

RF MEASUREMENT REPORT

FCC ID: TK4WSD377
Applicant: Compex Systems Pte Ltd
Application Type: Class II Permissive Change
Product: 2.4GHz/5GHz WiFi + Bluetooth Combination Module
Model No.: WSD377
Serial Model No. WSD377-I, WSD377-EVK
Brand Name: COMPEX
FCC Classification: Unlicensed National Information Infrastructure (NII)
FCC Rule Part(s): Part 15 Subpart E (Section 15.407)
Result: Complies
Received Date: 2022-12-01
Test Date: 2022-12-06

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
2212RSU005-U3	Rev. 01	Initial Report	2023-01-12	Valid

Note: Based on MRT original report No.1812RSU007-U3, this report adds two new antennas which gain are both less than the max gain of previous antennas, and the antenna type is same, so we only spot check Output power, Band Edge and Radiated Emission.

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1.4. Product Information

Product Name	2.4GHz/5GHz WiFi + Bluetooth Combination Module
Model No.	WSD377
Serial No.	104863192
Wi-Fi Specification	802.11a/b/g/n/ac
Bluetooth Specification	v4.2 single mode
Antenna Information	Refer to 1.7
Working Voltage	DC 3.3V
Note: 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	For 802.11a/n-HT20/ac-VHT20: 5180~5240MHz, 5260~5320MHz, 5500~5700MHz, 5745~5825MHz For 802.11n-HT40/ac-VHT40: 5190~5230MHz, 5270~5310MHz, 5510~5670MHz, 5755~5795MHz For 802.11ac-VHT80: 5210MHz, 5290MHz, 5530MHz, 5610 MHz, 5775MHz
Type of Modulation	802.11a/n/ac: OFDM
Data Rate	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps 802.11ac: up to 433.3Mbps

1.6. Working Frequencies

802.11a/n-HT20/ac-VHT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180 MHz	40	5200 MHz	44	5220 MHz
48	5240 MHz	52	5260 MHz	56	5280 MHz
60	5300 MHz	64	5320 MHz	100	5500 MHz
104	5520 MHz	108	5540 MHz	112	5560 MHz
116	5580 MHz	120	5600 MHz	124	5620 MHz
128	5640 MHz	132	5660 MHz	136	5680 MHz
140	5700 MHz	149	5745 MHz	153	5765 MHz
157	5785 MHz	161	5805 MHz	165	5825 MHz

802.11n-HT40/ac-VHT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz	54	5270 MHz
62	5310 MHz	102	5510 MHz	110	5550 MHz
118	5590 MHz	126	5630 MHz	134	5670 MHz
151	5755 MHz	159	5795 MHz	--	--

802.11ac-VHT80

Channel	Frequency	Channel	Frequency	Channel	Frequency
42	5210 MHz	58	5290 MHz	106	5530 MHz
122	5610 MHz	155	5775 MHz	--	--

1.7. Antenna Information

For original antenna

Polarization	Frequency Band (MHz)	TX Paths	Antenna Gain (dBi)
Omni	2400 ~ 2483.5	1*1	5.0
	5150 ~ 5850	1*1	7.0

For new Antenna

Antenna No.	Model No.	Polarization	Frequency Band (MHz)	TX Paths	Antenna Gain (dBi)
1	MA761.B.BICG.003	Omni	2400 ~ 2483.5	1*1	3.7
			5150 ~ 5850	1*1	5.4
2	WS.03.B.305151	Omni	2400 ~ 2483.5	1*1	2.7
			5150 ~ 5850	1*1	3.2

Note: Antenna No.1 was selected to perform test.

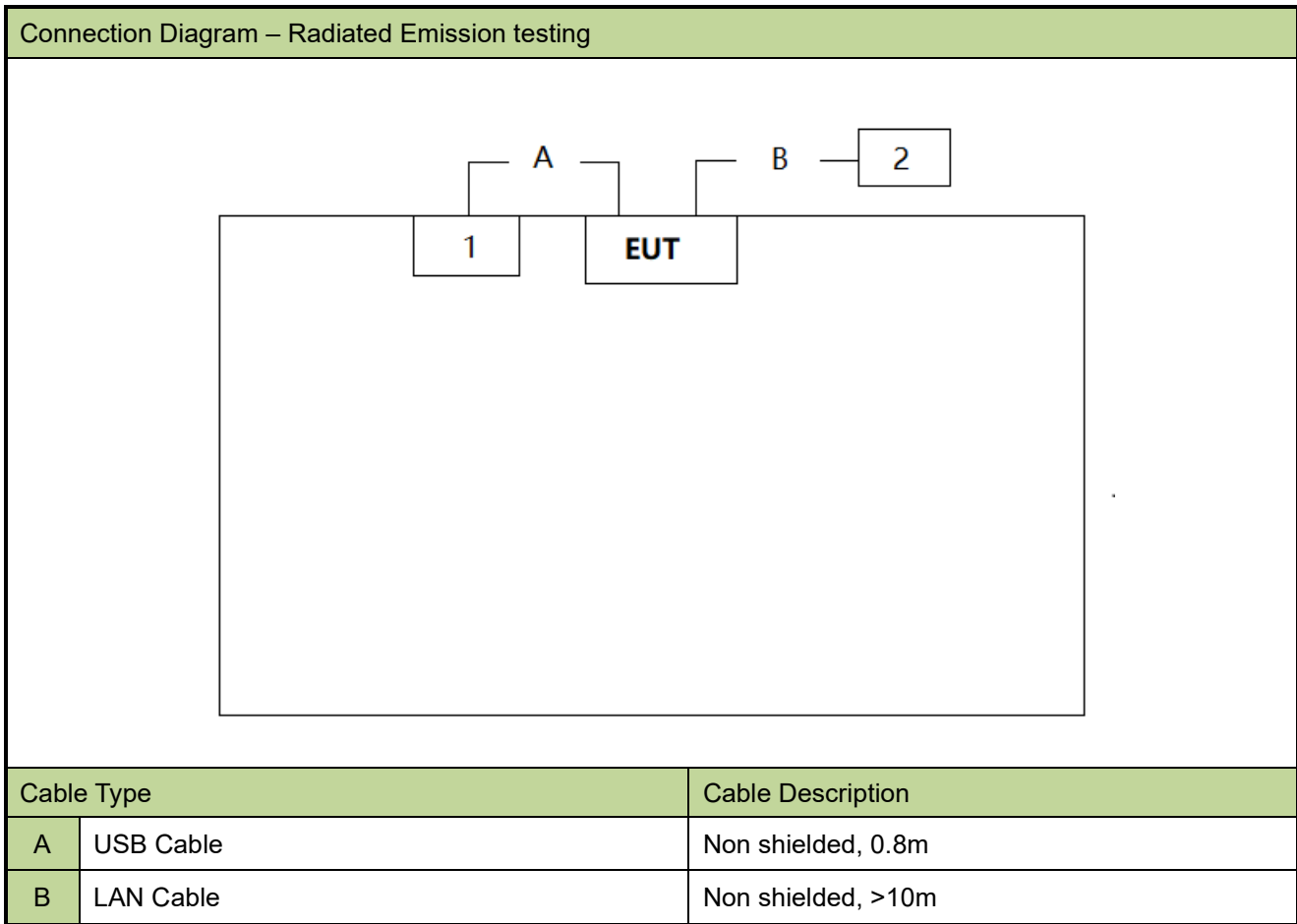
2. Test Configuration

2.1. Test Mode

Mode 1: Transmit by 802.11a (6Mbps)
Mode 2: Transmit by 802.11n-HT20 (MCS0)
Mode 3: Transmit by 802.11n-HT40 (MCS0)
Mode 4: Transmit by 802.11ac-VHT40 (MCS0)
Mode 5: Transmit by 802.11ac-VHT80 (MCS0)

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.



Product	Manufacturer	Model No.	
1	Host Computer	LIDON	SKR0317R01XX-3
2	Notebook	DELL	DELL Inspiron 5359

2.3. Test Software

The test utility software used during testing was “QRCT3”, and the version was v3.0-00268.

2.4. Applied Standards

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

- FCC Part 15.407
- 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 uses a unique IPEX 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
TRILOG Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2023-05-20	WZ-AC2
EMI Test Receiver	Agilent	N9038A	MRTSUE06125	1 year	2023-06-04	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	2023-05-08	WZ-AC2
Anechoic Chamber	RIKEN	WZ-AC2	MRTSUE06213	1 year	2023-04-21	WZ-AC2
Thermohygrometer	testo	608-H1	MRTSUE11038	1 year	2023-11-01	WZ-AC2
Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2022-12-29	WZ-AC2
USB Power Sensor	Keysight	U2021XA	MRTSUE06446	1 year	2023-06-04	WZ-SR5
Signal Analyzer	Keysight	N9010B	MRTSUE06457	1 year	2023-06-04	WZ-SR5
Thermohygrometer	testo	608-H1	MRTSUE06402	1 year	2023-06-06	WZ-SR5
Shielding Room	HUAMING	WZ-SR5	MRTSUE06442	N/A	N/A	WZ-SR5

Software	Version	Function
EMI Software	V3.0.0	EMI Test Software
Controller_MF 7802	1.02	RE Antenna & Turntable
Agilent Power Analyzer/Agilent Power Panel	V R03.09.00	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 Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): Horizontal: 30MHz~200MHz: 3.85dB 200MHz~1GHz: 4.36dB 1GHz~40GHz: 4.98dB Vertical: 30MHz~300MHz: 4.06dB 300MHz~1GHz: 5.28dB 1GHz~40GHz: 4.91dB
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
15.407(a)(1)(iv), (2), (3)(i)	Maximum Conducted Output Power	Conducted	Pass
15.205, 15.209 15.407(b)(9), (10), (11)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Radiated	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. Output Power Measurement

6.2.1. Test Limit

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm).

If transmitting antennas of directional gain greater than 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

6.2.2. Test Procedure

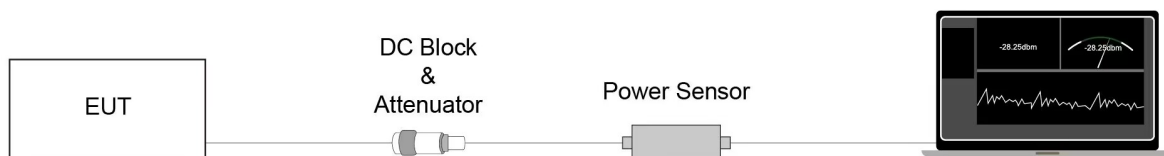
KDB 789033D02v02r01- Section II)E)3)b) Method PM-G

6.2.3. 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.

6.2.4. Test Setup



6.2.5. Test Result

Refer to Appendix A.1.

6.3. Radiated Spurious Emission Measurement

6.3.1. Test Limit

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

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

6.3.2. Test Procedure

KDB 789033 D02v02r01- Section II)G)

6.3.3. 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

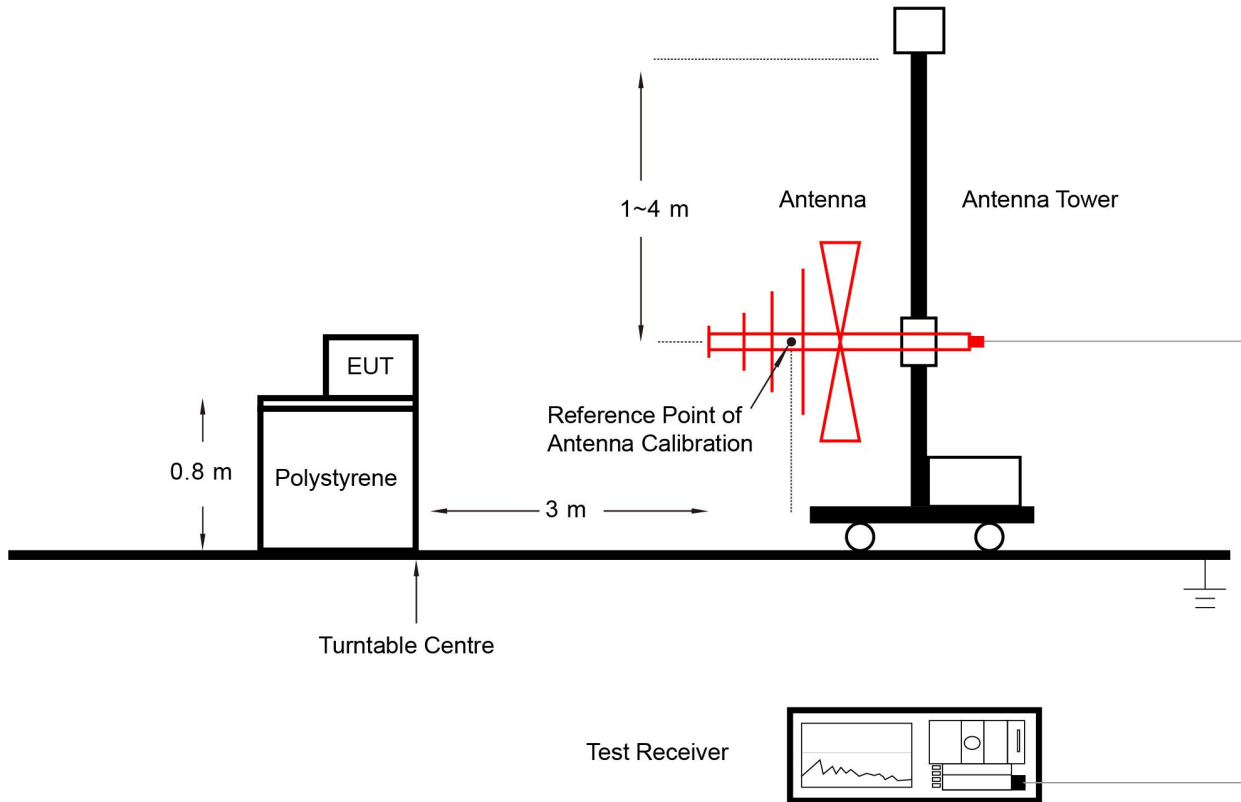
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

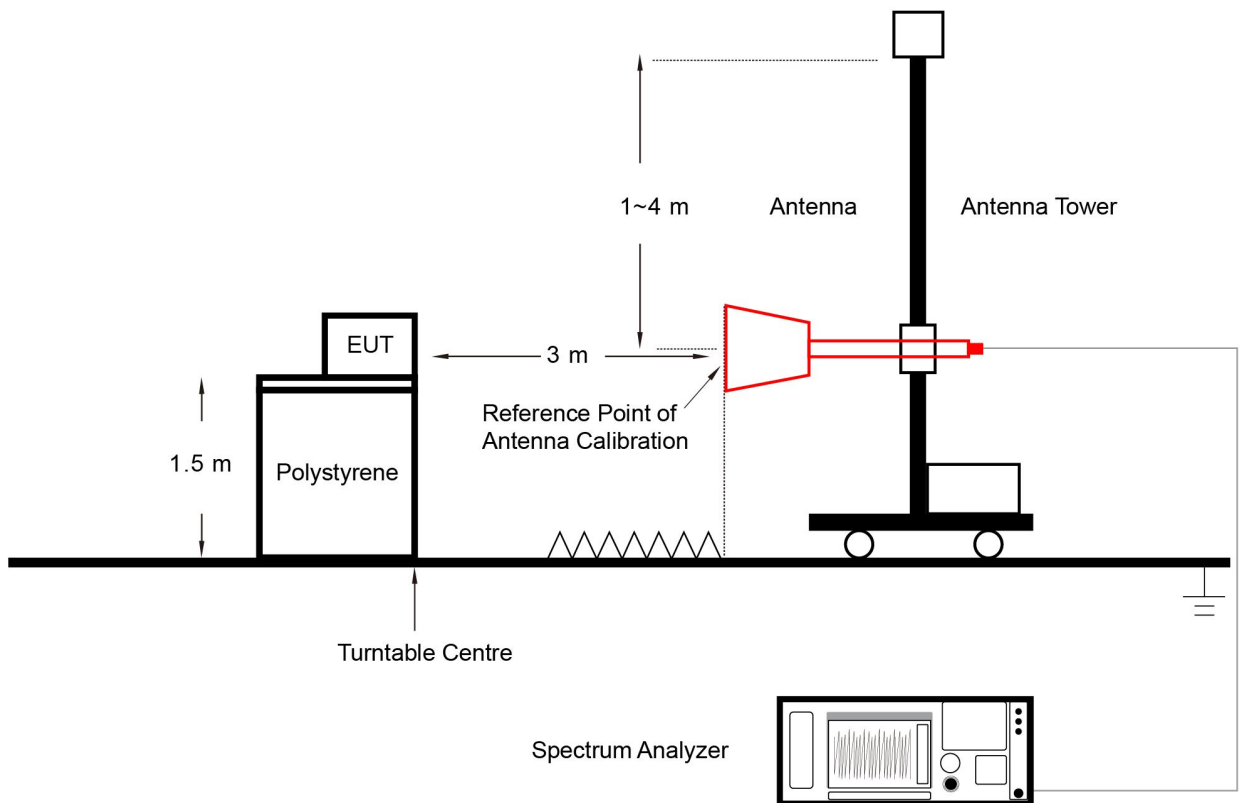
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10 Hz.
If the EUT duty cycle is $< 98\%$, set VBW $\geq 1/T$. T is the minimum transmission duration.
4.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

6.3.4. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.3.5. Test Result

Refer to Appendix A.2.

6.4. Radiated Restricted Band Edge Measurement

6.4.1. 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	--	--	--

For 15.407(b) requirement:

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Refer to KDB 789033 D02v02r01 G)2)c), as specified in § 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a maximum emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in § 15.407(b)(4)). However, an out-of-band emission that complies with both the peak and average limits of § 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz maximum emission limit.

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

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

6.4.2. Test Procedure

KDB 789033 D02v02r01- Section II)G)

6.4.3. Test Setting

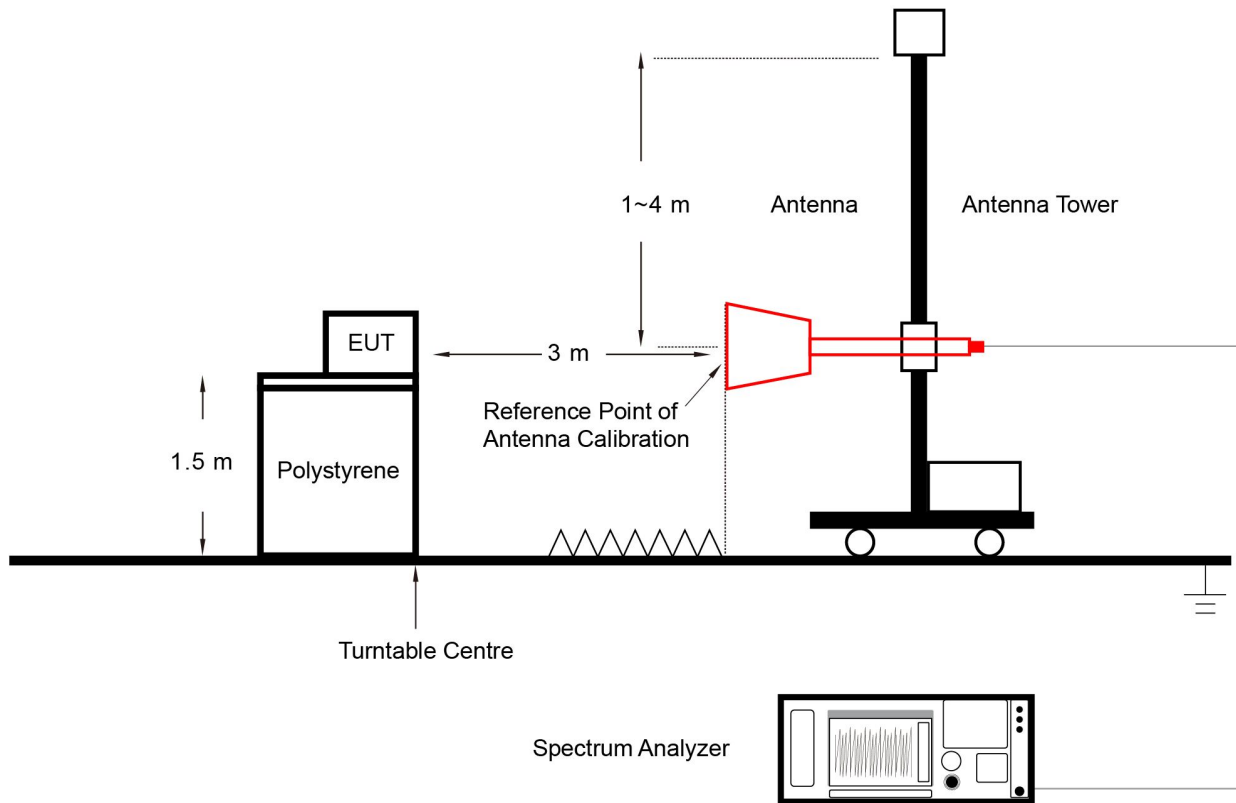
Peak Measurements above 1GHz

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 = 10Hz
4. If the EUT duty cycle is $< 98\%$, set VBW $\geq 1/T$. T is the minimum transmission duration
5. Detector = Peak
6. Sweep time = Auto
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.3.

Appendix A – Test Result

A.1 Output Power Test Result

Test Site	WZ-SR5	Test Engineer	Liz Yuan
Test Date	2022-12-06		

Test Mode	Data Rate/ MCS	Ch. No.	Freq. (MHz)	Total Average Power (dBm)	Average Power Limit (dBm)
11a	6Mbps	100	5500	10.17	≤ 30.00
11n-HT20	MCS0	140	5700	12.01	≤ 30.00
11n-HT40	MCS0	159	5795	11.82	≤ 30.00
11ac-VHT40	MCS0	38	5190	10.36	≤ 23.98
11ac-VHT80	MCS0	58	5290	10.53	≤ 23.98

A.2 Radiated Spurious Emission Measurement Test Result

Test Site	WZ-AC2	Test Engineer	Lucas Wang
Test Date	2022-12-06	Test Mode	802.11n-HT20 – Channel 140
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dB μ V)	Factor (dB/m)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB/m)	Detector	Polarization
*	7995.5	35.0	11.8	46.8	68.2	-21.4	Peak	Horizontal
*	10120.5	33.4	14.5	47.9	68.2	-20.3	Peak	Horizontal
	11310.5	32.1	17.5	49.6	74.0	-24.4	Peak	Horizontal
	12679.0	31.0	17.6	48.6	74.0	-25.4	Peak	Horizontal
*	8004.0	34.2	12.0	46.2	68.2	-22.0	Peak	Vertical
*	8871.0	32.7	13.3	46.0	68.2	-22.2	Peak	Vertical
	10826.0	31.7	17.6	49.3	74.0	-24.7	Peak	Vertical
	11455.0	31.6	17.3	48.9	74.0	-25.1	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB μ V/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

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

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

Test Site	WZ-AC2	Test Engineer	Lucas Wang
Test Date	2022-12-06	Test Mode	802.11n-HT40 – Channel 159
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB/m)	Detector	Polarization
*	7995.5	35.6	11.8	47.4	68.2	-20.8	Peak	Horizontal
*	8667.0	32.7	12.8	45.5	68.2	-22.7	Peak	Horizontal
	10979.0	32.1	17.4	49.5	74.0	-24.5	Peak	Horizontal
	12143.5	31.1	17.5	48.6	74.0	-25.4	Peak	Horizontal
*	8012.5	33.9	12.0	45.9	68.2	-22.3	Peak	Vertical
*	8794.5	32.3	13.4	45.7	68.2	-22.5	Peak	Vertical
	10894.0	31.8	17.1	48.9	74.0	-25.1	Peak	Vertical
	11718.5	31.2	17.5	48.7	74.0	-25.3	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: 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	Lucas Wang
Test Date	2022-12-06	Test Mode	802.11ac-VHT40 – Channel 38
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB/m)	Detector	Polarization
*	8012.5	34.3	12.0	46.3	68.2	-21.9	Peak	Horizontal
*	8684.0	32.8	12.9	45.7	68.2	-22.5	Peak	Horizontal
	11208.5	32.0	17.8	49.8	74.0	-24.2	Peak	Horizontal
	12356.0	30.9	17.0	47.9	74.0	-26.1	Peak	Horizontal
*	7995.5	34.4	11.8	46.2	68.2	-22.0	Peak	Vertical
*	8701.0	32.4	12.9	45.3	68.2	-22.9	Peak	Vertical
	11004.5	32.4	17.1	49.5	74.0	-24.5	Peak	Vertical
	11676.0	31.9	17.3	49.2	74.0	-24.8	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: 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	Lucas Wang
Test Date	2022-12-06	Test Mode	802.11ac-VHT80 – Channel 58
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB/m)	Detector	Polarization
*	7052.0	36.0	10.9	46.9	68.2	-21.3	Peak	Horizontal
*	7239.0	31.3	11.1	42.4	68.2	-25.8	Peak	Horizontal
	7587.5	39.2	11.5	50.7	74.0	-23.3	Peak	Horizontal
	11217.0	31.6	17.8	49.4	74.0	-24.6	Peak	Horizontal
*	7052.0	37.6	10.9	48.5	68.2	-19.7	Peak	Vertical
*	9219.5	33.4	14.3	47.7	68.2	-20.5	Peak	Vertical
	10843.0	32.9	17.3	50.2	74.0	-23.8	Peak	Vertical
	11455.0	32.3	17.3	49.6	74.0	-24.4	Peak	Vertical

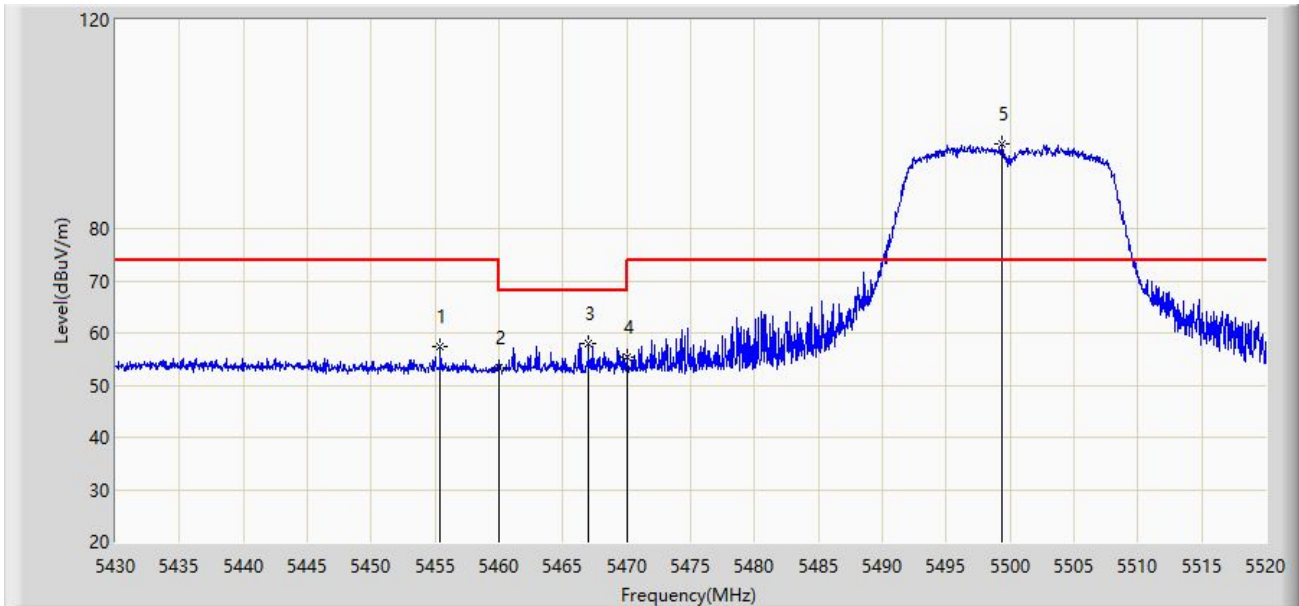
Note 1: "*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

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

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

A.3 Radiated Restricted Band Edge Test Result

Site: WZ-AC2	Time: 2022/12/06 - 19:58
Limit: FCC_5G_RE(3m)	Engineer: Lucas Wang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: 2.4GHz/5GHz WiFi + Bluetooth Combination Module	Power: DC 3.3V
Test Mode: Transmit by 802.11a at 5500MHz	



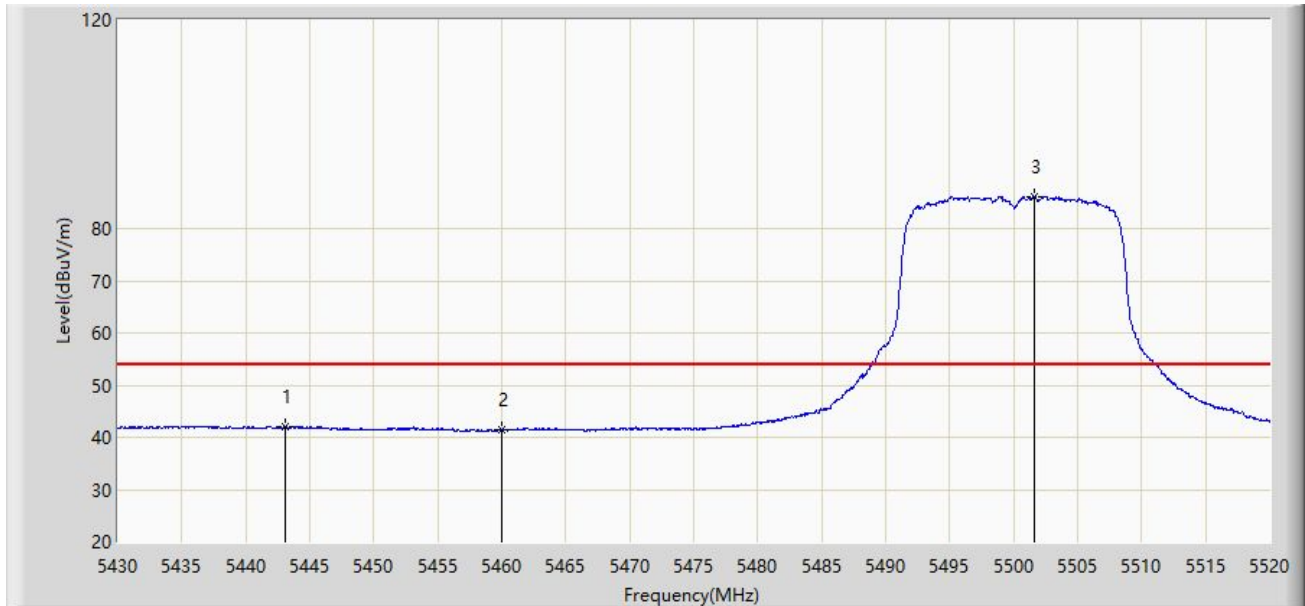
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		5455.425	57.411	53.555	-16.589	74.000	3.856	PK
2		5460.000	53.360	49.532	-20.640	74.000	3.828	PK
3	*	5466.990	58.026	54.228	-10.174	68.200	3.797	PK
4		5470.000	55.411	51.627	-12.789	68.200	3.785	PK
5		5499.390	96.371	92.333	N/A	N/A	4.038	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) - Pre_Amplifier Gain (dB).

Site: WZ-AC2	Time: 2022/12/06 - 20:01
Limit: FCC_5G_RE(3m)	Engineer: Lucas Wang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: 2.4GHz/5GHz WiFi + Bluetooth Combination Module	Power: DC 3.3V
Test Mode: Transmit by 802.11a at 5500MHz	



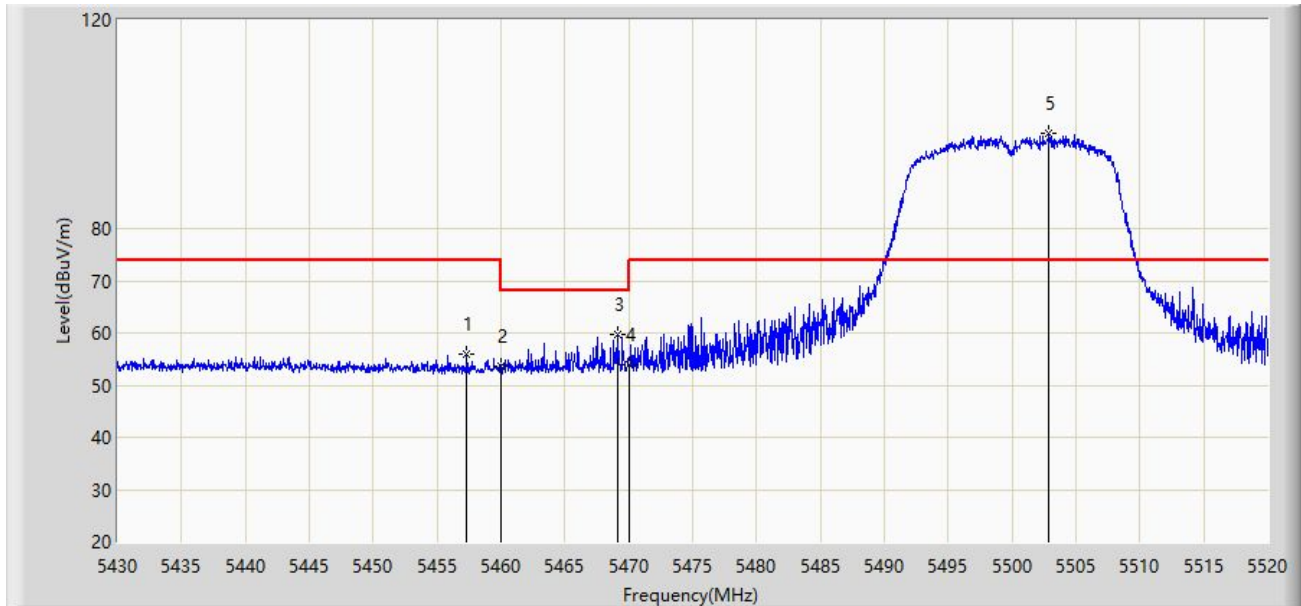
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	5443.095	42.047	37.912	-11.953	54.000	4.135	AV
2		5460.000	41.460	37.632	-12.540	54.000	3.828	AV
3		5501.595	86.179	82.104	N/A	N/A	4.076	AV

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

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

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

Site: WZ-AC2	Time: 2022/12/06 - 20:03
Limit: FCC_5G_RE(3m)	Engineer: Lucas Wang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: 2.4GHz/5GHz WiFi + Bluetooth Combination Module	Power: DC 3.3V
Test Mode: Transmit by 802.11a at 5500MHz	



No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		5457.315	55.995	52.155	-18.005	74.000	3.840	PK
2		5460.000	53.502	49.674	-20.498	74.000	3.828	PK
3	*	5469.150	59.796	56.008	-8.404	68.200	3.788	PK
4		5470.000	53.827	50.043	-14.373	68.200	3.785	PK
5		5502.900	98.275	94.177	N/A	N/A	4.098	PK

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

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

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

Site: WZ-AC2	Time: 2022/12/06 - 20:04
Limit: FCC_5G_RE(3m)	Engineer: Lucas Wang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: 2.4GHz/5GHz WiFi + Bluetooth Combination Module	Power: DC 3.3V
Test Mode: Transmit by 802.11a at 5500MHz	



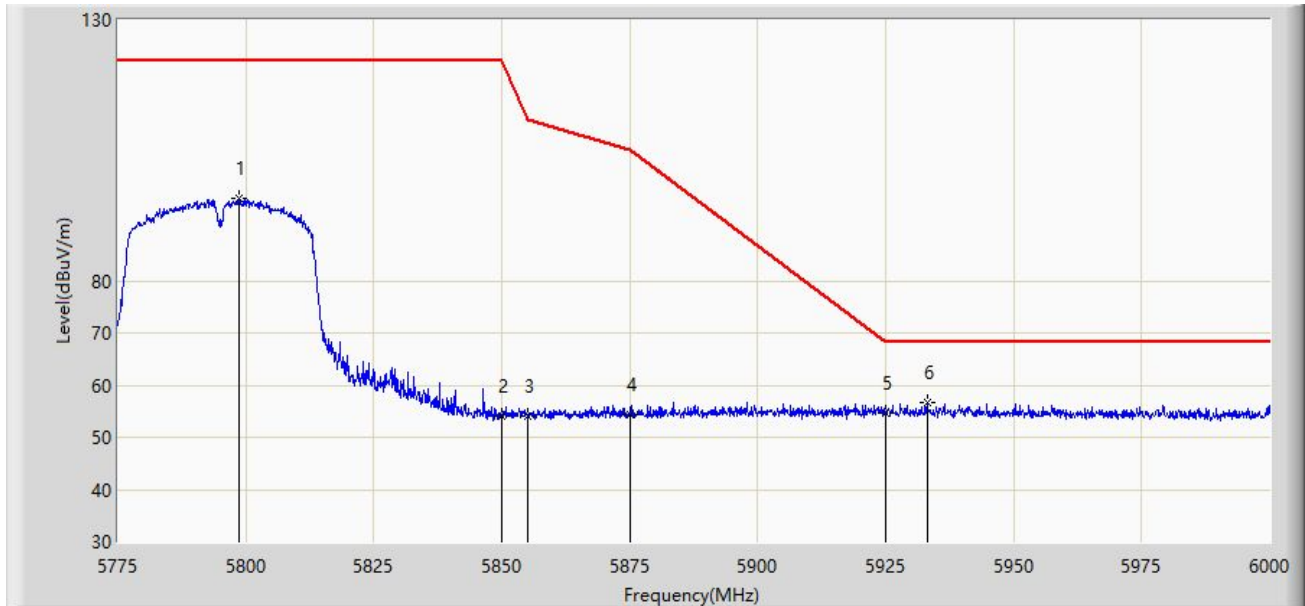
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	5436.795	42.199	37.922	-11.801	54.000	4.277	AV
2		5460.000	41.465	37.637	-12.535	54.000	3.828	AV
3		5502.675	88.155	84.061	N/A	N/A	4.093	AV

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

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

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

Site: WZ-AC2	Time: 2022/12/06 - 20:06
Limit: FCC_5.8G_RE(3m)	Engineer: Lucas Wang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: 2.4GHz/5GHz WiFi + Bluetooth Combination Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT40 at 5795MHz	



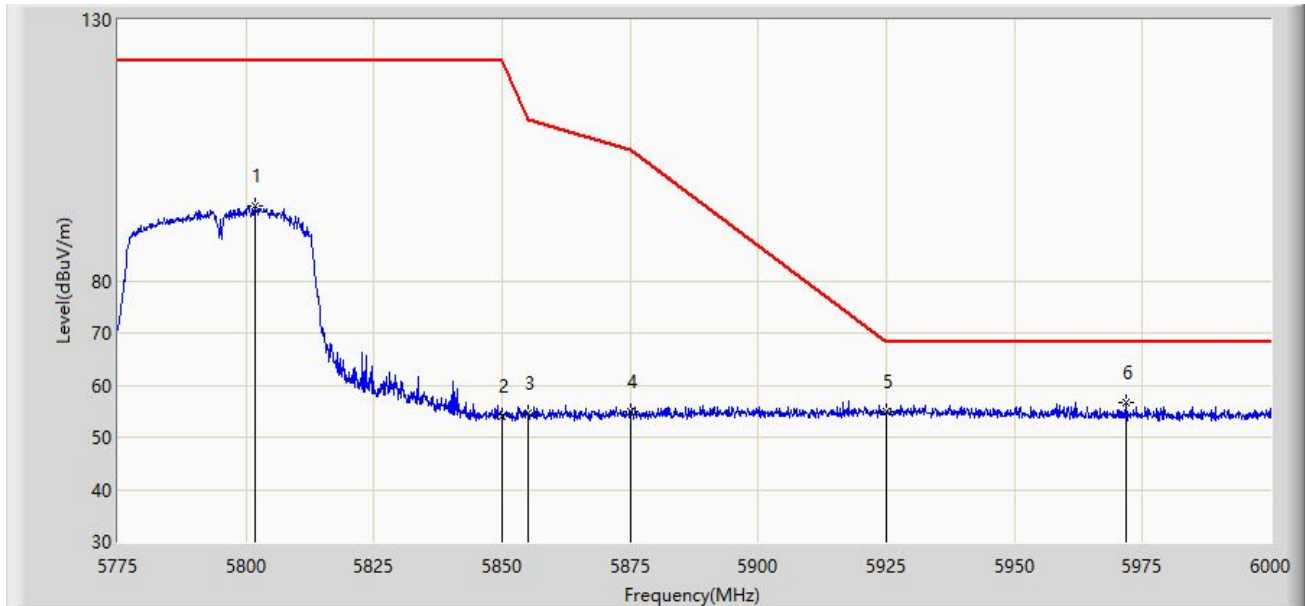
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		5798.737	95.687	89.814	N/A	N/A	5.872	PK
2		5850.000	54.146	48.436	-68.054	122.200	5.710	PK
3		5855.000	54.142	48.352	-56.658	110.800	5.790	PK
4		5875.000	54.303	48.390	-50.897	105.200	5.913	PK
5		5925.000	54.542	48.525	-13.658	68.200	6.016	PK
6	*	5933.175	56.737	50.650	-11.463	68.200	6.086	PK

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

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

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

Site: WZ-AC2	Time: 2022/12/06 - 20:07
Limit: FCC_5.8G_RE(3m)	Engineer: Lucas Wang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: 2.4GHz/5GHz WiFi + Bluetooth Combination Module	Power: DC 3.3V
Test Mode: Transmit by 802.11n-HT40 at 5795MHz	



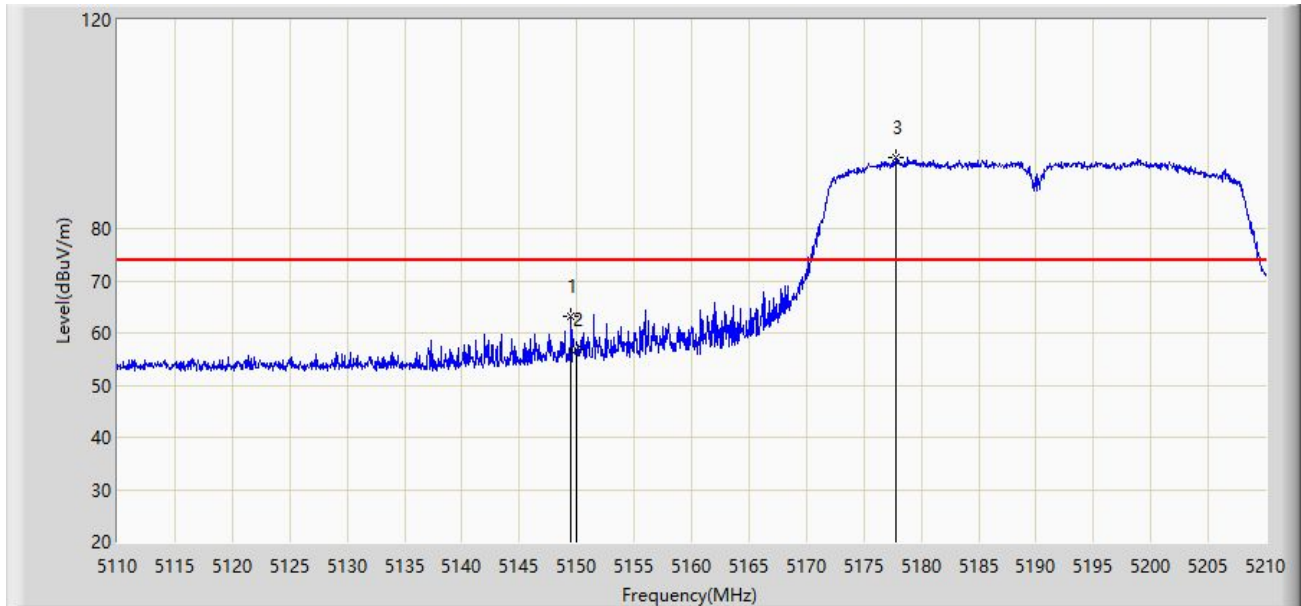
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		5801.888	94.313	88.471	N/A	N/A	5.842	PK
2		5850.000	54.189	48.479	-68.011	122.200	5.710	PK
3		5855.000	54.541	48.751	-56.259	110.800	5.790	PK
4		5875.000	54.800	48.887	-50.400	105.200	5.913	PK
5		5925.000	54.790	48.773	-13.410	68.200	6.016	PK
6	*	5971.763	56.602	50.600	-11.598	68.200	6.002	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) - Pre_Amplifier Gain (dB).

Site: WZ-AC2	Time: 2022/12/06 - 20:10
Limit: FCC_5G_RE(3m)	Engineer: Lucas Wang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: 2.4GHz/5GHz WiFi + Bluetooth Combination Module	Power: DC 3.3V
Test Mode: Transmit by 802.11ac-VHT40 at 5190MHz	



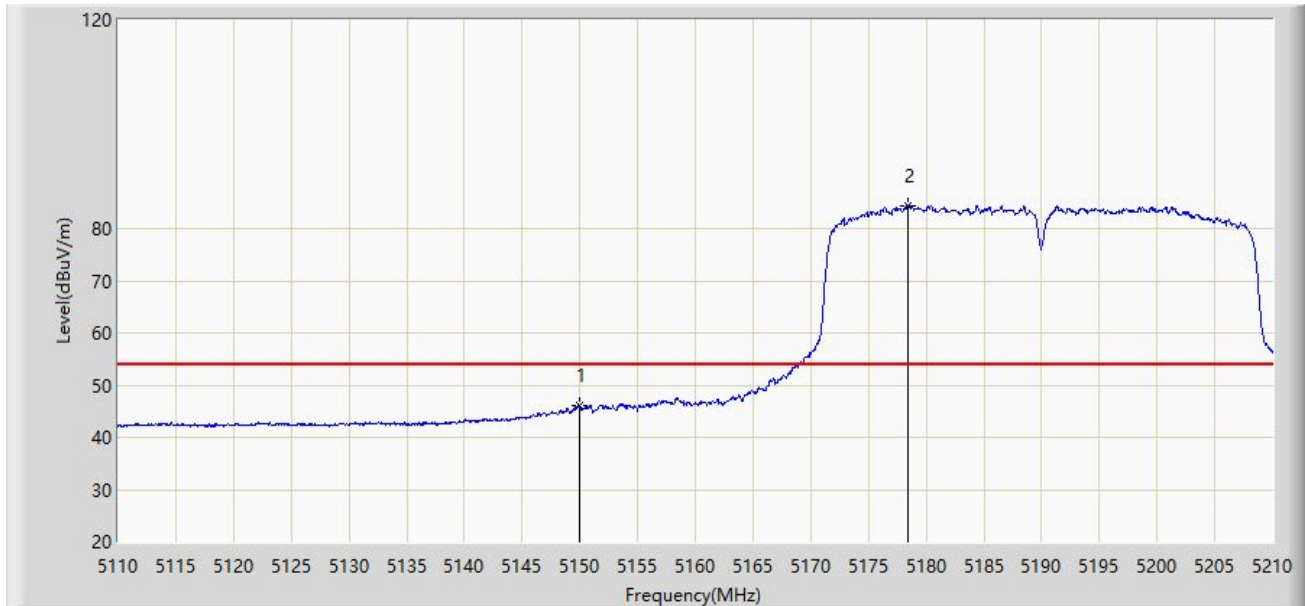
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	5149.500	63.228	59.147	-10.772	74.000	4.081	PK
2		5150.000	56.675	52.606	-17.325	74.000	4.069	PK
3		5177.750	93.686	89.908	N/A	N/A	3.778	PK

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

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

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

Site: WZ-AC2	Time: 2022/12/06 - 20:13
Limit: FCC_5G_RE(3m)	Engineer: Lucas Wang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: 2.4GHz/5GHz WiFi + Bluetooth Combination Module	Power: DC 3.3V
Test Mode: Transmit by 802.11ac-VHT40 at 5190MHz	



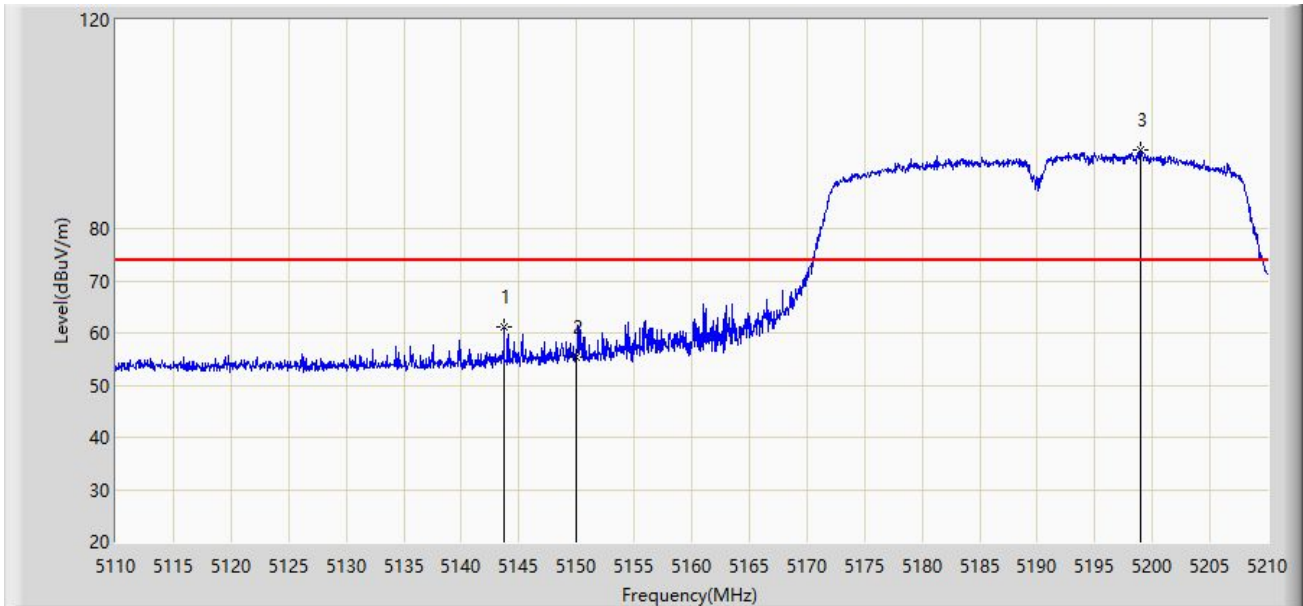
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	5150.000	46.150	42.081	-7.850	54.000	4.069	AV
2		5178.400	84.458	80.680	N/A	N/A	3.777	AV

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-AC2	Time: 2022/12/06 - 20:14
Limit: FCC_5G_RE(3m)	Engineer: Lucas Wang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: 2.4GHz/5GHz WiFi + Bluetooth Combination Module	Power: DC 3.3V
Test Mode: Transmit by 802.11ac-VHT40 at 5190MHz	



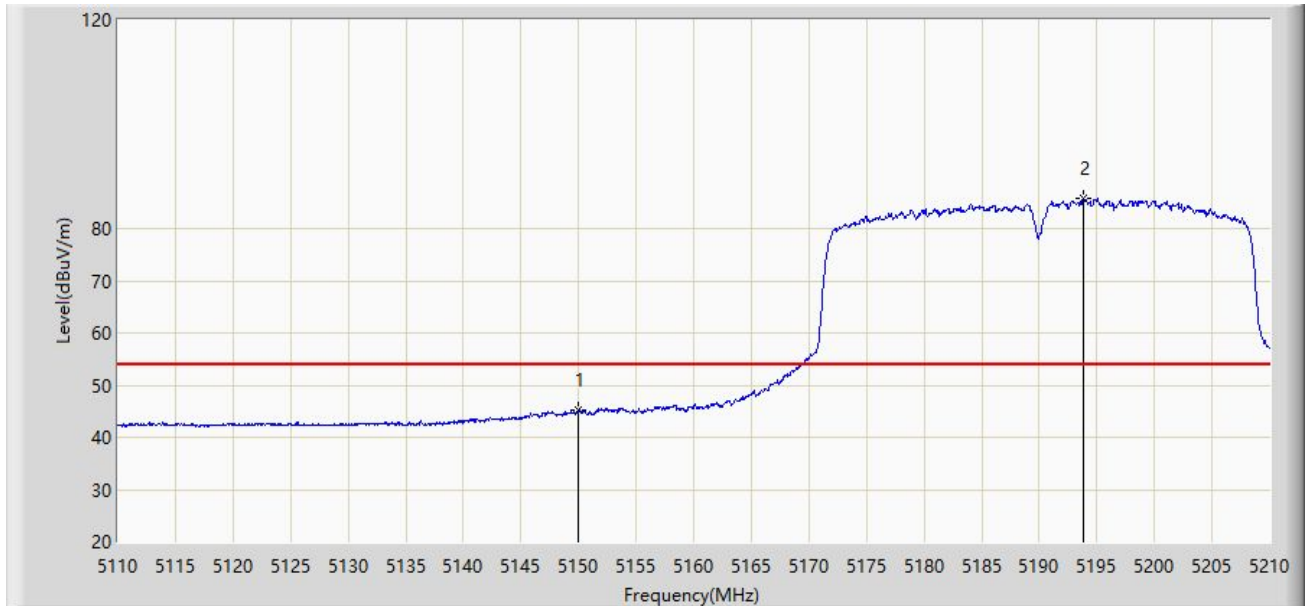
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	5143.700	61.020	56.896	-12.980	74.000	4.125	PK
2		5150.000	55.342	51.273	-18.658	74.000	4.069	PK
3		5198.950	95.045	91.262	N/A	N/A	3.783	PK

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) - Pre_Amplifier Gain (dB).

Site: WZ-AC2	Time: 2022/12/06 - 20:15
Limit: FCC_5G_RE(3m)	Engineer: Lucas Wang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: 2.4GHz/5GHz WiFi + Bluetooth Combination Module	Power: DC 3.3V
Test Mode: Transmit by 802.11ac-VHT40 at 5190MHz	



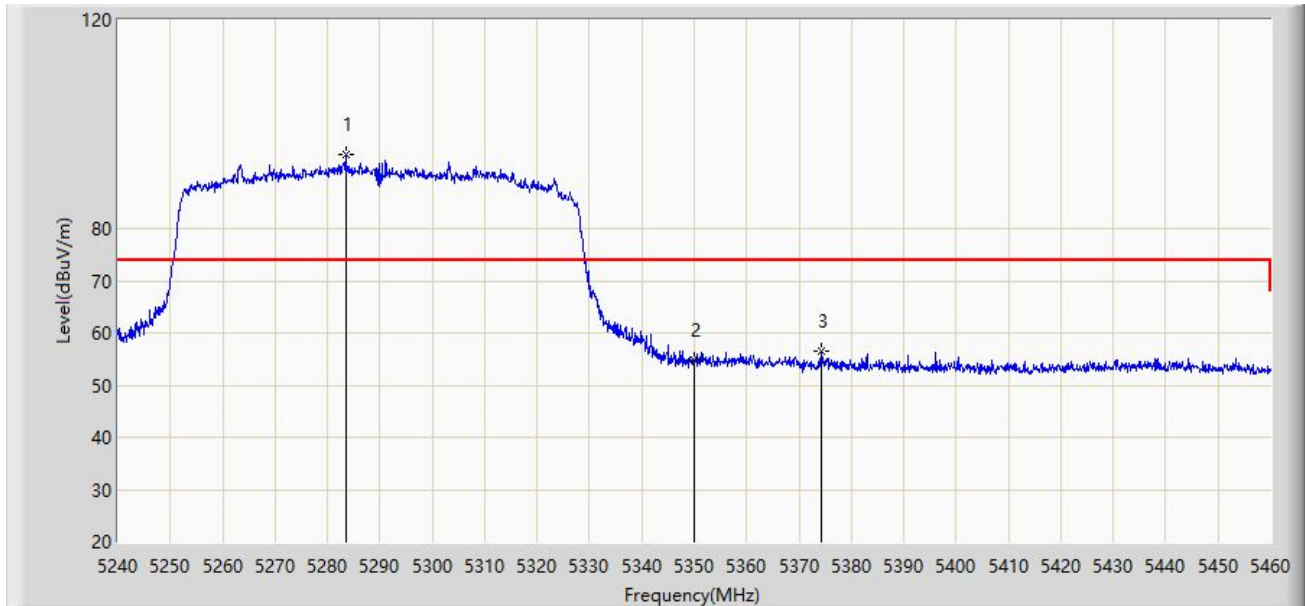
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	5150.000	45.166	41.097	-8.834	54.000	4.069	AV
2		5193.800	85.777	81.993	N/A	N/A	3.784	AV

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

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

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

Site: WZ-AC2	Time: 2022/12/06 - 20:20
Limit: FCC_5G_RE(3m)	Engineer: Lucas Wang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: 2.4GHz/5GHz WiFi + Bluetooth Combination Module	Power: DC 3.3V
Test Mode: Transmit by 802.11ac-VHT80 at 5290MHz	



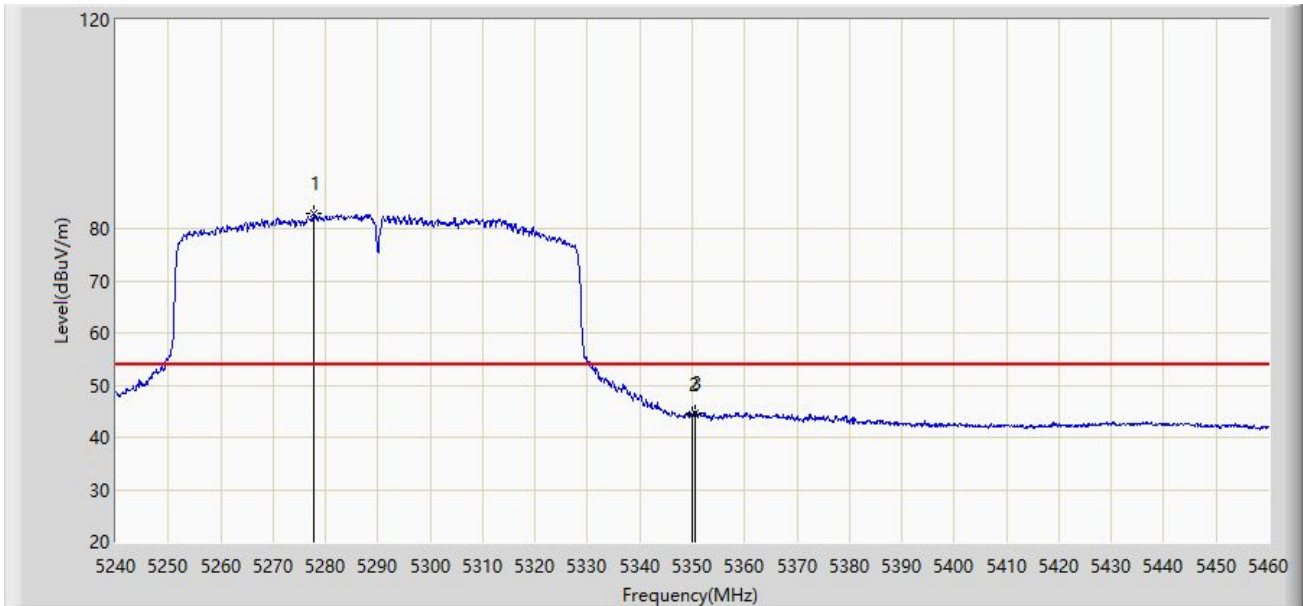
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		5283.450	94.078	90.411	N/A	N/A	3.667	PK
2		5350.000	54.717	50.870	-19.283	74.000	3.847	PK
3	*	5374.200	56.424	52.456	-17.576	74.000	3.967	PK

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

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

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

Site: WZ-AC2	Time: 2022/12/06 - 20:23
Limit: FCC_5G_RE(3m)	Engineer: Lucas Wang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: 2.4GHz/5GHz WiFi + Bluetooth Combination Module	Power: DC 3.3V
Test Mode: Transmit by 802.11ac-VHT80 at 5290MHz	



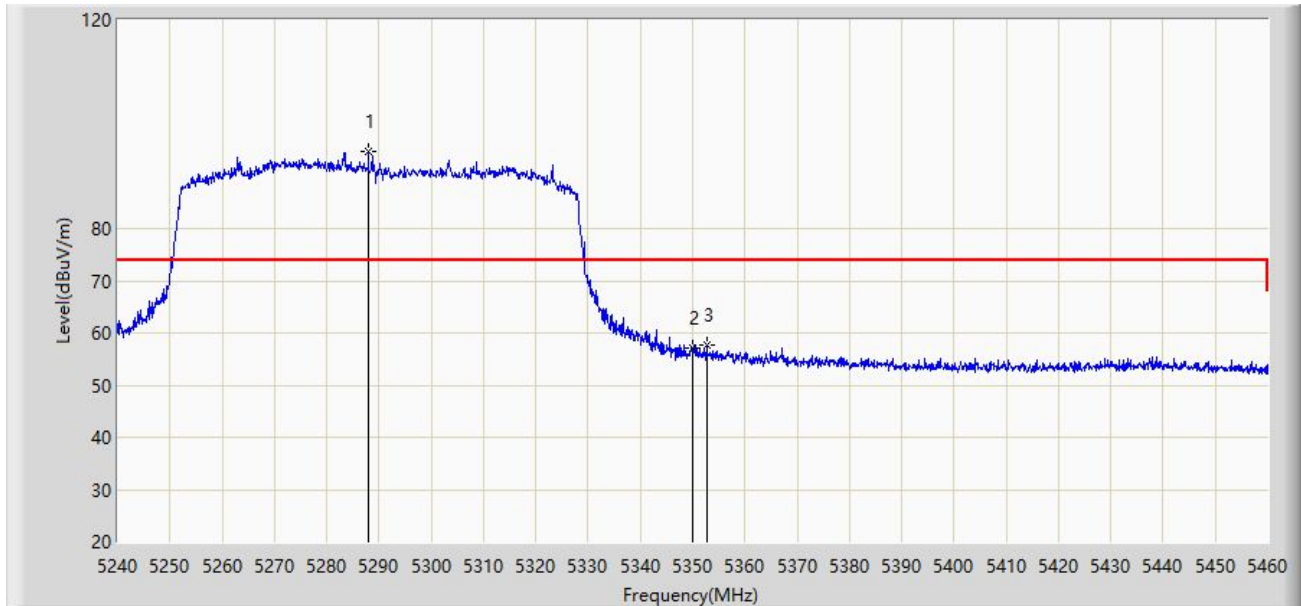
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		5277.840	82.996	79.380	N/A	N/A	3.616	AV
2		5350.000	44.205	40.358	-9.795	54.000	3.847	AV
3	*	5350.440	44.769	40.914	-9.231	54.000	3.855	AV

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-AC2	Time: 2022/12/06 - 20:24
Limit: FCC_5G_RE(3m)	Engineer: Lucas Wang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: 2.4GHz/5GHz WiFi + Bluetooth Combination Module	Power: DC 3.3V
Test Mode: Transmit by 802.11ac-VHT80 at 5290MHz	



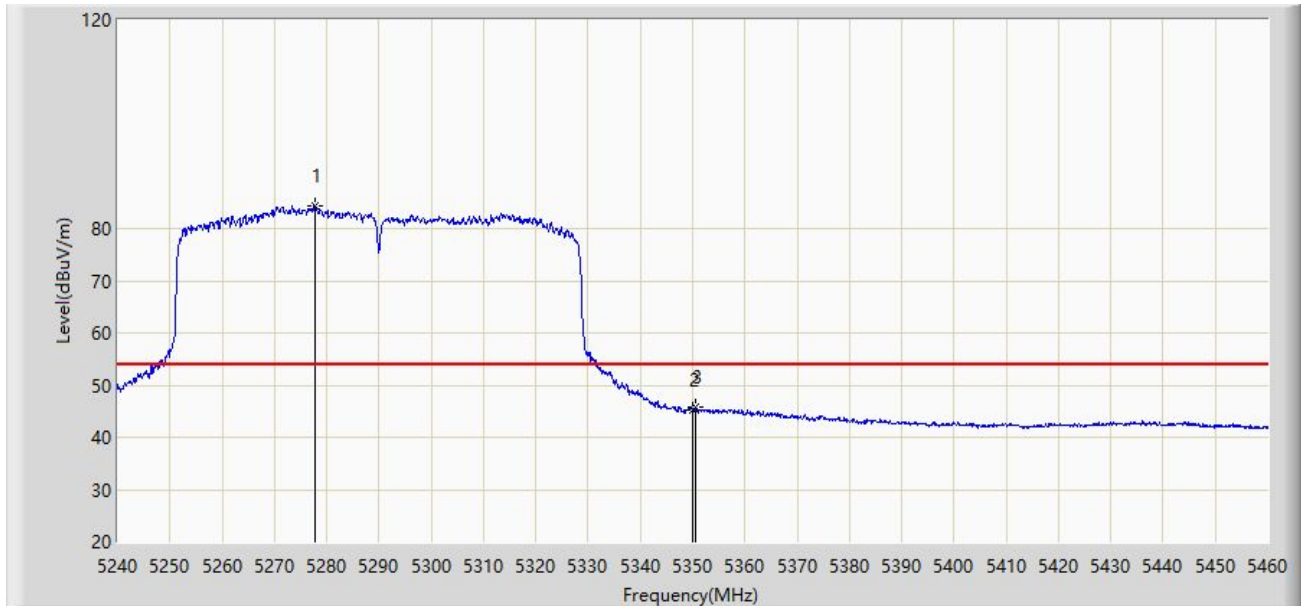
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		5287.960	94.678	91.026	N/A	N/A	3.651	PK
2		5350.000	57.236	53.389	-16.764	74.000	3.847	PK
3	*	5352.640	57.753	53.868	-16.247	74.000	3.885	PK

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

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

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

Site: WZ-AC2	Time: 2022/12/06 - 20:26
Limit: FCC_5G_RE(3m)	Engineer: Lucas Wang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: 2.4GHz/5GHz WiFi + Bluetooth Combination Module	Power: DC 3.3V
Test Mode: Transmit by 802.11ac-VHT80 at 5290MHz	



No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		5277.840	84.392	80.776	N/A	N/A	3.616	AV
2		5350.000	45.325	41.478	-8.675	54.000	3.847	AV
3	*	5350.660	45.699	41.840	-8.301	54.000	3.859	AV

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

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

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

Appendix B – Test Setup Photograph

Refer to “2212RSU005-UT” file.

Appendix C – EUT Photograph

Refer to “2212RSU005-UE” file.

_____ The End _____