

CIXI ZHONGBANG ELECTRIC APPLIANCE CO., LTD.

EMC TEST REPORT

Report Type:

FCC Part 15B EMC report

Model:

AT1677

REPORT NUMBER:

220301798SHA-001

ISSUE DATE:

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DOCUMENT CONTROL NUMBER:

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TEST REPORT

Report no.: 220301798SHA-001

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Address of Factory: 315315

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:

47CFR Part 15 (2019): Radio Frequency Devices (Subpart B)

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

PREPARED BY:

REVIEWED BY:



Project Engineer
Damon Ding



Reviewer
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TEST REPORT

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Revision History

Report No.	Version	Description	Issued Date
220301798SHA-001	Rev. 01	Initial issue of report	July 27, 2022

Measurement result summary

TEST ITEM	FCC REFERENCE	RESULT
Power line conducted emission	FCC 47 CFR Part 15.107	Pass
Radiated emission	FCC 47 CFR Part 15.109	Pass

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	Fan Heater (Smart Heater)
Type/Model:	AT1677
Add. Model No.: (See Note 1)	AT1635, AT1679, AT1632, AT1676, AT1678, AT1366, AT1513, AT1514, AT1520, AT1521, AT1323, AT1481, AT1482, AT1520, AT1521
Trade Mark:	atomi smart, atomi smart , smart
Description of EUT:	The EUT is fan heater, it supports Wi-Fi function, there are series models. We test AT1677 and list the worst results in this report.
Rating:	120V~,60Hz, 1500W
Category of EUT:	Class B
EUT type:	<input checked="" type="checkbox"/> Table top <input type="checkbox"/> Floor standing
Highest operating frequency	2462MHz
Software Version:	/
Hardware Version:	/
Sample received date:	2022.05.06
Date of test:	2022.05.16-2022.05.18
Note 1: The additional models are identical with the test model AT1677 except the model number for marketing purpose.	

1.2 Description of Test Facility

Name:	Intertek Testing Services Shanghai
Address:	Building 86, No. 1198 Qinzhou Road (North), Shanghai 200233, P.R. China
Telephone:	86 21 61278200
Telefax:	86 21 54262353

The test facility is recognized, certified, or accredited by these organizations:	CNAS Accreditation Lab Registration No. CNAS L0139
	FCC Accredited Lab Designation Number: CN1175
	IC Registration Lab Registration code No.: 2042B-1
	VCCI Registration Lab Registration No.: R-4243, G-845, C-4723, T-2252
	A2LA Accreditation Lab Certificate Number: 3309.02

Tests were sub-contracted.

Name:	Shenzhen UnionTrust Quality and Technology Co., Ltd.
Address:	Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng Science and Technology Park, Longhua District, Shenzhen, China
Telephone:	+86 (0) 755 2823 0888
Telefax:	+86 (0) 755 2823 0886

The test facility is recognized, certified, or accredited by these organizations:	Shenzhen UnionTrust Quality and Technology Co., Ltd.
	CNAS Accreditation Lab
	Registration No. CNAS L9069

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2019)
ANSI C63.4 (2014)

2.2 Mode of operation during the test

Within this test report, EUT was tested under all available operation modes and tested under its rating voltage and frequency. Other voltage and frequency are specified if used. The test mode is as follows:

Test Item	Test Mode
Radiated Emission	Test Mode 1: low heat mode + Wi-Fi Link (AC 120V) Test Mode 2: high heat mode + Wi-Fi Link (AC 120V)
Conducted emission	Test Mode 1: low heat mode + Wi-Fi Link (AC 120V) Test Mode 2: high heat mode + Wi-Fi Link (AC 120V)

2.3 Test software list

Test Items	Software	Manufacturer	Version
Radiated emission	e3	Audix	9.160323
Conducted emission	e3	Audix	9.160323

2.4 Test peripherals list

Item No	Description	Band and Model	S/No
1	Tablet	HUAWEI; JDN2-W09	UPK9X20B03003100
2	Wireless Router	SAGEMCOM; RAC2V1S	253703944

2.5 Support Cable list

Item No	Description	Length (m)	Cable Type
N/A	N/A	N/A	N/A

2.6 Test environment condition:

Test items	Temperature	Humidity
Power line conducted emission	25.2°C	50%RH
Radiated Emissions	24.3°C	51%RH

2.7 Instrument list

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input checked="" type="checkbox"/>	Test Receiver	R&S	ESR7	UTTTL-E005	4-Nov-2022
<input checked="" type="checkbox"/>	A.M.N.	R&S	ESH2-Z5	UTTTL-E003	4-Nov-2022
<input checked="" type="checkbox"/>	A.M.N.	ETS-Lindgren	3816/2SH	UTTTL-E004	4-Nov-2022
<input checked="" type="checkbox"/>	Shielding room	ETS-Lindgren	843	UTTTL-E076	4-Nov-2024
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input checked="" type="checkbox"/>	Test Receiver	R&S	ESIB 26	UTTTL-E026	4-Nov-2022
<input checked="" type="checkbox"/>	Loop antenna	ETS-Lindgren	6502	UTTTL-E013	10-Nov-2023
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-Lindgren	3142E	UTTTL-E014	10-Nov-2023
<input checked="" type="checkbox"/>	Pre-amplifier	ETS-Lindgren	118490	UTTTL-E015	5-Nov-2022
<input checked="" type="checkbox"/>	Horn antenna	ETS-Lindgren	3117	UTTTL-E017	10-Nov-2023
<input checked="" type="checkbox"/>	Pre-amplifier	ETS-Lindgren	118385	UTTTL-E017	5-Nov-2022
<input checked="" type="checkbox"/>	Horn antenna	ETS-Lindgren	3116C	UTTTL-E019	18-Jun-2022
<input checked="" type="checkbox"/>	Pre-amplifier	ETS-Lindgren	118384	UTTTL-E019	16-Nov-2022
<input checked="" type="checkbox"/>	6dB Attenuator	Talent	RA6A5-N-18	UTTTL-E056	10-Nov-2023
<input checked="" type="checkbox"/>	Multi device Controller	ETS-Lindgren	7006-001	----	----
<input checked="" type="checkbox"/>	3m Chamber & Accessory Equipment	ETS-Lindgren	3m	UTTTL-E010	21-Jan-2024

2.8 Measurement uncertainty

No.	Item	Measurement Uncertainty
1	Conducted emission 9kHz-150kHz	± 3.2 dB
2	Conducted emission 150kHz-30MHz	± 2.7 dB
3	Radiated emission 9kHz-30MHz	± 4.7 dB
4	Radiated emission 30MHz-1GHz	± 4.6 dB
5	Radiated emission 1GHz-18GHz	± 4.4 dB
6	Radiated emission 18GHz-26GHz	± 4.4 dB
7	Radiated emission 26GHz-40GHz	± 4.6 dB
Remark: 95% Confidence Levels, k=2.		

3 Radiated Emissions

Test result: Pass

3.1 Limit

3.1.1 Limits for radiated disturbance of class A device

Frequency (MHz)	Permitted limit in dB μ V/m (Quasi-peak) of Measurement Distance 10m
30 – 88	39
88 – 216	43.5
216 – 960	46.4
Above 960	49.5

Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.

3.1.2 Limits for radiated disturbance of class B device

FCC 47 CFR Part 15 Subpart B

Frequency (MHz)	Permitted limit in dB μ V/m (Quasi-peak) of Measurement Distance 3m
30 – 88	40.0
88 – 216	43.5
216 – 960	46.0
Above 960	54.0

Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.

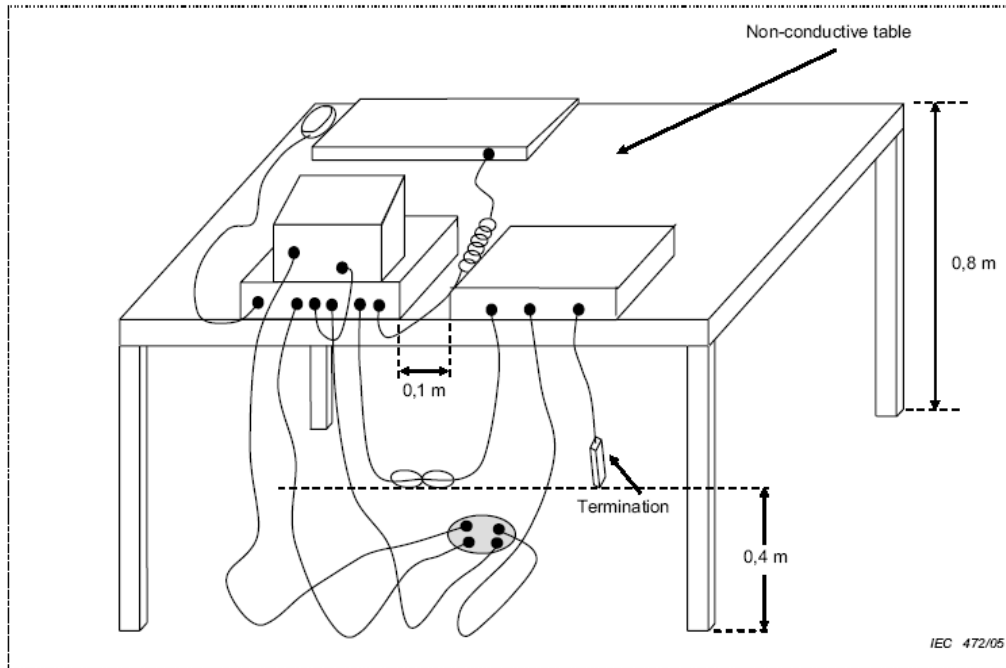
ICES-003 Issue 7

Frequency (MHz)	Permitted limit in dB μ V/m (Quasi-peak) of Measurement Distance 3m
30 ~ 88	40.0
88 ~ 216	43.5
216 ~ 230	46.0
230 ~ 960	47.0
960 ~ 1000	54.0
Above 1000	54.0

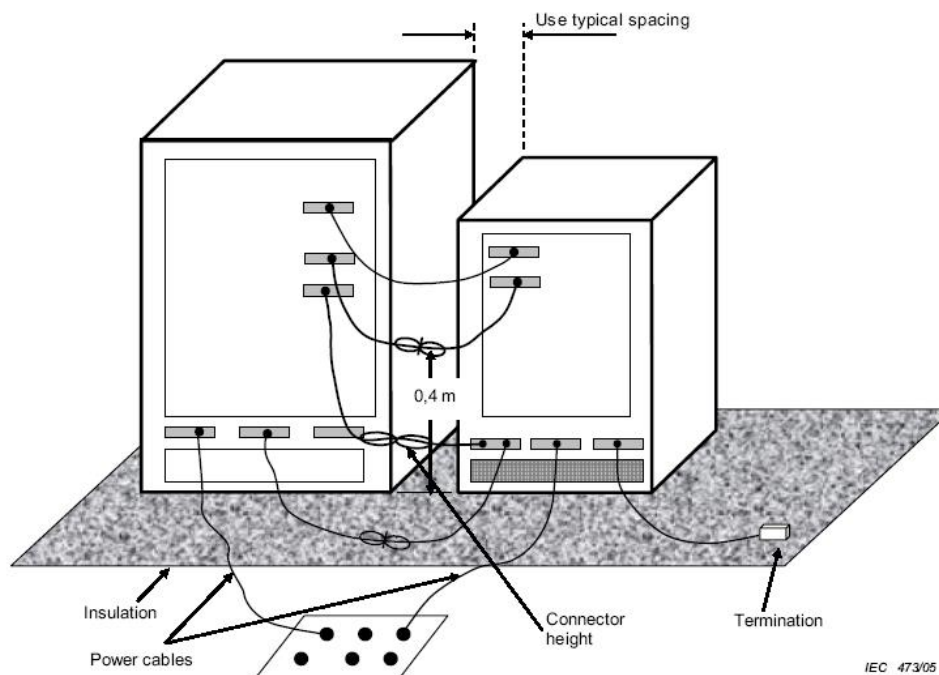
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.

3.2 Block diagram and test set up

For table top equipment



For floor standing equipment



3.3 Measurement Procedure

The measurement was performed in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, the pre-amplifier (and high pass filter if necessary) is equipped just at the output terminal of the antenna.

The distance from EUT to receiving antenna is **3** meters.

Measurement was performed according to clause 4 and clause 5 of ANSI 63.4.

Test procedure was according to clause 8.3 of ANSI 63.4.

EUT arrangement and operate condition were according to clause 6 and clause 8 of ANSI 63.4.

The radiated emission was measured using the test receiver with the resolutions bandwidth set as:

RBW = 100kHz, VBW = 300kHz (30MHz~1GHz)

RBW = 1MHz, VBW = 3MHz (>1GHz for PK)

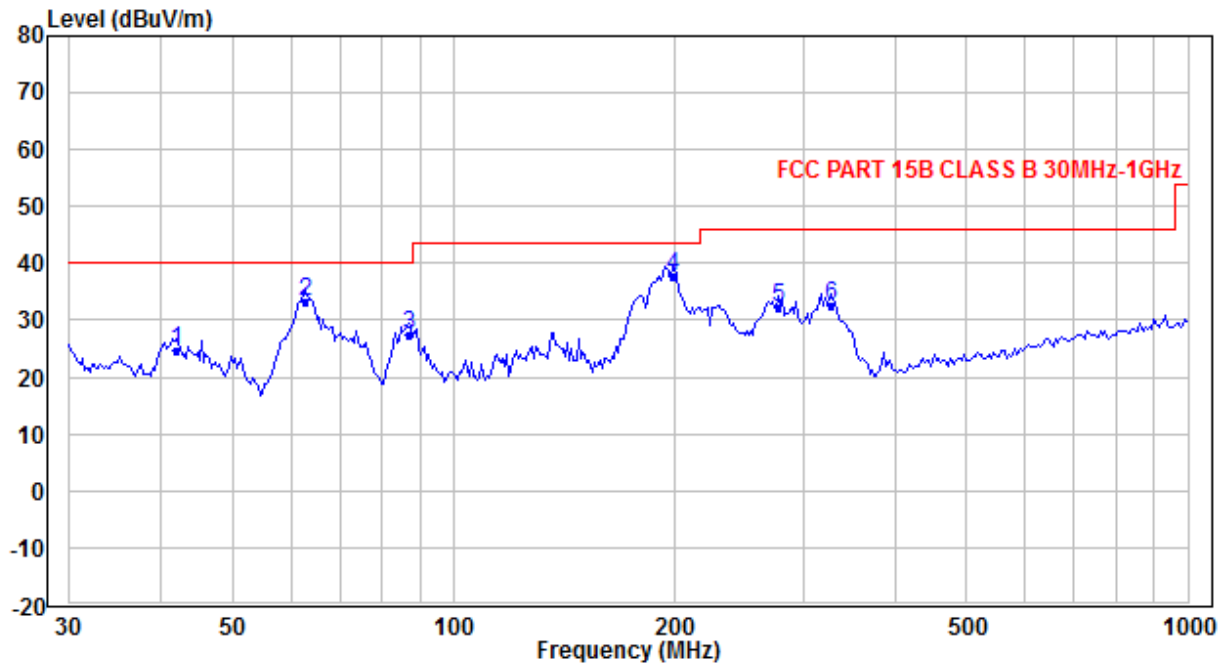
3.4 Test Results of Radiated Emissions

The measurement data for FCC 47 CFR Part 15 Subpart B as follows:

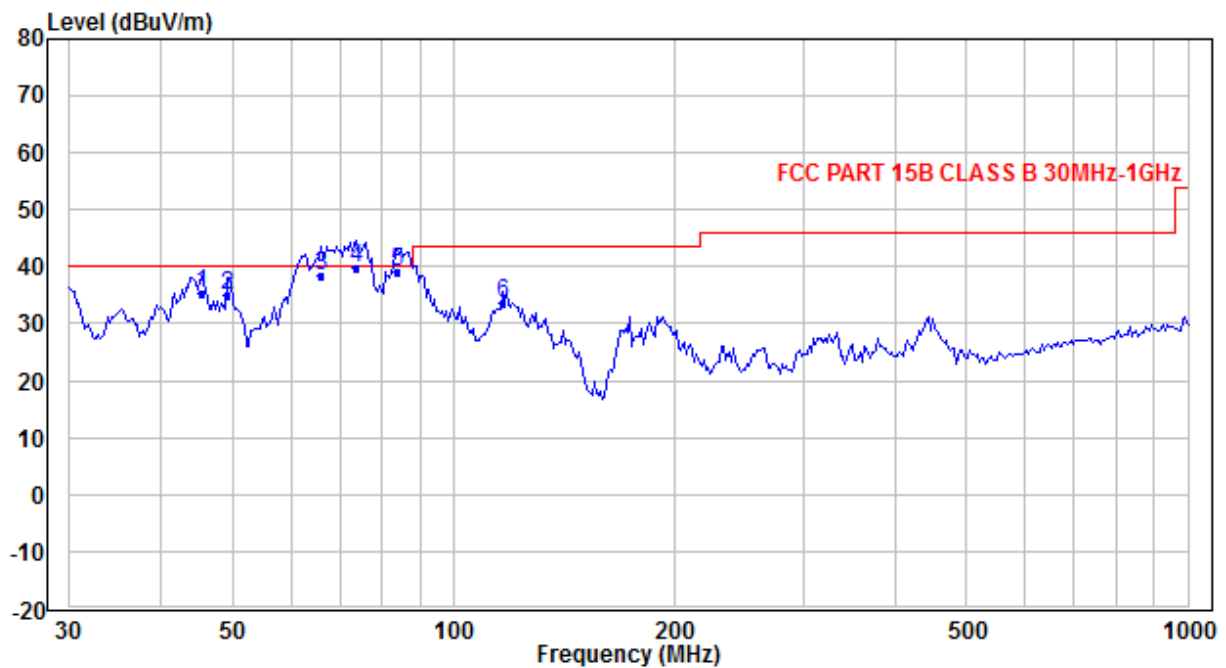
RE Below 1GHz:

Worse test mode: Test Mode 2

Horizontal



Vertical



TEST REPORT

Test data 30MHz~1GHz:

Polarization	Frequency (MHz)	Measured level (dBμV/m)	Factor (dB/m)	Limits (dBμV/m)	Margin (dB)	Detector
H	42.035	24.79	-9.15	40.00	15.21	QP
	62.743	33.19	-17.27	40.00	6.81	QP
	86.687	27.45	-16.52	40.00	12.55	QP
	198.642	37.64	-10.48	43.50	5.86	QP
	276.382	32.26	-7.63	46.00	13.74	QP
	327.155	32.58	-5.74	46.00	13.42	QP
V	45.413	35.43	-11.51	40.00	4.57	QP
	49.063	35.03	-14.02	40.00	4.97	QP
	65.907	38.54	-17.15	40.00	1.46	QP
	73.750	39.72	-17.48	40.00	0.28	QP
	83.694	39.07	-16.92	40.00	0.93	QP
	116.448	33.56	-15.87	43.50	9.94	QP

Remark:

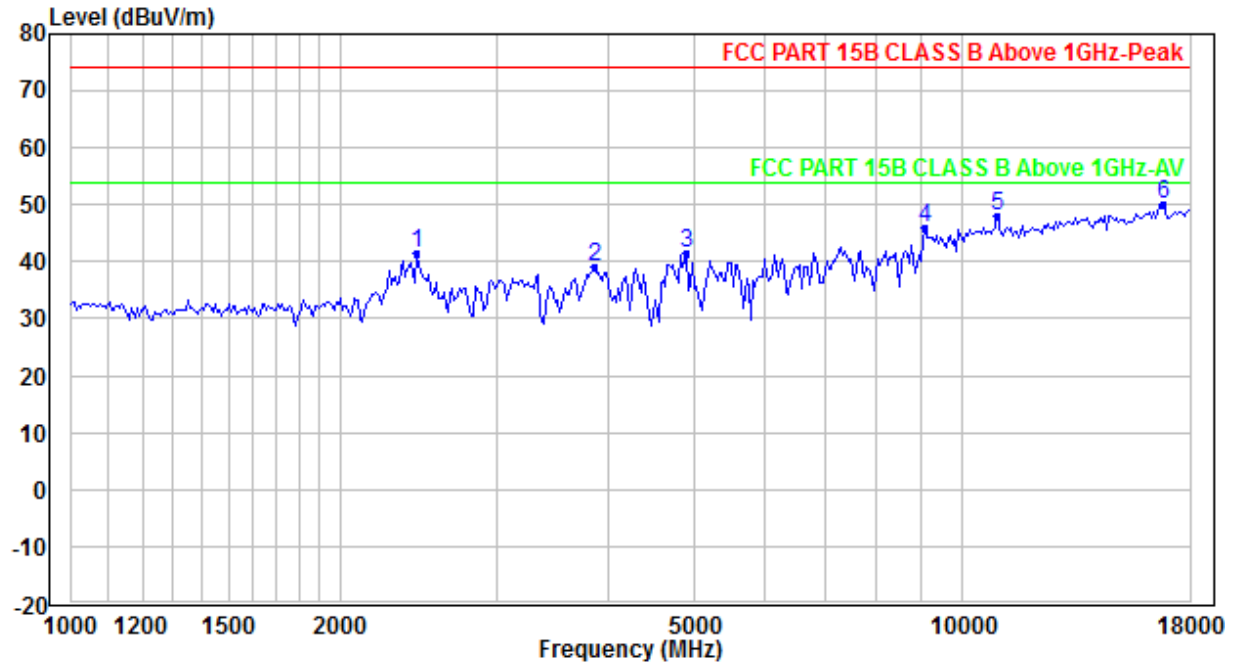
- Factor= Antenna Factor + Cable Loss (-Amplifier, is employed)
- Measured level= Original Receiver Reading + Factor
- Margin = Limit – Measured level
- The limit of ICES-003 in the 230MHz to 960MHz band is higher than that of FCC Part 15B, so the radiation emission test data conform to the limit of ICES-003.
- All possible modes of operation were investigated, only the worst-case emissions reported.

TEST REPORT

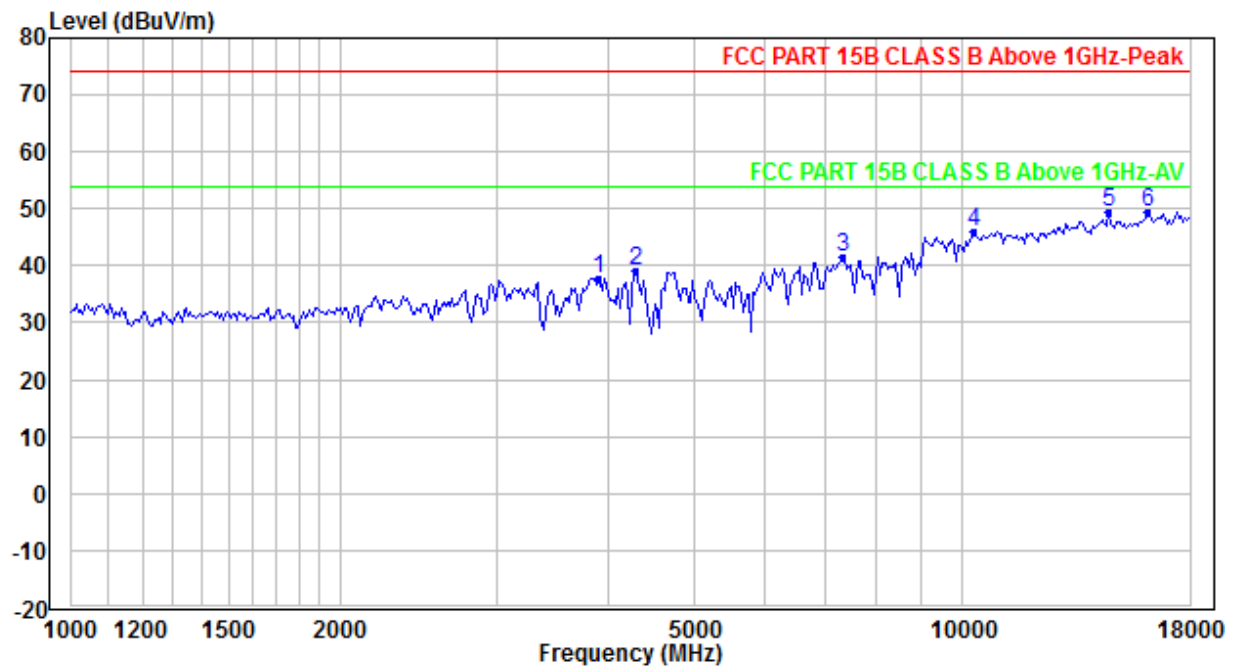
RE Above 1GHz:

Worse test mode: Test Mode 1

Horizontal



Vertical



TEST REPORT

Test data Above 1GHz:

Polarization	Frequency (MHz)	Measured level (dBμV/m)	Factor (dB/m)	Limits (dBμV/m)	Margin (dB)	Detector
H	2440.050	41.50	-8.26	74.00	32.50	Peak
	3855.931	39.07	-3.61	74.00	34.93	Peak
	4889.539	41.54	-2.29	74.00	32.46	Peak
	9087.293	46.00	5.09	74.00	28.00	Peak
	10937.880	48.02	7.29	74.00	25.98	Peak
	16791.350	50.12	12.61	74.00	23.88	Peak
V	3900.860	37.85	-3.45	74.00	36.15	Peak
	4304.524	39.20	-2.66	74.00	34.80	Peak
	7334.292	41.54	1.63	74.00	32.46	Peak
	10322.320	46.12	6.21	74.00	27.88	Peak
	14612.070	49.32	11.94	74.00	24.68	Peak
	16124.140	49.50	11.97	74.00	24.50	Peak

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Limit – Measured level
4. All possible modes of operation were investigated, only the worst-case emissions reported.
5. For Radiated Emission above 18GHz, there was not any unwanted emission detected.
6. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

4 Power line conducted emission

Test result: PASS

4.1 Limit

4.1.1 Limits for conducted disturbance voltage at the mains ports of class A device

Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60
Note: If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.		

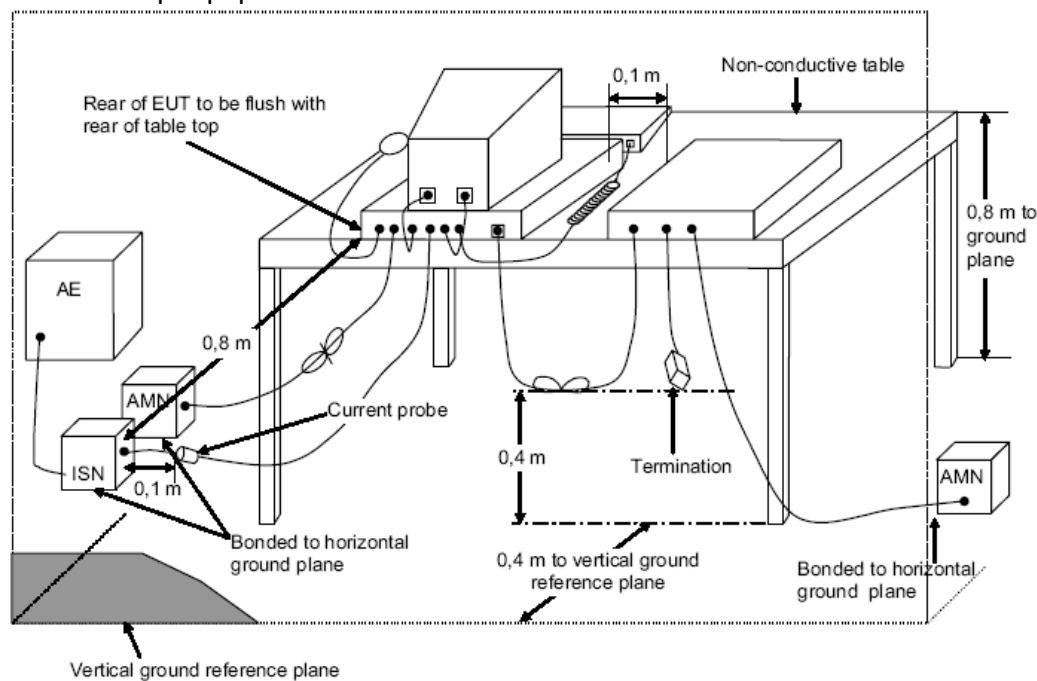
4.1.2 Limits for conducted disturbance voltage at the mains ports of class B device

Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 ~ 56 *	56 ~ 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50
Note: 1. * Means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz 2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.		

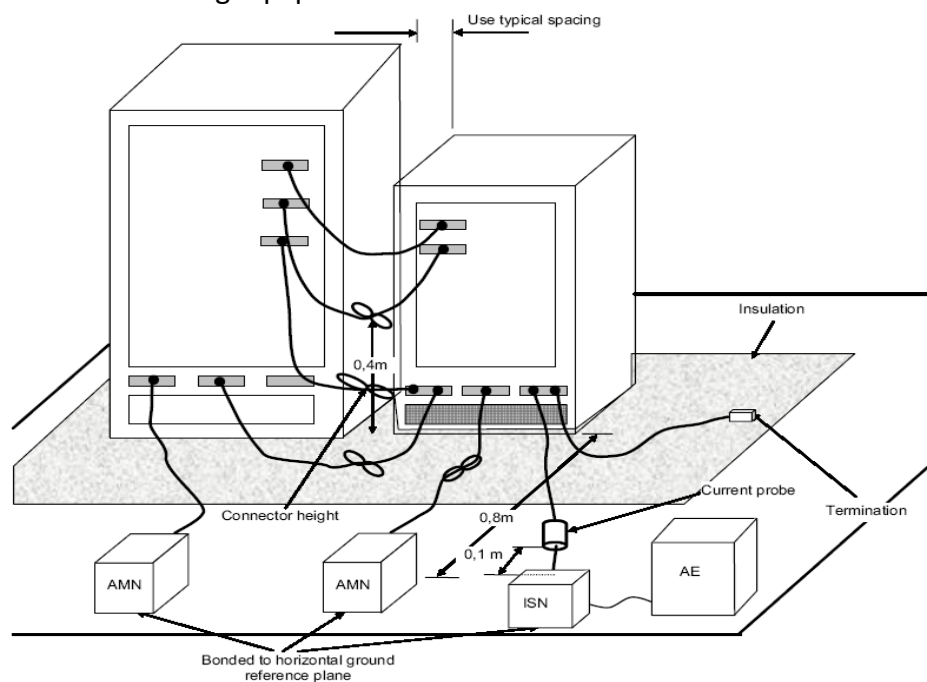
TEST REPORT

4.2 Block diagram and test set up

For table top equipment



For floor standing equipment



4.3 Measurement Procedure

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

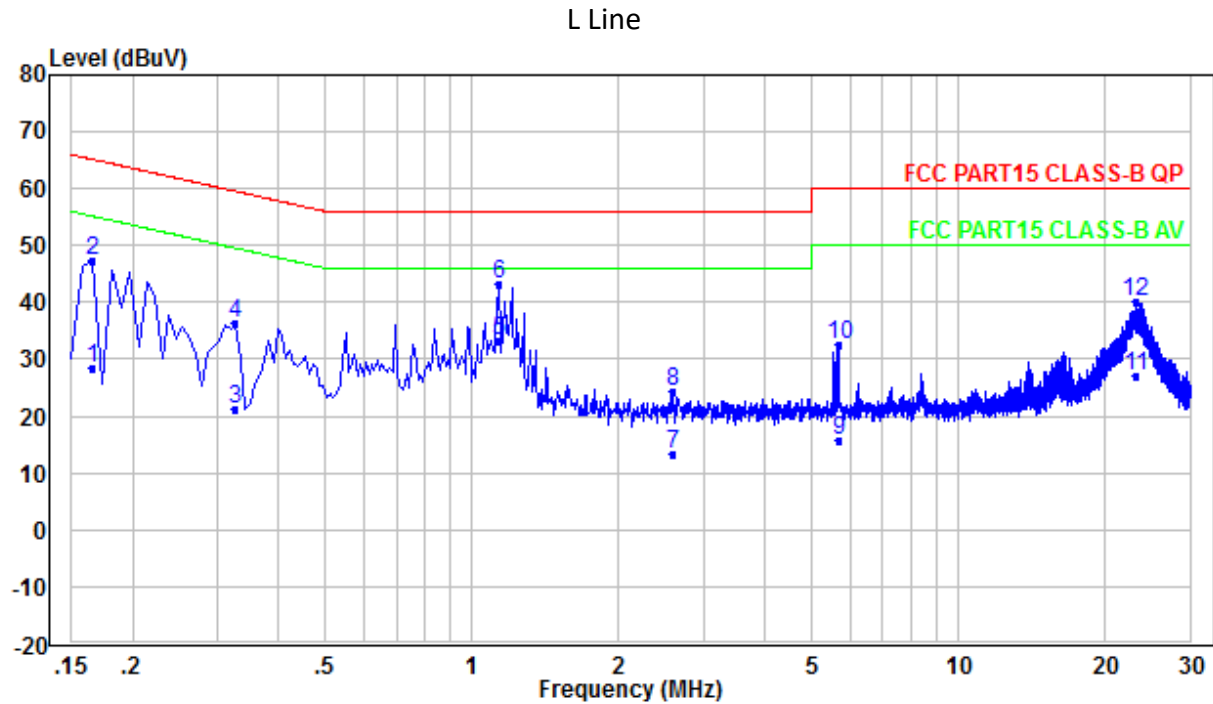
The bandwidth of the test receiver is set at 9 kHz.

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4.4 Test Results of Power line conducted emission

Worse Mode: Test Mode 1

Test Curve:

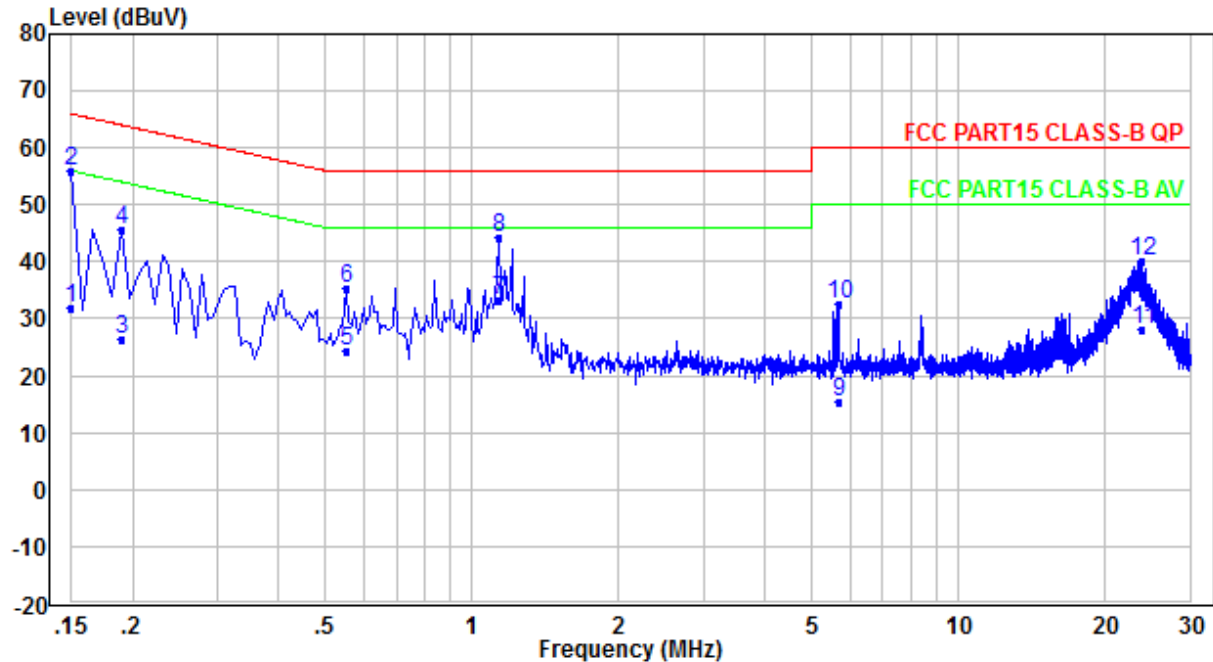


Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.166	47.37	65.16	17.79	28.37	55.16	26.79
0.326	36.31	59.55	23.24	21.31	49.55	28.24
1.134	43.23	56.00	12.77	33.23	46.00	12.77
2.590	24.45	56.00	31.55	13.45	46.00	32.55
5.669	32.61	60.00	27.39	15.61	50.00	34.39
23.145	40.08	60.00	19.92	27.08	50.00	22.92

Test Curve:

N Line



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.150	56.04	66.00	9.96	32.04	56.00	23.96
0.190	45.48	64.04	18.56	26.48	54.04	27.56
0.550	35.22	56.00	20.78	24.22	46.00	21.78
1.134	44.25	56.00	11.75	33.25	46.00	12.75
5.669	32.51	60.00	27.49	15.51	50.00	34.49
23.993	40.02	60.00	19.98	28.02	50.00	21.98

Remark: 1. Correct Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.

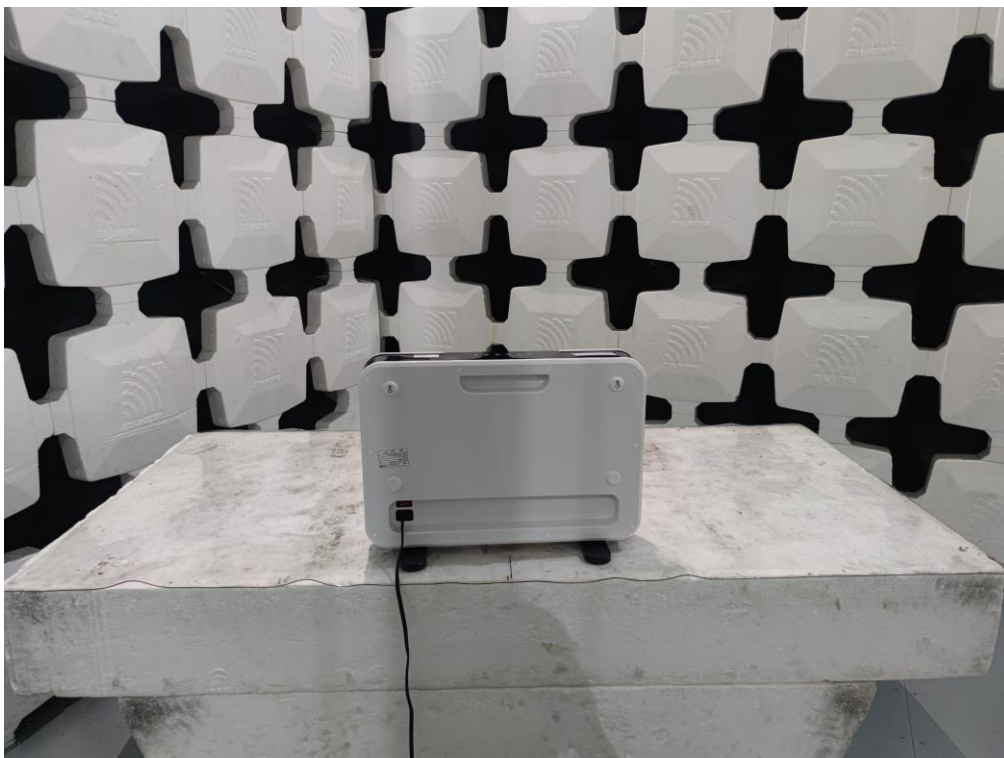
2. Corrected Reading = Original Receiver Reading + Correct Factor

3. Margin = Limit - Corrected Reading

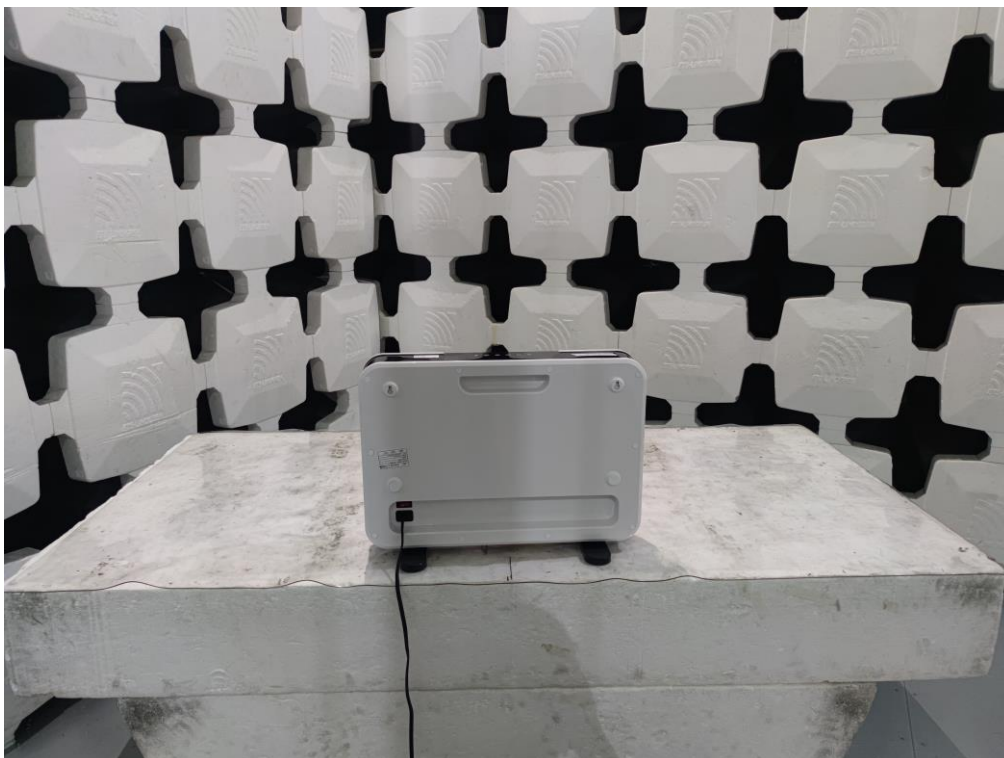
4. All possible modes of operation were investigated, only the worst-case emissions reported.

Appendix I: Photograph of test setup

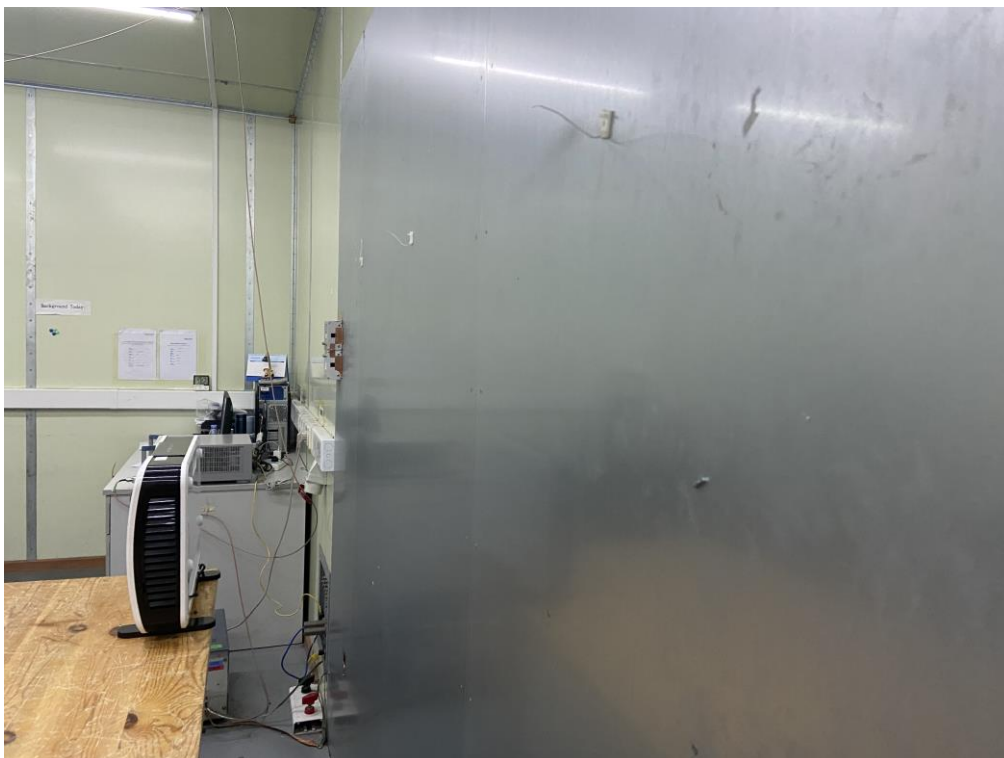
Radiated emission Test Setup-1 (30 MHz~1 GHz)



Radiated emission Test Setup-2 (Above 1 GHz)



Conducted Emission Test Setup3



Appendix II: Photograph of equipment under test

Refer to Appendix 2 for EUT external and internal photos.

***** END *****