
FCC Test Report

Report No.: AGC02931241101FE01

FCC ID : 2BLTR-RPT1V

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : DMR Repeater

BRAND NAME : TYTECH

MODEL NAME : MD-7500

APPLICANT : Quanzhou RadioBoss Technology Co., Ltd

DATE OF ISSUE : Nov. 20, 2024

STANDARD(S) : FCC Part 15 Subpart B

REPORT VERSION : V1.0

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Nov. 20, 2024	Valid	Initial Release

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1. General Information

Applicant	Quanzhou RadioBoss Technology Co., Ltd
Address	No.8, Chuangzao Road, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian
Manufacturer	Quanzhou RadioBoss Technology Co., Ltd
Address	No.8, Chuangzao Road, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian
Factory	Quanzhou RadioBoss Technology Co., Ltd
Address	No.8, Chuangzao Road, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian
Product Designation	DMR Repeater
Brand Name	TYTECH
Test Model	MD-7500
Series Model(s)	N/A
Difference Description	N/A
Date of receipt of test item	Oct. 11, 2024
Date of Test	Oct. 11, 2024~Nov. 20, 2024
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCTR-ER-FCC-SDOC V1.0

Note: The test results of this report relate only to the tested sample identified in this report.

Prepared By



Bibo Zhang
(Project Engineer)

Nov. 20, 2024

Reviewed By



Calvin Liu
(Reviewer)

Nov. 20, 2024

Approved By



Angela Li
(Authorized Officer)

Nov. 20, 2024

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2. Product Information

2.1 Product Technical Description

Housing Type	Plastic and metal
Highest Operating Frequency	☒ Greater than 108MHz ☐ Less than 108MHz
Equipment Type	Table-Top/ Floor-standing
Receiving Frequency	136MHz to 174MHz
Hardware Version	V2.0
Software Version	V1.0.0.56
Power Supply	AC 120V 60Hz&DC 13.8V, 12A

I/O Port Information (☒ Applicable ☐ Not Applicable)

I/O Port of EUT			
I/O Port Type	Q'TY	Cable	Tested with
Antenna Port	1	--	1
Hand microphone Port	1	0.8m Shielded	1

2.2 Auxiliary Surrounding Description

The Following Peripheral Devices and Interface Cables Were Connected During the Measurement:

☒ Test Accessories Come From The Laboratory

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	50ohm Load	N/A	Amphenol	DC-3G, Max.50W	N/A

☒ Test Accessories Come From The Manufacturer

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	AC Power Cable	N/A	TYT	N/A	0.6m Unshielded
2	Write frequency line	N/A	TYT	N/A	0.6m Shielded
3	Hand microphone	N/A	N/A	N/A	0.8m Shielded

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2.2 Test Methodology

The tests were performed according to following standards:

No.	Identity	Document Title
1	FCC 47 CFR Part 15	Radio Frequency Devices
2	ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

2.3 Definition of Device Classification

Unintentional radiator:

A device which is not intended to emit RF energy by radiation or induction.

Class A Digital Device:

A digital device which is marketed for use in commercial or business environment.

Class B Digital Device:

A digital device which is marketed for use by the general public or in a residential environment.

Note:

A manufacturer may also qualify a device intended to be marketed in a commercial, business or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, Regardless of its intended use.

2.3 Description of Test Modes

No.	Test Mode	Remark
1	Receiving at low channel of 136 MHz to 174 MHz	Worst
2	Receiving at middle channel of 136 MHz to 174 MHz	--
3	Receiving at high channel of 136 MHz to 174 MHz	--

Note: Only the result of the worst case was recorded in the report.

3. Test Environment

3.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (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 maintained in our files with Registration 975832.

IC-Registration No.: 24842 (CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

3.3 Environmental Conditions

	Normal Conditions
Temperature range (°C)	15 - 35
Relative humidity range	20 % - 75 %
Pressure range (kPa)	86 - 106

3.4 Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission	$U_c = \pm 2.9 \text{ dB}$
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 3.9 \text{ dB}$
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.9 \text{ dB}$

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3.5 List of Equipment Used

● Radiated Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☐	AGC-EM-E046	EMI Test Receiver	R&S	ESCI	10096	2024-02-01	2025-01-31
☒	AGC-EM-E116	EMI Test Receiver	R&S	ESCI	100034	2024-05-24	2025-05-23
☒	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2024-05-28	2025-05-27
☐	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2023-05-11	2025-05-10
☒	AGC-EM-E005	Wideband Antenna	SCHWARZBECK	VULB9168	VULB9168-494	2023-01-05	2025-01-04
☒	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2023-03-23	2025-03-22
☒	AGC-EM-E146	Pre-amplifier	ETS	3117-PA	00246148	2024-07-24	2026-07-23

● AC Power Line Conducted Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-EM-E045	EMI Test Receiver	R&S	ESPI	101206	2024-05-28	2025-05-27
☒	AGC-EM-A130	6dB Attenuator	Eeatsheep	LM-XX-6-5W	DC-6GZ	2023-06-09	2025-06-08
☒	AGC-EM-E023	AMN	R&S	100086	ESH2-Z5	2024-05-28	2025-05-27

● Test Software					
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information
☒	AGC-EM-S004	RE Test System	Tonscend	TS ⁺ Ver2.1(JS32-RE)	4.0.0.0
☐	AGC-EM-S003	RE Test System	FARA	EZ-EMC	V.RA-03A
☒	AGC-EM-S001	CE Test System	R&S	ES-K1	V1.71

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4. Summary of Test Results

Item	FCC Rules	Description Of Test	Class/Severity	Result
1	Section 15.107	Radiated Emission	Class B	Pass
2	Section 15.109	Conducted Emission	Class B	Pass

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5. Radiated Emission Measurements

5.1 Provisions Applicable

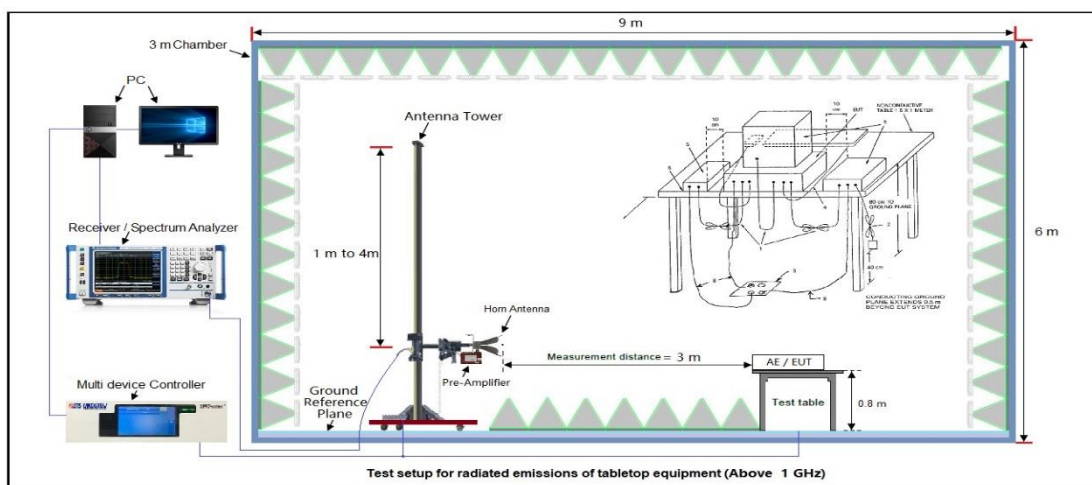
FCC CFR Title 47 Part 15 Subpart B Section 15.109:

Frequency Range	Class B Limit (dBuV/m @3m)	Class A Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	50.00	Quasi-peak
88MHz-216MHz	43.50	53.50	Quasi-peak
216MHz-960MHz	46.00	56.00	Quasi-peak
960MHz-1GHz	54.00	64.00	Quasi-peak
Above 1GHz	54.00	60.00	Average
	74.00	80.00	Peak

5.2 Measurement Setup



Radiated Emission Measurements Test Setup for 30MHz to 1GHz



Radiated Emission Measurements Test Setup for above 1GHz

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5.3 Measurement Procedure

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.4.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4. The EUT received power by AC 120V/60Hz.
5. The antenna was placed at 3 meter away from the EUT as stated in FCC Part 15. The antenna connected to the Analyzer via a cable and at times a pre-amplifier would be used.
6. The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
7. The test mode(s) were scanned during the test:
8. Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and Q.P./Peak reading is presented. For emissions below 1GHz, use 120KHz RBW and VBW $\geq$ 3RBW for QP reading.
9. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
10. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
11. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
12. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
13. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.
14. The test data of the worst case condition (mode 1) was reported on the following Data page.

EMI Test Receiver Setup:

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

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

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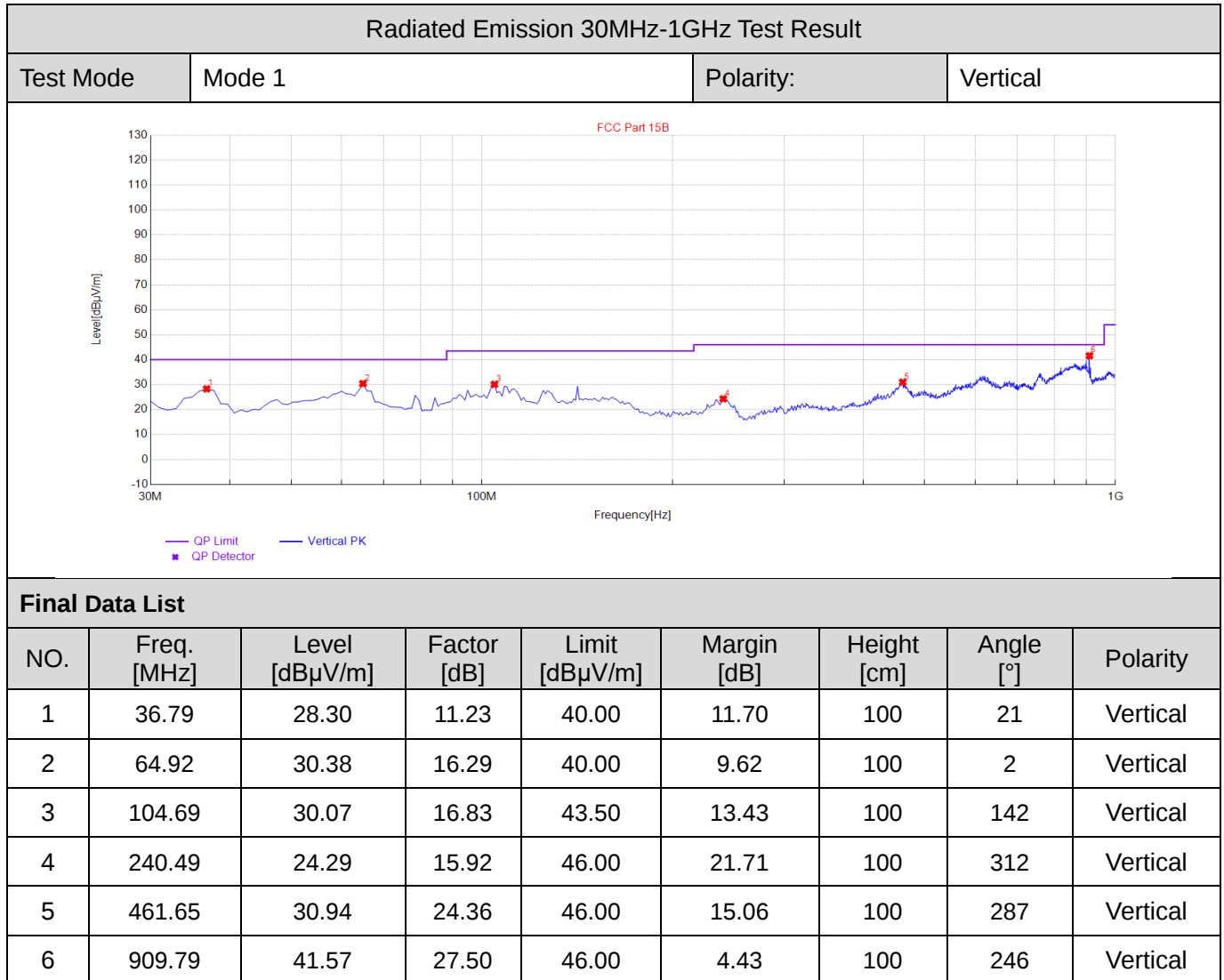
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5.4 Measurement Result

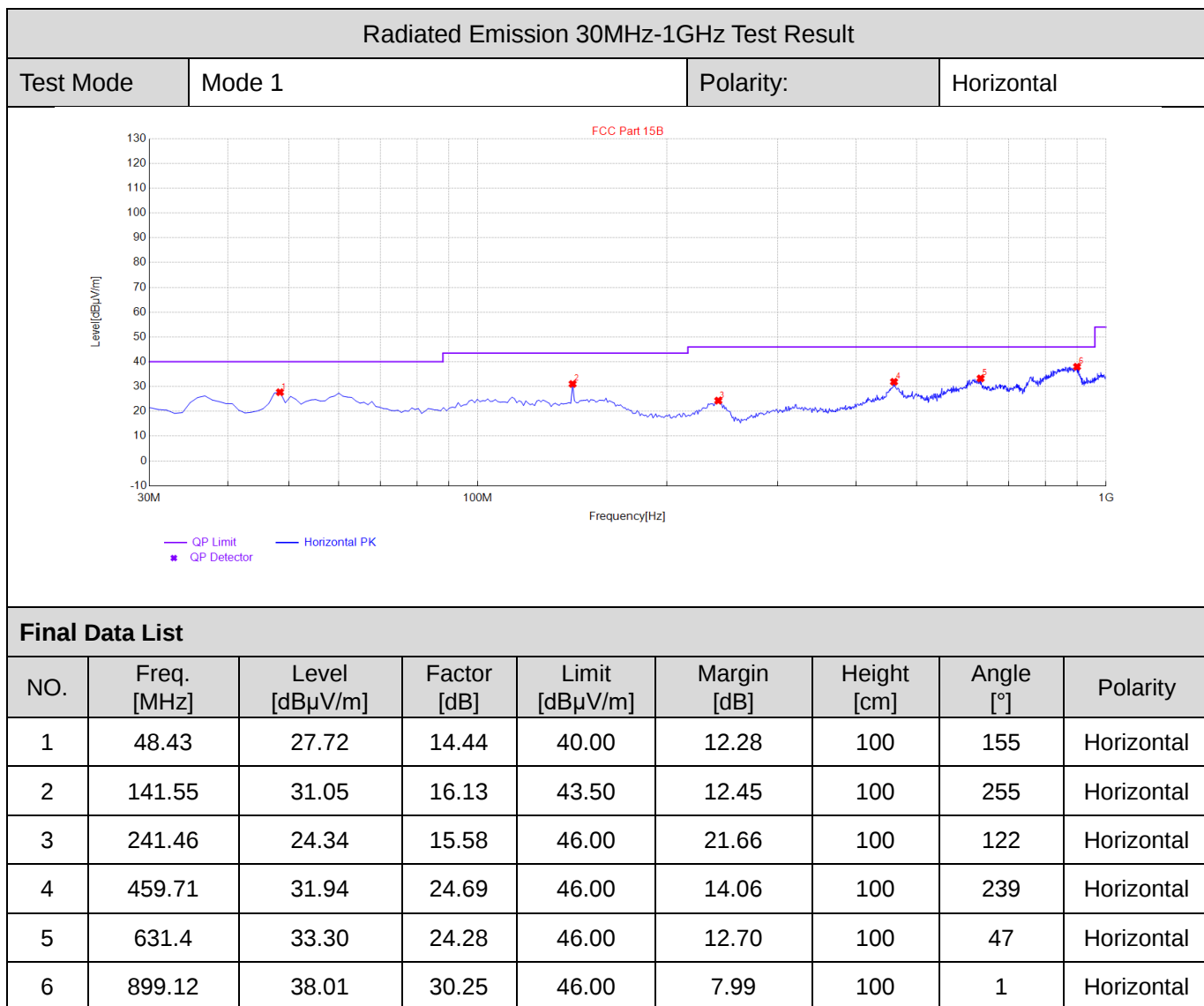
Measurement Power Supply: DC 13.8V



RESULT: PASS

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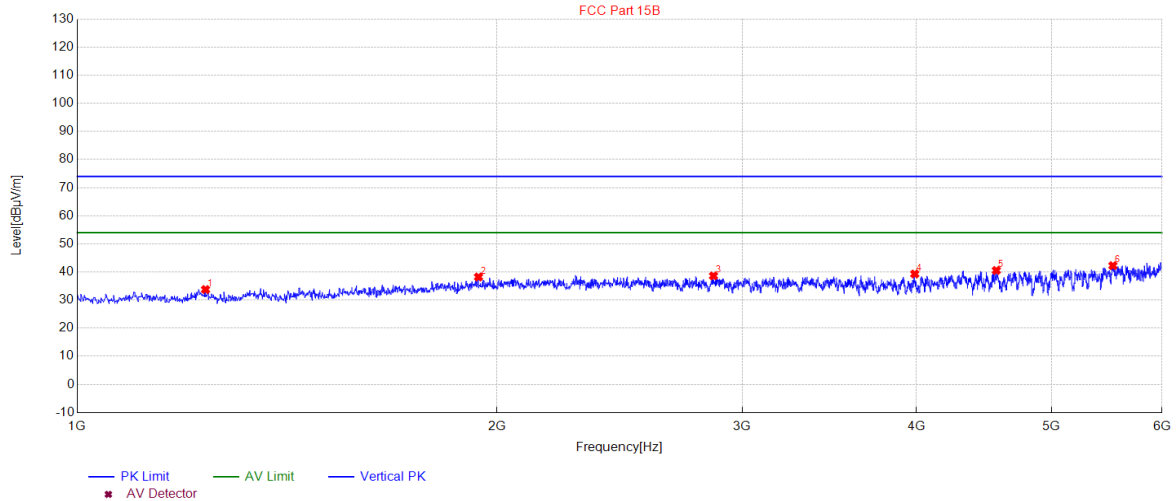
RESULT: PASS

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Radiated Emission Above 1GHz Test Result

Test Mode	Mode 1	Polarity:	Vertical
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Final Data List

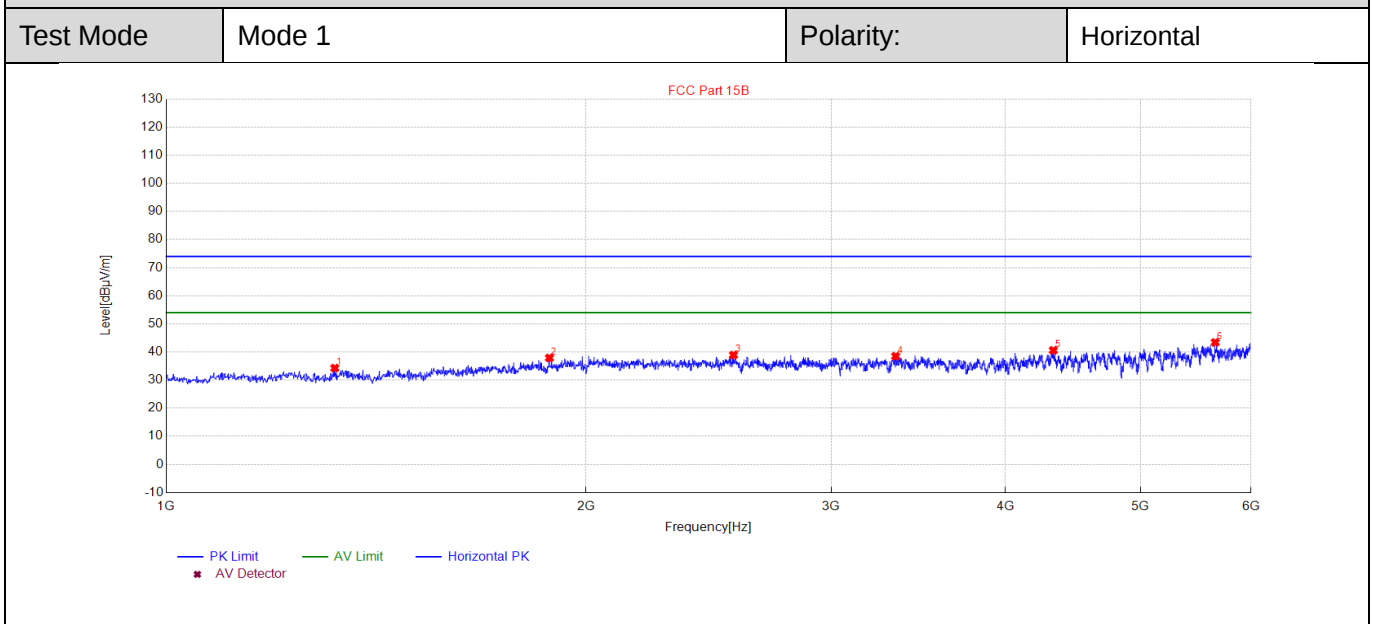
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1236.047209	33.75	-17.97	74.00	40.25	100	230	Vertical
2	1940.188038	38.21	-13.90	74.00	35.79	100	340	Vertical
3	2860.372074	38.61	-12.04	74.00	35.39	100	300	Vertical
4	3988.59772	39.29	-9.98	74.00	34.71	100	170	Vertical
5	4563.712743	40.54	-7.87	74.00	33.46	100	60	Vertical
6	5532.906581	42.25	-6.78	74.00	31.75	100	260	Vertical

RESULT: PASS

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Radiated Emission Above 1GHz Test Result



Final Data List

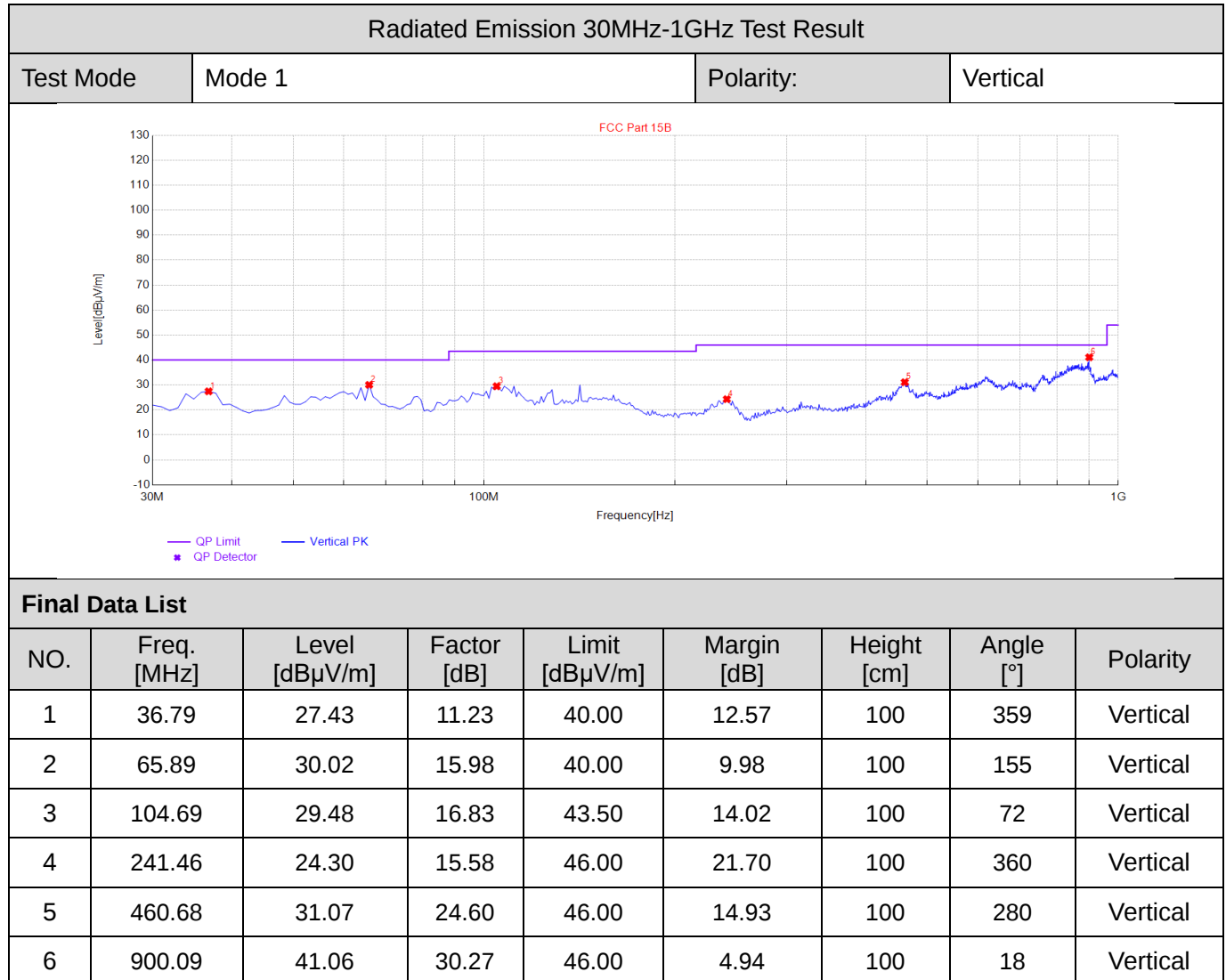
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1321.064213	34.26	-17.83	74.00	39.74	100	210	Horizontal
2	1883.176635	37.88	-14.37	74.00	36.12	100	20	Horizontal
3	2552.310462	38.90	-12.18	74.00	35.10	100	270	Horizontal
4	3336.467294	38.49	-11.08	74.00	35.51	100	360	Horizontal
5	4328.665733	40.57	-8.59	74.00	33.43	100	110	Horizontal
6	5655.931186	43.40	-6.42	74.00	30.60	100	240	Horizontal

RESULT : PASS

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Measurement Power Supply: AC 120V



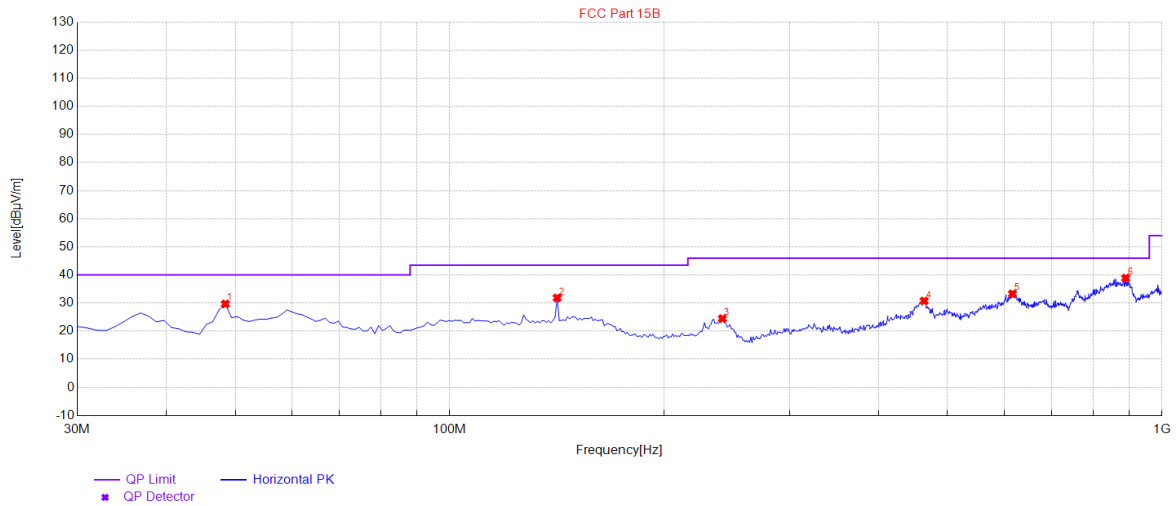
RESULT: PASS

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Radiated Emission 30MHz-1GHz Test Result

Test Mode	Mode 1	Polarity:	Horizontal
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Final Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	48.43	29.69	14.44	40.00	10.31	100	8	Horizontal
2	141.55	31.84	16.13	43.50	11.66	100	358	Horizontal
3	241.46	24.46	15.58	46.00	21.54	100	155	Horizontal
4	463.59	30.75	23.86	46.00	15.25	100	234	Horizontal
5	616.85	33.29	25.58	46.00	12.71	100	322	Horizontal
6	889.42	38.90	29.79	46.00	7.10	100	26	Horizontal

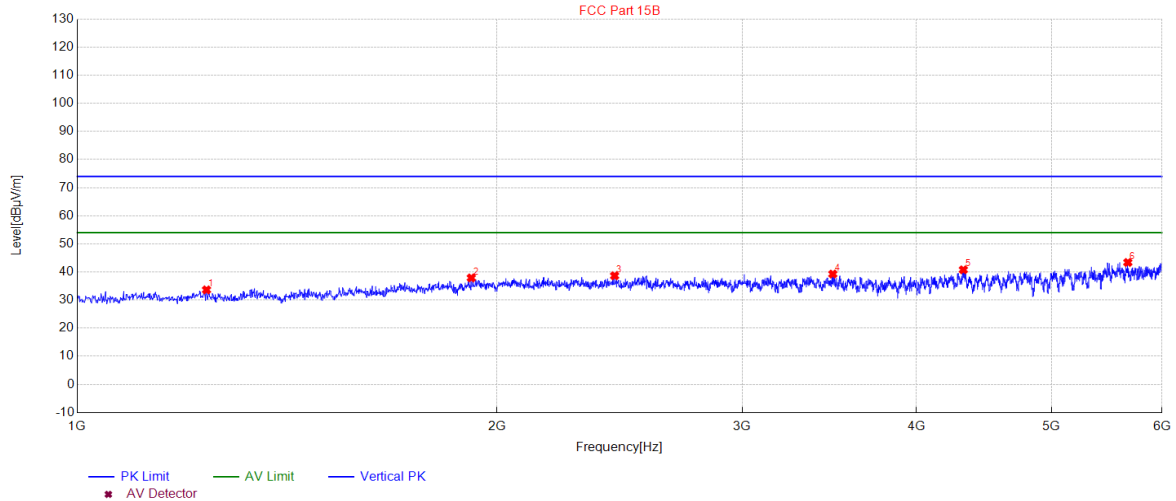
RESULT: PASS

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Radiated Emission Above 1GHz Test Result

Test Mode	Mode 1	Polarity:	Vertical
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Final Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1238.04761	33.63	-17.96	74.00	40.37	100	210	Vertical
2	1917.183437	37.89	-14.09	74.00	36.11	100	260	Vertical
3	2429.285857	38.65	-12.37	74.00	35.35	100	330	Vertical
4	3483.496699	39.26	-10.68	74.00	34.74	100	150	Vertical
5	4321.664333	40.77	-8.63	74.00	33.23	100	180	Vertical
6	5670.934187	43.38	-6.37	74.00	30.62	100	160	Vertical

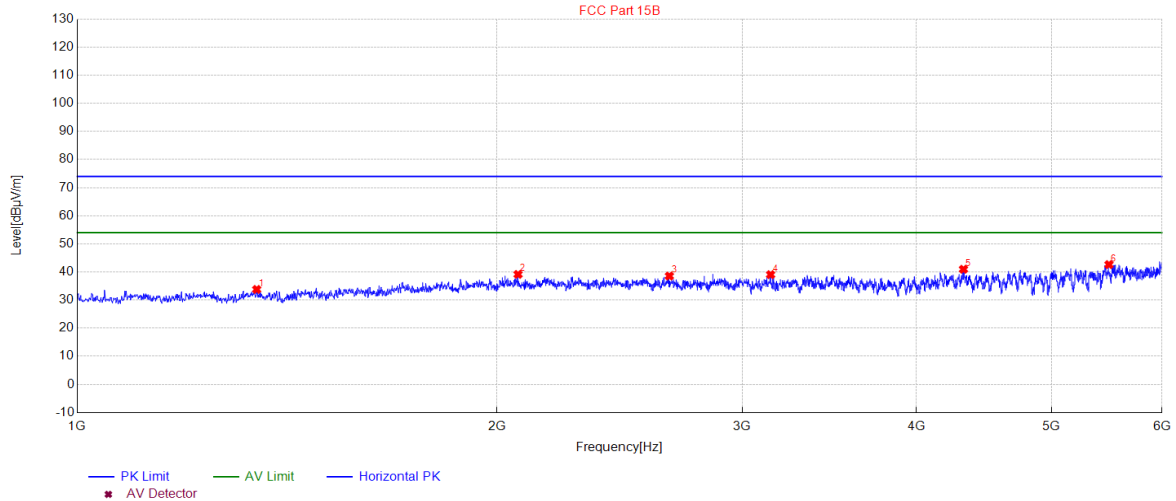
RESULT: PASS

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Radiated Emission Above 1GHz Test Result

Test Mode	Mode 1	Polarity:	Horizontal
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Final Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1345.069014	33.79	-17.79	74.00	40.21	100	350	Horizontal
2	2071.214243	39.14	-13.24	74.00	34.86	100	230	Horizontal
3	2659.331866	38.56	-12.13	74.00	35.44	100	310	Horizontal
4	3143.428686	39.06	-11.59	74.00	34.94	100	210	Horizontal
5	4322.664533	40.96	-8.62	74.00	33.04	100	230	Horizontal
6	5496.89938	42.62	-6.88	74.00	31.38	100	300	Horizontal

RESULT : PASS

Note:

- Factor=Antenna Factor + Cable loss - Amplifier gain, Margin= Limit-Measurement.
- The "Factor" value can be calculated automatically by software of measurement system.

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6. Conducted Emission Measurements

6.1 Provisions Applicable

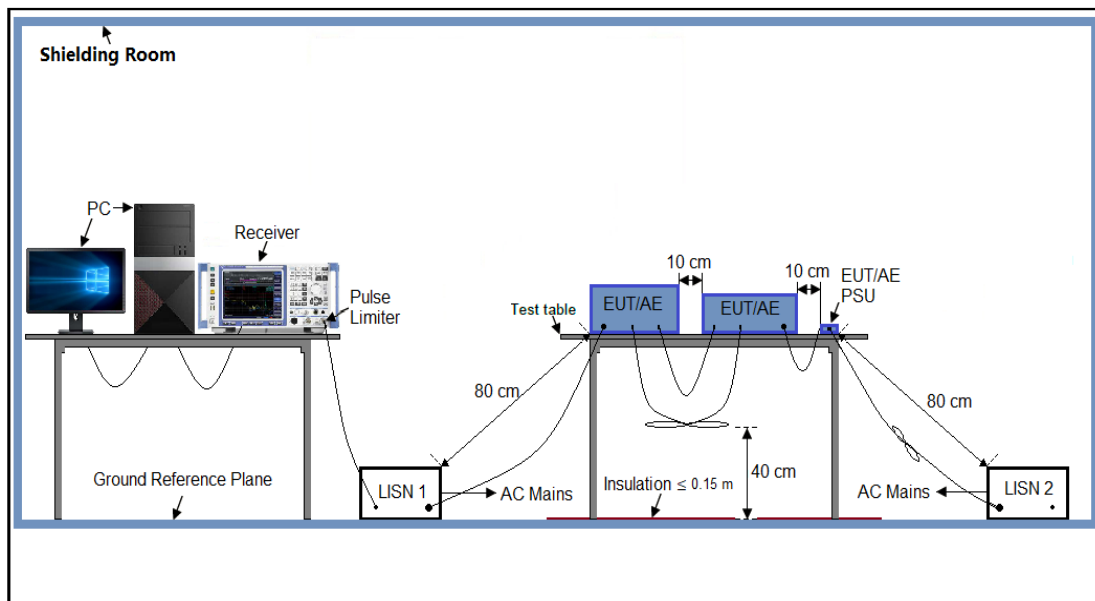
FCC CFR Title 47 Part 15 Subpart B Section 15.107:
For Class B Limits:

Frequency	Maximum RF Line Voltage	
	Q.P. (dBμV)	Average (dBμV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

For Class A Limits:

Frequency	Maximum RF Line Voltage	
	Q.P. (dBμV)	Average (dBμV)
150kHz~500kHz	79	66
500kHz~30MHz	73	60

6.2 Measurement Setup



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6.3 Measurement Procedure

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.4.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4. The EUT received AC 120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipment received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test data of the worst case condition (Mode 1) was reported on the following Data page.

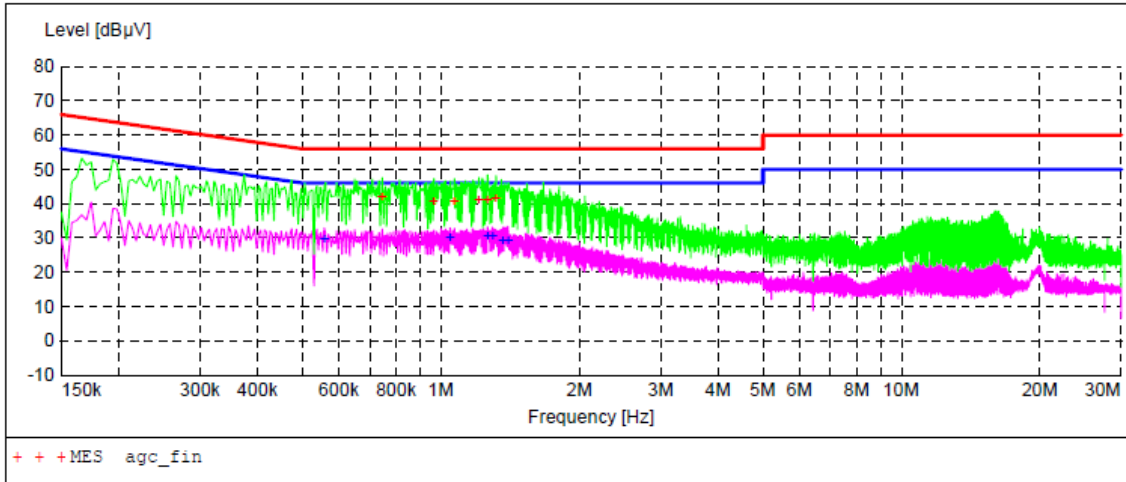
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6.4 Measurement Result

Measurement Power Supply: DC 13.8V

Ac Power Line Conducted Emission Test

Test Mode	Mode 1	LISN Line	Hot Side
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MEASUREMENT RESULT: "agc_fin"

2024/10/30 10:30

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.746000	42.10	6.2	56	13.9	QP	L1	GND
0.966000	40.60	6.2	56	15.4	QP	L1	GND
1.070000	40.60	6.2	56	15.4	QP	L1	GND
1.210000	41.10	6.2	56	14.9	QP	L1	GND
1.262000	41.00	6.2	56	15.0	QP	L1	GND
1.318000	41.30	6.2	56	14.7	QP	L1	GND

MEASUREMENT RESULT: "agc_fin2"

2024/10/30 10:30

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.558000	29.80	6.2	46	16.2	AV	L1	GND
1.046000	30.00	6.2	46	16.0	AV	L1	GND
1.262000	30.40	6.2	46	15.6	AV	L1	GND
1.294000	30.40	6.2	46	15.6	AV	L1	GND
1.362000	29.30	6.2	46	16.7	AV	L1	GND
1.398000	29.10	6.2	46	16.9	AV	L1	GND

RESULT: PASS

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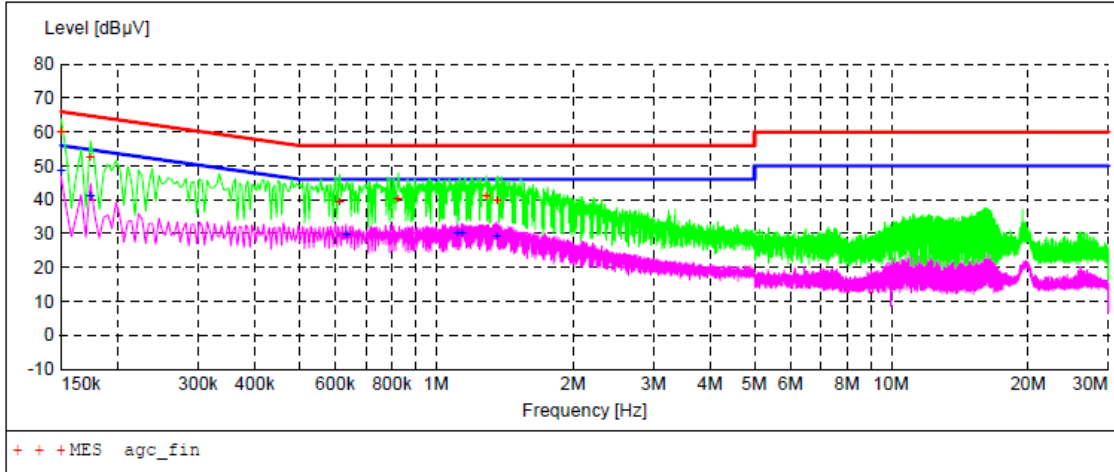
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Ac Power Line Conducted Emission Test

Test Mode	Mode 1	LISN Line	Neutral Side
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**MEASUREMENT RESULT: "agc_fin"**

2024/10/30 10:34

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.150000	60.10	6.1	66	5.9	QP	N
0.174000	52.40	6.1	65	12.4	QP	N
0.614000	39.40	6.2	56	16.6	QP	N
0.826000	40.00	6.2	56	16.0	QP	N
1.290000	41.10	6.2	56	14.9	QP	N
1.366000	39.90	6.2	56	16.1	QP	N

MEASUREMENT RESULT: "agc_fin2"

2024/10/30 10:34

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.150000	48.50	6.1	56	7.5	AV	N
0.174000	40.90	6.1	55	13.9	AV	N
0.634000	29.70	6.2	46	16.3	AV	N
1.114000	30.10	6.2	46	15.9	AV	N
1.138000	30.10	6.2	46	15.9	AV	N
1.358000	29.30	6.2	46	16.7	AV	N

RESULT: PASS

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Appendix I: Photographs of Test Setup

Refer to the Report No.: AGC02931241101AP03

Appendix II: Photographs of Test EUT

Refer to the Report No.: AGC02931241101AP02

-----End of Report-----

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3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
7. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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