

MEASUREMENT REPORT

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

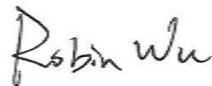
FCC ID: H8N-AP6356S
IC: 1353A-AP6356S
Applicant: Askey Computer Corp.
Application Type: CLASS II PERMISSIVE CHANGE
Product: WIFI+BT Combo Module
Model No.: AP6356S
Brand Name: ASKEY
FCC Classification: Digital Transmission System (DTS)
FCC Rule Part(s): Part 15 Subpart C (Section 15.247)
IC Rule(s): RSS-247 Issue 2, RSS-GEN Issue 5
Test Procedure(s): ANSI C63.10-2013, KDB 558074 D01v05r02
KDB 662911 D01v02r01
Test Date: July 20 ~ August 03, 2019

Reviewed By:



(Kevin Guo)

Approved By:



(Robin Wu)



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
1905RSU034-U4	Rev. 01	Initial Report	08-23-2019	Valid

Note: This report is prepared for FCC Class II permissive change supplement to MRT original “1902RSU013-U1” report adding a PIFA antenna and RF output power & Radiated Emission Data.

CONTENTS

Description	Page
1. INTRODUCTION	6
1.1. Scope	6
1.2. MRT Test Location	6
2. PRODUCT INFORMATION	7
2.1. Feature of Equipment under Test	7
2.2. Product Specification Subjective to this Report	7
2.3. Working Frequencies to this report	7
2.4. Description of Available Antennas	8
2.5. Description of Antenna RF Port	9
2.6. Test Mode	9
2.7. Test Software	9
2.8. Device Capabilities	10
2.9. Test Configuration	10
2.10. EMI Suppression Device(s)/Modifications	10
2.11. Labeling Requirements	10
3. DESCRIPTION of TEST	11
3.1. Evaluation Procedure	11
3.2. AC Line Conducted Emissions	11
3.3. Radiated Emissions	12
4. ANTENNA REQUIREMENTS	13
5. TEST EQUIPMENT CALIBRATION DATE	14
6. MEASUREMENT UNCERTAINTY	16
7. TEST RESULT	17
7.1. Summary	17
7.2. Output Power Measurement	18
7.2.1. Test Limit	18
7.2.2. Test Procedure Used	18
7.2.3. Test Setting	18
7.2.4. Test Setup	19
7.2.5. Test Result of Output Power	20
7.3. Radiated Spurious Emission Measurement	22
7.3.1. Test Limit	22
7.3.2. Test Procedure Used	22

7.3.3.	Test Setting.....	22
7.3.4.	Test Setup	24
7.3.5.	Test Result.....	25
7.4.	Radiated Restricted Band Edge Measurement.....	36
7.4.1.	Test Limit	36
7.4.2.	Test Procedure Used	39
7.4.3.	Test Setting.....	39
7.4.4.	Test Setup	40
7.4.5.	Test Result.....	41
8.	CONCLUSION	65
	Appendix A - Test Setup Photograph	66
	Appendix B - EUT Photograph.....	67

§2.1033 General Information

Applicant:	Askey Computer Corp.
Applicant Address:	10F, No.119, JIANKANG RD., ZHONGHE DIST., NEW TAIPEI CITY, TAIWAN
Manufacturer:	Askey Computer Corp.
Manufacturer Address:	10F, No.119, JIANKANG RD., ZHONGHE DIST., NEW TAIPEI CITY, TAIWAN
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

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 ANSI C63.4-2014.
- 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-20025, G-20034, C-20020, T-20020) 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, Radio and SAR testing.



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 measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.



2. PRODUCT INFORMATION

2.1. Feature of Equipment under Test

Product Name:	WIFI+BT Combo Module
Model No.:	AP6356S
Brand Name:	ASKEY
Wi-Fi Specification	802.11a/b/g/n/ac
Bluetooth Specification:	V4.2 dual mode
Power Type:	VBAT: 3.3V DC; VDDIO: 1.8V DC

2.2. Product Specification Subjective to this Report

Frequency Range:	802.11b/g/n-HT20: 2412 ~ 2462 MHz
Channel Number:	802.11b/g/n-HT20: 11
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 144.4Mbps
Antenna Information:	Refer to section 2.4

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

2.3. Working Frequencies to this report

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	--	--

2.4. Description of Available Antennas

Antenna Type	Frequency Band (GHz)	T _x Paths	Per Chain Max Antenna Gain (dBi)		Directional Gain (dBi)	
			Ant 0	Ant 1	For Power	For PSD
Wi-Fi Internal Antenna						
PIFA	2412 ~ 2462	2	1.98	2.40	2.40	5.41
	5150 ~ 5825	2	3.14	4.34	4.34	7.35
Bluetooth Internal Antenna						
PIFA	2402 ~ 2480	1	1.98		--	

Note:

The EUT supports Cyclic Delay Diversity (CDD) technology on 802.11a/b/g mode, and CDD signals are correlated.

For CDD transmissions, directional gain is calculated as follows, $N_{ANT} = 2$, $N_{SS} = 1$.

If all antennas have the same gain, G_{ANT} , Directional gain = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,
Array Gain = $10 \log (N_{ANT} / N_{SS})$ dB = 3.01;
- For power measurements on IEEE 802.11 devices,
Array Gain = 0 dB for $N_{ANT} \leq 4$;

If antenna gains are not equal, Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

2.5. Description of Antenna RF Port

Antenna RF Port		
--	2.4GHz & 5GHz & Bluetooth RF Port	
Software Control Port	Ant 0 (support Bluetooth)	Ant 1
		
Note: Ant 0 is a temporary RF connector to test conveniently.		

2.6. Test Mode

Test Mode	Mode 1: Transmit by 802.11b (1Mbps)
	Mode 2: Transmit by 802.11g (6Mbps)
	Mode 3: Transmit by 802.11n-HT20 (MCS0)

2.7. Test Software

The test utility software used during testing was the command provided by the customer.

2.8. Device Capabilities

This device contains the following capabilities:

802.11a/b/g/n/ac WLAN, Bluetooth EDR & LE

2.9. Test Configuration

The device was tested per the guidance of ANSI C63.10-2013. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.10. EMI Suppression Device(s)/Modifications

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

2.11. 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 were used in the measurement.

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, 50 Ω /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.

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 1-40GHz 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 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	MRTSUE06185	1 year	2020/04/15
Two-Line V-Network	R&S	ENV 216	MRTSUE06002	1 year	2020/06/13
Two-Line V-Network	R&S	ENV 216	MRTSUE06003	1 year	2020/06/13
Thermohygrometer	Testo	608-H1	MRTSUE06404	1 year	2019/08/14
Shielding Room	MIX-BEP	Chamber-SR2	MRTSUE06215	N/A	N/A

Radiated Emissions - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2020/08/01
PXA Signal Analyzer	Keysight	9030B	MRTSUE06395	1 year	2019/09/25
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2019/11/09
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2020/03/31
Broad Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2019/10/19
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06024	1 year	2019/12/17
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2019/11/16
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2020/06/11
Thermohygrometer	Testo	608-H1	MRTSUE06403	1 year	2019/08/14
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2020/04/30

Radiated Emission - AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Keysight	N9038A	MRTSUE06125	1 year	2020/08/01
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2019/11/09
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2019/10/19
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2019/11/09
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06024	1 year	2019/12/17
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2019/11/16
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2020/06/11
Temperature/Humidity Meter	Minggao	ETH529	MRTSUE06170	1 year	2019/12/13
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2020/04/30

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2020/04/15
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06452	1 year	2020/07/11
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2020/04/15
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2019/11/16
USB wideband power sensor	Keysight	U2021XA	MRTSUE06446	1 year	2020/06/30
USB wideband power sensor	Keysight	U2021XA	MRTSUE06447	1 year	2020/06/30
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2020/06/13
Audio Analyzer	Agilent	U8903B	MRTSUE06143	1 year	2020/06/13
Modulation Analyzer	HP	8901A	MRTSUE06098	1 year	2019/10/18
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2019/11/16
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2019/11/16
Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2019/08/14

Software	Version	Function
EMI Software	V3	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 $k = 2$.

Conducted Emission Measurement - SR2	
The maximum measurement uncertainty is evaluated as:	
9kHz~150kHz: 3.84dB	
150kHz~30MHz: 3.46dB	
Radiated Emission Measurement - AC1	
The maximum measurement uncertainty is evaluated as:	
Horizontal:	30MHz~300MHz: 4.07dB
	300MHz~1GHz: 3.63dB
	1GHz~18GHz: 4.16dB
Vertical:	30MHz~300MHz: 4.18dB
	300MHz~1GHz: 3.60dB
	1GHz~18GHz: 4.76dB
Radiated Emission Measurement - AC2	
The maximum measurement uncertainty is evaluated as:	
Horizontal:	30MHz~300MHz: 3.75dB
	300MHz~1GHz: 3.53dB
	1GHz~18GHz: 4.28dB
Vertical:	30MHz~300MHz: 3.86dB
	300MHz~1GHz: 3.53dB
	1GHz~18GHz: 4.33dB

7. TEST RESULT

7.1. Summary

FCC Section(s)	IC Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(b)(3)	RSS-247 [5.4(4)]	Output Power	$\leq 30\text{dBm}$	Conducted	Pass	Section 7.2
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 7.3 & 7.4

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. Output Power Measurement

7.2.1. Test Limit

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

The conducted output power limit specified in paragraph FCC Part 15.247(b) of this section is based on the use of antennas with directional gains that do not exceed 6dBi. If transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs FCC Part 15.247(b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6dBi.

7.2.2. Test Procedure Used

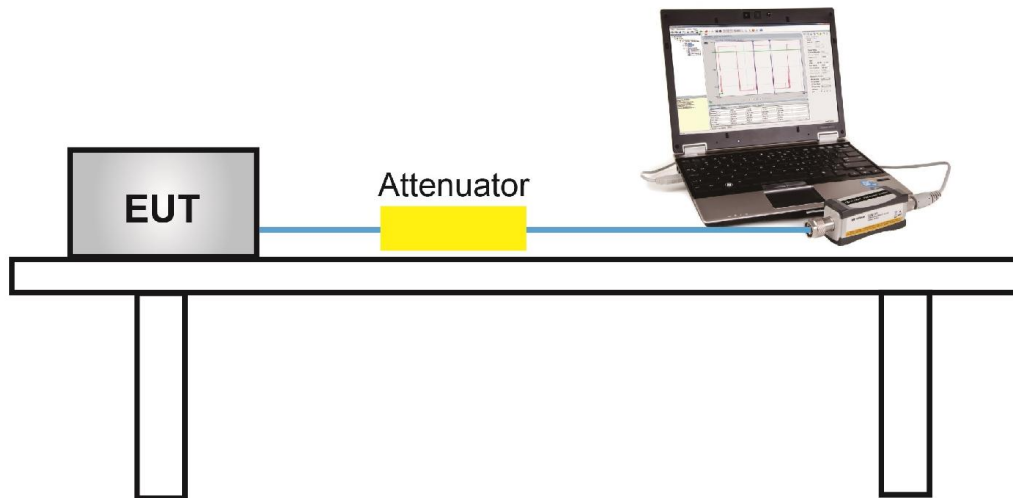
ANSI C63.10-2013 - Section 11.9.2.3.2

7.2.3. Test Setting

Method AVGPM-G (Measurement using a gated RF average-reading power meter)

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

7.2.4. Test Setup



7.2.5. 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 for Ant 0 / Ant 0+1 port:

Test Mode	Bandwidth (MHz)	Channel No.	Frequency (MHz)	Data Rate/ MCS	Average Power (dBm)
802.11b	20	6	2437	1Mbps	12.08
				5.5Mbps	11.47
				11Mbps	11.02
802.11g	20	6	2437	6Mbps	12.05
				24Mbps	11.31
				54Mbps	10.95
802.11n	20	6	2437	MCS0	11.87
				MCS3	11.23
				MCS7	10.86

Product	WIFI+BT Combo Module	Temperature	23°C
Test Engineer	Hunk Li	Relative Humidity	53%
Test Site	TR3	Test Date	2019/07/20

Test Mode	Data Rate/MCS	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Total Average Power (dBm)	Limit (dBm)	EIRP Average Power (dBm)	E.I.R.P Limit (dBm)	Result
11b	1Mbps	01	2412	11.35	12.69	15.08	≤ 30.00	17.48	≤ 36.00	Pass
11b	1Mbps	06	2437	12.08	13.12	15.64	≤ 30.00	18.04	≤ 36.00	Pass
11b	1Mbps	11	2462	12.56	13.26	15.93	≤ 30.00	18.33	≤ 36.00	Pass
11g	6Mbps	01	2412	11.57	13.06	15.39	≤ 30.00	17.79	≤ 36.00	Pass
11g	6Mbps	06	2437	12.05	13.37	15.77	≤ 30.00	18.17	≤ 36.00	Pass
11g	6Mbps	11	2462	12.35	13.62	16.04	≤ 30.00	18.44	≤ 36.00	Pass
11n-HT20	MCS0	01	2412	11.42	13.01	15.30	≤ 30.00	17.70	≤ 36.00	Pass
11n-HT20	MCS0	06	2437	11.87	13.22	15.61	≤ 30.00	18.01	≤ 36.00	Pass
11n-HT20	MCS0	11	2462	12.29	13.35	15.86	≤ 30.00	18.26	≤ 36.00	Pass

Note 1: Total Average Power (dBm) = $10 \cdot \log\{10^{(\text{Ant 0 Average Power}/10)} + 10^{(\text{Ant 1 Average Power}/10)}\}$ (dBm).

Note 2: EIRP Average Power (dBm) = Total Average Power (dBm) + Directional Gain (dBi),
Directional Gain = 2.40dBi.

7.3. Radiated Spurious Emission Measurement

7.3.1. 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 [V/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

7.3.2. Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

7.3.3. 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

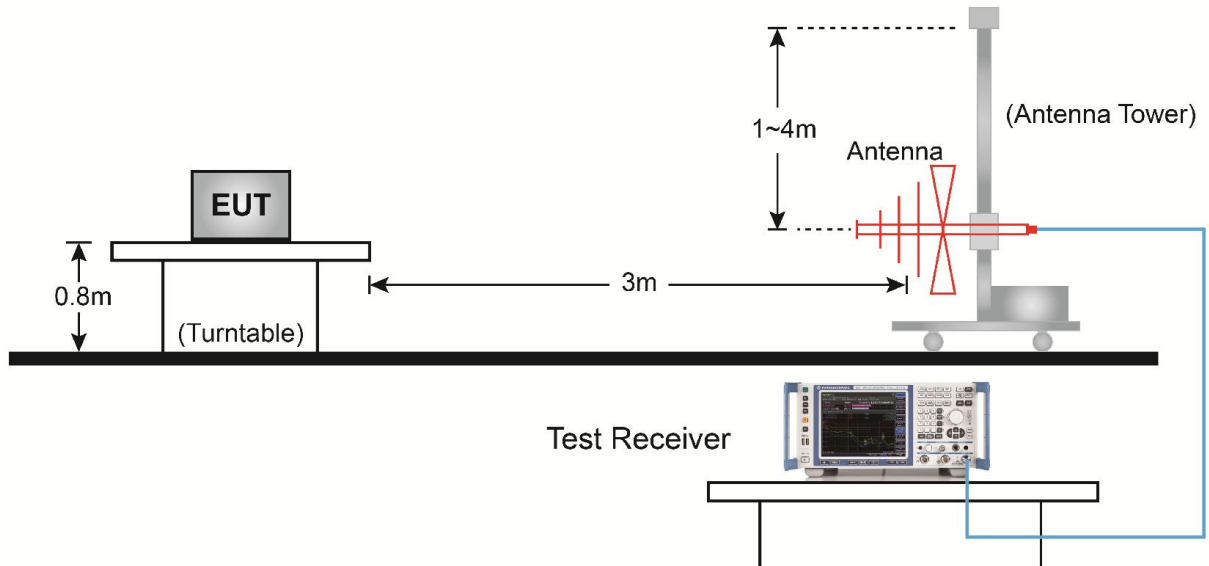
Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

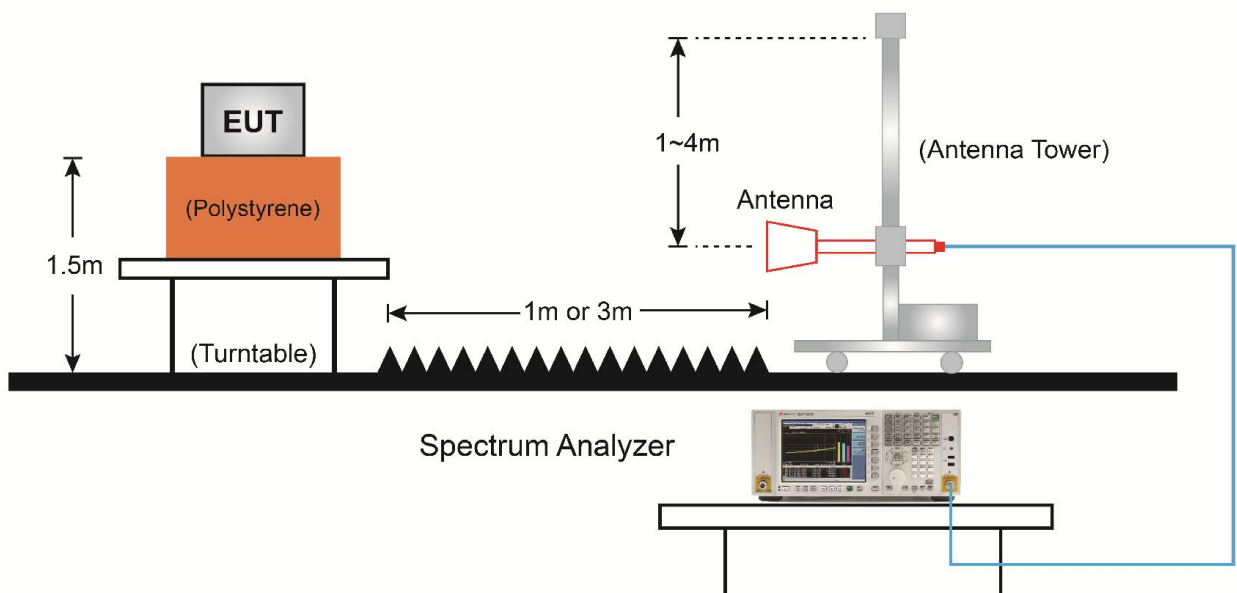
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW $\geq 1/T$
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). 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

7.3.4. Test Setup

30MHz ~ 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:



7.3.5. Test Result

Product	WIFI+BT Combo Module	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	56%
Test Site	AC1	Test Date	2019/08/03
Test Mode	802.11b	Test Channel	01
Remark	1. Average measurement was not performed if peak level lower than average limit (54dBμV/m). 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
	3813.5	38.2	1.9	40.1	74.0	-33.9	Peak	Horizontal
	4723.0	37.1	5.1	42.2	74.0	-31.8	Peak	Horizontal
*	6227.5	36.1	8.1	44.2	74.7	-30.5	Peak	Horizontal
*	9993.0	35.0	16.1	51.1	74.7	-23.6	Peak	Horizontal
	4060.0	37.5	2.7	40.2	74.0	-33.8	Peak	Vertical
	4740.0	36.8	5.4	42.2	74.0	-31.8	Peak	Vertical
*	6270.0	35.9	8.4	44.3	74.7	-30.4	Peak	Vertical
*	8794.5	33.2	13.3	46.5	74.7	-28.2	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (104.7dBμV/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	WIFI+BT Combo Module	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	56%
Test Site	AC1	Test Date	2019/08/03
Test Mode	802.11b	Test Channel	06
Remark	1. Average measurement was not performed if peak level lower than average limit (54dBμV/m). 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
	4034.5	37.8	2.7	40.5	74.0	-33.5	Peak	Horizontal
	4808.0	36.1	5.6	41.7	74.0	-32.3	Peak	Horizontal
*	6644.0	36.2	9.6	45.8	75.2	-29.4	Peak	Horizontal
*	8709.5	35.0	13.2	48.2	75.2	-27.0	Peak	Horizontal
	3907.0	38.0	2.3	40.3	74.0	-33.7	Peak	Vertical
	4876.0	37.9	5.7	43.6	74.0	-30.4	Peak	Vertical
*	6516.5	35.3	9.5	44.8	75.2	-30.4	Peak	Vertical
*	8837.0	35.5	13.3	48.8	75.2	-26.4	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (105.2dBμV/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	WIFI+BT Combo Module	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	56%
Test Site	AC1	Test Date	2019/08/03
Test Mode	802.11b	Test Channel	11
Remark	1. Average measurement was not performed if peak level lower than average limit (54dBμV/m). 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
	3788.0	39.3	1.9	41.2	74.0	-32.8	Peak	Horizontal
	4927.0	36.5	5.8	42.3	74.0	-31.7	Peak	Horizontal
*	6593.0	36.1	9.8	45.9	76.7	-30.8	Peak	Horizontal
*	8896.5	35.4	13.3	48.7	76.7	-28.0	Peak	Horizontal
	4017.5	37.8	2.5	40.3	74.0	-33.7	Peak	Vertical
	4927.0	38.6	5.8	44.4	74.0	-29.6	Peak	Vertical
*	6652.5	35.8	9.6	45.4	76.7	-31.3	Peak	Vertical
*	10027.0	34.1	16.0	50.1	76.7	-26.6	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	WIFI+BT Combo Module	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	56%
Test Site	AC1	Test Date	2019/08/03
Test Mode	802.11g	Test Channel	01
Remark	1. Average measurement was not performed if peak level lower than average limit (54dBμV/m). 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
	3839.0	39.3	2.1	41.4	74.0	-32.6	Peak	Horizontal
	4825.0	36.7	5.5	42.2	74.0	-31.8	Peak	Horizontal
*	5870.5	36.4	7.4	43.8	78.6	-34.8	Peak	Horizontal
*	8633.0	33.6	13.1	46.7	78.6	-31.9	Peak	Horizontal
	3762.5	40.0	1.7	41.7	74.0	-32.3	Peak	Vertical
	4808.0	37.4	5.6	43.0	74.0	-31.0	Peak	Vertical
*	6057.5	35.8	7.5	43.3	78.6	-35.3	Peak	Vertical
*	8769.0	34.6	13.4	48.0	78.6	-30.6	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (108.6dBμV/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)

Product	WIFI+BT Combo Module	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	56%
Test Site	AC1	Test Date	2019/08/03
Test Mode	802.11g	Test Channel	06
Remark	1. Average measurement was not performed if peak level lower than average limit (54dBμV/m). 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
	4026.0	37.9	2.6	40.5	74.0	-33.5	Peak	Horizontal
	4901.5	36.8	5.7	42.5	74.0	-31.5	Peak	Horizontal
*	6576.0	35.8	9.6	45.4	79.0	-33.6	Peak	Horizontal
*	10375.5	35.6	16.9	52.5	79.0	-26.5	Peak	Horizontal
	3805.0	39.4	1.9	41.3	74.0	-32.7	Peak	Vertical
	4876.0	36.5	5.7	42.2	74.0	-31.8	Peak	Vertical
*	6270.0	35.8	8.4	44.2	79.0	-34.8	Peak	Vertical
*	8692.5	35.1	13.2	48.3	79.0	-30.7	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (109.0dBμV/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	WIFI+BT Combo Module	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	56%
Test Site	AC1	Test Date	2019/08/03
Test Mode	802.11g	Test Channel	11
Remark	1. Average measurement was not performed if peak level lower than average limit (54dBμV/m). 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
	4026.0	38.2	2.6	40.8	74.0	-33.2	Peak	Horizontal
	5148.0	37.3	6.4	43.7	74.0	-30.3	Peak	Horizontal
*	6618.5	35.9	9.6	45.5	79.4	-33.9	Peak	Horizontal
*	9678.5	34.7	15.4	50.1	79.4	-29.3	Peak	Horizontal
	3915.5	38.5	2.3	40.8	74.0	-33.2	Peak	Vertical
	4774.0	37.5	5.3	42.8	74.0	-31.2	Peak	Vertical
*	6601.5	35.9	9.7	45.6	79.4	-33.8	Peak	Vertical
*	8743.5	36.8	13.3	50.1	79.4	-29.3	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (109.4dBμV/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	WIFI+BT Combo Module	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	56%
Test Site	AC1	Test Date	2019/08/03
Test Mode	802.11n-HT20	Test Channel	01
Remark	1. Average measurement was not performed if peak level lower than average limit (54dBμV/m). 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
	3737.0	38.4	1.6	40.0	74.0	-34.0	Peak	Horizontal
	5080.0	36.6	6.4	43.0	74.0	-31.0	Peak	Horizontal
*	6644.0	35.6	9.6	45.2	77.6	-32.4	Peak	Horizontal
*	8879.5	35.7	13.4	49.1	77.6	-28.5	Peak	Horizontal
	4034.5	37.8	2.7	40.5	74.0	-33.5	Peak	Vertical
	4825.0	36.9	5.5	42.4	74.0	-31.6	Peak	Vertical
*	5998.0	37.5	7.5	45.0	77.6	-32.6	Peak	Vertical
*	7936.0	35.7	12.6	48.3	77.6	-29.3	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (107.6dBμV/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)

Product	WIFI+BT Combo Module	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	56%
Test Site	AC1	Test Date	2019/08/03
Test Mode	802.11n-HT20	Test Channel	06
Remark	1. Average measurement was not performed if peak level lower than average limit (54dBμV/m). 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
	3779.5	40.0	1.8	41.8	74.0	-32.2	Peak	Horizontal
	5029.0	36.7	6.1	42.8	74.0	-31.2	Peak	Horizontal
*	6482.5	35.4	9.4	44.8	78.8	-34.0	Peak	Horizontal
*	8624.5	35.4	13.0	48.4	78.8	-30.4	Peak	Horizontal
	4043.0	37.7	2.7	40.4	74.0	-33.6	Peak	Vertical
	4757.0	36.3	5.4	41.7	74.0	-32.3	Peak	Vertical
*	6729.0	36.4	9.6	46.0	78.8	-32.8	Peak	Vertical
*	8854.0	34.9	13.4	48.3	78.8	-30.5	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (108.8dBμV/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	WIFI+BT Combo Module	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	56%
Test Site	AC1	Test Date	2019/08/03
Test Mode	802.11n-HT20	Test Channel	11
Remark	1. Average measurement was not performed if peak level lower than average limit (54dBμV/m). 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
	3890.0	38.6	2.2	40.8	74.0	-33.2	Peak	Horizontal
	4986.5	37.1	6.0	43.1	74.0	-30.9	Peak	Horizontal
*	6627.0	35.5	9.5	45.0	79.0	-34.0	Peak	Horizontal
*	8667.0	35.9	13.0	48.9	79.0	-30.1	Peak	Horizontal
	4026.0	37.8	2.6	40.4	74.0	-33.6	Peak	Vertical
	5080.0	36.3	6.4	42.7	74.0	-31.3	Peak	Vertical
*	6380.5	36.2	8.7	44.9	79.0	-34.1	Peak	Vertical
*	8599.0	35.4	12.9	48.3	79.0	-30.7	Peak	Vertical

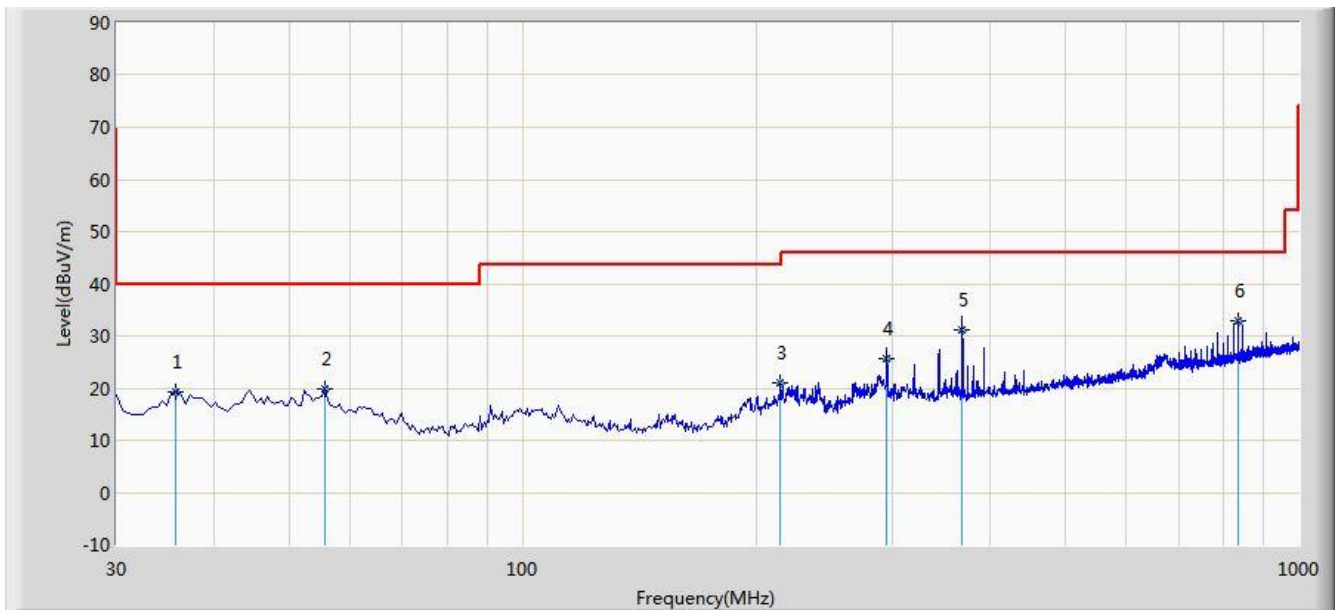
Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (109.0dBμV/m) or 15.209 which is higher.

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

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

The worst case of Radiated Emission below 1GHz:

Site: AC2	Time: 2019/08/08 - 22:50
Limit: FCC_Part15.209_RSE(3m)	Engineer: Dillon Diao
Probe: VULB9162_0.03-8GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC 120V/60Hz
Worst Case Mode: There is the worst case within frequency range 30MHz~1GHz.	



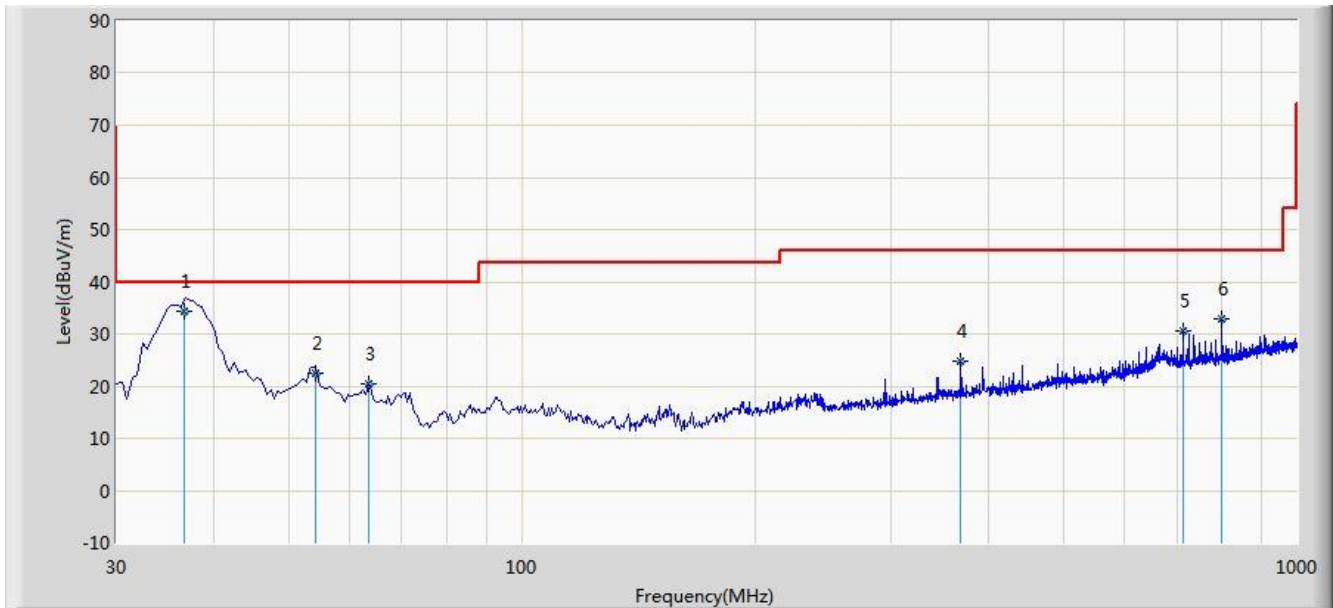
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			35.820	19.398	6.369	-20.602	40.000	13.029	QP
2			55.705	19.776	5.302	-20.224	40.000	14.474	QP
3			214.785	20.919	8.599	-22.581	43.500	12.320	QP
4			294.850	25.564	11.350	-20.436	46.000	14.213	QP
5			368.520	31.075	15.240	-14.925	46.000	15.836	QP
6		*	835.585	32.754	9.848	-13.246	46.000	22.906	QP

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

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

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

Site: AC2	Time: 2019/08/08 - 22:53
Limit: FCC_Part15.209_RSE(3m)	Engineer: Dillon Diao
Probe: VULB9162_0.03-8GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC 120V/60Hz
Worst Case Mode: There is the worst case within frequency range 30MHz~1GHz.	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	36.780	34.450	21.250	-5.550	40.000	13.201	QP
2			54.250	22.564	7.850	-17.436	40.000	14.714	QP
3			63.465	20.292	7.347	-19.708	40.000	12.946	QP
4			368.530	24.749	8.913	-21.251	46.000	15.836	QP
5			712.880	30.554	9.199	-15.446	46.000	21.356	QP
6			800.180	32.961	10.584	-13.039	46.000	22.377	QP

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

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

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

7.4. Radiated Restricted Band Edge Measurement

7.4.1. 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	8.025 - 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 - 156.525	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

For RSS-Gen Section 8.10 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 8.10 of RSS-Gen, must also comply with the radiated emission limits specified in Section 8.9.

Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.009 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.525225	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	--
8.37625 - 8.38675	1718.8 -1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 -2390	
12.51975 - 12.52025	2655 - 2900	
12.57675 - 12.57725	3260 - 3267	
13.36 -13.41	3332 -3339	
16.42 - 16.423	334.5 - 3358	
16.69475 - 16.69525	3500 - 4400	
16.80425 - 16.80475	4500 - 5150	
25.5 - 25.67	5350 - 5460	
37.5 - 38.25	7250 - 7750	
73 - 74.6	8025 - 8500	
74.8 - 75.2	--	
108 - 138		

All out of band emissions appearing in a restricted band as specified in Section 8.10 of the RSS-Gen must not exceed the limits shown in Table per Section 8.9.

RSS-Gen Section 8.9		
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

7.4.2. Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

7.4.3. Test Setting

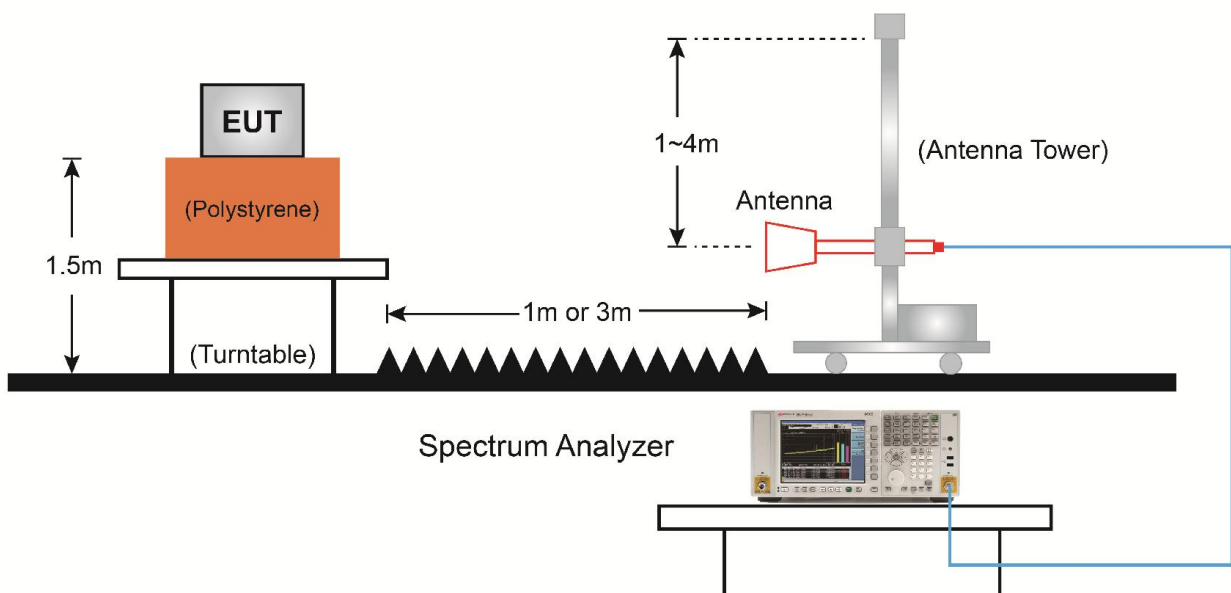
Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Field Strength Measurements

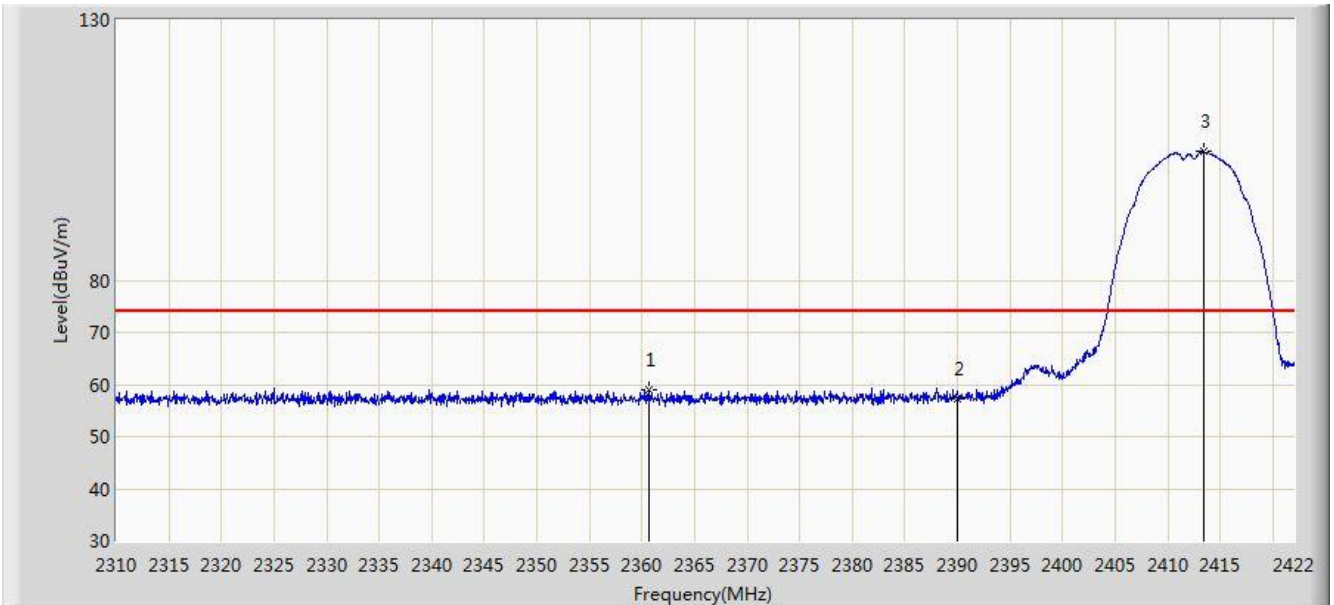
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW $\geq 1/T$
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). 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

7.4.4.Test Setup



7.4.5.Test Result

Site: AC1	Time: 2019/08/02 - 18:37
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11b at channel 2412MHz	

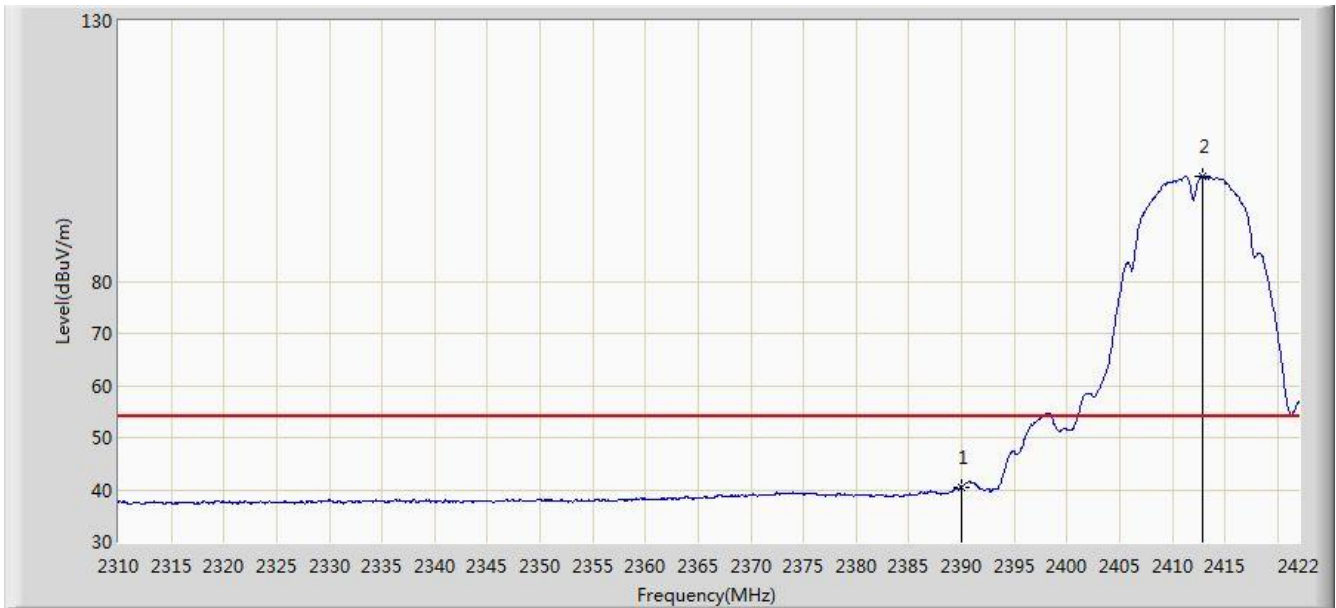


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2360.624	59.043	26.570	-14.957	74.000	32.473	PK
2		2390.000	57.252	24.839	-16.748	74.000	32.413	PK
3	*	2413.432	104.673	72.290	N/A	N/A	32.383	PK

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

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

Site: AC1	Time: 2019/08/02 - 18:48
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11b at channel 2412MHz	

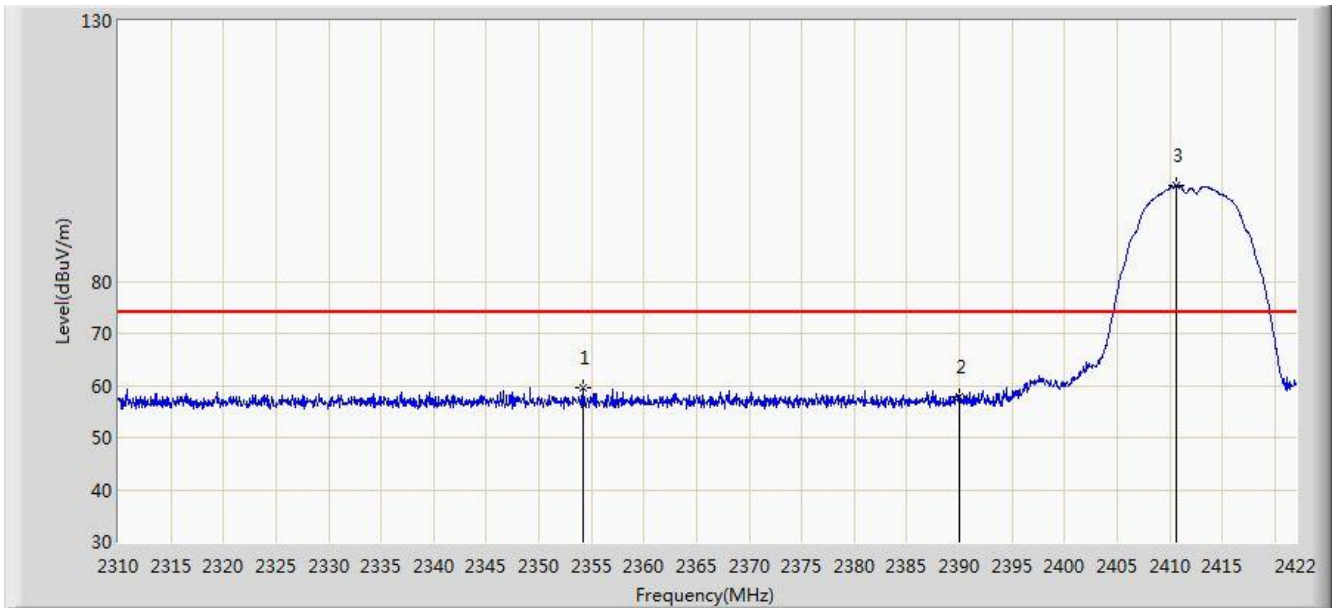


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	40.565	8.152	-13.435	54.000	32.413	AV
2	*	2412.816	100.193	67.810	N/A	N/A	32.383	AV

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

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

Site: AC1	Time: 2019/08/02 - 18:49
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11b at channel 2412MHz	

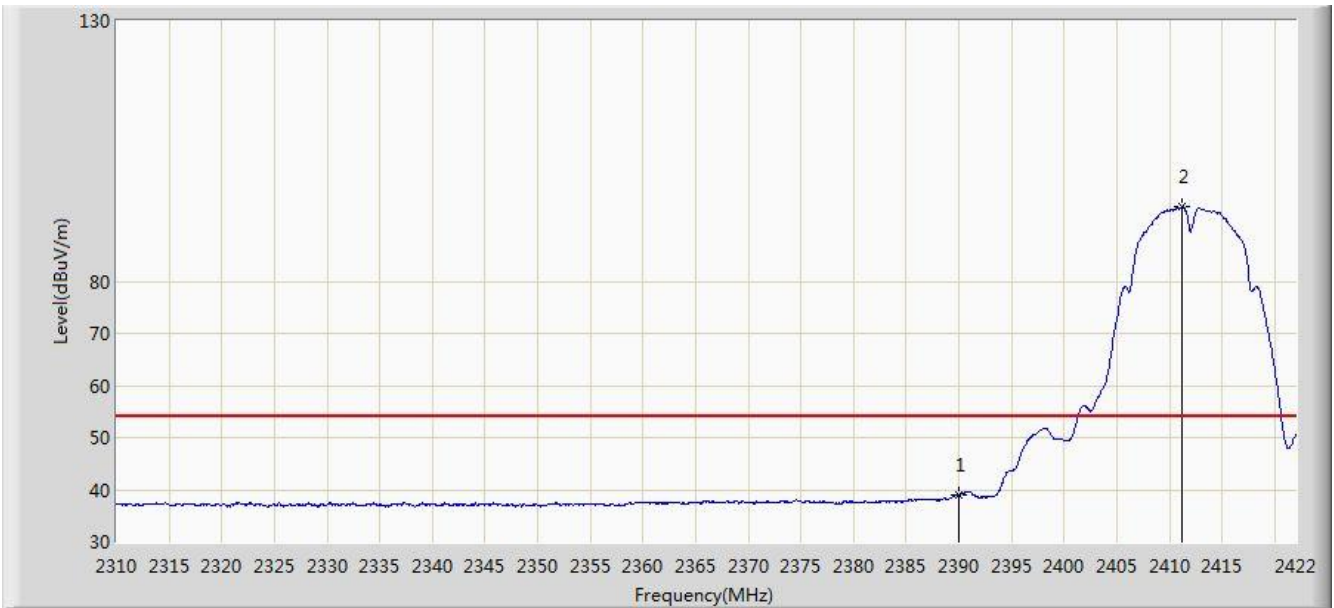


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2354.184	59.477	26.982	-14.523	74.000	32.494	PK
2		2390.000	57.951	25.538	-16.049	74.000	32.413	PK
3	*	2410.576	98.318	65.932	N/A	N/A	32.385	PK

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

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

Site: AC1	Time: 2019/08/02 - 18:53
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11b at channel 2412MHz	

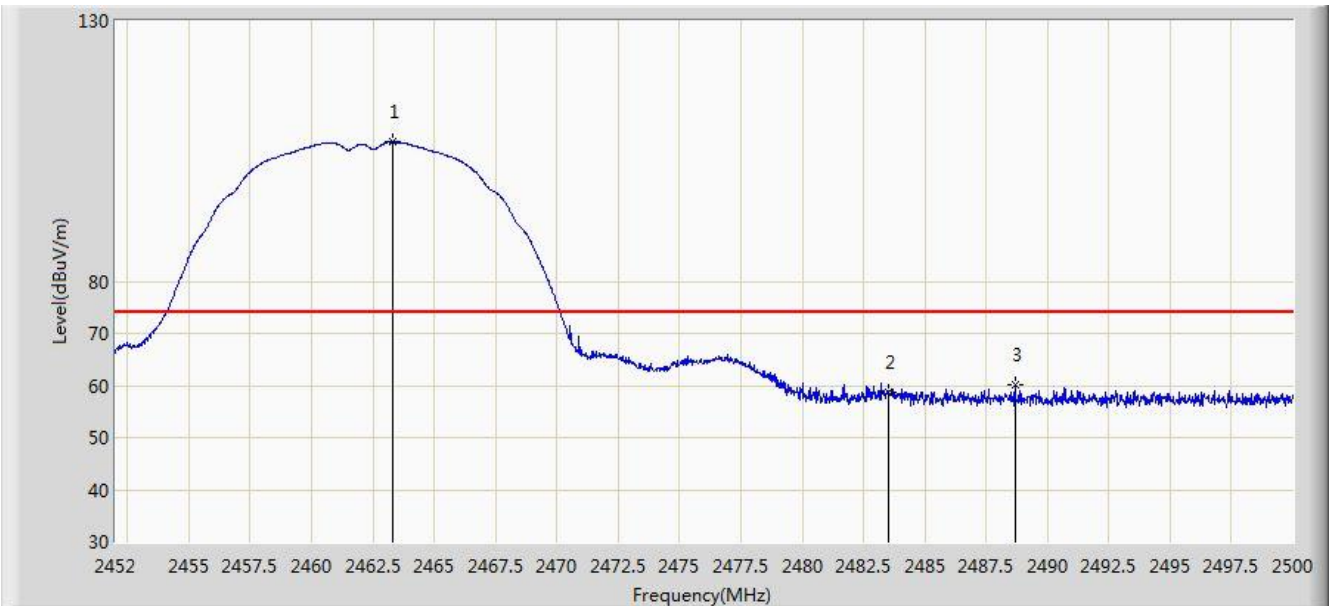


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	39.080	6.667	-14.920	54.000	32.413	AV
2	*	2411.248	94.398	62.013	N/A	N/A	32.385	AV

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

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

Site: AC1	Time: 2019/08/02 - 18:54
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11b at channel 2462MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2463.328	106.689	74.321	N/A	N/A	32.369	PK
2		2483.500	58.668	26.253	-15.332	74.000	32.416	PK
3		2488.696	60.107	27.681	-13.893	74.000	32.426	PK

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

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

Site: AC1	Time: 2019/08/02 - 18:56
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11b at channel 2462MHz	

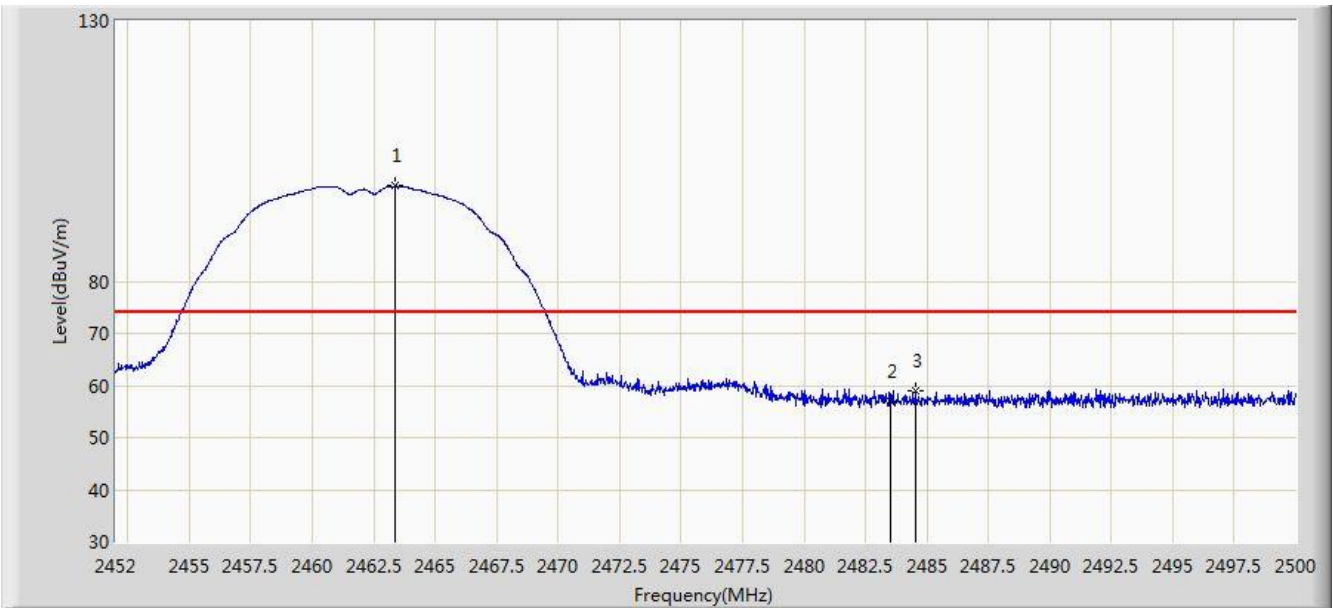


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2461.240	102.705	70.340	N/A	N/A	32.365	AV
2		2483.500	45.388	12.973	-8.612	54.000	32.416	AV

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

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

Site: AC1	Time: 2019/08/02 - 18:56
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11b at channel 2462MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2463.376	98.276	65.907	N/A	N/A	32.369	PK
2		2483.500	56.842	24.427	-17.158	74.000	32.416	PK
3		2484.544	59.069	26.652	-14.931	74.000	32.418	PK

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

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

Site: AC1	Time: 2019/08/02 - 18:57
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11b at channel 2462MHz	

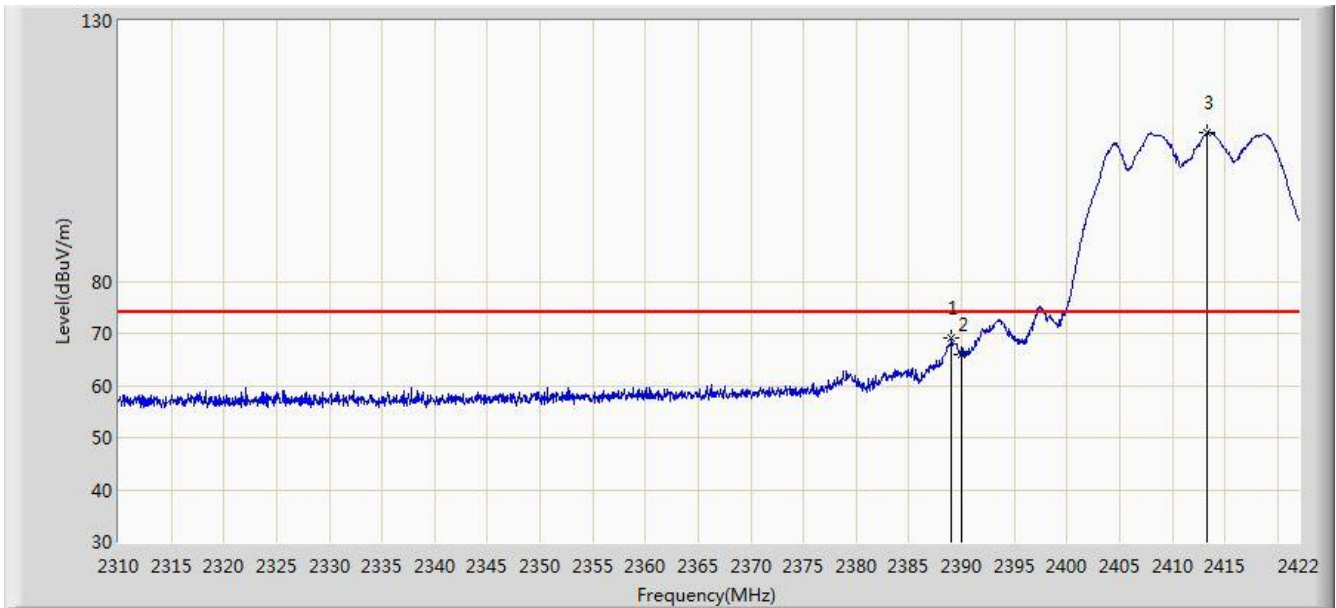


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2461.240	94.041	61.676	N/A	N/A	32.365	AV
2		2483.500	39.544	7.129	-14.456	54.000	32.416	AV

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

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

Site: AC1	Time: 2019/08/02 - 18:58
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11g at channel 2412MHz	

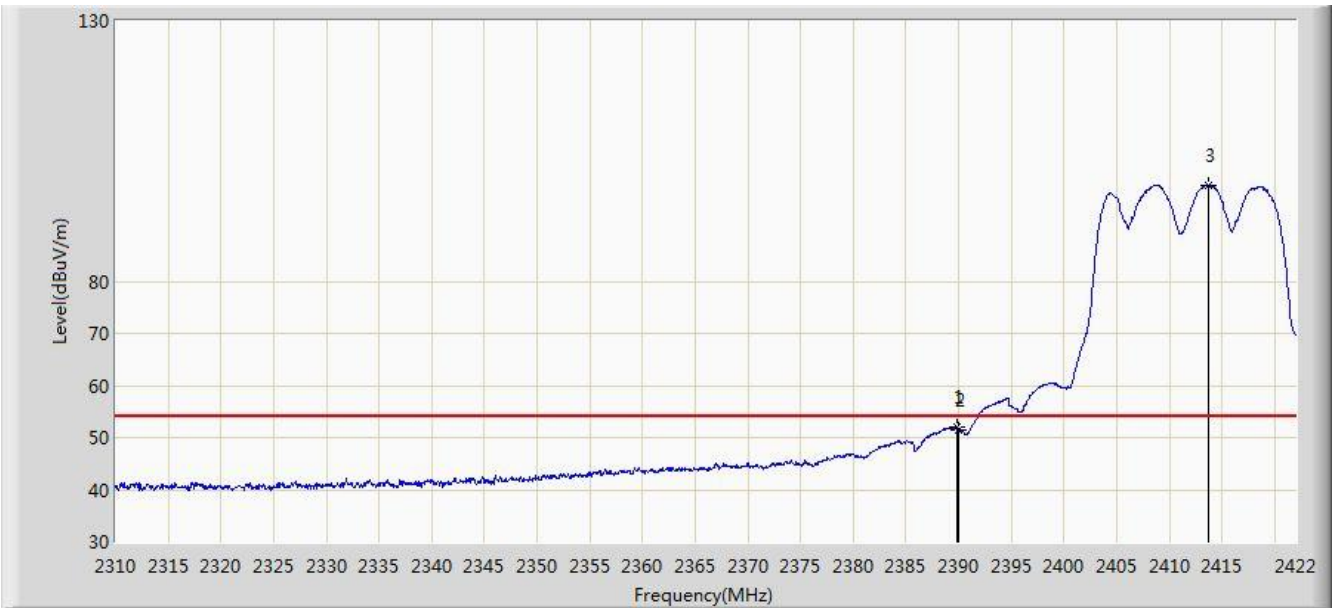


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2389.072	69.000	36.586	-5.000	74.000	32.414	PK
2		2390.000	65.916	33.503	-8.084	74.000	32.413	PK
3	*	2413.320	108.551	76.168	N/A	N/A	32.383	PK

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

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

Site: AC1	Time: 2019/08/02 - 19:00
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11g at channel 2412MHz	

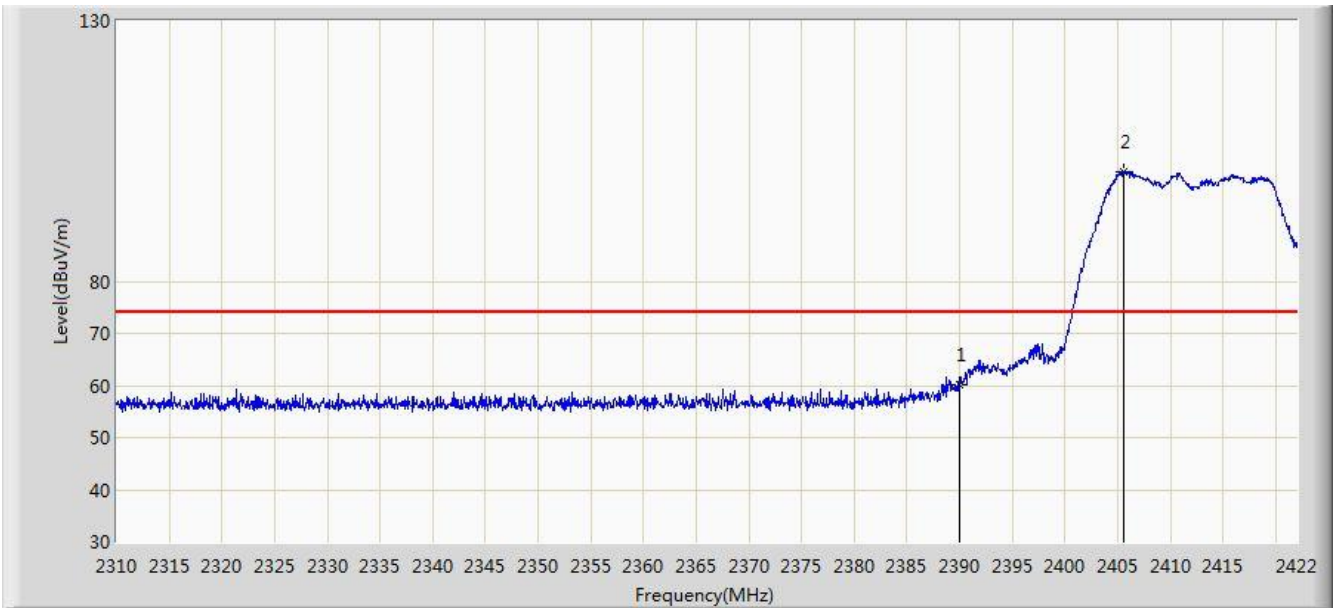


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2389.856	52.040	19.627	-1.960	54.000	32.413	AV
2		2390.000	51.544	19.131	-2.456	54.000	32.413	AV
3	*	2413.712	98.397	66.015	N/A	N/A	32.382	AV

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

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

Site: AC1	Time: 2019/08/02 - 19:01
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11g at channel 2412MHz	

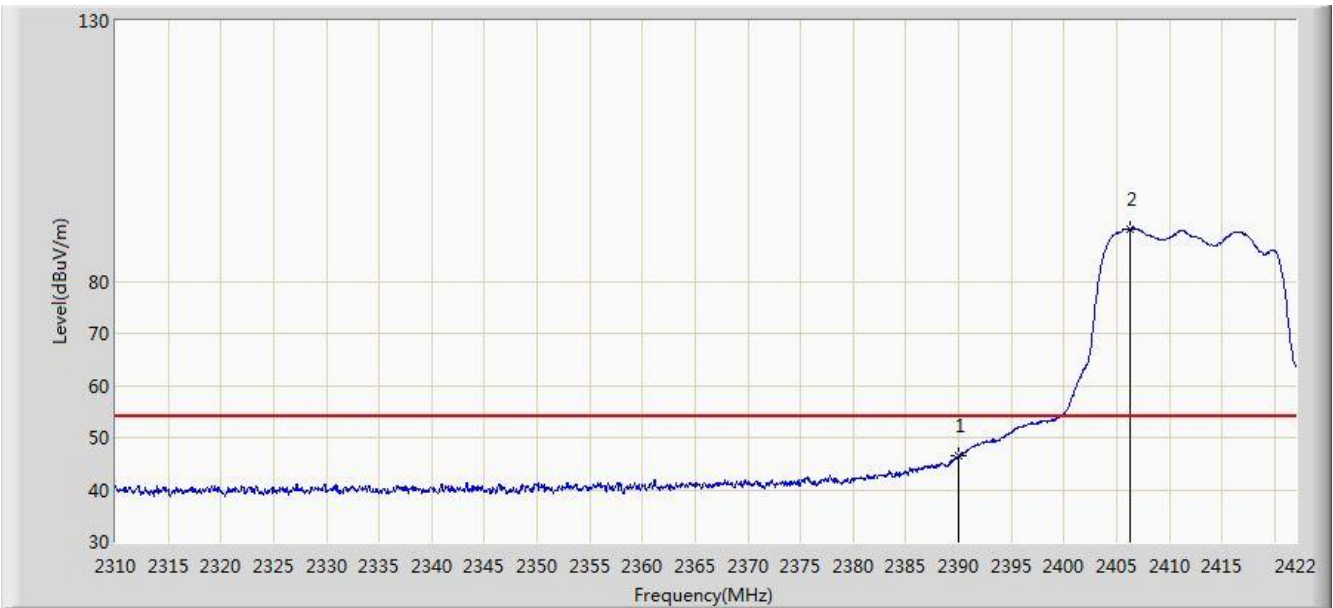


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	60.247	27.834	-13.753	74.000	32.413	PK
2	*	2405.592	101.015	68.623	N/A	N/A	32.392	PK

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

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

Site: AC1	Time: 2019/08/02 - 19:02
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11g at channel 2412MHz	

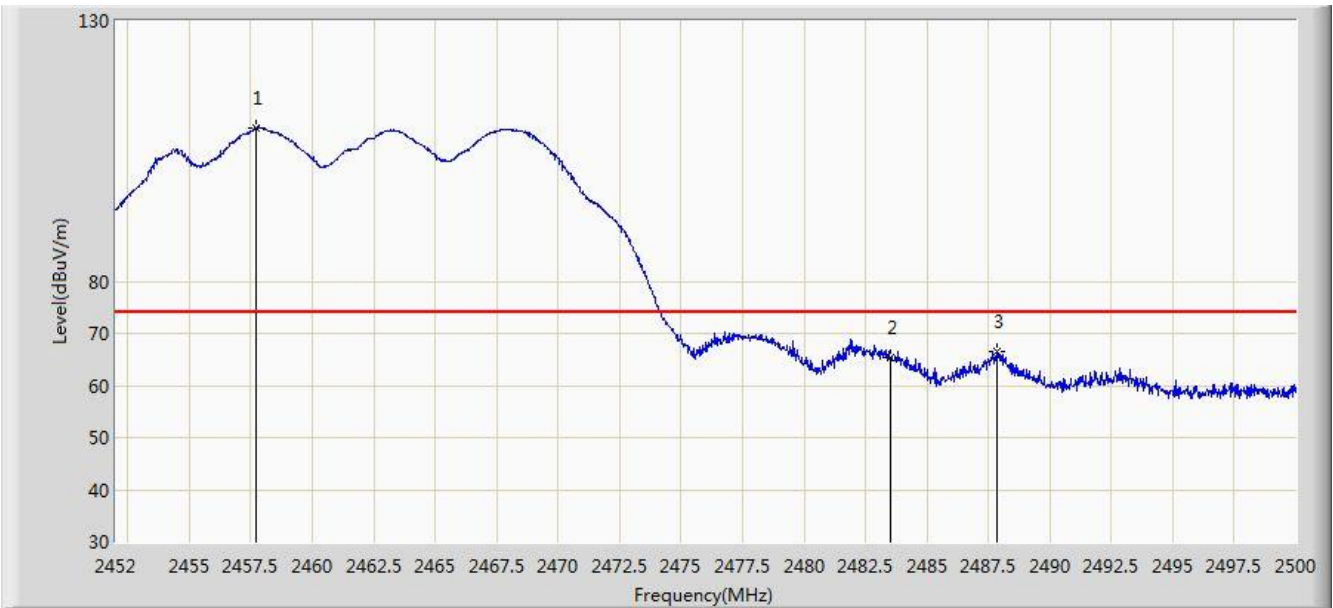


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	46.428	14.015	-7.572	54.000	32.413	AV
2	*	2406.320	90.072	57.681	N/A	N/A	32.391	AV

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

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

Site: AC1	Time: 2019/08/02 - 19:03
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11g at channel 2462MHz	

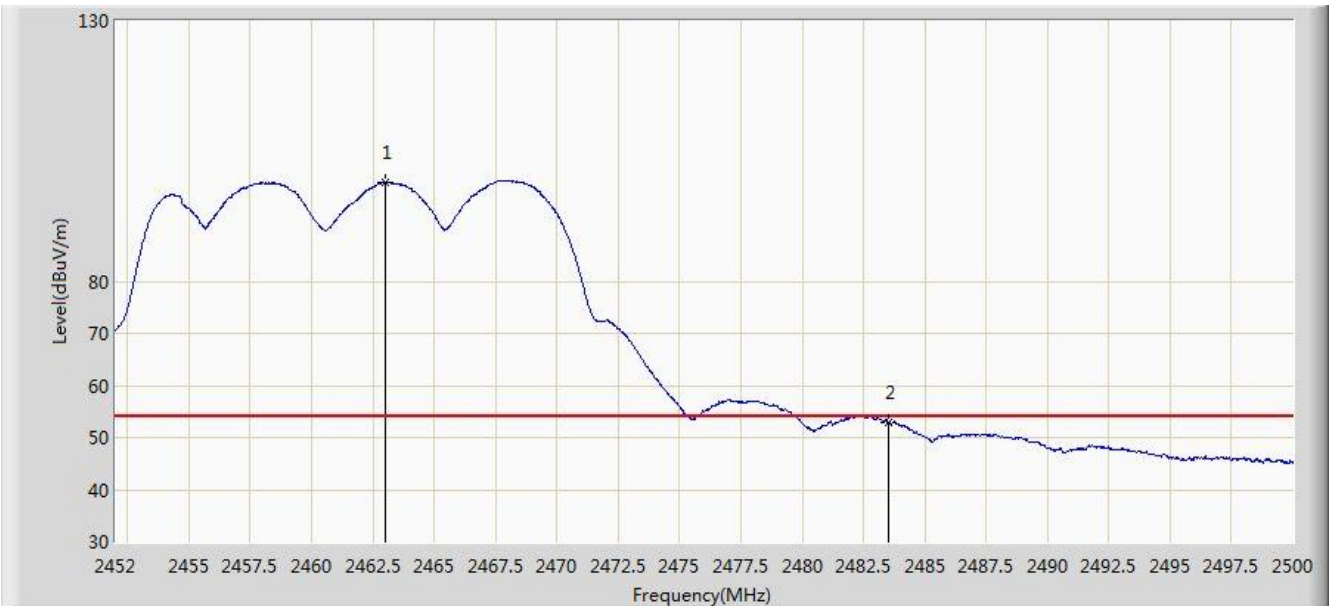


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2457.736	109.428	77.070	N/A	N/A	32.359	PK
2		2483.500	65.247	32.832	-8.753	74.000	32.416	PK
3		2487.832	66.516	34.092	-7.484	74.000	32.424	PK

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

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

Site: AC1	Time: 2019/08/02 - 19:04
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11g at channel 2462MHz	

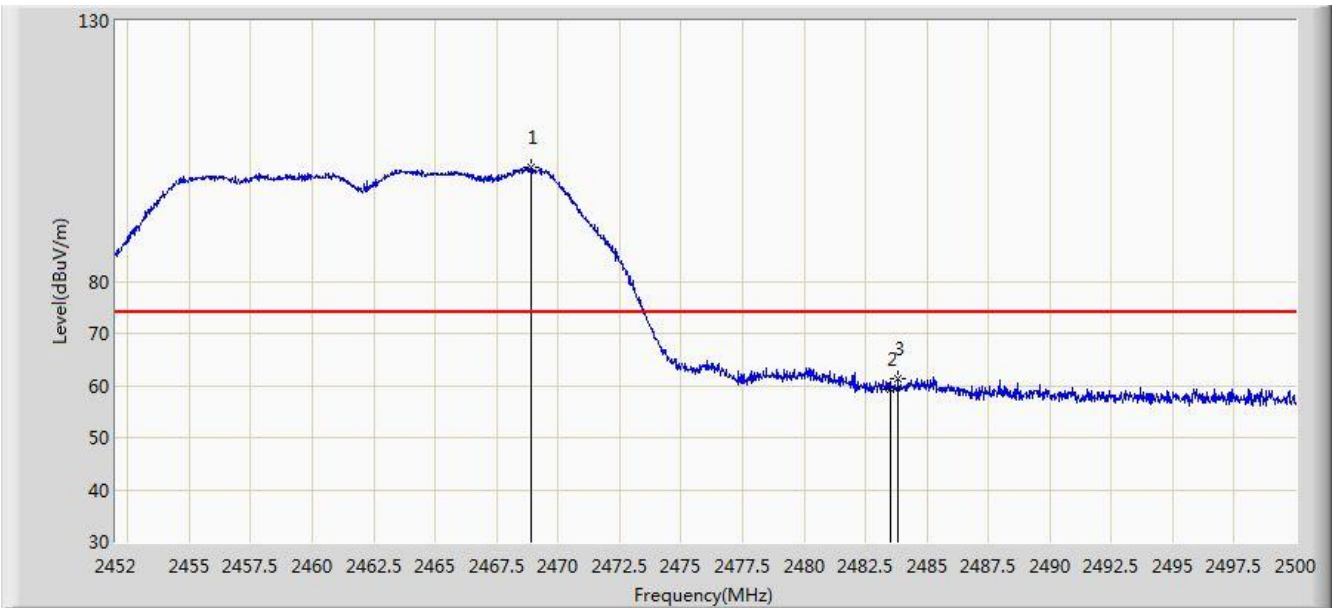


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2463.016	98.941	66.573	N/A	N/A	32.368	AV
2		2483.500	53.009	20.594	-0.991	54.000	32.416	AV

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

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

Site: AC1	Time: 2019/08/02 - 19:05
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11g at channel 2462MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2468.896	101.948	69.566	N/A	N/A	32.381	PK
2		2483.500	59.297	26.882	-14.703	74.000	32.416	PK
3		2483.848	61.423	29.007	-12.577	74.000	32.416	PK

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

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

Site: AC1	Time: 2019/08/02 - 19:06
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11g at channel 2462MHz	

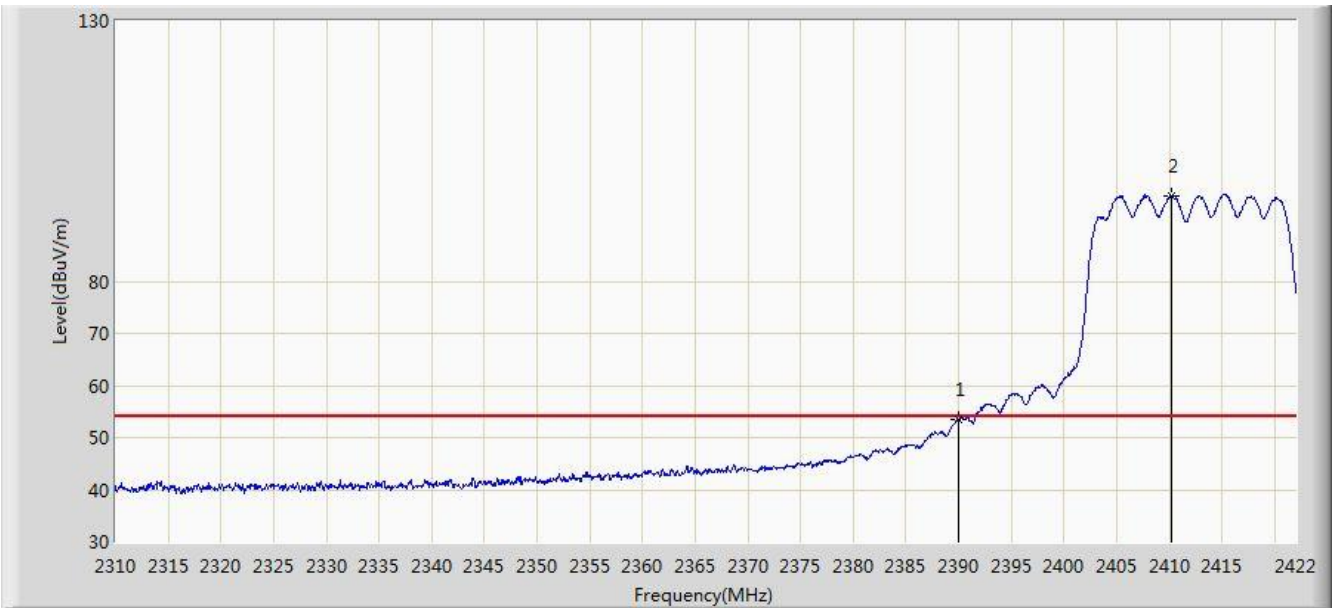


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2468.776	91.154	58.773	N/A	N/A	32.381	AV
2		2483.500	47.262	14.847	-6.738	54.000	32.416	AV

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

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

Site: AC1	Time: 2019/08/02 - 19:10
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11n-HT20 at channel 2412MHz power=48	

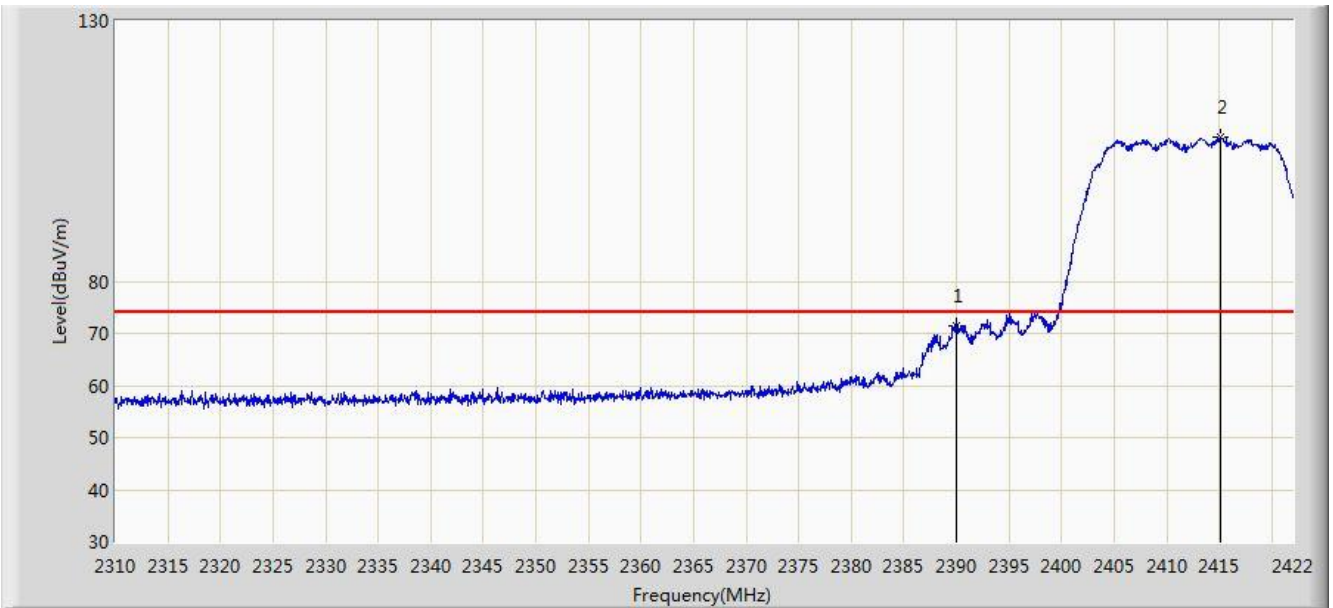


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	53.364	20.951	-0.636	54.000	32.413	AV
2	*	2410.184	96.374	63.988	N/A	N/A	32.386	AV

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

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

Site: AC1	Time: 2019/08/02 - 19:11
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11n-HT20 at channel 2412MHz power=48	

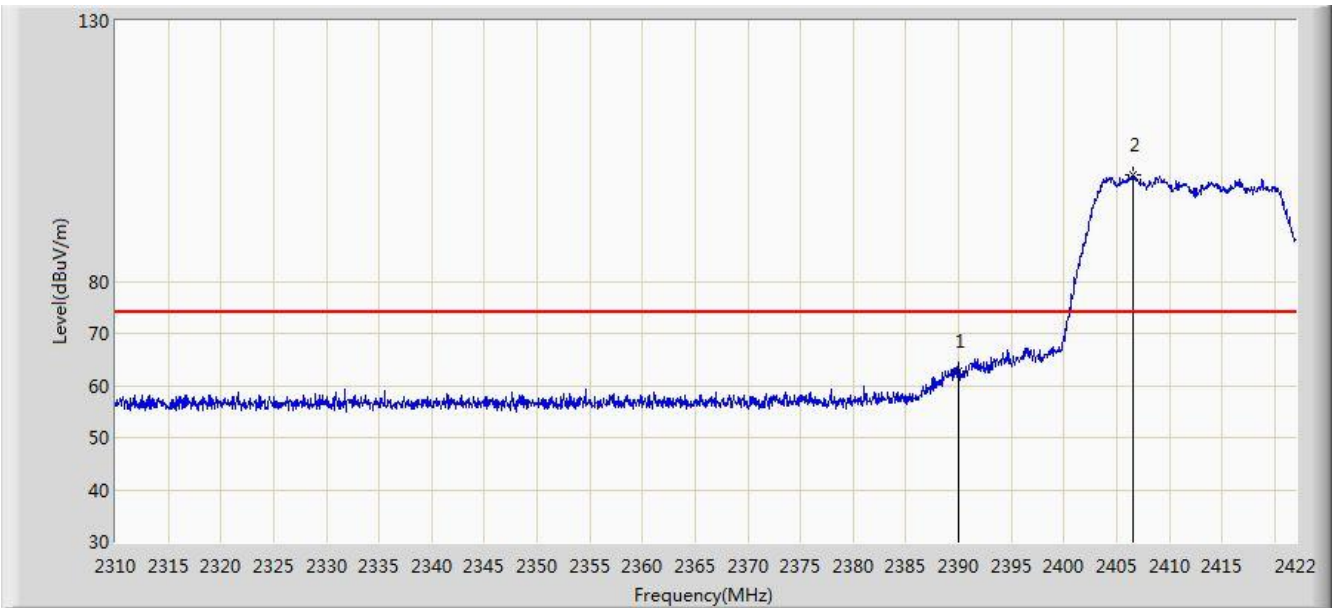


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	71.442	39.029	-2.558	74.000	32.413	PK
2	*	2415.112	107.629	75.248	N/A	N/A	32.381	PK

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

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

Site: AC1	Time: 2019/08/02 - 19:13
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11n-HT20 at channel 2412MHz power=48	

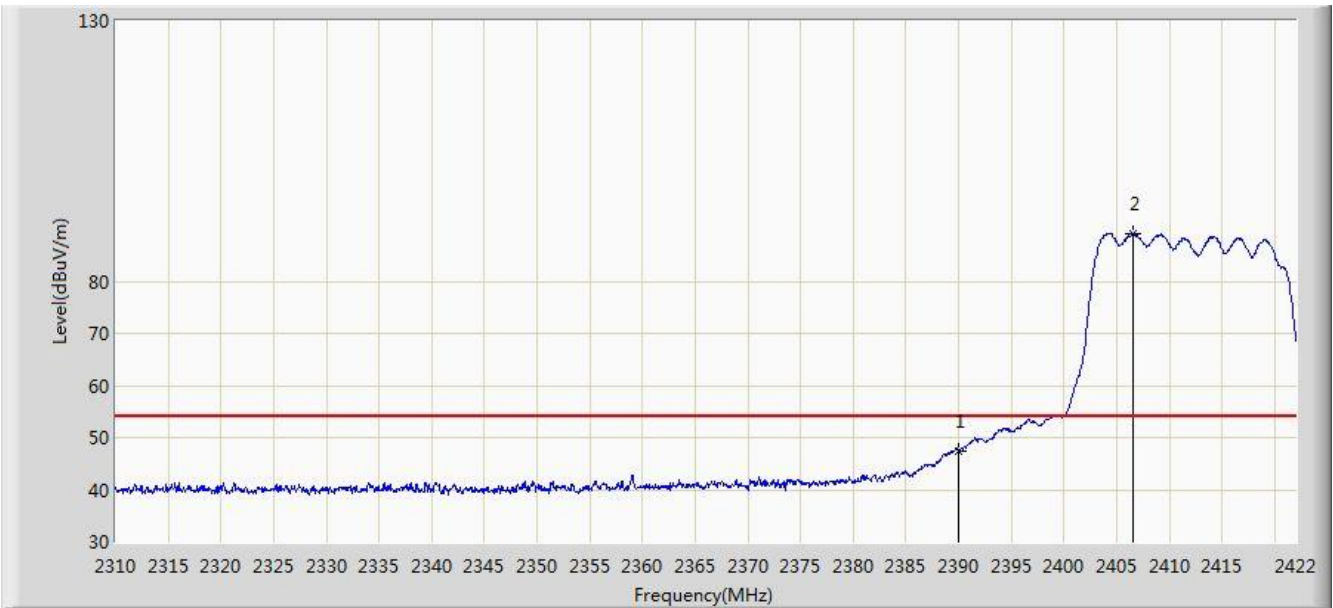


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	62.776	30.363	-11.224	74.000	32.413	PK
2	*	2406.544	100.559	68.168	N/A	N/A	32.390	PK

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

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

Site: AC1	Time: 2019/08/02 - 19:14
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11n-HT20 at channel 2412MHz power=48	

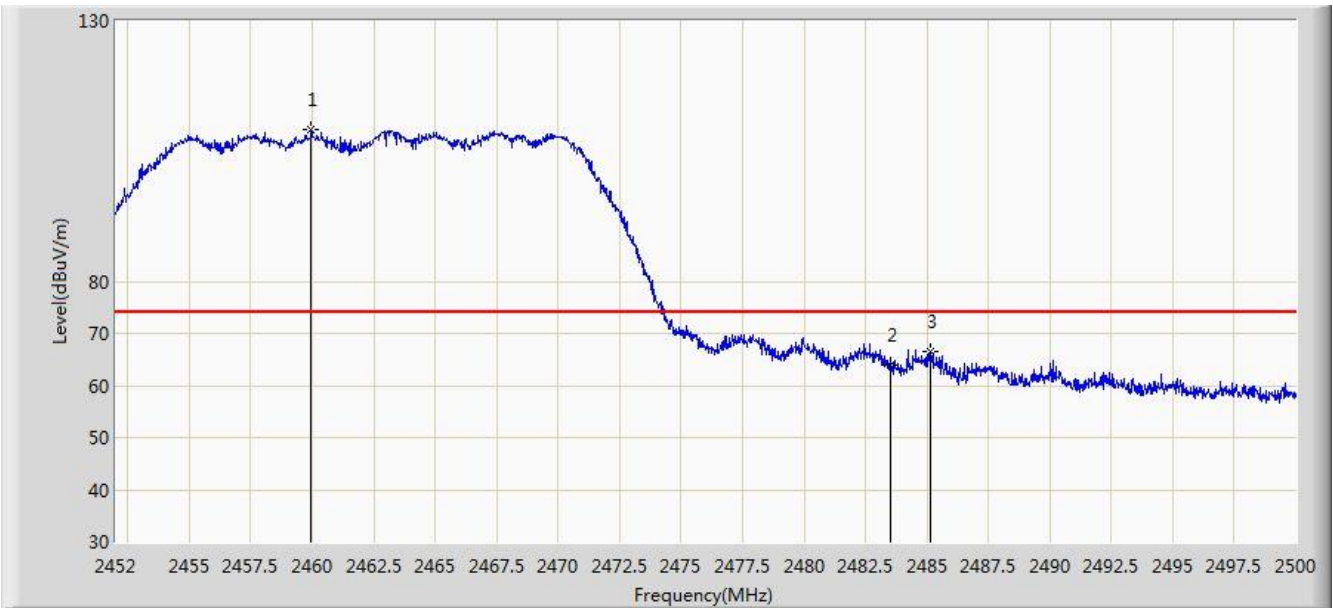


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	47.493	15.080	-6.507	54.000	32.413	AV
2	*	2406.600	89.062	56.672	N/A	N/A	32.390	AV

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

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

Site: AC1	Time: 2019/08/02 - 19:15
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11n-HT20 at channel 2462MHz	

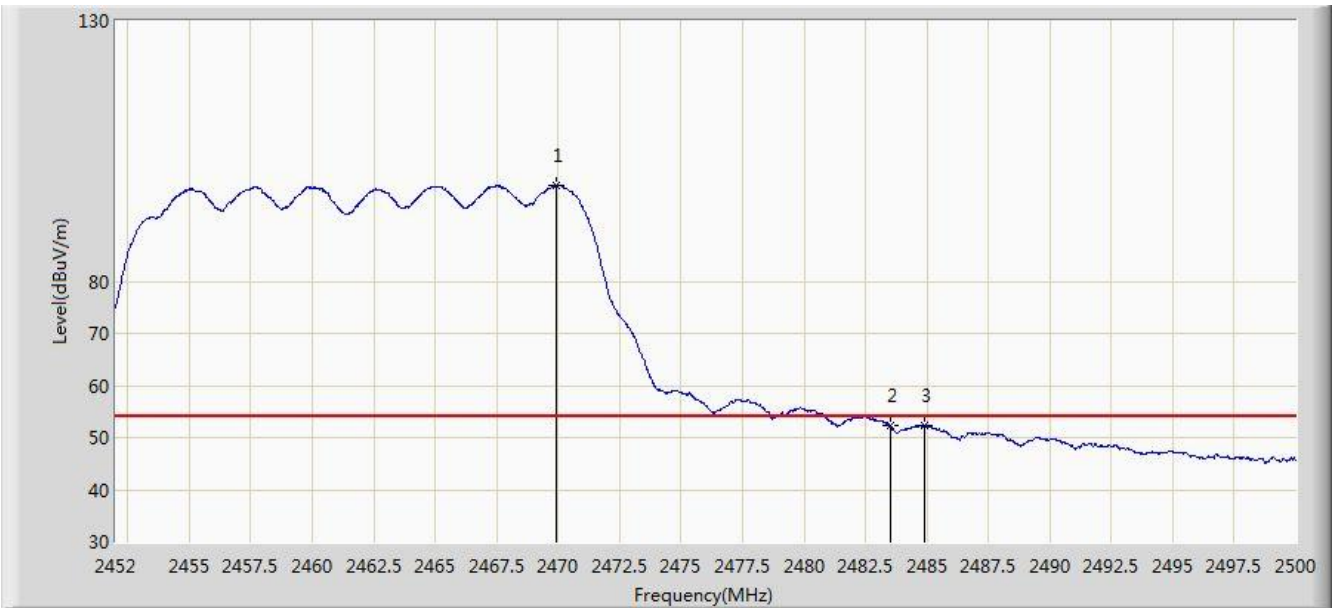


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2459.968	109.016	76.653	N/A	N/A	32.363	PK
2		2483.500	63.917	31.502	-10.083	74.000	32.416	PK
3		2485.120	66.644	34.225	-7.356	74.000	32.419	PK

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

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

Site: AC1	Time: 2019/08/02 - 19:16
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11n-HT20 at channel 2462MHz	

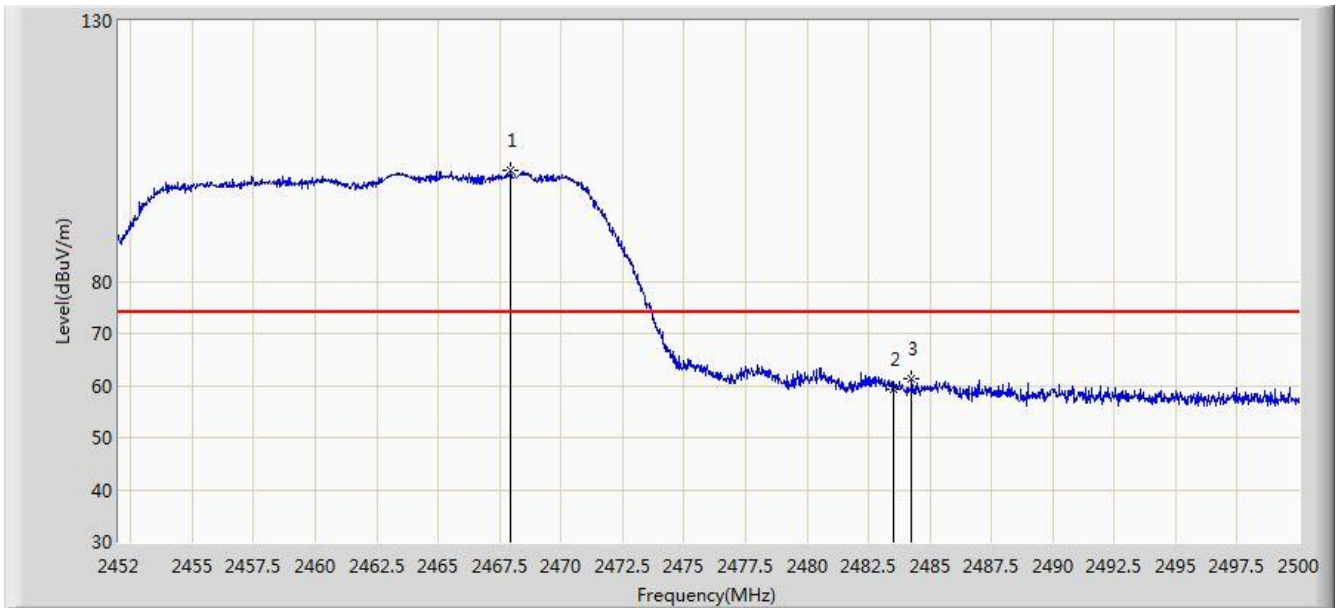


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2469.904	98.475	66.091	N/A	N/A	32.384	AV
2		2483.500	52.276	19.861	-1.724	54.000	32.416	AV
3		2484.904	52.378	19.960	-1.622	54.000	32.418	AV

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

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

Site: AC1	Time: 2019/08/02 - 19:16
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11n-HT20 at channel 2462MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2467.960	101.221	68.842	N/A	N/A	32.380	PK
2		2483.500	59.132	26.717	-14.868	74.000	32.416	PK
3		2484.256	61.212	28.795	-12.788	74.000	32.417	PK

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

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

Site: AC1	Time: 2019/08/02 - 19:17
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Test Mode: Transmit by 802.11n-HT20 at channel 2462MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2465.536	91.000	58.627	N/A	N/A	32.373	AV
2		2483.500	47.757	15.342	-6.243	54.000	32.416	AV

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

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

8. CONCLUSION

The data collected relate only the item(s) tested and show that the unit is in compliance with Part 15C of the FCC rules and ISED rules.

The End

Appendix A - Test Setup Photograph

Refer to “1905RSU034-UT” file.

Appendix B - EUT Photograph

Refer to “1905RSU034-UE” file.