

FCC REPORT

Applicant: Hulu Robotics Technology Company Limited

Address of Applicant: Unit A, 3/F, Cheong Sun Tower, 116-118 Wing Lok Street,
Sheung Wan, Hong Kong

Equipment Under Test (EUT)

Product Name: 2.4G Wireless Serial-USB

Model No.: MBK-2.4G-USB

FCC ID: 2ACWW1300303U

Applicable standards: FCC CFR Title 47 Part 15 Subpart B

Date of sample receipt: 15 May 2015

Date of Test: 15 May to 05 Jun., 2015

Date of report issued: 08 Jun., 2015

Test Result: Pass*

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Bruce Zhang
Laboratory Manager

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

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

2 Version

Version No.	Date	Description
00	08 Jun., 2015	Original

Prepared by:

Sera Xiang

Report Clerk

Date:

08 Jun., 2015

Reviewed by:

Gaven Liu

Project Engineer

Date:

08 Jun., 2015

3 Contents

Page

1	COVER PAGE.....	1
2	VERSION	2
3	CONTENTS	3
4	TEST SUMMARY	4
5	GENERAL INFORMATION	5
5.1	CLIENT INFORMATION	5
5.2	GENERAL DESCRIPTION OF E.U.T.	5
5.3	TEST MODE.....	5
5.4	DESCRIPTION OF SUPPORT UNITS	6
5.5	LABORATORY FACILITY	6
5.6	LABORATORY LOCATION	6
5.7	TEST INSTRUMENTS LIST.....	7
6	TEST RESULTS AND MEASUREMENT DATA	8
6.1	CONDUCTED EMISSION	8
6.2	RADIATED EMISSION	11
7	TEST SETUP PHOTO.....	17
8	EUT CONSTRUCTIONAL DETAILS.....	18

4 Test Summary

Test Item	Section in CFR 47	Result
Conducted Emission	Part 15.107	Pass
Radiated Emission	Part 15.109	Pass

Pass: The EUT complies with the essential requirements in the standard.

5 General Information

5.1 Client Information

Applicant:	Hulu Robotics Technology Company Limited
Address of Applicant:	Unit A, 3/F, Cheong Sun Tower, 116-118 Wing Lok Street, Sheung Wan, Hong Kong
Manufacturer:	Maker Works Technology INC
Address of Manufacturer:	Building C3, Floor 4th, Zhiyuan, Xili, Nanshan District, ShenZhen 518057 China

5.2 General Description of E.U.T.

Product Name:	2.4G Wireless Serial-USB
Model No.:	MBK-2.4G-USB
Power supply:	DC 5V

5.3 Test Mode

Operating mode	Detail description
Data exchange mode	Keep the EUT in Data exchange with PC mode
The sample was placed 0.8m above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

5.4 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC ID/DoC
DELL	PC	OPTIPLEX745	N/A	DoC
DELL	MONITOR	E178FPC	N/A	DoC
DELL	KEYBOARD	SK-8115	N/A	DoC
DELL	MOUSE	MOC5UO	N/A	DoC
HP	Printer	CB495A	05257893	DoC

5.5 Laboratory Facility

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

- **FCC - Registration No.: 817957**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. 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 out files. Registration 817957, February 27, 2012.

- **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

5.6 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282
Fax: +86-755-23116366

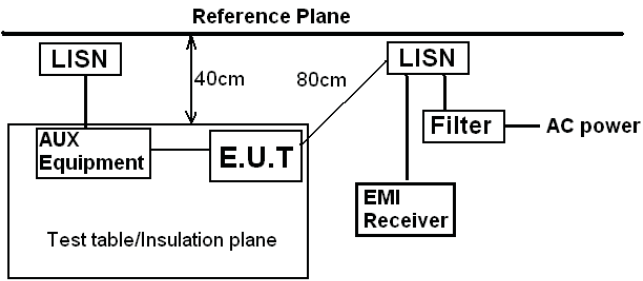
5.7 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	SAEMC	9(L)*6(W)* 6(H)	CCIS0001	08-23-2014	08-22-2017
2	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	CCIS0005	03-28-2015	03-28-2016
3	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	CCIS0006	03-28-2015	03-28-2016
4	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
5	Amplifier (10kHz-1.3GHz)	HP	8447D	CCIS0003	04-01-2015	03-31-2016
6	Amplifier (1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	CCIS0011	04-01-2015	03-31-2016
7	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	04-01-2015	03-31-2016
8	Horn Antenna	ETS-LINDGREN	3160	GTS217	04-01-2015	03-31-2016
9	Printer	HP	HP LaserJet P1007	N/A	N/A	N/A
10	Positioning Controller	UC	UC3000	CCIS0015	N/A	N/A
11	Spectrum analyzer 9k-30GHz	Rohde & Schwarz	FSP	CCIS0023	03-28-2015	03-28-2016
12	EMI Test Receiver	Rohde & Schwarz	ESPI	CCIS0022	03-28-2015	03-28-2016
13	Loop antenna	Laplace instrument	RF300	EMC0701	04-01-2015	03-31-2016
14	Universal radio communication tester	Rhode & Schwarz	CMU200	CCIS0069	03-28-2015	03-28-2016
15	Signal Analyzer	Rohde & Schwarz	FSIQ3	CCIS0088	04-08-2015	04-08-2016

Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongShuo Electron	11.0(L)x4.0(W)x3.0(H)	CCIS0061	11-10-2012	11-09-2015
2	EMI Test Receiver	Rohde & Schwarz	ESCI	CCIS0002	03-28-2015	03-28-2016
3	LISN	CHASE	MN2050D	CCIS0074	03-28-2015	03-28-2016
4	Coaxial Cable	CCIS	N/A	CCIS0086	04-01-2015	03-31-2016

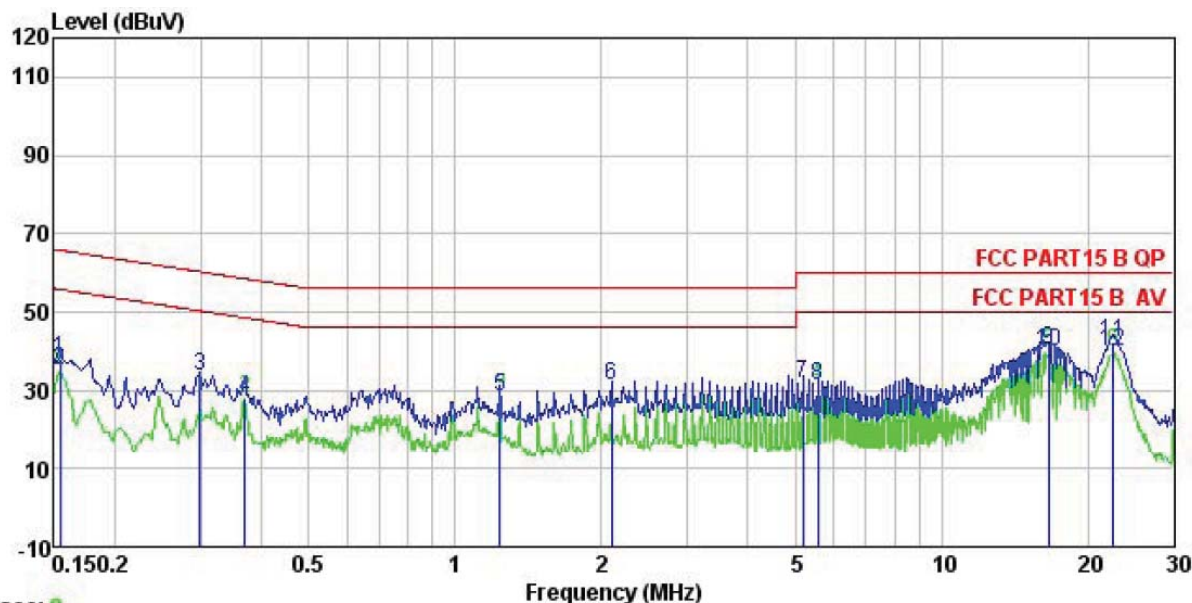
6 Test results and Measurement Data

6.1 Conducted Emission

Test Requirement:	FCC Part 15 B Section 15.107		
Test Method:	ANSI C63.4:2009		
Test Frequency Range:	150kHz to 30MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9kHz, VBW=30kHz		
Limit:	Frequency range (MHz)	Limit (dBμV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	0.5-30	60	50
* Decreases with the logarithm of the frequency.			
Test setup:	 Remark: E.U.T.: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m		
Test procedure	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2009 on conducted measurement.		
Test environment:	Temp.: 23 °C Humid.: 56% Press.: 1 01kPa		
Measurement Record:	Uncertainty: 3.28dB		
Test Instruments:	Refer to section 5.7 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Pass		

Measurement data:

Line:

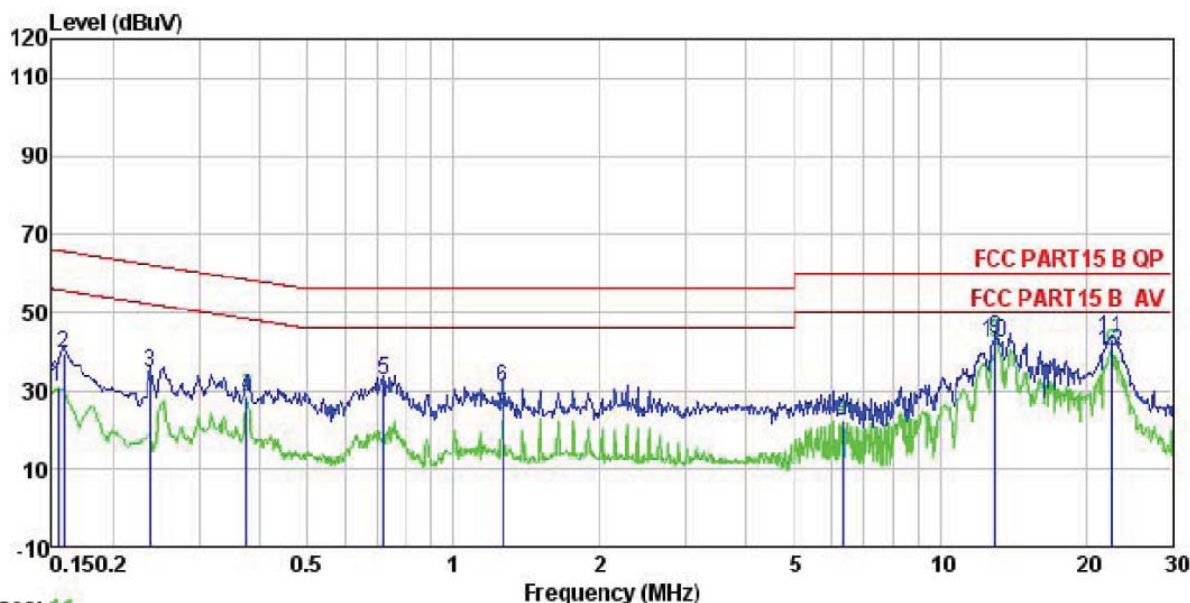


Trace: 9

Site : CCTS Shielding Room
 Condition : FCC PART15 B QP LISN LINE
 EUT : 2.4G Wireless Serial-USB
 Model : MBK-2.4G-USB
 Test Mode : ON mode
 Power Rating : AC 120V/60Hz
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa
 Test Engineer: GAREN
 Remark :

	Read	LISN	Cable		Limit	Over	
Freq	Level	Factor	Loss	Level	Line	Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.154	27.11	0.27	10.78	38.16	65.78	-27.62 QP
2	0.154	24.21	0.27	10.78	35.26	55.78	-20.52 Average
3	0.299	22.42	0.26	10.74	33.42	60.28	-26.86 QP
4	0.369	16.99	0.27	10.73	27.99	48.52	-20.53 Average
5	1.236	17.38	0.25	10.90	28.53	46.00	-17.47 Average
6	2.099	20.00	0.26	10.96	31.22	56.00	-24.78 QP
7	5.194	20.68	0.30	10.84	31.82	60.00	-28.18 QP
8	5.564	20.21	0.30	10.83	31.34	50.00	-18.66 Average
9	16.573	29.29	0.33	10.91	40.53	60.00	-19.47 QP
10	16.573	28.59	0.33	10.91	39.83	50.00	-10.17 Average
11	22.416	30.77	0.43	10.90	42.10	60.00	-17.90 QP
12	22.535	28.63	0.44	10.89	39.96	50.00	-10.04 Average

Neutral:



Trace: 11

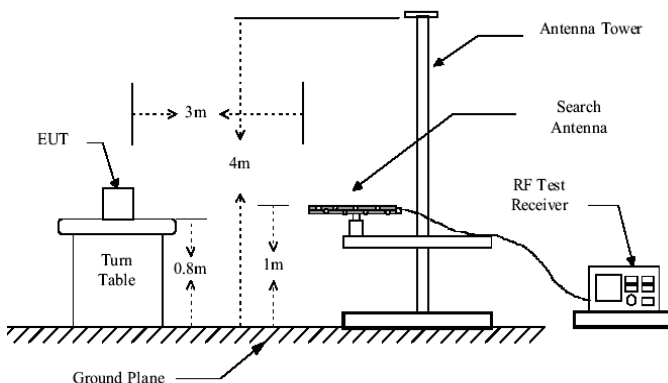
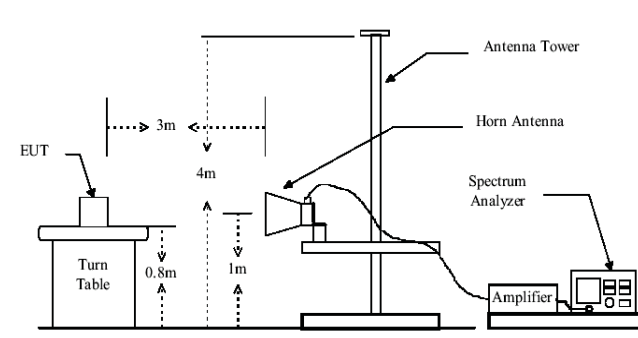
Site : CCIS Shielding Room
 Condition : FCC PART15 B QP LISM NEUTRAL
 EUT : 2.4G Wireless Serial-USB
 Model : MBK-2.4G-USB
 Test Mode : ON mode
 Power Rating : AC 120V/60Hz
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa
 Test Engineer: GAREN
 Remark :

	Freq	Read Level	LISM Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.154	19.52	0.25	10.78	30.55	55.78	-25.23	Average
2	0.158	28.44	0.25	10.78	39.47	65.56	-26.09	QP
3	0.238	23.38	0.25	10.75	34.38	62.17	-27.79	QP
4	0.377	17.17	0.25	10.72	28.14	48.34	-20.20	Average
5	0.720	21.76	0.18	10.78	32.72	56.00	-23.28	QP
6	1.262	19.83	0.24	10.90	30.97	56.00	-25.03	QP
7	1.262	12.46	0.24	10.90	23.60	46.00	-22.40	Average
8	6.319	11.18	0.27	10.81	22.26	50.00	-27.74	Average
9	12.988	31.87	0.25	10.91	43.03	60.00	-16.97	QP
10	12.988	31.10	0.25	10.91	42.26	50.00	-7.74	Average
11	22.416	31.88	0.37	10.90	43.15	60.00	-16.85	QP
12	22.535	28.84	0.38	10.89	40.11	50.00	-9.89	Average

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT
2. Final Test Level =Receiver Reading + LISM Factor + Cable Loss.

6.2 Radiated Emission

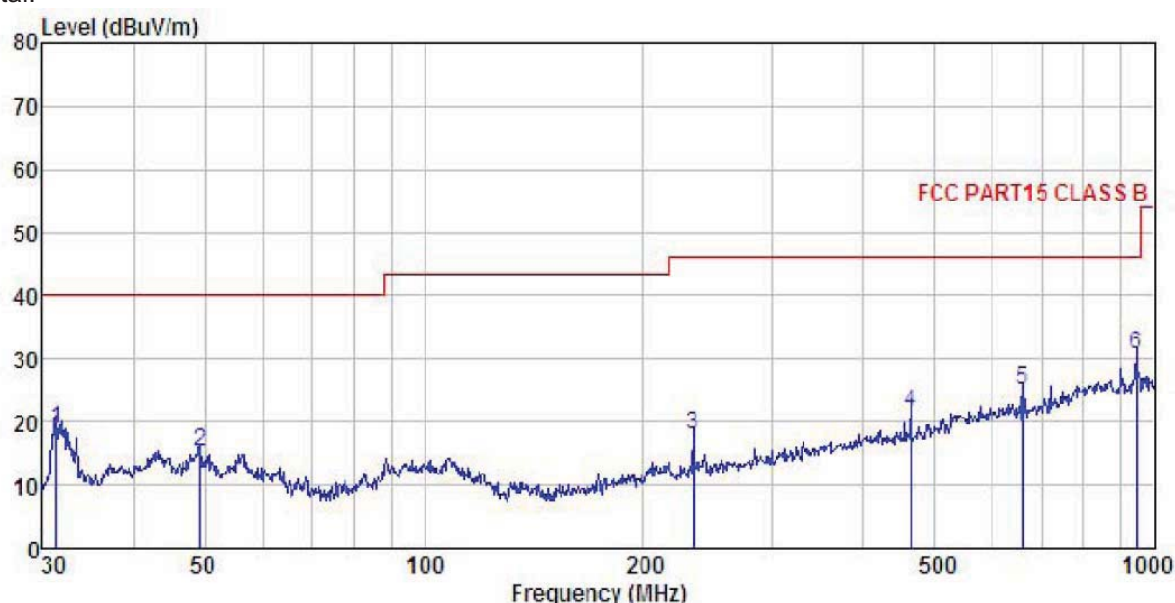
Test Requirement:	FCC Part 15 B Section 15.109				
Test Method:	ANSI C63.4:2009				
Test Frequency Range:	30MHz to 6000MHz				
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Limit:	Frequency	Limit (dBuV/m @3m)			Remark
	30MHz-88MHz	40.0			Quasi-peak Value
	88MHz-216MHz	43.5			Quasi-peak Value
	216MHz-960MHz	46.0			Quasi-peak Value
	960MHz-1GHz	54.0			Quasi-peak Value
	Above 1GHz	54.0			Average Value
Test setup:	Below 1GHz				
					
Test setup:	Above 1GHz				
					

Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test environment:	Temp.: 25 °C Humid.: 55% Press.: 1 01kPa
Measurement Record:	Uncertainty: 4.88dB
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data

Below 1GHz

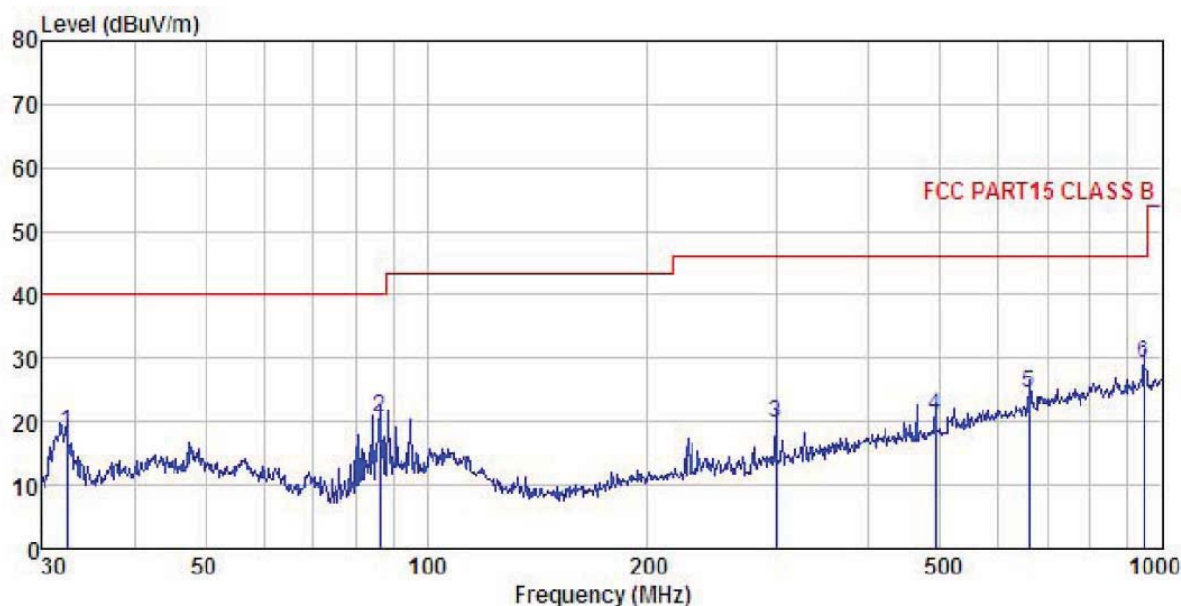
Horizontal:



Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M1G) HORIZONTAL
 EUT : 2.4G Wireless Serial-USB
 Model : MBK-2.4G-USB
 Test mode : ON Mode
 Power Rating : AC 120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: Garen
 REMARK :

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
		Level	Factor	Loss	Factor		Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	31.399	36.12	12.32	0.44	29.97	18.91	40.00	-21.09	QP
2	49.359	31.34	13.29	0.60	29.83	15.40	40.00	-24.60	QP
3	233.349	33.38	11.78	1.54	28.63	18.07	46.00	-27.93	QP
4	463.970	32.39	15.71	2.30	28.89	21.51	46.00	-24.49	QP
5	661.151	32.47	18.67	2.82	28.75	25.21	46.00	-20.79	QP
6	945.440	33.47	21.40	3.44	27.74	30.57	46.00	-15.43	QP

Vertical:

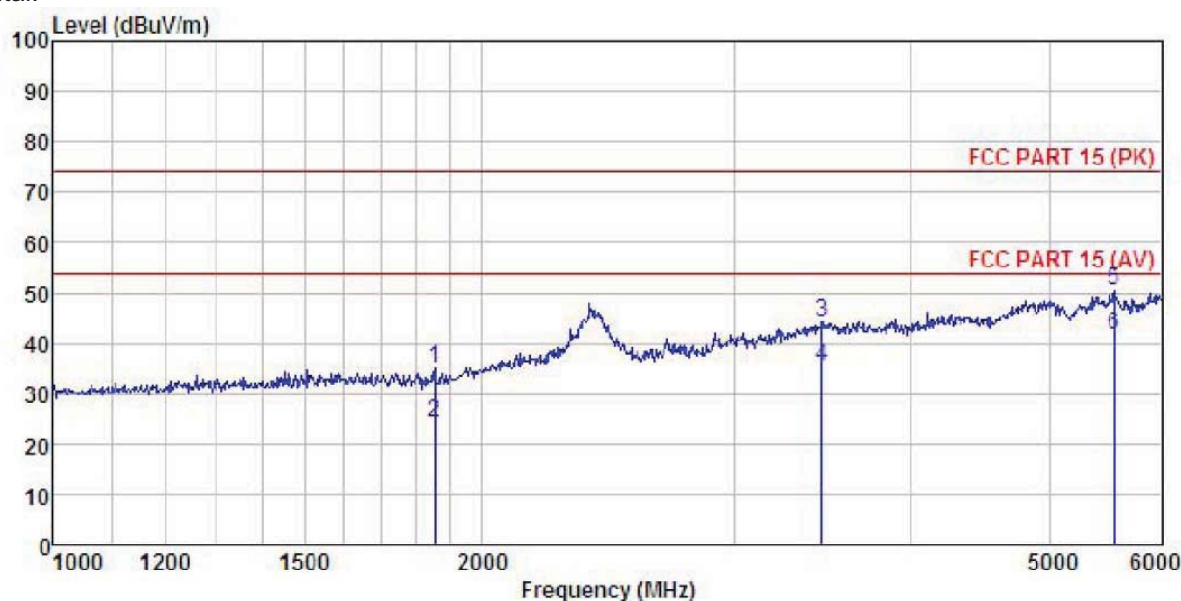


Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M1G) VERTICAL
 EUT : 2.4G Wireless Serial-USB
 Model : MBK-2.4G-USB
 Test mode : ON Mode
 Power Rating : AC 120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: Garen
 REMARK :

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	dBuV/m	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	32.406	35.65	12.32	0.45	29.97	18.45	40.00	-21.55	QP
2	86.503	38.49	10.89	0.89	29.59	20.68	40.00	-19.32	QP
3	298.268	33.49	13.00	1.76	28.45	19.80	46.00	-26.20	QP
4	492.469	31.20	16.39	2.38	28.94	21.03	46.00	-24.97	QP
5	661.151	31.84	18.67	2.82	28.75	24.58	46.00	-21.42	QP
6	945.440	32.14	21.40	3.44	27.74	29.24	46.00	-16.76	QP

Above 1GHz

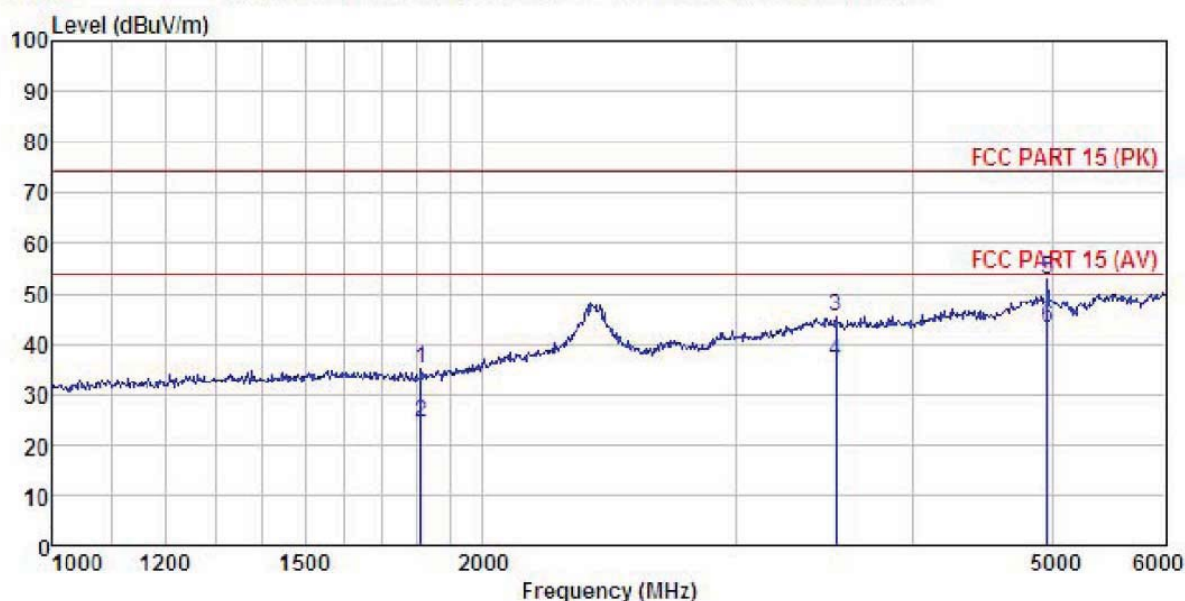
Horizontal:



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
 EUT : 2.4G Wireless Serial-USB
 Model : MEK-2.4G-USB
 Test mode : ON Mode
 Power Rating : AC 120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: Garen
 REMARK :

	Freq	ReadAntenna Level	Cable Factor	Preamp Loss	Factor	Limit Level	Over Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1852.184	44.99	25.52	5.50	40.94	35.07	74.00	-38.93	Peak
2	1852.184	34.25	25.52	5.50	40.94	24.33	54.00	-29.67	Average
3	3461.456	46.40	28.67	8.72	39.34	44.45	74.00	-29.55	Peak
4	3461.456	37.54	28.67	8.72	39.34	35.59	54.00	-18.41	Average
5	5555.085	47.37	32.09	11.43	40.32	50.57	74.00	-23.43	Peak
6	5555.085	38.54	32.09	11.43	40.32	41.74	54.00	-12.26	Average

Vertical:



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
 EUT : 2.4G Wireless Serial-USB
 Model : MBK-2.4G-USB
 Test mode : ON Mode
 Power Rating : AC 120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: Garen
 REMARK :

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1809.539	45.18	25.35	5.43	40.97	34.99	74.00	-39.01	Peak
2	1809.539	34.69	25.35	5.43	40.97	24.50	54.00	-29.50	Average
3	3530.356	47.34	29.01	8.83	39.83	45.35	74.00	-28.65	Peak
4	3530.356	38.45	29.01	8.83	39.83	36.46	54.00	-17.54	Average
5	4962.120	50.43	31.69	10.73	40.03	52.82	74.00	-21.18	Peak
6	4962.120	40.79	31.69	10.73	40.03	43.18	54.00	-10.82	Average