FCC Test Report

Report No.: AGC12996210902FE09

FCC ID	:	2AS6W-PRPLXX00860
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Yoto Mini
BRAND NAME	:	YOTO
MODEL NAME	:	Yoto Mini
APPLICANT	:	Yoto Ltd.
DATE OF ISSUE	:	Sep. 14, 2021
STANDARD(S) **TEST PROCEDURE(S)**	:	FCC Part 15 Subpart C Section 15.225
REPORT VERSION	:	V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Sep. 14, 2021	Valid	Initial release

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1. VERIFICATION OF CONFORMITY

Applicant	Yoto Ltd.
Address	Kemp House 152-160 City Road LONDON EC1V 2NX United Kingdom
Manufacturer	Yoto Ltd.
Address	Kemp House 152-160 City Road LONDON EC1V 2NX United Kingdom
Factory	SHENZHEN FENDA TECHNOLOGY CO., LTD.
Address	Fenda Technology Park, Zhoushi Road, Shiyan Street, Shenzhen, China
Product Designation	Yoto Mini
Brand Name	YOTO
Test Model	Yoto Mini
Date of test	Sep. 02, 2021 to Sep. 14, 2021
Deviation	None
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.225. The test results of this report relate only to the tested sample identified in this report.

Prepared By	Kelly Cheng (Project Engineer)	Sep. 14, 2021
Reviewed By	Max Zhang (Reviewer)	Sep. 14, 2021
Approved By	Forrest Lei (Authorized Officer)	Sep. 14, 2021

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	13.56MHz
Field Strength(3m)	56.17dBuV/m(PK)@3m
Modulation	ASK
Number of channels	1
Hardware Version	1.0
Software Version	V1.0
Antenna Designation	FPC Antenna
Antenna Gain	3.42dBi
Power Supply	DC 3.7V by battery or DC 5V by adapter

3. MEASUREMENT UNCERTAINTY

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

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB
- Uncertainty of Occupied Channel Bandwidth: Uc = ±2 %

4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Charging+ NFC mode (Connect to adapter)
2	Normal Working + NFC mode

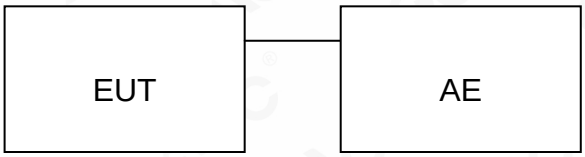
Note:
1. All the test modes can be supply by new battery, and only the data of the worst case recorded in the test report.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:

Conducted Emission Configure:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	Yoto Mini	N/A	Yoto Mini	EUT
2	Adapter	ZL-PCB01000 20502000	DC 5V	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
15.205(a)&15.225(a) &15.209	Radiated Emission	Compliant
15.215&15.225	20dB bandwidth	Compliant
15.207	Conducted Emission	Compliant
15.225(e)	Frequency Tolerance	Compliant
15.203	Antenna Requirement	Compliant

6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

7. TEST EQUIPMENT LIST

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	May 15, 2021	May 14, 2022
LISN	R&S	ESH2-Z5	100086	Jun. 09, 2021	Jun. 08, 2022
Test software	R&S	ES-K1(Ver.V1.71)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2021	May 14,2022
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 07, 2020	Dec. 06, 2021
Attenuator	Weinachel Corp	58-30-33	N/A	Jul. 10, 2021	Jul. 09, 2022
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
ANTENNA	SCHWARZBECK	VULB9168	D69250	Jan. 08, 2021	Jan. 07, 2023

8. RADIATED EMISSION

8.1 TEST LIMIT

Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μV/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark: (1) Emission level dBμV = 20 log Emission level μV/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

8.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed

at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

7. 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.
8. 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.
9. 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.
10. 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.

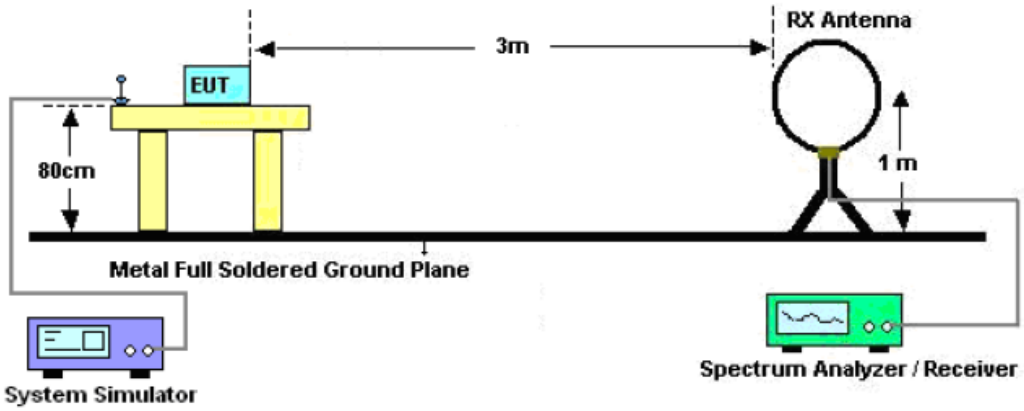
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RBW 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RBW 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RBW 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/1MHz for Peak, 1MHz/10Hz for Average

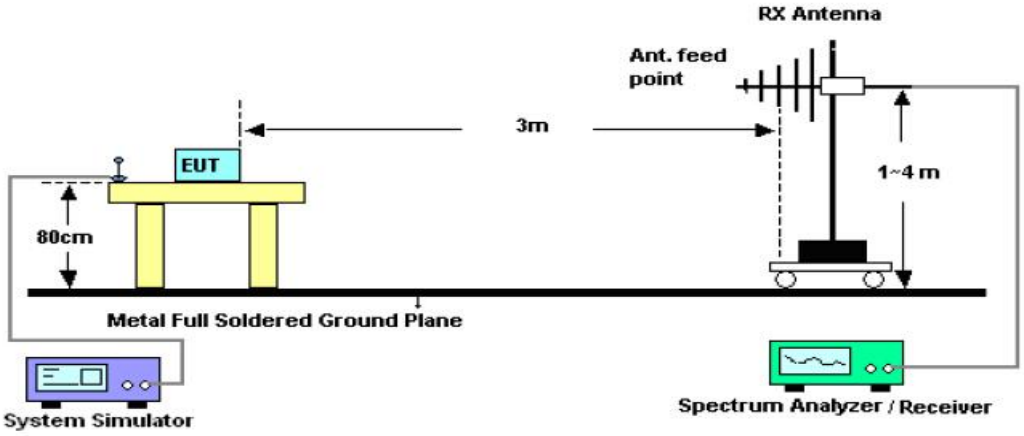
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RBW 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RBW 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RBW 120KHz for QP

8.2. TEST SETUP

Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



8.3. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

EUT :	Yoto Mini	Model Name. :	Yoto Mini
Temperature :	25℃	Relative Humidtity :	60%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	Mode 1	Polarization :	--

Frequency MHz	Polarization	Reading dB(uV) PK	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) AV	Margin dB	Pass/Fail
13.56	Face	44.91	11.26	56.17	124.00	-67.83	Pass
13.56	Side	44.63	11.26	55.89	124.00	-68.11	Pass

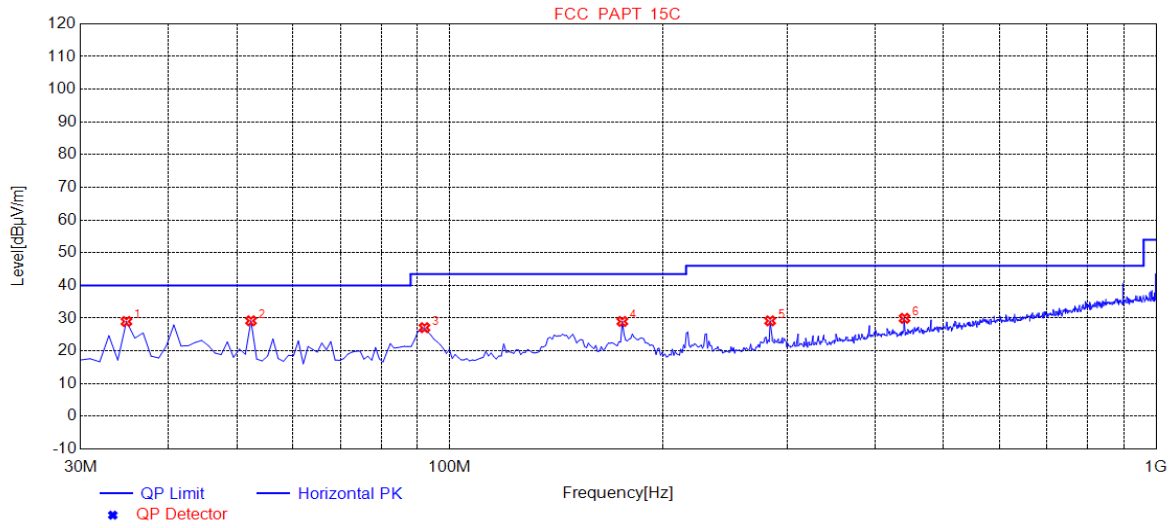
Note: 1.The level of peak emission is less than the average limit, so the level of average emission need not to be tested. Other emissions from 9kHz to 30MHz are considered as ambient noise. No recording in the test report.

2: Level(dBuV/m)=Reading(dBuV)+Factor(dB/m)

Factor(dB/m)=Antenna Factor(dB/m)+Cable loss(dB)+Attenuation(dB)for Attenuator

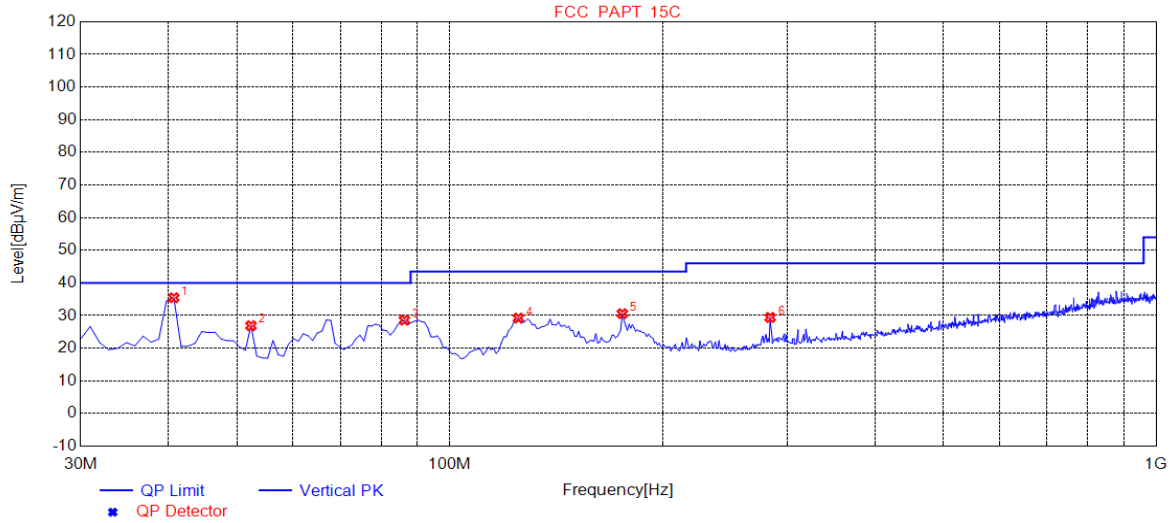
Margin=Level-Limit

RADIATED EMISSION BELOW 1GHZ-Horizontal



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	34.8500	29.00	10.70	40.00	11.00	200	117	Horizontal
2	52.3100	29.21	11.49	40.00	10.79	100	107	Horizontal
3	92.0800	27.10	8.12	43.50	16.40	200	177	Horizontal
4	175.5000	29.01	13.43	43.50	14.49	200	41	Horizontal
5	284.1400	29.19	16.25	46.00	16.81	100	150	Horizontal
6	440.3100	29.97	20.76	46.00	16.03	100	357	Horizontal

RADIATED EMISSION BELOW 1GHZ-Vertical



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	40.6700	35.47	11.91	40.00	4.53	100	87	Vertical
2	52.3100	26.90	11.49	40.00	13.10	100	17	Vertical
3	86.2600	28.61	7.22	40.00	11.39	100	110	Vertical
4	125.0600	29.24	13.81	43.50	14.26	100	357	Vertical
5	175.5000	30.60	13.43	43.50	12.90	100	93	Vertical
6	284.1400	29.43	16.25	46.00	16.57	100	130	Vertical

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Limit - Level.

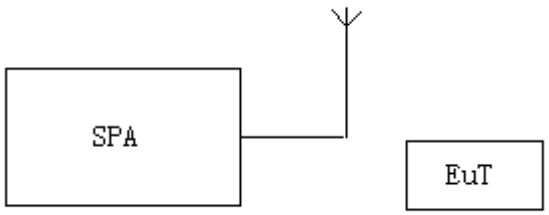
2. The “Factor” value can be calculated automatically by software of measurement system.

9. BANDWIDTH

9.1. MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:
   Centre frequency = Operation Frequency
   RBW=100Hz
   VBW=300Hz
   Span: 6kHz
   Sweep time: Auto
2. Set the EUT to continue transmitting mode. Allow the trace to stabilize. Use the “N dB down” function of SPA to define the bandwidth.
3. Record the plots and Reported.

9.2. TEST SETUP

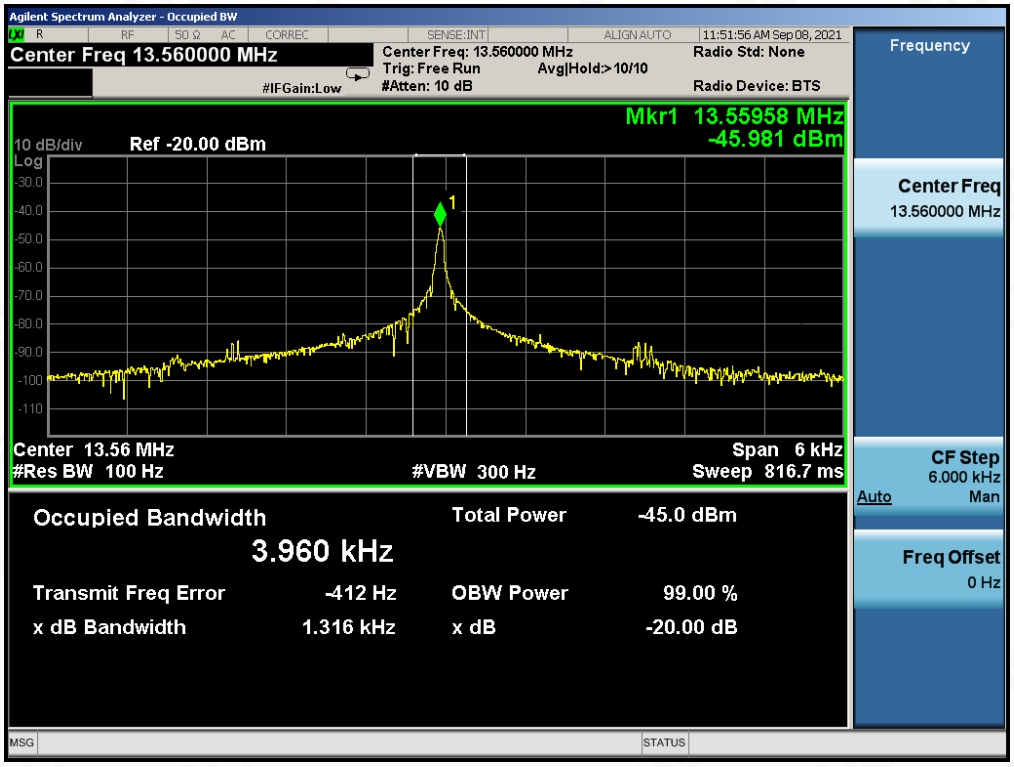


9.3. TEST RESULT

TEST ITEM	20DB BANDWIDTH
TEST MODULATION	ASK

Test Data (kHz)		Criteria
Operate Channel	1.316	PASS

TEST PLOT OF BANDWIDTH



10. FREQUENCY TOLERANCE

10.1. LIMITS

The frequency tolerance of the carrier signal shall be maintained within ±0.01%(±100 ppm) of the operating frequency over a temperature variation of −20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

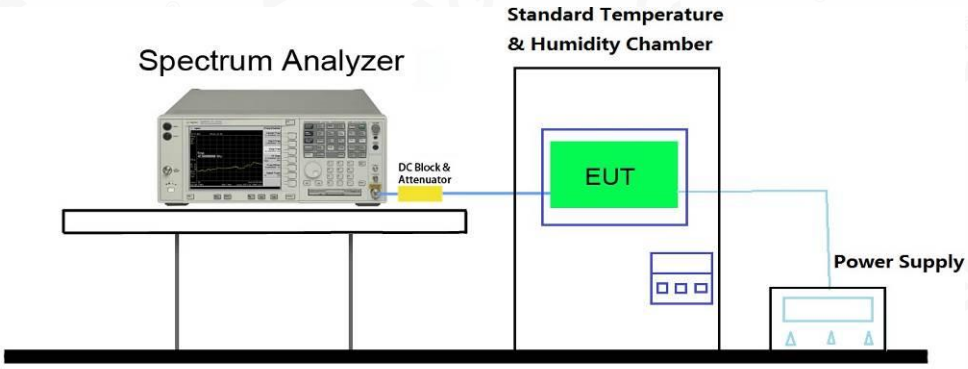
10.2 MEASUREMENT PROCEDURE

The EUT was connected to a frequency counter or spectrum analyzer through the antenna output of each transmitter. The EUT was then placed in a temperature chamber.

1. The nominal frequency of the transmitter was measured and recorded.
2. The temperature chamber was then set to -30ºC.
3. Once the temperature had reached -30ºC the EUT was allowed to soak for 30 minutes.
4. After soaking at -30ºC for thirty minutes the EUT was turned on and the transmit frequency was measured and recorded.
5. Steps (b) through (d) were repeated for each temperature in 10ºC steps from -20ºC to +50ºC.
6. The EUT was then removed from the temperature chamber and allowed to adjust to nominal room temperature (22ºC).
7. The input voltage was checked and adjusted to the nominal level. The frequency was measured and recorded.
8. The input voltage was then varied to 85% of its nominal level. The frequency was measured and recorded.

The input voltage was then varied to 115% of its nominal level. The frequency was measured and recorded.

10.3 MEASUREMENT SETUP



10.4 MEASUREMENT RESULTS

Test conditions		Frequency error (ppm)	Limit (ppm)	Result
Voltage (V)	Temp (℃)	Test Frequency (MHz)		
		13.56		
3.7	-30	8.850	±100	Pass
	-20	10.320		
	-10	12.540		
	0	9.590		
	10	11.060		
	20	11.800		
	30	13.270		
	40	8.110		
	50	14.010		
4.255	20	8.112		
3.145	20	8.850		

11. LINE CONDUCTED EMISSION TEST

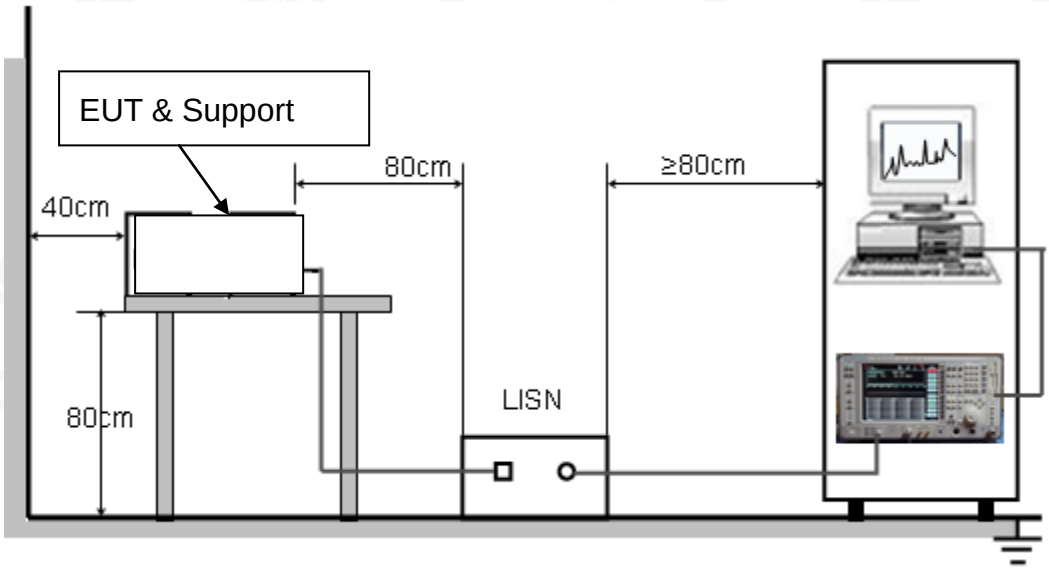
11.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

11.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



11.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

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 C63.10 (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 C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipment received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC 5V power from adapter which received AC120V/60Hz power from a LISN.
6. The 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 mode(s) were scanned during the preliminary test.

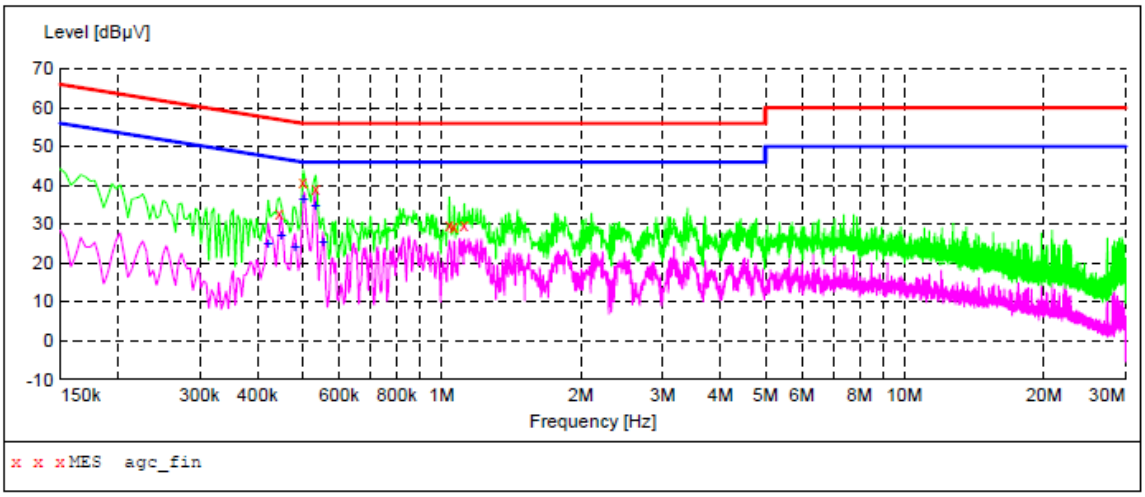
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

11.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

11.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

Line Conducted Emission Test Line 1-L



MEASUREMENT RESULT: "agc_fin"

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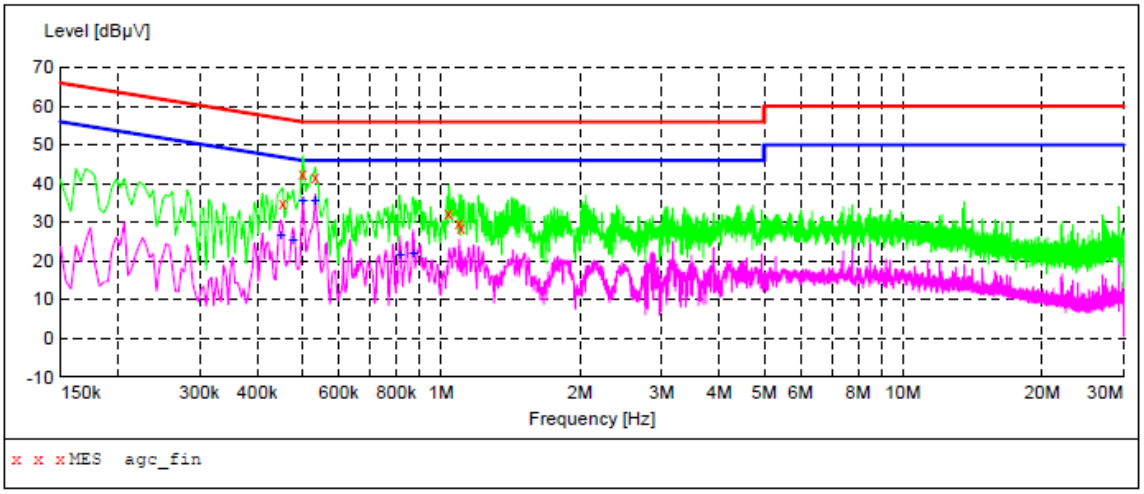
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.446000	32.60	7.9	57	24.3	QP	L1
0.502000	40.60	8.0	56	15.4	QP	L1
0.534000	39.10	8.0	56	16.9	QP	L1
1.038000	29.90	8.2	56	26.1	QP	L1
1.062000	29.20	8.2	56	26.8	QP	L1
1.118000	29.70	8.2	56	26.3	QP	L1

MEASUREMENT RESULT: "agc_fin2"

2021/9/2 16:46

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.422000	25.20	7.9	47	22.2	AV	L1
0.450000	27.10	7.9	47	19.8	AV	L1
0.482000	24.30	8.0	46	22.0	AV	L1
0.502000	36.50	8.0	46	9.5	AV	L1
0.534000	34.90	8.0	46	11.1	AV	L1
0.554000	25.30	8.0	46	20.7	AV	L1

Line Conducted Emission Test Line 2-N



MEASUREMENT RESULT: "agc_fin"

2021/9/2 16:43

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.454000	34.90	7.9	57	21.9	QP	N
0.502000	42.40	8.0	56	13.6	QP	N
0.534000	41.50	8.0	56	14.5	QP	N
1.038000	32.20	8.2	56	23.8	QP	N
1.094000	29.70	8.2	56	26.3	QP	N
1.106000	28.60	8.2	56	27.4	QP	N

MEASUREMENT RESULT: "agc_fin2"

2021/9/2 16:43

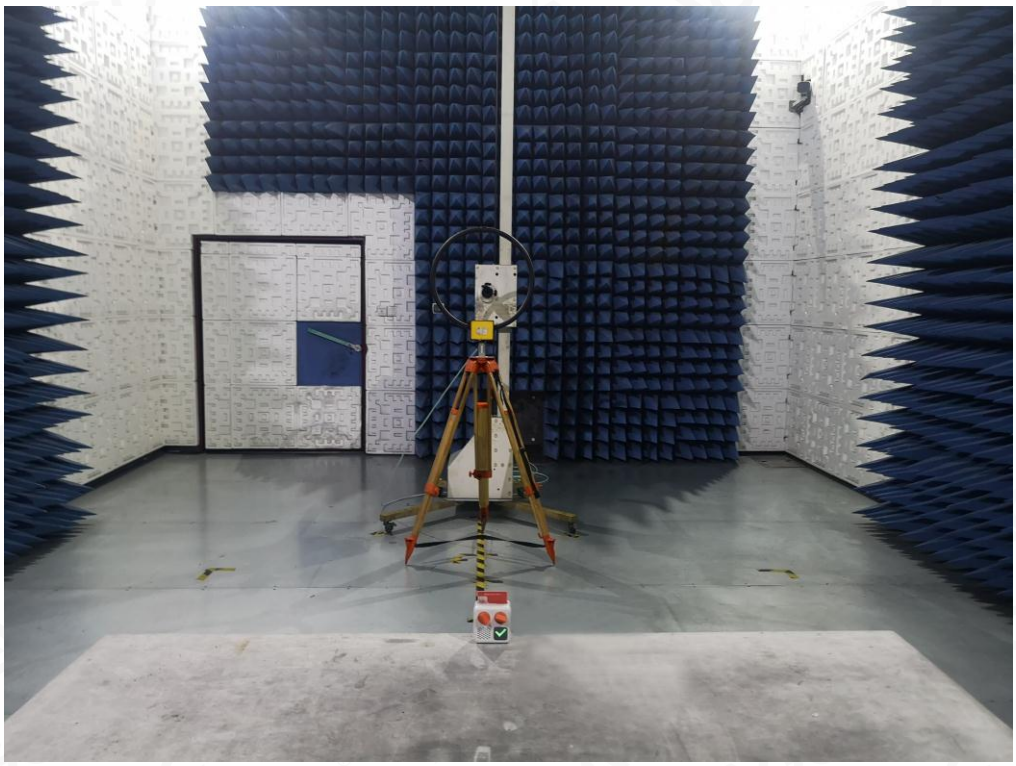
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.450000	26.70	7.9	47	20.2	AV	N
0.478000	25.50	8.0	46	20.9	AV	N
0.502000	35.70	8.0	46	10.3	AV	N
0.534000	35.60	8.0	46	10.4	AV	N
0.814000	21.50	8.1	46	24.5	AV	N
0.870000	22.10	8.1	46	23.9	AV	N

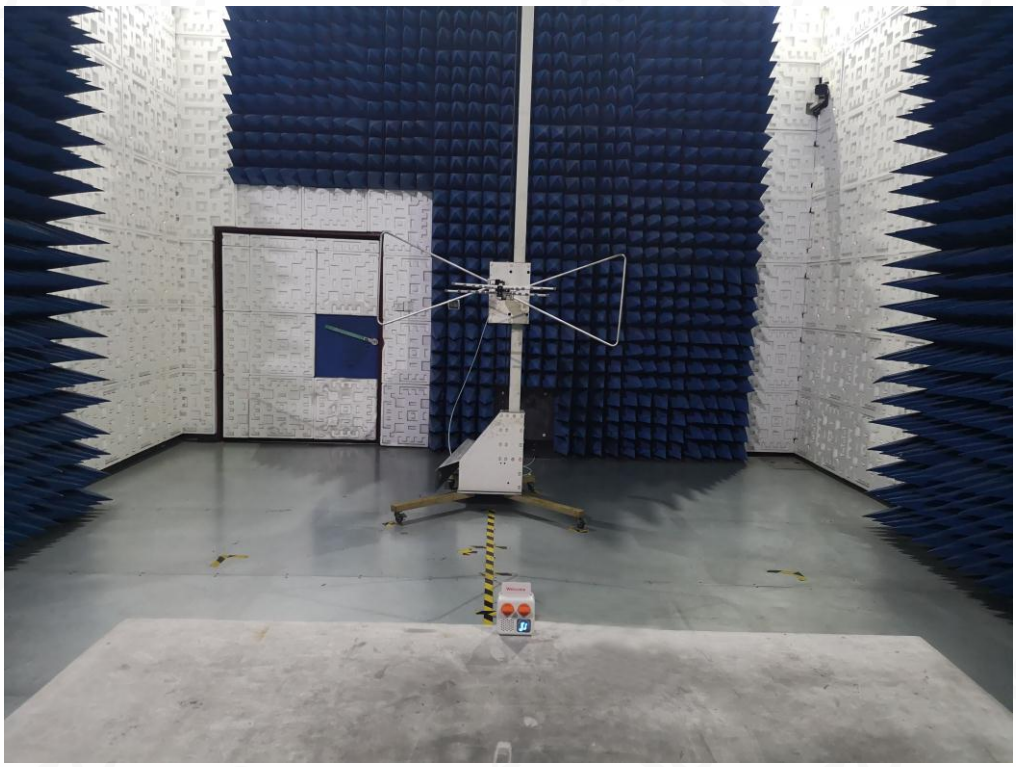
RESULT: PASS

Note: All the test modes had been tested, the mode 1 was the worst case. Only the data of the worst case would be record in this test report.

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC RADIATED EMISSION TEST SETUP





CONDUCTED EMISSION TEST SETUP

APPENDIX B: PHOTOGRAPHS OF EUT

Refer to the Report No.: AGC12996210902AP03

----END OF REPORT----

Statement

1. This report is invalid without the special seal for report of AGC and the signatures of approver.

2. This report is invalid if it is blotted out and deleted.

3. If the applicant has any questions about results, shall submit to AGC within 15 days.

4. This report is responsible for the sample provided by the client only.

5. This report shall not be reproduced except in full, or extracted without the written approval of AGC.

6. This report photocopy is invalid without the red chop.

Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

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.