TEST REPORT

Reference No......	:	WTX24X01021778W
FCC ID.....	:	2AO89-PGMIC3
Applicant.....	:	PICOGEAR
Address.....	:	63 RUE GABRIEL PERI, 94200 IVRY-SUR-SEINE, FRANCE
Manufacturer.....	:	The same as Applicant
Address.....	:	The same as Applicant
Product Name.....	:	PICOMIC 3
Model No......	:	PG-MIC3
Standards.....	:	FCC Part 15.249
Date of Receipt sample.....	:	2024-01-26
Date of Test.....	:	2024-01-26 to 2024-02-24; 2024-03-20 to 2024-05-09
Date of Issue.....	:	2024-05-09
Test Report Form No......	:	WTX_Part 15_249W
Test Result.....	:	**Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of approver.

Prepared By:

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Tested by:

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Approved by:

Jason Su

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Report version

Version No.	Date of issue	Description
Rev.00	2024-05-09	Original
/	/	/

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

General Description of EUT	
Product Name:	PICOMIC 3
Trade Name:	PICOGEAR
Model No.:	PG-MIC3
Adding Model(s):	/
Rated Voltage:	Battery DC3.7V
Battery Capacity	130mAh
Power Adapter Model:	/
Note: The test data is gathered from a production sample, provided by the manufacturer.	

Technical Characteristics of EUT	
Frequency Range:	2402MHz-2480MHz
Max. Field Strength:	92.80dBuV/m
Modulation:	GFSK
Quantity of Channels:	40
Channel Separation:	2MHz
Antenna Type:	Stamped Metal Antenna
Antenna Gain:	4.9dBi

1.2 Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.249: Operation within the bands 902-928MHz, 2400-2483.5MHz, 5725-5875MHz, and 24.0-24.25GHz.
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013,
The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

1.4 Test Facility

Address of the test laboratory
Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.
Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

FCC – Registration No.: 125990
Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is mai ntained in our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A
The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A and the CAB identifier is CN0057.

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Low Channel	2402MHz
TM2	Middle Channel	2440MHz
TM3	High Channel	2480MHz

Test Conditions	
Temperature:	22~25 °C
Relative Humidity:	50~55 %.
ATM Pressure:	1019 mbar

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Conducted Spurious Emission	Conducted	±2.17dB
Conducted Emissions	Conducted	9-150kHz ±3.74dB
		0.15-30MHz ±3.34dB
Transmitter Spurious Emissions	Radiated	30-200MHz ±4.52dB
		0.2-1GHz ±5.56dB
		1-6GHz ±3.84dB
		6-26GHz ±3.92dB

1.7 Test Equipment List and Details

Fixed asset Number	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
WTXE1041 A1001	Communication Tester	Rohde & Schwarz	CMW500	148650	2023-02-25	2024-02-24
WTXE1005 A1005	Spectrum Analyzer	Agilent	N9020A	US47140102	2023-02-25	2024-02-24
WTXE1084 A1001	Spectrum Analyzer	Agilent	N9020A	MY54320548	2023-02-25	2024-02-24
WTXE1004 A1-001	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2023-02-25	2024-02-24
☐ Chamber A: Below 1GHz						
WTXE1005 A1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2023-02-25	2024-02-24
WTXE1007 A1001	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2023-02-25	2024-02-24
WTXE1007 A1001	Amplifier	HP	8447F	2805A03475	2023-02-25	2024-02-24
WTXE1010 A1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-20	2024-03-19
WTXE1010 A1006	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2023-03-20	2026-03-19
☐ Chamber A: Above 1GHz						
WTXE1005 A1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2023-02-25	2024-02-24
WTXE1007 A1001	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2023-02-25	2024-02-24
WTXE1065 A1001	Amplifier	C&D	PAP-1G18	14918	2023-02-25	2024-02-24
WTXE1010 A1005	Horn Antenna	ETS	3117	00086197	2021-03-19	2024-03-18
WTXE1010 A1010	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2021-03-19	2024-03-18
WTXE1003 A1001	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2023-02-25	2024-02-24
WTXE1004 A1-001	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2023-02-25	2024-02-24
☐ Chamber B:Below 1GHz						
WTXE1010 A1006	Trilog Broadband Antenna	Schwarz beck	VULB9163(B)	9163-635	2021-04-09	2024-04-08
WTXE1038	Amplifier	Agilent	8447D	2944A104	2023-02-25	2024-02-24

A1001				57		
WTXE1001 A1002	EMI Test Receiver	Rohde & Schwarz	ESPI	101391	2023-02-25	2024-02-24
☒ Chamber C:Below 1GHz						
WTXE1093 A1001	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2023-02-25	2024-02-24
WTXE1010 A1013-1	Trilog Broadband Antenna	Schwarz beck	VULB 9168	1194	2021-05-28	2024-05-27
WTXE1010 A1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-20	2024-03-19
WTXE1007 A1002	Amplifier	HP	8447F	2944A038 69	2023-02-25	2024-02-24
☒ Chamber C: Above 1GHz						
WTXE1093 A1001	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2023-02-25	2024-02-24
WTXE1103 A1005	Horn Antenna	POAM	RTF-118A	1820	2023-03-10	2026-03-09
WTXE1103 A1006	Amplifier	Tonscend	TAP01018050	AP22E806 235	2023-02-25	2024-02-24
WTXE1010 A1010	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2021-03-19	2024-03-18
WTXE1003 A1001	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2023-02-25	2024-02-24
☐ Conducted Room 1#						
WTXE1001 A1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2023-02-25	2024-02-24
WTXE1002 A1001	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2023-02-25	2024-02-24
WTXE1003 A1001	AC LISN	Schwarz beck	NSLK8126	8126-279	2023-02-25	2024-02-24
☒ Conducted Room 2#						
WTXE1001 A1004	EMI Test Receiver	Rohde & Schwarz	ESPI	101259	2023-02-25	2024-02-24
WTXE1003 A1003	LISN	Rohde & Schwarz	ENV 216	100097	2023-02-25	2024-02-24

Fixed asset Number	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
WTXE1041A 1001	Communication Tester	Rohde & Schwarz	CMW500	148650	2024-02-24	2025-02-23
WTXE1005A 1005	Spectrum Analyzer	Agilent	N9020A	US47140102	2024-03-19	2025-03-18
WTXE1084A 1001	Spectrum Analyzer	Agilent	N9020A	MY54320548	2024-02-24	2025-02-23
WTXE1004A 1-001	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2024-02-27	2025-02-26
☐ Chamber A: Below 1GHz						
WTXE1005A 1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2024-02-24	2025-02-23
WTXE1001A 1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2024-03-19	2025-03-18
WTXE1007A 1001	Amplifier	HP	8447F	2805A03475	2024-02-24	2025-02-23
WTXE1010A 1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2024-02-26	2025-02-25
WTXE1010A 1006	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2024-02-24	2025-02-23
☐ Chamber A: Above 1GHz						
WTXE1005A 1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2024-02-24	2025-02-23
WTXE1001A 1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2024-03-19	2025-03-18
WTXE1065A 1001	Amplifier	C&D	PAP-1G18	2002	2024-02-27	2025-02-26
WTXE1010A 1005	Horn Antenna	ETS	3117	00086197	2024-02-26	2025-02-25
WTXE1010A 1010	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2024-03-17	2025-03-16
WTXE1003A 1001	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2024-02-29	2025-02-28
☐ Chamber B:Below 1GHz						
WTXE1010A 1006	Trilog Broadband Antenna	Schwarz beck	VULB9163(B)	9163-635	2024-03-17	2027-03-16
WTXE1038A 1001	Amplifier	Agilent	8447D	2944A10457	2024-02-24	2025-02-23
WTXE1001A 1002	EMI Test Receiver	Rohde & Schwarz	ESPI	101391	2024-02-24	2025-02-23

☒ Chamber C:Below 1GHz						
WTXE1093A 1001	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2024-02-27	2025-02-26
WTXE1010A 1013-1	Trilog Broadband Antenna	Schwarz beck	VULB 9168	1194	2024-04-18	2027-04-17
WTXE1010A 1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2024-02-26	2025-02-25
WTXE1007A 1002	Amplifier	HP	8447F	2944A038 69	2024-02-24	2025-02-23
☒ Chamber C: Above 1GHz						
WTXE1093A 1001	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2024-02-27	2025-02-26
WTXE1103A 1005	Horn Antenna	POAM	RTF-118A	1820	2023-03-10	2026-03-09
WTXE1103A 1006	Amplifier	Tonscend	TAP01018050	AP22E806 235	2024-02-27	2025-02-26
WTXE1010A 1010	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2024-03-17	2025-03-16
WTXE1003A 1001	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2024-02-29	2025-02-28
☐ Conducted Room 1#						
WTXE1104A 1029	EMI Test Receiver	Rohde & Schwarz	ESCI	100525	2023-12-12	2024-12-11
WTXE1002A 1001	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2024-02-24	2025-02-23
WTXE1003A 1001	AC LISN	Schwarz beck	NSLK8126	8126-279	2024-02-24	2025-02-23
☒ Conducted Room 2#						
WTXE1001A 1004	EMI Test Receiver	Rohde & Schwarz	ESPI	101259	2024-02-24	2025-02-23
WTXE1003A 1003	LISN	Rohde & Schwarz	ENV 216	100097	2024-02-24	2025-02-23

Software List			
Description	**Manufacturer**	**Model**	**Version**
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission Room 1#)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission Room 2#)*	SKET	EMC-I	V2.0

*Remark: indicates software version used in the compliance certification testing.

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§15.203	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§15.207(a)	Conducted Emission	Compliant
§15.209(a)(f)	Radiated Spurious Emissions	Compliant
§15.249(a)	Field Strength of Emissions	Compliant
§15.249(d)	Out of Band Emission	Compliant
§15.215(c)	Emission Bandwidth	Compliant

N/A: Not applicable.

3. Antenna Requirements

3.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.2 Test Result

This product has a Stamped Metal antenna, fulfill the requirement of this section.

4. Radiated Emissions

4.1 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of Harmonics (micro-volts/meter)
902-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

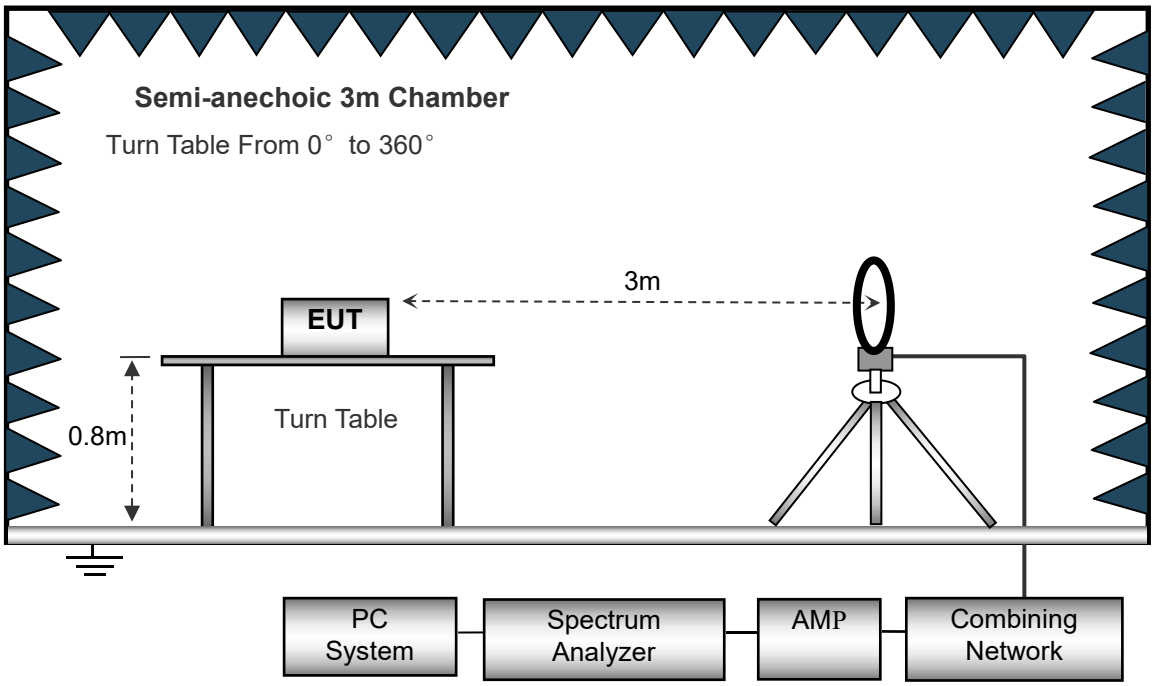
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

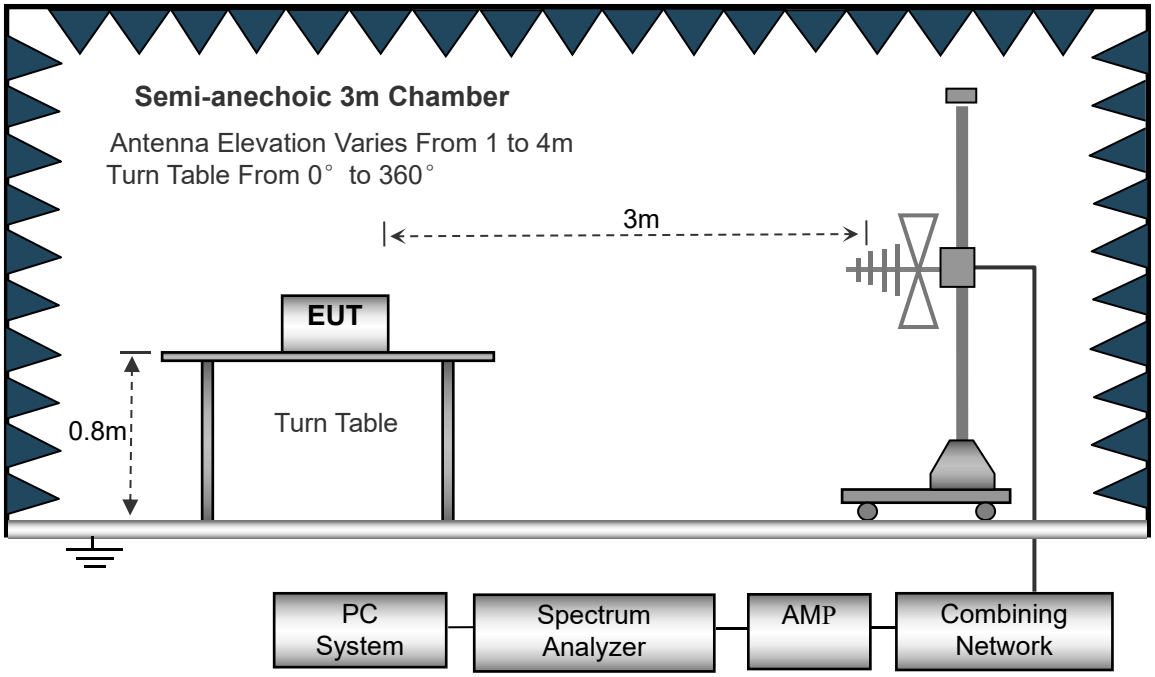
4.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.249(a) and FCC Part 15.209 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle. The spacing between the peripherals was 10cm.

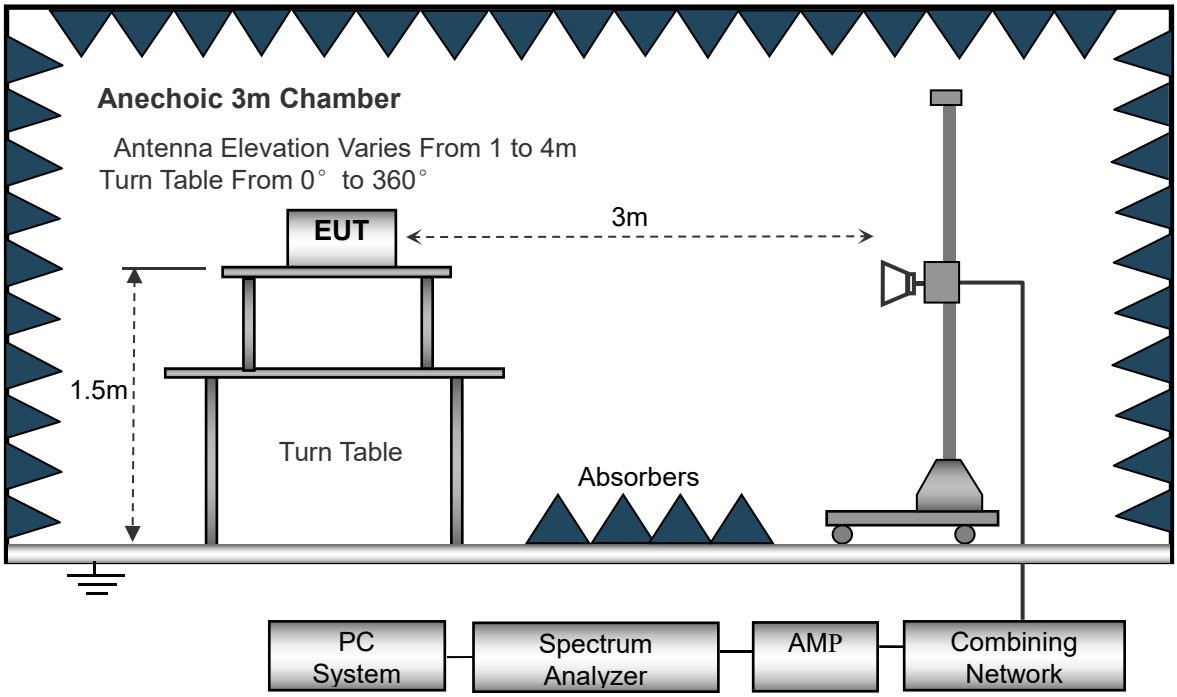
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30MHz to 1GHz.



The test setup for emission measurement above 1GHz.



Frequency :9kHz-30MHz
RBW=10KHz,
VBW =30KHz
Sweep time= Auto
Trace = max hold
Detector function = peak

Frequency :30MHz-1GHz
RBW=120KHz,
VBW=300KHz
Sweep time= Auto
Trace = max hold
Detector function = peak, QP

Frequency :Above 1GHz
RBW=1MHz,
VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto
Trace = max hold
Detector function = peak, AV

4.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit. The equation for margin calculation is as follows:

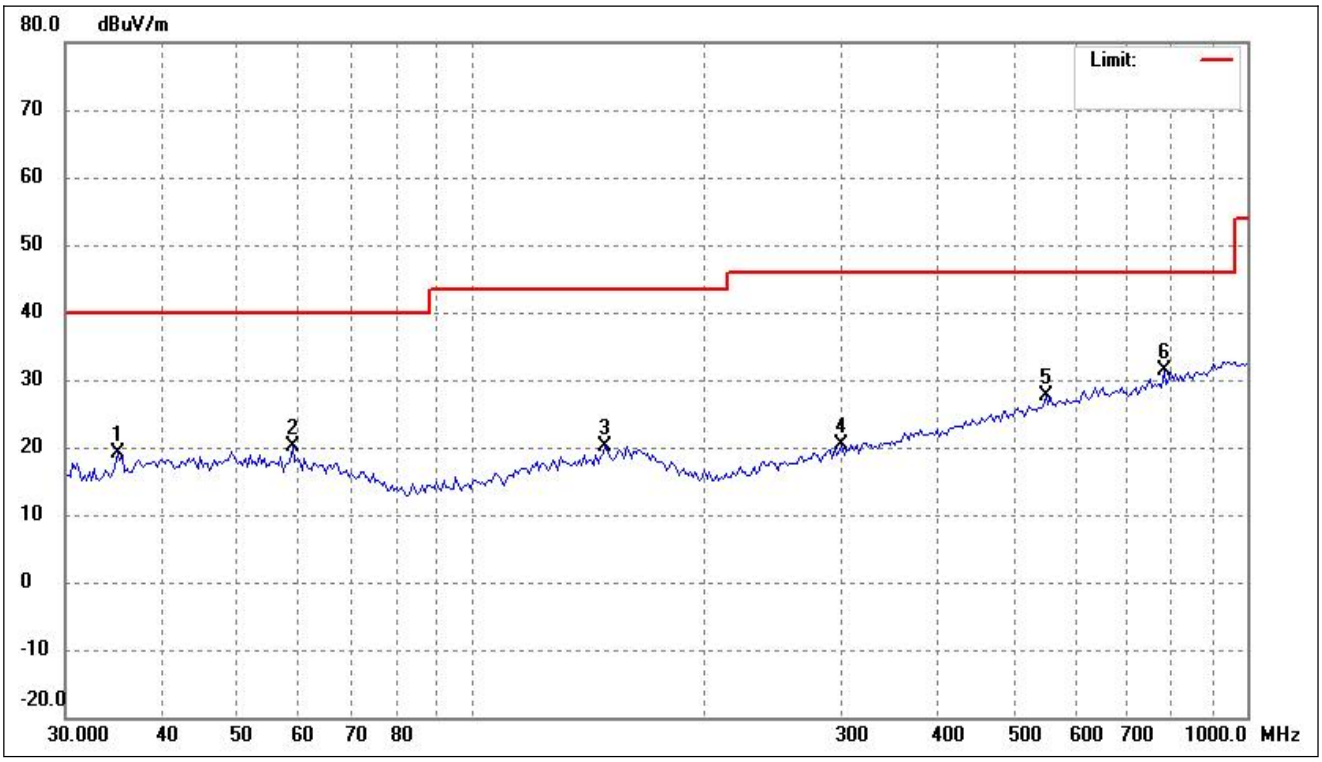
Margin = Corr. Ampl. – FCC Part 15C Limit

4.4 Summary of Test Results/Plots

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

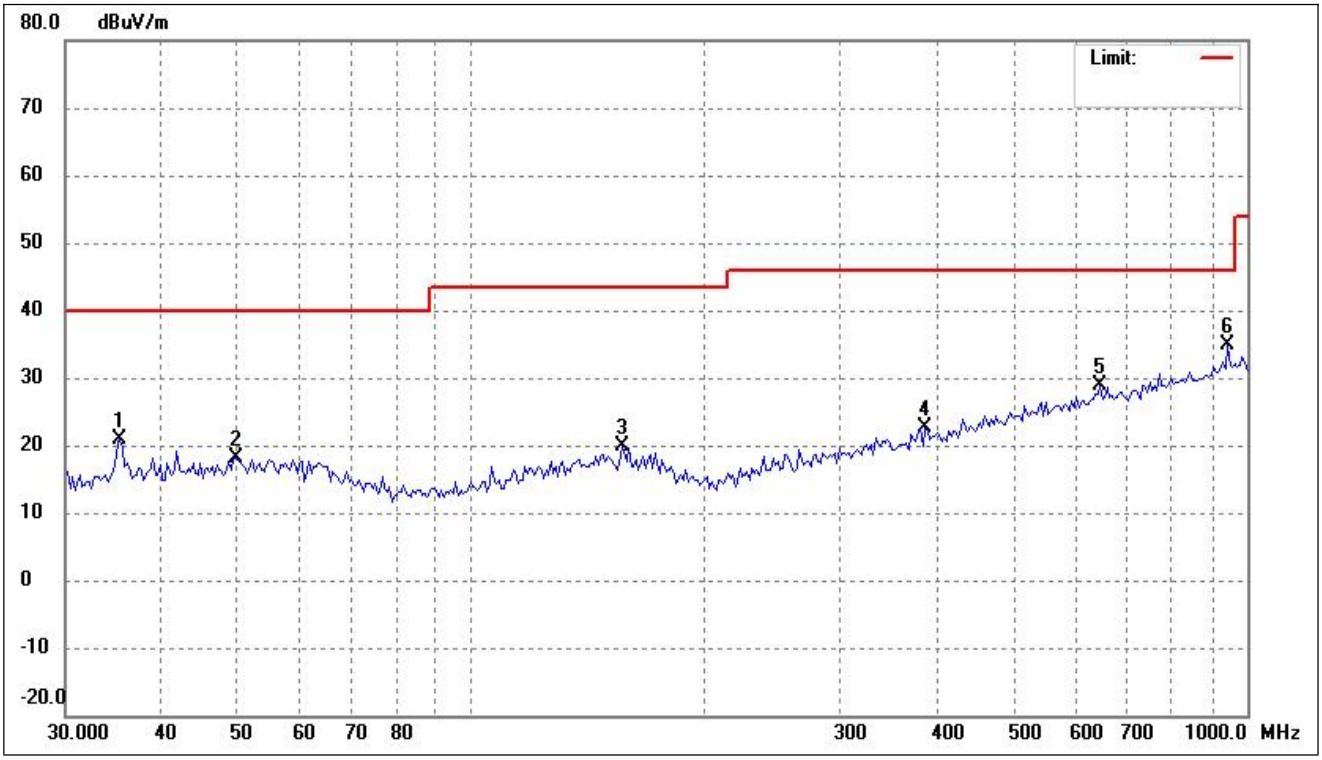
➢ Spurious Emissions Below 1GHz

Test Channel	Low	Polarity:	Horizontal



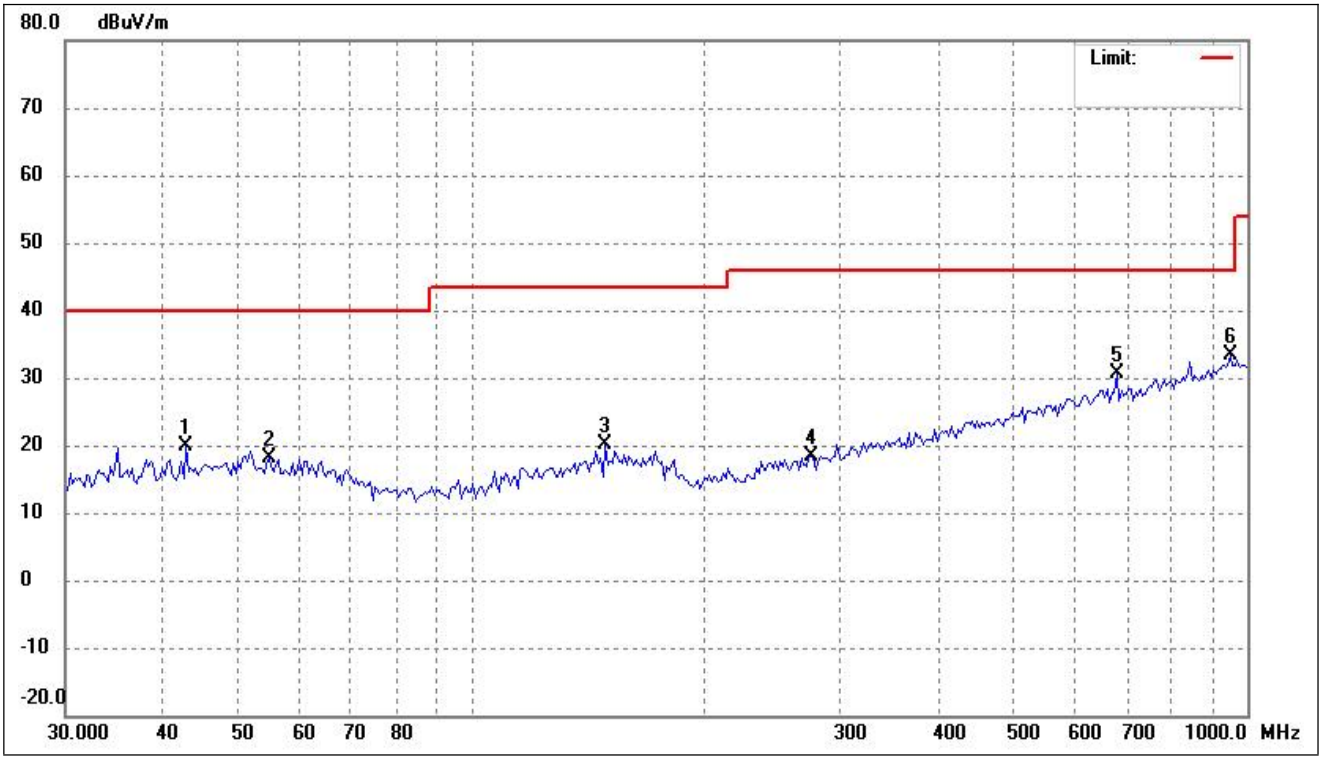
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	35.0157	28.57	-9.55	19.02	40.00	-20.98	-	-	peak
2	58.8979	29.10	-8.87	20.23	40.00	-19.77	-	-	peak
3	148.9175	28.72	-8.68	20.04	43.50	-23.46	-	-	peak
4	300.6988	28.66	-8.24	20.42	46.00	-25.58	-	-	peak
5	550.2902	30.48	-2.84	27.64	46.00	-18.36	-	-	peak
6	781.9606	31.29	0.13	31.42	46.00	-14.58	-	-	peak

Test Channel	Low	Polarity:	Vertical



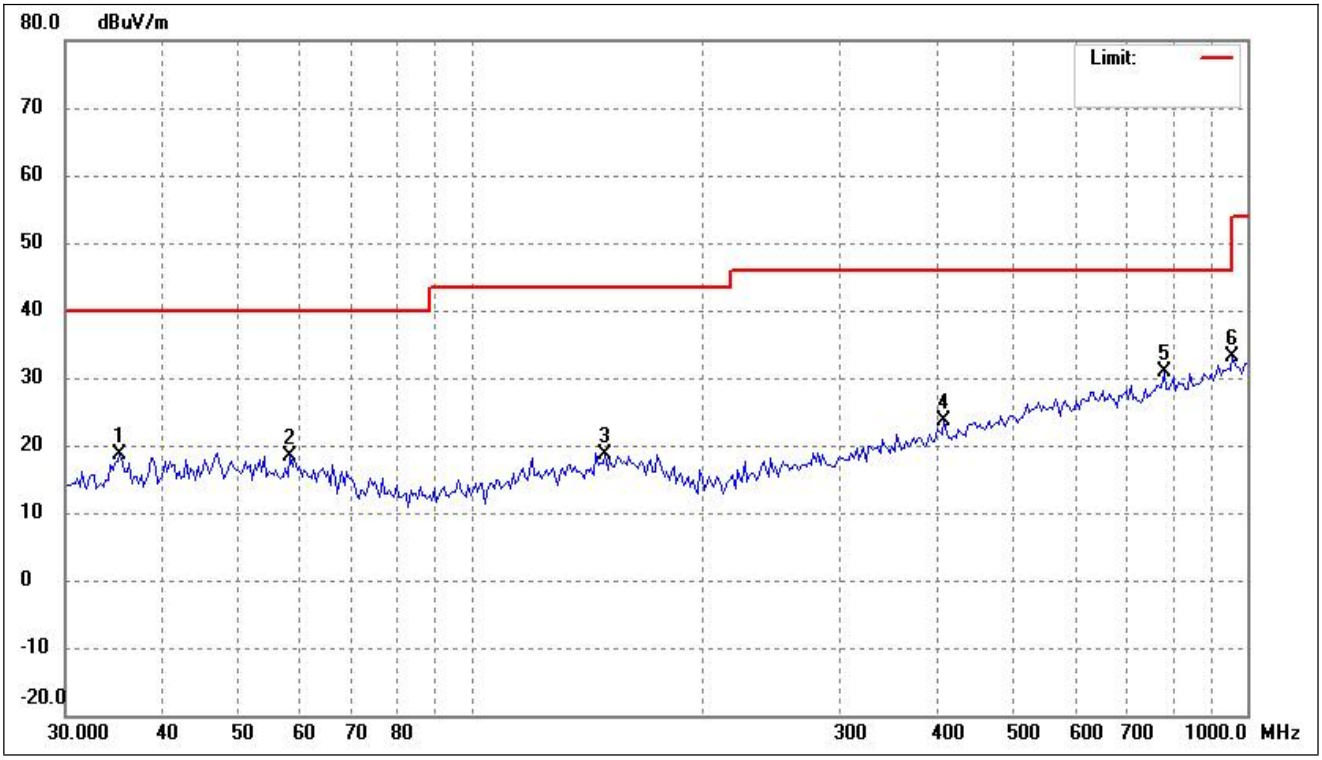
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	35.2626	30.40	-9.50	20.90	40.00	-19.10	-	-	peak
2	49.7571	26.27	-8.09	18.18	40.00	-21.82	-	-	peak
3	156.4259	28.38	-8.60	19.78	43.50	-23.72	-	-	peak
4	384.5447	28.91	-6.28	22.63	46.00	-23.37	-	-	peak
5	646.8217	30.25	-1.32	28.93	46.00	-17.07	-	-	peak
6	945.3336	32.64	2.15	34.79	46.00	-11.21	-	-	peak

Test Channel	Middle	Polarity:	Horizontal



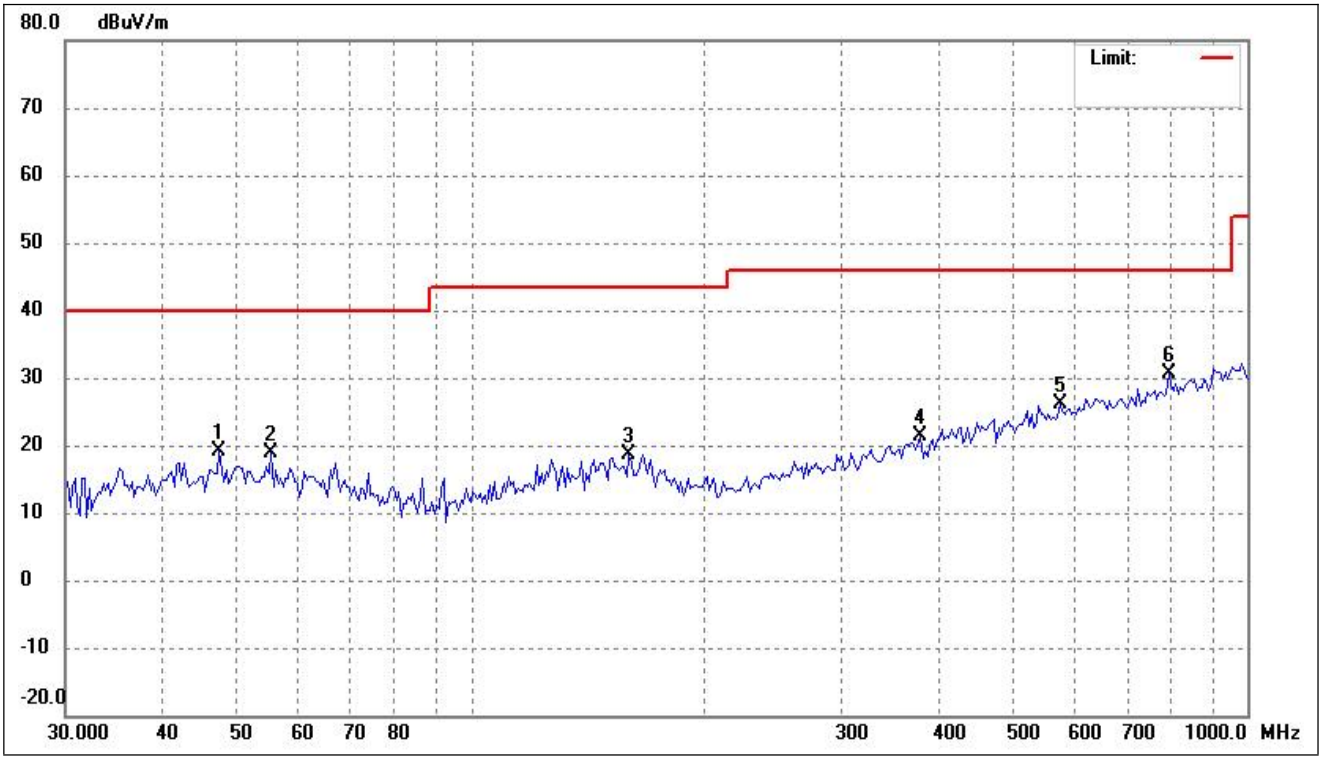
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	42.9305	28.24	-8.48	19.76	40.00	-20.24	-	-	peak
2	54.9011	26.70	-8.62	18.08	40.00	-21.92	-	-	peak
3	148.9175	28.75	-8.68	20.07	43.50	-23.43	-	-	peak
4	274.4464	27.48	-9.13	18.35	46.00	-27.65	-	-	peak
5	679.4346	31.75	-1.23	30.52	46.00	-15.48	-	-	peak
6	952.0001	31.23	2.25	33.48	46.00	-12.52	-	-	peak

Test Channel	Middle	Polarity:	Vertical



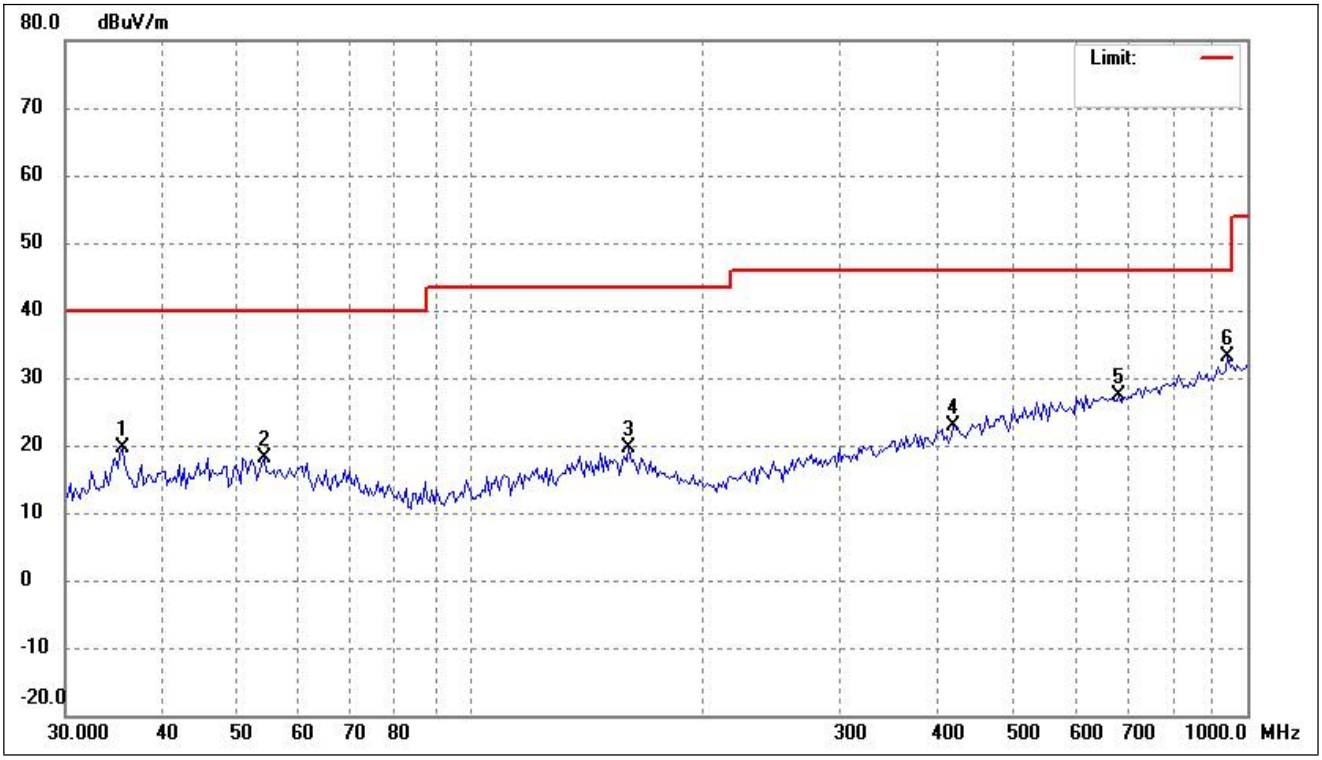
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	35.2626	28.17	-9.50	18.67	40.00	-21.33	-	-	peak
2	58.4855	27.24	-8.84	18.40	40.00	-21.60	-	-	peak
3	148.9175	27.30	-8.68	18.62	43.50	-24.88	-	-	peak
4	406.7820	29.52	-5.78	23.74	46.00	-22.26	-	-	peak
5	781.9606	30.76	0.13	30.89	46.00	-15.11	-	-	peak
6	958.7135	30.85	2.26	33.11	46.00	-12.89	-	-	peak

Test Channel	High	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	47.3688	27.30	-8.29	19.01	40.00	-20.99	-	-	peak
2	55.2883	27.46	-8.64	18.82	40.00	-21.18	-	-	peak
3	159.7586	27.33	-8.61	18.72	43.50	-24.78	-	-	peak
4	379.1780	27.64	-6.38	21.26	46.00	-24.74	-	-	peak
5	573.9882	28.43	-2.27	26.16	46.00	-19.84	-	-	peak
6	793.0281	30.48	0.23	30.71	46.00	-15.29	-	-	peak

Test Channel	High	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	35.5112	28.95	-9.44	19.51	40.00	-20.49	-	-	peak
2	54.1349	26.79	-8.54	18.25	40.00	-21.75	-	-	peak
3	159.7586	28.26	-8.61	19.65	43.50	-23.85	-	-	peak
4	418.3784	28.26	-5.47	22.79	46.00	-23.21	-	-	peak
5	684.2259	28.64	-1.20	27.44	46.00	-18.56	-	-	peak
6	945.3336	31.04	2.15	33.19	46.00	-12.81	-	-	peak

Remark: '-'Means' the test Degree and Height are not recorded by the test software and only show the worst case in the test report.

Spurious Emissions Above 1GHz

Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel-2402MHz							
2402.00	111.65	-18.85	92.80	114	-21.20	H	PK
2402.00	108.09	-18.85	89.24	94	-4.76	H	AVG
4804.000	50.71	-2.85	47.86	74.00	-26.14	H	PK
7206.000	49.57	2.73	52.30	74.00	-21.70	H	PK
2402.00	89.67	-8.42	81.25	114	-32.75	V	PK
2402.00	89.12	-8.42	80.7	94	-13.3	V	AVG
4804.498	51.05	-2.85	48.20	74.00	25.80	V	PK
7206.000	49.72	2.73	52.45	74.00	-21.55	V	PK
Middle Channel-2440MHz							
2440.00	88.64	-8.29	80.35	114	33.65	H	PK
2440.00	87.53	-8.29	79.24	94	-14.76	H	AVG
4880.000	50.47	-2.71	47.76	74.00	-26.24	H	PK
7320.000	48.41	3.14	51.55	74.00	-22.45	H	PK
2440.00	87.29	-8.29	79.00	114	-35.00	V	PK
2440.00	86.38	-8.29	78.09	94	-15.91	V	AVG
4880.000	50.71	-2.71	48.00	74.00	-26.00	V	PK
7320.000	48.87	3.14	52.01	74.00	-21.99	V	PK
High Channel-2480MHz							
2480.00	117.39	-18.68	92.73	114	-21.27	H	PK
2480.00	112.39	-18.68	87.91	94	-6.09	H	AVG
4960.000	50.64	-2.56	48.08	74.00	-25.92	H	PK
7440.000	50.23	3.54	53.77	74.00	-20.23	H	PK
2480.00	92.35	-8.18	84.17	114	-29.83	V	PK
2480.00	91.84	-8.18	83.66	94	-10.34	V	AVG
4960.000	50.98	-2.56	48.42	74.00	-25.58	V	PK
7440.000	50.10	3.54	53.64	74.00	-20.36	V	PK

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 5th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured. The measurements greater than 20dB below the limit from 9kHz to 30MHz..

5. Out of Band Emissions

5.1 Standard Applicable

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

5.2 Test Procedure

As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2483.5MHz, than mark the higher-level emission for comparing with the FCC rules.

5.3 Summary of Test Results/Plots

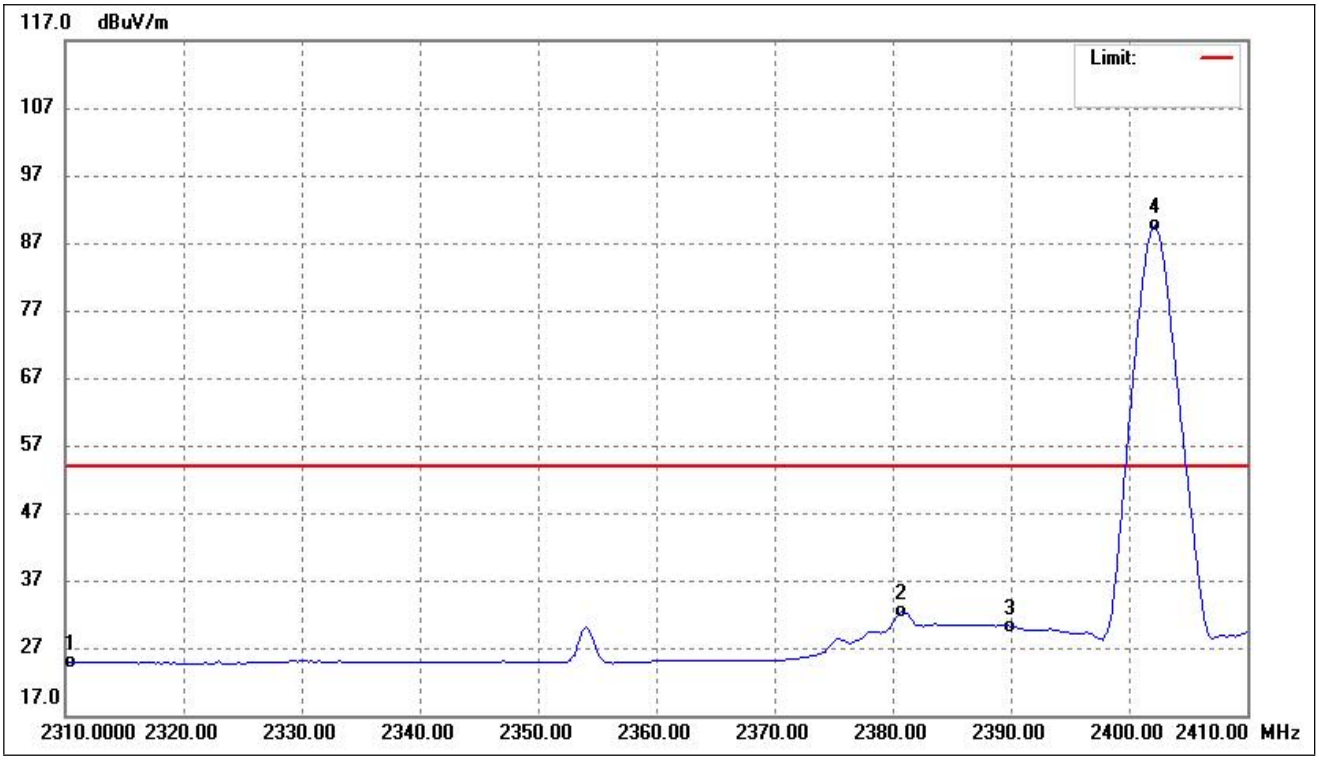
Test mode	Frequency	Limit	Result
	MHz	dBuV / dBc	
Lowest	2310.00	<54dBuV	Pass
	2390.00	<54dBuV	Pass
	2400.00	<54dBuV	Pass
Highest	2483.50	<54dBuV	Pass
	2500.00	<54dBuV	Pass

The edge emissions are below the FCC 15.209 Limits or complies with the 15.249 requirements.

Please refer to the test plots as below.

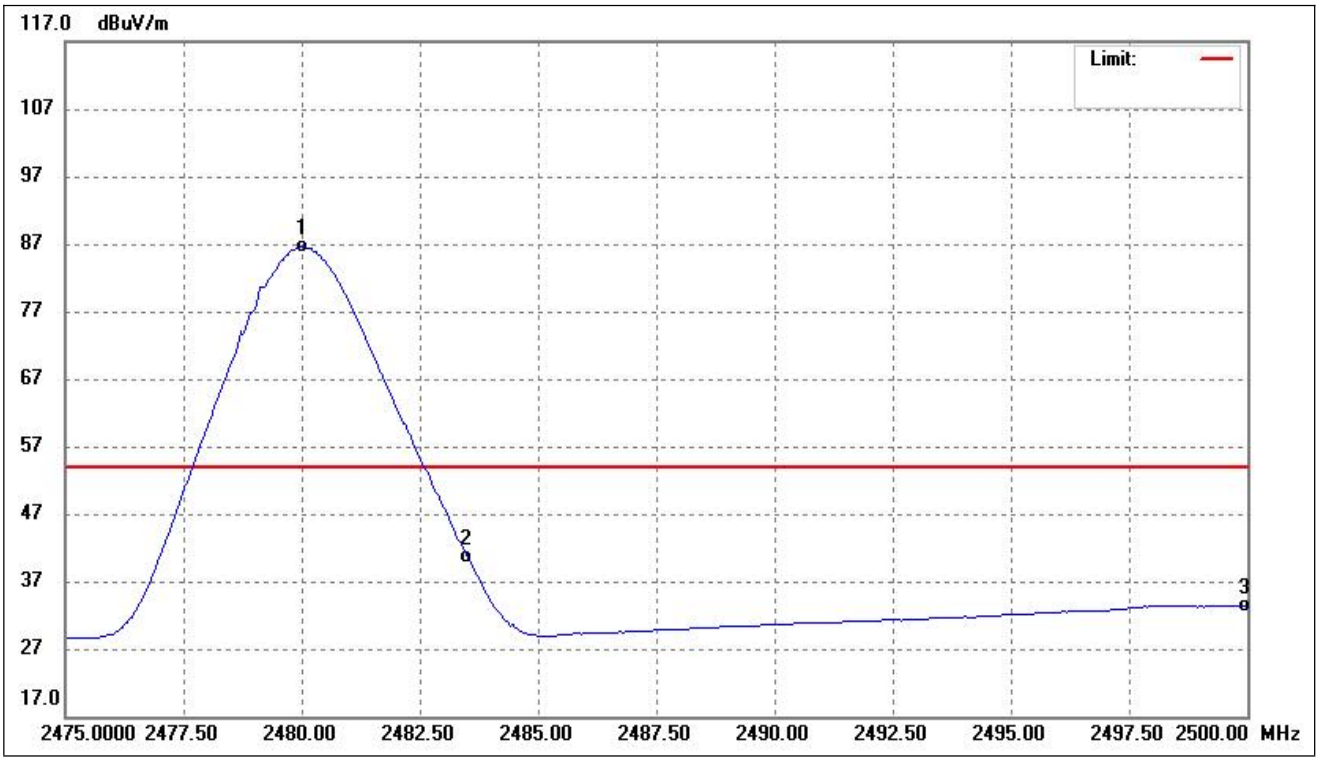
RBW: 1MHz; VBW: 3MHz

Test Channel	Low	Polarity:	Horizontal (worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	43.88	-19.02	24.86	54.00	-29.14	Ave Detector
	2310.000	61.57	-19.02	42.55	74.00	-31.45	Peak Detector
2	2380.741	51.19	-18.88	32.31	54.00	-21.69	Ave Detector
3	2390.000	48.97	-18.87	30.10	54.00	-23.90	Ave Detector
	2390.000	74.98	-18.87	56.11	74.00	-17.89	Peak Detector
4	2402.184	108.37	-18.85	89.52	/	/	Ave Detector
	2402.786	116.84	-18.84	98.00	/	/	Peak Detector

Test Channel	High	Polarity:	Horizontal (worst case)

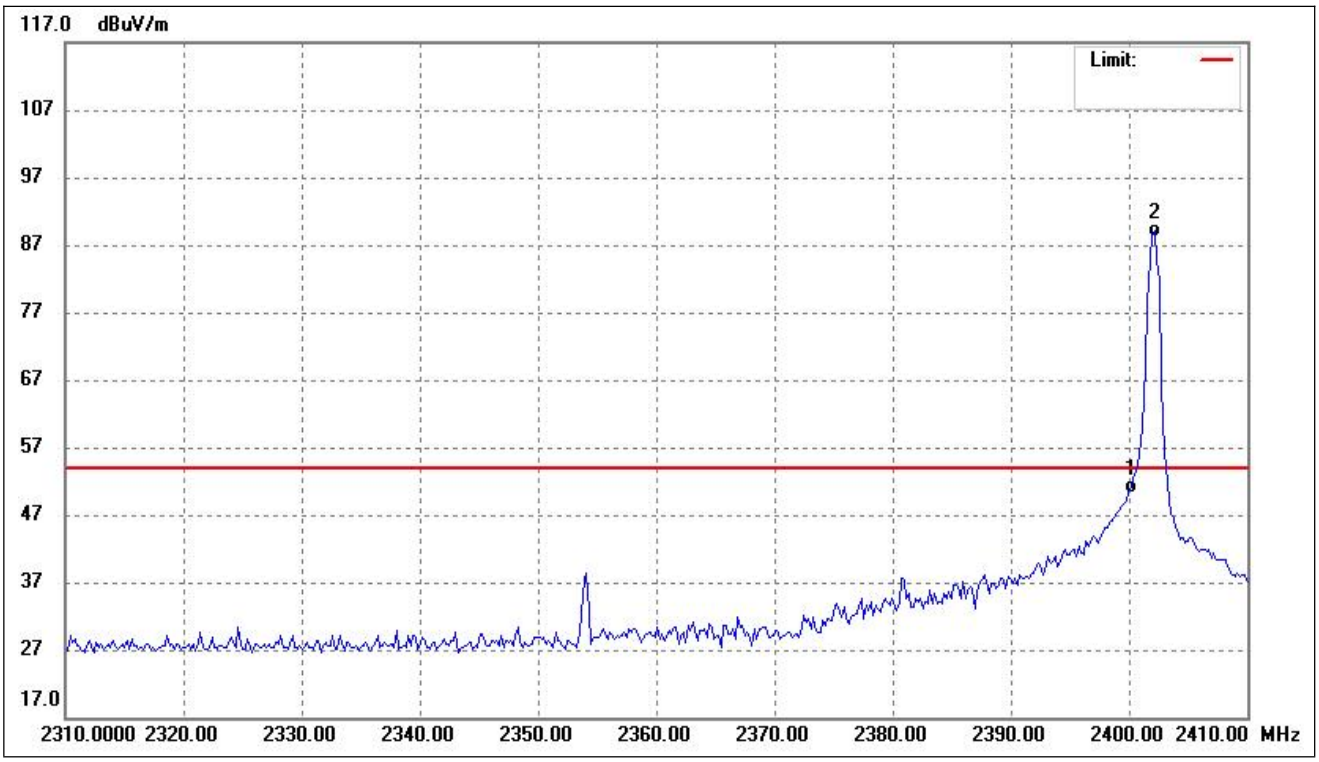


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2480.010	105.20	-18.68	86.52	/	/	Ave Detector
	2480.110	118.51	-18.68	99.83	/	/	Peak Detector
2	2483.500	59.29	-18.68	40.61	54.00	-13.39	Ave Detector
	2483.500	69.81	-18.68	51.13	74.00	-22.87	Peak Detector
3	2500.000	52.01	-18.65	33.36	54.00	-20.64	Ave Detector
	2500.000	66.04	-18.65	47.39	74.00	-26.61	Peak Detector

Band edge

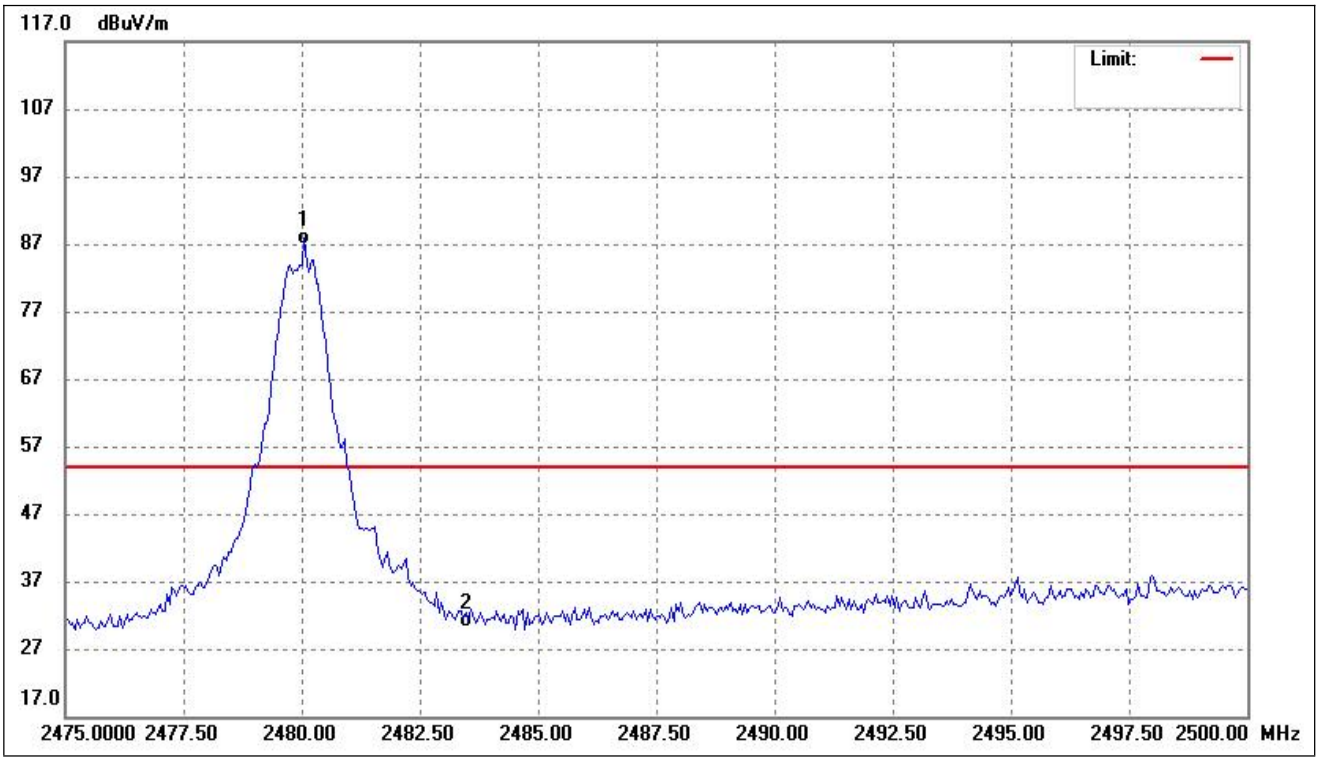
RBW: 100kHz; VBW: 300kHz

Test Channel	Low	Polarity:	Horizontal (worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2400.000	69.96	-18.85	51.11	54.00	-2.89	Ave Detector
	2400.000	69.85	-18.85	51.00	74.00	-23.00	Peak Detector
4	2402.184	108.09	-18.85	89.24	/	/	Ave Detector
	2401.984	111.65	-18.85	92.80	/	/	Peak Detector

Test Channel	High	Polarity:	Horizontal (worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2480.060	106.59	-18.68	87.91	/	/	Ave Detector
	2480.311	111.41	-18.68	92.73	/	/	Peak Detector
2	2483.500	49.76	-18.68	31.08	54.00	-22.92	Ave Detector
	2483.500	51.36	-18.68	32.68	74.00	-41.32	Peak Detector

6. Emission Bandwidth

6.1 Standard Applicable

According to 15.215(c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

6.2 Test Procedure

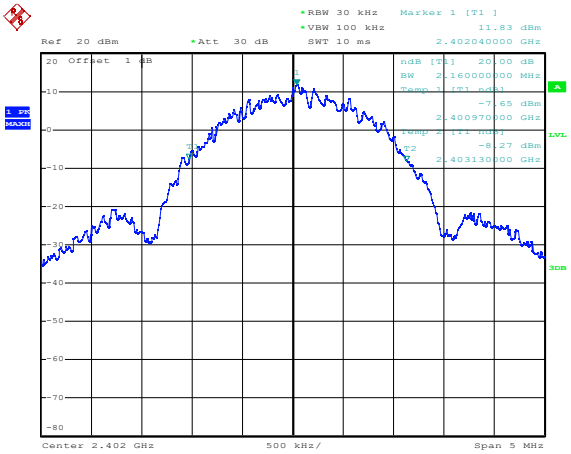
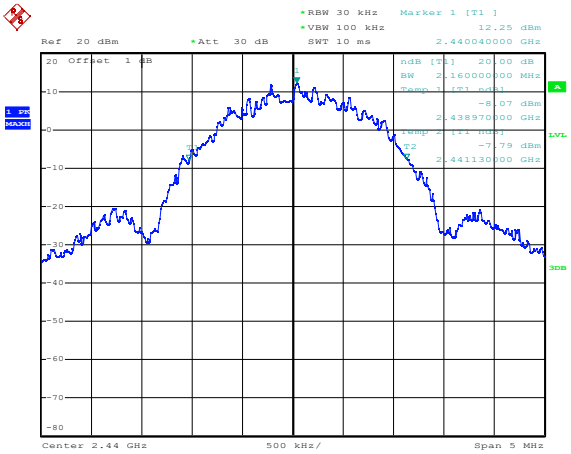
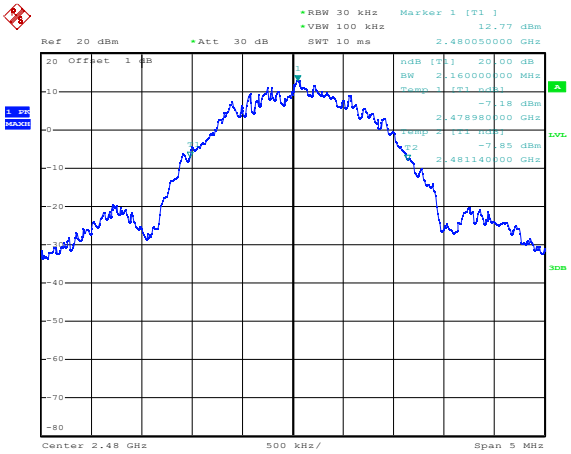
According to the ANSI 63.10-2013, the emission bandwidth test method as follows.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Set span = 1MHz, centered on a transmitting channel
RBW ≥1% 20dB Bandwidth, VBW ≥RBW
Sweep = auto
Detector function = peak
Trace = max hold
All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down and 99% bandwidth of the emission.

6.3 Summary of Test Results/Plots

Test Channel	20dB Bandwidth(kHz)
Low Channel	2160
Middle Channel	2160
High Channel	2160

Please refer to the following test plots:

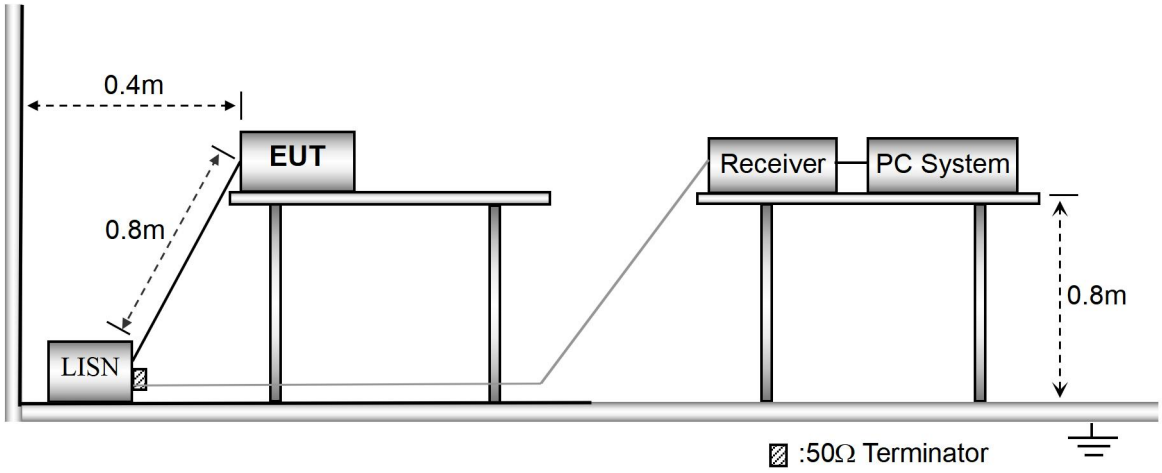
Low Channel	 Date: 3.APR.2024 14:38:43
Middle Channel	 Date: 3.APR.2024 14:40:00
High Channel	 Date: 3.APR.2024 14:41:35

7. Conducted Emissions

7.1 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle. The spacing between the peripherals was 10cm.

7.2 Basic Test Setup Block Diagram



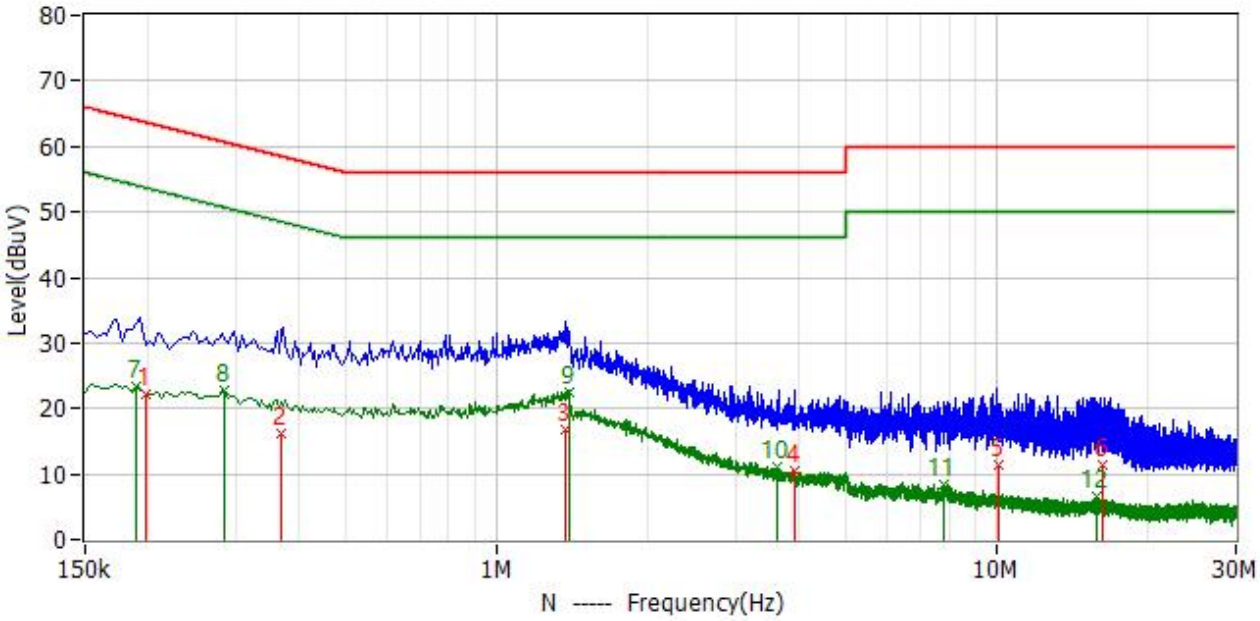
7.3 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency..... 150kHz
Stop Frequency..... 30MHz
Sweep Speed.....Auto
IF Bandwidth..... 10kHz
Quasi-Peak Adapter Bandwidth.....9kHz
Quasi-Peak Adapter Mode.....Normal

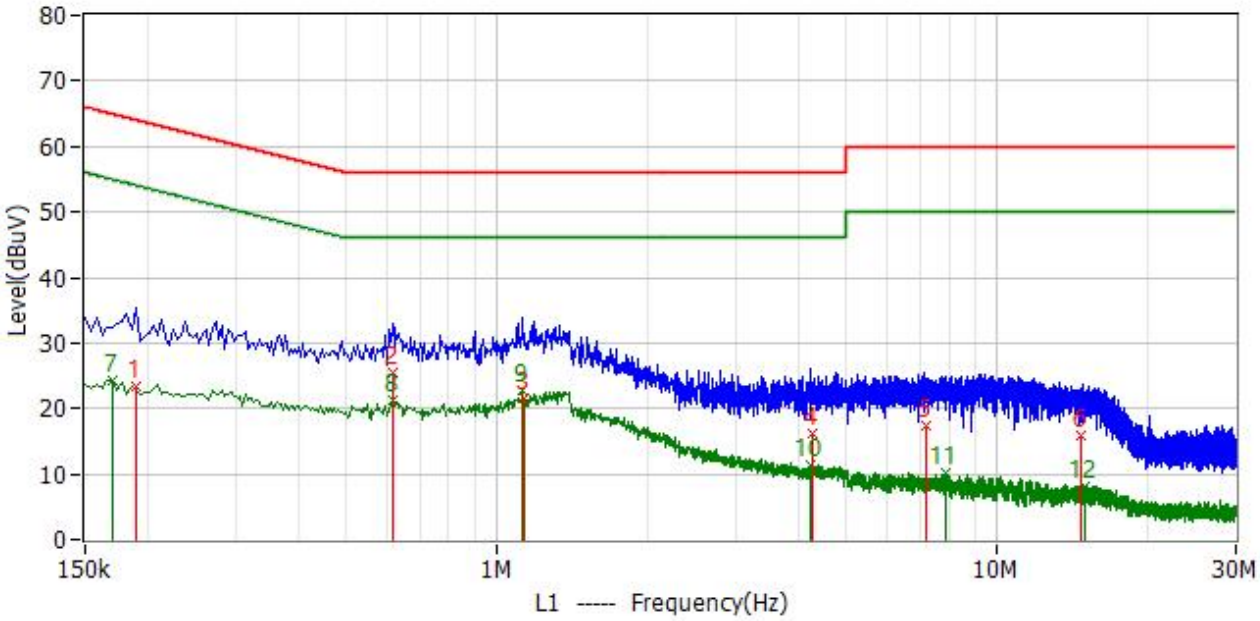
7.4 Summary of Test Results/Plots

Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral



No.	Frequency	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Delta dB	Detector
1	198.000kHz	12.4	9.7	22.1	63.7	-41.6	QP
2	370.000kHz	6.4	9.9	16.3	58.5	-42.2	QP
3	1.374MHz	7.1	9.7	16.8	56.0	-39.2	QP
4	3.926MHz	0.7	9.8	10.5	56.0	-45.5	QP
5	10.054MHz	1.5	9.9	11.4	60.0	-48.6	QP
6	16.206MHz	1.6	9.7	11.3	60.0	-48.7	QP
7*	190.000kHz	13.7	9.7	23.4	54.0	-30.6	AV
8*	286.000kHz	12.8	10.0	22.8	50.6	-27.8	AV
9*	1.394MHz	12.9	9.7	22.6	46.0	-23.4	AV
10*	3.618MHz	1.4	9.8	11.2	46.0	-34.8	AV
11*	7.790MHz	-1.3	9.8	8.5	50.0	-41.5	AV
12*	15.782MHz	-3.2	9.7	6.5	50.0	-43.5	AV

Test Mode	Communication	AC120V 60Hz	Polarity:	Line



No.	Frequency	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Delta dB	Detector
1	190.000kHz	13.7	9.7	23.4	64.0	-40.6	QP
2	618.000kHz	15.9	9.7	25.6	56.0	-30.4	QP
3	1.134MHz	11.9	9.8	21.7	56.0	-34.3	QP
4	4.258MHz	6.2	9.9	16.1	56.0	-39.9	QP
5	7.178MHz	7.7	9.7	17.4	60.0	-42.6	QP
6	14.738MHz	6.2	9.7	15.9	60.0	-44.1	QP
7*	170.000kHz	14.5	9.8	24.3	55.0	-30.6	AV
8*	618.000kHz	11.7	9.7	21.4	46.0	-24.6	AV
9*	1.122MHz	12.9	9.8	22.7	46.0	-23.3	AV
10*	4.250MHz	1.6	9.9	11.5	46.0	-34.5	AV
11*	7.890MHz	0.6	9.7	10.3	50.0	-39.7	AV
12*	15.010MHz	-1.5	9.7	8.2	50.0	-41.8	AV

APPENDIX PHOTOGRAPHS

Please refer to “ANNEX”

******* END OF REPORT *******