FCC RF TEST REPORT

No. 171101812SHA-001

Applicant	:	Guangzhou MCOHome Technology Co., Ltd Room 1504-1505, Building NO.23 Tianan Headquarter Center, No.555 Panyu Avenue North., DongHuan street, Panyu, Guangzhou 511400, China
Manufacturing site	:	Guangzhou MCOHome Technology Co., Ltd Room 1504-1505, Building NO.23 Tianan Headquarter Center, No.555 Panyu Avenue North., DongHuan street, Panyu, Guangzhou 511400, China
Product Name	:	Micro Dimmer
Type/Model	:	MH-P220
TEST RESULT	**:**	**PASS**

SUMMARY

The equipment complies with the requirements according to the following standard(s) or specification:

47CFR Part 15 (2016): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2013): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

Date of issue: April 17, 2018

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Reviewed by:

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Description of Test Facility

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1 GENERAL INFORMATION

1.1 Description of Client

Applicant	:	Guangzhou MCOHome Technology Co., Ltd Room 1504-1505, Building NO.23 Tianan Headquarter Center, No.555 Panyu Avenue North., DongHuan street, Panyu, Guangzhou 511400, China
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Manufacturer	:	Guangzhou MCOHome Technology Co., Ltd Room 1504-1505, Building NO.23 Tianan Headquarter Center, No.555 Panyu Avenue North., DongHuan street, Panyu, Guangzhou 511400, China

1.2 Identification of the EUT

Product Name	:	Micro Dimmer
Type/model	:	MH-P220
FCC ID	:	2ACTJMHP220

1.3 Technical Specification

Operation Frequency Band	:	902-928MHz
Modulation	:	FSK
Channel Frequency	:	1Channel at 908.42MHz
Description of EUT	:	The EUT is a Micro Dimmer which contains a Z-Wave module, and there have only one model, we test it and listed the Z-Wave results in this report.
Antenna	:	0dBi, wire antenna
Rating	:	85~260VAC, 50/60Hz
Category of EUT	:	Class B
EUT type	:	☒ Table top ☐ Floor standing
Sample received date	:	December 6, 2017
Date of test	:	December 6, 2017 to December 22, 2017

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2016)
ANSI C63.10 (2013)

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied.

The EUT is a small portable device, so three axes (X, Y, Z) were observed while the test receiver worked as “max hold” continuously and the highest reading among the whole test procedure was recorded.

Within this test report, EUT was tested with modulation and tested under its rating voltage and frequency.

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
-	-	-	-

2.5 Instrument list

Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Test Receiver	R&S	ESIB 26	EC 3045	2018-10-18
☑	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2018-05-30
☑	Horn antenna	R&S	HF 906	EC 3049	2018-09-22
☑	Horn antenna	ETS	3117	EC 4792-1	2018-08-23
☑	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2020-07-09
☑	Pre-amplifier	R&S	Pre-amp 18	EC5881	2018-06-19
☑	Semi-anechoic chamber	Albatross project	-	EC 3048	2018-09-08
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2018-09-10
☑	Power sensor	Agilent	U2021XA	EC 5338-1	2018-03-03
☑	Vector Signal Generator	Agilent	N5182B	EC 5175	2018-03-06
☑	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2018-03-03
☑	Mobile Test System	Litepoint	Iqxel	EC 5176	2018-01-11
☑	Test Receiver	R&S	ESCI 7	EC 4501	2018-02-23
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3323	2018-06-14
☑	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3324	2018-04-09
☑	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3325	2018-03-23
☑	Pressure meter	YM3	Shanghai Mengde	EC 3320	2018-06-28

2.6 Test Summary

This report applies to tested sample only. The test results have been compared directly with the limits, and the measurement uncertainty is recorded. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERANCE	RESULT
Radiated emission	15.249 & 15.209	Pass
Assigned bandwidth (20dB bandwidth)	15.215(c)	Pass
Power line conducted emission	15.207	Pass

Notes: 1: NA =Not Applicable

2: This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

2.7 Measurement uncertainty

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Measurement uncertainty
Maximum peak output power	± 0.74dB
Radiated Emissions in restricted frequency bands below 1GHz	± 4.90dB
Radiated Emissions in restricted frequency bands above 1GHz	± 5.02dB
Emission outside the frequency band	± 2.89dB
Power line conducted emission	± 3.19dB

3 Radiated emission

Test result: **Pass**

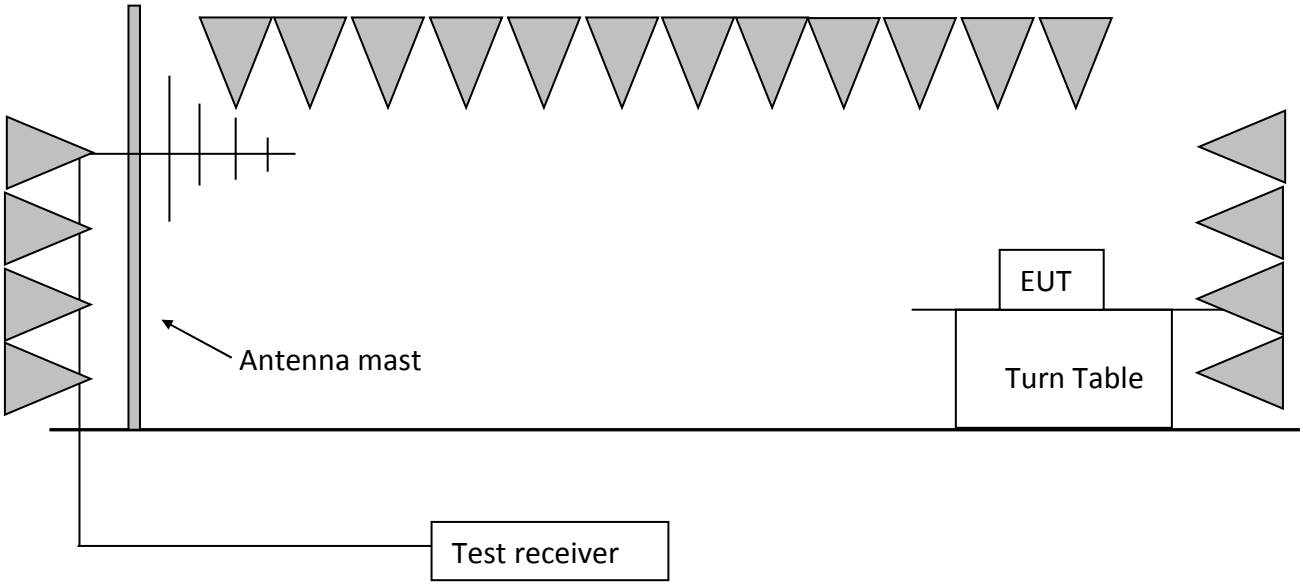
3.1 Test limit

Fundamental Frequency (MHz)	Fundamental limit (dBuV/m)	Harmonic limit (dBuV/m)
☒ 902 - 928	94	54
☐ 2400 - 2483.5	94	54
☐ 5725 - 5875	94	54
☐ 24000 - 24250	108	68

The radiated emissions which fall outside allocated band, must also comply with the radiated emission limits specified in §15.209(a) and Band edge emissions radiated outside of the specified frequency bands shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

3.2 Test Configuration



3.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.

Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m.

The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

RBW = 300 Hz, VBW = 1 kHz (9 kHz~150 kHz);
RBW = 10 kHz, VBW = 30 kHz (150 kHz~30MHz);
RBW = 100 kHz, VBW = 300 kHz (30MHz~1GHz for PK)
RBW = 1MHz, VBW = 3MHz (>1GHz for PK);

3.4 Test protocol

Temperature : 20 °C
Relative Humidity : 52 %

CH	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
908.42 MHz	**H**	**908.42**	**25.5**	**78.4**	**94.0**	**15.6**	**PK**
	H	*902.00*	*25.4*	*35.3*	*46.0*	*10.7*	*PK*
	H	*928.00*	*25.6*	*36.4*	*46.0*	*9.6*	*PK*
	H	30.00	21.0	19.2	40.0	19.0	PK
	H	43.61	13.4	11.6	40.0	26.6	PK
	H	74.71	13.9	7.5	40.0	26.1	PK
	H	119.42	16.6	13.3	43.5	26.9	PK
	H	129.14	16.8	12.9	43.5	26.7	PK
	H	179.68	15.7	10.4	43.5	27.8	PK
	H	337.13	20.1	15.7	46.0	25.9	PK
	H	442.10	23.9	18.2	46.0	22.1	PK
	H	661.76	26.3	20.8	46.0	19.7	PK
	H	922.24	30.5	23.2	46.0	15.5	PK
	H	1816.84	-8.7	47.5	54.0	6.5	PK
	H	2725.26	-6.8	45.2	54.0	8.8	PK
	H	3633.68	-4.6	42.8	54.0	11.2	PK
	V	**908.42**	**25.5**	**75.2**	**94.0**	**18.8**	**PK**
	V	*902.00*	*25.4*	*36.1*	*46.0*	*9.9*	*PK*
	V	*928.00*	*25.6*	*35.7*	*46.0*	*10.3*	*PK*
	V	30.00	24.3	19.2	40.0	15.7	PK
	V	49.44	19.5	9.0	40.0	20.5	PK
	V	74.71	16.3	7.5	40.0	23.7	PK
	V	121.36	17.2	13.3	43.5	26.3	PK
	V	168.02	18.3	10.8	43.5	25.2	PK
	V	195.23	17.5	10.7	43.5	26.0	PK
	V	337.13	18.7	15.7	46.0	27.3	PK
	V	492.65	24.4	19.2	46.0	21.6	PK
	V	683.15	26.3	20.9	46.0	19.7	PK
	V	943.63	30.1	23.4	46.0	15.9	PK
	V	1816.84	-8.7	45.3	54.0	8.7	PK
	V	2725.26	-6.8	42.5	54.0	11.5	PK
	V	3633.68	-4.6	41.2	54.0	12.8	PK

Remark:
1. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed);
2. Corrected Reading = Original Receiver Reading + Correct Factor;
3. Margin = Limit – Corrected Reading;
4. If the PK Corrected reading is lower than AV limit, the AV test can be elided;

Example:
Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV,
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m,
Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m,
Assuming limit = 54dBuV/m, Corrected Reading = 10.20dBuV/m,
Then Margin = 54 -10.20 = 43.80dBuV/m.

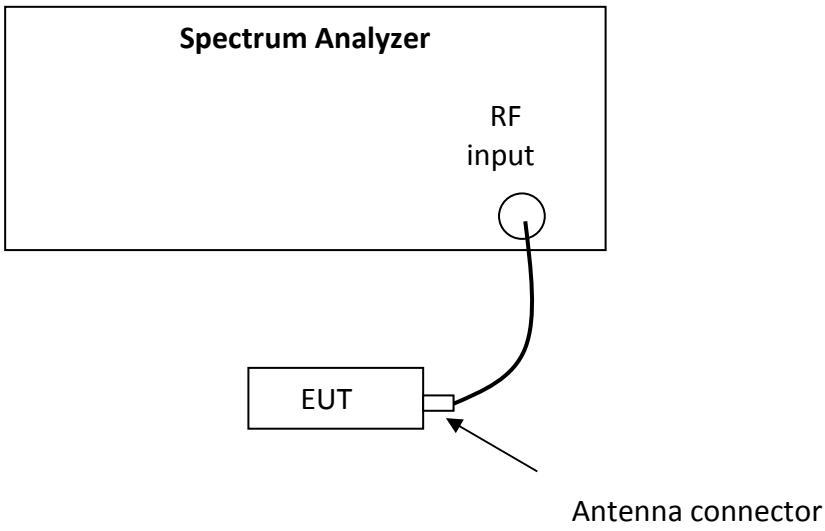
4 Assigned bandwidth (20dB bandwidth)

Test result: **Pass**

4.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emission is contained within the allocated frequency band.

4.2 Test Configuration



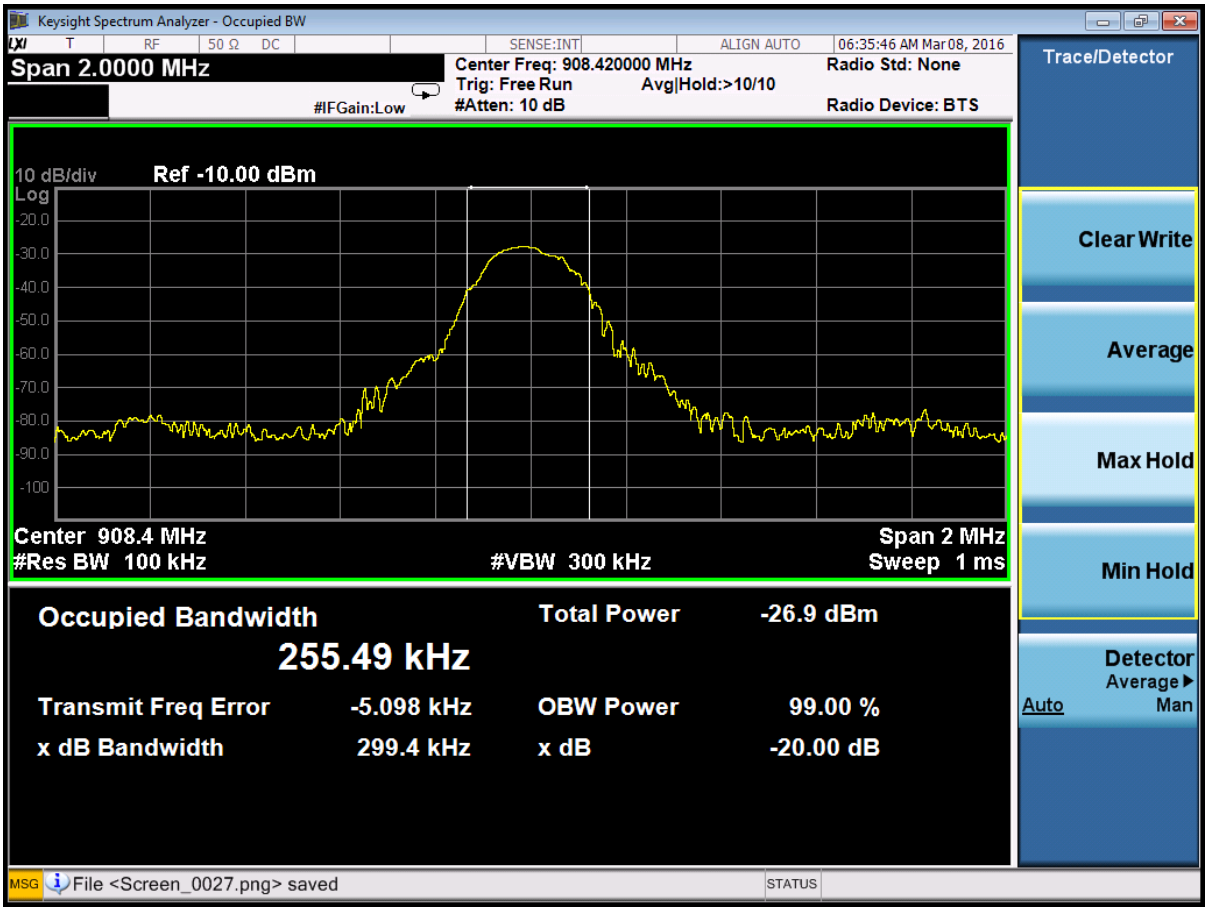
4.3 Test procedure and test setup

The 20dB Bandwidth per FCC §15.215(c) is measured using the Spectrum Analyzer.
Set Span = 2 to 3 times the 20 dB bandwidth, RBW = approximately 1% of the 20 dB bandwidth, VBW>RBW, Sweep = auto, Detector = peak, Trace = max hold.

4.4 Test protocol

Temperature : 20°C
Relative Humidity : 52 %

Mode	Channel Frequency	20dB Bandwidth (kHz)	F_L (MHz)	F_H (MHz)
1	908.42MHz	299.4	> 902	< 928



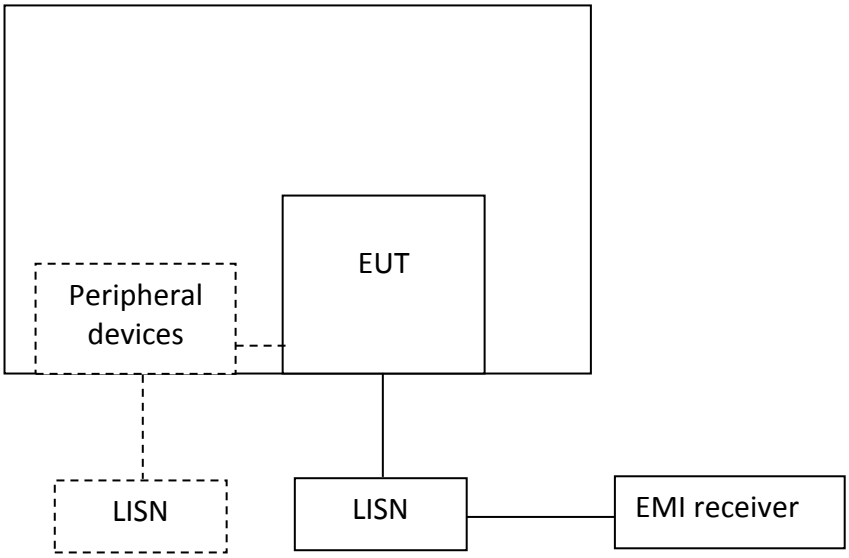
5 Power line conducted emission

Test result: **Pass**

5.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

5.2 Test configuration



☒ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

5.3 Test procedure and test set up

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

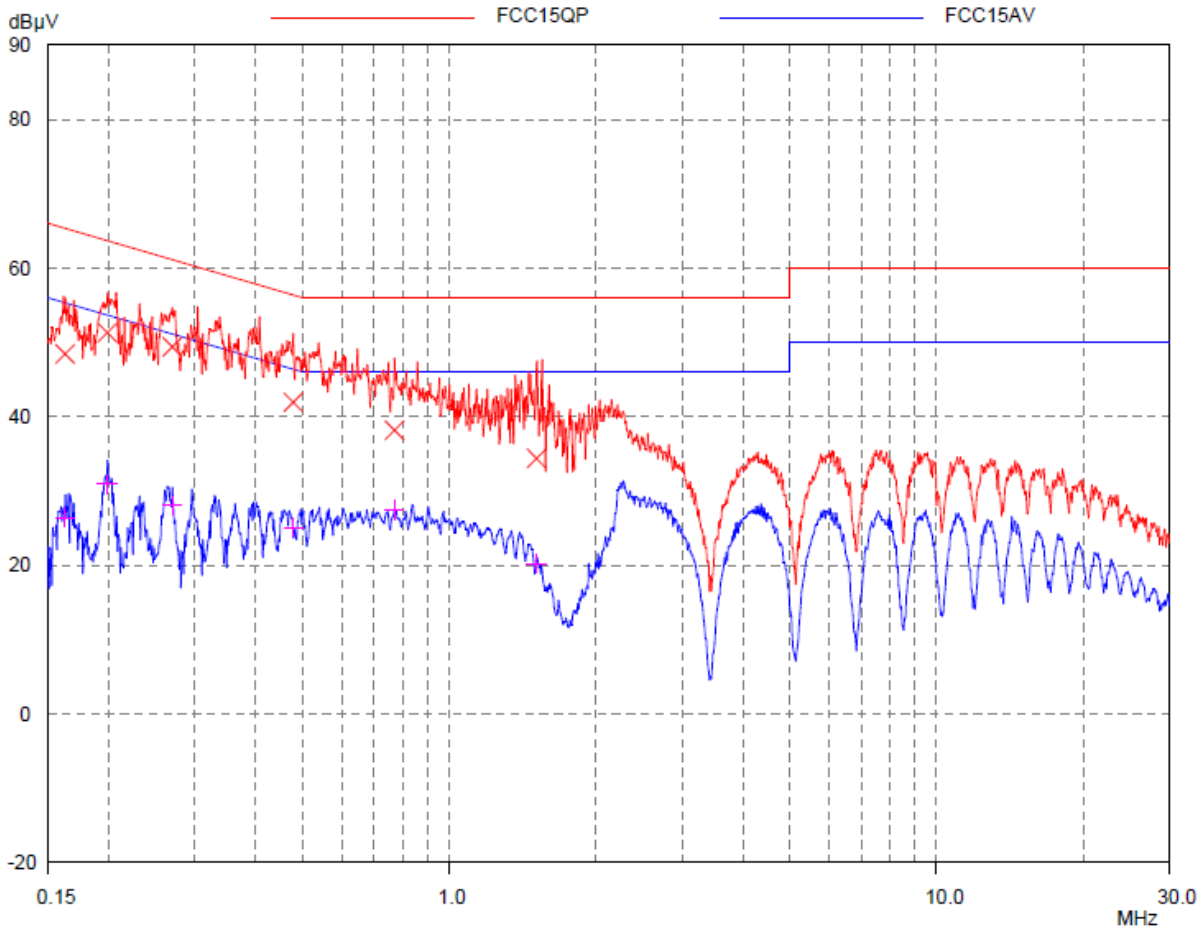
The bandwidth of the test receiver is set at 9 kHz.

5.4 Test protocol

Temperature : 20°C
Relative Humidity : 54%

L line:

Test Curve:

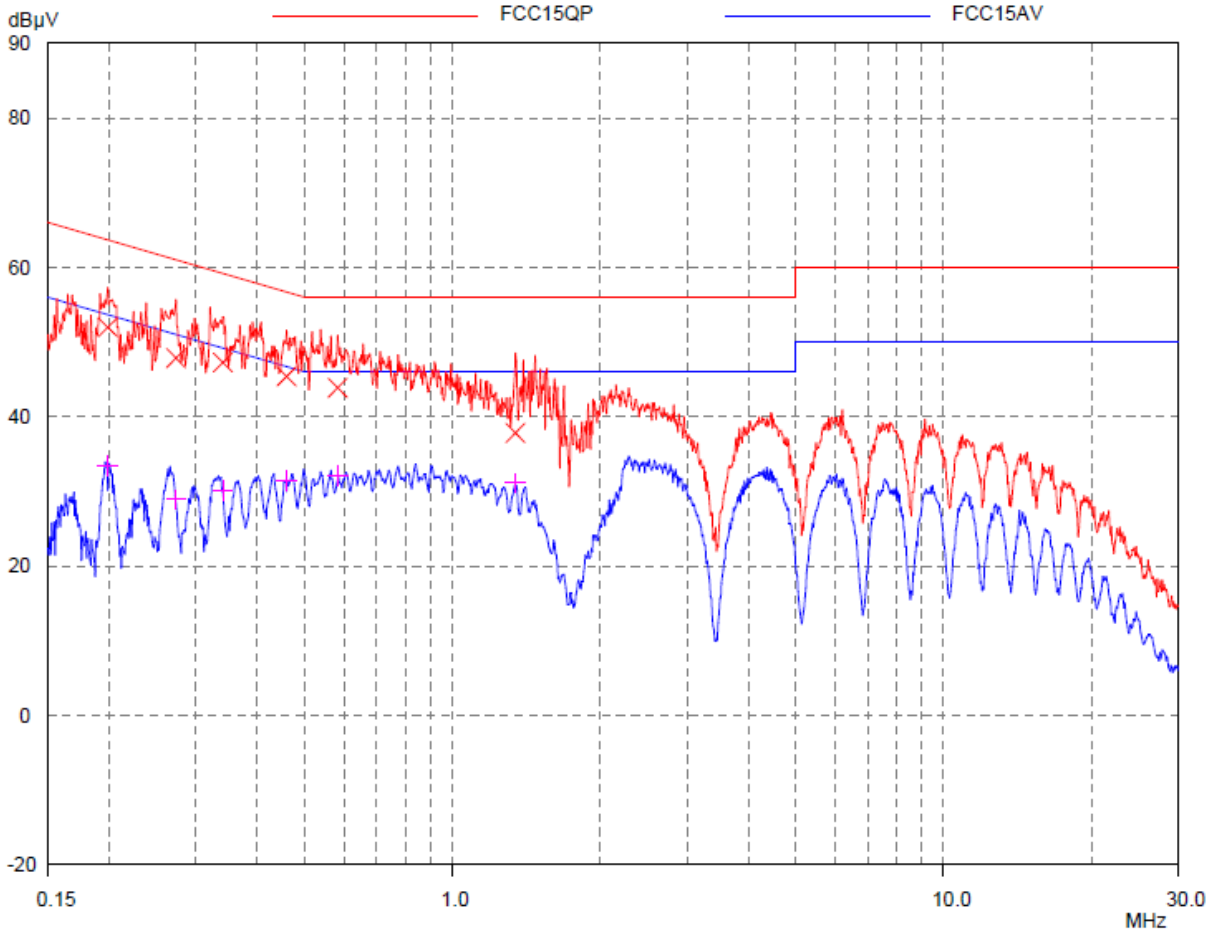


Test Data:

Frequency (MHz)	Quasi-peak			Average		
	Level dB(µV)	Limit dB (µV)	Margin dB	Level dB (µV)	Limit dB (µV)	Margin dB
0.162	48.46	65.34	16.88	26.45	55.34	28.89
0.198	51.31	63.68	12.37	30.93	53.68	22.75
0.270	49.41	61.13	11.72	28.03	51.13	23.10
0.477	41.96	56.38	14.42	25.09	46.38	21.29
0.771	38.19	56.00	17.81	27.49	46.00	18.51
1.507	34.39	56.00	21.61	20.26	46.00	25.74

N line:

Test Curve:



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	Level dB(µV)	Limit dB (µV)	Margin dB	Level dB (µV)	Limit dB (µV)	Margin dB
0.198	51.97	63.68	11.71	33.45	53.68	20.23
0.273	47.87	61.03	13.16	28.93	51.03	22.10
0.340	47.28	59.20	11.92	30.16	49.20	19.04
0.459	45.41	56.72	11.31	31.45	46.72	15.27
0.583	43.89	56.00	12.11	32.10	46.00	13.90
1.342	37.84	56.00	18.16	31.16	46.00	14.84

********** END **********