RF MEASUREMENT REPORT

FCC ID:	TK4WPQ618HV
Applicant:	Compex Systems Pte Ltd
Product:	Wireless Access Point
Model No.:	WPQ618HV, WPQ618LV
Brand Name:	COMPEX
FCC Classification:	Digital Transmission System (DTS)
FCC Rule Part(s):	Part 15 Subpart C (Section 15.247)
Result:	Complies
Test Date:	2022-05-16 ~ 2022-05-24

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.

Revision History

Report No.	Version	Description	Issue Date	Note
2203RSU059-U2	Rev. 01	Initial Report	2022-08-08	Valid

CONTENTS

1. General Information

1.1. Applicant

Compex Systems Pte Ltd

No:9 Harrison Road, Harrison Industrial Building, #05-01, Singapore 369651

1.2. Manufacturer

Compex Systems Pte Ltd

No:9 Harrison Road, Harrison Industrial Building, #05-01, Singapore 369651

1.3. Testing Facility

☒	**Test Site – MRT Suzhou Laboratory**				
	Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China **Laboratory Location (Suzhou - SIP)** 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China				
	Laboratory Accreditations				
	A2LA: 3628.01		CNAS: L10551		
	FCC: CN1166		ISED: CN0001		
	VCCI:	☐R-20025	☐G-20034	☐C-20020	☐T-20020
		☐R-20141	☐G-20134	☐C-20103	☐T-20104
☐	**Test Site – MRT Shenzhen Laboratory**				
	Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China				
	Laboratory Accreditations				
	A2LA: 3628.02		CNAS: L10551		
	FCC: CN1284		ISED: CN0105		
☐	**Test Site – MRT Taiwan Laboratory**				
	Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)				
	Laboratory Accreditations				
	TAF: L3261-190725				
	FCC: 291082, TW3261		ISED: TW3261		

1.4. Product Information

Product Name	Wireless Access Point
Model No.	WPQ618HV, WPQ618LV
EUT Identification No.	20210407Sample#02
Wi-Fi Specification	802.11a/b/g/n/ac/ax
Bluetooth Specification	V4.2 dual mode
Antenna Information	Refer to section 1.6
Power Supply	AC/DC Adapter or PoE Adapter
Remark: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Radio Specification

Frequency Range	2402~2480MHz
Channel Number	40
Type of Modulation	GFSK
Data Rate	1Mbps

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

1.6. Antenna Details

Antenna Type	Frequency Band (GHz)	Max Peak Gain (dBi)	CDD Directional Gain (dBi)	
			For Power	For PSD
Wi-Fi Antenna (2*2 MIMO)				
Omni Antenna 1#	2.4 ~ 2.5	8.00	8.00	11.01
	5.15 ~ 5.85	5.00	5.00	8.01
Omni Antenna 2# (P/NO: WD12020258G)	2.4 ~ 2.5	1.91	1.91	4.92
	5.15 ~ 5.85	3.39	3.39	6.40
Omni Antenna 3# (P/NO: 02S00029A)	2.4 ~ 2.5	3.41	3.41	6.42
	5.15 ~ 5.85	3.55	3.55	6.56
Bluetooth Antenna				
Omni-directional	2.4 ~ 2.5	2.00		

Note: 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 $N_{ANT} \leq 4$;

1.7. Working Frequencies

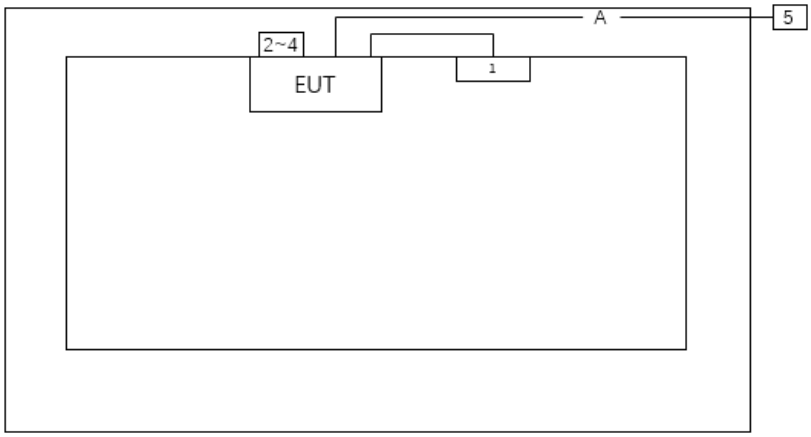
Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz
03	2408 MHz	04	2410 MHz	05	2412 MHz
06	2414 MHz	07	2416 MHz	08	2418 MHz
09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz
15	2432 MHz	16	2434 MHz	17	2436 MHz
18	2438 MHz	19	2440 MHz	20	2442 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. Test Configuration

2.1. Test System Connection Diagram

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.

Connection Diagram – Radiated Emission testing & AC Conducted Emissions



Cable Type		Cable Description
A	LAN Cable	Non shielded, > 10m

2.1. Test System Details

Product		Manufacturer	Model No.
1	Adapter	SWITCHING Power Supply	S050FU1200400
2~4	Simulated load	N/A	001
5	Notebook	Lenovo	E431

Note: This adapter is provided by the laboratory for testing only, not by the applicant.

2.2. Test Software

The test utility software used during testing was “QSPR”, and the version was 5.0-00196.

2.3. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15.247
- KDB 558074 D01v05r02
- ANSI C63.10-2013

2.4. Test Environment Condition

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

3. 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."

For Bluetooth Antenna Configuration

- The antenna of the device is **permanently attached.**

Conclusion:

The unit complies with the requirement of §15.203.

4. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2022-06-08	WZ-SR2
EMI Test Receiver	R&S	ESR3	MRTSUE06909	1 year	2022-11-01	WZ-SR2
Shielding Room	MIX-BEP	WZ-SR2	MRTSUE06215	5 years	2026-12-20	WZ-SR2
Thermohygrometer	testo	608-H1	MRTSUE06404	1 year	2022-06-28	WZ-SR2
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2022-12-29	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2022-09-16	WZ-AC1
Preamplifier	Agilent	83017A	MRTSUE06076	1 year	2022-11-12	WZ-AC1
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2022-08-05	WZ-AC1
Anechoic Chamber	TDK	WZ-AC1	MRTSUE06212	1 year	2023-04-21	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE06403	1 year	2022-06-28	WZ-AC1
Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2022-12-29	WZ-AC1
Thermohygrometer	testo	Testo 608-H1	MRTSUE11039	1 year	2022-11-11	WZ-AC1
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2022-10-28	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2022-12-01	WZ-AC1
Preamplifier	EMCI	EMC184045SE	MRTSUE06640	1 year	2023-01-13	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE06402	1 year	2022-6-28	WZ-SR5
USB Power Sensor	Agilent	U2021XA	MRTSUE06030	1 year	2022-10-10	WZ-SR5
Directional Coupler	narda	4226-10	MRTSUE06562	1 year	2022-10-28	WZ-SR5
Attenuator	SHX	SMA10-3dB-18G	MRTSUE06695	1 year	2023-03-02	WZ-SR5
Shielding Room	HUAMING	WZ-SR5	MRTSUE06442	N/A	N/A	WZ-SR5
Signal Analyzer	Keysight	N9010B	MRTSUE06457	1 year	2022-6-24	WZ-SR5

Software	Version	Function
EMI Software	V3.0.0	EMI Test Software
Controller_MF 7802	2.03C	RE Antenna&turntable

5. Decision Rules and Measurement Uncertainty

5.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.2. 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
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%

6. Test Result

6.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
15.247(a)(2)	6dB Bandwidth	Conducted	Pass
15.247(b)(3)	Output Power		Pass
15.247(e)	Power Spectral Density		Pass
15.247(d)	Band Edge / Out-of-Band Emissions		Pass
15.205 15.209	General Field Strength (Restricted Bands and Radiated Emission)	Radiated	Pass
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	Pass

Remark:

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.

6.2. 6dB Bandwidth Measurement

6.2.1. Test Limit

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

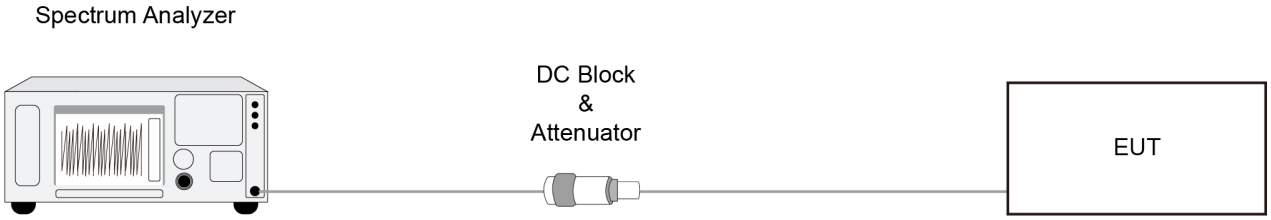
6.2.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.8

6.2.3. 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 to stabilize

6.2.4. Test Setup



6.2.5. Test Result

Refer to Appendix A.2.

6.3. Output Power Measurement

6.3.1. Test Limit

The maximum output 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.

6.3.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.9.1.3

ANSI C63.10 - 2013 - Section 11.9.2.3.2

6.3.3. Test Setting

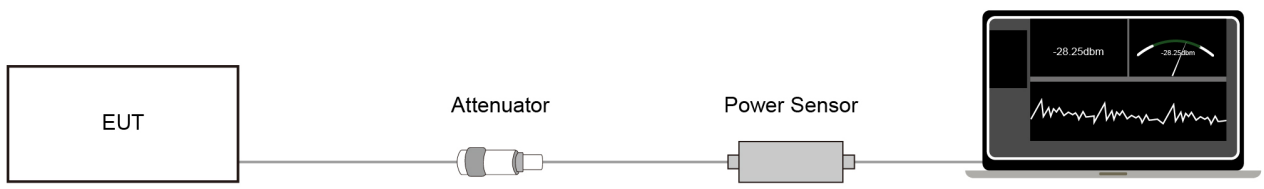
Method PKPM1 (Peak Power Measurement of Signals with DTS BW ≤ 50MHz)

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.

6.3.4. Test Setup



6.3.5. Test Result

Refer to Appendix A.3.

6.4. Power Spectral Density Measurement

6.4.1. 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.

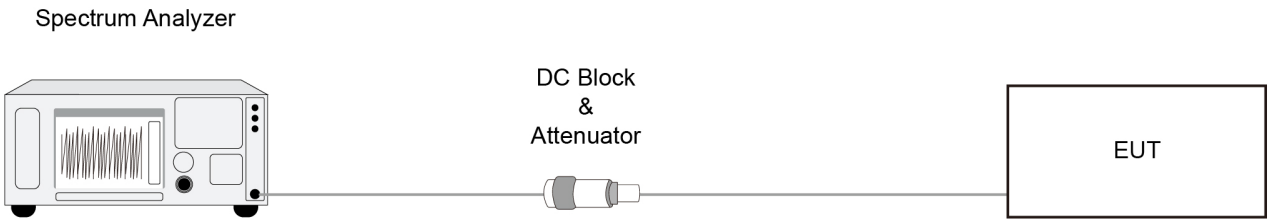
6.4.2. Test Procedure

ANSI C63.10-2013 Section 11.10.2

6.4.3. 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

6.4.4. Test Setup



6.4.5. Test Result

Refer to Appendix A.4.

6.5. Conducted Band Edge and Out-of-Band Emissions Measurement

6.5.1. 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 100 kHz bandwidth per the PSD procedure.

6.5.2. Test Procedure

ANSI C63.10-2013 - Section 11.11

6.5.3. Test Settitng

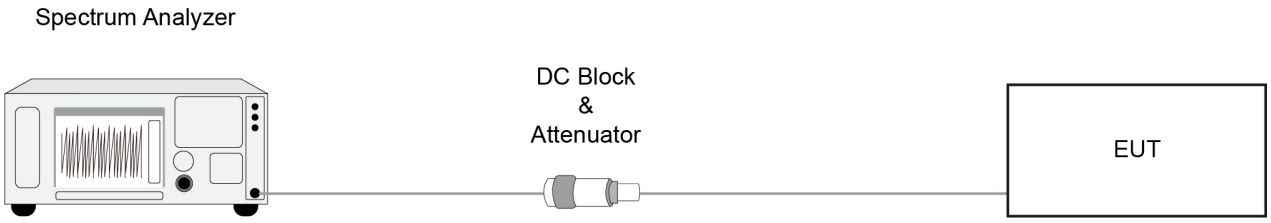
Reference level measurement

1. Set instrument center frequency to DTS channel center frequency
2. Set the span to ≥ 1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW ≥ 3 x RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize

Emission level measurement

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

6.5.4. Test Setup



6.5.5. Test Result

Refer to Appendix A.5.

6.6. Radiated Spurious Emission Measurement

6.6.1. 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

6.6.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.11 & 11.12

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)

6.6.3. 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
> 1000MHz	1MHz

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; 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

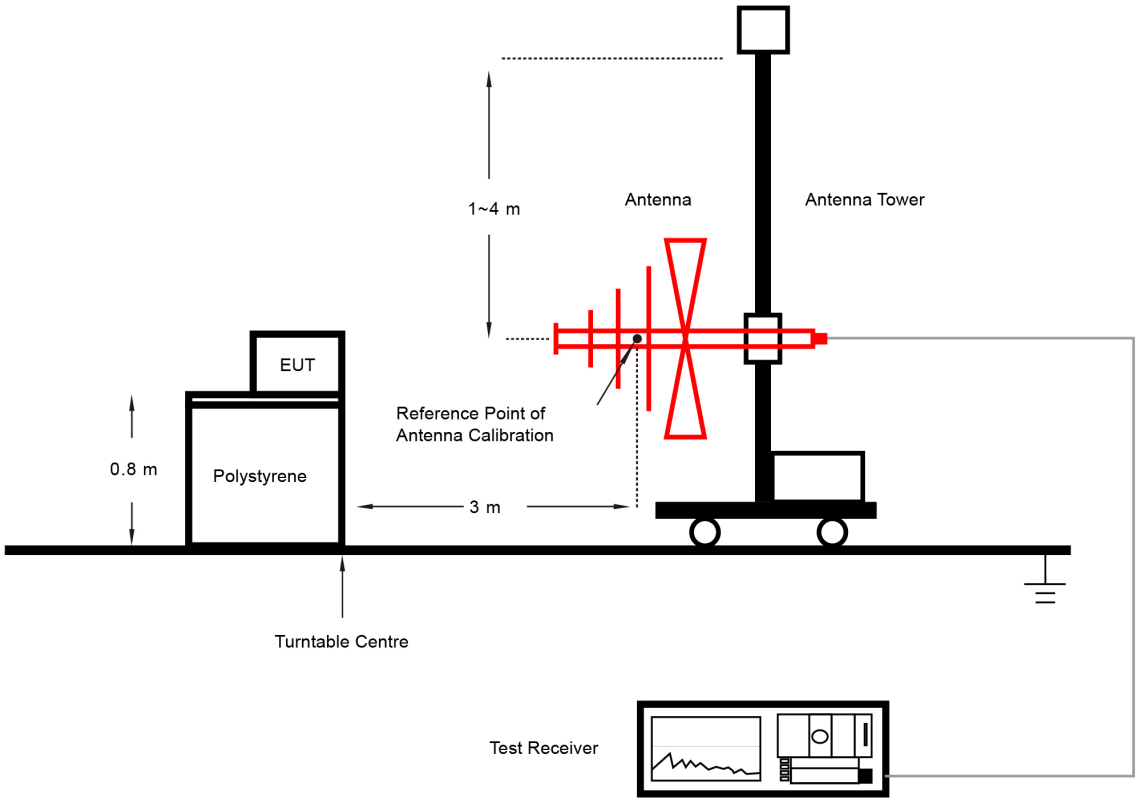
5. Sweep time = auto

6. Trace mode = max hold

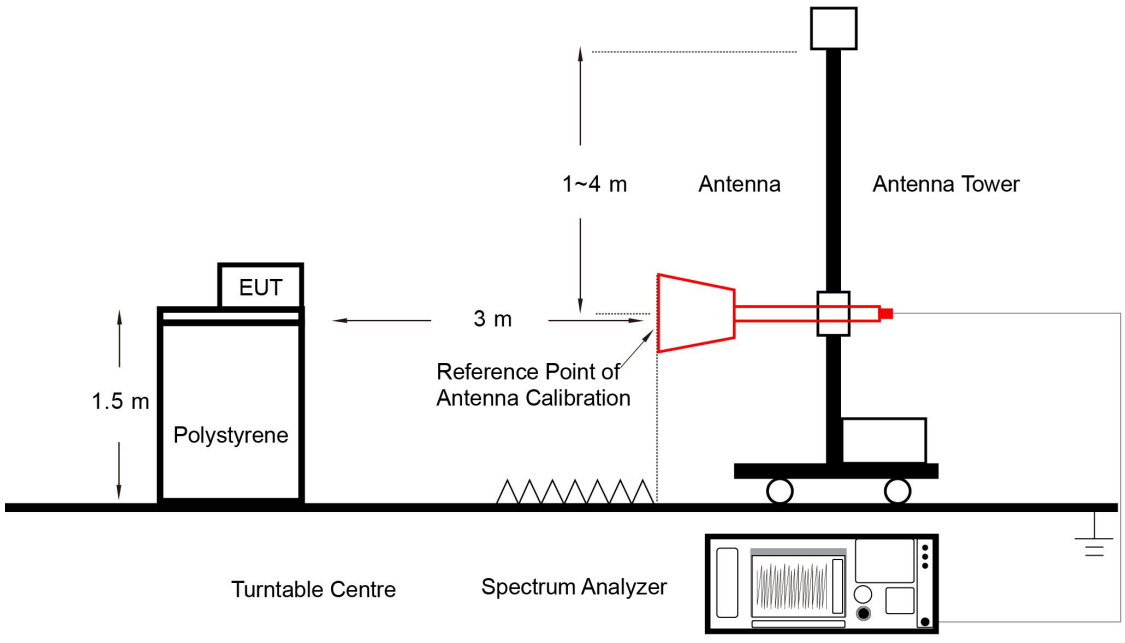
7. Trace was allowed to stabilize

6.6.4. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.6.5. Test Result

Refer to Appendix A.6.

6.7. Radiated Restricted Band Edge Measurement

6.7.1. 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 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

6.7.2. Test Procedure

ANSI C63.10-2013 Section 6.3 & 6.6 & 11.13

6.7.3. Test Setting

Peak Field Strength Measurements

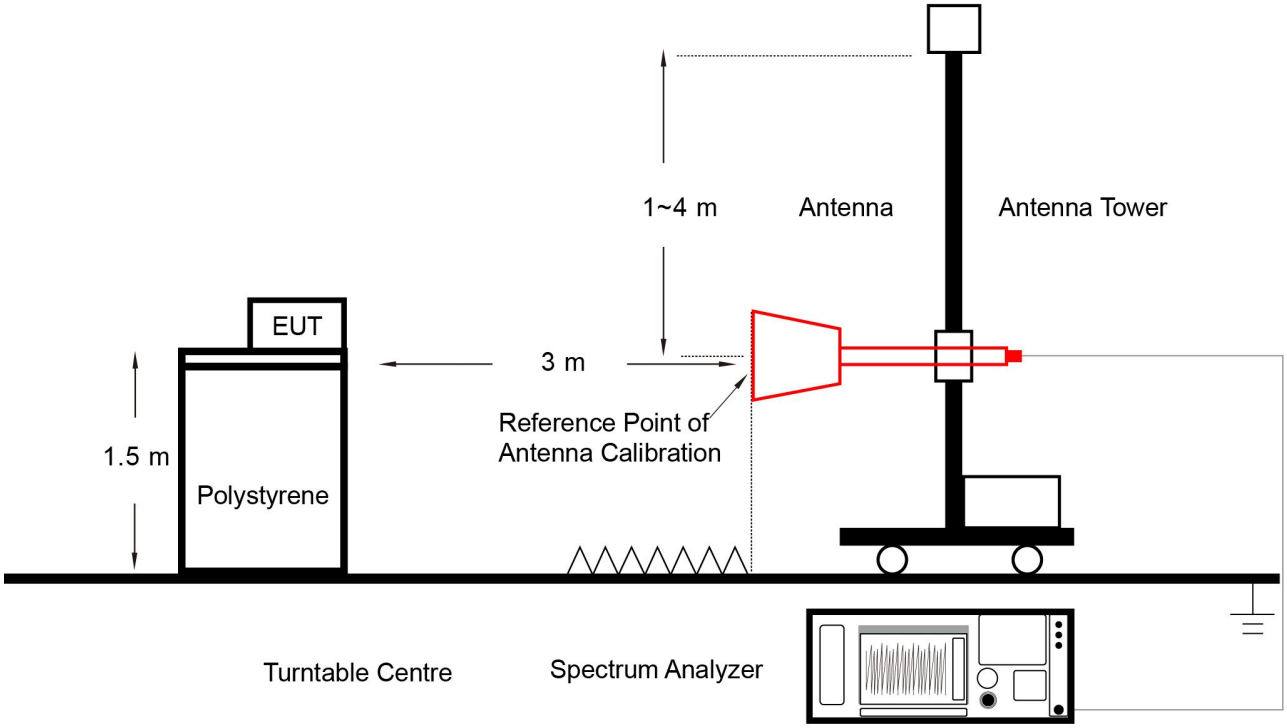
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

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. 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

6.7.4. Test Setup



6.7.5. Test Result

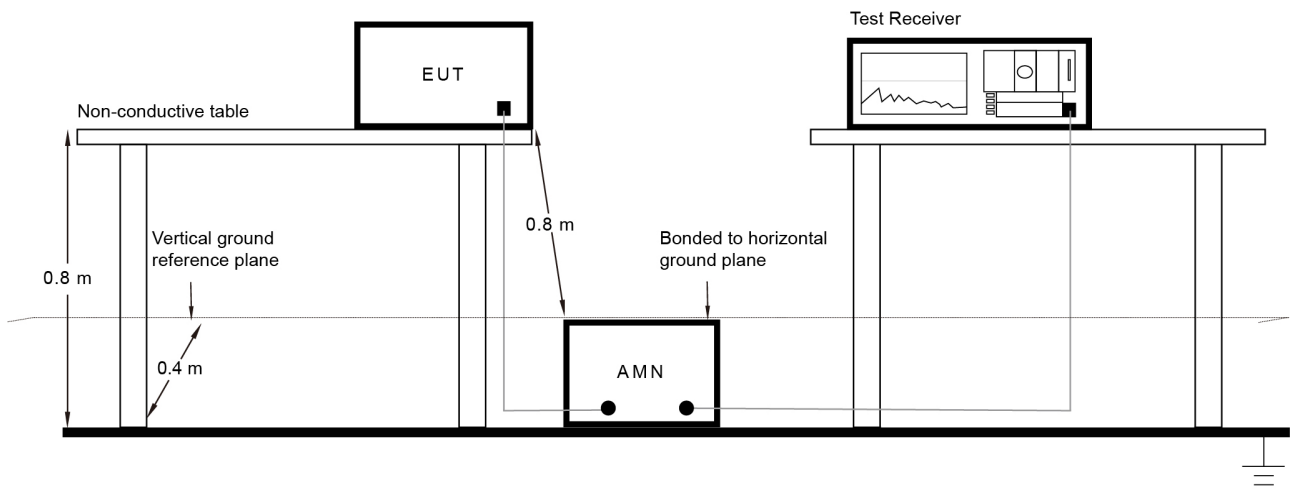
Refer to Appendix A.7.

6.8. AC Conducted Emissions Measurement

6.8.1. 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.		

6.8.2. Test Setup



6.8.3. Test Result

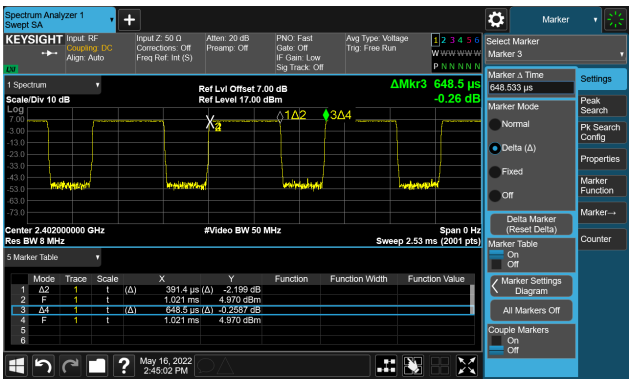
Refer to Appendix A.8.

Appendix A - Test Result

A.1 Duty Cycle Test Result

Test Site	WZ-SR5	Test Engineer	Liz Yuan
Test Date	2022/05/16		

Test Mode	Duty Cycle
BLE-1Mbps	60.35%
Duty Cycle (T = Transmission Duration)	
BLE-1Mbps (T = 391.4μs)	



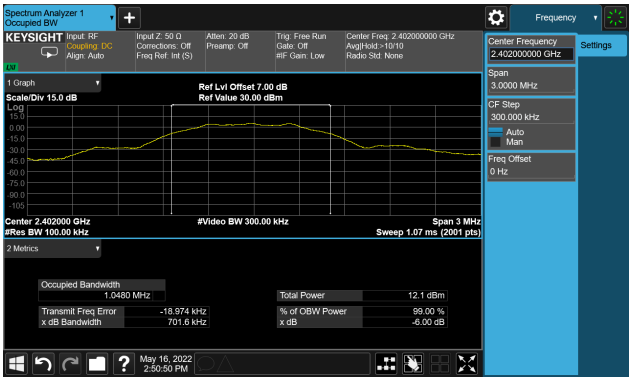
A.2 6dB Bandwidth Test Result

Test Site	WZ-SR5	Test Engineer	Liz Yuan
Test Date	2022/05/16		

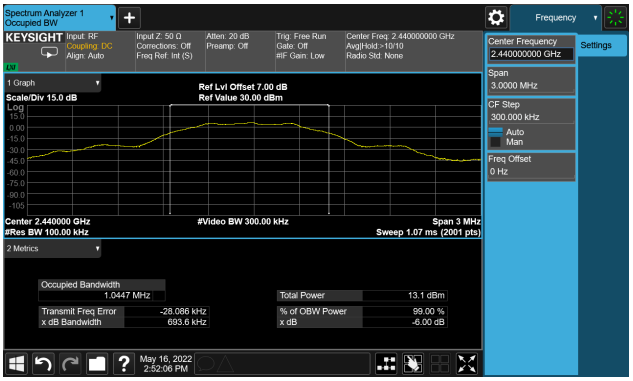
Test Mode	Data Rate	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
BLE	1Mbps	00	2402	0.7016	≥ 0.5
BLE	1Mbps	19	2440	0.6936	≥ 0.5
BLE	1Mbps	39	2480	0.6923	≥ 0.5

BLE-1Mbps 6dB Bandwidth

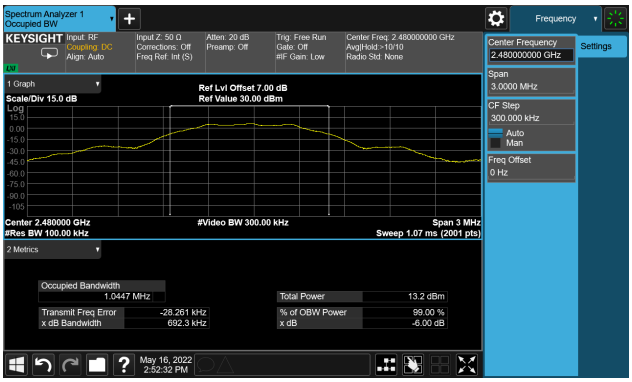
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



A.3 Output Power Test Result

Test Site	WZ-SR5	Test Engineer	Liz Yuan
Test Date	2022/05/16		

Test Result of Peak Output Power

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	5.80	≤ 30.00	Pass
BLE	1Mbps	19	2440	6.69	≤ 30.00	Pass
BLE	1Mbps	39	2480	6.67	≤ 30.00	Pass

Test Result of Average Output Power (Reporting Only)

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Average Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	5.27	≤ 30.00	Pass
BLE	1Mbps	19	2440	6.24	≤ 30.00	Pass
BLE	1Mbps	39	2480	6.31	≤ 30.00	Pass

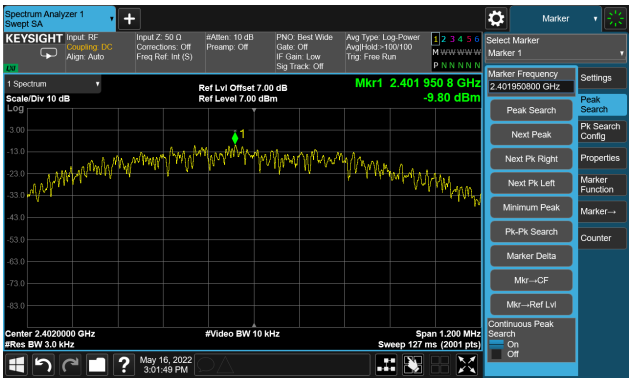
A.4 Power Spectral Density Test Result

Test Site	WZ-SR5	Test Engineer	Liz Yuan
Test Date	2022/05/16		

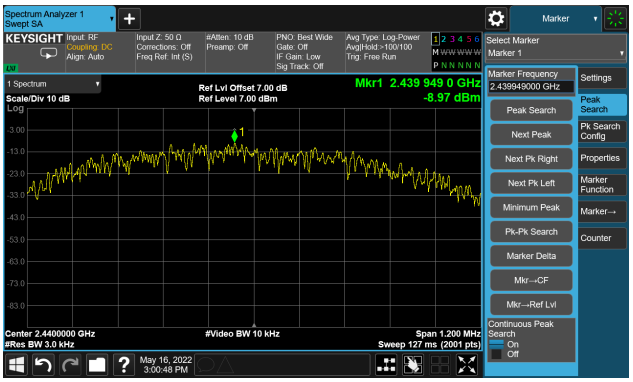
Test Mode	Data Rate	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1Mbps	00	2402	-9.80	≤ 8.00	Pass
BLE	1Mbps	19	2440	-8.97	≤ 8.00	Pass
BLE	1Mbps	39	2480	-8.86	≤ 8.00	Pass

BLE-1Mbps PSD

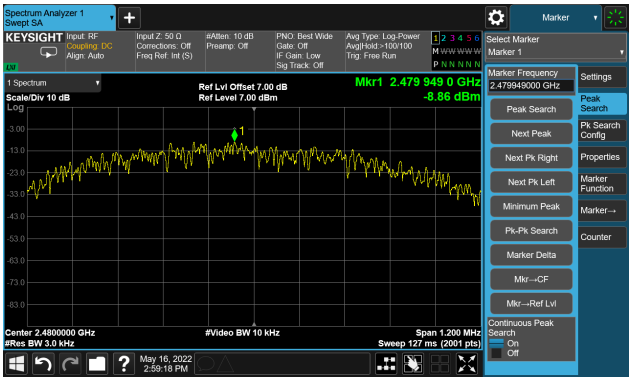
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



A.5 Conducted Band Edge and Out-of-Band Emissions Test Result

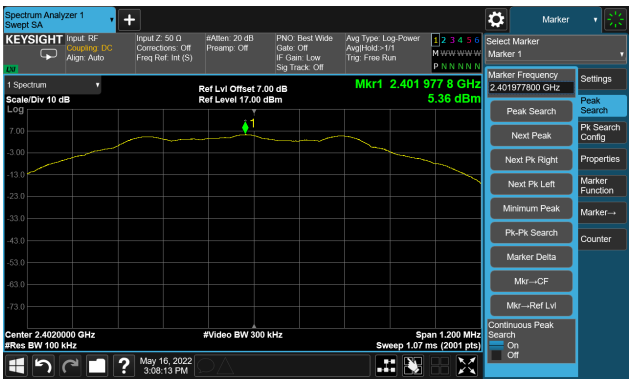
Test Site	WZ-SR5	Test Engineer	Liz Yuan
Test Date	2022/05/16		

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

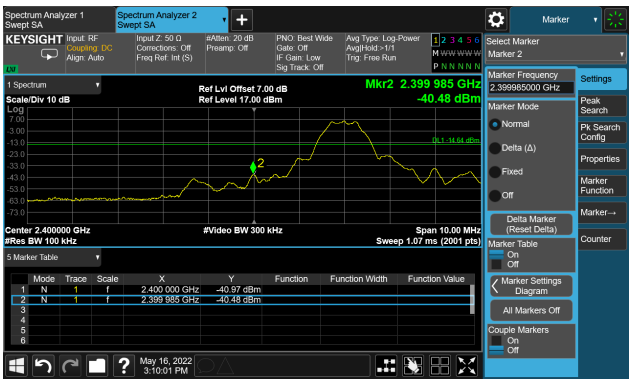
BLE- Out-of-Band Emissions

Channel 00 (2402MHz)

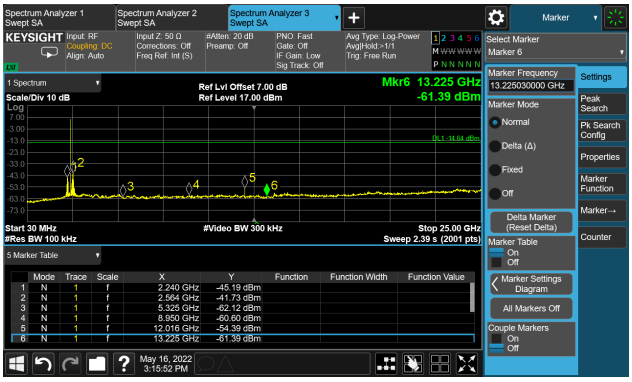
100kHz PSD Reference Level



Low Band Edge

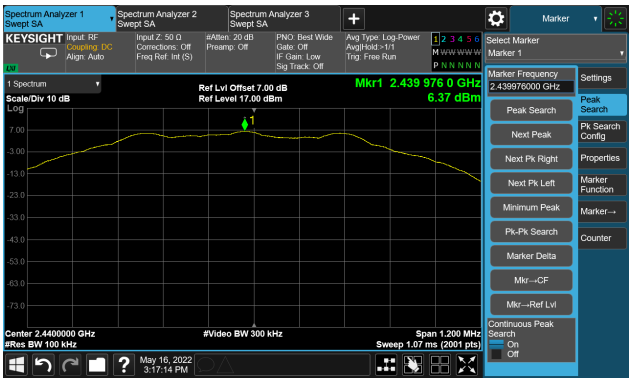


Spurious Emission 30MHz ~ 25GHz

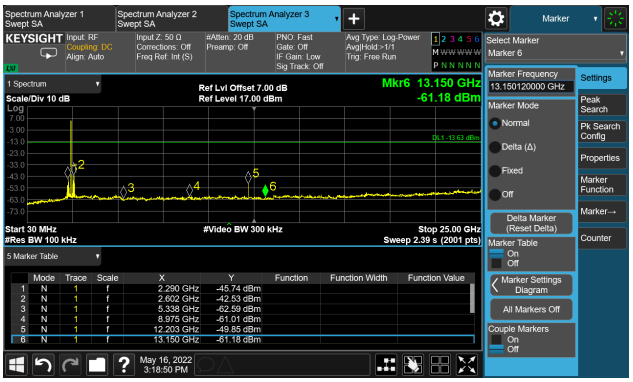


Channel 19 (2440MHz)

100kHz PSD Reference Level

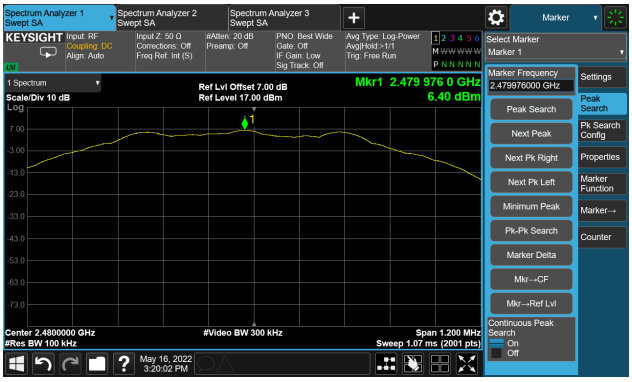


Spurious Emission 30MHz ~ 25GHz

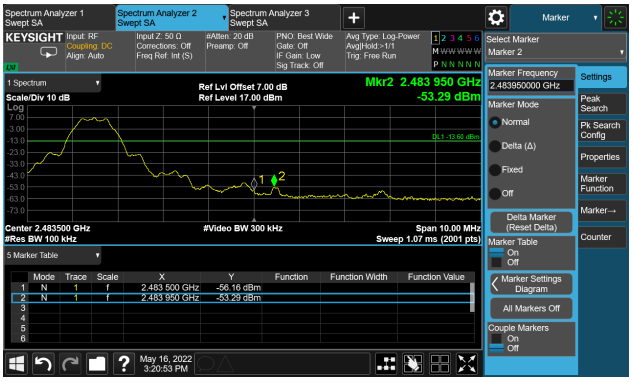


Channel 39 (2480MHz)

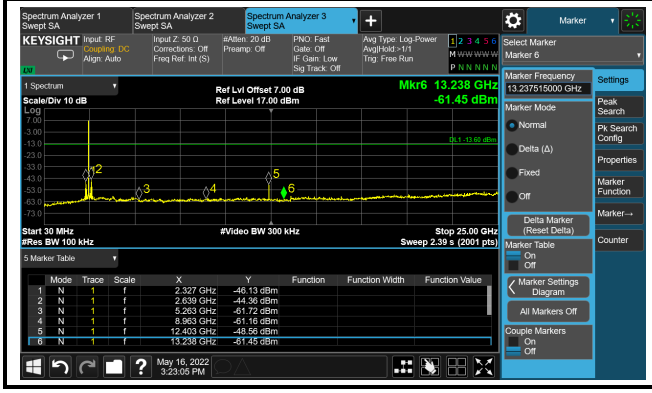
100kHz PSD Reference Level



High Band Edge



Spurious Emission 30MHz ~ 25GHz



A.6 Radiated Spurious Emission Test Result

Test Site	WZ-AC1	Test Engineer	Charles Zhang
Test Date	2022/05/24	Test Mode:	BLE-1Mbps
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.		

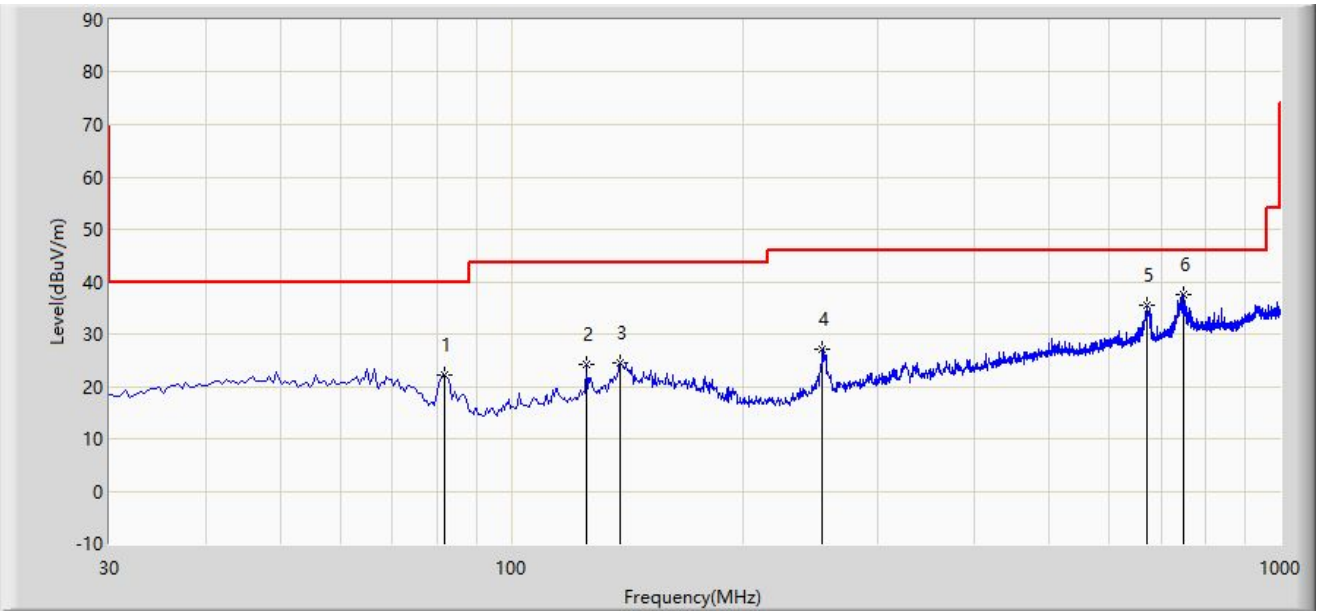
Test Channel	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
00	9117.500	35.9	10.8	46.7	74.0	-27.3	Peak	Horizontal
	10936.500	36.1	12.9	49.0	74.0	-25.0	Peak	Horizontal
	12169.000	37.0	12.2	49.2	74.0	-24.8	Peak	Horizontal
	7545.000	37.0	8.1	45.1	74.0	-28.9	Peak	Vertical
	10928.000	35.3	12.8	48.1	74.0	-25.9	Peak	Vertical
	12356.000	37.2	12.2	49.4	74.0	-24.6	Peak	Vertical
19	8352.500	36.6	8.8	45.4	74.0	-28.6	Peak	Horizontal
	10749.500	35.7	13.0	48.7	74.0	-25.3	Peak	Horizontal
	12194.500	37.3	12.1	49.4	74.0	-24.6	Peak	Horizontal
	8386.500	35.6	8.9	44.5	74.0	-29.5	Peak	Vertical
	11055.500	35.4	12.9	48.3	74.0	-25.7	Peak	Vertical
	12016.000	36.0	12.3	48.3	74.0	-25.7	Peak	Vertical
39	7434.500	36.2	8.0	44.2	74.0	-29.8	Peak	Horizontal
	9092.000	34.7	10.4	45.1	74.0	-28.9	Peak	Horizontal
	12398.500	37.6	11.9	49.5	74.0	-24.5	Peak	Horizontal
	4961.000	40.3	3.5	43.8	74.0	-30.2	Peak	Vertical
	8276.000	35.4	8.5	43.9	74.0	-30.1	Peak	Vertical
	11047.000	35.4	13.1	48.5	74.0	-25.5	Peak	Vertical

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

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

The Worst Case of Radiated Emission below 1GHz:

Site: WZ-AC1	Test Data: 2022/05/23
Limit: FCC_Part 15.209_RE(3m)	Engineer: Charles Zhang
Probe: WZ-AC1_VULB9162	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2440MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1			81.895	22.219	9.209	-17.781	40.000	13.010	PK
2			125.060	24.165	8.392	-19.335	43.500	15.773	PK
3			138.640	24.375	7.044	-19.125	43.500	17.331	PK
4			254.070	27.125	10.666	-18.875	46.000	16.459	PK
5			670.200	35.426	9.228	-10.574	46.000	26.198	PK
6		*	748.770	37.625	9.744	-8.375	46.000	27.881	PK

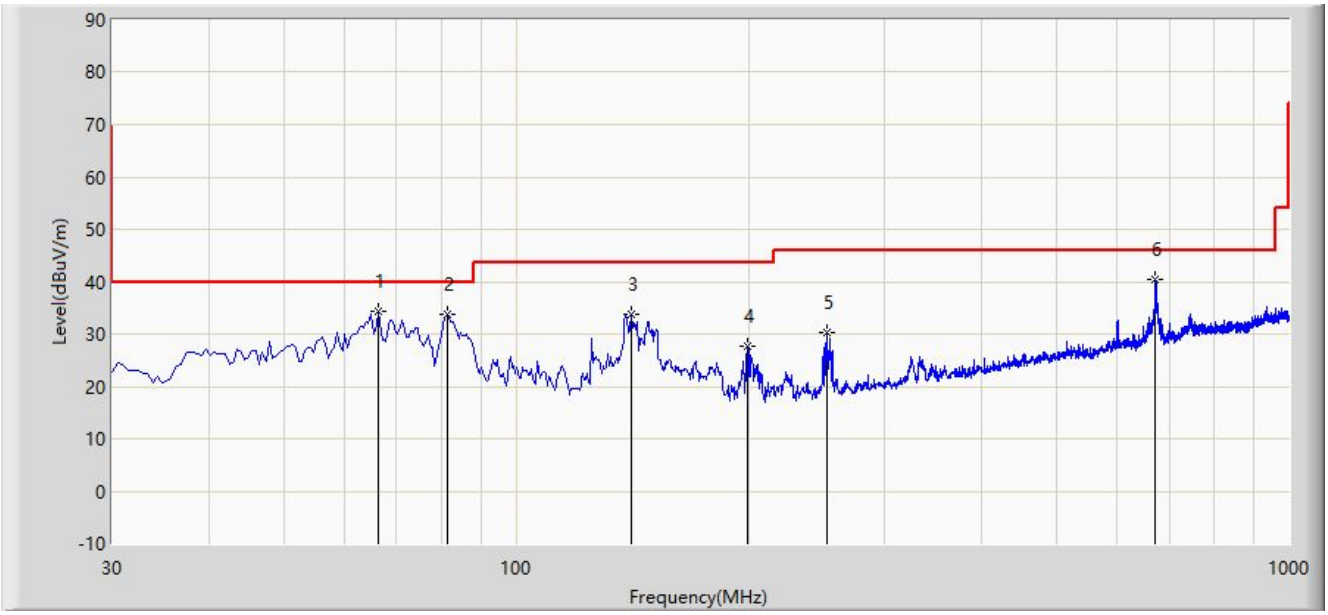
Note 1: " *", means this data is the worst emission level.

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

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 4: 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: WZ-AC1	Test Data: 2022/05/23
Limit: FCC_Part 15.209_RE(3m)	Engineer: Charles Zhang
Probe: WZ-AC1_VULB9162	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2440MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		*	66.375	34.318	17.651	-5.682	40.000	16.667	PK
2			81.410	33.656	20.526	-6.344	40.000	13.130	PK
3			141.065	33.773	16.215	-9.727	43.500	17.559	PK
4			199.265	27.801	13.465	-15.699	43.500	14.335	PK
5			252.615	30.298	13.885	-15.702	46.000	16.413	PK
6			671.655	40.301	14.093	-5.699	46.000	26.207	PK

Note 1: " *", means this data is the worst emission level.

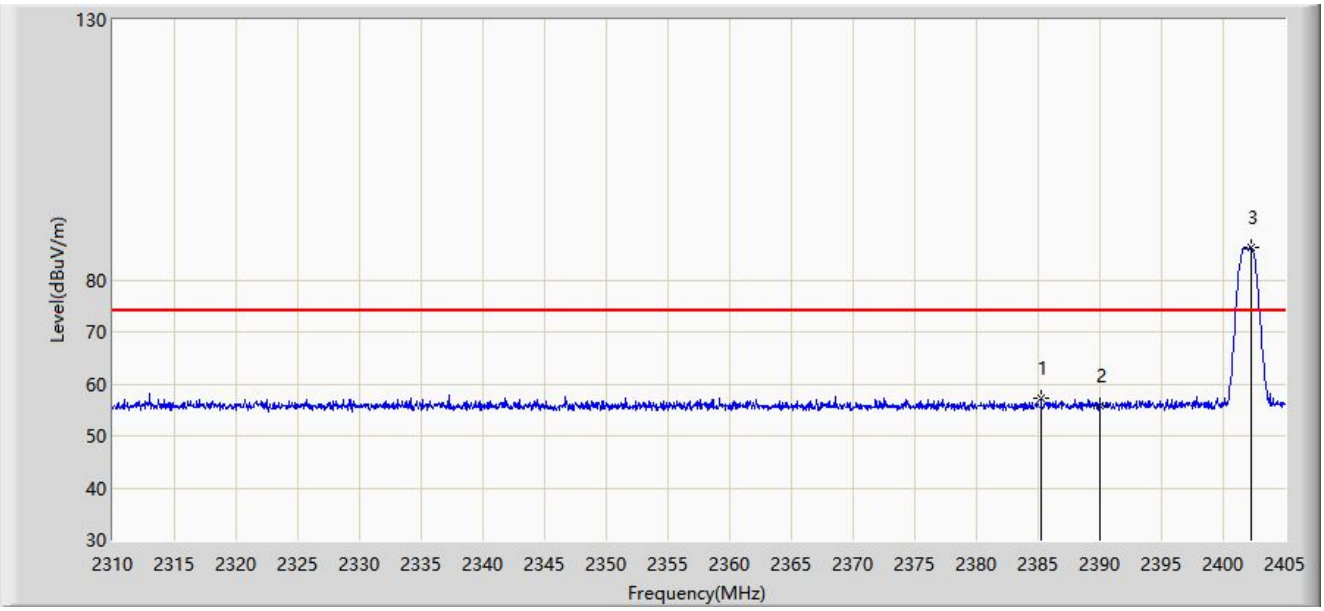
Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 4: 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.

A.7 Radiated Restricted Band Edge Test Result

Site: WZ-AC1	Test Data: 2022/05/23
Limit: FCC_2.4G_RE(3m)	Engineer: Charles Zhang
Probe: BBHA9120D_1167_1-18GHz	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2402MHz	



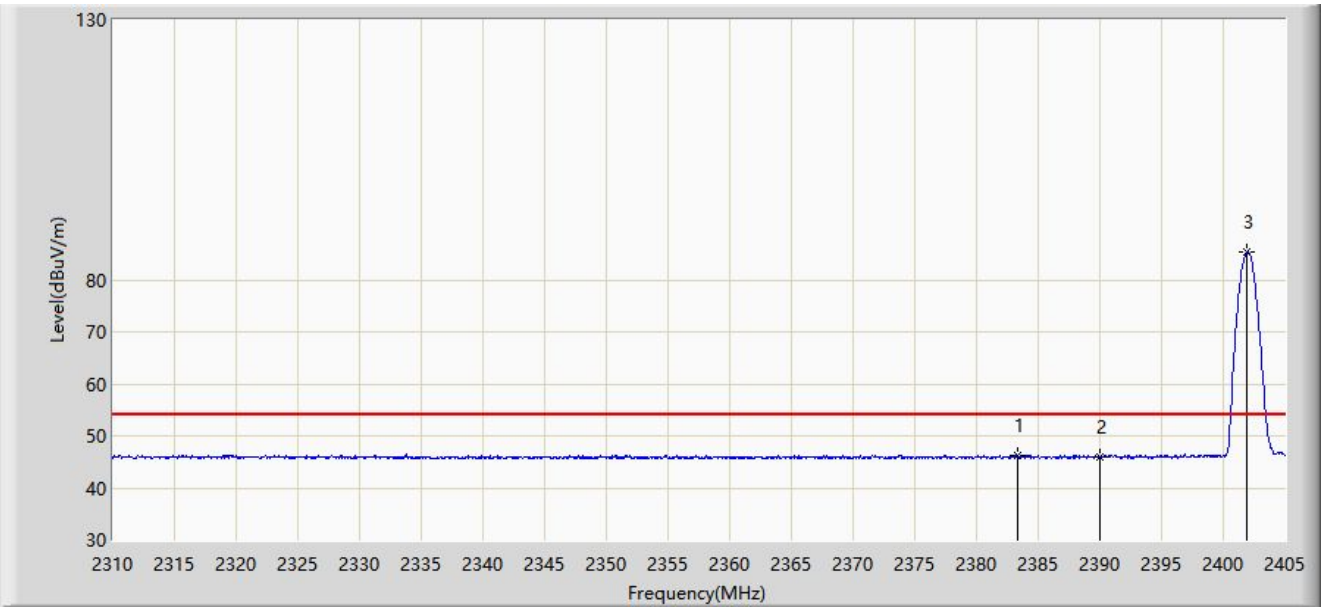
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2385.240	57.176	26.658	-16.824	74.000	30.518	PK
2		2390.000	55.739	25.213	-18.261	74.000	30.526	PK
3		2402.245	86.344	55.785	N/A	N/A	30.559	PK

Note 1: " * ", means this data is the worst emission level.

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

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC1	Test Data: 2022/05/23
Limit: FCC_2.4G_RE(3m)	Engineer: Charles Zhang
Probe: BBHA9120D_1167_1-18GHz	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2402MHz	



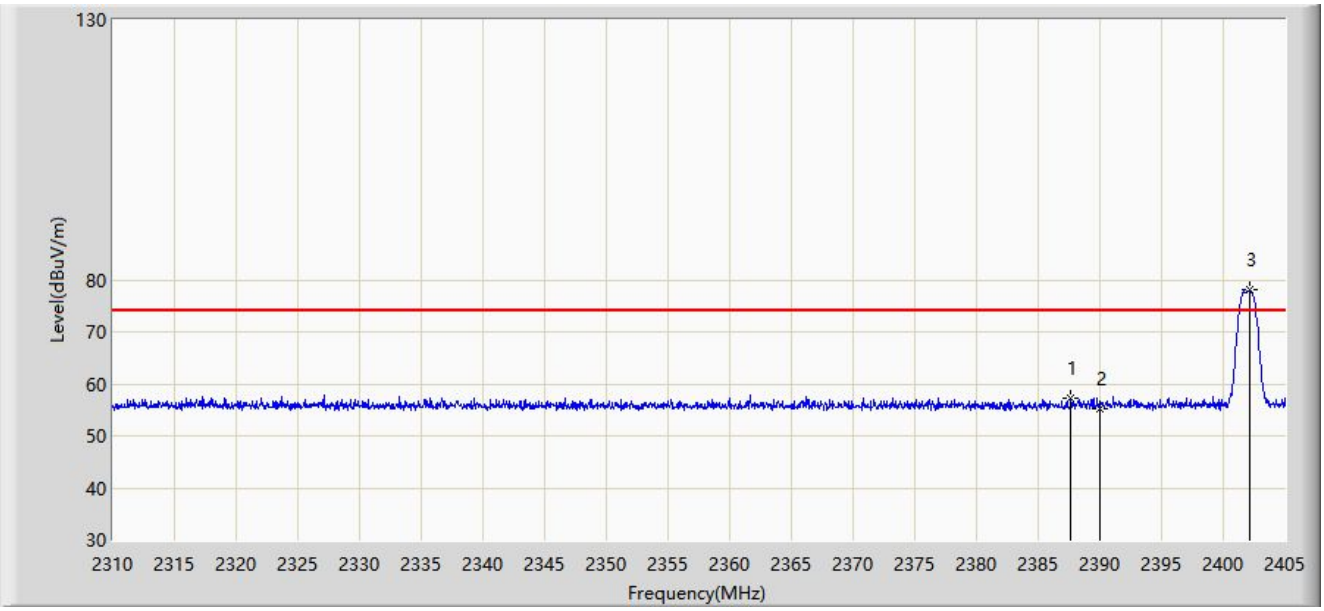
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2383.340	46.330	15.813	-7.670	54.000	30.517	AV
2		2390.000	45.901	15.375	-8.099	54.000	30.526	AV
3		2401.960	85.260	54.701	N/A	N/A	30.559	AV

Note 1: " * ", means this data is the worst emission level.

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

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC1	Test Data: 2022/05/23
Limit: FCC_2.4G_RE(3m)	Engineer: Charles Zhang
Probe: BBHA9120D_1167_1-18GHz	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2402MHz	



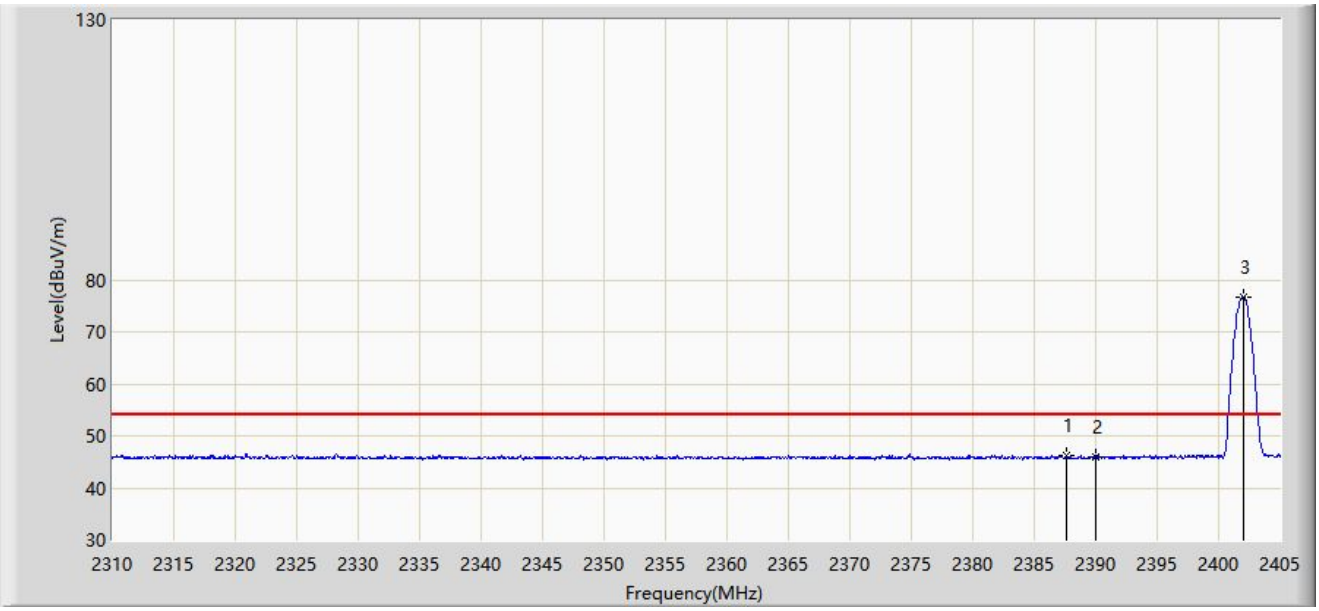
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2387.663	57.262	26.740	-16.738	74.000	30.522	PK
2		2390.000	55.337	24.811	-18.663	74.000	30.526	PK
3		2402.103	77.993	47.434	N/A	N/A	30.559	PK

Note 1: " * ", means this data is the worst emission level.

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

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC1	Test Data: 2022/05/23
Limit: FCC_2.4G_RE(3m)	Engineer: Charles Zhang
Probe: BBHA9120D_1167_1-18GHz	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2402MHz	



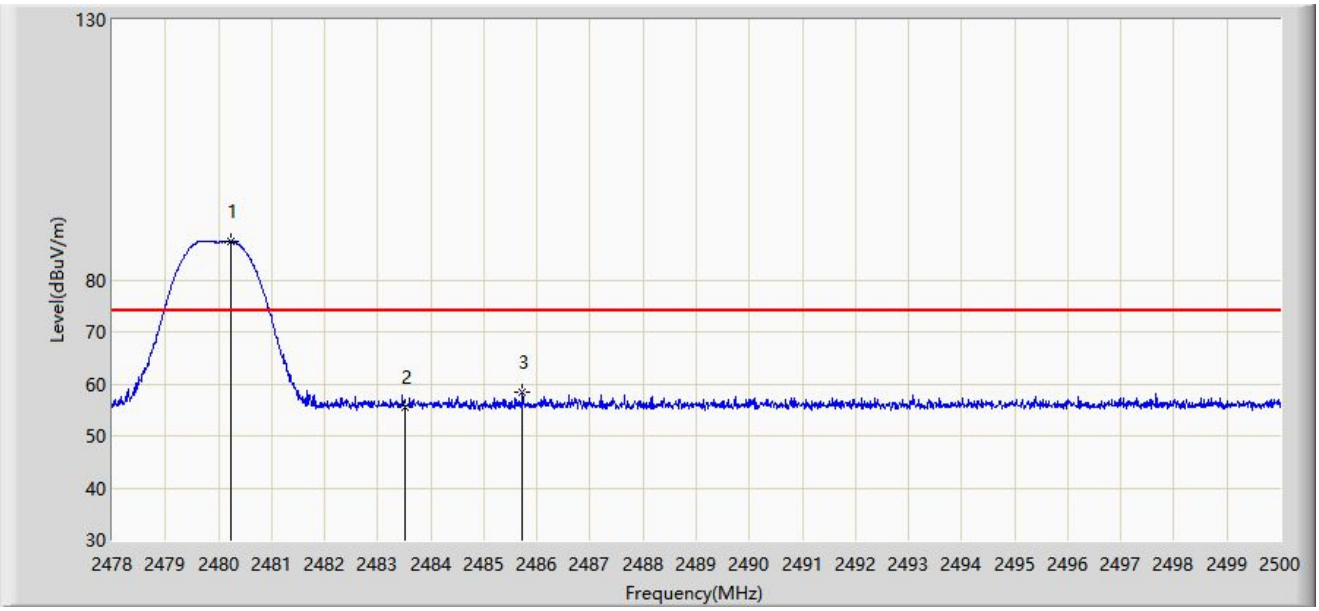
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2387.567	46.094	15.572	-7.906	54.000	30.522	AV
2		2390.000	46.010	15.484	-7.990	54.000	30.526	AV
3		2402.008	76.763	46.204	N/A	N/A	30.559	AV

Note 1: " * ", means this data is the worst emission level.

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

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC1	Test Data: 2022/05/23
Limit: FCC_2.4G_RE(3m)	Engineer: Charles Zhang
Probe: BBHA9120D_1167_1-18GHz	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2480MHz	



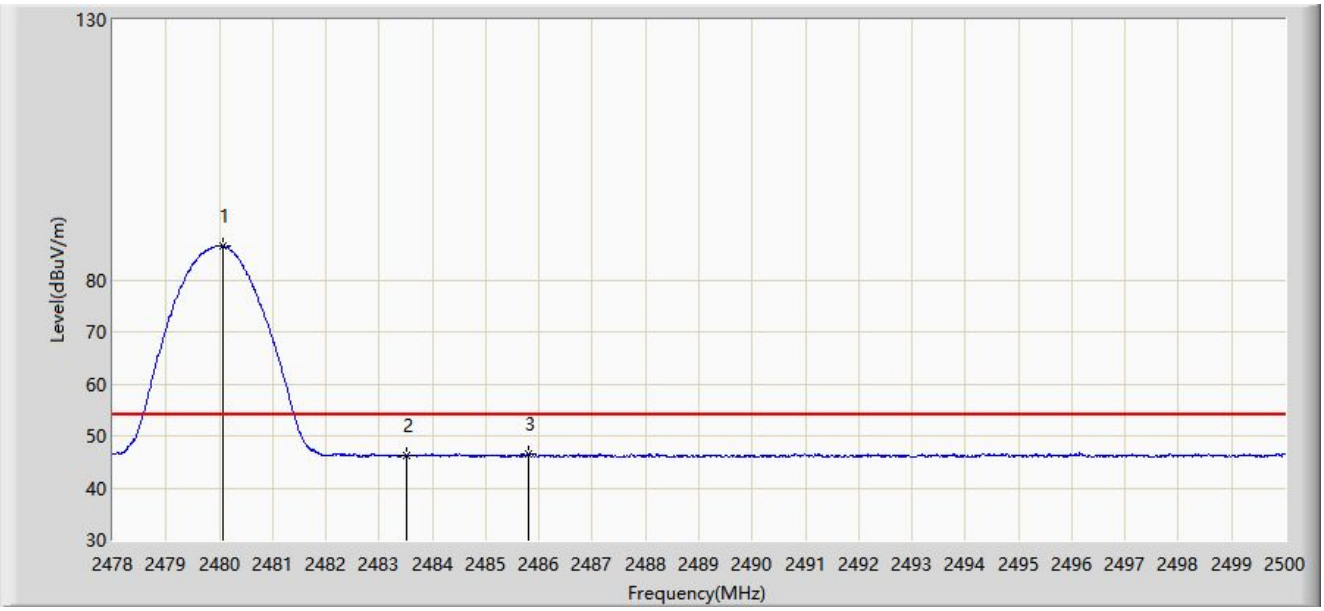
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2480.244	87.384	56.682	N/A	N/A	30.702	PK
2		2483.500	55.522	24.819	-18.478	74.000	30.704	PK
3	*	2485.733	58.373	27.668	-15.627	74.000	30.705	PK

Note 1: " * ", means this data is the worst emission level.

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

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC1	Test Data: 2022/05/23
Limit: FCC_2.4G_RE(3m)	Engineer: Charles Zhang
Probe: BBHA9120D_1167_1-18GHz	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2480MHz	



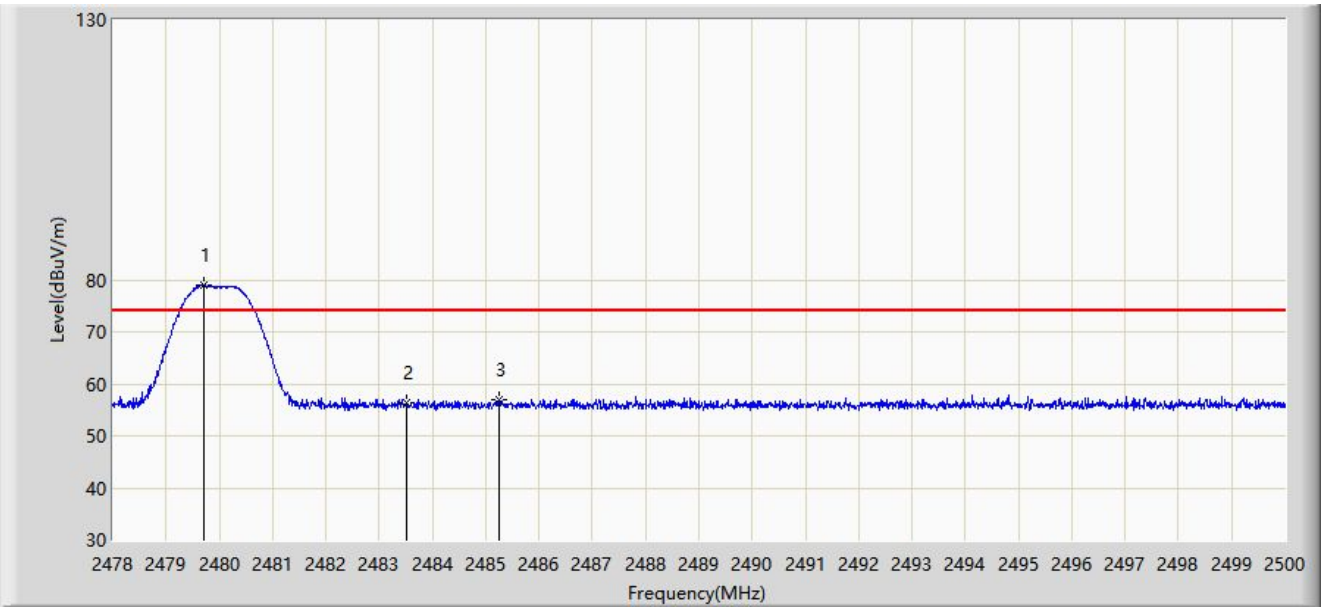
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2480.057	86.549	55.848	N/A	N/A	30.701	AV
2		2483.500	46.260	15.557	-7.740	54.000	30.704	AV
3	*	2485.810	46.475	15.770	-7.525	54.000	30.705	AV

Note 1: " * ", means this data is the worst emission level.

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

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC1	Test Data: 2022/05/23
Limit: FCC_2.4G_RE(3m)	Engineer: Charles Zhang
Probe: BBHA9120D_1167_1-18GHz	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2480MHz	



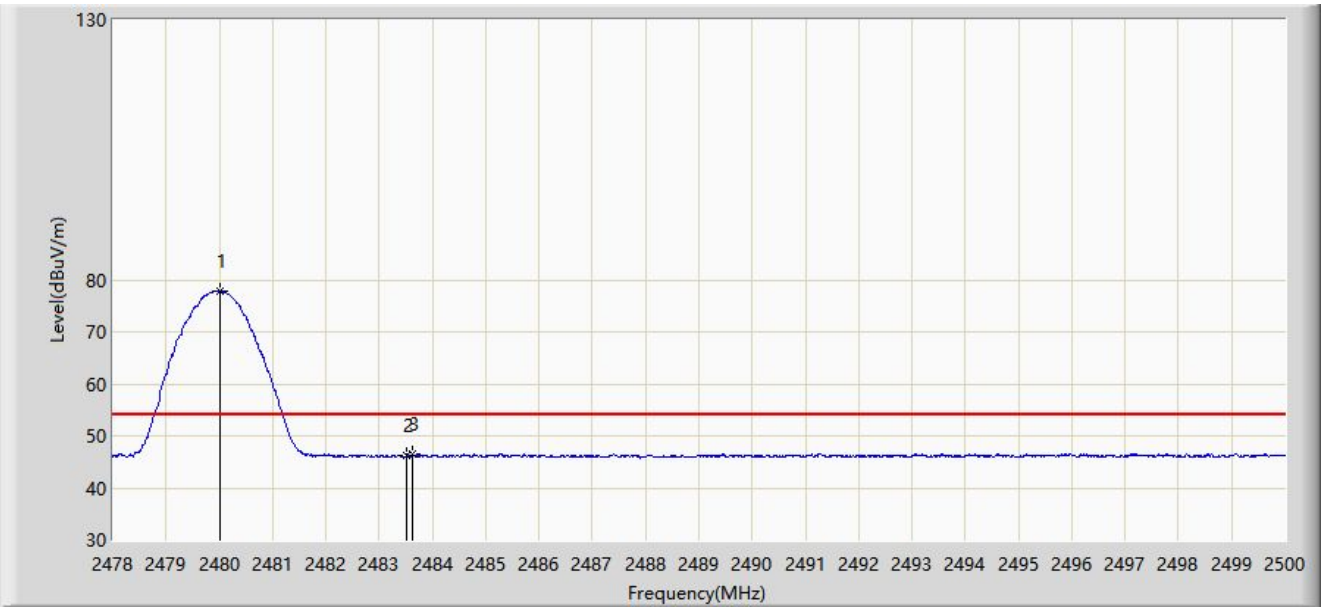
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2479.705	78.942	48.241	N/A	N/A	30.702	PK
2		2483.500	56.451	25.748	-17.549	74.000	30.704	PK
3	*	2485.238	56.883	26.178	-17.117	74.000	30.705	PK

Note 1: " * ", means this data is the worst emission level.

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

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC1	Test Data: 2022/05/23
Limit: FCC_2.4G_RE(3m)	Engineer: Charles Zhang
Probe: BBHA9120D_1167_1-18GHz	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2480MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2480.002	77.912	47.211	N/A	N/A	30.701	AV
2		2483.500	46.089	15.386	-7.911	54.000	30.704	AV
3	*	2483.621	46.399	15.695	-7.601	54.000	30.704	AV

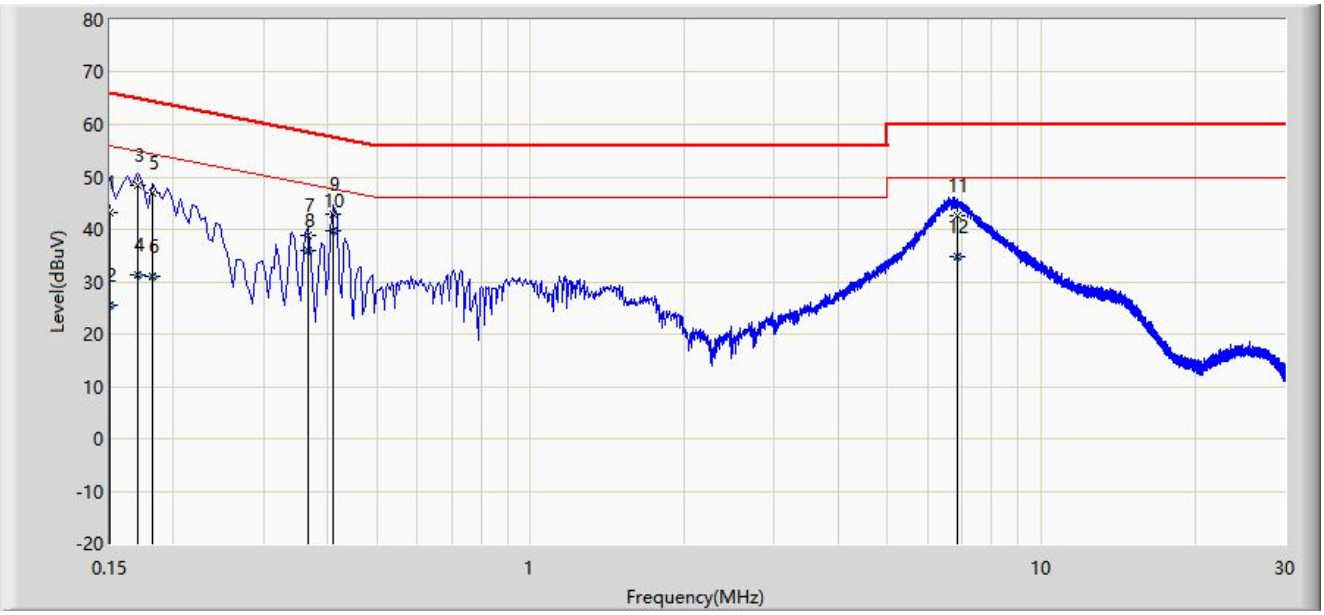
Note 1: " * ", means this data is the worst emission level.

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

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

A.8 AC Conducted Emissions Test Result

Site: WZ-SR2	Test Date: 2022/05/23
Limit: FCC_Part15.207_CE_AC Power	Engineer: Alin Zhou
Probe: ENV216_101683_Filter Off_E	Polarity: Line
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2440MHz	



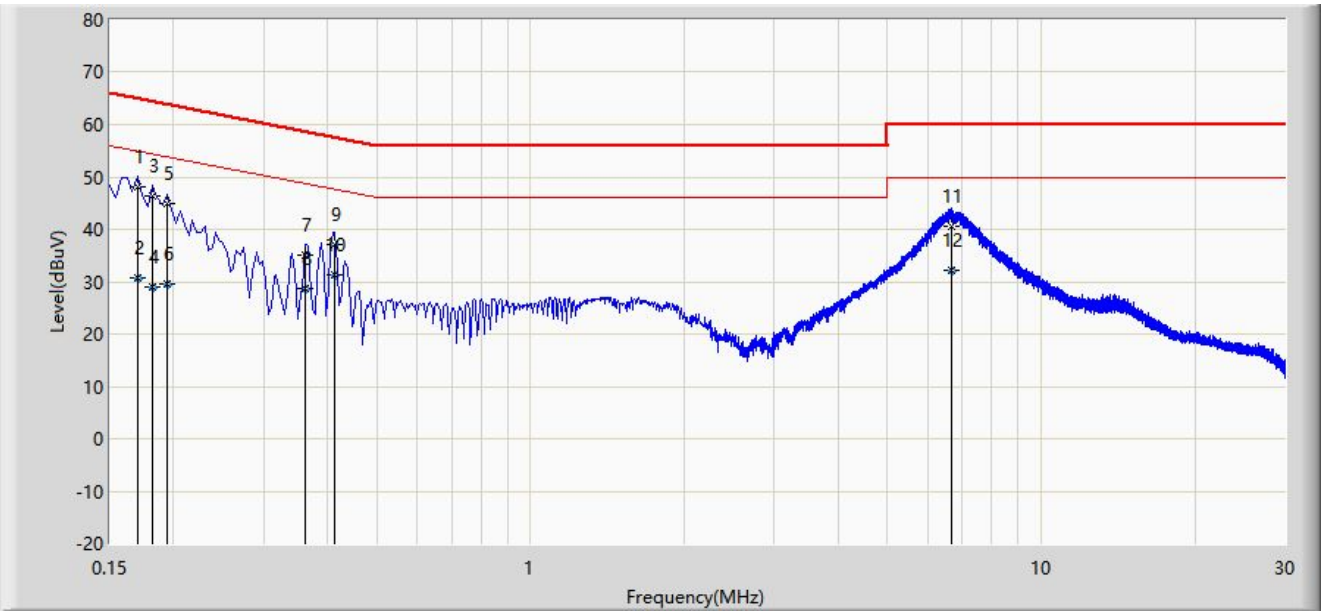
No	Mark	Frequency (MHz)	Measure Level (dBµV)	Reading Level (dBµV)	Margin (dB)	Limit (dBµV)	Factor (dB)	Type
1		0.150	43.204	33.303	-22.796	66.000	9.901	QP
2		0.150	25.649	15.747	-30.351	56.000	9.901	AV
3		0.170	48.438	38.538	-16.538	64.977	9.900	QP
4		0.170	31.221	21.321	-23.756	54.977	9.900	AV
5		0.182	47.062	37.162	-17.332	64.394	9.900	QP
6		0.182	31.067	21.167	-23.327	54.394	9.900	AV
7		0.366	38.738	28.828	-19.853	58.591	9.911	QP
8		0.366	36.076	26.165	-12.515	48.591	9.911	AV
9		0.410	42.984	33.070	-14.664	57.648	9.914	QP
10	*	0.410	39.642	29.728	-8.007	47.648	9.914	AV
11		6.842	42.745	32.113	-17.255	60.000	10.633	QP
12		6.842	34.807	24.175	-15.193	50.000	10.633	AV

Note 1: " *", means this data is the worst emission level.

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

Note 3: Factor (dB) = Cable Loss (dB) +LISN Factor (dB)

Site: WZ-SR2	Test Date: 2022/05/23
Limit: FCC_Part15.207_CE_AC Power	Engineer: Alin Zhou
Probe: ENV216_101683_Filter Off_E	Polarity: Neutral
EUT: Wireless Access Point	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2440MHz	



No	Mark	Frequency (MHz)	Measure Level (dBµV)	Reading Level (dBµV)	Margin (dB)	Limit (dBµV)	Factor (dB)	Type
1		0.170	48.172	38.256	-16.789	64.960	9.916	QP
2		0.170	30.585	20.669	-24.375	54.960	9.916	AV
3		0.182	46.388	36.474	-18.006	64.394	9.913	QP
4		0.182	29.100	19.187	-25.294	54.394	9.913	AV
5		0.194	45.036	35.124	-18.828	63.864	9.912	QP
6		0.194	29.436	19.525	-24.427	53.864	9.912	AV
7		0.362	34.941	25.021	-23.741	58.682	9.921	QP
8		0.362	28.704	18.784	-19.978	48.682	9.921	AV
9		0.414	37.070	27.146	-20.497	57.568	9.924	QP
10	*	0.414	31.394	21.470	-16.174	47.568	9.924	AV
11		6.686	40.527	29.894	-19.473	60.000	10.633	QP
12		6.686	32.147	21.514	-17.853	50.000	10.633	AV

Note 1: " *", means this data is the worst emission level.

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

Note 3: Factor (dB) = Cable Loss (dB) +LISN Factor (dB)

Appendix B - Test Setup Photograph

Refer to “2203RSU059-UT” file.

Appendix C - EUT Photograph

Refer to “2203RSU059-UE” file.

The End