FCC RADIO TEST REPORT

FCC ID: 2ARYK-YS002

Product： Remote LED Light

Trade Name： N/A

Model Name： YS002,

Serial Model： YS003, YS004, YS005, YS005A, YS006, YS007, YS008, YS008IR, YS008PIR, YS009, YS012, YS013, YS027, YS028, YS028-1, YS028-2

Report No.： UNIA2018121010FR-01

Prepared for

Ningbo YOVI Electronics Technology CO.,LTD

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Prepared by

Shenzhen United Testing Technology Co., Ltd.

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TEST RESULT CERTIFICATION

Applicant's name ..... :	Ningbo YOVI Electronics Technology CO.,LTD
Address ..... :	NO.312 Building, No.11 Xincheng Road, Ningbo Jiangbei Private Industrial Zone, Ningbo. China
Manufacture's Name..... :	Ningbo YOVI Electronics Technology CO.,LTD
Address ..... :	NO.312 Building, No.11 Xincheng Road, Ningbo Jiangbei Private Industrial Zone, Ningbo. China
Product description	
Product name ..... :	Remote LED Light
Trade Mark ..... :	N/A
Model and/or type reference :	YS002, YS003, YS004, YS005, YS005A, YS006, YS007, YS008, YS008IR, YS008PIR, YS009, YS012, YS013, YS027, YS028, YS028-1, YS028-2
Standards ..... :	FCC Rules and Regulations Part 15 Subpart C Section 15.249 ANSI C63.10: 2013

This device described above has been tested by Shenzhen United Testing Technology Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test ..... :	
Date (s) of performance of tests ..... :	Nov 26, 2018 ~ Dec 10, 2018
Date of Issue ..... :	Dec 10, 2018
Test Result ..... :	Pass

Prepared by: Kahn.Yang

Kahn yang/Editor

Reviewer: Sherwin Qian

Sherwin Qian/Supervisor

Approved & Authorized Signer: Liuze

Liuze/Manager

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1 TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

DESCRIPTION OF TEST	RESULT
CONDUCTED EMISSIONS TEST	N/A
RADIATED EMISSION TEST	COMPLIANT
BAND EDGE	COMPLIANT
OCCUPIED BANDWIDTH MEASUREMENT	COMPLIANT
ANTENNA REQUIREMENT	COMPLIANT

1.2 TEST FACILITY

Test Firm : Shenzhen United Testing Technology Co., Ltd.

Address : 2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.The testing quality system of our laboratory meets with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

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

CNAS-LAB Code: L6494

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of testing Laboratories.

Designation Number: CN1227

Test Firm Registration Number: 674885

The 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.

1.3 MEASUREMENT UNCERTAINTY

Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty(9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty(30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty(Above 1GHz)	=	4.06dB, k=2

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Remote LED Light
Trade Mark	N/A
Model Name	YS002
Serial No.	YS003, YS004, YS005, YS005A, YS006, YS007, YS008, YS008IR, YS008PIR, YS009, YS012, YS013, YS027, YS028, YS028-1, YS028-2
Model Difference	Only the model names are different for the marketing requirement.
FCC ID	2ARYK-YS002
Antenna Type	PCB Antenna
Antenna Gain	0dBi
Operation frequency	2450MHz
Number of Channels	1
Modulation Type	GFSK
Battery	2 pcs AA batteries
Power Source	DC 3.0V from Battery
Adapter Model	N/A

Table for auxiliary equipment:

Equipment Description	Manufacturer	Model	Calibration Due Date
--	--	--	--

2.2 Carrier Frequency of Channels

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2450	--	--	--	--	--	-

2.3 Operation of EUT during testing

Operating Mode
The mode is used: Keep Transmitting at 2450MHz

2.4 DESCRIPTION OF TEST SETUP

Operation of EUT during Conducted testing:

N/A

Operation of EUT during Radiation and Above1GHz Radiation testing:

EUT

2.5 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
CONDUCTED EMISSIONS TEST					
1	AMN	Schwarzbeck	NNLK8121	8121370	2019.9.9
2	AMN	ETS	3810/2	00020199	2019.9.9
3	EMI TEST RECEIVER	Rohde&Schwarz	ESCI	101210	2019.9.9
4	AAN	TESEQ	T8-Cat6	38888	2019.9.9
RADIATED EMISSION TEST					
1	Horn Antenna	Sunol	DRH-118	A101415	2019.9.29
2	BicoNILog Antenna	Sunol	JB1 Antenna	A090215	2019.9.29
3	PREAMP	HP	8449B	3008A00160	2019.9.9
4	PREAMP	HP	8447D	2944A07999	2019.9.9
5	EMI TEST RECEIVER	Rohde&Schwarz	ESR3	101891	2019.9.9
6	VECTOR Signal Generator	Rohde&Schwarz	SMU200A	101521	2019.9.28
7	Signal Generator	Agilent	E4421B	MY4335105	2019.9.28
8	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2019.9.28
9	MXA Signal Analyzer	Agilent	N9020A	MY51110104	2019.9.9
10	ANT Tower&Turn table Controller	Champro	EM 1000	60764	2019.9.28
11	Anechoic Chamber	Taihe Maorui	9m*6m*6m	966A0001	2019.9.9
12	Shielding Room	Taihe Maorui	6.4m*4m*3m	643A0001	2019.9.9
13	RF Power sensor	DARE	RPR3006W	15I00041SNO88	2019.3.14
14	RF Power sensor	DARE	RPR3006W	15I00041SNO89	2019.3.14
15	RF power divider	Anritsu	K241B	992289	2019.9.28
16	Wideband radio communication tester	Rohde&Schwarz	CMW500	154987	2019.9.28
17	Biconical antenna	Schwarzbeck	VHA 9103	91032360	2019.9.8
18	Biconical antenna	Schwarzbeck	VHA 9103	91032361	2019.9.8
19	Broadband Hybrid Antennas	Schwarzbeck	VULB9163	VULB9163#958	2019.9.8
20	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2019.1.12
21	Active Receive Loop Antenna	Schwarzbeck	FMZB 1919B	00023	2019.9.8
22	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170651	2019.03.14
23	Microwave Broadband Preamplifier	Schwarzbeck	BBV 9721	100472	2019.9.8
24	Active Loop Antenna	Com-Power	AL-130R	10160009	2019.05.10
25	Power Meter	KEYSIGHT	N1911A	MY50520168	2019.05.10
26	Frequency Meter	VICTOR	VC2000	997406086	2019.05.10
27	DC Power Source	HYELEC	HY5020E	055161818	2019.05.10

3 CONDUCTED EMISSIONS TEST

3.1 Conducted Power Line Emission Limit

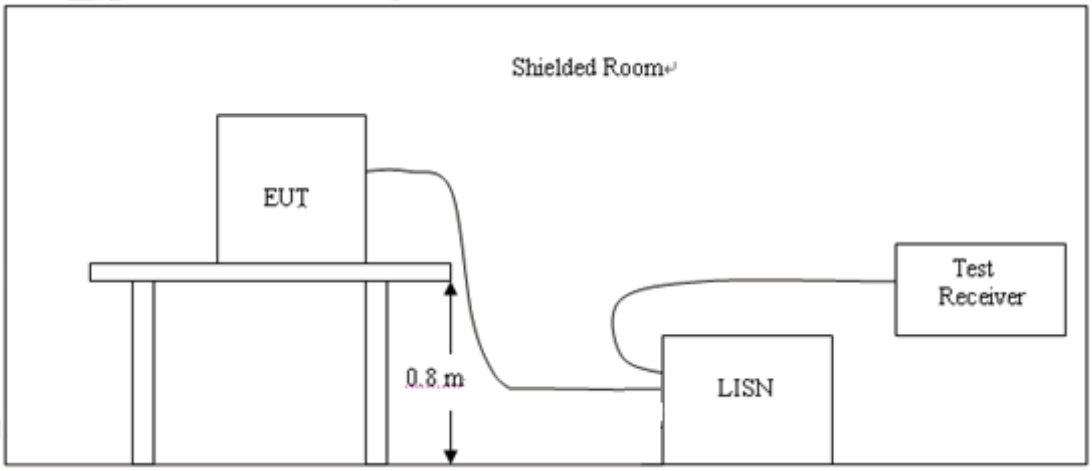
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

Frequency (MHz)	Maximum RF Line Voltage(dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15~0.50	79	66	66~56*	56~46*
0.50~5.00	73	60	56	46
5.00~30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

3.2 Test Setup



3.3 Test Procedure

1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is placed on a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
2, Support equipment, if needed, was placed as per ANSI C63.10.
3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5, All support equipments received AC power from a second LISN, if any.
6, The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7, Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

3.4 Test Result

N/A

Remark: EUT powered by AA battery, this test item not applicable.

4 RADIATED EMISSION TEST

4.1 Radiation Limit

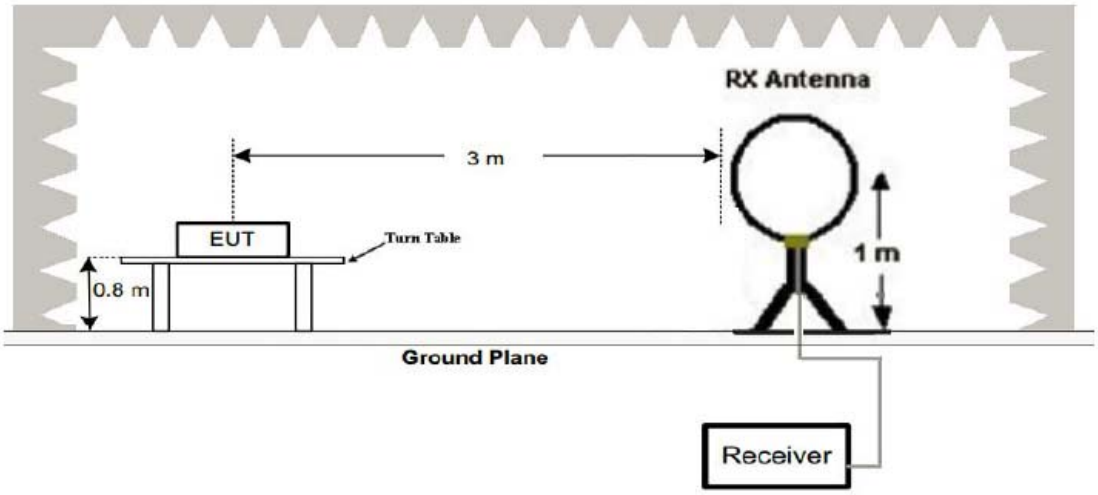
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30-88	3	40	100
88-216	3	43.5	150
216-960	3	46	200
Above 960	3	54	500

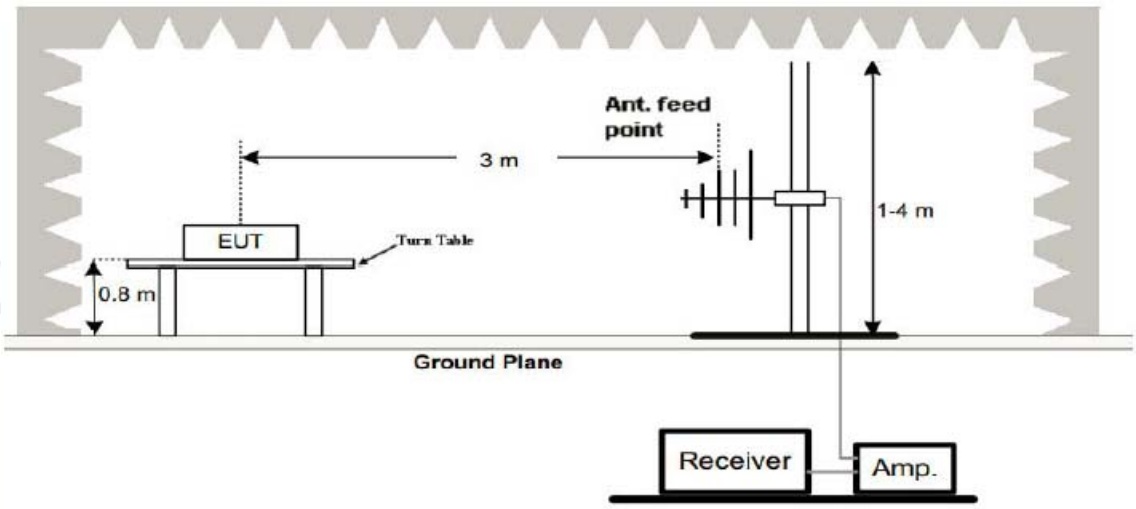
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

4.2 Test Setup

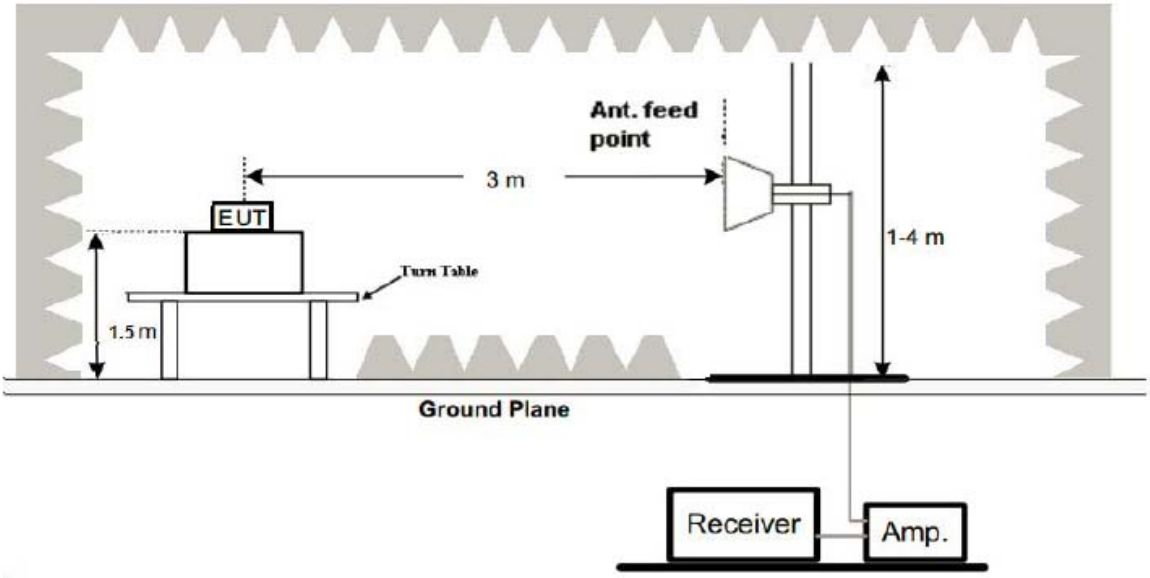
1. Radiated Emission Test-Up Frequency Below 30MHz



2. Radiated Emission Test-Up Frequency 30MHz~1GHz



3. Radiated Emission Test-Up Frequency Above 1GHz



4.3 Test Procedure

1. Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The test frequency range from 9 kHz to 25GHz per FCC PART 15.33(a).

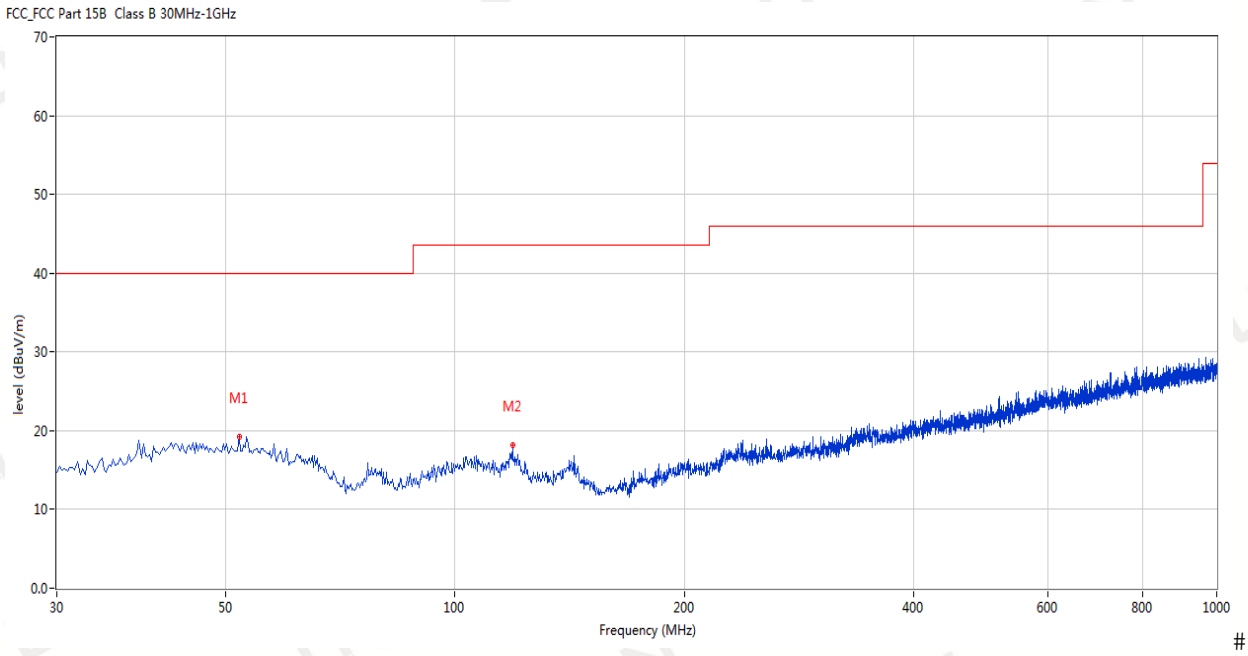
Note:
For battery operated equipment, the equipment tests shall be performed using a new battery.

4.4 Test Result

PASS
Remark:
1. Keep EUT transmitting at 2450MHz.
2. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Z axis” position was the worst, and test data recorded in this report.
3. Radiated emission test from 9 kHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 kHz to 30MHz and not recorded in this report.

Below 1GHz Test Results:

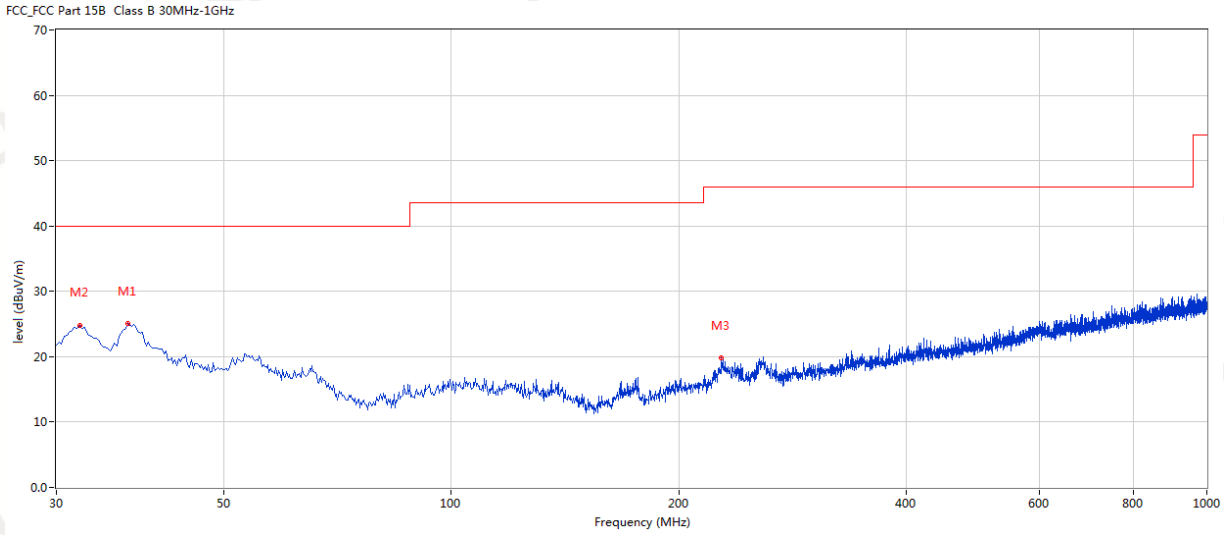
Temperature:	22℃	Relative Humidity:	48%
Test Date:	Dec 03, 2018	Pressure:	1010hPa
Test Voltage:	DC 3.0V from Battery	Polarization:	Horizontal
Test Mode:	Transmitting at 2450MHz		



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	52.062	19.19	-11.43	40.0	-20.81	Peak	12.00	100	H	Pass
2	118.975	18.17	-15.06	43.5	-25.33	Peak	336.00	200	H	Pass

Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

Temperature:	22℃	Relative Humidity:	48%
Test Date:	Dec 03, 2018	Pressure:	1010hPa
Test Voltage:	DC 3.0V from Battery	Polarization:	Vertical
Test Mode:	Transmitting at 2450MHz		



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	37.273	25.11	-13.06	40.0	-14.89	Peak	32.00	100	V	Pass
2	32.182	24.82	-14.51	40.0	-15.18	Peak	356.00	100	V	Pass
3	227.831	19.80	-12.78	46.0	-26.20	Peak	300.00	100	V	Pass

Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

Remark:
(1) Measuring frequencies from 9 kHz to the 1 GHz, Radiated emission test from 9 kHz to 30MHz was verified, and no any emission was found except system noise floor.
(2) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
(3) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120 kHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10 kHz.

Above 1 GHz Test Results:

Product:	Remote LED Light	Test Mode:	Keep transmitting at 2450MHz
Test Item:	Fundamental Radiated Emission Data	Temperature:	25℃
Test Voltage:	DC3.0V from Battery	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2450	93.82(PK)/88.79(AV)	H	114/94	-20.18(PK)/-5.21(AV)
2450	79.20(PK)	V	114/94	-14.80(AV)
4900	55.80(PK)/50.47(AV)	H	74/54	-22.20(PK)/-3.53(AV)
4900	48.86(PK)	V	74/54	-5.14(AV)
7350	--	H/V	74/54	--
9800	--	H/V	74/54	--
12250	--	H/V	74/54	--
14700	--	H/V	74/54	--
17150	--	H/V	74/54	--
19600	--	H/V	74/54	--
22050	--	H/V	74/54	--
24500	--	H/V	74/54	--

Note: (1) PK= Peak, AV= Average

(2) Emission Level = Reading Level + Antenna Factor + Cable Loss.

(3)Margin=Emission-Limits

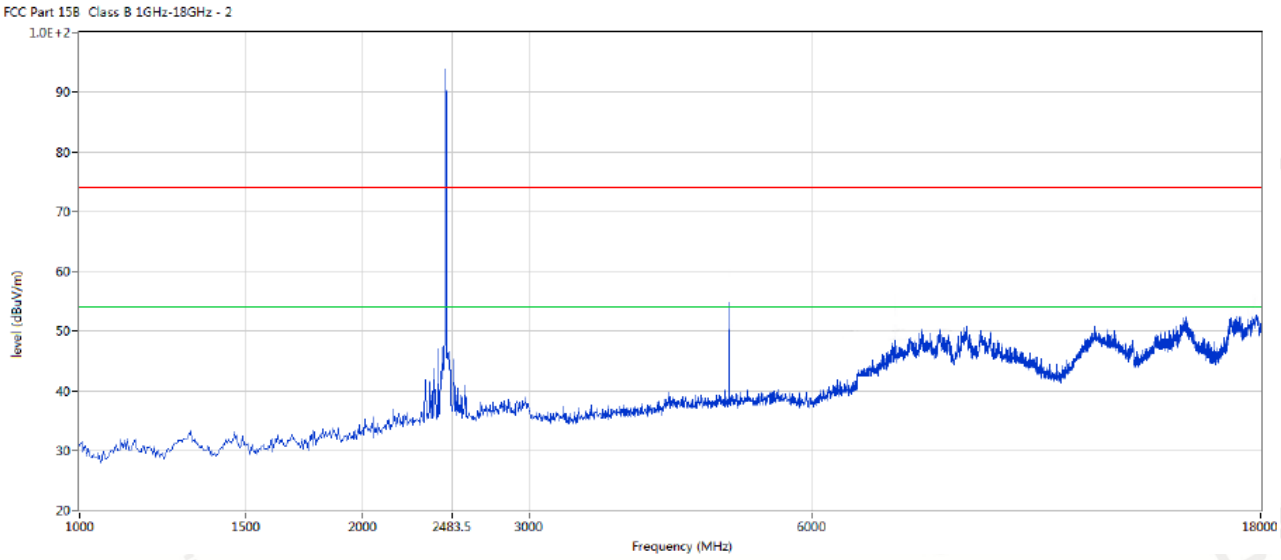
(4)According to section 15.35(b), the peak limit is 20dB higher than the average limit

(5) For test purpose, keep EUT continuous transmitting

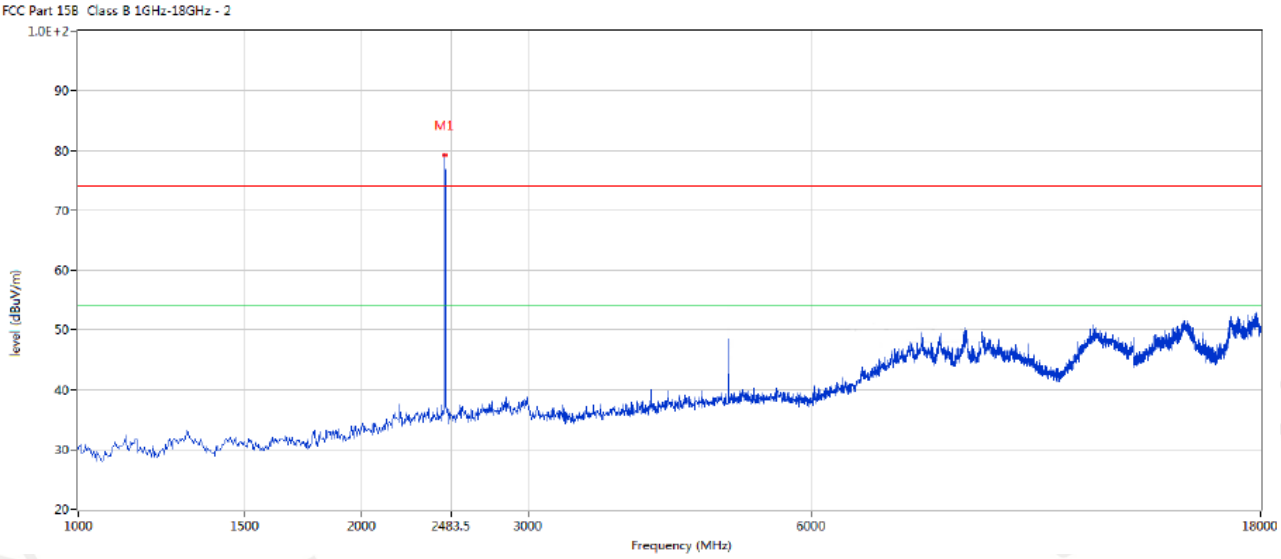
(6) During fundamental Radiated Emission measurement, Set RBW=3MHz, VBW=10MHz

Please refer to the following test plots for details:

Horizontal



Vertical



Remark：
(1) Measuring frequencies from 1 GHz to the 25 GHz.
(2) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
(3) Data of measurement within this frequency range shown "--- " 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.
(4) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
(5) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.
(6)All modes of operation were investigated and the worst-case emissions are reported.

5 BAND EDGE

5.1 Limits

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

5.2 Test Procedure

1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. 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.
4. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. 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.

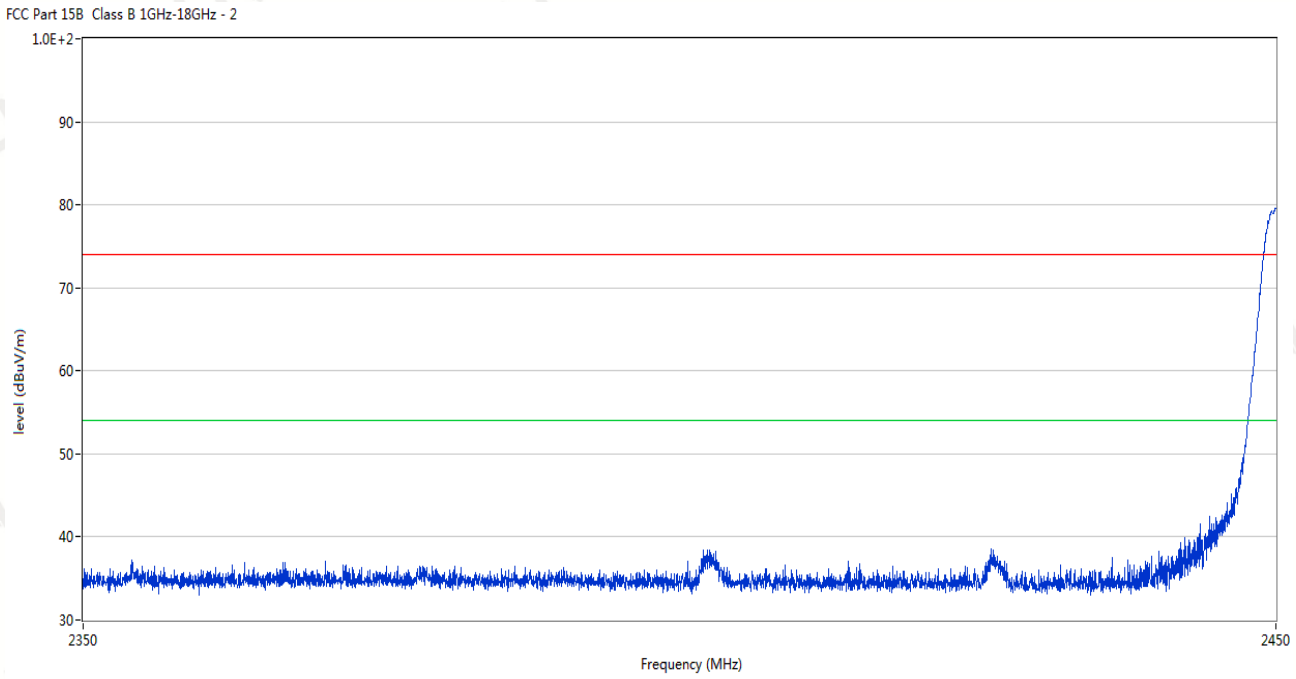
5.3 Test Result

PASS

Radiated Band Edge Test:

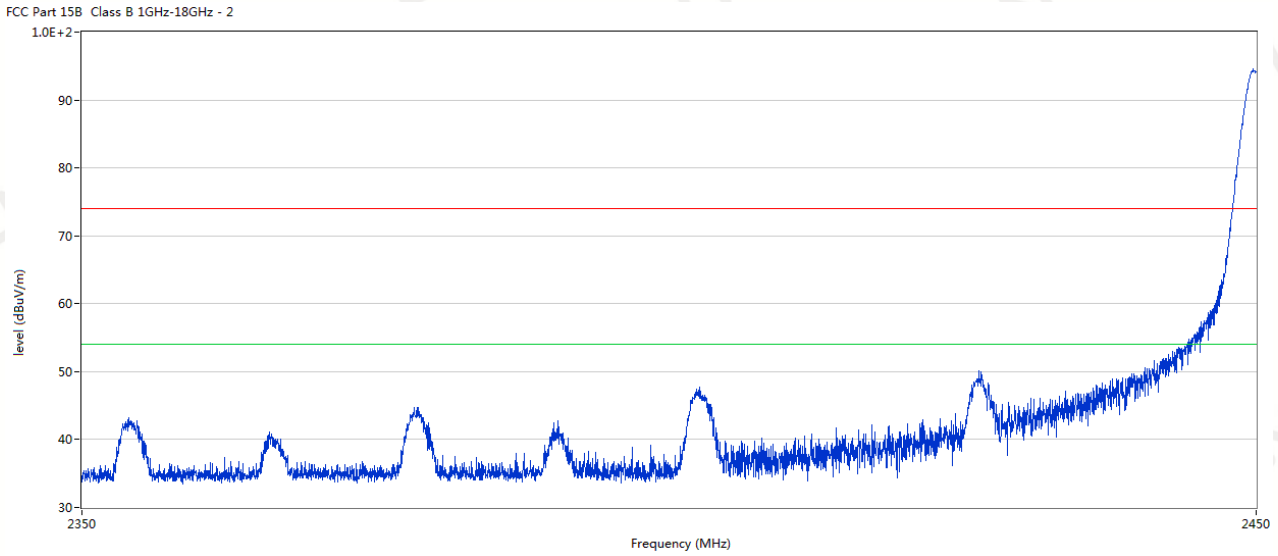
Test Result

Product:	Remote LED Light	Polarity	Vertical
Mode	Keeping Transmitting at 2450MHz	Test Voltage	DC3.0 V from Battery
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	--	--



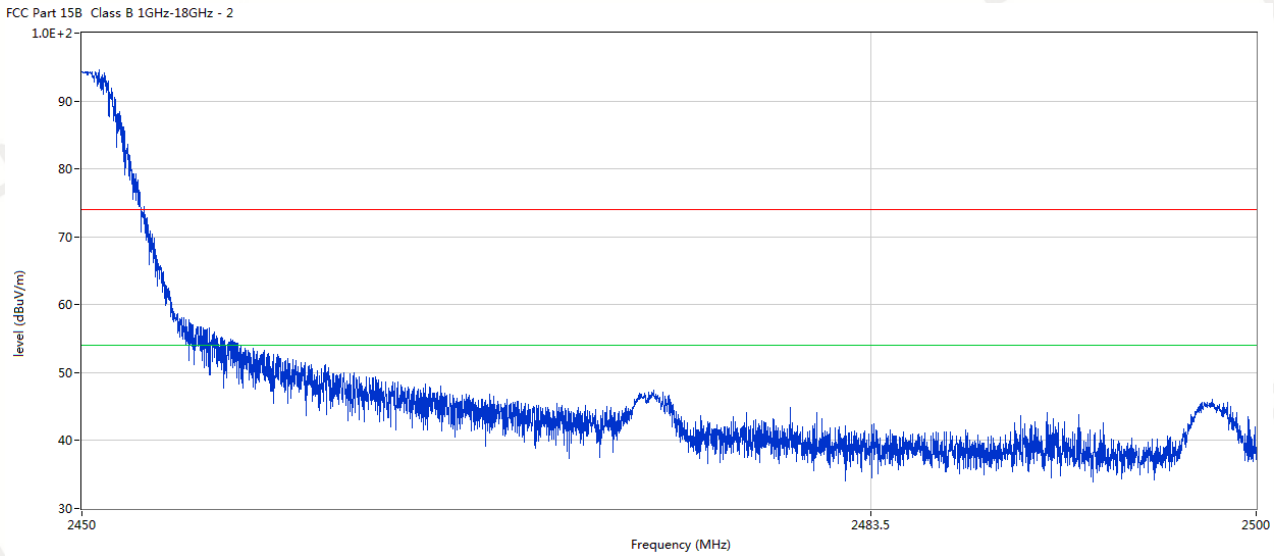
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2400	41.52	-3.57	74.0	-32.48	Peak	56.00	100	V	Pass
2	2390	37.57	-3.57	74.0	-36.43	Peak	206.00	100	V	Pass

Product:	Remote LED Light	Polarity	Horizontal
Mode	Keeping Transmitting at 2450MHz	Test Voltage	DC3.0 V from Battery
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	--	--



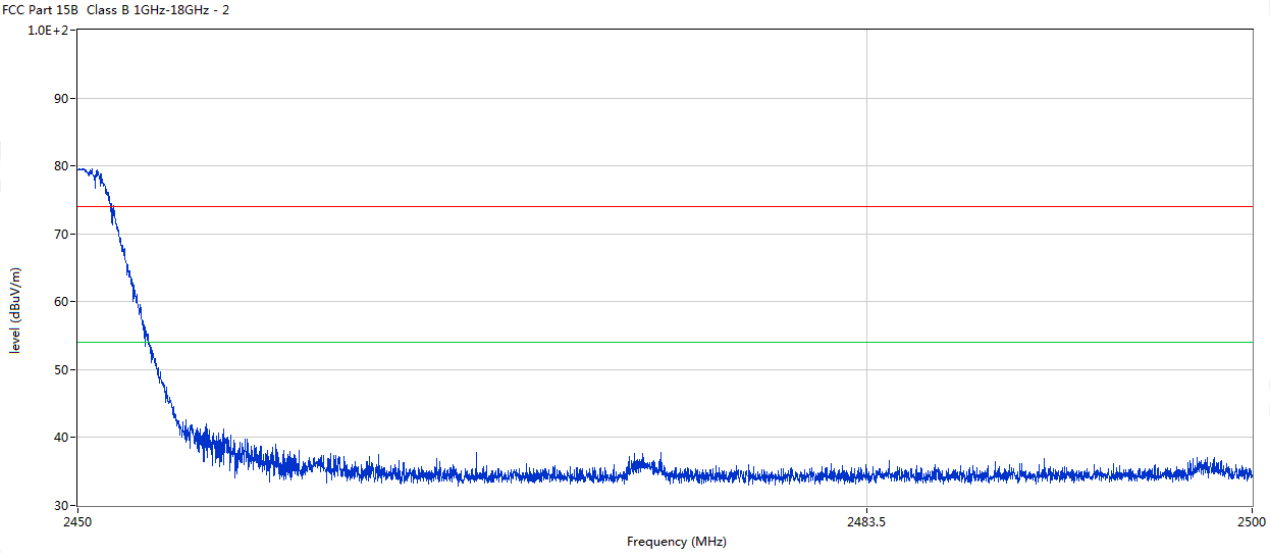
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2402.062	47.70	-3.57	74.0	-26.30	Peak	335.00	100	H	Pass
2	2425.981	50.13	-3.57	74.0	-23.87	Peak	318.00	100	H	Pass
3	2400	49.13	-3.57	74.0	-24.87	Peak	353.00	100	H	Pass
4	2390	59.04	-3.57	74.0	-14.96	Peak	353.00	100	H	Pass
5	2390	36.56	-3.57	54.0	-17.44	AV	353.00	100	H	Pass

Product:	Remote LED Light	Polarity	Horizontal
Mode	Keeping Transmitting at 2450MHz	Test Voltage	DC3.0 V from Battery
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	--	--



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2483.5	42.42	-3.57	74.0	-31.58	Peak	94.00	100	H	Pass
2	2498.125	46.06	-3.57	74.0	-27.94	Peak	111.00	100	H	Pass

Product:	Remote LED Light	Polarity	Vertical
Mode	Keeping Transmitting at 2450MHz	Test Voltage	DC3.0 V from Battery
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	--	--



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2483.5	36.56	-3.57	74.0	-37.44	Peak	328.00	100	V	Pass

Note: The PK emission level less than the AV limit. No necessary to record the AV emission level.

6 OCCUPIED BANDWIDTH MEASUREMENT

6.1 Test Setup

Same as Radiated Emission Measurement

6.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. Based on ANSI C63.10 section 6.9.2: RBW=30 kHz, VBW=100 kHz, Span=5MHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyzer with peak detector.

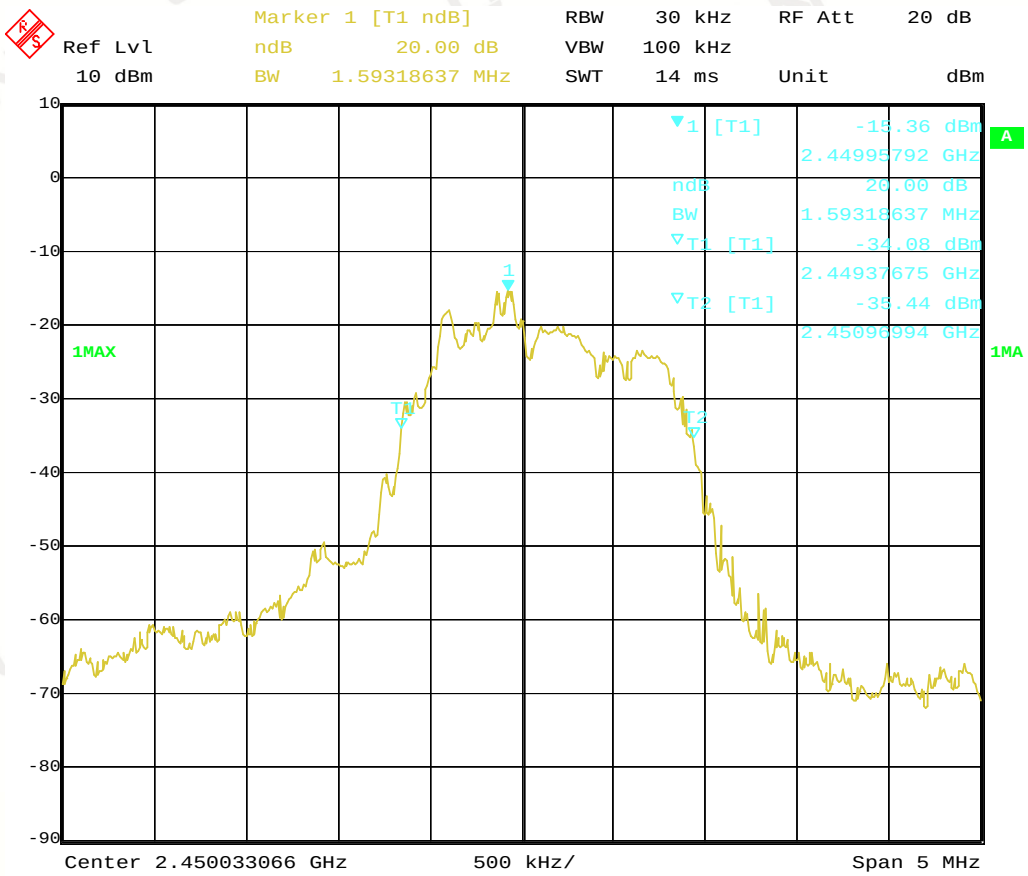
6.3 Measurement Equipment Used

Same as Radiated Emission Measurement

6.4 Test Result

PASS

Frequency (MHz)	20dB Bandwidth (MHz)	Result
2450	1.593	PASS



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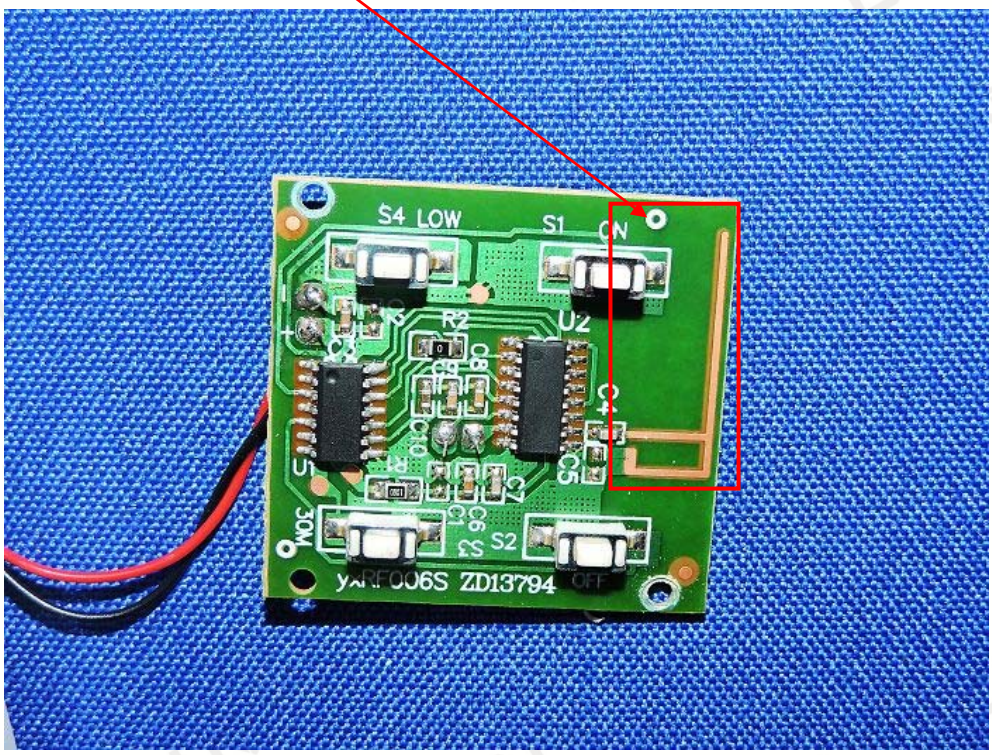
7 ANTENNA REQUIREMENT

Standard Applicable:
For intentional device, according to FCC 47 CFR 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.

Antenna Connected Construction
The antenna used in this product is a PCB Antenna. The directional gains of antenna used for transmitting is 0dBi.

ANTENNA:



8 PHOTOGRAPH OF TEST

8.1 Radiated Emission

8.2 Conducted Emission

N/A

End of Report