



RF MEASUREMENT REPORT

FCC ID: 2ALJ3AP43X
Applicant: HAN Networks Co., Ltd.
Product: HAN Access Point
Model No.: AP431, AP411
Brand Name: HANNETWORKS, HAN NETWORKS
FCC Classification: Digital Transmission System (DTS)
FCC Rule Part(s): Part 15 Subpart C (Section 15.247)
Result: Complies
Received Date: 2023-03-14
Test Date: 2023-05-26 ~ 2023-06-21

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
2303RSU029-U1	V01	Initial Report	2023-09-01	Valid

Note: This report is a copy report based on MRT original report (Report No. 2303RSU028-U1). Only applicant information and product information (name, model and brand name) has changed in this report.

CONTENTS

Description	Page
1. General Information	5
1.1. Applicant	5
1.2. Manufacturer	5
1.3. Testing Facility	5
1.4. Product Information.....	6
1.5. Radio Specification under Test	7
1.6. Working Frequencies	8
1.7. Description of Available Antennas.....	9
2. Test Configuration	10
2.1. Test Mode.....	10
2.2. Test System Connection Diagram.....	11
2.3. Test Software	12
2.4. Applied Standards.....	12
2.5. Test Environment Condition	12
3. Antenna Requirements	13
4. Measuring Instrument	14
5. Decision Rules and Measurement Uncertainty	16
5.1. Decision Rules	16
5.2. Measurement Uncertainty	16
6. Test Result.....	17
6.1. Summary	17
6.2. 6dB Bandwidth Measurement.....	18
6.2.1. Test Limit	18
6.2.2. Test Procedure	18
6.2.3. Test Setting	18
6.2.4. Test Setup	18
6.2.5. Test Result	18
6.3. Output Power Measurement	19
6.3.1. Test Limit	19
6.3.2. Test Procedure	19
6.3.3. Test Setting	19
6.3.4. Test Setup	19
6.3.5. Test Result	19
6.4. Power Spectral Density Measurement	20
6.4.1. Test Limit	20

6.4.2.	Test Procedure	20
6.4.3.	Test Setting	20
6.4.4.	Test Setup	20
6.4.5.	Test Result	20
6.5.	Conducted Band Edge and Out-of-Band Emissions Measurement	21
6.5.1.	Test Limit	21
6.5.2.	Test Procedure	21
6.5.3.	Test Setting	21
6.5.4.	Test Setup	21
6.5.5.	Test Result	22
6.6.	Radiated Spurious Emission Measurement.....	23
6.6.1.	Test Limit	23
6.6.2.	Test Procedure	23
6.6.3.	Test Setting	23
6.6.4.	Test Setup	25
6.6.5.	Test Result	26
6.7.	Radiated Restricted Band Edge Measurement	27
6.7.1.	Test Limit	27
6.7.2.	Test Procedure	28
6.7.3.	Test Setting	28
6.7.4.	Test Setup	29
6.7.5.	Test Result	29
6.8.	AC Conducted Emissions Measurement	30
6.8.1.	Test Limit	30
6.8.2.	Test Setup	30
6.8.3.	Test Result	30
Appendix A - Test Result.....		31
A.1	Duty Cycle Test Result	31
A.2	6dB Bandwidth Test Result	32
A.3	Output Power Test Result	34
A.4	Power Spectral Density Test Result	36
A.5	Conducted Band Edge and Out-of-Band Emissions Test Result.....	38
A.6	Radiated Spurious Emission Test Result.....	42
A.7	Radiated Restricted Band Edge Test Result.....	47
A.8	AC Conducted Emissions Test Result	67
Appendix B - Test Setup Photograph		69
Appendix C - EUT Photograph		70

1. General Information

1.1. Applicant

HAN Networks Co., Ltd.

101-A16, 1st Floor, Building 3, No.9 compound, Yongfeng Road, Haidian District, Beijing, P.R. China

1.2. Manufacturer

HAN Networks Co., Ltd.

101-A16, 1st Floor, Building 3, No.9 compound, Yongfeng Road, Haidian District, Beijing, P.R. China

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: 3261 FCC: 291082, TW3261 ISED: TW3261

1.4. Product Information

Product Name	HAN Access Point
Model No.	AP431, AP411
EUT Identification No.	20230525Sample#04 (AP431) 20230614Sample#03 (AP411)
Wi-Fi Specification	802.11a/b/g/n/ac/ax
Bluetooth Specification	V5.1 Single Mode
Antenna Information	Refer to Section 1.7
Power Type	AC Adapter Input or PoE Input
Operating Environment	Indoor Use
Accessories	
AC Adapter (For both AP431 and AP411)	Model: ADP-50GR B Input: 100-240V ~ 50/60Hz, 1.3A Output: 48.0V, 1.042A, 50.1W MAX
PoE Injector (For AP431)	Model: POE60U-1BT-X Input: 100-240V ~ 1.5A, 50/60Hz Output: 56.0V, 0.535A, 30W PIN 3, 6+ PIN 1, 2 Return Output: 56.0V, 0.535A, 30W PIN 4, 5+ PIN 7, 8 Return
PoE Injector (For AP411)	Model: PD-9001GR/AT/AC Input: 100-240V ~ 0.67A, 50/60Hz Output: 55.0V, 0.6A
Remark: - The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer. - AC Power Adapter and PoE Injector are not sold with Product. For this report, we select AC Adapter for testing. - Based on AP431, AP411 removed TPM (Trusted Platform Module), removed Eth1(LAN port) PoE function and modified the maximum data rate from 2.5Gbps to 1Gbps. USB 3.0 ports have different output current. For AP431, the max current is 1A. For AP411, the max current is 500mA. For the radio part, AP431 did all test items, and AP411 did the spot check.	

1.5. Radio Specification under Test

Bluetooth Frequency	2402 ~ 2480MHz
Channel Number	40
Type of modulation	GFSK
Data Rate	1Mbps & 2Mbps

1.6. 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	--	--	--	--

1.7. Description of Available Antennas

Antenna Type	Frequency Band (MHz)	Tx Paths	Max Antenna Gain (dBi)	Directional Gain (dBi)		Beamforming Directional Gain (dBi)
				For Power	For PSD	
Wi-Fi Antennas						
PIFA	2400 ~ 2483.5	2	4.15	4.15	7.16	7.16
PIFA	5150 ~ 5250	2	4.57	4.57	7.58	7.58
PIFA	5250 ~ 5350	2	4.55	4.55	7.56	7.56
PIFA	5470 ~ 5725	2	4.31	4.31	7.32	7.32
PIFA	5725 ~ 5850	2	4.30	4.30	7.31	7.31
PIFA	5925 ~ 6425	2	4.33	4.33	7.34	7.34
PIFA	6425 ~ 6525	2	4.77	4.77	7.78	7.78
PIFA	6525 ~ 6875	2	4.59	4.59	7.60	7.60
PIFA	6875 ~ 7125	2	4.01	4.01	7.02	7.02
Bluetooth Antenna						
PIFA	2400 ~ 2483.5	1	4.13	--	--	--
Remark: 1. The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated. For CDD transmissions, directional gain is calculated as follows. Directional gain = $G_{ANT\ Max} + \text{Array Gain}$, where Array Gain is as follows. • For power spectral density (PSD) measurements on all devices, $\text{Array Gain} = 10 \log (N_{ANT}/ N_{SS}) \text{ dB}$; • For power measurements on IEEE 802.11 devices, $\text{Array Gain} = 0 \text{ dB}$ for $N_{ANT} \leq 4$; 2. The EUT also supports Beam Forming mode, and the Beam Forming supports 802.11n/ac/ax, not include 802.11a/b/g. Beamforming Directional gain = $G_{ANT\ Max} + 10 \log (N_{ANT}/ N_{SS})$.						

2. Test Configuration

2.1. Test Mode

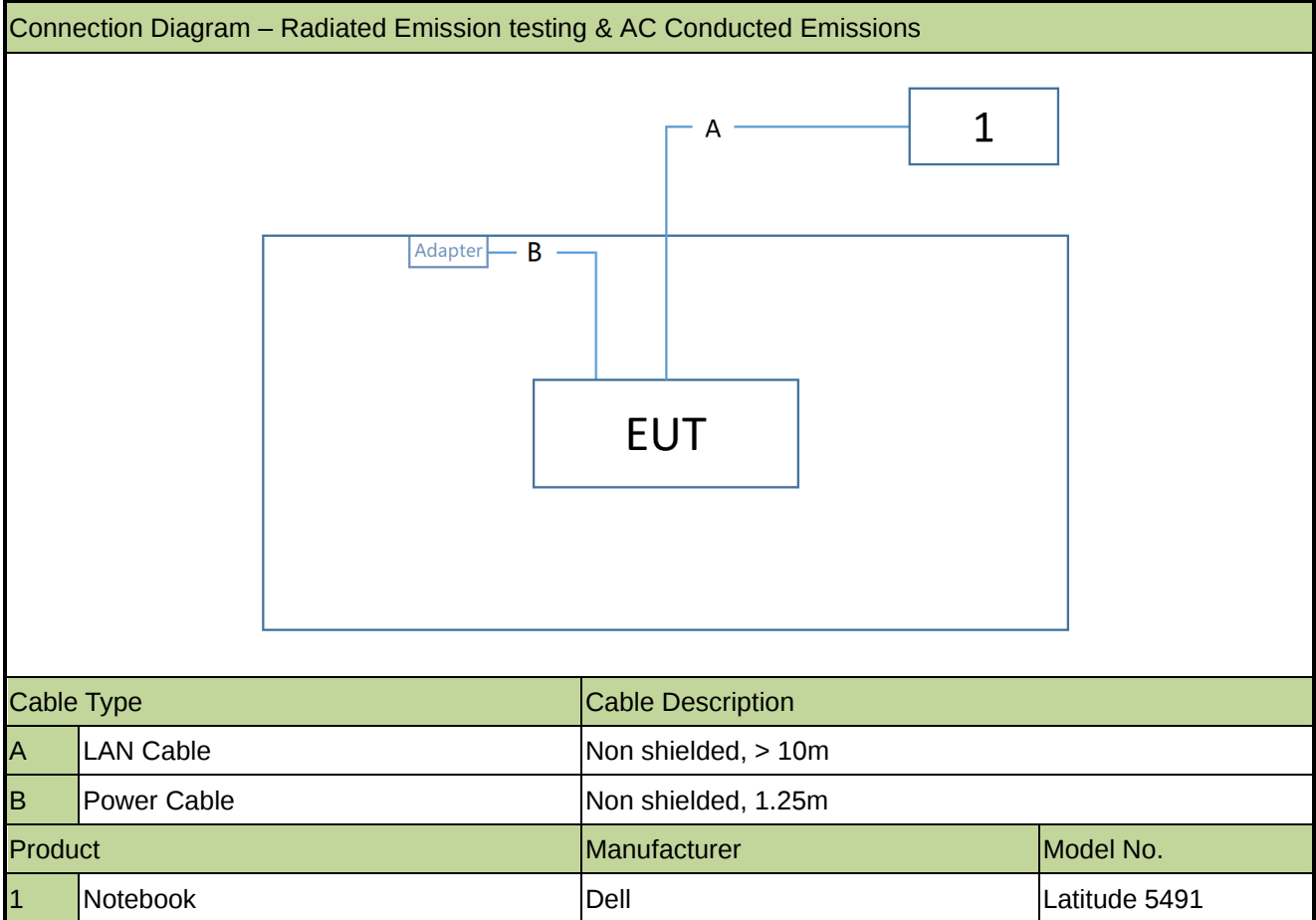
Mode 1: Transmit by BLE-1Mbps
Mode 2: Transmit by BLE-2Mbps

Spot check list of AP411:

Test Items	Test Mode	Test Channel	Test Frequency (MHz)
Output power	BLE 1Mbps	00	2402
	BLE 2Mbps	19	2440
	BLE 2Mbps	39	2480
Radiated Spurious Emission	BLE 1Mbps	00	2402
Radiated Band Edge	BLE 2Mbps	39	2480

2.2. 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.



2.3. Test Software

The test utility software used during testing was “telnet”, and commands were provided by manufacturer.

2.4. 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

2.5. 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.”

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

Conclusion:

The unit complies with the requirement of §15.203.

4. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
USB Power Sensor	Keysight	U2021XA	MRTSUE06446	1 year	2024-05-23	WZ-SR5
Signal Analyzer	Keysight	N9010B	MRTSUE06457	1 year	2024-05-23	WZ-SR5
Attenuator	MVE	MVE2213	MRTSUE11082	1 year	2023-06-09	WZ-SR5
Attenuator	MVE	MVE2213	MRTSUE11082	1 year	2024-06-08	WZ-SR5
Thermohygrometer	testo	608-H1	MRTSUE06402	1 year	2023-06-06	WZ-SR5
Thermohygrometer	testo	608-H1	MRTSUE06402	1 year	2024-05-31	WZ-SR5
Shielding Room	HUAMING	WZ-SR5	MRTSUE06442	N/A	N/A	WZ-SR5
TRILOG Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2024-05-15	WZ-AC2
EMI Test Receiver	Agilent	N9038A	MRTSUE06125	1 year	2024-05-23	WZ-AC2
Thermohygrometer	Mingle	ETH529	MRTSUE06170	1 year	2023-11-27	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2023-10-13	WZ-AC2
Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2024-05-07	WZ-AC2
Anechoic Chamber	RIKEN	WZ-AC2	MRTSUE06213	1 year	2024-04-20	WZ-AC2
Thermohygrometer	testo	608-H1	MRTSUE11038	1 year	2023-11-01	WZ-AC2
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2023-12-28	WZ-AC1
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2023-06-21	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2023-08-22	WZ-AC1
Preamplifier	Agilent	83017A	MRTSUE06076	1 year	2024-05-07	WZ-AC1
Anechoic Chamber	TDK	WZ-AC1	MRTSUE06212	1 year	2024-04-20	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE06403	1 year	2024-05-31	WZ-AC1
Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2023-12-28	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE11039	1 year	2023-11-01	WZ-AC1
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2023-09-29	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2023-11-05	WZ-AC1
Preamplifier	EMCI	EMC184045SE	MRTSUE06640	1 year	2024-01-12	WZ-AC1
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2024-05-23	WZ-SR2
Shielding Room	MIX-BEP	WZ-SR2	MRTSUE06215	5 years	2026-12-20	WZ-SR2
Thermohygrometer	testo	608-H1	MRTSUE06404	1 year	2024-05-31	WZ-SR2
Four-Line V-Network	R&S	ENV432	MRTSUE06615	1 year	2023-10-08	WZ-SR2
EMI Test Receiver	R&S	ESR3	MRTSUE06909	1 year	2023-10-27	WZ-SR2

Software	Version	Function
EMI Software	V3.0.0	EMI Test Software
Controller_MF 7802	2.03C	RE Antenna & Turntable
Controller_MF 7802	1.02	RE Antenna & Turntable
BenchVue Power Meter	2018.1	Power

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: 3.58dB 150kHz~30MHz: 3.20dB
Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 9kHz~30MHz: 2.60dB 30MHz~200MHz: 4.06dB 200MHz~1GHz: 5.28dB 1GHz~25GHz: 4.98dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 2.3dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 1.5dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 2.3dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 3.2%

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

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.

6.2. 6dB Bandwidth Measurement

6.2.1. Test Limit

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

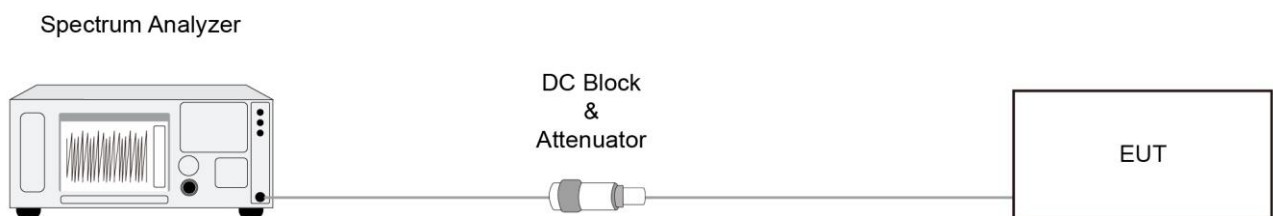
6.2.2. Test Procedure

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. $VBW \geq 3 \times RBW$
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

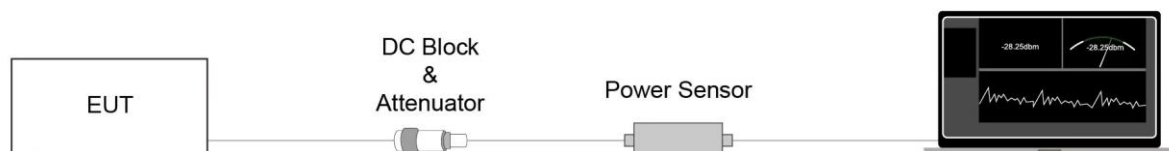
Method PKPM1 (Peak Power Measurement of Signals with DTS BW $\leq$ 50MHz)

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.

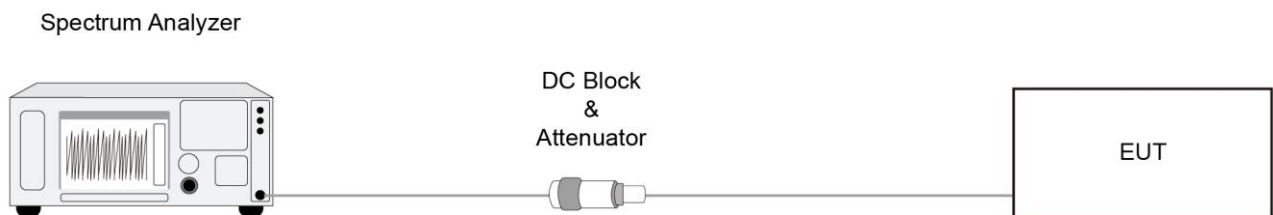
6.4.2. Test Procedure

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 Setting

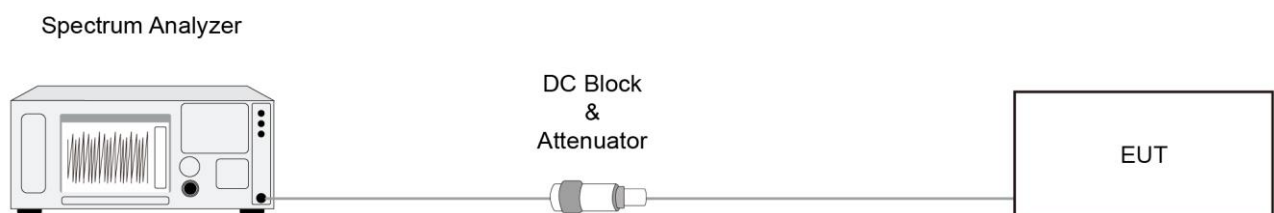
Reference level measurement

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 = 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 [$\mu\text{V/m}$]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

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

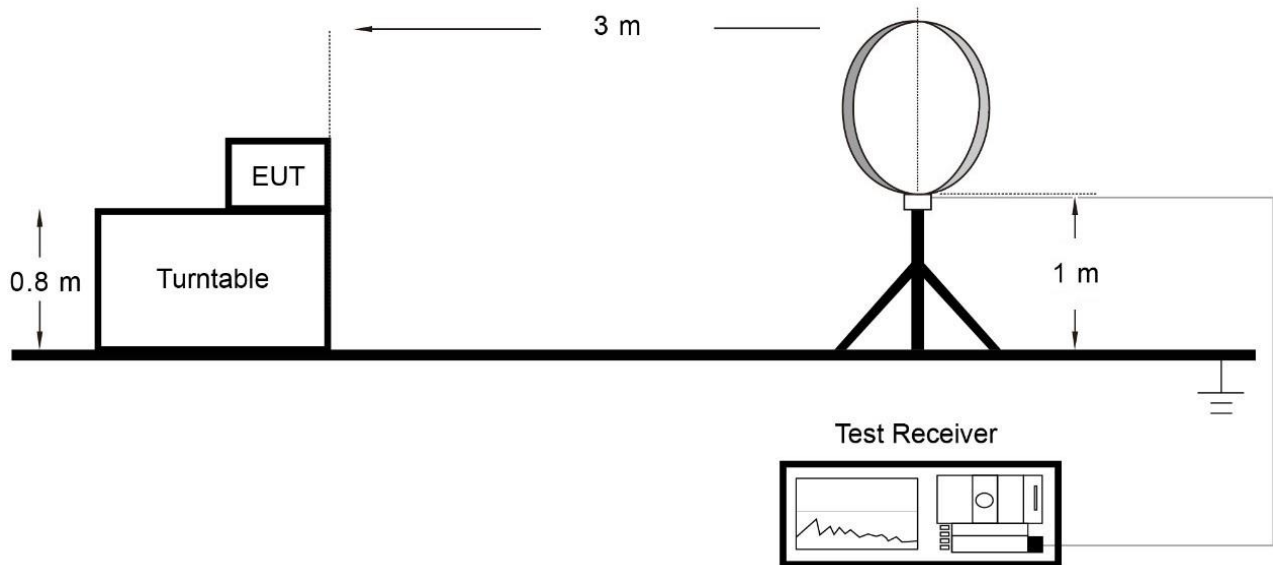
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

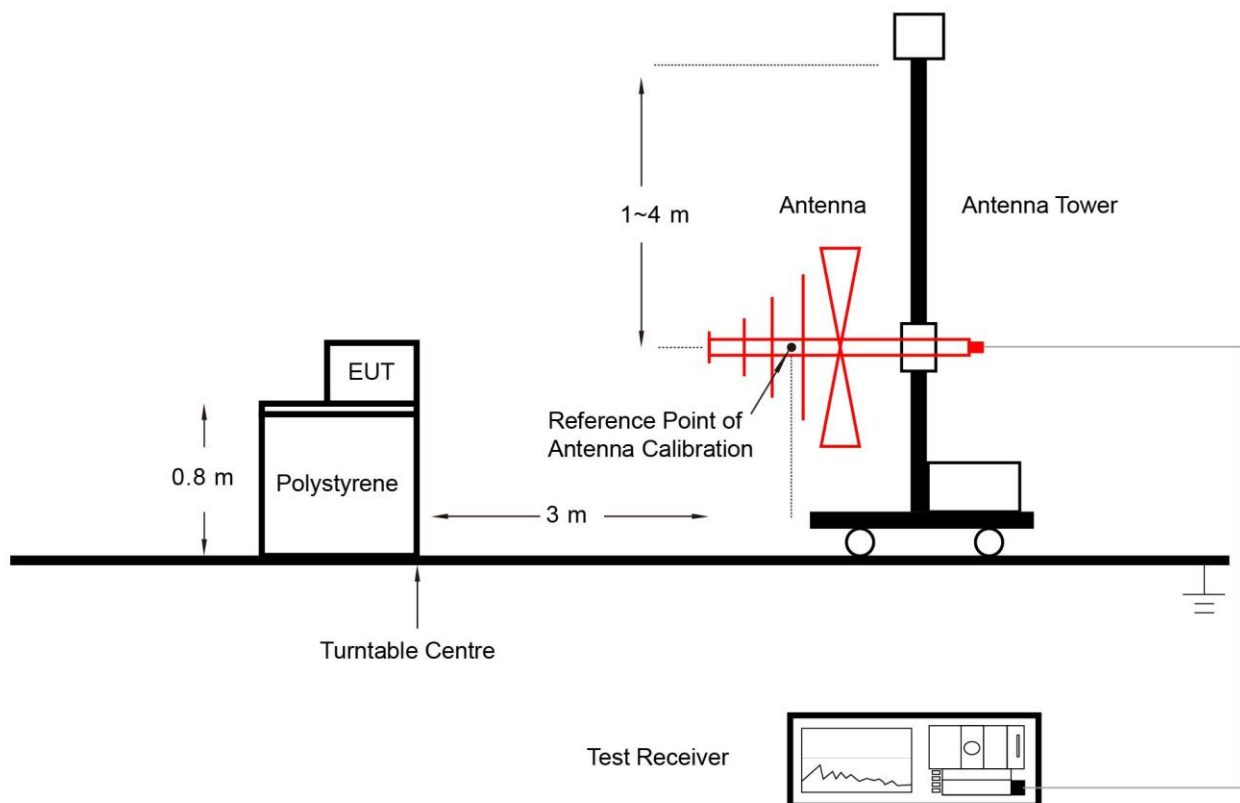
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10 Hz.
If the EUT duty cycle is $< 98\%$, set $\text{VBW} \geq 1/T$. T is the minimum transmission duration.
4. Detector = Peak
5. Sweep time = auto
6. Trace mode = max hold
7. Trace was allowed to stabilize

6.6.4. Test Setup

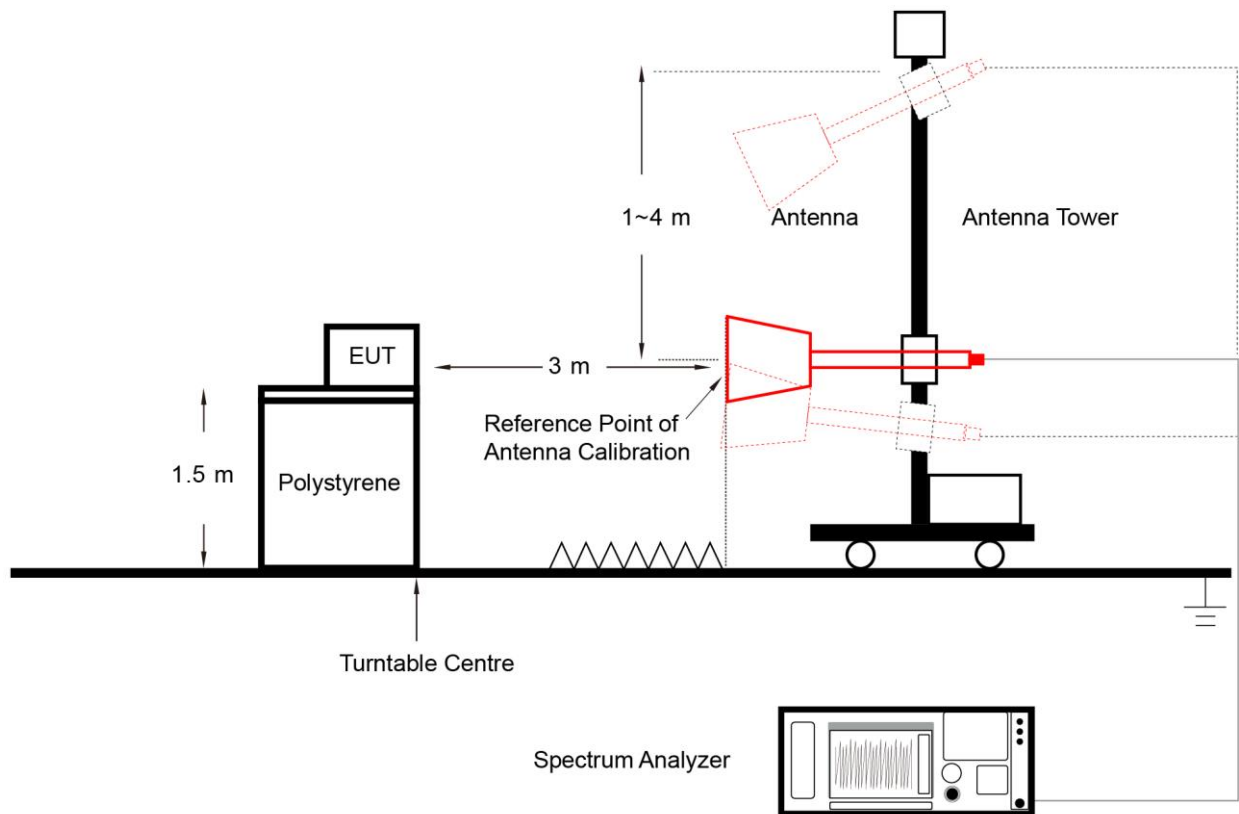
Below 30MHz Test Setup:



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 [$\mu\text{V/m}$]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

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

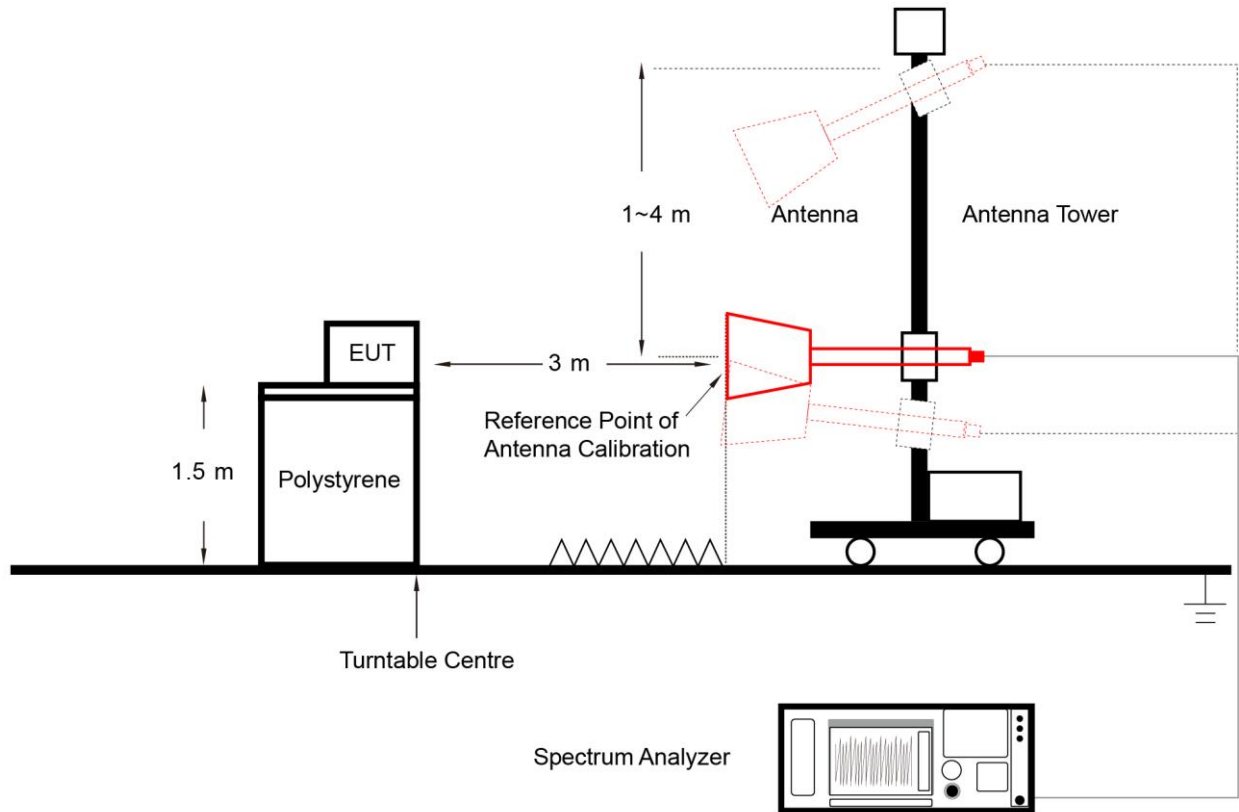
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

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 $\geq 1/T$
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

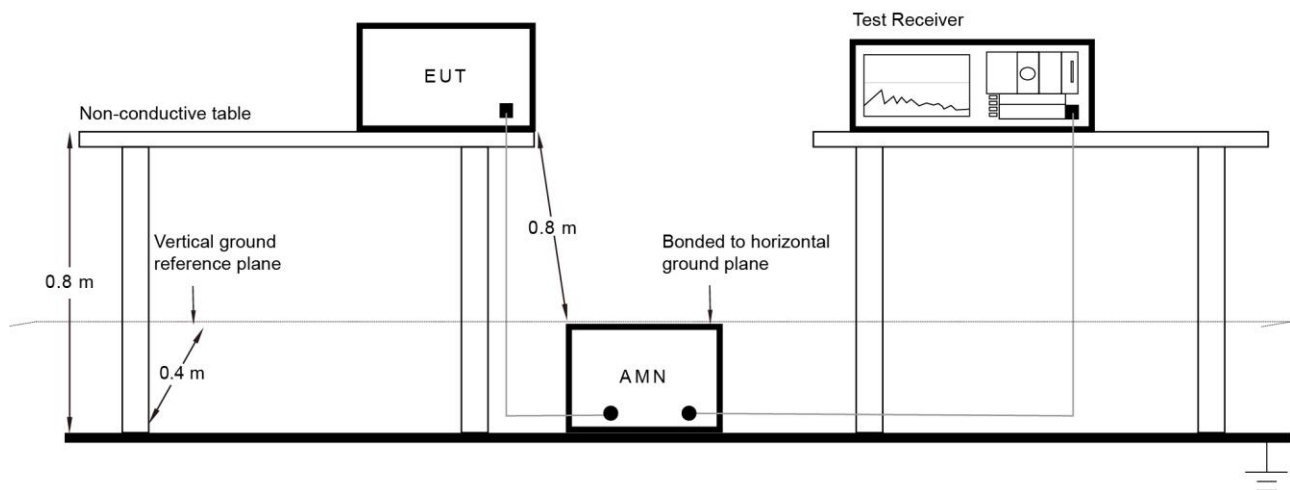
6.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dB μ V)	AV (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.

6.8.2. Test Setup



6.8.3. Test Result

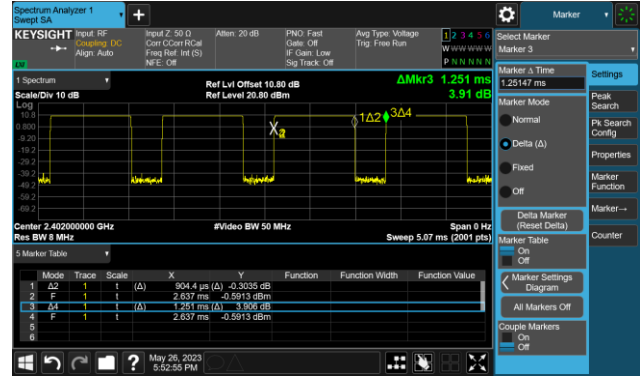
Refer to Appendix A.8.

Appendix A - Test Result

A.1 Duty Cycle Test Result

Test data of AP431:

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-05-26		

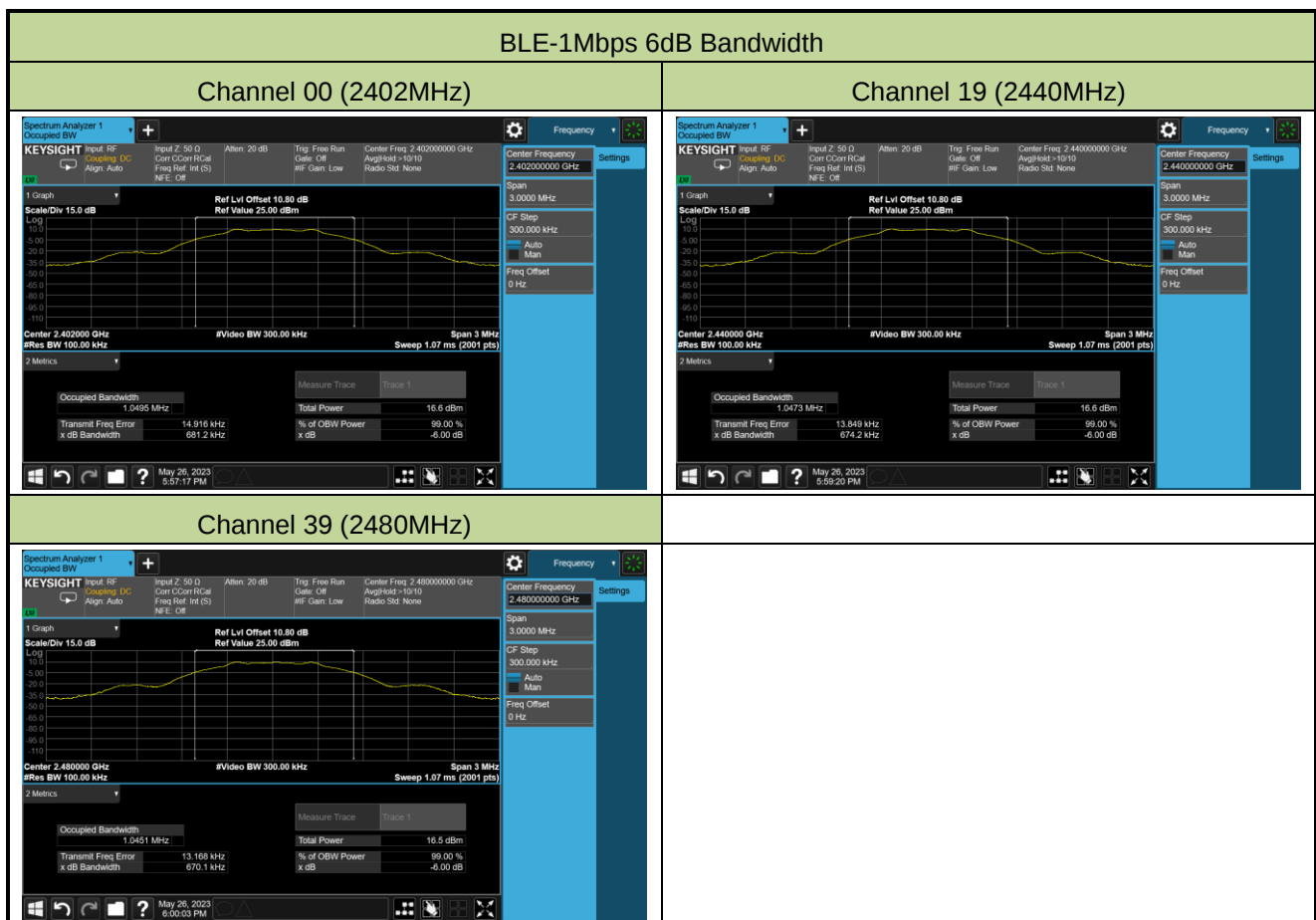
Test Mode	Duty Cycle
BLE-1Mbps	72.29%
BLE-2Mbps	37.32%
Duty Cycle (T = Transmission Duration)	
BLE-1Mbps (T = 904.4μs)	BLE-2Mbps (T = 466.1μs)
 BLE-1Mbps (T = 904.4μs) The screenshot shows a Keysight Spectrum Analyzer interface. The main display shows a signal waveform with a peak at 2.402 GHz. The measurement results table at the bottom indicates a peak level of -0.3035 dBm and a duty cycle of 72.29%.	 BLE-2Mbps (T = 466.1μs) The screenshot shows a Keysight Spectrum Analyzer interface. The main display shows a signal waveform with a peak at 2.402 GHz. The measurement results table at the bottom indicates a peak level of -1.836 dBm and a duty cycle of 37.32%.

A.2 6dB Bandwidth Test Result

Test data of AP431:

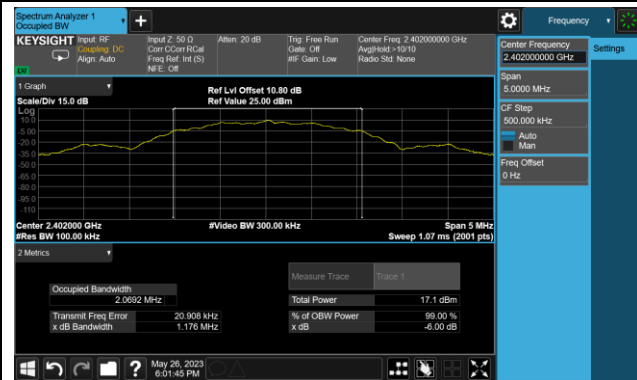
Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-05-26~2023-06-13		

Test Mode	Data Rate	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
BLE	1Mbps	00	2402	0.6812	≥ 0.5
BLE	1Mbps	19	2440	0.6742	≥ 0.5
BLE	1Mbps	39	2480	0.6701	≥ 0.5
BLE	2Mbps	00	2402	1.176	≥ 0.5
BLE	2Mbps	19	2440	1.168	≥ 0.5
BLE	2Mbps	39	2480	1.175	≥ 0.5



BLE-2Mbps 6dB Bandwidth

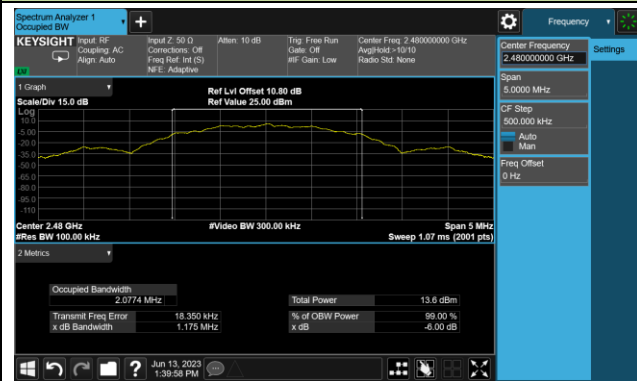
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



A.3 Output Power Test Result

Test data of AP431:

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-05-26		

Test Result of Peak Output Power

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	10.12	≤ 30.00	Pass
BLE	1Mbps	19	2440	10.16	≤ 30.00	Pass
BLE	1Mbps	39	2480	10.11	≤ 30.00	Pass
BLE	2Mbps	00	2402	10.10	≤ 30.00	Pass
BLE	2Mbps	19	2440	10.18	≤ 30.00	Pass
BLE	2Mbps	39	2480	6.41	≤ 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	9.93	≤ 30.00	Pass
BLE	1Mbps	19	2440	9.97	≤ 30.00	Pass
BLE	1Mbps	39	2480	9.92	≤ 30.00	Pass
BLE	2Mbps	00	2402	9.92	≤ 30.00	Pass
BLE	2Mbps	19	2440	9.98	≤ 30.00	Pass
BLE	2Mbps	39	2480	6.21	≤ 30.00	Pass

Spot Check Test Data of AP411:

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-06-20		

Test Result of Peak Output Power

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	9.00	≤ 30.00	Pass
BLE	2Mbps	19	2440	9.13	≤ 30.00	Pass
BLE	2Mbps	39	2480	5.56	≤ 30.00	Pass

Test Result of Average Output Power (Reporting Only)

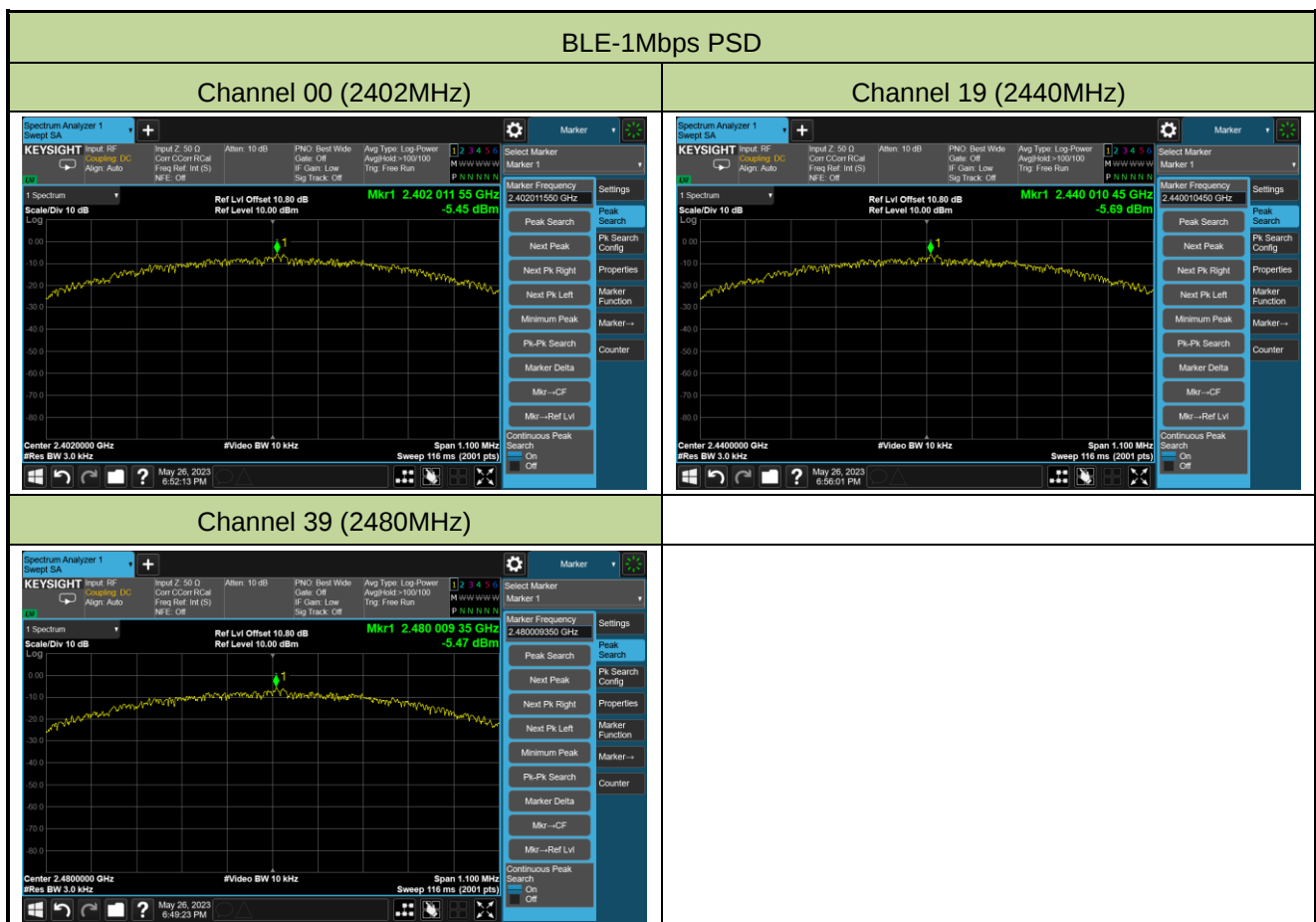
Test Mode	Data Rate	Channel No.	Frequency (MHz)	Average Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	8.80	≤ 30.00	Pass
BLE	2Mbps	19	2440	8.95	≤ 30.00	Pass
BLE	2Mbps	39	2480	5.35	≤ 30.00	Pass

A.4 Power Spectral Density Test Result

Test data of AP431:

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-05-26~2023-06-13		

Test Mode	Data Rate	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1Mbps	00	2402	-5.45	≤ 8.00	Pass
BLE	1Mbps	19	2440	-5.69	≤ 8.00	Pass
BLE	1Mbps	39	2480	-5.47	≤ 8.00	Pass
BLE	2Mbps	00	2402	-8.25	≤ 8.00	Pass
BLE	2Mbps	19	2440	-8.16	≤ 8.00	Pass
BLE	2Mbps	39	2480	-11.90	≤ 8.00	Pass

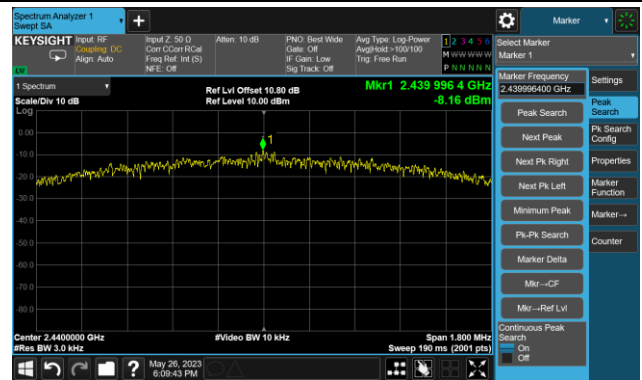


BLE-2Mbps PSD

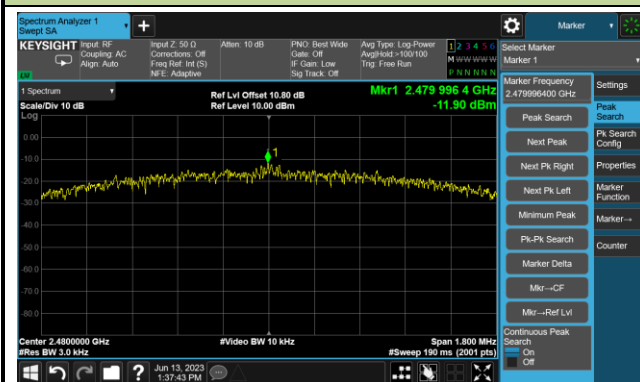
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)

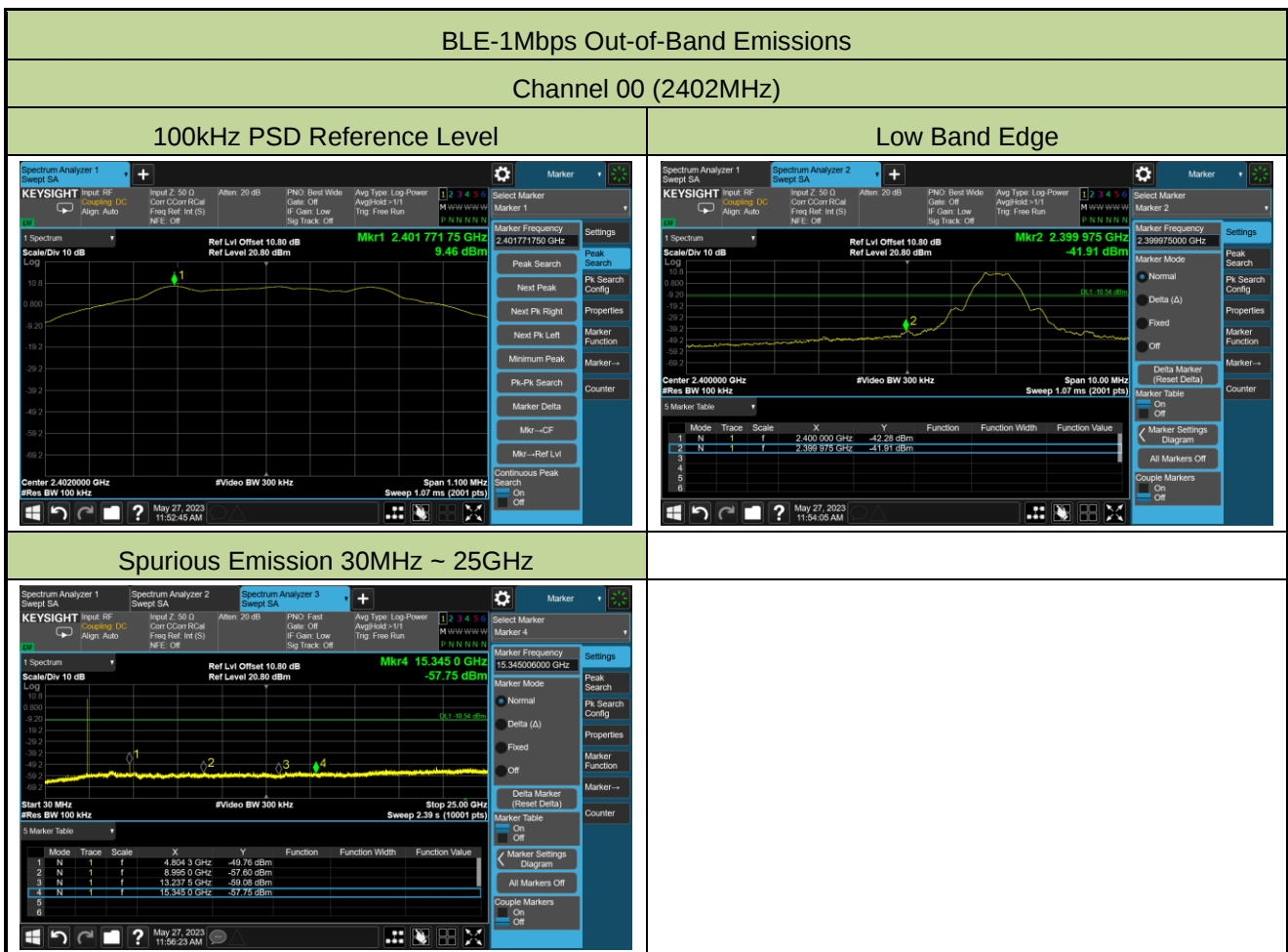


A.5 Conducted Band Edge and Out-of-Band Emissions Test Result

Test data of AP431:

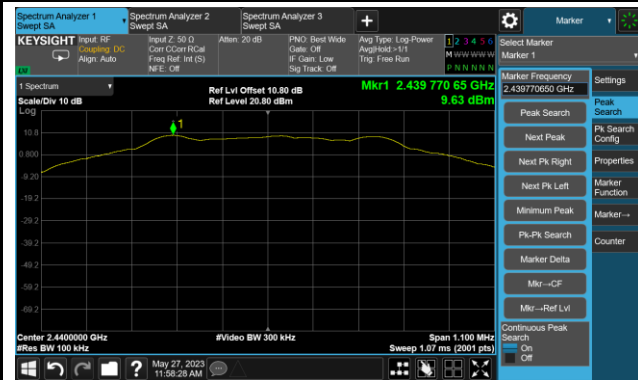
Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-05-27 ~ 2023-06-13		

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

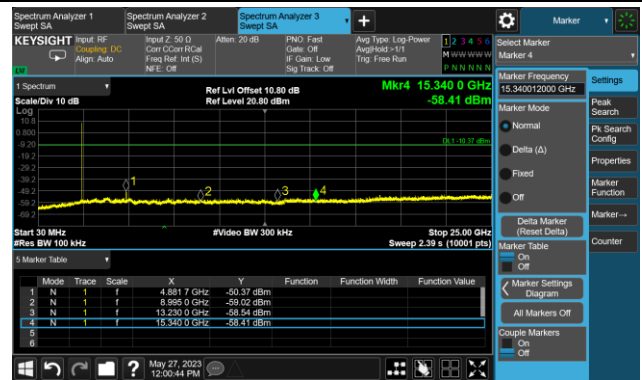


Channel 19 (2440MHz)

100kHz PSD Reference Level

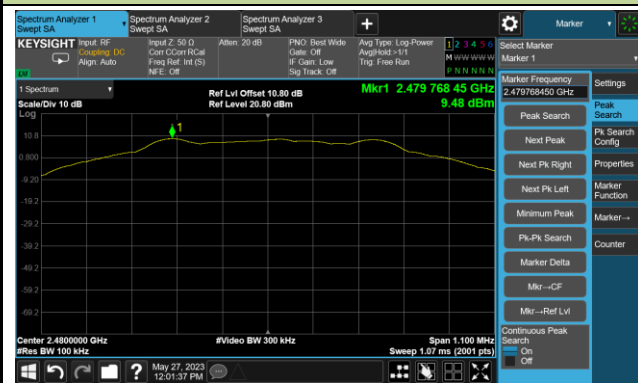


Spurious Emission 30MHz ~ 25GHz

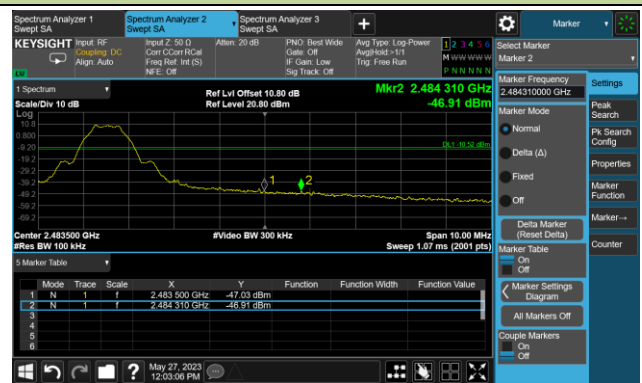


Channel 39 (2480MHz)

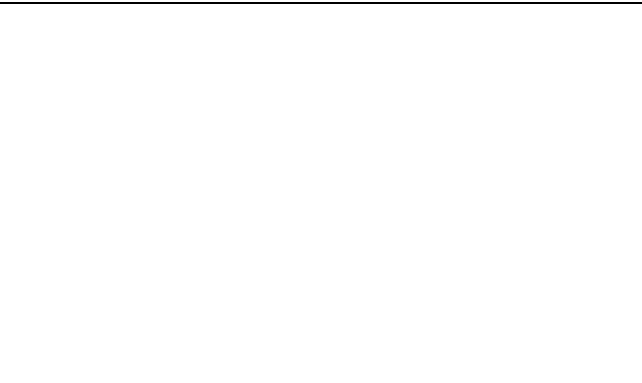
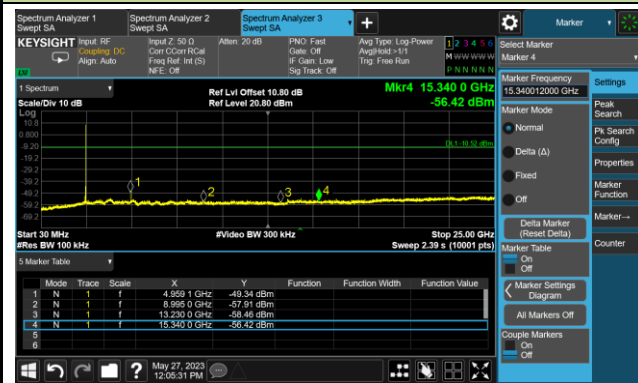
100kHz PSD Reference Level



High Band Edge



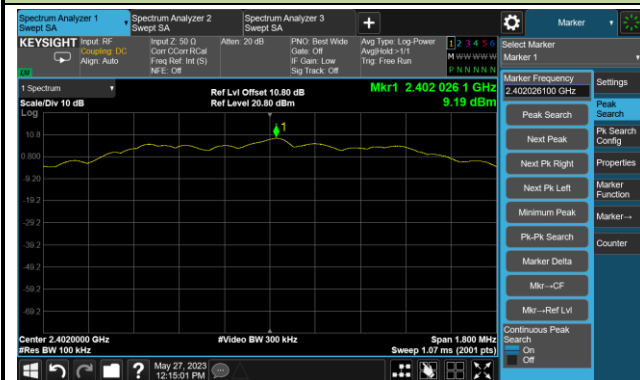
Spurious Emission 30MHz ~ 25GHz



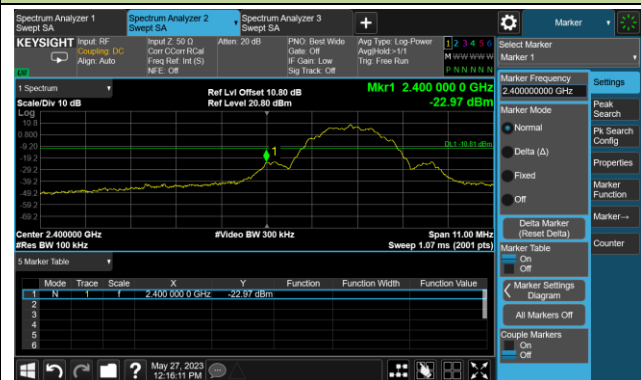
BLE-2Mbps Out-of-Band Emissions

Channel 00 (2402MHz)

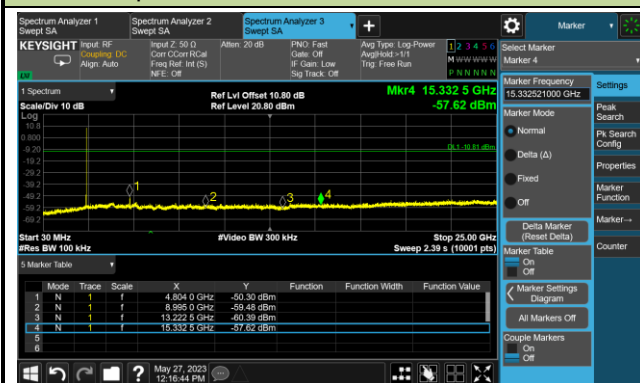
100kHz PSD Reference Level



Low Band Edge

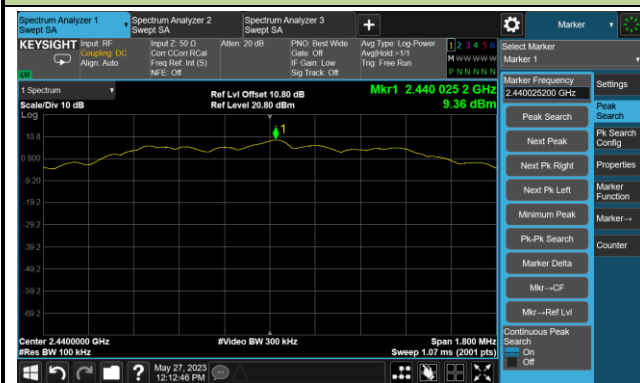


Spurious Emission 30MHz ~ 25GHz

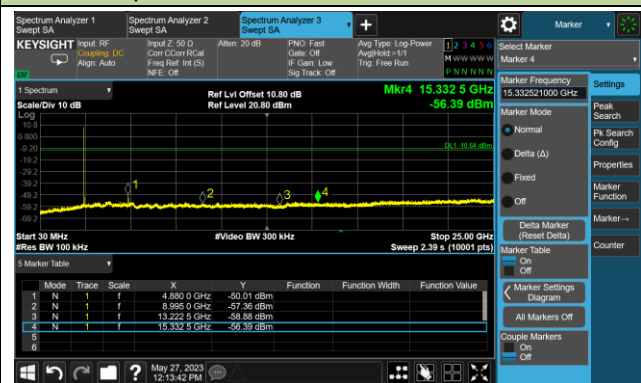


Channel 19 (2440MHz)

100kHz PSD Reference Level

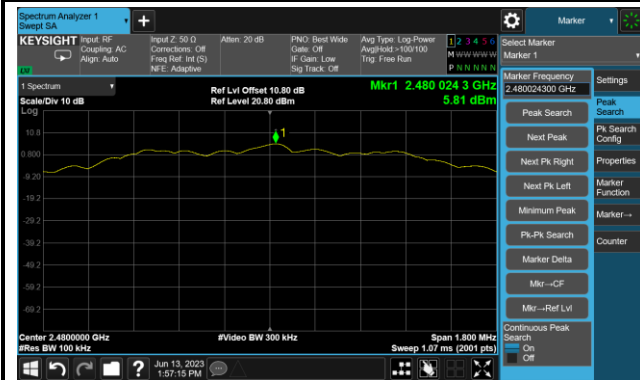


Spurious Emission 30MHz ~ 25GHz

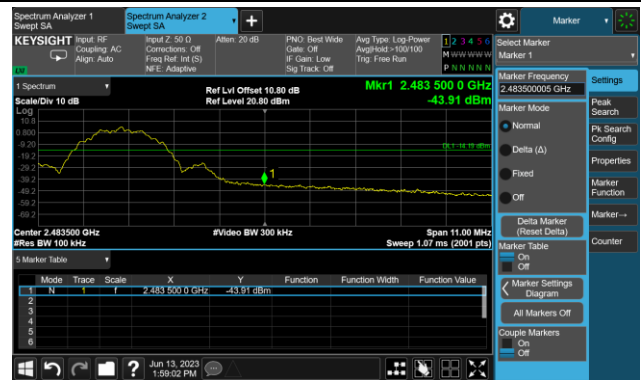


Channel 39 (2480MHz)

100kHz PSD Reference Level



High Band Edge



Spurious Emission 30MHz ~ 25GHz



A.6 Radiated Spurious Emission Test Result

Test data of AP431:

Test Site	WZ-AC2	Test Engineer	Dick Shen
Test Date	2023-06-05	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	4799.5	39.6	3.4	43.0	74.0	-31.0	Peak	Horizontal
	11565.5	31.0	17.7	48.7	74.0	-25.3	Peak	Horizontal
	15773.0	27.8	17.2	45.0	74.0	-29.0	Peak	Horizontal
	3898.5	35.2	-0.3	34.9	74.0	-39.1	Peak	Vertical
	4859.0	31.5	3.3	34.8	74.0	-39.2	Peak	Vertical
	11786.5	28.2	17.5	45.7	74.0	-28.3	Peak	Vertical
19	4077.0	32.3	0.3	32.6	74.0	-41.4	Peak	Horizontal
	4876.0	40.8	3.0	43.8	74.0	-30.2	Peak	Horizontal
	11786.5	28.3	17.5	45.8	74.0	-28.2	Peak	Horizontal
	4876.0	37.5	3.0	40.5	74.0	-33.5	Peak	Vertical
	7536.5	30.3	11.9	42.2	74.0	-31.8	Peak	Vertical
	11480.5	30.7	17.5	48.2	74.0	-25.8	Peak	Vertical
39	4060.0	33.2	0.3	33.5	74.0	-40.5	Peak	Horizontal
	4961.0	42.4	3.0	45.4	74.0	-28.6	Peak	Horizontal
	11072.5	29.4	16.4	45.8	74.0	-28.2	Peak	Horizontal
	4153.5	34.0	0.6	34.6	74.0	-39.4	Peak	Vertical
	4961.0	42.5	3.0	45.5	74.0	-28.5	Peak	Vertical
	11582.5	30.1	17.5	47.6	74.0	-26.4	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)

Test Site	WZ-AC2	Test Engineer	Dick Shen
Test Date	2023-06-05	Test Mode:	BLE-2Mbps
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.		

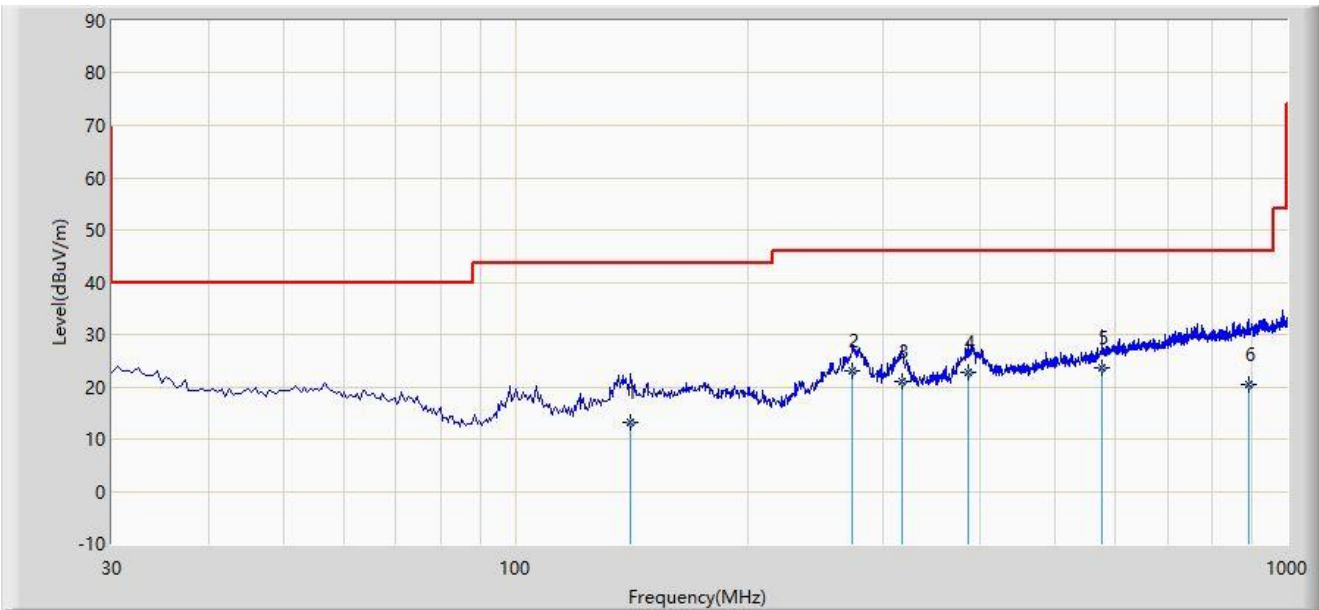
Test Channel	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
00	4799.5	38.8	3.4	42.2	74.0	-31.8	Peak	Horizontal
	11684.5	30.1	17.3	47.4	74.0	-26.6	Peak	Horizontal
	15917.5	25.7	17.5	43.2	74.0	-30.8	Peak	Horizontal
	7366.5	29.8	11.5	41.3	74.0	-32.7	Peak	Vertical
	10826.0	29.9	16.2	46.1	74.0	-27.9	Peak	Vertical
	11846.0	29.7	17.0	46.7	74.0	-27.3	Peak	Vertical
19	3915.5	34.1	-0.4	33.7	74.0	-40.3	Peak	Horizontal
	4961.0	41.8	3.0	44.8	74.0	-29.2	Peak	Horizontal
	11072.5	29.4	16.4	45.8	74.0	-28.2	Peak	Horizontal
	4961.0	41.2	3.0	44.2	74.0	-29.8	Peak	Vertical
	11225.5	29.1	16.8	45.9	74.0	-28.1	Peak	Vertical
	11633.5	27.2	17.7	44.9	74.0	-29.1	Peak	Vertical
39	4026.0	34.1	0.1	34.2	74.0	-39.8	Peak	Horizontal
	4961.0	42.0	3.0	45.0	74.0	-29.0	Peak	Horizontal
	11633.5	28.8	17.7	46.5	74.0	-27.5	Peak	Horizontal
	7426.0	31.2	11.7	42.9	74.0	-31.1	Peak	Vertical
	8242.0	31.6	10.9	42.5	74.0	-31.5	Peak	Vertical
	11472.0	29.9	17.4	47.3	74.0	-26.7	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 Result of Radiated Emission below 1GHz:

Site: WZ-AC1	Test Date: 2023-06-14
Limit: FCC_Part15.209_RSE(3m)	Engineer: Carl Jiang
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 2Mbps at 2440MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		141.060	13.259	-4.320	-30.241	43.500	17.579	QP
2		273.450	22.922	5.200	-23.078	46.000	17.722	QP
3		316.630	20.941	1.900	-25.059	46.000	19.041	QP
4		386.970	22.799	2.200	-23.201	46.000	20.599	QP
5	*	575.980	23.631	-1.200	-22.369	46.000	24.831	QP
6		892.230	20.422	-8.900	-25.578	46.000	29.322	QP

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

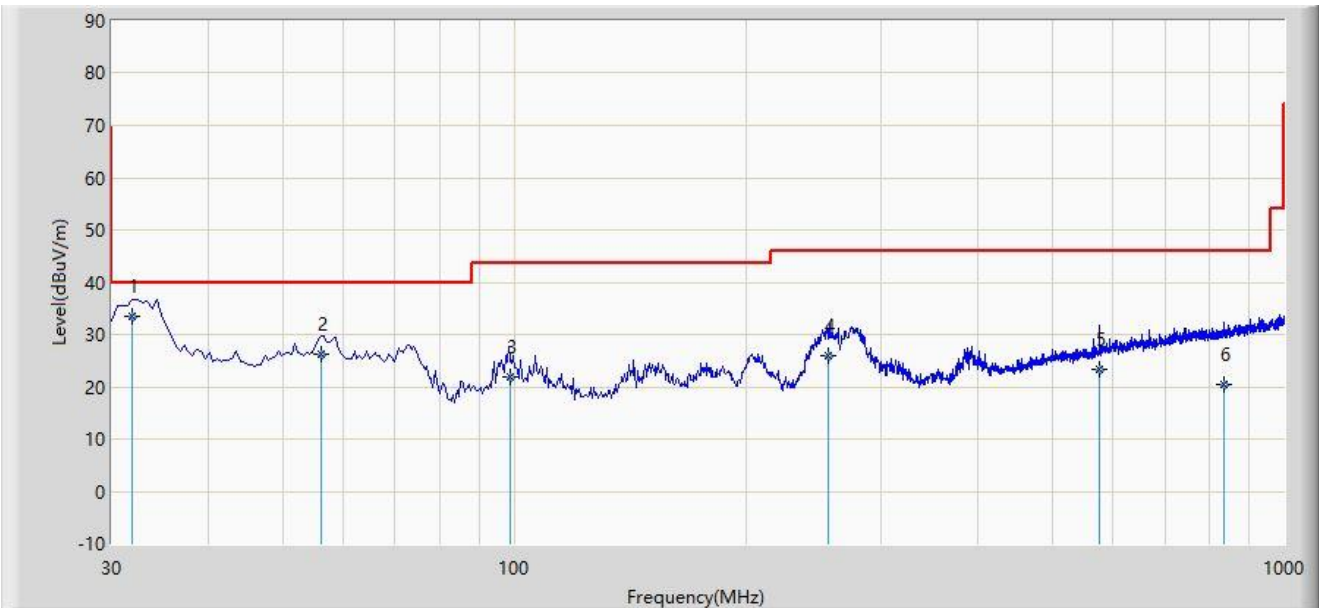
Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

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 Date: 2023-06-14
Limit: FCC_Part15.209_RSE(3m)	Engineer: Carl Jiang
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 2Mbps at 2440MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1	*	31.840	33.596	16.230	-6.404	40.000	17.366	QP
2		56.180	26.367	8.600	-13.633	40.000	17.767	QP
3		98.870	21.997	8.900	-21.503	43.500	13.097	QP
4		256.130	26.023	9.200	-19.977	46.000	16.823	QP
5		576.070	23.435	-1.400	-22.565	46.000	24.835	QP
6		836.250	20.569	-8.100	-25.431	46.000	28.669	QP

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

Note 2: Measure Level (dBuV/m) = Reading Level (dBuV) + 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.

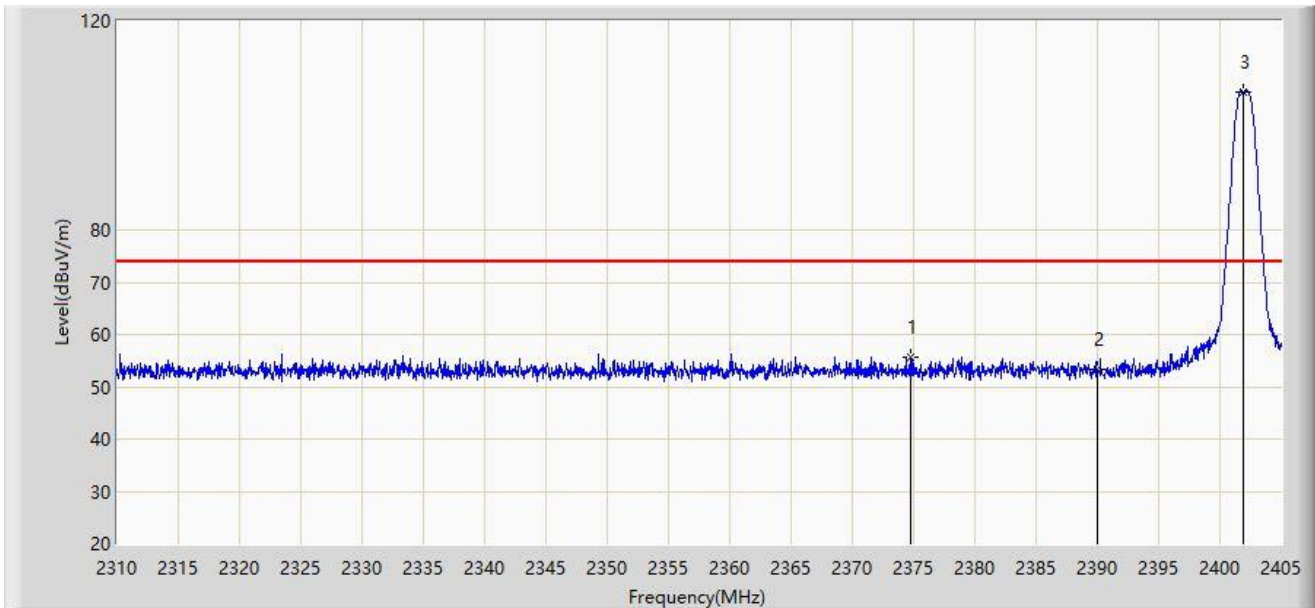
Spot Check Test Data of AP411:

Test Site	WZ-AC1	Test Engineer	Carl Jiang
Test Date	2023-06-19	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	4799.5	35.8	3.1	38.9	74.0	-35.1	Peak	Horizontal
	11565.5	38.0	12.6	50.6	74.0	-23.4	Peak	Horizontal
	15773.0	35.2	11.9	47.1	74.0	-26.9	Peak	Horizontal
	3898.5	37.2	0.6	37.8	74.0	-36.2	Peak	Vertical
	4859.0	36.6	2.8	39.4	74.0	-34.6	Peak	Vertical
	11786.5	35.2	11.9	47.1	74.0	-26.9	Peak	Vertical

A.7 Radiated Restricted Band Edge Test Result

Site: WZ-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 1Mbps at 2402MHz	



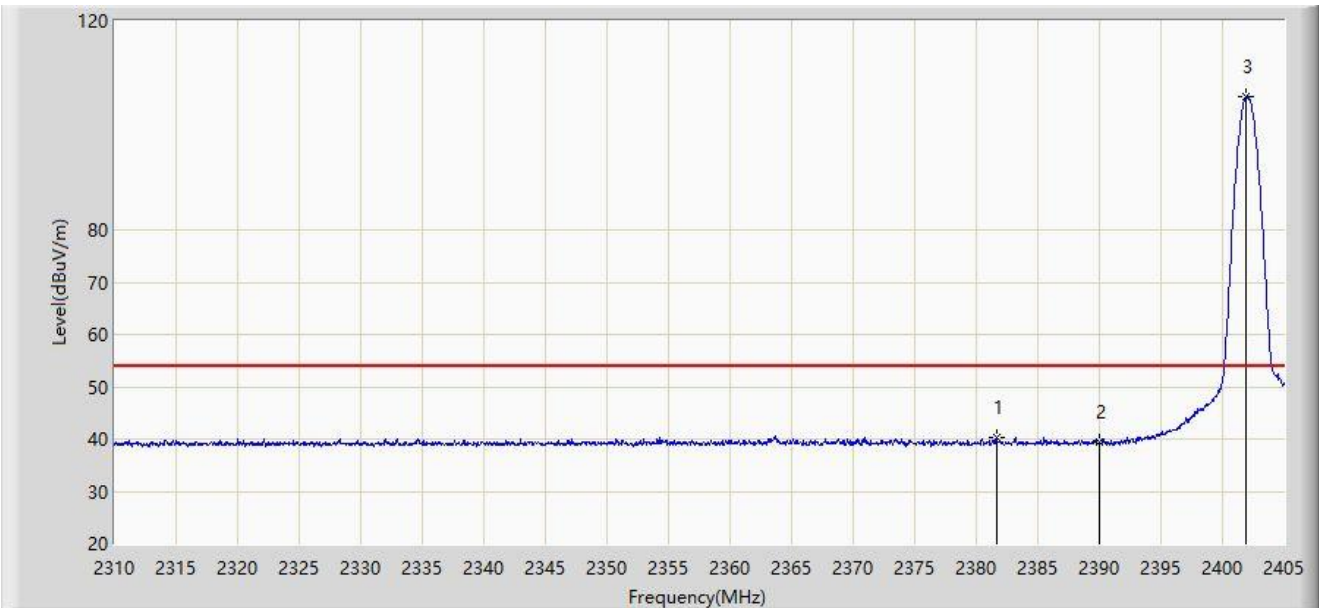
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2374.742	55.559	23.888	-18.441	74.000	31.671	PK
2		2390.000	53.230	21.615	-20.770	74.000	31.615	PK
3		2401.960	106.518	74.968	N/A	N/A	31.550	PK

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 1Mbps at 2402MHz	



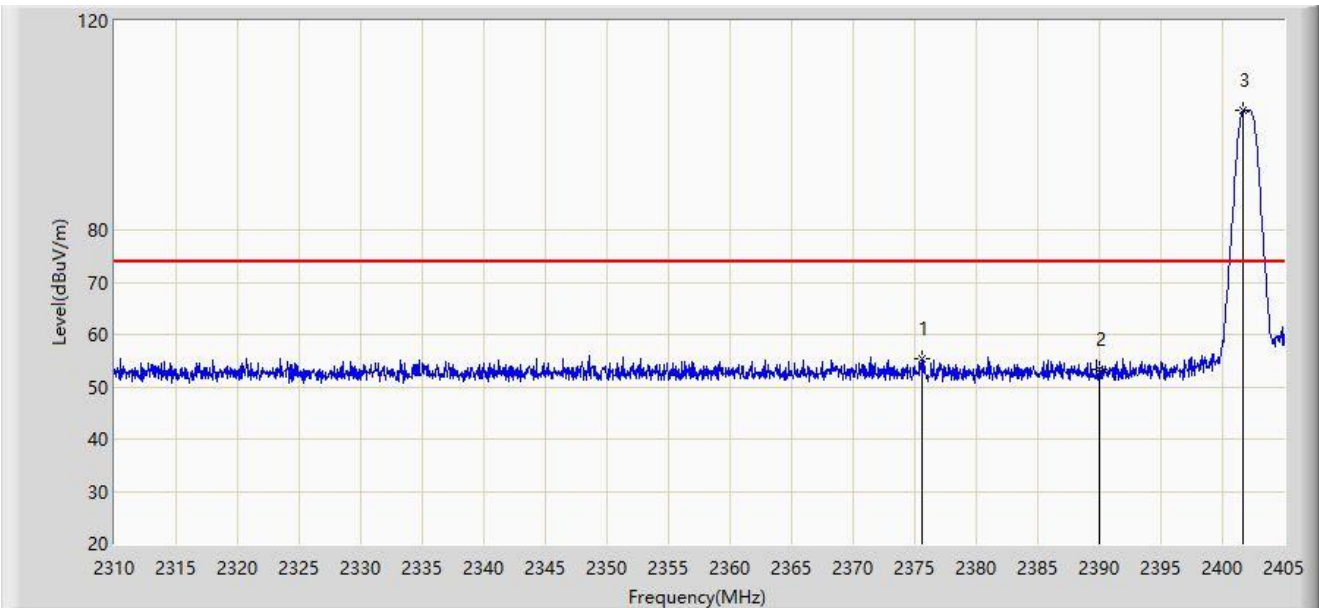
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2381.630	40.400	8.742	-13.600	54.000	31.657	AV
2		2390.000	39.436	7.821	-14.564	54.000	31.615	AV
3		2401.960	105.571	74.021	N/A	N/A	31.550	AV

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 1Mbps at 2402MHz	



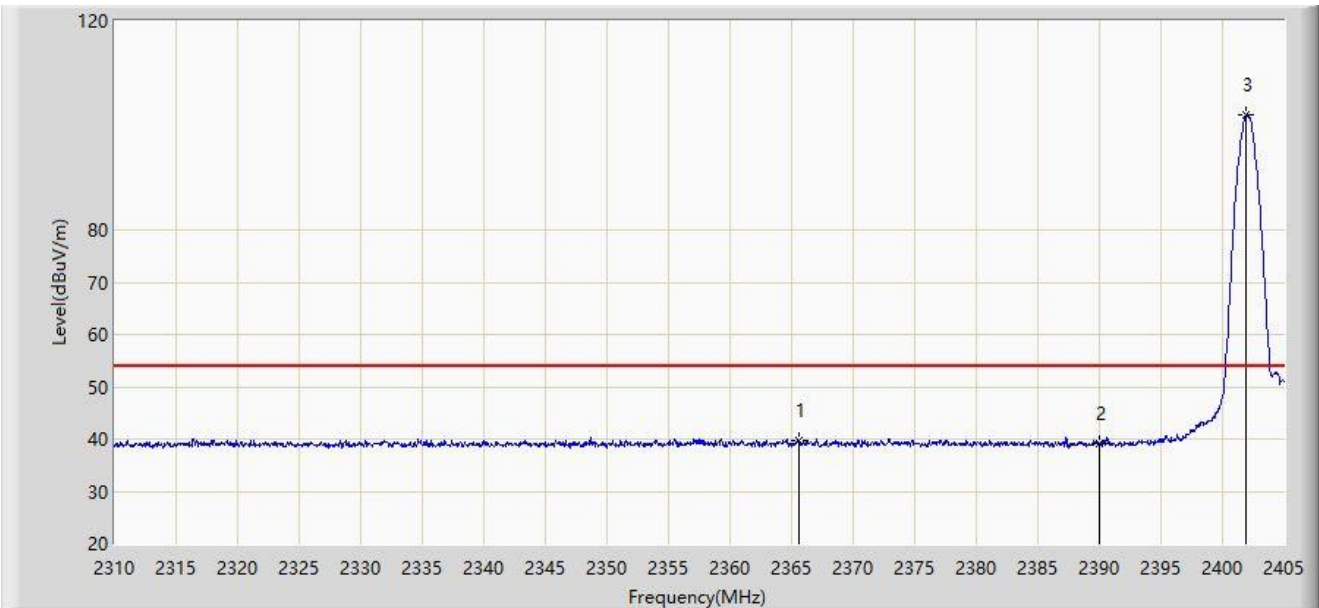
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2375.597	55.438	23.768	-18.562	74.000	31.670	PK
2		2390.000	53.219	21.604	-20.781	74.000	31.615	PK
3		2401.675	102.799	71.248	N/A	N/A	31.551	PK

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 1Mbps at 2402MHz	



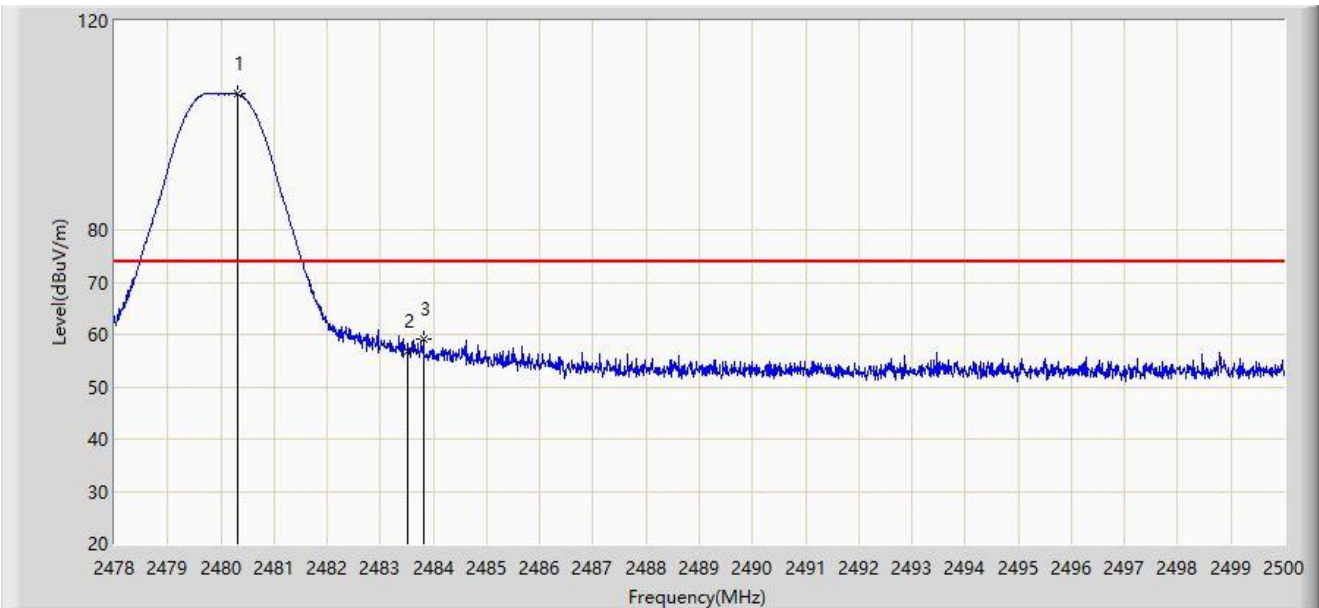
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2365.575	39.779	8.094	-14.221	54.000	31.685	AV
2		2390.000	39.099	7.484	-14.901	54.000	31.615	AV
3		2401.913	101.953	70.403	N/A	N/A	31.550	AV

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 1Mbps at 2480MHz	



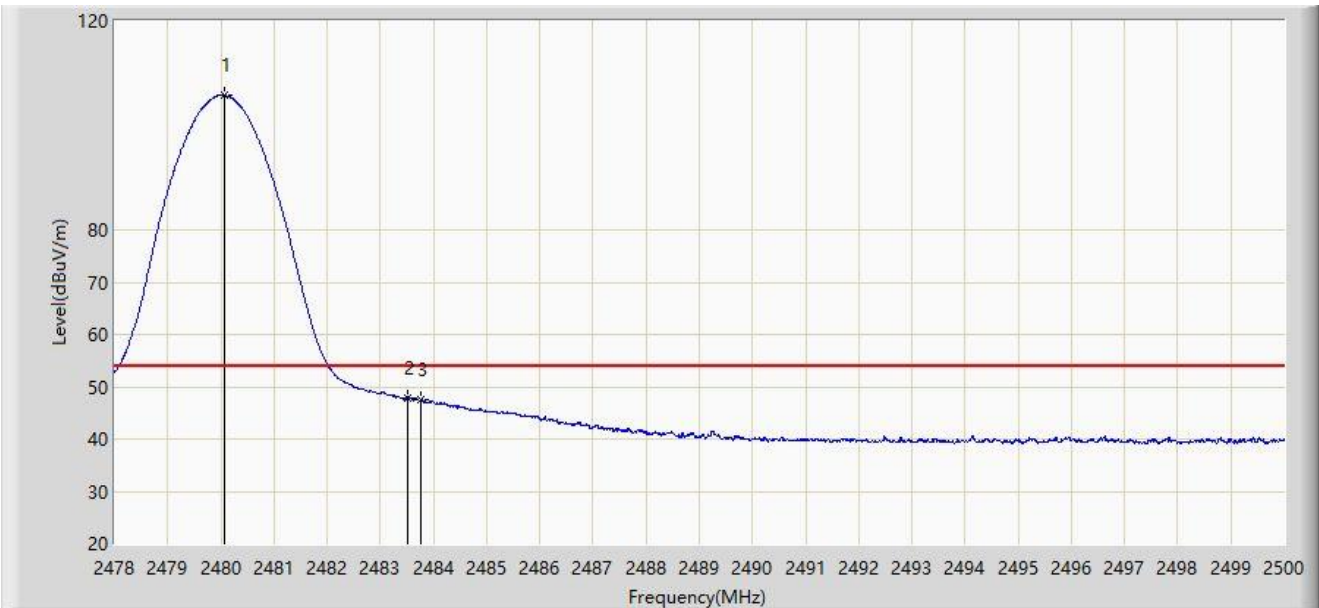
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2480.310	105.995	74.496	N/A	N/A	31.499	PK
2		2483.500	56.825	25.325	-17.175	74.000	31.500	PK
3	*	2483.808	59.214	27.713	-14.786	74.000	31.501	PK

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 1Mbps at 2480MHz	



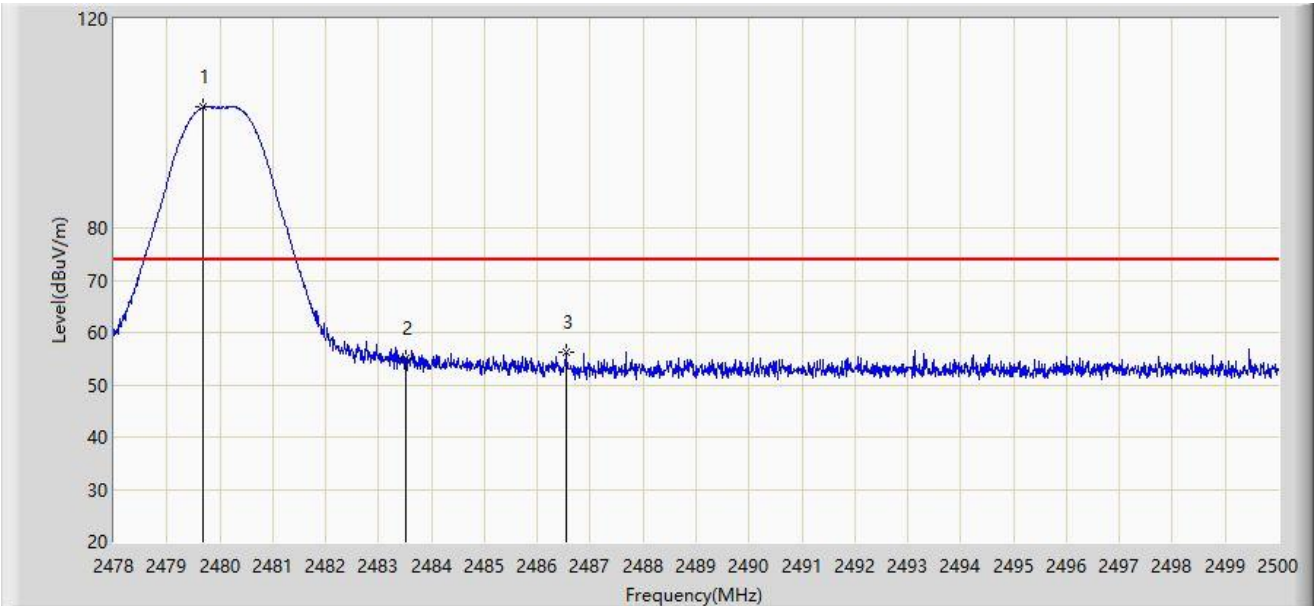
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2480.079	105.703	74.204	N/A	N/A	31.499	AV
2	*	2483.500	47.853	16.353	-6.147	54.000	31.500	AV
3		2483.775	47.591	16.090	-6.409	54.000	31.501	AV

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 1Mbps at 2480MHz	



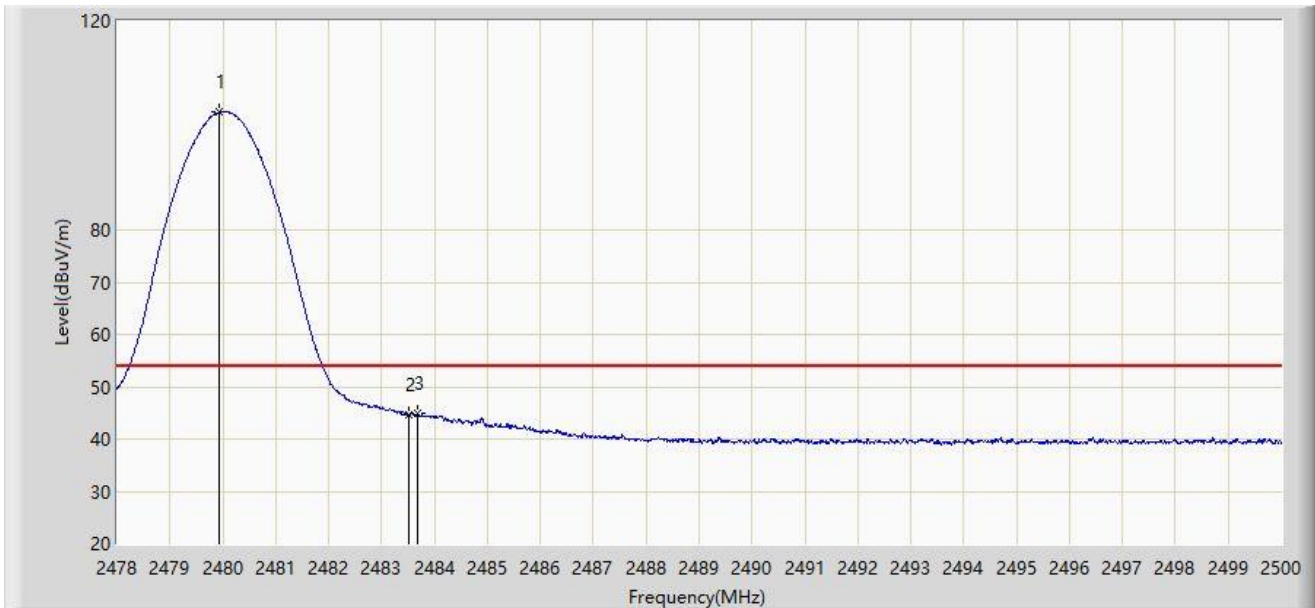
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2479.694	103.096	71.597	N/A	N/A	31.499	PK
2		2483.500	54.957	23.457	-19.043	74.000	31.500	PK
3	*	2486.536	56.279	24.777	-17.721	74.000	31.502	PK

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 1Mbps at 2480MHz	



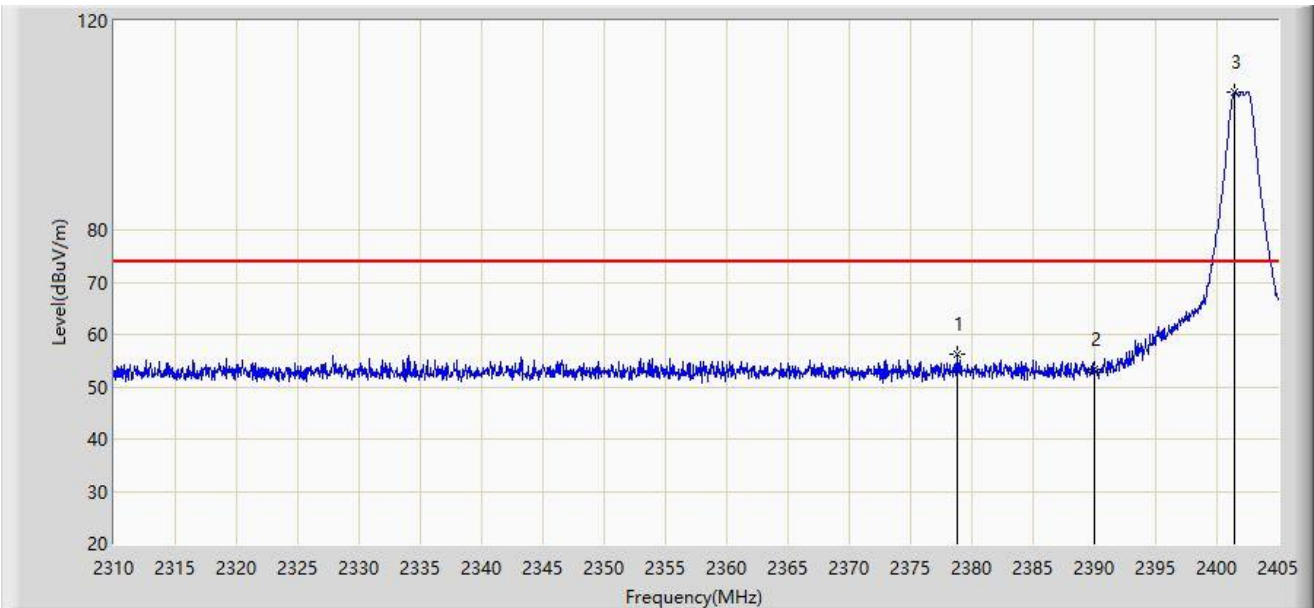
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2479.925	102.466	70.967	N/A	N/A	31.499	AV
2		2483.500	44.645	13.145	-9.355	54.000	31.500	AV
3	*	2483.687	44.935	13.434	-9.065	54.000	31.501	AV

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 2Mbps at 2402MHz	



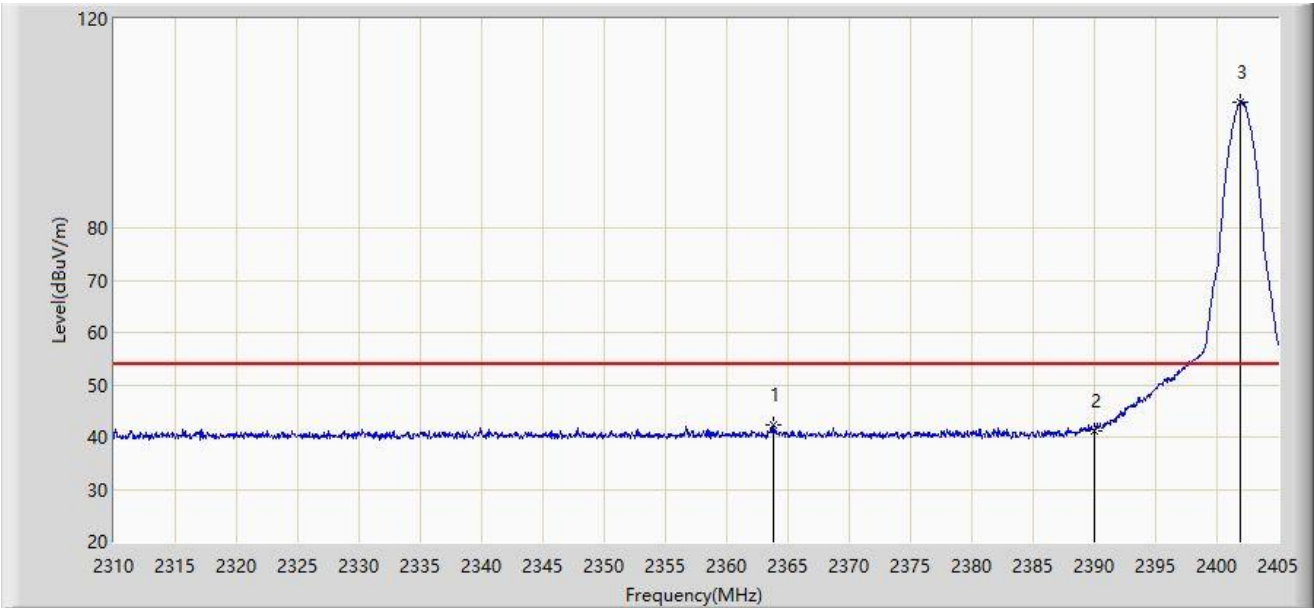
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2378.827	56.341	24.677	-17.659	74.000	31.664	PK
2		2390.000	53.323	21.708	-20.677	74.000	31.615	PK
3		2401.437	106.284	74.732	N/A	N/A	31.552	PK

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 2Mbps at 2402MHz	



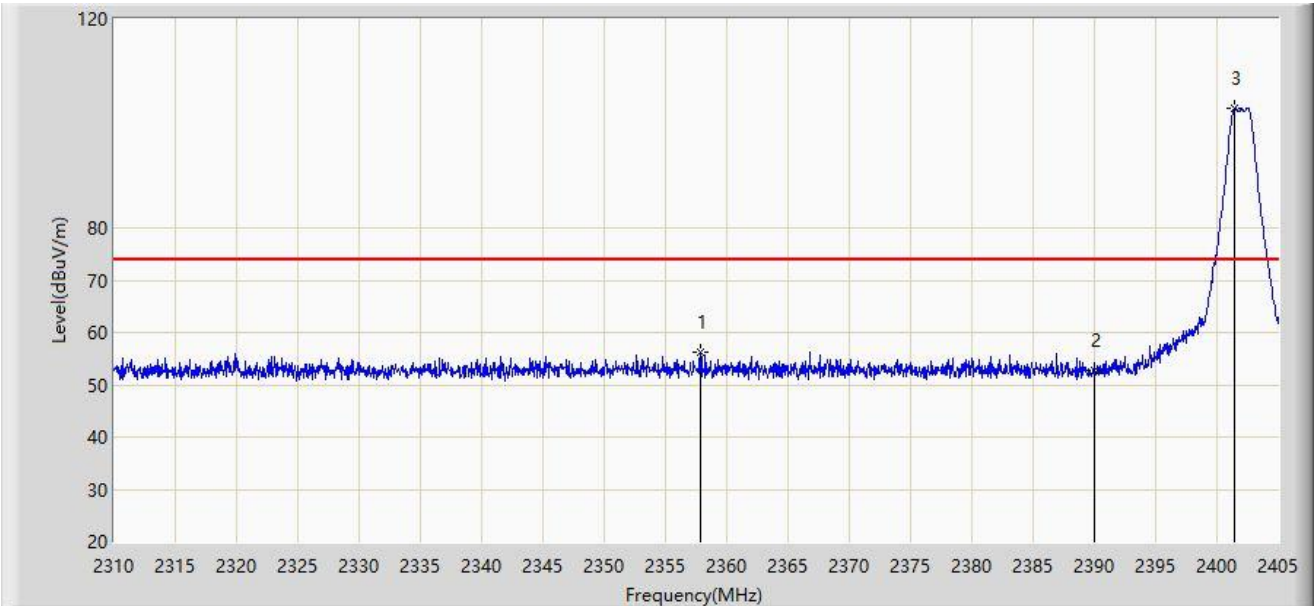
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2363.770	42.269	10.582	-11.731	54.000	31.687	AV
2		2390.000	41.109	9.494	-12.891	54.000	31.615	AV
3		2401.913	104.131	72.581	N/A	N/A	31.550	AV

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 2Mbps at 2402MHz	



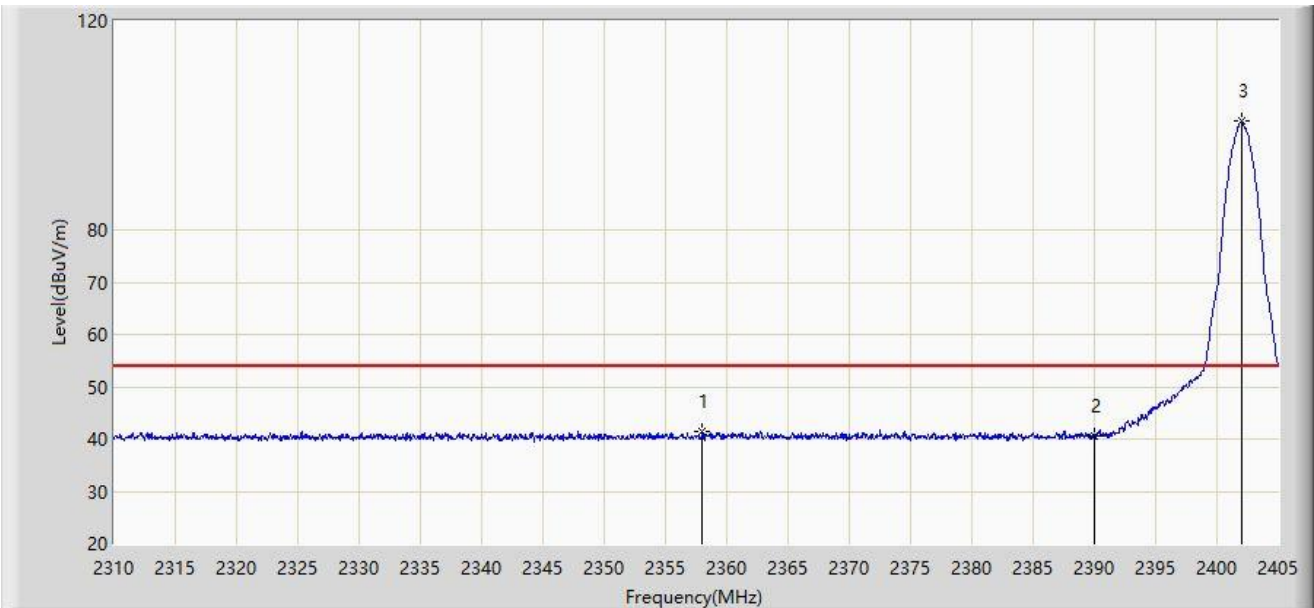
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2357.880	56.102	24.409	-17.898	74.000	31.694	PK
2		2390.000	52.677	21.062	-21.323	74.000	31.615	PK
3		2401.437	102.923	71.371	N/A	N/A	31.552	PK

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 2Mbps at 2402MHz	



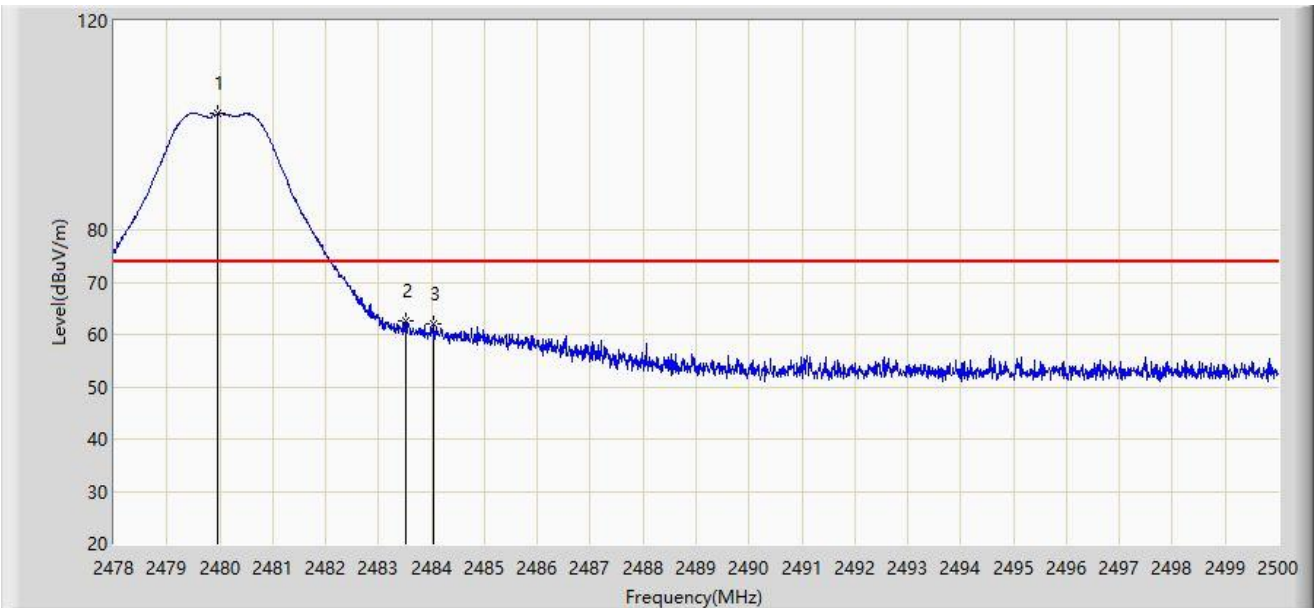
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2358.022	41.469	9.776	-12.531	54.000	31.693	AV
2		2390.000	40.672	9.057	-13.328	54.000	31.615	AV
3		2402.008	100.841	69.291	N/A	N/A	31.550	AV

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 2Mbps at 2480MHz	



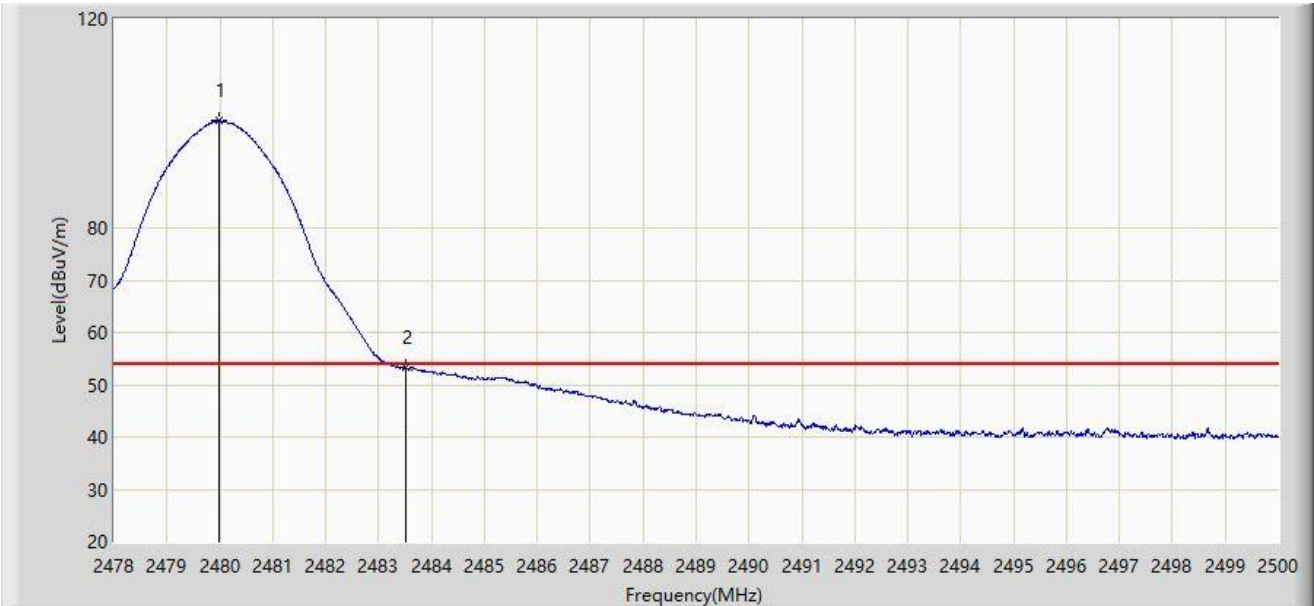
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2479.969	102.272	70.773	N/A	N/A	31.499	PK
2	*	2483.500	62.645	31.145	-11.355	74.000	31.500	PK
3		2484.028	61.905	30.404	-12.095	74.000	31.501	PK

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 2Mbps at 2480MHz	



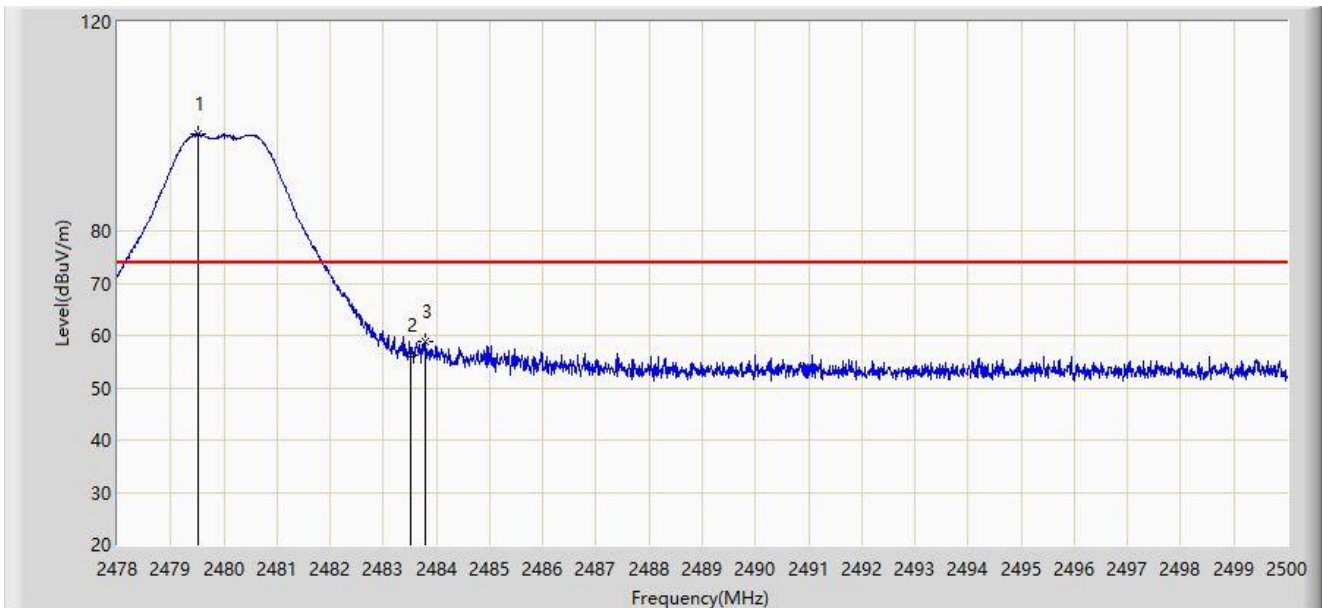
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2479.991	100.484	68.985	N/A	N/A	31.499	AV
2	*	2483.500	53.192	21.692	-0.808	54.000	31.500	AV

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 2Mbps at 2480MHz	



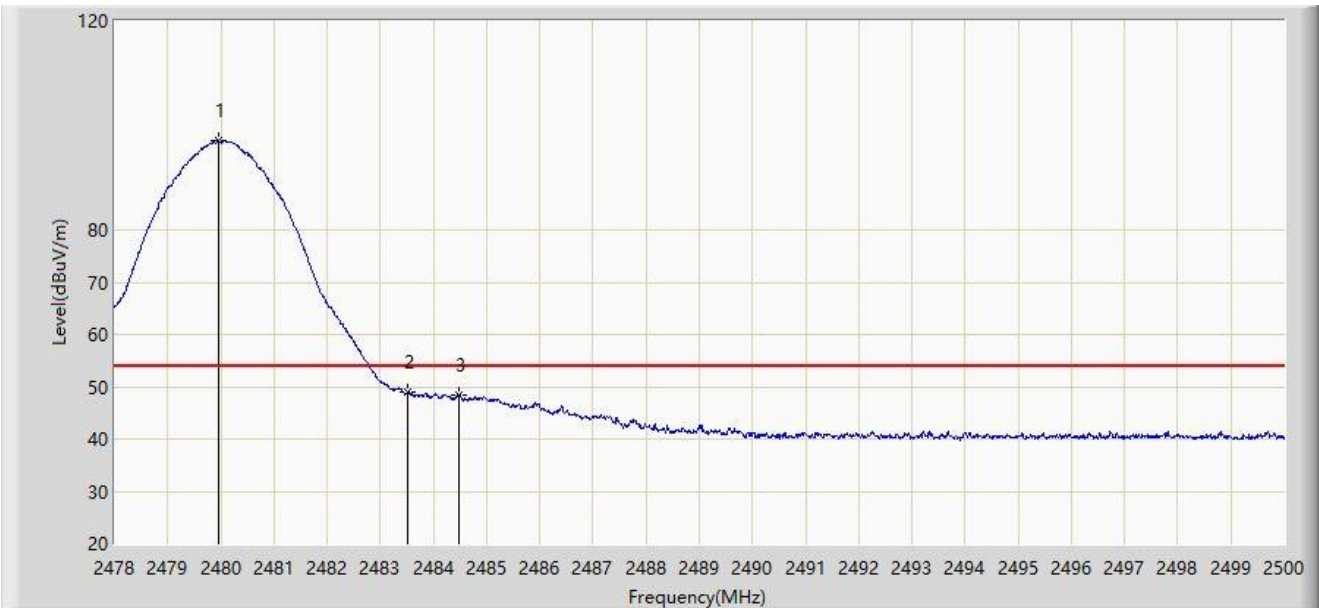
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2479.529	98.420	66.921	N/A	N/A	31.499	PK
2		2483.500	56.206	24.706	-17.794	74.000	31.500	PK
3	*	2483.797	58.916	27.415	-15.084	74.000	31.501	PK

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-AC2	Test Date: 2023-06-05
Limit: FCC_2.4G_RE(3m)	Engineer: Dick Shen
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 2Mbps at 2480MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2479.958	97.136	65.637	N/A	N/A	31.499	AV
2	*	2483.500	48.850	17.350	-5.150	54.000	31.500	AV
3		2484.490	48.266	16.765	-5.734	54.000	31.501	AV

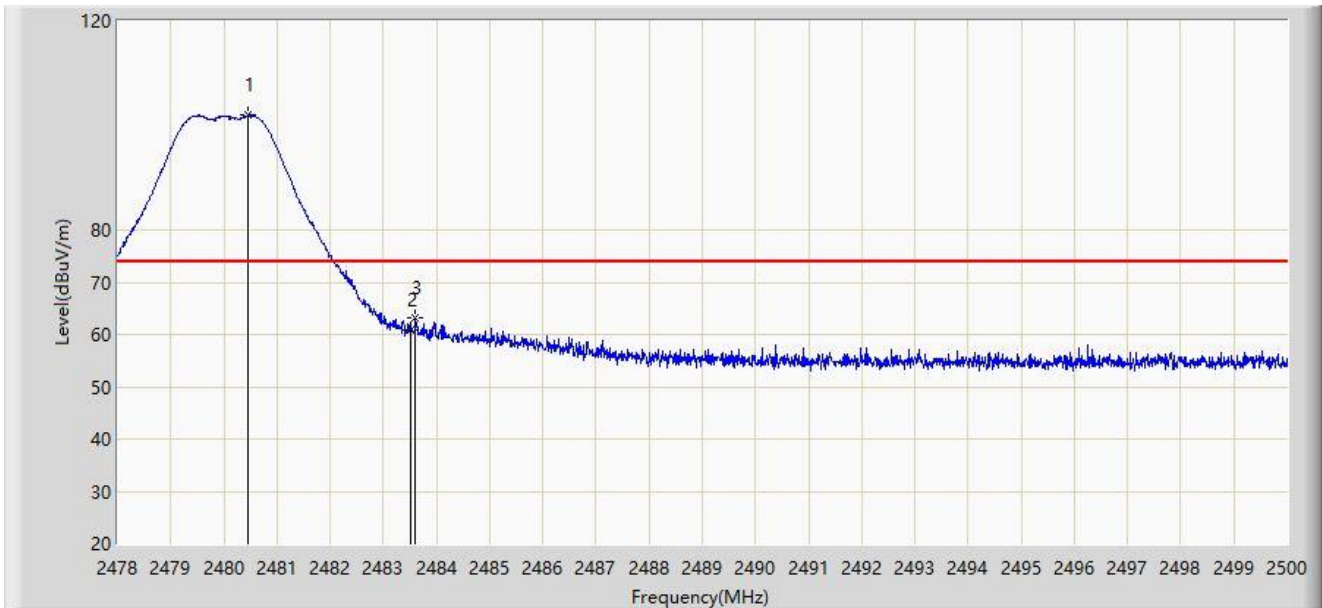
Note 1: " * ", means this data is the worst emission level.

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

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

Spot Check Test Data of AP411:

Site: WZ-AC2	Test Date: 2023-06-21
Limit: FCC_2.4G_RE(3m)	Engineer: Edith Yu
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: HAN Access Point (AP411)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE-2M at 2480MHz	



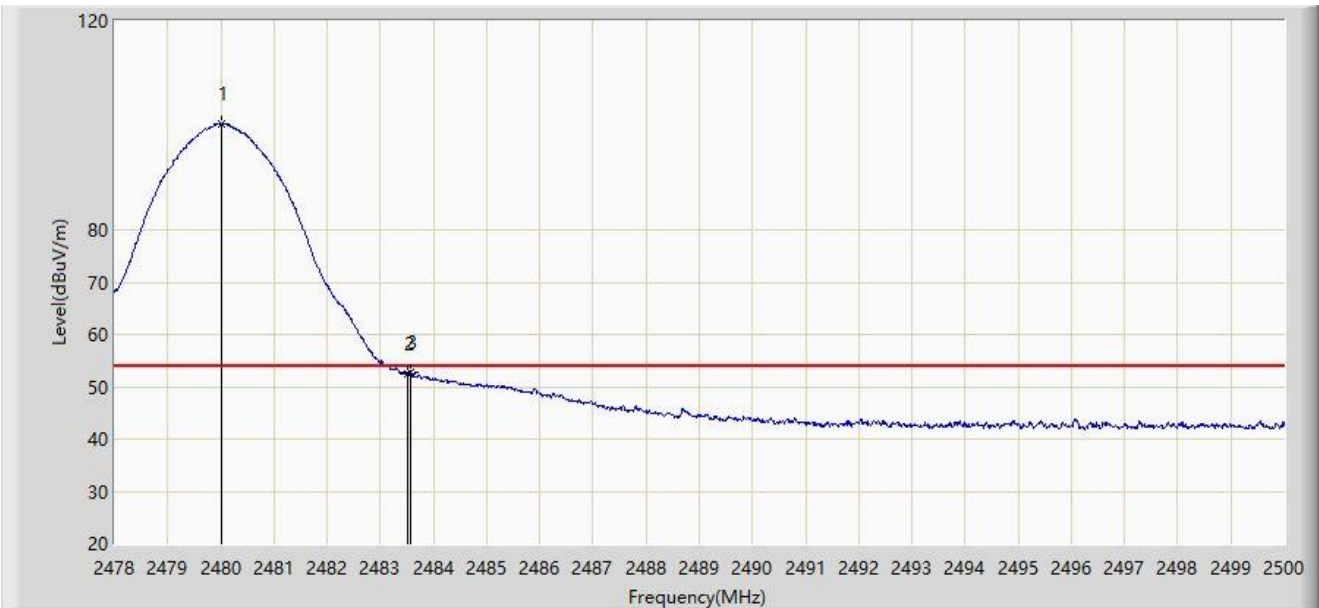
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2480.453	101.890	70.391	N/A	N/A	31.499	PK
2		2483.500	60.913	29.413	-13.087	74.000	31.500	PK
3	*	2483.610	63.202	31.701	-10.798	74.000	31.501	PK

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-AC2	Test Date: 2023-06-21
Limit: FCC_2.4G_RE(3m)	Engineer: Edith Yu
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: HAN Access Point (AP411)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE-2M at 2480MHz	



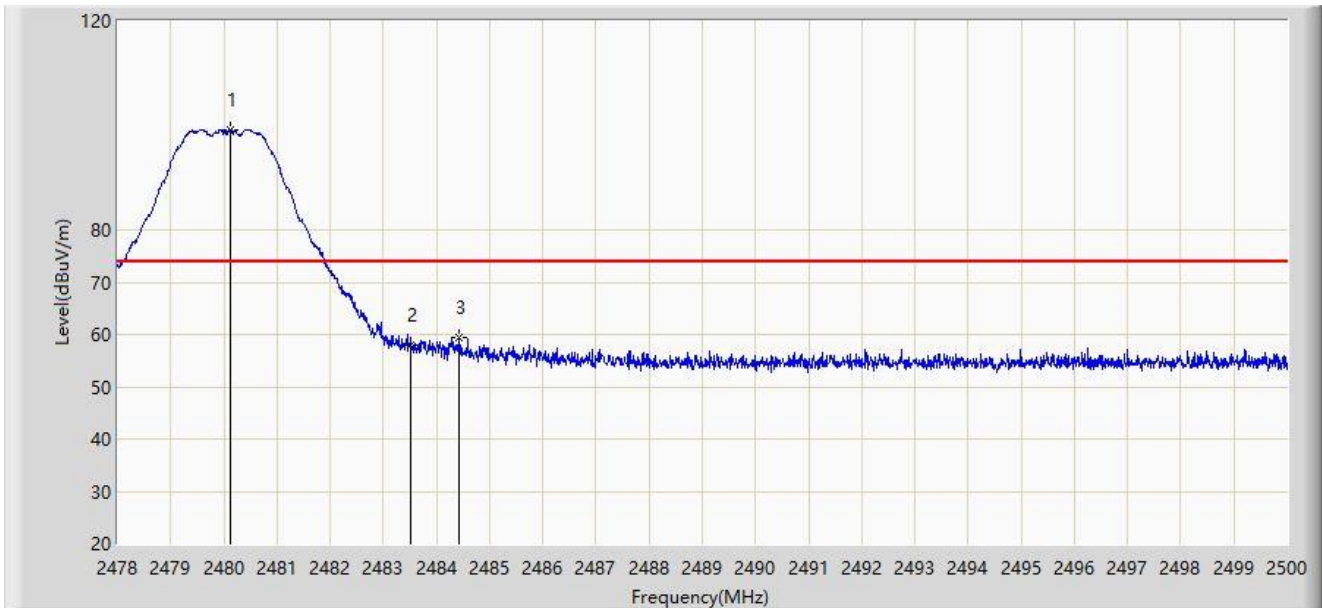
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2480.002	100.283	68.784	N/A	N/A	31.499	AV
2		2483.500	52.494	20.994	-1.506	54.000	31.500	AV
3	*	2483.566	52.756	21.255	-1.244	54.000	31.501	AV

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-AC2	Test Date: 2023-06-21
Limit: FCC_2.4G_RE(3m)	Engineer: Edith Yu
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: HAN Access Point (AP411)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE-2M at 2480MHz	



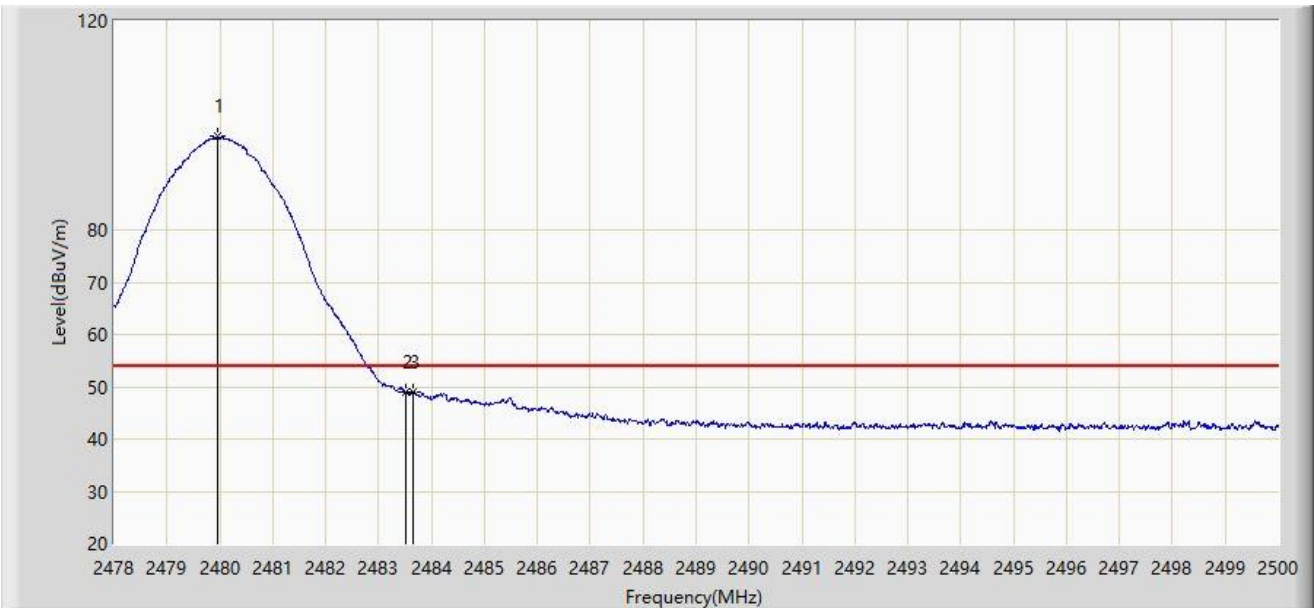
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2480.134	99.040	67.541	N/A	N/A	31.499	PK
2		2483.500	58.016	26.516	-15.984	74.000	31.500	PK
3	*	2484.413	59.431	27.930	-14.569	74.000	31.501	PK

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-AC2	Test Date: 2023-06-21
Limit: FCC_2.4G_RE(3m)	Engineer: Edith Yu
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: HAN Access Point (AP411)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE-2M at 2480MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2479.958	97.833	66.334	N/A	N/A	31.499	AV
2		2483.500	48.888	17.388	-5.112	54.000	31.500	AV
3	*	2483.643	49.035	17.534	-4.965	54.000	31.501	AV

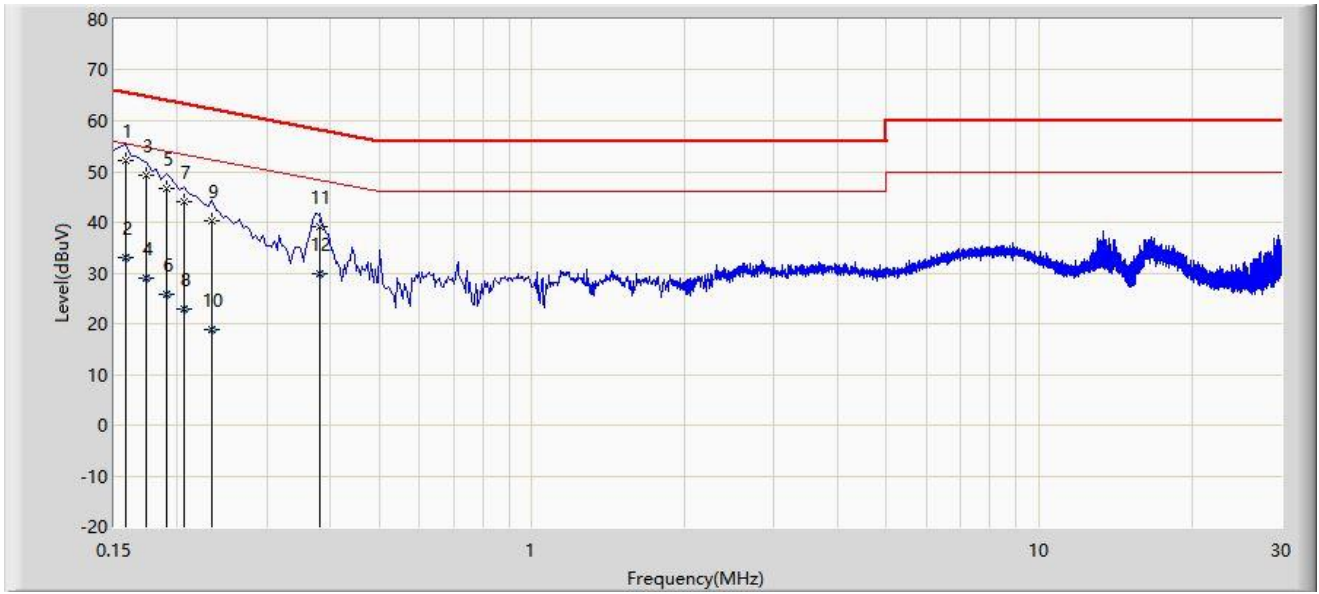
Note 1: " * ", means this data is the worst emission level.

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: 2023-06-09
Limit: FCC_Part15.207_CE_AC Power	Engineer: Alin Zhou
Probe: ENV216_101683_Filter Off_C	Polarity: Neutral
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 2Mbps at channel 2440MHz	



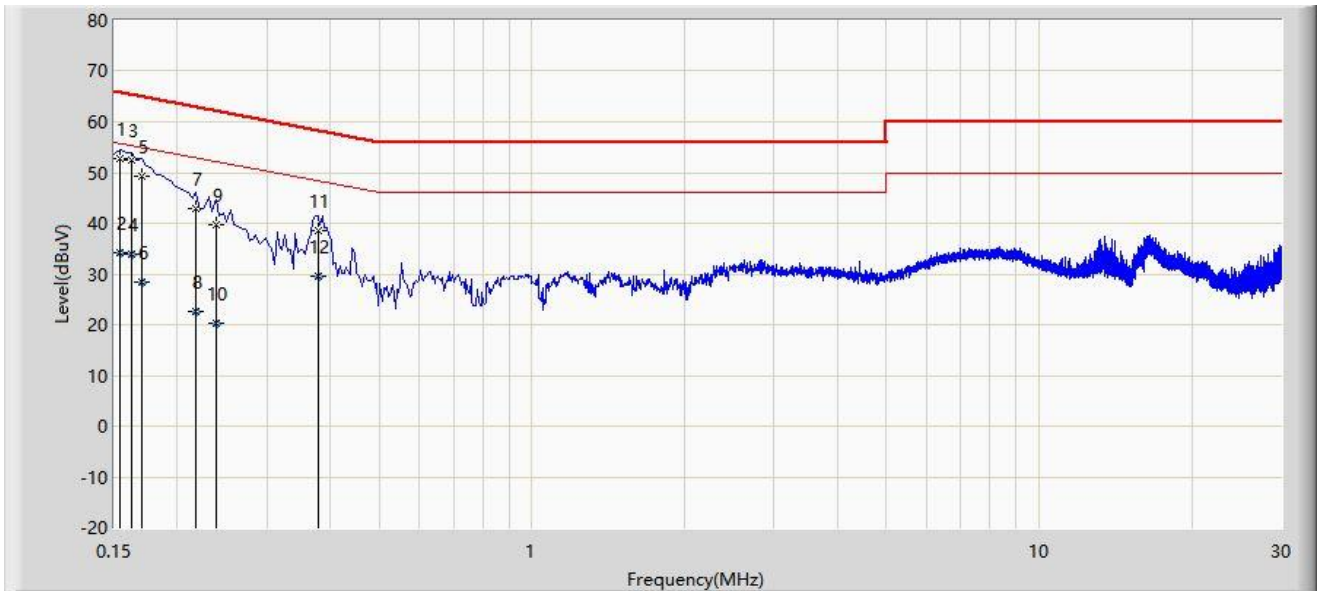
No	Mark	Frequency (MHz)	Measure Level (dBμV)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV)	Factor (dB)	Type
1	*	0.158	52.232	42.644	-13.336	65.568	9.588	QP
2		0.158	32.992	23.404	-22.577	55.568	9.588	AV
3		0.174	49.354	39.760	-15.413	64.767	9.595	QP
4		0.174	28.951	19.356	-25.817	54.767	9.595	AV
5		0.190	46.777	37.176	-17.259	64.037	9.601	QP
6		0.190	25.695	16.094	-28.342	54.037	9.601	AV
7		0.206	43.982	34.373	-19.383	63.365	9.609	QP
8		0.206	22.951	13.343	-30.414	53.365	9.609	AV
9		0.234	40.206	30.586	-22.101	62.307	9.620	QP
10		0.234	18.928	9.308	-33.379	52.307	9.620	AV
11		0.382	39.030	29.339	-19.205	58.236	9.692	QP
12		0.382	29.902	20.210	-18.334	48.236	9.692	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: 2023-06-09
Limit: FCC_Part15.207_CE_AC Power	Engineer: Alin Zhou
Probe: ENV216_101683_Filter Off_C	Polarity: Line
EUT: HAN Access Point (AP431)	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 2Mbps at channel 2440MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV)	Factor (dB)	Type
1		0.154	52.741	43.186	-13.041	65.781	9.554	QP
2		0.154	34.186	24.631	-21.596	55.781	9.554	AV
3	*	0.162	52.385	42.828	-12.976	65.361	9.557	QP
4		0.162	33.931	24.375	-21.429	55.361	9.557	AV
5		0.170	49.415	39.857	-15.545	64.960	9.559	QP
6		0.170	28.431	18.873	-26.529	54.960	9.559	AV
7		0.218	42.811	33.238	-20.084	62.895	9.574	QP
8		0.218	22.669	13.096	-30.226	52.895	9.574	AV
9		0.238	39.656	30.075	-22.510	62.166	9.581	QP
10		0.238	20.232	10.651	-31.934	52.166	9.581	AV
11		0.378	38.449	28.800	-19.874	58.323	9.649	QP
12		0.378	29.582	19.933	-18.741	48.323	9.649	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 “2303RSU029-UT” file.

Appendix C - EUT Photograph

Refer to “2303RSU029-UE” file.

The End
