



## Shenzhen Huaxia Testing Technology Co., Ltd

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Report Template Version: V03

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# Test Report

**Report No. :** CQASZ20190100020E-01

**Applicant:** Shenzhen Bright Lighting Technology Co.,Ltd

**Address of Applicant:** Bldg 18 Shancheng Industrial Park Shiyan Town Baoan District,Shenzhen, Guangdong 518108

**Manufacturer:** Shenzhen Bright Lighting Technology Co.,Ltd

**Address of Manufacturer:** Bldg 18 Shancheng Industrial Park Shiyan Town Baoan District,Shenzhen, Guangdong 518108

**Equipment Under Test (EUT):**

**Product:** 3D MOON LIGHT

**All Model No.:** BRT-A180-1-0.7DW, BRT-A150-1-0.5DW

**Test Model No.:** BRT-A180-1-0.7DW

**Brand Name:**  BRTLed

**FCC ID:** 2AQ22-BRTMOONLIGHT

**Standards:** 47 CFR Part 15, Subpart C

**Date of Test:** 2018-12-25 to 2019-01-08

**Date of Issue:** 2019-01-10

**Test Result :** PASS\*

**Tested By:**

*Daisy Qin*

**Reviewed By:**

*(Daisy Qin)  
Aaron Ma*

**Approved By:**

*(Aaron Ma)  
Jack Ai*



\* 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
CQASZ20190100020E-01	Rev.01	Initial report	2019-01-10

### 3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10 2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 2013	PASS
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(3)	ANSI C63.10 2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(2)	ANSI C63.10 2013	PASS
Power Spectral Density	47 CFR Part 15, Subpart C Section 15.247 (e)	ANSI C63.10 2013	PASS
Radiated Spurious Emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS

## 4 Contents


	Page
<b>1 COVER PAGE.....</b>	<b>1</b>
<b>2 VERSION .....</b>	<b>2</b>
<b>3 TEST SUMMARY .....</b>	<b>3</b>
<b>4 CONTENTS .....</b>	<b>4</b>
<b>5 GENERAL INFORMATION.....</b>	<b>5</b>
5.1 CLIENT INFORMATION .....	5
5.2 GENERAL DESCRIPTION OF EUT .....	5
5.3 TEST ENVIRONMENT AND MODE .....	6
5.4 DESCRIPTION OF SUPPORT UNITS .....	7
5.5 TEST LOCATION .....	7
5.6 TEST FACILITY .....	7
5.7 STATEMENT OF THE MEASUREMENT UNCERTAINTY .....	8
5.8 DEVIATION FROM STANDARDS .....	8
5.9 ABNORMALITIES FROM STANDARD CONDITIONS .....	8
5.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER .....	8
5.11 EQUIPMENT LIST .....	9
<b>6 TEST RESULTS AND MEASUREMENT DATA.....</b>	<b>10</b>
6.1 ANTENNA REQUIREMENT .....	10
6.2 CONDUCTED EMISSIONS .....	11
6.3 CONDUCTED PEAK OUTPUT POWER .....	15
6.4 6dB OCCUPY BANDWIDTH .....	17
6.5 POWER SPECTRAL DENSITY .....	25
6.6 RADIATED SPURIOUS EMISSIONS.....	30
6.6.1 Radiated emission below 1GHz.....	33
6.6.2 Transmitter emission above 1GHz.....	35
6.7 RESTRICTED BANDS AROUND FUNDAMENTAL FREQUENCY .....	41
<b>7 PHOTOGRAPHS - EUT TEST SETUP .....</b>	<b>55</b>
7.1 RADIATED SPURIOUS EMISSION.....	55
7.2 CONDUCTED EMISSION.....	56
<b>8 PHOTOGRAPHS - EUT CONSTRUCTIONAL DETAILS .....</b>	<b>57</b>

## 5 General Information

### 5.1 Client Information

Applicant:	Shenzhen Bright Lighting Technology Co.,Ltd
Address of Applicant:	Bldg 18 Shancheng Industrial Park Shiyan Town Baoan District, Shenzhen, Guangdong 518108
Manufacturer:	Shenzhen Bright Lighting Technology Co.,Ltd
Address of Manufacturer:	Bldg 18 Shancheng Industrial Park Shiyan Town Baoan District, Shenzhen, Guangdong 518108

### 5.2 General Description of EUT

Product Name:	3D MOON LIGHT
Model No.:	BRT-A180-1-0.7DW, BRT-A150-1-0.5DW
Trade Mark:	
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2472MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 13 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20) : OFDM (64QAM, 16QAM,QPSK,BPSK)
Transfer Rate:	IEEE for 802.11b: 1Mbps/2Mbps/5.5Mbps/11Mbps IEEE for 802.11g : 6Mbps/9Mbps/12Mbps/18Mbps/24Mbps/36Mbps/48Mbps/54Mbps IEEE for 802.11n(HT20) : 6.5Mbps/13Mbps/19.5Mbps/26Mbps/39Mbps/52Mbps/58.5Mbps/65Mbps
Antenna Type:	PCB antenna
Antenna Gain:	3.23dBi
Power Supply:	DC 3.7V from battery

Operation Frequency each of channel(802.11b/g/n HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz	12	2467 MHz
13	2472 MHz						

Note:

In section 15.31(m), regards to the operating frequency range over 5 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

For 802.11b/g/n (HT20):

Channel	Frequency
The Lowest channel	2412MHz
The Middle channel	2442MHz
The Highest channel	2472MHz

Note:

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

### 5.3 Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	52 % RH
Atmospheric Pressure:	1008 mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate. (the duty cycle > 98%)

## 5.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
Adapter	Apple	A1265	Provide by lab	DOC

## 5.5 Test Location

All tests were performed at:

**Shenzhen Huaxia Testing Technology Co., Ltd.,**

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua New District, Shenzhen, Guangdong, China

## 5.6 Test Facility

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

- **CNAS (No. CNAS L5785)**

CNAS has accredited Shenzhen Huaxia Testing Technology Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **ISED Registration No.: 22984-1**

The 3m Semi-anechoic chamber of Shenzhen Huaxia Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

- **A2LA (Certificate No. 4742.01)**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

- **FCC Registration No.: 522263**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen 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 No.:522263

## 5.7 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 Huaxia Testing Technology Co., Ltd.** 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 CQA laboratory is reported:

No.	Item	Uncertainty	Notes
1	Radiated Emission (Below 1GHz)	±5.12dB	(1)
2	Radiated Emission (Above 1GHz)	±4.60dB	(1)
3	Conducted Disturbance (0.15~30MHz)	±3.34dB	(1)
4	Radio Frequency	$3 \times 10^{-8}$	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8°C	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	time	0.6 %.	(1)
14	Frequency Error	5.5 Hz	(1)

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

## 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

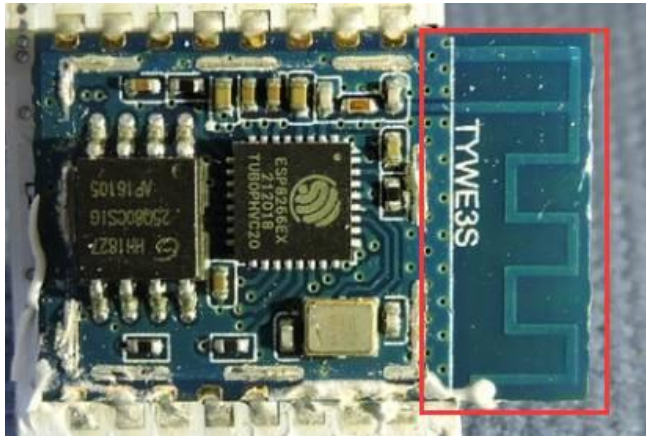
Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2018/9/26	2019/9/25
Spectrum analyzer	R&S	FSU26	CQA-038	2018/10/28	2018/10/27
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2018/9/26	2019/9/25
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2018/11/2	2019/11/1
Loop antenna	Schwarzbeck	FMZB1516	CQA-087	2018/10/28	2020/10/27
Bilog Antenna	R&S	HL562	CQA-011	2018/9/26	2020/9/25
Horn Antenna	R&S	HF906	CQA-012	2018/9/26	2020/9/25
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2018/9/26	2020/9/25
Coaxial Cable (Above 1GHz)	CQA	N/A	C019	2018/9/26	2019/9/25
Coaxial Cable (Below 1GHz)	CQA	N/A	C020	2018/9/26	2019/9/25
Antenna Connector	CQA	RFC-01	CQA-080	2018/9/26	2019/9/25
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2018/9/26	2019/9/25
Spectrum analyzer	Agilent	E4440A	CQA-103	2018/10/28	2018/10/27
Power Sensor	KEYSIGHT	U2021XA	CQA-30	2018/9/26	2019/9/25
N1918A Power Analysis Manager Power Panel	Agilent	N1918A	CQA-074	2018/9/26	2019/9/25
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2018/9/26	2019/9/25
EMI Test Receiver	R&S	ESPI3	CQA-013	2018/9/26	2019/9/25
LISN	R&S	ENV216	CQA-003	2018/11/5	2019/11/4
Coaxial cable	CQA	N/A	CQA-C009	2018/9/26	2019/9/25

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

<b>Standard requirement:</b>	47 CFR Part 15C Section 15.203 /247(c)
<p>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.</p> <p>15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p>	
<b>EUT Antenna:</b>	
<p>The antenna is a PCB antenna. The best case gain of the antenna is 3.23dBi.</p>	

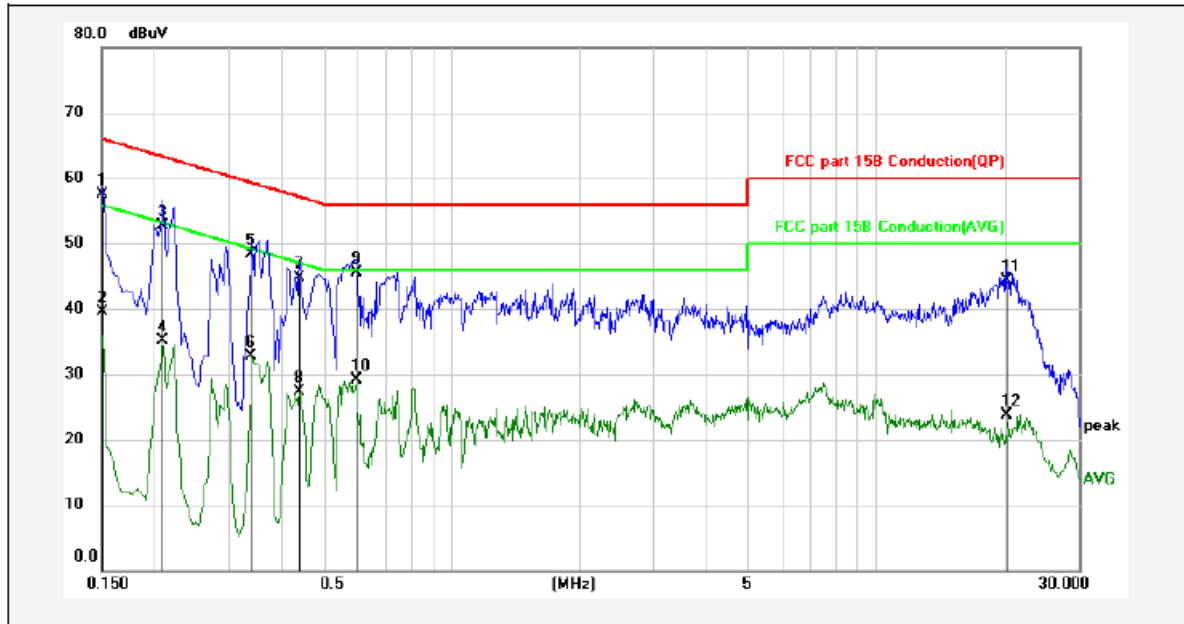
## 6.2 Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207,		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
	* Decreases with the logarithm of the frequency.		
Test Procedure:	<ol style="list-style-type: none"> <li>1) The mains terminal disturbance voltage test was conducted in a shielded room.</li> <li>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a <math>50\Omega/50\mu\text{H} + 5\Omega</math> linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.</li> <li>3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,</li> <li>4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.</li> <li>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</li> </ol>		

<p>Test Setup:</p>	<p>The diagram shows a test setup within a shielding room. A table is positioned 80cm above a ground reference plane. On this table, an EUT (Equipment Under Test) and an AE (Antenna) are placed. To the left, LISN1 is connected to AC Mains, and a 30cm distance is indicated between LISN1 and the EUT. To the right, LISN2 is connected to AC Mains. A Test Receiver is placed on a separate table to the right, connected to the AE. The entire setup is enclosed in a shielding room.</p>
<p>Exploratory Test Mode:</p>	<p>Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.</p>
<p>Final Test Mode:</p>	<p>Through Pre-scan, find the 1Mbps of rate of 802.11b at lowest channel is the worst case.          Only the worst case is recorded in the report.</p>
<p>Test Voltage:</p>	<p>AC120V/60Hz</p>
<p>Test Results:</p>	<p>Pass</p>

Measurement Data

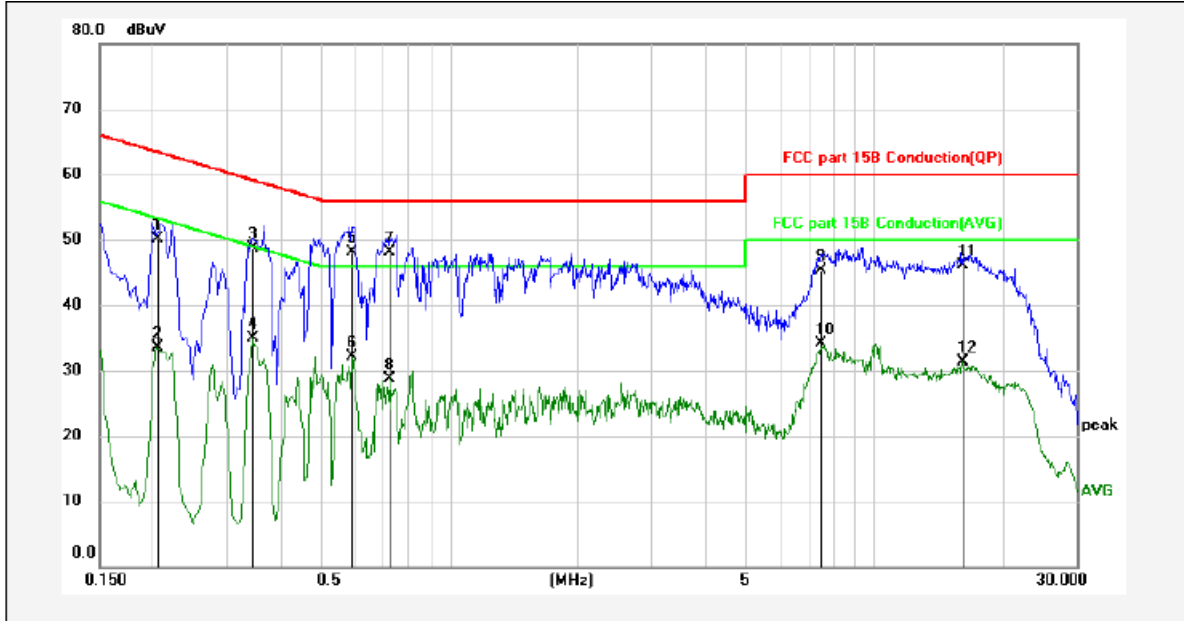
Live Line:



No.	Frequency (MHz)	Reading (dBuV)	Lisn/Isn (dB)	Cab_L (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	47.78	9.6	0.22	57.60	66.00	-8.40	QP	
2	0.1500	29.67	9.6	0.22	39.49	56.00	-16.51	AVG	
3	0.2085	42.87	9.6	0.23	52.70	63.26	-10.56	QP	
4	0.2085	25.28	9.6	0.23	35.11	53.26	-18.15	AVG	
5	0.3390	38.47	9.59	0.24	48.30	59.23	-10.93	QP	
6	0.3390	22.96	9.59	0.24	32.79	49.23	-16.44	AVG	
7	0.4380	34.98	9.58	0.24	44.80	57.10	-12.30	QP	
8	0.4380	17.49	9.58	0.24	27.31	47.10	-19.79	AVG	
9	0.5954	35.80	9.56	0.24	45.60	56.00	-10.40	QP	
10	0.5954	19.25	9.56	0.24	29.05	46.00	-16.95	AVG	
11	20.2785	34.29	9.81	0.2	44.30	60.00	-15.70	QP	
12	20.2785	13.72	9.81	0.2	23.73	50.00	-26.27	AVG	

Remarks: 1. Result=Reading+Lisn+Cab\_L  
 2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.


Neutral Line:



No.	Frequency (MHz)	Reading (dBuV)	Lisn/Isn (dB)	Cab_L (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.2040	40.31	9.6	0.23	50.14	63.45	-13.31	QP	
2	0.2040	23.76	9.6	0.23	33.59	53.45	-19.86	AVG	
3	0.3435	38.95	9.59	0.24	48.78	59.12	-10.34	QP	
4	0.3435	25.13	9.59	0.24	34.96	49.12	-14.16	AVG	
5	0.5909	38.32	9.56	0.24	48.12	56.00	-7.88	QP	
6	0.5909	22.31	9.56	0.24	32.11	46.00	-13.89	AVG	
7	0.7259	38.41	9.54	0.23	48.18	56.00	-7.82	QP	
8	0.7259	19.03	9.54	0.23	28.80	46.00	-17.20	AVG	
9	7.4895	35.39	9.75	0.21	45.35	60.00	-14.65	QP	
10	7.4895	24.07	9.75	0.21	34.03	50.00	-15.97	AVG	
11	16.0845	36.01	9.8	0.21	46.02	60.00	-13.98	QP	
12	16.0845	21.29	9.8	0.21	31.30	50.00	-18.70	AVG	

Remarks: 1. Result=Reading+Lisn+Cab\_L  
 2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

### 6.3 Conducted Peak Output Power

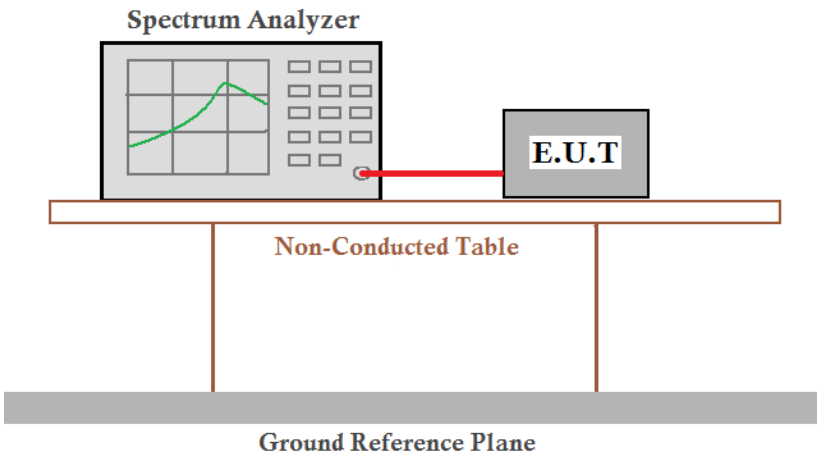
Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)
Test Method:	ANSI C63.10: 2013
Test Setup:	 <pre> graph LR     EUT[EUT] --- PM[Power Meter]             </pre>
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; Only the worst case is recorded in the report.
Limit:	30dBm
Test Results:	Pass

Measurement Data

Test CH	Peak Output Power (dBm)			Limit (dBm)	Result
	802.11b	802.11g	802.11n(HT20)		
Lowest	11.73	10.07	9.15	30.00	Pass
Middle	11.66	9.89	9.17		
Highest	10.71	9.64	9.39		



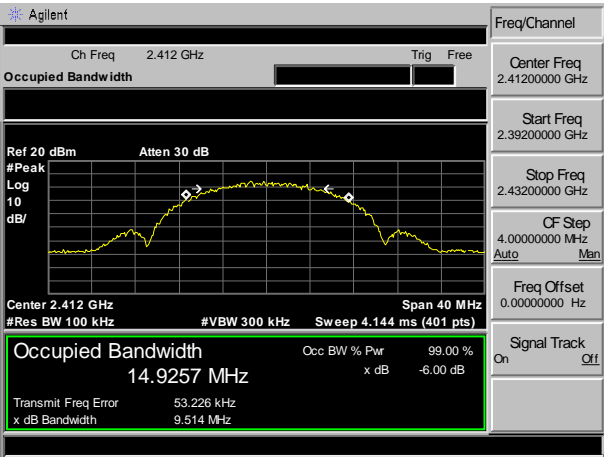
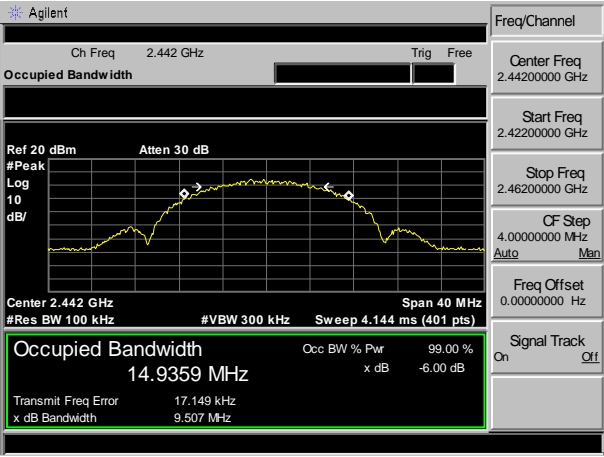
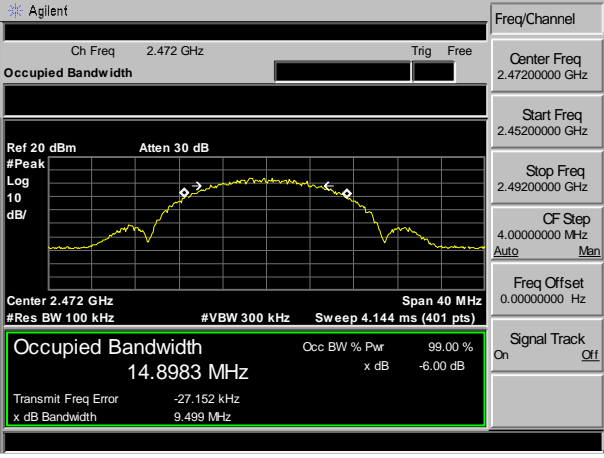
## 6.4 6dB Occupy Bandwidth


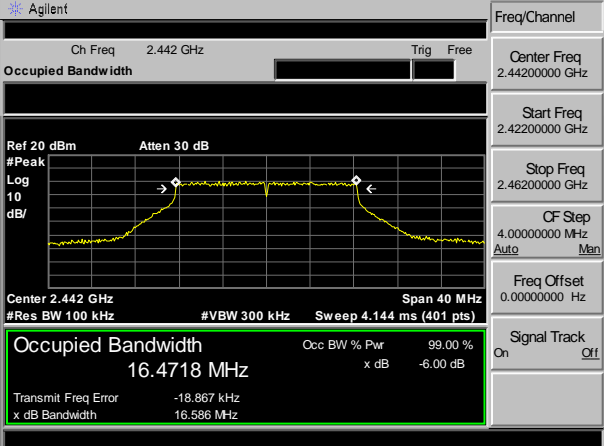

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	ANSI C63.10: 2013
Test Setup:	 <p style="text-align: center;">Offset=cable loss+ attenuation factor</p>
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) Only the worst case is recorded in the report.
Limit:	$\geq 500$ kHz
Test Results:	Pass

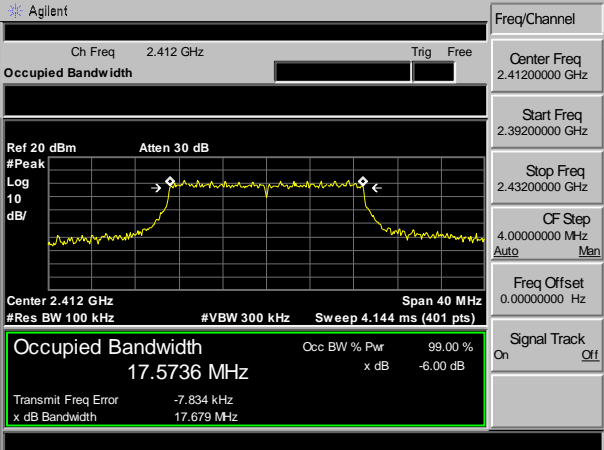
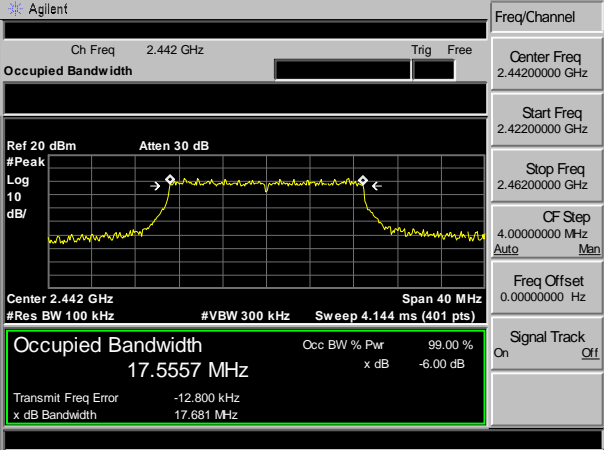
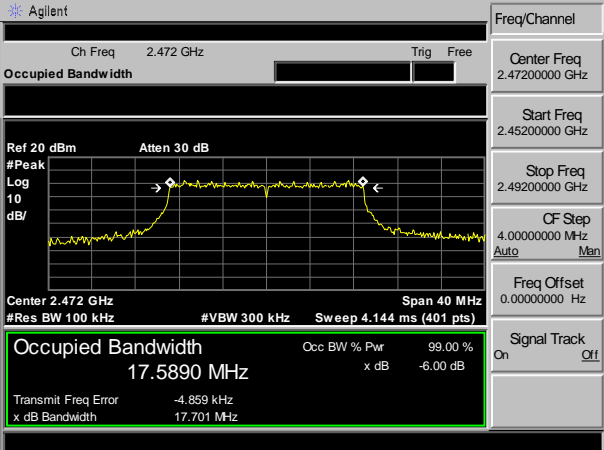
Measurement Data


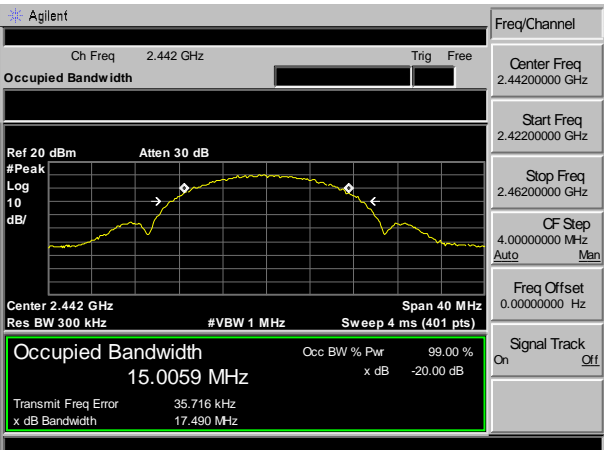
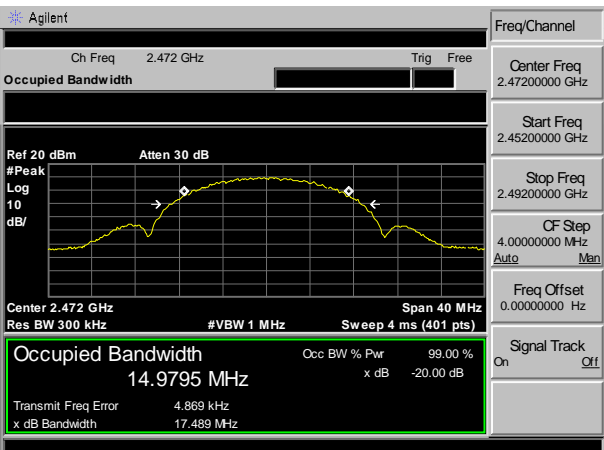
Test CH	6dB Emission Bandwidth (MHz)			Limit(kHz)	Result
	802.11b	802.11g	802.11n (H20)		
Lowest	9.514	16.610	17.679	>500	Pass
Middle	9.507	16.586	17.681		
Highest	9.499	16.606	17.701		
Test CH	99% Occupy Bandwidth (MHz)			Limit(kHz)	Result
	802.11b	802.11g	802.11n (H20)		
Lowest	15.046	16.869	17.774	N/A	N/A
Middle	15.006	16.868	17.786		
Highest	14.979	16.840	17.759		




Test plot as follows:




Graphs_6dB Occupy Bandwidth	
<p>11B/LCH</p>	 <p>Agilent Freq/Channel</p> <p>Ch Freq 2.412 GHz Trig Free</p> <p>Center Freq 2.4120000 GHz</p> <p>Start Freq 2.3920000 GHz</p> <p>Stop Freq 2.4320000 GHz</p> <p>CF Step 4.0000000 MHz Auto Man</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 20 dBm Atten 30 dB</p> <p>#Peak Log 10 dB/</p> <p>Center 2.412 GHz Span 40 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 4.144 ms (401 pts)</p> <p><b>Occupied Bandwidth 14.9257 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error 53.226 kHz</p> <p>x dB Bandwidth 9.514 MHz</p>
<p>11B/MCH</p>	 <p>Agilent Freq/Channel</p> <p>Ch Freq 2.442 GHz Trig Free</p> <p>Center Freq 2.4420000 GHz</p> <p>Start Freq 2.4220000 GHz</p> <p>Stop Freq 2.4620000 GHz</p> <p>CF Step 4.0000000 MHz Auto Man</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 20 dBm Atten 30 dB</p> <p>#Peak Log 10 dB/</p> <p>Center 2.442 GHz Span 40 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 4.144 ms (401 pts)</p> <p><b>Occupied Bandwidth 14.9359 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error 17.149 kHz</p> <p>x dB Bandwidth 9.507 MHz</p>
<p>11B/HCH</p>	 <p>Agilent Freq/Channel</p> <p>Ch Freq 2.472 GHz Trig Free</p> <p>Center Freq 2.4720000 GHz</p> <p>Start Freq 2.4520000 GHz</p> <p>Stop Freq 2.4920000 GHz</p> <p>CF Step 4.0000000 MHz Auto Man</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 20 dBm Atten 30 dB</p> <p>#Peak Log 10 dB/</p> <p>Center 2.472 GHz Span 40 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 4.144 ms (401 pts)</p> <p><b>Occupied Bandwidth 14.8983 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -27.152 kHz</p> <p>x dB Bandwidth 9.499 MHz</p>

<p>11G/LCH</p>	
<p>11G/MCH</p>	
<p>11G/HCH</p>	

<p>11N20SISO/LCH</p>	 <p>Agilent</p> <p>Ch Freq 2.412 GHz Trig Free</p> <p>Center Freq 2.4120000 GHz</p> <p>Start Freq 2.3920000 GHz</p> <p>Stop Freq 2.4320000 GHz</p> <p>CF Step 4.0000000 MHz</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On</p> <p>Ref 20 dBm Atten 30 dB</p> <p>#Peak Log 10 dB/</p> <p>Center 2.412 GHz Span 40 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 4.144 ms (401 pts)</p> <p>Occupied Bandwidth 17.5736 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -6.00 dB</p> <p>Transmit Freq Error -7.834 kHz</p> <p>x dB Bandwidth 17.679 MHz</p>
<p>11N20SISO/MCH</p>	 <p>Agilent</p> <p>Ch Freq 2.442 GHz Trig Free</p> <p>Center Freq 2.4420000 GHz</p> <p>Start Freq 2.4220000 GHz</p> <p>Stop Freq 2.4620000 GHz</p> <p>CF Step 4.0000000 MHz</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On</p> <p>Ref 20 dBm Atten 30 dB</p> <p>#Peak Log 10 dB/</p> <p>Center 2.442 GHz Span 40 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 4.144 ms (401 pts)</p> <p>Occupied Bandwidth 17.5557 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -6.00 dB</p> <p>Transmit Freq Error -12.800 kHz</p> <p>x dB Bandwidth 17.681 MHz</p>
<p>11N20SISO/HCH</p>	 <p>Agilent</p> <p>Ch Freq 2.472 GHz Trig Free</p> <p>Center Freq 2.4720000 GHz</p> <p>Start Freq 2.4520000 GHz</p> <p>Stop Freq 2.4920000 GHz</p> <p>CF Step 4.0000000 MHz</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On</p> <p>Ref 20 dBm Atten 30 dB</p> <p>#Peak Log 10 dB/</p> <p>Center 2.472 GHz Span 40 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 4.144 ms (401 pts)</p> <p>Occupied Bandwidth 17.5890 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -6.00 dB</p> <p>Transmit Freq Error -4.859 kHz</p> <p>x dB Bandwidth 17.701 MHz</p>

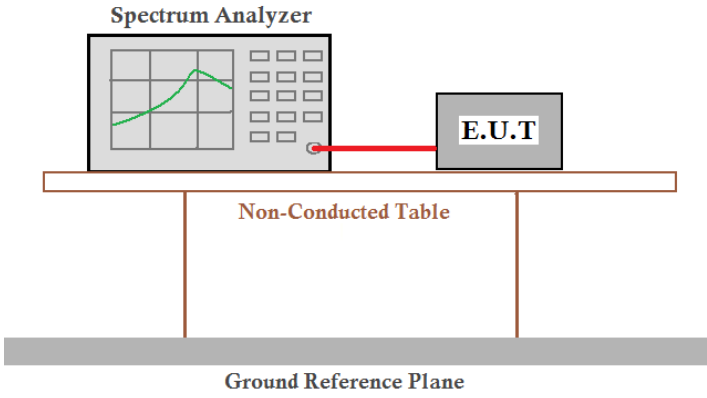
Graphs_99% OBW	
<p>11B/LCH</p>	 <p>Agilent Freq/Channel</p> <p>Ch Freq 2.412 GHz Trig Free</p> <p>Center Freq 2.41200000 GHz</p> <p>Start Freq 2.39200000 GHz</p> <p>Stop Freq 2.43200000 GHz</p> <p>CF Step 4.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 20 dBm Atten 30 dB</p> <p>#Peak Log 10 dB/</p> <p>Center 2.412 GHz Span 40 MHz</p> <p>Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)</p> <p><b>Occupied Bandwidth 15.0460 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p>Transmit Freq Error 69.138 kHz</p> <p>x dB Bandwidth 17.635 MHz</p>
<p>11B/MCH</p>	 <p>Agilent Freq/Channel</p> <p>Ch Freq 2.442 GHz Trig Free</p> <p>Center Freq 2.44200000 GHz</p> <p>Start Freq 2.42200000 GHz</p> <p>Stop Freq 2.46200000 GHz</p> <p>CF Step 4.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 20 dBm Atten 30 dB</p> <p>#Peak Log 10 dB/</p> <p>Center 2.442 GHz Span 40 MHz</p> <p>Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)</p> <p><b>Occupied Bandwidth 15.0059 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p>Transmit Freq Error 35.716 kHz</p> <p>x dB Bandwidth 17.490 MHz</p>
<p>11B/HCH</p>	 <p>Agilent Freq/Channel</p> <p>Ch Freq 2.472 GHz Trig Free</p> <p>Center Freq 2.47200000 GHz</p> <p>Start Freq 2.45200000 GHz</p> <p>Stop Freq 2.49200000 GHz</p> <p>CF Step 4.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 20 dBm Atten 30 dB</p> <p>#Peak Log 10 dB/</p> <p>Center 2.472 GHz Span 40 MHz</p> <p>Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)</p> <p><b>Occupied Bandwidth 14.9795 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p>Transmit Freq Error 4.869 kHz</p> <p>x dB Bandwidth 17.489 MHz</p>

<p>11G/LCH</p>	 <p>Agilent</p> <p>Ch Freq 2.412 GHz Trig Free</p> <p>Center Freq 2.4120000 GHz</p> <p>Start Freq 2.3920000 GHz</p> <p>Stop Freq 2.4320000 GHz</p> <p>CF Step 4.0000000 MHz</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On</p> <p>Center 2.412 GHz Span 40 MHz</p> <p>Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 16.8692 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>Transmit Freq Error -45.636 kHz</p> <p>x dB Bandwidth 19.228 MHz</p>
<p>11G/MCH</p>	 <p>Agilent</p> <p>Ch Freq 2.442 GHz Trig Free</p> <p>Center Freq 2.4420000 GHz</p> <p>Start Freq 2.4220000 GHz</p> <p>Stop Freq 2.4620000 GHz</p> <p>CF Step 4.0000000 MHz</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On</p> <p>Center 2.442 GHz Span 40 MHz</p> <p>Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 16.8677 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>Transmit Freq Error -66.836 kHz</p> <p>x dB Bandwidth 19.418 MHz</p>
<p>11G/HCH</p>	 <p>Agilent</p> <p>Ch Freq 2.472 GHz Trig Free</p> <p>Center Freq 2.4720000 GHz</p> <p>Start Freq 2.4520000 GHz</p> <p>Stop Freq 2.4920000 GHz</p> <p>CF Step 4.0000000 MHz</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On</p> <p>Center 2.472 GHz Span 40 MHz</p> <p>Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 16.8401 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>Transmit Freq Error -71.576 kHz</p> <p>x dB Bandwidth 19.483 MHz</p>

<p>11N20SISO/LCH</p>	
<p>11N20SISO/MCH</p>	
<p>11N20SISO/HCH</p>	



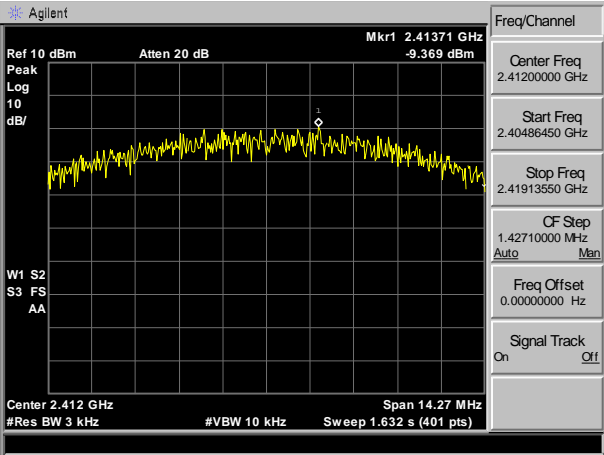
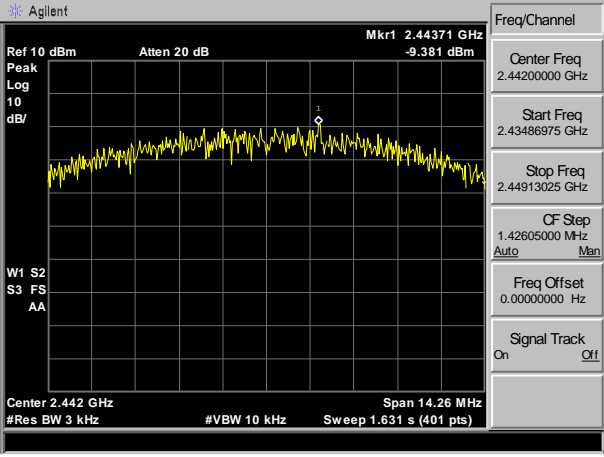
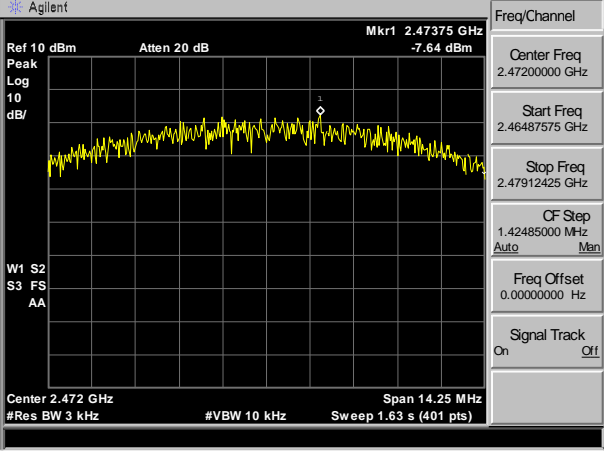
## 6.5 Power Spectral Density

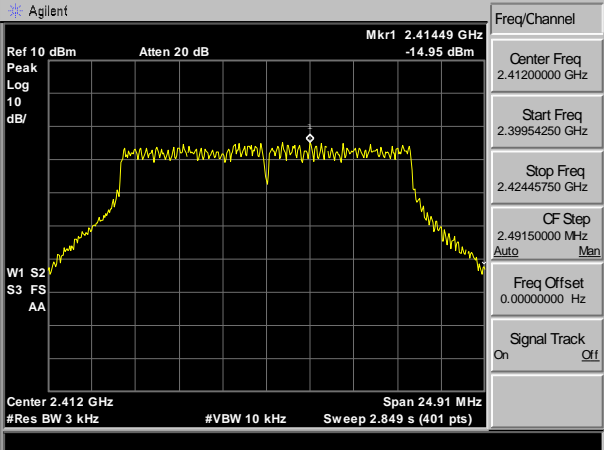
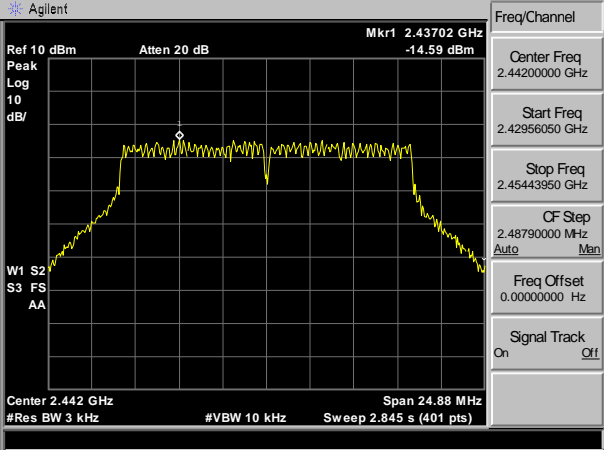
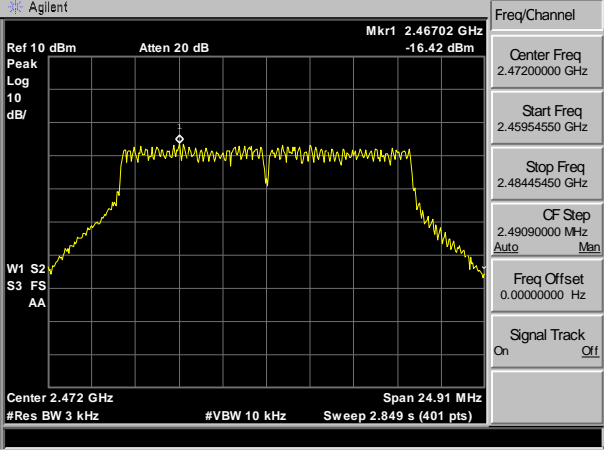
Test Requirement:	47 CFR Part 15C Section 15.247 (e)
Test Method:	ANSI C63.10: 2013
Test Setup:	 <p>Offset=cable loss+ attenuation factor</p>
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; Only the worst case is recorded in the report.
Limit:	≤8.00dBm/3kHz
Test Results:	Pass

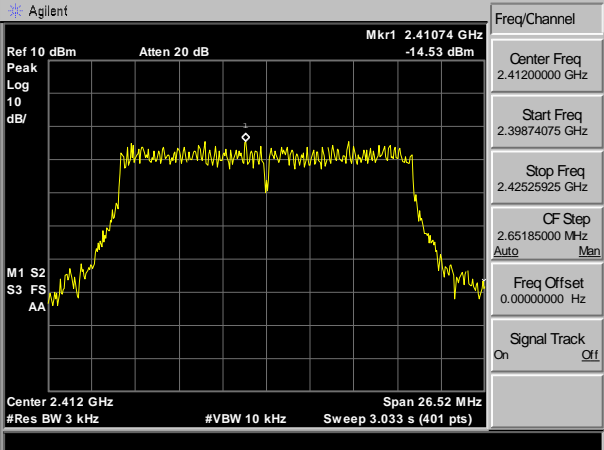
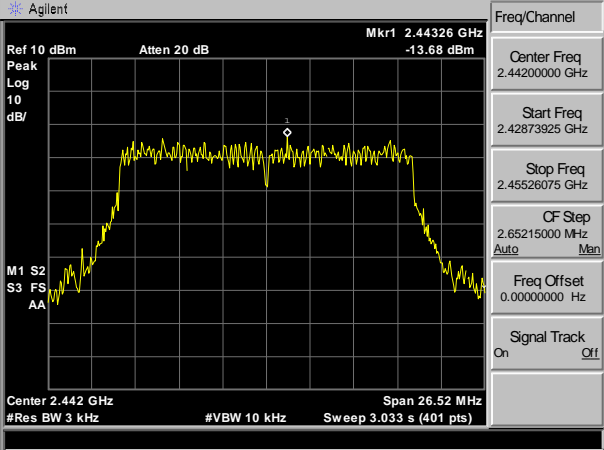
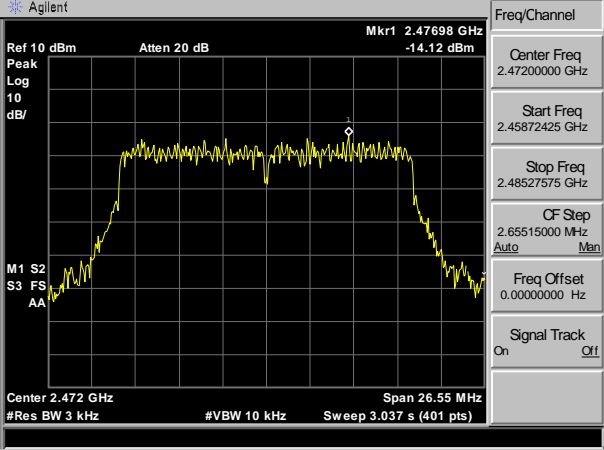
Measurement Data

Test CH	Power Spectral Density (dBm)			Limit (dBm/3kHz)	Result
	802.11b	802.11g	802.11n (HT20)		
Lowest	-9.369	-14.950	-14.530	8.00	Pass
Middle	-9.381	-14.590	-13.680		
Highest	-7.640	-16.420	-14.120		

Test plot as follows:

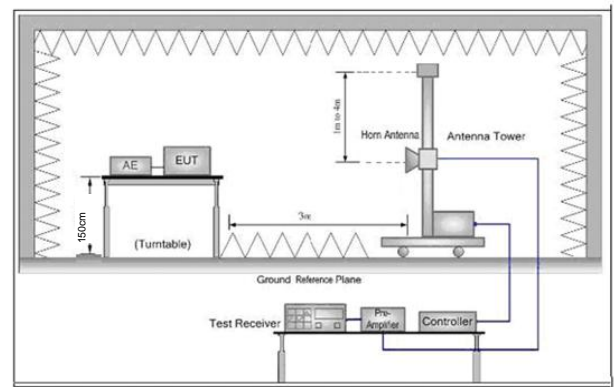
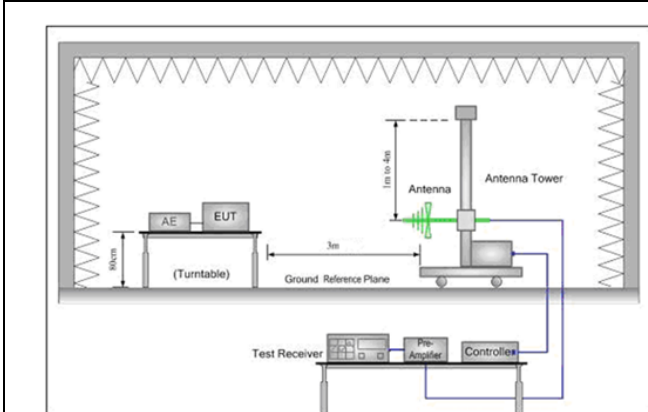
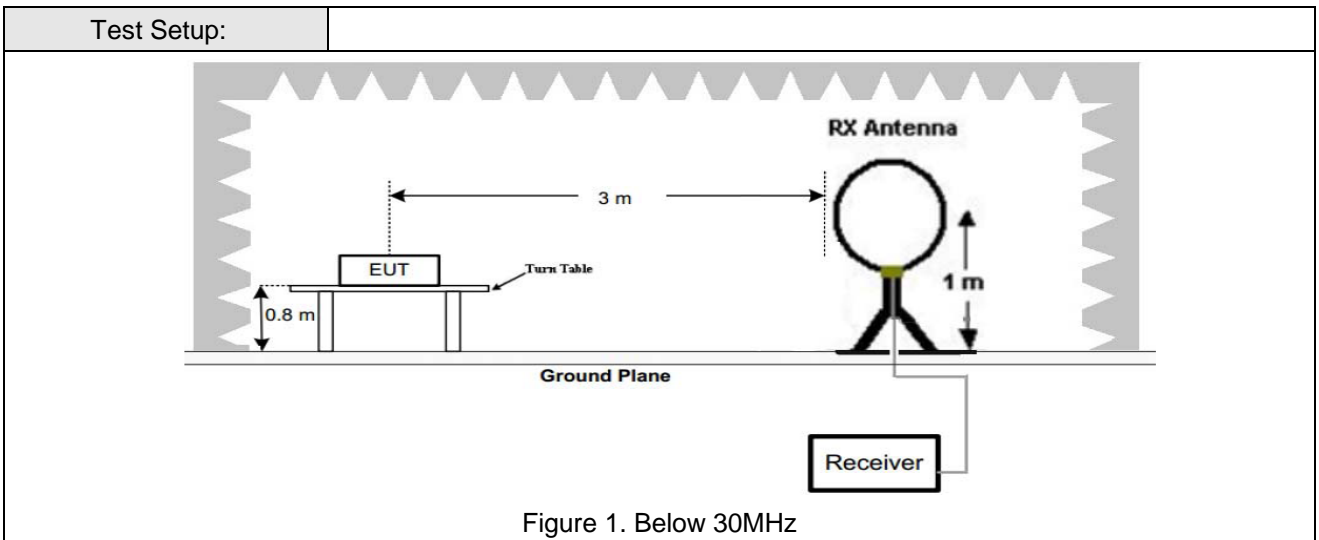
Graphs	
11B/LCH	
11B/MCH	
11B/HCH	

<p>11G/LCH</p>	
<p>11G/MCH</p>	
<p>11G/HCH</p>	

<p>11N20SISO/LCH</p>	
<p>11N20SISO/MCH</p>	
<p>11N20SISO/HCH</p>	

## 6.6 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 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	
Limit:	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
<p>Note: 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.</p>					



Test Procedure:

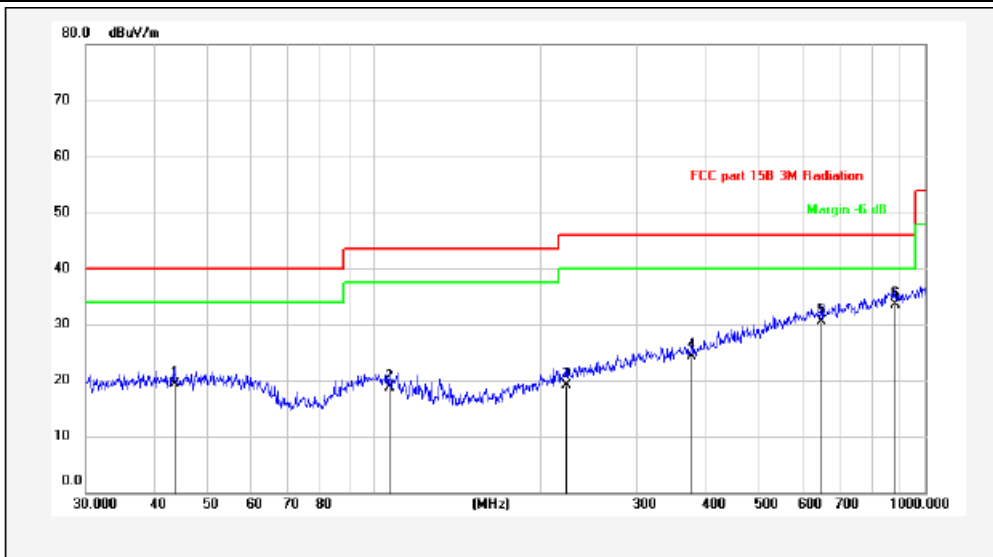
- a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
  - 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. 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

	<p>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.</p> <p>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>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.</p> <p>g. Test the EUT in the lowest channel ,the middle channel ,the Highest channel</p> <p>h. Repeat above procedures until all frequencies measured was complete.</p>
Exploratory Test Mode:	<p>Transmitting with all kind of modulations, data rates. Transmitting mode, Charge + Transmitting mode.</p>
Final Test Mode:	<p>Pretest the EUT at Transmitting mode and Charge +Transmitting mode, found the Charge +Transmitting mode which it is worse case Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) . For below 1GHz, through Pre-scan, find the 1Mbps of rate of 802.11b at lowest channel is the worst case. Only the worst case is recorded in the report.</p>
Test Results:	<p>Pass</p>



### 6.6.1 Radiated emission below 1GHz

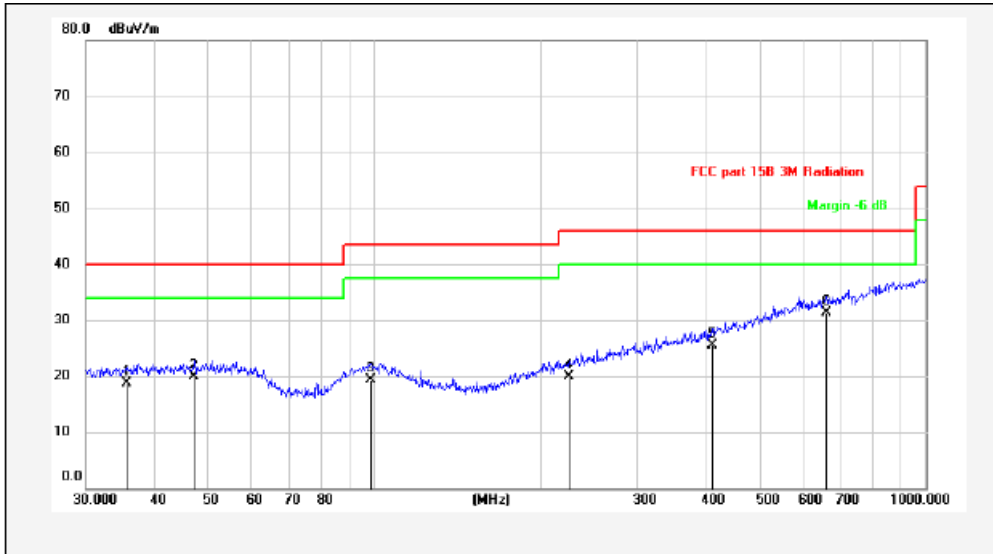
30MHz~1GHz		
Test mode:	Charge + Transmitting	Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna (dB/m)	Cable (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	43.5057	5.94	12.23	1.05	19.22	40.00	-20.78	QP
2	106.7587	5.54	11.56	1.56	18.66	43.50	-24.84	QP
3	223.7334	5.97	11.06	2.14	19.17	46.00	-26.83	QP
4	377.2591	6.47	15.05	2.7	24.22	46.00	-21.78	QP
5	647.3856	7.63	19.49	3.48	30.60	46.00	-15.40	QP
6	881.4067	7.43	22.03	4.01	33.47	46.00	-12.53	QP

Remarks: 1. Result=Reading+Antenna+Cable  
 2. If Peak Result complies with QP Limit, QP Result is deemed to comply with QP Limit.

Test mode:	Charge + Transmitting	Horizontal
------------	-----------------------	------------



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna (dB/m)	Cable (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	35.4992	6.57	11.21	0.96	18.74	40.00	-21.26	QP
2	47.1600	6.58	12.27	1.08	19.93	40.00	-20.07	QP
3	98.4865	6.01	11.87	1.5	19.38	43.50	-24.12	QP
4	225.3079	6.62	11.11	2.15	19.88	46.00	-26.12	QP
5	410.3824	6.95	15.71	2.77	25.43	46.00	-20.57	QP
6	661.1504	8.18	19.54	3.51	31.23	46.00	-14.77	QP

Remarks: 1. Result=Reading+Antenna+Cable  
 2. If Peak Result complies with QP Limit, QP Result is deemed to comply with QP Limit.

### 6.6.2 Transmitter emission above 1GHz

Test mode:		802.11b(1Mbps)		Test channel:		Lowest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)		H/V
4824.000	53.54	-4.26	49.28	74	-24.72	peak	H
4824.000	36.59	-4.26	32.33	54	-21.67	AVG	H
7236.000	51.06	1.18	52.24	74	-21.76	peak	H
7236.000	37.95	1.18	39.13	54	-14.87	AVG	H
4824.000	55.76	-4.26	51.50	74	-22.50	peak	V
4824.000	39.81	-4.26	35.55	54	-18.45	AVG	V
7236.000	50.46	1.18	51.64	74	-22.36	peak	V
7236.000	36.77	1.18	37.95	54	-16.05	AVG	V

Test mode:		802.11b(1Mbps)		Test channel:		Middle	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)		H/V
4884.000	52.63	-4.12	48.51	74	-25.49	peak	H
4884.000	36.31	-4.12	32.19	54	-21.81	AVG	H
7326.000	49.61	1.46	51.07	74	-22.93	peak	H
7326.000	35.16	1.46	36.62	54	-17.38	AVG	H
4884.000	52.32	-4.12	48.20	74	-25.80	peak	V
4884.000	36.04	-4.12	31.92	54	-22.08	AVG	V
7326.000	48.50	1.46	49.96	74	-24.04	peak	V
7326.000	35.74	1.46	37.20	54	-16.80	AVG	V

Test mode:		802.11b(1Mbps)		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4944.000	52.31	-4.03	48.28	74	-25.72	peak	H
4944.000	37.72	-4.03	33.69	54	-20.31	AVG	H
7416.000	50.18	1.66	51.84	74	-22.16	peak	H
7416.000	36.64	1.66	38.30	54	-15.70	AVG	H
4944.000	53.40	-4.03	49.37	74	-24.63	peak	V
4944.000	38.53	-4.03	34.50	54	-19.50	AVG	V
7416.000	49.89	1.66	51.55	74	-22.45	peak	V
7416.000	36.45	1.66	38.11	54	-15.89	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:

$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$

2) Scan from 9kHz to 25GHz, The disturbance above 10GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

Test mode:		802.11g(6Mbps)		Test channel:		Lowest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4824.000	52.48	-4.26	48.22	74	-25.78	peak	H
4824.000	36.19	-4.26	31.93	54	-22.07	AVG	H
7236.000	50.42	1.18	51.60	74	-22.40	peak	H
7236.000	38.89	1.18	40.07	54	-13.93	AVG	H
4824.000	55.54	-4.26	51.28	74	-22.72	peak	V
4824.000	39.67	-4.26	35.41	54	-18.59	AVG	V
7236.000	51.09	1.18	52.27	74	-21.73	peak	V
7236.000	36.16	1.18	37.34	54	-16.66	AVG	V

Test mode:		802.11g(6Mbps)		Test channel:		Middle	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4884.000	52.30	-4.12	48.18	74	-25.82	peak	H
4884.000	36.48	-4.12	32.36	54	-21.64	AVG	H
7326.000	48.49	1.46	49.95	74	-24.05	peak	H
7326.000	36.75	1.46	38.21	54	-15.79	AVG	H
4884.000	54.12	-4.12	50.00	74	-24.00	peak	V
4884.000	37.63	-4.12	33.51	54	-20.49	AVG	V
7326.000	49.52	1.46	50.98	74	-23.02	peak	V
7326.000	36.60	1.46	38.06	54	-15.94	AVG	V

Test mode:		802.11g(6Mbps)		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4944.000	52.16	-4.03	48.13	74	-25.87	peak	H
4944.000	37.77	-4.03	33.74	54	-20.26	AVG	H
7416.000	50.74	1.66	52.40	74	-21.60	peak	H
7416.000	36.88	1.66	38.54	54	-15.46	AVG	H
4944.000	53.47	-4.03	49.44	74	-24.56	peak	V
4944.000	37.23	-4.03	33.20	54	-20.80	AVG	V
7416.000	50.22	1.66	51.88	74	-22.12	peak	V
7416.000	37.68	1.66	39.34	54	-14.66	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:

$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$

2) Scan from 9kHz to 25GHz, The disturbance above 10GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

Test mode:		802.11n20 (6.5Mbps)		Test channel:		Lowest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4824.000	54.02	-4.26	49.76	74	-24.24	peak	H
4824.000	37.06	-4.26	32.80	54	-21.20	AVG	H
7236.000	51.88	1.18	53.06	74	-20.94	peak	H
7236.000	38.27	1.18	39.45	54	-14.55	AVG	H
4824.000	55.90	-4.26	51.64	74	-22.36	peak	V
4824.000	39.31	-4.26	35.05	54	-18.95	AVG	V
7236.000	52.12	1.18	53.30	74	-20.70	peak	V
7236.000	36.93	1.18	38.11	54	-15.89	AVG	V

Test mode:		802.11n20 (6.5Mbps)		Test channel:		Middle	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4884.000	52.63	-4.12	48.51	74	-25.49	peak	H
4884.000	37.00	-4.12	32.88	54	-21.12	AVG	H
7326.000	50.12	1.46	51.58	74	-22.42	peak	H
7326.000	35.11	1.46	36.57	54	-17.43	AVG	H
4884.000	54.02	-4.12	49.90	74	-24.10	peak	V
4884.000	37.07	-4.12	32.95	54	-21.05	AVG	V
7326.000	49.98	1.46	51.44	74	-22.56	peak	V
7326.000	35.82	1.46	37.28	54	-16.72	AVG	V

Test mode:		802.11n20 (6.5Mbps)		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4944.000	53.10	-4.03	49.07	74	-25.72	peak	H
4944.000	38.94	-4.03	34.91	54	-20.31	AVG	H
7416.000	49.98	1.66	51.64	74	-22.16	peak	H
7416.000	37.40	1.66	39.06	54	-15.70	AVG	H
4944.000	53.65	-4.03	49.62	74	-24.63	peak	V
4944.000	37.29	-4.03	33.26	54	-19.50	AVG	V
7416.000	51.12	1.66	52.78	74	-22.45	peak	V
7416.000	37.42	1.66	39.08	54	-15.89	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:

$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$

2) Scan from 9kHz to 25GHz, The disturbance above 10GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.



### 6.7 Restricted bands around fundamental frequency

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

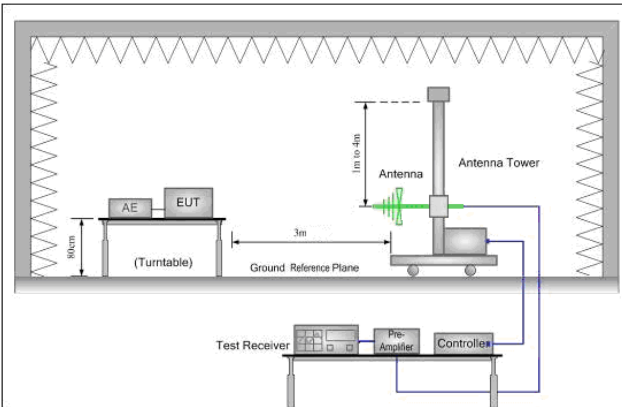


Figure 1. 30MHz to 1GHz

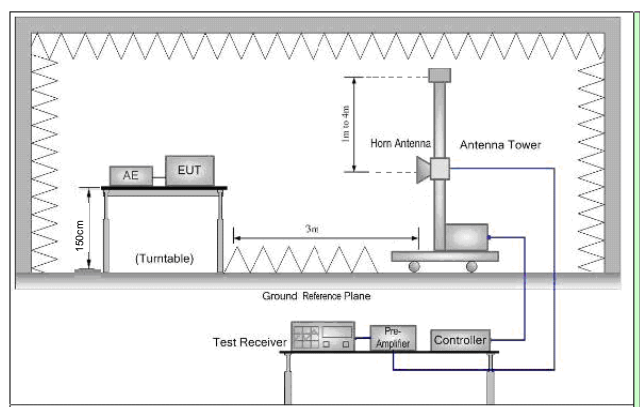


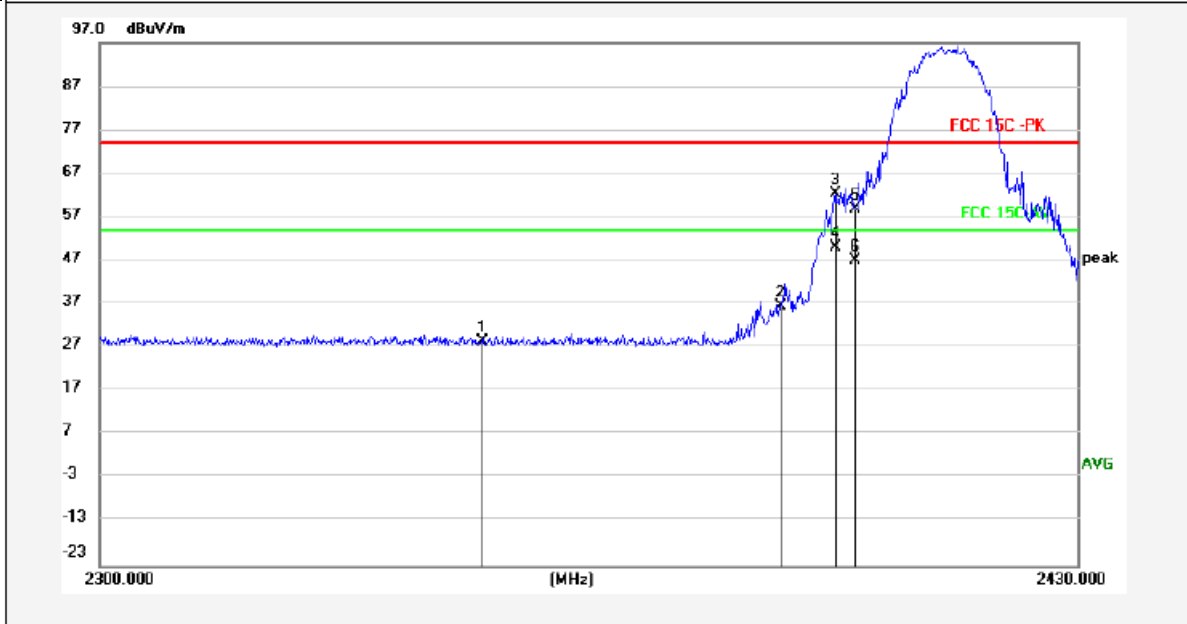
Figure 2. Above 1 GHz

Test Procedure:	<p>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 chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>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 chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>Note: For the radiated emission test above 1GHz:</p> <p>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.</p> <p>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.</p> <p>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.</p>
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	<p>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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>f. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel</p> <p>g. Test the EUT in the lowest channel , the Highest channel</p> <p>h. Repeat above procedures until all frequencies measured was complete.</p>
Exploratory Test Mode:	<p>Transmitting with all kind of modulations, data rates. Transmitting mode, Charge + Transmitting mode.</p>
Final Test Mode:	<p>Pretest the EUT at Transmitting mode and Charge +Transmitting mode, found the Charge +Transmitting mode which it is worse case . Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; Only the worst case is recorded in the report.</p>
Test Results:	<p>Pass</p>

Test data:

Test mode:	11b	Test channel:	Lowest	Polarization:	Horizontal
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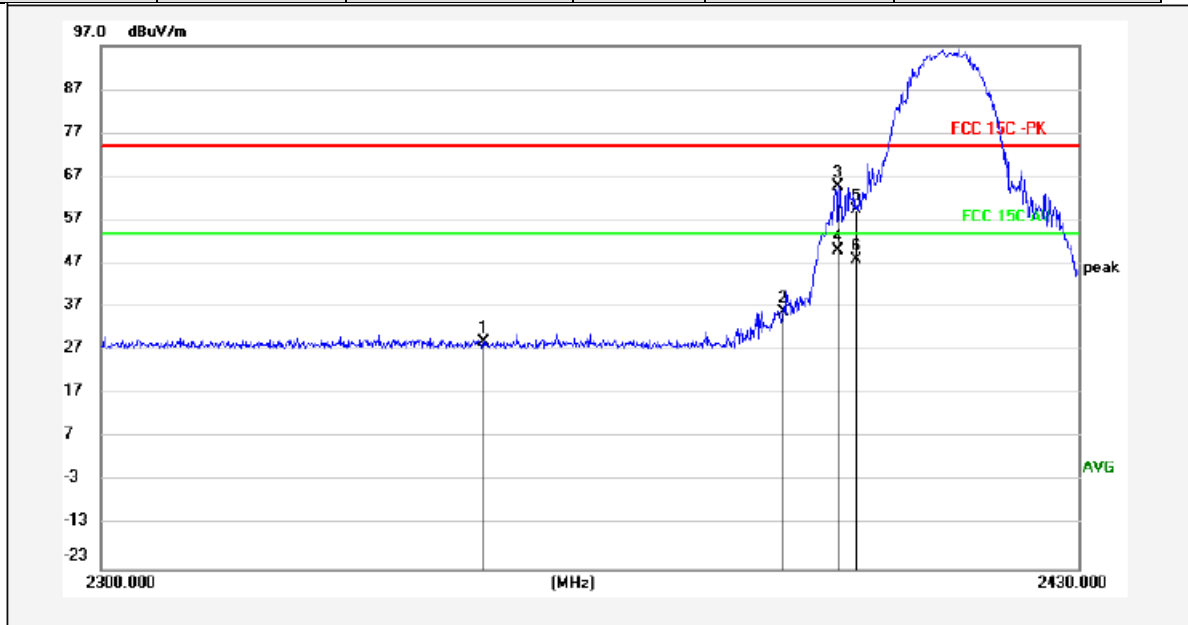


No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2350.000	33.95	27.13	-32.61	28.47	74.00	-45.53	peak	
2	2390.000	41.85	27.2	-32.52	36.53	74.00	-37.47	peak	
3	2397.240	67.61	27.22	-32.51	62.32	74.00	-11.68	peak	
4	2397.240	55.29	27.22	-32.51	50.00	54.00	-4.00	AVG	
5	2400.000	63.90	27.22	-32.5	58.62	74.00	-15.38	peak	
6	2400.000	52.31	27.22	-32.5	47.03	54.00	-6.97	AVG	

Remarks: 1. Result=Reading+Antenna+Cable

Note: The emission levels that are 20dB below the official limit are not reported.

Test mode:	11b	Test channel:	Lowest	Polarization:	Vertical
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No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2350.000	34.50	27.1	-32.61	28.99	74.00	-45.01	peak	
2	2390.000	41.42	27.18	-32.52	36.08	74.00	-37.92	peak	
3	2397.370	70.02	27.19	-32.51	64.70	74.00	-9.30	peak	
4	2397.370	55.36	27.19	-32.51	50.04	54.00	-3.96	AVG	
5	2400.000	64.64	27.2	-32.5	59.34	74.00	-14.66	peak	
6	2400.000	53.30	27.2	-32.5	48.00	54.00	-6.00	AVG	

Remarks: 1. Result=Reading+Antenna+Cable

Note: The emission levels that are 20dB below the official limit are not reported.

Test mode:	11b	Test channel:	Highest	Polarization:	Vertical
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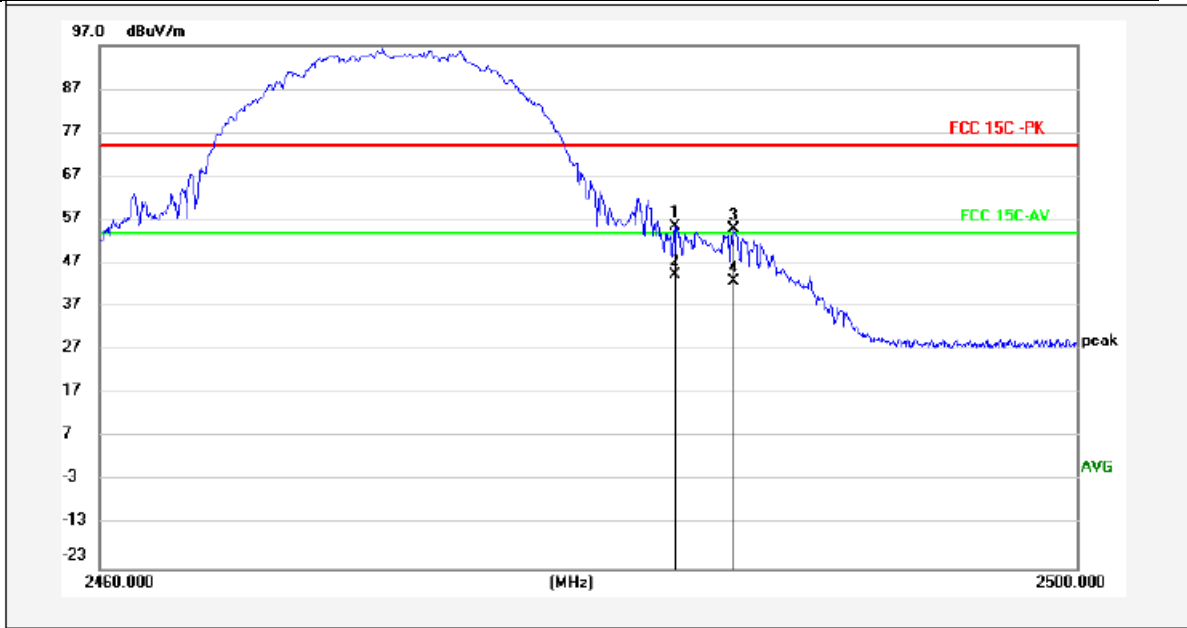


No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2483.500	58.65	27.37	-32.58	53.44	74.00	-20.56	peak	
2	2483.500	48.21	27.37	-32.58	43.00	54.00	-11.00	AVG	
3	2485.800	62.25	27.37	-32.58	57.04	74.00	-16.96	peak	
4	2485.800	50.30	27.37	-32.58	45.09	54.00	-8.91	AVG	

Remarks: 1. Result=Reading+Antenna+Cable

Note: The emission levels that are 20dB below the official limit are not reported.

Test mode:	11b	Test channel:	Highest	Polarization:	Horizontal
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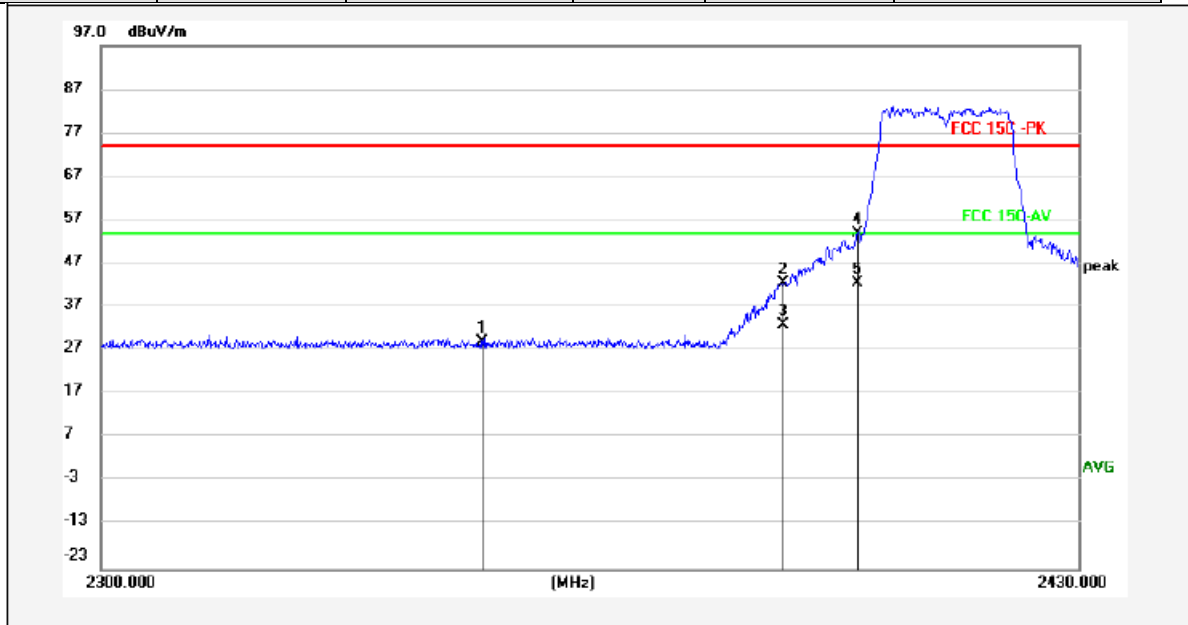


No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2483.500	60.78	27.37	-32.58	55.57	74.00	-18.43	peak	
2	2483.500	49.57	27.37	-32.58	44.36	54.00	-9.64	AVG	
3	2485.920	60.18	27.37	-32.58	54.97	74.00	-19.03	peak	
4	2485.920	48.21	27.37	-32.58	43.00	54.00	-11.00	AVG	

Remarks: 1. Result=Reading+Antenna+Cable

Note: The emission levels that are 20dB below the official limit are not reported.

Test mode:	11g	Test channel:	Lowest	Polarization:	Horizontal
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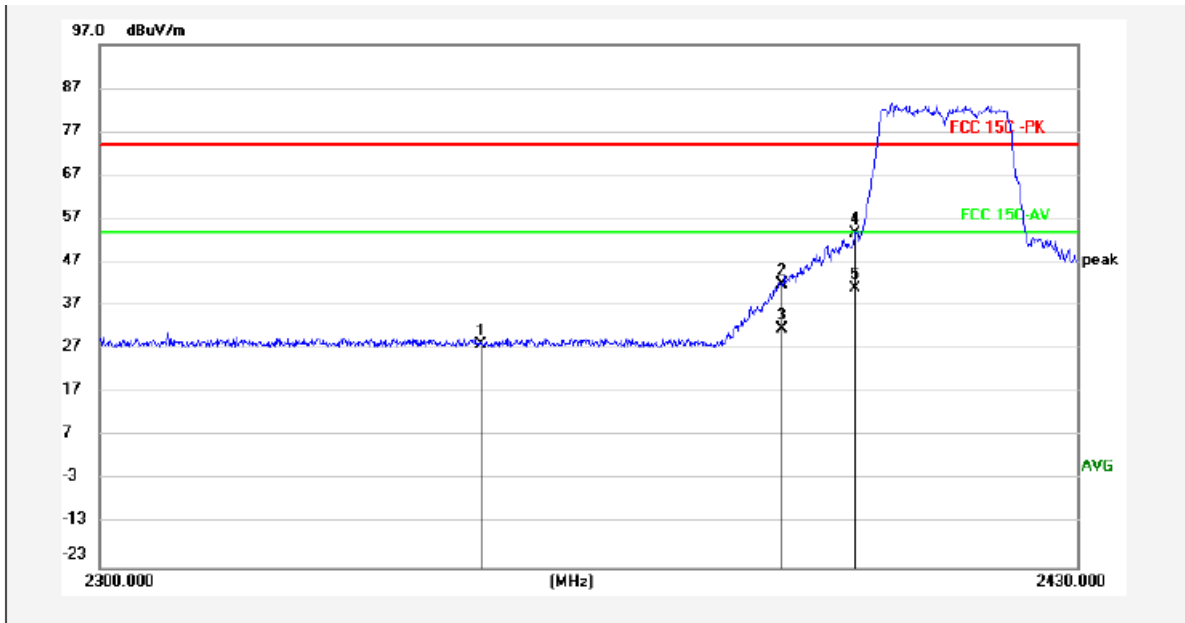


No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2350.000	34.54	27.1	-32.61	29.03	74.00	-44.97	peak	
2	2390.000	48.01	27.18	-32.52	42.67	74.00	-31.33	peak	
3	2390.000	38.22	27.18	-32.52	32.88	54.00	-21.12	AVG	
4	2400.000	59.39	27.2	-32.5	54.09	74.00	-19.91	peak	
5	2400.000	47.86	27.2	-32.5	42.56	54.00	-11.44	AVG	

Remarks: 1. Result=Reading+Antenna+Cable

Note: The emission levels that are 20dB below the official limit are not reported.

Test mode:	11g	Test channel:	Lowest	Polarization:	Vertical
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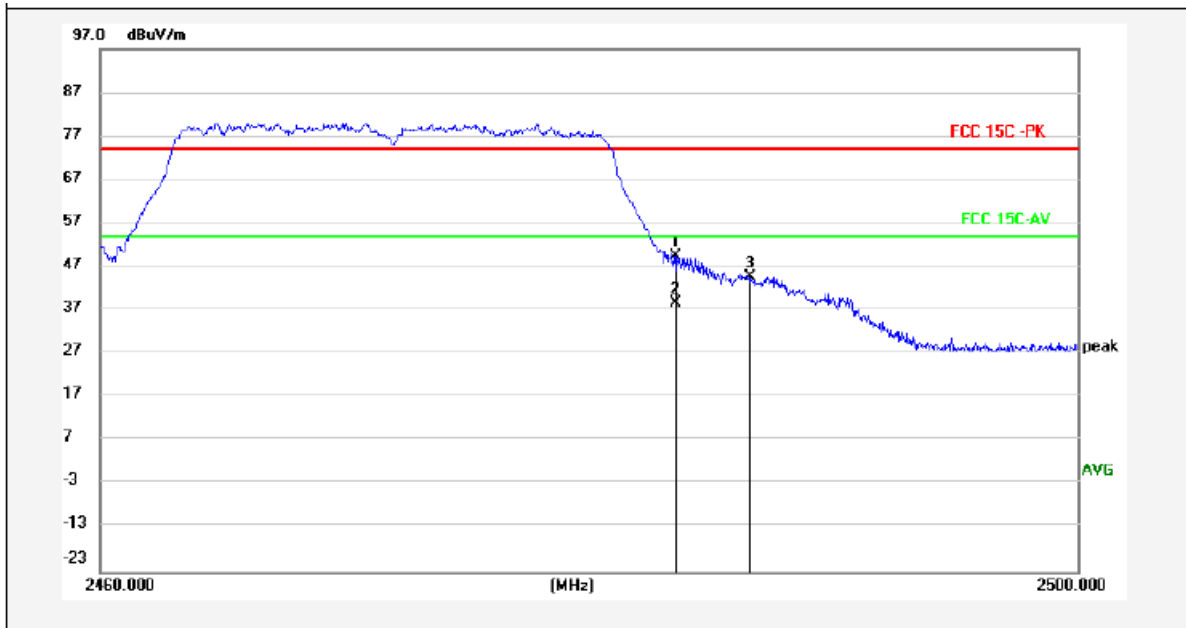
No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2350.000	33.73	27.13	-32.61	28.25	74.00	-45.75	peak	
2	2390.000	47.41	27.2	-32.52	42.09	74.00	-31.91	peak	
3	2390.000	37.01	27.2	-32.52	31.69	54.00	-22.31	AVG	
4	2400.000	58.82	27.22	-32.5	53.54	74.00	-20.46	peak	
5	2400.000	46.31	27.22	-32.5	41.03	54.00	-12.97	AVG	

Remarks: 1. Result=Reading+Antenna+Cable

Note: The emission levels that are 20dB below the official limit are not reported.



Test mode:	11g	Test channel:	Highest	Polarization:	Horizontal
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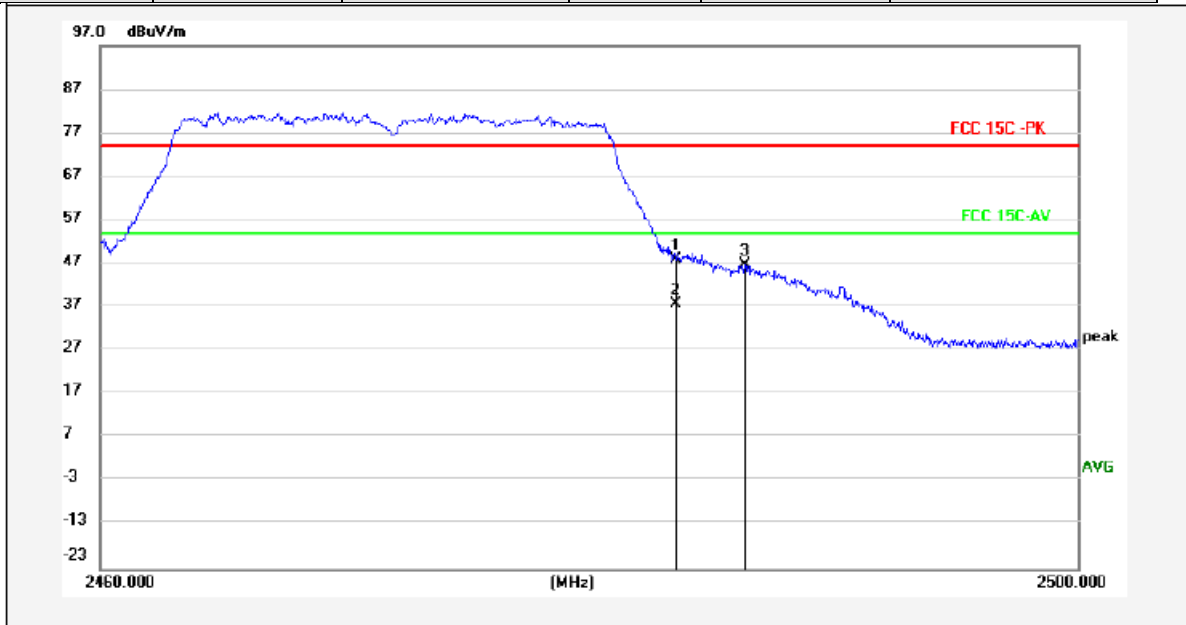


No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2483.500	54.73	27.37	-32.58	49.52	74.00	-24.48	peak	
2	2483.500	43.91	27.37	-32.58	38.70	54.00	-15.30	AVG	
3	2486.560	49.88	27.37	-32.58	44.67	74.00	-29.33	peak	

Remarks: 1. Result=Reading+Antenna+Cable

Note: The emission levels that are 20dB below the official limit are not reported.

Test mode:	11g	Test channel:	Highest	Polarization:	Vertical
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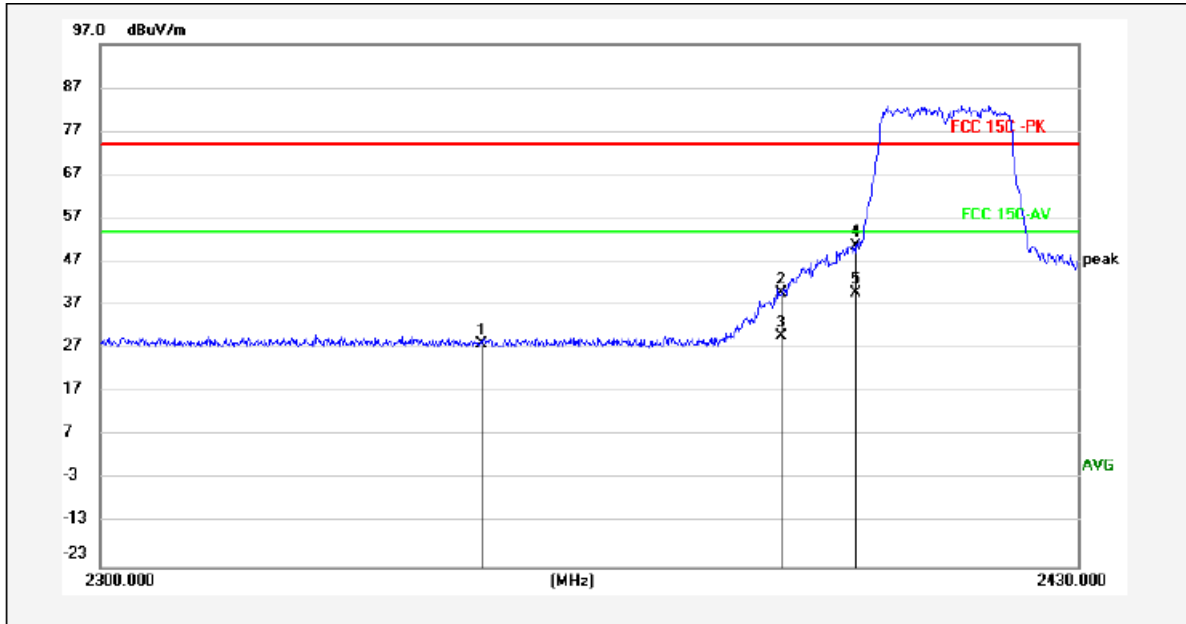


No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2483.500	53.30	27.37	-32.58	48.09	74.00	-25.91	peak	
2	2483.500	42.87	27.37	-32.58	37.66	54.00	-16.34	AVG	
3	2486.320	51.86	27.37	-32.58	46.65	74.00	-27.35	peak	

Remarks: 1. Result=Reading+Antenna+Cable

Note: The emission levels that are 20dB below the official limit are not reported.

Test mode:	11n HT20	Test channel:	Lowest	Polarization:	Horizontal
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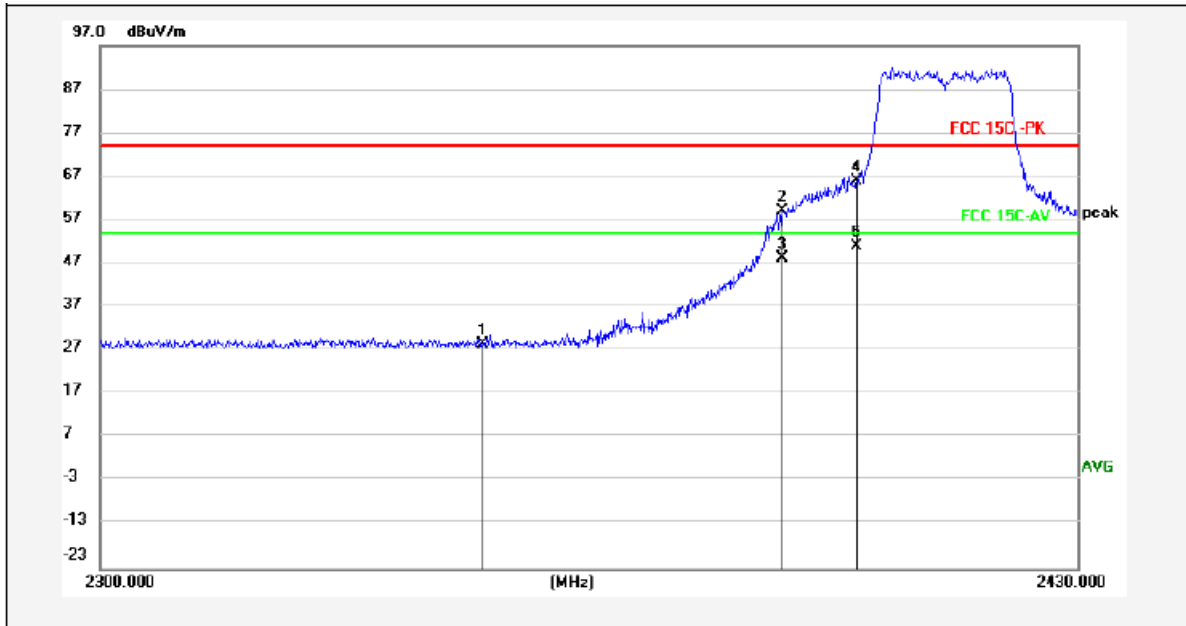


No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2350.000	33.57	27.13	-32.61	28.09	74.00	-45.91	peak	
2	2390.000	45.11	27.2	-32.52	39.79	74.00	-34.21	peak	
3	2390.000	35.32	27.2	-32.52	30.00	54.00	-24.00	AVG	
4	2400.000	56.05	27.22	-32.5	50.77	74.00	-23.23	peak	
5	2400.000	45.27	27.22	-32.5	39.99	54.00	-14.01	AVG	

Remarks: 1. Result=Reading+Antenna+Cable

Note: The emission levels that are 20dB below the official limit are not reported.

Test mode:	11n HT20	Test channel:	Lowest	Polarization:	Vertical
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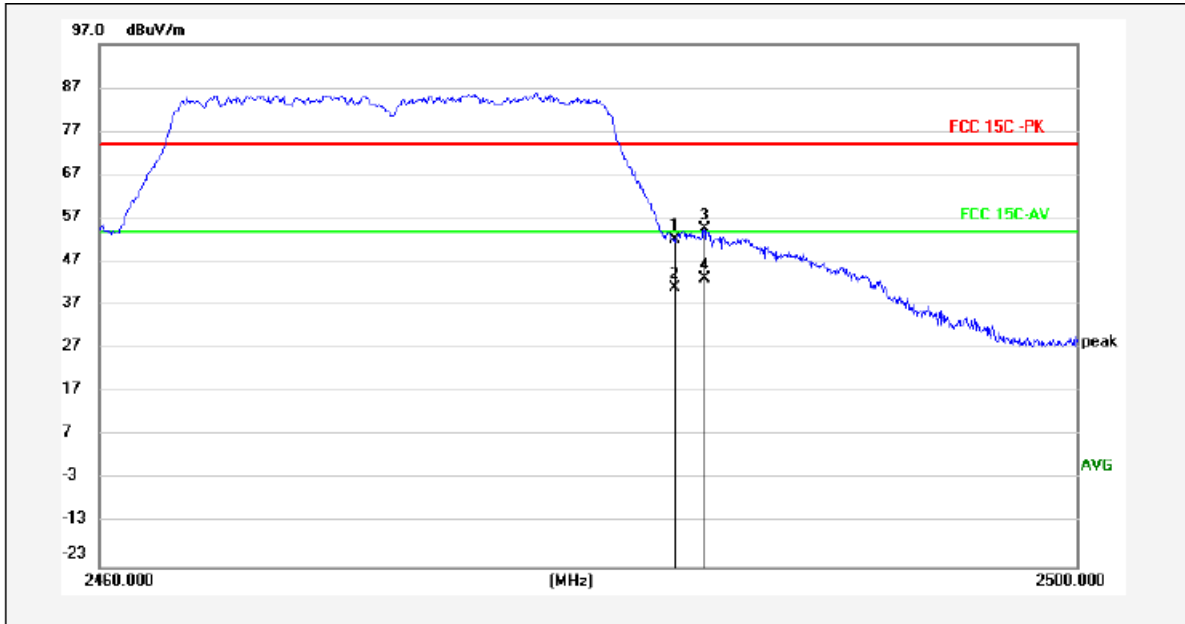


No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2350.000	33.90	27.13	-32.61	28.42	74.00	-45.58	peak	
2	2390.000	64.45	27.2	-32.52	59.13	74.00	-14.87	peak	
3	2390.000	53.43	27.2	-32.52	48.11	54.00	-5.89	AVG	
4	2400.000	71.38	27.22	-32.5	66.10	74.00	-7.90	peak	
5	2400.000	56.37	27.22	-32.5	51.09	54.00	-2.91	AVG	

Remarks: 1. Result=Reading+Antenna+Cable

Note: The emission levels that are 20dB below the official limit are not reported.

Test mode:	11n HT20	Test channel:	Highest	Polarization:	Vertical
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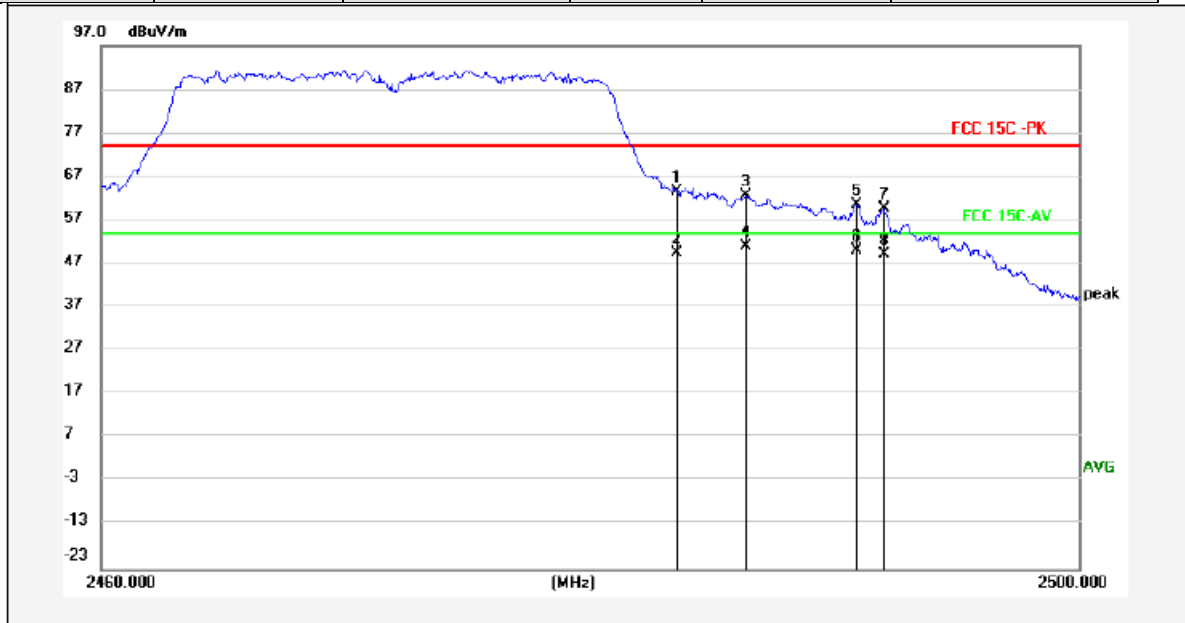


No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2483.500	57.22	27.37	-32.58	52.01	74.00	-21.99	peak	
2	2483.500	46.32	27.37	-32.58	41.11	54.00	-12.89	AVG	
3	2484.720	59.73	27.37	-32.58	54.52	74.00	-19.48	peak	
4	2484.720	48.22	27.37	-32.58	43.01	54.00	-10.99	AVG	

Remarks: 1. Result=Reading+Antenna+Cable

Note: The emission levels that are 20dB below the official limit are not reported.

Test mode:	11n HT20	Test channel:	Highest	Polarization:	Horizontal
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No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2483.500	68.69	27.37	-32.58	63.48	74.00	-10.52	peak	
2	2483.500	54.54	27.37	-32.58	49.33	54.00	-4.67	AVG	
3	2486.320	67.80	27.37	-32.58	62.59	74.00	-11.41	peak	
4	2486.320	56.21	27.37	-32.58	51.00	54.00	-3.00	AVG	
5	2490.880	65.72	27.38	-32.58	60.52	74.00	-13.48	peak	
6	2490.880	55.21	27.38	-32.58	50.01	54.00	-3.99	AVG	
7	2491.960	64.75	27.38	-32.58	59.55	74.00	-14.45	peak	
8	2491.960	54.30	27.38	-32.58	49.10	54.00	-4.90	AVG	

Remarks: 1. Result=Reading+Antenna+Cable

Note: The emission levels that are 20dB below the official limit are not reported.

## 7 Photographs - EUT Test Setup

### 7.1 Radiated Spurious Emission

9KHz~30MHz:



30MHz~1GHz:



Above 1GHz:



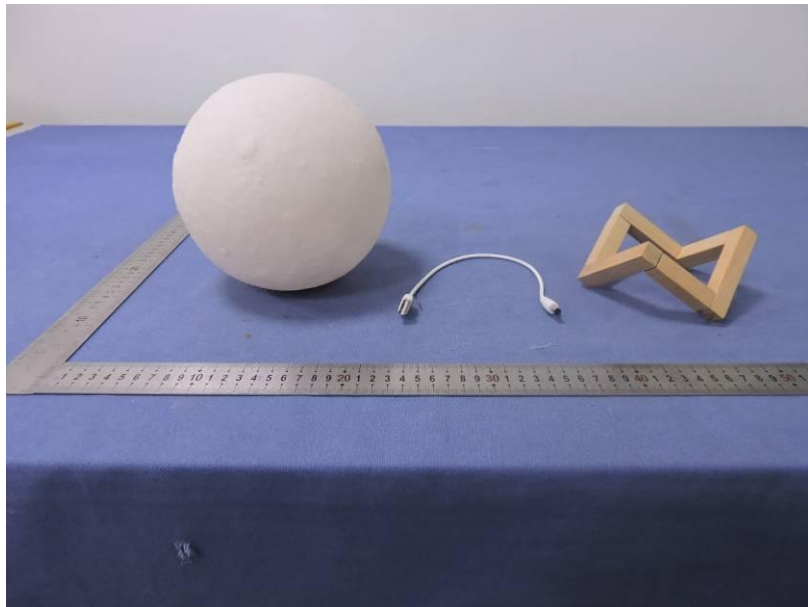
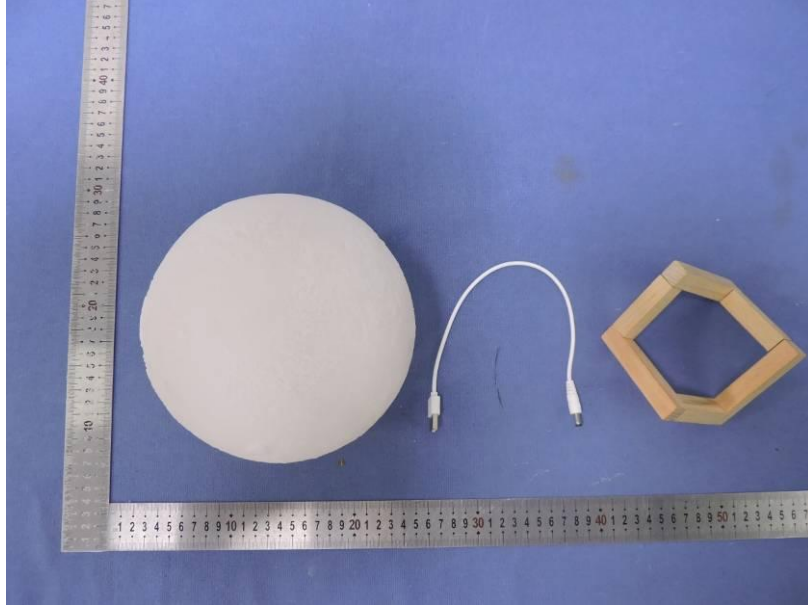
## 7.2 Conducted Emission

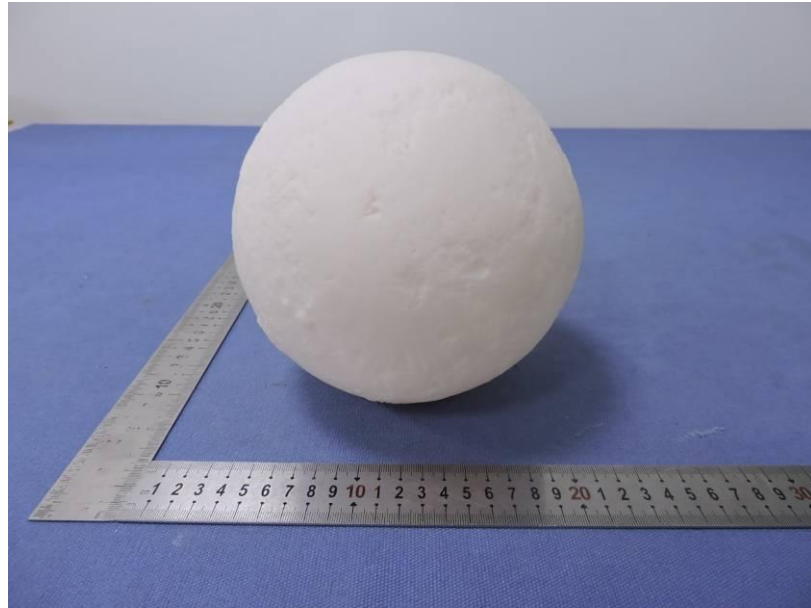


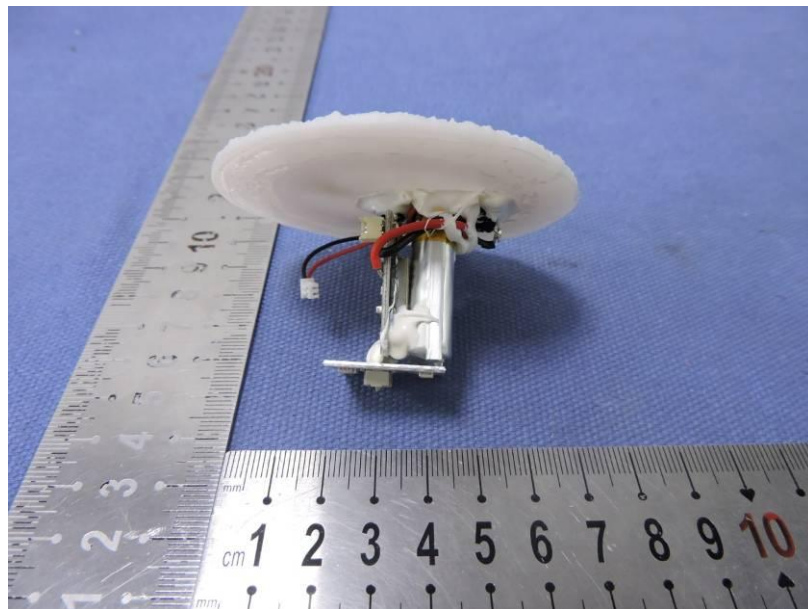
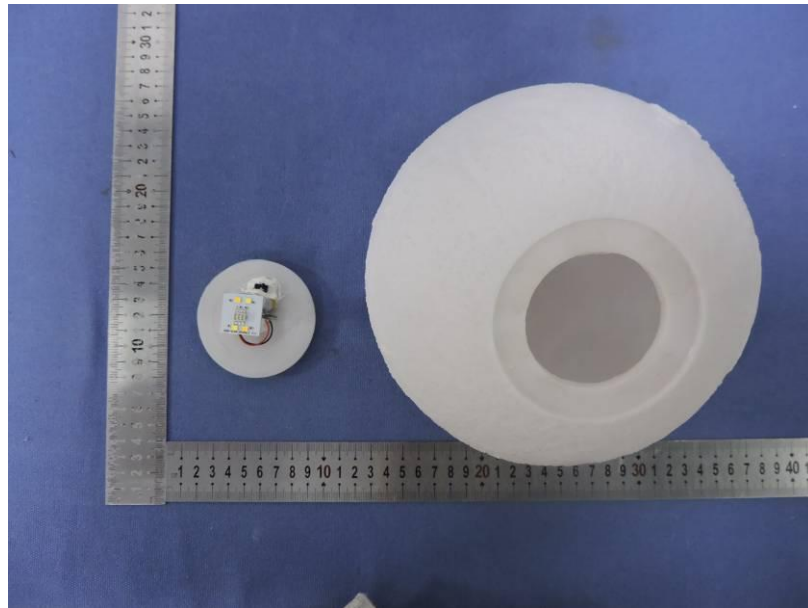


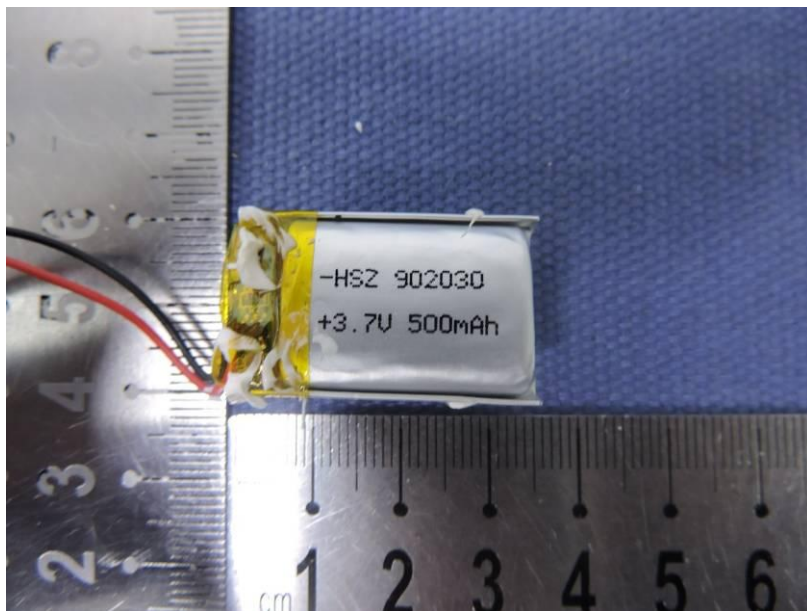
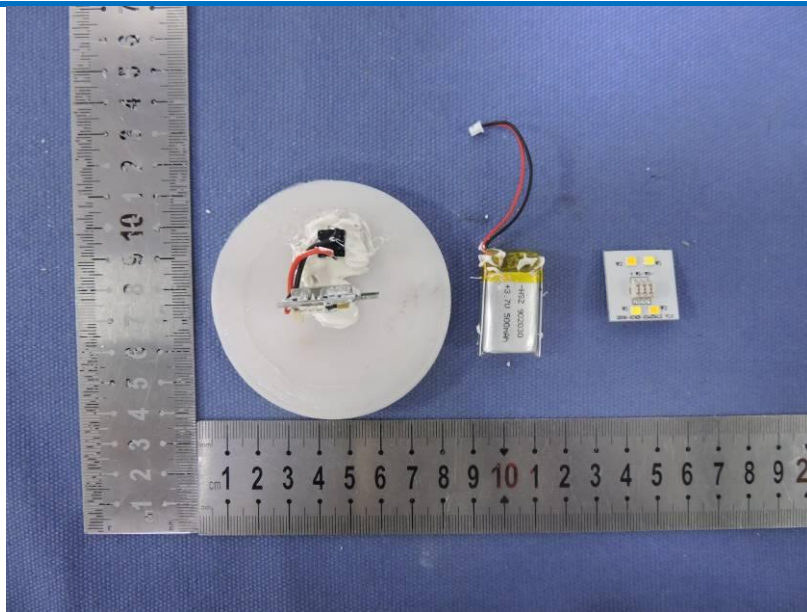
## 8 Photographs - EUT Constructional Details

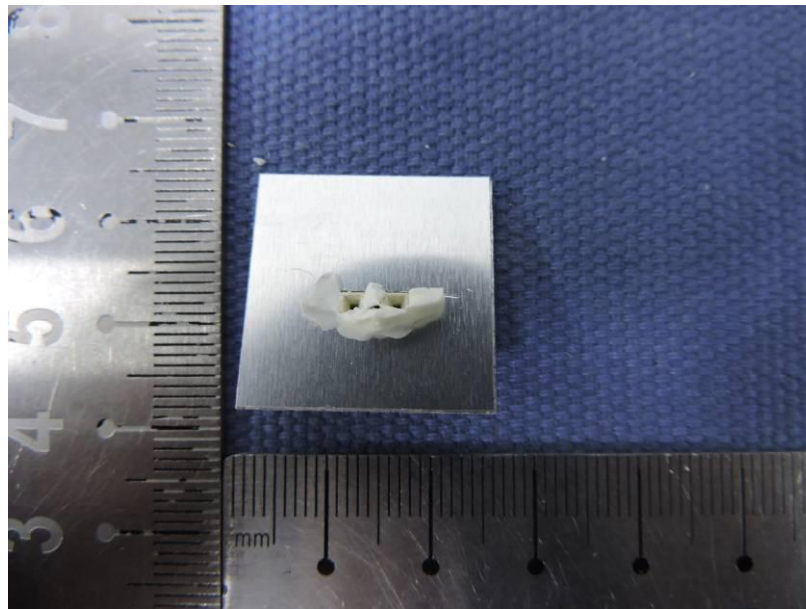
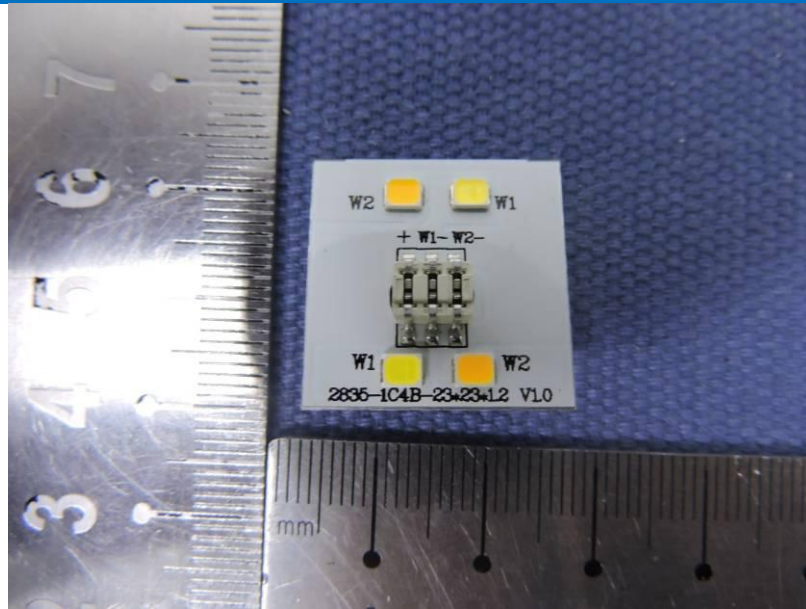
Test model No.: BRT-A180-1-0.7DW

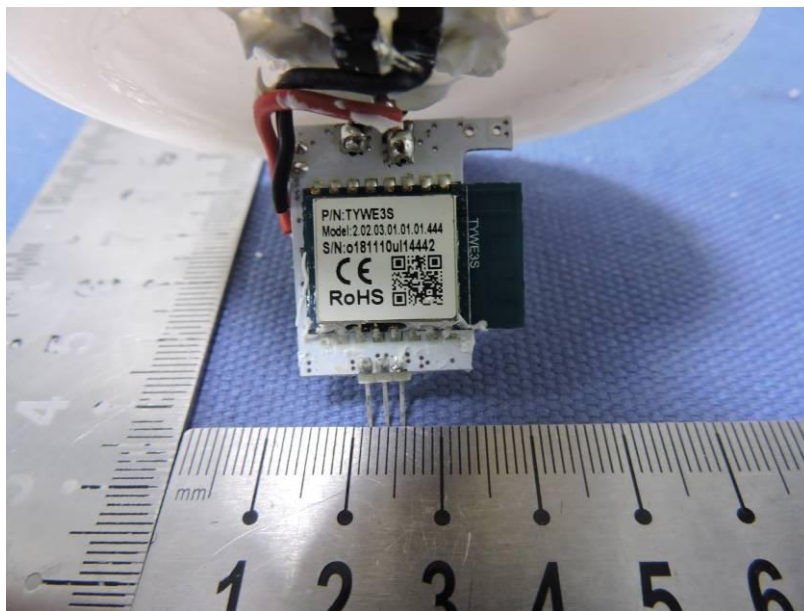
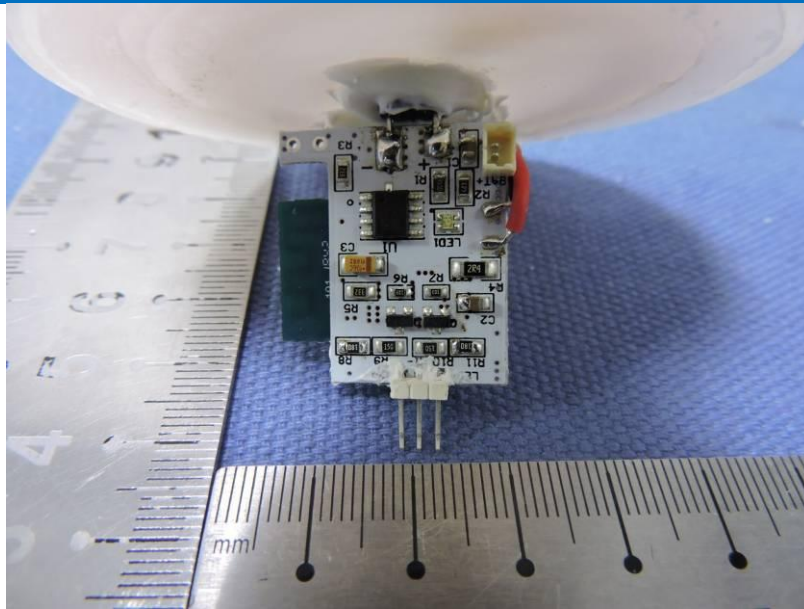


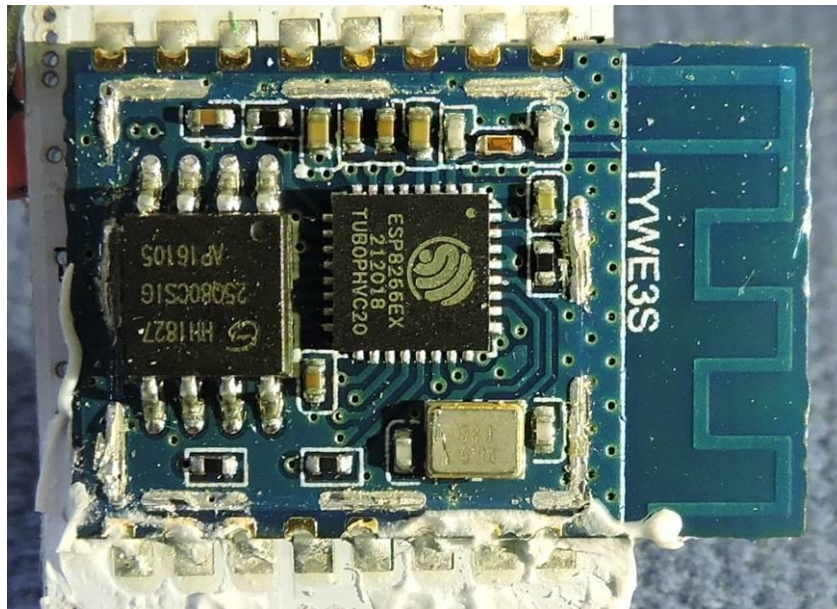
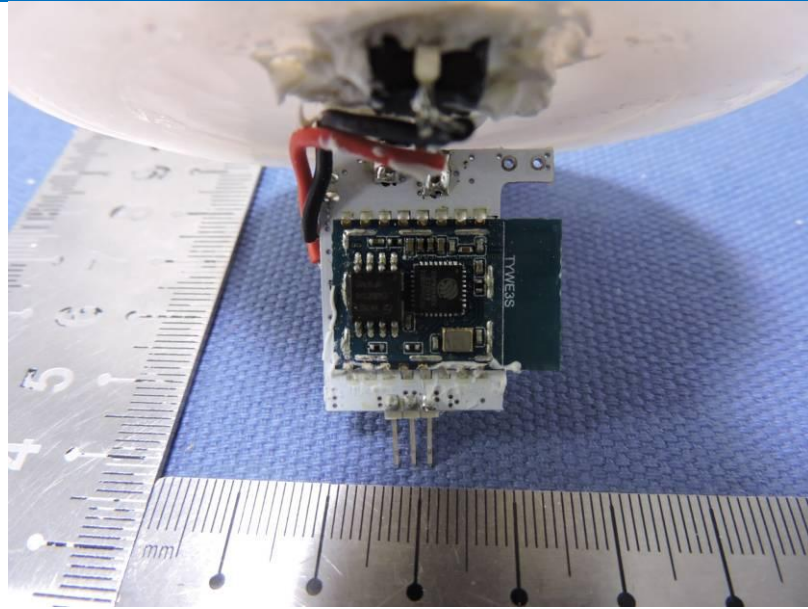












**THE END**