



RF MEASUREMENT REPORT

FCC ID: H8N-WAH0070
IC: 1353A-WAH0070
Applicant: ASKEY COMPUTER CORPORATION
Product: 802.11ah Module
Model No.: WAH0070-US
Brand Name: ASKEY
FCC Classification: Digital Transmission System (DTS)
FCC Rule Part(s): Part 15 Subpart C (Section 15.247)
ISED Rule(s): RSS-247 Issue 3, RSS-GEN Issue 5
Result: Complies
Received Date: 2023-12-05
Test Date: 2023-12-05 ~ 2023-12-30

Reviewed By:

Kevin Guo

Approved By:

Robin Wu



The test results relate only to the samples tested.

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

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

Revision History

Report No.	Version	Description	Issue Date	Note
2312RSU049-U2	V01	Initial Report	2024-01-17	Valid

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	6
1.6. Working Frequencies	7
2. Test Configuration	8
2.1. Test Mode.....	8
2.2. Test System Connection Diagram.....	8
2.3. Test Software	9
2.4. Applied Standards.....	9
2.5. Test Environment Condition	9
3. Antenna Requirements	10
4. Measuring Instrument	11
5. Decision Rules and Measurement Uncertainty	12
5.1. Decision Rules	12
5.2. Measurement Uncertainty	12
6. Test Result.....	13
6.1. Summary	13
6.2. 6dB & 99% Bandwidth Measurement	14
6.2.1. Test Limit	14
6.2.2. Test Procedure	14
6.2.3. Test Setting	14
6.2.4. Test Setup	15
6.2.5. Test Result	15
6.3. Output Power Measurement	16
6.3.1. Test Limit	16
6.3.2. Test Procedure	16
6.3.3. Test Setting	16
6.3.4. Test Setup	16
6.3.5. Test Result	16
6.4. Power Spectral Density Measurement	17
6.4.1. Test Limit	17
6.4.2. Test Procedure	17

6.4.3.	Test Setting	17
6.4.4.	Test Setup	17
6.4.5.	Test Result	18
6.5.	Conducted Band Edge and Out-of-Band Emissions Measurement	19
6.5.1.	Test Limit	19
6.5.2.	Test Procedure	19
6.5.3.	Test Settintg	19
6.5.4.	Test Setup	20
6.5.5.	Test Result	20
6.6.	Radiated Spurious Emission Measurement.....	21
6.6.1.	Test Limit	21
6.6.2.	Test Procedure	22
6.6.3.	Test Setting	22
6.6.4.	Test Setup	23
6.6.5.	Test Result	25
6.7.	Radiated Restricted Band Edge Measurement	26
6.7.1.	Test Limit	26
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 Bandwidth Test Result	31
A.2	6dB & 99% Bandwidth Test Result	32
A.3	Output Power Test Result	36
A.4	Power Spectral Density Test Result.....	37
A.5	Conducted Band Edge and Out-of-Band Emissions Test Result.....	39
A.6	Radiated Spurious Emission Test Result.....	46
A.7	Radiated Restricted Band Edge Test Result.....	55
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

ASKEY COMPUTER CORPORATION

10F, No.119, JIANKANG RD., ZHONGHE DIST., NEW TAIPEI CITY, TAIWAN

1.2. Manufacturer

ASKEY COMPUTER CORPORATION

10F, No.119, JIANKANG RD., ZHONGHE DIST., NEW TAIPEI CITY, TAIWAN

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 (PMN)	802.11ah Module
Model No. (HVIN)	WAH0070-US
EUT Serial No.	41EBH000011
Wireless Specification	802.11ah
Antenna Information	Refer to section 1.5
Working Voltage	Max DC 5V
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 under Test

Frequency Range	802.11ah-1MHz: 903.5~926.5MHz 802.11ah-2MHz: 905~925MHz 802.11ah-4MHz: 906~922MHz
Channel Number	802.11ah-1MHz: 24 802.11ah-2MHz: 11 802.11ah-4MHz: 5
Type of Modulation	BPSK, QPSK, 16QAM, 64QAM
Data Rate	802.11ah-1MHz: up to 3Mbps 802.11ah-2MHz: up to 6.5Mbps 802.11ah-4MHz: up to 13.5Mbps
Antenna Type	Dipole
Antenna Gain	1.57dBi

1.6. Working Frequencies

802.11ah-1MHz

Channel	Frequency	Channel	Frequency	Channel	Frequency
03	903.5 MHz	05	904.5 MHz	07	905.5 MHz
09	906.5 MHz	11	907.5 MHz	36	908.5 MHz
37	909.5 MHz	38	910.5 MHz	39	911.5 MHz
40	912.5 MHz	41	913.5 MHz	42	914.5 MHz
43	915.5 MHz	44	916.5 MHz	45	917.5 MHz
46	918.5 MHz	47	919.5 MHz	78	920.5 MHz
149	921.5 MHz	150	922.5 MHz	151	923.5 MHz
152	924.5 MHz	100	925.5 MHz	104	926.5 MHz

802.11ah-2MHz

Channel	Frequency	Channel	Frequency	Channel	Frequency
06	905 MHz	10	907 MHz	153	909 MHz
154	911 MHz	155	913 MHz	156	915 MHz
157	917 MHz	158	919 MHz	159	921 MHz
160	923 MHz	161	925 MHz	--	--

802.11ah-4MHz

Channel	Frequency	Channel	Frequency	Channel	Frequency
08	906 MHz	162	910 MHz	163	914 MHz
164	918 MHz	165	922 MHz	--	--

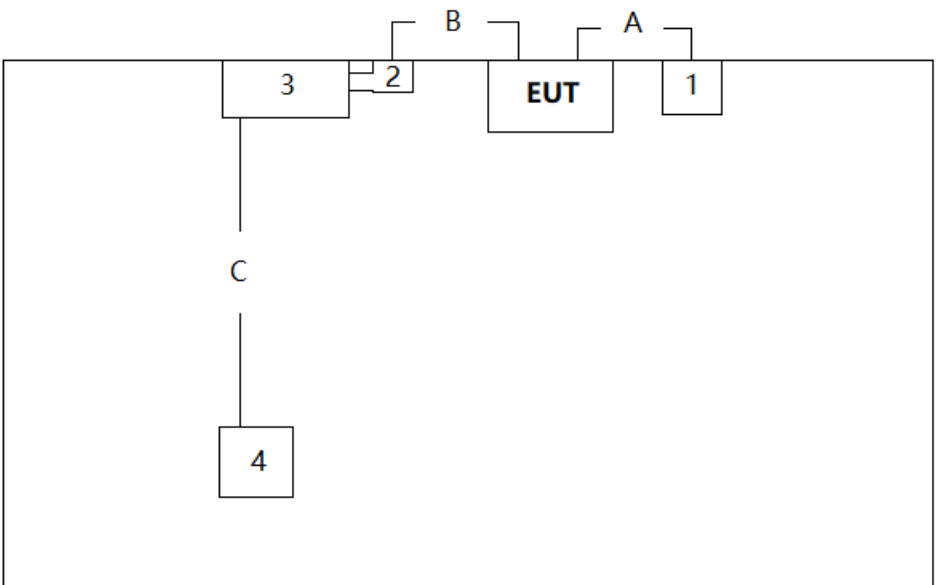
2. Test Configuration

2.1. Test Mode

Mode 1: Transmit by 802.11ah-1MHz (MCS10)
Mode 2: Transmit by 802.11ah-2MHz (MCS0)
Mode 3: Transmit by 802.11ah-4MHz (MCS0)
Mode 4: Receive by 802.11ah-1MHz at Channel 903.5MHz
Note: All modes of operation and data rates were investigated, so all RF test requirements shall be executed at the worst data rate which power is the greatest.

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.

Connection Diagram			
			
No.	Cable Type	Cable Spec.	Length
A	Power Cable	Non-Shielding	3.1m
B	USB Cable	Non-Shielding	0.4m
C	USB Cable	Non-Shielding	1.8m
No.	Product	Manufacturer	Model No.
1	Adapter	Chenzhou Frecom Electronics Co., Ltd	F12L33-120100SPAU
2	USB board	N/A	N/A
3	Notebook	HP	TPN-Q263
4	Mouse	Logitech	M-U0026

2.3. Test Software

The test utility software used during testing was “ModemTestTool.exe”, and the version was v1.4.3.

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
- RSS-247 Issue 3
- RSS-GEN Issue 5
- 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 **an external antenna with a RP-SMA connector.**

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
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2023-12-28	WZ-AC1
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2024-12-17	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2024-08-09	WZ-AC1
Preamplifier	Agilent	83017A	MRTSUE06076	1 year	2024-05-07	WZ-AC1
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2024-06-09	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	2024-10-23	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE11039	1 year	2024-10-25	WZ-AC1
Active Loop Antenna	Schwarzbeck	FMZB 1519-60 D	MRTSUE07076	1 year	2024-12-04	WZ-AC1
USB Power Sensor	Keysight	U2021XA	MRTSUE06446	1 year	2024-05-23	WZ-SR5
Signal Analyzer	Keysight	N9010B	MRTSUE07027	1 year	2024-10-23	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
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	2024-09-27	WZ-SR2
EMI Test Receiver	R&S	ESR3	MRTSUE06909	1 year	2024-09-27	WZ-SR2

Software	Version	Function
EMI V3	V 3.0.0	EMI Test Software
Controller_MF 7802	2.03C	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
The maximum measurement uncertainty is evaluated as: 9kHz~150kHz: 3.58dB 150kHz~30MHz: 3.20dB
Radiated Emission Measurement
The maximum measurement uncertainty is evaluated as: Coaxial: 9kHz~30MHz: 2.61dB Coplanar: 9kHz~30MHz: 2.62dB Horizontal: 30MHz~200MHz: 3.79dB 200MHz~1GHz: 3.91dB 1GHz~40GHz: 4.99dB Vertical: 30MHz~200MHz: 4.06dB 200MHz~1GHz: 5.21dB 1GHz~40GHz: 4.90dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 2.2dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 1.4dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 2.2dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 2.7%

6. Test Result

6.1. Summary

FCC Section(s)	RSS Section(s)	Test Description	Test Condition	Verdict
15.247(a)(2)	RSS-247 [5.2]	6dB Bandwidth	Conducted	Pass
--	RSS-Gen [6.7]	99% Bandwidth		Pass
15.247(b)(3)	RSS-247 [5.4(d)]	Output Power		Pass
15.247(e)	RSS-247 [5.2]	Power Spectral Density		Pass
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions		Pass
15.205 15.209	RSS-247 [5.5]	General Field Strength (Restricted Bands and Radiated Emission)	Radiated	Pass
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	Pass

Note:

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.

6.2. 6dB & 99% 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 6.9.3, 11.8

6.2.3. Test Setting

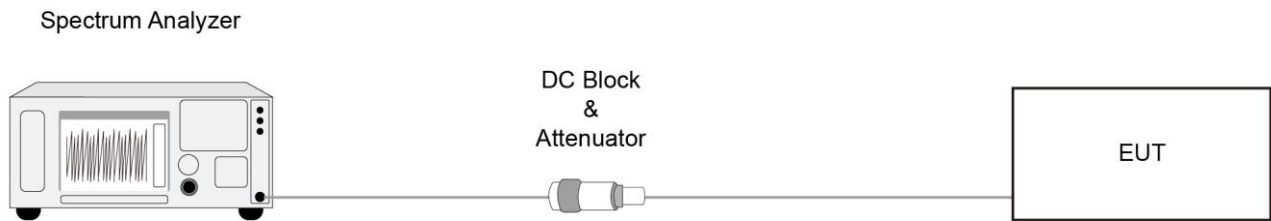
6dB Bandwidth

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

99% Bandwidth

1. Span = 1.5 times to 5 times the OBW
2. Set RBW = 1% to 5% the OBW
3. $VBW =$ approximately three 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

FCC Limit:

The maximum output power shall not exceed 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.

ISED Limit:

The maximum conducted output power shall not exceed 1 Watt (30dBm) and the EIRP shall not exceed 4 Watt (36dBm).

6.3.2. Test Procedure

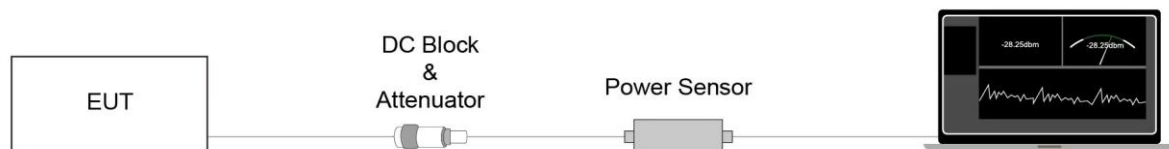
ANSI C63.10 - 2013 - Section 11.9.2.3.2

6.3.3. Test Setting

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.

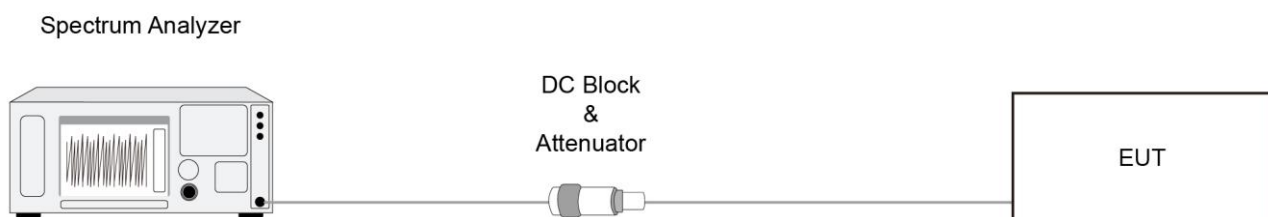
6.4.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.10.5

6.4.3. Test Setting

1. Measure the duty cycle (x) of the transmitter output signal.
2. Set instrument center frequency to DTS channel center frequency.
3. Set span to at least 1.5 times the OBW.
4. RBW = 10 kHz.
5. VBW = 30 kHz.
6. Detector = RMS.
7. Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$.
8. Sweep time = auto couple.
9. Don't use sweep triggering. Allow sweep to "free run".
10. Employ trace averaging (RMS) mode over a minimum of 100 traces.
11. Use the peak marker function to determine the maximum amplitude level.
12. Add $10 \log (1/x)$, where x is the duty cycle measured in step (a), to the measured PSD to compute the average PSD during the actual transmission time. If measured value exceeds requirement specified by regulatory agency, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced).

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 30dB 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 Settling

Reference level measurement

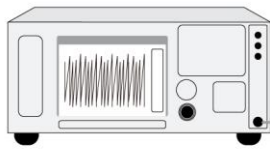
1. Set instrument center frequency to DTS channel center frequency
2. Set the span to ≥ 1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW $\geq 3 \times$ RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize

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

Spectrum Analyzer



DC Block
&
Attenuator



EUT



6.5.5. Test Result

Refer to Appendix A.5.

6.6. Radiated Spurious Emission Measurement

6.6.1. Test Limit

FCC 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

ISED Limit:

All out of band emissions appearing in a restricted band as specified in Section 8.10 of the RSS-GEN Issue 5 must not exceed the limits shown in Table per Section 8.9.

RSS-Gen Section 8.9		
Frequency [MHz]	Field Strength [$\mu\text{A/m}$]	Measured Distance [Meters]
0.009 - 0.490	6.37/F (kHz)	300
0.490 - 1.705	63.7/F (kHz)	30
1.705 - 30	0.08	30
Frequency [MHz]	Field Strength [$\mu\text{V/m}$]	Measured Distance [Meters]
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

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

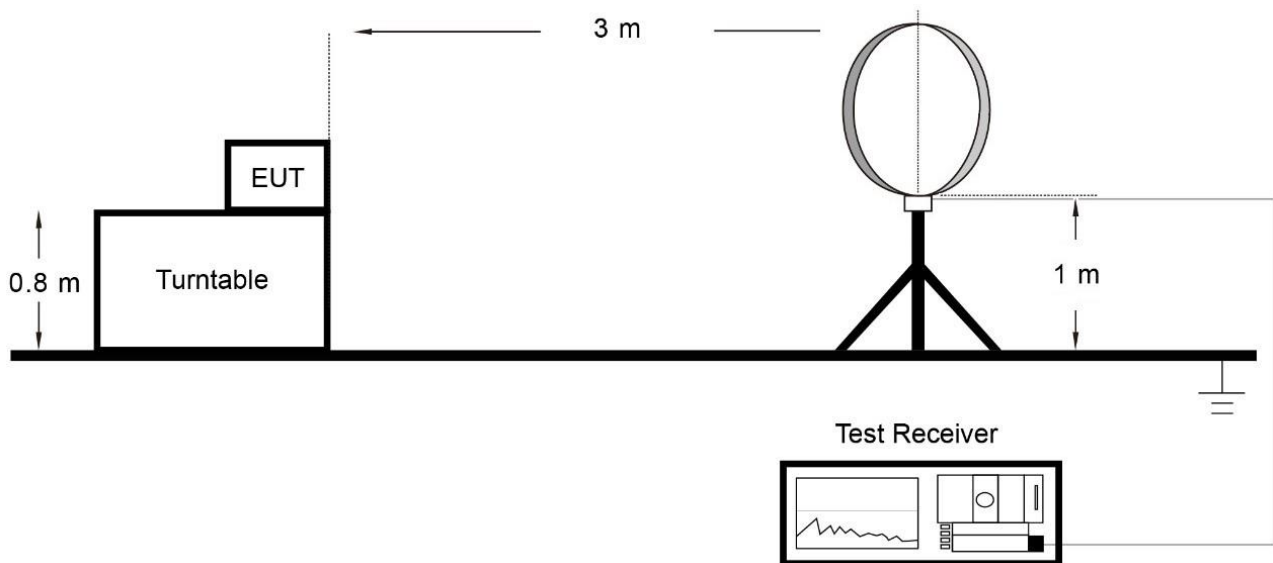
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

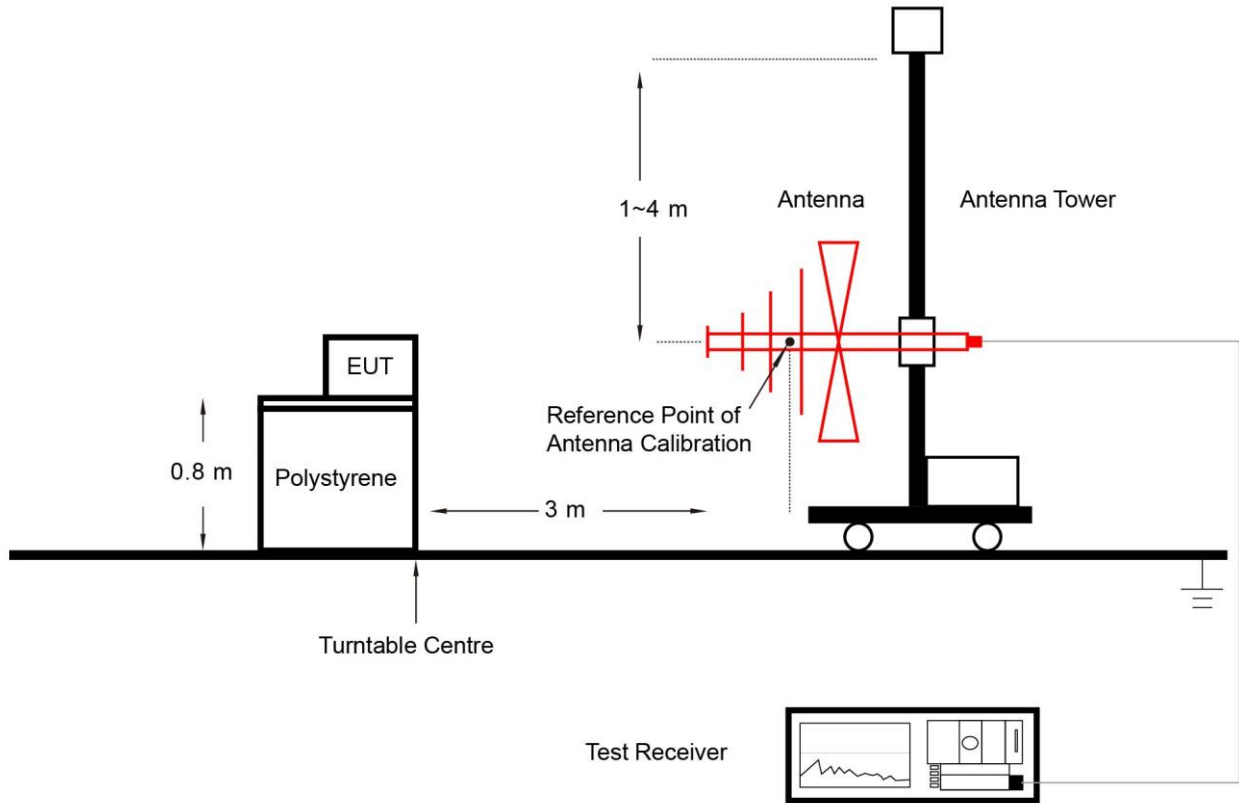
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10 Hz.
If the EUT duty cycle is $< 98\%$, set VBW $\geq 1/T$. T is the minimum transmission duration.
4.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

6.6.4. Test Setup

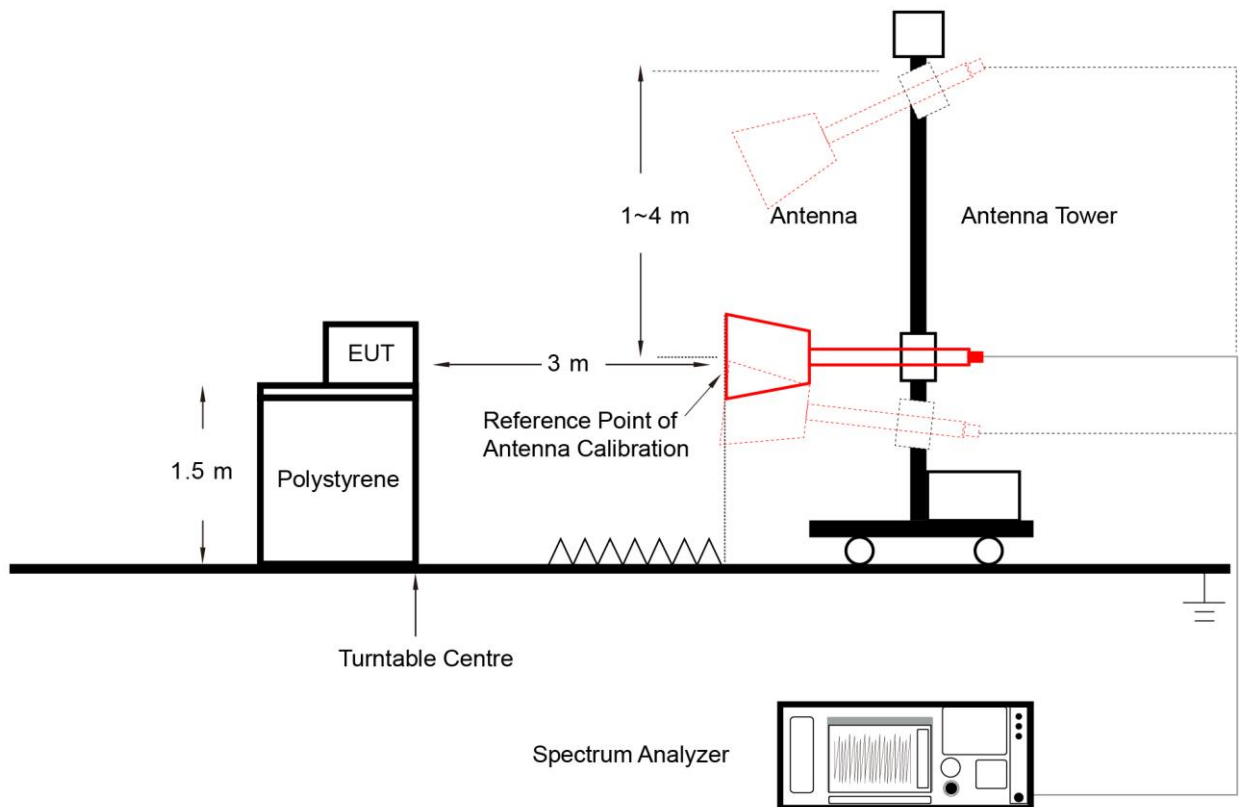
Below 30MHz Test Setup:



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 [μV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3

216 - 960	200	3
Above 960	500	3

For RSS-Gen Section 8.10 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 8.10 of RSS-Gen, must also comply with the radiated emission limits specified in Section 8.9.

Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	* Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for license exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 - 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 - 8500	
108 - 138	--	

All out of band emissions appearing in a restricted band as specified in Section 8.10 of the RSS-Gen must not exceed the limits shown in Table per Section 8.9.

RSS-Gen Section 8.9		
Frequency [MHz]	Field Strength [$\mu\text{A/m}$]	Measured Distance [Meters]
0.009 - 0.490	6.37/F (kHz)	300
0.490 - 1.705	63.7/F (kHz)	30
1.705 - 30	0.08	30
Frequency [MHz]	Field Strength [$\mu\text{V/m}$]	Measured Distance [Meters]
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

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

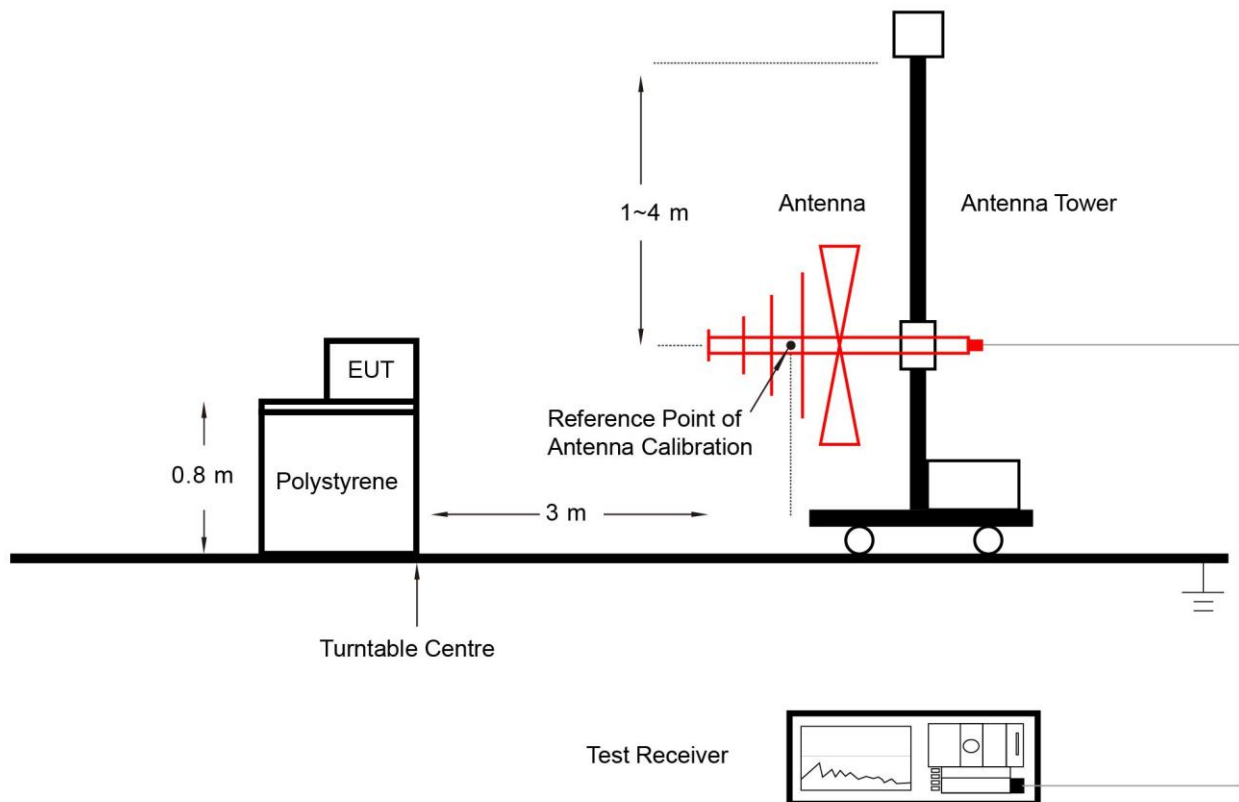
Average Field Strength Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10 Hz.

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

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

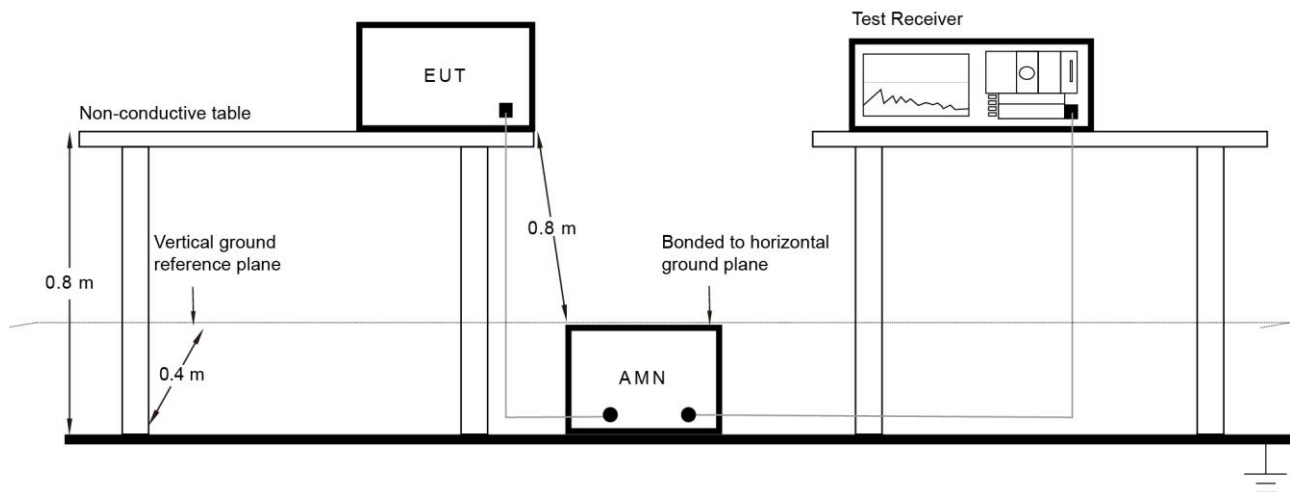
6.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 & RSS-GEN Issue 5 Section 8.8 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

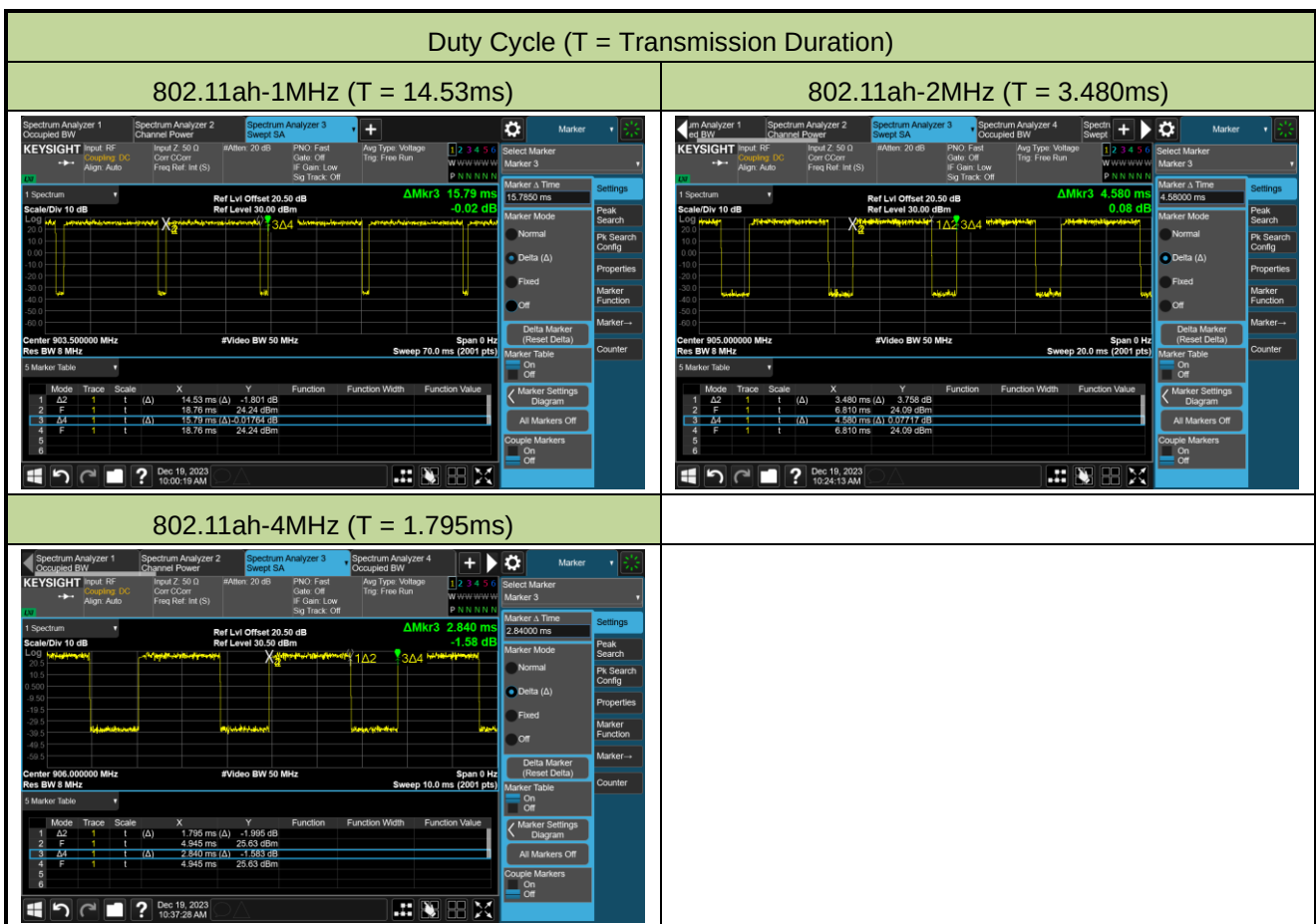
Refer to Appendix A.8.

Appendix A - Test Result

A.1 Duty Cycle Bandwidth Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-12-19		

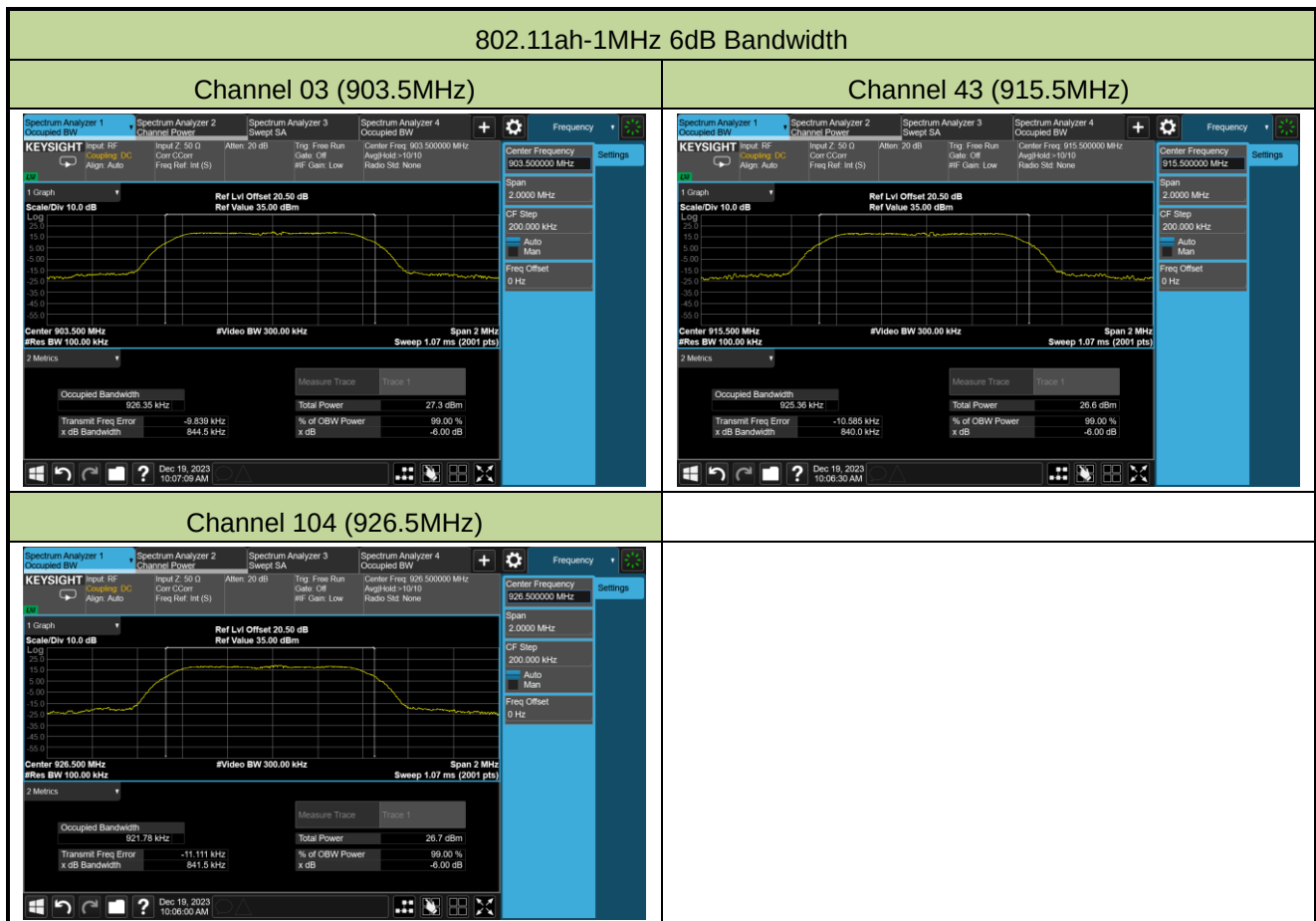
Test Mode	Duty Cycle
802.11ah-1MHz	92.02%
802.11ah-2MHz	75.98%
802.11ah-4MHz	63.20%



A.2 6dB & 99% Bandwidth Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-12-19	Test Item	6dB Bandwidth

Test Mode	Data Rate	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
802.11ah-1MHz	MCS10	03	903.5	0.8445	≥ 0.5
802.11ah-1MHz	MCS10	43	915.5	0.8400	≥ 0.5
802.11ah-1MHz	MCS10	104	926.5	0.8415	≥ 0.5
802.11ah-2MHz	MCS0	06	905.0	1.776	≥ 0.5
802.11ah-2MHz	MCS0	156	915.0	1.770	≥ 0.5
802.11ah-2MHz	MCS0	161	925.0	1.772	≥ 0.5
802.11ah-4MHz	MCS0	08	906.0	3.610	≥ 0.5
802.11ah-4MHz	MCS0	163	914.0	3.602	≥ 0.5
802.11ah-4MHz	MCS0	165	922.0	3.606	≥ 0.5

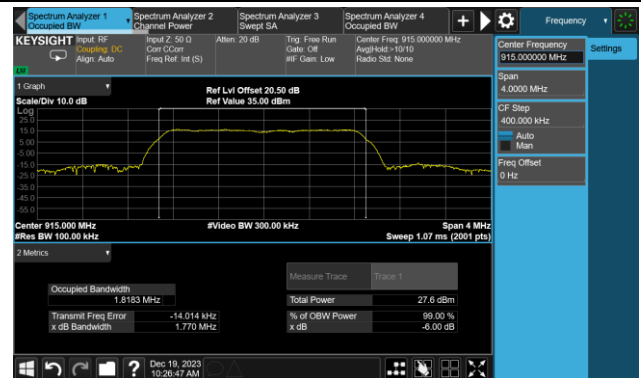


802.11ah-2MHz 6dB Bandwidth

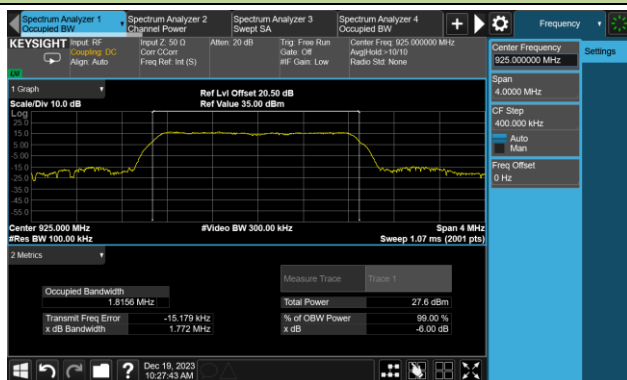
Channel 06 (905.0MHz)



Channel 156 (915.0MHz)

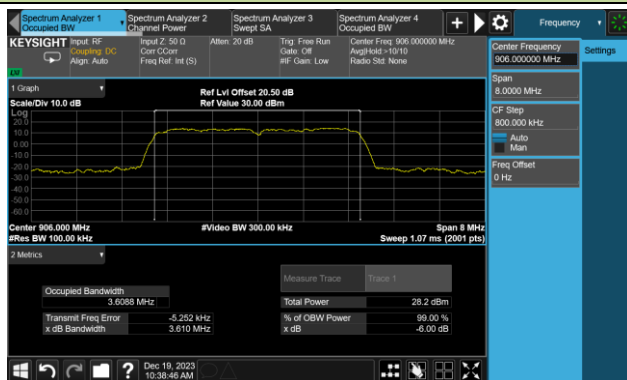


Channel 161 (925.0MHz)

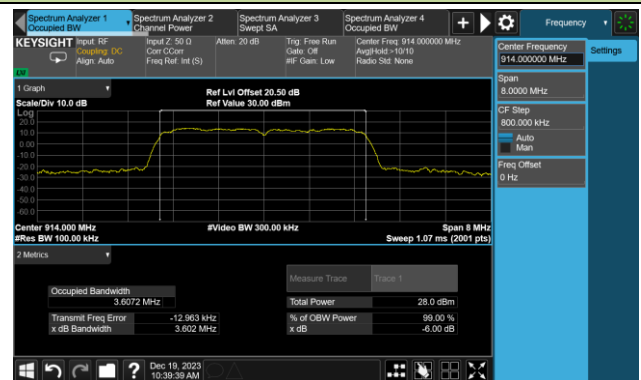


802.11ah-4MHz 6dB Bandwidth

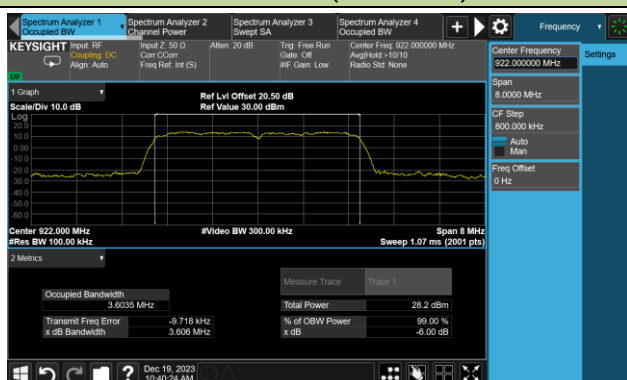
Channel 08 (906.0MHz)



Channel 163 (914.0MHz)

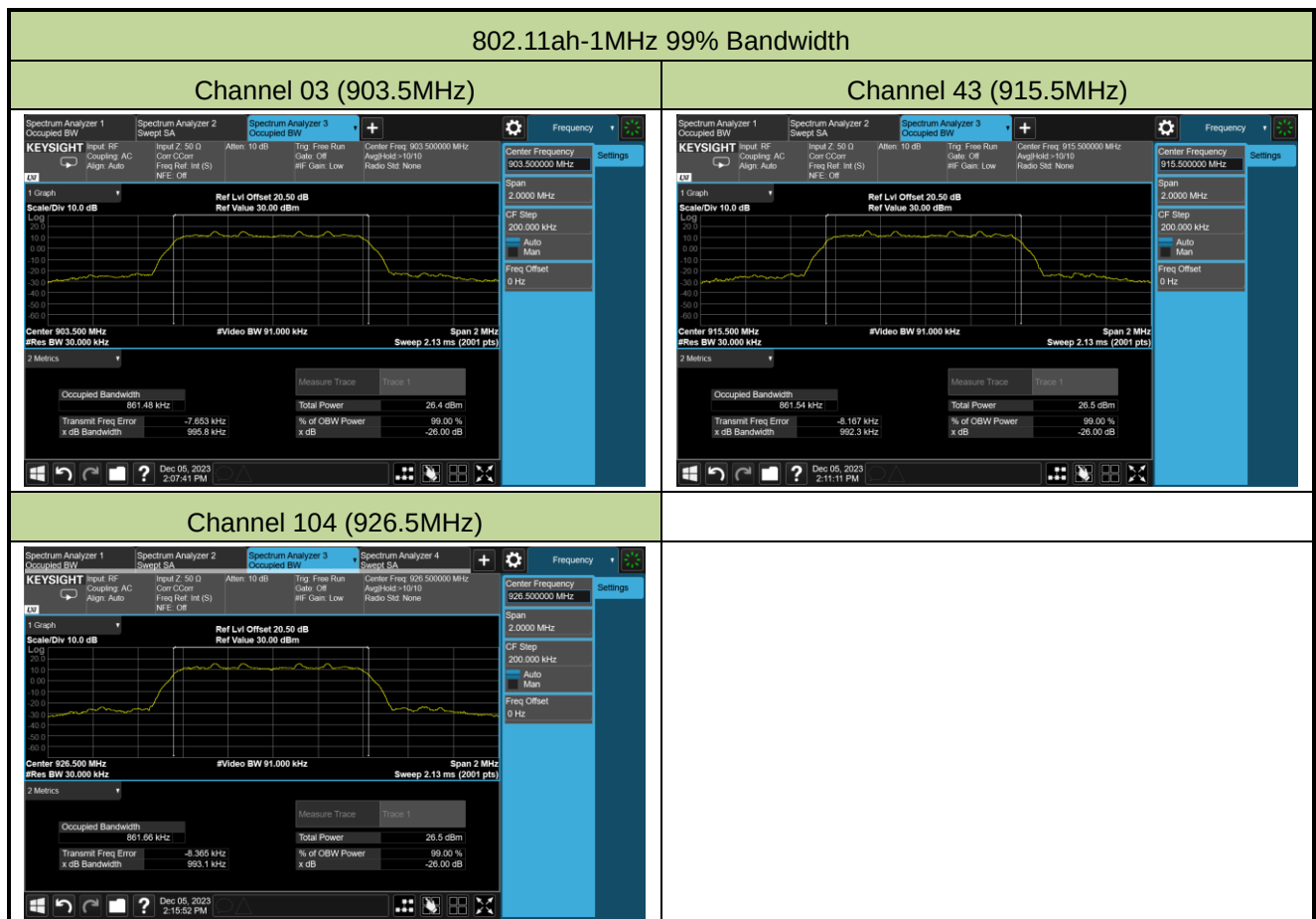


Channel 165 (922.0MHz)



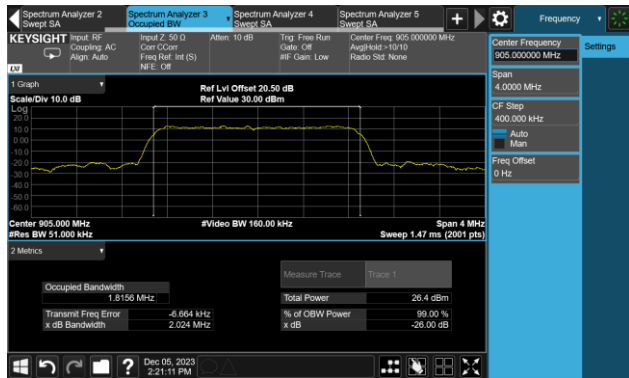
Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-12-05	Test Item	99% Bandwidth

Test Mode	Data Rate	Channel No.	Frequency (MHz)	99% Bandwidth (MHz)
802.11ah-1MHz	MCS10	03	903.5	0.86148
802.11ah-1MHz	MCS10	43	915.5	0.86154
802.11ah-1MHz	MCS10	104	926.5	0.86166
802.11ah-2MHz	MCS0	06	905.0	1.8156
802.11ah-2MHz	MCS0	156	915.0	1.8127
802.11ah-2MHz	MCS0	161	925.0	1.8125
802.11ah-4MHz	MCS0	08	906.0	3.6203
802.11ah-4MHz	MCS0	163	914.0	3.6172
802.11ah-4MHz	MCS0	165	922.0	3.6126

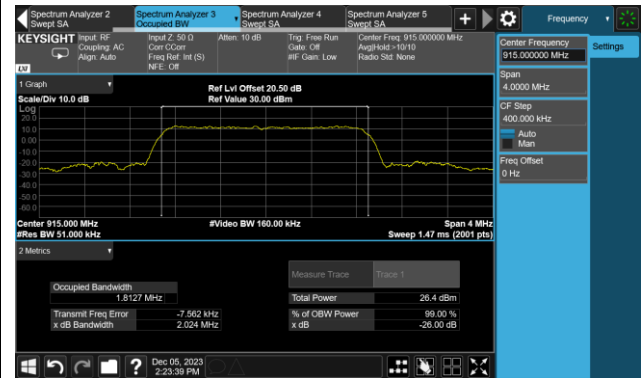


802.11ah-2MHz 99% Bandwidth

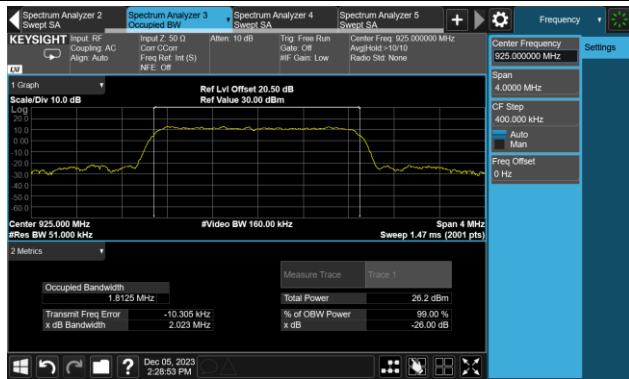
Channel 06 (905.0MHz)



Channel 156 (915.0MHz)

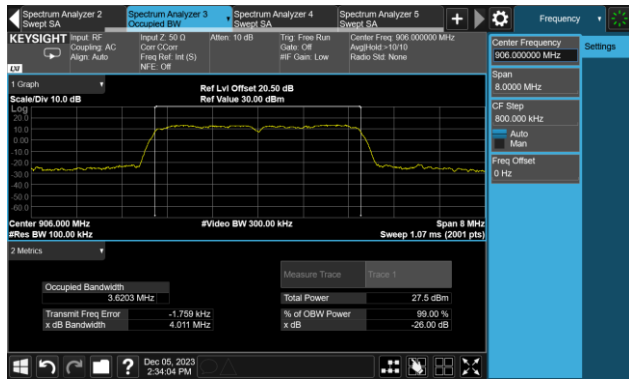


Channel 161 (925.0MHz)

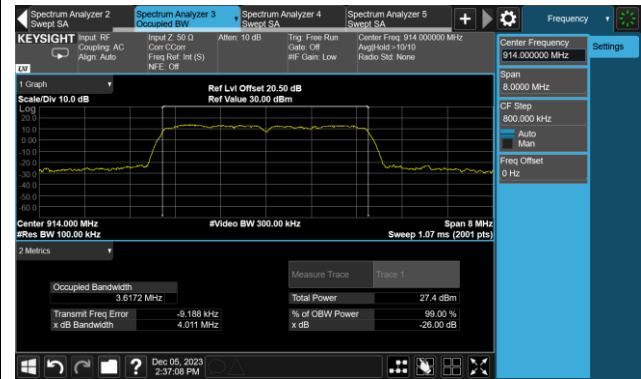


802.11ah-4MHz 99% Bandwidth

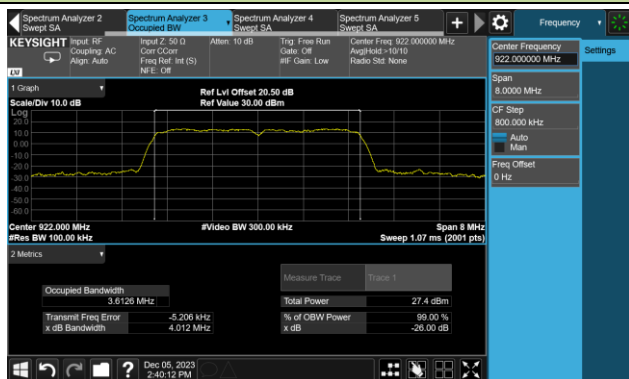
Channel 08 (906.0MHz)



Channel 163 (914.0MHz)



Channel 165 (922.0MHz)



A.3 Output Power Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-12-19		

Test Mode	Data Rate	Channel No.	Freq. (MHz)	Average Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
11ah-1MHz	MCS10	03	903.5	19.85	≤ 30.00	21.42	≤ 36.00
11ah-1MHz	MCS10	43	915.5	18.89	≤ 30.00	20.46	≤ 36.00
11ah-1MHz	MCS10	104	926.5	18.67	≤ 30.00	20.24	≤ 36.00
11ah-2MHz	MCS0	06	905.0	19.40	≤ 30.00	20.97	≤ 36.00
11ah-2MHz	MCS0	156	915.0	19.17	≤ 30.00	20.74	≤ 36.00
11ah-2MHz	MCS0	161	925.0	19.02	≤ 30.00	20.59	≤ 36.00
11ah-4MHz	MCS0	08	906.0	19.77	≤ 30.00	21.34	≤ 36.00
11ah-4MHz	MCS0	163	914.0	19.79	≤ 30.00	21.36	≤ 36.00
11ah-4MHz	MCS0	165	922.0	19.68	≤ 30.00	21.25	≤ 36.00

Note: EIRP (dBm) = Average Power (dBm) + Antenna Gain (dBi).

A.4 Power Spectral Density Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-12-05		

Test Mode	Data Rate	Channel No.	Freq. (MHz)	PSD (dBm/10kHz)	Duty Cycle (%)	10*log (1/duty cycle)	Total PSD (dBm/10kHz)	Limit (dBm/3kHz)
11ah-1MHz	MCS10	03	903.5	2.743	92.02	0.36	3.10	≤ 8
11ah-1MHz	MCS10	43	915.5	2.339	92.02	0.36	2.70	≤ 8
11ah-1MHz	MCS10	104	926.5	2.236	92.02	0.36	2.60	≤ 8
11ah-2MHz	MCS0	06	905.0	-1.381	75.98	1.19	-0.19	≤ 8
11ah-2MHz	MCS0	156	915.0	-1.554	75.98	1.19	-0.36	≤ 8
11ah-2MHz	MCS0	161	925.0	-1.587	75.98	1.19	-0.39	≤ 8
11ah-4MHz	MCS0	08	906.0	-3.503	63.20	1.99	-1.51	≤ 8
11ah-4MHz	MCS0	163	914.0	-3.429	63.20	1.99	-1.44	≤ 8
11ah-4MHz	MCS0	165	922.0	-3.783	63.20	1.99	-1.79	≤ 8

Note: Total PSD (dBm / 10kHz) = PSD + 10*log(1/duty cycle) (dBm / 10kHz).

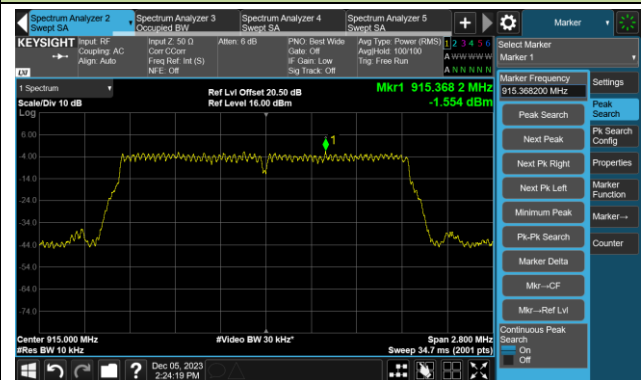


802.11ah-2MHz - PSD

Channel 06 (905.0MHz)



Channel 156 (915.0MHz)



Channel 161 (925.0MHz)



802.11ah-4MHz - PSD

Channel 08 (906.0MHz)



Channel 163 (914.0MHz)



Channel 165 (922.0MHz)



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

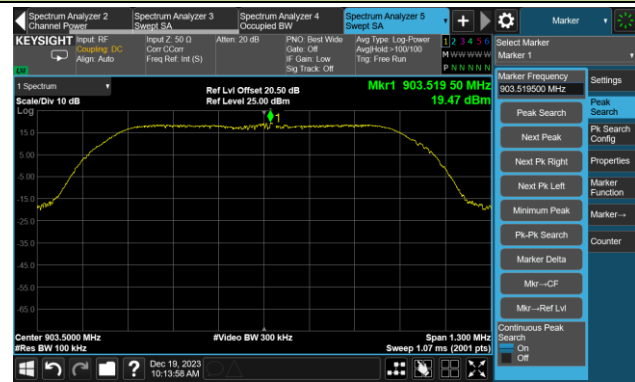
Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-12-19		

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Limit	Result
802.11ah-1MHz	MCS10	03	903.5	30dBc	Pass
802.11ah-1MHz	MCS10	43	915.5	30dBc	Pass
802.11ah-1MHz	MCS10	104	926.5	30dBc	Pass
802.11ah-2MHz	MCS0	06	905.0	30dBc	Pass
802.11ah-2MHz	MCS0	156	915.0	30dBc	Pass
802.11ah-2MHz	MCS0	161	925.0	30dBc	Pass
802.11ah-4MHz	MCS0	08	906.0	30dBc	Pass
802.11ah-4MHz	MCS0	163	914.0	30dBc	Pass
802.11ah-4MHz	MCS0	165	922.0	30dBc	Pass

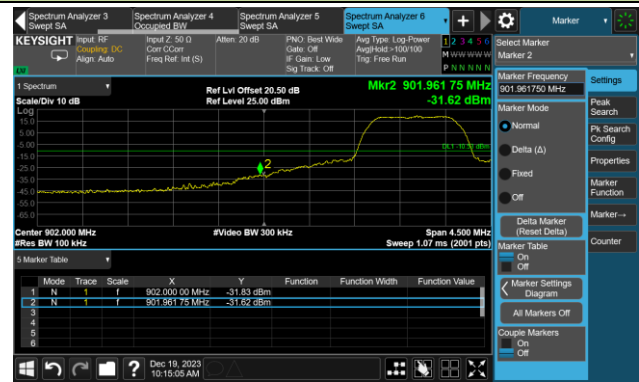
802.11ah-1MHz Out-of-Band Emissions

Channel 03 (903.5MHz)

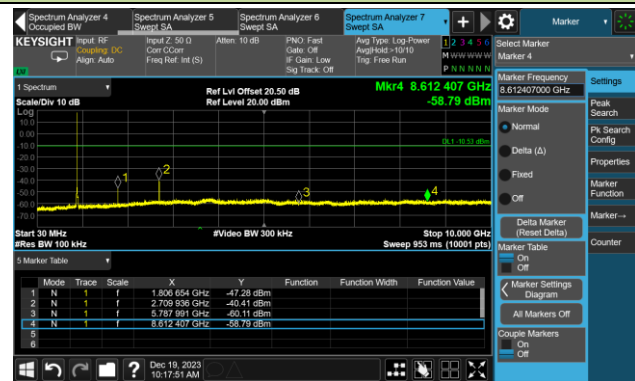
Reference Level



Low Band Edge

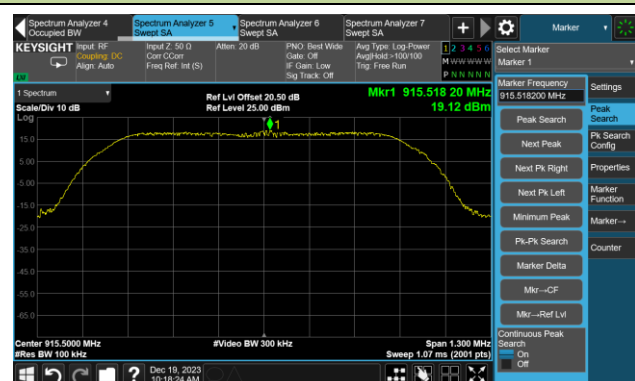


Spurious Emission

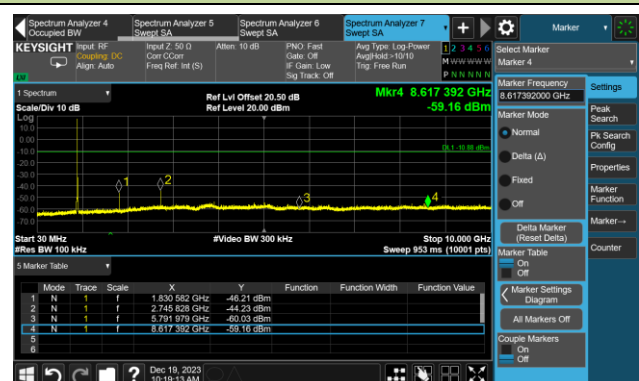


802.Channel 43 (915.5MHz)

Reference Level



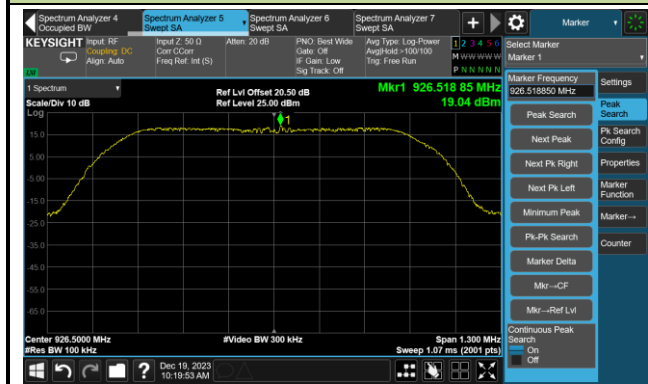
Spurious Emission



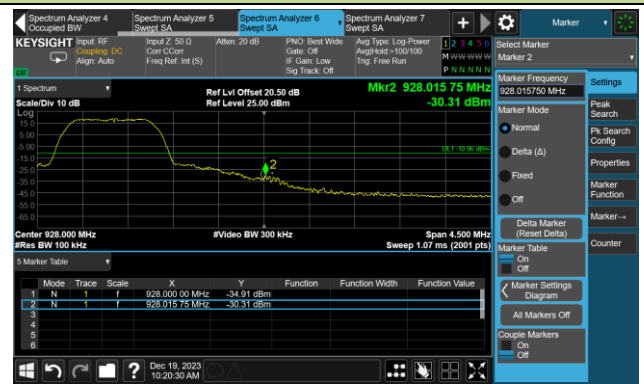
802.11ah-1MHz Out-of-Band Emissions

Channel 104 (926.5MHz)

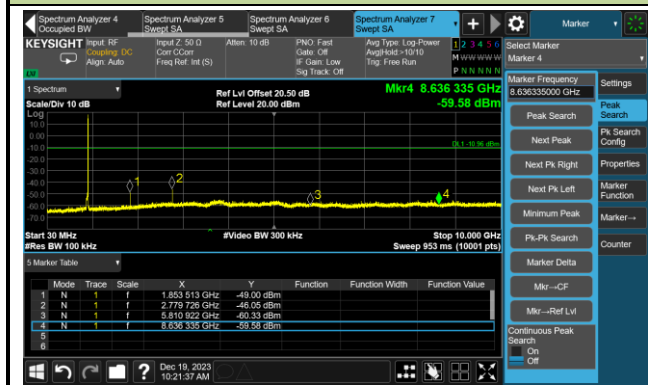
Reference Level



High Band Edge



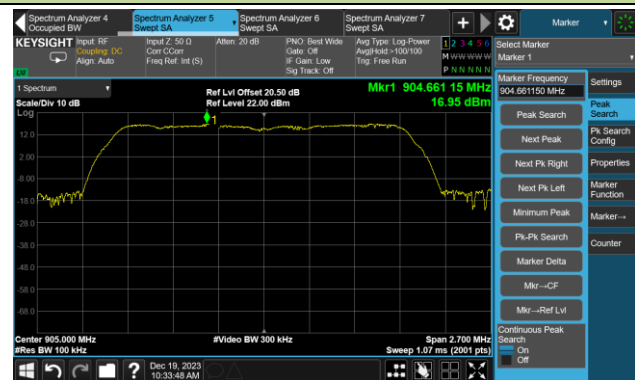
Spurious Emission



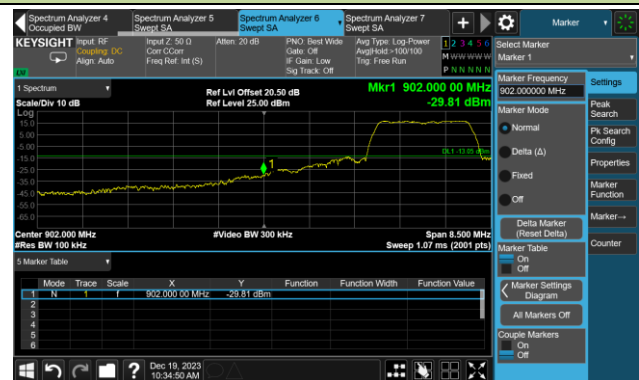
802.11ah-2MHz Out-of-Band Emissions

Channel 06 (905.0MHz)

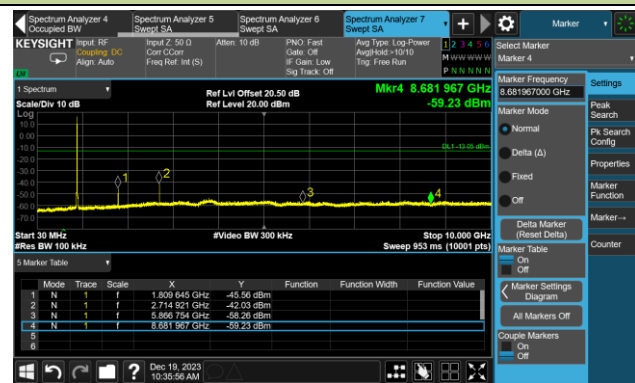
Reference Level



Low Band Edge

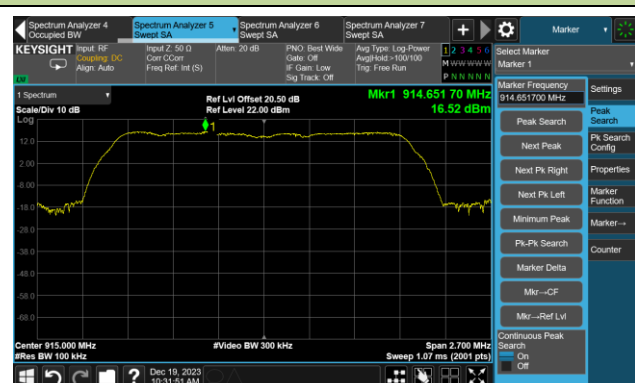


Spurious Emission

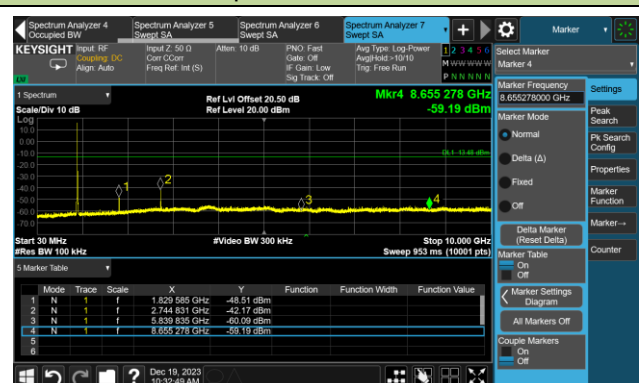


Channel 156 (915.0MHz)

Reference Level



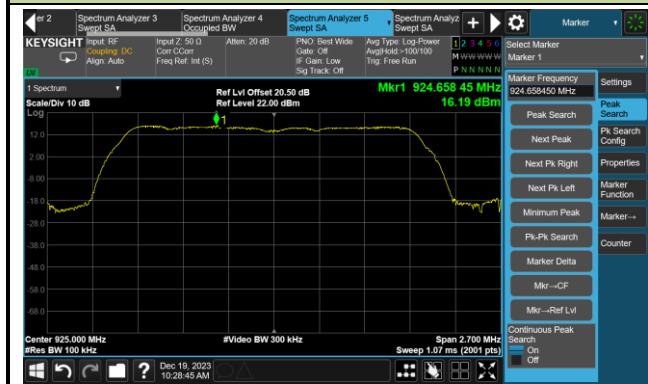
Spurious Emission



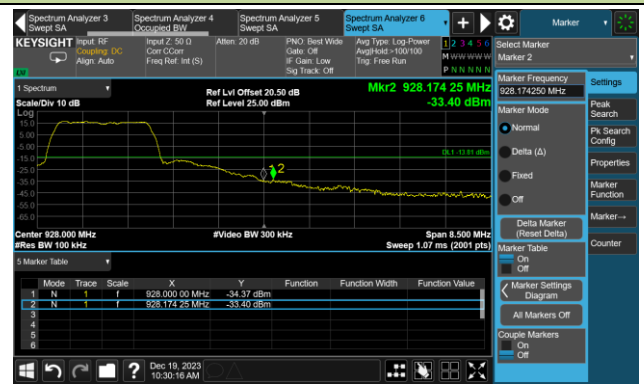
802.11ah-2MHz Out-of-Band Emissions

Channel 161 (925.0MHz)

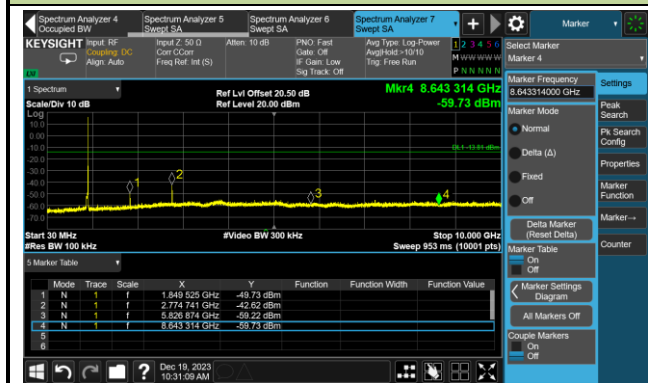
Reference Level



High Band Edge



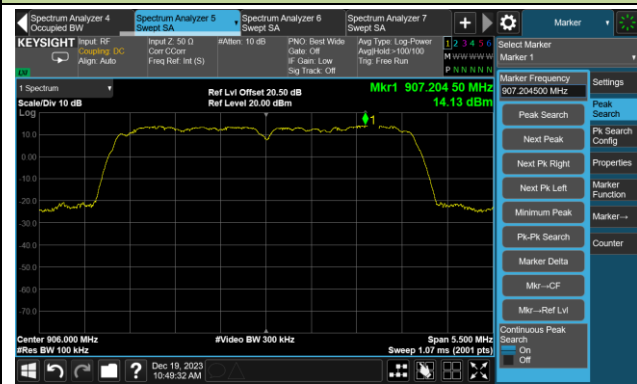
Spurious Emission



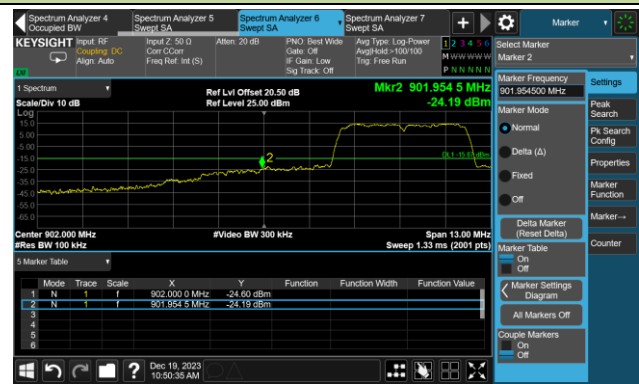
802.11ah-4MHz Out-of-Band Emissions

Channel 08 (906.0MHz)

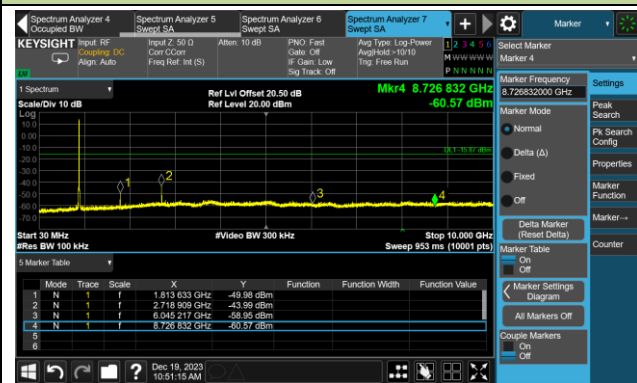
Reference Level



Low Band Edge

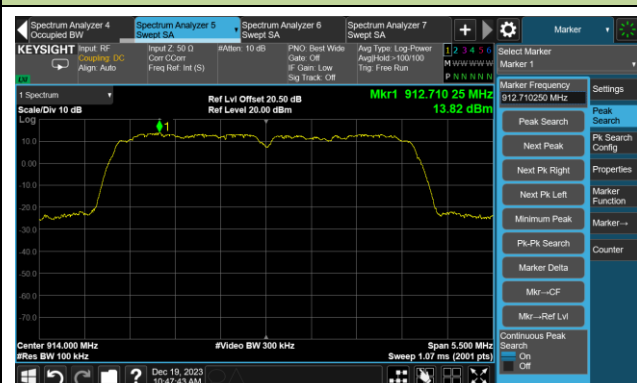


Spurious Emission

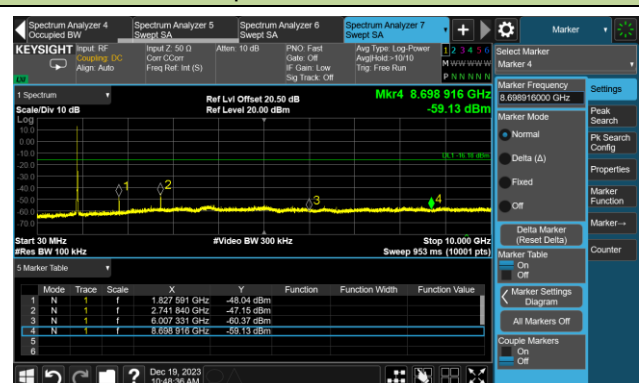


Channel 163 (914.0MHz)

Reference Level



Spurious Emission



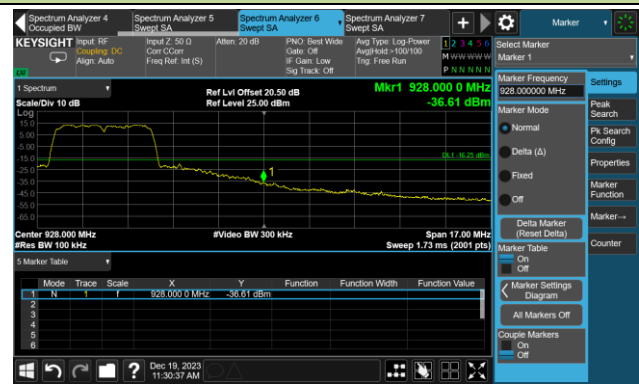
802.11ah-4MHz Out-of-Band Emissions

Channel 165 (922.0MHz)

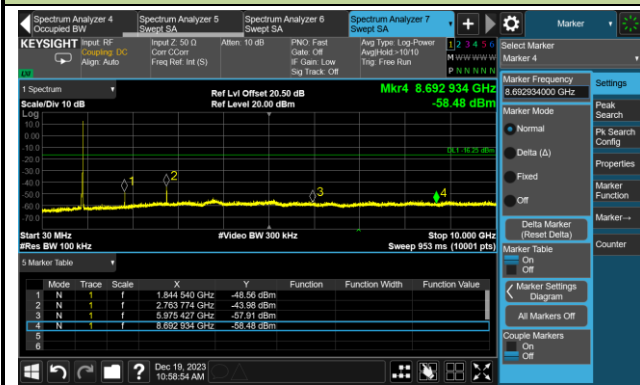
Reference Level



High Band Edge



Spurious Emission



A.6 Radiated Spurious Emission Test Result

Test Site	WZ-AC1	Test Engineer	Ajin Fan
Test Date	2023-12-29 ~ 2023-12-30	Test Mode	802.11ah-1MHz
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
03	2710.0	44.1	-2.4	41.7	74.0	-32.3	Peak	Horizontal
	7354.0	37.0	8.4	45.4	74.0	-28.6	Peak	Horizontal
	8177.5	36.9	9.0	45.9	74.0	-28.1	Peak	Horizontal
	2710.0	54.1	-2.4	51.7	74.0	-22.3	Peak	Vertical
	2710.0	37.9	-2.4	35.5	54.0	-18.5	Average	Vertical
	7462.0	36.2	8.6	44.8	74.0	-29.2	Peak	Vertical
	8438.5	36.1	8.9	45.0	74.0	-29.0	Peak	Vertical
43	2746.0	43.3	-2.3	41.0	74.0	-33.0	Peak	Horizontal
	4820.5	35.9	3.1	39.0	74.0	-35.0	Peak	Horizontal
	7480.0	36.6	8.6	45.2	74.0	-28.8	Peak	Horizontal
	2746.0	50.7	-2.3	48.4	74.0	-25.6	Peak	Vertical
	4690.0	36.4	2.6	39.0	74.0	-35.0	Peak	Vertical
	7480.0	37.2	8.6	45.8	74.0	-28.2	Peak	Vertical
104	2751.0	39.8	-2.2	37.6	74.0	-36.4	Peak	Horizontal
	7647.0	36.0	8.2	44.2	74.0	-29.8	Peak	Horizontal
	8463.0	35.1	9.3	44.4	74.0	-29.6	Peak	Horizontal
	2777.5	54.1	-2.1	52.0	74.0	-22.0	Peak	Vertical
	2777.5	35.3	-2.1	33.2	54.0	-20.8	Average	Vertical
	7651.0	36.2	8.2	44.4	74.0	-29.6	Peak	Vertical
	8254.0	34.9	8.7	43.6	74.0	-30.4	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-AC1	Test Engineer	Ajin Fan
Test Date	2023-12-29 ~ 2023-12-30	Test Mode	802.11ah-2MHz
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
06	2714.5	40.7	-2.3	38.4	74.0	-35.6	Peak	Horizontal
	7399.0	36.6	8.5	45.1	74.0	-28.9	Peak	Horizontal
	8245.0	36.5	8.8	45.3	74.0	-28.7	Peak	Horizontal
	2714.5	54.0	-2.3	51.7	74.0	-22.3	Peak	Vertical
	2714.5	36.6	-2.3	34.3	54.0	-19.7	Average	Vertical
	4861.0	36.8	2.9	39.7	74.0	-34.3	Peak	Vertical
	7381.0	36.1	8.6	44.7	74.0	-29.3	Peak	Vertical
156	2746.0	40.5	-2.3	38.2	74.0	-35.8	Peak	Horizontal
	7453.0	36.7	8.6	45.3	74.0	-28.7	Peak	Horizontal
	8119.0	35.1	9.0	44.1	74.0	-29.9	Peak	Horizontal
	2746.0	49.3	-2.3	47.0	74.0	-27.0	Peak	Vertical
	7615.0	36.7	8.3	45.0	74.0	-29.0	Peak	Vertical
	8299.0	35.9	8.7	44.6	74.0	-29.4	Peak	Vertical
161	3785.5	37.3	0.4	37.7	74.0	-36.3	Peak	Horizontal
	7466.5	35.9	8.6	44.5	74.0	-29.5	Peak	Horizontal
	8281.0	36.6	8.5	45.1	74.0	-28.9	Peak	Horizontal
	2773.0	49.5	-2.1	47.4	74.0	-26.6	Peak	Vertical
	4150.0	36.8	1.1	37.9	74.0	-36.1	Peak	Vertical
	4942.0	36.1	3.3	39.4	74.0	-34.6	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-AC1	Test Engineer	Ajin Fan
Test Date	2023-12-29 ~ 2023-12-30	Test Mode	802.11ah-4MHz
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.		

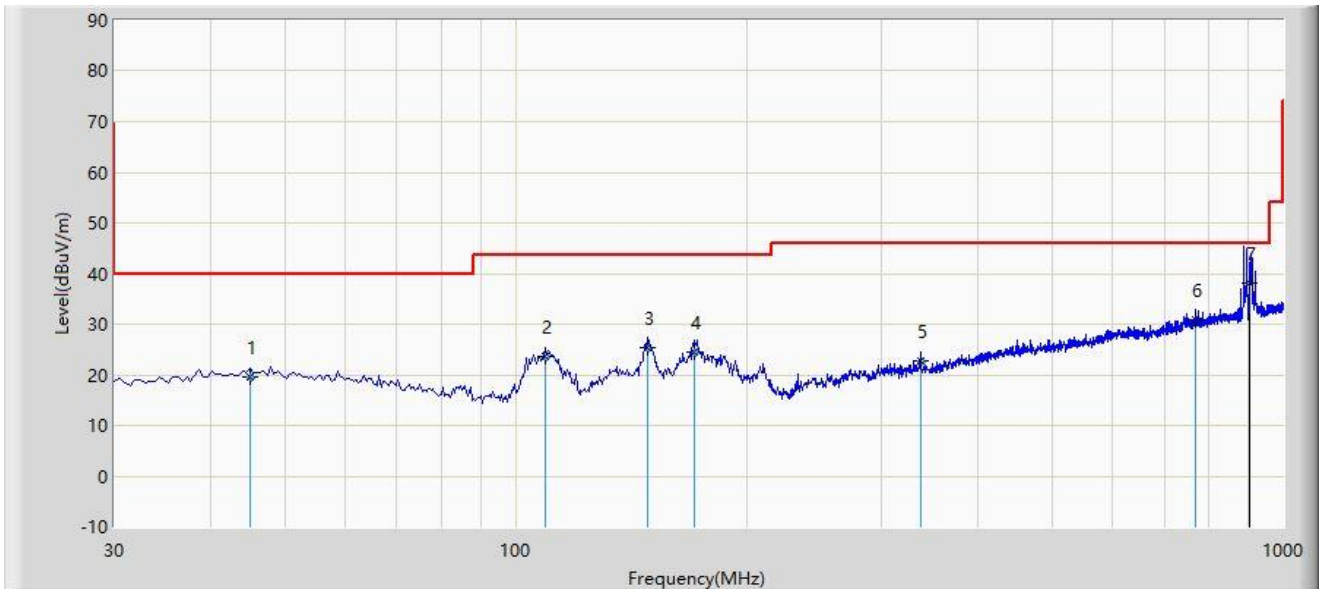
Test Channel	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
08	3668.5	38.5	0.0	38.5	74.0	-35.5	Peak	Horizontal
	4937.5	35.6	3.3	38.9	74.0	-35.1	Peak	Horizontal
	7417.0	36.1	8.4	44.5	74.0	-29.5	Peak	Horizontal
	2719.0	49.6	-2.3	47.3	74.0	-26.7	Peak	Vertical
	7462.0	36.3	8.6	44.9	74.0	-29.1	Peak	Vertical
	8227.0	33.4	8.8	42.2	74.0	-31.8	Peak	Vertical
163	3830.5	36.7	0.4	37.1	74.0	-36.9	Peak	Horizontal
	7340.5	37.1	8.2	45.3	74.0	-28.7	Peak	Horizontal
	8236.0	36.2	8.8	45.0	74.0	-29.0	Peak	Horizontal
	2737.0	49.6	-2.4	47.2	74.0	-26.8	Peak	Vertical
	7687.0	37.7	8.1	45.8	74.0	-28.2	Peak	Vertical
	8429.5	36.4	8.9	45.3	74.0	-28.7	Peak	Vertical
165	2786.5	39.0	-2.1	36.9	74.0	-37.1	Peak	Horizontal
	7493.5	36.6	8.6	45.2	74.0	-28.8	Peak	Horizontal
	8263.0	36.0	8.7	44.7	74.0	-29.3	Peak	Horizontal
	2764.0	49.1	-2.2	46.9	74.0	-27.1	Peak	Vertical
	7453.0	36.3	8.6	44.9	74.0	-29.1	Peak	Vertical
	8308.0	36.1	8.7	44.8	74.0	-29.2	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: 2023-12-29
Limit: FCC_Part15.209_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-1MHz at 903.5MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1		45.035	19.594	1.140	-20.406	40.000	18.455	QP
2		109.540	23.508	8.640	-19.992	43.500	14.867	QP
3		148.340	25.294	7.240	-18.206	43.500	18.055	QP
4		170.650	24.568	6.690	-18.932	43.500	17.878	QP
5		336.520	22.764	3.210	-23.236	46.000	19.554	QP
6	*	768.170	30.756	2.630	-15.244	46.000	28.126	QP
7		903.500	38.119	8.687	N/A	N/A	29.432	PK

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

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

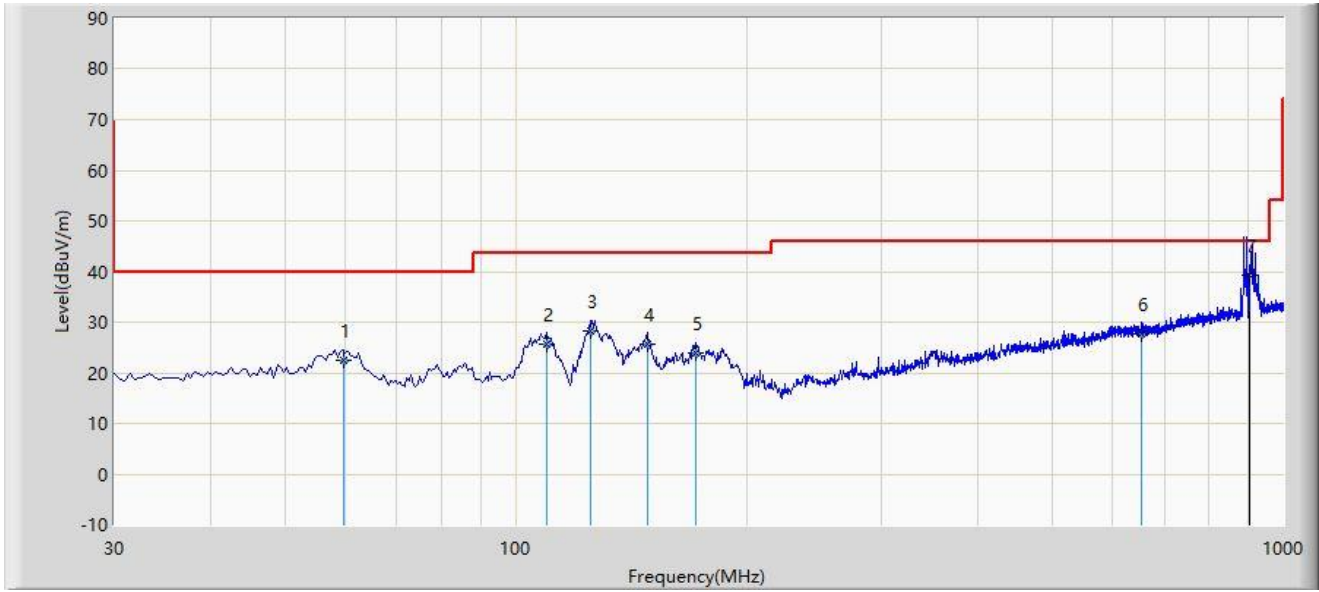
Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: The point (7) is fundamental frequency, that is not evaluated in this item.

Note 5: The amplitude of radiated emissions (frequency range from 9kHz to 30MHz) 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: 2023-12-30
Limit: FCC_Part15.209_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-1MHz at 903.5MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1		59.585	22.344	4.340	-17.656	40.000	18.004	QP
2		110.025	25.563	10.640	-17.937	43.500	14.923	QP
3	*	125.060	28.294	11.950	-15.206	43.500	16.345	QP
4		148.340	25.594	7.540	-17.906	43.500	18.055	QP
5		171.620	23.812	6.010	-19.688	43.500	17.802	QP
6		653.225	27.710	1.620	-18.290	46.000	26.090	QP
7		903.500	39.322	9.890	N/A	N/A	29.432	PK

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).

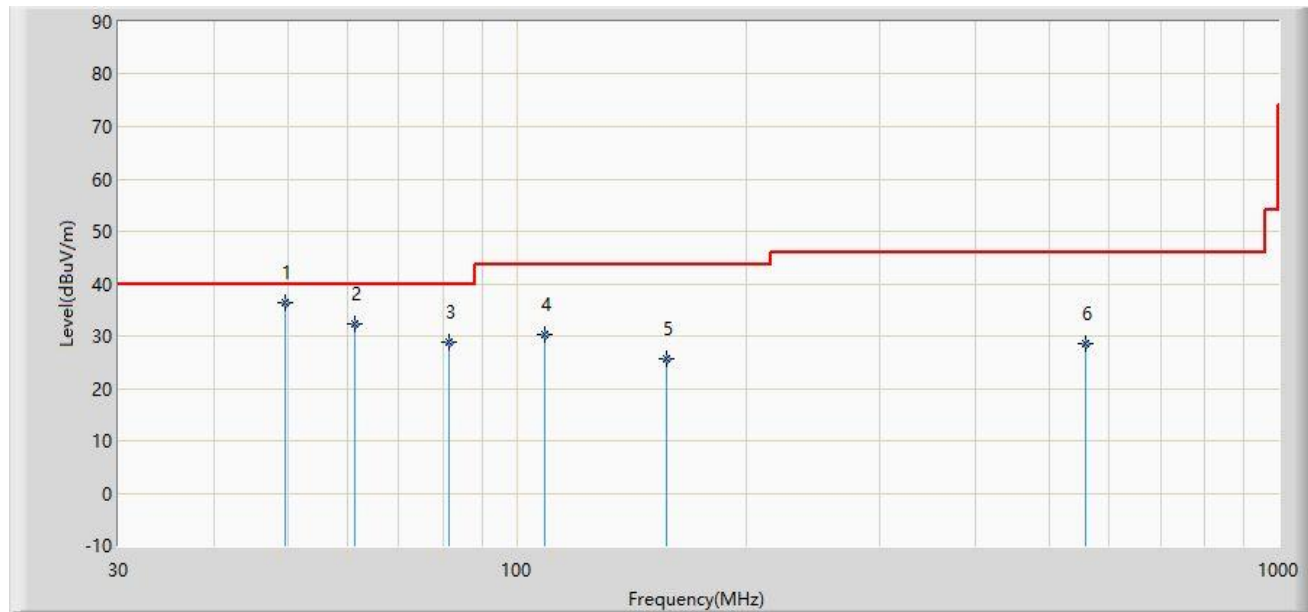
Note 4: The point (7) is fundamental frequency, that is not evaluated in this item.

Note 5: The amplitude of radiated emissions (frequency range from 9kHz to 30MHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value.

Therefore, the data is not presented in the report.

The Result of Receiver Radiated Emission:

Site: WZ-AC1	Time: 2023-12-21
Limit: RSS-Gen_RE(3m)	Engineer: Frank Xue
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode 4	



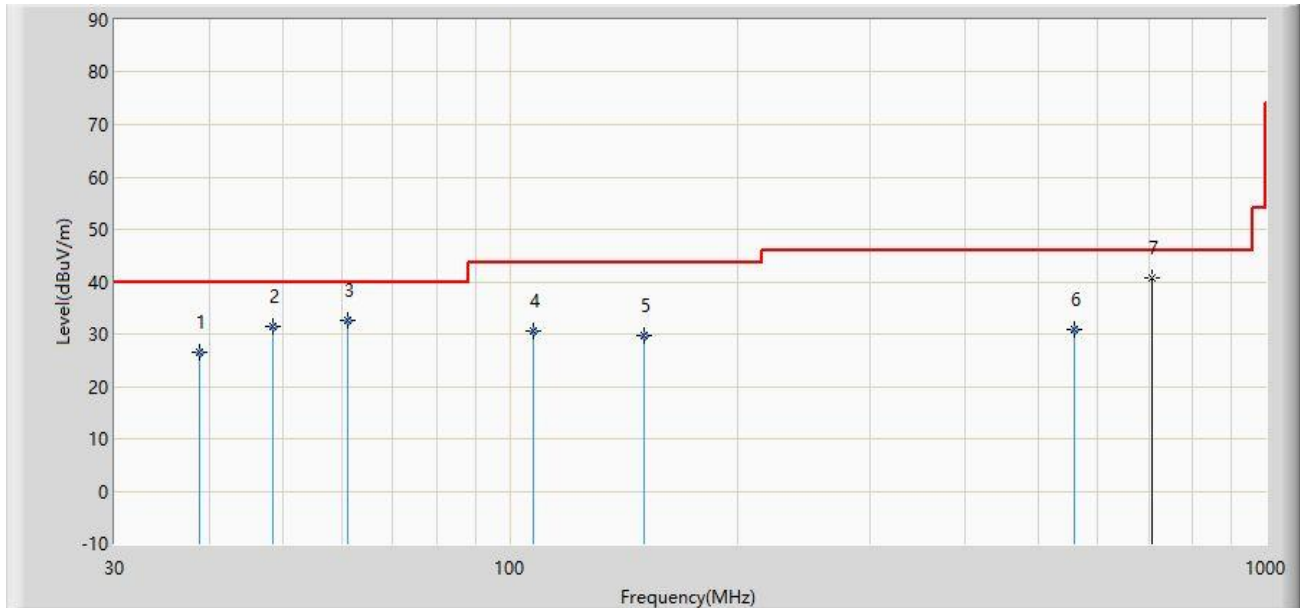
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1	*	49.650	36.381	17.800	-3.619	40.000	18.581	QP
2		61.270	32.212	14.400	-7.788	40.000	17.811	QP
3		81.520	28.777	14.900	-11.223	40.000	13.877	QP
4		108.860	30.390	15.600	-13.110	43.500	14.790	QP
5		157.550	25.688	7.400	-17.812	43.500	18.287	QP
6		558.430	28.551	4.400	-17.449	46.000	24.151	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).

Site: WZ-AC1	Time: 2023-12-21
Limit: RSS-Gen_RE(3m)	Engineer: Frank Xue
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode 4	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1		38.800	26.397	8.500	-13.603	40.000	17.896	QP
2		48.560	31.366	12.800	-8.634	40.000	18.566	QP
3	*	60.940	32.552	14.700	-7.448	40.000	17.852	QP
4		107.500	30.632	16.000	-12.868	43.500	14.632	QP
5		150.620	29.639	11.500	-13.861	43.500	18.139	QP
6		558.600	30.752	6.600	-15.248	46.000	24.151	QP
7		706.090	40.778	13.872	N/A	N/A	26.906	PK

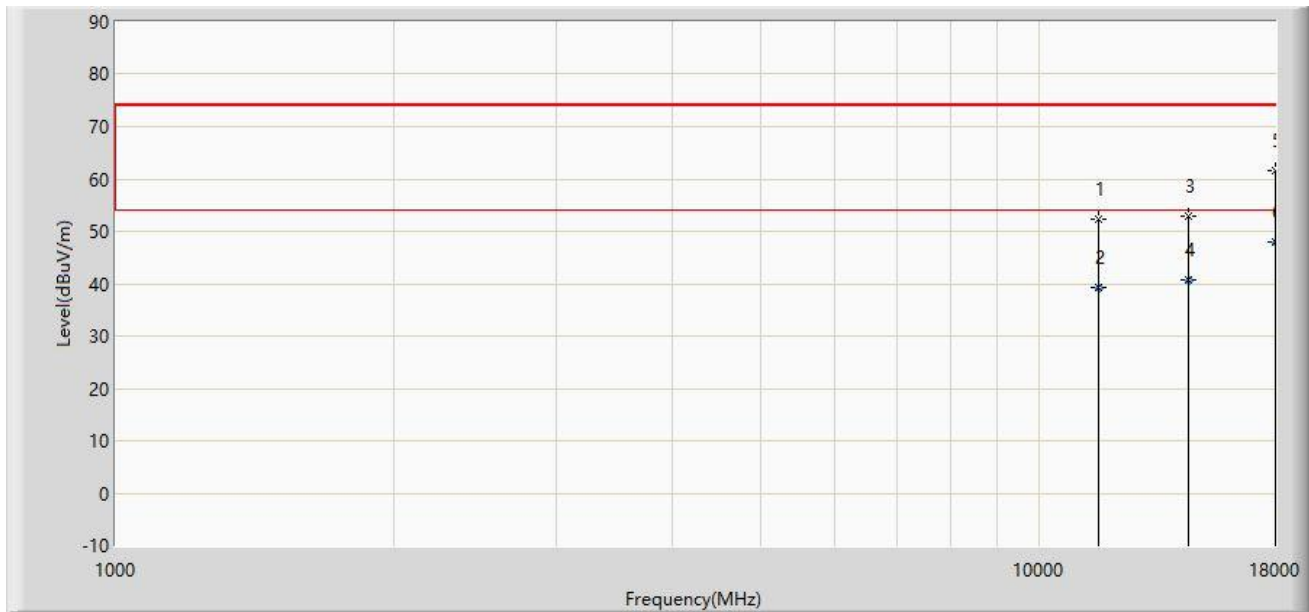
Note 1: " * ", means this data is the worst emission level.

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: It is authenticated that the point (7) is phone signal outside, so we can't take it as a reference.

Site: WZ-AC1	Time: 2023-12-21
Limit: RSS-Gen_RE(3m)	Engineer: Frank Xue
Probe: BBHA9120D_1167_1-18GHz	Polarity: Horizontal
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode 4	



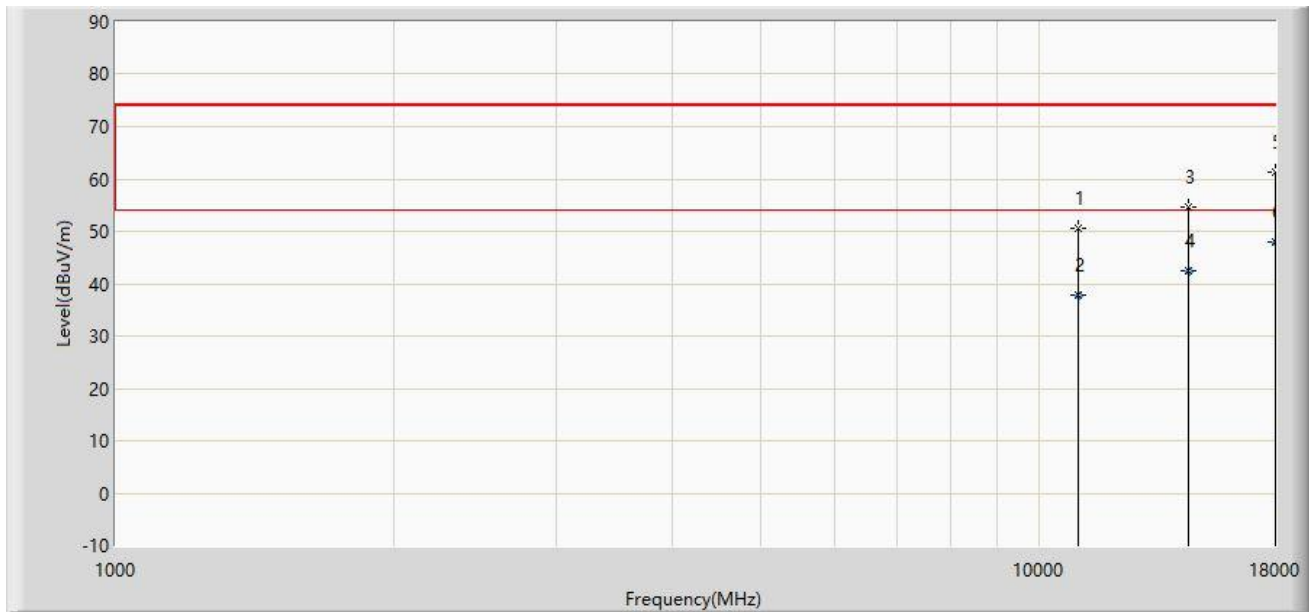
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		11599.500	52.365	39.153	-21.635	74.000	13.212	PK
2		11599.500	39.172	25.960	-14.828	54.000	13.212	AV
3		14515.000	52.986	37.046	-21.014	74.000	15.940	PK
4		14515.000	40.750	24.810	-13.250	54.000	15.940	AV
5		17974.500	61.698	38.889	-12.302	74.000	22.809	PK
6	*	17974.500	48.019	25.210	-5.981	54.000	22.809	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) - Pre_Amplifier Gain (dB).

Site: WZ-AC1	Time: 2023-12-21
Limit: RSS-Gen_RE(3m)	Engineer: Frank Xue
Probe: BBHA9120D_1167_1-18GHz	Polarity: Vertical
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode 4	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		10996.000	50.720	36.365	-23.280	74.000	14.355	PK
2		10996.000	37.775	23.420	-16.225	54.000	14.355	AV
3		14515.000	54.603	38.663	-19.397	74.000	15.940	PK
4		14515.000	42.450	26.510	-11.550	54.000	15.940	AV
5		17974.500	61.377	38.568	-12.623	74.000	22.809	PK
6	*	17974.500	48.099	25.290	-5.901	54.000	22.809	AV

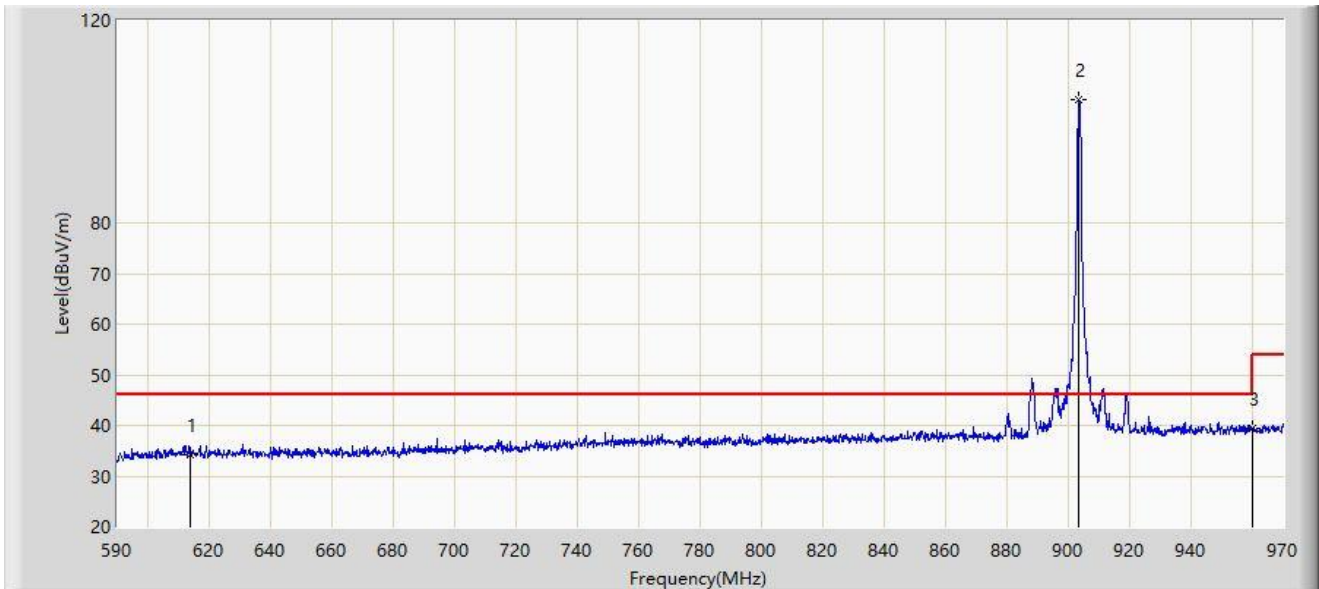
Note 1: " * ", means this data is the worst emission level.

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

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

A.7 Radiated Restricted Band Edge Test Result

Site: WZ-AC1	Test Date: 2023-12-28
Limit: FCC_Part15.209_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-1MHz at 903.5MHz	



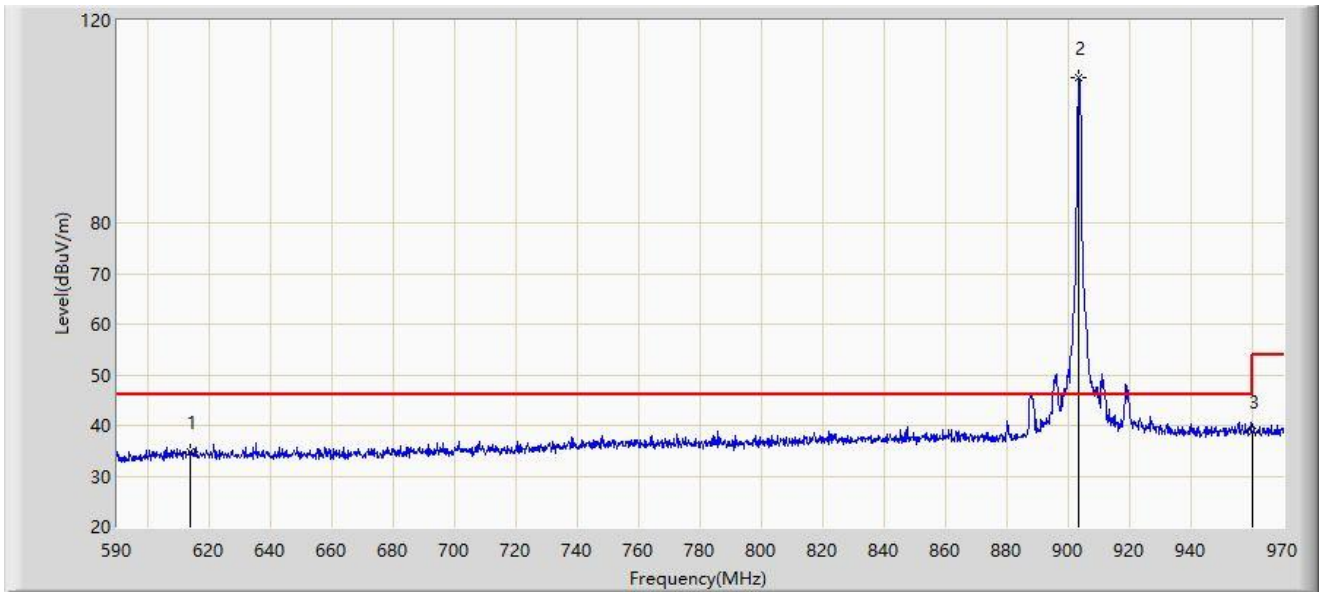
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	34.154	8.081	-11.846	46.000	26.073	PK
2		903.500	104.383	74.951	N/A	N/A	29.432	PK
3	*	960.000	39.448	9.284	-6.552	46.000	30.165	PK

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 Date: 2023-12-28
Limit: FCC_Part15.209_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-1MHz at 903.5MHz	



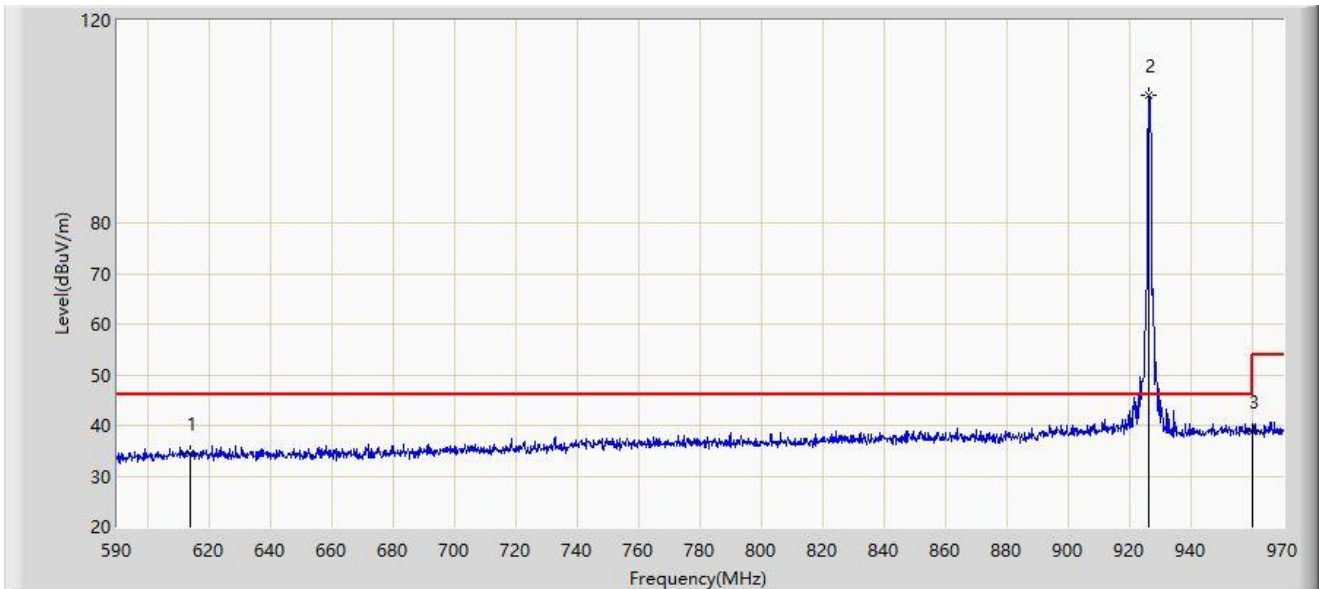
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	34.805	8.732	-11.195	46.000	26.073	PK
2		903.500	108.693	79.261	N/A	N/A	29.432	PK
3	*	960.000	38.845	8.681	-7.155	46.000	30.165	PK

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 Date: 2023-12-28
Limit: FCC_Part15.209_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-1MHz at 926.5MHz	



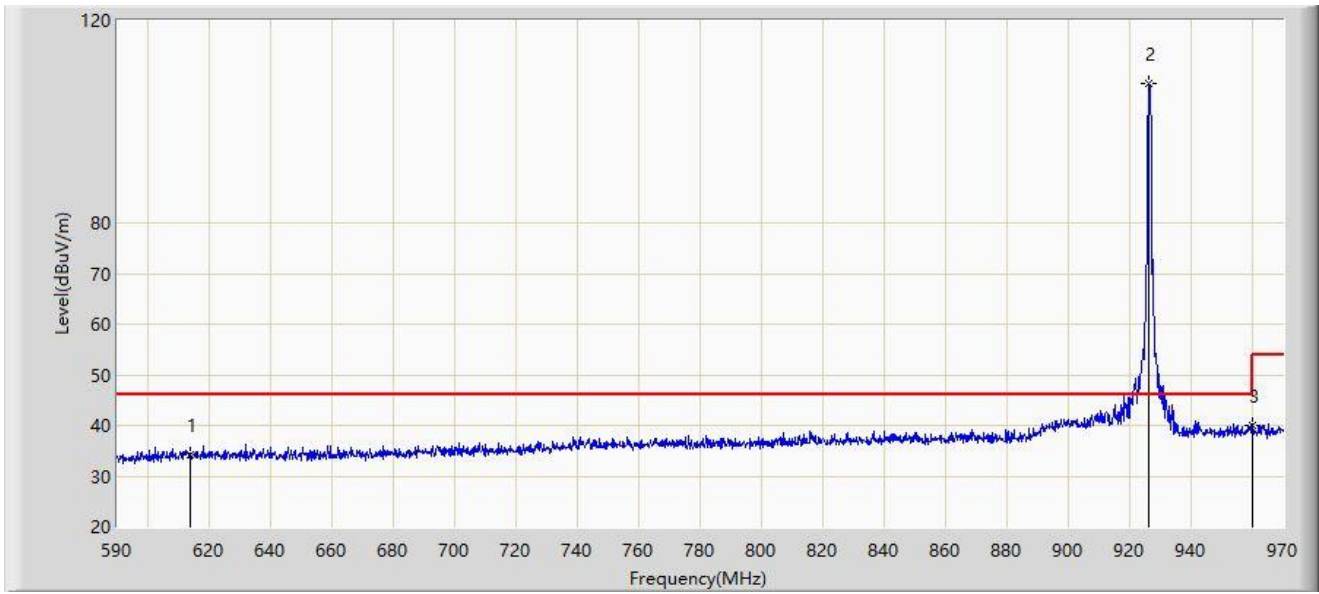
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	34.486	8.413	-11.514	46.000	26.073	PK
2		926.300	105.095	75.392	N/A	N/A	29.703	PK
3	*	960.000	38.964	8.800	-7.036	46.000	30.165	PK

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 Date: 2023-12-28
Limit: FCC_Part15.209_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-1MHz at 926.5MHz	



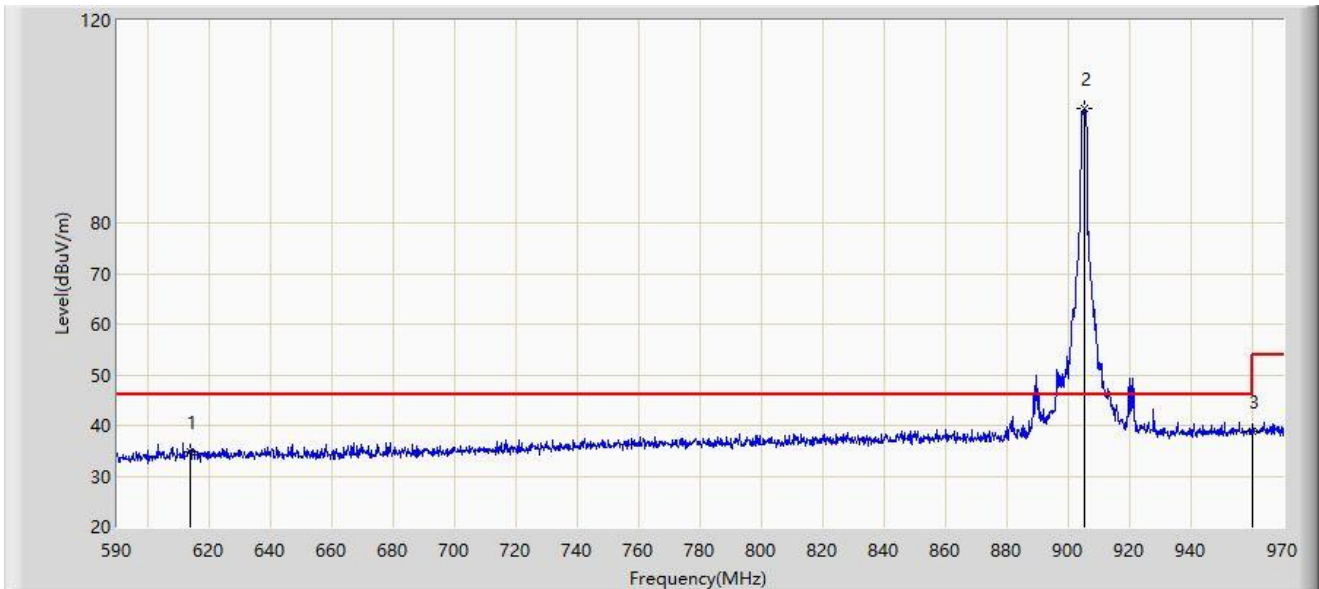
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	34.086	8.013	-11.914	46.000	26.073	PK
2		926.300	107.579	77.876	N/A	N/A	29.703	PK
3	*	960.000	39.969	9.805	-6.031	46.000	30.165	PK

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 Date: 2023-12-28
Limit: FCC_Part15.209_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-2MHz at 905MHz	



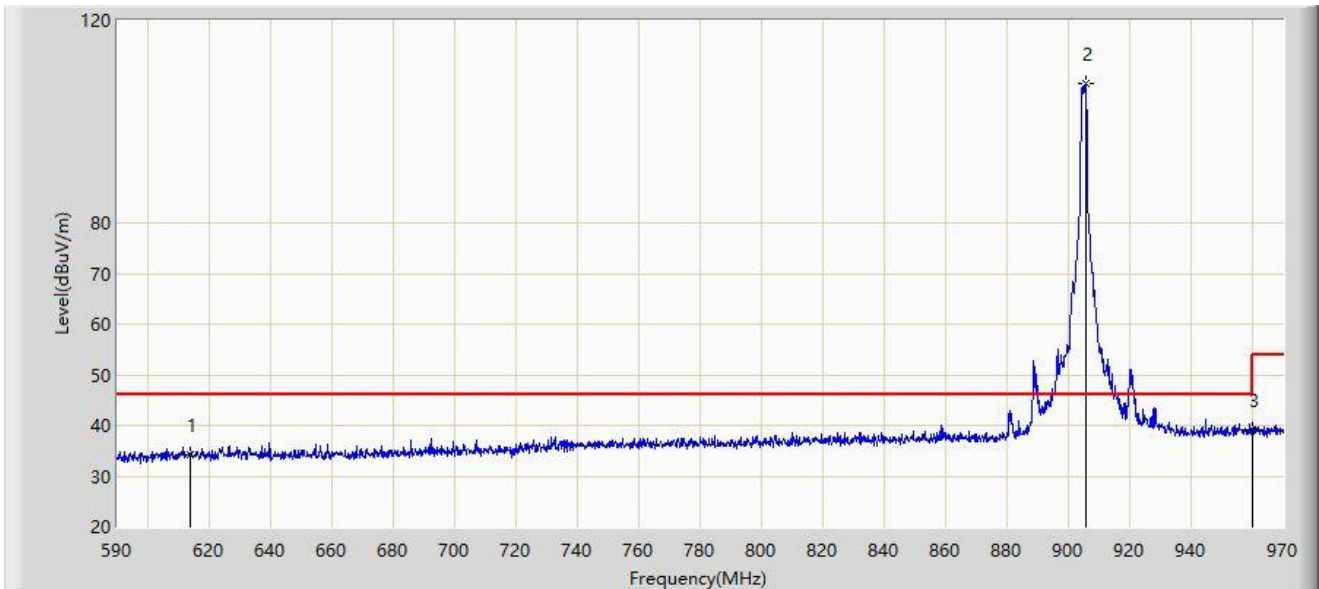
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	34.718	8.645	-11.282	46.000	26.073	PK
2		905.020	102.583	73.145	N/A	N/A	29.438	PK
3	*	960.000	38.724	8.560	-7.276	46.000	30.165	PK

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 Date: 2023-12-28
Limit: FCC_Part15.209_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-2MHz at 905MHz	



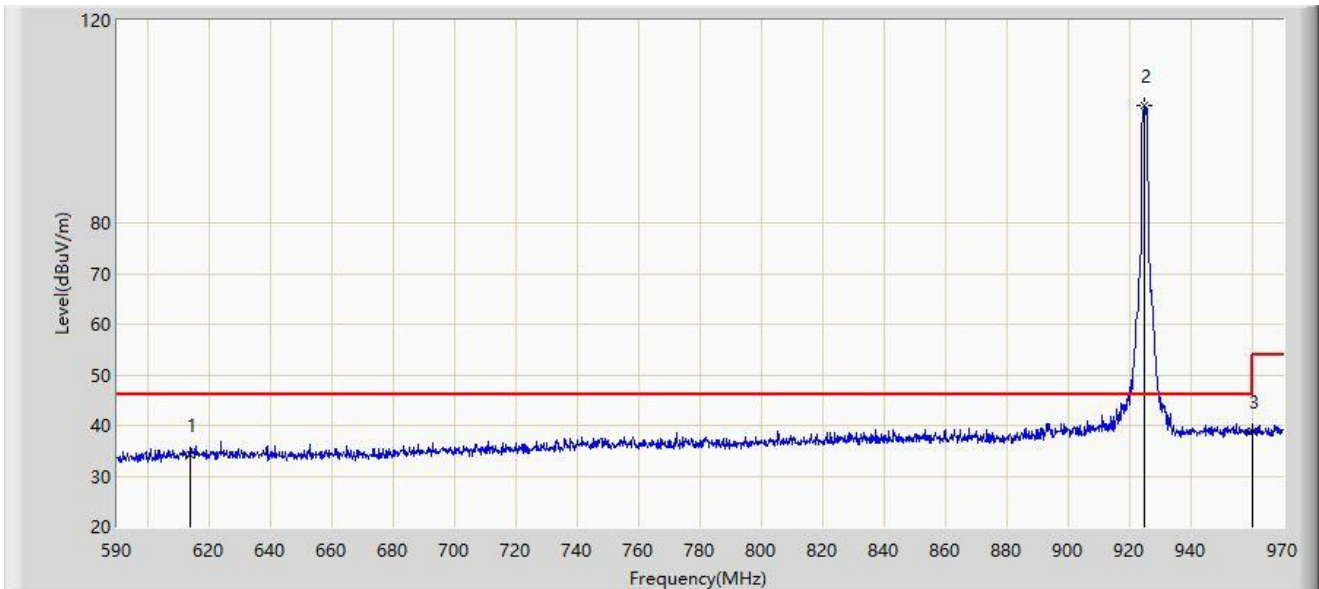
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	34.310	8.237	-11.690	46.000	26.073	PK
2		905.590	107.423	77.983	N/A	N/A	29.440	PK
3	*	960.000	39.089	8.925	-6.911	46.000	30.165	PK

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 Date: 2023-12-28
Limit: FCC_Part15.209_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-2MHz at 925MHz	



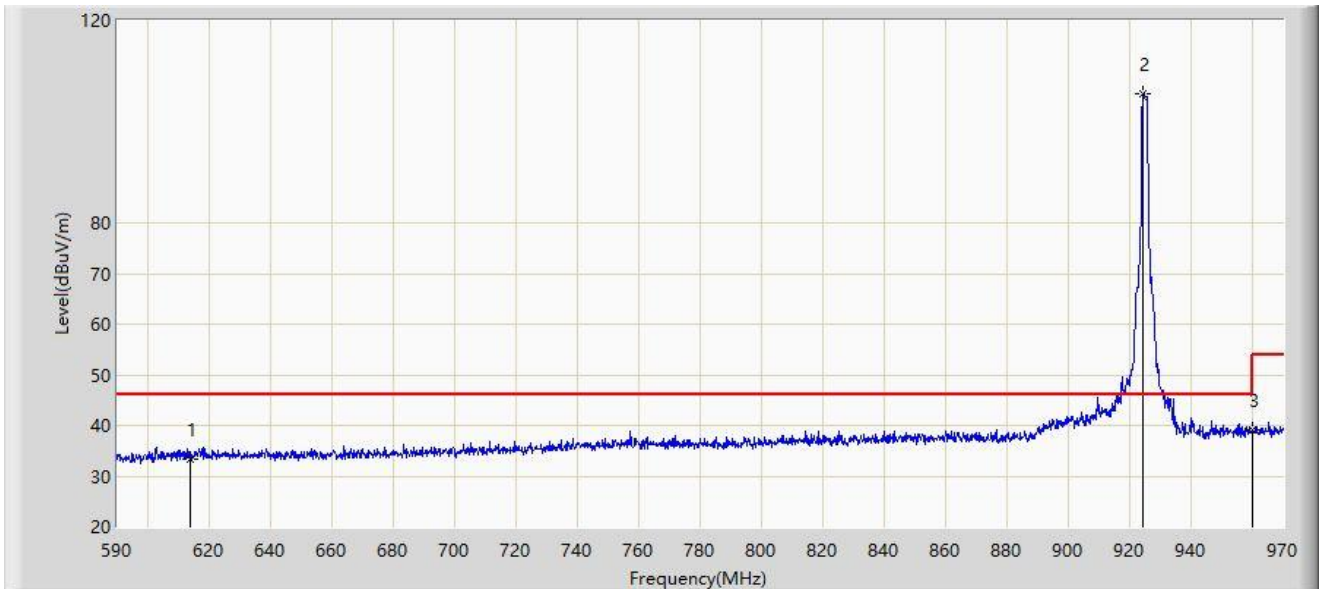
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	34.064	7.991	-11.936	46.000	26.073	PK
2		924.780	103.127	73.440	N/A	N/A	29.688	PK
3	*	960.000	38.916	8.752	-7.084	46.000	30.165	PK

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 Date: 2023-12-28
Limit: FCC_Part15.209_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-2MHz at 925MHz	



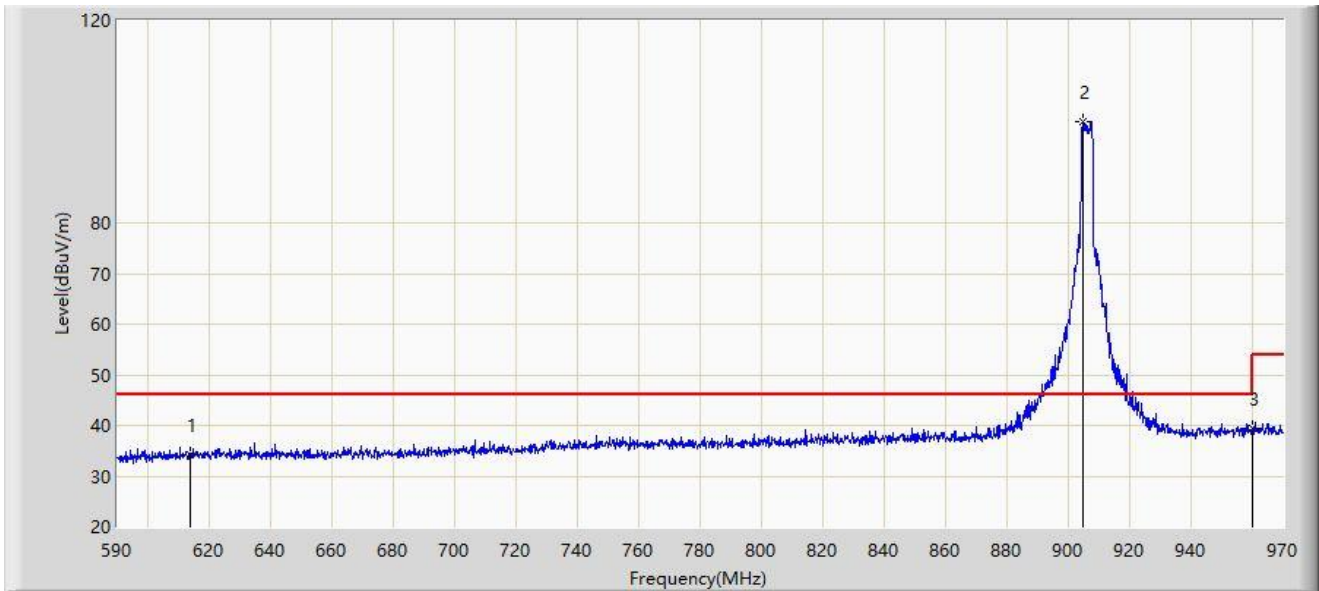
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	33.269	7.196	-12.731	46.000	26.073	PK
2		924.210	105.369	75.687	N/A	N/A	29.682	PK
3	*	960.000	39.045	8.881	-6.955	46.000	30.165	PK

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 Date: 2023-12-28
Limit: FCC_Part15.209_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-4MHz at 906MHz	



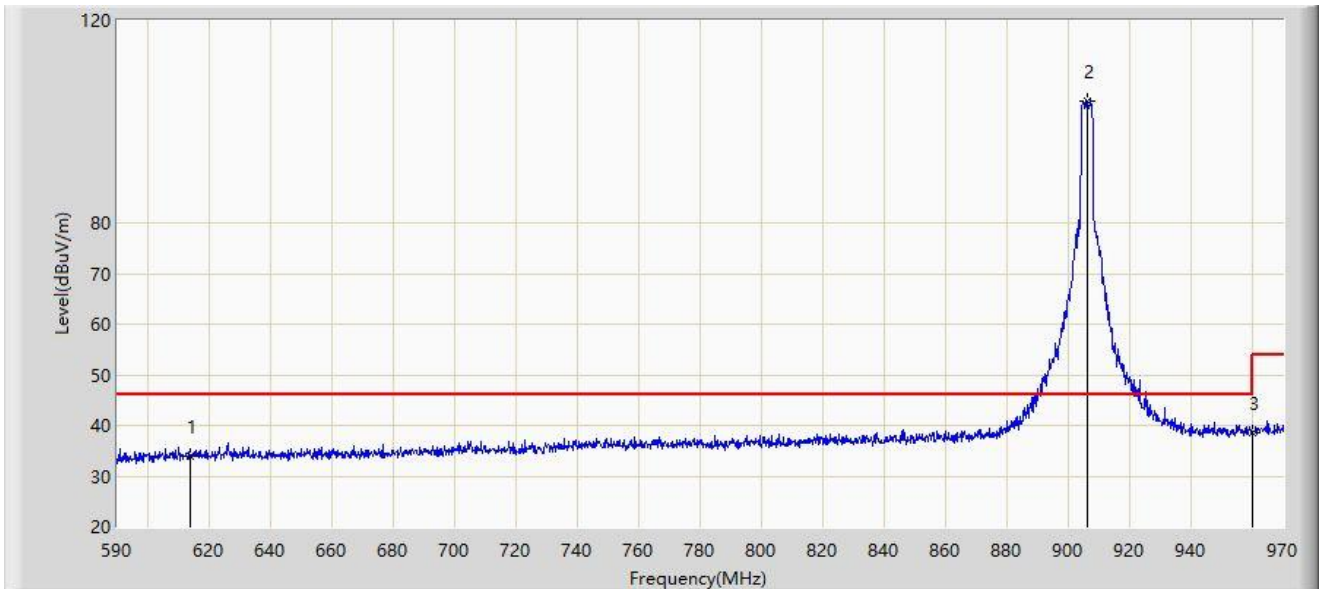
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	34.208	8.135	-11.792	46.000	26.073	PK
2		904.830	100.068	70.630	N/A	N/A	29.438	PK
3	*	960.000	39.323	9.159	-6.677	46.000	30.165	PK

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 Date: 2023-12-28
Limit: FCC_Part15.209_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-4MHz at 906MHz	



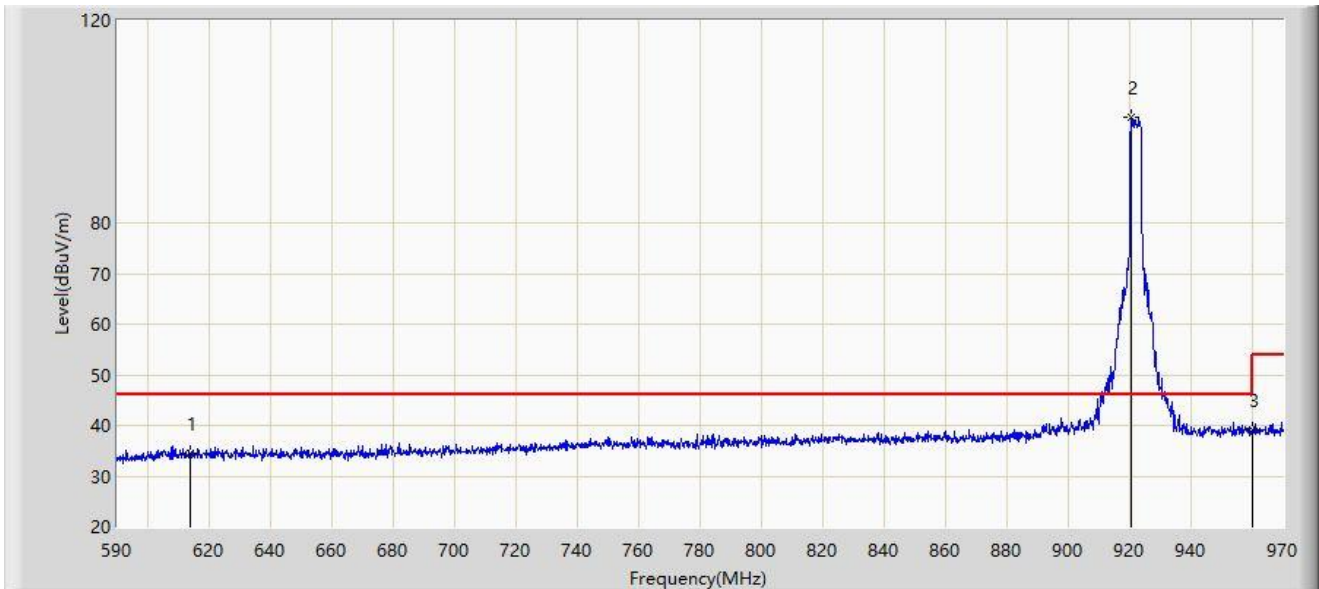
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	33.976	7.903	-12.024	46.000	26.073	PK
2		906.350	104.150	74.705	N/A	N/A	29.445	PK
3	*	960.000	38.506	8.342	-7.494	46.000	30.165	PK

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 Date: 2023-12-28
Limit: FCC_Part15.209_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-4MHz at 922MHz	



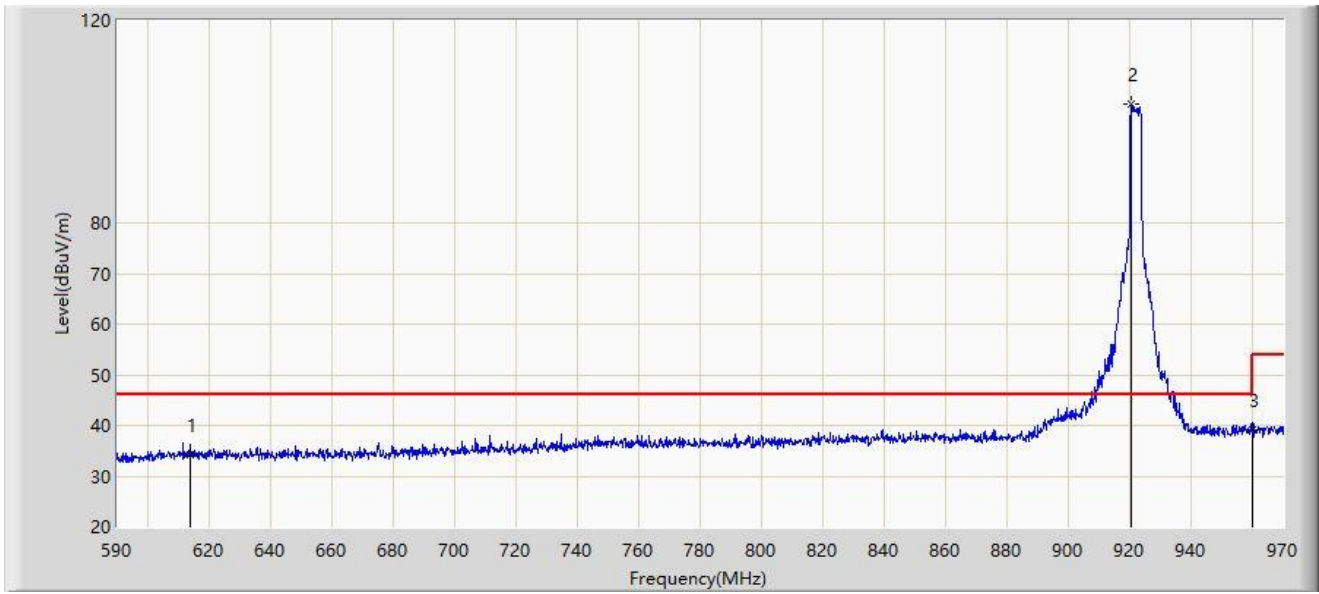
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	34.622	8.549	-11.378	46.000	26.073	PK
2		920.600	100.733	71.091	N/A	N/A	29.641	PK
3	*	960.000	39.057	8.893	-6.943	46.000	30.165	PK

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 Date: 2023-12-28
Limit: FCC_Part15.209_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-4MHz at 922MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	34.293	8.220	-11.707	46.000	26.073	PK
2		920.600	103.421	73.779	N/A	N/A	29.641	PK
3	*	960.000	39.149	8.985	-6.851	46.000	30.165	PK

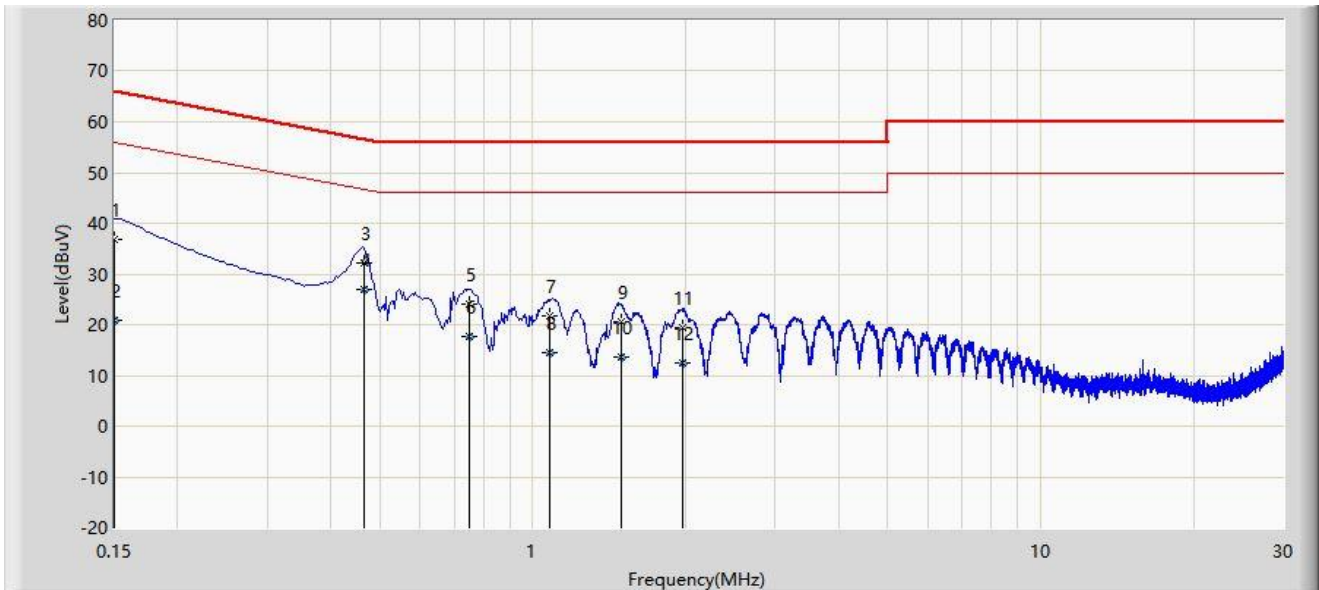
Note 1: " * ", means this data is the worst emission level.

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

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

A.8 AC Conducted Emissions Test Result

Site: WZ-SR2	Test Date: 2023-12-22
Temperature: 17.1°C	Humidity: 22.6%
Limit: FCC_Part15.207_CE_AC Power	Engineer: Linda Wei
Probe: ENV216_101683_Filter Off_E	Polarity: Line
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-1MHz at 903.5MHz	



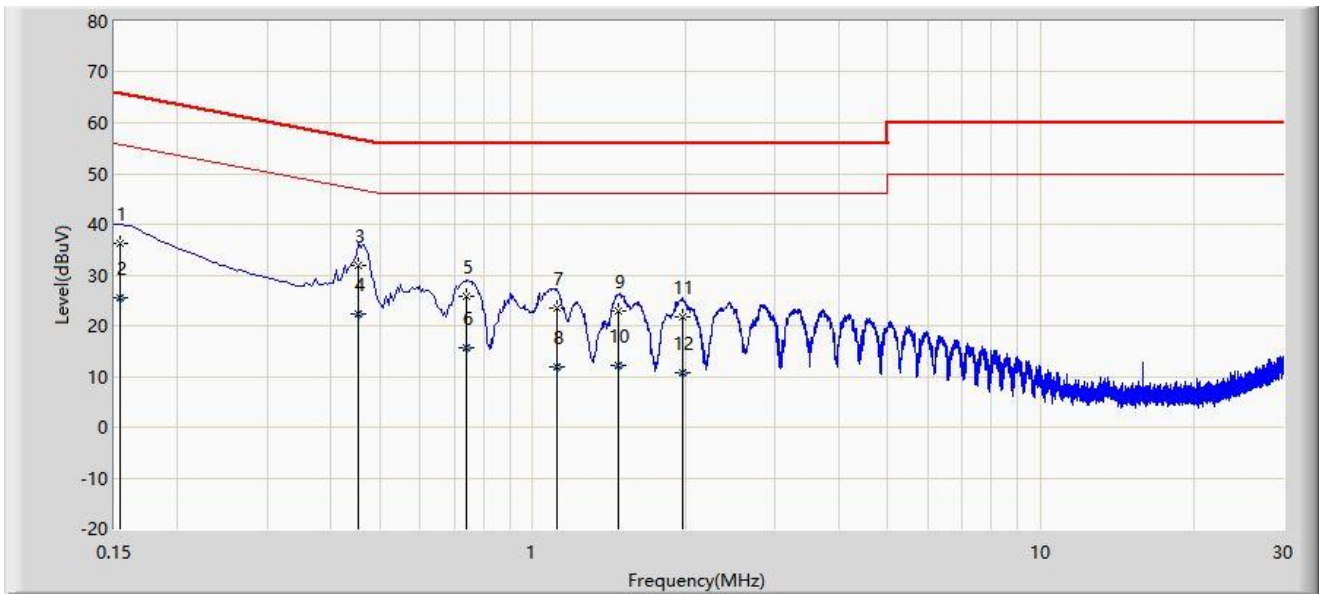
No	Mark	Frequency (MHz)	Measure Level (dBμV)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV)	Factor (dB)	Type
1		0.150	36.949	27.183	-29.051	66.000	9.766	QP
2		0.150	21.010	11.245	-34.990	56.000	9.766	AV
3		0.466	32.295	22.382	-24.290	56.585	9.913	QP
4	*	0.466	26.863	16.950	-19.722	46.585	9.913	AV
5		0.750	23.928	13.851	-32.072	56.000	10.076	QP
6		0.750	17.704	7.628	-28.296	46.000	10.076	AV
7		1.082	21.690	11.450	-34.310	56.000	10.239	QP
8		1.082	14.562	4.323	-31.438	46.000	10.239	AV
9		1.494	20.546	10.251	-35.454	56.000	10.295	QP
10		1.494	13.641	3.346	-32.359	46.000	10.295	AV
11		1.966	19.460	9.093	-36.540	56.000	10.367	QP
12		1.966	12.538	2.171	-33.462	46.000	10.367	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: 2023-12-22
Temperature: 17.1°C	Humidity: 22.6%
Limit: FCC_Part15.207_CE_AC Power	Engineer: Linda Wei
Probe: ENV216_101683_Filter Off_E	Polarity: Neutral
EUT: 802.11ah Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ah-1MHz at 903.5MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV)	Factor (dB)	Type
1		0.154	36.161	26.386	-29.621	65.781	9.774	QP
2		0.154	25.630	15.856	-30.151	55.781	9.774	AV
3		0.454	31.755	21.839	-25.047	56.802	9.917	QP
4	*	0.454	22.445	12.528	-24.357	46.802	9.917	AV
5		0.742	25.865	15.784	-30.135	56.000	10.081	QP
6		0.742	15.679	5.599	-30.321	46.000	10.081	AV
7		1.118	23.583	13.328	-32.417	56.000	10.255	QP
8		1.118	11.935	1.680	-34.065	46.000	10.255	AV
9		1.470	22.831	12.519	-33.169	56.000	10.312	QP
10		1.470	12.246	1.934	-33.754	46.000	10.312	AV
11		1.970	21.765	11.358	-34.235	56.000	10.407	QP
12		1.970	10.592	0.186	-35.408	46.000	10.407	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 “2312RSU049-UT” file.

Appendix C - EUT Photograph

Refer to “2312RSU049-UE” file.

The End