

FCC Test Report (Co-Located)

Report No.: RFDLK-WTW-P20080511-2

FCC ID: KA2IS2650APA1

Test Model: DIS-2650AP

Received Date: Aug. 26, 2020

Test Date: Dec. 09, 2020

Issued Date: Dec. 10, 2020

Applicant: D-Link Corporation

Address: No. 289, Sinhu 3rd Rd., Neihu District, Taipei City, 114, Taiwan

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., Kwei Shan Dist., Taoyuan City
33383, TAIWAN

**FCC Registration /
Designation Number:** 788550 / TW0003



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

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 | 8 |
| 3.2.1 Test Mode Applicability and Tested Channel Detail | 10 |
| 3.3 Description of Support Units | 11 |
| 3.3.1 Configuration of System under Test | 11 |
| 3.4 General Description of Applied Standards | 12 |
| 4 Test Types and Results | 13 |
| 4.1 Radiated Emission and Bandedge Measurement | 13 |
| 4.1.1 Limits of Radiated Emission and Bandedge Measurement | 13 |
| 4.1.2 Test Instruments | 15 |
| 4.1.3 Test Procedures | 16 |
| 4.1.4 Deviation from Test Standard | 17 |
| 4.1.5 Test Setup | 18 |
| 4.1.6 EUT Operating Conditions | 19 |
| 4.1.7 Test Results | 20 |
| 5 Pictures of Test Arrangements | 23 |
| Appendix – Information of the Testing Laboratories | 24 |

Release Control Record

| Issue No. | Description | Date Issued |
|-----------------------|------------------|---------------|
| RFDLK-WTW-P20080511-2 | Original Release | Dec. 10, 2020 |

1 Certificate of Conformity

Product: Wireless AC1200 Wave 2 Industrial indoor access point

Brand: D-Link

Test Model: DIS-2650AP

Sample Status: Engineering Sample

Applicant: D-Link Corporation

Test Date: Dec. 09, 2020

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

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 : Shelly Hsueh, **Date:** Dec. 10, 2020
Shelly Hsueh / Specialist

Approved by : Dylan Chiou, **Date:** Dec. 10, 2020
Dylan Chiou / Senior Project Engineer

2 Summary of Test Results

| Applied Standard: | 47 CFR FCC Part 15, Subpart C (Section 15.247) 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 -2.23dB at 2483.5 MHz. |

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:

| Measurement | Frequency | Expanded Uncertainty (k=2) (\pm) |
|--------------------------------|--------------------|--------------------------------------|
| Radiated Emissions up to 1 GHz | 9 kHz ~ 30 MHz | 3.04 dB |
| | 30 MHz ~ 200 MHz | 2.93 dB |
| | 200 MHz ~ 1000 MHz | 2.95 dB |
| Radiated Emissions above 1 GHz | 1 GHz ~ 18 GHz | 2.26 dB |
| | 18 GHz ~ 40 GHz | 1.94 dB |

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

| | | |
|---------------------|--|--|
| Product | Wireless AC1200 Wave 2 Industrial indoor access point | |
| Brand | D-Link | |
| Test Model | DIS-2650AP | |
| Sample Status | Engineering sample | |
| Power Supply Rating | 48 Vdc (from POE) 12Vdc (from DC power source) | |
| Modulation Type | WLAN | CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM |
| Transfer Rate | WLAN | 802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0 Mbps 802.11n: up to 300Mbps 802.11ac: up to 867Mbps |
| Operating Frequency | WLAN | 2.4GHz: 2412 ~ 2472MHz 5.0GHz: 5180 ~ 5240 MHz, 5745 ~5825 MHz |
| Number of Channel | WLAN | 2412 ~ 2462MHz: 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40) 5180 ~ 5240 MHz: 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80) 5745 ~ 5825 MHz: 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80) |
| Output Power | WLAN | CDD Mode: 93.898 mW for 2412 ~ 2462MHz 299.716 mW for 5180 ~ 5240 MHz 367.378 mW for 5745 ~ 5825 MHz Beamforming Mode: 93.688 mW for 2412 ~ 2462MHz 290.472 mW for 5180 ~ 5240 MHz 367.378 mW for 5745 ~ 5825 MHz |
| Antenna Type | Dipole antenna with 4.11 dBi gain (2412 ~ 2462MHz) Dipole antenna with 4.33 dBi gain (5180 ~ 5240 MHz) Dipole antenna with 5.74 dBi gain (5745 ~ 5825 MHz) | |
| Antenna Connector | SMA Male Reverse | |
| Accessory Device | N/A | |
| Cable Supplied | N/A | |

Note:

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

| Modulation Mode | CDD Mode | Beamforming Mode |
|------------------|----------|------------------|
| 802.11b | Support | Not Support |
| 802.11g | Support | Not Support |
| 802.11a | Support | Not Support |
| 802.11n (HT20) | Support | Support |
| 802.11n (HT40) | Support | Support |
| 802.11ac (VHT20) | Support | Support |
| 802.11ac (VHT40) | Support | Support |
| 802.11ac (VHT80) | Support | Support |

* The bandwidth and modulation are similar for HT20/HT40 on 802.11n mode and VHT20/VHT40 on 802.11n mode. Therefore the investigated worst case is the representative mode in test report. (Final test mode refer section 3.2.1)

2. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
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

WLAN 2.4G:

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

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

7 channels are provided for 802.11n (HT40):

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

For 5180 ~ 5240 MHz

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

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

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

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

1 channel is provided for 802.11ac (VHT80):

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

For 5745 ~ 5825 MHz:

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

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

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

| 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 \ge 1G | RE<1G | |
| - | √ | √ | -POE |

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

Note: For radiated emission test items chosen the worst maximum power was selected.

Note: "-" means no effect.

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 | Mode | Freq. Range (MHz) | Available Channel | Tested Channel | Modulation Technology |
|--------------------|--------------------------|-------------------|-------------------|----------------|-----------------------|
| - | 802.11b + 802.11n (HT40) | 2412 ~ 2472 | 1 to 13 | 11 + 159 | DBPSK |
| | | 5180 ~ 5240 | 36 to 48 | | OFDM |
| | | 5745 ~ 5825 | 151 to 159 | | 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 |
|--------------------|--------------------------|-------------------|-------------------|----------------|-----------------------|
| - | 802.11b + 802.11n (HT40) | 2412 ~ 2472 | 1 to 13 | 11 + 159 | DBPSK |
| | | 5180 ~ 5240 | 36 to 48 | | OFDM |
| | | 5745 ~ 5825 | 151 to 159 | | OFDM |

Test Condition:

| Applicable to | Environmental Conditions | Input Power (System) | Tested by |
|---------------|--------------------------|----------------------|------------|
| RE \ge 1G | 23 deg. C, 67% RH | 120 Vac, 60 Hz | Cyril Chen |
| RE<1G | 23 deg. C, 67% RH | 120 Vac, 60 Hz | Cyril Chen |

3.3 Description of Support Units

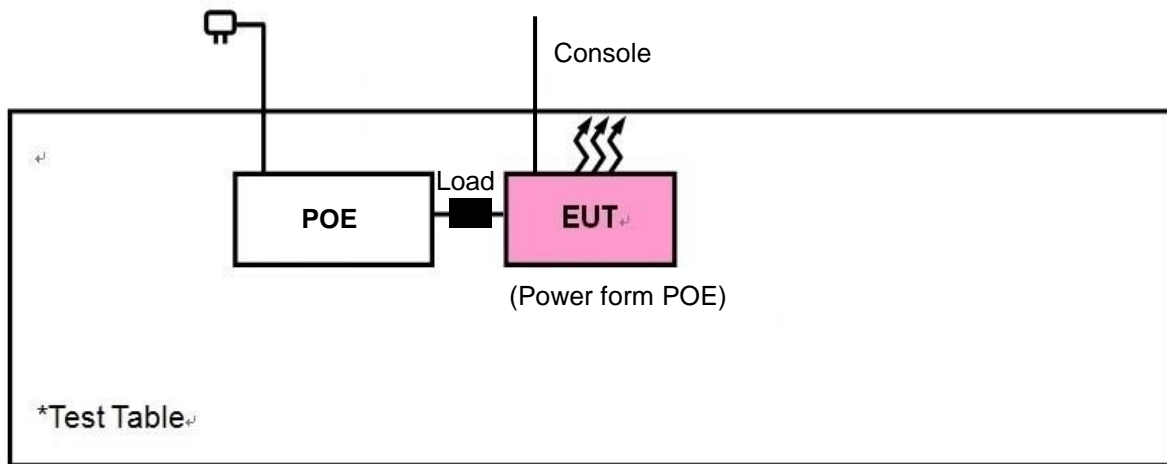
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| No. | Product | Brand | Model No. | Serial No. | FCC ID |
|-----|-----------------|------------|-------------|------------|--------|
| A. | POE | PLANET | POE-171A-95 | N/A | N/A |
| B. | DC Power Supply | GAIR AUGUS | 33010D | 807748 | N/A |

Note:

1. All power cords of the above support units are non-shielded (1.8m).

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 and references:

Test Standard:

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.

References Test Guidance:

KDB 558074 D01 Meas Guidance v05r02

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

KDB 662911 D01 Multiple Transmitter Output v02r01

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

For WLAN

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 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

| Applicable To | | Limit | |
|---|---|---|---|
| 789033 D02 General UNII Test Procedure New Rules v02r01 | | Field Strength at 3m | |
| | | PK: 74 (dBµV/m) | AV: 54 (dBµV/m) |
| Frequency Band | Applicable To | EIRP Limit | Equivalent Field Strength at 3m |
| 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 | <input checked="" type="checkbox"/> 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} |
| | <input type="checkbox"/> 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:

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

4.1.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Date of Calibration | Due Date of Calibration |
|--|-------------------|---------------------------|---------------------|-------------------------|
| Test Receiver Agilent | N9038A | MY51210203 | Mar. 18, 2020 | Mar. 17, 2021 |
| Spectrum Analyzer Agilent | N9010A | MY52220314 | Dec. 12, 2019 | Dec. 11, 2020 |
| Broadband Horn Antenna SCHWARZBECK | BBHA 9170 | 148 | Nov. 22, 2020 | Nov. 21, 2021 |
| HORN Antenna SCHWARZBECK | BBHA 9120D | 9120D-969 | Nov. 22, 2020 | Nov. 21, 2021 |
| BILOG Antenna SCHWARZBECK | VULB 9168 | 9168-472 | Nov. 06, 2020 | Nov. 05, 2021 |
| Fixed Attenuator WORKEN | MDCS18N-10 | MDCS18N-10-01 | Apr. 14, 2020 | Apr. 13, 2021 |
| Loop Antenna | EM-6879 | 269 | Sep. 17, 2020 | Sep. 16, 2021 |
| Preamplifier EMCI | EMC001340 | 980201 | Oct. 21, 2020 | Oct. 20, 2021 |
| Preamplifier EMCI | EMC 012645 | 980115 | Oct. 07, 2020 | Oct. 06, 2021 |
| Preamplifier EMCI | EMC 184045 | 980116 | Oct. 07, 2020 | Oct. 06, 2021 |
| Preamplifier EMCI | EMC 330H | 980112 | Oct. 07, 2020 | Oct. 06, 2021 |
| RF Coaxial Cable EMCI | EMC104-SM-SM-8000 | 171005 | Oct. 07, 2020 | Oct. 06, 2021 |
| RF Coaxial Cable HUBER+SUHNNER | SUCOFLEX 104 | EMC104-SM-SM-1000(140807) | Oct. 07, 2020 | Oct. 06, 2021 |
| RF Coaxial Cable Worken | 8D-FB | Cable-Ch10-01 | Oct. 07, 2020 | Oct. 06, 2021 |
| Boresight Antenna Fixture | FBA-01 | FBA-SIP01 | NA | NA |
| Software BV ADT | E3 6.120103 | NA | NA | NA |
| Antenna Tower MF | MFA-440H | NA | NA | NA |
| Turn Table MF | MFT-201SS | 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 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in HwaYa Chamber 10.

4.1.3 Test Procedures

For WLAN

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. For Bluetooth FHSS device measurement, 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, according to ANSI C63.10 section 7.5, the average value = peak value + duty cycle correction factor. The duty cycle correction factor refer to Chapter 3.3 of the BV CPS report no: RFBGSN-WTW-P20070580-6.
3. For WLAN device measurement, 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. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz. The duty cycle refers to the original report.
4. All modes of operation were investigated and the worst-case emissions are reported.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:

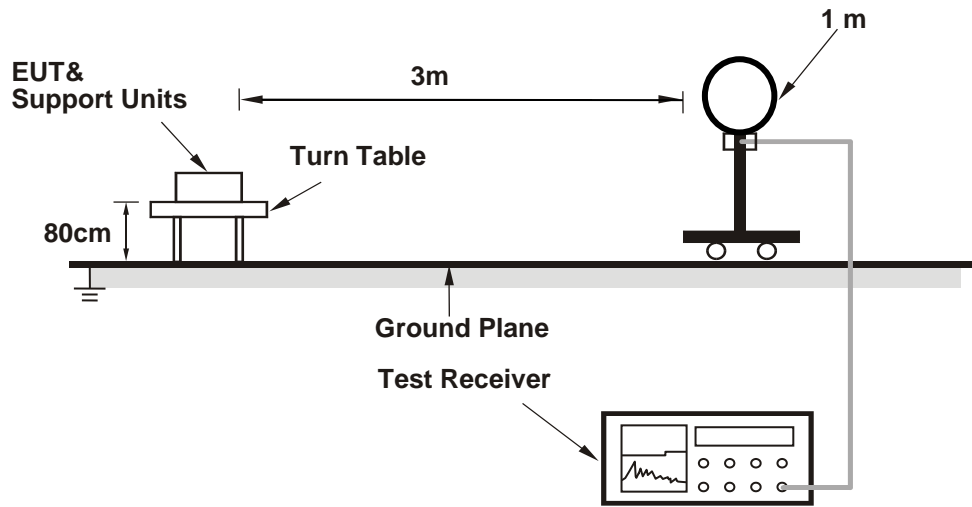
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.1.4 Deviation from Test Standard

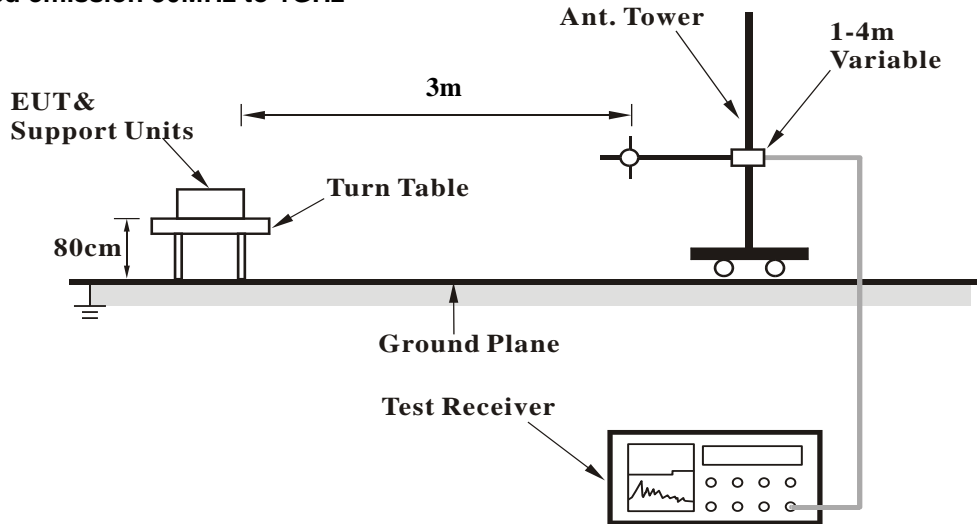
No deviation.

4.1.5 Test Setup

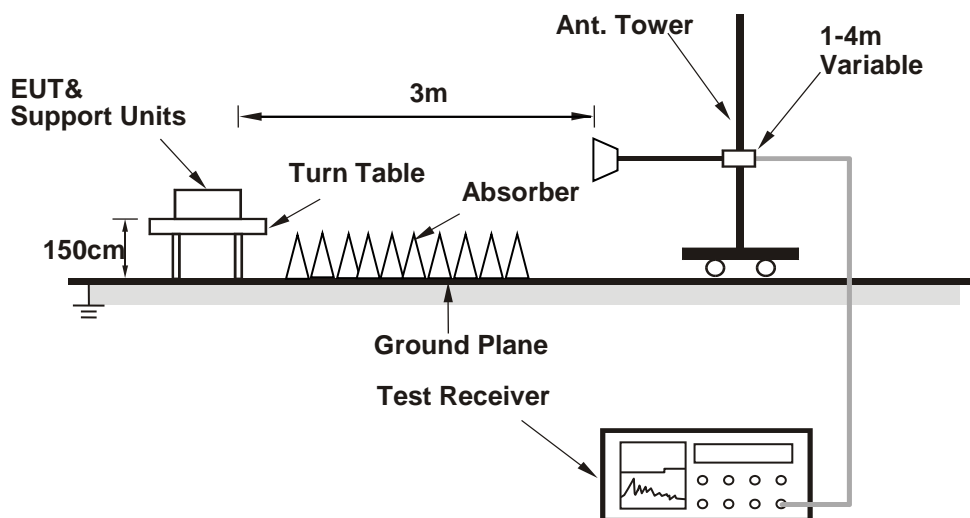
For Radiated emission below 30MHz



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 (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- d. The communication partner sent data to EUT by command "PING".

4.1.7 Test Results

Above 1GHz Data:

802.11b + 802.11n (HT40)

| EUT Test Condition | | Measurement Detail | |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel | Ch 11 + Ch 159 | 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 | Cyril Chen |

| 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 |
| 2462 | 99.98 | 105.79 | -5.81 | ----- | ----- | 177 | 135 | Average |
| 2462 | 102.96 | 108.77 | -5.81 | ----- | ----- | 177 | 135 | Peak |
| 2483.5 | 40.6 | 46.3 | -5.7 | 54 | -13.4 | 177 | 135 | Average |
| 2483.5 | 50.97 | 56.67 | -5.7 | 74 | -23.03 | 177 | 135 | Peak |
| 4924 | 35.29 | 50.8 | -15.51 | 54 | -18.71 | 177 | 222 | Average |
| 4924 | 45.22 | 60.73 | -15.51 | 74 | -28.78 | 177 | 222 | 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 |
| 2462 | 112.53 | 118.34 | -5.81 | ----- | ----- | 155 | 0 | Average |
| 2462 | 115.27 | 121.08 | -5.81 | ----- | ----- | 155 | 0 | Peak |
| 2483.5 | 51.77 | 57.47 | -5.7 | 54 | -2.23 | 155 | 0 | Average |
| 2483.5 | 61.51 | 67.21 | -5.7 | 74 | -12.49 | 155 | 0 | Peak |
| 4924 | 39.71 | 55.22 | -15.51 | 54 | -14.29 | 168 | 159 | Average |
| 4924 | 48.8 | 64.31 | -15.51 | 74 | -25.2 | 168 | 159 | Peak |

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.

802.11b + 802.11n (HT40)

| EUT Test Condition | | Measurement Detail | |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel | Ch 11 + Ch 159 | 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 | Cyril Chen |

<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 |
| 5795 | 98.32 | 97.37 | 0.95 | ----- | ----- | 110 | 321 | Average |
| 5795 | 105.58 | 104.63 | 0.95 | 68.2 | 37.38 | 110 | 321 | Peak |
| 11590 | 48.35 | 50.15 | -1.8 | 54 | -5.65 | 184 | 261 | Average |
| 11590 | 59.12 | 60.92 | -1.8 | 74 | -14.88 | 184 | 261 | 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 |
| 5795 | 107.21 | 106.26 | 0.95 | ----- | ----- | 184 | 356 | Average |
| 5795 | 114.01 | 113.06 | 0.95 | 68.2 | 45.81 | 184 | 356 | Peak |
| 11590 | 46.68 | 48.48 | -1.8 | 54 | -7.32 | 155 | 221 | Average |
| 11590 | 56.35 | 58.15 | -1.8 | 74 | -17.65 | 155 | 221 | 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 |
| 5638.825 | 49.7 | 49.03 | 0.67 | 68.2 | -18.5 | 110 | 321 | Peak |
| 5681.575 | 48.82 | 48.08 | 0.74 | 91.6 | -42.78 | 110 | 321 | Peak |
| 5910.525 | 50.92 | 49.64 | 1.28 | 78.88 | -27.96 | 110 | 321 | Peak |
| 6006.95 | 52.66 | 51.26 | 1.4 | 68.2 | -15.54 | 110 | 321 | 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 |
| 5632.65 | 55.13 | 54.46 | 0.67 | 68.2 | -13.07 | 184 | 356 | Peak |
| 5664.95 | 52.82 | 52.12 | 0.7 | 79.3 | -26.48 | 184 | 356 | Peak |
| 5910.05 | 52.72 | 51.44 | 1.28 | 79.23 | -26.51 | 184 | 356 | Peak |
| 5948.525 | 51.85 | 50.53 | 1.32 | 68.2 | -16.35 | 184 | 356 | Peak |

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.

Below 1GHz data

802.11b + 802.11n (HT40)

| EUT Test Condition | | Measurement Detail | |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel | Ch 11 + Ch 159 | 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 | Cyril Chen |

| 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 |
| 44.55 | 25.27 | 37.14 | -11.87 | 40 | -14.73 | 105 | 237 | QP |
| 93.05 | 24.81 | 41.99 | -17.18 | 43.5 | -18.69 | 148 | 249 | QP |
| 324.88 | 31.58 | 41.8 | -10.22 | 46 | -14.42 | 157 | 211 | QP |
| 482.02 | 26.07 | 31.87 | -5.8 | 46 | -19.93 | 133 | 126 | QP |
| 649.83 | 34.5 | 36.11 | -1.61 | 46 | -11.5 | 159 | 124 | QP |
| 774.96 | 34.32 | 32.88 | 1.44 | 46 | -11.68 | 166 | 132 | QP |
| 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 |
| 53.28 | 26.94 | 38.79 | -11.85 | 40 | -13.06 | 153 | 219 | QP |
| 212.36 | 26.01 | 41.03 | -15.02 | 43.5 | -17.49 | 106 | 284 | QP |
| 324.88 | 26.92 | 37.14 | -10.22 | 46 | -19.08 | 157 | 234 | QP |
| 567.38 | 27.75 | 31.6 | -3.85 | 46 | -18.25 | 133 | 269 | QP |
| 767.2 | 32.28 | 31.1 | 1.18 | 46 | -13.72 | 177 | 118 | QP |
| 817.64 | 33.91 | 31.8 | 2.11 | 46 | -12.09 | 166 | 158 | QP |

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).

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 and approved 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.

--- END ---