

RF MEASUREMENT REPORT

FCC ID: TK4WLE900VX
Applicant: Compex Systems Pte Ltd
Application Type: Class II Permissive Change
Product: 802.11ac Dual Band Module
Model No.: WLE900VX, WLE900VX-I
Brand Name: COMPEX
FCC Classification: Unlicensed National Information Infrastructure (NII)
FCC Rule Part(s): Part 15 Subpart E (Section 15.407)
Result: Complies
Test Date: 2022-08-17 ~ 2022-09-21

Reviewed By:

Jame Yuan

Approved By:

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 789033. 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
2208RSU014-U2	Rev. 01	Initial Report	2022-09-27	Valid

Note: Based on MRT original report No.1801RSU027-U2, this report adds a new antenna which gain is less than the max gain of all previous antennas, so we only spot check Output power, Band Edge and Radiated Emission.

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1. General Information

1.1. Applicant

Compex Systems Pte Ltd

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

1.2. Manufacturer

Compex Systems Pte Ltd

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

1.3. Testing Facility

<input checked="" type="checkbox"/>	<p>Test Site – MRT Suzhou Laboratory</p> <hr/> <p>Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China</p> <p>Laboratory Location (Suzhou - SIP) 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China</p> <hr/> <p>Laboratory Accreditations</p> <p>A2LA: 3628.01 CNAS: L10551</p> <p>FCC: CN1166 ISED: CN0001</p> <p>VCCI: <input type="checkbox"/>R-20025 <input type="checkbox"/>G-20034 <input type="checkbox"/>C-20020 <input type="checkbox"/>T-20020</p> <p style="padding-left: 100px;"><input type="checkbox"/>R-20141 <input type="checkbox"/>G-20134 <input type="checkbox"/>C-20103 <input type="checkbox"/>T-20104</p>
<input type="checkbox"/>	<p>Test Site – MRT Shenzhen Laboratory</p> <hr/> <p>Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China</p> <hr/> <p>Laboratory Accreditations</p> <p>A2LA: 3628.02 CNAS: L10551</p> <p>FCC: CN1284 ISED: CN0105</p>
<input type="checkbox"/>	<p>Test Site – MRT Taiwan Laboratory</p> <hr/> <p>Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)</p> <hr/> <p>Laboratory Accreditations</p> <p>TAF: L3261-190725</p> <p>FCC: 291082, TW3261 ISED: TW3261</p>

1.4. Product Information

Product Name	802.11ac Dual Band Module
Model No.	WLE900VX, WLE900VX-I
EUT Identification No.	20220804Sample#03
Wi-Fi Specification	802.11a/b/g/n/ac
Antenna Information	Refer to section 1.7
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	For 802.11a/n-HT20: 5180~5320MHz, 5500~5700MHz, 5745~5825MHz For 802.11ac-VHT20: 5180~5320MHz, 5500~5720MHz, 5745~5825MHz For 802.11n-HT40: 5190~5310MHz, 5510~5670MHz, 5755~5795MHz For 802.11ac-VHT40: 5190~5310MHz, 5510~5710MHz, 5755~5795MHz For 802.11ac-VHT80: 5210MHz, 5290MHz, 5530MHz, 5610MHz, 5690MHz, 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 450Mbps 802.11ac: up to 1299.9Mbps

1.6. Working Frequencies

802.11a/n-HT20

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

802.11ac-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	144	5720 MHz	149	5745 MHz
153	5765 MHz	157	5785 MHz	161	5805 MHz
165	5825 MHz	--	--	--	--

802.11n-HT40

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

802.11ac-VHT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz	54	5270 MHz
62	5310 MHz	102	5510 MHz	110	5550MHz
118	5590 MHz	126	5630 MHz	134	5670 MHz
142	5710 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	138	5690 MHz	155	5775 MHz

1.7. Antenna Details

Original Antenna List

Antenna Type	Manufacturer	Antenna Gain(dBi)		Directional Gain (dBi)	
		2.4G	5G	2.4G	5G
Panel Antenna 1#	Compex Systems Pte Ltd	11.0	--	11.0	--
Panel Antenna 2#	Kenbotong Communication LTD	10.0	10.0	10.0	10.0
Panel Antenna 3#	Smart Ant Inc	7.0	7.0	7.0	7.0
Panel Antenna 4#	TAOGLAS Inc	4.5	6.7	4.5	6.7
Panel Antenna 5#	Compex Systems Pte Ltd	5.0	5.0	5.0	5.0
Panel Antenna 6#	Compex Systems Pte Ltd	5.0	5.0	5.0	5.0
Omni Antenna 1#	Kunshan Wavelink Electronic Co., Ltd	2.0	2.0	2.0	2.0
Omni Antenna 2#	Smart Ant Co., Ltd	2.5	5.0	2.5	5.0
Omni Antenna 3#	Smart Ant Co., Ltd	3.0	6.0	3.0	6.0
Omni Antenna 4#	Smart Ant Co., Ltd	2.0	2.0	2.0	2.0
Omni Antenna 5#	Smart Ant Co., Ltd	5.0	7.0	5.0	7.0
Omni Antenna 6#	Smart Ant Co., Ltd	3.0	6.0	3.0	6.0
Omni Antenna 7#	Smart Ant Co., Ltd	2.0	2.0	2.0	2.0
Omni Antenna 8#	Smart Ant Co., Ltd	4.5	7.0	4.5	7.0

Add New Antenna

Antenna Type	Manufacturer	Antenna Gain(dBi)		Directional Gain (dBi)	
		2.4G	5G	2.4G	5G
Omni Antenna	Ethertronics Inc	3.6	5.1	3.6	5.1

Note 1: The device didn't support transmit beam-forming mode and Cyclic Delay Diversity (CDD) mode, and the transmit signals are uncorrected, so no add array gain to the band power and band PSD.

Note 2: The directional gain= G_{ANT}

Test Mode	Ant 0	Ant 1	Ant 2	Ant 0+1	Ant 0+1+2
802.11a	√	√	√	×	×
802.11ac-VHT20	√	√	√	√	√
802.11ac-VHT40	√	√	√	√	√
802.11ac-VHT80	√	√	√	√	√
802.11ax-HE20	√	√	√	√	√
802.11ax-HE40	√	√	√	√	√
802.11ax-HE80	√	√	√	√	√

Note: "x" means not support, "√" means support

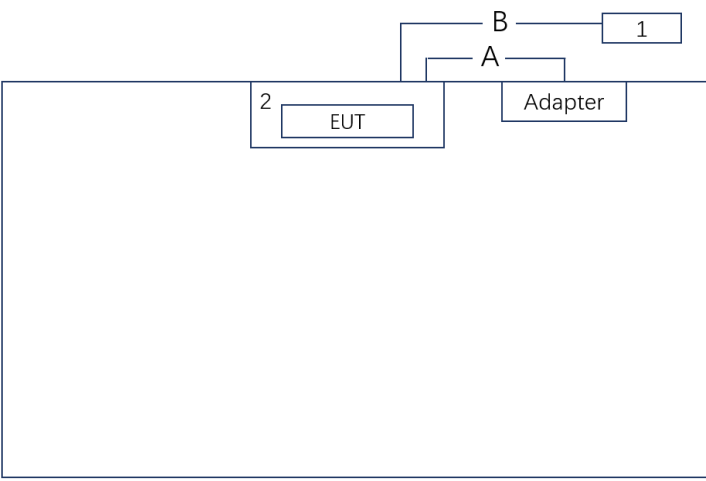
2. Test Configuration

2.1. Test Mode

Test Mode	Mode 1: Transmit by 802.11a(6Mbps) (SISO Mode)
	Mode 2: Transmit by 802.11ac-VHT20(MCS0) (SISO Mode)
	Mode 3: Transmit by 802.11ac-VHT40(MCS0) (SISO Mode)
	Mode 4: Transmit by 802.11ac-VHT80(MCS0) (SISO Mode)
	Mode 5: Transmit by 802.11ac-VHT80(MCS0) (MIMO Mode) $N_{ss}=1$

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.

Connection Diagram – Radiated Emission testing			
			
Cable Type		Cable Description	
A	Power Cable	Non shielded, 1.5m	
B	LAN Cable	Non shielded, > 10.0m	
Product	Manufacturer	Model No.	
1	Notebook	Lenovo	E495
2	Accessory	Compex	WPJ563HV

Note: Adapter (M/N: DSA-24PFD-15 FEU 120200) was supplied by lab, which is not shipped with EUT.

2.3. Test Software

The test utility software used during testing was “ART2-GUI”, and the version was 2.3.

Final Power Parameter Value for spot check channel.

Test Mode	Test Frequency	Power Parameter Value				
		Ant 0	Ant 1	Ant 2	Ant 0 + 1	Ant 0 + 1 + 2
802.11a	5500	19.5	--	--	Not Support	Not Support
802.11ac-VHT20	5320	18.5	--	--	--	--
802.11 ac-VHT40	5190	--	--	15.0	--	--
	5270	20.0	--	--	--	--
802.11 ac-VHT80	5290	15.0	--	--	--	--
	5775	--	--	--	--	14.5

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
- KDB 789033 D02v02r01
- KDB 662911 D01v02r01
- 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.	Last Cali. Date	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	2022-12-01	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2022-10-21	WZ-AC2
Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2022-11-12	WZ-AC2
Anechoic Chamber	RIKEN	WZ-AC2	MRTSUE06213	1 year	2023-04-21	WZ-AC2
Thermohygrometer	testo	Testo 608-H1	MRTSUE11038	1 year	2022-11-11	WZ-AC2
Thermohygrometer	testo	608-H1	MRTSUE06402	1 year	2023-06-06	WZ-SR5
Shielding Room	HUAMING	WZ-SR5	MRTSUE06442	N/A	N/A	WZ-SR5
USB Power Sensor	Agilent	U2021XA	MRTSUE06030	1 year	2022-10-10	WZ-SR5

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

5. Decision Rules and Measurement Uncertainty

5.1. Decision Rules

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

5.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): Horizontal: 30MHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~40GHz: 6.40dB Vertical: 30MHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 1.13dB

6. Test Result

6.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
15.407(a)(1)(ii), (2), (3)(i)	Maximum Conducted Output Power	Conducted	Pass
15.205, 15.209 15.407(b)(8), (9), (10)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Radiated	Pass

6.2. Output Power Measurement

6.2.1. Test Limit

For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W 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

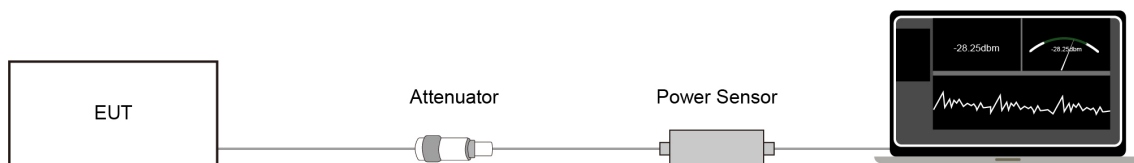
KDB 789033D02v02r01- Section II)E)3)b) Method PM-G

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

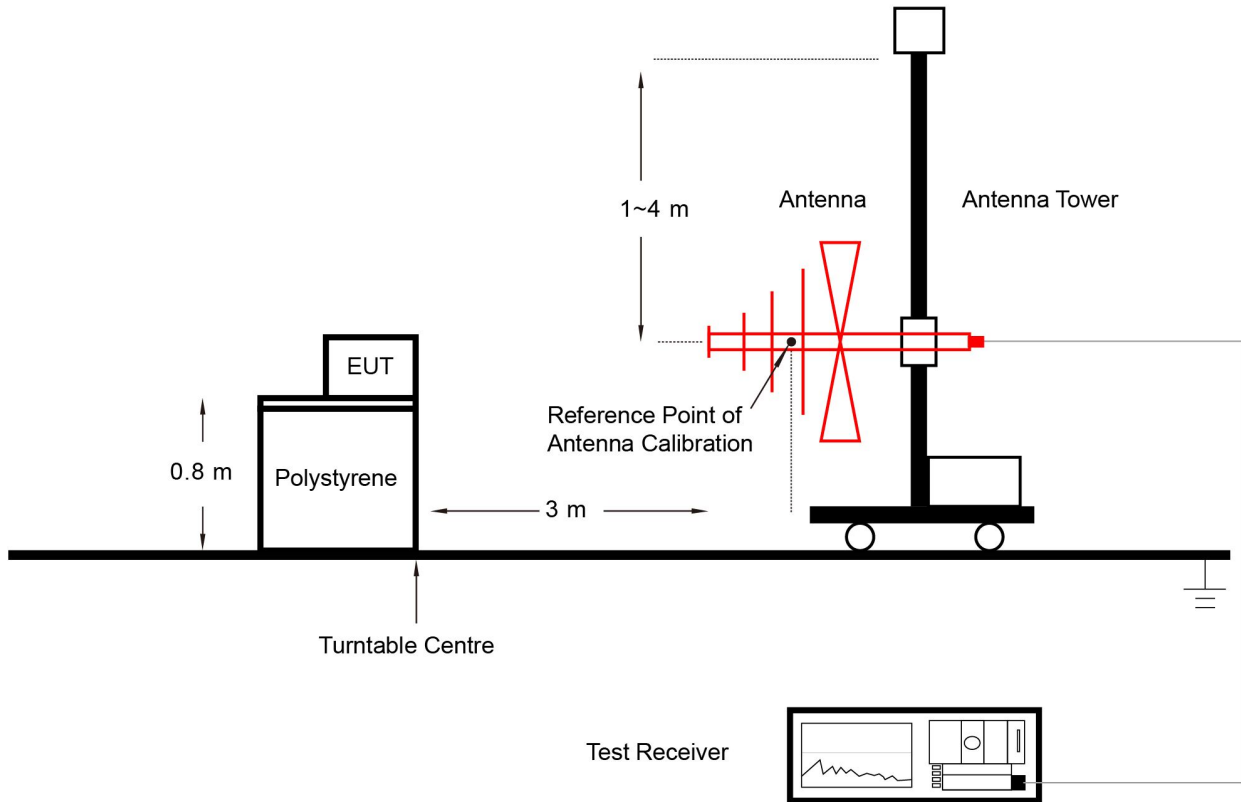
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

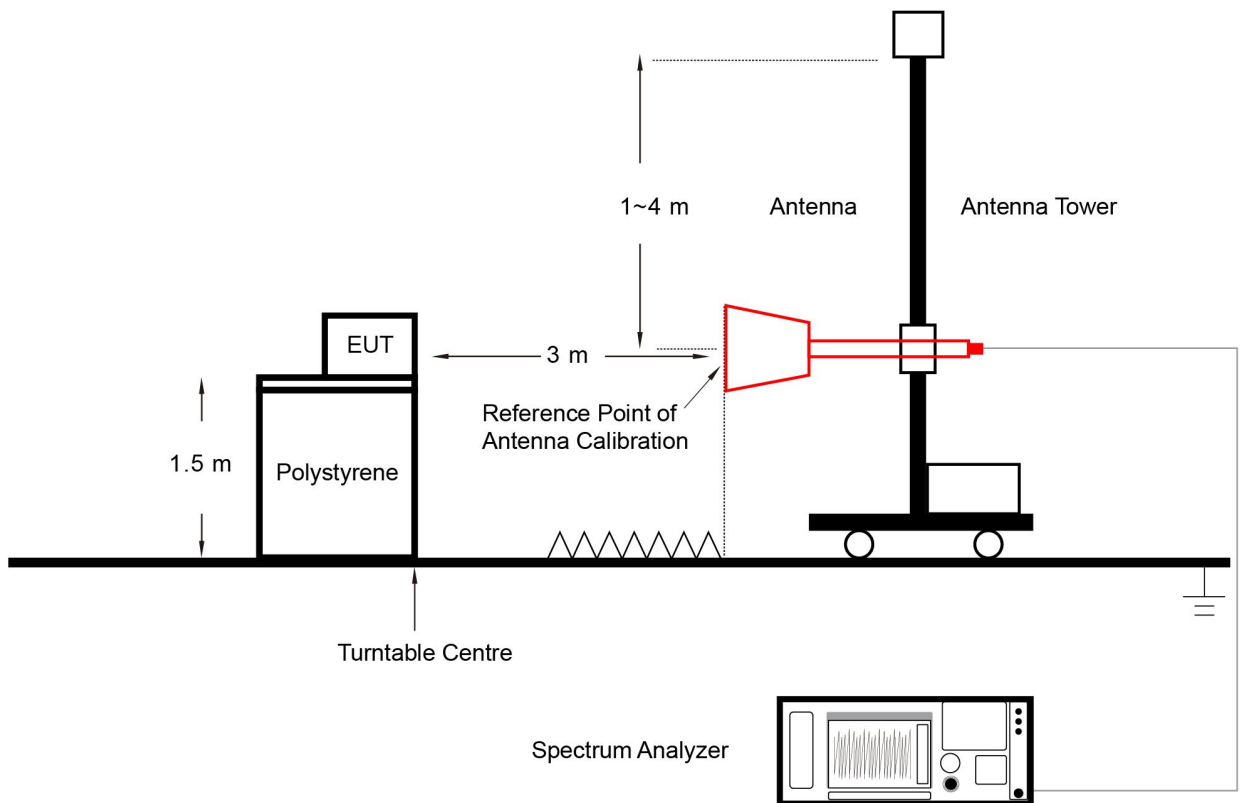
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10 Hz.
If the EUT duty cycle is $< 98\%$, set VBW $\geq 1/T$. T is the minimum transmission duration.
4. 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

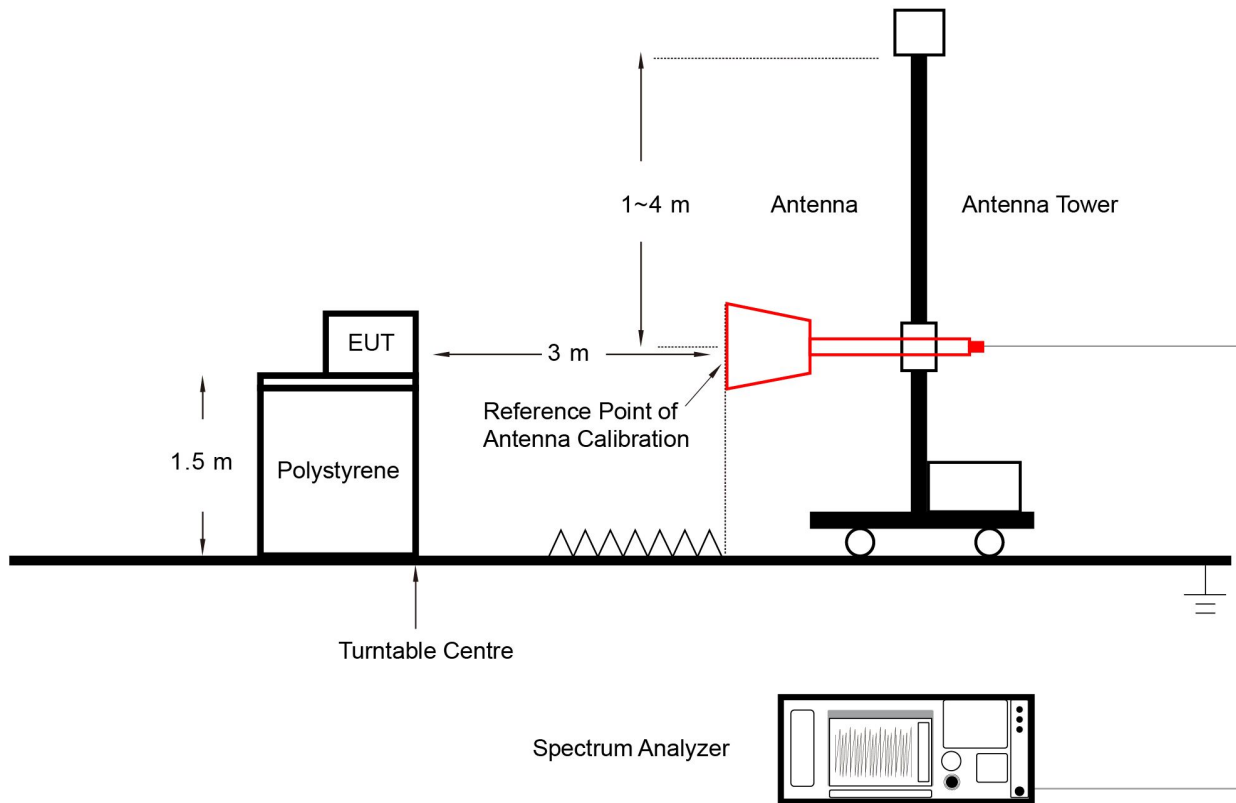
Peak Measurements above 1GHz

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	Lynn Yang
Test Date	2022-09-21	Test Mode	1TX

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Limit (dBm)
11a	6Mbps	100	5500	19.28	≤ 23.98
11ac-VHT20	MCS0	64	5320	19.55	≤ 23.98
11ac-VHT40	MCS0	54	5270	19.96	≤ 23.98
11ac-VHT80	MCS0	58	5290	14.79	≤ 23.98

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 2 Average Power (dBm)	Limit (dBm)
11ac-VHT40	MCS0	38	5190	15.13	≤ 30.00

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2022-09-21	Test Mode	3TX

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Ant 2 Average Power (dBm)	Total Average Power (dBm)	Limit (dBm)
11ac-VHT80	MCS0	155	5775	11.62	10.77	10.85	15.87	≤ 30.00

Note: Total Average Power (dBm) = $10 \cdot \log \{10^{(\text{Ant 0 Average Power} / 10)} + 10^{(\text{Ant 1 Average Power} / 10)} + 10^{(\text{Ant 2 Average Power} / 10)}\}$

A.2 Radiated Emission Test Result – Spot Check

Test Site	WZ-AC2	Test Engineer	Luis Yang
Test Date	2022-08-17	Test Mode	802.11ac-VHT20 – Channel 64
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)	Detector	Polarization
*	7094.5	34.5	10.9	45.4	68.2	-22.8	Peak	Horizontal
	8140.0	33.3	12.0	45.3	74.0	-28.7	Peak	Horizontal
*	9814.5	33.3	13.9	47.2	68.2	-21.0	Peak	Horizontal
	11625.0	30.5	17.7	48.2	74.0	-25.8	Peak	Horizontal
	7502.5	32.1	11.5	43.6	74.0	-30.4	Peak	Vertical
*	8828.5	31.3	13.3	44.6	68.2	-23.6	Peak	Vertical
*	10401.0	32.3	15.7	48.0	68.2	-20.2	Peak	Vertical
	11565.5	31.2	17.9	49.1	74.0	-24.9	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	Luis Yang
Test Date	2022-08-17	Test Mode	802.11ac-VHT40 – Channel 54
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)	Detector	Polarization
*	7026.5	36.1	10.4	46.5	68.2	-21.7	Peak	Horizontal
	8276.0	30.4	11.3	41.7	74.0	-32.3	Peak	Horizontal
*	10537.0	34.1	15.7	49.8	68.2	-18.4	Peak	Horizontal
	11599.5	30.2	17.8	48.0	74.0	-26.0	Peak	Horizontal
	7502.5	31.7	11.5	43.2	74.0	-30.8	Peak	Vertical
*	8709.5	32.8	12.9	45.7	68.2	-22.5	Peak	Vertical
*	10358.5	32.3	15.4	47.7	68.2	-20.5	Peak	Vertical
	10783.5	32.8	16.6	49.4	74.0	-24.6	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	Luis Yang
Test Date	2022-08-17	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)	Detector	Polarization
*	8752.0	32.1	13.0	45.1	68.2	-23.1	Peak	Horizontal
	9194.0	31.6	14.1	45.7	74.0	-28.3	Peak	Horizontal
	11361.5	30.7	17.6	48.3	74.0	-25.7	Peak	Horizontal
*	14175.0	30.1	20.7	50.8	68.2	-17.4	Peak	Horizontal
	9092.0	30.9	13.7	44.6	74.0	-29.4	Peak	Vertical
*	10290.5	32.2	14.9	47.1	68.2	-21.1	Peak	Vertical
	10996.0	32.0	16.9	48.9	74.0	-25.1	Peak	Vertical
*	14073.0	30.8	20.0	50.8	68.2	-17.4	Peak	Vertical

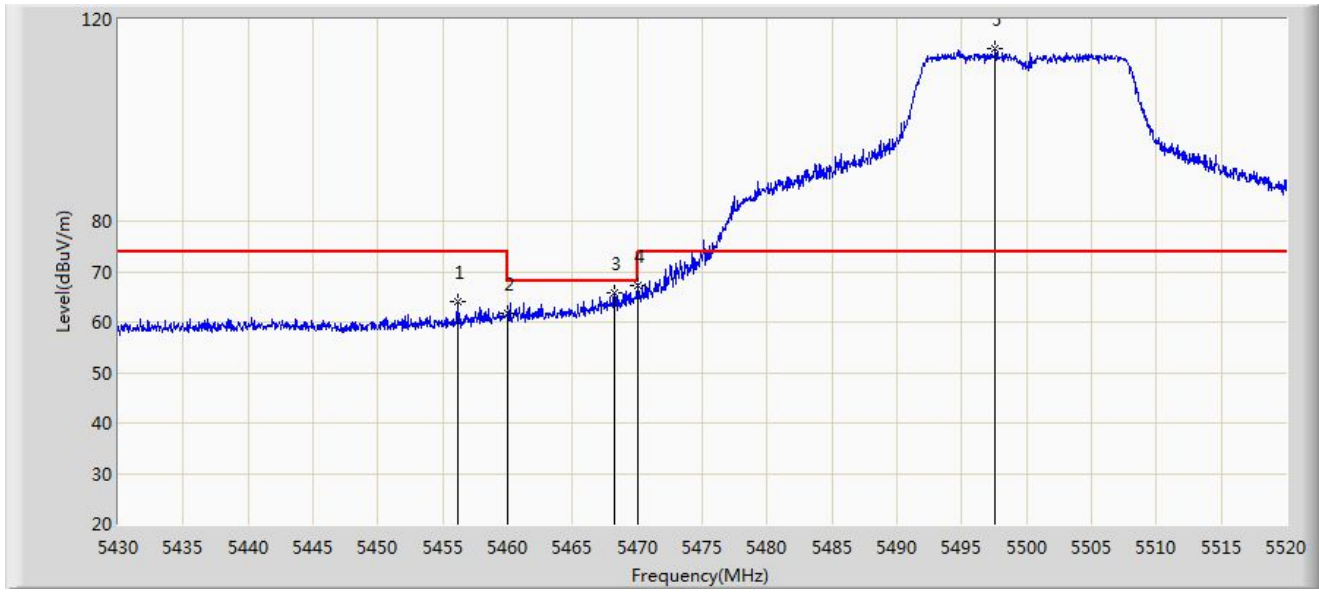
Note 1: "*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

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	Test Date: 2022-08-17
Limit: FCC_5G_RE(3m)	Engineer: Luis Yang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: 802.11ac Dual Band Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11a at 5500MHz	



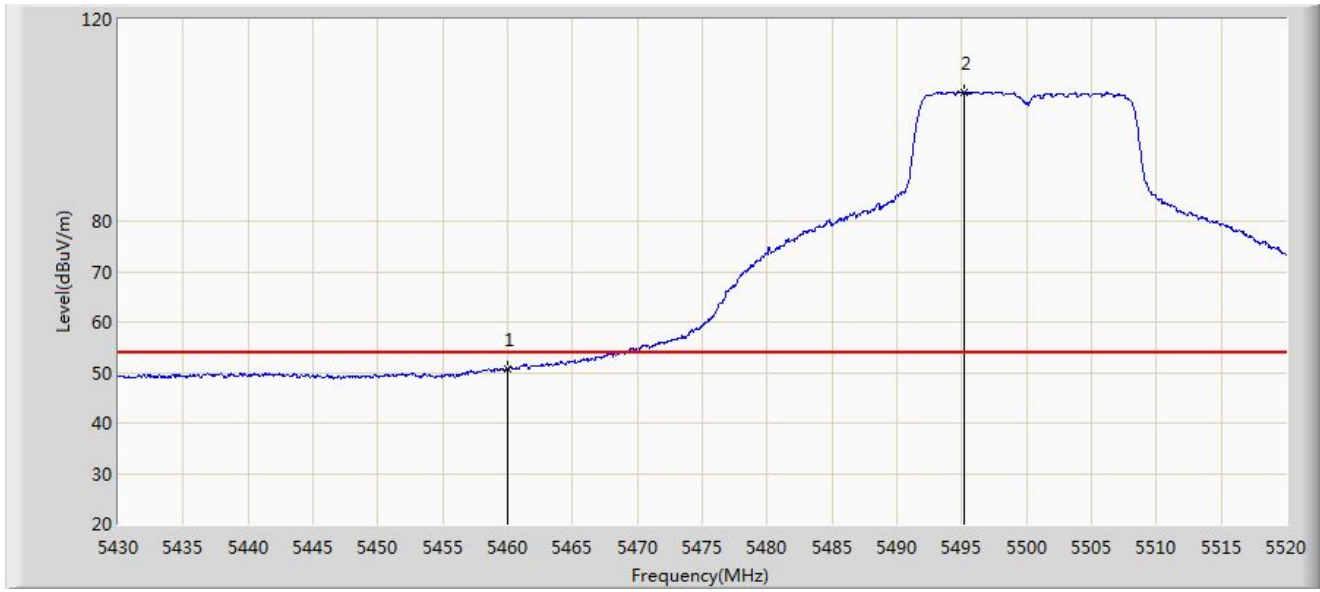
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		5456.145	63.968	60.042	-10.032	74.000	3.926	PK
2		5460.000	61.625	57.721	-12.375	74.000	3.904	PK
3		5468.205	65.719	61.855	-2.481	68.200	3.864	PK
4	*	5470.000	67.210	63.354	-0.990	68.200	3.856	PK
5		5497.590	114.166	110.081	N/A	N/A	4.085	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	Test Date: 2022-08-17
Limit: FCC_5G_RE(3m)	Engineer: Luis Yang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: 802.11ac Dual Band Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11a at 5500MHz	



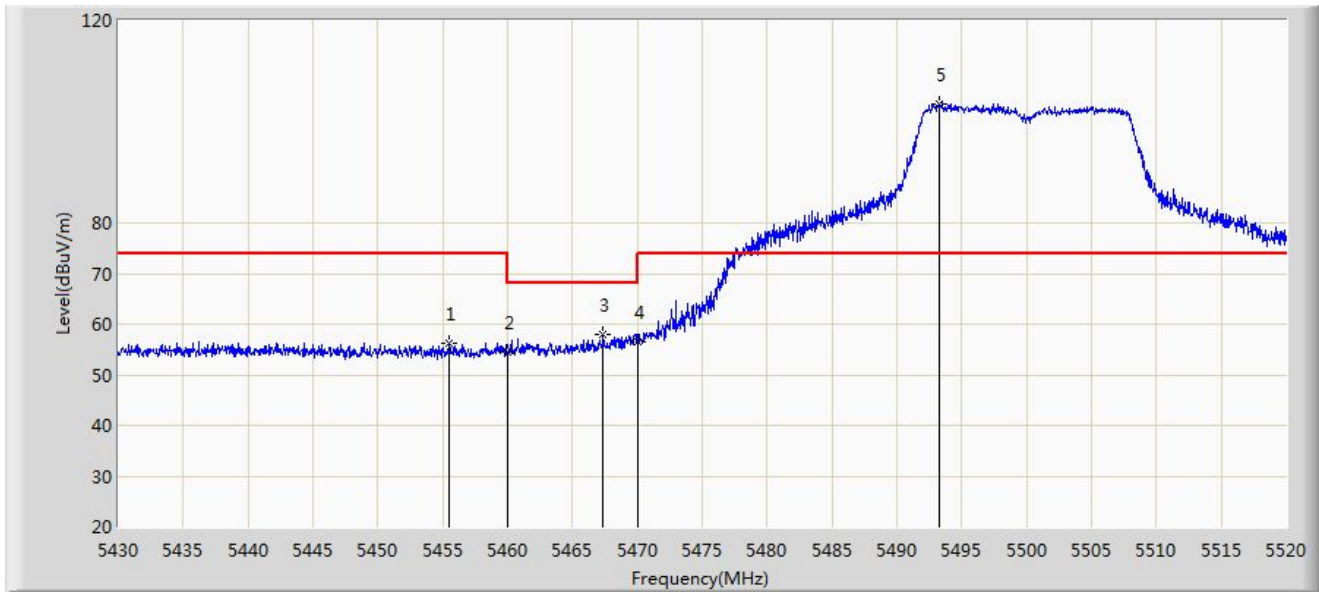
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	5460.000	50.769	46.865	-3.231	54.000	3.904	AV
2		5495.160	105.584	101.541	N/A	N/A	4.042	AV

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	Test Date: 2022-08-17
Limit: FCC_5G_RE(3m)	Engineer: Luis Yang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: 802.11ac Dual Band Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11a at 5500MHz	



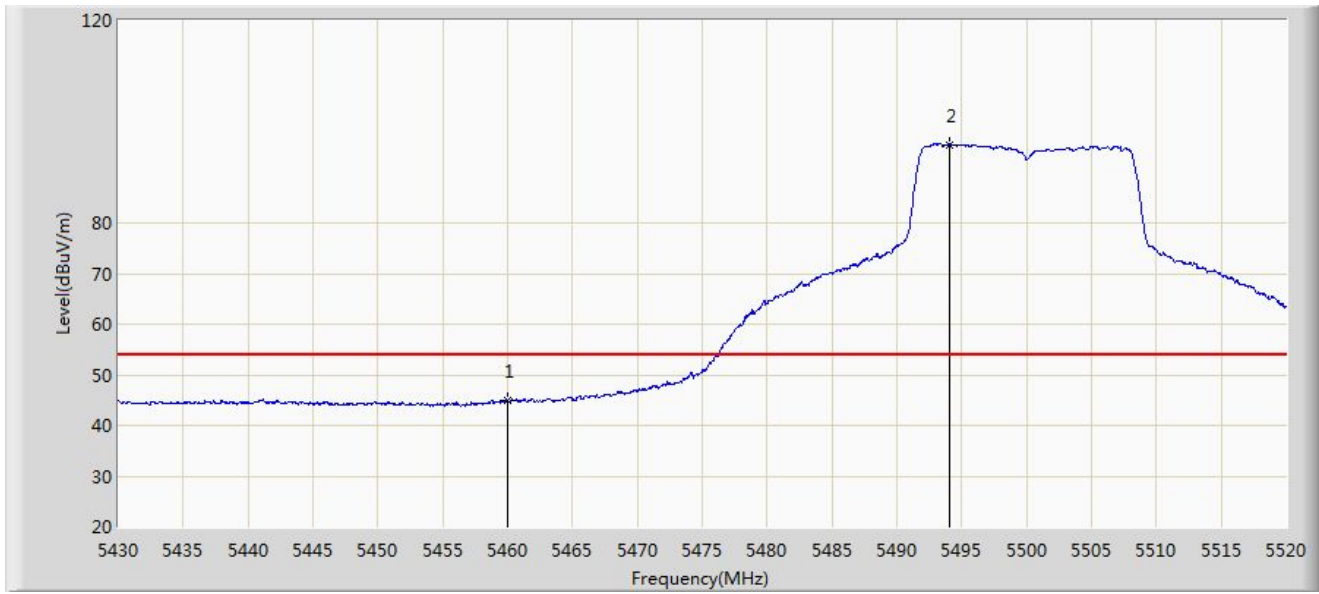
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		5455.515	56.311	52.378	-17.689	74.000	3.932	PK
2		5460.000	54.375	50.471	-19.625	74.000	3.904	PK
3	*	5467.350	57.921	54.052	-10.279	68.200	3.868	PK
4		5470.000	56.573	52.717	-11.627	68.200	3.856	PK
5		5493.315	103.385	99.375	N/A	N/A	4.010	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	Test Date: 2022-08-17
Limit: FCC_5G_RE(3m)	Engineer: Luis Yang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: 802.11ac Dual Band Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11a at 5500MHz	



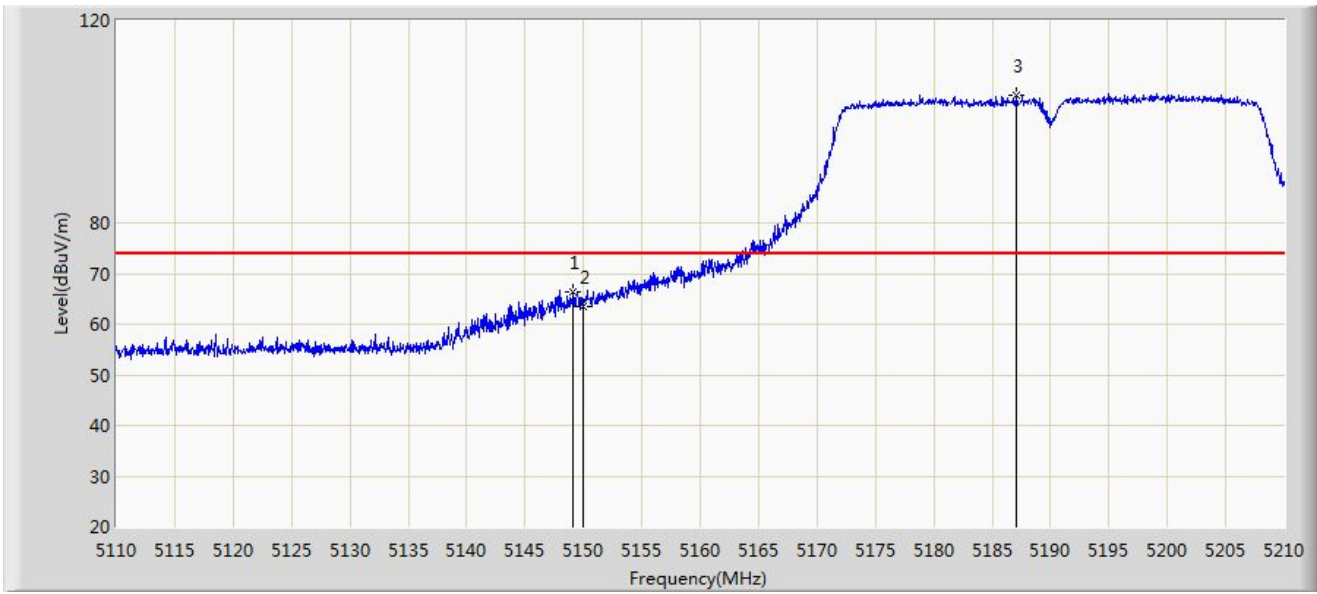
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	5460.000	44.827	40.923	-9.173	54.000	3.904	AV
2		5494.080	95.478	91.454	N/A	N/A	4.024	AV

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	Test Date: 2022-08-17
Limit: FCC_5G_RE(3m)	Engineer: Luis Yang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: 802.11ac Dual Band Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ac-VHT40 at 5190MHz	



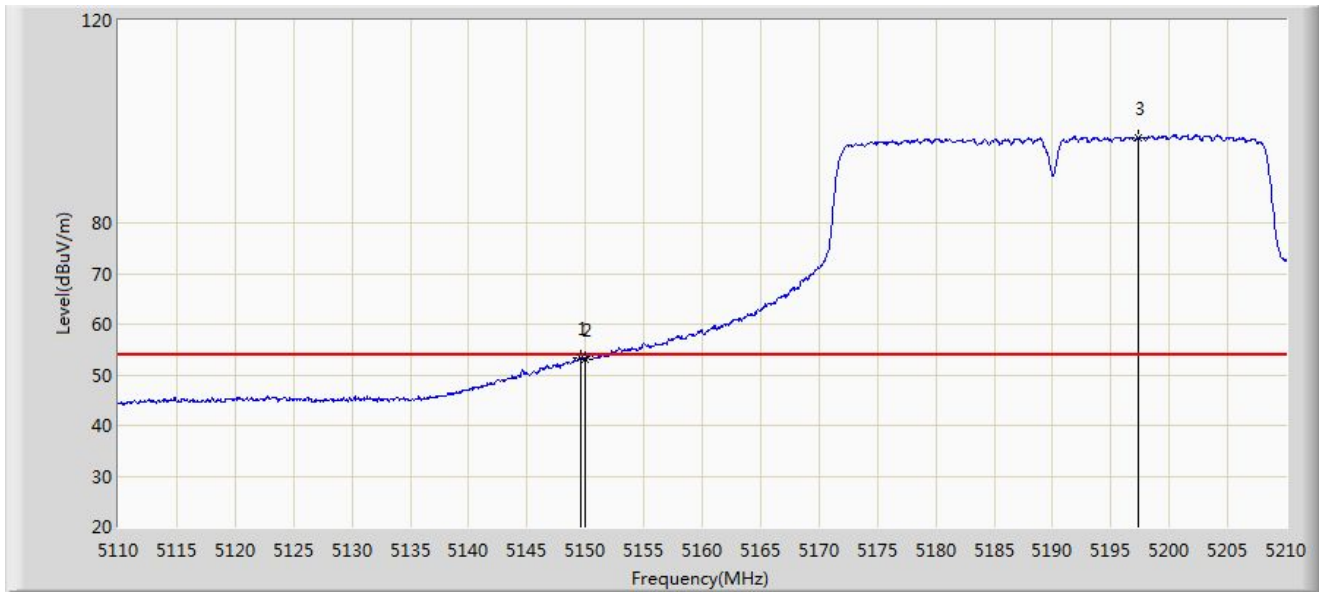
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	5149.150	66.436	62.295	-7.564	74.000	4.140	PK
2		5150.000	63.560	59.442	-10.440	74.000	4.118	PK
3		5187.100	105.302	101.459	N/A	N/A	3.843	PK

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	Test Date: 2022-08-17
Limit: FCC_5G_RE(3m)	Engineer: Luis Yang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: 802.11ac Dual Band Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ac-VHT40 at 5190MHz	



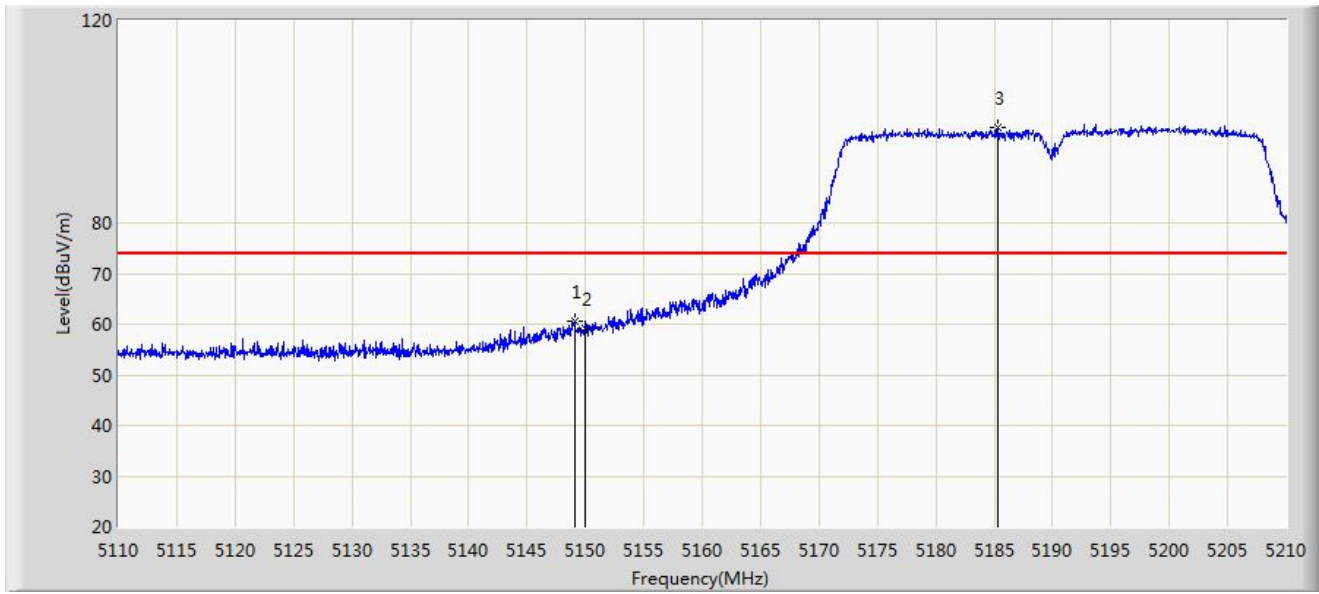
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	5149.550	53.257	49.127	-0.743	54.000	4.130	AV
2		5150.000	53.130	49.012	-0.870	54.000	4.118	AV
3		5197.350	96.918	93.059	N/A	N/A	3.858	AV

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	Test Date: 2022-08-17
Limit: FCC_5G_RE(3m)	Engineer: Luis Yang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: 802.11ac Dual Band Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ac-VHT40 at 5190MHz	



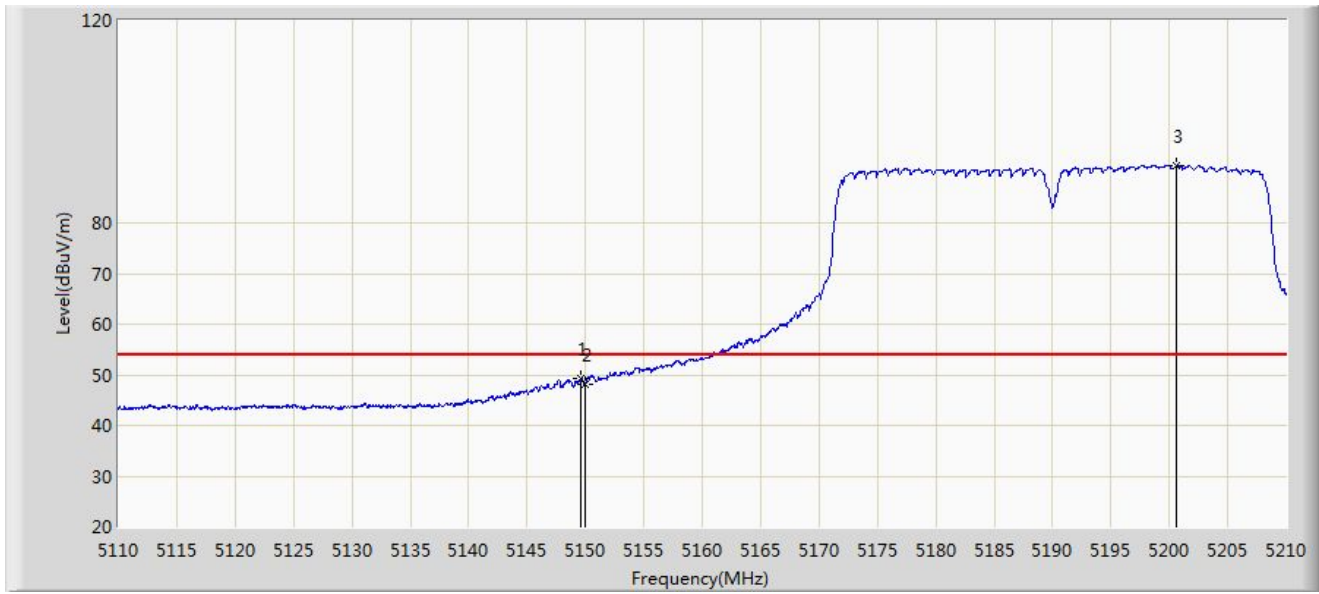
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	5149.050	60.598	56.454	-13.402	74.000	4.144	PK
2		5150.000	59.269	55.151	-14.731	74.000	4.118	PK
3		5185.300	98.921	95.085	N/A	N/A	3.836	PK

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	Test Date: 2022-08-17
Limit: FCC_5G_RE(3m)	Engineer: Luis Yang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: 802.11ac Dual Band Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ac-VHT40 at 5190MHz	



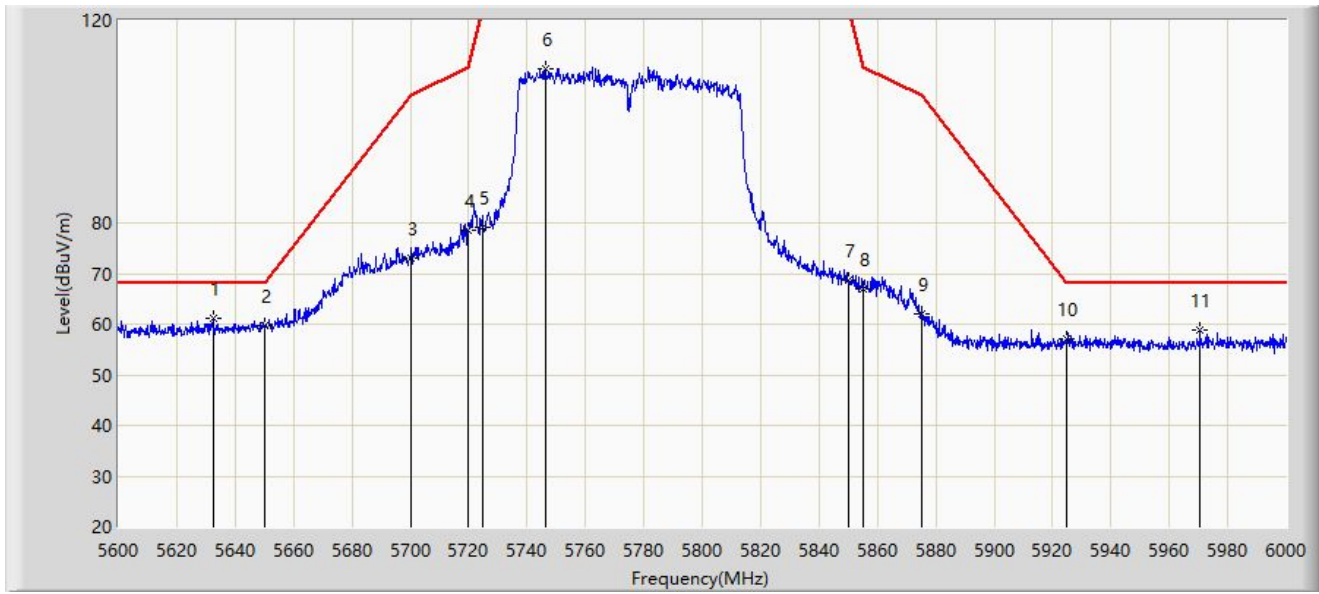
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	5149.650	49.215	45.087	-4.785	54.000	4.128	AV
2		5150.000	48.085	43.967	-5.915	54.000	4.118	AV
3		5200.650	91.283	87.424	N/A	N/A	3.859	AV

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).

Site: WZ-AC2	Test Date: 2022-08-17
Limit: FCC_5.8G_RE(3m)	Engineer: Luis Yang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Horizontal
EUT: 802.11ac Dual Band Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ac-VHT80 at 5775MHz	



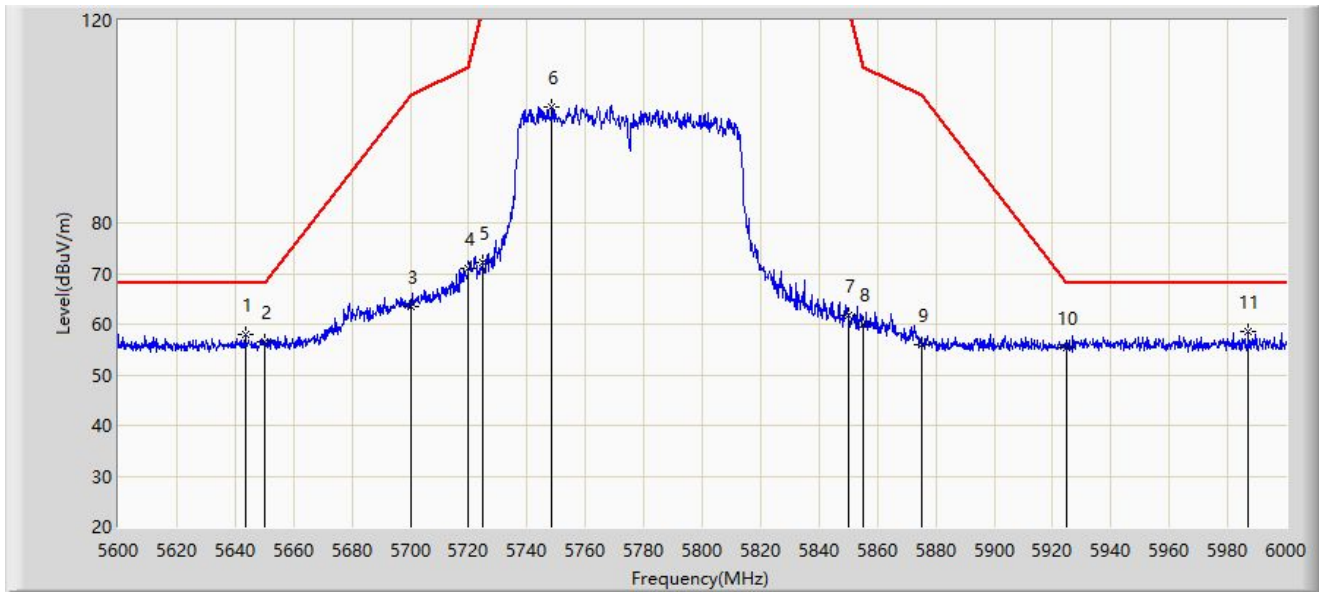
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	5632.400	61.028	56.104	-7.172	68.200	4.924	PK
2		5650.000	59.626	54.404	-8.574	68.200	5.222	PK
3		5700.000	73.032	67.851	-32.168	105.200	5.181	PK
4		5720.000	78.442	73.003	-32.358	110.800	5.439	PK
5		5725.000	79.226	73.705	-42.974	122.200	5.521	PK
6		5746.200	110.552	104.947	N/A	N/A	5.605	PK
7		5850.000	68.738	63.018	-53.462	122.200	5.720	PK
8		5855.000	66.894	61.092	-43.906	110.800	5.802	PK
9		5875.000	62.167	56.218	-43.033	105.200	5.949	PK
10		5925.000	57.127	51.067	-11.073	68.200	6.060	PK
11		5970.600	58.711	52.655	-9.489	68.200	6.057	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	Test Date: 2022-08-17
Limit: FCC_5.8G_RE(3m)	Engineer: Luis Yang
Probe: BBHA9120D_1457_1-18GHz	Polarity: Vertical
EUT: 802.11ac Dual Band Module	Power: AC 120V/60Hz
Test Mode: Transmit by 802.11ac-VHT80 at 5775MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		5643.400	58.041	52.894	-10.159	68.200	5.146	PK
2		5650.000	56.382	51.160	-11.818	68.200	5.222	PK
3		5700.000	63.420	58.239	-41.780	105.200	5.181	PK
4		5720.000	70.939	65.500	-39.861	110.800	5.439	PK
5		5725.000	72.158	66.637	-50.042	122.200	5.521	PK
6		5748.600	102.867	97.299	N/A	N/A	5.568	PK
7		5850.000	61.741	56.021	-60.459	122.200	5.720	PK
8		5855.000	59.864	54.062	-50.936	110.800	5.802	PK
9		5875.000	56.025	50.076	-49.175	105.200	5.949	PK
10		5925.000	55.253	49.193	-12.947	68.200	6.060	PK
11	*	5987.200	58.571	52.429	-9.629	68.200	6.141	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).

Appendix B – Test Setup Photograph

Refer to “2208RSU014-UT” file.

Appendix C – EUT Photograph

Refer to “2208RSU014-UE” file.

_____ The End _____