

# FCC PART 15 SUBPART C TEST REPORT

## FCC PART 15.247

Report Reference No.....: MWR1411000105

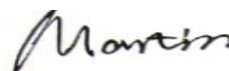
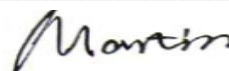
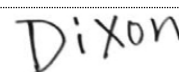
FCC ID.....: RQQHLT-E355

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Date of issue.....: Nov 07, 2014

**Representative Laboratory Name.:** Maxwell International Co., Ltd.

Address.....: Room 509, Hongfa center building, Baoan District, Shenzhen, Guangdong, China

**Testing Laboratory Name.....:** Shenzhen CTL Testing Technology Co., Ltd.

Address.....: Floor 1-A, Baisha Technology Park, No. 3011, Shaheixi Road, Nanshan, Shenzhen, China

**Applicant's name.....:** HYUNDAI CORPORATION

Address.....: 140-2, Kye-dong, Chongro-ku, Seoul, South Korea

**Test specification.....:**

Standard.....: **FCC Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz**

TRF Originator.....: Maxwell International Co., Ltd.

Master TRF.....: Dated 2011-05

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**Test item description.....:** Mobile Phone

Trade Mark.....: HYUNDAI

**Manufacturer.....:** WASAM TECHNOLOGY (SHEN ZHEN) CO.,LTD.

Model/Type reference.....: E355

Listed Models .....: E365

Modulation Type.....: DSSS(CCK,DQPSK,DBPSK),OFDM(64QAM,16QAM,QPSK, BPSK)

Operation Frequency.....: From 2412MHz to 2462MHz

Rating.....: DC 3.70V

Hardware version.....: WW805V 0.5

Software version .....: WW805\_72\_HS\_HYUNDAI\_3G\_324\_KK\_EN\_B25  
\_CO\_V03\_20141027\_1115

Result.....: **PASS**

**TEST REPORT**

|                          |                      |               |
|--------------------------|----------------------|---------------|
| <b>Test Report No. :</b> | <b>MWR1411000105</b> | Nov 07, 2014  |
|                          |                      | Date of issue |

Equipment under Test : Mobile Phone

Model /Type : E355

Listed Models : E365

**Applicant** : **HYUNDAI CORPORATION**

Address : 140-2, Kye-dong, Chongro-ku, Seoul, South Korea

**Manufacturer** **WASAM TECHNOLOGY (SHEN ZHEN) CO.,LTD.**

Address : B,F Building, (Hengqiang Industrial Park), Bogang Taifeng Industrial Zone, Shajing Town, Bao'an District, Shenzhen, China.

|                    |             |
|--------------------|-------------|
| <b>Test Result</b> | <b>PASS</b> |
|--------------------|-------------|

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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## 1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

[ANSI C63.10](#): American National Standard for Testing Unlicensed Wireless Devices

[KDB558074 D01 V03](#): Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

## 2. SUMMARY

### 2.1. General Remarks

|                                |   |              |
|--------------------------------|---|--------------|
| Date of receipt of test sample | : | Oct 10, 2014 |
|                                |   |              |
| Testing commenced on           | : | Oct 11, 2014 |
|                                |   |              |
| Testing concluded on           | : | Nov 06, 2014 |

### 2.2. Product Description

The **HYUNDAI CORPORATION's** Model: E355 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

|                              |                                       |
|------------------------------|---------------------------------------|
| Name of EUT                  | Mobile Phone                          |
| Model Number                 | E355                                  |
| FCC ID                       | RQQHLT-E355                           |
| Modulation Type              | GMSK for GSM/GPRS; QPSK for WCDMA     |
| Antenna Type                 | Internal                              |
| GSM/EDGE/GPRS                | Supported GPRS                        |
| Extreme temp. Tolerance      | -30°C to +50°C                        |
| Extreme vol. Limits          | 3.40VDC to 4.20VDC (nominal: 3.70VDC) |
| GSM Operation Frequency Band | GSM 850MHz/ PCS 1900MHz               |
| GSM Release Version          | R99                                   |
| GPRS operation mode          | Class B                               |
| GPRS Multislot Class         | 12                                    |
| EGPRS Multislot Class        | Only support downlink mode            |

### 2.3. Equipment Under Test

#### Power supply system utilised

|                      |   |                                                                   |                                   |
|----------------------|---|-------------------------------------------------------------------|-----------------------------------|
| Power supply voltage | : | <input type="radio"/> 120V / 60 Hz                                | <input type="radio"/> 115V / 60Hz |
|                      |   | <input type="radio"/> 12 V DC                                     | <input type="radio"/> 24 V DC     |
|                      |   | <input checked="" type="radio"/> Other (specified in blank below) |                                   |

DC 3.70V

### 2.4. Description of the test mode

IEEE 802.11b/g/n: The product support Third channels but only use Eleventh channels in USA.

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

### 2.5. Short description of the Equipment under Test (EUT)

#### 2.5.1 General Description

E355 is subscriber equipment in the WCDMA/GSM system. The HSPA/UMTS frequency band is Band II, Band V; The GSM/GPRS/EDGE (EDGE downlink only) frequency and includes GSM850 and GSM900 and DCS1800 and PCS1900, but only Band II and Band V and GSM850 and PCS1900 bands test data included in

this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS, AGPS and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and SIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

## 2.5.2 Test Modes

| Test Case                                                      | Test Conditions    |                                                                                                                    |
|----------------------------------------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------|
|                                                                | Configuration      | Description                                                                                                        |
| DTS (6 dB) Bandwidth                                           | Measurement Method | FCC KDB 558074 §7.1.1Option2.                                                                                      |
|                                                                | Test Environment   | NTNV                                                                                                               |
|                                                                | EUT Configuration  | 11b_L,11b_M,11b_H<br>11g_L,11g_M,11g_H<br>11n HT20_L, 11n HT20_M, 11n HT20_H<br>11n HT40_L, 11n HT40_M, 11n HT40_H |
|                                                                |                    |                                                                                                                    |
| Maximum Peak Conducted Output Power                            | Measurement Method | FCC KDB 558074§7.2.1.1                                                                                             |
|                                                                | Test Environment   | NTNV                                                                                                               |
|                                                                | Test Setup         | Test Setup 1                                                                                                       |
|                                                                | EUT Configuration  | 11b_L,11b_M,11b_H<br>11g_L,11g_M,11g_H<br>11n HT20_L, 11n HT20_M, 11n HT20_H<br>11n HT40_L, 11n HT40_M, 11n HT40_H |
| Maximum Power Spectral Density Level                           | Measurement Method | FCC KDB 558074 §7.3.1Option 1 (peak PSD).                                                                          |
|                                                                | Test Environment   | NTNV                                                                                                               |
|                                                                | EUT Configuration  | 11b_L,11b_M,11b_H<br>11g_L,11g_M,11g_H<br>11n HT20_L, 11n HT20_M, 11n HT20_H<br>11n HT40_L, 11n HT40_M, 11n HT40_H |
|                                                                |                    |                                                                                                                    |
| Unwanted Emissions into Non-Restricted Frequency Bands         | Measurement Method | FCC KDB 558074§7.4.1, use Peak PSD.                                                                                |
|                                                                | Test Environment   | NTNV                                                                                                               |
|                                                                | Test Setup         | Test Setup 1                                                                                                       |
|                                                                | EUT Configuration  | 11b_L,11b_M,11b_H<br>11g_L,11g_M,11g_H<br>11n HT20_L, 11n HT20_M, 11n HT20_H<br>11n HT40_L, 11n HT40_M, 11n HT40_H |
| Unwanted Emissions into Restricted Frequency Bands (Conducted) | Measurement Method | FCC KDB 558074§7.4.2, Conducted (antenna-port).                                                                    |
|                                                                | Test Environment   | NTNV                                                                                                               |
|                                                                | EUT Configuration  | 11b_L,11b_M,11b_H<br>11g_L,11g_M,11g_H<br>11n HT20_L, 11n HT20_M, 11n HT20_H<br>11n HT40_L, 11n HT40_M, 11n HT40_H |
|                                                                |                    |                                                                                                                    |
| Unwanted Emissions into Restricted                             | Measurement Method | FCC KDB 558074§7.4.2,Radiated(cabinet/case emissions with Impedance matching for antenna-port).                    |
|                                                                | Test Environment   | NTNV                                                                                                               |
|                                                                | EUT Configuration  | 11b_L,11b_M,11b_H<br>11g_L,11g_M,11g_H<br>11n HT20_L, 11n HT20_M, 11n HT20_H<br>11n HT40_L, 11n HT40_M, 11n HT40_H |
|                                                                |                    |                                                                                                                    |

| Test Case                         | Test Conditions    |                      |
|-----------------------------------|--------------------|----------------------|
|                                   | Configuration      | Description          |
| AC Power Line Conducted Emissions | Measurement Method | AC mains conducted.  |
|                                   | Test Environment   | NTNV                 |
|                                   | EUT Configuration  | 11g_M (Worst Conf.). |
|                                   |                    |                      |

Note: 1. For Radiated Emissions, By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "Z axis" position was the worst, then the final test was executed the worst condition and test data were recorded in this report.

2. Typical working modes for each IEEE 802.11 mode are selected to perform tests. The manufacturer provide special test software to control TX duty cycle >98% for TX test; recorded worst case at difference data rate as follows:

| Test Mode | Test Modes Description                                                      |
|-----------|-----------------------------------------------------------------------------|
| 11b       | IEEE 802.11b with data rate of 1 Mbps using SISO mode.                      |
| 11g       | IEEE 802.11g with data rate of 6 Mbps using SISO mode.                      |
| 11n HT20  | IEEE 802.11n with data rate of MCS0 and bandwidth of 20MHz using SISO mode. |
| 11n HT40  | IEEE 802.11n with data rate of MCS7 and bandwidth of 40MHz using SISO mode. |

## 2.6. EUT operation mode

| Test Mode | RF Ch. | BG Port | TX Freq. [MHz]      | RX Freq. [MHz] | Ch. BW [MHz] |
|-----------|--------|---------|---------------------|----------------|--------------|
| 11b       | L      | BG 1    | Ch No. 1 / 2412MHz  | ---            | 20           |
|           |        | BG2     |                     | ---            | 20           |
|           | M      | BG 1    | Ch No. 6 / 2437 MHz | ---            | 20           |
|           |        | BG2     |                     | ---            | 20           |
|           | H      | BG 1    | Ch No. 11/ 2462MHz  | ---            | 20           |
|           |        | BG2     |                     | ---            | 20           |
| 11g       | L      | BG 1    | Ch No. 1 / 2412MHz  | ---            | 20           |
|           |        | BG2     |                     | ---            | 20           |
|           | M      | BG 1    | Ch No. 6 / 2437 MHz | ---            | 20           |
|           |        | BG2     |                     | ---            | 20           |
|           | H      | BG 1    | Ch No. 11/ 2462MHz  | ---            | 20           |
|           |        | BG2     |                     | ---            | 20           |
| 11n HT20  | L      | BG 1    | Ch No. 1 / 2412MHz  | ---            | 20           |
|           |        | BG2     |                     | ---            | 20           |
|           | M      | BG 1    | Ch No. 6 / 2437 MHz | ---            | 20           |
|           |        | BG2     |                     | ---            | 20           |
|           | H      | BG 1    | Ch No. 11/ 2462MHz  | ---            | 20           |
|           |        | BG2     |                     | ---            | 20           |
| 11n HT40  | L      | BG 1    | Ch No. 3/ 2422MHz   | ---            | 40           |
|           |        | BG2     |                     | ---            | 40           |
|           | M      | BG 1    | Ch No. 6 / 2437 MHz | ---            | 40           |
|           |        | BG2     |                     | ---            | 40           |
|           | H      | BG 1    | Ch No. 9/ 2452 MHz  | ---            | 40           |
|           |        | BG2     |                     | ---            | 40           |

## 2.7. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

|   |             |                |   |
|---|-------------|----------------|---|
| ○ | Power Cable | Length (m) :   | / |
|   |             | Shield :       | / |
|   |             | Detachable :   | / |
| ○ | Multimeter  | Manufacturer : | / |
|   |             | Model No. :    | / |

## 2.8. Internal Identification of AE used during the test

| AE ID* | Description |
|--------|-------------|
| AE1    | Charger     |

AE1

Model: E355

INPUT: 100-300V 50/60HZ 0.15A

OUTPUT: DC 5.0V,500mAh

\*AE ID: is used to identify the test sample in the lab internally.

## 2.9. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: RQQHLT-E355** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## 2.10. Modifications

No modifications were implemented to meet testing criteria.

## 2.11. Test Environments

NOTE: The values used in the test report maybe stringent than the declared.

| Environment Parameter | Selected Values During Tests |         |                   |
|-----------------------|------------------------------|---------|-------------------|
| NTNV                  | Temperature                  | Voltage | Relative Humidity |
|                       | Ambient                      | 3.7VDC  | Ambient           |

## 2.12. NOTE

- The EUT is a Mobile Phone with WCDMA/GSM/GPRS,WiFi and Bluetooth fuction,The functions of the EUT listed as below:

|           | Test Standards          | Reference Report |
|-----------|-------------------------|------------------|
| GSM/GPRS  | FCC Part 22/FCC Part 24 | MWR1411000101    |
| WCDMA     | FCC Part 22/FCC Part 24 | MWR1411000102    |
| Bluetooth | FCC Part 15 C 15.247    | MWR1411000103    |
| BLE       | FCC Part 15 C 15.247    | MWR1411000104    |
| WiFi      | FCC Part 15 C 15.247    | MWR1411000105    |
| USB Port  | FCC Part 15 B           | MWR1411000106    |
| SAR       | FCC Part 2 §2.1093      | MWR1411000107    |

- The frequency bands used in this EUT are listed as follows:

| Frequency Band(MHz) | 2400-2483.5 | 5150-5350 | 5470-5725 | 5725-5850 |
|---------------------|-------------|-----------|-----------|-----------|
| 802.11b             | √           | —         | —         | —         |
| 802.11g             | √           | —         | —         | —         |
| 802.11n HT20        | √           | —         | —         | —         |
| 802.11n HT40        | √           | —         | —         | —         |

- The EUT incorporates a SISO function,Physically,the EUT provides one completed transmitter and one completed receiver.

| Modulation Mode | TX Function |
|-----------------|-------------|
| 802.11b         | 1TX         |
| 802.11g         | 1TX         |
| 802.11n HT20    | 1TX         |
| 802.11n HT40    | 1TX         |

### 3. TEST ENVIRONMENT

#### 3.1. Address of the test laboratory

**Shenzhen CTL Testing Technology Co., Ltd.**

Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

#### 3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### FCC-Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, Dec 19, 2013

#### 3.3. Environmental conditions

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

|                       |                     |
|-----------------------|---------------------|
| Temperature:          | <u>15-35 ° C</u>    |
| Humidity:             | <u>30-60 %</u>      |
| Atmospheric pressure: | <u>950-1050mbar</u> |

#### 3.4. Test Description

| Test Item                                                      | FCC Part No.        | Requirements                                                                                                                        | Verdict |
|----------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------|---------|
| DTS (6 dB) Bandwidth                                           | 15.247(a)(2)        | $\geq 500$ kHz.                                                                                                                     | PASS    |
| Maximum Peak Conducted Output Power                            | 15.247(b)(3)        | For directional gain: $< 30\text{dBm} - (G[\text{dBi}] - 6 [\text{dB}])$ , peak;<br>Otherwise : $< 30\text{dBm}$ , peak.            | PASS    |
| Maximum Power Spectral Density Level                           | 15.247(e)           | For directional gain : $< 8\text{dBm}/3$ kHz – $(G[\text{dBi}] - 6[\text{dB}])$ , peak.<br>Otherwise : $< 8\text{dBm}/3$ kHz, peak. | PASS    |
| Band Edges Compliance                                          | 15.247(d)           | $< -20\text{dBm}/100$ kHz if total peak power $\leq$ power limit.                                                                   | PASS    |
| Unwanted Emissions into Non-Restricted Frequency Bands         | 15.247(d)           | $< -20\text{dBm}/100$ kHz if total peak power $\leq$ power limit.                                                                   | PASS    |
| Unwanted Emissions into Restricted Frequency Bands (Conducted) | 15.247(d)<br>15.209 | $< -20\text{dBm}/100$ kHz if total peak power $\leq$ power limit.                                                                   | PASS    |
| Unwanted Emissions into Restricted Frequency Bands (Radiated)  | 15.247(d)<br>15.209 | FCC Part 15.209 field strength limit;                                                                                               | PASS    |
| AC Power Line Conducted Emissions                              | 15.207              | FCC Part 15.207 conducted limit;                                                                                                    | PASS    |

Remark: The measurement uncertainty is not included in the test result.

#### 3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may

result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen CTL Testing Technology Co., Ltd. is reported:

| Test Items                                | Measurement Uncertainty | Notes |
|-------------------------------------------|-------------------------|-------|
| Frequency stability                       | 25 Hz                   | (1)   |
| Transmitter power conducted               | 0.57 dB                 | (1)   |
| Transmitter power Radiated                | 2.20 dB                 | (1)   |
| Conducted spurious emission 9KHz-40 GHz   | 1.60 dB                 | (1)   |
| Radiated spurious emission 9KHz-12.75 GHz | 2.20 dB                 | (1)   |
| Conducted Emission 9KHz-30MHz             | 3.39 dB                 | (1)   |
| Radiated Emission 9KHz-30MHz              | 2.88 dB                 | (1)   |
| Radiated Emission 30~1000MHz              | 4.24 dB                 | (1)   |
| Radiated Emission 1~18GHz                 | 5.16 dB                 | (1)   |
| Radiated Emission 18-40GHz                | 5.54 dB                 | (1)   |
| Occupied Bandwidth                        | -----                   | (1)   |
| Emission Mask                             | -----                   | (1)   |
| Modulation Characteristic                 | -----                   | (1)   |
| Transmitter Frequency Behavior            | -----                   | (1)   |

### 3.6. Equipments Used during the Test

| AC Power Conducted Emission |                   |               |             |            |            |
|-----------------------------|-------------------|---------------|-------------|------------|------------|
| Item                        | Test Equipment    | Manufacturer  | Model No.   | Serial No. | Last Cal.  |
| 1                           | Artificial Mains  | Rohde&Schwarz | ENV216      | 101316     | 2014/07/02 |
| 2                           | EMI Test Receiver | Rohde&Schwarz | ESCI3       | 103710     | 2014/07/02 |
| 3                           | Pulse Limiter     | Com-Power     | LIT-153     | 53226      | 2014/07/01 |
| 4                           | EMI Test Software | Rohde&Schwarz | ES-K1 V1.71 | N/A        | N/A        |
| 5                           | RF Cable4         | /             | Cable000001 | /          | 2014/07/06 |

| Radiated Emission |                    |                              |             |            |            |
|-------------------|--------------------|------------------------------|-------------|------------|------------|
| Item              | Test Equipment     | Manufacturer                 | Model No.   | Serial No. | Last Cal.  |
| 1                 | Bilog Antenna      | Sunol Sciences Corp.         | JB1         | A061713    | 2014/07/12 |
| 2                 | EMI TEST Receivcer | Rohde&Schwarz                | ESCI3       | 103710     | 2014/07/02 |
| 3                 | EMI TEST Software  | Audix                        | E3          | N/A        | N/A        |
| 4                 | EMI TEST Software  | Rohde&Schwarz                | ESK1        | N/A        | N/A        |
| 5                 | HORN ANTENNA       | Sunol Sciences Corp.         | DRH-118     | A062013    | 2014/07/12 |
| 6                 | Amplifer           | HP                           | 8447D       | 3113A07663 | 2014/10/26 |
| 7                 | Preamplifier       | HP                           | 8349B       | 3155A00882 | 2014/07/03 |
| 8                 | Amplifer           | Compliance Direction systems | PAP1-4060   | 129        | 2014/07/03 |
| 9                 | Loop Antenna       | Rohde&Schwarz                | HFH2-Z2     | 100020     | 2014/06/29 |
| 10                | TURNTABLE          | MATURO                       | TT2.0       | ----       | N/A        |
| 11                | ANTENNA MAST       | MATURO                       | TAM-4.0-P   | ----       | N/A        |
| 12                | Horn Antenna       | SCHWARZBECK                  | BBHA9170    | 25849      | 2014/06/21 |
| 13                | Spectrum Analyzer  | Rohde&Schwarz                | FSU26       | 201148     | 2014/07/02 |
| 14                | RF Cable 5         | /                            | Cable000005 | /          | 2014/07/06 |
| 15                | RF Cable 6         | /                            | Cable000006 | /          | 2014/07/06 |

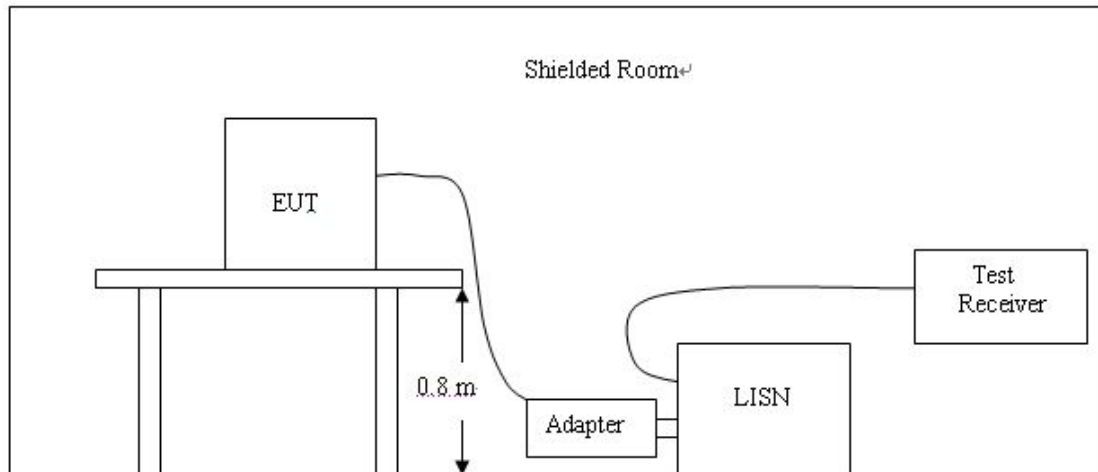
| Maximum Peak Output Power / Power Spectral Density / 6dB Bandwidth / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission |                     |               |             |            |            |
|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------|-------------|------------|------------|
| Item                                                                                                                                      | Test Equipment      | Manufacturer  | Model No.   | Serial No. | Last Cal.  |
| 1                                                                                                                                         | Spectrum Analyzer   | Rohde&Schwarz | FSU26       | 201148     | 2014/07/02 |
| 2                                                                                                                                         | Power Sensor        | Rohde&Schwarz | NRR-Z81     | 256697     | 2014/07/02 |
| 3                                                                                                                                         | MXA Signal Analyzer | Agilent       | N9020A      | MY53420615 | 2014/05/12 |
| 4                                                                                                                                         | RF Cable1           | /             | Cable000001 | /          | 2014/07/06 |

The Cal.Interval was one year

## 4. TEST CONDITIONS AND RESULTS

### 4.1. AC Power Conducted Emission

#### TEST CONFIGURATION



#### TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2009.
2. Support equipment, if needed, was placed as per ANSI C63.10-2009
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2009
4. The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

#### AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following:

| Frequency (MHz) | Maximum RF Line Voltage (dBμV) |      |         |        |
|-----------------|--------------------------------|------|---------|--------|
|                 | CLASS A                        |      | CLASS B |        |
|                 | Q.P.                           | Ave. | Q.P.    | Ave.   |
| 0.15 - 0.50     | 79                             | 66   | 66-56*  | 56-46* |
| 0.50 - 5.00     | 73                             | 60   | 56      | 46     |
| 5.00 - 30.0     | 73                             | 60   | 60      | 50     |

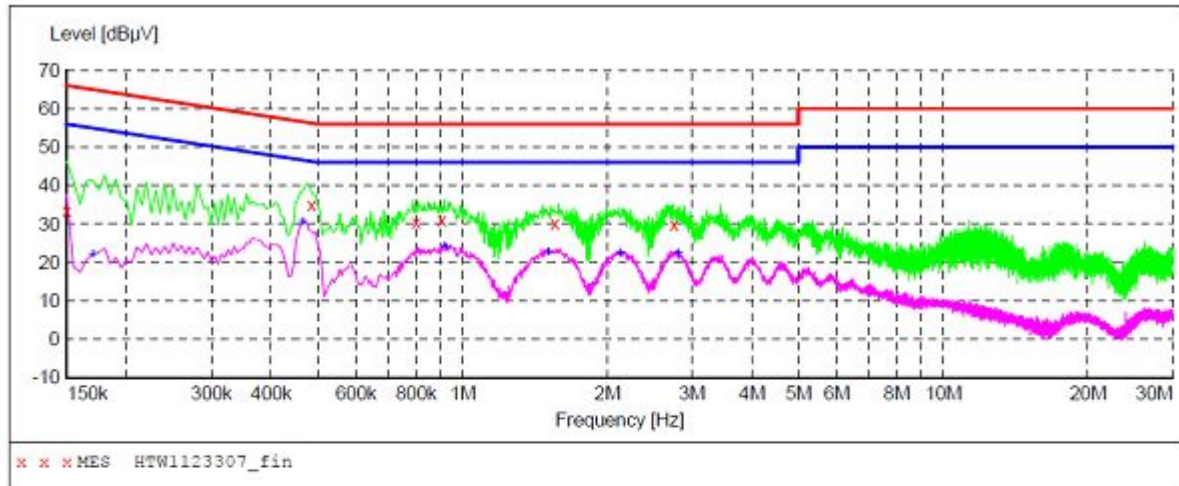
\* Decreasing linearly with the logarithm of the frequency

#### TEST RESULTS

The AC Power Conducted Emission measurement is performed the each test mode (b/g/n) and channel (low/mid/high), the datum recorded below (802.11b mode, the middle channel) is the worst case for all the test modes and channels.

**SCAN TABLE: "Voltage (9K-30M)FIN"**

Short Description: 150K-30M Voltage


**MEASUREMENT**

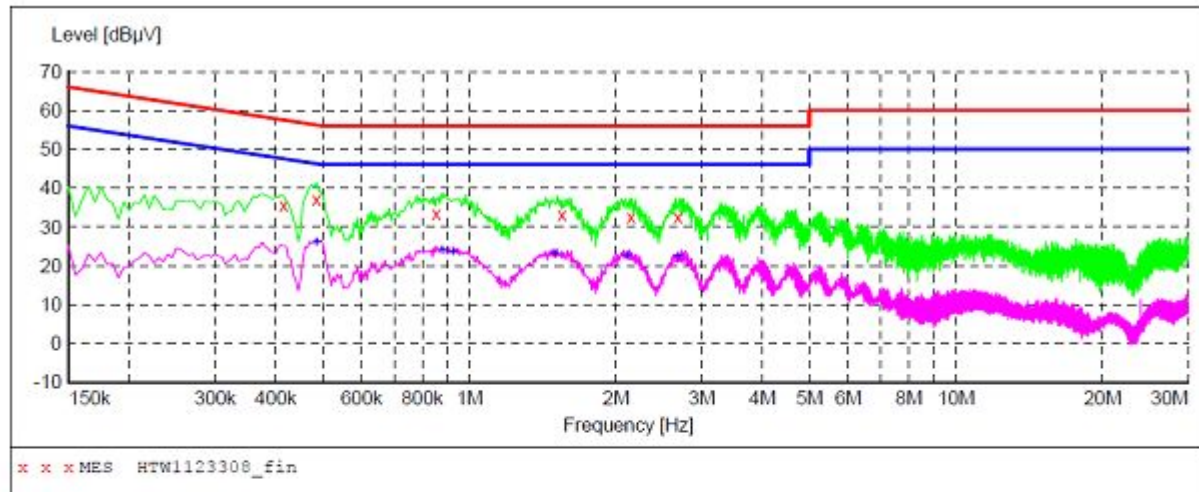
| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.150000         | 33.50         | 10.3         | 66            | 32.5         | QP       | N    | GND |
| 0.485000         | 35.00         | 10.4         | 56            | 21.3         | QP       | N    | GND |
| 0.800000         | 30.50         | 10.2         | 56            | 25.5         | QP       | N    | GND |
| 0.905000         | 31.00         | 10.2         | 56            | 25.0         | QP       | N    | GND |
| 1.555000         | 30.10         | 10.3         | 56            | 25.9         | QP       | N    | GND |
| 2.750000         | 29.70         | 10.3         | 56            | 26.3         | QP       | N    | GND |

**MEASUREMENT**

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.170000         | 22.00         | 10.3         | 55            | 33.0         | AV       | N    | GND |
| 0.465000         | 30.60         | 10.4         | 47            | 16.0         | AV       | N    | GND |
| 0.920000         | 23.90         | 10.2         | 46            | 22.1         | AV       | N    | GND |
| 1.505000         | 22.60         | 10.3         | 46            | 23.4         | AV       | N    | GND |
| 2.130000         | 22.40         | 10.3         | 46            | 23.6         | AV       | N    | GND |
| 2.805000         | 22.20         | 10.3         | 46            | 23.8         | AV       | N    | GND |

**SCAN TABLE: "Voltage (9K-30M) FIN"**

Short Description: 150K-30M Voltage


**MEASUREMENT RESULT:**

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.415000         | 35.40         | 10.4         | 58            | 22.1         | QP       | L1   | GND |
| 0.485000         | 37.00         | 10.4         | 56            | 19.3         | QP       | L1   | GND |
| 0.855000         | 33.50         | 10.2         | 56            | 22.5         | QP       | L1   | GND |
| 1.550000         | 33.10         | 10.3         | 56            | 22.9         | QP       | L1   | GND |
| 2.150000         | 32.70         | 10.3         | 56            | 23.3         | QP       | L1   | GND |
| 2.680000         | 32.50         | 10.3         | 56            | 23.5         | QP       | L1   | GND |

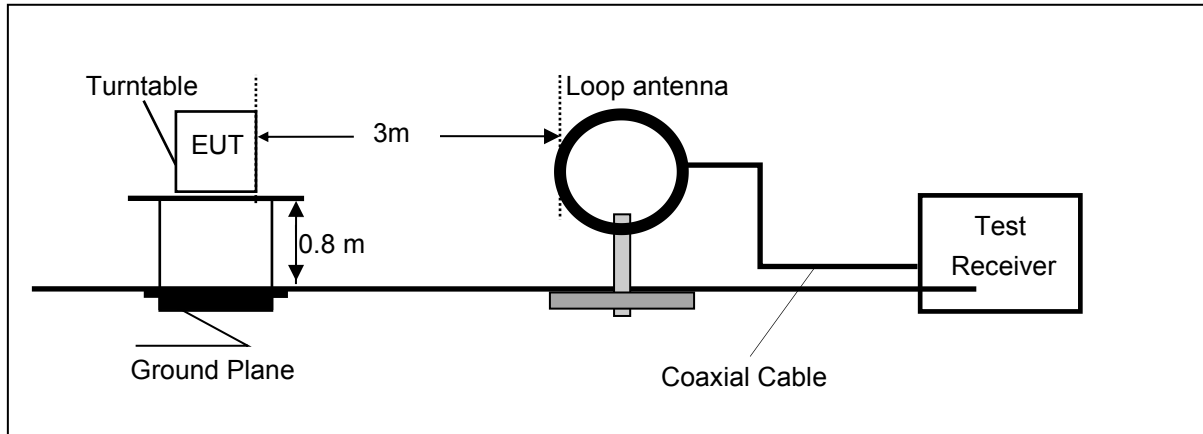
**MEASUREMENT RESULT:**

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.485000         | 25.90         | 10.4         | 46            | 20.4         | AV       | L1   | GND |
| 0.880000         | 23.70         | 10.2         | 46            | 22.3         | AV       | L1   | GND |
| 0.925000         | 23.60         | 10.2         | 46            | 22.4         | AV       | L1   | GND |
| 1.495000         | 22.80         | 10.3         | 46            | 23.2         | AV       | L1   | GND |
| 2.105000         | 22.70         | 10.3         | 46            | 23.3         | AV       | L1   | GND |
| 2.680000         | 22.20         | 10.3         | 46            | 23.8         | AV       | L1   | GND |

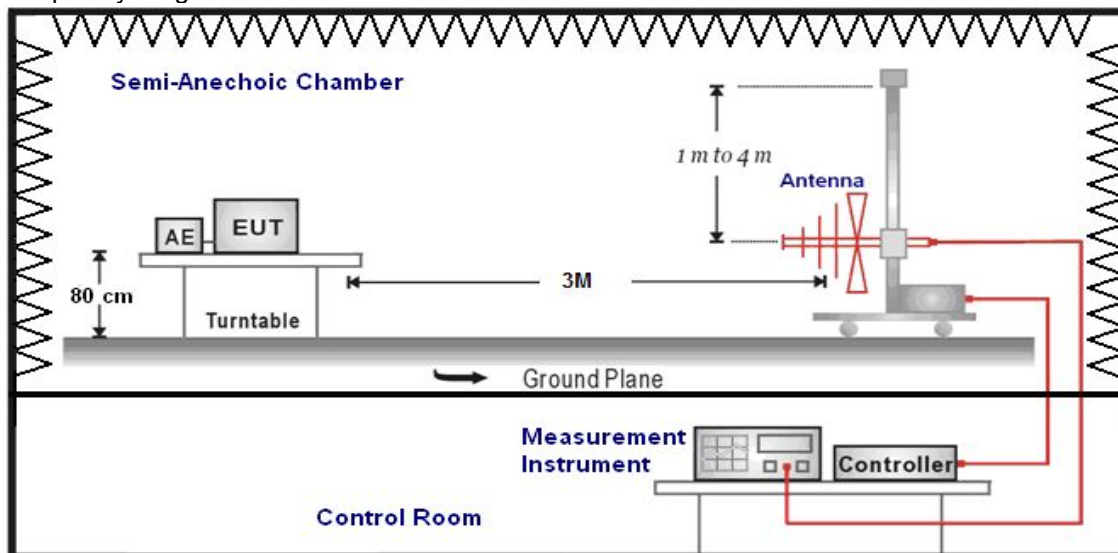
## 4.2. Radiated Emission

### TEST CONFIGURATION

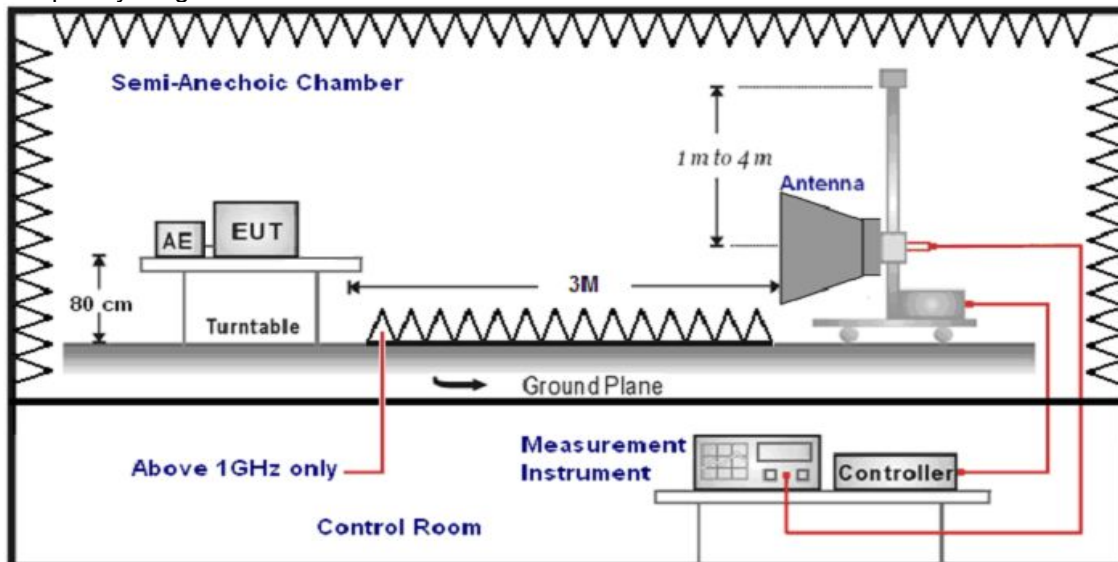
Frequency range 9KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



## TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT minimum operation frequency was 32.768KHz and maximum operation frequency was 2462MHz.so radiated emission test frequency band from 9KHz to 25GHz.

## Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

|                           |                                            |
|---------------------------|--------------------------------------------|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude    | AG = Amplifier Gain                        |
| AF = Antenna Factor       |                                            |

## RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power.

The frequency spectrum above 1 GHz for Transmitter was investigated. All emission not reported are much lower than the prescribed limits. Set the RBW=1MHz,VBW=3MHz for Peak Detector while the RBW=1MHz,VBW=10Hz for Average Detector,Readings are both peak and average values.

| Frequency (MHz) | Distance (Meters) | Radiated (dBμV/m)         | Radiated (μV/m) |
|-----------------|-------------------|---------------------------|-----------------|
| 0.009-0.49      | 300               | $20\log(2400/F(KHz))+80$  | $2400/F(KHz)$   |
| 0.49-1.705      | 30                | $20\log(24000/F(KHz))+40$ | $24000/F(KHz)$  |
| 1.705-30        | 30                | $20\log(30)+40$           | 30              |
| 30-88           | 3                 | 40.0                      | 100             |
| 88-216          | 3                 | 43.5                      | 150             |
| 216-960         | 3                 | 46.0                      | 200             |
| Above 960       | 3                 | 54.0                      | 500             |

## TEST RESULTS

Remark:

1. The radiated measurement are performed the each test mode (b/g/n) and channel (low/mid/high), the datum recorded below (802.11b mode, the middle channel) is the worst case for all the test mode and channel.
2. ULTRA-BROADBAND ANTENNA for the radiation emission test below 1G.
3. HORN ANTENNA for the radiation emission test above 1G.
4. We tested both battery powered and powered by adapter charging mode at three orientate ons, recorded worst case at powered by adapter charging mode.
5. "----" means not recorded as emission levels lower than limit.

### For 9KHz to 30MHz

| Frequency (MHz) | Corrected Reading (dBμV/m)@3m | FCC Limit (dBμV/m) @3m | Margin (dB) | Detector | Result |
|-----------------|-------------------------------|------------------------|-------------|----------|--------|
| 12.00           | 44.11                         | 69.54                  | 25.43       | QP       | PASS   |
| 24.00           | 46.88                         | 69.54                  | 22.66       | QP       | PASS   |

**For 30MHz to 1000MHz**

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Margin Limit (dB) | Polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-------------------|--------------|
| 34.86           | 48.91             | 15.82                 | 0.61            | 32.06                    | 33.28          | 40.00               | 6.72              | Vertical     |
| 113.35          | 47.36             | 14.15                 | 1.31            | 31.83                    | 30.99          | 43.50               | 12.51             | Vertical     |
| 234.17          | 43.56             | 14.88                 | 2.04            | 32.16                    | 28.32          | 46.00               | 17.68             | Vertical     |
| 742.26          | 38.29             | 22.34                 | 4.24            | 31.25                    | 33.62          | 46.00               | 12.38             | Vertical     |
| 34.26           | 47.72             | 15.80                 | 0.60            | 32.06                    | 32.06          | 40.00               | 7.94              | Horizontal   |
| 96.44           | 46.91             | 16.02                 | 1.16            | 31.75                    | 32.34          | 43.50               | 11.16             | Horizontal   |
| 147.36          | 52.08             | 11.27                 | 1.55            | 31.97                    | 32.93          | 43.50               | 10.57             | Horizontal   |
| 239.13          | 41.01             | 15.06                 | 2.06            | 32.16                    | 25.97          | 46.00               | 20.03             | Horizontal   |

**For 1GHz to 25GHz**
**802.11b Mode(above 1GHz)**

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11b--2412MHz) |                 |                         |    |                |             |                    |                      |                  |                       |                   |               |                          |
|------------------------------------------------------------------------|-----------------|-------------------------|----|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| No.                                                                    | Frequency (MHz) | Emission Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
| 1                                                                      | 4824.00         | 57.11                   | PK | 74.00          | 16.89       | 1.00               | 202                  | 55.01            | 31.60                 | 7.00              | 36.5          | 2.10                     |
| 1                                                                      | 4824.00         | 43.64                   | AV | 54.00          | 10.36       | 1.00               | 202                  | 41.54            | 31.60                 | 7.00              | 36.5          | 2.10                     |
| 2                                                                      | 7236.00         | 59.02                   | PK | 74.00          | 14.98       | 1.00               | 288                  | 48.09            | 37.33                 | 8.90              | 35.3          | 10.93                    |
| 2                                                                      | 7236.00         | 42.79                   | AV | 54.00          | 11.21       | 1.00               | 288                  | 31.86            | 37.33                 | 8.90              | 35.3          | 10.93                    |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11b--2412MHz) |                 |                         |    |                |             |                    |                      |                  |                       |                   |               |                          |
|----------------------------------------------------------------------|-----------------|-------------------------|----|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| No.                                                                  | Frequency (MHz) | Emission Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
| 1                                                                    | 4824.00         | 54.61                   | PK | 74.00          | 19.39       | 1.00               | 35                   | 52.51            | 31.60                 | 7.00              | 36.5          | 2.10                     |
| 1                                                                    | 4824.00         | 40.49                   | AV | 54.00          | 13.51       | 1.00               | 35                   | 38.39            | 31.60                 | 7.00              | 36.5          | 2.10                     |
| 2                                                                    | 7236.00         | 57.24                   | PK | 74.00          | 16.76       | 1.00               | 177                  | 46.31            | 37.33                 | 8.90              | 35.3          | 10.93                    |
| 2                                                                    | 7236.00         | 39.85                   | AV | 54.00          | 14.15       | 1.00               | 177                  | 28.92            | 37.33                 | 8.90              | 35.3          | 10.93                    |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11b--2437MHz) |                 |                         |    |                |             |                    |                      |                  |                       |                   |               |                          |
|------------------------------------------------------------------------|-----------------|-------------------------|----|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| No.                                                                    | Frequency (MHz) | Emission Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
| 1                                                                      | 4824.00         | 58.29                   | PK | 74.00          | 15.71       | 1.00               | 199                  | 56.17            | 31.60                 | 7.00              | 36.5          | 2.12                     |
| 1                                                                      | 4824.00         | 43.61                   | AV | 54.00          | 10.39       | 1.00               | 199                  | 41.49            | 31.60                 | 7.00              | 36.5          | 2.12                     |
| 2                                                                      | 7236.00         | 59.42                   | PK | 74.00          | 14.58       | 1.00               | 27                   | 48.34            | 37.33                 | 8.90              | 35.3          | 11.08                    |
| 2                                                                      | 7236.00         | 42.56                   | AV | 54.00          | 11.44       | 1.00               | 27                   | 31.48            | 37.33                 | 8.90              | 35.3          | 11.08                    |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11b--2437MHz) |                 |                         |    |                |             |                    |                      |                  |                       |                   |               |                          |
|----------------------------------------------------------------------|-----------------|-------------------------|----|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| No.                                                                  | Frequency (MHz) | Emission Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
| 1                                                                    | 4874.00         | 55.69                   | PK | 74.00          | 18.31       | 1.00               | 108                  | 53.57            | 31.02                 | 7.60              | 36.5          | 2.12                     |
| 1                                                                    | 4874.00         | 42.08                   | AV | 54.00          | 11.92       | 1.00               | 108                  | 39.96            | 31.02                 | 7.60              | 36.5          | 2.12                     |
| 2                                                                    | 7311.00         | 57.46                   | PK | 74.00          | 16.54       | 1.00               | 124                  | 46.38            | 37.28                 | 8.60              | 34.8          | 11.08                    |
| 2                                                                    | 7311.00         | 40.78                   | AV | 54.00          | 13.22       | 1.00               | 124                  | 29.70            | 37.28                 | 8.60              | 34.8          | 11.08                    |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11b--2462MHz) |                 |                        |    |                |             |                    |                      |                  |                       |                   |               |                          |
|------------------------------------------------------------------------|-----------------|------------------------|----|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| No.                                                                    | Frequency (MHz) | Emssion Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
| 1                                                                      | 4924.00         | 57.44                  | PK | 74.00          | 16.56       | 1.00               | 319                  | 55.06            | 31.58                 | 7.00              | 36.2          | 2.38                     |
| 1                                                                      | 4924.00         | 42.38                  | AV | 54.00          | 11.62       | 1.00               | 319                  | 40.00            | 31.58                 | 7.00              | 36.2          | 2.38                     |
| 2                                                                      | 7386.00         | 58.30                  | PK | 74.00          | 15.7        | 1.00               | 177                  | 46.59            | 38.51                 | 8.50              | 35.3          | 11.71                    |
| 2                                                                      | 7386.00         | 42.25                  | AV | 54.00          | 11.75       | 1.00               | 177                  | 30.54            | 38.51                 | 8.50              | 35.3          | 11.71                    |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11b--2462MHz) |                 |                        |    |                |             |                    |                      |                  |                       |                   |               |                          |
|----------------------------------------------------------------------|-----------------|------------------------|----|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| No.                                                                  | Frequency (MHz) | Emssion Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
| 1                                                                    | 4924.00         | 54.69                  | PK | 74.00          | 19.31       | 1.00               | 128                  | 52.31            | 31.58                 | 7.00              | 36.2          | 2.38                     |
| 1                                                                    | 4924.00         | 41.52                  | AV | 54.00          | 12.48       | 1.00               | 128                  | 39.14            | 31.58                 | 7.00              | 36.2          | 2.38                     |
| 2                                                                    | 7386.00         | 56.40                  | PK | 74.00          | 17.60       | 1.00               | 125                  | 44.69            | 38.51                 | 8.50              | 35.3          | 11.71                    |
| 2                                                                    | 7386.00         | 39.84                  | AV | 54.00          | 14.16       | 1.00               | 125                  | 28.13            | 38.51                 | 8.50              | 35.3          | 11.71                    |

- REMARKS:**
1. Emission level (dBuV/m)=Raw Value(dBuV)+Correction Factor(dB/m)
  2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
  3. The other emission levels were very low against the limit.
  4. Margin value = Limit value- Emission level.
  5. For Wireless 802.11b mode at 1Mbps.

#### 802.11g Mode(above 1GHz)

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11g--2412MHz) |                 |                        |    |                |             |                    |                      |                  |                       |                   |               |                          |
|------------------------------------------------------------------------|-----------------|------------------------|----|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| No.                                                                    | Frequency (MHz) | Emssion Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
| 1                                                                      | 4824.00         | 57.48                  | PK | 74.00          | 16.52       | 1.00               | 79                   | 55.38            | 31.60                 | 7.00              | 36.5          | 2.10                     |
| 1                                                                      | 4824.00         | 43.05                  | AV | 54.00          | 10.95       | 1.00               | 79                   | 40.95            | 31.60                 | 7.00              | 36.5          | 2.10                     |
| 2                                                                      | 7236.00         | 58.29                  | PK | 74.00          | 15.71       | 1.00               | 166                  | 47.36            | 37.33                 | 8.90              | 35.3          | 10.93                    |
| 2                                                                      | 7236.00         | 41.66                  | AV | 54.00          | 12.34       | 1.00               | 166                  | 30.73            | 37.33                 | 8.90              | 35.3          | 10.93                    |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11g--2412MHz) |                 |                        |    |                |             |                    |                      |                  |                       |                   |               |                          |
|----------------------------------------------------------------------|-----------------|------------------------|----|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| No.                                                                  | Frequency (MHz) | Emssion Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
| 1                                                                    | 4824.00         | 53.96                  | PK | 74.00          | 20.04       | 1.00               | 110                  | 51.86            | 31.6                  | 7.00              | 36.5          | 2.10                     |
| 1                                                                    | 4824.00         | 39.67                  | AV | 54.00          | 14.33       | 1.00               | 110                  | 37.57            | 31.6                  | 7.00              | 36.5          | 2.10                     |
| 2                                                                    | 7236.00         | 56.58                  | PK | 74.00          | 17.42       | 1.00               | 236                  | 45.65            | 37.33                 | 8.90              | 35.3          | 10.93                    |
| 2                                                                    | 7236.00         | 39.72                  | AV | 54.00          | 14.28       | 1.00               | 236                  | 28.79            | 37.33                 | 8.90              | 35.3          | 10.93                    |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11g--2437MHz) |                 |                        |    |                |             |                    |                      |                  |                       |                   |               |                          |
|------------------------------------------------------------------------|-----------------|------------------------|----|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| No.                                                                    | Frequency (MHz) | Emssion Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
| 1                                                                      | 4874.00         | 57.55                  | PK | 74.00          | 16.45       | 1.00               | 330                  | 55.43            | 31.02                 | 7.60              | 36.5          | 2.12                     |
| 1                                                                      | 4874.00         | 43.44                  | AV | 54.00          | 10.56       | 1.00               | 330                  | 41.32            | 31.02                 | 7.60              | 36.5          | 2.12                     |
| 2                                                                      | 7311.00         | 58.29                  | PK | 74.00          | 15.71       | 1.00               | 279                  | 47.21            | 37.28                 | 8.60              | 34.8          | 11.08                    |
| 2                                                                      | 7311.00         | 42.11                  | AV | 54.00          | 11.89       | 1.00               | 279                  | 31.03            | 37.28                 | 8.60              | 34.8          | 11.08                    |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11g--2437MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4874.00         | 55.02 PK               | 74.00          | 18.98       | 1.00               | 164                  | 52.90            | 31.02                 | 7.60              | 36.5          | 2.12                     |
| 1   | 4874.00         | 41.67 AV               | 54.00          | 12.33       | 1.00               | 164                  | 39.55            | 31.02                 | 7.60              | 36.5          | 2.12                     |
| 2   | 7311.00         | 56.87 PK               | 74.00          | 17.13       | 1.00               | 108                  | 45.79            | 37.28                 | 8.60              | 34.8          | 11.08                    |
| 2   | 7311.00         | 41.06 AV               | 54.00          | 12.94       | 1.00               | 108                  | 29.98            | 37.28                 | 8.60              | 34.8          | 11.08                    |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11g--2462MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4924.00         | 56.91 PK               | 74.00          | 17.09       | 1.00               | 274                  | 54.53            | 31.58                 | 7.00              | 36.2          | 2.38                     |
| 1   | 4924.00         | 41.97 AV               | 54.00          | 12.03       | 1.00               | 274                  | 39.59            | 31.58                 | 7.00              | 36.2          | 2.38                     |
| 2   | 7386.00         | 57.59 PK               | 74.00          | 16.41       | 1.00               | 225                  | 45.88            | 38.51                 | 8.50              | 35.3          | 11.71                    |
| 2   | 7386.00         | 42.06 AV               | 54.00          | 11.94       | 1.00               | 225                  | 30.35            | 38.51                 | 8.50              | 35.3          | 11.71                    |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11g--2462MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4924.00         | 53.87 PK               | 74.00          | 20.13       | 1.00               | 13                   | 51.49            | 31.58                 | 7.00              | 36.2          | 2.38                     |
| 1   | 4924.00         | 41.15 AV               | 54.00          | 12.85       | 1.00               | 13                   | 38.77            | 31.58                 | 7.00              | 36.2          | 2.38                     |
| 2   | 7311.00         | 55.54 PK               | 74.00          | 18.46       | 1.00               | 189                  | 43.83            | 38.51                 | 8.50              | 35.3          | 11.71                    |
| 2   | 7311.00         | 39.78 AV               | 54.00          | 14.22       | 1.00               | 189                  | 28.07            | 38.51                 | 8.50              | 35.3          | 11.71                    |

- REMARKS:**
1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
  2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
  3. The other emission levels were very low against the limit.
  4. Margin value = Limit value- Emission level.
  5. For Wireless 802.11g mode at 6Mbps.

**802.11n HT20 Mode(above 1GHz)**
**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n HT20--2412MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4824.00         | 55.56 PK               | 74.00          | 18.44       | 1.00               | 345                  | 53.46            | 31.60                 | 7.00              | 36.5          | 2.10                     |
| 1   | 4824.00         | 41.97 AV               | 54.00          | 12.03       | 1.00               | 345                  | 39.87            | 31.60                 | 7.00              | 36.5          | 2.10                     |
| 2   | 7236.00         | 57.42 PK               | 74.00          | 16.58       | 1.00               | 199                  | 46.49            | 37.33                 | 8.90              | 35.3          | 10.93                    |
| 2   | 7236.00         | 41.38 AV               | 54.00          | 12.62       | 1.00               | 199                  | 30.45            | 37.33                 | 8.90              | 35.3          | 10.93                    |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n HT20--2412MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4824.00         | 53.44 PK               | 74.00          | 20.56       | 1.00               | 124                  | 51.34            | 31.6                  | 7.00              | 36.5          | 2.10                     |
| 1   | 4824.00         | 39.38 AV               | 54.00          | 14.62       | 1.00               | 124                  | 37.28            | 31.6                  | 7.00              | 36.5          | 2.10                     |
| 2   | 7236.00         | 55.81 PK               | 74.00          | 18.19       | 1.00               | 166                  | 44.88            | 37.33                 | 8.90              | 35.3          | 10.93                    |
| 2   | 7236.00         | 39.46 AV               | 54.00          | 14.54       | 1.00               | 166                  | 28.53            | 37.33                 | 8.90              | 35.3          | 10.93                    |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n HT20--2437MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4874.00         | 57.00 PK               | 74.00          | 17.00       | 1.00               | 26                   | 54.88            | 31.02                 | 7.60              | 36.5          | 2.12                     |
| 1   | 4874.00         | 42.75 AV               | 54.00          | 11.25       | 1.00               | 26                   | 40.63            | 31.02                 | 7.60              | 36.5          | 2.12                     |
| 2   | 7311.00         | 57.82 PK               | 74.00          | 16.18       | 1.00               | 301                  | 46.74            | 37.28                 | 8.60              | 34.8          | 11.08                    |
| 2   | 7311.00         | 41.54 AV               | 54.00          | 12.46       | 1.00               | 301                  | 30.46            | 37.28                 | 8.60              | 34.8          | 11.08                    |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n HT20--2437MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4874.00         | 54.19 PK               | 74.00          | 19.81       | 1.00               | 347                  | 52.07            | 31.02                 | 7.60              | 36.5          | 2.12                     |
| 1   | 4874.00         | 41.41 AV               | 54.00          | 12.59       | 1.00               | 347                  | 39.29            | 31.02                 | 7.60              | 36.5          | 2.12                     |
| 2   | 7311.00         | 56.48 PK               | 74.00          | 17.52       | 1.00               | 114                  | 45.40            | 37.28                 | 8.60              | 34.8          | 11.08                    |
| 2   | 7311.00         | 40.67 AV               | 54.00          | 13.33       | 1.00               | 114                  | 29.59            | 37.28                 | 8.60              | 34.8          | 11.08                    |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n HT20--2462MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4924.00         | 56.29 PK               | 74.00          | 17.71       | 1.00               | 128                  | 53.91            | 31.58                 | 7.00              | 36.2          | 2.38                     |
| 1   | 4924.00         | 41.56 AV               | 54.00          | 12.44       | 1.00               | 128                  | 39.18            | 31.58                 | 7.00              | 36.2          | 2.38                     |
| 2   | 7311.00         | 58.48 PK               | 74.00          | 15.52       | 1.00               | 33                   | 46.77            | 38.51                 | 8.50              | 35.3          | 11.71                    |
| 2   | 7311.00         | 42.21 AV               | 54.00          | 11.79       | 1.00               | 33                   | 30.50            | 38.51                 | 8.50              | 35.3          | 11.71                    |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n HT20--2462MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4924.00         | 53.47 PK               | 74             | 20.53       | 1.00               | 200                  | 51.09            | 31.58                 | 7.00              | 36.2          | 2.38                     |
| 1   | 4924.00         | 40.55 AV               | 54             | 13.45       | 1.00               | 200                  | 38.17            | 31.58                 | 7.00              | 36.2          | 2.38                     |
| 2   | 7386.00         | 56.29 PK               | 74             | 17.71       | 1.00               | 145                  | 44.58            | 38.51                 | 8.50              | 35.3          | 11.71                    |
| 2   | 7386.00         | 40.08 AV               | 54             | 13.92       | 1.00               | 145                  | 28.37            | 38.51                 | 8.50              | 35.3          | 11.71                    |

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
  3. The other emission levels were very low against the limit.
  4. Margin value = Limit value - Emission level.
  5. For Wireless 802.11n HT20 mode at 6.5Mbps.

**802.11n HT40MHz Mode(above 1GHz)**
**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n HT40--2422MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4844.00         | 55.87 PK               | 74.00          | 18.13       | 1.00               | 122                  | 53.76            | 31.01                 | 7.30              | 36.2          | 2.11                     |
| 1   | 4844.00         | 42.14 AV               | 54.00          | 11.86       | 1.00               | 122                  | 40.03            | 31.01                 | 7.30              | 36.2          | 2.11                     |
| 2   | 7266.00         | 57.95 PK               | 74.00          | 16.05       | 1.00               | 246                  | 47.15            | 36.70                 | 8.90              | 34.8          | 10.80                    |
| 2   | 7266.00         | 41.41 AV               | 54.00          | 12.59       | 1.00               | 246                  | 30.61            | 36.70                 | 8.90              | 34.8          | 10.80                    |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n HT40--2422MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4844.00         | 53.95                  | PK | 74.00          | 20.05       | 1.00               | 108                  | 51.84            | 31.01                 | 7.30              | 36.2          | 2.11                     |
| 1   | 4844.00         | 39.64                  | AV | 54.00          | 14.36       | 1.00               | 108                  | 37.53            | 31.01                 | 7.30              | 36.2          | 2.11                     |
| 2   | 7266.00         | 56.50                  | PK | 74.00          | 17.50       | 1.00               | 212                  | 45.70            | 36.70                 | 8.90              | 34.8          | 10.80                    |
| 2   | 7266.00         | 39.58                  | AV | 54.00          | 14.42       | 1.00               | 212                  | 28.78            | 36.70                 | 8.90              | 34.8          | 10.80                    |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n HT40--2437MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4874.00         | 57.51                  | PK | 74.00          | 16.49       | 1.00               | 138                  | 55.39            | 31.02                 | 7.60              | 36.5          | 2.12                     |
| 1   | 4874.00         | 42.87                  | AV | 54.00          | 11.13       | 1.00               | 138                  | 40.75            | 31.02                 | 7.60              | 36.5          | 2.12                     |
| 2   | 7311.00         | 58.29                  | PK | 74.00          | 15.71       | 1.00               | 312                  | 47.21            | 37.28                 | 8.60              | 34.8          | 11.08                    |
| 2   | 7311.00         | 41.64                  | AV | 54.00          | 12.36       | 1.00               | 312                  | 30.56            | 37.28                 | 8.60              | 34.8          | 11.08                    |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n HT40--2437MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4874.00         | 53.85                  | PK | 74.00          | 20.15       | 1.00               | 68                   | 51.73            | 31.02                 | 7.60              | 36.5          | 2.12                     |
| 1   | 4874.00         | 41.15                  | AV | 54.00          | 12.85       | 1.00               | 68                   | 39.03            | 31.02                 | 7.60              | 36.5          | 2.12                     |
| 2   | 7311.00         | 56.10                  | PK | 74.00          | 17.90       | 1.00               | 91                   | 45.02            | 37.28                 | 8.60              | 34.8          | 11.08                    |
| 2   | 7311.00         | 40.58                  | AV | 54.00          | 13.42       | 1.00               | 91                   | 29.50            | 37.28                 | 8.60              | 34.8          | 11.08                    |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n HT40--2452MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4904.00         | 55.56                  | PK | 74.00          | 18.44       | 1.00               | 108                  | 53.29            | 31.47                 | 7.00              | 36.2          | 2.27                     |
| 1   | 4904.00         | 41.17                  | AV | 54.00          | 12.83       | 1.00               | 108                  | 38.90            | 31.47                 | 7.00              | 36.2          | 2.27                     |
| 2   | 7356.00         | 57.81                  | PK | 74.00          | 16.19       | 1.00               | 124                  | 46.16            | 38.45                 | 8.50              | 35.3          | 11.65                    |
| 2   | 7356.00         | 41.72                  | AV | 54.00          | 12.28       | 1.00               | 124                  | 30.07            | 38.45                 | 8.50              | 35.3          | 11.65                    |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n HT40--2452MHz)**

| No. | Frequency (MHz) | Emssion Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier | Correction Factor (dB/m) |
|-----|-----------------|------------------------|----|----------------|-------------|--------------------|----------------------|------------------|-----------------------|-------------------|---------------|--------------------------|
| 1   | 4904.00         | 53.10                  | PK | 74.00          | 20.9        | 1.00               | 128                  | 50.83            | 31.47                 | 7.00              | 36.2          | 2.27                     |
| 1   | 4904.00         | 40.36                  | AV | 54.00          | 13.64       | 1.00               | 128                  | 38.09            | 31.47                 | 7.00              | 36.2          | 2.27                     |
| 2   | 7356.00         | 55.57                  | PK | 74.00          | 18.43       | 1.00               | 124                  | 43.92            | 38.45                 | 8.50              | 35.3          | 11.65                    |
| 2   | 7356.00         | 39.83                  | AV | 54.00          | 14.17       | 1.00               | 124                  | 28.18            | 38.45                 | 8.50              | 35.3          | 11.65                    |

- REMARKS:**
1. Emission level (dBuV/m) =Raw Value (dBuV) + Correction Factor (dB/m)
  2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
  3. The other emission levels were very low against the limit.
  4. Margin value = Limit value- Emission level.
  5. For Wireless 802.11n HT40MHz mode at 13.5Mbps.

### 4.3. Maximum Peak Output Power

#### TEST CONFIGURATION



#### TEST PROCEDURE

According to KDB558074 D01 DTS Meas Guidance v03:

PKPM1 Peak power meter method: The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

Maximum conducted (average) output power: As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.

1. The EUT is configured to transmit continuously, or to transmit with a constant duty factor.
2. At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
3. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

If the transmitter does not transmit continuously, measure the duty cycle (x) of the transmitter output signal as described in Section 6.0.

Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

Adjust the measurement in dBm by adding  $10\log(1/x)$ , where x is the duty cycle to the measurement result.

#### LIMIT

The Maximum Peak Output Power Measurement is 30dBm.

#### TEST RESULTS

Remark: We measured output power at difference data rate for each mode and recorded worst case for each mode.

##### 4.3.1 802.11b Test Mode

###### A. Test Verdict

| Channel | Frequency (MHz) | Measured Output Peak Power (dBm) | Limits (dBm) | Verdict |
|---------|-----------------|----------------------------------|--------------|---------|
| 1       | 2412            | 22.77                            | 30           | PASS    |
| 6       | 2437            | 22.96                            | 30           | PASS    |
| 11      | 2462            | 23.26                            | 30           | PASS    |

- Note: 1. For 802.11b mode at final test to get the worst-case emission at 1Mbps.  
2. The test results including the cable loss.

##### 4.3.2 802.11g Test Mode

###### A. Test Verdict

| Channel | Frequency (MHz) | Measured Output Peak Power (dBm) | Limits (dBm) | Verdict |
|---------|-----------------|----------------------------------|--------------|---------|
| 1       | 2412            | 17.70                            | 30           | PASS    |
| 6       | 2437            | 19.79                            | 30           | PASS    |
| 11      | 2462            | 18.00                            | 30           | PASS    |

- Note: 1. For 802.11g mode at final test to get the worst-case emission at 6Mbps.  
2. The test results including the cable loss.

**4.3.3 802.11n HT20 Test Mode**

## A. Test Verdict

| Channel | Frequency (MHz) | Measured Output Peak Power (dBm) | Limits (dBm) | Verdict |
|---------|-----------------|----------------------------------|--------------|---------|
| 1       | 2412            | 17.68                            | 30           | PASS    |
| 6       | 2437            | 19.86                            | 30           | PASS    |
| 11      | 2462            | 18.11                            | 30           | PASS    |

Note: 1. For 802.11n HT20 mode at final test to get the worst-case emission at 6.5Mbps.  
2. The test results including the cable loss.

**4.3.4 802.11n HT40 Test Mode**

## A. Test Verdict

| Channel | Frequency (MHz) | Measured Output Peak Power (dBm) | Limits (dBm) | Verdict |
|---------|-----------------|----------------------------------|--------------|---------|
| 3       | 2422            | 16.61                            | 30           | PASS    |
| 6       | 2437            | 18.64                            | 30           | PASS    |
| 9       | 2452            | 16.78                            | 30           | PASS    |

Note: 1. For 802.11n HT40 mode at final test to get the worst-case emission at 13.5Mbps.  
2. The test results including the cable loss.

## 4.4. Power Spectral Density

### TEST CONFIGURATION



### TEST PROCEDURE

According to KDB 558074 D01 V03 Method PKPSD (peak PSD) this procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
4. Set the VBW  $\geq 3 \text{ RBW}$ .
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### LIMIT

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 during any time interval of continuous transmission.

### TEST RESULTS

#### 4.4.1 802.11b Test Mode

##### A. Test Verdict

| Channel | Frequency (MHz) | Report PSD (dBm/30kHz) | Refer to Plot | Limits (dBm/3KHz) | Verdict |
|---------|-----------------|------------------------|---------------|-------------------|---------|
| 1       | 2412            | 7.09                   | Plot 4.4.1 A  | 8                 | PASS    |
| 6       | 2437            | 6.73                   | Plot 4.4.1 B  | 8                 | PASS    |
| 11      | 2462            | 5.89                   | Plot 4.4.1 C  | 8                 | PASS    |

- Note:
1. For 802.11b mode at final test to get the worst-case emission at 1Mbps.
  2. The test results including the cable loss.

##### B. Test Plots



(Plot 4.4.1 A: Channel 1: 2412MHz @ 802.11b)



(Plot 4.4.1 B: Channel 6: 2437MHz @ 802.11b)



(Plot 4.4.1 C: Channel 11: 2462MHz @ 802.11b)

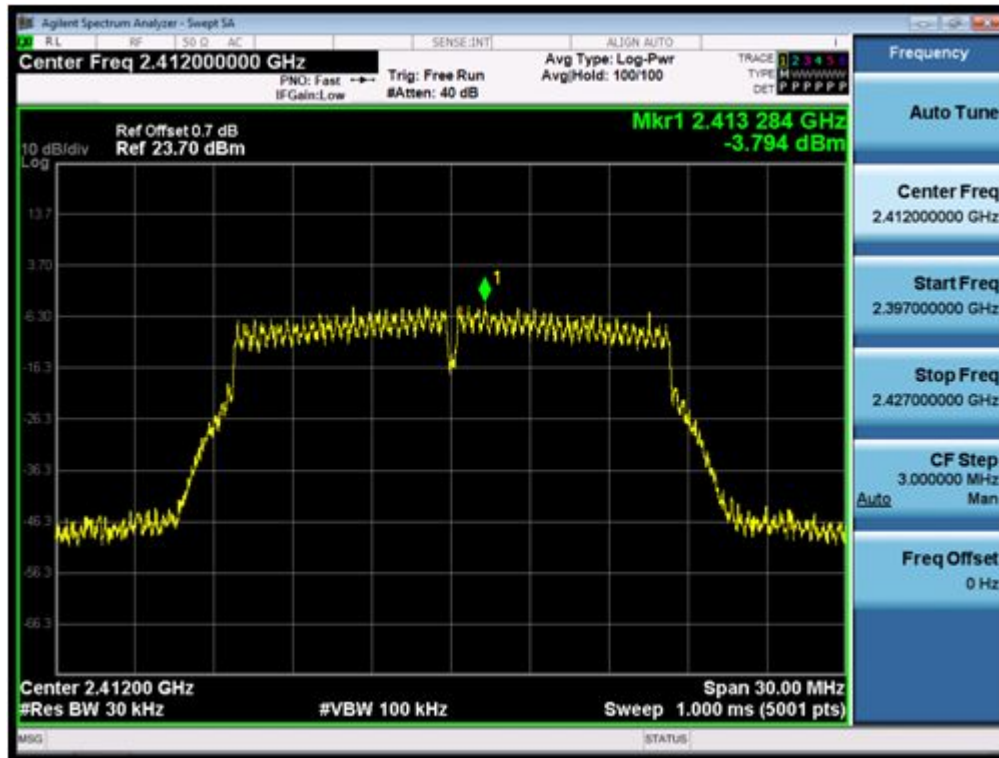
#### 4.4.2 802.11g Test Mode

##### A. Test Verdict

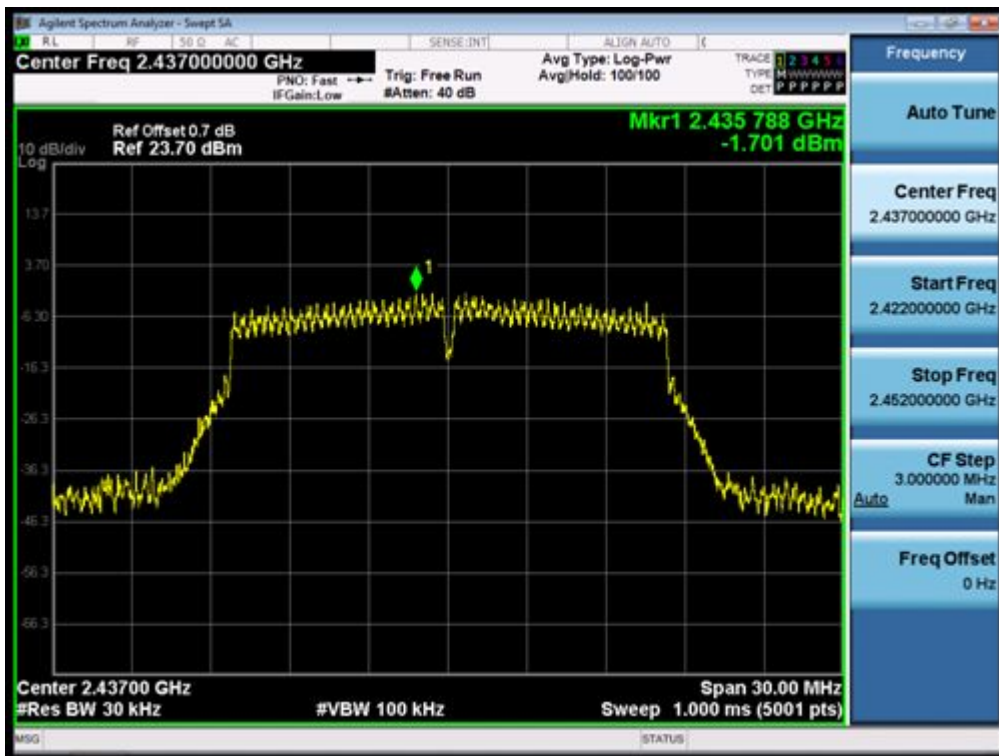
| Channel | Frequency (MHz) | Report PSD (dBm/30kHz) | Refer to Plot | Limits (dBm/3KHz) | Verdict |
|---------|-----------------|------------------------|---------------|-------------------|---------|
| 1       | 2412            | -3.79                  | Plot 4.4.2 A  | 8                 | PASS    |
| 6       | 2437            | -1.70                  | Plot 4.4.2 B  | 8                 | PASS    |
| 11      | 2462            | -3.05                  | Plot 4.4.2 C  | 8                 | PASS    |

Note: 1. For 802.11g mode at final test to get the worst-case emission at 6Mbps.  
 2. The test results including the cable loss.

##### B. Test Plots



(Plot 4.4.2 A: Channel 1: 2412MHz @ 802.11g)



(Plot 4.4.2 B: Channel 6: 2437MHz @ 802.11g)



(Plot 4.4.2 C: Channel 11: 2462MHz @ 802.11g)

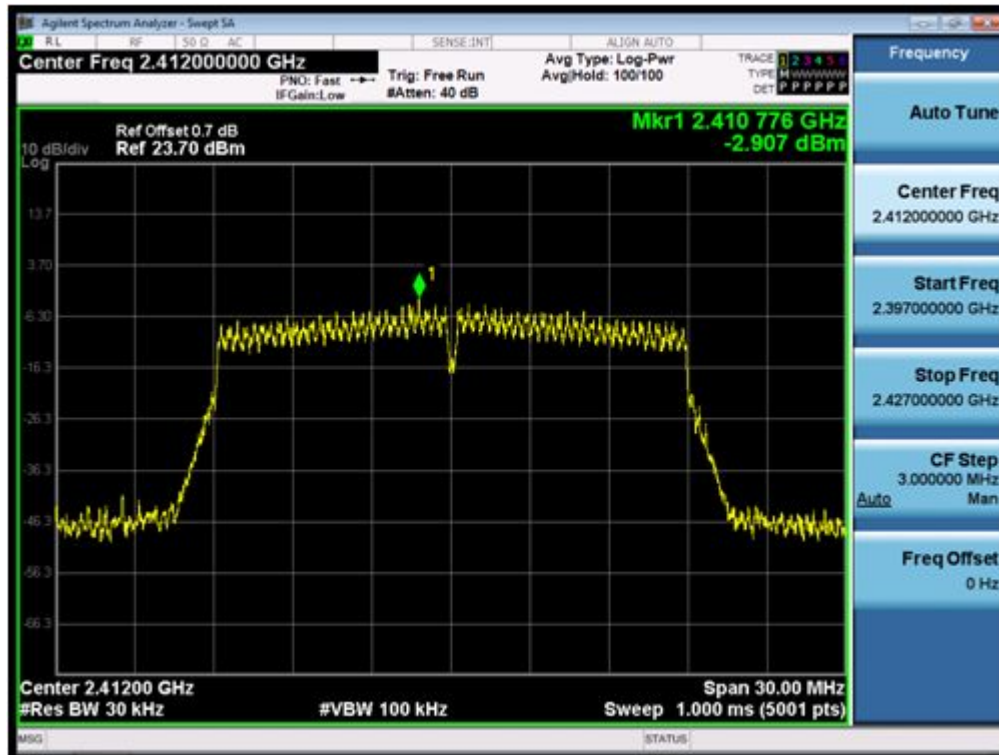
#### 4.4.3 802.11n HT20 Test Mode

##### A. Test Verdict

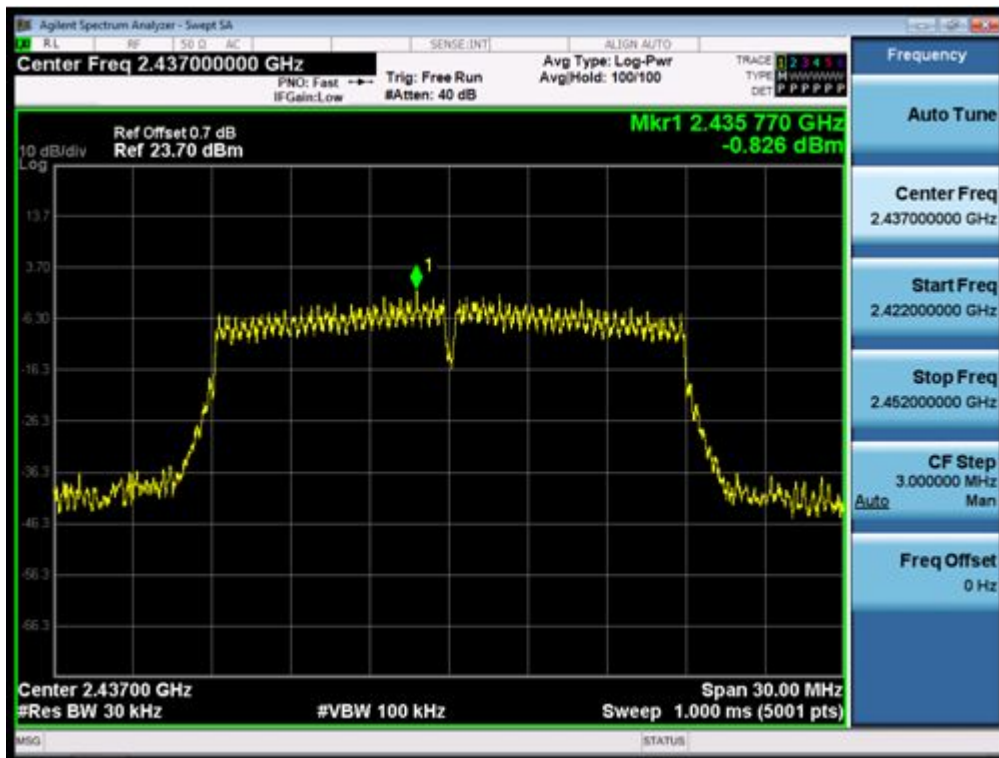
| Channel | Frequency (MHz) | Report PSD (dBm/30kHz) | Refer to Plot | Limits (dBm/3KHz) | Verdict     |
|---------|-----------------|------------------------|---------------|-------------------|-------------|
| 1       | 2412            | -2.91                  | Plot 4.4.3 A  | 8                 | <b>PASS</b> |
| 6       | 2437            | -0.83                  | Plot 4.4.3 B  | 8                 | PASS        |
| 11      | 2462            | -3.03                  | Plot 4.4.3 C  | 8                 | PASS        |

Note: 1. For 802.11n HT20 mode at final test to get the worst-case emission at 6.5Mbps.  
2. The test results including the cable loss.

##### B. Test Plots



(Plot 4.4.3 A: Channel 1: 2412MHz @ 802.11n HT20)



(Plot 4.4.3 B: Channel 6: 2437MHz @ 802.11n HT20)



(Plot 4.4.3 C: Channel 11: 2462MHz @ 802.11n HT20)

#### 4.4.4 802.11n HT40 Test Mode

##### A. Test Verdict

| Channel | Frequency (MHz) | Report PSD (dBm/30kHz) | Refer to Plot | Limits (dBm/3KHz) | Verdict |
|---------|-----------------|------------------------|---------------|-------------------|---------|
| 3       | 2422            | -8.27                  | Plot 4.4.4 A  | 8                 | PASS    |
| 6       | 2437            | -6.06                  | Plot 4.4.4 B  | 8                 | PASS    |
| 9       | 2452            | -7.91                  | Plot 4.4.4 C  | 8                 | PASS    |

Note: 1. For 802.11n HT40 mode at final test to get the worst-case emission at 13.5Mbps.  
2. The test results including the cable loss.

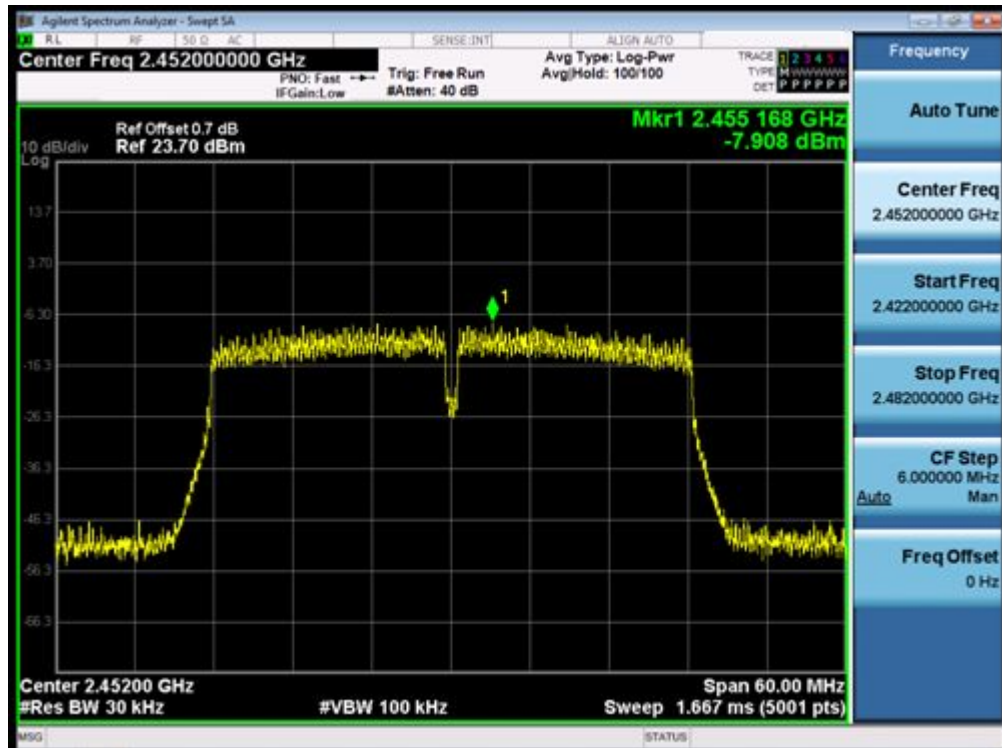
##### B. Test Plots



(Plot 4.4.4 A: Channel 3: 2422MHz @ 802.11n HT40))



(Plot 4.4.4 B: Channel 6: 2437MHz @ 802.11n HT40)



(Plot 4.4.4 C: Channel 6: 2452MHz @ 802.11n HT40)

## 4.5. Band Edge Compliance of RF Emission

### TEST REQUIREMENT

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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. 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)).

### TEST PROCEDURE

According to KDB 558074 D01 V03 for Antenna-port conducted measurement. Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz for peak detector and RBW=1MHz, VBW=10Hz for average detector.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.
6. Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 12.2.2, 12.2.3, and 12.2.4 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
7. Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see 12.2.5 for guidance on determining the applicable antenna gain)
8. Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies  $\leq 30$  MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies  $> 1000$  MHz).
9. For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).
10. Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:  
$$E = \text{EIRP} - 20\log D + 104.8$$

where:

E = electric field strength in dB $\mu$ V/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

11. Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.
12. Compare the resultant electric field strength level to the applicable regulatory limit.
13. Perform radiated spurious emission test dures until all measured frequencies were complete.

### LIMIT

Below -20dB of the highest emission level in operating band.

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)

## TEST RESULTS

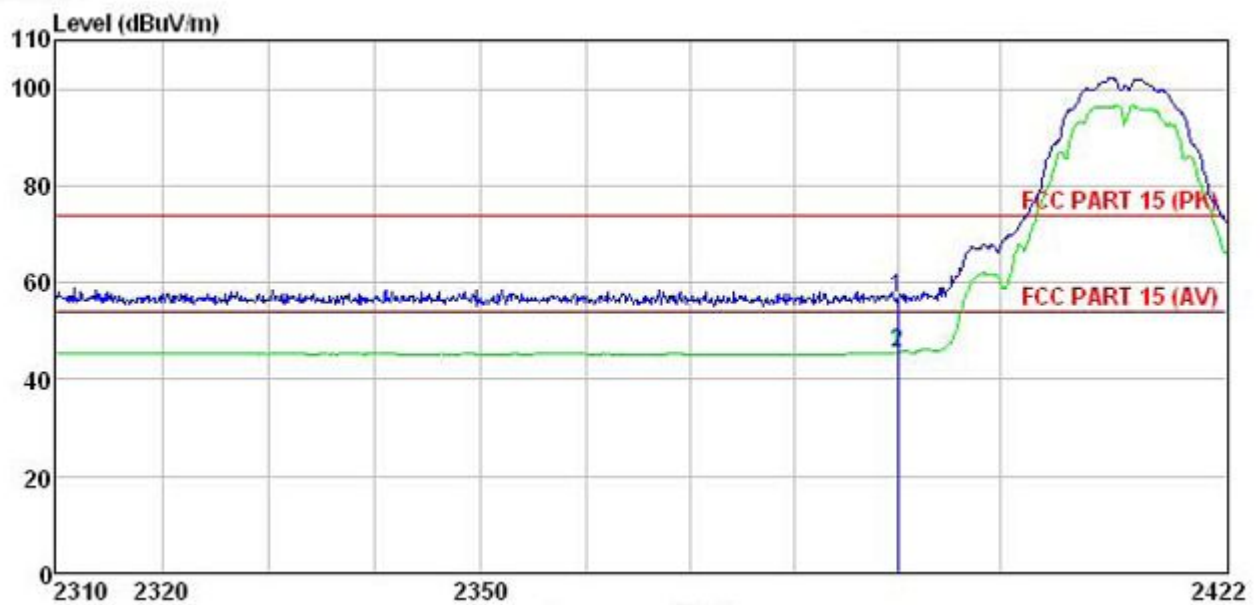
### 4.5.1 For Radiated Bandedge Measurement

Remark: The Bandedge was measured at difference data rate for each mode and recorded worst case for each mode.

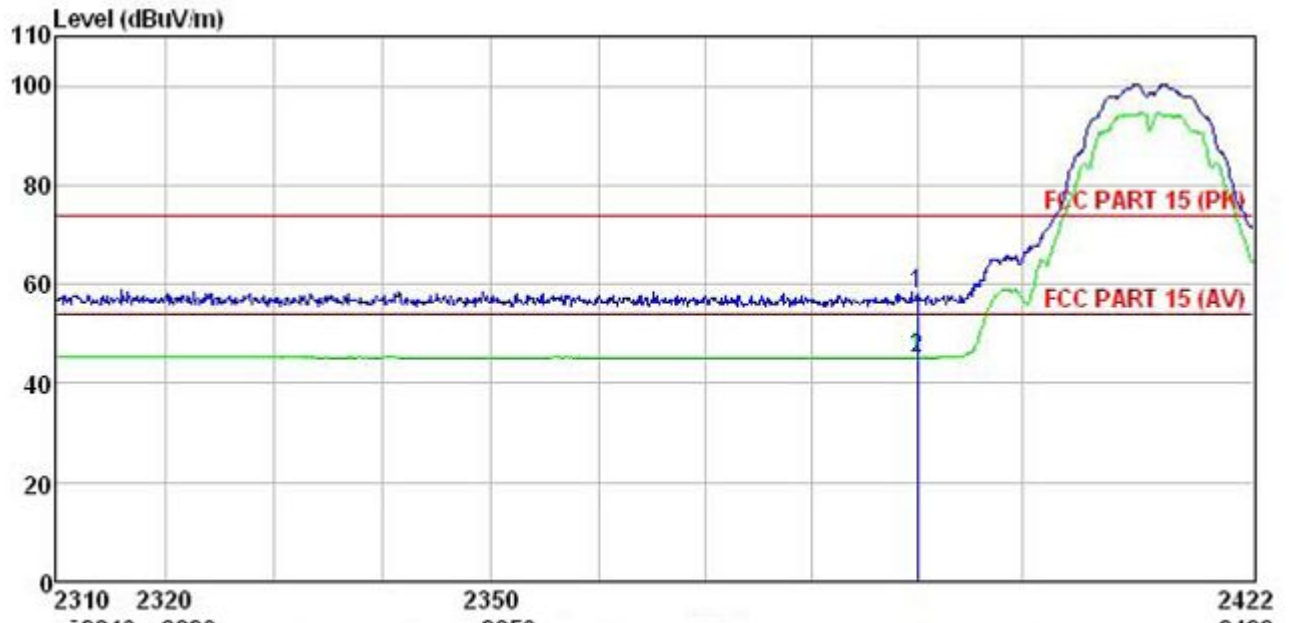
11B:

Low Channel

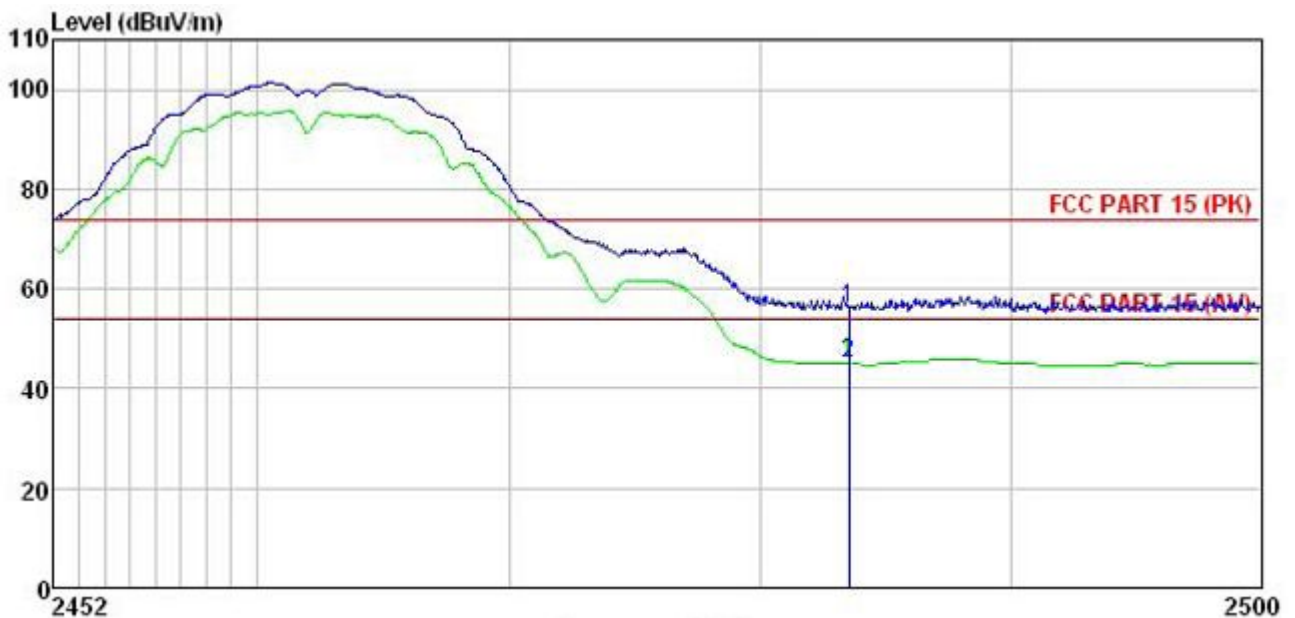
HORIZONTAL:



|   | Freq     | ReadAntenna<br>Level | Antenna<br>Factor | Cable<br>Loss | Preamp<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark  |
|---|----------|----------------------|-------------------|---------------|------------------|--------|---------------|---------------|---------|
|   | MHz      | dBuV                 | dB/m              | dB            | dB               | dBuV/m | dBuV/m        | dB            |         |
| 1 | 2390.000 | 23.56                | 27.58             | 5.67          | 0.00             | 56.81  | 74.00         | -17.19        | Peak    |
| 2 | 2390.000 | 12.35                | 27.58             | 5.67          | 0.00             | 45.60  | 54.00         | -8.40         | Average |

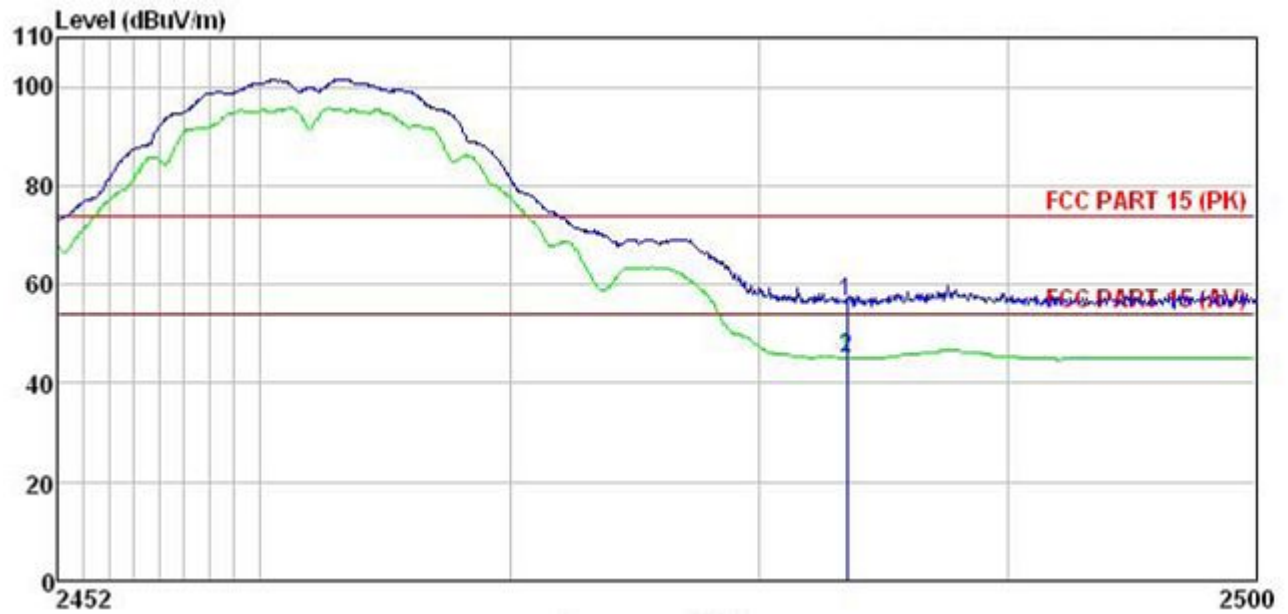
**VERTICAL:**


|   | Freq     | ReadAntenna<br>Level | Antenna<br>Factor | Cable<br>Loss | Preamp<br>Factor | Level  | Limit  | Over   | Remark  |
|---|----------|----------------------|-------------------|---------------|------------------|--------|--------|--------|---------|
|   | MHz      | dBuV                 | dB/m              | dB            | dB               | dBuV/m | dBuV/m | dB     |         |
| 1 | 2390.000 | 24.60                | 27.58             | 5.67          | 0.00             | 57.85  | 74.00  | -16.15 | Peak    |
| 2 | 2390.000 | 11.92                | 27.58             | 5.67          | 0.00             | 45.17  | 54.00  | -8.83  | Average |

**High Channel**
**HORIZONTAL:**


|   | Freq     | ReadAntenna<br>Level | Antenna<br>Factor | Cable<br>Loss | Preamp<br>Factor | Level  | Limit  | Over   | Remark  |
|---|----------|----------------------|-------------------|---------------|------------------|--------|--------|--------|---------|
|   | MHz      | dBuV                 | dB/m              | dB            | dB               | dBuV/m | dBuV/m | dB     |         |
| 1 | 2483.500 | 22.96                | 27.52             | 5.70          | 0.00             | 56.18  | 74.00  | -17.82 | Peak    |
| 2 | 2483.500 | 11.72                | 27.52             | 5.70          | 0.00             | 44.94  | 54.00  | -9.06  | Average |

# VERTICAL

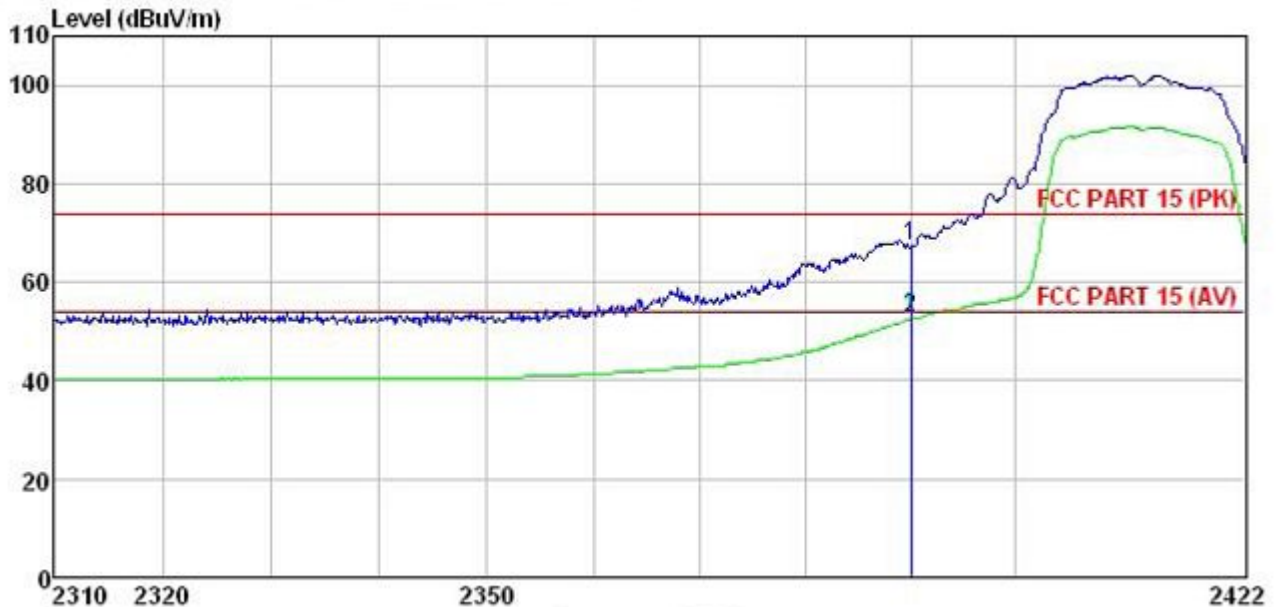


|   | Freq     | ReadAntenna | Cable  | Preamp | Level  | Limit  | Over   | Remark        |
|---|----------|-------------|--------|--------|--------|--------|--------|---------------|
|   | MHz      | Level       | Factor | Loss   | Factor | Line   | Limit  |               |
|   |          | dBuV        | dB/m   | dB     | dB     | dBuV/m | dBuV/m | dB            |
| 1 | 2483.500 | 23.04       | 27.52  | 5.70   | 0.00   | 56.26  | 74.00  | -17.74 Peak   |
| 2 | 2483.500 | 11.88       | 27.52  | 5.70   | 0.00   | 45.10  | 54.00  | -8.90 Average |

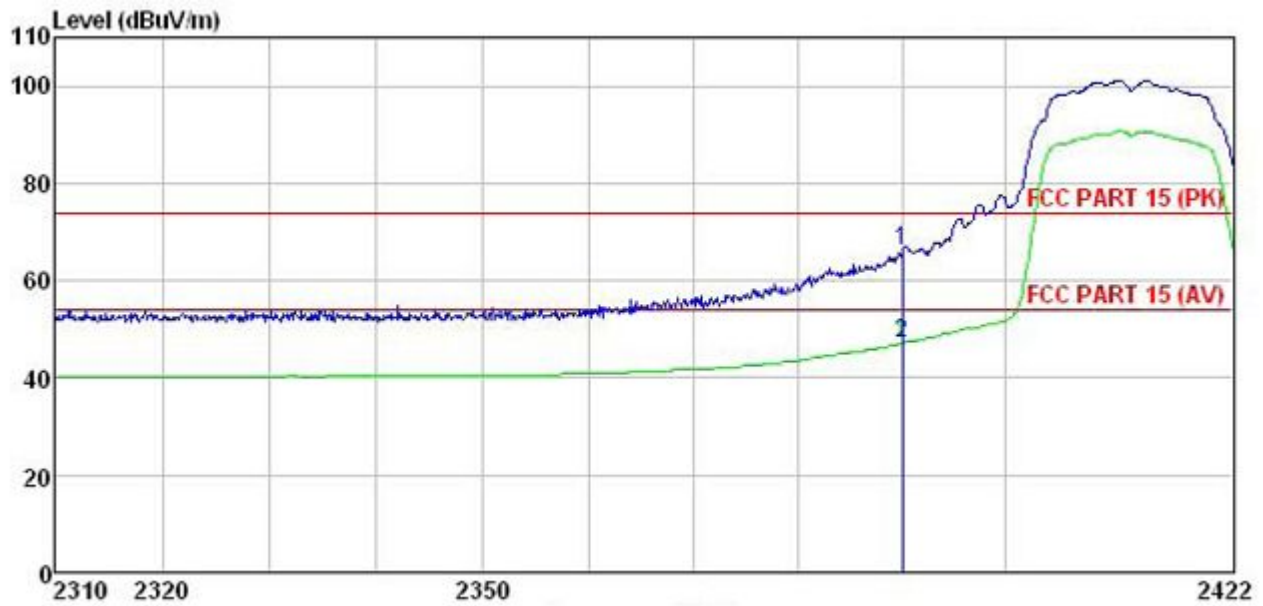
# 11G:

## Low Channel

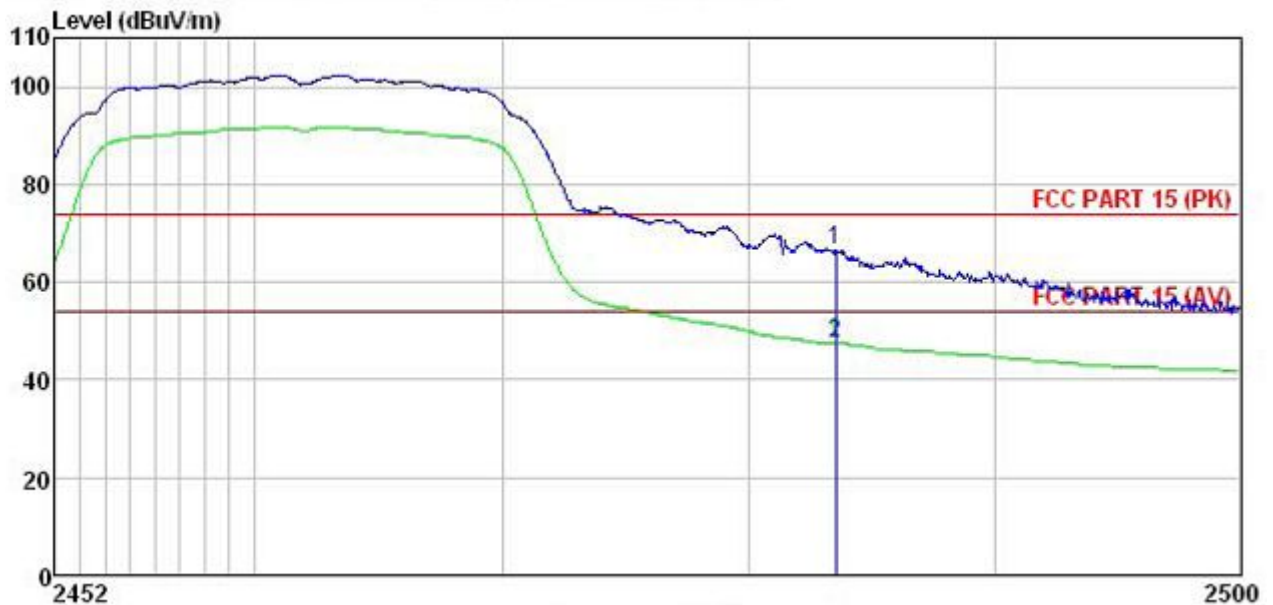
# HORIZONTAL:



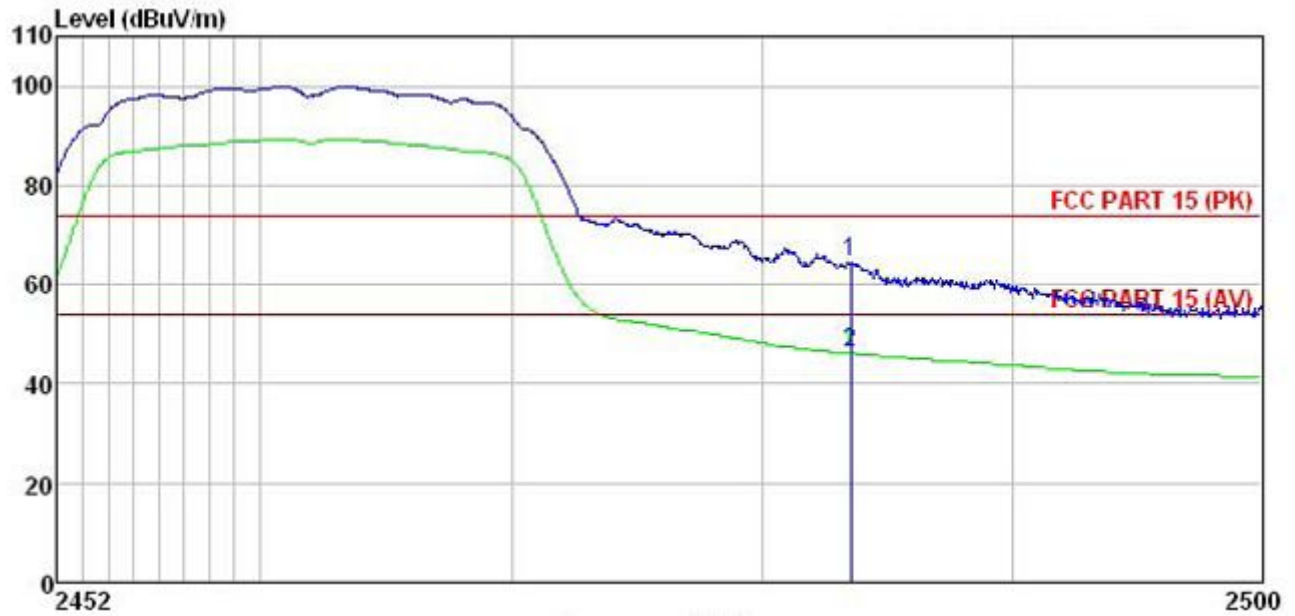
|   | Freq     | ReadAntenna | Cable  | Preamp | Level  | Limit  | Over   | Remark        |
|---|----------|-------------|--------|--------|--------|--------|--------|---------------|
|   | MHz      | Level       | Factor | Loss   | Factor | Line   | Limit  |               |
|   |          | dBuV        | dB/m   | dB     | dB     | dBuV/m | dBuV/m | dB            |
| 1 | 2390.000 | 34.14       | 27.58  | 5.67   | 0.00   | 67.39  | 74.00  | -6.61 Peak    |
| 2 | 2390.000 | 19.32       | 27.58  | 5.67   | 0.00   | 52.57  | 54.00  | -1.43 Average |

**VERTICAL:**


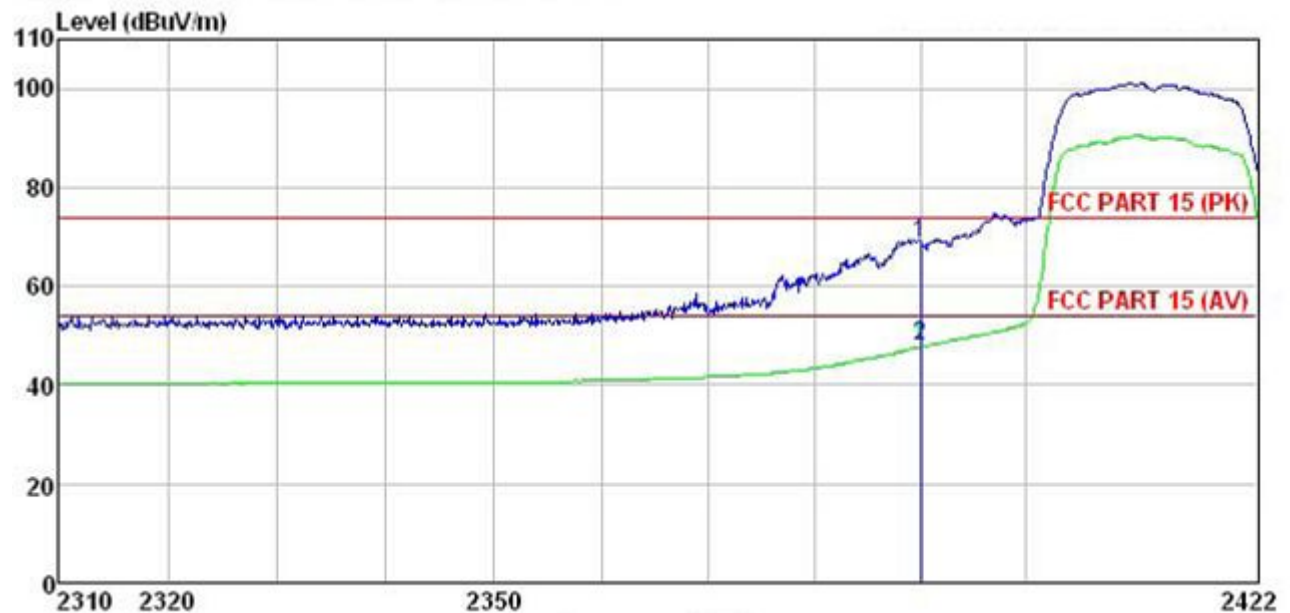
|   | Freq     | ReadAntenna | Cable  | Preamp | Level  | Limit  | Over   |               |
|---|----------|-------------|--------|--------|--------|--------|--------|---------------|
|   |          | Level       | Factor | Loss   | Factor | Line   | Limit  | Remark        |
|   | MHz      | dBuV        | dB/m   | dB     | dB     | dBuV/m | dBuV/m | dB            |
| 1 | 2390.000 | 33.10       | 27.58  | 5.67   | 0.00   | 66.35  | 74.00  | -7.65 Peak    |
| 2 | 2390.000 | 13.97       | 27.58  | 5.67   | 0.00   | 47.22  | 54.00  | -6.78 Average |

**High Channel**
**HORIZONTAL:**


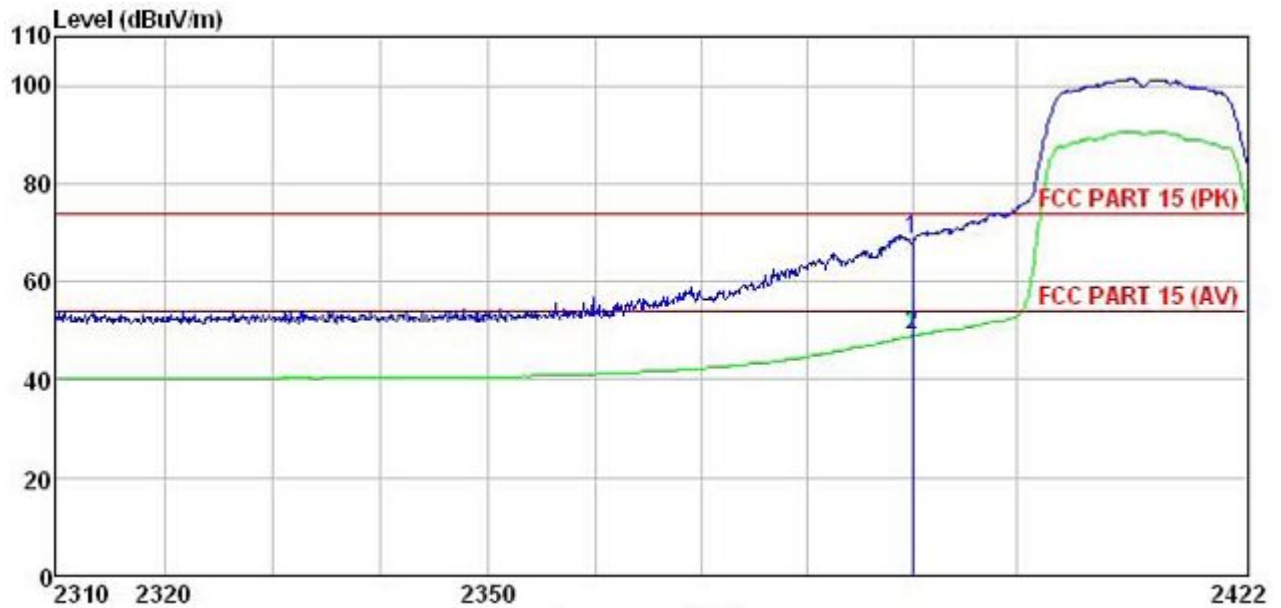
|   | Freq     | ReadAntenna | Cable  | Preamp | Level  | Limit  | Over   |               |
|---|----------|-------------|--------|--------|--------|--------|--------|---------------|
|   |          | Level       | Factor | Loss   | Factor | Line   | Limit  | Remark        |
|   | MHz      | dBuV        | dB/m   | dB     | dB     | dBuV/m | dBuV/m | dB            |
| 1 | 2483.500 | 33.15       | 27.52  | 5.70   | 0.00   | 66.37  | 74.00  | -7.63 Peak    |
| 2 | 2483.500 | 14.18       | 27.52  | 5.70   | 0.00   | 47.40  | 54.00  | -6.60 Average |

**VERTICAL:**


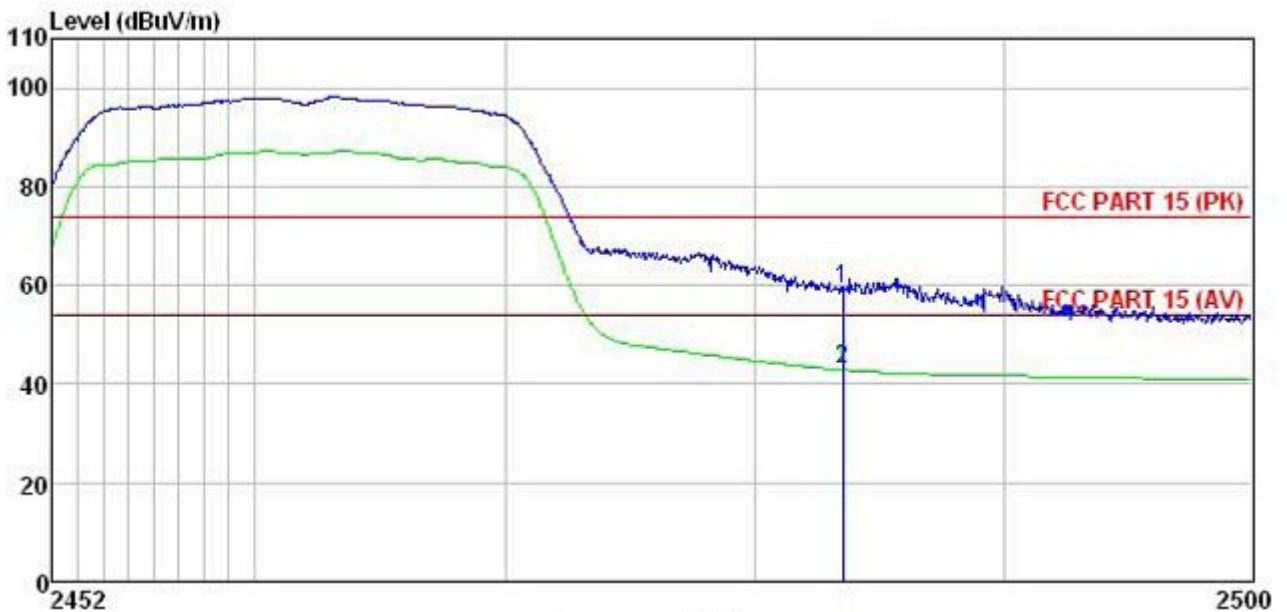
|   | Freq     | ReadAntenna<br>Level | Antenna<br>Factor | Cable<br>Loss | Preamp<br>Factor | Level  | Limit  | Over  | Remark  |
|---|----------|----------------------|-------------------|---------------|------------------|--------|--------|-------|---------|
|   | MHz      | dBuV                 | dB/m              | dB            | dB               | dBuV/m | dBuV/m | dB    |         |
| 1 | 2483.500 | 31.14                | 27.52             | 5.70          | 0.00             | 64.36  | 74.00  | -9.64 | Peak    |
| 2 | 2483.500 | 12.93                | 27.52             | 5.70          | 0.00             | 46.15  | 54.00  | -7.85 | Average |

**11N(20M):**
**Low Channel**
**HORIZONTAL:**


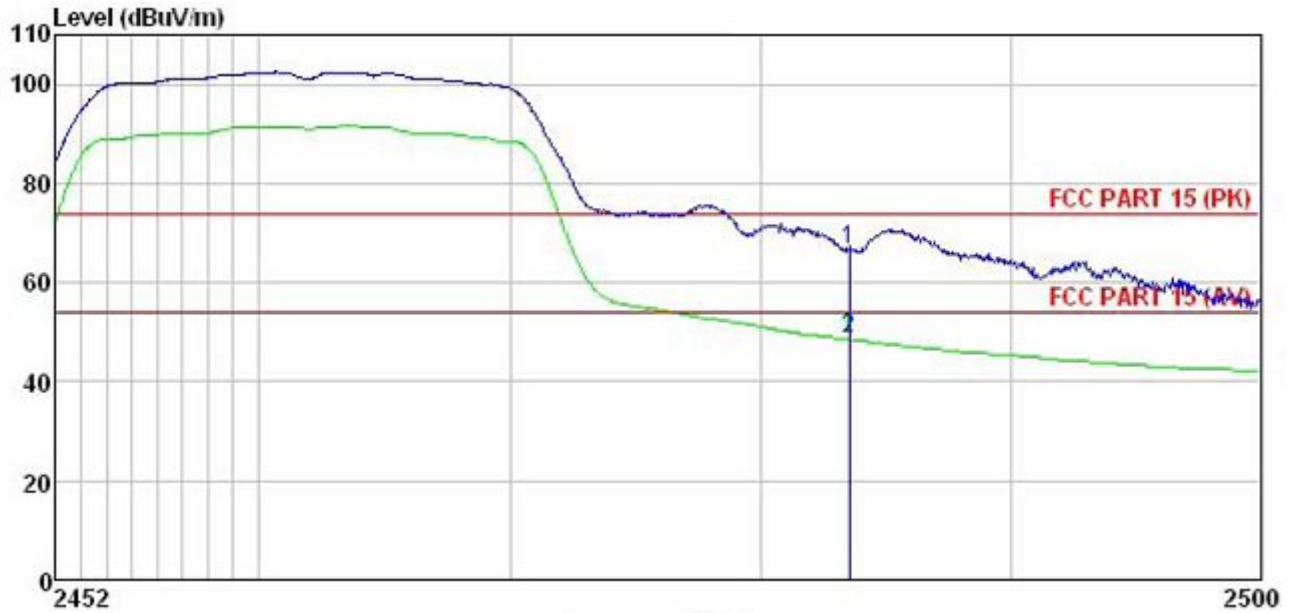
|   | Freq     | ReadAntenna<br>Level | Antenna<br>Factor | Cable<br>Loss | Preamp<br>Factor | Level  | Limit  | Over  | Remark  |
|---|----------|----------------------|-------------------|---------------|------------------|--------|--------|-------|---------|
|   | MHz      | dBuV                 | dB/m              | dB            | dB               | dBuV/m | dBuV/m | dB    |         |
| 1 | 2390.000 | 35.46                | 27.58             | 5.67          | 0.00             | 68.71  | 74.00  | -5.29 | Peak    |
| 2 | 2390.000 | 14.51                | 27.58             | 5.67          | 0.00             | 47.76  | 54.00  | -6.24 | Average |

**VERTICAL:**


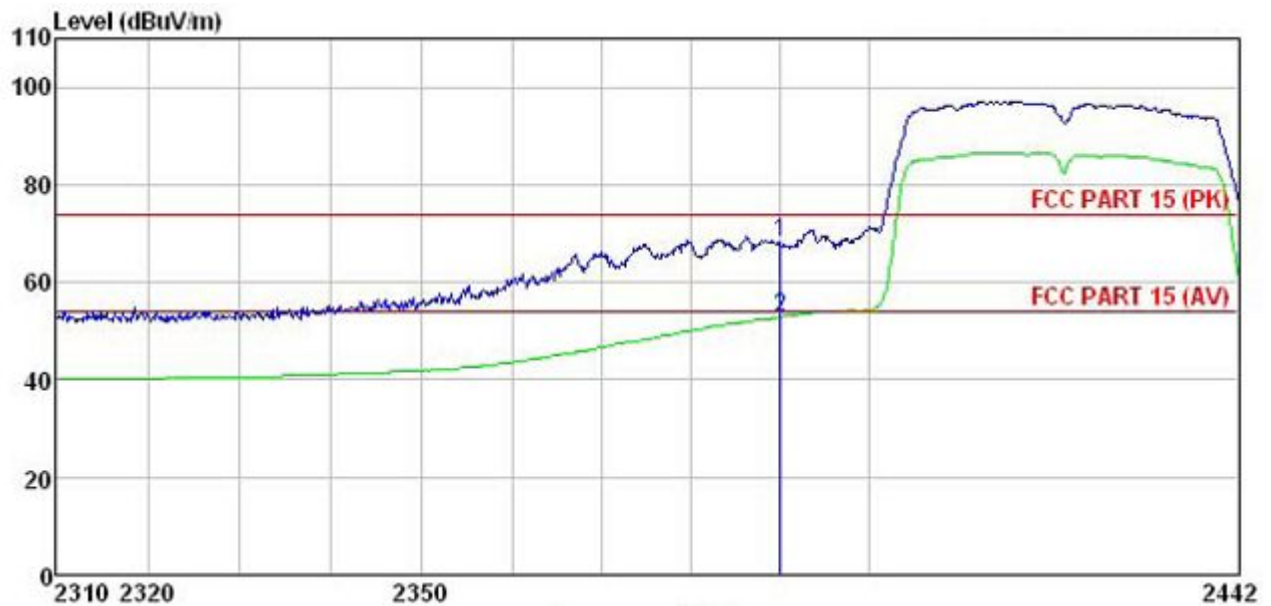
|   | Freq     | ReadAntenna<br>Level | Antenna<br>Factor | Cable<br>Loss | Preamp<br>Factor | Level  | Limit  | Over  | Remark  |
|---|----------|----------------------|-------------------|---------------|------------------|--------|--------|-------|---------|
|   | MHz      | dBuV                 | dB/m              | dB            | dB               | dBuV/m | dBuV/m | dB    |         |
| 1 | 2390.000 | 35.20                | 27.58             | 5.67          | 0.00             | 68.45  | 74.00  | -5.55 | Peak    |
| 2 | 2390.000 | 15.75                | 27.58             | 5.67          | 0.00             | 49.00  | 54.00  | -5.00 | Average |

**High Channel**
**HORIZONTAL:**


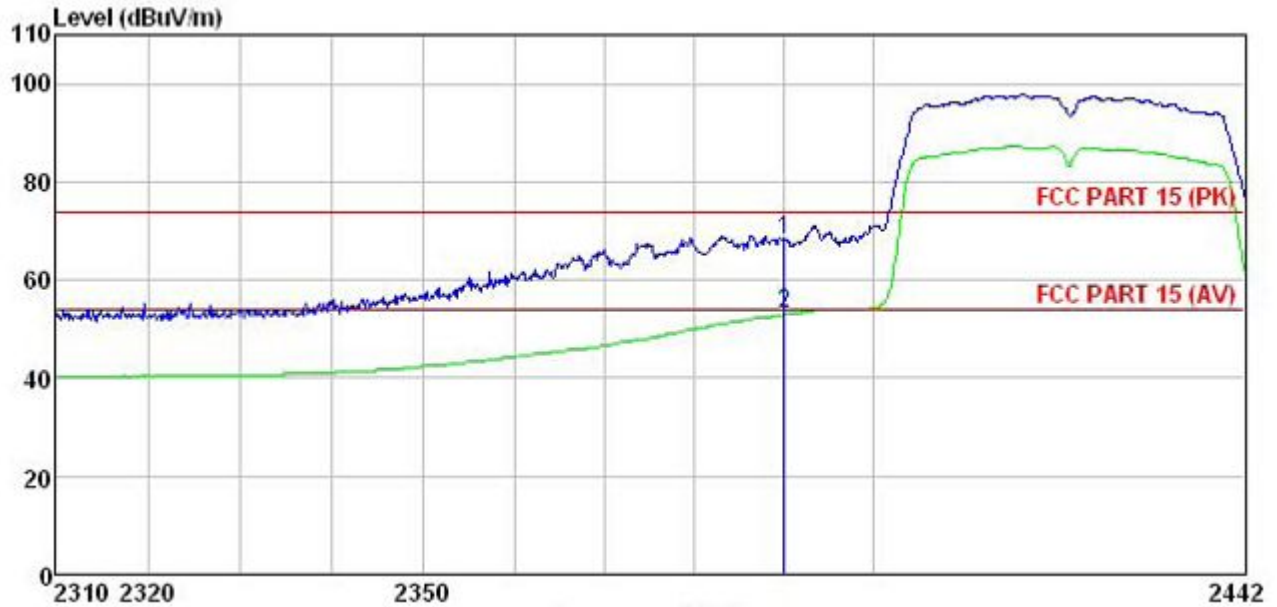
|   | Freq     | ReadAntenna<br>Level | Antenna<br>Factor | Cable<br>Loss | Preamp<br>Factor | Level  | Limit  | Over   | Remark  |
|---|----------|----------------------|-------------------|---------------|------------------|--------|--------|--------|---------|
|   | MHz      | dBuV                 | dB/m              | dB            | dB               | dBuV/m | dBuV/m | dB     |         |
| 1 | 2483.500 | 25.93                | 27.52             | 5.70          | 0.00             | 59.15  | 74.00  | -14.85 | Peak    |
| 2 | 2483.500 | 9.66                 | 27.52             | 5.70          | 0.00             | 42.88  | 54.00  | -11.12 | Average |

**VERTICAL:**


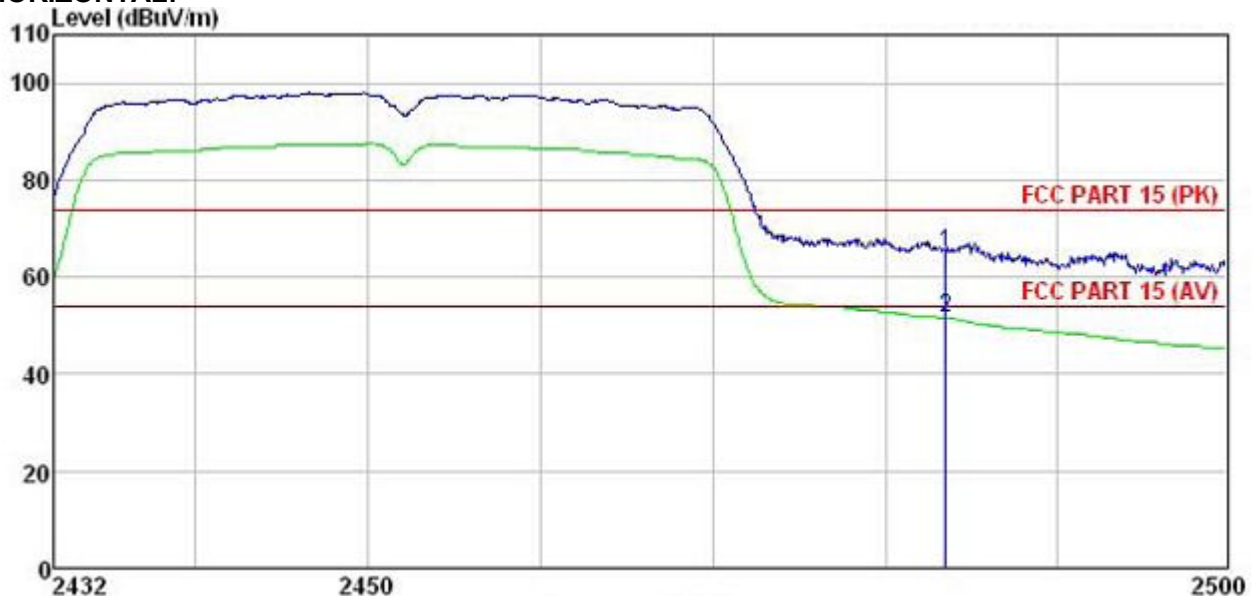
|   | Freq     | ReadAntenna | Cable  | Preamp | Level  | Limit  | Over   | Remark        |
|---|----------|-------------|--------|--------|--------|--------|--------|---------------|
|   | MHz      | Level       | Factor | Loss   | Factor | Line   | Limit  |               |
|   |          | dBuV        | dB/m   | dB     | dB     | dBuV/m | dBuV/m | dB            |
| 1 | 2483.500 | 33.28       | 27.52  | 5.70   | 0.00   | 66.50  | 74.00  | -7.50 Peak    |
| 2 | 2483.500 | 15.33       | 27.52  | 5.70   | 0.00   | 48.55  | 54.00  | -5.45 Average |

**11N(40):**
**Low Channel:**
**HORIZONTAL:**


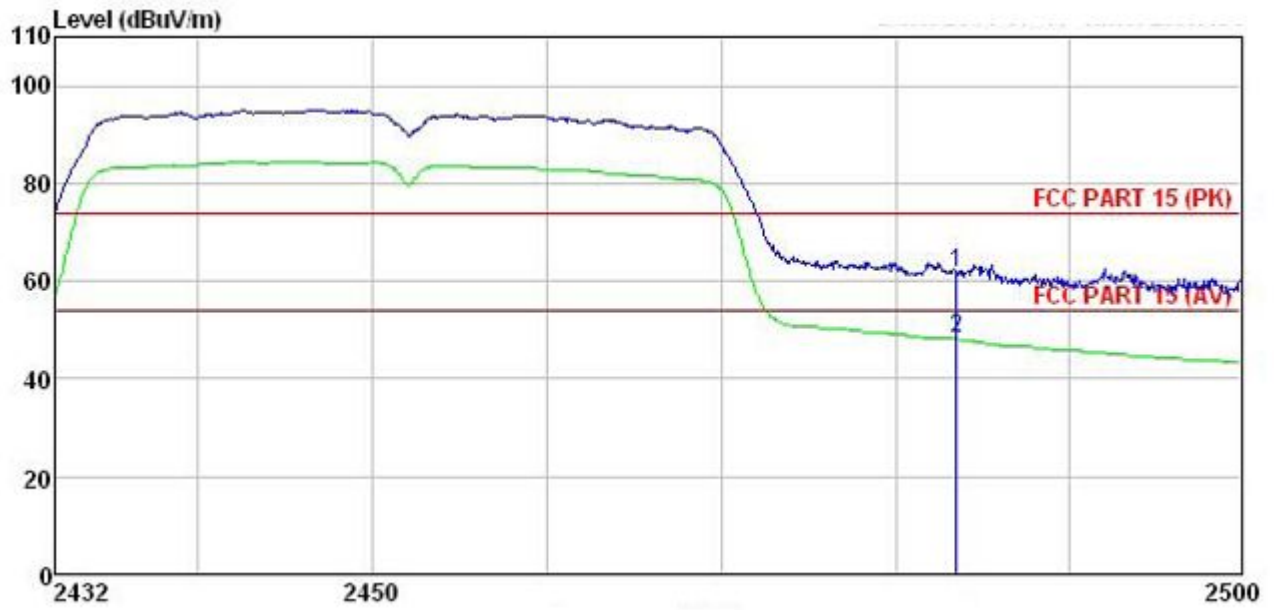
|   | Freq     | ReadAntenna | Cable  | Preamp | Level  | Limit  | Over   | Remark        |
|---|----------|-------------|--------|--------|--------|--------|--------|---------------|
|   | MHz      | Level       | Factor | Loss   | Factor | Line   | Limit  |               |
|   |          | dBuV        | dB/m   | dB     | dB     | dBuV/m | dBuV/m | dB            |
| 1 | 2390.000 | 35.13       | 27.58  | 5.67   | 0.00   | 68.38  | 74.00  | -5.62 Peak    |
| 2 | 2390.000 | 19.66       | 27.58  | 5.67   | 0.00   | 52.91  | 54.00  | -1.09 Average |

**VERTICAL:**


|   | Freq     | ReadAntenna | Cable  | Preamp | Level  | Limit  | Over   | Remark        |
|---|----------|-------------|--------|--------|--------|--------|--------|---------------|
|   | MHz      | Level       | Factor | Loss   | Factor | Line   | Limit  |               |
|   |          | dBuV        | dB/m   | dB     | dB     | dBuV/m | dBuV/m | dB            |
| 1 | 2390.000 | 34.78       | 27.58  | 5.67   | 0.00   | 68.03  | 74.00  | -5.97 Peak    |
| 2 | 2390.000 | 19.75       | 27.58  | 5.67   | 0.00   | 53.00  | 54.00  | -1.00 Average |

**High Channel:**
**HORIZONTAL:**


|   | Freq     | ReadAntenna | Cable  | Preamp | Level  | Limit  | Over   | Remark        |
|---|----------|-------------|--------|--------|--------|--------|--------|---------------|
|   | MHz      | Level       | Factor | Loss   | Factor | Line   | Limit  |               |
|   |          | dBuV        | dB/m   | dB     | dB     | dBuV/m | dBuV/m | dB            |
| 1 | 2483.500 | 31.89       | 27.52  | 5.70   | 0.00   | 65.11  | 74.00  | -8.89 Peak    |
| 2 | 2483.500 | 18.36       | 27.52  | 5.70   | 0.00   | 51.58  | 54.00  | -2.42 Average |

**VERTICAL:**


|   | Freq     | ReadAntenna<br>Level | Antenna<br>Factor | Cable<br>Loss | Preamp<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark  |
|---|----------|----------------------|-------------------|---------------|------------------|--------|---------------|---------------|---------|
|   | MHz      | dBuV                 | dB/m              | dB            | dB               | dBuV/m | dBuV/m        | dB            |         |
| 1 | 2483.500 | 28.44                | 27.52             | 5.70          | 0.00             | 61.66  | 74.00         | -12.34        | Peak    |
| 2 | 2483.500 | 14.90                | 27.52             | 5.70          | 0.00             | 48.12  | 54.00         | -5.88         | Average |

## 4.5.2 For Conducted Bandedge Measurement

11B:

A. Test Plots



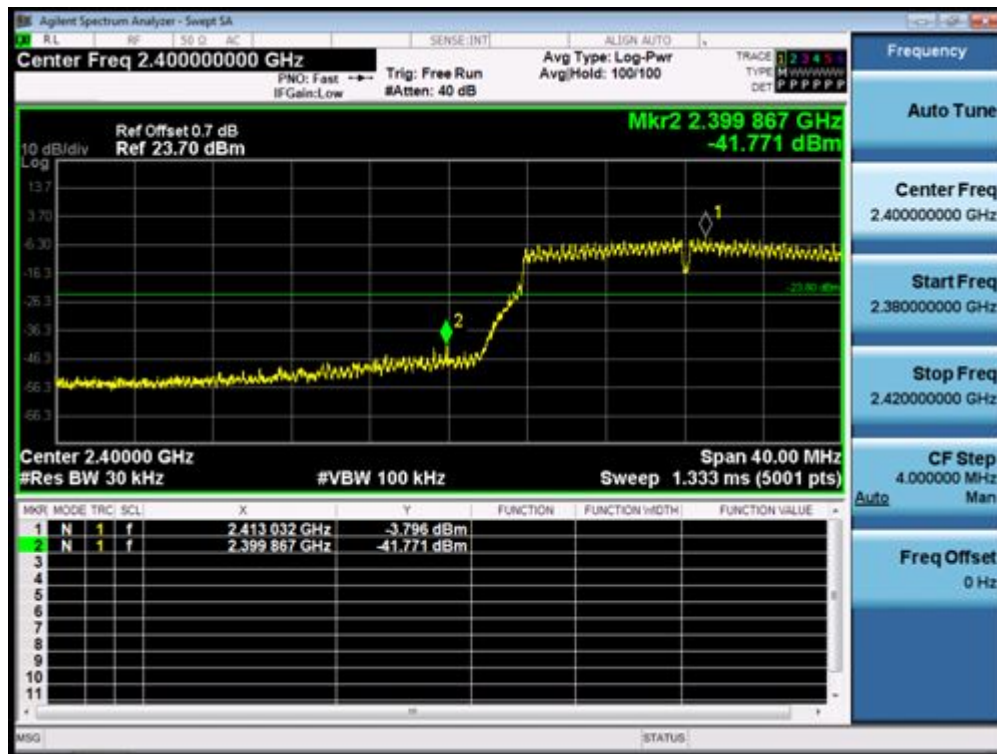
(Plot 4.5.2.1 A: Channel 01: 2412MHz )



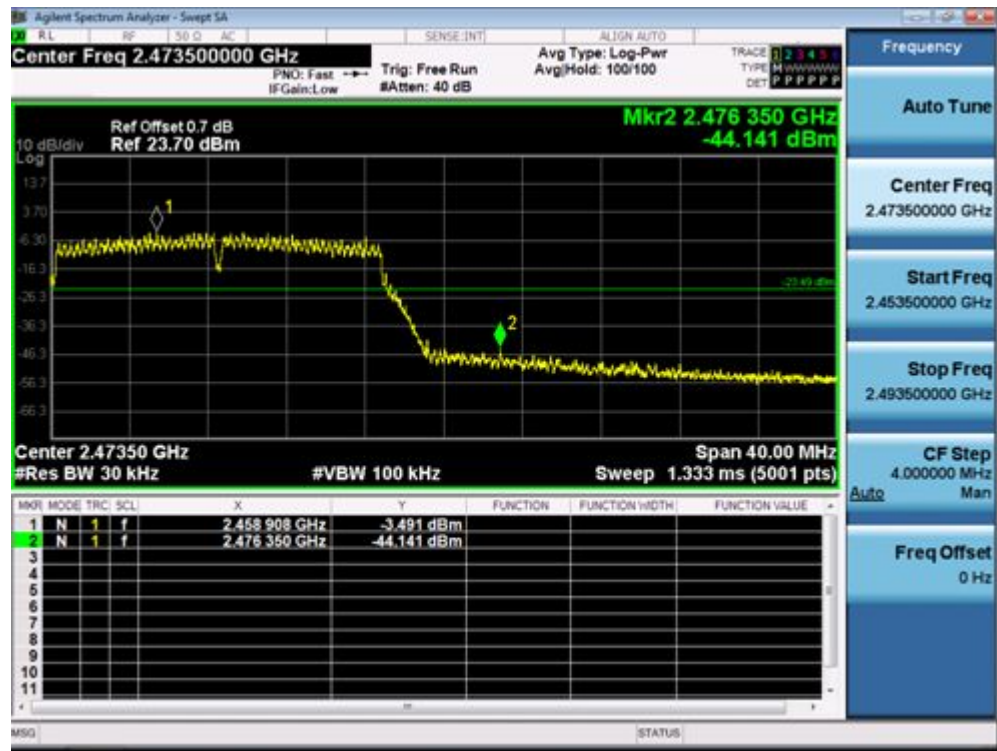
(Plot 4.5.2.1 B: Channel 11: 2462MHz )

11G:

B. Test Plots



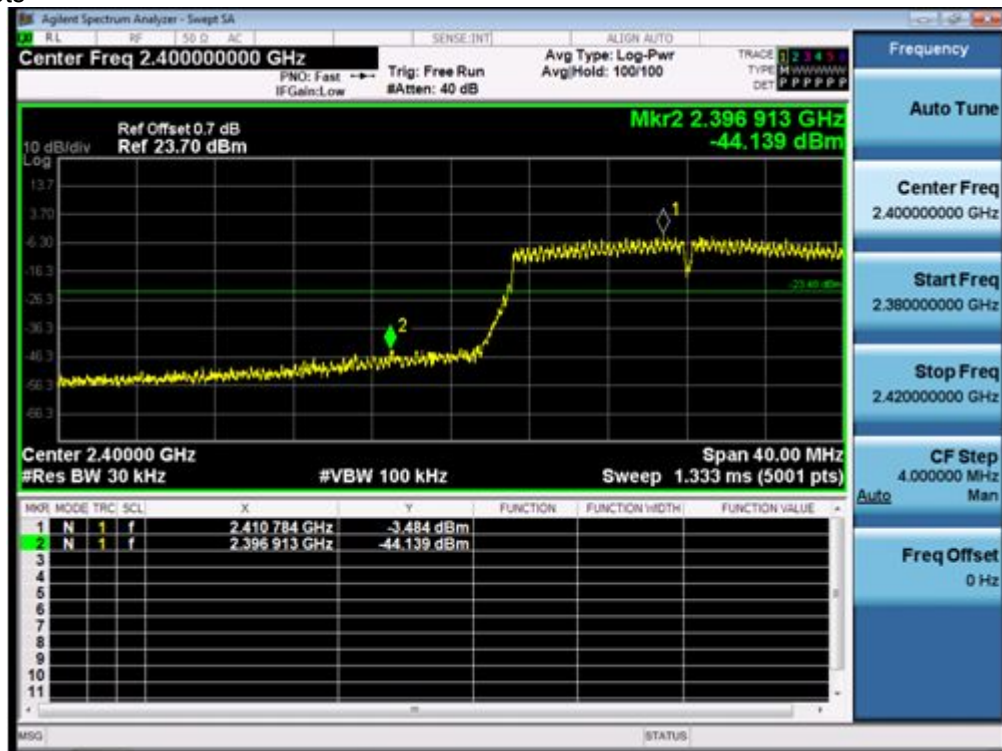
(Plot 4.5.2.2 A: Channel 01: 2412MHz )



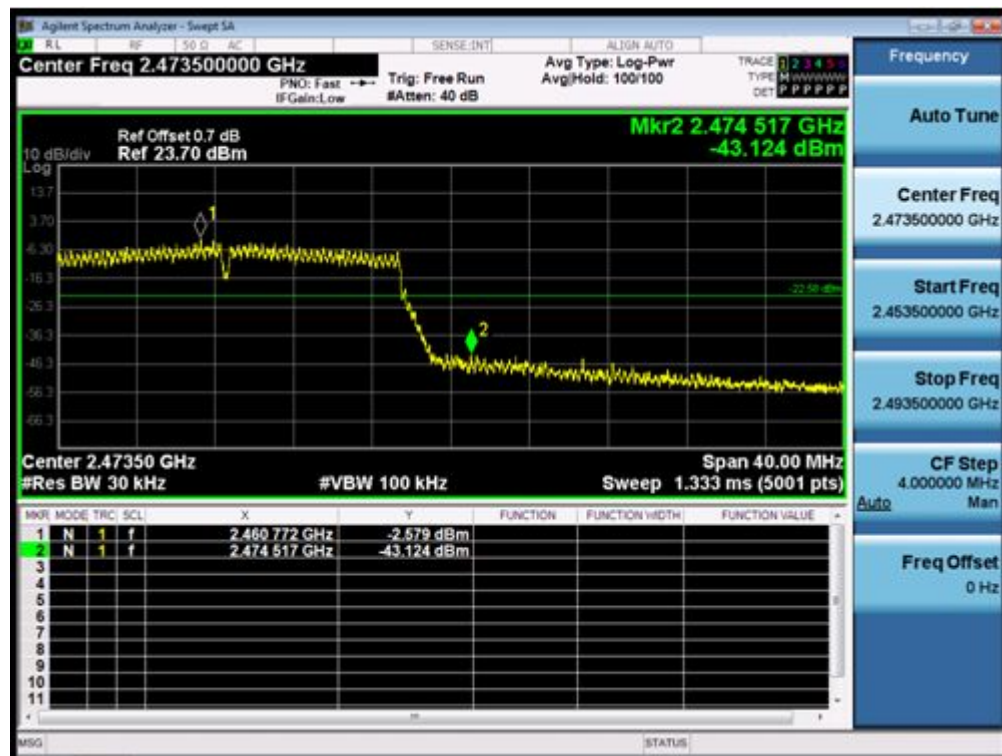
(Plot 4.5.2.2 B: Channel 11: 2462MHz)

11N(20M):

C. Test Plots



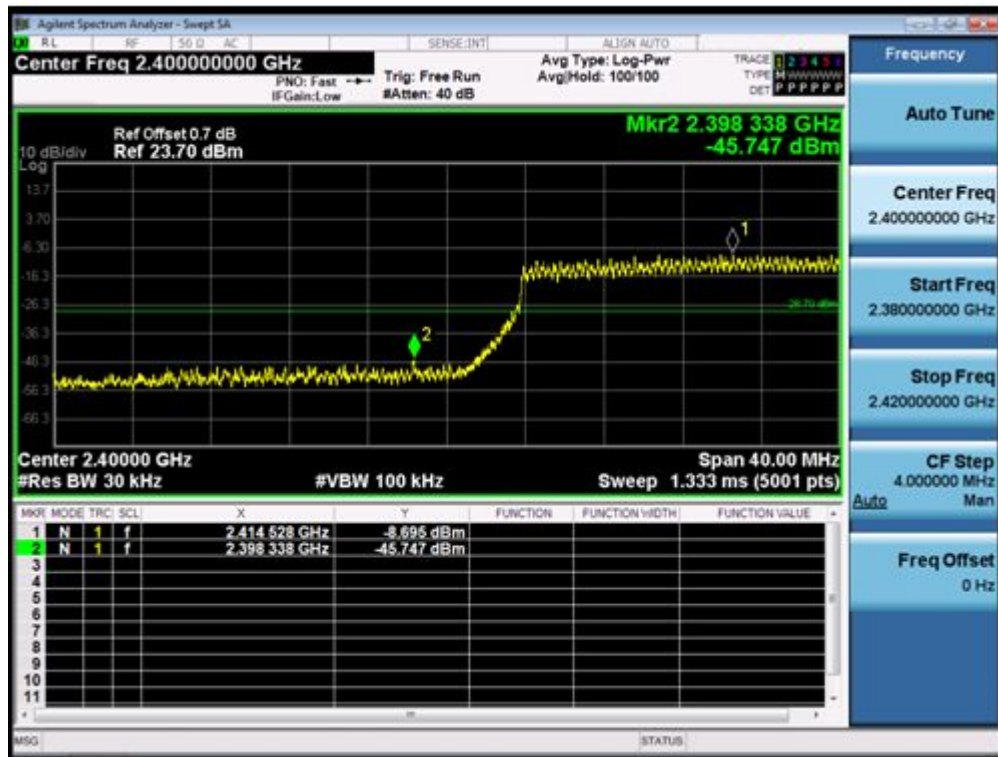
(Plot 4.5.2.3 A: Channel 01: 2412MHz)



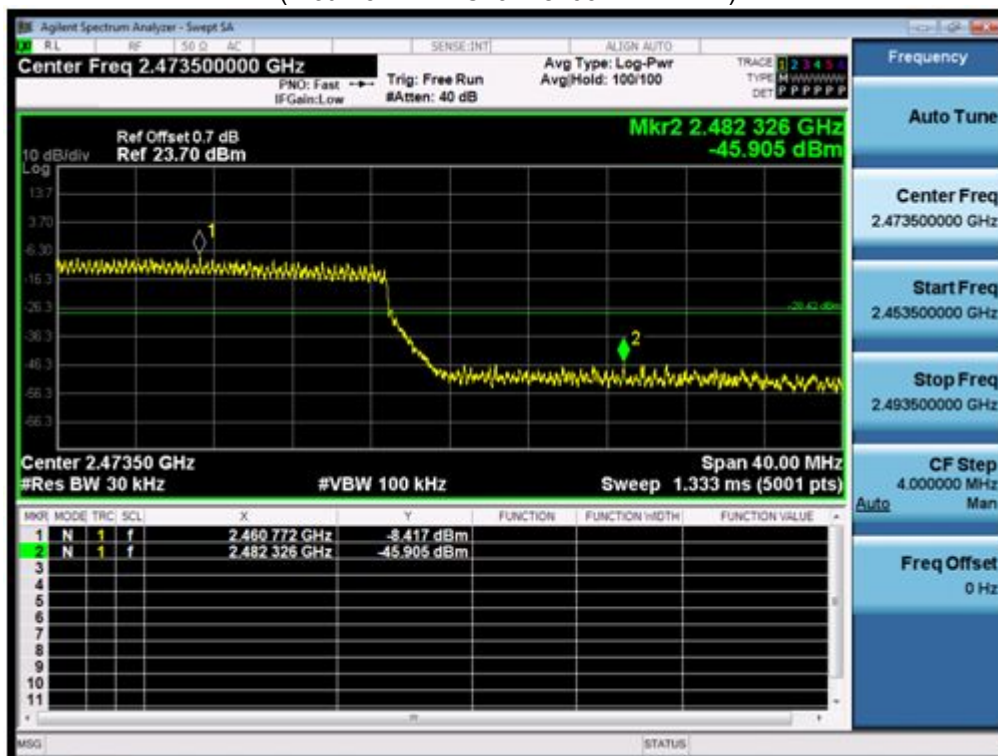
(Plot 4.5.2.3 B: Channel 11: 2412MHz)

11N(40M):

D. Test Plots



(Plot 4.5.2.4 A: Channel 03: 2422MHz)



(Plot 4.5.2.4 B: Channel 09: 2452MHz)

## 4.6. Spurious RF Conducted Emission

### TEST CONFIGURATION



### TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2009 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100 kHz and VBW= 300 KHz to measure the peak field strength, and measure frequency range from 9 KHz to 26.5GHz.

### LIMIT

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

### TEST RESULTS

Remark: The measurement frequency range is from 9 KHz to the 10<sup>th</sup> harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandedge measurement data.

#### 4.6.1 802.11b Test Mode

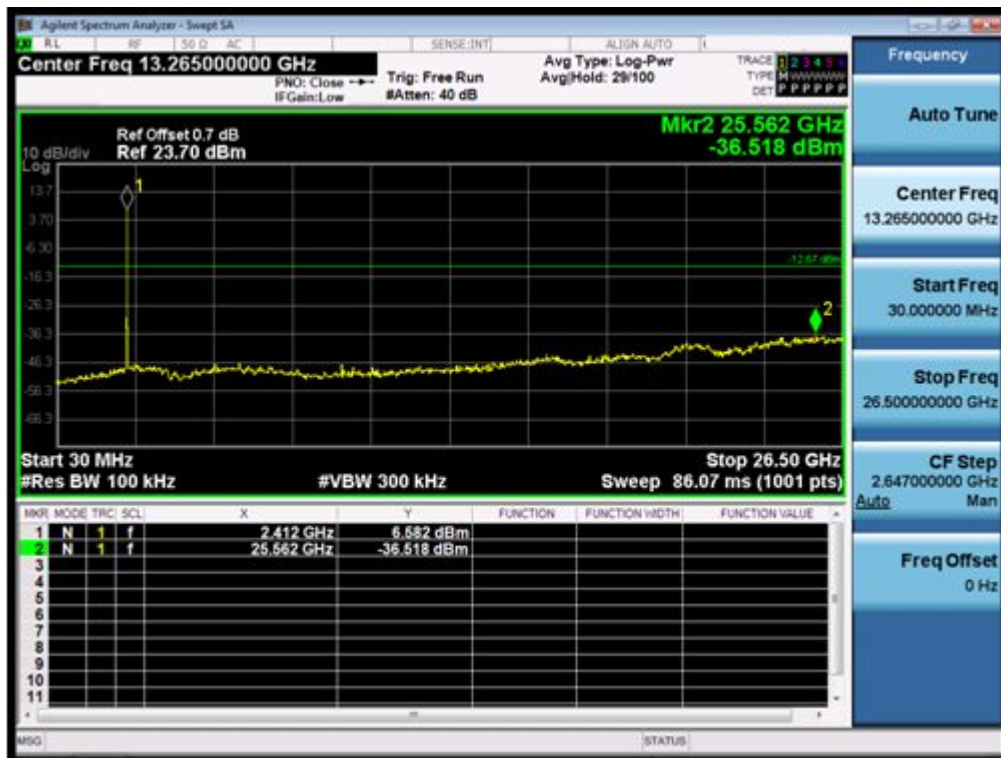
##### A. Test Verdict

| Channel | Frequency (MHz) | Frequency Range | Refer to Plot | Limit (dBc) | Verdict |
|---------|-----------------|-----------------|---------------|-------------|---------|
| 1       | 2412            | 2.412 GHz       | Plot 4.6.1 A1 | ---         | PASS    |
|         |                 | 30MHz -26GHz    | Plot 4.6.1 A2 | -20         | PASS    |
| 6       | 2437            | 2.437 GHz       | Plot 4.6.1 B1 | ---         | PASS    |
|         |                 | 30MHz -26GHz    | Plot 4.6.1 B2 | -20         | PASS    |
| 11      | 2462            | 2.462 GHz       | Plot 4.6.1 C1 | ---         | PASS    |
|         |                 | 30MHz -26GHz    | Plot 4.6.1 C2 | -20         | PASS    |

- Note:
1. For 802.11b mode at final test to get the worst-case emission at 1Mbps.
  2. The test results including the cable lose.



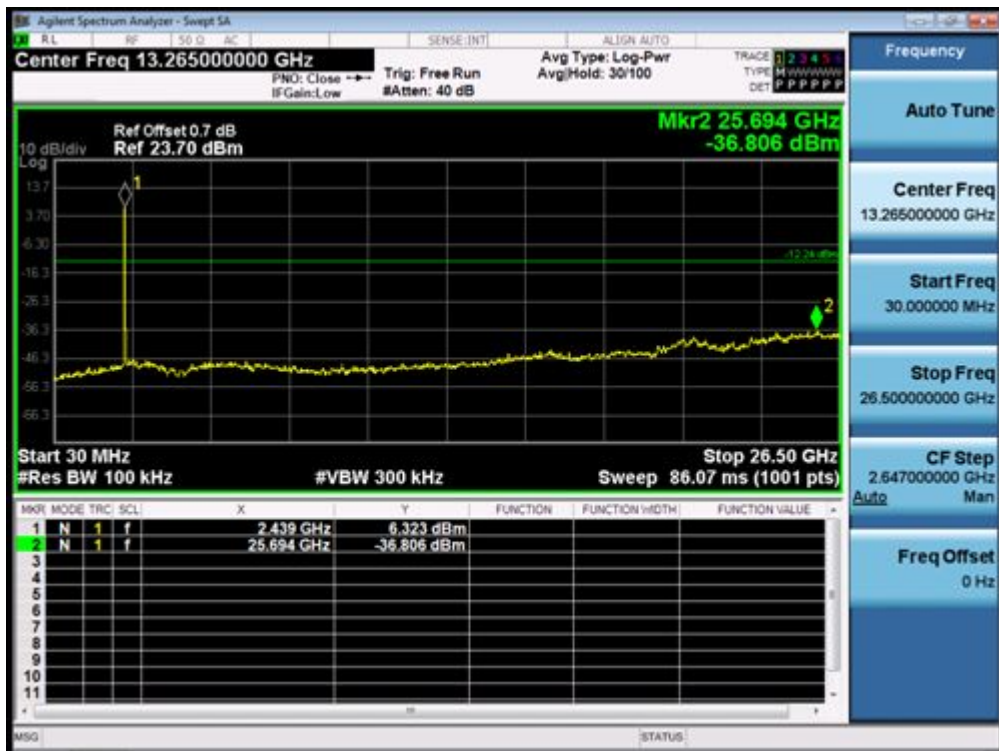
(Plot 4.6.1 A1: Channel 1: 2412MHz @ 802.11b)



(Plot 4.6.1 A2: Channel 1: 2412MHz @ 802.11b)



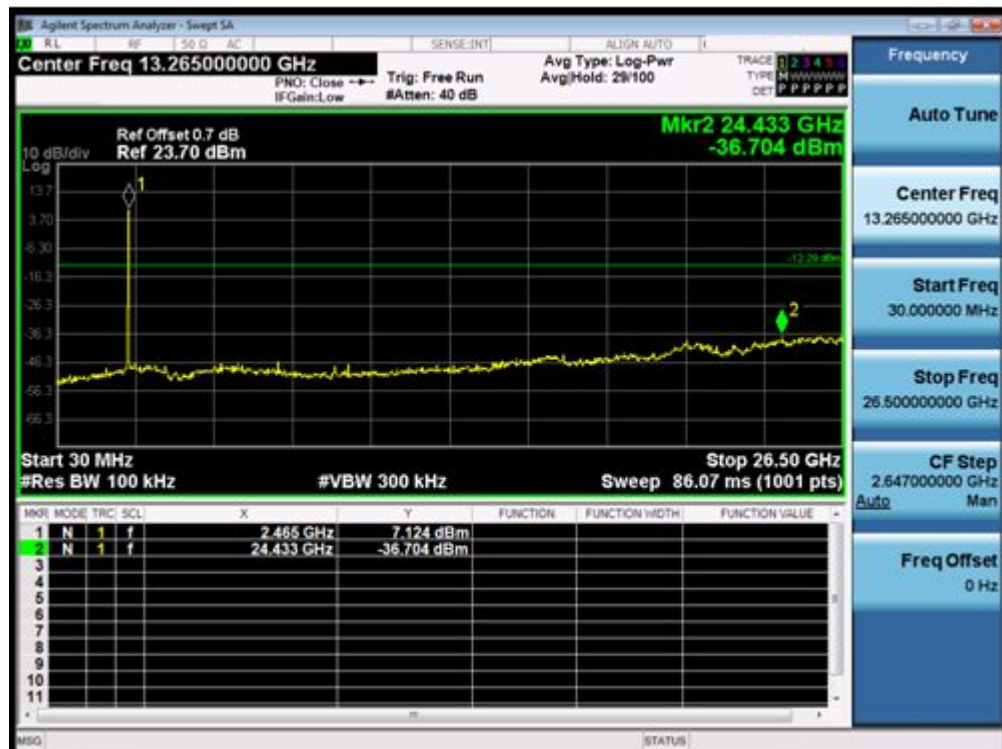
(Plot 4.6.1 B1: Channel 6: 2437MHz @ 802.11b)



(Plot 4.6.1 B2: Channel 6: 2437MHz @ 802.11b)



(Plot 4.6.1 C1: Channel 11: 2462MHz @ 802.11b)



(Plot 4.6.1 C2: Channel 11: 2462MHz @ 802.11b)

#### 4.6.2 802.11g Test Mode

##### A. Test Verdict

| Channel | Frequency (MHz) | Frequency Range | Refer to Plot | Limit (dBc) | Verdict |
|---------|-----------------|-----------------|---------------|-------------|---------|
| 1       | 2412            | 2.412 GHz       | Plot 4.6.2 A1 | ---         | PASS    |
|         |                 | 30MHz-26GHz     | Plot 4.6.2 A2 | -20         | PASS    |
| 6       | 2437            | 2.437 GHz       | Plot 4.6.2 B1 | ---         | PASS    |
|         |                 | 30MHz-26GHz     | Plot 4.6.2 B2 | -20         | PASS    |
| 11      | 2462            | 2.462 GHz       | Plot 4.6.2 C1 | ---         | PASS    |
|         |                 | 30MHz-26GHz     | Plot 4.6.2 C2 | -20         | PASS    |

Note: 1. For 802.11g mode at final test to get the worst-case emission at 6Mbps.  
2. The test results including the cable lose.

##### B. Test Plots



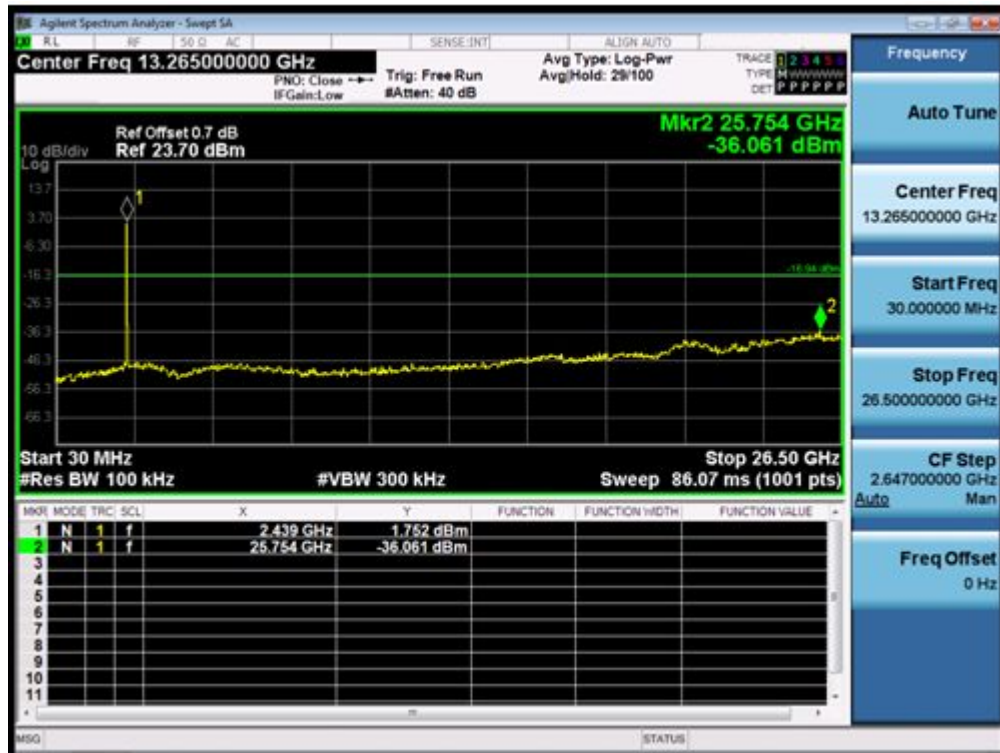
(Plot 4.6.2 A1: Channel 1: 2412MHz @ 802.11g)



(Plot 4.6.2 A2: Channel 1: 2412MHz @ 802.11g)



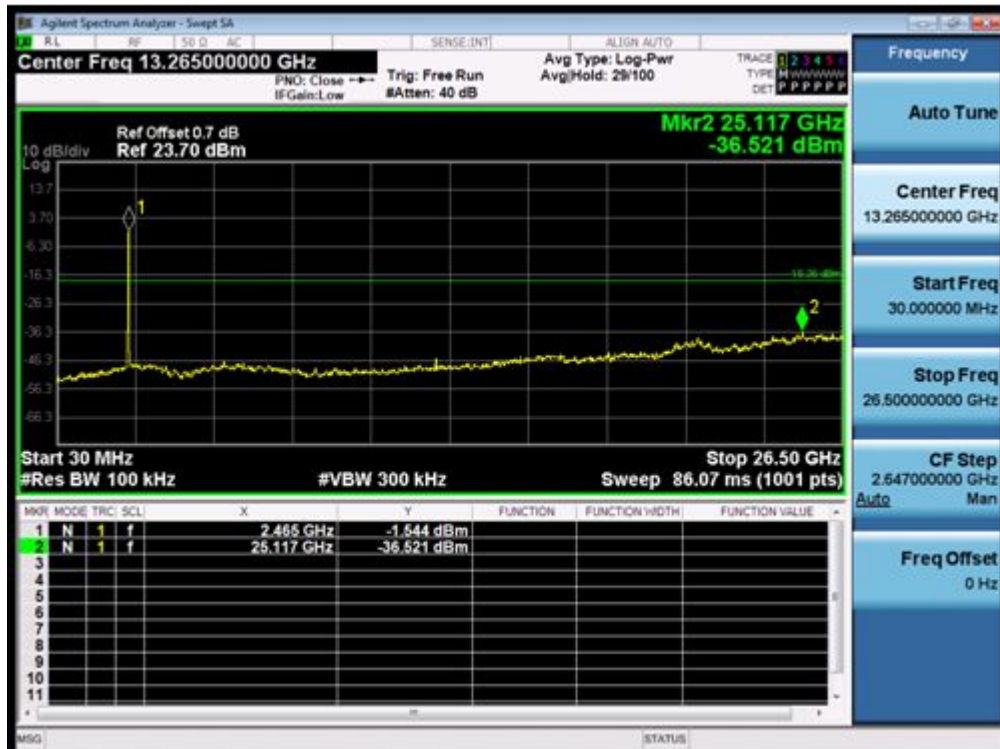
(Plot 4.6.2 B1: Channel 6: 2437MHz @ 802.11g)



(Plot 4.6.2 B2: Channel 6: 2437MHz @ 802.11g)



(Plot 4.6.2 C1: Channel 11: 2462MHz @ 802.11g)



(Plot 4.6.2 C2: Channel 11: 2462MHz @ 802.11g)

### 4.6.3 802.11n HT20MHz Test Mode

#### A. Test Verdict

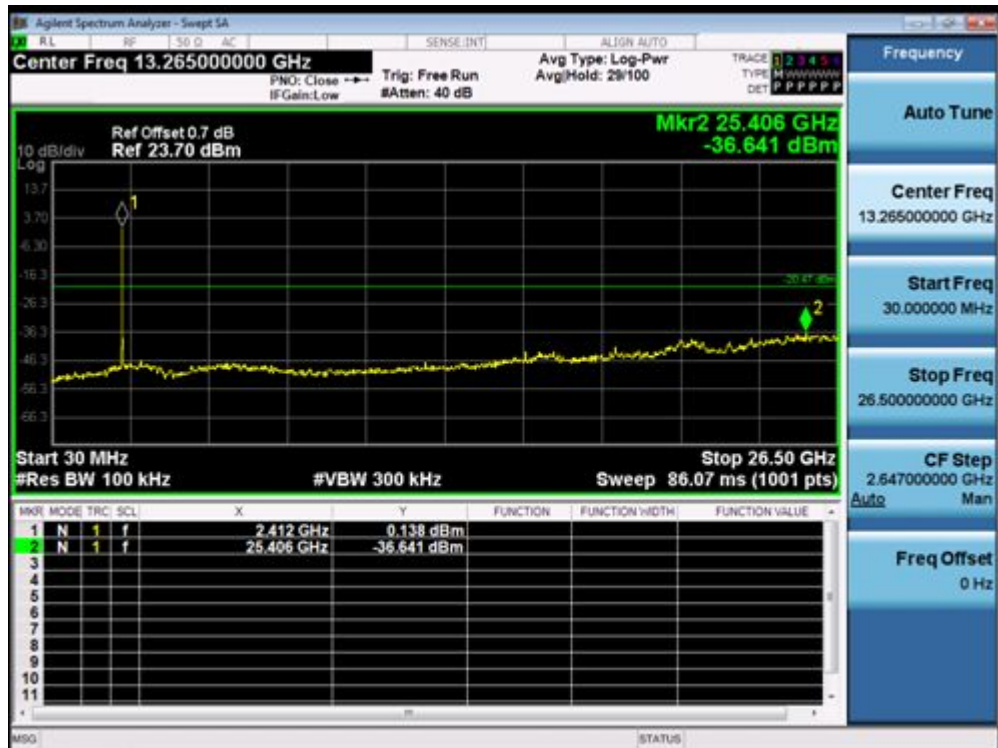
| Channel | Frequency (MHz) | Frequency Range | Refer to Plot | Limit (dBc) | Verdict |
|---------|-----------------|-----------------|---------------|-------------|---------|
| 1       | 2412            | 2.412 GHz       | Plot 4.6.3 A1 | ---         | PASS    |
|         |                 | 30MHz-26GHz     | Plot 4.6.3 A2 | -20         | PASS    |
| 6       | 2437            | 2.437 GHz       | Plot 4.6.3 B1 | ---         | PASS    |
|         |                 | 30MHz-26GHz     | Plot 4.6.3 B2 | -20         | PASS    |
| 11      | 2462            | 2.462 GHz       | Plot 4.6.3 C1 | ---         | PASS    |
|         |                 | 30MHz-26GHz     | Plot 4.6.3 C2 | -20         | PASS    |

Note: 1. For 802.11n HT20MHz mode at final test to get the worst-case emission at 6.5Mbps.  
2. The test results including the cable lose.

#### B. Test Plots



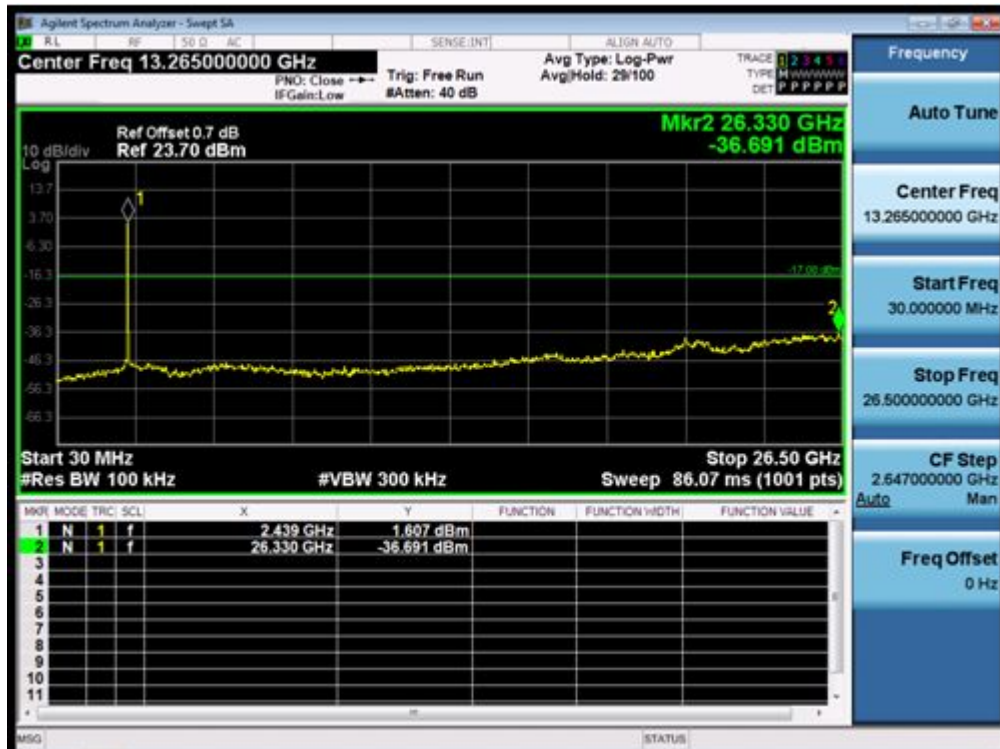
(Plot 4.6.3 A1: Channel 1: 2412MHz @ 802.11n HT20)



(Plot 4.6.3 A2: Channel 1: 2412MHz @ 802.11n HT20)



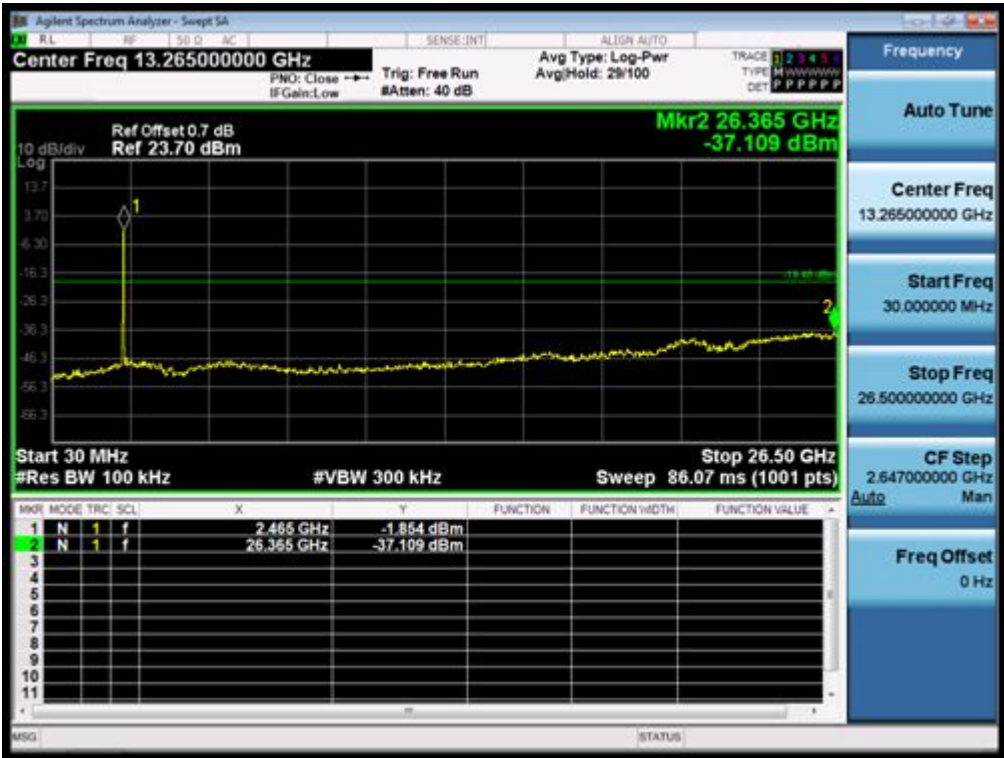
(Plot 4.6.3 B1: Channel 6: 2437MHz @ 802.11n HT20)



(Plot 4.6.3 B2: Channel 6: 2437MHz @ 802.11n HT20)



(Plot 4.6.3 C1: Channel 11: 2462MHz @ 802.11n HT20)



(Plot 4.6.3 C2: Channel 11: 2462MHz @ 802.11n HT20)

#### 4.6.4 802.11n HT40MHz Test Mode

##### A. Test Verdict

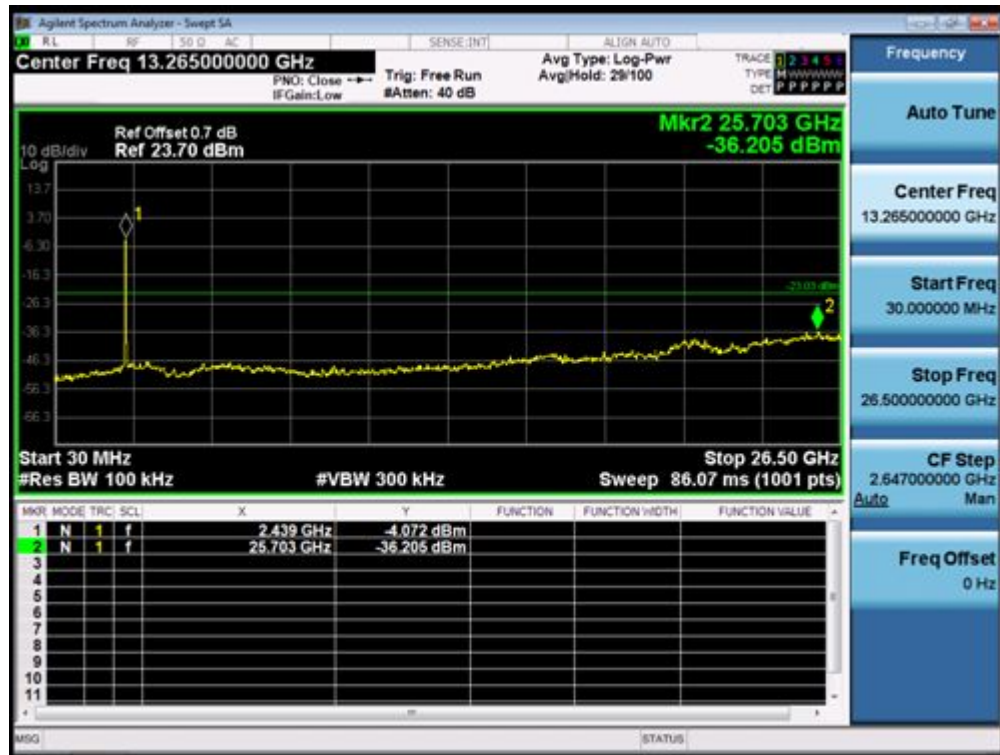
| Channel | Frequency (MHz) | Frequency Range | Refer to Plot | Limit (dBc) | Verdict |
|---------|-----------------|-----------------|---------------|-------------|---------|
| 3       | 2422            | 2.422 GHz       | Plot 4.6.4 A1 | ---         | PASS    |
|         |                 | 30MHz-26GHz     | Plot 4.6.4 A2 | -20         | PASS    |
| 6       | 2437            | 2.437 GHz       | Plot 4.6.4 B1 | ---         | PASS    |
|         |                 | 30MHz-26GHz     | Plot 4.6.4 B2 | -20         | PASS    |
| 9       | 2452            | 2.452 GHz       | Plot 4.6.4 C1 | ---         | PASS    |
|         |                 | 30MHz-26GHz     | Plot 4.6.3 C2 | -20         | PASS    |

Note: 1. For 802.11n HT40MHz mode at final test to get the worst-case emission at 13.5Mbps.  
2. The test results including the cable lose.

##### B. Test Plots



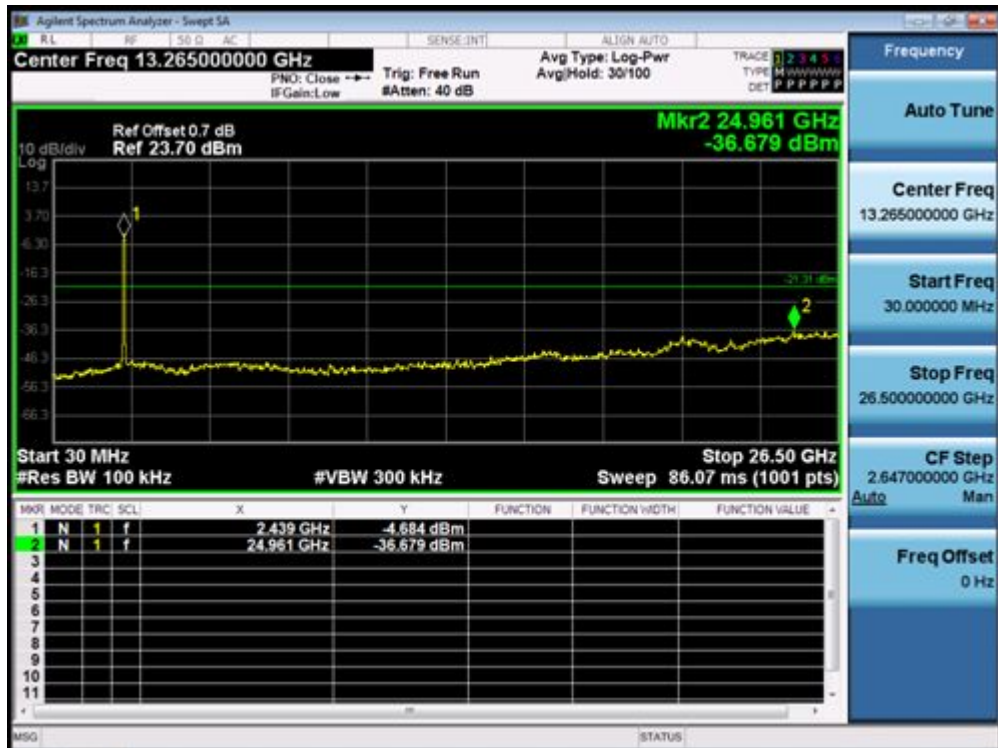
(Plot 4.6.4 A1: Channel 3: 2422MHz @ 802.11n HT40)



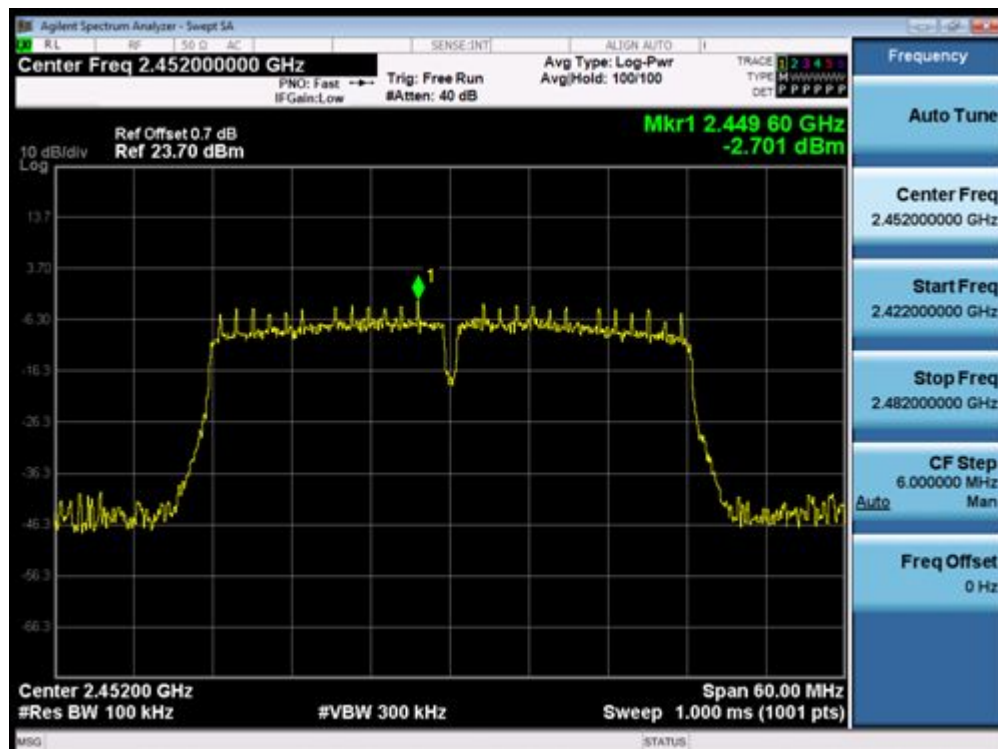
(Plot 4.6.4 A2: Channel 3: 2422MHz @ 802.11n HT40)



(Plot 4.6.4 B1: Channel 6: 2437MHz @ 802.11n HT40)



(Plot 4.6.4 B2: Channel 6: 2437MHz @ 802.11n HT40)



(Plot 4.6.4 C1: Channel 9 : 2452MHz @ 802.11n HT40)



(Plot 4.6.4 C2: Channel 9: 2452MHz @ 802.11n HT40)

## 4.7. 6dB Bandwidth

### TEST CONFIGURATION



### TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300KHz. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB. According to KDB558074 D01 V03 for one of the following procedures may be used to determine the modulated DTS device signal bandwidth.

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

### LIMIT

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

### TEST RESULTS

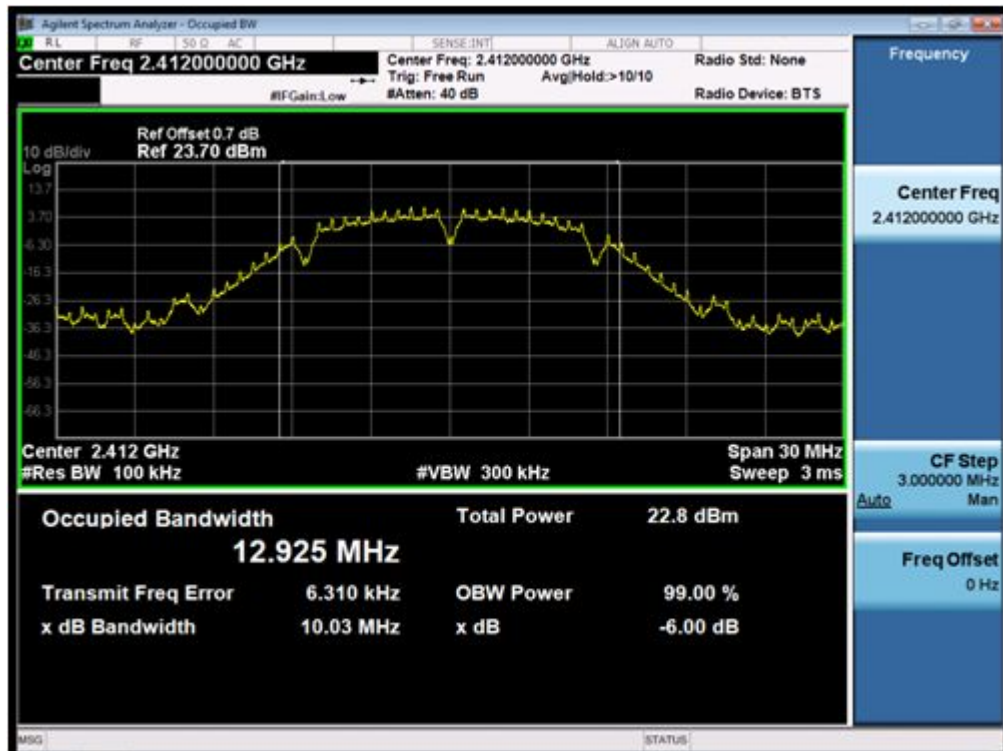
#### 4.7.1 801.11b Test Mode

##### A. Test Verdict

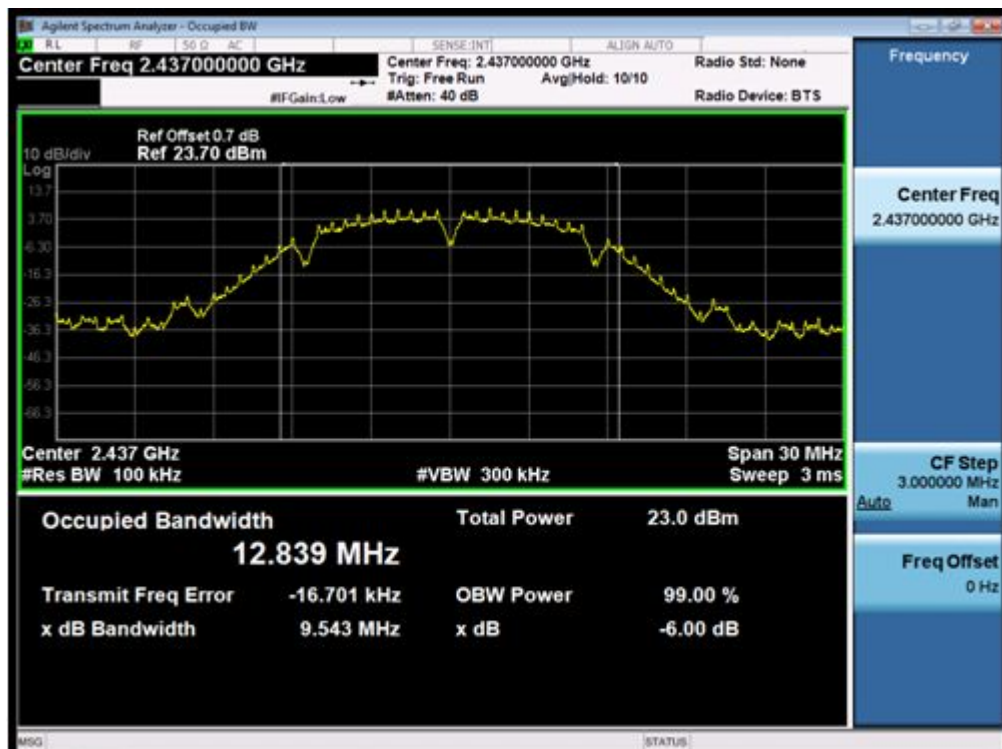
| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Refer to Plot | Limits (kHz) | Verdict |
|---------|-----------------|----------------------|---------------|--------------|---------|
| 1       | 2412            | 10.03                | Plot 4.7.1 A  | $\geq 500$   | PASS    |
| 6       | 2437            | 9.54                 | Plot 4.7.1 B  | $\geq 500$   | PASS    |
| 11      | 2462            | 9.56                 | Plot 4.7.1 C  | $\geq 500$   | PASS    |

Note: 1. For 802.11b mode at final test to get the worst-case emission at 1Mbps.  
2. The test results including the cable loss.

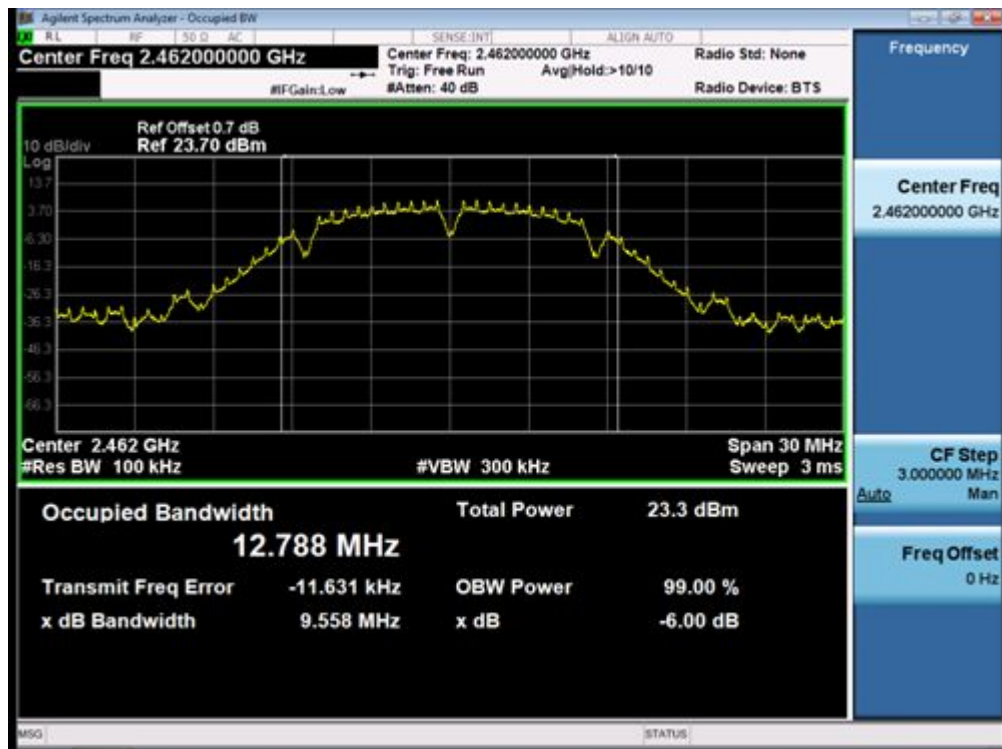
##### B. Test Plots



(Plot 4.7.1 A: Channel 1: 2412MHz @ 802.11b)



(Plot 4.7.1 B: Channel 6: 2437MHz @ 802.11b)



(Plot 4.7.1 C: Channel 11: 2462MHz @ 802.11b)

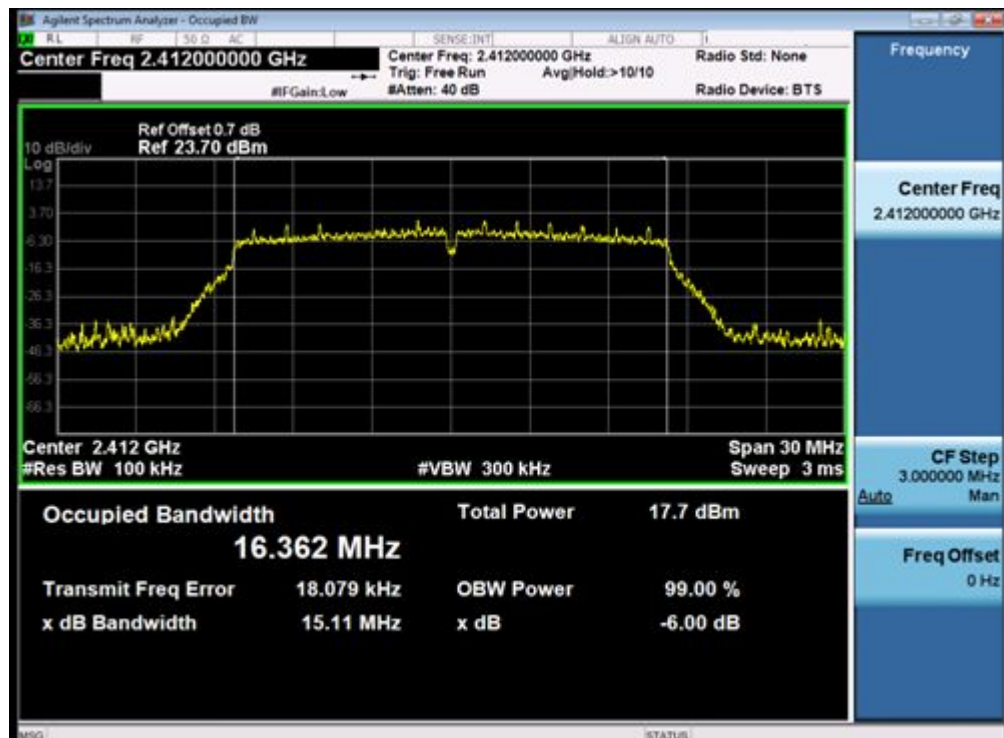
#### 4.7.2 801.11g Test Mode

##### A. Test Verdict

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Refer to Plot | Limits (kHz) | Verdict |
|---------|-----------------|----------------------|---------------|--------------|---------|
| 1       | 2412            | 15.11                | Plot 4.7.2 A  | $\geq 500$   | PASS    |
| 6       | 2437            | 15.03                | Plot 4.7.2 B  | $\geq 500$   | PASS    |
| 11      | 2462            | 15.13                | Plot 4.7.2 C  | $\geq 500$   | PASS    |

Note: 1. For 802.11g mode at final test to get the worst-case emission at 6Mbps.  
2. The test results including the cable loss.

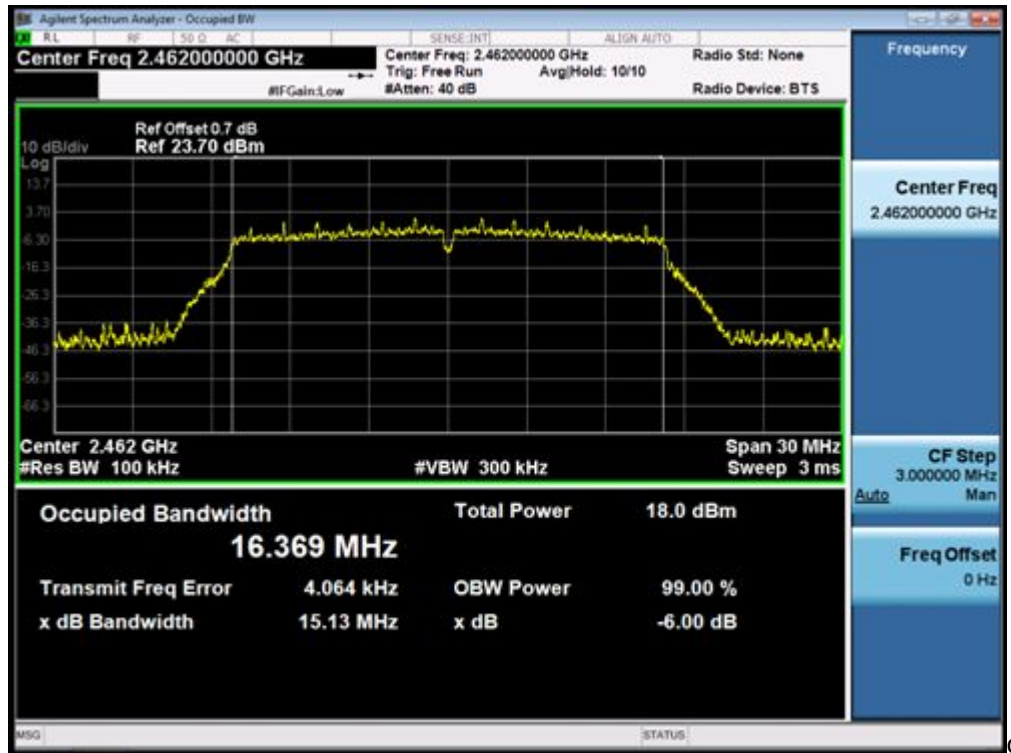
##### B. Test Plots



(Plot 4.7.2 A: Channel 1: 2412MHz @ 802.11g)



(Plot 4.7.2 B: Channel 6: 2437MHz @ 802.11g)



(Plot 4.7.2 C: Channel 11: 2462MHz @ 802.11g)

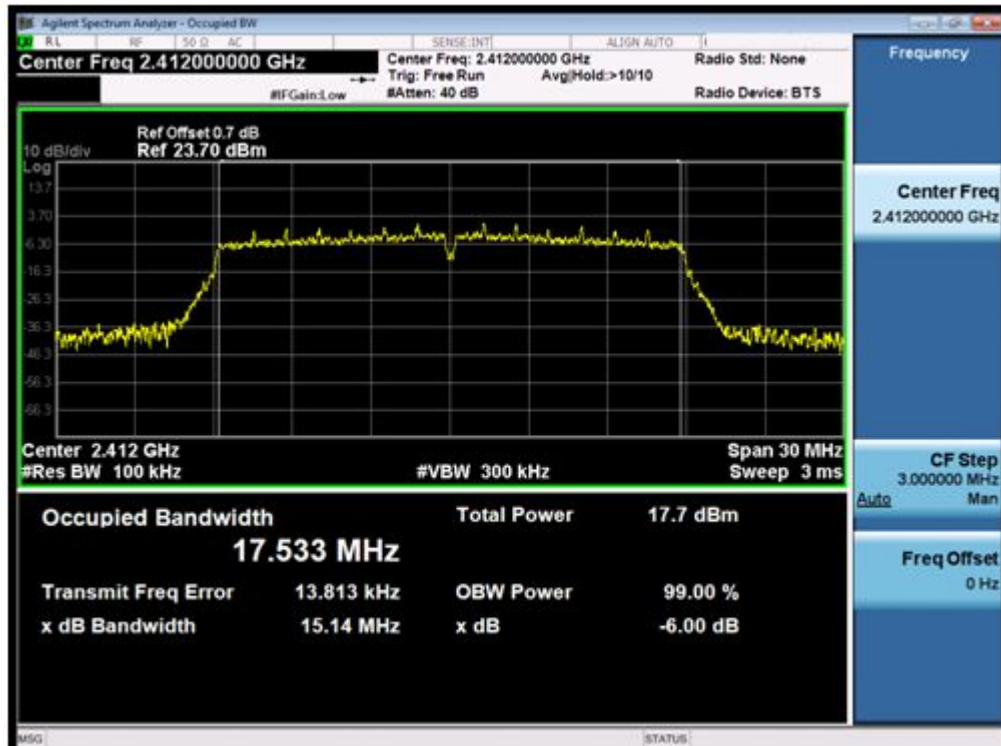
### 4.7.3 801.11n HT20MHz Test Mode

### A. Test Verdict

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Refer to Plot | Limits (kHz) | Verdict |
|---------|-----------------|----------------------|---------------|--------------|---------|
| 1       | 2412            | 15.14                | Plot 4.7.3 A  | ≥500         | PASS    |
| 6       | 2437            | 15.91                | Plot 4.7.3 B  | ≥500         | PASS    |
| 11      | 2462            | 15.89                | Plot 4.7.3 C  | ≥500         | PASS    |

Note: 1. For 802.11n HT20MHz mode at final test to get the worst-case emission at 6.5Mbps.  
2. The test results including the cable loss.

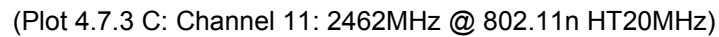
### B. Test Plots



(Plot 4.7.3 A: Channel 1: 2412MHz @ 802.11n HT20)



(Plot 4.7.3 B: Channel 6: 2437MHz @ 802.11n HT20)

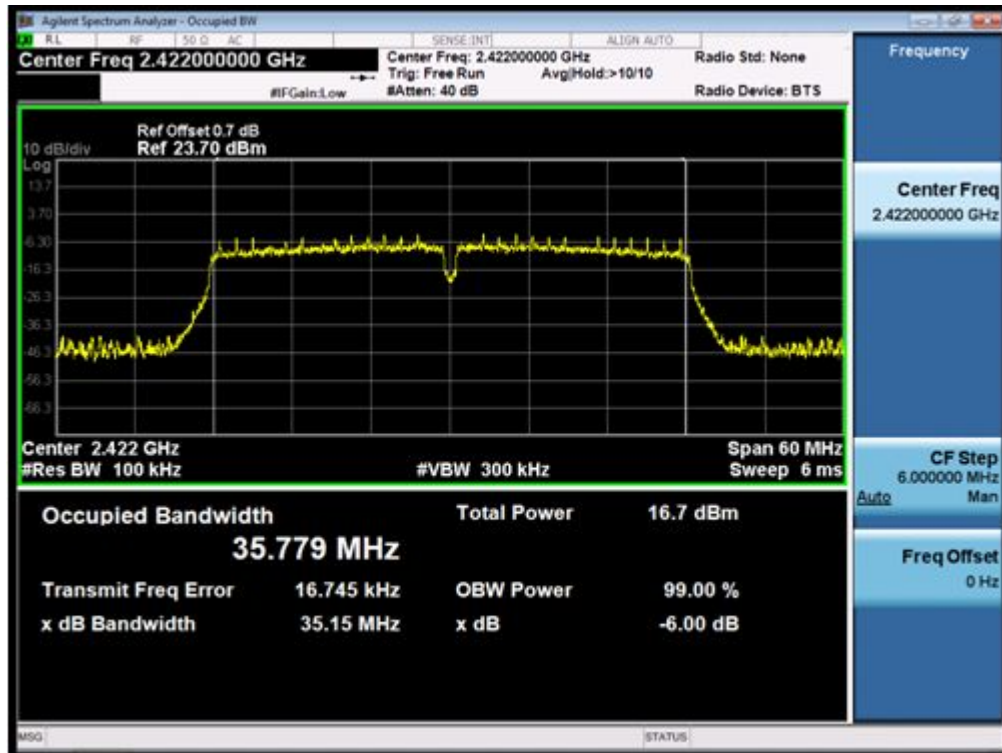


### A. Test Verdict

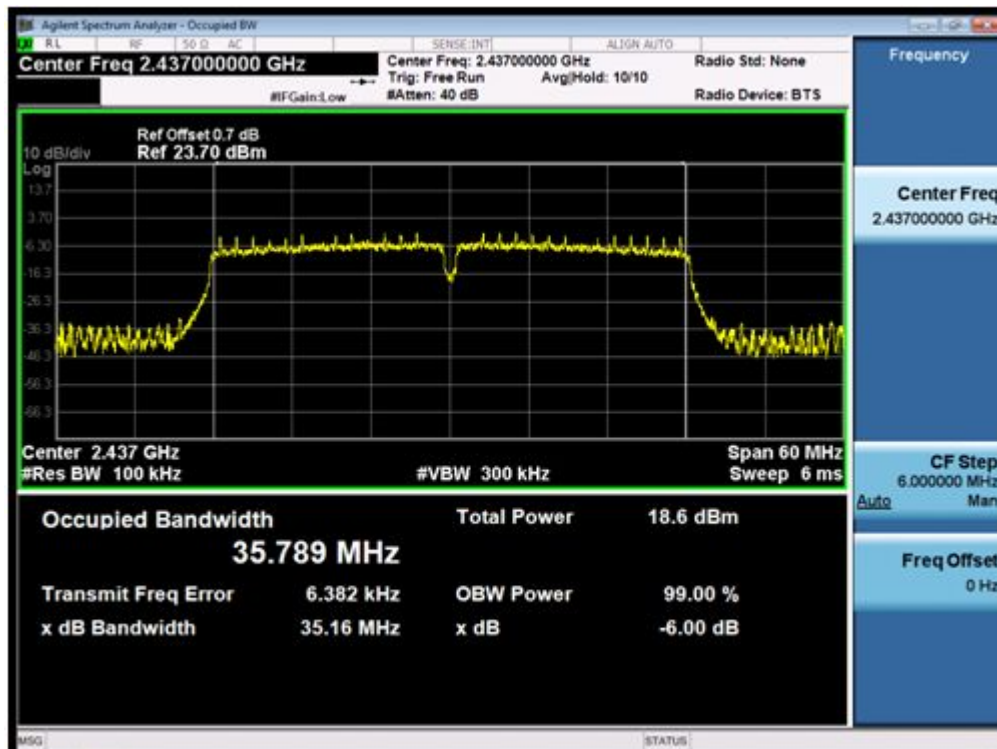
Note:

1. For 802.11n HT40MHz mode at final test to get the worst-case emission at 13.5Mbps.
2. The test results including the cable loss.

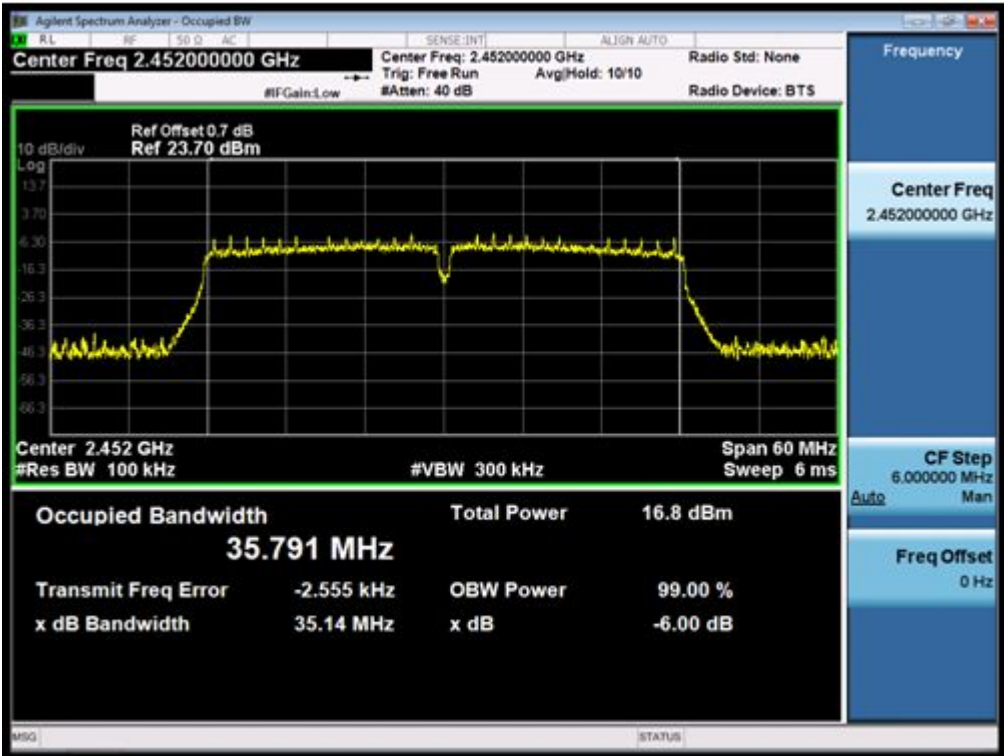
### B. Test Plots



(Plot 4.7.4 A: Channel 3: 2422MHz @ 802.11n HT40MHz)



(Plot 4.7.3 B: Channel 6: 2437MHz @ 802.11n HT40MHz)



(Plot 4.7.4 C: Channel 9: 2452MHz @ 802.11n HT40MHz)

## 4.8. Antenna Requirement

### **Standard Applicable**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

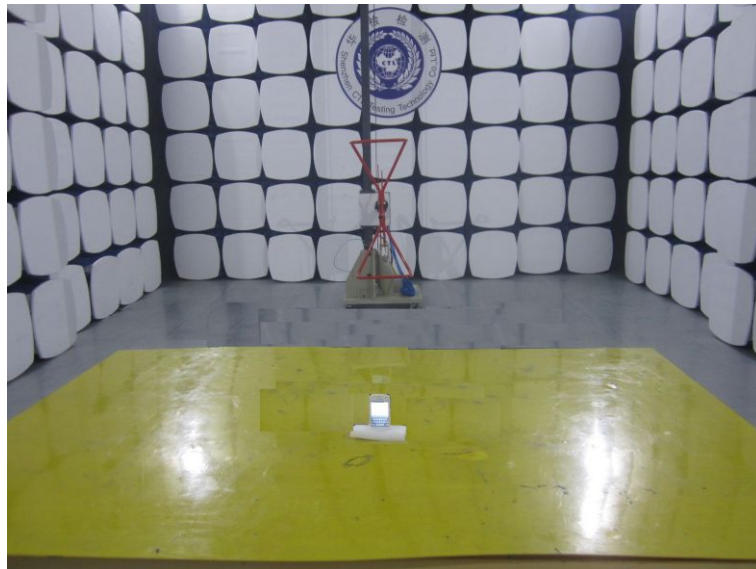
### **Refer to statement below for compliance**

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

### **Antenna Connected Construction**

The WLAN and Bluetooth sharing same antenna and the maximum antenna gain of WLAN used was 0.00 dBi

## 5. Test Setup Photos of the EUT



.....End of Report.....