

FCC Test Report

Applicant : YABER TECHNOLOGIES CO.,LIMITED

Address : Room 406, 4 Floor, B Building, BanTian
International Center, HuanCheng South Road,
BanTian Street, LongGang District,
Shenzhen, China

Product Name : Projector

Report Date : Jun. 02, 2023



Shenzhen Anbotech Compliance Laboratory Limited

Shenzhen Anbotech Compliance Laboratory Limited

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Code: AB-RF-05-b



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TEST REPORT

Applicant : YABER TECHNOLOGIES CO.,LIMITED

Manufacturer : YABER TECHNOLOGIES CO.,LIMITED

Product Name : Projector

Model No. : K2s, L2, L3, L4, L5, L2e, L3e, L4e, L5e, L2s, L3s, L4s, L5s, T4, T4s, Pico T4, T5, T5s, Pico T5, Pro U15, Pro U15e, Pro U15s, U15, U15s, U15e, Pro U16, Pro U16e, Pro U16s, U16, U16s, U16e, Pro V15, Pro V15s, Pro V15e, V15, V15s, V15e, Pro V16, Pro V16s, Pro V16e, V16, V16s, V16e, Y1, Y2, Y3, Y1s, Y2s, Y3s, R1, R2, R3, R1s, R2s, R3s, B1, B2, B3, B1s, B2s, B3s, E1, E2, E3, E1s, E2s, E3s, A1, A2, A3, A1s, A2s, A3s

Trade Mark : Yaber

Rating(s) : Input: 100-240V~, 50/60Hz,140W

Test Standard(s) : FCC Part15 Subpart C, Section 15.225

Test Method(s) : ANSI C63.10: 2020

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt

Mar. 20, 2023

Date of Test

Mar. 20~Apr. 13, 2023

Prepared By

Tu Tu Hong

(TuTu Hong)

Approved & Authorized Signer

Kingkongjin

Shenzhen Anbotek Compliance Laboratory Limited

Code:AB-RF-05-b

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(Kingkong Jin)



Revision History

Report Version	Description	Issued Date
R00	Original Issue.	Jun. 02, 2023



1. General Information

1.1. Client Information

Applicant	:	YABER TECHNOLOGIES CO.,LIMITED
Address	:	Room 406, 4 Floor, B Building, BanTian International Center, HuanCheng South Road, BanTian Street, LongGang District, Shenzhen, China
Manufacturer	:	YABER TECHNOLOGIES CO.,LIMITED
Address	:	Room 406, 4 Floor, B Building, BanTian International Center, HuanCheng South Road, BanTian Street, LongGang District, Shenzhen, China
Factory	:	YABER TECHNOLOGIES CO.,LIMITED
Address	:	Room 406, 4 Floor, B Building, BanTian International Center, HuanCheng South Road, BanTian Street, LongGang District, Shenzhen, China

1.2. Description of Device (EUT)

Product Name	:	Projector
Model No.	:	K2s, L2, L3, L4, L5, L2e, L3e, L4e, L5e, L2s, L3s, L4s, L5s, T4, T4s, Pico T4, T5, T5s, Pico T5, Pro U15, Pro U15e, Pro U15s, U15, U15s, U15e, Pro U16, Pro U16e, Pro U16s, U16, U16s, U16e, Pro V15, Pro V15s, Pro V15e, V15, V15s, V15e, Pro V16, Pro V16s, Pro V16e, V16, V16s, V16e, Y1, Y2, Y3, Y1s, Y2s, Y3s, R1, R2, R3, R1s, R2s, R3s, B1, B2, B3, B1s, B2s, B3s, E1, E2, E3, E1s, E2s, E3s, A1, A2, A3, A1s, A2s, A3s (Note: All samples are the same except the model number, so we prepare "K2s" for test only.)
Trade Mark	:	Yaber
Test Power Supply	:	AC 120V, 60Hz
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)
Adapter	:	N/A

RF Specification

Operation Frequency	:	13.56MHz
Number of Channel	:	1 Channel
Modulation Type	:	FSK
Antenna Type	:	Inductive loop coil Antenna
Antenna Gain(Peak)	:	0 dBi

Remark: 1)For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



1.3. Auxiliary Equipment Used During Test

Description	Rating(s)
/	/

1.4. Description of Test Configuration

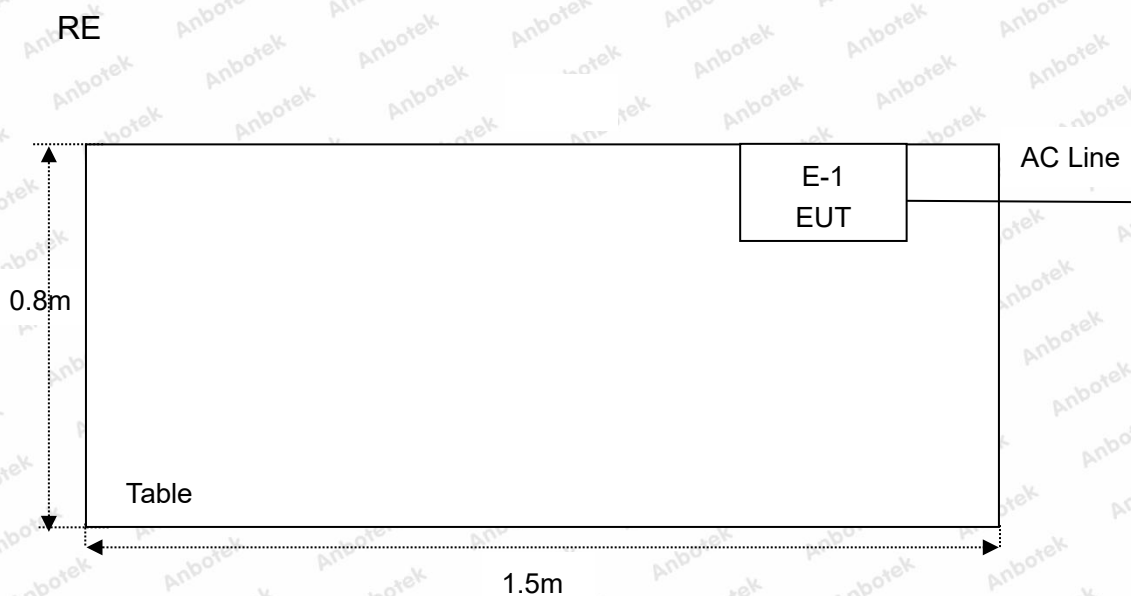
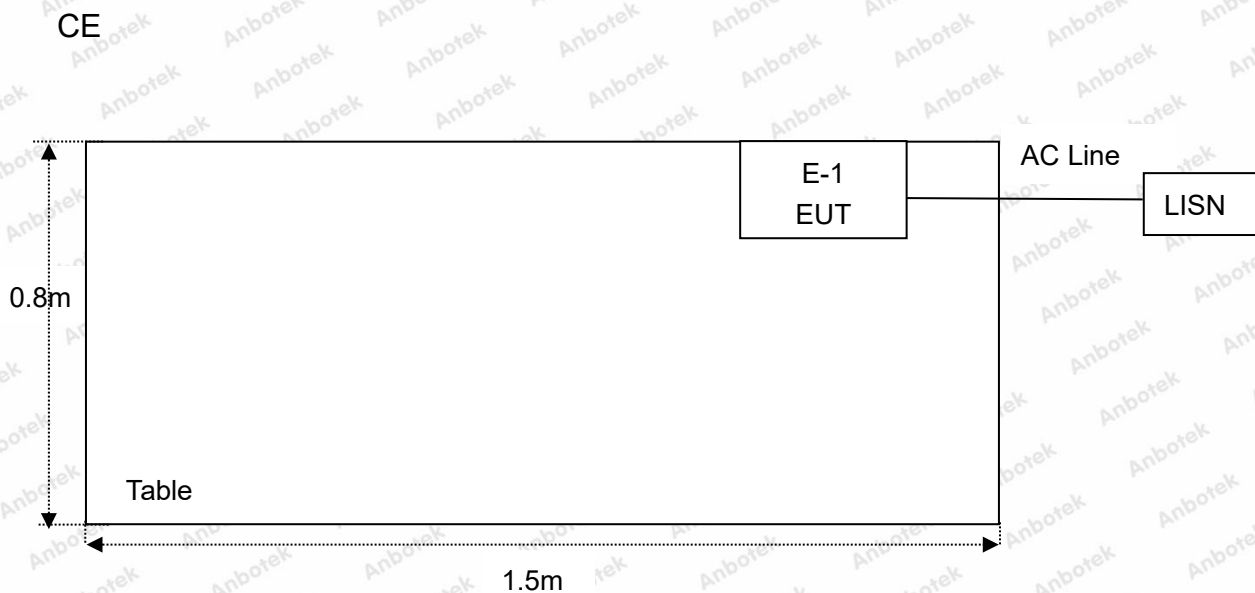
Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
01	13.56								

Note:

1. During the test, the EUT was keeping continuous transmission.



1.5. Description Of Test Setup



1.6. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Oct. 23, 2022	1 Year
2.	Three Phase V-type Artificial Power Network	CYBERTEK	EM5040DT	E215040DT001	Jul. 05, 2022	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 13, 2022	1 Year
4.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 23, 2022	1 Year
5.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 22, 2022	1 Year
6.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 13, 2022	1 Year
7.	EMI Preamplifier	SKET Electronic	LNPA-0118G -45	SKET-PA-002	Oct. 13, 2022	1 Year
8.	Double Ridged Horn Antenna	SCHWARZBECK	BBHA 9120D	02555	Oct. 16, 2022	3 Year
9.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Oct. 23, 2022	1 Year
10.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Oct. 23, 2022	1 Year
11.	Horn Antenna	A-INFO	LB-180400-K F	J211060628	Oct. 23, 2022	1 Year
12.	Pre-amplifier	SONOMA	310N	186860	Oct. 23, 2022	1 Year
13.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
14.	MXA Spectrum Analysis	KEYSIGHT	N9020A	MY53280032	Oct. 13, 2022	1 Year
15.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Oct. 13, 2022	1 Year
16.	Signal Generator	Agilent	E4421B	MY41000743	Oct. 13, 2022	1 Year
17.	DC Power Supply	IVYTECH	IV3605	1804D360510	Oct. 22, 2022	1 Year
18.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80 B	N/A	Oct. 19, 2022	1 Year
19.	Power Meter	Agilent	N1914A	MY50001102	Oct. 26, 2022	1 Year



1.7. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 3.9 dB (Horizontal)
		Ur = 3.8 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4 dB

1.8. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111.

ISED-Registration No.: 8058A

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102



2. Summary of Test Results

Standard Section	Test Item	Result
15.203	Antenna Requirement	PASS
15.207	Conducted Emission	PASS
15.205/15.209/15.225	Spurious Emission	PASS
15.215(c)	20dB Occupied Bandwidth	PASS
15.225(e)	Frequency Tolerance	PASS
Remark: "N/A" is an abbreviation for Not Applicable.		



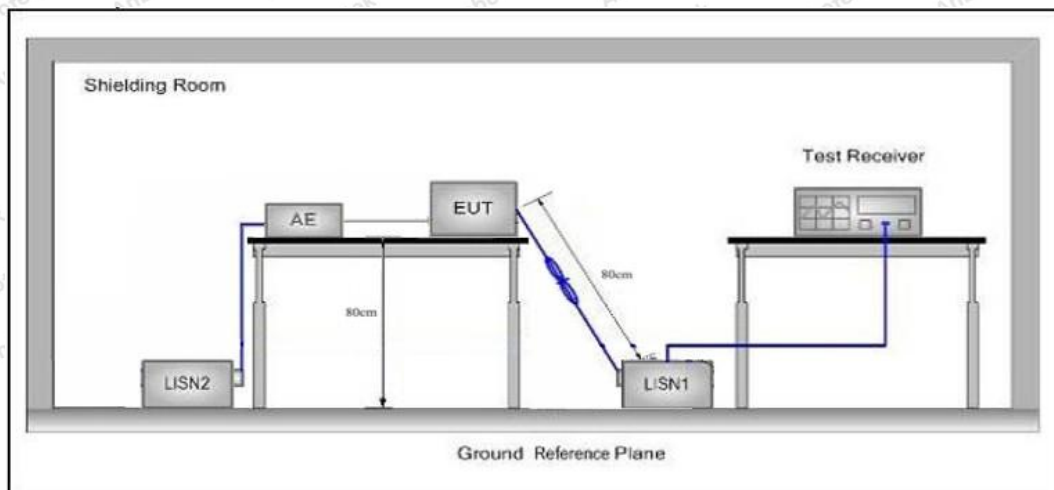
3. Conducted Emission Test

3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207		
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50

Remark: (1) *Decreasing linearly with logarithm of the frequency.
(2) The lower limit shall apply at the transition frequency.

3.2. Test Setup



3.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10: 2020 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

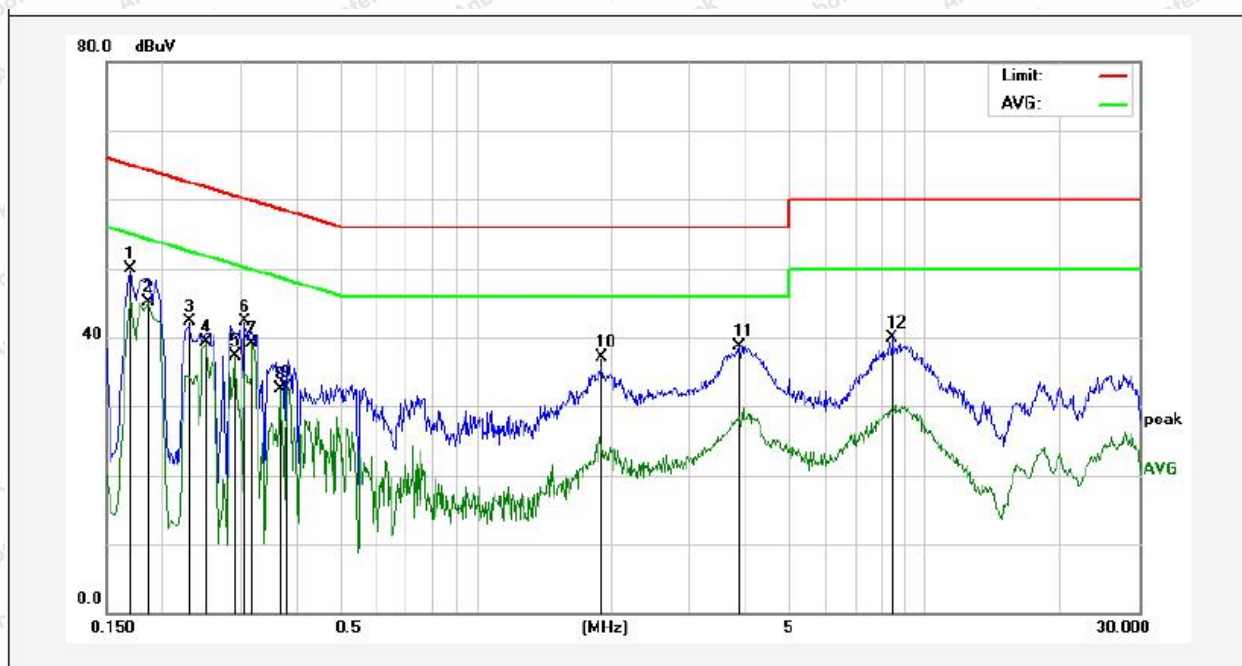
AC conducted emission pre-test at both at AC 120V/60Hz and AC 240V/60Hz modes, recorded worst case AC 120V/60Hz.

Please to see the following pages.



Conducted Emission Test Data

Test Site: 1# Shielded Room
Operating Condition: 13.56MHz
Test Specification: AC 120V, 60Hz
Comment: Live Line
Temp.(°C)/Hum.(%RH): 22.1°C/52%RH

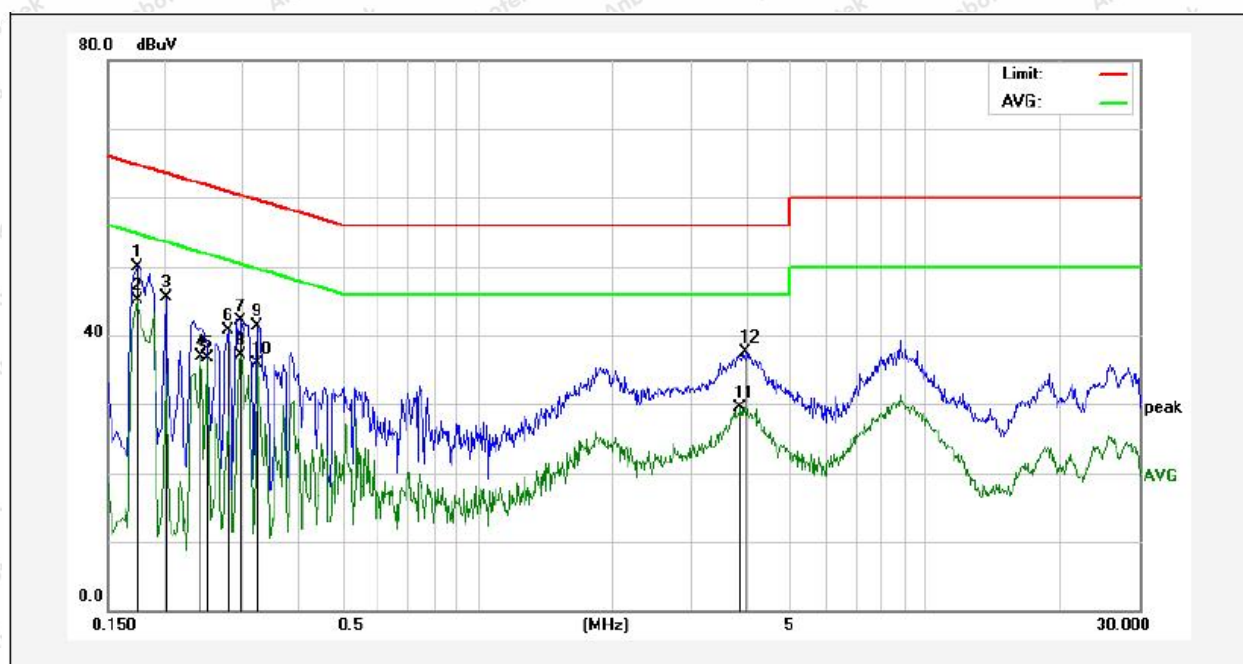


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1693	40.11	9.83	49.94	64.99	-15.05	QP	
2	0.1853	35.18	9.83	45.01	54.24	-9.23	AVG	
3	0.2291	32.47	9.83	42.30	62.48	-20.18	QP	
4	0.2494	29.43	9.82	39.25	51.77	-12.52	AVG	
5	0.2893	27.38	9.83	37.21	50.54	-13.33	AVG	
6	0.3050	32.48	9.83	42.31	60.10	-17.79	QP	
7	0.3165	29.23	9.83	39.06	49.80	-10.74	AVG	
8	0.3653	22.69	9.82	32.51	48.61	-16.10	AVG	
9	0.3769	22.84	9.81	32.65	48.35	-15.70	AVG	
10	1.8978	27.33	9.83	37.16	56.00	-18.84	QP	
11	3.8399	28.79	9.85	38.64	56.00	-17.36	QP	
12	8.4561	29.96	9.92	39.88	60.00	-20.12	QP	



Conducted Emission Test Data

Test Site: 1# Shielded Room
Operating Condition: 13.56MHz
Test Specification: AC 120V, 60Hz
Comment: Neutral Line
Temp.(°C)/Hum.(%RH): 22.1°C/52%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1739	40.14	9.83	49.97	64.77	-14.80	QP	
2	0.1739	35.18	9.83	45.01	54.77	-9.76	AVG	
3	0.2017	35.72	9.83	45.55	63.54	-17.99	QP	
4	0.2416	27.08	9.83	36.91	52.04	-15.13	AVG	
5	0.2494	26.93	9.82	36.75	51.77	-15.02	AVG	
6	0.2772	30.88	9.83	40.71	60.90	-20.19	QP	
7	0.2970	32.30	9.83	42.13	60.32	-18.19	QP	
8	0.2970	27.33	9.83	37.16	50.32	-13.16	AVG	
9	0.3215	31.39	9.83	41.22	59.67	-18.45	QP	
10	0.3215	25.99	9.83	35.82	49.67	-13.85	AVG	
11	3.8603	19.59	9.85	29.44	46.00	-16.56	AVG	
12	3.9639	27.63	9.85	37.48	56.00	-18.52	QP	



4. Radiation Spurious Emission and Band Edge

4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.205, 15.209 and 15.225				
Test Limit	Frequency (MHz)	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz~0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz~88MHz	100	40.0	Quasi-peak	3
	88MHz~216MHz	150	43.5	Quasi-peak	3
	216MHz~960MHz	200	46.0	Quasi-peak	3
	960MHz~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	74.0	Peak	3
Remark: (1)The lower limit shall apply at the transition frequency. (2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.					

(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 emissions shall not exceed 334 microvolts/meter 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.

Note:

(1) The tighter limit shall apply at the boundary between two frequency range.

(2) Limitation expressed in dBuV/m is calculated by $20\log$ Emission Level (uV/m).

(3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $Ld1 = Ld2 * (d2/d1)^2$.

Example:

F.S Limit at 30m distance is 30uV/m, then F.S Limitation at 3m distance is adjusted as



$$Ld1 = L1 = 30\mu V/m * (10)^2 = 100 * 30 \mu V/m$$

4.2. Test Setup

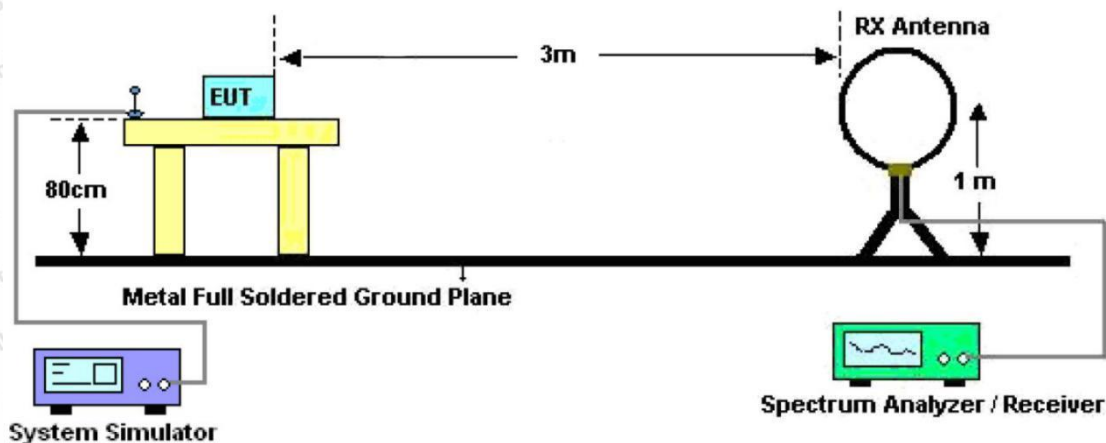


Figure 1. Below 30MHz

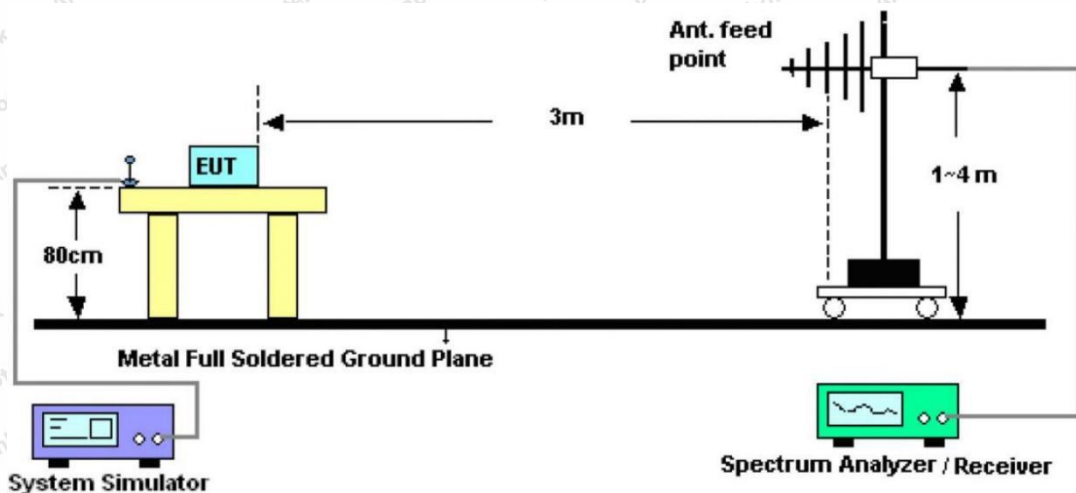


Figure 2. 30MHz to 1GHz

4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

For 9kHz to 150kHz, Set the spectrum analyzer as:

RBW = 200Hz, VBW = 1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:

RBW = 9KHz, VBW = 30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.



For 30MHz to 1000MHz, Set the spectrum analyzer as:

RBW = 100kHz, VBW = 300kHz, Detector = Quasi-Peak, Trace mode = Max hold, Sweep = auto couple.

4.4. Test Data

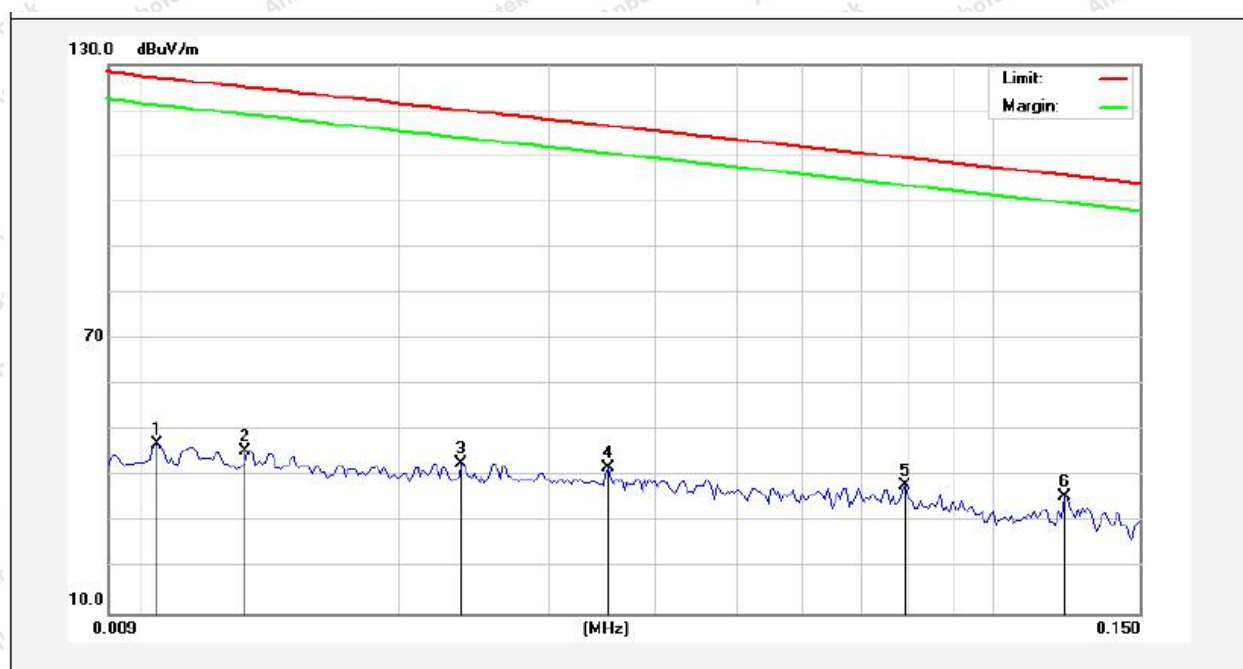
PASS

During the test, Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the X-axis is the worst case.



Test Results (9KHz~0.15MHz)

Test Mode: 13.56MHz
Power Source: AC 120V, 60Hz
Polarization: X
Temp.(°C)/Hum.(%RH): 24.4°C/47%RH

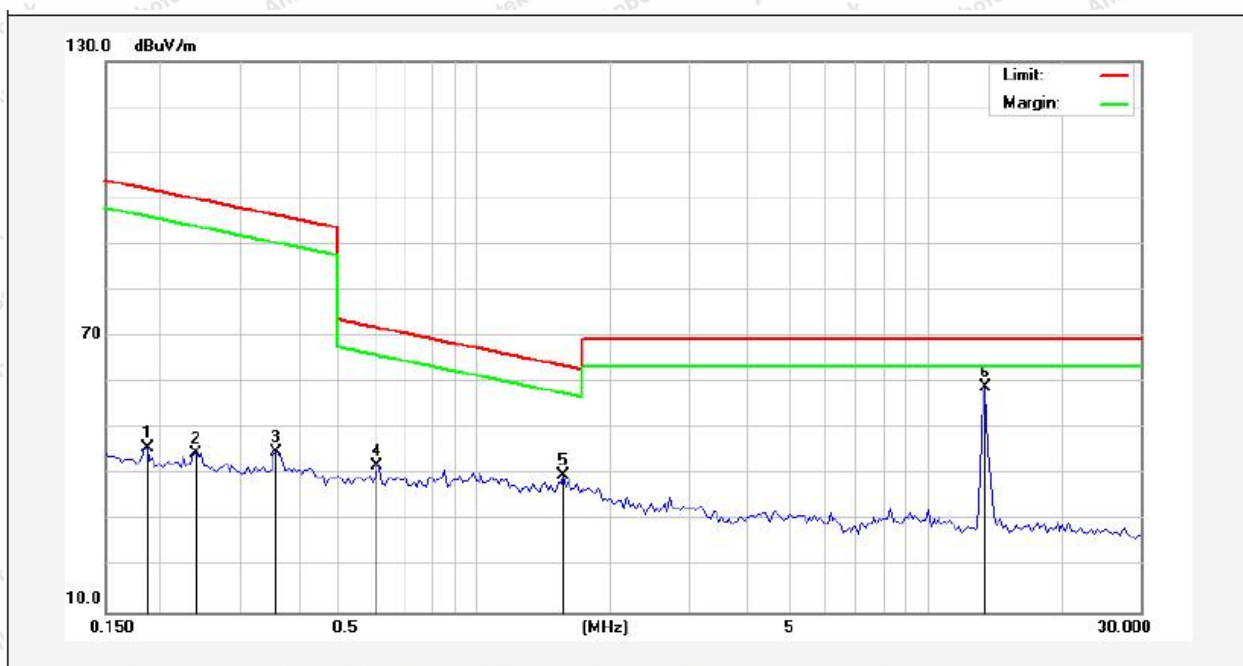


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	0.0103	27.09	20.08	47.17	127.14	-79.97	AVG			
2	0.0131	25.37	20.16	45.53	125.07	-79.54	AVG			
3	0.0235	22.44	20.37	42.81	120.02	-77.21	AVG			
4	0.0352	21.56	20.48	42.04	116.53	-74.49	AVG			
5	0.0791	17.81	20.36	38.17	109.54	-71.37	AVG			
6	0.1223	15.41	20.34	35.75	105.78	-70.03	AVG			



Test Results (0.15MHz~30MHz)

Test Mode: 13.56MHz
Power Source: AC 120V, 60Hz
Polarization: Y
Temp.(°C)/Hum.(%RH): 24.4°C/47%RH

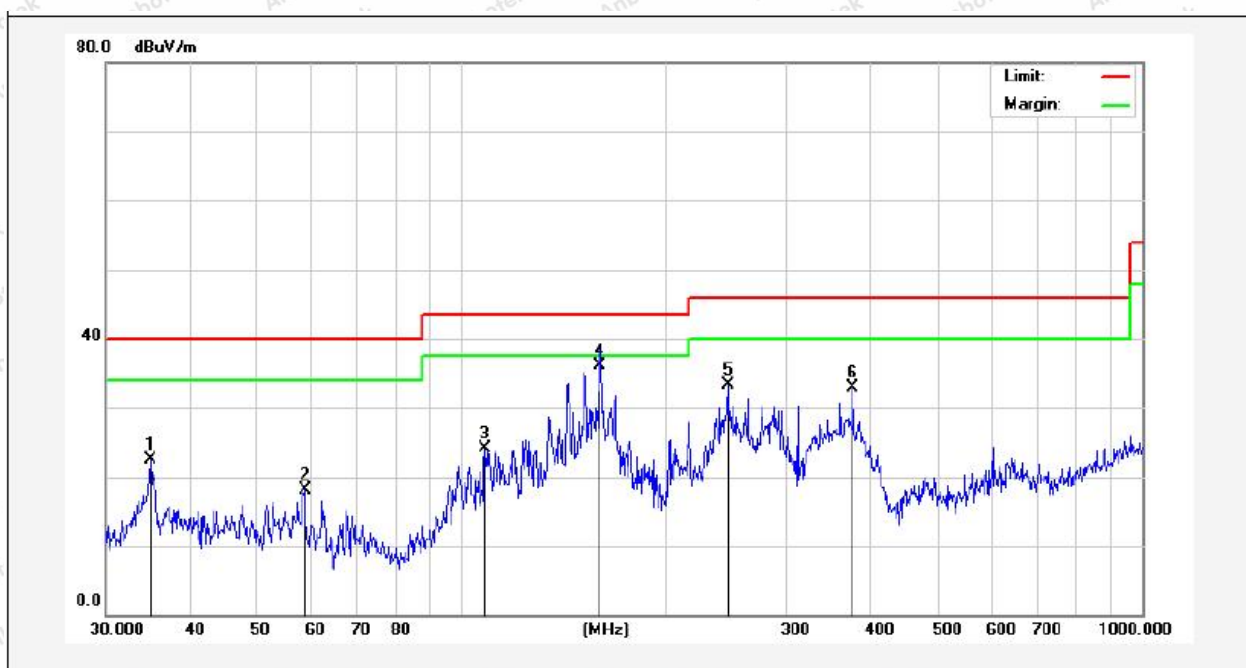


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	0.1853	25.48	20.32	45.80	102.19	-56.39	AVG			
2	0.2384	24.43	20.30	44.73	100.02	-55.29	AVG			
3	0.3593	24.64	20.28	44.92	96.48	-51.56	AVG			
4	0.6027	21.71	20.27	41.98	72.01	-30.03	QP			
5	1.5642	19.44	20.26	39.70	63.75	-24.05	QP			
6	13.5509	38.59	20.53	59.12	69.50	-10.38	QP			



Test Results (30~1000MHz)

Test Mode: 13.56MHz
Power Source: AC 120V, 60Hz
Polarization: Horizontal
Temp.(°C)/Hum.(%RH): 24.4°C/47%RH

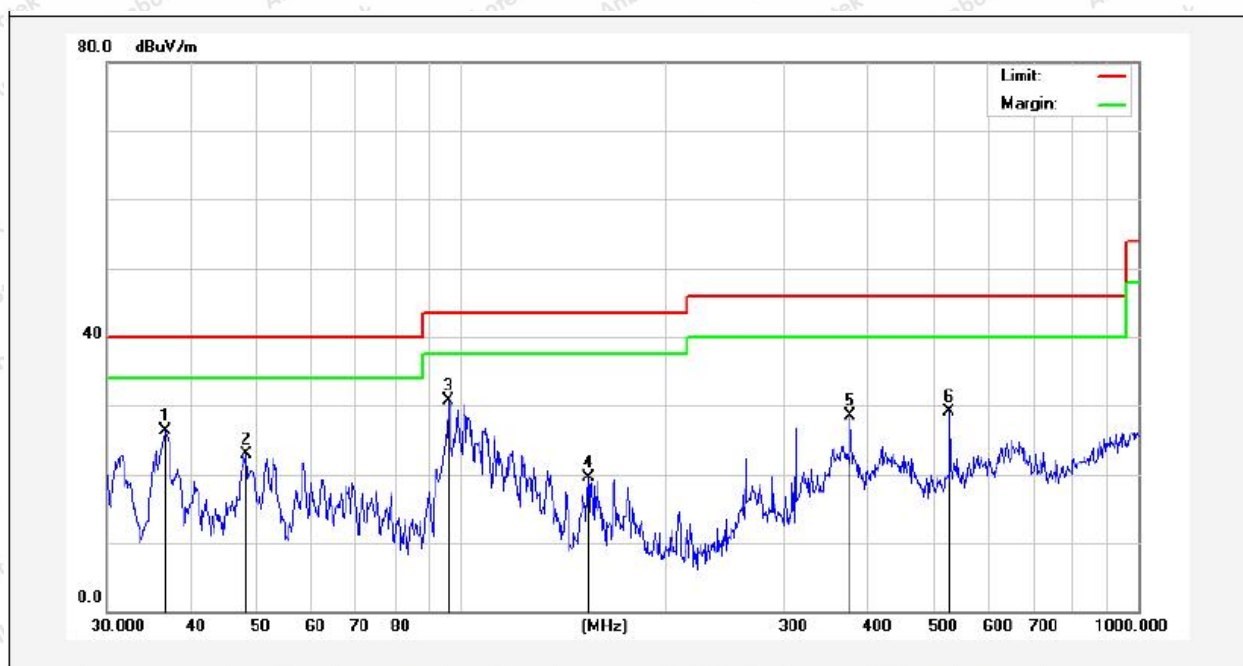


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	34.8823	41.08	-18.50	22.58	40.00	-17.42	QP			
2	58.8185	35.56	-17.52	18.04	40.00	-21.96	QP			
3	108.2667	46.95	-22.86	24.09	43.50	-19.41	QP			
4	159.7844	60.19	-24.00	36.19	43.50	-7.31	QP			
5	245.9509	54.80	-21.56	33.24	46.00	-12.76	QP			
6	375.9385	49.04	-16.08	32.96	46.00	-13.04	QP			



Test Results (30~1000MHz)

Test Mode: 13.56MHz
Power Source: AC 120V, 60Hz
Polarization: Vertical
Temp.(°C)/Hum.(%RH): 24.4°C/47%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	36.5092	42.75	-16.37	26.38	40.00	-13.62	QP			
2	48.1626	38.37	-15.51	22.86	40.00	-17.14	QP			
3	95.7622	47.77	-17.13	30.64	43.50	-12.86	QP			
4	154.2786	41.32	-21.90	19.42	43.50	-24.08	QP			
5	375.9385	43.17	-14.71	28.46	46.00	-17.54	QP			
6	526.3967	41.16	-11.98	29.18	46.00	-16.82	QP			



Test Results (Inband)

Indicated			Table Angle Degree	Antenna Height (m)	Detector	Correction Factor			Corrected Amplitude (dBuV/m) @3m	FCC part 15.225	
Frequency Range (MHz)	Mark Point (MHz)	Corrected Amplitude (dBuV/m) @3m				Ant. Factor (dB)	Cable Loss (dB)	Pre-Amp. Gain (dB)		Limit (dBuV/m) @3m	Result
13.110~13.410	13.387	71.46	0	1.0	QP	20.8	0.2	30.2	62.26	80.5	PASS
13.410~13.553	13.547	69.02	0	1.0	QP	20.9	0.2	30.2	59.92	90.5	PASS
13.553~13.567	13.558	94.10	0	1.0	QP	20.9	0.2	30.2	85.00	124	PASS
13.567~13.710	13.576	73.37	0	1.0	QP	21.1	0.2	30.2	64.47	90.5	PASS
13.710~14.010	13.889	72.49	0	1.0	QP	21.2	0.2	30.2	63.69	80.5	PASS

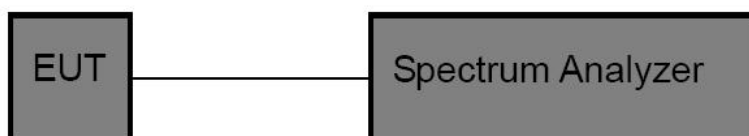


5. Frequency Tolerance

5.1. Test Requirement

Test Standard	FCC Part15 C Section 15.225(e)
Test Limit	±0.01% (100ppm)

5.2. Test Setup



5.3. Test Procedure

Let the EUT works on 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.

5.4. Test Data

Pass

Voltage (V)	Temperature (°C)	Frequency Measured (MHz)	Test data (ppm)	Limit (ppm)	Verdict
AC 120V	-20	13.560708	52.21	±100	PASS
	-10	13.560655	48.32	±100	PASS
	0	13.560622	45.84	±100	PASS
	+10	13.560710	52.39	±100	PASS
	+20	13.560674	49.73	±100	PASS
	+30	13.560738	54.39	±100	PASS
	+40	13.560683	50.33	±100	PASS
	+50	13.560648	47.75	±100	PASS
AC 132V	+20	13.560740	54.57	±100	PASS
AC 108V	+20	13.560703	51.81	±100	PASS

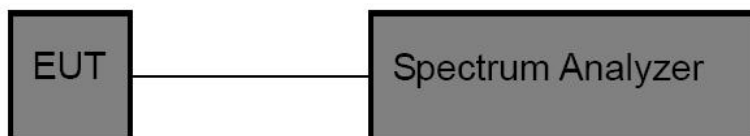


6. 20DB Occupy Bandwidth Test

6.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.215(c)
Test Limit	N/A

6.2. Test Setup



6.3. Test Procedure

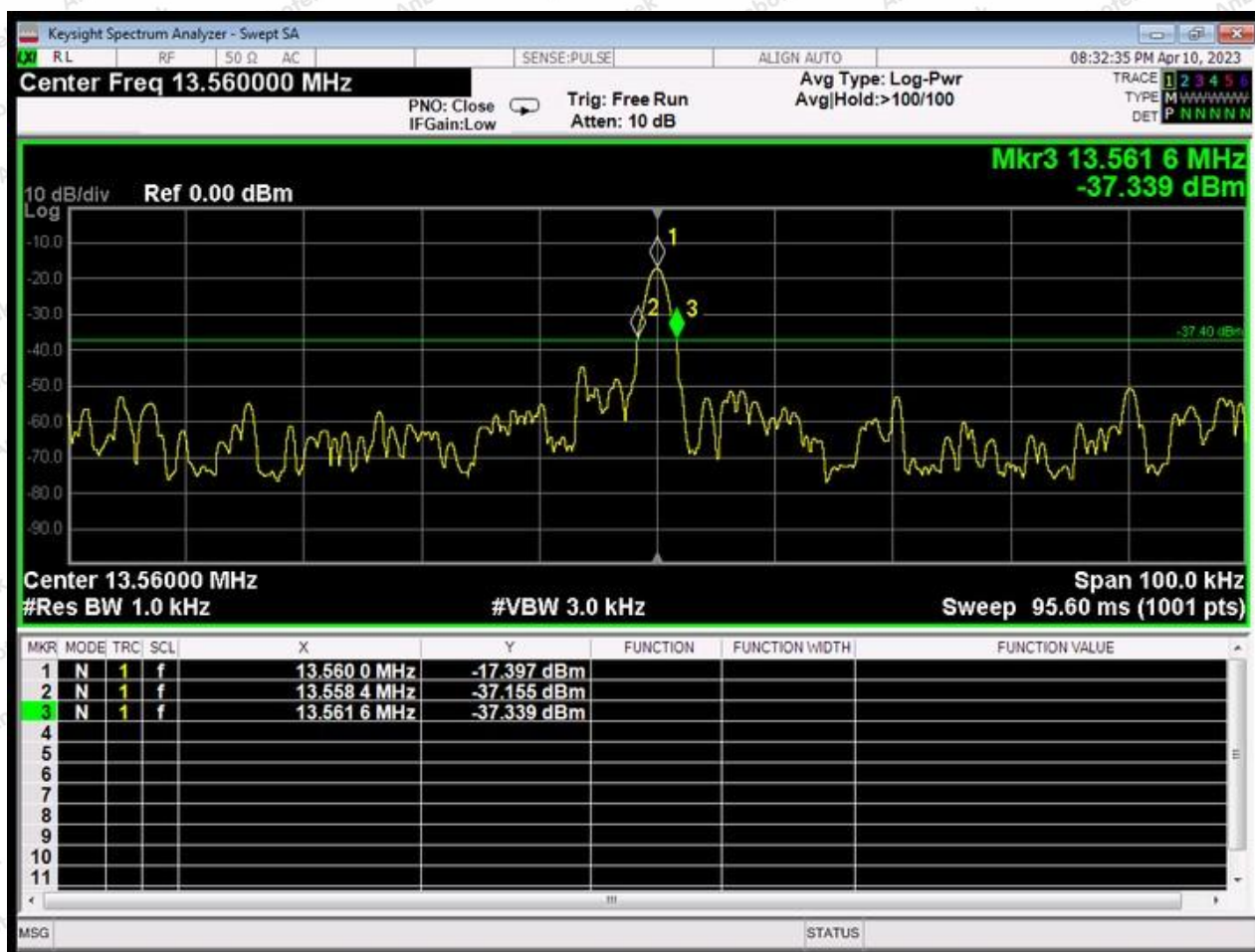
The bandwidth of the fundamental frequency was measured by spectrum analyzer with 3kHz RBW and VBW $\geq$ 3*RBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

6.4. Test Data

Test Item	: 20dB Bandwidth	Test Mode	: Continuously transmitting
Test Voltage	: AC 120V, 60Hz	Temperature	: 24℃
Test Result	: PASS	Humidity	: 55%RH



Freq. (MHz)	Bandwidth (kHz)	Results
13.56	3.2	PASS



7. Antenna Requirement

7.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203
Requirement	1) 15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

7.2. Antenna Connected Construction

The antenna is a Inductive loop coil Antenna which permanently attached, and the best case gain of the antenna is 0 dBi. It complies with the standard requirement.



APPENDIX I -- TEST SETUP PHOTOGRAPH

Please refer to separated files Appendix I -- Test Setup Photograph

APPENDIX II -- EXTERNAL PHOTOGRAPH

Please refer to separated files Appendix II -- External Photograph

APPENDIX III -- INTERNAL PHOTOGRAPH

Please refer to separated files Appendix III -- Internal Photograph

----- End of Report -----

