FCC TEST REPORT

FOR

Shenzhen Maono Technology Co., Ltd.

Wireless microphone

Test Model: AU-WM800

Additional Model No.: Please refer to page 6

Prepared for	:	Shenzhen Maono Technology Co., Ltd.
Address	:	4B, Building No. 45, Software Town of Universiade, No. 8288 Longgang Rd., Longgang District, Shenzhen China
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd
Address	:	Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
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Web	:	www.LCS-cert.com
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Date of receipt of test sample	:	November 10, 2020
Number of tested samples	:	2
Sample No.		201105096A-1, 201105096A-2
Serial number	:	Prototype
Date of Test	:	November 10, 2020 ~ November 25, 2020
Date of Report	:	November 30, 2020

FCC TEST REPORT FCC CFR 47 PART 15 C(15.249)	
Report Reference No. ..... :	**LCS201105096AEA**
Date of Issue..... :	November 30, 2020
Testing Laboratory Name..... :	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address..... :	Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure..... :	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name..... :	**Shenzhen Maono Technology Co., Ltd.**
Address..... :	4B, Building No. 45, Software Town of Universiade, No. 8288 Longgang Rd., Longgang District, Shenzhen China
Test Specification	
Standard..... :	FCC CFR 47 PART 15 C(15.249)
Test Report Form No..... :	LCSEMC-1.0
TRF Originator..... :	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF..... :	Dated 2011-03

Test Item Description..... :	**Wireless microphone**
Trade Mark..... :	Maono
Model/ Type reference..... :	AU-WM800
Ratings..... :	Input: DC 5V DC 3.7V by Rechargeable Li-ion Battery 350mAh
Result ..... :	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Jayden Zhuo/ Administrators	Jin Wang/ Technique principal	Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : LCS201105096AEA	November 30, 2020 Date of issue

Type / Model.....	:	AU-WM800
EUT.....	:	Wireless microphone
Applicant.....	**:**	**Shenzhen Maono Technology Co., Ltd.**
Address.....	:	4B, Building No. 45, Software Town of Universiade, No. 8288 Longgang Rd., Longgang District, Shenzhen China
Telephone.....	:	/
Fax.....	:	/
Manufacturer.....	**:**	**SHENZHEN DING CHUANG SMART MANUFACTURING CO., LTD.**
Address.....	:	3/F NO. 1 AOXIANG ROAD, ZHANGBEI COMMUNITY, LONGCHENG STREET, LONGGANG DISTRICT, SHENZHEN, GUANGDONG, CHINA
Telephone.....	:	/
Fax.....	:	/
Factory.....	**:**	**/**
Address.....	:	/
Telephone.....	:	/
Fax.....	:	/

Test Result	Positive

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	November 30, 2020	Initial Issue	Gavin Liang

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Wireless microphone
Test Model	:	AU-WM800
List Model No.	:	AU-WM820, AU-WM830
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested.
Hardware Version	:	A.2
Software Version	:	A.0
Power Supply	:	Input: DC 5V DC 3.7V by Rechargeable Li-ion Battery 350mAh
Transmit		
Transmit Frequency	:	2406MHz~2478MHz (2406MHz, 2407MHz, 2410.5MHz, 2414MHz, 2417.5MHz, 2421MHz, 2424.5MHz, 2428MHz, 2431.5MHz, 2435MHz, 2438.5MHz, 2440MHz, 2442MHz, 2445.5MHz, 2449MHz, 2452.5MHz, 2456MHz, 2459.5MHz, 2463MHz, 2466.5MHz, 2470MHz, 2473.5MHz, 2477MHz, 2478MHz)
Number of Channels	:	24
Modulation Type	:	FM
Antenna Description	:	PCB Antenna, 0dBi(Max.)

1.2. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
---	Adapter	BY-075W03SX	--	FCC

Note: product sales without adapter

1.3. External I/O

I/O Port Description	Quantity	Cable
Microphone port	2	N/A
Type-C Port	2	USB Cable: 0.8m, unshielded

1.4. Description of Test Facility

Site Description
EMC Lab. : NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
CNAS Registration Number is L4595.

1.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.6. Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	±3.10dB	(1)
		30MHz~200MHz	±2.96dB	(1)
		200MHz~1000MHz	±3.10dB	(1)
		1GHz~26.5GHz	±4.00dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	±1.63dB	(1)
Power disturbance	:	30MHz~300MHz	±1.60dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.7. Description of Test Modes

The EUT operates in the unlicensed ISM band at 902~928MHz. The following operating modes were applied for the related test items. And the new battery is used during the measurement.
The EUT received DC 3.0V by new battery.
All test modes were tested, only the result of the worst case was recorded in the report.

The EUT is considered a portable unit; it was pre-tested on the positioned of each 3 axis. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

Mode of Operations	Transmitting Frequency (MHz)
FM	2406MHz~2478MHz
For Conducted Emission	
Test Mode	/
For Radiated Emission	
Test Mode	TX Mode

***Note: Using a temporary antenna connector for the EUT when the conducted measurements(Band Edges Measurement and 20 dB Bandwidth) are performed.

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd.

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.249 under the FCC Rules Part 15 Subpart C.

2.3. General Test Procedures

2.3.1 Conducted Emissions (N/A)

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013

2.4. Test Sample

The application provides 2 samples to meet requirement;

Sample Number	Description
Sample 1(201105096A-1)	Engineer sample – continuous transmit
Sample 2(201105096A-2)	Normal sample – Intermittent transmit

3. CONNECTION DIAGRAM OF TEST SYSTEM

3.1. Justification

The system was configured for testing in a continuous transmit condition.

3.2. EUT Exercise Software

EUT will transmit while power on.

3.3. Special Accessories

N/A

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207(a)	Conduction Emissions	Compliant
§15.205(a), §15.209(a), §15.249(a), §15.249(c)	Radiated Emissions Measurement	Compliant
§15.249	Band Edges Measurement	Compliant
§15.249, §15.215	20 dB Bandwidth	Compliant

5. SUMMARY OF TEST EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Meter	R&S	NRVS	100444	2020-06-22	2021-06-21
2	Power Sensor	R&S	NRV-Z81	100458	2020-06-22	2021-06-21
3	Power Sensor	R&S	NRV-Z32	10057	2020-06-22	2021-06-21
4	Test Software	Tonscend	JS1120-2	/	N/A	N/A
5	RF Control Unit	Tonscend	JS0806-2	N/A	2020-06-22	2021-06-21
6	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2020-11-20	2021-11-19
7	DC Power Supply	Agilent	E3642A	N/A	2020-11-12	2021-11-11
8	EMI Test Software	AUDIX	EZ	/	N/A	N/A
9	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2020-09-26	2022-09-25
10	Positioning Controller	MF	MF-7082	N/A	2020-06-22	2021-06-21
11	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-07-26	2021-07-25
12	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2021-07-25
13	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2021-07-01
14	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2020-09-20	2021-09-19
15	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2020-06-22	2021-06-21
16	EMI Test Receiver	R&S	ESR 7	101181	2020-06-22	2021-06-21
17	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2020-11-12	2021-11-11
18	Broadband Preamplifier	/	BP-01M18G	P190501	2020-06-22	2021-06-21
19	RF Cable-R03m	Jye Bao	RG142	CB021	2020-06-22	2021-06-21
20	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2020-06-22	2021-06-21
21	6dB Attenuator	/	100W/6dB	1172040	2020-06-22	2021-06-21
22	3dB Attenuator	/	2N-3dB	/	2020-06-22	2021-06-21
23	EMI Test Receiver	R&S	ESPI	101840	2020-06-22	2021-06-21
24	Artificial Mains	R&S	ENV216	101288	2020-06-22	2021-06-21
25	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	2020-06-22	2021-06-21
Note: All equipment is calibrated through CHINA CEPREI LABORATORY and GUANGZHOU LISAI CALIBRATION AND TEST CO., LTD.						

6. ANTENNA REQUIREMENT

6.1. Standard Applicable

According to antenna requirement of §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. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

6.2. Antenna Connected Construction

6.2.1. Standard Applicable

According to § 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.

6.2.2. Antenna Connector Construction

The directional gains of antenna used for transmitting is 0 dBi, and the antenna is connect to PCB board and no consideration of replacement. Please see EUT photo for details.

6.2.3. Results: Compliance.

7. AC POWER LINE CONDUCTED EMISSIONS

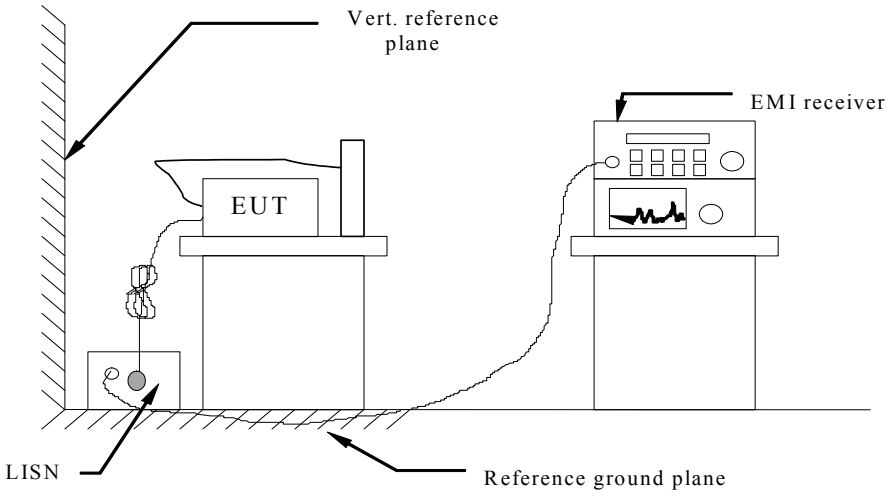
7.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

* Decreasing linearly with the logarithm of the frequency

7.2 Block Diagram of Test Setup



7.3 Test Results

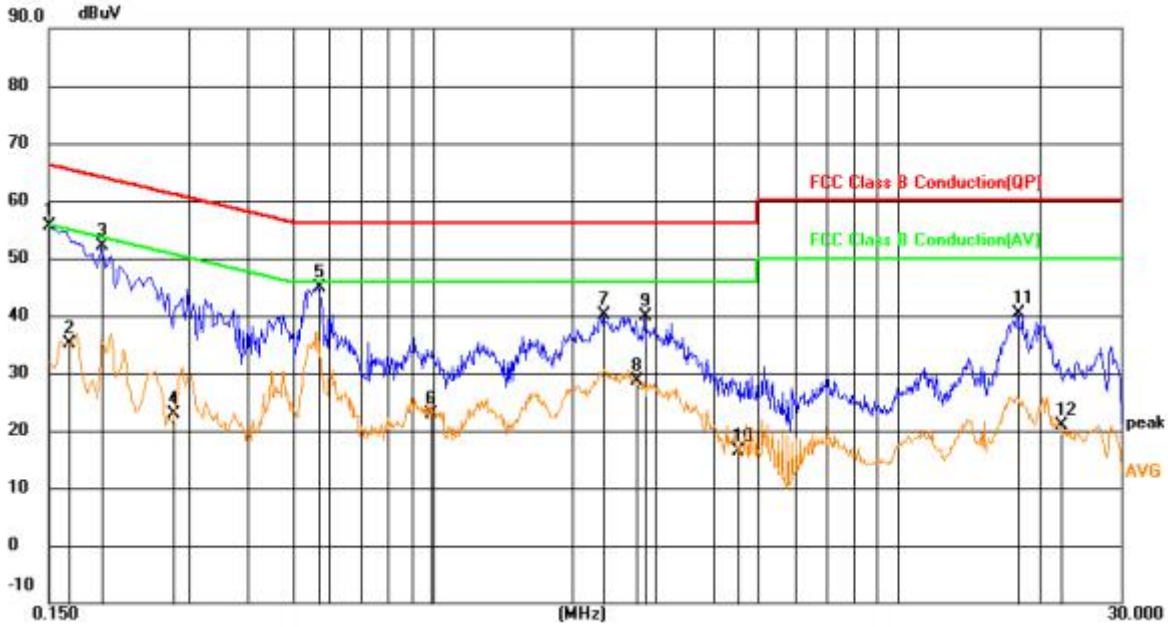
PASS

The test data please refer to following page.

Temperature	23.3℃	Humidity	53.7%
Test Engineer	Diamond Lu	Configurations	

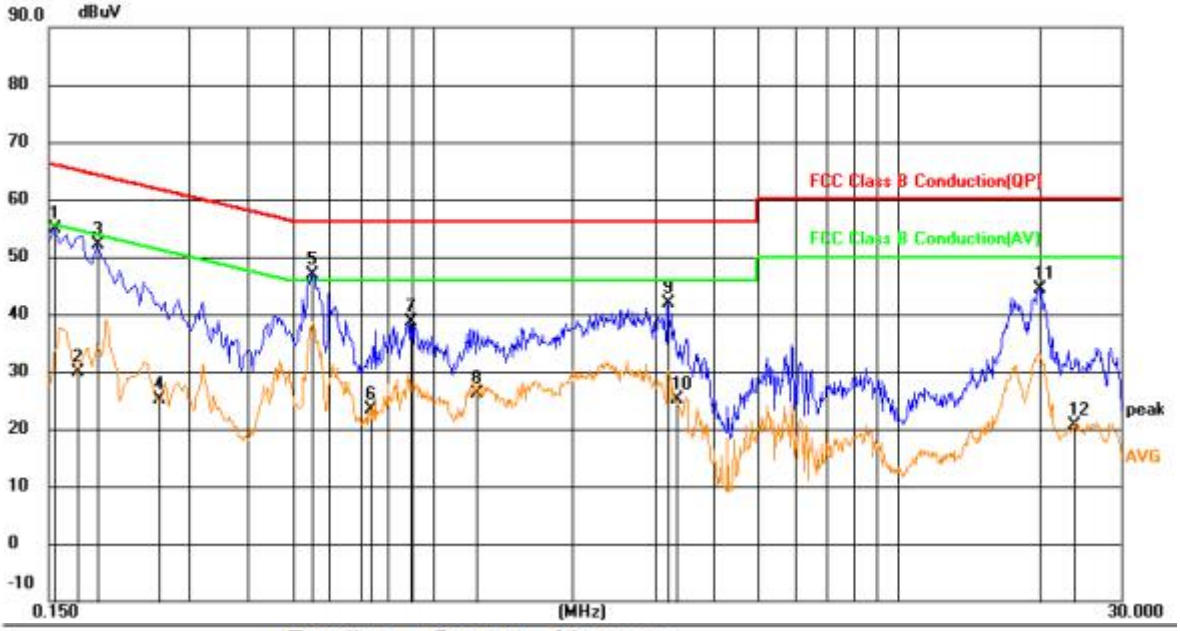
AC Conducted Emission of powered by charge power adaptor mode @ AC 120V/60Hz (worst case)

Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1500	36.39	19.14	55.53	66.00	-10.47	QP	
2		0.1658	15.89	19.16	35.05	55.17	-20.12	AVG	
3		0.1949	32.86	19.17	52.03	63.83	-11.80	QP	
4		0.2787	3.73	19.25	22.98	50.85	-27.87	AVG	
5		0.5684	25.58	19.30	44.88	56.00	-11.12	QP	
6		0.9913	3.65	19.27	22.92	46.00	-23.08	AVG	
7		2.3322	20.61	19.43	40.04	56.00	-15.96	QP	
8		2.7419	9.11	19.46	28.57	46.00	-17.43	AVG	
9		2.8500	20.43	19.46	39.89	56.00	-16.11	QP	
10		4.5015	-3.03	19.48	16.45	46.00	-29.55	AVG	
11		17.9564	19.99	20.27	40.26	60.00	-19.74	QP	
12		22.1909	0.64	20.27	20.91	50.00	-29.09	AVG	

Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1544	35.81	19.14	54.95	65.76	-10.81	QP	
2		0.1724	10.82	19.16	29.98	54.84	-24.86	AVG	
3		0.1905	32.97	19.17	52.14	64.01	-11.87	QP	
4		0.2587	5.82	19.24	25.06	51.47	-26.41	AVG	
5	*	0.5503	27.67	19.32	46.99	56.00	-9.01	QP	
6		0.7347	4.08	19.30	23.38	46.00	-22.62	AVG	
7		0.8969	19.28	19.29	38.57	56.00	-17.43	QP	
8		1.2388	6.94	19.28	26.22	46.00	-19.78	AVG	
9		3.2053	22.30	19.46	41.76	56.00	-14.24	QP	
10		3.3405	5.56	19.46	25.02	46.00	-20.98	AVG	
11		20.1299	24.43	20.04	44.47	60.00	-15.53	QP	
12		23.8380	0.56	20.09	20.65	50.00	-29.35	AVG	

****Note: 1). Pre-scan all modes and recorded the worst case results in this report*
2). Margin=Reading level + Correct - Limit

8. RADIATED EMISSION MEASUREMENT

8.1. Standard Applicable

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
\1\ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293.	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(\2\)
13.36-13.41			

\1\ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

\2\ Above 38.6

According to §15.249 (a): Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

* Field strength limits are specified at a distance of 3 meters.
* As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section 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. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.
* Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

8.2. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB/VB 200Hz/1KHz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB/VB 120kHz/1MHz for QP

8.3. Test Procedure

1) Sequence of testing 9 kHz to 30 MHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna height is 0.8 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

2) Sequence of testing 30 MHz to 1 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1 GHz to 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

4) Sequence of testing above 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

Premeasurement:

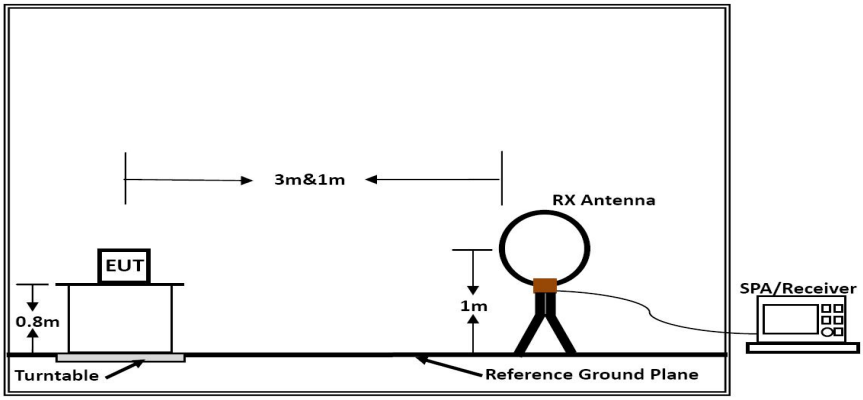
--- The antenna is moved spherical over the EUT in different polarisations of the antenna.

Final measurement:

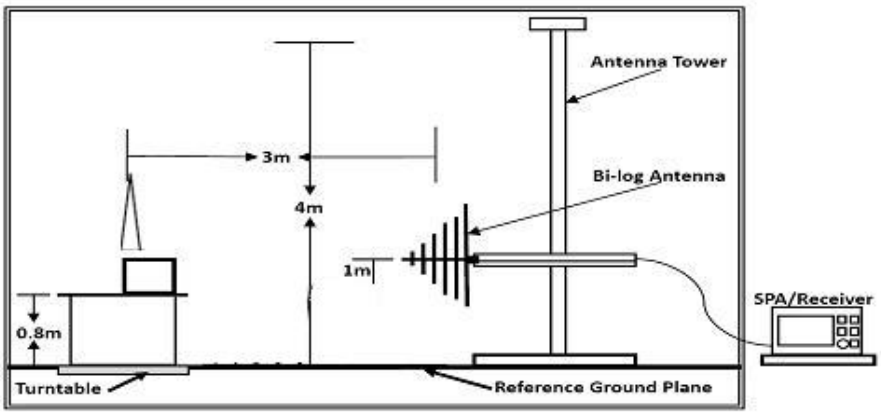
--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

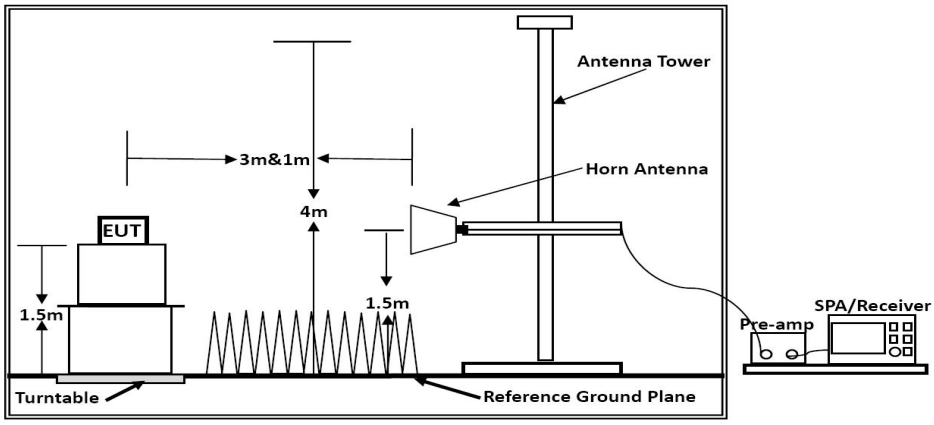
8.4. Block Diagram of Test Setup



Below 30MHz



Below 1GHz



Above 1GHz

Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1m]) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

8.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

8.6. Test Results

Results of Radiated Emissions (9 KHz~30MHz)

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Over Limit (dBuV)	Remark
---	--	---	---	See Note

Note:

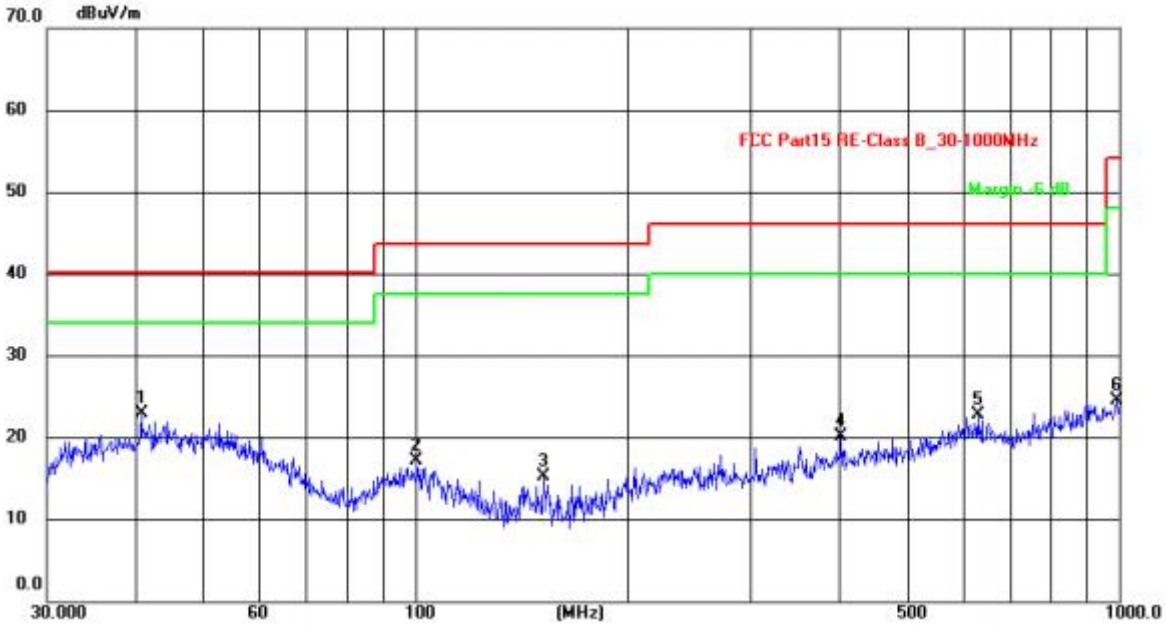
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.

Results of Radiated Emissions (30MHz~1000MHz)

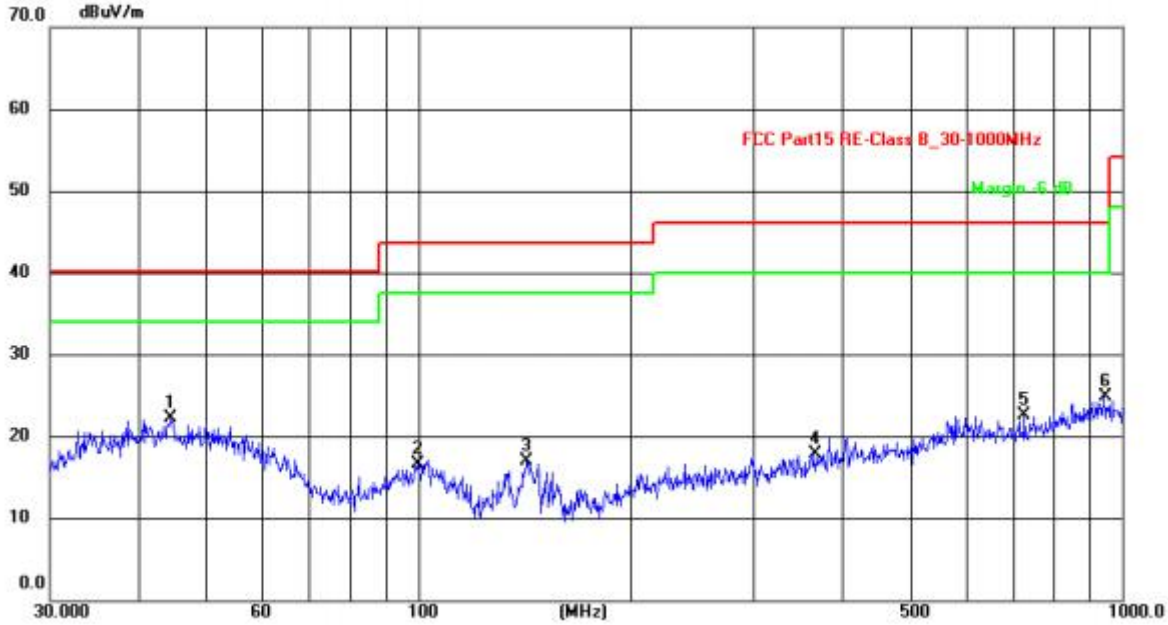
Temperature	24.6℃	Humidity	54.1%
Test Engineer	Diamond Lu	Configurations	FM

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	40.8446	51.79	-28.85	22.94	40.00	-17.06	QP
2	100.5806	47.36	-30.13	17.23	43.50	-26.27	QP
3	152.1297	49.21	-33.89	15.32	43.50	-28.18	QP
4	403.2500	45.13	-24.88	20.25	46.00	-25.75	QP
5	629.4772	43.99	-21.08	22.91	46.00	-23.09	QP
6	993.0114	42.94	-18.27	24.67	54.00	-29.33	QP

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	44.5868	50.52	-28.25	22.27	40.00	-17.73	QP
2	99.8777	46.87	-30.12	16.75	43.50	-26.75	QP
3	142.8243	51.41	-34.30	17.11	43.50	-26.39	QP
4	365.5391	43.77	-25.76	18.01	46.00	-27.99	QP
5	726.8052	43.73	-21.01	22.72	46.00	-23.28	QP
6	942.1305	43.52	-18.56	24.96	46.00	-21.04	QP

Note:

1). Pre-scan all modes and recorded the worst case results in this report.

2). Emission level (dBuV/m) = 20 log Emission level (uV/m).

3). Corrected Reading: Antenna Factor + Cable Loss + Read Level = Level.

Field Strength Of Fundamental						
Frequency (MHz)	Pol.	Measure Result (PK, dBuV/m)	Measure Result (AVG, dBuV/m)	Peak Limit (dBuV/m)	AVG Limit (dBuV/m)	Result
2406	H	90.76	78.14	114	94	Pass
2406	V	87.26	78.09	114	94	Pass

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4812.67	57.02	33.06	35.04	3.94	58.98	74.00	-15.02	Peak	Horizontal
4812.55	41.16	33.06	35.04	3.94	43.12	54.00	-10.88	Average	Horizontal
4812.46	57.57	33.06	35.04	3.94	59.53	74.00	-14.47	Peak	Vertical
4812.28	42.31	33.06	35.04	3.94	44.27	54.00	-9.73	Average	Vertical

Field Strength Of Fundamental						
Frequency (MHz)	Pol.	Measure Result (PK, dBuV/m)	Measure Result (AVG, dBuV/m)	Peak Limit (dBuV/m)	AVG Limit (dBuV/m)	Result
2440	H	90.16	77.35	114	94	Pass
2440	V	87.09	77.28	114	94	Pass

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4880.68	55.35	33.16	35.15	3.96	57.32	74.00	-16.68	Peak	Horizontal
4880.45	42.34	33.16	35.15	3.96	44.31	54.00	-9.69	Average	Horizontal
4880.47	55.23	33.16	35.15	3.96	57.20	74.00	-16.80	Peak	Vertical
4880.55	44.09	33.16	35.15	3.96	46.06	54.00	-7.94	Average	Vertical

Field Strength Of Fundamental						
Frequency (MHz)	Pol.	Measure Result (PK, dBuV/m)	Measure Result (AVG, dBuV/m)	Peak Limit (dBuV/m)	AVG Limit (dBuV/m)	Result
2478	H	90.27	77.83	114	94	Pass
2478.	V	87.29	77.90	114	94	Pass

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4956.67	54.43	33.26	35.14	3.98	56.53	74.00	-17.47	Peak	Horizontal
4956.53	46.72	33.26	35.14	3.98	48.82	54.00	-5.18	Average	Horizontal
4956.61	54.94	33.26	35.14	3.98	57.04	74.00	-16.96	Peak	Vertical
4956.45	46.51	33.26	35.14	3.98	48.61	54.00	-5.39	Average	Vertical

Notes:

1). Measuring frequencies from 9 KHz~10th harmonic or 26.5GHz (which is less), No emission found between lowest internal used/generated frequency to 30MHz.
2). Radiated emissions measured in frequency range from 9 KHz~10th harmonic or 26.5GHz (which is less) were made with an instrument using Peak detector mode.
3). Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4). Measured radiated emission used band 2.4G filter in order to avoid spectrum overload.

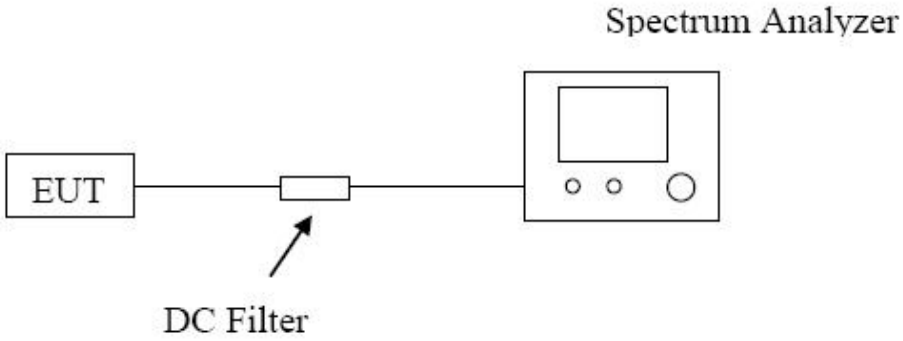
5). Corrected Reading: Antenna Factor + Cable Loss + Read Level = Level.

9. BANDEDGES MEASUREMENT

9.1. Standard Applicable

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

9.2. Block Diagram of Test Setup



9.3. Test Procedure

The EUT is placed on a turntable, which is 0.8m above the ground plane. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

Peak: RBW=120MHz, RBW=300MHz / Sweep=AUTO

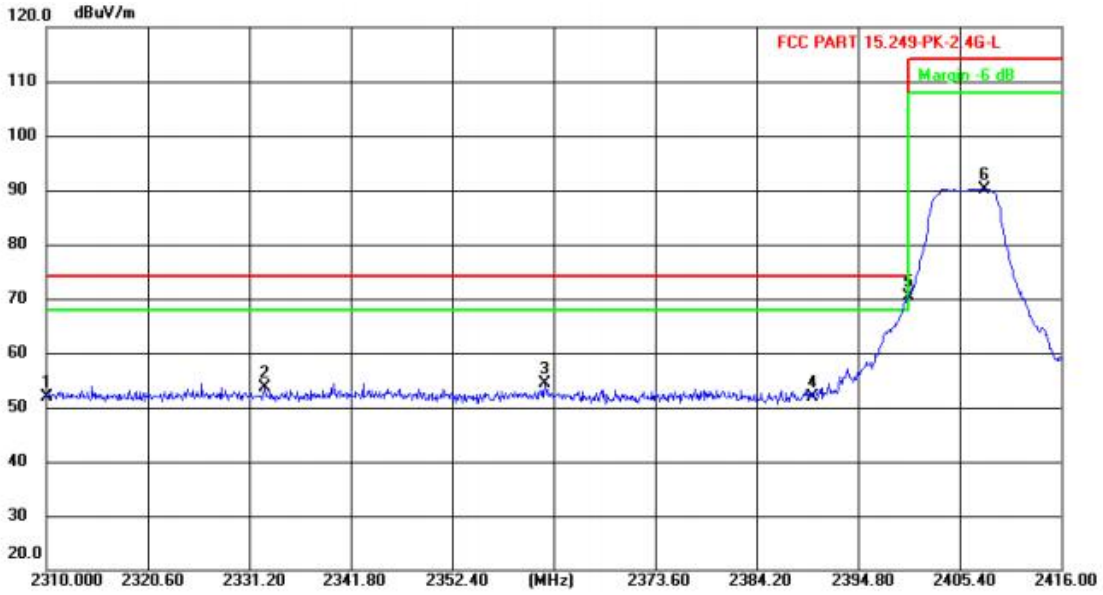
Repeat the procedures until the peak versus polarization are measured.

9.4. Test Results

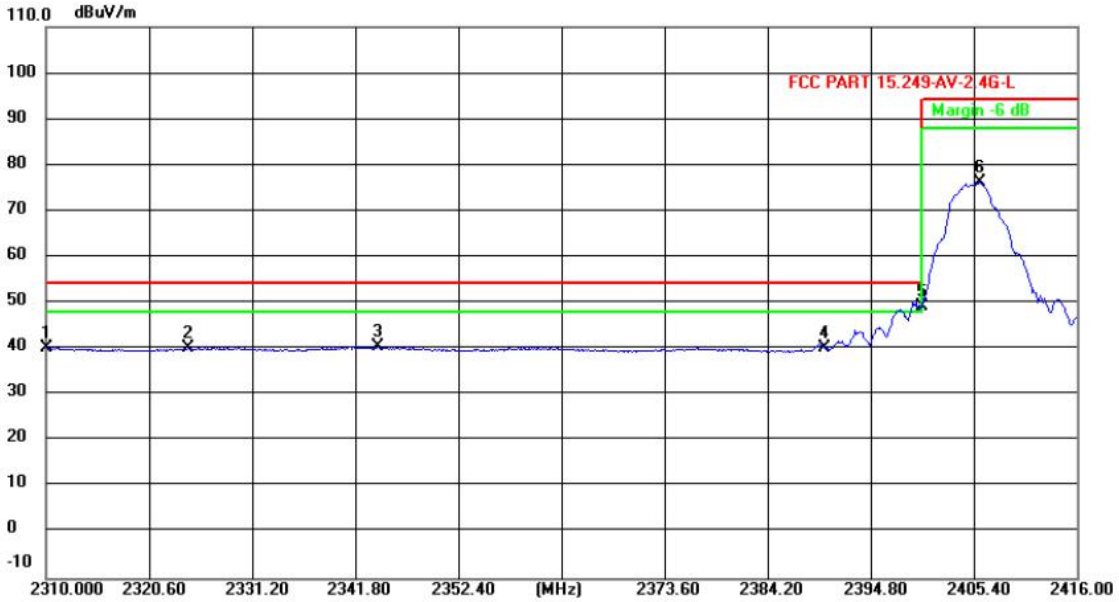
Temperature	24.6℃	Humidity	54.1%
Test Engineer	Diamond Lu	Configurations	FM

Test Mode	Frequency	Limit	Result
	MHz	dBuV/dBc	
Lowest	2406	<46dBuV	Pass
Highest	2478	<46dBuV	Pass

Test Result of 2406MHz:
Horizontal:

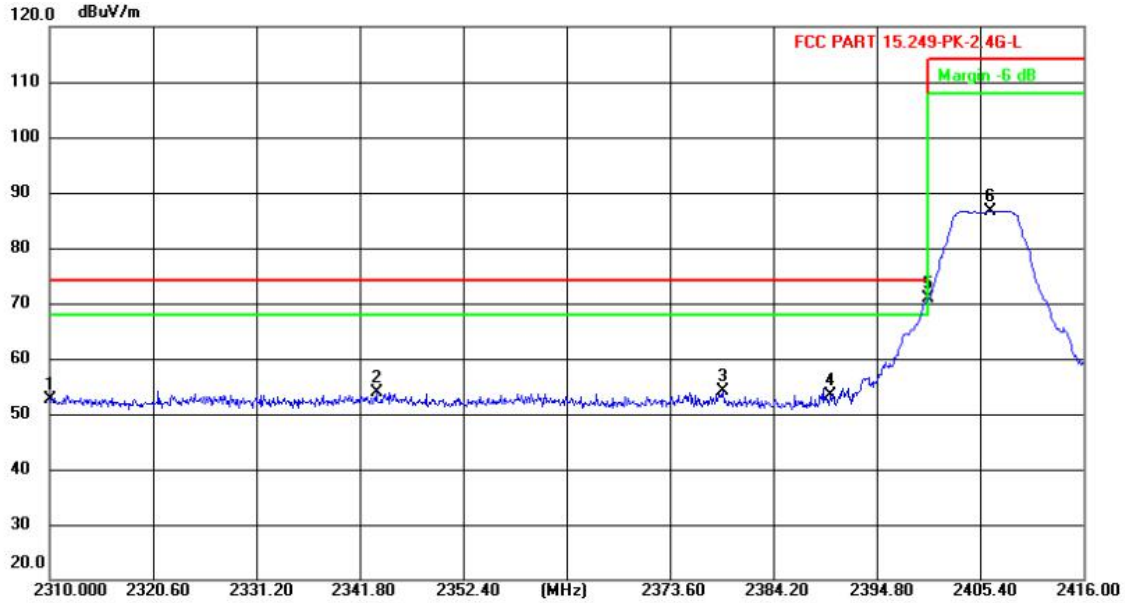


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2310.000	90.79	-38.87	51.92	74.00	-22.08	peak
2	2332.790	92.39	-38.86	53.53	74.00	-20.47	peak
3	2362.046	93.22	-38.84	54.38	74.00	-19.62	peak
4	2390.000	90.62	-38.82	51.80	74.00	-22.20	peak
5	2400.000	109.17	-38.82	70.35	74.00	-3.65	peak
6	2408.050	129.04	-38.82	90.22	114.00	-23.78	peak

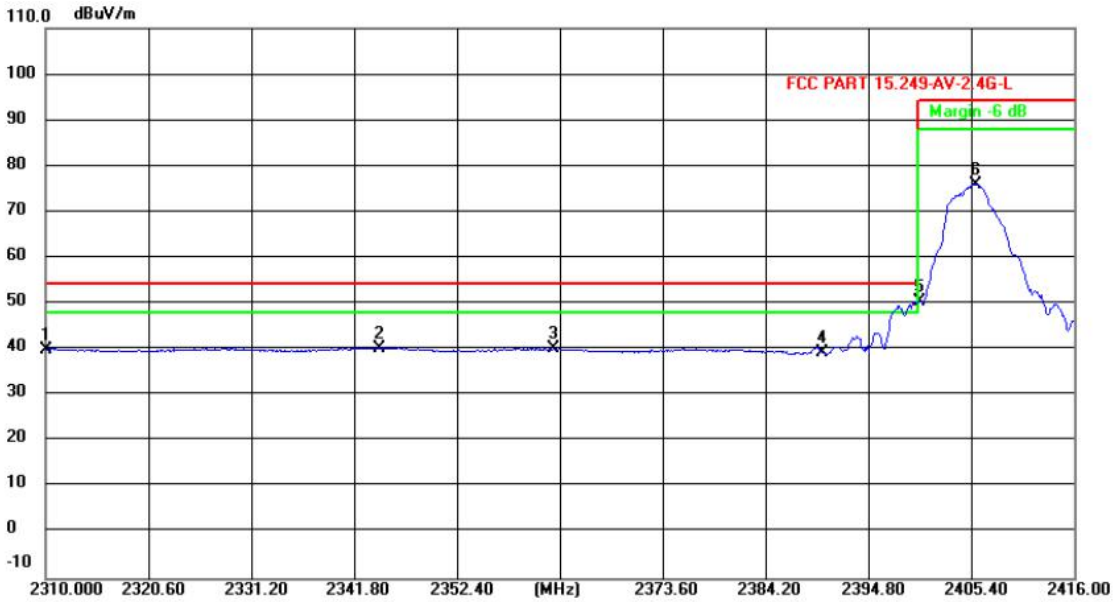


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2310.000	78.98	-38.87	40.11	54.00	-13.89	AVG
2	2324.628	79.14	-38.86	40.28	54.00	-13.72	AVG
3	2344.132	79.30	-38.85	40.45	54.00	-13.55	AVG
4	2390.000	79.15	-38.82	40.33	54.00	-13.67	AVG
5	2400.000	88.17	-38.82	49.35	54.00	-4.65	AVG
6	2406.036	115.01	-38.82	76.19	94.00	-17.81	AVG

Vertical:

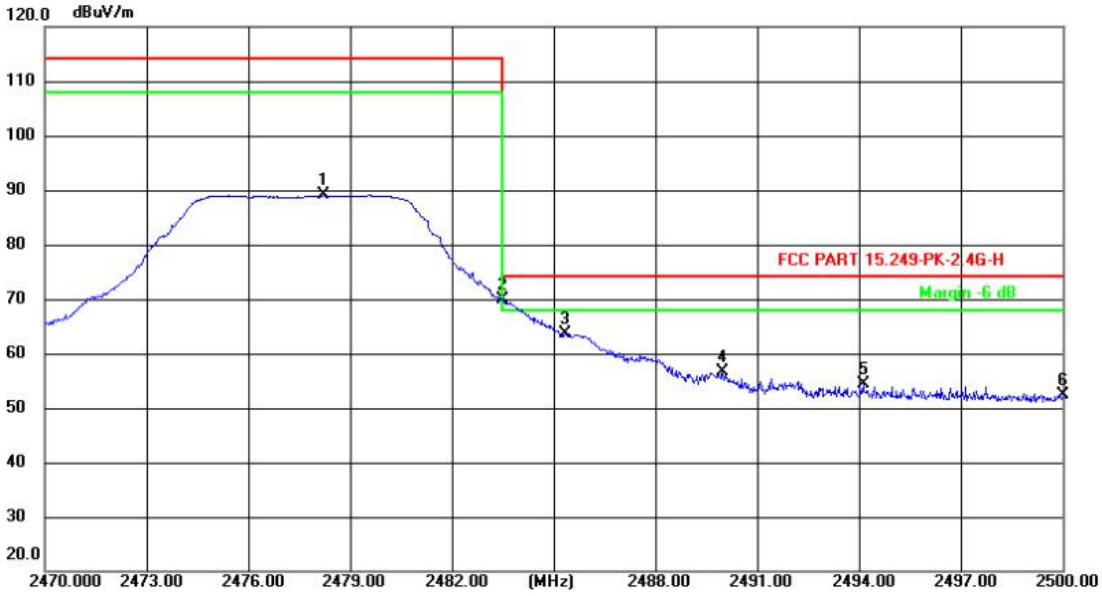


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2310.000	91.40	-38.87	52.53	74.00	-21.47	peak
2	2343.496	92.74	-38.85	53.89	74.00	-20.11	peak
3	2379.006	92.88	-38.83	54.05	74.00	-19.95	peak
4	2390.000	92.31	-38.82	53.49	74.00	-20.51	peak
5	2400.000	109.67	-38.82	70.85	74.00	-3.15	peak
6	2406.460	125.55	-38.82	86.73	114.00	-27.27	peak

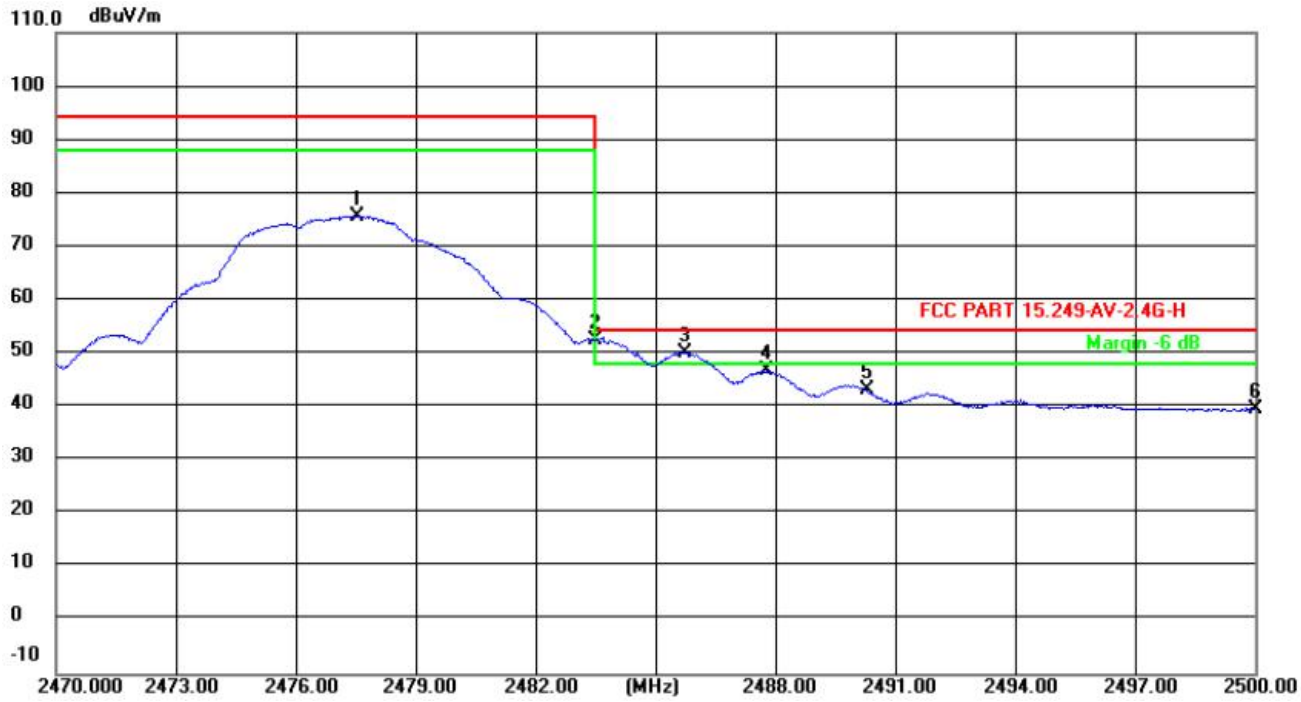


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2310.000	78.97	-38.87	40.10	54.00	-13.90	AVG
2	2344.344	79.25	-38.85	40.40	54.00	-13.60	AVG
3	2362.364	79.16	-38.84	40.32	54.00	-13.68	AVG
4	2390.000	78.29	-38.82	39.47	54.00	-14.53	AVG
5	2400.000	89.17	-38.82	50.35	54.00	-3.65	AVG
6	2405.930	114.91	-38.82	76.09	94.00	-17.91	AVG

Test Result of 2478MHz:
Horizontal:

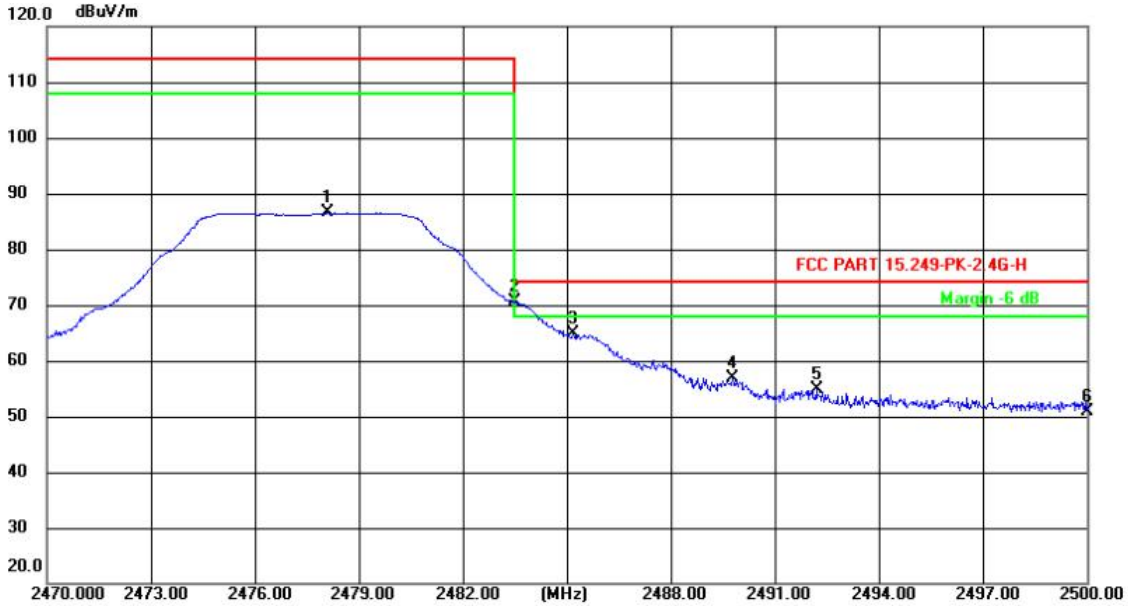


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2478.220	127.82	-38.76	89.06	114.00	-24.94	peak
2	2483.500	108.59	-38.76	69.83	74.00	-4.17	peak
3	2485.330	102.47	-38.76	63.71	74.00	-10.29	peak
4	2489.980	95.44	-38.75	56.69	74.00	-17.31	peak
5	2494.120	93.08	-38.75	54.33	74.00	-19.67	peak
6	2500.000	91.23	-38.74	52.49	74.00	-21.51	peak

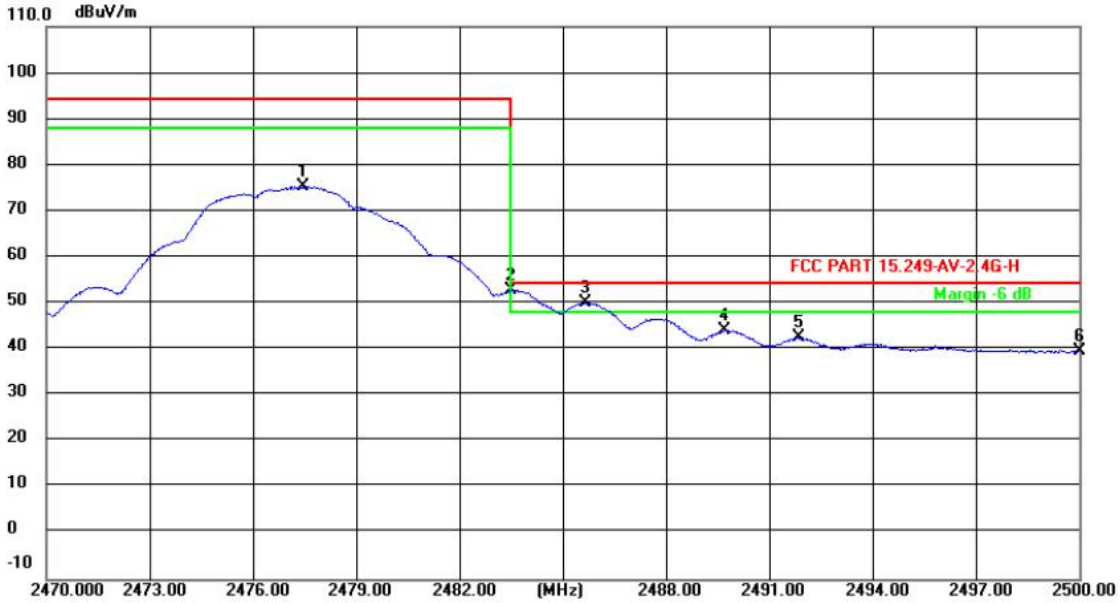


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2477.530	114.50	-38.76	75.74	94.00	-18.26	AVG
2	2483.500	91.42	-38.76	52.66	54.00	-1.34	AVG
3	2485.750	89.05	-38.76	50.29	54.00	-3.71	AVG
4	2487.760	85.53	-38.75	46.78	54.00	-7.22	AVG
5	2490.280	81.96	-38.75	43.21	54.00	-10.79	AVG
6	2500.000	78.35	-38.74	39.61	54.00	-14.39	AVG

Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2478.100	125.28	-38.76	86.52	114.00	-27.48	peak
2	2483.500	109.34	-38.76	70.58	74.00	-3.42	peak
3	2485.180	103.58	-38.76	64.82	74.00	-9.18	peak
4	2489.770	95.56	-38.75	56.81	74.00	-17.19	peak
5	2492.200	93.59	-38.75	54.84	74.00	-19.16	peak
6	2500.000	89.71	-38.74	50.97	74.00	-23.03	peak



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2477.440	114.06	-38.76	75.30	94.00	-18.70	AVG
2	2483.500	91.58	-38.76	52.82	54.00	-1.18	AVG
3	2485.660	88.93	-38.76	50.17	54.00	-3.83	AVG
4	2489.710	82.97	-38.75	44.22	54.00	-9.78	AVG
5	2491.870	81.39	-38.75	42.64	54.00	-11.36	AVG
6	2500.000	78.35	-38.74	39.61	54.00	-14.39	AVG

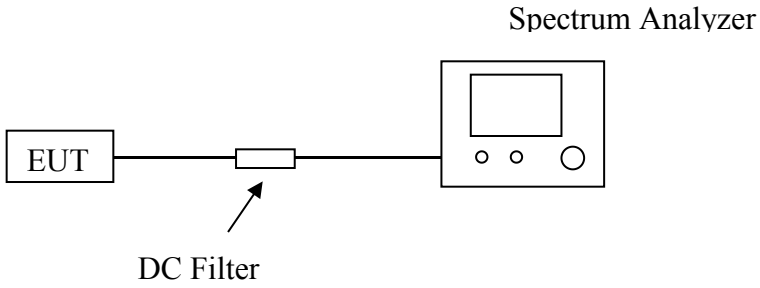
Note: Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

10. 20 DB BANDWIDTH MEASUREMENT

10.1. Standard Applicable

According to §15.215

10.2. Block Diagram of Test Setup



10.3. Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel

RBW = 1% to 5% of the 20 dB bandwidth

VBW =3 RBW

Sweep = auto

Detector function = peak

Trace = max hold

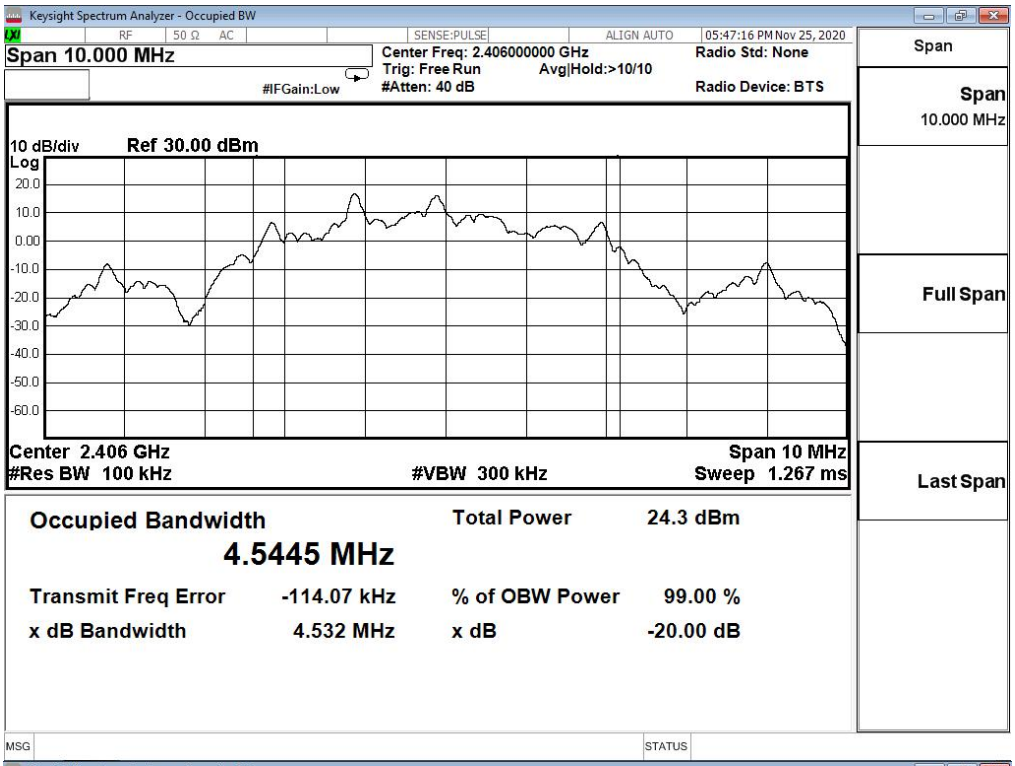
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

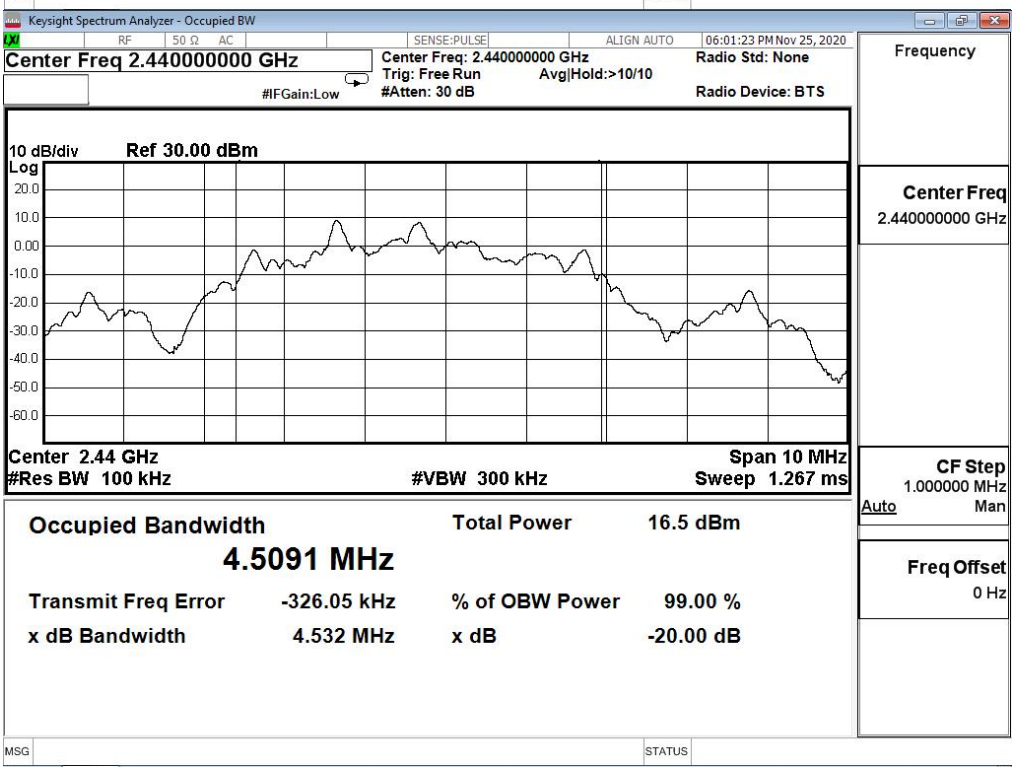
10.4. Test Results

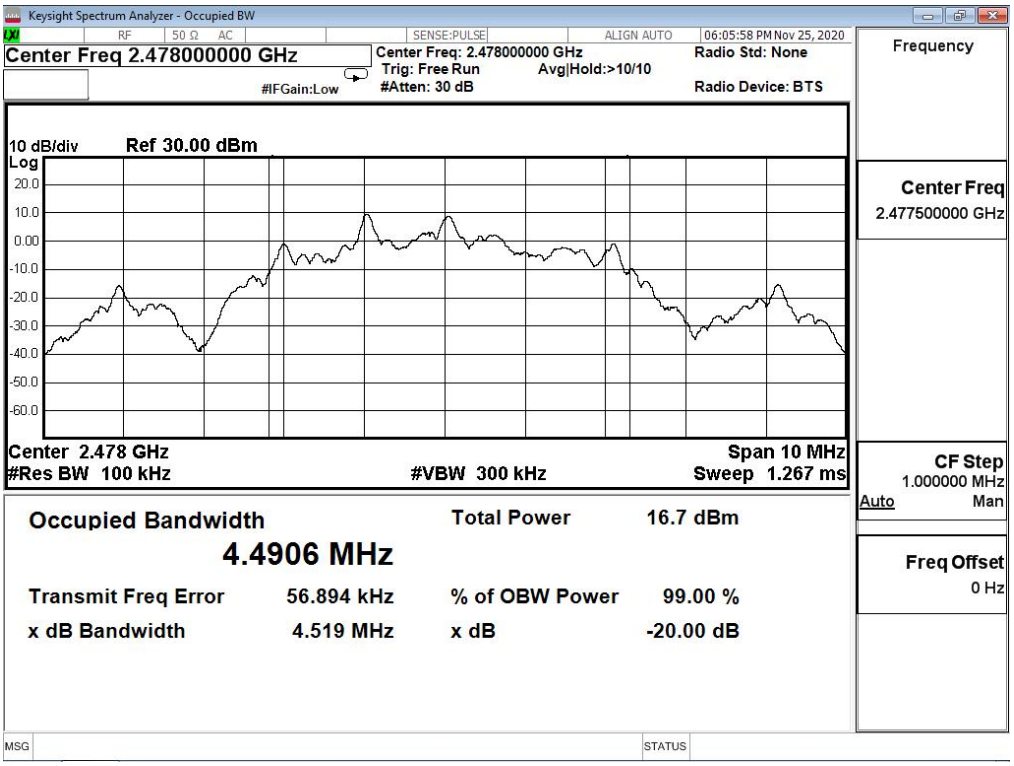
Please refer to the following page.
Result: Pass

Temperature	24.6℃	Humidity	54.1%
Test Engineer	Diamond Lu	Configurations	FM

Test Result Of 20dB Bandwidth Measurement		
Test Frequency (MHz)	20dB Bandwidth (MHz)	Limit (MHz)
2406	4.532	Non-Specified
2440	4.532	Non-Specified
2478	4.519	Non-Specified






Keysight Spectrum Analyzer - Occupied BW
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
06:05:58 PM Nov 25, 2020
Center Freq 2.478000000 GHz
Center Freq: 2.478000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Log
Ref 30.00 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Center Freq
2.477500000 GHz
Center 2.478 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10 MHz
Sweep 1.267 ms
CF Step
1.000000 MHz
Auto
Man
Occupied Bandwidth
4.4906 MHz
Total Power 16.7 dBm
Transmit Freq Error 56.894 kHz
% of OBW Power 99.00 %
x dB Bandwidth 4.519 MHz
x dB -20.00 dB
Freq Offset
0 Hz
MSG
STATUS

11.AC Power line conducted emissions

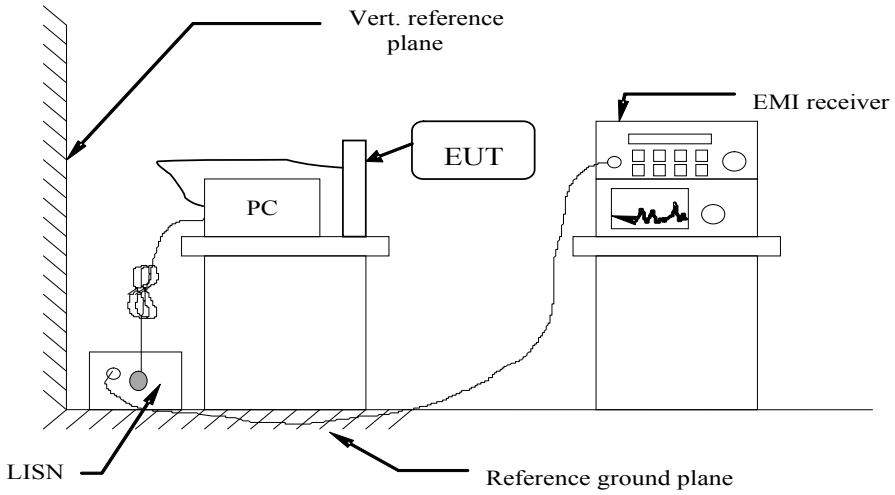
11.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

* Decreasing linearly with the logarithm of the frequency

11.2. Block Diagram of Test Setup



11.3. Test Results

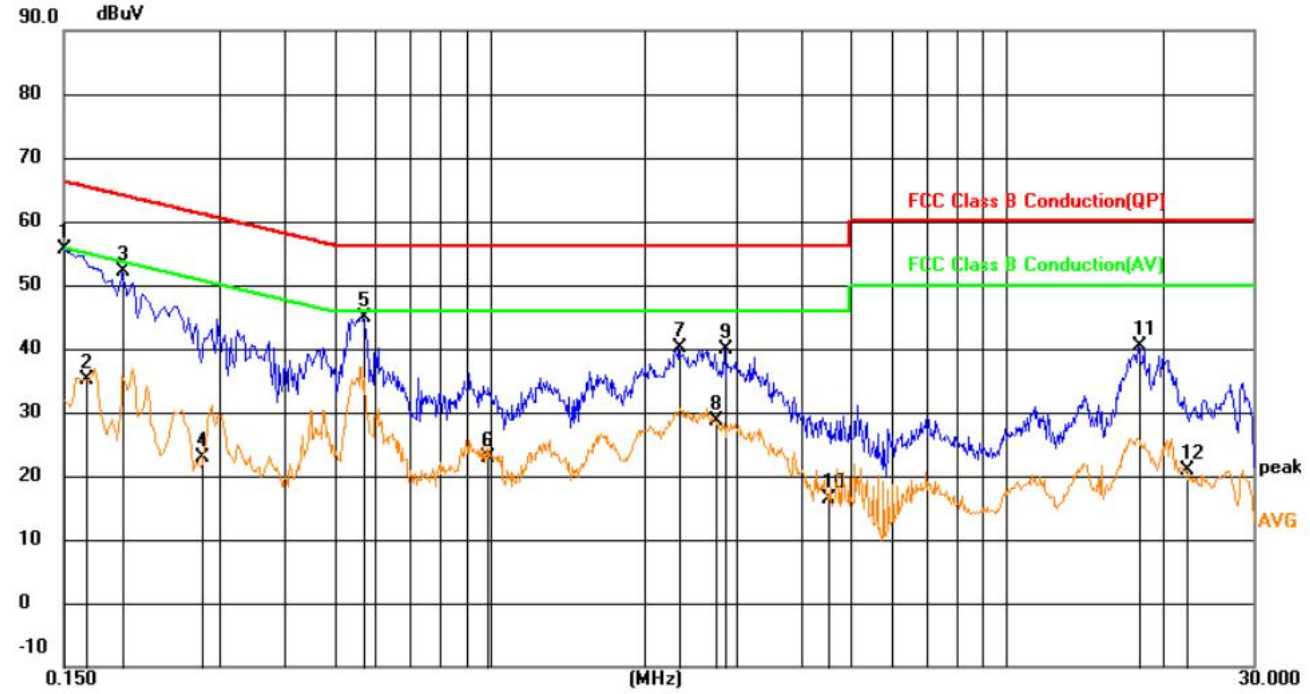
PASS

The test data please refer to following page.

Temperature	23.3℃	Humidity	53.7%
Test Engineer	Diamond Lu	Configurations	FM

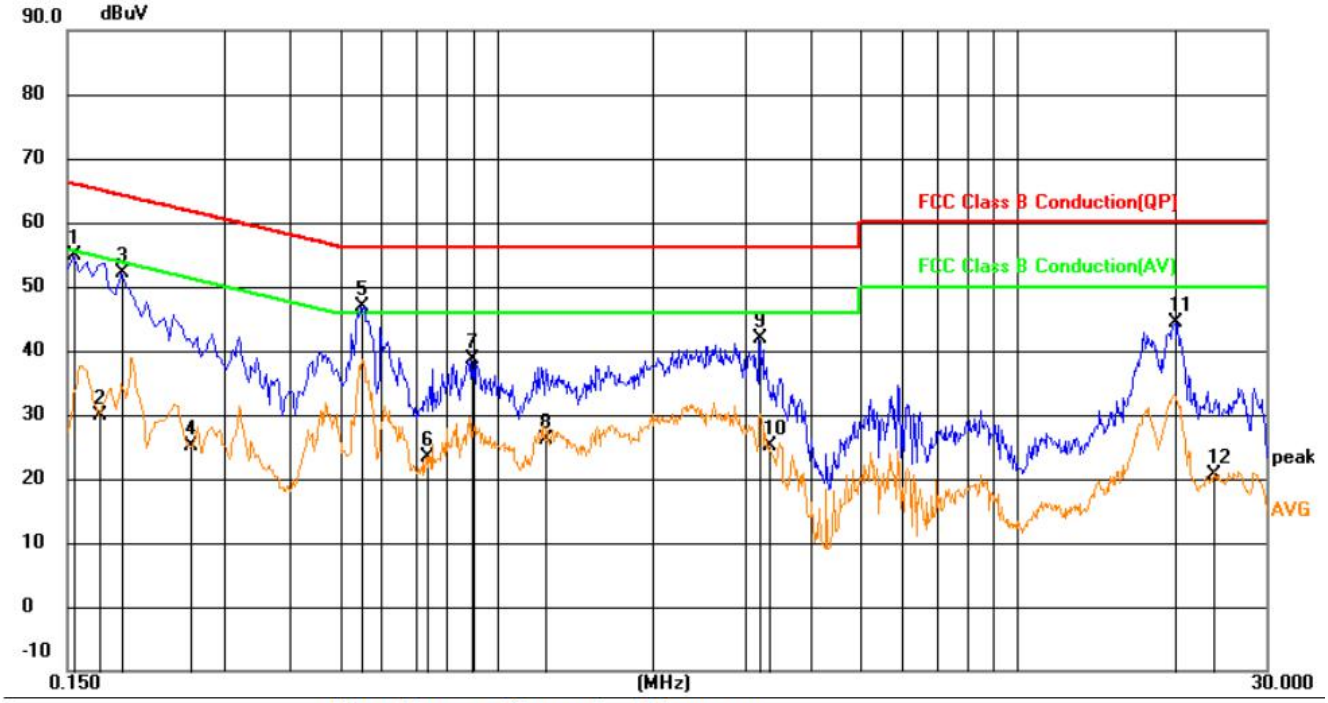
AC Conducted Emission of powered by charge power adaptor mode @ AC 120V/60Hz (worst case)

Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1500	36.39	19.14	55.53	66.00	-10.47	QP	
2		0.1658	15.89	19.16	35.05	55.17	-20.12	AVG	
3		0.1949	32.86	19.17	52.03	63.83	-11.80	QP	
4		0.2787	3.73	19.25	22.98	50.85	-27.87	AVG	
5		0.5684	25.58	19.30	44.88	56.00	-11.12	QP	
6		0.9913	3.65	19.27	22.92	46.00	-23.08	AVG	
7		2.3322	20.61	19.43	40.04	56.00	-15.96	QP	
8		2.7419	9.11	19.46	28.57	46.00	-17.43	AVG	
9		2.8500	20.43	19.46	39.89	56.00	-16.11	QP	
10		4.5015	-3.03	19.48	16.45	46.00	-29.55	AVG	
11		17.9564	19.99	20.27	40.26	60.00	-19.74	QP	
12		22.1909	0.64	20.27	20.91	50.00	-29.09	AVG	

Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1544	35.81	19.14	54.95	65.76	-10.81	QP	
2		0.1724	10.82	19.16	29.98	54.84	-24.86	AVG	
3		0.1905	32.97	19.17	52.14	64.01	-11.87	QP	
4		0.2587	5.82	19.24	25.06	51.47	-26.41	AVG	
5	*	0.5503	27.67	19.32	46.99	56.00	-9.01	QP	
6		0.7347	4.08	19.30	23.38	46.00	-22.62	AVG	
7		0.8969	19.28	19.29	38.57	56.00	-17.43	QP	
8		1.2388	6.94	19.28	26.22	46.00	-19.78	AVG	
9		3.2053	22.30	19.46	41.76	56.00	-14.24	QP	
10		3.3405	5.56	19.46	25.02	46.00	-20.98	AVG	
11		20.1299	24.43	20.04	44.47	60.00	-15.53	QP	
12		23.8380	0.56	20.09	20.65	50.00	-29.35	AVG	

****Note: 1). Pre-scan all modes and recorded the worst case results in this report*
2). Margin=Reading level + Correct - Limit

12. TEST SETUP PhotographS of eut

Please refer to separated files for Test Setup Photos of the EUT.

13. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

14. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

-------THE END OF REPORT----------