TEST REPORT

Product Name : Smart Lock U300
Model Number : DL-D02E, DL-D02D
FCC ID : 2AKIT-DLD02

Prepared for	:	Lumi United Technology Co., Ltd
Address	:	B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China
Prepared by	:	EMTEK (DONGGUAN) CO., LTD.
Address	:	-1&2/F.,Building 2, Zone A, Zhongda Marine Biotechnology Research and Development Base, No.9, Xincheng Avenue, Songshanhu High-technology Industrial Development Zone, Dongguan, Guangdong, China TEL: +86-0769-22807078 FAX: +86-0769-22807079
Report Number	:	EDG2404300196E00403R
Date(s) of Tests	:	April 30, 2024 to May 31, 2024
Date of issue	:	May 31, 2024

Table of Contents

1 TEST RESULT CERTIFICATION

Applicant	:	Lumi United Technology Co., Ltd
Address	:	B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China
Manufacturer	:	Lumi United Technology Co., Ltd
Address	:	B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China
EUT	:	Smart Lock U300
Model Name	:	DL-D02E, DL-D02D
Trademark	:	Aqara

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C	PASS

The above equipment was tested by EMTEK(DONGGUAN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 15.225.

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

Date of Test : April 30, 2024 to May 31, 2024

Prepared by : Warren Deng /Editor

Reviewer : Tim Dong /Supervisor

Approve & Authorized Signer : Sam Lv / Manager

Modified History

Version	Report No.	Revision Date	Summary
	EDG2404300196E00403R	/	Original Report

2 EUT TECHNICAL DESCRIPTION

Characteristics	Description
Product Name:	Smart Lock U300
Model Number:	DL-D02E, DL-D02D All models are the same, except the model name. Here, DL-D02E is selected to test all the test items.
Device Type:	NFC
Modulation:	ASK
Operating Frequency Range(s):	13.110-14.010 MHz
Channel Frequency:	13.56MHz
Number of Channels:	1 channel
Antenna Type :	Coil Antenna
Power supply:	☒ DC 6V from battery ☒ DC 5V from USB
Temperature Range:	Outer Panel:-30° C~55° C(-22° F~+131° F) Inner Panel:-10° C~55° C(14° F~+131° F)

Note: *for more details, please refer to the User's manual of the EUT.*

3 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
2.1049	Occupied Bandwidth	PASS	
15.225(e)	Frequency stability	PASS	
15.225(d) 15.209	Radiated Spurious Emissions	PASS	
15.207	Conducted Emission	PASS	
NOTE1: N/A (Not Applicable)			

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2AKIT-DLD02 filing to comply with Section 15.225 of the FCC Part 15, Subpart C Rules.

4 TEST METHODOLOGY

4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:
FCC 47 CFR Part 2, Subpart J
FCC 47 CFR Part 15, Subpart C

4.2 MEASUREMENT EQUIPMENT USED

Conducted Emission Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCI	100137	2024/4/29	1Year
Signal Analyzer	R&S	FSV30	103039	2024/4/28	1 Year
AMN	Rohde&Schwarz	ENV216	101209	2024/4/28	1Year
AMN	Rohde&Schwarz	ENV216	100017	2024/4/28	1Year
RF Switching Unit	CDS	RSU-M2	38401	2024/4/28	1Year
AMN	Schwarzbeck	NNLK8121	8121-641	2024/4/28	1Year
AMN	Rohde&Schwarz	ESH3-Z6	101101	2024/4/28	1Year
AMN	Rohde&Schwarz	ESH3-Z6	101102	2024/4/28	1Year
Power Splitters & Dividers	Weinschel Associates	WA1506A	A1066	2024/4/28	1Year
Current Probe	FCC	F-52	8377	2024/4/28	1Year
Passive voltage probe	Rohde&Schwarz	ESH2-Z3	100122	2024/4/28	1Year

For Spurious Emissions Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCI	101415	2024/4/28	1Year
Signal Analyzer	R&S	FSV30	103039	2024/4/28	1 Year
Bi-log Hybrid Antenna	Schwarzbeck	VULB9163	141	2024/5/5	1Year
Pre-Amplifie	HP	8447F	OPTH64	2024/4/28	1 Year
Signal Analyzer	R&S	FSV30	103039	2024/4/28	1 Year
Horn Antenna	Schwarzbeck	BBHA9120D	1272	2024/5/5	1Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-567	2024/5/5	1Year
Pre-Amplifie	LUNAR EM	PM1-18-40	J10100000081	2024/4/28	1Year
Loop antenna	Schwarzbeck	FMZB1519	1519-012	2024/5/5	1Year

For other test items:

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Wireless Connectivity Tester	R&S	CMW270	102543	2024/4/29	1Year
Automatic Control Unit	Tonscend	JS0806-2	21I8060480	2024/4/29	1Year
Signal Analyzer	KEYSIGHT	N9010B	MY60242456	2024/4/29	1Year
Analog Signal Generator	KEYSIGHT	N5173B	MY61252625	2024/4/29	1Year
UP/DOWN-Converter	R&S	CMW-Z800A	100274	2024/4/29	1Year
Vector Signal Generator	KEYSIGHT	N5182B	MY61252674	2024/4/29	1Year
Frequency Extender	KEYSIGHT	N5182BX07	MY59362541	2024/4/29	1Year
Temperature&Humidity test chamber	ESPEC	EL-02KA	12107166	2024/4/29	1 Year

Remark: *Each piece of equipment is scheduled for calibration once a year.*

4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.
The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.
The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting mode is programmed.

☒ Frequency and Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	13.56				

☒ Test Frequency and Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	13.56				

5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

-1&2/F.,Building 2, Zone A, Zhongda Marine Biotechnology Research and Development Base, No.9, Xincheng Avenue, Songshanhu High-technology Industrial Development Zone, Dongguan, Guangdong, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description		
EMC Lab.	:	Accredited by CNAS, 2020.08.27 The certificate is valid until 2024.07.05 The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2018 The Certificate Registration Number is L3150 Accredited by FCC Designation Number: CN1300 Test Firm Registration Number: 945551 Accredited by A2LA, April 05, 2021 The Certificate Registration Number is 4321.02 Accredited by Industry Canada The Certificate Registration Number is CN0113
Name of Firm	:	EMTEK (DONGGUAN) CO., LTD.
Site Location	:	-1&2/F.,Building 2, Zone A, Zhongda Marine Biotechnology Reserch and Development Base, No.9, Xincheng Avenue, Songshanhu High-technology Industrial Development Zone, Dongguan, Guangdong, China

6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

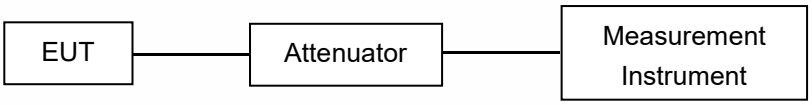
Parameter	Uncertainty
Radio Frequency	±1x10^-5
Conducted Emissions Test	±2.0dB
Radiated Emission Test	±2.0dB
Occupied Bandwidth Test	±1.0dB
All emission, radiated	±3dB
Temperature	±0.5℃
Humidity	±3%

Measurement Uncertainty for a level of Confidence of 95%

7 SETUP OF EQUIPMENT UNDER TEST

7.1 RADIO FREQUENCY TEST SETUP 1

The component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



7.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

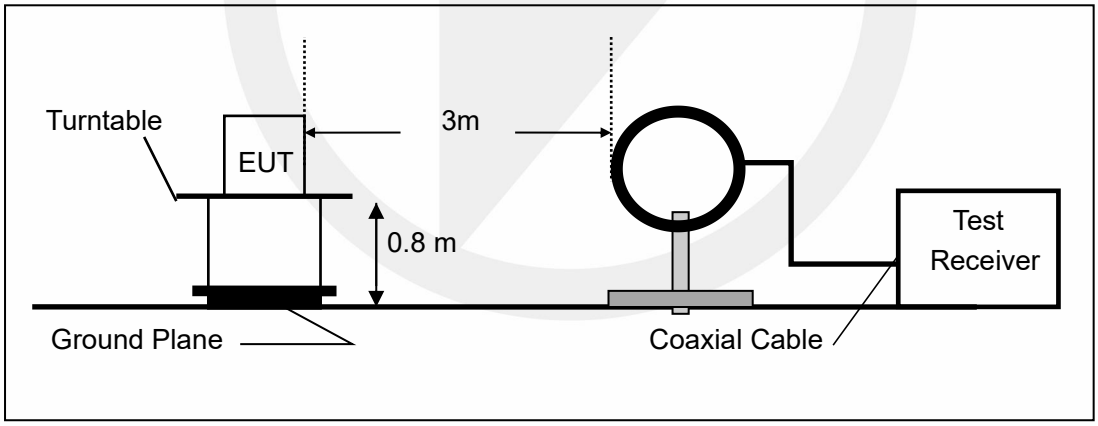
Below 30MHz：

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

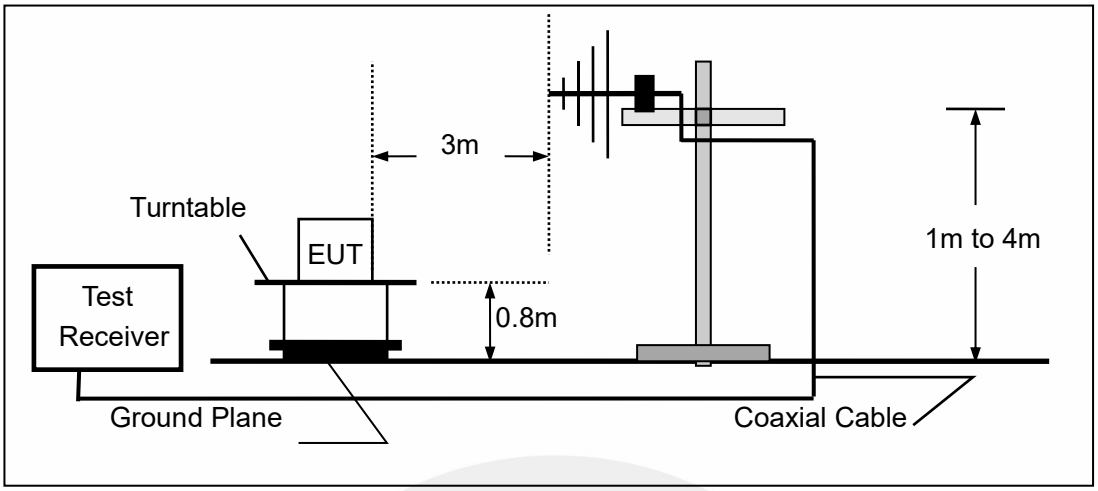
Above 30MHz：

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz

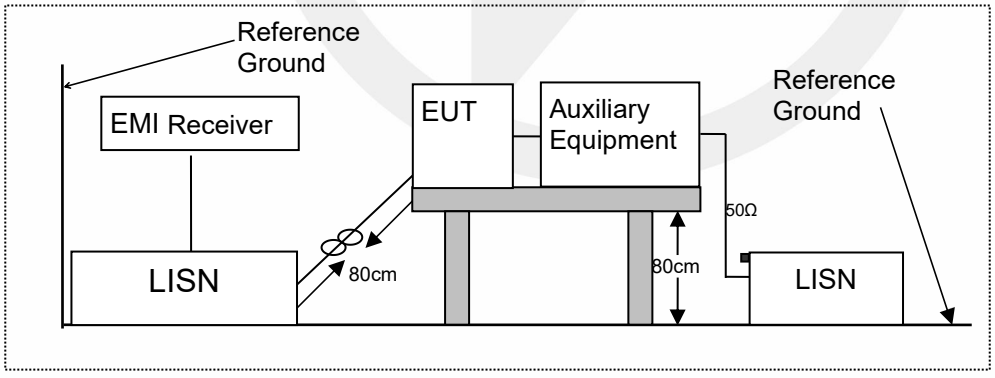


7.3 CONDUCTED EMISSION TEST SETUP

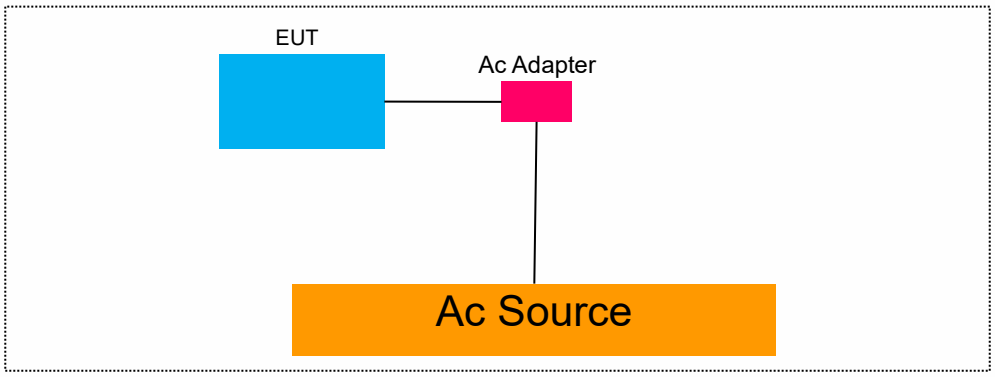
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



7.5 SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
DC cable	0.5	Unshielded	With Ferrite
/	/	/	/

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Adaptor	APPLE	/	/

Notes:

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*
3. *Unless otherwise denoted as EUT in 『Remark』 column , device(s) used in tested system is a support equipment*

8 TEST REQUIREMENTS

8.1 OCCUPIED BANDWIDTH

8.1.1 Applicable Standard

According to FCC Part 2.1049

8.1.2 Conformance Limit

No limit requirement.

8.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

8.1.4 Test Procedure

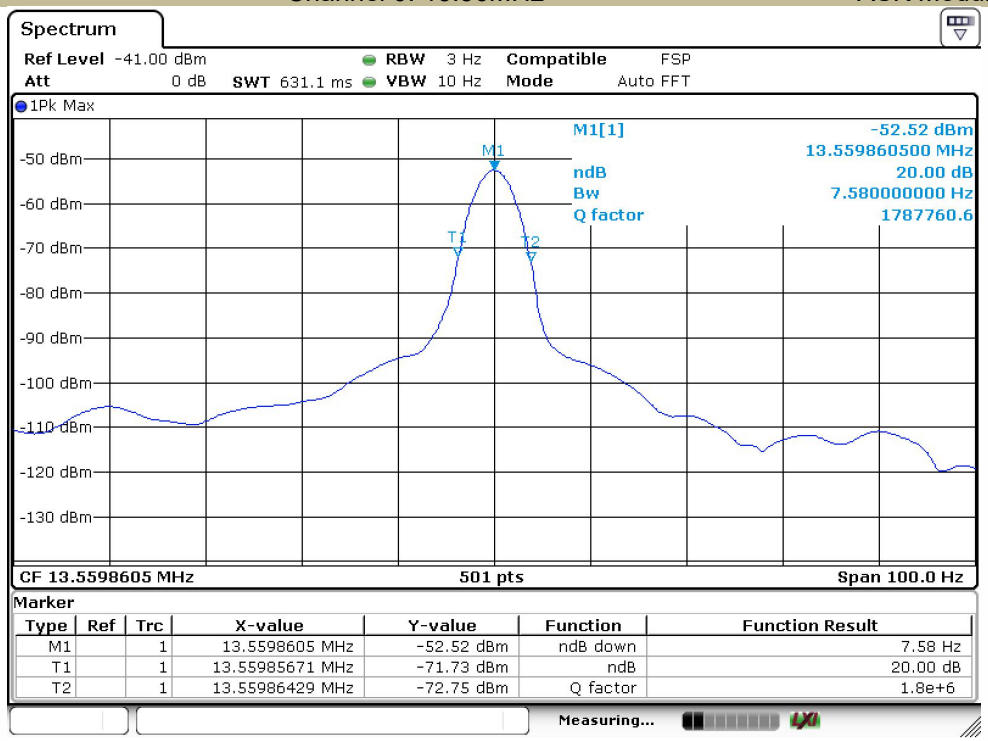
The EUT was operating in transmit mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.
The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
Set to the maximum power setting and enable the EUT transmit continuously
Set RBW = 1% occupied bandwidth (30Hz).
Set the video bandwidth (VBW) =3 times RBW .
Set Span= approximately 2 to 3 times the occupied bandwidth
Set Detector = Peak.
Set Trace mode = max hold.
Set Sweep = auto couple.
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 99% down one side of the emission. Reset the markerdelta 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 99% 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.
Measure and record the results in the test report.

8.1.5 Test Results

Temperature :	25℃	Test Date :	
Humidity :	65 %	Test By:	Calvin

Modulation Mode	Channel Number	Channel Frequency (MHz)	Measurement Bandwidth (Hz)	Limit (kHz)	Verdict
ASK	1	13.56	7.58	N/A	PASS
Note: N/A (Not Applicable)					

Test Model	Occupied Bandwidth Channel 0: 13.56MHz	ASK Modulation



8.2 FREQUENCY STABILITY

8.2.1 Applicable Standard

According to FCC Part 2.1055

8.2.2 Conformance Limit

According to part 15.225(e),The frequency tolerance of the carrier signal shall be maintained within ±0.01% 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.

8.2.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.2.4 Test Procedures

Connect the EUT to frequency analyzer via the antenna connector.
EUT was placed at temperature chamber and connected to an external power supply.
Temperature and voltage condition shall be tested to confirm frequency stability.
(a) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.
(b) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point, which shall be specified by the manufacturer.

8.2.5 Test Results

Operation Mode	Channel Number	Test Condition		Channel Frequency (MHz)	Freq.Dev. (Hz)	Deviation (ppm)	Limit (ppm)
		Voltage (V)	Temp (℃)				
ASK	CH0	Vnom	-20	13.559969	-28	-2.06	10
			-10	13.559990	-19	-1.40	10
			0	13.559976	-29	-2.14	10
			10	13.559960	-33	-2.43	10
			20	13.559984	-37	-2.73	10
			30	13.559973	-29	-2.14	10
			40	13.559972	-50	-3.69	10
			50	13.559988	-49	-3.61	10
		85% Vnom	20	13.559980	-15	-1.11	10
		115% Vnom	20	13.559955	-39	-2.88	10
VERDICT				PASS			

8.3 RADIATED SPURIOUS EMISSION

8.3.1 Applicable Standard

According to FCC Part 15.225 and 15.209

8.3.2 Conformance Limit

Field Strength of Fundamental Emissions and Spectrum Mask					
Emissions	**(uV/m)@30m**	**(dBuV/m)@30m**	**(dBuV/m)@10m**	**(dBuV/m)@3m**	**(dBuV/m)@1m**
Fundamental	15848	84.0	103.1	**124.0**	143.1
Quasi peak measurement of the fundamental.					

Spectrum Mask					
Freq. of Emission (MHz)	**(uV/m)@30m**	**(dBuV/m)@30m**	**(dBuV/m)@10m**	**(dBuV/m)@3m**	**(dBuV/m)@1m**
1.705~13.110	30	29.5	48.6	**69.5**	88.6
13.110~13.410	106	40.5	59.6	**80.5**	99.6
13.410~13.553	334	50.5	69.6	**90.5**	109.6
13.553~13.567	15848	84.0	103.1	**124.0**	143.1
13.567~13.710	334	50.5	69.6	**90.5**	109.6
13.710~14.010	106	40.5	59.6	**80.5**	99.6
14.010~30.000	30	29.5	48.6	**69.5**	88.6

According to FCC Part15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	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	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			

According to FCC Part15.205, the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009-0.490	2400/F(KHz)	48.5 - 13.8	300
0.490-1.705	24000/F(KHz)	33.8 – 23.0	30
1.705-30	30	29.5	30
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

8.3.3 Test Configuration

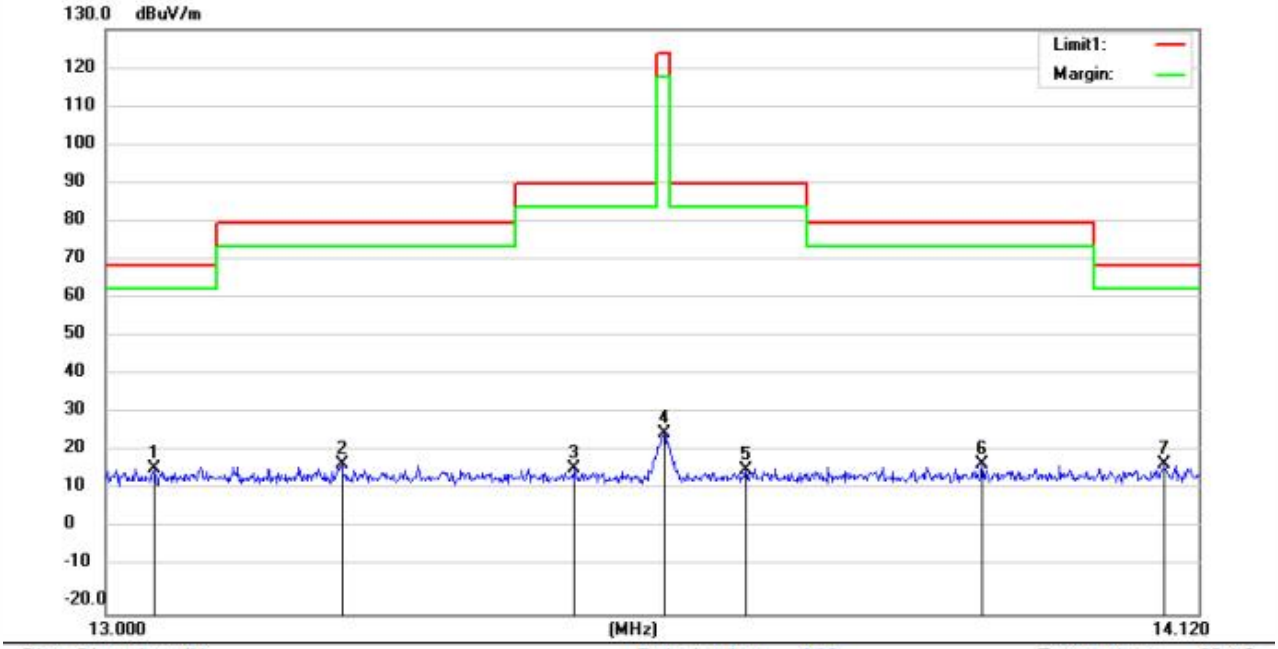
Test according to clause 6.2 radio frequency test setup 2

8.3.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:
The EUT was placed on a turn table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Span = wide enough to fully capture the emission being measured
RBW = 100 kHz for f < 1 GHz(30MHz to 1GHz), 200Hz for f<150KHz(9KHz to 150KHz), 9KHz for f<30MHz(150KHz to 30KHz)
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.
Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log(dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.
Repeat above procedures until all frequency measured was complete.

8.3.5 Test Results

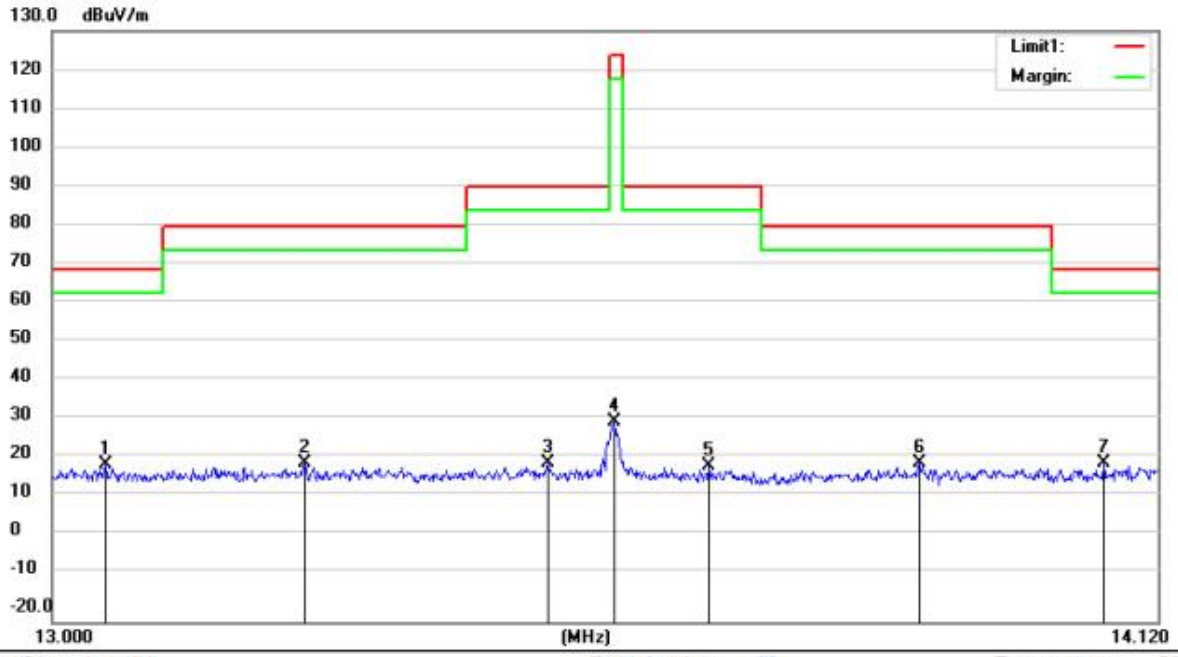
■ Field Strength of Fundamental Emissions and Spectrum Mask



Site Chamber #1 Polarization: 90° Temperature: 22.1 C

No.	Mk.	Freq.	Reading Level	Ant. Factor	Pre Amp Gain	Cable loss	Measure-ment	Limit	Over		HI	Degree	
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	Detector	cm	deg.	Comment
1		13.0493	47.26	0	30.35	0.54	17.45	69.50	-52.05	peak			
2		13.2352	48.10	0	30.35	0.55	18.30	80.50	-62.20	peak			
3		13.4693	47.13	0	30.35	0.56	17.34	90.50	-73.16	peak			
4		13.5610	55.99	0	30.35	0.57	26.21	124.00	-97.79	peak			
5		13.6450	46.78	0	30.35	0.57	17.00	90.50	-73.50	peak			
6		13.8915	48.24	0	30.35	0.58	18.47	80.50	-62.03	peak			
7	*	14.0840	48.02	0	30.35	0.59	18.26	69.50	-51.24	peak			

*:Maximum data x:Over limit !:over margin Operator: Ccyf



Site Chamber #1 Polarization: 0° Temperature: 22.1 C

No.	Mk.	Freq.	Reading Level	Ant. Factor	Pre Amp Gain	Cable loss	Measure-ment	Limit	Over		HI	Degree	
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	Detector	cm	deg.	Comment
1		13.0525	49.72	0	30.35	0.54	19.91	69.50	-49.59	peak			
2		13.2475	49.98	0	30.35	0.55	20.18	80.50	-60.32	peak			
3		13.4906	50.13	0	30.35	0.56	20.34	90.50	-70.16	peak			
4		13.5586	60.46	0	30.35	0.57	30.68	124.00	-93.32	peak			
5		13.6540	49.42	0	30.35	0.57	19.64	90.50	-70.86	peak			
6		13.8711	50.10	0	30.35	0.58	20.33	80.50	-60.17	peak			
7	*	14.0640	50.19	0	30.35	0.59	20.43	69.50	-49.07	peak			

*:Maximum data x:Over limit !:over margin Operator: Ccyf

■ Spurious Emission below 150kHz (9KHz to 150kHz)

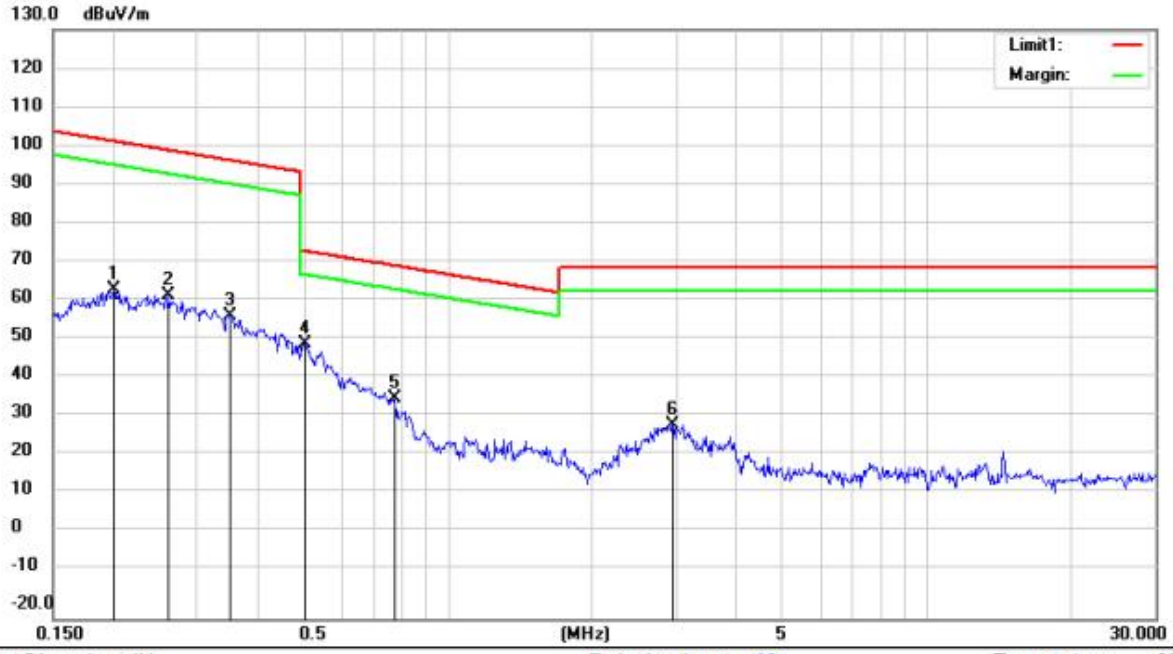
Temperature:	24℃	Test Date:	
Humidity:	53 %	Test By:	XIA
Test mode:	TX Mode		

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
--	--	--	--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor

■ Spurious Emission below 30MHz (150KHz to 30MHz)

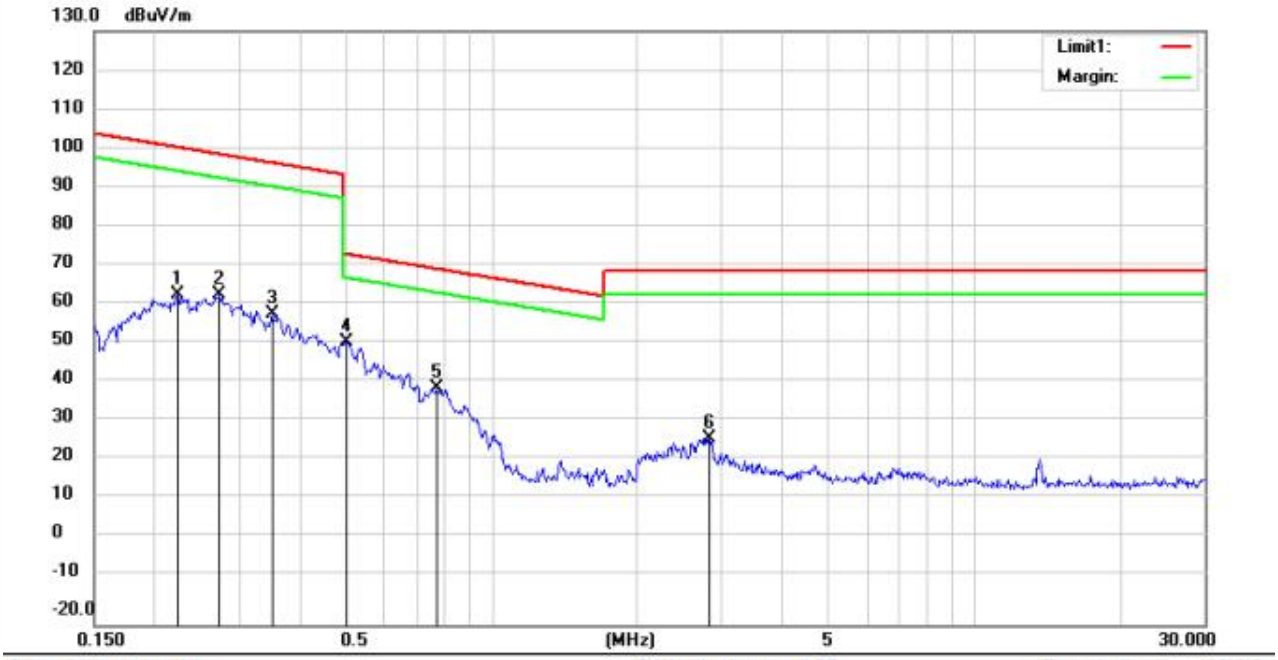
All mode have been tested, and the worst result was report as below:



Site Chamber #1 Polarization: 0° Temperature: 22.1 C

No.	Mk.	Freq.	Reading Level	Ant. Factor	Pre Amp Gain	Cable loss	Measure-ment	Limit	Over		HI	Degree	
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	Detector	cm	deg.	Comment
1		0.2006	92.21	0	28.63	0.09	63.67	101.55	-37.88	peak			
2		0.2615	91.70	0	29.38	0.1	62.42	99.25	-36.83	peak			
3		0.3520	86.91	0	29.89	0.12	57.14	96.67	-39.53	peak			
4	*	0.5020	79.99	0	30.02	0.15	50.12	73.59	-23.47	peak			
5		0.7751	65.92	0	30.24	0.2	35.88	69.83	-33.95	peak			
6		2.9462	59.40	0	30.41	0.34	29.33	69.54	-40.21	peak			

*:Maximum data x:Over limit !:over margin Operator: Ccyf

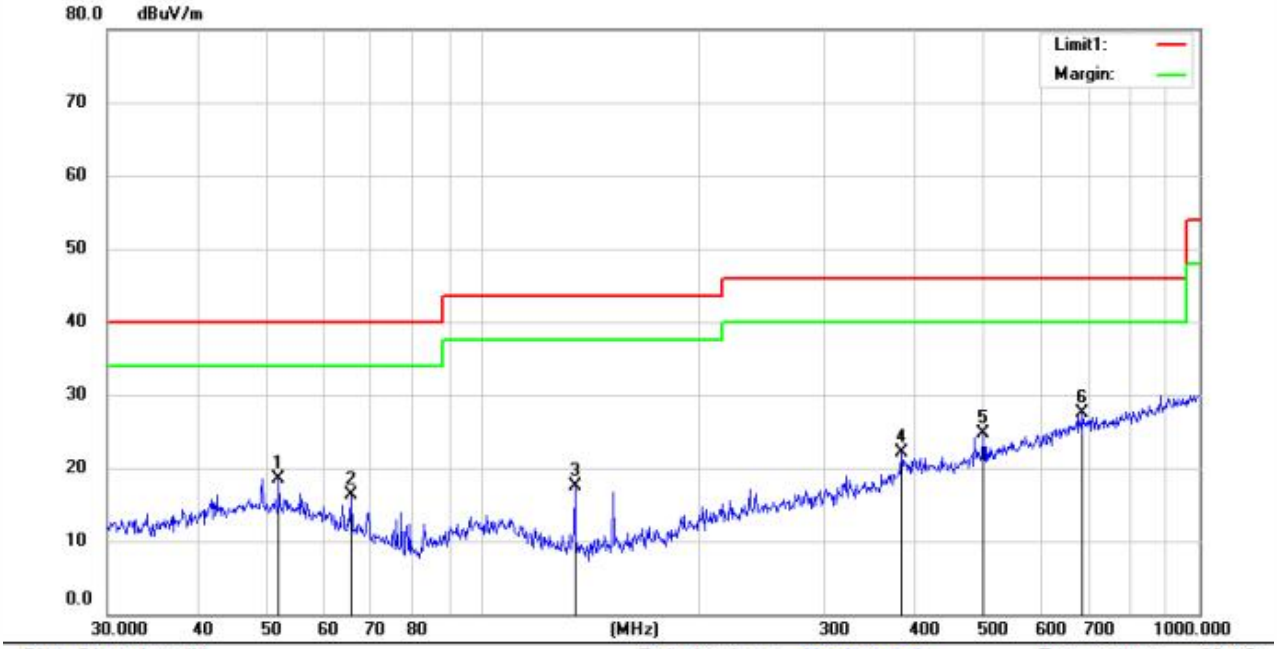


Site Chamber #1 Polarization: 90° Temperature: 22.1 C

No.	Mk.	Freq.	Reading Level	Ant. Factor	Pre Amp Gain	Cable loss	Measure-ment	Limit	Over		HI	Degree	
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	Detector	cm	deg.	Comment
1		0.2230	92.19	0	28.9	0.09	63.38	100.63	-37.25	peak			
2		0.2730	92.94	0	29.52	0.1	63.52	98.88	-35.36	peak			
3		0.3501	88.27	0	29.89	0.12	58.50	96.72	-38.22	peak			
4	*	0.4993	81.41	0	30.02	0.15	51.54	73.64	-22.10	peak			
5		0.7670	69.91	0	30.24	0.2	39.87	69.92	-30.05	peak			
6		2.8240	57.28	0	30.41	0.33	27.20	69.54	-42.34	peak			

*:Maximum data x:Over limit !:over margin Operator: Ccyf

■ Spurious Emission Above 30MHz (30MHz to 1GHz)

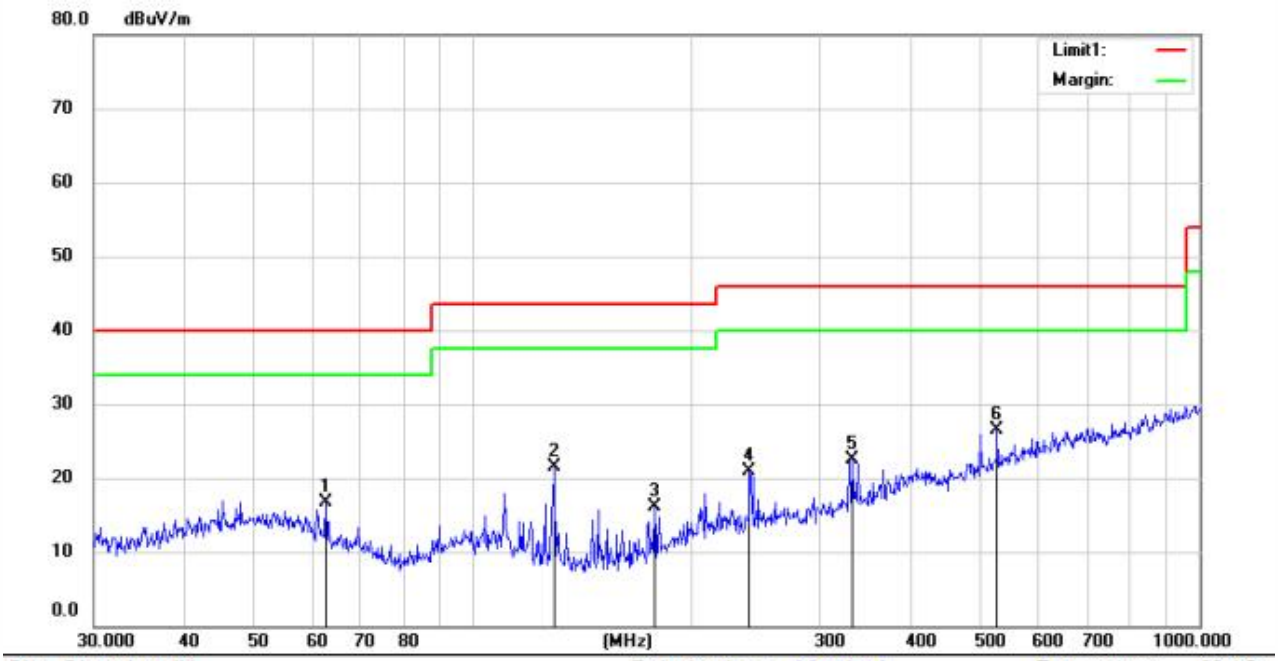


Site Chamber #1 Polarization: *Horizontal* Temperature: 22.4 C

No.	Mk.	Freq.	Reading Level	Ant. Factor	Pre Amp Gain	Cable loss	Measure-ment	Limit	Over		HI	Degree	
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	Detector	cm	deg.	Comment
1		52.0251	34.45	13.8	30.49	0.83	18.59	40.00	-21.41	QP			
2		65.5725	34.88	10.79	30.54	1.08	16.21	40.00	-23.79	QP			
3		134.5591	38.69	8.22	30.71	1.33	17.53	43.50	-25.97	QP			
4		383.9318	32.75	15.88	29.82	3.27	22.08	46.00	-23.92	QP			
5		499.4245	33.86	17.79	29.81	2.86	24.70	46.00	-21.30	QP			
6	*	687.1506	32.47	21.57	30.08	3.48	27.44	46.00	-18.56	QP			

*:Maximum data x:Over limit !:over margin Operator: Ccyf

Remark:
1. Measurement (dBμV/m) = Antenna Factor(dB) -Amp Factor(dB) +Cable Loss(dB) + Reading(dBμV/m)
2. Over (dB) = Measurement (dBμV/m) - Limit (dBμV/m)



Site Chamber #1 Polarization: *Vertical* Temperature: 22.4 C

No.	Mk.	Freq.	Reading Level	Ant. Factor	Pre Amp Gain	Cable loss	Measure-ment	Limit	Over		HI	Degree	
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	Detector	cm	deg.	Comment
1		62.6505	34.52	11.56	30.53	1.07	16.62	40.00	-23.38	QP			
2		129.0142	42.33	8.54	30.74	1.29	21.42	43.50	-22.08	QP			
3		177.5090	35.27	9.65	30.48	1.58	16.02	43.50	-27.48	QP			
4		239.9873	36.22	12.72	30.15	2.04	20.83	46.00	-25.17	QP			
5		332.5187	35.41	14.62	29.83	2.3	22.50	46.00	-23.50	QP			
6	*	526.3967	35.07	18.38	29.85	2.99	26.59	46.00	-19.41	QP			

*:Maximum data x:Over limit !:over margin Operator: Ccyf

Remark:
1. Measurement (dBμV/m) = Antenna Factor(dB) -Amp Factor(dB) +Cable Loss(dB) + Reading(dBμV/m)
2. Over (dB) = Measurement (dBμV/m) - Limit (dBμV/m)

8.4 CONDUCTED EMISSION TEST

8.4.1 Applicable Standard

According to FCC Part 15.207(a)

8.4.2 Conformance Limit

Conducted Emission Limit		
Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50
Note: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.		

8.4.3 Test Configuration

Test according to clause 7.3 conducted emission test setup

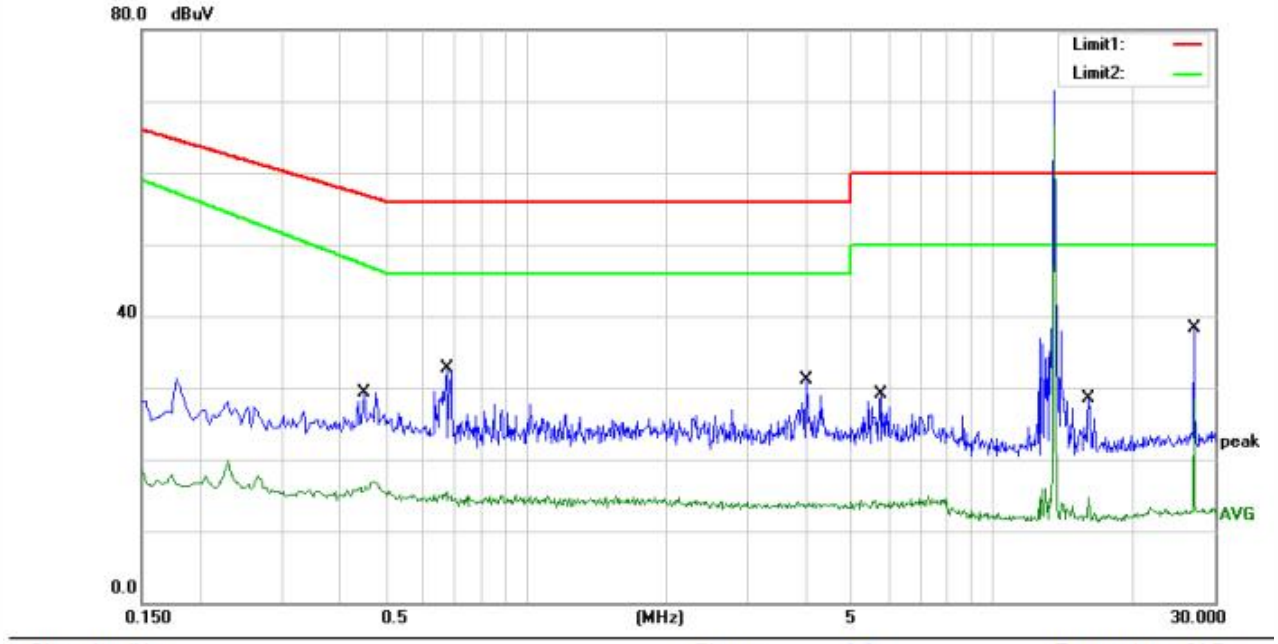
8.4.4 Test Procedure

The EUT was placed on a table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Repeat above procedures until all frequency measured were complete.

8.4.5 Test Results

Pass

The 120V &240V voltagehave been tested, and the worst result recorded was report as below:

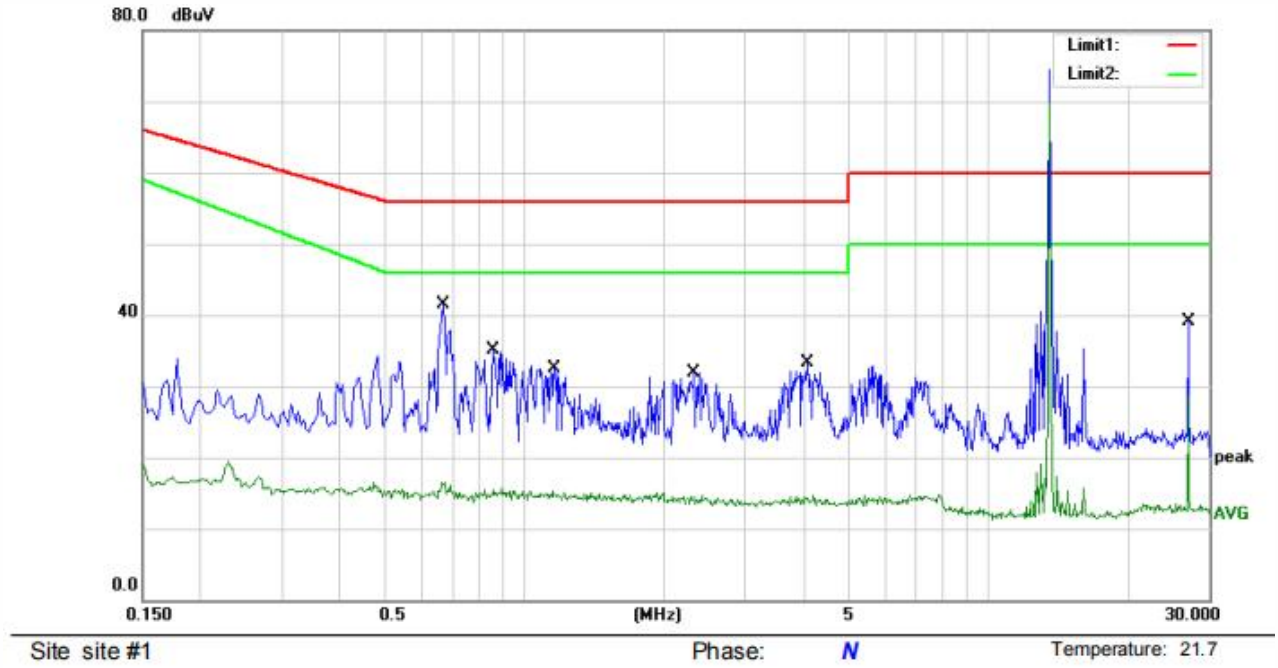


Site site #1 Phase: L1 Temperature: 21.7

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4500	12.27	17.07	29.34	56.88	-27.54	QP	
2		0.4500	-0.77	17.07	16.30	47.14	-30.84	AVG	
3		0.6780	15.62	17.02	32.64	56.00	-23.36	QP	
4		0.6780	-1.52	17.02	15.50	46.00	-30.50	AVG	
5		3.9980	14.10	16.99	31.09	56.00	-24.91	QP	
6		3.9980	-3.15	16.99	13.84	46.00	-32.16	AVG	
7		5.7460	12.12	16.99	29.11	60.00	-30.89	QP	
8		5.7460	-3.06	16.99	13.93	50.00	-36.07	AVG	
9		16.0545	11.63	16.88	28.51	60.00	-31.49	QP	
10		16.0545	-2.10	16.88	14.78	50.00	-35.22	AVG	
11		27.1220	21.23	17.14	38.37	60.00	-21.63	QP	
12	*	27.1220	11.36	17.14	28.50	50.00	-21.50	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Jian

Remark:
1. Measurement (dBμV) = AMN Factor (dB) + Cable Loss (dB) + Reading (dBμV)
2. Over (dB) = Measurement (dBμV) - Limit (dBμV)



Site site #1 Phase: N Temperature: 21.7

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.6700	24.42	17.03	41.45	56.00	-14.55	QP	
2		0.6700	-0.51	17.03	16.52	46.00	-29.48	AVG	
3		0.8540	18.01	17.02	35.03	56.00	-20.97	QP	
4		0.8540	-1.54	17.02	15.48	46.00	-30.52	AVG	
5		1.1590	15.47	17.04	32.51	56.00	-23.49	QP	
6		1.1590	-1.66	17.04	15.38	46.00	-30.62	AVG	
7		2.3220	14.86	17.08	31.94	56.00	-24.06	QP	
8		2.3220	-2.53	17.08	14.55	46.00	-31.45	AVG	
9		4.0900	16.25	16.98	33.23	56.00	-22.77	QP	
10		4.0900	-2.21	16.98	14.77	46.00	-31.23	AVG	
11		27.1220	22.01	17.14	39.15	60.00	-20.85	QP	
12		27.1220	11.56	17.14	28.70	50.00	-21.30	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Jian

Remark:
1. Measurement (dBμV) = AMN Factor (dB) + Cable Loss (dB) + Reading (dBμV)
2. Over (dB) = Measurement (dBμV) - Limit (dBμV)

9 ANTENNA APPLICATION

9.1.1 Antenna Requirement

Standard	Requirement
FCC CRF Part 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 replaced 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 §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 §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.

For intentional device, according to FCC 47 CFR Section 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. if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

9.2 RESULT

The EUT'S antenna is coil antenna, The antenna's gain is 0 dBi and meets the requirement. and the antenna can't be replaced by the user, which in accordance to section 15.203.