TEST REPORT

Applicant	:	Home Tech Innovation, Inc
Address of Applicant	:	1035 Cambridge St, Suite 11A, Cambridge, MA 02141
Product Name	:	Suvie Kitchen Robot
Brand Name	:	Suvie
Model No.	:	SV301
FCC ID	:	2AT2K-SV301
Standards	:	FCC CFR47 Part 15, Subpart C
Date of Receipt	:	2022-07-11
Date of Test	:	2022-07-22~2022-07-29
Date of Issue	:	2022-08-01

Remark:

This report details the results of the testing carried out on one sample, the results contained in this report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

Prepared by: Chris Chen (Chris Chen) Reviewed by: Oliver Xiang (Oliver Xiang) Approved by: Guoyou Chi (Authorized signatory: Guoyou Chi)

Contents

1 General Information

1.1 Testing Laboratory Information

Company Name	ICAS Testing Technology Service (Shanghai) Co., Ltd.
Address	No.1298 Pingan Rd, Minhang District, Shanghai, China
Telephone	0086 21-51682999
Fax	0086 21-54711112
Homepage	www.icasiso.com

1.2 Applicant Information

Applicant Company Name	Home Tech Innovation, Inc
Address	1035 Cambridge St, Suite 11A, Cambridge, MA 02141
Contact Person	Kevin Incorvia
Telephone	+1 617 800 5336
Email	kincorvia@suvie.com
Manufacturer	Home Tech Innovation, Inc
Manufacturer Address	1035 Cambridge St, Suite 11A, Cambridge, MA 02141

1.3 EUT Description

Product Name	Suvie Kitchen Robot
Under Test Model Name	SV301
Series Model Name	/
Description of Model name differentiation	/
Mode of Operation	NFC
Frequency Range	13.56MHz
Modulation Type	ASK
Hardware version	SV301_1.0.2
Software version	fw
Antenna Type	PCB Loop Antenna
Testing voltage	AC120V, 60Hz

2 Summary of Test Result

2.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C (10-1-16 Edition)	Miscellaneous Wireless Communications Services
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Remark: All test items were verified and recorded according to the standards and without any addition/deviation/exclusion during the test.

2.2 Test Result

No.	FCC Part No.	Description	Test Result	Verdict
1	15.203	Antenna Requirement	Clause 4.1.1	PASS
2	15.225(e)	Frequency Stability	Clause 4.1.2	PASS
3	15.215	Emissions Bandwidth	Clause 4.1.3	PASS
4	15.225(a)	Field Strength of Fundamental Emissions	Clause 4.1.4	PASS
5	15.225(d) 15.209	Radiated Emissions	Clause 4.1.4	PASS
6	15.207	Conducted Emissions	Clause 4.1.5	PASS

3 General Test Configurations

3.1 Test Environments

During the measurement, the environmental conditions complied with the range listed as below.

Relative Humidity	30% to 60%	
Atmospheric Pressure	100kPa to102kPa	
Temperature	NT (Normal Temperature)	+20℃ to +25℃
Working Voltage of the EUT	NV (Normal Voltage)	AC120V

3.2 Test Equipment List

Instrument	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE & SCHWARZ	FSV40N	101450	2022-06-10	2023-06-09
EMI Test Receiver	ROHDE & SCHWARZ	ESPI3	100173	2022-06-10	2023-06-09
EMI Test Receiver	ROHDE & SCHWARZ	ESR 7	101911	2022-06-10	2023-06-09
V-network	SCHWARZBECK	NSLK 8127	8127-902	2022-06-10	2023-06-09
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2021-06-08	2023-06-07
Loop Antenna	SCHWARZBECK	FMZB 1513	N/A	2022-06-10	2023-06-09
EMC chamber 9*6*6 （L*W*H)	CHANGNING	966	N/A	2022-06-10	2023-06-09
Shielded Enclosure 8*5*4 （L*W*H)	CHANGNING	854	N/A	2022-06-10	2023-06-09
Test Software	BL	BL410_E	N/A	N/A	N/A

3.3 Measurement Uncertainty

Measurement	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5dB
	> 1GHz	± 1.5dB
Radiated Emission	9kHz - 30MHz	± 3.54dB
	30MHz - 1GHz	± 3.42dB
	> 1GHz	± 4.20dB
Conducted Emission on AC Mains	9kHz to 30MHz	± 1.71dB

4 Test Set-up and Operation Modes

4.1 Details of Test Mode

Using test software was control EUT work in continuous transmitter and receiver mode. Select test channel as below:

Channel	Frequency
Test channel	13.56MHz

The basic operation modes are:

A. On
   1. test mode
      a. Transmitting
         i. Test Channel
B. Standby
C. Off

4.2 Special Accessories and Auxiliary Equipment

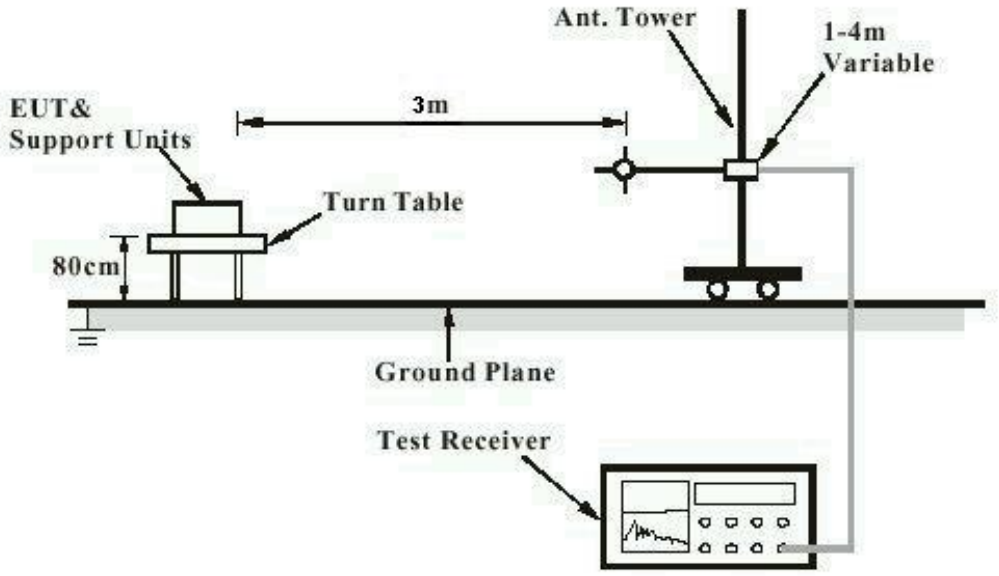
Description	Manufacturer	Model No.	Serial No.
/	/	/	/

4.3 Support Software

Description	Manufacturer	Software Name
/	/	/

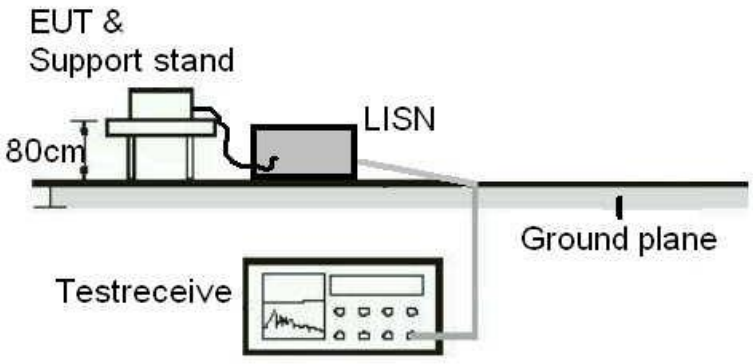
4.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 30MHz are done with a table height of 0.8m.

Diagram of Measurement Equipment Configuration for Conduction Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **PASS**

Test standard	:	Part 15.203
Requirement	:	The use of approved antennas only with directional gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an antenna with a gain of 0 dBi. The antenna is an internal antenna with no possibility of replacement with a non-approvrd antenna by the end-user.

Therefore, the EUT is considered to comply with this provision.

5.1.2 Frequency Stability

RESULT: **PASS**

Test standard : FCC Part 15.225(e)

Requirement : ANSI C63.10-2013

Kind of test site : Shielded room

Test setup

Test Channel : Test channel

Operation Mode : A.1.a

Ambient temperature : 20°C

Relative humidity : 50%

Test Procedure

1.The test is performed in a Temperature Chamber.

2.The EUT is configured as MS + AC Power Supply.

Table 1: Frequency Stability

Temperature (℃)	Voltage (VAC)	Measured		Limit
		Frequency (MHz)	Tolerance (ppm)	
-20	120	13.5600412	3.038348083	100ppm
-10		13.5600424	3.126843658	
0		13.5600478	3.525073746	
+10		13.5600513	3.783185841	
+20		13.5600565	4.166666667	
+30		13.5600612	4.513274336	
+40		13.5600620	4.572271386	
+50		13.5600677	4.992625369	
+20	102	13.5600523	3.856932153	
+20	138	13.5600567	4.181415929	

5.1.3 Emissions Bandwidth

RESULT: **PASS**

Test standard	:	FCC Part 15.215(c) ANSI 63.10 Section 6.9
Requirement	:	ANSI C63.10-2013
Kind of test site	:	EMC chamber

Test setup

Test Channel	:	Test channel
Operation Mode	:	A.1.a
Ambient temperature	:	20°C
Relative humidity	:	50%

Test procedure

The spectrum analyzer connected via a receive antenna placed near the EUT in peak Max hold mode.

The resolution bandwidth of 10Hz and the video bandwidth of 30Hz were used.

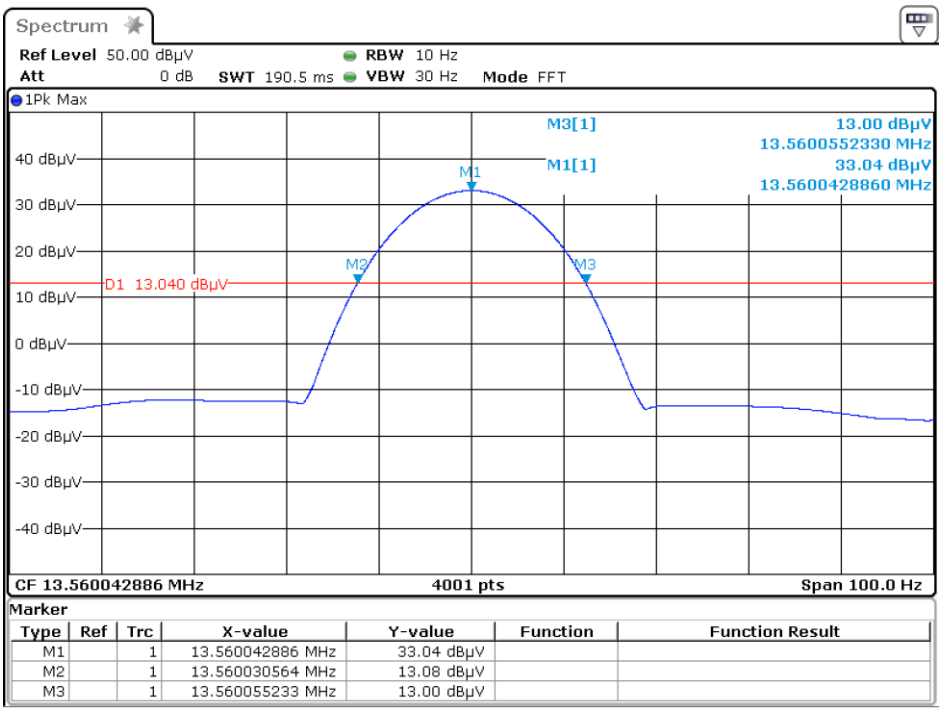
Measured the spectrum width with power higher than 20dB below carrier.

Table 2: 20dB Bandwidth

Test Mode	Test Channel (MHz)	20dB Bandwidth (kHz)
ASK	13.56	0.024669

Remark: Because the measured signal is CW adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

20dB Bandwidth



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5.1.4 Field Strength of Fundamental Emissions and Radiated Emissions

RESULT: **PASS**

Test standard	:	FCC Part 15.225(a)(b)(c) FCC Part 15.209
Requirement	:	ANSI C63.10-2013
Kind of test site	:	EMC chamber

Test setup

Test Channel	:	Test channel
Operation Mode	:	A.1.a
Ambient temperature	:	20°C
Relative humidity	:	50%

Notes:
Operation within the band 13.110-14.010 MHz as contained in §15.225:
(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any at 30 meters.
(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.
(f) The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The Z-plane results were found as the worst case and were shown in this report.

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(KHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(KHz)	87.6-20log(F)
1.705 ~ 13.110	30	30	29.54
13.110 ~ 13.410	30	106	40.51
13.410~ 13.553	30	334	50.47
13.553~13.567	30	15848	84.00
13.567~13.710	30	334	50.47
13.710~14.010	30	106	40.51
14.010~30	30	30	29.54
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0

(1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz and above 1000MHz.Radiated emissions limits in these three bands are based on measurements employing an average detector.
(2) At frequencies below 30MHz, measurement may be performed at a distance closer then that specified, and the limit at closer measurement distance can be extrapolated by below formula:
Limit3m(dBuV/m)= Limit300m(dBuV/m) + 40Log(300m/3m) = Limit300m(dBuV/m) + 80
Limit3m(dBuV/m)= Limit30m(dBuV/m) + 40Log(30m/3m) = Limit30m(dBuV/m) + 40

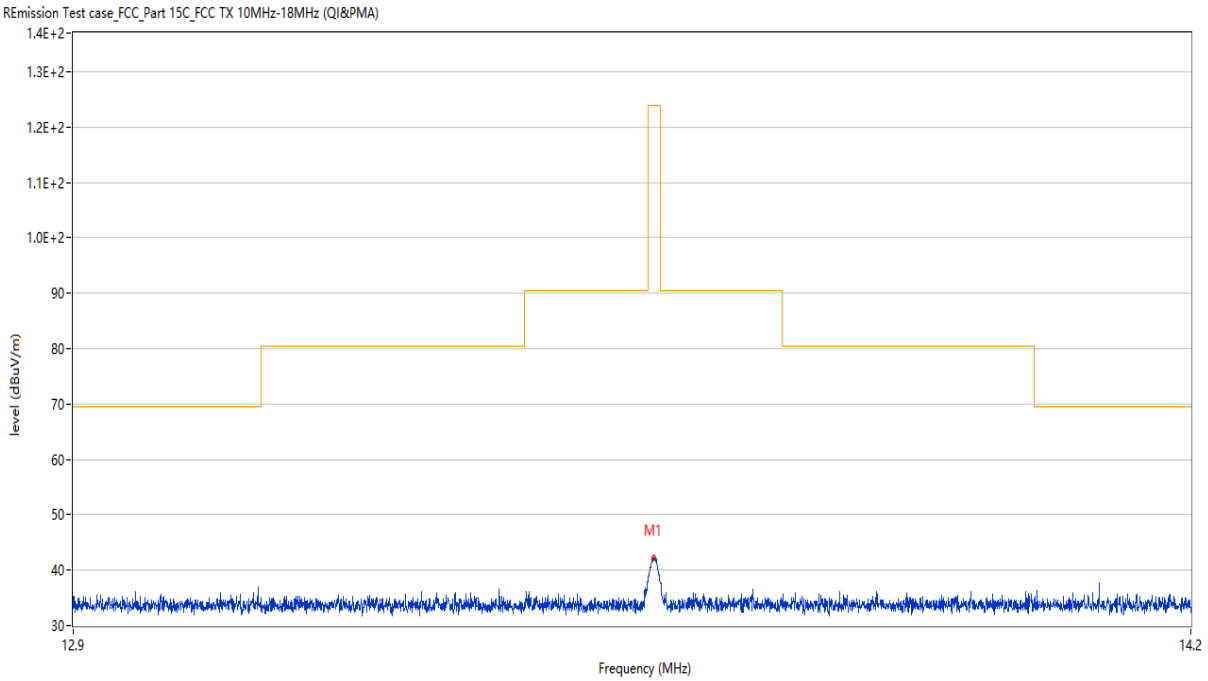
(3) EUT was placed on a non-metallic table, 100 cm above the ground plane inside a semi-anechoic chamber.
(4) Test antenna was located 3m from the EUT on an adjustable mast

According ANSI C63.10:2013 clause 6.4.4.2 and 6,5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also be positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground. for measurement above 30MHz, the Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

Test data :

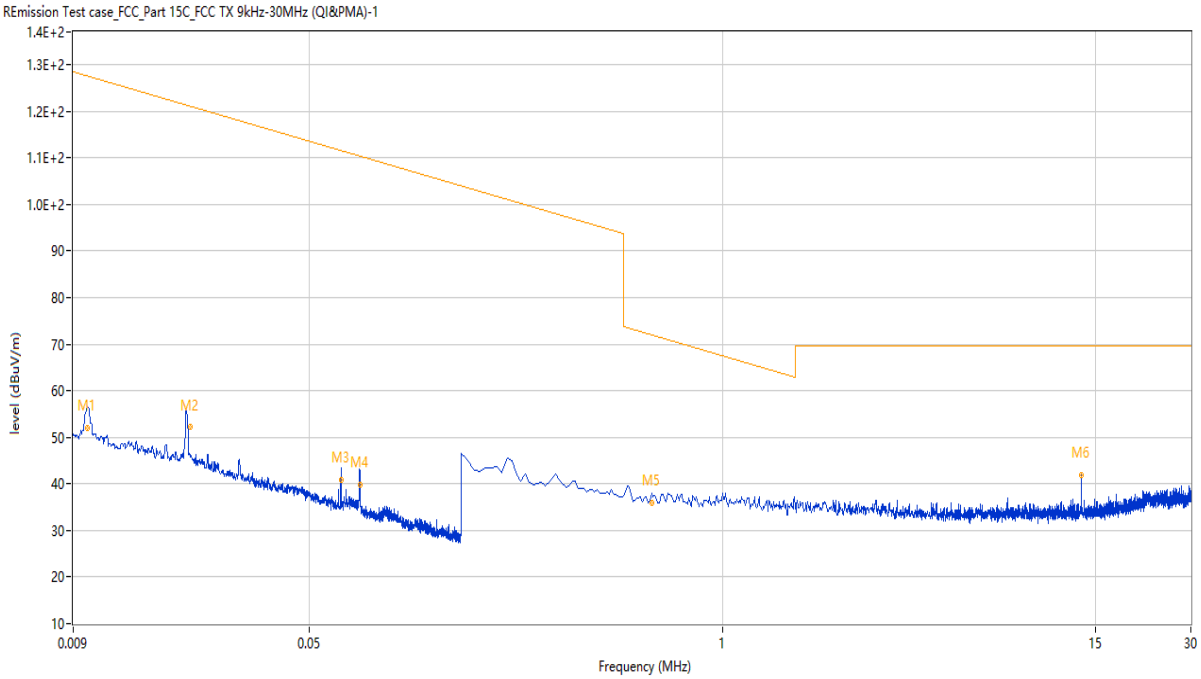
Note: The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

Frequency Range:	12.9k-14.2kHz	**Polarization:**	X



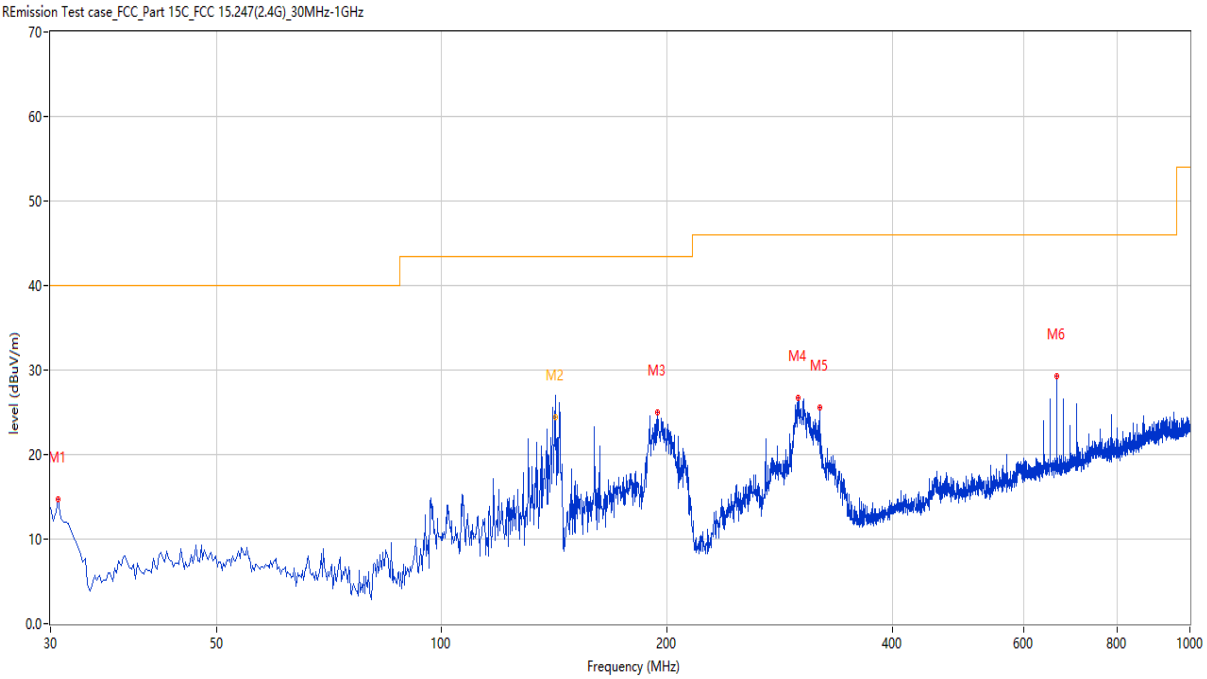
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	13.560	41.97	20.86	124.0	-82.03	Peak	250.60	100	X	Pass

Frequency Range:	9k-30MHz	**Polarization:**	X



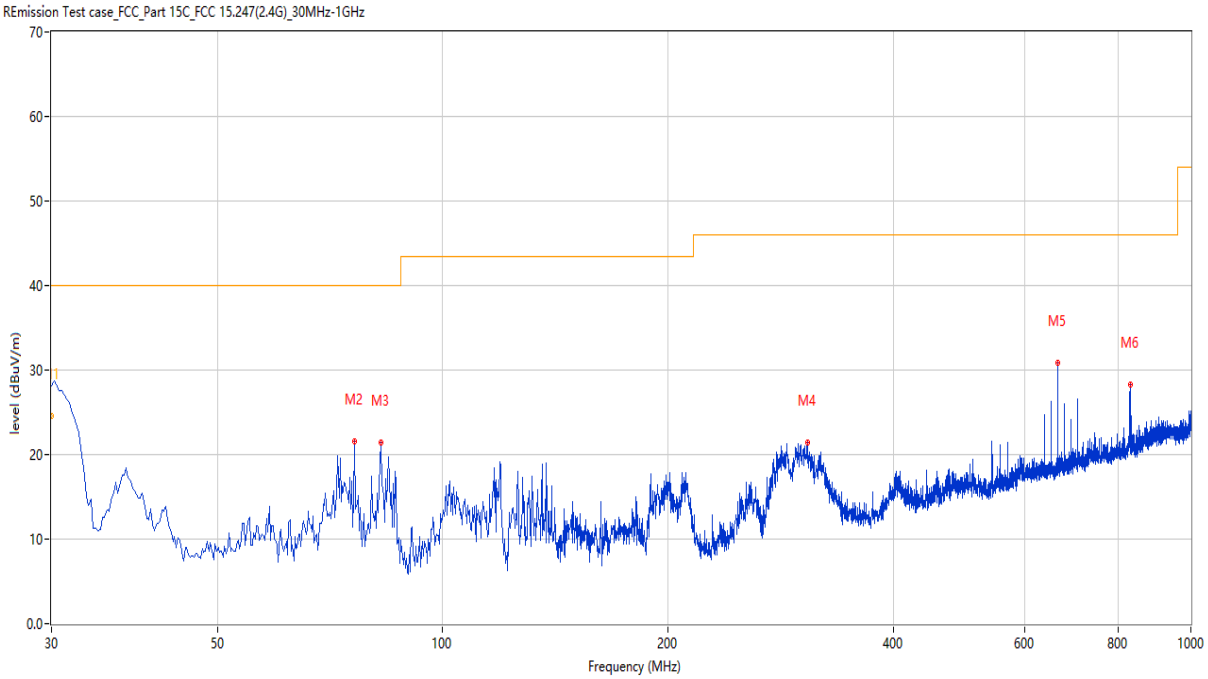
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	0.010	56.51	19.30	127.6	-71.09	Peak	359.40	100	X	Pass
1*	0.010	51.95	19.30	127.6	-75.65	QP	359.40	100	X	Pass
2	0.021	55.93	20.20	121.3	-65.37	Peak	71.90	100	X	Pass
2*	0.021	52.19	20.20	121.3	-69.11	QP	71.90	100	X	Pass
3	0.063	43.53	20.50	111.6	-68.07	Peak	315.40	100	X	Pass
3*	0.063	40.86	20.50	111.6	-70.74	QP	315.40	100	X	Pass
4	0.072	43.01	20.49	110.4	-67.39	Peak	56.30	100	X	Pass
4*	0.072	39.74	20.49	110.4	-70.66	QP	56.30	100	X	Pass
5	0.598	37.92	20.32	72.0	-34.08	Peak	0.00	100	X	Pass
5*	0.598	35.88	20.32	72.0	-36.12	QP	0.00	100	X	Pass
6	13.557	42.23	20.86	69.5	-27.27	Peak	236.30	100	X	Pass
6*	13.557	41.83	20.86	69.5	-27.67	QP	236.30	100	X	Pass

Frequency Range:	30M-1GHz	**Polarization:**	Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	30.727	14.75	-29.59	40.0	-25.25	Peak	0.00	200	Horizontal	Pass
2	141.765	26.95	-29.97	43.5	-16.55	Peak	97.60	100	Horizontal	Pass
2*	141.765	24.39	-29.97	43.5	-19.11	QP	97.60	100	Horizontal	Pass
3	194.131	24.96	-26.32	43.5	-18.54	Peak	252.40	100	Horizontal	Pass
4	299.835	26.66	-23.77	46.0	-19.34	Peak	106.90	100	Horizontal	Pass
5	319.958	25.57	-23.18	46.0	-20.43	Peak	83.50	100	Horizontal	Pass
6	664.221	29.33	-14.76	46.0	-16.67	Peak	210.70	100	Horizontal	Pass

Frequency Range:	30M-1GHz	**Polarization:**	Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	30.000	28.12	-29.82	40.0	-11.88	Peak	0.00	200	Vertical	Pass
1*	30.000	24.54	-29.82	40.0	-15.46	QP	0.00	200	Vertical	Pass
2	76.306	21.53	-31.31	40.0	-18.47	Peak	0.00	200	Vertical	Pass
3	82.609	21.38	-31.14	40.0	-18.62	Peak	0.00	200	Vertical	Pass
4	307.351	21.48	-23.52	46.0	-24.52	Peak	0.00	200	Vertical	Pass
5	664.221	30.80	-14.76	46.0	-15.20	Peak	294.20	100	Vertical	Pass
6	831.505	28.26	-11.57	46.0	-17.74	Peak	185.90	200	Vertical	Pass

Note: Margin（Over Limit）>10dB, so do not need to test by QP Detector

5.1.5 Conducted Emissions

RESULT: **PASS**

Test standard	:	FCC Part 15.207
Requirement	:	ANSI C63.10-2013
Kind of test site	:	Shielded Enclosure

Test setup

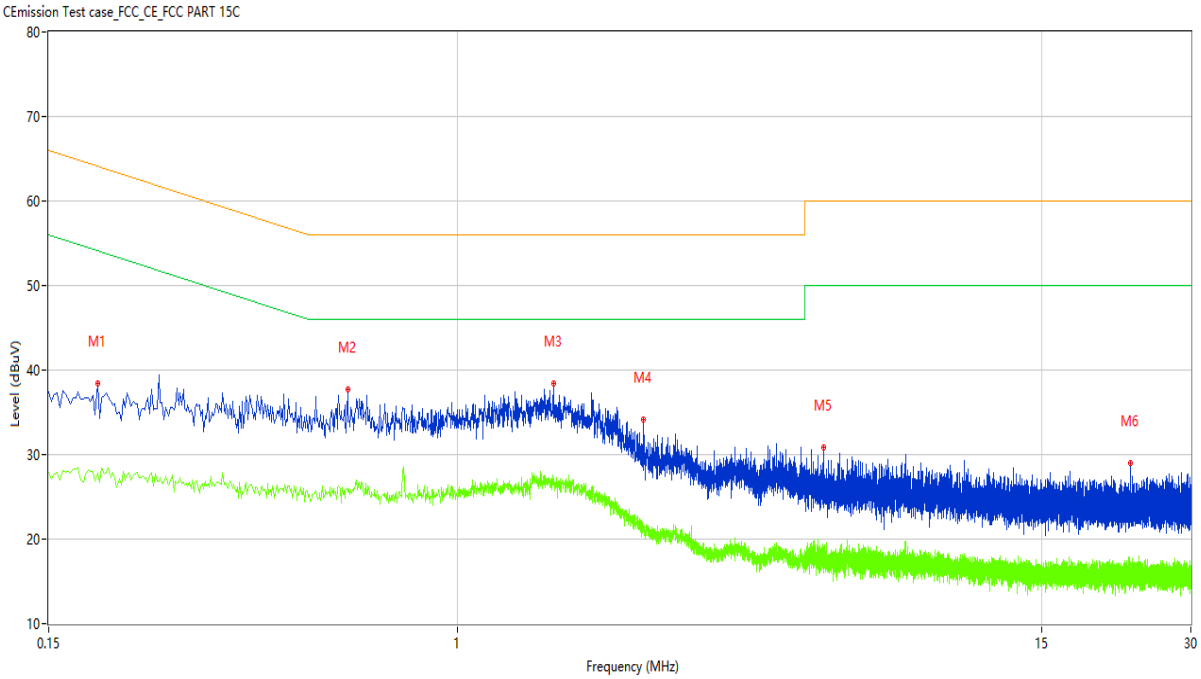
Input Voltage	:	AC120V, 60Hz
Operation Mode	:	A.1.a
Ambient temperature	:	20°C
Relative humidity	:	50%

For details refer to following test plot.

Note:

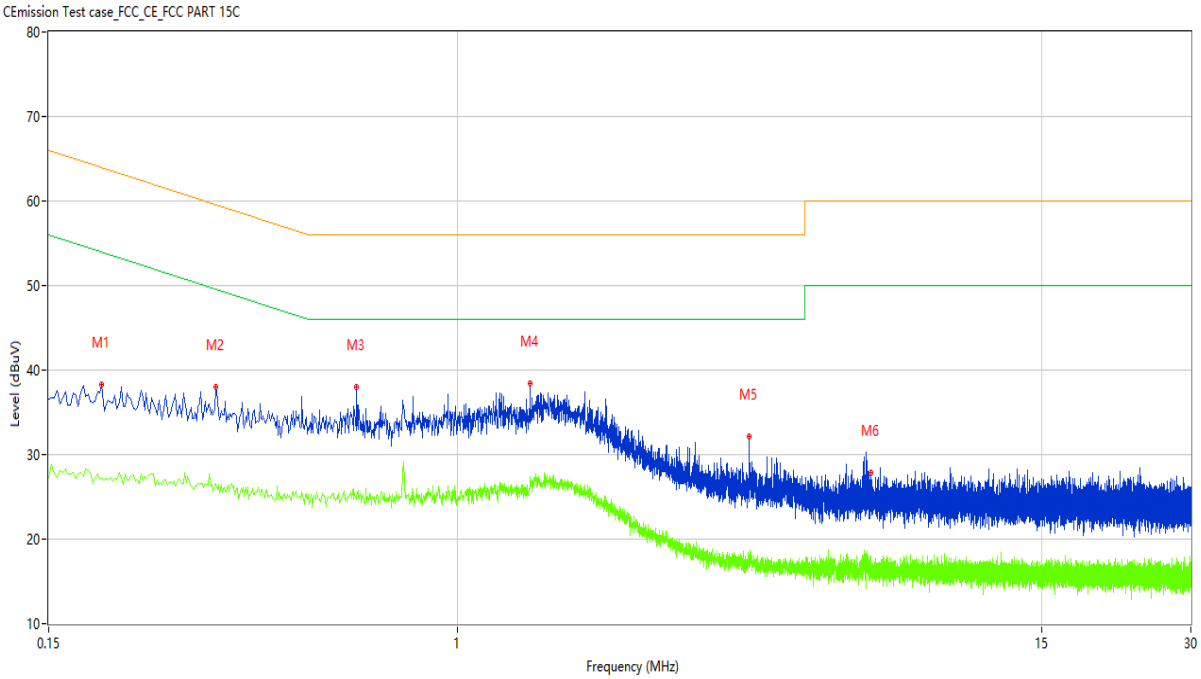
The all configurations were tested respectively, but only the worst configuration shown here.

Frequency Range:	150k-30MHz	**Phase:**	Line



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.188	31.62	9.65	64.12	-32.50	Peak	L	Pass
1*	0.188	23.25	9.65	64.12	-40.87	QP	L	Pass
1**	0.188	27.90	9.65	54.12	-26.22	AV	L	Pass
2	0.600	35.30	9.76	56.00	-20.70	Peak	L	Pass
2*	0.600	24.38	9.76	56.00	-31.62	QP	L	Pass
2**	0.600	25.94	9.76	46.00	-20.06	AV	L	Pass
3	1.562	29.14	9.67	56.00	-26.86	Peak	L	Pass
3*	1.562	22.03	9.67	56.00	-33.97	QP	L	Pass
3**	1.562	26.74	9.67	46.00	-19.26	AV	L	Pass
4	2.370	26.44	9.68	56.00	-29.56	Peak	L	Pass
4*	2.370	16.97	9.68	56.00	-39.03	QP	L	Pass
4**	2.370	21.30	9.68	46.00	-24.70	AV	L	Pass
5	5.464	26.59	9.70	60.00	-33.41	Peak	L	Pass
5*	5.464	15.66	9.70	60.00	-44.34	QP	L	Pass
5**	5.464	18.28	9.70	50.00	-31.72	AV	L	Pass
6	22.712	18.33	9.44	60.00	-41.67	Peak	L	Pass
6*	22.712	11.33	9.44	60.00	-48.67	QP	L	Pass
6**	22.712	16.57	9.44	50.00	-33.43	AV	L	Pass

Frequency Range:	150k-30MHz	**Phase:**	Neutral



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.192	32.49	9.65	63.95	-31.46	Peak	N	Pass
1*	0.192	23.14	9.65	63.95	-40.81	QP	N	Pass
1**	0.192	27.08	9.65	53.95	-26.87	AV	N	Pass
2	0.326	32.80	9.71	59.55	-26.75	Peak	N	Pass
2*	0.326	23.18	9.71	59.55	-36.37	QP	N	Pass
2**	0.326	26.53	9.71	49.55	-23.02	AV	N	Pass
3	0.626	36.49	9.77	56.00	-19.51	Peak	N	Pass
3*	0.626	26.50	9.77	56.00	-29.50	QP	N	Pass
3**	0.626	24.92	9.77	46.00	-21.08	AV	N	Pass
4	1.400	31.02	9.67	56.00	-24.98	Peak	N	Pass
4*	1.400	22.92	9.67	56.00	-33.08	QP	N	Pass
4**	1.400	27.50	9.67	46.00	-18.50	AV	N	Pass
5	3.870	26.79	9.68	56.00	-29.21	Peak	N	Pass
5*	3.870	15.58	9.68	56.00	-40.42	QP	N	Pass
5**	3.870	17.94	9.68	46.00	-28.06	AV	N	Pass
6	6.808	29.64	9.68	60.00	-30.36	Peak	N	Pass
6*	6.808	17.66	9.68	60.00	-42.34	QP	N	Pass
6**	6.808	17.02	9.68	50.00	-32.98	AV	N	Pass

6 Photographs of the EUT and Test Set-Up

6.1 Photographs of the EUT

6.2 Photographs of the Test Set-up

Conducted Emission Test Set-up

Radiated Emission Test Set-up for Below 30MHz

Radiated Emission Test Set-up for 30M-1GHz

End of the report