

## TEST REPORT For FCC

**FCC Standards : FCC 47CFR part 15 subpart C**  
**Industry Canada Standards :RSS-247 Issue 1 & RSS-GEN Issue 4**

Test Report No. : CTK-2016-01234  
Date of Issue : 2016-10-13  
FCC ID : A3LWEA412H  
Certification Number IC : 649E-WEA412H  
Model/Type No. : WEA412h  
Kind of Product : WLAN Access Point  
Applicant : Samsung Electronics Co., Ltd.  
Applicant Address : 129, Samsung-ro Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea, 16677  
Manufacturer : Samsung Electronics Co., Ltd.  
Manufacturer Address : 129, Samsung-ro Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea, 16677  
Contact Person : Kim, Young-Gyun / Senior Engineer  
Telephone : +82-31-279-4443  
Received Date : 2016-09-13  
Test period : Start : 2016-09-21 End : 2016-10-12

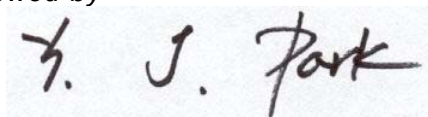
The test results presented in this report relate only to the object tested.

Tested by



Won-Jae, Hwang  
Test Engineer  
Date: 2016-10-13

Reviewed by



Young-Joon, Park  
Technical Manager  
Date: 2016-10-13

## REPORT REVISION HISTORY

| Date       | Revision                | Page No |
|------------|-------------------------|---------|
| 2016-10-13 | Issued (CTK-2016-01234) | All     |
|            |                         |         |
|            |                         |         |
|            |                         |         |
|            |                         |         |
|            |                         |         |
|            |                         |         |
|            |                         |         |
|            |                         |         |
|            |                         |         |

***This report shall not be reproduced except in full, without the written approval of CTK Co., Ltd. This document may be altered or revised by CTK Co., Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by CTK Co., Ltd. will constitute fraud and shall nullify the document.***

## TABLE OF CONTENTS

|                                                                 |    |
|-----------------------------------------------------------------|----|
| REPORT REVISION HISTORY .....                                   | 2  |
| 1.0 General Product Description .....                           | 4  |
| 1.1 Test mode .....                                             | 5  |
| 1.2 EUT Operation Test Setup .....                              | 5  |
| 1.3 Tested Frequency .....                                      | 5  |
| 1.4 Device Modifications .....                                  | 5  |
| 1.5 Peripheral Devices .....                                    | 5  |
| 1.6 Calibration Details of Equipment Used for Measurement ..... | 5  |
| 1.7 Test Facility .....                                         | 5  |
| 1.8 Laboratory Accreditations and Listings .....                | 6  |
| 2.0 Summary of tests .....                                      | 7  |
| 2.1 Technical Characteristic Test .....                         | 8  |
| 2.1.1 ON Time, Duty Cycle .....                                 | 8  |
| 2.1.2 6dB Bandwidth and 99% Bandwidth .....                     | 9  |
| 2.1.3 OUTPUT POWER .....                                        | 14 |
| 2.1.4 Power Spectral Density .....                              | 19 |
| 2.1.5 Band - edge .....                                         | 24 |
| 2.1.6 Field Strength of Emissions .....                         | 30 |
| Test Data .....                                                 | 34 |
| 2.1.7 AC Conducted Emissions .....                              | 46 |
| APPENDIX A – Test Equipment Used For Tests .....                | 49 |

## 1.0 General Product Description

| Equipment model name | WEA412h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                       |                         |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------|-----------------------|---------------|-------------|---------------|--|--|--|-----------------------|--|--|---------|----|-------------|-------|---|---|---------|----|-------|-------|---|---------|----|-------|-------|-------|
| Serial number        | Prototype                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                       |                         |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| EUT condition        | Pre-production, not damaged                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                       |                         |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| Frequency Range      | 802.11b/g/n_HT20 : 2412 MHz - 2462 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                       |                         |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| RF output power :    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       |                         |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
|                      | <table><tr><th>Mode</th><th>Channel Bandwidth (MHz)</th><th>Frequency Range (MHz)</th><th>ANT1 (SISO)</th><th>ANT2 (SISO)</th><th>ANT1+2 (MIMO)</th></tr><tr><td colspan="3"></td><td colspan="3">RF output power (dBm)</td></tr><tr><td>802.11b</td><td>20</td><td rowspan="3">2412 - 2462</td><td>18.36</td><td>-</td><td>-</td></tr><tr><td>802.11g</td><td>20</td><td>15.86</td><td>14.68</td><td>-</td></tr><tr><td>802.11n</td><td>20</td><td>15.58</td><td>13.78</td><td>17.78</td></tr></table> | Mode                  | Channel Bandwidth (MHz) | Frequency Range (MHz) | ANT1 (SISO)   | ANT2 (SISO) | ANT1+2 (MIMO) |  |  |  | RF output power (dBm) |  |  | 802.11b | 20 | 2412 - 2462 | 18.36 | - | - | 802.11g | 20 | 15.86 | 14.68 | - | 802.11n | 20 | 15.58 | 13.78 | 17.78 |
| Mode                 | Channel Bandwidth (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Frequency Range (MHz) | ANT1 (SISO)             | ANT2 (SISO)           | ANT1+2 (MIMO) |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       | RF output power (dBm)   |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| 802.11b              | 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2412 - 2462           | 18.36                   | -                     | -             |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| 802.11g              | 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       | 15.86                   | 14.68                 | -             |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| 802.11n              | 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       | 15.58                   | 13.78                 | 17.78         |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| Number of channels   | 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |                         |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| Transfer Rate        | 802.11b : 11 / 5.5 / 2 / 1 Mbps<br>802.11g : 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6 Mbps<br>802.11n : up to 144.4 Mbps                                                                                                                                                                                                                                                                                                                                                                                     |                       |                         |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| Type of Modulation   | 802.11b : DSSS<br>802.11g/n : OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |                         |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| Power Source         | DC 48 V(Adaptor,PoE)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                       |                         |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| Duty Cycle           | 802.11b : 99.1 %<br>802.11g : 98.6 %<br>802.11n_HT20 : 98.6 %                                                                                                                                                                                                                                                                                                                                                                                                                                           |                       |                         |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| Antenna Type         | PCB antenna                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                       |                         |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| Antenna Gain*        | 3.38 dBi(Ant1), 2.89 dBi(Ant2) @2.4GHz<br>5.73 dBi(Ant1), 4.85 dBi(Ant2) @5GHz                                                                                                                                                                                                                                                                                                                                                                                                                          |                       |                         |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| Hardware Rev         | PCS01C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                       |                         |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |
| Software Rev         | V4.4.6.R                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                       |                         |                       |               |             |               |  |  |  |                       |  |  |         |    |             |       |   |   |         |    |       |       |   |         |    |       |       |       |

\* This EUT is supported the two antenna port. Worst case is Ant1. So the worst data of Ant1 are shown.

## 1.1 Test mode

| Test Item                                                                                                                                     | Modulation | Data Rate |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|
| 6 dB Bandwidth<br>Maximum Output Power<br>Conducted Spurious emission<br>Band Edge<br>Power Spectral Density<br>Radiated Emissions Above 1GHz | 802.11b    | 1 Mbps    |
|                                                                                                                                               | 802.11g    | 6 Mbps    |
|                                                                                                                                               | 802.11n    | MCS 0     |
| Radiated Emissions Below 1GHz<br>AC Conducted Emissions                                                                                       | Nomal Mode | Auto      |

## 1.2 EUT Operation Test Setup

For WLAN function, the engineering test program was provided and enabled to make EUT continuous transmit/receive.

## 1.3 Tested Frequency

802.11b, 802.11g, 802.11n\_HT20

|                 | LOW  | MID  | HIGH |
|-----------------|------|------|------|
| Frequency (MHz) | 2412 | 2437 | 2462 |

## 1.4 Device Modifications

The following modifications were necessary for compliance:

Not applicable

## 1.5 Peripheral Devices

| Device        | Manufacturer      | Model No.      | Serial No. |
|---------------|-------------------|----------------|------------|
| Note Computer | HP                | ProBook 650 G1 | 5CG5114KD2 |
| AC/DC Adapter | HP                | PPP012D-S      | -          |
| PoE Switch    | DVR C&C Co., Ltd. | DS-SW04-TP60   | -          |
| AC/DC ADAPTOR | ACT CO.,LTD       | AP36-48        | -          |

## 1.6 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

## 1.7 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

## 1.8 Laboratory Accreditations and Listings

| Country       | Agency | Scope of Accreditation                                                                           | Logo                                                                                                        |
|---------------|--------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| USA           | FCC    | 3 m & 10 m SAC and Conducted Test Site to perform FCC Part 15/18 measurements                    | <br>805871               |
| JAPAN         | VCCI   | 3 m & 10 m SAC and Conducted Test Site                                                           | <br>R-948, C-986, T-1843 |
| KOREA         | MSIP   | EMI (Electromagnetic Interference / Emission)<br>EMS (Electromagnetic Susceptibility / Immunity) | <br>No. 51, KR0025       |
| International | KOLAS  | EMC                                                                                              |                         |

## 2.0 Summary of tests

| FCC Part Section(s) | Parameter                          | Limit           | Test Condition | Status (note 1) |
|---------------------|------------------------------------|-----------------|----------------|-----------------|
| 15.247(a)           | 6 dB Bandwidth                     | > 500 kHz       | Conducted      | C               |
| 15.247(b)           | Maximum Output Power               | < 1 Watt        |                | C               |
| 15.247(d)           | Conducted Spurious emission        | > 20 dBc        |                | C               |
| 15.247(d)           | Band Edge                          | > 20 dBc        |                | C               |
| 15.247(e)           | Transmitter Power Spectral Density | < 8 dBm @ 3 kHz |                | C               |
|                     |                                    |                 |                | C               |
| 15.209              | Field Strength of Harmonics        | 15.209(a)       | Radiated       | C               |
| 15.207              | AC Conducted Emissions             | 15.207(a)       | Line Conducted | C               |

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:

- FCC Part 15.247, ANSI C63.10-2013

The tests were performed according to the method of measurements prescribed in

KDB No.558074

## 2.1 Technical Characteristic Test

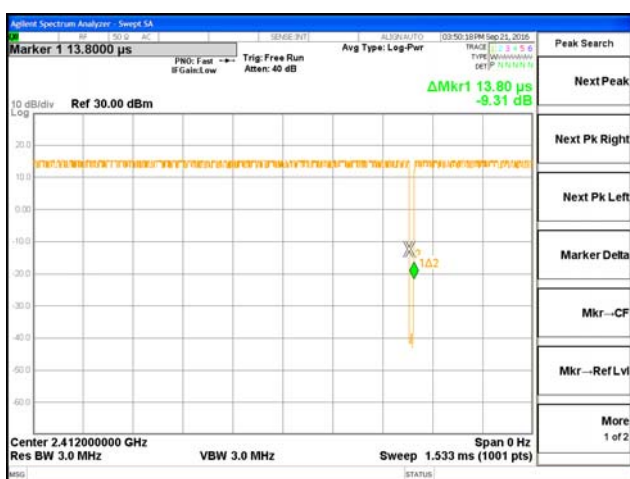
### 2.1.1 ON Time, Duty Cycle

#### Procedure:

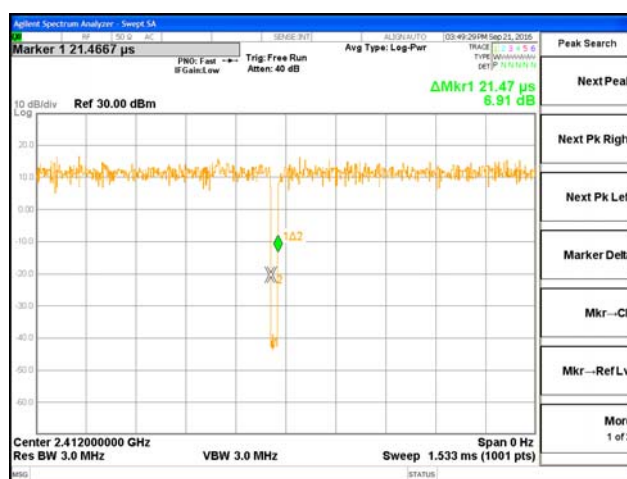
KDB 558074 Zero-Span Spectrum Analyzer Method.

#### Measurement Data:

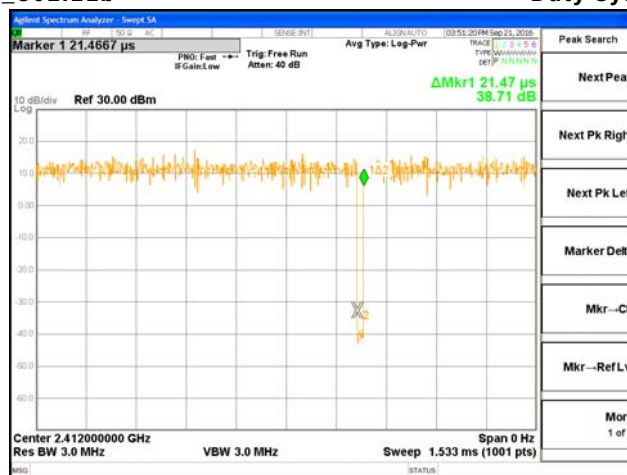
|              | ON Time<br>(ms) | Period<br>(ms) | TX OFF<br>(ms) | Duty Cycle<br>(linear) | Duty Cycle<br>(%) |
|--------------|-----------------|----------------|----------------|------------------------|-------------------|
| 802.11b      | 1.519           | 1.533          | 0.014          | 0.991                  | 99.1              |
| 802.11g      | 1.512           | 1.533          | 0.021          | 0.986                  | 98.6              |
| 802.11n_HT20 | 1.512           | 1.533          | 0.021          | 0.986                  | 98.6              |



Duty Cycle\_802.11b



Duty Cycle\_802.11g



Duty Cycle\_802.11n\_HT20

## 2.1.2 6dB Bandwidth and 99 % Bandwidth

### Procedure:

The bandwidth at 6dB below the highest in-band spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 6dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is ( as close as possible to ) even with the reference marker level. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

### The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

Span = 50 MHz

VBW = 300 kHz (3 x RBW)

Sweep = auto

Trace = max hold

Detector function = peak

## Measurement Data:

### Ant : A1

|                         | 6 dB Bandwidth and 99% Bandwidth (MHz) |       |          |       |          |       |
|-------------------------|----------------------------------------|-------|----------|-------|----------|-------|
| Frequency               | 2412 MHz                               |       | 2437 MHz |       | 2462 MHz |       |
| Mode                    | 6dB                                    | 99%   | 6dB      | 99%   | 6dB      | 99%   |
| 802.11b                 | 8.12                                   | 10.07 | 8.13     | 10.05 | 8.12     | 10.07 |
| 802.11g                 | 16.47                                  | 16.56 | 16.45    | 16.55 | 16.47    | 16.54 |
| 802.11n HT20            | 17.67                                  | 17.69 | 17.67    | 17.67 | 17.69    | 17.68 |
| Measurement uncertainty | $\pm 3$ dB                             |       |          |       |          |       |

### Ant : A2

|                         | 6 dB Bandwidth and 99% Bandwidth (MHz) |       |          |       |          |       |
|-------------------------|----------------------------------------|-------|----------|-------|----------|-------|
| Frequency               | 2412 MHz                               |       | 2437 MHz |       | 2462 MHz |       |
| Mode                    | 6dB                                    | 99%   | 6dB      | 99%   | 6dB      | 99%   |
| 802.11g                 | 16.46                                  | 16.56 | 16.50    | 16.55 | 16.45    | 16.56 |
| 802.11n HT20            | 17.66                                  | 17.69 | 17.66    | 17.67 | 17.66    | 17.69 |
| Measurement uncertainty | $\pm 3$ dB                             |       |          |       |          |       |

## Minimum Standard:

6 dB Bandwidth > 500kHz

See next pages for actual measured spectrum plots.



Ant : A1\_802.11b



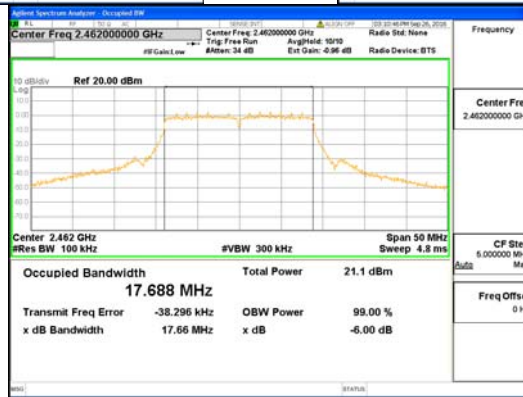
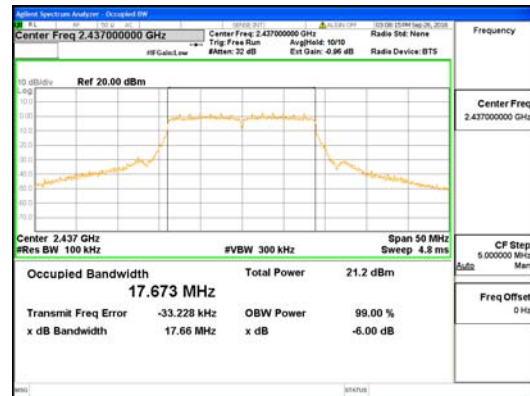
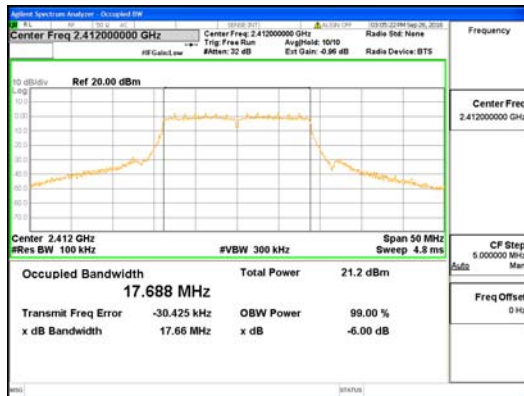
Ant : A1\_802.11g



Ant : A2\_802.11g



Ant : A1\_802.11n



Ant : A2\_802.11n

## 2.1.3 OUTPUT POWER

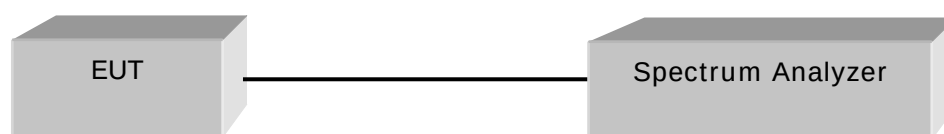
### Test Location

RF Test Room

### Test Procedures

Average Power(Procedure 9.2.2.2 in KDB 558074, Method AVGSA-1)

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.



The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 1 MHz

Span = about 36 MHz, 50 MHz

VBW = 3 MHz (3 x RBW)

Sweep = auto

Trace = average at least 100

Detector function = RMS

### Limit

| Operating Mode | Mode        | ANT Configuration | ANT Gain (dBi) | Limit (dBm) |       |
|----------------|-------------|-------------------|----------------|-------------|-------|
|                |             |                   |                | FCC         | IC    |
| SISO           | 802.11b/g/n | ANT1              | 3.38           | 30          | 36    |
| SISO           | 802.11g/n   | ANT2              | 3.38           | 30          | 36    |
| MIMO (2Tx)     | 802.11n     | ANT1 + ANT2       | 6.39           | 29.61       | 35.61 |

## Test Results

### Ant : A1

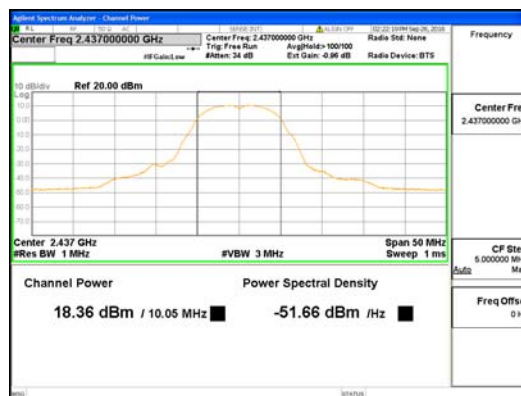
|                         | Measured Output Power (dBm) |          |          |
|-------------------------|-----------------------------|----------|----------|
| Mode                    | 2412 MHz                    | 2437 MHz | 2462 MHz |
| 802.11b                 | 18.21                       | 18.36    | 18.14    |
| 802.11g                 | 15.86                       | 15.77    | 15.65    |
| 802.11n HT20            | 15.58                       | 15.36    | 15.21    |
| Measurement uncertainty | ± 3 dB                      |          |          |

### Ant : A2

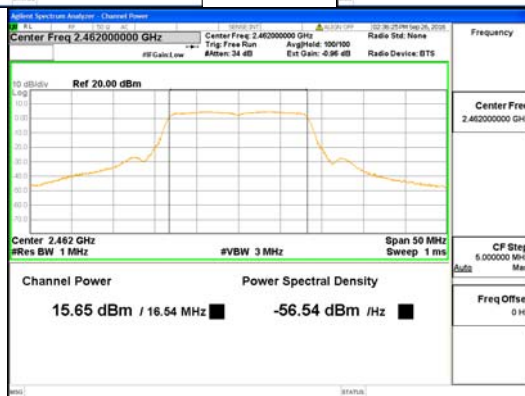
|                         | Measured Output Power (dBm) |          |          |
|-------------------------|-----------------------------|----------|----------|
| Mode                    | 2412 MHz                    | 2437 MHz | 2462 MHz |
| 802.11g                 | 14.61                       | 14.68    | 14.65    |
| 802.11n HT20            | 13.78                       | 13.71    | 13.67    |
| Measurement uncertainty | ± 3 dB                      |          |          |

### Ant : A1 + A2

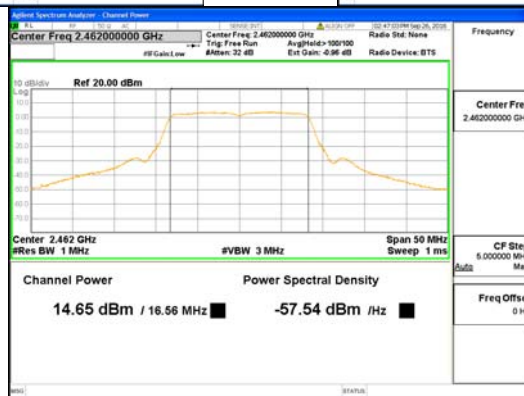
|                         | Measured Output Power (dBm) |          |          |
|-------------------------|-----------------------------|----------|----------|
| Mode                    | 2412 MHz                    | 2437 MHz | 2462 MHz |
| 802.11n HT20            | 17.78                       | 17.62    | 17.52    |
| Measurement uncertainty | ± 3 dB                      |          |          |



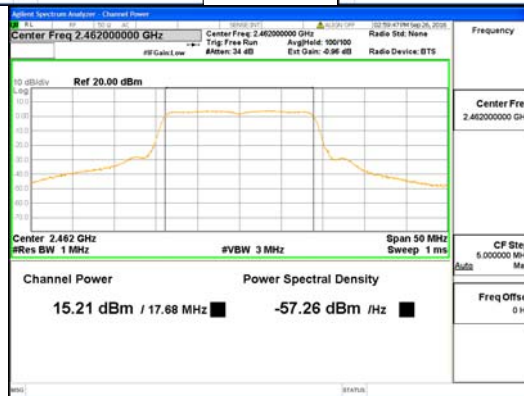
Ant : A1\_802.11b



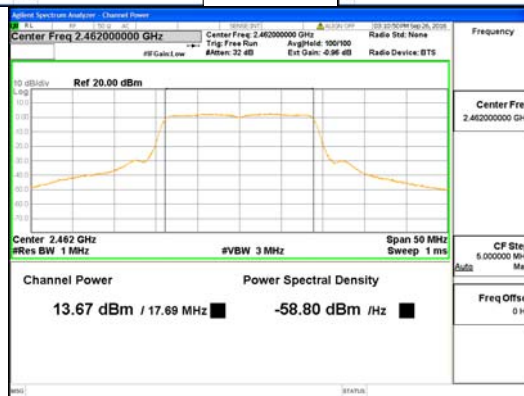
Ant : A1\_802.11g



Ant : A2\_802.11g



Ant : A1\_802.11n



Ant : A2\_802.11n

## 2.1.4 Power Spectral Density

### Procedure:

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

The spectrum analyzer is set to:

RBW = 3 kHz

VBW = 10 kHz

Sweep = Auto

Span = 20 MHz

Detector function = peak

Trace = max hold

### Limit

| Operating Mode | Mode        | ANT Configuration | ANT Gain (dBi) | Limit (dBm) |      |
|----------------|-------------|-------------------|----------------|-------------|------|
|                |             |                   |                | FCC         | IC   |
| SISO           | 802.11b/g/n | ANT1              | 3.38           | 8           | 8    |
| SISO           | 802.11g/n   | ANT2              | 3.38           | 8           | 8    |
| MIMO (2Tx)     | 802.11n     | ANT1 + ANT2       | 6.39           | 7.61        | 7.61 |

## Test Results

### Ant : A1

|                         | Measured Power Density (dBm) |          |          |
|-------------------------|------------------------------|----------|----------|
| Mode                    | 2412 MHz                     | 2437 MHz | 2462 MHz |
| 802.11b                 | -5.11                        | -3.95    | -4.47    |
| 802.11g                 | -8.86                        | -9.51    | -9.81    |
| 802.11n HT20            | -9.79                        | -8.66    | -10.70   |
| Measurement uncertainty | $\pm 3$ dB                   |          |          |

### Ant : A2

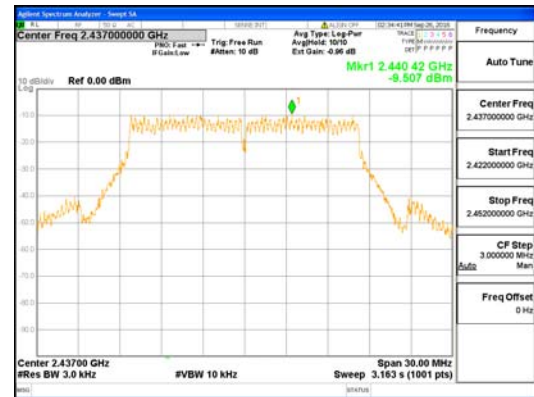
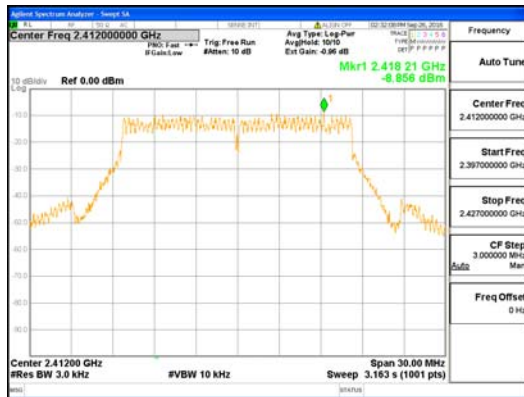
|                         | Measured Power Density (dBm) |          |          |
|-------------------------|------------------------------|----------|----------|
| Mode                    | 2412 MHz                     | 2437 MHz | 2462 MHz |
| 802.11g                 | -10.43                       | -10.04   | -10.73   |
| 802.11n HT20            | -11.35                       | -11.58   | -11.18   |
| Measurement uncertainty | $\pm 3$ dB                   |          |          |

### Ant : A1 + A2

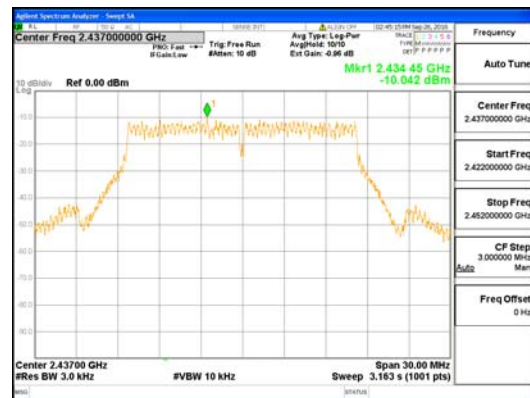
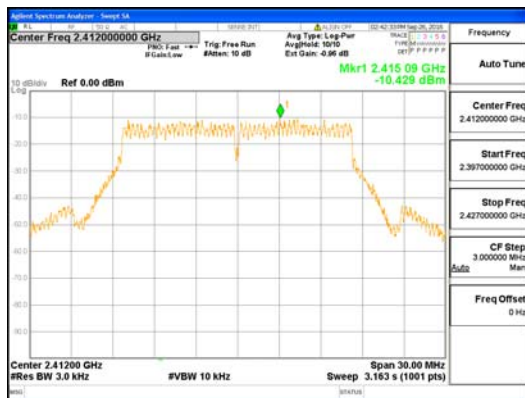
|                         | Measured Power Density (dBm) |          |          |
|-------------------------|------------------------------|----------|----------|
| Mode                    | 2412 MHz                     | 2437 MHz | 2462 MHz |
| 802.11n HT20            | -7.49                        | -6.87    | -7.92    |
| Measurement uncertainty | $\pm 3$ dB                   |          |          |



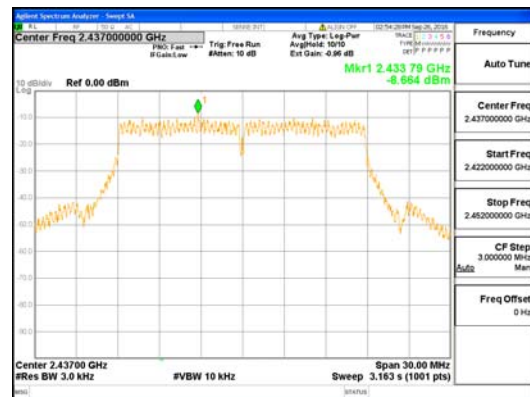
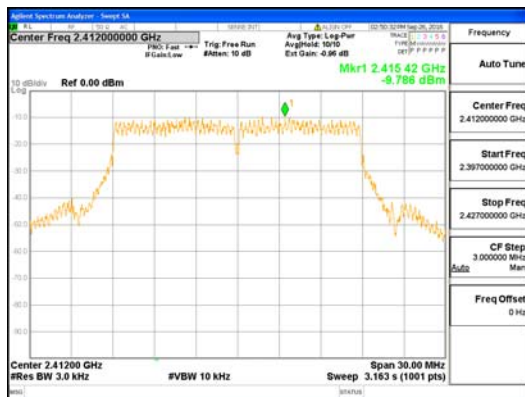
Ant : A1\_802.11b



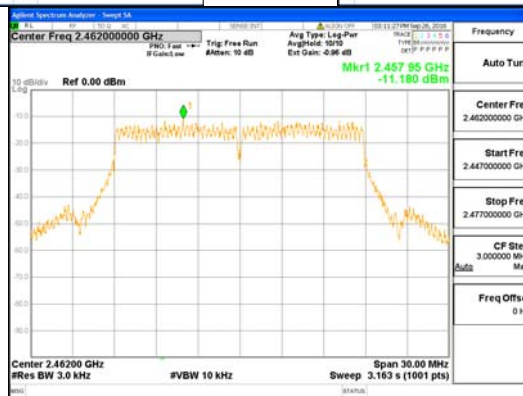
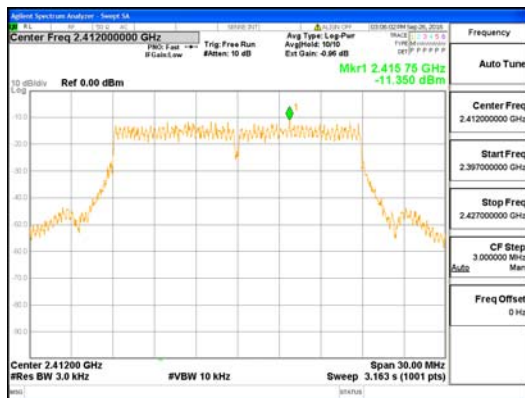
Ant : A1\_802.11g



Ant : A2\_802.11g



Ant : A1\_802.11n



Ant : A2\_802.11n

## 2.1.5 Band - edge

### Procedure:

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

VBW = 300 kHz

Span = 50 MHz

Detector function = peak

Trace = max hold

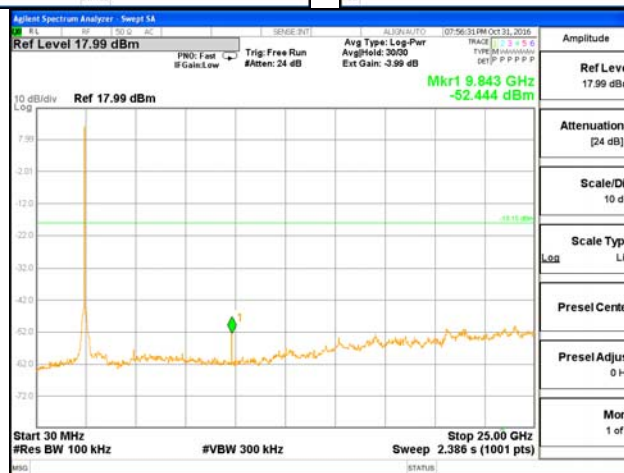
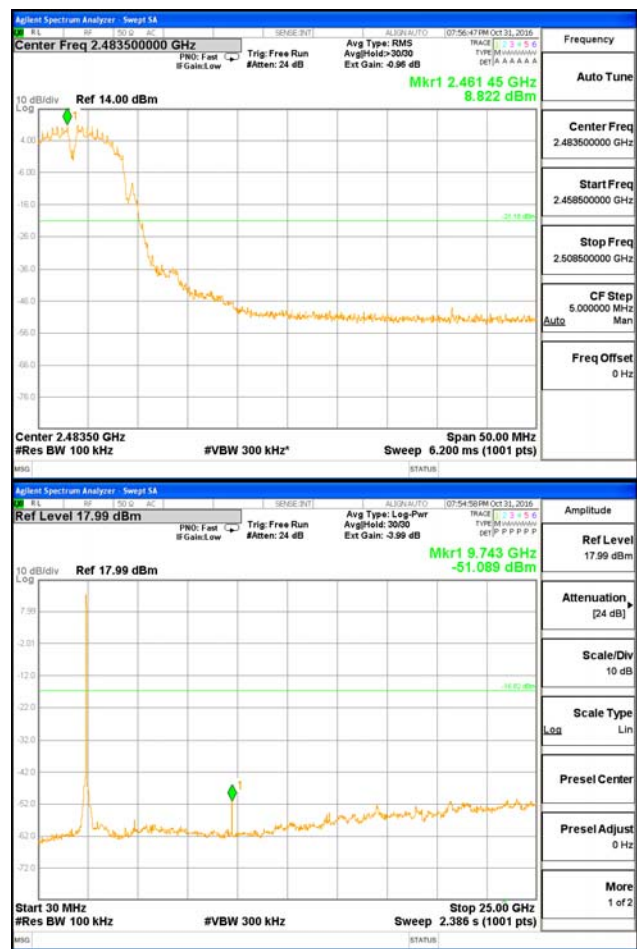
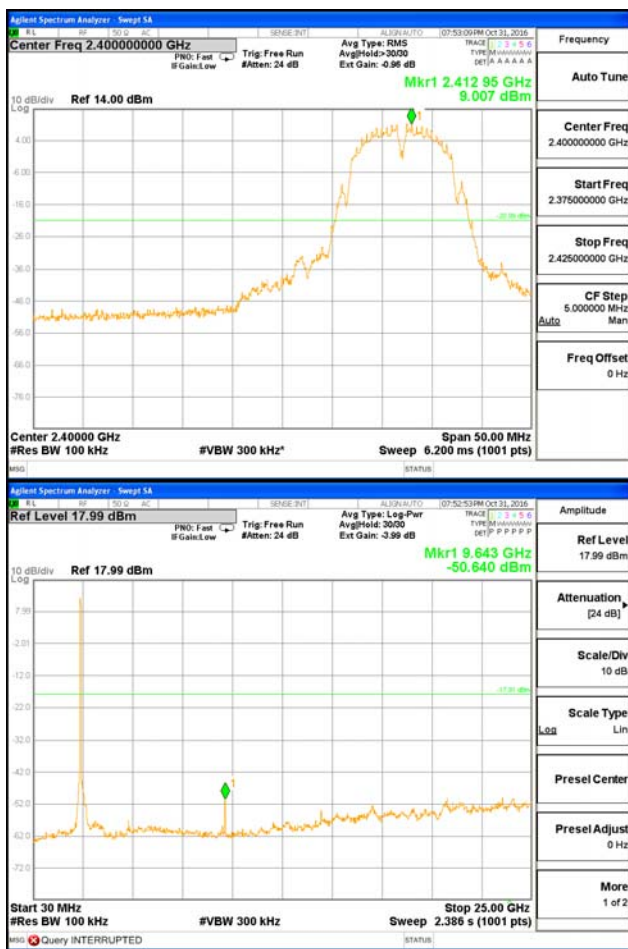
Sweep = auto

### Measurement Data: Complies

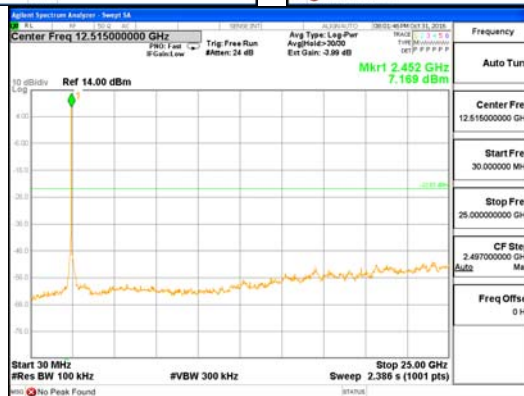
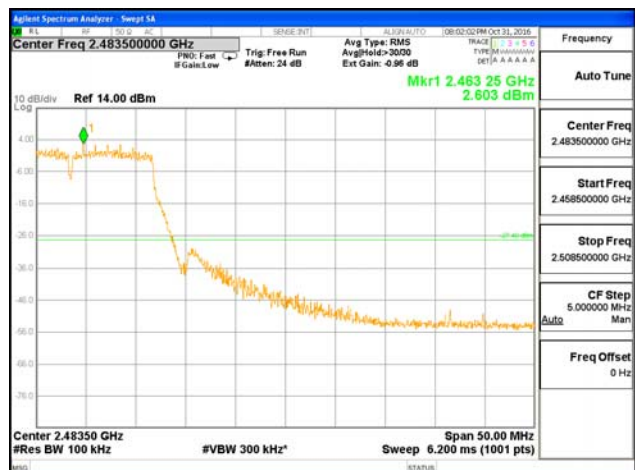
- All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.

|                          |          |
|--------------------------|----------|
| <b>Minimum Standard:</b> | > 20 dBc |
|--------------------------|----------|

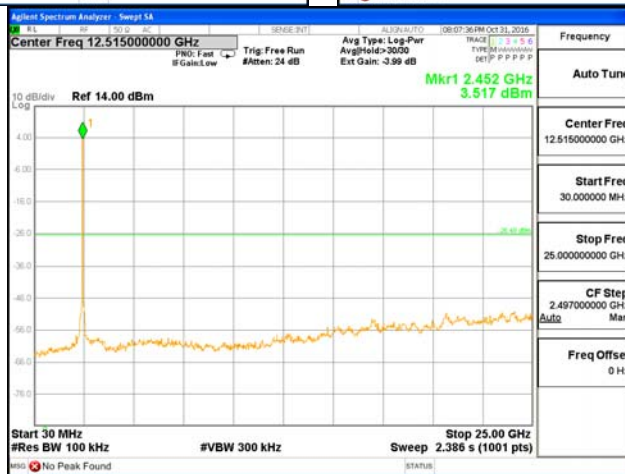
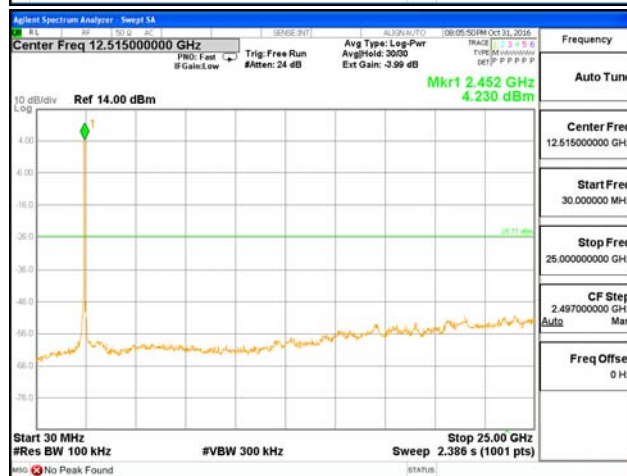
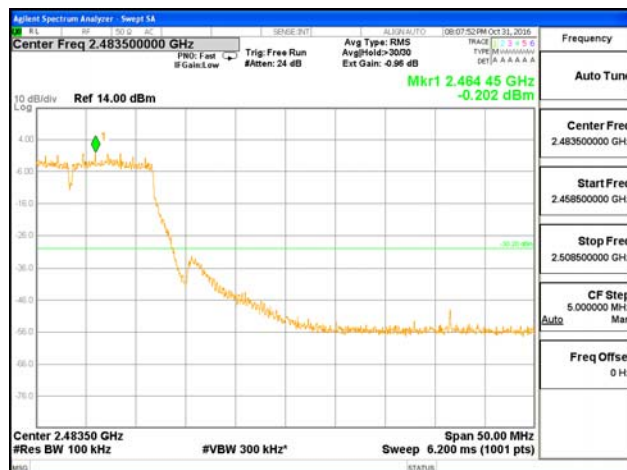
See next pages for actual measured spectrum plots.



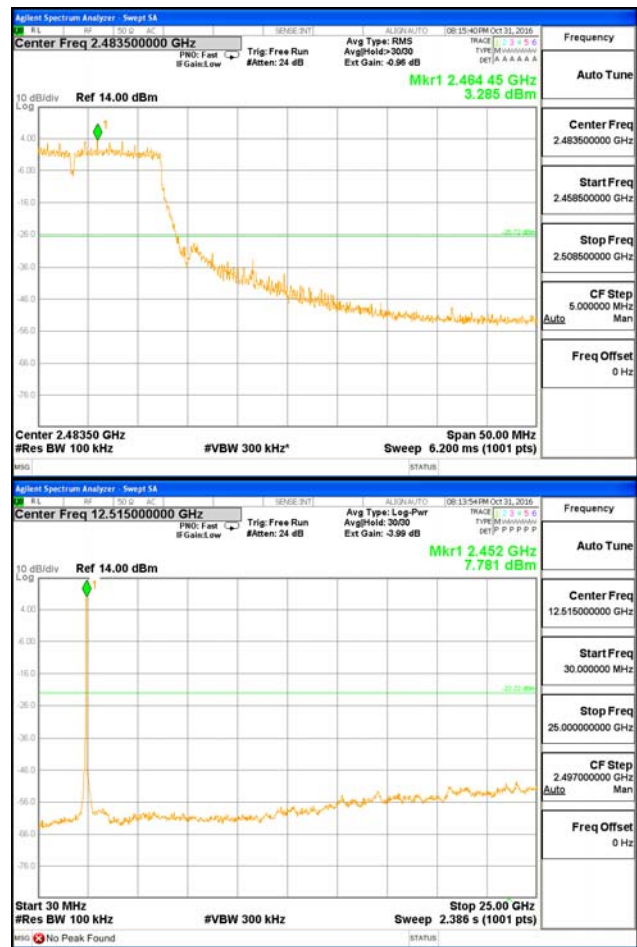
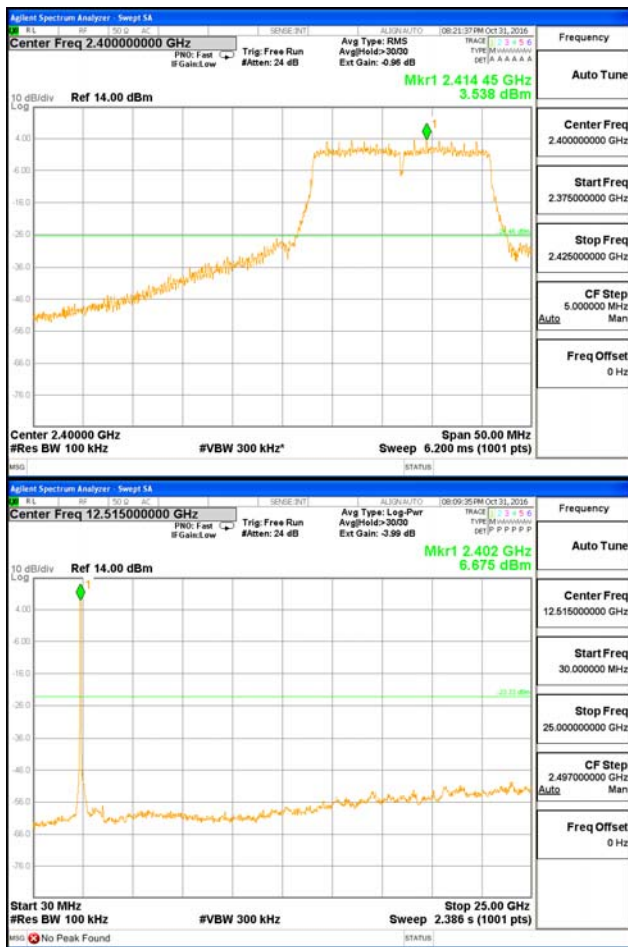
Ant : A1\_802.11b



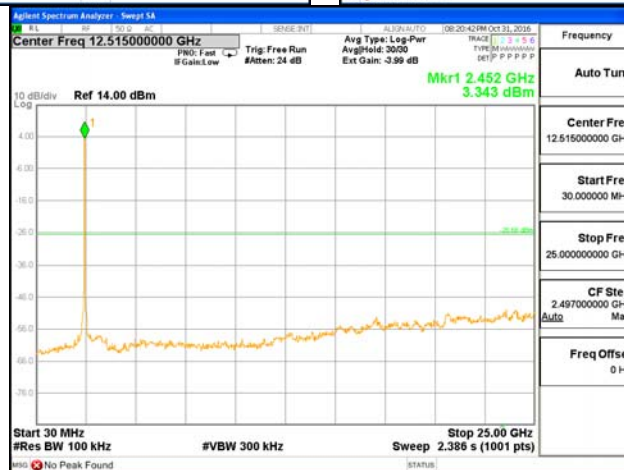
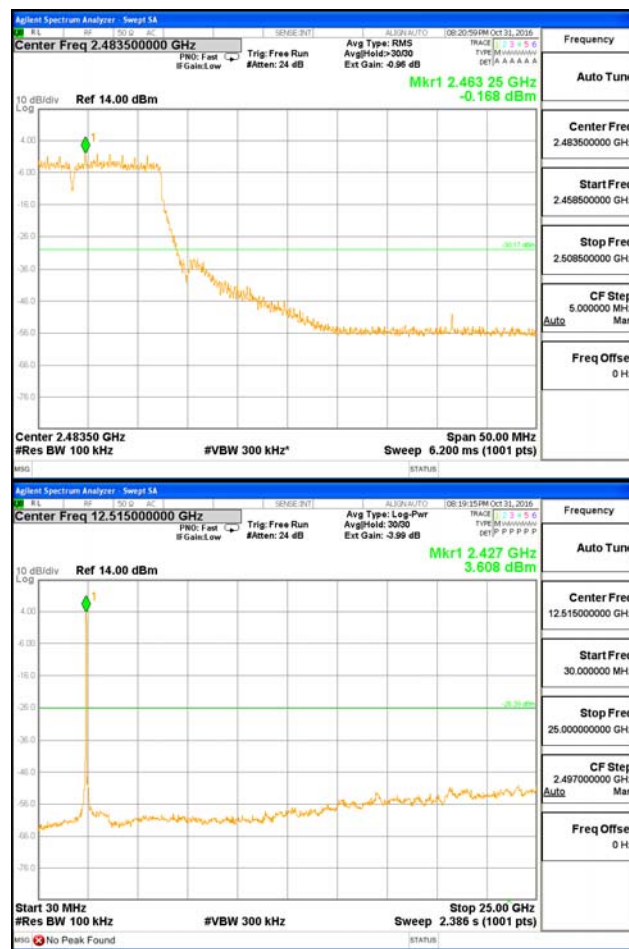
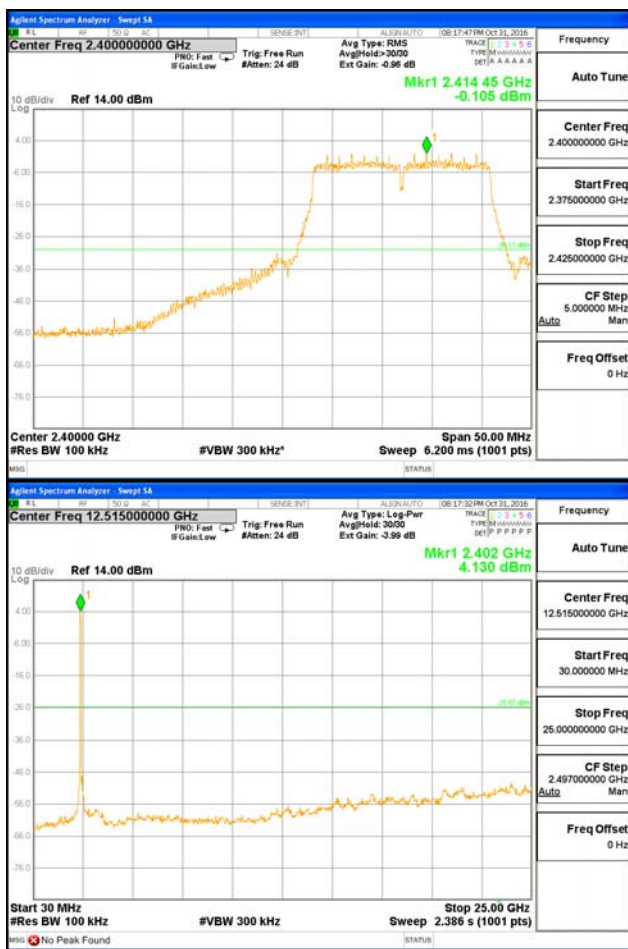
Ant : A1\_802.11g



Ant : A2\_802.11g



Ant : A1\_802.11n



Ant : A2\_802.11n

## 2.1.6 Field Strength of Emissions

### Test Location

- ☒ 10 m SAC (test distance : ☐ 10 m, ☒ 3 m)  
☒ 3 m SAC (test distance : 3 m)

### Test Procedures

- 1) In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- 2) In the frequency range above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) and Horn Test Antenna(above 1 GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.

The spectrum analyzer is set to:

Frequency Range = 9 kHz ~ 25 GHz (2.4 GHz 10<sup>th</sup> harmonic)  
RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz, 9 kHz for  $f < 30$  MHz  
VBW  $\geq$  RBW  
Sweep = auto

### Limit

#### - 15.209(a)

| Frequency(MHz) | Field Strength<br>uV/m@3m | Field Strength<br>dBuV/m@3m | Measurement<br>Distance (meters) |
|----------------|---------------------------|-----------------------------|----------------------------------|
| 0.009-0.490    | 2400/F(kHz)               | -                           | 300                              |
| 0.490-1.705    | 24000/F(kHz)              | -                           | 30                               |
| 1.705-30       | 30                        | -                           | 30                               |
| 30-88          | 100**                     | 40                          | 3                                |
| 88-216         | 150**                     | 43.5                        | 3                                |
| 216-960        | 200**                     | 46                          | 3                                |
| Above 960      | 500                       | 54                          | 3                                |

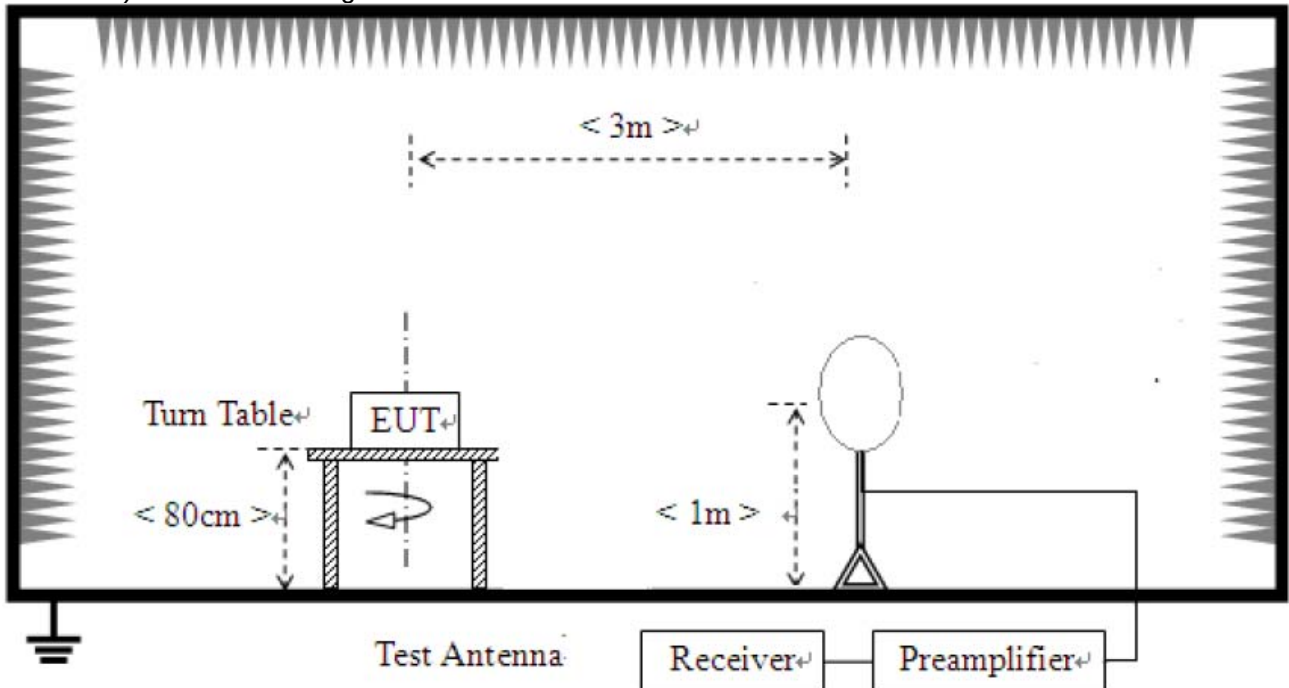
\*\* Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

Note :

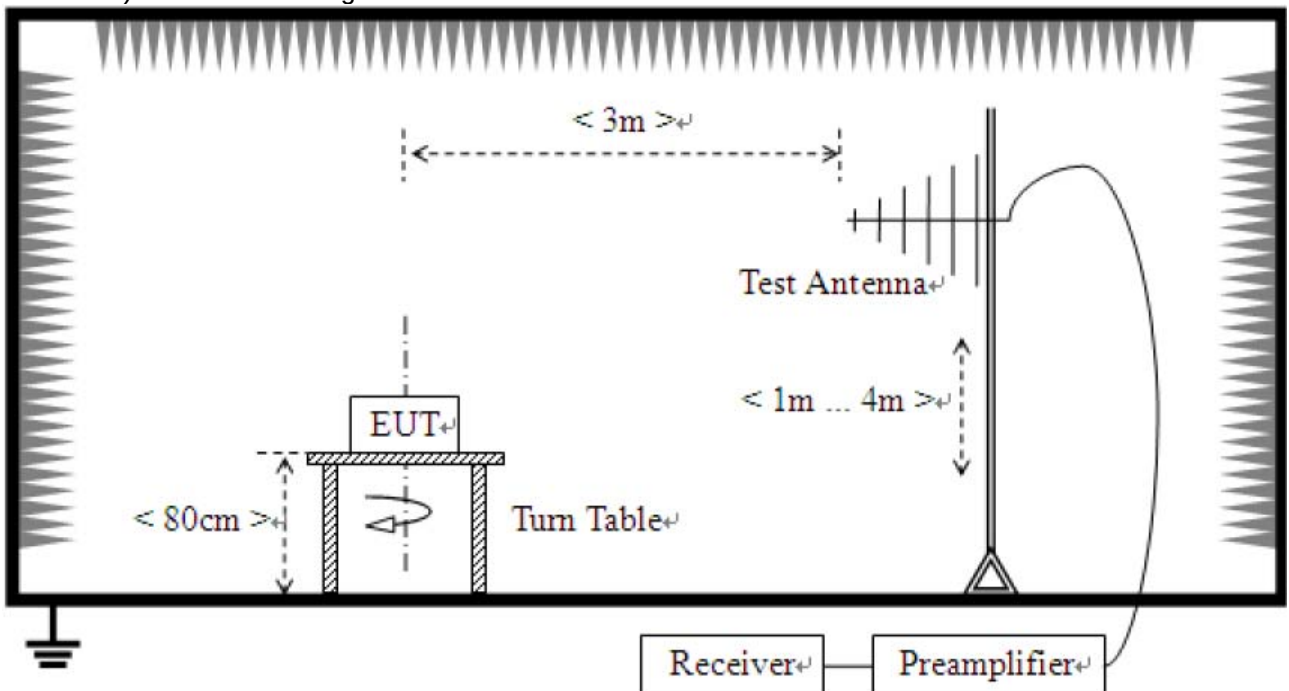
- 1) For above 1 GHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
- 2) For above 1 GHz, limit field strength of harmonics : 54 dBuV/m@3m (AV) and 74 dBuV/m@3m (PK)

### Test Setup:

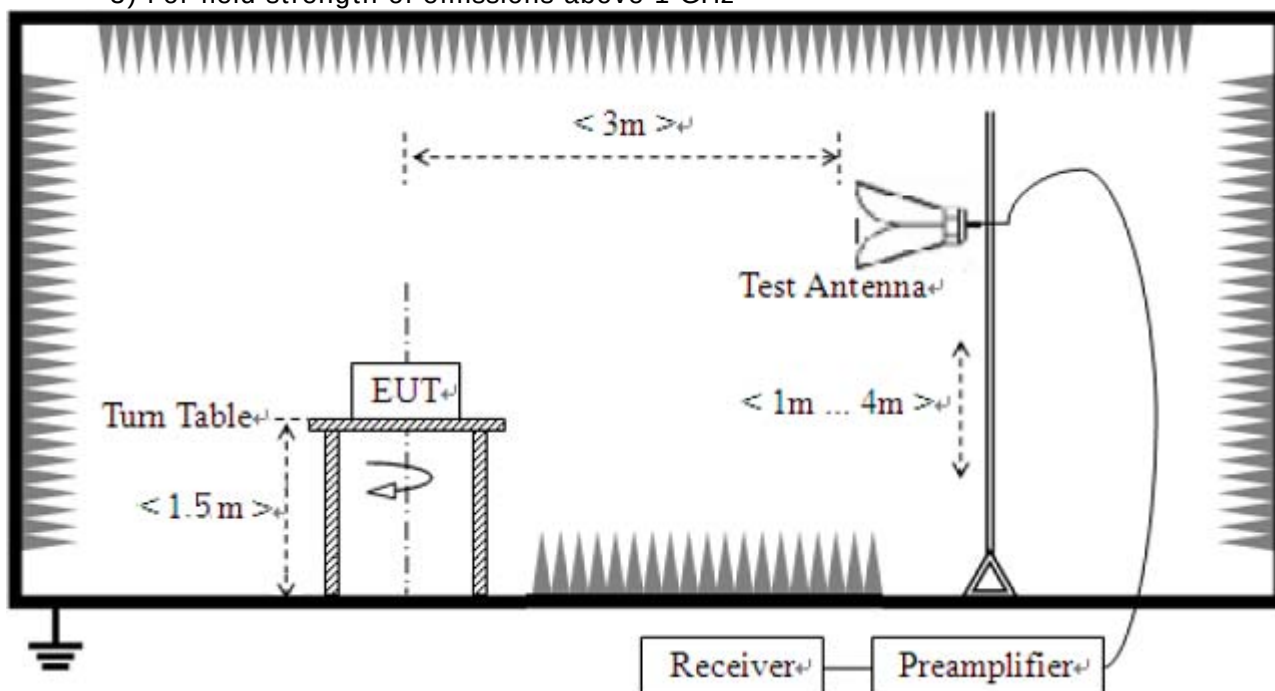
- 1) For field strength of emissions from 9 kHz to 30 MHz



- 2) For field strength of emissions from 30 MHz to 1 GHz



3) For field strength of emissions above 1 GHz



**Test Mode**

The worst-case antenna configuration are determined to be as follows for each mode.

802.11b mode : ANT1 (SISO)

802.11g mode : ANT1, ANT2 (SISO)

802.11n HT20 mode : ANT1 + ANT2

This EUT is supported the AC Adaptor and PoE. We have done all test mode. Worst case is PoE. So the worst data of PoE are shown.

## Test Results

### 1) 9 kHz to 30 MHz

|           |                           |                    |                |
|-----------|---------------------------|--------------------|----------------|
| EUT       | WLAN Access Point         | Measurement Detail |                |
| Model     | WEA412h                   | Frequency Range    | 9 kHz – 30 MHz |
| Test mode | 802.11b, 802.11g, 802.11n | Detector function  | Quasi-Peak     |

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark   |
|-----------------|------------------------|-------------|----------|
| -               | -                      | -           | See note |

**Note :**

The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB)

## 2) 30 MHz to 1 GHz

### Test mode : 802.11n

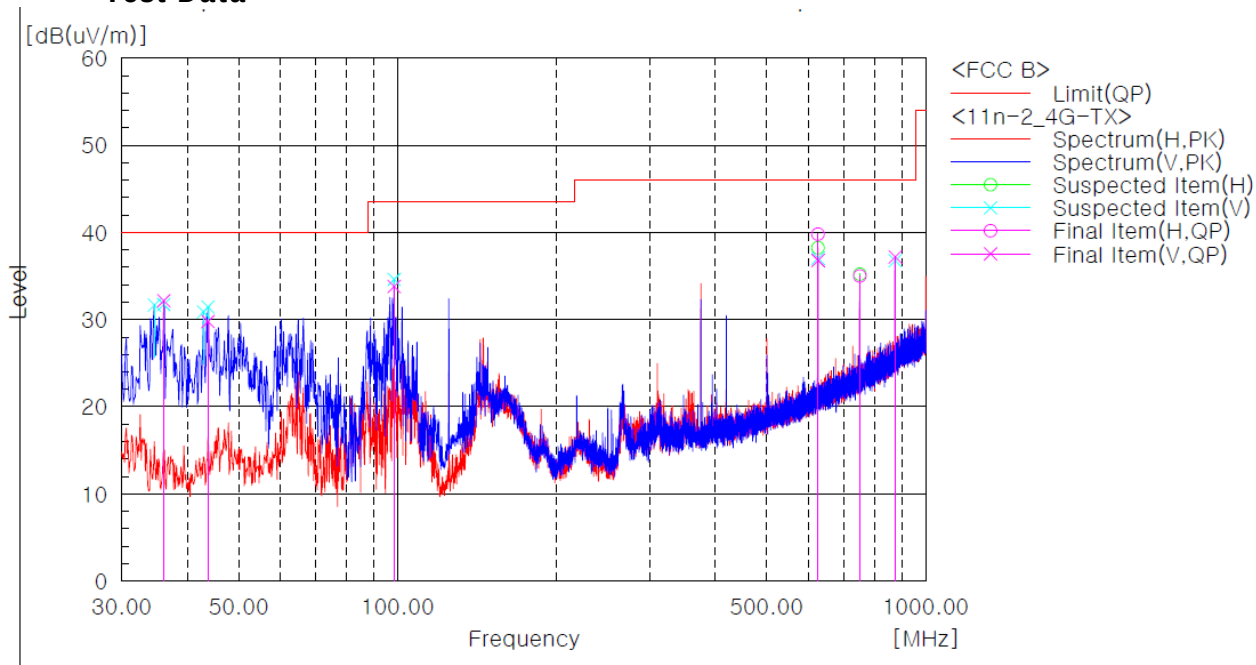
|               |                   |                    |               |
|---------------|-------------------|--------------------|---------------|
| EUT           | WLAN Access Point | Measurement Detail |               |
| Model         | WEA412h           | Frequency Range    | Below 1000MHz |
| Configuration | ANT A1+A2         | Detector function  | Quasi-Peak    |

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark     |
|-----------------|------------------------|-------------|------------|
| 624.974         | 39.8                   | 6.2         | Quasi-peak |

### Test Data



### Final Result

| No. | Frequency [MHz] | (P) | Reading QP [dB(uV)] | c.f [dB(1/m)] | Result QP [dB(uV/m)] | Limit QP [dB(uV/m)] | Margin QP [dB] | Angle [deg] |
|-----|-----------------|-----|---------------------|---------------|----------------------|---------------------|----------------|-------------|
| 1   | 36.063          | V   | 49.6                | -17.4         | 32.2                 | 40.0                | 7.8            | 205.5       |
| 2   | 43.701          | V   | 45.3                | -15.5         | 29.8                 | 40.0                | 10.2           | 220.9       |
| 3   | 98.385          | V   | 50.8                | -17.0         | 33.8                 | 43.5                | 9.7            | 67.4        |
| 4   | 624.974         | H   | 45.3                | -5.5          | 39.8                 | 46.0                | 6.2            | 84.8        |
| 5   | 624.974         | V   | 42.3                | -5.5          | 36.8                 | 46.0                | 9.2            | 329.0       |
| 6   | 750.104         | H   | 38.3                | -3.3          | 35.0                 | 46.0                | 11.0           | 84.8        |
| 7   | 875.112         | V   | 38.5                | -1.3          | 37.2                 | 46.0                | 8.8            | 313.5       |

### Remark :

1. The field strength of spurious emission was measured in the following position: EUT and antenna stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.

### 3) above 1 GHz

#### Test mode : 802.11b

|       |                   |                    |                |
|-------|-------------------|--------------------|----------------|
| EUT   | WLAN Access Point | Measurement Detail |                |
| Model | WEA412h           | Frequency Range    | 1-25GHz        |
| Mode  | ANT A1            | Detector function  | Average / Peak |

#### Remarks

We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark  |
|-----------------|------------------------|-------------|---------|
| 2483.50         | 47.30                  | 6.70        | Average |

#### Ch.1(2412 MHz)

| Frequency [MHz] | (P) | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|-----------------|-----|---------------------|---------------------|---------------------|---------------------|----------------|----------------|
| 1374.60         | H   | 54.00               | 74.00               | 39.94               | 41.69               | 14.06          | 32.31          |
| 1374.60         | V   | 54.00               | 74.00               | 40.15               | 42.19               | 13.85          | 31.81          |
| 1375.00         | H   | 54.00               | 74.00               | 44.39               | 47.77               | 9.61           | 26.23          |
| 1375.00         | V   | 54.00               | 74.00               | 46.98               | 49.90               | 7.03           | 24.10          |
| 1375.30         | H   | 54.00               | 74.00               | 41.26               | 43.15               | 12.74          | 30.85          |
| 1375.30         | V   | 54.00               | 74.00               | 42.86               | 44.98               | 11.14          | 29.02          |

#### Ch.6(2437 MHz)

| Frequency [MHz] | (P) | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|-----------------|-----|---------------------|---------------------|---------------------|---------------------|----------------|----------------|
| 1374.60         | H   | 54.00               | 74.00               | 39.46               | 41.64               | 14.54          | 32.36          |
| 1374.60         | V   | 54.00               | 74.00               | 40.97               | 42.45               | 13.03          | 31.55          |
| 1375.00         | H   | 54.00               | 74.00               | 44.19               | 47.62               | 9.81           | 26.38          |
| 1375.00         | V   | 54.00               | 74.00               | 46.92               | 49.45               | 7.08           | 24.55          |
| 1375.30         | H   | 54.00               | 74.00               | 41.01               | 43.37               | 12.99          | 30.63          |
| 1375.30         | V   | 54.00               | 74.00               | 42.60               | 44.36               | 11.40          | 29.64          |

Ch.11(2462 MHz)

| Frequency<br>[MHz] | (P) | Limit<br>AV<br>[dB(uV/m)] | Limit<br>PK<br>[dB(uV/m)] | Level<br>AV<br>[dB(uV/m)] | Level<br>PK<br>[dB(uV/m)] | Margin<br>AV<br>[dB] | Margin<br>PK<br>[dB] |
|--------------------|-----|---------------------------|---------------------------|---------------------------|---------------------------|----------------------|----------------------|
| 1374.60            | H   | 54.00                     | 74.00                     | 39.16                     | 41.30                     | 14.84                | 32.70                |
| 1374.60            | V   | 54.00                     | 74.00                     | 40.00                     | 42.52                     | 14.00                | 31.48                |
| 1375.00            | H   | 54.00                     | 74.00                     | 44.21                     | 47.66                     | 9.79                 | 26.34                |
| 1375.00            | V   | 54.00                     | 74.00                     | 46.80                     | 49.63                     | 7.20                 | 24.37                |
| 1375.30            | H   | 54.00                     | 74.00                     | 41.55                     | 43.94                     | 12.45                | 30.06                |
| 1375.30            | V   | 54.00                     | 74.00                     | 42.00                     | 43.31                     | 12.00                | 30.69                |

**Restricted band edge test data**

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

| Frequency<br>[MHz] | (P) | Limit<br>AV<br>[dB(uV/m)] | Limit<br>PK<br>[dB(uV/m)] | Level<br>AV<br>[dB(uV/m)] | Level<br>PK<br>[dB(uV/m)] | Margin<br>AV<br>[dB] | Margin<br>PK<br>[dB] |
|--------------------|-----|---------------------------|---------------------------|---------------------------|---------------------------|----------------------|----------------------|
| 2390.00            | H   | 54.00                     | 74.00                     | 41.05                     | 54.06                     | 12.95                | 19.94                |
| 2390.00            | V   | 54.00                     | 74.00                     | 45.70                     | 58.42                     | 8.30                 | 15.58                |
| 2483.50            | H   | 54.00                     | 74.00                     | 43.09                     | 56.13                     | 10.91                | 17.87                |
| 2483.50            | V   | 54.00                     | 74.00                     | 47.30                     | 60.55                     | 6.70                 | 13.45                |

**Test mode : 802.11g**

|       |                   |                    |                |
|-------|-------------------|--------------------|----------------|
| EUT   | WLAN Access Point | Measurement Detail |                |
| Model | WEA412h           | Frequency Range    | 1-25GHz        |
| Mode  | ANT A1            | Detector function  | Average / Peak |

**Remarks**

We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark |
|-----------------|------------------------|-------------|--------|
| 2483.50         | 72.85                  | 1.15        | Peak   |

Ch.1(2412 MHz)

| Frequency [MHz] | (P) | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|-----------------|-----|---------------------|---------------------|---------------------|---------------------|----------------|----------------|
| 1374.60         | H   | 54.00               | 74.00               | 39.20               | 41.16               | 14.80          | 32.84          |
| 1374.60         | V   | 54.00               | 74.00               | 40.34               | 42.55               | 13.66          | 31.45          |
| 1375.00         | H   | 54.00               | 74.00               | 44.15               | 47.57               | 9.85           | 26.43          |
| 1375.00         | V   | 54.00               | 74.00               | 46.88               | 49.67               | 7.12           | 24.33          |
| 1375.30         | H   | 54.00               | 74.00               | 41.23               | 43.86               | 12.77          | 30.14          |
| 1375.30         | V   | 54.00               | 74.00               | 42.26               | 44.90               | 11.74          | 29.10          |

Ch.6(2437 MHz)

| Frequency [MHz] | (P) | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|-----------------|-----|---------------------|---------------------|---------------------|---------------------|----------------|----------------|
| 1374.60         | H   | 54.00               | 74.00               | 39.12               | 41.70               | 14.88          | 32.30          |
| 1374.60         | V   | 54.00               | 74.00               | 40.14               | 42.56               | 13.86          | 31.44          |
| 1375.00         | H   | 54.00               | 74.00               | 44.21               | 47.42               | 9.79           | 26.58          |
| 1375.00         | V   | 54.00               | 74.00               | 46.79               | 49.41               | 7.21           | 24.59          |
| 1375.30         | H   | 54.00               | 74.00               | 41.83               | 43.25               | 12.17          | 30.75          |
| 1375.30         | V   | 54.00               | 74.00               | 42.44               | 44.78               | 11.56          | 29.22          |

Ch.11(2462 MHz)

| Frequency<br>[MHz] | (P) | Limit<br>AV<br>[dB(uV/m)] | Limit<br>PK<br>[dB(uV/m)] | Level<br>AV<br>[dB(uV/m)] | Level<br>PK<br>[dB(uV/m)] | Margin<br>AV<br>[dB] | Margin<br>PK<br>[dB] |
|--------------------|-----|---------------------------|---------------------------|---------------------------|---------------------------|----------------------|----------------------|
| 1374.60            | H   | 54.00                     | 74.00                     | 39.49                     | 41.87                     | 14.51                | 32.13                |
| 1374.60            | V   | 54.00                     | 74.00                     | 40.53                     | 42.42                     | 13.47                | 31.58                |
| 1375.00            | H   | 54.00                     | 74.00                     | 44.06                     | 47.62                     | 9.94                 | 26.38                |
| 1375.00            | V   | 54.00                     | 74.00                     | 46.77                     | 49.46                     | 7.23                 | 24.54                |
| 1375.30            | H   | 54.00                     | 74.00                     | 41.01                     | 43.64                     | 12.99                | 30.36                |
| 1375.30            | V   | 54.00                     | 74.00                     | 42.06                     | 44.68                     | 11.94                | 29.32                |

**Restricted band edge test data**

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

| Frequency<br>[MHz] | (P) | Limit<br>AV<br>[dB(uV/m)] | Limit<br>PK<br>[dB(uV/m)] | Level<br>AV<br>[dB(uV/m)] | Level<br>PK<br>[dB(uV/m)] | Margin<br>AV<br>[dB] | Margin<br>PK<br>[dB] |
|--------------------|-----|---------------------------|---------------------------|---------------------------|---------------------------|----------------------|----------------------|
| 2390.00            | H   | 54.00                     | 74.00                     | 44.88                     | 63.18                     | 9.12                 | 10.82                |
| 2390.00            | V   | 54.00                     | 74.00                     | 50.02                     | 69.64                     | 3.98                 | 4.36                 |
| 2483.50            | H   | 54.00                     | 74.00                     | 43.51                     | 65.22                     | 10.49                | 8.78                 |
| 2483.50            | V   | 54.00                     | 74.00                     | 51.24                     | 72.85                     | 2.76                 | 1.15                 |

### Test mode : 802.11g

|       |                   |                    |                |
|-------|-------------------|--------------------|----------------|
| EUT   | WLAN Access Point | Measurement Detail |                |
| Model | WEA412h           | Frequency Range    | 1-25GHz        |
| Mode  | ANT A2            | Detector function  | Average / Peak |

### Remarks

We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark |
|-----------------|------------------------|-------------|--------|
| 2483.50         | 70.50                  | 3.50        | Peak   |

### Ch.1(2412 MHz)

| Frequency [MHz] | (P) | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|-----------------|-----|---------------------|---------------------|---------------------|---------------------|----------------|----------------|
| 1374.60         | H   | 54.00               | 74.00               | 39.46               | 41.44               | 14.54          | 32.56          |
| 1374.60         | V   | 54.00               | 74.00               | 40.79               | 42.95               | 13.21          | 31.05          |
| 1375.00         | H   | 54.00               | 74.00               | 44.08               | 47.73               | 9.92           | 26.27          |
| 1375.00         | V   | 54.00               | 74.00               | 46.78               | 49.34               | 7.23           | 24.66          |
| 1375.30         | H   | 54.00               | 74.00               | 41.25               | 43.52               | 12.75          | 30.48          |
| 1375.30         | V   | 54.00               | 74.00               | 42.42               | 44.45               | 11.58          | 29.55          |

### Ch.6(2437 MHz)

| Frequency [MHz] | (P) | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|-----------------|-----|---------------------|---------------------|---------------------|---------------------|----------------|----------------|
| 1374.60         | H   | 54.00               | 74.00               | 39.54               | 41.16               | 14.46          | 32.84          |
| 1374.60         | V   | 54.00               | 74.00               | 40.47               | 42.64               | 13.53          | 31.36          |
| 1375.00         | H   | 54.00               | 74.00               | 44.03               | 47.50               | 9.98           | 26.50          |
| 1375.00         | V   | 54.00               | 74.00               | 46.81               | 49.56               | 7.19           | 24.44          |
| 1375.30         | H   | 54.00               | 74.00               | 41.51               | 43.74               | 12.49          | 30.26          |
| 1375.30         | V   | 54.00               | 74.00               | 42.98               | 44.13               | 11.02          | 29.87          |

Ch.11(2462 MHz)

| Frequency<br>[MHz] | (P) | Limit<br>AV<br>[dB(uV/m)] | Limit<br>PK<br>[dB(uV/m)] | Level<br>AV<br>[dB(uV/m)] | Level<br>PK<br>[dB(uV/m)] | Margin<br>AV<br>[dB] | Margin<br>PK<br>[dB] |
|--------------------|-----|---------------------------|---------------------------|---------------------------|---------------------------|----------------------|----------------------|
| 1374.60            | H   | 54.00                     | 74.00                     | 39.66                     | 41.67                     | 14.34                | 32.33                |
| 1374.60            | V   | 54.00                     | 74.00                     | 40.36                     | 42.46                     | 13.64                | 31.54                |
| 1375.00            | H   | 54.00                     | 74.00                     | 44.04                     | 47.89                     | 9.96                 | 26.11                |
| 1375.00            | V   | 54.00                     | 74.00                     | 46.79                     | 49.42                     | 7.21                 | 24.58                |
| 1375.30            | H   | 54.00                     | 74.00                     | 41.82                     | 43.42                     | 12.18                | 30.58                |
| 1375.30            | V   | 54.00                     | 74.00                     | 42.19                     | 44.52                     | 11.81                | 29.48                |

**Restricted band edge test data**

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

| Frequency<br>[MHz] | (P) | Limit<br>AV<br>[dB(uV/m)] | Limit<br>PK<br>[dB(uV/m)] | Level<br>AV<br>[dB(uV/m)] | Level<br>PK<br>[dB(uV/m)] | Margin<br>AV<br>[dB] | Margin<br>PK<br>[dB] |
|--------------------|-----|---------------------------|---------------------------|---------------------------|---------------------------|----------------------|----------------------|
| 2390.00            | H   | 54.00                     | 74.00                     | 47.73                     | 64.95                     | 6.27                 | 9.05                 |
| 2390.00            | V   | 54.00                     | 74.00                     | 47.42                     | 67.90                     | 6.58                 | 6.10                 |
| 2483.50            | H   | 54.00                     | 74.00                     | 46.72                     | 70.50                     | 7.28                 | 3.50                 |
| 2483.50            | V   | 54.00                     | 74.00                     | 43.07                     | 67.12                     | 10.93                | 6.88                 |

### Test mode : 802.11n

|       |                   |                    |                |
|-------|-------------------|--------------------|----------------|
| EUT   | WLAN Access Point | Measurement Detail |                |
| Model | WEA412h           | Frequency Range    | 1-25GHz        |
| Mode  | ANT A1+A2         | Detector function  | Average / Peak |

### Remarks

We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark  |
|-----------------|------------------------|-------------|---------|
| 2483.50         | 52.41                  | 1.59        | Average |

### Ch.1(2412 MHz)

| Frequency [MHz] | (P) | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|-----------------|-----|---------------------|---------------------|---------------------|---------------------|----------------|----------------|
| 1374.60         | H   | 54.00               | 74.00               | 39.70               | 41.10               | 14.30          | 32.90          |
| 1374.60         | V   | 54.00               | 74.00               | 40.12               | 42.84               | 13.88          | 31.16          |
| 1375.00         | H   | 54.00               | 74.00               | 44.02               | 47.78               | 9.98           | 26.22          |
| 1375.00         | V   | 54.00               | 74.00               | 46.70               | 49.45               | 7.30           | 24.55          |
| 1375.30         | H   | 54.00               | 74.00               | 41.55               | 43.53               | 12.45          | 30.47          |
| 1375.30         | V   | 54.00               | 74.00               | 42.15               | 44.85               | 11.85          | 29.15          |

### Ch.6(2437 MHz)

| Frequency [MHz] | (P) | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|-----------------|-----|---------------------|---------------------|---------------------|---------------------|----------------|----------------|
| 1374.60         | H   | 54.00               | 74.00               | 39.30               | 41.99               | 14.70          | 32.01          |
| 1374.60         | V   | 54.00               | 74.00               | 40.36               | 42.60               | 13.64          | 31.40          |
| 1375.00         | H   | 54.00               | 74.00               | 43.97               | 47.69               | 10.03          | 26.31          |
| 1375.00         | V   | 54.00               | 74.00               | 46.77               | 49.24               | 7.23           | 24.76          |
| 1375.30         | H   | 54.00               | 74.00               | 41.94               | 43.64               | 12.06          | 30.36          |
| 1375.30         | V   | 54.00               | 74.00               | 42.54               | 44.14               | 11.46          | 29.86          |

Ch.11(2462 MHz)

| Frequency<br>[MHz] | (P) | Limit<br>AV<br>[dB(uV/m)] | Limit<br>PK<br>[dB(uV/m)] | Level<br>AV<br>[dB(uV/m)] | Level<br>PK<br>[dB(uV/m)] | Margin<br>AV<br>[dB] | Margin<br>PK<br>[dB] |
|--------------------|-----|---------------------------|---------------------------|---------------------------|---------------------------|----------------------|----------------------|
| 1374.60            | H   | 54.00                     | 74.00                     | 39.31                     | 41.17                     | 14.69                | 32.83                |
| 1374.60            | V   | 54.00                     | 74.00                     | 40.49                     | 42.49                     | 13.51                | 31.51                |
| 1375.00            | H   | 54.00                     | 74.00                     | 44.12                     | 47.51                     | 9.88                 | 26.49                |
| 1375.00            | V   | 54.00                     | 74.00                     | 46.69                     | 49.37                     | 7.31                 | 24.63                |
| 1375.30            | H   | 54.00                     | 74.00                     | 41.06                     | 43.35                     | 12.94                | 30.65                |
| 1375.30            | V   | 54.00                     | 74.00                     | 42.90                     | 44.87                     | 11.10                | 29.13                |

**Restricted band edge test data**

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

| Frequency<br>[MHz] | (P) | Limit<br>AV<br>[dB(uV/m)] | Limit<br>PK<br>[dB(uV/m)] | Level<br>AV<br>[dB(uV/m)] | Level<br>PK<br>[dB(uV/m)] | Margin<br>AV<br>[dB] | Margin<br>PK<br>[dB] |
|--------------------|-----|---------------------------|---------------------------|---------------------------|---------------------------|----------------------|----------------------|
| 2390.00            | H   | 54.00                     | 74.00                     | 44.40                     | 63.13                     | 9.60                 | 10.87                |
| 2390.00            | V   | 54.00                     | 74.00                     | 50.87                     | 69.67                     | 3.13                 | 4.33                 |
| 2483.50            | H   | 54.00                     | 74.00                     | 45.00                     | 66.40                     | 9.00                 | 7.60                 |
| 2483.50            | V   | 54.00                     | 74.00                     | 52.41                     | 71.44                     | 1.59                 | 2.56                 |

## Test Results

### 1) 9 kHz to 30 MHz

#### Test mode : Receiver

|       |                   |                    |                |
|-------|-------------------|--------------------|----------------|
| EUT   | WLAN Access Point | Measurement Detail |                |
| Model | WEA412h           | Frequency Range    | 9 kHz – 30 MHz |
| Mode  | Receiver          | Detector function  | Quasi-Peak     |

The requirements are:

☒ Complies

| Frequency<br>(MHz) | Measured Data<br>(dBuV/m) | Margin<br>(dB) | Remark   |
|--------------------|---------------------------|----------------|----------|
| -                  | -                         | -              | See note |

#### Note :

The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB)

## 2) 30 MHz to 1 GHz

### Test mode : Receiver

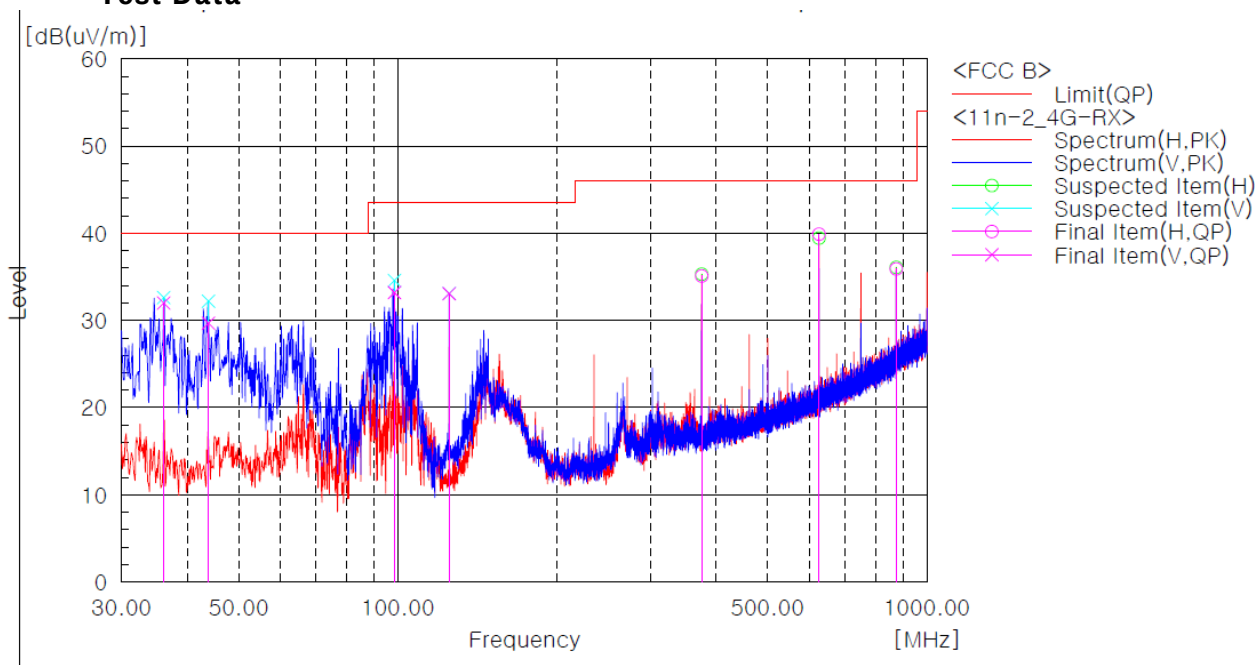
|       |                   |                    |                   |
|-------|-------------------|--------------------|-------------------|
| EUT   | WLAN Access Point | Measurement Detail |                   |
| Model | WEA412h           | Frequency Range    | Below 1000MHz     |
| Mode  | Receiver          | Detector function  | Quasi-Peak / Peak |

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark     |
|-----------------|------------------------|-------------|------------|
| 625.095         | 39.9                   | 6.1         | Quasi-Peak |

### Test Data



### Final Result

| No. | Frequency [MHz] | (P) | Reading QP [dB(uV)] | c.f [dB(1/m)] | Result QP [dB(uV/m)] | Limit QP [dB(uV/m)] | Margin QP [dB] | Angle [deg] |
|-----|-----------------|-----|---------------------|---------------|----------------------|---------------------|----------------|-------------|
| 1   | 36.063          | V   | 49.4                | -17.4         | 32.0                 | 40.0                | 8.0            | 231.2       |
| 2   | 43.823          | V   | 45.2                | -15.5         | 29.7                 | 40.0                | 10.3           | 95.2        |
| 3   | 98.385          | V   | 50.2                | -17.0         | 33.2                 | 43.5                | 10.3           | 140.1       |
| 4   | 124.939         | V   | 48.3                | -15.2         | 33.1                 | 43.5                | 10.4           | 277.6       |
| 5   | 375.078         | H   | 44.8                | -9.7          | 35.1                 | 46.0                | 10.9           | 217.5       |
| 6   | 625.095         | H   | 45.4                | -5.5          | 39.9                 | 46.0                | 6.1            | 109.8       |
| 7   | 875.112         | H   | 37.2                | -1.3          | 35.9                 | 46.0                | 10.1           | 278.9       |

### Remark :

1. The field strength of spurious emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.

### Test mode : Receiver

|       |                   |                    |                |
|-------|-------------------|--------------------|----------------|
| EUT   | WLAN Access Point | Measurement Detail |                |
| Model | WEA412h           | Frequency Range    | 1-25GHz        |
| Mode  | Receiver          | Detector function  | Average / Peak |

### Remarks

We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark  |
|-----------------|------------------------|-------------|---------|
| 1375.00         | 45.92                  | 8.08        | Average |

| Frequency [MHz] | (P)                                                                  | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|-----------------|----------------------------------------------------------------------|---------------------|---------------------|---------------------|---------------------|----------------|----------------|
| 1374.60         | H                                                                    | 54.00               | 74.00               | 48.50               | 50.24               | 5.50           | 23.76          |
| 1374.60         | V                                                                    | 54.00               | 74.00               | 48.39               | 51.15               | 5.61           | 22.85          |
| 1375.00         | H                                                                    | 54.00               | 74.00               | 44.77               | 48.50               | 9.23           | 25.50          |
| 1375.00         | V                                                                    | 54.00               | 74.00               | 45.92               | 49.16               | 8.08           | 24.84          |
| 1375.30         | H                                                                    | 54.00               | 74.00               | 47.56               | 49.96               | 6.44           | 24.04          |
| 1375.30         | V                                                                    | 54.00               | 74.00               | 48.14               | 50.47               | 5.86           | 23.53          |
| other           | No emissions were detected at a level greater than 20dB below limit. |                     |                     |                     |                     |                |                |

## 2.1.7 AC Conducted Emissions

### Test Location

Shielded Room

### Frequency Range of Measurement

150 kHz to 30 MHz

### Instrument Settings

IF Band Width: 9 kHz

### Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.

Amplitude measurements were performed with a quasi-peak detector and an average detector.

### Limit

#### - 15.207(a)

| Frequency (MHz) | Conducted Limit (dBuV) |           |
|-----------------|------------------------|-----------|
|                 | Quasi-peak             | Average   |
| 0.15 ~ 0.5      | 66 to 56*              | 56 to 46* |
| 0.5 ~ 5         | 56                     | 46        |
| 5 ~ 30          | 60                     | 50        |

\* Decreases with the logarithm of the frequency.

### Test Results

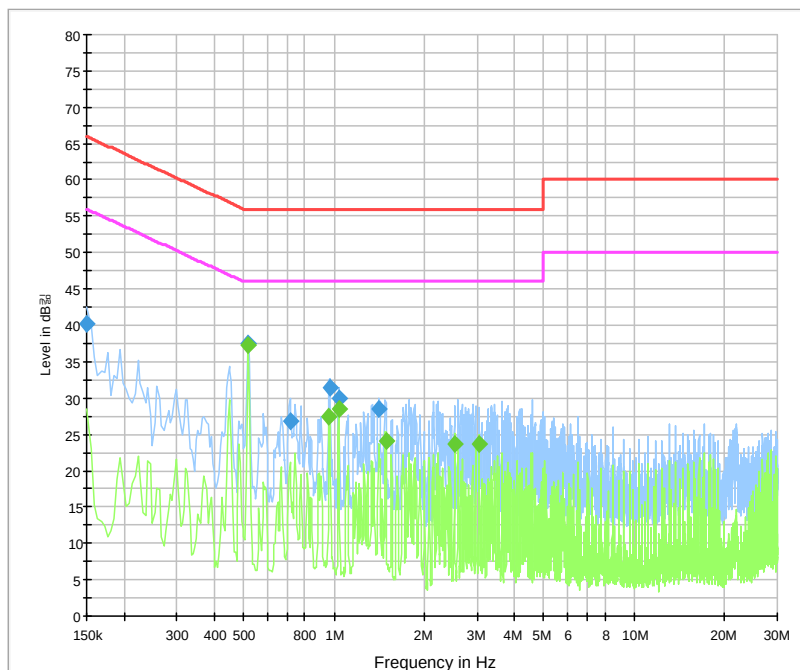
The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark  |
|-----------------|------------------------|-------------|---------|
| 0.519 000       | 37.3                   | 8.7         | Average |

## Test Data

[HOT]  
CISPR 22 Class B\_L1



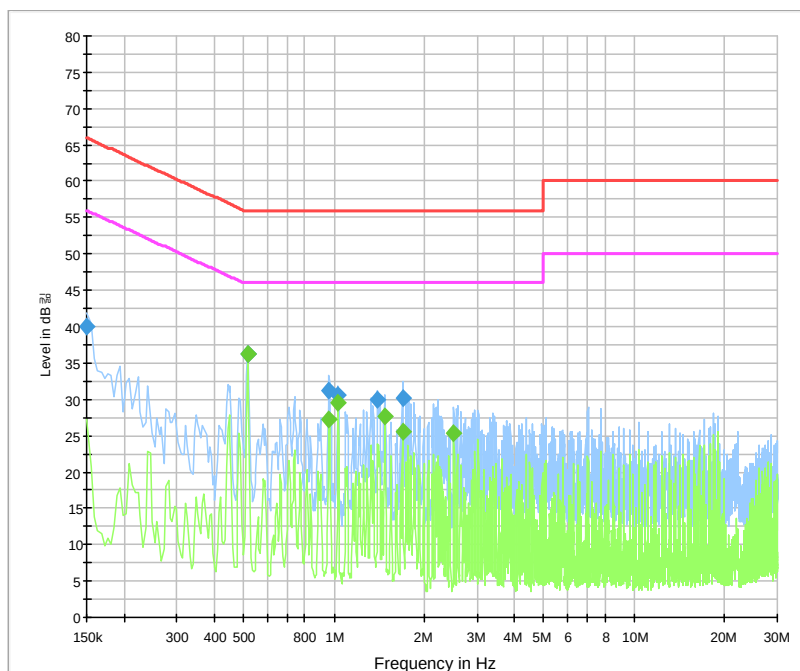
## Final Result 1

| Frequency (MHz) | QuasiPeak (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------|--------------|
| 0.150000        | 40.2             | 1000.0          | 9.000           | On     | L1   | 9.7        | 25.8        | 66.0         |
| 0.519000        | 37.6             | 1000.0          | 9.000           | On     | L1   | 9.9        | 18.4        | 56.0         |
| 0.712500        | 26.9             | 1000.0          | 9.000           | On     | L1   | 9.8        | 29.1        | 56.0         |
| 0.969000        | 31.4             | 1000.0          | 9.000           | On     | L1   | 9.8        | 24.6        | 56.0         |
| 1.036500        | 29.9             | 1000.0          | 9.000           | On     | L1   | 9.7        | 26.1        | 56.0         |
| 1.410000        | 28.5             | 1000.0          | 9.000           | On     | L1   | 9.7        | 27.5        | 56.0         |

## Final Result 2

| Frequency (MHz) | CAverage (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|-----------------|-----------------|-----------------|-----------------|--------|------|------------|-------------|--------------|
| 0.519000        | 37.3            | 1000.0          | 9.000           | On     | L1   | 9.9        | 8.7         | 46.0         |
| 0.964500        | 27.5            | 1000.0          | 9.000           | On     | L1   | 9.8        | 18.5        | 46.0         |
| 1.036500        | 28.6            | 1000.0          | 9.000           | On     | L1   | 9.7        | 17.4        | 46.0         |
| 1.486500        | 24.1            | 1000.0          | 9.000           | On     | L1   | 9.7        | 21.9        | 46.0         |
| 2.521500        | 23.7            | 1000.0          | 9.000           | On     | L1   | 9.7        | 22.3        | 46.0         |
| 3.039000        | 23.6            | 1000.0          | 9.000           | On     | L1   | 9.7        | 22.4        | 46.0         |

[NEUTRAL]  
CISPR 22 Class B\_N



## Final Result 1

| Frequency (MHz) | QuasiPeak (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------|--------------|
| 0.150000        | 40.0             | 1000.0          | 9.000           | On     | N    | 9.7        | 26.0        | 66.0         |
| 0.514500        | 36.3             | 1000.0          | 9.000           | On     | N    | 9.9        | 19.7        | 56.0         |
| 0.964500        | 31.3             | 1000.0          | 9.000           | On     | N    | 9.8        | 24.7        | 56.0         |
| 1.032000        | 30.6             | 1000.0          | 9.000           | On     | N    | 9.7        | 25.4        | 56.0         |
| 1.401000        | 30.0             | 1000.0          | 9.000           | On     | N    | 9.7        | 26.0        | 56.0         |
| 1.693500        | 30.1             | 1000.0          | 9.000           | On     | N    | 9.7        | 25.9        | 56.0         |

## Final Result 2

| Frequency (MHz) | CAverage (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|-----------------|-----------------|-----------------|-----------------|--------|------|------------|-------------|--------------|
| 0.514500        | 36.1            | 1000.0          | 9.000           | On     | N    | 9.9        | 9.9         | 46.0         |
| 0.964500        | 27.3            | 1000.0          | 9.000           | On     | N    | 9.8        | 18.7        | 46.0         |
| 1.032000        | 29.4            | 1000.0          | 9.000           | On     | N    | 9.7        | 16.6        | 46.0         |
| 1.477500        | 27.7            | 1000.0          | 9.000           | On     | N    | 9.7        | 18.3        | 46.0         |
| 1.693500        | 25.5            | 1000.0          | 9.000           | On     | N    | 9.7        | 20.5        | 46.0         |
| 2.508000        | 25.3            | 1000.0          | 9.000           | On     | N    | 9.7        | 20.7        | 46.0         |

## APPENDIX A – Test Equipment Used For Tests

|    | Name of Equipment        | Manufacturer    | Model No.    | Serial No.    | Cal Date   | Due Date   |
|----|--------------------------|-----------------|--------------|---------------|------------|------------|
| 1  | Signal Analyzer          | Agilent         | N9020A       | MY48011598    | 2015-11-02 | 2016-11-02 |
| 2  | Spectrum Analyzer        | Rohde & Schwarz | FSP-30       | 100994        | 2015-11-02 | 2016-11-02 |
| 3  | Signal Generator         | Rohde & Schwarz | SMB100A      | 175528        | 2016-01-20 | 2017-01-20 |
| 4  | EMI Test Receiver        | Rohde & Schwarz | ESCI7        | 100816        | 2015-11-02 | 2016-11-02 |
| 5  | LISN                     | Rohde & Schwarz | ENV216       | 101760        | 2016-02-05 | 2017-02-05 |
| 6  | EMI Test Receiver        | Rohde & Schwarz | ESCI7        | 100814        | 2015-11-02 | 2016-11-02 |
| 7  | Trilog Broadband Antenna | SCHWARZBECK     | VULB 9161 SE | 9161-4133     | 2015-06-18 | 2017-06-18 |
| 8  | Active Loop Antenna      | SCHWARZBECK     | FMZB 1513    | 1513-126      | 2016-05-16 | 2018-05-16 |
| 9  | 6dB Attenuator           | R&S             | DNF          | 272.4110.50-1 | 2016-02-04 | 2017-02-04 |
| 10 | 6dB Attenuator           | R&S             | DNF          | 272.4110.50-2 | 2015-11-03 | 2016-11-03 |
| 11 | AMPLIFIER                | SONOMA          | 310          | 291721        | 2016-02-02 | 2017-02-02 |
| 12 | EMI Test Receiver        | Rohde & Schwarz | ESU40        | 100336        | 2015-05-14 | 2017-05-14 |
| 13 | PREAMPLIFIER             | Agilent         | 8449B        | 3008A02011    | 2015-12-08 | 2016-12-08 |
| 14 | Horn Antenna             | ETS-Lindgren    | 3115         | 00078894      | 2015-09-02 | 2017-09-02 |
| 15 | Horn Antenna             | ETS-Lindgren    | 3116         | 00062504      | 2015-09-04 | 2017-09-04 |
| 16 | Horn Antenna             | ETS-Lindgren    | 3116         | 00062916      | 2015-04-30 | 2017-04-30 |
| 17 | Horn Antenna             | ETS-Lindgren    | 3117         | 00154525      | 2015-09-02 | 2017-09-02 |
| 18 | Band Reject Filter       | Micro Tronics   | BRM50702     | G233          | 2016-05-16 | 2017-05-16 |