



# **FCC 47 CFR PART 15 SUBPART C**

## **TEST REPORT**

*For*

**Applicant :** PC Partner limited

**Address :** 19/F, Shatin Galleria, 18-24 Shan Mei Street, Fo Tan, Shatin, N.T.,  
Hong Kong

**Product Name :** Mini PC

**Model Name :** ZBOX-PI320, ZBOX-PI321, ZBOX-PIzzz(z=A-Z or 0-9)

**Brand Name :** N/A

**FCC ID :** NPFZTWL4330-INT01

**Report No. :** MTE/SAL/F14111405

**Date of Issue :** Nov. 07, 2014

**Issued by :** Most Technology Service Co., Ltd.

**Address :** No.5, Langshan 2nd Rd., North Hi-Tech Industrial park, Nanshan,  
Shenzhen, Guangdong, China

**Tel :** 86-755-8617 0306

**Fax :** 86-755-8617 0310

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## 1. VERIFICATION OF CONFORMITY

**Equipment Under Test:** Mini PC  
**Brand Name:** N/A  
**Model Name:** ZBOX-PI320  
**Series Model Name:** ZBOX-PI321, ZBOX-PIzzz(z=A-Z or 0-9)  
**FCC ID:** NPFZTWL4330-INT01  
**Applicant:** PC Partner limited  
19/F, Shatin Galleria, 18-24 Shan Mei Street, Fo Tan, Shatin, N.T., Hong Kong  
**Manufacturer:** PC Partner limited  
19/F, Shatin Galleria, 18-24 Shan Mei Street, Fo Tan, Shatin, N.T., Hong Kong  
**Technical Standards:** 47 CFR Part 15 Subpart C  
**File Number:** MTE/SAL/F14111405  
**Date of test:** Nov. 03-06, 2014  
**Deviation:** None  
**Condition of Test Sample:** Normal  
**Test Result:** PASS

The above equipment was tested by *MOST* for compliance with the requirements set forth in FCC rules and the Technical Standards mentioned above. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment and the level of the immunity endurance of the equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

Tested by (+ signature):

  
\_\_\_\_\_  
Sophia Liu

Nov. 03, 2014

Review by (+ signature):

  
\_\_\_\_\_  
Henry Chen

Nov. 07, 2014

Approved by (+ signature):

  
\_\_\_\_\_  
Yvette Zhou(Manager)

Nov. 07, 2014



## 2. GENERAL INFORMATION

### 2.1 Product Information

|                               |                                                                                                                    |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Description:                  | Mini PC                                                                                                            |
| Model Name:                   | ZBOX-PI320                                                                                                         |
| Series Number:                | ZBOX-PI321, ZBOX-Plzzz(z=A-Z or 0-9)                                                                               |
| Model Difference description: | The identical in interior structure, electrical circuits, components and appearance, only different in model name. |
| Frequency Range:              | 802.11b/g/n(20MHz): 2412-2462MHz                                                                                   |
| Number of Channels:           | IEEE 802.11b/g/n(20MHz)mode:11 Channels                                                                            |
| Modulation Technique:         | IEEE 802.11b mode: DSSS<br>IEEE 802.11g mode: OFDM<br>802.11n Standard-20 MHz Channel mode: OFDM                   |
| Antenna Type:                 | PCB                                                                                                                |
| Antenna Gain:                 | -0.7dBi                                                                                                            |
| Power Supply:                 | DC 5V by Adapter Input AC 120V/60Hz                                                                                |
| Temperature Range:            | 0°C ~ +40°C                                                                                                        |

**NOTE:**

1. For a more detailed features description about the EUT, please refer to User's Manual.

## 2.2 Objective

Perform FCC Part 15 Subpart C tests for FCC Marking.

## 2.3 Test Standards and Results

Test items and the results are as bellow:

| No. | Section                       | Description                 | Result | Date of Test |
|-----|-------------------------------|-----------------------------|--------|--------------|
| 1   | 15.247(a)(2)                  | 6dB Bandwidth               | PASS   | 2014-11-04   |
| 2   | 15.247(b)(3)                  | Peak Output Power           | PASS   | 2014-11-04   |
| 3   | 15.247(d)                     | conducted spurious emission | N/A    | N/A          |
| 4   | 15.247(d)                     | Band Edge                   | PASS   | 2014-11-05   |
| 5   | 15.247(e)                     | Power Spectral Density      | PASS   | 2014-11-04   |
| 6   | 15.207                        | Conducted Emission          | PASS   | 2014-11-05   |
| 7   | 15.247(d)<br>15.205<br>15.209 | Radiated Emission           | PASS   | 2014-11-06   |

Note: 1. The test result judgment is decided by the limit of measurement standard  
2. The information of measurement uncertainty is available upon the customer's request.

## 2.4 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

## 2.5 MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

The report uncertainty of measurement  $y \pm U$ , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , Providing a level of confidence of approximately 95%

- Uncertainty of Conducted Emission,  $U_c = \pm 1.8\text{dB}$
- Uncertainty of Radiated Emission,  $U_c = \pm 3.2\text{dB}$

### 3. TEST FACILITY

|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Site:                            | Most Technology Service Co., Ltd.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Location:                             | No.5, Nangshan 2nd Rd., North Hi-Tech Industrial park, Nanshan, Shenzhen, Guangdong, China                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Description:                          | <p>There is one 3m semi-anechoic an area test sites and two line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4 and CISPR 16 requirements.</p> <p>The FCC Registration Number is <b>490827</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Site Filing:                          | The site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Instrument Tolerance:                 | All measuring equipment is in accord with ANSI C63.4 and CISPR 16 requirements that meet industry regulatory agency and accreditation agency requirement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Ground Plane:                         | Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna. It has no holes or gaps having longitudinal dimensions larger than one-tenth of a wavelength at the highest frequency of measurement up to 1GHz. |
| 558074 D01 DTS Meas Guidance v03r01 : | provides Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under CFR Title 47 15.247                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

### 3.2 Test Conditions

The EUT has been tested under normal operating (TX) and standby (RX) condition.

The field strength of radiation emission was measured in the following position: EUT lie-down position (Y axis), stand-up position (X, Z axis).

The following data show only with the worst case setup.

The worst case of X axis was reported.

Based on client request, all normal using modes of the normal function were tested but only the worst test data of the worst mode is reported by this report.

### 3.3 Channel List

| Channel List for 802.11b/g/n(20MHz) |                 |         |                 |         |                 |
|-------------------------------------|-----------------|---------|-----------------|---------|-----------------|
| Channel                             | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 01                                  | 2412MHz         | 05      | 2432MHz         | 09      | 2452MHz         |
| 02                                  | 2417MHz         | 06      | 2437MHz         | 10      | 2457MHz         |
| 03                                  | 2422MHz         | 07      | 2442MHz         | 11      | 2462MHz         |
| 04                                  | 2427MHz         | 08      | 2447MHz         |         |                 |

### 3.4 Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level, Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively

| Pre-test Mode | Description                  |
|---------------|------------------------------|
| Mode 1        | 802.11b CH01/CH06/CH11       |
| Mode 2        | 802.11g CH01/CH06/CH11       |
| Mode 3        | 802.11n(20MHz)CH01/CH06/CH11 |

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The measurements are performed at all bit rate of transmitter, the worst data was reported.

### 3.5 Table of Parameters of Text Software Setting

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level, the RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of WLAN

| Test software Version | Test Channels |         |         |
|-----------------------|---------------|---------|---------|
| 802.11b               | 2412MHz       | 2437MHz | 2462MHz |
| 802.11g               | 2412MHz       | 2437MHz | 2462MHz |
| 802.11n(20MHz)        | 2412MHz       | 2437MHz | 2462MHz |

#### 4. TEST EQUIPMENT LIST

**Instrumentation:** The following list contains equipment used at MOST for testing. The equipment conforms to the CISPR 16-1/ANSI C63.2 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 10 kHz to 1.0 GHz or above.

| No. | Equipment                            | Manufacturer      | Model No.      | S/N          | Calibration date | Calibration Interval |
|-----|--------------------------------------|-------------------|----------------|--------------|------------------|----------------------|
| 1   | Test Receiver                        | Rohde & Schwarz   | ESCI           | 100492       | 2014/03/10       | 1 Year               |
| 2   | Spectrum Analyzer                    | Agilent           | E7405A         | US44210471   | 2014/03/14       | 1 Year               |
| 3   | L.I.S.N.                             | Rohde & Schwarz   | ENV216         | 100093       | 2014/03/10       | 1 Year               |
| 4   | Coaxial Switch                       | Anritsu Corp      | MP59B          | 6200283933   | 2014/03/07       | 1 Year               |
| 5   | Terminator                           | Hubersuhner       | 50Ω            | No.1         | 2014/03/07       | 1 Year               |
| 6   | RF Cable                             | SchwarzBeck       | N/A            | No.1         | 2014/03/07       | 1 Year               |
| 7   | Test Receiver                        | Rohde & Schwarz   | ESPI           | 101202       | 2014/03/10       | 1 Year               |
| 8   | Bilog Antenna                        | Sunol             | JB3            | A121206      | 2014/03/14       | 1 Year               |
| 9   | Horn Antenna                         | SCHWARZBECK       | BBHA9120D      | 756          | 2014/03/14       | 1 Year               |
| 10  | Horn Antenna                         | Penn Engineering  | 9034           | 8376         | 2014/03/14       | 1 Year               |
| 11  | Cable                                | Resenberger       | N/A            | NO.1         | 2014/03/07       | 1 Year               |
| 12  | Cable                                | SchwarzBeck       | N/A            | NO.2         | 2014/03/07       | 1 Year               |
| 13  | Cable                                | SchwarzBeck       | N/A            | NO.3         | 2014/03/07       | 1 Year               |
| 14  | DC Power Filter                      | DuoJi             | DL2×30B        | N/A          | 2014/03/07       | 1 Year               |
| 15  | Single Phase Power Line Filter       | DuoJi             | FNF 202B30     | N/A          | 2014/03/07       | 1 Year               |
| 16  | 3 Phase Power Line Filter            | DuoJi             | FNF 402B30     | N/A          | 2014/03/07       | 1 Year               |
| 17  | Test Receiver                        | Rohde & Schwarz   | ESCI           | 100492       | 2014/03/10       | 1 Year               |
| 18  | Absorbing Clamp                      | Luthi             | MDS21          | 3635         | 2014/03/12       | 1 Year               |
| 19  | Coaxial Switch                       | Anritsu Corp      | MP59B          | 6200283933   | 2014/03/07       | 1 Year               |
| 20  | AC Power Source                      | Kikusui           | AC40MA         | LM003232     | 2014/03/10       | 1 Year               |
| 21  | Test Analyzer                        | Kikusui           | KHA1000        | LM003720     | 2014/03/10       | 1 Year               |
| 22  | Line Impedence Network               | Kikusui           | LIN40MA-PCR-L  | LM002352     | 2014/03/10       | 1 Year               |
| 23  | ESD Tester                           | Kikusui           | KES4021        | LM003537     | 2014/03/07       | 1 Year               |
| 24  | EMC PRO System                       | EM Test           | UCS-500-M4     | V0648102026  | 2014/03/10       | 1 Year               |
| 25  | Signal Generator                     | IFR               | 2032           | 203002/100   | 2014/03/10       | 1 Year               |
| 26  | Amplifier                            | A&R               | 150W1000       | 301584       | 2014/03/14       | 1 Year               |
| 27  | CDN                                  | FCC               | FCC-801-M2-25  | 47           | 2014/03/10       | 1 Year               |
| 28  | CDN                                  | FCC               | FCC-801-M3-25  | 107          | 2014/03/10       | 1 Year               |
| 29  | EM Injection Clamp                   | FCC               | F-203I-23mm    | 403          | 2014/03/10       | 1 Year               |
| 30  | RF Cable                             | MIYAZAKI          | N/A            | No.1/No.2    | 2014/03/10       | 1 Year               |
| 31  | Universal Radio Communication Tester | ROHDE&SCHWARZ     | CMU200         | 0304789      | 2014/03/10       | 1 Year               |
| 32  | Telecommunication Antenna            | European Antennas | PSA 75301R/170 | 0304213      | 2014/03/10       | 1 Year               |
| 33  | 8 Loop Antenna                       | ARA               | PLA-1030/B     | 1029         | 2014/02/19       | 1 Year               |
| 34  | Power Meter                          | R&S               | NRVS           | 100696       | 2014/07/06       | 1 Year               |
| 35  | Power Sensor(AV)                     | R&S               | URV5-Z4        | 0395.1619.05 | 2014/07/06       | 1 Year               |

**NOTE:** Equipments listed above have been calibrated and are in the period of validation.

## 5. 47 CFR Part 15 C 15.247 Requirements

### 5.1 6dB Bandwidth

#### 5.1.1 Definition

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

#### 5.1.2 Limit

| FCC Part15(15.247) |           |                                         |                      |        |
|--------------------|-----------|-----------------------------------------|----------------------|--------|
| Section            | Test Item | Limit                                   | Frequency Range(MHz) | Result |
| 15.247(a)(2)       | Bandwidth | $\geq 500\text{KHz}$<br>(6dB Bandwidth) | 2400-2483.5          | PASS   |

#### 5.1.3 Test Configuration

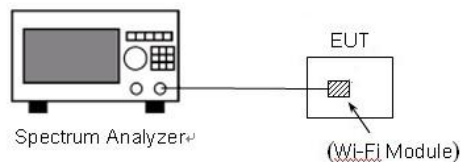


Figure 1: RF Test Setup

#### 5.1.4 Test Procedure

| Spectrum Parameters | Setting                                         |
|---------------------|-------------------------------------------------|
| Attenuation         | Auto                                            |
| Span Frequency      | $>$ Measurement bandwidth or channel separation |
| RB                  | 100kHz                                          |
| VB                  | $\geq 3 \times \text{RBW}$                      |
| Detector            | Peak                                            |
| Trace               | Max Hold                                        |
| Sweep Time          | Auto                                            |

The EUT is powered by the Battery, is coupled to the Spectrum Analyzer (SA) through the Attenuator/DC Block. The path loss as the factor is calibrated to correct the reading. During the measurement, the EUT is activated and is set to operate at maximum power. The RF load attached to the EUT antenna terminal is 50Ohm.

#### 5.1.5 Test Result

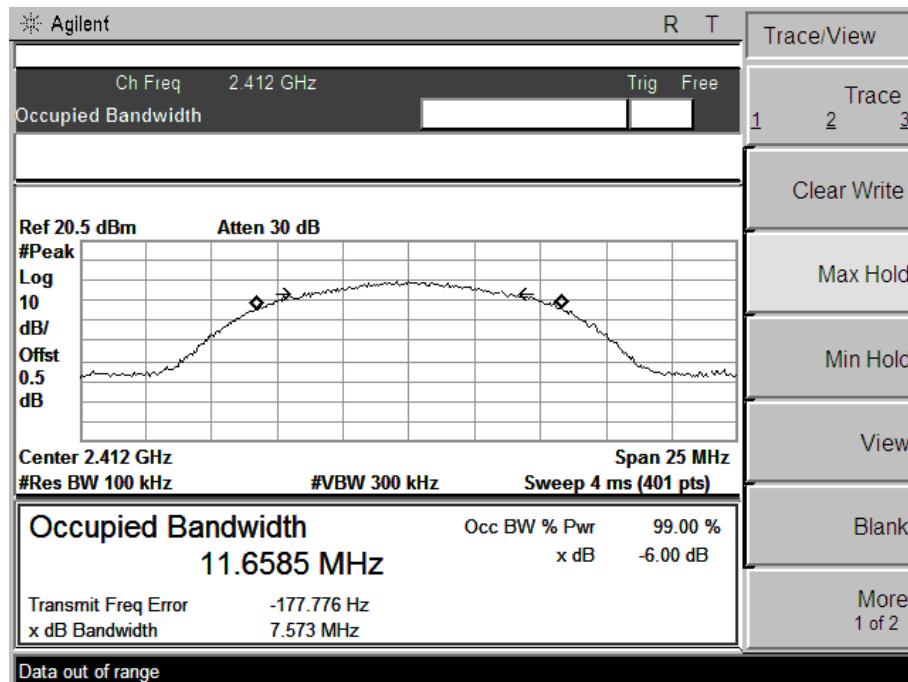
The lowest, Middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

### 5.1.5.1 802.11b Test Mode

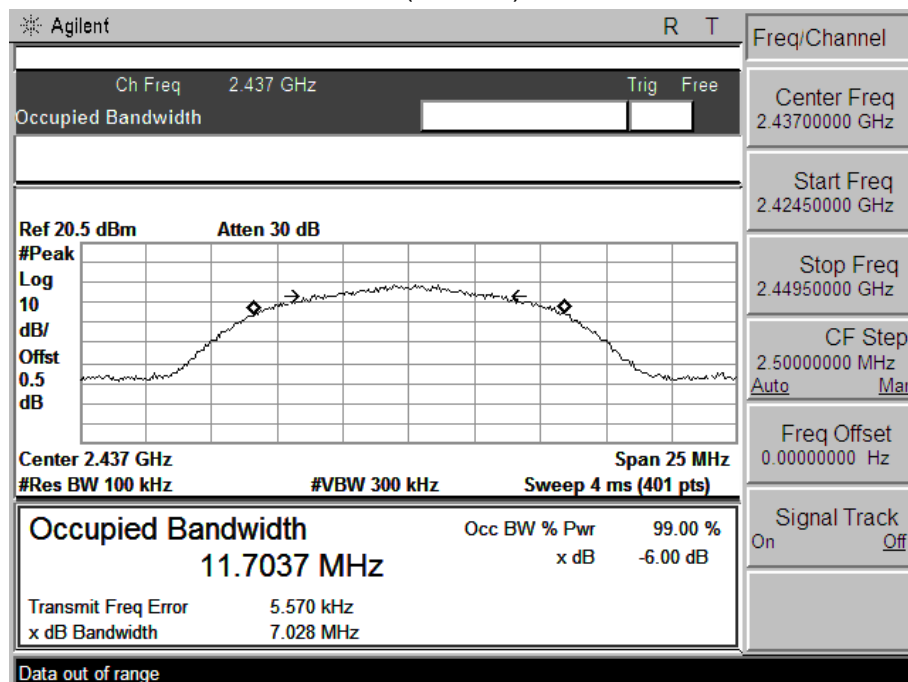
#### A. Test Verdict:

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Limits (kHz) | Result |
|---------|-----------------|----------------------|--------------|--------|
| 1       | 2412            | 7.573                | $\geq 500$   | PASS   |
| 6       | 2437            | 7.028                | $\geq 500$   | PASS   |
| 11      | 2462            | 6.802                | $\geq 500$   | PASS   |

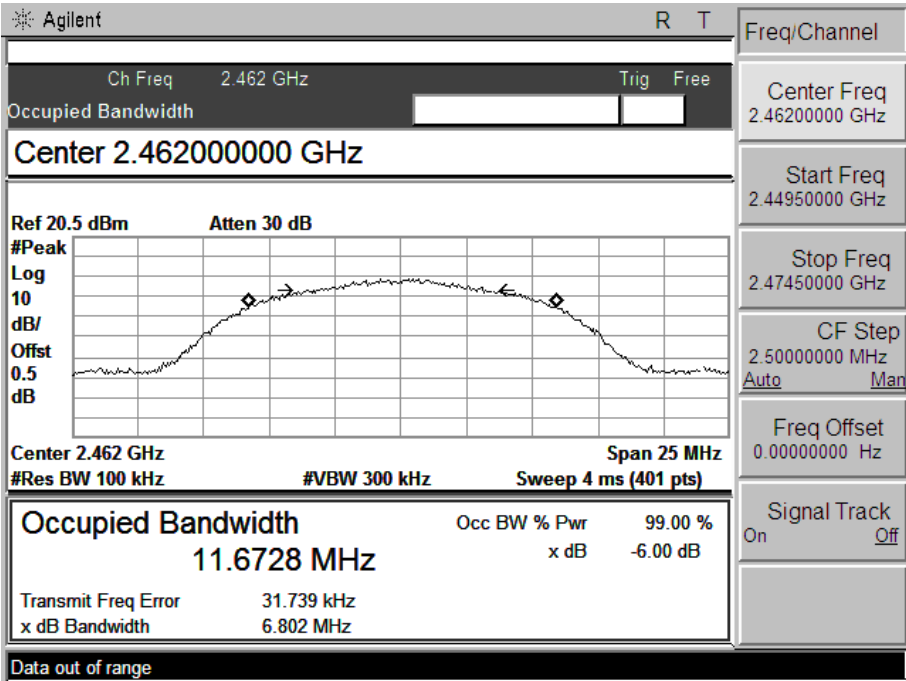
#### B. Test Plot:



(CH Low)



(CH Mid)



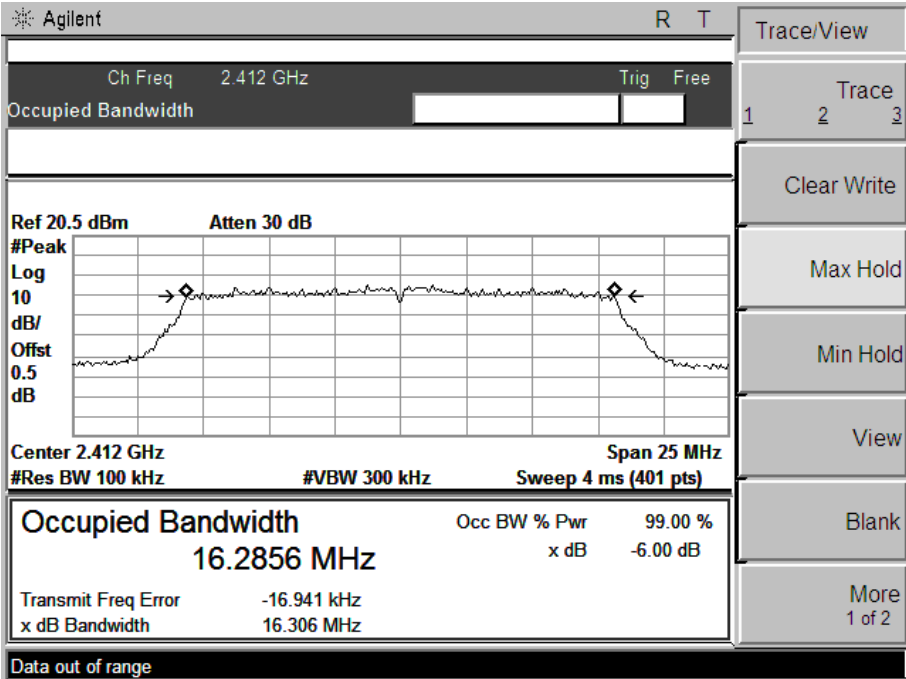
(CH High)

5.1.5.2 802.11g Test Mode

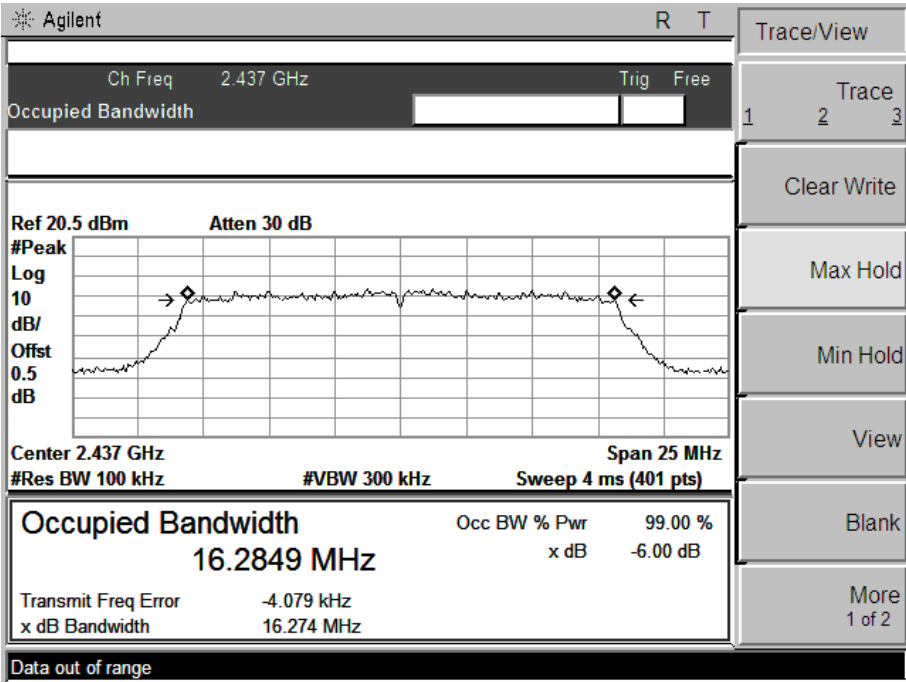
A. Test Verdict:

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Limits (kHz) | Result |
|---------|-----------------|----------------------|--------------|--------|
| 1       | 2412            | 16.306               | ≥500         | PASS   |
| 6       | 2437            | 16.274               | ≥500         | PASS   |
| 11      | 2462            | 15.766               | ≥500         | PASS   |

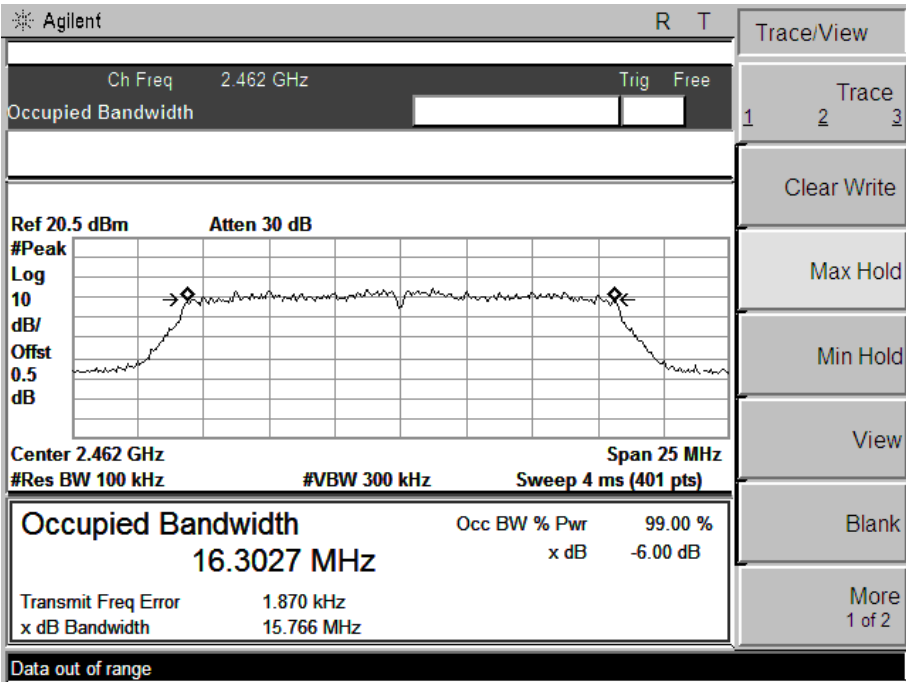
B. Test Plot:



(CH Low)



(CH Mid)



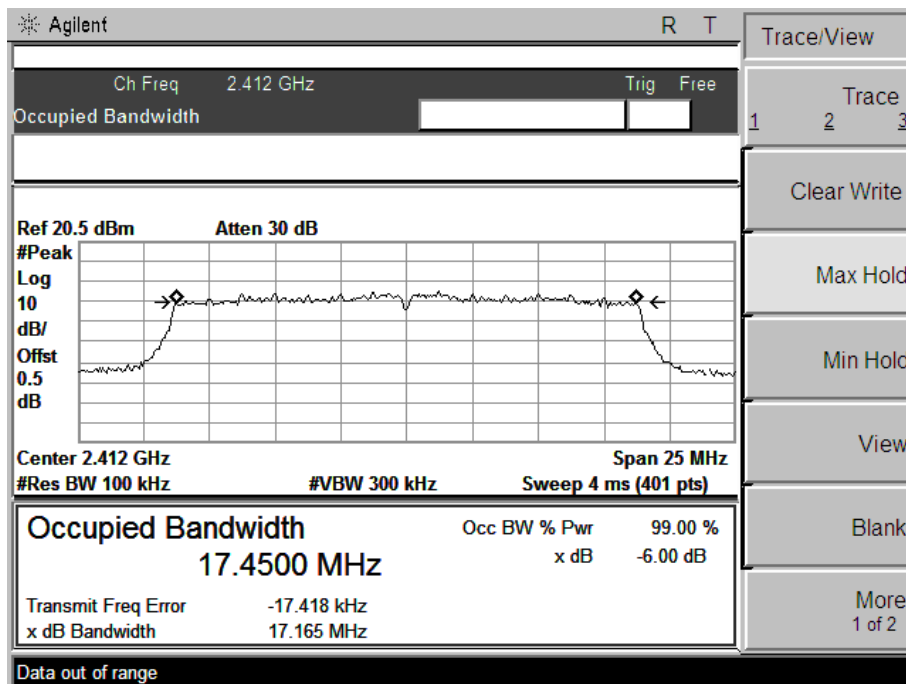
(CH High)

### 5.1.5.3 802.11n(20MHz) Test Mode

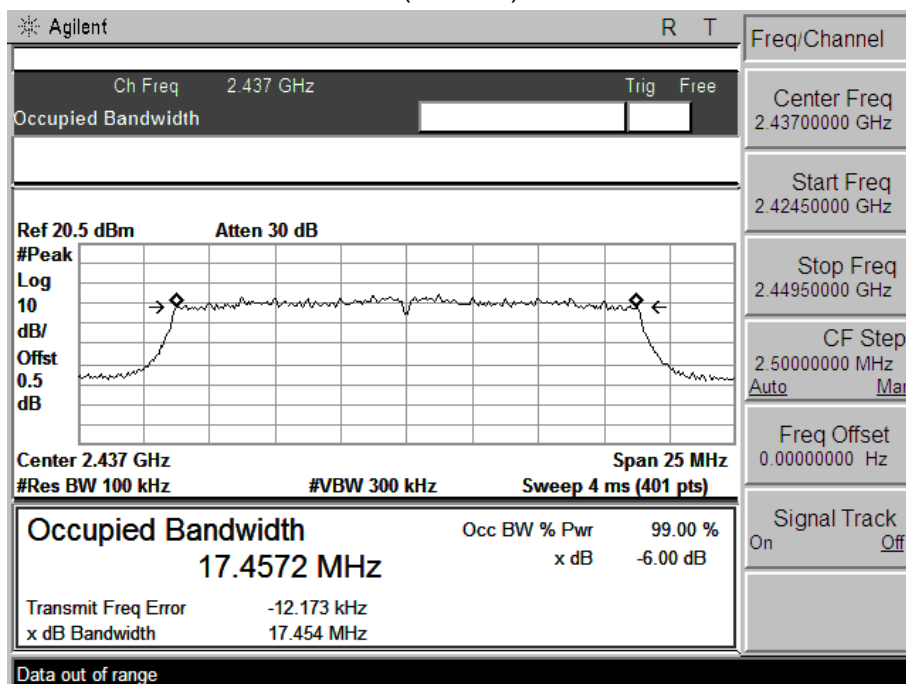
#### A. Test Verdict:

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Limits (kHz) | Result |
|---------|-----------------|----------------------|--------------|--------|
| 1       | 2412            | 17.165               | $\geq 500$   | PASS   |
| 6       | 2437            | 17.454               | $\geq 500$   | PASS   |
| 11      | 2462            | 17.530               | $\geq 500$   | PASS   |

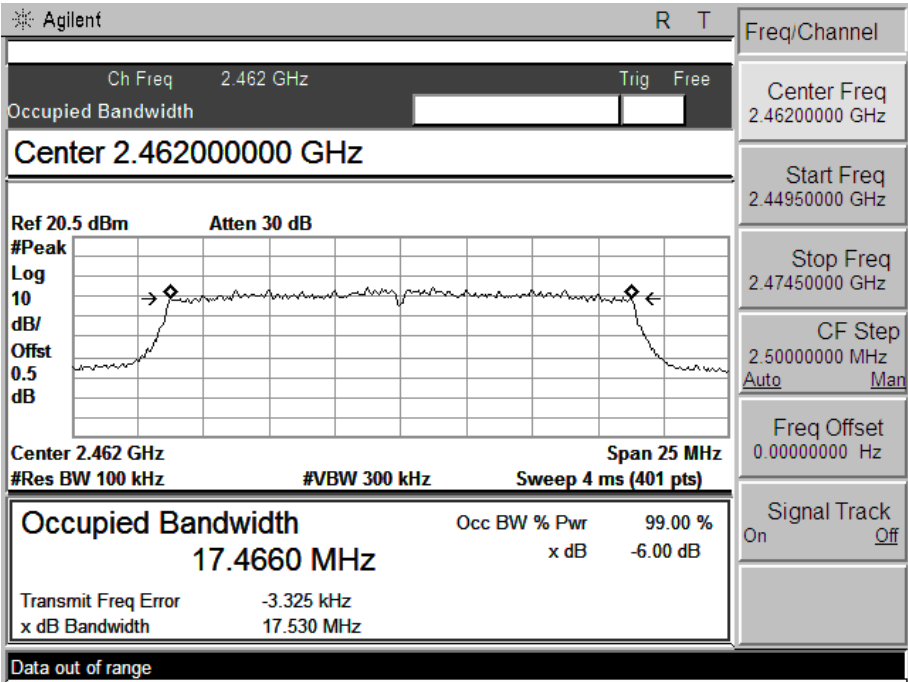
#### B. Test Plot:



(CH Low)



(CH Mid)



(CH High)

## 5.2 Peak Output Power

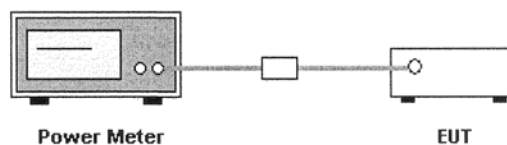
### 5.2.1 Definition

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.

### 5.2.2 Limit

| FCC Part15(15.247) |                   |       |                      |        |
|--------------------|-------------------|-------|----------------------|--------|
| Section            | Test Item         | Limit | Frequency Range(MHz) | Result |
| 15.247(b)(1)       | Peak Output Power | 30dBm | 2400-2483.5          | PASS   |

### 5.2.3 Test Configuration



### 5.2.4 Test Procedure

The EUT which is powered by AC adapter, is coupled to the Power Meter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

### 5.2.5 Test Result

The EUT operates at maximum output power mode. The lowest, Middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

#### 5.2.5.1 802.11b Test Mode

##### A. Test Verdict:

| Channel | Frequency (MHz) | Peak Output Power | Limit |   | Verdict |
|---------|-----------------|-------------------|-------|---|---------|
|         |                 | dBm               | dBm   | W |         |
| 1       | 2412            | 9.45              | 30    | 1 | PASS    |
| 6       | 2437            | 9.58              |       |   | PASS    |
| 11      | 2462            | 9.33              |       |   | PASS    |

#### 5.2.5.2 802.11g Test Mode

##### A. Test Verdict:

| Channel | Frequency (MHz) | Peak Output Power | Limit |   | Verdict |
|---------|-----------------|-------------------|-------|---|---------|
|         |                 | dBm               | dBm   | W |         |
| 1       | 2412            | 8.21              | 30    | 1 | PASS    |
| 6       | 2437            | 8.24              |       |   | PASS    |
| 11      | 2462            | 8.74              |       |   | PASS    |

**5.2.5.3 802.11n(20MHz) Test Mode****A. Test Verdict:**

| Channel | Frequency<br>(MHz) | Peak Output<br>Power | Limit |   | Verdict |
|---------|--------------------|----------------------|-------|---|---------|
|         |                    | dBm                  | dBm   | W |         |
| 1       | 2412               | 7.97                 | 30    | 1 | PASS    |
| 6       | 2437               | 7.88                 |       |   | PASS    |
| 11      | 2462               | 8.08                 |       |   | PASS    |

## **5.3 Conducted Spurious Emission**

### **5.3.1 Definition**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

### **5.3.2 Test Description**

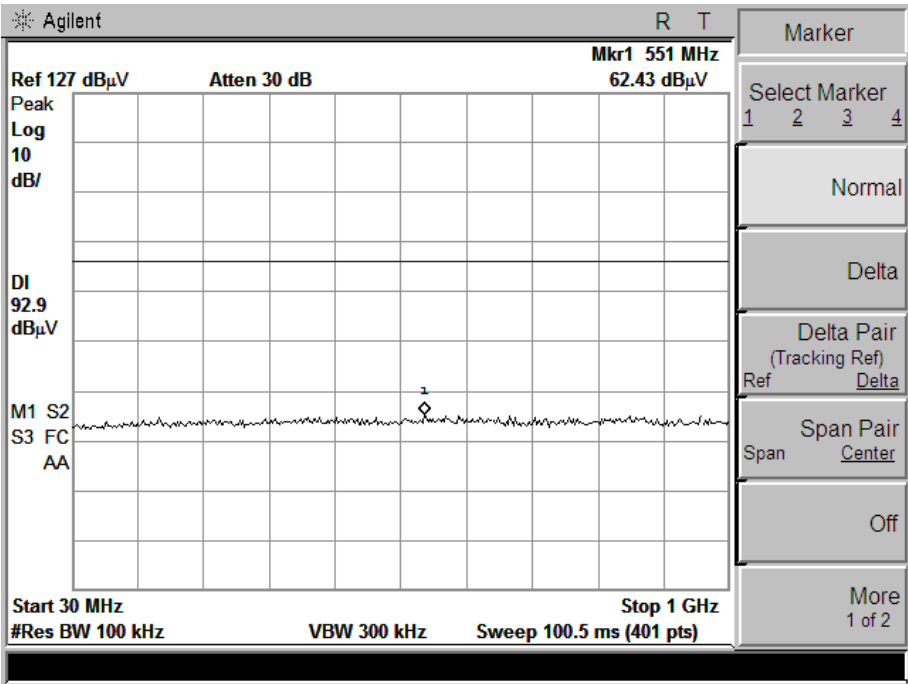
See section 5.1.2 of this report.

### **5.3.3 Test Result**

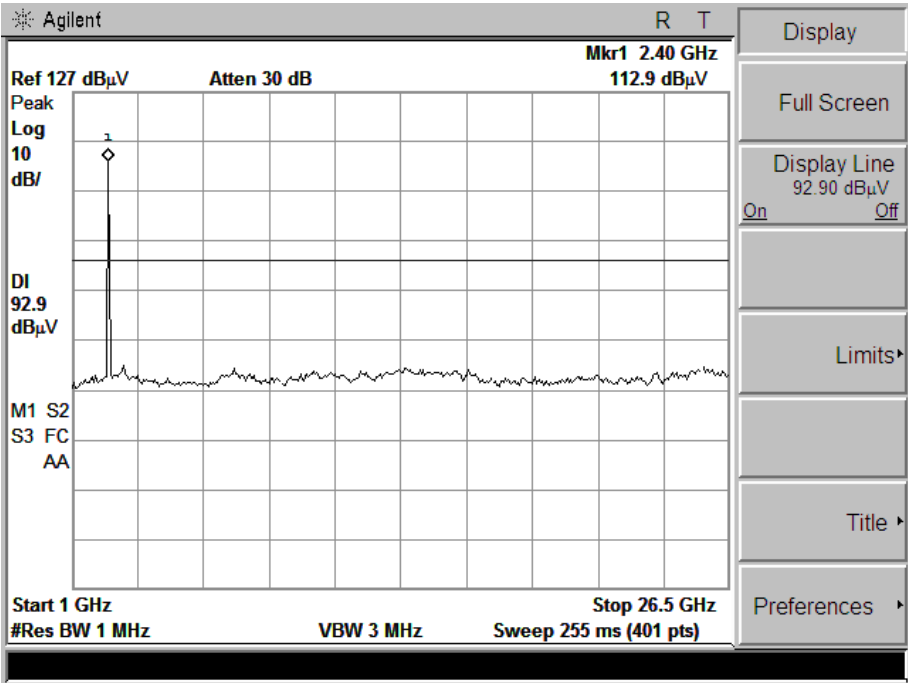
The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

5.3.3.1 802.11b Test Mode

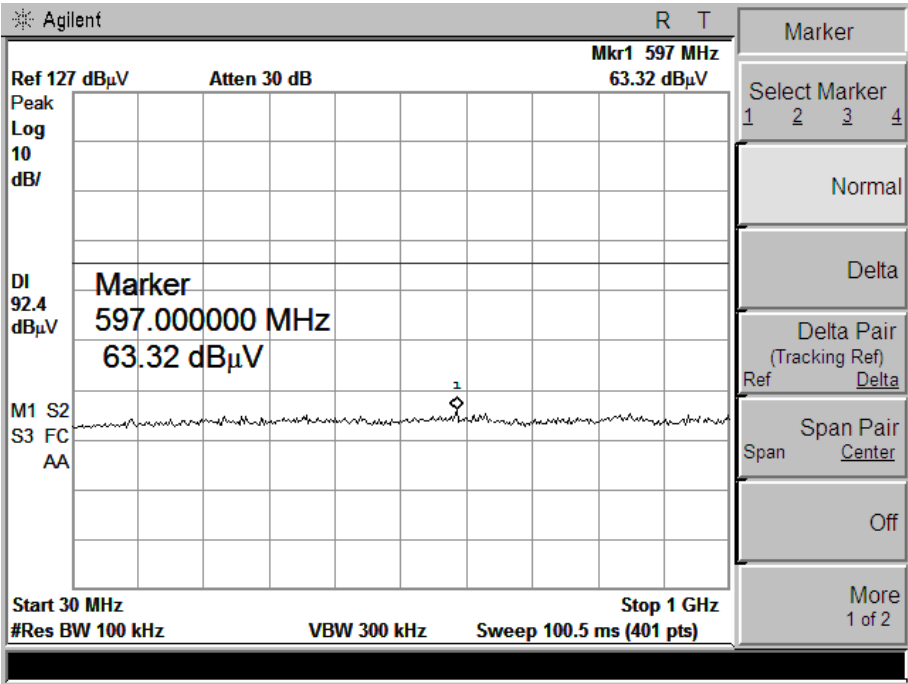
Test Plot:



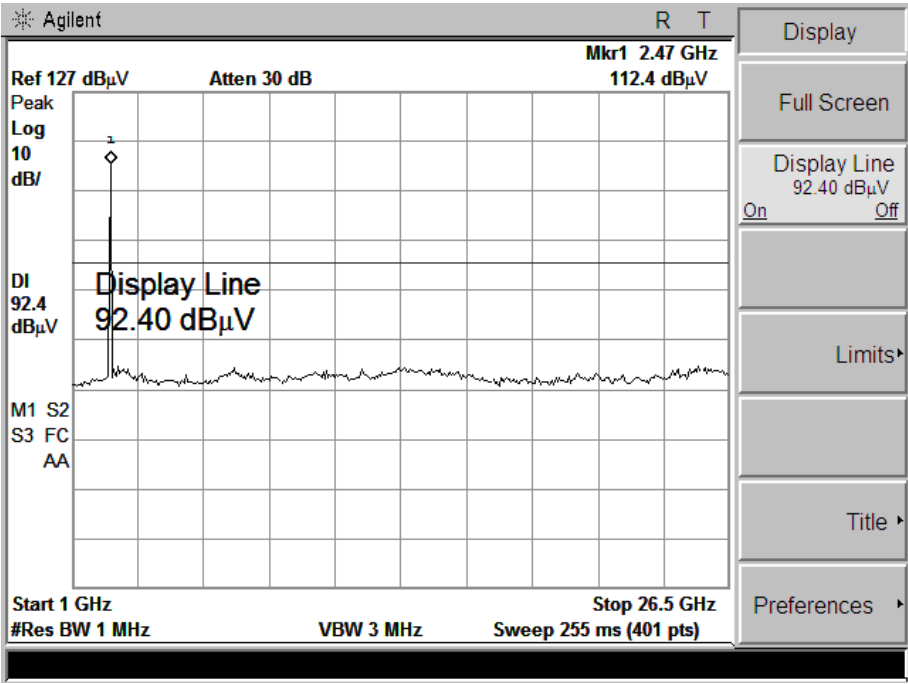
(CH Low, 9kHz to 1GHz)



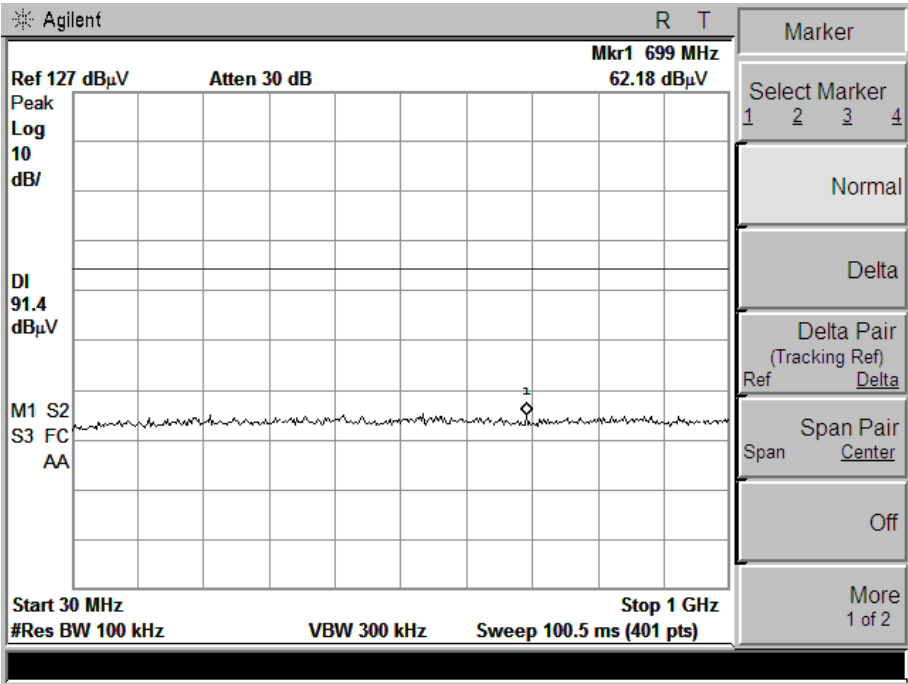
(CH Low, 1GHz to 26.5GHz)



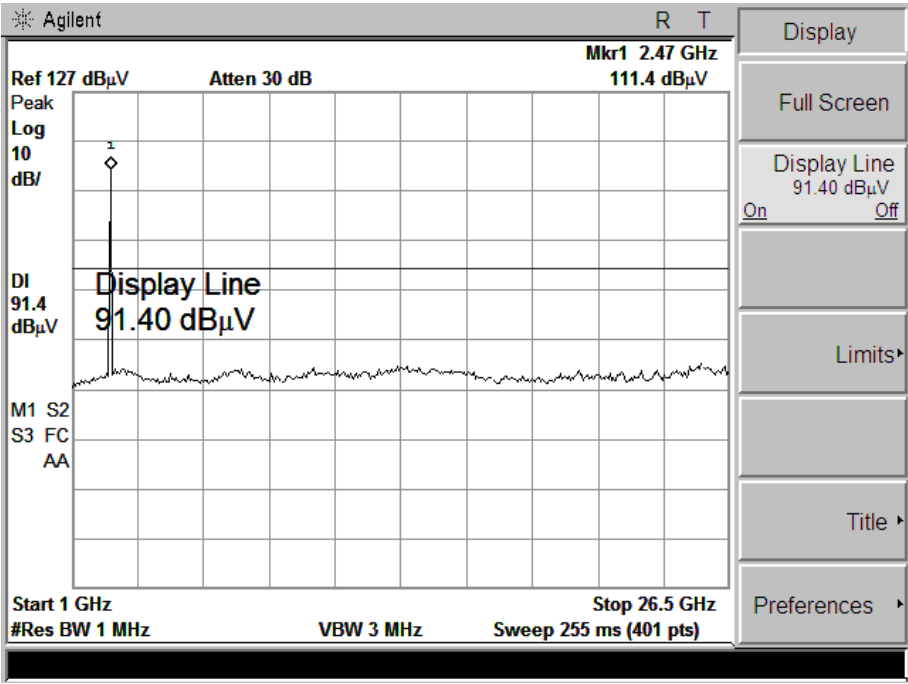
(CH Mid, 9kHz to 1GHz)



(CH Mid, 1GHz to 26.5GHz)



(CH High, 9kHz to 1GHz)



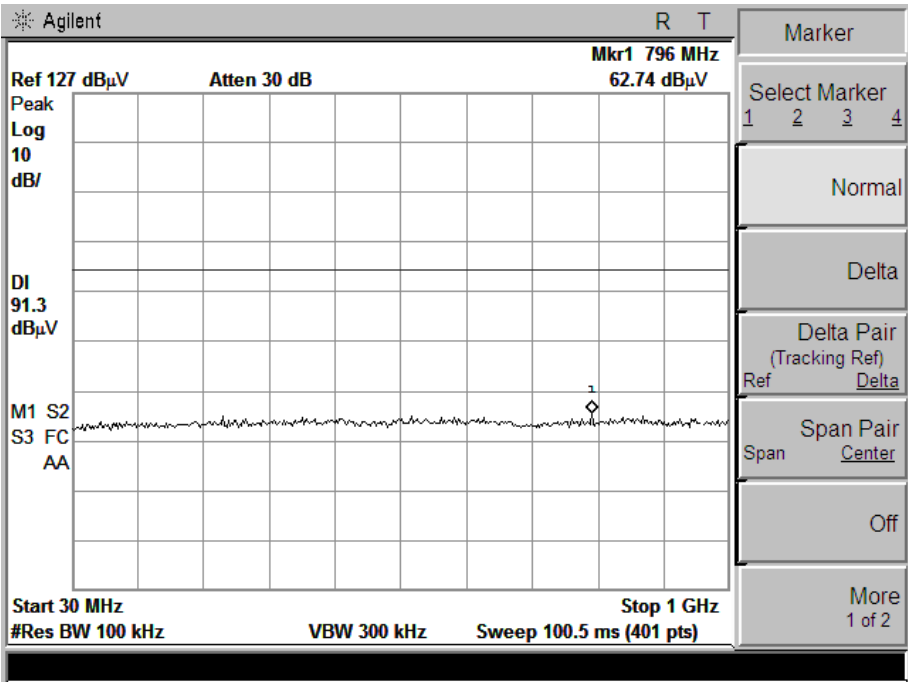
(CH High, 1GHz to 26.5GHz)

**Note:**

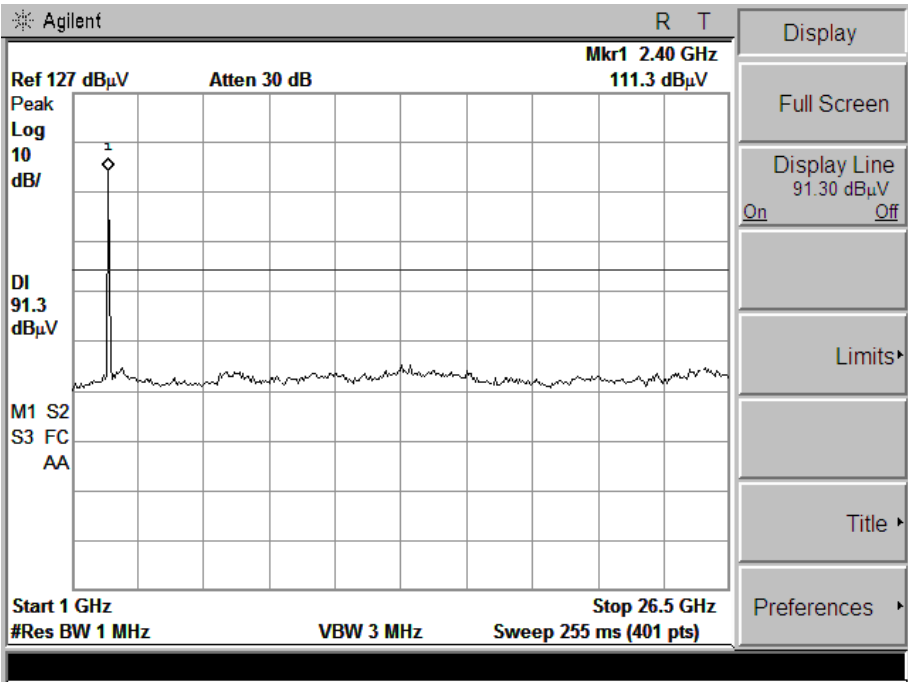
- 1. The power of the Module transmitting frequency should be ignored.

5.3.2. 802.11g Test Mode

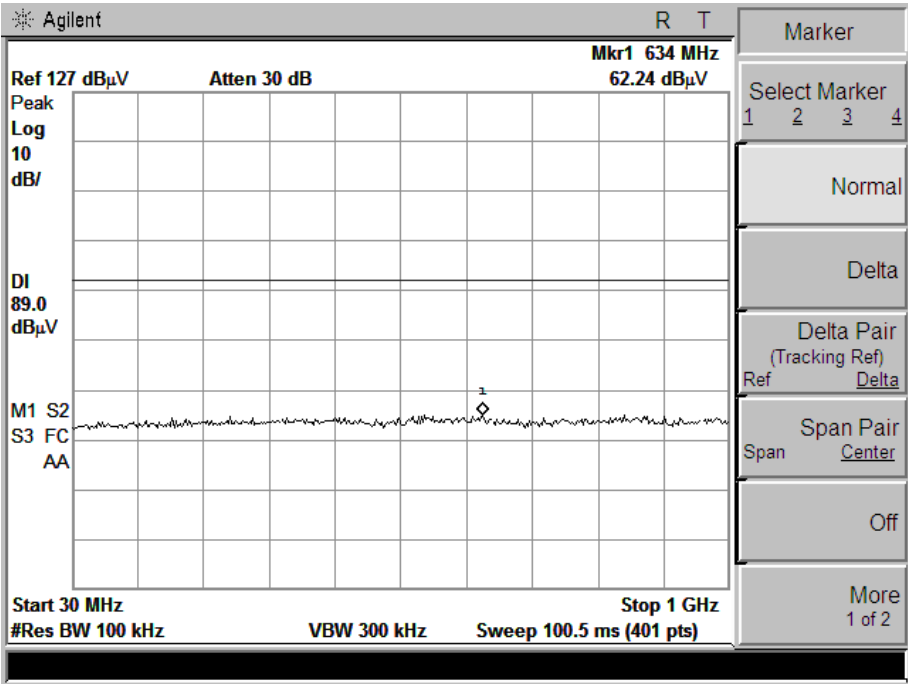
Test Plot:



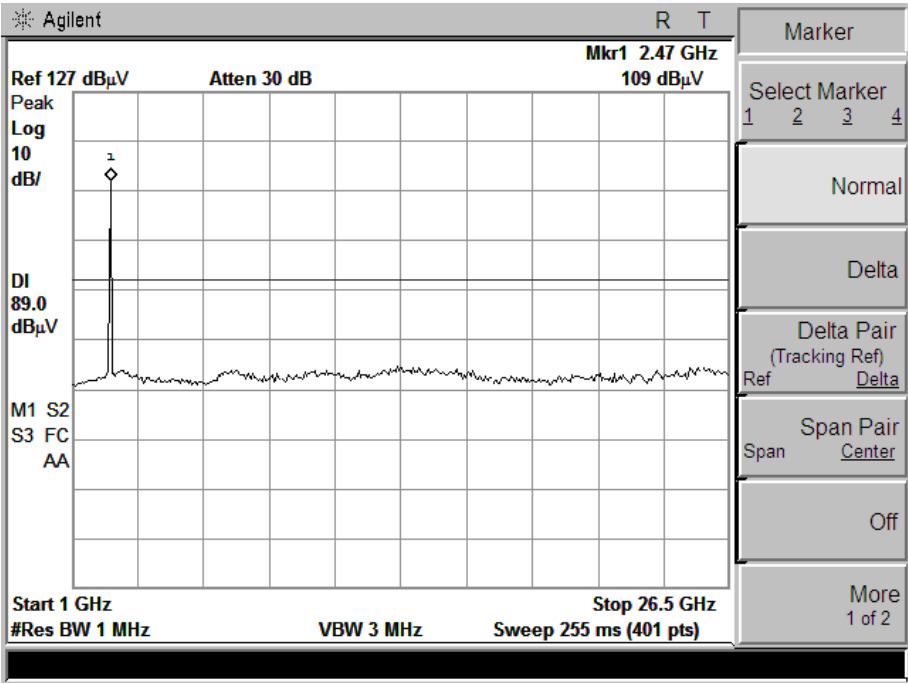
(CH Low, 9kHz to 1GHz)



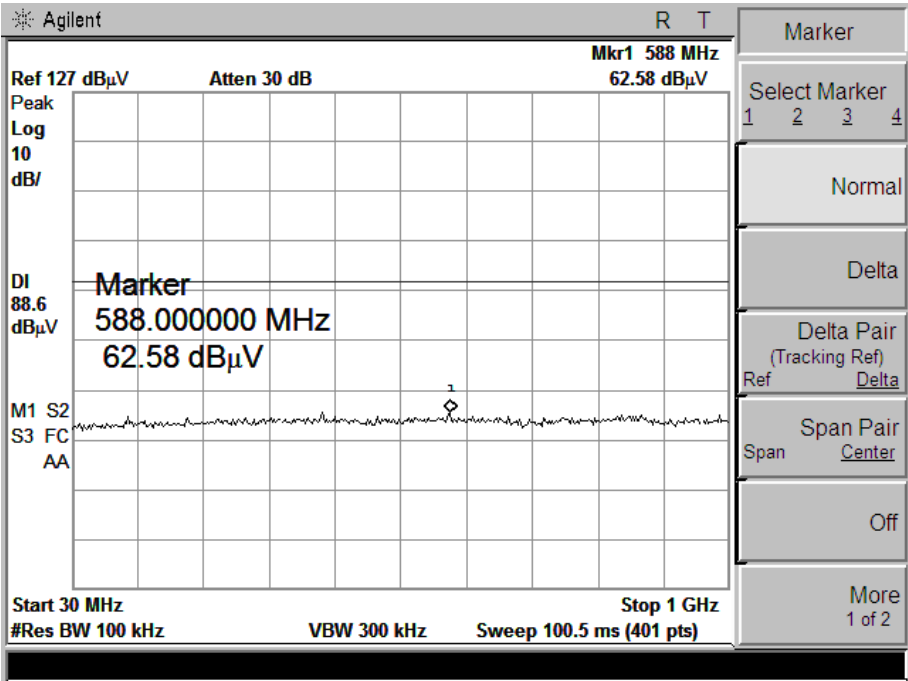
(CH Low, 1GHz to 26.5GHz)



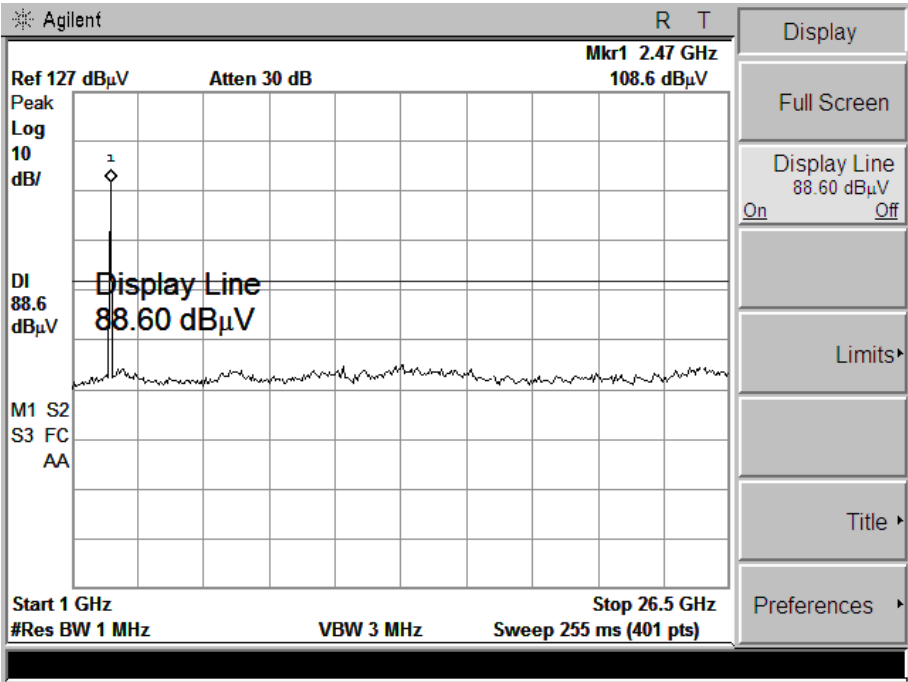
(CH Mid, 9kHz to 1GHz)



(CH Mid, 1GHz to 26.5GHz)



(CH High, 9kHz to 1GHz)

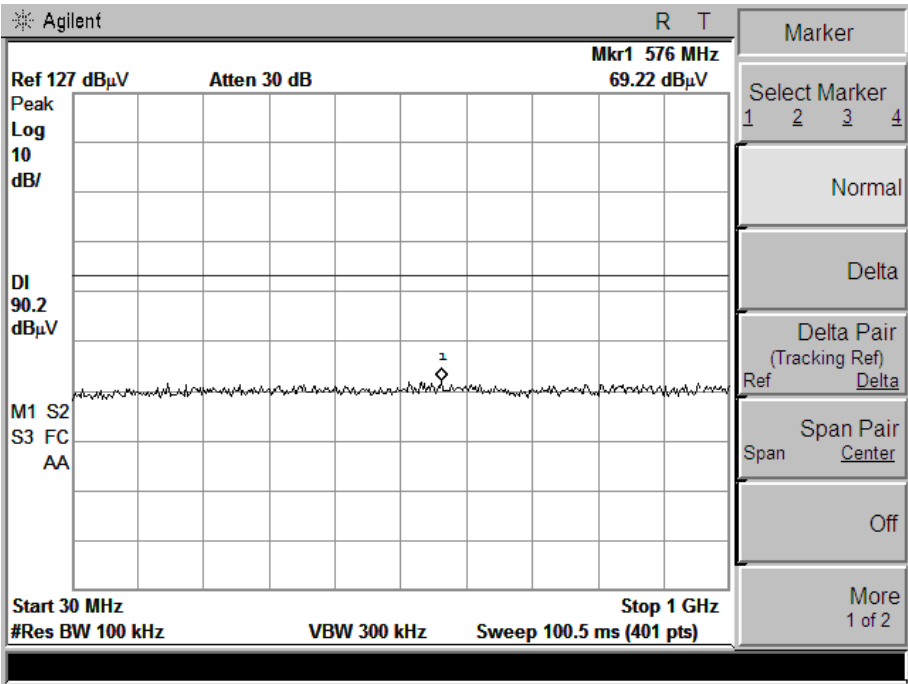


(CH High, 1GHz to 26.5GHz)

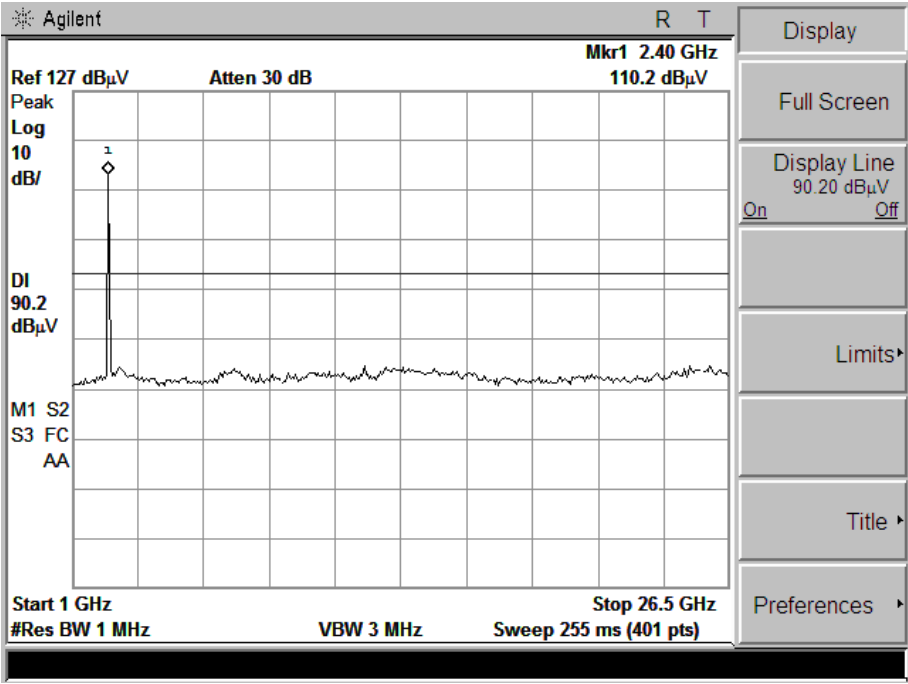
**Note:**  
1. The power of the Module transmitting frequency should be ignored.

5.3.3. 802.11n(20MHz) Test Mode

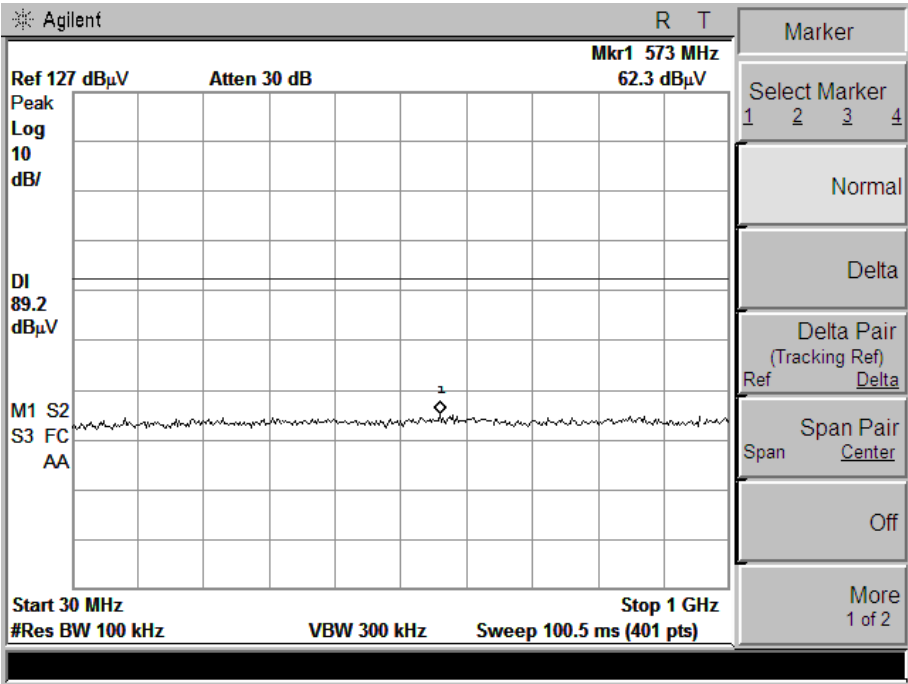
Test Plot:



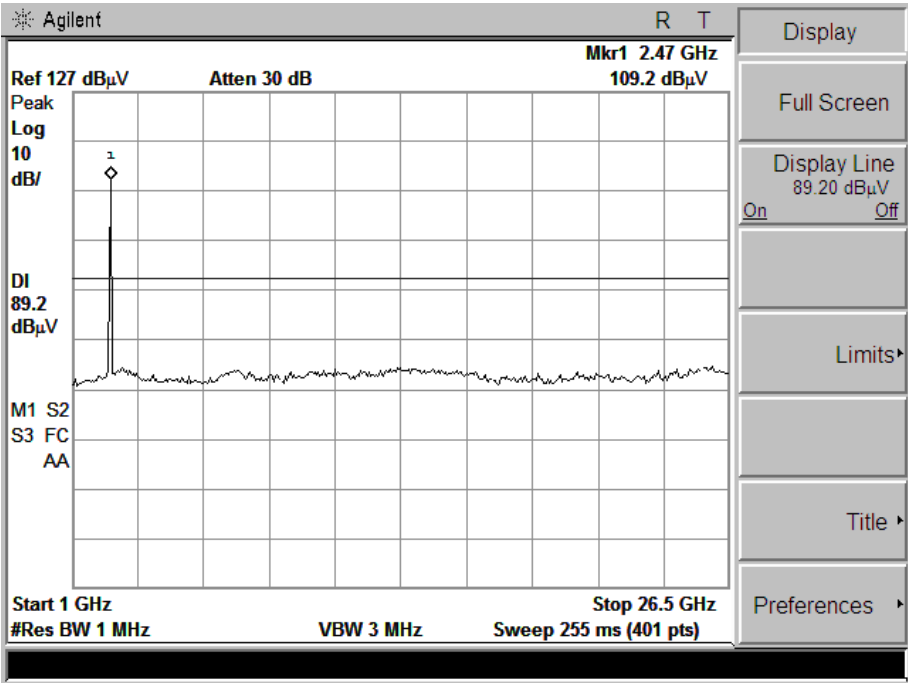
(CH Low, 9kHz to 1GHz)



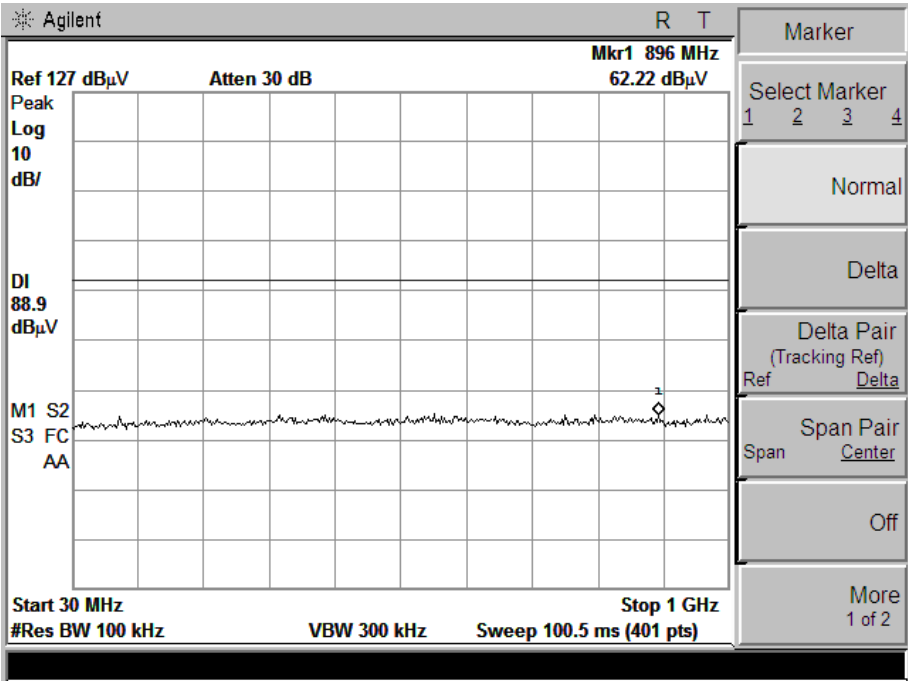
(CH Low, 1GHz to 26.5GHz)



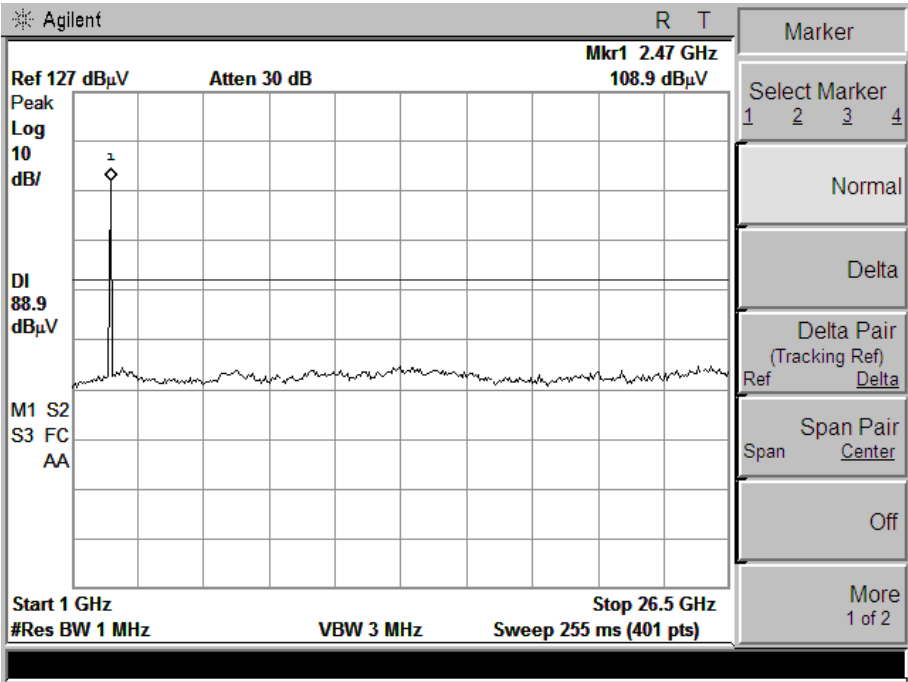
(CH Mid, 9kHz to 1GHz)



(CH Mid, 1GHz to 26.5GHz)



(CH High, 9kHz to 1GHz)



(CH High, 1GHz to 26.5GHz)

## 5.4 Band Edge

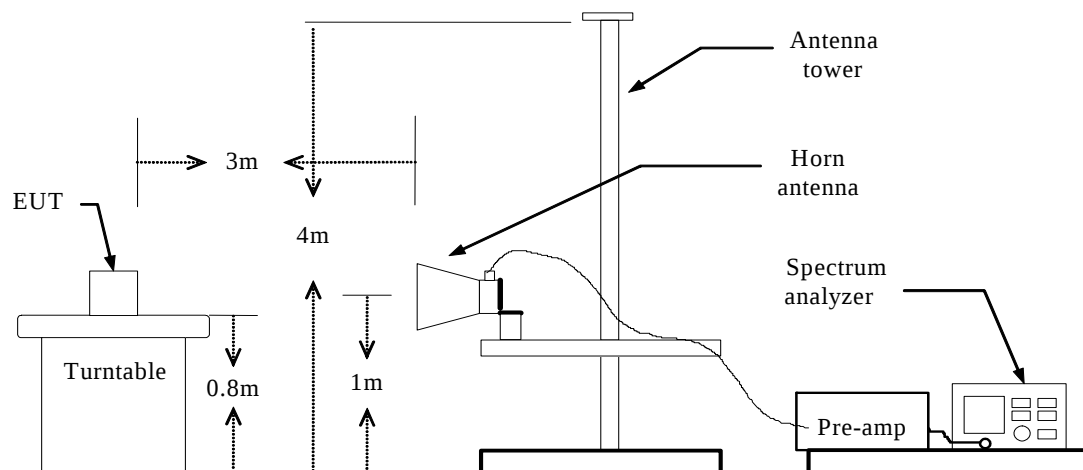
### 5.4.1 Definition

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

### 5.4.2 Test Description

| Spectrum Parameters  | Setting                      |
|----------------------|------------------------------|
| Attenuation          | Auto                         |
| Start-stop frequency | 2350MHz-2420MHz/2450MHz-2500 |
| RB                   | 1MHz                         |
| VB                   | 3MHz                         |
| Detector             | Peak                         |
| Trace                | Max Hold                     |
| Sweep Time           | Auto                         |

### 5.4.3 Test Configuration



### 5.4.4 Test Result

The EUT operates at continuous transmit test mode. The lowest and highest channels are tested to verify the band edge emissions.



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

### Radiated Emission Measurement

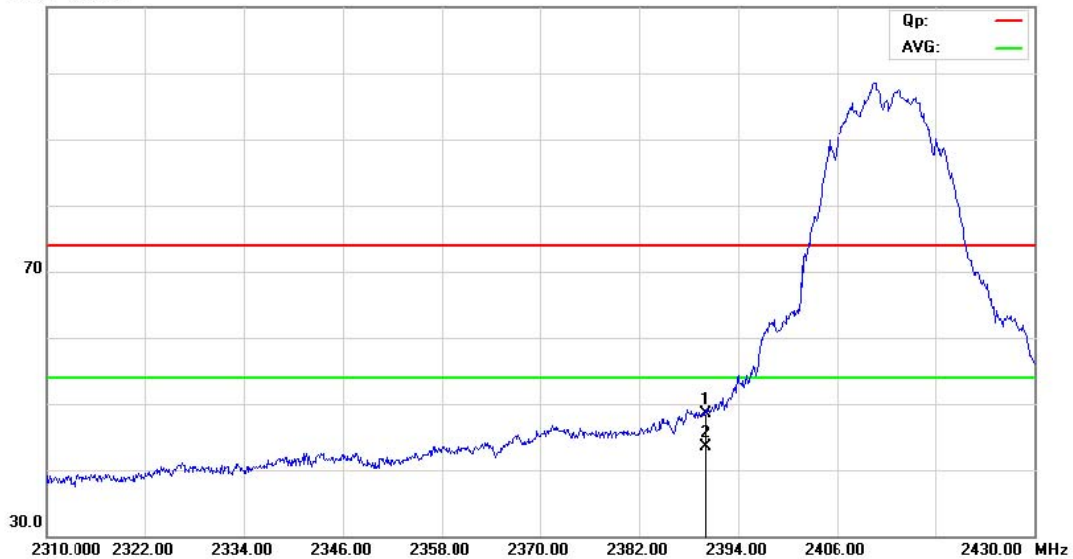
File: ZBOX-PI320

Data: #1

Date: 2014-11-05

Time: 17:09:42

110.0 dBuV/m



Site: MOST #1

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Part15 B Spurious Radiation(PEAK)

Power: AC120V/60Hz

Humidity: 61 %

EUT: Mini PC

Distance:

M/N: ZBOX-PI320

Mode: Low CH

Note: 802.11b

| 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   |     | 2390.000     | 38.21                    | 10.36                   | 48.57                      | 74.00           | -25.43     | peak                    | 0               |         |
| 2   | *   | 2390.000     | 33.12                    | 10.36                   | 43.48                      | 54.00           | -10.52     | AVG                     | 0               |         |

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

Engineer Signature:

Kang



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

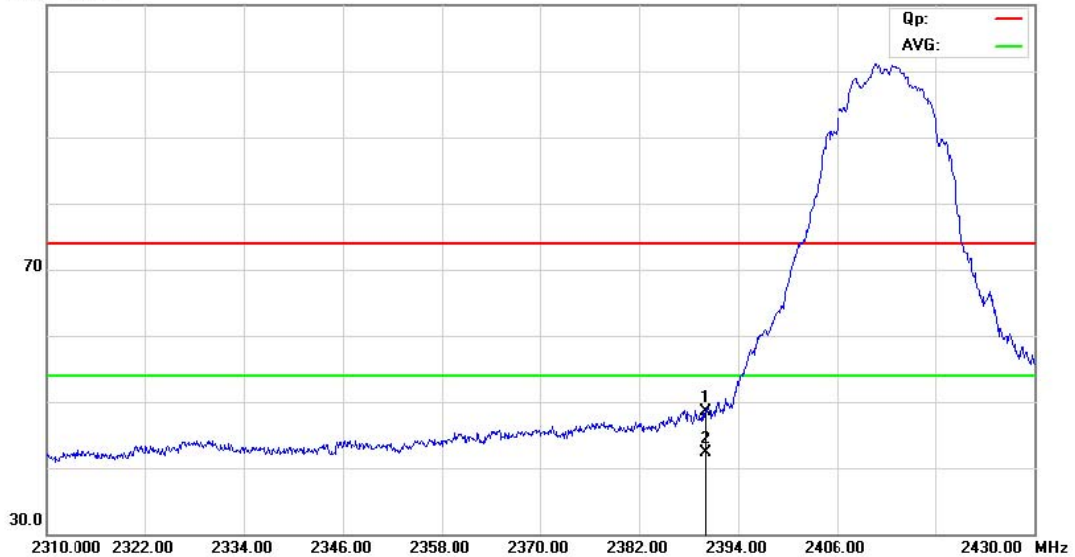
### Radiated Emission Measurement

File: ZBOX-PI320  
110.0 dBuV/m

Data: #2

Date: 2014-11-05

Time: 17:16:09



Site: MOST #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part15 B Spurious Radiation(PEAK)

Power: AC120V/60Hz

Humidity: 61 %

EUT: Mini PC

Distance:

M/N: ZBOX-PI320

Mode: Low CH

Note: 802.11b

| 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   |     | 2390.000     | 38.24                    | 10.36                   | 48.60                      | 74.00           | -25.40     | peak                    | 0               |         |
| 2   | *   | 2390.000     | 32.01                    | 10.36                   | 42.37                      | 54.00           | -11.63     | AVG                     | 0               |         |

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

Engineer Signature: Kang



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

### Radiated Emission Measurement

File: ZBOX-PI320

Data: #15

Date: 2014-11-05

Time: 18:46:48

110.0 dBuV/m



Site: MOST #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part15 B Spurious Radiation(PEAK)

Power: AC120V/60Hz

Humidity: 61 %

EUT: Mini PC

Distance:

M/N: ZBOX-PI320

Mode: High CH

Note: 802.11b

| 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   |     | 2483.500     | 38.24                    | 10.73                   | 48.97                      | 74.00           | -25.03     | peak                    | 0               |         |
| 2   | *   | 2483.500     | 32.04                    | 10.73                   | 42.77                      | 54.00           | -11.23     | AVG                     | 0               |         |

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

Engineer Signature:

Kang



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

### Radiated Emission Measurement

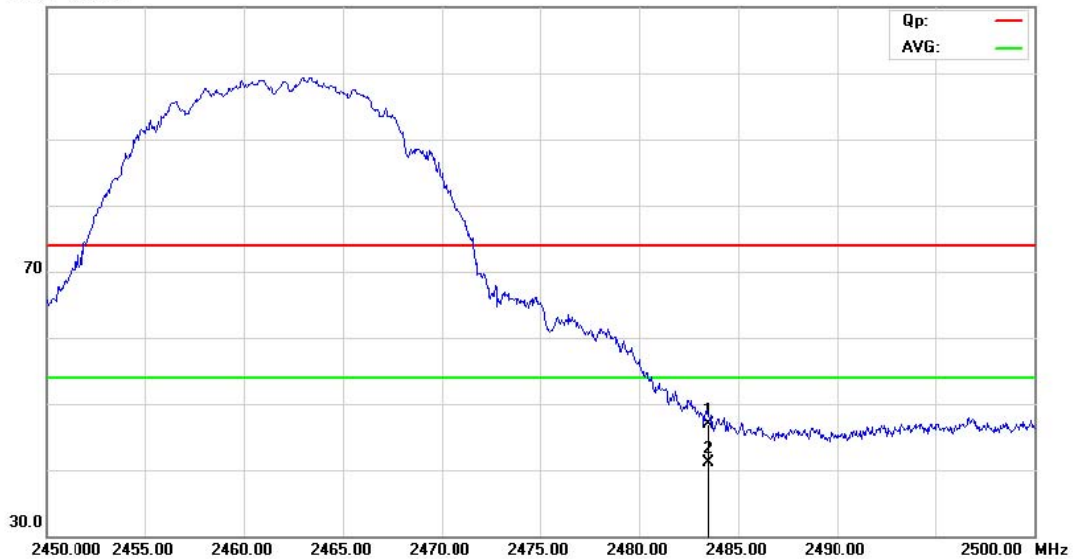
File: ZBOX-PI320

Data: #16

Date: 2014-11-05

Time: 18:54:46

110.0 dBuV/m



Site: MOST #1

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Part15 B Spurious Radiation(PEAK)

Power: AC120V/60Hz

Humidity: 61 %

EUT: Mini PC

Distance:

M/N: ZBOX-PI320

Mode: High CH

Note: 802.11b

| 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   |     | 2483.500     | 36.24                    | 10.73                   | 46.97                      | 74.00           | -27.03     | peak                    | 0               |         |
| 2   | *   | 2483.500     | 30.41                    | 10.73                   | 41.14                      | 54.00           | -12.86     | AVG                     | 0               |         |

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

Engineer Signature:

Kang



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

### Radiated Emission Measurement

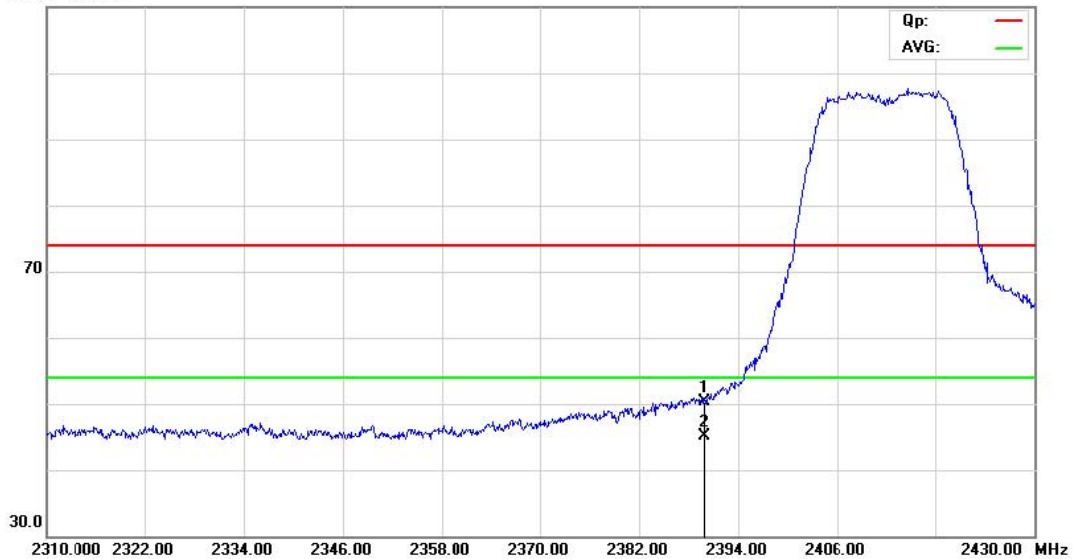
File: ZBOX-PI320

Data: #3

Date: 2014-11-05

Time: 17:23:16

110.0 dBuV/m



Site: MOST #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part15 B Spurious Radiation(PEAK)

Power: AC120V/60Hz

Humidity: 61 %

EUT: Mini PC

Distance:

M/N: ZBOX-PI320

Mode: Low CH

Note: 802.11g

| 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   |     | 2390.000     | 40.01                    | 10.36                   | 50.37                      | 74.00           | -23.63     | peak                    | 0               |         |
| 2   | *   | 2390.000     | 34.84                    | 10.36                   | 45.20                      | 54.00           | -8.80      | AVG                     | 0               |         |

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

Engineer Signature:

Kang



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

### Radiated Emission Measurement

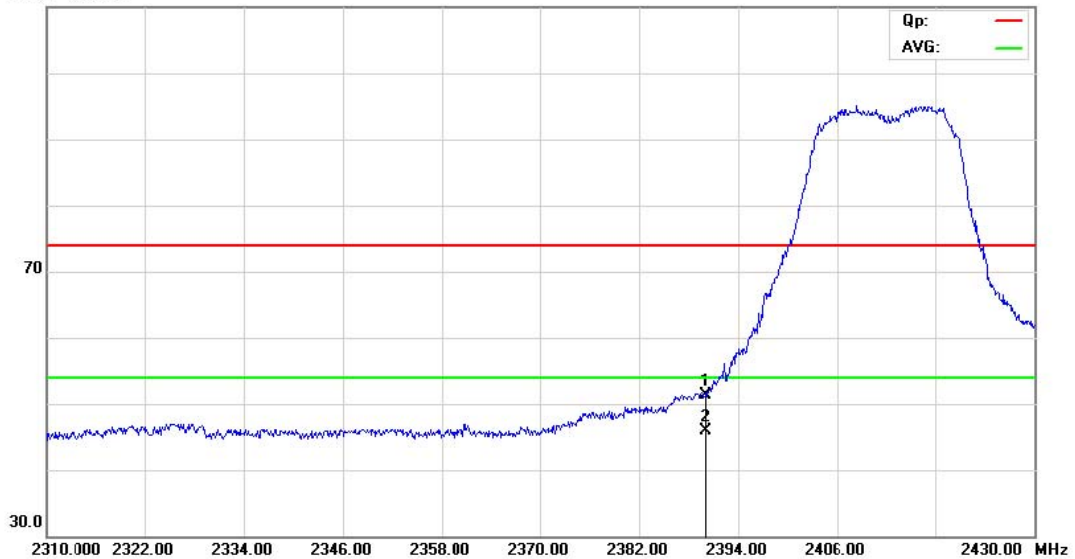
File: ZBOX-PI320

Data: #4

Date: 2014-11-05

Time: 17:30:27

110.0 dBuV/m



Site: MOST #1

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Part15 B Spurious Radiation(PEAK)

Power: AC120V/60Hz

Humidity: 61 %

EUT: Mini PC

Distance:

M/N: ZBOX-PI320

Mode: Low CH

Note: 802.11g

| 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   |     | 2390.000     | 41.02                    | 10.36                   | 51.38                      | 74.00           | -22.62     | peak                    | 0               |         |
| 2   | *   | 2390.000     | 35.47                    | 10.36                   | 45.83                      | 54.00           | -8.17      | AVG                     | 0               |         |

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

Engineer Signature:

Kang



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

### Radiated Emission Measurement

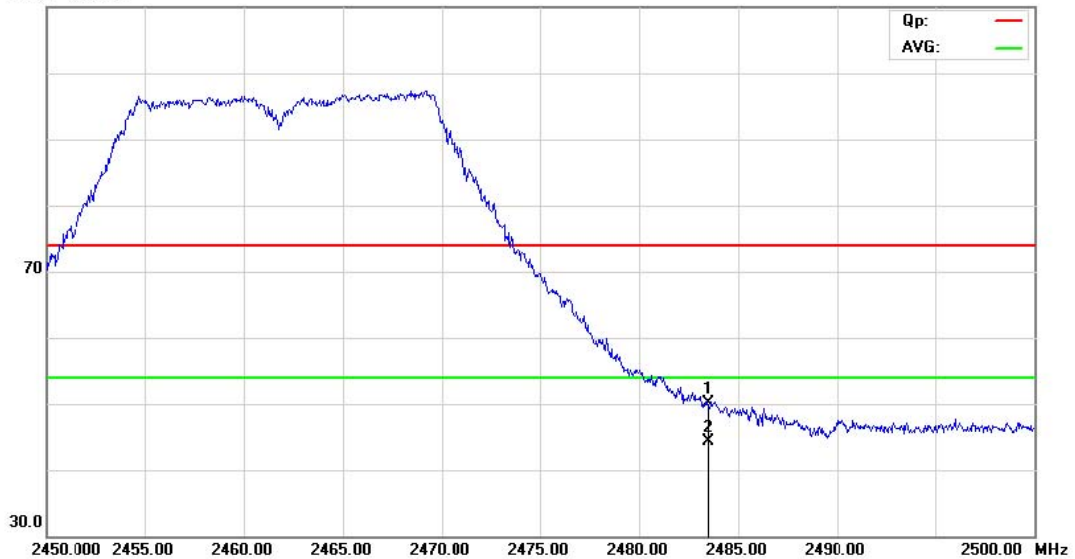
File: ZBOX-PI320

Data: #13

Date: 2014-11-05

Time: 18:30:54

110.0 dBuV/m



Site: MOST #1

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Part15 B Spurious Radiation(PEAK)

Power: AC120V/60Hz

Humidity: 61 %

EUT: Mini PC

Distance:

M/N: ZBOX-PI320

Mode: High CH

Note: 802.11g

| 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   |     | 2483.500     | 39.42                    | 10.73                   | 50.15                      | 74.00           | -23.85     | peak                    | 0               |         |
| 2   | *   | 2483.500     | 33.51                    | 10.73                   | 44.24                      | 54.00           | -9.76      | AVG                     | 0               |         |

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

Engineer Signature:

Kang



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

### Radiated Emission Measurement

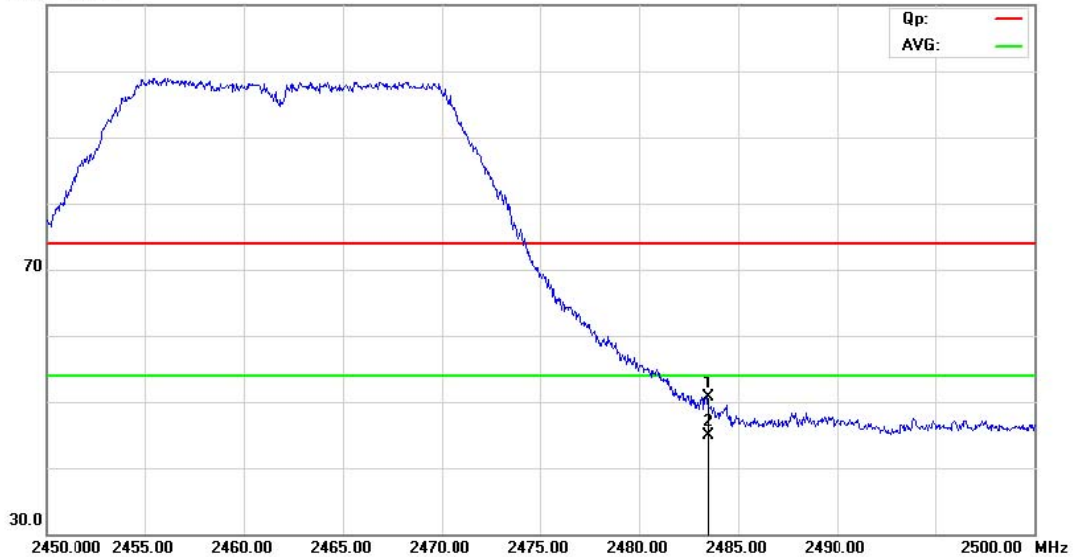
File: ZBOX-PI320

Data: #14

Date: 2014-11-05

Time: 18:38:44

110.0 dBuV/m



Site: MOST #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part15 B Spurious Radiation(PEAK)

Power: AC120V/60Hz

Humidity: 61 %

EUT: Mini PC

Distance:

M/N: ZBOX-PI320

Mode: High CH

Note: 802.11g

| 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   |     | 2483.500     | 40.01                    | 10.73                   | 50.74                      | 74.00           | -23.26     | peak                    | 0               |         |
| 2   | *   | 2483.500     | 34.21                    | 10.73                   | 44.94                      | 54.00           | -9.06      | AVG                     | 0               |         |

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

Engineer Signature:

Kang



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

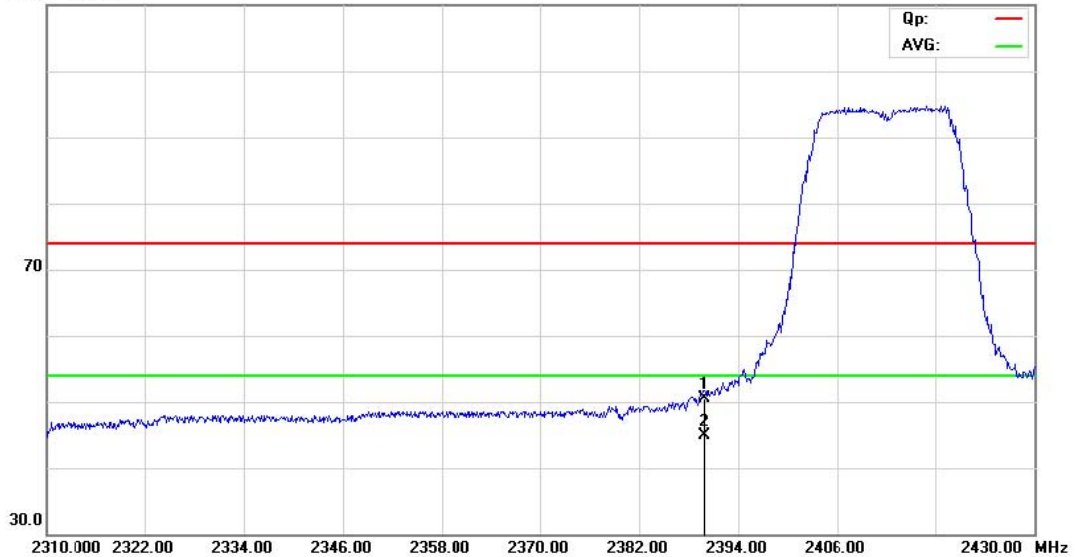
### Radiated Emission Measurement

File: ZBOX-PI320  
110.0 dBuV/m

Data: #5

Date: 2014-11-05

Time: 17:38:18



Site: MOST #1

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Part15 B Spurious Radiation(PEAK)

Power: AC120V/60Hz

Humidity: 61 %

EUT: Mini PC

Distance:

M/N: ZBOX-PI320

Mode: Low CH

Note: 802.11n-HT20

| 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   |     | 2390.000     | 40.12                    | 10.36                   | 50.48                      | 74.00           | -23.52     | peak                    | 0               |         |
| 2   | *   | 2390.000     | 34.51                    | 10.36                   | 44.87                      | 54.00           | -9.13      | AVG                     | 0               |         |

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

Engineer Signature:

Kang



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

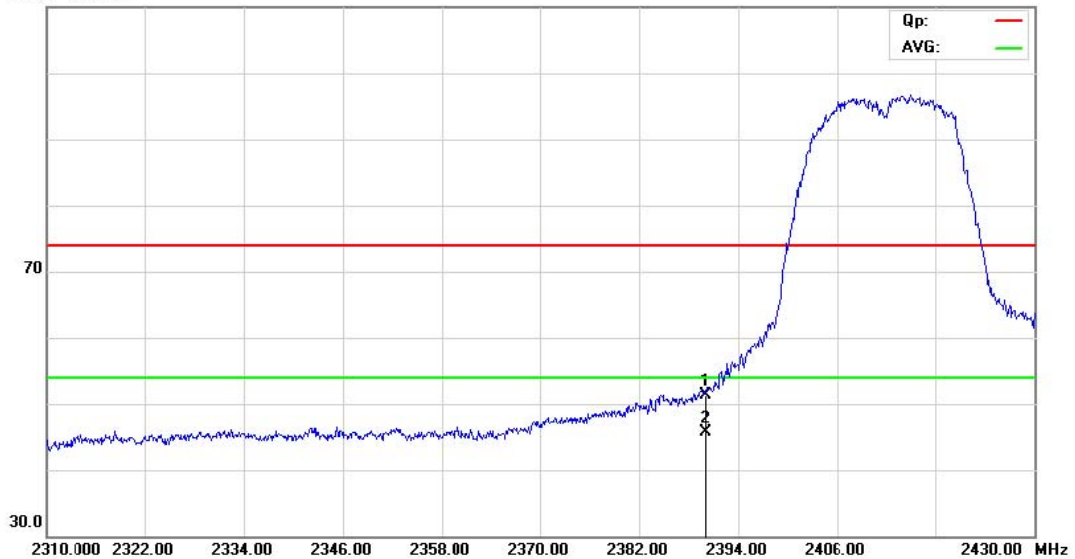
### Radiated Emission Measurement

File: ZBOX-PI320  
110.0 dBuV/m

Data: #6

Date: 2014-11-05

Time: 17:43:51



Site: MOST #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part15 B Spurious Radiation(PEAK)

Power: AC120V/60Hz

Humidity: 61 %

EUT: Mini PC

Distance:

M/N: ZBOX-PI320

Mode: Low CH

Note: 802.11n-HT20

| 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   |     | 2390.000     | 40.94                    | 10.36                   | 51.30                      | 74.00           | -22.70     | peak                    | 0               |         |
| 2   | *   | 2390.000     | 35.33                    | 10.36                   | 45.69                      | 54.00           | -8.31      | AVG                     | 0               |         |

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

Engineer Signature:

Kang



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

### Radiated Emission Measurement

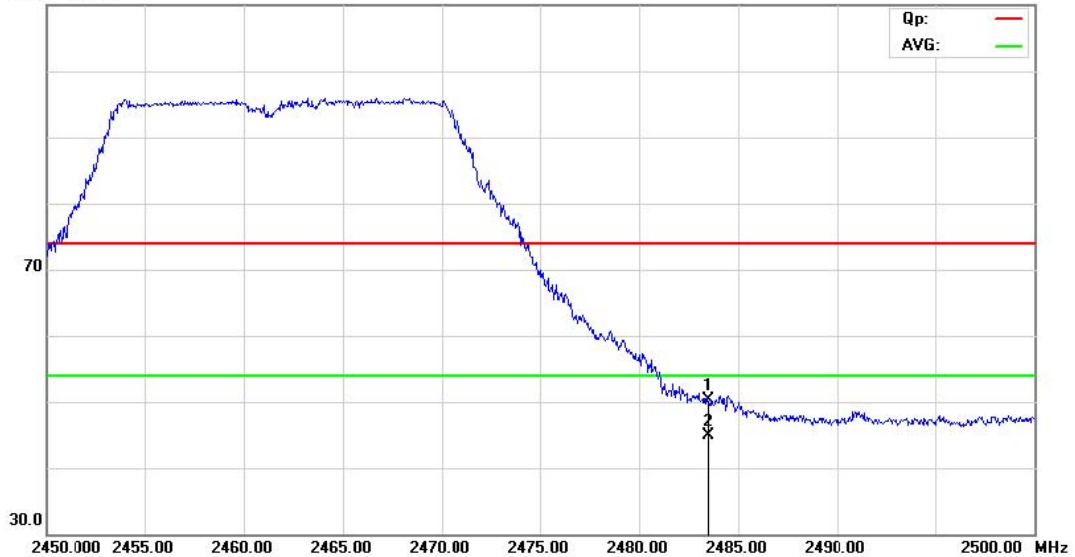
File: ZBOX-PI320

Data: #11

Date: 2014-11-05

Time: 18:16:43

110.0 dBuV/m



Site: MOST #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part15 B Spurious Radiation(PEAK)

Power: AC120V/60Hz

Humidity: 61 %

EUT: Mini PC

Distance:

M/N: ZBOX-PI320

Mode: High CH

Note: 802.11n-HT20

| 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   |     | 2483.500     | 39.51                    | 10.73                   | 50.24                      | 74.00           | -23.76     | peak                    | 0               |         |
| 2   | *   | 2483.500     | 34.21                    | 10.73                   | 44.94                      | 54.00           | -9.06      | AVG                     | 0               |         |

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

Engineer Signature:

Kang



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

### Radiated Emission Measurement

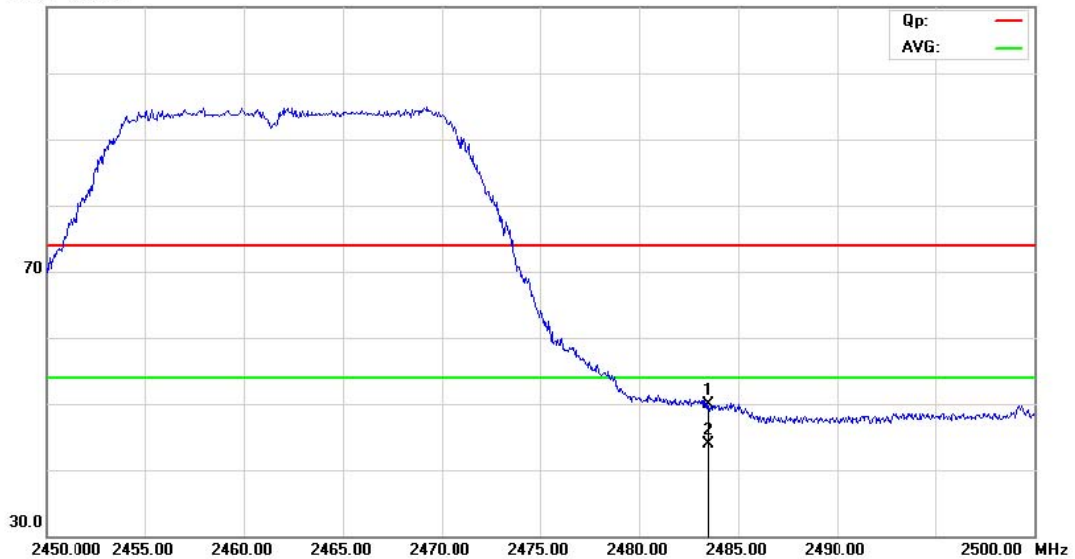
File: ZBOX-PI320

Data: #12

Date: 2014-11-05

Time: 18:22:31

110.0 dBuV/m



Site: MOST #1

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Part15 B Spurious Radiation(PEAK)

Power: AC120V/60Hz

Humidity: 61 %

EUT: Mini PC

Distance:

M/N: ZBOX-PI320

Mode: High CH

Note: 802.11n-HT20

| 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   |     | 2483.500     | 39.21                    | 10.73                   | 49.94                      | 74.00           | -24.06     | peak                    | 0               |         |
| 2   | *   | 2483.500     | 33.21                    | 10.73                   | 43.94                      | 54.00           | -10.06     | AVG                     | 0               |         |

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

Engineer Signature:

Kang

## 5.5 Power Spectral Density (PSD)

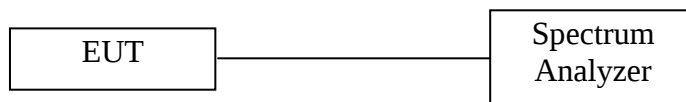
### 5.5.1 Definition

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band.

### 5.5.2 Limit

| FCC Part15(15.247) |                        |                        |                      |        |
|--------------------|------------------------|------------------------|----------------------|--------|
| Section            | Test Item              | Limit                  | Frequency Range(MHz) | Result |
| 15.247             | Power Spectral Density | 8 dBm<br>(in any 3KHz) | 2402-2483.5          | PASS   |

### 5.5.3 Test Configuration

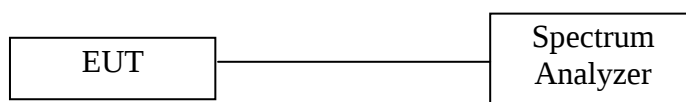


### 5.5.4 Test Description

| Spectrum Parameters | Setting           |
|---------------------|-------------------|
| Attenuation         | Auto              |
| Span Frequency      | 1.5 DTS Bandwidth |
| RB                  | 100kHz            |
| VB                  | 300KHz            |
| Detector            | Peak              |
| Trace               | Max Hold          |
| Sweep Time          | Auto              |

- Set analyzer center frequency to DTS Channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to:  $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$ .
- Set the  $\text{VBW} \geq 3 \times \text{RBW}$ .
- 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 with the RBW.
- If measured value exceeds limit, reduce RBW (no less than 3kHz) and repeat.

### 5.5.5 Test Configuration



### 5.5.6 Operation Condition

The EUT tested system was configured as the statements of 2.1 unless otherwise a special operating condition is specified in the follows during the testing.

### 5.5.7 Test Result

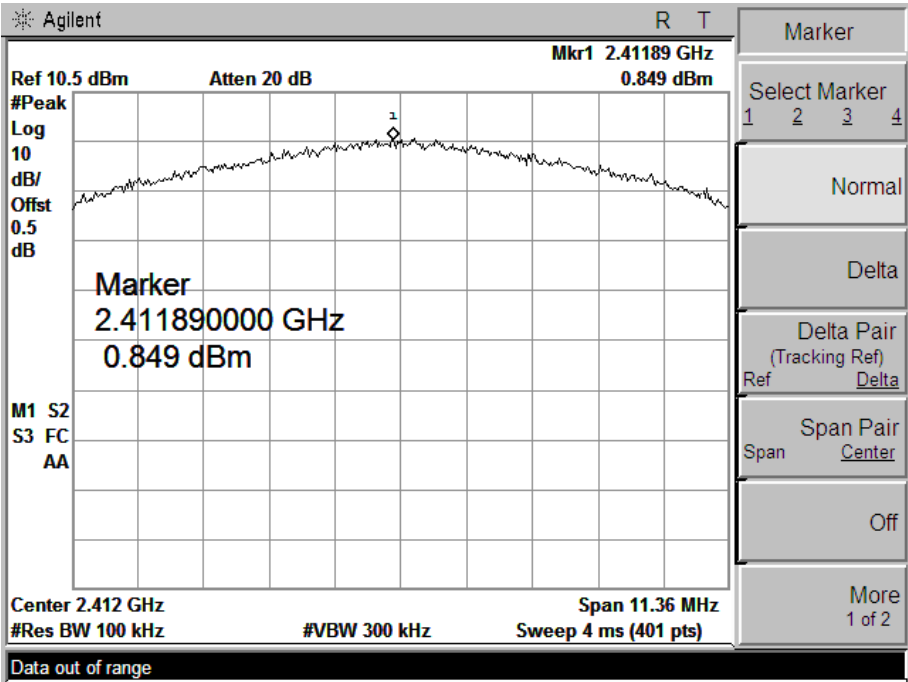
The lowest, middle and highest channels are tested to verify the power spectral density.

5.5.6.1 802.11b Test Mode

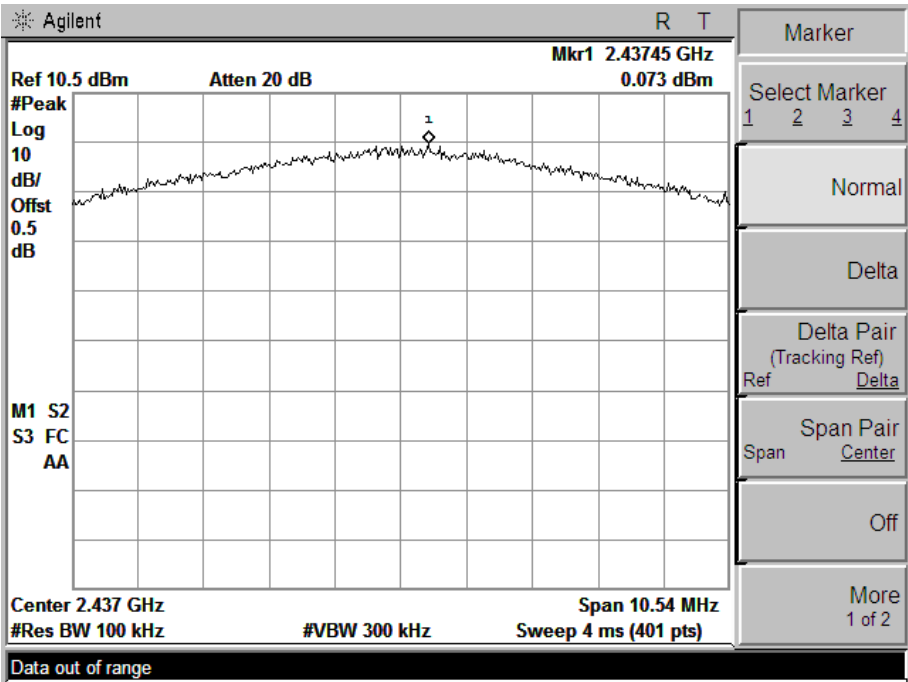
A. Test Verdict:

| Channel | Frequency (MHz) | PSD (dBm) | Limits(dBm) | Result |
|---------|-----------------|-----------|-------------|--------|
| 1       | 2412            | 0.849     | ≤8          | PASS   |
| 7       | 2437            | 0.073     | ≤8          | PASS   |
| 11      | 2462            | -0.142    | ≤8          | PASS   |

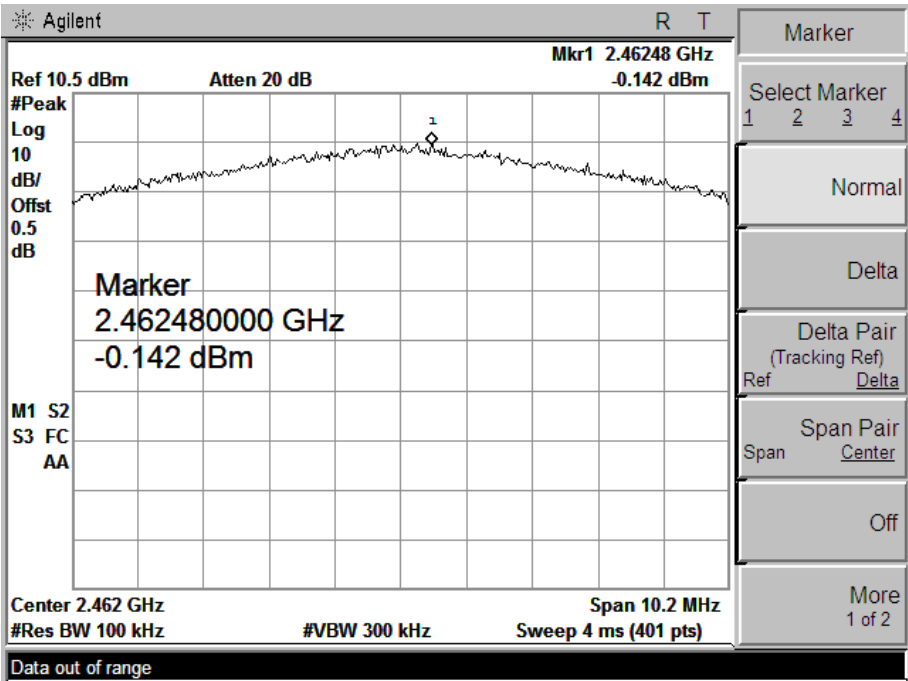
B. Test Plot:



(CH Low)



(CH Mid)



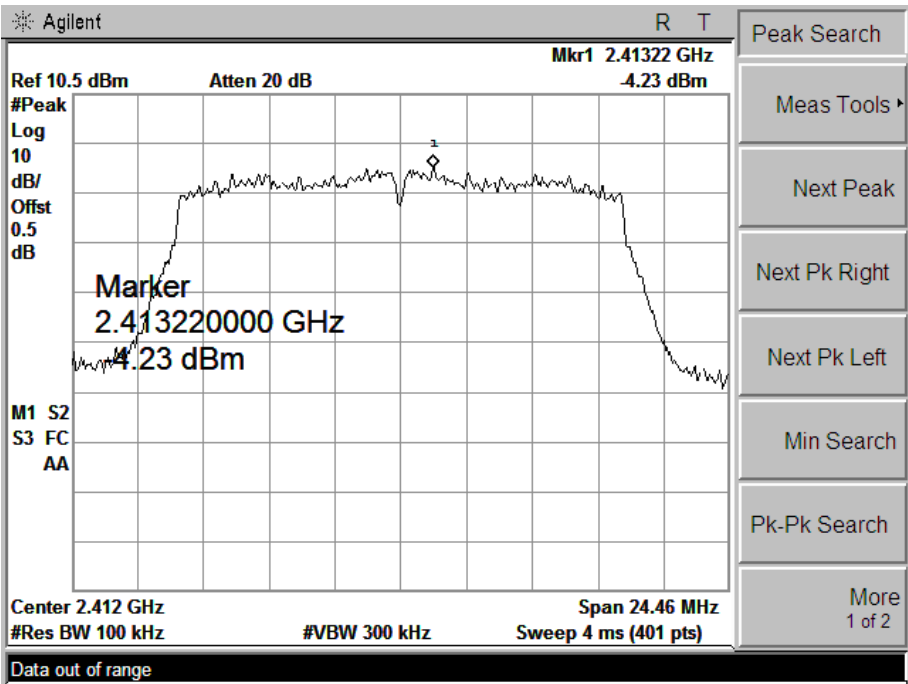
(CH High)

5.5.6.2 802.11g Test Mode

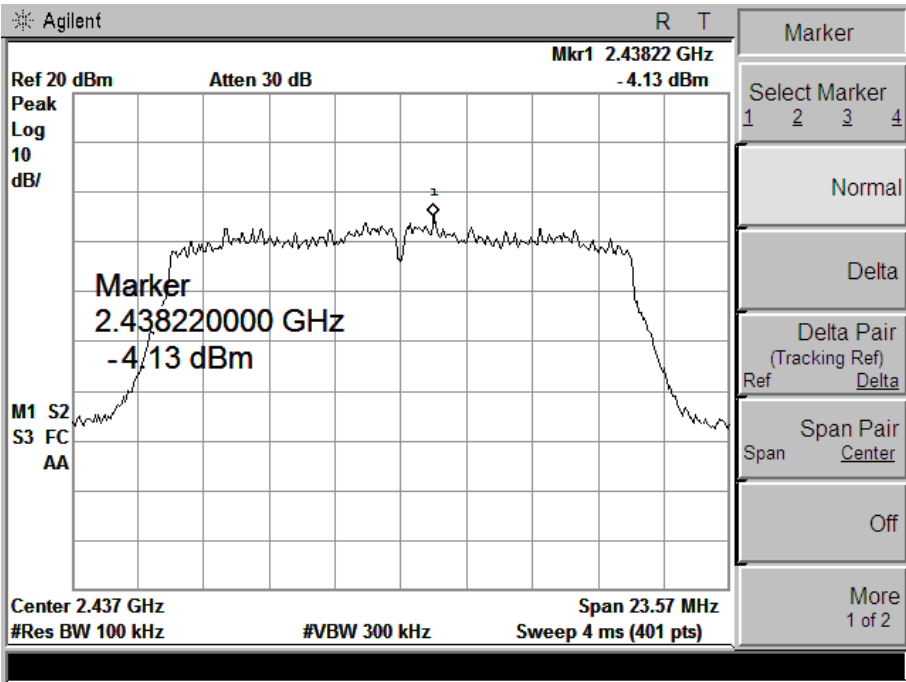
A. Test Verdict:

| Channel | Frequency (MHz) | PSD (dBm) | Limits(dBm) | Result |
|---------|-----------------|-----------|-------------|--------|
| 1       | 2412            | -4.23     | ≤8          | PASS   |
| 7       | 2437            | -4.13     | ≤8          | PASS   |
| 11      | 2462            | -4.995    | ≤8          | PASS   |

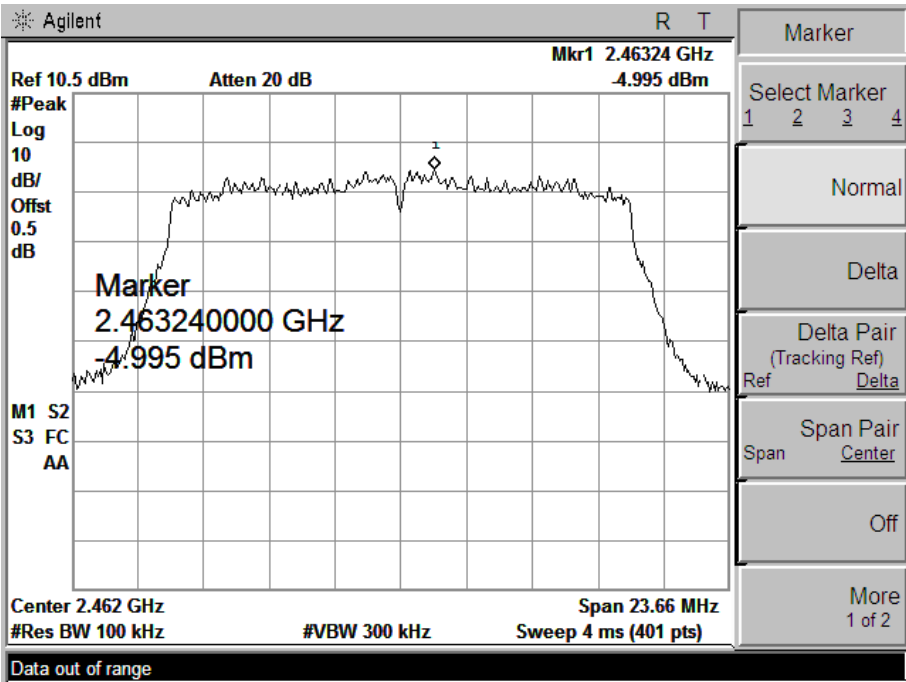
B. Test Plot:



(CH Low)



(CH Mid)



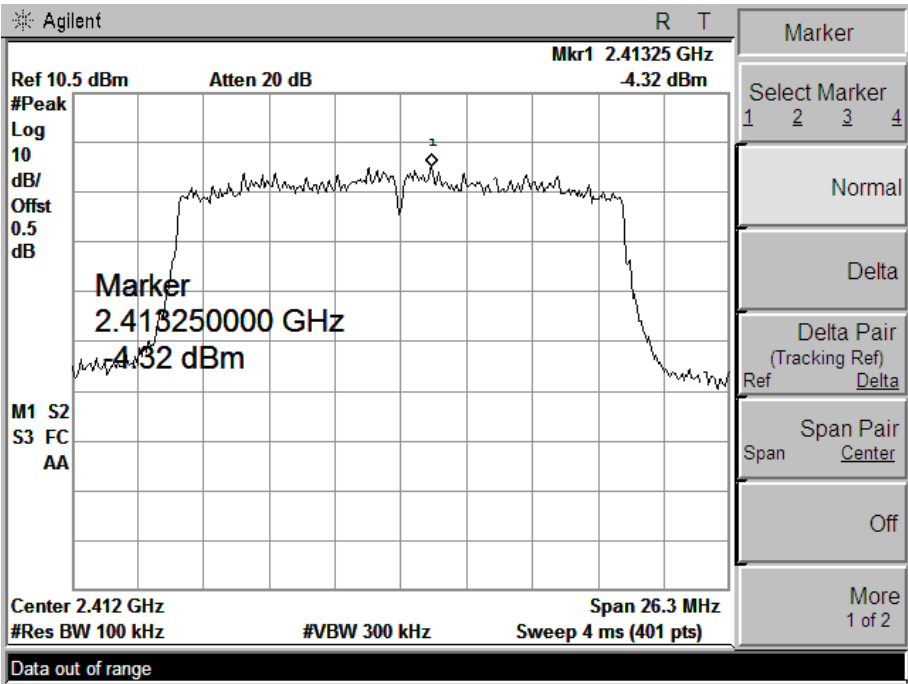
(CH High)

5.5.6.3 802.11n(20MHz) Test Mode

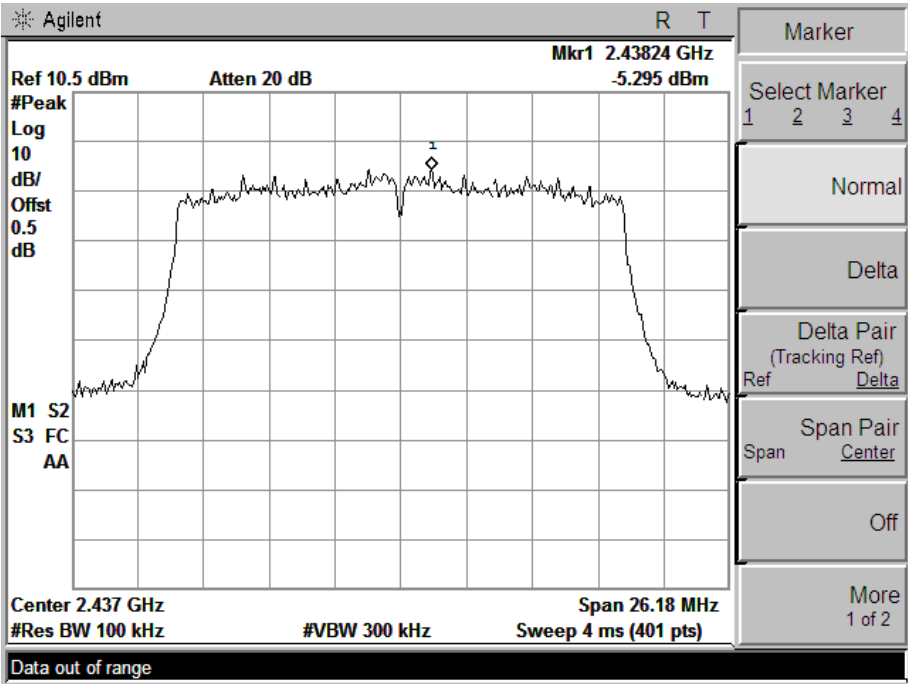
A. Test Verdict:

| Channel | Frequency (MHz) | PSD (dBm) | Limits(dBm) | Result |
|---------|-----------------|-----------|-------------|--------|
| 1       | 2412            | -4.32     | ≤8          | PASS   |
| 7       | 2437            | -5.295    | ≤8          | PASS   |
| 11      | 2462            | -5.011    | ≤8          | PASS   |

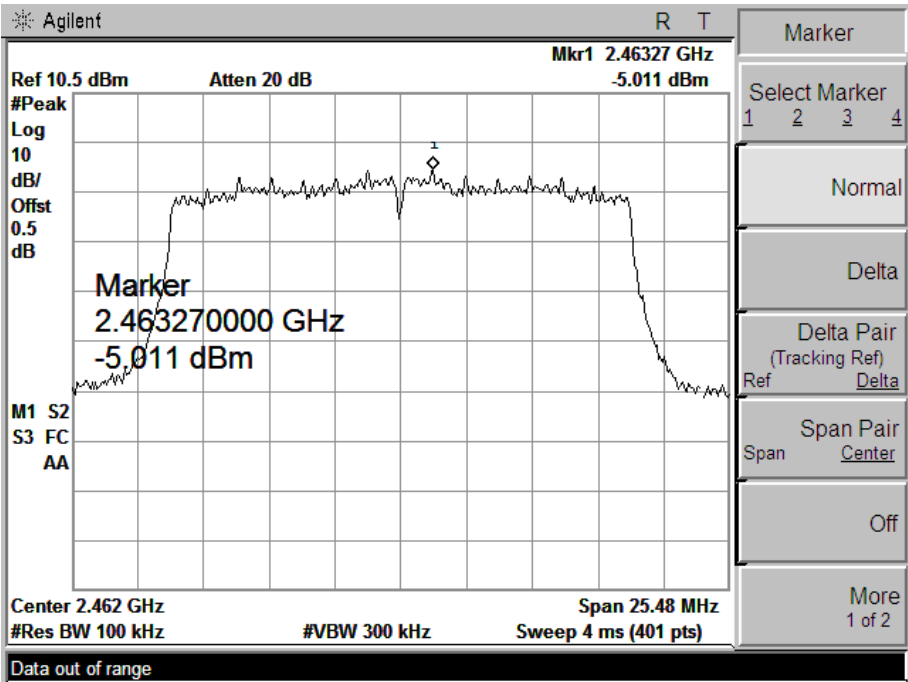
B. Test Plot:



(CH Low)



(CH Mid)



(CH High)

## 5.6 Conducted Emission

### 5.6.1 Definition

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN).

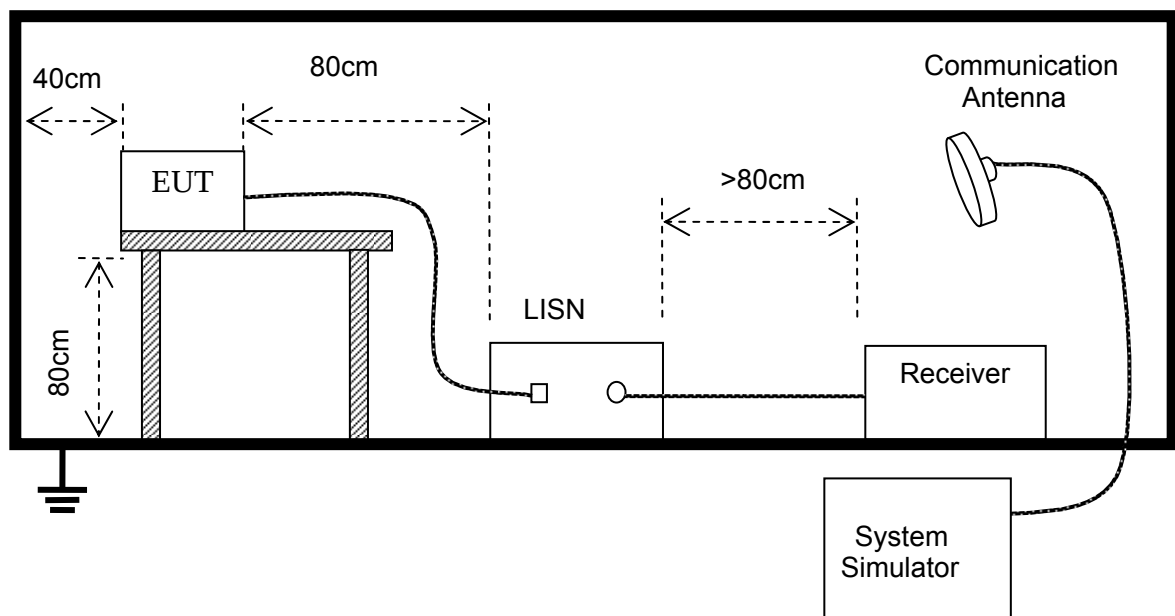
| Frequency     | Maximum RF Line Voltage |                |
|---------------|-------------------------|----------------|
|               | Q.P.( dBuV)             | Average( dBuV) |
| 150kHz-500kHz | 66-56                   | 56-46          |
| 500kHz-5MHz   | 56                      | 46             |
| 5MHz-30MHz    | 60                      | 50             |

**Note:**

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz

### 5.6.2 Test Description

The EUT is powered by the Battery charged with the AC Adapter which is powered by 120V, 60Hz AC mains supply. The path loss as the factor is calibrated to correct the reading. During the measurement, the EUT is activated and is set to operate at maximum power.



### 5.6.3 Test Result

A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.

The Wifi model was carried out for 802.11b/g/n modulation types with two adapters, 802.11b High channel modulation type was the worst case condition, The test data was shown on the summary data page.



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

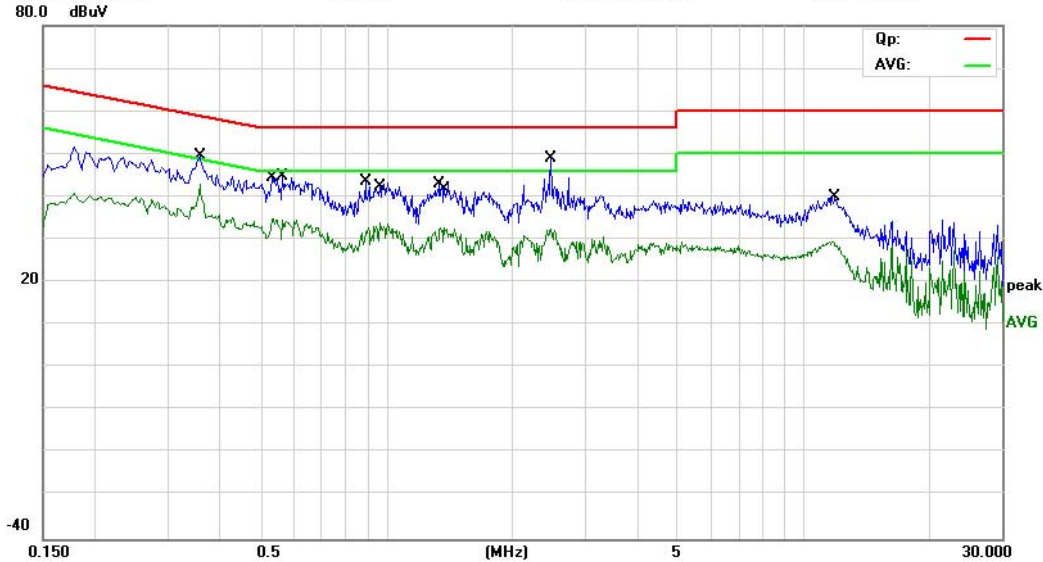
### Conducted Emission Measurement

File: ZBOX-PI320

Data: #3

Date: 2014-11-3

Time: 15:35:33



Site: MOST #1

Phase: **N**

Temperature: 24.9

Limit: FCC Part15 B Class B QP

Power: DC 5V by Adapter

Humidity: 47 %

EUT: Mini PC

M/N: ZBOX-PI320

Mode: WIFI

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   |     | 0.3580       | 38.70                    | 10.95                   | 49.65                    | 58.77         | -9.12      | QP       |         |
| 2   | *   | 0.3580       | 31.86                    | 10.95                   | 42.81                    | 48.77         | -5.96      | AVG      |         |
| 3   |     | 0.5340       | 24.89                    | 10.00                   | 34.89                    | 46.00         | -11.11     | AVG      |         |
| 4   |     | 0.5660       | 34.87                    | 10.00                   | 44.87                    | 56.00         | -11.13     | QP       |         |
| 5   |     | 0.8940       | 33.61                    | 10.00                   | 43.61                    | 56.00         | -12.39     | QP       |         |
| 6   |     | 0.9660       | 23.91                    | 10.00                   | 33.91                    | 46.00         | -12.09     | AVG      |         |
| 7   |     | 1.3420       | 33.40                    | 9.66                    | 43.06                    | 56.00         | -12.94     | QP       |         |
| 8   |     | 1.3780       | 23.27                    | 9.62                    | 32.89                    | 46.00         | -13.11     | AVG      |         |
| 9   |     | 2.4940       | 27.10                    | 9.49                    | 36.59                    | 56.00         | -19.41     | QP       |         |
| 10  |     | 2.4940       | 20.60                    | 9.49                    | 30.09                    | 46.00         | -15.91     | AVG      |         |
| 11  |     | 11.7500      | 20.58                    | 9.00                    | 29.58                    | 50.00         | -20.42     | AVG      |         |
| 12  |     | 11.9060      | 31.02                    | 9.00                    | 40.02                    | 60.00         | -19.98     | QP       |         |

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

Engineer Signature: Robin



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

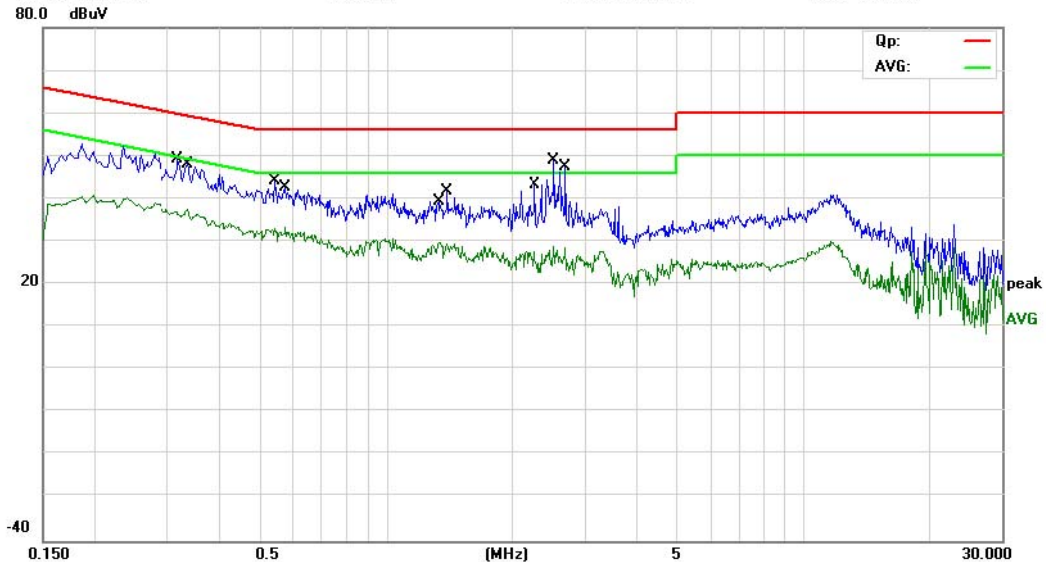
### Conducted Emission Measurement

File: ZBOX-PI320

Data: #4

Date: 2014-11-3

Time: 15:40:44



Site: MOST #1

Phase: **L1**

Temperature: 24.9

Limit: FCC Part15 B Class B QP

Power: DC 5V by Adapter

Humidity: 47 %

EUT: Mini PC

M/N: ZBOX-PI320

Mode: WIFI

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   |     | 0.3180       | 38.01                    | 11.21                   | 49.22                    | 59.76         | -10.54     | QP       |         |
| 2   |     | 0.3340       | 26.55                    | 11.11                   | 37.66                    | 49.35         | -11.69     | AVG      |         |
| 3   |     | 0.5420       | 34.02                    | 10.00                   | 44.02                    | 56.00         | -11.98     | QP       |         |
| 4   |     | 0.5740       | 23.22                    | 10.00                   | 33.22                    | 46.00         | -12.78     | AVG      |         |
| 5   |     | 1.3340       | 20.12                    | 9.67                    | 29.79                    | 46.00         | -16.21     | AVG      |         |
| 6   |     | 1.4020       | 32.12                    | 9.60                    | 41.72                    | 56.00         | -14.28     | QP       |         |
| 7   |     | 2.2700       | 18.47                    | 9.27                    | 27.74                    | 46.00         | -18.26     | AVG      |         |
| 8   |     | 2.2780       | 34.06                    | 9.28                    | 43.34                    | 56.00         | -12.66     | QP       |         |
| 9   | *   | 2.5300       | 39.56                    | 9.53                    | 49.09                    | 56.00         | -6.91      | QP       |         |
| 10  |     | 2.5300       | 19.25                    | 9.53                    | 28.78                    | 46.00         | -17.22     | AVG      |         |
| 11  |     | 2.7020       | 37.64                    | 9.70                    | 47.34                    | 56.00         | -8.66      | QP       |         |
| 12  |     | 2.7020       | 18.97                    | 9.70                    | 28.67                    | 46.00         | -17.33     | AVG      |         |

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

Engineer Signature: Robin

## 5.7 Radiated Emission

### 5.7.1 Definition

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

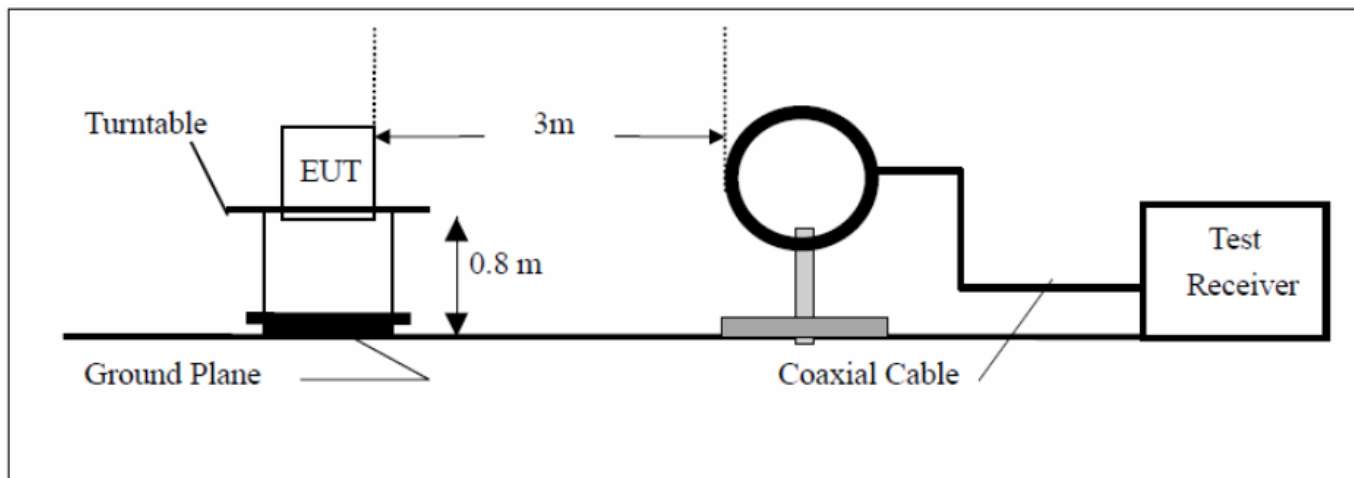
According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength ( $\mu\text{V/m}$ ) | Measurement Distance (m) |
|-----------------|------------------------------------|--------------------------|
| 0.009 - 0.490   | $2400/F(\text{kHz})$               | 300                      |
| 0.490 - 1.705   | $24000/F(\text{kHz})$              | 30                       |
| 1.705 - 30.0    | 30                                 | 30                       |
| 30 - 88         | 100                                | 3                        |
| 88 - 216        | 150                                | 3                        |
| 216 - 960       | 200                                | 3                        |
| Above 960       | 500                                | 3                        |

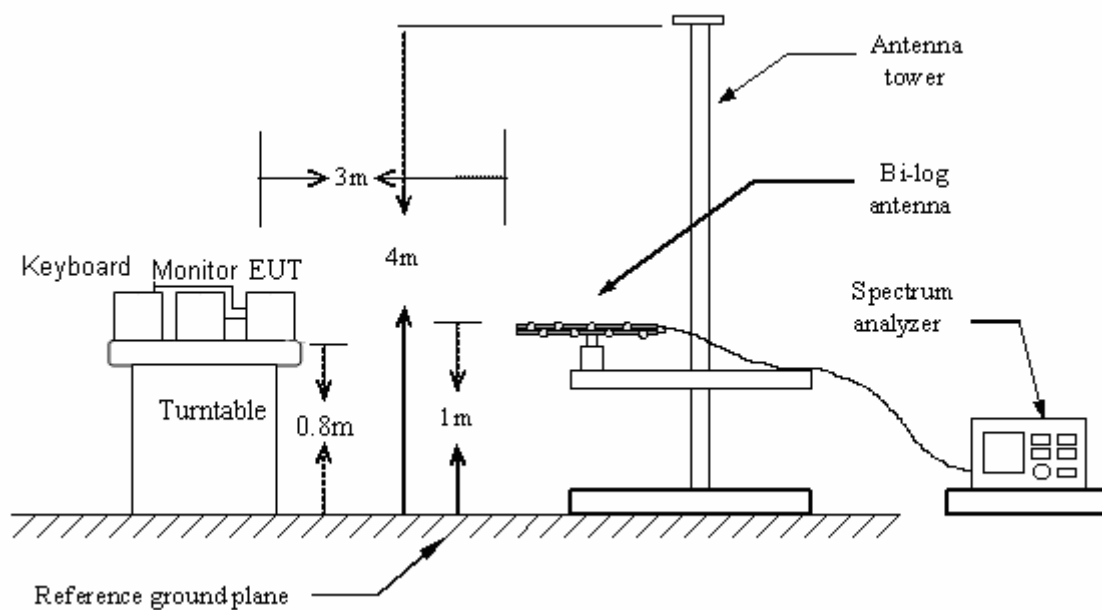
As shown in FCC section 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

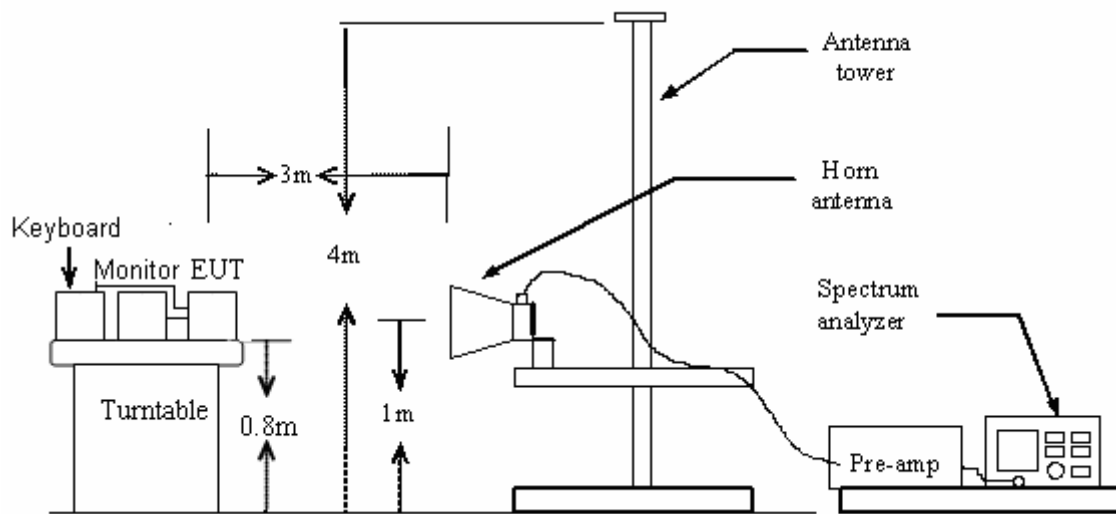
## 5.7.2 Test Description

### A. Test Configuration:



Below 1GHz:



**Above 1GHz:****B. Test procedures**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:  
Below 1GHz: RBW=100 kHz / VBW=300 kHz / Sweep=AUTO  
Above 1GHz : (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO  
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

**5.7.3 Test Result**

The Wifi model was carried out for 802.11b/g/n modulation types with two adapters, 802.11b High channel modulation type was the worst case condition, The test data was shown on the summary data page.

**From 9KHz to 30MHz:**

|              |          |                    |                  |
|--------------|----------|--------------------|------------------|
| EUT:         | Mini PC  | Model Name. :      | ZBOX-PI320       |
| Temperature: | 26 °C    | Relative Humidity: | 61%              |
| Pressure:    | 1010 hPa | Test Voltage :     | DC 5V by Adaptor |
| Test Mode :  | TX       | Polarization :     | --               |

| Freq. | Reading  | Limit    | Margin | State |
|-------|----------|----------|--------|-------|
| (MHz) | (dBuV/m) | (dBuV/m) | (dB)   | P/F   |
| --    | --       | --       | --     | PASS  |
| --    | --       | --       | --     | PASS  |

**Note:**

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

Distance extrapolation factor =  $20 \log (\text{specific distance/test distance})(\text{dB})$ ;

Limit line = specific limits(dBuv) + distance extrapolation factor.

**Conclusion: PASS**

## Below 1 GHz



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

## Radiated Emission Measurement

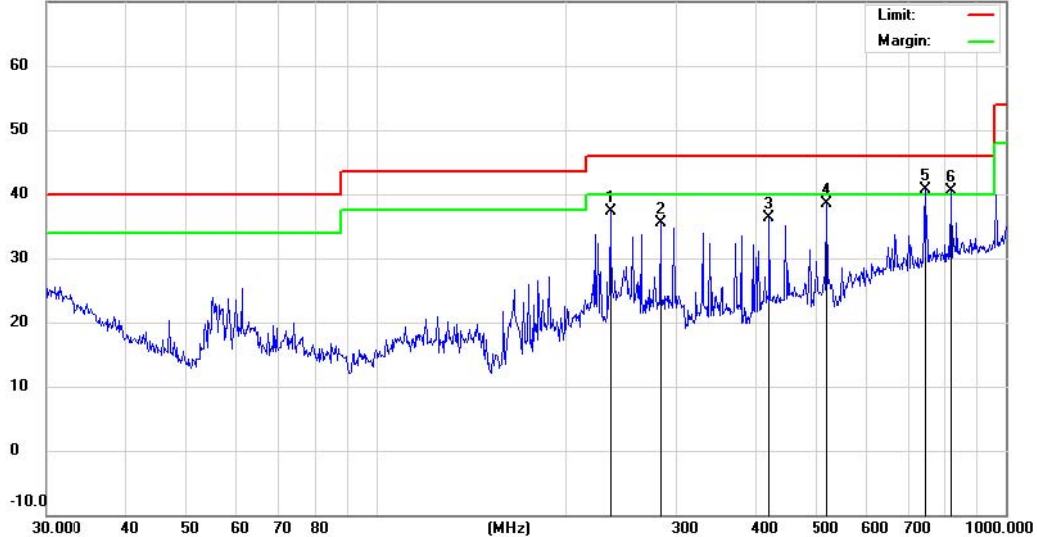
File: ZBOX-PI320

Data: #5

Date: 2014-11-4

Time: 11:12:14

70.0 dBuV/m



Site Chamber #1

Polarization: **Horizontal**

Temperature: 27.2

Limit: FCC Part15 B 3M Radiation

Power: DC 5V by Adapter

Humidity: 46 %

EUT: Mini PC

Distance: 3m

M/N: ZBOX-PI320

Mode: WIFI

Note:

| 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   |     | 235.8163 | 20.32         | 16.91          | 37.23       | 46.00  | -8.77  | QP             |              |         |
| 2   |     | 282.9849 | 16.15         | 19.40          | 35.55       | 46.00  | -10.45 | QP             |              |         |
| 3   |     | 420.5803 | 16.33         | 20.02          | 36.35       | 46.00  | -9.65  | QP             |              |         |
| 4   |     | 520.8881 | 16.68         | 21.83          | 38.51       | 46.00  | -7.49  | QP             |              |         |
| 5   | *   | 744.8659 | 15.13         | 25.65          | 40.78       | 46.00  | -5.22  | QP             |              |         |
| 6   | I   | 818.8340 | 14.13         | 26.43          | 40.56       | 46.00  | -5.44  | QP             |              |         |

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

Engineer Signature:

Cesc



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

### Radiated Emission Measurement

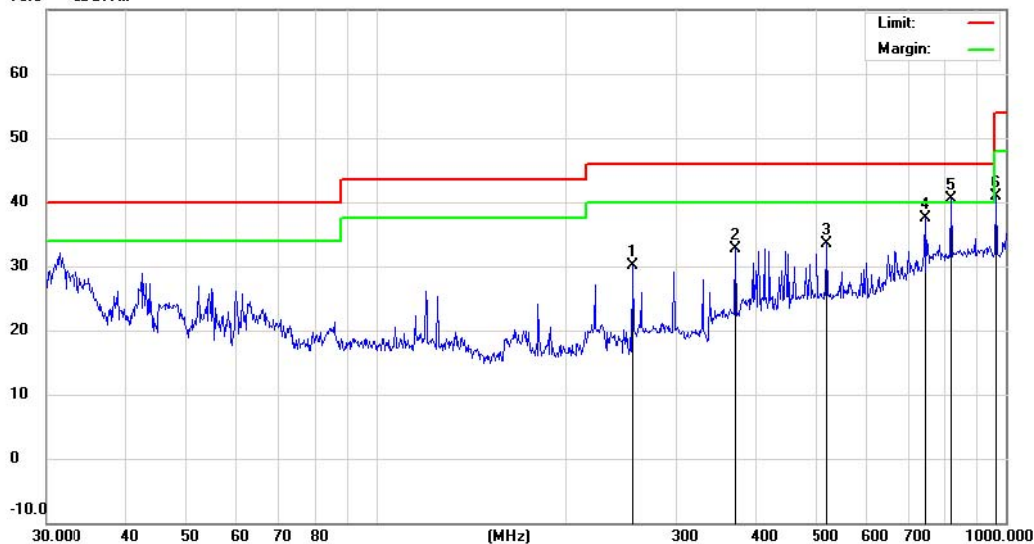
File: ZBOX-PI320

Data: #5

Date: 2014-11-4

Time: 11:36:41

70.0 dBuV/m



Site Chamber #1

Polarization: **Vertical**

Temperature: 27.2

Limit: FCC Part15 B 3M Radiation

Power: DC 5V by Adapter

Humidity: 46 %

EUT: Mini PC

Distance: 3m

M/N: ZBOX-PI320

Mode: WIFI

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |        |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|--------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | Detector       | cm           | degree |
| 1   |     | 255.6231 | 12.51         | 17.51          | 30.02       | 46.00  | -15.98 | QP             |              |        |
| 2   |     | 372.0045 | 14.62         | 18.18          | 32.80       | 46.00  | -13.20 | QP             |              |        |
| 3   |     | 520.8881 | 11.61         | 21.83          | 33.44       | 46.00  | -12.56 | QP             |              |        |
| 4   |     | 744.8659 | 11.76         | 25.65          | 37.41       | 46.00  | -8.59  | QP             |              |        |
| 5   | *   | 818.8340 | 13.98         | 26.43          | 40.41       | 46.00  | -5.59  | QP             |              |        |
| 6   |     | 965.5420 | 12.85         | 28.06          | 40.91       | 54.00  | -13.09 | QP             |              |        |

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

Engineer Signature:

Cesc

**Above 1 GHz**

**Operation Mode:** TX/ IEEE 802.11b/CH Low      **Test Date:** Nov. 04, 2014  
**Temperature:** 26°C      **Tested by:** Roy  
**Humidity:** 70 % RH      **Polarity:** Ver. / Hor.

| Freq.  | Ant. Pol | Peak    | AV      | Ant. / CL | Actual Fs |          | Peak     | AV       | AV     |
|--------|----------|---------|---------|-----------|-----------|----------|----------|----------|--------|
| (MHz)  | H/V      | Reading | Reading | CF        |           |          | Limit    | Limit    | Margin |
|        |          | (dBuV)  | (dBuV)  | (dB)      | Peak      | AV       | (dBuV/m) | (dBuV/m) | (dB)   |
|        |          |         |         |           | (dBuV/m)  | (dBuV/m) |          |          |        |
| 4824.0 | H        | 38.37   | 16.61   | 23.78     | 54.98     | 40.39    | 74.00    | 54.00    | -13.61 |
| N/A    | H        |         |         |           |           |          |          |          |        |
| 4824.0 | V        | 36.26   | 16.12   | 24.01     | 52.38     | 40.13    | 74.00    | 54.00    | -13.87 |
| N/A    | V        |         |         |           |           |          |          |          |        |

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX/ IEEE 802.11b/CH MID      **Test Date:** Nov. 04, 2014  
**Temperature:** 26°C      **Tested by:** Roy  
**Humidity:** 70 % RH      **Polarity:** Ver. / Hor.

| Freq.  | Ant. Pol | Peak    | AV      | Ant. / CL | Actual Fs |          | Peak     | AV       | AV     |
|--------|----------|---------|---------|-----------|-----------|----------|----------|----------|--------|
| (MHz)  | H/V      | Reading | Reading | CF        | Peak      | AV       | Limit    | Limit    | Margin |
|        |          | (dBuV)  | (dBuV)  | (dB)      | (dBuV/m)  | (dBuV/m) | (dBuV/m) | (dBuV/m) | (dB)   |
| 4874.0 | H        | 36.13   | 13.88   | 23.78     | 50.01     | 37.66    | 74.00    | 54.00    | -16.34 |
| N/A    | H        |         |         |           |           |          |          |          |        |
| 4874.0 | V        | 37.16   | 16.23   | 24.01     | 53.39     | 40.24    | 74.00    | 54.00    | -13.76 |
| N/A    | V        |         |         |           |           |          |          |          |        |

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX/ IEEE 802.11b/CH High      **Test Date:** Nov. 04, 2014  
**Temperature:** 26°C      **Tested by:** Roy  
**Humidity:** 70 % RH      **Polarity:** Ver. / Hor.

| Freq.  | Ant. Pol | Peak    | AV      | Ant. / CL | Actual Fs |          | Peak     | AV       | AV     |
|--------|----------|---------|---------|-----------|-----------|----------|----------|----------|--------|
| (MHz)  | H/V      | Reading | Reading | CF        | Peak      | AV       | Limit    | Limit    | Margin |
|        |          | (dBuV)  | (dBuV)  | (dB)      | (dBuV/m)  | (dBuV/m) | (dBuV/m) | (dBuV/m) | (dB)   |
| 4924.0 | H        | 36.73   | 14.28   | 23.78     | 51.01     | 38.06    | 74.00    | 54.00    | -15.94 |
| N/A    | H        |         |         |           |           |          |          |          |        |
| 4924.0 | V        | 34.34   | 15.75   | 24.01     | 50.09     | 39.76    | 74.00    | 54.00    | -14.24 |
| N/A    | V        |         |         |           |           |          |          |          |        |

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX/ IEEE 802.11g/CH Low      **Test Date:** Nov. 04, 2014  
**Temperature:** 26°C      **Tested by:** Roy  
**Humidity:** 70 % RH      **Polarity:** Ver. / Hor.

| Freq.  | Ant. Pol | Peak    | AV      | Ant. / CL | Actual Fs |          | Peak     | AV       | AV     |
|--------|----------|---------|---------|-----------|-----------|----------|----------|----------|--------|
| (MHz)  | H/V      | Reading | Reading | CF        | Peak      | AV       | Limit    | Limit    | Margin |
|        |          | (dBuV)  | (dBuV)  | (dB)      | (dBuV/m)  | (dBuV/m) | (dBuV/m) | (dBuV/m) | (dB)   |
| 4824.0 | H        | 36.31   | 15.50   | 23.78     | 60.09     | 39.28    | 74.00    | 54.00    | -14.72 |
| N/A    | H        |         |         |           |           |          |          |          |        |
| 4824.0 | V        | 38.05   | 13.94   | 24.01     | 62.06     | 37.95    | 74.00    | 54.00    | -16.05 |
| N/A    | V        |         |         |           |           |          |          |          |        |

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX/ IEEE 802.11g/CH MID      **Test Date:** Nov. 04, 2014  
**Temperature:** 26°C      **Tested by:** Roy  
**Humidity:** 70 % RH      **Polarity:** Ver. / Hor.

| Freq.  | Ant. Pol | Peak    | AV      | Ant. / CL | Actual Fs |          | Peak     | AV       | AV     |
|--------|----------|---------|---------|-----------|-----------|----------|----------|----------|--------|
| (MHz)  | H/V      | Reading | Reading | CF        | Peak      | AV       | Limit    | Limit    | Margin |
|        |          | (dBuV)  | (dBuV)  | (dB)      | (dBuV/m)  | (dBuV/m) | (dBuV/m) | (dBuV/m) | (dB)   |
| 4874.0 | H        | 35.92   | 13.86   | 23.78     | 59.70     | 37.64    | 74.00    | 54.00    | -16.36 |
| N/A    | H        |         |         |           |           |          |          |          |        |
| 4874.0 | V        | 35.79   | 14.62   | 24.01     | 59.80     | 38.63    | 74.00    | 54.00    | -15.37 |
| N/A    | V        |         |         |           |           |          |          |          |        |

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX/ IEEE 802.11g/CH High**Test Date:** Nov. 04, 2014**Temperature:** 26°C**Tested by:** Roy**Humidity:** 70 % RH**Polarity:** Ver. / Hor.

| Freq.  | Ant. Pol | Peak    | AV      | Ant. / CL | Actual Fs |       | Peak     | AV       | AV     |
|--------|----------|---------|---------|-----------|-----------|-------|----------|----------|--------|
| (MHz)  | H/V      | Reading | Reading | CF        | Peak      | AV    | Limit    | Limit    | Margin |
|        |          | (dBuV)  | (dBuV)  | (dB)      |           |       | (dBuV/m) | (dBuV/m) | (dB)   |
| 4924.0 | H        | 35.36   | 14.82   | 23.78     | 59.14     | 38.60 | 74.00    | 54.00    | -15.40 |
| N/A    | H        |         |         |           |           |       |          |          |        |
| 4924.0 | V        | 33.99   | 16.52   | 24.01     | 58.00     | 40.53 | 74.00    | 54.00    | -13.47 |
| N/A    | V        |         |         |           |           |       |          |          |        |

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX/ IEEE 802.11n(20MHz)/CH Low  
**Temperature:** 26°C  
**Humidity:** 70 % RH  
**Test Date:** Nov. 04, 2014  
**Tested by:** Roy  
**Polarity:** Ver. / Hor.

| Freq.  | Ant. Pol | Peak    | AV      | Ant. / CL | Actual Fs |          | Peak     | AV       | AV     |
|--------|----------|---------|---------|-----------|-----------|----------|----------|----------|--------|
| (MHz)  | H/V      | Reading | Reading | CF        | Peak      | AV       | Limit    | Limit    | Margin |
|        |          | (dBuV)  | (dBuV)  | (dB)      | (dBuV/m)  | (dBuV/m) | (dBuV/m) | (dBuV/m) | (dB)   |
| 4824.0 | H        | 34.16   | 11.92   | 23.78     | 57.94     | 35.70    | 74.00    | 54.00    | -18.30 |
| N/A    | H        |         |         |           |           |          |          |          |        |
| 4824.0 | V        | 35.33   | 15.16   | 24.01     | 59.34     | 39.17    | 74.00    | 54.00    | -14.83 |
| N/A    | V        |         |         |           |           |          |          |          |        |

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

|                        |                                |                   |               |
|------------------------|--------------------------------|-------------------|---------------|
| <b>Operation Mode:</b> | TX/ IEEE 802.11n(20MHz)/CH Mid | <b>Test Date:</b> | Nov. 04, 2014 |
| <b>Temperature:</b>    | 26°C                           | <b>Tested by:</b> | Roy           |
| <b>Humidity:</b>       | 70 % RH                        | <b>Polarity:</b>  | Ver. / Hor.   |

| Freq.  | Ant. Pol | Peak    | AV      | Ant. / CL | Actual Fs |       | Peak     | AV       | AV     |
|--------|----------|---------|---------|-----------|-----------|-------|----------|----------|--------|
| (MHz)  | H/V      | Reading | Reading | CF        | Peak      | AV    | Limit    | Limit    | Margin |
|        |          | (dBuV)  | (dBuV)  | (dB)      |           |       | (dBuV/m) | (dBuV/m) | (dB)   |
| 4874.0 | H        | 33.51   | 13.43   | 23.78     | 57.29     | 37.21 | 74.00    | 54.00    | -16.79 |
| N/A    | H        |         |         |           |           |       |          |          |        |
|        |          |         |         |           |           |       |          |          |        |
| 4874.0 | V        | 34.57   | 12.49   | 24.01     | 58.58     | 36.50 | 74.00    | 54.00    | -17.50 |
| N/A    | V        |         |         |           |           |       |          |          |        |
|        |          |         |         |           |           |       |          |          |        |

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- 6 Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX/ IEEE 802.11n(20MHz)/CH High

**Test Date:** Nov. 04, 2014

**Temperature:** 26°C

**Tested by:** Roy

**Humidity:** 70 % RH

**Polarity:** Ver. / Hor.

| Freq.  | Ant. Pol | Peak    | AV      | Ant. / CL | Actual Fs |       | Peak     | AV       | AV     |
|--------|----------|---------|---------|-----------|-----------|-------|----------|----------|--------|
| (MHz)  | H/V      | Reading | Reading | CF        | Peak      | AV    | Limit    | Limit    | Margin |
|        |          | (dBuV)  | (dBuV)  | (dB)      |           |       | (dBuV/m) | (dBuV/m) | (dB)   |
| 4924.0 | H        | 33.32   | 13.33   | 23.78     | 57.10     | 37.11 | 74.00    | 54.00    | -16.89 |
| N/A    | H        |         |         |           |           |       |          |          |        |
|        |          |         |         |           |           |       |          |          |        |
| 4924.0 | V        | 33.25   | 13.58   | 24.01     | 57.26     | 37.59 | 74.00    | 54.00    | -16.41 |
| N/A    | V        |         |         |           |           |       |          |          |        |
|        |          |         |         |           |           |       |          |          |        |

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

## **APPENDIX 1**

### **PHOTOGRAPHS OF TEST SETUP**

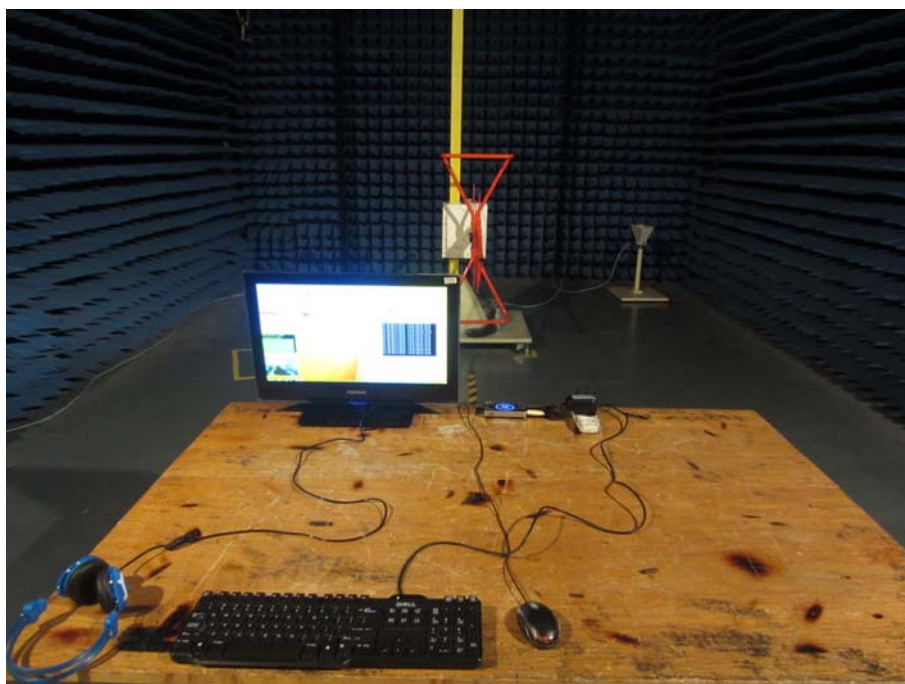
CONDUCTED TEST SETUP



CE TEST SETUP



RE TEST SETUP



-----END OF REPORT-----