MEASUREMENT REPORT

FCC PART 15.247 Bluetooth-LE

FCC ID:	Q9DAPINH503
Applicant:	Hewlett Packard Enterprise Company
Application Type:	Certification
Product:	ACCESS POINT
Model No.:	APINH503
Brand Name:	aruba a Hewlett Packard Enterprise company, Hewlett Packard Enterprise
FCC Classification:	Digital Transmission System (DTS)
FCC Rule Part(s):	Part15 Subpart C (Section 15.247)
Test Procedure(s):	ANSI C63.10-2013
Test Date:	July 15 ~ August 06, 2020

Reviewed By: (Paddy Chen)

Approved By: (Chenz Ker)

Testing Laboratory 3261

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.

Revision History

Report No.	Version	Description	Issue Date	Note
2007TW0002-U1	Rev. 01	Initial Report	08-06-2020	Valid

CONTENTS

Description Page

General Information

Applicant:	Hewlett Packard Enterprise Company
Applicant Address:	3333 Scott Blvd, Santa Clara, CA 95054, USA
Manufacturer:	Hewlett Packard Enterprise Company
Manufacturer Address:	3333 Scott Blvd, Santa Clara, CA 95054, USA
Test Site:	MRT Technology (Taiwan) Co., Ltd
Test Site Address:	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Fuxing Rd., Taoyuan, Taiwan (R.O.C)

- **MRT facility is a FCC registered (Reg. No. 291082 and 153292) test facility with the site description report on file and is designated by the FCC as an Accredited Test Film.**
- **MRT facility is an IC registered (MRT Reg. No. 21723-1) test laboratory with the site description on file at Industry Canada.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (TAF) under the American Association for Laboratory Accreditation Program (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, Taiwan, EU and TELEC Rules.**

TAF certificate here

Testing Laboratory
3261

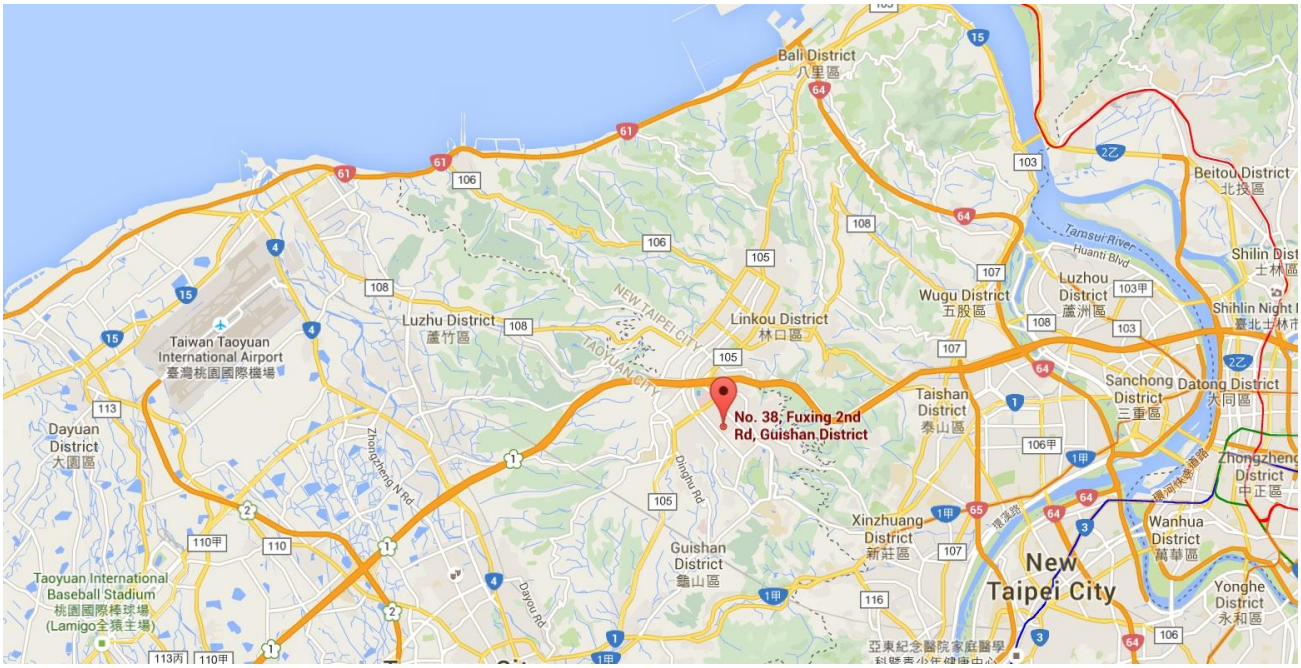
1. INTRODUCTION

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 Innovation, Science and Economic Development Canada and Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	ACCESS POINT
Model No.	APINH503
Serial No.	CNKHKSL02B
Wi-Fi Specification	802.11a/b/g/n/ac/ax
Bluetooth Specification	v5.0 single mode, BLE only
Zigbee Specification	802.15.4
Software Version	V100
Operating Temperature	0 ~ 40 °C
Power Type	AC Adapter or PoE input
Operating Environment	Indoor Use

2.2. Product Specification Subjective to this Report

Bluetooth Frequency	2402 ~ 2480MHz
Bluetooth Version	v5.0 single mode
Type of modulation	GFSK
Data Rate	1Mbps & 2Mbps

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

2.3. Working Frequencies for this Report

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz
03	2408 MHz	04	2410 MHz	05	2412 MHz
06	2414 MHz	07	2416 MHz	08	2418 MHz
09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz
15	2432 MHz	16	2434 MHz	17	2436 MHz
18	2438 MHz	19	2440 MHz	20	2442 MHz
21	2444 MHz	22	2446 MHz	23	2448 MHz
24	2450 MHz	25	2452 MHz	26	2454 MHz
27	2456 MHz	28	2458 MHz	29	2460 MHz
30	2462 MHz	31	2464 MHz	32	2466 MHz
33	2468 MHz	34	2470 MHz	35	2472 MHz
36	2474 MHz	37	2476 MHz	38	2478 MHz
39	2480 MHz	--	--	--	--

2.4. Description of Available Antennas

Antenna Type	Frequency Band (GHz)	Max Peak Gain (dBi)	BF Directional Gain (dBi)	CDD Directional Gain (dBi)	
				For Power	For PSD
Wi-Fi Internal Antenna (2.4GHz 2*2 MIMO, 5GHz 2*2 MIMO)					
PIFA	2.4	1.73	4.71	1.73	4.71
	5	5.04	8.05	5.04	8.05
Bluetooth / ZigBee Internal Antenna					
Monopole	2.4	2.49			

Note:

1. The EUT supports Cyclic Delay Diversity (CDD) 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} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,

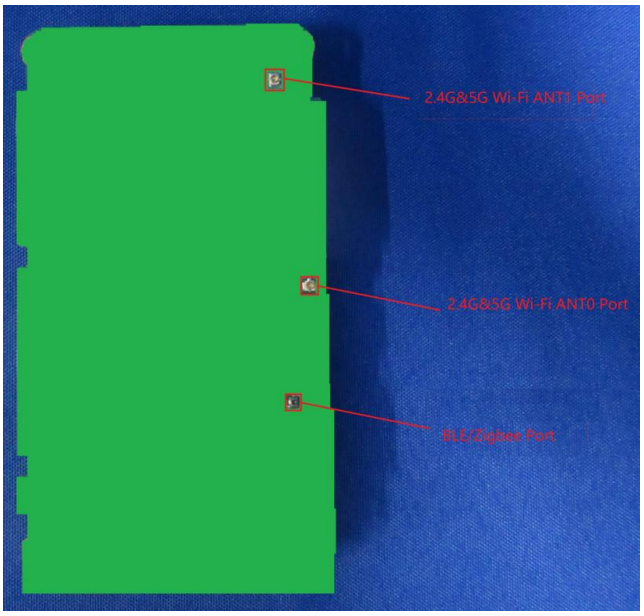
  Array Gain = 10 log (N_{ANT}/ N_{SS}) dB = 3.01;

- For power measurements on IEEE 802.11 devices,

  Array Gain = 0 dB for $N_{ANT} \leq 4$;

2. The EUT also supports Beam Forming mode, and the Beam Forming support 802.11n/ac/ax, not include 802.11a/b/g. Directional gain = G_{ANT} + BF Gain, BF Gain was declared by the applicant.
3. Antenna type and antenna gain are provided by the manufacturer.

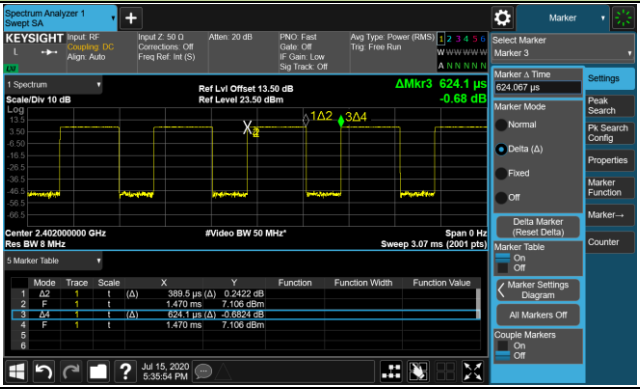
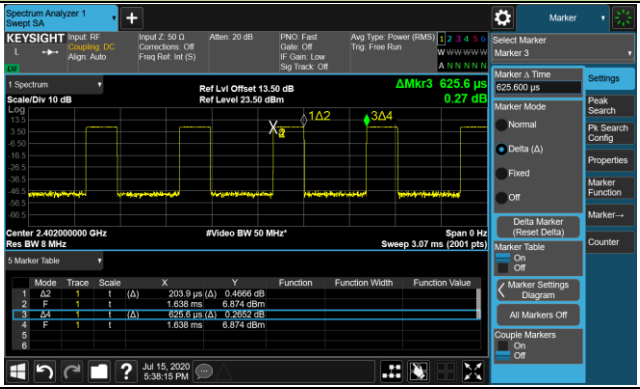
2.5. Description of Antenna RF Port

Antenna RF Port


2.6. Duty Cycle

The maximum achievable duty cycles were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Test Mode	Duty Cycle
BLE- 1Mbps	62.41%
BLE- 2Mbps	32.59%

Duty Cycle (T = Transmission Duration)	
BLE- 1Mbps (T = 389.5us)	BLE- 2Mbps (T = 203.9us)
	

2.7. EMI Suppression Device(s)/Modifications

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

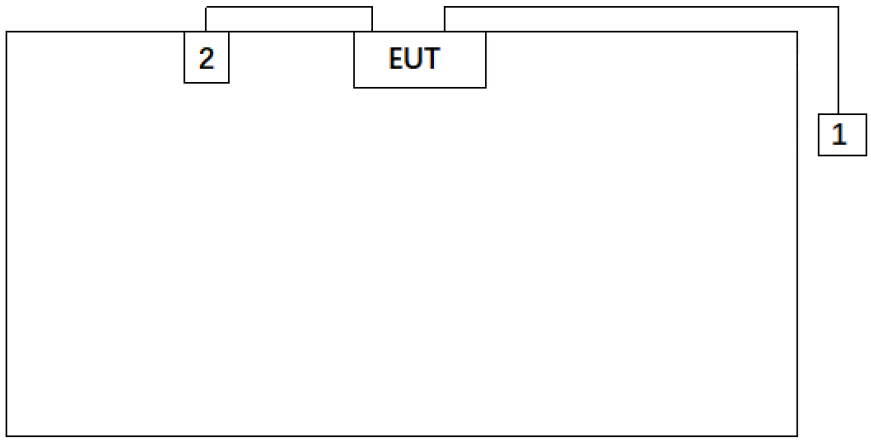
2.8. Labeling Requirements

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.

2.9. Description of Test Configuration and Software

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



Product		Manufacturer	Model No.
1	Notebook	DELL	Precision 3510
2	AC Adapter	aruba	DB-48A12

Note 1: The test utility software used during testing was “telnet.exe” and command was provided by the manufacturer.

Note 2: Detail power setting refer to operation description.

2.10. Test Environment Condition

Ambient Temperature	15°C~35°C
Relative Humidity	20%RH ~75%RH

3. DESCRIPTION OF TEST

3.1. Measurement Procedure

The measurement procedure described in the document titled “American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices” (ANSI C63.10-2013) was used in the measurement.

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. 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."

- The antenna of the device is **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Two-Line V-Network	R&S	ENV 216	MRTTWA00019	1 year	2021/3/26
Two-Line V-Network	R&S	ENV 216	MRTTWA00020	1 year	2021/4/24
8-Wire ISN (T8)	R&S	ENY81	MRTTWA00018	1 year	2021/5/25
EMI Test Receiver	R&S	ESR3	MRTTWA00045	1 year	2021/5/26
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00033	1 year	2021/5/28

Radiated Emissions

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Acitve Loop Antenna	SCHWARZBECK	FMZB 1519B	MRTTWA00002	1 year	2021/4/27
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2020/9/4
Broadband Horn antenna	SCHWARZBECK	BBHA 9120D	MRTTWA00003	1 year	2021/4/24
Breitband Horn antenna	SCHWARZBECK	BBHA 9170	MRTTWA00004	1 year	2021/4/24
Broadband Preamplifier	SCHWARZBECK	BBV 9718	MRTTWA00005	1 year	2021/4/24
Broadband Amplifier	SCHWARZBECK	BBV 9721	MRTTWA00006	1 year	2021/4/24
Signal Analyzer	R&S	FSV40	MRTTWA00007	1 year	2021/3/24
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2021/3/25
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2020/10/2
Antenna Cable	HUBERSUHNER	SF106	MRTTWE00010	1 year	2021/6/16
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00032	1 year	2021/5/28

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
X-Series USB Peak and Average Power Sensor	KEYSIGHT	U2021XA	MRTTWA00014	1 year	2021/4/24
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2020/10/2
EXA Signal Analyzer	KEYSIGHT	N9010B	MRTTWA00074	1 year	2021/7/11
Attenuator	WTI	218FS-20	MRTTWE00026	1 year	2021/05/30
Attenuator	WTI	218FS-10	MRTTWE00027	1 year	2021/05/30
Attenuator	WTI	218FS-06	MRTTWE00028	1 year	2021/05/30
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00033	1 year	2021/5/28

Software	Version	Function
v3	9.160520a	EMI Test Software

6. MEASUREMENT UNCERTAINTY

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

AC Conducted Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: 2.53dB
Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: 4.25dB 1GHz ~ 40GHz: 4.45dB
Conducted Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 0.84dB
Conducted Spurious Emission
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 2.65 dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 3.3%
Temp. / Humidity
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±0.82°C/ ±3%

7. TEST RESULT

7.1. Summary

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	6dB Bandwidth	≥ 500kHz	Conducted	Pass	Section 7.2
15.247(b)(3)	Output Power	≤ 1Watt		Pass	Section 7.3
15.247(e)	Power Spectral Density	≤ 8dBm / 3kHz		Pass	Section 7.4
15.247(d)	Band Edge / Out-of-Band Emissions	≥ 20dBc (Peak)		Pass	Section 7.5
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 7.6 & 7.7
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.8

Notes:

1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
2) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.

7.2. 6dB Bandwidth Measurement

7.2.1.Test Limit

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

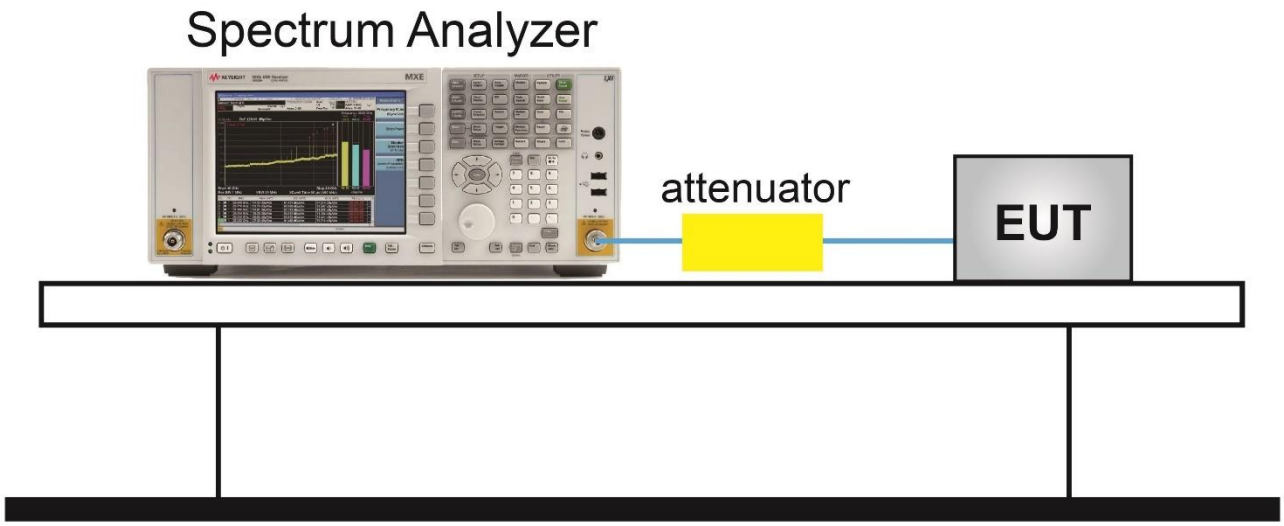
7.2.2.Test Procedure used

ANSI C63.10-2013 Section 11.8

7.2.3.Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace was allowed to stabilize

7.2.4.Test Setup



7.2.5.Test Result

Product	ACCESS POINT	Test Engineer	Eric Lin
Test Site	SR2	Test Date	2020/07/15

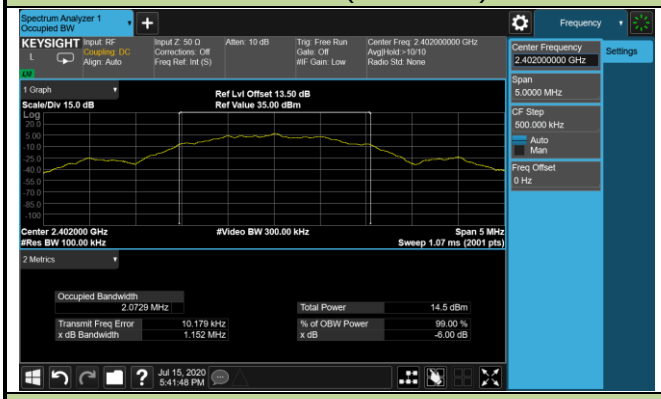
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
BLE	1	00	2402	0.703	≥ 0.5	Pass
BLE	1	19	2440	0.696	≥ 0.5	Pass
BLE	1	39	2480	0.696	≥ 0.5	Pass
BLE	2	00	2402	1.152	≥ 0.5	Pass
BLE	2	19	2440	1.143	≥ 0.5	Pass
BLE	2	39	2480	1.156	≥ 0.5	Pass

BLE 6dB Bandwidth – 1Mbps

Channel 00 (2402MHz)

Channel 19 (2440MHz)

Channel 39 (2480MHz)

BLE 6dB Bandwidth – 2Mbps	
Channel 00 (2402MHz)	Channel 19 (2440MHz)
	
Channel 39 (2480MHz)	
	

7.3. Output Power Measurement

7.3.1.Test Limit

The maximum out power shall be less 1 Watt (30dBm).

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 6 dBi. If transmitting antennas of directional gain greater than 6 dBi 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 6 dBi.

7.3.2.Test Procedure Used

ANSI C63.10-2013 Section 11.9.1.3

ANSI C63.10-2013 Section 11.9.2.3

7.3.3.Test Setting

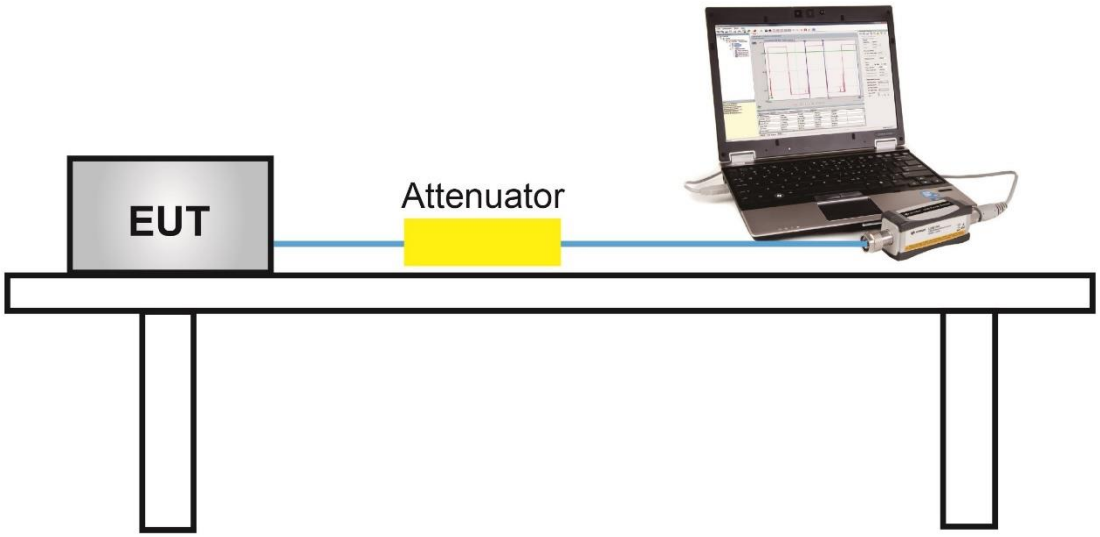
Method PKPM1 (Peak Power Measurement of Signals with DTS BW ≤ 50MHz)

Peak power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The pulse sensor employs a VBW = 50MHz so this method was only used for signals whose DTS bandwidth was less than or equal to 50MHz.

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

7.3.4.Test Setup



7.3.5.Test Result of Output Power

Product	ACCESS POINT	Test Engineer	Eric Lin
Test Site	SR2	Test Date	2020/07/15

Test Result of Peak Output Power

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
BLE	1	00	2402	8.39	≤ 30.00	Pass
BLE	1	19	2440	8.35	≤ 30.00	Pass
BLE	1	39	2480	8.17	≤ 30.00	Pass
BLE	2	00	2402	8.40	≤ 30.00	Pass
BLE	2	19	2440	8.36	≤ 30.00	Pass
BLE	2	39	2480	8.18	≤ 30.00	Pass

Note: E.I.R.P (dBm) = Max Peak Power (dBm) + Antenna Gain (dBi) = 8.40 dBm + 2.49 dBi = 10.89 dBm.

Test Result of Average Output Power (Reporting Only)

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Average Power (dBm)	Limit (dBm)	Result
BLE	1	00	2402	8.00	≤ 30.00	Pass
BLE	1	19	2440	8.00	≤ 30.00	Pass
BLE	1	39	2480	7.80	≤ 30.00	Pass
BLE	2	00	2402	8.02	≤ 30.00	Pass
BLE	2	19	2440	7.97	≤ 30.00	Pass
BLE	2	39	2480	7.78	≤ 30.00	Pass

Note: E.I.R.P (dBm) = Max Peak Power (dBm) + Antenna Gain (dBi) = 8.02 dBm + 2.49 dBi = 10.51 dBm.

7.4. Power Spectral Density Measurement

7.4.1.Test Limit

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

The same method of determining the conducted output power shall be used to determine the power spectral density.

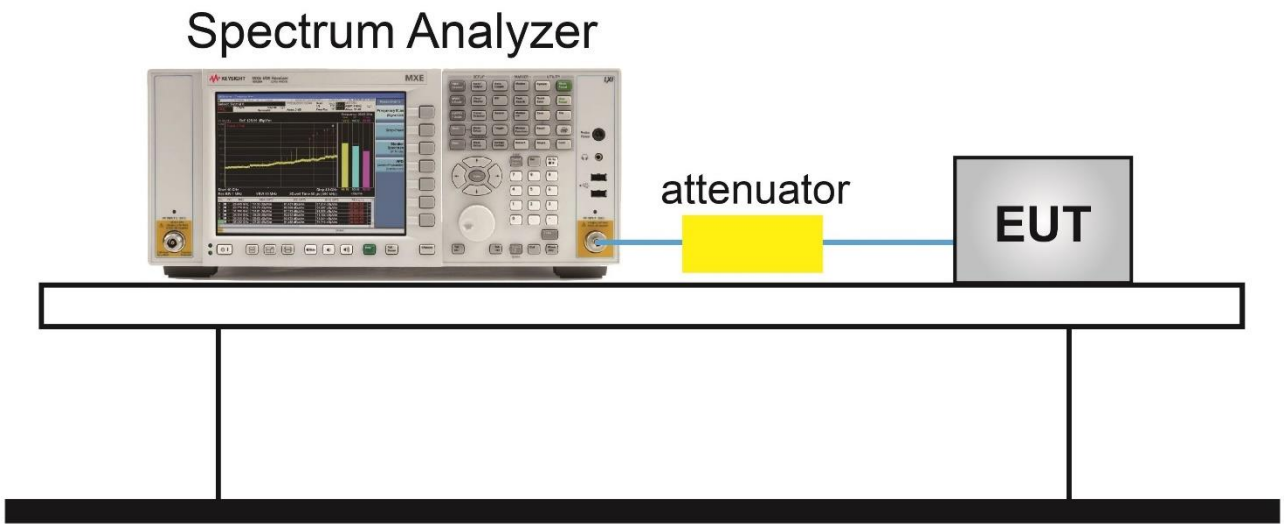
7.4.2.Test Procedure Used

ANSI C63.10-2013 Section 11.10.2

7.4.3.Test Setting

1. Analyzer was set to the center frequency of the DTS channel under investigation
2. Span = 1.5 times the DTS channel bandwidth
3. RBW = 3kHz
4. VBW = 10kHz
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Trace was allowed to stabilize

7.4.4.Test Setup



7.4.5.Test Result

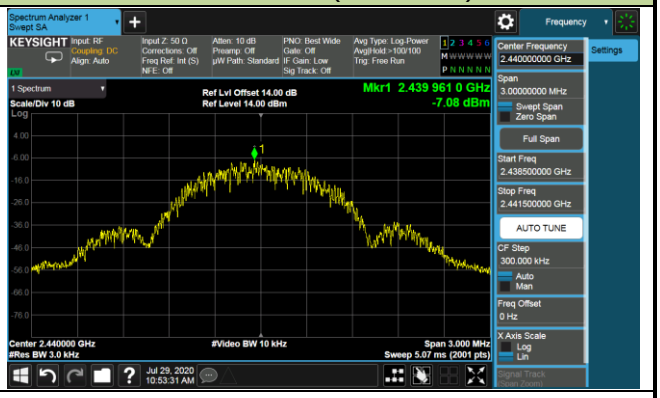
Product	ACCESS POINT	Test Engineer	Eric Lin
Test Site	SR2	Test Date	2020/07/29

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1	00	2402	-6.95	≤ 8.00	Pass
BLE	1	19	2440	-7.08	≤ 8.00	Pass
BLE	1	39	2480	-9.18	≤ 8.00	Pass
BLE	2	00	2402	-9.51	≤ 8.00	Pass
BLE	2	19	2440	-9.61	≤ 8.00	Pass
BLE	2	39	2480	-10.03	≤ 8.00	Pass

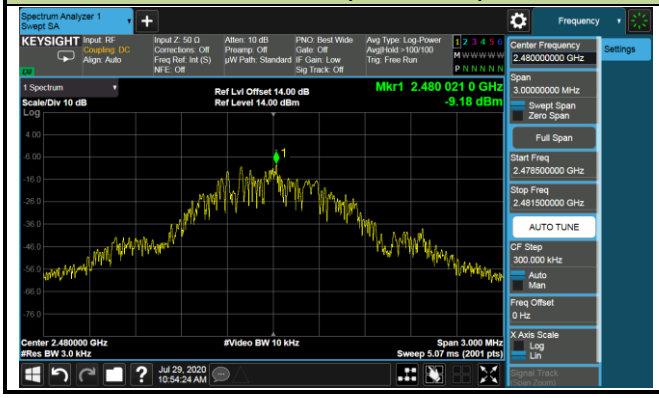
BLE PSD – 1Mbps

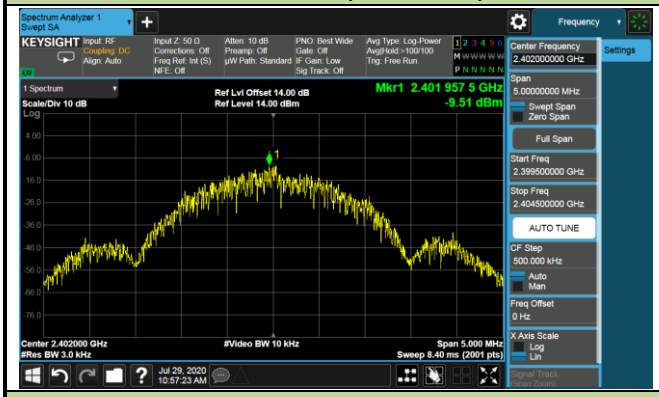
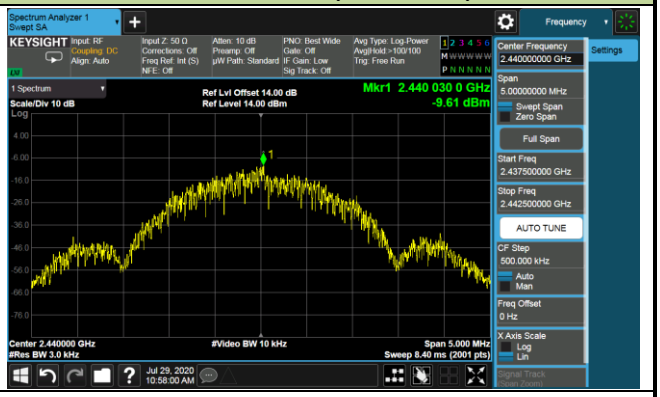
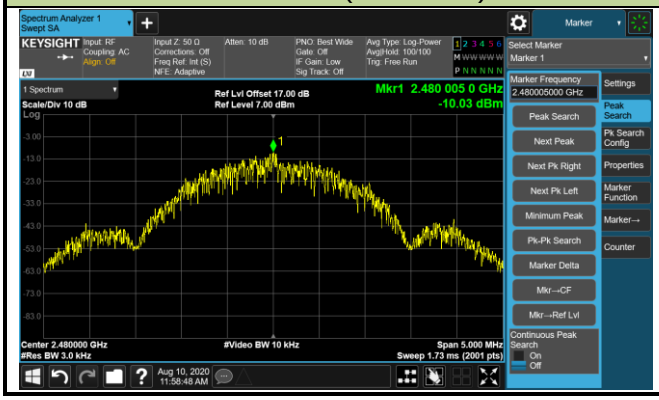
Channel 00 (2402MHz)

Channel 19 (2440MHz)



Channel 39 (2480MHz)



BLE PSD – 2Mbps	
Channel 00 (2402MHz)	Channel 19 (2440MHz)
	
Channel 39 (2480MHz)	
	

7.5. Conducted Band Edge and Out-of-Band Emissions

7.5.1.Test Limit

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the PSD procedure.

7.5.2.Test Procedure Used

ANSI C63.10-2013 Section 11.11

7.5.3.Test Settitng

1. Reference level measurement

a) Set instrument center frequency to DTS channel center frequency

b) Set the span to ≥ 1.5 times the DTS bandwidth

c) Set the RBW = 100 kHz

d) Set the VBW ≥ 3 x RBW

e) Detector = peak

f) Sweep time = auto couple

g) Trace mode = max hold

h) Allow trace to fully stabilize

2. Emission level measurement

a) Start frequency was set to 30MHz and stop frequency was set to 25GHz (separated into two plots per channel)

b) RBW = 100kHz

c) VBW = 300kHz

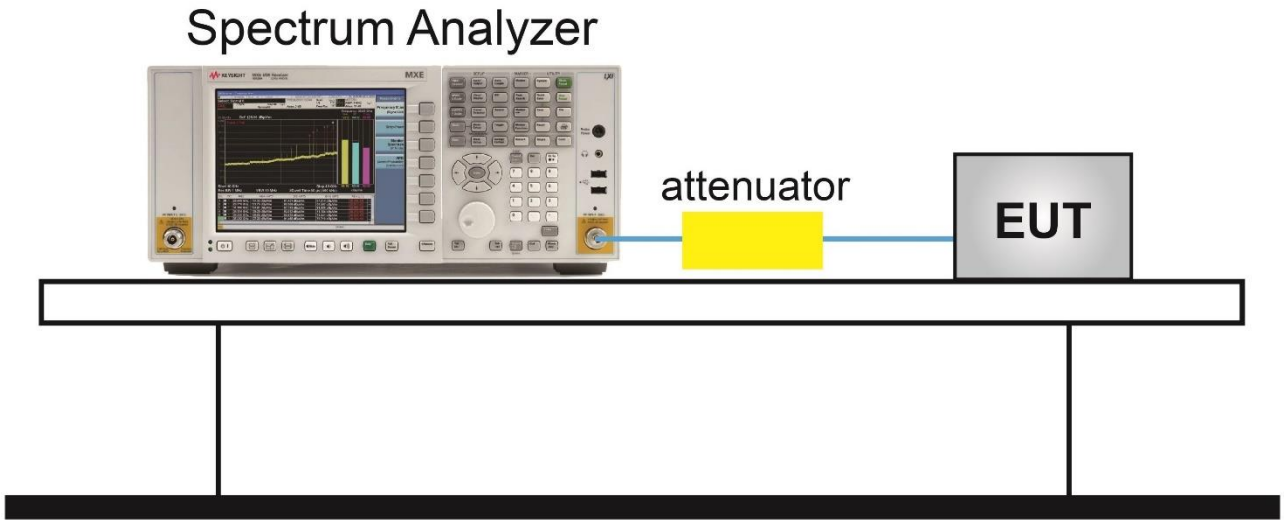
d) Detector = Peak

e) Trace mode = max hold

f) Sweep time = auto couple

g) The trace was allowed to stabilize

7.5.4.Test Setup



7.5.5.Test Result

Product	ACCESS POINT	Test Engineer	Eric Lin
Test Site	SR2	Test Date	2020/07/29

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Limit	Result
BLE	1	00	2402	20dBc	Pass
BLE	1	19	2440	20dBc	Pass
BLE	1	39	2480	20dBc	Pass
BLE	2	00	2402	20dBc	Pass
BLE	2	19	2440	20dBc	Pass
BLE	2	39	2480	20dBc	Pass

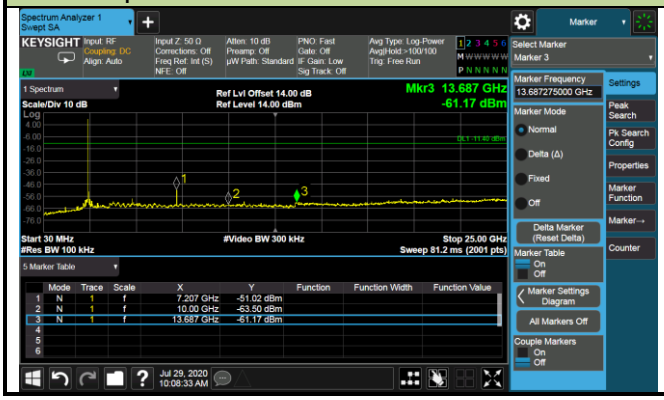
BLE Out-of-Band Emissions – 1Mbps

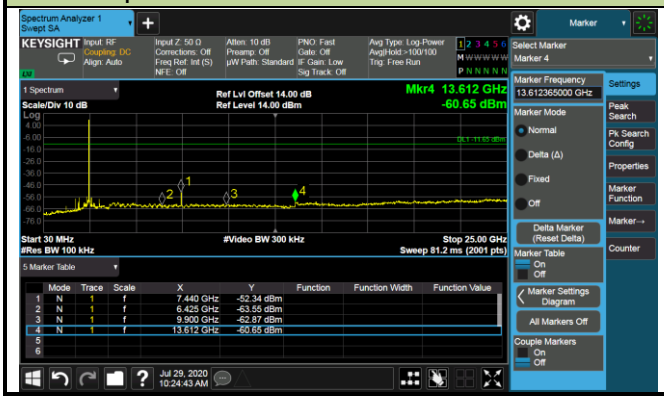
Channel 00 (2402MHz)

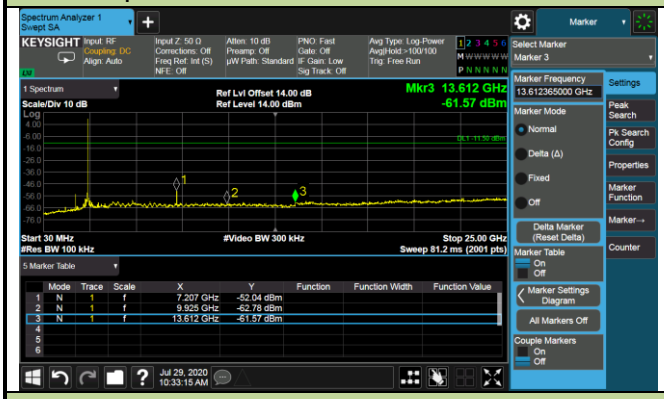
100kHz PSD reference Level

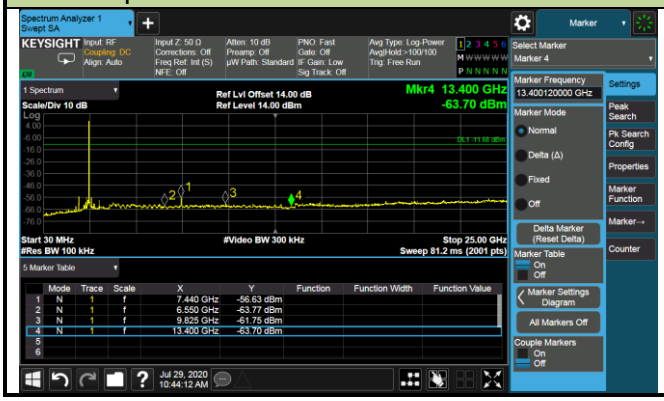
Low Band Edge

Spurious Emission 30MHz ~ 25GHz



Channel 19 (2440MHz)	
100kHz PSD reference Level	Spurious Emission 30MHz ~ 25GHz
	
Channel 39 (2480MHz)	
100kHz PSD reference Level	High Band Edge
	
Spurious Emission 30MHz ~ 25GHz	
	

BLE Out-of-Band Emissions – 2Mbps	
Channel 00 (2402MHz)	
100kHz PSD reference Level	Low Band Edge
	
Spurious Emission 30MHz ~ 25GHz	
	
Channel 19 (2440MHz)	
100kHz PSD reference Level	Spurious Emission 30MHz ~ 25GHz
	

Channel 39 (2480MHz)	
100kHz PSD reference Level	High Band Edge
	
Spurious Emission 30MHz ~ 25GHz	
	

7.6. Radiated Spurious Emission Measurement

7.6.1.Test Limit

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

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

7.6.2.Test Procedure Used

ANSI C63.10-2013 Section 6.3 (General Requirements)

ANSI C63.10-2013 Section 6.4 (Standard test method below 30MHz)

ANSI C63.10-2013 Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10-2013 Section 6.6 (Standard test method above 1GHz)

ANSI C63.10-2013 Section 11.11 & 11.12

7.6.3.Test Setting

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

Quasi-Peak Measurements below 1GHz

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

2. Span was set greater than 1MHz

3. RBW = as specified in Table 1

4. Detector = CISPR quasi-peak

5. Sweep time = auto couple

6. Trace was allowed to stabilize

Peak Measurements above 1GHz

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

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

2. RBW = 1MHz

3. VBW; If the EUT is configured to transmit with duty cycle ≥ 98%, set VBW = 10 Hz.

If the EUT duty cycle is < 98%, set VBW ≥ 1/T. T is the minimum transmission duration.

4. Detector = Peak

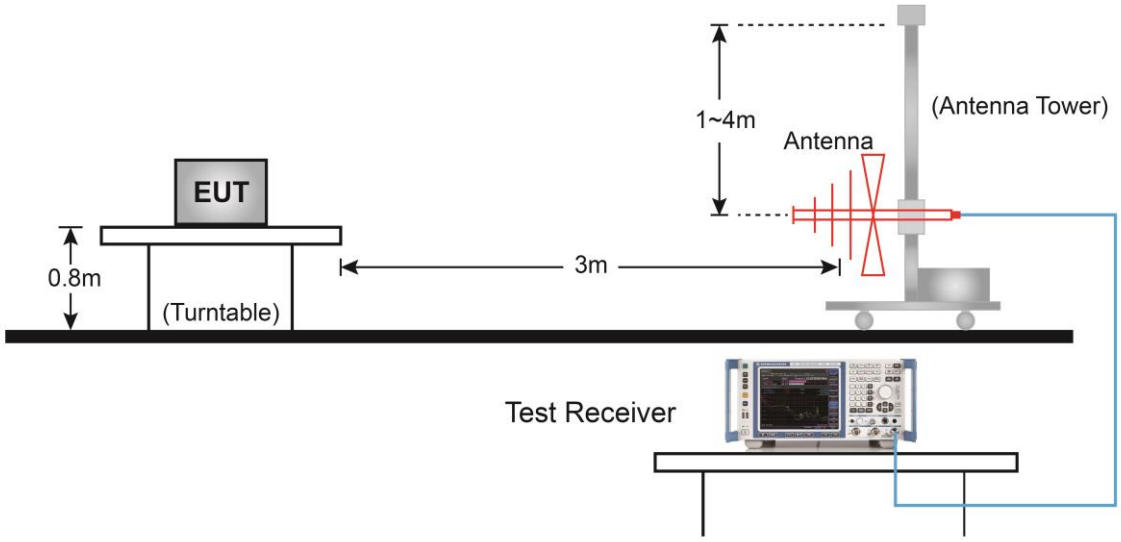
5. Sweep time = auto

6. Trace mode = max hold

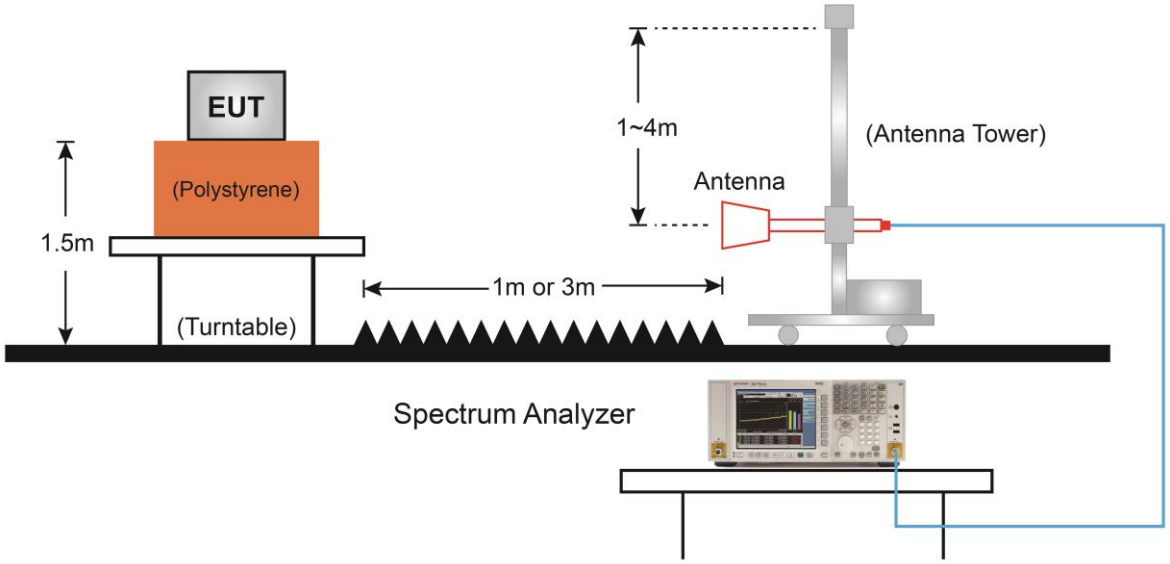
7. Trace was allowed to stabilize

7.6.4.Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



7.6.5.Test Result

Product	ACCESS POINT	Test Engineer	Jay Chu
Test Site	AC1	Test Date	2020/07/24
Test Mode	BLE - 1Mbps	Test Channel:	00
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	3966.5	34.3	0.8	35.1	74.0	-38.9	Peak	Horizontal
	5003.5	33.3	3.8	37.1	74.0	-36.9	Peak	Horizontal
*	6219.0	32.5	6.9	39.4	74.0	-34.6	Peak	Horizontal
*	9636.0	29.9	14.7	44.6	74.0	-29.4	Peak	Horizontal
	3898.5	34.3	0.5	34.8	74.0	-39.2	Peak	Vertical
	4850.5	32.8	3.4	36.2	74.0	-37.8	Peak	Vertical
*	6006.5	32.2	5.9	38.1	74.0	-35.9	Peak	Vertical
*	9653.0	30.4	14.7	45.1	74.0	-28.9	Peak	Vertical

Note 1: “*” means test frequency didn't fall into restricted band.

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	ACCESS POINT	Test Engineer	Jay Chu
Test Site	AC1	Test Date	2020/07/24
Test Mode	BLE - 1Mbps	Test Channel:	19
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4043.0	34.1	1.0	35.1	74.0	-38.9	Peak	Horizontal
	4697.5	34.4	3.0	37.4	74.0	-36.6	Peak	Horizontal
*	6550.5	30.9	8.3	39.2	74.0	-34.8	Peak	Horizontal
*	8794.5	29.3	13.2	42.5	74.0	-31.5	Peak	Horizontal
	4043.0	34.1	1.0	35.1	74.0	-38.9	Peak	Vertical
	4850.5	33.3	3.4	36.7	74.0	-37.3	Peak	Vertical
*	6355.0	31.1	7.5	38.6	74.0	-35.4	Peak	Vertical
*	9772.0	30.8	14.9	45.7	74.0	-28.3	Peak	Vertical

Note 1: “*” means test frequency didn't fall into restricted band.

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	ACCESS POINT	Test Engineer	Jay Chu
Test Site	AC1	Test Date	2020/07/24
Test Mode	BLE - 1Mbps	Test Channel:	39
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	3873.0	34.8	0.4	35.2	74.0	-38.8	Peak	Horizontal
	4833.5	33.3	3.4	36.7	74.0	-37.3	Peak	Horizontal
*	6219.0	31.9	6.9	38.8	74.0	-35.2	Peak	Horizontal
*	8735.0	29.0	13.0	42.0	74.0	-32.0	Peak	Horizontal
	4111.0	33.4	1.3	34.7	74.0	-39.3	Peak	Vertical
	4672.0	33.4	3.0	36.4	74.0	-37.6	Peak	Vertical
*	6380.5	31.2	7.6	38.8	74.0	-35.2	Peak	Vertical
*	8616.0	30.4	12.7	43.1	74.0	-30.9	Peak	Vertical

Note 1: “*” means test frequency didn't fall into restricted band.

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	ACCESS POINT	Test Engineer	Jay Chu
Test Site	AC1	Test Date	2020/07/24
Test Mode	BLE - 2Mbps	Test Channel:	00
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	3890.0	33.8	0.5	34.3	74.0	-39.7	Peak	Horizontal
	4842.0	32.8	3.4	36.2	74.0	-37.8	Peak	Horizontal
*	6261.5	31.7	7.0	38.7	74.0	-35.3	Peak	Horizontal
*	9636.0	30.6	14.7	45.3	74.0	-28.7	Peak	Horizontal
	4043.0	34.9	1.0	35.9	74.0	-38.1	Peak	Vertical
	5071.5	33.9	3.8	37.7	74.0	-36.3	Peak	Vertical
*	6635.5	31.0	8.7	39.7	74.0	-34.3	Peak	Vertical
*	10426.5	29.0	16.8	45.8	74.0	-28.2	Peak	Vertical

Note 1: “*” means test frequency didn't fall into restricted band.

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	ACCESS POINT	Test Engineer	Jay Chu
Test Site	AC1	Test Date	2020/07/24
Test Mode	BLE - 2Mbps	Test Channel:	19
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4026.0	33.5	1.0	34.5	74.0	-39.5	Peak	Horizontal
	4935.5	32.6	3.6	36.2	74.0	-37.8	Peak	Horizontal
*	6244.5	31.5	7.0	38.5	74.0	-35.5	Peak	Horizontal
*	8701.0	30.0	12.9	42.9	74.0	-31.1	Peak	Horizontal
	4043.0	33.6	1.0	34.6	74.0	-39.4	Peak	Vertical
	4791.0	33.4	3.2	36.6	74.0	-37.4	Peak	Vertical
*	6312.5	31.8	7.3	39.1	74.0	-34.9	Peak	Vertical
*	8692.5	30.8	12.9	43.7	74.0	-30.3	Peak	Vertical

Note 1: “*” means test frequency didn't fall into restricted band.

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	ACCESS POINT	Test Engineer	Jay Chu
Test Site	AC1	Test Date	2020/07/24
Test Mode	BLE - 2Mbps	Test Channel:	39
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	3941.0	33.8	0.7	34.5	74.0	-39.5	Peak	Horizontal
	4910.0	32.7	3.5	36.2	74.0	-37.8	Peak	Horizontal
*	6100.0	32.0	6.3	38.3	74.0	-35.7	Peak	Horizontal
*	8726.5	30.6	13.0	43.6	74.0	-30.4	Peak	Horizontal
	3873.0	34.4	0.4	34.8	74.0	-39.2	Peak	Vertical
	4927.0	33.2	3.6	36.8	74.0	-37.2	Peak	Vertical
*	6533.5	31.3	8.2	39.5	74.0	-34.5	Peak	Vertical
*	8667.0	30.7	12.9	43.6	74.0	-30.4	Peak	Vertical

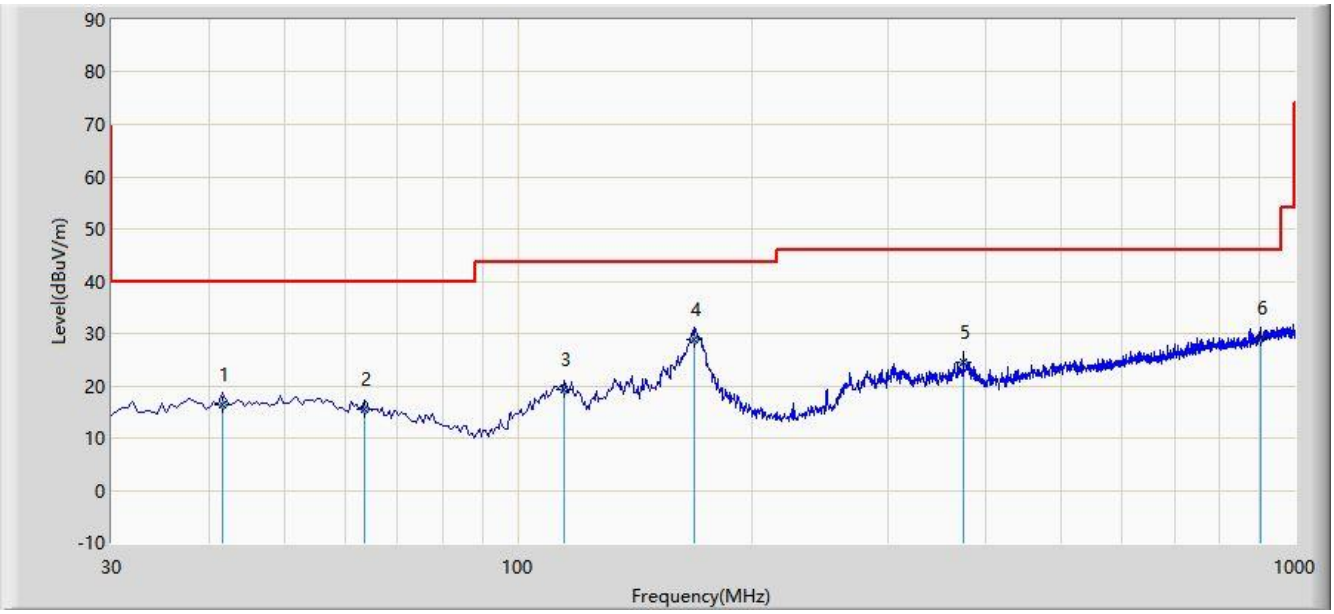
Note 1: “*” means test frequency didn't fall into restricted band.

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 Result of Radiated Spurious Emission below 1GHz:

Site: AC1	Time: 2020/08/06 - 01:44
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: VULB 9162 (30MHz~8GHz)	Polarity: Horizontal
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth LE(1Mbps) at Channel 2440MHz	



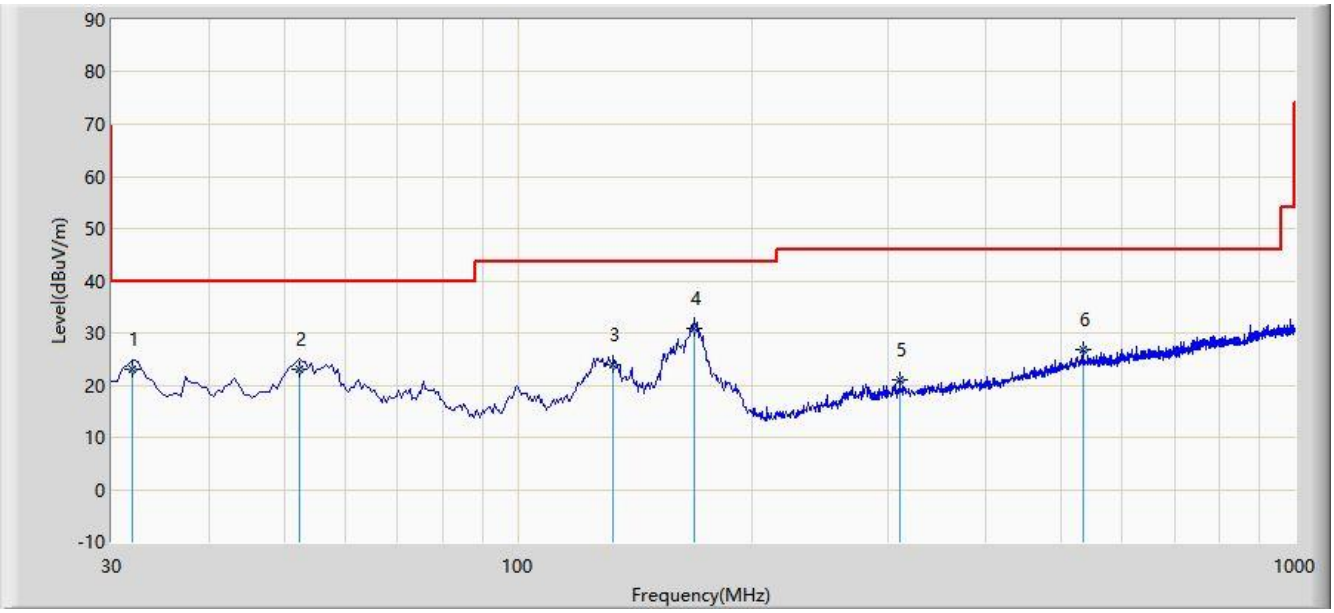
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			41.640	16.404	-4.500	-23.596	40.000	20.904	QP
2			63.465	15.386	-3.465	-24.614	40.000	18.851	QP
3			114.875	19.351	1.500	-24.149	43.500	17.850	QP
4		*	168.710	28.865	12.545	-14.635	43.500	16.320	QP
5			374.835	24.447	0.654	-21.553	46.000	23.793	QP
6			903.485	28.990	-2.500	-17.010	46.000	31.490	QP

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

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

Note 2: The amplitude of radiated emissions (frequency range from 9kHz to 30MHz and 18GHz to 25GHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

Site: AC1	Time: 2020/08/06 - 01:45
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: VULB 9162 (30MHz~8GHz)	Polarity: Vertical
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth LE(1Mbps) at Channel 2440MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			31.940	23.029	4.645	-16.971	40.000	18.384	QP
2			52.310	22.940	1.650	-17.060	40.000	21.290	QP
3			132.820	23.769	7.940	-19.731	43.500	15.829	QP
4		*	168.710	30.880	14.560	-12.620	43.500	16.320	QP
5			310.330	20.880	-0.940	-25.120	46.000	21.820	QP
6			534.400	26.814	0.450	-19.186	46.000	26.364	QP

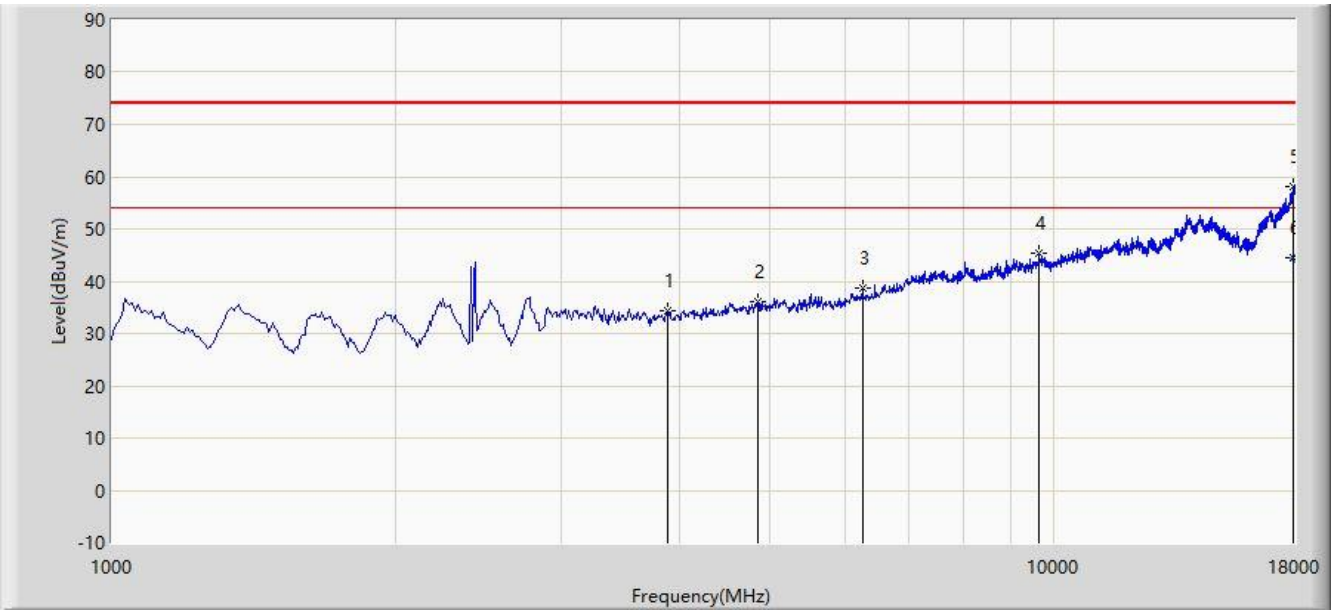
Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

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

Note 2: The amplitude of radiated emissions (frequency range from 9kHz to 30MHz and 18GHz to 25GHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

The Worse Case Result Plot of Radiated Spurious Emission Above 1GHz

Site: AC1	Time: 2020/07/24 - 23:42
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Horizontal
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE(2Mbps) at Channel 2402MHz	



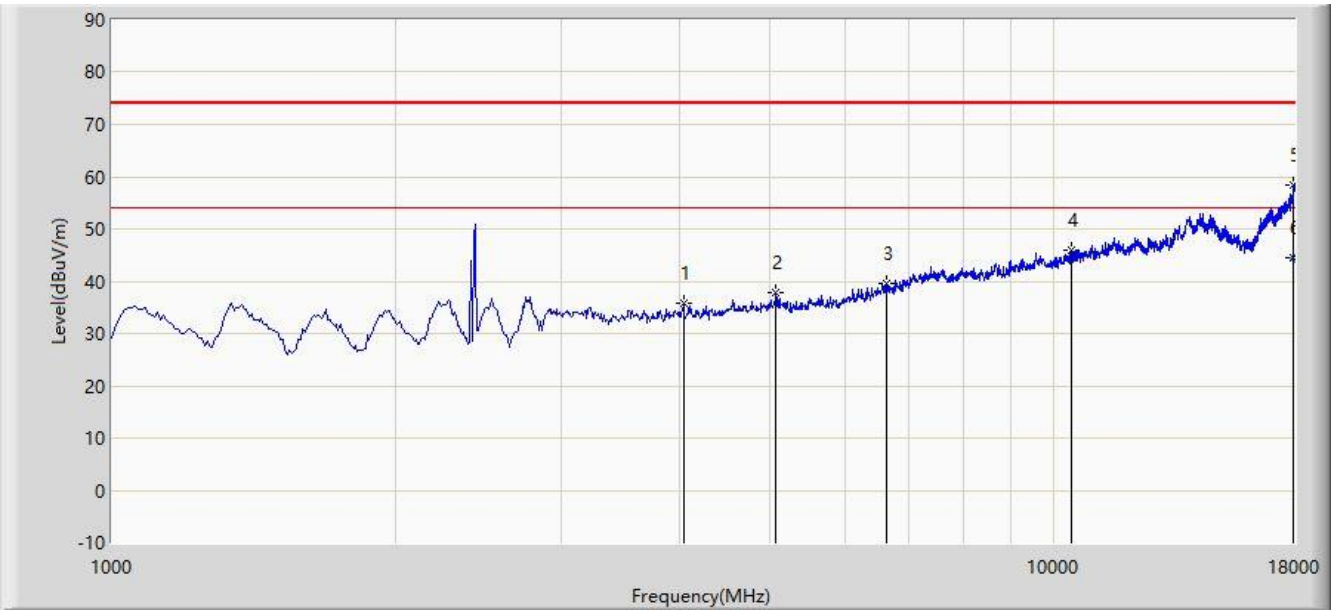
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			3890.000	34.307	33.806	-39.693	74.000	0.501	PK
2			4842.000	36.166	32.796	-37.834	74.000	3.370	PK
3			6261.500	38.748	31.705	-35.252	74.000	7.043	PK
4			9636.000	45.303	30.627	-28.697	74.000	14.676	PK
5			17966.000	58.220	26.248	-15.780	74.000	31.972	PK
6		*	17966.000	44.363	12.391	-9.637	54.000	31.972	AV

Note1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

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

Note2: The amplitude of radiated emissions (Frequency range around 13 to 18GHz above average limit) is same as the ambient noise, we selected the highest peak level frequency and performed average emission testing again.

Site: AC1	Time: 2020/07/24 - 23:44
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Vertical
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE(2Mbps) at Channel 2402MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			4043.000	35.933	34.910	-38.067	74.000	1.023	PK
2			5071.500	37.759	33.934	-36.241	74.000	3.824	PK
3			6635.500	39.703	31.010	-34.297	74.000	8.693	PK
4			10426.500	45.843	29.024	-28.157	74.000	16.820	PK
5			17923.500	58.290	26.439	-15.710	74.000	31.851	PK
6		*	17923.500	44.434	12.583	-9.566	54.000	31.851	AV

Note1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

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

Note2: The amplitude of radiated emissions (Frequency range around 13 to 18GHz above average limit) is same as the ambient noise, we selected the highest peak level frequency and performed average emission testing again.

7.7. Radiated Restricted Band Edge Measurement

7.7.1.Test Limit

For 15.205 requirement:

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

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1] 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 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

7.7.2.Test Procedure Used

ANSI C63.10-2013 Section 6.3 (General Requirements)

ANSI C63.10-2013 Section 6.6 (Standard test method above 1GHz)

ANSI C63.10-2013 Section 11.13

7.7.3.Test Setting

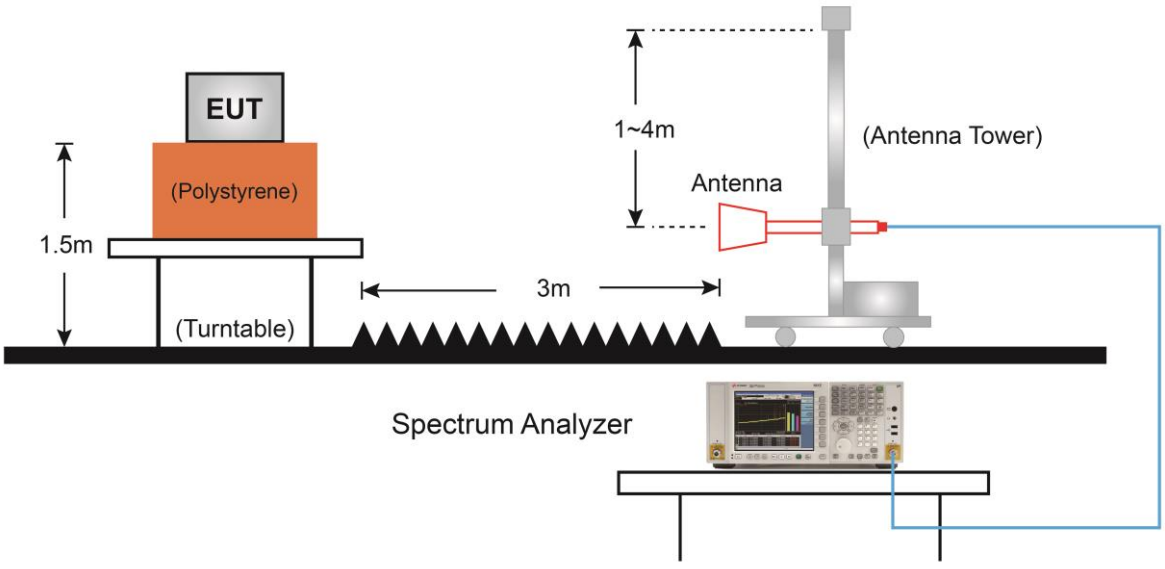
Peak Field Strength Measurements

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

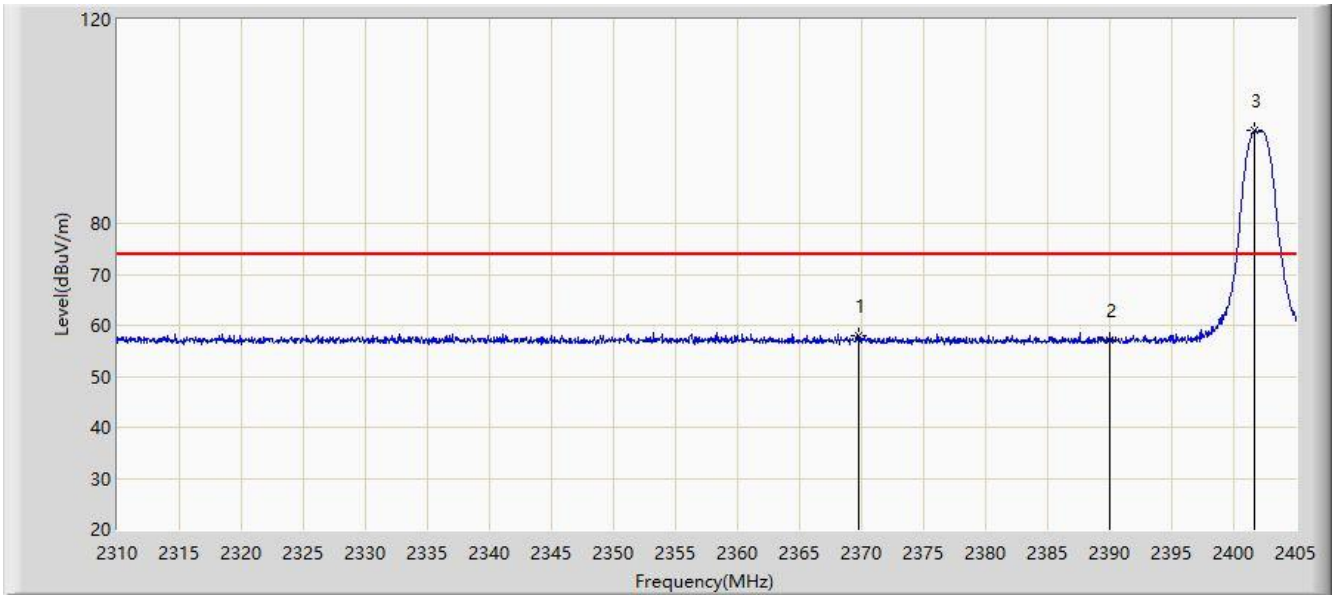
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ 1/T
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

7.7.4.Test Setup



7.7.5.Test Result

Site: AC1	Time: 2020/07/26 - 11:39
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Horizontal
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (1Mbps) at Channel 2402MHz	

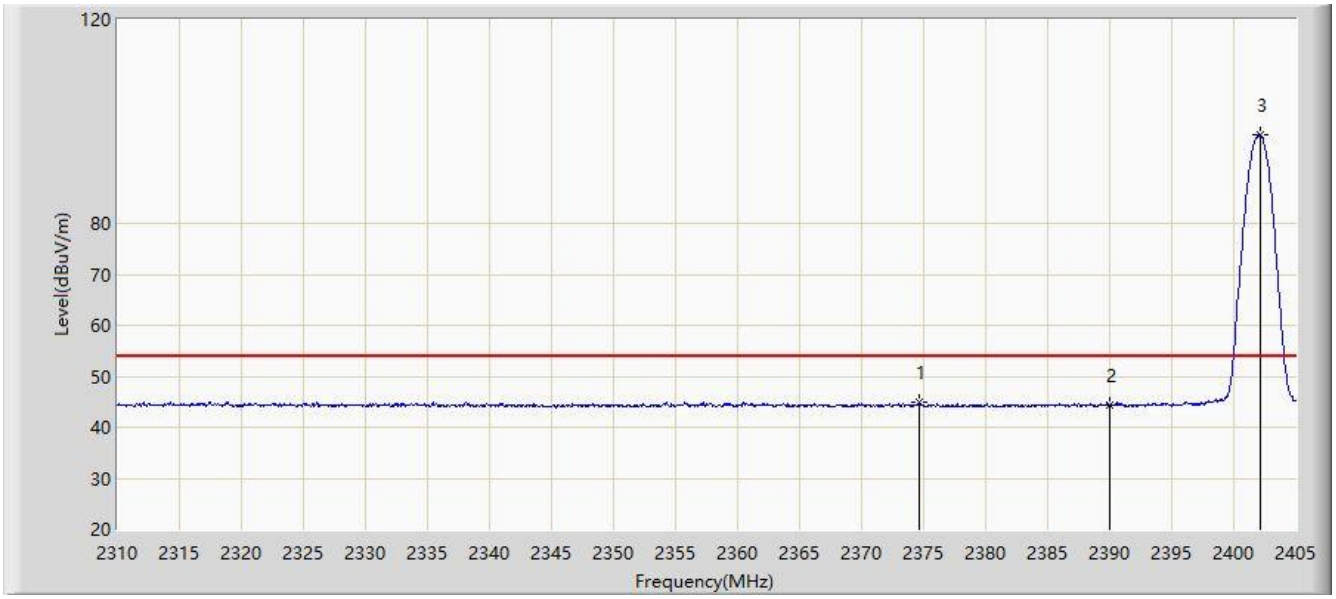


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2369.802	58.081	25.874	-15.919	74.000	32.207	PK
2			2390.000	57.089	24.793	-16.911	74.000	32.296	PK
3		*	2401.675	98.131	65.784	N/A	N/A	32.347	PK

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

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

Site: AC1	Time: 2020/07/26 - 11:59
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Horizontal
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (1Mbps) at Channel 2402MHz	

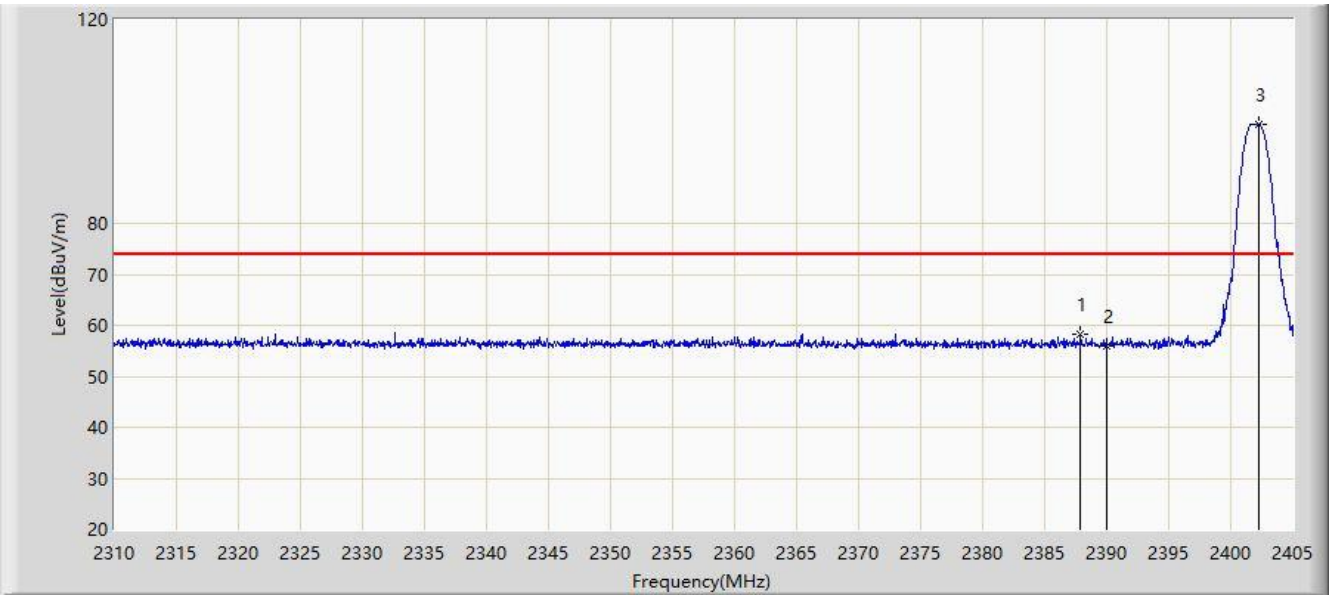


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2374.695	44.795	12.567	-9.205	54.000	32.228	AV
2			2390.000	44.273	11.977	-9.727	54.000	32.296	AV
3		*	2402.150	97.291	64.942	N/A	N/A	32.349	AV

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

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

Site: AC1	Time: 2020/07/26 - 12:04
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Vertical
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (1Mbps) at Channel 2402MHz	

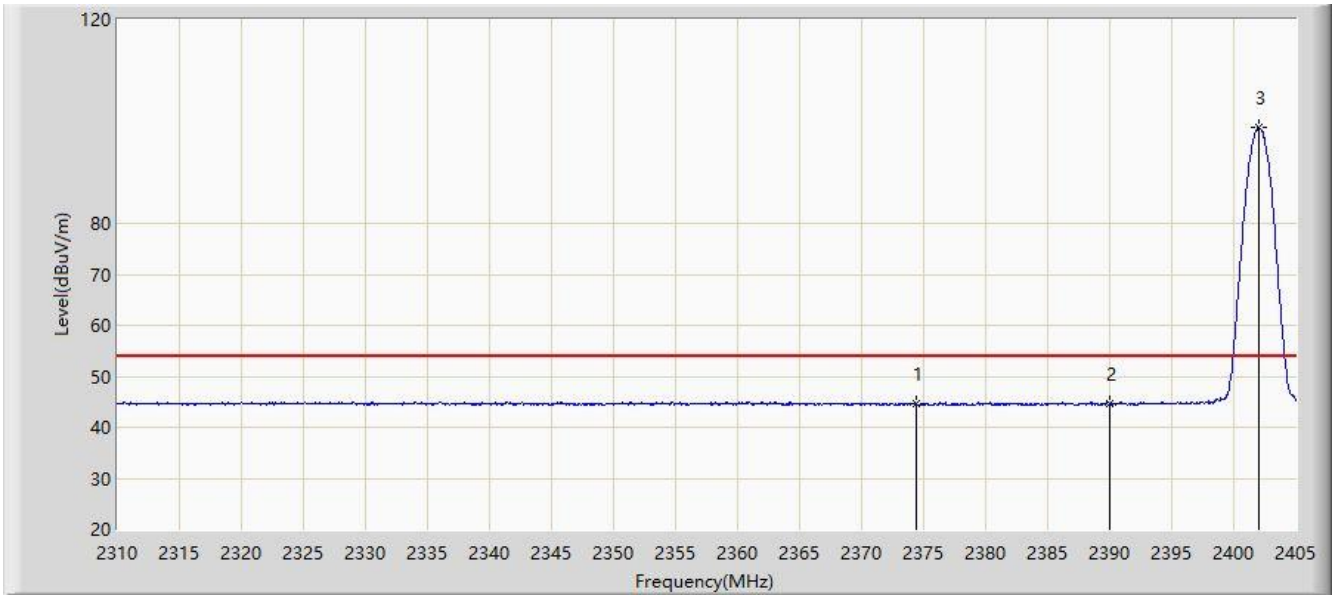


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2387.900	58.237	25.950	-15.763	74.000	32.287	PK
2			2390.000	55.953	23.657	-18.047	74.000	32.296	PK
3		*	2402.292	99.511	67.161	N/A	N/A	32.350	PK

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

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

Site: AC1	Time: 2020/07/26 - 12:04
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Vertical
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (1Mbps) at Channel 2402MHz	

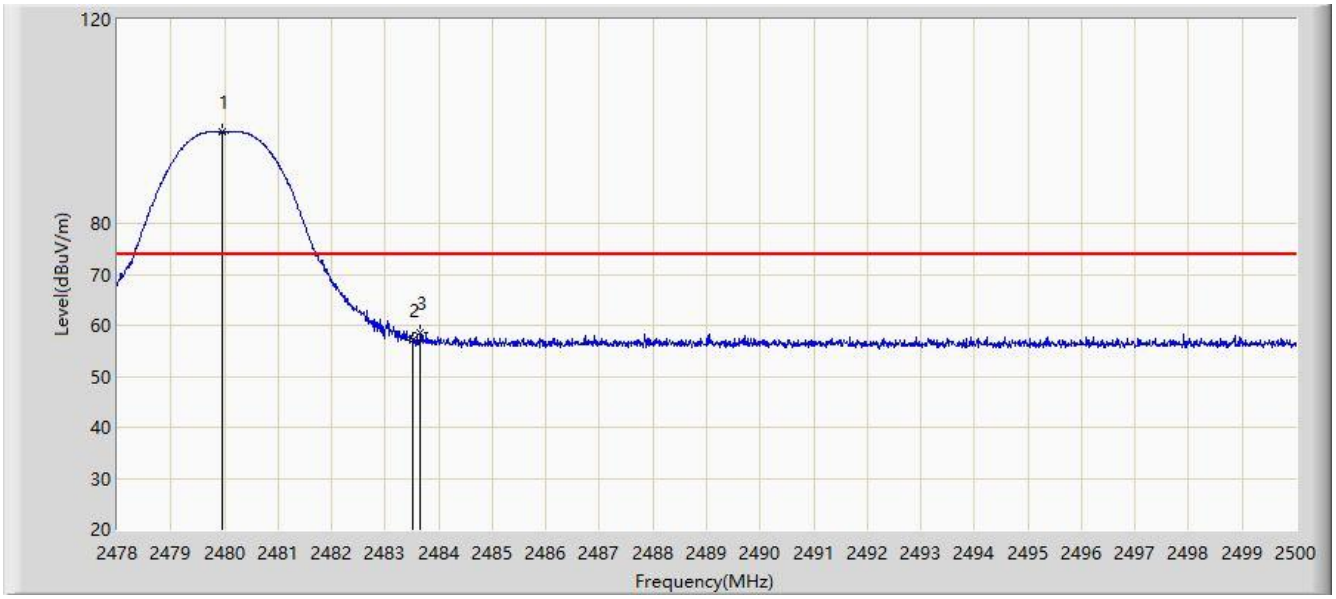


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2374.363	44.739	12.512	-9.261	54.000	32.227	AV
2			2390.000	44.639	12.343	-9.361	54.000	32.296	AV
3		*	2402.008	98.778	66.429	N/A	N/A	32.348	AV

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

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

Site: AC1	Time: 2020/07/26 - 12:11
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Horizontal
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (1Mbps) at Channel 2480MHz	

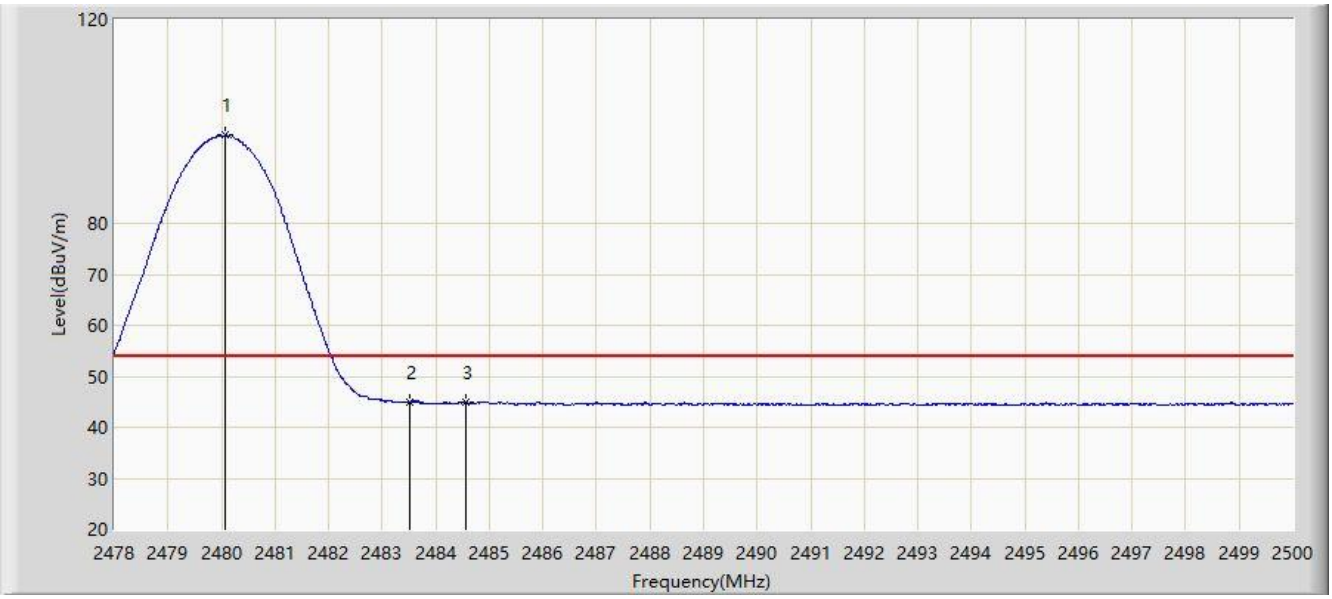


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.969	97.881	65.189	N/A	N/A	32.692	PK
2			2483.500	57.100	24.392	-16.900	74.000	32.707	PK
3			2483.665	58.411	25.703	-15.589	74.000	32.709	PK

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

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

Site: AC1	Time: 2020/07/26 - 12:16
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Horizontal
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (1Mbps) at Channel 2480MHz	

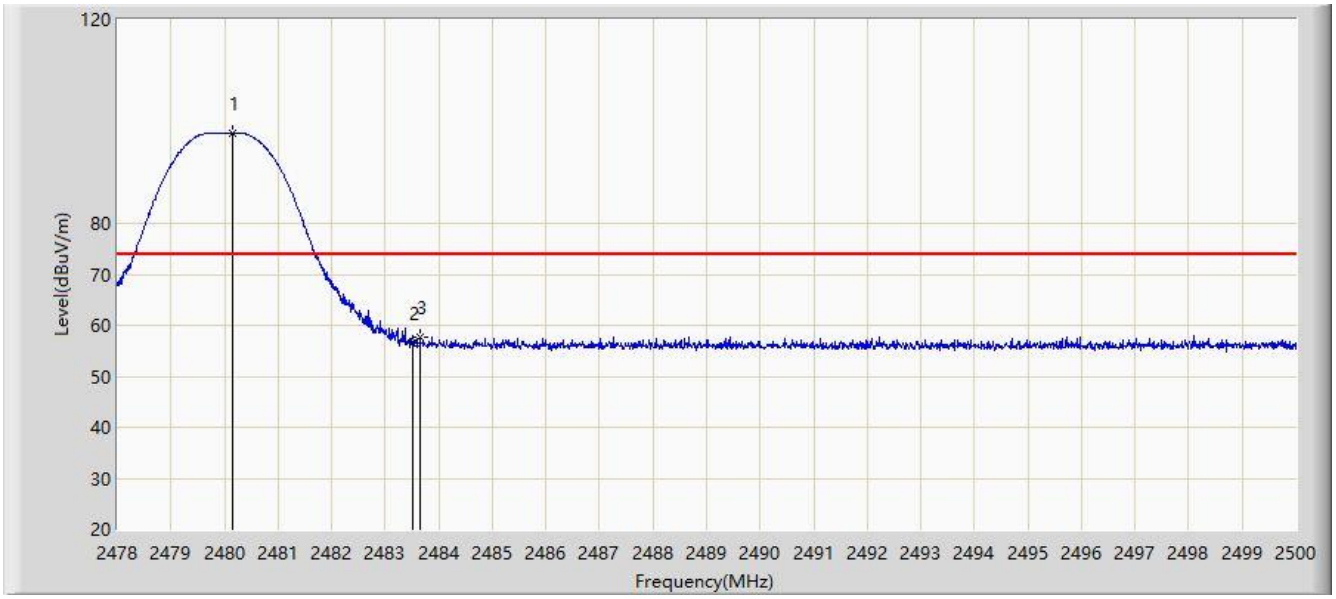


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.079	97.256	64.563	N/A	N/A	32.692	AV
2			2483.500	44.888	12.180	-9.112	54.000	32.707	AV
3			2484.556	45.003	12.291	-8.997	54.000	32.713	AV

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

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

Site: AC1	Time: 2020/07/26 - 12:19
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Vertical
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (1Mbps) at Channel 2480MHz	

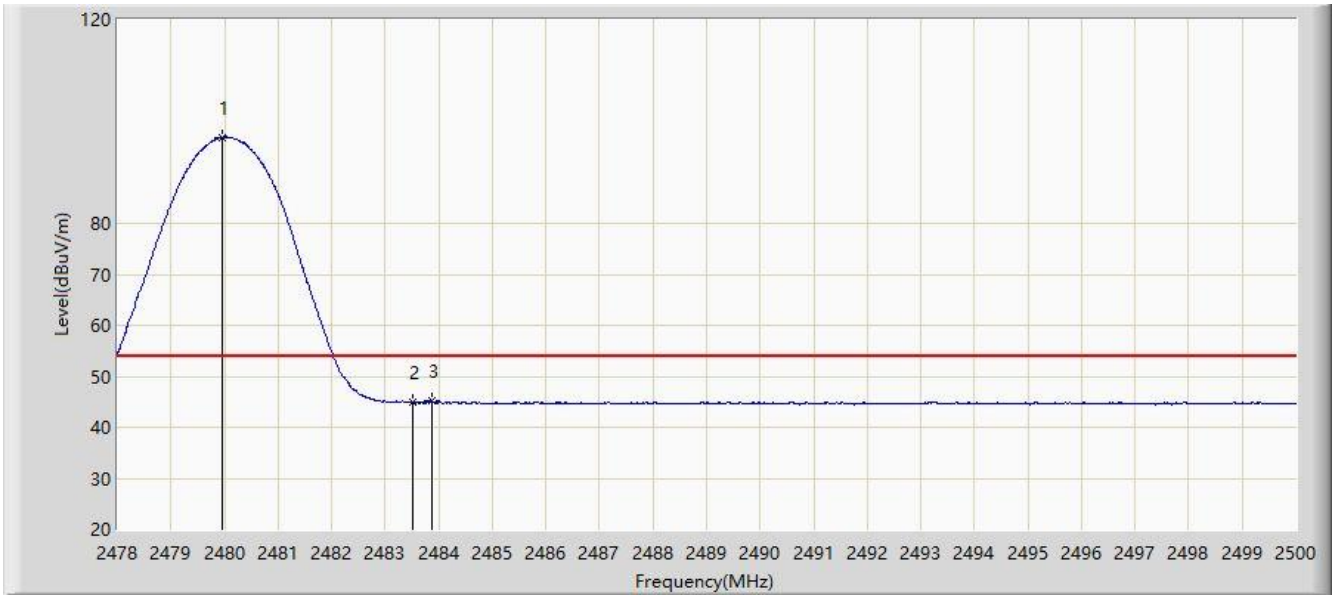


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.145	97.648	64.955	N/A	N/A	32.693	PK
2			2483.500	56.659	23.951	-17.341	74.000	32.707	PK
3			2483.654	57.778	25.070	-16.222	74.000	32.709	PK

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

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

Site: AC1	Time: 2020/07/26 - 12:19
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Vertical
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (1Mbps) at Channel 2480MHz	

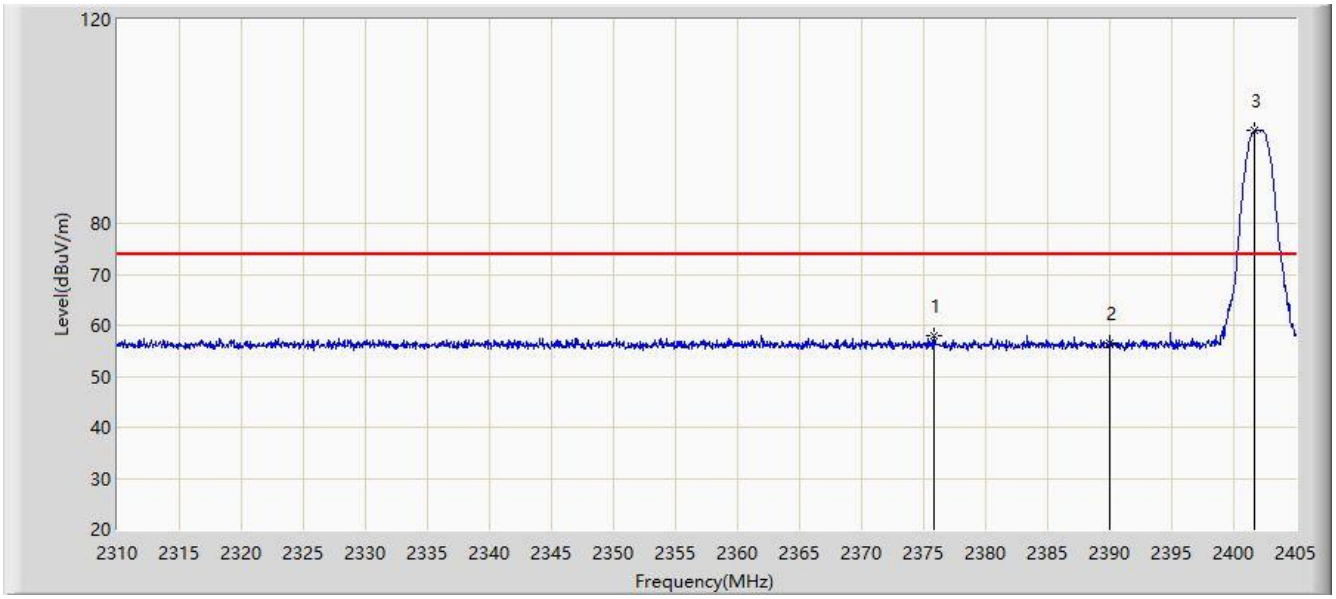


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.947	96.872	64.180	N/A	N/A	32.692	AV
2			2483.500	44.791	12.083	-9.209	54.000	32.707	AV
3			2483.874	45.185	12.476	-8.815	54.000	32.709	AV

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

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

Site: AC1	Time: 2020/07/26 - 13:05
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Horizontal
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (2Mbps) at Channel 2402MHz	

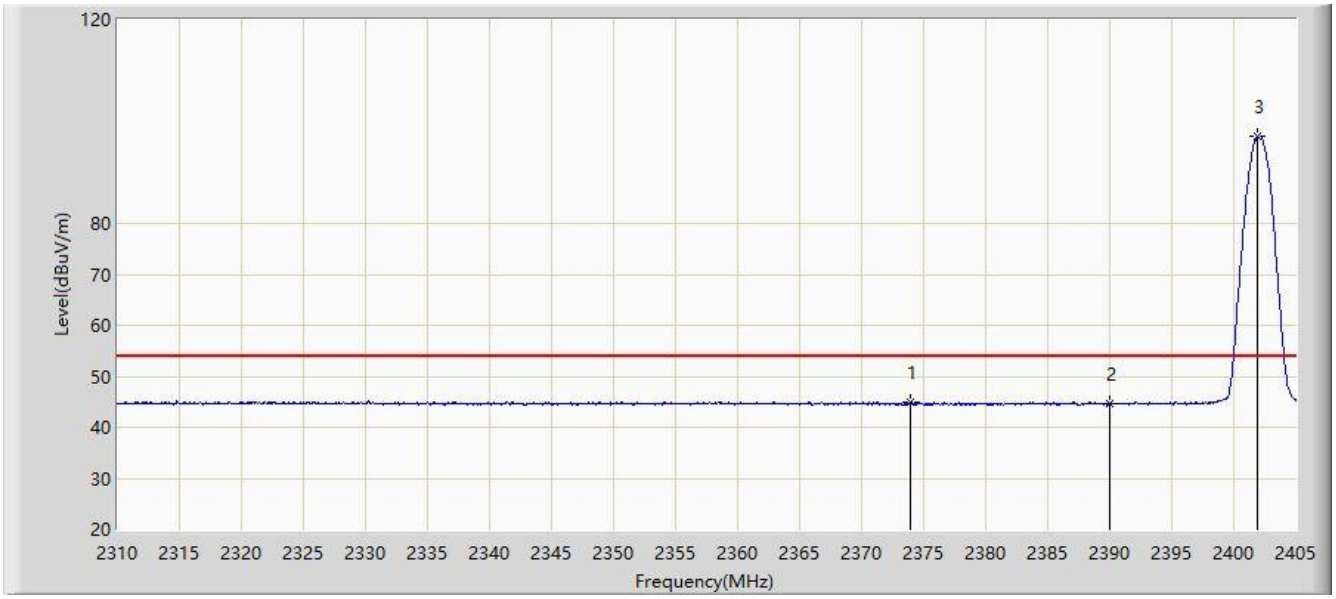


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2375.788	57.991	25.758	-16.009	74.000	32.233	PK
2			2390.000	56.403	24.107	-17.597	74.000	32.296	PK
3		*	2401.675	98.243	65.896	N/A	N/A	32.347	PK

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

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

Site: AC1	Time: 2020/07/26 - 13:09
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Horizontal
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (2Mbps) at Channel 2402MHz	

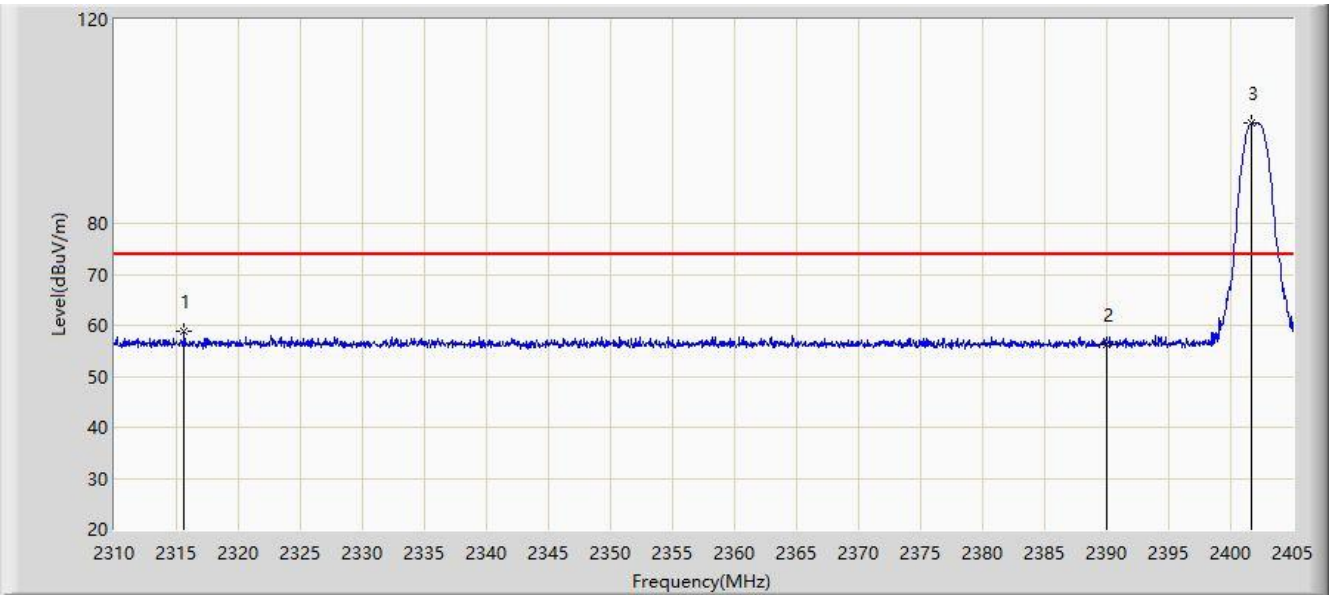


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2373.982	45.050	12.825	-8.950	54.000	32.225	AV
2			2390.000	44.572	12.276	-9.428	54.000	32.296	AV
3		*	2401.960	97.200	64.851	N/A	N/A	32.348	AV

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

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

Site: AC1	Time: 2020/07/26 - 13:12
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Vertical
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (2Mbps) at Channel 2402MHz	

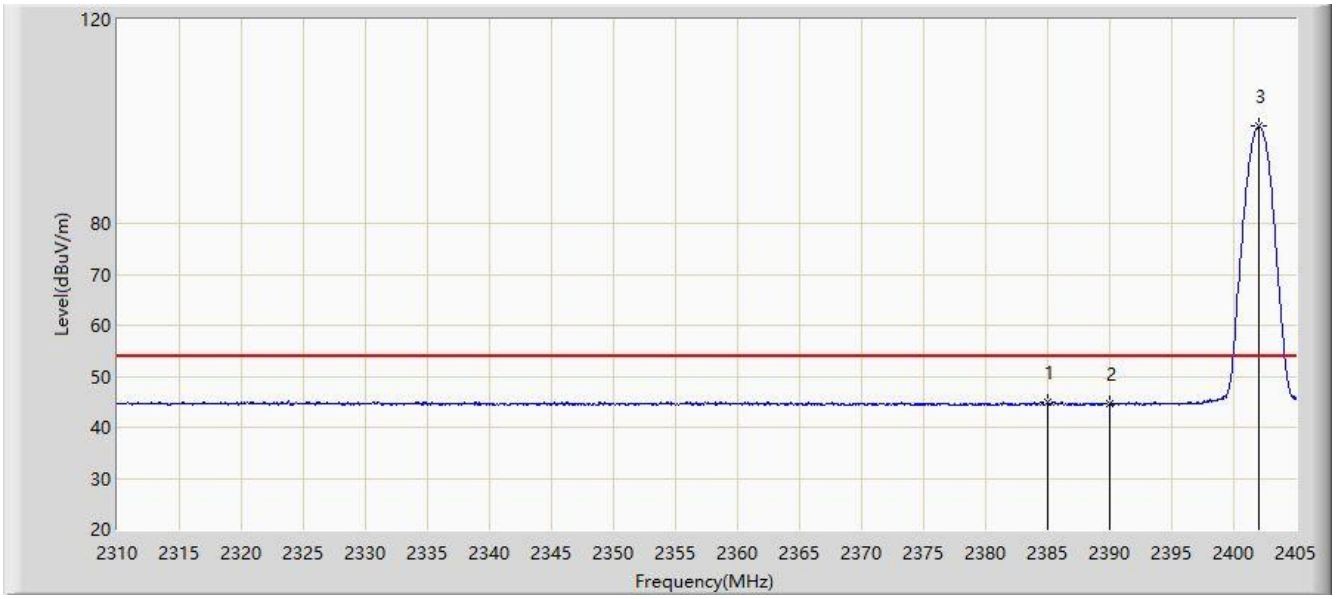


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2315.653	58.967	26.998	-15.033	74.000	31.969	PK
2			2390.000	56.104	23.808	-17.896	74.000	32.296	PK
3		*	2401.722	99.694	67.346	N/A	N/A	32.348	PK

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

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

Site: AC1	Time: 2020/07/26 - 13:15
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Vertical
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (2Mbps) at Channel 2402MHz	

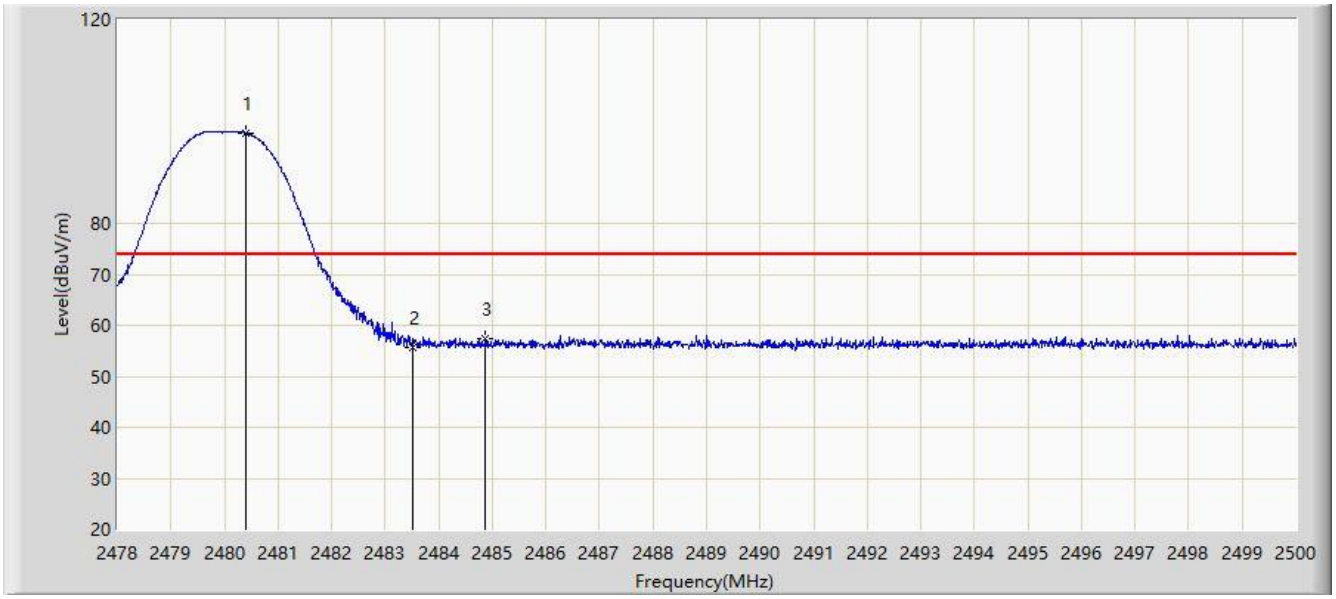


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2385.002	45.010	12.736	-8.990	54.000	32.274	AV
2			2390.000	44.582	12.286	-9.418	54.000	32.296	AV
3		*	2402.055	99.055	66.706	N/A	N/A	32.349	AV

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

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

Site: AC1	Time: 2020/07/26 - 13:17
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Horizontal
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (2Mbps) at Channel 2480MHz	

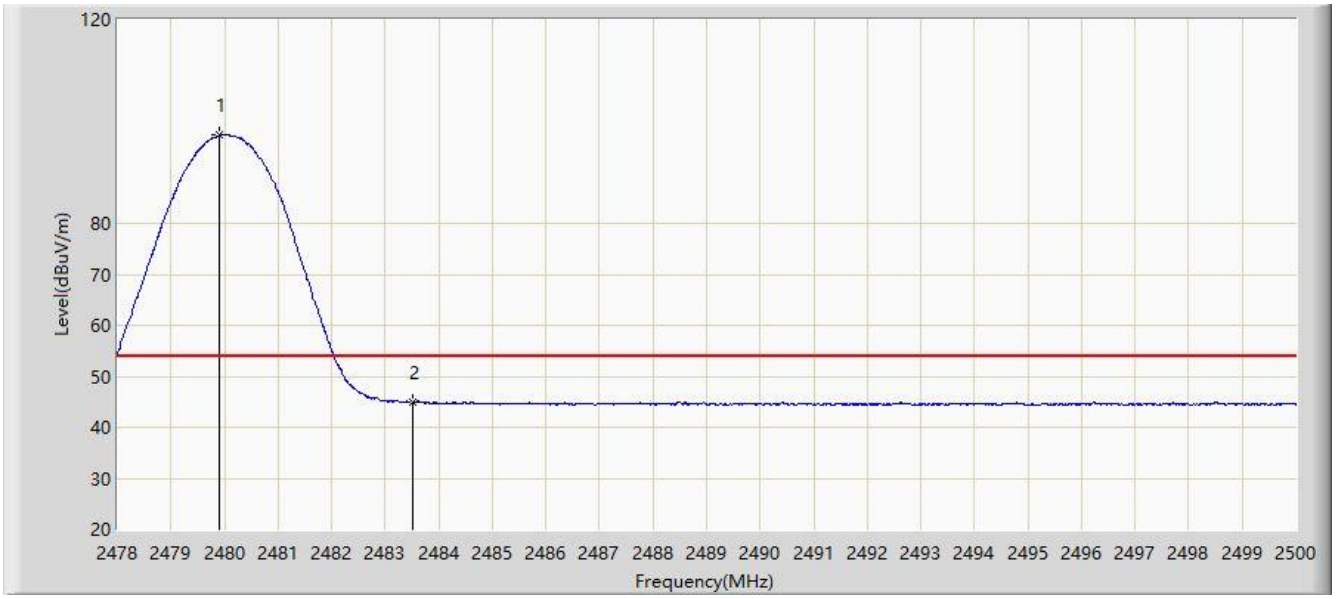


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.398	97.795	65.101	N/A	N/A	32.694	PK
2			2483.500	55.626	22.918	-18.374	74.000	32.707	PK
3			2484.875	57.453	24.739	-16.547	74.000	32.714	PK

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

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

Site: AC1	Time: 2020/07/26 - 13:20
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Horizontal
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (2Mbps) at Channel 2480MHz	

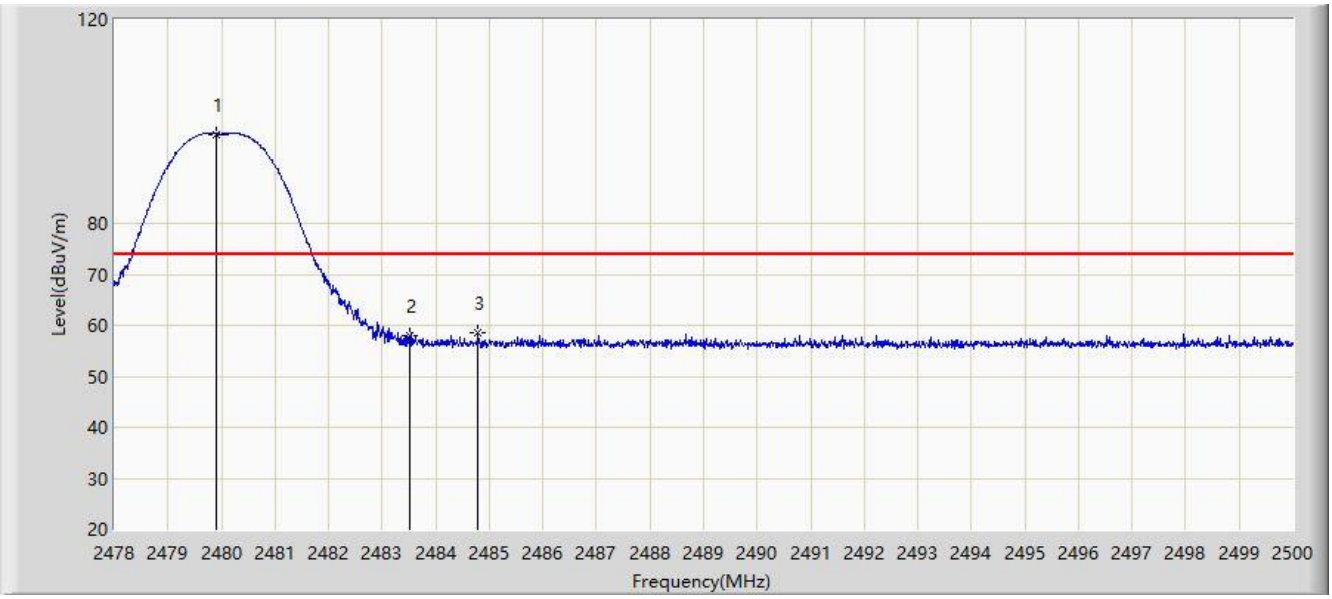


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.903	97.494	64.802	N/A	N/A	32.692	AV
2			2483.500	44.938	12.230	-9.062	54.000	32.707	AV

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

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

Site: AC1	Time: 2020/07/26 - 13:23
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Vertical
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (2Mbps) at Channel 2480MHz	

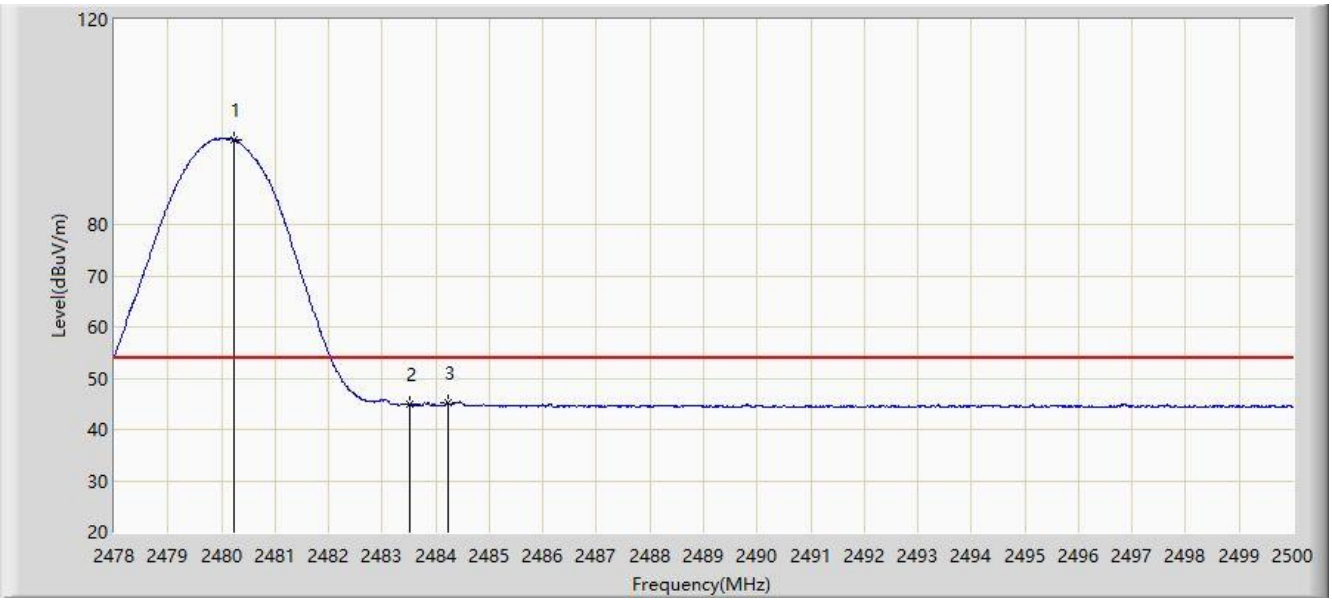


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.903	97.529	64.837	N/A	N/A	32.692	PK
2			2483.500	58.086	25.378	-15.914	74.000	32.707	PK
3			2484.787	58.429	25.716	-15.571	74.000	32.713	PK

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

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

Site: AC1	Time: 2020/07/26 - 13:26
Limit: FCC_Part15.209_RE(3m)	Engineer: Jay Chu
Probe: BBHA 9120D (1GHz~18GHz)	Polarity: Vertical
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode: Transmit by BLE (2Mbps) at Channel 2480MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.244	96.580	63.887	N/A	N/A	32.693	AV
2			2483.500	44.915	12.207	-9.085	54.000	32.707	AV
3			2484.226	45.311	12.600	-8.689	54.000	32.711	AV

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

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

7.8. AC Conducted Emissions Measurement

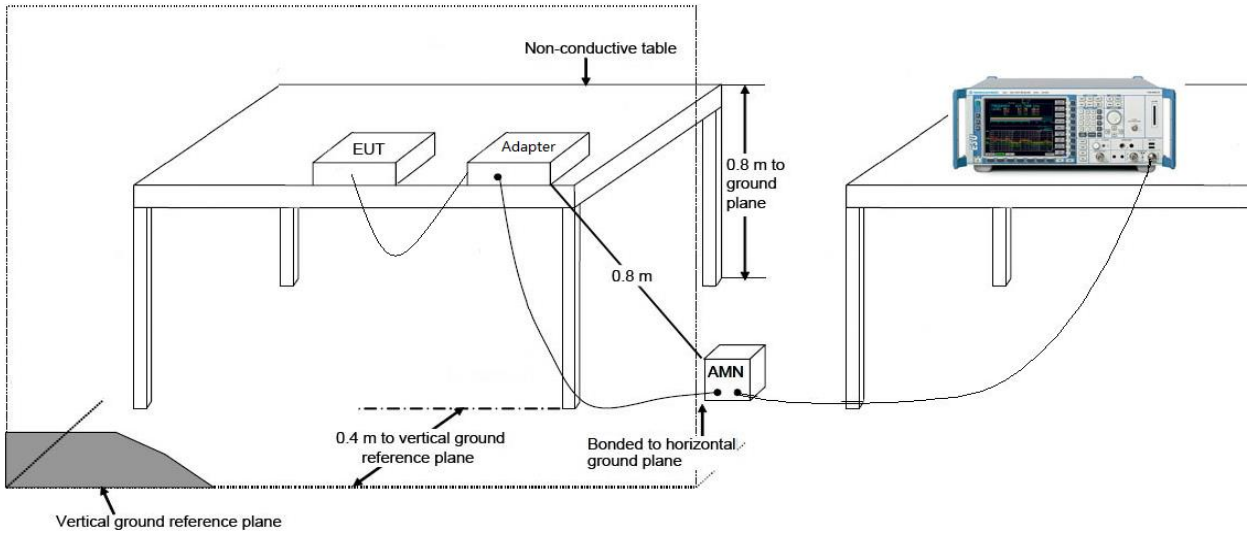
7.8.1.Test Limit

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

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

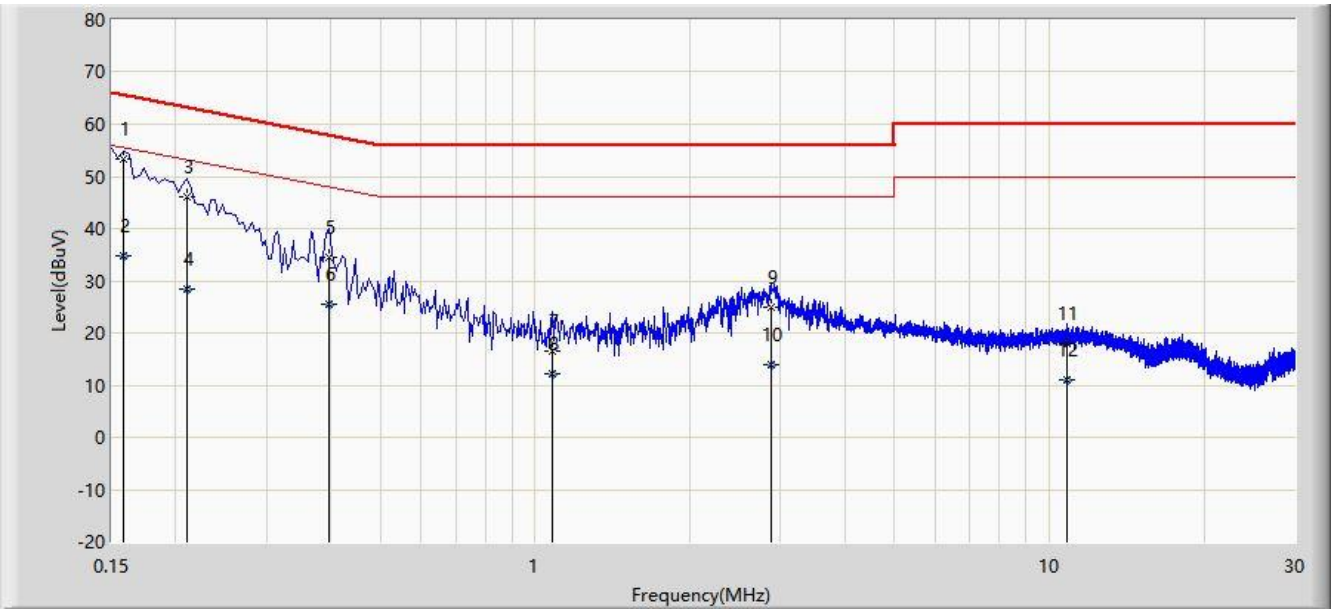
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

7.8.2.Test Setup



7.8.3.Test Result

Site: SR2	Time: 2020/08/06 - 14:51
Limit: FCC_Part15.207_CE	Engineer: Jay Chu
Probe: ENV216_Filter On	Polarity: Line
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode 1	

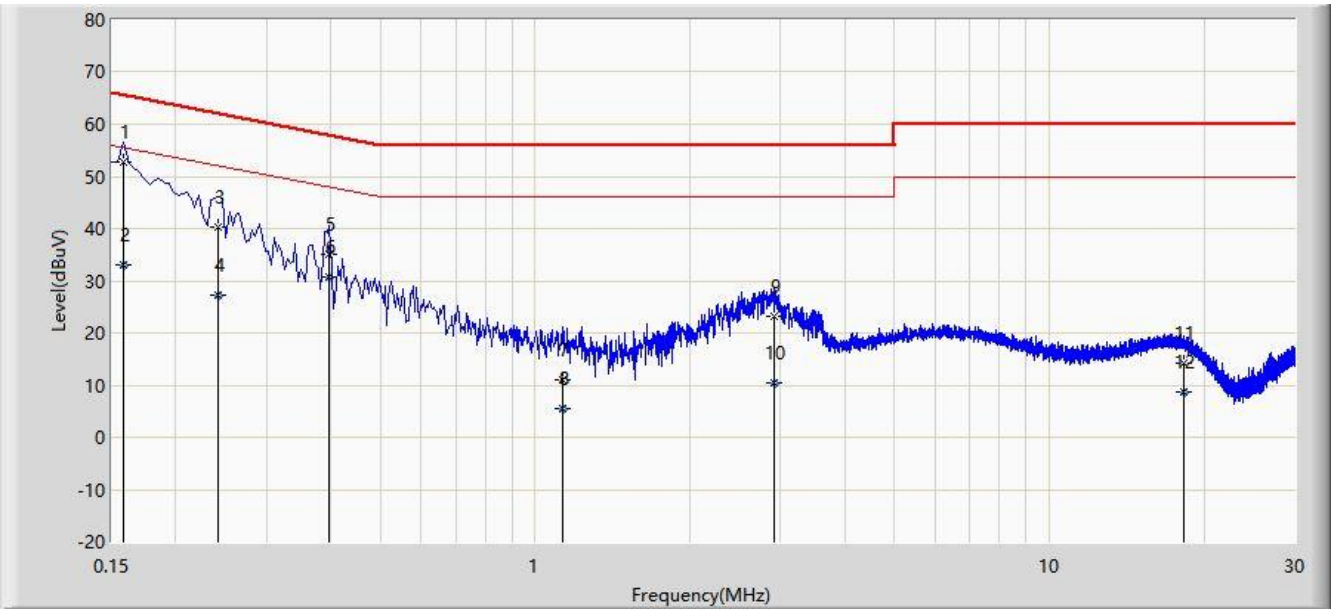


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV)	Factor (dB)	Type
1		*	0.158	53.238	43.627	-12.330	65.568	9.611	QP
2			0.158	34.799	25.188	-20.769	55.568	9.611	AV
3			0.210	46.121	36.508	-17.084	63.205	9.613	QP
4			0.210	28.317	18.704	-24.888	53.205	9.613	AV
5			0.398	34.610	24.986	-23.285	57.895	9.624	QP
6			0.398	25.418	15.794	-22.477	47.895	9.624	AV
7			1.078	16.619	6.956	-39.381	56.000	9.663	QP
8			1.078	12.101	2.438	-33.899	46.000	9.663	AV
9			2.878	24.902	15.199	-31.098	56.000	9.703	QP
10			2.878	13.917	4.214	-32.083	46.000	9.703	AV
11			10.846	17.945	8.056	-42.055	60.000	9.889	QP
12			10.846	10.922	1.033	-39.078	50.000	9.889	AV

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

Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

Site: SR2	Time: 2020/08/06 - 16:06
Limit: FCC_Part15.207_CE	Engineer: Jay Chu
Probe: ENV216_Filter On	Polarity: Neutral
EUT: ACCESS POINT	Power: AC 120V/60Hz
Test Mode 1	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV)	Factor (dB)	Type
1		*	0.158	52.694	43.073	-12.874	65.568	9.621	QP
2			0.158	32.941	23.320	-22.627	55.568	9.621	AV
3			0.242	40.245	30.619	-21.783	62.027	9.626	QP
4			0.242	27.373	17.747	-24.655	52.027	9.626	AV
5			0.398	35.050	25.416	-22.845	57.895	9.634	QP
6			0.398	30.869	21.235	-17.026	47.895	9.634	AV
7			1.130	10.899	1.227	-45.101	56.000	9.672	QP
8			1.130	5.650	-4.022	-40.350	46.000	9.672	AV
9			2.910	23.117	13.409	-32.883	56.000	9.708	QP
10			2.910	10.442	0.734	-35.558	46.000	9.708	AV
11			18.206	14.259	4.223	-45.741	60.000	10.036	QP
12			18.206	8.774	-1.262	-41.226	50.000	10.036	AV

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

Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

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.

The End

Appendix A - Test Setup Photograph

Refer to “2007TW0002-UT” file.

Appendix B - EUT Photograph

Refer to “2007TW0002-UE” file.