

APPLICATION CERTIFICATION FCC Part 15C

On Behalf of
DALIS Lighting, Inc

LED bulb
Model No.: SM-BLBBR30

FCC ID: 2AQSN-SMBLBBR30

Prepared for : DALIS Lighting, Inc
Address : 80 De La Seigneurie East, Blainville, Quebec, J7C 4N1,
Canada.

Prepared by : Shenzhen Accurate Technology Co., Ltd.
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Report No. : ATE20200073
Date of Test : January 15-February 19, 2020
Date of Report : February 20, 2020

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Test Report Certification

Applicant : DALS Lighting, Inc
Address : 80 De La Seigneurie East, Blainville, Quebec, J7C 4N1, Canada.
Manufacturer : Hengdian Group Tospn Lighting Co., Ltd
Address : Hengdian Electronics Industrial Zone, Dongyang, Zhejiang,
P.R.China
Product : LED bulb
Model No. : SM-BLBBR30
Trade Mark : DALS

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247

ANSI C63.10: 2013

The EUT was tested according to DTS test procedure of Apr 05, 2017 KDB558074
v05r02 D01 DTS Meas Guidance v04 for compliance to FCC 47CFR 15.247 requirements

The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test : January 15-February 19, 2020

Date of Report : February 20, 2020

Prepared by :

Bob Wang
(Bob Wang, Engineer)

Approved & Authorized Signer :

Sean Liu
(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	LED bulb
Model Number	:	SM-BLBBR30
Frequency Range	:	802.11b/g/n(20MHz): 2412-2462MHz 802.11n(40MHz): 2422-2452MHz
Number of Channels	:	802.11b/g/n (20MHz):11 802.11n (40MHz): 7
Antenna Gain	:	2.5dBi
Type of Antenna	:	PCB Antenna
Power Supply	:	AC 120V; 60Hz
Data Rate	:	802.11b: 11, 5.5, 2, 1 Mbps 802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps 802.11n: up to 150Mbps
Modulation Type	:	DSSS, OFDM
Applicant	:	DALS Lighting, Inc
Address	:	80 De La Seigneurie East, Blainville, Quebec, J7C 4N1, Canada.
Manufacturer	:	Hengdian Group Tospn Lighting Co., Ltd
Address	:	Hengdian Electronics Industrial Zone, Dongyang, Zhejiang, P.R.China
Date of sample receiver	:	January 14, 2020
Date of Test	:	January 15-February 19, 2020
Sample No.	:	2000051

1.2.Carrier Frequency of Channels

802.11b, 802.11g, 802.11n (20MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437	---	---

802.11n (40MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
---	---	07	2442
---	---	08	2447
03	2422	09	2452
04	2427	---	---
05	2432	---	---
06	2437	---	---

1.3.Accessory and Auxiliary Equipment

PC

Manufacturer: LENOVO

M/N: 4290-RT8

S/N: R9-FW93G 11/08

1.4. Description of Test Facility

EMC Lab	: Recognition of accreditation by Federal Communications Commission (FCC) The Designation Number is CN1189 The Registration Number is 708358 Listed by Innovation, Science and Economic Development Canada (ISED) The Registration Number is 5077A-2 Accredited by China National Accreditation Service for Conformity Assessment (CNAS) The Registration Number is CNAS L3193 Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
Name of Firm	: Shenzhen Accurate Technology Co., Ltd.
Site Location	: 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

1.5. Measurement Uncertainty

Radiated emission expanded uncertainty (9kHz-30MHz)	: U=2.66dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	: U=4.28dB, k=2
Radiated emission expanded uncertainty (1G-18GHz)	: U=4.98dB, k=2
Radiated emission expanded uncertainty (18G-26.5GHz)	: U=5.06dB, k=2
Conduction Emission Expanded Uncertainty (Mains ports, 9kHz-30MHz)	: U=2.72dB, k=2
Conduction Emission Expanded Uncertainty (Telecommunication ports, 150kHz-30MHz)	: U=2.94dB, k=2
Power disturbance Expanded Uncertainty	: U=2.92dB, k=2
Harmonic current expanded uncertainty	: U=0.512%, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 04, 2020	1 Year
EMI Test Receiver	Rohde&Schwarz	ESR	101526/003	Jan. 04, 2020	1 Year
Spectrum Analyzer	Rohde&Schwarz	FSV-40	101495	Jan. 04, 2020	1 Year
Pre-Amplifier	Agilent	8447D	294A10619	Jan. 04, 2020	1 Year
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan. 04, 2020	1 Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 04, 2020	1 Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 04, 2020	1 Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 04, 2020	1 Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 04, 2020	1 Year
Open Switch and Control Unit	Rohde&Schwarz	OSP120 + OSP-B157	101244 + 100866	Jan. 04, 2020	1 Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 04, 2020	1 Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18G-10SS	N/A	Jan. 04, 2020	1 Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2375 /2510-60/11SS	N/A	Jan. 04, 2020	1 Year
Conducted Emission Test Software: ES-K1 V1.71					
Radiated Emission Test Software: EZ EMC V1.1.4.2					

3. OPERATION OF EUT DURING TESTING

3.1. Operating Mode

The mode is used: **1.802.11b Transmitting mode**

Low Channel: 2412MHz

Middle Channel: 2437MHz

High Channel: 2462MHz

2.802.11g Transmitting mode

Low Channel: 2412MHz

Middle Channel: 2437MHz

High Channel: 2462MHz

3.802.11n (20MHz) Transmitting mode

Low Channel: 2412MHz

Middle Channel: 2437MHz

High Channel: 2462MHz

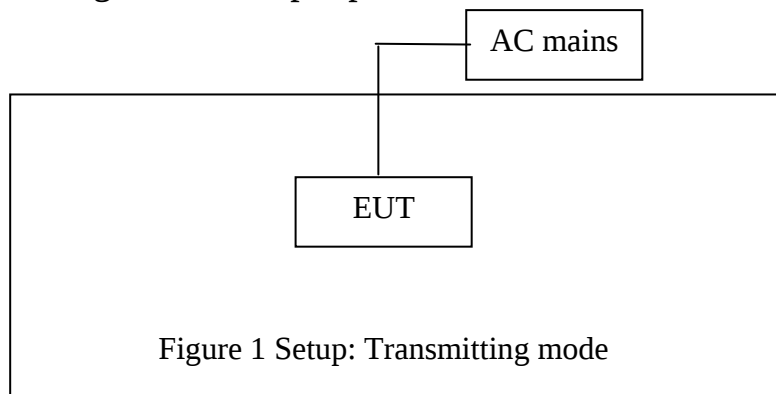
4.802.11n (40MHz) Transmitting mode

Low Channel: 2422MHz

Middle Channel: 2437MHz

High Channel: 2452MHz

3.2. Configuration and peripherals

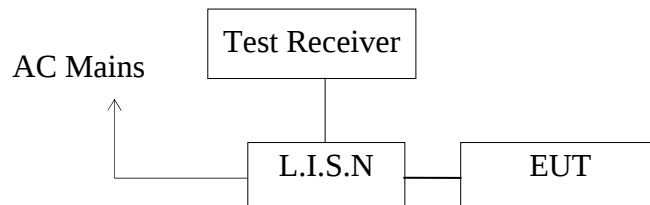


4. TEST PROCEDURES AND RESULTS

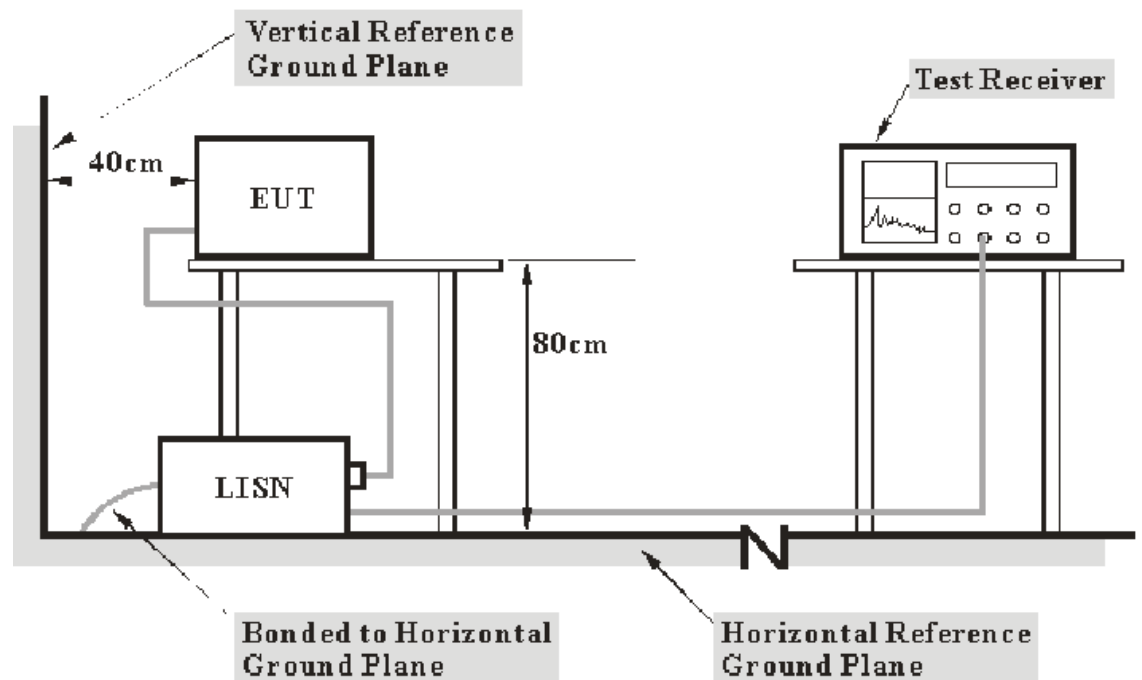
FCC Rules	Description of Test	Result
Section 15.207	Power Line Conducted Emission	Compliant
KDB558074 v05r02 D01 DTS Meas Guidance v04	Duty cycle	Compliant
Section 15.247(a)(2)	6dB Bandwidth Test	Compliant
ANSI C63.10: 2013 Section 6.9.3	99% occupied Bandwidth	Compliant
Section 15.247(b)(3)	Maximum Peak Output Power Test	Compliant
Section 15.247(e)	Power Spectral Density Test	Compliant
Section 15.247(d)	Band Edge Compliance Test	Compliant
Section 15.247(d) Section 15.209	Radiated Spurious Emission Test	Compliant
Section 15.203	Antenna Requirement	Compliant

5. POWER LINE CONDUCTED MEASUREMENT

5.1. Block Diagram of Test Setup



5.1.1. Test System Setup



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

5.2.Power Line Conducted Emission Measurement Limits

Frequency (MHz)	Limit dB(μ V)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0
NOTE1: The lower limit shall apply at the transition frequencies. NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

5.3.Configuration of EUT on Measurement

The equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

5.4.Operating Condition of EUT

5.4.1. Setup the EUT and simulator as shown as Section 5.1.

5.4.2. Turn on the power of all equipment.

5.4.3. Let the EUT work in test mode and measure it.

5.5.Test Procedure

The EUT is put on the plane 0.8 m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

5.6.Data Sample

Frequency (MHz)	Transducer value (dB)	QuasiPeak Level (dBμV)	Average Level (dBμV)	QuasiPeak Limit (dBμV)	Average Limit (dBμV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	10.5	51.1	34.2	56.0	46.0	4.9	11.8	Pass

Frequency(MHz) = Emission frequency in MHz

Transducer value(dB) = Insertion loss of LISN + Cable Loss

Level(dBμV) = Quasi-peak Reading/Average Reading + Transducer value

Limit (dBμV) = Limit stated in standard

Margin = Limit (dBμV) - Level (dBμV)

Calculation Formula:

Margin = Limit (dBμV) - Level (dBμV)

5.7.Power Line Conducted Emission Measurement Results

PASS.

Test Lab: Shielding room

The frequency range from 150kHz to 30MHz is checked.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.
Emissions attenuated more than 20 dB below the permissible value are not reported.

All data was recorded in the Quasi-peak and average detection mode.

The spectral diagrams are attached as below.

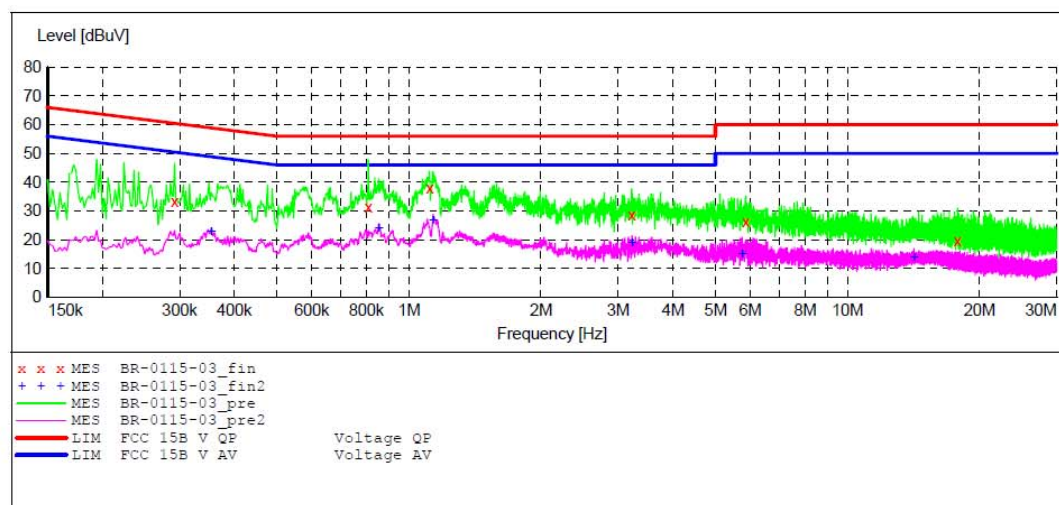
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: LED bulb M/N:SM-BLBBR30
 Manufacturer: Hengdian
 Operating Condition: Wifi Communication
 Test Site: 2#Shielding Room
 Operator: Ben
 Test Specification: N 120V/60Hz
 Comment: Report NO.:ATE20200073
 Start of Test: 2020-1-15 / 10:55:03

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Width Frequency Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "BR-0115-03_fin"

2020-1-15 10:58

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.292000	33.10	10.9	61	27.4	QP	N	GND
0.808000	31.40	11.1	56	24.6	QP	N	GND
1.114000	37.80	11.2	56	18.2	QP	N	GND
3.220000	28.60	11.4	56	27.4	QP	N	GND
5.865000	26.20	11.5	60	33.8	QP	N	GND
17.830000	19.60	11.7	60	40.4	QP	N	GND

MEASUREMENT RESULT: "BR-0115-03_fin2"

2020-1-15 10:58

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.354000	22.60	10.9	49	26.3	AV	N	GND
0.854000	23.70	11.1	46	22.3	AV	N	GND
1.136000	26.50	11.2	46	19.5	AV	N	GND
3.225000	18.90	11.4	46	27.1	AV	N	GND
5.750000	15.10	11.5	50	34.9	AV	N	GND
14.190000	13.60	11.6	50	36.4	AV	N	GND

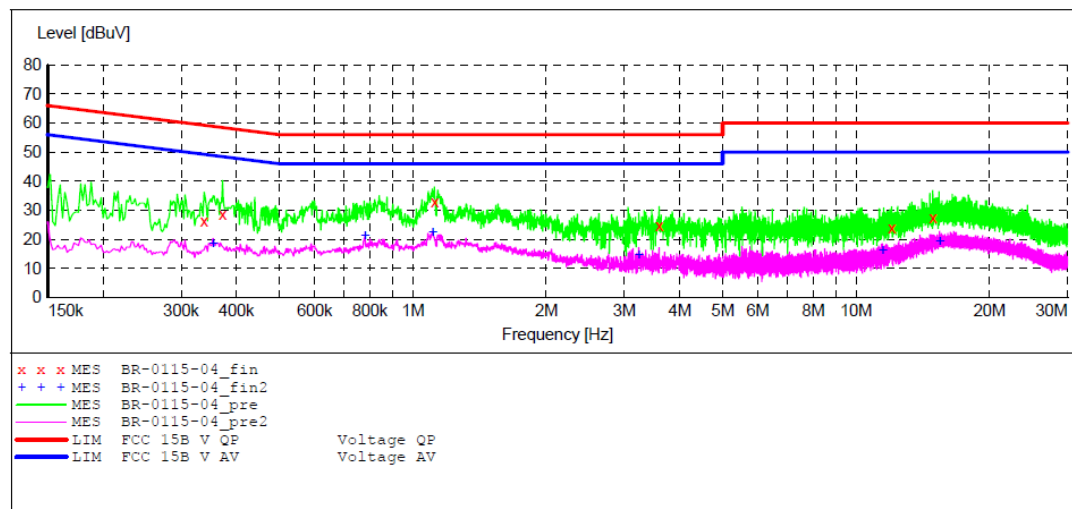
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: LED bulb M/N:SM-BLBBR30
 Manufacturer: Hengdian
 Operating Condition: Wifi Communication
 Test Site: 2#Shielding Room
 Operator: Ben
 Test Specification: L 120V/60Hz
 Comment: Report NO.:ATE20200073
 Start of Test: 2020-1-15 / 10:59:14

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "BR-0115-04_fin"

2020-1-15 11:00

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.338000	26.10	10.9	59	33.2	QP	L1	GND
0.372000	28.60	10.9	59	29.9	QP	L1	GND
1.118000	32.80	11.2	56	23.2	QP	L1	GND
3.595000	24.70	11.4	56	31.3	QP	L1	GND
12.030000	24.10	11.6	60	35.9	QP	L1	GND
14.905000	27.50	11.6	60	32.5	QP	L1	GND

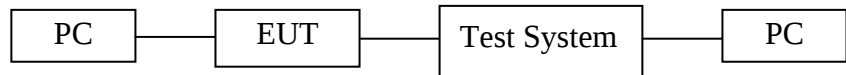
MEASUREMENT RESULT: "BR-0115-04_fin2"

2020-1-15 11:00

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.354000	18.50	10.9	49	30.4	AV	L1	GND
0.780000	21.10	11.1	46	24.9	AV	L1	GND
1.110000	22.20	11.2	46	23.8	AV	L1	GND
3.235000	14.40	11.4	46	31.6	AV	L1	GND
11.480000	16.30	11.6	50	33.7	AV	L1	GND
15.445000	19.40	11.7	50	30.6	AV	L1	GND

6. DUTY CYCLE MEASUREMENT

6.1. Block Diagram of Test Setup



6.2. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.3. Operating Condition of EUT

6.3.1. Setup the EUT and simulator as shown as Section 6.1.

6.3.2. Turn on the power of all equipment.

6.3.3. Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462 and 2422-2452MHz. We select 2412MHz, 2437MHz, 2462MHz and 2422MHz, 2437MHz, 2452MHz TX frequency to transmit.

6.4. Test Procedure

Measurements of duty cycle and transmission duration shall be performed using one of the following techniques:

1. A diode detector and an oscilloscope that together have sufficiently short response time to permit accurate measurements of the on- and off-times of the transmitted signal.
2. The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on- and off-times of the transmitted signal
 - a. Set the center frequency of the instrument to the centre frequency of the transmission
 - b. Set $RBW \geq OBW$ if possible; otherwise, set RBW to the largest available value(10MHz).
 - c. Set detector = Peak or average.
 - d. The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100.
(For example, if VBW and/or RBW are limited to 3MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

6.5.Test Result

Test Lab: Shielding room

The test was performed with 802.11b			
Channel	Frequency (MHz)	duty cycle(x)	10log(1/x)
Middle	2437	96.31%	0.16

The test was performed with 802.11g			
Channel	Frequency (MHz)	duty cycle(x)	10log(1/x)
Middle	2437	91.89%	0.37

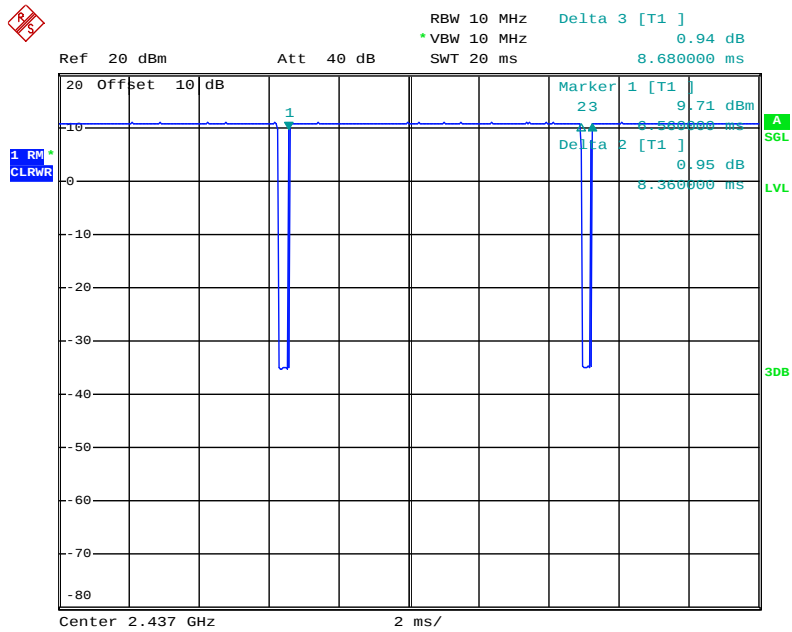
The test was performed with 802.11n (Bandwidth: 20 MHz)			
Channel	Frequency (MHz)	duty cycle(x)	10log(1/x)
Middle	2437	83.33%	0.79

The test was performed with 802.11n (Bandwidth: 40 MHz)			
Channel	Frequency (MHz)	duty cycle(x)	10log(1/x)
Middle	2437	77.78%	1.09

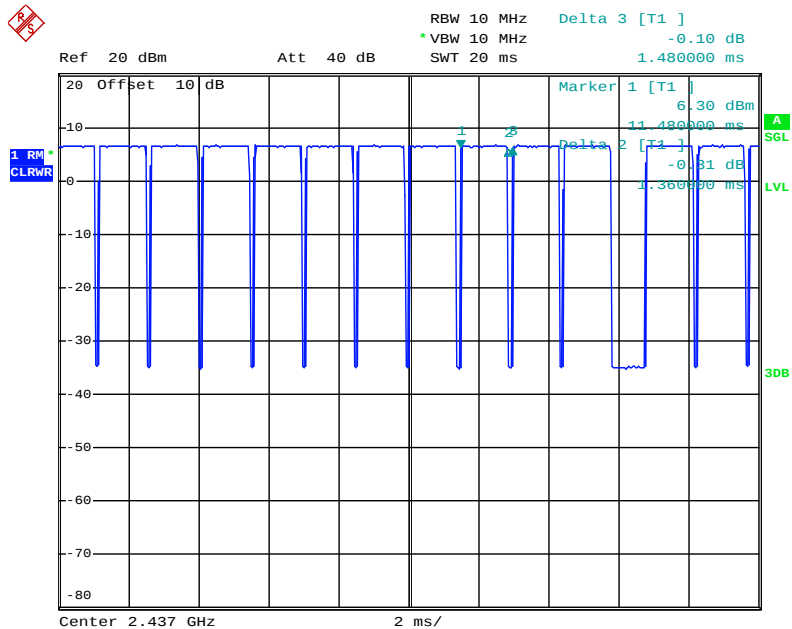
Note: We tested 802.11b/g/n mode the all data rate and recorded the worst case data for this channel to be 11Mbps for 802.11b mode and 54Mbps for 802.11g mode and MCS7 for 802.11n(20MHz) and MCS7 for 802.11n(40MHz)mode.

The spectrum analyzer plots are attached as below.

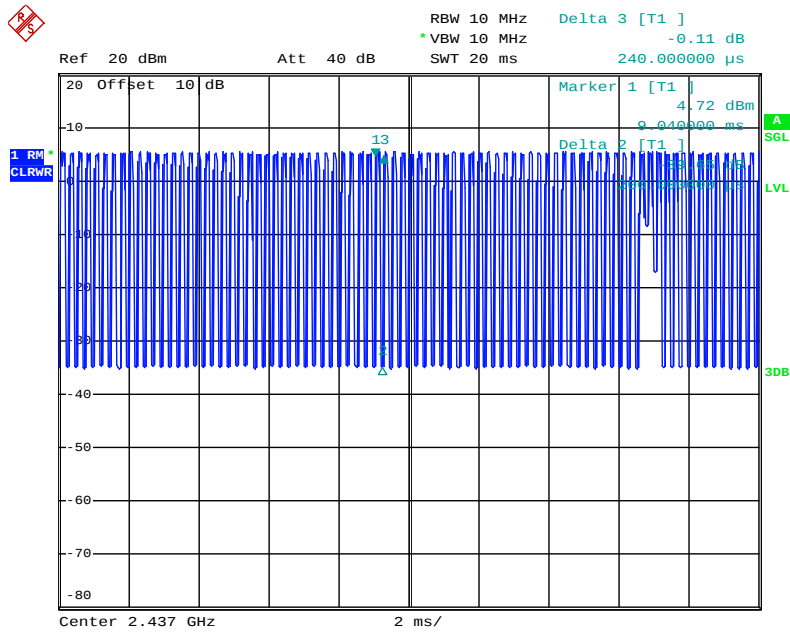
802.11b Channel Middle 2437MHz



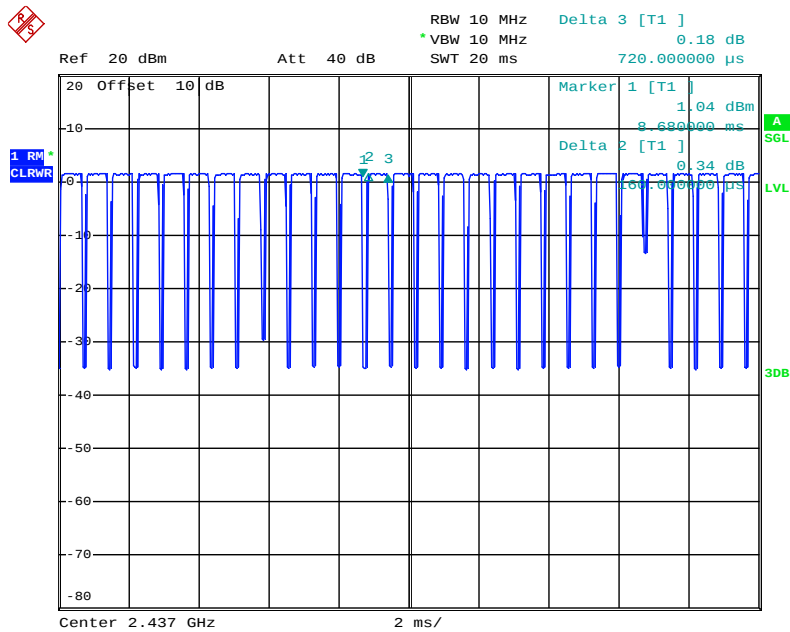
802.11g Channel Middle 2437MHz



802.11n Channel Middle 2437MHz(20MHz)

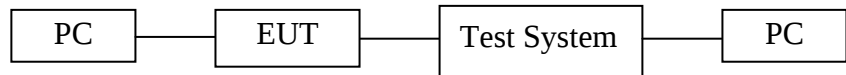


802.11n Channel Middle 2437MHz(40MHz)



7. 6DB BANDWIDTH MEASUREMENT

7.1. Block Diagram of Test Setup



7.2. The Requirement For Section 15.247(a)(2)

Section 15.247(a)(2): Systems using digital modulation techniques may operate in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

7.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4. Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 7.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462 and 2422-2452MHz. We select 2412MHz, 2437MHz, 2462MHz and 2422MHz, 2437MHz, 2452MHz TX frequency to transmit.

7.5. Test Procedure

1. Set resolution bandwidth (RBW) = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.6.Test Result

Test Lab: Shielding room

The test was performed with 802.11b			
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
Low	2412	10.08	> 0.5MHz
Middle	2437	10.08	> 0.5MHz
High	2462	10.08	> 0.5MHz

The test was performed with 802.11g			
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
Low	2412	16.32	> 0.5MHz
Middle	2437	16.32	> 0.5MHz
High	2462	16.32	> 0.5MHz

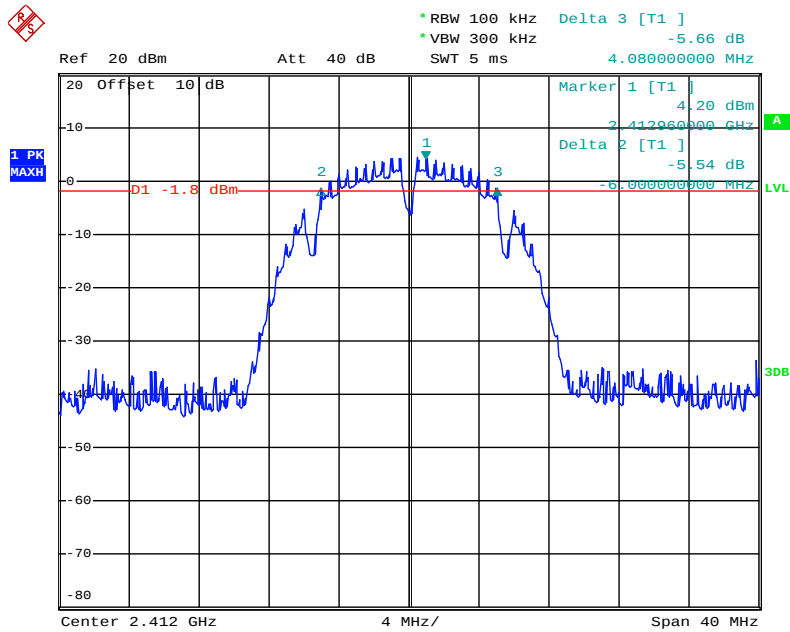
The test was performed with 802.11n (Bandwidth: 20 MHz)			
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
Low	2412	17.68	> 0.5MHz
Middle	2437	17.68	> 0.5MHz
High	2462	17.60	> 0.5MHz

The test was performed with 802.11n (Bandwidth: 40 MHz)			
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
Low	2422	35.52	> 0.5MHz
Middle	2437	35.52	> 0.5MHz
High	2452	35.52	> 0.5MHz

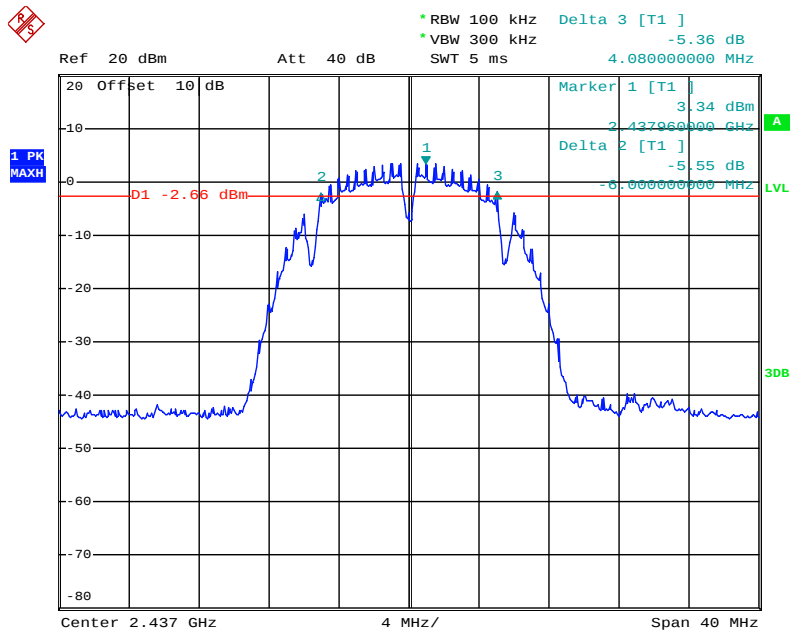
Note: We tested 802.11b/g/n mode the all data rate and recorded the worst case data for this channel to be 11Mbps for 802.11b mode and 54Mbps for 802.11g mode and MCS7 for 802.11n(20MHz) and MCS7 for 802.11n(40MHz)mode.

The spectrum analyzer plots are attached as below.

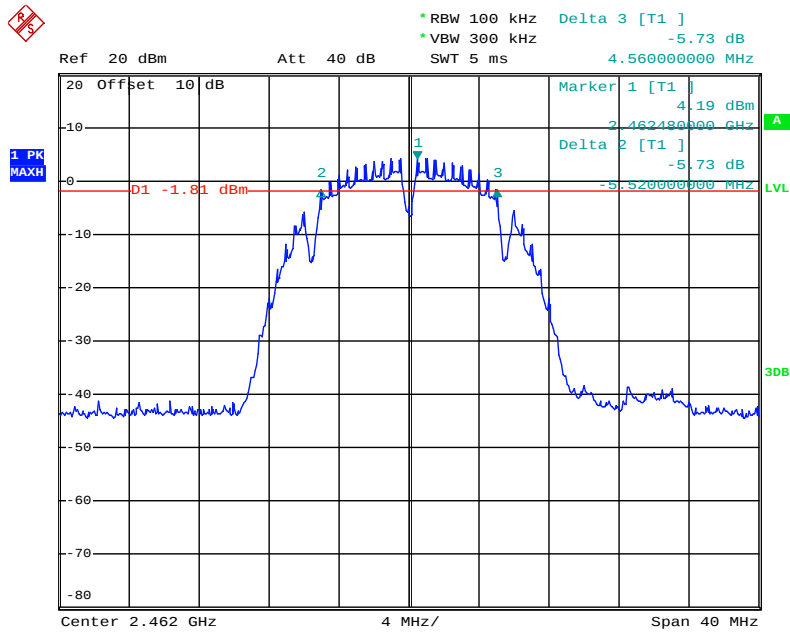
802.11b Channel Low 2412MHz



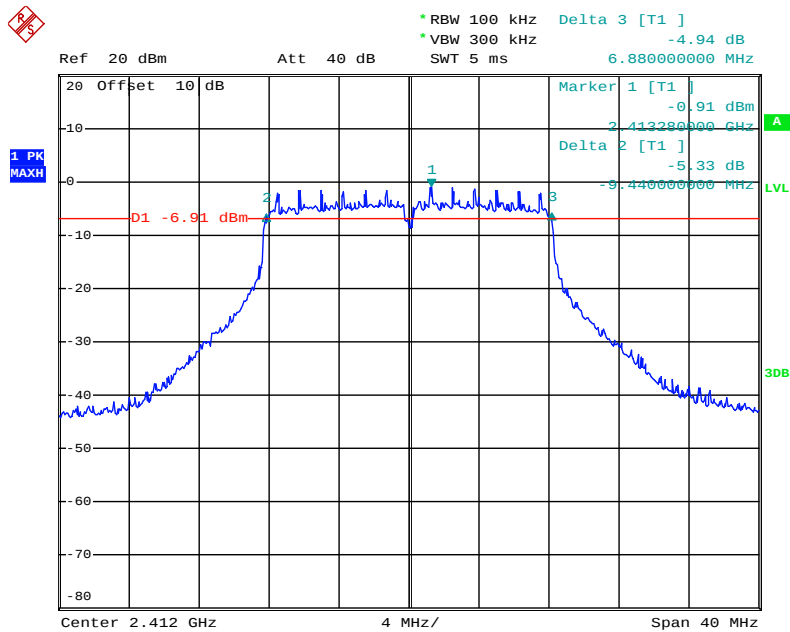
802.11b Channel Middle 2437MHz



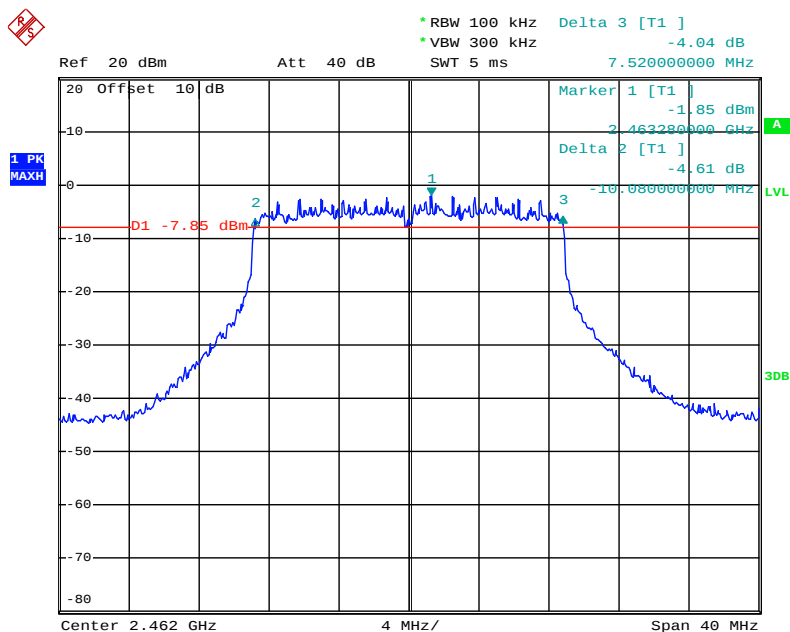
802.11b Channel High 2462MHz



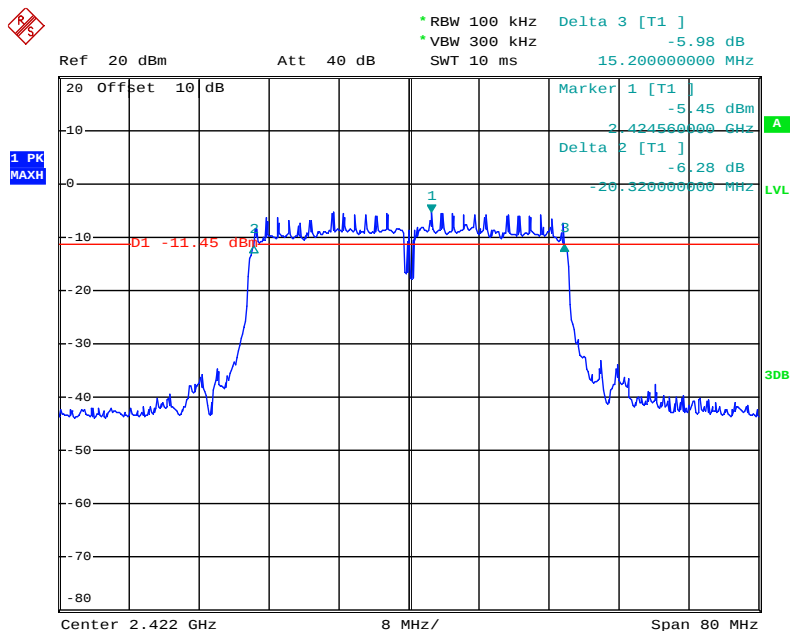
802.11g Channel Low 2412MHz



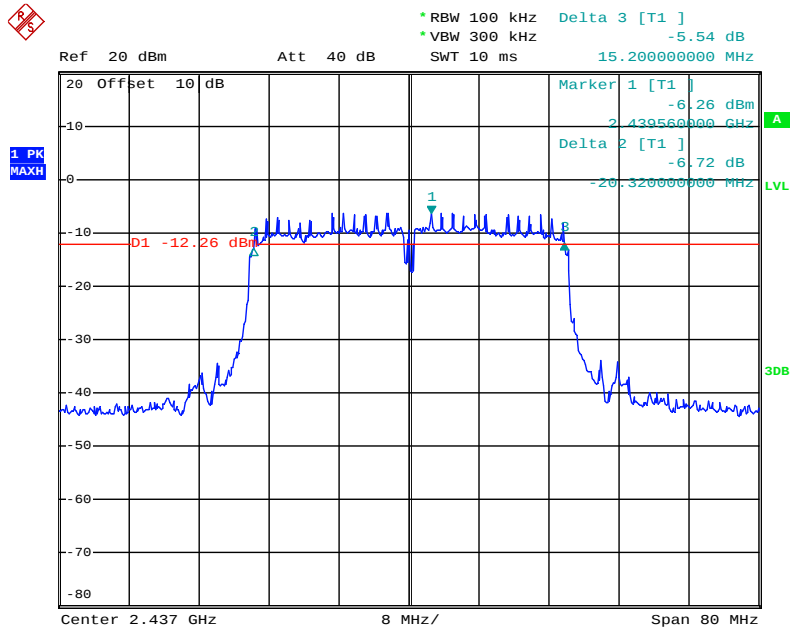
802.11n Channel High 2462MHz(20MHz)



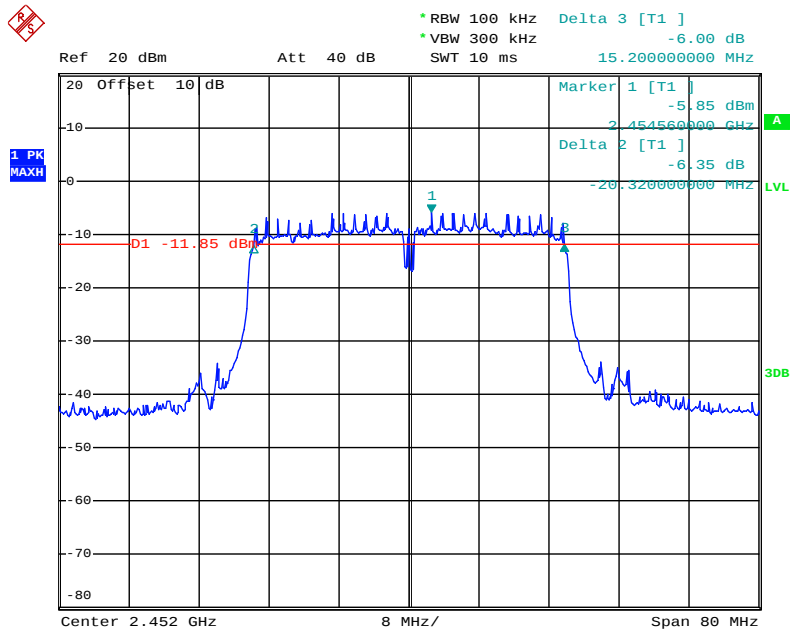
802.11n Channel Low 2422MHz (40MHz)



802.11n Channel Middle 2437MHz(40MHz)

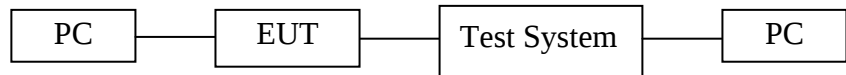


802.11n Channel High 2452MHz(40MHz)



8. 99% OCCUPIED BANDWIDTH

8.1. Block Diagram of Test Setup



8.2. The Requirement For ANSI C63.10: 2013 Section 6.9.3

ANSI C63.10: 2013 Section 6.9.3: The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

8.3. EUT Configuration on Measurement

The following equipment is installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4. Operating Condition of EUT

8.4.1. Setup the EUT and simulator as shown as Section 8.1.

8.4.2. Turn on the power of all equipment.

8.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462 and 2422-2452MHz. We select 2412MHz, 2437MHz, 2462MHz and 2422MHz, 2437MHz, 2452MHz TX frequency to transmit.

8.5. Test Procedure

- 8.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable. The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- 8.5.2. The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.
- 8.5.3. A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.
- 8.5.4. Set SPA “Meas” function, Select “Occupied Bandwidth” function, Select “99% Power Bandwidth”. The frequency of the upper and lower markers indicating the edges of the transmitters “99% Power” emission bandwidth shall be recorded to automate by SPA.

8.6.Measurement Result

Test Lab: Shielding room

The test was performed with 802.11b		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
Low	2412	12.88
Middle	2437	12.96
High	2462	12.88

The test was performed with 802.11g		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
Low	2412	17.28
Middle	2437	17.20
High	2462	17.20

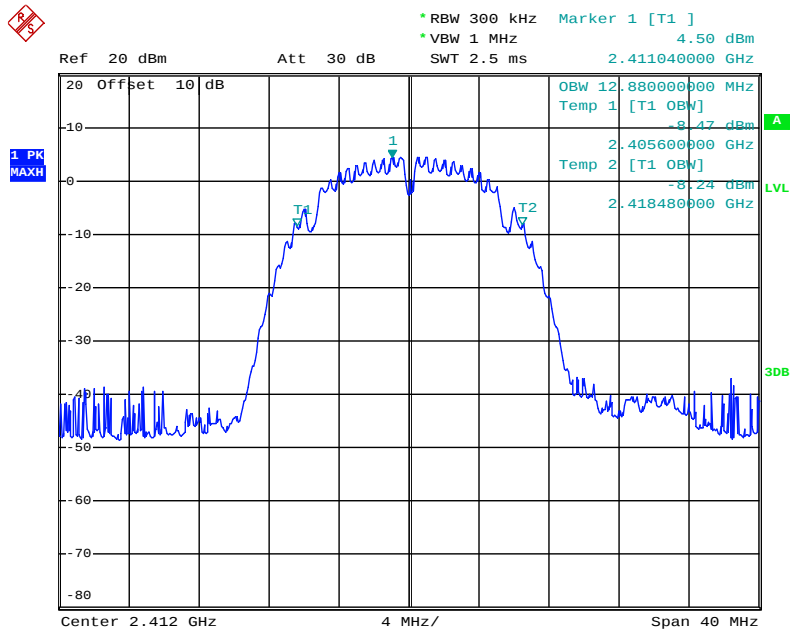
The test was performed with 802.11n (Bandwidth: 20 MHz)		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
Low	2412	18.00
Middle	2437	18.00
High	2462	18.00

The test was performed with 802.11n (Bandwidth: 40 MHz)		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
Low	2422	36.48
Middle	2437	36.48
High	2452	36.48

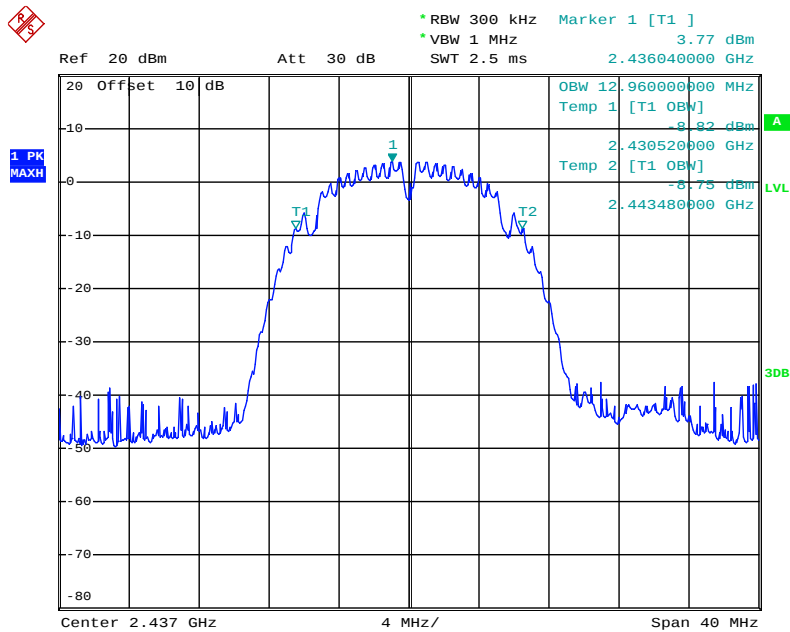
Note: We tested 802.11b/g/n mode the all data rate and recorded the worst case data for this channel to be 11Mbps for 802.11b mode and 54Mbps for 802.11g mode and MCS7 for 802.11n(20MHz) and MCS7 for 802.11n(40MHz) mode.

The spectrum analyzer plots are attached as below.

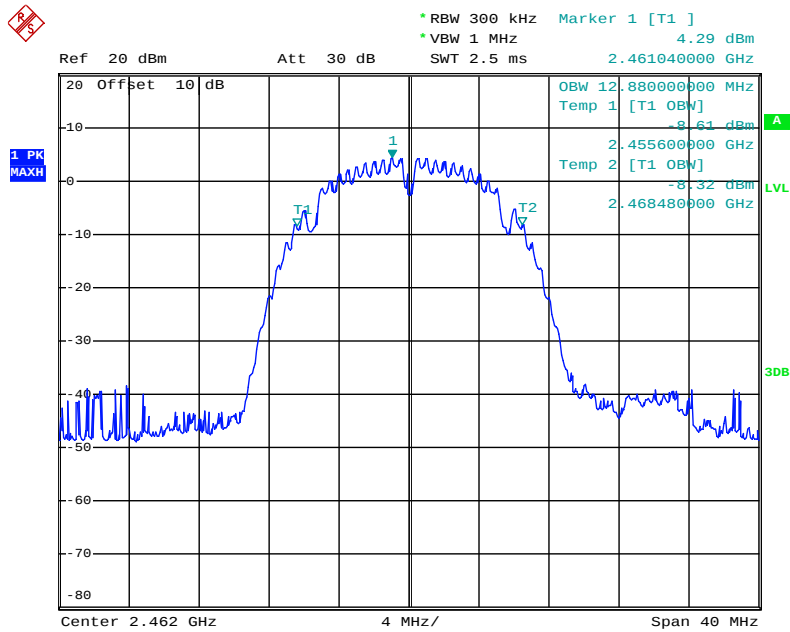
802.11b Channel Low 2412MHz



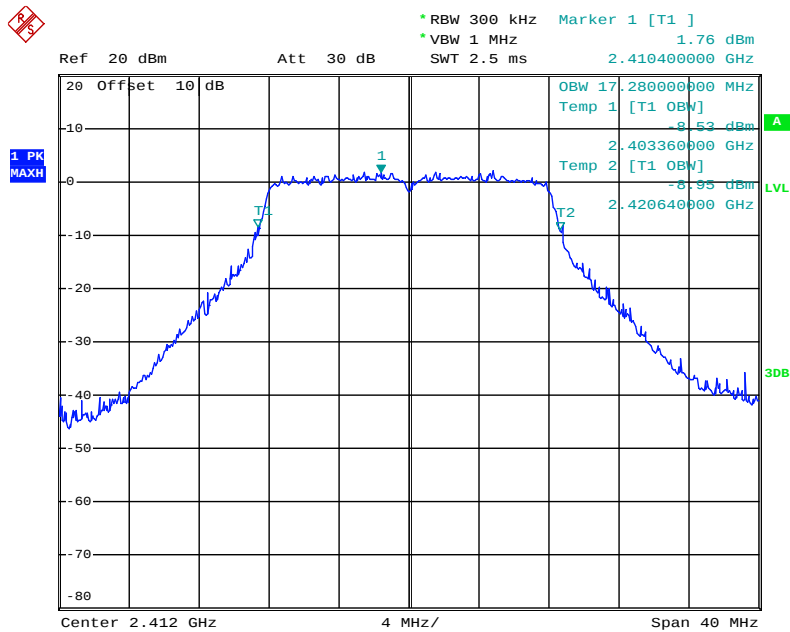
802.11b Channel Middle 2437MHz



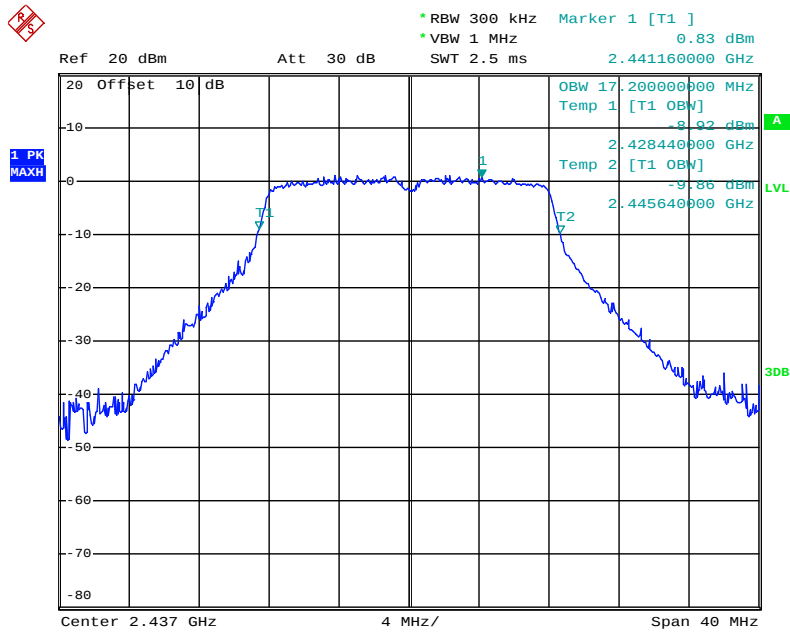
802.11b Channel High 2462MHz



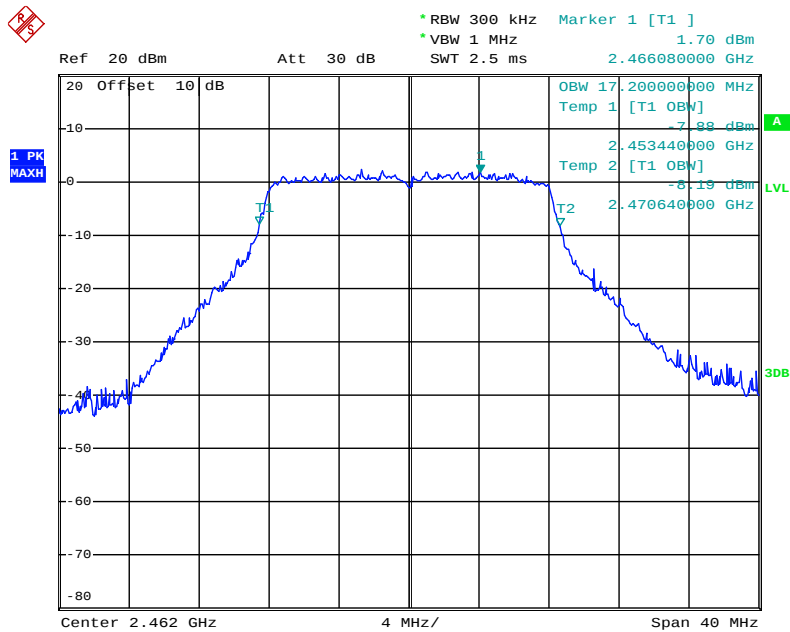
802.11g Channel Low 2412MHz



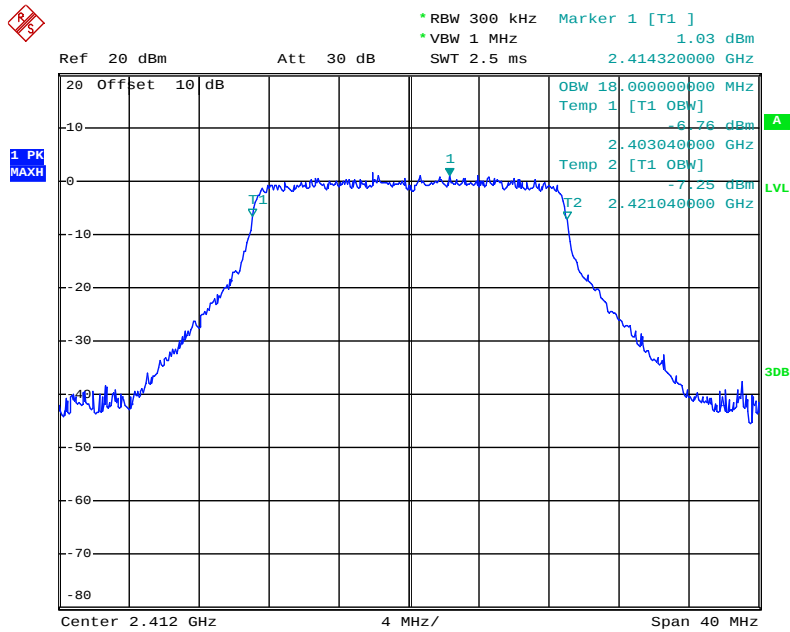
802.11g Channel Middle 2437MHz



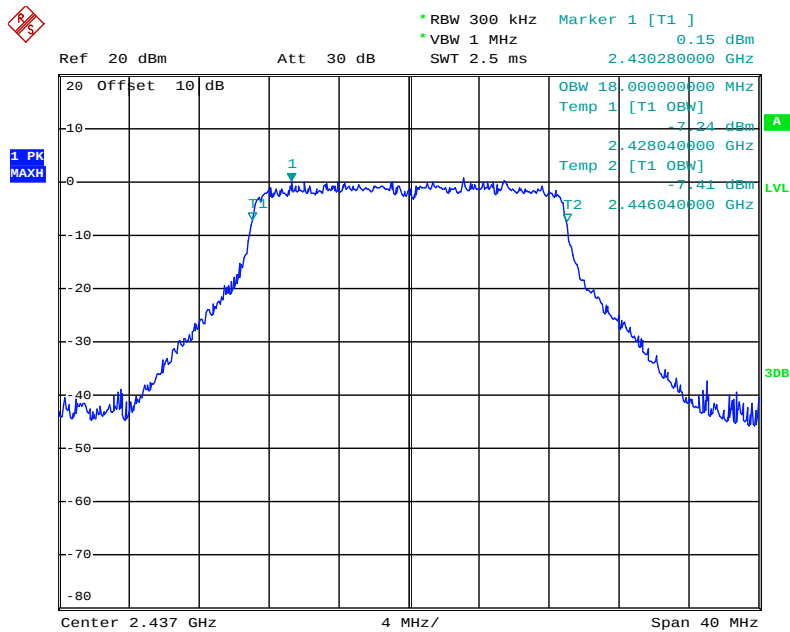
802.11g Channel High 2462MHz



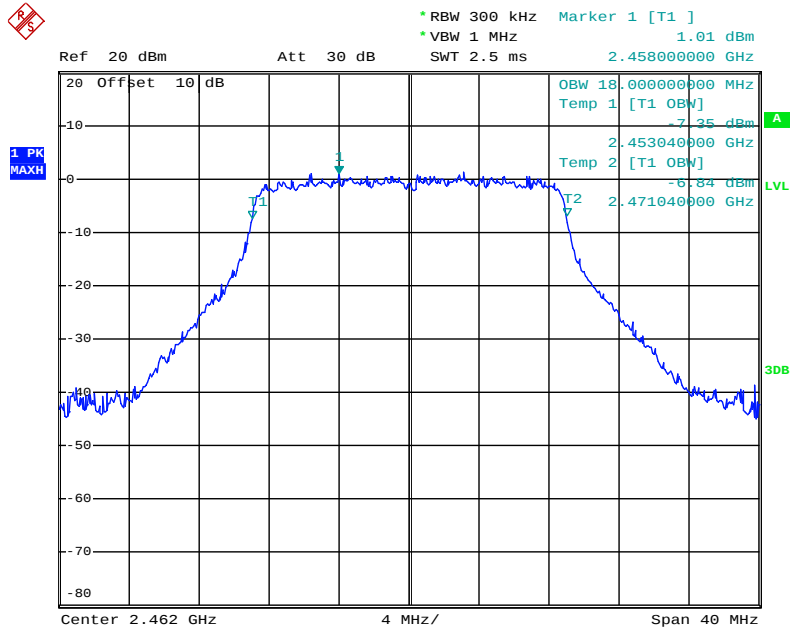
802.11n Channel Low 2412MHz (20MHz)



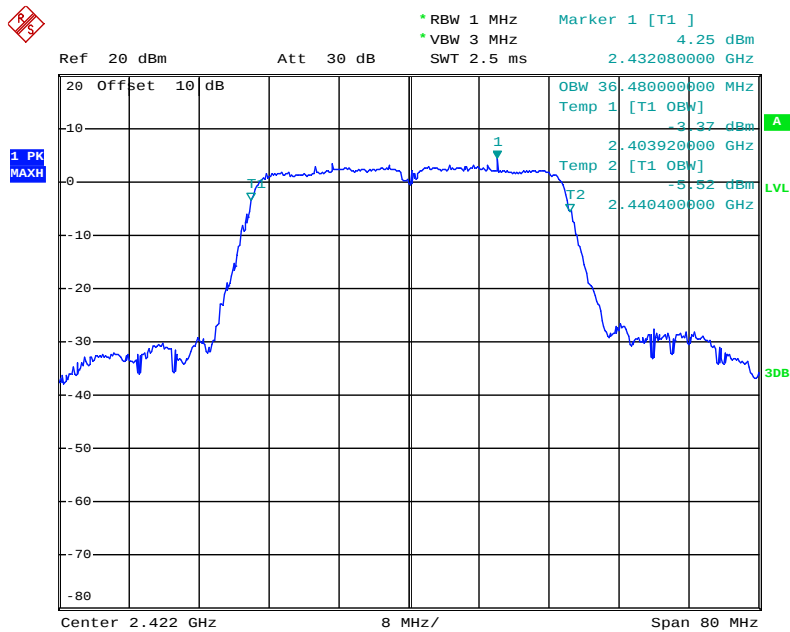
802.11n Channel Middle 2437MHz(20MHz)



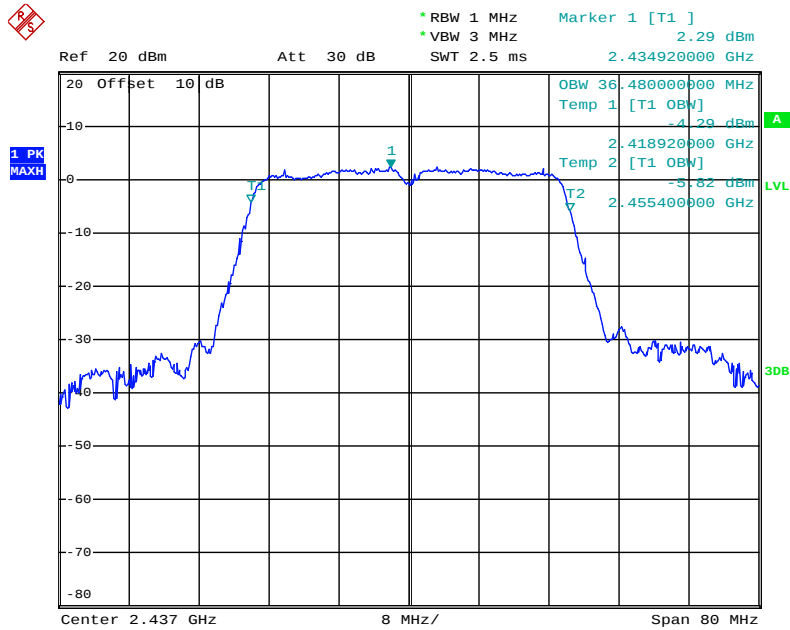
802.11n Channel High 2462MHz(20MHz)



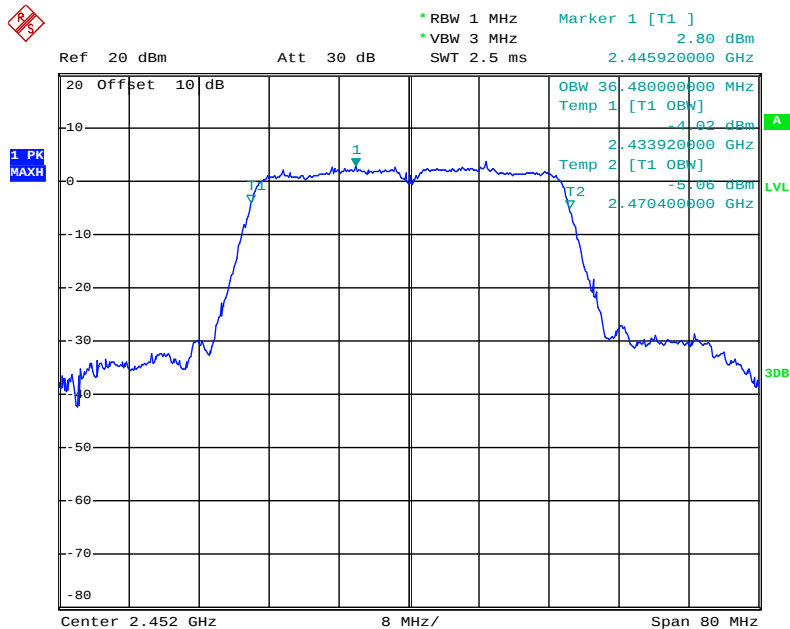
802.11n Channel Low 2422MHz (40MHz)



802.11n Channel Middle 2437MHz(40MHz)

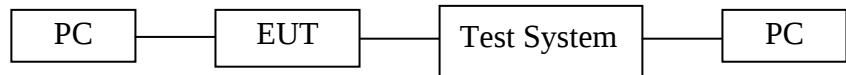


802.11n Channel High 2452MHz(40MHz)



9. MAXIMUM CONDUCTED (AVERAGE) OUTPUT POWER

9.1. Block Diagram of Test Setup



9.2. The Requirement For Section 15.247(b)(3)

Section 15.247(b)(3): For systems using digital modulation in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands: 1 Watt.

9.3. EUT Configuration on Measurement

The equipment is installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.4. Operating Condition of EUT

9.4.1. Setup the EUT and simulator as shown as Section 9.1.

9.4.2. Turn on the power of all equipment.

9.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462 and 2422-2452MHz. We select 2412MHz, 2437MHz, 2462MHz and 2422MHz, 2437MHz, 2452MHz TX frequency to transmit.

9.5. Test Procedure

9.5.1. The EUT was tested according to DTS test procedure of Apr 05, 2017 KDB5580 74 v05r02 D01 DTS Meas Guidance v04 for compliance to FCC 47CFR 15.247 requirements.

9.5.2. The transmitter output was connected to the spectrum analyzer through a low loss cable.

9.5.3. Set RBW = 1-5% of the OBW, not to exceed 1 MHz, VBW $\geq 3 \times$ RBW, Sweep time = auto, Set span to at least 1.5 times the OBW, Detector = RMS.

9.5.4. Measurement the Maximum conducted (average) output power.

9.6.Test Result

Test Lab: Shielding room

Final power= Ave output power+10log(1/ duty cycle)

The test was performed with 802.11b						
Channel	Frequency (MHz)	Ave output power (dBm)	10log(1/ duty cycle)	Final power (dBm)	Final power (W)	Limits dBm / W
Low	2412	15.81	0.16	15.97	0.0395	30 dBm / 1 W
Middle	2437	15.17	0.16	15.33	0.0341	30 dBm / 1 W
High	2462	15.72	0.16	15.88	0.0387	30 dBm / 1 W

The test was performed with 802.11g						
Channel	Frequency (MHz)	Ave output power (dBm)	10log(1/ duty cycle)	Final power (dBm)	Final power (W)	Limits dBm / W
Low	2412	14.00	0.37	14.37	0.0274	30 dBm / 1 W
Middle	2437	13.38	0.37	13.75	0.0237	30 dBm / 1 W
High	2462	13.83	0.37	14.20	0.0263	30 dBm / 1 W

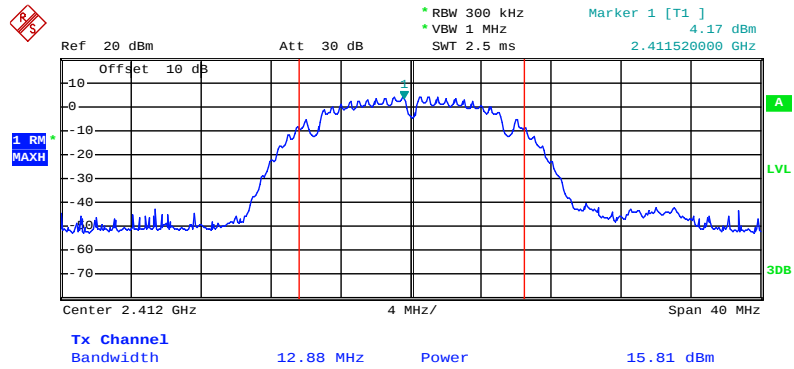
The test was performed with 802.11n (20MHz)						
Channel	Frequency (MHz)	Ave output power (dBm)	10log(1/ duty cycle)	Final power (dBm)	Final power (W)	Limits dBm / W
Low	2412	13.58	0.79	14.37	0.0274	30 dBm / 1 W
Middle	2437	12.80	0.79	13.59	0.0228	30 dBm / 1 W
High	2462	13.43	0.79	14.22	0.0264	30 dBm / 1 W

The test was performed with 802.11n (40MHz)						
Channel	Frequency (MHz)	Ave output power (dBm)	10log(1/ duty cycle)	Final power (dBm)	Final power (mW)	Limits dBm / W
Low	2422	10.40	1.09	11.49	0.0141	30 dBm / 1 W
Middle	2437	9.59	1.09	10.68	0.0117	30 dBm / 1 W
High	2452	9.86	1.09	10.95	0.0124	30 dBm / 1 W

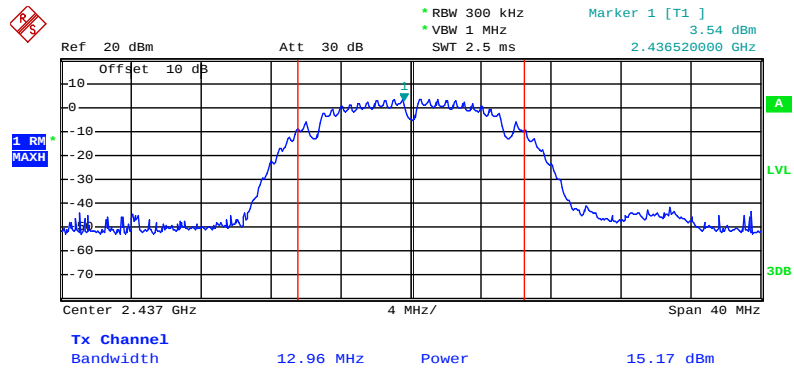
Note: We tested 802.11b/g/n mode the all data rate and recorded the worst case data for this channel to be 11Mbps for 802.11b mode and 54Mbps for 802.11g mode and MCS7 for 802.11n(20MHz) and MCS7 for 802.11n(40MHz) mode.

The spectrum analyzer plots are attached as below.

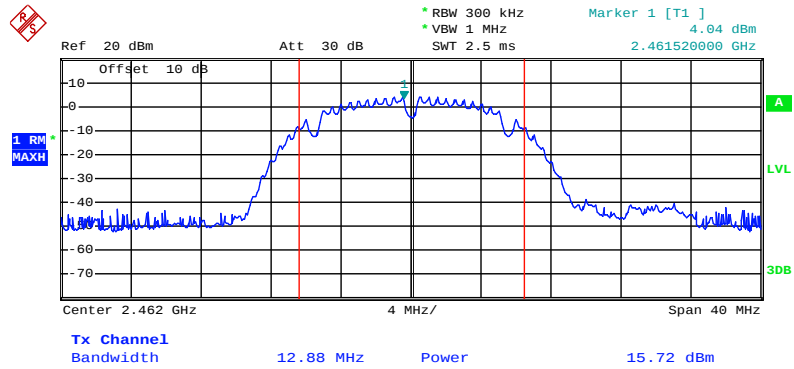
802.11b Channel Low 2412MHz



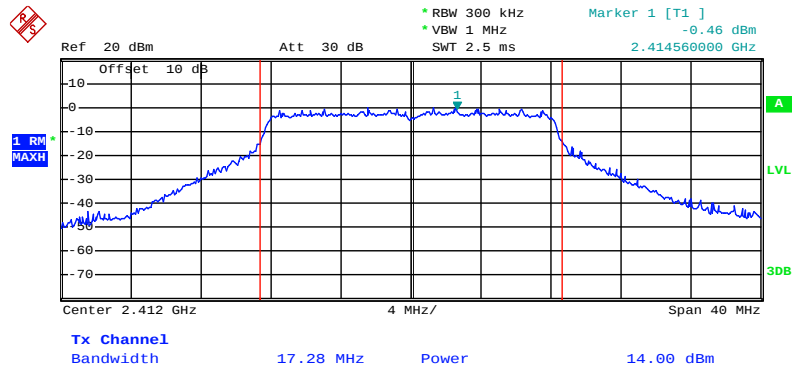
802.11b Channel Middle 2437MHz



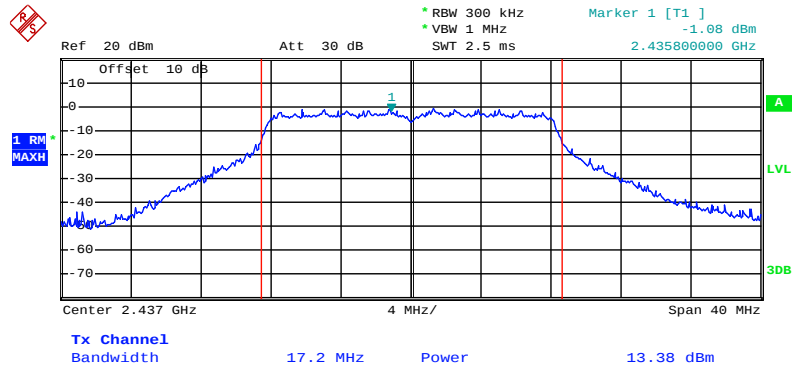
802.11b Channel High 2462MHz



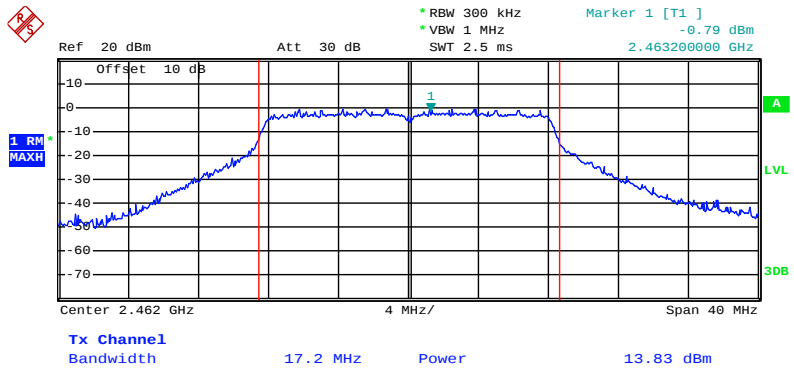
802.11g Channel Low 2412MHz



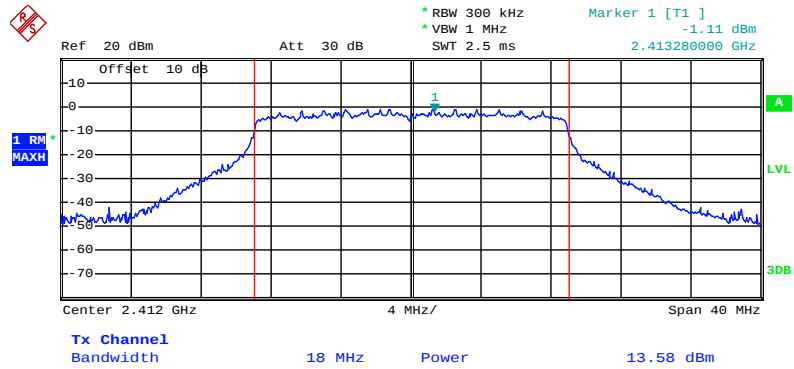
802.11g Channel Middle 2437MHz



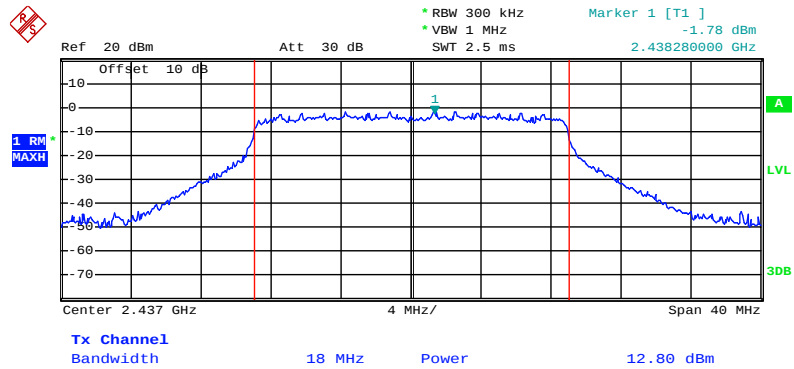
802.11g Channel High 2462MHz



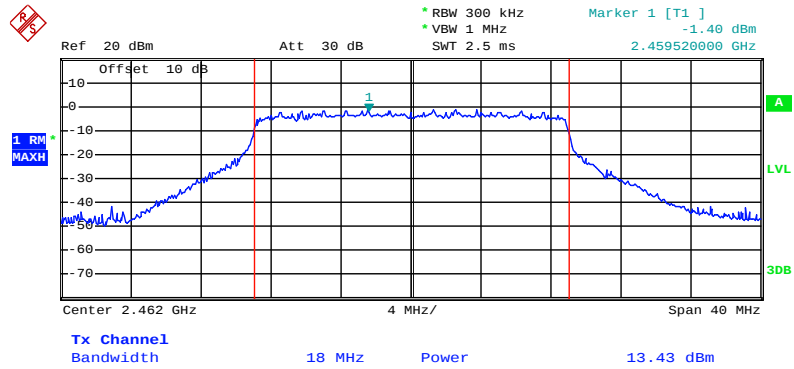
802.11n Channel Low 2412MHz (20MHz)



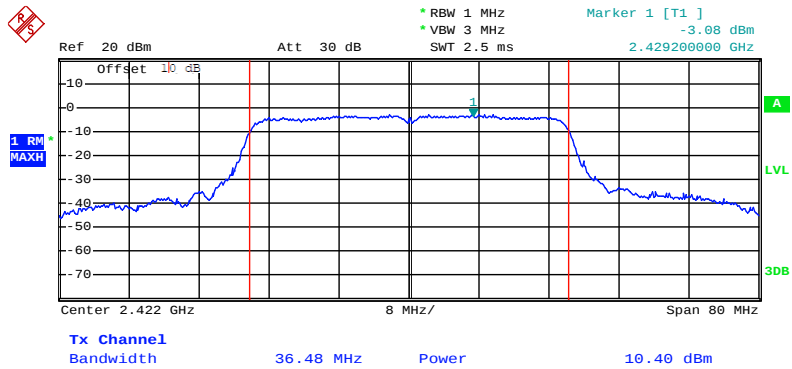
802.11n Channel Middle 2437MHz (20MHz)



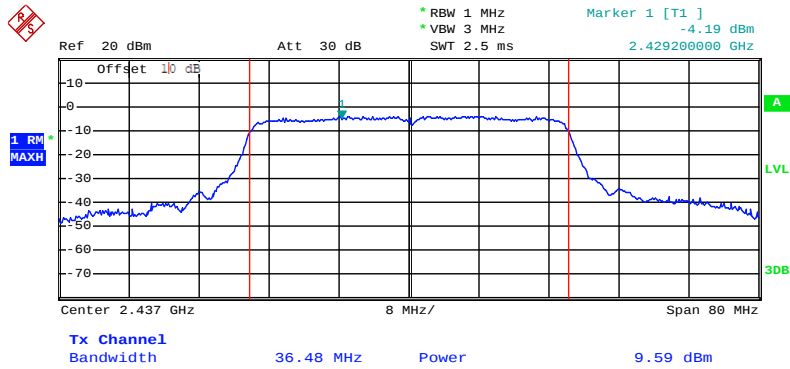
802.11n Channel High 2462MHz (20MHz)



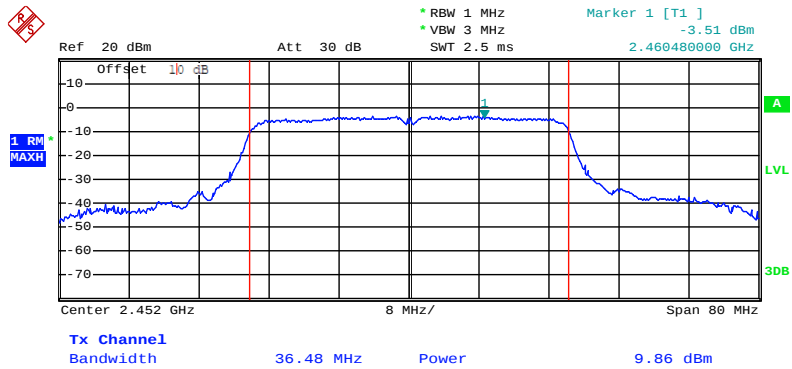
802.11n Channel Low 2422MHz (40MHz)



802.11n Channel Middle 2437MHz (40MHz)

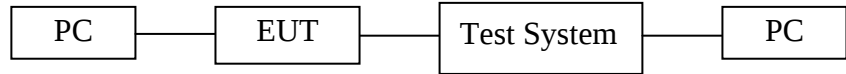


802.11n Channel High 2452MHz (40MHz)



10. POWER SPECTRAL DENSITY MEASUREMENT

10.1. Block Diagram of Test Setup



10.2. The Requirement For Section 15.247(e)

Section 15.247(e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

10.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

10.4. Operating Condition of EUT

10.4.1. Setup the EUT and simulator as shown as Section 10.1.

10.4.2. Turn on the power of all equipment.

10.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462 and 2422-2452MHz. We select 2412MHz, 2437MHz, 2462MHz and 2422MHz, 2437MHz, 2452MHz TX frequency to transmit.

10.5. Test Procedure

10.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

10.5.2. Measurement Procedure AVGPSD-2:

This procedure is applicable when the EUT cannot be configured to transmit continuously (i.e., duty cycle < 98%), and when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty is constant (i.e., duty cycle variations are less than $\pm 2\%$):

Measure the duty cycle(x) of the transmitter output signal as described in Section 6.0.

Set instrument center frequency to DTS channel center frequency.

Set span to at least $1.5 \times \text{OBW}$.

Set RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$.

Set VBW $\geq 3 \times \text{RBW}$

Detector = power averaging(RMS) or sample detector (when RMS not available).

Ensure that the number of measurement points in sweep $\geq 2 \times \text{span/RBW}$.

Sweep time = auto couple.

Do not use sweep triggering. Allow sweep to “free run”.

Employ trace averaging(RMS) mode over a minimum of 100 traces.

Use the peak maker function to determine the maximum amplitude level.

Add $10\log(1/x)$, where x is the duty cycle measured in step(a), to the measured PSD to compute the average PSD during the actual transmission time.

If resultant value exceeds the limit, then reduce RBW (no less than 3kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

10.6.Test Result

Test Lab: Shielding room

The test was performed with 802.11b					
Channel	Frequency (MHz)	AVG Power Spectral Density (dBm/3KHz)	10log(1/ duty cycle)	Final Power Spectral Density (dBm/3KHz)	Limits (dBm/3KHz)
Low	2412	-18.28	0.16	-18.12	8 dBm
Middle	2437	-19.23	0.16	-19.07	8 dBm
High	2462	-18.45	0.16	-18.29	8 dBm

The test was performed with 802.11g					
Channel	Frequency (MHz)	AVG Power Spectral Density (dBm/3KHz)	10log(1/ duty cycle)	Final Power Spectral Density (dBm/3KHz)	Limits (dBm/3KHz)
Low	2412	-23.19	0.37	-22.82	8 dBm
Middle	2437	-24.81	0.37	-24.47	8 dBm
High	2462	-23.80	0.37	-23.43	8 dBm

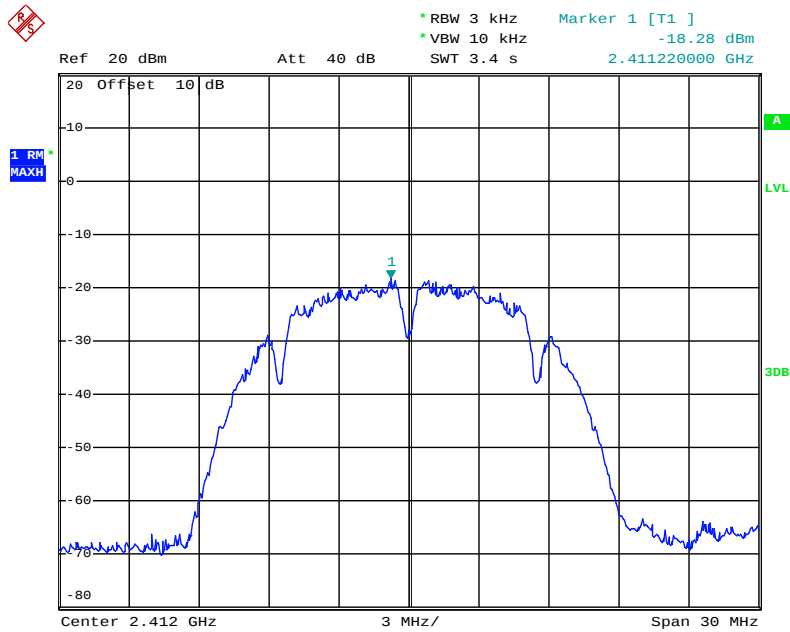
The test was performed with 802.11n (20MHz)					
Channel	Frequency (MHz)	AVG Power Spectral Density (dBm/3KHz)	10log(1/ duty cycle)	Final Power Spectral Density (dBm/3KHz)	Limits (dBm/3KHz)
Low	2412	-24.46	0.79	-23.67	8 dBm
Middle	2437	-23.65	0.79	-22.86	8 dBm
High	2462	-25.00	0.79	-24.21	8 dBm

The test was performed with 802.11n (40MHz)					
Channel	Frequency (MHz)	AVG Power Spectral Density (dBm)	10log(1/ duty cycle)	Final Power Spectral Density (dBm)	Limits (dBm)
Low	2422	-29.25	1.09	-28.16	8 dBm
Middle	2437	-30.44	1.09	-29.35	8 dBm
High	2452	-29.94	1.09	-28.85	8 dBm

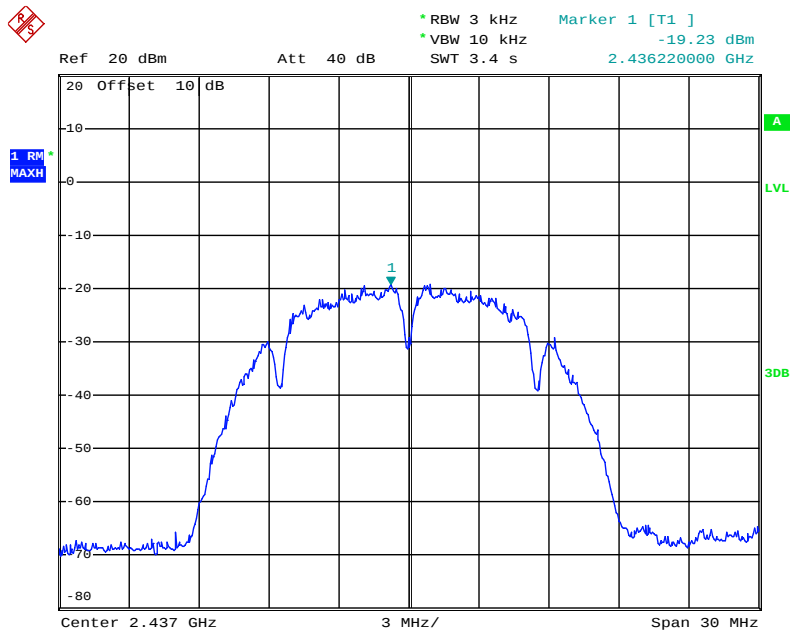
Note: We tested 802.11b/g/n mode the all data rate and recorded the worst case data for this channel to be 11Mbps for 802.11b mode and 54Mbps for 802.11g mode and MCS7 for 802.11n(20MHz) and MCS7 for 802.11n(40MHz) mode.

The spectrum analyzer plots are attached as below.

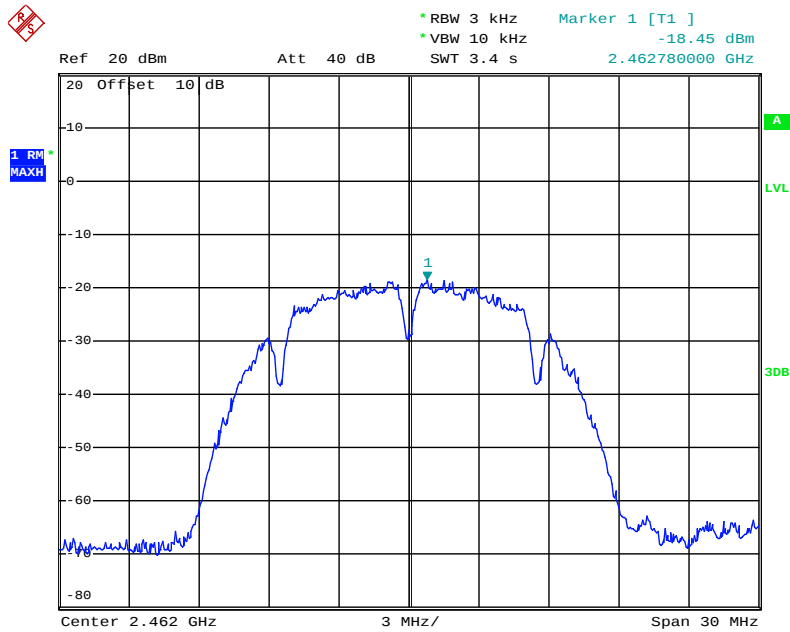
802.11b Channel Low 2412MHz



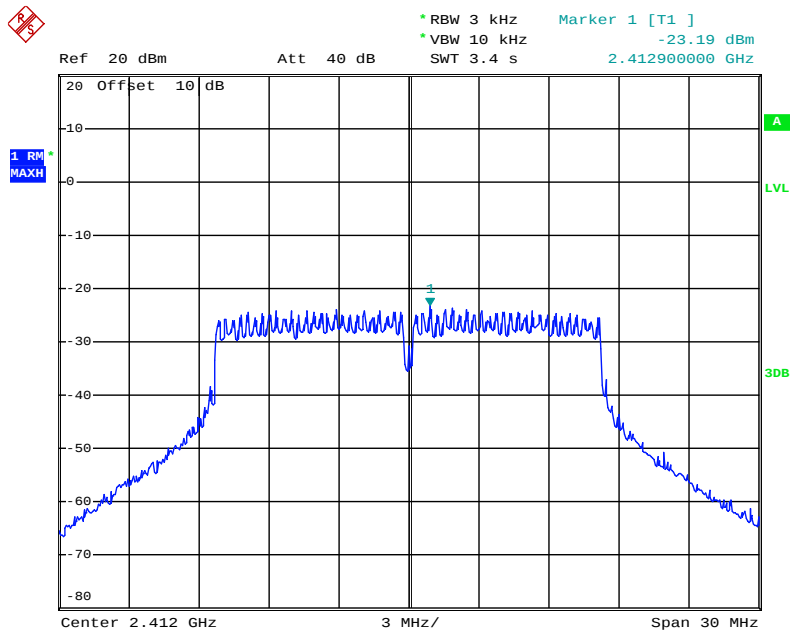
802.11b Channel Middle 2437MHz



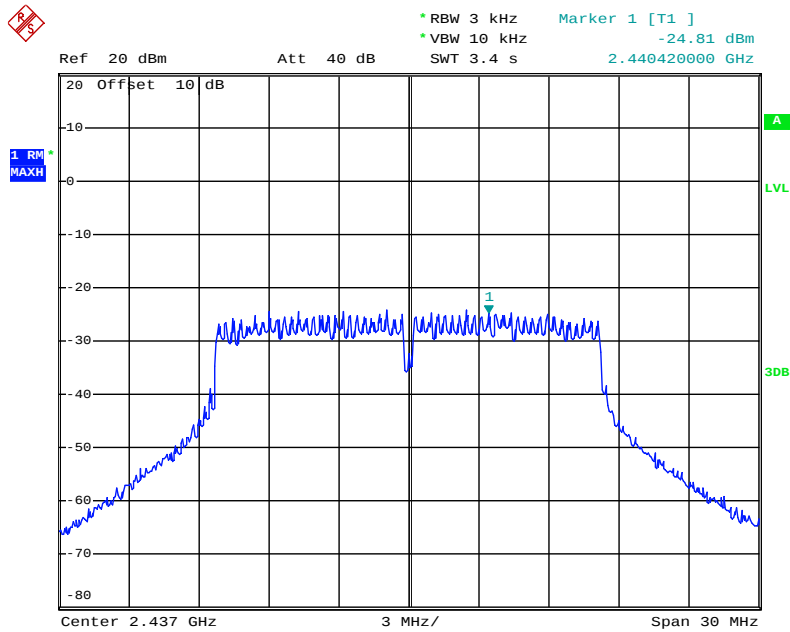
802.11b Channel High 2462MHz



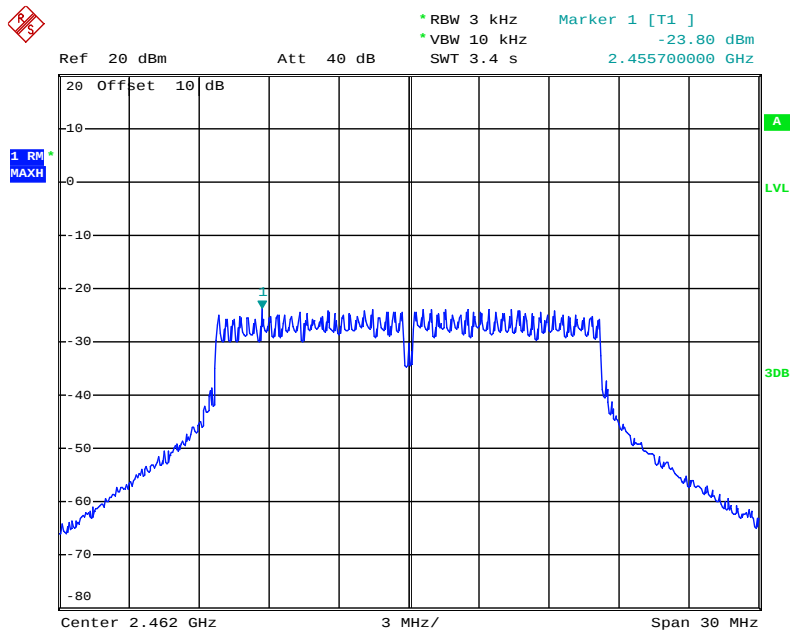
802.11g Channel Low 2412MHz



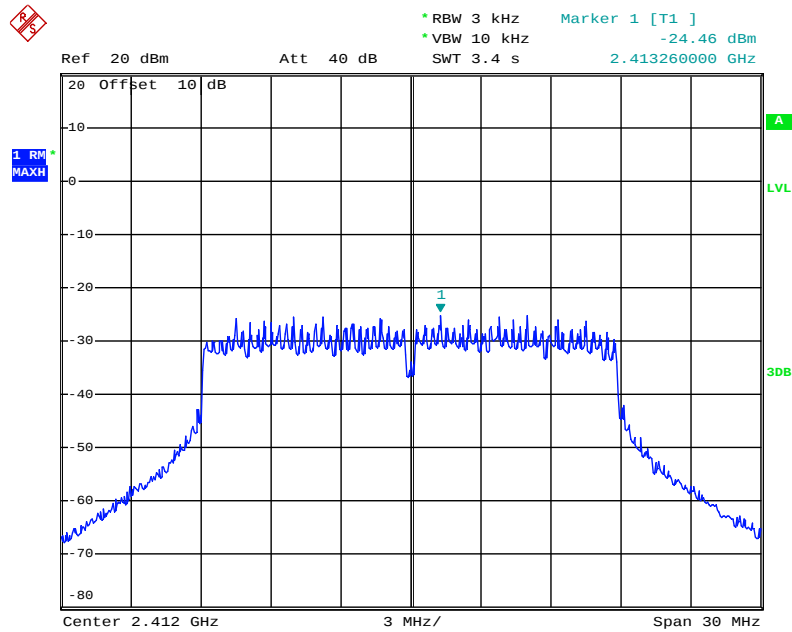
802.11g Channel Middle 2437MHz



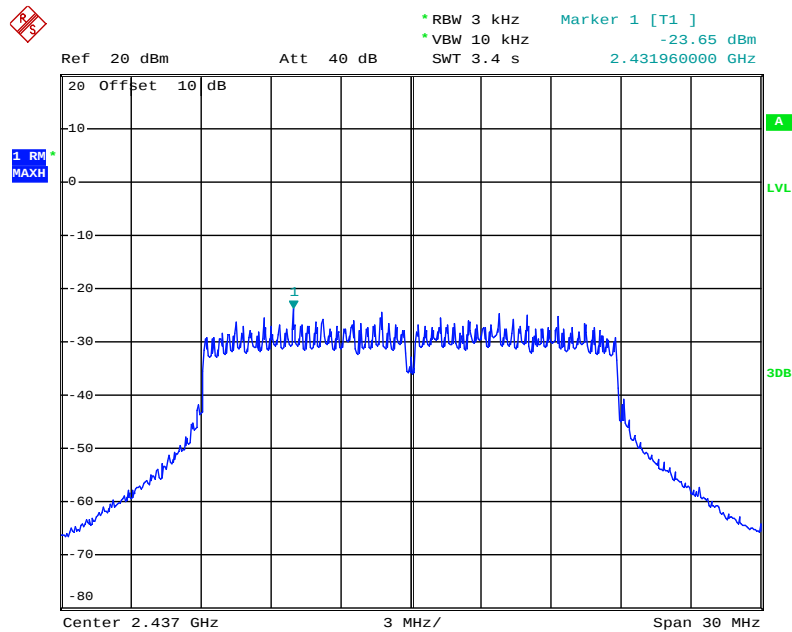
802.11g Channel High 2462MHz



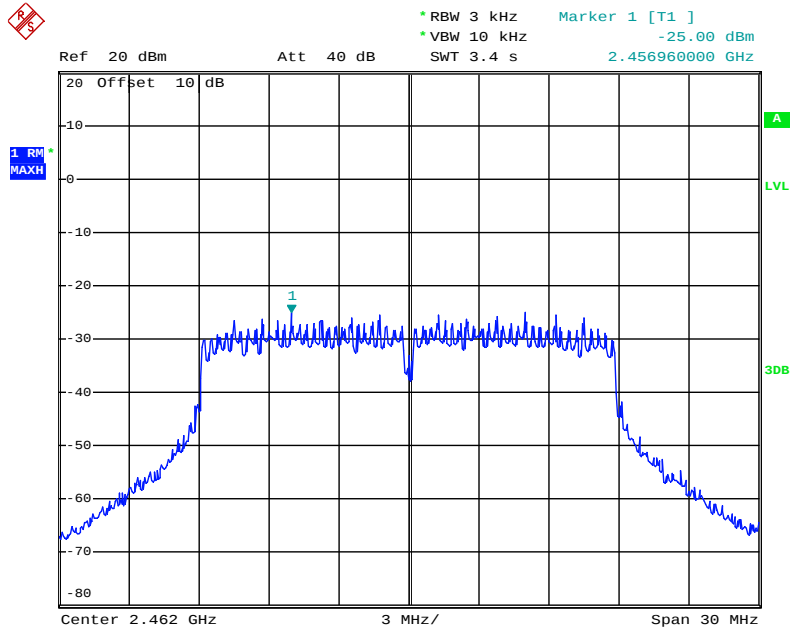
802.11n Channel Low 2412MHz (20MHz)



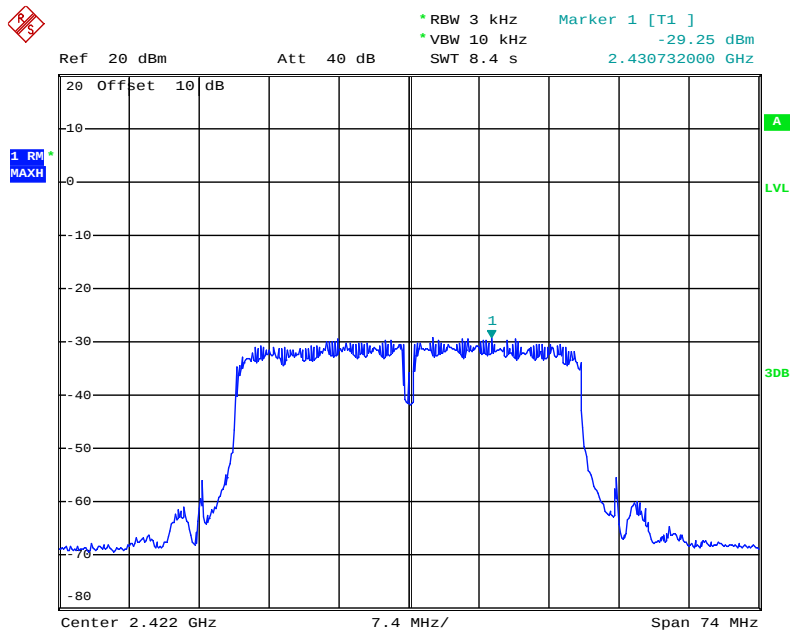
802.11n Channel Middle 2437MHz (20MHz)



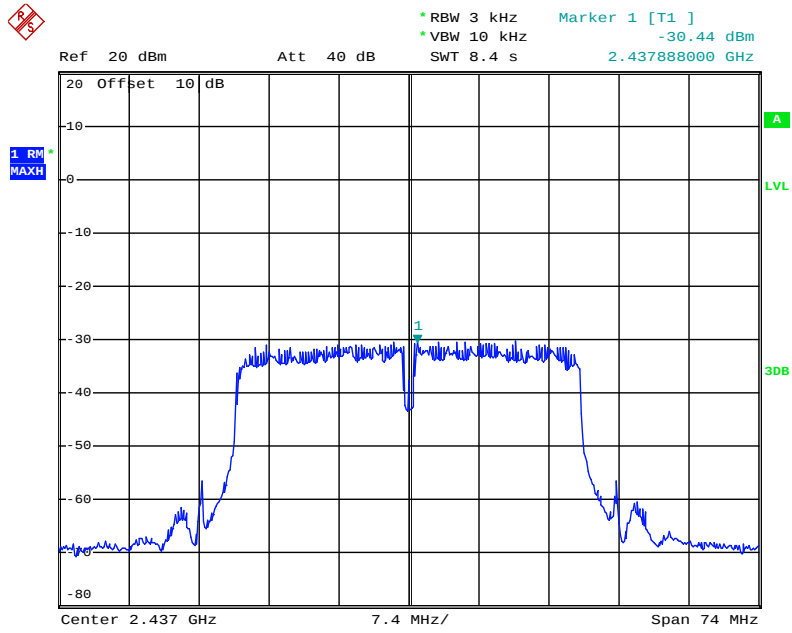
802.11n Channel High 2462MHz(20MHz)



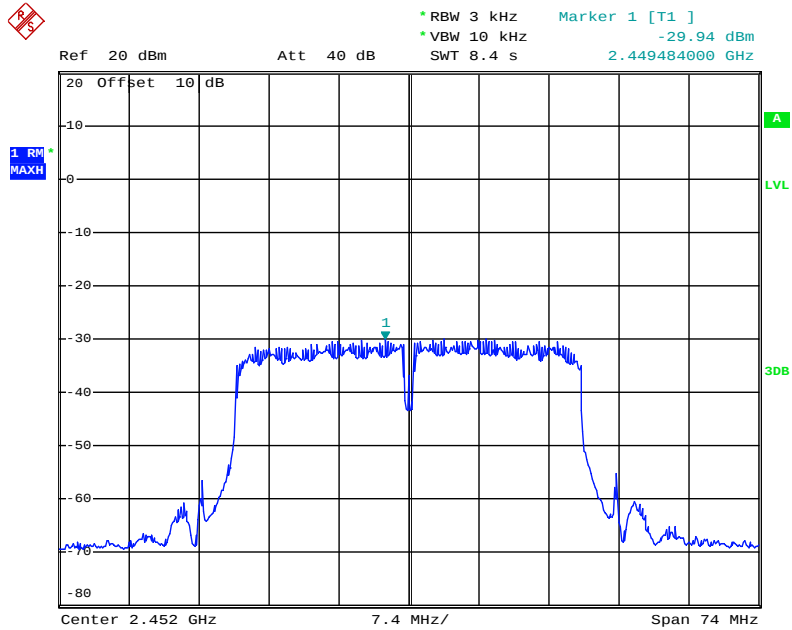
802.11n Channel Low 2422MHz (40MHz)



802.11n Channel Middle 2437MHz (40MHz)

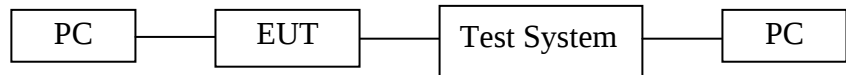


802.11n Channel High 2452MHz(40MHz)



11.BAND EDGE COMPLIANCE TEST

11.1.Block Diagram of Test Setup



11.2.The Requirement For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

11.3.EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

11.4.Operating Condition of EUT

11.4.1.Setup the EUT and simulator as shown as Section 11.1.

11.4.2.Turn on the power of all equipment.

11.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462 and 2422-2452MHz MHz. We select 2412MHz, 2462MHz and 2422MHz, 2452MHz TX frequency to transmit.

11.5. Test Procedure

Conducted Band Edge:

11.5.1. The transmitter output was connected to the spectrum analyzer via a low loss cable.

11.5.2. Set RBW of spectrum analyzer to 100kHz and VBW to 300kHz.

Radiate Band Edge:

11.5.1. The EUT is placed on a turntable, which is 1.5m above the ground plane and worked at highest radiated power.

11.5.2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.

11.5.3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

11.5.4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

11.5.5. RBW=1MHz, VBW=1MHz

11.5.6. The band edges was measured and recorded.

11.6. Test Result

Test Lab: Shielding room

The test was performed with 802.11b		
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2400	39.04	> 30dBc
2483.5	39.42	> 30dBc

The test was performed with 802.11g		
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2400	32.40	> 30dBc
2483.5	41.77	> 30dBc

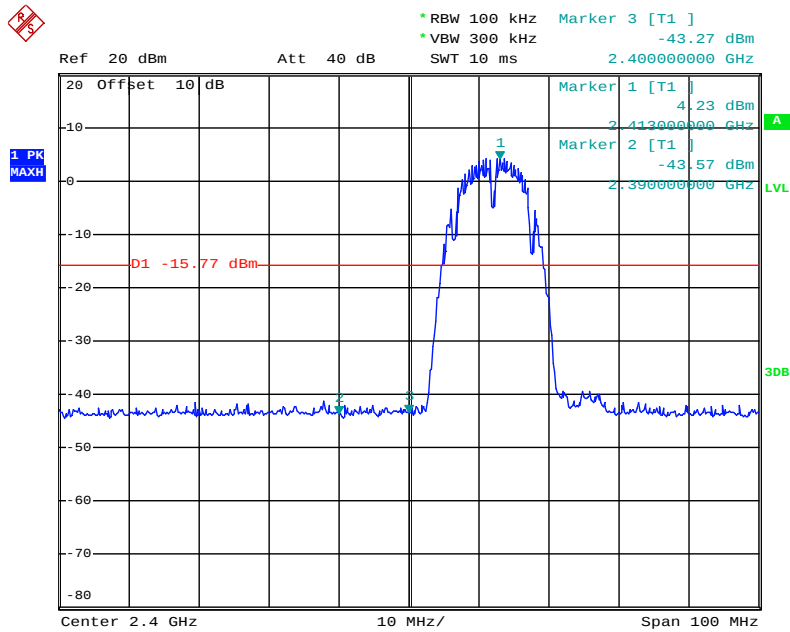
The test was performed with 802.11n (20MHz)		
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2400	31.22	> 30dBc
2483.5	42.31	> 30dBc

The test was performed with 802.11n (40MHz)		
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2400	31.75	> 30dBc
2483.5	37.78	> 30dBc

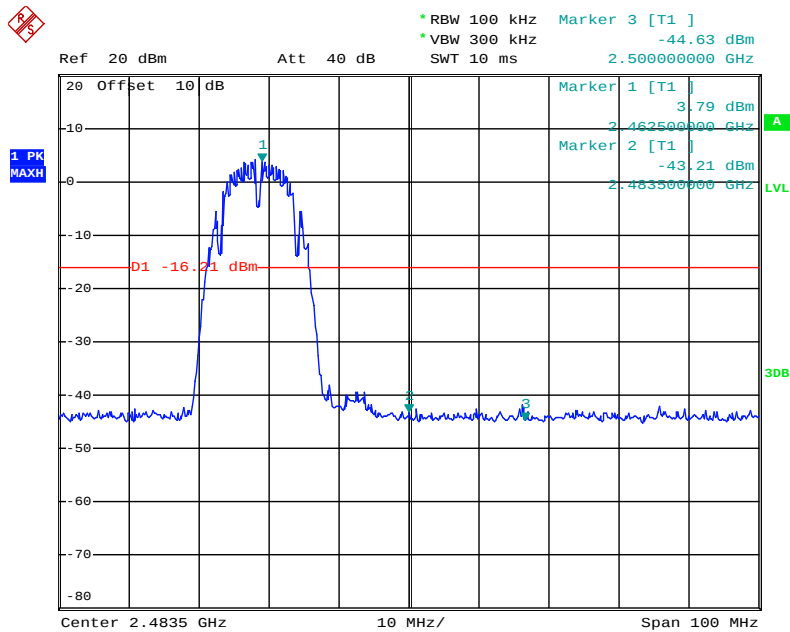
Note: We tested 802.11b/g/n mode the all data rate and recorded the worst case data for this channel to be 11Mbps for 802.11b mode and 54Mbps for 802.11g mode and MCS7 for 802.11n(20MHz) and MCS7 for 802.11n(40MHz) mode.

The spectrum analyzer plots are attached as below.

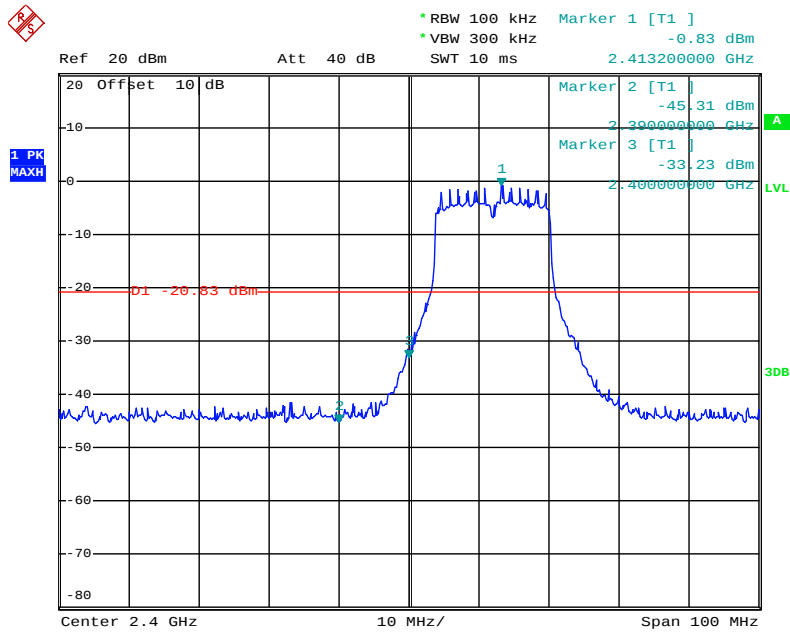
802.11b Channel Low 2412MHz



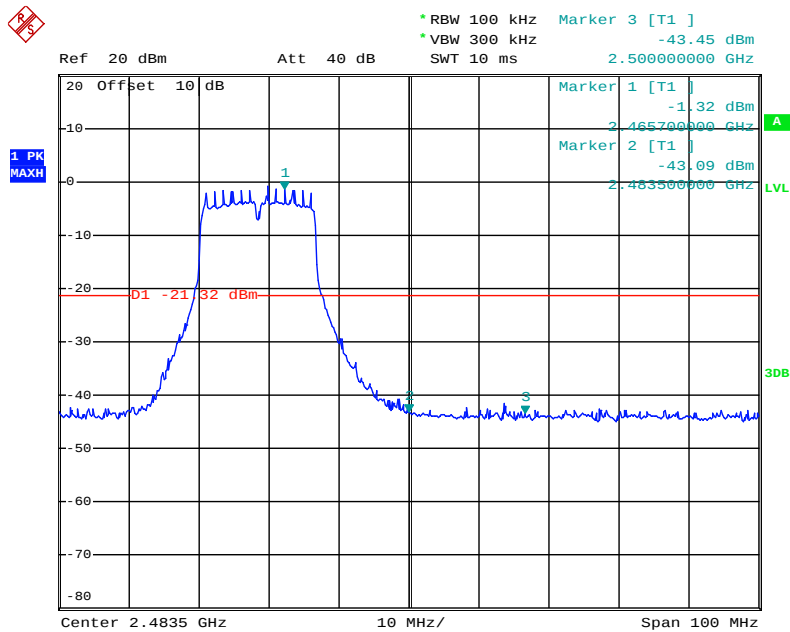
802.11b Channel High 2462MHz



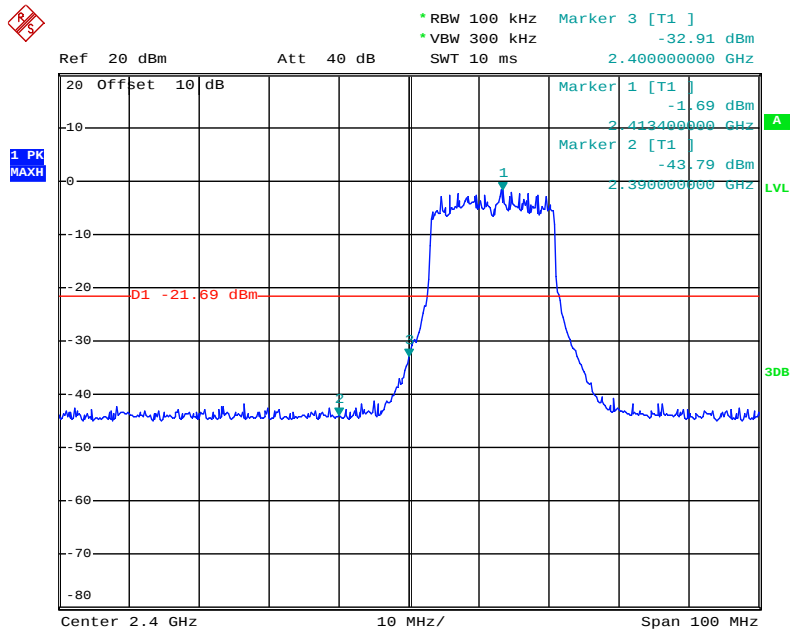
802.11g Channel Low 2412MHz



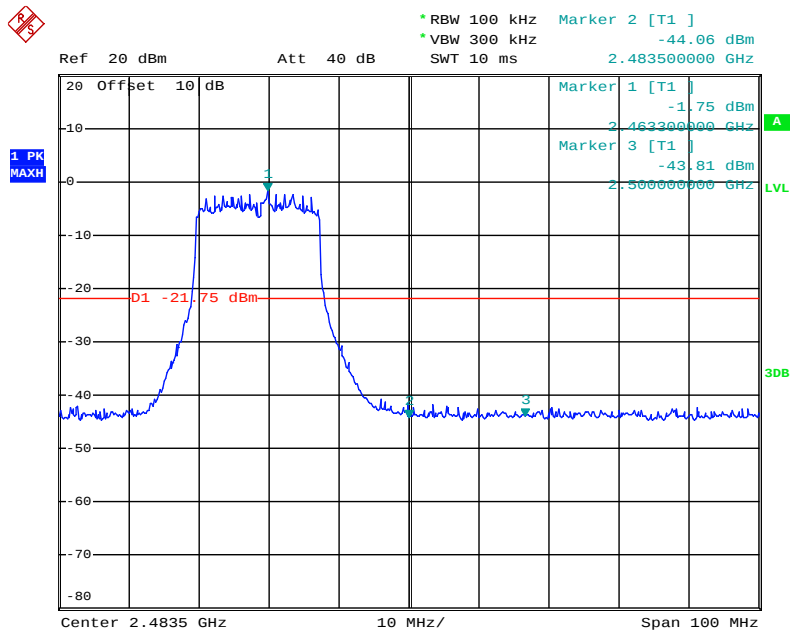
802.11g Channel High 2462MHz



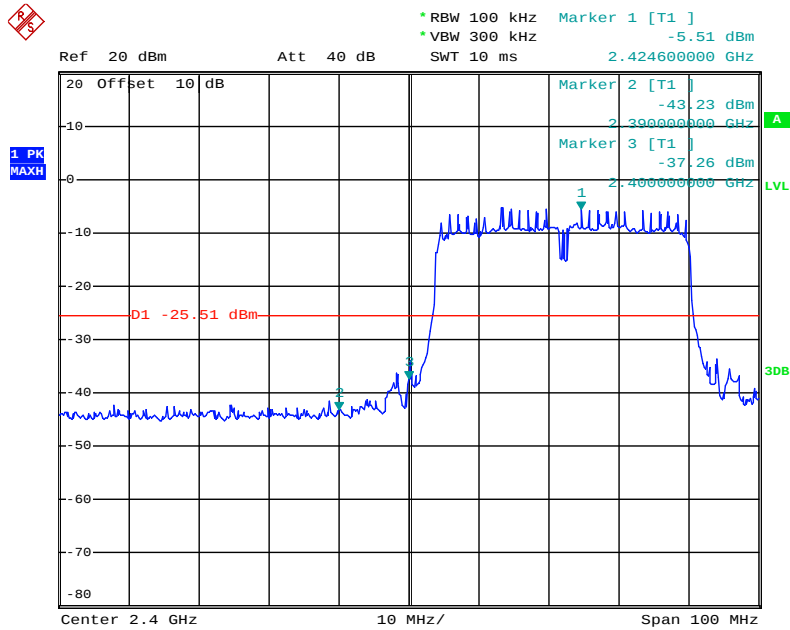
802.11n Channel Low 2412MHz (20MHz)



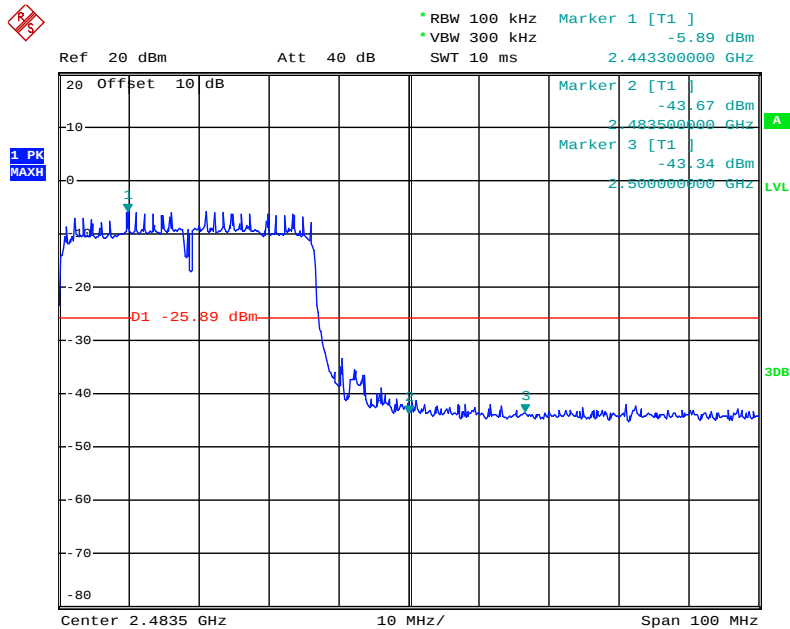
802.11n Channel High 2462MHz (20MHz)



802.11n Channel Low 2422MHz (40MHz)



802.11n Channel High 2452MHz (40MHz)



Radiated Band Edge Result

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:
$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$
3. Display the measurement of peak values.

Test Procedure:

The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Let the EUT work in TX modes then measure it.

We select 2412MHz, 2462MHz TX frequency to transmit(802.11b/g/n20 mode).

We select 2422MHz, 2452MHz TX frequency to transmit(802.11n40 mode).

During the radiated emission test, the spectrum analyzer was set with the following configurations:

- 1.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.
- 2.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.
3. We tested 802.11b/g/n mode the all and the worst-case(802.11b) emissions are reported.

Noto: We tested 802.11b/g/n mode the all data rate and recorded the worst case data for this channel to be 11Mbps for 802.11b mode and 54Mbps for 802.11g mode and MCS7 for 802.11n(20MHz) and MCS7 for 802.11n(40MHz) mode.

Test Lab: 3m Anechoic chamber



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Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: BR #36

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: LED bulb

Mode: TX Chanel 1(802.11b)

Model: SM-BLBBR30

Manufacturer: Hengdian

Polarization: Horizontal

Power Source: AC 120V/60Hz

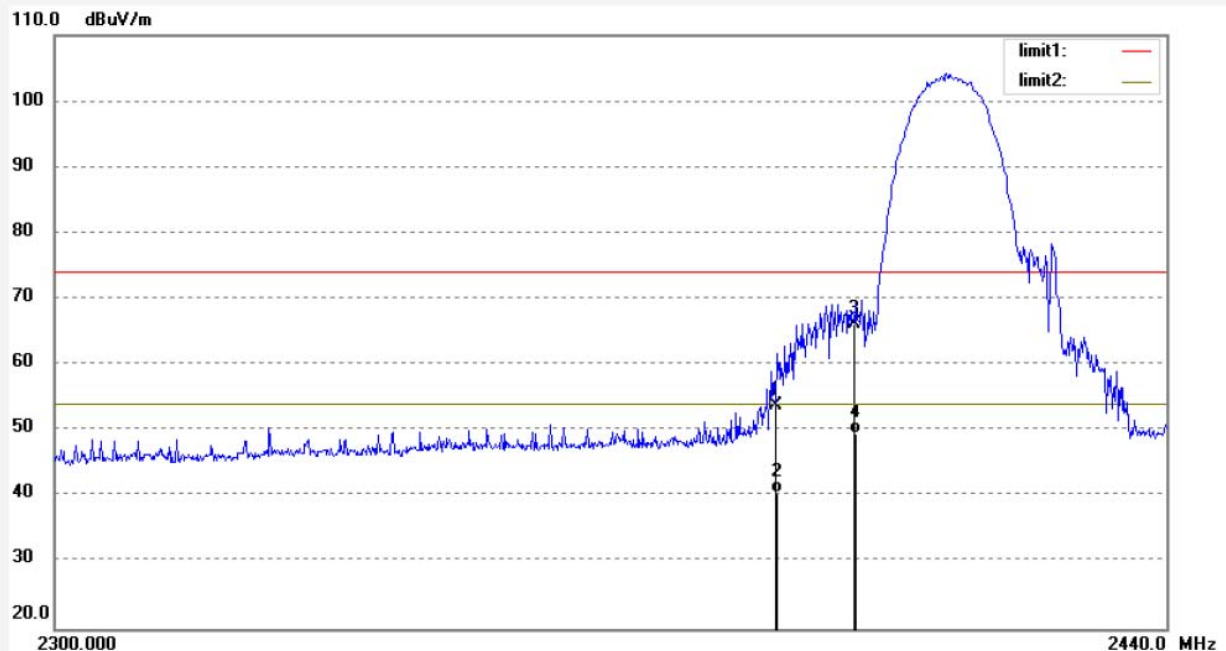
Date: 20/02/19/

Time: 14/18/17

Engineer Signature: Ben

Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	53.11	0.79	53.90	74.00	-20.10	peak	200	136	
2	2390.000	39.71	0.79	40.50	54.00	-13.50	AVG	200	169	
3	2400.000	65.35	0.88	66.23	74.00	-7.77	peak	200	256	
4	2400.000	48.72	0.88	49.60	54.00	-4.40	AVG	200	302	



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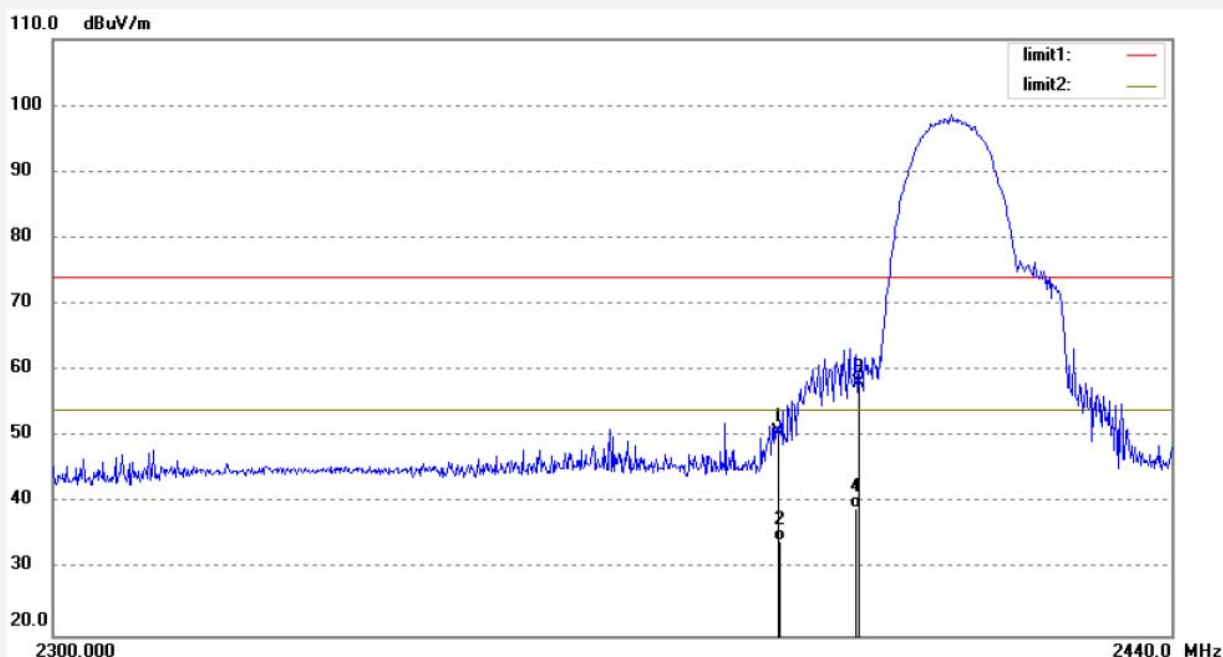
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: BR #35
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: LED bulb
Mode: TX Chanel 1(802.11b)
Model: SM-BLBBR30
Manufacturer: Hengdian

Polarization: Vertical
Power Source: AC 120V/60Hz
Date: 20/02/19/
Time: 14/14/58
Engineer Signature: Ben
Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	49.86	0.79	50.65	74.00	-23.35	peak	150	145	
2	2390.000	33.61	0.79	34.40	54.00	-19.60	AVG	150	163	
3	2400.000	57.17	0.88	58.05	74.00	-15.95	peak	150	198	
4	2400.000	38.42	0.88	39.30	54.00	-14.70	AVG	150	256	



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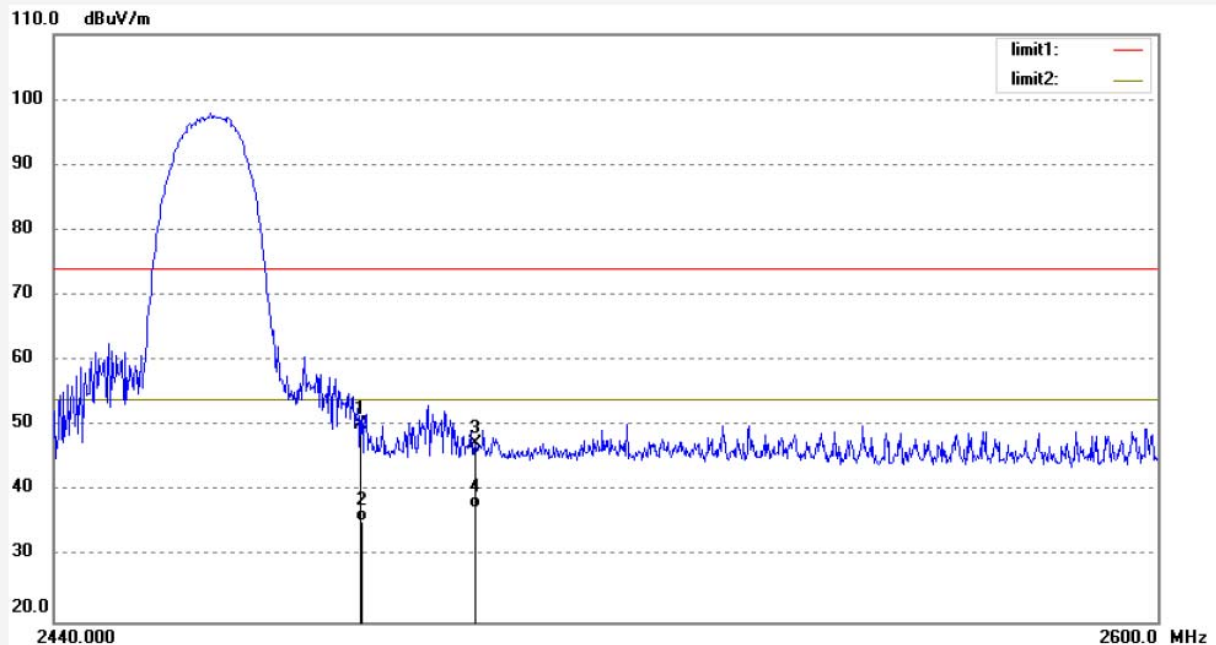
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: BR #34
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: LED bulb
Mode: TX Chanel 11(802.11b)
Model: SM-BLBBR30
Manufacturer: Hengdian

Polarization: Vertical
Power Source: AC 120V/60Hz
Date: 20/02/19/
Time: 14/11/56
Engineer Signature: Ben
Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	49.10	1.10	50.20	74.00	-23.80	peak	150	125	
2	2483.500	34.40	1.10	35.50	54.00	-18.50	AVG	150	196	
3	2500.000	46.31	1.10	47.41	74.00	-26.59	peak	150	215	
4	2500.000	36.30	1.10	37.40	54.00	-16.60	AVG	150	296	



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Site: 1# Chamber

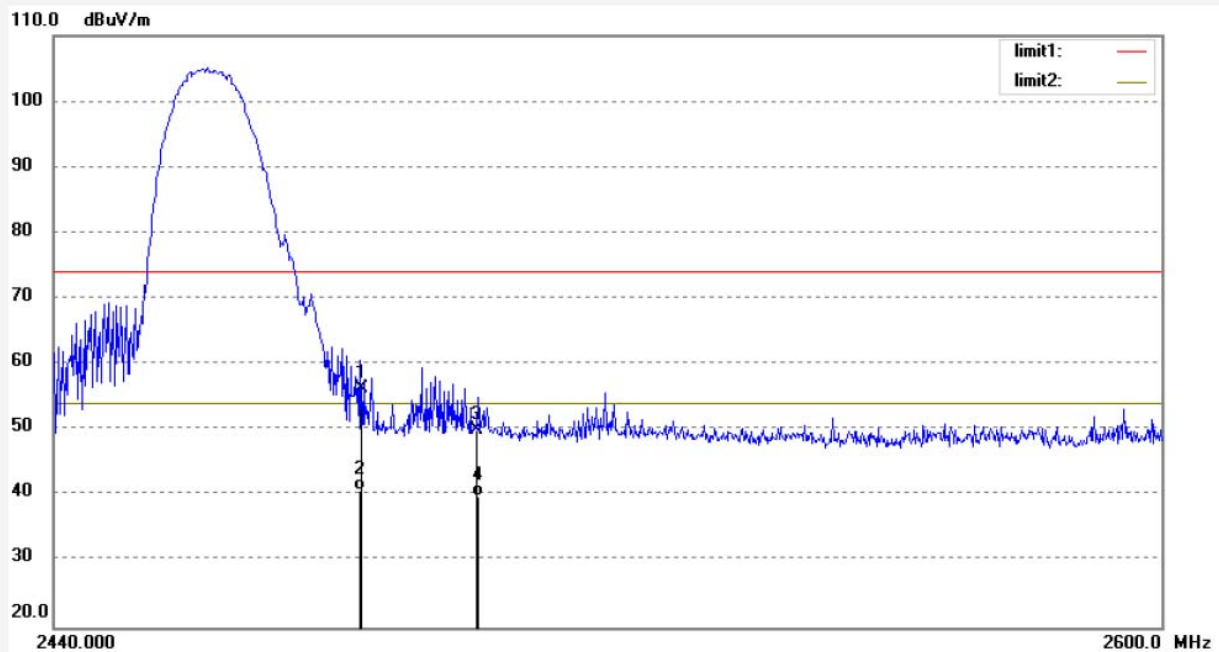
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: BR #33
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: LED bulb
Mode: TX Chanel 11(802.11b)
Model: SM-BLBBR30
Manufacturer: Hengdian

Polarization: Horizontal
Power Source: AC 120V/60Hz
Date: 20/02/19/
Time: 14/06/29
Engineer Signature: Ben
Distance: 3m

Note: Report NO.:ATE20200073

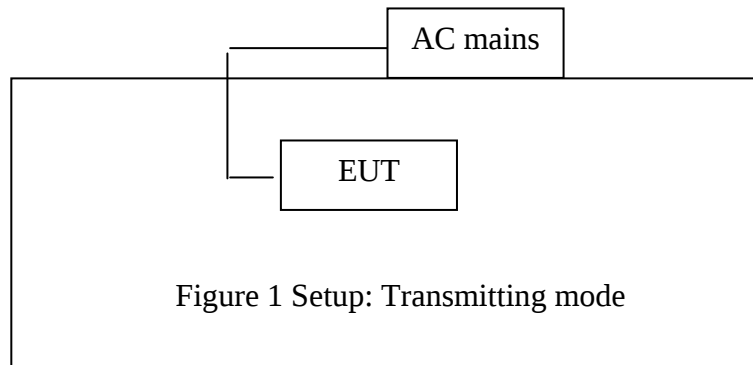


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	55.14	1.10	56.24	74.00	-17.76	peak	200	145	
2	2483.500	39.70	1.10	40.80	54.00	-13.20	AVG	200	168	
3	2500.000	49.05	1.10	50.15	74.00	-23.85	peak	200	215	
4	2500.000	38.90	1.10	40.00	54.00	-14.00	AVG	200	286	

12.RADIATED SPURIOUS EMISSION TEST

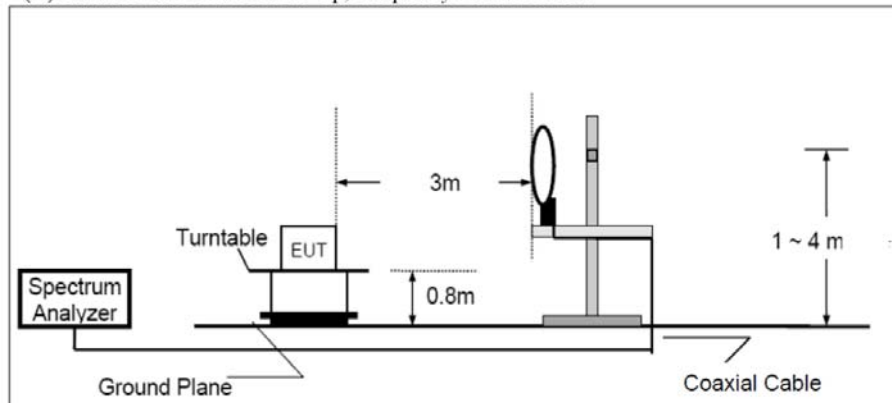
12.1.Block Diagram of Test Setup

12.1.1.Block diagram of connection between the EUT and peripherals

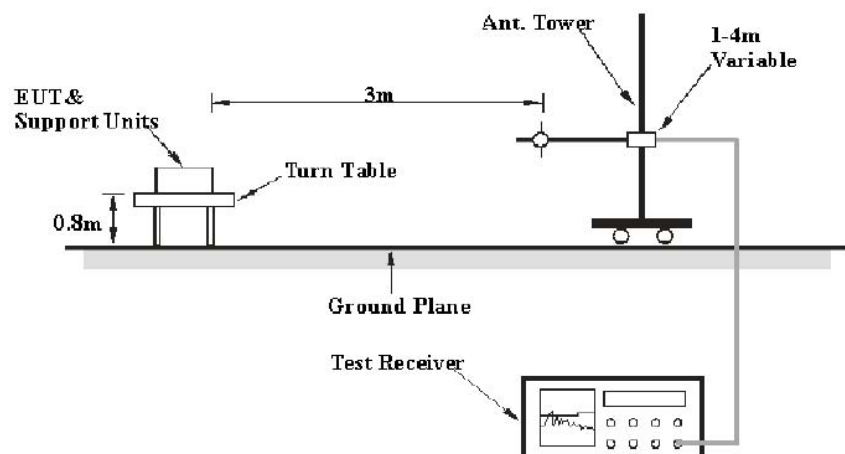


12.1.2.Semi-Anechoic Chamber Test Setup Diagram

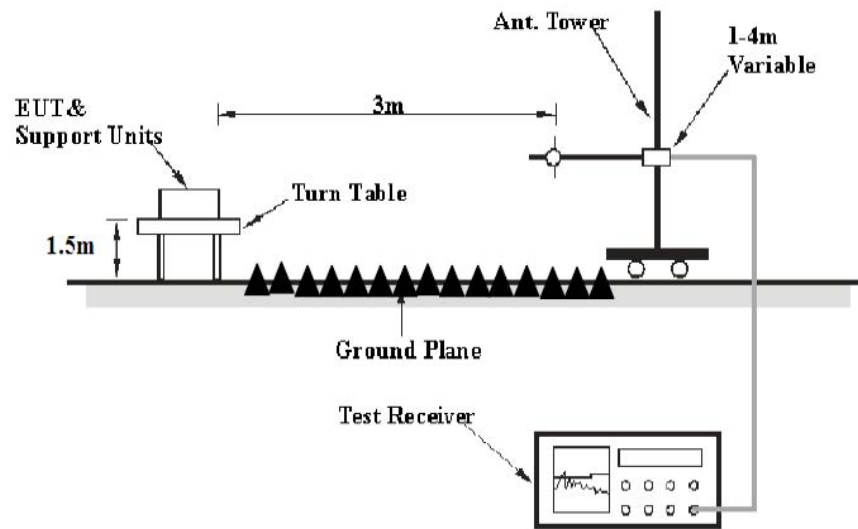
(A)Radiated Emission Test Set-Up, Frequency below 30MHz



(B)Radiated Emission Test Set-Up, Frequency 30MHz-1GHz



(C) Radiated Emission Test Set-Up, Frequency above 1GHz



12.2.The Limit For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

12.3.Restricted bands of operation

12.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510

²Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

12.4.Configuration of EUT on Measurement

The equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

12.5. Operating Condition of EUT

12.5.1. Setup the EUT and simulator as shown as Section 10.1.

12.5.2. Turn on the power of all equipment.

12.5.3. Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462 and 2422-2452MHz. We select 2412MHz, 2437MHz, 2462MHz and 2422MHz, 2437MHz, 2452MHz TX frequency to transmit.

12.6. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground (Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground (Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement.

The frequency range from 30MHz to 26500MHz is checked.

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

During the radiated emission test, the spectrum analyzer was set with the following configurations:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak at frequency below 1GHz.
2. 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.
3. 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.
4. All modes of operation were investigated and the worst-case emissions are reported.

12.7.Data Sample

Frequency (MHz)	Reading (dB μ v)	Factor (dB/m)	Result (dB μ v/m)	Limit (dB μ v/m)	Margin (dB)	Remark
X.XX	48.69	-13.35	35.34	46	-10.66	QP

Frequency(MHz) = Emission frequency in MHz

Reading(dB μ v) = Uncorrected Analyzer/Receiver reading

Factor (dB/m) = Antenna factor + Cable Loss – Amplifier gain

Result(dB μ v/m) = Reading(dB μ v) + Factor(dB/m)

Limit (dB μ v/m) = Limit stated in standard

Margin (dB) = Result(dB μ v/m) - Limit (dB μ v/m)

QP = Quasi-peak Reading

Calculation Formula:

Margin(dB) = Result (dB μ V/m)–Limit(dB μ V/m)

Result(dB μ V/m)= Reading(dB μ V)+ Factor(dB/m)

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit.

12.8.The Field Strength of Radiation Emission Measurement Results

Test Lab: 3m Anechoic chamber

Note: 1. Emissions attenuated more than 20 dB below the permissible value are not reported.

2. The radiation emissions from 9KHz-30MHz and 18-26.5GHz are not reported, because the test values lower than the limits of 20dB.

3. We tested 802.11b/g/n mode the all data rate and the worst case data for this channel to be 11Mbps for 802.11b mode.

The spectrum analyzer plots are attached as below.

Below 1G



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Site: 1# Chamber

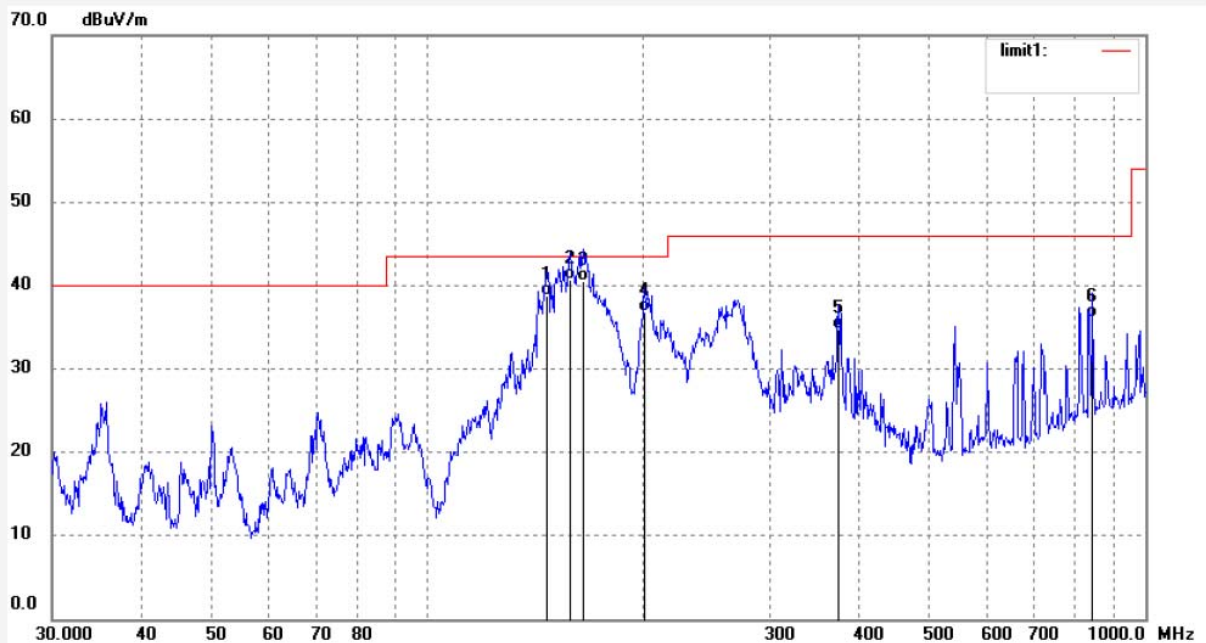
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: BR30 #3
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: LED bulb
Mode: TX Chanel 1(802.11b)
Model: SM-BLBBR30
Manufacturer: Hengdian

Polarization: Horizontal
Power Source: AC 120V/60Hz
Date: 20/01/16/
Time: 9/30/50
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	146.8392	66.86	-28.06	38.80	43.50	-4.70	QP	200	196	
2	158.0834	67.99	-27.29	40.70	43.50	-2.80	QP	200	156	
3	164.8911	67.05	-26.55	40.50	43.50	-3.00	QP	200	123	
4	200.7472	61.23	-24.33	36.90	43.50	-6.60	QP	200	215	
5	373.8861	53.41	-18.71	34.70	46.00	-11.30	QP	200	263	
6	844.8028	44.33	-8.13	36.20	46.00	-9.80	QP	200	315	



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Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: BR30 #4

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: LED bulb

Mode: TX Chanel 1(802.11b)

Model: SM-BLBBR30

Manufacturer: Hengdian

Polarization: Vertical

Power Source: AC 120V/60Hz

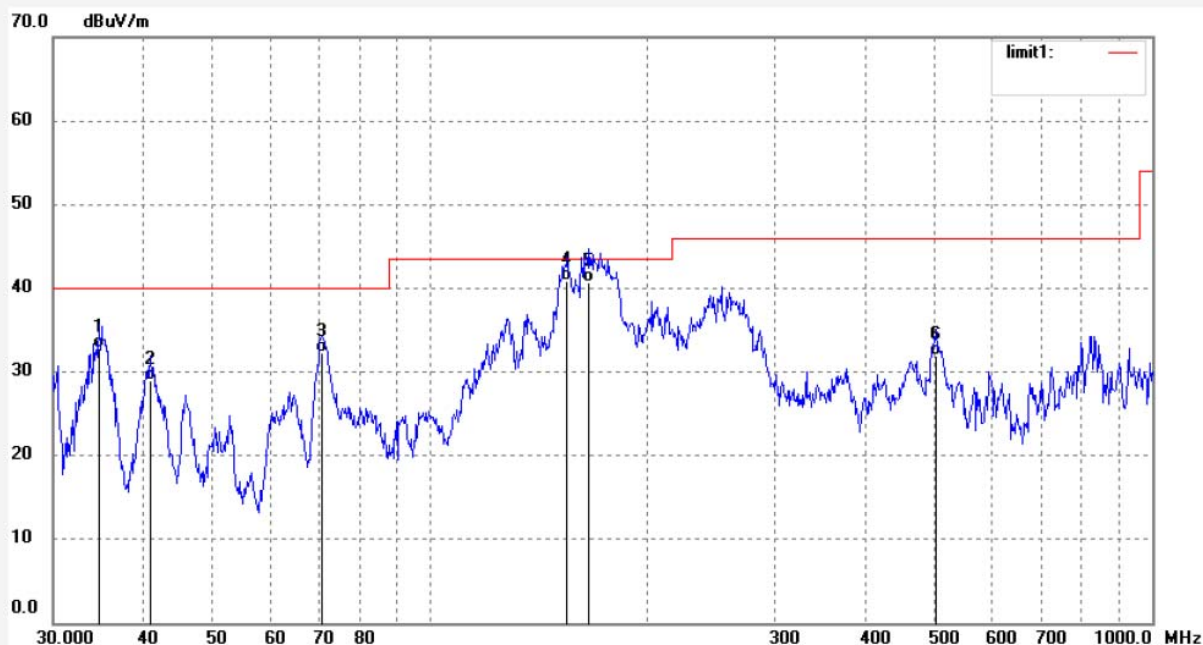
Date: 20/01/16/

Time: 9/31/30

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	34.7704	54.29	-21.39	32.90	40.00	-7.10	QP	100	102	
2	40.8699	52.63	-23.73	28.90	40.00	-11.10	QP	100	136	
3	70.7047	59.82	-27.52	32.30	40.00	-7.70	QP	100	168	
4	154.7856	68.44	-27.64	40.80	43.50	-2.70	QP	100	215	
5	166.0540	67.12	-26.42	40.70	43.50	-2.80	QP	100	296	
6	502.2472	48.26	-16.26	32.00	46.00	-14.00	QP	100	323	



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Site: 1# Chamber

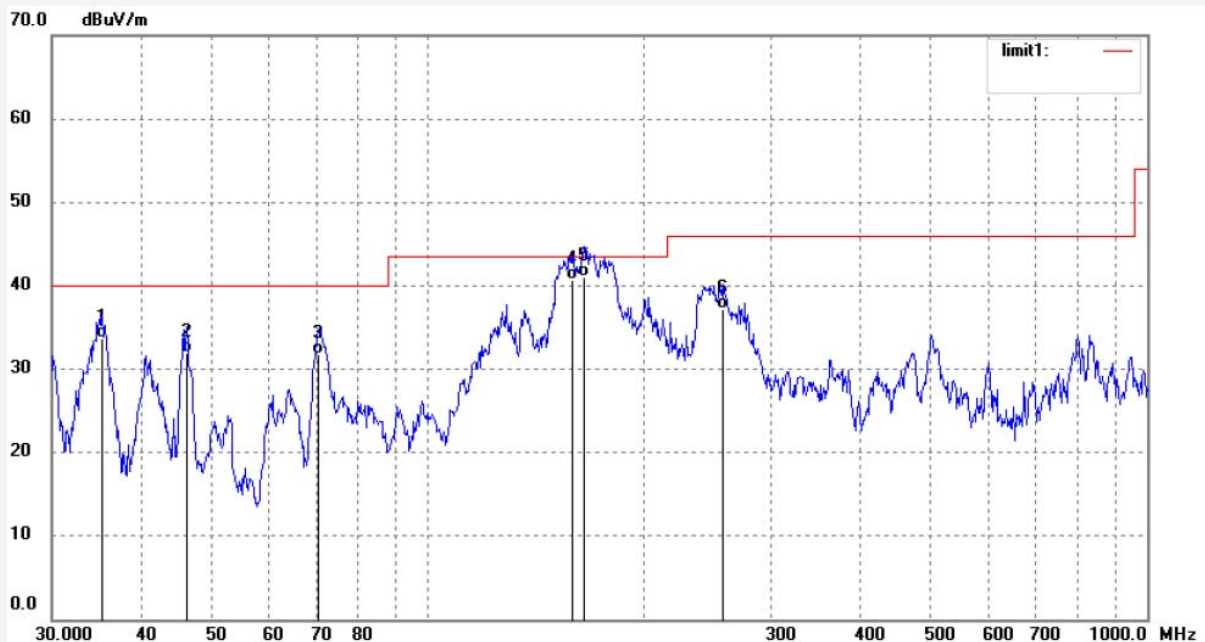
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: BR30 #5
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: LED bulb
Mode: TX Chanel 6(802.11b)
Model: SM-BLBBR30
Manufacturer: Hengdian

Polarization: Vertical
Power Source: AC 120V/60Hz
Date: 20/01/16/
Time: 9/32/38
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	35.2625	55.25	-21.55	33.70	40.00	-6.30	QP	100	106	
2	46.2180	56.85	-24.85	32.00	40.00	-8.00	QP	100	163	
3	70.4565	59.20	-27.50	31.70	40.00	-8.30	QP	100	185	
4	158.6399	67.92	-27.22	40.70	43.50	-2.80	QP	100	196	
5	164.8910	67.65	-26.55	41.10	43.50	-2.40	QP	100	245	
6	257.6265	60.39	-23.19	37.20	46.00	-8.80	QP	100	286	



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Job No.: BR30 #6

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: LED bulb

Mode: TX Chanel 6(802.11b)

Model: SM-BLBBR30

Manufacturer: Hengdian

Polarization: Horizontal

Power Source: AC 120V/60Hz

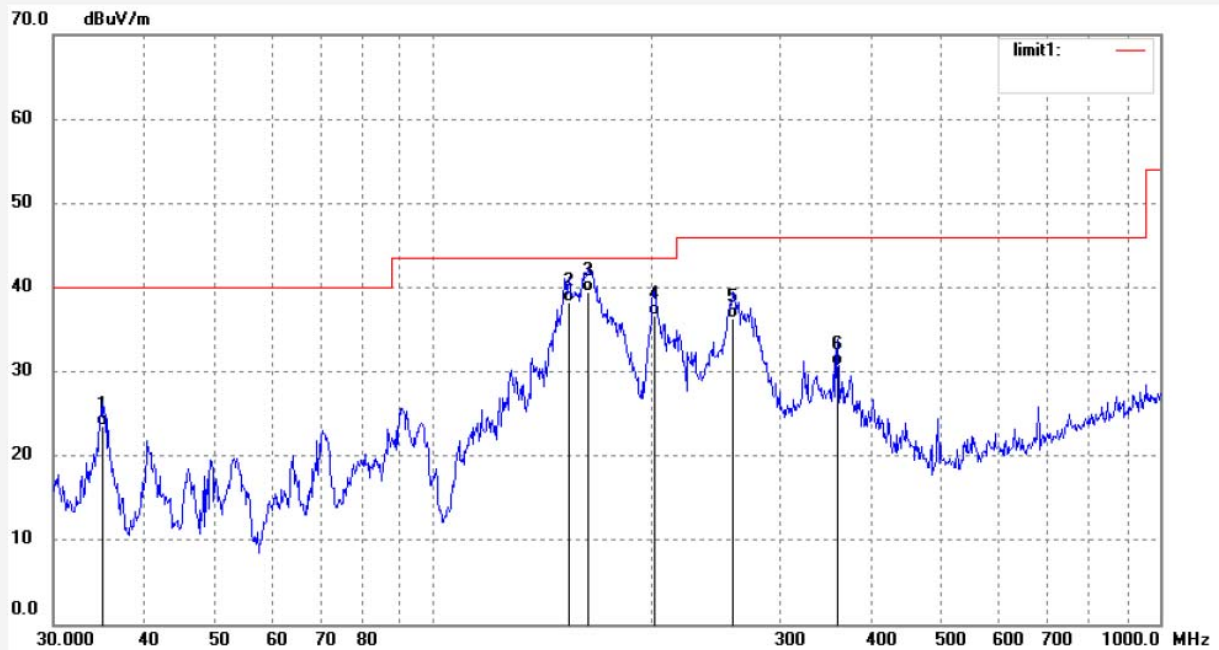
Date: 20/01/16/

Time: 9/34/06

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	35.1388	45.11	-21.51	23.60	40.00	-16.40	QP	200	109	
2	153.7017	65.92	-27.72	38.20	43.50	-5.30	QP	200	156	
3	163.7366	66.18	-26.68	39.50	43.50	-4.00	QP	200	186	
4	201.4539	60.90	-24.30	36.60	43.50	-6.90	QP	200	245	
5	258.5333	59.54	-23.14	36.40	46.00	-9.60	QP	200	278	
6	359.7114	49.72	-18.92	30.80	46.00	-15.20	QP	200	320	



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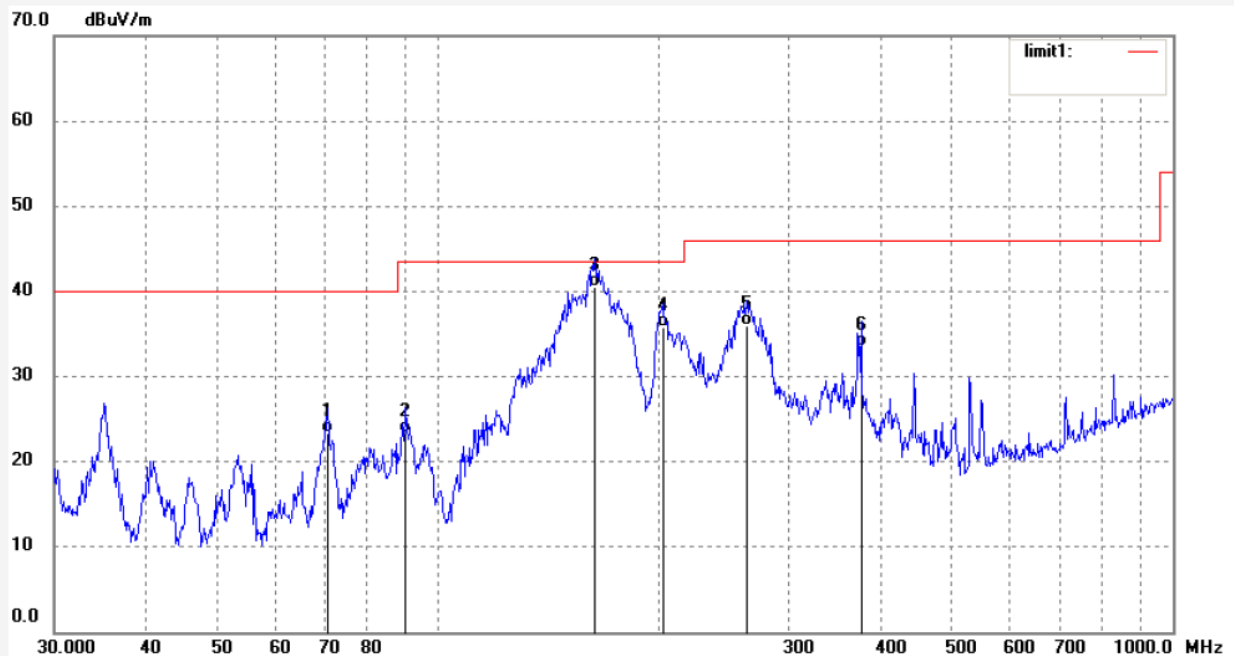
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: BR30 #7
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: LED bulb
Mode: TX Chanel 11(802.11b)
Model: SM-BLBBR30
Manufacturer: Hengdian

Polarization: Horizontal
Power Source: AC 120V/60Hz
Date: 20/01/16/
Time: 9/35/35
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	70.7047	50.82	-27.52	23.30	40.00	-16.70	QP	200	103	
2	90.4196	50.72	-27.42	23.30	43.50	-20.20	QP	200	163	
3	163.1622	67.23	-26.73	40.50	43.50	-3.00	QP	200	196	
4	202.1630	59.98	-24.28	35.70	43.50	-7.80	QP	200	245	
5	263.1154	58.75	-22.85	35.90	46.00	-10.10	QP	200	296	
6	376.5227	52.27	-18.67	33.60	46.00	-12.40	QP	200	349	



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Site: 1# Chamber

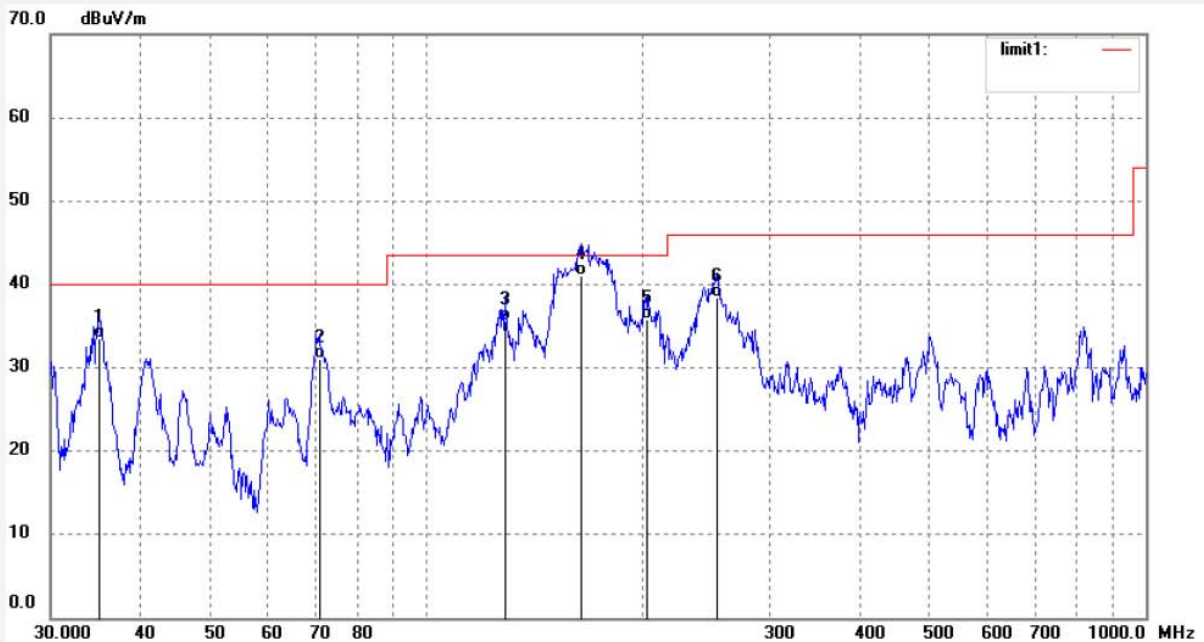
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: BR30 #8
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: LED bulb
Mode: TX Chanel 11(802.11b)
Model: SM-BLBBR30
Manufacturer: Hengdian

Polarization: Vertical
Power Source: AC 120V/60Hz
Date: 20/01/16/
Time: 9/36/18
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	35.0157	54.96	-21.46	33.50	40.00	-6.50	QP	100	103	
2	70.9535	58.52	-27.52	31.00	40.00	-9.00	QP	100	123	
3	128.4861	63.20	-27.67	35.53	43.50	-7.97	QP	100	163	
4	164.3129	67.61	-26.61	41.00	43.50	-2.50	QP	100	196	
5	202.8745	59.95	-24.25	35.70	43.50	-7.80	QP	100	245	
6	253.1401	61.96	-23.46	38.50	46.00	-7.50	QP	100	315	

Above 1G



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Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: BR #27

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: LED bulb

Mode: TX Chanel 1(802.11b)

Model: SM-BLBBR30

Manufacturer: Hengdian

Polarization: Vertical

Power Source: AC 120V/60Hz

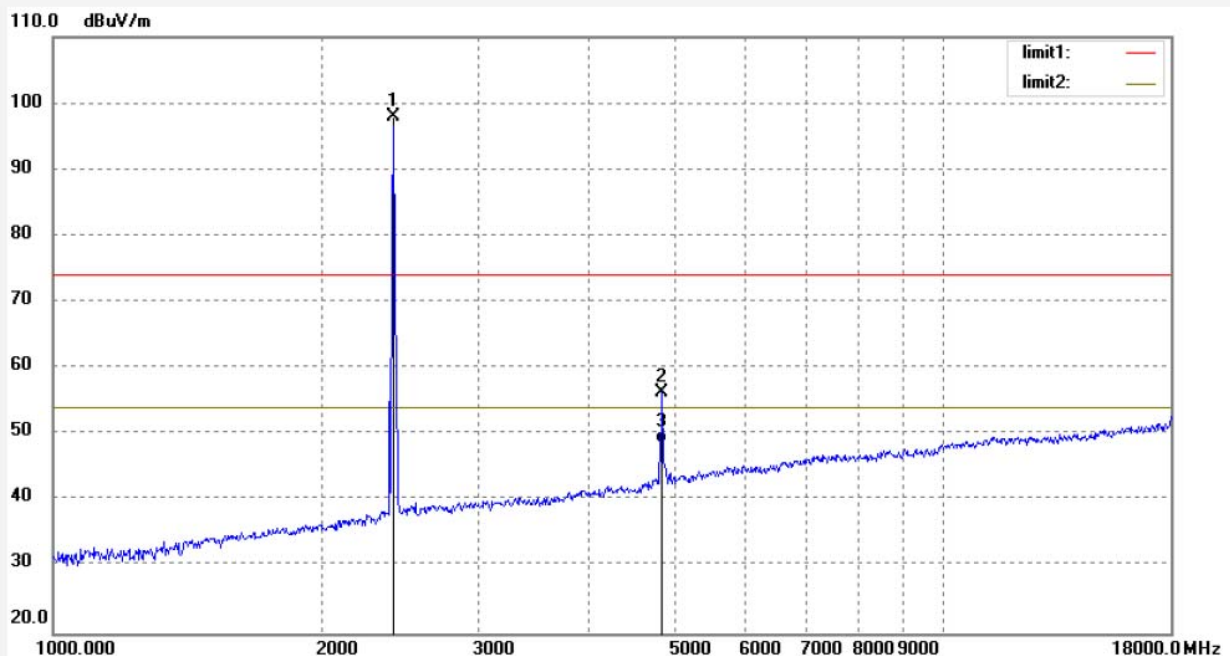
Date: 20/02/19/

Time: 13/57/53

Engineer Signature: Ben

Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2412.072	97.06	0.94	98.00			peak	150	102	
2	4824.012	48.63	7.65	56.28	74.00	-17.72	peak	150	163	
3	4824.012	40.95	7.65	48.60	54.00	-5.40	AVG	150	296	



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Fax:+86-0755-26503396

Job No.: BR #28

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: LED bulb

Mode: TX Chanel 1(802.11b)

Model: SM-BLBBR30

Manufacturer: Hengdian

Polarization: Horizontal

Power Source: AC 120V/60Hz

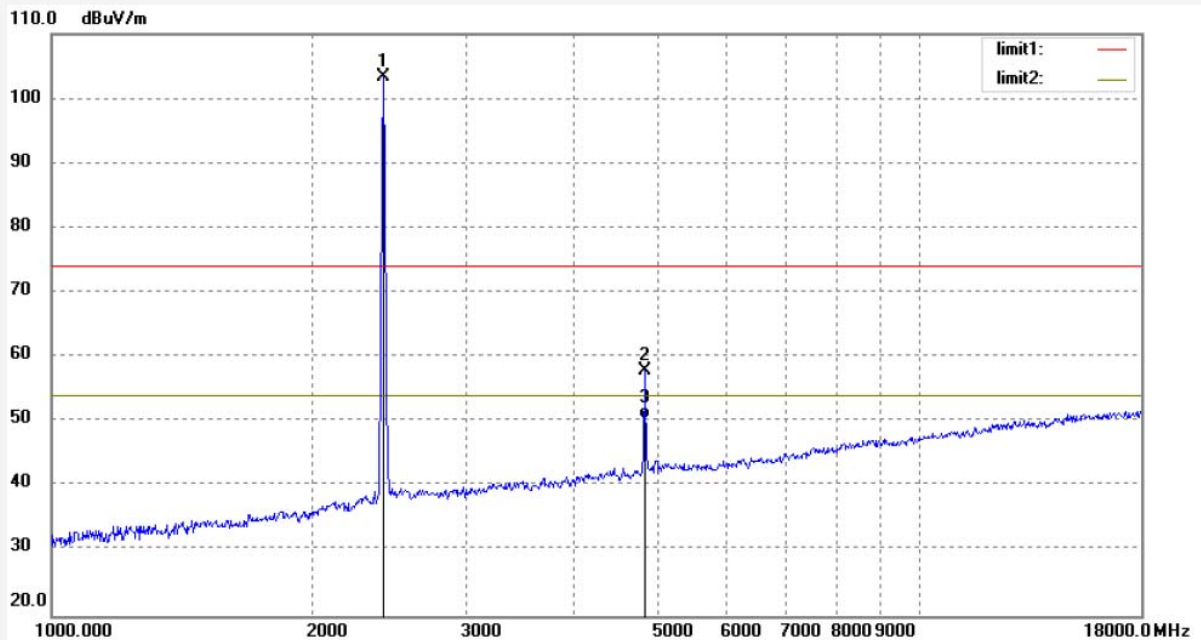
Date: 20/02/19/

Time: 13/59/14

Engineer Signature: Ben

Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2412.072	102.43	0.94	103.37			peak	200	196	
2	4824.012	50.45	7.53	57.98	74.00	-16.02	peak	200	265	
3	4824.012	42.97	7.53	50.50	54.00	-3.50	AVG	200	325	



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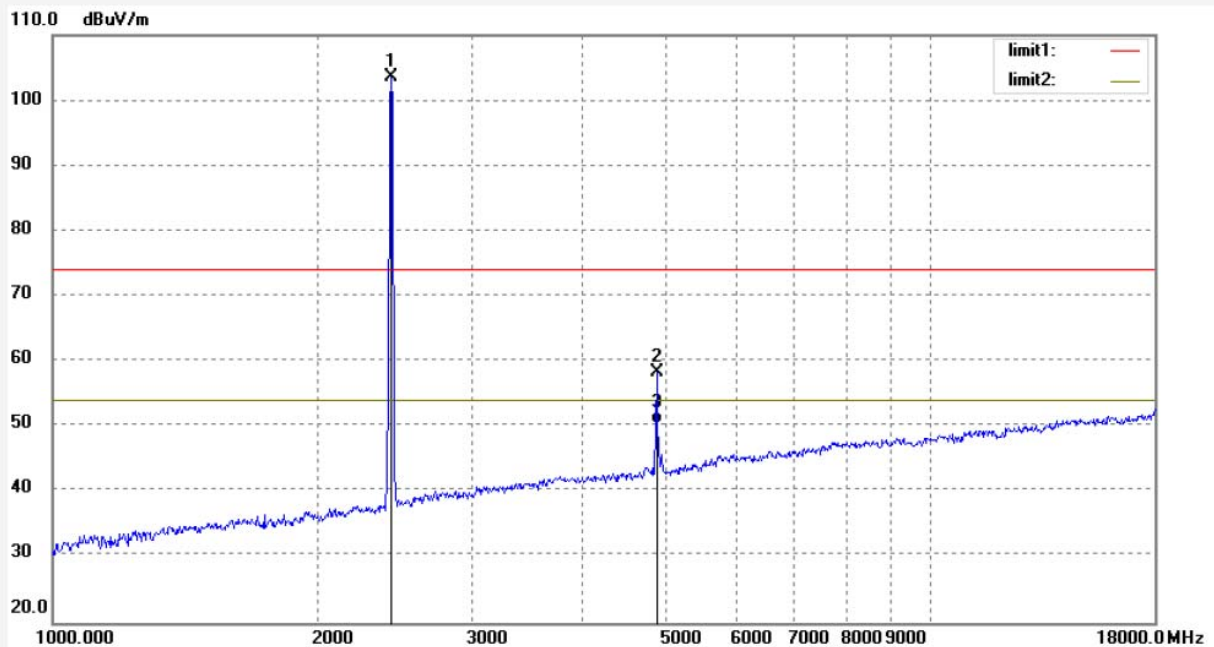
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: BR #29
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: LED bulb
Mode: TX Chanel 6(802.11b)
Model: SM-BLBBR30
Manufacturer: Hengdian

Polarization: Horizontal
Power Source: AC 120V/60Hz
Date: 20/02/19/
Time: 14/01/06
Engineer Signature: Ben
Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2437.101	102.69	1.00	103.69			peak	200	115	
2	4874.042	50.25	8.04	58.29	74.00	-15.71	peak	200	163	
3	4874.042	42.36	8.04	50.40	54.00	-3.60	AVG	200	249	



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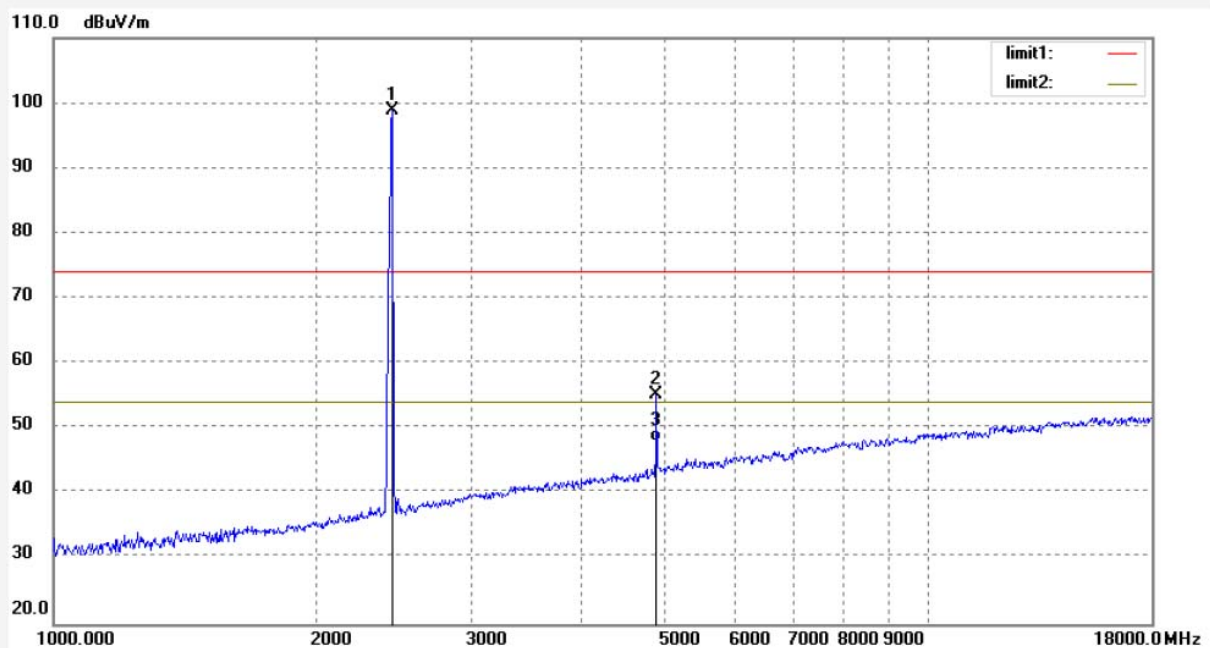
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: BR #30
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: LED bulb
Mode: TX Chanel 6(802.11b)
Model: SM-BLBBR30
Manufacturer: Hengdian

Polarization: Vertical
Power Source: AC 120V/60Hz
Date: 20/02/19/
Time: 14/02/07
Engineer Signature: Ben
Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2437.101	97.80	1.03	98.83			peak	150	165	
2	4874.042	47.10	8.17	55.27	74.00	-18.73	peak	150	178	
3	4874.042	39.93	8.17	48.10	54.00	-5.90	AVG	150	225	



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Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: BR #31

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: LED bulb

Mode: TX Chanel 11(802.11b)

Model: SM-BLBBR30

Manufacturer: Hengdian

Polarization: Vertical

Power Source: AC 120V/60Hz

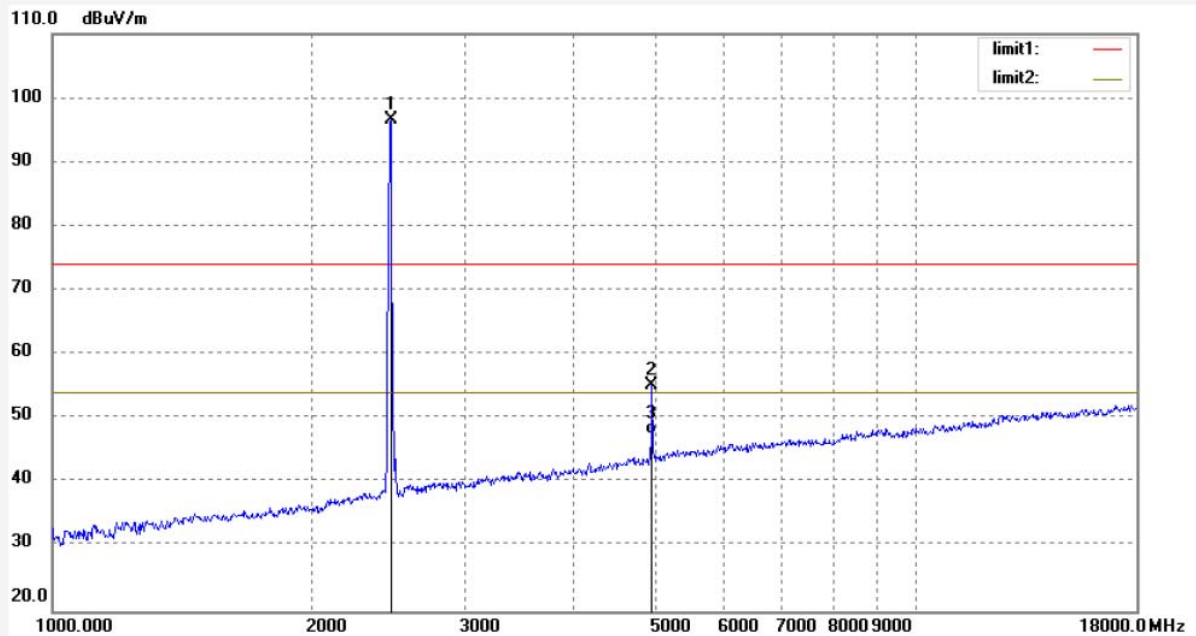
Date: 20/02/19/

Time: 14/03/55

Engineer Signature: Ben

Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2462.024	95.58	1.09	96.67			peak	150	185	
2	4924.021	46.59	8.52	55.11	74.00	-18.89	peak	150	236	
3	4924.021	38.98	8.52	47.50	54.00	-6.50	AVG	150	305	



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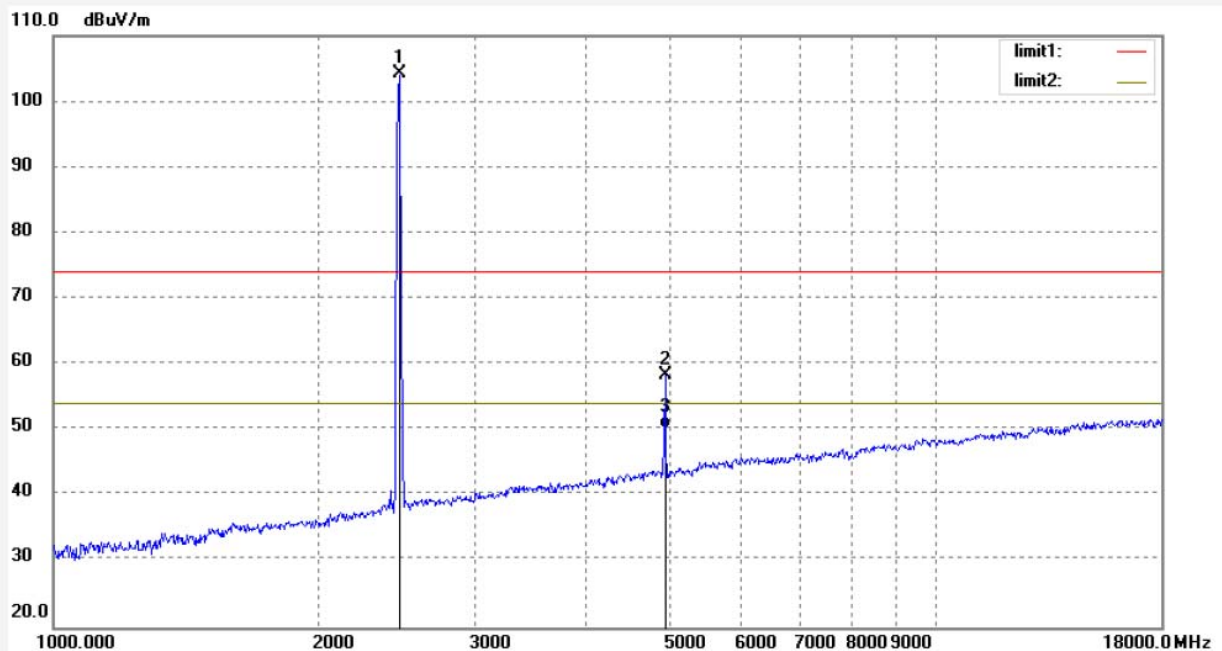
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: BR #32
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: LED bulb
Mode: TX Chanel 11(802.11b)
Model: SM-BLBBR30
Manufacturer: Hengdian

Polarization: Horizontal
Power Source: AC 120V/60Hz
Date: 20/02/19/
Time: 14/05/13
Engineer Signature: Ben
Distance: 3m

Note: Report NO.:ATE20200073



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2462.024	103.06	1.09	104.15			peak	200	185	
2	4924.021	49.86	8.44	58.30	74.00	-15.70	peak	200	215	
3	4924.021	41.86	8.44	50.30	54.00	-3.70	AVG	200	275	

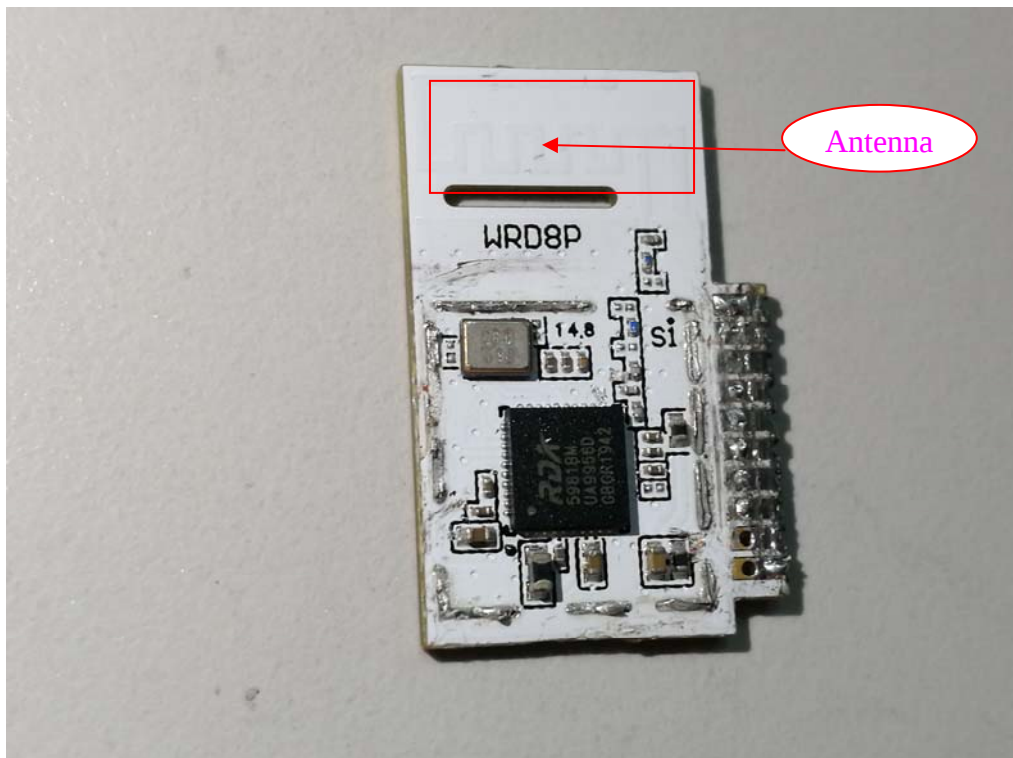
13.ANTENNA REQUIREMENT

13.1.The Requirement

According to 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.

13.2.Antenna Construction

Device is equipped with PCB Antenna, which isn't displaced by other antenna. The Antenna gain of EUT is 2.5dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



----- THE END OF TEST REPORT -----