



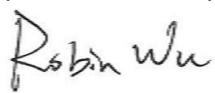
MEASUREMENT REPORT

FCC PART 15.247 / RSS-247 Bluetooth

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: FCC Part 15 Spread Spectrum Transmitter (DSS)
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
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.

Revision History

Report No.	Version	Description	Issue Date	Note
1905RSU034-U2	Rev. 01	Initial Report	08-23-2019	Valid

Note: This report is prepared for FCC Class II permissive change supplement to MRT original “1902RSU013-U2” report adding a PIFA antenna and RF output power & Radiated Emission Data.

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§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. Equipment Description

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 Standard

Bluetooth v3.0 Specification	
Operating Frequency:	2402~2480MHz
Bluetooth Version:	V4.2 dual mode
Type of modulation:	FHSS
Data Rate:	1Mbps(GFSK), 2Mbps(Pi/4 DQPSK), 3Mbps (8DPSK)
Antenna Information:	Refer to section 2.4

The test data contained in this report pertains only to the emissions due to the EUT's Bluetooth transmitter.

- 15.247(g): In accordance with the Bluetooth Industry Standard, the system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) system.
- 15.247(h): In accordance with the Bluetooth Industry Standard, the system does not coordinate its channels selection/ hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.
- 15.247(h): The EUT employs Adaptive Frequency Hopping (AFH) which identifies sources of interference namely devices operating in 802.11 WLAN and excludes them from the list of available channels. The process of re-mapping reduces the number of test channels from 79 channels to a minimum number of 20 channels.

2.3. Operation Frequency / Channel List

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2403 MHz	02	2404 MHz
03	2405 MHz	04	2406 MHz	05	2407 MHz
06	2408 MHz	07	2409 MHz	08	2410 MHz
09	2411 MHz	10	2412 MHz	11	2413 MHz
12	2414 MHz	13	2415 MHz	14	2416 MHz
15	2417 MHz	16	2418 MHz	17	2419 MHz
18	2420 MHz	19	2421 MHz	20	2422 MHz
21	2423 MHz	22	2424 MHz	23	2425 MHz
24	2426 MHz	25	2427 MHz	26	2428 MHz
27	2429 MHz	28	2430 MHz	29	2431 MHz
30	2432 MHz	31	2433 MHz	32	2434 MHz
33	2435 MHz	34	2436 MHz	35	2437 MHz
36	2438 MHz	37	2439 MHz	38	2440 MHz
39	2441 MHz	40	2442 MHz	41	2443 MHz
42	2444 MHz	43	2445 MHz	44	2446 MHz
45	2447 MHz	46	2448 MHz	47	2449 MHz
48	2450 MHz	49	2451 MHz	50	2452 MHz
51	2453 MHz	52	2454 MHz	53	2455 MHz
54	2456 MHz	55	2457 MHz	56	2458 MHz
57	2459 MHz	58	2460 MHz	59	2461 MHz
60	2462 MHz	61	2463 MHz	62	2464 MHz
63	2465 MHz	64	2466 MHz	65	2467 MHz
66	2468 MHz	67	2469 MHz	68	2470 MHz
69	2471 MHz	70	2472 MHz	71	2473 MHz
72	2474 MHz	73	2475 MHz	74	2476 MHz
75	2477 MHz	76	2478 MHz	77	2479 MHz
78	2480 MHz	N/A	N/A	N/A	N/A

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.

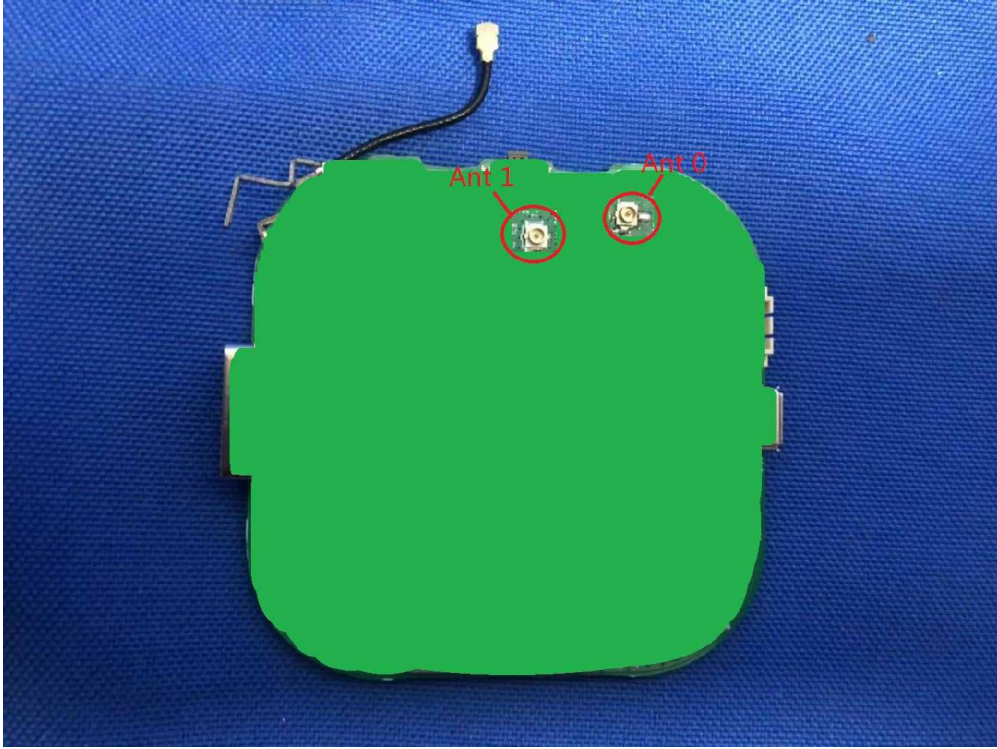
For CDD transmissions, directional gain is calculated as follows, $N_{ANT} = 2$, $N_{SS} = 1$.

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.

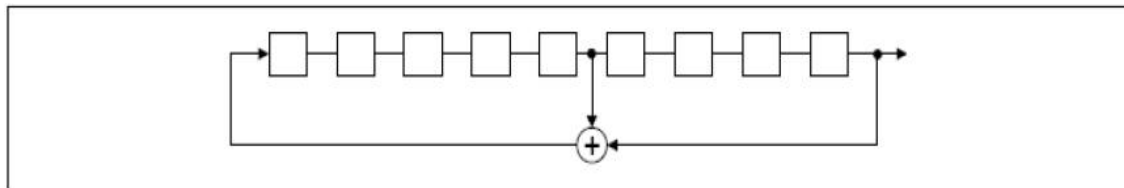
2.5. Description of Antenna RF Port

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. Pseudorandom Frequency Hopping Sequence

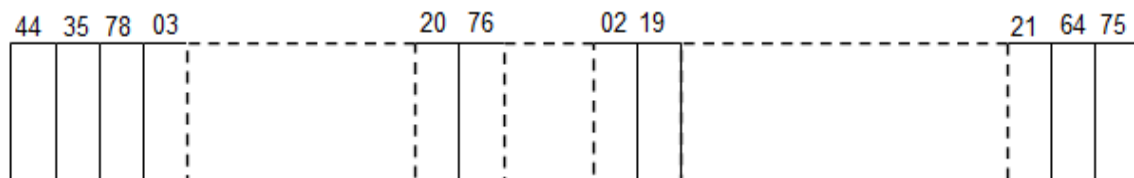
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence: $2^9 - 1 = 511$ bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their Corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

2.7. Device Capabilities

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

2.8. 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.

2.9. Test Software

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

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 Filing was used in the measurement of the device.

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 were 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. An 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 Beamwidth 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 Part Section(s)	IC Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(b)(1)	RSS-247 [5.4(b)]	Peak Transmitter Output Power	<1 Watt if > 75 non- overlapping channels used	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) 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.
- 2) 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.

7.2. Output Power Measurement

7.2.1. Test Limit

The maximum out power permissible output power is 1 Watt for all other frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels.

The E.I.R.P shall not exceed 4 Watt.

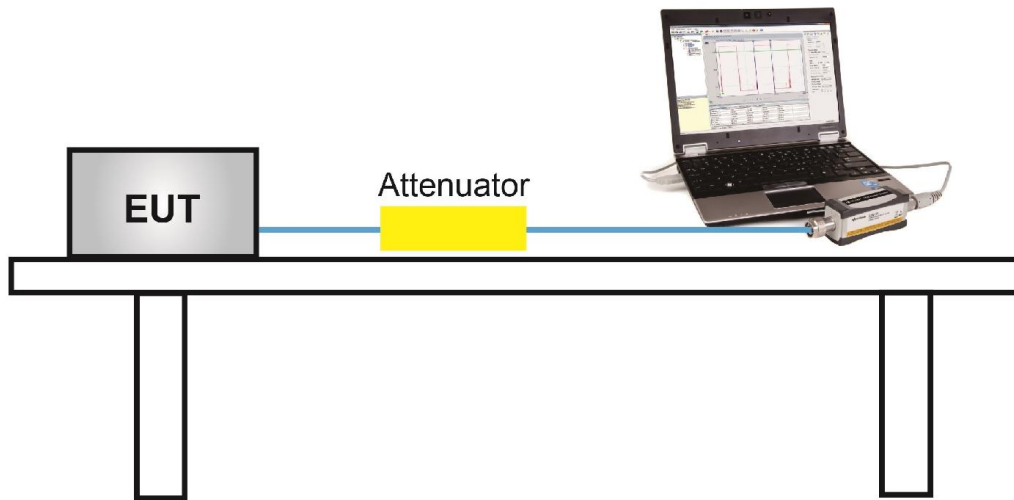
7.2.2. Test Procedure Used

ANSI C63.10-2013 - Section 7.8.5

7.2.3. Test Setting

1. Set RBW $\geq$ the 20 dB bandwidth of the emission being measured.
2. VBW $\geq 3 \times$ RBW
3. Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (don't forget added the external attenuation and cable loss)

7.2.4. Test Setup



7.2.5. Test Result

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	Channel No.	Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	E.I.R.P (dBm)	E.I.R.P Limit (dBm)
DH5	00	2402	7.33	≤ 30	9.31	≤ 36.00
DH5	39	2441	8.13	≤ 30	10.11	≤ 36.00
DH5	78	2480	8.09	≤ 30	10.07	≤ 36.00
2DH5	00	2402	5.01	≤ 30	6.99	≤ 36.00
2DH5	39	2441	6.28	≤ 30	8.26	≤ 36.00
2DH5	78	2480	6.68	≤ 30	8.66	≤ 36.00
3DH5	00	2402	5.43	≤ 30	7.41	≤ 36.00
3DH5	39	2441	6.66	≤ 30	8.64	≤ 36.00
3DH5	78	2480	7.06	≤ 30	9.04	≤ 36.00

Note: E.I.R.P (dBm) = Peak Power (dBm) + Antenna Gain (dBi), Antenna Gain = 1.98dBi.

DH5 Output Power

Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



2DH5 Output Power

Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



3DH5 Output Power

Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



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

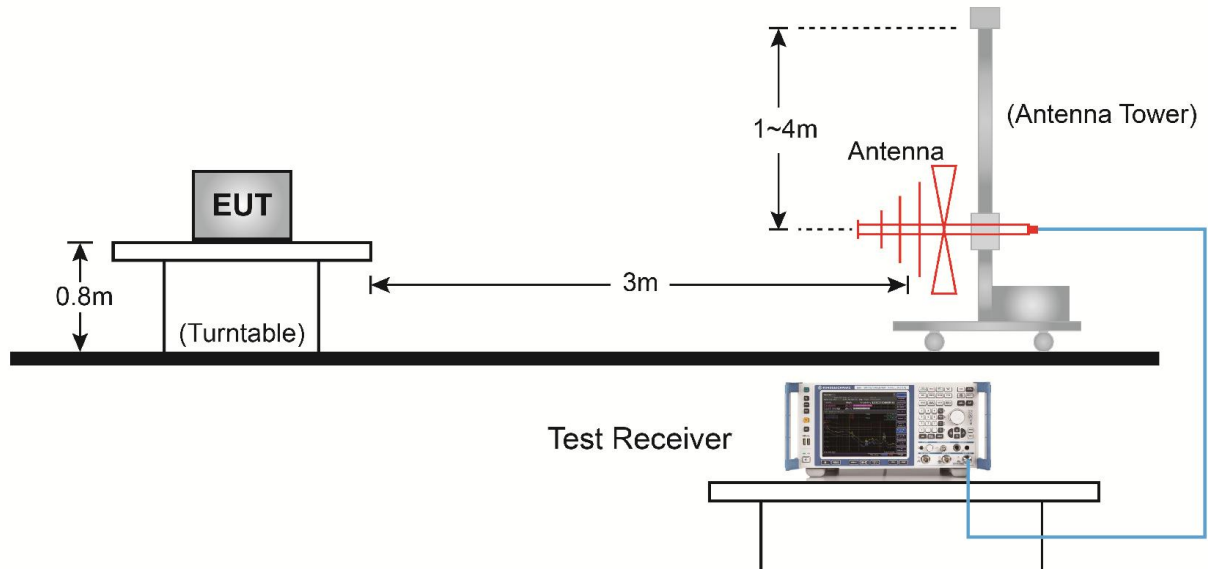
Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

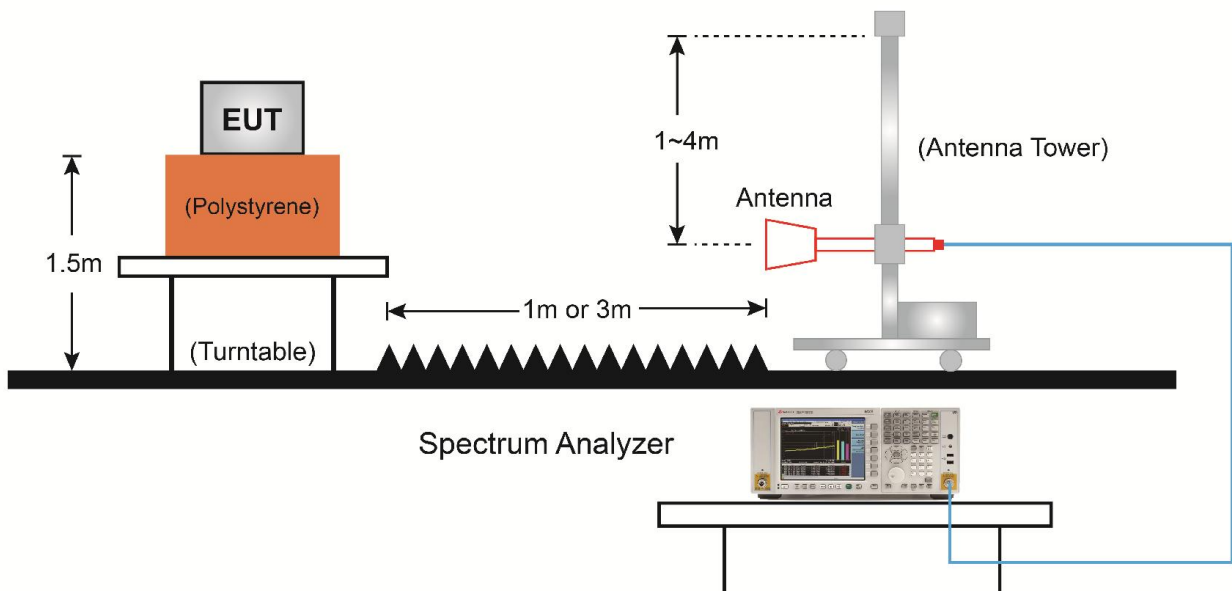
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW $\geq 1/T$
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). 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	DH5	Test Channel	00
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
	4808.0	37.1	5.6	42.7	74.0	-31.3	Peak	Horizontal
	7460.0	36.0	11.8	47.8	74.0	-26.2	Peak	Horizontal
*	8888.0	36.0	13.4	49.4	80.8	-31.4	Peak	Horizontal
*	10044.0	35.9	16.1	52.0	80.8	-28.8	Peak	Horizontal
	4808.0	37.3	5.6	42.9	74.0	-31.1	Peak	Vertical
	7417.5	35.8	11.8	47.6	74.0	-26.4	Peak	Vertical
*	8624.5	36.1	13.0	49.1	80.8	-31.7	Peak	Vertical
*	9933.5	34.8	16.1	50.9	80.8	-29.9	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (100.8dBμV/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	DH5	Test Channel	39
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
	4799.5	37.1	5.5	42.6	74.0	-31.4	Peak	Horizontal
	7426.0	36.1	11.9	48.0	74.0	-26.0	Peak	Horizontal
*	8539.5	35.5	12.8	48.3	82.1	-33.8	Peak	Horizontal
*	10256.5	34.4	16.5	50.9	82.1	-31.2	Peak	Horizontal
	4884.5	38.7	5.7	44.4	74.0	-29.6	Peak	Vertical
	7383.5	36.1	11.7	47.8	74.0	-26.2	Peak	Vertical
*	8701.0	35.4	13.2	48.6	82.1	-33.5	Peak	Vertical
*	10027.0	34.7	16.0	50.7	82.1	-31.4	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (102.1dBμV/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	WIFI+BT Combo Module	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	56%
Test Site	AC1	Test Date	2019/08/03
Test Mode	DH5	Test Channel	78
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
	4051.5	39.0	2.7	41.7	74.0	-32.3	Peak	Horizontal
	7409.0	36.0	11.7	47.7	74.0	-26.3	Peak	Horizontal
*	8752.0	34.2	13.3	47.5	83.1	-35.6	Peak	Horizontal
*	10044.0	35.0	16.1	51.1	83.1	-32.0	Peak	Horizontal
	4034.5	38.3	2.7	41.0	74.0	-33.0	Peak	Vertical
	7502.5	33.9	12.0	45.9	74.0	-28.1	Peak	Vertical
*	8718.0	35.3	13.2	48.5	83.1	-34.6	Peak	Vertical
*	10154.5	34.1	16.4	50.5	83.1	-32.6	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (103.1dBμV/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	WIFI+BT Combo Module	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	56%
Test Site	AC1	Test Date	2019/08/03
Test Mode	2DH5	Test Channel	00
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
	4094.0	37.8	2.8	40.6	74.0	-33.4	Peak	Horizontal
	7468.5	36.0	11.8	47.8	74.0	-26.2	Peak	Horizontal
*	8726.5	35.0	13.2	48.2	79.9	-31.7	Peak	Horizontal
*	10554.0	34.7	17.4	52.1	79.9	-27.8	Peak	Horizontal
	4000.5	38.2	2.5	40.7	74.0	-33.3	Peak	Vertical
	7451.5	35.4	11.9	47.3	74.0	-26.7	Peak	Vertical
*	8828.5	34.5	13.4	47.9	79.9	-32.0	Peak	Vertical
*	9848.5	34.4	16.1	50.5	79.9	-29.4	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (99.9dBμV/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	WIFI+BT Combo Module	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	56%
Test Site	AC1	Test Date	2019/08/03
Test Mode	2DH5	Test Channel	39
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
	4000.5	38.4	2.5	40.9	74.0	-33.1	Peak	Horizontal
	4782.5	36.3	5.4	41.7	74.0	-32.3	Peak	Horizontal
*	6533.5	34.9	9.6	44.5	81.0	-36.5	Peak	Horizontal
*	9712.5	34.8	15.4	50.2	81.0	-30.8	Peak	Horizontal
	4264.0	38.3	3.4	41.7	74.0	-32.3	Peak	Vertical
	7383.5	36.6	11.7	48.3	74.0	-25.7	Peak	Vertical
*	8837.0	35.0	13.3	48.3	81.0	-32.7	Peak	Vertical
*	10290.5	34.3	16.6	50.9	81.0	-30.1	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (101.0dBμV/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	2DH5	Test Channel	78
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
	4094.0	38.1	2.8	40.9	74.0	-33.1	Peak	Horizontal
	4765.5	37.1	5.4	42.5	74.0	-31.5	Peak	Horizontal
*	6227.5	36.0	8.1	44.1	82.3	-38.2	Peak	Horizontal
*	10163.0	34.6	16.5	51.1	82.3	-31.2	Peak	Horizontal
	4009.0	38.7	2.5	41.2	74.0	-32.8	Peak	Vertical
	5037.5	36.2	6.2	42.4	74.0	-31.6	Peak	Vertical
*	6380.5	36.8	8.7	45.5	82.3	-36.8	Peak	Vertical
*	8573.5	35.4	12.8	48.2	82.3	-34.1	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (102.3dBμV/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	3DH5	Test Channel	00
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	38.6	2.6	41.2	74.0	-32.8	Peak	Horizontal
	4867.5	35.2	5.7	40.9	74.0	-33.1	Peak	Horizontal
*	6380.5	36.2	8.7	44.9	80.2	-35.3	Peak	Horizontal
*	8650.0	35.2	13.1	48.3	80.2	-31.9	Peak	Horizontal
	3788.0	39.2	1.9	41.1	74.0	-32.9	Peak	Vertical
	5037.5	37.1	6.2	43.3	74.0	-30.7	Peak	Vertical
*	6040.5	36.3	7.4	43.7	80.2	-36.5	Peak	Vertical
*	9678.5	36.6	15.4	52.0	80.2	-28.2	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (100.2dBμV/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	3DH5	Test Channel	39
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
	3983.5	38.2	2.5	40.7	74.0	-33.3	Peak	Horizontal
	4757.0	36.5	5.4	41.9	74.0	-32.1	Peak	Horizontal
*	6261.5	35.8	8.3	44.1	81.1	-37.0	Peak	Horizontal
*	9984.5	34.6	16.0	50.6	81.1	-30.5	Peak	Horizontal
	4009.0	38.2	2.5	40.7	74.0	-33.3	Peak	Vertical
	4952.5	36.4	5.9	42.3	74.0	-31.7	Peak	Vertical
*	6006.5	36.1	7.5	43.6	81.1	-37.5	Peak	Vertical
*	10571.0	35.2	17.2	52.4	81.1	-28.7	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (101.1dBμV/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	WIFI+BT Combo Module	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	56%
Test Site	AC1	Test Date	2019/08/03
Test Mode	3DH5	Test Channel	78
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
	3652.0	39.7	1.4	41.1	74.0	-32.9	Peak	Horizontal
	4791.0	36.8	5.4	42.2	74.0	-31.8	Peak	Horizontal
*	6423.0	36.0	8.9	44.9	82.5	-37.6	Peak	Horizontal
*	10027.0	32.5	16.0	48.5	82.5	-34.0	Peak	Horizontal
	4068.5	38.3	2.7	41.0	74.0	-33.0	Peak	Vertical
	4808.0	36.5	5.6	42.1	74.0	-31.9	Peak	Vertical
*	6576.0	35.8	9.6	45.4	82.5	-37.1	Peak	Vertical
*	8599.0	35.8	12.9	48.7	82.5	-33.8	Peak	Vertical

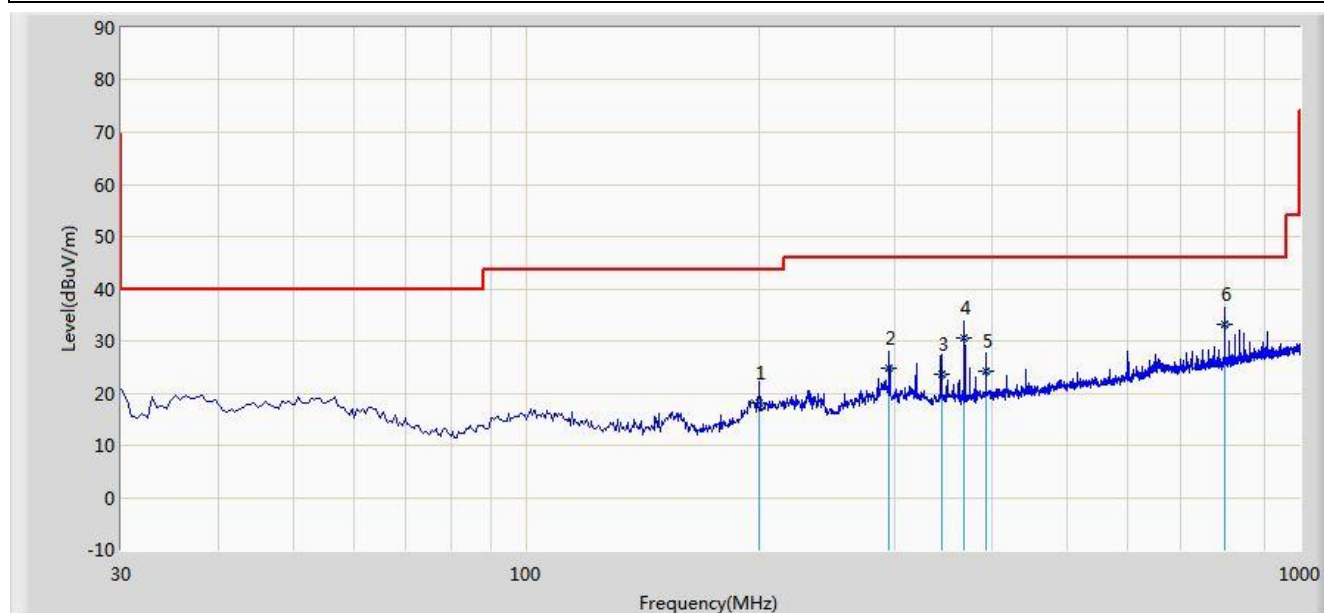
Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (102.5dBμV/m) or 15.209 which is higher.

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 - 22:13
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.	



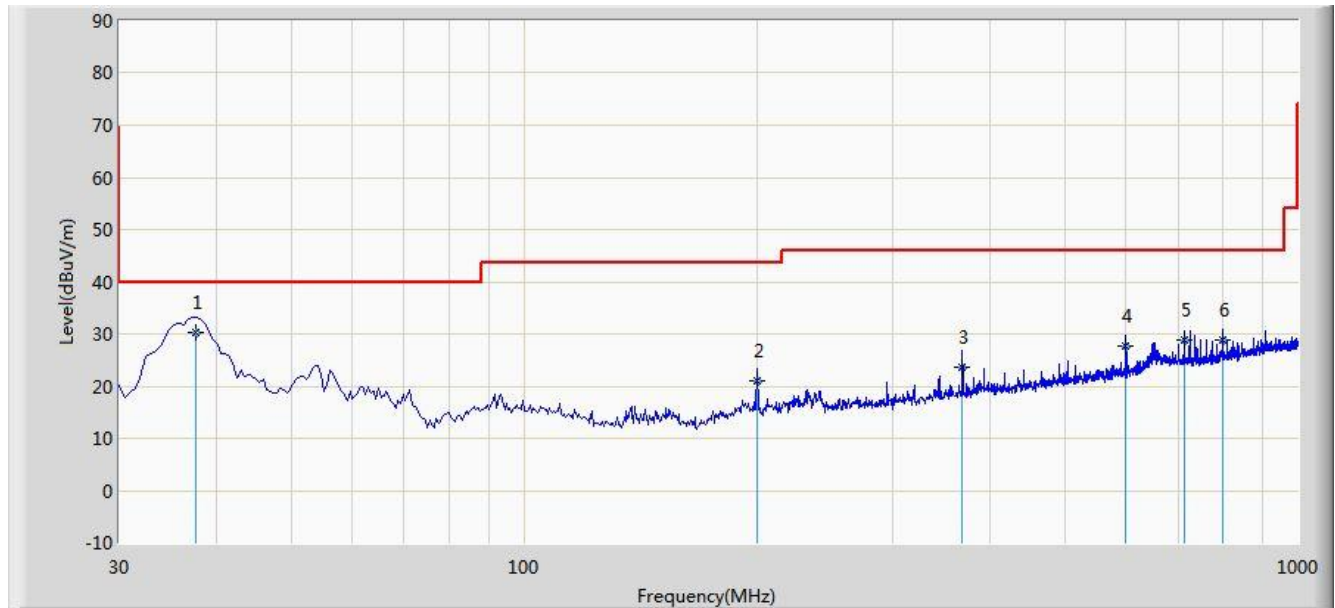
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			200.234	18.088	6.003	-25.412	43.500	12.085	QP
2			294.800	24.656	10.443	-21.344	46.000	14.212	QP
3			344.200	23.480	8.004	-22.520	46.000	15.476	QP
4			368.500	30.692	14.857	-15.308	46.000	15.834	QP
5			393.200	24.296	8.014	-21.704	46.000	16.282	QP
6		*	800.100	33.122	10.746	-12.878	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.

Site: AC2	Time: 2019/08/08 - 22:17
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		*	37.740	30.213	16.850	-9.787	40.000	13.363	QP
2			200.260	21.035	8.950	-22.465	43.500	12.085	QP
3			368.510	23.725	7.890	-22.275	46.000	15.835	QP
4			599.870	27.796	8.120	-18.204	46.000	19.676	QP
5			712.840	28.765	7.410	-17.235	46.000	21.354	QP
6			800.180	28.727	6.350	-17.273	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

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 [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

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

7.4.1. Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

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

7.4.2. Test Setting

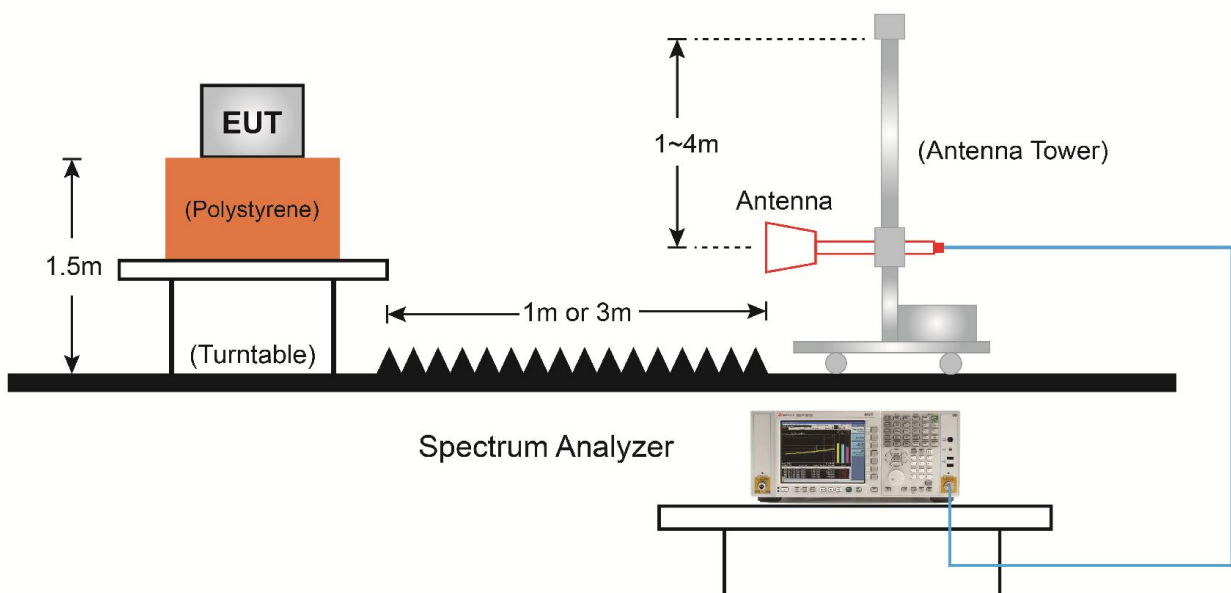
Peak Field Strength Measurements

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 Measurements above 1GHz (Method VB)

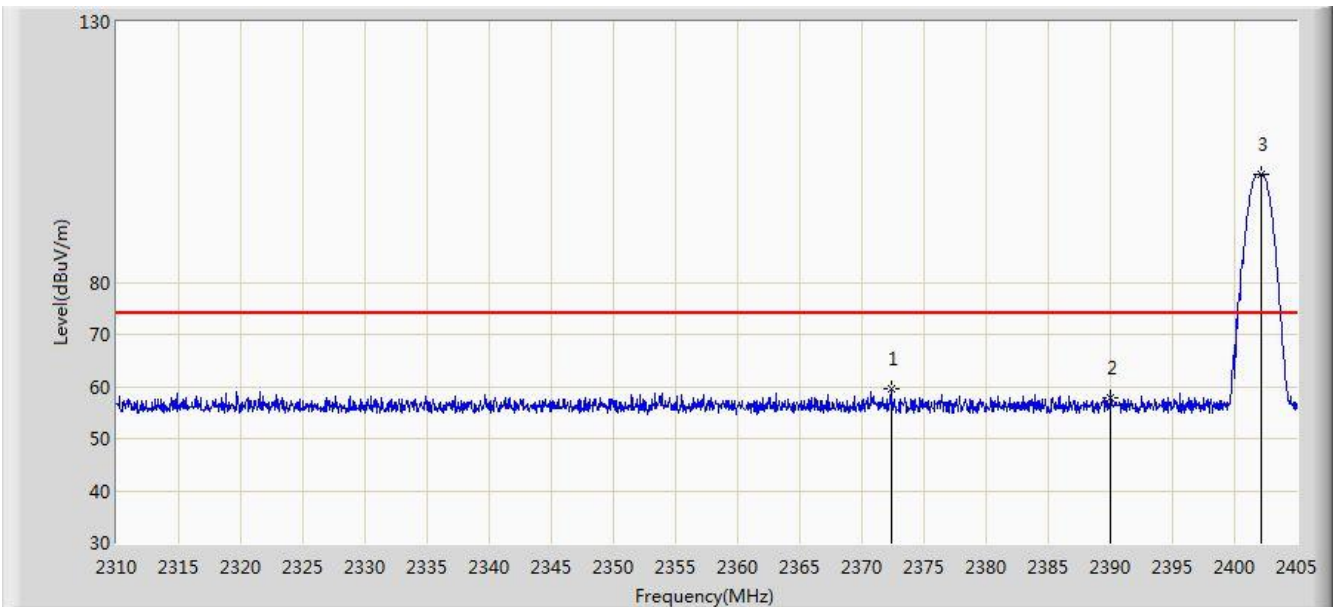
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW $\geq 1/T$
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain).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

7.4.3. Test Setup



7.4.4. Test Result

Site: AC1	Time: 2019/08/03 - 00:35
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by DH5 at channel 2402MHz	

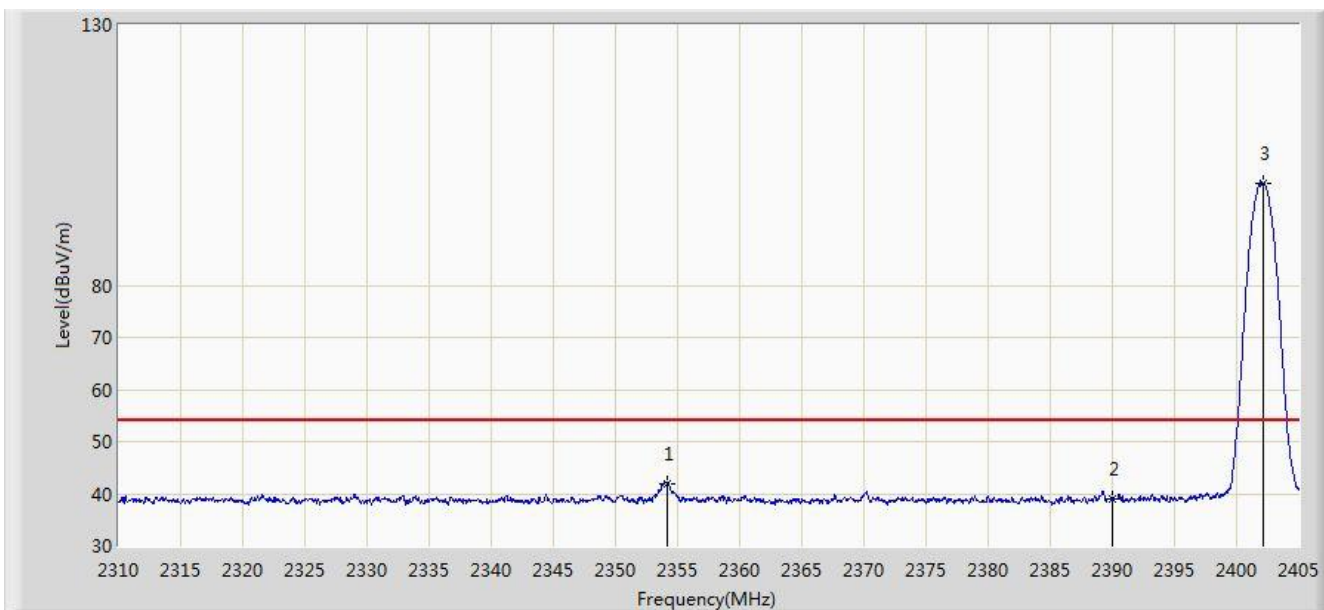


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2372.367	59.630	27.183	-14.370	74.000	32.447	PK
2		2390.000	57.684	25.271	-16.316	74.000	32.413	PK
3	*	2402.198	100.832	68.436	N/A	N/A	32.396	PK

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

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

Site: AC1	Time: 2019/08/03 - 00:37
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by DH5 at channel 2402MHz	

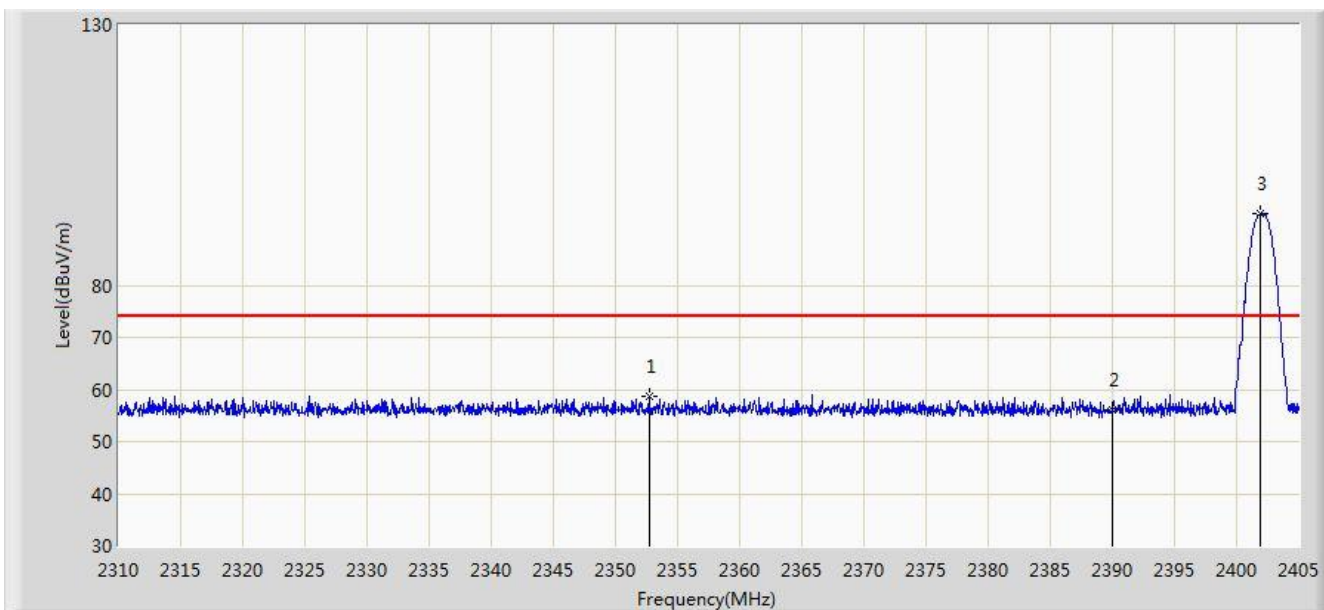


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2354.127	42.013	9.518	-11.987	54.000	32.495	AV
2		2390.000	39.049	6.636	-14.951	54.000	32.413	AV
3	*	2402.102	99.438	67.042	N/A	N/A	32.395	AV

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

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

Site: AC1	Time: 2019/08/03 - 00:38
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by DH5 at channel 2402MHz	

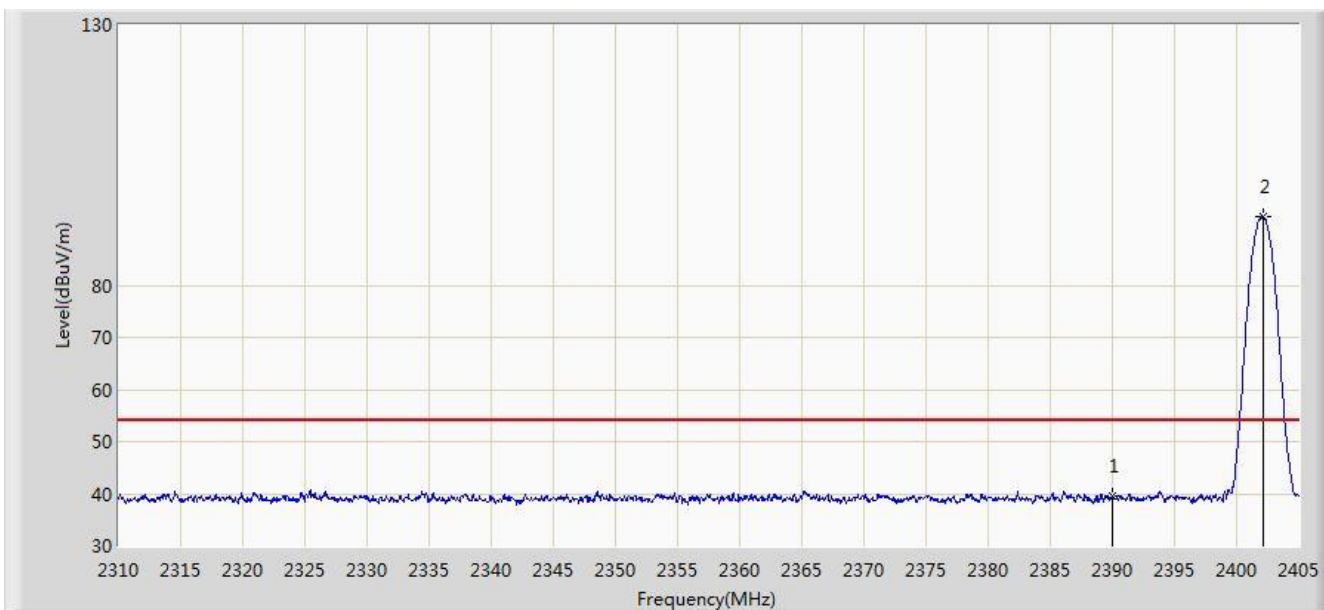


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2352.750	58.807	26.306	-15.193	74.000	32.501	PK
2		2390.000	56.138	23.725	-17.862	74.000	32.413	PK
3	*	2401.912	93.663	61.267	N/A	N/A	32.396	PK

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

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

Site: AC1	Time: 2019/08/03 - 00:39
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by DH5 at channel 2402MHz	

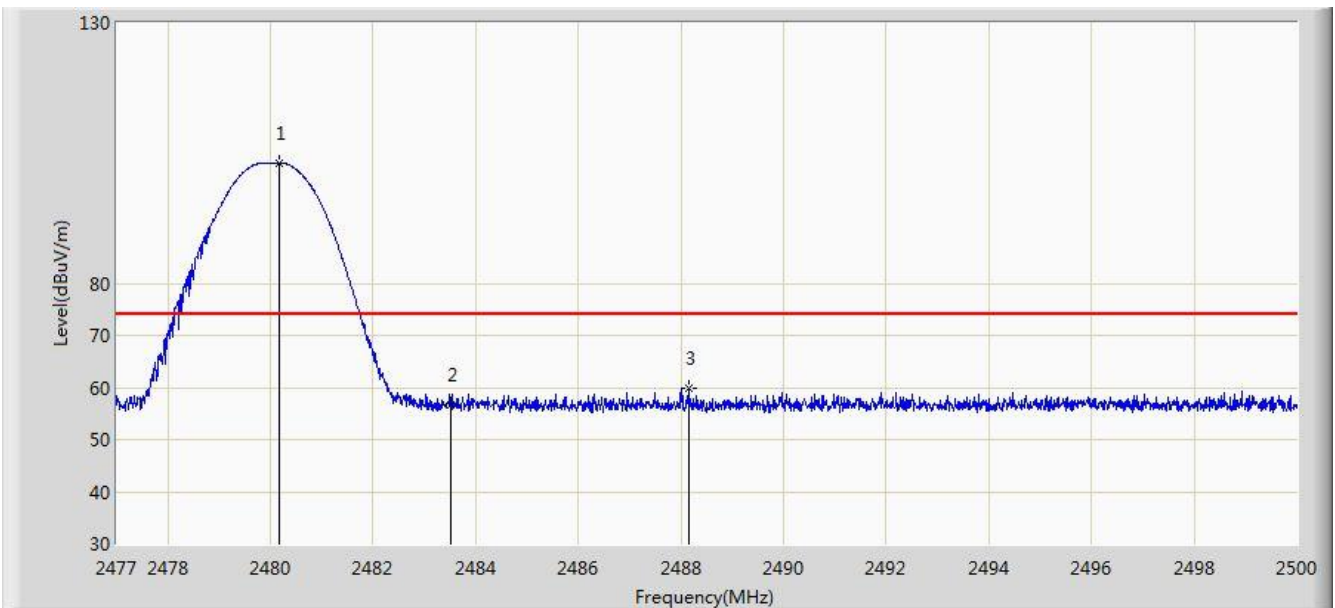


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	39.527	7.114	-14.473	54.000	32.413	AV
2	*	2402.102	93.152	60.756	N/A	N/A	32.395	AV

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

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

Site: AC1	Time: 2019/08/03 - 00:39
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by DH5 at channel 2480MHz	

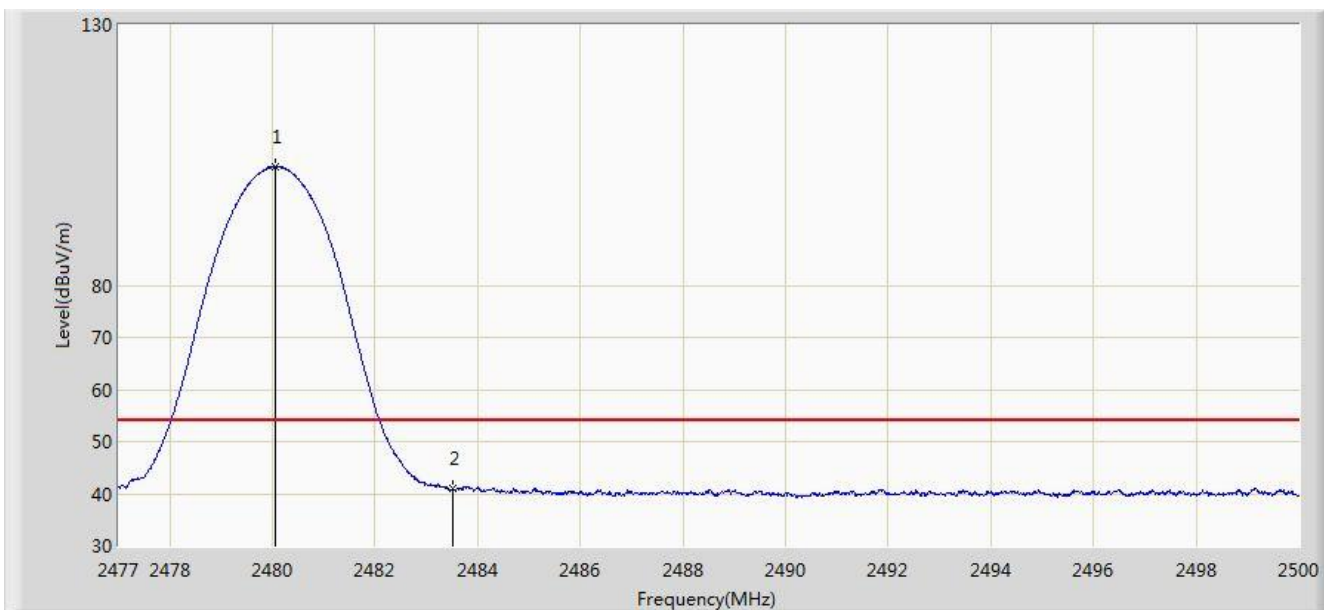


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.174	103.126	70.717	N/A	N/A	32.409	PK
2		2483.500	56.646	24.231	-17.354	74.000	32.416	PK
3		2488.144	59.755	27.330	-14.245	74.000	32.425	PK

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

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

Site: AC1	Time: 2019/08/03 - 00:41
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by DH5 at channel 2480MHz	

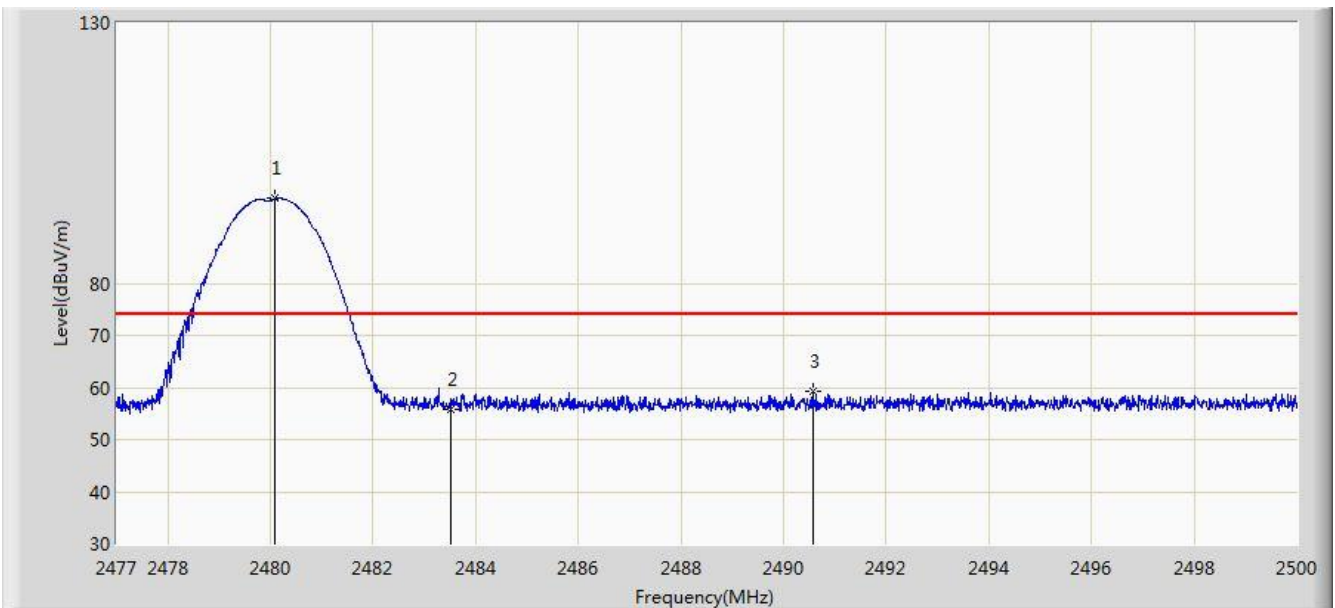


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.059	102.699	70.290	N/A	N/A	32.408	AV
2		2483.500	40.881	8.466	-13.119	54.000	32.416	AV

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

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

Site: AC1	Time: 2019/08/03 - 00:41
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by DH5 at channel 2480MHz	

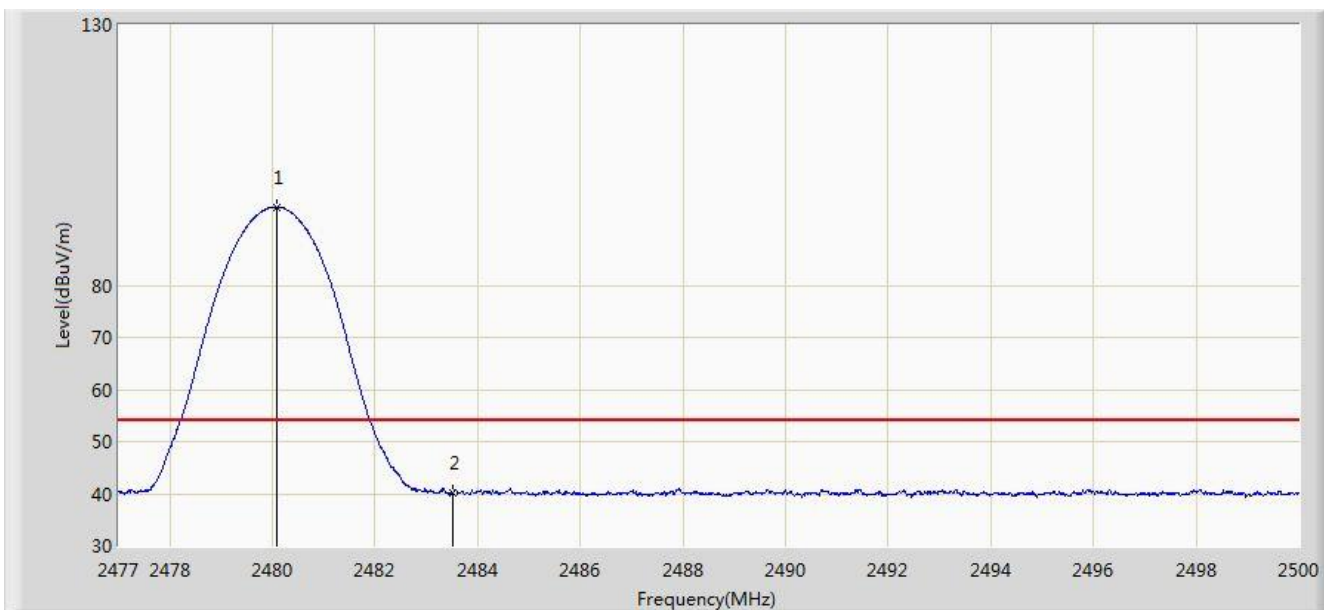


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.082	96.280	63.871	N/A	N/A	32.408	PK
2		2483.500	55.933	23.518	-18.067	74.000	32.416	PK
3		2490.582	59.142	26.713	-14.858	74.000	32.429	PK

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

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

Site: AC1	Time: 2019/08/03 - 00:42
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by DH5 at channel 2480MHz	

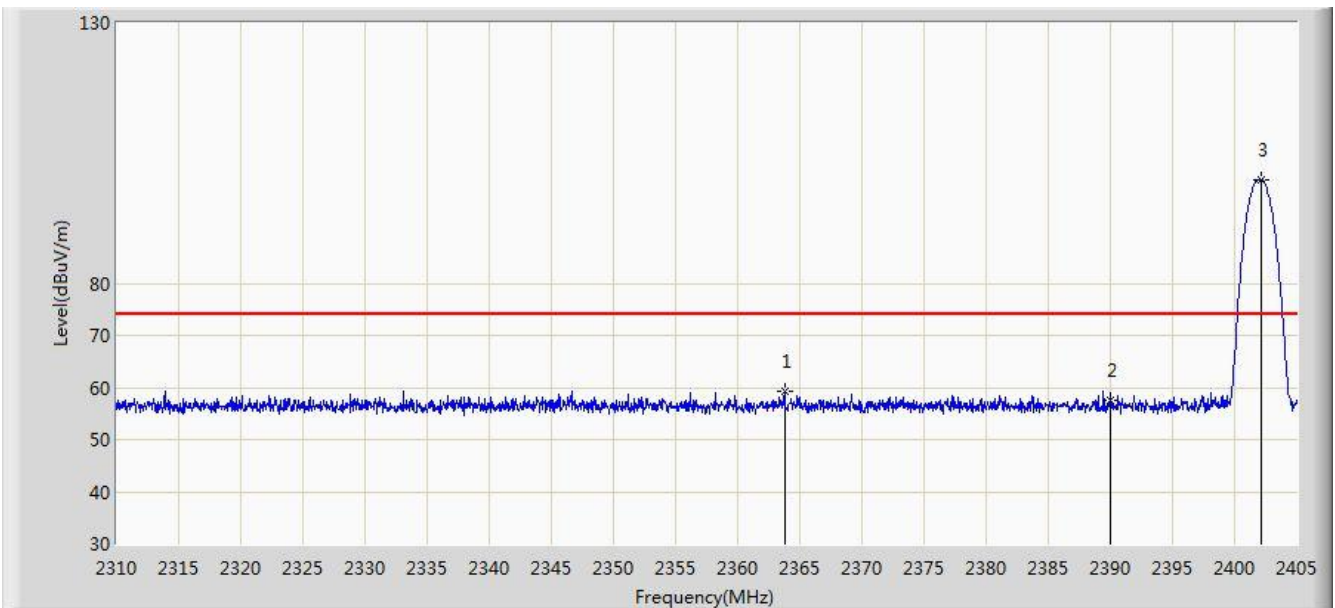


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.071	95.032	62.623	N/A	N/A	32.408	AV
2		2483.500	40.173	7.758	-13.827	54.000	32.416	AV

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

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

Site: AC1	Time: 2019/08/03 - 00:43
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 2DH5 at channel 2402MHz	

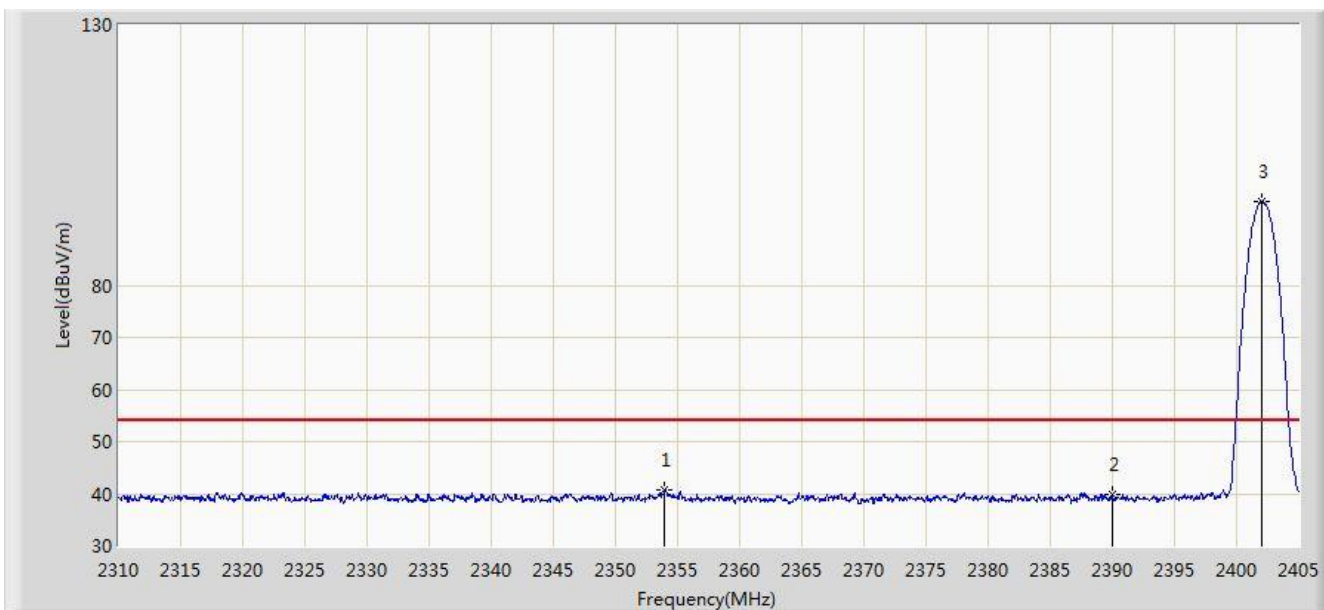


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2363.770	59.242	26.776	-14.758	74.000	32.466	PK
2		2390.000	57.418	25.005	-16.582	74.000	32.413	PK
3	*	2402.198	99.944	67.548	N/A	N/A	32.396	PK

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

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

Site: AC1	Time: 2019/08/03 - 00:45
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 2DH5 at channel 2402MHz	

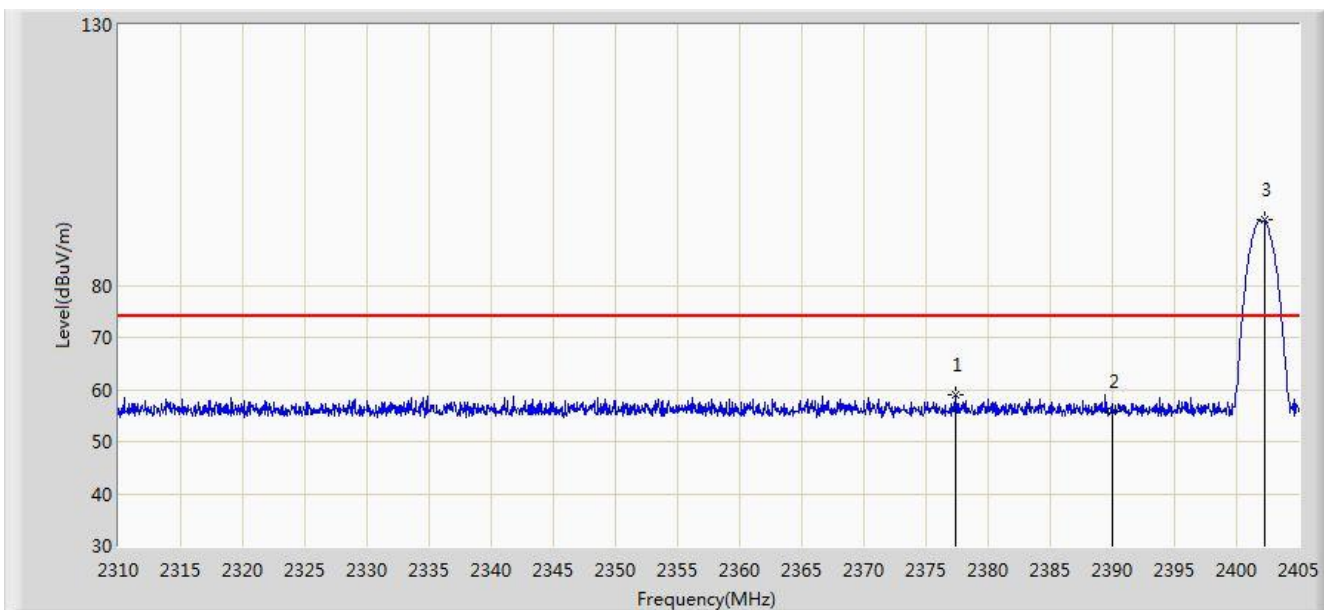


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2353.985	40.621	8.125	-13.379	54.000	32.495	AV
2		2390.000	39.732	7.319	-14.268	54.000	32.413	AV
3	*	2402.055	96.227	63.831	N/A	N/A	32.395	AV

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

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

Site: AC1	Time: 2019/08/03 - 00:45
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 2DH5 at channel 2402MHz	

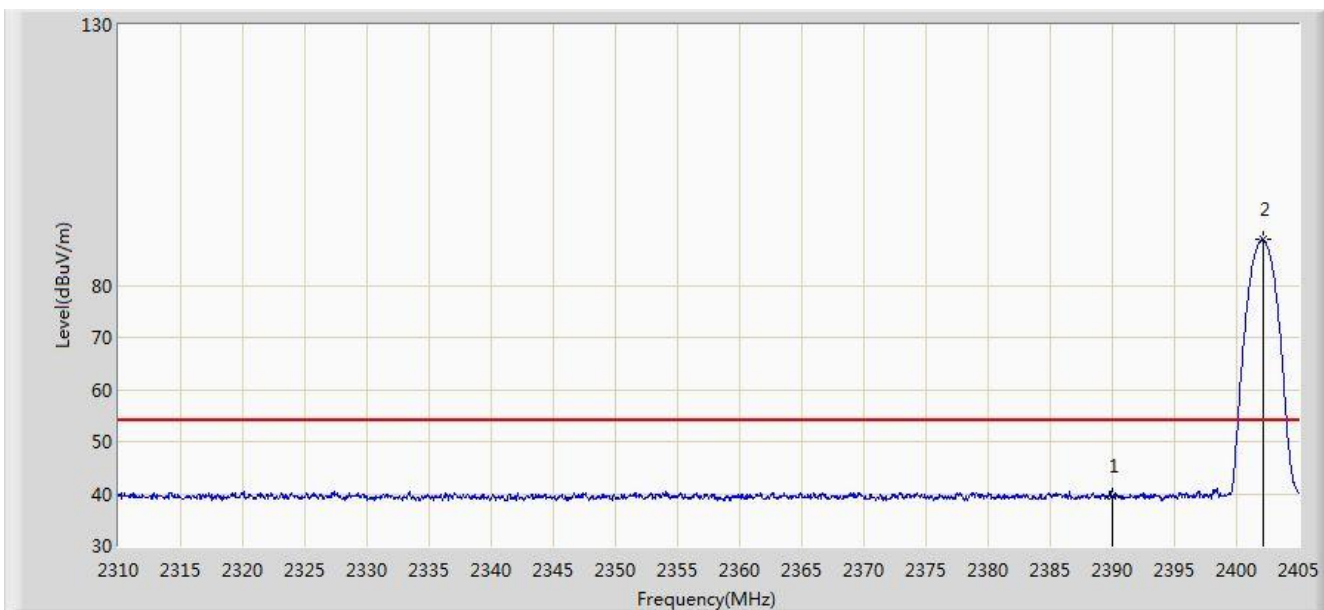


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2377.355	58.918	26.482	-15.082	74.000	32.436	PK
2		2390.000	55.882	23.469	-18.118	74.000	32.413	PK
3	*	2402.245	92.472	60.076	N/A	N/A	32.396	PK

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

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

Site: AC1	Time: 2019/08/03 - 00:46
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 2DH5 at channel 2402MHz	

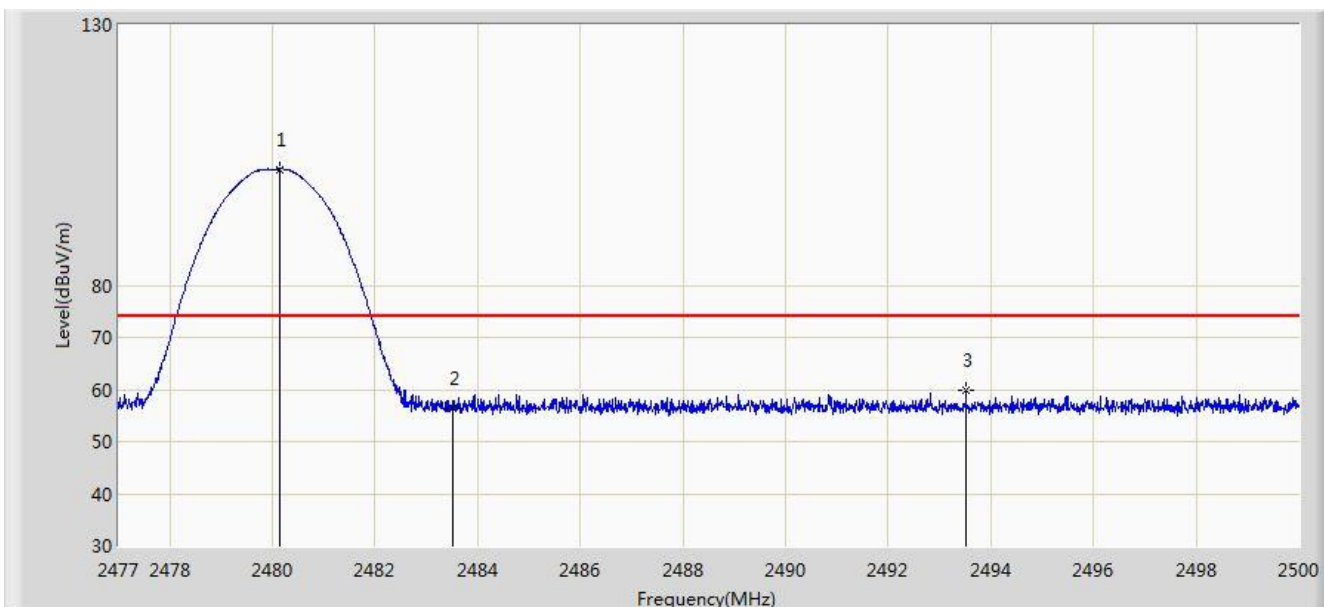


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	39.687	7.274	-14.313	54.000	32.413	AV
2	*	2402.102	88.773	56.377	N/A	N/A	32.395	AV

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

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

Site: AC1	Time: 2019/08/03 - 00:46
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 2DH5 at channel 2480MHz	

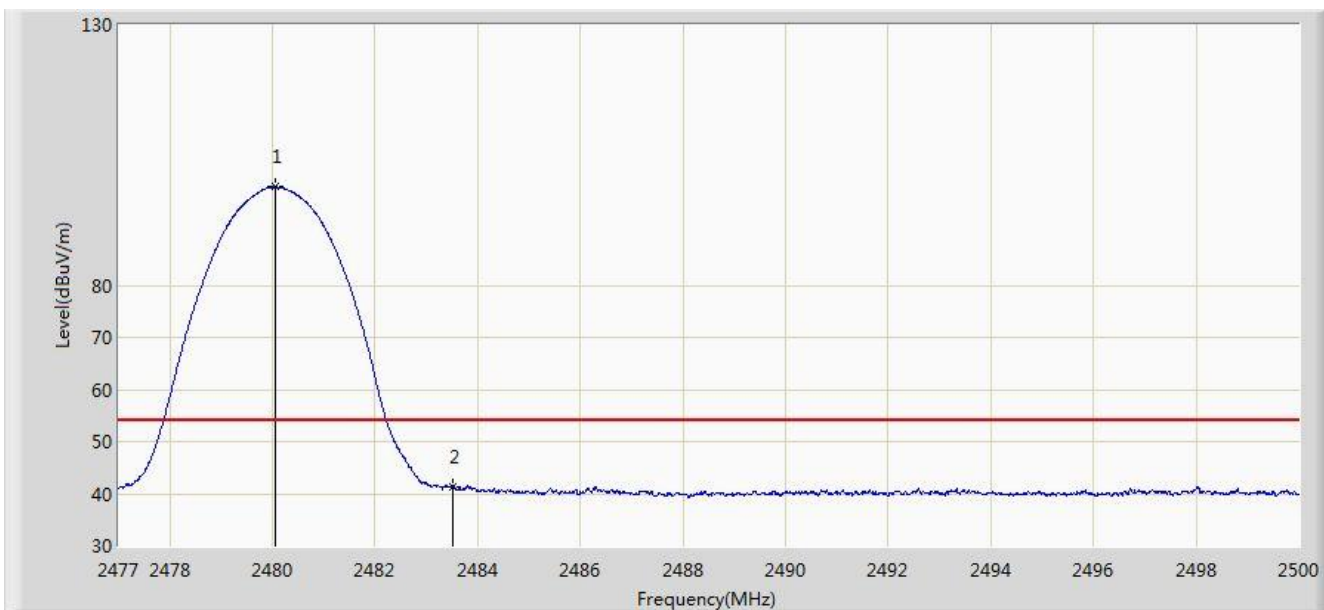


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.140	102.282	69.873	N/A	N/A	32.409	PK
2		2483.500	56.452	24.037	-17.548	74.000	32.416	PK
3		2493.514	59.863	27.428	-14.137	74.000	32.436	PK

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

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

Site: AC1	Time: 2019/08/03 - 00:48
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 2DH5 at channel 2480MHz	

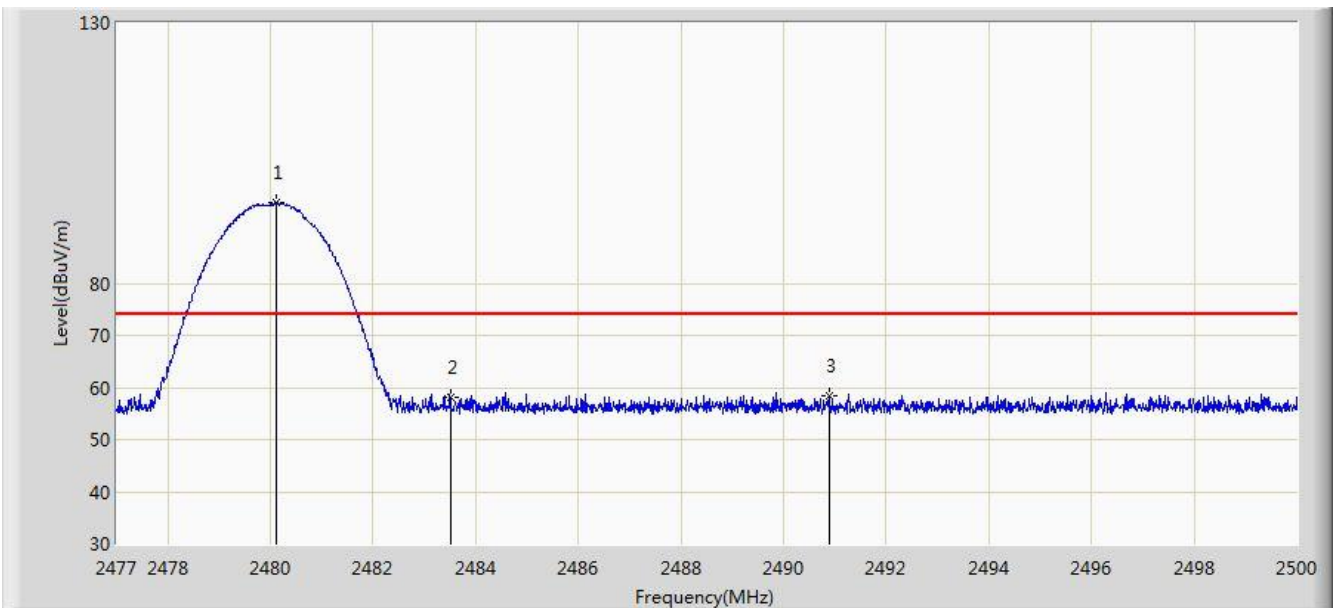


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.048	98.868	66.459	N/A	N/A	32.408	AV
2		2483.500	41.391	8.976	-12.609	54.000	32.416	AV

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

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

Site: AC1	Time: 2019/08/03 - 00:48
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 2DH5 at channel 2480MHz	

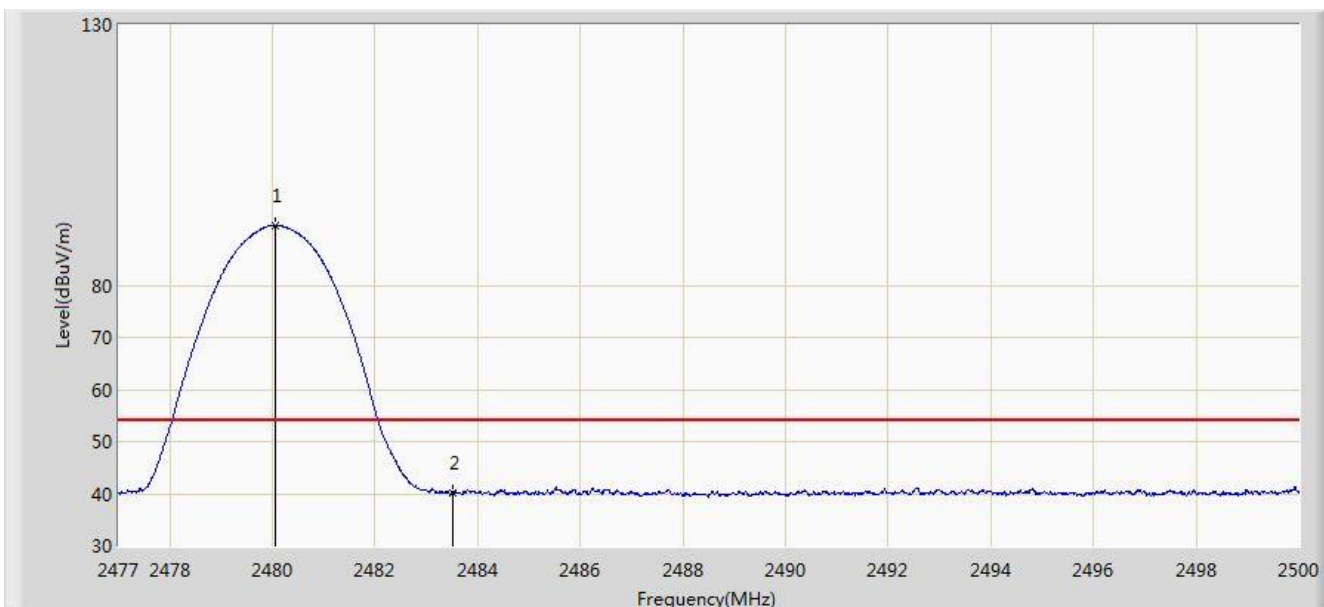


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.117	95.501	63.092	N/A	N/A	32.408	PK
2		2483.500	58.203	25.788	-15.797	74.000	32.416	PK
3		2490.881	58.492	26.062	-15.508	74.000	32.430	PK

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

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

Site: AC1	Time: 2019/08/03 - 00:49
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 2DH5 at channel 2480MHz	

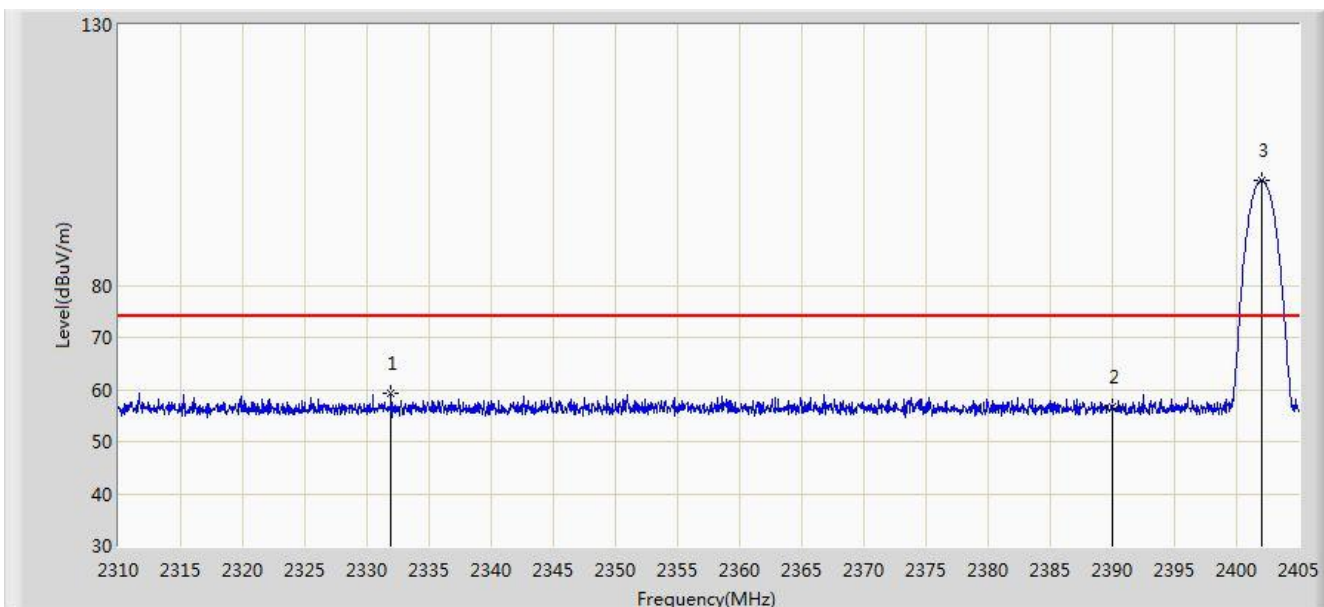


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.059	91.561	59.152	N/A	N/A	32.408	AV
2		2483.500	40.246	7.831	-13.754	54.000	32.416	AV

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

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

Site: AC1	Time: 2019/08/03 - 00:49
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 3DH5 at channel 2402MHz	

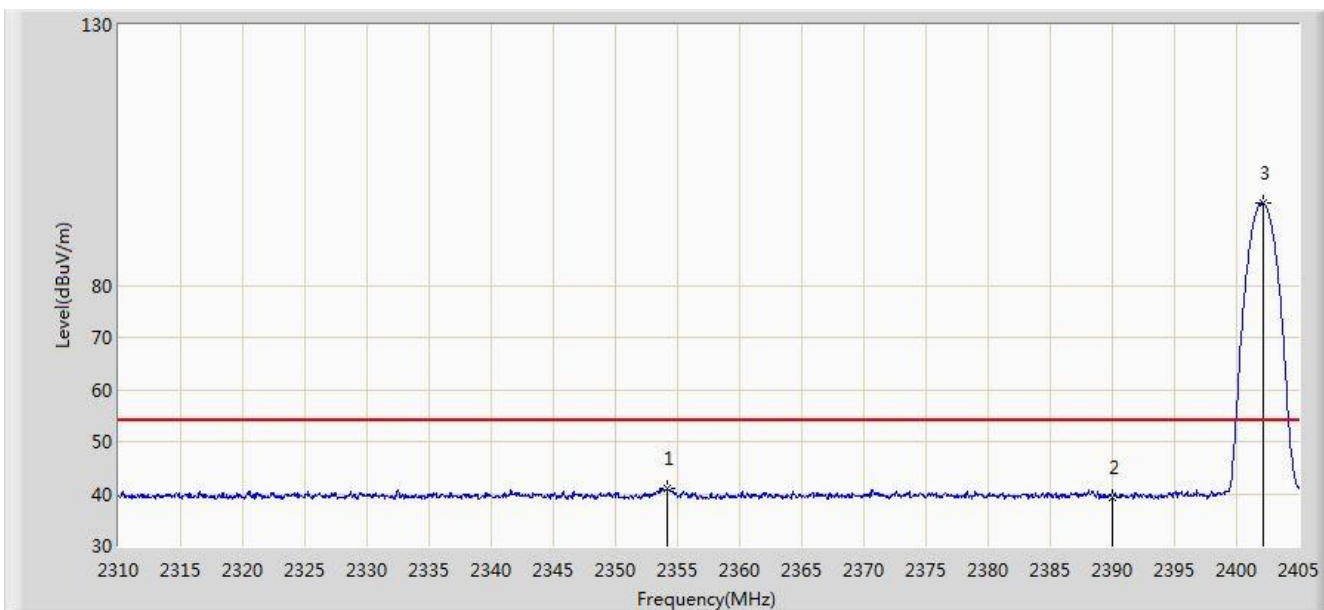


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2331.897	59.196	26.612	-14.804	74.000	32.584	PK
2		2390.000	56.613	24.200	-17.387	74.000	32.413	PK
3	*	2402.008	100.245	67.849	N/A	N/A	32.396	PK

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

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

Site: AC1	Time: 2019/08/03 - 00:51
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 3DH5 at channel 2402MHz	

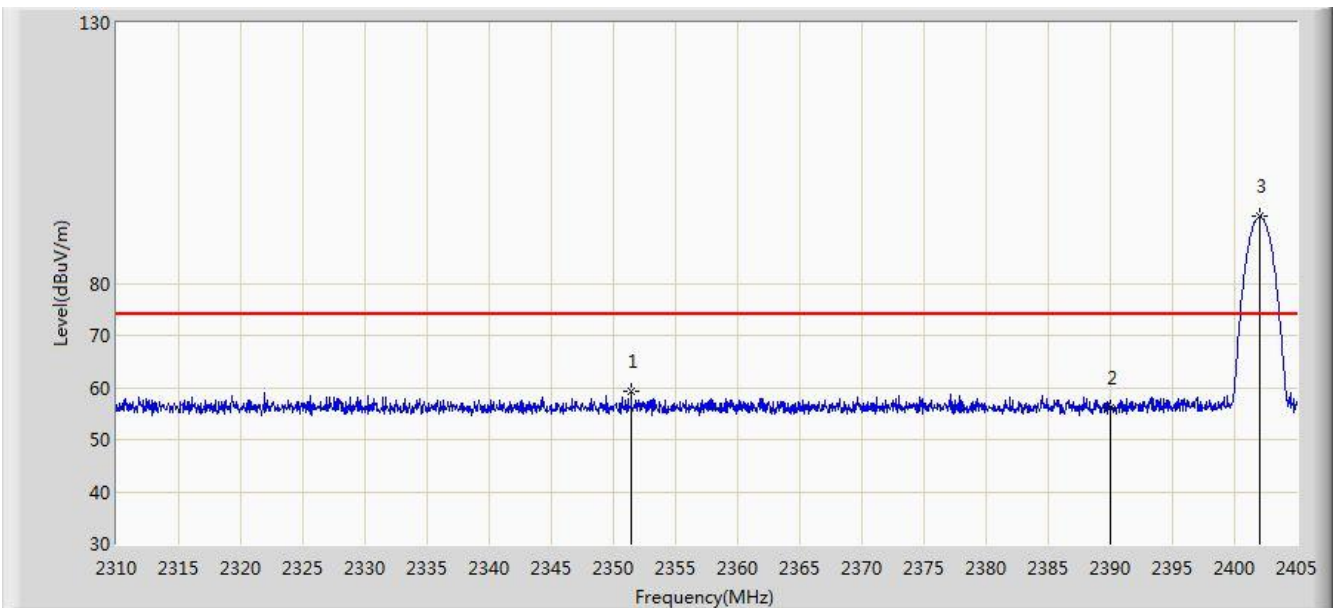


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2354.175	41.048	8.553	-12.952	54.000	32.495	AV
2		2390.000	39.332	6.919	-14.668	54.000	32.413	AV
3	*	2402.102	95.832	63.436	N/A	N/A	32.395	AV

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

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

Site: AC1	Time: 2019/08/03 - 00:52
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 3DH5 at channel 2402MHz	

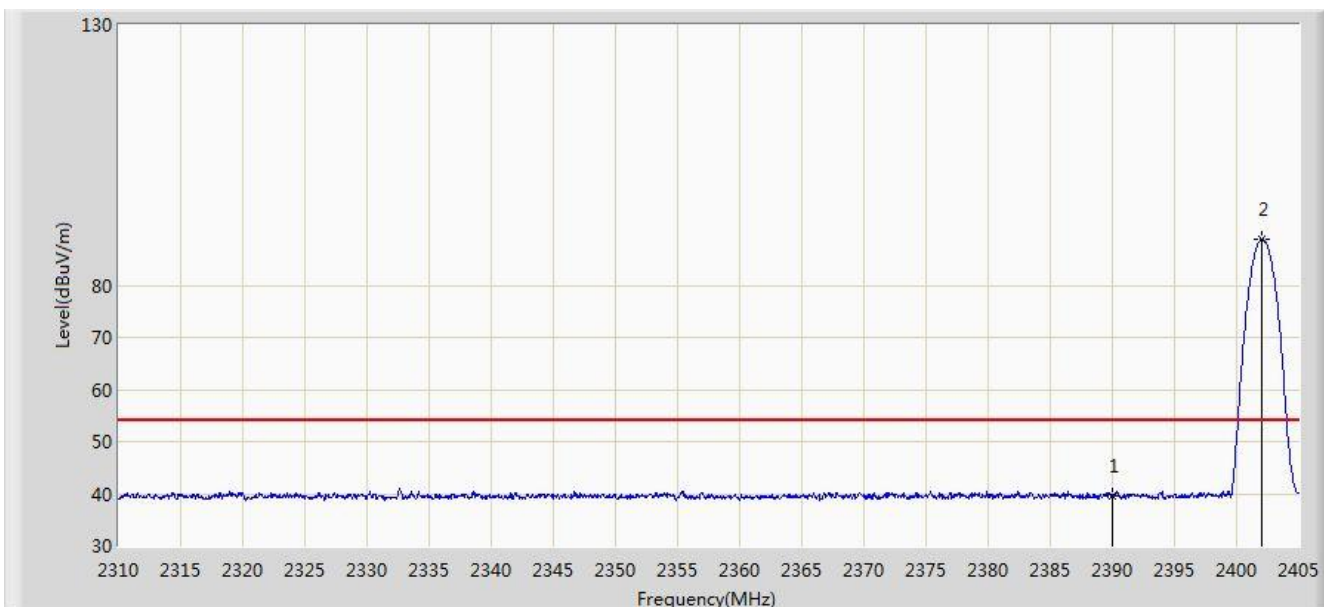


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2351.420	59.140	26.634	-14.860	74.000	32.506	PK
2		2390.000	56.049	23.636	-17.951	74.000	32.413	PK
3	*	2402.055	92.796	60.400	N/A	N/A	32.395	PK

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

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

Site: AC1	Time: 2019/08/03 - 00:53
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 3DH5 at channel 2402MHz	

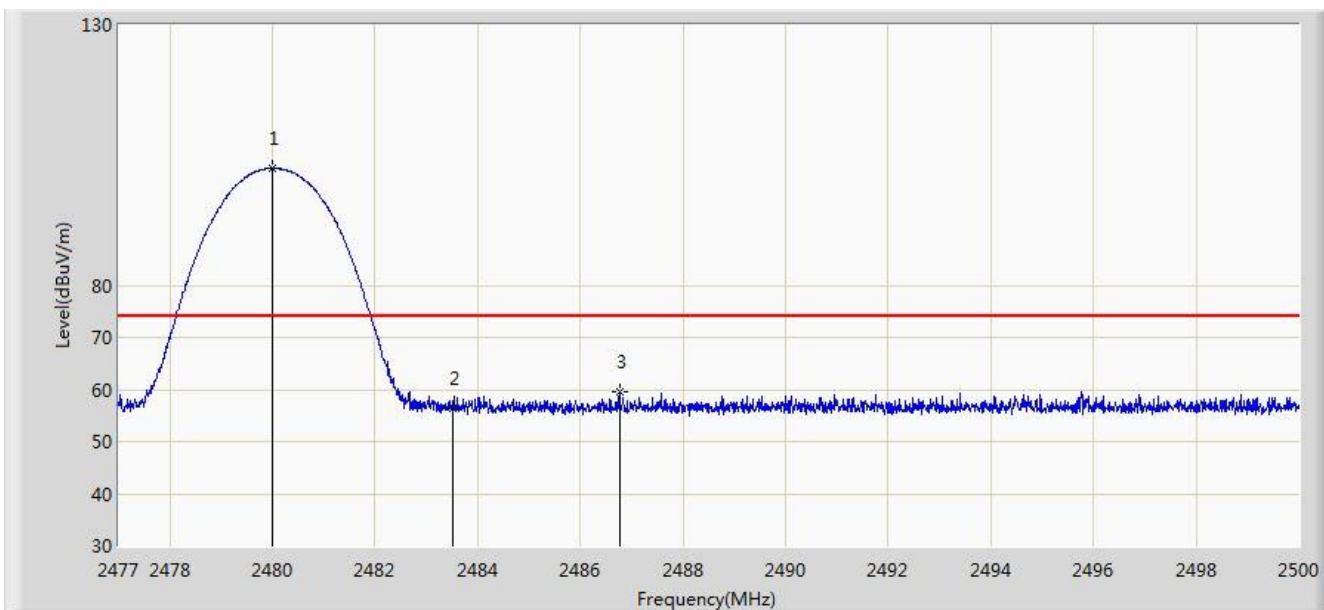


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	39.676	7.263	-14.324	54.000	32.413	AV
2	*	2402.055	88.806	56.410	N/A	N/A	32.395	AV

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

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

Site: AC1	Time: 2019/08/03 - 00:53
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 3DH5 at channel 2480MHz	

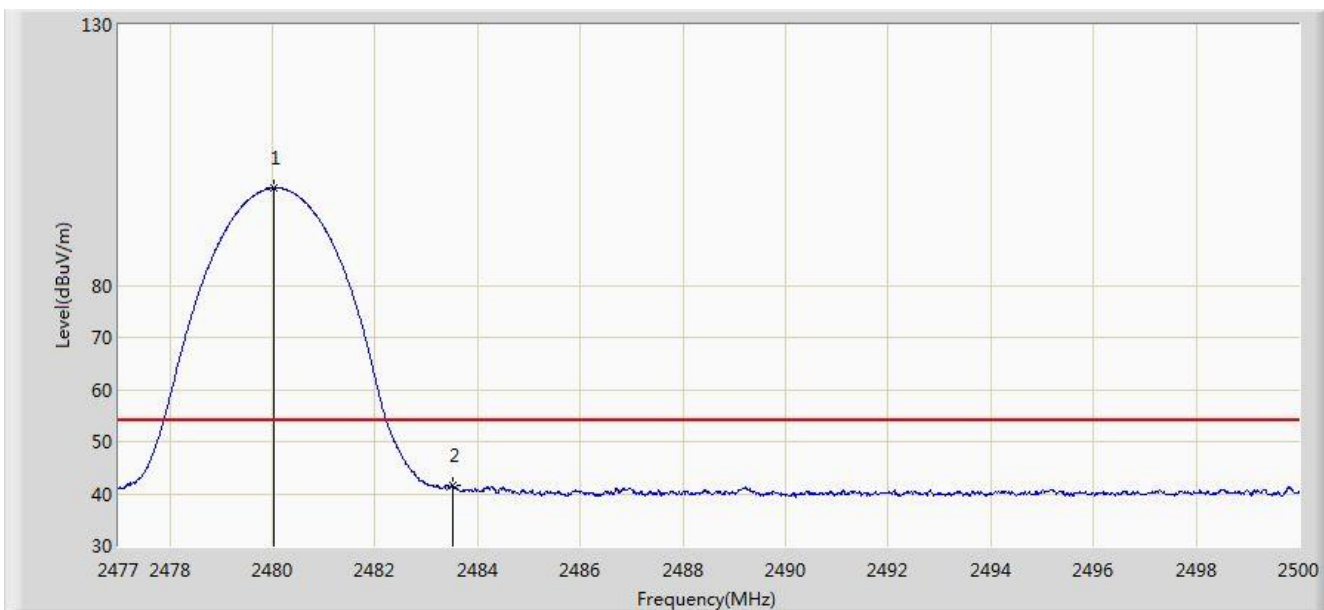


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.002	102.539	70.131	N/A	N/A	32.408	PK
2		2483.500	56.374	23.959	-17.626	74.000	32.416	PK
3		2486.763	59.438	27.016	-14.562	74.000	32.422	PK

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

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

Site: AC1	Time: 2019/08/03 - 00:55
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 3DH5 at channel 2480MHz	

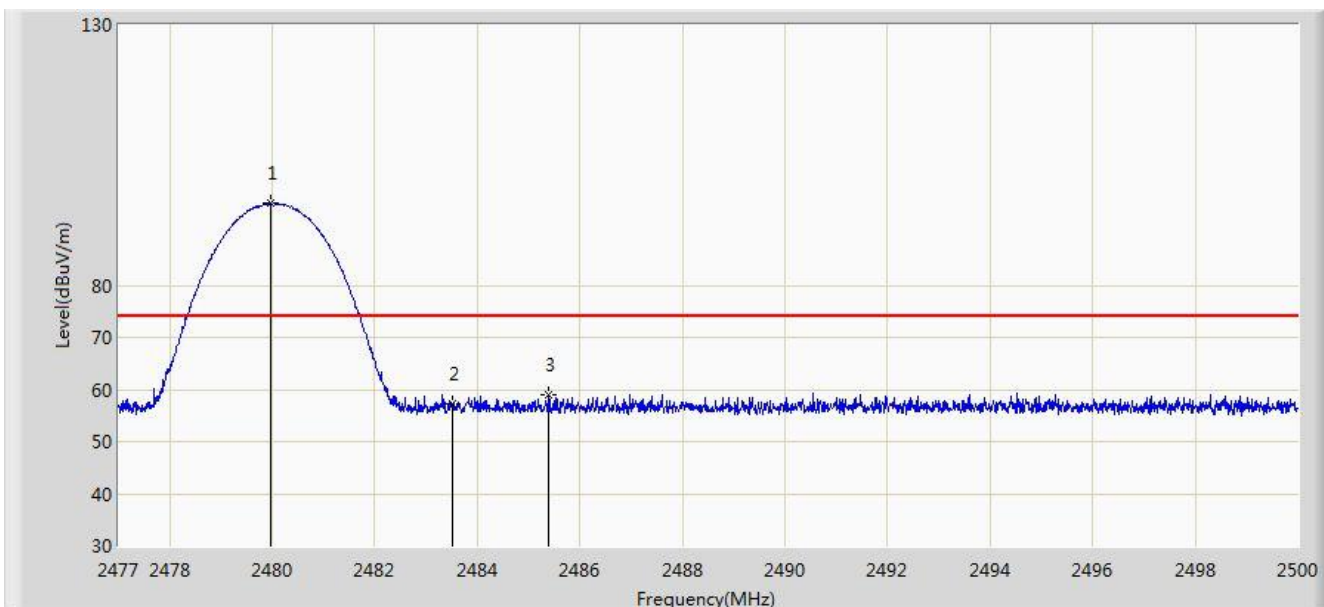


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.036	98.681	66.272	N/A	N/A	32.408	AV
2		2483.500	41.609	9.194	-12.391	54.000	32.416	AV

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

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

Site: AC1	Time: 2019/08/03 - 00:55
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 3DH5 at channel 2480MHz	

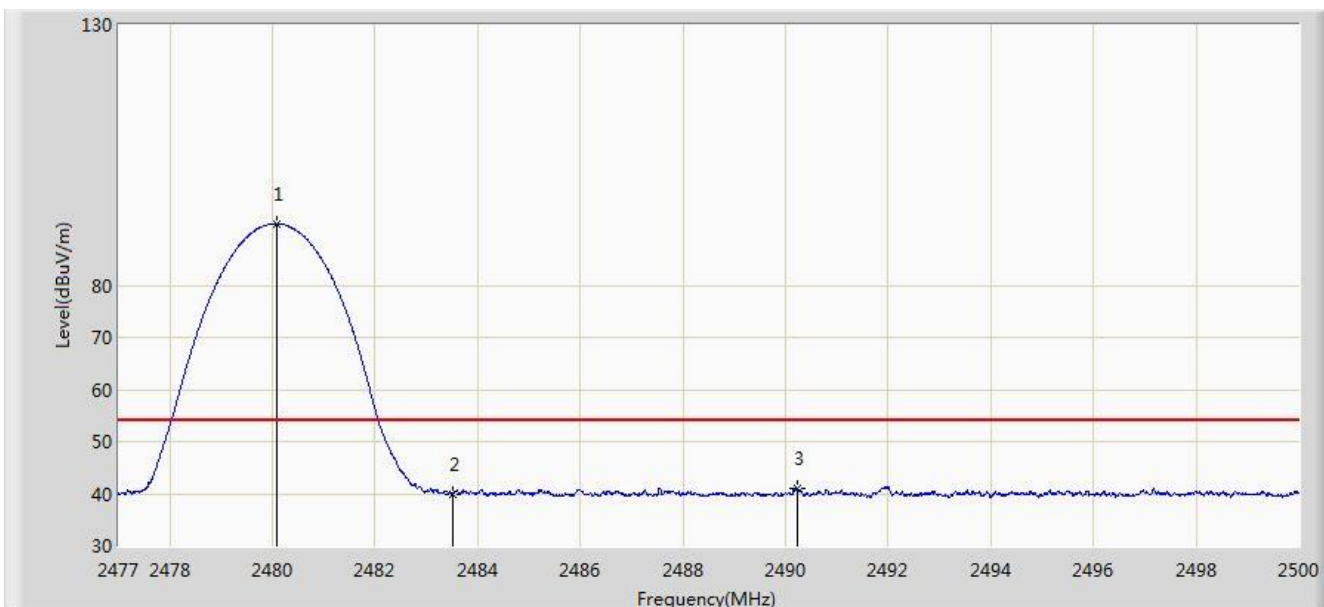


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2479.979	95.815	63.407	N/A	N/A	32.408	PK
2		2483.500	57.154	24.739	-16.846	74.000	32.416	PK
3		2485.384	58.857	26.438	-15.143	74.000	32.419	PK

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

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

Site: AC1	Time: 2019/08/03 - 00:56
Limit: FCC_Part15_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIFI+BT Combo Module	Power: AC120V/60Hz
Note: Transmit by 3DH5 at channel 2480MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.071	91.826	59.417	N/A	N/A	32.408	AV
2		2483.500	39.830	7.415	-14.170	54.000	32.416	AV
3		2490.225	41.139	8.710	-12.861	54.000	32.429	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.