

FCC PART 15.249

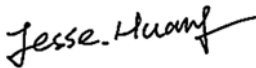
TEST REPORT

For

HHC Changzhou Corp.

No. 61 Xinggang Road, Zhonglou District, Changzhou, Jiangsu, China, 213023

FCC ID: 2AEQWCH05HHC006

Report Type: Original Report		Product Type: Remote Control	
Test Engineer:	Matt Yao		
Report Number:	RKS160111001-00B		
Report Date:	2016-01-19		
Reviewed By:	Jesse Huang		
Test Laboratory:	EMC Manager		
	Bay Area Compliance Laboratories Corp. (Kunshan) Chenghu Road, Kunshan Development Zone No.248, Kunshan, Jiangsu, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn		



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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The HHC Changzhou Corp.'s product, model number: CH05B (FCC ID: 2AEQWCH05HHC006) (the "EUT") in this report was a Remote Control, was measured approximately: 120 mm (L) x 51mm (W) x 15mm (H), Weight: 150g, rated input voltage: 3*battery AAA 1.5V..

Note: The series product model CH05B, CH03. They have same RF module. The different is the quantity of button. CH03 has 3 buttons. CH05B has 5 buttons, so the PCB layout have some changes, but not affect RF performance, we clarify that both CH05B and CH03, the duty cycle of RF signal is the same, when press any button, the transmitted spectrum is the same, they do not affect RF spectrum.

All measurement and test data in this report was gathered from production sample serial number: 20160107001. (Assigned by BACL, Kunshan). The EUT was received on 2016-01-07.

Objective

This type approval report is prepared on behalf of HHC Changzhou Corp. in accordance with Part 2-Subpart J, and Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

N/A.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Lab Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with radiated emission is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the Chenghu Road, Kunshan Development Zone No.248, Kunshan, Jiangsu, China.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

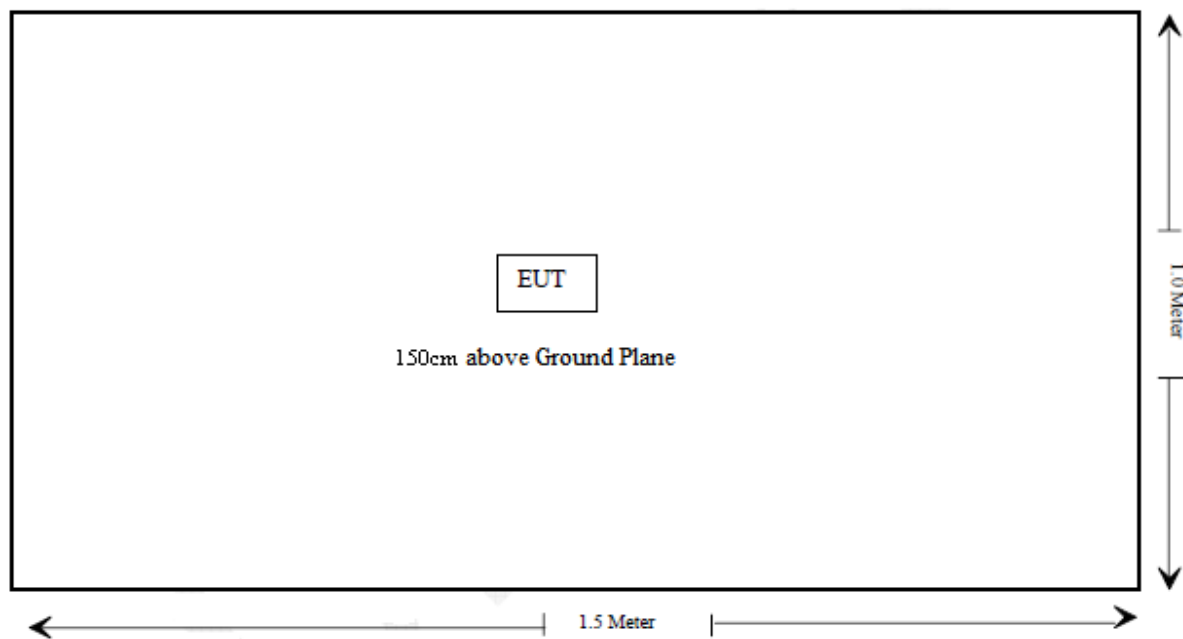
The system was configured in testing mode which was provided by manufacturer.

EUT was tested with Channel 2403MHz, 2412MHz and 2425MHz.

EUT Exercise Software

No software was used during the test.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conduction Emissions	Not Applicable*
15.205, §15.209, §15.249	Radiated Emissions	Compliance
§15.249(d)	Out of Band Emission	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance

*Not Applicable: The EUT is battery operated equipment.

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

Antenna Connector Construction

The EUT has one integral antenna arrangement and antenna gain is 2dBi, which was permanently attached ,fulfill the requirement of this section, please refer to the EUT photos.

Result: Compliant.

FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS& OUT OF BAND EMISSION

Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) 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 §15.209, whichever is the lesser attenuation.

Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cispr} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Kunshan) is:

30M~200MHz: 5.0 dB

200M~1GHz: 6.2 dB

1G~6GHz: 4.45 dB

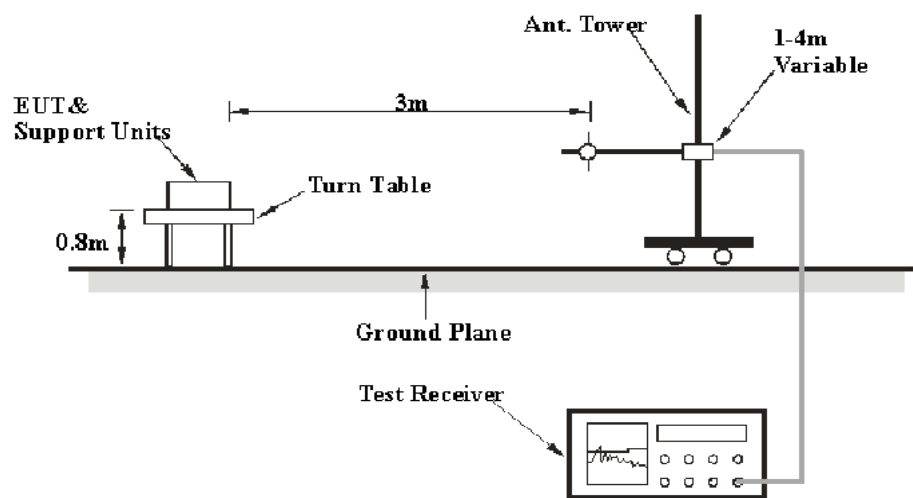
6G~18GHz: 5.23 dB

Table 1 – Values of U_{cispr}

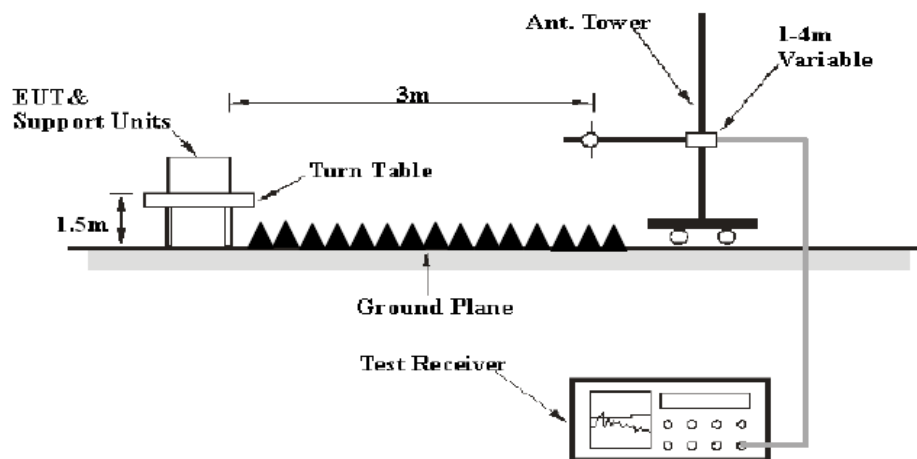
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

Test Equipment Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak and average detection mode above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sonoma Instrument	Amplifier	330	171377	2015-9-16	2016-9-16
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2015-5-20	2016-5-19
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2015-11-7	2016-11-6
ETS	Horn Antenna	3115	6229	2015-11-7	2016-11-6
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-4	2016-11-3
Mini	Pre-amplifier	ZVA-183-S+	857001418	2015-9-16	2016-9-16
R&S	Auto test Software	EMC32	V 09.10.0	-	-
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-6-15

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

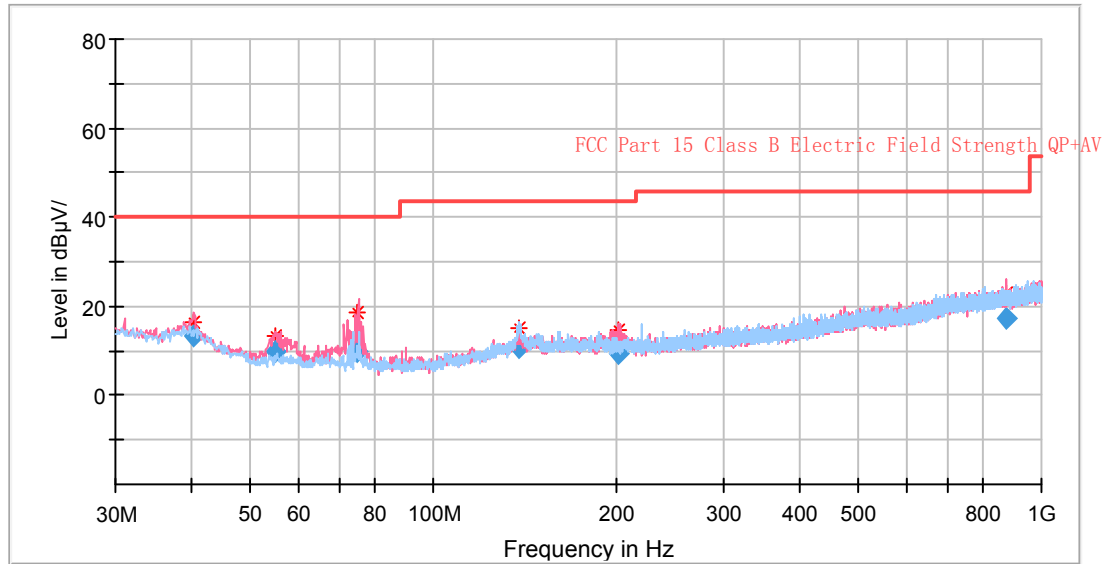
According to the data in the following table, the EUT complied with the FCC Part 15.209 & 15.205 & 15.249, with the worst margin reading of:

3.56 dB at 4806 MHz in the **Horizontal** polarization for Low Channel

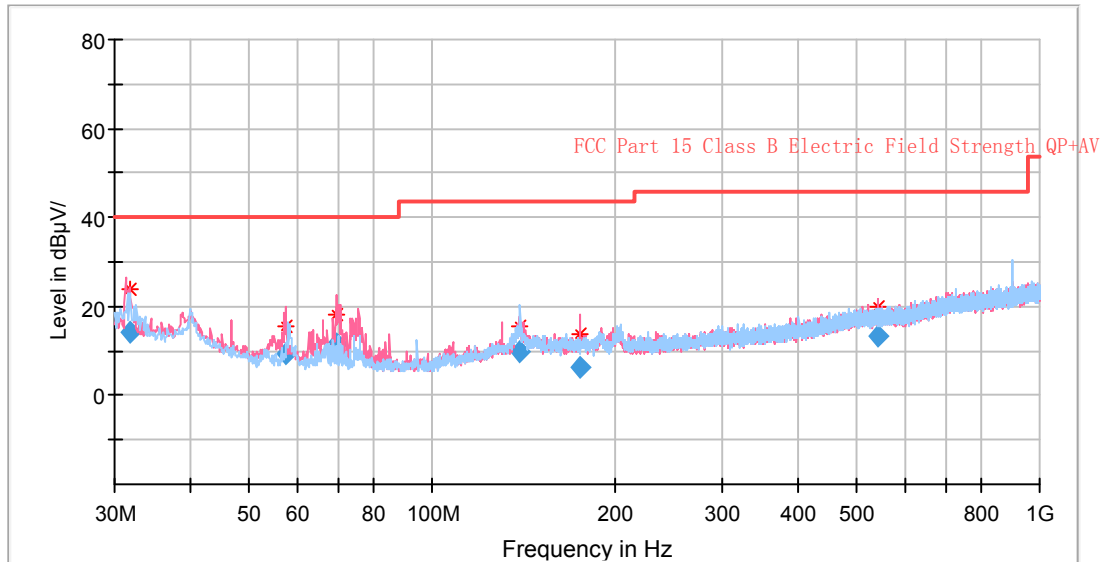
Test Data**Environmental Conditions**

Temperature:	25.6°C
Relative Humidity:	52%
ATM Pressure:	101.2 kPa

The testing was performed by Matt Yao on 2016-1-18.

30MHz-1GHz:**For CH05B**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.249/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μV/m)	Margin (dB)
40.3362	24.03	QP	257	100	V	-10.5	13.53	40	26.47
55.04535	26.59	QP	3	100	V	-16.6	9.99	40	30.01
75.14525	26.98	QP	168	100	V	-17.1	9.88	40	30.12
138.2940	22.88	QP	298	100	H	-12.1	10.78	43.5	32.72
200.9356	21.89	QP	187	100	V	-12.3	9.59	43.5	33.91
873.7175	18.14	QP	149	100	V	-0.7	17.44	46	28.56

For CH03

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.249/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave)		Height (cm)	Polar (H/V)			Limit (dB μV/m)	Margin (dB)
31.725950	24.45	QP	322.0	100.0	V	-10.4	14.05	40.00	25.95
57.419550	26.20	QP	278.0	100.0	V	-16.6	9.60	40.00	30.40
69.775950	28.57	QP	0.0	100.0	V	-17.0	11.57	40.00	28.43
139.259550	21.76	QP	359.0	100.0	H	-11.9	9.86	43.50	33.64
174.720200	18.43	QP	32.0	100.0	V	-12.0	6.43	43.50	37.07
540.883100	18.37	QP	168.0	100.0	V	-5.2	13.17	46.00	32.83

1GHz-25GHz:

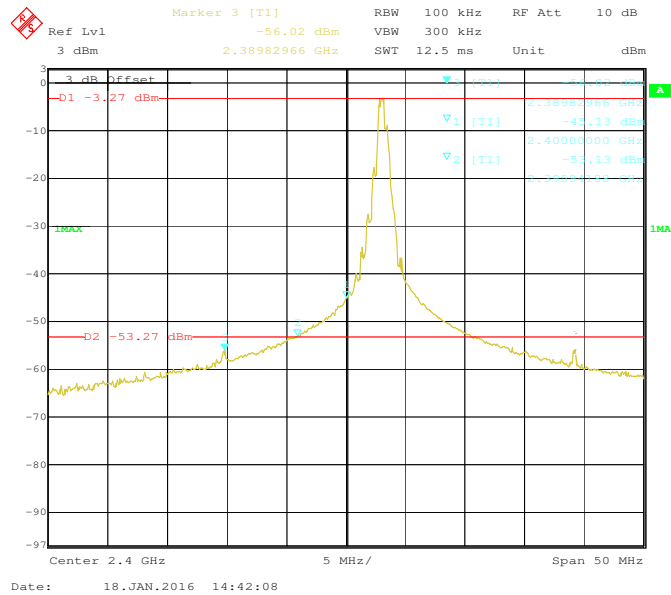
Test Mode: Transmitting (Scan with X, Y, Z axis, the worst case is X axis)

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Correcte d Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.249/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
Low Channel (2403 MHz)									
2403	91.56	PK	154	150	V	3.0	94.56	114	19.44
2403	84.21	Ave	154	150	V	3.0	87.21	94	6.79
2403	91.34	PK	189	150	H	3.0	94.34	114	19.66
2403	84.13	Ave	189	150	H	3.0	87.13	94	6.87
1267	49.99	PK	245	200	H	-2.1	47.89	74	26.11
1267	38.66	Ave	245	200	H	-2.1	36.56	54	17.44
2395	31.88	PK	88	150	H	4.1	35.98	74	38.02
2395	21.35	Ave	88	150	H	4.1	25.45	54	28.55
2400	49.34	PK	115	200	V	3.0	52.34	74	21.66
2400	35.94	Ave	115	200	V	3.0	38.94	54	15.06
4806	36.74	Ave	167	200	H	13.7	50.44	54	3.56
4806	39.75	PK	176	200	H	13.7	53.45	74	20.55
7209	19.71	Ave	351	200	H	20.5	40.21	54	13.79
7209	34.42	PK	351	200	H	20.5	54.92	74	19.08

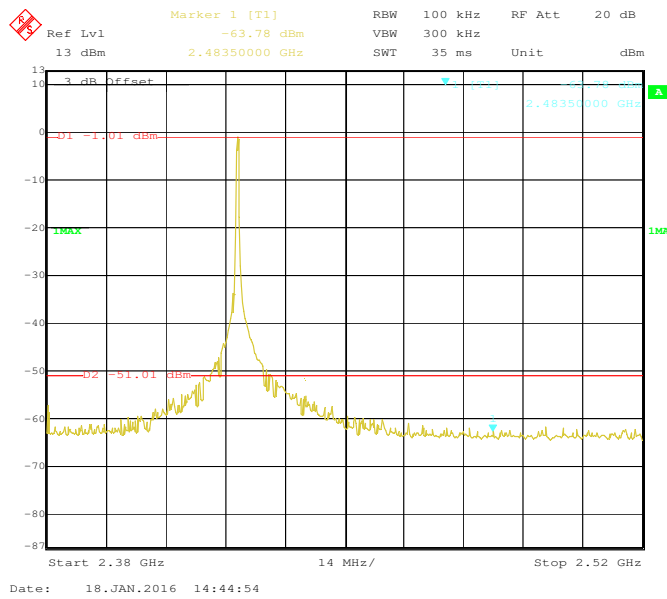
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Correcte d Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.249/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
Middle Channel (2412MHz)									
2412	91.56	PK	190	150	V	3	94.56	114	19.44
2412	84.22	Ave	190	150	V	3	87.22	94	6.78
2412	90.77	PK	145	150	H	3	93.77	114	20.23
2412	84.25	Ave	145	150	H	3	87.25	94	6.75
1270	39.11	Ave	244	200	H	-1.9	37.21	54	16.79
1270	53.03	PK	244	200	H	-1.9	51.13	74	22.87
4824	33.66	PK	200	200	H	13.9	47.56	74	26.44
4824	21.89	Ave	200	200	H	13.9	35.79	54	18.21
6690	31.67	PK	89	200	V	19.8	51.47	74	22.53
6690	17.76	Ave	89	200	V	19.8	37.56	54	16.44
7236	35.53	PK	11	200	H	20.8	56.33	74	17.67
7236	19.45	Ave	11	200	H	20.8	40.25	54	13.75
7890	27.66	PK	223	150	H	22.5	50.16	74	23.84
7890	18.84	Ave	223	150	V	22.5	41.34	54	12.66
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Correcte d Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.249/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
High Channel (2425MHz)									
2425	90.88	PK	62	150	V	3	93.88	114	20.12
2425	83.72	Ave	62	150	V	3	86.72	94	7.28
2425	90.74	PK	230	150	H	3	93.74	114	20.26
2425	83.22	Ave	230	150	H	3	86.22	94	7.78
1272	27.02	Ave	251	200	V	-1.9	25.12	54	28.88
1272	40.06	PK	251	200	V	-1.9	38.16	74	35.84
4850	26.34	Ave	183	200	H	14.1	40.44	54	13.56
4850	37.14	PK	183	200	H	14.1	51.24	74	22.76
6859	32.38	PK	57	200	V	19.8	52.18	74	21.82
6859	22.77	Ave	57	200	V	19.8	42.57	54	11.43
7275	23.44	Ave	0.0	200	H	20.8	44.24	54	9.76
7275	41.61	PK	0.0	200	H	20.8	62.41	74	11.59
7888	29.65	PK	227	200	V	22.5	52.15	74	21.85
7888	15.05	Ave	227	200	V	22.5	37.55	54	16.45

Conducted -50dB Out Of Band Emissions at Antenna Port

Left side



Right side



Note: The band emission compliant with the general radiated emission limits in § 15.209. Please refer to radiated emissions test section.

FCC §15.215(c) – 20 dB BANDWIDTH TESTING**Applicable Standard**

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-4	2016-11-3
Dressler	Attenuator	ATT 6/75	510020010004	2015-11-12	2016-11-12

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	25.6°C
Relative Humidity:	51 %
ATM Pressure:	101.2kPa

* The testing was performed by Matt Yao on 2016-1-19.

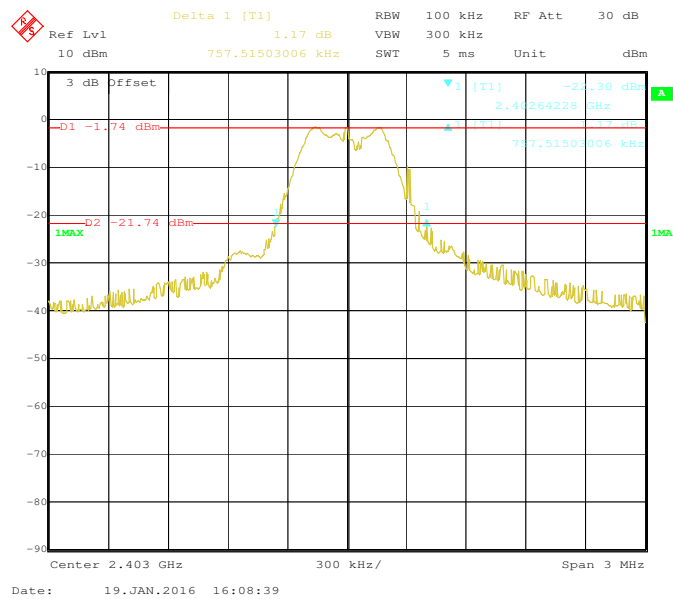
Test Result: Compliant.

Please refer to following tables and plots

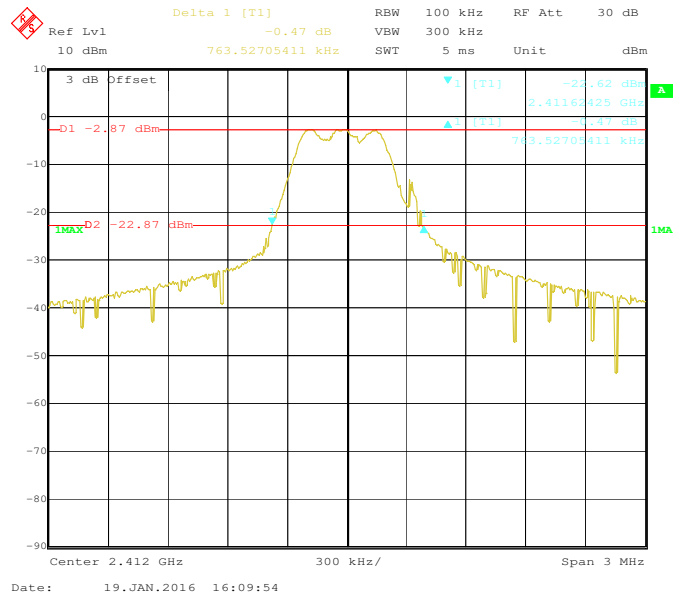
Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2403	0.76
Middle	2412	0.76
High	2425	0.79

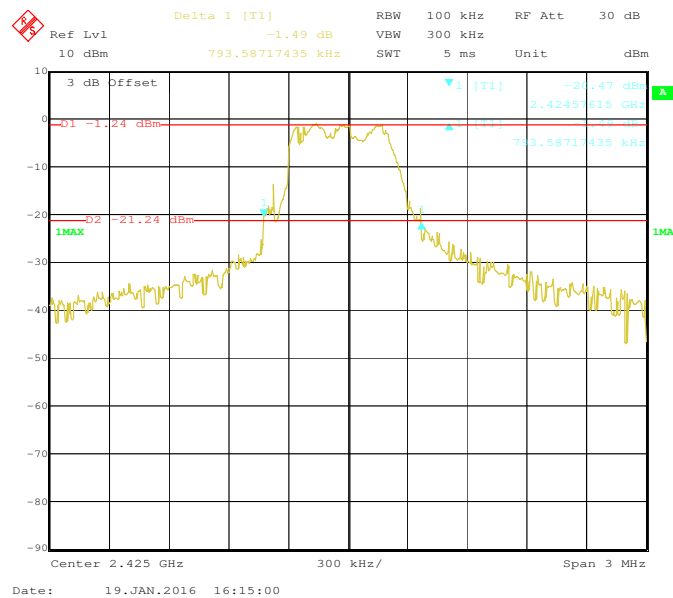
Low Channel



Middle Channel



High Channel



DECLARATION

DECLARATION

Date:2016-1-14

To:
Bay Area Compliance Laboratories Corp. (Kunshan)
No.248 Chenghu Road Kunshan,Jiangsu,China
<http://www.baclcorp.com>

Dear Sir or Madam:

We, (company name: HHC Changzhou Corp.) hereby declare that product: Remote Control, model: CH05B, serial model:CH03, which has been tested by BACL.

CH05B and CH03 have same RF module. The different is the quantity of button. CH03 has 3 buttons. CH05B has 5 buttons ,so the PCB layout have some changes ,but not affect RF performance ,we clarify that both CH05B and CH03 ,the duty cycle of RF signal is the same ,when press any button ,the transmitted spectrum is the same ,they do not affect RF spectrum.

Please contact me if there is need for any additional clarification or information.
Best Regards

Signature:
Printed name: Jack Chen *Jack Chen*
Title: Projenager

***** END OF REPORT *****