# FCC TEST REPORT

For

Shenzhen KVD Communications Equipment Limited

GSM/WCDMA Smartphone

Model No.: X9 Mini

Additional Model No.: /

| | | |
|---|---|---|
| Prepared for | : | Shenzhen KVD Communications Equipment Limited |
| Address | : | Room 13C, Block C, Electronics Science and Technology Building, Shennan Road Middle, Shenzhen, China |
| Prepared by | : | Shenzhen LCS Compliance Testing Laboratory Ltd. |
| Address | : | 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China |
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| Fax | : | (+86)755-82591332 |
| Web | : | www.LCS-cert.com |
| Mail | : | webmaster@LCS-cert.com |
| Date of receipt of test sample | : | Oct 19, 2016 |
| Number of tested samples | : | 1 |
| IMEI Number | : | 868969010014527 |
| Date of Test | : | Oct 19, 2016~Nov 17, 2016 |
| Date of Report | : | Nov 17, 2016 |

# FCC TEST REPORT
# FCC CFR 47 PART 15 C(15.247): 2015

| | | |
|---|---|---|
| **Report Reference No. .....** | **:** | **LCS1610171016E** |
| Date of Issue ..... | : | Nov 17, 2016 |
| **Testing Laboratory Name..... :** | | **Shenzhen LCS Compliance Testing Laboratory Ltd.** |
| Address ..... | : | 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China |
| Testing Location/ Procedure ..... | : | Full application of Harmonised standards ■<br>Partial application of Harmonised standards □<br>Other standard testing method □ |
| **Applicant's Name ..... :** | | **Shenzhen KVD Communications Equipment Limited** |
| Address ..... | : | Room 13C, Block C, Electronics Science and Technology Building, Shennan Road Middle, Shenzhen, China |
| **Test Specification** | | |
| Standard..... | : | FCC CFR 47 PART 15 C(15.247): 2015 |
| **Test Report Form No. ..... :** | | LCSEMC-1.0 |
| TRF Originator ..... | : | Shenzhen LCS Compliance Testing Laboratory Ltd. |
| Master TRF ..... | : | Dated 2011-03 |



| | | |
|---|---|---|
| **EUT Description. ..... :** | | **GSM/WCDMA Smartphone** |
| Trade Mark..... | : | DOOGEE |
| Model/ Type reference ..... | : | X9 Mini |
| Ratings ..... | : | DC 3.8V by Li-ion Battery(2000mAh)<br>Recharge Voltage: DC 5V/1000mA |
| Result ..... | : | **Positive** |

| **Compiled by:** | **Supervised by:** | **Approved by:** |
|---|---|---|
| Calvin Weng | | |
| Calvin Weng/ Administrators | Glin Lu/ Technique principal | Gavin Liang/ Manager |

# FCC -- TEST REPORT

| | |
|---|---|
| **Test Report No. :** **LCS1610171016E** | Nov 17, 2016<br>Date of issue |

| | | |
|---|---|---|
| EUT..... | : | GSM/WCDMA Smartphone |
| Type / Model..... | : | X9 Mini |
| **Applicant.....** | **:** | **Shenzhen KVD Communications Equipment Limited** |
| Address..... | : | Room 13C, Block C, Electronics Science and Technology Building, Shennan Road Middle, Shenzhen, China |
| Telephone..... | : | |
| Fax..... | : | |
| **Manufacturer.....** | **:** | **Shenzhen KVD Communications Equipment Limited** |
| Address..... | : | The second floor in A2 building, Silicon valley power new material industrial park, Zongyi Road, Dafu industrial park, Guanlan Guanguang Road, Baoan district, Shenzhen City, China |
| Telephone..... | : | |
| Fax..... | : | |
| **Factory.....** | **:** | **Shenzhen KVD Communications Equipment Limited** |
| Address..... | : | The second floor in A2 building, Silicon valley power new material industrial park, Zongyi Road, Dafu industrial park, Guanlan Guanguang Road, Baoan district, Shenzhen City, China |
| Telephone..... | : | |
| Fax..... | : | |

| **Test Result** | **Positive** |
|---|---|

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.

## Revision History

| Revision | Issue Date | Revisions | Revised By |
|---|---|---|---|
| 00 | 2016-11-17 | Initial Issue | Gavin Liang |
| | | | |
| | | | |

# TABLE OF CONTENTS

# 1. GENERAL INFORMATION

## 1.1. Description of Device (EUT)

| | | |
|---|---|---|
| EUT | : | GSM/WCDMA Smartphone |
| Test Model | : | X9 Mini |
| Additional Model Number | : | / |
| Model Declaration | : | / |
| Hardware Version | : | V1.1 |
| Software Version | : | DOOGEE-X9_Mini-Android6.0-20161111 |
| Power Supply | : | DC 3.8V by Li-ion Battery(2000mAh)<br>Recharge Voltage: DC 5V/1000mA |
| EUT Supports Radios Application | : | 2.4GHz WIFI/Bluetooth/GSM/GPRS/EDGE/WCDMA/ GPS(RX) |
| Bluetooth | : | |
| Operating Frequency | : | 2.402-2.480GHz |
| Channel Number | : | 79 channels for Bluetooth V3.0 (DSS)<br>40 channels for Bluetooth V4.0 (DTS) |
| Channel Spacing | : | 1MHz for Bluetooth V3.0 (DSS)<br>2MHz for Bluetooth V4.0 (DTS) |
| Modulation Type | : | GFSK, Pi/4-DQPSK, 8-DPSK for Bluetooth V3.0 (DSS)<br>GFSK for Bluetooth V4.0 (DTS) |
| Bluetooth Version | : | V4.0 |
| Antenna Description | : | PIFA Antenna, 0dBi(Max.) |
| WIFI(2.4GHz Band) | : | |
| Operating Frequency | : | 2412-2462MHz |
| Channel Spacing | : | 5MHz |
| Channel Number | : | 11 Channel for 20MHz bandwidth(2412~2462MHz)<br>7 channels for 40MHz bandwidth(2422~2452MHz) |
| Modulation Type | : | 802.11b: DSSS; 802.11g/n: OFDM |
| Antenna Description | : | PIFA Antenna, 0dBi(Max.) |

## 1.2. Host System Configuration List and Details

| Manufacturer | Description | Model | Serial Number | Certificate |
|---|---|---|---|---|
| Shenzhen KVD Communications Equipment Limited | Power Adapter | HJ-0501000B3 | --- | FCC VoC |

## 1.3. External I/O Cable

| I/O Port Description | Quantity | Cable |
|---|---|---|
| Earphone Port | 1 | N/A |
| USB Port | 1 | 1m unshielded cable |

## 1.4. Description of Test Facility

CNAS Registration Number. is L4595.
FCC Registration Number. is 899208.
Industry Canada Registration Number. is 9642A-1.
VCCI Registration Number. is C-4260 and R-3804.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

## 1.5. 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 LCS 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.

## 1.6. Measurement Uncertainty

| Test Item | | Frequency Range | Uncertainty | Note |
|---|---|---|---|---|
| Radiation Uncertainty | : | 9KHz~30MHz | ±3.10dB | (1) |
| | | 30MHz~200MHz | ±2.96dB | (1) |
| | | 200MHz~1000MHz | ±3.10dB | (1) |
| | | 1GHz~26.5GHz | ±3.80dB | (1) |
| | | 26.5GHz~40GHz | ±3.90dB | (1) |
| Conduction Uncertainty | : | 150kHz~30MHz | ±1.63dB | (1) |
| Power disturbance | : | 30MHz~300MHz | ±1.60dB | (1) |

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

## 1.7. Description Of Test Modes

The EUT has been tested under operating condition.

This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.

Worst-case mode and channel used for 150kHz-30 MHz power line conducted emissions was the mode and channel with the highest output power, that was determined to be 802.11b mode(Low Channel).

Worst-case mode and channel used for 9kHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be 802.11b mode(Low Channel).

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case datarates used during the testing are as follows:

BT LE: 1Mbps, GFSK
802.11b Mode: 1 Mbps, DSSS.
802.11g Mode: 6 Mbps, OFDM.
802.11n Mode HT20: MCS0, OFDM.
802.11n Mode HT40: MCS0, OFDM.

# 2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd..

## 2.1. EUT Configuration

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

## 2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to FCC's request, Test Procedure KDB558074 D01 DTS Meas. Guidance v03r05 is required to be used for this kind of FCC 15.247 digital modulation device.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

## 2.3. General Test Procedures

### 2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

### 2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013

# 3. SYSTEM TEST CONFIGURATION

## 3.1. Justification

The system was configured for testing in a continuous transmit condition.

## 3.2. EUT Exercise Software

N/A

## 3.3. Special Accessories

N/A

## 3.4. Block Diagram/Schematics

Please refer to the related document

## 3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

## 3.6. Test Setup

Please refer to the test setup photo.

# 4. SUMMARY OF TEST RESULTS

| Applied Standard: FCC Part 15 Subpart C | | |
|---|---|---|
| FCC Rules | Description of Test | Result |
| §15.247(b) | Maximum Conducted Output Power | Compliant |
| §15.247(e) | Power Spectral Density | Compliant |
| §15.247(a)(2) | 6dB Bandwidth | Compliant |
| §15.247(a) | Occupied Bandwidth | Compliant |
| §15.209, §15.247(d) | Radiated and Conducted Spurious Emissions | Compliant |
| §15.205 | Emissions at Restricted Band | Compliant |
| §15.207(a) | Conducted Emissions | Compliant |
| §15.203 | Antenna Requirements | Compliant |
| §15.247(i)§2.1093 | RF Exposure | Compliant |

# 5. TEST RESULT

## 5.1. On Time and Duty Cycle

### 5.1.1. Standard Applicable

None; for reporting purpose only.

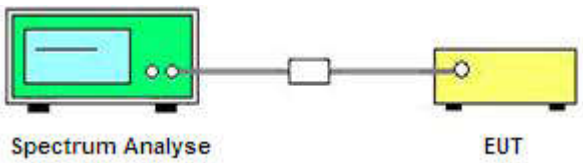
### 5.1.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of the spectrum analyse.

### 5.1.3. Test Procedures

1. Set the centre frequency of the spectrum analyse to the transmiting frequency;
2. Set the span=0MHz, RBW=8MHz, VBW=50MHz, Sweep time=5ms;
3. Detector = peak;
4. Trace mode = Single hold.

### 5.1.4. Test Setup Layout

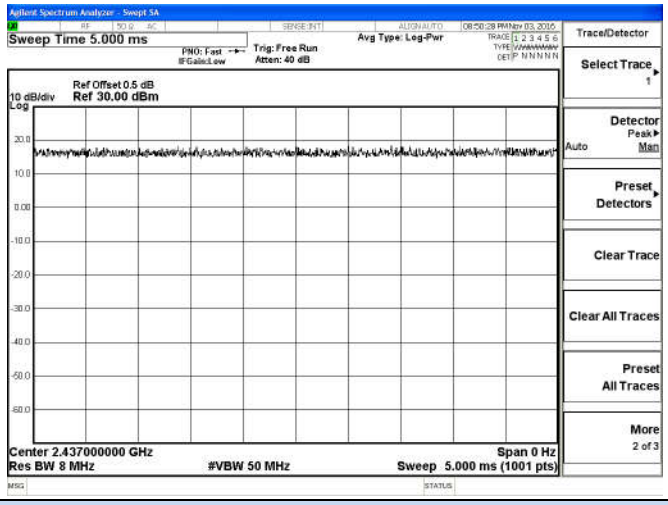
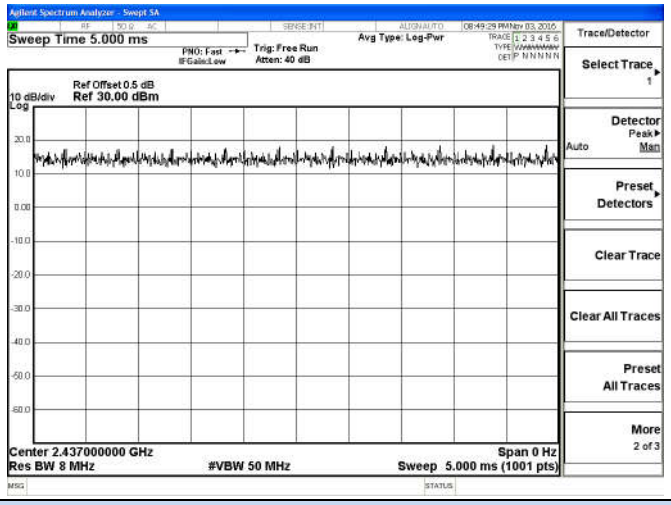
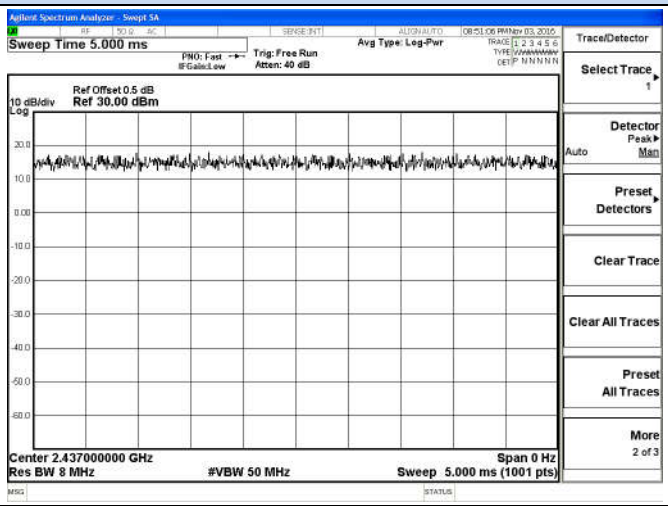
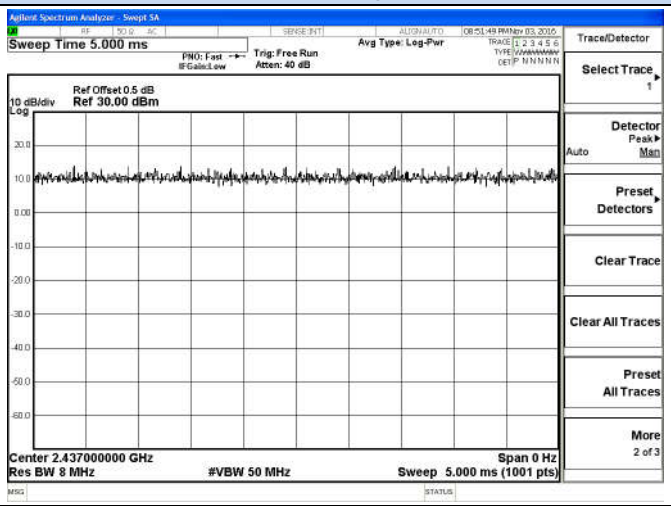
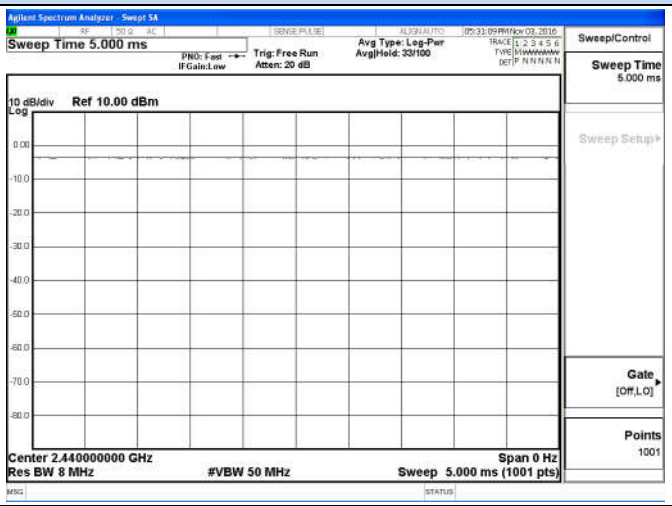



### 5.1.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

### 5.1.6. Test result

| Mode | On Time B (ms) | Period (ms) | Duty Cycle x (Linear) | Duty Cycle (%) | Duty Cycle Correction Factor (dB) | 1/B Minimum VBW(KHz) |
|---|---|---|---|---|---|---|
| 802.11b | 5.0 | 5.0 | 1 | 100 | 0 | 0.01 |
| 802.11g | 5.0 | 5.0 | 1 | 100 | 0 | 0.01 |
| 802.11n-HT20 | 5.0 | 5.0 | 1 | 100 | 0 | 0.01 |
| 802.11n-HT40 | 5.0 | 5.0 | 1 | 100 | 0 | 0.01 |
| BLE | 5.0 | 5.0 | 1 | 100 | 0 | 0.01 |

| Test plot of On Time and Duty Cycle | |
|---|---|
|  |  |
| 802.11b | 802.11g |
|  |  |
| 802.11n-HT20 | 802.11n-HT40 |
|  | |
| BT LE | |

## 5.2. Maximum Conducted Output Power Measurement

### 5.2.1. Standard Applicable

According to §15.247(b): For systems using digital modulation in the 2400-2483.5 MHz and 5725-5850 MHz band, the limit for maximum peak conducted output power is 30dBm. The limited has to be reduced by the amount in dB that the gain of the antenna exceed 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter peak output power.

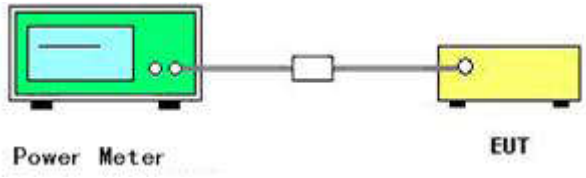
### 5.2.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of the power meter.

### 5.2.3. Test Procedures

The transmitter output (antenna port) was connected to the power meter.

### 5.2.4. Test Setup Layout




### 5.2.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.2.6. Test Result of Maximum Conducted Output Power

| Temperature | 25℃ | Humidty | 60% |
|---|---|---|---|
| Test Engineer | Chaz | Configurations | BT LE/802.11b/g/n |

BT LE

| Channel | Frequency (MHz) | Conducted Power (dBm) | Peak/AVG | Max. Limit (dBm) | Result |
|---|---|---|---|---|---|
| 0 | 2402 | -6.363 | Peak | 30 | Complies |
| 19 | 2440 | -6.744 | Peak | 30 | Complies |
| 39 | 2480 | -6.700 | Peak | 30 | Complies |
| 0 | 2402 | -6.571 | AVG | 30 | Complies |
| 19 | 2440 | -6.934 | AVG | 30 | Complies |
| 39 | 2480 | -6.903 | AVG | 30 | Complies |

802.11b

| Channel | Frequency (MHz) | Conducted Power (dBm) | Peak/AVG | Max. Limit (dBm) | Result |
|---|---|---|---|---|---|
| 1 | 2412 | 17.82 | Peak | 30 | Complies |
| 6 | 2437 | 17.20 | Peak | 30 | Complies |
| 11 | 2462 | 16.98 | Peak | 30 | Complies |
| 1 | 2412 | 13.41 | AVG | 30 | Complies |
| 6 | 2437 | 13.07 | AVG | 30 | Complies |
| 11 | 2462 | 13.01 | AVG | 30 | Complies |

802.11g

| Channel | Frequency (MHz) | Conducted Power (dBm) | Peak/AVG | Max. Limit (dBm) | Result |
|---|---|---|---|---|---|
| 1 | 2412 | 16.84 | Peak | 30 | Complies |
| 6 | 2437 | 15.77 | Peak | 30 | Complies |
| 11 | 2462 | 15.75 | Peak | 30 | Complies |
| 1 | 2412 | 11.22 | AVG | 30 | Complies |
| 6 | 2437 | 11.19 | AVG | 30 | Complies |
| 11 | 2462 | 11.13 | AVG | 30 | Complies |

802.11n (HT20)

| Channel | Frequency (MHz) | Conducted Power (dBm) | Peak/AVG | Max. Limit (dBm) | Result |
|---|---|---|---|---|---|
| 1 | 2412 | 16.98 | Peak | 30 | Complies |
| 6 | 2437 | 15.87 | Peak | 30 | Complies |
| 11 | 2462 | 15.35 | Peak | 30 | Complies |
| 1 | 2412 | 10.79 | AVG | 30 | Complies |
| 6 | 2437 | 10.74 | AVG | 30 | Complies |
| 11 | 2462 | 10.61 | AVG | 30 | Complies |

802.11n (HT40)

| Channel | Frequency (MHz) | Conducted Power (dBm) | Peak/AVG | Max. Limit (dBm) | Result |
|---|---|---|---|---|---|
| 3 | 2422 | 15.95 | Peak | 30 | Complies |
| 6 | 2437 | 15.13 | Peak | 30 | Complies |
| 9 | 2452 | 15.14 | Peak | 30 | Complies |
| 3 | 2422 | 10.21 | AVG | 30 | Complies |
| 6 | 2437 | 10.09 | AVG | 30 | Complies |
| 9 | 2452 | 10.10 | AVG | 30 | Complies |

Note: AV power was measured only for RF exposure evaluation.

## 5.3. Power Spectral Density Measurement

### 5.3.1. Standard Applicable

According to §15.247(e): 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.

### 5.3.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of Spectrum Analyzer.

### 5.3.3. Test Procedures

1. The transmitter was connected directly to a Spectrum Analyzer through a directional couple.

2. The power was monitored at the coupler port with a Spectrum Analyzer. The power level was set to the maximum level.

3. Set the RBW = 3 kHz~100kHz.

4. Set the VBW ≥ 3*RBW

5. Set the span to 1.5 times the DTS channel bandwidth.

6. Detector = peak.

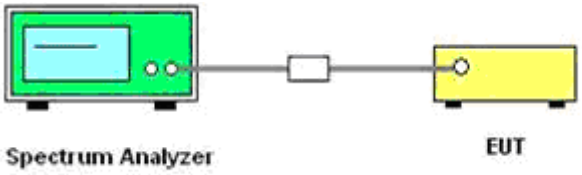
7. Sweep time = auto couple.

8. Trace mode = max hold.

9. Allow trace to fully stabilize.

10. Use the peak marker function to determine the maximum power level in any 3 kHz band segment within the fundamental EBW.

### 5.3.4. Test Setup Layout




### 5.3.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.3.6. Test Result of Power Spectral Density

| Temperature | 25℃ | Humidity | 60% |
|---|---|---|---|
| Test Engineer | Chaz | Configurations | BT LE/802.11b/g/n |

BT LE

| Channel | Frequency (MHz) | Mearsured Power Density (dBm/3KHz) | Max. Limit (dBm/3KHz) | Result |
|---|---|---|---|---|
| 0 | 2402 | -13.313 | 8 | Complies |
| 19 | 2440 | -13.666 | 8 | Complies |
| 39 | 2480 | -13.610 | 8 | Complies |

802.11b

| Channel | Frequency (MHz) | Mearsured Power Density (dBm/100KHz) | Max. Limit (dBm/3KHz) | Result |
|---|---|---|---|---|
| 1 | 2412 | 4.660 | 8 | Complies |
| 6 | 2437 | 4.387 | 8 | Complies |
| 11 | 2462 | 4.473 | 8 | Complies |

802.11g

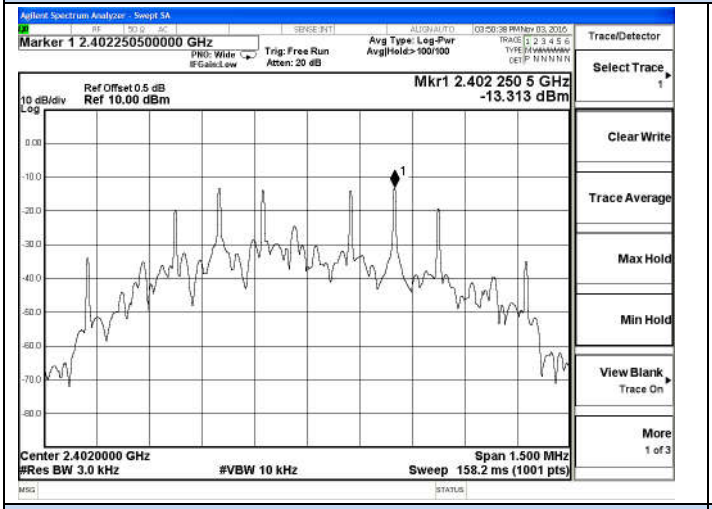
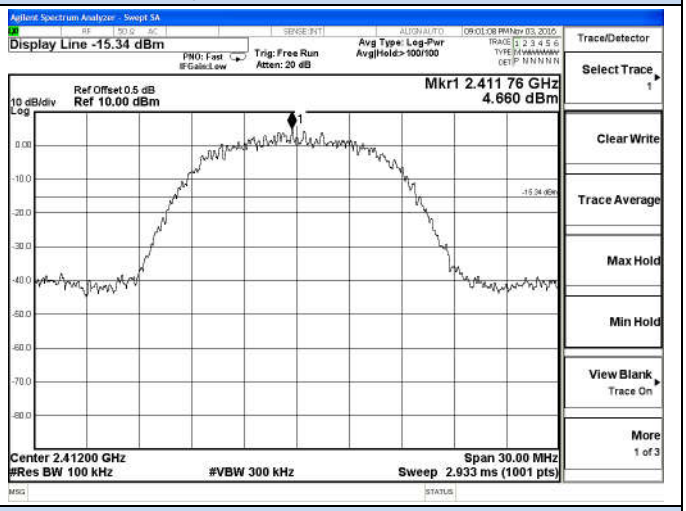
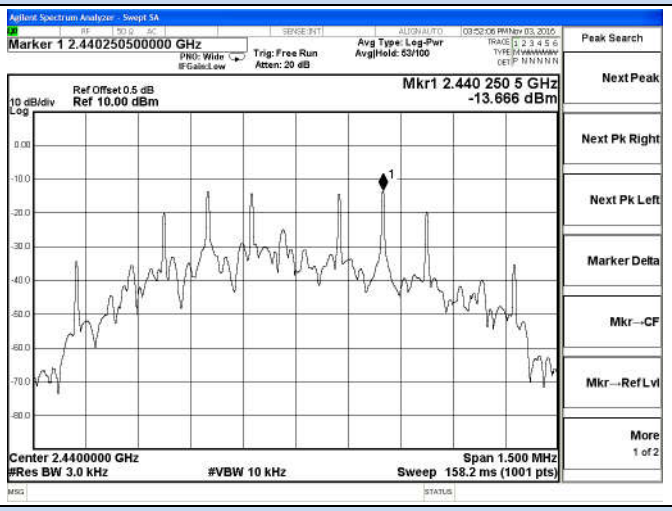
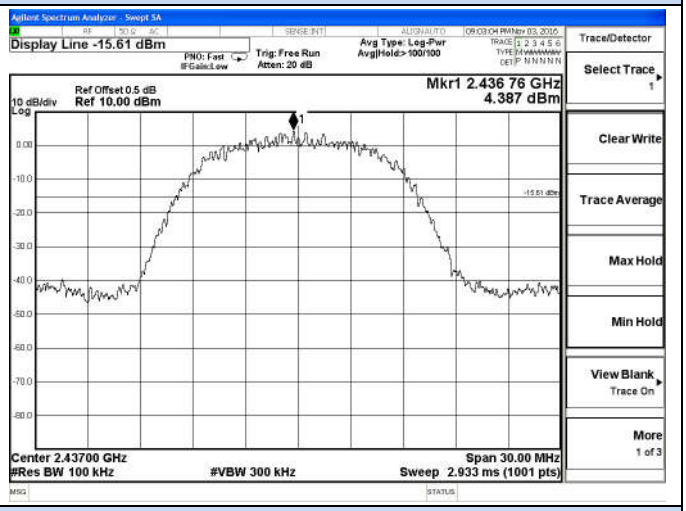
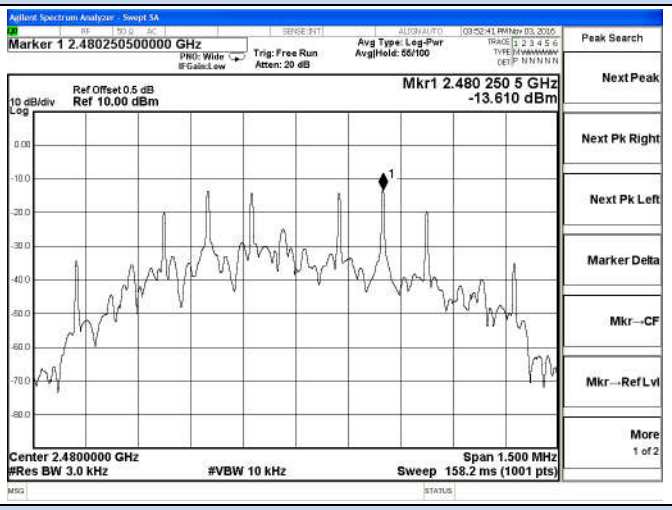
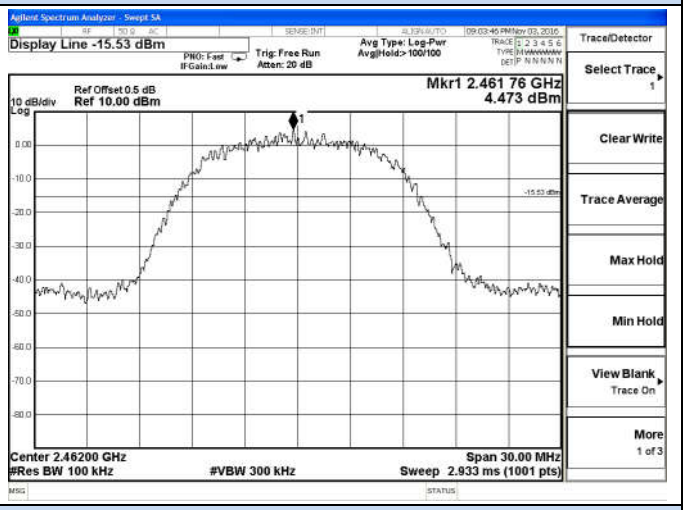
| Channel | Frequency (MHz) | Mearsured Power Density (dBm/100KHz) | Max. Limit (dBm/3KHz ) | Result |
|---|---|---|---|---|
| 1 | 2412 | -1.486 | 8 | Complies |
| 6 | 2437 | -2.479 | 8 | Complies |
| 11 | 2462 | -2.471 | 8 | Complies |

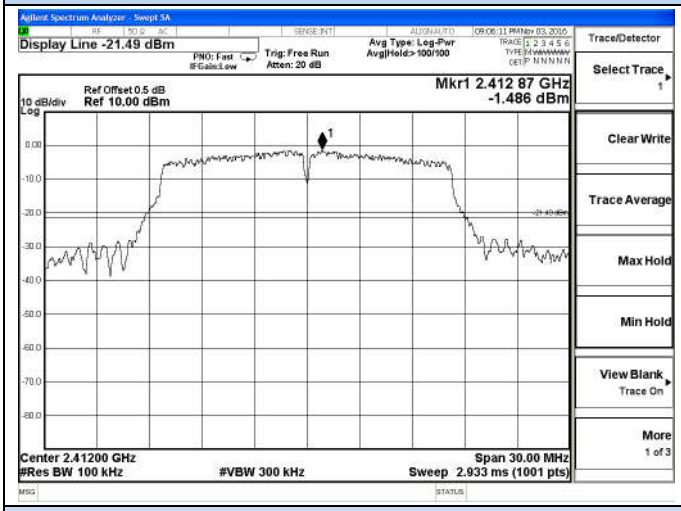
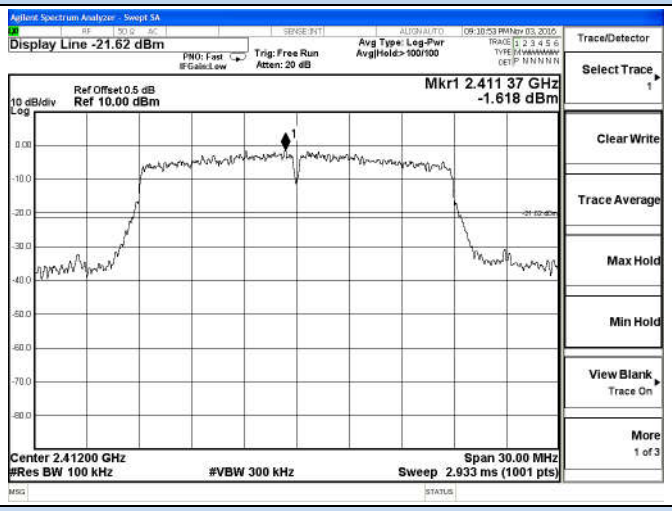
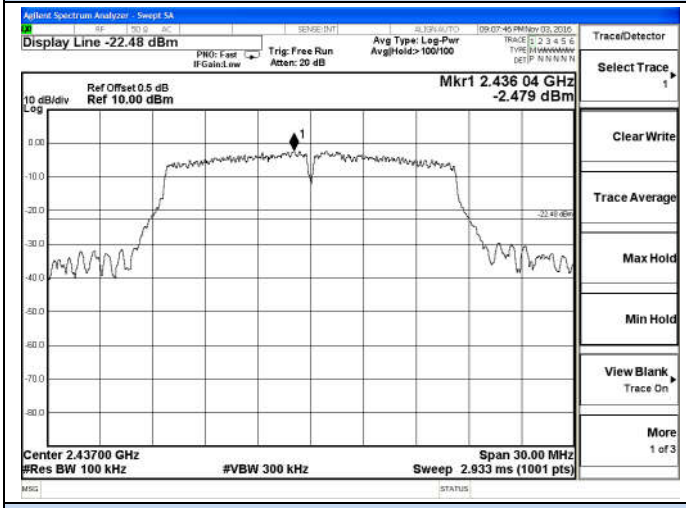
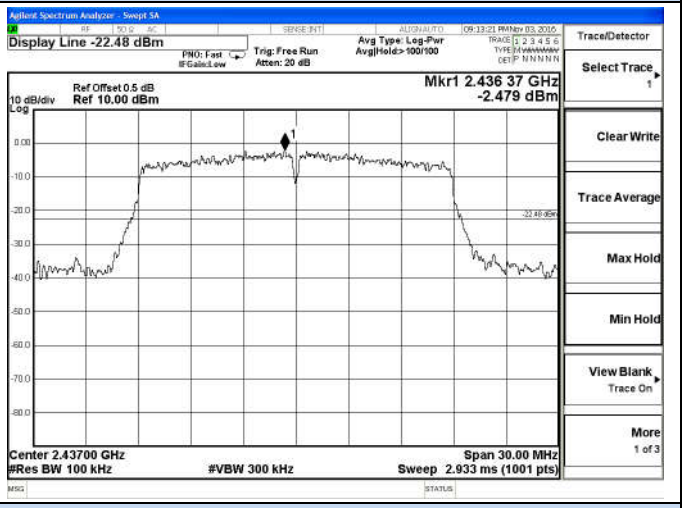
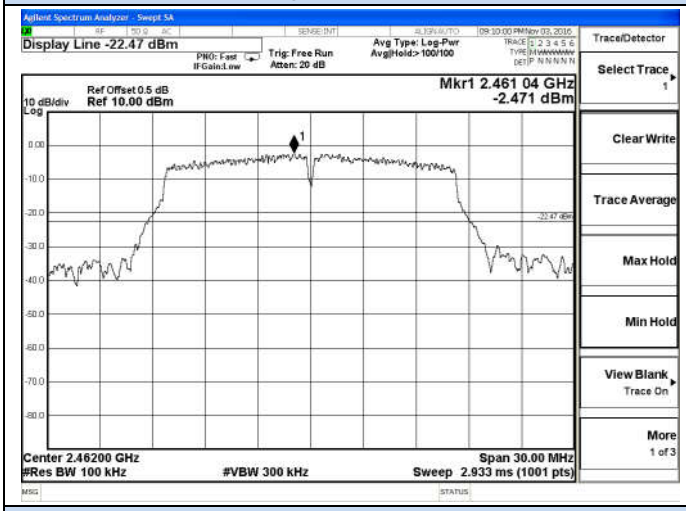
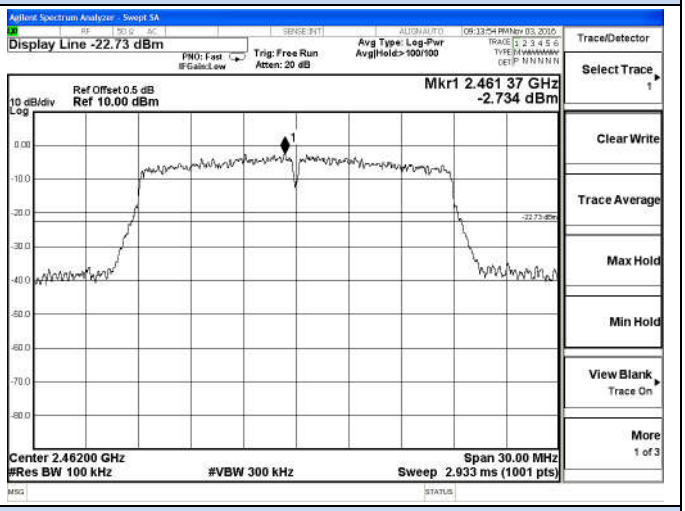
802.11n-HT20

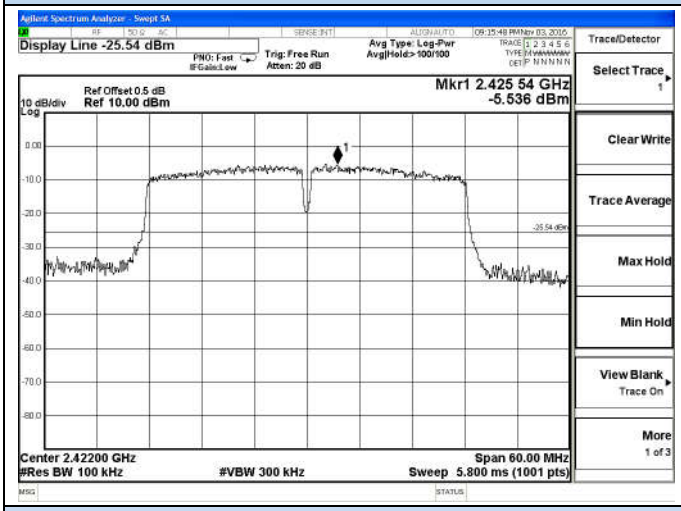
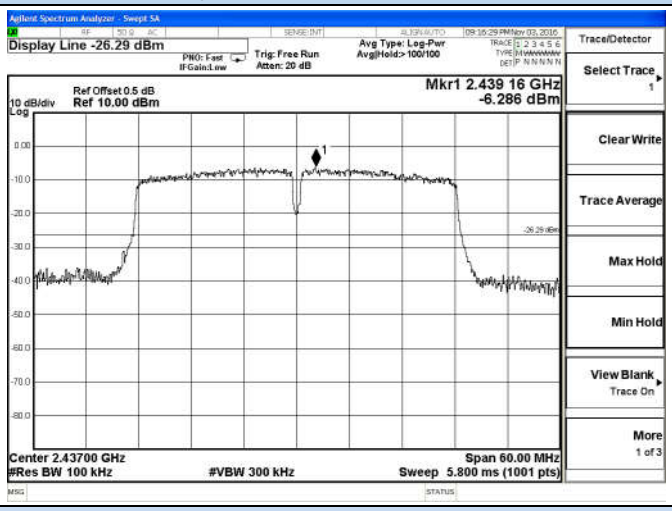
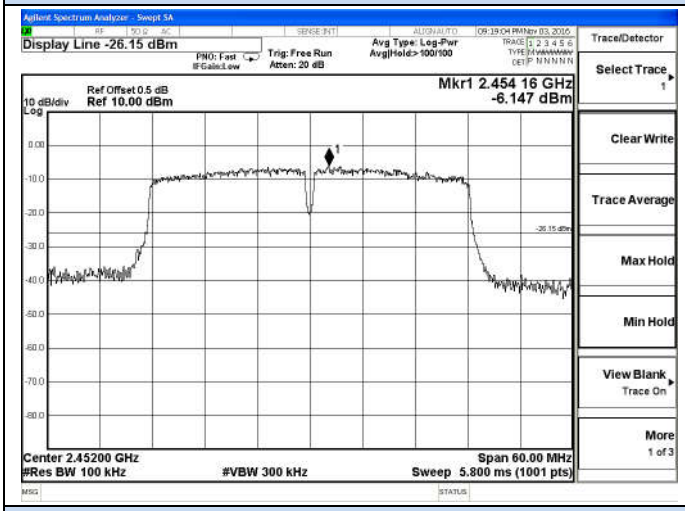
| Channel | Frequency (MHz) | Mearsured Power Density (dBm/100KHz) | Max. Limit (dBm/3KHz ) | Result |
|---|---|---|---|---|
| 1 | 2412 | -1.618 | 8 | Complies |
| 6 | 2437 | -2.479 | 8 | Complies |
| 11 | 2462 | -2.734 | 8 | Complies |

802.11n-HT40

| Channel | Frequency (MHz) | Mearsured Power Density (dBm/100KHz) | Max. Limit (dBm/3KHz ) | Result |
|---|---|---|---|---|
| 3 | 2422 | -5.536 | 8 | Complies |
| 6 | 2437 | -6.286 | 8 | Complies |
| 9 | 2452 | -6.147 | 8 | Complies |

| Test plot of Power Spectral Density | |
|---|---|
|  |  |
| BT LE-Low channel | 802.11b-Low channel |
|  |  |
| BT LE-Middle channel | 802.11b-Middle channel |
|  |  |
| BT LE-High channel | 802.11b-High channel |

| Test plot of Power Spectral Density | |
|---|---|
|  |  |
| 802.11g-Low channel | 802.11n(HT20)-Low channel |
|  |  |
| 802.11g-Middle channel | 802.11n(HT20)-Middle channel |
|  |  |
| 802.11g-High channel | 802.11n(HT20)-High channel |

| Test plot of Power Spectral Density | |
|---|---|
|  |  |
| 802.11n(HT40)-Low channel | 802.11n(HT40)-Mid channel |
|  | |
| 802.11n(HT40)-High channel | |

## 5.4. 6 dB Spectrum Bandwidth Measurement

### 5.4.1. Standard Applicable

According to §15.247(a)(2): For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

### 5.4.2. Measuring Instruments and Setting

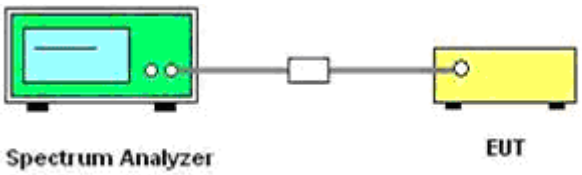
Please refer to section 6 of equipments list in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | > RBW |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | 100ms |

### 5.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth and the video bandwidth were set according to KDB558074.
3. Measured the spectrum width with power higher than 6dB below carrier.

### 5.4.4. Test Setup Layout




### 5.4.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.4.6. Test Result of 6dB Spectrum Bandwidth

| Temperature | 25℃ | Humidity | 60% |
|---|---|---|---|
| Test Engineer | Chaz | Configurations | BT LE/802.11b/g/n |

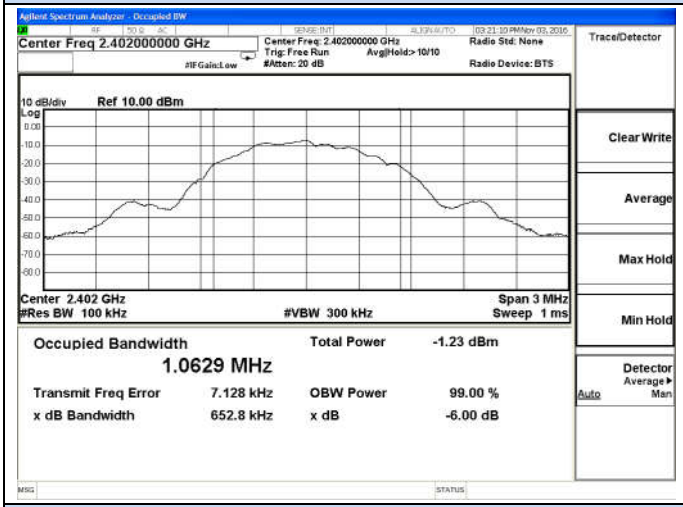
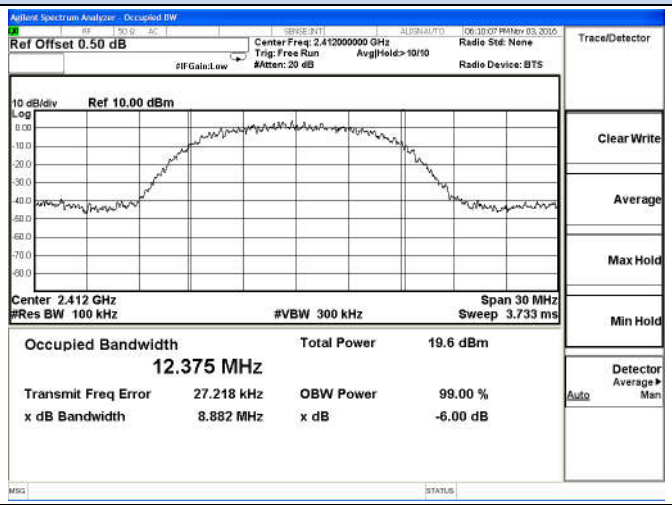
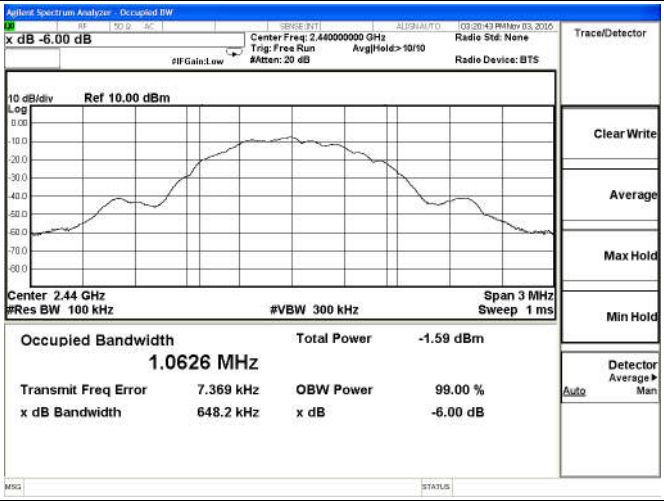
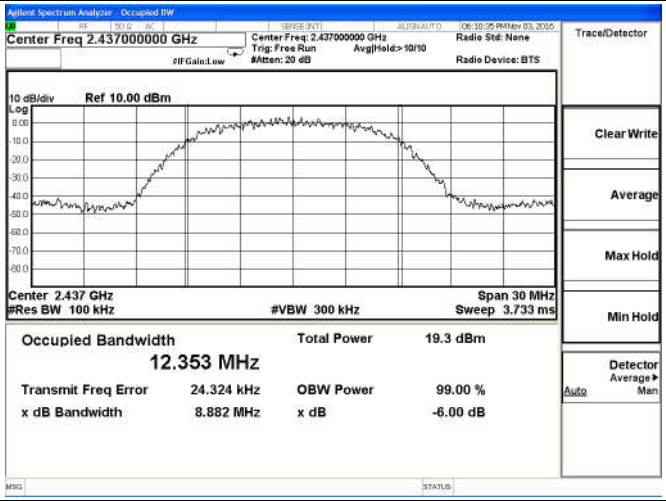
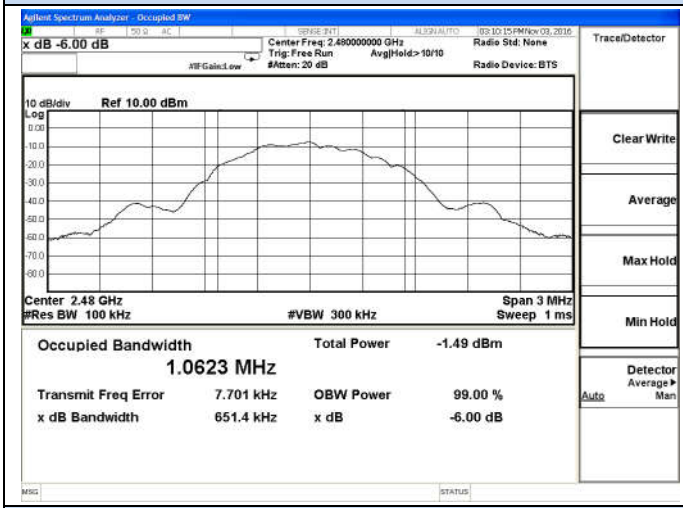
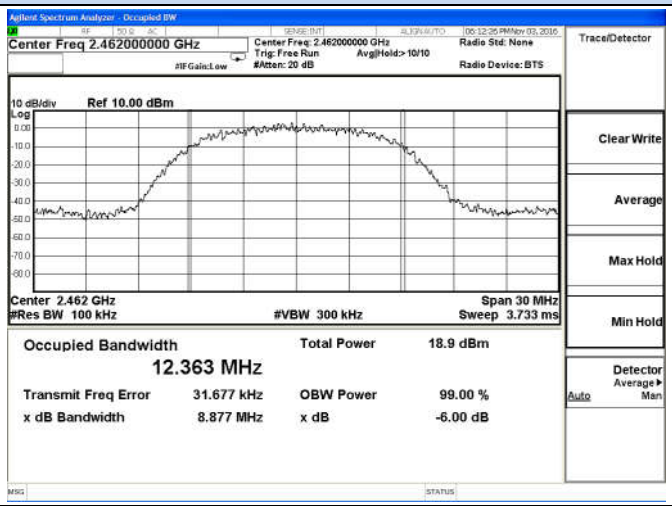
| BT LE | | | | |
|---|---|---|---|---|
| Channel | Frequency | 6dB Bandwidth (MHz) | Min. Limit (kHz) | Result |
| 0 | 2402 | 0.653 | 500 | Complies |
| 19 | 2440 | 0.648 | 500 | Complies |
| 39 | 2480 | 0.651 | 500 | Complies |

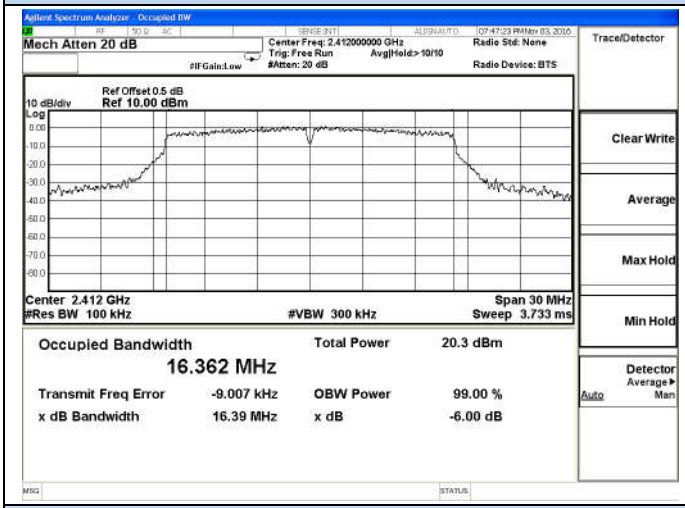
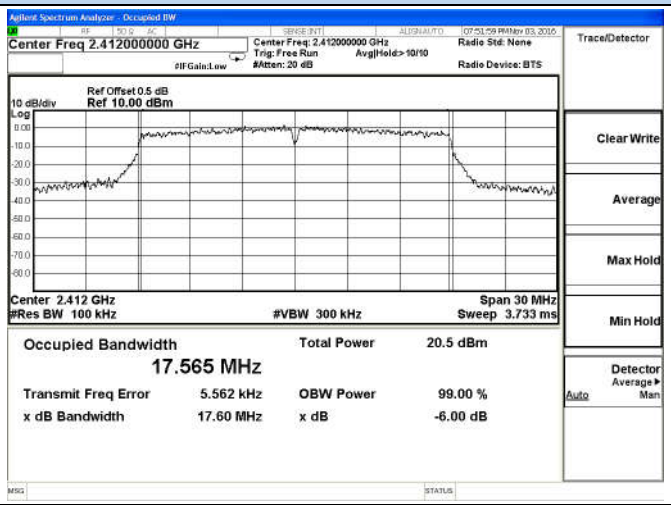
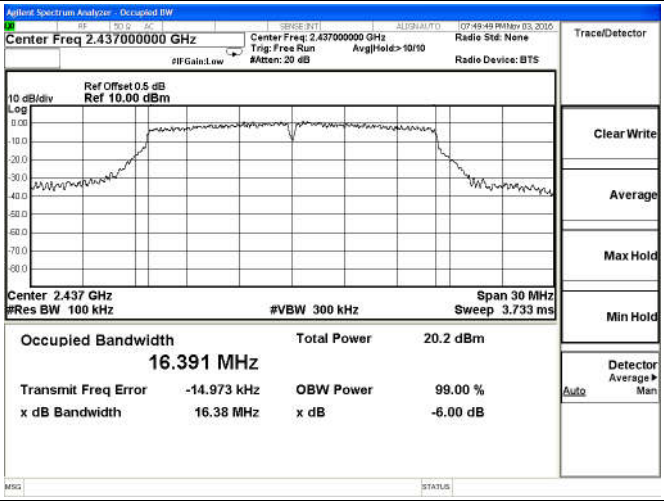
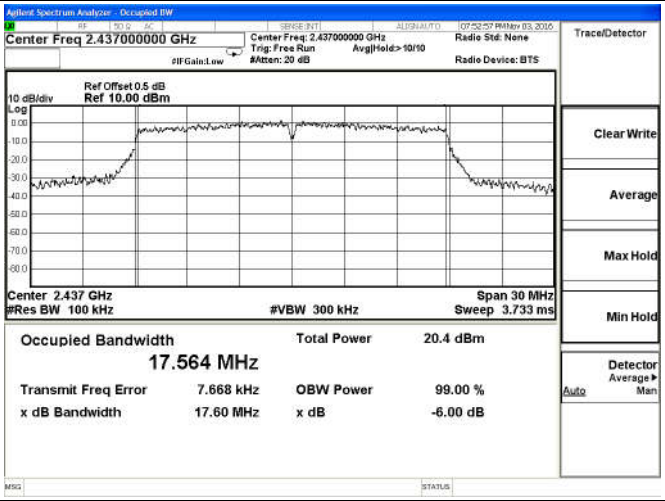
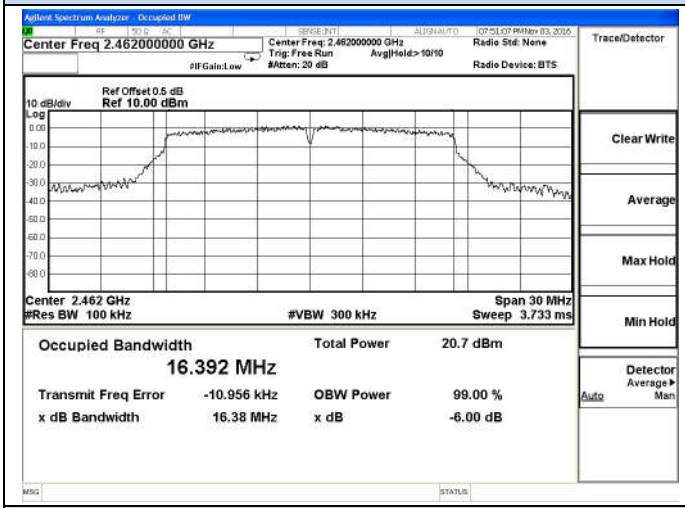
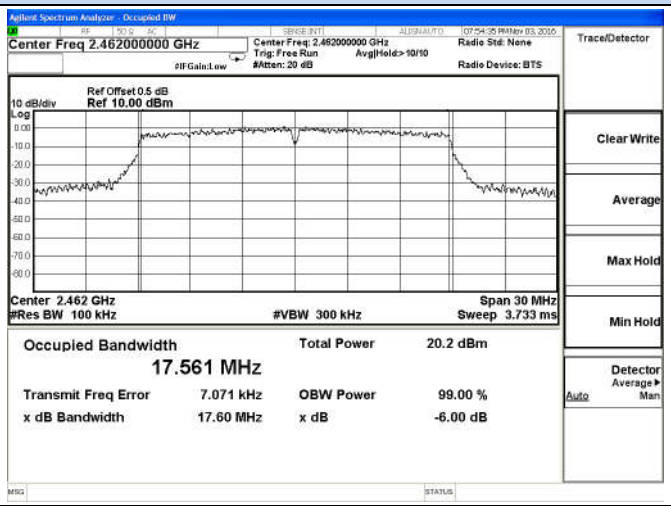
| 802.11b | | | | |
|---|---|---|---|---|
| Channel | Frequency | 6dB Bandwidth (MHz) | Min. Limit (kHz) | Result |
| 1 | 2412 | 8.882 | 500 | Complies |
| 6 | 2437 | 8.882 | 500 | Complies |
| 11 | 2462 | 8.877 | 500 | Complies |

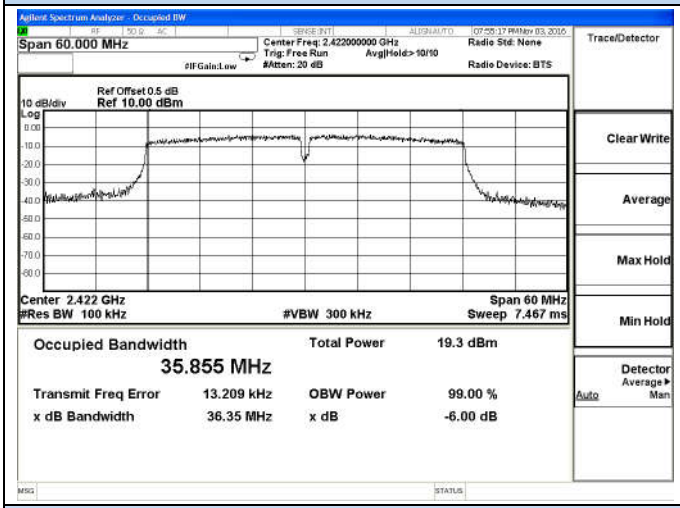
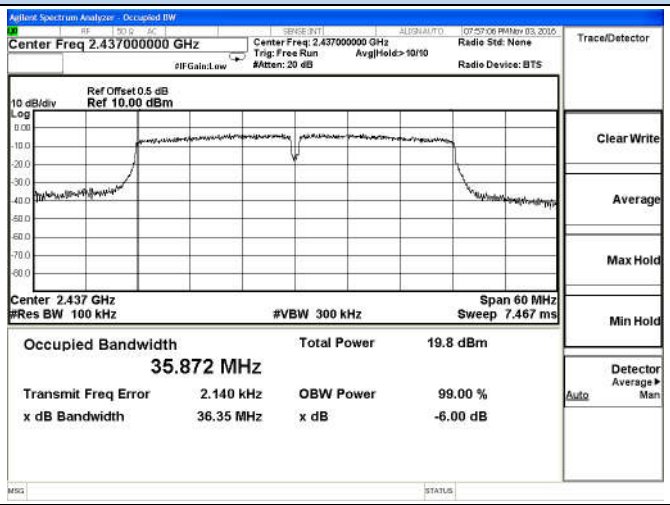
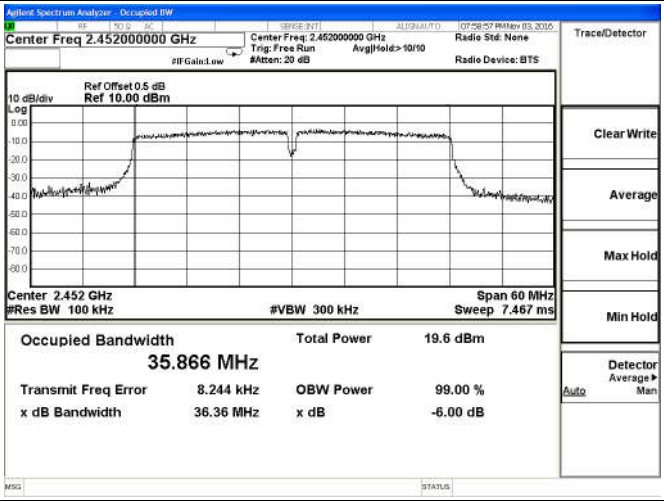
| 802.11g | | | | |
|---|---|---|---|---|
| Channel | Frequency | 6dB Bandwidth (MHz) | Min. Limit (kHz) | Result |
| 1 | 2412 | 16.39 | 500 | Complies |
| 6 | 2437 | 16.38 | 500 | Complies |
| 11 | 2462 | 16.38 | 500 | Complies |

| 802.11n HT20 | | | | |
|---|---|---|---|---|
| Channel | Frequency | 6dB Bandwidth (MHz) | Min. Limit (kHz) | Result |
| 1 | 2412 | 17.60 | 500 | Complies |
| 6 | 2437 | 17.60 | 500 | Complies |
| 11 | 2462 | 17.60 | 500 | Complies |

| 802.11n HT40 | | | | |
|---|---|---|---|---|
| Channel | Frequency | 6dB Bandwidth (MHz) | Min. Limit (kHz) | Result |
| 3 | 2422 | 36.35 | 500 | Complies |
| 6 | 2437 | 36.35 | 500 | Complies |
| 9 | 2452 | 36.36 | 500 | Complies |

| Test plot of 6 dB Bandwidth | |
|---|---|
|  |  |
| BT LE-Low channel | 802.11b-Low channel |
|  |  |
| BT LE-Middle channel | 802.11b-Middle channel |
|  |  |
| BT LE-High channel | 802.11b-High channel |

| Test plot of 6 dB Bandwidth | |
|---|---|
|  |  |
| 802.11g-Low channel | 802.11n(HT20)-Low channel |
|  |  |
| 802.11g-Middle channel | 802.11n(HT20)-Middle channel |
|  |  |
| 802.11g-High channel | 802.11n(HT20)-High channel |

| Test plot of 6 dB Bandwidth | |
|---|---|
|  |  |
| 802.11n(HT40)-Low channel | 802.11n(HT40)-Mid channel |
|  | |
| 802.11n(HT40)-High channel | |

## 5.5. Radiated Emissions Measurement

### 5.5.1. Standard Applicable

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| \1\ 0.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 25.5-25.67 | 1300-1427 | 8.025-8.5 |
| 4.17725-4.17775 | 37.5-38.25 | 1435-1626.5 | 9.0-9.2 |
| 4.20725-4.20775 | 73-74.6 | 1645.5-1646.5 | 9.3-9.5 |
| 6.215-6.218 | 74.8-75.2 | 1660-1710 | 10.6-12.7 |
| 6.26775-6.26825 | 108-121.94 | 1718.8-1722.2 | 13.25-13.4 |
| 6.31175-6.31225 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475-156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2690-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293. | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3600-4400 | (\2\) |
| 13.36-13.41 | | | |

\1\ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

\2\ Above 38.6

According to §15.247 (d): 20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

5.5.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB (Emission in restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |
| RB / VB (Emission in non-restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |

| Receiver Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP/AVG |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for QP/AVG |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 100kHz for QP |

5.5.3. Test Procedures

**1) Sequence of testing 9 kHz to 30 MHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna height is 0.8 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

**Final measurement:**

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

**2) Sequence of testing 30 MHz to 1 GHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

**Final measurement:**

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

**3) Sequence of testing 1 GHz to 18 GHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

**Final measurement:**

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

**4) Sequence of testing above 18 GHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

**Premeasurement:**

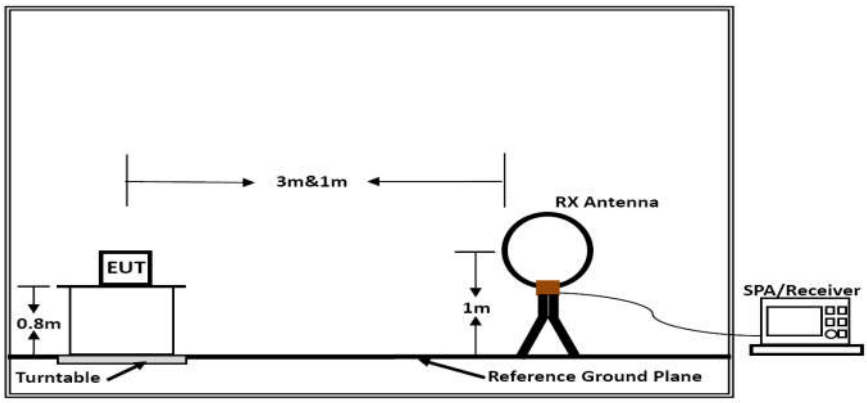
--- The antenna is moved spherical over the EUT in different polarisations of the antenna.

**Final measurement:**

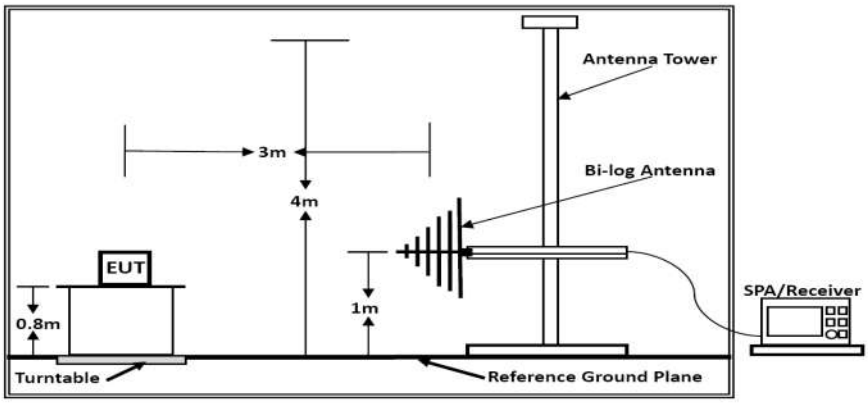
--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

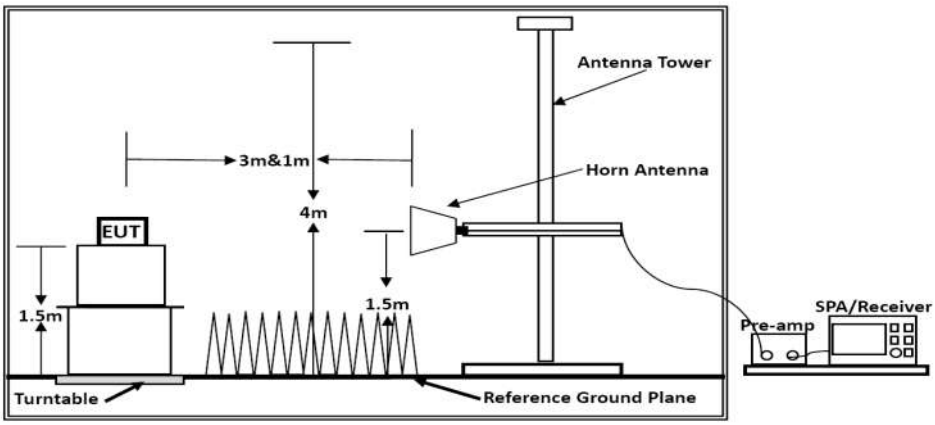
5.5.4. Test Setup Layout




Below 30MHz




Below 1GHz




Above 1GHz

Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1.5m.

Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1.5m]) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

5.5.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.5.6. Results of Radiated Emissions (9kHz~30MHz)

| Temperature | 25℃ | Humidty | 60% |
|---|---|---|---|
| Test Engineer | Chaz | Configurations | BT LE/802.11b/g/n |

| Freq. (MHz) | Level (dBuV) | Over Limit (dB) | Over Limit (dBuV) | Remark |
|---|---|---|---|---|
| - | - | - | - | See Note |

Note:

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

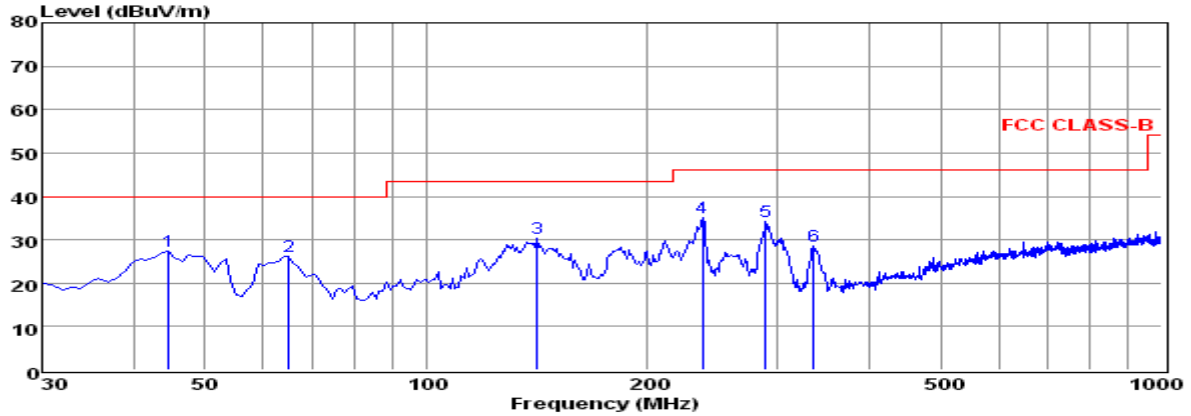
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.

5.5.7. Results of Radiated Emissions (30MHz~1GHz)

| Temperature | 25℃ | Humidty | 60% |
|---|---|---|---|
| Test Engineer | Chaz | Configurations | 802.11b (Low CH) |

Test result for 802.11b (Low Channel)

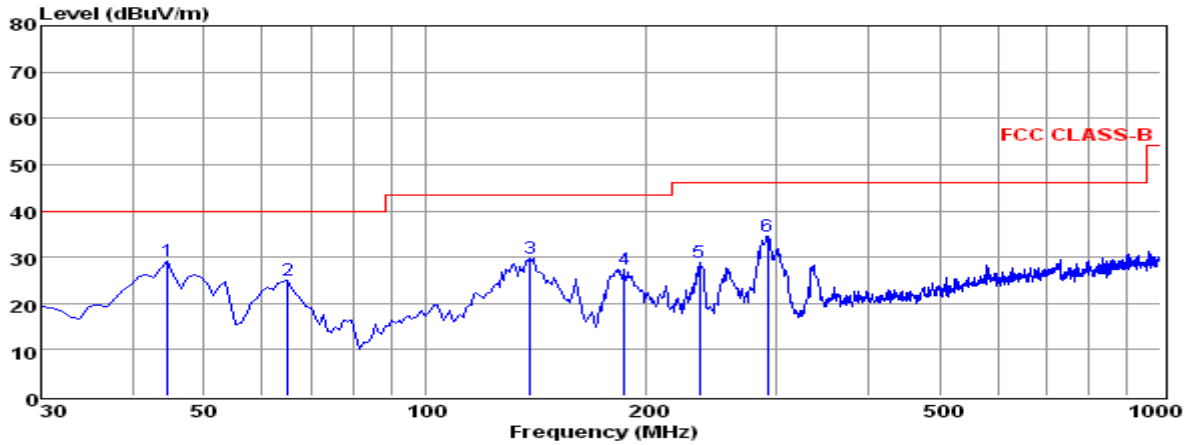
Horizontal:




| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 44.55 | 13.35 | 0.41 | 13.55 | 27.31 | 40.00 | -12.69 | QP |
| 2 | 64.92 | 15.01 | 0.52 | 10.74 | 26.27 | 40.00 | -13.73 | QP |
| 3 | 141.55 | 21.51 | 0.71 | 8.20 | 30.42 | 43.50 | -13.08 | QP |
| 4 | 237.58 | 22.22 | 0.96 | 11.98 | 35.16 | 46.00 | -10.84 | QP |
| 5 | 288.99 | 20.19 | 1.05 | 12.85 | 34.09 | 46.00 | -11.91 | QP |
| 6 | 336.52 | 13.36 | 1.09 | 13.98 | 28.43 | 46.00 | -17.57 | QP |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Vertical:




| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 44.55 | 15.19 | 0.41 | 13.55 | 29.15 | 40.00 | -10.85 | QP |
| 2 | 64.92 | 13.60 | 0.52 | 10.74 | 24.86 | 40.00 | -15.14 | QP |
| 3 | 138.64 | 20.72 | 0.75 | 8.29 | 29.76 | 43.50 | -13.74 | QP |
| 4 | 186.17 | 16.30 | 0.98 | 10.22 | 27.50 | 43.50 | -16.00 | QP |
| 5 | 235.64 | 16.20 | 0.87 | 11.90 | 28.97 | 46.00 | -17.03 | QP |
| 6 | 291.90 | 20.52 | 1.01 | 12.90 | 34.43 | 46.00 | -11.57 | QP |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Note:

1). Pre-scan all mode and recorded the worst case results in this report (802.11b (Low Channel)).
Emission level (dBuV/m) = 20 log Emission level (uV/m).
2). Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

5.5.8. Results for Radiated Emissions (Above 1GHz)

BT LE

Channel 0

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4804.0 | 54.78 | 33.06 | 35.04 | 3.94 | 56.74 | 74 | -17.26 | Peak | Horizontal |
| 4804.0 | 40.02 | 33.06 | 35.04 | 3.94 | 41.98 | 54 | -12.02 | Average | Horizontal |
| 4804.0 | 59.07 | 33.06 | 35.04 | 3.94 | 61.03 | 74 | -12.97 | Peak | Vertical |
| 4804.0 | 42.34 | 33.06 | 35.04 | 3.94 | 44.30 | 54 | -9.70 | Average | Vertical |

Channel 19

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4880.0 | 54.87 | 33.16 | 35.15 | 3.96 | 56.84 | 74 | -17.16 | Peak | Horizontal |
| 4880.0 | 44.35 | 33.16 | 35.15 | 3.96 | 46.32 | 54 | -7.68 | Average | Horizontal |
| 4880.0 | 59.07 | 33.16 | 35.15 | 3.96 | 61.04 | 74 | -12.96 | Peak | Vertical |
| 4880.0 | 41.90 | 33.16 | 35.15 | 3.96 | 43.87 | 54 | -10.13 | Average | Vertical |

Channel 39

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4960.0 | 55.09 | 33.26 | 35.14 | 3.98 | 57.19 | 74 | -16.81 | Peak | Horizontal |
| 4960.0 | 43.06 | 33.26 | 35.14 | 3.98 | 45.16 | 54 | -8.84 | Average | Horizontal |
| 4960.0 | 58.70 | 33.26 | 35.14 | 3.98 | 60.80 | 74 | -13.20 | Peak | Vertical |
| 4960.0 | 42.26 | 33.26 | 35.14 | 3.98 | 44.36 | 54 | -9.64 | Average | Vertical |

802.11b

Channel 1

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4824.00 | 50.15 | 33.06 | 35.14 | 3.98 | 52.05 | 74 | -21.95 | Peak | Horizontal |
| 4824.00 | 38.34 | 33.06 | 35.14 | 3.98 | 40.24 | 54 | -13.76 | Average | Horizontal |
| 4824.00 | 52.31 | 33.06 | 35.14 | 3.98 | 54.21 | 74 | -19.79 | Peak | Vertical |
| 4824.00 | 43.83 | 33.06 | 35.14 | 3.98 | 45.73 | 54 | -8.27 | Average | Vertical |

Channel 6

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4874.00 | 46.80 | 33.16 | 35.15 | 3.96 | 48.77 | 74 | -25.23 | Peak | Horizontal |
| 4874.00 | 37.82 | 33.16 | 35.15 | 3.96 | 39.79 | 54 | -14.21 | Average | Horizontal |
| 4874.00 | 48.40 | 33.16 | 35.15 | 3.96 | 50.37 | 74 | -23.63 | Peak | Vertical |
| 4874.00 | 40.24 | 33.16 | 35.15 | 3.96 | 42.21 | 54 | -11.79 | Average | Vertical |

Channel 11

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4924.00 | 47.86 | 33.26 | 35.14 | 3.98 | 49.96 | 74 | -24.04 | Peak | Horizontal |
| 4924.00 | 39.24 | 33.26 | 35.14 | 3.98 | 41.34 | 54 | -12.66 | Average | Horizontal |
| 4924.00 | 48.83 | 33.26 | 35.14 | 3.98 | 50.93 | 74 | -23.07 | Peak | Vertical |
| 4924.00 | 40.23 | 33.26 | 35.14 | 3.98 | 42.33 | 54 | -11.67 | Average | Vertical |

802.11g

Channel 1

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4824.00 | 50.25 | 33.06 | 35.14 | 3.98 | 52.15 | 74 | -21.85 | Peak | Horizontal |
| 4824.00 | 37.94 | 33.06 | 35.14 | 3.98 | 39.84 | 54 | -14.16 | Average | Horizontal |
| 4824.00 | 51.88 | 33.06 | 35.14 | 3.98 | 53.78 | 74 | -20.22 | Peak | Vertical |
| 4824.00 | 44.39 | 33.06 | 35.14 | 3.98 | 46.29 | 54 | -7.71 | Average | Vertical |

Channel 6

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4874.00 | 46.98 | 33.16 | 35.15 | 3.96 | 48.95 | 74 | -25.05 | Peak | Horizontal |
| 4874.00 | 38.27 | 33.16 | 35.15 | 3.96 | 40.24 | 54 | -13.76 | Average | Horizontal |
| 4874.00 | 47.65 | 33.16 | 35.15 | 3.96 | 49.62 | 74 | -24.38 | Peak | Vertical |
| 4874.00 | 40.10 | 33.16 | 35.15 | 3.96 | 42.07 | 54 | -11.93 | Average | Vertical |

Channel 11

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4924.00 | 47.63 | 33.26 | 35.14 | 3.98 | 49.73 | 74 | -24.27 | Peak | Horizontal |
| 4924.00 | 39.29 | 33.26 | 35.14 | 3.98 | 41.39 | 54 | -12.61 | Average | Horizontal |
| 4924.00 | 48.64 | 33.26 | 35.14 | 3.98 | 50.74 | 74 | -23.26 | Peak | Vertical |
| 4924.00 | 40.32 | 33.26 | 35.14 | 3.98 | 42.42 | 54 | -11.58 | Average | Vertical |

802.11n HT20

Channel 1

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4824.00 | 49.69 | 33.06 | 35.14 | 3.98 | 51.59 | 74 | -22.41 | Peak | Horizontal |
| 4824.00 | 38.23 | 33.06 | 35.14 | 3.98 | 40.13 | 54 | -13.87 | Average | Horizontal |
| 4824.00 | 51.86 | 33.06 | 35.14 | 3.98 | 53.76 | 74 | -20.24 | Peak | Vertical |
| 4824.00 | 43.94 | 33.06 | 35.14 | 3.98 | 45.84 | 54 | -8.16 | Average | Vertical |

Channel 6

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4874.00 | 47.02 | 33.16 | 35.15 | 3.96 | 48.99 | 74 | -25.01 | Peak | Horizontal |
| 4874.00 | 38.06 | 33.16 | 35.15 | 3.96 | 40.03 | 54 | -13.97 | Average | Horizontal |
| 4874.00 | 47.69 | 33.16 | 35.15 | 3.96 | 49.66 | 74 | -24.34 | Peak | Vertical |
| 4874.00 | 39.62 | 33.16 | 35.15 | 3.96 | 41.59 | 54 | -12.41 | Average | Vertical |

Channel 11

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4924.00 | 47.93 | 33.26 | 35.14 | 3.98 | 50.03 | 74 | -23.97 | Peak | Horizontal |
| 4924.00 | 38.73 | 33.26 | 35.14 | 3.98 | 40.83 | 54 | -13.17 | Average | Horizontal |
| 4924.00 | 49.31 | 33.26 | 35.14 | 3.98 | 51.41 | 74 | -22.59 | Peak | Vertical |
| 4924.00 | 40.23 | 33.26 | 35.14 | 3.98 | 42.33 | 54 | -11.67 | Average | Vertical |

802.11n HT40

Channel 3

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4844.00 | 48.62 | 33.06 | 35.14 | 3.98 | 50.52 | 74 | -23.48 | Peak | Horizontal |
| 4844.00 | 38.33 | 33.06 | 35.14 | 3.98 | 40.23 | 54 | -13.77 | Average | Horizontal |
| 4844.00 | 51.96 | 33.06 | 35.14 | 3.98 | 53.86 | 74 | -20.14 | Peak | Vertical |
| 4844.00 | 44.13 | 33.06 | 35.14 | 3.98 | 46.03 | 54 | -7.97 | Average | Vertical |

Channel 6

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4874.00 | 47.25 | 33.16 | 35.15 | 3.96 | 49.22 | 74 | -24.78 | Peak | Horizontal |
| 4874.00 | 38.38 | 33.16 | 35.15 | 3.96 | 40.35 | 54 | -13.65 | Average | Horizontal |
| 4874.00 | 47.83 | 33.16 | 35.15 | 3.96 | 49.80 | 74 | -24.20 | Peak | Vertical |
| 4874.00 | 40.06 | 33.16 | 35.15 | 3.96 | 42.03 | 54 | -11.97 | Average | Vertical |

Channel 9

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 4904.00 | 48.01 | 33.26 | 35.14 | 3.98 | 50.11 | 74 | -23.89 | Peak | Horizontal |
| 4904.00 | 38.95 | 33.26 | 35.14 | 3.98 | 41.05 | 54 | -12.95 | Average | Horizontal |
| 4904.00 | 48.90 | 33.26 | 35.14 | 3.98 | 51.00 | 74 | -23.00 | Peak | Vertical |
| 4904.00 | 39.83 | 33.26 | 35.14 | 3.98 | 41.93 | 54 | -12.07 | Average | Vertical |

Notes:

1). Measuring frequencies from 9k~10th harmonic or 26.5GHz (which is less), No emission found between lowest internal used/generated frequency to 30MHz.
2). Radiated emissions measured in frequency range from 9k~10th harmonic or 26.5GHz (which is less) were made with an instrument using Peak detector mode.
3). Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5.5.9. Results of Restricted Bands Test (Radiated)

| BT LE | | | | | | |
|---|---|---|---|---|---|---|
| Freq. MHz | Reading Level dBm | Antenna Gain dBi | Calculated E dBuV/m | Limit dBuV/m | Margin dB | Remark |
| 2310.000 | -61.04 | 0.00 | 34.19 | 74.00 | -39.81 | Peak |
| 2390.000 | -59.63 | 0.00 | 35.60 | 74.00 | -38.40 | Peak |
| 2483.500 | -59.67 | 0.00 | 35.56 | 74.00 | -38.44 | Peak |
| 2500.000 | -59.70 | 0.00 | 35.53 | 74.00 | -38.47 | Peak |

| 802.11b | | | | | | |
|---|---|---|---|---|---|---|
| Freq. MHz | Reading Level dBm | Antenna Gain dBi | Calculated E dBuV/m | Limit dBuV/m | Margin dB | Remark |
| 2310.000 | -50.58 | 0.00 | 44.65 | 74.00 | -29.35 | Peak |
| 2310.000 | -60.12 | 0.00 | 35.11 | 54.00 | -18.89 | Average |
| 2390.000 | -41.41 | 0.00 | 53.82 | 74.00 | -20.18 | Peak |
| 2390.000 | -49.28 | 0.00 | 45.95 | 54.00 | -8.05 | Average |
| 2483.500 | -46.44 | 0.00 | 48.79 | 74.00 | -25.21 | Peak |
| 2483.500 | -54.38 | 0.00 | 40.85 | 54.00 | -13.15 | Average |
| 2500.000 | -47.63 | 0.00 | 47.60 | 74.00 | -26.40 | Peak |
| 2500.000 | -57.93 | 0.00 | 37.30 | 54.00 | -16.70 | Average |

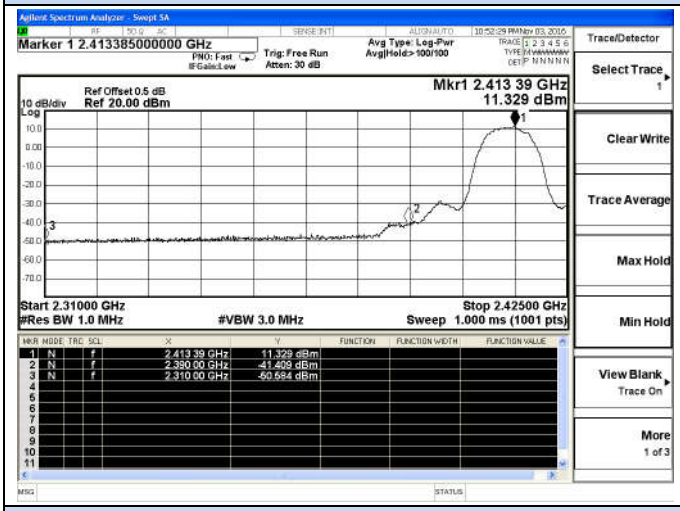
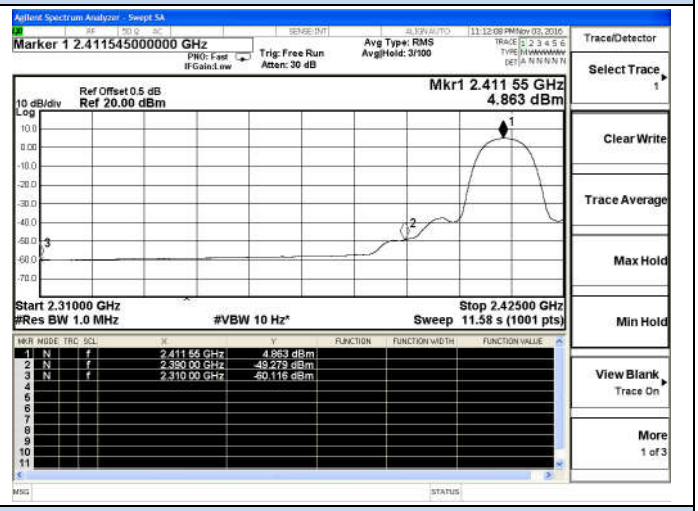
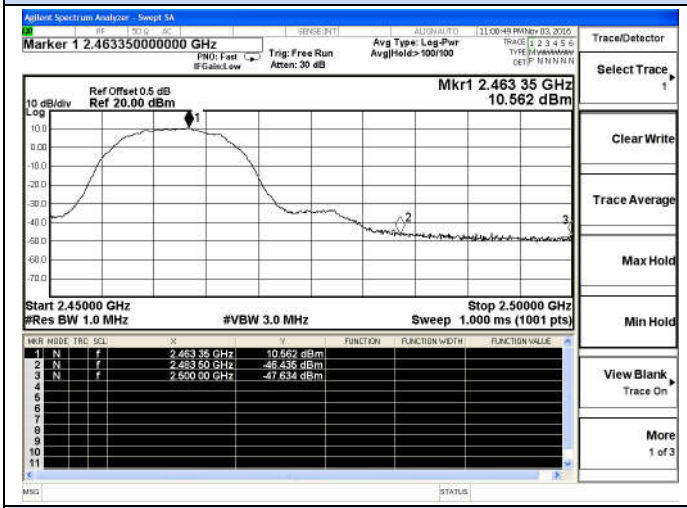
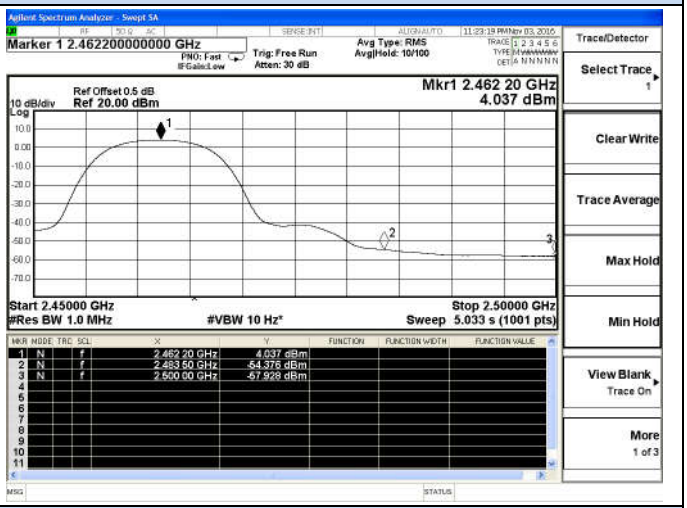
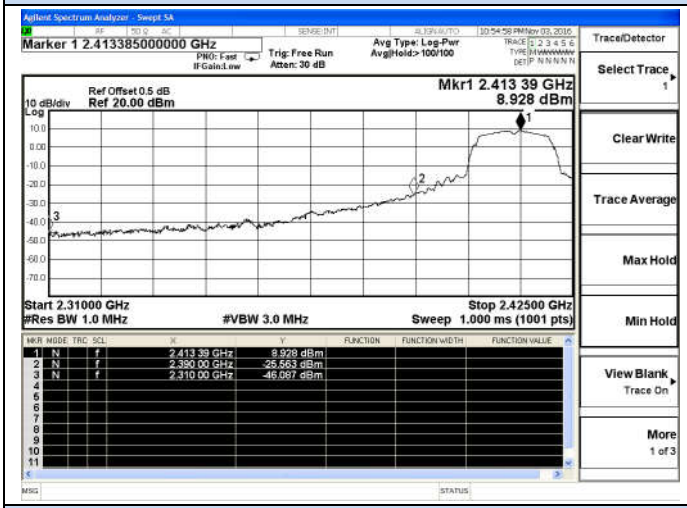
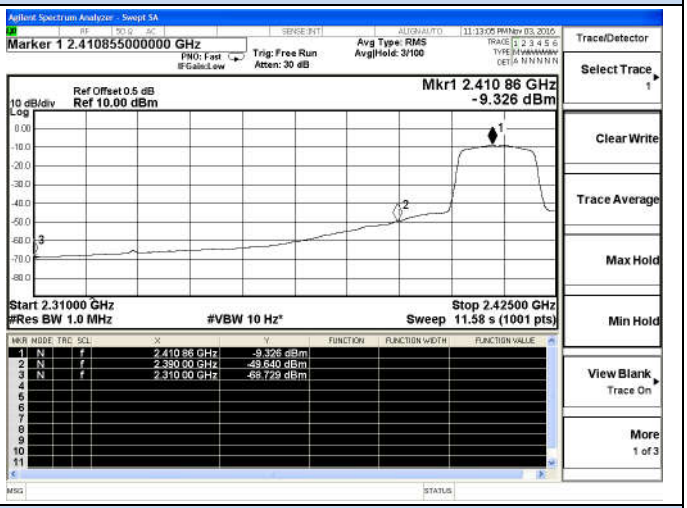
| 802.11g | | | | | | |
|---|---|---|---|---|---|---|
| Freq. MHz | Reading Level dBm | Antenna Gain dBi | Calculated E dBuV/m | Limit dBuV/m | Margin dB | Remark |
| 2310.000 | -46.09 | 0.00 | 49.14 | 74.00 | -24.86 | Peak |
| 2310.000 | -68.73 | 0.00 | 26.50 | 54.00 | -27.50 | Average |
| 2390.000 | -25.56 | 0.00 | 69.67 | 74.00 | -4.33 | Peak |
| 2390.000 | -49.64 | 0.00 | 45.59 | 54.00 | -8.41 | Average |
| 2483.500 | -27.25 | 0.00 | 67.98 | 74.00 | -6.02 | Peak |
| 2483.500 | -41.93 | 0.00 | 53.30 | 54.00 | -0.70 | Average |
| 2500.000 | -37.09 | 0.00 | 58.14 | 74.00 | -15.86 | Peak |
| 2500.000 | -50.39 | 0.00 | 44.84 | 54.00 | -9.16 | Average |

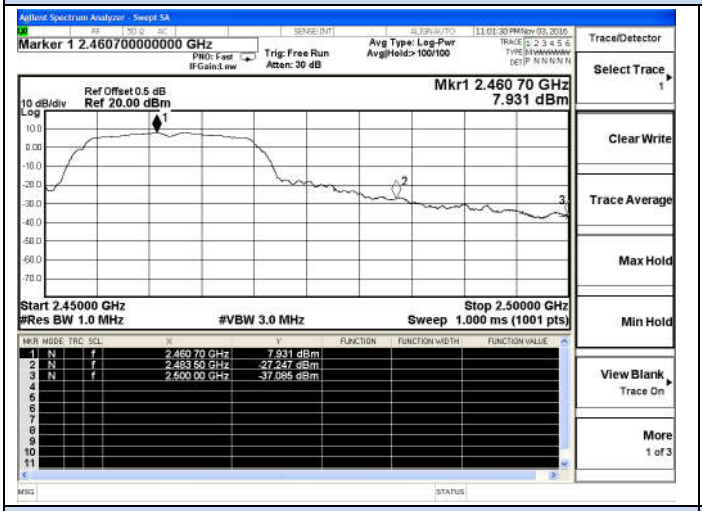
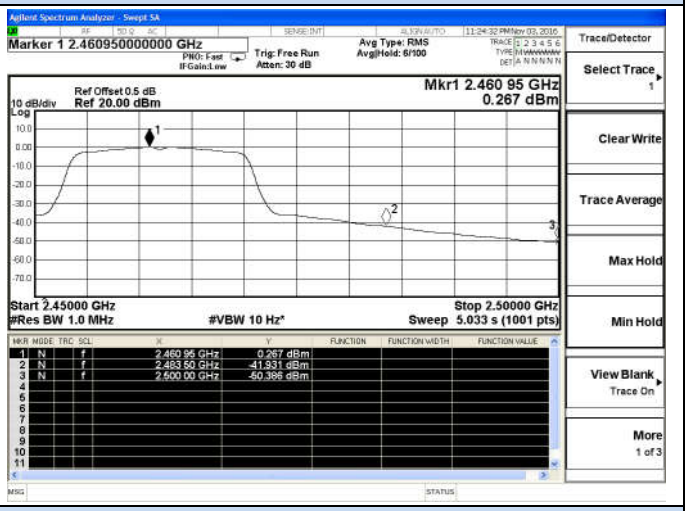
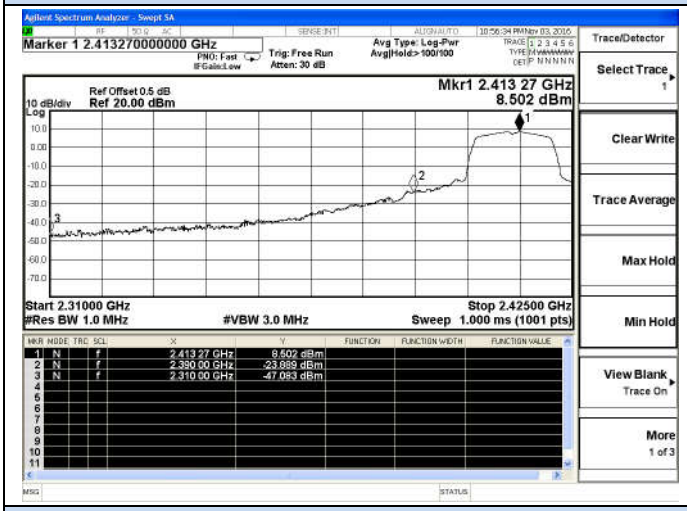
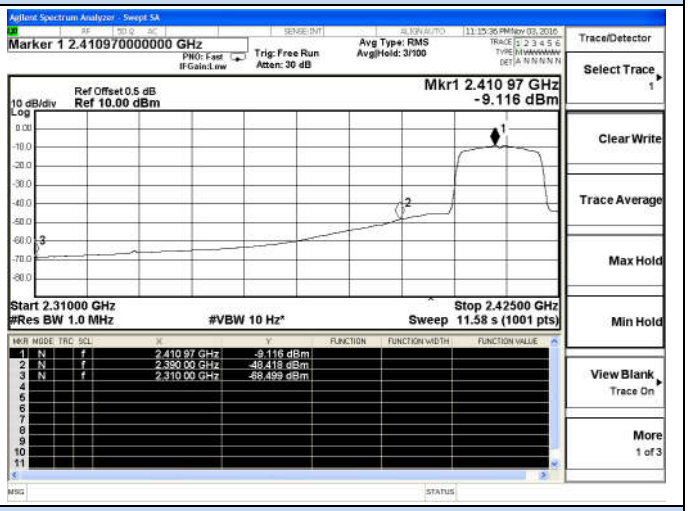
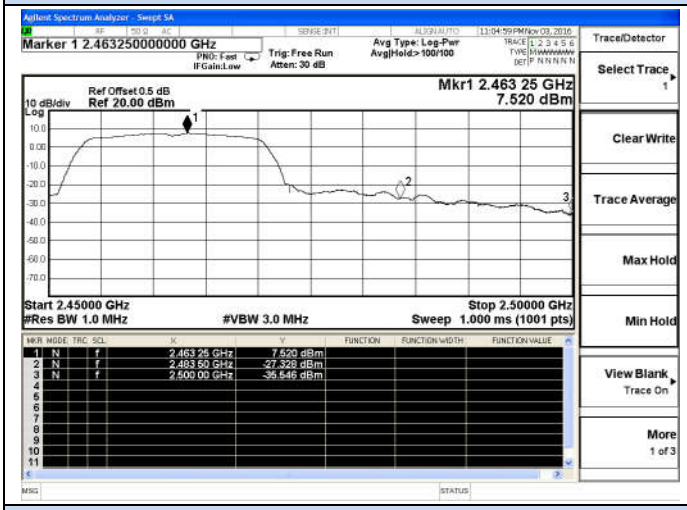
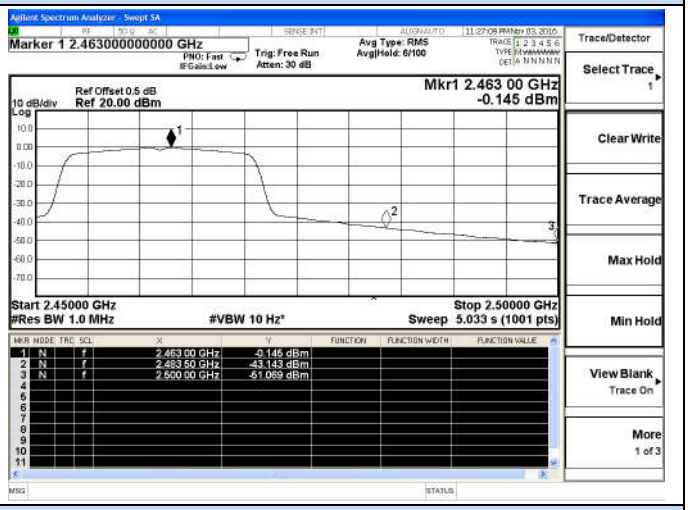
| 802.11n(HT20) | | | | | | |
|---|---|---|---|---|---|---|
| Freq. MHz | Reading Level dBm | Antenna Gain dBi | Calculated E dBuV/m | Limit dBuV/m | Margin dB | Remark |
| 2310.000 | -47.08 | 0.00 | 48.15 | 74.00 | -25.85 | Peak |
| 2310.000 | -68.50 | 0.00 | 26.73 | 54.00 | -27.27 | Average |
| 2390.000 | -23.89 | 0.00 | 71.34 | 74.00 | -2.66 | Peak |
| 2390.000 | -48.42 | 0.00 | 46.81 | 54.00 | -7.19 | Average |
| 2483.500 | -27.33 | 0.00 | 67.90 | 74.00 | -6.10 | Peak |
| 2483.500 | -43.14 | 0.00 | 52.09 | 54.00 | -1.91 | Average |
| 2500.000 | -35.55 | 0.00 | 59.68 | 74.00 | -14.32 | Peak |
| 2500.000 | -51.07 | 0.00 | 44.16 | 54.00 | -9.84 | Average |

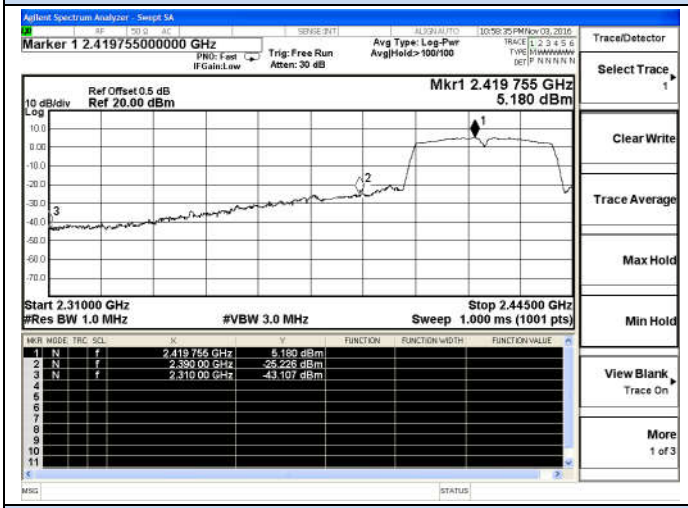
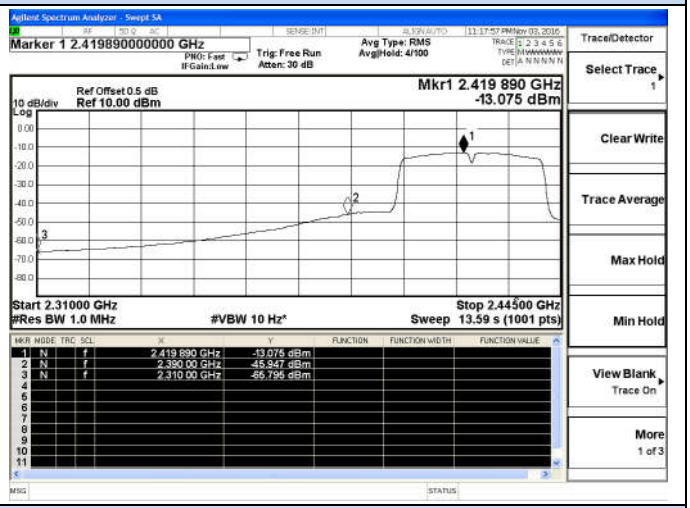
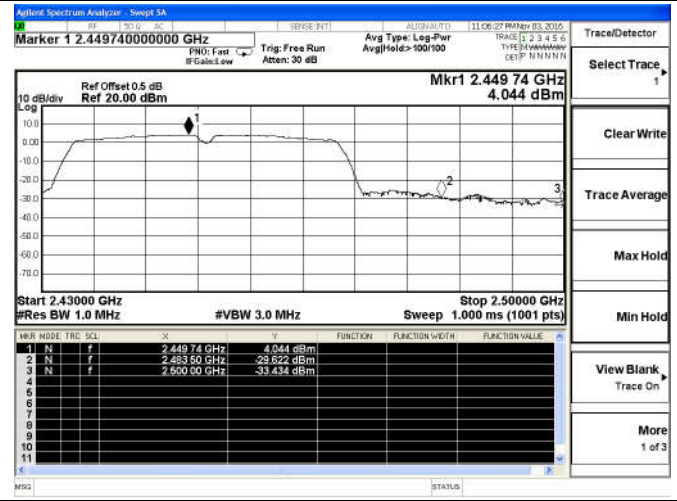
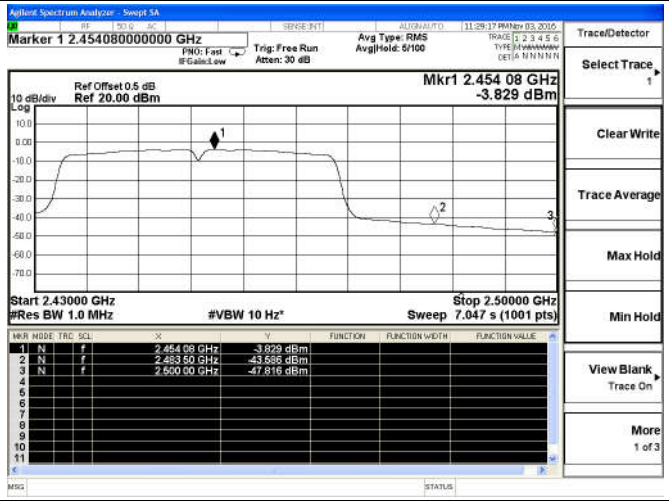
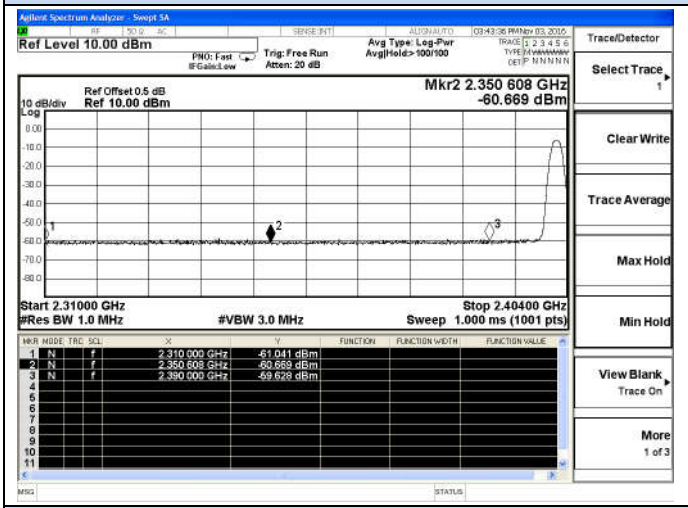
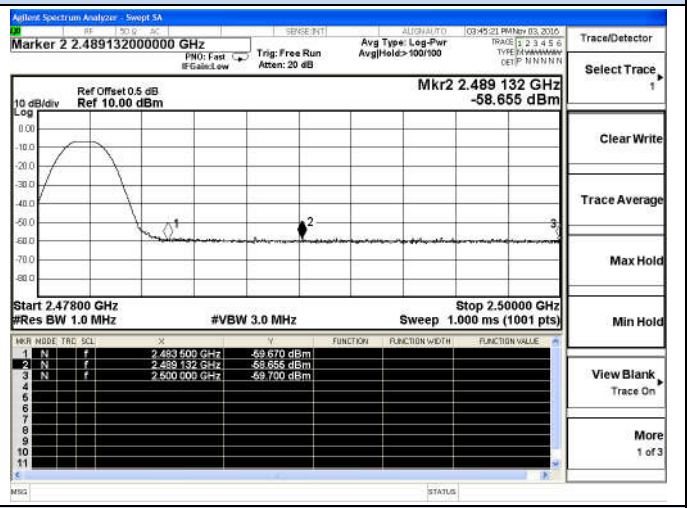
| 802.11n(HT40) | | | | | | |
|---|---|---|---|---|---|---|
| Freq. MHz | Reading Level dBm | Antenna Gain dBi | Calculated E dBuV/m | Limit dBuV/m | Margin dB | Remark |
| 2310.000 | -43.11 | 0.00 | 52.12 | 74.00 | -21.88 | Peak |
| 2310.000 | -65.80 | 0.00 | 29.43 | 54.00 | -24.57 | Average |
| 2390.000 | -25.23 | 0.00 | 70.00 | 74.00 | -4.00 | Peak |
| 2390.000 | -45.95 | 0.00 | 49.28 | 54.00 | -4.72 | Average |
| 2483.500 | -29.62 | 0.00 | 65.61 | 74.00 | -8.39 | Peak |
| 2483.500 | -43.59 | 0.00 | 51.64 | 54.00 | -2.36 | Average |
| 2500.000 | -33.43 | 0.00 | 61.80 | 74.00 | -12.20 | Peak |
| 2500.000 | -47.82 | 0.00 | 47.41 | 54.00 | -6.59 | Average |

Note:

1). All modes have been tested and we only record the worst test result;
2). Calculated E=Reading Level+Antenna Gain+104.77-(20LogD), Where D is 3, so E=Reading Level+95.23

| Test plot of Restricted Bands-conducted | |
|---|---|
|  |  |
| 802.11b-Low channel(Peak) | 802.11b-Low channel(Average) |
|  |  |
| 802.11b-High channel(Peak) | 802.11b-High channel(Average) |
|  |  |
| 802.11g-Low channel(Peak) | 802.11g-Low channel(Average) |

| Test plot of Restricted Bands | |
|---|---|
|  |  |
| 802.11g-High channel(Peak) | 802.11g-High channel(Average) |
|  |  |
| 802.11n(HT20)-Low channel(Peak) | 802.11n(HT20)-Low channel(Average) |
|  |  |
| 802.11n(HT20)-High channel(Peak) | 802.11n(HT20)-High channel(Average) |

| Test plot of Restricted Bands | |
|---|---|
|  |  |
| 802.11n(HT40)-Low channel(Peak) | 802.11n(HT40)-Low channel(Average) |
|  |  |
| 802.11n(HT40)-High channel(Peak) | 802.11n(HT40)-High channel(Average) |
| Test plot of Restricted Bands | |
|  |  |
| BT LE-Low channel(Peak) | BT LE-High channel(Peak) |

## 5.6. Conducted Spurious Emissions and Band Edges Test

### 5.6.1. Standard Applicable

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

### 5.6.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameter | Setting |
|---|---|
| Detector | Peak |
| Attenuation | Auto |
| RB / VB (Emission in restricted band) | 100KHz/300KHz |
| RB / VB (Emission in non-restricted band) | 100KHz/300KHz |

### 5.6.3. Test Procedures

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz

The spectrum from 9kHz to 26.5GHz is investigated with the transmitter set to the lowest,middle, and highest channels.

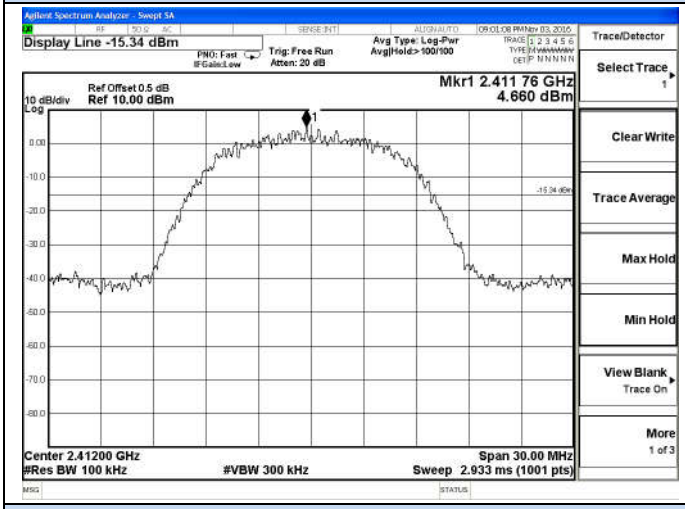
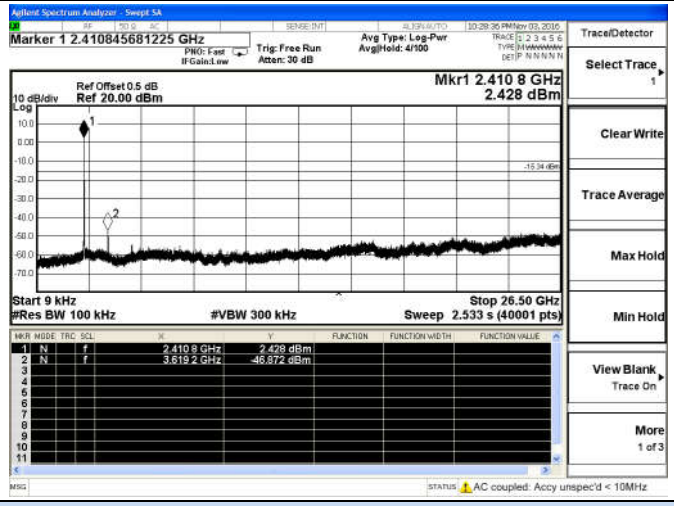
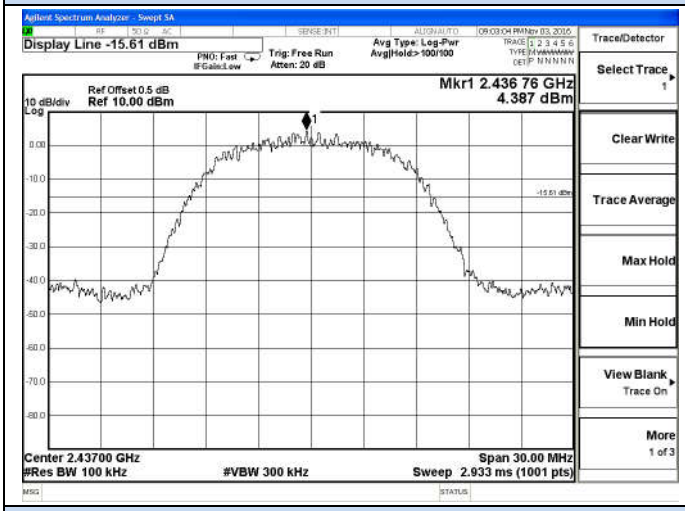
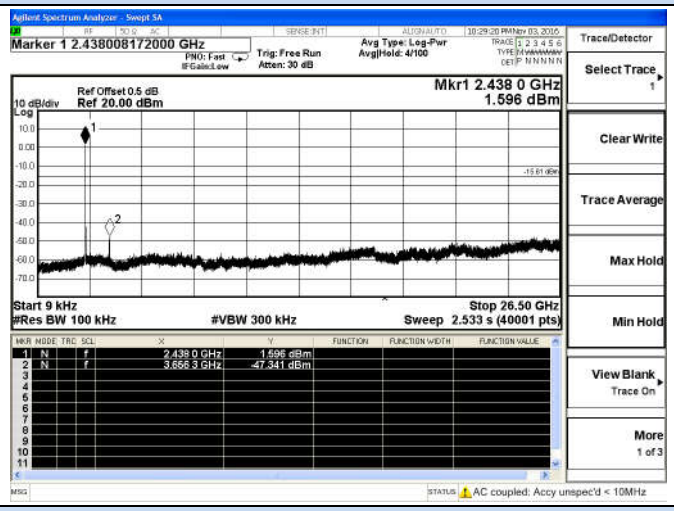
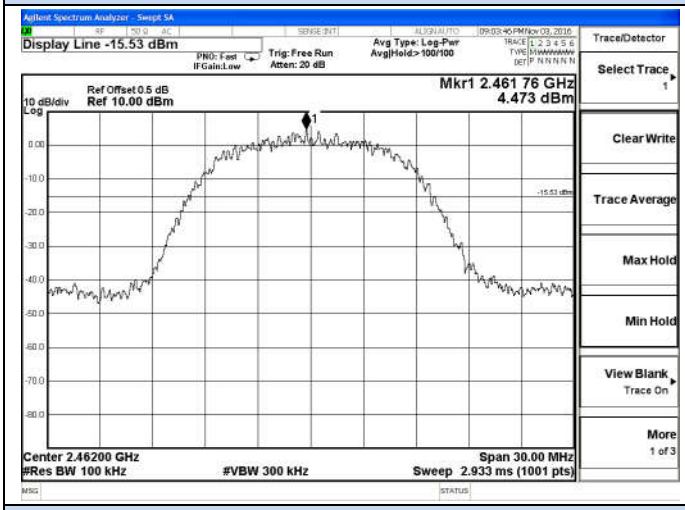
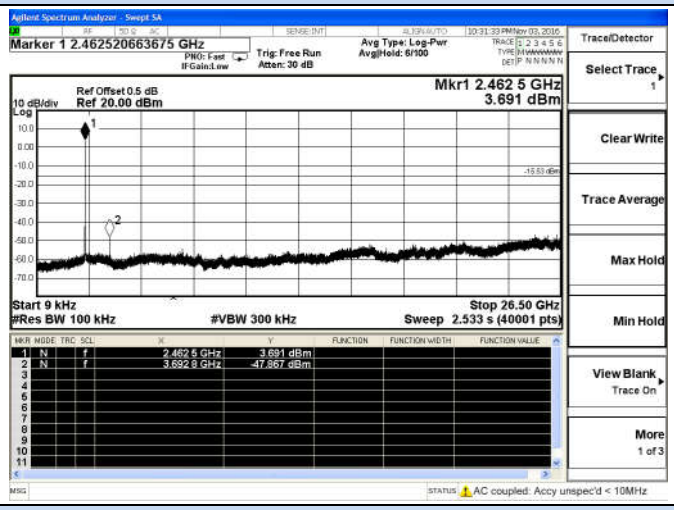
### 5.6.4. Test Setup Layout

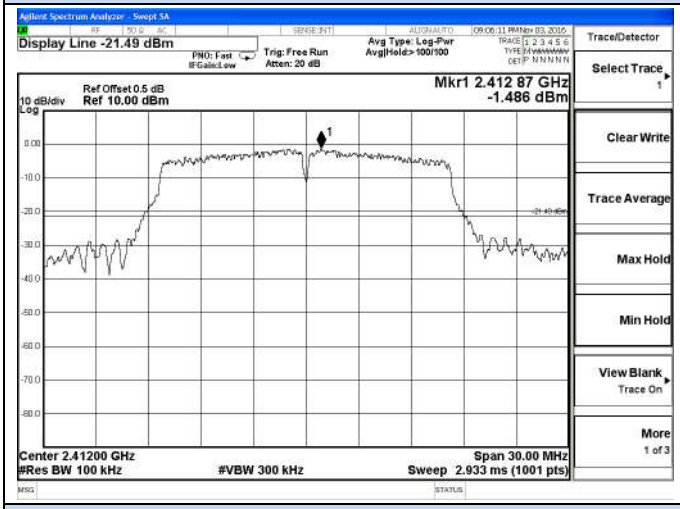
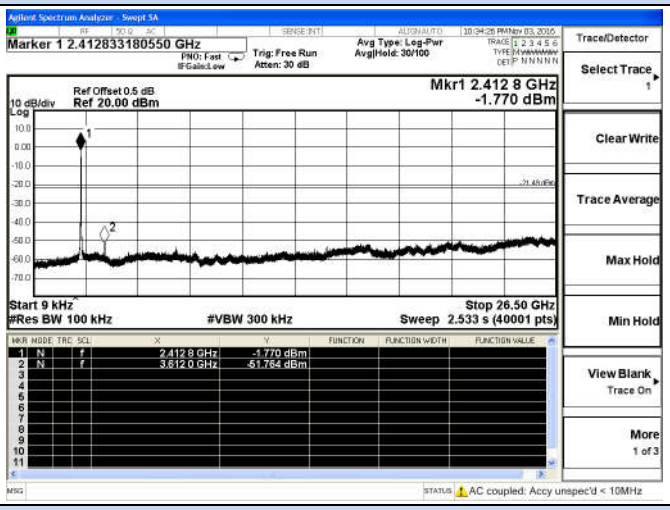
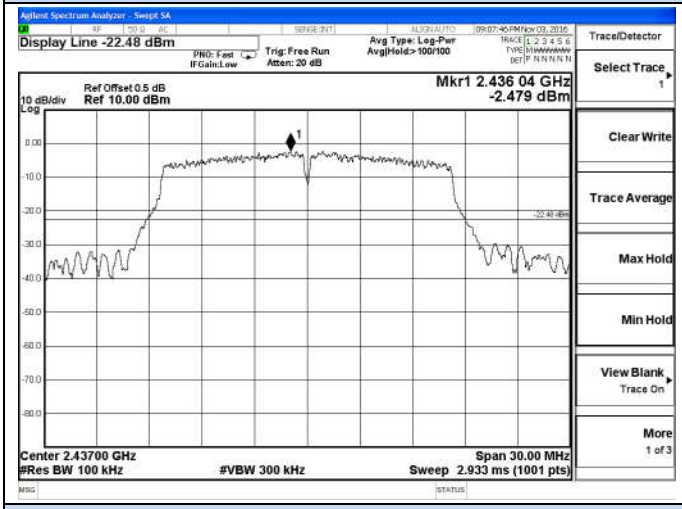
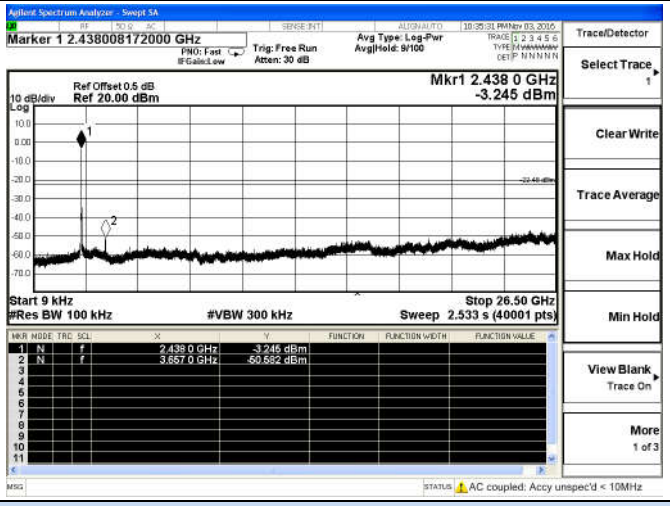
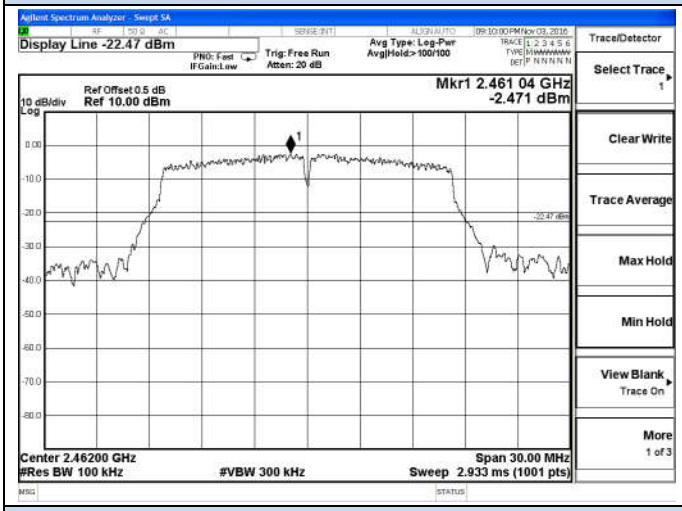
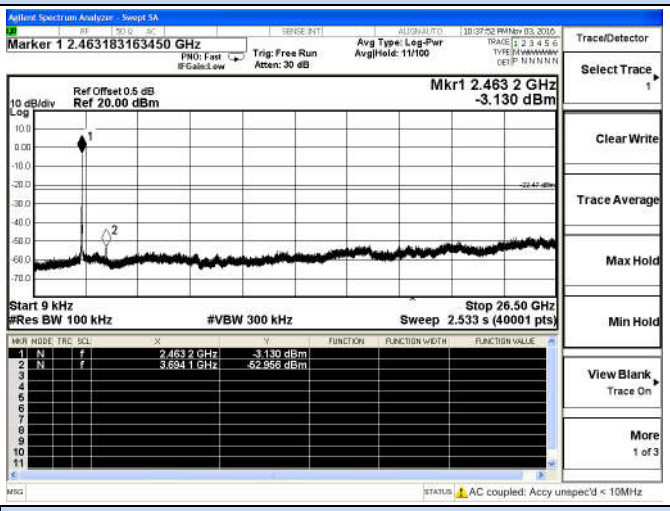
This test setup layout is the same as that shown in section 5.4.4.

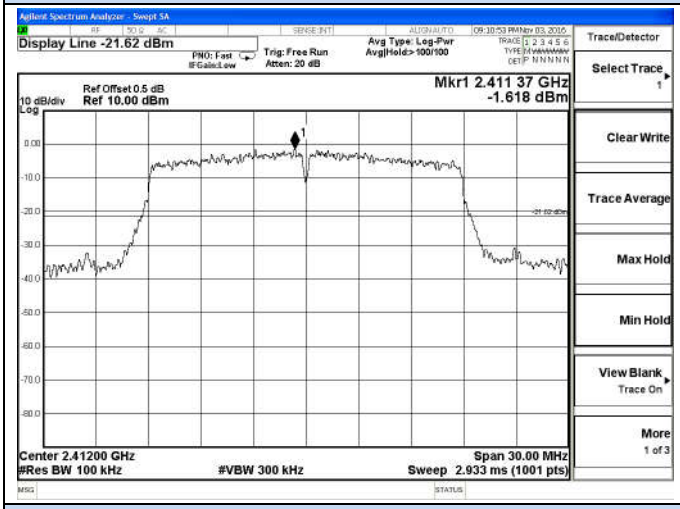
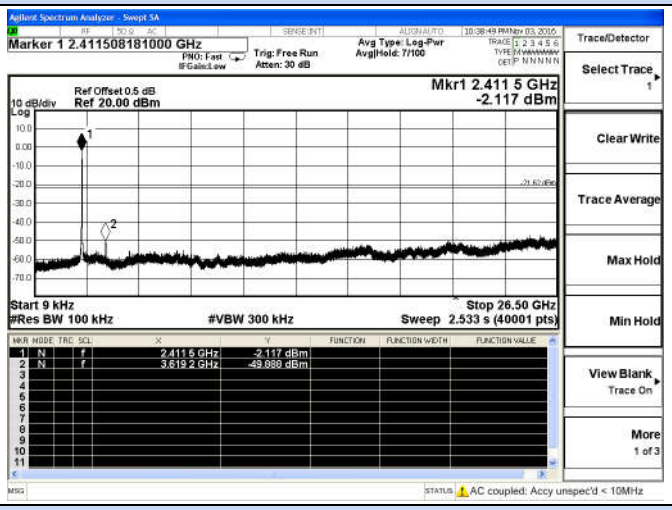
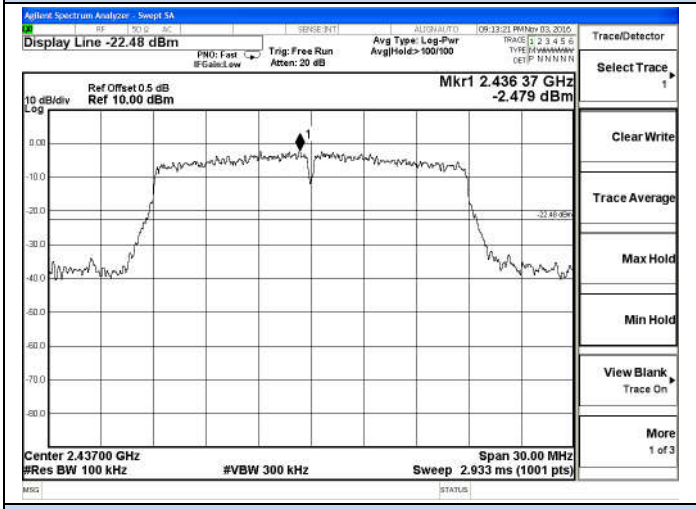
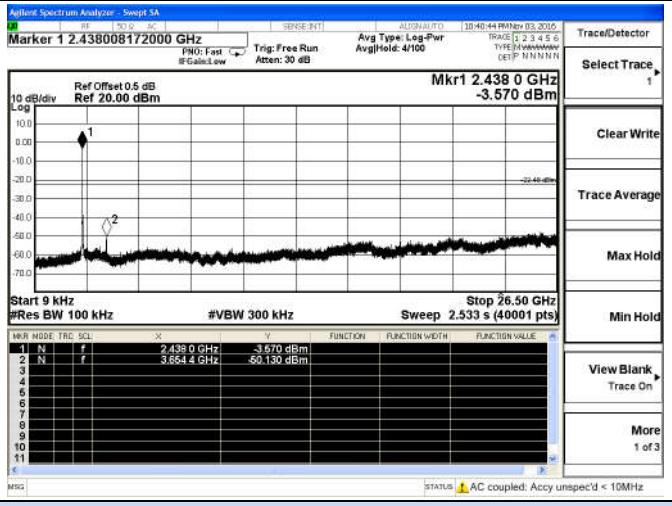
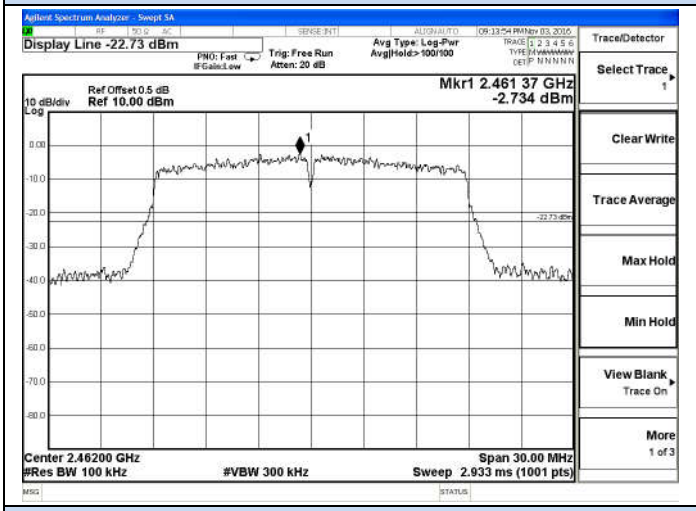
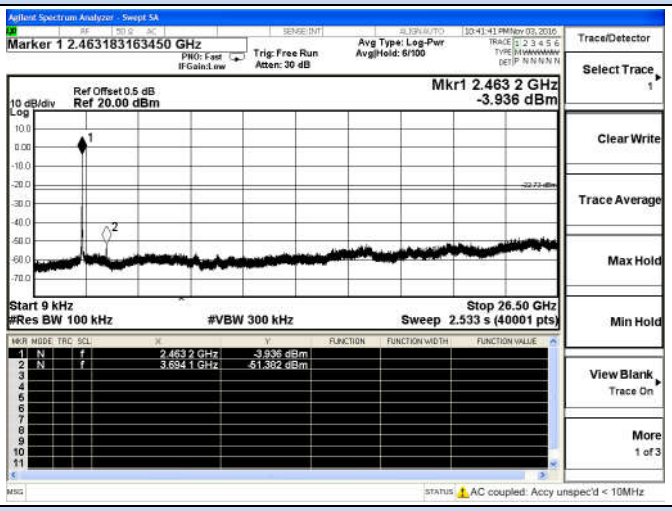
### 5.6.5. EUT Operation during Test

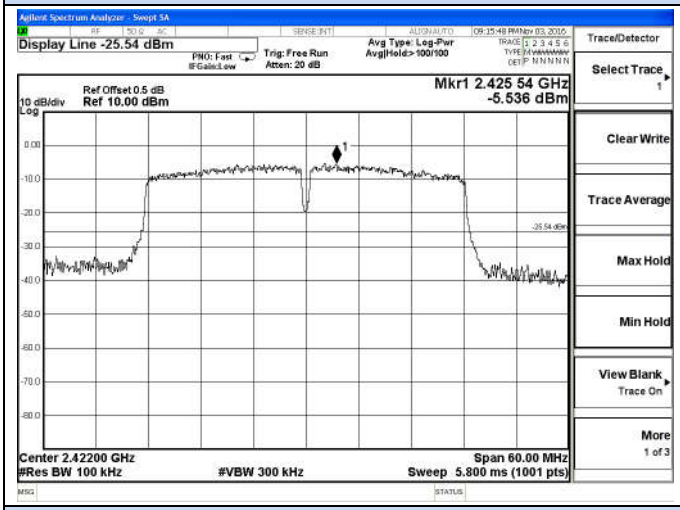
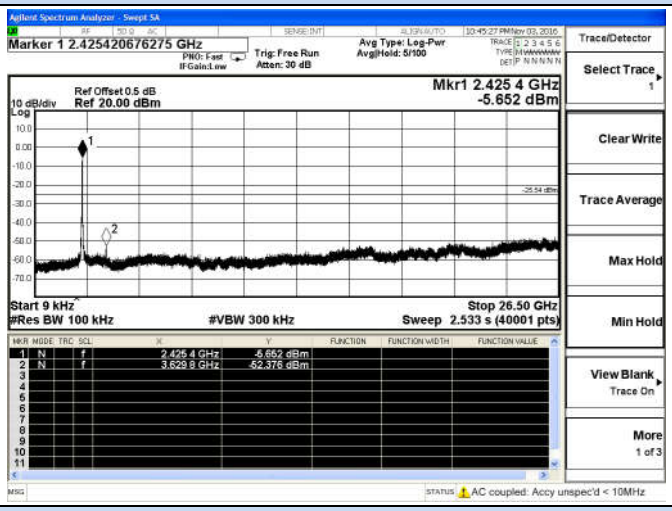
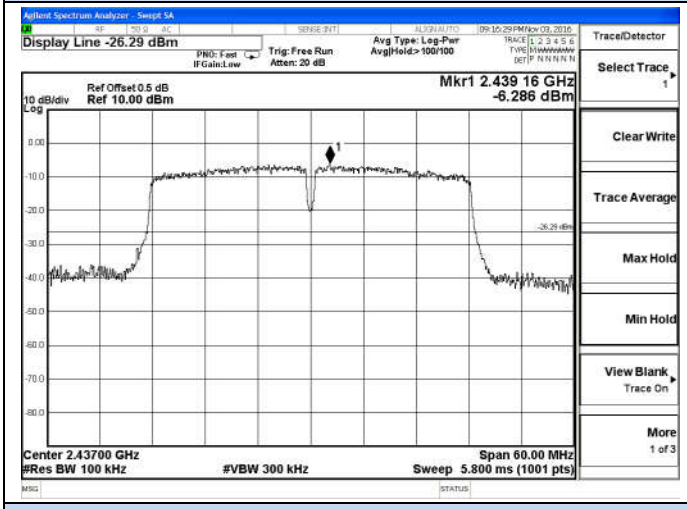
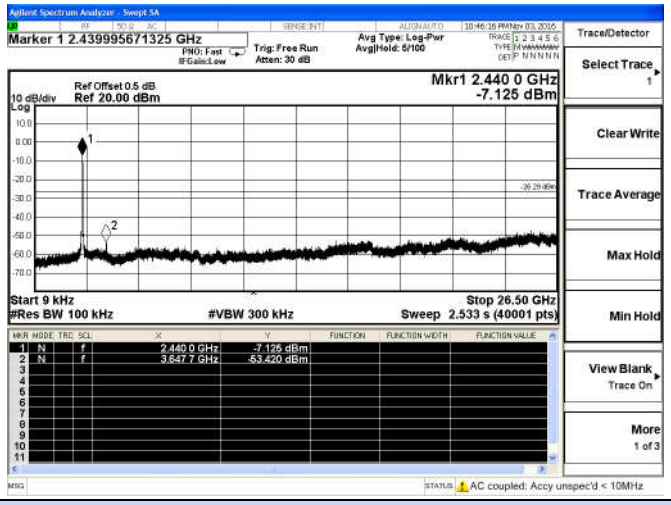
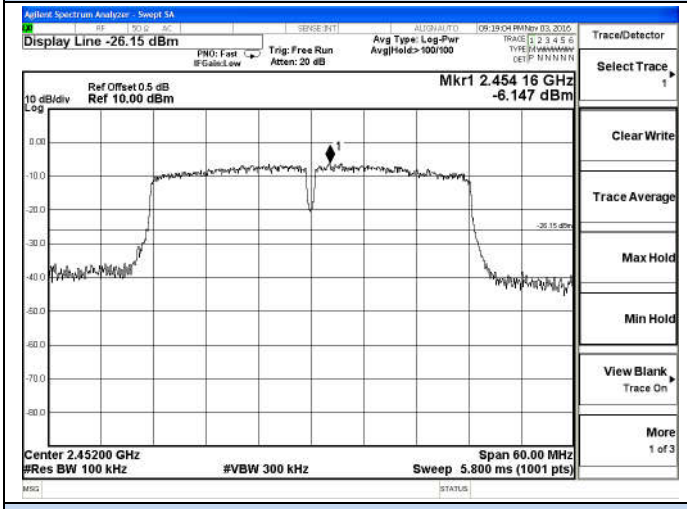
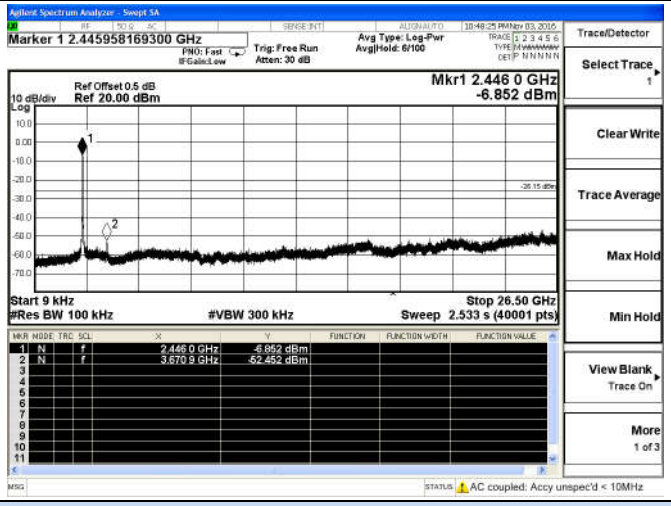
The EUT was programmed to be in continuously transmitting mode.

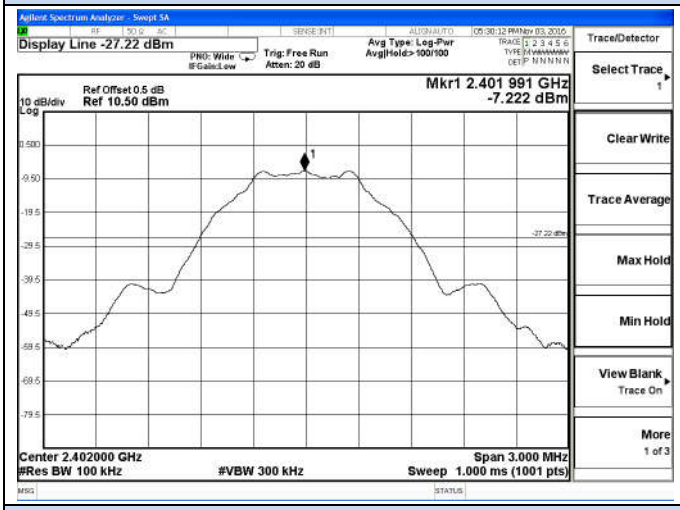
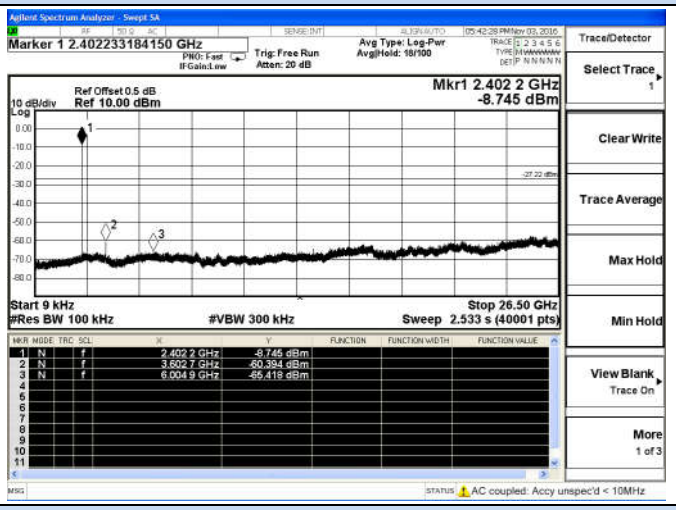
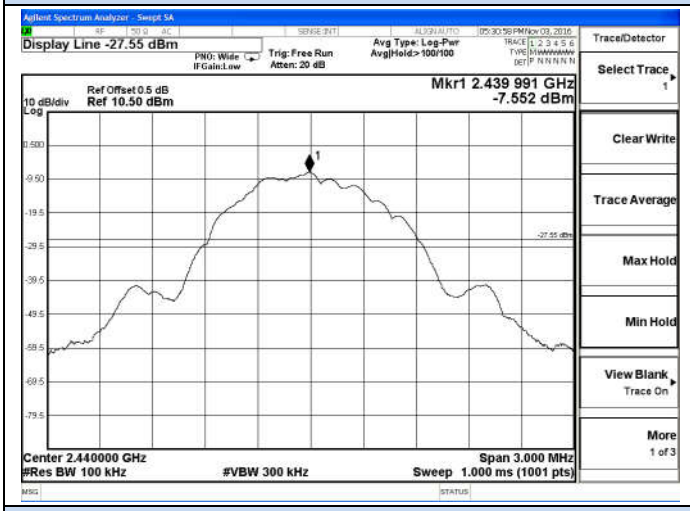
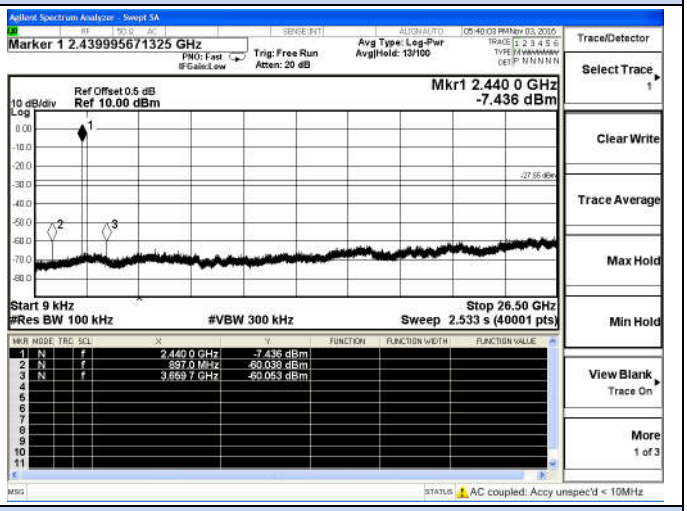
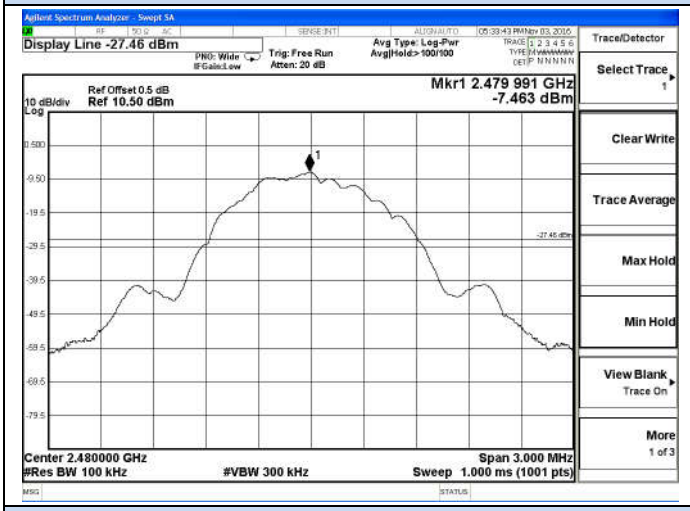
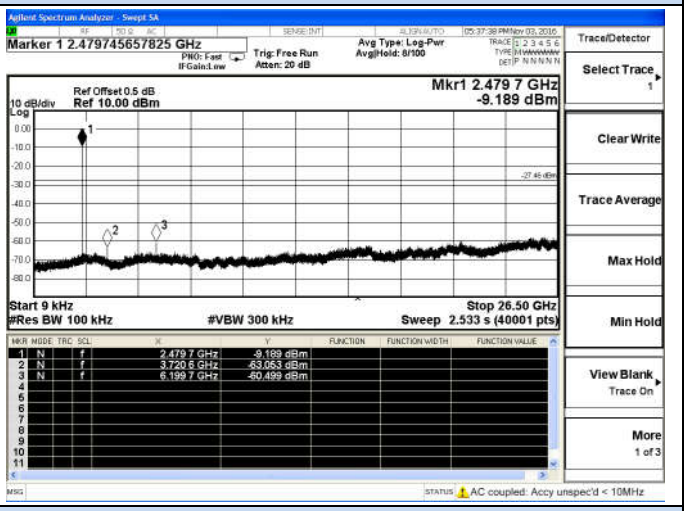
### 5.6.6. Test Results of Conducted Spurious Emissions

| Test plot of Conducted Spurious Emission | |
|---|---|
| IEEE 802.11b | |
|  |  |
| Reference | Low channel |
|  |  |
| Reference | Middle channel |
|  |  |
| Reference | High channel |

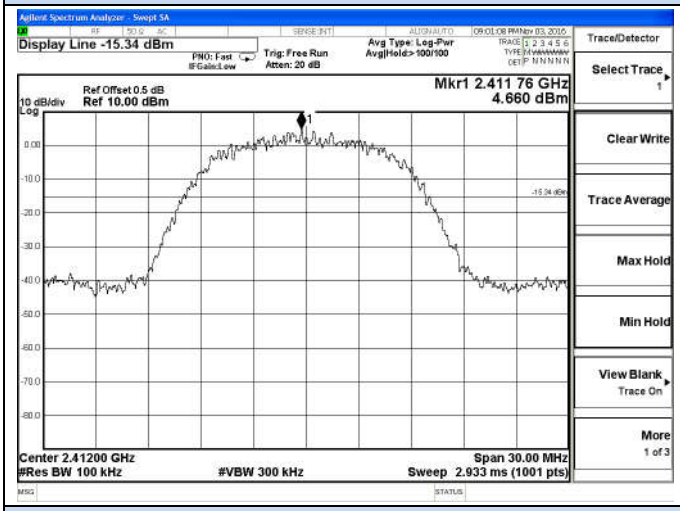
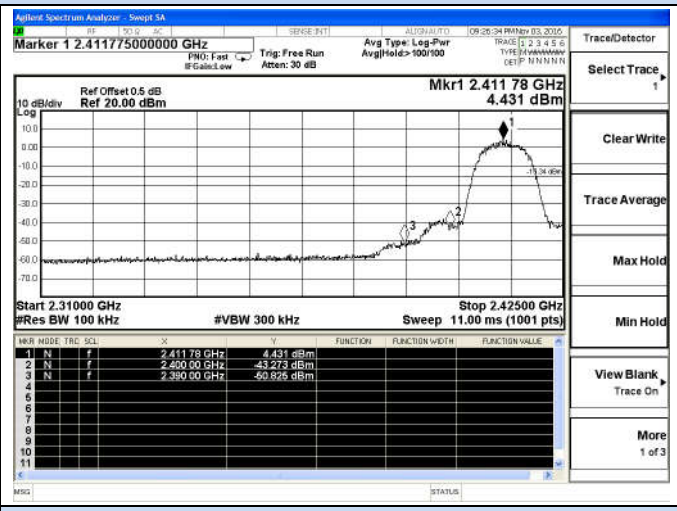
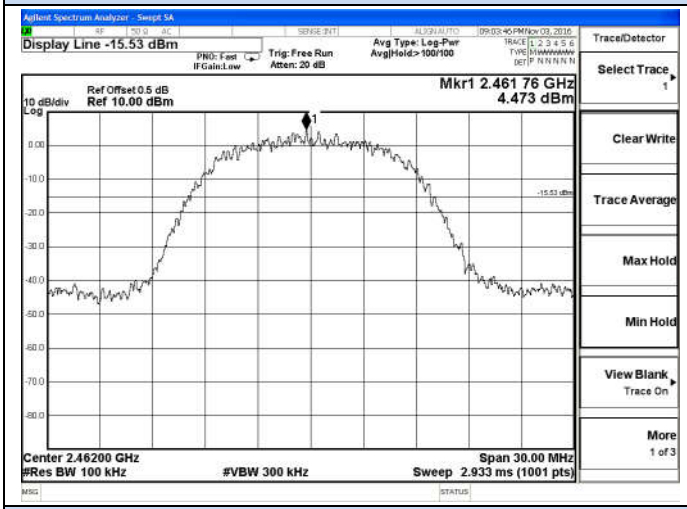
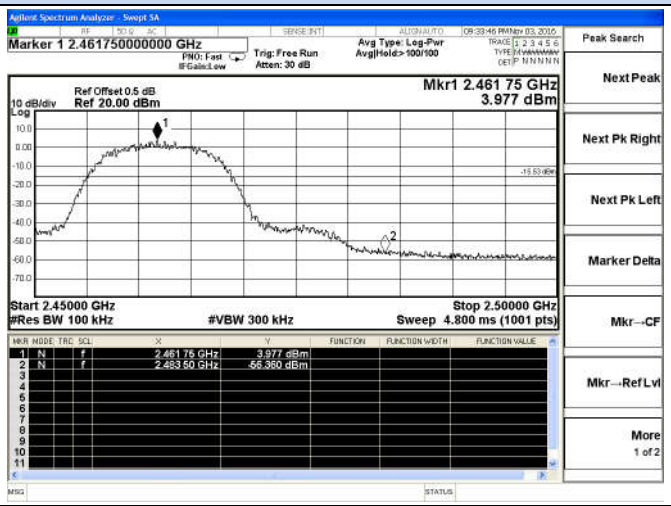
| IEEE 802.11g | |
|---|---|
|  |  |
| Reference | Low channel |
|  |  |
| Reference | Middle channel |
|  |  |
| Reference | High channel |

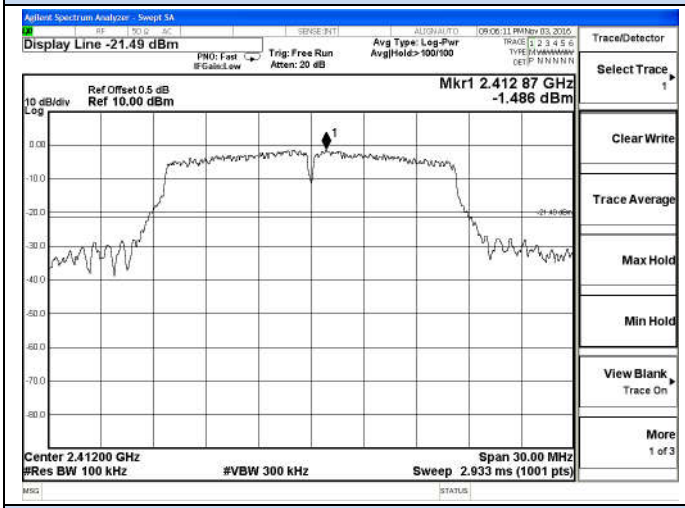
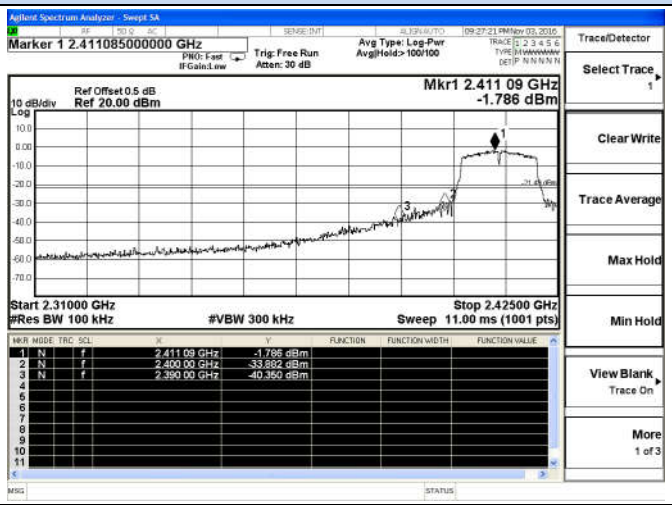
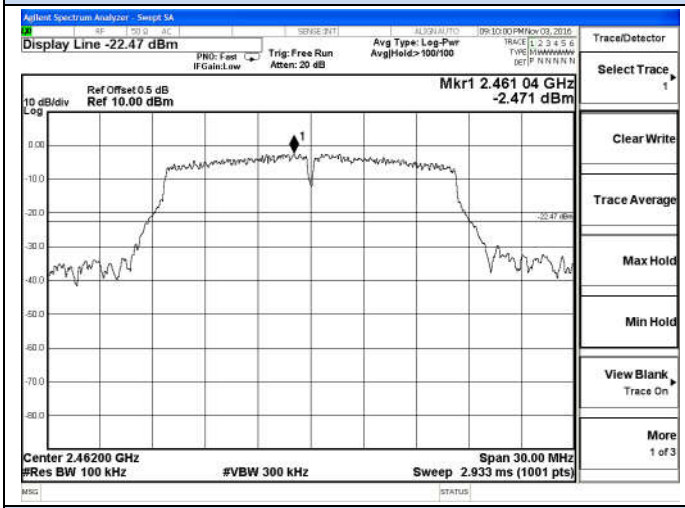
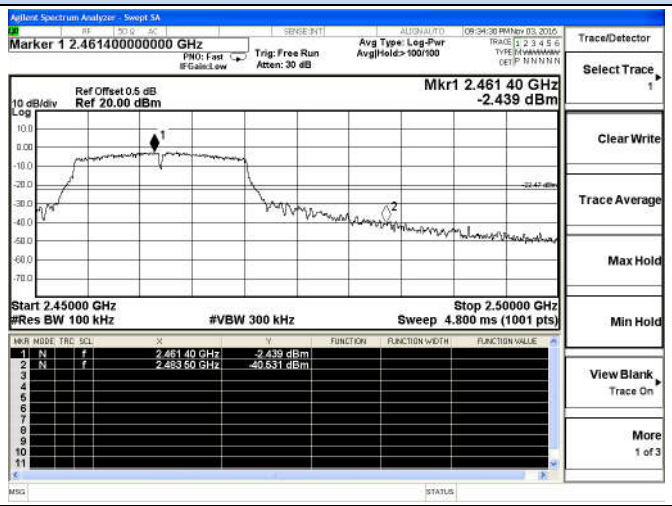
| IEEE 802.11n-HT20 | |
|---|---|
|  |  |
| Reference | Low channel |
|  |  |
| Reference | Middle channel |
|  |  |
| Reference | High channel |

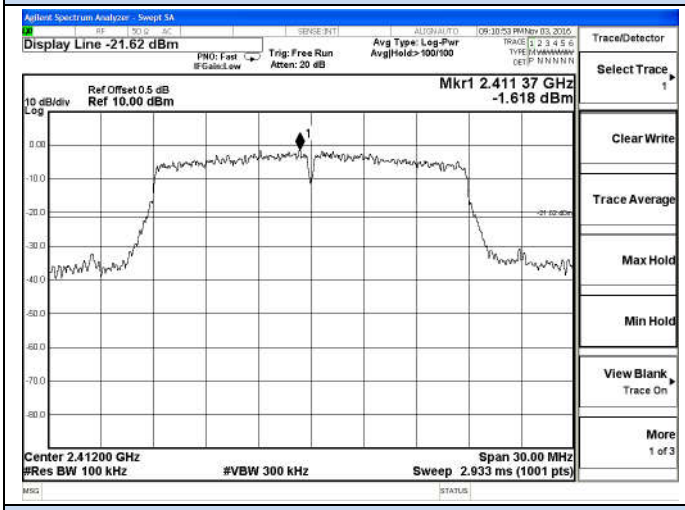
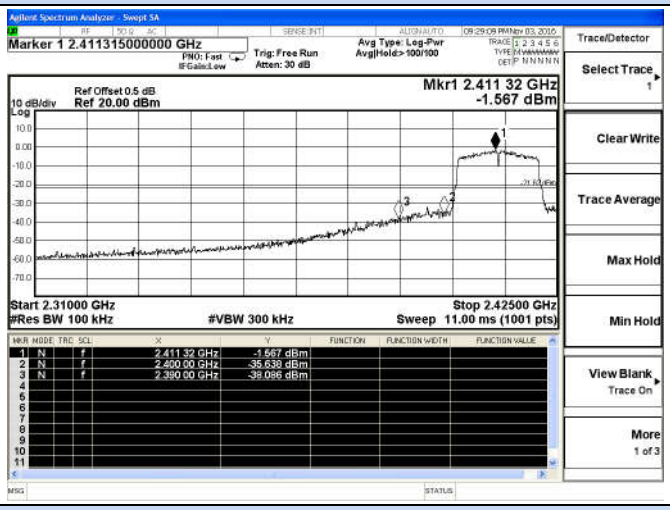
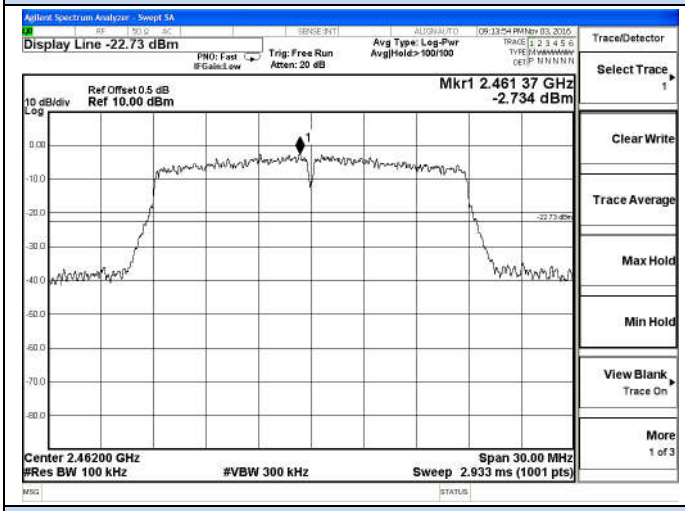
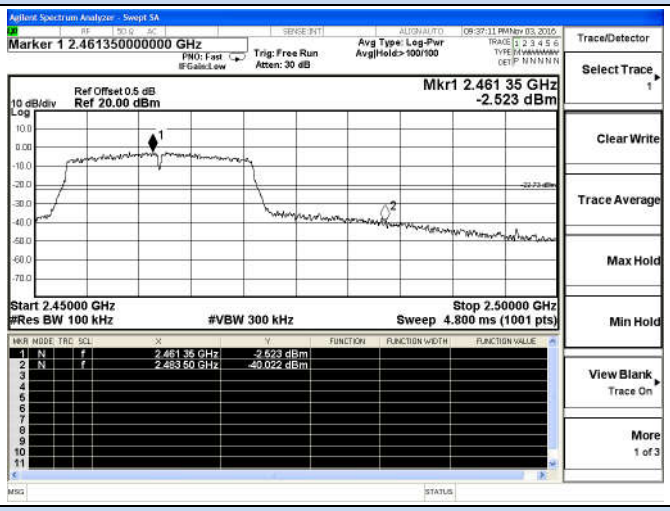
| IEEE 802.11n-HT40 | |
|---|---|
|  |  |
| Reference | Low channel |
|  |  |
| Reference | Middle channel |
|  |  |
| Reference | High channel |

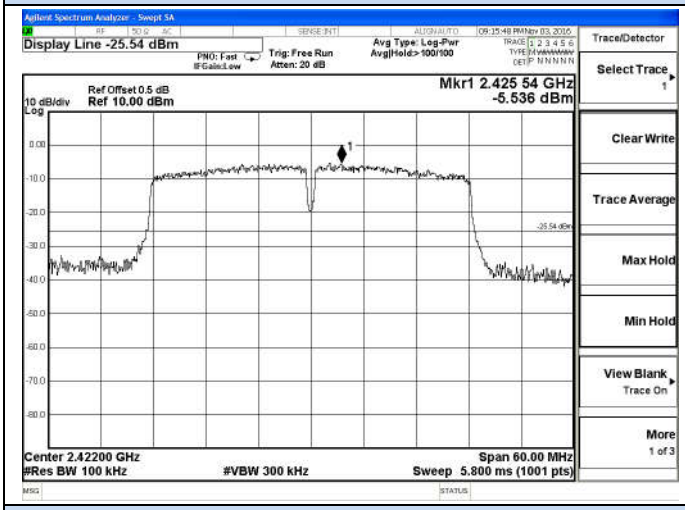
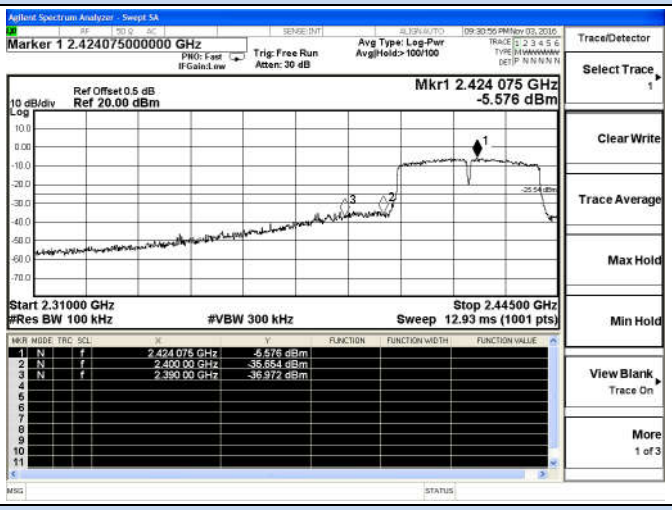
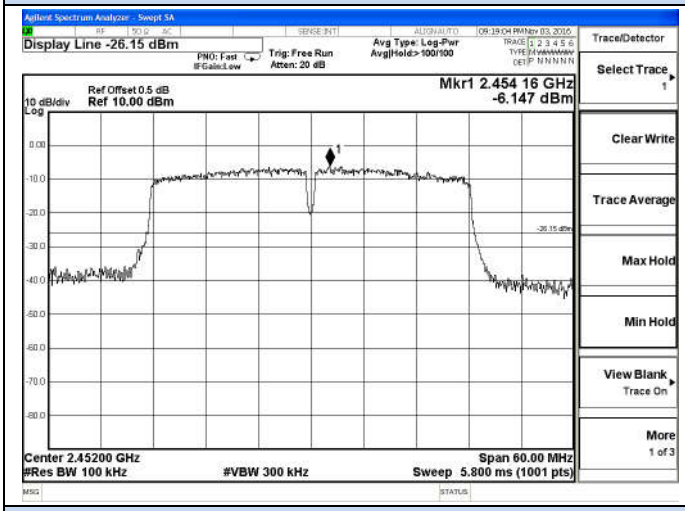
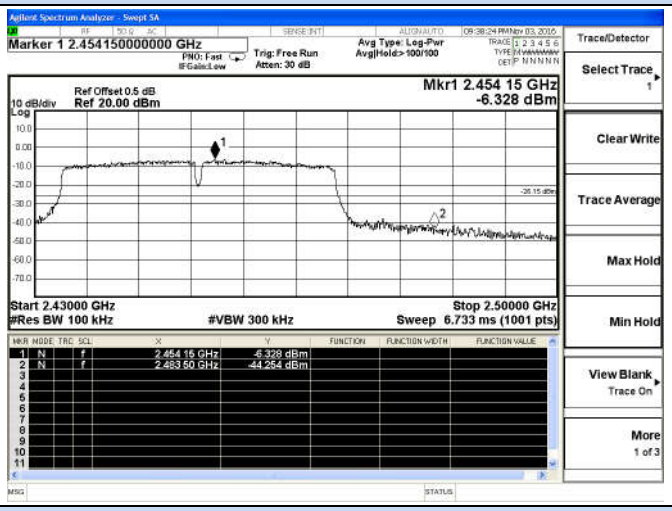
| Test plot of Conducted Spurious Emission | |
|---|---|
| BT LE | |
|  |  |
| Reference | Low channel |
|  |  |
| Reference | Middle channel |
|  |  |
| Reference | High channel |

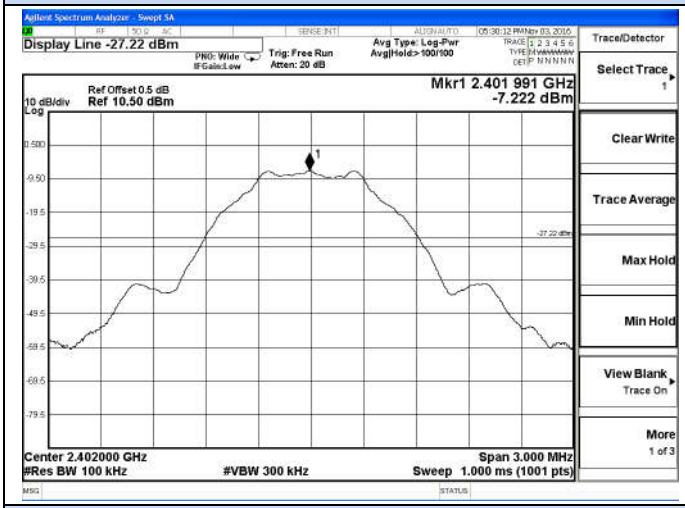
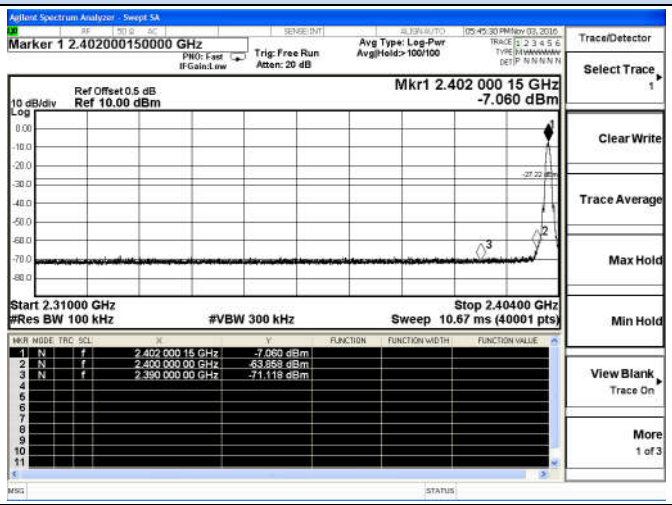
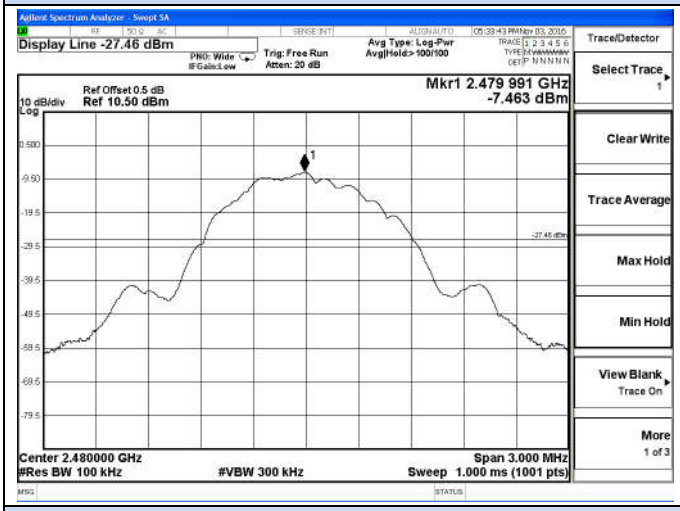
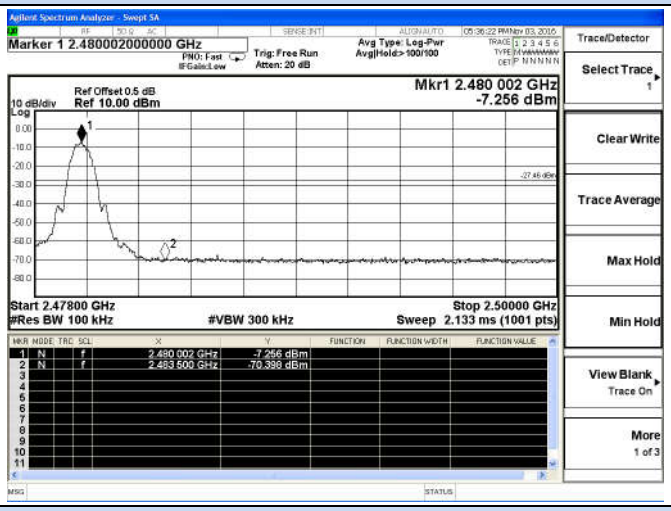
5.6.7. Test Results of Band Edges Test

| Test plot of Band Edges Test | |
|---|---|
| IEEE 802.11b | |
|  |  |
| Reference | Low channel |
|  |  |
| Reference | High channel |

| Test plot of Band Edges Test | |
|---|---|
| IEEE 802.11g | |
|  |  |
| Reference | Low channel |
|  |  |
| Reference | High channel |

| Test plot of Band Edges Test | |
|---|---|
| IEEE 802.11n-HT20 | |
|  |  |
| Reference | Low channel |
|  |  |
| Reference | High channel |

| Test plot of Band Edges Test | |
|---|---|
| IEEE 802.11n-HT40 | |
|  |  |
| Reference | Low channel |
|  |  |
| Reference | High channel |

| Test plot of Band Edges Test | |
|---|---|
| BT LE | |
|  |  |
| Reference | Low channel |
|  |  |
| Reference | High channel |

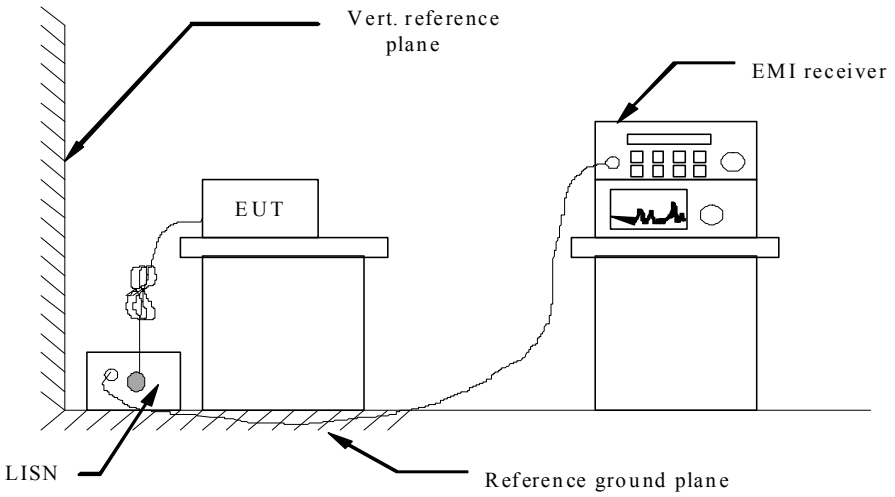
## 5.7. Power line conducted emissions

### 5.7.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

| Frequency Range (MHz) | Limits (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56 | 56 to 46 |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

### 5.7.2 Block Diagram of Test Setup



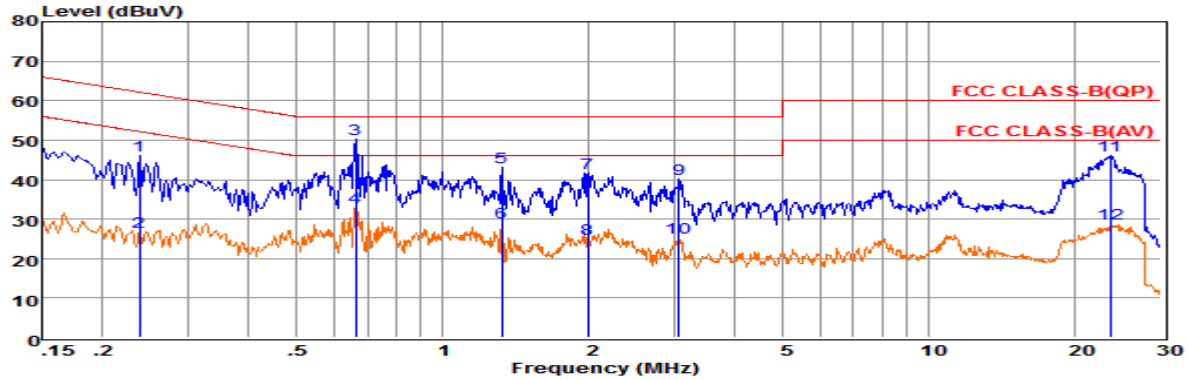

### 5.7.3 Test Results

**PASS.**

The test data please refer to following page.

Test result for 802.11b(AC 120V)

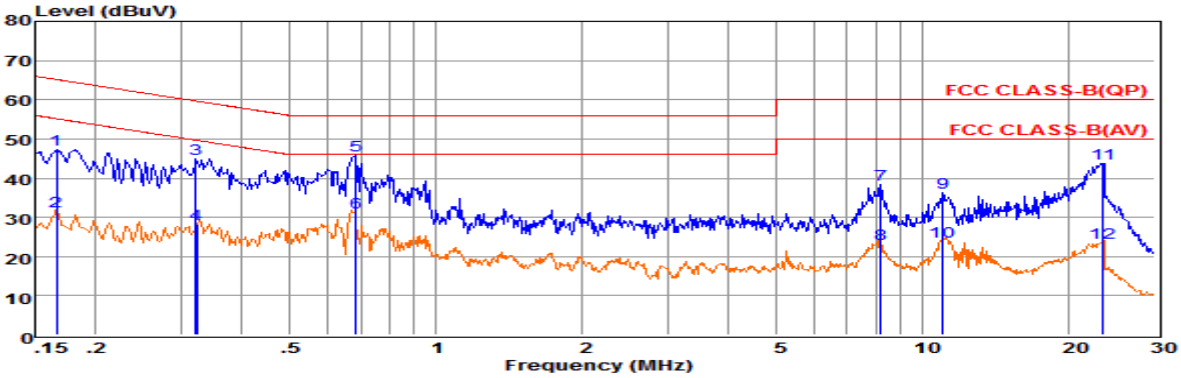
Live Line:




| | Freq | Reading | LISNFac | CabLos | Aux2Fac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dB | dB | dBuV | dBuV | dB |
| 1 | 0.24 | 26.57 | 9.63 | 0.03 | 10.00 | 46.23 | 62.17 | -15.94 | QP |
| 2 | 0.24 | 7.19 | 9.63 | 0.03 | 10.00 | 26.85 | 52.17 | -25.32 | Average |
| 3 | 0.66 | 30.48 | 9.64 | 0.04 | 10.00 | 50.16 | 56.00 | -5.84 | QP |
| 4 | 0.66 | 13.42 | 9.64 | 0.04 | 10.00 | 33.10 | 46.00 | -12.90 | Average |
| 5 | 1.32 | 23.36 | 9.63 | 0.05 | 10.00 | 43.04 | 56.00 | -12.96 | QP |
| 6 | 1.32 | 9.49 | 9.63 | 0.05 | 10.00 | 29.17 | 46.00 | -16.83 | Average |
| 7 | 1.99 | 21.93 | 9.64 | 0.05 | 10.00 | 41.62 | 56.00 | -14.38 | QP |
| 8 | 1.99 | 5.38 | 9.64 | 0.05 | 10.00 | 25.07 | 46.00 | -20.93 | Average |
| 9 | 3.06 | 20.41 | 9.64 | 0.06 | 10.00 | 40.11 | 56.00 | -15.89 | QP |
| 10 | 3.06 | 5.51 | 9.64 | 0.06 | 10.00 | 25.21 | 46.00 | -20.79 | Average |
| 11 | 23.64 | 26.25 | 9.71 | 0.13 | 10.00 | 46.09 | 60.00 | -13.91 | QP |
| 12 | 23.64 | 9.02 | 9.71 | 0.13 | 10.00 | 28.86 | 50.00 | -21.14 | Average |

Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

Neutral Line:




| | Freq | Reading | LISNFac | CabLos | Aux2Fac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dB | dB | dBuV | dBuV | dB |
| 1 | 0.17 | 27.68 | 9.66 | 0.02 | 10.00 | 47.36 | 65.16 | -17.80 | QP |
| 2 | 0.17 | 11.78 | 9.66 | 0.02 | 10.00 | 31.46 | 55.16 | -23.70 | Average |
| 3 | 0.32 | 25.19 | 9.61 | 0.03 | 10.00 | 44.83 | 59.66 | -14.83 | QP |
| 4 | 0.32 | 8.51 | 9.61 | 0.03 | 10.00 | 28.15 | 49.66 | -21.51 | Average |
| 5 | 0.69 | 26.08 | 9.63 | 0.04 | 10.00 | 45.75 | 56.00 | -10.25 | QP |
| 6 | 0.69 | 11.45 | 9.63 | 0.04 | 10.00 | 31.12 | 46.00 | -14.88 | Average |
| 7 | 8.19 | 18.49 | 9.70 | 0.07 | 10.00 | 38.26 | 60.00 | -21.74 | QP |
| 8 | 8.19 | 3.30 | 9.70 | 0.07 | 10.00 | 23.07 | 50.00 | -26.93 | Average |
| 9 | 11.02 | 16.39 | 9.73 | 0.09 | 10.00 | 36.21 | 60.00 | -23.79 | QP |
| 10 | 11.02 | 3.85 | 9.73 | 0.09 | 10.00 | 23.67 | 50.00 | -26.33 | Average |
| 11 | 23.51 | 23.84 | 9.82 | 0.13 | 10.00 | 43.79 | 60.00 | -16.21 | QP |
| 12 | 23.51 | 3.43 | 9.82 | 0.13 | 10.00 | 23.38 | 50.00 | -26.62 | Average |

Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

***Note: Pre-scan all mode and recorded the worst case results in this report (802.11b @120VAC).

## 5.8. Antenna Requirements

### 5.8.1 Standard Applicable

According to antenna requirement of §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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

### 5.8.2 Antenna Connected Construction

#### 5.8.2.1. Standard Applicable

According to § 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.

#### 5.8.2.2. Antenna Connector Construction

The **directional gains** of antenna used for transmitting is **0dBi, and the antenna is PIFA antenna and no consideration of replacement**. Please see EUT photo for details.

#### 5.8.2.3. Results: Compliance.

# 6. LIST OF MEASURING EQUIPMENTS

| Instrument | Manufacture | Model No. | Serial No. | Characteristics | Cal Date | Due Date |
|---|---|---|---|---|---|---|
| EMC Receiver | R&S | ESCS 30 | 100174 | 9kHz – 2.75GHz | Jun 18, 2016 | Jun 17, 2017 |
| Signal analyzer | Agilent | E4448A(External mixers to 40GHz) | US44300469 | 9kHz~40GHz | Jul 16, 2016 | Jul 15, 2017 |
| LISN | MESS Tec | NNB-2/16Z | 99079 | 9KHz-30MHz | Jun 18, 2016 | Jun 17, 2017 |
| LISN | EMCO | 3819/2NM | 9703-1839 | 9KHz-30MHz | Jun 18, 2016 | Jun 17, 2017 |
| RF Cable-CON | UTIFLEX | 3102-26886-4 | CB049 | 9KHz-30MHz | Jun 18, 2016 | Jun 17, 2017 |
| ISN | SCHAFFNE | ISN ST08 | 21653 | 9KHz-30MHz | Jun 18, 2016 | Jun 17, 2017 |
| 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH03-HY | 30M-18GHz | Jun 18, 2016 | Jun 17, 2017 |
| Amplifier | SCHAFFNE | COA9231A | 18667 | 9kHz-2GHzz | Apr 18, 2016 | Apr 17, 2017 |
| Amplifier | Agilent | 8449B | 3008A021 | 1GHz-26.5GHz | Apr 18, 2016 | Apr 17, 2017 |
| Amplifier | MITEQ | AMF-6F-260400 | 9121372 | 26.5GHz-40GHz | Apr 18, 2016 | Apr 17, 2017 |
| Loop Antenna | R&S | HFH2-Z2 | 860004/00 | 9k-30MHz | Apr 18, 2016 | Apr 17, 2017 |
| By-log Antenna | SCHWARZB | VULB9163 | 9163-470 | 30MHz-1GHz | Apr 18, 2016 | Apr 17, 2017 |
| Horn Antenna | EMCO | 3115 | 6741 | 1GHz-18GHz | Apr 18, 2016 | Apr 17, 2017 |
| Horn Antenna | SCHWARZB | BBHA9170 | BBHA9170 | 15GHz-40GHz | Apr 18, 2016 | Apr 17, 2017 |
| RF Cable-R03m | Jye Bao | RG142 | CB021 | 30MHz-1GHz | Jun 18, 2016 | Jun 17, 2017 |
| RF Cable-HIGH | SUHNER | SUCOFLEX 106 | 03CH03-H | 1GHz-40GHz | Jun 18, 2016 | Jun 17, 2017 |
| Power Meter | R&S | NRVS | 100444 | DC-40GHz | Jun 18, 2016 | Jun 17, 2017 |
| Power Sensor | R&S | NRV-Z51 | 100458 | DC-30GHz | Jun 18, 2016 | Jun 17, 2017 |
| Power Sensor | R&S | NRV-Z32 | 10057 | 30MHz-6GHz | Jun 18, 2016 | Jun 17, 2017 |
| AC Power Source | HPC | HPA-500E | HPA-9100 | AC 0~300V | Jun 18, 2016 | Jun 17, 2017 |
| DC power Soure | GW | GPC-6030D | C671845 | DC 1V-60V | Jun 18, 2016 | Jun 17, 2017 |
| Temp. and Humidigy Chamber | Giant Force | GTH-225-20-S | MAB0103-00 | N/A | Jun 18, 2016 | Jun 17, 2017 |
| RF CABLE-1m | JYE Bao | RG142 | CB034-1m | 20MHz-7GHz | Jun 18, 2016 | Jun 17, 2017 |
| RF CABLE-2m | JYE Bao | RG142 | CB035-2m | 20MHz-1GHz | Jun 18, 2016 | Jun 17, 2017 |
| Signal Generator | R&S | SMR40 | 10016 | 10MHz~40GHz | Jul 16, 2016 | Jul 15, 2017 |
| Universal Radio Communication Tester | R&S | CMU200 | 112012 | N/A | Oct 27, 2016 | Oct 26, 2017 |
| Wideband Radia Communication Tester | R&S | CMW500 | 1201.0002K50 | N/A | Nov 19, 2015 | Nov 18, 2016 |
| MXG Vector Signal Generator | Agilent | N5182A | MY47071151 | 250KHz~6GHz | Oct 27, 2016 | Oct 26, 2017 |
| MXG Vector Signal Generator | Agilent | E4438C | MY42081396 | 250KHz~6GHz | Oct 27, 2016 | Oct 26, 2017 |
| PSG Analog Signal Generator | Agilent | N8257D | MY46520521 | 250KHz~20GHz | Nov 19, 2015 | Nov 18, 2016 |
| MXA Signal Analyzer | Agilent | N9020A | MY50510140 | 10Hz~26.5GHz | Oct 27, 2016 | Oct 26, 2017 |
| DC Power Supply | Agilent | E3642A | / | 0-8V,5A/0-20V,2.5A | May 20, 2016 | May 19, 2017 |
| RF Control Unit | Tonscend | JS0806-1 | / | / | Nov 19, 2015 | Nov 18, 2016 |
| LTE Test Software | Tonscend | JS1120-1 | / | Version: 2.5.7.0 | N/A | N/A |

| | | | | | | |
|---|---|---|---|---|---|---|
| X-series USB Peak and Average Power Sensor Agilent | Agilent | U2021XA | MY54080022 | / | Oct 27, 2016 | Oct 26, 2017 |
| 4 Ch.Simultaneous Sampling 14 Bits 2 MS/s | Agilent | U2531A | MY54080016 | / | Oct 27, 2016 | Oct 26, 2017 |
| Test Software | Ascentest | AT890-SW | 20141230 | Version: | N/A | N/A |
| Splitter/Combiner(Qty: 2) | Mini-Circuits | ZAPD-50W 4.2-6.0 GHz | NN256400424 | / | Oct 27, 2016 | Oct 26, 2017 |
| Splitter/Combine(Qty: 2) | MCLI | PS3-7 | 4463/4464 | / | Oct 27, 2016 | Oct 26, 2017 |
| ATT (Qty: 1) | Mini-Circuits | VAT-30+ | 30912 | / | Oct 27, 2016 | Oct 26, 2017 |

# 7. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

# 8. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

# 9. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

**----------THE END OF REPORT----------**