

FCC TEST REPORT

For

SHENZHEN GOODHEALTH MOTOR MANUF. CO., LTD.

Wireless Remote Controller

Model No.: HK-S-33

Prepared For : SHENZHEN GOODHEALTH MOTOR MANUF. CO., LTD.

Address : A5 Building, The 3rd Industrial Zone Yanchuan, Songgang Town,
Shenzhen City, 518105, China

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited

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Report Number : R0217050084W1

Date of Test : May 25~May 31, 2017

Date of Report : May 31, 2017

Contents

1. General Information.....	4
1.1. Client Information.....	4
1.2. Description of Device (EUT).....	4
1.3. Auxiliary Equipment Used During Test.....	4
1.4. Description of Test Modes.....	5
1.5. List of Channels.....	5
1.6. Description of Test Setup.....	6
1.7. Test Equipment List.....	7
1.8. Measurement Uncertainty.....	7
1.9. Description of Test Facility.....	8
2. Summary of Test Results.....	9
3. Radiation Spurious Emission and Band Edge.....	10
3.1. Test Standard and Limit.....	10
3.2. Test Setup.....	11
3.3. Test Procedure.....	12
3.4. Test Data.....	12
4. 20dB Bandwidth Test.....	17
4.1. Test Standard and Limit.....	17
4.2. Test Setup.....	17
4.3. Test Procedure.....	17
4.4. Test Data.....	17
5. Antenna Requirement.....	19
5.1. Test Standard and Requirement.....	19
5.2. Antenna Connected Construction.....	19
APPENDIX I -- TEST SETUP PHOTOGRAPH.....	20
APPENDIX II -- EXTERNAL PHOTOGRAPH.....	21
APPENDIX III -- INTERNAL PHOTOGRAPH.....	24

TEST REPORT

Applicant : SHENZHEN GOODHEALTH MOTOR MANUF. CO., LTD.
Manufacturer : SHENZHEN GOODHEALTH MOTOR MANUF. CO., LTD.
Product Name : Wireless Remote Controller
Model No. : HK-S-33
Trade Mark : N/A
Rating(s) : DC 4.5V by "AAA" Battery*3

Test Standard(s) : FCC Part15 Subpart C, Paragraph 15.249

Test Method(s) : ANSI C63.10: 2013

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : May 25~May 31, 2017

Prepared by :



Winkey Wang

(Tested Engineer / Winkey Wang)

Reviewer :

Amy Ding

(Project Manager / Amy Ding)

Approved & Authorized Signer :

Tom Chen

(Manager / Tom Chen)

1. General Information

1.1. Client Information

Applicant	:	SHENZHEN GOODHEALTH MOTOR MANUF. CO., LTD.
Address	:	A5 Building, The 3rd Industrial Zone Yanchuan, Songgang Town, Shenzhen City, 518105, China
Manufacturer	:	SHENZHEN GOODHEALTH MOTOR MANUF. CO., LTD.
Address	:	A5 Building, The 3rd Industrial Zone Yanchuan, Songgang Town, Shenzhen City, 518105, China

1.2. Description of Device (EUT)

Product Name	:	Wireless Remote Controller	
Model No.	:	HK-S-33	
Trade Mark	:	N/A	
Test Power Supply	:	DC 4.5V by “AAA” Battery*3	
Product Description	:	Operation Frequency 1:	2434MHz
		Number of Channel:	1 Channels
		Modulation Type:	FSK
		Antenna Type:	PCB Antenna
		Antenna Gain(Peak):	1.5 dBi
		Operation Frequency 2:	8MHz
		Number of Channel:	1 Channels
		Modulation Type:	FSK
		Antenna Type:	loop Antenna
		Antenna Gain(Peak):	-0.5 dBi
Remark: 1)For a more detailed features description, please refer to the manufacturer’s specifications or the User’s Manual. 2) This test report test for Operation Frequency 1 : 2434MHz			

1.3. Auxiliary Equipment Used During Test

N/A	
-----	--

1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	TX Mode

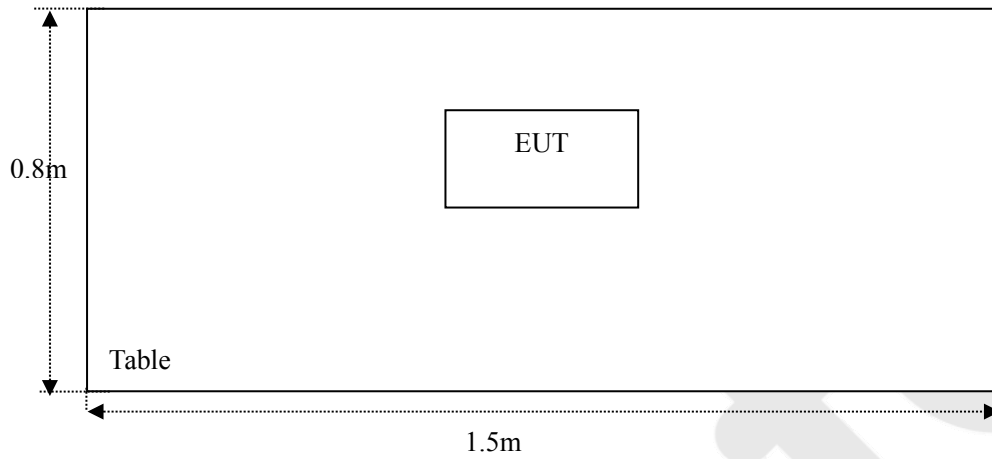
For Radiated Emission	
Final Test Mode	Description
Mode 1	TX Mode

1.5. List of Channels

Channel	Frequency
01	2434 MHz

1.6. Description of Test Setup

RE



1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Two-Line V-network	Rohde & Schwarz	ENV216	100055	Jul. 19, 2016	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Jun. 17, 2016	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Jun. 17, 2016	1 Year
4.	Spectrum Analysis	Agilent	E4407B	US39390582	Jul. 12, 2016	1 Year
5.	Preamplifier	Instruments corporation	EMC011830	980100	Jun. 17, 2016	1 Year
6.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Jun. 17, 2016	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	May 06, 2017	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	May 06, 2017	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519	012	May 11, 2017	1 Year
10.	Pre-amplifier	SONOMA	310N	186860	Jun. 17, 2016	1 Year
11.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
12.	Power Sensor	Agilent	KFSW150502	15I00041SN045	Jun. 17, 2016	1 Year
13.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Jun. 17, 2016	1 Year
14.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Jun. 17, 2016	1 Year
15.	Signal Generator	Agilent	E4421B	MY41000743	Jun. 17, 2016	1 Year
16.	DC Power supply	IV	IV-8080	YQSB0096	Jun. 17, 2016	1 Year
17.	TEMP&HUMI PROGRAMMABLE CHAMBER	Bell Group	BE-THK-150 M8	SE-0137	Jun. 17, 2016	1 Year

1.8. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.1 dB (Horizontal)
		Ur = 4.3 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4dB

1.9. Description of Test Facility

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

FCC-Registration No.: 752021

Shenzhen Anbotek Compliance Laboratory Limited, 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 our files. Registration 752021, July 06, 2016.

IC-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A, June 13, 2016.

Test Location

All Emissions tests were performed at

Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

2. Summary of Test Results

Standard Section	Test Item	Result
15.203	Antenna Requirement	PASS
15.207	Conducted Emission	N/A
15.249	Spurious Emission	PASS
15.215(c)	20dB Bandwidth	PASS
15.249(c)	Band Edge	PASS
Remark: "N/A" is an abbreviation for Not Applicable.		

3. Radiation Spurious Emission and Band Edge

3.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.209 and 15.205				
Test Limit	Frequency (MHz)	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~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	74.0	Peak	3

Remark:

- (1)The lower limit shall apply at the transition frequency.
- (2) 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.

Test Standard	FCC Part15 C Section 15.249					
Test Limit	Frequency (MHz)	Field Strength of fundamental ((millivolts /meter)	Field Strength of Harmonics (microvolts/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	2400~2483.5	50	-	114.0	Peak	3
	2400~2483.5	50	-	94.0	Average	3
	2400~2483.5	-	500	74.0	Peak	3
	2400~2483.5	-	500	54.0	Average	3

Remark:

- (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.

3.2. Test Setup

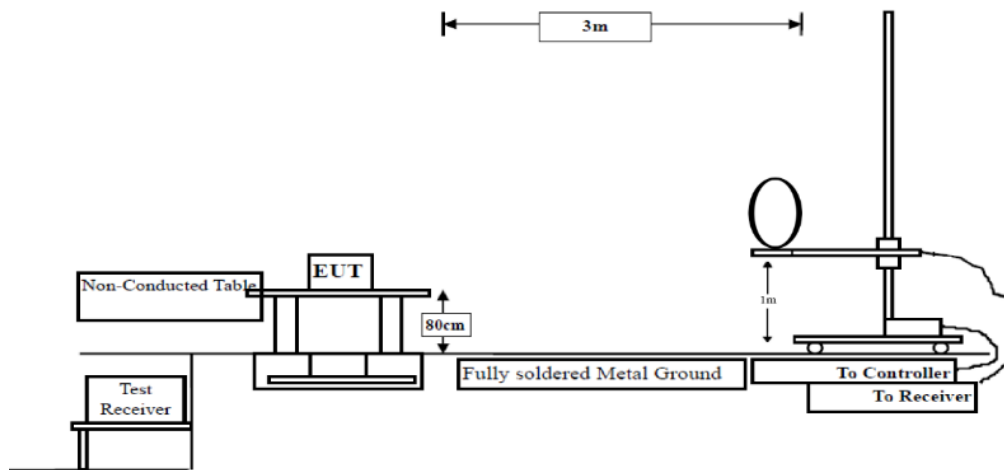


Figure 1. Below 30MHz

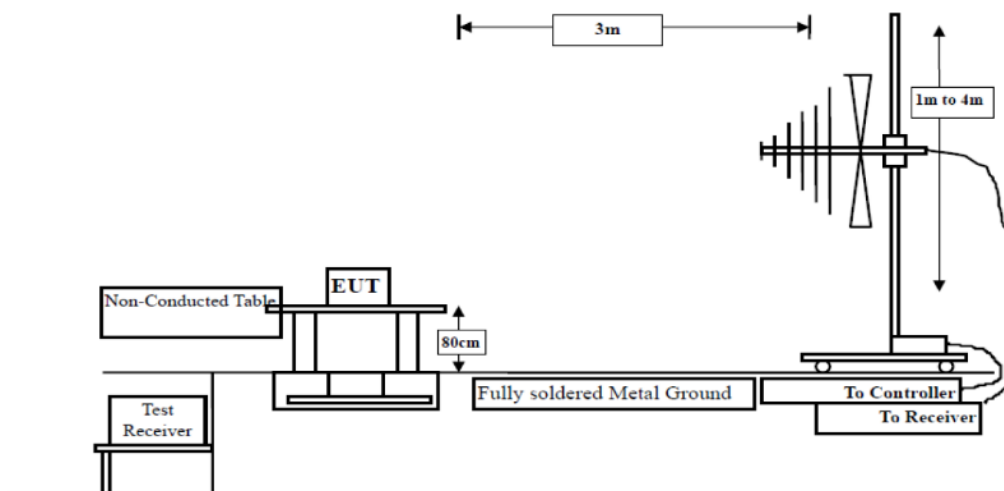


Figure 2. 30MHz to 1GHz

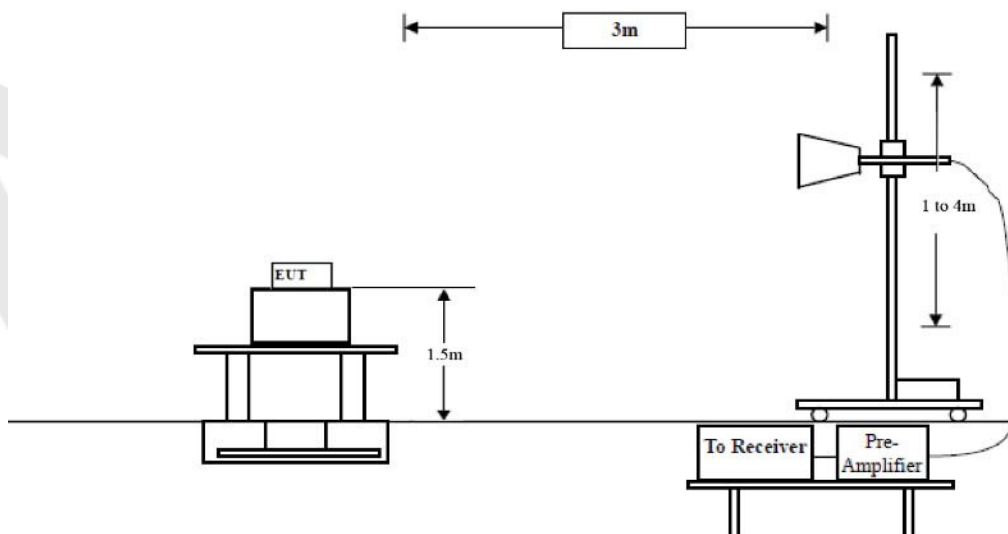


Figure 3. Above 1 GHz

3.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.

For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

For 9kHz to 150kHz, Set the spectrum analyzer as:

RBW = 200Hz, VBW =1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:

RBW = 9KHz, VBW =30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:

RBW = 100kHz, VBW =300kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For above 1GHz,Set the spectrum analyzer as:

RBW =1MHz, VBW =10Hz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.

3.4. Test Data

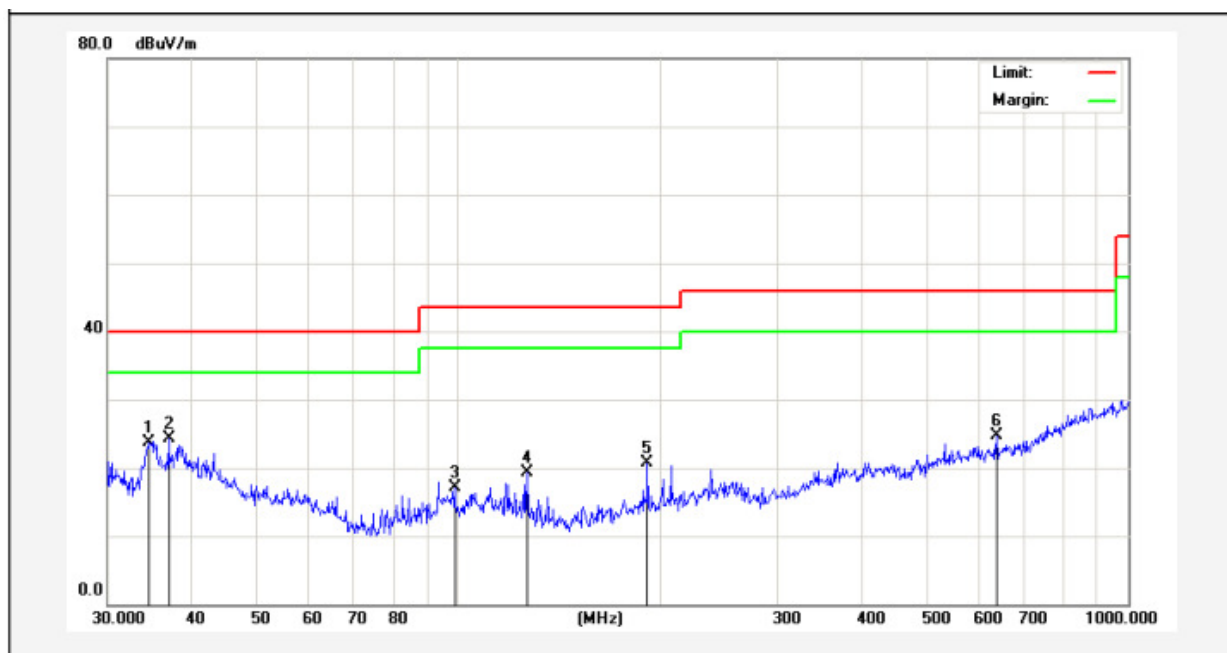
PASS

During the test, Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the X-axis is the worst case.

The test results of 9kHz-30MHz and above 18000MHz are attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Test Results (30~1000MHz)

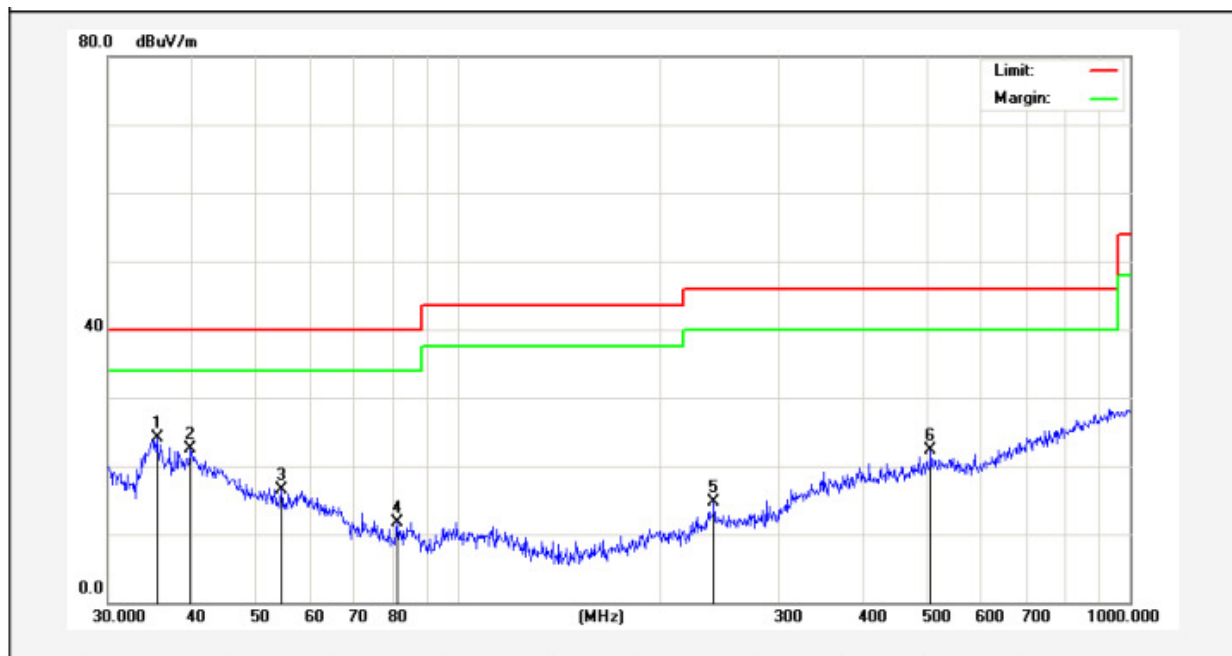
Job No.: 0217050084W Temp.(°C)/Hum.(%RH): 24.3°C/55%RH
Standard: FCC PART 15C Power Source: DC 4.5V
Test Mode: TX mode Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	34.6385	38.13	-14.49	23.64	40.00	-16.36	peak			
2	37.0248	36.95	-12.70	24.25	40.00	-15.75	peak			
3	98.8326	37.97	-20.82	17.15	43.50	-26.35	peak			
4	126.7723	41.57	-22.34	19.23	43.50	-24.27	peak			
5	191.7450	41.59	-20.92	20.67	43.50	-22.83	peak			
6	636.1340	34.99	-10.24	24.75	46.00	-21.25	peak			

Test Results (30~1000MHz)

Job No.: 0217050084W Temp.(°C)/Hum.(%RH): 24.3°C/55%RH
Standard: FCC PART 15C Power Source: DC 4.5V
Test Mode: TX mode Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	35.4993	37.96	-13.90	24.06	40.00	-15.94	peak			
2	39.8542	33.05	-10.49	22.56	40.00	-17.44	peak			
3	54.4516	31.41	-14.88	16.53	40.00	-23.47	peak			
4	80.9275	31.35	-19.68	11.67	40.00	-28.33	peak			
5	239.9874	28.76	-14.09	14.67	46.00	-31.33	peak			
6	504.7062	33.09	-10.86	22.23	46.00	-23.77	peak			

Test Results (Above 1000MHz)

Horizontal CH Low (2434MHz)								
Frequency	Reading	Ant Factor	Cable Loss	Amplifier	Level	Limit	Over Limit	Remark
MHz	dB	(dBuV/m)	(dB)	(dB)	dBμV/m	dBμV/m	dB	
2434.00	85.78	31.21	2.17	35.30	83.86	114.00	-30.14	Peak
2434.00	78.92	31.21	2.17	35.30	77.00	94.00	-17.00	AV
4868.00	34.52	34.25	6.75	34.27	41.25	74.00	-32.75	Peak
4868.00	33.33	34.25	6.75	34.27	40.06	54.00	-13.94	AV
7302.00	41.69	38.26	7.91	34.66	53.20	74.00	-20.80	Peak
7302.00	29.09	38.26	7.91	34.66	40.60	54.00	-13.40	AV
9736.00	---	---	---	---	---	---	---	---
9736.00	---	---	---	---	---	---	---	---
12170.00	---	---	---	---	---	---	---	---
12170.00	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---

Vertical CH Low (2434MHz)								
Frequency	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
MHz	dB	dB/m	dB	dBμV	dBμV/m	dBμV/m	dB	
2434.00	91.05	31.21	2.17	35.30	89.13	114.00	-24.87	Peak
2434.00	79.87	31.21	2.17	35.30	77.95	94.00	-16.05	AV
4868.00	46.56	34.25	6.75	34.27	53.29	74.00	-20.71	Peak
4868.00	33.61	34.25	6.75	34.27	40.34	54.00	-13.66	AV
7302.00	44.01	38.26	7.91	34.66	55.52	74.00	-18.48	Peak
7302.00	31.09	38.26	7.91	34.66	42.60	54.00	-11.40	AV
9736.00	---	---	---	---	---	---	---	---
9736.00	---	---	---	---	---	---	---	---
12170.00	---	---	---	---	---	---	---	---
12170.00	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---

NOTE: “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

The results of different modulations are the same.

Radiated Band Edge:

Test Mode:					Test channel: Lowest				
Peak Value									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Det.
2400.00	54.31	29.16	3.43	34.01	52.89	74.00	-21.11	H	PK
2400.00	42.19	29.16	3.43	34.01	40.77	54.00	-13.23	H	AV
2483.50	51.65	29.28	3.53	34.03	50.43	74.00	-23.57	H	PK
2483.50	36.69	29.28	3.53	34.03	35.47	54.00	-18.53	H	AV
2400.00	57.13	29.16	3.43	34.01	55.71	74.00	-18.29	V	PK
2400.00	42.97	29.16	3.43	34.01	41.55	54.00	-12.45	V	AV
2483.50	52.78	29.28	3.53	34.03	51.56	74.00	-22.44	V	PK
2483.50	37.18	29.28	3.53	34.03	35.96	54.00	-18.04	V	AV

Remark:

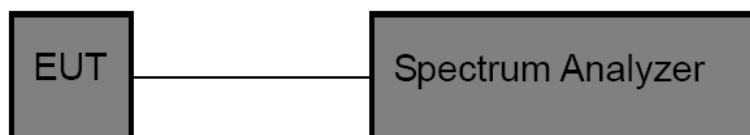
1. Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

4. 20dB Bandwidth Test

4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.249
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4.2. Test Setup



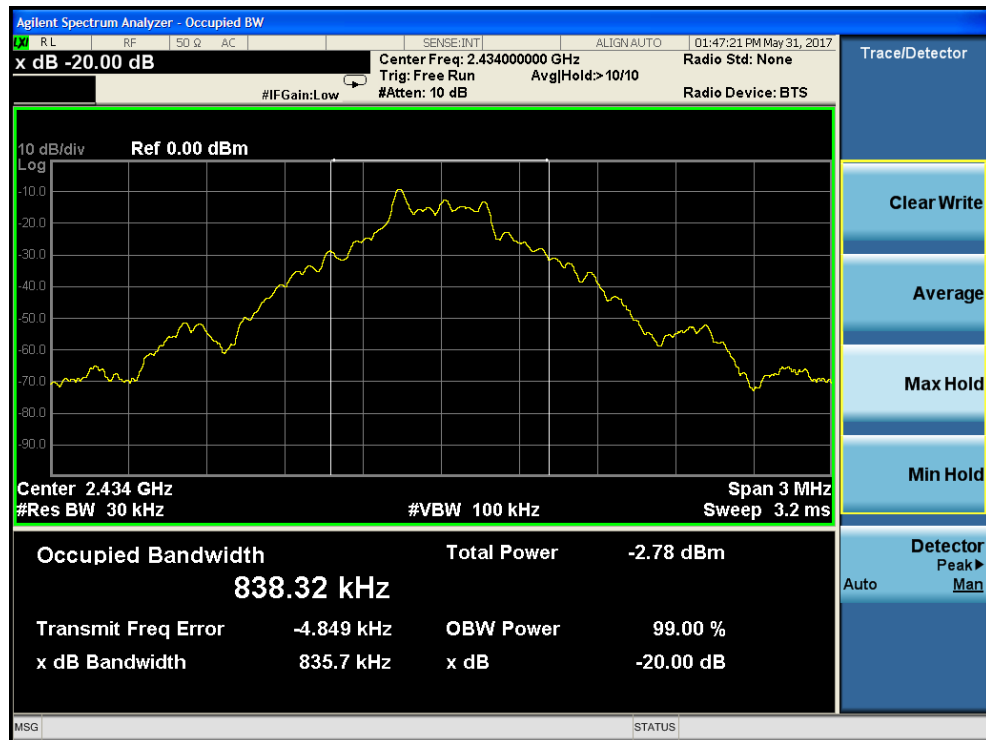
4.3. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:
RBW = 30kHz, VBW $\geq$ 3*RBW (100kHz)
Detector= Peak
Trace mode= Max hold.
Sweep- auto couple.
4. Mark the peak frequency and -20dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

4.4. Test Data

Test Item	: 20dB Bandwidth	Test Mode	: TX Mode
Test Voltage	: DC 4.5V	Temperature	: 24℃
Test Result	: PASS	Humidity	: 55%RH

Frequency (MHz)	Bandwidth (kHz)	Result
2434MHZ	835.7	PASS



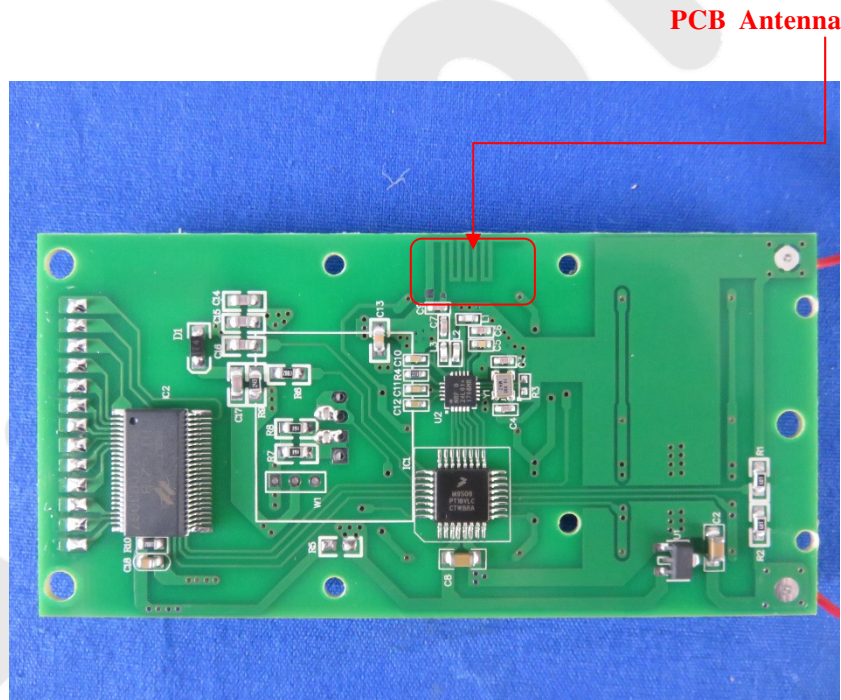
5. Antenna Requirement

5.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203
Requirement	1) 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.

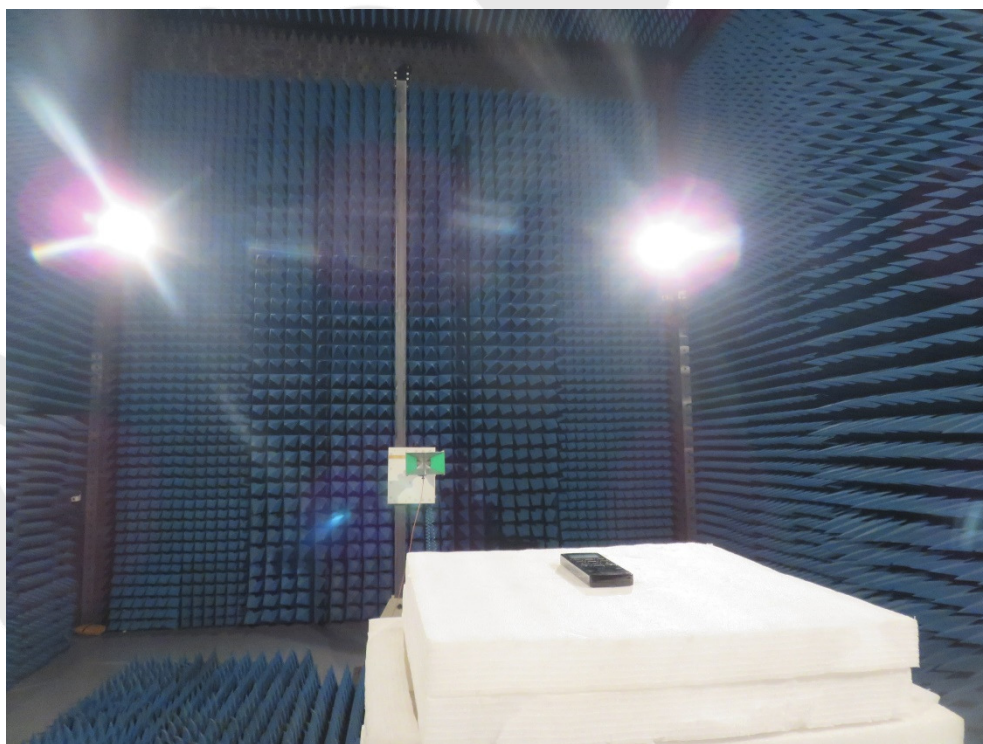
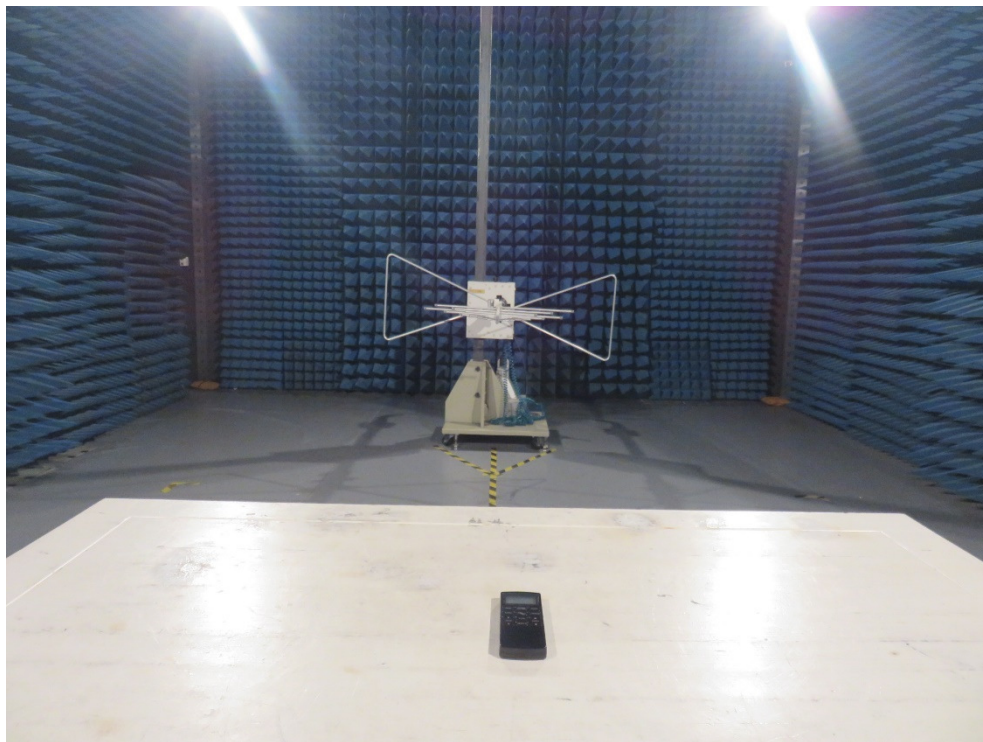
5.2. Antenna Connected Construction

The antenna is a PCB antenna which permanently attached, and the best case gain of the antenna is 1.5dBi. It complies with the standard requirement.



APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Radiation Emission Test



APPENDIX II -- EXTERNAL PHOTOGRAPH







APPENDIX III -- INTERNAL PHOTOGRAPH

