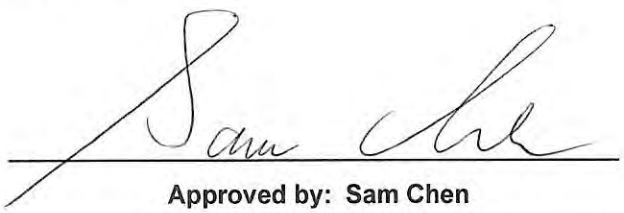
RADIO TEST REPORT

FCC ID	:	MSQ-RTAX5X00
Equipment	:	ROG Rapture AX10000 Tri-band Gaming Mesh Router
Brand Name	:	ASUS
Model Name	:	GT6
Applicant	:	ASUSTeK COMPUTER INC. 1F., No. 15, Lide Rd., Beitou, Taipei City 112, Taiwan
Manufacturer (1)	:	Compal Networking(KunShan) CO., LTD No.520,Nan Bang RD., Economic & Technical Development Zone, KunShan,JiangSu,China
Manufacturer (2)	:	ARCADYAN TECHNOLOGY (VIETNAM) CO., LTD. Land plot No. D4-5-6, Thang Long Industrial Park (Vinh Phuc), Thien Ke Commune, Binh Xuyen District, 15000 Vinh Phuc Province, Vietnam
Standard	:	47 CFR FCC Part 15.247

The product was received on Aug. 05, 2022, and testing was started from Sep. 02, 2022 and completed on Sep. 02, 2022. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.



Approved by: Sam Chen

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

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FR221807-01AA	01	Initial issue of report	Sep. 23, 2022

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

Declaration of Conformity:
1. The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results. 2. The measurement uncertainty please refer to report "Measurement Uncertainty".
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen
Report Producer: Sandy Chuang

1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
2400-2483.5	b, g, n (HT20), VHT20, ax (HEW20)	2412-2462	1-11 [11]
2400-2483.5	n (HT40), VHT40, ax (HEW40)	2422-2452	3-9 [7]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	802.11b	20	2TX
2.4-2.4835GHz	802.11g	20	2TX
2.4-2.4835GHz	802.11n HT20	20	2TX
2.4-2.4835GHz	802.11n HT20-BF	20	2TX
2.4-2.4835GHz	VHT20	20	2TX
2.4-2.4835GHz	VHT20-BF	20	2TX
2.4-2.4835GHz	802.11ax HEW20	20	2TX
2.4-2.4835GHz	802.11ax HEW20-BF	20	2TX
2.4-2.4835GHz	802.11n HT40	40	2TX
2.4-2.4835GHz	802.11n HT40-BF	40	2TX
2.4-2.4835GHz	VHT40	40	2TX
2.4-2.4835GHz	VHT40-BF	40	2TX
2.4-2.4835GHz	802.11ax HEW40	40	2TX
2.4-2.4835GHz	802.11ax HEW40-BF	40	2TX

Note:
- 11b mode uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
- 11g, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- VHT20, VHT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- HEW20, HEW40 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	Port				Brand Name	Model Name	Antenna Type	Connector	Gain (dBi)
	WLAN 2.4GHz	WLAN 5GHz UNII 1~2A	WLAN 5GHz UNII 2C~4 (Mode 1)	WLAN 5GHz UNII 2C~4 (Mode 2)					
1	2	4	-	-	LYNwave	MLX22M-121AA1-A / MLX22M-121AA1-B	Dipole	I-PEX	Note1
2	1	3	-	-	LYNwave	MLX22M-121AA1-A / MLX22M-121AA1-B	Dipole	I-PEX	
3	-	2	-	-	LYNwave	MLX22M-121AA1-A / MLX22M-121AA1-B	Dipole	I-PEX	
4	-	1	-	-	LYNwave	MLX22M-121AA1-A / MLX22M-121AA1-B	Dipole	I-PEX	
5	-	-	4	4	LYNwave	MLX22M-121AA1-A / MLX22M-121AA1-B	Dipole	I-PEX	
6	-	-	1	1	LYNwave	MLX22M-121AA1-A / MLX22M-121AA1-B	Dipole	I-PEX	
7	-	-	3	3	LYNwave	MLX22M-121AA1-A / MLX22M-121AA1-B	Dipole	I-PEX	
8	-	-	2	-	LYNwave	MLX22M-121AA1-A / MLX22M-121AA1-B	Dipole	I-PEX	
9	-	-	-	2	LYNwave	MLX22M-121AA1-A / MLX22M-121AA1-B	Dipole	I-PEX	

Note1: **<Antenna gain>**

Ant.	Port				Gain(dBi)								
	WLAN 2.4GHz	WLAN 5GHz UNII 1~2A	WLAN 5GHz UNII 2C~4 (Mode 1)	WLAN 5GHz UNII 2C~4 (Mode 2)	WLAN 2.4GHz	WLAN 5GHz							
						UNII 1	UNII 2A	UNII 2C		UNII 3		UNII 4	
								Mode1	Mode2	Mode1	Mode2	Mode1	Mode2
1	2	4	-	-	4.1	3.53	3.81	-	-	-	-	-	-
2	1	3	-	-	3.39	3.26	4.32	-	-	-	-	-	-
3	-	2	-	-	-	2.32	2.96	-	-	-	-	-	-
4	-	1	-	-	-	2.31	2.44	-	-	-	-	-	-
5	-	-	4	4	-	-	-	1.43	1.43	2.08	2.08	2.5	2.5
6	-	-	1	1	-	-	-	1.66	1.66	1.91	1.91	2.89	2.89
7	-	-	3	3	-	-	-	2.8	2.8	3.51	3.51	3.79	3.79
8	-	-	2	-	-	-	-	2.55	-	3.36	-	3.65	-
9	-	-	-	2	-	-	-	-	3.64	-	3.64	-	3.29

<Directional Gain>

Item	WLAN 2.4GHz	Directional Gain(dBi)							
		WLAN 5GHz							
		UNII 1	UNII 2A	UNII 2C		UNII 3		UNII 4	
				Mode1	Mode2	Mode1	Mode2	Mode1	Mode2
2T1S	6.01	-	-	-	-	-	-	-	-
2T2S	4.1	-	-	-	-	-	-	-	-
4T1S	-	6.24	6.43	6.13	4.83	7.23	5.25	6.76	4.95
4T2S	-	-	4.32	-	-	4.23	3.64	3.79	3.79

Note2: The above information (except gain) was declared by manufacturer.
The directional gain is measured which follows the procedure of KDB 662911 D03.

Note3: Mode1 was Ant.5~7+Ant.8 and Mode 2 was Ant. 5~7+Ant.9.

Note4: The EUT support the antenna with TX/RX diversity functions. Both Ant.8 and Ant.9 can be used as transmitting and receiving antennas, but only one of them will be used at one time.
Ant. 8 generated be the worst case, so it was selected to test and recorded in the report.

Note5: Antennas' Model Name: MLX22M-121AA1-A are for EUT 1 use and MLX22M-121AA1-B are for EUT 2 use. They're same type of antennas.

For 2.4GHz function:

For IEEE 802.11b/g/n/VHT/ax (2TX/2RX):

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

For 5GHz function:

For IEEE 802.11a/n/ac/ax (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

1.1.3 EUT Operational Condition

EUT Power Type	From Power Adapter			
Beamforming Function	☒	With beamforming	☐	Without beamforming
	The product has beamforming function for 11n/VHT/ax in 2.4GHz and 11n/ac/ax in 5GHz.			
Function	☒	Point-to-multipoint	☐	Point-to-point
Test Software Version	M-TOOL V3.2.1.5			

Note: The above information was declared by manufacturer.

1.1.4 Table for EUT supports functions

Function	Support Type
AP Router	Master
Bridge	Slave without radar detection
Repeater	Master
Mesh	Master

Note: The above information was declared by manufacturer.

1.1.5 Table for EUT Information

EUT	PCB board Version	Color of outer case	
		Black	White
EUT 1	R1.20	V	V
EUT 2	R2.00	V	V

Note 1: EUT 2 (color: black) was selected to test Emissions in Restricted Frequency Bands (below 1GHz).
Note 2: The above information was declared by manufacturer.

1.1.6 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FR221807AA.
Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Upgrading the PCB version of EUT to R2.00 from R1.20. The difference is listed below: (1) Mainboard: Adding common mode filter to TX path of USB3.0 (Location: FL1). (2) I/O board: Adding common mode filter to RX path of USB3.0 (Location: FL3).	Emissions in Restricted Frequency Bands (below 1GHz)
2. Revising the black and white housing to the final version. 3. Adding Zero wait function for DFS. 4. Adding a set antennas (Model Name: MLX22M-121AA1-B) which is almost same as the original antenna but the grey color. The new antennas is available for the white housing only.	After evaluation, the test results don't be affected.

1.2 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR FCC Part 15.247
- ANSI C63.10-2013

The following reference test guidance is not within the scope of accreditation of TAF.

- FCC KDB 558074 D01 v05r02
- FCC KDB 662911 D03 v01
- FCC KDB 414788 D01 v01r01

1.3 Testing Location Information

Testing Location Information	
Test Lab.：Sporton International Inc. Hsinchu Laboratory	
Hsinchu (TAF: 3787)	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.) TEL: 886-3-656-9065 FAX: 886-3-656-9085 Test site Designation No. TW3787 with FCC. Conformity Assessment Body Identifier (CABID) TW3787 with ISED.

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
Radiated	03CH04-CB	Bruce Yang	24.9~26.7 / 61~64	Sep. 02, 2022

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Test Items	Uncertainty	Remark
Radiated Emission (9kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.6 dB	Confidence levels of 95%

2 Test Configuration of EUT

2.1 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	Emissions in Restricted Frequency Bands
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Operating Mode < 1GHz	CTX
1. The Adapter 1 and Adapter 2 were performed testing. After evaluation, Adapter 1 has been evaluated to be the worst case. Consequently, measurement will follow this same test mode. 2. The 2.4GHz, 5GHz UNII 1, 2A and 5GHz UNII 2C~4 were performed testing. After evaluation, 2.4GHz was the worst case, Consequently, measurement will follow this same test mode. 3. The EUT was performed in X axis, Y axis and Z axis position for Emissions in Restricted Frequency Bands, and the worst case was found at Y axis for WLAN 2.4GHz. So the measurement will follow this same test configuration.	
1	EUT 2 in Y axis + 2.4GHz + Adapter 1

2.2 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

2.3 Accessories

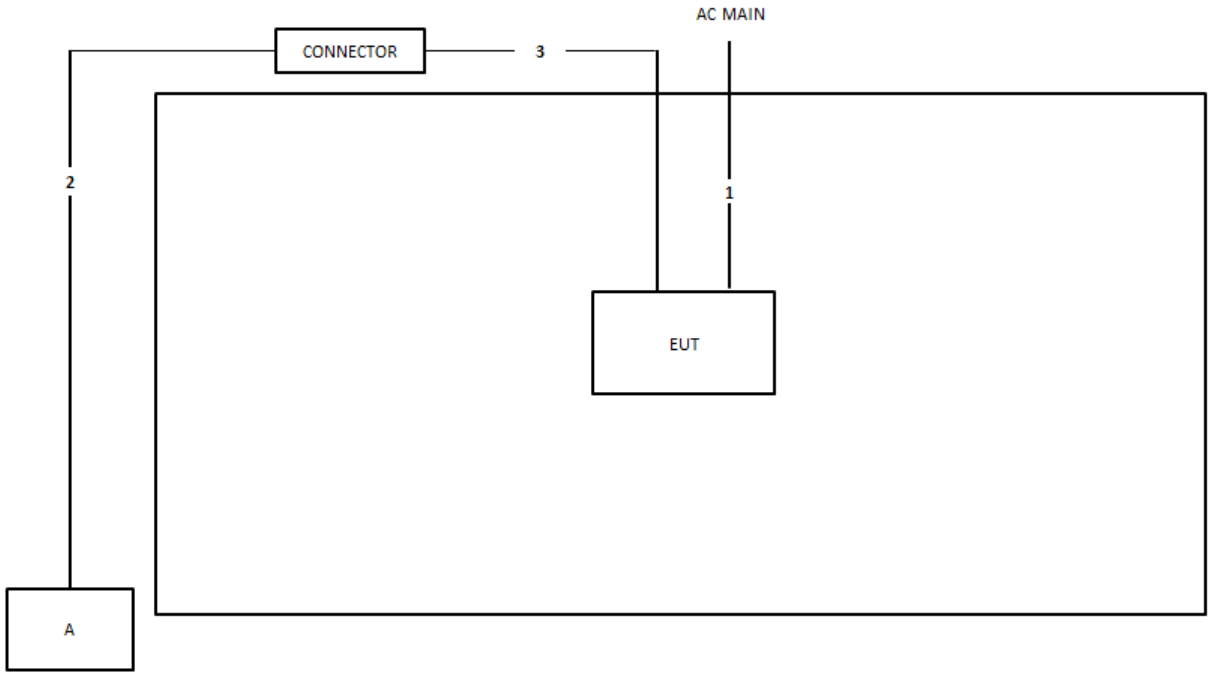
Accessories					
No.	**Equipment Name**	**Brand Name**	**Model Name**	**Rating**	**Remark**
1	Adapter 1	DELTA	ADP-45FE F	INPUT: 100-240V~1.2A, 50-60Hz OUTPUT: 19V, 2.37A	With the DC cable: Non-shielded, 1.6m
2	Adapter 2	AcBel	ADH011	INPUT: 100-240V~1.4A, 50-60Hz OUTPUT: 19.5V, 2.31A, 45W MAX	With the DC cable: Non-shielded, 1.6m
Others					
RJ-45 cable*1: Non-shielded, 1.5m Power cord*2: Non-shielded, 0.8m					

2.4 Support Equipment

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	Notebook	DELL	E4300	N/A

2.5 Test Setup Diagram

Test Setup Diagram - Radiated Test < 1GHz



Item	Connection	Shielded	Length
1	Power cable	No	2.4m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	1.5m

3 Transmitter Test Result

3.1 Emissions in Restricted Frequency Bands

3.1.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

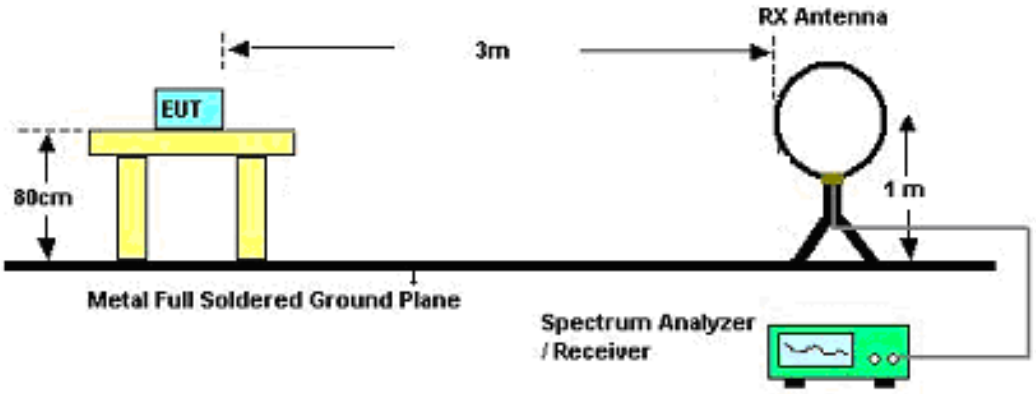
3.1.3 Test Procedures

Test Method			
▪ The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].			
▪ Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.			
▪ For the transmitter unwanted emissions shall be measured using following options below:			
	▪ Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands.		
		☐	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.1(trace averaging for duty cycle ≥98%).
		☐	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.2(trace averaging + duty factor).
		☒	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.3(Reduced VBW≥1/T).
		☐	Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
		☐	Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.
		☒	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.4 measurement procedure peak limit.
▪ For the transmitter band-edge emissions shall be measured using following options below:			
	▪ Refer as FCC KDB 558074 clause 8.7 & C63.10 clause 11.13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.		
	▪ Refer as FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.		
	▪ Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).		
	▪ For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB		
	▪ For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.		

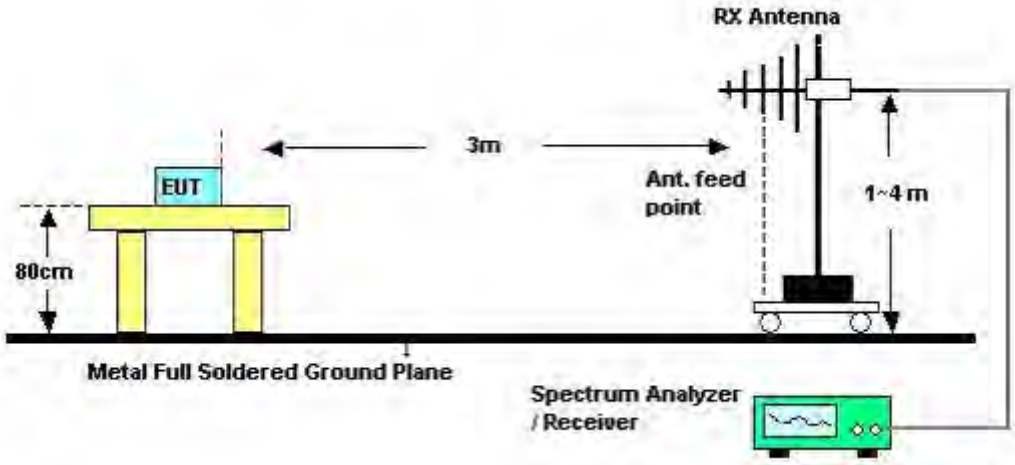
3.1.4 Test Setup

Radiated - Emissions in Restricted Frequency Bands

9kHz ~30MHz



30MHz~1GHz



3.1.5 Measurement Results Calculation

The measured Level is calculated using:
Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.

3.1.6 Emissions in Restricted Frequency Bands (Below 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.
All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.
The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10th harmonic or 40 GHz, whichever is appropriate.

3.1.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix A

4 Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	May 14, 2022	May 13, 2023	Radiation (03CH04-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH04-CB	30 MHz ~ 1 GHz	Aug. 02, 2022	Aug. 01, 2023	Radiation (03CH04-CB)
BILOG ANTENNA with 6 dB attenuator	Schaffner & EMCI	CBL6112B & N-6-06	22021&AT-N06 07	30MHz ~ 1GHz	Oct. 09, 2021	Oct. 08, 2022	Radiation (03CH04-CB)
Pre-Amplifier	Agilent	310N	187291	0.1MHz ~ 1GHz	Dec. 16, 2021	Dec. 15, 2022	Radiation (03CH04-CB)
Spectrum Analyzer	R&S	FSP40	100142	9kHz~40GHz	Mar. 28, 2022	Mar. 27, 2023	Radiation (03CH04-CB
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 17, 2022	Jun. 16, 2023	Radiation (03CH04-CB)
RF Cable-low	Woken	RG402	Low Cable-03+67	30MHz – 1GHz	Oct. 04, 2021	Oct. 03, 2022	Radiation (03CH04-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH04-CB)

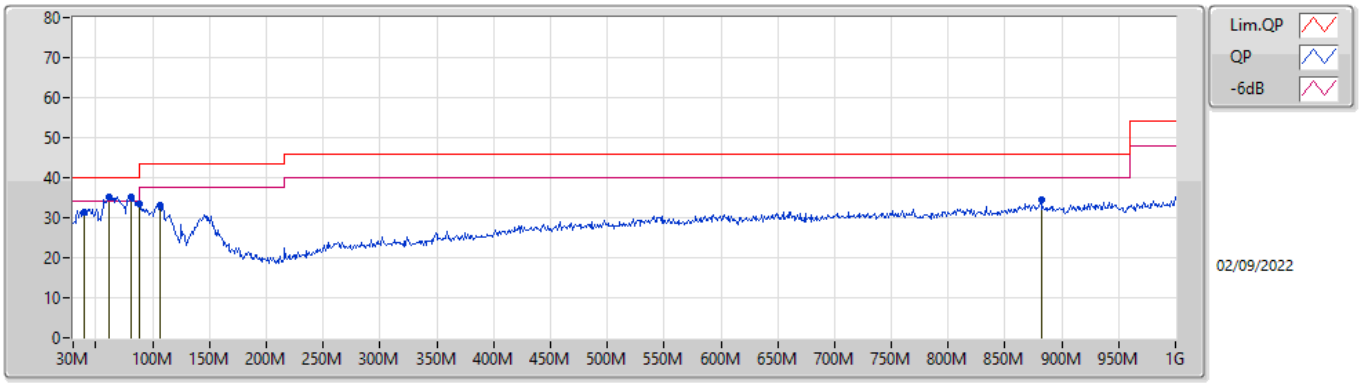
Note: Calibration Interval of instruments listed above is one year.

NCR means Non-Calibration required.

Summary

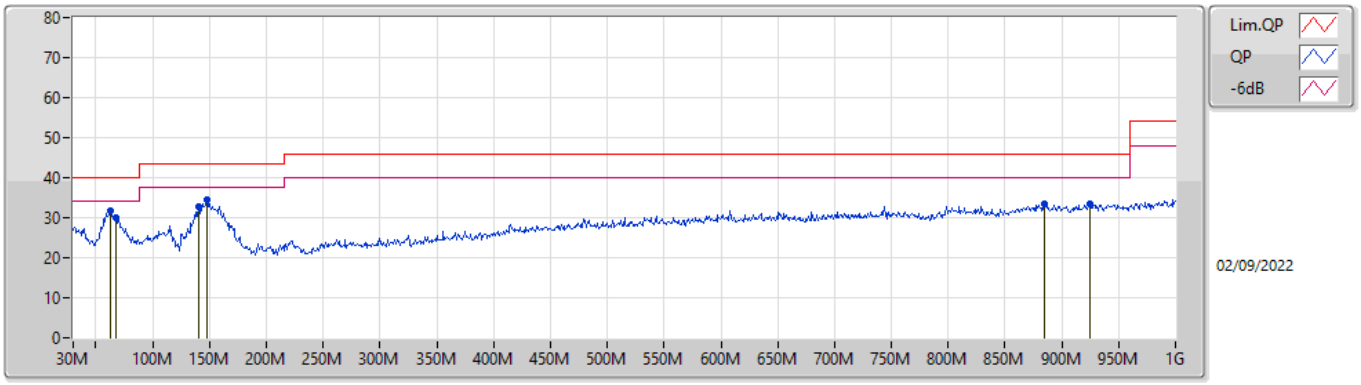
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	PK	81.41M	35.33	40.00	-4.67	Vertical

Mode 1



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB/m)	(m)		(°)	(m)		(dBuV/m)	(dB/m)	(dB)	(dB)
PK	39.7M	31.23	40.00	-8.77	-12.24	3	Vertical	295	1.00	-	43.47	18.34	1.60	32.18
PK	62.01M	35.05	40.00	-4.95	-17.98	3	Vertical	63	1.25	-	53.03	12.49	1.70	32.17
PK	81.41M	35.33	40.00	-4.67	-17.39	3	Vertical	245	1.25	"Worst"	52.72	12.92	1.80	32.11
PK	88M	33.62	40.00	-6.38	-16.06	3	Vertical	230	1.00	-	49.68	14.21	1.80	32.07
PK	106.63M	33.15	43.50	-10.35	-12.51	3	Vertical	238	1.00	-	45.66	17.67	1.90	32.08
PK	881.66M	34.34	46.00	-11.66	-2.31	3	Vertical	81	1.25	-	36.65	26.98	3.79	33.08

Mode 1



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB/m)	(m)		(°)	(m)		(dBuV/m)	(dB/m)	(dB)	(dB)
PK	62.98M	31.56	40.00	-8.44	-17.96	3	Horizontal	137	3.00	"Worst"	49.52	12.52	1.70	32.18
PK	67.83M	29.98	40.00	-10.02	-18.06	3	Horizontal	121	3.00	-	48.04	12.40	1.70	32.16
PK	140.58M	32.84	43.50	-10.66	-13.04	3	Horizontal	237	2.00	-	45.88	17.17	2.00	32.21
PK	148.34M	34.40	43.50	-9.10	-13.62	3	Horizontal	262	2.00	-	48.02	16.55	2.00	32.17
PK	884.57M	33.60	46.00	-12.40	-2.21	3	Horizontal	205	3.00	-	35.81	27.06	3.81	33.08
PK	924.34M	33.61	46.00	-12.39	-2.02	3	Horizontal	360	2.00	-	35.63	26.84	3.90	32.76