TEST REPORT

Applicant: **Address:**	**Dongguan Rainbow Tech Electronic & Plastic Products Co., Ltd.** **No.22 Fuxing Road, Xiagang Village, Chang'an Town, Dongguan, Guangdong, China**		
Manufacturer: **Address:**	**Dongguan Rainbow Tech Electronic & Plastic Products Co., Ltd.** **No.22 Fuxing Road, Xiagang Village, Chang'an Town, Dongguan, Guangdong, China**		
Factory: **Address:**	**Dongguan Rainbow Tech Electronic & Plastic Products Co., Ltd.** **No.22 Fuxing Road, Xiagang Village, Chang'an Town, Dongguan, Guangdong, China**		
E.U.T.:	**Wireless Charger**		
Model Number:	**ZH114、ZH130、ZH138、ZH118-A、ZH118-B**		
Trade mark:	**N/A**		
FCC ID:	**2AKV5ZH118**		
Date of Receipt:	**Dec. 26, 2023**	**Date of Test:**	**Dec. 26, 2023 - Jan. 24, 2024**
Test Specification:	**FCC 47 CFR Part 15, Subpart C**		
Test Result:	**The equipment under test was found to be compliance with the requirements of the standards applied.**		

Prepared by:

Jerry Hu/ Engineer

Approved & Authorized Signer:

Frank Shen/ Manager

Issue Date: January 25, 2024

This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Dongguan Lepont Service Co., Ltd.

TABLE OF CONTENTS

1. GENERAL PRODUCT INFORMATION 4

1.1. PRODUCT FUNCTION 4
1.2. EUT TECHNICAL DESCRIPTION 4
1.3. DESCRIPTION OF TEST MODES 5

2. TEST STANDARDS AND SITES 5

2.1. DESCRIPTION OF STANDARDS AND RESULTS 5
2.2. LIST OF TEST AND MEASUREMENT INSTRUMENTS 6
2.3. MEASUREMENT UNCERTAINTY 7
2.4. TEST FACILITY 7

3. SETUP OF EQUIPMENT UNDER TEST 8

3.1. RADIO FREQUENCY TEST SETUP 1 8
3.2. RADIO FREQUENCY TEST SETUP 2 8
3.3. CONDUCTED EMISSION TEST SETUP 10
3.4. BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM 10
3.5. SUPPORT EQUIPMENT 11

4. TEST RESULTS AND MEASUREMENT DATA 12

4.1. 20DB BANDWIDTH 12
4.2. RADIATED SPURIOUS EMISSION 16
4.3. CONDUCTED EMISSION TEST 34
4.4. ANTENNA APPLICATION 43

Revision History of This Test Report		
Report Number	Description	Issued Date
LP23100240C01-01	Initial Issue	2024-1-25

1. GENERAL PRODUCT INFORMATION

1.1. PRODUCT FUNCTION

Refer to Technical Construction Form and User Manual.

1.2. EUT TECHNICAL DESCRIPTION

Product Name:	Wireless Charger
Model No.:	ZH114、ZH130、ZH138、ZH118-A、ZH118-B
Test Model No:	ZH118-A
Difference:	1, All the models have the same circuit diagram and PCB layout, except for model name, appearance and colour. 2, The models ZH114, ZH130, ZH138, and ZH118-A have the same appearance, but differ from the ZH118-B, as detailed in the EUT photo
Serial No.:	N/A
Test sample(s) ID:	LP23100240C01-S001
Sample(s) Status	Engineer sample
Hardware:	V1.0
Software:	V1.0
Operation frequency:	115-205KHz for Phone and Earphone 320-327KHz for Watch
Modulation Type:	FSK
Antenna Type:	Inductive Loop Antenna with 10 Turns for Phone and Earphone Inductive Loop Antenna with 14 Turns for Watch
Antenna Gain :	0dBi
Wireless Charging:	Watch wireless output : 2W Phone wireless output : 10W/7.5W/5W Earphone wireless output : 3W
Power Supply:	☒DC 9V for ADAPTER ☒Adapter supply: Model: GN413-090200-AG Input:100-240VAC, 50/60Hz, 0.5A Max. Output: 9V2A
Note: for more details, please refer to the User’s manual of the EUT.	

1.3. DESCRIPTION OF TEST MODES

All the test modes were carried out with the EUT in normal operation,the final test mode of the EUT was the worst test mode for emission test, which was shown in this report and defined as:

Mode:	TEST MODE DESCRIPPTION
1	ADAPTER + EUT + Phone Wireless Output: 10W + Earphone Wireless Output: 3W + Watch Wireless Output: 2W
2	ADAPTER + EUT + Phone Wireless Output: 10W + Earphone Wireless Output: 3W
3	ADAPTER + EUT + Phone Wireless Output: 10W + Watch Wireless Output: 2W
4	ADAPTER + EUT + Earphone Wireless Output: 3W + Watch Wireless Output: 2W
5	ADAPTER + EUT + Phone Wireless Output: 10W
6	ADAPTER + EUT + Phone Wireless Output: 7.5W
7	ADAPTER + EUT + Phone Wireless Output: 5W
8	ADAPTER + EUT + Earphone Wireless Output: 3W
9	ADAPTER + EUT + Watch Wireless Output: 2W

Note:
1. Product folding has been evaluated for use.
2. All test modes were pre - tested, but we only recorded the worst case in this report.The worst case is Mode 1
3. All voltage inputs have been tested, with only the worst voltage recorded.

2. TEST STANDARDS AND SITES

2.1. DESCRIPTION OF STANDARDS AND RESULTS

The EUT have been tested according to the applicable standards as referenced below.

FCC Part Clause	Test Parameter	Verdict	Remark
FCC Part 15, Subpart C- Section 15.207 ANSI C63.10-2013	Conducted Emission	PASS	
FCC Part 15, Subpart C- Section 15.209 ANSI C63.10-2013	Radiated Emission	PASS	
FCC Part 15, Subpart C- Section 15.215 ANSI C63.10-2013	20dB Bandwidth	PASS	
15.203	Antenna Application	PASS	
NOTE1: N/A (Not Applicable)			

2.2. LIST OF TEST AND MEASUREMENT INSTRUMENTS

For radiated(9K-30M) emission test(966 Chamber 1)							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Interval	Lab No.	Remark
EMI Test Receiver	Rohde & Schwarz	ESR 3	101849	Feb. 15, 2023	1 Year	LEP-E006	☑
Active Loop Antenna	Schwarzbeck	FMZB 1519C	00008	Feb. 15, 2023	3 Year	LEP-E068	☑
966 Chamber 1	MR	MR-L02	LEP-E051	Nov. 17, 2022	3 Year	LEP-E051	☑
Test software	EZ-EMC	Fala	EMEC-3A1	N/A	N/A	N/A	☑
For radiated(30M-1G) emission test(966 Chamber 1)							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Interval	Lab No.	Remark
EMI Test Receiver	Rohde & Schwarz	ESR 3	101849	Feb. 15, 2023	1 Year	LEP-E006	☑
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	743	Nov. 20, 2022	3 Year	LEP-E005	☑
Signal Amplifier	HP	8447D	1726A01222	Feb. 15, 2023	1 Year	LEP-E007	☑
6dB Attenuator	RswTech	5W 6dB	LEP-E084	Feb. 15, 2023	1 Year	LEP-E084	☑
966 Chamber 1	MR	MR-L02	LEP-E051	Nov. 17, 2022	3 Year	LEP-E051	☑
Test software	EZ-EMC	Fala	EMEC-3A1	N/A	N/A	N/A	☑
For radiated(1-18G) emission test(966 Chamber 1)							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Interval	Lab No.	Remark
Spectrum analyzer	Rohde & Schwarz	FSV40	101412	Feb. 15, 2023	1 Year	LEP-E076	☐
Spectrum analyzer	Agilent	N9020A	MY49100060	Feb. 15, 2023	1 Year	LEP-E020	☐
Horn antenna	Schwarzbeck	BBHA 9120D	01875	Nov. 20, 2022	3 Year	LEP-E024	☐
Preamplifier	Schwarzbeck	BBN 9718B	00010	Feb. 15, 2023	1 Year	LEP-E025	☐
966 Chamber 1	MR	MR-L02	LEP-E051	Nov. 17, 2022	3 Year	LEP-E051	☐
Test software	EZ-EMC	Fala	EMEC-3A1	N/A	N/A	N/A	☐
For radiated(18-40G) emission test(966 Chamber 1)							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Interval	Lab No.	Remark
Spectrum analyzer	Rohde & Schwarz	FSV40	101412	Feb. 15, 2023	1 Year	LEP-E076	☐
Horn antenna+Preamplifier	COM-POWER	AH840	10100020	Sep. 05, 2022	3 Year	LEP-E075	☐
966 Chamber 1	MR	MR-L02	LEP-E051	Nov. 17, 2022	3 Year	LEP-E051	☐
Test software	EZ-EMC	Fala	EMEC-3A1	N/A	N/A	N/A	☐
For conducted emission at the mains terminals test(Shielded Room 2)							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Interval	Lab No.	Remark
EMI Test Receiver	Rohde & Schwarz	ESCS30	1002.4500	Feb. 15, 2023	1 Year	LEP-E004	☐
Artificial Mains Network	Rohde & Schwarz	ENV216	100873	Feb. 15, 2023	1 Year	LEP-E001	☐
Artificial Mains Network	Schwarzbeck	NSLK 8128	NSLK 8128-249	Feb. 15, 2023	1 Year	LEP-E047	☐
Pulse Limiter	Schwarzbeck	VYSD9561-F-N	00612	Feb. 15, 2023	1 Year	LEP-E047	☐
RF Switching Unit	CD	RSU-M2	8830008	Feb. 15, 2023	1 Year	LEP-E045	☐
Shielded Room 2	MR	MR-L01	LEP-E050	Nov. 17, 2022	3 Year	LEP-E050	☑
Test software	EZ-EMC	Fala	EMC-CON 3A1.1+	N/A	N/A	N/A	☑
For RF test							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Interval	Lab No.	Remark
Spectrum analyzer	Rohde & Schwarz	FSV40	101412	Feb. 15, 2023	1 Year	LEP-E076	☑
Spectrum analyzer	Agilent	N9020A	MY49100060	Feb. 15, 2023	1 Year	LEP-E020	☑
Vector source	Agilent	N5182A	MY47420382	Feb. 15, 2023	1 Year	LEP-E021	☑
Analog signal source	Agilent	N5171B	MY51350292	Feb. 15, 2023	1 Year	LEP-E022	☑
All instrument	Rohde & Schwarz	CMW 500	1201.002K50	Feb. 15, 2023	1 Year	LEP-E019	☑
High and low temperature chamber	Math-mart	MT-1202-40	LEP-E041	Feb. 15, 2023	1 Year	LEP-E041	☑
control unit	Tonscend	JS0806-2	10165	Feb. 15, 2023	1 Year	LEP-E034	☑
Testing software	Tonscend	JSTS1120-3	Ver 2.6.77.0518	N/A	N/A	N/A	☑

2.3. MEASUREMENT UNCERTAINTY

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

Parameter	Uncertainty
Conducted Emissions Test	±3.08dB
Radiated Emission Test	±4.60dB
Occupied Bandwidth Test	±2.3%
Antenna Port Emission	±3dB
Temperature	±3.2%
Humidity	±2.5%
Measurement Uncertainty for a level of Confidence of 95%	

2.4. TEST FACILITY

EMC Lab. : The Laboratory has been assessed and proved to be in compliance with CNAS/CL01
The Certificate Registration Number is L10100.
The Laboratory has been assessed and proved to be in compliance with A2LA
The Certificate Registration Number is 6901.01

FCC Designation No.: CN1351
Test Firm Registration No.: 397428

ISED CAB identifier: CN0151
Test Firm Registration No.: 20133

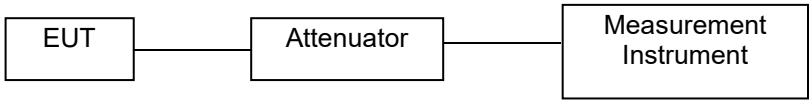
Test Location : Dongguan Lepont Testing Service Co., Ltd.

Address : Room 102, Building 11, No.7, Houjie Science And Technology Avenue, Houjie, Dongguan, Guangdong, China

3. SETUP OF EQUIPMENT UNDER TEST

3.1. 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.



3.2. RADIO FREQUENCY TEST SETUP 2

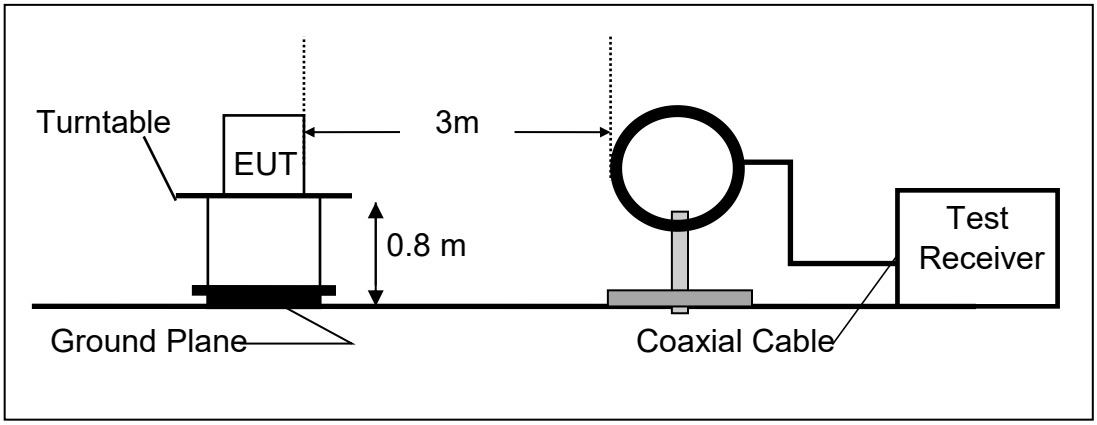
The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 32.

Below 30MHz：
The EUT is placed on a turntable 0.8meters 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.

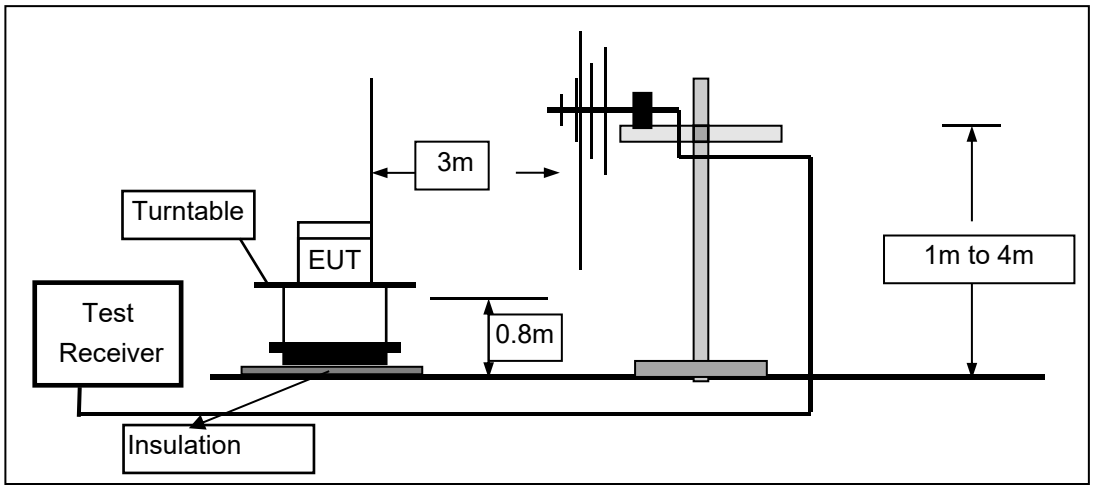
Above 30MHz：
The EUT is placed on a turntable 0.8meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz:
(Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.)
The EUT is placed on a turntable 1.5 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).

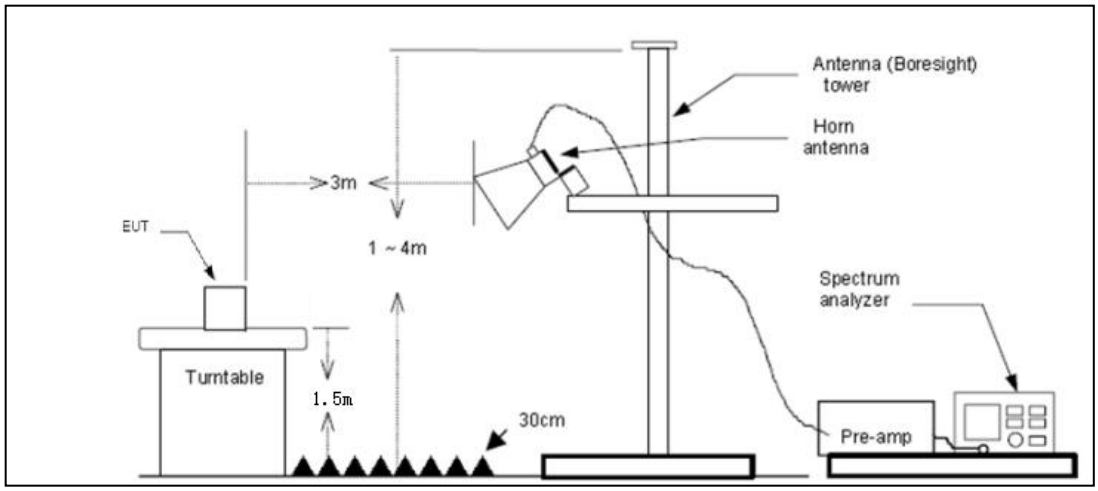
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



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

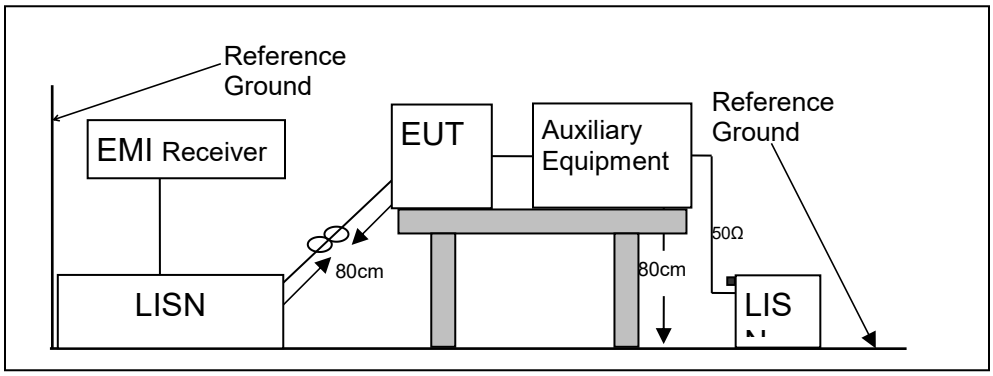


(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

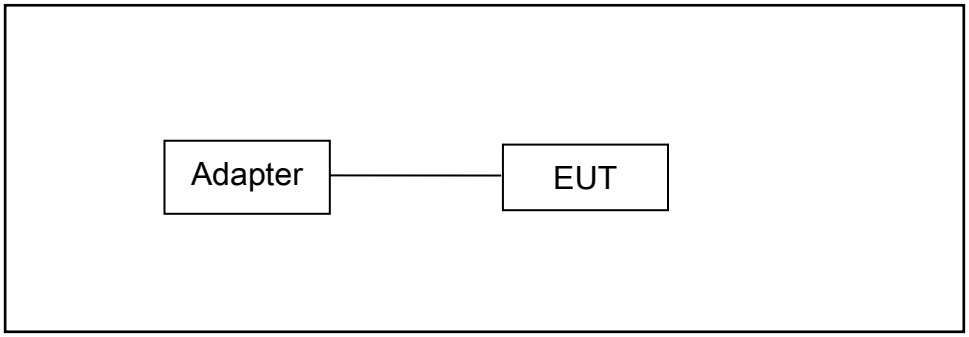


3.3. CONDUCTED EMISSION TEST SETUP

The mains cable of the EUT (Perfect Share Mini) must be connected to LISN. The LISN shall be placed 0.8m 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 0.8m.
According to the requirements in Section 13.1.4.1 of 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.



3.4. BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



3.5. SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without 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
Intelligent wireless charging full function test module	YZB	/	/
Watch	Apple	Watch Series 8	N/A

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.

4. TEST RESULTS AND MEASUREMENT DATA

4.1. 20DB BANDWIDTH

4.1.1. Applicable Standard

According to FCC Part 15.215

4.1.2. Test Procedure

Set to the maximum power setting and enable the EUT transmit continuously
a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation.
d) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “−xx dB down” requirement
e) Set detection mode to peak and trace mode to max hold.
f) Determine the “−xx dB down amplitude” using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.
Measure and record the results in the test report.

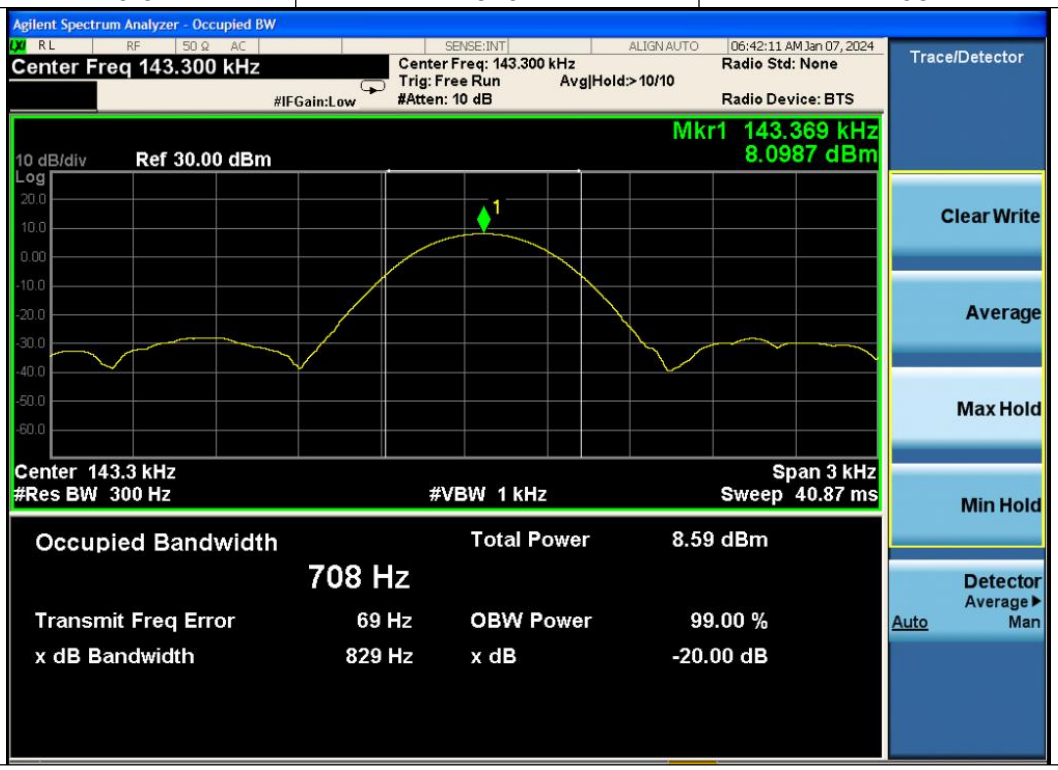
4.1.3. Test Results:

Note: Because the measured signal is CW-like, adjusting the RBW per C63.10 would not be practical since measurement bandwidth will always follow the RBW. The RBW is set to 300 Hz to perform the occupied bandwidth test.

Frequency 115-205kHz 20dB Band

Temperature:	25.3℃	Test By:	Jerry
Humidity:	51.5%	Test Mode:	Tx(phone wireless charger)

Frequency(kHz)	20 dB occupied bandwidth(Hz)	99% occupied bandwidth(Hz)
143.3	829	708

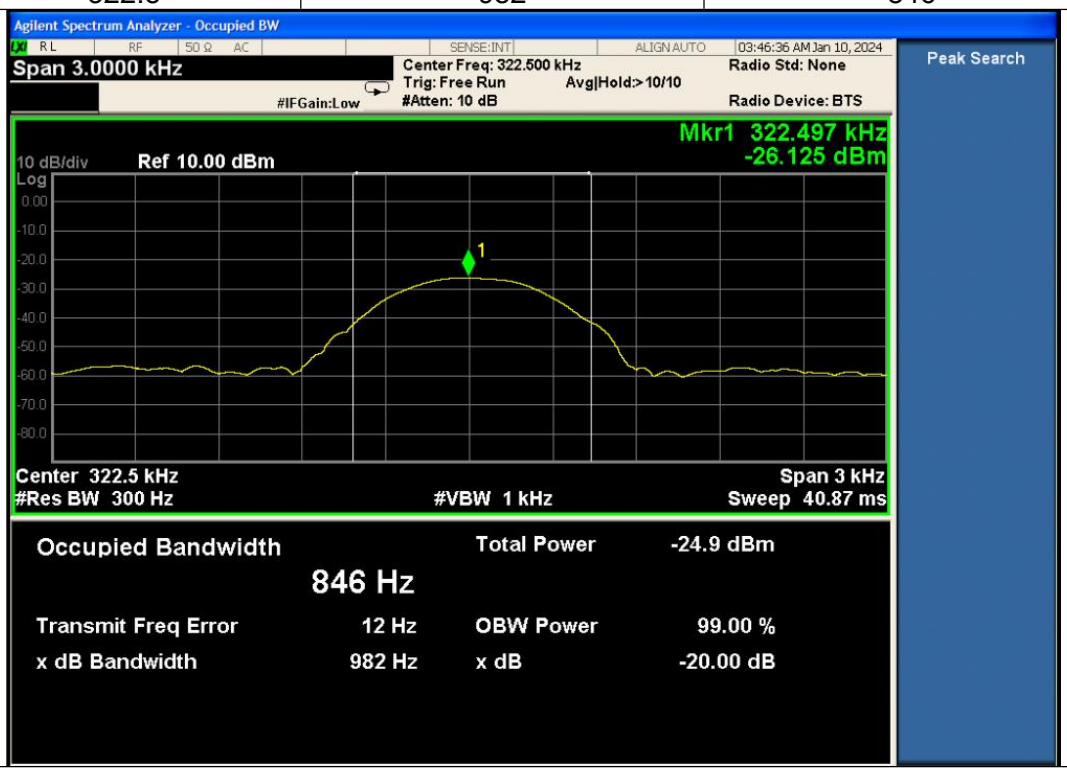


Temperature:	25.3℃	Test By:	Jerry
Humidity:	51.5%	Test Mode:	Tx(Earphone wireless charger)

Frequency(kHz)	20 dB occupied bandwidth(Hz)	99% occupied bandwidth(Hz)
129.6	852	743

Frequency 320-327kHz 20dB Band

Temperature:	25.3℃	Test By:	Jerry
Humidity:	51.5%	Test Mode:	Tx(Watch wireless charger)
Frequency(kHz)		20 dB occupied bandwidth(Hz)	99% occupied bandwidth(Hz)
322.5		982	846



4.2. RADIATED SPURIOUS EMISSION

4.2.1. Applicable Standard

According to FCC Part 15.209

4.2.2. Conformance Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

FCC Part 15.209				
Frequency (MHz)	Field Strength Limitation		Field Strength Limitation Frequency tion at 3m Measurement Dist	
	(uV/m)	Dist	(uV/m)	(dBuV/m)
0.009 – 0.490	2400 / F(KHz)	300m	10000 * 2400/F(KHz)	20log 2400/F(KHz) + 80
0.490 – 1.705	24000 / F(KHz)	30m	100 * 24000/F(KHz)	20log 24000/F(KHz) + 40
1.705 – 30.00	30	30m	100* 30	20log 30 + 40
30.0 – 88.0	100	3m	100	20log 100
88.0 – 216.0	150	3m	150	20log 150
216.0 – 960.0	200	3m	200	20log 200
Above 960.0	500	3m	500	20log 500

15.205 RESTRICTED BANDS OF OPERATION

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])

Remark: 1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

4.2.3. Test Configuration

Test according to clause 3.2 radio frequency test setup 2

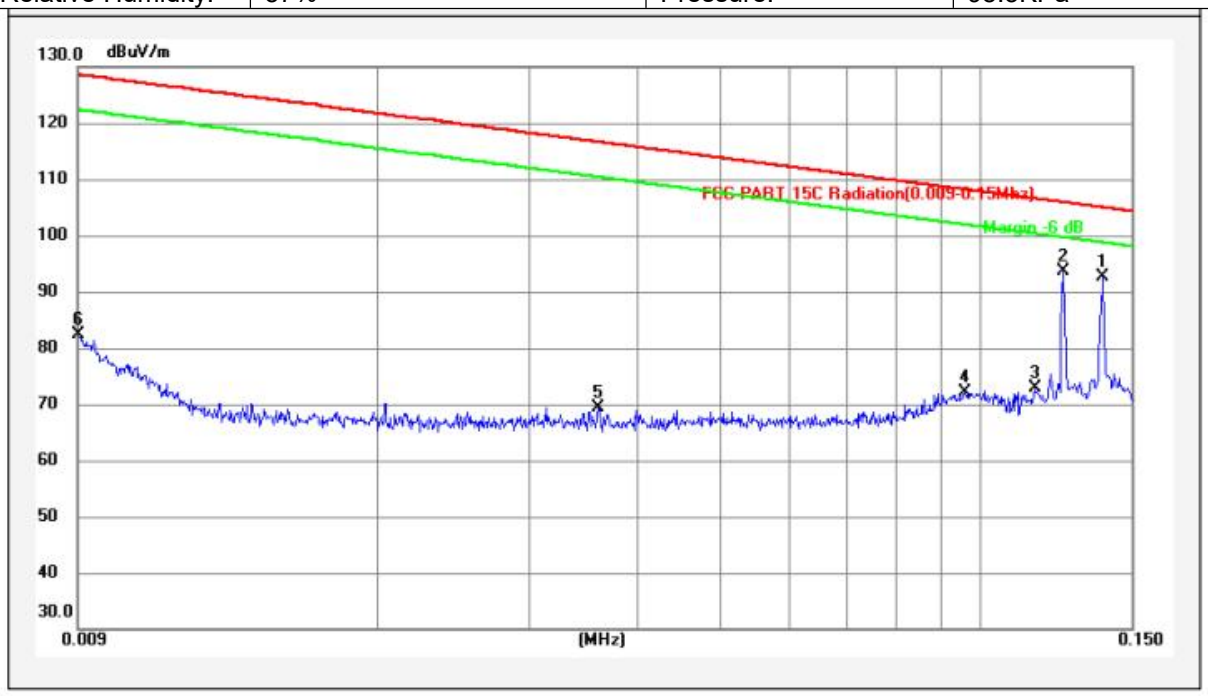
4.2.4. Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.
5. Use the following receiver/spectrum analyzer settings:
   Span = wide enough to fully capture the emission being measured
   RBW=200Hz for 9KHz to 150KHz,
   RBW=9kHz for 150KHz to 30MHz,
   RBW=120KHz for 30MHz to 1GHz
   VBW ≥ 3*RBW
   Sweep = auto
   Detector function = QP
   Trace = max hold

4.2.5. Test Results：

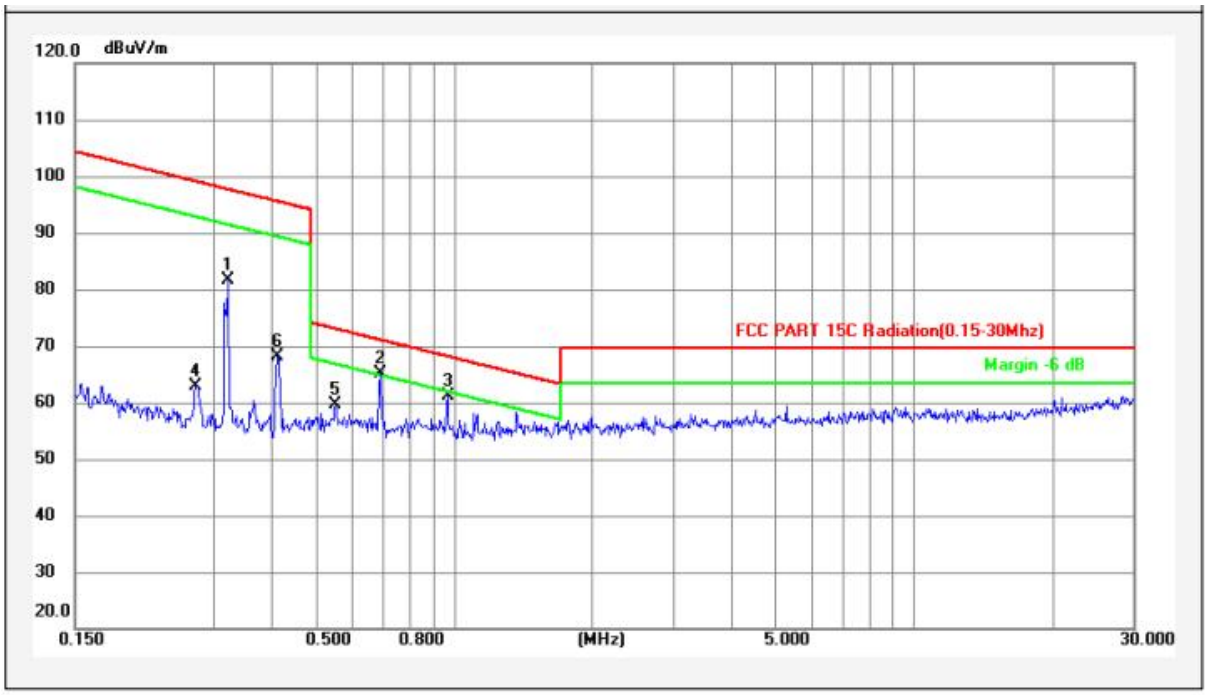
■ Spurious Emission below 30MHz (9KHz to 30MHz)
Mode 1:

Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃		Phase:	Vertical
Relative Humidity:	57%		Pressure:	98.3KPa



No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	0.1386	20.62	72.02	92.64	104.76	-12.12	peak		
2	0.1247	20.56	73.07	93.63	105.67	-12.04	peak	*	
3	0.1155	20.52	52.39	72.91	106.33	-33.42	peak		
4	0.0961	20.53	51.57	72.10	107.91	-35.81	peak		
5	0.0361	20.79	48.52	69.31	116.35	-47.04	peak		
6	0.0090	20.56	61.75	82.31	128.31	-46.00	peak		

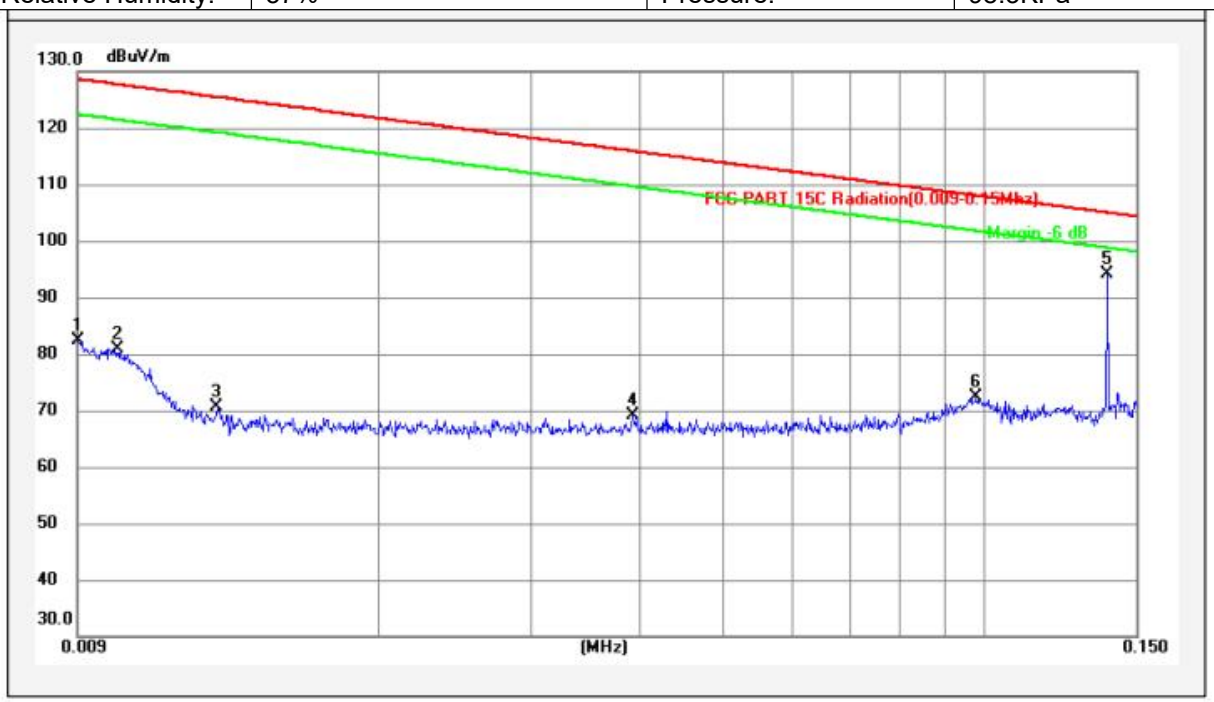
Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃		Phase:	Horizontal
Relative Humidity:	57%		Pressure:	98.3KPa



No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	0.3215	20.67	61.01	81.68	97.46	-15.78	peak		
2	0.6900	20.89	44.25	65.14	70.82	-5.68	peak	*	
3	0.9683	20.18	41.00	61.18	67.88	-6.70	peak		
4	0.2743	20.64	42.27	62.91	98.84	-35.93	peak		
5	0.5522	20.79	38.88	59.67	72.76	-13.09	peak		
6	0.4126	20.71	47.33	68.04	95.29	-27.25	peak		

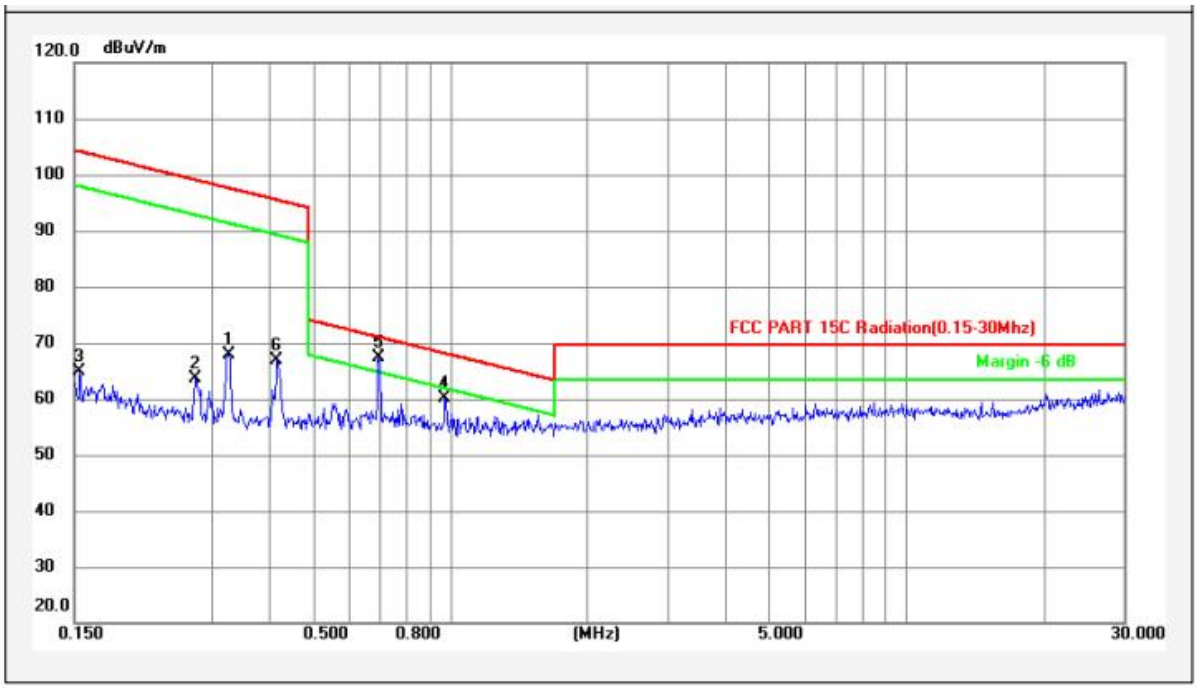
Mode 5:

Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃		Phase:	Vertical
Relative Humidity:	57%		Pressure:	98.3KPa



No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	0.0090	20.56	61.91	82.47	128.31	-45.84	peak		
2	0.0100	20.48	60.42	80.90	127.40	-46.50	peak		
3	0.0130	20.45	50.08	70.53	125.14	-54.61	peak		
4	0.0393	20.84	48.41	69.25	115.61	-46.36	peak		
5	0.1389	20.63	73.51	94.14	104.74	-10.60	peak	*	
6	0.0980	20.49	51.96	72.45	107.75	-35.30	peak		

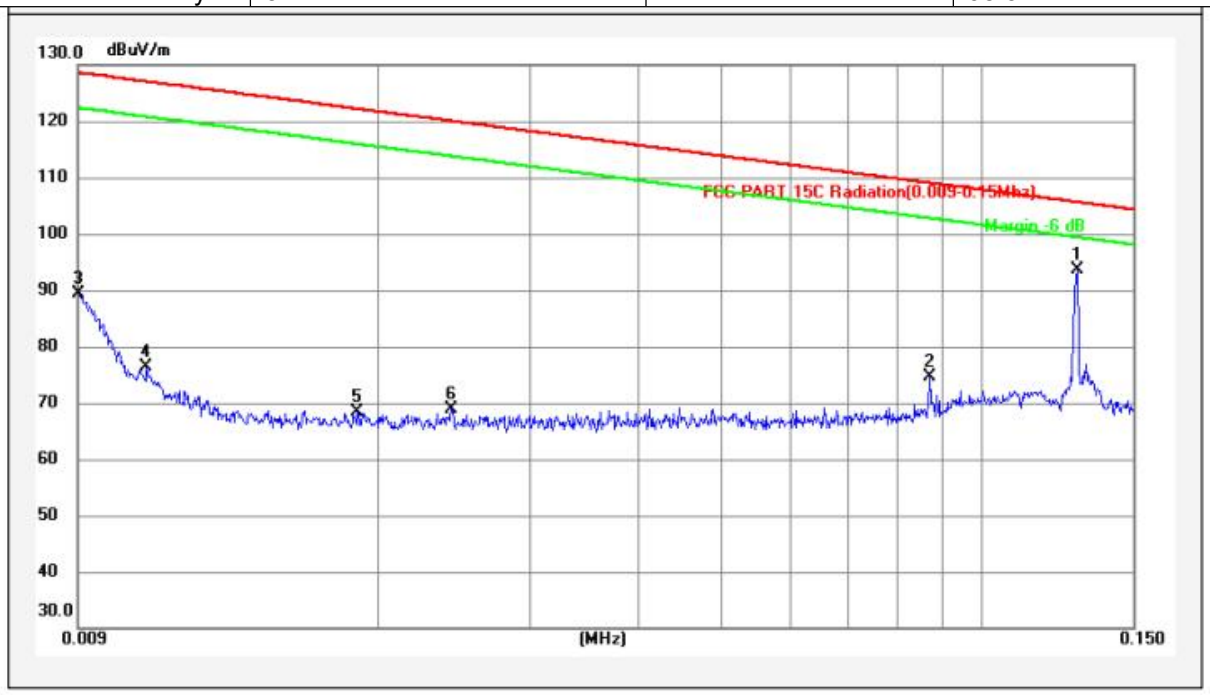
Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃		Phase:	Horizontal
Relative Humidity:	57%		Pressure:	98.3KPa



No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	0.3268	20.67	47.28	67.95	97.32	-29.37	peak		
2	0.2758	20.64	42.88	63.52	98.79	-35.27	peak		
3	0.1539	20.68	44.29	64.97	103.86	-38.89	peak		
4	0.9735	20.17	40.00	60.17	67.83	-7.66	peak		
5	0.6972	20.89	46.57	67.46	70.73	-3.27	peak	*	
6	0.4169	20.72	46.09	66.81	95.20	-28.39	peak		

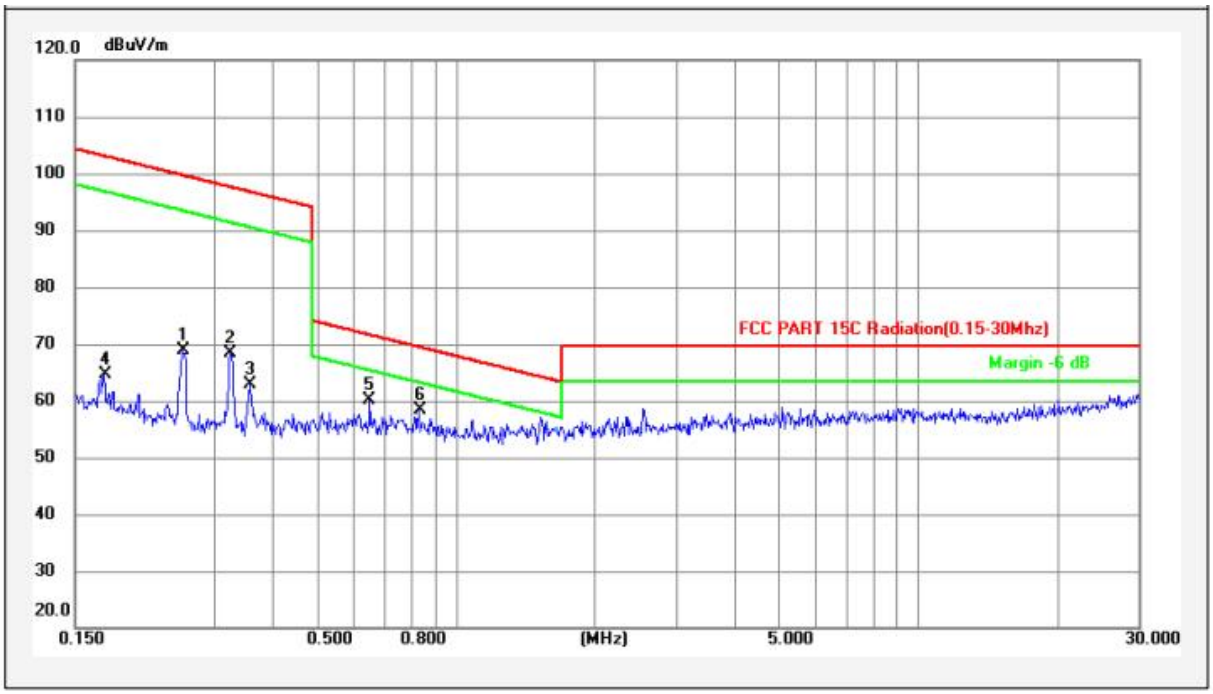
Mode 8:

Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃		Phase:	Vertical
Relative Humidity:	57%		Pressure:	98.3KPa



No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	0.1292	20.59	73.01	93.60	105.37	-11.77	peak	*	
2	0.0871	20.70	53.82	74.52	108.76	-34.24	peak		
3	0.0090	20.56	68.93	89.49	128.31	-38.82	peak		
4	0.0108	20.47	55.95	76.42	126.74	-50.32	peak		
5	0.0189	20.40	48.09	68.49	121.92	-53.43	peak		
6	0.0243	20.52	48.46	68.98	119.75	-50.77	peak		

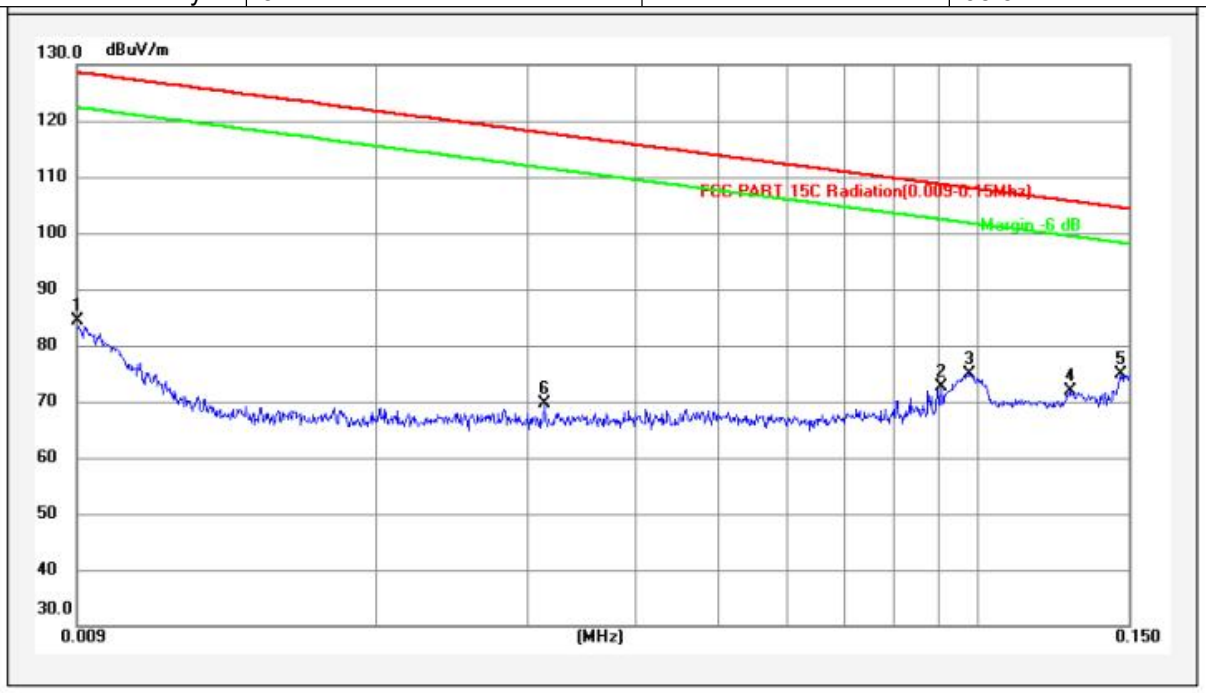
Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃		Phase:	Horizontal
Relative Humidity:	57%		Pressure:	98.3KPa



No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	0.2562	20.63	48.29	68.92	99.43	-30.51	peak		
2	0.3251	20.67	47.78	68.45	97.36	-28.91	peak		
3	0.3577	20.69	42.07	62.76	96.53	-33.77	peak		
4	0.1731	20.67	44.05	64.72	102.84	-38.12	peak		
5	0.6508	20.86	39.35	60.21	71.33	-11.12	peak		
6	0.8305	20.65	37.76	58.41	69.21	-10.80	peak	*	

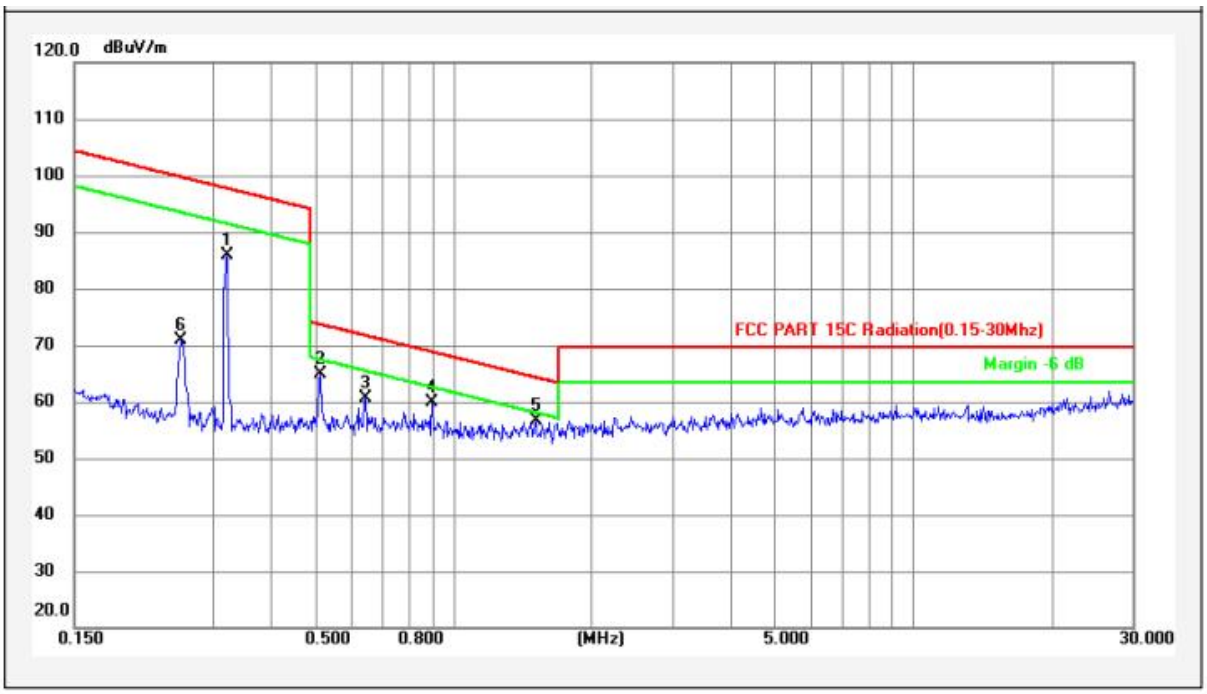
Mode 9:

Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃		Phase:	Vertical
Relative Humidity:	57%		Pressure:	98.3KPa



No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	0.0090	20.56	63.78	84.34	128.31	-43.97	peak		
2	0.0909	20.62	51.95	72.57	108.39	-35.82	peak		
3	0.0978	20.49	54.45	74.94	107.76	-32.82	peak		
4	0.1284	20.57	51.26	71.83	105.42	-33.59	peak		
5	0.1470	20.66	54.15	74.81	104.25	-29.44	peak	*	
6	0.0313	20.72	48.81	69.53	117.57	-48.04	peak		

Test Mode:	FSK	Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃	Phase:	Horizontal
Relative Humidity:	57%	Pressure:	98.3KPa

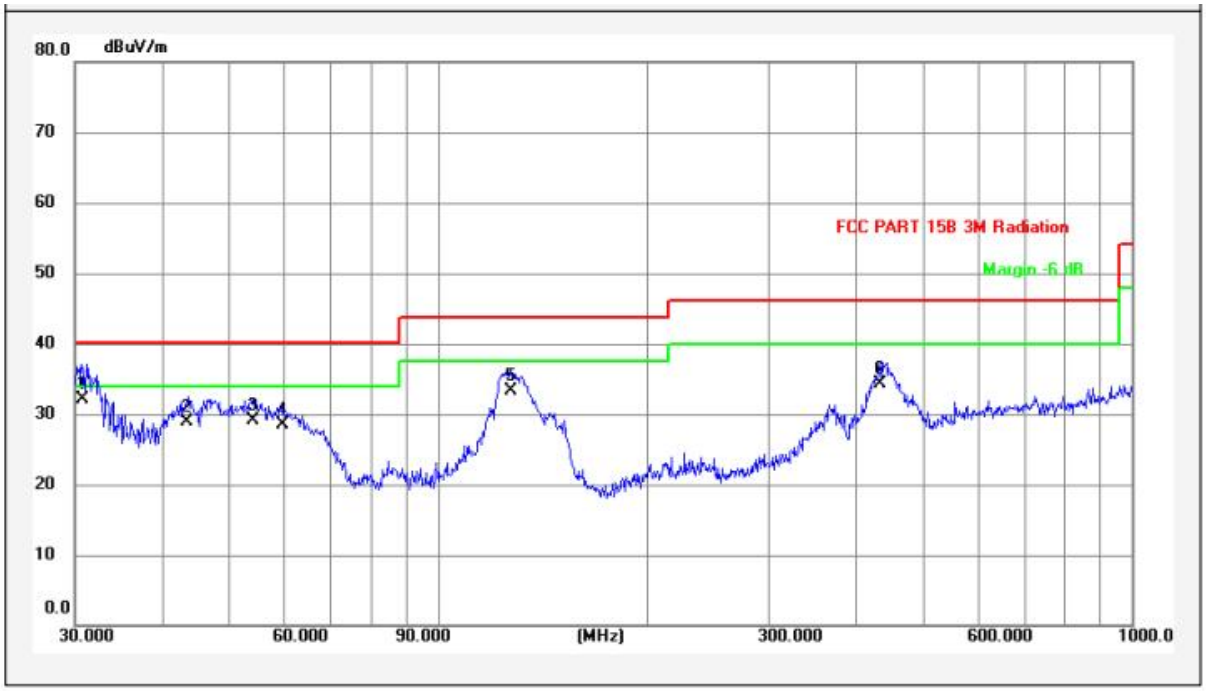


No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	0.3215	20.67	65.32	85.99	97.46	-11.47	peak		
2	0.5127	20.76	44.02	64.78	73.41	-8.63	peak		
3	0.6439	20.85	39.76	60.61	71.43	-10.82	peak		
4	0.8991	20.42	39.39	59.81	68.52	-8.71	peak		
5	1.5112	20.04	36.57	56.61	64.01	-7.40	peak	*	
6	0.2561	20.63	50.37	71.00	99.43	-28.43	peak		

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

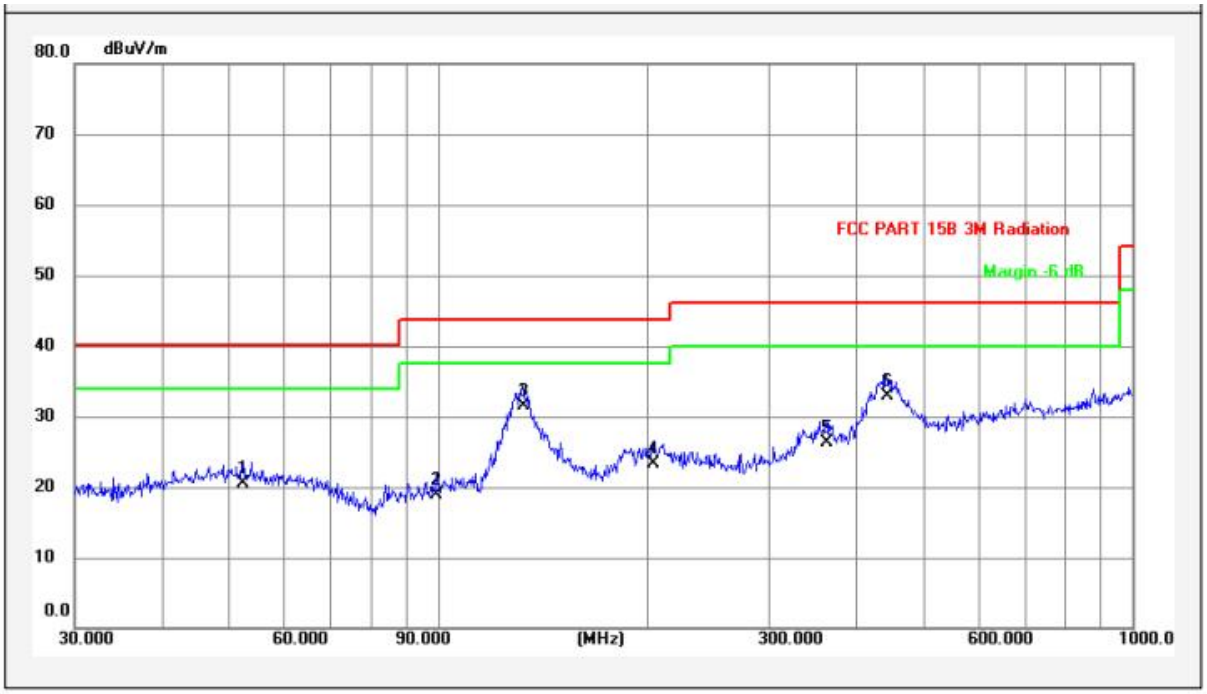
Mode 1:

Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃		Phase:	Vertical
Relative Humidity:	57%		Pressure:	98.3KPa



No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	30.6379	10.06	22.14	32.20	40.00	-7.80	QP	*	
2	43.5057	12.38	16.44	28.82	40.00	-11.18	QP		
3	54.0710	11.98	17.22	29.20	40.00	-10.80	QP		
4	59.6493	11.42	16.99	28.41	40.00	-11.59	QP		
5	127.2176	8.07	25.25	33.32	43.50	-10.18	QP		
6	434.0650	15.36	18.95	34.31	46.00	-11.69	QP		

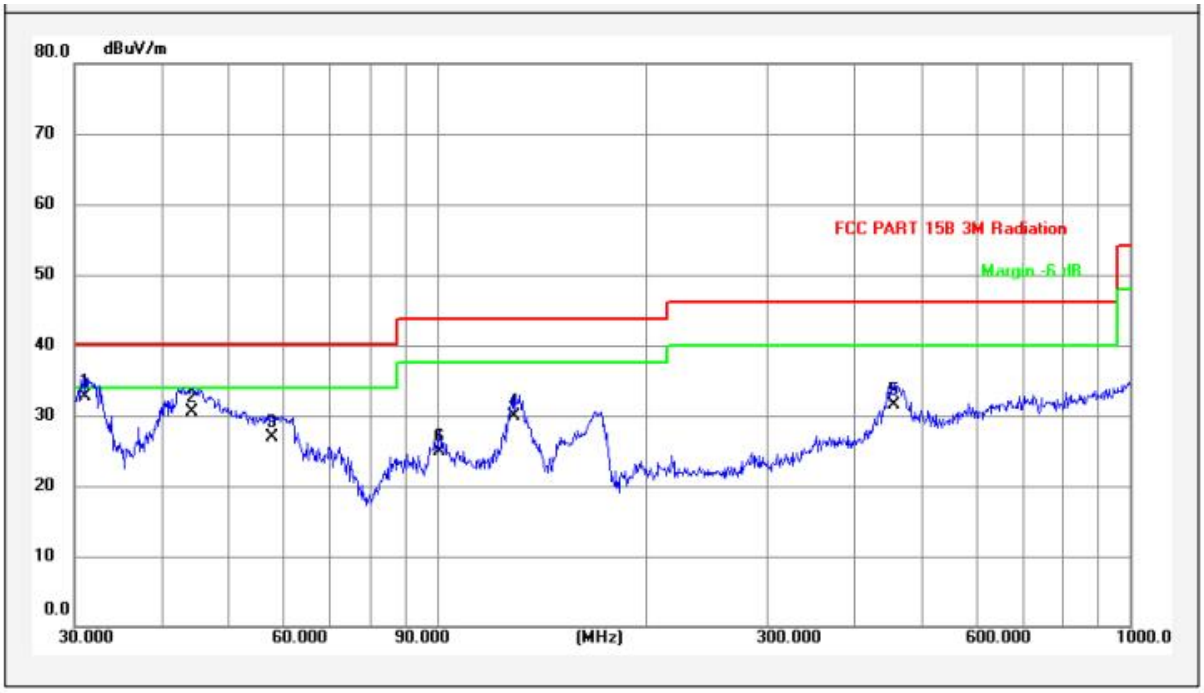
Test Mode:	FSK	Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃	Phase:	Horizontal
Relative Humidity:	57%	Pressure:	98.3KPa



No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	52.3912	12.16	8.39	20.55	40.00	-19.45	QP		
2	99.5281	10.51	8.34	18.85	43.50	-24.65	QP		
3	132.2206	7.40	24.18	31.58	43.50	-11.92	QP	*	
4	204.2377	10.83	12.39	23.22	43.50	-20.28	QP		
5	362.9844	14.58	11.75	26.33	46.00	-19.67	QP		
6	441.7426	15.51	17.33	32.84	46.00	-13.16	QP		

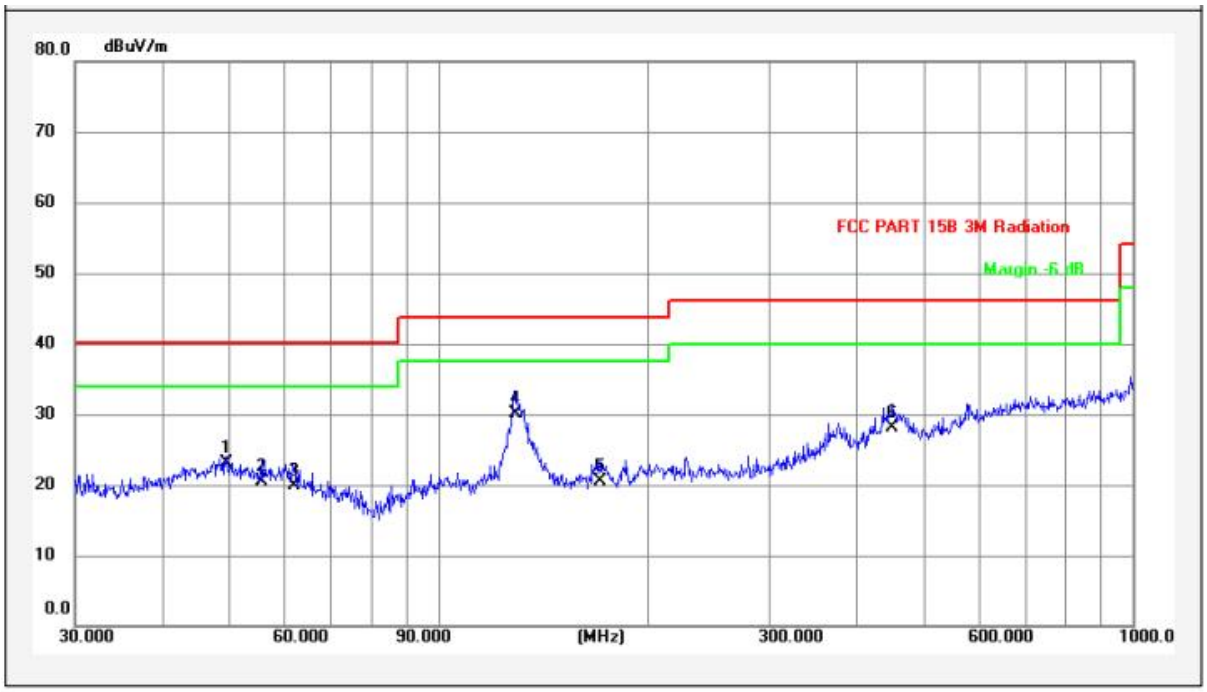
Mode 5:

Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃		Phase:	Vertical
Relative Humidity:	57%		Pressure:	98.3KPa



No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	30.9619	10.04	22.76	32.80	40.00	-7.20	QP	*	
2	44.2752	12.58	18.02	30.60	40.00	-9.40	QP		
3	57.7962	11.60	15.40	27.00	40.00	-13.00	QP		
4	129.0146	7.77	22.23	30.00	43.50	-13.50	QP		
5	455.9058	15.71	15.89	31.60	46.00	-14.40	QP		
6	100.9339	10.54	14.36	24.90	43.50	-18.60	QP		

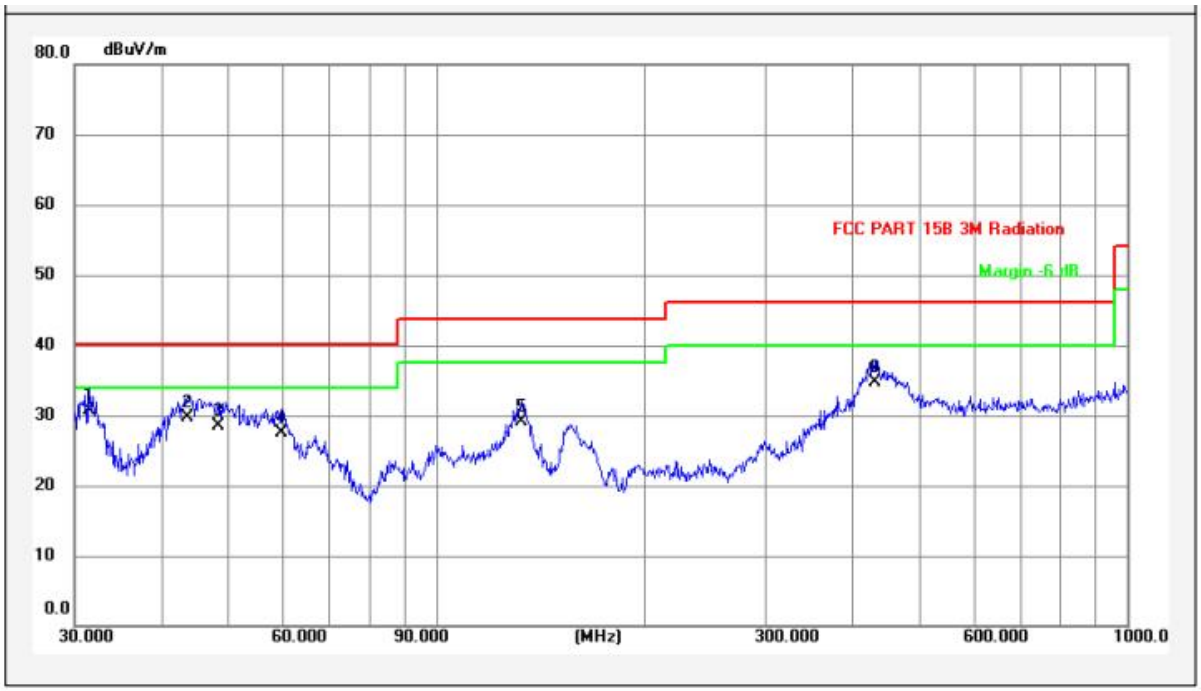
Test Mode:	FSK	Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃	Phase:	Horizontal
Relative Humidity:	57%	Pressure:	98.3KPa



No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	49.5328	12.44	10.66	23.10	40.00	-16.90	QP		
2	55.8047	11.81	8.69	20.50	40.00	-19.50	QP		
3	61.7781	10.95	8.95	19.90	40.00	-20.10	QP		
4	128.5630	7.84	22.36	30.20	43.50	-13.30	QP	*	
5	170.7926	8.63	11.97	20.60	43.50	-22.90	QP		
6	451.1350	15.68	12.52	28.20	46.00	-17.80	QP		

Mode 8:

Test Mode:	FSK	Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃	Phase:	Vertical
Relative Humidity:	57%	Pressure:	98.3KPa



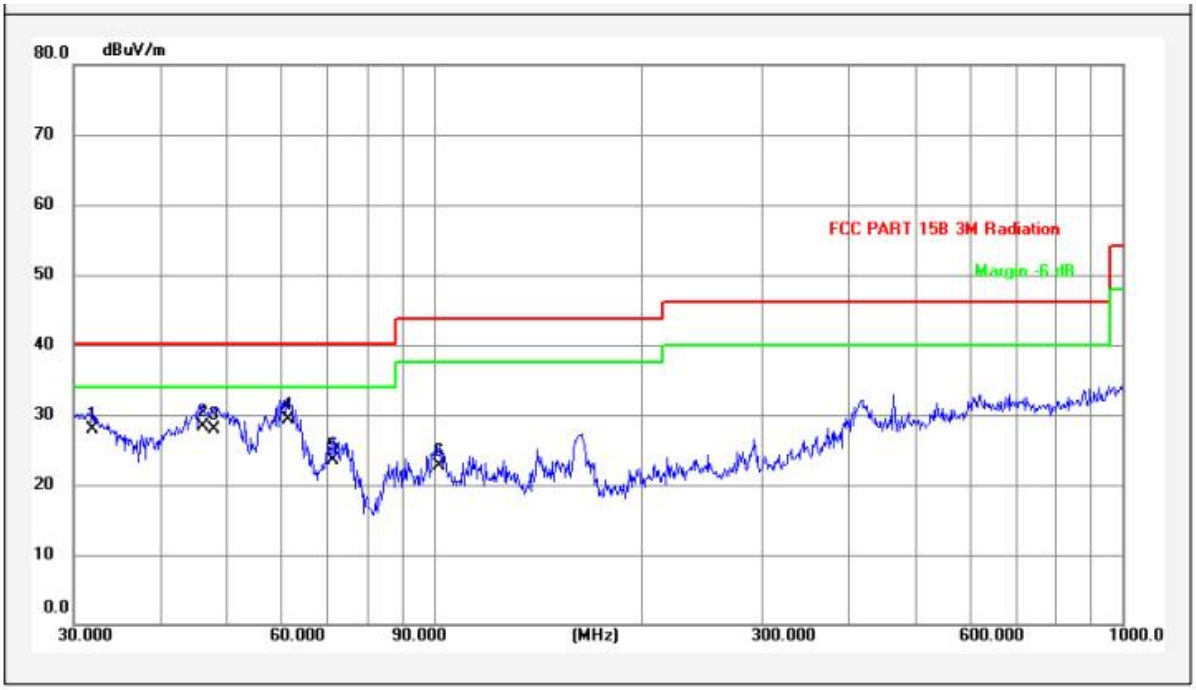
No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	31.5094	10.02	20.78	30.80	40.00	-9.20	QP	*	
2	43.6584	12.42	17.38	29.80	40.00	-10.20	QP		
3	48.5015	12.51	16.09	28.60	40.00	-11.40	QP		
4	59.8588	11.40	16.10	27.50	40.00	-12.50	QP		
5	133.1510	7.32	21.78	29.10	43.50	-14.40	QP		
6	432.5455	15.33	19.47	34.80	46.00	-11.20	QP		

Test Mode:	FSK	Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃	Phase:	Horizontal
Relative Humidity:	57%	Pressure:	98.3KPa

No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	132.2205	7.40	23.50	30.90	43.50	-12.60	QP		
2	158.1123	7.87	15.23	23.10	43.50	-20.40	QP		
3	379.9141	14.62	17.98	32.60	46.00	-13.40	QP		
4	457.5073	15.72	20.68	36.40	46.00	-9.60	QP		
5	480.5276	15.81	20.69	36.50	46.00	-9.50	QP	*	
6	334.8588	13.91	12.49	26.40	46.00	-19.60	QP		

Mode 9:

Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃		Phase:	Vertical
Relative Humidity:	57%		Pressure:	98.3KPa



No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	31.9544	9.99	17.91	27.90	40.00	-12.10	QP		
2	46.1779	12.69	15.71	28.40	40.00	-11.60	QP		
3	47.9939	12.55	15.45	28.00	40.00	-12.00	QP		
4	61.5617	11.00	18.30	29.30	40.00	-10.70	QP	*	
5	71.3300	8.58	14.92	23.50	40.00	-16.50	QP		
6	102.0013	10.47	12.23	22.70	43.50	-20.80	QP		

Test Mode:	FSK	Test Voltage:	AC 120V/60Hz
Temperature:	23.7℃	Phase:	Horizontal
Relative Humidity:	57%	Pressure:	98.3KPa

No.	Frequency (MHz)	Factor (dBuV/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	MK.	Remark
1	59.8588	11.40	11.60	23.00	40.00	-17.00	QP		
2	73.8756	7.87	11.93	19.80	40.00	-20.20	QP		
3	102.0014	10.47	9.93	20.40	43.50	-23.10	QP		
4	237.4760	11.11	13.19	24.30	46.00	-21.70	QP		
5	252.0627	11.27	12.13	23.40	46.00	-22.60	QP		
6	429.5228	15.27	16.19	31.46	46.00	-14.54	peak	*	

4.3. CONDUCTED EMISSION TEST

4.3.1. Applicable Standard

According to FCC Part 15.207

4.3.2. 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.		

Remark: Test results were obtained from the following equation:
Measurement (dBμV) = LISN Factor (dB) + Cable Loss (dB) + Reading (dBμV)
Margin (dB) = Measurement (dBμV) - Limit (dBμV)

4.3.3. Test Configuration

Test according to clause 3.3 conducted emission test setup

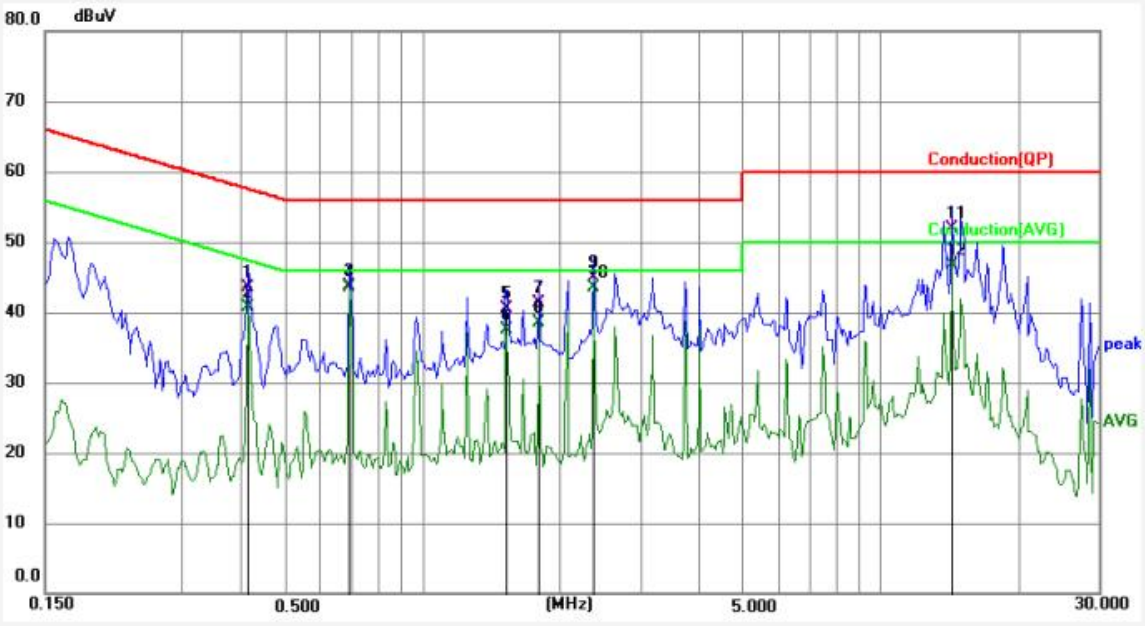
4.3.4. Test Procedure

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.

4.3.5. Test Results：

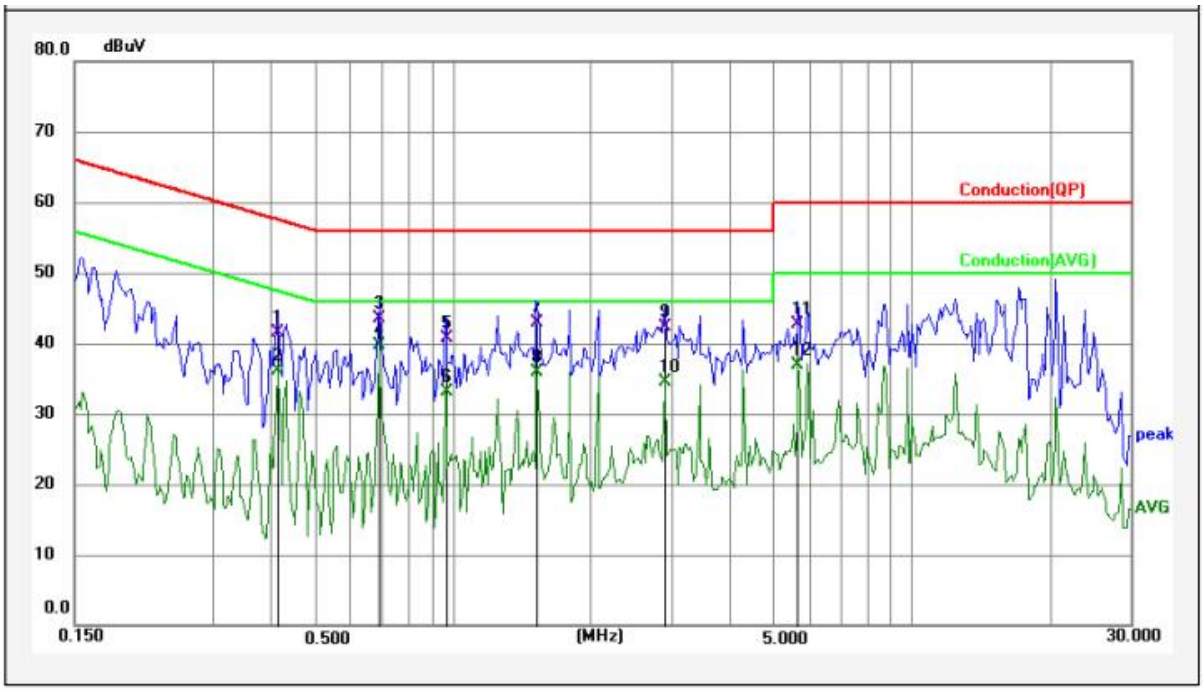
Mode 1:

Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	22.9℃		Phase:	L1
Relative Humidity:	57%		Pressure:	101.3KPa



No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	MK.	Remark
1	0.4159	10.84	32.76	43.60	57.53	-13.93	QP		
2	0.4159	10.84	29.77	40.61	47.53	-6.92	AVG		
3	0.6926	11.04	32.76	43.80	56.00	-12.20	QP		
4	0.6926	11.04	32.45	43.49	46.00	-2.51	AVG		
5	1.5243	11.22	29.38	40.60	56.00	-15.40	QP		
6	1.5243	11.22	26.32	37.54	46.00	-8.46	AVG		
7	1.8020	11.24	30.06	41.30	56.00	-14.70	QP		
8	1.8020	11.24	27.30	38.54	46.00	-7.46	AVG		
9	2.3628	11.26	33.64	44.90	56.00	-11.10	QP		
10	2.3628	11.26	32.34	43.60	46.00	-2.40	AVG	*	
11	14.3016	11.51	40.49	52.00	60.00	-8.00	QP		
12	14.3016	11.51	35.21	46.72	50.00	-3.28	AVG		

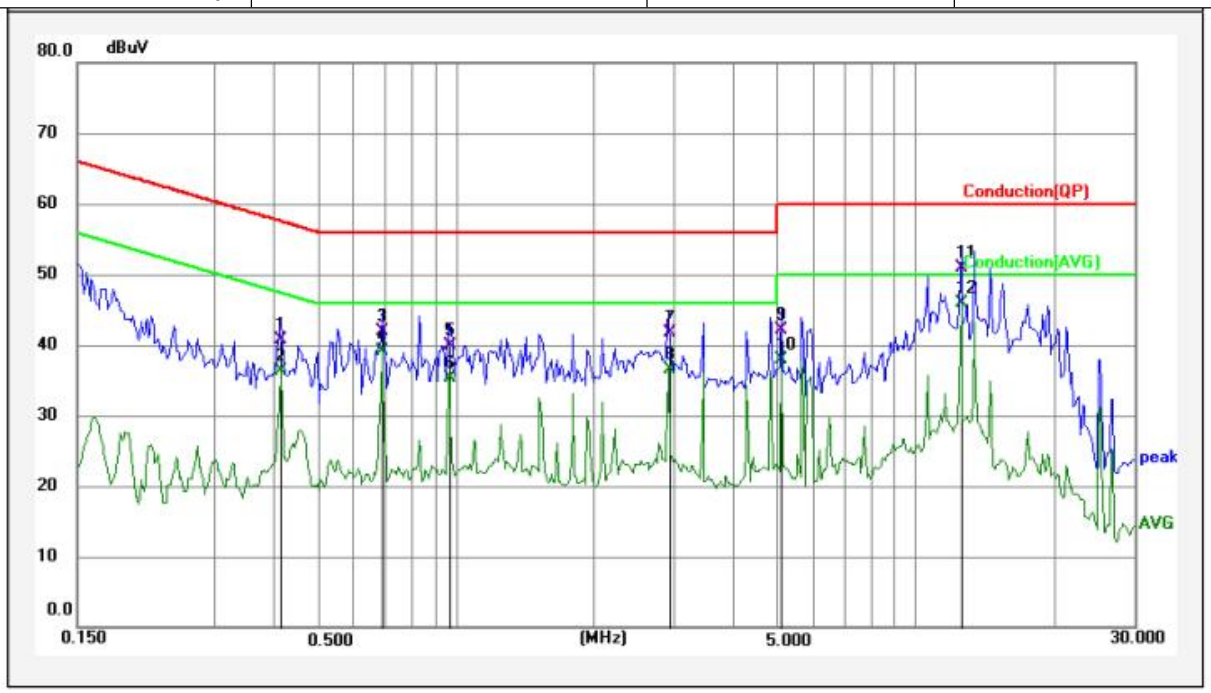
Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	22.9℃		Phase:	N
Relative Humidity:	57%		Pressure:	101.3KPa



No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	MK.	Remark
1	0.4158	10.84	30.66	41.50	57.53	-16.03	QP		
2	0.4158	10.84	25.35	36.19	47.53	-11.34	AVG		
3	0.6926	11.04	32.46	43.50	56.00	-12.50	QP		
4	0.6926	11.04	28.60	39.64	46.00	-6.36	AVG	*	
5	0.9678	11.18	29.62	40.80	56.00	-15.20	QP		
6	0.9678	11.18	21.84	33.02	46.00	-12.98	AVG		
7	1.5244	11.22	31.78	43.00	56.00	-13.00	QP		
8	1.5244	11.22	24.72	35.94	46.00	-10.06	AVG		
9	2.9066	11.28	31.12	42.40	56.00	-13.60	QP		
10	2.9066	11.28	23.15	34.43	46.00	-11.57	AVG		
11	5.6749	11.50	31.20	42.70	60.00	-17.30	QP		
12	5.6749	11.50	25.42	36.92	50.00	-13.08	AVG		

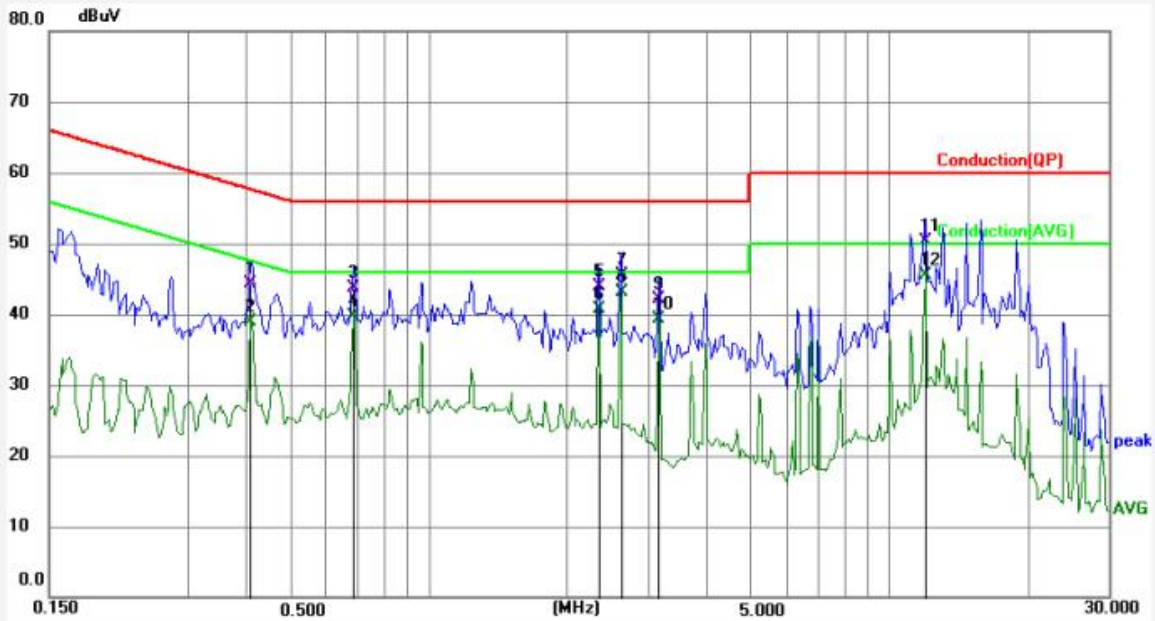
Mode 5:

Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	22.9℃		Phase:	L1
Relative Humidity:	57%		Pressure:	101.3KPa



No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	MK.	Remark
1	0.4159	10.84	29.96	40.80	57.53	-16.73	QP		
2	0.4159	10.84	25.47	36.31	47.53	-11.22	AVG		
3	0.6926	11.04	30.96	42.00	56.00	-14.00	QP		
4	0.6926	11.04	28.09	39.13	46.00	-6.87	AVG		
5	0.9680	11.18	28.72	39.90	56.00	-16.10	QP		
6	0.9680	11.18	24.11	35.29	46.00	-10.71	AVG		
7	2.9068	11.28	30.42	41.70	56.00	-14.30	QP		
8	2.9068	11.28	25.16	36.44	46.00	-9.56	AVG		
9	5.1165	11.50	30.60	42.10	60.00	-17.90	QP		
10	5.1165	11.50	26.49	37.99	50.00	-12.01	AVG		
11	12.5897	11.51	39.39	50.90	60.00	-9.10	QP		
12	12.5897	11.51	34.38	45.89	50.00	-4.11	AVG	*	

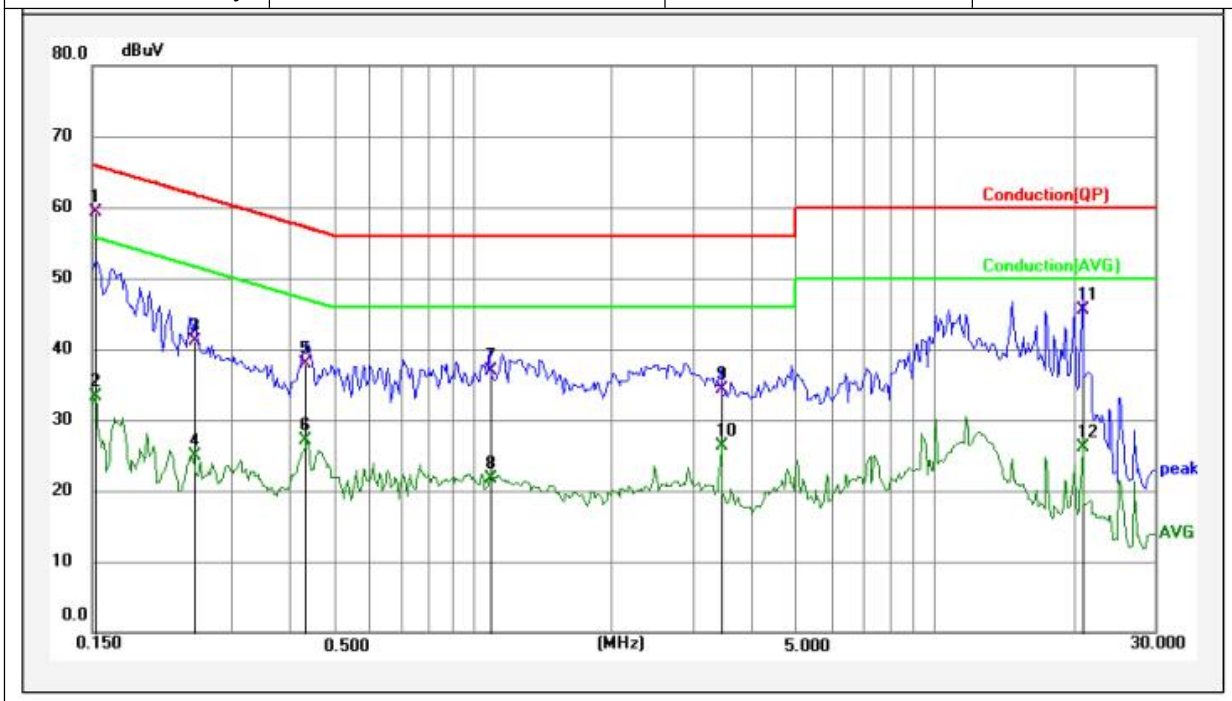
Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	22.9℃		Phase:	N
Relative Humidity:	57%		Pressure:	101.3KPa



No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	MK.	Remark
1	0.4126	11.01	33.29	44.30	57.60	-13.30	QP		
2	0.4126	11.01	27.86	38.87	47.60	-8.73	AVG		
3	0.6871	10.93	32.77	43.70	56.00	-12.30	QP		
4	0.6871	10.93	28.69	39.62	46.00	-6.38	AVG		
5	2.3440	11.00	33.00	44.00	56.00	-12.00	QP		
6	2.3440	11.00	29.70	40.70	46.00	-5.30	AVG		
7	2.6207	10.99	34.61	45.60	56.00	-10.40	QP		
8	2.6207	10.99	32.18	43.17	46.00	-2.83	AVG	*	
9	3.1719	11.01	31.09	42.10	56.00	-13.90	QP		
10	3.1719	11.01	28.31	39.32	46.00	-6.68	AVG		
11	12.0020	11.37	39.03	50.40	60.00	-9.60	QP		
12	12.0020	11.37	34.05	45.42	50.00	-4.58	AVG		

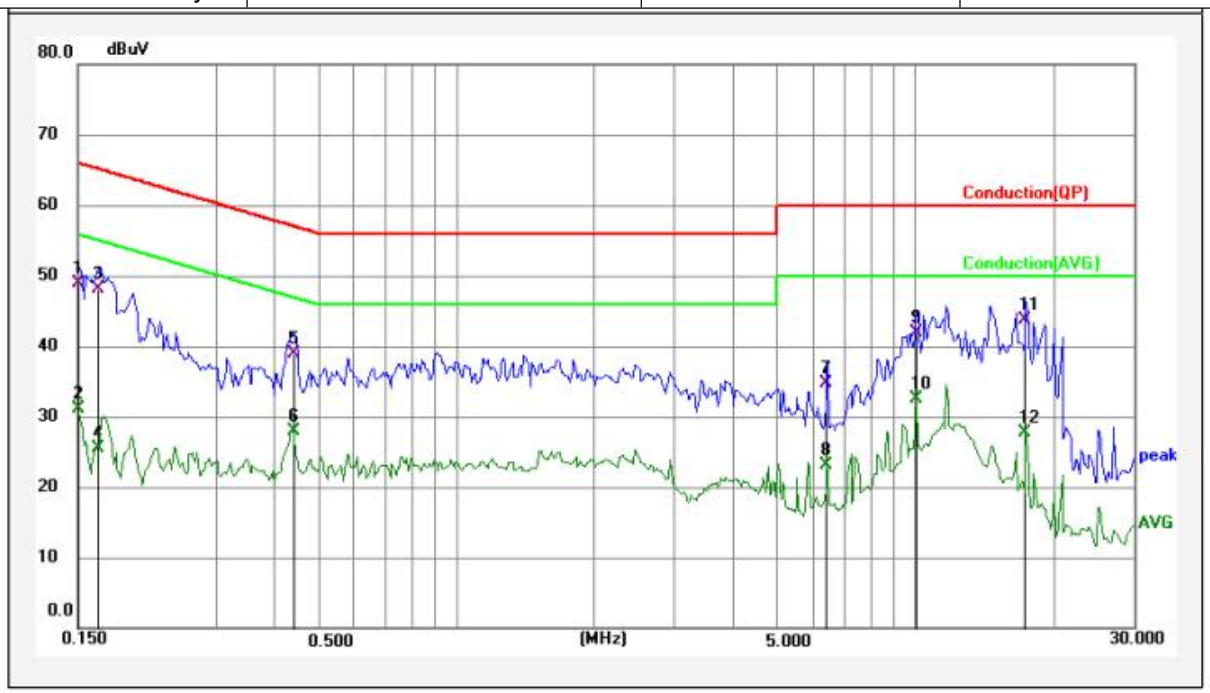
Mode 8:

Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	22.9℃		Phase:	L1
Relative Humidity:	57%		Pressure:	101.3KPa



No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	MK.	Remark
1	0.1524	10.70	48.70	59.40	65.87	-6.47	QP	*	
2	0.1524	10.70	22.58	33.28	55.87	-22.59	AVG		
3	0.2498	10.75	30.45	41.20	61.76	-20.56	QP		
4	0.2498	10.75	14.06	24.81	51.76	-26.95	AVG		
5	0.4363	10.84	27.06	37.90	57.13	-19.23	QP		
6	0.4363	10.84	16.22	27.06	47.13	-20.07	AVG		
7	1.0908	11.20	25.80	37.00	56.00	-19.00	QP		
8	1.0908	11.20	10.46	21.66	46.00	-24.34	AVG		
9	3.4626	11.33	23.07	34.40	56.00	-21.60	QP		
10	3.4626	11.33	14.97	26.30	46.00	-19.70	AVG		
11	20.9648	11.54	34.06	45.60	60.00	-14.40	QP		
12	20.9648	11.54	14.59	26.13	50.00	-23.87	AVG		

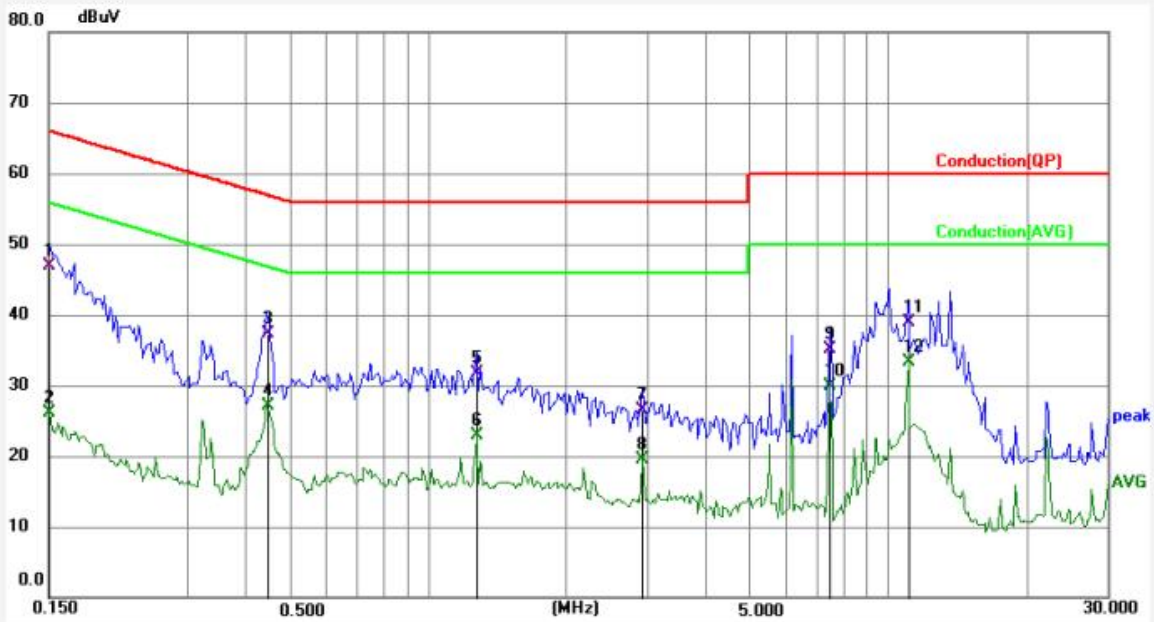
Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	22.9℃		Phase:	N
Relative Humidity:	57%		Pressure:	101.3KPa



No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	MK.	Remark
1	0.1500	10.82	38.18	49.00	66.00	-17.00	QP		
2	0.1500	10.82	20.35	31.17	56.00	-24.83	AVG		
3	0.1663	10.84	37.36	48.20	65.14	-16.94	QP		
4	0.1663	10.84	14.59	25.43	55.14	-29.71	AVG		
5	0.4433	11.03	27.87	38.90	57.00	-18.10	QP		
6	0.4433	11.03	16.87	27.90	47.00	-19.10	AVG		
7	6.4466	11.26	23.54	34.80	60.00	-25.20	QP		
8	6.4466	11.26	11.80	23.06	50.00	-26.94	AVG		
9	10.0721	11.34	30.56	41.90	60.00	-18.10	QP		
10	10.0721	11.34	21.24	32.58	50.00	-17.42	AVG		
11	17.4541	11.45	32.35	43.80	60.00	-16.20	QP	*	
12	17.4541	11.45	16.27	27.72	50.00	-22.28	AVG		

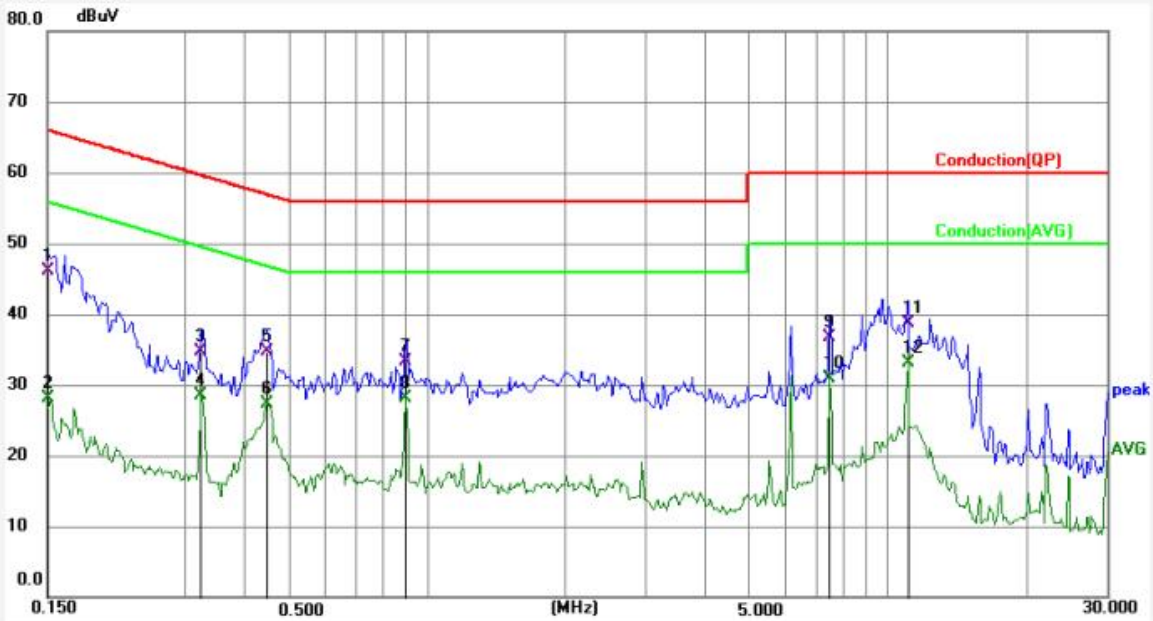
Mode 9:

Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	22.9℃		Phase:	L1
Relative Humidity:	57%		Pressure:	101.3KPa



No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	MK.	Remark
1	0.1512	10.70	36.30	47.00	65.93	-18.93	QP		
2	0.1512	10.70	15.31	26.01	55.93	-29.92	AVG		
3	0.4469	10.86	26.54	37.40	56.93	-19.53	QP		
4	0.4469	10.86	16.31	27.17	46.93	-19.76	AVG		
5	1.2793	11.22	20.48	31.70	56.00	-24.30	QP		
6	1.2793	11.22	11.64	22.86	46.00	-23.14	AVG		
7	2.9300	11.28	15.22	26.50	56.00	-29.50	QP		
8	2.9300	11.28	8.26	19.54	46.00	-26.46	AVG		
9	7.5003	11.51	23.69	35.20	60.00	-24.80	QP		
10	7.5003	11.51	18.35	29.86	50.00	-20.14	AVG		
11	11.0827	11.52	27.38	38.90	60.00	-21.10	QP		
12	11.0827	11.52	21.78	33.30	50.00	-16.70	AVG	*	

Test Mode:	FSK		Test Voltage:	AC 120V/60Hz
Temperature:	22.9℃		Phase:	N
Relative Humidity:	57%		Pressure:	101.3KPa



No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	MK.	Remark
1	0.1500	10.82	35.28	46.10	66.00	-19.90	QP		
2	0.1500	10.82	17.36	28.18	56.00	-27.82	AVG		
3	0.3249	10.96	23.84	34.80	59.58	-24.78	QP		
4	0.3249	10.96	17.58	28.54	49.58	-21.04	AVG		
5	0.4467	11.03	23.77	34.80	56.94	-22.14	QP		
6	0.4467	11.03	16.22	27.25	46.94	-19.69	AVG		
7	0.9009	10.97	22.43	33.40	56.00	-22.60	QP		
8	0.9009	10.97	17.05	28.02	46.00	-17.98	AVG		
9	7.5003	11.30	25.50	36.80	60.00	-23.20	QP		
10	7.5003	11.30	19.62	30.92	50.00	-19.08	AVG		
11	11.0827	11.35	27.35	38.70	60.00	-21.30	QP		
12	11.0827	11.35	21.78	33.13	50.00	-16.87	AVG	*	

4.4. ANTENNA APPLICATION

4.4.1. 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. And according to FCC 47 CFR Section 15.247 (b), 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.

4.4.2. Result

PASS.

☒ Antenna use a permanently attached antenna which is not replaceable.
☐ Not using a standard antenna jack or electrical connector for antenna replacement
☐ The antenna has to be professionally installed (please provide method of installation)

Note:which in accordance to section 15.203, please refer to the internal photos.

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