

# TEST REPORT

## CERTIFICATE OF CONFORMITY

**Standard:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
47 CFR FCC Part 15, Subpart E (Section 15.407)

**Report No.:** RFBBQZ-WTW-P24030358-4

**FCC ID:** PY324200628

**Product:** AX3000 Wallplug Extender

**Brand:** NETGEAR

**Model No.:** EAX17

**Received Date:** 2024/4/8

**Test Date:** 2024/9/4 ~ 2024/10/17

**Issued Date:** 2024/10/29

**Applicant and Manufacturer:** NETGEAR, INC.

**Address:** 350 East Plumeria Drive San Jose CA 95134

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

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

**Test Location:** No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kewi Shan Dist., Taoyuan City 33383, Taiwan

**FCC Registration /** 788550 / TW0003

**Designation Number:**

**Approved by:**

*Jeremy Lin*

**Date:**

2024/10/29

Jeremy Lin / Project Engineer

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Prepared by : Celine Chou / Senior Specialist

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## Release Control Record

| Issue No.              | Description       | Date Issued |
|------------------------|-------------------|-------------|
| RFBBQZ-WTW-P24030358-4 | Original release. | 2024/10/29  |

## 1 Certificate

**Product:** AX3000 Wallplug Extender

**Brand:** NETGEAR

**Test Model:** EAX17

**Sample Status:** Engineering sample

**Applicant and Manufacturer:** NETGEAR, INC.

**Test Date:** 2024/9/4 ~ 2024/10/17

**Standard:** 47 CFR FCC Part 15, Subpart C (Section 15.247)

47 CFR FCC Part 15, Subpart E (Section 15.407)

47 CFR FCC Part 2

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.

## 2 Summary of Test Results

| Standard / Clause                                                                 | Test Item                       | Result | Remark                         |
|-----------------------------------------------------------------------------------|---------------------------------|--------|--------------------------------|
| 15.205 /<br>15.209 /<br>15.247(d)<br>15.407(b)(9)                                 | Unwanted Emissions below 1 GHz  | Pass   | Meet the requirement of limit. |
| 15.205 /<br>15.209 /<br>15.247(d)<br>15.407(b) (1/2/3/4(i)/10)<br>15.407(b)(5/10) | Unwanted Emissions above 1 GHz  | Pass   | Meet the requirement of limit. |
| 15.247(d)                                                                         | Conducted Out of Band Emissions | Pass   | Meet the requirement of limit. |

Note: 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:

| Parameter                              | Specification   | Uncertainty<br>(±) |
|----------------------------------------|-----------------|--------------------|
| Radiated Spurious Emissions below 1GHz | 9 kHz ~ 30 MHz  | 3.59 dB            |
|                                        | 30 MHz ~ 1 GHz  | 3.64 dB            |
| Radiated Spurious Emissions above 1GHz | 1 GHz ~ 18 GHz  | 2.29 dB            |
|                                        | 18 GHz ~ 40 GHz | 2.29 dB            |
| Conducted Out of Band Emissions        | 9 kHz ~ 40 GHz  | 2.79 dB            |

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

### 2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

|                       |                                                                                                                                                                                                                                                                                                                                             |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product               | AX3000 Wallplug Extender                                                                                                                                                                                                                                                                                                                    |
| Brand                 | NETGEAR                                                                                                                                                                                                                                                                                                                                     |
| Test Model            | EAX17                                                                                                                                                                                                                                                                                                                                       |
| Status of EUT         | Engineering sample                                                                                                                                                                                                                                                                                                                          |
| Power Supply Rating   | 100-240 Vac                                                                                                                                                                                                                                                                                                                                 |
| Modulation Type       | CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM<br>256QAM for OFDM in VHT and ac mode<br>1024QAM for OFDMA in 11ax mode only                                                                                                                                                                                                |
| Modulation Technology | DSSS, OFDM, OFDMA                                                                                                                                                                                                                                                                                                                           |
| Transfer Rate         | 802.11b: up to 11 Mbps<br>802.11g: up to 54 Mbps<br>802.11a: up to 54 Mbps<br>802.11n (2.4GHz Band): up to 300 Mbps<br>802.11n (5GHz Band): up to 450 Mbps<br>VHT (2.4GHz Band): up to 400 Mbps<br>802.11ac (5GHz Band): up to 2340 Mbps<br>802.11ax (2.4GHz Band): up to 573.5 Mbps<br>802.11ax (5GHz Band): up to 3602.9 Mbps             |
| Operating Frequency   | 2.412 GHz ~ 2.462 GHz<br>5.18 GHz ~ 5.25 GHz<br>5.26 GHz ~ 5.32 GHz<br>5.50 GHz ~ 5.72 GHz<br>5.745 GHz ~ 5.825 GHz<br>5.815 GHz ~ 5.885 GHz                                                                                                                                                                                                |
| Number of Channel     | 2.4 GHz<br>802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20): 11<br>802.11n (HT40), VHT40, 802.11ax (HE40): 7<br>5 GHz:<br>802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 28<br>802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 14<br>802.11ac (VHT80), 802.11ax (HE80): 7<br>802.11ac (VHT160), 802.11ax (HE160): 3 |

Note:

1. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.
2. Simultaneously transmission combination.

| Combination | Technology   |            |
|-------------|--------------|------------|
| 1           | WLAN 2.4 GHz | WLAN 5 GHz |

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

### 3.2 Antenna Description of EUT

1. The antenna information is listed as below.

| Antenna Type | Connector Type | Freq. (MHz) | Antenna Gain (dBi) |       |       | Directional Gain (dBi) |
|--------------|----------------|-------------|--------------------|-------|-------|------------------------|
|              |                |             | Ant 0              | Ant 1 | Ant 2 |                        |
| PIFA         | NA             | 2400~2483.5 | 3.44               | 3.54  | -     | 4.67                   |
|              |                | 5150~5250   | 4.06               | 3.17  | 3.93  | 5.80                   |
|              |                | 5250~5350   | 4.21               | 3.64  | 4.38  | 5.77                   |
|              |                | 5470~5725   | 4.70               | 3.59  | 4.14  | 5.79                   |
|              |                | 5725~5850   | 5.20               | 2.70  | 3.95  | 5.97                   |

\*The detailed antenna information, please refer to the BV CPS Directional Gain Measurement Report no.: RFBBQZ-WTW-P24030358-5.

| Antenna Type | Connector Type | Freq. (MHz) | Antenna Gain (dBi) |       |       |
|--------------|----------------|-------------|--------------------|-------|-------|
|              |                |             | Ant 0              | Ant 1 | Ant 2 |
| PIFA         | NA             | 5850 ~ 5895 | 5.20               | 2.70  | 3.95  |

\*Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

### 3.3 Test Mode Applicability and Tested Channel Detail

|             |                                                                                                                                                                                                                                                                                                                                                               |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pre-Scan:   | 1. EUT can be used in the following ways: X-axis/ Y-axis/ Z-axis. Pre-scan these ways and find the worst case as a representative test condition.<br>2. 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). |
| Worst Case: | X-axis/ Y-axis/ Z-axis Worst Condition: X-axis                                                                                                                                                                                                                                                                                                                |

Following channel(s) was (were) selected for the final test as listed below:

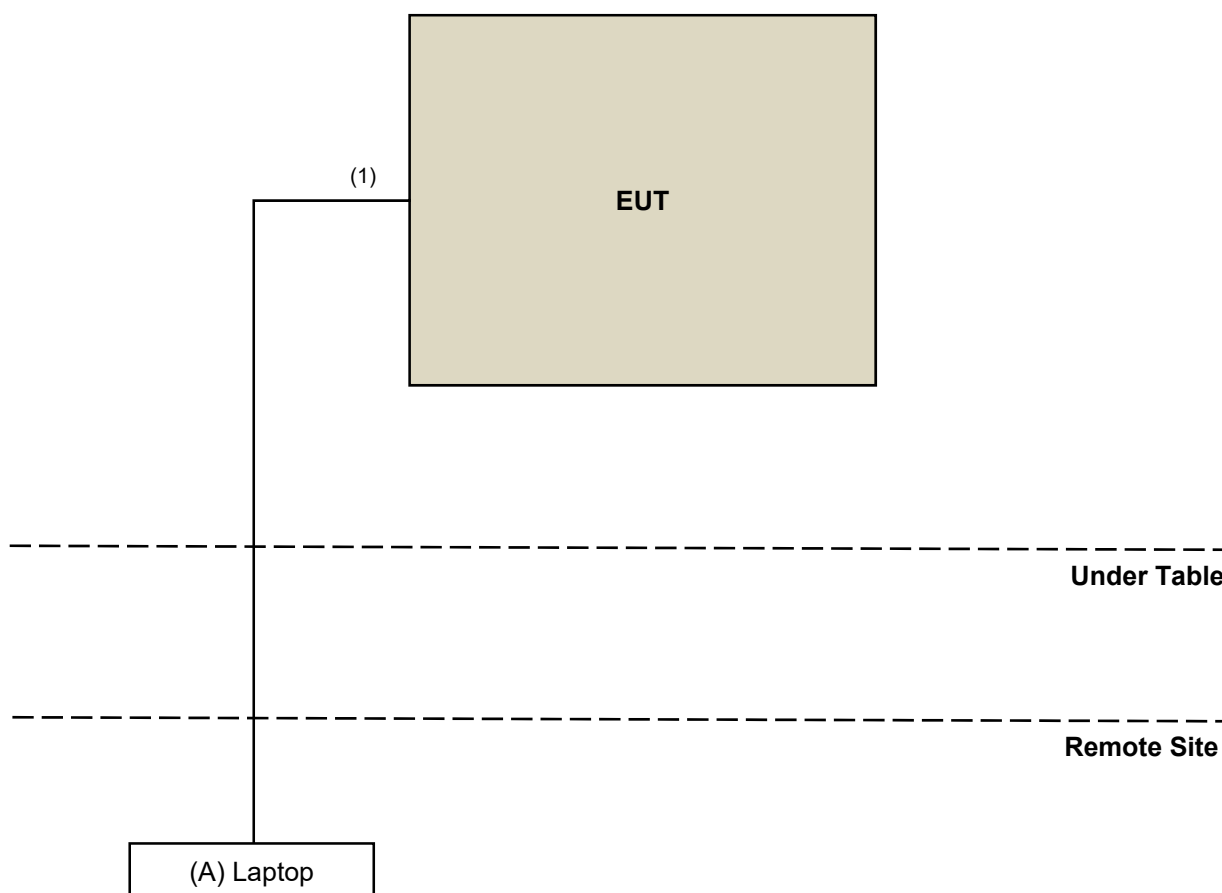
| Test Item                       | Combination | Test Standard | Mode | Tested Channel |
|---------------------------------|-------------|---------------|------|----------------|
| Unwanted Emissions below 1 GHz  | 1           | FCC 15.247    | 11b  | 6              |
|                                 |             | FCC 15.407    | 11a  | 149            |
| Unwanted Emissions above 1 GHz  | 1           | FCC 15.247    | 11b  | 6              |
|                                 |             | FCC 15.407    | 11a  | 149            |
| Conducted Out of Band Emissions | 1           | FCC 15.247    | 11b  | 6              |
|                                 |             |               | 11a  | 149            |



### 3.4 Test Program Used and Operation Descriptions

Controlling software QATool\_V2.78 has been activated to set the EUT under transmission condition continuously at specific channel frequency.

### 3.5 Connection Diagram of EUT and Peripheral Devices



### 3.6 Configuration of Peripheral Devices and Cable Connections

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks         |
|----|---------|-------|-----------|------------|--------|-----------------|
| A  | Laptop  | DELL  | E5430     | 2RL3YW1    | N/A    | Provided by Lab |

| ID | Cable Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks         |
|----|--------------------|------|------------|--------------------|--------------|-----------------|
| 1  | RJ-45 Cable        | 1    | 10         | N                  | 0            | Provided by Lab |

## 4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.1 Unwanted Emissions below 1 GHz

| Description<br>Manufacturer       | Model No.                    | Serial No.   | Calibrated<br>Date | Calibrated<br>Until |
|-----------------------------------|------------------------------|--------------|--------------------|---------------------|
| Antenna Tower<br>inn-co GmbH      | MA 4000                      | 010303       | N/A                | N/A                 |
| Bi_Log Antenna<br>Schwarzbeck     | VULB 9168                    | 9168-155     | 2023/10/13         | 2024/10/12          |
| EMI Test Receiver<br>R&S          | ESR3                         | 102782       | 2023/12/7          | 2024/12/6           |
| Loop Antenna<br>Electro-Metrics   | EM-6879                      | 269          | 2023/9/23          | 2024/9/22           |
| Loop Antenna<br>TESEQ             | HLA 6121                     | 45745        | 2024/8/21          | 2025/8/20           |
| Preamplifier<br>Agilent           | 8447D                        | 2944A10631   | 2024/5/1           | 2025/4/30           |
| Preamplifier<br>EMCI              | EMC001340                    | 980201       | 2023/9/27          | 2024/9/26           |
| RF Coaxial Cable<br>Woken         | 8D-FB                        | Cable-CH4-01 | 2024/7/6           | 2025/7/5            |
| Signal & Spectrum Analyzer<br>R&S | FSW43                        | 101582       | 2024/4/12          | 2025/4/11           |
| Software<br>BV ADT                | ADT_Radiated_<br>V7.6.15.9.5 | N/A          | N/A                | N/A                 |
| Turn Table<br>BV ADT              | TT100                        | TT93021705   | N/A                | N/A                 |
| Turn Table Controller<br>BV ADT   | SC100                        | SC93021705   | N/A                | N/A                 |

Notes:

1. The test was performed in HY - 966 chamber 3.
2. Tested Date: 2024/9/4

#### 4.2 Unwanted Emissions above 1 GHz

| Description<br>Manufacturer           | Model No.                    | Serial No.           | Calibrated<br>Date | Calibrated<br>Until |
|---------------------------------------|------------------------------|----------------------|--------------------|---------------------|
| Antenna Tower<br>inn-co GmbH          | MA 4000                      | 010303               | N/A                | N/A                 |
| Boresight antenna tower fixture<br>BV | BAF-02                       | 5                    | N/A                | N/A                 |
| EMI Test Receiver<br>R&S              | ESR3                         | 102782               | 2023/12/7          | 2024/12/6           |
| Horn Antenna<br>Schwarzbeck           | BBHA 9120D                   | 9120D-408            | 2023/11/12         | 2024/11/11          |
|                                       | BBHA 9170                    | 9170-480             | 2023/11/12         | 2024/11/11          |
|                                       |                              | BBHA9170241          | 2023/10/16         | 2024/10/15          |
|                                       |                              | BBHA9170243          | 2023/11/12         | 2024/11/11          |
| Preamplifier<br>EMCI                  | EMC 184045                   | 980116               | 2024/9/24          | 2025/9/23           |
| Preamplifier<br>Keysight              | 83017A                       | MY53270295           | 2024/5/1           | 2025/4/30           |
| RF Coaxial Cable<br>EMCI              | EMC102-KM-KM-600             | 150928               | 2024/7/6           | 2025/7/5            |
|                                       | EMC102-KM-KM-3000            | 150929               | 2024/7/6           | 2025/7/5            |
| RF Coaxial Cable<br>HUBER+SUHNER      | SUCOFLEX 104                 | Cable-CH4-03(250724) | 2024/5/1           | 2025/4/30           |
|                                       |                              | MY 13380+295012/04   | 2024/5/1           | 2025/4/30           |
| Signal & Spectrum Analyzer<br>R&S     | FSW43                        | 101582               | 2024/4/12          | 2025/4/11           |
| Software<br>BV ADT                    | ADT_Radiated_<br>V7.6.15.9.5 | N/A                  | N/A                | N/A                 |
| Turn Table<br>BV ADT                  | TT100                        | TT93021705           | N/A                | N/A                 |
| Turn Table Controller<br>BV ADT       | SC100                        | SC93021705           | N/A                | N/A                 |

Notes:

1. The test was performed in HY - 966 chamber 3.
2. Tested Date: 2024/10/14

#### 4.3 Conducted Out of Band Emissions

| Description<br>Manufacturer       | Model No.                        | Serial No. | Calibrated<br>Date | Calibrated<br>Until |
|-----------------------------------|----------------------------------|------------|--------------------|---------------------|
| Signal & Spectrum Analyzer<br>R&S | FSV3044                          | 101105     | 2024/2/27          | 2025/2/26           |
| Software<br>BV                    | ADT_RF Test Software<br>V7.6.5.4 | N/A        | N/A                | N/A                 |

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2024/10/17

## 5 Limits of Test Items

### 5.1 Unwanted Emissions below 1 GHz

For FCC 15.247:

| 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                             |

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

For FCC 15.407:

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                             |

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

## 5.2 Unwanted Emissions above 1 GHz

For FCC 15.247:

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| Above 960         | 500                               | 3                             |

Notes:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- 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.

For FCC 15.407 transmitters operating in the 5.150-5.850 GHz band:

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) |
|-------------------|-----------------------------------|-------------------------------|
| Above 960         | 500                               | 3                             |

Notes:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- 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.

Limits of unwanted emission out of the restricted bands

| Applicable To                                           | Limit                 |                 |
|---------------------------------------------------------|-----------------------|-----------------|
| 789033 D02 General UNII Test Procedure New Rules v02r01 | Field Strength at 3 m |                 |
|                                                         | PK: 74 (dBμV/m)       | AV: 54 (dBμV/m) |

| Applicable To   | EIRP Limit                                                                                                                              | Equivalent Field Strength at 3 m                                                                                                            |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| 15.407(b)(1)    | PK: -27 (dBm/MHz)                                                                                                                       | PK: 68.2 (dBμV/m) *                                                                                                                         |
| 15.407(b)(2)    | PK: -27 (dBm/MHz)                                                                                                                       | PK: 68.2 (dBμV/m) *                                                                                                                         |
| 15.407(b)(3)    | PK: -27 (dBm/MHz)                                                                                                                       | PK: 68.2 (dBμV/m) *                                                                                                                         |
| 15.407(b)(4)(i) | PK: -27 (dBm/MHz) <sup>*1</sup><br>PK: 10 (dBm/MHz) <sup>*2</sup><br>PK: 15.6 (dBm/MHz) <sup>*3</sup><br>PK: 27 (dBm/MHz) <sup>*4</sup> | PK: 68.2 (dBμV/m) <sup>*1</sup><br>PK: 105.2 (dBμV/m) <sup>*2</sup><br>PK: 110.8 (dBμV/m) <sup>*3</sup><br>PK: 122.2 (dBμV/m) <sup>*4</sup> |

<sup>\*1</sup> beyond 75 MHz or more above of the band edge.

<sup>\*2</sup> below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

<sup>\*3</sup> below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

<sup>\*4</sup> 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:

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

For 5.815-5.885 GHz band limits of unwanted emission out of the restricted bands

- (i) For an indoor access point or subordinate device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of 15 dBm/MHz and shall decrease linearly to an e.i.r.p. of -7 dBm/MHz at or above 5.925 GHz.
- (ii) For a client device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of -5 dBm/MHz and shall decrease linearly to an e.i.r.p. of -27 dBm/MHz at or above 5.925 GHz.
- (iii) For a client device or indoor access point or subordinate device, all emissions below 5.725 GHz shall not exceed an e.i.r.p. of -27 dBm/MHz at 5.65 GHz increasing linearly to 10 dBm/MHz at 5.7 GHz, and from 5.7 GHz increasing linearly to a level of 15.6 dBm/MHz at 5.72 GHz, and from 5.72 GHz increasing linearly to a level of 27 dBm/MHz at 5.725 GHz.

**Note:**

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

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

### 5.3 Conducted Out of Band Emissions

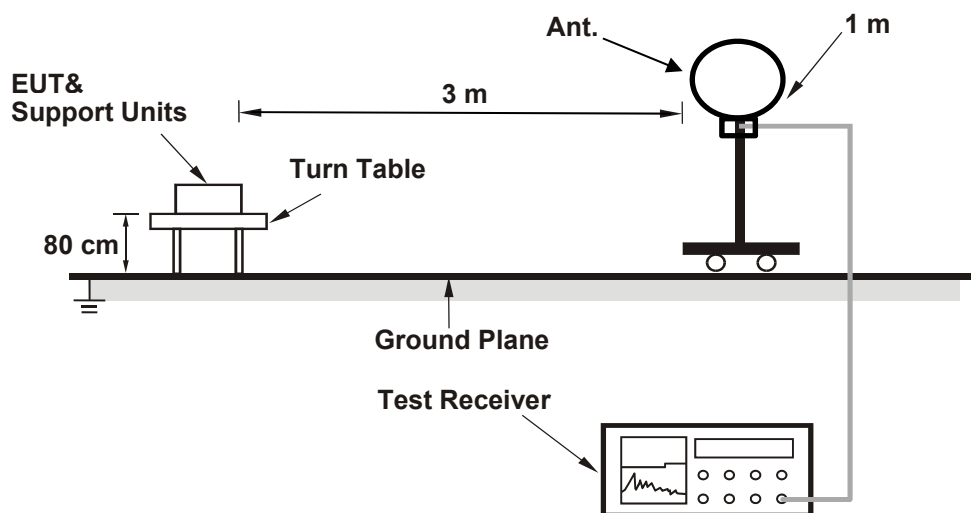
Below 30 dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

## 6 Test Arrangements

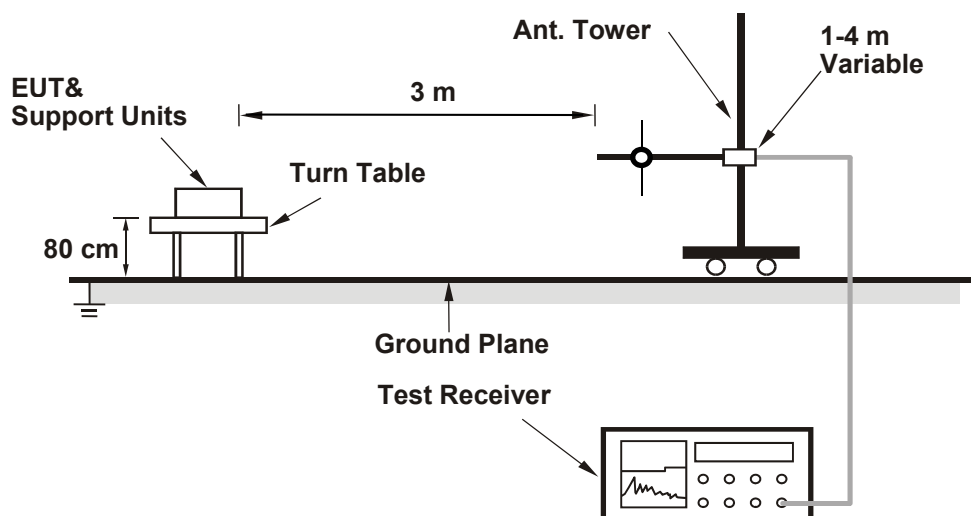
### 6.1 Unwanted Emissions below 1 GHz

#### 6.1.1 Test Setup

For Radiated emission below 30 MHz



For Radiated emission above 30 MHz



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

## 6.1.2 Test Procedure

### 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 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. 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, except for the frequency band (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

#### Notes:

9. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz at frequency below 150 kHz.
10. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz or 10 kHz at frequency (150 kHz to 30 MHz).
11. All modes of operation were investigated and the worst-case emissions are reported.

### For Radiated emission above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters 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.

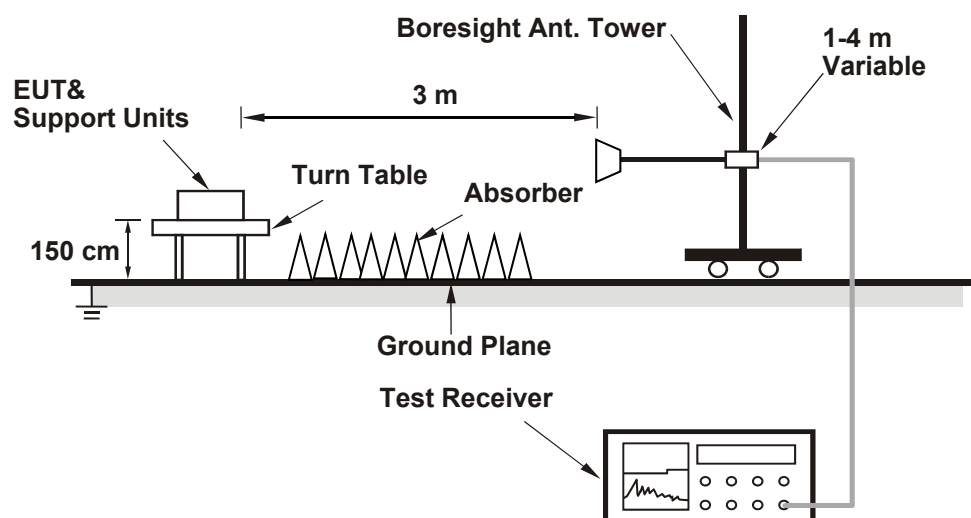
#### Notes:

12. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
13. All modes of operation were investigated and the worst-case emissions are reported.



## 6.2 Unwanted Emissions above 1 GHz

### 6.2.1 Test Setup



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

### 6.2.2 Test Procedure

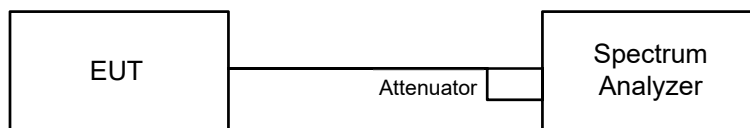
- The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- The test-receiver system was set to peak and average detects 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.

#### Notes:

- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1 GHz.
- For fundamental and harmonic signal measurement, 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.
- All modes of operation were investigated and the worst-case emissions are reported.

## 6.3 Conducted Out of Band Emissions

### 6.3.1 Test Setup



### 6.3.2 Test Procedure

#### MEASUREMENT PROCEDURE REF

- Set the RBW = 100 kHz.
- Set the VBW  $\geq$  300 kHz.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

#### MEASUREMENT PROCEDURE OOB

- Set RBW = 100 kHz.
- Set VBW  $\geq$  300 kHz.
- Detector = peak.
- Sweep = auto couple.
- Trace Mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

## 7 Test Results of Test Item

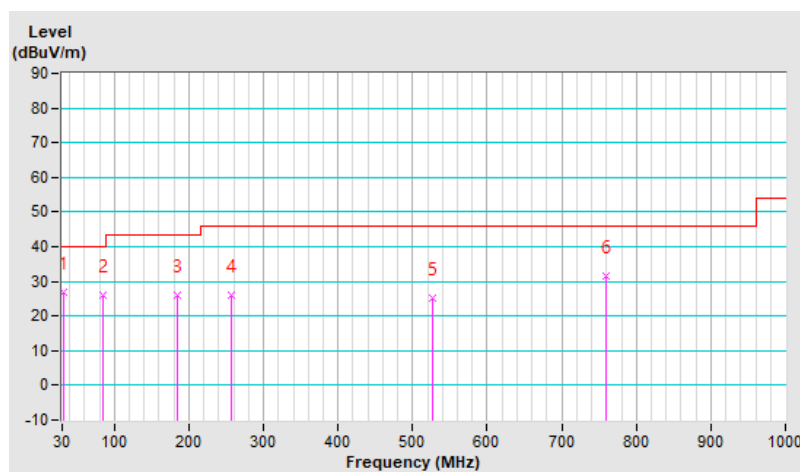
### 7.1 Unwanted Emissions below 1 GHz

|                 |                |                               |                               |
|-----------------|----------------|-------------------------------|-------------------------------|
| Combination     | 1              |                               |                               |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | QP: RB=120kHz, DET=Quasi-Peak |
| Input Power     | 120 Vac, 60 Hz | Environmental Conditions      | 23 °C, 66 % RH                |
| Tested By       | Titan Hsu      |                               |                               |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 32.81           | 26.7 QP                 | 40.0           | -13.3       | 1.99 H             | 171                  | 37.2             | -10.5                    |
| 2                                                    | 84.83           | 25.9 QP                 | 40.0           | -14.1       | 1.99 H             | 180                  | 40.1             | -14.2                    |
| 3                                                    | 184.64          | 26.1 QP                 | 43.5           | -17.4       | 1.49 H             | 257                  | 36.6             | -10.5                    |
| 4                                                    | 256.33          | 26.1 QP                 | 46.0           | -19.9       | 1.00 H             | 73                   | 35.0             | -8.9                     |
| 5                                                    | 526.25          | 25.2 QP                 | 46.0           | -20.8       | 1.49 H             | 137                  | 28.3             | -3.1                     |
| 6                                                    | 759.61          | 31.6 QP                 | 46.0           | -14.4       | 1.49 H             | 228                  | 29.1             | 2.5                      |

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

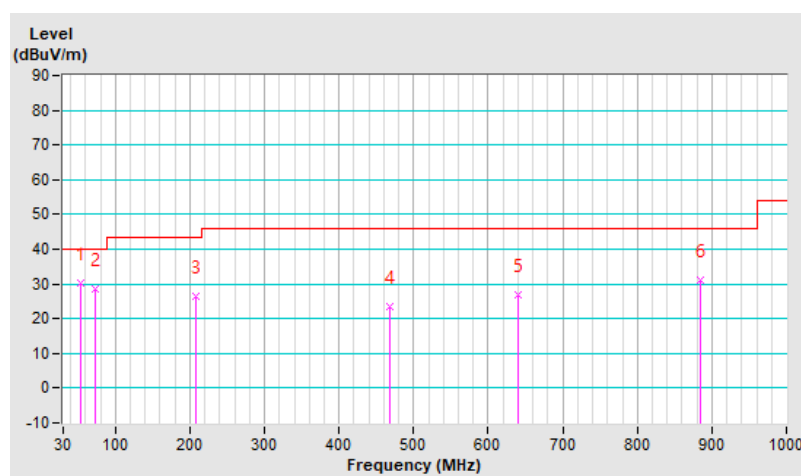


|                 |                |                               |                               |
|-----------------|----------------|-------------------------------|-------------------------------|
| Combination     | 1              |                               |                               |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | QP: RB=120kHz, DET=Quasi-Peak |
| Input Power     | 120 Vac, 60 Hz | Environmental Conditions      | 23 °C, 66 % RH                |
| Tested By       | Titan Hsu      |                               |                               |

| Antenna Polarity & Test Distance : Vertical at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|----------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                 | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                  | 53.9            | 30.4 QP                 | 40.0           | -9.6        | 1.01 V             | 13                   | 39.5             | -9.1                     |
| 2                                                  | 73.58           | 28.7 QP                 | 40.0           | -11.3       | 1.01 V             | 116                  | 40.3             | -11.6                    |
| 3                                                  | 208.54          | 26.5 QP                 | 43.5           | -17.0       | 1.01 V             | 156                  | 37.9             | -11.4                    |
| 4                                                  | 468.61          | 23.3 QP                 | 46.0           | -22.7       | 1.50 V             | 291                  | 27.3             | -4.0                     |
| 5                                                  | 640.12          | 26.7 QP                 | 46.0           | -19.3       | 1.01 V             | 58                   | 26.9             | -0.2                     |
| 6                                                  | 884.72          | 31.0 QP                 | 46.0           | -15.0       | 1.50 V             | 192                  | 26.5             | 4.5                      |

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



## 7.2 Unwanted Emissions above 1 GHz

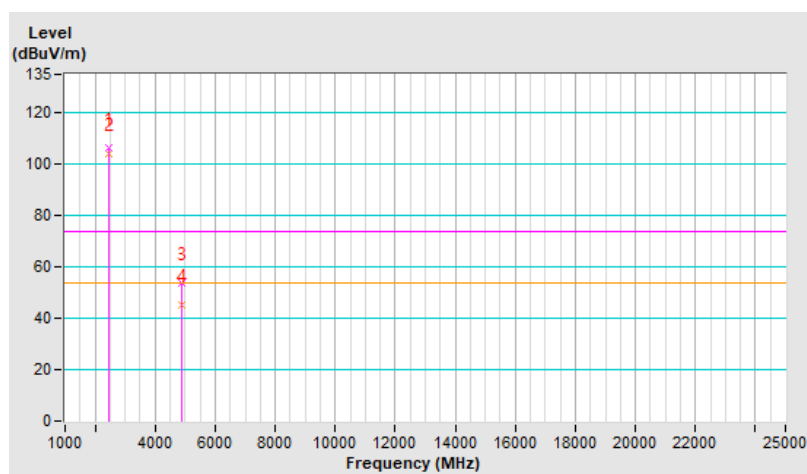
### FCC 15.247

|                 |                |                               |                                                                      |
|-----------------|----------------|-------------------------------|----------------------------------------------------------------------|
| Combination     | 1              |                               |                                                                      |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | PK: RB=1 MHz, VB=3 MHz, DET=Peak<br>AV: RB=1 MHz, VB=10 Hz, DET=Peak |
| Input Power     | 120 Vac, 60 Hz | Environmental Conditions      | 23 °C, 66 % RH                                                       |
| Tested By       | Titan Hsu      |                               |                                                                      |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | *2437           | 106.6 PK                |                |             | 1.95 H             | 155                  | 71.6             | 35.0                     |
| 2                                                    | *2437           | 104.2 AV                |                |             | 1.95 H             | 155                  | 69.2             | 35.0                     |
| 3                                                    | 4874            | 53.9 PK                 | 74.0           | -20.1       | 1.06 H             | 158                  | 40.2             | 13.7                     |
| 4                                                    | 4874            | 45.3 AV                 | 54.0           | -8.7        | 1.06 H             | 158                  | 31.6             | 13.7                     |

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency, the limit was restricted at the RF Output Power.

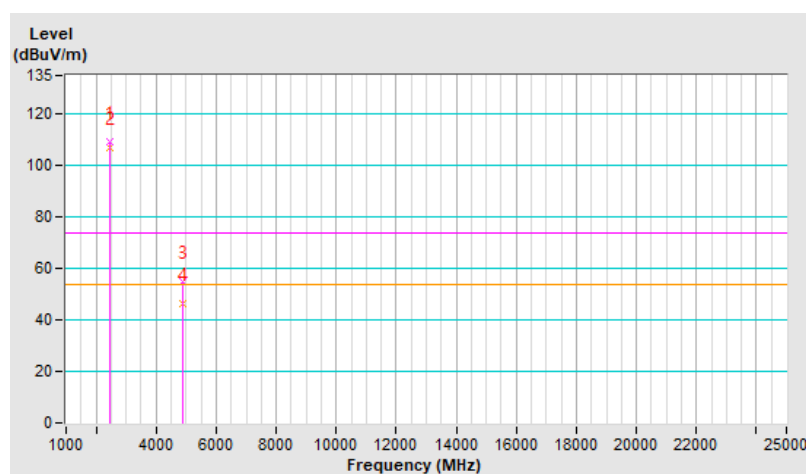


|                 |                |                               |                                                                      |
|-----------------|----------------|-------------------------------|----------------------------------------------------------------------|
| Combination     | 1              |                               |                                                                      |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | PK: RB=1 MHz, VB=3 MHz, DET=Peak<br>AV: RB=1 MHz, VB=10 Hz, DET=Peak |
| Input Power     | 120 Vac, 60 Hz | Environmental Conditions      | 23 °C, 66 % RH                                                       |
| Tested By       | Titan Hsu      |                               |                                                                      |

| Antenna Polarity & Test Distance : Vertical at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|----------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                 | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                  | *2437           | 109.3 PK                |                |             | 1.25 V             | 61                   | 74.3             | 35.0                     |
| 2                                                  | *2437           | 106.8 AV                |                |             | 1.25 V             | 61                   | 71.8             | 35.0                     |
| 3                                                  | 4874            | 54.9 PK                 | 74.0           | -19.1       | 1.88 V             | 335                  | 41.2             | 13.7                     |
| 4                                                  | 4874            | 46.2 AV                 | 54.0           | -7.8        | 1.88 V             | 335                  | 32.5             | 13.7                     |

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.



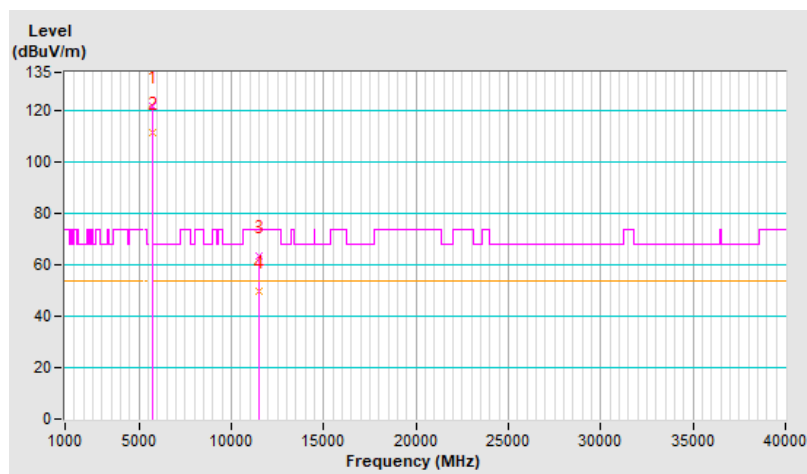
# FCC 15.407

|                 |                |                               |                                                                      |
|-----------------|----------------|-------------------------------|----------------------------------------------------------------------|
| Combination     | 1              |                               |                                                                      |
| Frequency Range | 1 GHz ~ 40 GHz | Detector Function & Bandwidth | PK: RB=1 MHz, VB=3 MHz, DET=Peak<br>AV: RB=1 MHz, VB=10 Hz, DET=Peak |
| Input Power     | 120 Vac, 60 Hz | Environmental Conditions      | 23 °C, 66 % RH                                                       |
| Tested By       | Titan Hsu      |                               |                                                                      |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | *5745           | 121.6 PK                |                |             | 2.18 H             | 25                   | 77.0             | 44.6                     |
| 2                                                    | *5745           | 111.6 AV                |                |             | 2.18 H             | 25                   | 67.0             | 44.6                     |
| 3                                                    | 11490           | 63.5 PK                 | 74.0           | -10.5       | 2.05 H             | 132                  | 40.1             | 23.4                     |
| 4                                                    | 11490           | 49.6 AV                 | 54.0           | -4.4        | 2.05 H             | 132                  | 26.2             | 23.4                     |

## Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency, the limit was restricted at the RF Output Power.

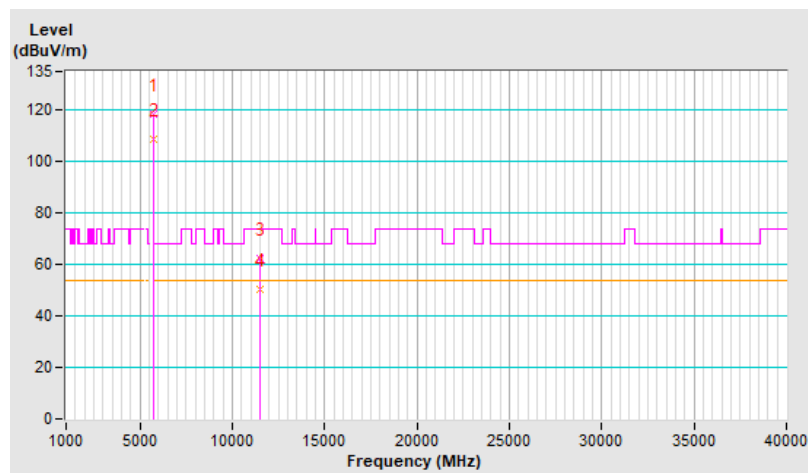


|                 |                |                               |                                                                      |
|-----------------|----------------|-------------------------------|----------------------------------------------------------------------|
| Combination     | 1              |                               |                                                                      |
| Frequency Range | 1 GHz ~ 40 GHz | Detector Function & Bandwidth | PK: RB=1 MHz, VB=3 MHz, DET=Peak<br>AV: RB=1 MHz, VB=10 Hz, DET=Peak |
| Input Power     | 120 Vac, 60 Hz | Environmental Conditions      | 23 °C, 66 % RH                                                       |
| Tested By       | Titan Hsu      |                               |                                                                      |

| Antenna Polarity & Test Distance : Vertical at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|----------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                 | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                  | *5745           | 118.6 PK                |                |             | 2.06 V             | 210                  | 74.0             | 44.6                     |
| 2                                                  | *5745           | 108.5 AV                |                |             | 2.06 V             | 210                  | 63.9             | 44.6                     |
| 3                                                  | 11490           | 62.6 PK                 | 74.0           | -11.4       | 1.42 V             | 230                  | 39.2             | 23.4                     |
| 4                                                  | 11490           | 50.2 AV                 | 54.0           | -3.8        | 1.42 V             | 230                  | 26.8             | 23.4                     |

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.



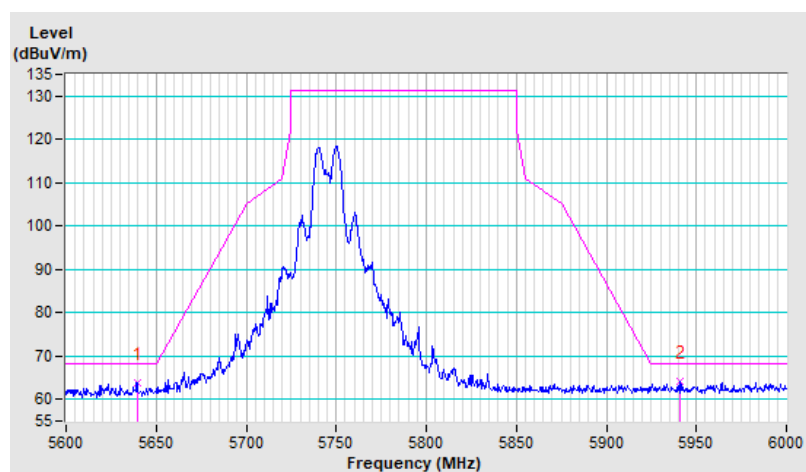


|                 |                |                               |                                  |
|-----------------|----------------|-------------------------------|----------------------------------|
| Combination     | 1              |                               |                                  |
| Frequency Range | 1 GHz ~ 40 GHz | Detector Function & Bandwidth | PK: RB=1 MHz, VB=3 MHz, DET=Peak |
| Input Power     | 120 Vac, 60 Hz | Environmental Conditions      | 23 °C, 66 % RH                   |
| Tested By       | Titan Hsu      |                               |                                  |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | #5639.6         | 63.8 PK                 |                |             | 2.18 H             | 25                   | 50.5             | 13.3                     |
| 2                                                    | #5941.2         | 64.1 PK                 |                |             | 2.18 H             | 25                   | 50.1             | 14.0                     |

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " # " : The radiated frequency is out of the restricted band, the limit was restricted at the Conducted Out of Band Emissions.

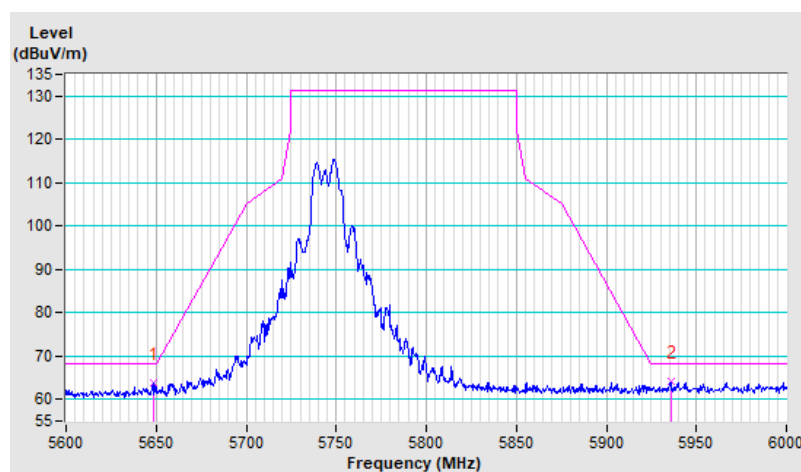


|                 |                |                               |                                  |
|-----------------|----------------|-------------------------------|----------------------------------|
| Combination     | 1              |                               |                                  |
| Frequency Range | 1 GHz ~ 40 GHz | Detector Function & Bandwidth | PK: RB=1 MHz, VB=3 MHz, DET=Peak |
| Input Power     | 120 Vac, 60 Hz | Environmental Conditions      | 23 °C, 66 % RH                   |
| Tested By       | Titan Hsu      |                               |                                  |

| Antenna Polarity & Test Distance : Vertical at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|----------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                 | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                  | #5648.8         | 63.7 PK                 |                |             | 2.06 V             | 210                  | 50.3             | 13.4                     |
| 2                                                  | #5936.4         | 64.0 PK                 |                |             | 2.06 V             | 210                  | 50.0             | 14.0                     |

#### Remarks:

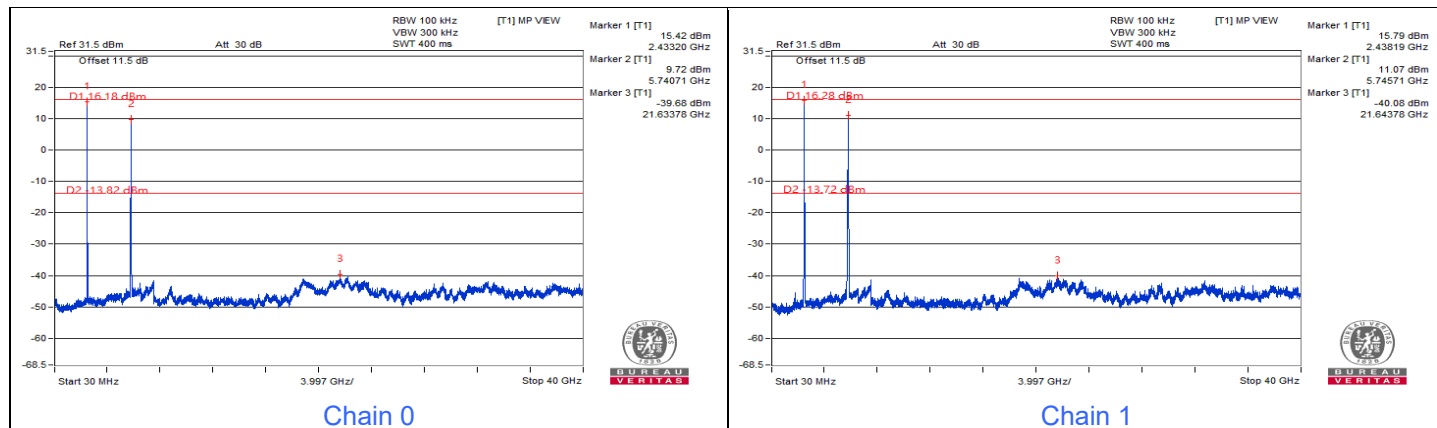
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " # " : The radiated frequency is out of the restricted band, the limit was restricted at the Conducted Out of Band Emissions.



### 7.3 Conducted Out of Band Emissions

|              |                |                           |              |            |          |
|--------------|----------------|---------------------------|--------------|------------|----------|
| Input Power: | 120 Vac, 60 Hz | Environmental Conditions: | 23°C, 61% RH | Tested By: | Gary Lin |
|--------------|----------------|---------------------------|--------------|------------|----------|

#### Combination 1



## 8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

## 9 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:

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**Web Site:** <http://ee.bureauveritas.com.tw>

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

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