# FCC Test Report

# (Co-Located)

| | |
|---|---|
| **Report No.:** | RF180424C02-2 |
| **FCC ID:** | KA2WL8620APEA1 |
| **Test Model:** | DWL-8620APE |
| **Received Date:** | Apr. 24, 2018 |
| **Test Date:** | Jun. 06 ~ Jul. 08, 2018 |
| **Issued Date:** | Jul. 09, 2018 |
| **Applicant:** | D-Link Corporation |
| **Address:** | 17595 Mt. Herrmann, Fountain Valley, California, United States, 92708 |
| **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:** | No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.) |
| **FCC Registration / Designation Number:** | 788550 / TW0003 |

Testing Laboratory
2021

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**Release Control Record**

| Issue No. | Description | Date Issued |
|---|---|---|
| RF180424C02-2 | Original release. | Jul. 09, 2018 |

## 1 Certificate of Conformity

| | |
|---|---|
| **Product:** | Unified AC Concurrent Dual-Band PoE Access Point |
| **Brand:** | D-Link Corporation |
| **Test Model:** | DWL-8620APE |
| **Sample Status:** | Engineering sample |
| **Applicant:** | D-Link Corporation |
| **Test Date:** | Jun. 06 ~ Jul. 08, 2018 |
| **Standards:** | 47 CFR FCC Part 15, Subpart C (Section 15.247)<br>47 CFR FCC Part 15, Subpart E (Section 15.407)<br>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 :** _____ , **Date:** Jul. 09, 2018

Suntee Liu / Specialist

**Approved by :** _____ , **Date:** Jul. 09, 2018

Bruce Chen / Project Engineer

## 2 Summary of Test Results

| Applied Standard: | 47 CFR FCC Part 15, Subpart C (Section 15.247)<br>47 CFR FCC Part 15, Subpart E (Section 15.407) | | |
|---|---|---|---|
| FCC Clause | Test Item | Result | Remarks |
| 15.205 / 15.209 / 15.247(d) 15.407(b) (1/2/3/4(i/ii)/6) | Radiated Emissions | Pass | Meet the requirement of limit. Minimum passing margin is -0.2dB at 239.88MHz. |

*For U-NII-3 band compliance with rule part 15.407(b)(4)(i), the OOBE test plots were recorded in Annex A.

### 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 | 30MHz ~ 200MHz | 3.86 dB |
| | 200MHz ~1000MHz | 3.87 dB |
| Radiated Emissions above 1 GHz | 1GHz ~ 18GHz | 2.29 dB |
| | 18GHz ~ 40GHz | 2.29 dB |

### 2.2 Modification Record

There were no modifications required for compliance.

## 3 General Information

### 3.1 General Description of EUT

| | |
|---|---|
| Product | Unified AC Concurrent Dual-Band PoE Access Point |
| Brand | D-Link Corporation |
| Test Model | DWL-8620APE |
| Sample Status | Engineering sample |
| Power Supply Rating | 12Vdc (adapter)<br>52Vdc (POE) |
| Modulation Type | CCK, DQPSK, DBPSK for DSSS<br>256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM |
| Modulation Technology | DSSS, OFDM |
| Transfer Rate | 802.11b:11/5.5/2/1Mbps<br>802.11a/g: 54/48/36/24/18/12/9/6Mbps<br>802.11n: up to 600Mbps<br>802.11ac: up to 1733.3Mbps |
| Operating Frequency | 2.4GHz: 2412 ~ 2462MHz<br>5.0GHz: 5180 ~ 5240MHz, 5745 ~ 5825MHz |
| Number of Channel | 2412 ~ 2462MHz:<br>802.11b, 802.11g, 802.11n (HT20): 11<br>802.11n (HT40)7<br>5180~5240MHz:<br>802.11a, 802.11n (HT20), 802.11ac (VHT20): 4<br>802.11n (HT40), 802.11ac (VHT40): 2<br>802.11ac (VHT80), 802.11ac (VHT80+VHT80): 1<br>5745~5825MHz:<br>802.11a, 802.11n (HT20), 802.11ac (VHT20): 5<br>802.11n (HT40), 802.11ac (VHT40): 2<br>802.11ac (VHT80), 802.11ac (VHT80+VHT80): 1 |
| Output Power | CDD Mode:<br>2412~2462MHz: 899.271mW<br>5180~5240MHz: 653.064mW<br>5745~5825MHz: 922.430mW<br>Beamforming Mode:<br>2412~2462MHz: 621.015mW<br>5180~5240MHz: 434.467mW<br>5745~5825MHz: 630.983mW |
| Antenna Type | Refer to Note |
| Antenna Connector | Refer to Note |
| Accessory Device | Adapter |
| Data Cable Supplied | NA |

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides 4 completed transmitters and 4 receivers.

| Band | Modulation Mode | Beamforming Mode | TX Function | Available Channel |
|---|---|---|---|---|
| 2.4GHz | 802.11b | Not Support | 4TX | 1 ~ 11 |
| | 802.11g | Not Support | 4TX | 1 ~ 11 |
| | 802.11n (HT20) | Support | 4TX | 1 ~ 11 |
| | 802.11n (HT40) | Support | 4TX | 3 ~ 9 |
| 5GHz | 802.11a | Not Support | 4TX | 36 ~ 48, 149 ~ 165 |
| | 802.11n (HT20) | Support | 4TX | 36 ~ 48, 149 ~ 165 |
| | 802.11n (HT40) | Support | 4TX | 38 ~ 46, 151 ~ 159 |
| | 802.11ac (VHT20) | Support | 4TX | 36 ~ 48, 149 ~ 165 |
| | 802.11ac (VHT40) | Support | 4TX | 38 ~ 46, 151 ~ 159 |
| | 802.11ac (VHT80) | Support | 4TX | 42, 155 |
| | 802.11ac (VHT80+ VHT80) | Support | 2TX+2TX | 42 + 155 |

* For 802.11n, CDD mode is the worst case for final radiated emission and power line conducted emission tests after pretesting CDD mode and beamforming mode.

2. The EUT uses following antennas.

| Ant. No. | Type | Connector | Ant. Gain (dBi) | | Beamforming Gain (dBi) | |
|---|---|---|---|---|---|---|
| | | | 2.4GHz | 5GHz | 2.4GHz | 5GHz |
| 0, 1, 2, 3 | Dipole | SMA | 3 | 4 | 3.78 | 5.77 |

3. The EUT consumes power from the following adapters.

| Adapter 1 | |
|---|---|
| Brand | Channel Well Technology |
| Model | 2ABL030F NJ |
| Input Power | 100-240Vac~, 50/60Hz 1.0A |
| Output Power | 12.0Vdc / 2.5A |
| Power Cord | 1.2m non-shielded power cord without core |

| Adapter 2 | |
|---|---|
| Brand | Asian Power Devices Inc. |
| Model | WA-30J12R |
| Input Power | 100-240Vac~, 50-60Hz, 0.9A Max |
| Output Power | 12Vdc / 2.5A |
| Power Cord | 1.2m non-shielded power cord without core |

### 3.2 Description of Test Modes

For 2.4GHz

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

| Channel | Frequency | Channel | Frequency |
|---|---|---|---|
| 1 | 2412MHz | 7 | 2442MHz |
| 2 | 2417MHz | 8 | 2447MHz |
| 3 | 2422MHz | 9 | 2452MHz |
| 4 | 2427MHz | 10 | 2457MHz |
| 5 | 2432MHz | 11 | 2462MHz |
| 6 | 2437MHz | | |

7 channels are provided for 802.11n (HT40):

| Channel | Frequency | Channel | Frequency |
|---|---|---|---|
| 3 | 2422MHz | 7 | 2442MHz |
| 4 | 2427MHz | 8 | 2447MHz |
| 5 | 2432MHz | 9 | 2452MHz |
| 6 | 2437MHz | | |

5180 ~ 5240MHz:

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

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

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

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

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency |
|---|---|
| 42 | 5210MHz |

5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

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

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

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

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency |
|---|---|
| 155 | 5775MHz |

For 802.11ac (VHT80+VHT80):

5180~5240MHz & 5745~5825MHz:

1 channel is provided for 802.11ac (VHT80+VHT80):

| Channel | Frequency |
|---|---|
| 42+155 | 5210MHz+5775MHz |

### 3.2.1 Test Mode Applicability and Tested Channel Detail

| EUT Configure Mode | Applicable to | | Description |
|---|---|---|---|
| | RE≥1G | RE<1G | |
| A | √ | √ | Power from adapter 1 |
| B | - | √ | Power from adapter 2 |
| C | - | √ | Power from POE |

Where RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Z-plane.
2. "-": Means no effect.

Radiated Emission Test (Above 1GHz):

☒ 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 | Mode | Freq. Range (MHz) | Available Channel | Tested Channel | Modulation Technology |
|---|---|---|---|---|---|
| A | 802.11b | 2412-2462 | 1 to 11 | 6 | OFDM |
| | 802.11n (HT20) | 5745-5825 | 149 to 165 | 165 | OFDM |

Radiated Emission Test (Below 1GHz):

☒ 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 | Mode | Freq. Range (MHz) | Available Channel | Tested Channel | Modulation Technology |
|---|---|---|---|---|---|
| A, B, C | 802.11b | 2412-2462 | 1 to 11 | 6 | OFDM |
| | 802.11n (HT20) | 5745-5825 | 149 to 165 | 165 | OFDM |

Test Condition:

| Applicable to | Environmental Conditions | Input Power | Tested by |
|---|---|---|---|
| RE≥1G | 25 deg. C, 66% RH | 120Vac, 60Hz | Willy Cheng |
| RE<1G | 25 deg. C, 66% RH<br>25deg. C, 66%RH | 120Vac, 60Hz | Willy Cheng |

### 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.

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|---|---|---|---|---|---|---|
| A. | Notebook | DELL | E5410 | 1HC2XM1 | FCC DoC Approved | - |
| B. | Load | NA | NA | NA | NA | - |
| C. | POE | PHIHONG | POE31U-1AT | NA | NA | - |

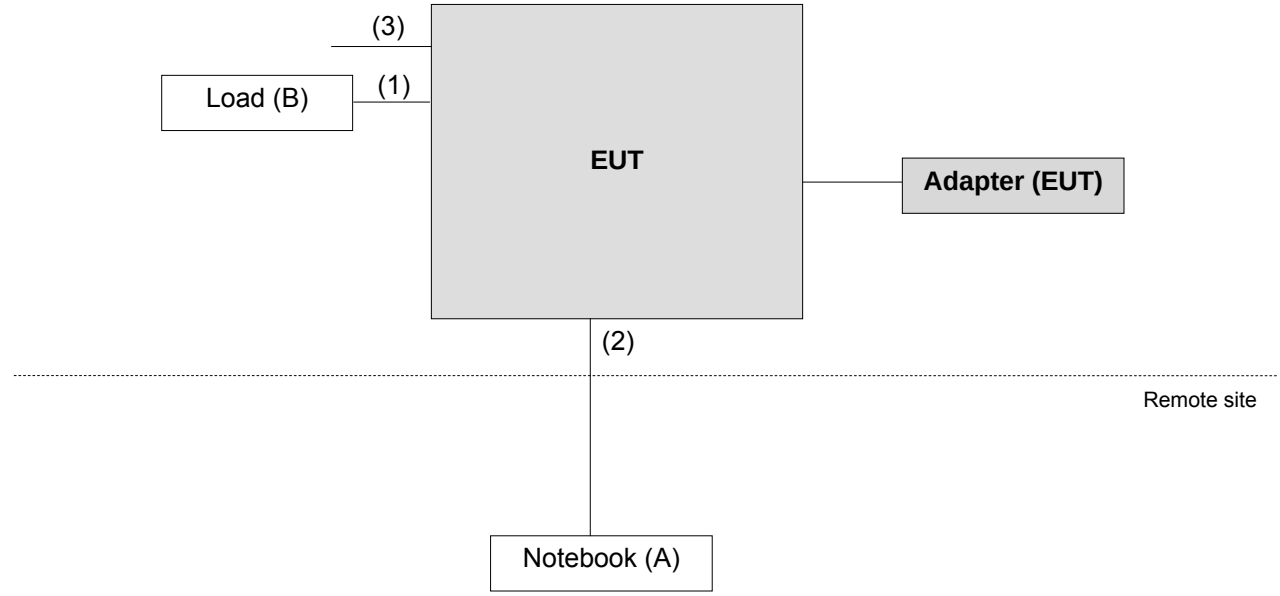
Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

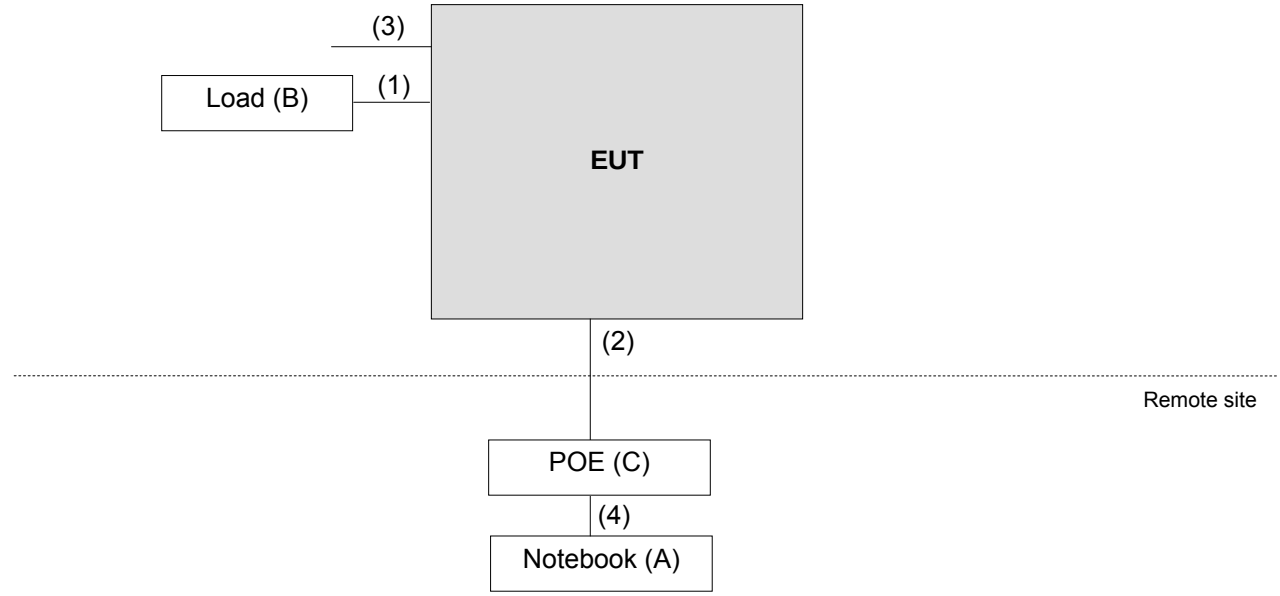
| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|---|---|---|---|---|---|---|
| 1. | RJ45 cable | 1 | 1.5 | N | 0 | Cat5e |
| 2. | RJ45 cable | 1 | 5 | N | 0 | Cat5e |
| 3. | RJ45 to console cable | 1 | 1.2 | N | 0 | Cat5e |
| 4. | RJ45, Cat5e | 1 | 1.8 | N | 0 | Cat5e |

### 3.3.1 Configuration of System under Test

Mode A, B




Mode C




### 3.4 General Description of Applied Standards

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

**FCC Part 15, Subpart C (15.247)**

**FCC Part 15, Subpart E (15.407)**

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. Other emissions shall be at least 20dB below the highest level of the desired power:

| 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 1000MHz, 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 20dB under any condition of modulation.

Limits of unwanted emission out of the restricted bands

<table>
<tr><td colspan="3">Applicable To</td><td colspan="2">Limit</td></tr>
<tr><td colspan="3" rowspan="2">789033 D02 General UNII Test Procedure New Rules v02r01</td><td colspan="2">Field Strength at 3m</td></tr>
<tr><td>PK: 74 (dBμV/m)</td><td>AV: 54 (dBμV/m)</td></tr>
<tr><td>Frequency Band</td><td colspan="2">Applicable To</td><td>EIRP Limit</td><td>Equivalent Field Strength at 3m</td></tr>
<tr><td>5150~5250 MHz</td><td colspan="2">15.407(b)(1)</td><td rowspan="3">PK: -27 (dBm/MHz)</td><td rowspan="3">PK: 68.2(dBμV/m)</td></tr>
<tr><td>5250~5350 MHz</td><td colspan="2">15.407(b)(2)</td></tr>
<tr><td>5470~5725 MHz</td><td colspan="2">15.407(b)(3)</td></tr>
<tr><td rowspan="2">5725~5850 MHz</td><td>☒</td><td>15.407(b)(4)(i)</td><td>PK: -27 (dBm/MHz) *1<br>PK: 10 (dBm/MHz) *2<br>PK: 15.6 (dBm/MHz) *3<br>PK: 27 (dBm/MHz) *4</td><td>PK: 68.2(dBμV/m) *1<br>PK: 105.2 (dBμV/m) *2<br>PK: 110.8(dBμV/m) *3<br>PK: 122.2 (dBμV/m) *4</td></tr>
<tr><td>☐</td><td>15.407(b)(4)(ii)</td><td colspan="2">Emission limits in section 15.247(d)</td></tr>
<tr><td colspan="5">*1 beyond 75 MHz or more above of the band edge.<br>*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.<br>*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.<br>*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.</td></tr>
</table>

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

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

### 4.1.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Date of Calibration | Due Date of Calibration |
|---|---|---|---|---|
| Test Receiver ROHDE & SCHWARZ | ESCI | 100424 | Oct. 17, 2017 | Oct. 16, 2018 |
| Spectrum Analyzer ROHDE & SCHWARZ | FSP40 | 100041 | Dec. 12, 2017 | Dec. 11, 2018 |
| BILOG Antenna SCHWARZBECK | VULB9168 | 9168-171 | Dec. 11, 2017 | Dec. 10, 2018 |
| HORN Antenna SCHWARZBECK | 9120D | 209 | Dec. 13, 2017 | Dec. 12, 2018 |
| HORN Antenna SCHWARZBECK | BBHA 9170 | BBHA9170241 | Dec. 01, 2017 | Nov. 30, 2018 |
| Loop Antenna EMCI | EM-6879 | 269 | Aug. 11, 2017 | Aug. 10, 2018 |
| Preamplifier Agilent (Below 1GHz) | 8447D | 2944A10738 | Aug. 21, 2017 | Aug. 20, 2018 |
| Preamplifier Agilent (Above 1GHz) | 8449B | 3008A02465 | Apr. 03, 2018 | Apr. 02, 2019 |
| RF signal cable HUBER+SUHNER | SUCOFLEX 104 | Cable-CH3-03 (223653/4) | Aug. 21, 2017 | Aug. 20, 2018 |
| RF signal cable HUBER+SUHNER& EMCI | SUCOFLEX 104&EMC104-SM-SM-8000 | Cable-CH3-03 (309224+170907) | Sep.11, 2017 | Sep. 10, 2018 |
| Software BV ADT | ADT_Radiated_ V7.6.15.9.5 | NA | NA | NA |
| Antenna Tower inn-co GmbH | MA 4000 | 013303 | NA | NA |
| Antenna Tower Controller BV ADT | AT100 | AT93021702 | NA | NA |
| Turn Table BV ADT | TT100 | TT93021702 | NA | NA |
| Turn Table Controller BV ADT | SC100 | SC93021702 | NA | NA |
| Boresight Antenna Fixture | FBA-01 | FBA-SIP01 | NA | NA |
| High Speed Peak Power Meter | ML2495A | 0824012 | Aug. 18, 2017 | Aug. 17, 2018 |
| Power Sensor | MA2411B | 0738171 | Aug. 18, 2017 | Aug. 17, 2018 |
| 26GHz ~ 40GHz Amplifier Agilent | 8449B | 3008A1960 | Aug. 08, 2017 | Aug. 07, 2018 |

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 3.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
5. The IC Site Registration No. is IC 7450F-3.

### 4.1.3 Test Procedures

**For Radiated emission below 30MHz**

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. 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 9kHz at frequency below 30MHz.

**For Radiated emission above 30MHz**

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) 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 detect 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:**

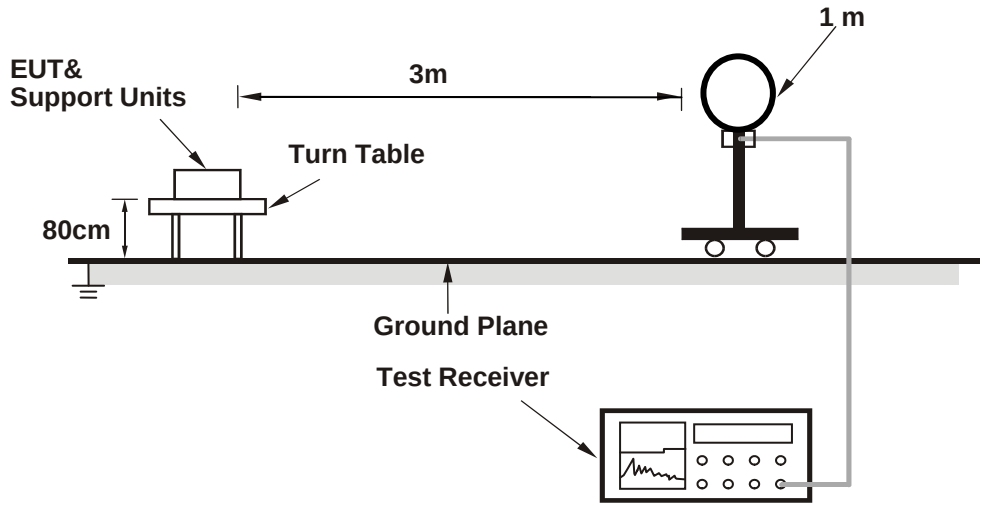
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

### 4.1.4 Deviation from Test Standard

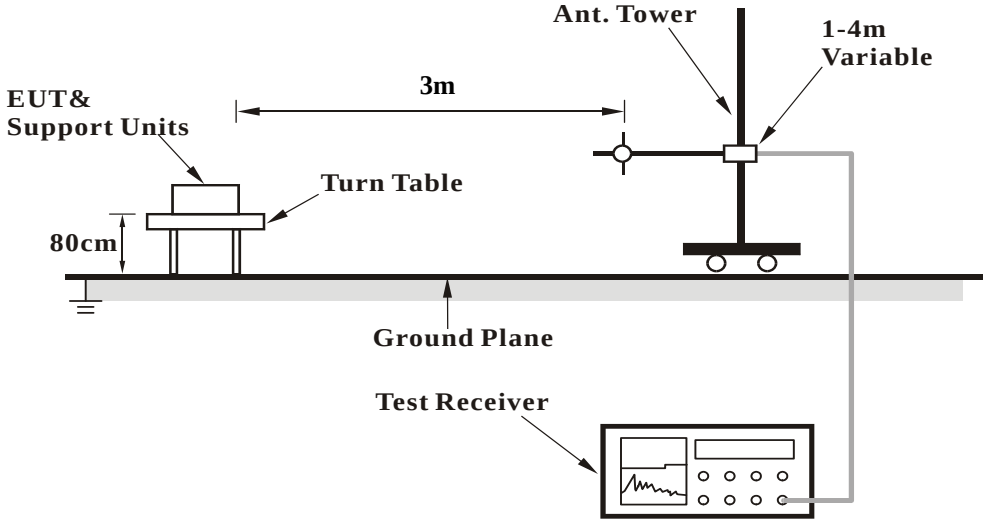
No deviation.

### 4.1.5 Test Setup

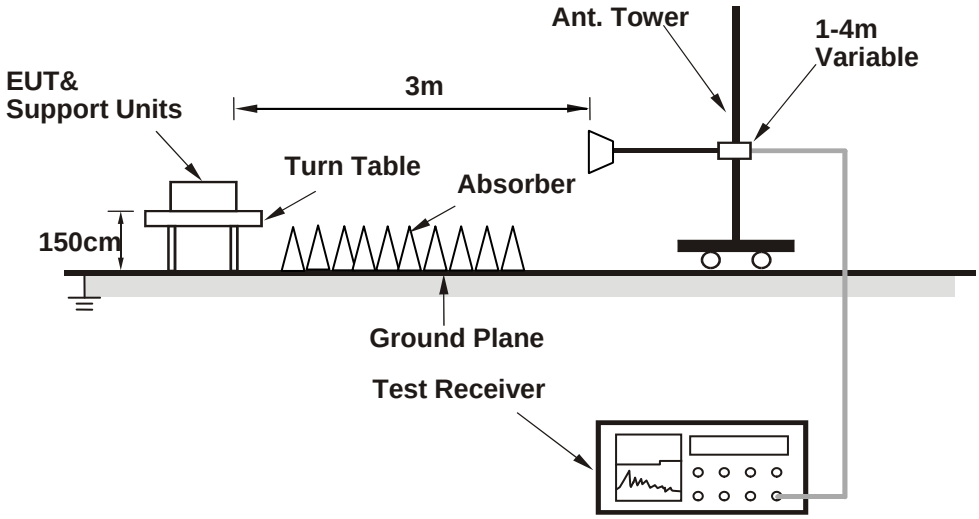
**For Radiated emission below 30MHz**




**For Radiated emission 30MHz to 1GHz**



**For Radiated emission above 1GHz**




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

### 4.1.6 EUT Operating Conditions

a. Placed the EUT on the testing table.
b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via a RJ45 cable and ran a test program (QRCT 3.0.239.0) to enable EUT under transmission condition continuously at specific channel frequency.
d. The necessary accessories enable the system in full functions.

### 4.1.7 Test Results

Above 1GHz Data:

802.11b + 802.11n (HT20)

| CHANNEL | CH 6 + CH 165 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 40GHz | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 2390.00 | 60.5 PK | 74.0 | -13.5 | 2.28 H | 182 | 27.0 | 33.5 |
| 2 | 2390.00 | 49.7 AV | 54.0 | -4.3 | 2.28 H | 182 | 16.2 | 33.5 |
| 3 | *2437.00 | 124.6 PK | | | 1.74 H | 155 | 91.2 | 33.4 |
| 4 | *2437.00 | 120.9 AV | | | 1.74 H | 155 | 87.5 | 33.4 |
| 5 | 2483.50 | 60.5 PK | 74.0 | -13.5 | 2.22 H | 319 | 27.3 | 33.2 |
| 6 | 2483.50 | 48.7 AV | 54.0 | -5.3 | 2.22 H | 319 | 15.5 | 33.2 |
| 7 | 4874.00 | 47.0 PK | 74.0 | -27.0 | 2.67 H | 253 | 43.3 | 3.7 |
| 8 | 4874.00 | 34.8 AV | 54.0 | -19.2 | 2.67 H | 253 | 31.1 | 3.7 |
| 9 | *5825.00 | 123.0 PK | | | 1.42 H | 149 | 82.5 | 40.5 |
| 10 | *5825.00 | 111.9 AV | | | 1.42 H | 149 | 71.4 | 40.5 |
| 11 | 11650.00 | 60.2 PK | 74.0 | -13.8 | 2.96 H | 283 | 42.7 | 17.5 |
| 12 | 11650.00 | 46.7 AV | 54.0 | -7.3 | 2.96 H | 283 | 29.2 | 17.5 |
| 13 | #5600.80 | 57.2 PK | 68.2 | -11.0 | 1.42 H | 149 | 52.7 | 4.5 |
| 14 | #5978.40 | 57.9 PK | 68.2 | -10.3 | 1.42 H | 149 | 52.6 | 5.3 |

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

| CHANNEL | CH 6 + CH 165 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 40GHz | | |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 2390.00 | 58.1 PK | 74.0 | -15.9 | 2.98 V | 267 | 24.6 | 33.5 |
| 2 | 2390.00 | 46.7 AV | 54.0 | -7.3 | 2.98 V | 267 | 13.2 | 33.5 |
| 3 | *2437.00 | 111.5 PK | | | 3.50 V | 279 | 78.1 | 33.4 |
| 4 | *2437.00 | 107.9 AV | | | 3.50 V | 279 | 74.5 | 33.4 |
| 5 | 2483.50 | 57.9 PK | 74.0 | -16.1 | 3.10 V | 354 | 24.7 | 33.2 |
| 6 | 2483.50 | 45.7 AV | 54.0 | -8.3 | 3.10 V | 354 | 12.5 | 33.2 |
| 7 | 4874.00 | 46.4 PK | 74.0 | -27.6 | 2.62 V | 148 | 42.7 | 3.7 |
| 8 | 4874.00 | 32.7 AV | 54.0 | -21.3 | 2.62 V | 148 | 29.0 | 3.7 |
| 9 | *5825.00 | 116.0 PK | | | 3.28 V | 251 | 75.5 | 40.5 |
| 10 | *5825.00 | 104.9 AV | | | 3.28 V | 251 | 64.4 | 40.5 |
| 11 | 11650.00 | 60.3 PK | 74.0 | -13.7 | 2.96 V | 171 | 42.8 | 17.5 |
| 12 | 11650.00 | 48.1 AV | 54.0 | -5.9 | 2.96 V | 171 | 30.6 | 17.5 |
| 13 | #5600.80 | 55.2 PK | 68.2 | -13.0 | 3.25 V | 251 | 50.7 | 4.5 |
| 14 | #5951.20 | 56.1 PK | 68.2 | -12.1 | 3.28 V | 251 | 50.9 | 5.2 |

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Below 1GHz data:

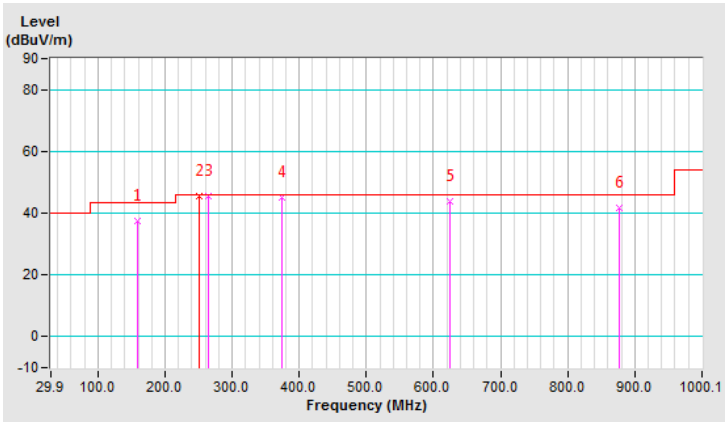
802.11b + 802.11n (HT20)

| CHANNEL | CH 6 + CH 165 | DETECTOR FUNCTION | Quasi-Peak (QP) |
|---|---|---|---|
| FREQUENCY RANGE | 9kHz ~ 1GHz | TEST MODE | A |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 158.22 | 37.6 QP | 43.5 | -5.9 | 2.00 H | 174 | 51.3 | -13.7 |
| 2 | 251.62 | 45.7 QP | 46.0 | -0.3 | 1.00 H | 1 | 59.7 | -14.0 |
| 3 | 265.16 | 45.4 QP | 46.0 | -0.6 | 1.00 H | 5 | 58.8 | -13.4 |
| 4 | 373.86 | 44.9 QP | 46.0 | -1.1 | 1.00 H | 8 | 55.6 | -10.7 |
| 5 | 624.73 | 43.9 QP | 46.0 | -2.1 | 1.00 H | 40 | 48.8 | -4.9 |
| 6 | 876.14 | 41.8 QP | 46.0 | -4.2 | 1.51 H | 38 | 42.0 | -0.2 |

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

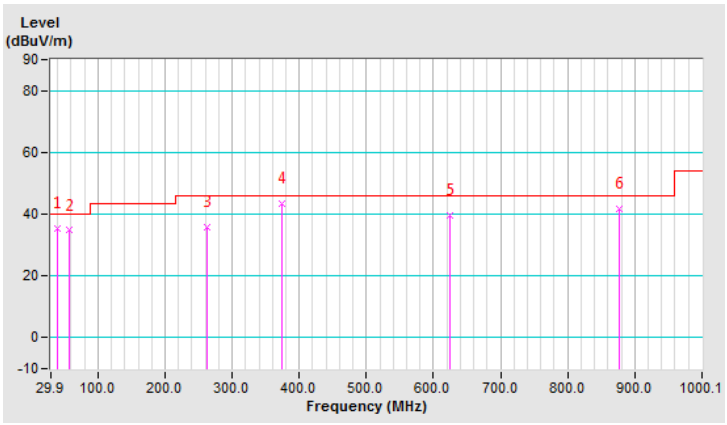


| | | | |
|---|---|---|---|
| CHANNEL | CH 6 + CH 165 | DETECTOR FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | 9kHz ~ 1GHz | TEST MODE | A |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 39.62 | 35.5 QP | 40.0 | -4.5 | 1.49 V | 4 | 50.6 | -15.1 |
| 2 | 57.12 | 34.7 QP | 40.0 | -5.3 | 1.00 V | 336 | 49.2 | -14.5 |
| 3 | 263.21 | 35.7 QP | 46.0 | -10.3 | 1.49 V | 126 | 49.2 | -13.5 |
| 4 | 374.42 | 43.4 QP | 46.0 | -2.6 | 1.00 V | 118 | 54.0 | -10.6 |
| 5 | 624.26 | 39.4 QP | 46.0 | -6.6 | 1.49 V | 145 | 44.4 | -5.0 |
| 6 | 876.39 | 41.7 QP | 46.0 | -4.3 | 1.00 V | 20 | 41.9 | -0.2 |

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

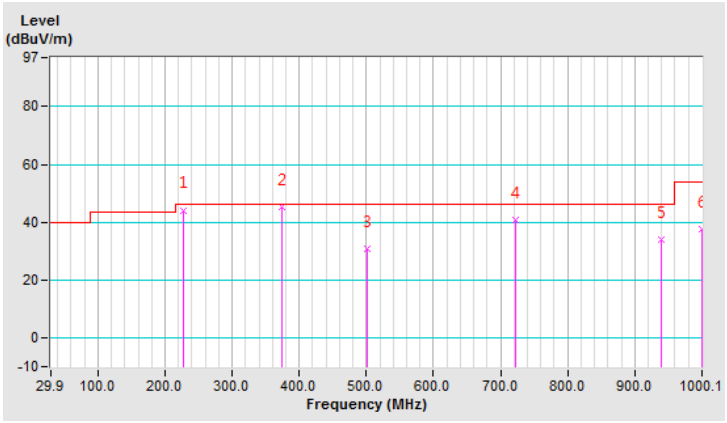


| | | | |
|---|---|---|---|
| CHANNEL | CH 6 + CH 165 | DETECTOR FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | 9kHz ~ 1GHz | TEST MODE | B |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 228.22 | 44.2 QP | 46.0 | -1.8 | 1.51 H | 5 | 60.2 | -16.0 |
| 2 | 375.00 | 45.3 QP | 46.0 | -0.7 | 1.01 H | 38 | 55.9 | -10.6 |
| 3 | 500.42 | 30.8 QP | 46.0 | -15.2 | 1.51 H | 80 | 38.8 | -8.0 |
| 4 | 722.07 | 40.7 QP | 46.0 | -5.3 | 1.51 H | 168 | 44.1 | -3.4 |
| 5 | 939.83 | 33.8 QP | 46.0 | -12.2 | 1.00 H | 265 | 33.0 | 0.8 |
| 6 | 1000.10 | 37.4 QP | 54.0 | -16.6 | 2.00 H | 338 | 35.6 | 1.8 |

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

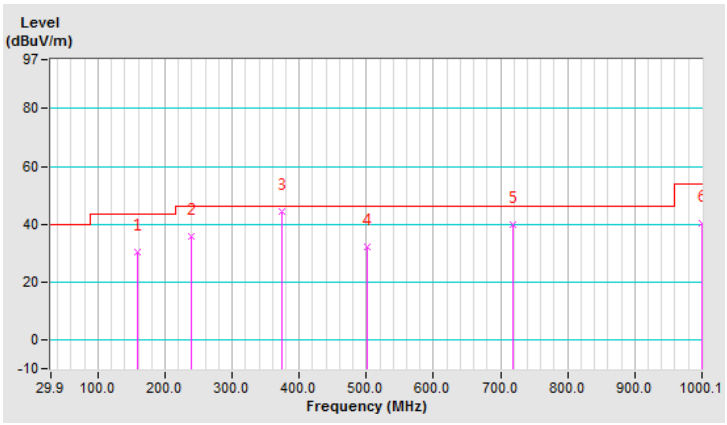


| | | | |
|---|---|---|---|
| CHANNEL | CH 6 + CH 165 | DETECTOR FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | 9kHz ~ 1GHz | TEST MODE | B |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 158.22 | 30.2 QP | 43.5 | -13.3 | 1.49 V | 281 | 43.9 | -13.7 |
| 2 | 239.88 | 36.0 QP | 46.0 | -10.0 | 1.99 V | 100 | 50.7 | -14.7 |
| 3 | 375.02 | 44.4 QP | 46.0 | -1.6 | 1.01 V | 108 | 55.0 | -10.6 |
| 4 | 500.42 | 32.1 QP | 46.0 | -13.9 | 1.00 V | 350 | 40.1 | -8.0 |
| 5 | 718.18 | 40.0 QP | 46.0 | -6.0 | 1.49 V | 185 | 43.5 | -3.5 |
| 6 | 1000.00 | 40.1 QP | 54.0 | -13.9 | 1.00 V | 127 | 38.1 | 2.0 |

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

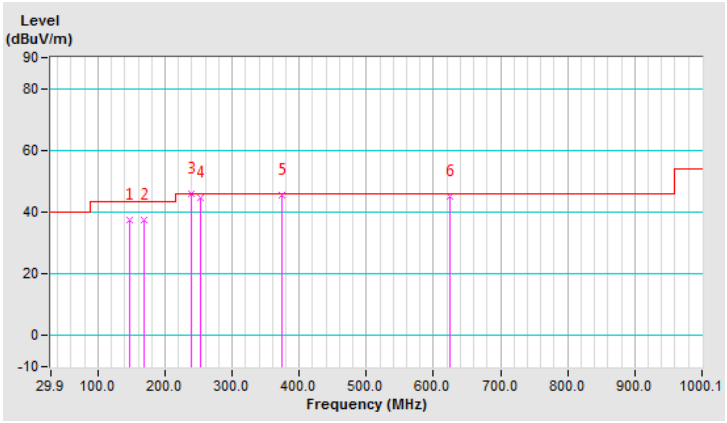


| CHANNEL | CH 6 + CH 165 | DETECTOR FUNCTION | Quasi-Peak (QP) |
|---|---|---|---|
| FREQUENCY RANGE | 9kHz ~ 1GHz | TEST MODE | C |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 146.56 | 37.4 QP | 43.5 | -6.1 | 1.99 H | 321 | 51.3 | -13.9 |
| 2 | 167.94 | 37.5 QP | 43.5 | -6.0 | 1.99 H | 348 | 51.5 | -14.0 |
| **3** | **239.88** | **45.8 QP** | **46.0** | **-0.2** | **1.00 H** | **6** | **60.5** | **-14.7** |
| 4 | 253.49 | 44.5 QP | 46.0 | -1.5 | 1.00 H | 1 | 58.5 | -14.0 |
| 5 | 374.21 | 45.3 QP | 46.0 | -0.7 | 1.00 H | 17 | 55.9 | -10.6 |
| 6 | 624.62 | 44.9 QP | 46.0 | -1.1 | 1.00 H | 316 | 49.9 | -5.0 |

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

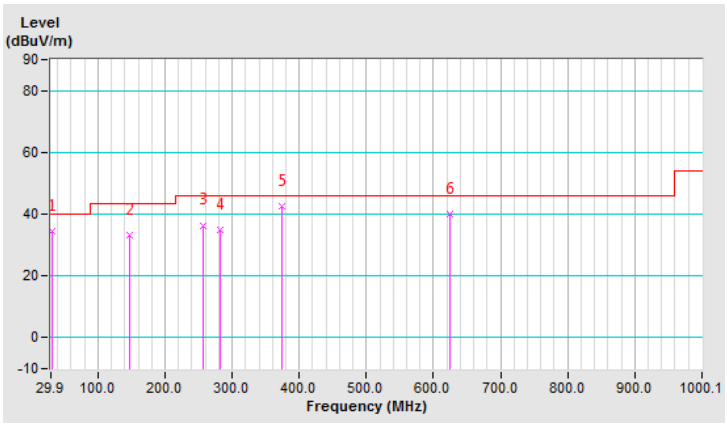


| | | | |
|---|---|---|---|
| CHANNEL | CH 6 + CH 165 | DETECTOR FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | 9kHz ~ 1GHz | TEST MODE | C |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 31.28 | 34.3 QP | 40.0 | -5.7 | 1.01 V | 224 | 50.3 | -16.0 |
| 2 | 146.44 | 33.1 QP | 43.5 | -10.4 | 1.01 V | 169 | 47.0 | -13.9 |
| 3 | 257.38 | 36.4 QP | 46.0 | -9.6 | 1.51 V | 109 | 50.3 | -13.9 |
| 4 | 282.66 | 34.8 QP | 46.0 | -11.2 | 2.00 V | 72 | 47.4 | -12.6 |
| 5 | 374.12 | 42.5 QP | 46.0 | -3.5 | 1.51 V | 79 | 53.1 | -10.6 |
| 6 | 624.65 | 40.1 QP | 46.0 | -5.9 | 1.01 V | 97 | 45.1 | -5.0 |

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

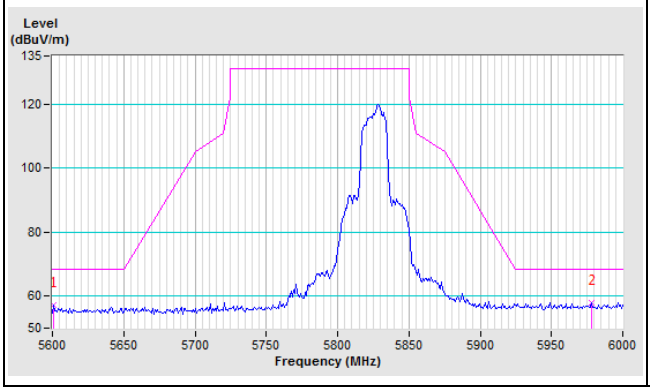
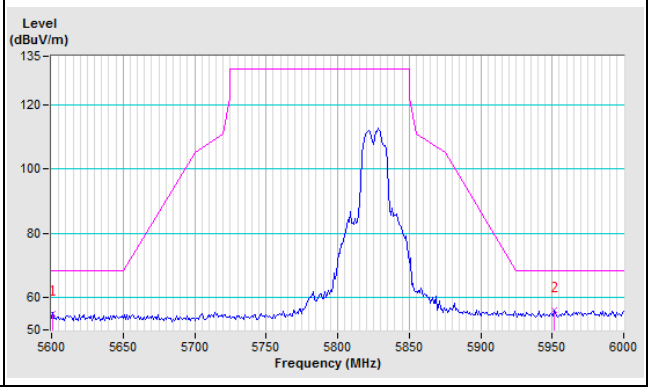


## 5 Pictures of Test Arrangements

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

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

802.11b + 802.11n (HT20)

| CH165 | |
|---|---|
| Horizontal | Vertical |
|  |  |

**Appendix – Information on 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 and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following: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Tel: 886-2-26052180
Fax: 886-2-26051924

**Hsin Chu EMC/RF/Telecom Lab**
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Fax: 886-3-6668323

**Hwa Ya EMC/RF/Safety Lab**
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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.

**--- END ---**