

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT  
INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART C REQUIREMENT**

*OF*

**Portable Receipt and Label Printer**

**Model No.: DP-530, DP-530L**

**FCC ID: Z7ODP530L**

**Trademark:** 

**Report No.: ED150918005E**

**Issue Date: October 12, 2015**

*Prepared for*

**Jiangmen Dascom Computer Peripherals Co., Ltd.  
No.399, Jin Xing Road, Jiang Hai District, Jiangmen City, Guang Dong  
Province, P.R. China**

*Prepared by*

**DONGGUAN EMTEK CO., LTD.  
No.281, Guantai Road, Nancheng District,  
Dongguan, Guangdong, China  
TEL: 86-769-22807078  
FAX: 86-769-22807079**

**This report shall not be reproduced, except in full, without the written approval of  
DONGGUAN EMTEK CO., LTD.**

## VERIFICATION OF COMPLIANCE

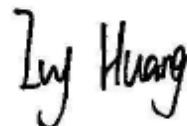
|                      |                                                                                                                                             |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant:           | Jiangmen Dascom Computer Peripherals Co., Ltd.<br>No.399, Jin Xing Road, Jiang Hai District, Jiangmen City, Guang Dong Province, P.R. China |
| Manufacturer:        | Jiangmen Dascom Computer Peripherals Co., Ltd.<br>No.399, Jin Xing Road, Jiang Hai District, Jiangmen City, Guang Dong Province, P.R. China |
| Product Description: | Portable Receipt and Label Printer                                                                                                          |
| Model Number:        | DP-530, DP-530L<br>(Note: The samples are the same except appearance and model number. So DP-530 was selected for full test.)               |
| Trade Mark:          |                                                            |

### We hereby certify that:

The above equipment was tested by DONGGUAN EMTEK CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247(2014).

Date of Test : August 24, 2015 to September 30, 2015

Prepared by :



Ivy Huang/Editor

Reviewer :



Alan He/Supervisor

Approved & Authorized  
Signer :



Sam Lv/Manager

### Modified Information

| Version | Summary         | Revision Date | Report No.   |
|---------|-----------------|---------------|--------------|
| Ver.1.0 | Original Report | /             | ED150918005E |
|         |                 |               |              |
|         |                 |               |              |
|         |                 |               |              |
|         |                 |               |              |
|         |                 |               |              |
|         |                 |               |              |

## Table of Contents

|                                                       |           |
|-------------------------------------------------------|-----------|
| <b>1. GENERAL INFORMATION.....</b>                    | <b>6</b>  |
| 1.1 PRODUCT DESCRIPTION .....                         | 6         |
| 1.2 RELATED SUBMITTAL(S) / GRANT(S).....              | 6         |
| 1.3 TEST METHODOLOGY .....                            | 7         |
| 1.4 SPECIAL ACCESSORIES .....                         | 7         |
| 1.5 EQUIPMENT MODIFICATIONS .....                     | 7         |
| 1.6 TEST FACILITY .....                               | 7         |
| <b>2. SYSTEM TEST CONFIGURATION .....</b>             | <b>8</b>  |
| 2.1 EUT CONFIGURATION .....                           | 8         |
| 2.2 EUT EXERCISE .....                                | 8         |
| 2.3 TEST PROCEDURE .....                              | 8         |
| 2.4 CONFIGURATION OF TESTED SYSTEM.....               | 9         |
| <b>3. DESCRIPTION OF TEST MODES .....</b>             | <b>10</b> |
| <b>4. SUMMARY OF TEST RESULTS .....</b>               | <b>11</b> |
| <b>5. CONDUCTED EMISSIONS TEST .....</b>              | <b>12</b> |
| 5.1 MEASUREMENT PROCEDURE .....                       | 12        |
| 5.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)..... | 12        |
| 5.3 MEASUREMENT EQUIPMENT USED .....                  | 12        |
| 5.4 CONDUCTED EMISSION LIMIT .....                    | 12        |
| 5.5 MEASUREMENT RESULT .....                          | 13        |
| <b>6. RADIATED EMISSION TEST .....</b>                | <b>17</b> |
| 6.1 MEASUREMENT PROCEDURE .....                       | 17        |
| 6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)..... | 18        |
| 6.3 MEASUREMENT EQUIPMENT USED .....                  | 19        |
| 6.4 RADIATED EMISSION LIMIT .....                     | 20        |
| 6.5 MEASUREMENT RESULT .....                          | 21        |
| <b>7. 6DB BANDWIDTH TEST.....</b>                     | <b>28</b> |
| 7.1 MEASUREMENT PROCEDURE .....                       | 28        |
| 7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)..... | 28        |
| 7.3 MEASUREMENT EQUIPMENT USED .....                  | 28        |
| 7.4 MEASUREMENT RESULTS .....                         | 28        |
| <b>8. MAXIMUM PEAK OUTPUT POWER TEST .....</b>        | <b>33</b> |
| 8.1 MEASUREMENT PROCEDURE .....                       | 33        |
| 8.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)..... | 33        |
| 8.3 MEASUREMENT EQUIPMENT USED .....                  | 33        |
| 8.4 PEAK POWER OUTPUT LIMIT .....                     | 33        |
| 8.5 MEASUREMENT RESULTS .....                         | 33        |
| <b>9. BAND EDGE TEST.....</b>                         | <b>34</b> |
| 9.1 MEASUREMENT PROCEDURE .....                       | 34        |
| 9.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)..... | 35        |
| 9.3 MEASUREMENT EQUIPMENT USED .....                  | 35        |
| 9.4 MEASUREMENT RESULTS .....                         | 35        |
| <b>10. POWER DENSITY .....</b>                        | <b>42</b> |
| 10.1 TEST EQUIPMENT.....                              | 42        |
| 10.2 MEASURING INSTRUMENTS AND SETTING .....          | 42        |
| 10.3 TEST PROCEDURES .....                            | 42        |

|                                              |           |
|----------------------------------------------|-----------|
| 10.4 BLOCK DIAGRAM OF TEST SETUP .....       | 42        |
| 10.5 LIMIT .....                             | 42        |
| 10.6 TEST RESULT .....                       | 43        |
| <b>11. ANTENNA PORT EMISSION.....</b>        | <b>47</b> |
| 11.1 TEST EQUIPMENT .....                    | 47        |
| 11.2 MEASURING INSTRUMENTS AND SETTING ..... | 47        |
| 11.3 TEST PROCEDURES.....                    | 47        |
| 11.4 BLOCK DIAGRAM OF TEST SETUP .....       | 47        |
| 11.5 TEST RESULT .....                       | 47        |
| <b>12. ANTENNA APPLICATION.....</b>          | <b>51</b> |
| 12.1 ANTENNA REQUIREMENT .....               | 51        |
| 12.2 RESULT .....                            | 51        |

Appendix I (Photos of EUT)(6 Pages)

## 1. General Information

### 1.1 Product Description

| Characteristics           | Description                                                                                 |
|---------------------------|---------------------------------------------------------------------------------------------|
| Product Name              | Portable Receipt and Label Printer                                                          |
| Model number              | DP-530                                                                                      |
| Power Supply              | DC 19V, 3.42A                                                                               |
| Kind of Device            | WiFi Device                                                                                 |
| Modulation                | DSSS with DBPSK/DQPSK/CCK for 802.11b;<br>OFDM with BPSK/QPSK/16QAM/64QAM for 802.11n(HT40) |
| Operating Frequency Range | 2412-2462MHz for 802.11b<br>2422-2452MHz for 802.11n(HT40)                                  |
| Number of Channels        | 11 Channels for 802.11b<br>7 Channels for 802.11n(HT40)                                     |
| Transmit Power Max        | 12.69dBm                                                                                    |
| Antenna Type              | Internal chip antenna                                                                       |
| Antenna Gain              | 0.5 dBi                                                                                     |

### 1.2 Related Submittal(s) / Grant(s)

This submittal(s) (test report) is intended for filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system is compliance with Subpart B is authorized under a DOC procedure.

### **1.3 Test Methodology**

All the test program has follow FCC new test procedure KDB558074 D01 v03r03, Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

### **1.4 Special Accessories**

Not available for this EUT intended for grant.

### **1.5 Equipment Modifications**

Not available for this EUT intended for grant.

### **1.6 Test Facility**

#### **Site Description**

EMC Lab : Accredited by FCC, June 18, 2014  
The Certificate Number is 247565

Accredited by Industry Canada, February 19, 2014  
The Certificate Number is 9444A

Name of Firm : DONGGUAN EMTEK CO., LTD.  
Site Location : No.281, Guantai Road, Nancheng District,  
Dongguan, Guangdong, China

## **2. System Test Configuration**

### **2.1 EUT Configuration**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### **2.2 EUT Exercise**

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

### **2.3 Test Procedure**

#### **2.3.1 Conducted Emissions**

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

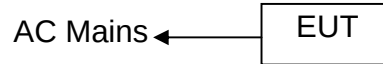
#### **2.3.2 Radiated Emissions**

Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of EUT was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013.



## 2.4 Configuration of Tested System

**Fig. 2-1 Configuration of Tested System**



**Table 2-1 Equipment Used in Tested System**

| Item | Equipment                          | Trademark | Model No. | FCC ID    | Note |
|------|------------------------------------|-----------|-----------|-----------|------|
| 1.   | Portable Receipt and Label Printer | N/A       | DP-530    | Z7ODP530L | EUT  |

**Note:**

- (1) Unless otherwise denoted as EUT in 『Remark』 column, device(s) used in tested system is a support equipment.

### 3. Description of Test Modes

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (802.11b: 1 Mbps; 802.11g: 6 Mbps; 802.11n (HT20 ): MCS0; 802.11n (HT40 ): MCS8) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for 802.11 b:

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

Frequency and Channel list for 802.11 n (HT40):

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

Test Frequency and Channel for 802.11 b:

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 1                | 2412            | 6                | 2437            | 11                | 2462            |

Test Frequency and channel for 802.11 n (HT40):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 3                | 2422            | 6                | 2437            | 9                 | 2452            |

#### 4. Summary of Test Results

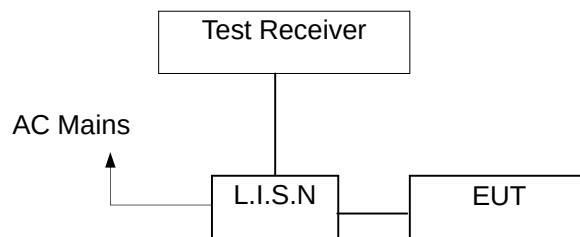
| FCC Rules           | Description Of Test         | Result |
|---------------------|-----------------------------|--------|
| §15.247(a)(2)       | 6dB bandwidth               | Pass   |
| §15.247(b)(3)       | Max Peak output Power test  | Pass   |
| §15.247(e)          | Power density               | Pass   |
| §15.247(d)          | Band edge test              | Pass   |
| §15.207             | AC Power Conducted Emission | Pass   |
| §15.247(d), §15.209 | Radiated Emission           | Pass   |
| §15.247(d)          | Antenna Port Emission       | Pass   |
| §15.247(b)&§15.203  | Antenna Application         | Pass   |

## 5. Conducted Emissions Test

### 5.1 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

### 5.2 Test SET-UP (Block Diagram of Configuration)



### 5.3 Measurement Equipment Used

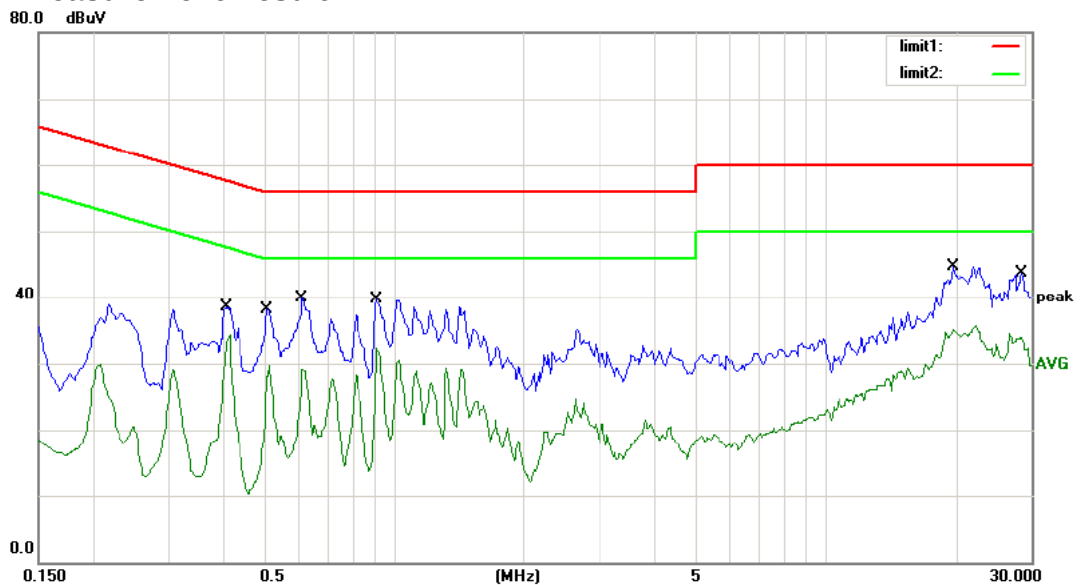
| Item | Equipment         | Manufacturer  | Model No. | Serial No. | Last Cal.    | Cal. Interval |
|------|-------------------|---------------|-----------|------------|--------------|---------------|
| 1.   | Test Receiver     | Rohde&Schwarz | ESCS30    | 100018     | May 16, 2015 | 1 Year        |
| 2.   | L.I.S.N.          | Rohde&Schwarz | ENV216    | 100017     | May 16, 2015 | 1Year         |
| 3.   | RF Switching Unit | CDS           | RSU-M2    | 38401      | May 16, 2015 | 1Year         |

### 5.4 Conducted Emission Limit

| Conducted Emission<br>Frequency(MHz) | Quasi-peak | Average |
|--------------------------------------|------------|---------|
| 0.15-0.5                             | 66-56      | 56-46   |
| 0.5-5.0                              | 56         | 46      |
| 5.0-30.0                             | 60         | 50      |

- Note:** 1. The lower limit shall apply at the transition frequencies  
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

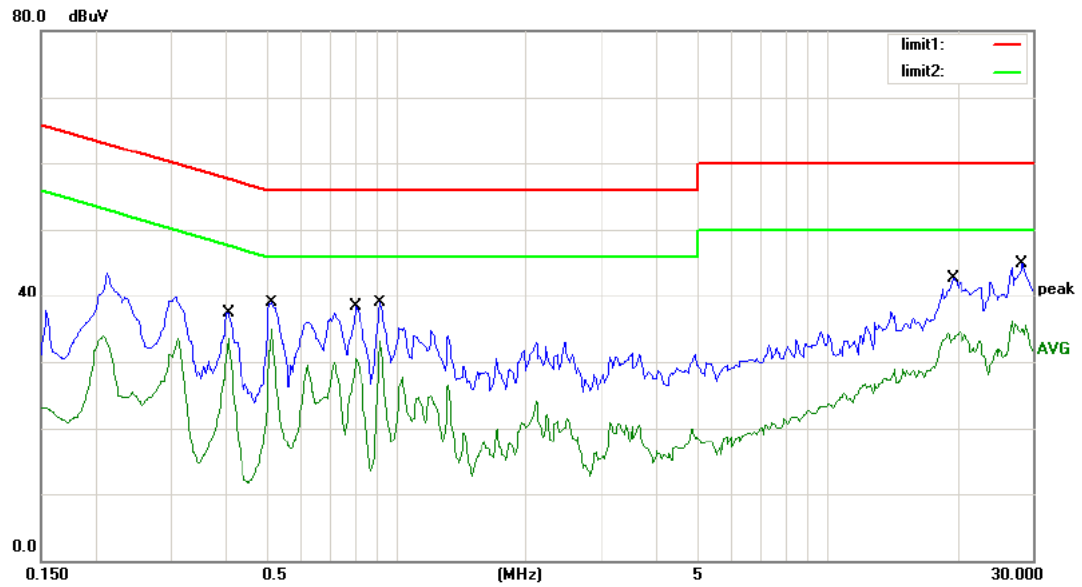
## 5.5 Measurement Result



Site site #1 Phase: **L1** Temperature: 24  
 Limit: (CE)FCC PART 15 class B\_QP Power: AC 120V/60Hz Humidity: 55 %  
 Mode: WIFI(TX2412)  
 Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.4063       | 38.42                    | 0.00                    | 38.42                    | 57.72         | -19.30     | QP       |         |
| 2   | *   | 0.4063       | 34.21                    | 0.00                    | 34.21                    | 47.72         | -13.51     | AVG      |         |
| 3   |     | 0.5100       | 38.02                    | 0.00                    | 38.02                    | 56.00         | -17.98     | QP       |         |
| 4   |     | 0.5100       | 29.62                    | 0.00                    | 29.62                    | 46.00         | -16.38     | AVG      |         |
| 5   |     | 0.6134       | 39.95                    | 0.00                    | 39.95                    | 56.00         | -16.05     | QP       |         |
| 6   |     | 0.6134       | 29.13                    | 0.00                    | 29.13                    | 46.00         | -16.87     | AVG      |         |
| 7   |     | 0.9104       | 39.64                    | 0.00                    | 39.64                    | 56.00         | -16.36     | QP       |         |
| 8   |     | 0.9104       | 32.31                    | 0.00                    | 32.31                    | 46.00         | -13.69     | AVG      |         |
| 9   |     | 19.7250      | 44.69                    | 0.00                    | 44.69                    | 60.00         | -15.31     | QP       |         |
| 10  |     | 19.7250      | 35.17                    | 0.00                    | 35.17                    | 50.00         | -14.83     | AVG      |         |
| 11  |     | 28.5000      | 43.77                    | 0.00                    | 43.77                    | 60.00         | -16.23     | QP       |         |
| 12  |     | 28.5000      | 34.52                    | 0.00                    | 34.52                    | 50.00         | -15.48     | AVG      |         |

\*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver.

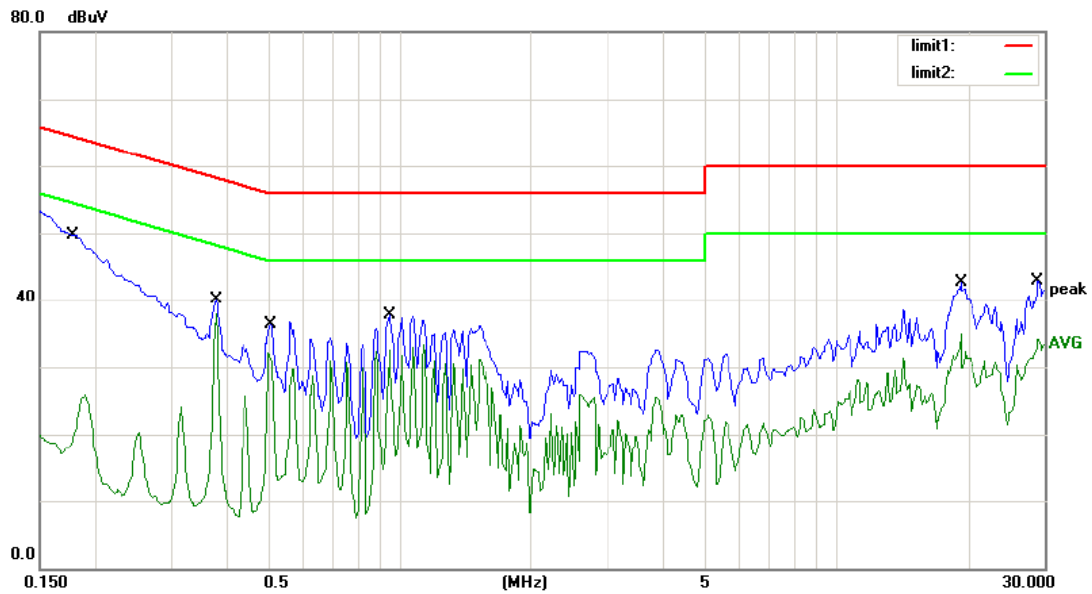


Site site #1  
 Limit: (CE)FCC PART 15 class B\_QP  
 Mode: WIFI(TX2412)  
 Note:

Phase: **N**  
 Power: AC 120V/60Hz  
 Temperature: 24  
 Humidity: 55 %

| No. Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|---------|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1       | 0.4065       | 37.33                    | 0.00                    | 37.33                    | 57.72         | -20.39     | QP       |         |
| 2       | 0.4065       | 33.52                    | 0.00                    | 33.52                    | 47.72         | -14.20     | AVG      |         |
| 3       | 0.5144       | 38.87                    | 0.00                    | 38.87                    | 56.00         | -17.13     | QP       |         |
| 4 *     | 0.5144       | 34.94                    | 0.00                    | 34.94                    | 46.00         | -11.06     | AVG      |         |
| 5       | 0.8070       | 38.26                    | 0.00                    | 38.26                    | 56.00         | -17.74     | QP       |         |
| 6       | 0.8070       | 30.44                    | 0.00                    | 30.44                    | 46.00         | -15.56     | AVG      |         |
| 7       | 0.9195       | 38.81                    | 0.00                    | 38.81                    | 56.00         | -17.19     | QP       |         |
| 8       | 0.9195       | 33.09                    | 0.00                    | 33.09                    | 46.00         | -12.91     | AVG      |         |
| 9       | 19.6250      | 42.80                    | 0.00                    | 42.80                    | 60.00         | -17.20     | QP       |         |
| 10      | 19.6250      | 34.43                    | 0.00                    | 34.43                    | 50.00         | -15.57     | AVG      |         |
| 11      | 28.4250      | 44.92                    | 0.00                    | 44.92                    | 60.00         | -15.08     | QP       |         |
| 12      | 28.4250      | 35.70                    | 0.00                    | 35.70                    | 50.00         | -14.30     | AVG      |         |

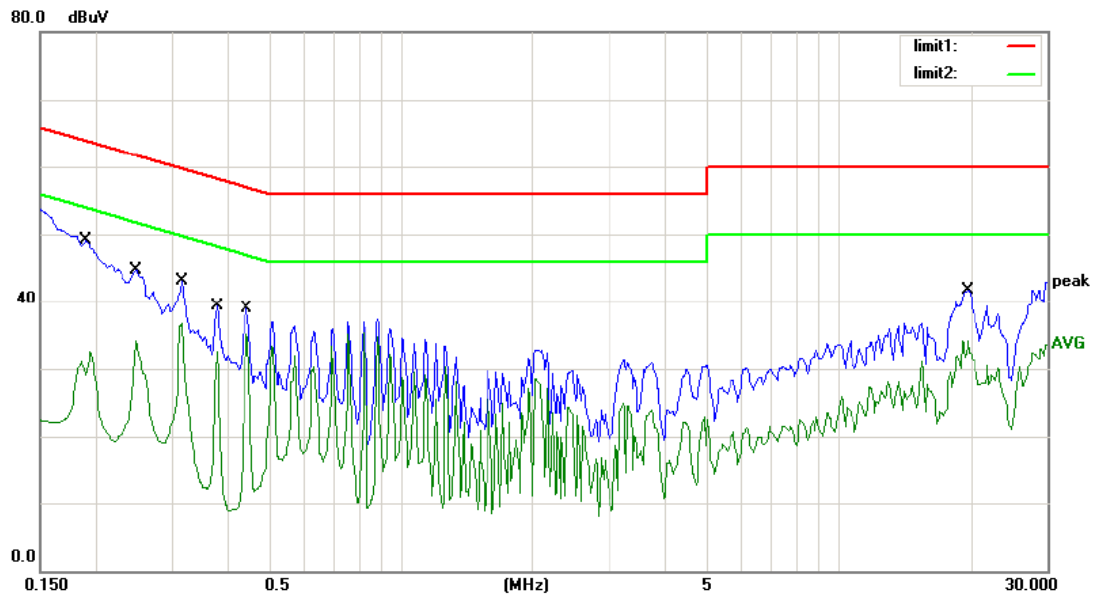
\*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver.



Site site #1 Phase: **L1** Temperature: 24  
 Limit: (CE)FCC PART 15 class B\_QP Power: AC 240V/50Hz Humidity: 55 %  
 Mode: WIFI(TX2412)  
 Note:

| No. Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|---------|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1       | 0.1796       | 44.58                    | 0.00                    | 44.58                    | 64.50         | -19.92     | QP       |         |
| 2       | 0.1796       | 25.80                    | 0.00                    | 25.80                    | 54.50         | -28.70     | AVG      |         |
| 3       | 0.3795       | 40.16                    | 0.00                    | 40.16                    | 58.29         | -18.13     | QP       |         |
| 4 *     | 0.3795       | 37.84                    | 0.00                    | 37.84                    | 48.29         | -10.45     | AVG      |         |
| 5       | 0.5100       | 36.25                    | 0.00                    | 36.25                    | 56.00         | -19.75     | QP       |         |
| 6       | 0.5100       | 32.05                    | 0.00                    | 32.05                    | 46.00         | -13.95     | AVG      |         |
| 7       | 0.9510       | 37.71                    | 0.00                    | 37.71                    | 56.00         | -18.29     | QP       |         |
| 8       | 0.9510       | 32.41                    | 0.00                    | 32.41                    | 46.00         | -13.59     | AVG      |         |
| 9       | 19.2750      | 42.65                    | 0.00                    | 42.65                    | 60.00         | -17.35     | QP       |         |
| 10      | 19.2750      | 34.91                    | 0.00                    | 34.91                    | 50.00         | -15.09     | AVG      |         |
| 11      | 29.0500      | 42.96                    | 0.00                    | 42.96                    | 60.00         | -17.04     | QP       |         |
| 12      | 29.0500      | 34.16                    | 0.00                    | 34.16                    | 50.00         | -15.84     | AVG      |         |

\*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver.



Site site #1 Phase: **N** Temperature: 24  
 Limit: (CE)FCC PART 15 class B\_QP Power: AC 240V/50Hz Humidity: 55 %  
 Mode: WIFI(TX2412)  
 Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.1905       | 49.14                    | 0.00                    | 49.14                    | 64.01         | -14.87     | QP       |         |
| 2   |     | 0.1905       | 32.59                    | 0.00                    | 32.59                    | 54.01         | -21.42     | AVG      |         |
| 3   |     | 0.2490       | 44.73                    | 0.00                    | 44.73                    | 61.79         | -17.06     | QP       |         |
| 4   |     | 0.2490       | 34.04                    | 0.00                    | 34.04                    | 51.79         | -17.75     | AVG      |         |
| 5   |     | 0.3165       | 43.11                    | 0.00                    | 43.11                    | 59.80         | -16.69     | QP       |         |
| 6   |     | 0.3165       | 36.78                    | 0.00                    | 36.78                    | 49.80         | -13.02     | AVG      |         |
| 7   |     | 0.3795       | 39.25                    | 0.00                    | 39.25                    | 58.29         | -19.04     | QP       |         |
| 8   |     | 0.3795       | 32.47                    | 0.00                    | 32.47                    | 48.29         | -15.82     | AVG      |         |
| 9   |     | 0.4425       | 38.82                    | 0.00                    | 38.82                    | 57.01         | -18.19     | QP       |         |
| 10  | *   | 0.4425       | 35.12                    | 0.00                    | 35.12                    | 47.01         | -11.89     | AVG      |         |
| 11  |     | 19.8000      | 41.74                    | 0.00                    | 41.74                    | 60.00         | -18.26     | QP       |         |
| 12  |     | 19.8000      | 34.15                    | 0.00                    | 34.15                    | 50.00         | -15.85     | AVG      |         |

\*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver.



## 6. Radiated Emission Test

### 6.1 Measurement Procedure

1. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured was complete.

When spectrum scanned from 30MHz to 1GHz setting resolution bandwidth 120KHz and video bandwidth 300KHz:

| EMI Test Receiver | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 120KHz   |
| VB                | 300KHz   |
| Detector          | QP       |
| Trace             | Max hold |

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz:

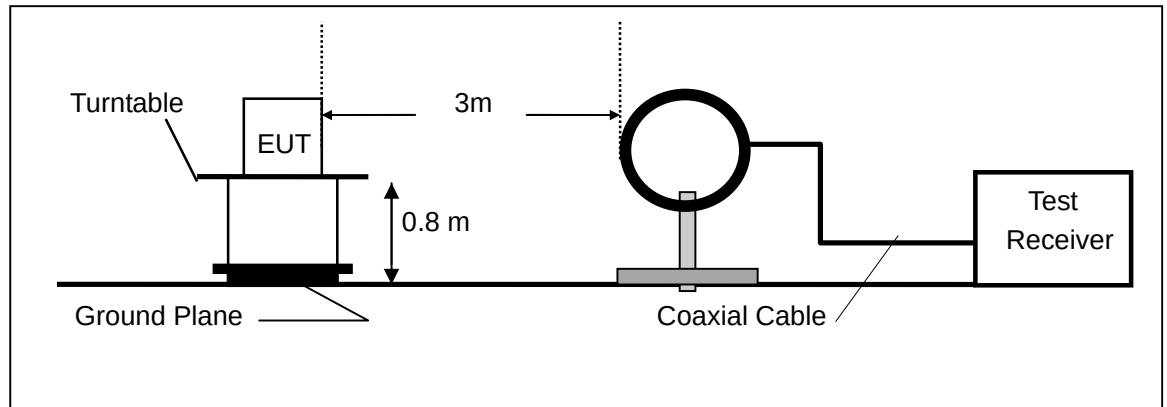
| EMI Test Receiver | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 1MHz     |
| VB                | 3MHz     |
| Detector          | Peak     |
| Trace             | Max hold |

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 10Hz:

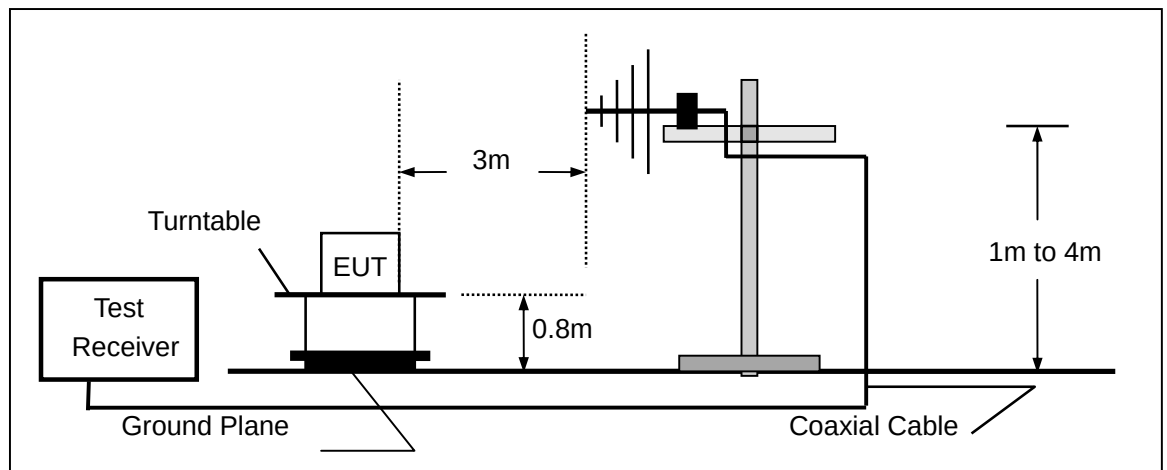
| EMI Test Receiver | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 1MHz     |
| VB                | 10Hz     |
| Detector          | Peak     |
| Trace             | Max hold |

## 6.2 Test SET-UP (Block Diagram of Configuration)

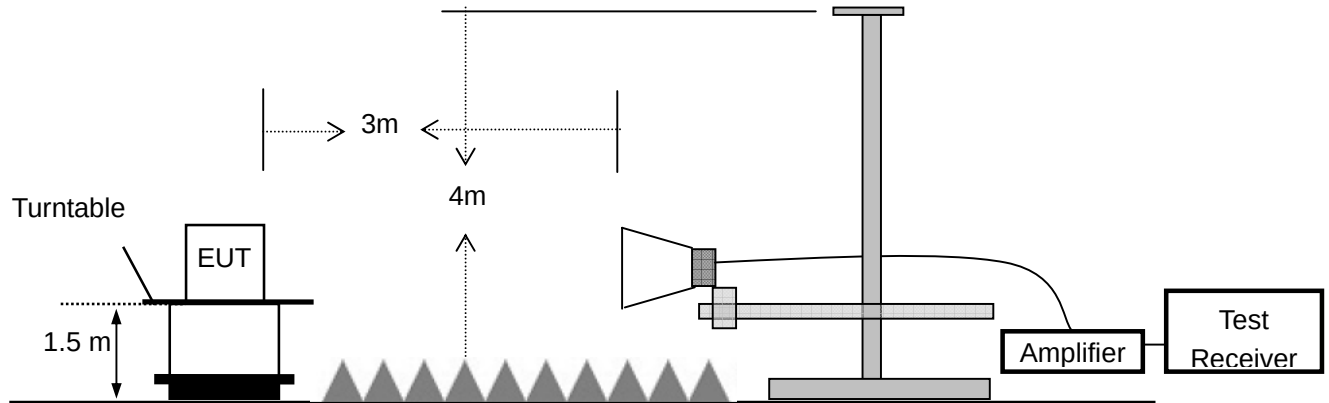
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



### 6.3 Measurement Equipment Used

| Item | Equipment                      | Manufacturer    | Model No.  | Serial No.   | Characteristics | Last Cal.  | Cal. Interval |
|------|--------------------------------|-----------------|------------|--------------|-----------------|------------|---------------|
| 1.   | Test Receiver                  | Rohde & Schwarz | ESCI       | 1166.5950.03 | 9KHz-3GHz       | 3/15/2015  | 1 Year        |
| 2.   | Loop Antenna                   | Schwarzbeck     | FMZB 1519  | 012          | 9 KHz -30MHz    | 12/29/2014 | 1 Year        |
| 3.   | Bilog Antenna                  | Schwarzbeck     | VULB9163   | 000141       | 25MHz-2GHz      | 3/15/2015  | 1 Year        |
| 4.   | Power Amplifier                | CDS             | RSU-M352   | 818          | 1MHz-1GHz       | 3/15/2015  | 1 Year        |
| 5.   | Power Amplifier                | HP              | 8447F      | OPT H64      | 1GHz-26.5GHz    | 3/15/2015  | 1 Year        |
| 6.   | Color Monitor                  | SUNSP0          | SP-140A    | N/A          | --              | 3/15/2015  | 1 Year        |
| 7.   | Single Line Filter             | JIANLI          | XL-3       | N/A          | --              | 3/15/2015  | 1 Year        |
| 8.   | Single Phase Power Line Filter | JIANLI          | DL-2X100B  | N/A          | --              | 3/15/2015  | 1 Year        |
| 9.   | 3 Phase Power Line Filter      | JIANLI          | DL-4X100B  | N/A          | --              | 3/15/2015  | 1 Year        |
| 10.  | DC Power Filter                | JIANLI          | DL-2X50B   | N/A          | --              | 3/15/2015  | 1 Year        |
| 11.  | Cable                          | Schwarzbeck     | PLF-100    | 549489       | 9KHz-3GHz       | 3/15/2015  | 1 Year        |
| 12.  | Cable                          | Rosenberger     | CIL02      | A0783566     | 9KHz-3GHz       | 3/15/2015  | 1 Year        |
| 13.  | Cable                          | Rosenberger     | RG 233/U   | 525178       | 9KHz-3GHz       | 3/15/2015  | 1 Year        |
| 14.  | Signal Analyzer                | Rohde & Schwarz | FSV30      | 103040       | 9KHz-40GHz      | 12/29/2014 | 1 Year        |
| 15.  | Horn Antenna                   | Schwarzbeck     | BBHA9120D  | 9120D-1272   | 1GHz-18GHz      | 12/29/2014 | 1 Year        |
| 16.  | Horn Antenna                   | Schwarzbeck     | BBHA 9170  | BBHA9170399  | 14GHz -26.5GHz  | 12/29/2014 | 1 Year        |
| 17.  | Power Amplifier                | LUNAR EM        | LNA1G18-40 | J10100000081 | 1GHz-26.5GHz    | 12/29/2014 | 1 Year        |
| 18.  | Cable                          | H+S             | CBL-26     | N/A          | 1GHz-26.5GHz    | 12/29/2014 | 1 Year        |
| 19.  | Cable                          | H+S             | CBL-26     | N/A          | 1GHz-26.5GHz    | 12/29/2014 | 1 Year        |
| 20.  | Cable                          | H+S             | CBL-26     | N/A          | 1GHz-26.5GHz    | 12/29/2014 | 1 Year        |

#### 6.4 Radiated Emission Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

| Frequencies<br>(MHz) | Field Strength<br>(micorvolts/meter) | Measurement Distance<br>(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                                |

#### Restricted bands of operation

| MHz                        | MHz                   | MHz             | GHz              |
|----------------------------|-----------------------|-----------------|------------------|
| 0.090 - 0.110              | 16.42 - 16.423        | 399.9 - 410     | 4.5 - 5.15       |
| <sup>1</sup> 0.495 - 0.505 | 16.69475 - 16.69525   | 608 - 614       | 5.35 - 5.46      |
| 2.1735 - 2.1905            | 16.80425 - 16.80475   | 960 - 1240      | 7.25 - 7.75      |
| 4.125 - 4.128              | 25.5 - 25.67          | 1300 - 1427     | 8.025 - 8.5      |
| 4.17725 - 4.17775          | 37.5 - 38.25          | 1435 - 1626.5   | 9.0 - 9.2        |
| 4.20725 - 4.20775          | 73 - 74.6             | 1645.5 - 1646.5 | 9.3 - 9.5        |
| 6.215 - 6.218              | 74.8 - 75.2           | 1660 - 1710     | 10.6 - 12.7      |
| 6.26775 - 6.26825          | 108 - 121.94          | 1718.8 - 1722.2 | 13.25 - 13.4     |
| 6.31175 - 6.31225          | 123 - 138             | 2200 - 2300     | 14.47 - 14.5     |
| 8.291 - 8.294              | 149.9 - 150.05        | 2310 - 2390     | 15.35 - 16.2     |
| 8.362 - 8.366              | 156.52475 - 156.52525 | 2483.5 - 2500   | 17.7 - 21.4      |
| 8.37625 - 8.38675          | 156.7 - 156.9         | 2690 - 2900     | 22.01 - 23.12    |
| 8.41425 - 8.41475          | 162.0125 - 167.17     | 3260 - 3267     | 23.6 - 24.0      |
| 12.29 - 12.293             | 167.72 - 173.2        | 3332 - 3339     | 31.2 - 31.8      |
| 12.51975 - 12.52025        | 240 - 285             | 3345.8 - 3358   | 36.43 - 36.5     |
| 12.57675 - 12.57725        | 322 - 335.4           | 3600 - 4400     | ( <sup>2</sup> ) |

Remark 1. Emission level in dBuV/m=20 log (uV/m)

- :
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
  3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

## 6.5 Measurement Result

### Below 30MHz:

All the modulation modes were tested the data of the test mode are recorded in the following pages.

|                    |            |               |                    |
|--------------------|------------|---------------|--------------------|
| Operation Mode:    | TX Mode    | Test Date :   | September 14, 2015 |
| Frequency Range:   | 9KHz~30MHz | Temperature : | 28°C               |
| Test Result:       | PASS       | Humidity :    | 60 %               |
| Measured Distance: | 3m         | Test By:      | WOLF               |

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission Level<br>(dBuV/m) | Limit 3m<br>(dBuV/m) | Over<br>(dB) |
|----------------|-----------------|----------------------------|----------------------|--------------|
| --             | --              | --                         | --                   | --           |

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

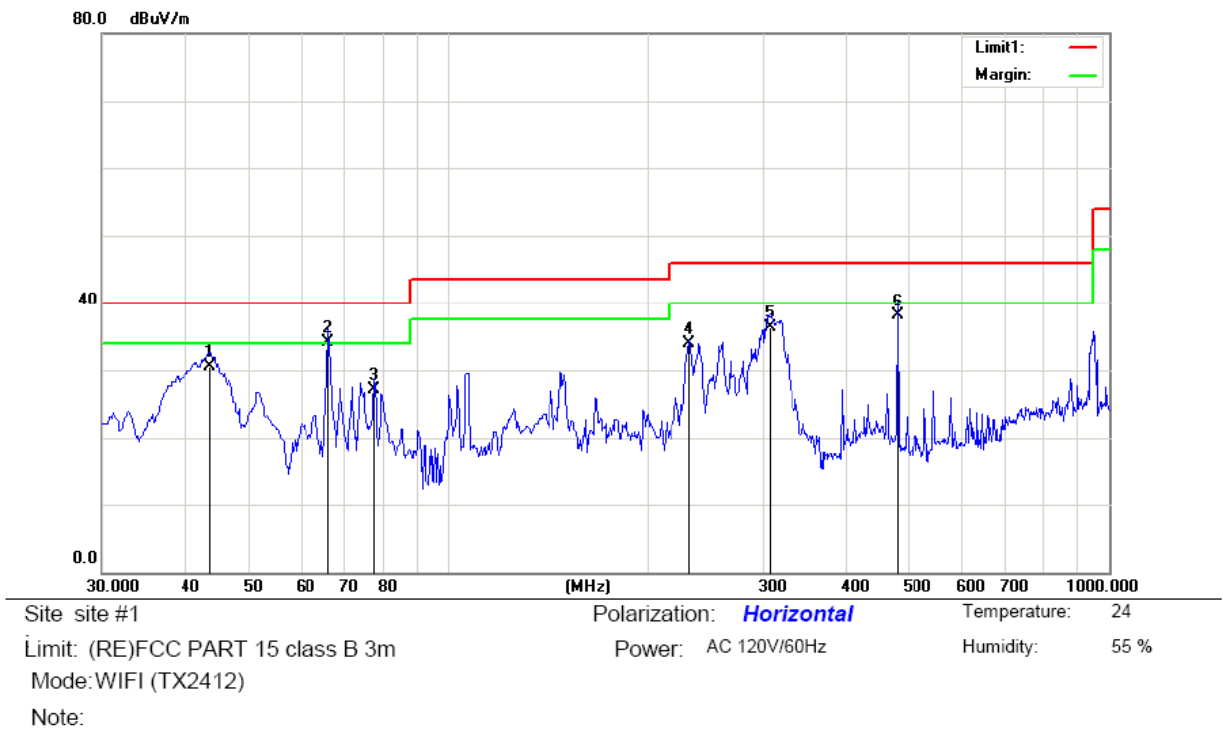
Distance extrapolation factor =  $40\log(\text{Specific distance} / \text{test distance})$  (dB);

Limit line = Specific limits(dBuV) + distance extrapolation factor.

### Below 1000MHz:

All the modulation modes were tested the data of the worst mode (TX 802.11b) are recorded in the following pages and the others modulation methods do not exceed the limits.

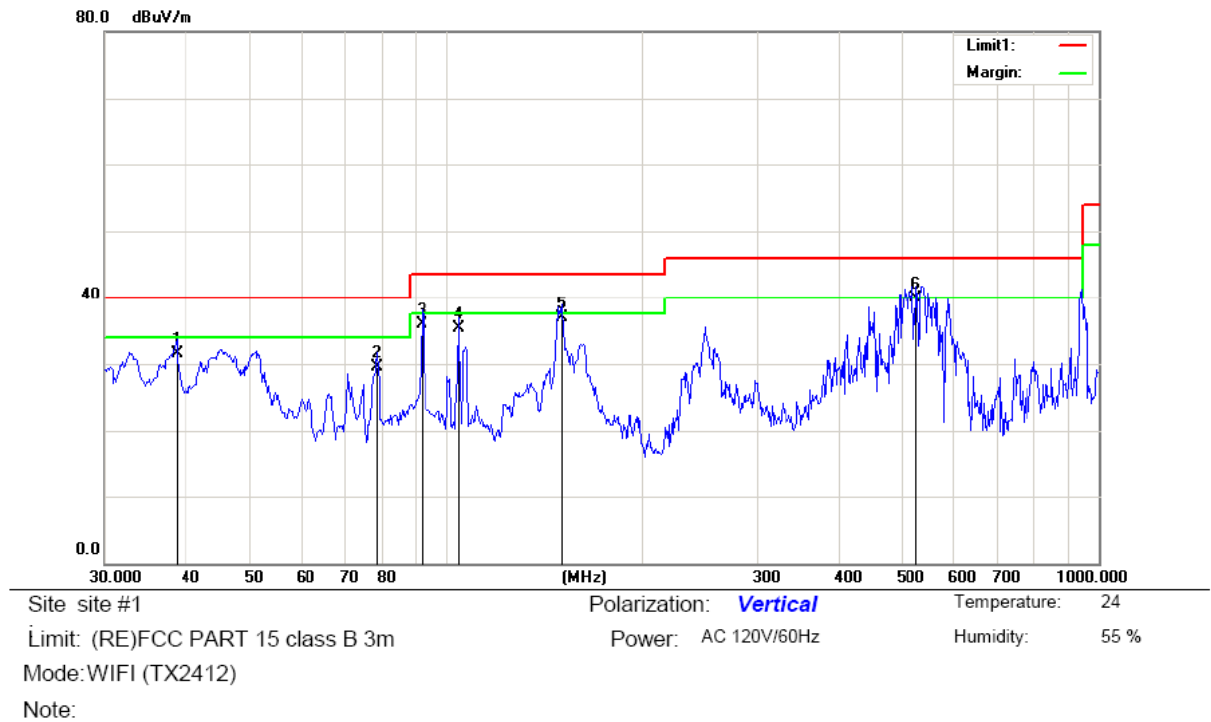
Please refer to the following test plots:



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 43.6584  | 43.84         | -13.36         | 30.48       | 40.00  | -9.52  | QP             | 0            |         |
| 2   | *   | 65.8900  | 55.17         | -21.07         | 34.10       | 40.00  | -5.90  | QP             | 0            |         |
| 3   |     | 77.5300  | 49.67         | -22.60         | 27.07       | 40.00  | -12.93 | QP             | 0            |         |
| 4   |     | 231.7600 | 49.78         | -15.93         | 33.85       | 46.00  | -12.15 | QP             | 0            |         |
| 5   |     | 307.4200 | 50.24         | -13.85         | 36.39       | 46.00  | -9.61  | QP             | 0            |         |
| 6   |     | 480.0800 | 48.57         | -10.54         | 38.03       | 46.00  | -7.97  | QP             | 0            |         |

\*:Maximum data x:Over limit l:over margin

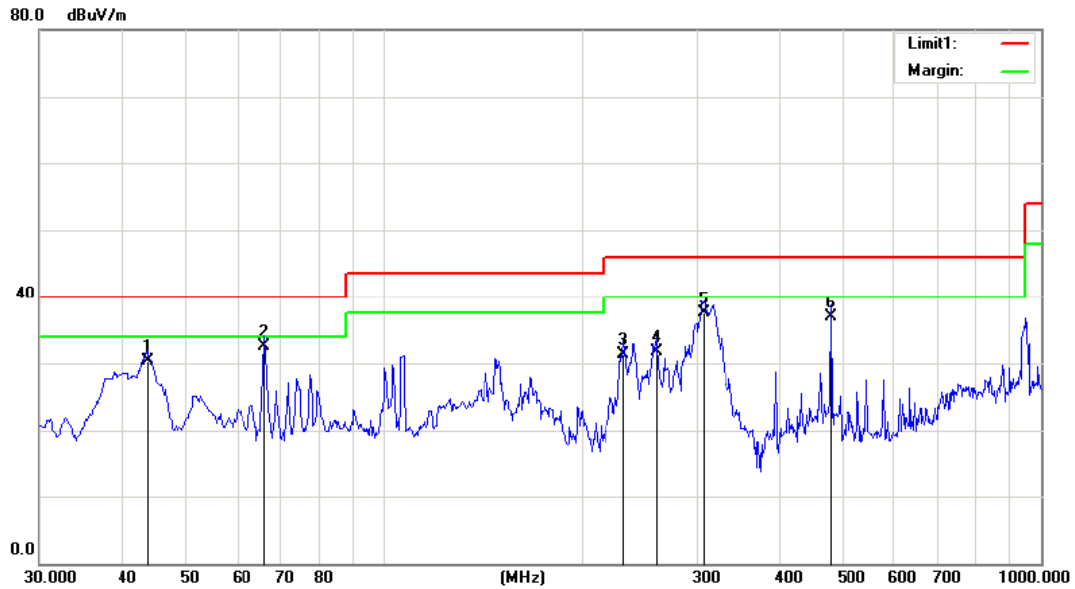
Operator:



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m       | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 38.7300  | 45.34         | -13.77         | 31.57        | 40.00  | -8.43  | QP             | 0            |         |
| 2   |     | 78.5000  | 52.14         | -22.55         | 29.59        | 40.00  | -10.41 | QP             | 0            |         |
| 3   |     | 92.0800  | 56.34         | -20.52         | 35.82        | 43.50  | -7.68  | QP             | 0            |         |
| 4   |     | 104.6900 | 53.48         | -18.26         | 35.22        | 43.50  | -8.28  | QP             | 0            |         |
| 5   |     | 150.5377 | 54.71         | -17.79         | 36.92        | 43.50  | -6.58  | QP             | 0            |         |
| 6   | *   | 526.6400 | 49.67         | -9.86          | 39.81        | 46.00  | -6.19  | QP             | 0            |         |

\*:Maximum data x:Over limit !:over margin

Operator:



Site site #1

Polarization: **Horizontal**

Temperature: 24

Limit: (RE)FCC PART 15 class B 3m

Power: DC 19V

Humidity: 55 %

Mode: WIFI (TX2412)

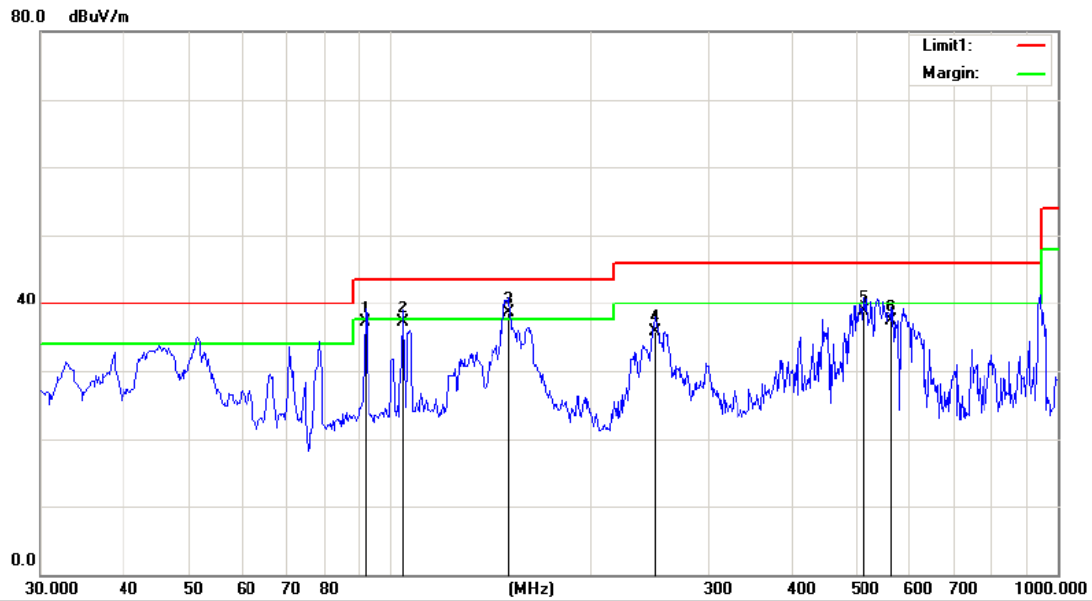
Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|---------|
| 1   |     | 43.8120      | 43.58                    | -13.35                  | 30.23                      | 40.00           | -9.77      | QP                      | 0               |         |
| 2   | *   | 65.8900      | 53.64                    | -21.07                  | 32.57                      | 40.00           | -7.43      | QP                      | 0               |         |
| 3   |     | 231.7600     | 47.25                    | -15.93                  | 31.32                      | 46.00           | -14.68     | QP                      | 0               |         |
| 4   |     | 260.8600     | 47.14                    | -15.38                  | 31.76                      | 46.00           | -14.24     | QP                      | 0               |         |
| 5   |     | 307.4200     | 51.45                    | -13.85                  | 37.60                      | 46.00           | -8.40      | QP                      | 0               |         |
| 6   |     | 480.0800     | 47.47                    | -10.54                  | 36.93                      | 46.00           | -9.07      | QP                      | 0               |         |

\*:Maximum data x:Over limit l:over margin

Operator:





Site site #1

Polarization: **Vertical**

Temperature: 24

Limit: (RE)FCC PART 15 class B 3m

Power: DC 19V

Humidity: 55 %

Mode:WIFI (TX2412)

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m       | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 92.0800  | 57.58         | -20.52         | 37.06        | 43.50  | -6.44  | QP             | 0            |         |
| 2   |     | 104.6900 | 55.41         | -18.26         | 37.15        | 43.50  | -6.35  | QP             | 0            |         |
| 3   | *   | 150.5377 | 56.35         | -17.79         | 38.56        | 43.50  | -4.94  | QP             | 0            |         |
| 4   |     | 250.1900 | 51.24         | -15.48         | 35.76        | 46.00  | -10.24 | QP             | 0            |         |
| 5   |     | 515.0000 | 48.78         | -10.08         | 38.70        | 46.00  | -7.30  | QP             | 0            |         |
| 6   |     | 566.4100 | 46.34         | -8.99          | 37.35        | 46.00  | -8.65  | QP             | 0            |         |

\*:Maximum data x:Over limit !:over margin

Operator:

### Above 1000MHz:

Operation Mode: 802.11b Lowest Test Date : September 14, 2015

| Freq.<br>(MHz) | Ant. Pol.<br>H/V | Emission Level(dBuV/m) |       | Limit 3m(dBuV/m) |    | Over(dB) |        |
|----------------|------------------|------------------------|-------|------------------|----|----------|--------|
|                |                  | PK                     | AV    | PK               | AV | PK       | AV     |
| 4824           | V                | 64.19                  | 45.12 | 74               | 54 | -9.81    | -8.88  |
| 7236           | V                | 63.48                  | 44.78 | 74               | 54 | -10.52   | -9.22  |
| 9648           | V                | 62.39                  | 43.29 | 74               | 54 | -11.61   | -10.71 |
| 12060          | V                | 61.49                  | 42.58 | 74               | 54 | -12.51   | -11.42 |
| 14472          | V                | 60.58                  | 41.31 | 74               | 54 | -13.42   | -12.69 |
| 16884          | V                | 59.67                  | 40.67 | 74               | 54 | -14.33   | -13.33 |
| 4824           | H                | 65.24                  | 45.06 | 74               | 54 | -8.76    | -8.94  |
| 7236           | H                | 64.38                  | 44.21 | 74               | 54 | -9.62    | -9.79  |
| 9648           | H                | 63.21                  | 43.87 | 74               | 54 | -10.79   | -10.13 |
| 12060          | H                | 62.38                  | 42.29 | 74               | 54 | -11.62   | -11.71 |
| 14472          | H                | 61.98                  | 41.37 | 74               | 54 | -12.02   | -12.63 |
| 16884          | H                | 60.39                  | 40.39 | 74               | 54 | -13.61   | -13.61 |

Operation Mode: 802.11b Middle Test Date : September 14, 2015

| Freq.<br>(MHz) | Ant. Pol.<br>H/V | Emission Level(dBuV/m) |       | Limit 3m(dBuV/m) |    | Over(dB) |        |
|----------------|------------------|------------------------|-------|------------------|----|----------|--------|
|                |                  | PK                     | AV    | PK               | AV | PK       | AV     |
| 4874           | V                | 64.26                  | 45.81 | 74               | 54 | -9.74    | -8.19  |
| 7311           | V                | 63.45                  | 44.58 | 74               | 54 | -10.55   | -9.42  |
| 9688           | V                | 62.68                  | 43.63 | 74               | 54 | -11.32   | -10.37 |
| 12185          | V                | 61.37                  | 42.65 | 74               | 54 | -12.63   | -11.35 |
| 14622          | V                | 60.54                  | 41.49 | 74               | 54 | -13.46   | -12.51 |
| 17059          | V                | 59.86                  | 40.28 | 74               | 54 | -14.14   | -13.72 |
| 4874           | H                | 65.36                  | 46.77 | 74               | 54 | -8.64    | -7.23  |
| 7311           | H                | 64.78                  | 45.69 | 74               | 54 | -9.22    | -8.31  |
| 9688           | H                | 63.59                  | 44.87 | 74               | 54 | -10.41   | -9.13  |
| 12185          | H                | 62.58                  | 43.19 | 74               | 54 | -11.42   | -10.81 |
| 14622          | H                | 61.98                  | 42.98 | 74               | 54 | -12.02   | -11.02 |
| 17059          | H                | 60.79                  | 41.79 | 74               | 54 | -13.21   | -12.21 |

Operation Mode: 802.11b Highest

Test Date : September 14, 2015

| Freq.<br>(MHz) | Ant. Pol.<br>H/V | Emission Level(dBuV/m) |       | Limit 3m(dBuV/m) |    | Over(dB) |        |
|----------------|------------------|------------------------|-------|------------------|----|----------|--------|
|                |                  | PK                     | AV    | PK               | AV | PK       | AV     |
| 4924           | V                | 63.55                  | 45.29 | 74               | 54 | -10.45   | -8.71  |
| 7386           | V                | 62.45                  | 44.38 | 74               | 54 | -11.55   | -9.62  |
| 9848           | V                | 61.49                  | 43.15 | 74               | 54 | -12.51   | -10.85 |
| 12310          | V                | 60.37                  | 42.58 | 74               | 54 | -13.63   | -11.42 |
| 14772          | V                | 59.68                  | 41.68 | 74               | 54 | -14.32   | -12.32 |
| 17234          | V                | 58.67                  | 40.29 | 74               | 54 | -15.33   | -13.71 |
| 4924           | H                | 66.93                  | 44.41 | 74               | 54 | -7.07    | -9.59  |
| 7386           | H                | 65.39                  | 43.57 | 74               | 54 | -8.61    | -10.43 |
| 9848           | H                | 64.38                  | 42.67 | 74               | 54 | -9.62    | -11.33 |
| 12310          | H                | 63.19                  | 41.79 | 74               | 54 | -10.81   | -12.21 |
| 14772          | H                | 62.54                  | 40.49 | 74               | 54 | -11.46   | -13.51 |
| 17234          | H                | 61.95                  | 39.78 | 74               | 54 | -12.05   | -14.22 |

**All emissions not reported were more than 20dB below the specified limit or in the noise floor.**

- Note:**
- (1) All Readings are Peak Value and AV.
  - (2) Emission Level= Reading Level+Probe Factor +Cable Loss.
  - (3) Data of measurement within this frequency range shown “ – ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

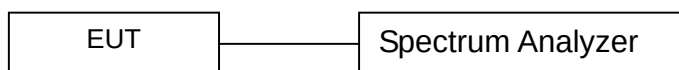
## 7. 6dB Bandwidth Test

### 7.1 Measurement Procedure

The EUT was operating in IEEE 802.11b, 802.11g, 802.11n(H20), 802.11n(H40) mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

1. Set resolution bandwidth (RBW) = 100 kHz.
2. Set the video bandwidth (VBW) = 300 kHz
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequency) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### 7.2 Test SET-UP (Block Diagram of Configuration)



### 7.3 Measurement Equipment Used

| EQUIPMENT TYPE    | MFR     | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|---------|--------------|---------------|------------|------------|
| Spectrum Analyzer | Agilent | FSV30        | 1321.3008K    | 05/16/2015 | 05/15/2016 |

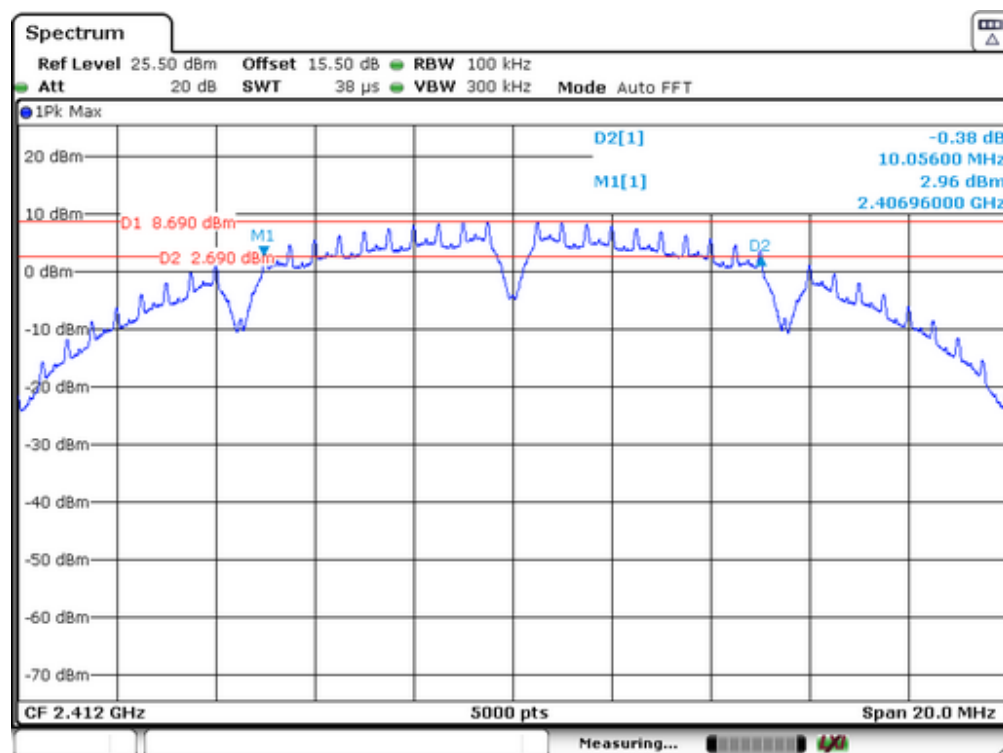
### 7.4 Measurement Results

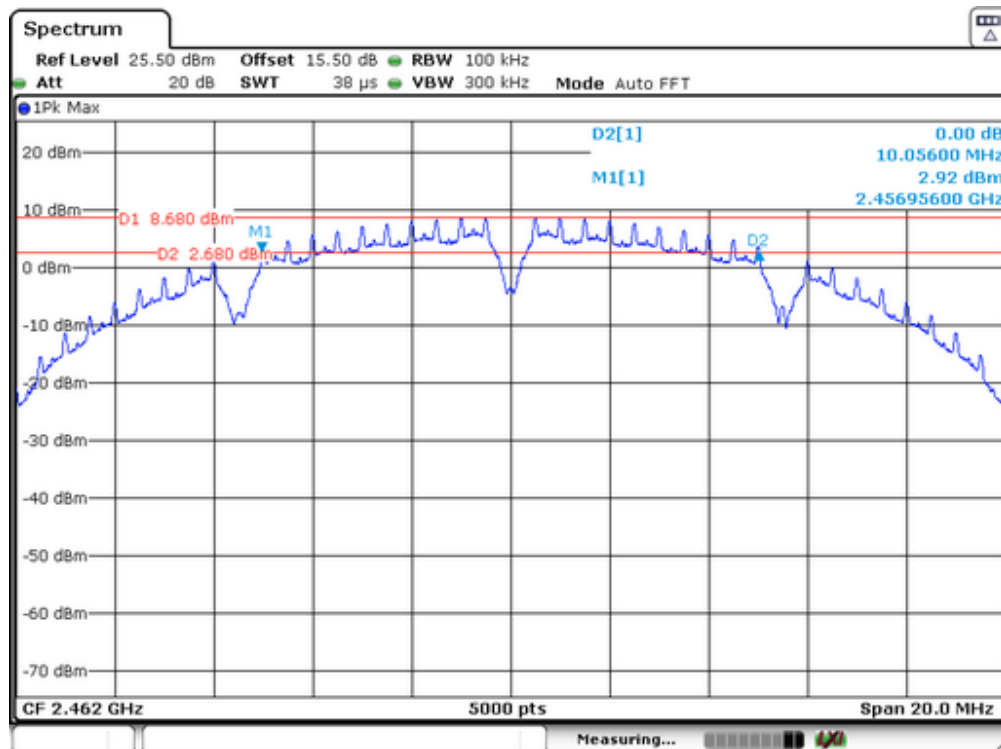
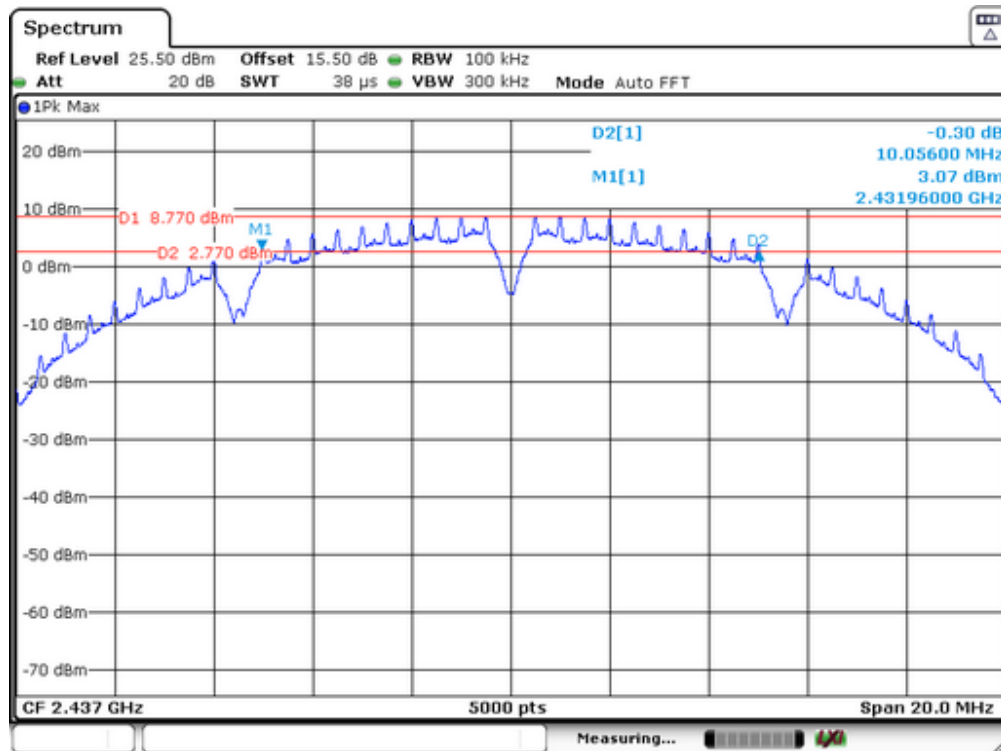
6 Bandwidth Test Data Chart:

Refer to attached data chart.

|                    |         |               |                    |
|--------------------|---------|---------------|--------------------|
| Spectrum Detector: | PK      | Test Date :   | September 14, 2015 |
| Test By:           | Andy    | Temperature : | 28°C               |
| Test Mode:         | 802.11b | Humidity :    | 60%                |

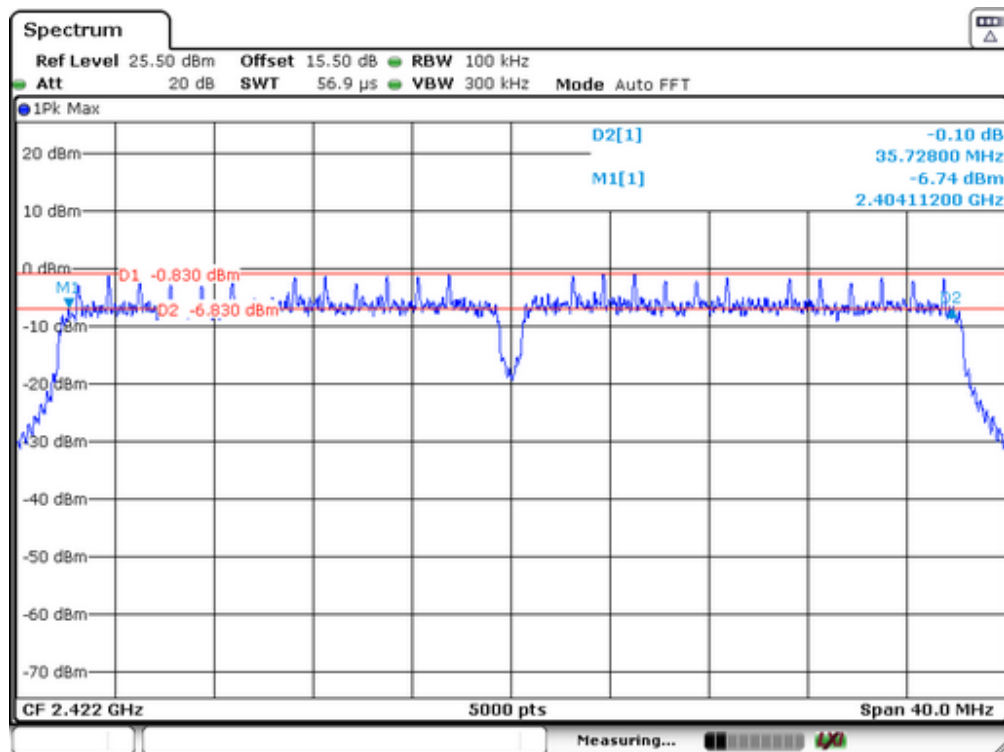
| Channel frequency (MHz) | Measurement level (KHz) | Required Limit (KHz) | Result |
|-------------------------|-------------------------|----------------------|--------|
| 2412                    | 10056                   | >500                 | Pass   |
| 2437                    | 10056                   | >500                 |        |
| 2462                    | 10056                   | >500                 |        |

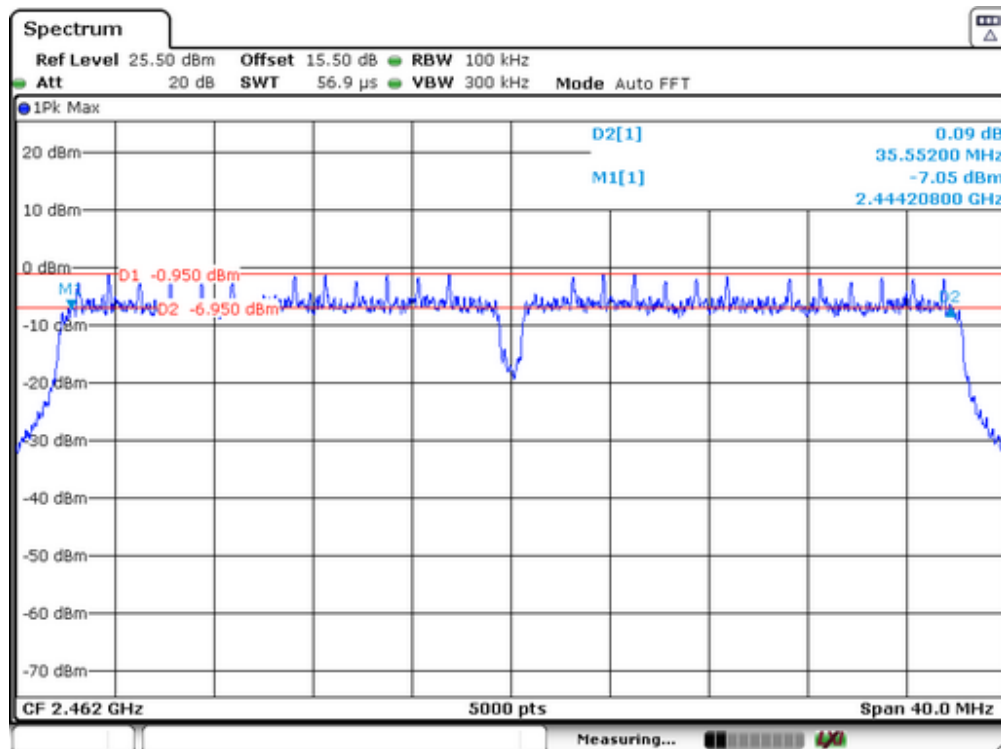
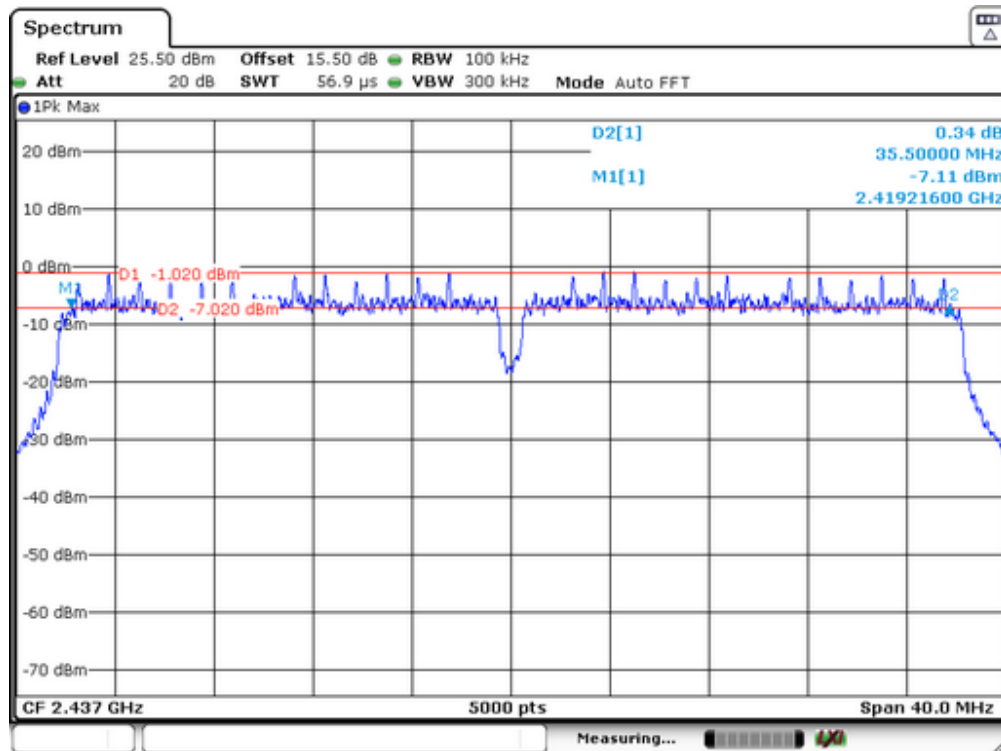




Spectrum Detector: PK      Test Date : September 14, 2015  
 Test By: Andy      Temperature : 28°C  
 Test Mode: 802.11n(HT40)      Humidity : 60%

| Channel frequency (MHz) | Measurement level (KHz) | Required Limit (KHz) | Result |
|-------------------------|-------------------------|----------------------|--------|
| 2422                    | 35728                   | >500                 | Pass   |
| 2437                    | 35500                   | >500                 |        |
| 2452                    | 35552                   | >500                 |        |







## 8. Maximum Peak Output Power Test

### 8.1 Measurement Procedure

The maximum peak conducted output power can be measured using a broadband peak RF power meter. The power meter must have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast, average-responding diode type sensor.

- The Transmitter output (antenna port) was connected to the power meter.
- Turn on the EUT and power meter and then record the peak power value.
- Repeat above procedures on all channels needed to be tested.

### 8.2 Test SET-UP (Block Diagram of Configuration)



### 8.3 Measurement Equipment Used

| EQUIPMENT TYPE | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|----------------|--------------|---------------|------------|------------|
| Power meter    | ML2495A      | 0824006       | 05/16/2015 | 05/15/2016 |
| Power sensor   | MA2411B      | 0738172       | 05/16/2015 | 05/15/2016 |

### 8.4 Peak Power output limit

The maximum peak power shall be less 1Watt.

### 8.5 Measurement Results

|                    |      |               |                    |
|--------------------|------|---------------|--------------------|
| Spectrum Detector: | PK   | Test Date :   | September 14, 2015 |
| Test By:           | Jack | Temperature : | 28°C               |
| Test Result:       | PASS | Humidity :    | 60%                |

| Test Channel | Max Output Power (dBm) |               | Limit(dBm) | Result |
|--------------|------------------------|---------------|------------|--------|
|              | 802.11b                | 802.11n(HT40) |            |        |
| Lowest       | 10.26                  | 7.05          | 30         | Pass   |
| Middle       | 11.42                  | 8.43          |            |        |
| Highest      | 12.69                  | 9.26          |            |        |

## 9. Band Edge Test

### 9.1 Measurement Procedure

#### For Conducted Test

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r03.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. Measure and record the results in the test report.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

#### For Radiated emission Test

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r03.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Repeat above procedures until all frequency measured were complete.

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz.

| EMI Test Receiver | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 1MHz     |
| VB                | 3MHz     |
| Detector          | Peak     |
| Trace             | Max hold |

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 10Hz.

| EMI Test Receiver | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 1MHz     |
| VB                | 10Hz     |
| Detector          | Peak     |
| Trace             | Max hold |

## 9.2 Test SET-UP (Block Diagram of Configuration)

As 6.2 Test set up (B) and (C)

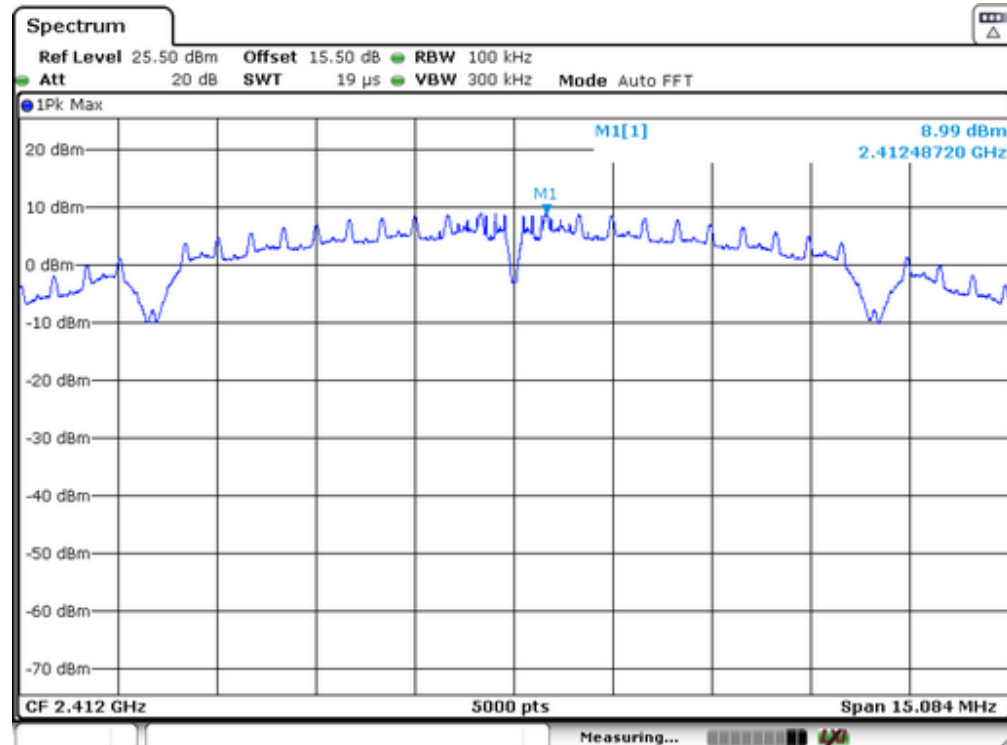
## 9.3 Measurement Equipment Used

Same as 6.3 Radiated Emission Measurement.

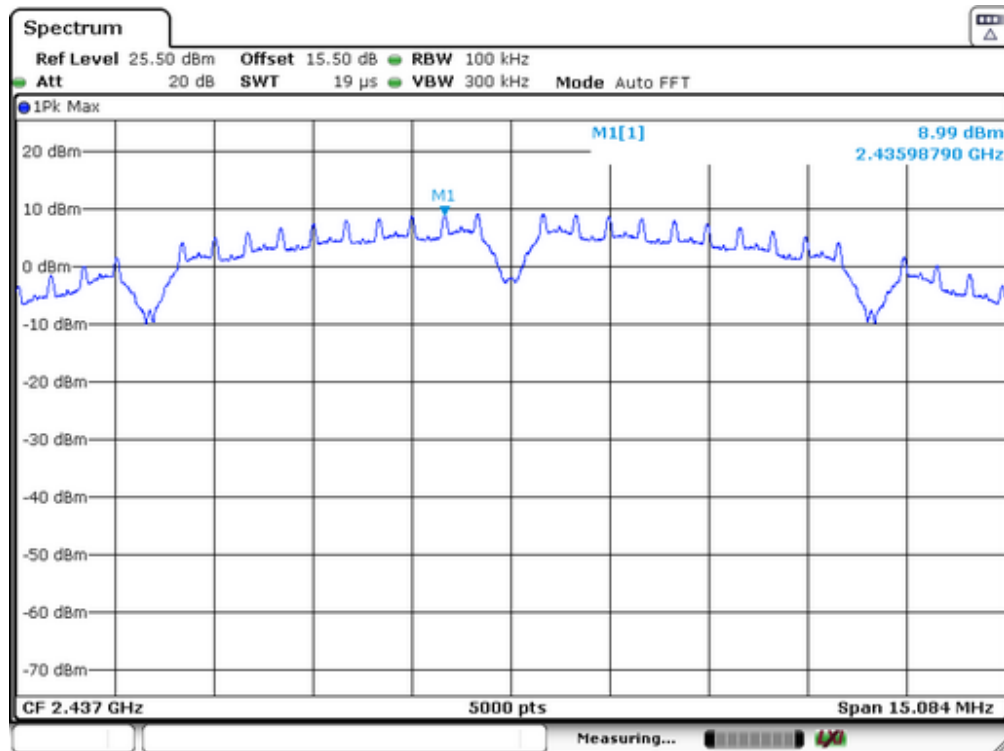
## 9.4 Measurement Results

### 1. Conducted Test

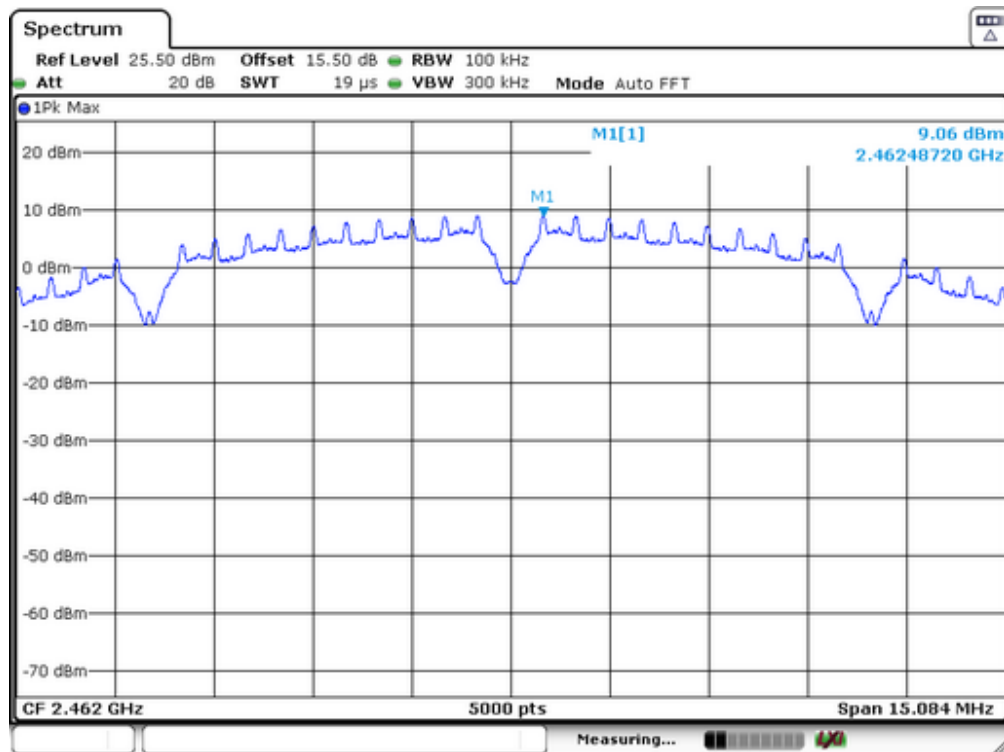
Test Mode: 802.11b



Lowest Channel

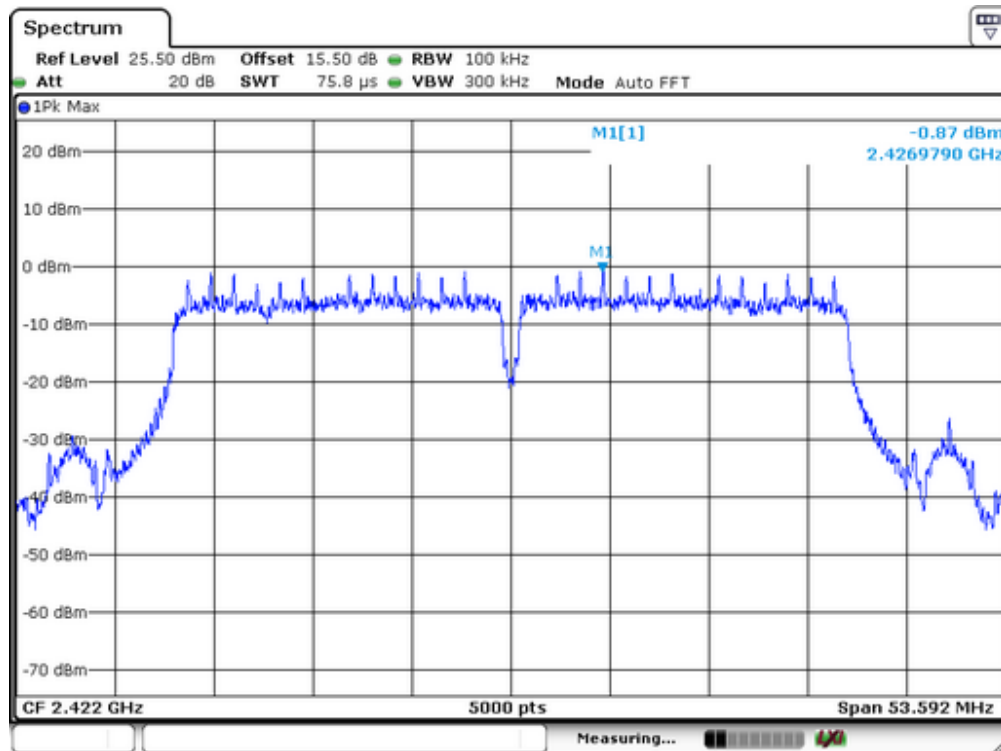


Middle Channel

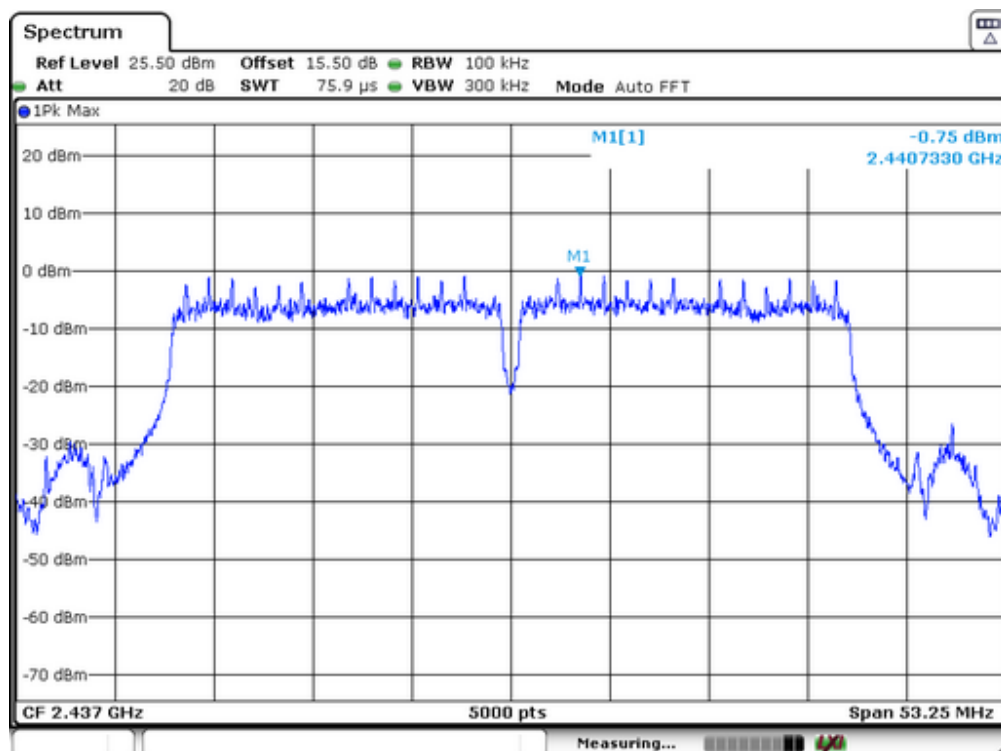


Highest Channel

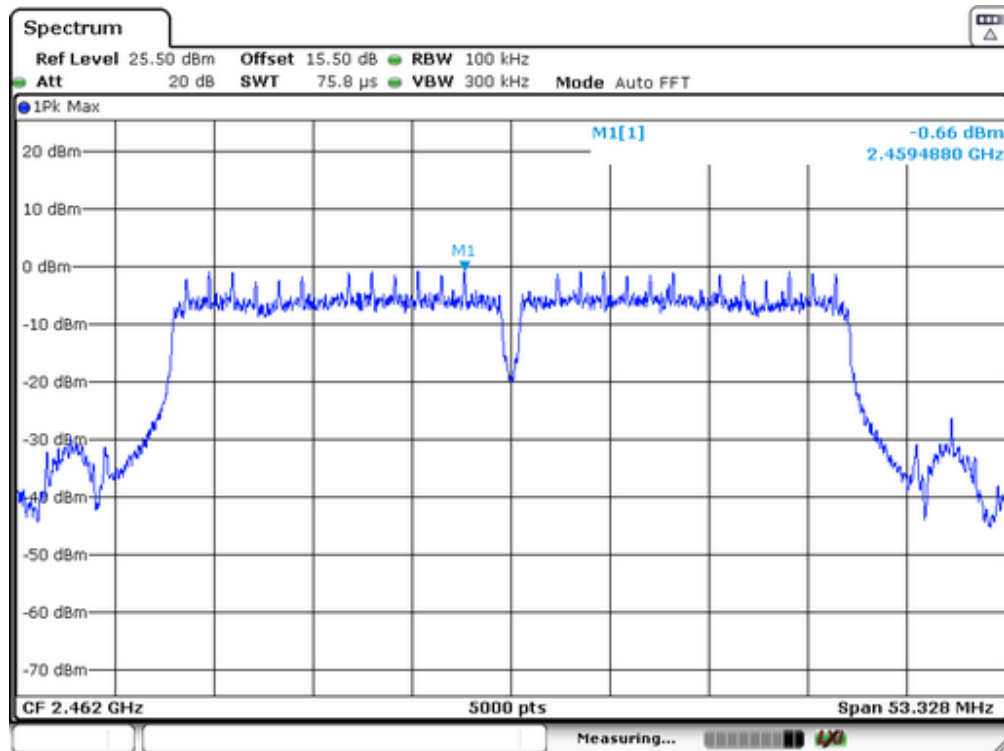
Test Mode: 802.11n(HT40)



Lowest Channel

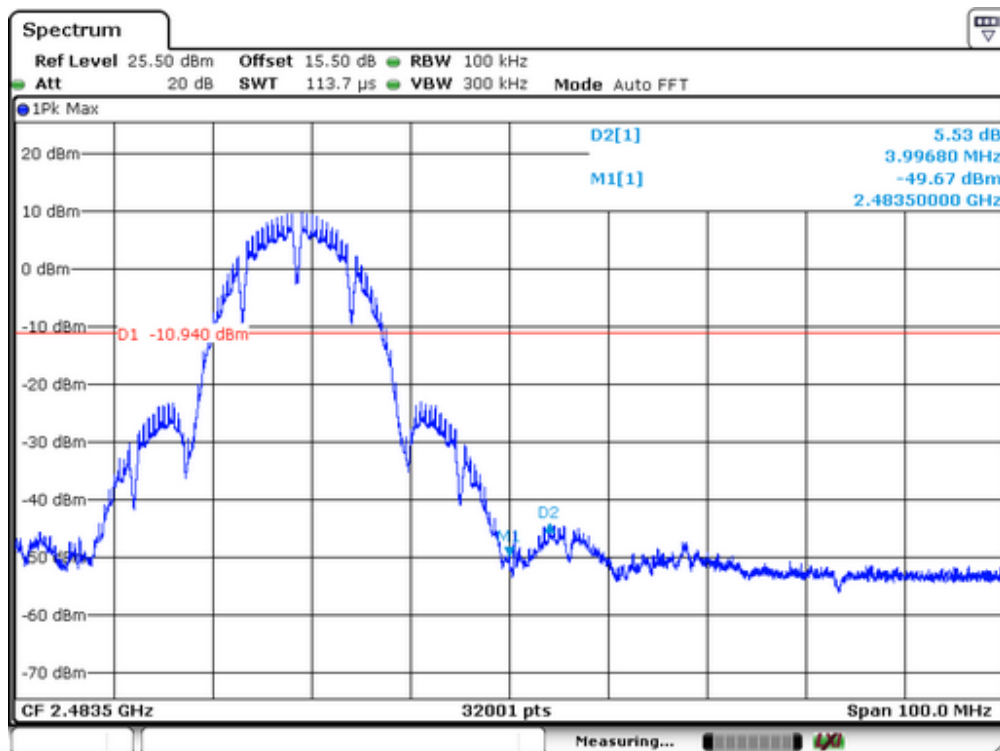
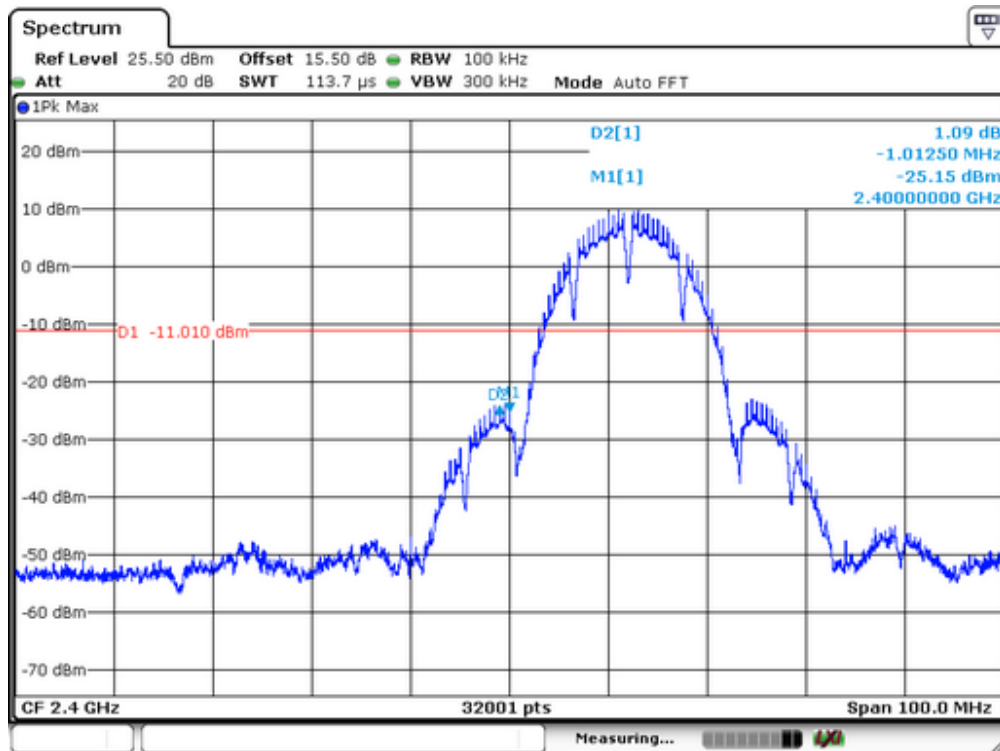


Middle Channel

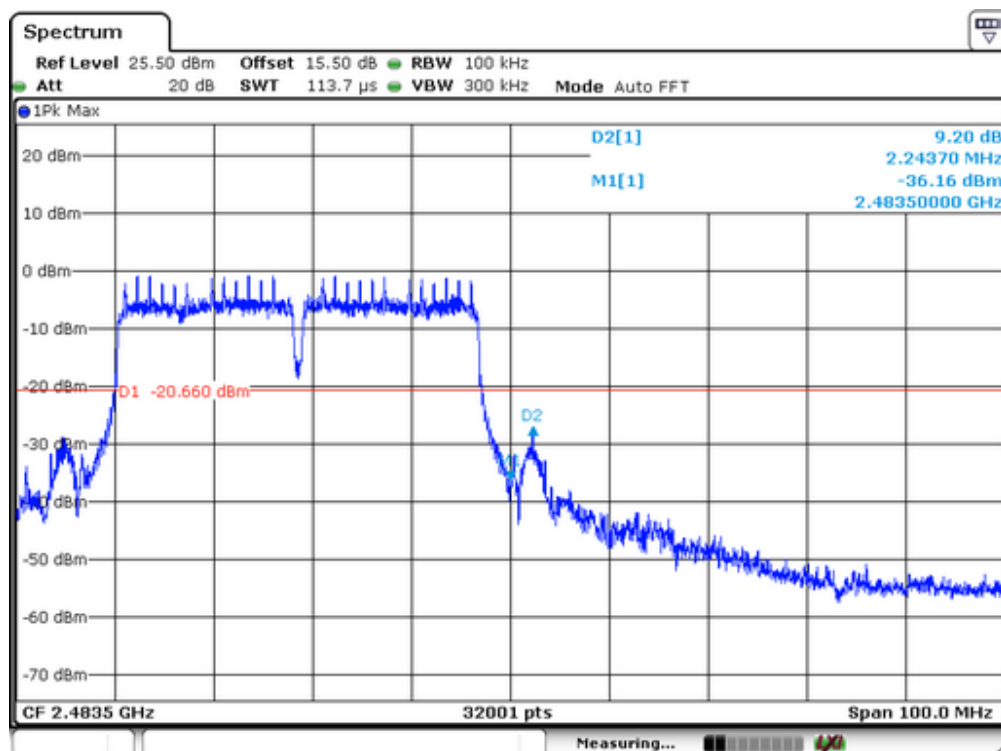
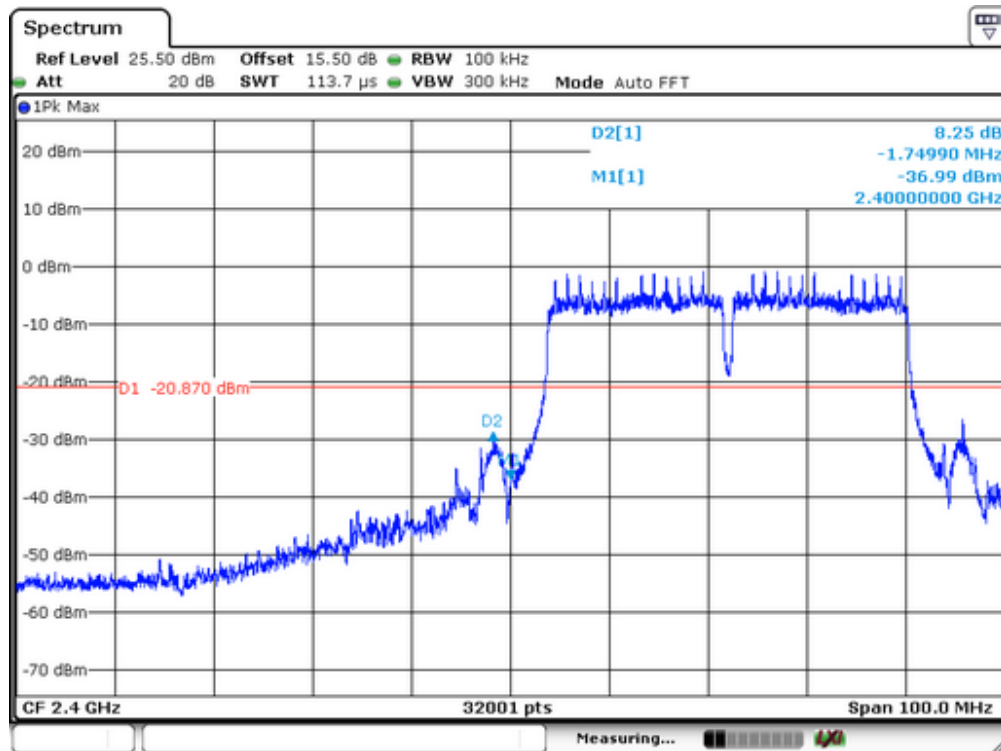


Highest Channel

Test mode: 802.11b



Test mode: 802.11n(HT40)





## 2. Radiated emission Test

Spectrum Detector: PK/AV      Test Date : September 14, 2015  
 Test By: Andy      Temperature : 28 °C  
 Test mode: 802.11b      Humidity : 65 %

| IEEE 802.11b    |                      |                   |       |                          |    |             |        |
|-----------------|----------------------|-------------------|-------|--------------------------|----|-------------|--------|
| Frequency (MHz) | Antenna polarization | Emission (dBuV/m) |       | Band edge Limit (dBuV/m) |    | Margin (dB) |        |
|                 | (H/V)                | PK                | AV    | PK                       | AV | PK          | AV     |
| <2400           | H                    | 62.48             | 45.52 | 74                       | 54 | -11.52      | -8.48  |
| <2400           | V                    | 58.3              | 40.15 | 74                       | 54 | -15.7       | -13.85 |
| >2483.5         | H                    | 63.04             | 44.36 | 74                       | 54 | -10.96      | -9.64  |
| >2483.5         | V                    | 60.59             | 39.25 | 74                       | 54 | -13.41      | -14.75 |

Spectrum Detector: PK/AV      Test Date : September 14, 2015  
 Test By: Andy      Temperature : 28 °C  
 Test mode: 802.11n(HT40)      Humidity : 65 %

| IEEE 802.11n(HT40) |                      |                   |       |                          |    |             |        |
|--------------------|----------------------|-------------------|-------|--------------------------|----|-------------|--------|
| Frequency (MHz)    | Antenna polarization | Emission (dBuV/m) |       | Band edge Limit (dBuV/m) |    | Margin (dB) |        |
|                    | (H/V)                | PK                | AV    | PK                       | AV | PK          | AV     |
| <2400              | H                    | 63.26             | 44.01 | 74                       | 54 | -10.74      | -9.99  |
| <2400              | V                    | 60.25             | 40.36 | 74                       | 54 | -13.75      | -13.64 |
| >2483.5            | H                    | 64.15             | 45.26 | 74                       | 54 | -9.85       | -8.74  |
| >2483.5            | V                    | 59.35             | 38.75 | 74                       | 54 | -14.65      | -15.25 |

## 10. Power Density

### 10.1 Test Equipment

| EQUIPMENT TYPE    | MFR     | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|---------|--------------|---------------|------------|------------|
| Spectrum Analyzer | Agilent | FSV30        | 1321.3008K    | 05/16/2015 | 05/15/2016 |

### 10.2 Measuring Instruments and Setting

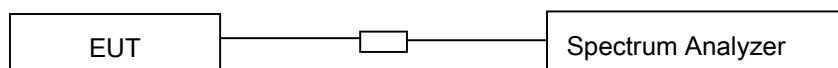
The following table is the setting of spectrum analyzer.

| Spectrum analyzer | Setting                                      |
|-------------------|----------------------------------------------|
| Attenuation       | Auto                                         |
| Span Frequency    | Set the span to 1.5 times the DTS bandwidth. |
| RB                | 100KHz                                       |
| VB                | 300KHz                                       |
| Detector          | Peak                                         |
| Trace             | Max hold                                     |
| Sweep Time        | Automatic                                    |

### 10.3 Test Procedures

- The transmitter output (antenna port) was connected to the spectrum analyzer.
- Set analyzer center frequency to DTS channel center frequency.
- Set the analyzer span to a minimum of 1.5 times the DTS bandwidth.
- Set the RBW=100KHz. Set the VBW=300KHz
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

### 10.4 Block Diagram of Test Setup



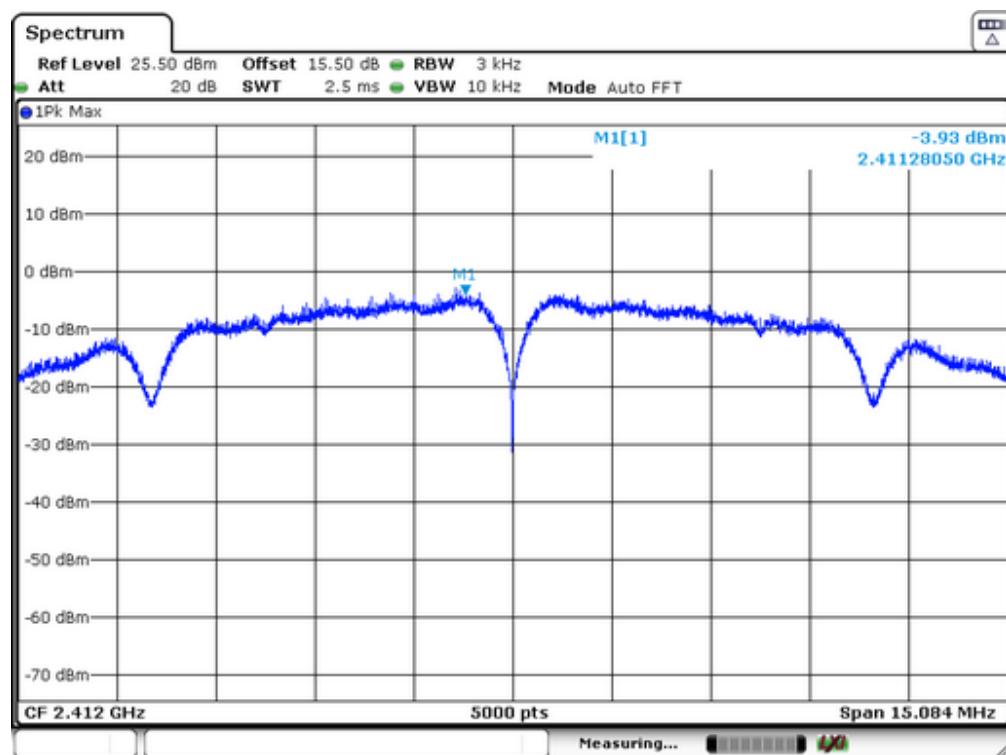
### 10.5 Limit

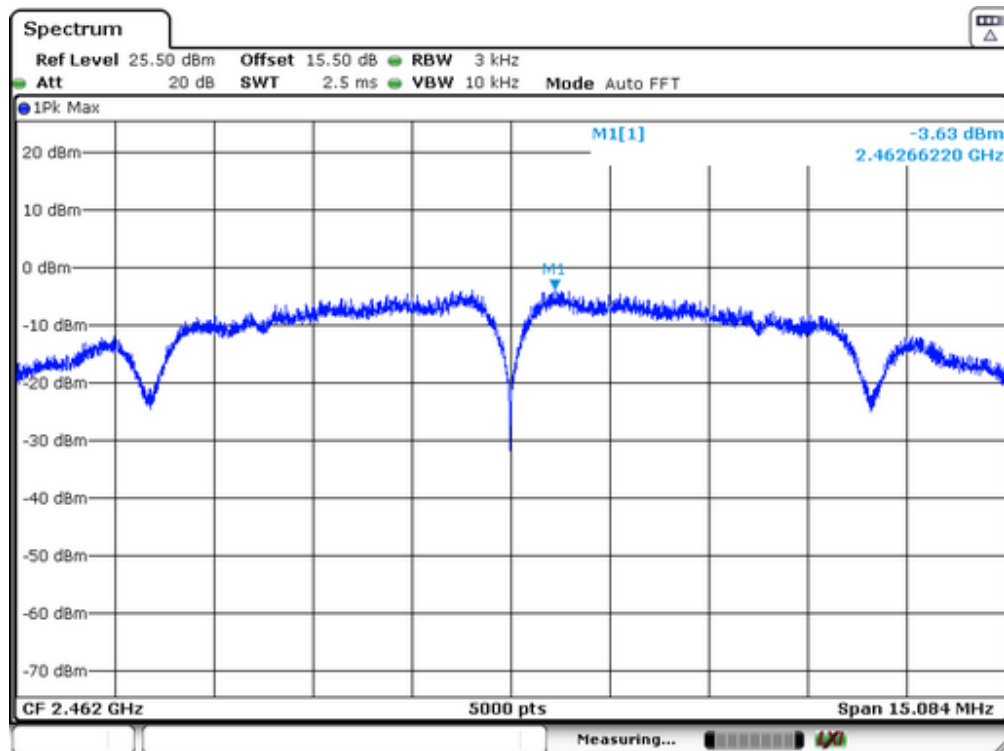
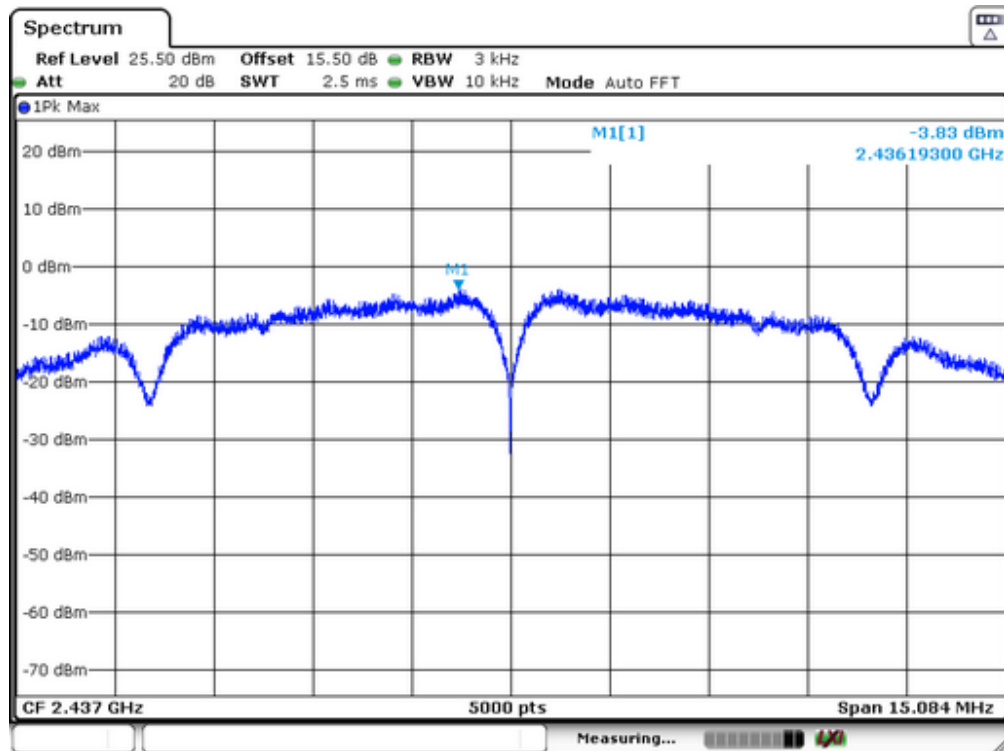
The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3 kHz bandwidth.

## 10.6 Test Result

|                    |         |               |                    |
|--------------------|---------|---------------|--------------------|
| Spectrum Detector: | PK      | Test Date :   | September 14, 2015 |
| Test By:           | Andy    | Temperature : | 28°C               |
| Test Mode:         | 802.11b | Humidity :    | 60%                |

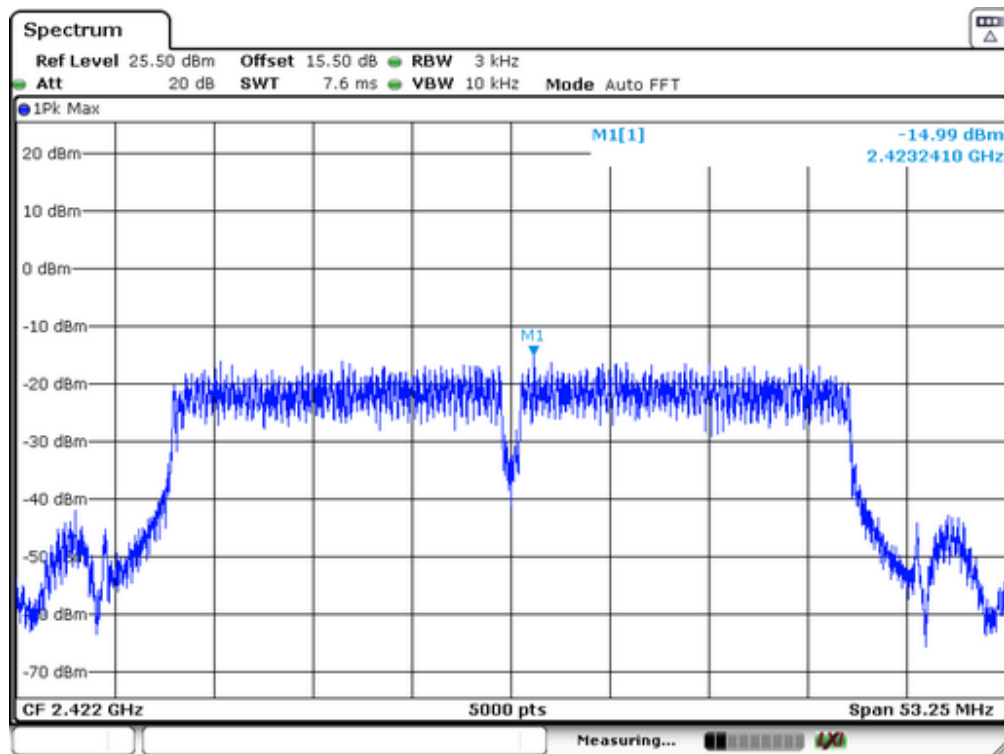
| Channel frequency (MHz) | Measurement level (dBm/3KHz) | Limit(dBm/3KHz) | Result |
|-------------------------|------------------------------|-----------------|--------|
| 2412                    | -3.93                        | 8               | Pass   |
| 2437                    | -3.83                        |                 |        |
| 2462                    | -3.63                        |                 |        |

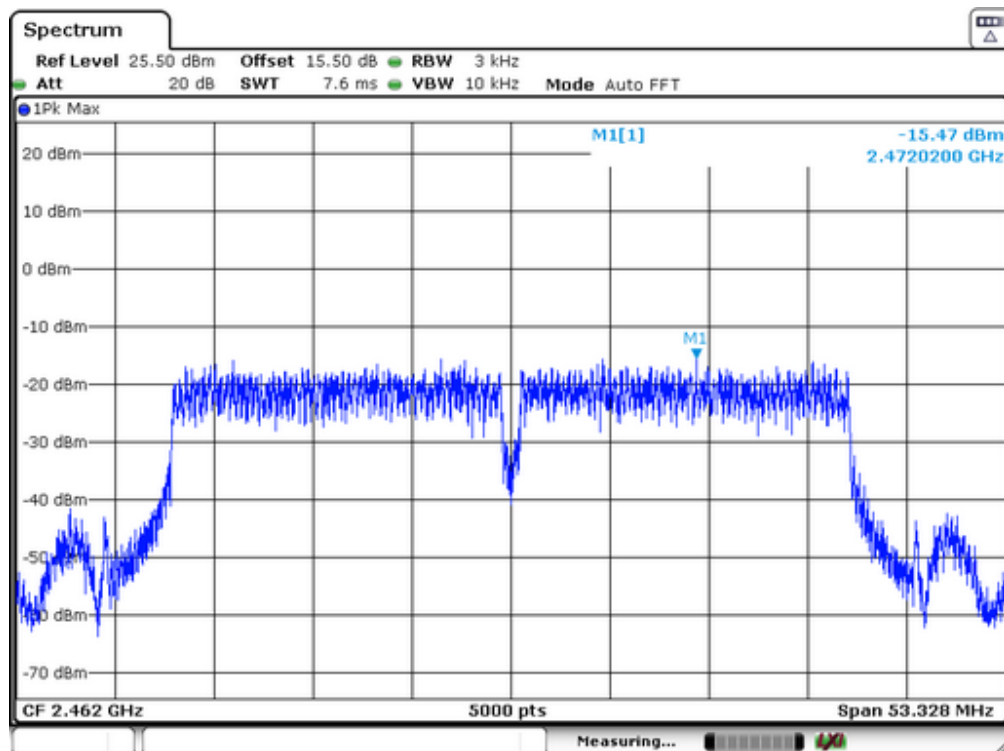
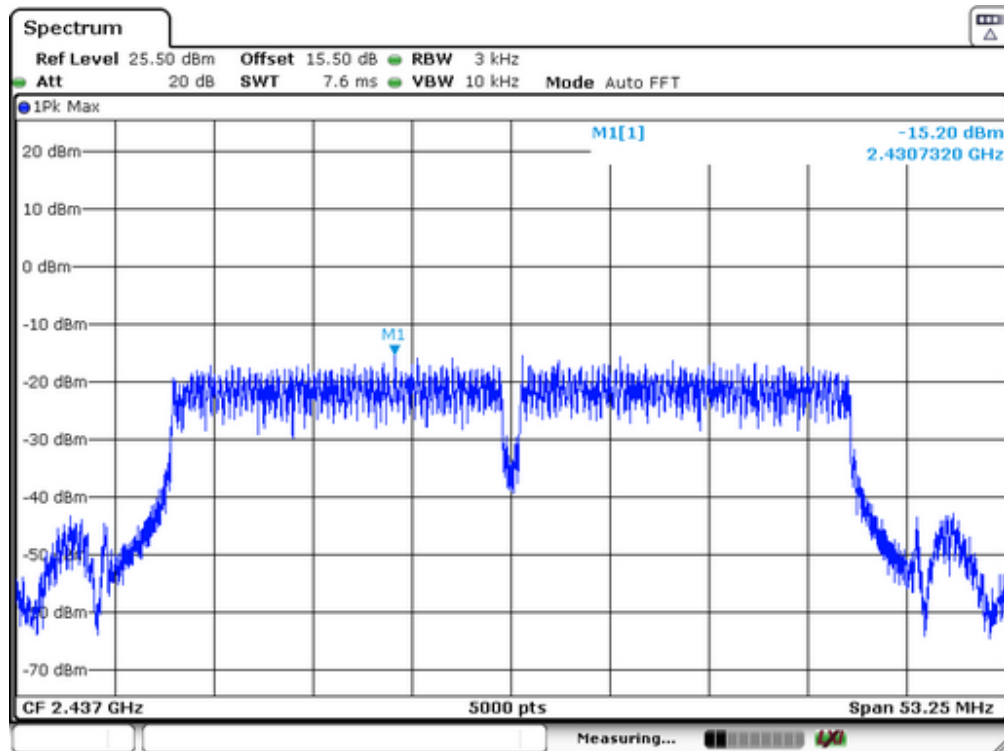




Spectrum Detector: PK      Test Date : September 14, 2015  
 Test By: Andy      Temperature : 28°C  
 Test Mode: 802.11n(H40)      Humidity : 60%

| Channel frequency (MHz) | Measurement level (dBm/3KHz) | Limit(dBm/3KHz) | Result |
|-------------------------|------------------------------|-----------------|--------|
| 2422                    | -14.99                       | 8               | Pass   |
| 2437                    | -15.20                       |                 |        |
| 2452                    | -15.47                       |                 |        |





## 11. Antenna Port Emission

### 11.1 Test Equipment

| EQUIPMENT TYPE    | MFR     | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|---------|--------------|---------------|------------|------------|
| Spectrum Analyzer | Agilent | FSV30        | 1321.3008K    | 05/16/2015 | 05/15/2016 |

### 11.2 Measuring Instruments and Setting

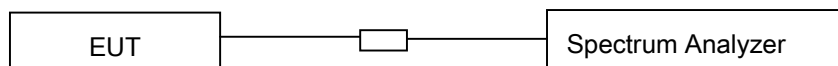
The following table is the setting of spectrum analyzer.

| Spectrum analyzer | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 100kHz   |
| VB                | 300kHz   |
| Detector          | Peak     |
| Trace             | Max hold |

### 11.3 Test Procedures

The conducted spurious emissions were measured conducted using a spectrum analyzer at low, Middle, and high channels, the limit was determined by attenuation 20dB of the RF peak power output.

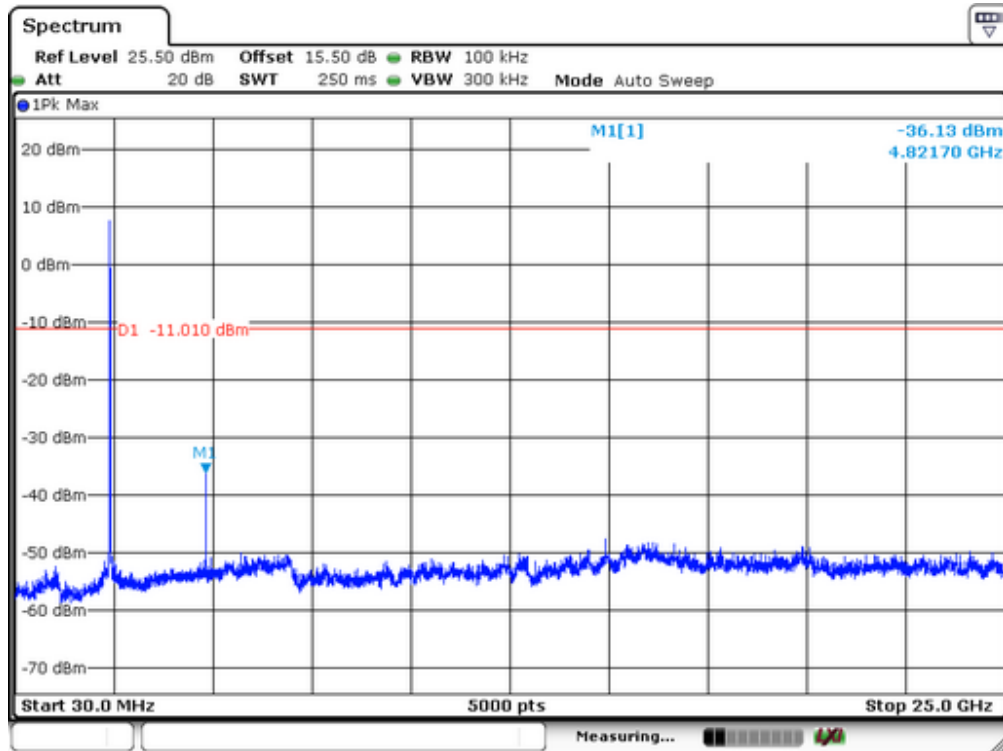
### 11.4 Block Diagram of Test setup



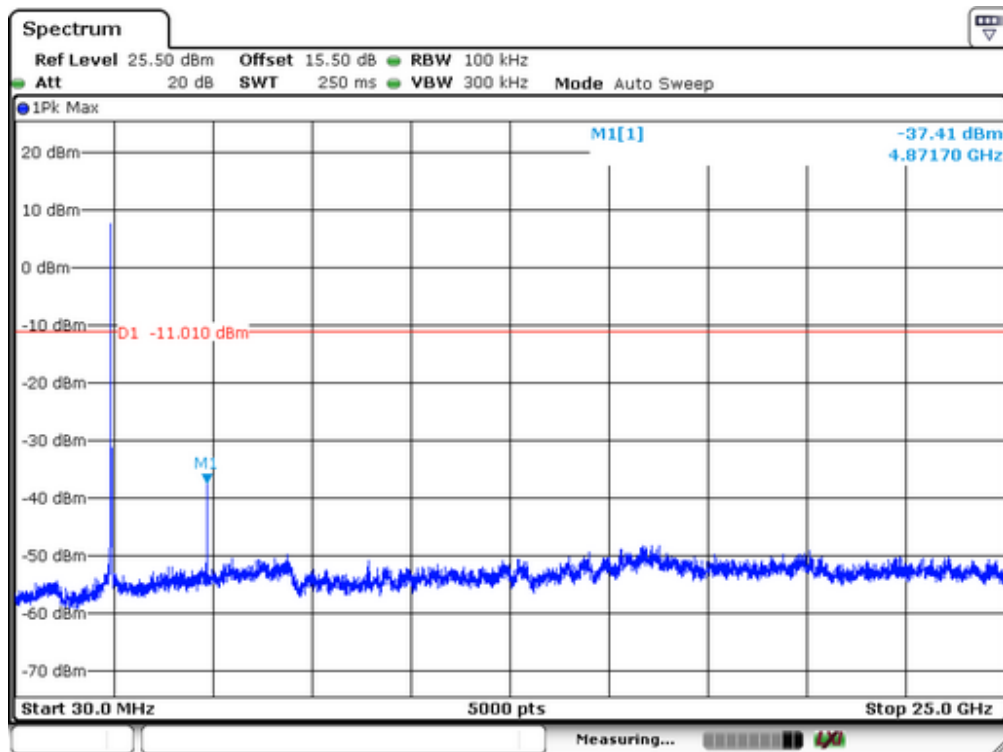
### 11.5 Test Result

**PASS.**

Test Mode: 802.11b

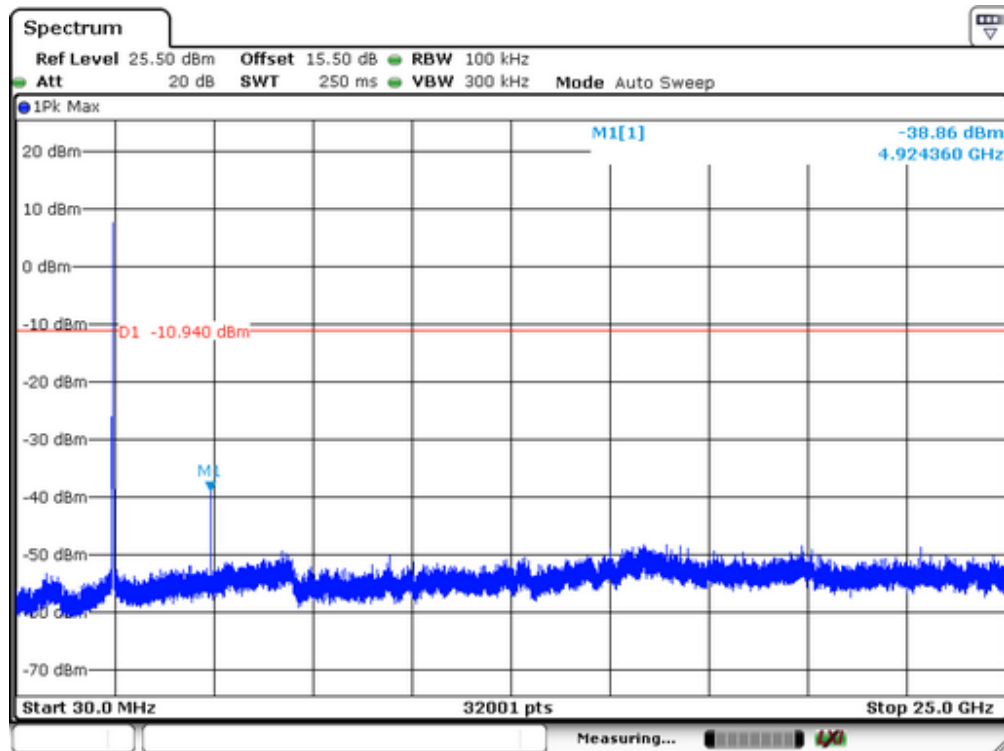


Lowest Channel



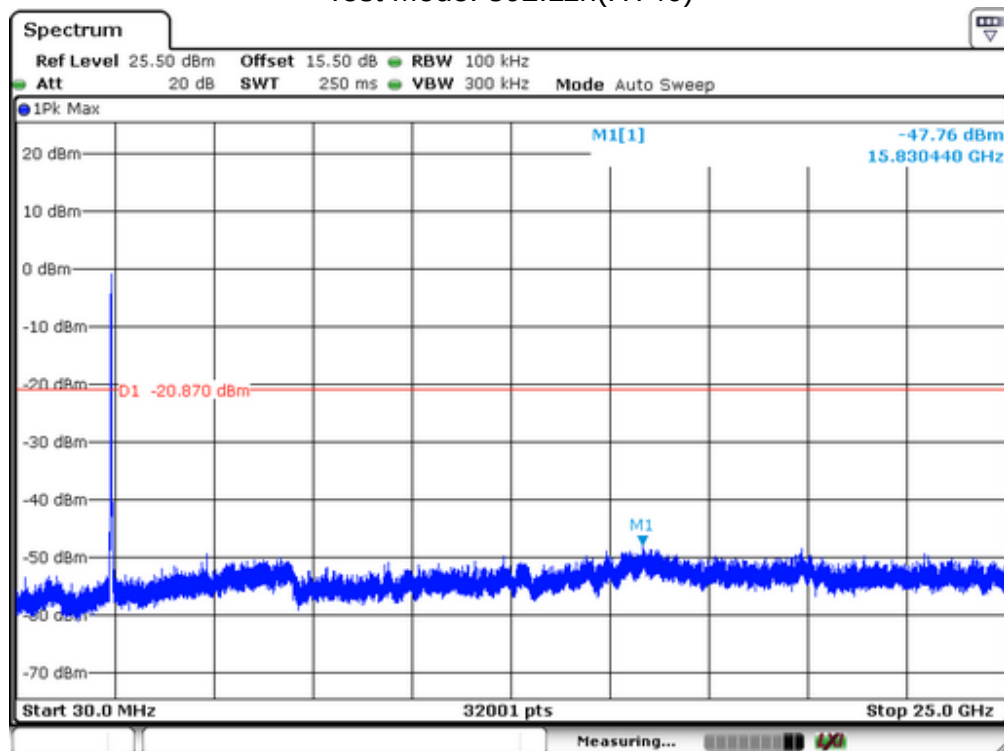
Middel Channel



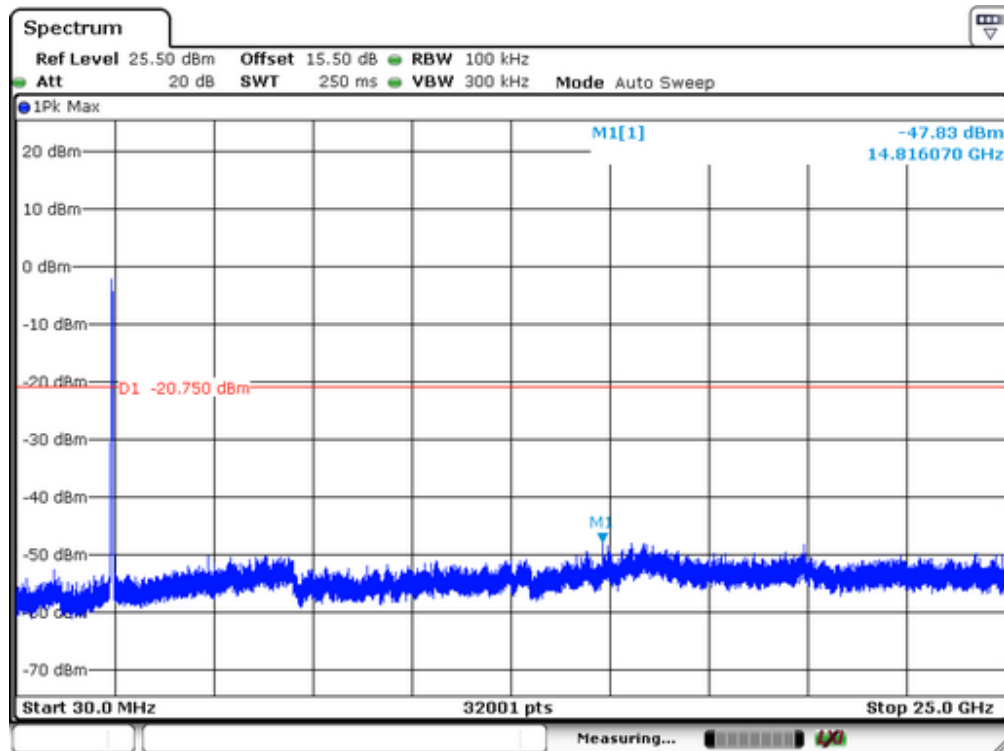


Highest Channel

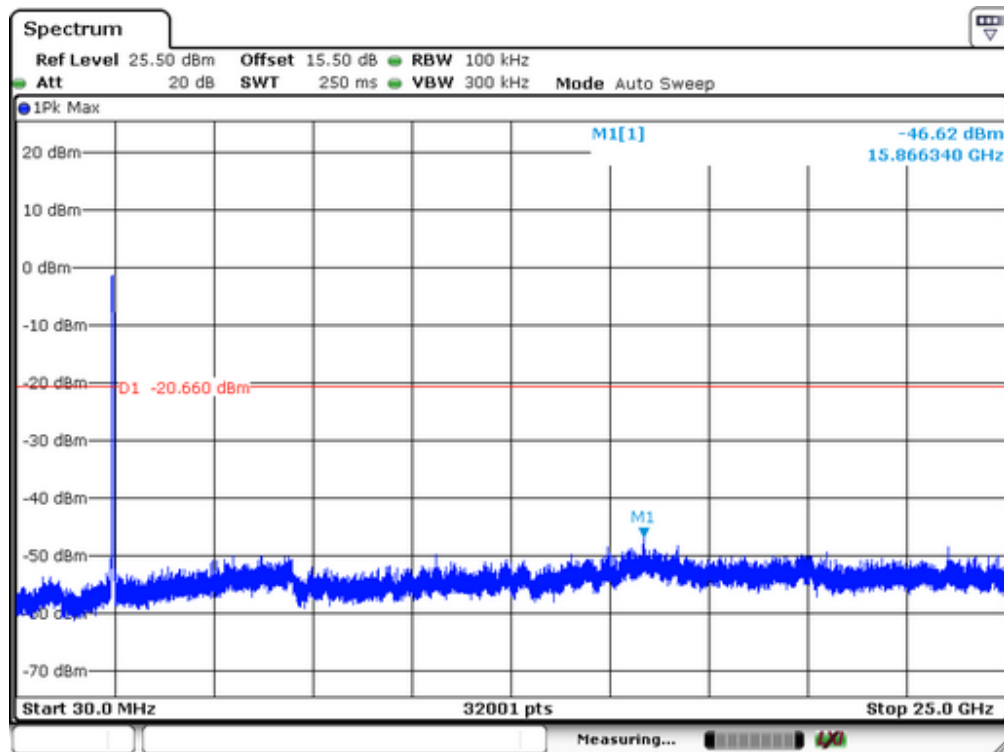
Test Mode: 802.11n(HT40)



Lowest Channel



Middle Channel



Highest Channel

## **12. Antenna Application**

### **12.1 Antenna Requirement**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **12.2 Result**

The EUT'S antenna, permanent attached antenna, is a chip antenna. The antenna's gain is 0.5 dBi and meets the requirement.

# APPENDIX I (PHOTOS OF EUT)



