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Report No.: 1710WSU01603
Report Version: V01
Issue Date: 12-11-2017

MEASUREMENT REPORT

FCC PART 15.247 & IC RSS-247 WLAN 802.11b/g/n

FCC ID: VPYLB1PJ

IC: 772C-LB1PJ

APPLICANT: Murata Manufacturing Co., Ltd.

Application Type: Certification

Product: W-LAN + Bluetooth Module

Model No.: LBEE5ZZ1PJ

FCC Classification: Digital Transmission System (DTS)

FCC Rule Part(s): Part 15 Subpart C (Section 15.247)

IC Rule(s): RSS-247 Issue 2

Test Procedure(s): ANSI C63.10-2013, KDB 558074 D01v04

Test Date: October 25 ~ November 28, 2017

Reviewed By : _(Kevin Guo)_

Approved By : _(Marlin Chen)_

Revision History

Report No.	Version	Description	Issue Date	Note
1710WSU01603	Rev. 01	Initial report	12-11-2017	Valid

CONTENTS

§2.1033 General Information

Applicant:	Murata Manufacturing Co., Ltd.
Applicant Address:	10-1, Higashikotari 1-chome, Nagaokakyo-shi, Kyoto 617-8555, Japan
Manufacturer:	Murata Manufacturing Co., Ltd.
Manufacturer Address:	10-1, Higashikotari 1-chome, Nagaokakyo-shi, Kyoto 617-8555, Japan
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
FCC Registration No.:	893164
IC Registration No.:	11384A-1
FCC Rule Part(s):	Part 15.247
IC Rule(s):	RSS-247 Issue 2
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	Digital Transmission System (DTS)

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC registered (MRT Reg. No. 893164) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-4179, G-814, C-4664, T-2206) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.**

1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.

2. PRODUCT INFORMATION

2.1. Feature of Equipment under Test

Product Name:	W-LAN + Bluetooth Module
Model No.:	LBEE5ZZ1PJ
Brand Name:	Murata
Work Voltage	DC 3.3V
WiFi Specification	802.11 a/b/g/n/ac
Bluetooth Specification	v4.0 dual mode

2.2. Product Specification Subjective to this Report

Frequency Range	802.11b/g/n-HT20: 2412 ~ 2462MHz 802.11n-HT40: 2422 ~ 2452MHz
Channel Number:	802.11b/g/n-HT20: 11 802.11n-HT40: 7
Type of Modulation	802.11b: DSSS 802.11g/n: OFDM
Data Rate:	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps
Maximum Average Output Power	802.11b: 18.75dBm 802.11g: 17.91dBm 802.11n-HT20: 17.64dBm 802.11n-HT40: 16.82dBm
Antenna type	PCB Antenna
Antenna Gain	3.1dBi

Note: For other features of this EUT, test report will be issued separately.

2.3. Operation Frequency / Channel List

802.11b/g/n-HT20

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

Channel List for 802.11n-HT40

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

2.4. Test Mode

Test Mode	Mode 1: Transmit by 802.11b
	Mode 2: Transmit by 802.11g
	Mode 3: Transmit by 802.11n-HT20
	Mode 4: Transmit by 802.11n-HT40

2.5. Description of Test Software

The test utility software used during testing was "QCARCT", and the version was "v3.0.210.0".

Power Parameter Value:

Test Mode	Test Frequency (MHz)	Power Parameter Value	Test Mode	Test Frequency (MHz)	Power Parameter Value
11b	2412	18.0	11n-HT20	2412	18.0
	2437	18.0		2437	18.0
	2462	18.0		2462	18.0
11g	2412	18.0	11n-HT40	2422	17.5
	2437	18.0		2437	17.5
	2462	18.0		2452	17.5

2.6. Device Capabilities

This device contains the following capabilities:

5GHz WLAN (NII), 2.4GHz WLAN (DTS), Bluetooth (v4.1 dual mode).

Note: 2.4GHz WLAN (DTS) operation is possible in 20MHz channel bandwidths. The maximum achievable duty cycle was determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak or average per the guidance of Section 6.0 b) of KDB 558074 D01v04. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Test Mode	Duty Cycle
802.11b	99.80%
802.11g	95.34%
802.11n-HT20	95.04%
802.11n-HT40	90.97%
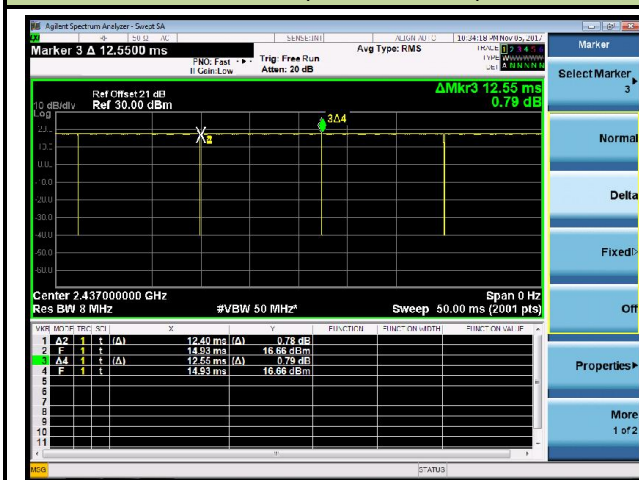
802.11b (T = 12.40ms)	802.11g (T = 2.045ms)
802.11n-HT20 (T = 1.915ms)	**802.11n-HT20 (T = 942.4us)**
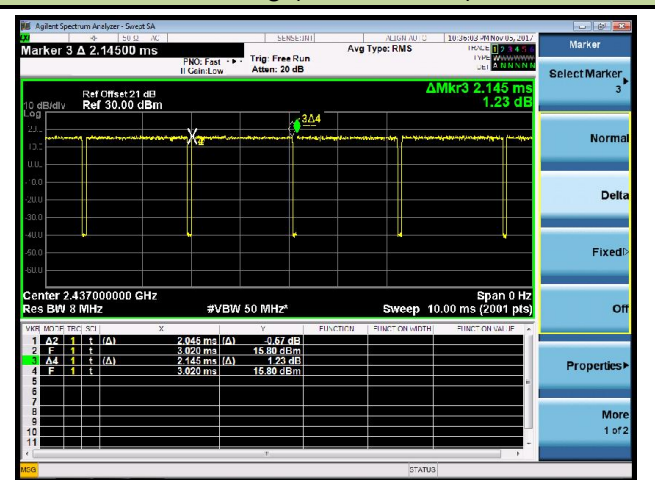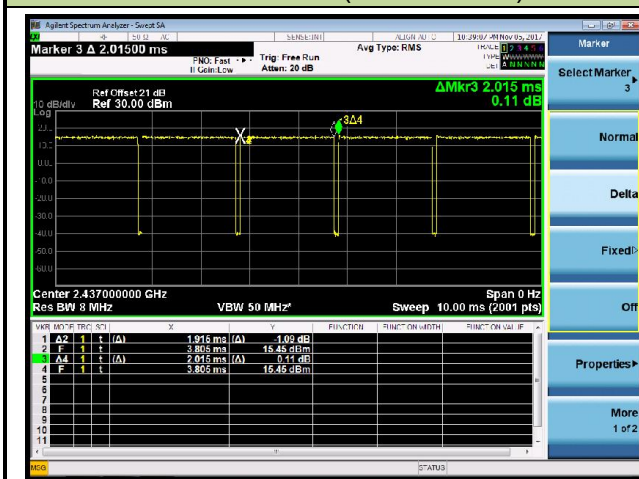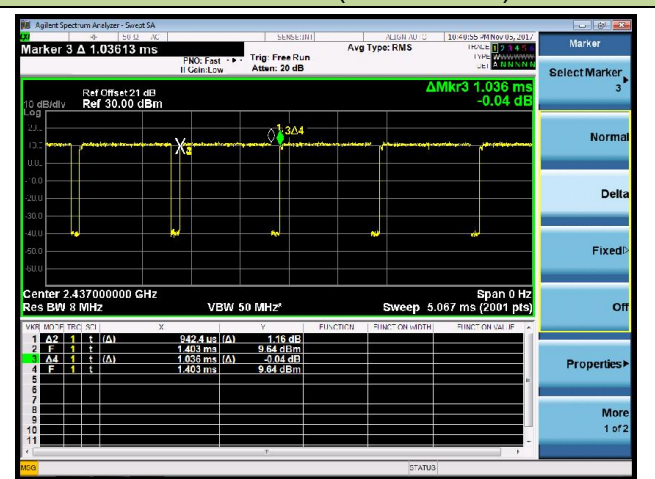
2.7. Test Configuration

The **W-LAN + Bluetooth Module** was tested per the guidance of KDB 558074 D01v04. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.8. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.9. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

RSP-100 Issue 11 Section 3

The manufacturer, importer or distributor shall meet the labelling requirements set out in this section for every unit:

(i) prior to marketing in Canada, for products manufactured in Canada

(ii) prior to importation into Canada, for imported products

For information regarding the e-labelling option, see Notice 2014–DRS1003. The label for the certified product represents the manufacturer's or importer's compliance with Innovation, Science and Economic Development Canada's (ISED) regulatory requirements.

Please see attachment for IC label and label location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 558074 D01v04 were used in the measurement of the **W-LAN + Bluetooth Module**.
Deviation from measurement procedure……………………………......................................None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.
The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.
Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.
An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.
Line conducted emissions test results are shown in Section 7.8.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-25GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

Conclusion:

The **W-LAN + Bluetooth Module** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06001	1 year	2018/06/20
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2018/06/20
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2018/06/20
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06181	1 year	2017/12/20
Shielding Anechoic Chamber	Mikebang	Chamber-SR2	MRTSUE06214	1 year	2018/05/10

Radiated Emission - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
MXE EMI Receiver	Agilent	N9038A	MRTSUE06125	1 year	2018/08/18
Loop Antenna	Schwarzbeck	FMZB1519	MRTSUE06025	1 year	2018/11/21
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2018/11/21
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2018/10/21
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2017/12/11
Broadband Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06024	1 year	2018/04/25
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06183	1 year	2017/12/22
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2018/05/10

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2018/04/25
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2017/12/06
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06180	1 year	2017/12/22

Software	Version	Function
e3	V8.3.5	EMI Test Software

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement - SR2
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):   150kHz~30MHz: 3.46dB
Radiated Emission Measurement - AC1
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):   9kHz ~ 1GHz: 4.18dB   1GHz ~ 25GHz: 4.76dB
Spurious Emissions, Conducted - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):   0.78dB
Output Power - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):   1.13dB
Power Spectrum Density - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):   1.15dB
Occupied Bandwidth - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):   0.28%

7. TEST RESULT

7.1. Summary

Company Name: **Murata Manufacturing Co., Ltd.**

FCC ID: **VPYLB1PJ**

IC: **772C-LB1PJ**

FCC Classification: **Digital Transmission System (DTS)**

Data Rate(s) Tested: **1Mbps ~ 11Mbps (b); 6Mbps ~ 54Mbps (g);**

MCS0 for 802.11n-HT20MHz; MCS0 for 802.11n-HT40MHz.

FCC Section(s)	IC Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	RSS-247 [5.2]	6dB Bandwidth	≥ 500kHz	Conducted	Pass	Section 7.2
15.247(b)(3)	RSS-247 [5.4(4)]	Output Power	≤ 30dBm		Pass	Section 7.3
15.247(e)	RSS-247 [5.2]	Power Spectral Density	≤ 8dBm/3kHz		Pass	Section 7.4
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions	≥ 20dBc(Peak)		Pass	Section 7.5
15.205 15.209	RSS-247 [5.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 7.6 & 7.7
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	N/A	Section 7.8

Notes:

1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.

2) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.

7.2. 6dB Bandwidth Measurement

7.2.1. Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

7.2.2. Test Procedure used

KDB 558074 D01v04 – Section 8.2 Option 2

7.2.3. Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.

2. Set RBW = 100 kHz

3. VBW ≥ 3 × RBW

4. Detector = Peak

5. Trace mode = max hold

6. Sweep = auto couple

7. Allow the trace was allowed to stabilize

7.2.4. Test Setup
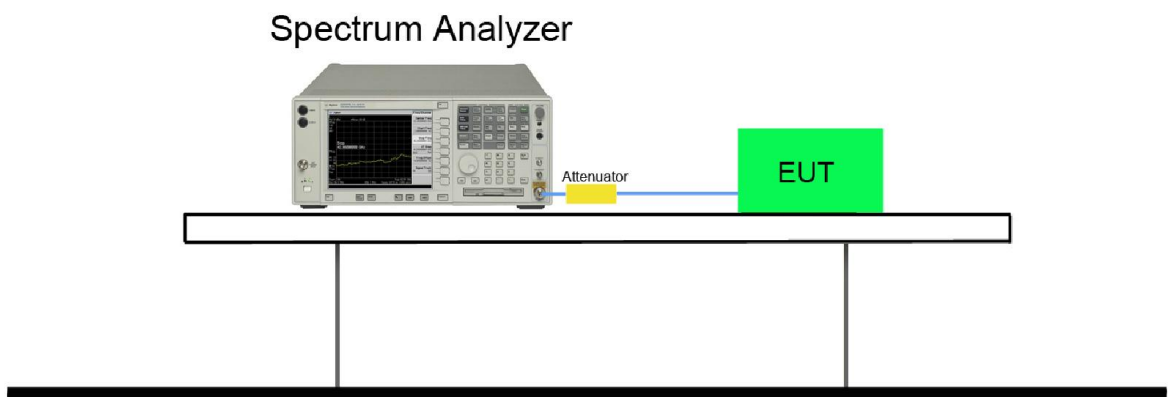
7.2.5.Test Result

Product	W-LAN + Bluetooth Module	Temperature	23°C
Test Engineer	Hunk Li	Relative Humidity	54%
Test Site	TR3	Test Date	2017/11/05
Test Item	6dB Bandwidth		

Test Mode	Data Rate / MCS	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11b	1Mbps	01	2412	8.10	≥0.5	Pass
802.11b	1Mbps	06	2437	8.10	≥0.5	Pass
802.11b	1Mbps	11	2462	8.10	≥0.5	Pass
802.11g	6Mbps	01	2412	15.17	≥0.5	Pass
802.11g	6Mbps	06	2437	15.16	≥0.5	Pass
802.11g	6Mbps	11	2462	15.03	≥0.5	Pass
802.11n-HT20	MCS0	01	2412	15.17	≥0.5	Pass
802.11n-HT20	MCS0	06	2437	15.17	≥0.5	Pass
802.11n-HT20	MCS0	11	2462	15.16	≥0.5	Pass
802.11n-HT40	MCS0	03	2422	35.15	≥0.5	Pass
802.11n-HT40	MCS0	06	2437	35.15	≥0.5	Pass
802.11n-HT40	MCS0	09	2452	35.15	≥0.5	Pass

802.11b 6dB Bandwidth

Channel 01 (2412MHz)	Channel 06 (2437MHz)
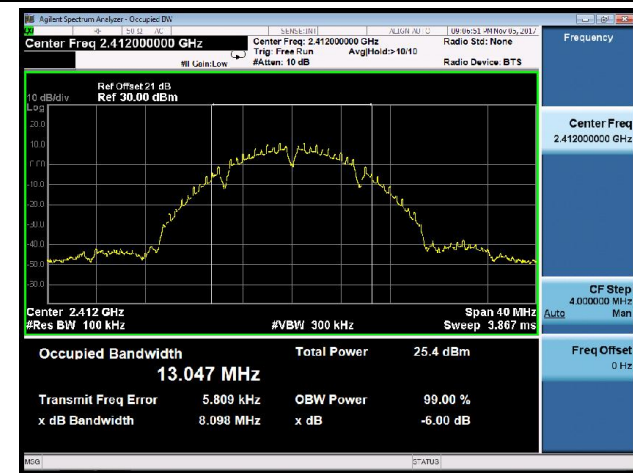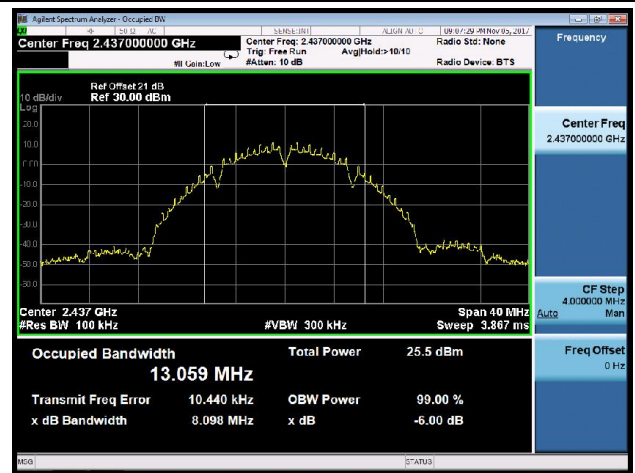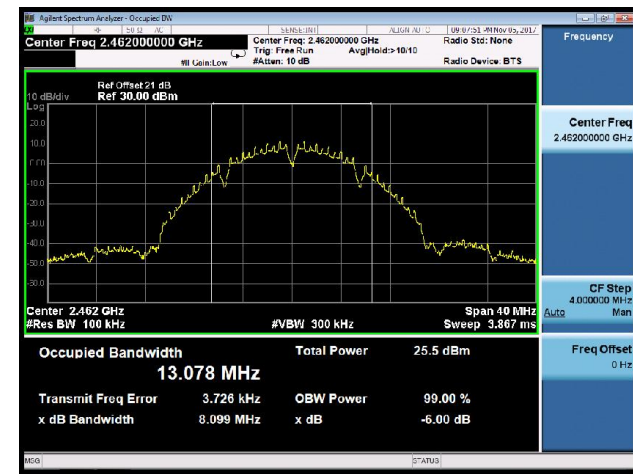
Channel 11 (2462MHz)	

802.11g 6dB Bandwidth

Channel 01 (2412MHz)	Channel 06 (2437MHz)
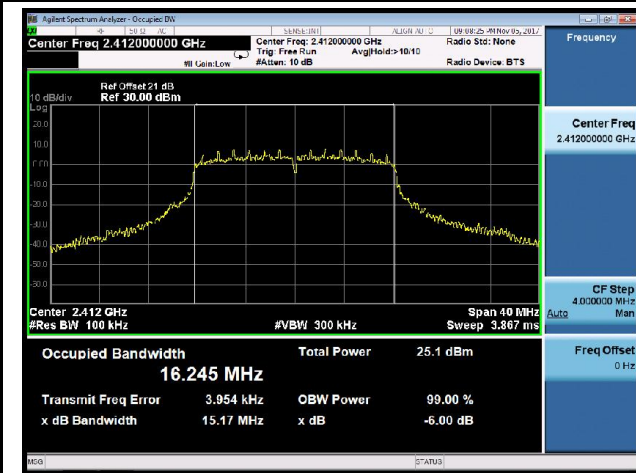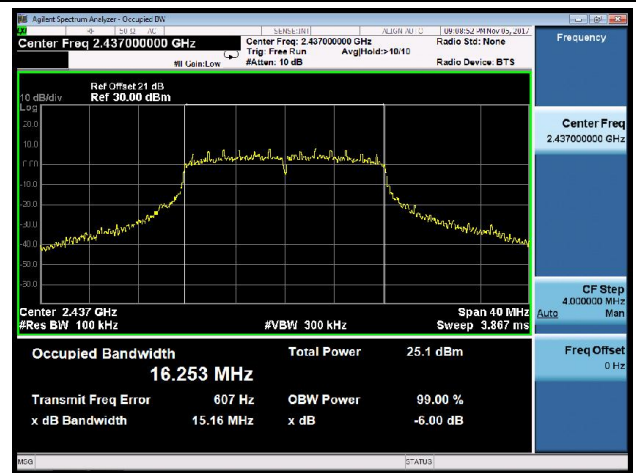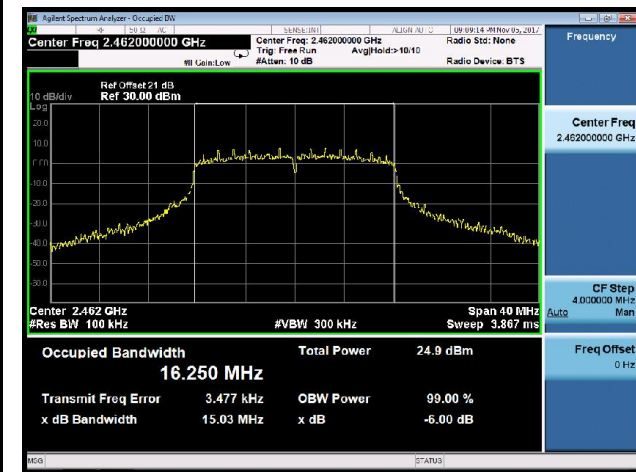
Channel 11 (2462MHz)	

802.11n-HT20 6dB Bandwidth

Channel 01 (2412MHz)	Channel 06 (2437MHz)

Occupied Bandwidth

17.409 MHz

	Total Power	25.0 dBm	
Transmit Freq Error	2.361 kHz	OBW Power	99.00 %
x dB Bandwidth	15.17 MHz	x dB	-6.00 dB

Occupied Bandwidth

17.407 MHz

	Total Power	25.0 dBm	
Transmit Freq Error	3.163 kHz	OBW Power	99.00 %
x dB Bandwidth	15.17 MHz	x dB	-6.00 dB

Channel 11 (2462MHz)	

Occupied Bandwidth

17.410 MHz

	Total Power	24.9 dBm	
Transmit Freq Error	-3.736 kHz	OBW Power	99.00 %
x dB Bandwidth	15.16 MHz	x dB	-6.00 dB
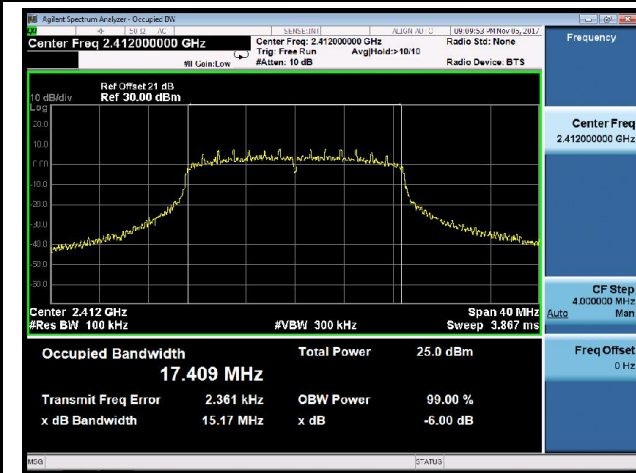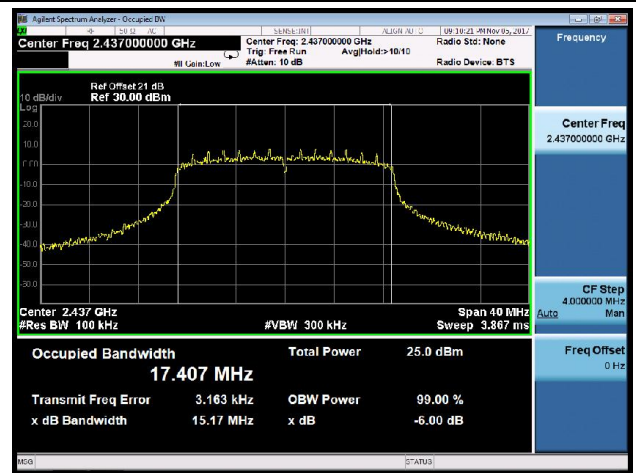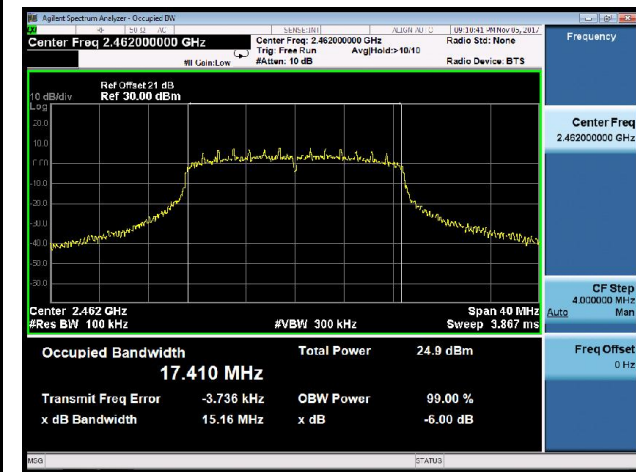
802.11n-HT40 6dB Bandwidth

Channel 03 (2422MHz)	Channel 06 (2437MHz)
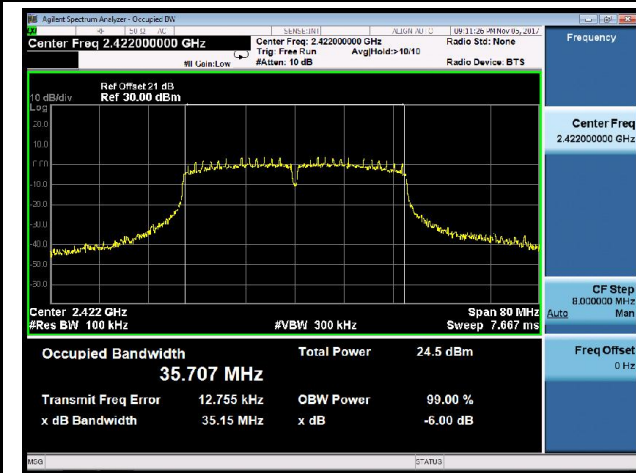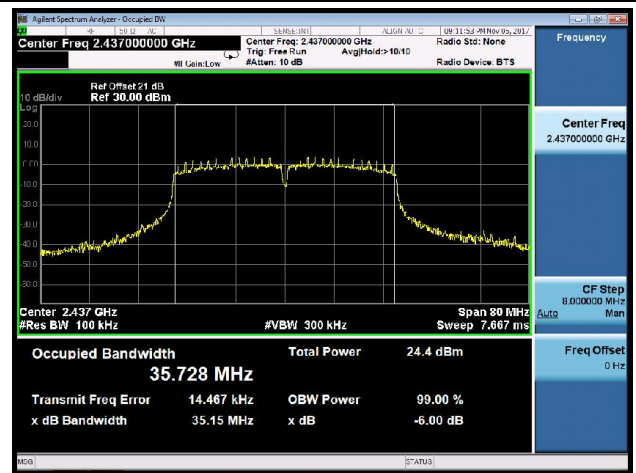
Channel 09 (2452MHz)	
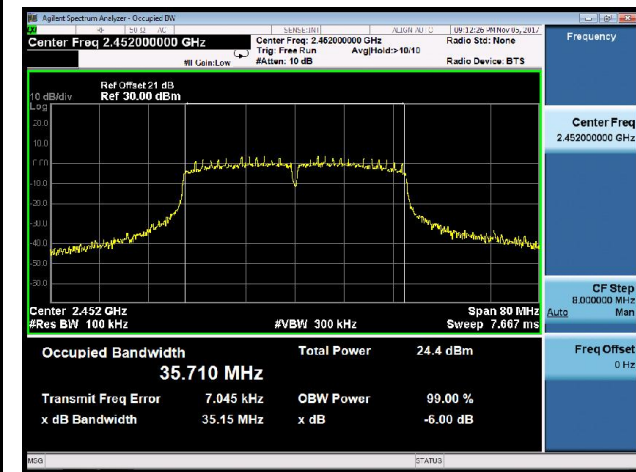
7.3. Output Power Measurement

7.3.1. Test Limit

The maximum conducted output power shall be exceed 1 Watt (30dBm) and the E.I.R.P shall not exceed 4 Watt (36dBm).

The total conducted output power shall be reduced by 1 dB below the specified limits for each 3 dB that the directional gain of the antenna/antenna array exceeds 6dBi.

7.3.2. Test Procedure Used

KDB 558074 D01v04 - Section 9.2.3.2 AVGPM-G Average Power Method

7.3.3. Test Setting

Average Power Measurement

Average power measurements were perform only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

7.3.4. Test Setup
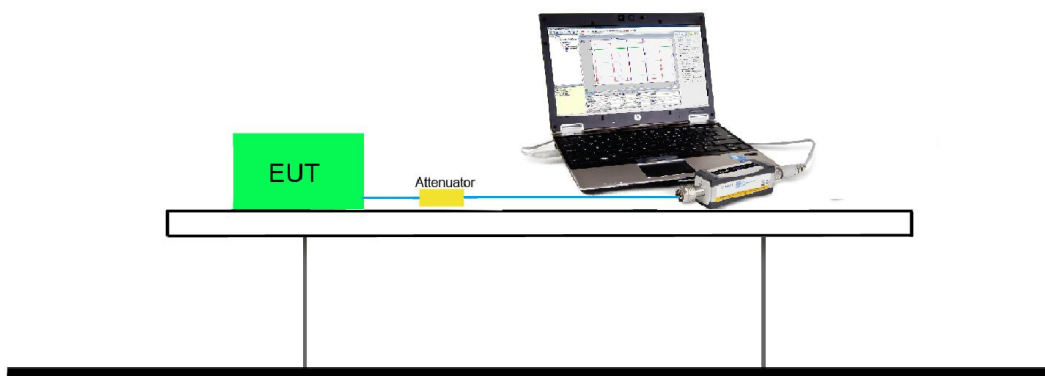
7.3.5.Test Result of Output Power

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (gray marker) for final test of each channel.

Output power at various data rates:

Test Mode	Bandwidth (MHz)	Channel No.	Frequency (MHz)	Data Rate / MCS	Power Parameter Value	Average Power (dBm)
802.11b	20	6	2437	1Mbps	18	18.41
				5.5Mbps	18	18.35
				11Mbps	18	18.27
802.11g	20	6	2437	6Mbps	18	17.91
				24Mbps	17	17.01
				54Mbps	17	16.62
802.11n	20	6	2437	MCS0	18	17.64
				MCS3	16.5	16.42
				MCS7	16	15.63
802.11n	40	6	2437	MCS0	17.5	16.82
				MCS3	16	15.51
				MCS7	15.5	14.81

Product	W-LAN + Bluetooth Module	Temperature	23°C
Test Engineer	Hunk Li	Relative Humidity	54%
Test Site	TR3	Test Date	2017/11/05
Test Item	Output Power		

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	Average Power (dBm)	Power Limit (dBm)	Max EIRP (dBm)	EIRP Limit (dBm)	Result
11b	1Mbps	1	2412	18.59	≤ 30.00	21.69	≤ 36.00	Pass
11b	1Mbps	6	2437	18.41	≤ 30.00	21.51	≤ 36.00	Pass
11b	1Mbps	11	2462	18.75	≤ 30.00	21.85	≤ 36.00	Pass
11g	6Mbps	1	2412	17.67	≤ 30.00	20.77	≤ 36.00	Pass
11g	6Mbps	6	2437	17.91	≤ 30.00	21.01	≤ 36.00	Pass
11g	6Mbps	11	2462	17.89	≤ 30.00	20.99	≤ 36.00	Pass
11n-HT20	MCS0	1	2412	17.40	≤ 30.00	20.50	≤ 36.00	Pass
11n-HT20	MCS0	6	2437	17.64	≤ 30.00	20.74	≤ 36.00	Pass
11n-HT20	MCS0	11	2462	17.42	≤ 30.00	20.52	≤ 36.00	Pass
11n-HT40	MCS0	3	2422	16.64	≤ 30.00	19.74	≤ 36.00	Pass
11n-HT40	MCS0	6	2437	16.82	≤ 30.00	19.92	≤ 36.00	Pass
11n-HT40	MCS0	9	2452	16.65	≤ 30.00	19.75	≤ 36.00	Pass

Note: Max EIRP (dBm) = Average Power (dBm) + Antenna Gain (dBi), Antenna Gain (dBi) = 3.1dBi.

7.4. Power Spectral Density Measurement

7.4.1. Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

7.4.2. Test Procedure Used

KDB 558074 D01v04 - Section 10.5 Method AVGPSD

7.4.3. Test Setting

1. Measure the duty cycle (x) of the transmitter output signal.

2. Set instrument center frequency to DTS channel center frequency.

3. Set span to at least 1.5 times the OBW.

4. RBW = 10 kHz.

5. VBW = 30 kHz.

6. Detector = RMS.

7. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.

8. Sweep time = auto couple.

9. Don't use sweep triggering. Allow sweep to "free run".

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

11. Use the peak marker function to determine the maximum amplitude level.

12. 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.

13. Add Constant Factor = 10*log (3kHz / 10kHz) = -5.23.

7.4.4.Test Setup

Spectrum Analyzer
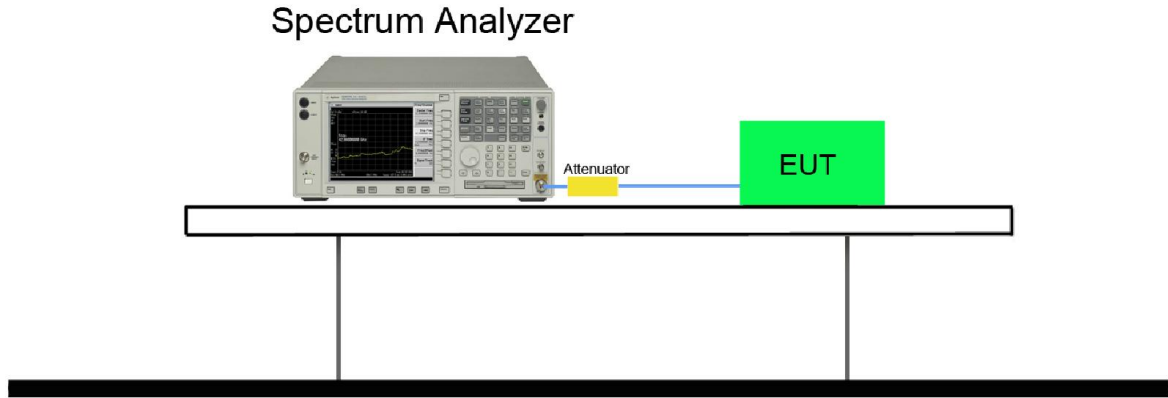
7.4.5.Test Result

Product	W-LAN + Bluetooth Module	Temperature	23°C
Test Engineer	Hunk Li	Relative Humidity	54%
Test Site	TR3	Test Date	2017/11/27
Test Item	Power Spectral Density		

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	AVGPSD (dBm/ 10kHz)	Duty Cycle (%)	Constant Factor	Final AVGPSD (dBm/3kHz)	Limit (dBm/ 3kHz)	Result
11b	1Mbps	1	2412	-7.10	98.80	-5.23	-7.10	≤ 8.0	Pass
11b	1Mbps	6	2437	-6.55	98.80	-5.23	-6.55	≤ 8.0	Pass
11b	1Mbps	11	2462	-7.69	98.80	-5.23	-7.69	≤ 8.0	Pass
11g	6Mbps	1	2412	-10.09	95.34	-5.23	-9.88	≤ 8.0	Pass
11g	6Mbps	6	2437	-9.80	95.34	-5.23	-9.59	≤ 8.0	Pass
11g	6Mbps	11	2462	-10.36	95.34	-5.23	-10.15	≤ 8.0	Pass
11n-HT20	MCS0	1	2412	-10.49	95.04	-5.23	-10.27	≤ 8.0	Pass
11n-HT20	MCS0	6	2437	-10.32	95.04	-5.23	-10.10	≤ 8.0	Pass
11n-HT20	MCS0	11	2462	-10.55	95.04	-5.23	-10.33	≤ 8.0	Pass
11n-HT40	MCS0	3	2422	-13.99	90.97	-5.23	-13.58	≤ 8.0	Pass
11n-HT40	MCS0	6	2437	-14.05	90.97	-5.23	-13.64	≤ 8.0	Pass
11n-HT40	MCS0	9	2452	-14.23	90.97	-5.23	-13.82	≤ 8.0	Pass

Note 1: When EUT duty cycle ≥ 98%, Final AVGPSD (dBm/3kHz) = AVGPSD (dBm/10kHz) + Constant Factor.

Note 2: When EUT duty cycle < 98%, Final AVGPSD (dBm/3kHz) = AVGPSD (dBm/10kHz) + 10*log (1/Duty cycle) + Constant Factor.

802.11b AVGPSD

Channel 01 (2412MHz)	Channel 06 (2437MHz)

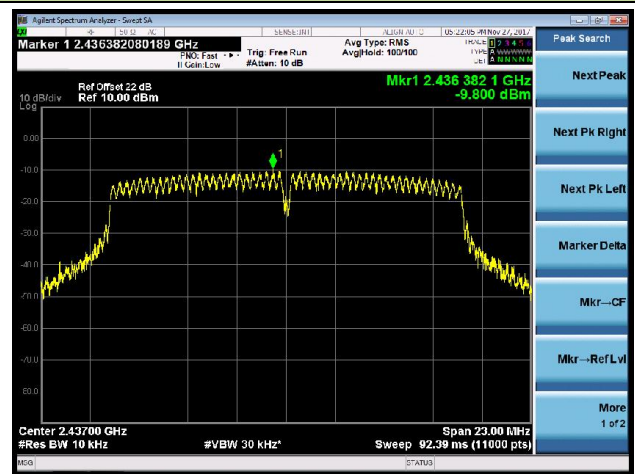| Channel 11 (2462MHz)	

802.11g AVGPSD
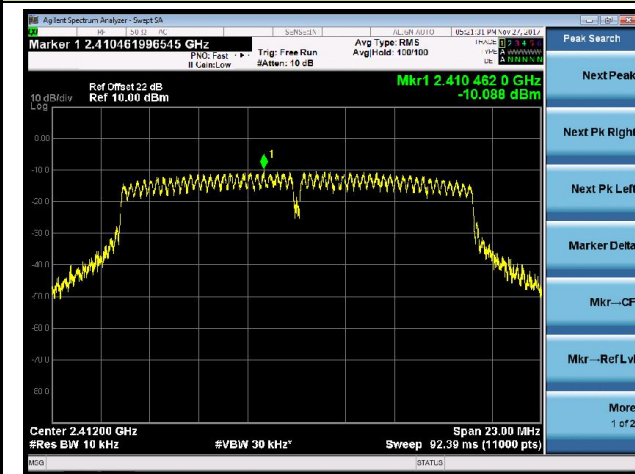
Channel 01 (2412MHz)

Channel 06 (2437MHz)
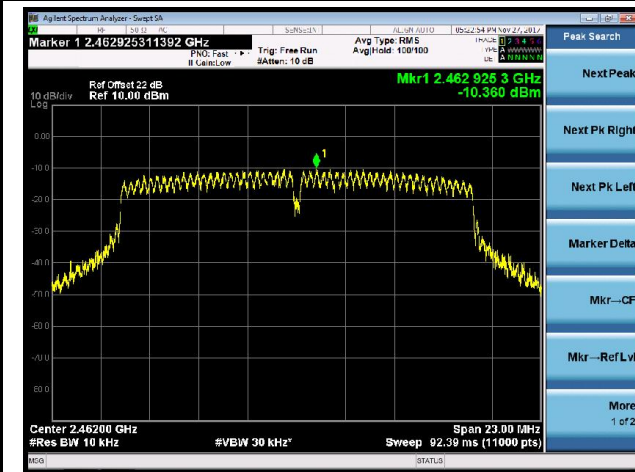
Channel 11 (2462MHz)
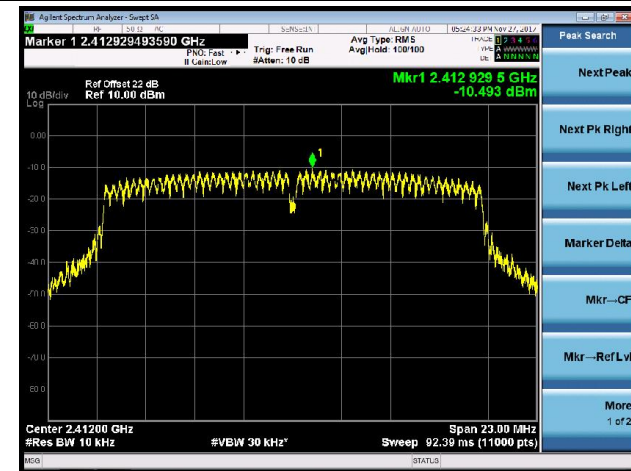
802.11n-HT20 AVGPSD	
Channel 01 (2412MHz)	**Channel 06 (2437MHz)**
Channel 11 (2462MHz)	
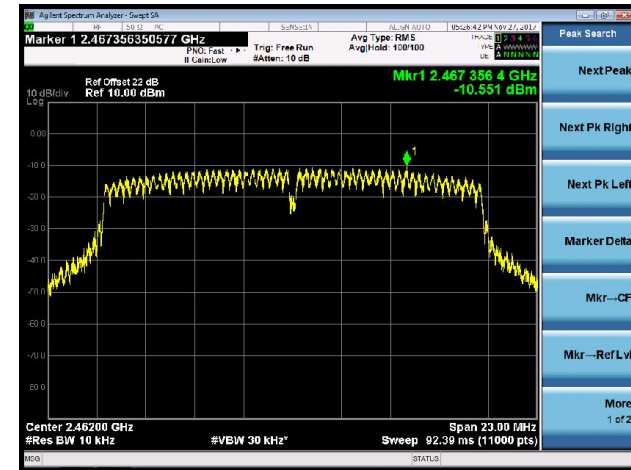
802.11n-HT40 AVGPSD
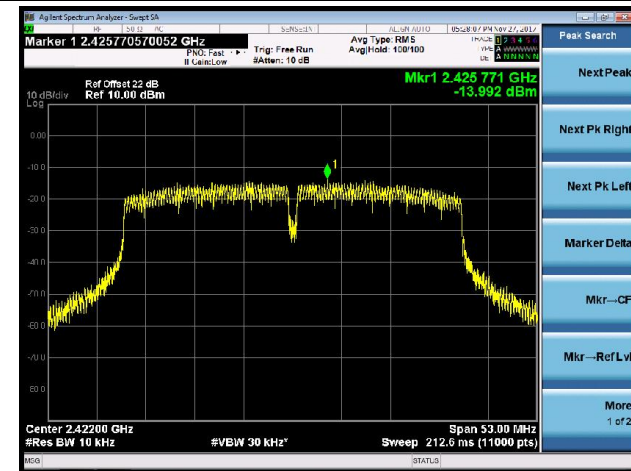
Channel 03 (2422MHz)	Channel 06 (2437MHz)
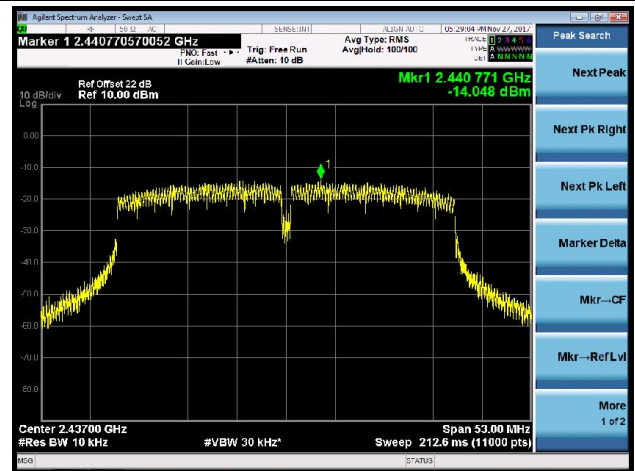
Channel 09 (2452MHz)	
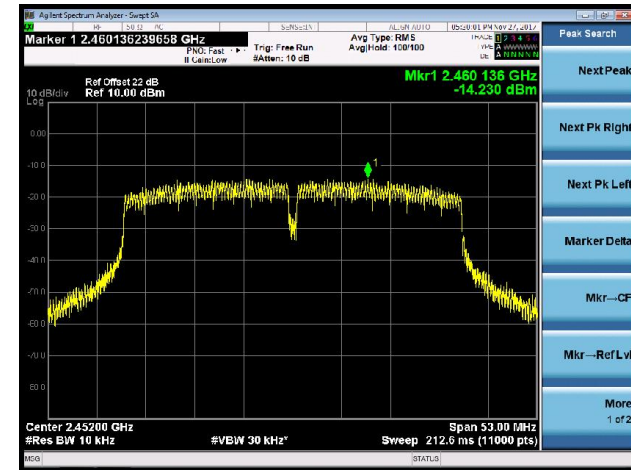
7.5. Conducted Band Edge and Out-of-Band Emissions

7.5.1.Test Limit

The limit for out-of-band spurious emissions at the band edge is 30dB below the fundamental

emission level, as determined from the in-band power measurement of the DTS channel performed

in a 100 kHz bandwidth per the PSD procedure.

7.5.2.Test Procedure Used

KDB 558074 D01v04 - Section 11.2 & Section 11.3

7.5.3.Test Settitng

Reference level measurement

1. Set instrument center frequency to DTS channel center frequency

2. Set the span to ≥ 1.5 times the DTS bandwidth

3. Set the RBW = 100 kHz

4. Set the VBW ≥ 3 x RBW

5. Detector = peak

6. Sweep time = auto couple

7. Trace mode = max hold

8. Allow trace to fully stabilize

Emission level measurement

1. Set the center frequency and span to encompass frequency range to be measured

2. RBW = 100kHz

3. VBW = 300kHz

4. Detector = Peak

5. Trace mode = max hold

6. Sweep time = auto couple

7. The trace was allowed to stabilize

7.5.4.Test Setup

Spectrum Analyzer

Attenuator   EUT
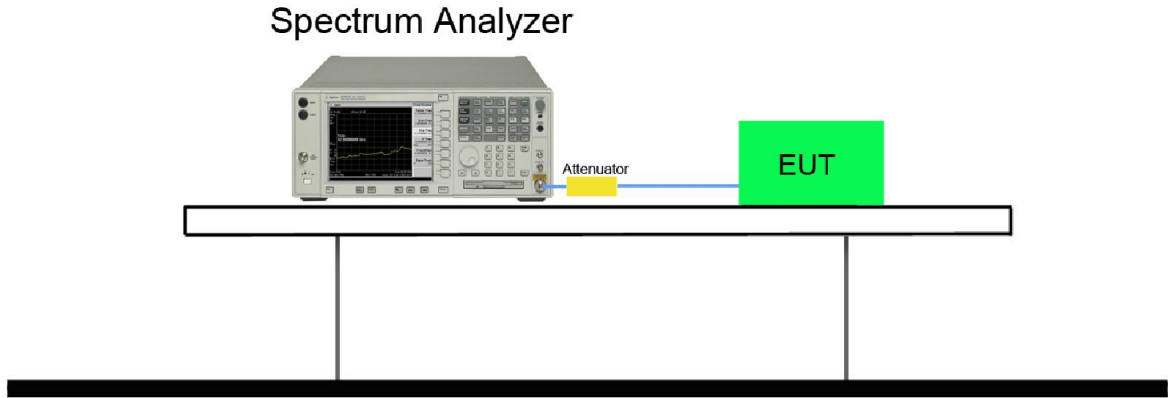
7.5.5.Test Result

Product	W-LAN + Bluetooth Module	Temperature	23°C
Test Engineer	Will Yan	Relative Humidity	54%
Test Site	TR3	Test Date	2017/11/27
Test Item	Conducted Band Edge and Out-of-Band Emissions		

Test Mode	Data Rate / MCS	Channel No.	Frequency (MHz)	Limit	Result
802.11b	1Mbps	01	2412	30dBc	Pass
802.11b	1Mbps	06	2437	30dBc	Pass
802.11b	1Mbps	11	2462	30dBc	Pass
802.11g	6Mbps	01	2412	30dBc	Pass
802.11g	6Mbps	06	2437	30dBc	Pass
802.11g	6Mbps	11	2462	30dBc	Pass
802.11n-HT20	MCS0	01	2412	30dBc	Pass
802.11n-HT20	MCS0	06	2437	30dBc	Pass
802.11n-HT20	MCS0	11	2462	30dBc	Pass
11n-HT40	MCS0	3	2422	30dBc	Pass
11n-HT40	MCS0	6	2437	30dBc	Pass
11n-HT40	MCS0	9	2452	30dBc	Pass

802.11b Out-of-Band Emissions
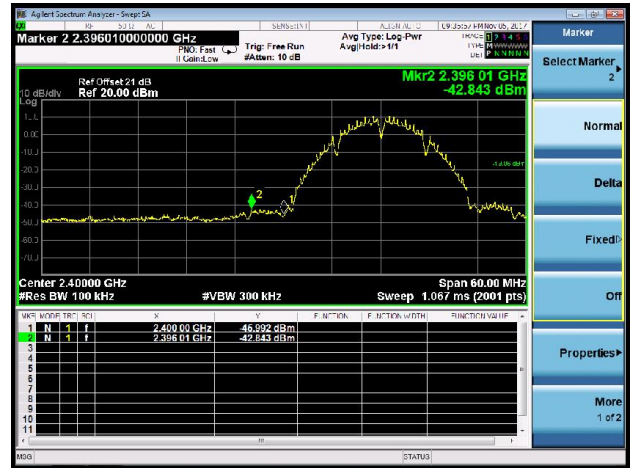
Channel 01 (2412MHz)

100kHz PSD Reference Level	Low Band Edge

Spurious Emission	

Channel 06 (2437MHz)

100kHz PSD Reference Level	Spurious Emission

Channel 11 (2462MHz)
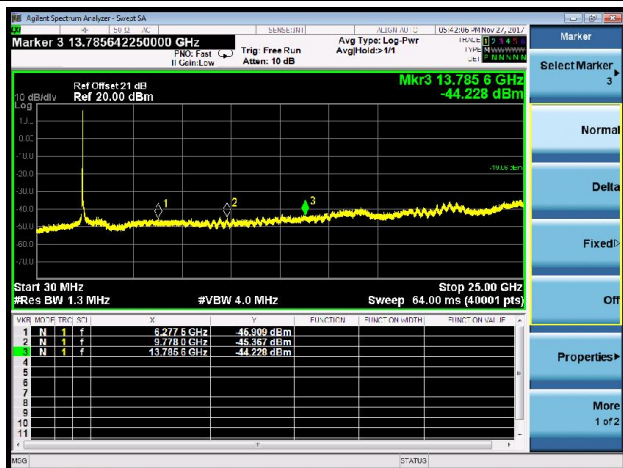
100kHz PSD Reference Level	High Band Edge
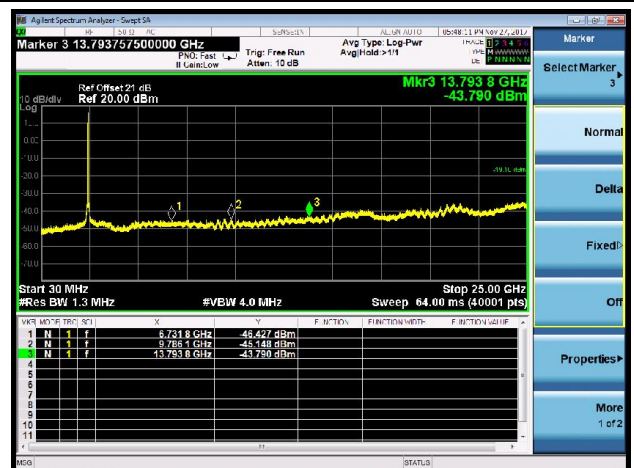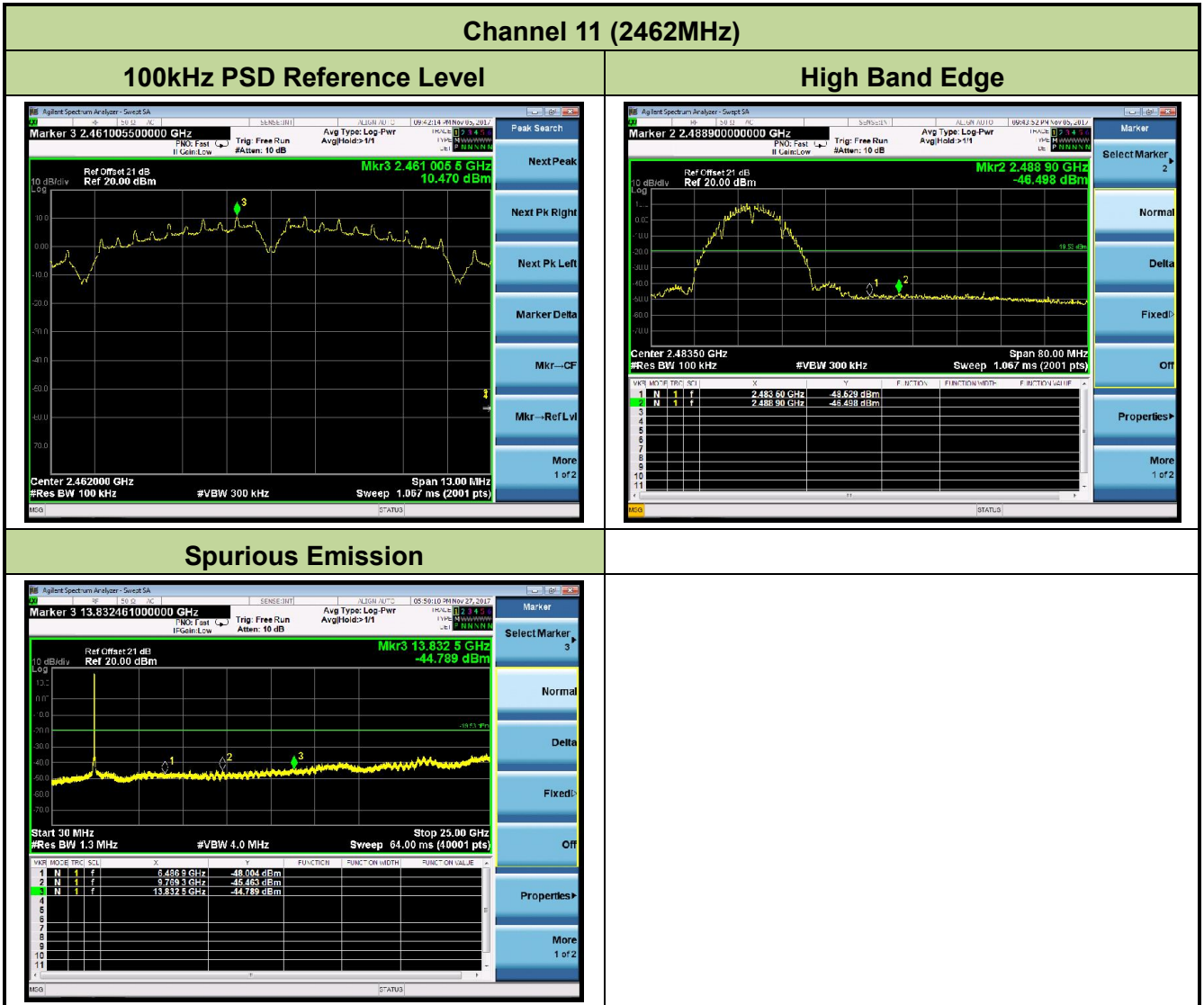
Spurious Emission

802.11g Out-of-Band Emissions
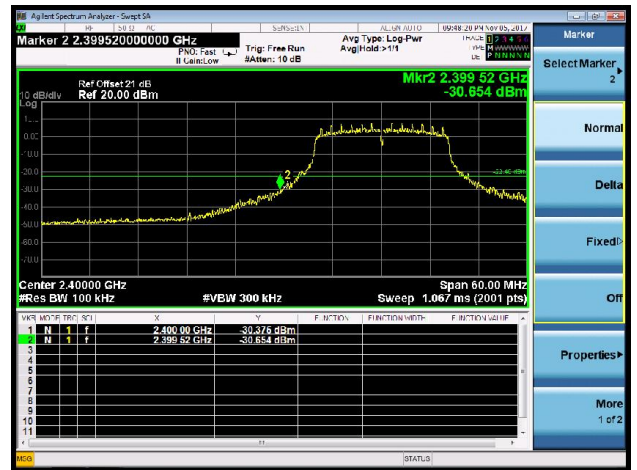
Channel 01 (2412MHz)

100kHz PSD Reference Level	Low Band Edge

Spurious Emission	

Channel 06 (2437MHz)

100kHz PSD Reference Level	Spurious Emission

Channel 11 (2462MHz)
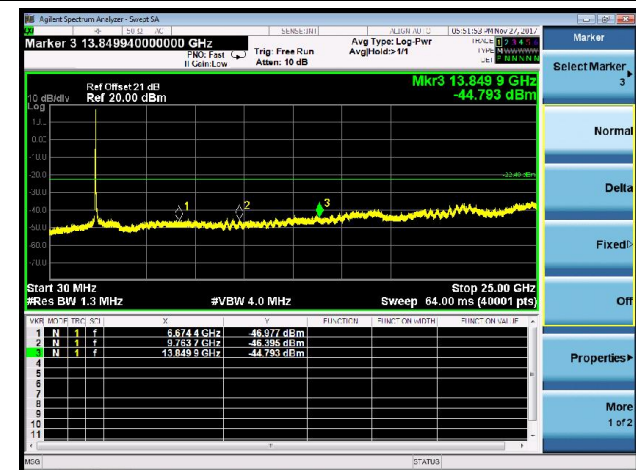
100kHz PSD Reference Level	High Band Edge
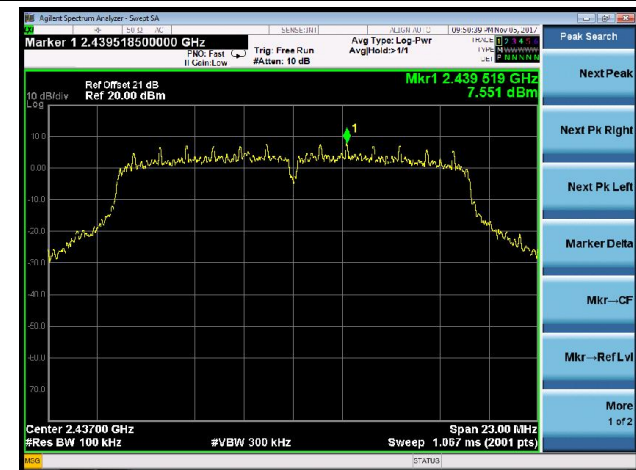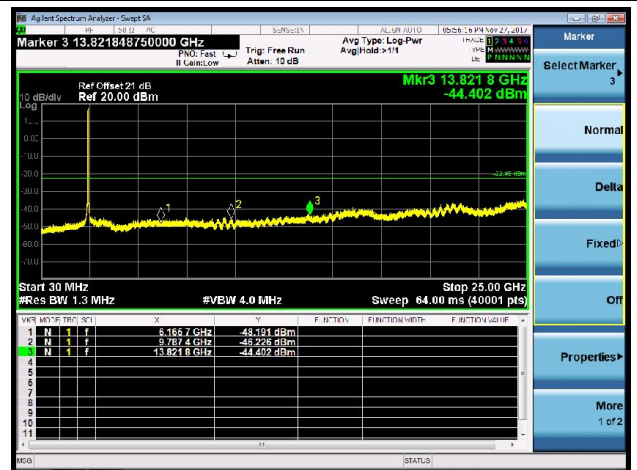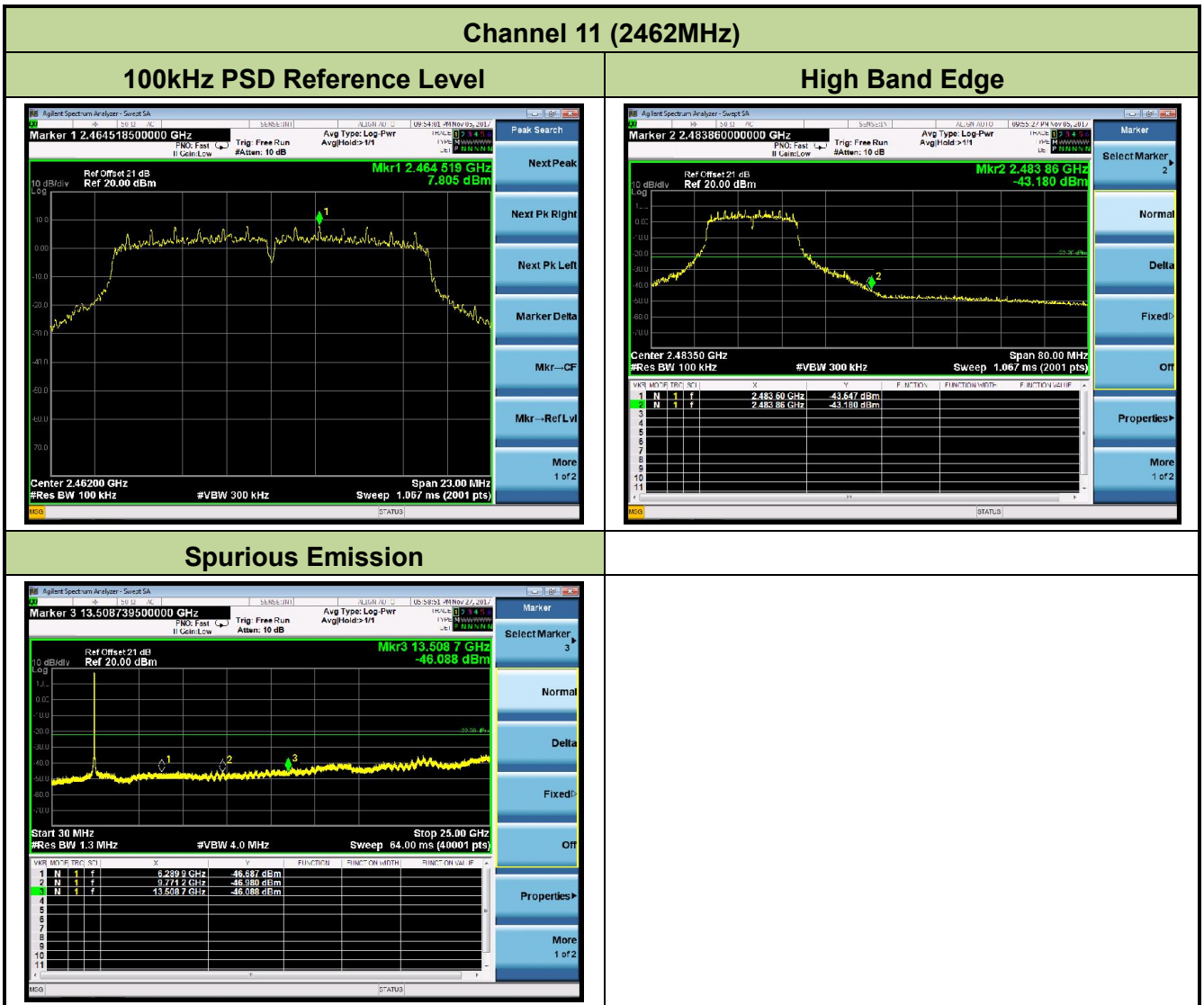
Spurious Emission

802.11n-HT20 Out-of-Band Emissions
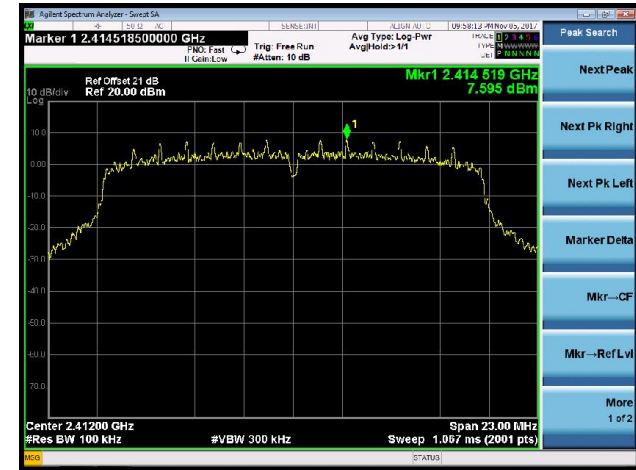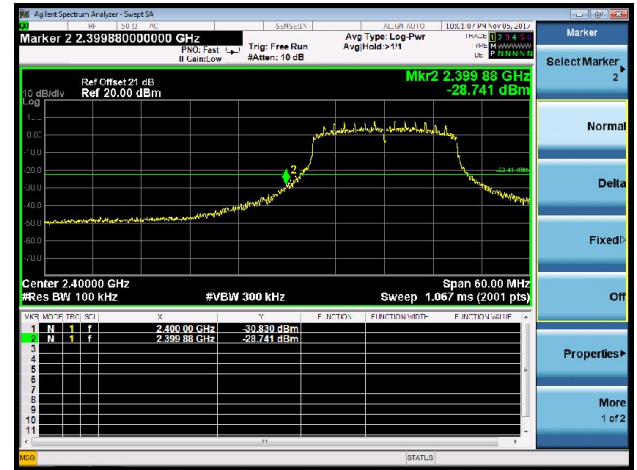
Channel 01 (2412MHz)

100kHz PSD Reference Level	Low Band Edge

Spurious Emission	

Channel 06 (2437MHz)

100kHz PSD Reference Level	Spurious Emission

Channel 11 (2462MHz)
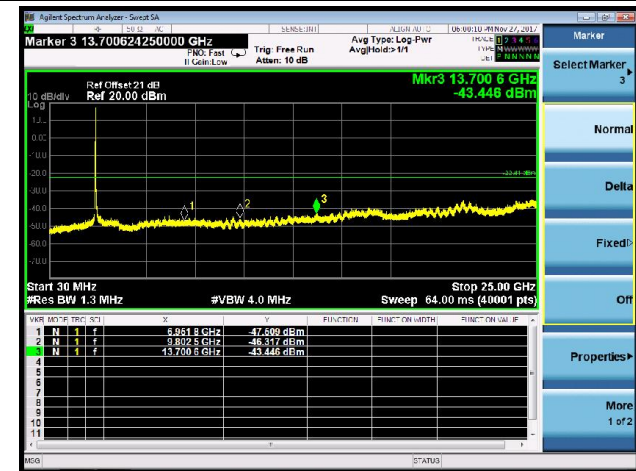
100kHz PSD Reference Level	High Band Edge
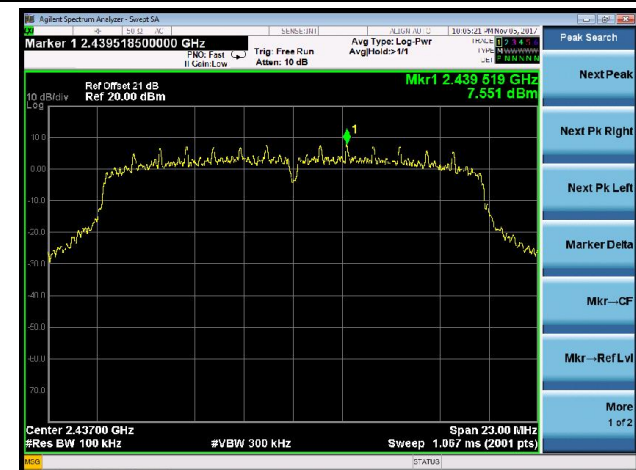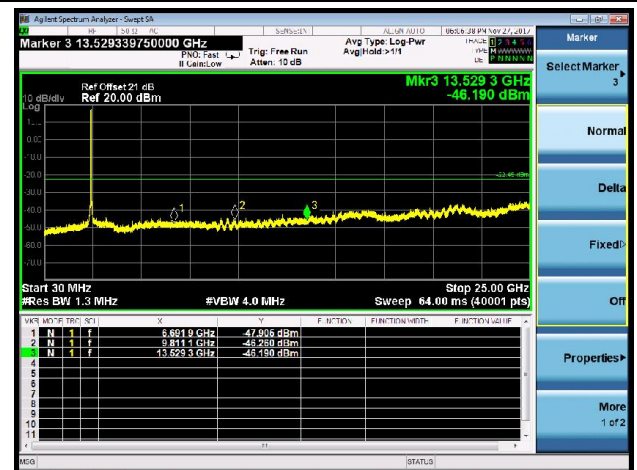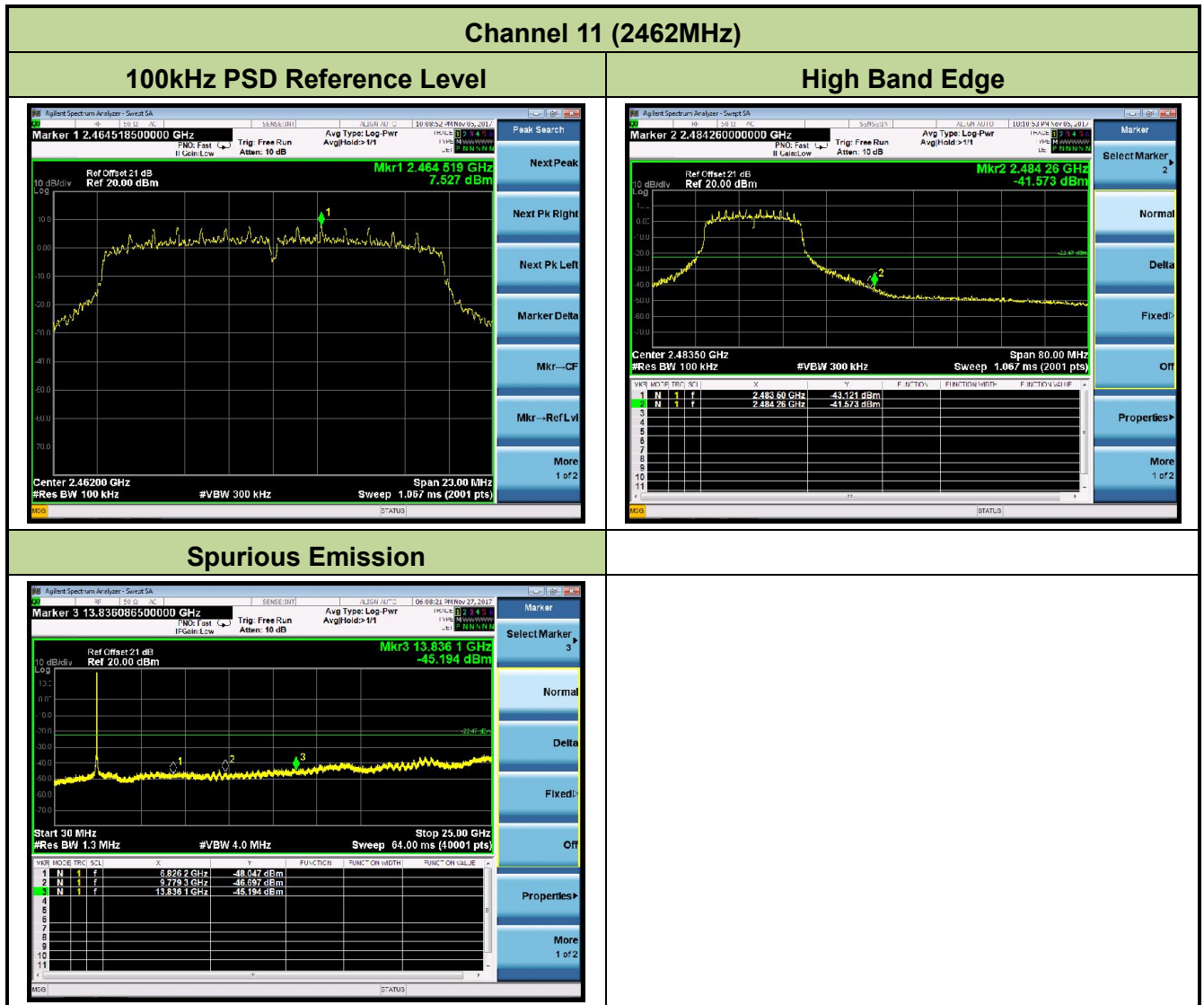
Spurious Emission

802.11n-HT40 Out-of-Band Emissions

Channel 03 (2422MHz)

100kHz PSD Reference Level	Low Band Edge
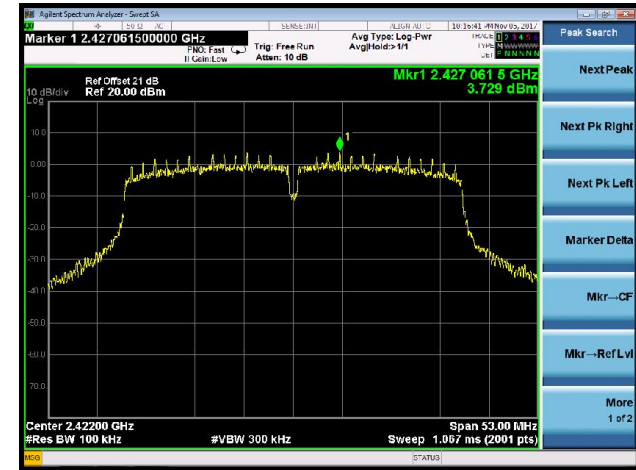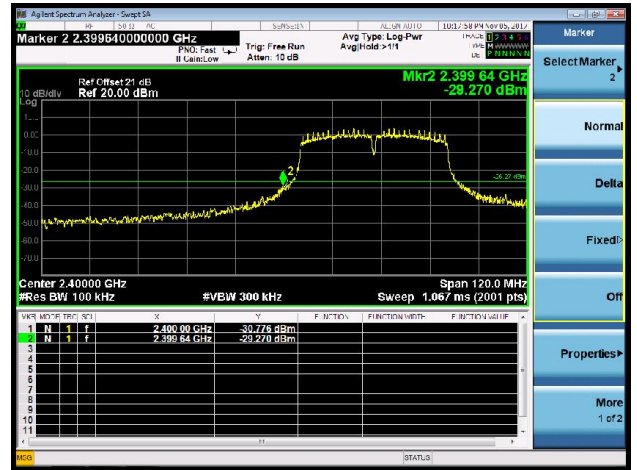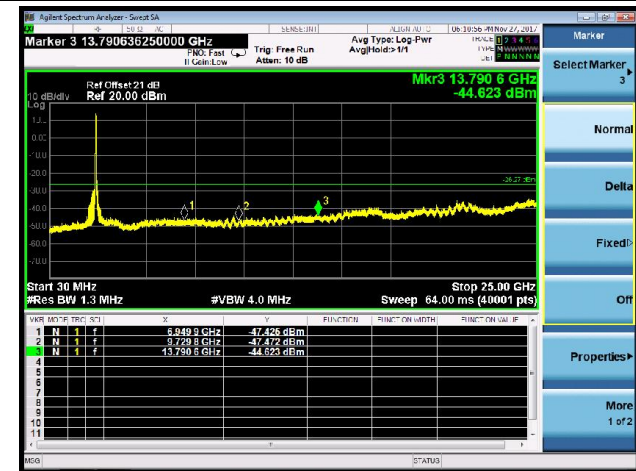
Spurious Emission	

Channel 06 (2437MHz)
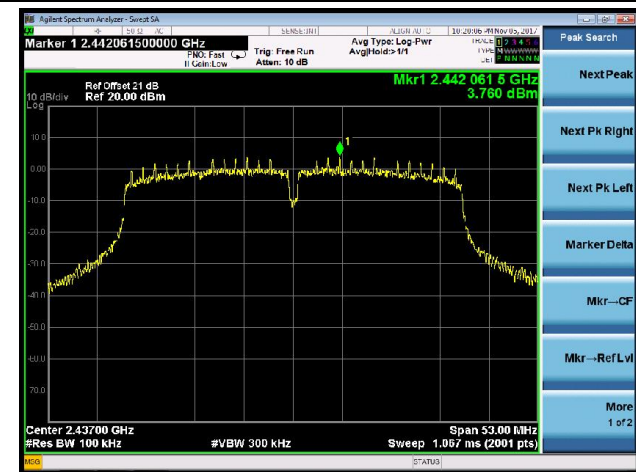
100kHz PSD Reference Level	Spurious Emission
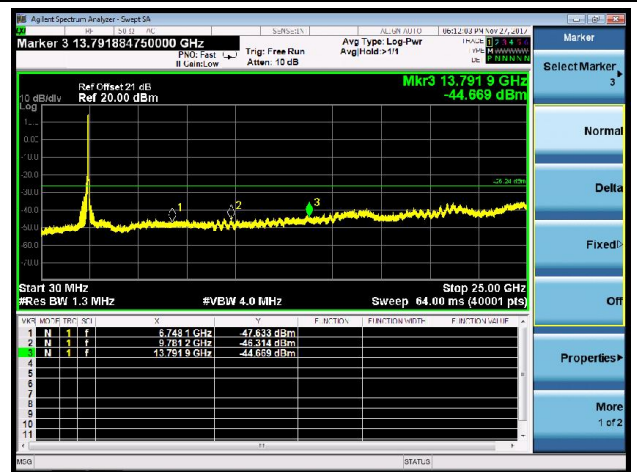
Channel 09 (2452MHz)

100kHz PSD Reference Level
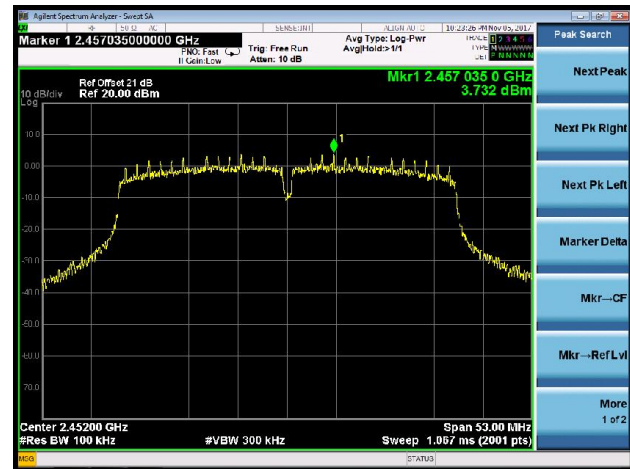
High Band Edge
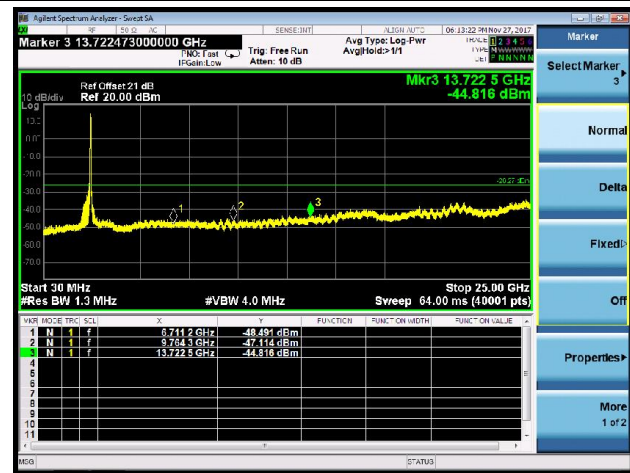
Spurious Emission

7.6. Radiated Spurious Emission Measurement

7.6.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47

CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.6.2. Test Procedure Used

KDB 558074 D01v04 – Section 12.2.3 (quasi-peak measurements)

KDB 558074 D01v04 – Section 12.2.4 (peak power measurements)

KDB 558074 D01v04 – Section 12.2.5 (average power measurements)

7.6.3. Test Setting

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. RBW = as specified in Table 1

3. VBW = 3MHz

4. Detector = peak

5. Sweep time = auto couple

6. Trace mode = max hold

7. Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. RBW = 1MHz

3. VBW ≥ 1/T

4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode

5. Detector = Peak

6. Sweep time = auto

7. Trace mode = max hold

8. Allow max hold to run for at least 50 times (1/duty cycle) traces

7.6.4.Test Setup

9kHz ~ 30MHz Test Setup:
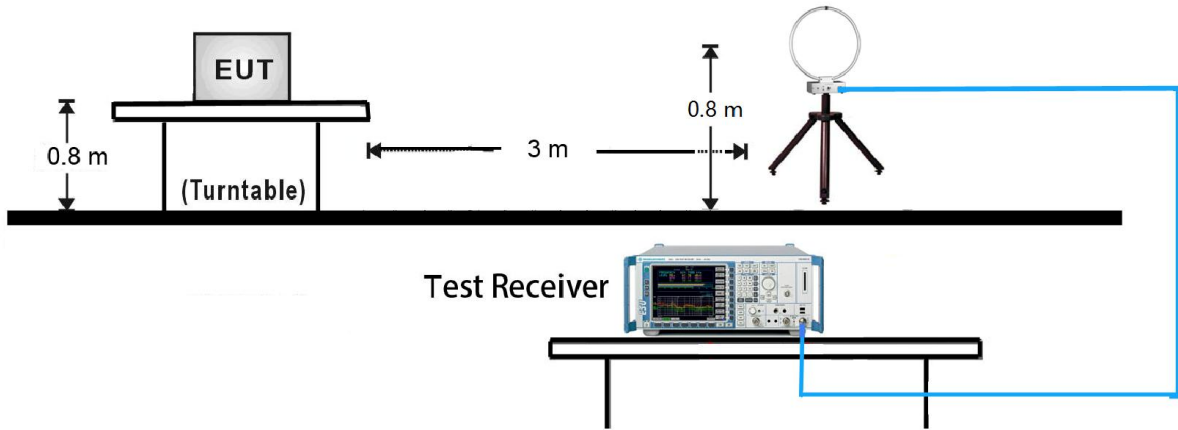
30MHz ~ 1GHz Test Setup:
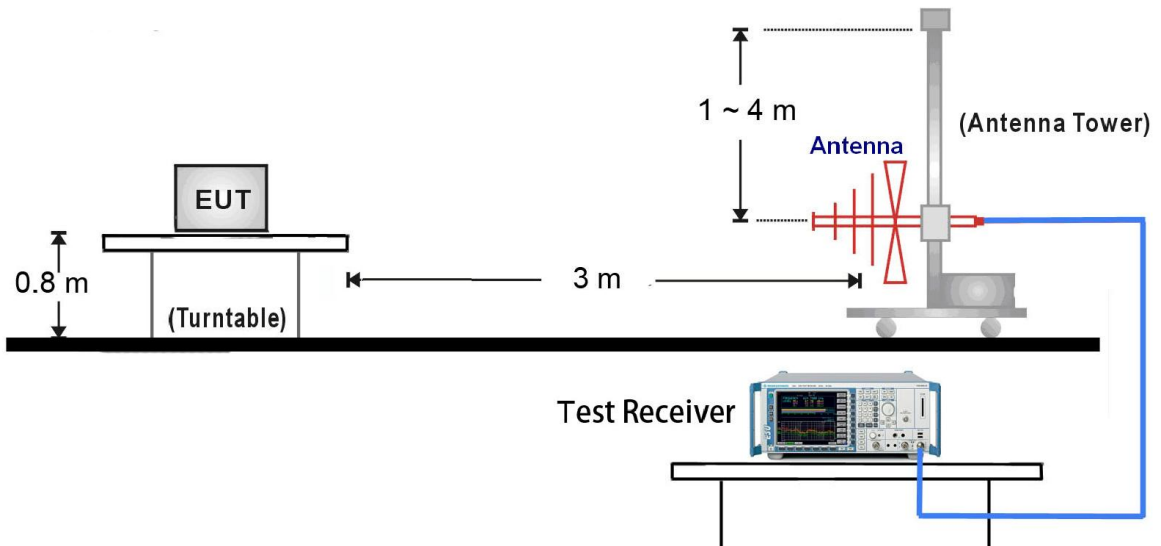
1GHz ~ 18GHz Test Setup:
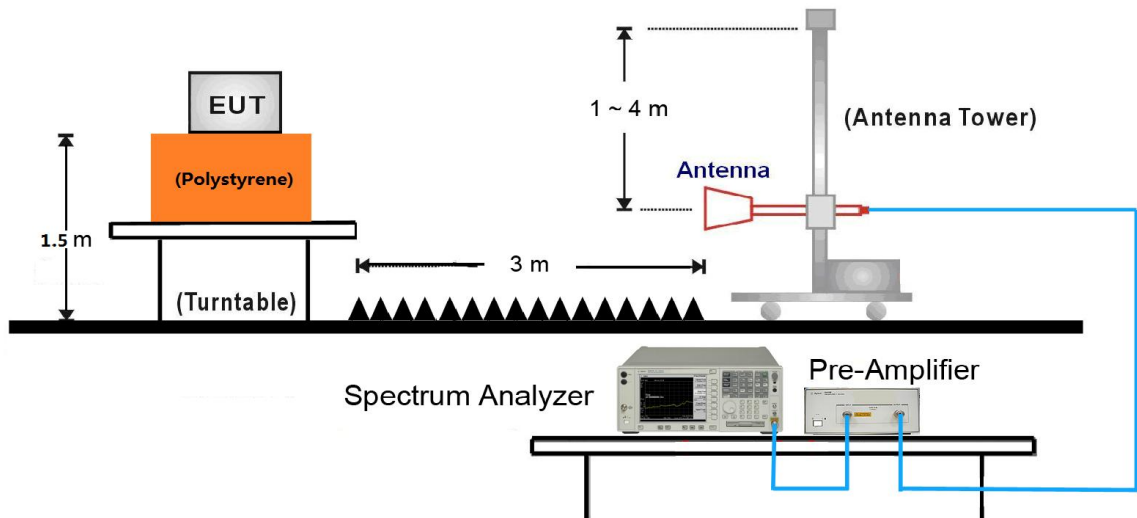
18GHz ~25GHz Test Setup:

7.6.5.Test Result

Product	W-LAN + Bluetooth Module	Temperature	26°C
Test Engineer	Will Yan	Relative Humidity	56%
Test Site	AC1	Test Date	2017/10/31
Test Mode:	802.11b	Test Channel:	01
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBµV)	Factor (dB)	Measure Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
	4825.0	36.5	2.7	39.2	74.0	-34.8	Peak	Horizontal
	7477.0	35.2	8.2	43.4	74.0	-30.6	Peak	Horizontal
*	9695.5	33.9	10.9	44.8	76.9	-32.1	Peak	Horizontal
*	15254.5	33.8	13.4	47.2	76.9	-29.7	Peak	Horizontal
	4825.0	36.7	2.7	39.4	74.0	-34.6	Peak	Vertical
	7460.0	34.8	8.1	42.9	74.0	-31.1	Peak	Vertical
*	9746.5	33.5	11.3	44.8	76.9	-32.1	Peak	Vertical
*	14889.0	33.6	15.0	48.6	76.9	-28.3	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (106.9dBµV/m) or 15.209 which is higher.

Note 2: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	W-LAN + Bluetooth Module	Temperature	26°C
Test Engineer	Will Yan	Relative Humidity	56%
Test Site	AC1	Test Date	2017/10/31
Test Mode:	802.11b	Test Channel:	06
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBµV)	Factor (dB)	Measure Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
	4876.0	36.1	2.7	38.8	74.0	-35.2	Peak	Horizontal
	7502.5	34.1	8.3	42.4	74.0	-31.6	Peak	Horizontal
*	9797.5	33.8	11.5	45.3	76.7	-31.4	Peak	Horizontal
*	14880.5	33.1	15.0	48.1	76.7	-28.6	Peak	Horizontal
	4765.5	36.2	2.6	38.8	74.0	-35.2	Peak	Vertical
	7579.0	34.7	8.2	42.9	74.0	-31.1	Peak	Vertical
*	9814.5	33.0	11.6	44.6	76.7	-32.1	Peak	Vertical
*	15127.0	33.3	14.2	47.5	76.7	-29.2	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (106.7dBµV/m) or 15.209 which is higher.

Note 2: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	W-LAN + Bluetooth Module	Temperature	26°C
Test Engineer	Will Yan	Relative Humidity	56%
Test Site	AC1	Test Date	2017/10/31
Test Mode:	802.11b	Test Channel:	11
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBµV)	Factor (dB)	Measure Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
	4927.0	36.8	2.8	39.6	74.0	-34.4	Peak	Horizontal
	7502.5	33.6	8.3	41.9	74.0	-32.1	Peak	Horizontal
*	9678.5	33.2	10.9	44.1	75.8	-31.7	Peak	Horizontal
*	15254.5	33.4	13.4	46.8	75.8	-29.0	Peak	Horizontal
	4816.5	34.9	2.7	37.6	74.0	-36.4	Peak	Vertical
	7468.5	33.0	8.1	41.1	74.0	-32.9	Peak	Vertical
*	9687.0	32.4	10.9	43.3	75.8	-32.5	Peak	Vertical
*	14880.5	32.4	15.0	47.4	75.8	-28.4	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (105.8dBµV/m) or 15.209 which is higher.

Note 2: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	W-LAN + Bluetooth Module	Temperature	26°C
Test Engineer	Will Yan	Relative Humidity	56%
Test Site	AC1	Test Date	2017/10/31
Test Mode:	802.11g	Test Channel:	01
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4816.5	36.0	2.7	38.7	74.0	-35.3	Peak	Horizontal
	7239.0	40.3	7.8	48.1	74.0	-25.9	Peak	Horizontal
*	9806.0	34.9	11.5	46.4	82.2	-35.8	Peak	Horizontal
*	14812.5	32.1	15.2	47.3	82.2	-34.9	Peak	Horizontal
	4816.5	35.8	2.7	38.5	74.0	-35.5	Peak	Vertical
	7247.5	35.9	7.9	43.8	74.0	-30.2	Peak	Vertical
*	9721.0	32.2	11.1	43.3	82.2	-38.9	Peak	Vertical
*	15016.5	31.7	14.6	46.3	82.2	-35.9	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (112.2dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	W-LAN + Bluetooth Module	Temperature	26°C
Test Engineer	Will Yan	Relative Humidity	56%
Test Site	AC1	Test Date	2017/10/31
Test Mode:	802.11g	Test Channel:	06
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4867.5	36.2	2.7	38.9	74.0	-35.1	Peak	Horizontal
	7307.0	40.0	8.0	48.0	74.0	-26.0	Peak	Horizontal
*	9721.0	33.3	11.1	44.4	81.8	-37.4	Peak	Horizontal
*	14889.0	32.0	15.0	47.0	81.8	-34.8	Peak	Horizontal
	4757.0	34.4	2.6	37.0	74.0	-37.0	Peak	Vertical
	7307.0	36.4	8.0	44.4	74.0	-29.6	Peak	Vertical
*	9627.5	31.7	11.0	42.7	81.8	-39.1	Peak	Vertical
*	14770.0	31.6	15.5	47.1	81.8	-34.7	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (111.8dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	W-LAN + Bluetooth Module	Temperature	26°C
Test Engineer	Will Yan	Relative Humidity	56%
Test Site	AC1	Test Date	2017/10/31
Test Mode:	802.11g	Test Channel:	11
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4927.0	37.4	2.8	40.2	74.0	-33.8	Peak	Horizontal
	7375.0	38.3	7.9	46.2	74.0	-27.8	Peak	Horizontal
*	9678.5	32.5	10.9	43.4	80.4	-37.0	Peak	Horizontal
*	14855.0	31.9	15.1	47.0	80.4	-33.4	Peak	Horizontal
	4765.5	35.2	2.6	37.8	74.0	-36.2	Peak	Vertical
	7477.0	33.8	8.2	42.0	74.0	-32.0	Peak	Vertical
*	9678.5	32.2	10.9	43.1	80.4	-37.3	Peak	Vertical
*	15203.5	31.8	13.6	45.4	80.4	-35.0	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (110.4dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	W-LAN + Bluetooth Module	Temperature	26°C
Test Engineer	Will Yan	Relative Humidity	56%
Test Site	AC1	Test Date	2017/10/31
Test Mode:	802.11n-HT20	Test Channel:	01
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4816.5	37.2	2.7	39.9	74.0	-34.1	Peak	Horizontal
	7230.5	44.2	7.8	52.0	74.0	-22.0	Peak	Horizontal
*	9721.0	31.9	11.1	43.0	80.9	-37.9	Peak	Horizontal
*	14897.5	33.3	15.0	48.3	80.9	-32.6	Peak	Horizontal
	4791.0	35.4	2.7	38.1	74.0	-35.9	Peak	Vertical
	7239.0	36.7	7.8	44.5	74.0	-29.5	Peak	Vertical
*	9721.0	32.9	11.1	44.0	80.9	-36.9	Peak	Vertical
*	14880.5	33.6	15.0	48.6	80.9	-32.3	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (110.9dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	W-LAN + Bluetooth Module	Temperature	26°C
Test Engineer	Will Yan	Relative Humidity	56%
Test Site	AC1	Test Date	2017/10/31
Test Mode:	802.11n-HT20	Test Channel:	06
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBµV)	Factor (dB)	Measure Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
	4867.5	35.7	2.7	38.4	74.0	-35.6	Peak	Horizontal
	7315.5	40.4	8.0	48.4	74.0	-25.6	Peak	Horizontal
*	9644.5	32.4	11.0	43.4	80.7	-37.3	Peak	Horizontal
*	14957.0	31.8	14.8	46.6	80.7	-34.1	Peak	Horizontal
	4740.0	34.3	2.5	36.8	74.0	-37.2	Peak	Vertical
	7315.5	36.7	8.0	44.7	74.0	-29.3	Peak	Vertical
*	9517.0	31.7	10.6	42.3	80.7	-38.4	Peak	Vertical
*	14634.0	32.0	15.7	47.7	80.7	-33.0	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (110.7dBµV/m) or 15.209 which is higher.

Note 2: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	W-LAN + Bluetooth Module	Temperature	26°C
Test Engineer	Will Yan	Relative Humidity	56%
Test Site	AC1	Test Date	2017/10/31
Test Mode:	802.11n-HT20	Test Channel:	11
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBµV)	Factor (dB)	Measure Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
	4927.0	36.6	2.8	39.4	74.0	-34.6	Peak	Horizontal
	7383.5	41.4	7.9	49.3	74.0	-24.7	Peak	Horizontal
*	9848.5	35.1	11.6	46.7	80.0	-33.3	Peak	Horizontal
*	14931.5	33.9	14.9	48.8	80.0	-31.2	Peak	Horizontal
	4927.0	36.7	2.8	39.5	74.0	-34.5	Peak	Vertical
	7383.5	35.2	7.9	43.1	74.0	-30.9	Peak	Vertical
*	9780.5	34.2	11.4	45.6	80.0	-34.4	Peak	Vertical
*	15042.0	33.1	14.6	47.7	80.0	-32.3	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (110.0dBµV/m) or 15.209 which is higher.

Note 2: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	W-LAN + Bluetooth Module	Temperature	26°C
Test Engineer	Will Yan	Relative Humidity	56%
Test Site	AC1	Test Date	2017/10/31
Test Mode:	802.11n-HT40	Test Channel:	03
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBµV)	Factor (dB)	Measure Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
	4740.0	34.7	2.5	37.2	74.0	-36.8	Peak	Horizontal
	7400.5	32.9	7.9	40.8	74.0	-33.2	Peak	Horizontal
*	9687.0	32.4	10.9	43.3	76.1	-32.8	Peak	Horizontal
*	15110.0	31.7	14.3	46.0	76.1	-30.1	Peak	Horizontal
	4842.0	33.7	2.7	36.4	74.0	-37.6	Peak	Vertical
	7579.0	32.7	8.2	40.9	74.0	-33.1	Peak	Vertical
*	9678.5	32.1	10.9	43.0	76.1	-33.1	Peak	Vertical
*	14965.5	32.0	14.8	46.8	76.1	-29.3	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (106.1dBµV/m) or 15.209 which is higher.

Note 2: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	W-LAN + Bluetooth Module	Temperature	26°C
Test Engineer	Will Yan	Relative Humidity	56%
Test Site	AC1	Test Date	2017/10/31
Test Mode:	802.11n-HT40	Test Channel:	06
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4859.0	32.8	2.7	35.5	74.0	-38.5	Peak	Horizontal
	7621.5	32.9	8.1	41.0	74.0	-33.0	Peak	Horizontal
*	9678.5	32.5	10.9	43.4	75.8	-32.4	Peak	Horizontal
*	15050.5	32.1	14.5	46.6	75.8	-29.2	Peak	Horizontal
	4799.5	37.0	2.7	39.7	74.0	-34.3	Peak	Vertical
	7536.5	34.1	8.3	42.4	74.0	-31.6	Peak	Vertical
*	9789.0	32.7	11.4	44.1	75.8	-31.7	Peak	Vertical
*	15161.0	32.0	14.0	46.0	75.8	-29.8	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (105.8dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	W-LAN + Bluetooth Module	Temperature	26°C
Test Engineer	Will Yan	Relative Humidity	56%
Test Site	AC1	Test Date	2017/10/31
Test Mode:	802.11n-HT20	Test Channel:	09
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBµV)	Factor (dB)	Measure Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
	4765.5	35.3	2.6	37.9	74.0	-36.1	Peak	Horizontal
	7468.5	33.2	8.1	41.3	74.0	-32.7	Peak	Horizontal
*	9687.0	32.0	10.9	42.9	75.6	-32.7	Peak	Horizontal
*	14965.5	31.6	14.8	46.4	75.6	-29.2	Peak	Horizontal
	4748.5	35.6	2.5	38.1	74.0	-35.9	Peak	Vertical
	7621.5	33.3	8.1	41.4	74.0	-32.6	Peak	Vertical
*	9721.0	31.7	11.1	42.8	75.6	-32.8	Peak	Vertical
*	15186.5	31.3	13.8	45.1	75.6	-30.5	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (105.6dBµV/m) or 15.209 which is higher.

Note 2: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

7.7. Radiated Restricted Band Edge Measurement

7.7.1.Test Limit

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (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	8.25 - 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	156.52475-156.525	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	--	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 – 0.490	2400/F (kHz)	300
0.490 – 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.7.2. Test Procedure Used

KDB 558074 D01v04 - Section 12.2.4 (peak power measurements)

KDB 558074 D01v04 - Section 13.3.3 (average power measurements)

7.7.3. Test Setting

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. RBW = as specified in Table 1

3. VBW = 3MHz

4. Detector = peak

5. Sweep time = auto couple

6. Trace mode = max hold

7. Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. RBW = 1MHz

3. VBW ≥ 1/T

4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode

5. Detector = Peak

6. Sweep time = auto

7. Trace mode = max hold

8. Allow max hold to run for at least 50 times (1/duty cycle) traces

7.7.4. Test Setup
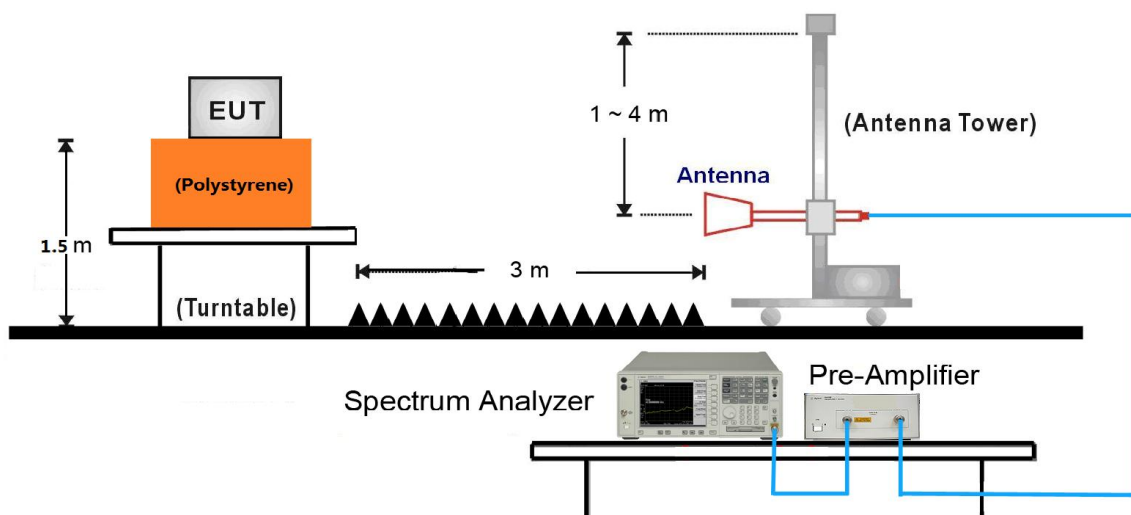
7.7.5.Test Result

Site: AC1	Time: 2017/10/31 - 19:35
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11b at channel 2412MHz	
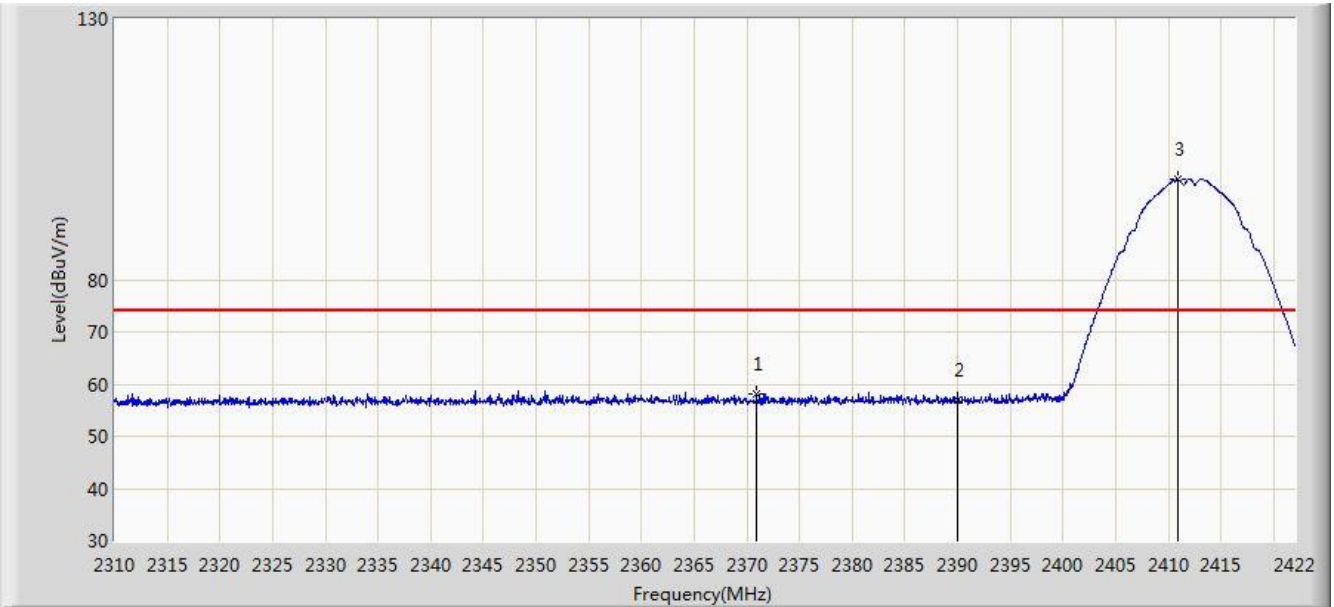
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2370.928	58.194	26.956	-15.806	74.000	31.238	PK
2			2390.000	56.958	25.755	-17.042	74.000	31.203	PK
3			2410.968	99.154	67.983	N/A	N/A	31.171	PK

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2017/10/31 - 20:41
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11b at channel 2412MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBµV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	44.041	12.838	-9.959	54.000	31.203	AV
2			2411.136	94.516	63.345	N/A	N/A	31.171	AV

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

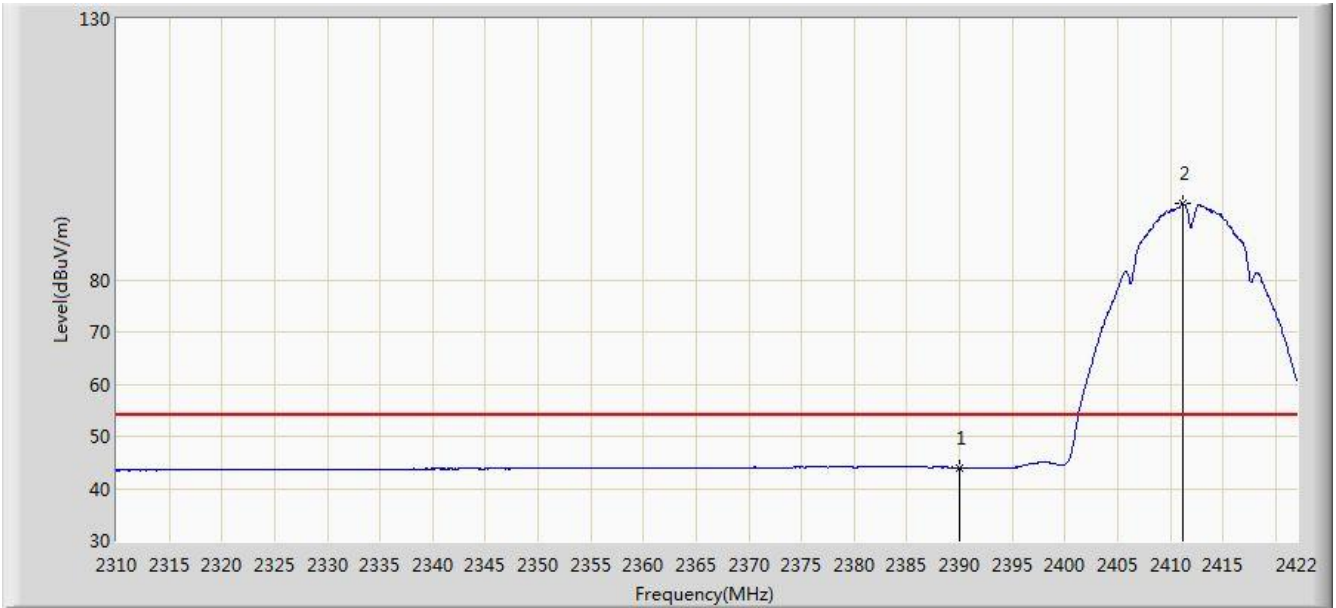| Site: AC1	Time: 2017/10/31 - 20:42
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11b at channel 2412MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBµV/m)	Reading Level (dBµV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2385.040	59.757	28.545	-14.243	74.000	31.212	PK
2			2390.000	58.308	27.105	-15.692	74.000	31.203	PK
3			2410.800	106.913	75.741	N/A	N/A	31.172	PK

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

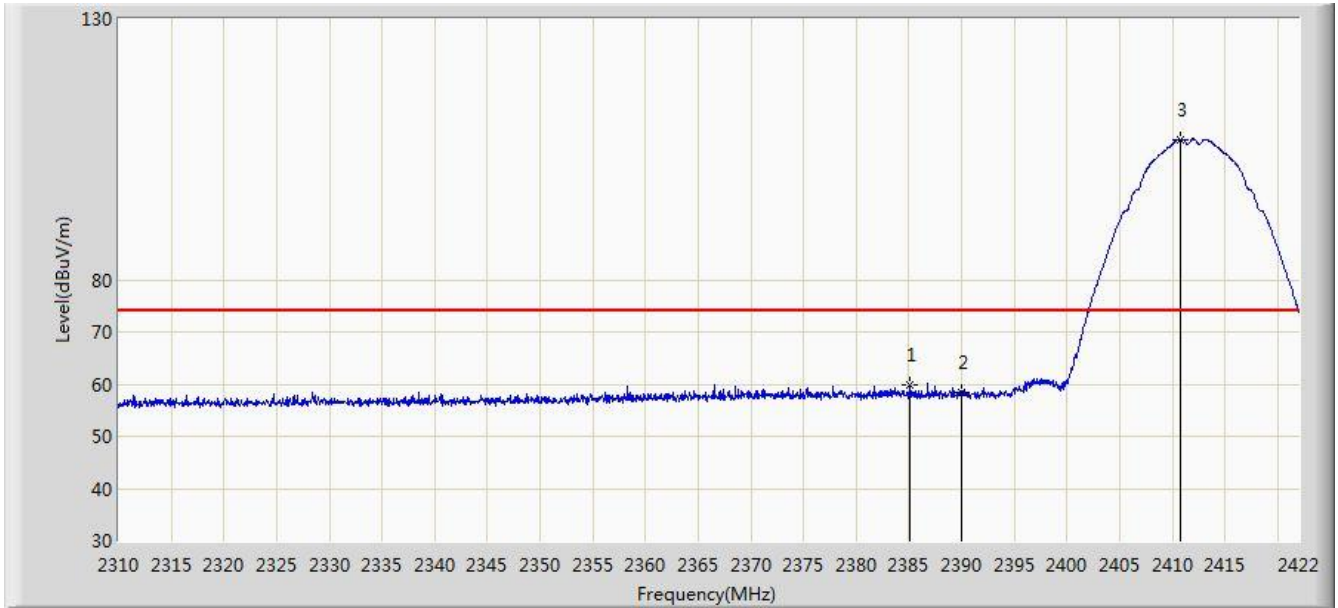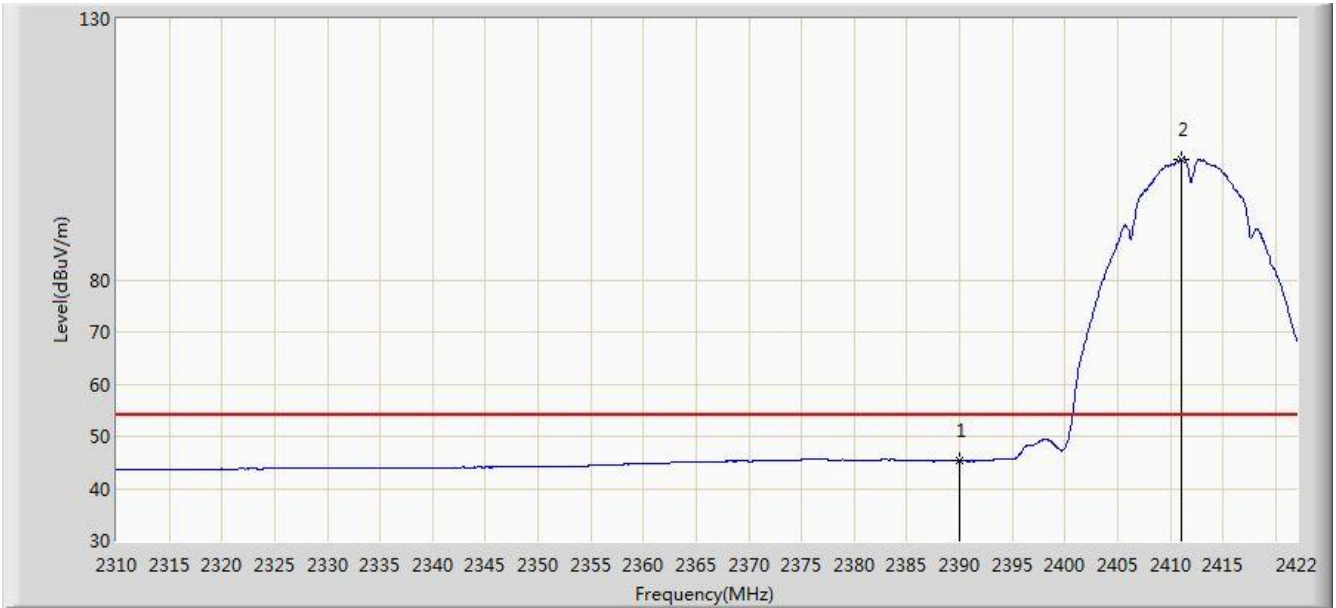| Site: AC1	Time: 2017/10/31 - 20:57
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11b at channel 2412MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBµV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	45.326	14.123	-8.674	54.000	31.203	AV
2			2411.024	103.177	72.006	N/A	N/A	31.171	AV

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2017/10/31 - 20:59
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11b at channel 2462MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2461.816	104.039	72.904	N/A	N/A	31.135	PK
2			2483.500	57.588	26.395	-16.412	74.000	31.194	PK
3			2488.120	58.918	27.713	-15.082	74.000	31.206	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

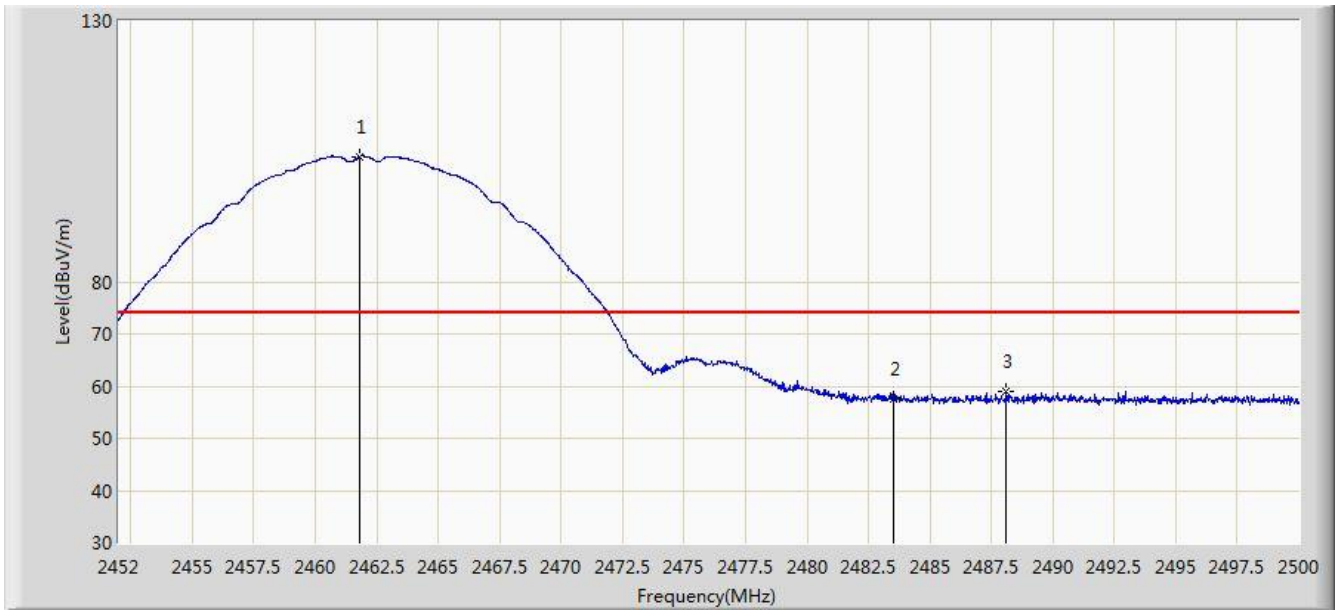| Site: AC1	Time: 2017/10/31 - 21:03
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11b at channel 2462MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2461.240	95.655	64.521	N/A	N/A	31.134	AV
2			2483.500	44.251	13.058	-9.749	54.000	31.194	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

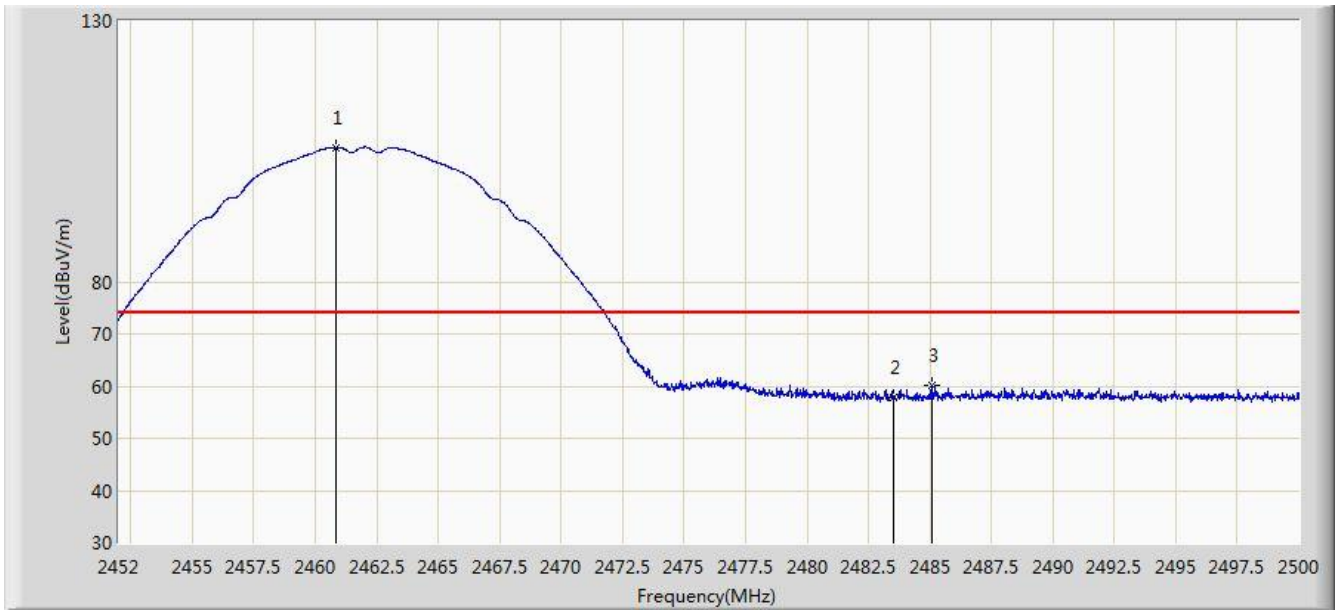|	
Site: AC1	Time: 2017/10/31 - 21:05
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11b at channel 2462MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBµV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2460.856	105.762	74.629	N/A	N/A	31.133	PK
2			2483.500	57.819	26.626	-16.181	74.000	31.194	PK
3			2485.072	60.160	28.963	-13.840	74.000	31.197	PK

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2017/10/31 - 21:08
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11b at channel 2462MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2461.168	101.138	70.004	N/A	N/A	31.134	AV
2			2483.500	45.223	14.030	-8.777	54.000	31.194	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

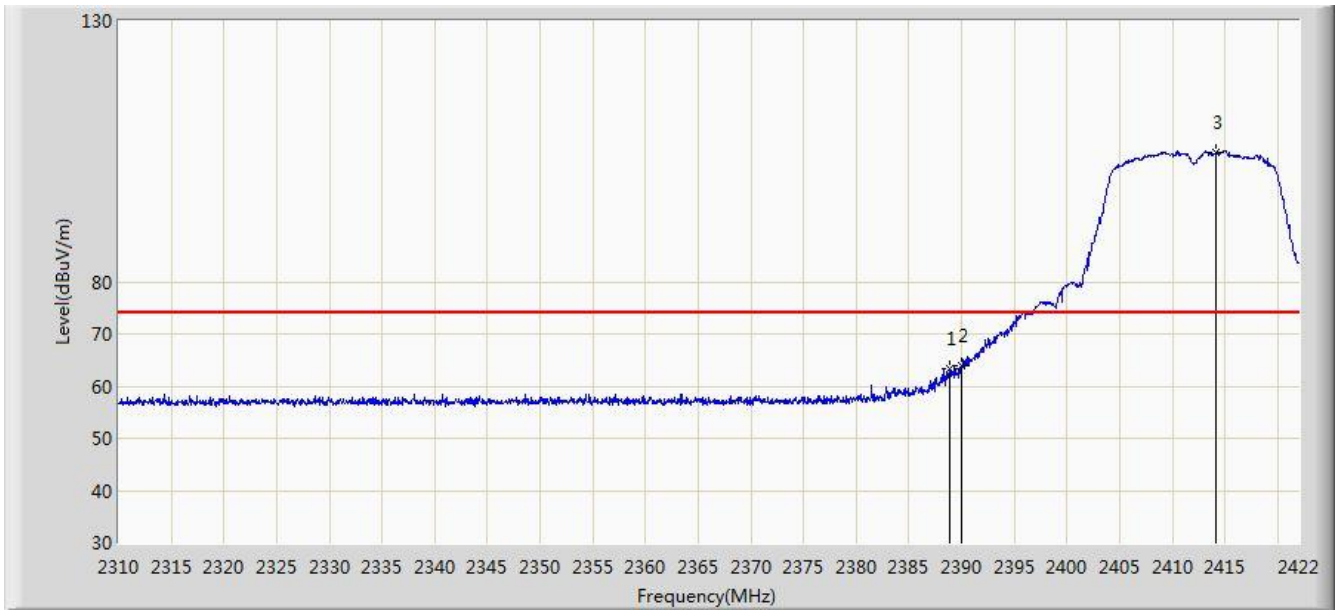| Site: AC1	Time: 2017/10/31 - 21:32
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11g at channel 2412MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2388.848	63.441	32.236	-10.559	74.000	31.205	PK
2			2390.000	63.805	32.602	-10.195	74.000	31.203	PK
3			2414.160	104.726	73.560	N/A	N/A	31.166	PK

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

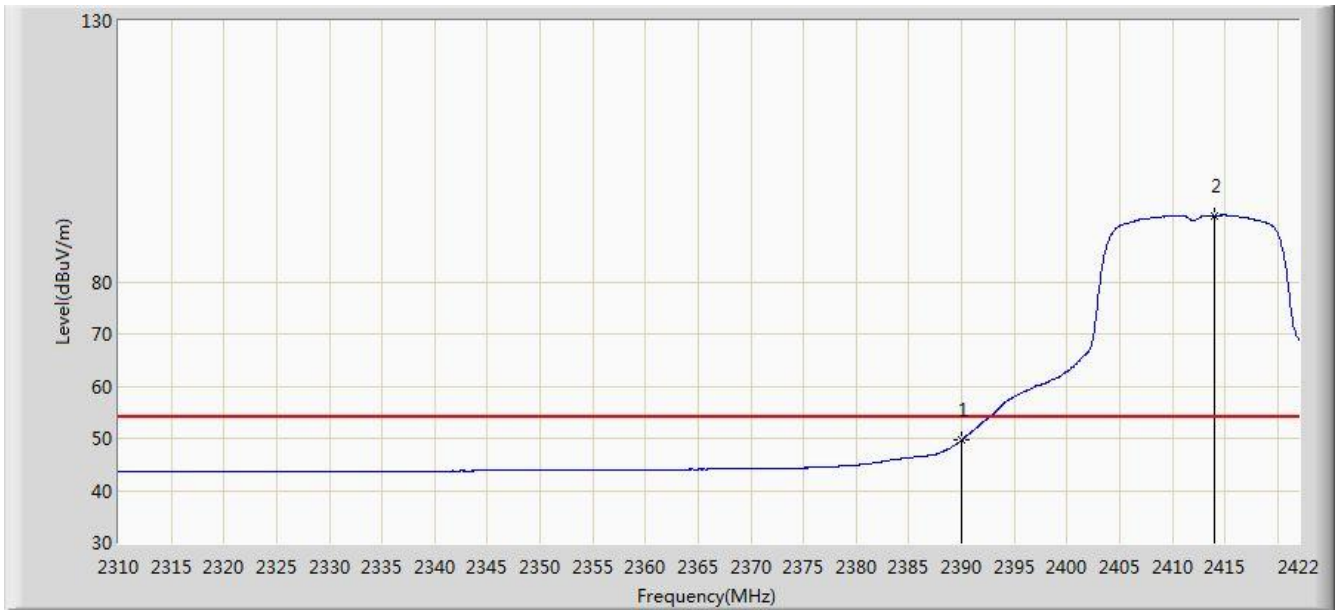| Site: AC1	Time: 2017/10/31 - 21:38
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11g at channel 2412MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	49.691	18.488	-4.309	54.000	31.203	AV
2			2413.936	92.709	61.543	N/A	N/A	31.166	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

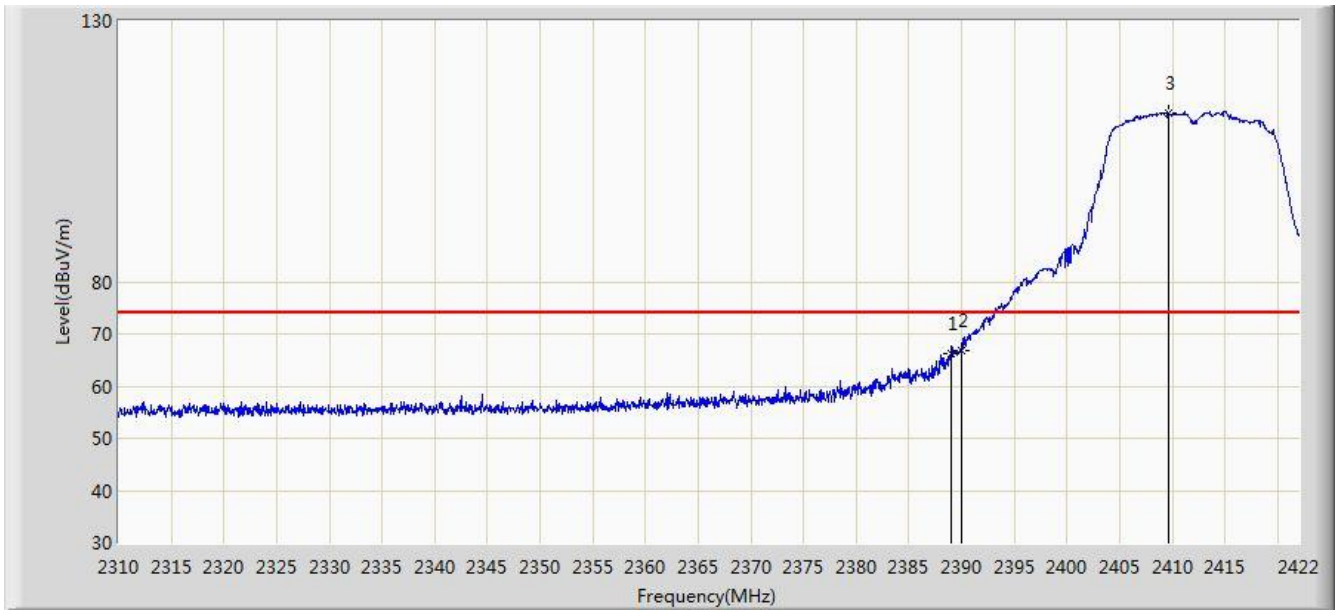| Site: AC1	Time: 2017/10/31 - 21:32
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11g at channel 2412MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2388.960	66.141	34.936	-7.859	74.000	31.204	PK
2			2390.000	66.907	35.704	-7.093	74.000	31.203	PK
3			2409.624	112.209	81.036	N/A	N/A	31.174	PK

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

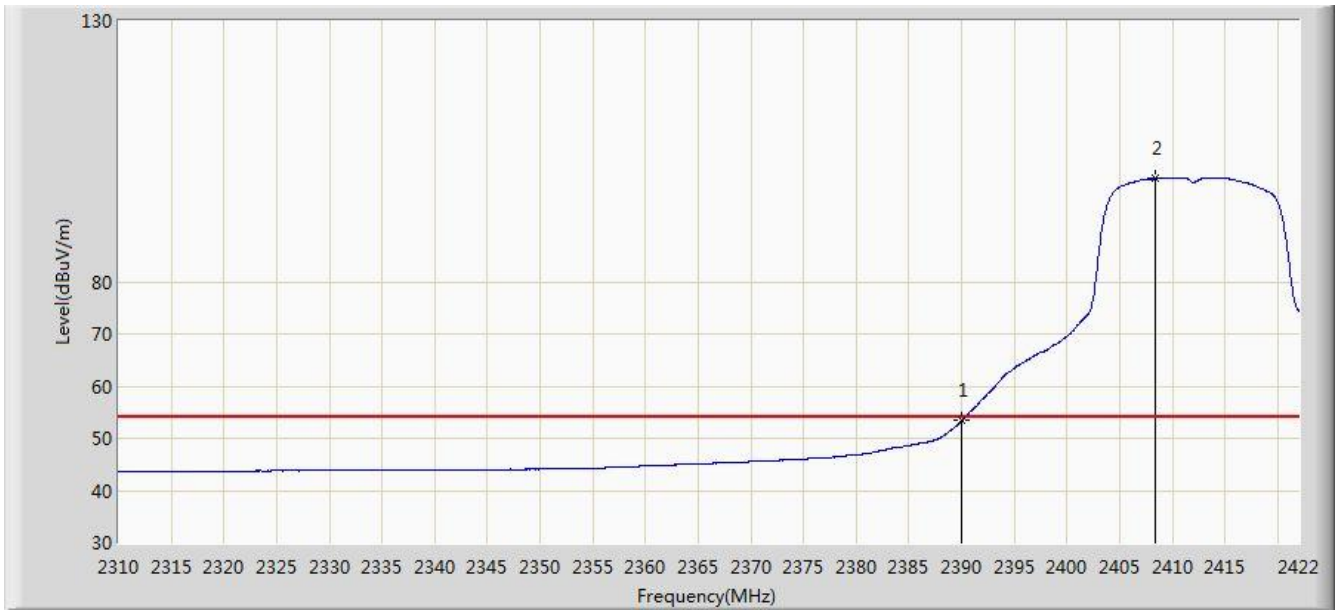| Site: AC1	Time: 2017/10/31 - 21:29
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11g at channel 2412MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	53.384	22.181	-0.616	54.000	31.203	AV
2			2408.336	99.783	68.608	N/A	N/A	31.175	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

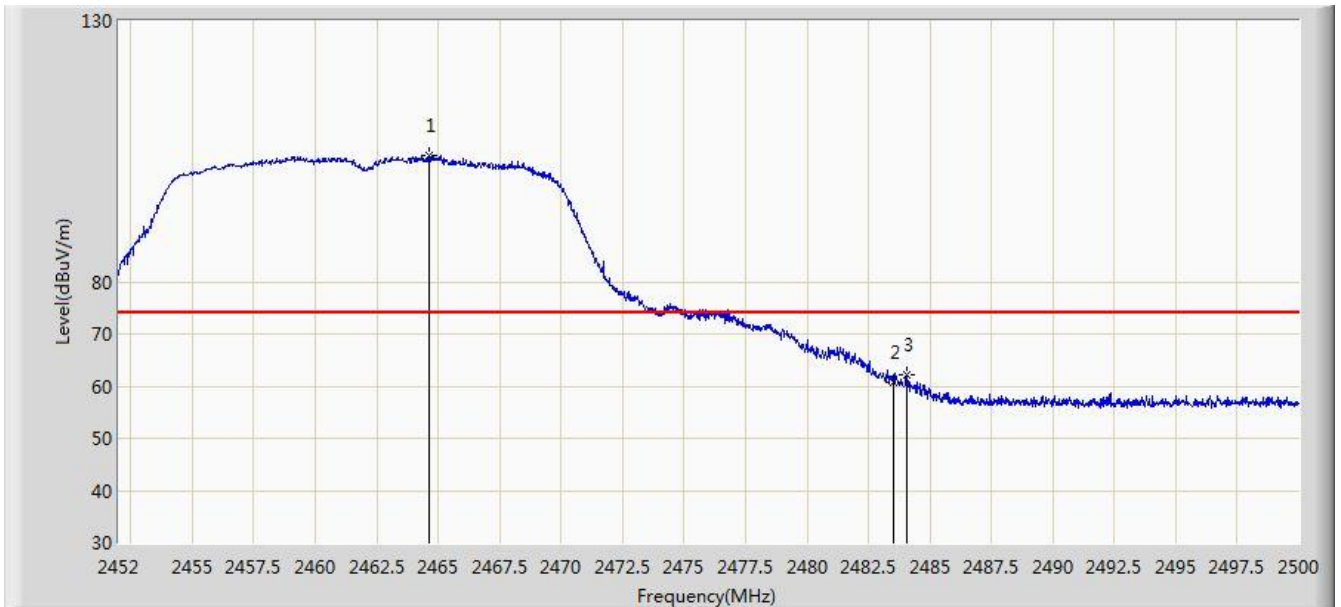| Site: AC1	Time: 2017/10/31 - 21:56
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11g at channel 2462MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2464.648	104.285	73.144	N/A	N/A	31.142	PK
2			2483.500	60.849	29.656	-13.151	74.000	31.194	PK
3			2484.040	62.240	31.045	-11.760	74.000	31.195	PK

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

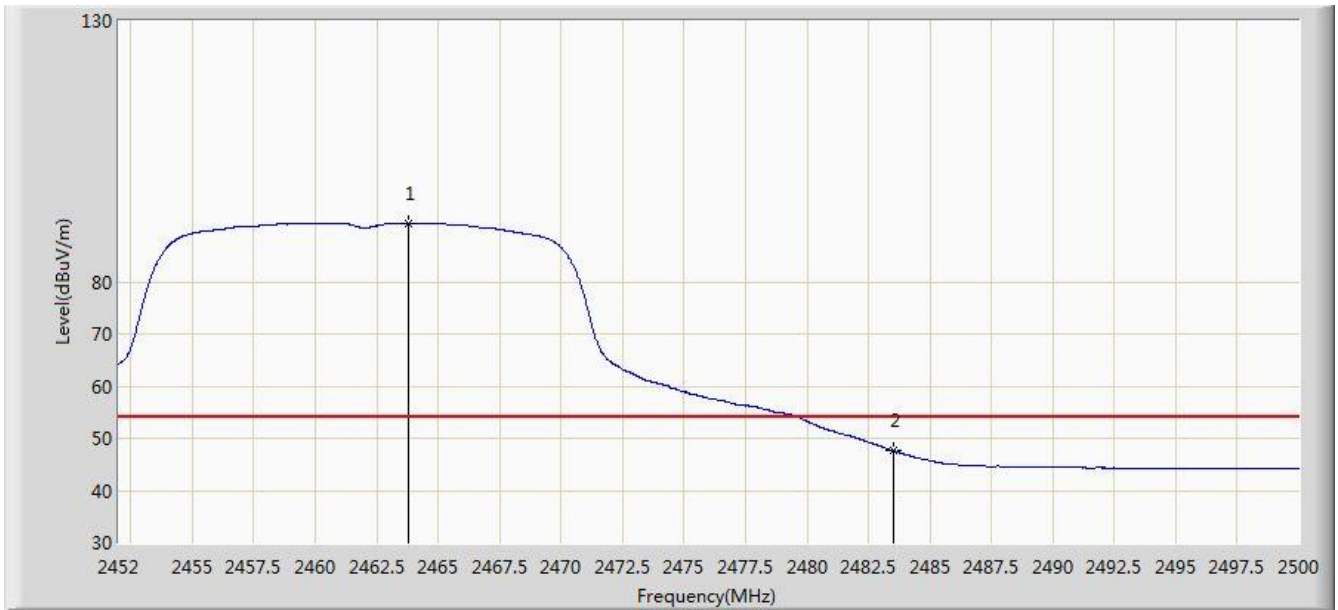| Site: AC1	Time: 2017/10/31 - 21:58
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11g at channel 2462MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2463.760	91.135	59.996	N/A	N/A	31.139	AV
2			2483.500	47.645	16.452	-6.355	54.000	31.194	AV

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

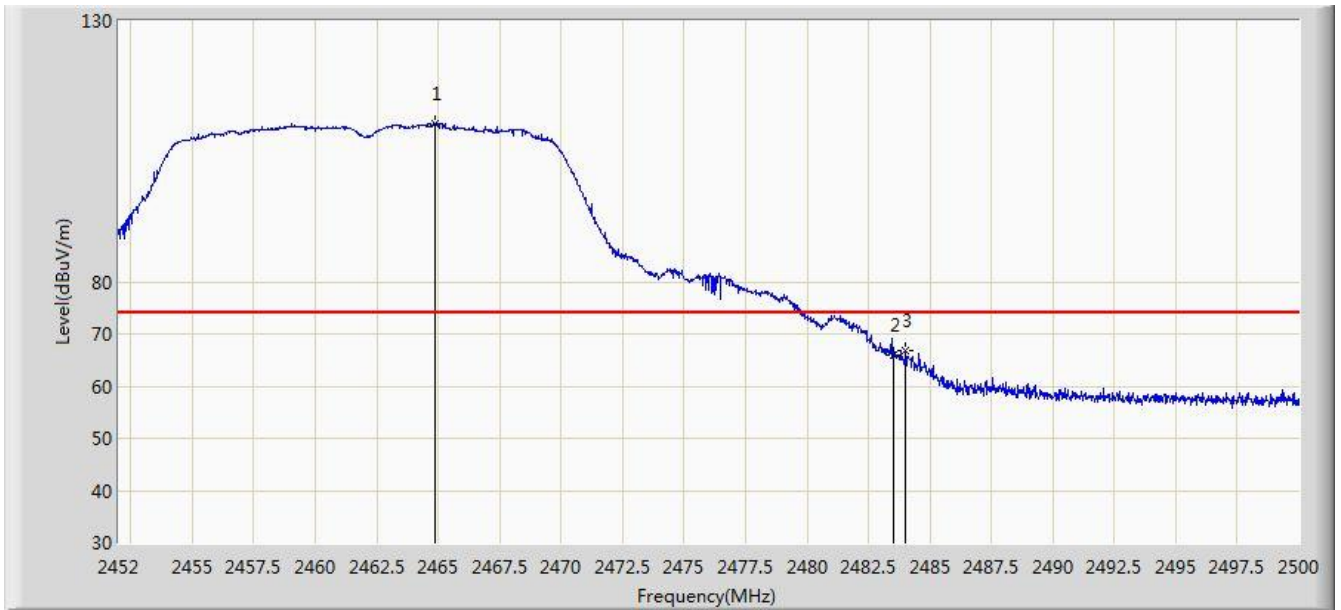| Site: AC1	Time: 2017/10/31 - 21:56
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11g at channel 2462MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2464.888	110.377	79.235	N/A	N/A	31.142	PK
2			2483.500	65.835	34.642	-8.165	74.000	31.194	PK
3			2484.016	66.828	35.633	-7.172	74.000	31.195	PK

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

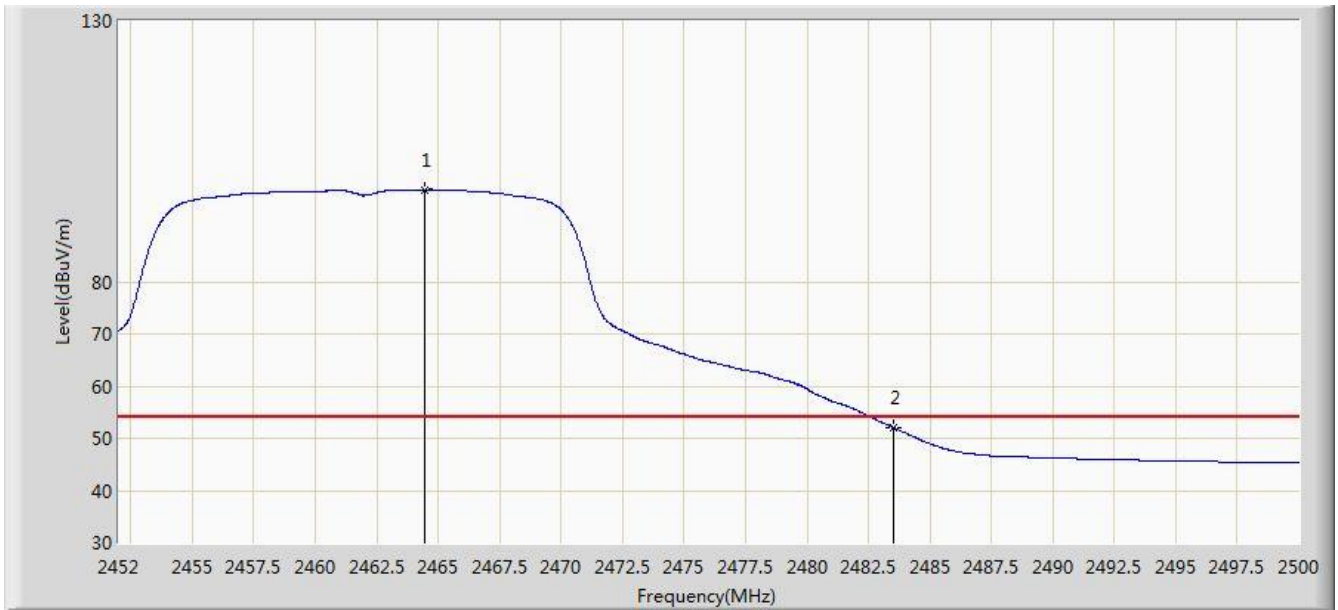| Site: AC1	Time: 2017/10/31 - 21:55
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11g at channel 2462MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2464.432	97.609	66.468	N/A	N/A	31.140	AV
2			2483.500	52.112	20.919	-1.888	54.000	31.194	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2017/10/31 - 22:03
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT20 at channel 2412MHz	
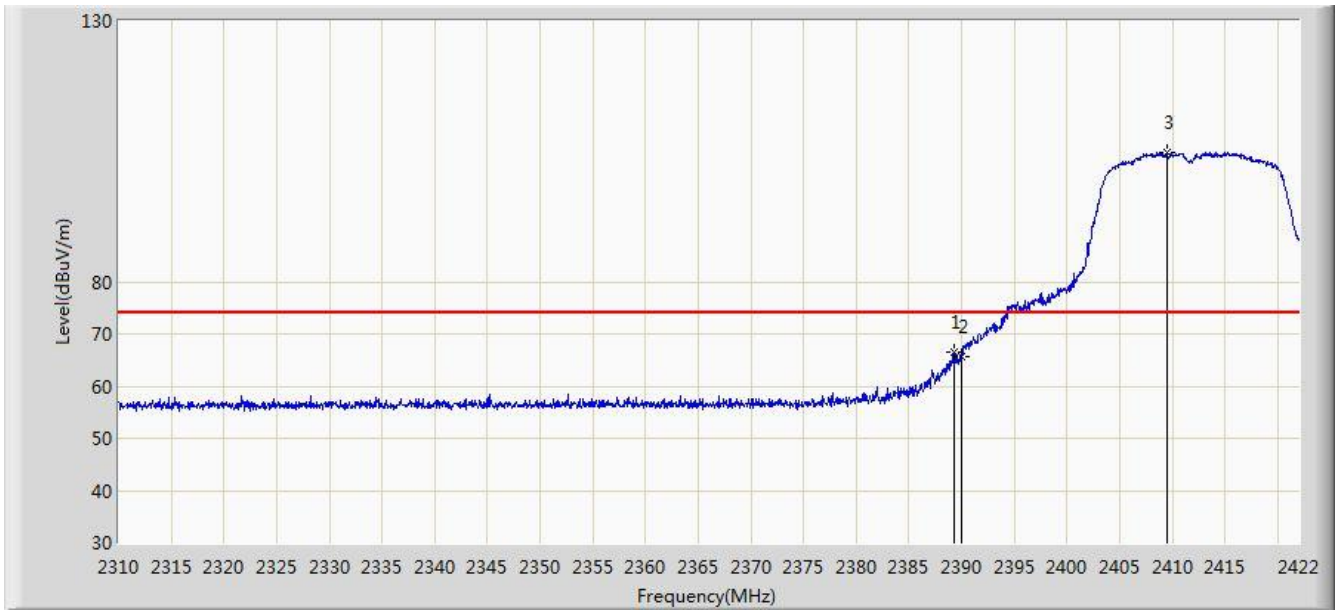
No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Over Limit (dB)	Limit (dBμV/m)	Factor (dB)	Type
1			2389.240	66.587	35.383	-7.413	74.000	31.204	PK
2			2390.000	65.677	34.474	-8.323	74.000	31.203	PK
3			2409.512	104.793	73.620	N/A	N/A	31.173	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

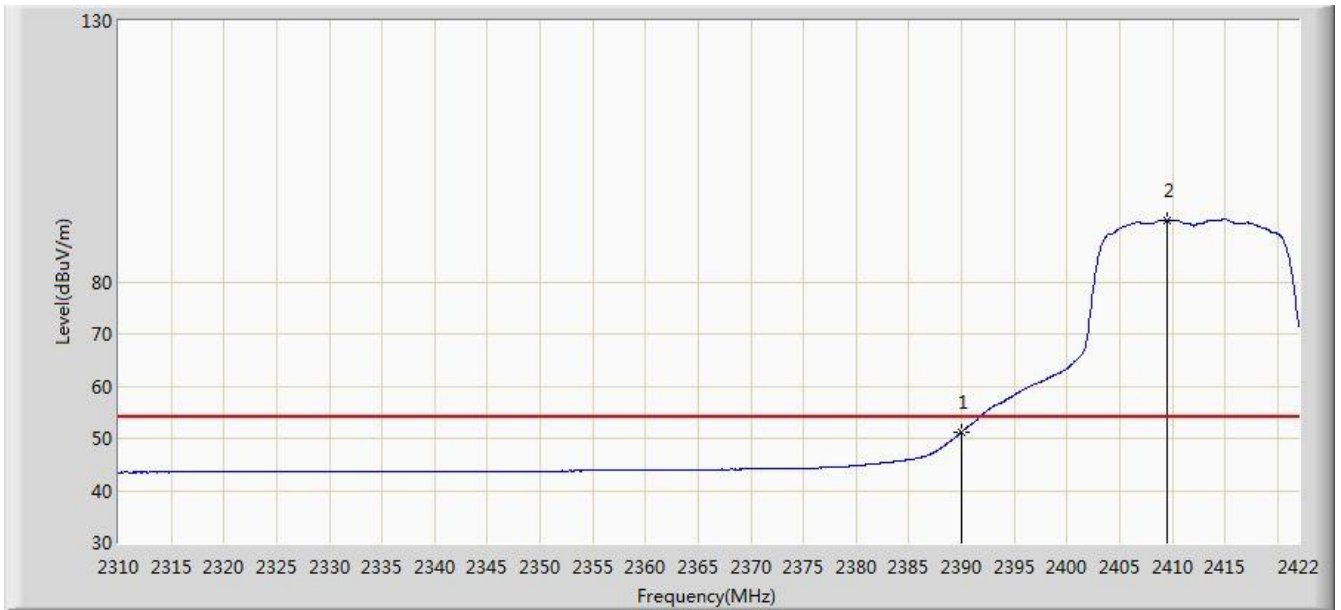| Site: AC1	Time: 2017/10/31 - 22:04
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT20 at channel 2412MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	51.240	20.037	-2.760	54.000	31.203	AV
2			2409.568	91.780	60.607	N/A	N/A	31.173	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

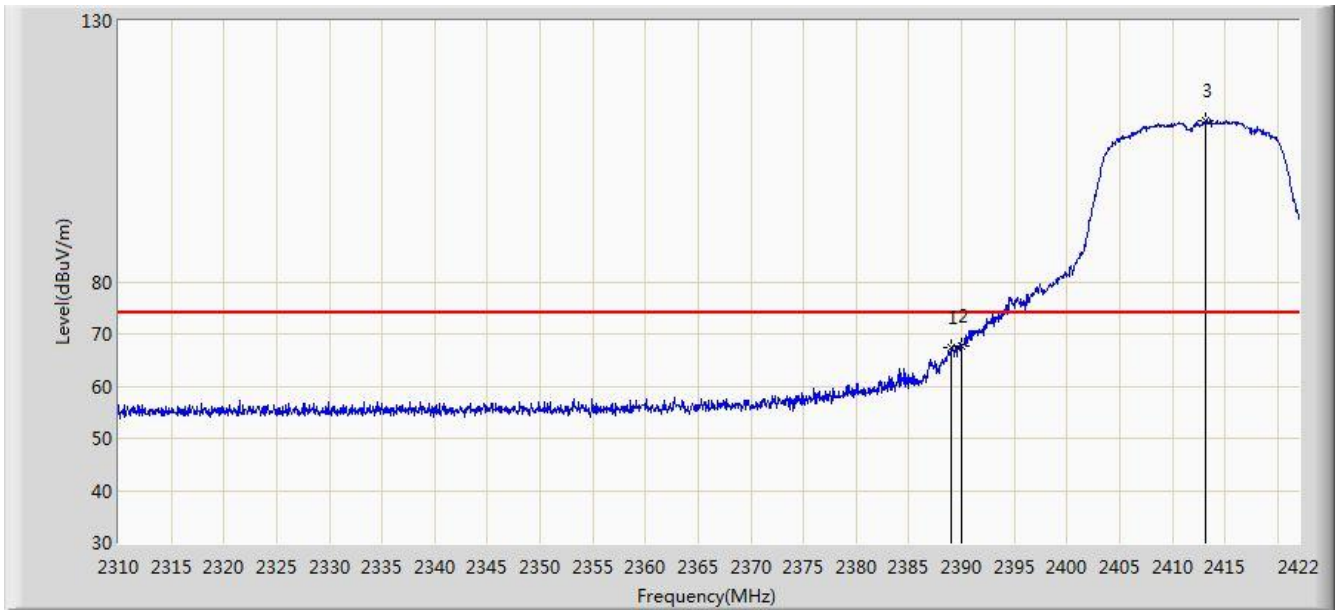| Site: AC1	Time: 2017/10/31 - 22:02
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT20 at channel 2412MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2389.016	67.402	36.197	-6.598	74.000	31.204	PK
2			2390.000	67.699	36.496	-6.301	74.000	31.203	PK
3			2413.152	110.935	79.767	N/A	N/A	31.167	PK

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

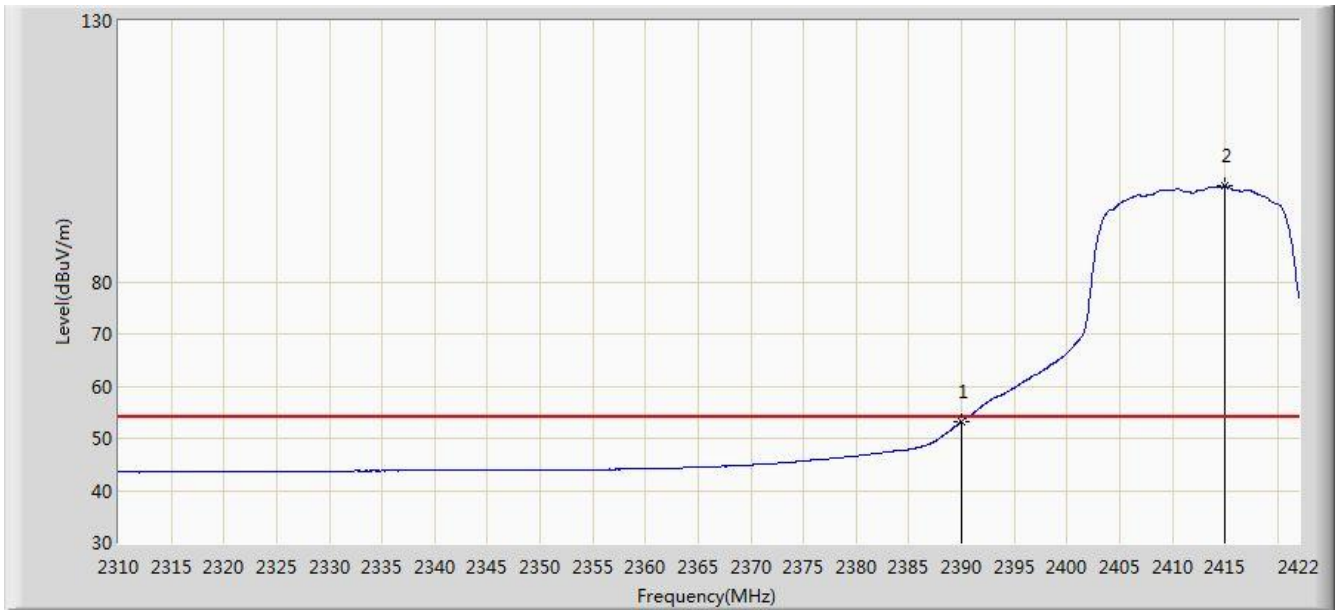| Site: AC1	Time: 2017/10/31 - 22:01
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT20 at channel 2412MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	53.227	22.024	-0.773	54.000	31.203	AV
2			2415.000	98.268	67.104	N/A	N/A	31.165	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

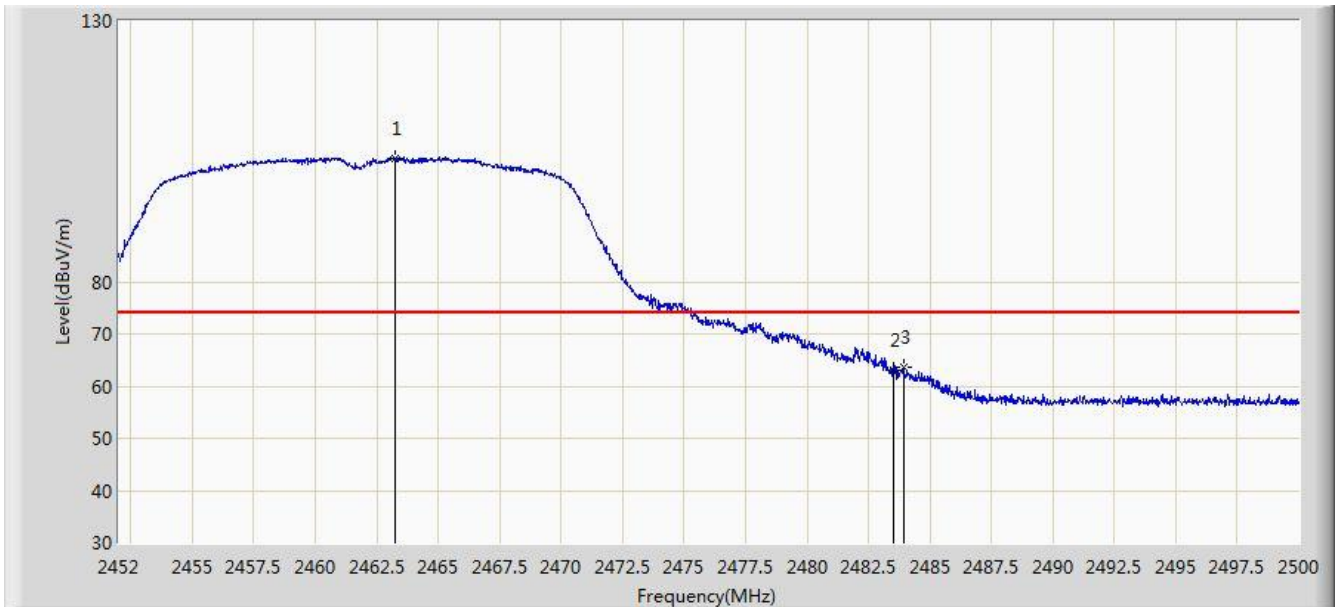| Site: AC1	Time: 2017/10/31 - 22:10
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT20 at channel 2462MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBµV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2463.256	103.545	72.407	N/A	N/A	31.138	PK
2			2483.500	63.082	31.889	-10.918	74.000	31.194	PK
3			2483.944	63.687	32.493	-10.313	74.000	31.194	PK

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

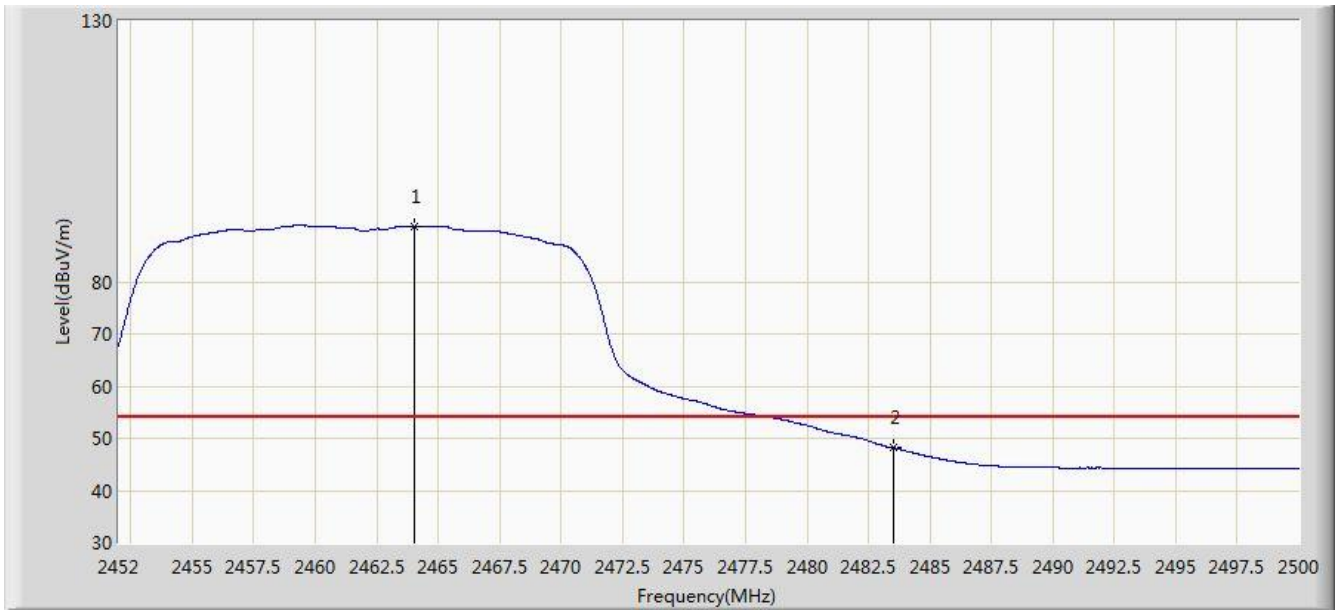| Site: AC1	Time: 2017/10/31 - 22:11
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT20 at channel 2462MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2464.000	90.624	59.485	N/A	N/A	31.139	AV
2			2483.500	48.191	16.998	-5.809	54.000	31.194	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2017/10/31 - 22:09
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT20 at channel 2462MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2460.208	110.010	78.878	N/A	N/A	31.132	PK
2			2483.500	68.051	36.858	-5.949	74.000	31.194	PK
3			2483.800	68.472	37.278	-5.528	74.000	31.194	PK

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

| Site: AC1	Time: 2017/10/31 - 22:08
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT20 at channel 2462MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2459.368	97.861	66.730	N/A	N/A	31.131	AV
2			2483.500	53.384	22.191	-0.616	54.000	31.194	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

| Site: AC1	Time: 2017/10/31 - 22:21
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT40 at channel 2422MHz	
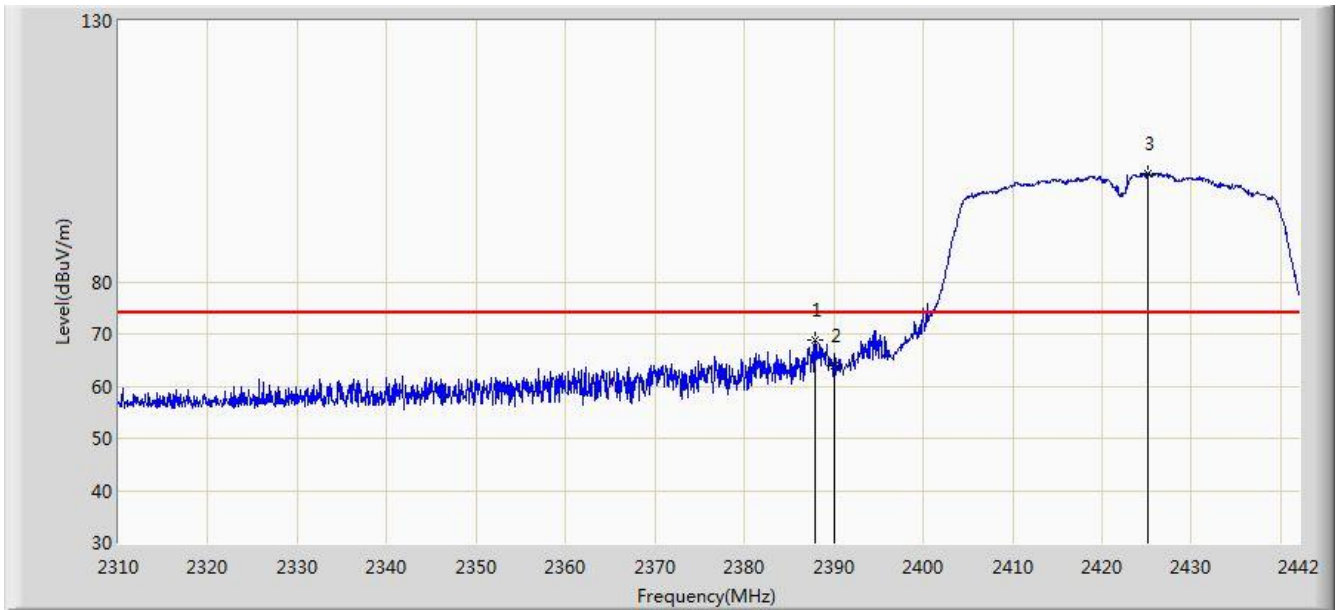
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2387.946	68.736	37.529	-5.264	74.000	31.206	PK
2			2390.000	64.045	32.842	-9.955	74.000	31.203	PK
3			2425.104	100.742	69.595	N/A	N/A	31.147	PK

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

|	
Site: AC1	Time: 2017/10/31 - 22:23
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT40 at channel 2422MHz	
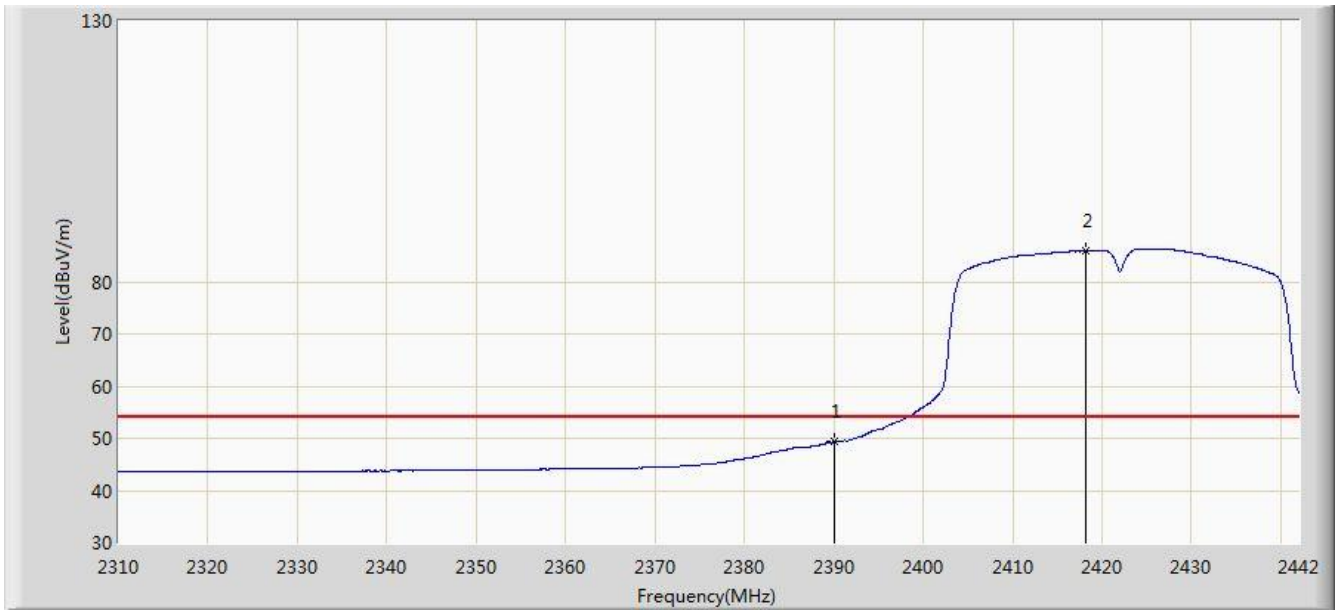
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	49.300	18.097	-4.700	54.000	31.203	AV
2			2418.108	85.862	54.703	N/A	N/A	31.159	AV

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

| Site: AC1	Time: 2017/10/31 - 22:20
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT40 at channel 2422MHz	
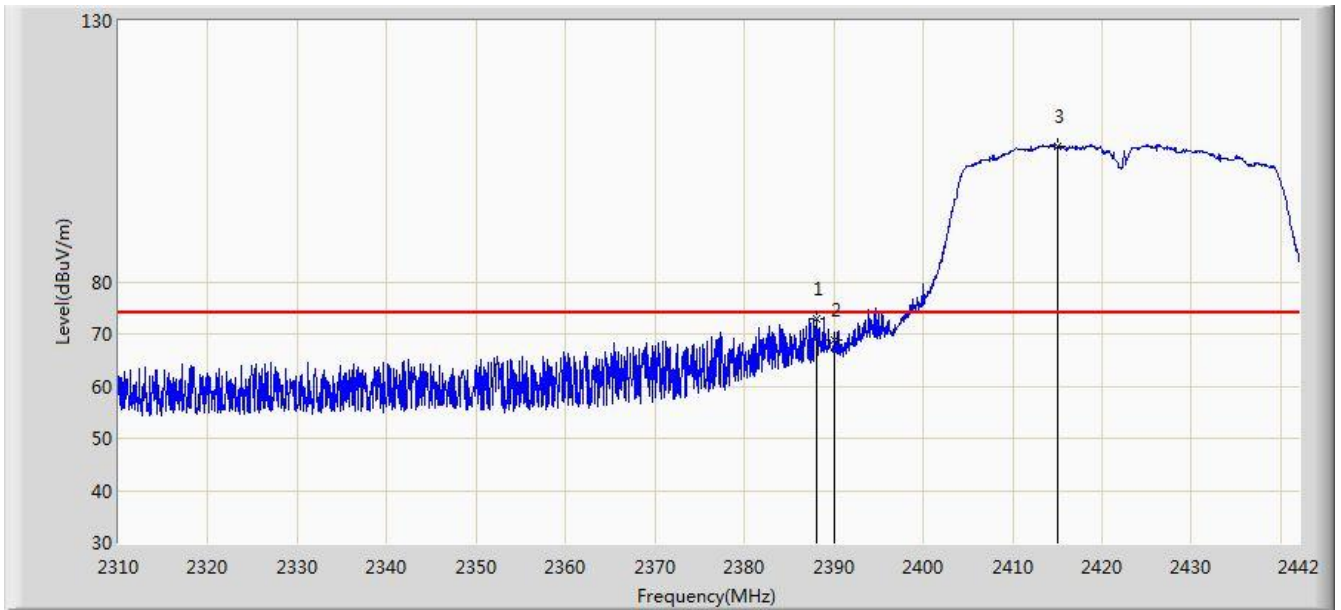
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2388.144	73.026	41.820	-0.974	74.000	31.207	PK
2			2390.000	68.829	37.626	-5.171	74.000	31.203	PK
3			2415.006	106.082	74.918	N/A	N/A	31.165	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

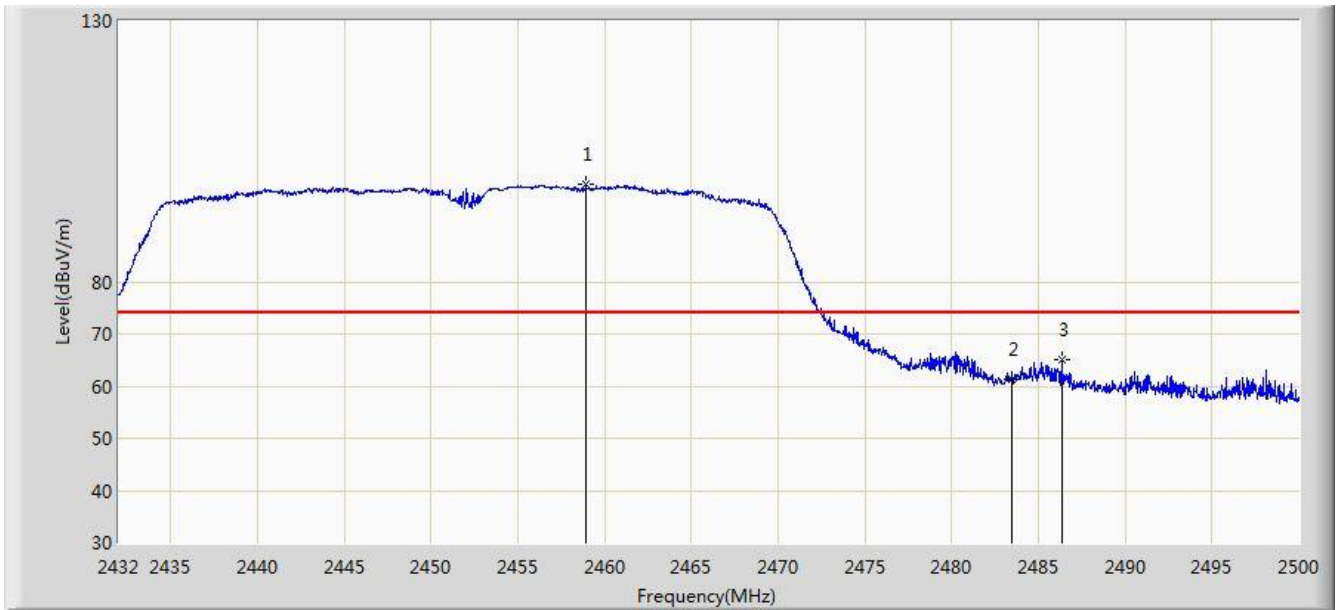| Site: AC1	Time: 2017/10/31 - 22:19
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT40 at channel 2422MHz	
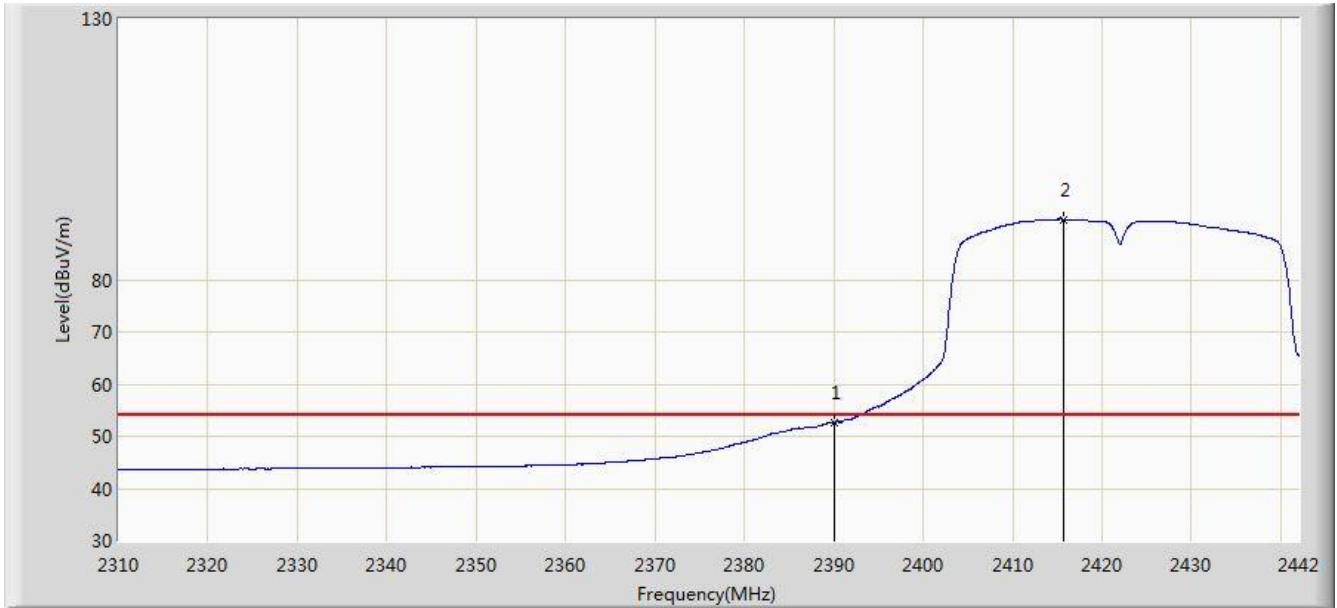
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	52.673	21.470	-1.327	54.000	31.203	AV
2			2415.666	91.579	60.416	N/A	N/A	31.163	AV

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

| Site: AC1	Time: 2017/10/31 - 22:29
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT40 at channel 2452MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2458.928	98.793	67.663	N/A	N/A	31.130	PK
2			2483.500	61.302	30.109	-12.698	74.000	31.194	PK
3			2486.366	64.972	33.771	-9.028	74.000	31.201	PK

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

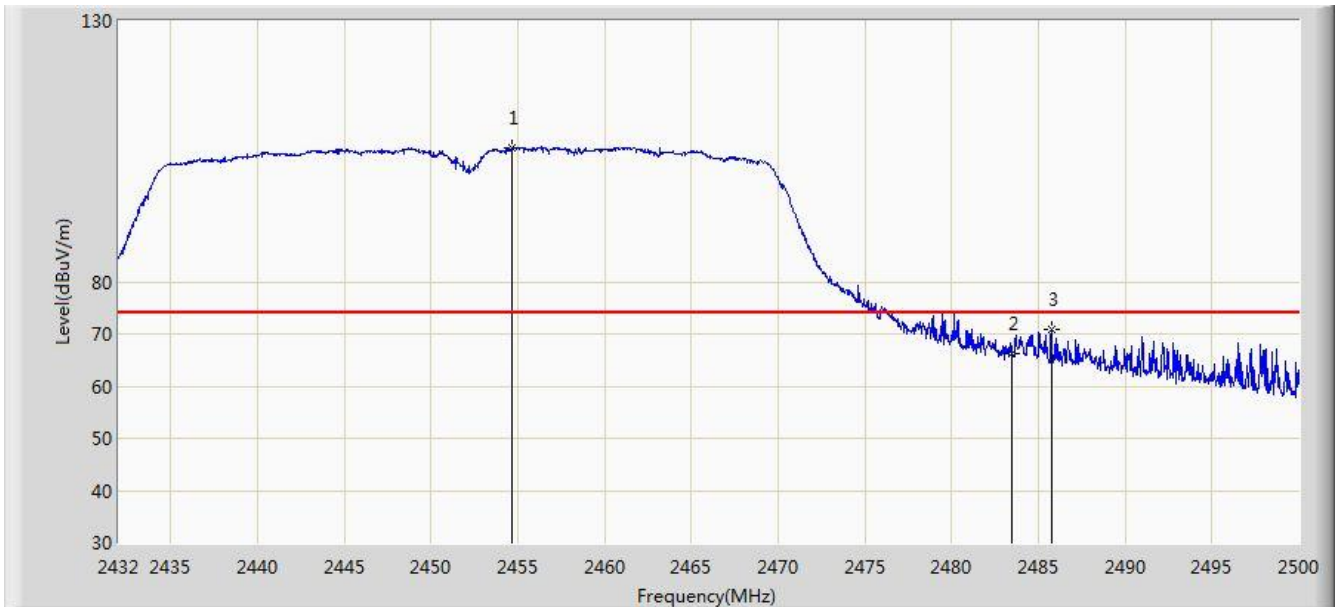| Site: AC1	Time: 2017/10/31 - 22:32
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT40 at channel 2452MHz	
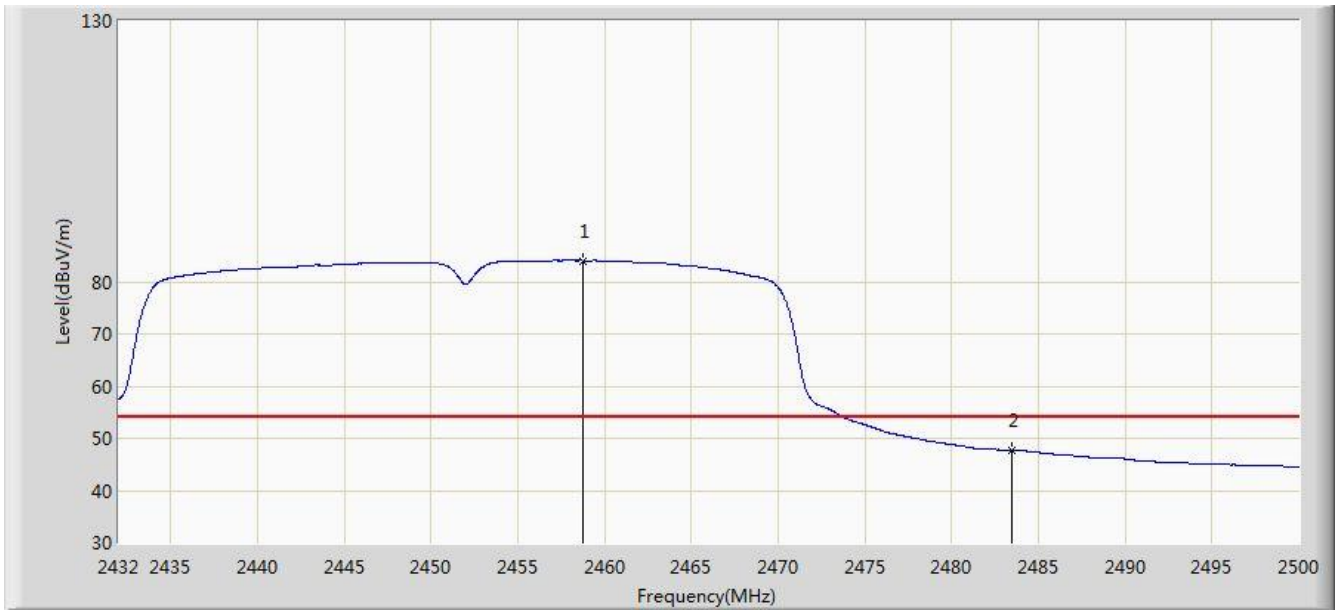
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2458.724	84.049	52.919	N/A	N/A	31.129	AV
2			2483.500	47.692	16.499	-6.308	54.000	31.194	AV

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

| Site: AC1	Time: 2017/10/31 - 22:29
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT40 at channel 2452MHz	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBµV/m)	Reading Level (dBµV)	Over Limit (dB)	Limit (dBµV/m)	Factor (dB)	Type
1			2454.678	105.645	74.523	N/A	N/A	31.123	PK
2			2483.500	66.229	35.036	-7.771	74.000	31.194	PK
3			2485.754	70.899	39.700	-3.101	74.000	31.200	PK

Note: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2017/10/31 - 22:28
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: W-LAN + Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT40 at channel 2452MHz	
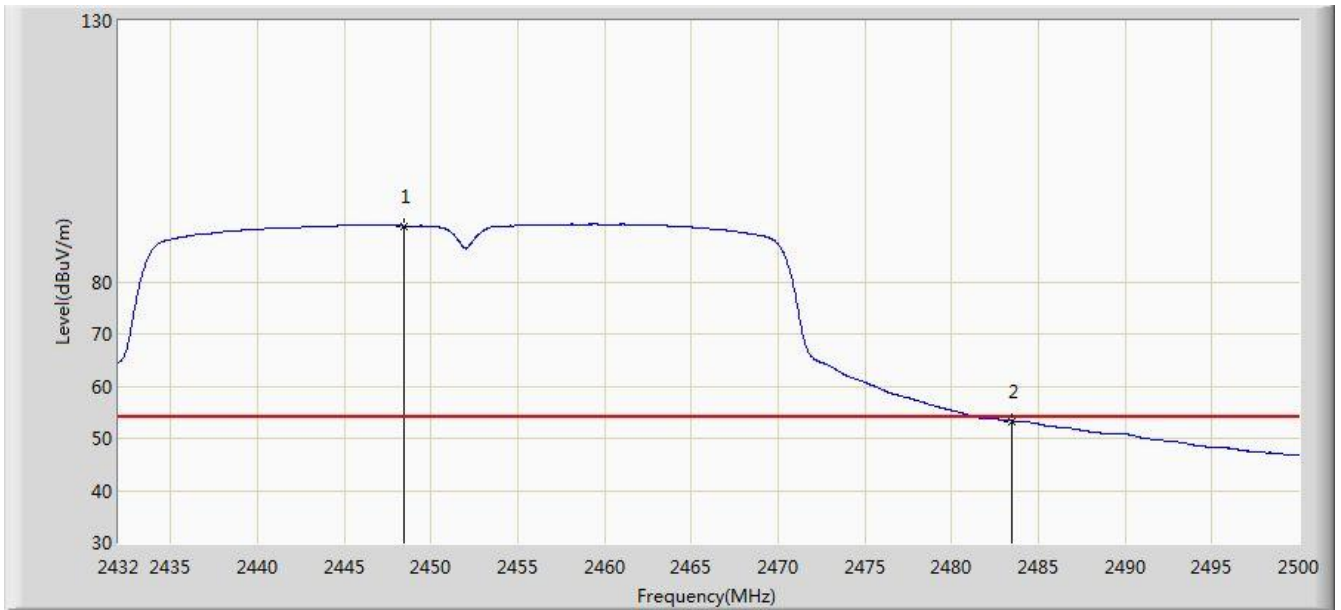
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2448.456	90.721	59.610	N/A	N/A	31.111	AV
2			2483.500	53.320	22.127	-0.680	54.000	31.194	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).
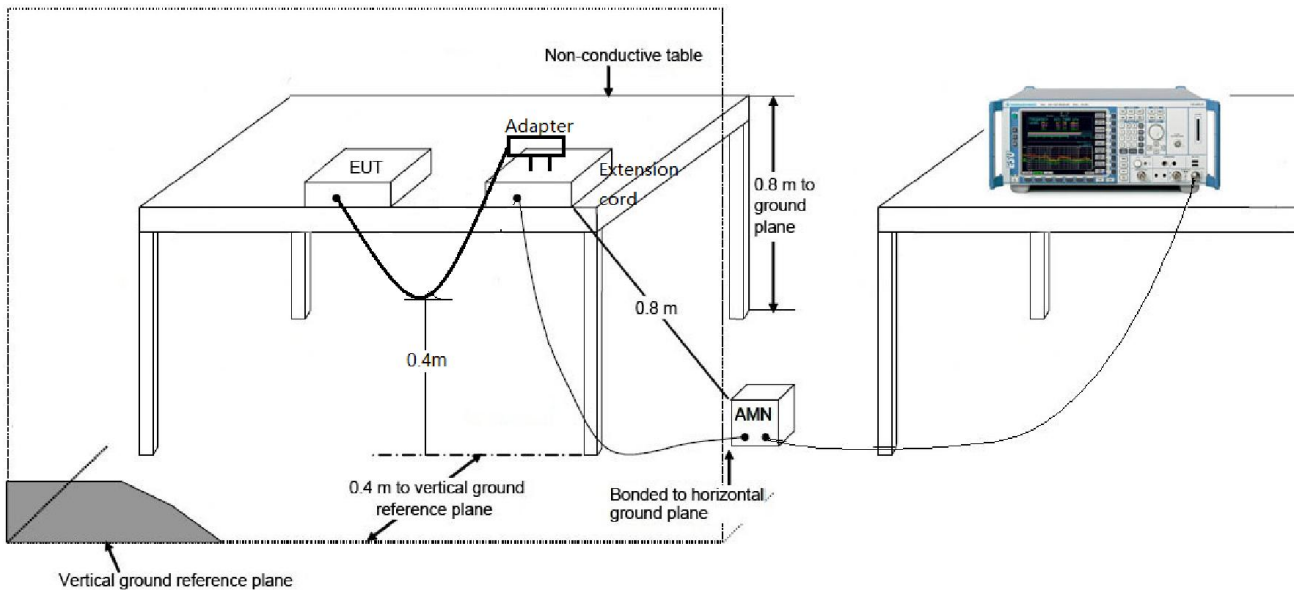
7.8. AC Conducted Emissions Measurement

7.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 – 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

7.8.2. Test Setup

7.8.3.Test Result

The EUT is supplied by DC 3.3V, so this item is not application.

8. CONCLUSION

The data collected relate only the item(s) tested and show that the **W-LAN + Bluetooth Module** is in

compliance with Part 15C of the FCC Rules & IC Rules.

—— The End ——