

FCC REPORT

Applicant: Aztech Technologies Pte Ltd

Address of Applicant: 31, Ubi Road 1, #01-05 Singapore 408694, SINGAPORE

Equipment Under Test (EUT)

Product Name: ZigBee Hub

Model No.: KHUB-210-ZB

Trade mark: **Kyla^S**

FCC ID: I38KHUB210ZB

Applicable standards: FCC CFR Title 47 Part 15 Subpart B

Date of sample receipt: 06 Aug., 2019

Date of Test: 06 Aug., to 28 Aug., 2019

Date of report issued: 29 Aug., 2019

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.

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2 Version

Version No.	Date	Description
00	29 Aug., 2019	Original

Tested by:

YT Yang

Test Engineer

Date:

29 Aug., 2019

Reviewed by:

Winner Zhang

Project Engineer

Date:

29 Aug., 2019

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4 Test Summary

Test Item	Section in CFR 47	Result
Conducted Emission	Part 15.107	Pass
Radiated Emission	Part 15.109	Pass
<i>Remark:</i> <i>Pass: The EUT complies with the essential requirements in the standard.</i> <i>N/A: The EUT not applicable of the test item.</i>		

5 General Information

5.1 Client Information

Applicant:	Aztech Technologies Pte Ltd
Address:	31, Ubi Road 1, #01-05 Singapore 408694, SINGAPORE
Manufacturer:	Aztech Technologies Pte Ltd
Address:	31, Ubi Road 1, #01-05 Singapore 408694, SINGAPORE
Factory:	Aztech Communication Device (DG) LTD
Address:	Jiu Jiang Shui Village, Chang Ping Town, 523500 Dong Guan City, Guang Dong Province, PEOPLE'S REPUBLIC OF CHINA

5.2 General Description of E.U.T.

Product Name:	ZigBee Hub
Model No.:	KHUB-210-ZB
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

5.3 Test Mode

Operating mode	Detail description
Working mode	Keep the EUT in Working 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 Measurement Uncertainty

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±1.60 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±3.12 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.32 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.38 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±3.36 dB (k=2)

5.5 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
LENOVO	Laptop	SL510	2847A65	DoC

5.6 Related Submittal(s) / Grant (s)

This is an original grant, no related submittals and grants.

5.7 Description of Cable Used

Cable Type	Description	Length	From	To
Detached USB Cable	Unshielded	1.0m	EUT	Adapter

5.8 Laboratory Facility

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

- **FCC - Designation No.: CN1211**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

- **ISED – CAB identifier.: CN0021**

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.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

5.9 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
Email: info@ccis-cb.com, Website: <http://www.ccis-cb.com>

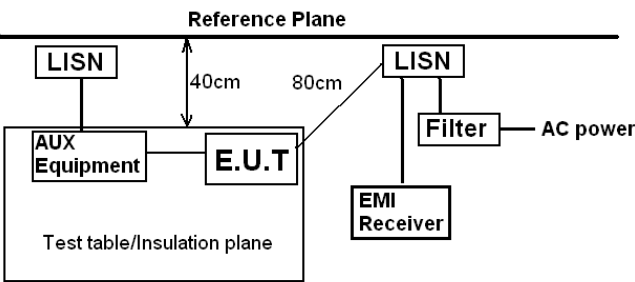
5.10 Test Instruments list

Radiated Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
Loop Antenna	SCHWARZBECK	FMZB1519B	00044	03-18-2019	03-17-2020
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-18-2019	03-17-2020
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-18-2019	03-17-2020
Horn Antenna	SCHWARZBECK	BBHA9120D	1805	06-22-2017	06-21-2020
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170582	11-21-2018	11-20-2019
EMI Test Software	AUDIX	E3	Version: 6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-18-2019	03-17-2020
Pre-amplifier	CD	PAP-1G18	11804	03-18-2019	03-17-2020
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-18-2019	03-17-2020
Spectrum analyzer	Rohde & Schwarz	FSP40	100363	11-21-2018	11-20-2019
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-18-2019	03-17-2020
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-18-2019	03-17-2020
Cable	MICRO-COAX	MFR64639	K10742-5	03-18-2019	03-17-2020
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-18-2019	03-17-2020

Conducted Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
EMI Test Receiver	Rohde & Schwarz	ESCI	101189	03-18-2019	03-17-2020
Pulse Limiter	SCHWARZBECK	OSRAM 2306	9731	03-18-2019	03-17-2020
LISN	CHASE	MN2050D	1447	03-18-2019	03-17-2020
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2019	07-20-2020
Cable	HP	10503A	N/A	03-18-2019	03-17-2020
EMI Test Software	AUDIX	E3	Version: 6.110919b		

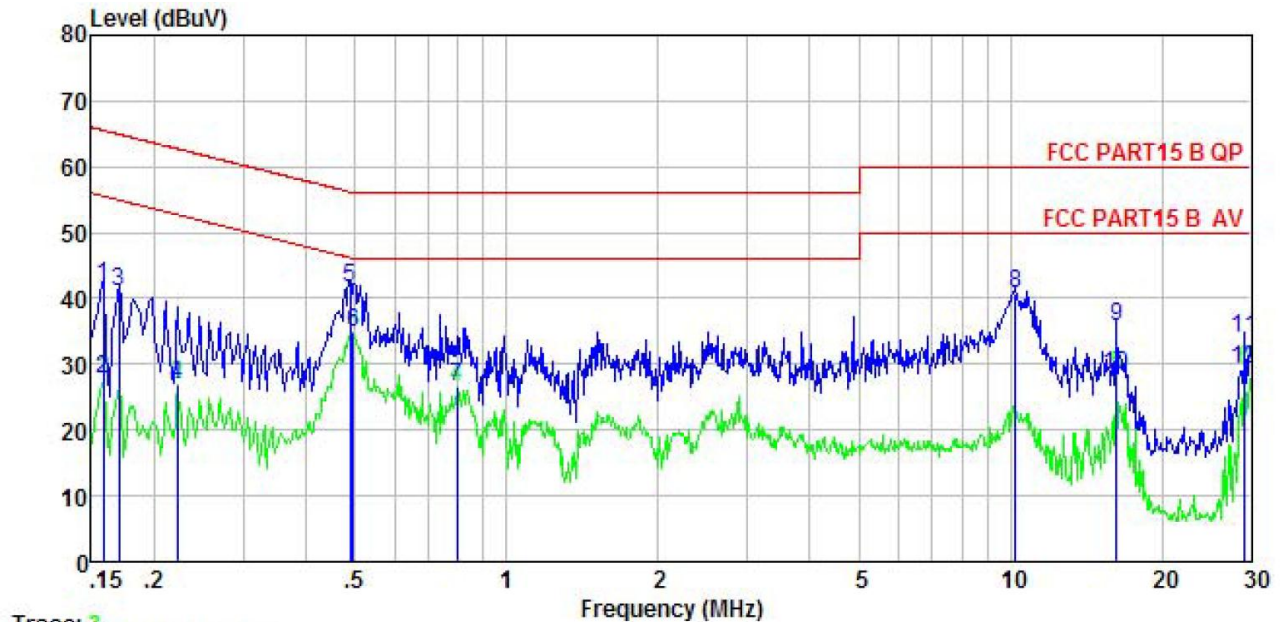
6 Test results and Measurement Data

6.1 Conducted Emission

Test Requirement:	FCC Part 15 B Section 15.107		
Test Method:	ANSI C63.4:2014		
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: 2014 on conducted measurement.		
Test Instruments:	Refer to section 5.10 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Pass		

Measurement data:

Product name:	ZigBee Hub	Product model:	KHUB-210-ZB
Test by:	YT	Test mode:	Working mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Line
Test voltage:	AC120V/60Hz	Environment:	Temp: 22.5℃ Humi: 55%

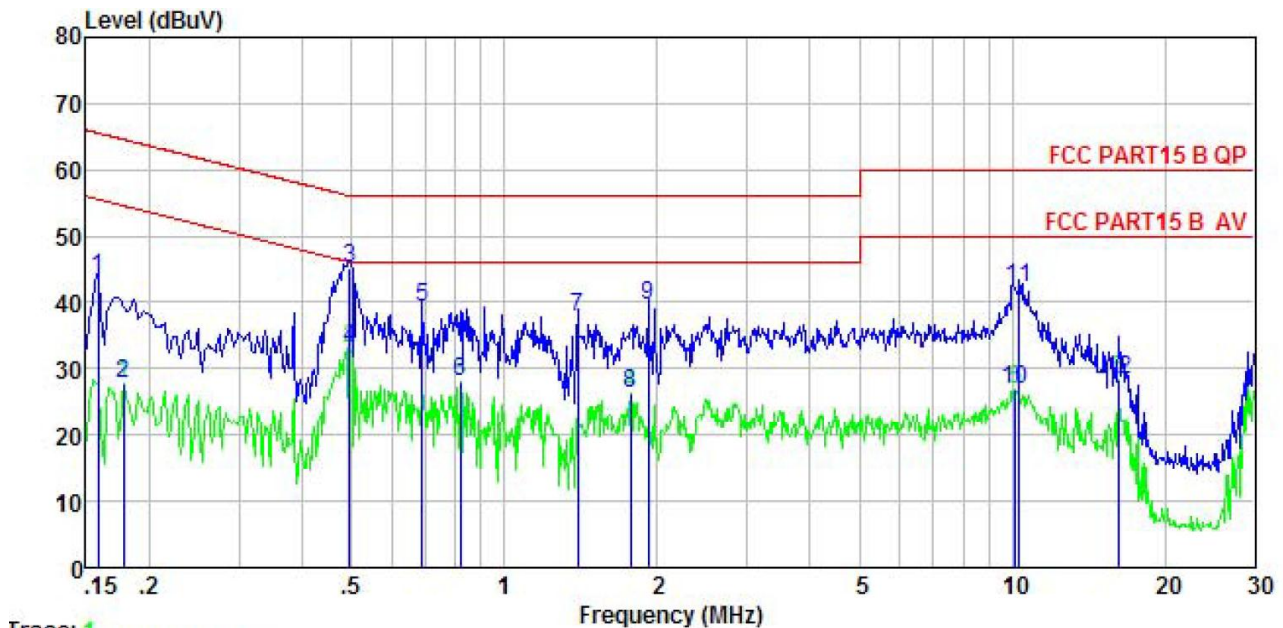


	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.158	31.72	-0.44	10.77	42.05	65.56	-23.51	QP
2	0.158	17.44	-0.44	10.77	27.77	55.56	-27.79	Average
3	0.170	30.70	-0.43	10.77	41.04	64.94	-23.90	QP
4	0.222	16.36	-0.40	10.76	26.72	52.74	-26.02	Average
5	0.489	31.40	-0.39	10.76	41.77	56.19	-14.42	QP
6	0.497	24.52	-0.39	10.76	34.89	46.05	-11.16	Average
7	0.796	16.19	-0.38	10.81	26.62	46.00	-19.38	Average
8	10.233	30.38	-0.61	10.94	40.71	60.00	-19.29	QP
9	16.226	25.52	-0.76	10.91	35.67	60.00	-24.33	QP
10	16.226	18.14	-0.76	10.91	28.29	50.00	-21.71	Average
11	29.216	24.08	-1.11	10.87	33.84	60.00	-26.16	QP
12	29.216	19.34	-1.11	10.87	29.10	50.00	-20.90	Average

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss.

Product name:	ZigBee Hub	Product model:	KHUB-210-ZB
Test by:	YT	Test mode:	Working mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC120V/60Hz	Environment:	Temp: 22.5℃ Humi: 55%

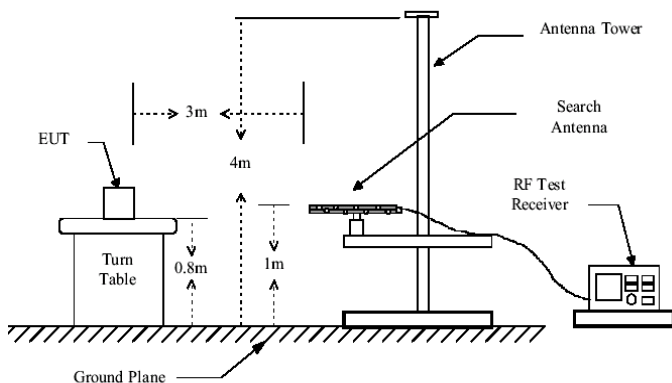
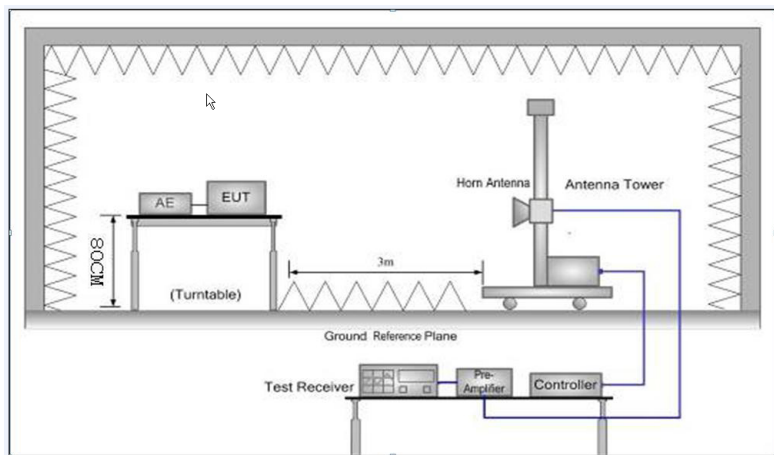


	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.158	33.73	-0.68	10.77	43.82	65.56	-21.74	QP
2	0.178	17.80	-0.69	10.77	27.88	54.59	-26.71	Average
3	0.497	34.95	-0.65	10.76	45.06	56.05	-10.99	QP
4	0.497	22.95	-0.65	10.76	33.06	46.05	-12.99	Average
5	0.690	29.15	-0.64	10.77	39.28	56.00	-16.72	QP
6	0.817	17.96	-0.64	10.82	28.14	46.00	-17.86	Average
7	1.396	27.61	-0.65	10.91	37.87	56.00	-18.13	QP
8	1.772	15.90	-0.66	10.94	26.18	46.00	-19.82	Average
9	1.918	29.14	-0.67	10.95	39.42	56.00	-16.58	QP
10	10.125	16.80	-0.79	10.94	26.95	50.00	-23.05	Average
11	10.342	32.17	-0.79	10.94	42.32	60.00	-17.68	QP
12	16.140	18.45	-0.96	10.91	28.40	50.00	-21.60	Average

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss.

6.2 Radiated Emission

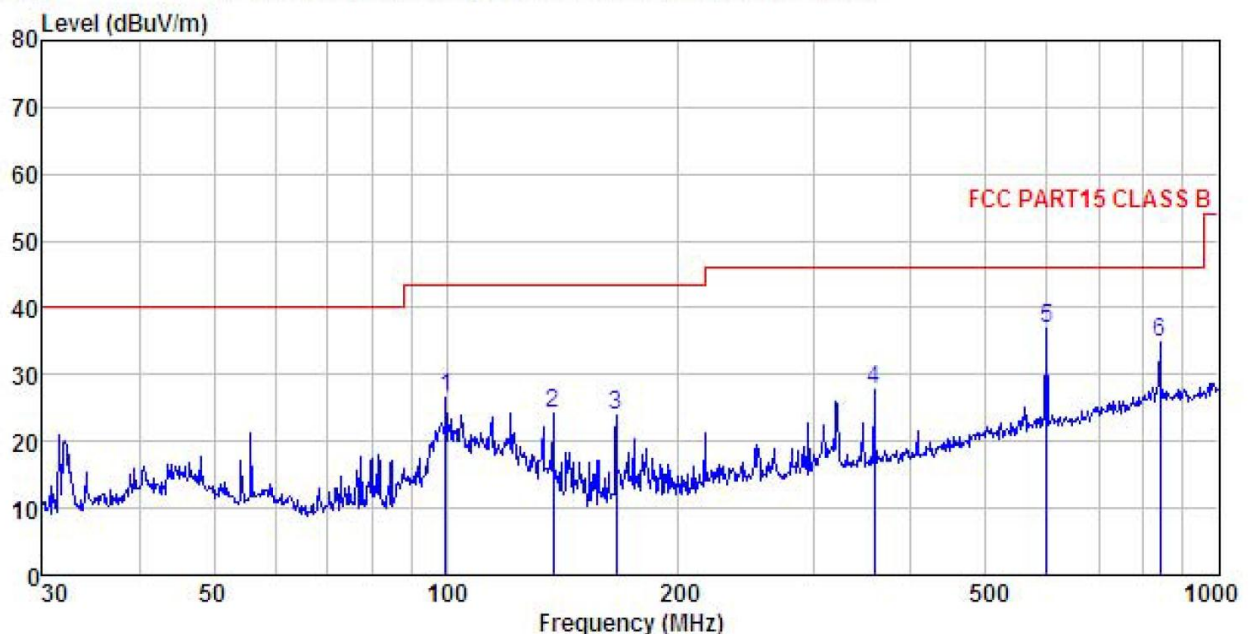
Test Requirement:	FCC Part 15 B Section 15.109				
Test Method:	ANSI C63.4:2014				
Test Frequency Range:	30MHz to 6000MHz				
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
RMS		1MHz	3MHz	Average 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
		74.0		Peak 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 camber. 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 Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed
Remark:	All of the observed value above 6GHz were the noise floor , which were no recorded

Measurement Data:

Below 1GHz:

Product Name:	ZigBee Hub	Product model:	KHUB-210-ZB
Test By:	YT	Test mode:	Working mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Vertical
Test Voltage:	AC120V/60Hz	Environment:	Temp: 24℃ Humi: 57%

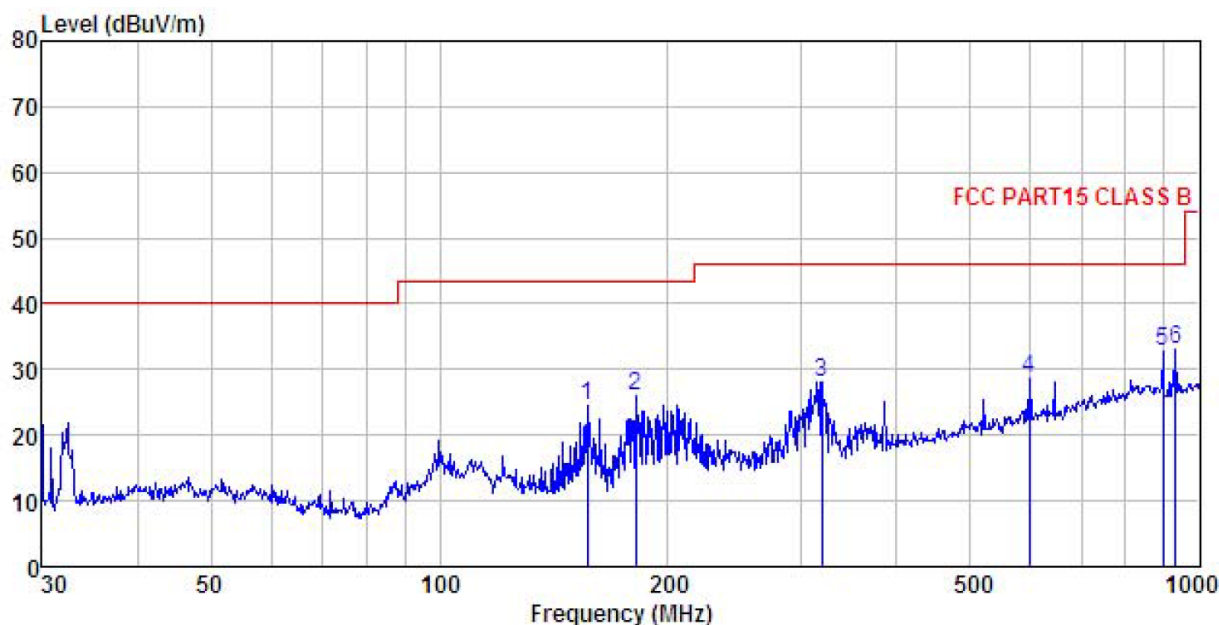


	Freq	ReadAntenna	Cable	Preamp	Limit	Over	
	Level	Factor	Loss	Factor	Level	Line	Limit
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m
1	99.878	41.67	12.41	1.94	29.53	26.49	43.50
2	137.420	41.49	9.69	2.37	29.29	24.26	43.50
3	166.068	40.87	9.49	2.63	29.08	23.91	43.50
4	357.929	38.39	14.71	3.10	28.59	27.61	46.00
5	599.321	42.53	19.50	3.94	28.94	37.03	46.00
6	839.182	36.44	22.36	4.22	28.04	34.98	46.00

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Name:	ZigBee Hub	Product model:	KHUB-210-ZB
Test By:	YT	Test mode:	Working mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	AC120V/60Hz	Environment:	Temp: 24℃ Humi: 57%



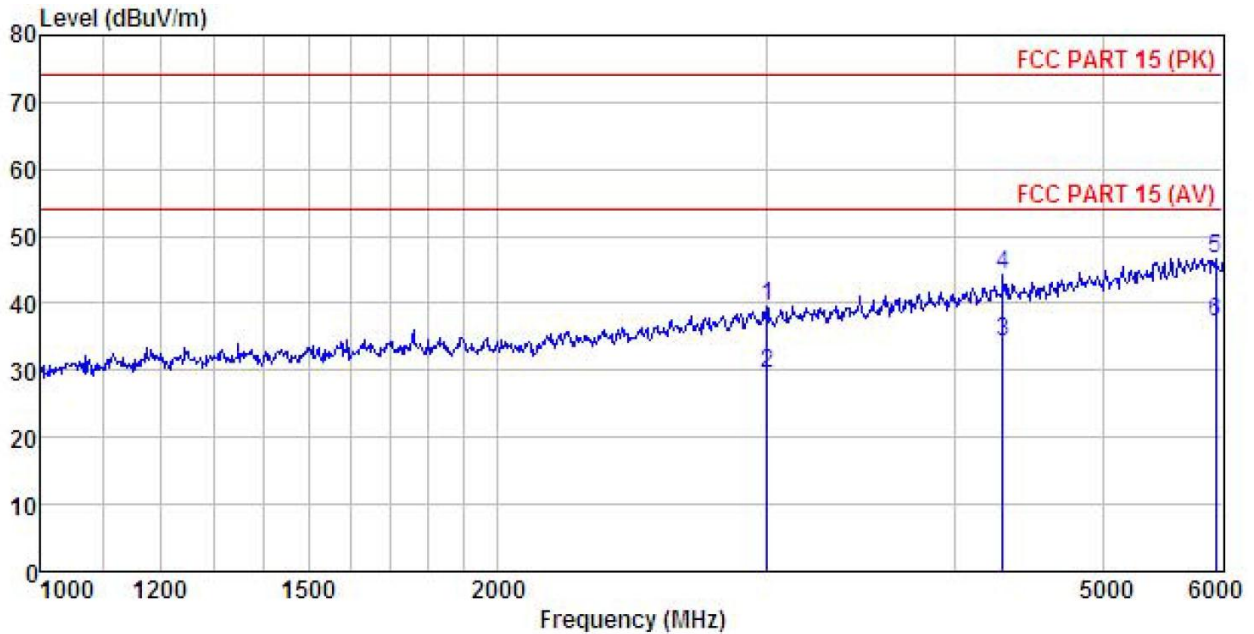
	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over	Remark
	MHz	Level	Factor	Loss	Factor	Line	Limit	
		dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	156.458	42.02	9.15	2.56	29.16	24.57	43.50	-18.93 QP
2	181.283	42.25	10.01	2.74	28.96	26.04	43.50	-17.46 QP
3	318.817	39.57	14.01	3.00	28.49	28.09	46.00	-17.91 QP
4	597.223	34.24	19.44	3.94	28.95	28.67	46.00	-17.33 QP
5	896.997	34.31	22.51	3.74	27.89	32.67	46.00	-13.33 QP
6	932.272	34.05	22.62	4.03	27.78	32.92	46.00	-13.08 QP

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Above 1GHz:

Product Name:	ZigBee Hub	Product model:	KHUB-210-ZB
Test By:	YT	Test mode:	Working mode
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Vertical
Test Voltage:	AC120V/60Hz	Environment:	Temp: 24℃ Humi: 57%

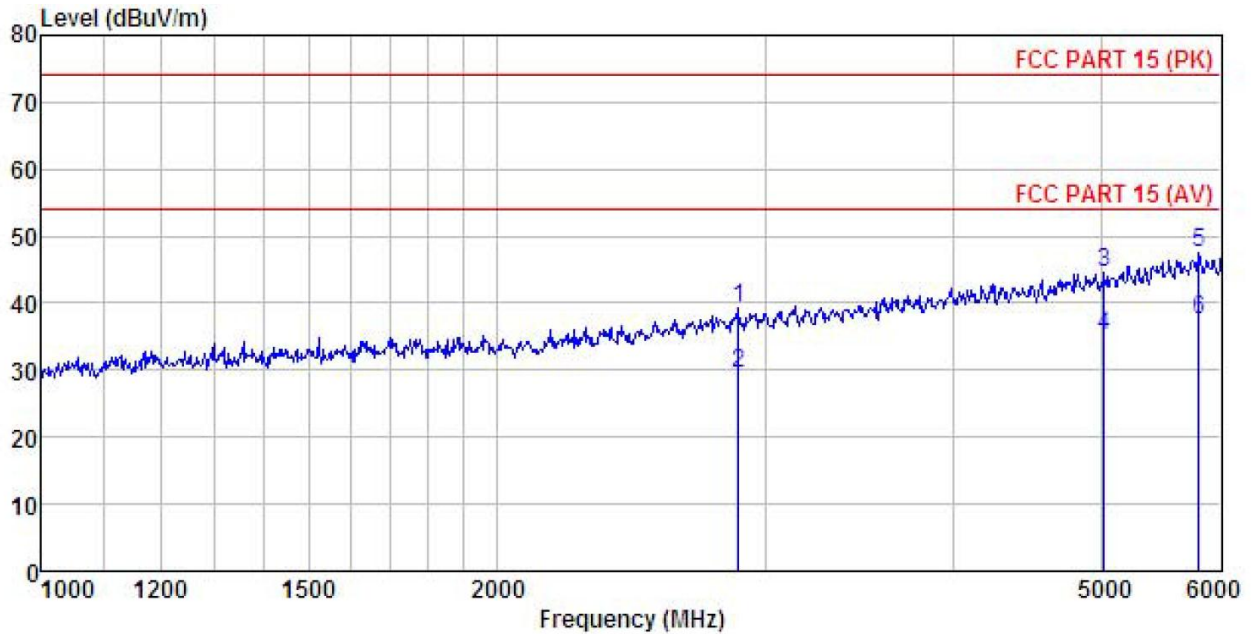


	Freq	ReadAntenna	Cable	Preamp		Limit	Over	
	MHz	Level	Factor	Loss	Factor	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	3004.588	47.26	28.50	5.35	41.51	39.60	74.00	-34.40 Peak
2	3004.588	37.27	28.50	5.35	41.51	29.61	54.00	-24.39 Average
3	4299.472	39.33	30.36	6.56	41.89	34.36	74.00	-39.64 QP
4	4299.472	49.19	30.36	6.56	41.89	44.22	74.00	-29.78 Peak
5	5935.842	48.18	32.69	7.92	42.04	46.75	74.00	-27.25 Peak
6	5935.842	38.71	32.69	7.92	42.04	37.28	54.00	-16.72 Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Name:	ZigBee Hub	Product model:	KHUB-210-ZB
Test By:	YT	Test mode:	Working mode
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Horizontal
Test Voltage:	AC120V/60Hz	Environment:	Temp: 24℃ Humi: 57%



	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2883.284	47.45	28.26	5.22	41.60	39.33	74.00	-34.67 Peak
2	2883.284	37.69	28.26	5.22	41.60	29.57	50.00	-20.43 Average
3	5024.748	48.18	31.46	6.96	41.89	44.71	74.00	-29.29 Peak
4	5024.748	38.71	31.46	6.96	41.89	35.24	54.00	-18.76 Average
5	5799.177	49.14	32.66	7.89	42.02	47.67	74.00	-26.33 Peak
6	5799.177	39.05	32.66	7.89	42.02	37.58	54.00	-16.42 Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.