Shenzhen CTL Testing Technology Co., Ltd.
Tel: +86-755-89486194 E-mail: ctl@ctl-lab.com

# TEST REPORT

## FCC PART 15.247

**Report Reference No.** .....: **CTL1703037071-WF**

| | | |
|---|---|---|
| Compiled by:<br>( position+printed name+signature) | Allen Wang<br>(File administrators) | Allen Wang |
| Tested by:<br>( position+printed name+signature) | Nice Nong<br>(Test Engineer) | Nice Nong |
| Approved by:<br>( position+printed name+signature) | Ivan Xie<br>(Manager) | Ivan Xie |

| | |
|---|---|
| **Product Name**.....: | VoIP Wireless ATA |
| **Model/Type reference** .....: | FTA1101 |
| **Brand Name**.....: | Flyingvoice |
| **FCC ID** .....: | 2AL9D-FTA1101 |
| **Applicant's name** .....: | **Flyingvoice Network Technology Co., Ltd** |
| **Address of applicant** .....: | Room102, 1F East, Bldg 3#, Minqi Park, Pingshan, Xili, Nanshan District, Shenzhen, China |
| **Test Firm** .....: | **Shenzhen CTL Testing Technology Co., Ltd.** |
| **Address of Test Firm** .....: | Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055 |
| **Test specification**.....: | |
| Standard.....: | **FCC Part 15.247:** Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz. |
| TRF Originator .....: | Shenzhen CTL Testing Technology Co., Ltd. |
| Master TRF .....: | Dated 2011-01 |
| **Date of Receipt**.....: | May 02, 2017 |
| **Date of Test Date**.....: | May 02, 2017–May 18, 2017 |
| **Data of Issue**.....: | May 24, 2017 |
| **Result**.....: | Positive |

# TEST REPORT

| Test Report No. : | CTL1703037071-WF | May 24, 2017 |
|---|---|---|
| | | Date of issue |

| | | |
|---|---|---|
| Equipment under Test | : | VoIP Wireless ATA |
| Model /Type | : | FTA1101 |
| **Applicant** | : | **Flyingvoice Network Technology Co., Ltd** |
| Address | : | Room102, 1F East, Bldg 3#, Minqi Park, Pingshan, Xili, Nanshan District, Shenzhen, China |
| **Manufacturer** | : | **Flyingvoice Network Technology Co., Ltd** |
| Address | : | Room102, 1F East, Bldg 3#, Minqi Park, Pingshan, Xili, Nanshan District, Shenzhen, China |

| Test result | Pass * |
|---|---|

* In the configuration tested, the EUT complied with the standards specified page 5.

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.

# ** Modified History **

| Revisions | Description | Issued Data | Report No. | Remark |
|---|---|---|---|---|
| Version 1.0 | Initial Test Report Release | 2017-05-24 | CTL1703037071-WF | Tracy Qi |
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## Table of Contents Page

# 1. SUMMARY

## 1.1. 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 C63.10:2013 : American National Standard for Testing Unlicensed Wireless Devices

ANSI C63.4: 2014: –American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz Range of 9 kHz to 40GHz

558074 D01 DTS Meas Guidance v04 : Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

KDB 662911: D01Emissions Testing of Transmitters with Multiple Outputs in the Same Band

## 1.2. Test Description

| FCC PART 15.247 | | |
|---|---|---|
| FCC Part 15.207 | AC Power Conducted Emission | PASS |
| FCC Part 15.247(a)(2) | 6dB Bandwidth | PASS |
| FCC Part 15.247(d) | Spurious RF Conducted Emission | PASS |
| FCC Part 15.247(b) | Maximum Conducted Output Power | PASS |
| FCC Part 15.247(e) | Power Spectral Density | PASS |
| FCC Part 15.109/ 15.205/ 15.209 | Radiated Emissions | PASS |
| FCC Part 15.247(d) | Band Edge | PASS |
| FCC Part 15.203/15.247 (b) | Antenna Requirement | PASS |

## 1.3. Test Facility

### 1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 22/EN 55022 requirements.

### 1.3.2 Laboratory accreditation

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

### IC Registration No.: 9618B

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

### FCC-Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory 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, December 19, 2013.

## 1.4. 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 CTL laboratory is reported:

| Test | Measurement Uncertainty | Notes |
|---|---|---|
| Transmitter power conducted | ±0.57 dB | (1) |
| Transmitter power Radiated | ±2.20 dB | (1) |
| Conducted spurious emission 9KHz-40 GHz | ±2.20 dB | (1) |
| Occupied Bandwidth | ±0.01ppm | (1) |
| Radiated Emission 30~1000MHz | ±4.10dB | (1) |
| Radiated Emission Above 1GHz | ±4.32dB | (1) |
| Conducted Disturbance0.15~30MHz | ±3.20dB | (1) |

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 1.5. Environmental conditions

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

| | |
|---|---|
| Normal Temperature: | 25°C |
| Relative Humidity: | 55 % |
| Air Pressure: | 101 kPa |

## 1.6. General Description of EUT

| | |
|---|---|
| Product Name: | VoIP Wireless ATA |
| Model/Type reference: | FTA1101 |
| Power supply: | AC 120V/60Hz |
| **WIFI** | |
| Supported type: | 802.11b/802.11g/802.11n(H20)/802.11n(H40) |
| Modulation: | 802.11b: DSSS<br>802.11g/802.11n(H20)/802.11n(H40): OFDM |
| Operation frequency: | 802.11b/802.11g/802.11n(H20): 2412MHz~2462MHz<br>802.11n(H40): 2422MHz~2452MHz |
| Channel number: | 802.11b/802.11g/802.11n(H20): 11<br>802.11n(H40): 7 |
| Channel separation: | 5MHz |
| Antenna type: | PCB Antenna : 2 |
| Antenna gain: | 2.0dBi |

Note: 802.11b/802.11g have SISO mode only ;802.11n(H20)/802.11n(H40) have MIMO mode only

Directional gain =2+10log 2=5.01dBi

## 2. Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing.

**Operation Frequency WIFI：**

| 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 | | |

Note: The line display in grey were the channel selected for testing

**Data Rate Used:**

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

| Test Items | Mode | Data Rate | Channel |
|---|---|---|---|
| Maximum Conducted Output Power<br>Power Spectral Density<br>6dB Bandwidth<br>Spurious RF conducted emission<br>Radiated Emission 9kHz~1GHz&<br>Radiated Emission 1GHz~10th Harmonic | 11b/DSSS | 1 Mbps | 1/6/11 |
| | 11g/OFDM | 6 Mbps | 1/6/11 |
| | 11n(20MHz)/OFDM | 6.5Mbps | 1/6/11 |
| | 11n(40MHz)/OFDM | 13.5 Mbps | 3/6/9 |
| Band Edge | 11b/DSSS | 1 Mbps | 1/11 |
| | 11g/OFDM | 6 Mbps | 1/11 |
| | 11n(20MHz)/OFDM | 6.5Mbps | 1/11 |
| | 11n(40MHz)/OFDM | 13.5 Mbps | 3//9 |

Note: All tests performed with alternate AC power sulpply and DC power supply , recorded the worst case at AC mode

## 2.1. Equipments Used during the Test

| Test Equipment | Manufacturer | Model No. | Serial No. | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| ULTRA-ROADBAND ANTENNA | Sunol Sciences Corp. | JB1 | A061713 | 2016/06/02 | 2017/06/01 |
| EMI Test Receiver | R&S | ESCI | 103710 | 2016/06/02 | 2017/06/01 |
| Spectrum Analyzer | Agilent | E4407B | MY41440676 | 2016/05/21 | 2017/05/20 |
| Controller | EM Electronics | Controller EM 1000 | N/A | 2016/05/21 | 2017/05/20 |
| Horn Antenna | Sunol Sciences Corp. | DRH-118 | A062013 | 2016/05/19 | 2017/05/18 |
| Active Loop Antenna | Daze | ZN30900A | N/A | 2016/05/19 | 2017/05/18 |
| LISN | R&S | ENV216 | 3560.6550.12 | 2016/06/02 | 2017/06/01 |
| LISN | R&S | ESH2-Z5 | 860014/010 | 2016/06/02 | 2017/06/01 |
| ISN | FCC | F-071115-1057-1-09 | 11229 | 2016/05/19 | 2017/05/18 |
| Amplifier | Agilent | 8349B | 3008A02306 | 2016/05/19 | 2017/05/18 |
| Amplifier | Agilent | 8447D | 2944A10176 | 2016/05/19 | 2017/05/18 |
| Transient Limiter | SCHWARZCECK | VTSD 9561F | 9666 | 2016/06/02 | 2017/06/01 |
| Radio Communication Tester | R&S | CMU200 | 115419 | 2016/05/22 | 2017/05/21 |
| Temperature/Humidity Meter | Gangxing | CTH-608 | 02 | 2016/05/20 | 2017/05/19 |
| SIGNAL GENERATOR | Agilent | E4421B | US40051744 | 2016/05/20 | 2017/05/19 |
| Power Meter | Agilent | U2531A | TW53323507 | 2016/05/21 | 2017/05/20 |
| Power Sensor | Agilent | U2021XA | MY5365004 | 2016/05/21 | 2017/05/20 |
| Climate Chamber | ESPEC | EL-10KA | A20120523 | 2016/05/20 | 2017/05/19 |
| High-Pass Filter | K&L | 9SH10-2700/X12750-O/O | N/A | 2016/05/20 | 2017/05/19 |
| High-Pass Filter | K&L | 41H10-1375/U12750-O/O | N/A | 2016/05/20 | 2017/05/19 |
| RF Cable | HUBER+SUHNER | RG214 | N/A | 2016/05/20 | 2017/05/19 |

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

This submittal(s) (test report) is intended for FCC ID: 2AL9D-FTA1101 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## 2.3. Modifications

No modifications were implemented to meet testing criteria.

# 3. TEST CONDITIONS AND RESULTS

## 3.1. Conducted Emissions Test

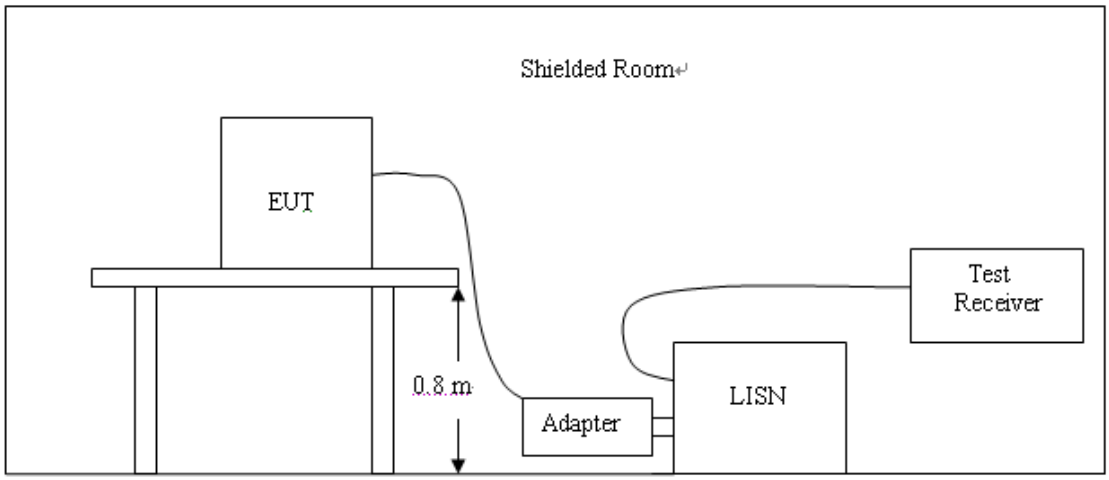
**LIMIT**

FCC CFR Title 47 Part 15 Subpart C Section 15.207

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

* Decreases with the logarithm of the frequency.

**TEST CONFIGURATION**



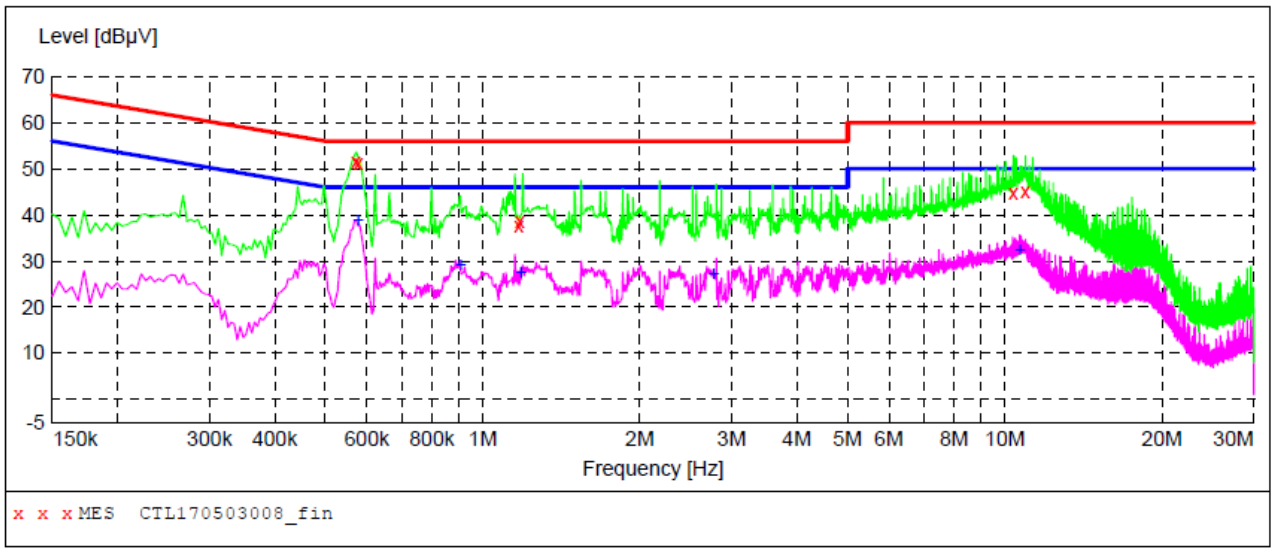

**TEST PROCEDURE**

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 C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. 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.

## TEST RESULTS

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

Short Description: 150K-30M Voltage




***MEASUREMENT RESULT: "CTL170503008_fin"***

5/3/2017 2:39PM

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.572000 | 51.60 | 10.2 | 56 | 4.4 | QP | L1 | GND |
| 0.578000 | 51.10 | 10.2 | 56 | 4.9 | QP | L1 | GND |
| 1.172000 | 37.80 | 10.3 | 56 | 18.2 | QP | L1 | GND |
| 1.178000 | 38.70 | 10.3 | 56 | 17.3 | QP | L1 | GND |
| 10.388000 | 44.80 | 10.6 | 60 | 15.2 | QP | L1 | GND |
| 10.952000 | 45.10 | 10.6 | 60 | 14.9 | QP | L1 | GND |

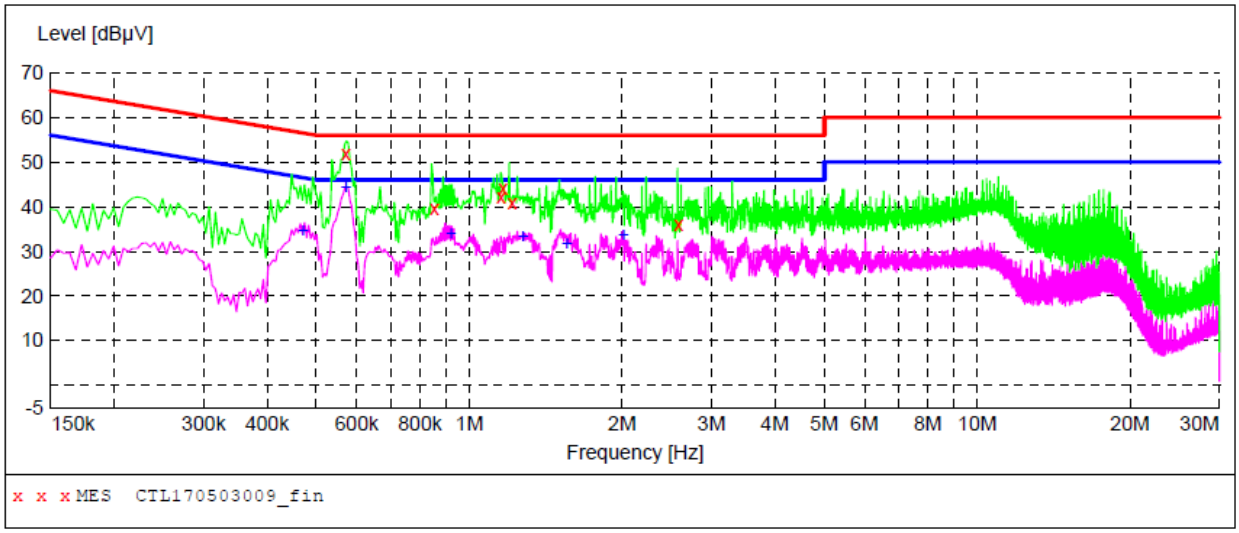
***MEASUREMENT RESULT: "CTL170503008_fin2"***

5/3/2017 2:39PM

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.578000 | 38.90 | 10.2 | 46 | 7.1 | AV | L1 | GND |
| 0.908000 | 29.20 | 10.2 | 46 | 16.8 | AV | L1 | GND |
| 1.184000 | 27.60 | 10.3 | 46 | 18.4 | AV | L1 | GND |
| 2.768000 | 27.40 | 10.4 | 46 | 18.6 | AV | L1 | GND |
| 10.682000 | 32.40 | 10.6 | 50 | 17.6 | AV | L1 | GND |

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

Short Description: 150K-30M Voltage




***MEASUREMENT RESULT: "CTL170503009_fin"***

5/3/2017 2:42PM

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.572000 | 51.80 | 10.2 | 56 | 4.2 | QP | N | GND |
| 0.854000 | 39.50 | 10.2 | 56 | 16.5 | QP | N | GND |
| 1.154000 | 42.20 | 10.3 | 56 | 13.8 | QP | N | GND |
| 1.166000 | 44.00 | 10.3 | 56 | 12.0 | QP | N | GND |
| 1.214000 | 40.80 | 10.3 | 56 | 15.2 | QP | N | GND |
| 2.582000 | 35.90 | 10.4 | 56 | 20.1 | QP | N | GND |

***MEASUREMENT RESULT: "CTL170503009_fin2"***

5/3/2017 2:42PM

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.470000 | 34.80 | 10.2 | 47 | 11.7 | AV | N | GND |
| 0.572000 | 44.50 | 10.2 | 46 | 1.5 | AV | N | GND |
| 0.920000 | 34.00 | 10.3 | 46 | 12.0 | AV | N | GND |
| 1.274000 | 33.30 | 10.3 | 46 | 12.7 | AV | N | GND |
| 1.556000 | 31.90 | 10.3 | 46 | 14.1 | AV | N | GND |
| 2.012000 | 33.80 | 10.4 | 46 | 12.2 | AV | N | GND |

## 3.2. Radiated Emissions and Band Edge

**Limit**

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

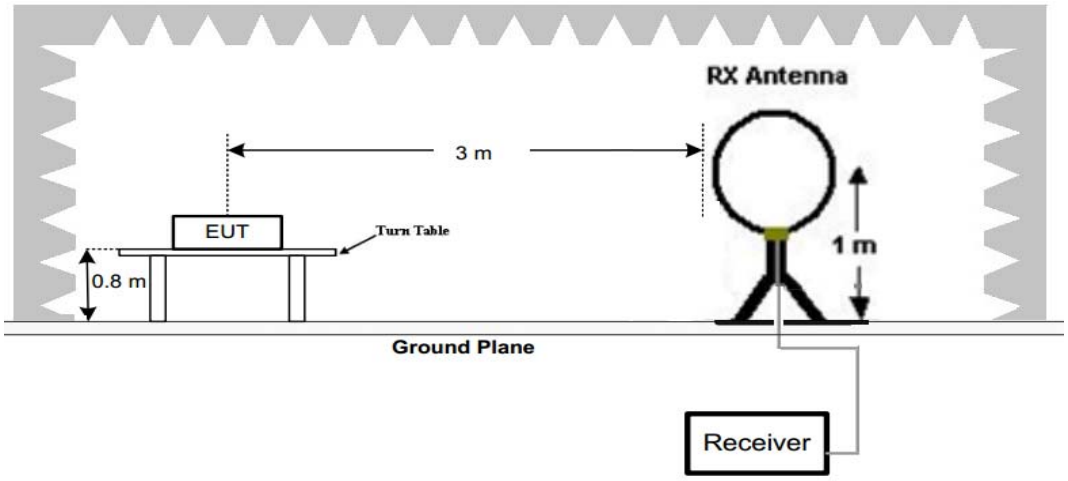
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

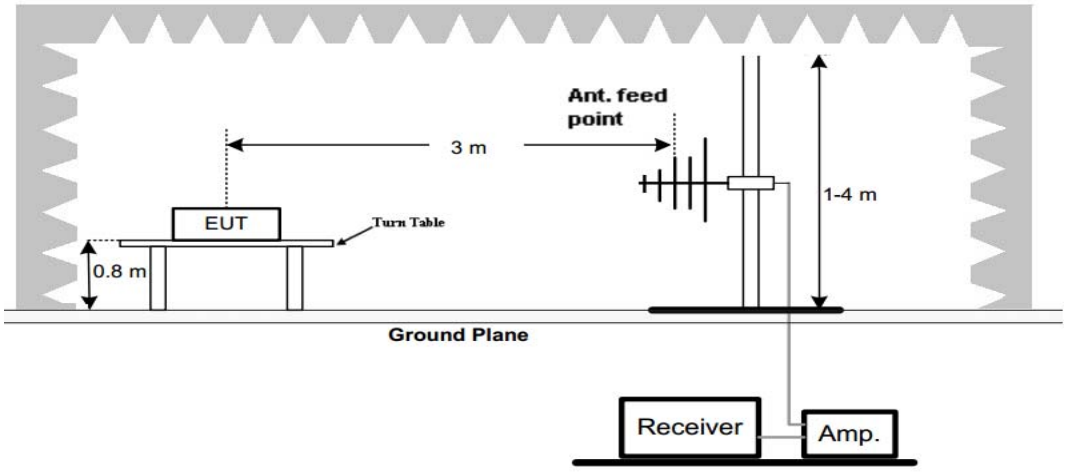
| Frequency (MHz) | Distance (Meters) | Radiated (dBμV/m) | Radiated (μV/m) |
|---|---|---|---|
| 0.009-0.49 | 3 | 20log(2400/F(KHz))+40log(300/3) | 2400/F(KHz) |
| 0.49-1.705 | 3 | 20log(24000/F(KHz))+ 40log(30/3) | 24000/F(KHz) |
| 1.705-30 | 3 | 20log(30)+ 40log(30/3) | 30 |
| 30-88 | 3 | 40.0 | 100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

**TEST CONFIGURATION**

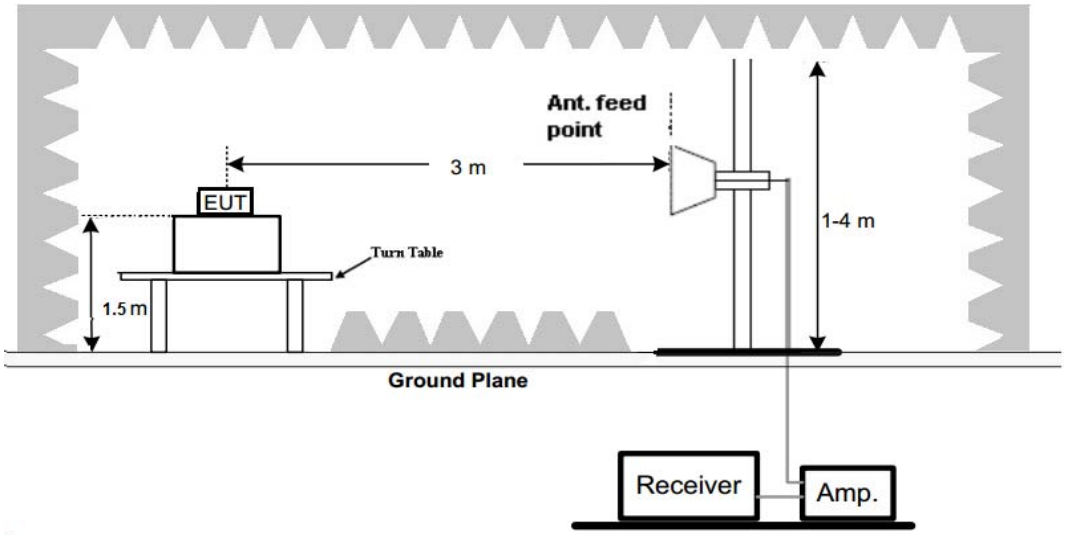
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz




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



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




**Test Procedure**

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m 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.

**TEST RESULTS**

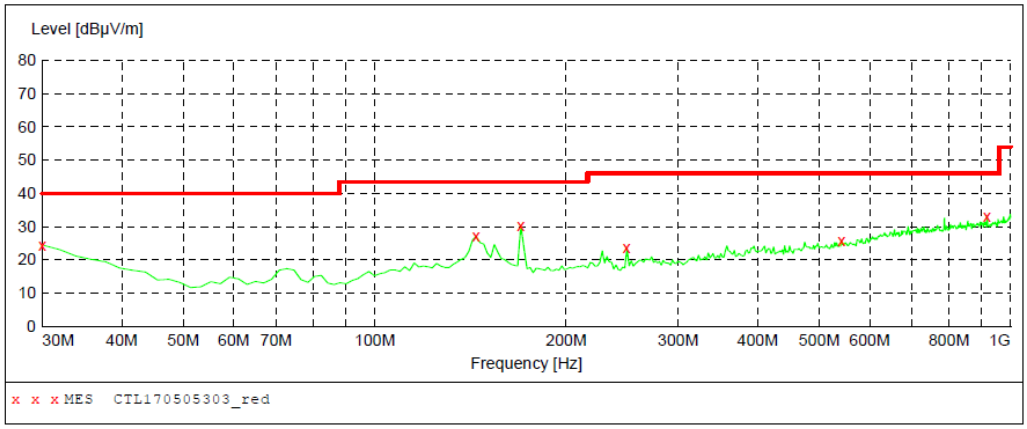
Remark:
1. We tested three channels (lowest/middle/highest) of each mode and recorded worst case at 802.11b low channel for measurement below 1GHz.
2. We tested three channels (lowest/middle/highest) of each mode and recorded worst case at 802.11b mode above 1GHz.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

## For 30MHz-1GHz

### Horizontal

***SWEEP TABLE: "test (30M-1G)"***

| Short Description: | | | Field Strength | | |
|---|---|---|---|---|---|
| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
| 30.0 MHz | 1.0 GHz | MaxPeak | 300.0 ms | 120 kHz | JB1 |




***MEASUREMENT RESULT: "CTL170505303_red"***

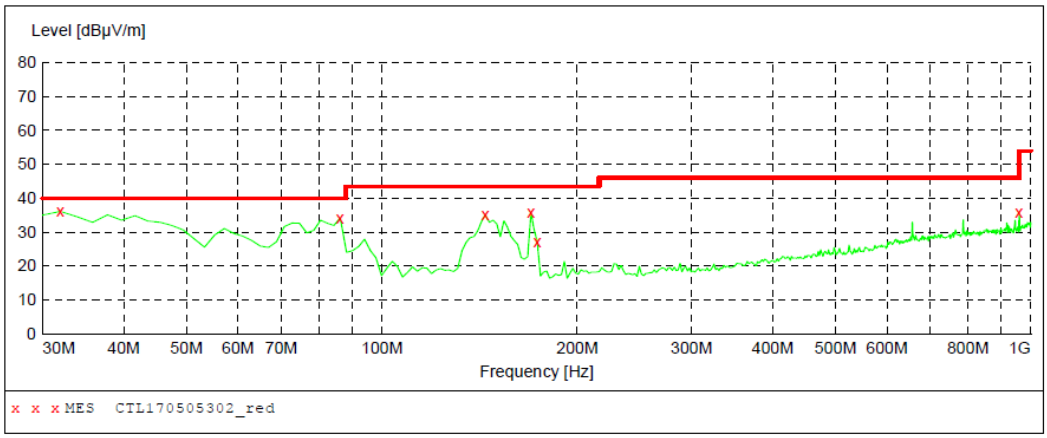
5/5/2017 9:42AM

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Det. | Height cm | Azimuth deg | Polarization |
|---|---|---|---|---|---|---|---|---|
| 30.000000 | 24.40 | 20.8 | 40.0 | 15.6 | --- | 0.0 | 0.00 | HORIZONTAL |
| 144.460000 | 27.00 | 14.1 | 43.5 | 16.5 | --- | 0.0 | 0.00 | HORIZONTAL |
| 169.680000 | 30.40 | 13.3 | 43.5 | 13.1 | --- | 0.0 | 0.00 | HORIZONTAL |
| 249.220000 | 23.50 | 13.8 | 46.0 | 22.5 | --- | 0.0 | 0.00 | HORIZONTAL |
| 542.160000 | 25.90 | 20.7 | 46.0 | 20.1 | --- | 0.0 | 0.00 | HORIZONTAL |
| 918.520000 | 33.10 | 26.2 | 46.0 | 12.9 | --- | 0.0 | 0.00 | HORIZONTAL |

### Vertical

***SWEEP TABLE: "test (30M-1G)"***

| Short Description: | | | Field Strength | | |
|---|---|---|---|---|---|
| Start Frequency | Stop Frequency | Detector | Meas. Time | IF Bandw. | Transducer |
| 30.0 MHz | 1.0 GHz | MaxPeak | 300.0 ms | 120 kHz | JB1 |




***MEASUREMENT RESULT: "CTL170505302_red"***

5/5/2017 9:39AM

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Det. | Height cm | Azimuth deg | Polarization |
|---|---|---|---|---|---|---|---|---|
| 31.940000 | 36.10 | 19.2 | 40.0 | 3.9 | --- | 0.0 | 0.00 | VERTICAL |
| 86.260000 | 34.10 | 9.0 | 40.0 | 5.9 | --- | 0.0 | 0.00 | VERTICAL |
| 144.460000 | 35.00 | 14.1 | 43.5 | 8.5 | --- | 0.0 | 0.00 | VERTICAL |
| 169.680000 | 35.80 | 13.3 | 43.5 | 7.7 | --- | 0.0 | 0.00 | VERTICAL |
| 173.560000 | 27.10 | 13.0 | 43.5 | 16.4 | --- | 0.0 | 0.00 | VERTICAL |
| 959.260000 | 35.90 | 26.6 | 46.0 | 10.1 | --- | 0.0 | 0.00 | VERTICAL |

***For 1GHz to 25GHz***

***802.11b Mode (above 1GHz)***

| Frequency(MHz): | | | 2412 | | Polarity: | | | HORIZONTAL | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4824.00 | 58.43 | PK | 74 | 15.57 | 53.88 | 33.52 | 6.92 | 35.89 | 4.55 |
| 4824.00 | 51.02 | AV | 54 | 2.98 | 46.47 | 33.52 | 6.92 | 35.89 | 4.55 |
| 5128.15 | 50.36 | PK | 74 | 23.64 | 43.16 | 34.38 | 7.10 | 34.28 | 7.20 |
| 5128.15 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |
| 7236.00 | 48.79 | PK | 74 | 25.21 | 37.52 | 37.1 | 9.19 | 35.02 | 11.27 |
| 7236.00 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |

| Frequency(MHz): | | | 2412 | | Polarity: | | | VERTICAL | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4824.00 | 60.04 | PK | 74 | 13.96 | 55.49 | 33.52 | 6.92 | 35.89 | 4.55 |
| 4824.00 | 52.81 | AV | 54 | 1.19 | 48.26 | 33.52 | 6.92 | 35.89 | 4.55 |
| 5128.15 | 51.83 | PK | 74 | 22.17 | 44.63 | 34.38 | 7.10 | 34.28 | 7.20 |
| 5128.15 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |
| 7236.00 | 49.48 | PK | 74 | 24.52 | 38.21 | 37.1 | 9.19 | 35.02 | 11.27 |
| 7236.00 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |

| Frequency(MHz): | | | 2437 | | Polarity: | | | HORIZONTAL | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4874.00 | 59.46 | PK | 74 | 14.54 | 53.22 | 33.59 | 6.95 | 34.3 | 6.24 |
| 4874.00 | 51.21 | AV | 54 | 2.79 | 44.97 | 33.59 | 6.95 | 34.3 | 6.24 |
| 5215.50 | 48.36 | PK | 74 | 25.64 | 40.76 | 34.56 | 7.15 | 34.11 | 7.60 |
| 5215.50 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |
| 7311.00 | 48.53 | PK | 74 | 25.47 | 36.87 | 37.44 | 9.22 | 35 | 11.66 |
| 7311.00 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |

| Frequency(MHz): | | | 2437 | | Polarity: | | | VERTICAL | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4874.00 | 59.73 | PK | 74 | 14.27 | 53.39 | 33.59 | 6.95 | 34.2 | 6.34 |
| 4874.00 | 52.01 | AV | 54 | 1.99 | 45.67 | 33.59 | 6.95 | 34.2 | 6.34 |
| 5215.50 | 48.86 | PK | 74 | 25.14 | 41.96 | 34.07 | 7.05 | 34.22 | 6.90 |
| 5215.50 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |
| 7311.00 | 49.95 | PK | 74 | 24.05 | 38.29 | 37.44 | 9.22 | 35 | 11.66 |
| 7311.00 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |

| Frequency(MHz): | | | 2462 | | Polarity: | | | HORIZONTAL | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4924.00 | 59.39 | PK | 74 | 14.61 | 53.55 | 33.71 | 6.98 | 35.91 | 4.78 |
| 4924.00 | 49.45 | AV | 54 | 4.55 | 43.73 | 33.71 | 6.98 | 35.91 | 4.78 |
| 5235.50 | 51.08 | PK | 74 | 22.92 | 41.24 | 34.34 | 7.09 | 34.27 | 7.17 |
| 5235.50 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |
| 7386.00 | 48.24 | PK | 74 | 25.76 | 37.4 | 37.61 | 9.25 | 34.98 | 11.88 |
| 7386.00 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |

| Frequency(MHz): | | | 2462 | | Polarity: | | | VERTICAL | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4924.00 | 60.19 | PK | 74 | 13.81 | 55.41 | 33.71 | 6.98 | 35.91 | 4.78 |
| 4924.00 | 51.66 | AV | 54 | 2.34 | 46.88 | 33.71 | 6.98 | 35.91 | 4.78 |
| 5235.50 | 48.47 | PK | 74 | 25.53 | 41.3 | 34.34 | 7.09 | 34.27 | 7.17 |
| 5235.50 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |
| 7386.00 | 48.92 | PK | 74 | 25.08 | 37.04 | 37.61 | 9.25 | 34.98 | 11.88 |
| 7386.00 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |

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. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RMS detector is for AV value.

Note: 802.11b/802.11g Ant 1 Ant 2 SISO mode and 802.11n H20 &H40 MIMO mode all have been tested, only worse case 802.11b Ant 1 is reported

***Results of Band Edges Test (Radiated)***

| Frequency(MHz): | | | 2412 | | Polarity: | | | HORIZONTAL | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 2412.00 | 113.49 | PK | -- | -- | 80.1 | 28.78 | 4.61 | 0 | 33.39 |
| 2412.00 | 107.04 | AV | -- | -- | 73.65 | 28.78 | 4.61 | 0 | 33.39 |
| 2361.75 | 42.18 | PK | 74 | 31.82 | 9.1 | 28.52 | 4.56 | 0 | 33.08 |
| 2361.75 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |
| 2390.00 | 60.07 | PK | 74 | 13.93 | 26.75 | 28.72 | 4.60 | 0 | 33.32 |
| 2390.00 | 52.36 | AV | 54 | 1.64 | 19.04 | 28.72 | 4.60 | 0 | 33.32 |
| 2400.00 | 61.12 | PK | 74 | 12.88 | 27.73 | 28.78 | 4.61 | 0 | 33.39 |
| 2400.00 | 52.96 | AV | 54 | 1.04 | 19.57 | 28.78 | 4.61 | 0 | 33.39 |

| Frequency(MHz): | | | 2412 | | Polarity: | | | VERTICAL | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 2412.00 | 114.05 | PK | -- | -- | 80.66 | 28.78 | 4.61 | 0 | 33.39 |
| 2412.00 | 106.36 | AV | -- | -- | 72.97 | 28.78 | 4.61 | 0 | 33.39 |
| 2361.75 | 43.02 | PK | 74 | 30.98 | 9.94 | 28.52 | 4.56 | 0 | 33.08 |
| 2361.75 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |
| 2390.00 | 60.94 | PK | 74 | 13.06 | 27.62 | 28.72 | 4.60 | 0 | 33.32 |
| 2390.00 | 51.18 | AV | 54 | 2.82 | 17.86 | 28.72 | 4.60 | 0 | 33.32 |
| 2400.00 | 62.32 | PK | 74 | 11.68 | 28.93 | 28.78 | 4.61 | 0 | 33.39 |
| 2400.00 | 52.91 | AV | 54 | 1.09 | 19.52 | 28.78 | 4.61 | 0 | 33.39 |

| Frequency(MHz): | | | 2462 | | Polarity: | | | HORIZONTAL | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 2462.00 | 114.06 | PK | -- | -- | 80.44 | 28.92 | 4.7 | 0 | 33.62 |
| 2462.00 | 108.91 | AV | -- | -- | 75.29 | 28.92 | 4.7 | 0 | 33.62 |
| 2483.50 | 43.14 | PK | 74 | 30.86 | 9.51 | 28.93 | 4.7 | 0 | 33.63 |
| 2483.50 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |
| 2486.75 | 42.38 | PK | 74 | 31.62 | 8.74 | 28.94 | 4.71 | 0 | 33.64 |
| 2486.75 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |
| 2500.00 | 43.55 | PK | 74 | 30.45 | 9.87 | 28.96 | 4.72 | 0 | 33.68 |
| 2500.00 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |

| Frequency(MHz): | | | 2462 | | Polarity: | | | VERTICAL | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 2462.00 | 113.18 | PK | -- | -- | 79.56 | 28.92 | 4.7 | 0 | 33.62 |
| 2462.00 | 107.25 | AV | -- | -- | 73.63 | 28.92 | 4.7 | 0 | 33.62 |
| 2483.50 | 43.04 | PK | 74 | 30.96 | 9.41 | 28.93 | 4.7 | 0 | 33.63 |
| 2483.50 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |
| 2486.75 | 44.18 | PK | 74 | 29.82 | 10.54 | 28.94 | 4.71 | 0 | 33.64 |
| 2486.75 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |
| 2500.00 | 43.67 | PK | 74 | 30.33 | 9.99 | 28.96 | 4.72 | 0 | 33.68 |
| 2500.00 | -- | AV | 54 | -- | -- | -- | -- | -- | -- |

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. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RMS detector is for AV value.

Note: 802.11b/802.11g Ant 1 Ant 2 SISO mode and 802.11n H20 &H40 MIMO mode all have been tested, only worse case 802.11b Ant 1 is reported

## 3.3. Maximum Conducted Output Power

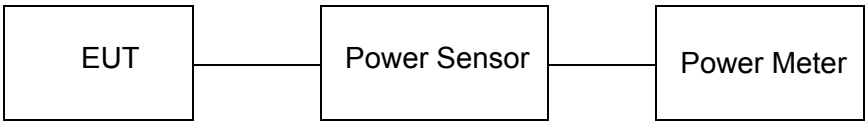
**Limit**

The Maximum Peak Output Power Measurement is 30dBm.

**Test Procedure**

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

**Test Configuration**




**Test Results**

**WIFI**

| Type | Channel | PK Output power Ant1 (dBm) | PK Output power Ant2 (dBm) | Output power Total (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| 802.11b | 01 | 16.04 | 16.39 | / | 30.00 | Pass |
| | 06 | 16.11 | 16.44 | / | | |
| | 11 | 16.32 | 16.48 | / | | |
| 802.11g | 01 | 14.99 | 14.12 | / | 30.00 | Pass |
| | 06 | 14.96 | 14.10 | / | | |
| | 11 | 14.17 | 14.19 | / | | |
| 802.11n(HT20) MIMO | 01 | 13.70 | 13.09 | 16.42 | 30.00 | Pass |
| | 06 | 13.74 | 12.98 | 16.39 | | |
| | 11 | 13.92 | 13.12 | 16.55 | | |
| 802.11n(HT40) MIMO | 03 | 12.76 | 12.99 | 15.89 | 30.00 | Pass |
| | 06 | 12.98 | 12.98 | 15.99 | | |
| | 09 | 12.79 | 12.07 | 15.46 | | |

Note: 1.The test results including the cable lose.

## 3.4. Power Spectral Density

**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 Procedure**

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW ≥ 3 kHz.
3. Set the VBW ≥ 3× RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
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 power level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

**Test Configuration**

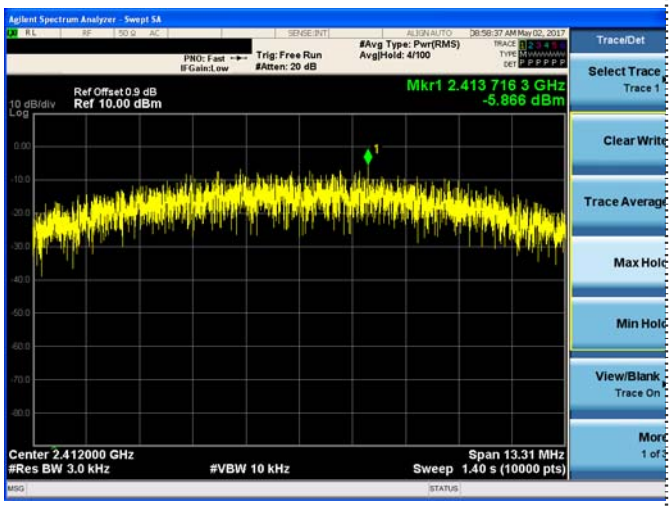
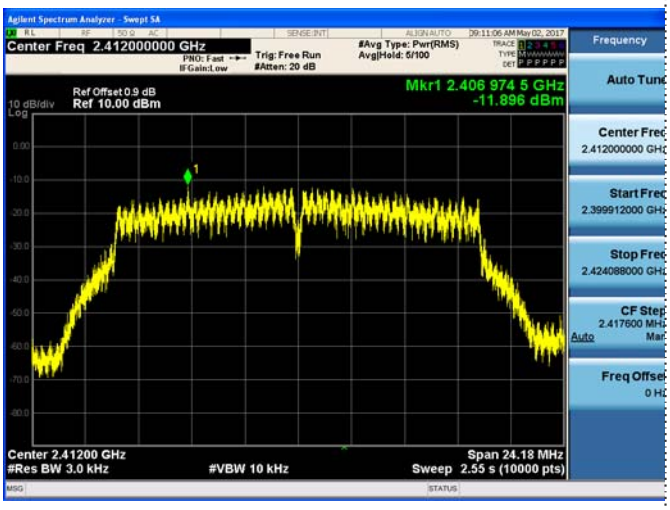
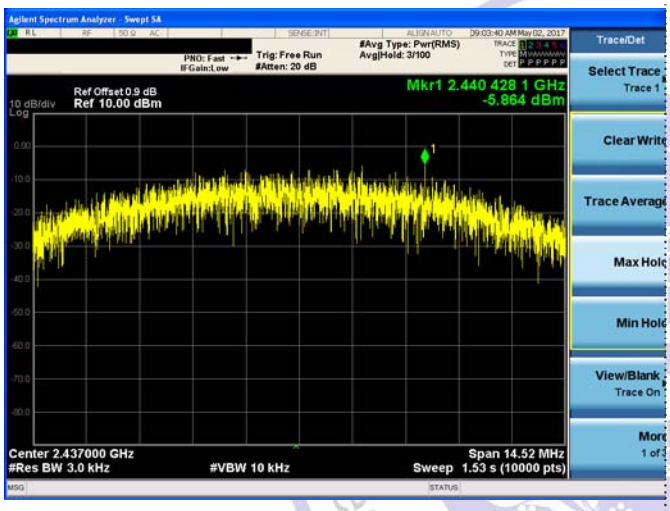
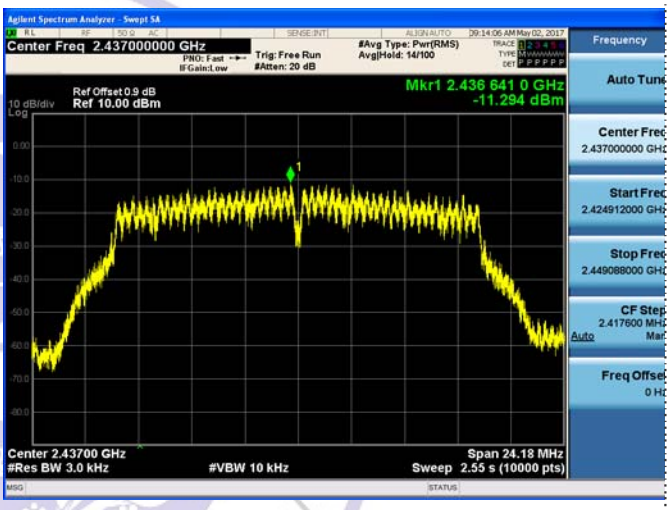
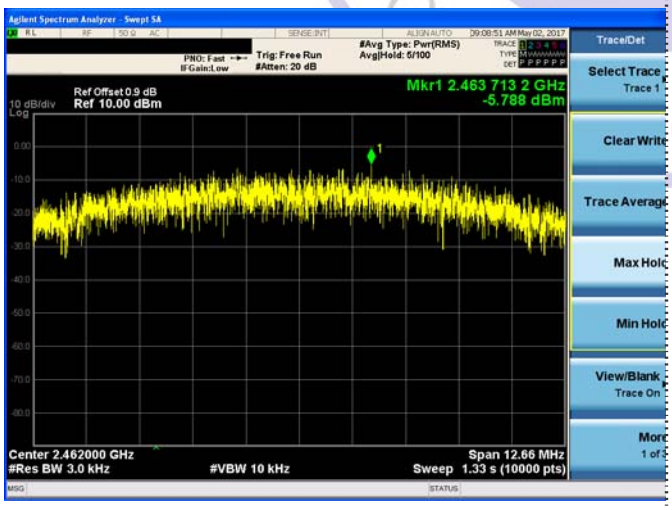
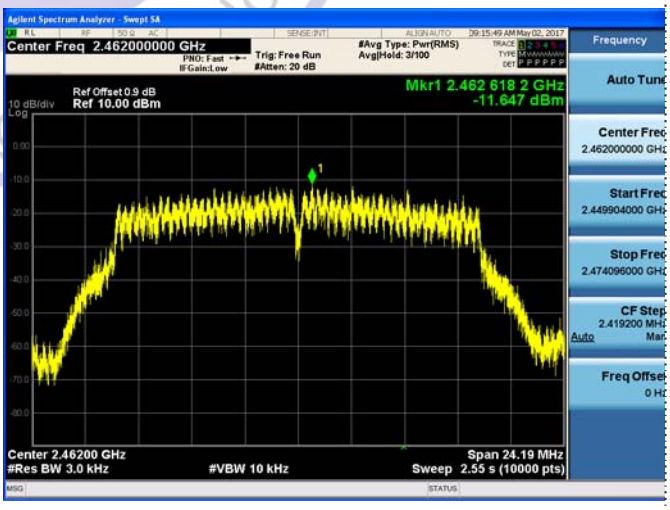

**Test Results**

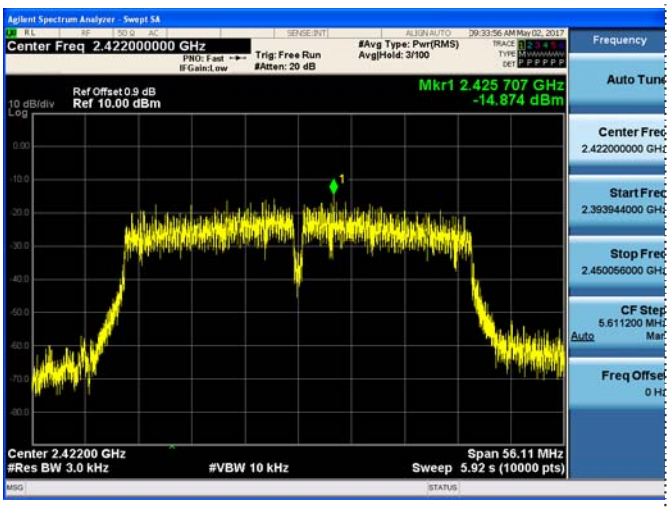
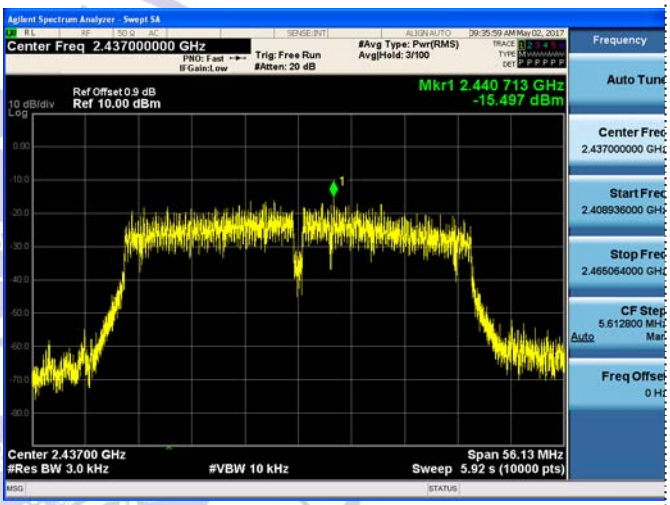
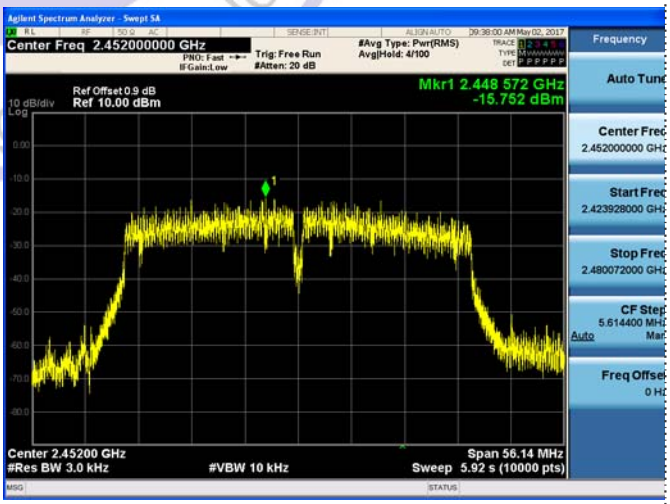
**WIFI**

| Type | Channel | Power Spectral Density Ant1 (dBm/3KHz) | Power Spectral Density Ant2 (dBm/3KHz) | Power Spectral Density Total (dBm/3KHz) | Limit (dBm/3KHz) | Result |
|---|---|---|---|---|---|---|
| 802.11b | 01 | -5.866 | -5.494 | / | 8.00 | Pass |
| | 06 | -5.864 | -5.753 | / | | |
| | 11 | -5.788 | -5.424 | / | | |
| 802.11g | 01 | -11.896 | -11.540 | / | 8.00 | Pass |
| | 06 | -11.294 | -10.818 | / | | |
| | 11 | -11.647 | -11.462 | / | | |
| 802.11n(HT20) MIMO | 01 | -11.371 | -11.066 | -8.21 | 8.00 | Pass |
| | 06 | -10.178 | -11.110 | -7.61 | | |
| | 11 | -9.800 | -11.039 | -7.37 | | |
| 802.11n(HT40) MIMO | 03 | -14.874 | -14.573 | -11.71 | 8.00 | Pass |
| | 06 | -15.497 | -14.541 | -11.98 | | |
| | 09 | -15.752 | -13.664 | -11.57 | | |

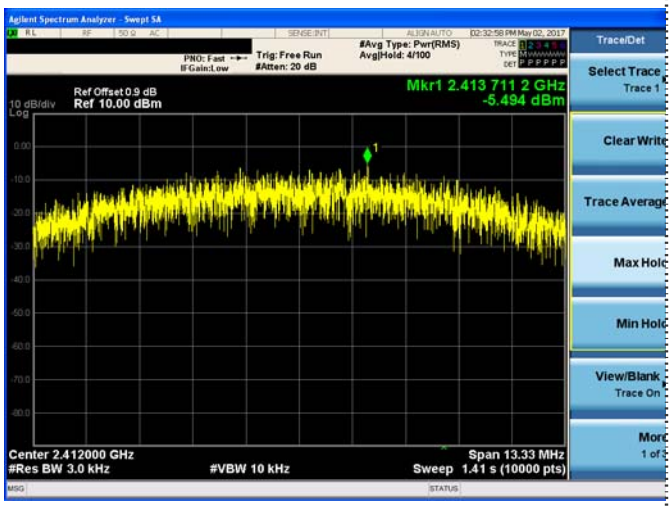
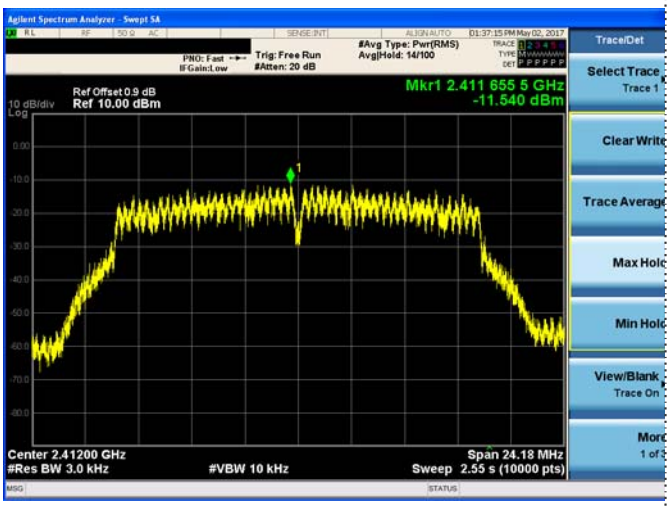
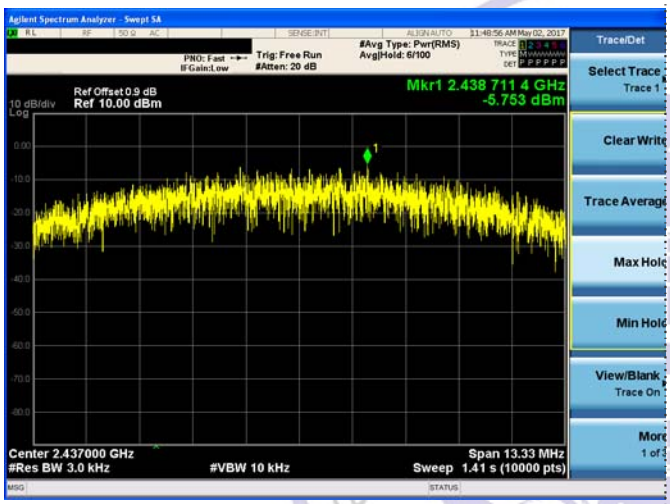
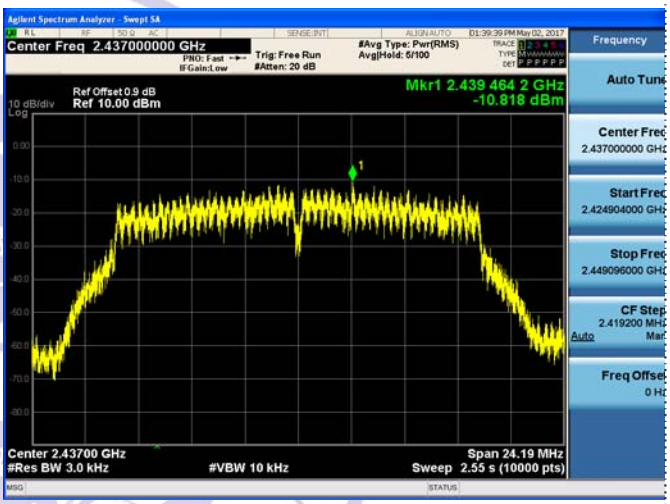
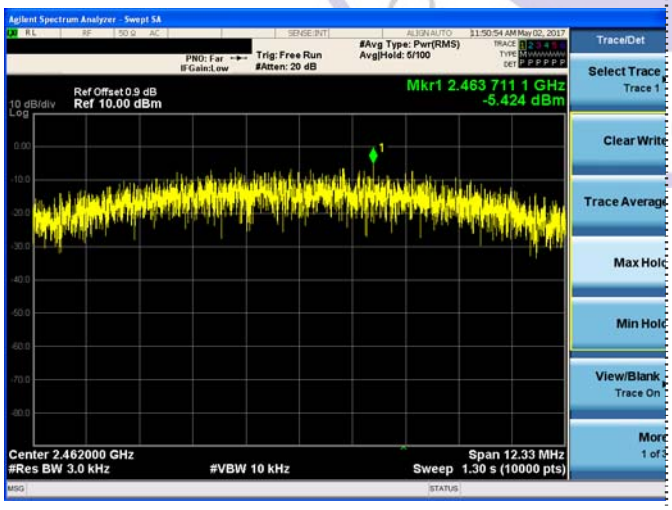
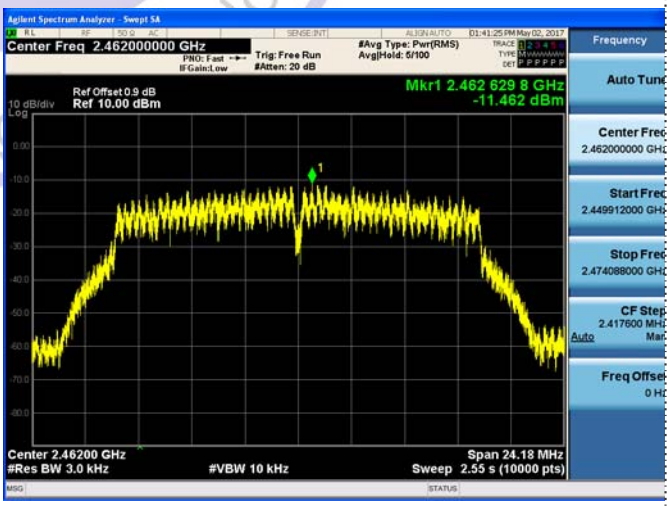
Test plot as follows:

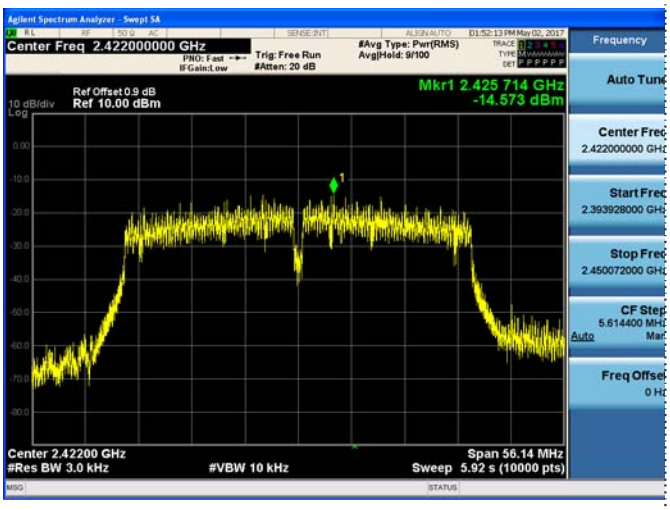
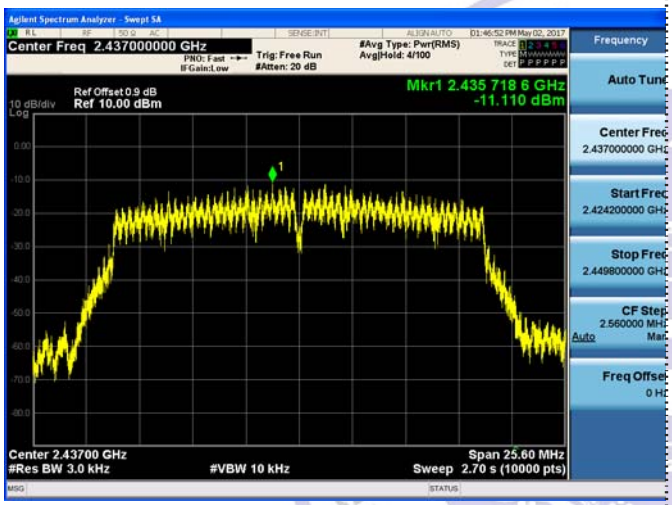
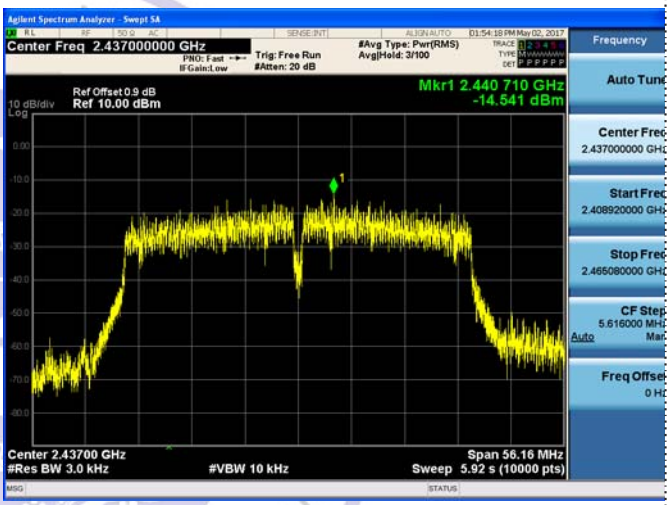
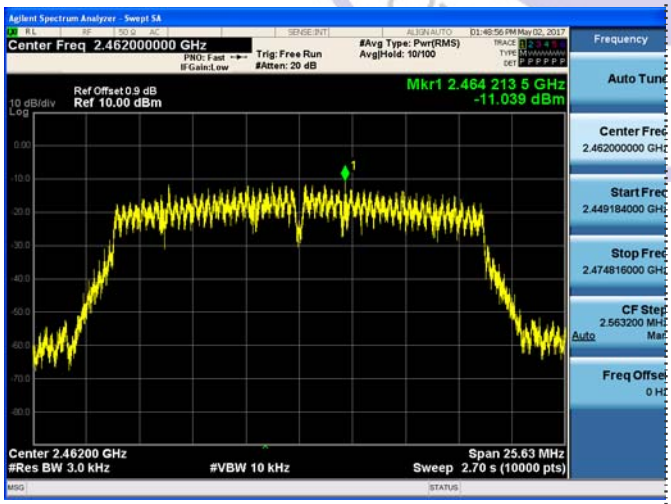
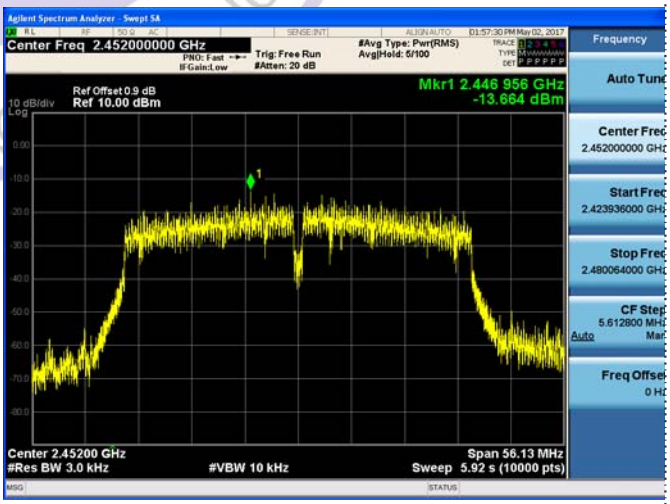
Ant1

| 802.11b | 802.11g |
| --- | --- |
|  |  |
| CH01 | CH01 |
|  |  |
| CH06 | CH06 |
|  |  |
| CH11 | CH11 |

| 802.11n(HT20) | 802.11n(HT40) |
|---|---|
|  |  |
| CH01 | CH03 |
|  |  |
| CH06 | CH06 |
|  |  |
| CH11 | CH09 |

Ant 2

| 802.11b | 802.11g |
|---|---|
|  |  |
| CH01 | CH01 |
|  |  |
| CH06 | CH06 |
|  |  |
| CH11 | CH11 |

| 802.11n(HT20) | 802.11n(HT40) |
|---|---|
|  |  |
| CH01 | CH03 |
|  |  |
| CH06 | CH06 |
|  |  |
| CH11 | CH09 |

## 3.5. 6dB Bandwidth

**Limit**

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

**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 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

**Test Configuration**

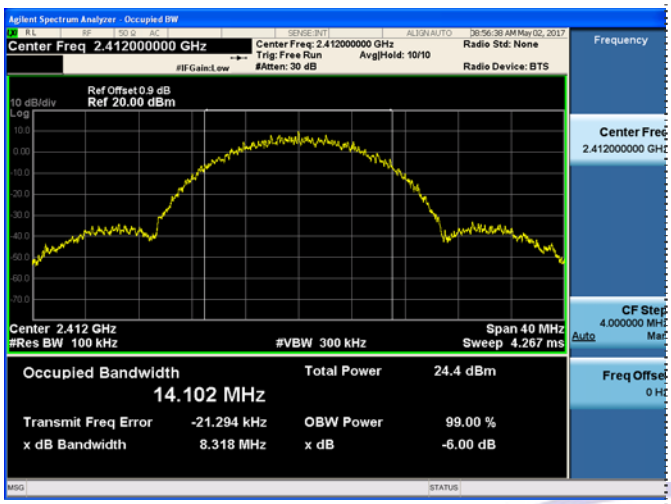
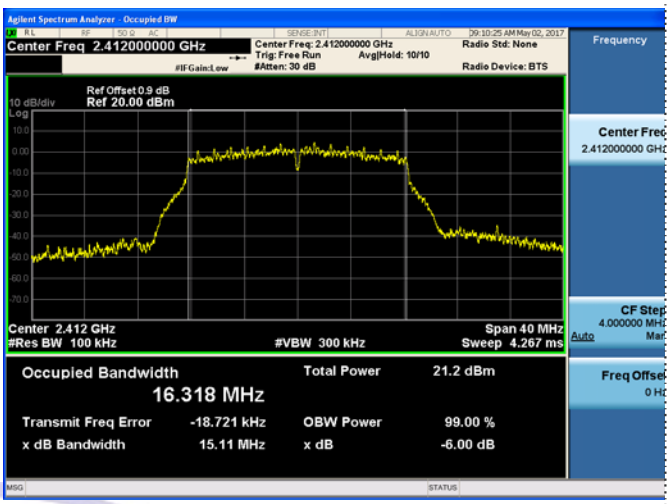
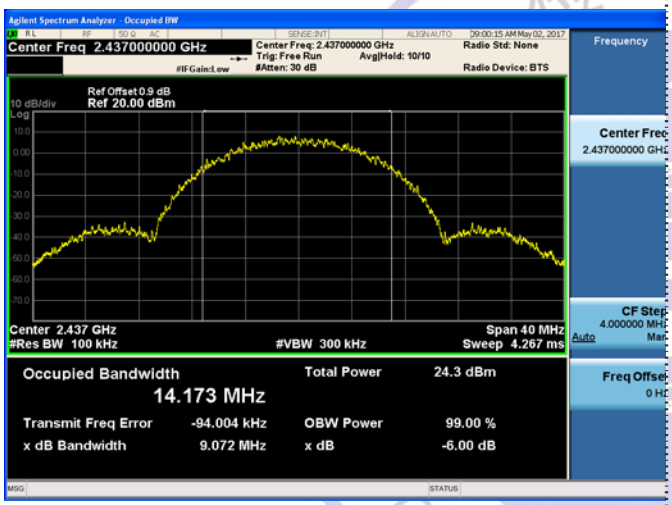
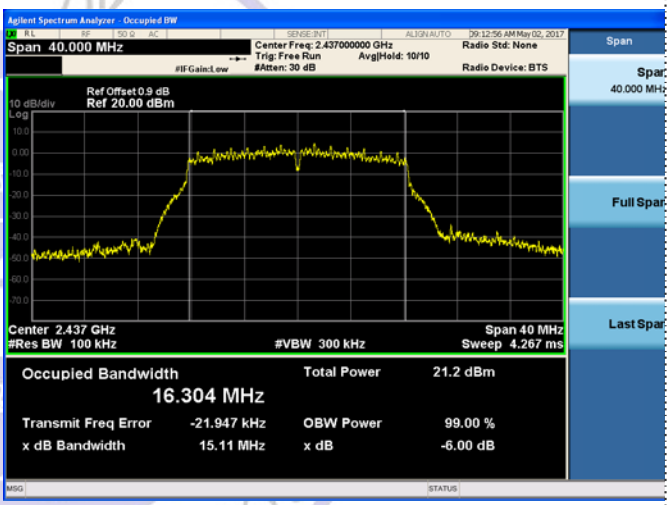
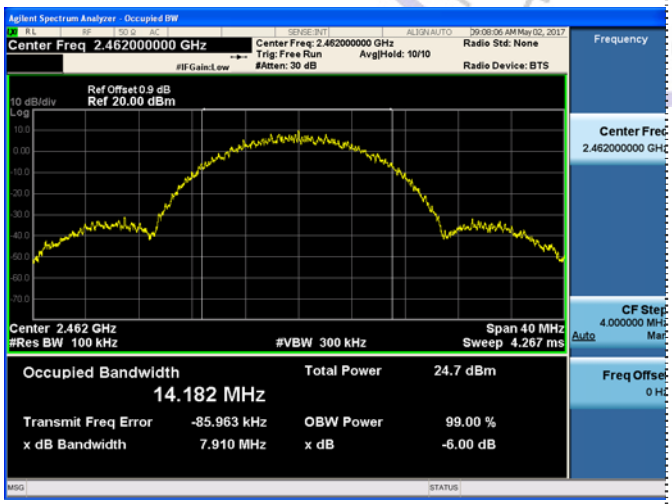
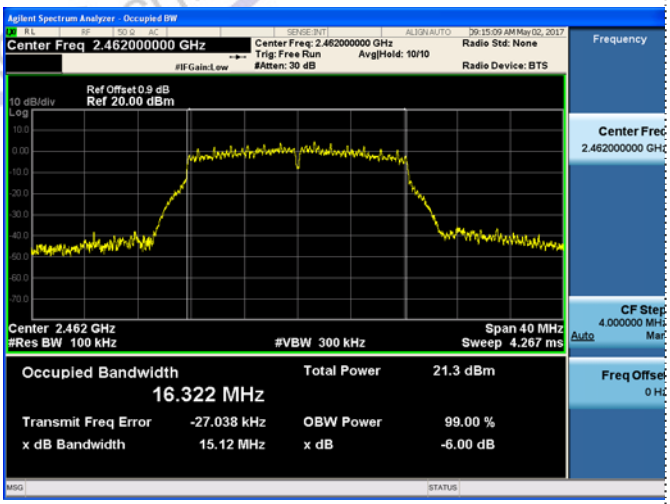

**Test Results**

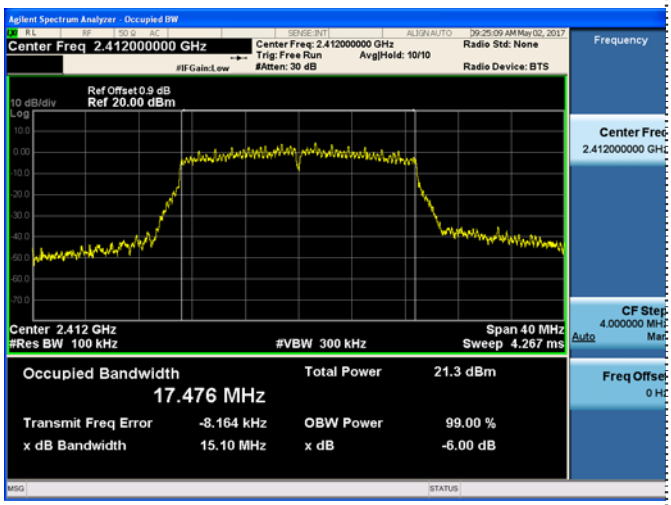
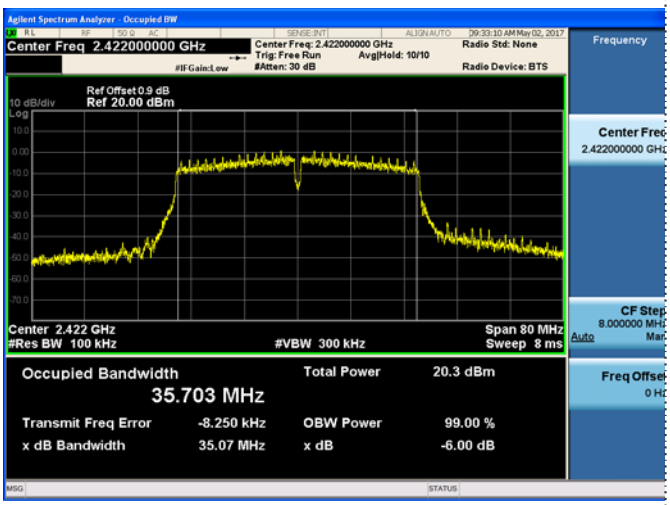
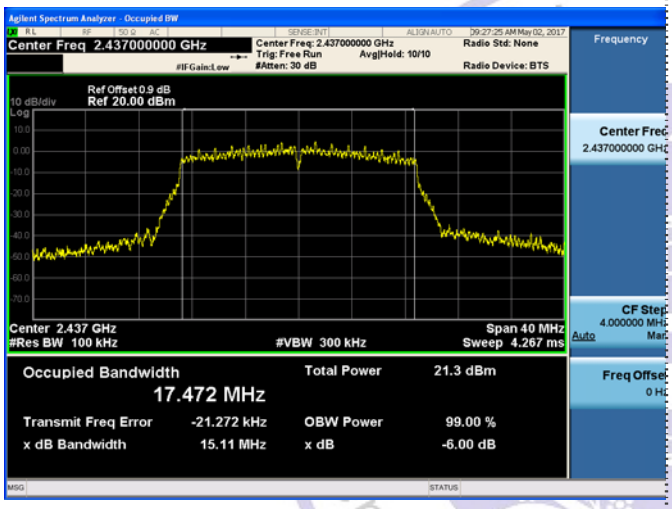
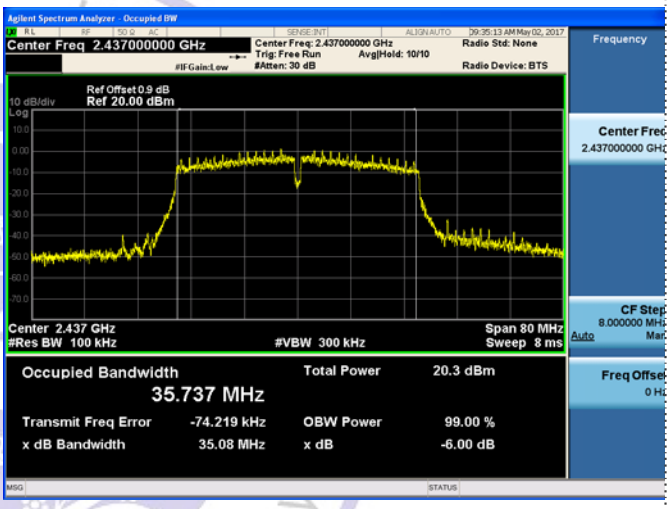
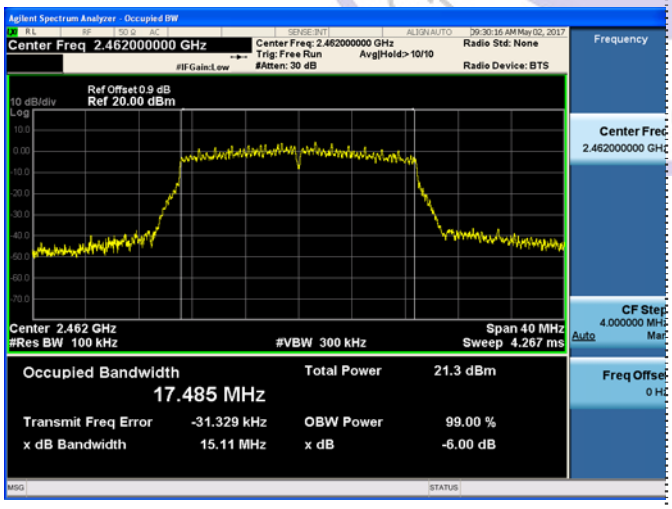
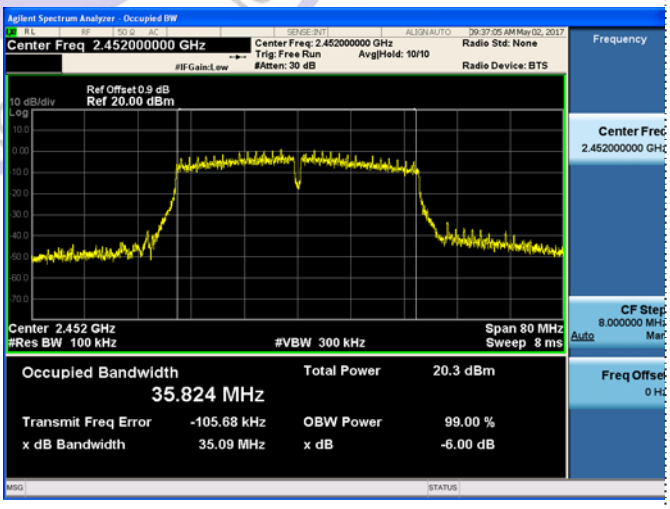
***WIFI***

| Type | Channel | 6dB Bandwidth Ant1 (MHz) | 6dB Bandwidth Ant2 (MHz) | Limit (KHz) | Result |
|---|---|---|---|---|---|
| 802.11b | 01 | 8.318 | 8.332 | ≥500 | Pass |
| | 06 | 9.072 | 8.333 | | |
| | 11 | 7.910 | 7.707 | | |
| 802.11g | 01 | 15.11 | 15.11 | ≥500 | Pass |
| | 06 | 15.11 | 15.12 | | |
| | 11 | 15.12 | 15.11 | | |
| 802.11n(HT20) | 01 | 15.10 | 15.11 | ≥500 | Pass |
| | 06 | 15.11 | 16.00 | | |
| | 11 | 15.11 | 16.02 | | |
| 802.11n(HT40) | 03 | 35.07 | 35.09 | ≥500 | Pass |
| | 06 | 35.08 | 35.10 | | |
| | 09 | 35.09 | 35.08 | | |

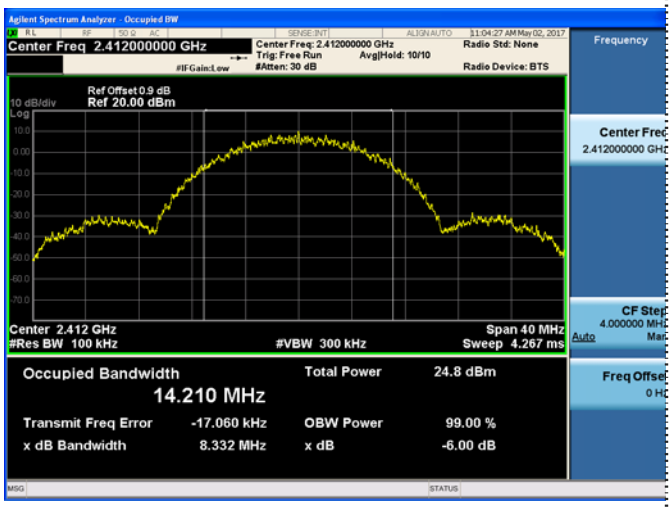
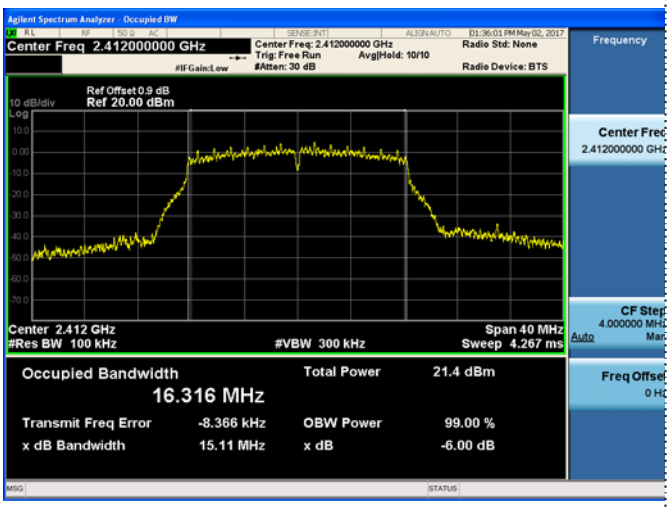
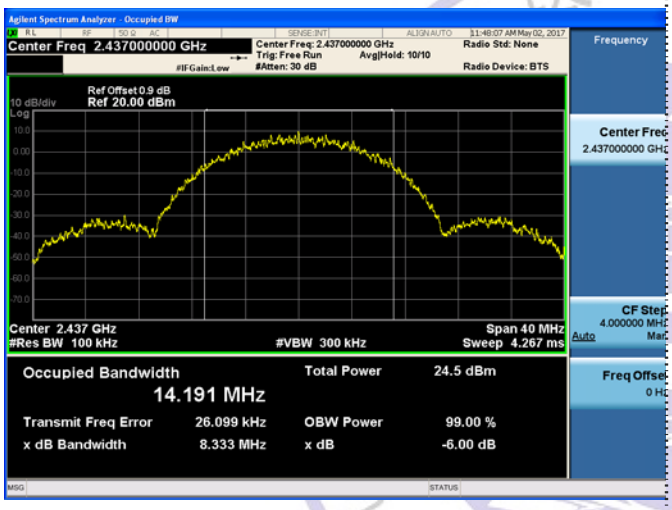
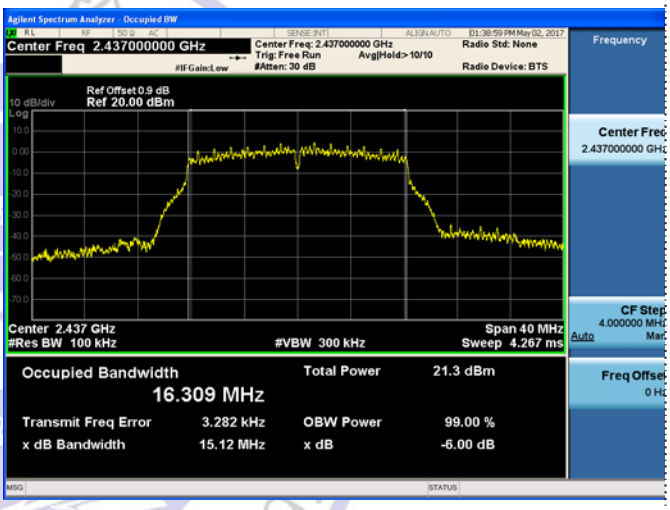
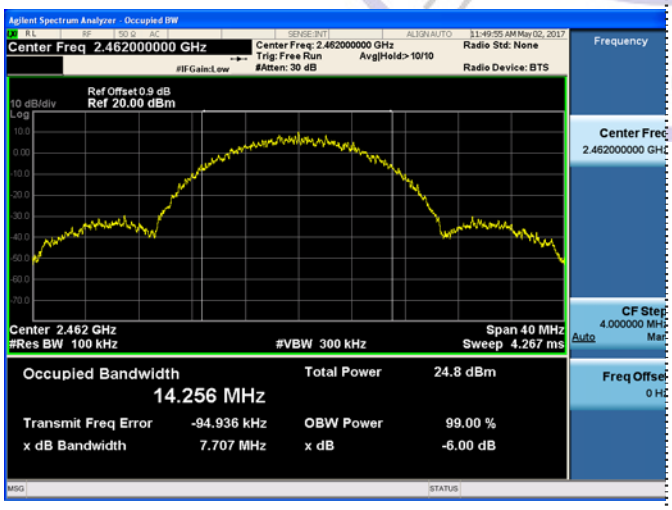
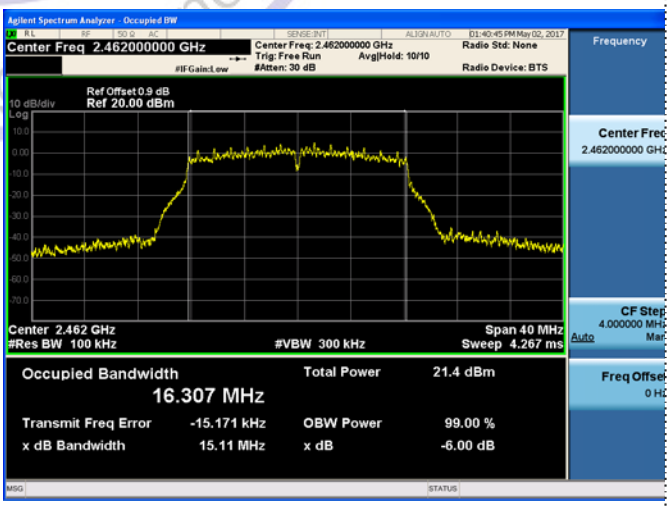
Test plot as follows:

***Ant 1***

| *802.11b* | *802.11g* |
|---|---|
|  |  |
| *CH01* | *CH01* |
|  |  |
| *CH06* | *CH06* |
|  |  |
| *CH11* | *CH11* |

| 802.11n(HT20) | 802.11n(HT40) |
| --- | --- |
|  |  |
| CH01 | CH03 |
|  |  |
| CH06 | CH06 |
|  |  |
| CH11 | CH09 |

*Ant 2*

| *802.11b* | *802.11g* |
|---|---|
|  |  |
| *CH01* | *CH01* |
|  |  |
| *CH06* | *CH06* |
|  |  |
| *CH11* | *CH11* |