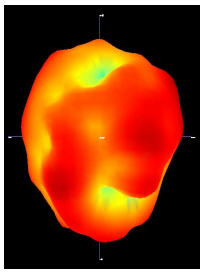
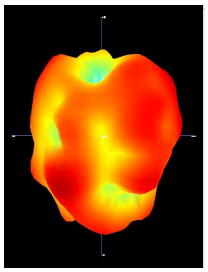
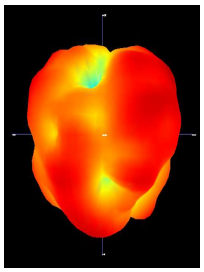
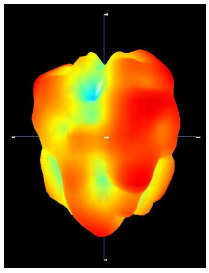
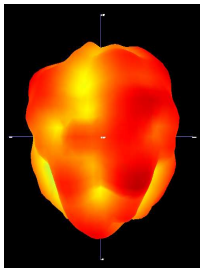
Fig.2 Network Analyzer

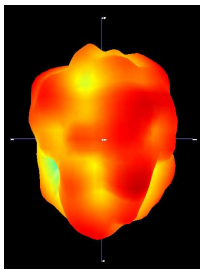
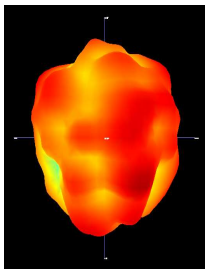
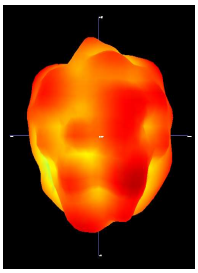
6.2 Test Equipment:

Instrument	Brand Name	Type/Model	Serial Number	Last Cal.	Due Date
SG24	MVG	Standard	SG24	gain cal@2023.6.1 Probe cal@2023.11.15	2024.11.14
Turn Table	MVG	N/A	-	System Calibration	System Calibration
Power Supply Unit	SANTAK	CASTLE 3K(6G)	190916-26590068	System Calibration	System Calibration
Active Switching Unit	MVG	N/A	MODU-009-A-0120	System Calibration	System Calibration
Control Unit SG24	MVG	N/A	MODU-022-A-0032	System Calibration	System Calibration
Amplification Unit	MVG	N/A	MODU-020-B-0005	System Calibration	System Calibration
Cable 8m - 400MHz to 6GHz	MVG	SUCOFLEX 106	SN 81469 /6	2023.11.15	2024.11.14
Temperature & Humidity	deli	deli	-	2024.4.15	2024.10.14
ENA Series Network Analyzer	KeySight	E5071C	MY46523087	2023.11.24	2024.11.23

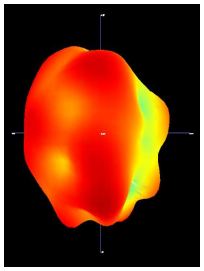
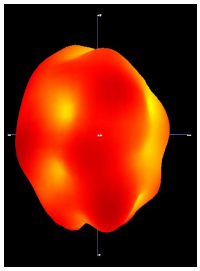
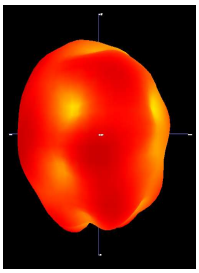
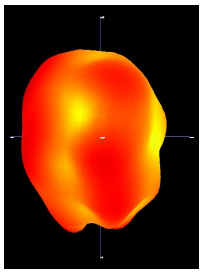
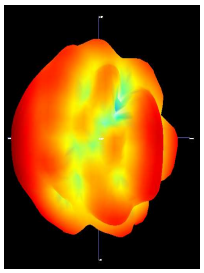
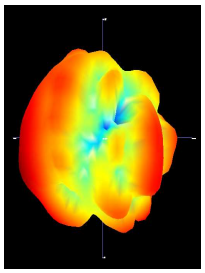
Appendix A. 3D Pattern

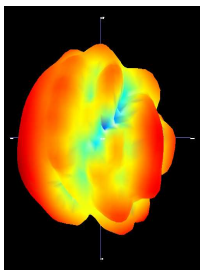
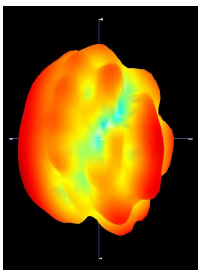
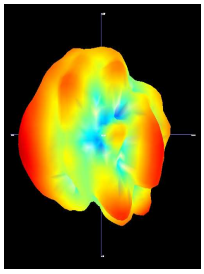
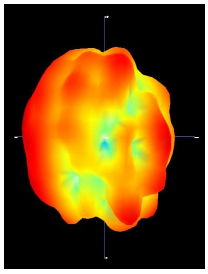
Antenna #1 (5GHz):

5150MHz	5200MHz
	
5250MHz	**5300MHz**
	
5350MHz	**5500MHz**
	
5650MHz	**5700MHz**
	
5750MHz	**5800MHz**

	
5850MHz	
	

Antenna #2 (2.4GHz and 5GHz):

2400MHz	**2440MHz**
	
2460MHz	**2480MHz**
	
5150MHz	**5200MHz**
	

5250MHz	5300MHz
	
5350MHz	**5500MHz**
	
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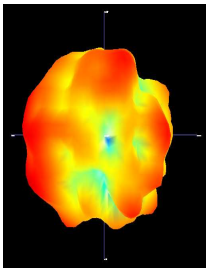
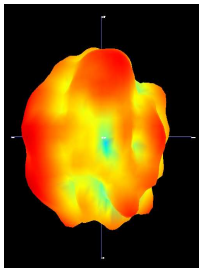
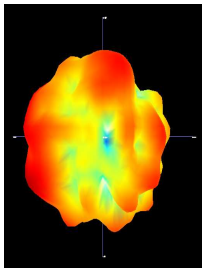
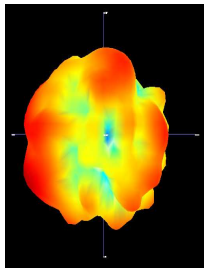
	
5750MHz	**5800MHz**
	
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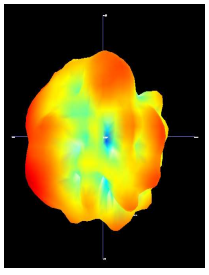	

Antenna #3 (2.4GHz):

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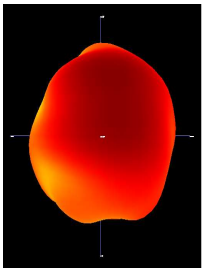
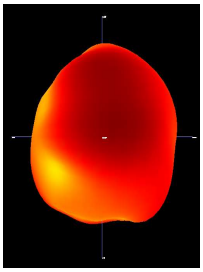
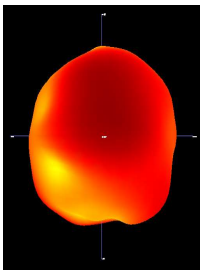
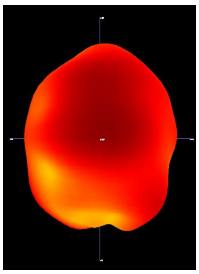
	
2460MHz	**2480MHz**
	

Antenna #4 (Bluetooth & ZigBee):

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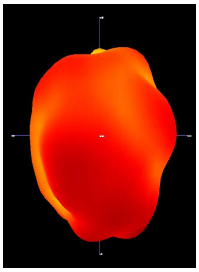
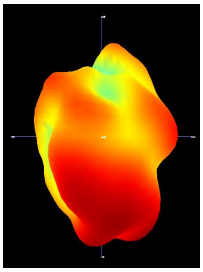
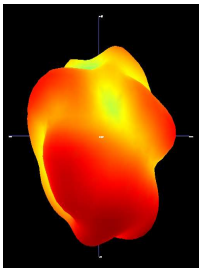
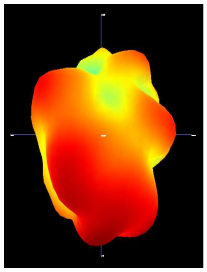
	
2460MHz	**2480MHz**
	

Appendix B. Photographs

Photographs are in a separate document for the sake of confidentiality concerns.