

Design Pool Ltd

EMC TEST REPORT

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FCC Part 15C

Model:
APWADG01

REPORT NUMBER:
200303064SHA-002

ISSUE DATE:
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DOCUMENT CONTROL NUMBER:
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TEST REPORT

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Report no.: 200303064SHA-002

Applicant: Design Pool Ltd

Address of Applicant: 2/F East Town Bldg, 41 Lockhart Road, Wan Chai, Hong Kong

Manufacturer: ASAP Technology (Jiangxi) Co., Ltd

Address of Manufacturer: Ji'an Industrial Park, Ji'an, Jiangxi 343100 China

FCC ID: X3QDROPXLW01

SUMMARY:

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

47CFR Part 15 (2017): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2013): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

TESTED, PREPARED AND CHECKED BY :

Project Engineer
Wade Zhang
Intertek Testing Services Shanghai

REVIEWED AND APPROVED BY :

Reviewer
Daniel Zhao
Intertek Testing Services Shanghai

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TEST REPORT**Revision History**

Report No.	Version	Description	Issued Date
200303064SHA-002	Rev. 01	Initial issue of report	June 17, 2020

TEST REPORT**Measurement result summary**

TEST ITEM	FCC REFERENCE	RESULT
Antenna Requirement	15.203	Pass
Power line conducted emission	15.207	Pass
Radiated emission	15.209	Pass
20dB bandwidth	15.215	Pass

TEST REPORT**1 GENERAL INFORMATION****1.1 Description of Equipment Under Test (EUT)**

Product name:	Apple Watch dongle
Type/Model:	APWADG01
Description of EUT:	Apple Watch dongle
Rating:	DC 5V
EUT type:	<input checked="" type="checkbox"/> Table top <input type="checkbox"/> Floor standing
Operating Frequency Range:	326.5 KHz
Antenna Type:	Coil antenna
Sample received date:	May. 12, 2020
Date of test:	May. 12, 2020 to May 23, 2020

TEST REPORT**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 CAB identifier.: CN0051
	VCCI Registration Lab Registration No.: R-14243, G-10845, C-14723, T-12252
	A2LA Accreditation Lab Certificate Number: 3309.02

All tests were sub-contracted.

Shenzhen UnionTrust Quality and Technology Co., Ltd.

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Tested, Prepared and Checked by Henry Lu from Shenzhen UnionTrust Quality and Technology Co., Ltd.

Reviewed and Approved by Daniel Zhao from Intertek Testing Services Shanghai.

The test facility is recognized, certified, or accredited by the following organizations:**CNAS-Lab Code: L9069**

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

IC-Registration No.: 21600-1

The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has

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been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

TEST REPORT**2 TEST SPECIFICATIONS****2.1 Standards or specification**

47CFR Part 15 (2017)
ANSI C63.10 (2013)

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.

Test Item	EMI Test Modes
Conducted emission	Mode 1 :Operating with Max. Power Output
Radiated emission	Mode 1 :Operating with Max. Power Output

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	e3	Audix	9.160323
Radiated emission	e3	Audix	9.160333

2.4 Test peripherals list

Item No	Description	Band and Model	S/No
1	Apple Watch	Apple-Series 5	N/A
2	Adapter	Aohai-A88-502000	N/A
3	USB cable	N/A	N/A

2.5 Test environment condition:

Test items	Temperature	Humidity
Power line conducted emission	25.8°C	59% RH
Radiated Emissions	24.3°C	57% RH

TEST REPORT
2.6 Instrument list

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
<input checked="" type="checkbox"/>	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 03, 2018	Dec. 03, 2021
<input checked="" type="checkbox"/>	Receiver	R&S	ESIB26	100114	Nov. 24, 2019	Nov. 23, 2020
<input checked="" type="checkbox"/>	Loop Antenna	ETS-LINDGREN	6502	00202525	Nov. 16, 2019	Nov. 15, 2020
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 16, 2019	Nov. 15, 2020
<input checked="" type="checkbox"/>	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 24, 2019	Nov. 23, 2020
<input checked="" type="checkbox"/>	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2019	Nov. 23, 2020

Conducted Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
<input checked="" type="checkbox"/>	Receiver	R&S	ESR7	1316.3003K07-101181-K3	Nov. 24, 2019	Nov. 23, 2020
<input checked="" type="checkbox"/>	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 24, 2019	Nov. 23, 2020
<input checked="" type="checkbox"/>	LISN	R&S	ESH2-Z5	860014/024	Nov. 24, 2019	Nov. 23, 2020

TEST REPORT**2.7 Measurement uncertainty**

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Frequency	Expanded Uncertainty (k=2)
Conducted emission at mains ports	9kHz ~ 150kHz	±3.2 dB
	150kHz ~ 30MHz	±2.7 dB
Radiated Emissions	9KHz ~ 30MHz	± 4.7 dB
	30MHz ~ 1GHz	± 4.6 dB
	1GHz ~ 18GHz	± 4.4 dB
	18GHz~26 GHz	± 4.6 dB
	26 GHz~40 GHz	± 4.6 dB

TEST REPORT**3 Radiated Emissions****Test result:** Pass**3.1 Limit**

3.1.1 The field strength of any emissions appearing outside of the 127.772 kHz band shall not exceed the general radiated emission limits in §15.209.

Frequency	Field strength (microvolt/meter)	Limit (dB μ V/m)	Remark	Measurement distance (m)
0.009 MHz-0.490 MHz	2400/F(kHz)	--	--	300
0.490 MHz-1.705 MHz	24000/F(kHz)	--	--	30
1.705 MHz-30 MHz	30	--	--	30
30 MHz-88 MHz	100	40.0	Quasi-peak	3
88 MHz-216 MHz	150	43.5	Quasi-peak	3
216 MHz-960 MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1 GHz	500	54.0	Average	3

Remark:

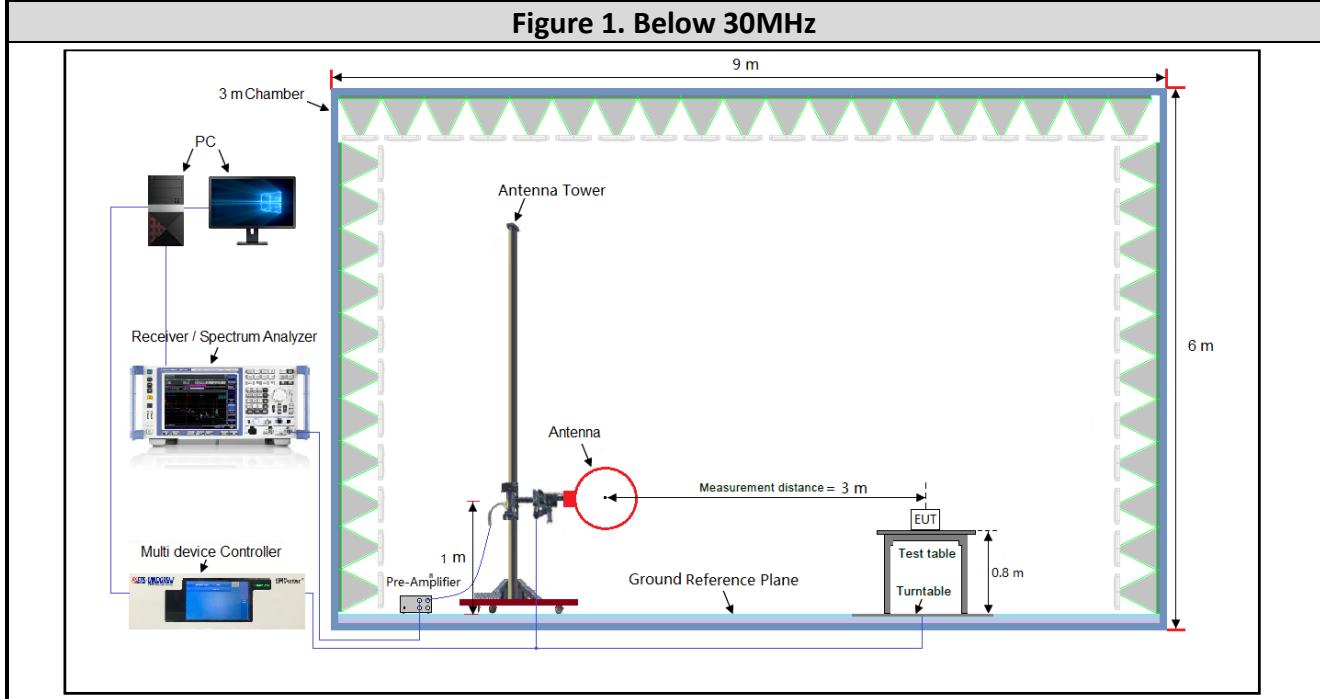
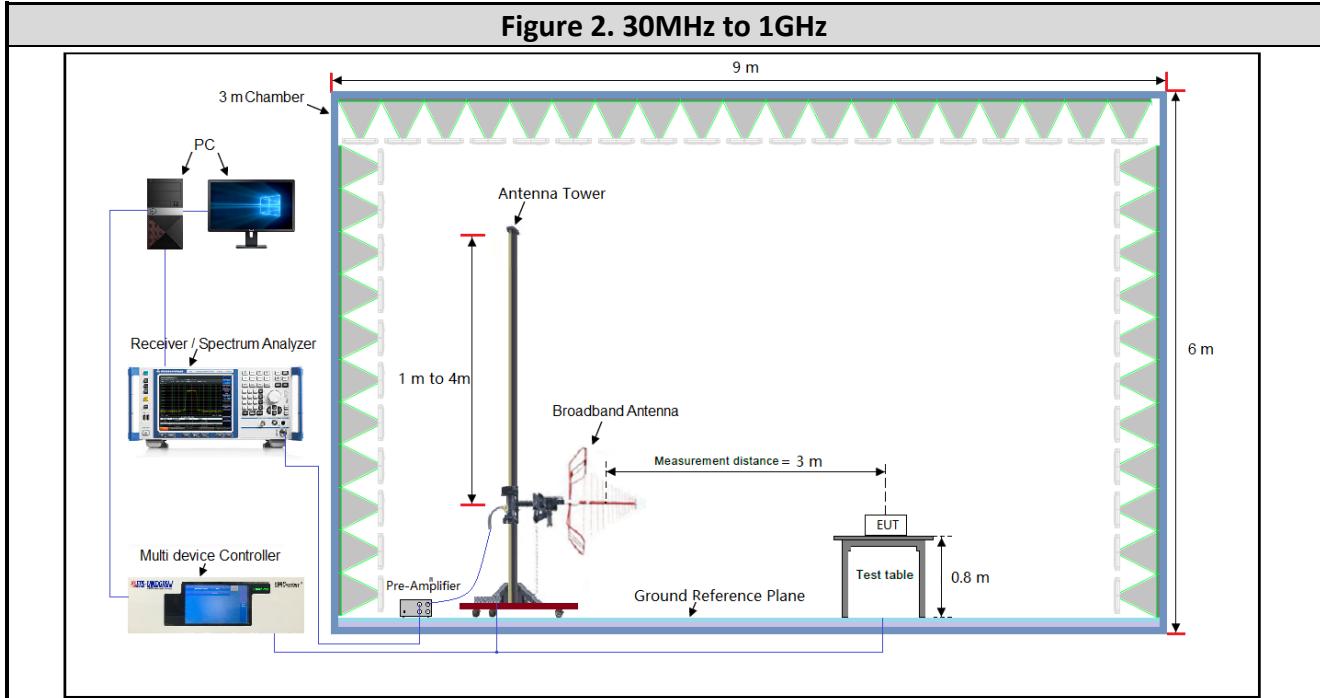
1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB μ V/m) = 20 log Emission level (μ V/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.
4. For Below 30MHz, the measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

$$\begin{aligned} \text{Field strength limit for 13.56MHz} &= 15848 \mu\text{V/m} && \text{at 30m} \\ &= 84 \text{ dB}\mu\text{V/m} && \text{at 30m} \\ &= 84 \text{ dB}\mu\text{V/m} + 40\log(30/3) \text{ dB} && \text{at 3m} \\ &= 124 \text{ dB}\mu\text{V/m} && \text{at 3m} \end{aligned}$$

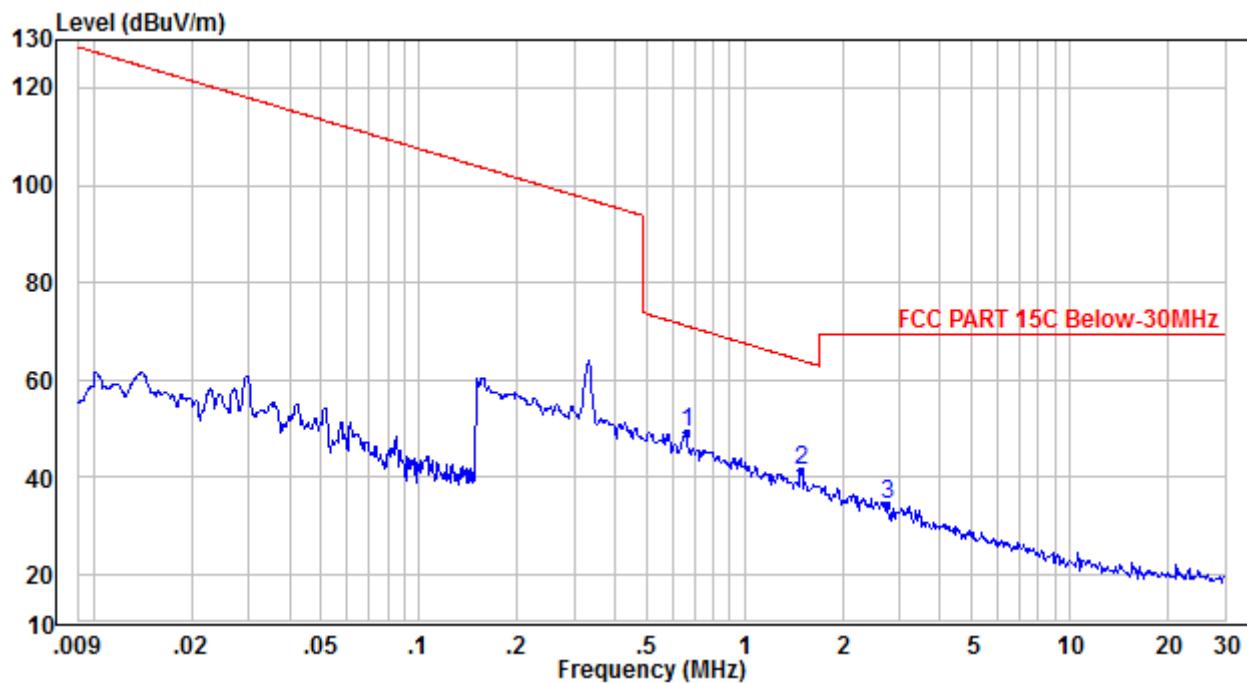
TEST REPORT
3.2 Block diagram and test set up

For table top equipment

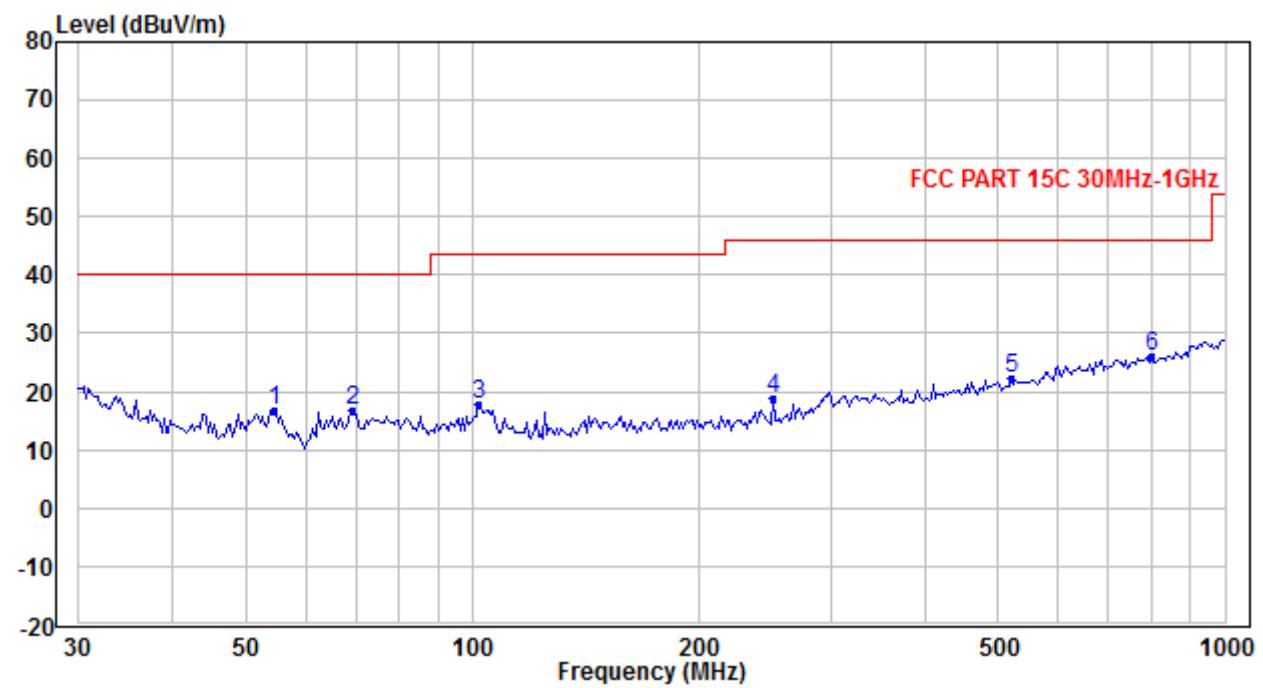
Figure 1. Below 30MHz

Figure 2. 30MHz to 1GHz


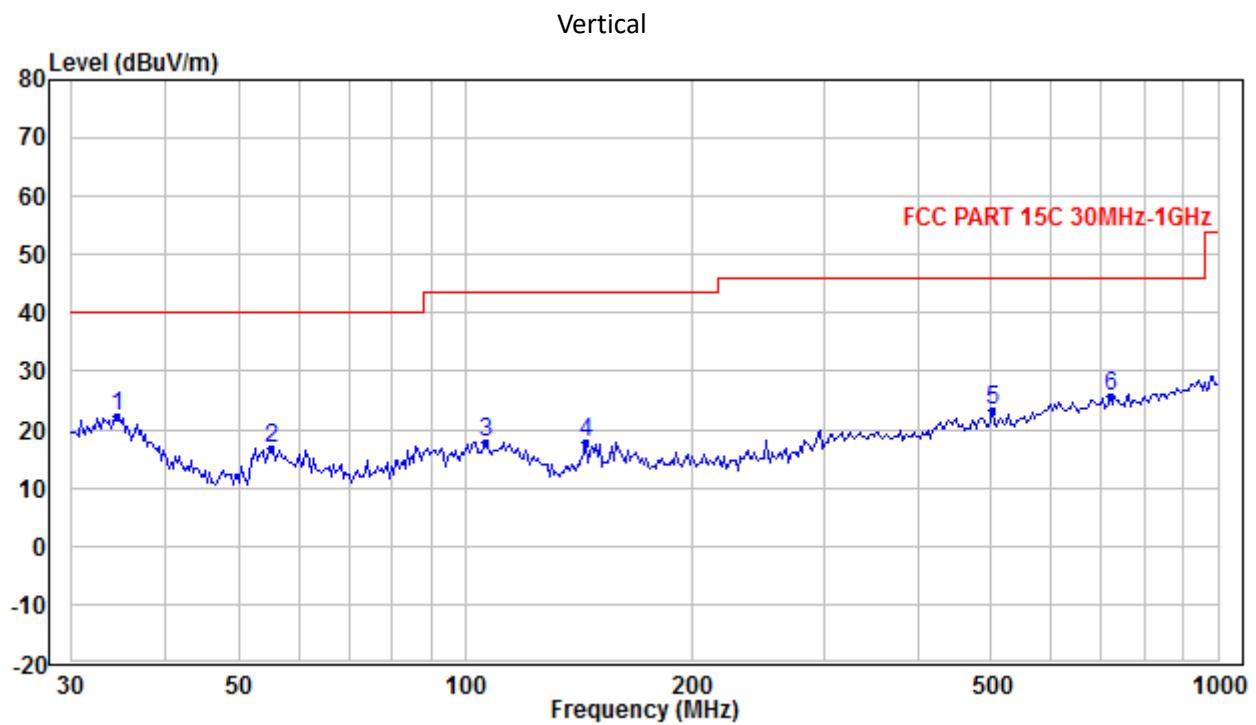
TEST REPORT**3.3 Measurement Procedure**

- 1) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 3) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 6) If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

TEST REPORT**3.4 Test Results of Radiated Emissions****Radiated Emission Test Data (9 KHz ~ 30 MHz):****Radiated Emission Test Data (30 MHz ~ 1 GHz):**

Horizontal



TEST REPORT

TEST REPORT
Test data 9 KHz ~ 30 MHz:

Frequency (MHz)	Measured level (dB μ V/m)	Factor (dB)	Limits (dB μ V/m)	Margin (dB)	Detector
0.665	49.09	-16.82	71.13	22.04	Peak
1.499	41.26	-16.78	64.03	22.77	Peak
2.750	34.33	-16.78	69.50	35.17	Peak

Test data 30MHz~1GHz:

Polarization	Frequency (MHz)	Measured level (dB μ V/m)	Factor (dB)	Limits (dB μ V/m)	Margin (dB)	Detector
H	54.517	16.77	-13.86	40.00	23.23	Peak
	69.230	16.85	-13.73	40.00	23.15	Peak
	101.893	17.85	-11.77	43.50	25.65	Peak
	250.486	18.91	-8.56	46.00	27.09	Peak
	520.208	22.37	-3.27	46.00	23.63	Peak
	798.620	26.21	1.57	46.00	19.79	Peak
V	34.527	22.11	-7.48	40.00	17.89	Peak
	55.288	16.70	-13.96	40.00	23.30	Peak
	106.281	17.96	-11.93	43.50	25.54	Peak
	144.790	17.90	-11.06	43.50	25.60	Peak
	502.247	23.44	-3.54	46.00	22.56	Peak
	718.725	25.72	0.12	46.00	20.28	Peak

Remark:

1. Factor= Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Measured level= Original Receiver Reading + Factor
3. Margin = Limit – Measured level

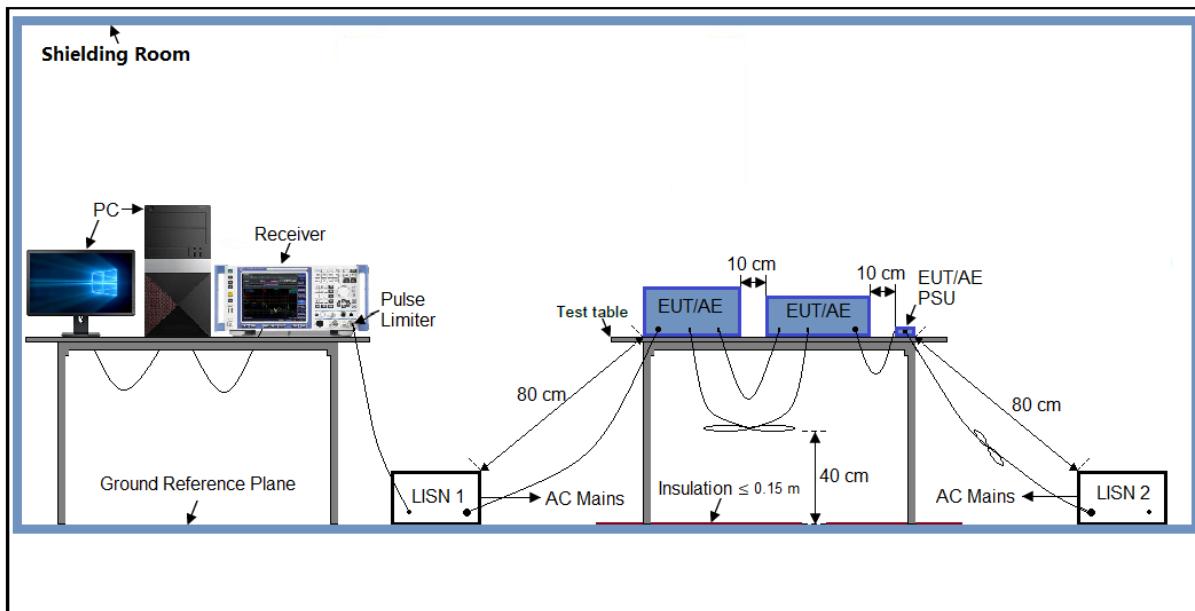
TEST REPORT**4 Power line conducted emission****Test result:** Pass**4.1 Limit****4.1.1 Limits for conducted disturbance voltage at the mains ports of class B device**

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

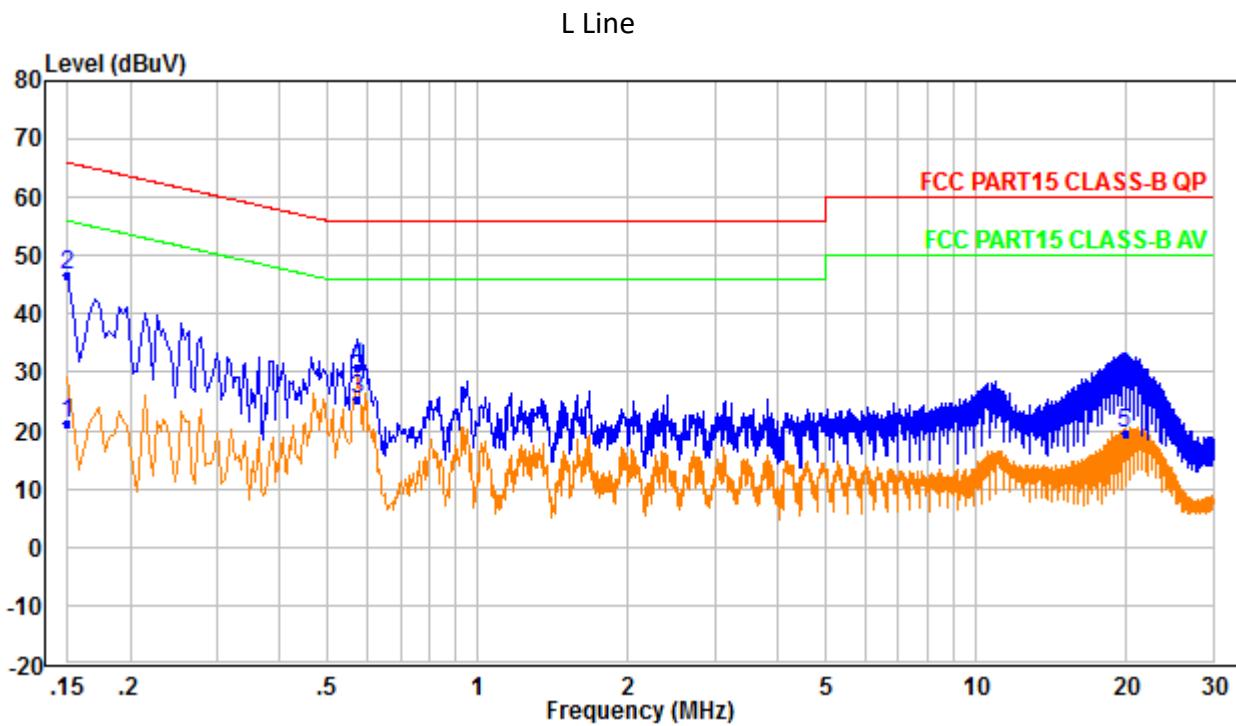


TEST REPORT**4.3 Measurement Procedure**

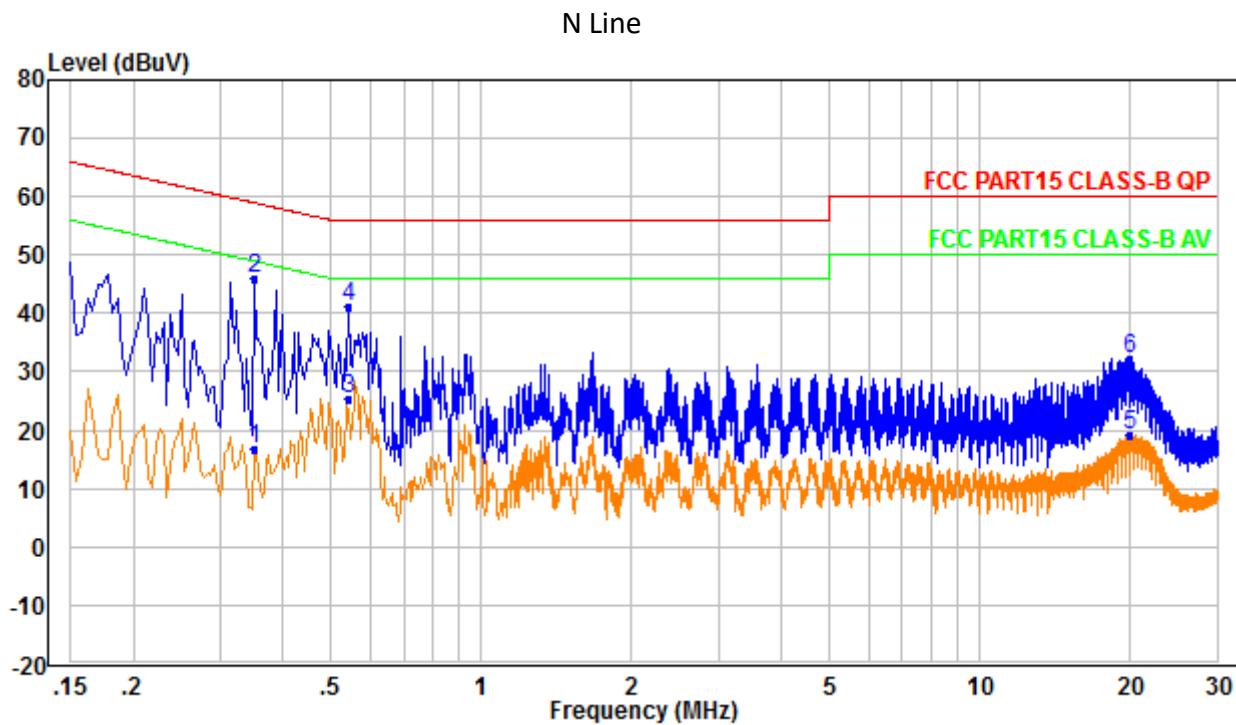
Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be 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 C63.10. 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.

TEST REPORT
4.4 Test Results of Power line conducted emission
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)
0.150	46.82	66.00	19.18	21.22	56.00	34.78
0.574	30.81	56.00	25.19	25.51	46.00	20.49
19.957	29.23	60.00	30.77	19.63	50.00	30.37

TEST REPORT
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)
0.350	45.95	58.96	13.01	16.73	48.96	32.23
0.542	41.11	56.00	14.89	25.23	46.00	20.77
19.969	32.30	60.00	27.70	19.33	50.00	30.67

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

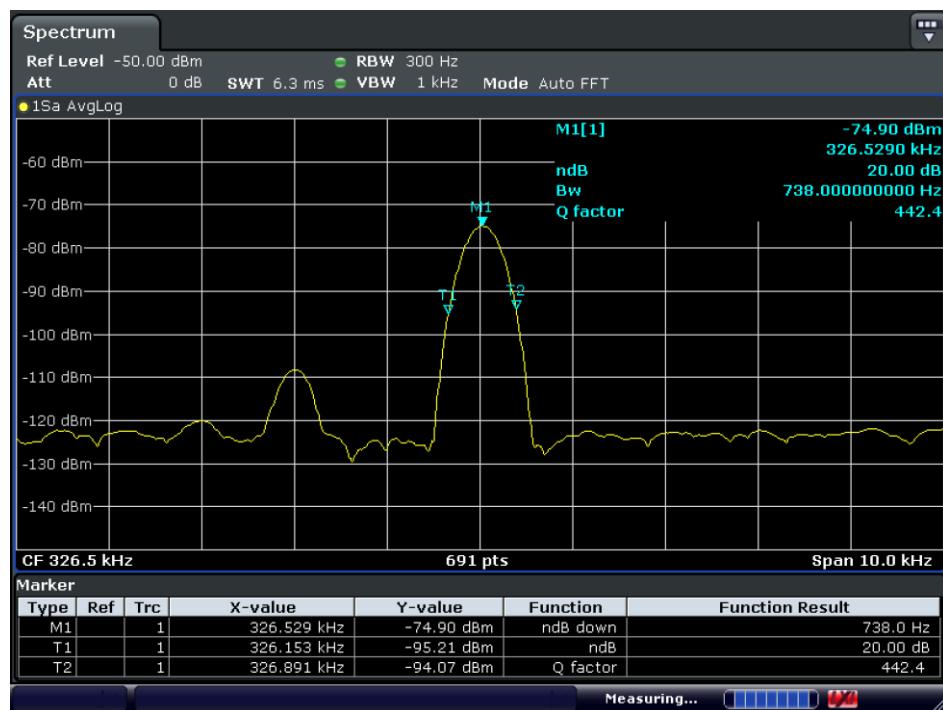
3. Margin = Limit - Corrected Reading

TEST REPORT

5 Measured Bandwidth

Pursuant to FCC Part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designed (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

326.5 kHz



Date: 20.MAY.2020 17:21:22

TEST REPORT**6 ANTENNA REQUIREMENT**

Standard Requirement
15.203 requirement: 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
EUT Antenna:
This product has a permanent antenna, fulfill the requirement of this section.

TEST REPORT**Appendix I: Photograph of test setup**

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

Appendix II: Photograph of equipment under test

Refer to Appendix 2 for EUT external and internal photos.

***** END *****