

Partial FCC Test Report

Report No.: RF190422C23-3

FCC ID: W23-WMU62XX

Test Model: WMU6206

Received Date: Apr. 22, 2019

Test Date: May 11, 2019

Issued Date: May 21, 2019

Applicant: jjPlus Corporation

Address: 13F., No.120-3, Qiaoh Rd. Zhonghe Dist., New Taipei City 23584 Taiwan
(R.O.C.)

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
(R.O.C)

Test Location: B2F., No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231,
Taiwan, R.O.C

FCC Registration /
Designation Number: 427177 / TW0011



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Table of Contents

| | |
|---|-----------|
| Release Control Record | 3 |
| 1 Certificate of Conformity | 4 |
| 2 Summary of Test Results..... | 5 |
| 2.1 Measurement Uncertainty..... | 5 |
| 2.2 Modification Record | 5 |
| 3 General Information | 6 |
| 3.1 General Description of EUT | 6 |
| 3.2 Description of Test Modes..... | 7 |
| 3.2.1 Test Mode Applicability and Tested Channel Detail..... | 9 |
| 3.3 Description of Support Units | 10 |
| 3.3.1 Configuration of System under Test | 10 |
| 3.4 General Description of Applied Standards..... | 10 |
| 4 Test Types and Results | 11 |
| 4.1 Radiated Emission and Bandedge Measurement | 11 |
| 4.1.1 Limits of Radiated Emission and Bandedge Measurement | 11 |
| 4.1.2 Limits of Unwanted Emission Out of the Restricted Bands | 12 |
| 4.1.3 Test Instruments | 13 |
| 4.1.4 Test Procedures..... | 14 |
| 4.1.5 Deviation from Test Standard | 15 |
| 4.1.6 Test Setup..... | 15 |
| 4.1.7 EUT Operating Conditions..... | 16 |
| 4.1.8 Test Results | 17 |
| 5 Pictures of Test Arrangements..... | 23 |
| Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band) | 24 |
| Appendix – Information of the Testing Laboratories | 25 |

Release Control Record

| Issue No. | Description | Date Issued |
|---------------|------------------|--------------|
| RF190422C23-3 | Original Release | May 21, 2019 |

1 Certificate of Conformity

Product: 11ac 2T2R WIFI & BT Module

Brand: jjPlus

Test Model: WMU6206

Sample Status: Identical Prototype

Applicant: jjPlus Corporation

Test Date: May 11, 2019

Standards: 47 CFR FCC Part 15, Subpart E (Section 15.407)
ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Gina Liu, **Date:** May 21, 2019
Gina Liu / Specialist

Approved by : Dylan Chiou, **Date:** May 21, 2019
Dylan Chiou / Project Engineer

2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart E (Section 15.407) | | | |
|--|--|--------|---|
| FCC Clause | Test Item | Result | Remarks |
| 15.407(b)(6) | AC Power Conducted Emissions | N/A | Refer to Note 1 |
| 15.407(b) (1/2/3/4(i/ii)/6) | Radiated Emissions & Band Edge Measurement | Pass | Meet the requirement of limit. Minimum passing margin is -3.08 dB at 5350 MHz. |
| 15.407(a)(1/2/3) | Max Average Transmit Power | N/A | Refer to Note 1 |
| --- | Occupied Bandwidth Measurement | N/A | Refer to Note 1 |
| 15.407(a)(1/2/3) | Peak Power Spectral Density | N/A | Refer to Note 1 |
| 15.407(e) | 6 dB Bandwidth | N/A | Refer to Note 1 |
| 15.407(g) | Frequency Stability | N/A | Refer to Note 1 |
| 15.203 | Antenna Requirement | N/A | Refer to Note 1 |

Note:

1. This report is a partial report, only test item of Radiated Emissions was performed for this report. Other testing data please refer to BV CPS report no.: RF181127C08-3 for module (Brand: jjPlus, Model: WMU6206).
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| Measurement | Frequency | Expanded Uncertainty (k=2) (±) |
|--------------------------------|--------------------|--------------------------------|
| Radiated Emissions up to 1 GHz | 9 kHz ~ 30 MHz | 3.04 dB |
| | 30 MHz ~ 200 MHz | 2.0153 dB |
| | 200 MHz ~ 1000 MHz | 2.0224 dB |
| Radiated Emissions above 1 GHz | 1 GHz ~ 18 GHz | 1.0121 dB |
| | 18 GHz ~ 40 GHz | 1.1508 dB |

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

| | |
|------------------------------|---|
| Product | 11ac 2T2R WIFI & BT Module |
| Brand | jjPlus |
| Test Model | WMU6206 |
| Status of EUT | Identical Prototype |
| Power Supply Rating | 3.3 Vdc (host equipment) |
| Modulation Type | 256QAM, 64QAM, 16QAM, QPSK, BPSK |
| Modulation Technology | OFDM |
| Transfer Rate | 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0 Mbps 802.11n: up to 300.0 Mbps 802.11ac: up to 866.7 Mbps |
| Operating Frequency | 5180 ~ 5240 MHz, 5260 ~ 5320 MHz, 5500 ~ 5700 MHz, 5745 ~ 5825 MHz |
| Number of Channel | 5180 ~ 5240 MHz: 4 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40) 1 for 802.11ac (VHT80) 5260 ~ 5320 MHz: 4 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40) 1 for 802.11ac (VHT80) 5500 ~ 5700 MHz: 11 for 802.11a, 802.11n (HT20) 5 for 802.11n (HT40) 2 for 802.11ac (VHT80) 5745 ~ 5825 MHz: 5 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40) 1 for 802.11ac (VHT80) |
| Accessory Device | N/A |
| Data Cable Supplied | N/A |

Note:

1. The EUT is authorized for use in specific End-product. Please refer to below for more details.

| Product | Brand | Model |
|------------------------------|--------|---------|
| 11ac 2T2R WiFi and BT dongle | jjPlus | WMI6201 |

2. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

| Modulation Mode | Tx Function |
|------------------|-------------|
| 802.11a | 1TX |
| 802.11n (HT20) | 2TX |
| 802.11n (HT40) | 2TX |
| 802.11ac (VHT20) | 2TX |
| 802.11ac (VHT40) | 2TX |
| 802.11ac (VHT80) | 2TX |

* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ac mode for VHT20 / VHT40, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

3. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

For 5180 ~ 5240 MHz

4 channels are provided for 802.11a, 802.11n (HT20):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 36 | 5180 | 44 | 5220 |
| 40 | 5200 | 48 | 5240 |

2 channels are provided for 802.11n (HT40):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 38 | 5190 | 46 | 5230 |

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency (MHz) |
|---------|-----------------|
| 42 | 5210 |

For 5260 ~ 5320 MHz

4 channels are provided for 802.11a, 802.11n (HT20):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 52 | 5260 | 60 | 5300 |
| 56 | 5280 | 64 | 5320 |

2 channels are provided for 802.11n (HT40):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 54 | 5270 | 62 | 5310 |

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency (MHz) |
|---------|-----------------|
| 58 | 5290 |

For 5500 ~ 5700 MHz

11 channels are provided for 802.11a, 802.11n (HT20):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 100 | 5500 | 124 | 5620 |
| 104 | 5520 | 128 | 5640 |
| 108 | 5540 | 132 | 5660 |
| 112 | 5560 | 136 | 5680 |
| 116 | 5580 | 140 | 5700 |
| 120 | 5600 | | |

5 channels are provided for 802.11n (HT40):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 102 | 5510 | 126 | 5630 |
| 110 | 5550 | 134 | 5670 |
| 118 | 5590 | | |

2 channels are provided for 802.11ac (VHT80):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 106 | 5530 | 122 | 5610 |

For 5745 ~ 5825 MHz:

5 channels are provided for 802.11a, 802.11n (HT20):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 149 | 5745 | 161 | 5805 |
| 153 | 5765 | 165 | 5825 |
| 157 | 5785 | | |

2 channels are provided for 802.11n (HT40):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 151 | 5755 | 159 | 5795 |

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency (MHz) |
|---------|-----------------|
| 155 | 5775 |

3.2.1 Test Mode Applicability and Tested Channel Detail

| EUT Configure Mode | Applicable To | | Description |
|--------------------|---------------|-------|-------------|
| | RE \geq 1G | RE<1G | |
| - | √ | √ | - |

Where **RE \geq 1G**: Radiated Emission above 1 GHz **RE<1G**: Radiated Emission below 1 GHz

Radiated Emission Test (Above 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT Configure Mode | Frequency Band (MHz) | Mode | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|--------------------|----------------------|------------------|-------------------|----------------|-----------------------|-----------------|------------------|
| - | 5180-5240 | 802.11n (HT40) | 38 to 46 | 38 | OFDM | BPSK | 13.5 |
| - | 5260-5320 | 802.11n (HT40) | 54 to 62 | 62 | OFDM | BPSK | 13.5 |
| - | 5500-5700 | 802.11ac (VHT80) | 106 to 122 | 106 | OFDM | BPSK | 29.3 |
| - | 5745-5825 | 802.11a | 149 to 165 | 165 | OFDM | BPSK | 6.0 |

Radiated Emission Test (Below 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT Configure Mode | Frequency Band (MHz) | Mode | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|--------------------|----------------------|----------------|-------------------|----------------|-----------------------|-----------------|------------------|
| - | 5260-5320 | 802.11n (HT40) | 54 to 62 | 62 | OFDM | BPSK | 13.5 |

Test Condition:

| Applicable To | Environmental Conditions | Input Power (System) | Tested by |
|---------------|--------------------------|----------------------|---|
| RE \geq 1G | 25 deg. C, 65 % RH | 120 Vac, 60 Hz | Harry Hsueh, Karl Lee, Charles Hsiao |
| RE<1G | 25 deg. C, 65 % RH | 120 Vac, 60 Hz | Karl Lee |

3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

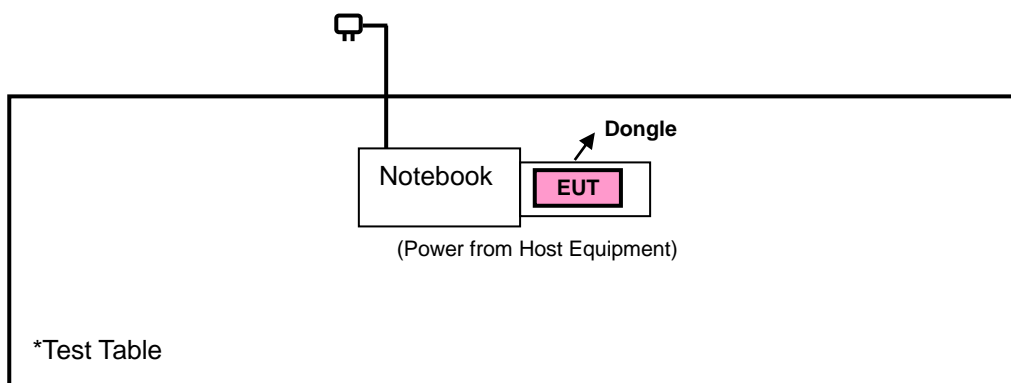
| No. | Product | Brand | Model No. | Serial No. | FCC ID |
|-----|------------------------------|--------|-----------|------------|--------|
| 1. | Notebook | DELL | E6420 | D3T96R1 | N/A |
| 2. | 11ac 2T2R WiFi and BT dongle | jjPlus | WMI6201 | N/A | N/A |

| No. | Signal Cable Description Of The Above Support Units |
|-----|---|
| 1. | N/A |
| 2. | N/A |

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item 2 was provided by client.

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart E (15.407)

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009 ~ 0.490 | 2400/F (kHz) | 300 |
| 0.490 ~ 1.705 | 24000/F (kHz) | 30 |
| 1.705 ~ 30.0 | 30 | 30 |
| 30 ~ 88 | 100 | 3 |
| 88 ~ 216 | 150 | 3 |
| 216 ~ 960 | 200 | 3 |
| Above 960 | 500 | 3 |

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

4.1.2 Limits of Unwanted Emission Out of the Restricted Bands

| Applicable To | | Limit | |
|---|------------------|---|---|
| 789033 D02 General UNII Test Procedures New Rules v02r01 | | Field Strength at 3 m | |
| | | PK: 74 (dBμV/m) | AV: 54 (dBμV/m) |
| Frequency Band | Applicable To | EIRP Limit | Equivalent Field Strength at 3 m |
| 5150~5250 MHz | 15.407(b)(1) | PK: -27 (dBm/MHz) | PK: 68.2 (dBμV/m) |
| 5250~5350 MHz | 15.407(b)(2) | | |
| 5470~5725 MHz | 15.407(b)(3) | | |
| 5725~5850 MHz | 15.407(b)(4)(i) | PK:-27 (dBm/MHz) ^{*1} PK:10 (dBm/MHz) ^{*2} PK:15.6 (dBm/MHz) ^{*3} PK:27 (dBm/MHz) ^{*4} | PK: 68.2 (dBμV/m) ^{*1} PK:105.2 (dBμV/m) ^{*2} PK: 110.8 (dBμV/m) ^{*3} PK:122.2 (dBμV/m) ^{*4} |
| | 15.407(b)(4)(ii) | Emission limits in section 15.247(d) | |

^{*1} beyond 75 MHz or more above of the band edge.

^{*2} below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

^{*3} below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

^{*4} from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Note:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where } P \text{ is the eirp (Watts).}$$

4.1.3 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Date of Calibration | Due Date of Calibration |
|--|-----------------|---|---------------------|-------------------------|
| Test Receiver Agilent Technologies | N9038A | MY52260177 | Aug. 20, 2018 | Aug. 19, 2019 |
| Spectrum Analyzer ROHDE & SCHWARZ | FSV40 | 100980 | Apr. 23, 2019 | Apr. 22, 2020 |
| HORN Antenna ETS-Lindgren | 3117 | 00143293 | Nov. 25, 2018 | Nov. 24, 2019 |
| BILOG Antenna SCHWARZBECK | VULB 9168 | 9168-616 | Nov. 27, 2018 | Nov. 26, 2019 |
| HORN Antenna SCHWARZBECK | BBHA 9170 | 9170-480 | Nov. 25, 2018 | Nov. 24, 2019 |
| Fixed Attenuator Woken | 00801A1GGAM02Y | NA | May 17, 2018 | May 16, 2019 |
| Bluetooth Tester | CBT | 100980 | Jun. 28, 2017 | Jun. 27, 2019 |
| Loop Antenna | EM-6879 | 269 | Sep. 07, 2018 | Sep. 06, 2019 |
| Preamplifier Agilent | 310N | 187226 | Jun. 19, 2018 | Jun. 18, 2019 |
| Preamplifier Agilent | 83017A | MY39501357 | Jun. 19, 2018 | Jun. 18, 2019 |
| Preamplifier EMCI | EMC 184045 | 980116 | Oct. 12, 2018 | Oct. 11, 2019 |
| Power Meter Anritsu | ML2495A | 1012010 | Sep. 05, 2018 | Sep. 04, 2019 |
| Power Sensor Anritsu | MA2411B | 1315050 | Sep. 04, 2018 | Sep. 03, 2019 |
| RF signal cable ETS-LINDGREN | 5D-FB | Cable-CH1-01(RFC -SMS-100-SMS-12 0+RFC-SMS-100-S MS-400) | Jun. 19, 2018 | Jun. 18, 2019 |
| RF signal cable ETS-LINDGREN | 8D-FB | Cable-CH1-02(RFC -SMS-100-SMS-24) | Jun. 19, 2018 | Jun. 18, 2019 |
| Boresight Antenna Fixture | FBA-01 | FBA-SIP01 | NA | NA |
| Software BV ADT | E3 8.130425b | NA | NA | NA |
| Antenna Tower MF | NA | NA | NA | NA |
| Turn Table MF | NA | NA | NA | NA |
| Antenna Tower & Turn Table Controller MF | MF-7802 | NA | NA | NA |

- Note: 1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HsinTien Chamber 1.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.

4.1.4 Test Procedures

For Radiated Emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Both Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

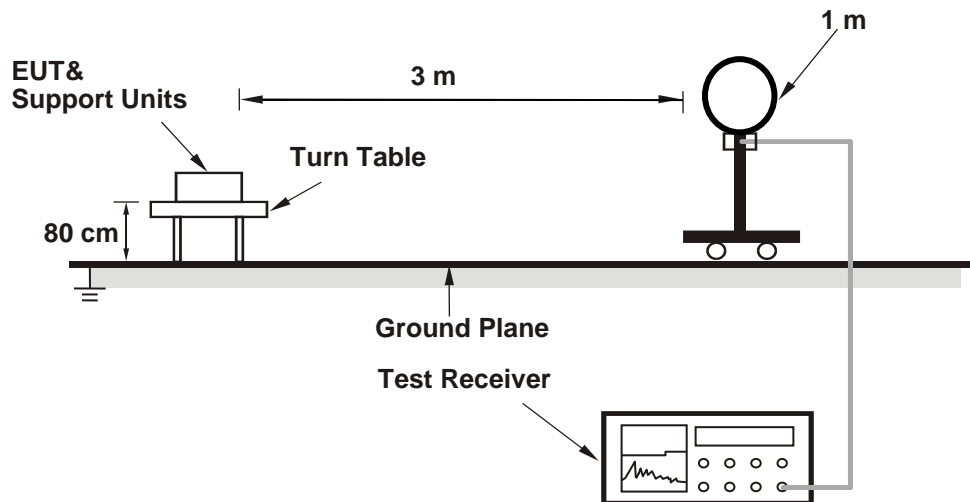
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10 Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1 GHz.
(11a: RBW = 1 MHz, VBW = 1 kHz ; 11n (HT40): RBW = 1 MHz, VBW = 3 kHz ;
11ac (VHT80): RBW = 1 MHz, VBW = 10 kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.5 Deviation from Test Standard

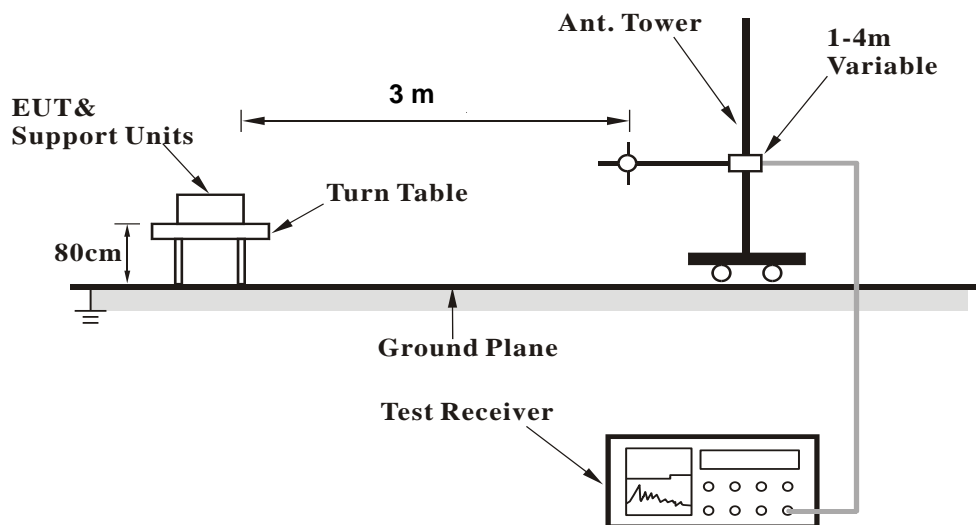
No deviation.

4.1.6 Test Setup

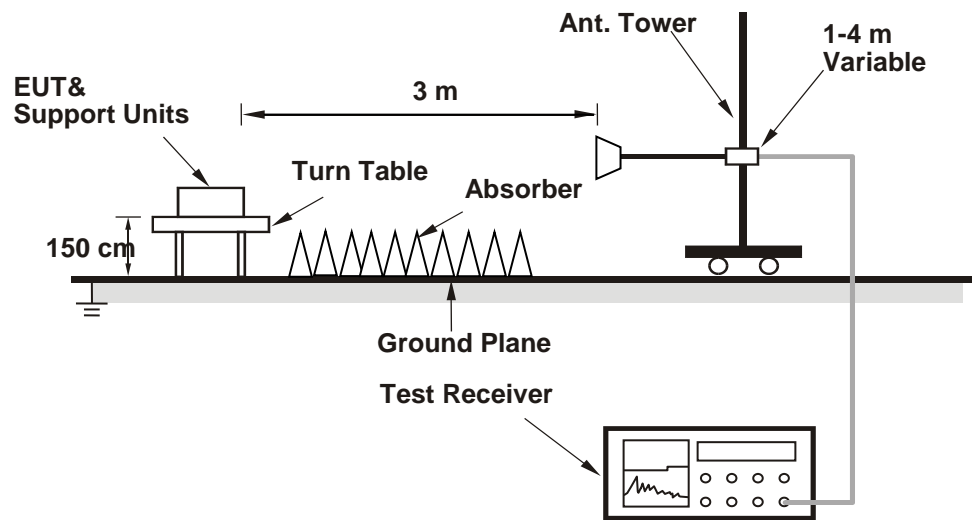
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.7 EUT Operating Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.8 Test Results
Above 1 GHz Data :
802.11a

| EUT Test Condition | | Measurement Detail | |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel | Channel 165 | Frequency Range | 1 GHz ~ 40 GHz |
| Input Power | 120 Vac, 60 Hz | Detector Function | Peak (PK) Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By | Harry Hsueh |

<Spurious Emission>

| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | | |
|---|-------------------------|-------------------|---------------|----------------|-------------|---------------------|----------------------|---------|
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 5825 | 93.67 | 84.38 | 9.29 | | | 102 | 99 | Average |
| 5825 | 100.48 | 91.19 | 9.29 | | | 102 | 99 | Peak |
| 11650 | 48.73 | 33.2 | 15.53 | 54 | -5.27 | 115 | 54 | Average |
| 11650 | 54.81 | 39.28 | 15.53 | 74 | -19.19 | 115 | 54 | Peak |
| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | | |
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 5825 | 87.49 | 78.2 | 9.29 | | | 250 | 300 | Average |
| 5825 | 94.71 | 85.42 | 9.29 | | | 250 | 300 | Peak |
| 11650 | 47.69 | 32.16 | 15.53 | 54 | -6.31 | 123 | 349 | Average |
| 11650 | 54.24 | 38.71 | 15.53 | 74 | -19.76 | 123 | 349 | Peak |

<Out of Band Emission (OOBE)>

| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | | |
|---|-------------------------|-------------------|---------------|----------------|-------------|---------------------|----------------------|--------|
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| *5553.55 | 52.8 | 43.83 | 8.97 | 68.2 | -15.4 | 102 | 99 | Peak |
| 5653.3 | 52.44 | 43.34 | 9.1 | 70.64 | -18.2 | 102 | 99 | Peak |
| 5920.525 | 50.6 | 41.22 | 9.38 | 71.51 | -20.91 | 102 | 99 | Peak |
| *5929.975 | 52.88 | 43.48 | 9.4 | 68.2 | -15.32 | 102 | 99 | Peak |
| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | | |
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| *5629.675 | 53.4 | 44.35 | 9.05 | 68.2 | -14.8 | 250 | 300 | Peak |
| 5651.725 | 51.38 | 42.29 | 9.09 | 69.48 | -18.1 | 250 | 300 | Peak |
| 5920 | 50.64 | 41.26 | 9.38 | 71.9 | -21.26 | 250 | 300 | Peak |
| *5980.9 | 51.73 | 42.27 | 9.46 | 68.2 | -16.47 | 250 | 300 | Peak |

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 5825 MHz: Fundamental Frequency
- *: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

802.11n (HT40)

| EUT Test Condition | | Measurement Detail | |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel | Channel 38 | Frequency Range | 1 GHz ~ 40 GHz |
| Input Power | 120 Vac, 60 Hz | Detector Function | Peak (PK) Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By | Harry Hsueh |

| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | | |
|---|-------------------------|-------------------|---------------|----------------|-------------|---------------------|----------------------|---------|
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 5150 | 50.32 | 42.07 | 8.25 | 54 | -3.68 | 110 | 95 | Average |
| 5150 | 61.88 | 53.63 | 8.25 | 74 | -12.12 | 110 | 95 | Peak |
| 5190 | 95.65 | 87.31 | 8.34 | 54 | 41.65 | 100 | 94 | Average |
| 5190 | 102.07 | 93.73 | 8.34 | | | 100 | 94 | Peak |
| 5442.07 | 42.87 | 34.08 | 8.79 | | | 100 | 94 | Average |
| 5442.07 | 53.35 | 44.56 | 8.79 | 74 | -20.65 | 100 | 94 | Peak |
| *10380 | 53.06 | 38.71 | 14.35 | 68.2 | -15.14 | 182 | 5 | Peak |
| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | | |
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 5150 | 44.76 | 36.51 | 8.25 | 54 | -9.24 | 250 | 302 | Average |
| 5150 | 54.38 | 46.13 | 8.25 | 74 | -19.62 | 250 | 302 | Peak |
| 5190 | 88.69 | 80.35 | 8.34 | | | 250 | 302 | Average |
| 5190 | 95.7 | 87.36 | 8.34 | | | 250 | 302 | Peak |
| 5459.56 | 42.83 | 34.01 | 8.82 | 54 | -11.17 | 250 | 302 | Average |
| 5459.56 | 53.58 | 44.76 | 8.82 | 74 | -20.42 | 250 | 302 | Peak |
| *10380 | 53.6 | 39.25 | 14.35 | 68.2 | -14.6 | 113 | 21 | Peak |

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 5190 MHz: Fundamental Frequency
- *: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

| | | | |
|---------------------------------|--------------------|--------------------------|---------------------------|
| Channel | Channel 62 | Frequency Range | 1 GHz ~ 40 GHz |
| Input Power | 120 Vac, 60 Hz | Detector Function | Peak (PK) Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By | Harry Hsueh |

| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | | |
|---|-------------------------|-------------------|---------------|----------------|--------------|---------------------|----------------------|----------------|
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 5147.15 | 42.77 | 34.52 | 8.25 | 54 | -11.23 | 100 | 97 | Average |
| 5147.15 | 52.7 | 44.45 | 8.25 | 74 | -21.3 | 100 | 97 | Peak |
| 5310 | 96.74 | 88.19 | 8.55 | | | 100 | 97 | Average |
| 5310 | 103.46 | 94.91 | 8.55 | | | 100 | 97 | Peak |
| 5350 | 50.92 | 42.29 | 8.63 | 54 | -3.08 | 105 | 89 | Average |
| 5350 | 62.48 | 53.85 | 8.63 | 74 | -11.52 | 105 | 89 | Peak |
| 10620 | 47.13 | 32.42 | 14.71 | 54 | -6.87 | 151 | 74 | Average |
| 10620 | 51.95 | 37.24 | 14.71 | 74 | -22.05 | 151 | 74 | Peak |
| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | | |
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 5111 | 42.62 | 34.42 | 8.2 | 54 | -11.38 | 250 | 300 | Average |
| 5111 | 53.9 | 45.7 | 8.2 | 74 | -20.1 | 250 | 300 | Peak |
| 5310 | 89.87 | 81.32 | 8.55 | | | 250 | 300 | Average |
| 5310 | 96.3 | 87.75 | 8.55 | | | 250 | 300 | Peak |
| 5350 | 43.71 | 35.08 | 8.63 | 54 | -10.29 | 250 | 300 | Average |
| 5350 | 53.71 | 45.08 | 8.63 | 74 | -20.29 | 250 | 300 | Peak |
| 10620 | 46.91 | 32.2 | 14.71 | 54 | -7.09 | 159 | 66 | Average |
| 10620 | 52.28 | 37.57 | 14.71 | 74 | -21.72 | 159 | 66 | Peak |

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 5310 MHz: Fundamental Frequency
- *: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

802.11ac (VHT80)

| EUT Test Condition | | Measurement Detail | |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel | Channel 106 | Frequency Range | 1 GHz ~ 40 GHz |
| Input Power | 120 Vac, 60 Hz | Detector Function | Peak (PK) Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By | Charles Hsiao |

| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | | |
|---|-------------------------|-------------------|---------------|----------------|-------------|---------------------|----------------------|---------|
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 5457.68 | 46.4 | 37.58 | 8.82 | 54 | -7.6 | 116 | 100 | Average |
| 5457.68 | 57.78 | 48.96 | 8.82 | 74 | -16.22 | 116 | 100 | Peak |
| *5470 | 57.92 | 49.09 | 8.83 | 68.2 | -10.28 | 116 | 100 | Peak |
| 5530 | 92.8 | 83.87 | 8.93 | | | 110 | 99 | Average |
| 5530 | 99.52 | 90.59 | 8.93 | | | 110 | 99 | Peak |
| *5725.56 | 51.56 | 42.4 | 9.16 | 68.2 | -16.64 | 110 | 99 | Peak |
| 11060 | 47.08 | 32 | 15.08 | 54 | -6.92 | 105 | 248 | Average |
| 11060 | 54.09 | 39.01 | 15.08 | 74 | -19.91 | 105 | 248 | Peak |
| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | | |
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 5458.48 | 43.86 | 35.04 | 8.82 | 54 | -10.14 | 250 | 300 | Average |
| 5458.48 | 54.43 | 45.61 | 8.82 | 74 | -19.57 | 250 | 300 | Peak |
| *5470 | 52.93 | 44.1 | 8.83 | 68.2 | -15.27 | 250 | 300 | Peak |
| 5530 | 84.67 | 75.74 | 8.93 | | | 250 | 300 | Average |
| 5530 | 91.53 | 82.6 | 8.93 | | | 250 | 300 | Peak |
| *5725.64 | 51.11 | 41.95 | 9.16 | 68.2 | -17.09 | 250 | 300 | Peak |
| 11060 | 47 | 31.92 | 15.08 | 54 | -7 | 154 | 356 | Average |
| 11060 | 54.05 | 38.97 | 15.08 | 74 | -19.95 | 154 | 356 | Peak |

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 5530 MHz: Fundamental Frequency
- *: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

9 kHz ~ 30 MHz Data:

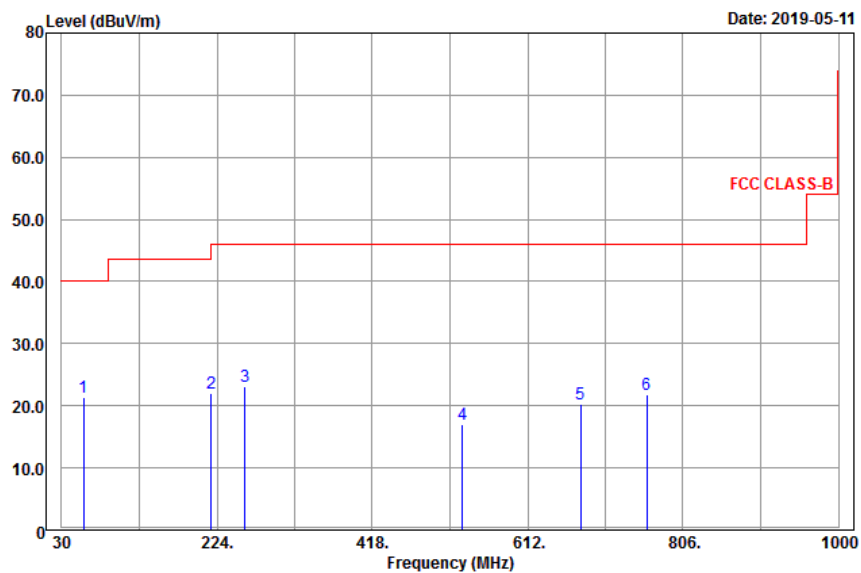
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Worst-Case Data:

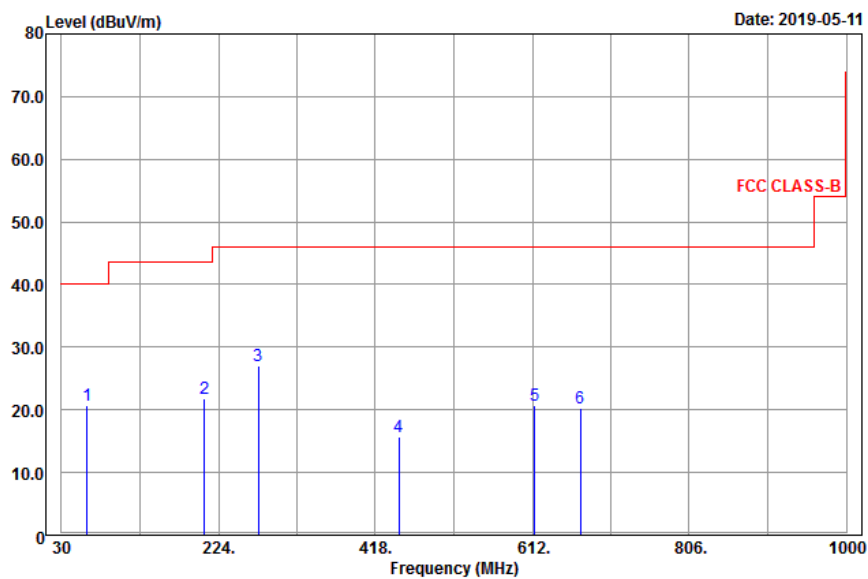
802.11n (HT40)

| EUT Test Condition | | Measurement Detail | |
|--------------------------|--------------------|--------------------|------------------------------|
| Channel | Channel 62 | Frequency Range | 30 MHz ~ 1 GHz |
| Input Power | 120 Vac, 60 Hz | Detector Function | Peak (PK) Quasi-peak (QP) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By | Karl Lee |

Horizontal



Vertical



| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | | |
|---|-------------------------|-------------------|---------------|----------------|-------------|---------------------|----------------------|--------|
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 57.54 | 21.43 | 38.93 | -17.5 | 40 | -18.57 | 124 | 4 | Peak |
| 217.11 | 22.11 | 41.4 | -19.29 | 46 | -23.89 | 178 | 88 | Peak |
| 259.23 | 23.16 | 40.85 | -17.69 | 46 | -22.84 | 152 | 160 | Peak |
| 530.3 | 16.97 | 29.68 | -12.71 | 46 | -29.03 | 153 | 303 | Peak |
| 678 | 20.3 | 30.46 | -10.16 | 46 | -25.7 | 187 | 79 | Peak |
| 760.6 | 21.75 | 30.74 | -8.99 | 46 | -24.25 | 199 | 98 | Peak |
| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | | |
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 61.32 | 20.8 | 39.02 | -18.22 | 40 | -19.2 | 189 | 187 | Peak |
| 206.85 | 21.79 | 41.28 | -19.49 | 43.5 | -21.71 | 113 | 215 | Peak |
| 273.54 | 27 | 44.5 | -17.5 | 46 | -19 | 154 | 179 | Peak |
| 447 | 15.65 | 29.79 | -14.14 | 46 | -30.35 | 144 | 185 | Peak |
| 615 | 20.63 | 31.8 | -11.17 | 46 | -25.37 | 164 | 327 | Peak |
| 671.7 | 20.37 | 30.64 | -10.27 | 46 | -25.63 | 171 | 205 | Peak |

Remarks:

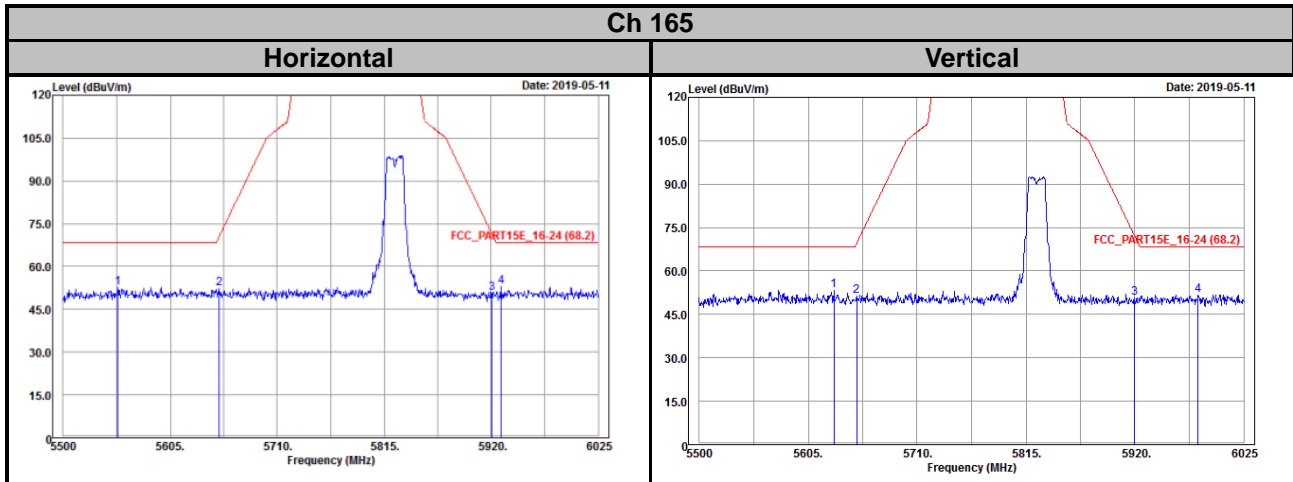
- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- The emission levels of other frequencies were very low against the limit

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a



Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Lin Kou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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