

FCC TEST REPORT

For

Wahoo Fitness LLC

RPM

Model No.: WFPODCAD2

Prepared For : Wahoo Fitness LLC
Address : 90 W. Wieuca Road #110 Atlanta, GA 30342, United States

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited
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Report Number : R0117020607W1
Date of Test : Feb. 21~Mar. 23, 2017
Date of Report : Mar. 23, 2017

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TEST REPORT

Applicant : Wahoo Fitness LLC
Manufacturer : Flextronics Electronics Technology (Suzhou) Co., Ltd.
EUT : RPM
Model No. : WFPODCAD2
Serial No. : N.A.
Trade Mark : DC 3.0V Battery*1 "CR2032"
Rating : Flextronics Electronics Technology (Suzhou) Co., Ltd.

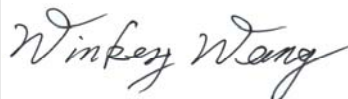
Measurement Procedure Used:

FCC Part15 Subpart C, Paragraph 15.207, 15.249 & 15.209

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 : Feb. 21~Mar. 23, 2017



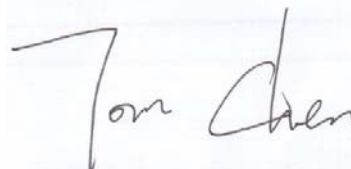
Prepared by :

(Tested Engineer / Winkey Wang)



Reviewer :

(Project Manager / Brown Lu)



Approved & Authorized Signer :

(Manager / Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	: RPM
Model Number	: WFPODCAD2
Test Power Supply	: DC 3V
Frequency	: BT: 2402~2480MHz ANT+: 2457MHz
Modulation	: BT: GFSK ANT+: GFSK
Channel Spacing	: BT: 2MHz ANT+: 1MHz
Number of Channels	: BT: 40 ANT+: 1
Antenna Type	: Ceramic Chip Antenna (BT & ANT+)
Antenna Gain	: 3.19 dBi (BT & ANT+)
Applicant Address	: Wahoo Fitness LLC 90 W. Wieuca Road #110 Atlanta, GA 30342, United States
Manufacturer Address	: Flextronics Electronics Technology (Suzhou) Co., Ltd. No.268 Suhong Road, Suzhou Industrial Park, Suzhou City, Jiangsu Province, China
Date of receipt	: Feb. 21, 2017
Date of Test	: Feb. 21~Mar. 23, 2017
Note	: This report is for ANT+ module.

1.2. Auxiliary Equipment Used during Test

N/A

1.3. 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

1.4. Measurement Uncertainty

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

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC Part 15, Paragraph 15.249.

2.1. Summary of Test Results

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Notes
§15.207 (a)	Conducted Emission	-	N/A
§15.205	Restricted Band of Operation	PASS	Complies
§15.209 §15.249(a)	Radiated Emission	PASS	Complies
§15.215(c)	20dB Bandwidth Test	PASS	Complies
§15.203	Antenna Requirement	PASS	Complies

Note: This product is low voltage products. It is using the battery as a power source.

2.2. Description of Test Modes

The EUT has been tested under operating condition.

Manual control the EUT for staying in continuous transmitting mode.

3. Test Procedure

GENERAL: This report shall NOT be reproduced except in full without the written approval of Shenzhen Anbotek Compliance Laboratory Limited. The EUT was transmitting a test signal during the testing.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.10-2013 using a spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the EUT was 74.3oF with a humidity of 69%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz) METER READING + ACF = FS
20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

ANSI STANDARD C63.10-2013 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

4. Radiation Interference

4.1. Requirements (15.249, 15.209):

FIELD STRENGTH of Fundamental: 902-928 MHz 2.4-2.4835 GHz 94 dB μ V/m @3m	FIELD STRENGTH of Harmonics 54 dB μ V/m @3m	S15.209 30 - 88 MHz 88 - 216 MHz 216 - 960 MHz ABOVE 960 MHz	40 dB μ V/m @3M 43.5 46 54dB μ V/m
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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.

4.2. Test Procedure

For below 1GHz, the EUT is placed on a turn table which is 0.8 meter high above the ground. For above 1GHz, the EUT is placed on a turn table which is 1.5 meter high above the ground. 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. Both horizontal and vertical polarization of the antenna are set on test.

All readings from 30MHz to 1GHz are quasi-peak values with a resolution bandwidth of 120kHz. All reading are above 1GHz, peak & average values with a resolution bandwidth of 1MHz. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation. The test results are listed in Section 4.3.

4.3 Test Equipment

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, 2016	1 Year
8	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	May 06, 2016	1 Year
9	Loop Antenna	Schwarzbeck	FMZB 1519	012	May 11, 2016	1 Year
10	Pre-amplifier	SONOMA	310N	186860	Jun. 17, 2016	1 Year
11	EMI Test	SHURPLE	N/A	N/A	N/A	N/A

	Software EZ-EMC					
12	Power Sensor	Agilent	KFSW150 502	15I00041SN0 45	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 PROGRAMMAB LE CHAMBER	Bell Group	BE-THK-1 50M8	SE-0137	Jun. 17, 2016	1 Year

4.4. Test Results

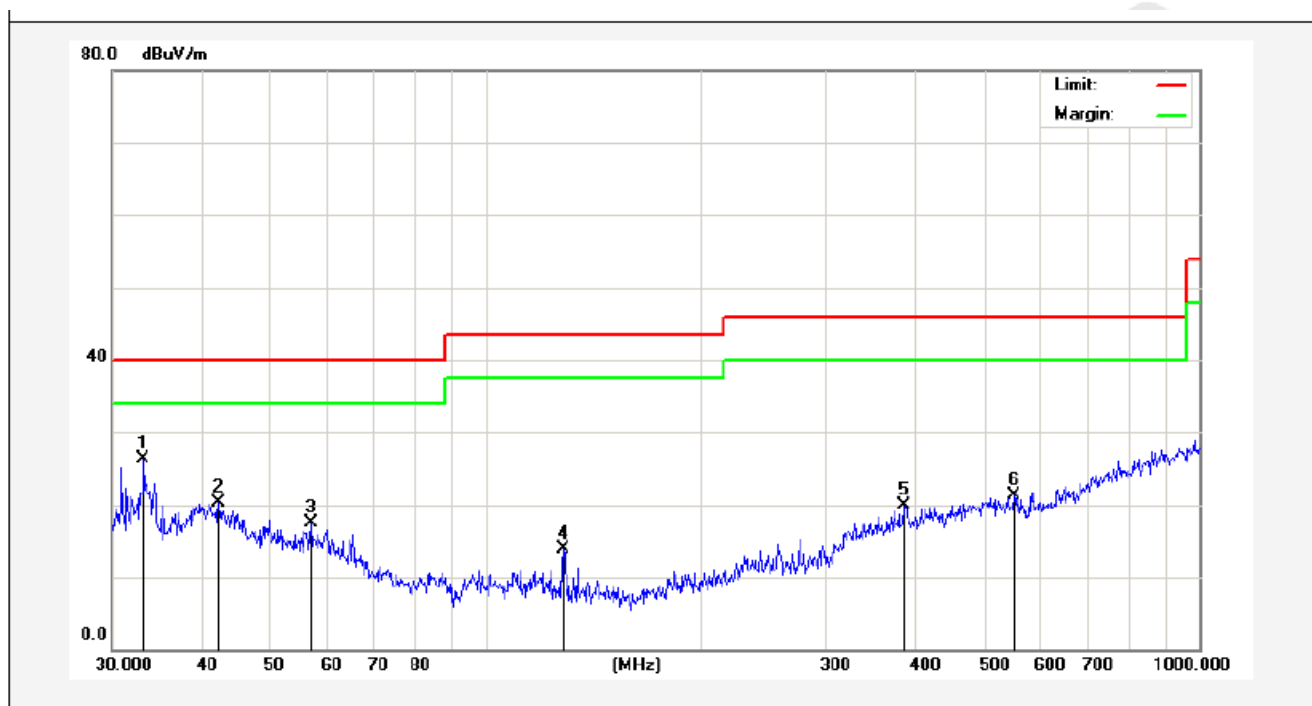
PASS.

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.

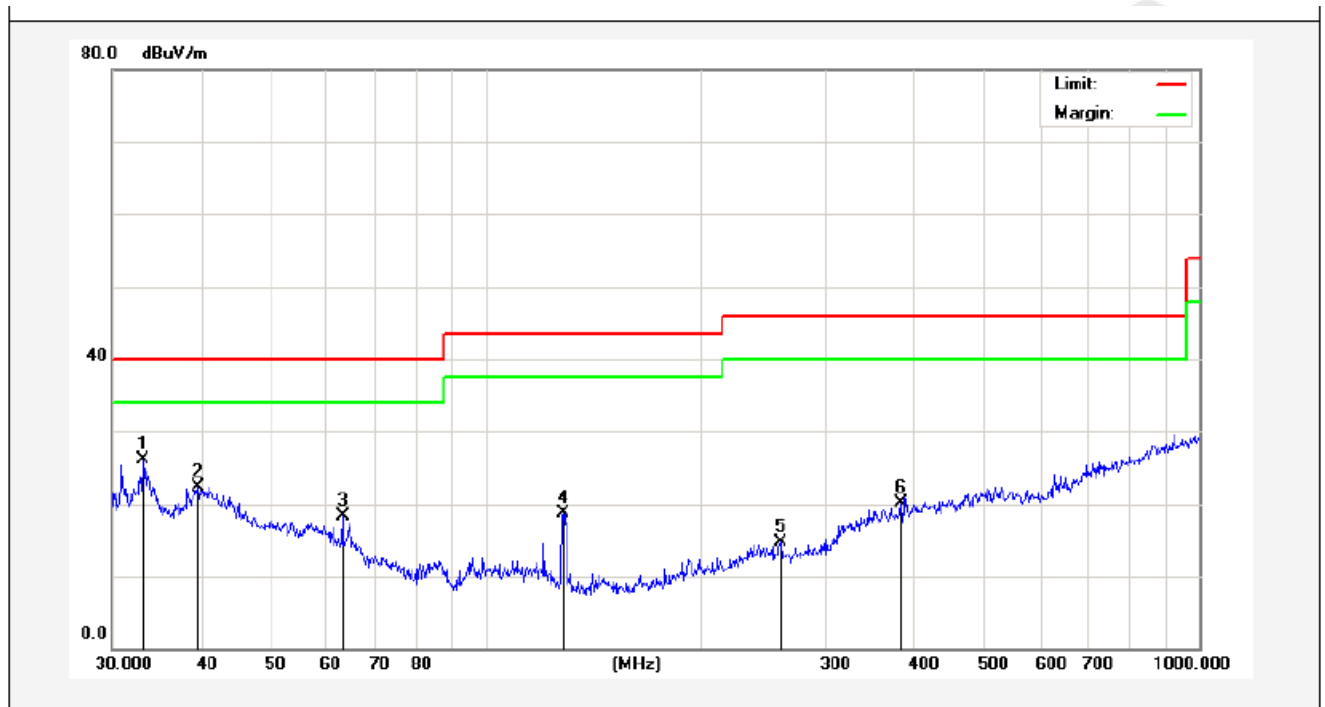
Below 1GHz:

Job No.:	0117020607W	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 3V
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Mode:	TX mode	Distance:	3m
Note:	30-1000MHz		



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	33.2112	41.56	-15.24	26.32	40.00	-13.68	peak			
2	42.3022	31.56	-11.27	20.29	40.00	-19.71	peak			
3	56.9912	32.67	-15.11	17.56	40.00	-22.44	peak			
4	128.5630	36.46	-22.60	13.86	43.50	-29.64	peak			
5	386.6338	33.13	-13.14	19.99	46.00	-26.01	peak			
6	550.9480	32.32	-11.10	21.22	46.00	-24.78	peak			

Job No.:	0117020607W	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 3V
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Mode:	TX mode	Distance:	3m
Note:	30-1000MHz		



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	33.2111	41.32	-15.24	26.08	40.00	-13.92	peak			
2	39.5756	33.08	-10.70	22.38	40.00	-17.62	peak			
3	63.0915	34.91	-16.67	18.24	40.00	-21.76	peak			
4	128.5629	36.35	-17.60	18.75	43.50	-24.75	peak			
5	259.2337	28.70	-14.00	14.70	46.00	-31.30	peak			
6	382.5878	32.26	-12.21	20.05	46.00	-25.95	peak			

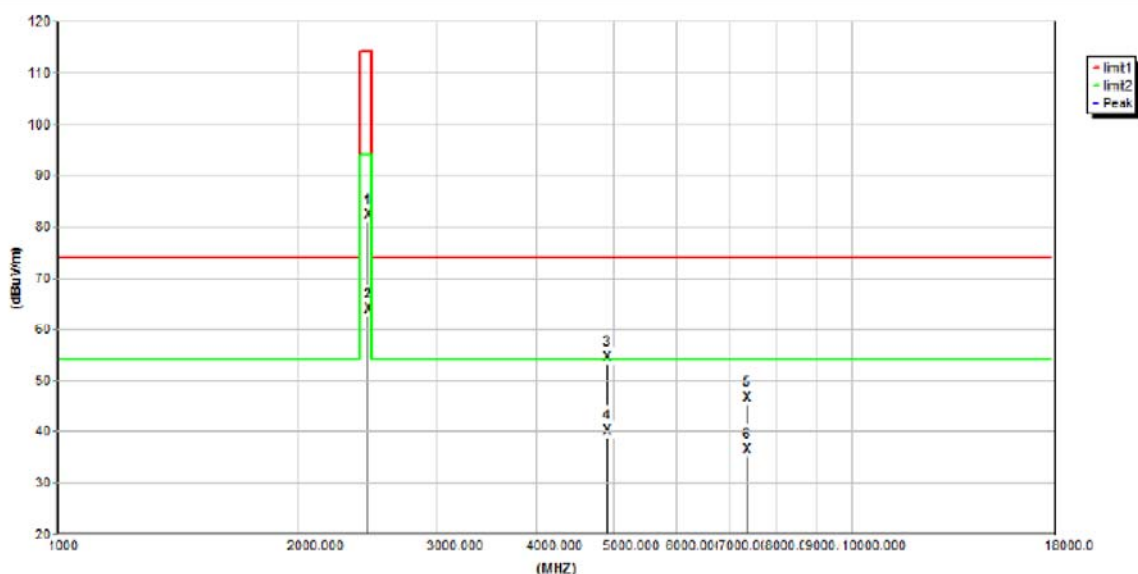
Above 1 GHz:

Job No.:	0117020607W	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C_3m	Power Source:	DC 3V
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Mode:	TX Mode	Distance:	3m
Note:	Above 1000MHz		



No.	Freq. (MHz)	Reading (dBuV)	Antenna Factor	Cable Loss (dB)	Amp. (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
1	2457.0000	78.78	31.21	3.56	29.30	84.25	114.00	-29.75	Peak
2	2457.0000	62.36	31.21	3.56	29.30	67.83	94.00	-26.17	AVG
3	4914.0000	50.71	34.01	6.68	34.14	57.26	74.00	-16.74	Peak
4	4914.0000	34.57	34.01	6.68	34.14	41.12	54.00	-12.88	AVG
5	7371.0000	39.04	36.16	7.75	34.48	48.47	74.00	-25.53	Peak
6	7371.0000	27.09	36.16	7.75	34.48	36.52	54.00	-17.48	AVG

Job No.: 0117020607W Polarization: Vertical
Standard: (RE)FCC PART15 C _3m Power Source: DC 3V
Test item: Radiation Test Temp.(C)/Hum.(%RH): 24.3(C)/55%RH
Mode: TX Mode Distance: 3m
Note: Above 1000MHz



No.	Freq. (MHz)	Reading (dBuV)	Antenna Factor	Cable Loss (dB)	Amp. (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
1	2457.0000	76.67	31.21	3.56	29.30	82.14	114.00	-31.86	Peak
2	2457.0000	58.32	31.21	3.56	29.30	63.79	94.00	-30.21	AVG
3	4914.0000	47.88	34.01	6.68	34.14	54.43	74.00	-19.57	Peak
4	4914.0000	33.60	34.01	6.68	34.14	40.15	54.00	-13.85	AVG
5	7371.0000	37.03	36.16	7.75	34.48	46.46	74.00	-27.54	Peak
6	7371.0000	26.18	36.16	7.75	34.48	35.61	54.00	-18.39	AVG

5. Bandedge

5.1. Requirements (15.249):

The field strength of any emissions appearing outside the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 50 dB below the level of the carrier or to the general limits of 15.249.

5.2. Test Procedure

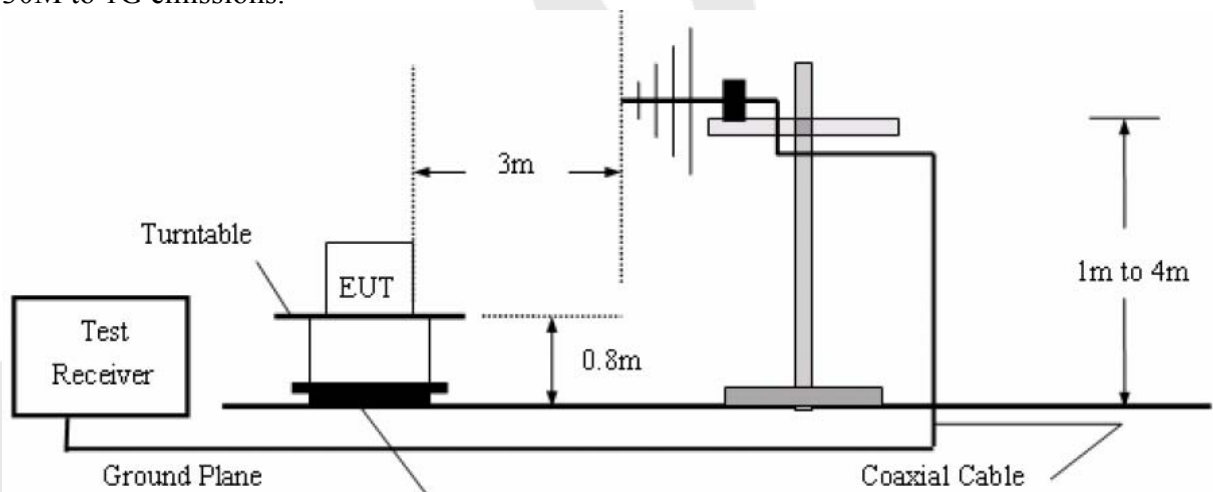
The EUT is placed on a turn table which is 1.5 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test. The device is evaluated in xyz orientation.

Test Equipment

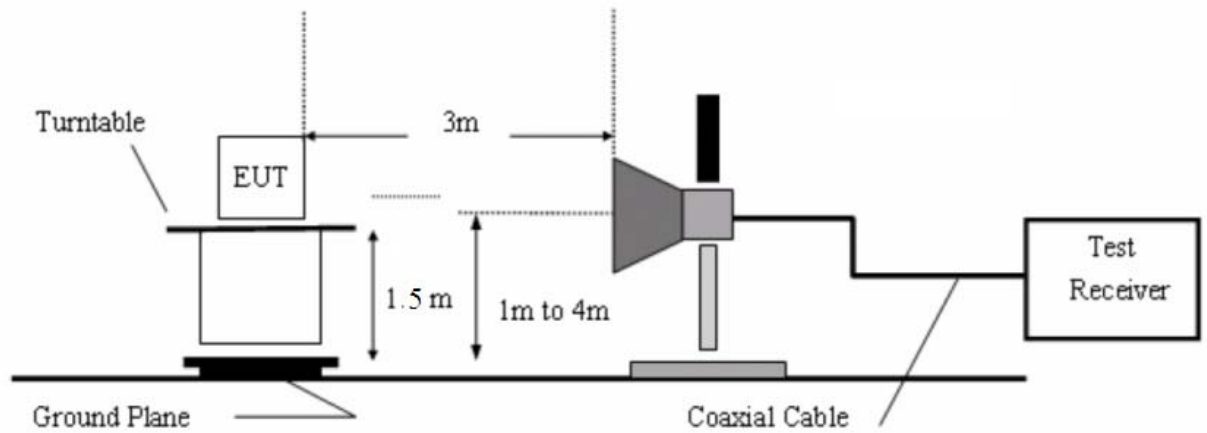
Same as the equipment listed in 5.3.

5.3. Test Configuration:

30M to 1G emissions:



1G to 40G emissions:

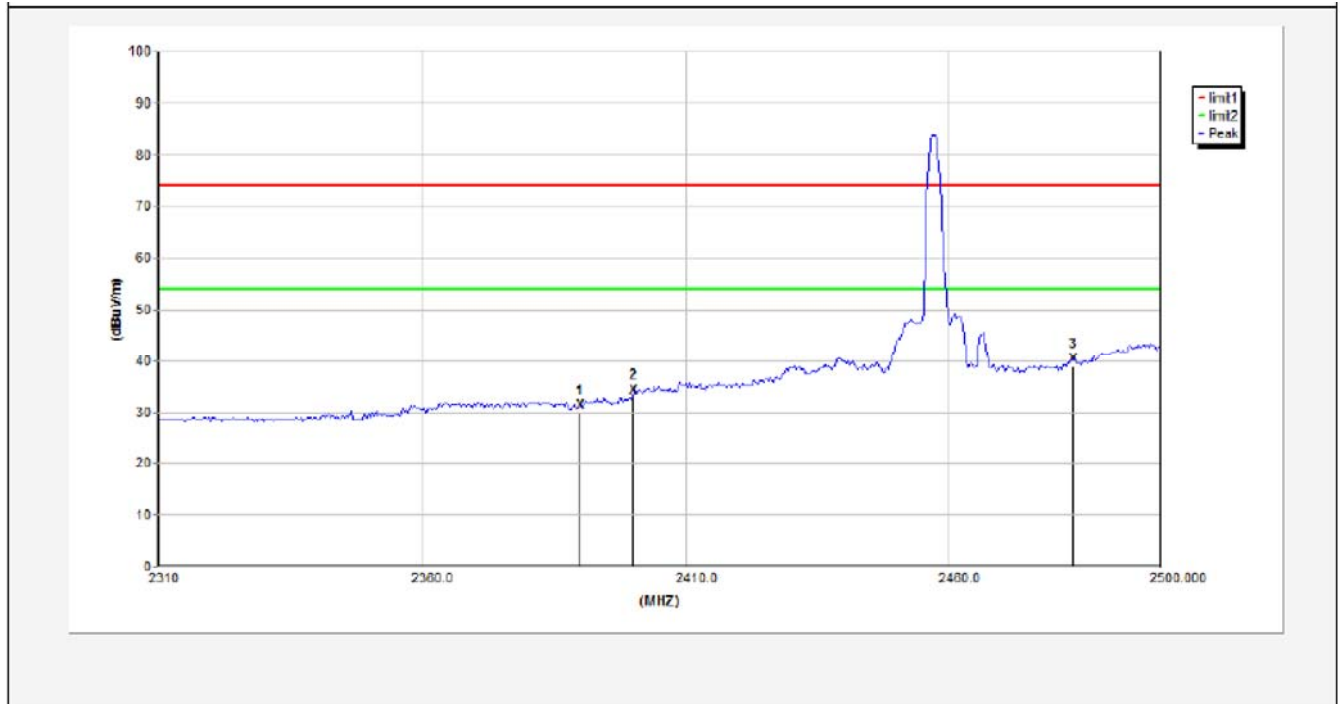


5.4. Test Results

Pass.

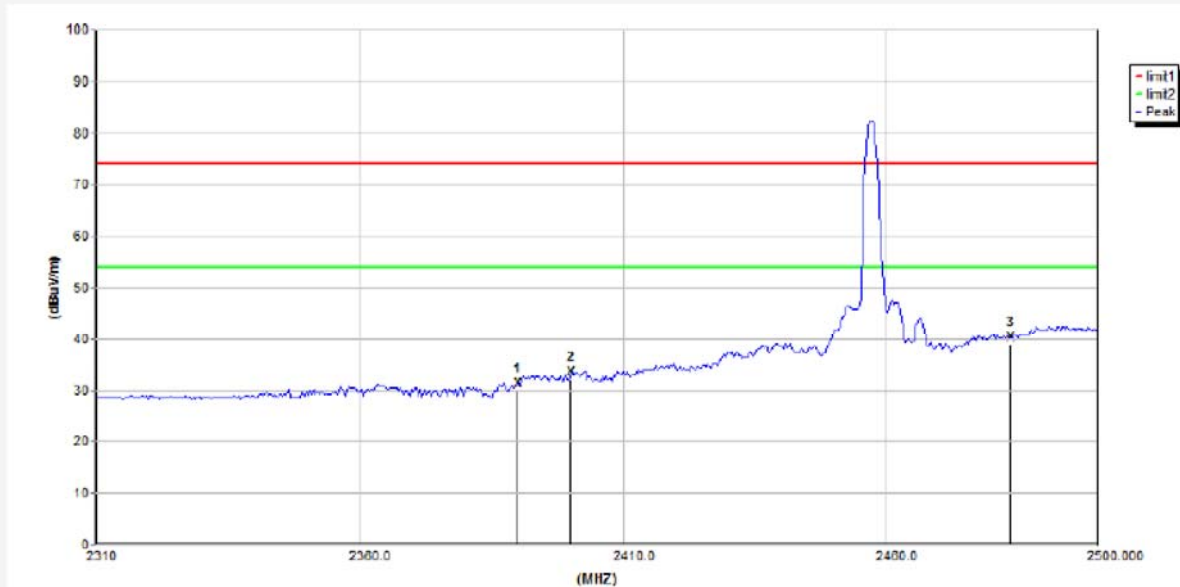
Please refer the following plot. Only the worst case (x orientation).

Job No.:	0117020607W	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 3V
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	PEAK	Distance:	3m



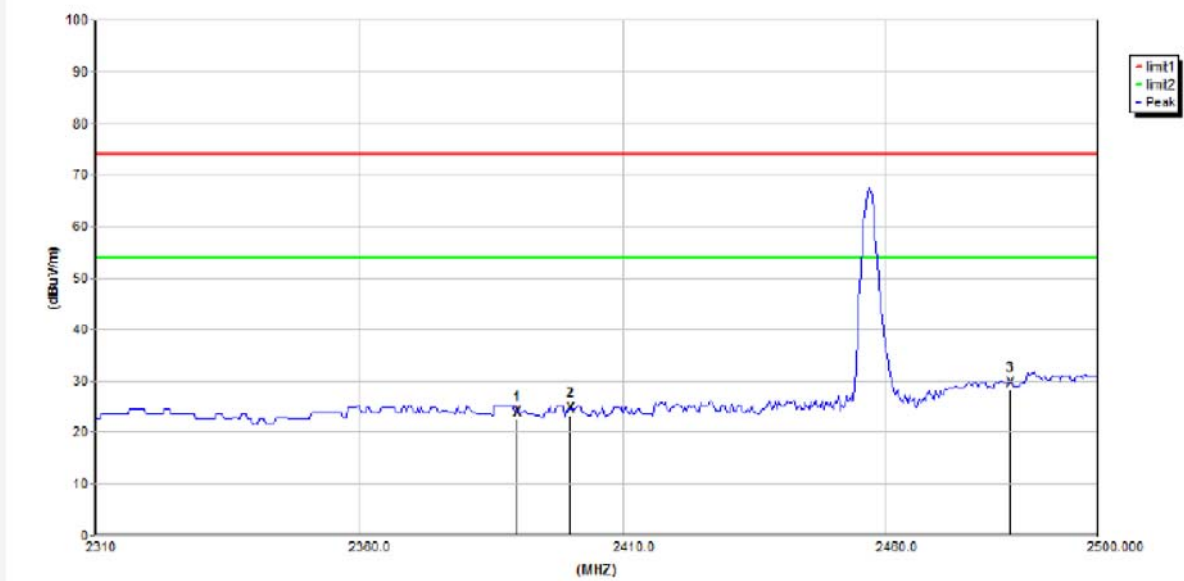
No.	Freq. (MHz)	Reading (dBuV)	Antenna Factor	Cable Loss (dB)	Amp. (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
1	2390.0000	32.68	29.15	3.41	34.01	31.23	74.00	-42.77	Peak
2	2400.0000	28.48	31.21	3.56	29.30	33.95	74.00	-40.05	Peak
3	2483.5000	33.62	34.01	6.68	34.14	40.17	74.00	-33.83	Peak

Job No.:	0117020607W	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 3V
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	PEAK	Distance:	3m



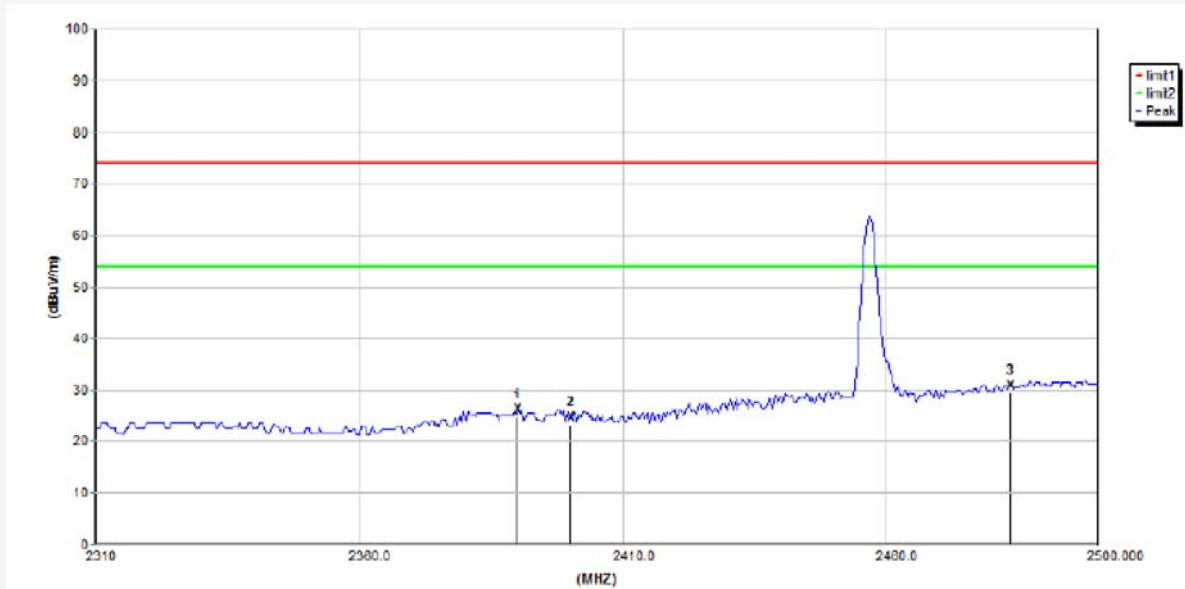
No.	Freq. (MHz)	Reading (dBuV)	Antenna Factor	Cable Loss (dB)	Amp. (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
1	2390.0000	29.90	29.15	3.41	31.23	31.23	74.00	-42.77	Peak
2	2400.0000	27.98	31.21	3.56	29.30	33.45	74.00	-40.55	Peak
3	2483.5000	33.62	34.01	6.68	34.14	40.17	74.00	-33.83	Peak

Job No.:	0117020607W	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 3V
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	AVG	Distance:	3m



No.	Freq. (MHz)	Reading (dBuV)	Antenna Factor	Cable Loss (dB)	Amp. (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
1	2390.0000	22.55	29.15	3.41	31.23	23.88	54.00	-30.12	AVG
2	2400.0000	19.12	31.21	3.56	29.30	24.59	54.00	-29.41	AVG
3	2483.5000	22.98	34.01	6.68	34.14	29.53	54.00	-24.47	AVG

Job No.:	0117020607W	Polarization:	Vertical
Standard:	(RE)FCC PART15 C_3m	Power Source:	DC 3V
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	AVG	Distance:	3m



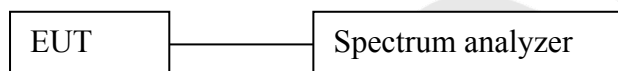
No.	Freq. (MHz)	Reading (dBuV)	Antenna Factor	Cable Loss (dB)	Amp. (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
1	2390.0000	24.53	29.15	3.41	31.23	25.86	54.00	-28.14	AVG
2	2400.0000	19.05	31.21	3.56	29.30	24.52	54.00	-29.48	AVG
3	2483.5000	23.66	34.01	6.68	34.14	30.21	54.00	-23.79	AVG

6. Occupied Bandwidth

6.1. Requirements :

According to 15.215 (c), 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. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

6.2. Test SET-UP



6.3 Test Equipment

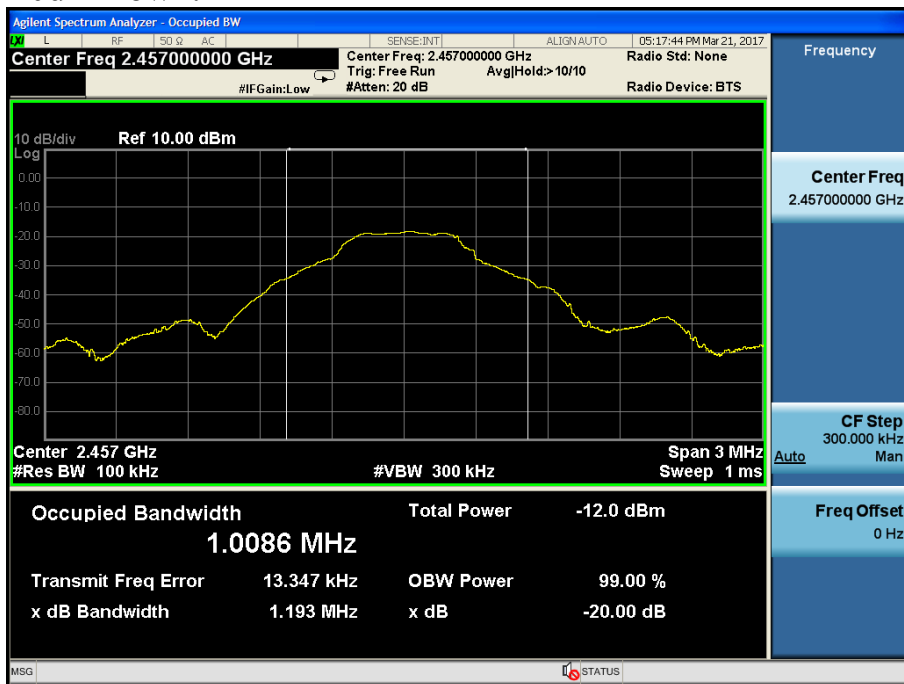
Same as the equipment listed in 4.3.

6.4. Test Results

Pass.

Please refer the following plot.

20dB Down:



7. ANTENNA APPLICATION

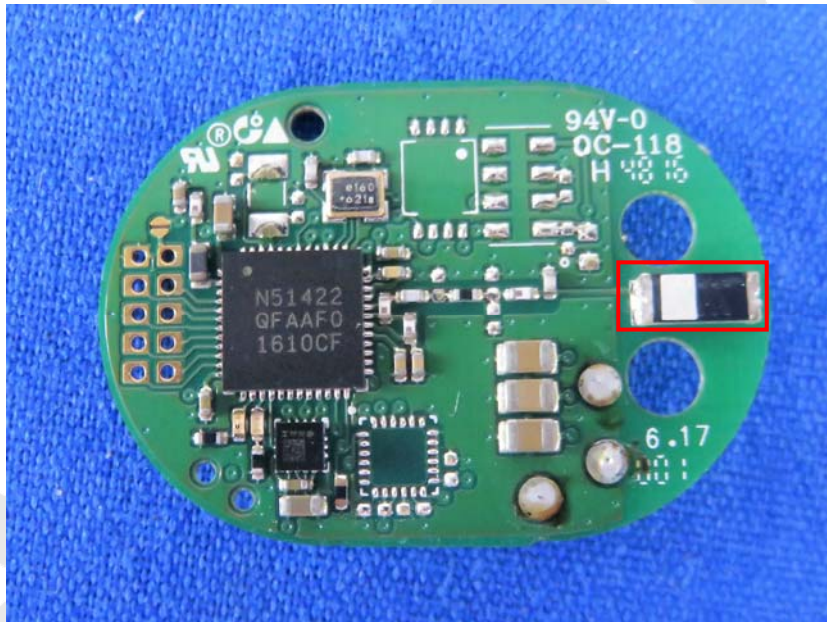
7.1. Antenna requirement

The EUT'S antenna is met the requirement of FCC part 15C section 15.203.

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 shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

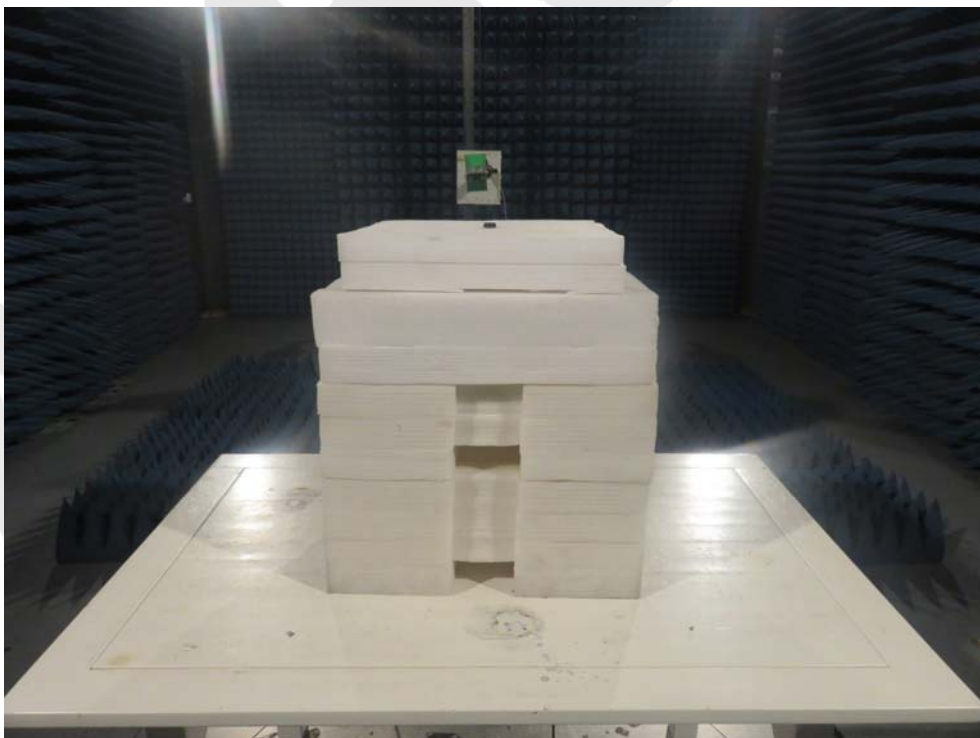
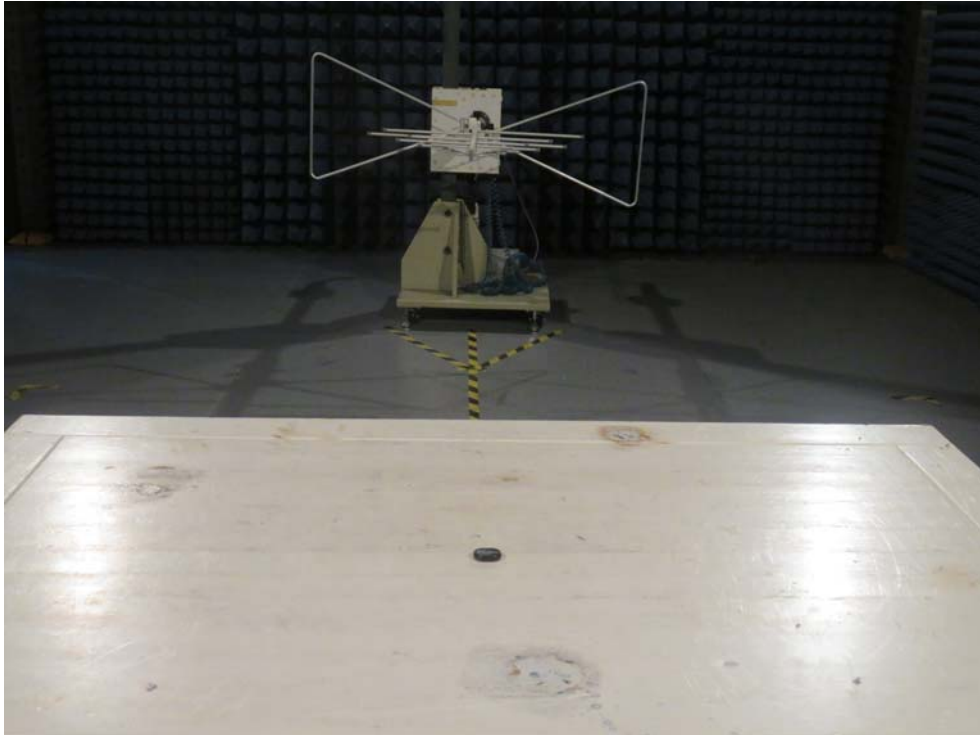
7.2. Result

The EUT's antenna used a ceramic chip antenna which is permanently attached, The antenna's gain is 3.19dBi and meets the requirement.

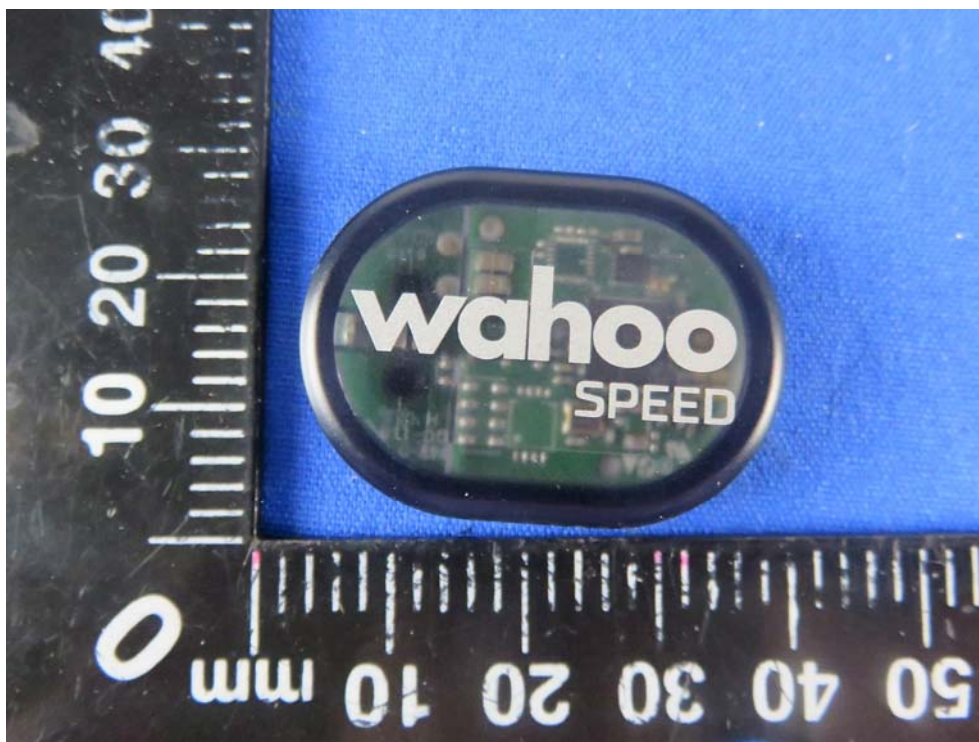


8. PHOTOGRAPH

8.1. Photo of Radiation Emission Test



APPENDIX I (External Photos)







APPENDIX III -- INTERNAL PHOTOGRAPH

