

MEASUREMENT REPORT

FCC PART 15.247 Bluetooth-LE

FCC ID: TK4WPQ872

APPLICANT: Compex Systems Pte Ltd.

Application Type: Certification

Product: Wireless Access Point

Model No.: WPQ872, WPQ872-I, WPQ872HV, WPQ872LV

Brand Name: COMPEX

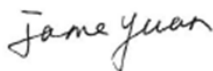
FCC Classification: Digital Transmission System (DTS)

FCC Rule Part(s): Part15 Subpart C (Section 15.247)

Test Procedure(s): ANSI C63.10-2013

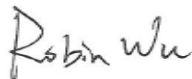
Test Date: March 03 ~ July 30, 2020

Reviewed By:



(Jame Yuan)

Approved By:



(Robin Wu)



The test results relate only to the samples tested.

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

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

Revision History

Report No.	Version	Description	Issue Date	Note
2001RSU050-U1	Rev. 01	Initial Report	08-20-2020	Valid

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General Information

Applicant:	Compex Systems Pte Ltd.
Applicant Address:	No:9 Harrison Road, Harrison Industrial Building, #05-01, Singapore 369651
Manufacturer:	Compex Systems Pte Ltd.
Manufacturer Address:	No:9 Harrison Road, Harrison Industrial Building, #05-01, Singapore 369651
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China

Test Facility / Accreditations

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

- MRT facility is a FCC registered (MRT Designation No. CN1166) 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 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 Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.



2. PRODUCT INFORMATION

2.1. Feature of Equipment under Test

Product Name:	Wireless Access Point
Model No.:	WPQ872, WPQ872-I, WPQ872HV, WPQ872LV
Serial No.:	400562741600251 (External Antenna) 400562741600252 (Internal Antenna)
Wi-Fi Specification:	802.11a/b/g/n/ac/ax
Bluetooth Version:	v5.0 single mode (Bluetooth-LE Only)
Accessories	
DC Adapter:	MODEL: FSP040-DHMN2 INPUT: 100 - 240V ~ 50/60Hz, 1.2A. OUTPUT: DC 12.0V, 3.4A
POE	MODEL: PD-9001GR/AT/AC INPUT: 100 - 240V ~ 50/60Hz, 0.67A. OUTPUT: DC 55.0V, 0.6A

Note 1: This device has two antenna configurations, one is internal, another is external, detail see EUT photo and operation description.

Note 2: This device has two power supply, we select DC adapter for all RF testing.

Note 3: The difference of models is only for marketing different client.

Note 4: We selected WPQ872 to perform all RF testing.

2.2. Product Specification Subjective to this Report

Frequency Range:	2402 ~ 2480MHz
Channel Number:	40
Type of modulation:	GFSK
Data Rate	Up to 2Mbps
Antenna Type:	PCB Antenna
Antenna Gain:	3dBi

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	--	--	--	--

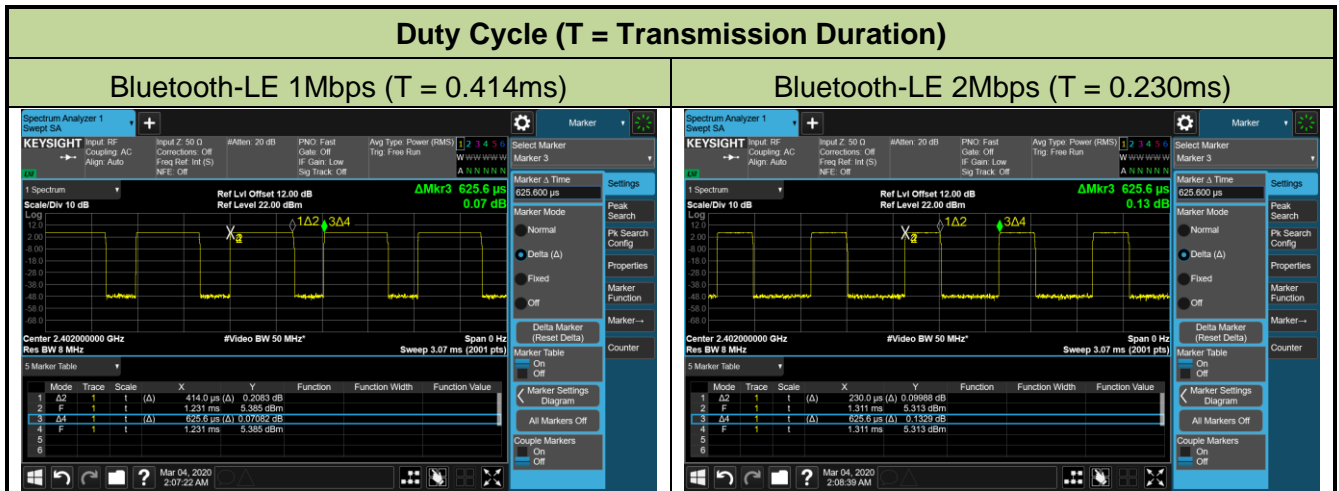
2.4. Test Mode

Test Mode	Mode 1: Transmit by Bluetooth-LE (1M)
	Mode 2: Transmit by Bluetooth-LE (2M)

2.5. 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
Bluetooth-LE - 1Mbps	66.18%
Bluetooth-LE - 2Mbps	36.76%

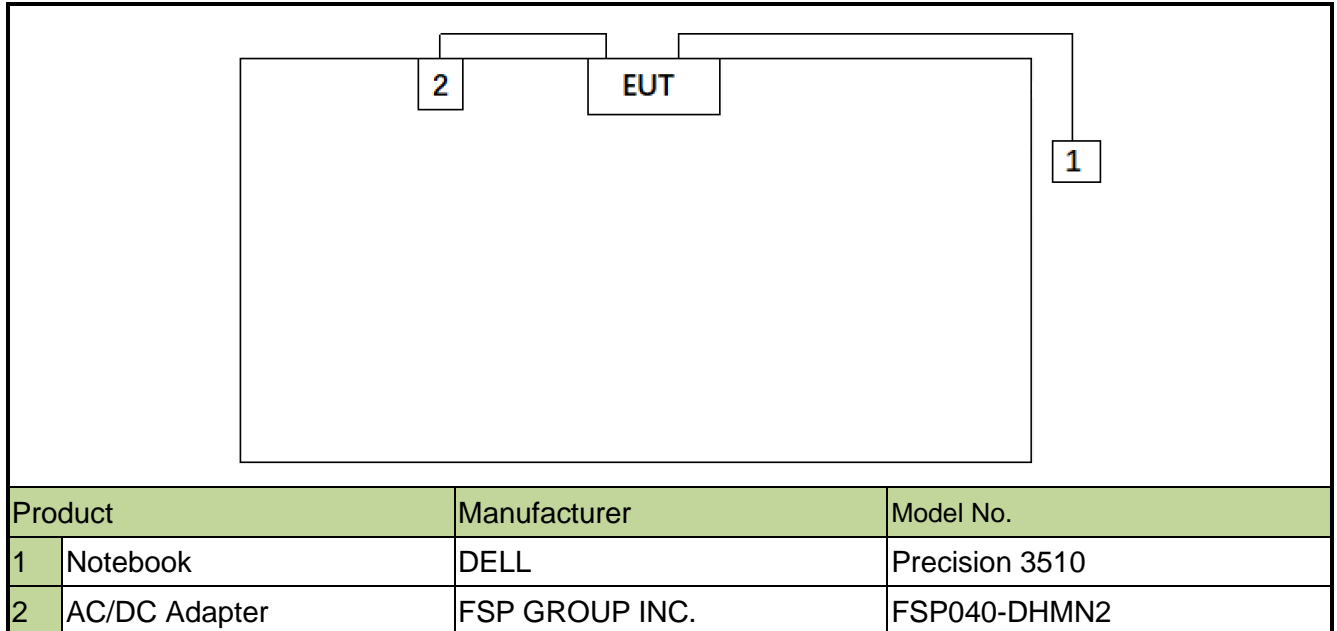


2.6. EMI Suppression Device(s)/Modifications

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

2.7. 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.



Note: The test utility software used during testing was “Engineer Command” that provided by the manufacturer.

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.

3. DESCRIPTION OF TEST

3.1. Evaluation 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 Bluetooth internal antenna of the unit 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 - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2021/01/18
Two-Line V-Network	R&S	ENV 216	MRTSUE06002	1 year	2021/06/11
Two-Line V-Network	R&S	ENV 216	MRTSUE06003	1 year	2021/06/11
Thermohygrometer	Testo	608-H1	MRTSUE06404	1 year	2020/08/08
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	2020/09/03
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/13
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2021/04/03
Broad Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2020/10/13
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06024	1 year	2020/12/29
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermohygrometer	Testo	608-H1	MRTSUE06403	1 year	2020/08/08
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2021/04/30

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	2020/11/13
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2020/10/13
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2020/10/27
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06024	1 year	2020/12/29
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Temperature/Humidity Meter	Minggao	ETH529	MRTSUE06170	1 year	2020/12/15
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2021/04/30

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2021/04/14
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06452	1 year	2021/07/10
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/14
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2020/11/17
USB wideband power sensor	Keysight	U2021XA	MRTSUE06446	1 year	2021/06/11
USB wideband power sensor	Keysight	U2021XA	MRTSUE06447	1 year	2021/06/11
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2021/06/11
Audio Analyzer	Agilent	U8903B	MRTSUE06143	1 year	2021/06/11
Modulation Analyzer	HP	8901A	MRTSUE06098	1 year	2020/10/10
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2020/11/07
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
Attenuator	MVE	6dB	MRTSUE06534	1 year	2020/12/12
Attenuator	MVE	10dB	MRTSUE06543	1 year	2020/12/12
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2020/11/07
Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2020/08/08

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 $k = 2$.

AC Conducted Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 9kHz~150kHz: 3.74dB 150kHz~30MHz: 3.44dB
Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): Horizontal: 30MHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~40GHz: 6.40dB Vertical: 30MHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 1.13dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 1.15dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.28%

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	$\geq 500\text{kHz}$	Conducted	Pass	Section 7.2
15.247(b)(3), (4)	Output Power	$\leq 30\text{dBm}$		Pass	Section 7.3
15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$		Pass	Section 7.4
15.247(d)	Band Edge / Out-of-Band Emissions	$\leq 20\text{dBc}$ (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) 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 Occupied Bandwidth Measurement

7.2.1. Test Limit

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

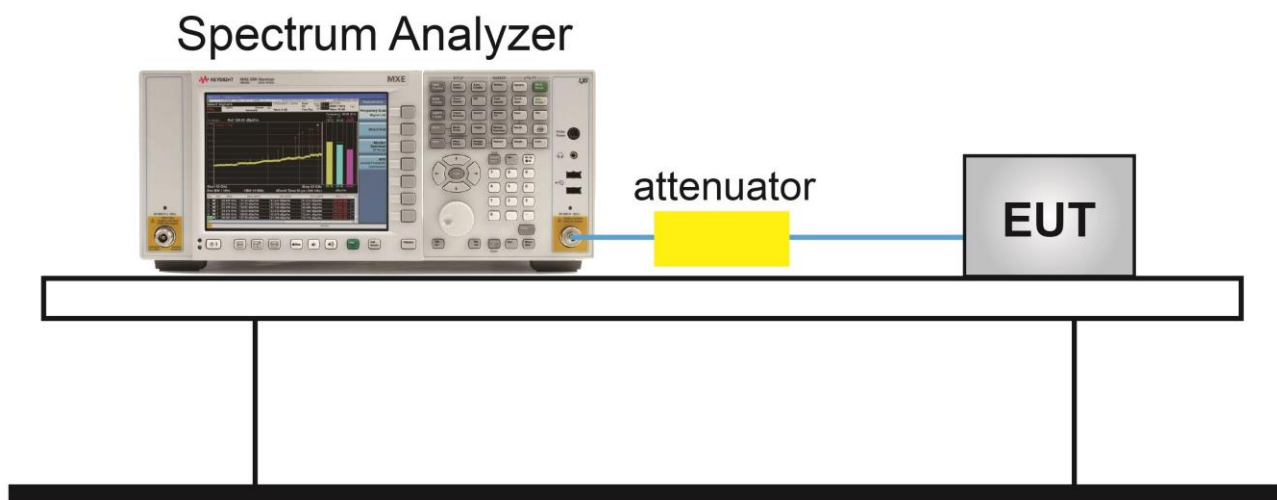
7.2.2. Test Procedure used

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. $VBW \geq 3 \times RBW$
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace was allowed to stabilize

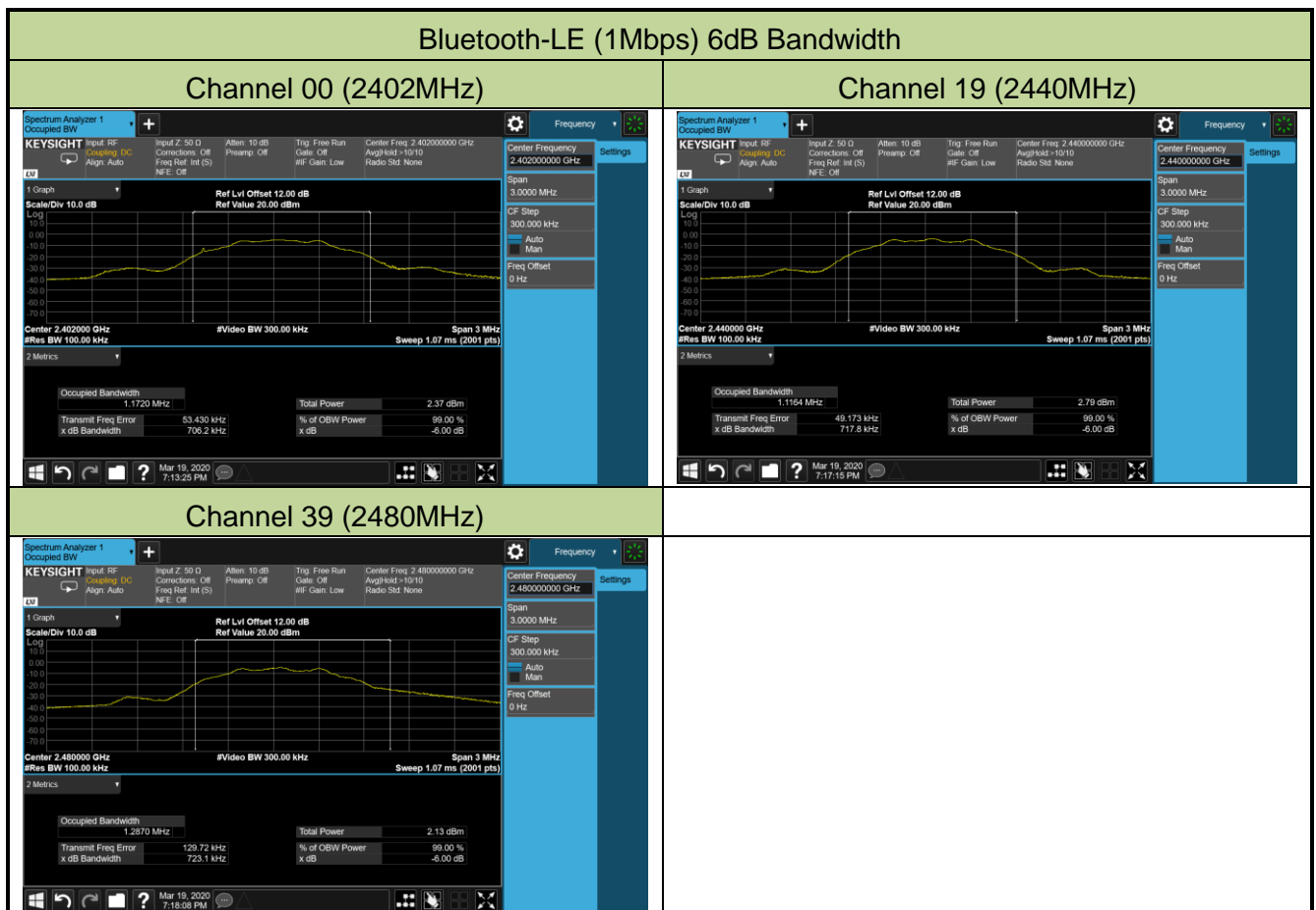
7.2.4. Test Setup



7.2.5. Test Result

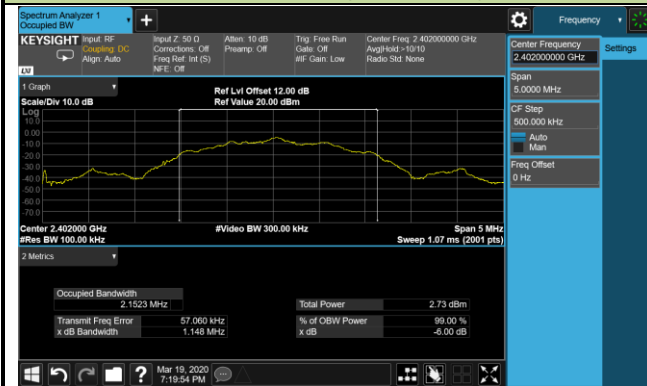
Product	Wireless Access Point	Temperature	25°C
Test Engineer	Snake Ni	Relative Humidity	52%
Test Site	TR3	Test Date	2020/03/19

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Bluetooth-LE	1	00	2402	0.706	≥ 0.5	Pass
Bluetooth-LE	1	19	2440	0.718	≥ 0.5	Pass
Bluetooth-LE	1	39	2480	0.723	≥ 0.5	Pass
Bluetooth-LE	2	00	2402	1.148	≥ 0.5	Pass
Bluetooth-LE	2	19	2440	1.187	≥ 0.5	Pass
Bluetooth-LE	2	39	2480	1.180	≥ 0.5	Pass



Bluetooth-LE (2Mbps) 6dB Bandwidth

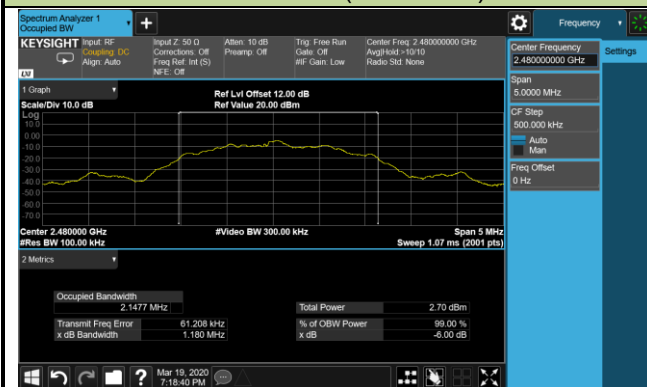
Channel 00 (2402MHz)



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).

7.3.2. Test Procedure Used

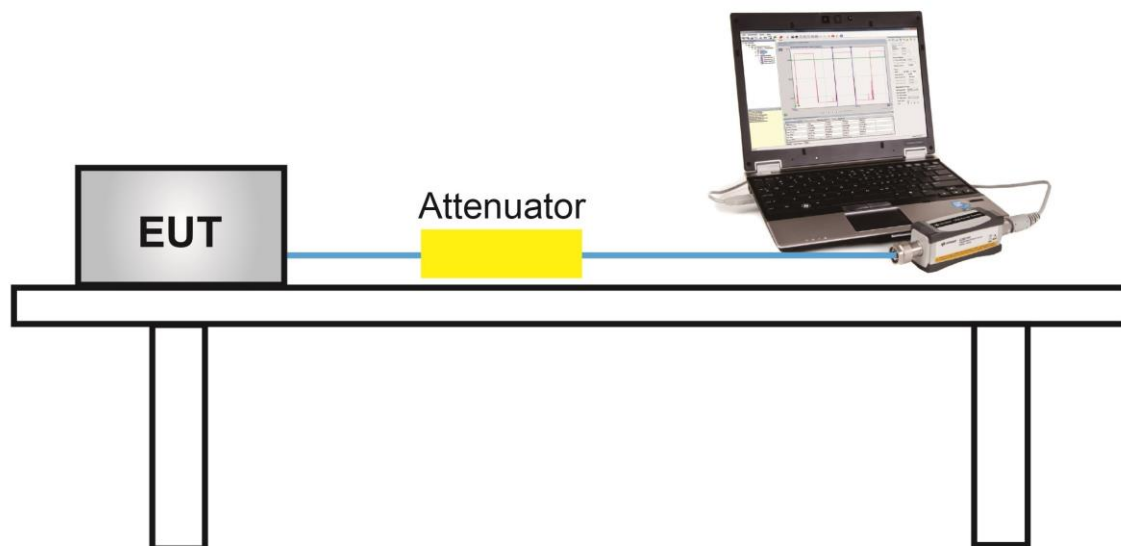
ANSI C63.10-2013 Section 11.9.1.3

7.3.3. Test Setting

Method PKPM1 (Peak Power Measurement)

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.

7.3.4. Test Setup



7.3.5. Test Result

Product	Wireless Access Point	Temperature	25°C
Test Engineer	Yuri Li	Relative Humidity	52%
Test Site	TR3	Test Date	2020/03/04

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
Bluetooth-LE	1	00	2402	5.71	≤ 30.00	Pass
Bluetooth-LE	1	19	2440	5.83	≤ 30.00	Pass
Bluetooth-LE	1	39	2480	5.93	≤ 30.00	Pass
Bluetooth-LE	2	00	2402	5.75	≤ 30.00	Pass
Bluetooth-LE	2	19	2440	5.82	≤ 30.00	Pass
Bluetooth-LE	2	39	2480	5.97	≤ 30.00	Pass

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.

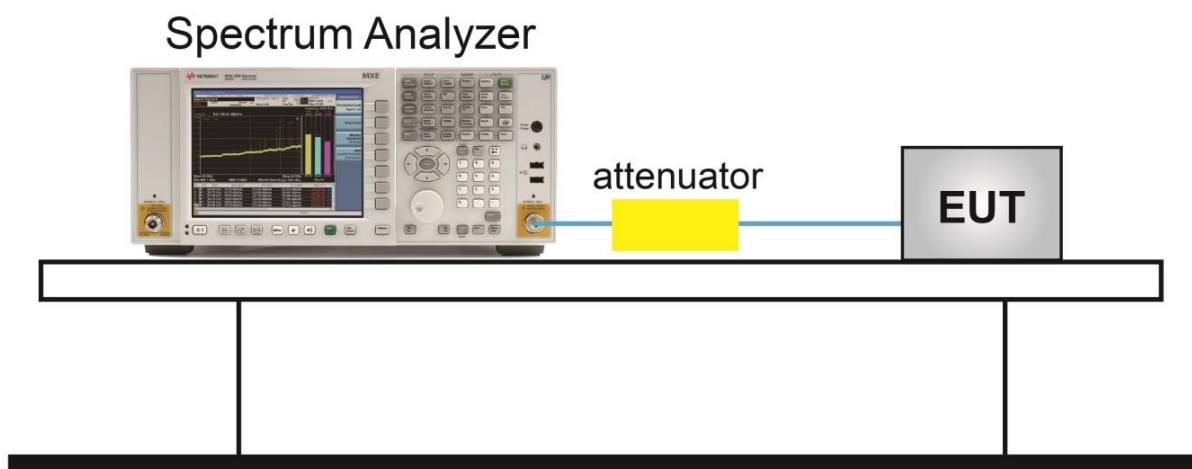
7.4.2. Test Procedure Used

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

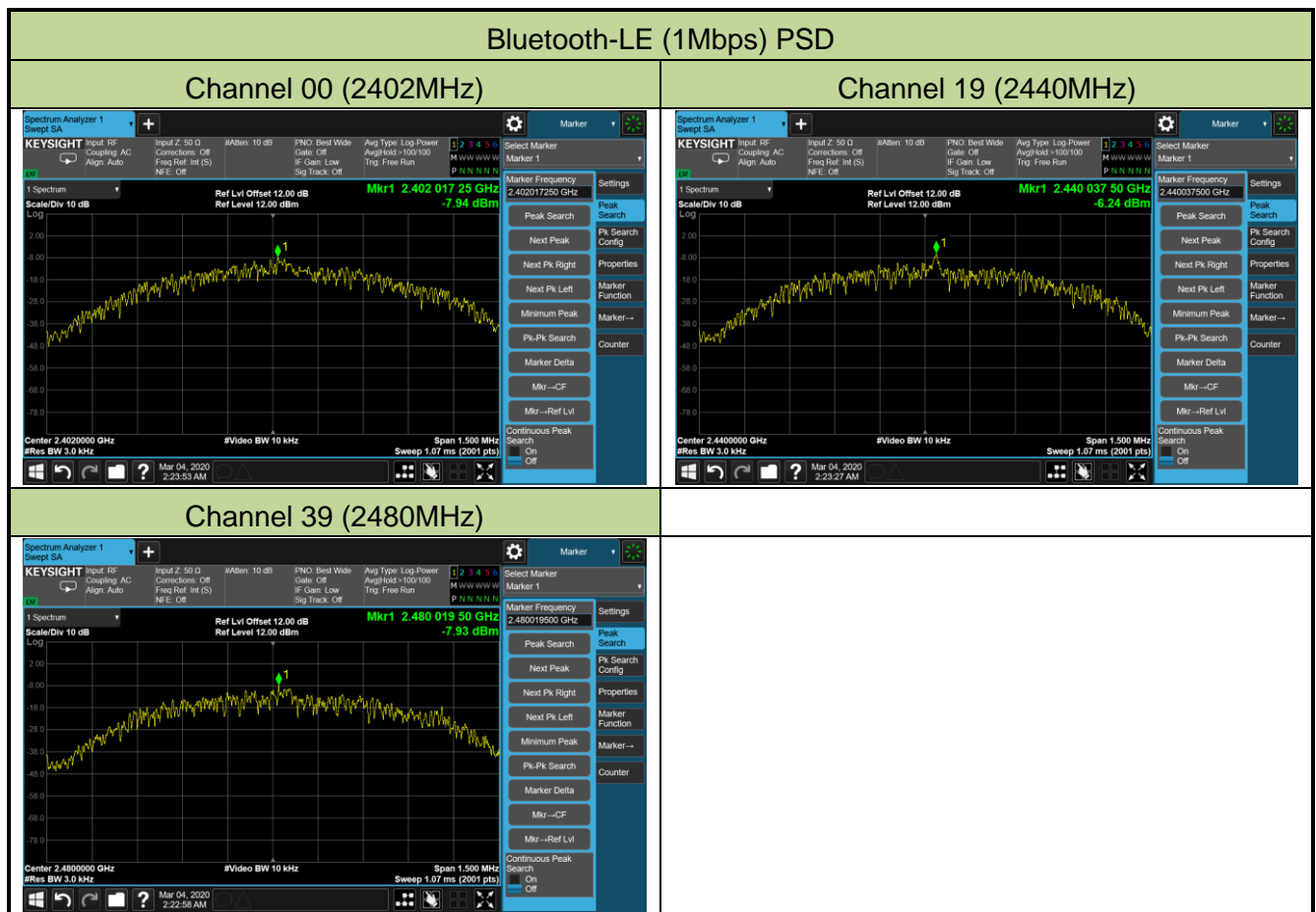
7.4.4. Test Setup



7.4.5. Test Result

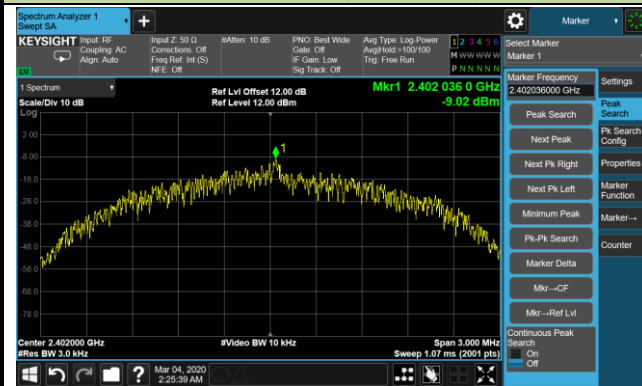
Product	Wireless Access Point	Temperature	25°C
Test Engineer	Eric Xu	Relative Humidity	52%
Test Site	TR3	Test Date	2020/03/04

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
Bluetooth-LE	1	00	2402	-7.94	≤ 8.00	Pass
Bluetooth-LE	1	19	2440	-6.24	≤ 8.00	Pass
Bluetooth-LE	1	39	2480	-7.93	≤ 8.00	Pass
Bluetooth-LE	2	00	2402	-9.02	≤ 8.00	Pass
Bluetooth-LE	2	19	2440	-6.57	≤ 8.00	Pass
Bluetooth-LE	2	39	2480	-8.91	≤ 8.00	Pass

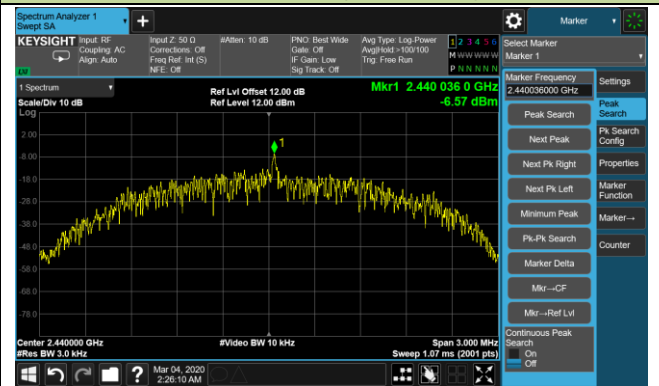


Bluetooth-LE (2Mbps) PSD

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 20 dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth per the PSD procedure.

7.5.2. Test Procedure Used

ANSI C63.10-2013 Section 11.11

7.5.3. Test Setting

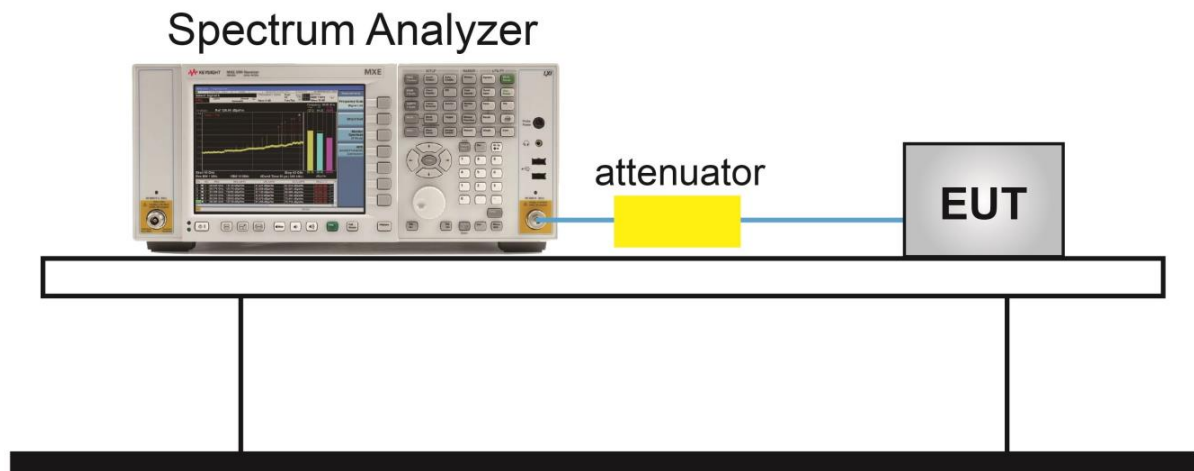
Reference level measurement

1. Set instrument center frequency to DTS channel center frequency
2. Set the span to ≥ 1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW $\geq 3 \times$ RBW
5. Detector = Peak
6. Sweep time = Auto couple
7. Trace mode = Max hold
8. Allow trace to fully stabilize

Emission level measurement

1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100 kHz
3. VBW = 300 kHz
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep time = Auto couple
7. The trace was allowed to stabilize

7.5.4. Test Setup



7.5.5. Test Result

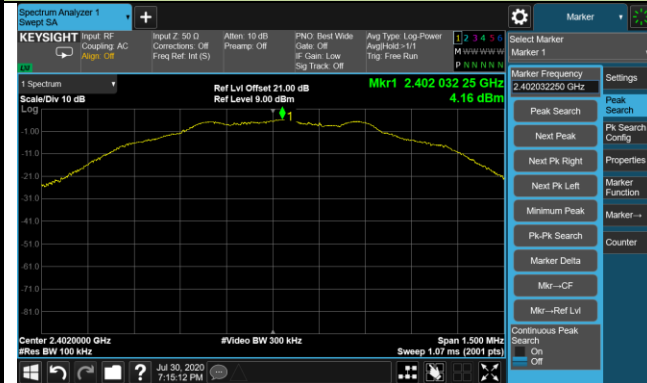
Product	Wireless Access Point	Temperature	25°C
Test Engineer	Eric Xu	Relative Humidity	52%
Test Site	TR3	Test Date	2020/07/30

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

Bluetooth-LE (1Mbps) Out-of-Band Emissions

Channel 00 (2402MHz)

100kHz PSD reference Level



Low Band Edge



Spurious Emission 30MHz ~ 25GHz



Channel 19 (2440MHz)

100kHz PSD reference Level

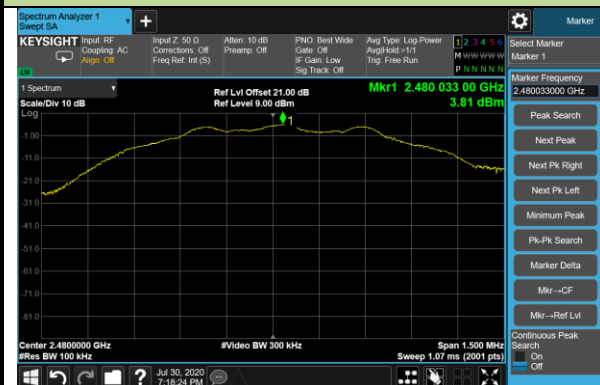


Spurious Emission 30MHz ~ 25GHz



Channel 39 (2480MHz)

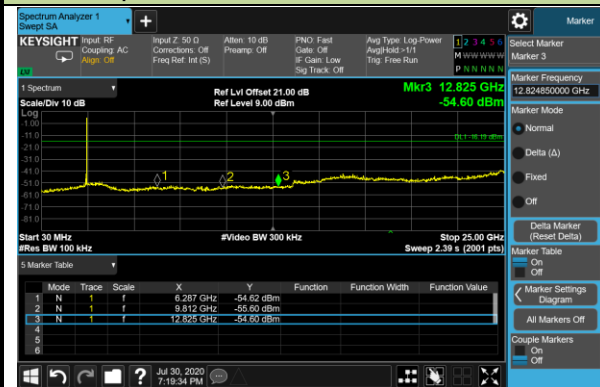
100kHz PSD reference Level



High Band Edge



Spurious Emission 30MHz ~ 25GHz



Bluetooth-LE (2Mbps) Out-of-Band Emissions

Channel 00 (2402MHz)

100kHz PSD reference Level



Low Band Edge

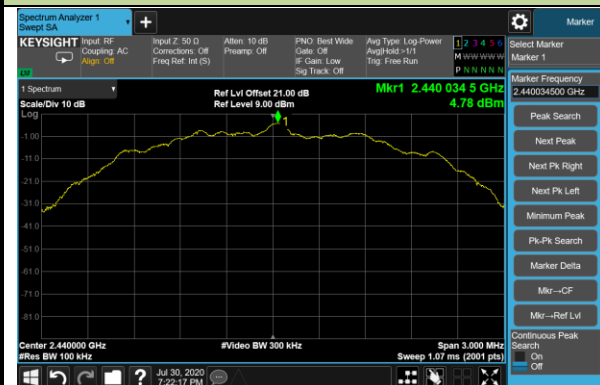


Spurious Emission 30MHz ~ 25GHz



Channel 19 (2440MHz)

100kHz PSD reference Level



Spurious Emission 30MHz ~ 25GHz



Channel 39 (2480MHz)

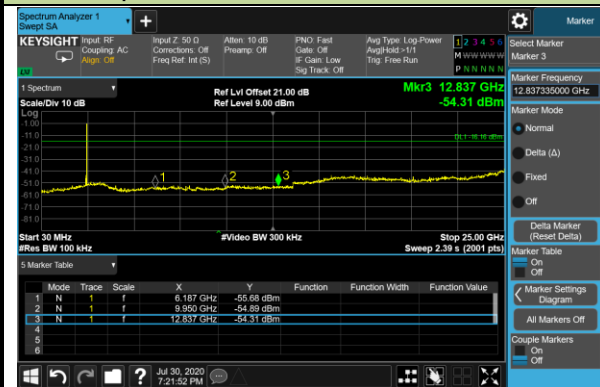
100kHz PSD reference Level



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 15.209 Limits		
Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measured Distance (m)
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)

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
> 1000 MHz	1 MHz

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

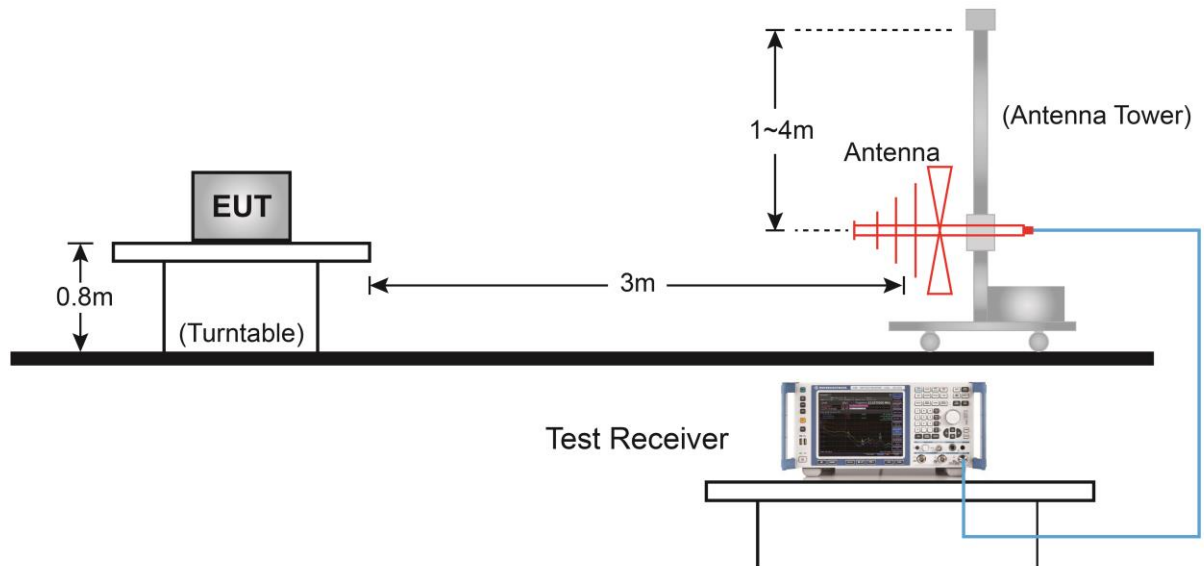
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

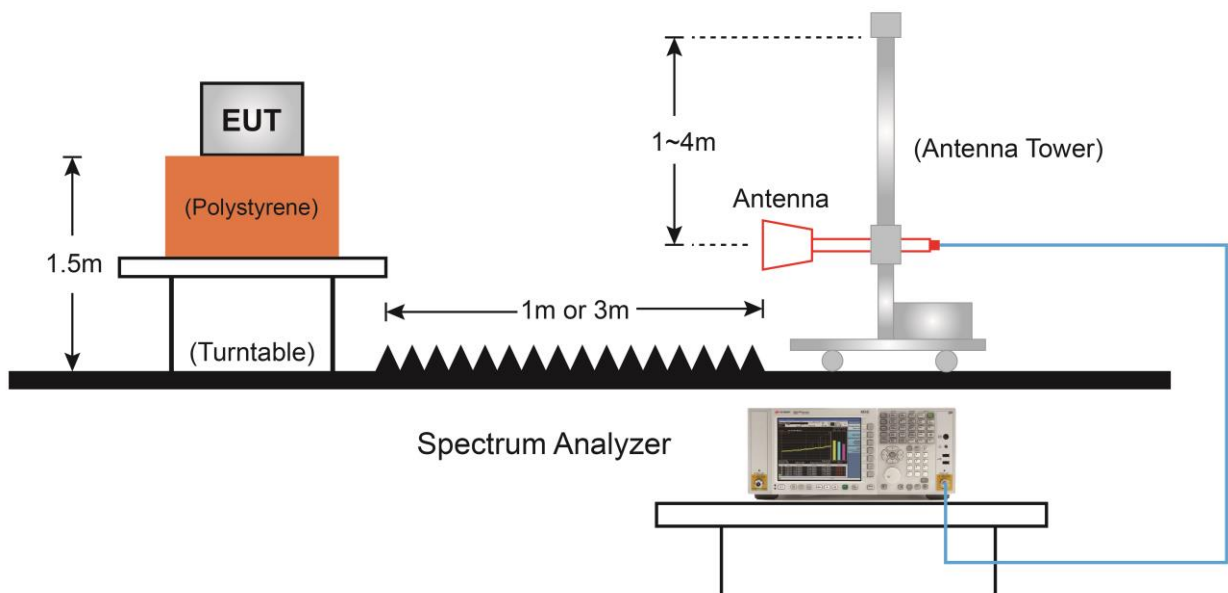
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. $VBW \geq 1/T$. T is the minimum transmission duration
4. Detector = Peak
5. Sweep time = auto
6. Trace mode = max hold
7. Trace was allowed to stabilize

7.6.4. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



7.6.5. Test Result

Product	Wireless Access Point	Temperature	25°C
Test Engineer	Jason Gao	Relative Humidity	54%
Test Site	AC1	Test Date	2020/03/03
Test Mode	Bluetooth-LE(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
*	3252.5	41.9	2.3	44.2	80.8	-36.6	Peak	Horizontal
*	3499.0	41.0	3.1	44.1	80.8	-36.7	Peak	Horizontal
	3754.0	41.7	3.9	45.6	74.0	-28.4	Peak	Horizontal
	4247.0	39.8	5.4	45.2	74.0	-28.8	Peak	Horizontal
*	3252.5	47.6	2.3	49.9	80.8	-30.9	Peak	Vertical
*	3499.0	45.7	3.1	48.8	80.8	-32.0	Peak	Vertical
	3754.0	48.9	3.9	52.8	74.0	-21.2	Peak	Vertical
	4247.0	44.0	5.4	49.4	74.0	-24.6	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	Wireless Access Point	Temperature	25°C
Test Engineer	Jason Gao	Relative Humidity	54%
Test Site	AC1	Test Date	2020/03/03
Test Mode	Bluetooth-LE(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
*	3252.5	41.2	2.3	43.5	81.5	-38.0	Peak	Horizontal
*	3499.0	41.6	3.1	44.7	81.5	-36.8	Peak	Horizontal
	3754.0	41.9	3.9	45.8	74.0	-28.2	Peak	Horizontal
	4247.0	40.0	5.4	45.4	74.0	-28.6	Peak	Horizontal
*	3371.5	41.6	2.3	43.9	81.5	-37.6	Peak	Vertical
*	3499.0	45.5	3.1	48.6	81.5	-32.9	Peak	Vertical
	3754.0	47.7	3.9	51.6	74.0	-22.4	Peak	Vertical
	4247.0	43.2	5.4	48.6	74.0	-25.4	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is 20dBc of the fundamental emission level (101.5dBμV/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)

Product	Wireless Access Point	Temperature	25°C
Test Engineer	Jason Gao	Relative Humidity	54%
Test Site	AC1	Test Date	2020/03/03
Test Mode	Bluetooth-LE(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
*	3252.5	40.8	2.3	43.1	83.3	-40.2	Peak	Horizontal
*	3499.0	40.8	3.1	43.9	83.3	-39.4	Peak	Horizontal
	3754.0	42.1	3.9	46.0	74.0	-28.0	Peak	Horizontal
	4000.5	39.7	4.7	44.4	74.0	-29.6	Peak	Horizontal
*	3252.5	46.8	2.3	49.1	83.3	-34.2	Peak	Vertical
*	3499.0	45.5	3.1	48.6	83.3	-34.7	Peak	Vertical
	3754.0	47.9	3.9	51.8	74.0	-22.2	Peak	Vertical
	4000.5	42.6	4.7	47.3	74.0	-26.7	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (103.3dBμV/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	Wireless Access Point	Temperature	25°C
Test Engineer	Jason Gao	Relative Humidity	54%
Test Site	AC1	Test Date	2020/03/03
Test Mode	Bluetooth-LE(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
*	2997.5	42.3	2.1	44.4	81.5	-37.1	Peak	Horizontal
*	3074.0	40.2	2.4	42.6	81.5	-38.9	Peak	Horizontal
	3754.0	40.8	3.9	44.7	74.0	-29.3	Peak	Horizontal
	4000.5	38.5	4.7	43.2	74.0	-30.8	Peak	Horizontal
*	3252.5	46.6	2.3	48.9	81.5	-32.6	Peak	Vertical
*	3499.0	45.6	3.1	48.7	81.5	-32.8	Peak	Vertical
	3754.0	48.0	3.9	51.9	74.0	-22.1	Peak	Vertical
	4247.0	42.1	5.4	47.5	74.0	-26.5	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (101.5dBμV/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)

Product	Wireless Access Point	Temperature	25°C
Test Engineer	Jason Gao	Relative Humidity	54%
Test Site	AC1	Test Date	2020/03/03
Test Mode	Bluetooth-LE(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
*	3125.0	44.0	2.6	46.6	81.3	-34.7	Peak	Horizontal
*	3499.0	44.9	3.1	48.0	81.3	-33.3	Peak	Horizontal
	4247.0	42.6	5.4	48.0	74.0	-26.0	Peak	Horizontal
	4502.0	41.4	6.2	47.6	74.0	-26.4	Peak	Horizontal
*	3125.0	41.6	2.6	44.2	81.3	-37.1	Peak	Vertical
*	3252.5	45.4	2.3	47.7	81.3	-33.6	Peak	Vertical
	3754.0	47.4	3.9	51.3	74.0	-22.7	Peak	Vertical
	4000.5	41.2	4.7	45.9	74.0	-28.1	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is 20dBc of the fundamental emission level (101.3dBμV/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	Wireless Access Point	Temperature	25°C
Test Engineer	Jason Gao	Relative Humidity	54%
Test Site	AC1	Test Date	2020/03/03
Test Mode	Bluetooth-LE(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
*	3252.5	40.9	2.3	43.2	81.0	-37.8	Peak	Horizontal
*	3499.0	40.3	3.1	43.4	81.0	-37.6	Peak	Horizontal
	3754.0	41.6	3.9	45.5	74.0	-28.5	Peak	Horizontal
	4247.0	38.6	5.4	44.0	74.0	-30.0	Peak	Horizontal
*	3125.0	42.2	2.6	44.8	81.0	-36.2	Peak	Vertical
*	3252.5	46.6	2.3	48.9	81.0	-32.1	Peak	Vertical
	4247.0	42.0	5.4	47.4	74.0	-26.6	Peak	Vertical
	4502.0	40.8	6.2	47.0	74.0	-27.0	Peak	Vertical

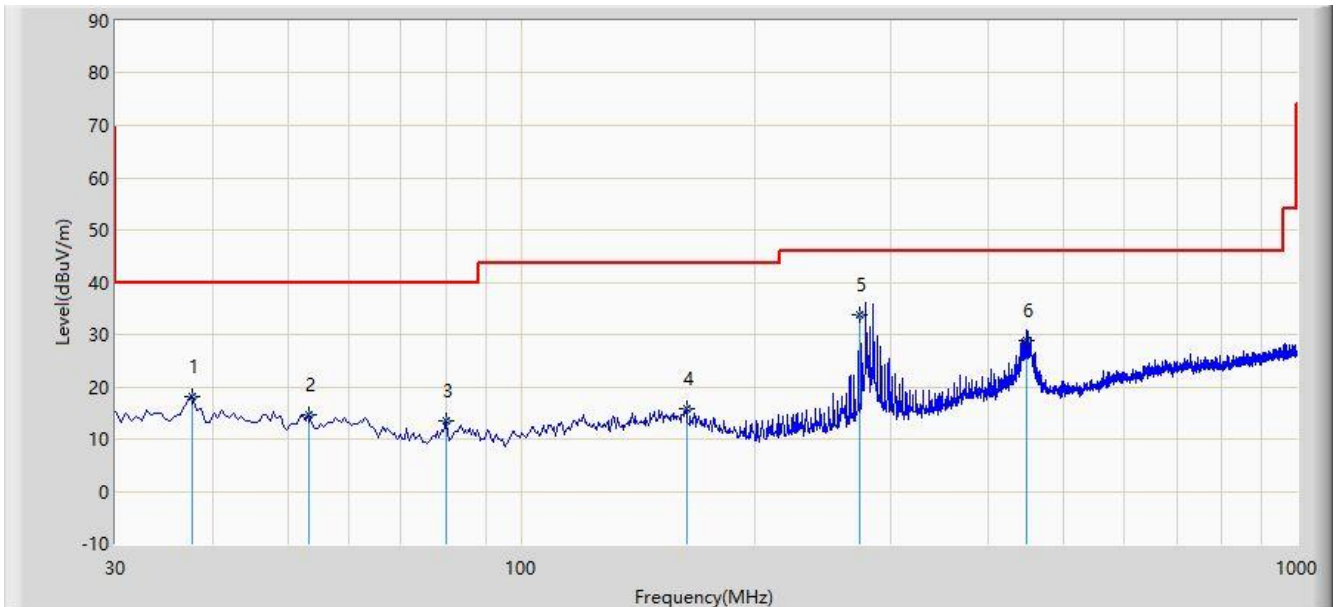
Note 1: “*” is not in restricted band, its limit is 20dBc of the fundamental emission level (101.0dBμV/m) or 15.209 which is higher.

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

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

The Result of Radiated Emission below 1GHz:

Site: AC1	Time: 2020/03/18 - 14:06
Limit: FCC_Part15.209_RE(3m)	Engineer: Buter Shi
Probe: AC1_VULB 9168 _20-2000MHz	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(1Mbps) at Channel 2480MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB)	Type
1			37.760	18.238	3.800	-21.762	40.000	14.438	QP
2			53.280	14.647	0.576	-25.353	40.000	14.071	QP
3			79.955	13.585	3.223	-26.415	40.000	10.362	QP
4			163.375	15.758	0.462	-27.742	43.500	15.296	QP
5		*	273.246	33.756	19.681	-12.244	46.000	14.076	QP
6			448.056	28.868	10.483	-17.132	46.000	18.385	QP

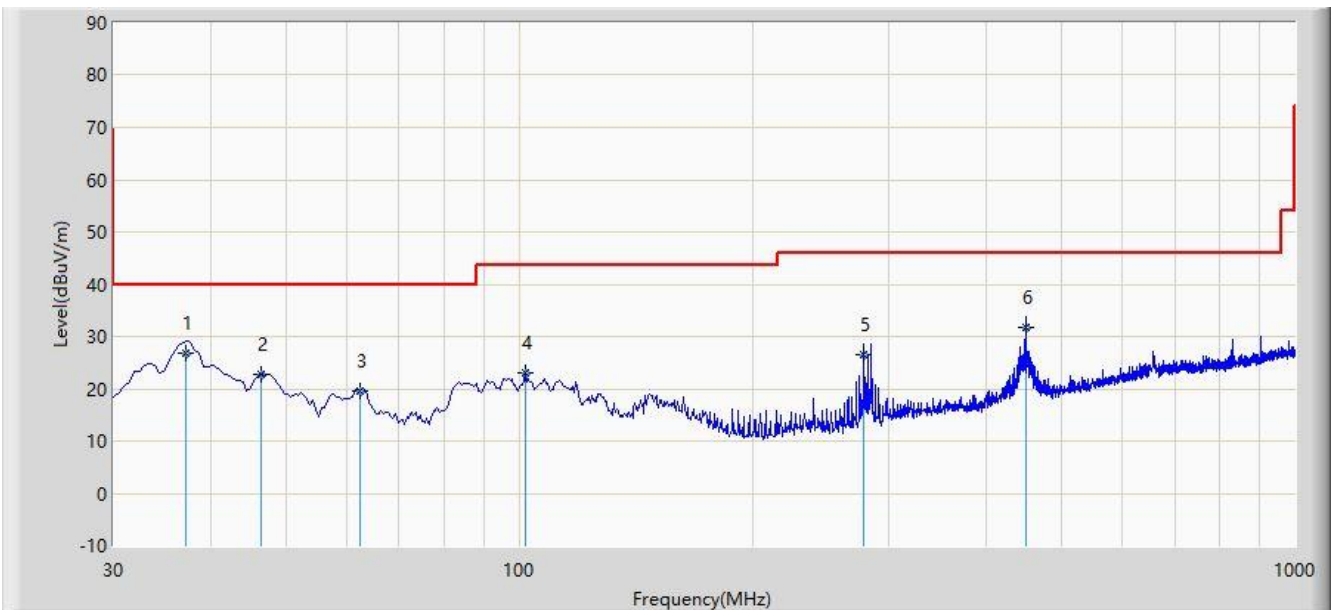
Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

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: 2020/03/18 - 14:08
Limit: FCC_Part15.209_RE(3m)	Engineer: Buter Shi
Probe: AC1_VULB 9168 _20-2000MHz	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(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		*	37.250	26.871	12.507	-13.129	40.000	14.363	QP
2			46.490	22.872	8.514	-17.128	40.000	14.358	QP
3			62.495	19.704	6.566	-20.296	40.000	13.137	QP
4			101.780	23.014	11.543	-20.486	43.500	11.471	QP
5			278.245	26.408	12.146	-19.592	46.000	14.262	QP
6			450.007	31.677	13.204	-14.323	46.000	18.473	QP

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

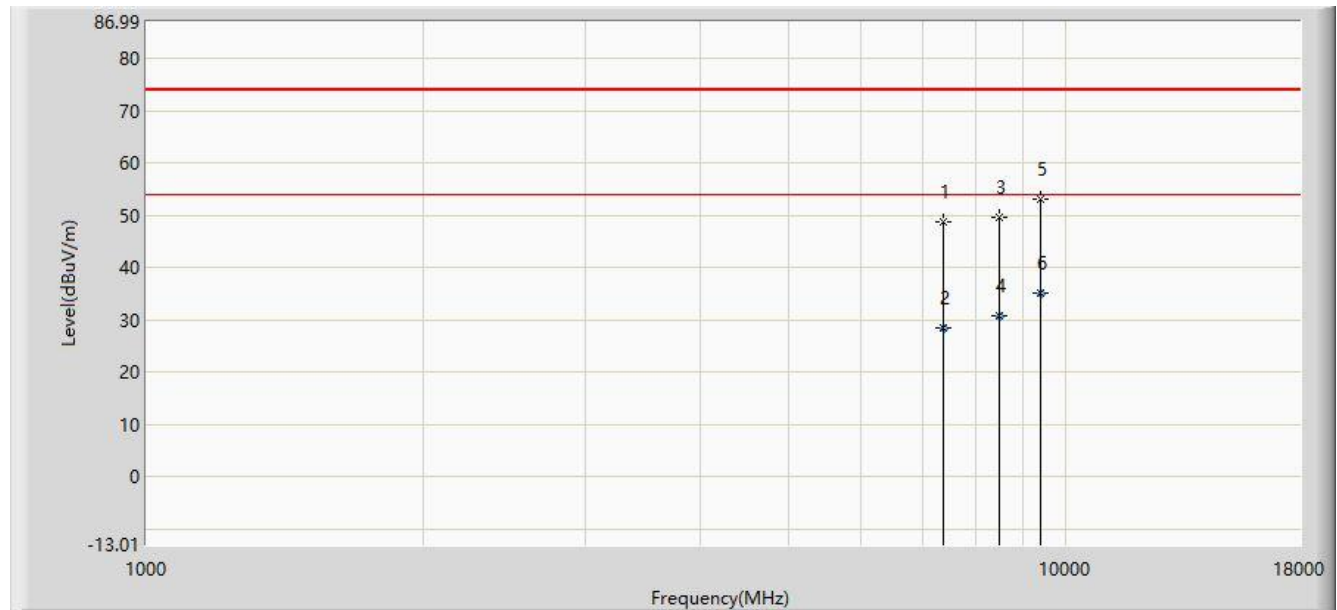
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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.

Test Result of Radiated Emissions for Co-located (For Internal antenna configuration)

Test Mode:	2.4GHz Wi-Fi & 5GHz Wi-Fi & BLE Transmit	Test Site:	AC1
Test Engineer:	Buter Shi	Polarity:	Horizontal
Remark:	There is the ambient noise within frequency range 9kHz~30MHz and 18GHz~40GHz, the permissible value is not show in the report.		



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			7358.000	48.650	44.996	-25.350	74.000	3.654	PK
2			7358.000	28.564	24.910	-25.436	54.000	3.654	AV
3			8463.000	49.721	34.937	-24.279	74.000	14.784	PK
4			8463.000	30.750	27.180	-23.250	54.000	3.570	AV
5			9406.500	53.207	46.811	-20.793	74.000	6.396	PK
6		*	9406.500	35.106	28.710	-18.894	54.000	6.396	AV

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

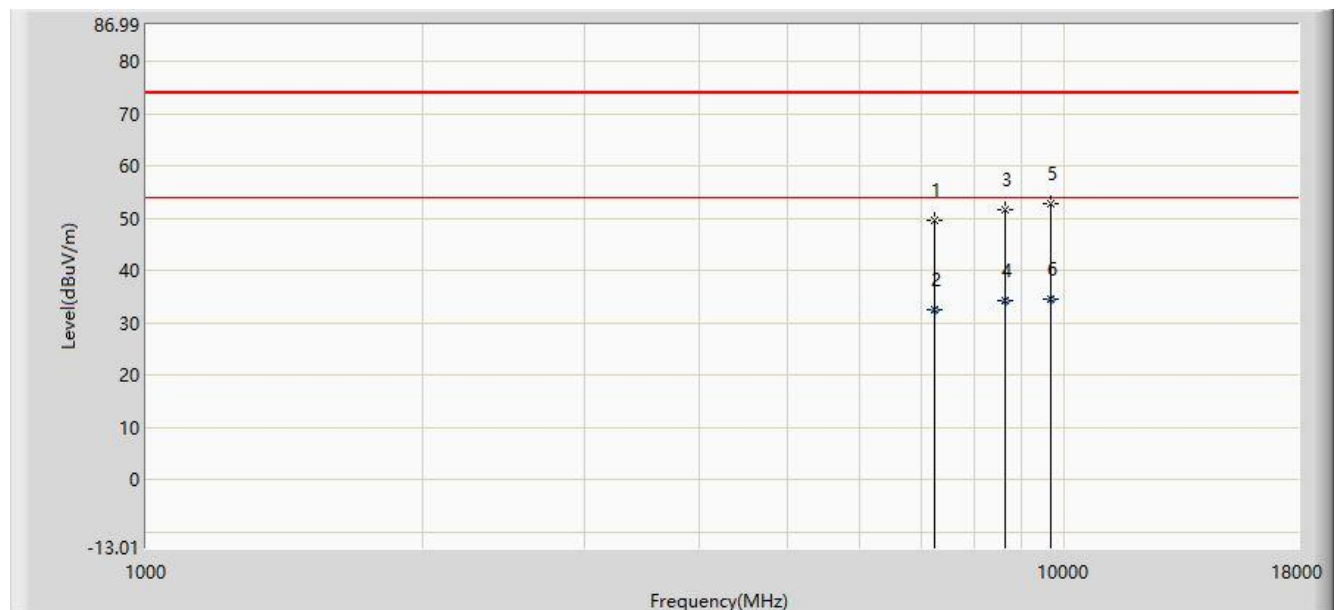
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Note 2: We selected the 2.4GHz and 5GHz worst-case mode of radiated spurious emissions in the DTS and UNII reports.

Note 3: Detail Channel information:

2.4GHz Wi-Fi 802.11ax-HE40 Channel 2422MHz & 5GHz Wi-Fi 802.11ac-VHT80 Channel 5530MHz & 2.4GHz Bluetooth channel 2402MHz

Test Mode:	2.4GHz Wi-Fi & 5GHz Wi-Fi & BLE Transmit	Test Site:	AC1
Test Engineer:	Buter Shi	Polarity:	Vertical
Remark:	There is the ambient noise within frequency range 9kHz~30MHz and 18GHz~40GHz, the permissible value is not show in the report.		



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			7222.000	49.498	46.185	-24.502	74.000	3.313	PK
2			7222.000	32.483	29.170	-21.517	54.000	3.313	AV
3			8641.500	51.560	47.011	-22.440	74.000	4.550	PK
4			8641.500	34.279	29.730	-19.721	54.000	4.550	AV
5			9695.500	52.930	46.153	-21.070	74.000	6.777	PK
6		*	9695.500	34.617	27.840	-19.383	54.000	6.777	AV

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

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

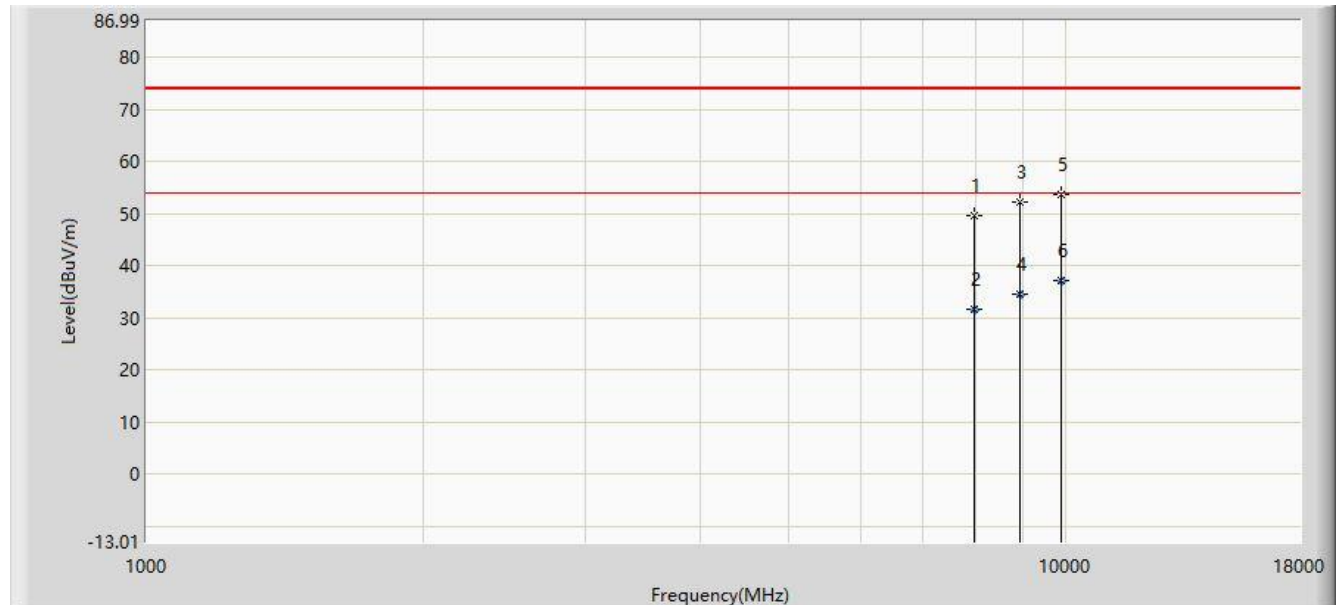
Note 2: We selected the 2.4GHz and 5GHz worst-case mode of radiated spurious emissions in the DTS and UNII reports.

Note 3: Detail Channel information:

2.4GHz Wi-Fi 802.11ax-HE40 Channel 2422MHz & 5GHz Wi-Fi 802.11ac-VHT80 Channel 5530MHz & 2.4GHz Bluetooth channel 2402MHz

Test Result of Radiated Emissions for Co-located (For External antenna configuration)

Test Mode:	2.4GHz Wi-Fi & 5GHz Wi-Fi & BLE Transmit	Test Site:	AC1
Test Engineer:	Buter Shi	Polarity:	Horizontal
Remark:	There is the ambient noise within frequency range 9kHz~30MHz and 18GHz~40GHz, the permissible value is not show in the report.		



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			7953.000	49.503	45.672	-24.497	74.000	3.831	PK
2			7953.000	31.641	27.810	-22.359	54.000	3.831	AV
3			8922.000	52.145	47.069	-21.855	74.000	5.076	PK
4			8922.000	34.586	29.510	-19.414	54.000	5.076	AV
5			9899.500	53.797	46.718	-20.203	74.000	7.079	PK
6		*	9899.500	37.249	30.170	-16.751	54.000	7.079	AV

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

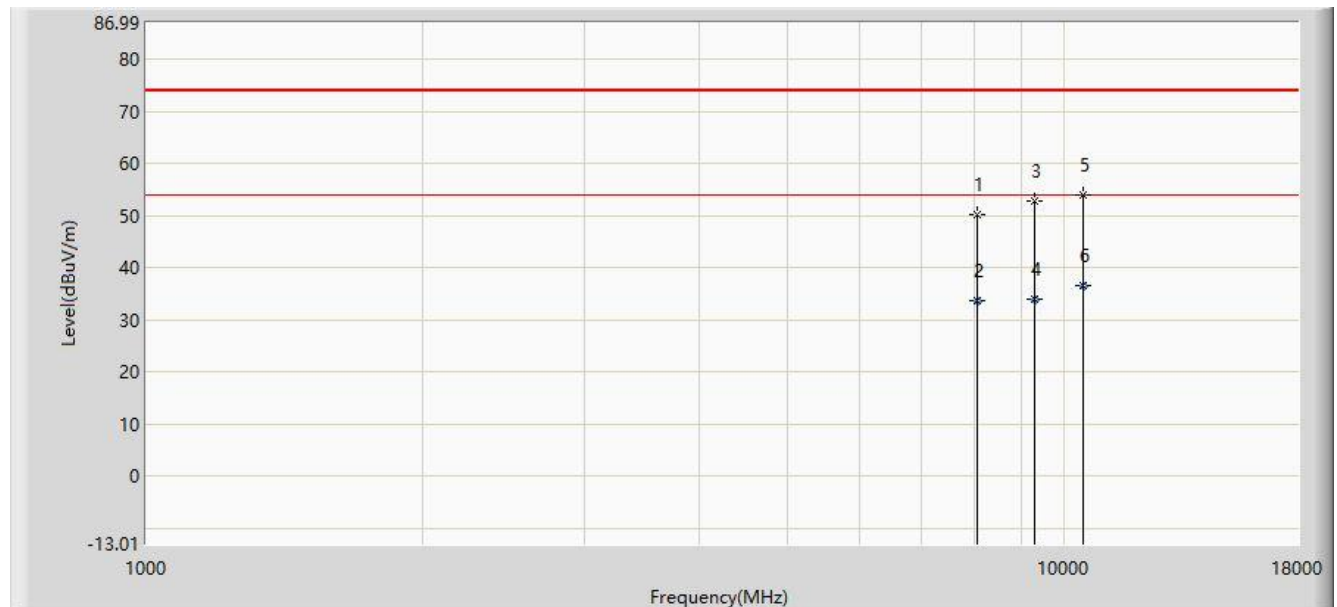
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Note 2: We selected the 2.4GHz and 5GHz worst-case mode of radiated spurious emissions in the DTS and UNII reports.

Note 3: Detail Channel information:

2.4GHz Wi-Fi 802.11ax-HE40 Channel 2422MHz & 5GHz Wi-Fi 802.11ac-VHT80 Channel 5530MHz & 2.4GHz Bluetooth channel 2402MHz

Test Mode:	2.4GHz Wi-Fi & 5GHz Wi-Fi & BLE Transmit	Test Site:	AC1
Test Engineer:	Buter Shi	Polarity:	Vertical
Remark:	There is the ambient noise within frequency range 9kHz~30MHz and 18GHz~40GHz, the permissible value is not show in the report.		



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			8046.500	50.307	46.373	-23.693	74.000	3.934	PK
2			8046.500	33.644	29.710	-20.356	54.000	3.934	AV
3			9313.000	52.690	46.387	-21.310	74.000	6.303	PK
4			9313.000	33.817	27.514	-20.183	54.000	6.303	AV
5			10494.500	53.831	46.174	-20.169	74.000	7.657	PK
6		*	10494.500	36.417	28.760	-17.583	54.000	7.657	AV

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

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

Note 2: We selected the 2.4GHz and 5GHz worst-case mode of radiated spurious emissions in the DTS and UNII reports.

Note 3: Detail Channel information:

2.4GHz Wi-Fi 802.11ax-HE40 Channel 2422MHz & 5GHz Wi-Fi 802.11ac-VHT80 Channel 5530MHz & 2.4GHz Bluetooth channel 2402MHz

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 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41	--	--	--

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 15.209 Limits		
Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measured Distance (m)
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

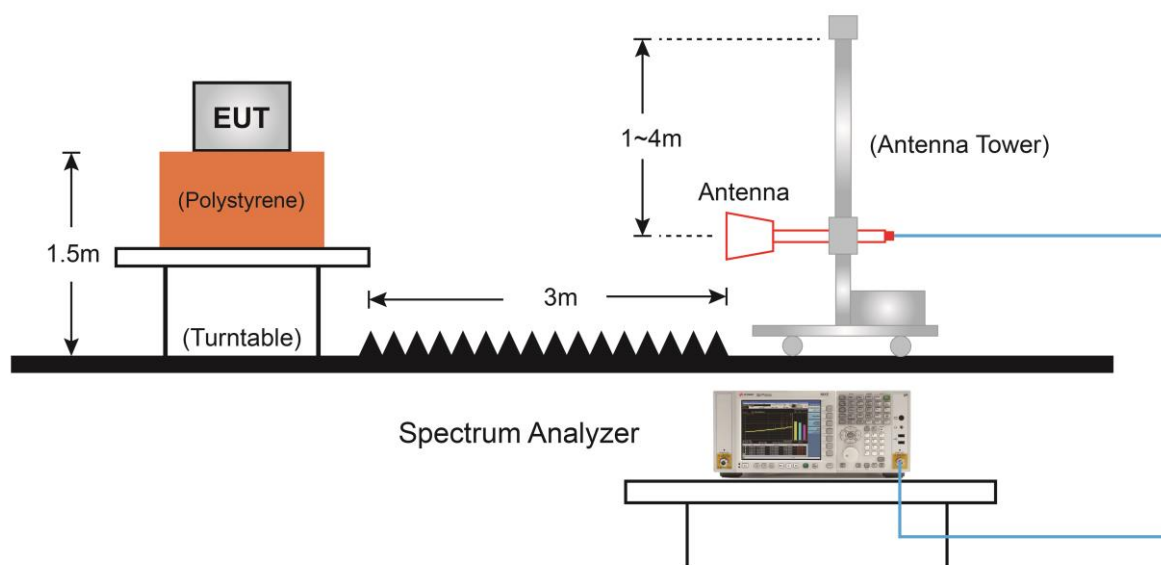
7.7.3.Test Setting

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

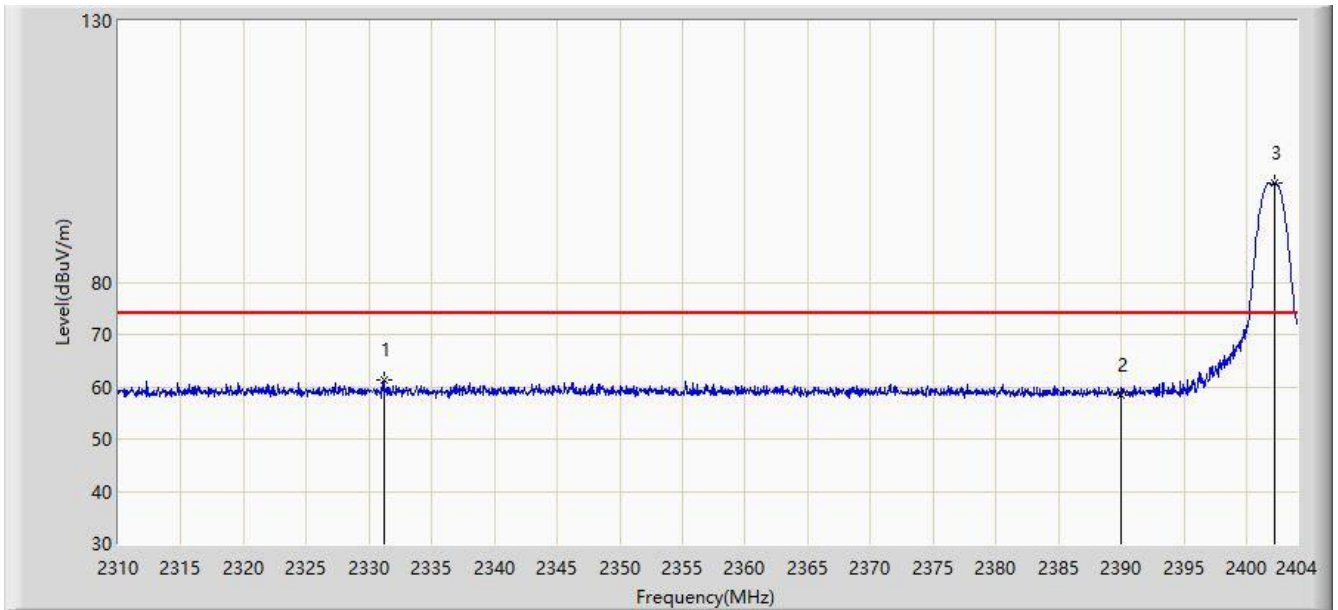
Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW $\geq 1/T$ (T is the minimum transmission duration)
4. Detector = Peak
5. Sweep time = Auto
6. Trace mode = Max hold
7. Trace was allowed to stabilize

7.7.4. Test Setup

7.7.5.Test Result

Site: AC1	Time: 2020/03/12 - 16:48
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(1Mbps) at 2402MHz	

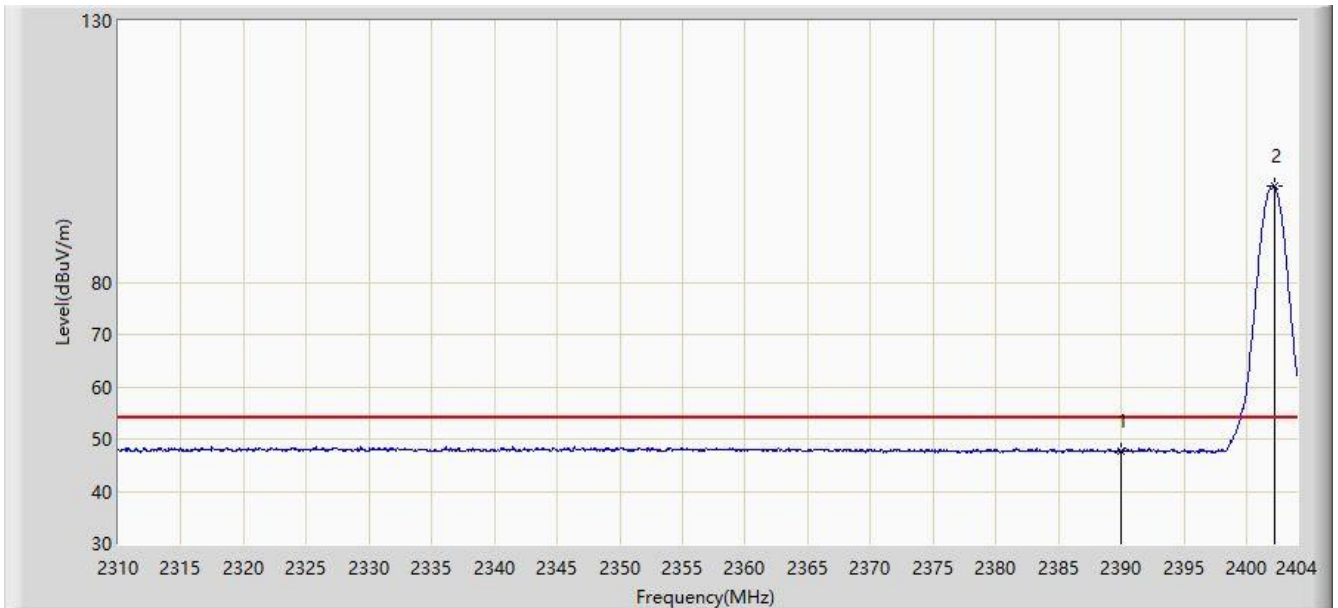


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2331.150	61.220	28.081	-12.780	74.000	33.138	PK
2			2390.000	58.528	25.448	-15.472	74.000	33.080	PK
3		*	2402.214	98.938	65.852	N/A	N/A	33.086	PK

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

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

Site: AC1	Time: 2020/03/12 - 16:51
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(1Mbps) at 2402MHz	

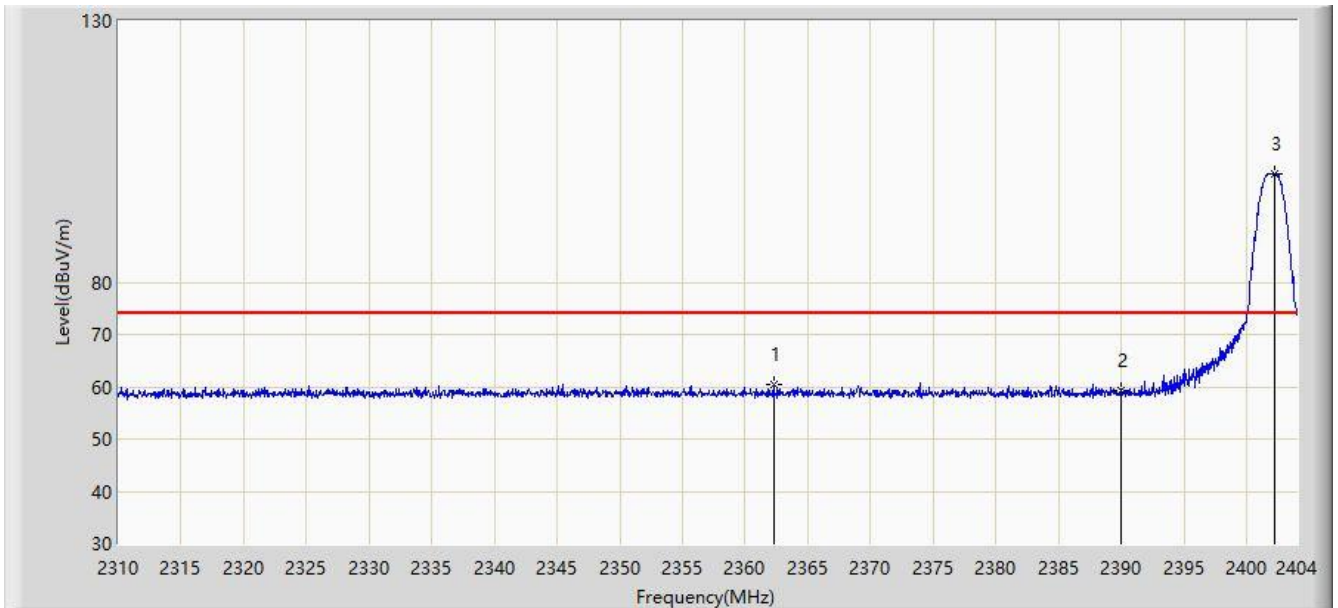


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	47.820	14.740	-6.180	54.000	33.080	AV
2		*	2402.214	98.272	65.186	N/A	N/A	33.086	AV

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

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

Site: AC1	Time: 2020/03/12 - 16:52
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(1Mbps) at 2402MHz	

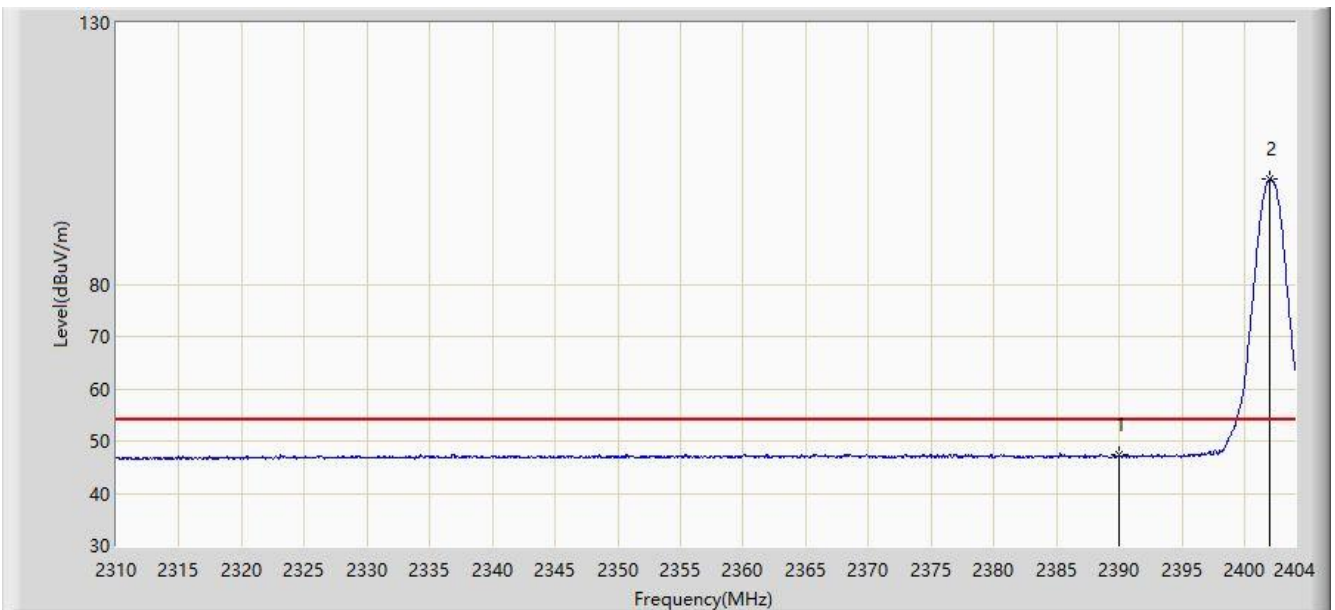


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2362.264	60.338	27.203	-13.662	74.000	33.135	PK
2			2390.000	59.369	26.289	-14.631	74.000	33.080	PK
3		*	2402.214	100.780	67.694	N/A	N/A	33.086	PK

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

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

Site: AC1	Time: 2020/03/12 - 16:54
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(1Mbps) at 2402MHz	

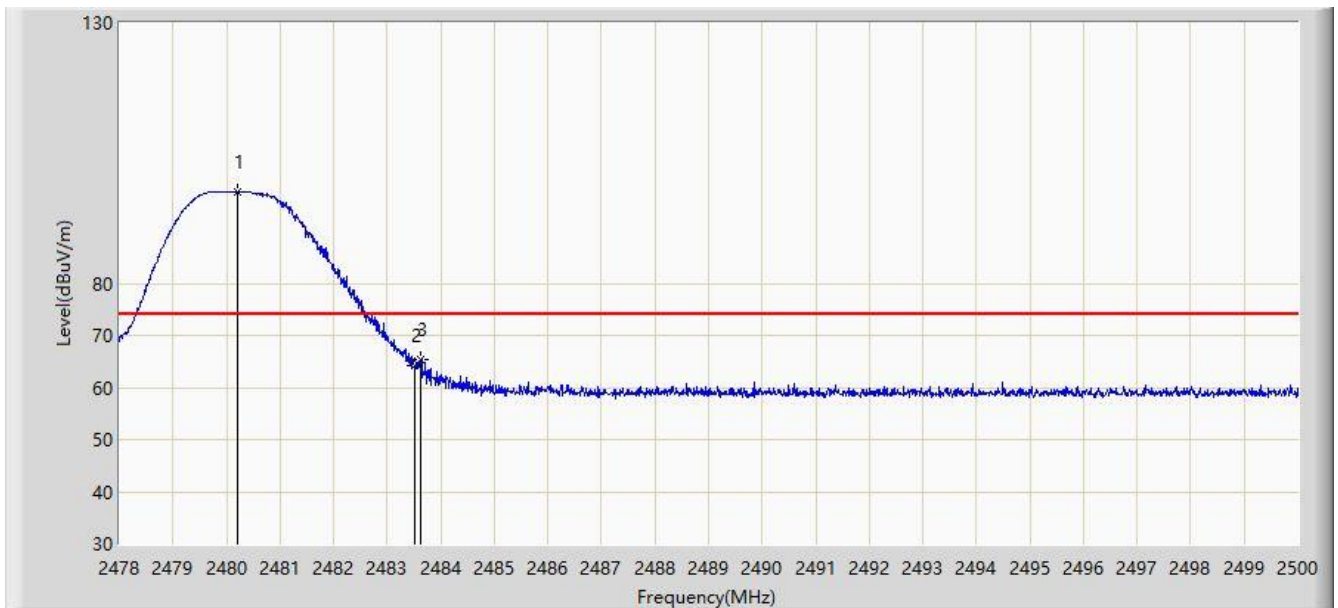


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	47.313	14.233	-6.687	54.000	33.080	AV
2		*	2402.026	100.108	67.022	N/A	N/A	33.086	AV

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

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

Site: AC1	Time: 2020/03/19 - 19:59
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(1Mbps) at 2480MHz	

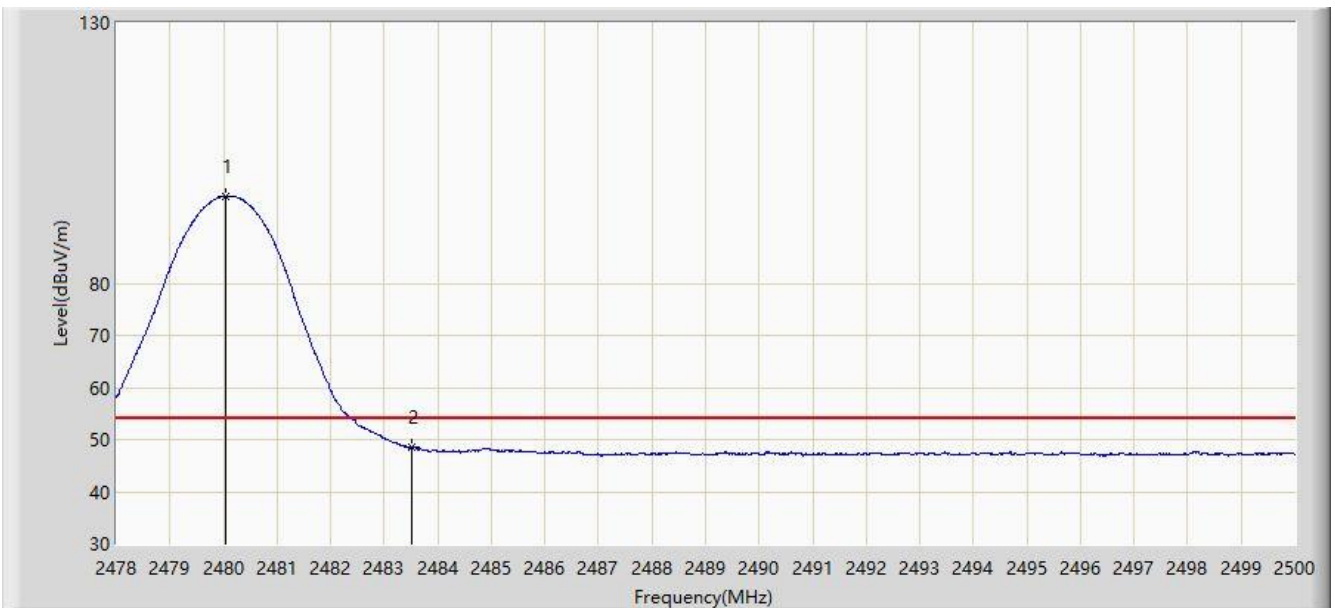


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.211	97.592	64.549	N/A	N/A	33.043	PK
2			2483.500	64.225	31.183	-9.775	74.000	33.042	PK
3			2483.632	65.364	32.322	-8.636	74.000	33.041	PK

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

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

Site: AC1	Time: 2020/03/19 - 20:00
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(1Mbps) at 2480MHz	

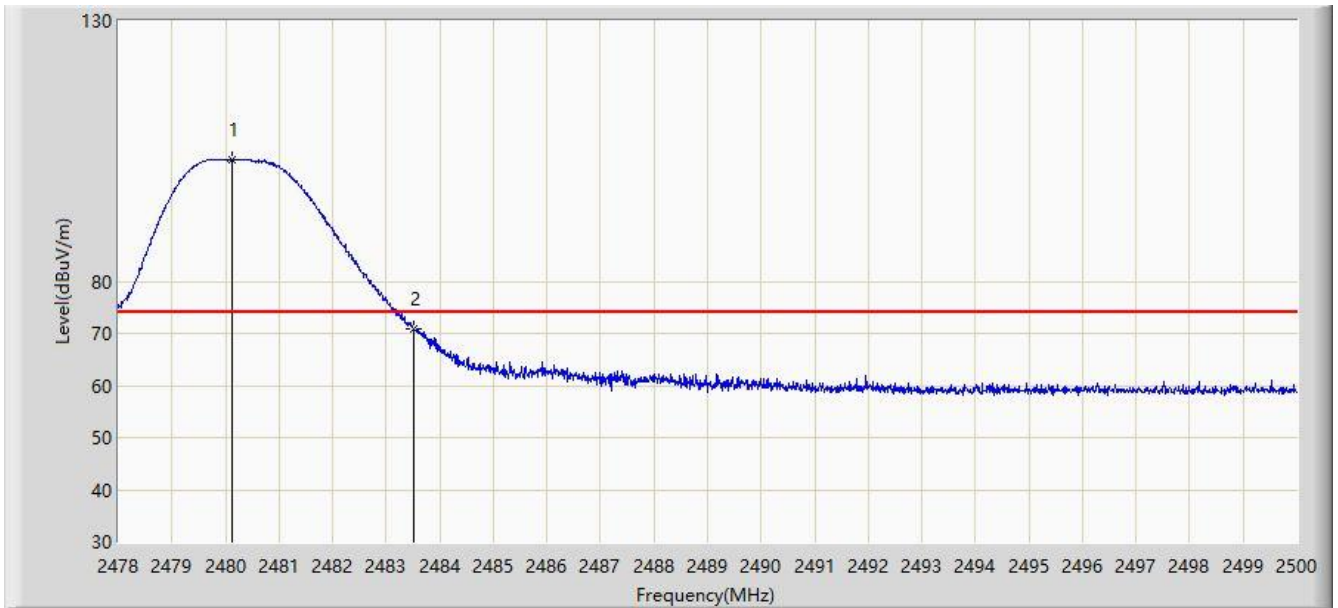


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.046	96.786	63.742	N/A	N/A	33.044	AV
2			2483.500	48.649	15.607	-5.351	54.000	33.042	AV

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

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

Site: AC1	Time: 2020/03/19 - 20:01
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(1Mbps) at 2480MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.112	103.286	70.242	N/A	N/A	33.043	PK
2			2483.500	70.888	37.846	-3.112	74.000	33.042	PK

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

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

Site: AC1	Time: 2020/03/19 - 20:02
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(1Mbps) at 2480MHz	

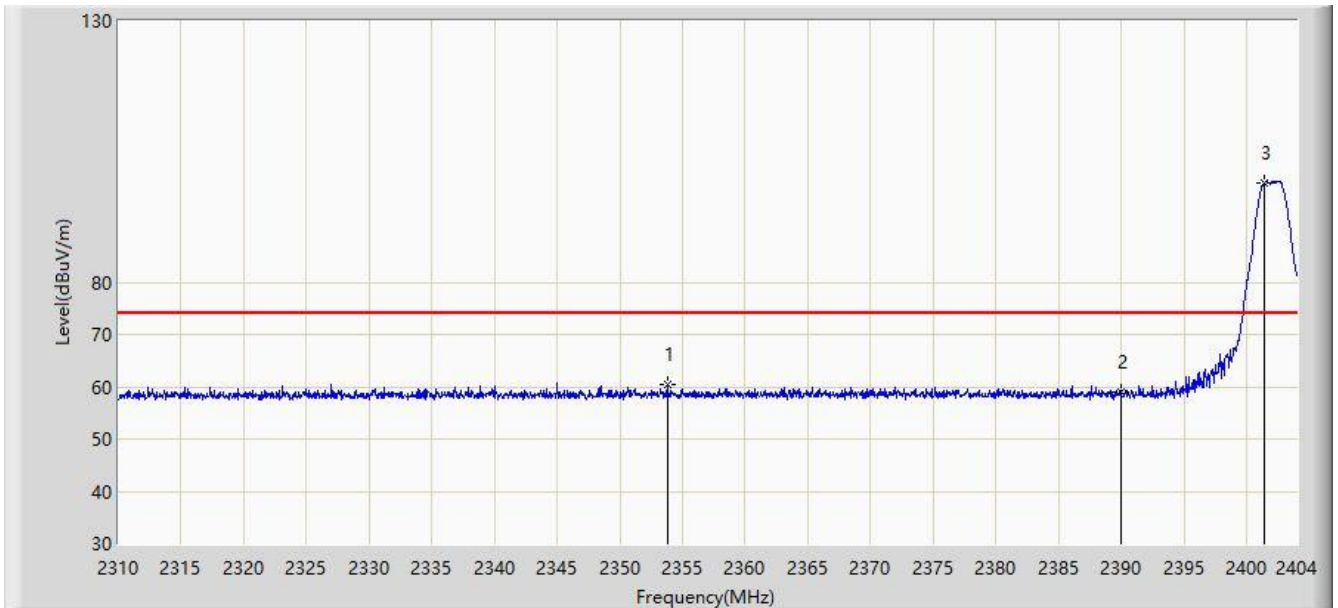


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.112	102.318	69.274	N/A	N/A	33.043	AV
2			2483.500	51.088	18.046	-2.912	54.000	33.042	AV

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

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

Site: AC1	Time: 2020/03/12 - 16:56
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(2Mbps) at 2402MHz	

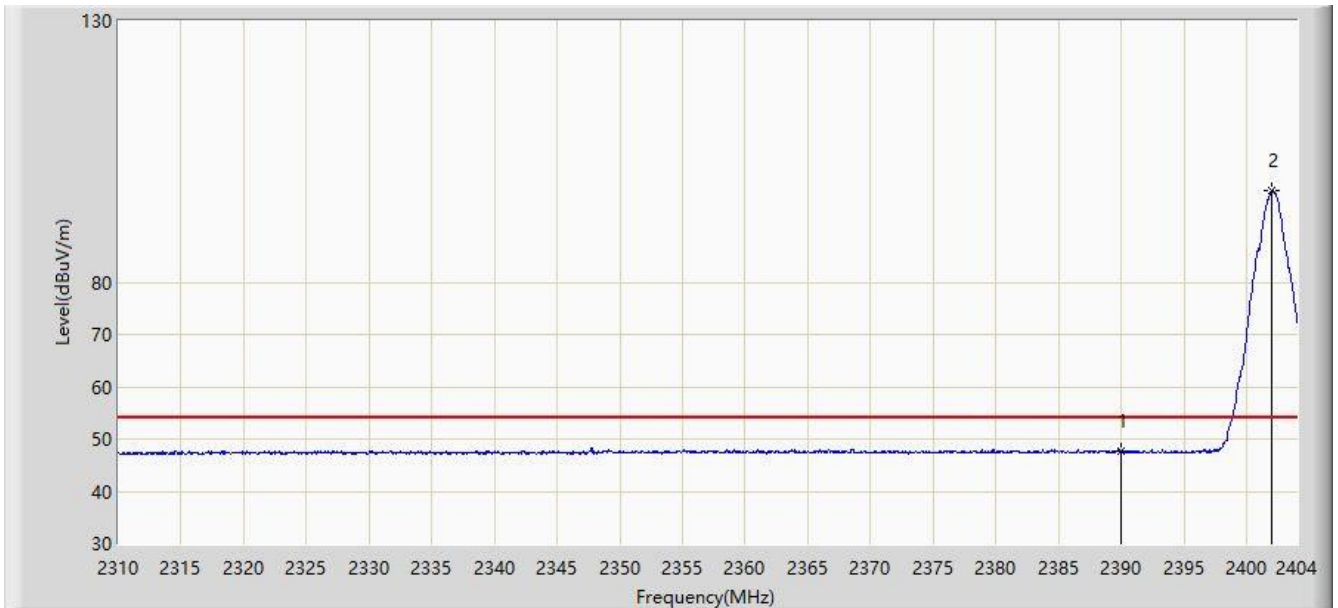


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2353.804	60.493	27.374	-13.507	74.000	33.119	PK
2			2390.000	58.846	25.766	-15.154	74.000	33.080	PK
3		*	2401.462	99.130	66.045	N/A	N/A	33.085	PK

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

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

Site: AC1	Time: 2020/03/12 - 16:57
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(2Mbps) at 2402MHz	

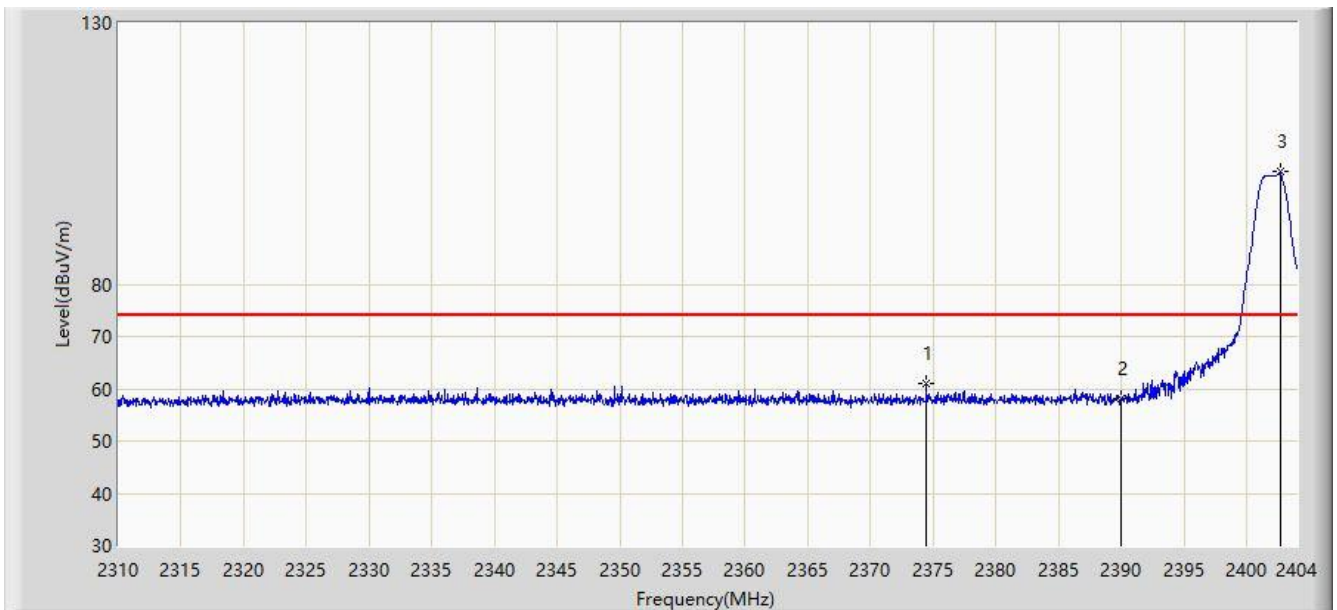


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	47.538	14.458	-6.462	54.000	33.080	AV
2		*	2402.026	97.568	64.482	N/A	N/A	33.086	AV

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

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

Site: AC1	Time: 2020/03/12 - 16:59
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(2Mbps) at 2402MHz	

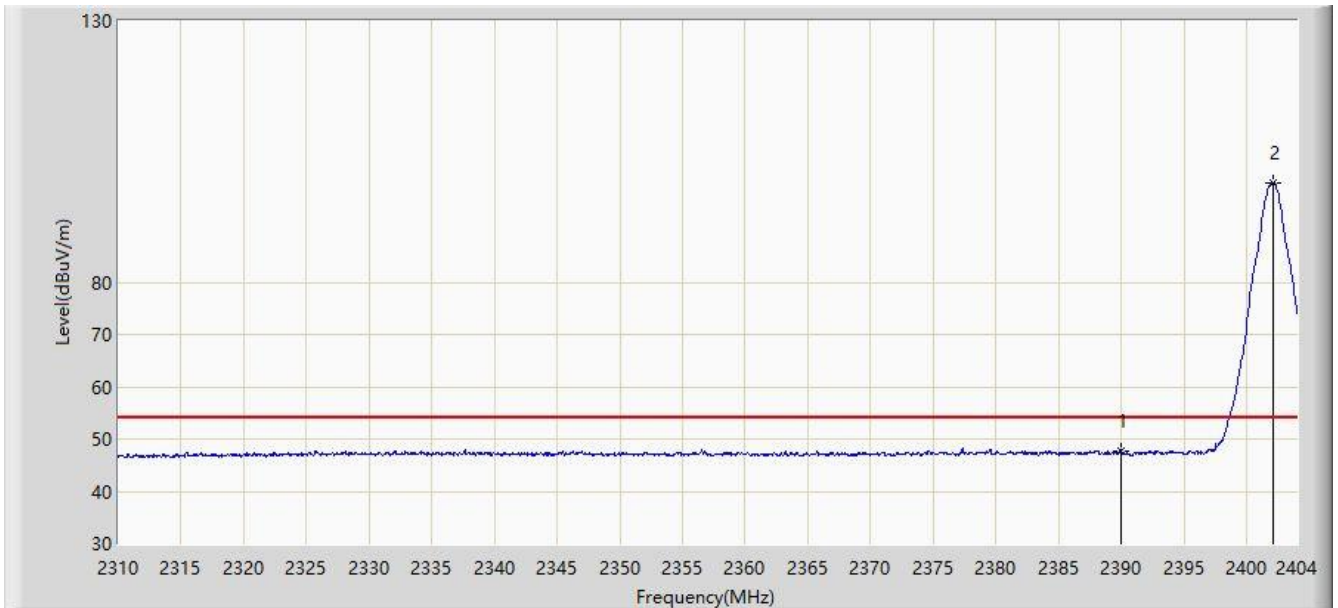


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2374.437	60.903	27.793	-13.097	74.000	33.110	PK
2			2390.000	58.121	25.041	-15.879	74.000	33.080	PK
3		*	2402.731	101.450	68.363	N/A	N/A	33.087	PK

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

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

Site: AC1	Time: 2020/03/12 - 17:02
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(2Mbps) at 2402MHz	

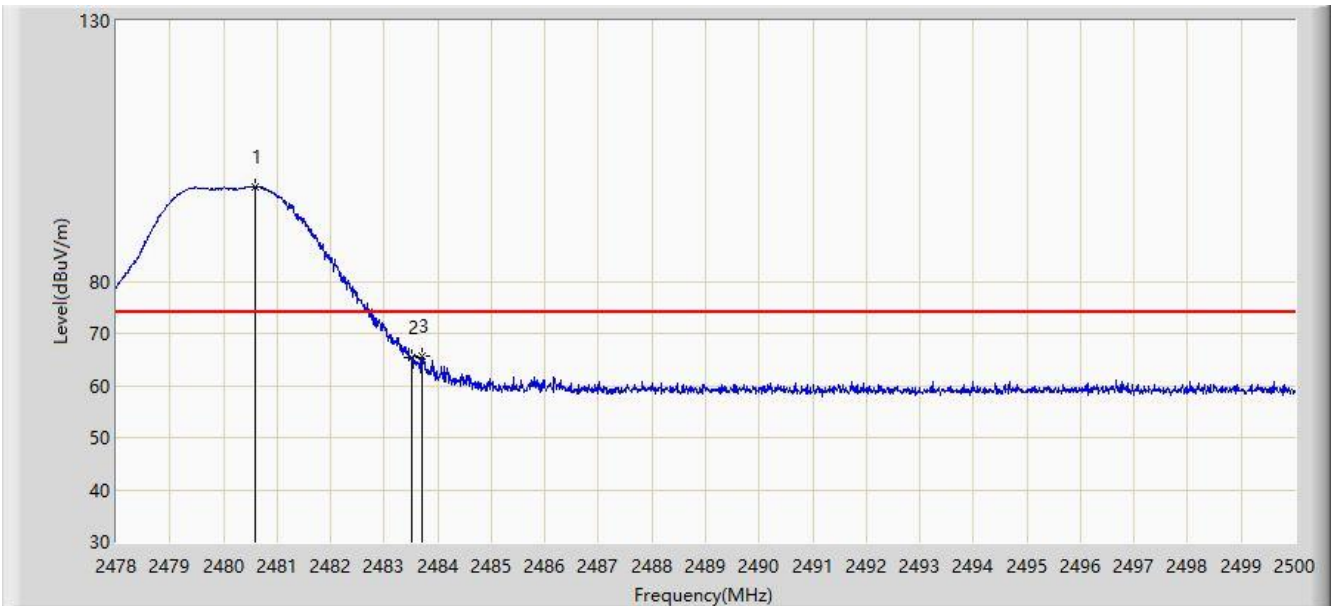


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	47.668	14.588	-6.332	54.000	33.080	AV
2		*	2402.073	99.110	66.024	N/A	N/A	33.086	AV

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

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

Site: AC1	Time: 2020/03/19 - 20:03
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(2Mbps) at 2480MHz	

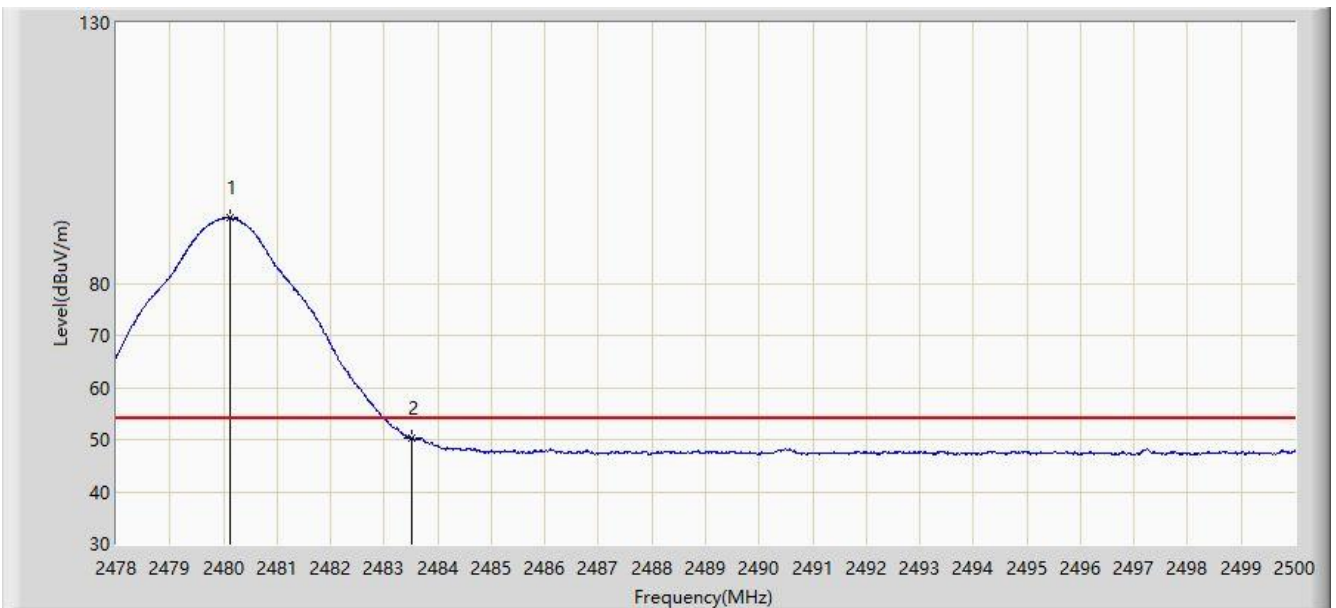


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.585	98.168	65.125	N/A	N/A	33.044	PK
2			2483.500	65.472	32.430	-8.528	74.000	33.042	PK
3			2483.720	65.649	32.607	-8.351	74.000	33.042	PK

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

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

Site: AC1	Time: 2020/03/19 - 20:05
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(2Mbps) at 2480MHz	

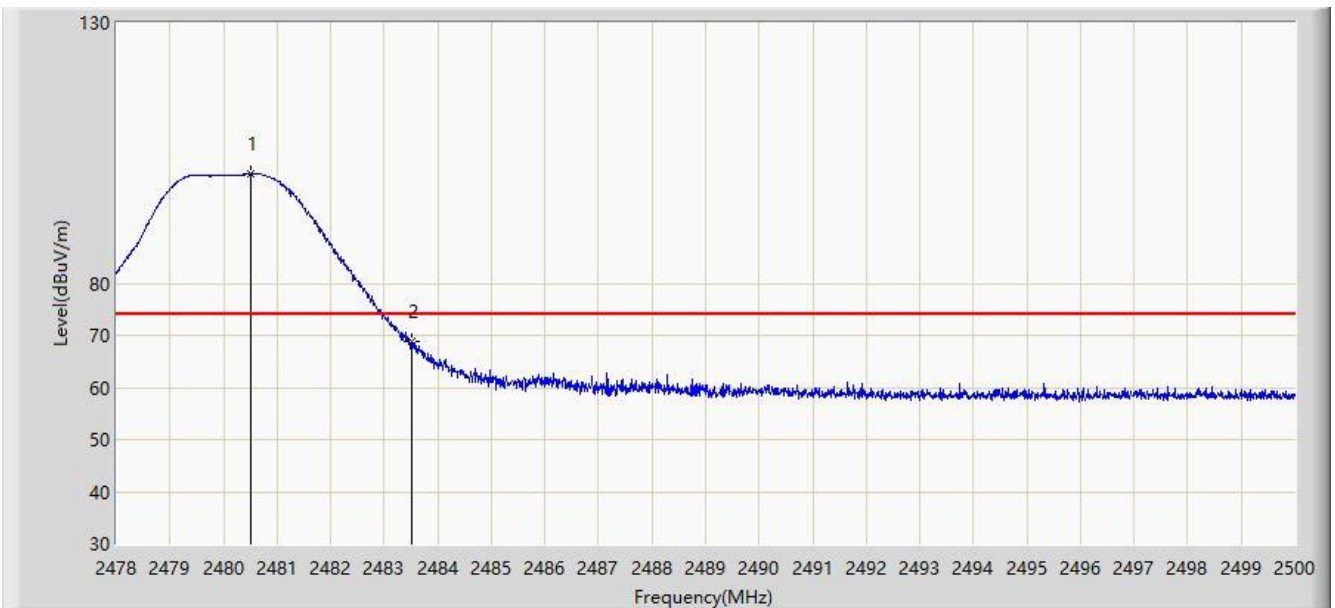


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.112	92.529	59.485	N/A	N/A	33.043	AV
2			2483.500	50.376	17.334	-3.624	54.000	33.042	AV

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

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

Site: AC1	Time: 2020/03/19 - 20:05
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(2Mbps) at 2480MHz	

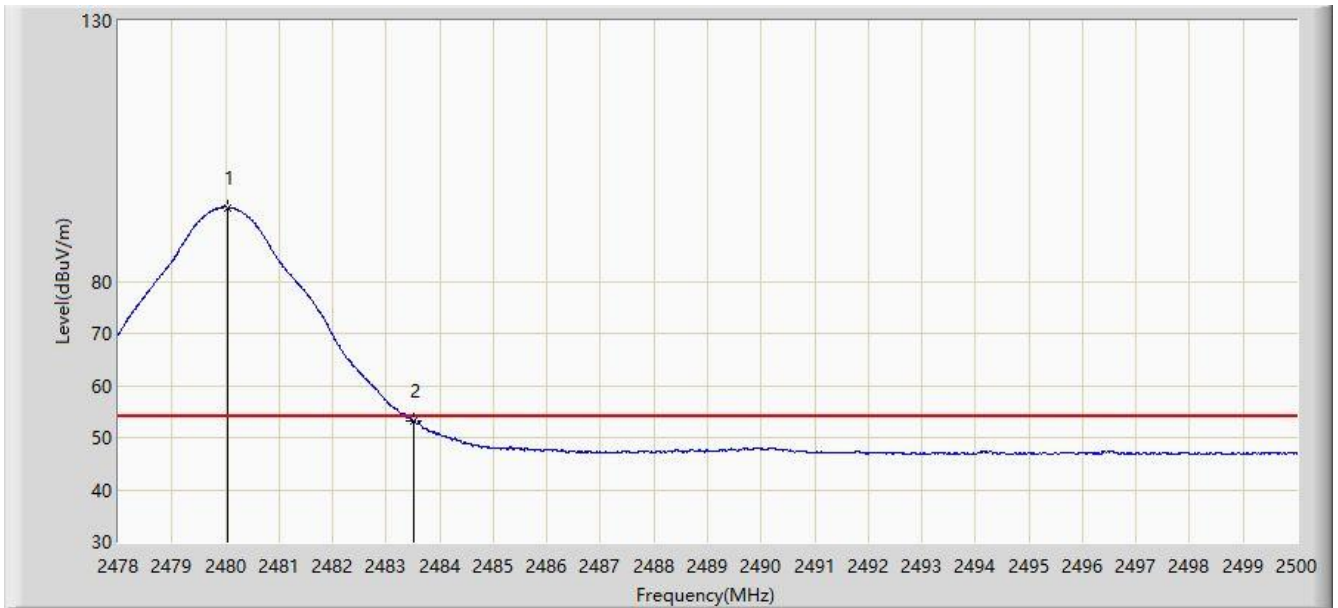


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.519	100.968	67.925	N/A	N/A	33.043	PK
2			2483.500	68.920	35.878	-5.080	74.000	33.042	PK

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

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

Site: AC1	Time: 2020/03/19 - 20:06
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: AC1_BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by Bluetooth-LE(2Mbps) at 2480MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.046	94.176	61.132	N/A	N/A	33.044	AV
2			2483.500	53.283	20.241	-0.717	54.000	33.042	AV

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

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

7.8. AC Conducted Emissions Measurement

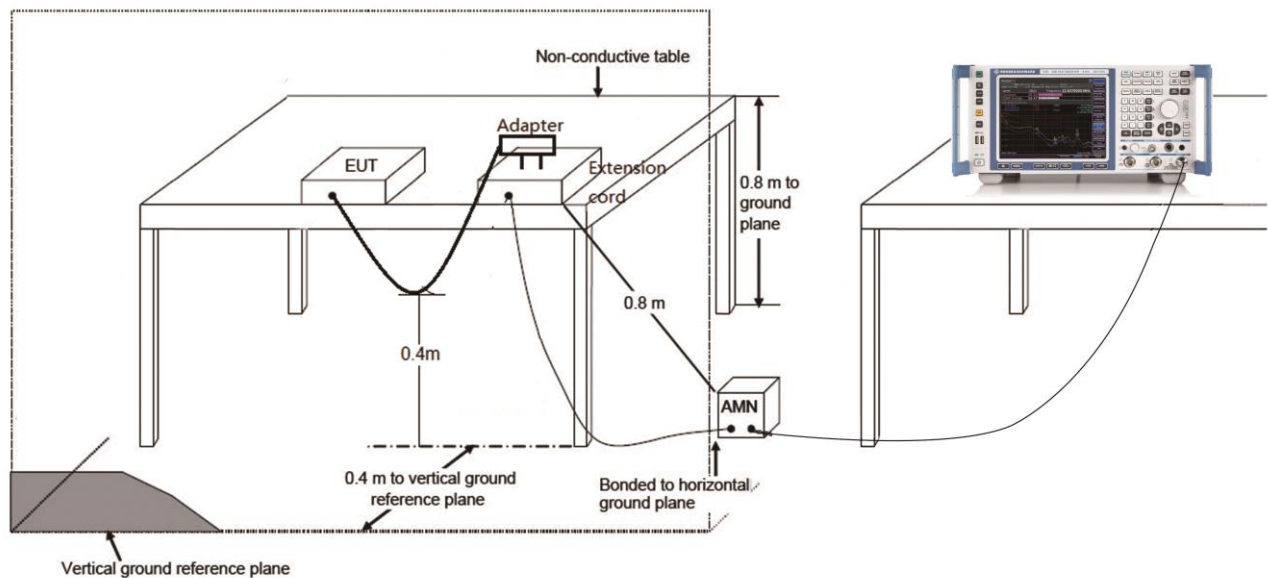
7.8.1. Test Limit

FCC Part 15.207 Limits		
Frequency (MHz)	QP (dB μ V)	Average (dB μ V)
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.

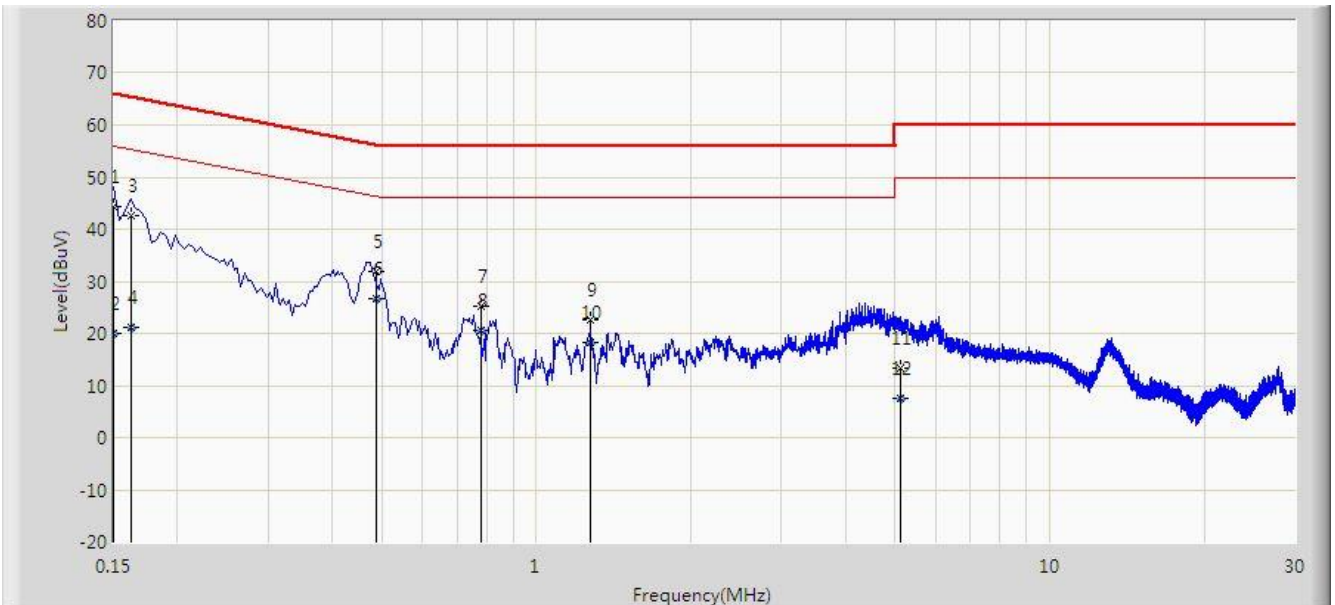
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

7.8.2. Test Setup



7.8.3.Test Result

Site: SR2	Time: 2020/03/04 - 15:06
Limit: FCC_Part15.207_CE_AC Power	Engineer: Antony Yang
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode 1	

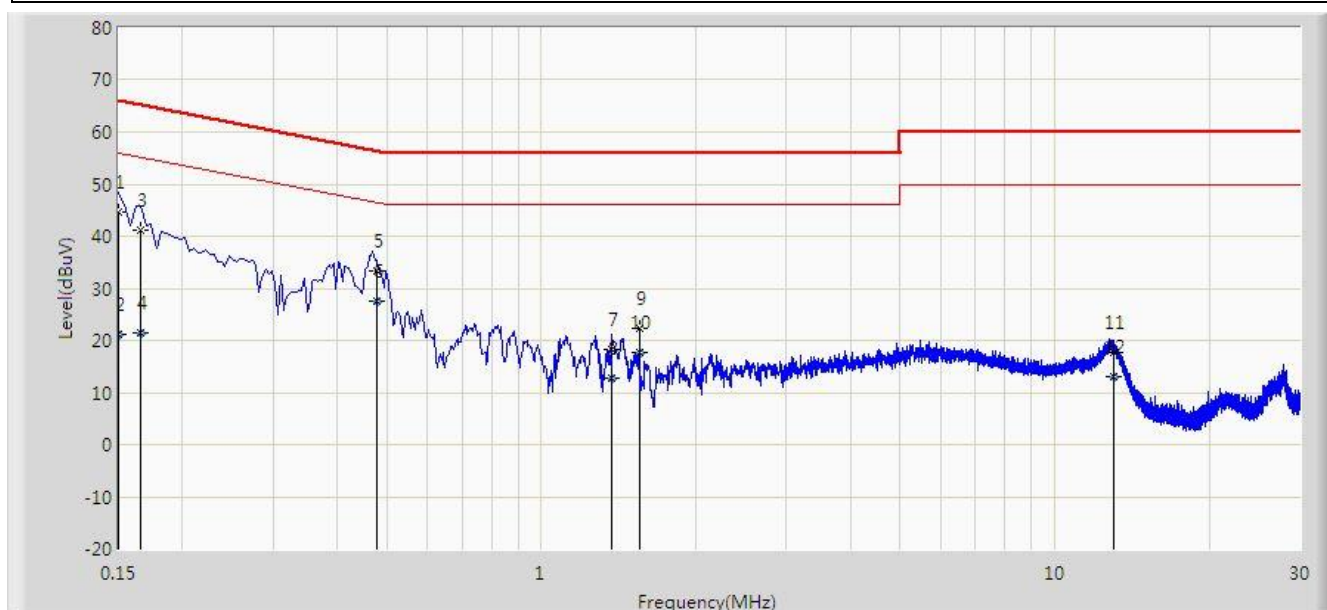


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.150	44.205	33.037	-21.795	66.000	11.168	QP
2			0.150	20.143	8.975	-35.857	56.000	11.168	AV
3			0.162	42.640	32.543	-22.721	65.361	10.097	QP
4			0.162	21.276	11.179	-34.085	55.361	10.097	AV
5			0.488	31.957	21.800	-24.245	56.202	10.157	QP
6		*	0.488	26.757	16.600	-19.445	46.202	10.157	AV
7			0.779	25.222	15.200	-30.778	56.000	10.022	QP
8			0.779	20.622	10.600	-25.378	46.000	10.022	AV
9			1.274	22.505	12.607	-33.495	56.000	9.899	QP
10			1.274	18.294	8.395	-27.706	46.000	9.899	AV
11			5.110	13.449	3.400	-46.551	60.000	10.049	QP
12			5.110	7.449	-2.600	-42.551	50.000	10.049	AV

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

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

Site: SR2	Time: 2020/03/04 - 15:21
Limit: FCC_Part15.207_CE_AC Power	Engineer: Antony Yang
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: Wireless 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			0.150	44.495	33.353	-21.505	66.000	11.142	QP
2			0.150	21.061	9.919	-34.939	56.000	11.142	AV
3			0.166	41.244	31.173	-23.914	65.158	10.071	QP
4			0.166	21.475	11.404	-33.683	55.158	10.071	AV
5			0.478	33.370	23.200	-23.003	56.374	10.170	QP
6		*	0.478	27.470	17.300	-18.903	46.374	10.170	AV
7			1.374	18.315	8.420	-37.685	56.000	9.895	QP
8			1.374	12.879	2.983	-33.121	46.000	9.895	AV
9			1.557	22.187	12.300	-33.813	56.000	9.887	QP
10			1.557	17.787	7.900	-28.213	46.000	9.887	AV
11			13.046	17.691	7.576	-42.309	60.000	10.115	QP
12			13.046	12.949	2.834	-37.051	50.000	10.115	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 “2001RSU050-UT” file.

Appendix B - EUT Photograph

Refer to "2001RSU050-UE" file.