Shenzhen Huaxia Testing Technology Co., Ltd

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Report Template Version: V03
Report Template Revision Date: Mar.1st, 2017

FCC Test Report

Report No. :	CQASZ171101533EW-01
Applicant:	Shenzhen HCY Electrics and Technology Co., Ltd
Address of Applicant:	The 1st building, No 2 Gangbei Road, Bogang Village Shajing Town, Baoan, Shenzhen, China
Manufacturer:	Shenzhen HCY Electrics and Technology Co., Ltd
Address of Manufacturer:	The 1st building, No 2 Gangbei Road, Bogang Village Shajing Town, Baoan, Shenzhen, China
Factory:	Shenzhen HCY Electrics and Technology Co., Ltd
Address of Factory:	The 1st building, No 2 Gangbei Road, Bogang Village Shajing Town, Baoan, Shenzhen, China

Equipment Under Test (EUT):

Product:	Air Mouse
Model No.:	HCY-57B
Brand Name:	N/A
FCC ID:	2AOBUHCY-57B
Standards:	47 CFR Part 15, Subpart C
Date of Test:	2017-11-10 to 2017-11-16
Date of Issue:	2017-11-16
Test Result :	**PASS***

Tested By: Aaron Ma

(Aaron Ma)

Reviewed By: Owen Zhou

(Owen Zhou)

Approved By:

(Jack Ai)

SHENZHEN HUAXIA TESTING TECHNOLOGY CO., LTD
华夏准测
APPROVED

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

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

2 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ171101533EW-01	Rev.01	Initial report	2017-11-16

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203	ANSI C63.10 (2013)	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 (2013)	N/A
Field Strength of the Fundamental Signal	47 CFR Part 15, Subpart C Section 15.249 (a)	ANSI C63.10 (2013)	PASS
Spurious Emissions	47 CFR Part 15, Subpart C Section 15.249 (a)/15.209	ANSI C63.10 (2013)	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.249(a)/15.205	ANSI C63.10 (2013)	PASS
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.215 (c)	ANSI C63.10 (2013)	PASS

N/A: Not applicable, When the EUT are charging, the EUT does not work.

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5 General Information

5.1 Client Information

Applicant:	Shenzhen HCY Electrics and Technology Co., Ltd
Address of Applicant:	The 1st building, No 2 Gangbei Road, Bogang Village Shajing Town, Baoan, Shenzhen, China
Manufacturer:	Shenzhen HCY Electrics and Technology Co., Ltd
Address of Manufacturer:	The 1st building, No 2 Gangbei Road, Bogang Village Shajing Town, Baoan, Shenzhen, China
Factory:	Shenzhen HCY Electrics and Technology Co., Ltd
Address of Factory:	The 1st building, No 2 Gangbei Road, Bogang Village Shajing Town, Baoan, Shenzhen, China

5.2 General Description of EUT

Name:	Air Mouse
Model No.:	HCY-57B
Trade Mark :	N/A
Hardware Version:	V1.0
Software Version:	V14
Frequency Range:	2406 MHz
Modulation Type:	GFSK
Number of Channels:	1 (declared by the client)
Sample Type:	Portable production
Test Software of EUT:	Press R & F key at the same time (manufacturer declare)
Antenna Type:	PCB antenna
Antenna Gain:	0dBi
Power Supply:	Rechargeable battery : Model:403030 DC3.7V 300mAh Charge by DC 5V

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2406MHz	/	/	/	/	/	/

Note: This product is only one channel(2406MHz)

5.3 Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	52 % RH
Atmospheric Pressure:	1008 mbar
Test Mode:	Use test software (Press R & F key at the same time) to set the working frequency keep transmitting of the EUT.

5.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
/	/	/	/	/

5.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the **Shenzhen Tongce Testing Lab** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for **TCT** laboratory is reported:

Item	Uncertainty	Notes
All emissions, radiated(<1GHz)	±3.92dB	(1)
All emissions, radiated(>1GHz)	±4.28dB	(1)
Conducted Disturbance	±2.56dB	(1)
Spurious emissions, conducted	±0.11dB	(1)
RF power, conducted	±0.12dB	(1)
Temperature	±0.1°C	(1)
Humidity	±1.0%	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

5.6 Test Location

All tests were performed at:

Shenzhen Tongce Testing Lab,

1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China

5.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:
FCC – Registration No.: 645098
Shenzhen Tongce Testing Lab
The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

5.8 Deviation from Standards

None.

5.9 Abnormalities from Standard Conditions

None.

5.10 Other Information Requested by the Customer

None.

5.11 Equipment List

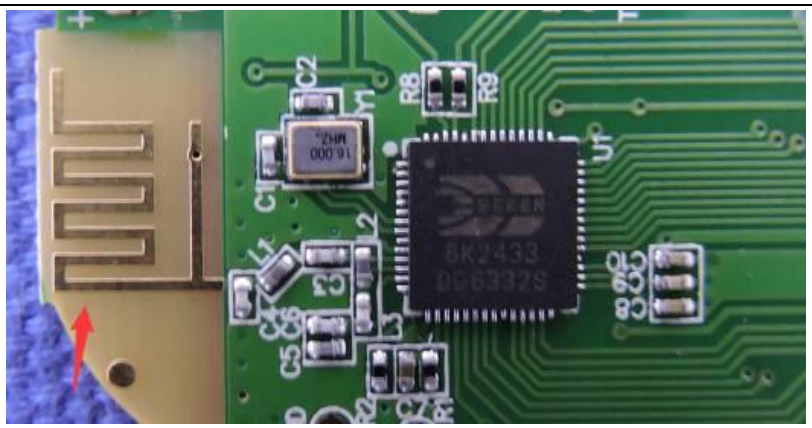
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Due. Date
1	EMI Test Receiver	R&S	ESVD	100008	2018/09/27
2	Spectrum Analyzer	R&S	FSQ	200061	2018/09/27
3	Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	2018/09/27
4	Pre-amplifier	HP	8447D	2727A05017	2018/09/27
5	Loop antenna	ZHINAN	ZN30900A	12024	2018/09/27
6	Broadband Antenna	Schwarzbeck	VULB9163	340	2018/09/27
7	Horn Antenna	Schwarzbeck	BBHA 9120D	631	2018/09/27
8	Horn Antenna	Schwarzbeck	BBHA 9170	582	2018/06/07
9	Antenna Mast	CCS	CC-A-4M	N/A	N/A
10	Coax cable (9KHz~40GHz)	TCT	RE-low-01	N/A	2018/09/27
11	Coax cable (9KHz~40GHz)	TCT	RE-high-02	N/A	2018/09/27
12	Spectrum Analyzer	R&S	FSU	200054	2018/09/27
13	Antenna Connector	TCT	RFC-01	N/A	2018/09/27
14	RF cable (9KHz~26.25GHz)	TCT	RE-06	N/A	2018/09/27

Note:

The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

6 Test results and Measurement Data

6.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
EUT Antenna:	
The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.	

6.2 Radiated Emission

Test Requirement:	47 CFR Part 15C Section 15.249 and 15.209 and 15.205
Test Method:	ANSI C63.10: 2013
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30KHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30KHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100 kHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Note: For fundamental frequency, RBW=5MHz, VBW=5MHz, Peak detector is for PK value, RMS detector is for Average value.

Limit:
(Spurious Emissions and band edge)

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 1) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

2) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Limit:
(Field strength of the fundamental signal)

Frequency	Limit (dBuV/m @3m)	Remark
2400MHz-2483.5MHz	94.0	Average Value
	114.0	Peak Value

Test Setup:	

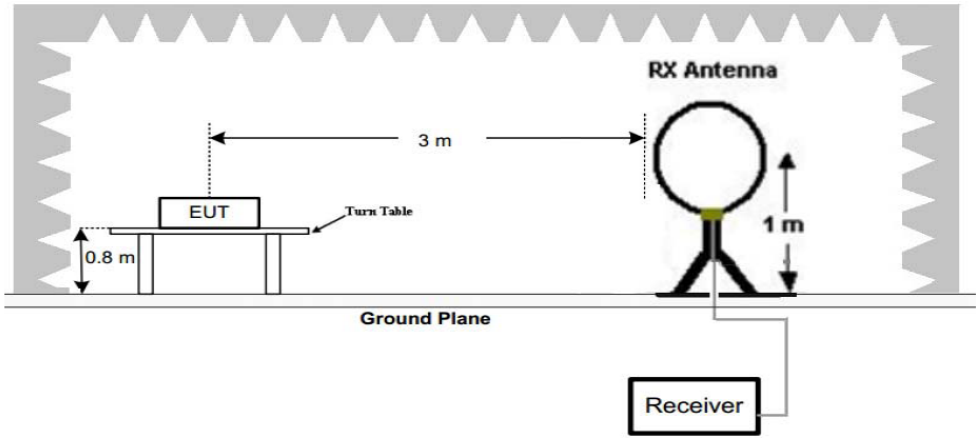


Figure 1. Below 30MHz

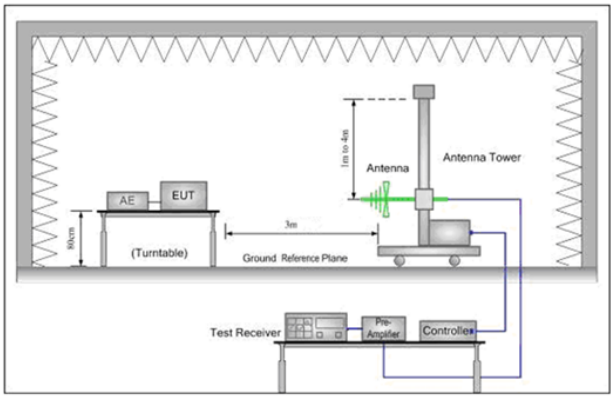


Figure 2. 30MHz to 1GHz

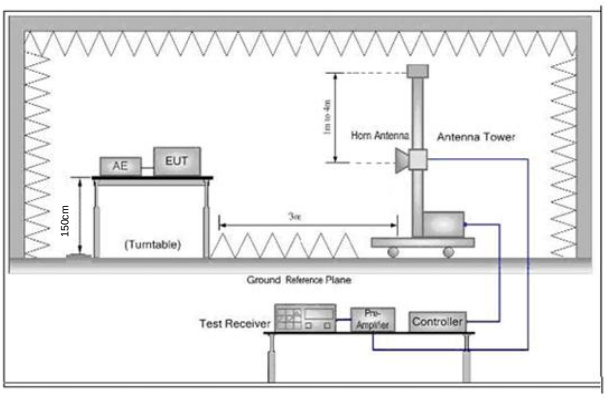


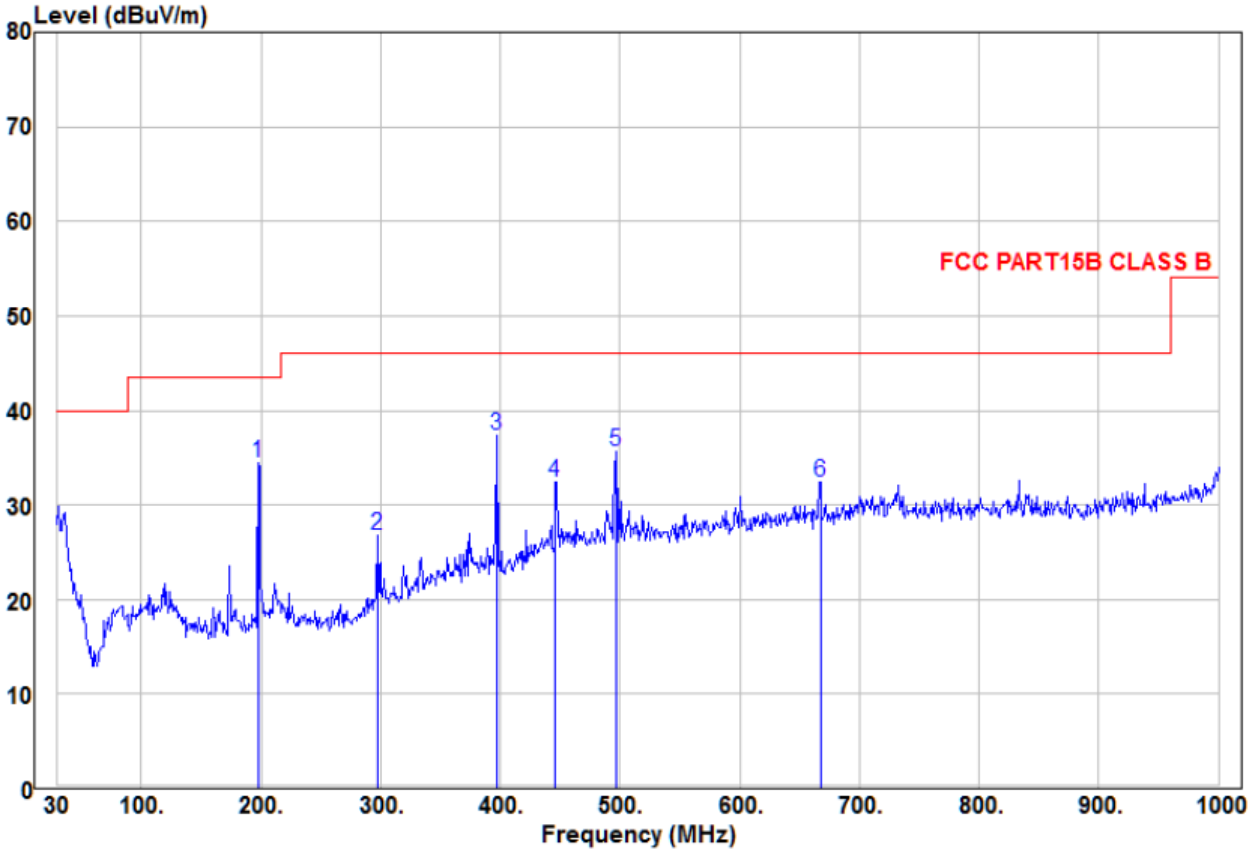
Figure 3. Above 1 GHz

Test Procedure:	a. 1) Below 1G: 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) Above 1G: The EUT was placed on the top of a rotating table 1.5 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. Note: For the radiated emission test above 1GHz: Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. 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. d. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table

	was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. 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. g. Test the EUT in the lowest channel,the middle channel,the Highest channel h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode,And found the X axis positioning which it is worse case. i. Repeat above procedures until all frequencies measured was complete.
Instruments Used:	Refer to section 5.11 for details
Exploratory Test Mode:	Transmitting mode
Final Test Mode:	Pretest the EUT at Transmitting mode, Only the worst case is recorded in the report.
Test Voltage:	DC3.7V
Test Results:	Pass

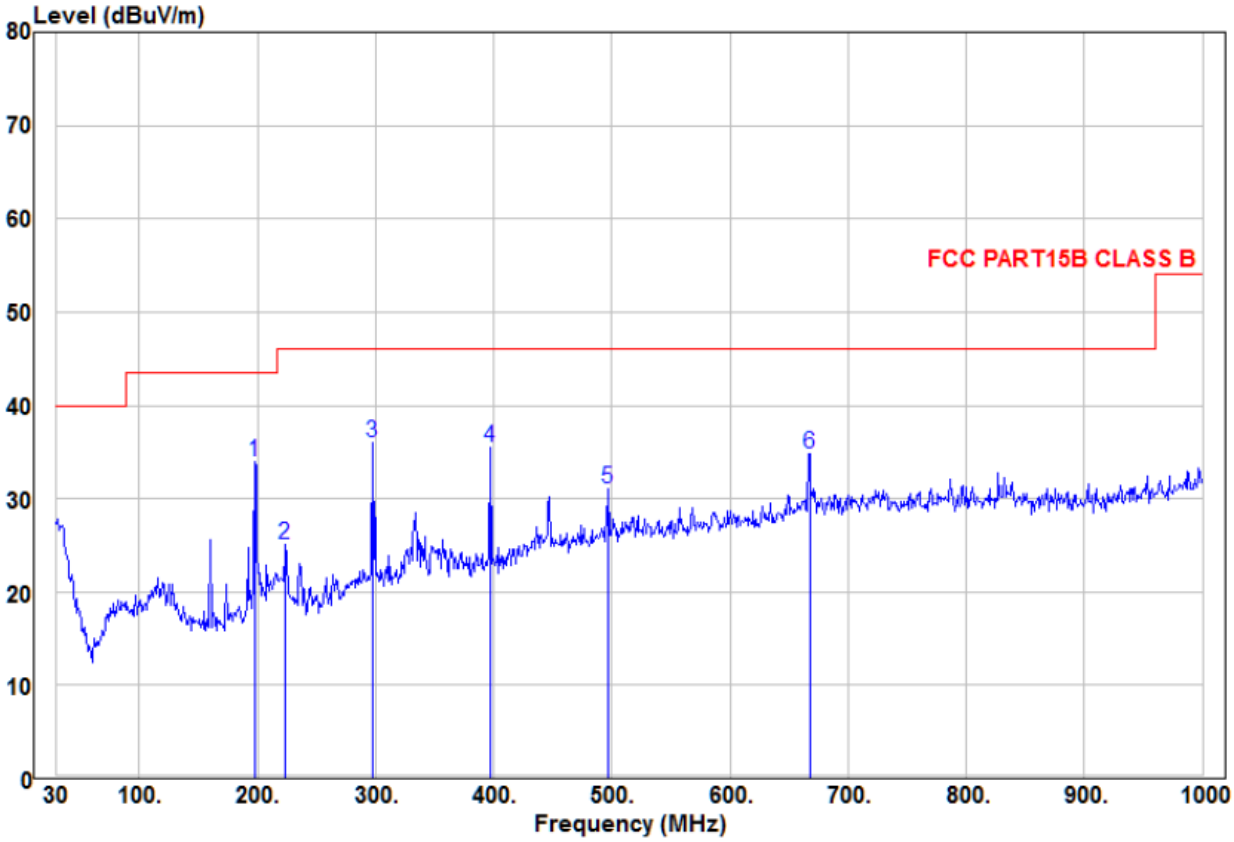
Measurement Data

30MHz~1GHz		
Test mode:	Transmitting	Vertical



		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1		197.81	26.13	8.29	34.42	43.50	-9.08	Peak	VERTICAL
2		297.72	15.36	11.46	26.82	46.00	-19.18	Peak	VERTICAL
3	pp	396.66	23.37	14.02	37.39	46.00	-8.61	Peak	VERTICAL
4		446.13	16.90	15.55	32.45	46.00	-13.55	Peak	VERTICAL
5		496.57	18.60	17.07	35.67	46.00	-10.33	Peak	VERTICAL
6		667.29	12.98	19.52	32.50	46.00	-13.50	Peak	VERTICAL

Test mode:	Transmitting	Horizontal



		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	pp	197.81	25.73	8.29	34.02	43.50	-9.48	Peak	HORIZONTAL
2		224.00	15.64	9.47	25.11	46.00	-20.89	Peak	HORIZONTAL
3		297.72	24.53	11.46	35.99	46.00	-10.01	Peak	HORIZONTAL
4		397.63	21.38	14.03	35.41	46.00	-10.59	Peak	HORIZONTAL
5		496.57	13.99	17.07	31.06	46.00	-14.94	Peak	HORIZONTAL
6		667.29	15.32	19.52	34.84	46.00	-11.16	Peak	HORIZONTAL

Above 1GHz			
Test mode:	Transmitting	Test channel:	2406MHz

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2390	49.66	-4.36	45.30	74	-28.70	peak	H
2390	/	/	/	/	/	AVG	H
2400	51.85	-4.36	50.49	74	-26.51	peak	H
2400	/	/	/	/	/	AVG	H
2406	**97.98**	**-4.38**	**93.60**	**114**	**-20.4**	**peak**	**H**
2406	**92.51**	**-4.38**	**88.13**	**94**	**-5.87**	**AVG**	**H**
2483.5	50.92	-4.22	46.70	74	-27.30	peak	H
2483.5	/	/	/	/	/	AVG	H
4812	61.51	-4.32	57.19	74	-16.81	peak	H
4812	52.12	-4.32	47.8	54	-6.2	AVG	H
7218	56.02	1.1	57.12	74	-16.88	Peak	H
7218	45.1	1.1	46.2	54	-7.8	AVG	H
9024	47.99	4.1	52.09	74	-21.91	peak	H
9024	/	/	/	/	/	AVG	H

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz, the disturbance below 30MHz was very low. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported .

Above 1GHz			
Test mode:	Transmitting	Test channel:	2406MHz

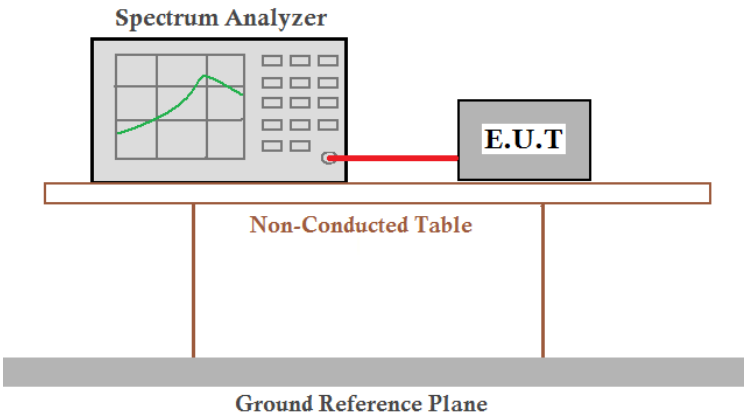
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2390	48.57	-4.36	44.21	74	-29.79	peak	V
2390	/	/	/	/	/	AVG	V
2400	52.33	-4.36	52.97	74	-26.03	peak	V
2400	/	/	/	/	/	AVG	V
2406	**92.12**	**-4.38**	**87.74**	**114**	**-26.26**	**peak**	**V**
2406	**87.23**	**-4.38**	**82.85**	**94**	**-11.15**	**AVG**	**V**
2483.5	51.85	-4.22	47.63	74	-26.37	peak	V
2483.5	/	/	/	/	/	AVG	V
4812	58.42	-4.32	54.1	74	-19.9	peak	V
4812	49.12	-4.32	44.8	54	-9.2	AVG	V
7218	53.45	1.1	54.55	74	-19.45	Peak	V
7218	42.03	1.1	43.13	54	-10.87	AVG	V
9840	45.93	7.22	53.15	74	-20.85	peak	V
9840	/	/	/	/	/	AVG	V

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
   Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz, the disturbance below 30MHz was very low. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported .

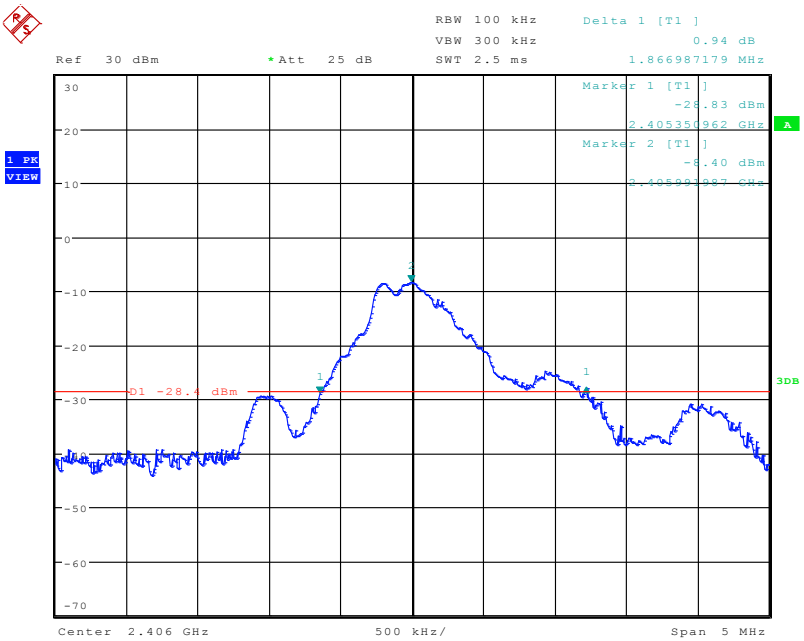
6.3 20dB Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.215
Test Method:	ANSI C63.10:2013
Test Setup:	
Instruments Used:	Refer to section 5.11 for details
Test Mode:	Transmitting with GFSK modulation.
Limit:	N/A
Test Results:	Pass

Measurement Data

Test channel	20dB bandwidth (MHz)	Results
2406MHz	1.867	Pass

Test plot as follows:

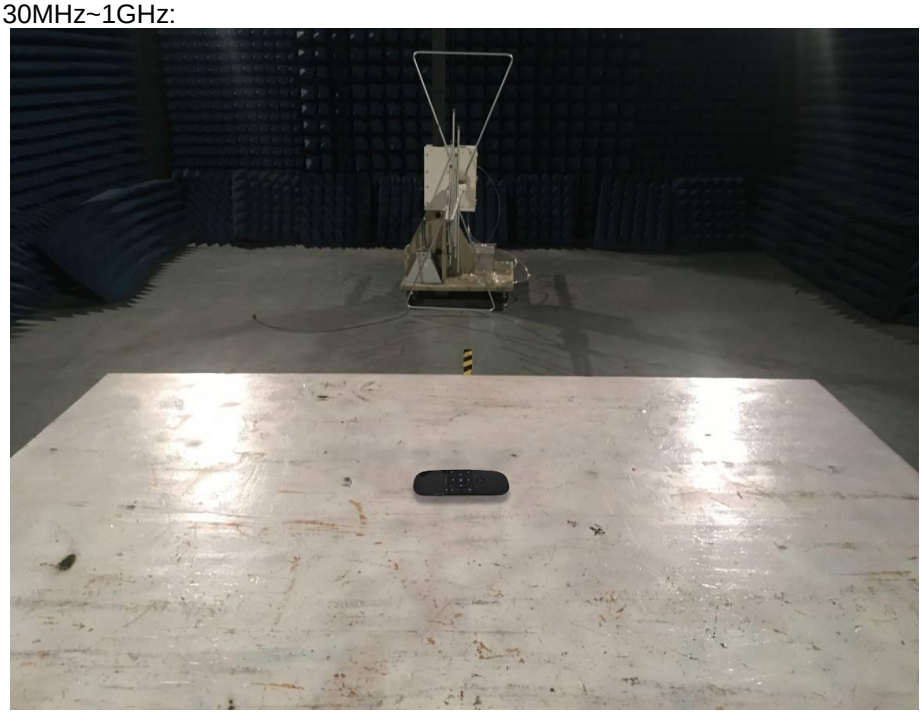


7 Photographs

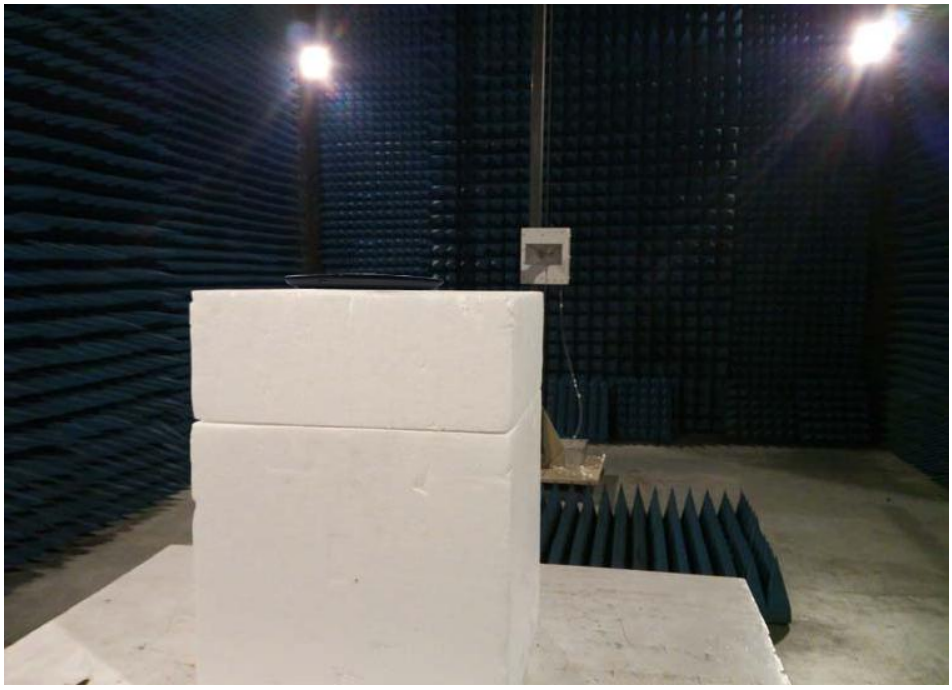
7.1 Radiated Emission Test Setup

9KHz~30MHz:

30MHz~1GHz:



Above 1GHz:



7.2 EUT Constructional Details

Esc
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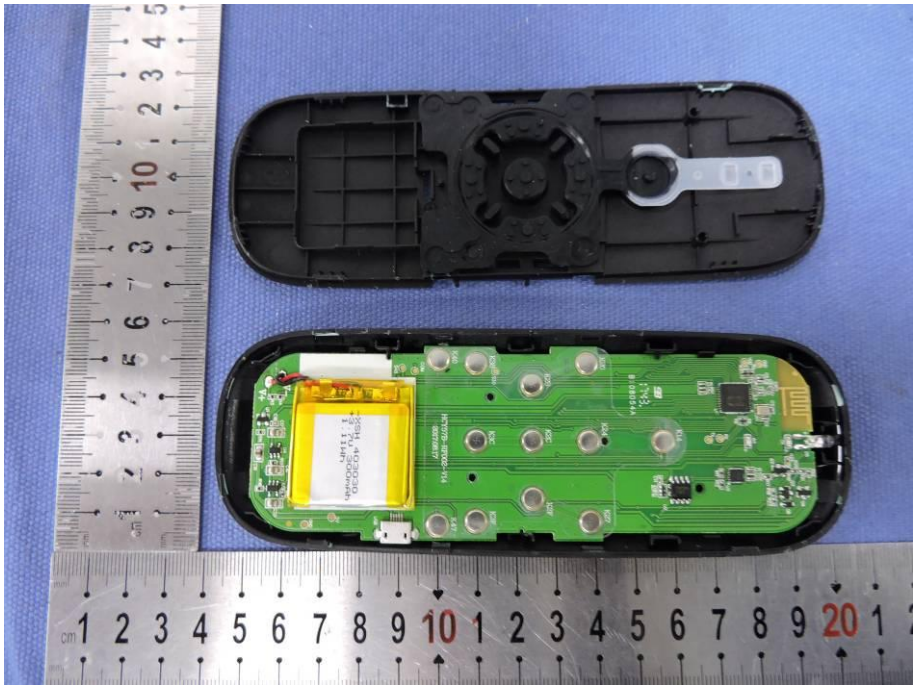
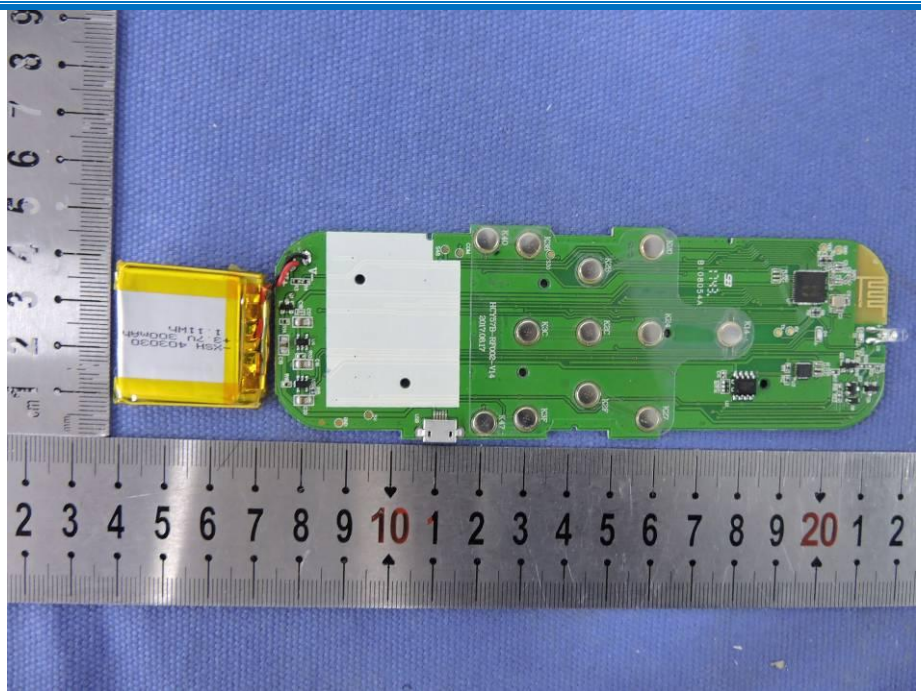
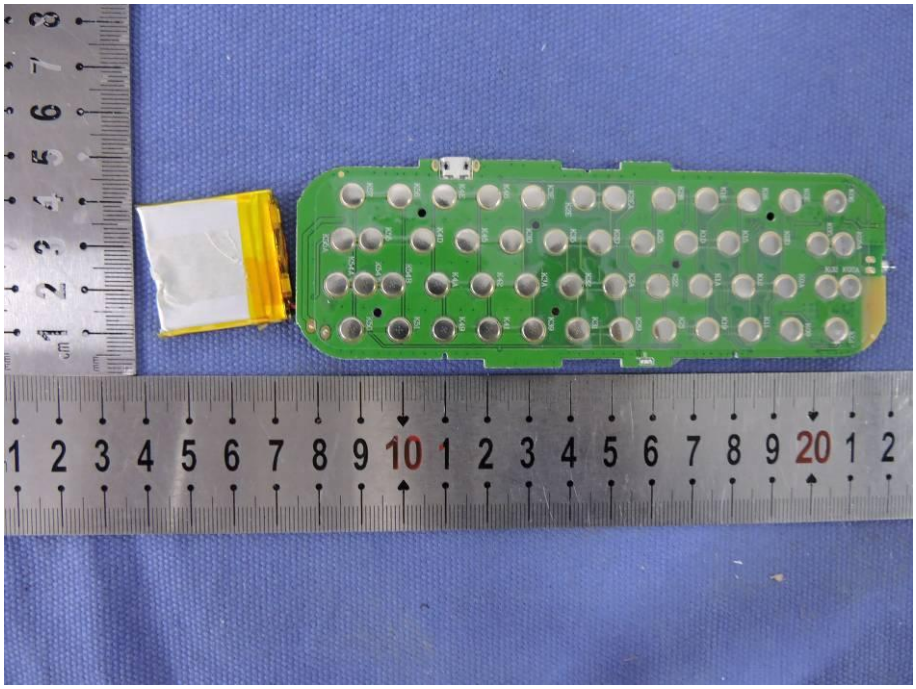
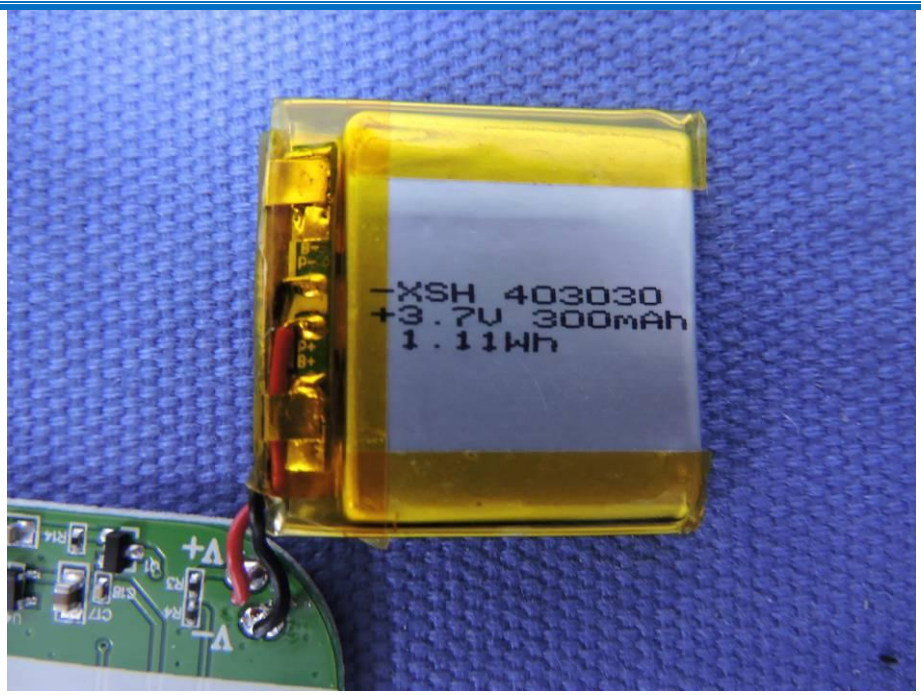
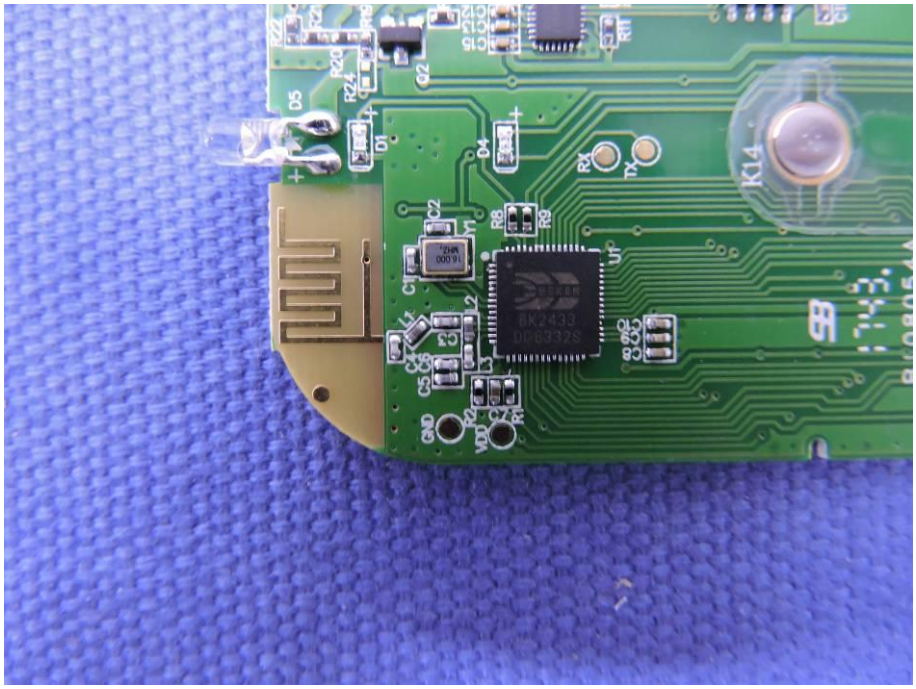
Fn
Alt
AltGr
Home
PgDn
End
www.
.com











END OF THE REPORT