

# TEST REPORT

Reference No. .... : WTD18S12133784W  
FCC ID..... : DC9-IVPCDS  
Applicant..... : OPTEX CO., LTD.  
Address ..... : 5-8-12, Ogoto Otsu-Shi, Shifa-Ken Japan 520-0101  
Manufacturer ..... : OPTEX CO., LTD.  
Address ..... : 5-8-12, Ogoto Otsu-Shi, Shifa-Ken Japan 520-0101  
Product Name ..... : Door Station  
Model No. .... : IVPC-DS  
Standards..... : FCC CFR47 Part 15 C Section 15.247:2018  
Date of Receipt sample..... : 2018-12-26  
Date of Test..... : 2018-12-26 to 2019-01-04  
Date of Issue ..... : 2019-01-04  
Test Result ..... : Pass

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company.

The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

**Prepared By:**

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## 2 Laboratories Introduction

**Waltek Services (Shenzhen) Co., Ltd** is a professional third-party testing and certification laboratory with multi-year product testing and certification experience, established strictly in accordance with ISO/IEC 17025 requirements, and accredited by ILAC (International Laboratory Accreditation Cooperation) member. A2LA (American Association for Laboratory Accreditation, the certification number is 4243.01) of USA, CNAS (China National Accreditation Service for Conformity Assessment, the registration number is L3110) of China. Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC (The Federal Communications Commission), CEC (California energy efficiency), ISED (Innovation, Science and Economic Development Canada). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as Intertek (ETL-SEMKO), TÜV Rheinland, TÜV SÜD, etc.



Waltek Services (Shenzhen) Co., Ltd is one of the largest and the most comprehensive third party testing laboratory in China. Our test capability covered four large fields: safety test. ElectroMagnetic Compatibility (EMC), and energy performance, wireless radio. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.

## 2.1 Test Facility

### A. Accreditations for Conformity Assessment (International)

| Country/Region                                                      | Scope Covered By | Scope              | Note |
|---------------------------------------------------------------------|------------------|--------------------|------|
| USA                                                                 | ISO/IEC 17025    | FCC ID \ DOC \ VOC | 1    |
| Canada                                                              |                  | IC ID \ VOC        | 2    |
| Japan                                                               |                  | MIC-T \ MIC-R      | -    |
| Europe                                                              |                  | EMCD \ RED         | -    |
| Taiwan                                                              |                  | NCC                | -    |
| Hong Kong                                                           |                  | OFCA               | -    |
| Australia                                                           |                  | RCM                | -    |
| India                                                               |                  | WPC                | -    |
| Thailand                                                            |                  | NTC                | -    |
| Singapore                                                           |                  | IDA                | -    |
| Note:                                                               |                  |                    |      |
| 1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476. |                  |                    |      |
| 2. ISED Canada Registration No.: 7760A                              |                  |                    |      |

### B.TCBs and Notify Bodies Recognized Testing Laboratory.

| Recognized Testing Laboratory of ...      | Notify body number |
|-------------------------------------------|--------------------|
| TUV Rheinland                             | Optional.          |
| Intertek                                  |                    |
| TUV SUD                                   |                    |
| SGS                                       |                    |
| Phoenix Testlab GmbH                      | 0700               |
| Element Materials Technology Warwick Ltd. | 0891               |
| Timco Engineering, Inc.                   | 1177               |
| Eurofins Product Service GmbH             | 0681               |

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#### 4 Revision History

| Test report No. | Date of Receipt sample | Date of Test             | Date of Issue | Purpose  | Comment | Approved |
|-----------------|------------------------|--------------------------|---------------|----------|---------|----------|
| WTD18S12133784W | 2018-12-26             | 2018-12-26 to 2019-01-04 | 2019-01-04    | original | -       | Valid    |

## 5 General Information

### 5.1 General Description of E.U.T

|                       |                                                                                                                                                       |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name:         | Door Station                                                                                                                                          |
| Model No.:            | IVPC-DS                                                                                                                                               |
| Model Difference:     | N/A                                                                                                                                                   |
| Operation Frequency:  | 802.11b/g/n HT20: 2412MHz ~ 2462MHz                                                                                                                   |
| RF output power       | 10.70dBm                                                                                                                                              |
| Type of modulation:   | IEEE 802.11b (CCK/QPSK/BPSK,11Mbps max.)<br>IEEE 802.11g (BPSK/QPSK/16QAM/64QAM,54Mbps max.)<br>IEEE 802.11n (BPSK/QPSK/16QAM/64QAM,HT20:72Mbps max.) |
| Antenna installation: | External antenna with RP-SMA connector                                                                                                                |

### 5.2 Details of E.U.T

|          |                                                          |
|----------|----------------------------------------------------------|
| Ratings: | Input: 10 to 24V 0.6A<br>Battery: DC 3.7V 5000mAh 18.5Wh |
|----------|----------------------------------------------------------|

### 5.3 Channel List

WIFI

| Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) |
|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|
| 1           | 2412            | 2           | 2417            | 3           | 2422            | 4           | 2427            |
| 5           | 2432            | 6           | 2437            | 7           | 2442            | 8           | 2447            |
| 9           | 2452            | 10          | 2457            | 11          | 2462            | 12          | -               |

## 5.4 Test Mode

Table 1 Tests Carried Out Under FCC part 15.247

| Test Items                     | Mode         | Data Rate | Channel | TX/RX |
|--------------------------------|--------------|-----------|---------|-------|
| Maximum Peak Output Power      | 802.11b      | 11 Mbps   | 1/6/11  | TX    |
|                                | 802.11g      | 54 Mbps   | 1/6/11  | TX    |
|                                | 802.11n HT20 | 108 Mbps  | 1/6/11  | TX    |
| Power Spectral Density         | 802.11b      | 11 Mbps   | 1/6/11  | TX    |
|                                | 802.11g      | 54 Mbps   | 1/6/11  | TX    |
|                                | 802.11n HT20 | 108 Mbps  | 1/6/11  | TX    |
| Frequency Range                | 802.11b      | 11 Mbps   | 1/11    | TX    |
|                                | 802.11g      | 54 Mbps   | 1/11    | TX    |
|                                | 802.11n HT20 | 108 Mbps  | 1/11    | TX    |
| Transmitter Spurious Emissions | 802.11b      | 11 Mbps   | 1/6/11  | TX    |
|                                | 802.11g      | 54 Mbps   | 1/6/11  | TX    |
|                                | 802.11n HT20 | 108 Mbps  | 1/6/11  | TX    |

**Note** :Parameters set by test software during channel & power tests, the software provided by the customer was used to set the operating channels as well as the output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product.

## 6 Equipment Used during Test

### 6.1 Equipments List

| Conducted Emissions                                   |                                        |                      |              |            |                       |       |
|-------------------------------------------------------|----------------------------------------|----------------------|--------------|------------|-----------------------|-------|
| Item                                                  | Equipment                              | Manufacturer         | Model No.    | Serial No. | Last Calibration Date | Valid |
| 1                                                     | EMI Test Receiver                      | R&S                  | ESCI         | 100947     | 2018-09-15            | 1Year |
| 2                                                     | LISN                                   | R&S                  | ENV216       | 100115     | 2018-09-15            | 1Year |
| 3                                                     | Cable                                  | Top                  | TYPE16(3.5M) | -          | 2018-09-15            | 1Year |
| 3m Semi-anechoic Chamber for Radiation Emissions      |                                        |                      |              |            |                       |       |
| Item                                                  | Equipment                              | Manufacturer         | Model No.    | Serial No. | Last Calibration Date | Valid |
| 1                                                     | Spectrum Analyzer                      | R&S                  | FSP          | 100091     | 2018-04-20            | 1Year |
| 2                                                     | Amplifier                              | Agilent              | 8447D        | 2944A10178 | 2018-01-10            | 1Year |
| 3                                                     | Trilog Broadband Antenna               | SCHWARZBECK          | VULB9163     | 336        | 2018-05-18            | 1Year |
| 4                                                     | Coaxial Cable (below 1GHz)             | Top                  | TYPE16(13M)  | -          | 2018-10-15            | 1Year |
| 5                                                     | Broad-band Horn Antenna                | SCHWARZBECK          | BBHA 9120 D  | 667        | 2018-05-18            | 1Year |
| 6                                                     | Broad-band Horn Antenna (FCC/IC ID 才放) | SCHWARZBECK          | BBHA 9170    | 335        | 2018-10-24            | 1Year |
| 7                                                     | Broadband Preamplifier                 | COMPLIANCE DIRECTION | PAP-1G18     | 2004       | 2018-04-07            | 1Year |
| 8                                                     | Coaxial Cable (above 1GHz)             | Top                  | 1GHz-18GHz   | EW02014-7  | 2018-04-07            | 1Year |
| 9                                                     | Signal Generater                       | R&S                  | SMP22        | 100102     | 2018-09-15            | 1Year |
| 3m Semi-anechoic Chamber for Radiation Emissions(TDK) |                                        |                      |              |            |                       |       |
| Item                                                  | Equipment                              | Manufacturer         | Model No.    | Serial No. | Last Calibration Date | Valid |
| 1                                                     | Test Receiver                          | R&S                  | ESCI         | 101296     | 2018-04-20            | 1Year |
| 2                                                     | Trilog Broadband Antenna               | SCHWARZBECK          | VULB9160     | 9160-3325  | 2018-04-19            | 1Year |
| 3                                                     | Active Loop Antenna                    | Com-Power Corp.      | AL-130R      | 10160007   | 2018-04-17            | 1Year |
| 4                                                     | Amplifier                              | ANRITSU              | MH648A       | M43381     | 2018-04-20            | 1Year |
| 5                                                     | Cable                                  | HUBER+SUHNER         | CBL2         | 525178     | 2018-04-20            | 1Year |
| RF Conducted Testing                                  |                                        |                      |              |            |                       |       |
| Item                                                  | Equipment                              | Manufacturer         | Model No.    | Serial No. | Last Calibration Date | Valid |
| 1.                                                    | EMC Analyzer                           | Agilent              | E7405A       | MY45114943 | 2018-09-13            | 1Year |

|    |                                 |         |        |            |            |       |
|----|---------------------------------|---------|--------|------------|------------|-------|
|    | (9k~26.5GHz)                    |         |        |            |            |       |
| 2. | Spectrum Analyzer<br>(9k-6GHz)  | R&S     | FSL6   | 100959     | 2018-09-13 | 1Year |
| 3. | Signal Analyzer<br>(9k~26.5GHz) | Agilent | N9010A | MY50520207 | 2018-09-13 | 1Year |

## 6.2 Measurement Uncertainty

| Parameter                         | Uncertainty                           |
|-----------------------------------|---------------------------------------|
| Radio Frequency                   | $\pm 1 \times 10^{-6}$                |
| RF Power                          | $\pm 1.0$ dB                          |
| RF Power Density                  | $\pm 2.2$ dB                          |
| Radiated Spurious Emissions test  | $\pm 5.03$ dB (30M~1000MHz)           |
|                                   | $\pm 5.47$ dB (1000M~25000MHz)        |
| Conducted Spurious Emissions test | $\pm 3.64$ dB (AC mains 150KHz~30MHz) |

## 6.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by GUANG ZHOU GRG METROLOGY & TEST CO., LTD. address is No.163, Pingyun Rd. West of Huangpu Ave, Tianhe District, Guangzhou, Guangdong, China.

## 7 Test Summary

| Test Items                                                                | Test Requirement                 | Result |
|---------------------------------------------------------------------------|----------------------------------|--------|
| Radiated Emissions                                                        | 15.247<br>15.205(a)<br>15.209(a) | C      |
| Conducted Emissions                                                       | 15.207(a)                        | C      |
| Bandwidth                                                                 | 15.247(a)(2)                     | C      |
| Maximum Peak Output Power                                                 | 15.247(b)(3),(4)                 | N/A    |
| Power Spectral Density                                                    | 15.247(e)                        | C      |
| Band Edge                                                                 | 15.247(d)                        | C      |
| Antenna Requirement                                                       | 15.203                           | C      |
| Maximum Permissible Exposure<br>(Exposure of Humans to RF Fields)         | 1.1307(b)(1)                     | C      |
| Note: C=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable. |                                  |        |

## 8 Conducted Emission

|                   |                                                                                                                        |
|-------------------|------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC CFR 47 Part 15 Section 15.207                                                                                      |
| Test Method:      | ANSI C63.10:2013,ANSI C63.4:2014                                                                                       |
| Test Result:      | PASS                                                                                                                   |
| Frequency Range:  | 150kHz to 30MHz                                                                                                        |
| Class/Severity:   | Class B                                                                                                                |
| Limit:            | 66-56 dB $\mu$ V between 0.15MHz & 0.5MHz<br>56 dB $\mu$ V between 0.5MHz & 5MHz<br>60 dB $\mu$ V between 5MHz & 30MHz |
| Detector:         | Peak for pre-scan (9kHz Resolution Bandwidth)                                                                          |

### 8.1 E.U.T. Operation

Operating Environment :

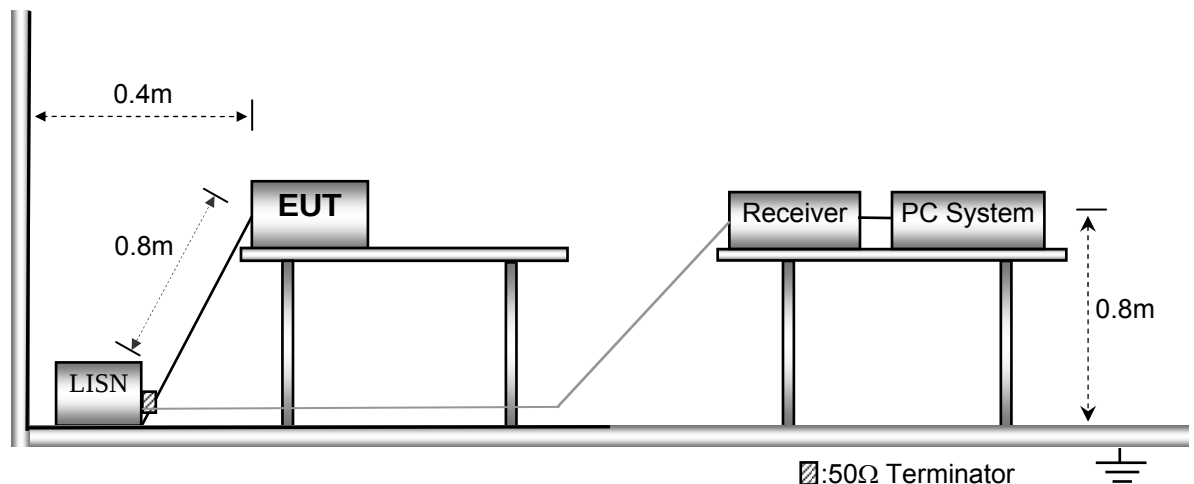
|                       |           |
|-----------------------|-----------|
| Temperature:          | 21.5 °C   |
| Humidity:             | 51.9 % RH |
| Atmospheric Pressure: | 101.2kPa  |

EUT Operation :

The test was performed in Transmitting mode, the test data were shown in the report.

### 8.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10.



### 8.3 Measurement Description

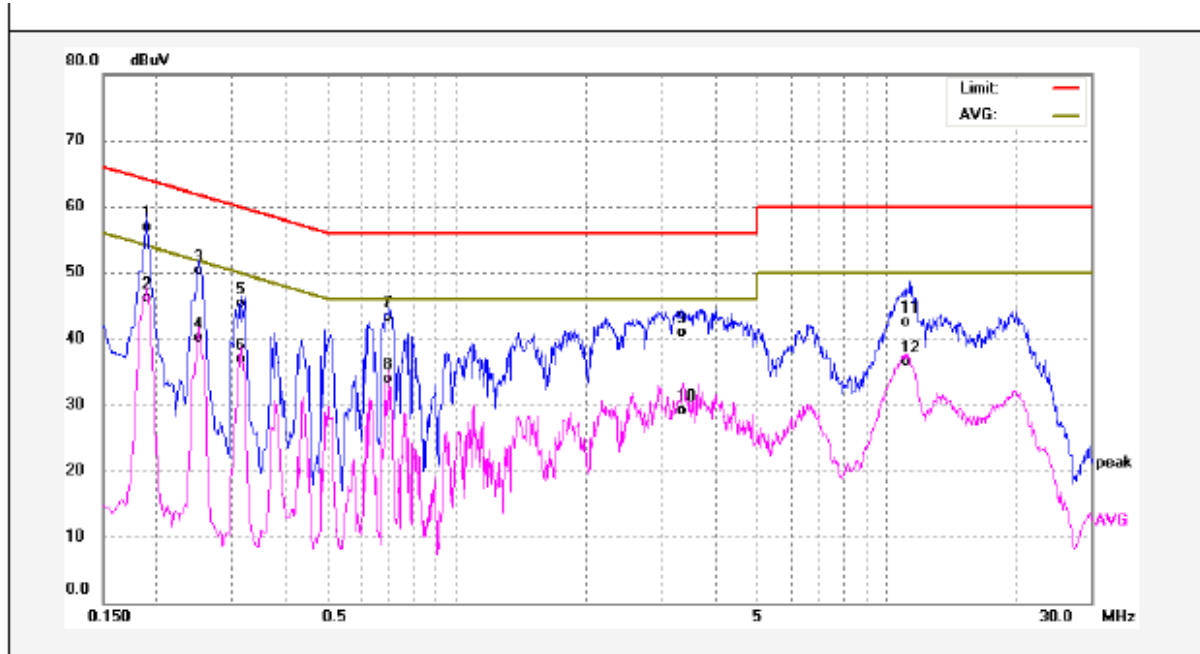
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

## 8.4 Conducted Emission Test Result

An initial pre-scan was performed on the live and neutral lines.

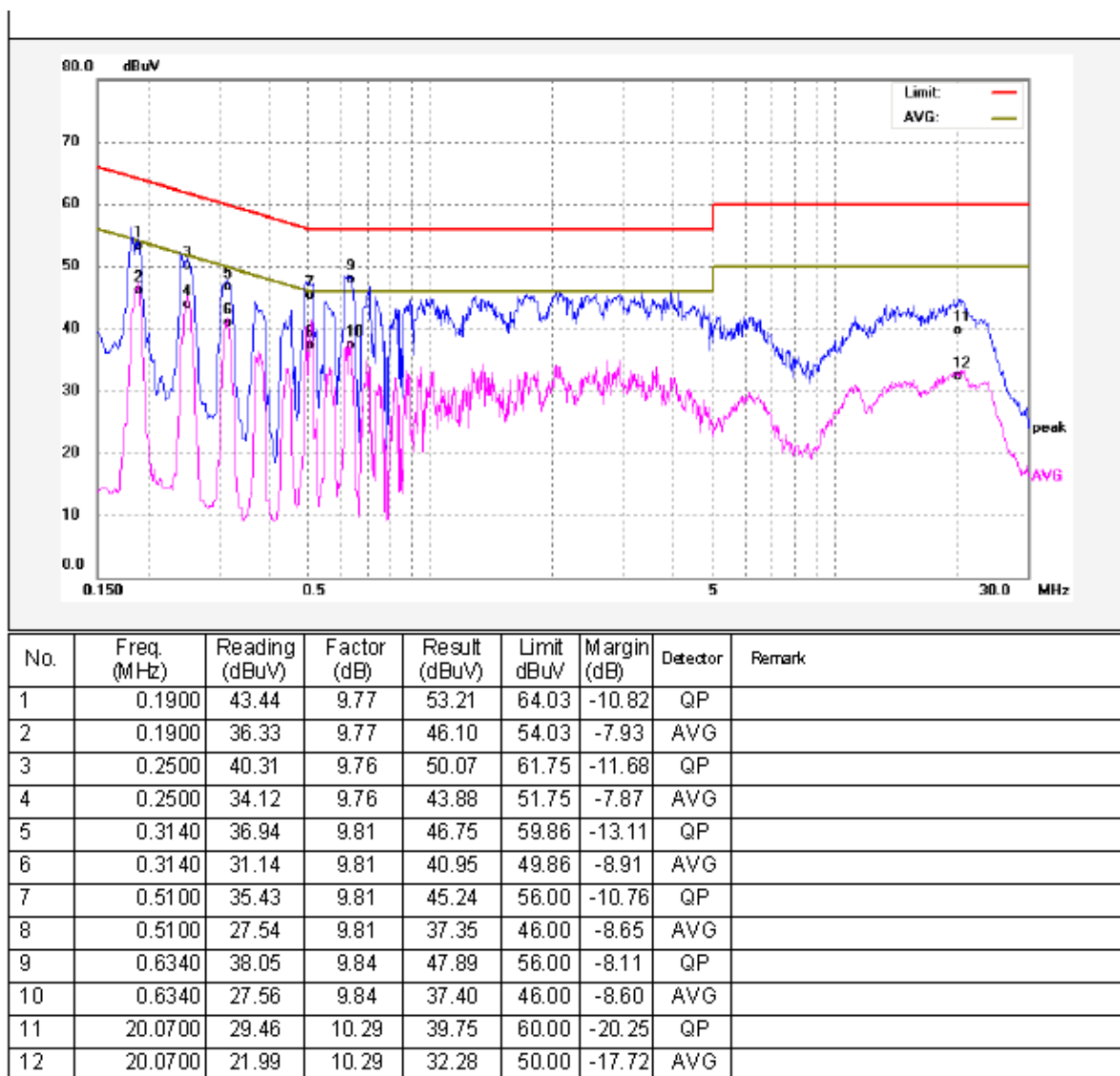
Only the worst case (WIFI transmitting mode) test data were record in the report.

Live line:



| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit dBuV | Margin (dB) | Detector | Remark |
|-----|-------------|----------------|-------------|---------------|------------|-------------|----------|--------|
| 1   | 0.1900      | 47.07          | 9.77        | 56.84         | 64.03      | -7.19       | QP       |        |
| 2   | 0.1900      | 36.25          | 9.77        | 46.02         | 54.03      | -8.01       | AVG      |        |
| 3   | 0.2500      | 40.64          | 9.76        | 50.40         | 61.75      | -11.35      | QP       |        |
| 4   | 0.2500      | 30.43          | 9.76        | 40.19         | 51.75      | -11.56      | AVG      |        |
| 5   | 0.3140      | 35.57          | 9.81        | 45.38         | 59.86      | -14.48      | QP       |        |
| 6   | 0.3140      | 27.02          | 9.81        | 36.83         | 49.86      | -13.03      | AVG      |        |
| 7   | 0.6940      | 33.50          | 9.83        | 43.33         | 56.00      | -12.67      | QP       |        |
| 8   | 0.6940      | 24.04          | 9.83        | 33.87         | 46.00      | -12.13      | AVG      |        |
| 9   | 3.3660      | 30.98          | 9.93        | 40.91         | 56.00      | -15.09      | QP       |        |
| 10  | 3.3660      | 19.26          | 9.93        | 29.19         | 46.00      | -16.81      | AVG      |        |
| 11  | 11.1260     | 32.39          | 10.08       | 42.47         | 60.00      | -17.53      | QP       |        |
| 12  | 11.1260     | 26.36          | 10.08       | 36.44         | 50.00      | -13.56      | AVG      |        |

Neutral line:



## 9 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2013, ANSI C63.4:2014

Test Result: PASS

Measurement Distance: 3m

Limit:

| Frequency<br>(MHz) | Field Strength |                 | Field Strength Limit at 3m Measurement Dist |                                |
|--------------------|----------------|-----------------|---------------------------------------------|--------------------------------|
|                    | uV/m           | Distance<br>(m) | uV/m                                        | dBuV/m                         |
| 0.009 ~ 0.490      | 2400/F(kHz)    | 300             | $10000 * 2400/F(kHz)$                       | $20\log^{(2400/F(kHz))} + 80$  |
| 0.490 ~ 1.705      | 24000/F(kHz)   | 30              | $100 * 24000/F(kHz)$                        | $20\log^{(24000/F(kHz))} + 40$ |
| 1.705 ~ 30         | 30             | 30              | $100 * 30$                                  | $20\log^{(30)} + 40$           |
| 30 ~ 88            | 100            | 3               | 100                                         | $20\log^{(100)}$               |
| 88 ~ 216           | 150            | 3               | 150                                         | $20\log^{(150)}$               |
| 216 ~ 960          | 200            | 3               | 200                                         | $20\log^{(200)}$               |
| Above 960          | 500            | 3               | 500                                         | $20\log^{(500)}$               |

### 9.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

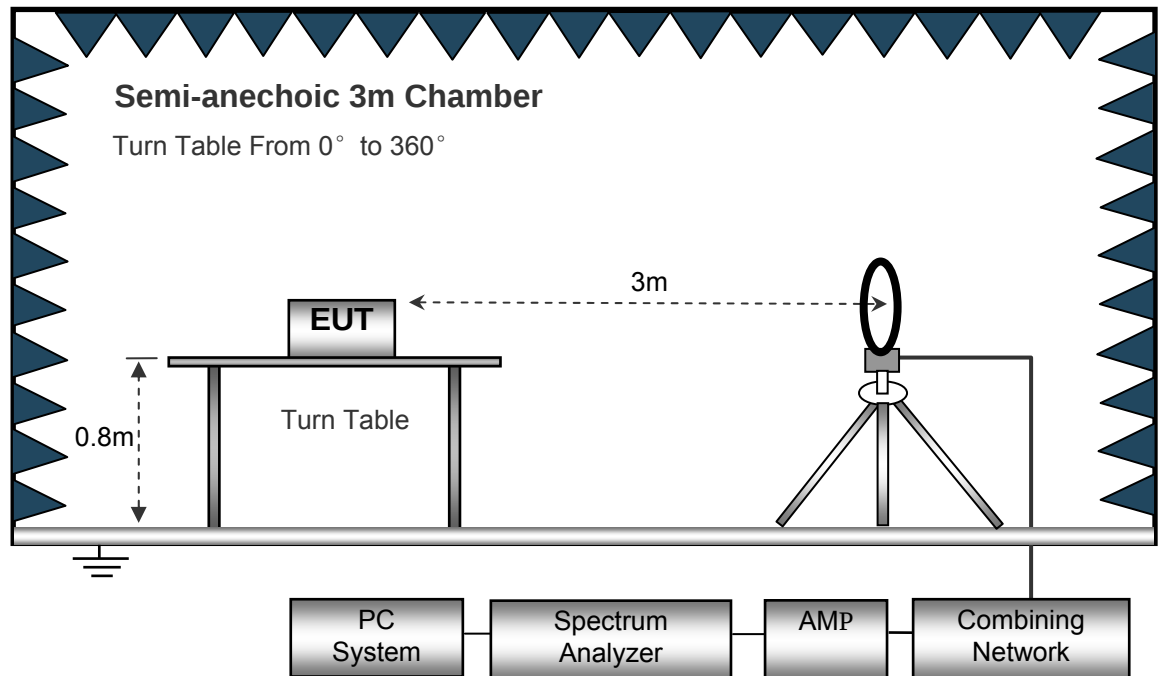
EUT Operation :

The test was performed in transmitting mode, the test data were shown in the report.

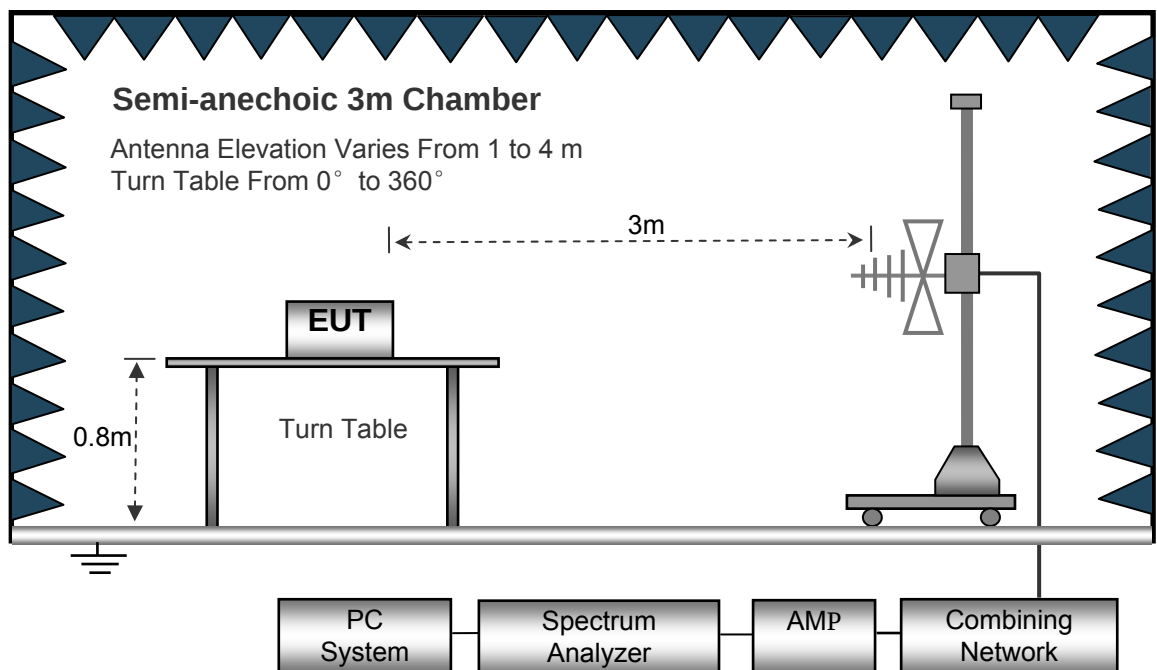
## 9.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

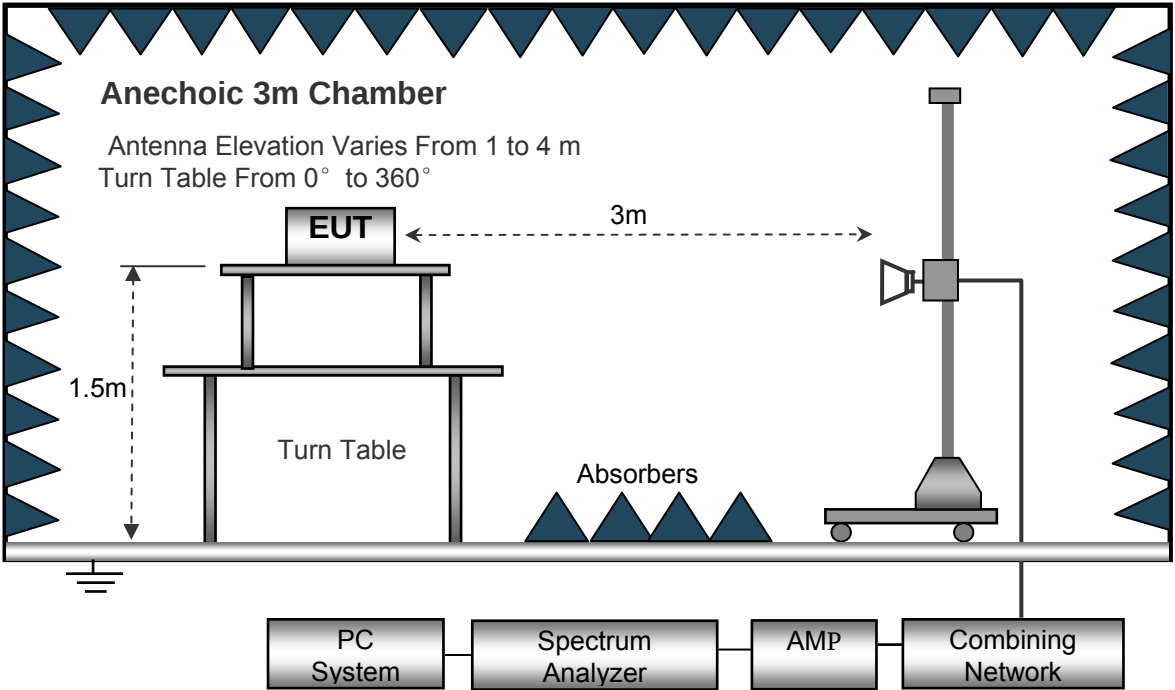
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



9.3 Spectrum Analyzer Setup

Below 30MHz

- Sweep Speed ..... Auto
- IF Bandwidth.....10kHz
- Video Bandwidth.....10kHz
- Resolution Bandwidth.....10kHz

30MHz ~ 1GHz

- Sweep Speed ..... Auto
- Detector .....PK
- Resolution Bandwidth.....100kHz
- Video Bandwidth.....300kHz

Above 1GHz

- Sweep Speed ..... Auto
- Detector .....PK
- Resolution Bandwidth.....1MHz
- Video Bandwidth.....3MHz
- Detector .....Ave.
- Resolution Bandwidth.....1MHz
- Video Bandwidth.....10Hz

## 9.4 Test Procedure

1. The EUT is placed on a turntable. For below 1GHz, the EUT is 0.8m above ground plane;  
For above 1GHz, the EUT is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in X axis,so the worst data were shown as follow.
8. A 2.4GHz high -pass filter is used during radiated emissions above 1GHz measurement.

## 9.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

## 9.6 Summary of Test Results

### Test Frequency : 12.8MHz ~ 30MHz

The measurements were more than 20 dB below the limit and not reported.

### Test Frequency : 30MHz ~ 18GHz

| Frequency                | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 |        |
|--------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|-------------------------|--------|
|                          |                  |             |                  | Height     | Polar |                  |                     | Limit                   | Margin |
| (MHz)                    | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m)                | (dB)   |
| 11b: Low Channel 2412MHz |                  |             |                  |            |       |                  |                     |                         |        |
| 485.61                   | 12.81            | PK          | 356              | 1.7        | H     | 21.09            | 33.90               | 45.00                   | -11.10 |
| 485.61                   | 12.22            | PK          | 43               | 1.6        | V     | 21.09            | 33.31               | 45.00                   | -11.69 |
| 4824.00                  | 50.49            | PK          | 327              | 1.6        | V     | -1.05            | 49.44               | 74.00                   | -24.56 |
| 4824.00                  | 42.74            | Ave         | 327              | 1.6        | V     | -1.05            | 41.69               | 54.00                   | -12.31 |
| 7236.00                  | 46.19            | PK          | 112              | 1.2        | H     | 1.34             | 47.53               | 74.00                   | -26.47 |
| 7236.00                  | 41.24            | Ave         | 112              | 1.2        | H     | 1.34             | 42.58               | 54.00                   | -11.42 |
| 2331.88                  | 46.23            | PK          | 314              | 1.9        | V     | -13.19           | 33.04               | 74.00                   | -40.96 |
| 2331.88                  | 37.75            | Ave         | 314              | 1.9        | V     | -13.19           | 24.56               | 54.00                   | -29.44 |
| 2357.69                  | 43.65            | PK          | 14               | 1.0        | H     | -13.15           | 30.50               | 74.00                   | -43.50 |
| 2357.69                  | 36.25            | Ave         | 14               | 1.0        | H     | -13.15           | 23.10               | 54.00                   | -30.90 |
| 2499.36                  | 43.72            | PK          | 214              | 1.9        | V     | -13.08           | 30.64               | 74.00                   | -43.36 |
| 2499.36                  | 38.20            | Ave         | 214              | 1.9        | V     | -13.08           | 25.12               | 54.00                   | -28.88 |

| Frequency                   | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 |        |
|-----------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|-------------------------|--------|
|                             |                  |             |                  | Height     | Polar |                  |                     | Limit                   | Margin |
| (MHz)                       | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m)                | (dB)   |
| 11b: Middle Channel 2437MHz |                  |             |                  |            |       |                  |                     |                         |        |
| 485.61                      | 14.09            | PK          | 296              | 1.5        | H     | 21.09            | 35.18               | 45.00                   | -9.82  |
| 485.61                      | 13.96            | PK          | 101              | 2.0        | V     | 21.09            | 35.05               | 45.00                   | -9.95  |
| 4874.00                     | 49.46            | PK          | 262              | 1.2        | V     | -0.63            | 48.83               | 74.00                   | -25.17 |
| 4874.00                     | 44.24            | Ave         | 262              | 1.2        | V     | -0.63            | 43.61               | 54.00                   | -10.39 |
| 7311.00                     | 45.24            | PK          | 169              | 1.9        | H     | 2.21             | 47.45               | 74.00                   | -26.55 |
| 7311.00                     | 42.79            | Ave         | 169              | 1.9        | H     | 2.21             | 45.00               | 54.00                   | -9.00  |
| 2315.72                     | 46.30            | PK          | 310              | 1.6        | V     | -13.19           | 33.11               | 74.00                   | -40.89 |
| 2315.72                     | 37.05            | Ave         | 310              | 1.6        | V     | -13.19           | 23.86               | 54.00                   | -30.14 |
| 2388.98                     | 43.24            | PK          | 179              | 1.5        | H     | -13.14           | 30.10               | 74.00                   | -43.90 |
| 2388.98                     | 37.52            | Ave         | 179              | 1.5        | H     | -13.14           | 24.38               | 54.00                   | -29.62 |
| 2494.77                     | 42.79            | PK          | 28               | 1.9        | V     | -13.09           | 29.70               | 74.00                   | -44.30 |
| 2494.77                     | 36.06            | Ave         | 28               | 1.9        | V     | -13.09           | 22.97               | 54.00                   | -31.03 |

| Frequency                 | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 |        |
|---------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|-------------------------|--------|
|                           |                  |             |                  | Height     | Polar |                  |                     | Limit                   | Margin |
| (MHz)                     | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m)                | (dB)   |
| 11b: High Channel 2462MHz |                  |             |                  |            |       |                  |                     |                         |        |
| 485.61                    | 13.07            | PK          | 76               | 1.6        | H     | 21.09            | 34.16               | 45.00                   | -10.84 |
| 485.61                    | 13.42            | PK          | 320              | 1.9        | V     | 21.09            | 34.51               | 45.00                   | -10.49 |
| 4924.00                   | 50.34            | PK          | 315              | 1.6        | V     | -0.25            | 50.09               | 74.00                   | -23.91 |
| 4924.00                   | 44.75            | Ave         | 315              | 1.6        | V     | -0.25            | 44.50               | 54.00                   | -9.50  |
| 7386.00                   | 48.22            | PK          | 189              | 1.3        | H     | 2.85             | 51.07               | 74.00                   | -22.93 |
| 7386.00                   | 41.31            | Ave         | 189              | 1.3        | H     | 2.85             | 44.16               | 54.00                   | -9.84  |
| 2334.93                   | 46.08            | PK          | 118              | 1.3        | V     | -13.19           | 32.89               | 74.00                   | -41.11 |
| 2334.93                   | 39.75            | Ave         | 118              | 1.3        | V     | -13.19           | 26.56               | 54.00                   | -27.44 |
| 2371.22                   | 42.01            | PK          | 245              | 1.3        | H     | -13.14           | 28.87               | 74.00                   | -45.13 |
| 2371.22                   | 38.01            | Ave         | 245              | 1.3        | H     | -13.14           | 24.87               | 54.00                   | -29.13 |
| 2491.04                   | 44.24            | PK          | 15               | 1.5        | V     | -13.09           | 31.15               | 74.00                   | -42.85 |
| 2491.04                   | 37.06            | Ave         | 15               | 1.5        | V     | -13.09           | 23.97               | 54.00                   | -30.03 |

| Frequency                | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 |        |
|--------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|-------------------------|--------|
|                          |                  |             |                  | Height     | Polar |                  |                     | Limit                   | Margin |
| (MHz)                    | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m)                | (dB)   |
| 11g: Low Channel 2412MHz |                  |             |                  |            |       |                  |                     |                         |        |
| 485.61                   | 12.97            | PK          | 212              | 2.0        | H     | 21.09            | 34.06               | 45.00                   | -10.94 |
| 485.61                   | 12.69            | PK          | 156              | 1.7        | V     | 21.09            | 33.78               | 45.00                   | -11.22 |
| 4824.00                  | 51.66            | PK          | 36               | 1.1        | V     | -1.06            | 50.60               | 74.00                   | -23.40 |
| 4824.00                  | 48.37            | Ave         | 36               | 1.1        | V     | -1.06            | 47.31               | 54.00                   | -6.69  |
| 7236.00                  | 47.10            | PK          | 156              | 1.7        | H     | 1.35             | 48.45               | 74.00                   | -25.55 |
| 7236.00                  | 46.46            | Ave         | 156              | 1.7        | H     | 1.35             | 47.81               | 54.00                   | -6.19  |
| 2310.38                  | 46.41            | PK          | 277              | 1.9        | V     | -13.19           | 33.22               | 74.00                   | -40.78 |
| 2310.38                  | 39.35            | Ave         | 277              | 1.9        | V     | -13.19           | 26.16               | 54.00                   | -27.84 |
| 2377.82                  | 44.11            | PK          | 267              | 1.5        | H     | -13.14           | 30.97               | 74.00                   | -43.03 |
| 2377.82                  | 38.13            | Ave         | 267              | 1.5        | H     | -13.14           | 24.99               | 54.00                   | -29.01 |
| 2486.27                  | 44.19            | PK          | 332              | 1.3        | V     | -13.08           | 31.11               | 74.00                   | -42.89 |
| 2486.27                  | 36.93            | Ave         | 332              | 1.3        | V     | -13.08           | 23.85               | 54.00                   | -30.15 |

| Frequency                   | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 |        |
|-----------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|-------------------------|--------|
|                             |                  |             |                  | Height     | Polar |                  |                     | Limit                   | Margin |
| (MHz)                       | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m)                | (dB)   |
| 11g: Middle Channel 2437MHz |                  |             |                  |            |       |                  |                     |                         |        |
| 485.61                      | 13.47            | PK          | 87               | 1.6        | H     | 21.09            | 34.56               | 45.00                   | -10.44 |
| 485.61                      | 14.10            | PK          | 248              | 1.2        | V     | 21.09            | 35.19               | 45.00                   | -9.81  |
| 4874.00                     | 49.64            | PK          | 270              | 1.6        | V     | -0.62            | 49.02               | 74.00                   | -24.98 |
| 4874.00                     | 48.79            | Ave         | 270              | 1.6        | V     | -0.62            | 48.17               | 54.00                   | -5.83  |
| 7311.00                     | 47.47            | PK          | 260              | 1.9        | H     | 2.20             | 49.67               | 74.00                   | -24.33 |
| 7311.00                     | 46.28            | Ave         | 260              | 1.9        | H     | 2.20             | 48.48               | 54.00                   | -5.52  |
| 2317.76                     | 46.90            | PK          | 45               | 1.1        | V     | -13.19           | 33.71               | 74.00                   | -40.29 |
| 2317.76                     | 37.13            | Ave         | 45               | 1.1        | V     | -13.19           | 23.94               | 54.00                   | -30.06 |
| 2365.86                     | 42.79            | PK          | 174              | 1.9        | H     | -13.15           | 29.64               | 74.00                   | -44.36 |
| 2365.86                     | 37.78            | Ave         | 174              | 1.9        | H     | -13.15           | 24.63               | 54.00                   | -29.37 |
| 2493.46                     | 44.83            | PK          | 259              | 1.6        | V     | -13.09           | 31.74               | 74.00                   | -42.26 |
| 2493.46                     | 38.16            | Ave         | 259              | 1.6        | V     | -13.09           | 25.07               | 54.00                   | -28.93 |

| Frequency                 | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 |        |
|---------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|-------------------------|--------|
|                           |                  |             |                  | Height     | Polar |                  |                     | Limit                   | Margin |
| (MHz)                     | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m)                | (dB)   |
| 11g: High Channel 2462MHz |                  |             |                  |            |       |                  |                     |                         |        |
| 485.61                    | 13.92            | PK          | 296              | 1.3        | H     | 21.09            | 35.01               | 45.00                   | -9.99  |
| 485.61                    | 12.91            | PK          | 58               | 1.2        | V     | 21.09            | 34.00               | 45.00                   | -11.00 |
| 4924.00                   | 50.76            | PK          | 299              | 1.7        | V     | -0.25            | 50.51               | 74.00                   | -23.49 |
| 4924.00                   | 46.47            | Ave         | 299              | 1.7        | V     | -0.25            | 46.22               | 54.00                   | -7.78  |
| 7386.00                   | 47.69            | PK          | 356              | 1.1        | H     | 2.86             | 50.55               | 74.00                   | -23.45 |
| 7386.00                   | 42.41            | Ave         | 356              | 1.1        | H     | 2.86             | 45.27               | 54.00                   | -8.73  |
| 2337.20                   | 46.35            | PK          | 127              | 1.1        | V     | -13.19           | 33.16               | 74.00                   | -40.84 |
| 2337.20                   | 37.89            | Ave         | 127              | 1.1        | V     | -13.19           | 24.70               | 54.00                   | -29.30 |
| 2384.00                   | 42.33            | PK          | 146              | 1.4        | H     | -13.14           | 29.19               | 74.00                   | -44.81 |
| 2384.00                   | 38.64            | Ave         | 146              | 1.4        | H     | -13.14           | 25.50               | 54.00                   | -28.50 |
| 2499.76                   | 42.05            | PK          | 86               | 1.2        | V     | -13.08           | 28.97               | 74.00                   | -45.03 |
| 2499.76                   | 37.50            | Ave         | 86               | 1.2        | V     | -13.08           | 24.42               | 54.00                   | -29.58 |

| Frequency                | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 |        |
|--------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|-------------------------|--------|
|                          |                  |             |                  | Height     | Polar |                  |                     | Limit                   | Margin |
| (MHz)                    | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m)                | (dB)   |
| n20: Low Channel 2412MHz |                  |             |                  |            |       |                  |                     |                         |        |
| 485.61                   | 12.88            | PK          | 176              | 1.0        | H     | 21.09            | 33.97               | 45.00                   | -11.03 |
| 485.61                   | 13.21            | PK          | 276              | 1.3        | V     | 21.09            | 34.30               | 45.00                   | -10.70 |
| 4824.00                  | 50.58            | PK          | 51               | 1.7        | V     | -1.06            | 49.52               | 74.00                   | -24.48 |
| 4824.00                  | 48.90            | Ave         | 51               | 1.7        | V     | -1.06            | 47.84               | 54.00                   | -6.16  |
| 7236.00                  | 47.07            | PK          | 3                | 1.5        | H     | 1.34             | 48.41               | 74.00                   | -25.59 |
| 7236.00                  | 45.54            | Ave         | 3                | 1.5        | H     | 1.34             | 46.88               | 54.00                   | -7.12  |
| 2329.82                  | 45.28            | PK          | 21               | 1.9        | V     | -13.19           | 32.09               | 74.00                   | -41.91 |
| 2329.82                  | 37.90            | Ave         | 21               | 1.9        | V     | -13.19           | 24.71               | 54.00                   | -29.29 |
| 2363.47                  | 42.59            | PK          | 184              | 1.0        | H     | -13.14           | 29.45               | 74.00                   | -44.55 |
| 2363.47                  | 37.81            | Ave         | 184              | 1.0        | H     | -13.14           | 24.67               | 54.00                   | -29.33 |
| 2492.32                  | 44.70            | PK          | 318              | 1.5        | V     | -13.08           | 31.62               | 74.00                   | -42.38 |
| 2492.32                  | 37.58            | Ave         | 318              | 1.5        | V     | -13.08           | 24.50               | 54.00                   | -29.50 |

| Frequency                   | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 |        |
|-----------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|-------------------------|--------|
|                             |                  |             |                  | Height     | Polar |                  |                     | Limit                   | Margin |
| (MHz)                       | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m)                | (dB)   |
| n20: Middle Channel 2437MHz |                  |             |                  |            |       |                  |                     |                         |        |
| 485.61                      | 13.40            | PK          | 39               | 2.0        | H     | 21.09            | 34.49               | 45.00                   | -10.51 |
| 485.61                      | 14.03            | PK          | 16               | 1.8        | V     | 21.09            | 35.12               | 45.00                   | -9.88  |
| 4874.00                     | 50.37            | PK          | 8                | 1.1        | V     | -0.61            | 49.76               | 74.00                   | -24.24 |
| 4874.00                     | 48.41            | Ave         | 8                | 1.1        | V     | -0.61            | 47.80               | 54.00                   | -6.20  |
| 7311.00                     | 47.65            | PK          | 349              | 1.6        | H     | 2.21             | 49.86               | 74.00                   | -24.14 |
| 7311.00                     | 45.35            | Ave         | 349              | 1.6        | H     | 2.21             | 47.56               | 54.00                   | -6.44  |
| 2327.36                     | 45.92            | PK          | 13               | 1.0        | V     | -13.19           | 32.73               | 74.00                   | -41.27 |
| 2327.36                     | 38.30            | Ave         | 13               | 1.0        | V     | -13.19           | 25.11               | 54.00                   | -28.89 |
| 2389.90                     | 44.94            | PK          | 330              | 1.8        | H     | -13.14           | 31.80               | 74.00                   | -42.20 |
| 2389.90                     | 37.88            | Ave         | 330              | 1.8        | H     | -13.14           | 24.74               | 54.00                   | -29.26 |
| 2487.25                     | 42.43            | PK          | 212              | 1.3        | V     | -13.09           | 29.34               | 74.00                   | -44.66 |
| 2487.25                     | 38.28            | Ave         | 212              | 1.3        | V     | -13.09           | 25.19               | 54.00                   | -28.81 |

| Frequency                 | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 |        |
|---------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|-------------------------|--------|
|                           |                  |             |                  | Height     | Polar |                  |                     | Limit                   | Margin |
| (MHz)                     | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m)                | (dB)   |
| n20: High Channel 2462MHz |                  |             |                  |            |       |                  |                     |                         |        |
| 485.61                    | 13.75            | PK          | 149              | 1.0        | H     | 21.09            | 34.84               | 45.00                   | -10.16 |
| 485.61                    | 13.75            | PK          | 259              | 1.5        | V     | 21.09            | 34.84               | 45.00                   | -10.16 |
| 4924.00                   | 50.65            | PK          | 29               | 1.4        | V     | -0.24            | 50.41               | 74.00                   | -23.59 |
| 4924.00                   | 48.86            | Ave         | 29               | 1.4        | V     | -0.24            | 48.62               | 54.00                   | -5.38  |
| 7386.00                   | 47.37            | PK          | 175              | 2.0        | H     | 2.83             | 50.20               | 74.00                   | -23.80 |
| 7386.00                   | 45.05            | Ave         | 175              | 2.0        | H     | 2.83             | 47.88               | 54.00                   | -6.12  |
| 2317.48                   | 46.31            | PK          | 58               | 1.3        | V     | -13.19           | 33.12               | 74.00                   | -40.88 |
| 2317.48                   | 39.89            | Ave         | 58               | 1.3        | V     | -13.19           | 26.70               | 54.00                   | -27.30 |
| 2365.30                   | 44.94            | PK          | 227              | 1.3        | H     | -13.14           | 31.80               | 74.00                   | -42.20 |
| 2365.30                   | 37.42            | Ave         | 227              | 1.3        | H     | -13.14           | 24.28               | 54.00                   | -29.72 |
| 2499.88                   | 42.38            | PK          | 183              | 1.9        | V     | -13.08           | 29.30               | 74.00                   | -44.70 |
| 2499.88                   | 38.67            | Ave         | 183              | 1.9        | V     | -13.08           | 25.59               | 54.00                   | -28.41 |

**Test Frequency: 18GHz~25GHz**

The measurements were more than 20 dB below the limit and not reported.

## 10 Band Edge Measurement

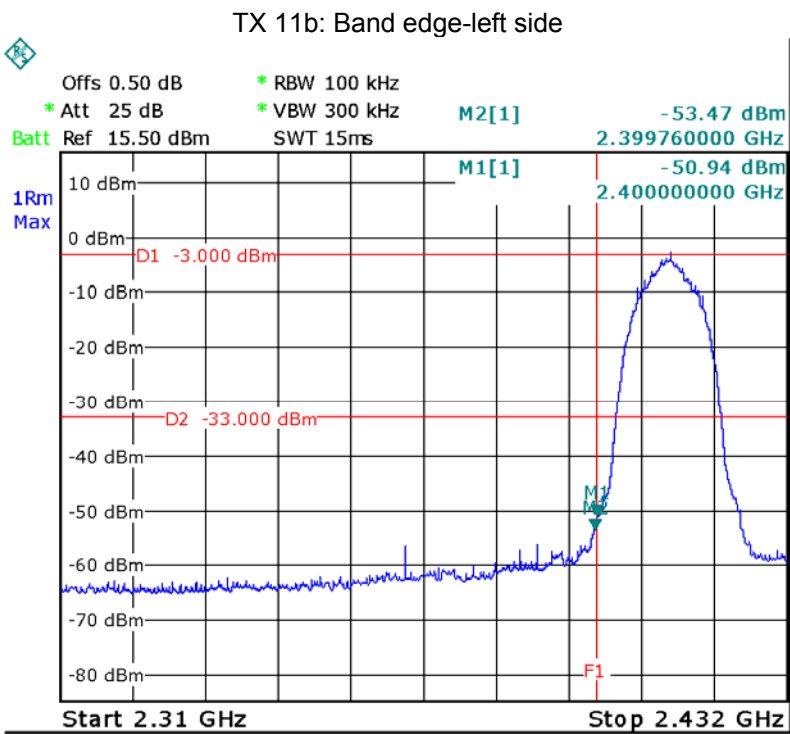
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC CFR47 Part 15 Section 15.247                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Test Method:      | 558074 D01 DTS Meas Guidance V04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Test Limit:       | Regulation 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). |
| Test Mode:        | Transmitting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

### 10.1 Test Produce

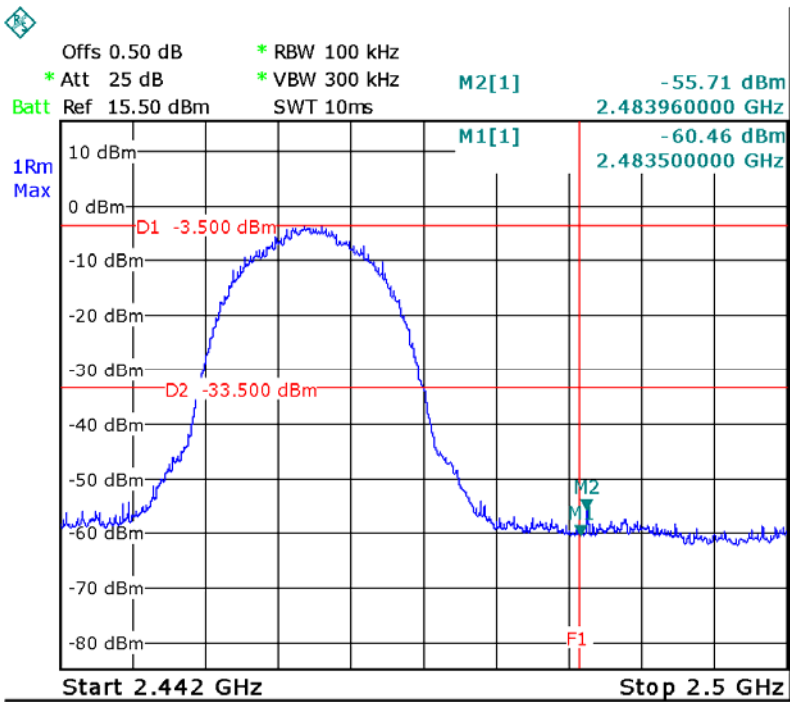
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

10.2 Test Result

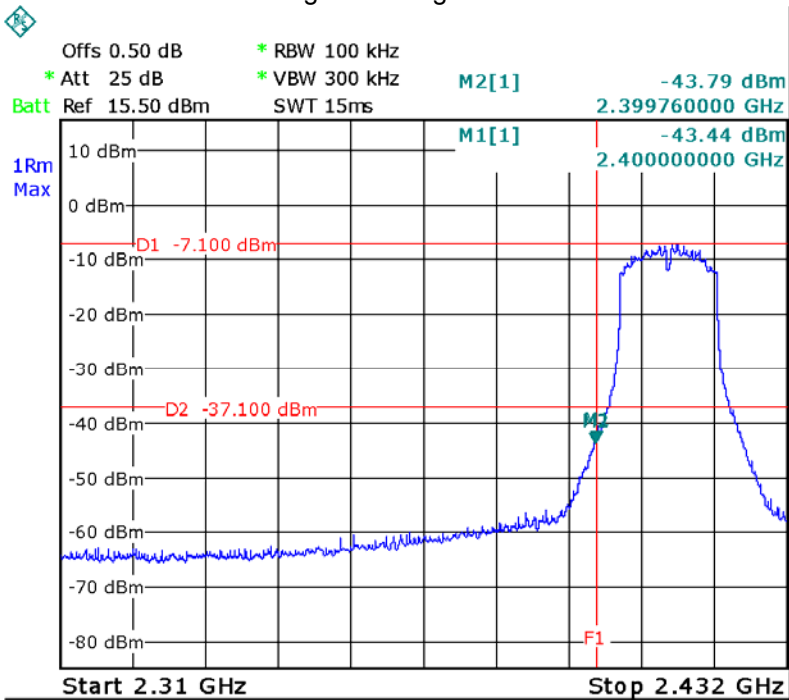
Test result plots shown as follows:



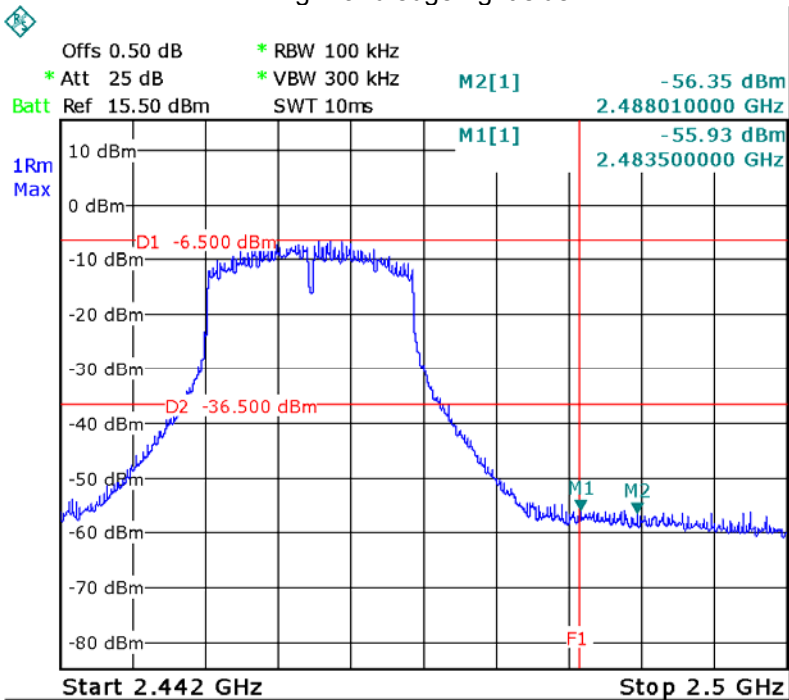
TX 11b: Band edge-right side



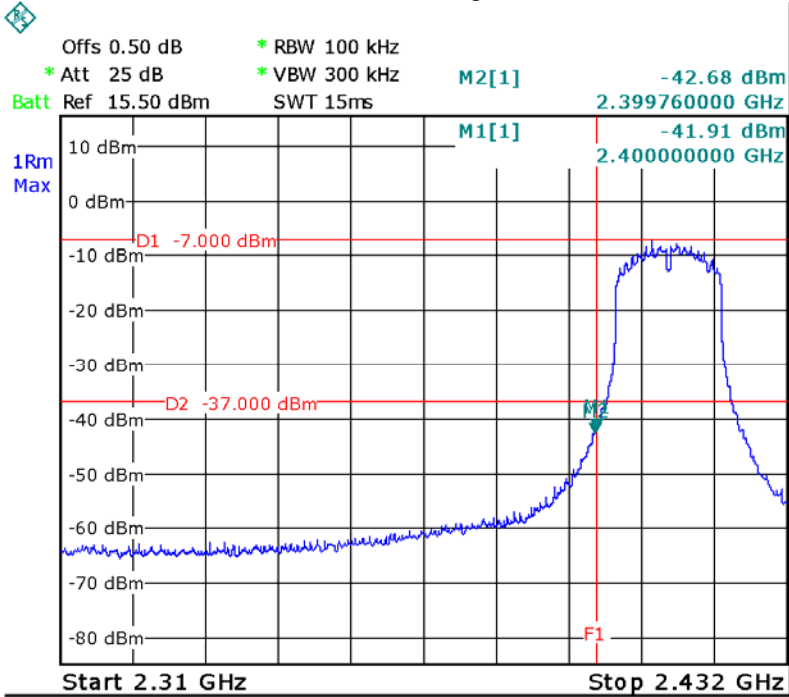
TX 11g: Band edge-left side



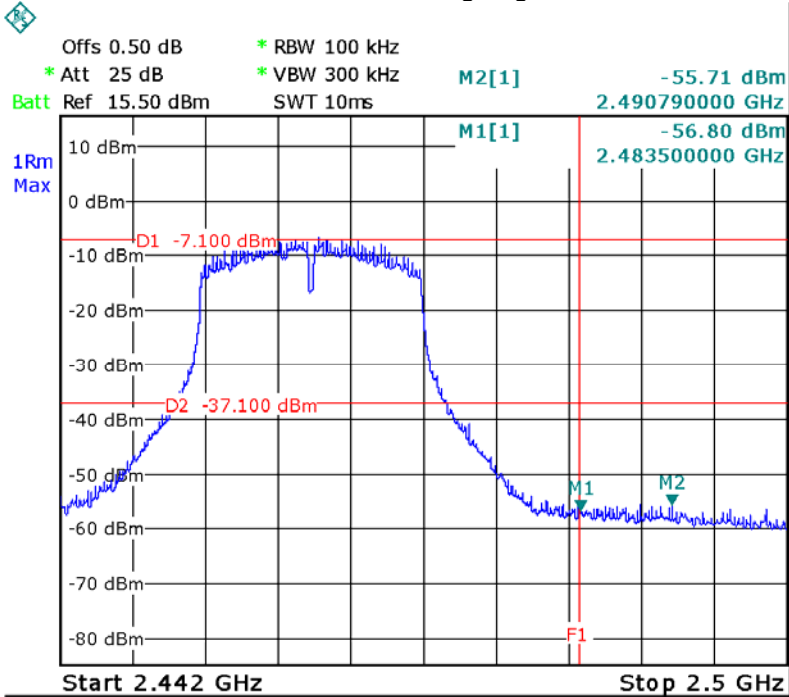
TX 11g: Band edge-right side



TX 11n HT20: Band edge-left side



TX 11n HT20: Band edge-right side



11 Bandwidth Measurement

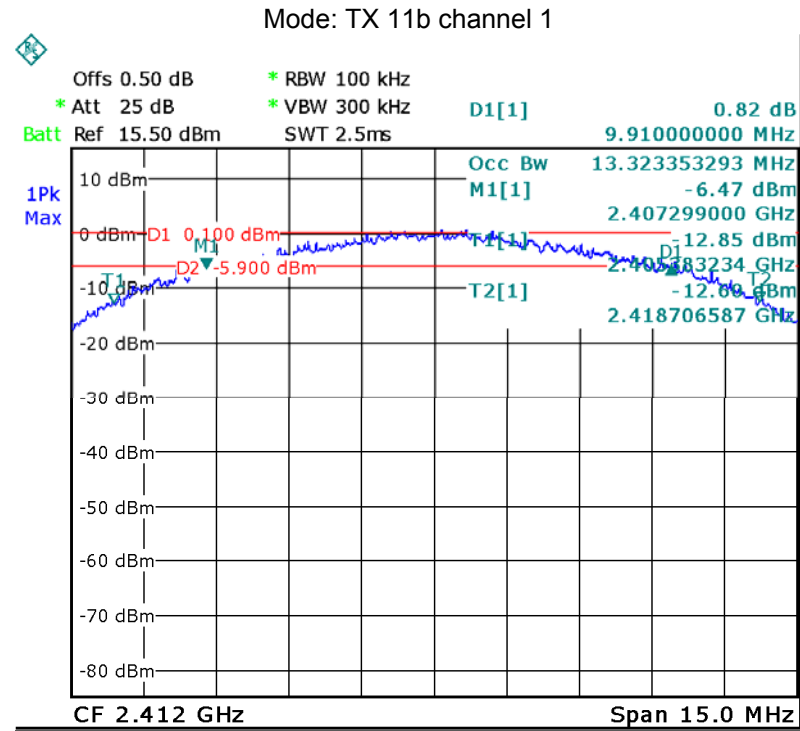
Test Requirement: FCC CFR47 Part 15 Section 15.247  
Test Method: 558074 D01 DTS Meas Guidance V04

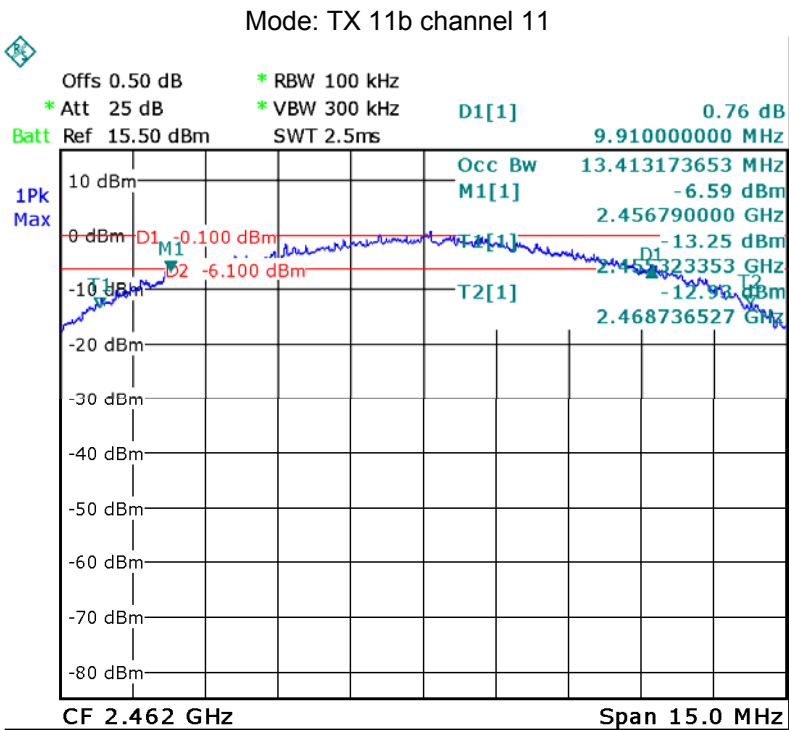
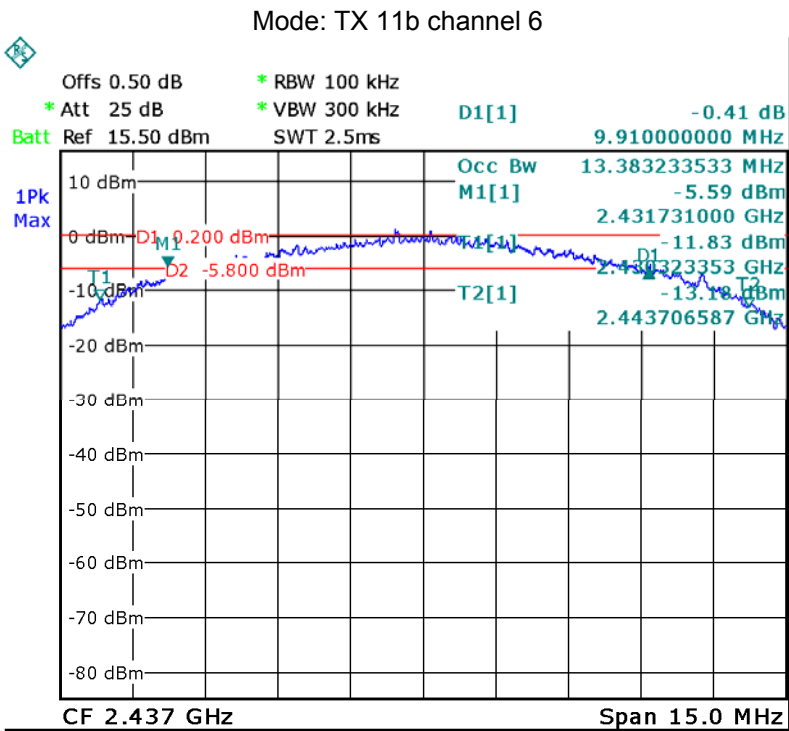
11.1 Test Procedure:

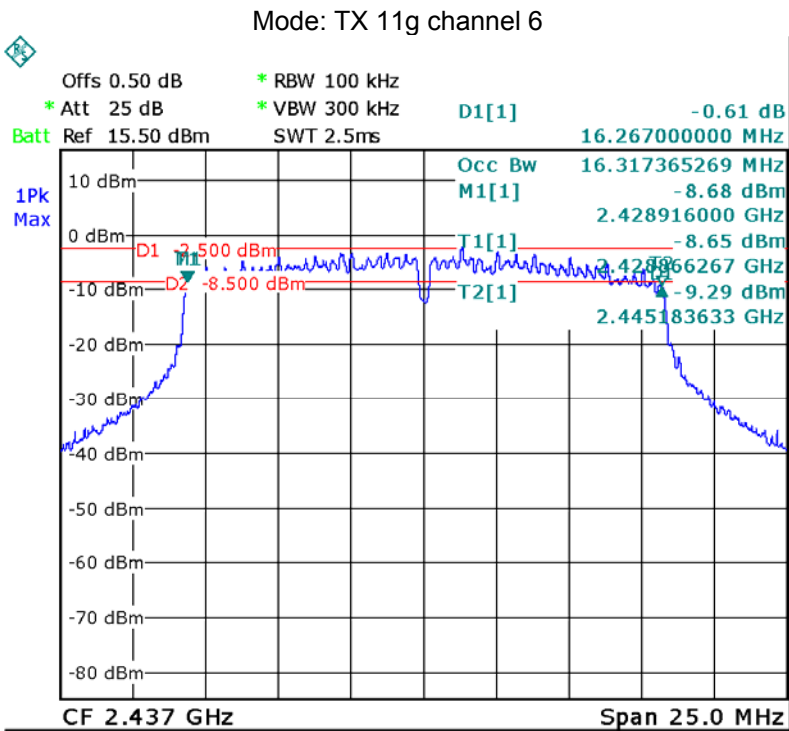
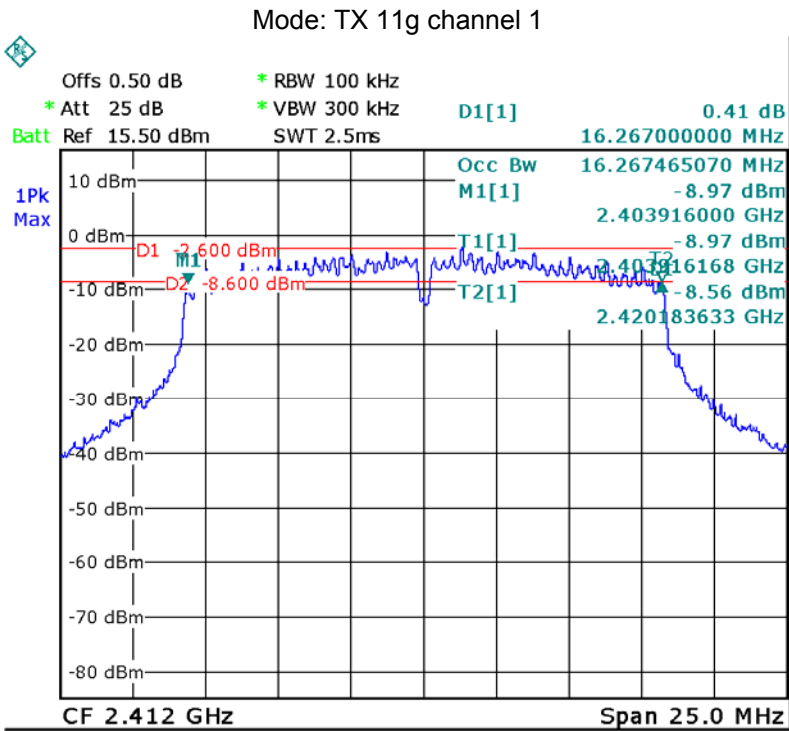
- 1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
- 2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

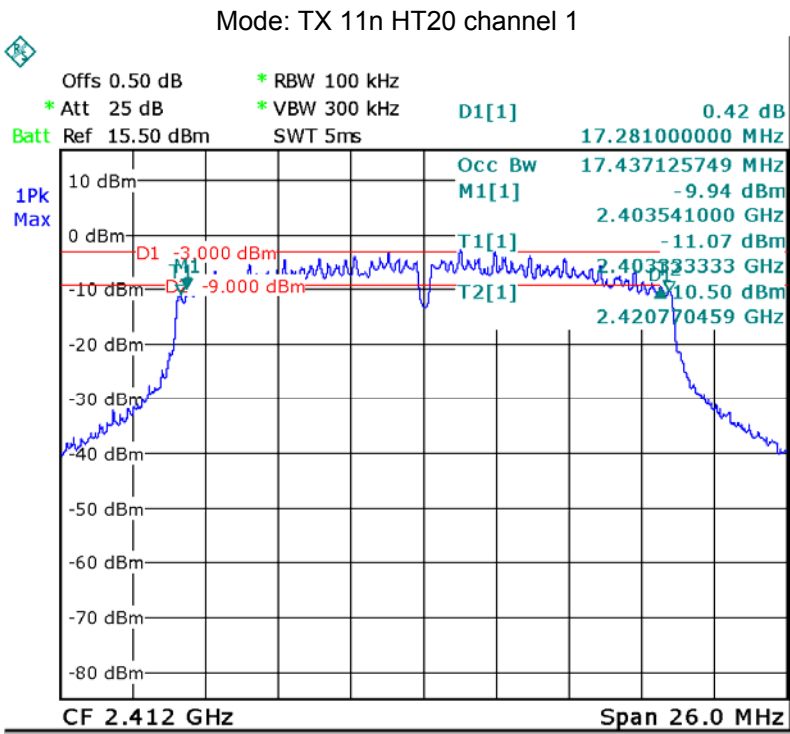
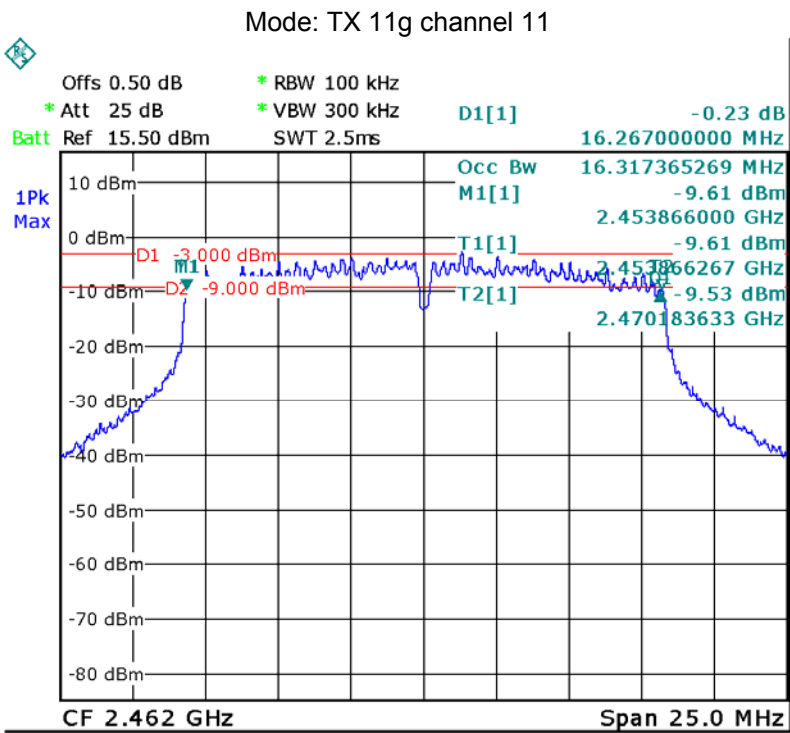
11.2 Test Result:

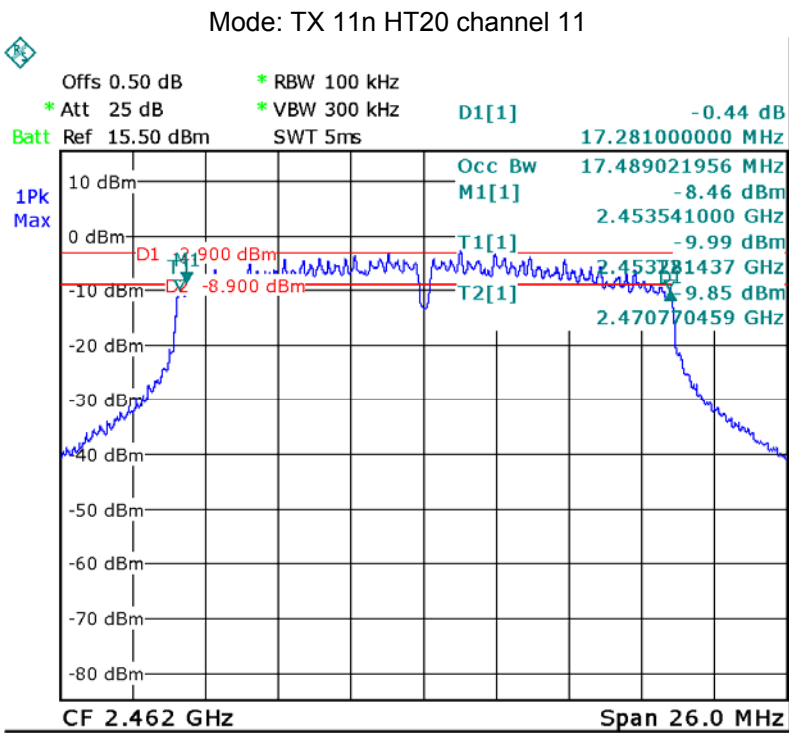
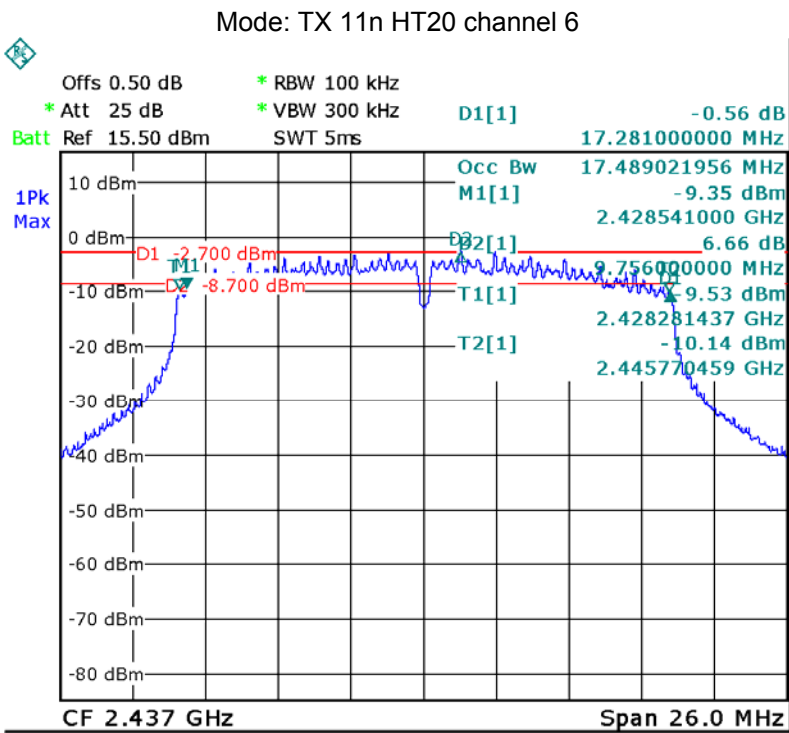
| Operation mode | 6dB Bandwidth (MHz) |           |            | 99% Bandwidth (MHz) |           |            |
|----------------|---------------------|-----------|------------|---------------------|-----------|------------|
| TX 11b         | Channel 1           | Channel 6 | Channel 11 | Channel 1           | Channel 6 | Channel 11 |
|                | 9.910               | 9.910     | 9.910      | 13.323              | 13.383    | 13.413     |
| TX 11g         | Channel 1           | Channel 6 | Channel 11 | Channel 1           | Channel 6 | Channel 11 |
|                | 16.267              | 16.267    | 16.267     | 16.267              | 16.317    | 16.317     |
| TX 11n HT20    | Channel 1           | Channel 6 | Channel 11 | Channel 1           | Channel 6 | Channel 11 |
|                | 17.281              | 17.281    | 17.281     | 17.437              | 17.489    | 17.489     |











## 12 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 DTS Meas Guidance V04

### 12.1 Test Procedure:

558074 D01 DTS Meas Guidance V04

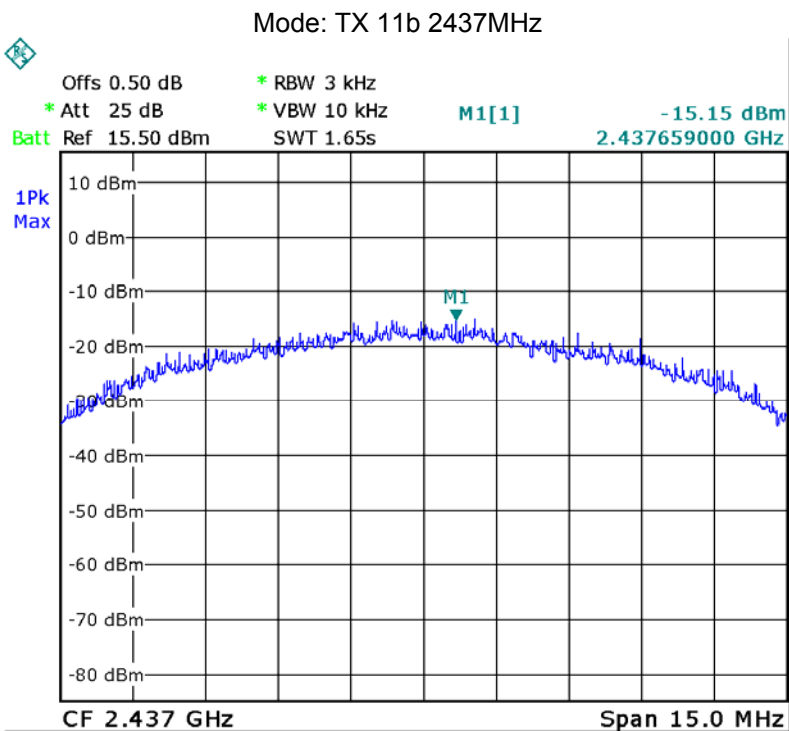
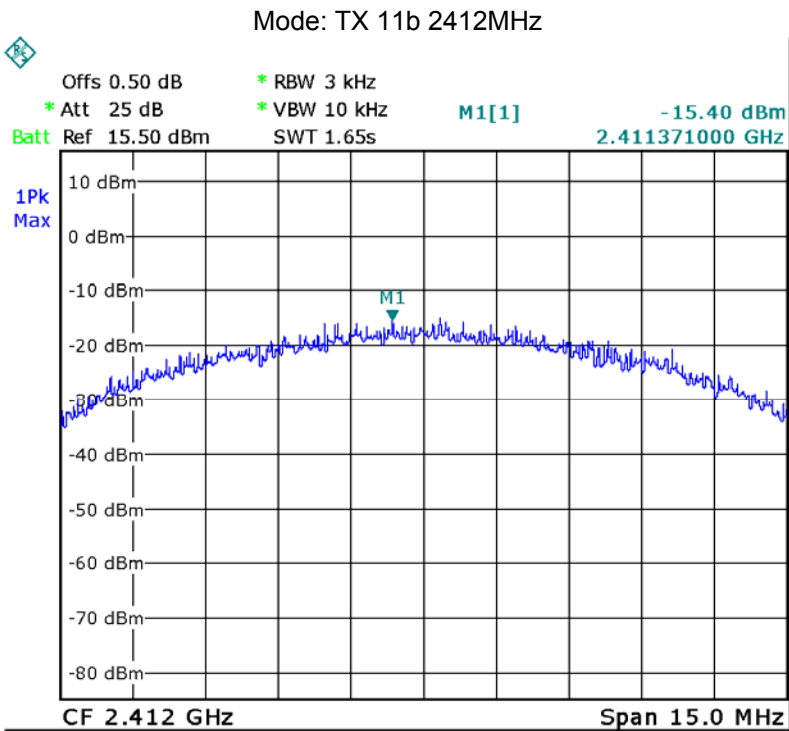
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

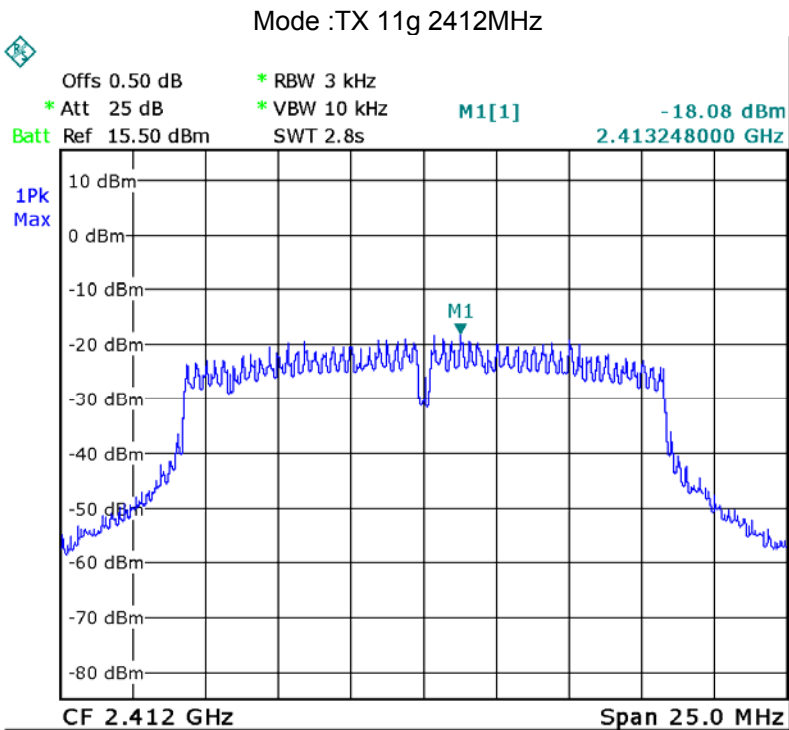
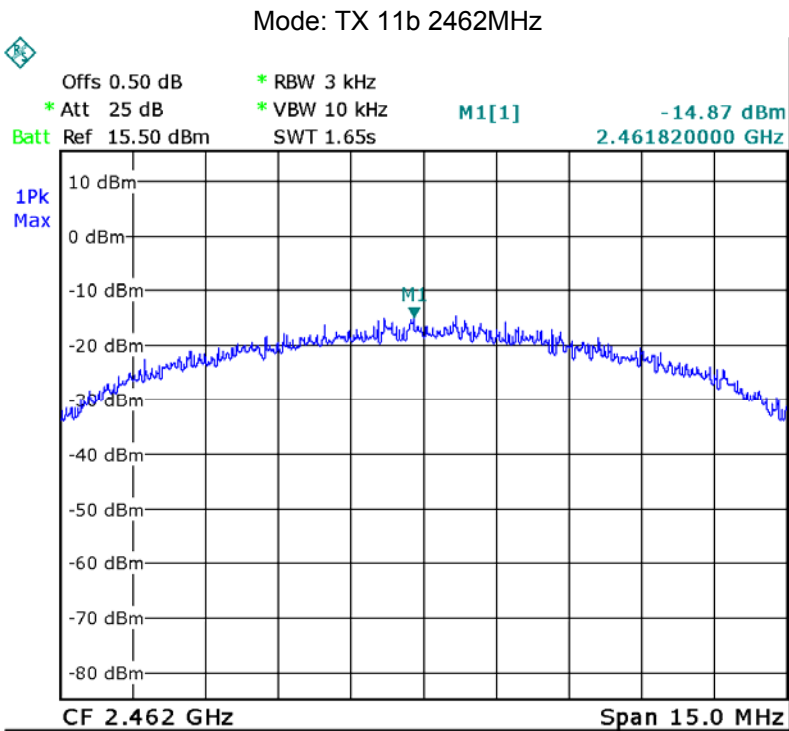
### 12.2 Test Result:

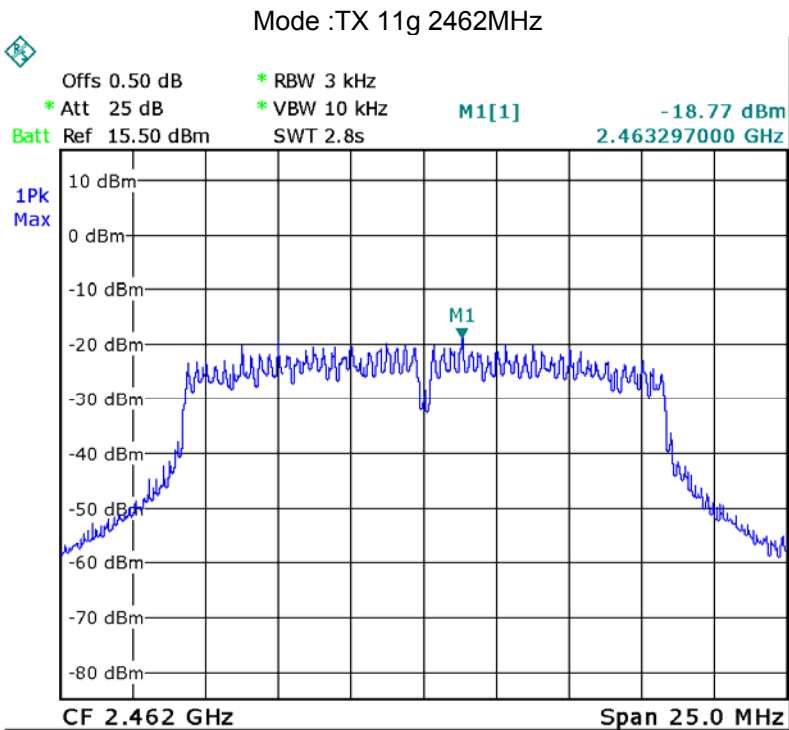
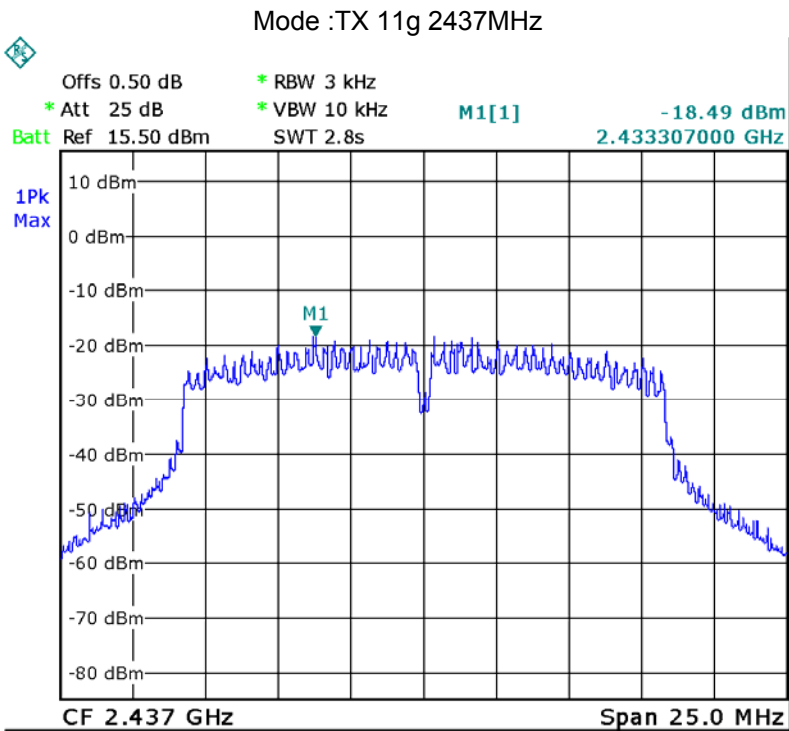
| Test mode :TX 11b             |         |         |
|-------------------------------|---------|---------|
| Power Spectral (dBm per 3kHz) |         |         |
| 2412MHz                       | 2437MHz | 2462MHz |
| -15.40                        | -15.15  | -14.87  |
| Limit: 8dBm per 3kHz          |         |         |

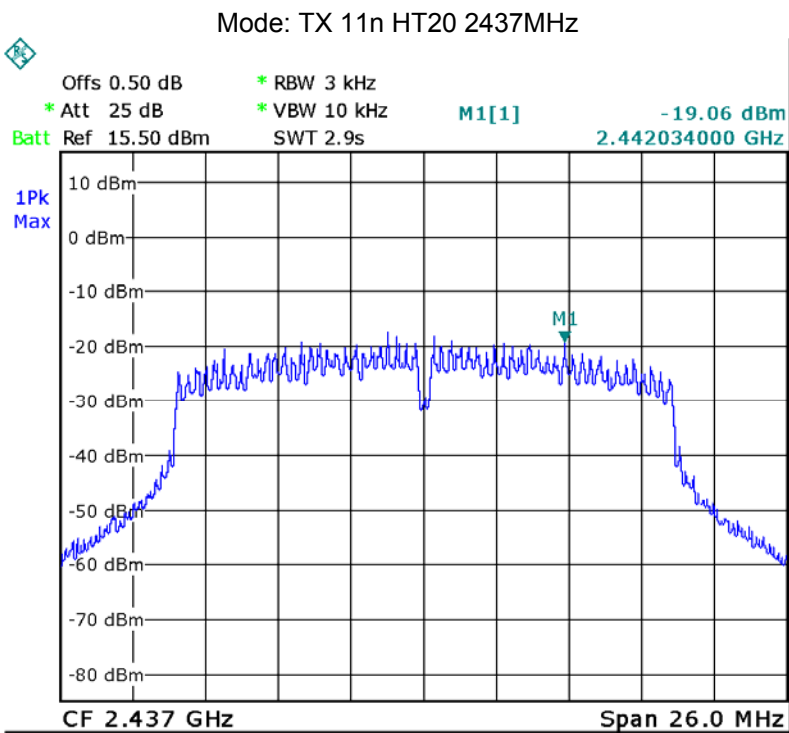
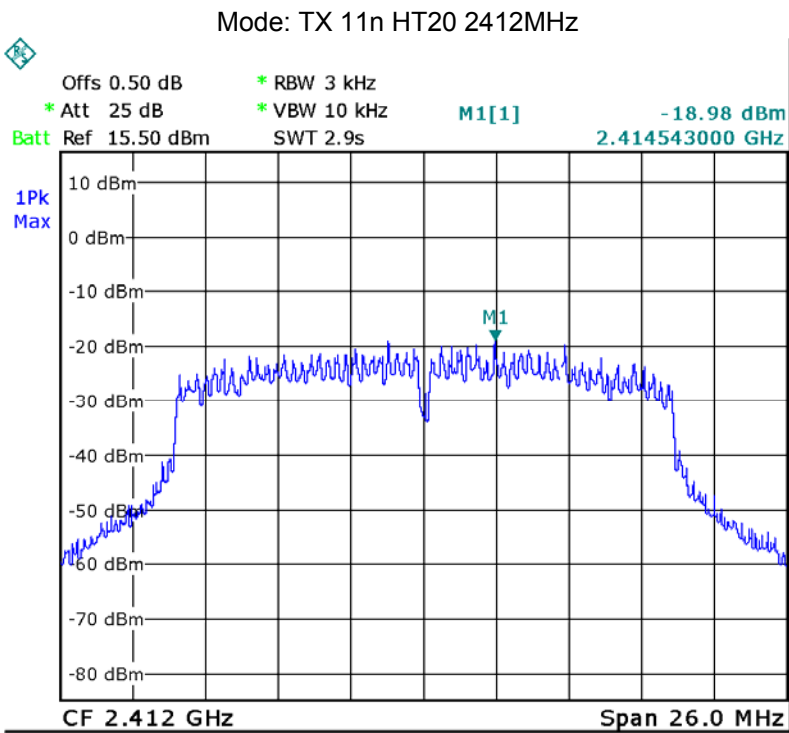
| Test mode :TX 11g             |         |         |
|-------------------------------|---------|---------|
| Power Spectral (dBm per 3kHz) |         |         |
| 2412MHz                       | 2437MHz | 2462MHz |
| -18.08                        | -18.49  | -18.77  |
| Limit: 8dBm per 3kHz          |         |         |

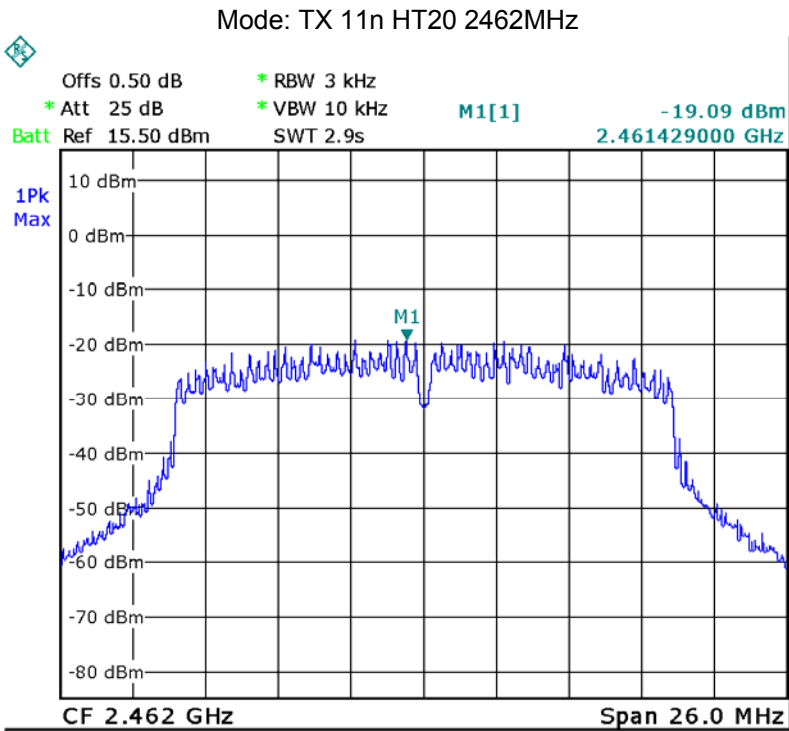
| Test mode :TX 11n HT20        |         |         |
|-------------------------------|---------|---------|
| Power Spectral (dBm per 3kHz) |         |         |
| 2412MHz                       | 2437MHz | 2462MHz |
| -18.98                        | -19.06  | -19.09  |
| Limit: 8dBm per 3kHz          |         |         |











### 13 Antenna Requirement

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 replaced 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 §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 §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.

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

Result:

The EUT has a External antenna with RP-SMA connector, meets the requirements of FCC 15.203.



WIFI ANT

## 14 RF Exposure

Test Requirement: FCC Part 1.1307

Evaluation Method: FCC Part 2.1091

### 14.1 Requirements

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

### 14.2 The procedures / limit

#### (A) Limits for Occupational / Controlled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm <sup>2</sup> ) | Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|------------------------------------------|------------------------------------------------------------------|
| 0.3-3.0               | 614                               | 1.63                              | (100)*                                   | 6                                                                |
| 3.0-30                | 1842 / f                          | 4.89 / f                          | (900 / f)*                               | 6                                                                |
| 30-300                | 61.4                              | 0.163                             | 1.0                                      | 6                                                                |
| 300-1500              |                                   |                                   | F/300                                    | 6                                                                |
| 1500-100,000          |                                   |                                   | 5                                        | 6                                                                |

#### (B) Limits for General Population / Uncontrolled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm <sup>2</sup> ) | Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|------------------------------------------|------------------------------------------------------------------|
| 0.3-1.34              | 614                               | 1.63                              | (100)*                                   | 30                                                               |
| 1.34-30               | 824/f                             | 2.19/f                            | (180/f)*                                 | 30                                                               |
| 30-300                | 27.5                              | 0.073                             | 0.2                                      | 30                                                               |
| 300-1500              |                                   |                                   | F/1500                                   | 30                                                               |
| 1500-100,000          |                                   |                                   | 1.0                                      | 30                                                               |

Note: f = frequency in MHz ; \*Plane-wave equivalent power density

### 14.3 MPE Calculation Method

**P** = Peak RF output power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = P_{out} * G / (4 * \pi * R^2)$$

From the peak EUT RF output power, the minimum mobile separation distance,  $d=0.2\text{m}$ , as well as the gain of the used antenna, the RF power density can be obtained.

| Antenna Gain (dBi) | Antenna Gain (numeric) | Max. Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (mW/cm <sup>2</sup> ) | Limit of Power Density (mW/cm <sup>2</sup> ) |
|--------------------|------------------------|------------------------------|------------------------|-------------------------------------|----------------------------------------------|
| 5.00               | 3.162                  | 10.62                        | 11.53                  | 0.0073                              | 1                                            |

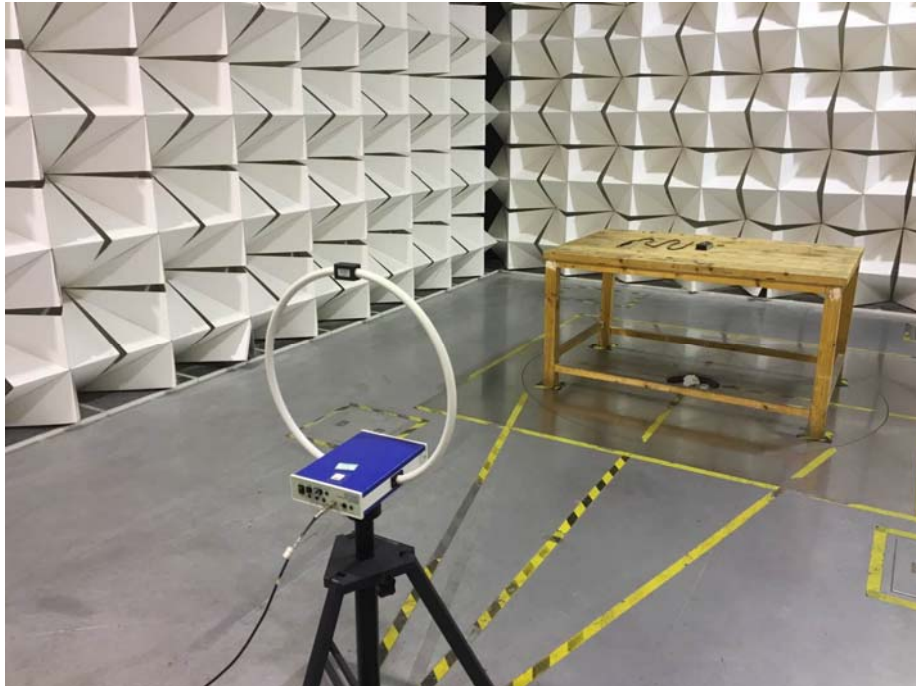
Result: Compliance

No SAR measurement is required.

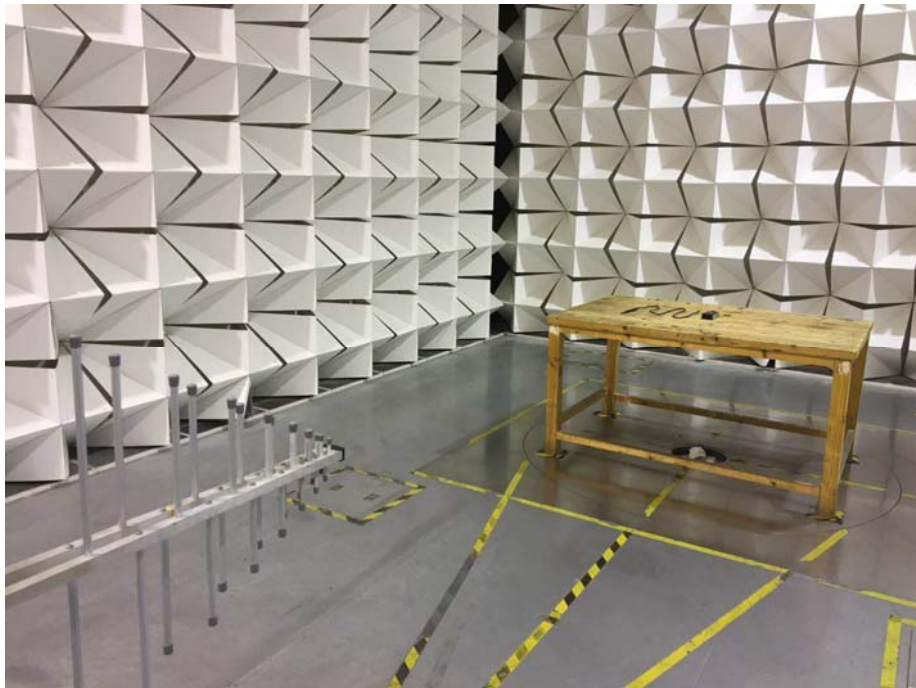
## 15 Photographs – Test Setup Photos

### 15.1 Radiated Emission

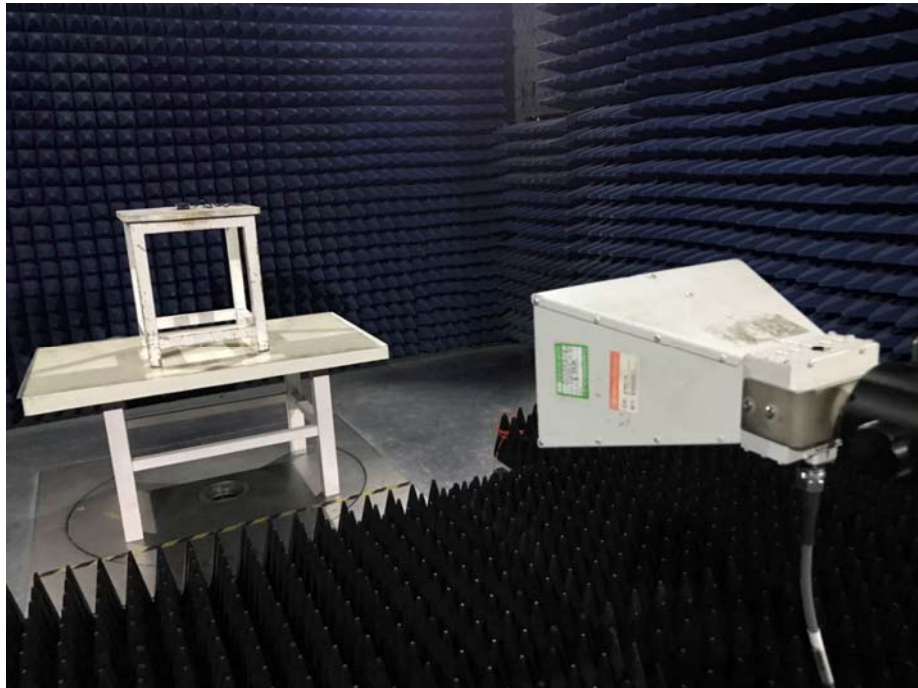
Test frequency Below 30MHz



Test frequency from 30MHz to 1GHz



Test frequency above 1GHz



## 15.2 Conducted Emission



## 16 Photographs - Constructional Details

### 16.1 EUT – External View



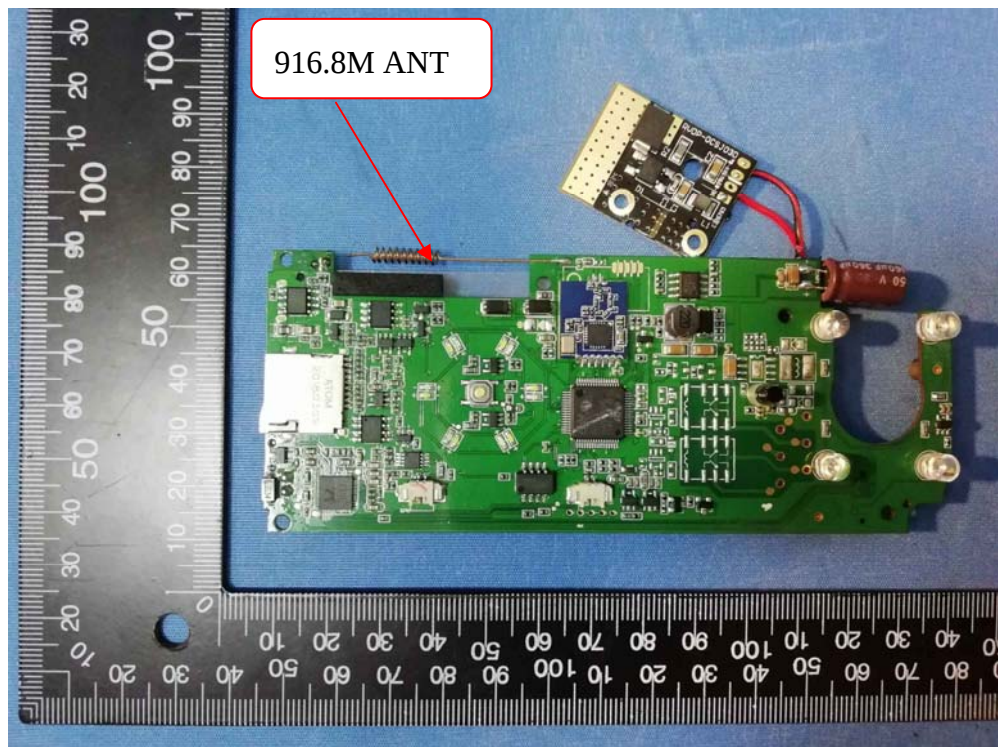
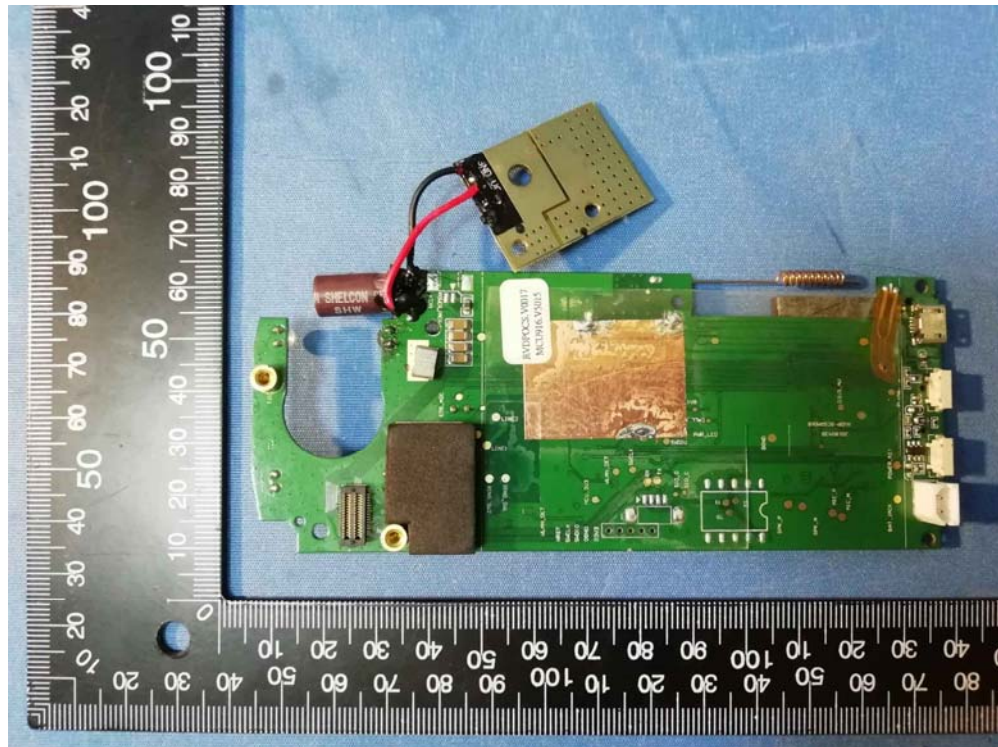


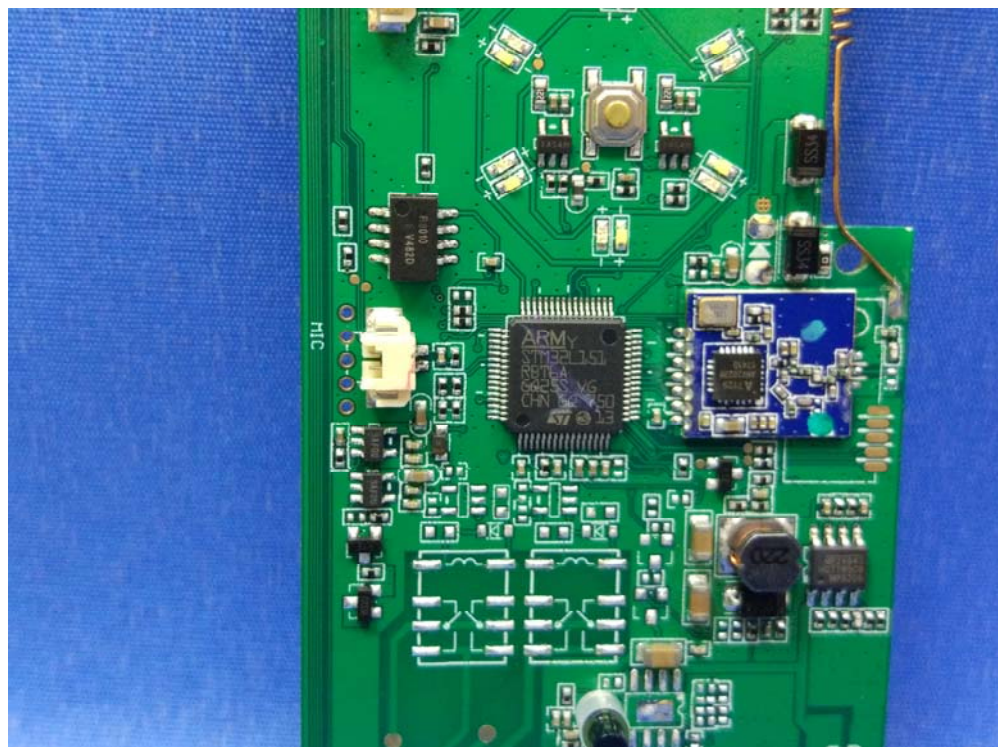
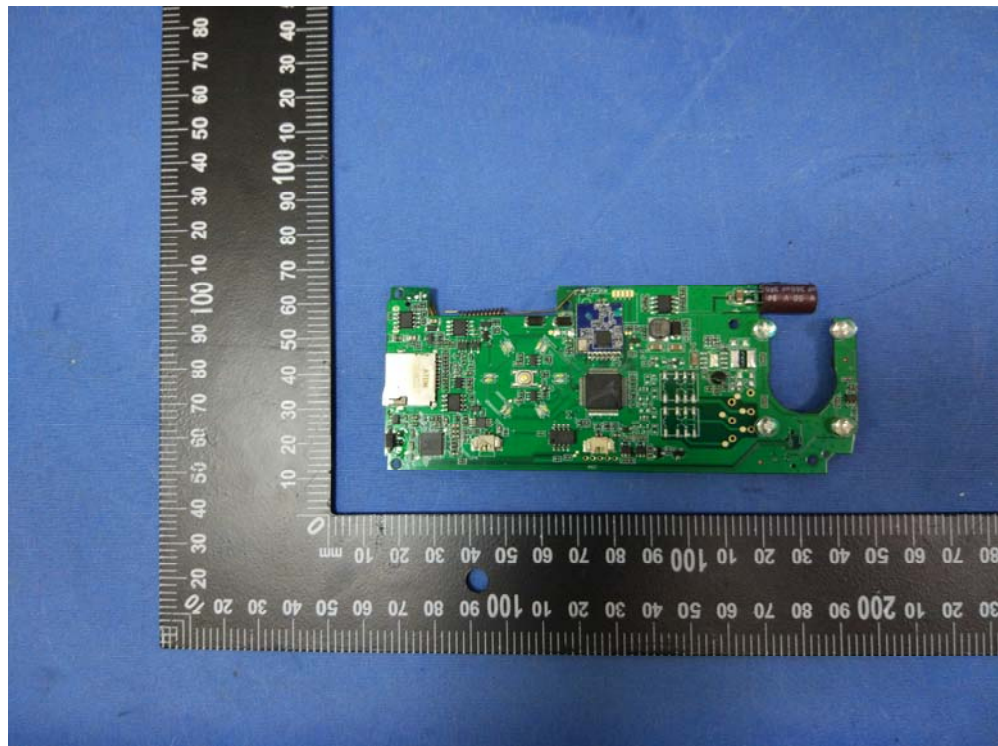




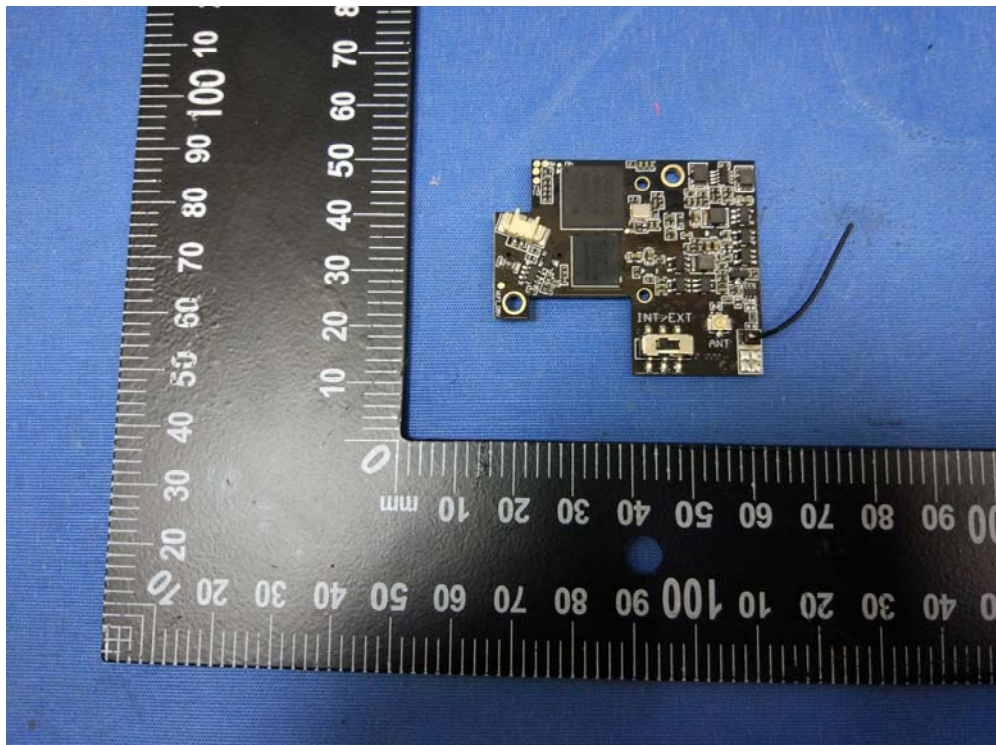
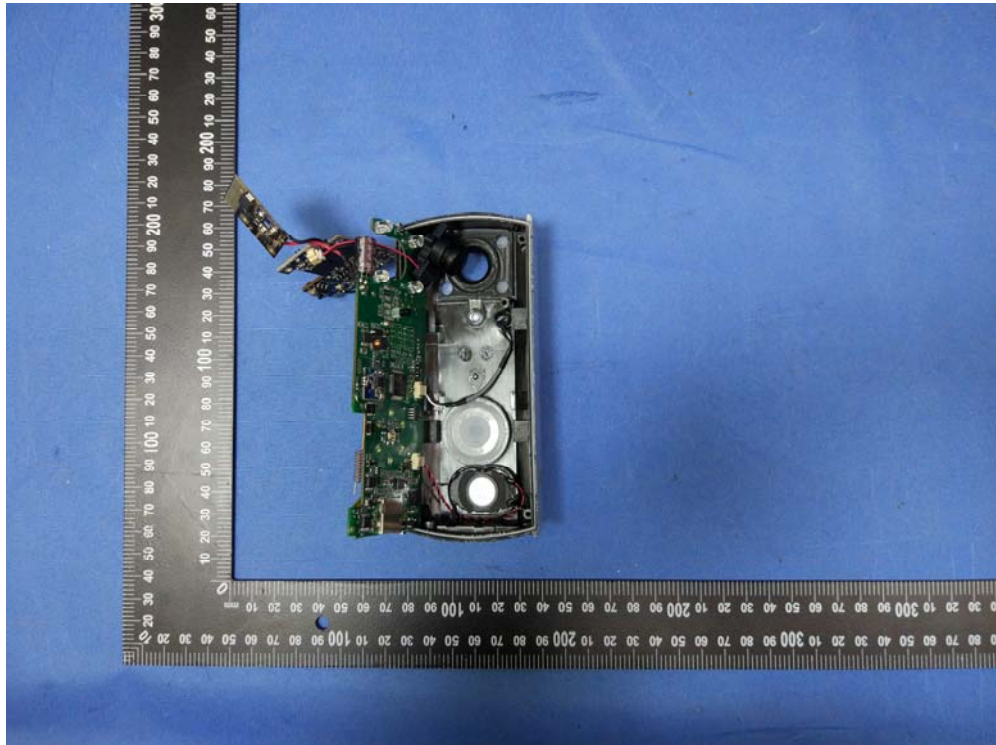
## 16.2 EUT – Internal View

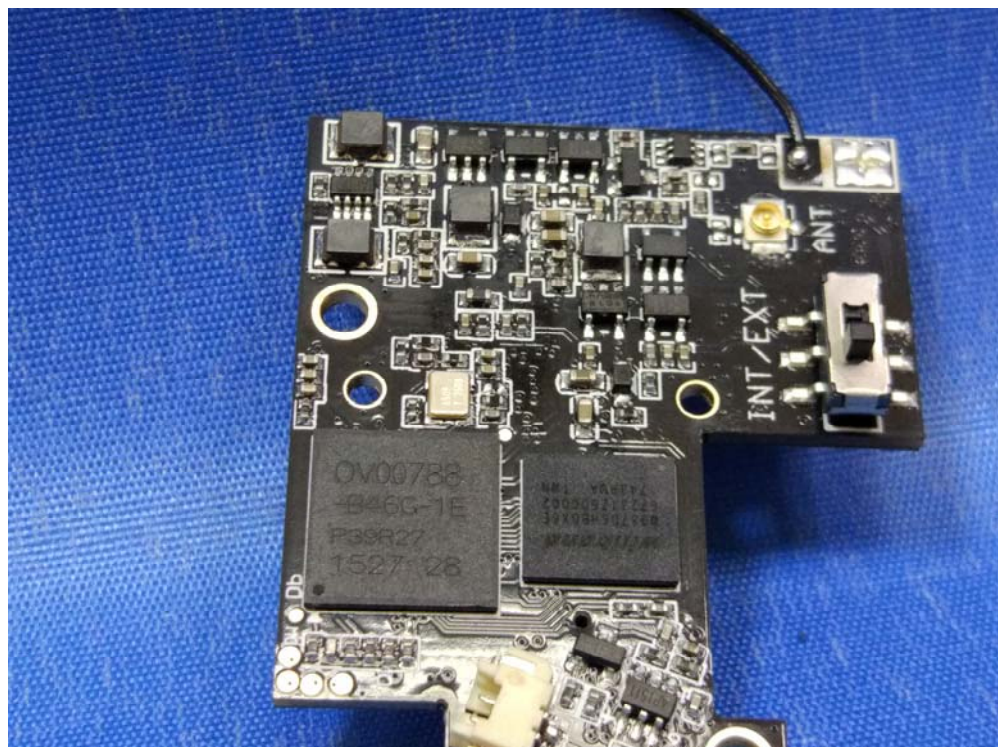
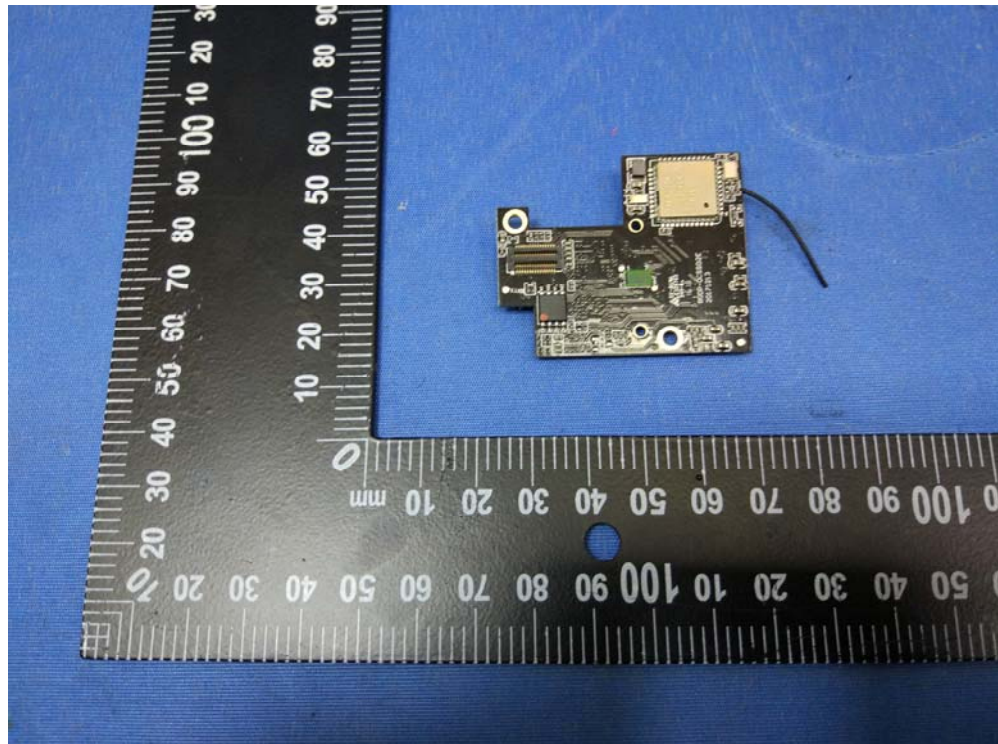


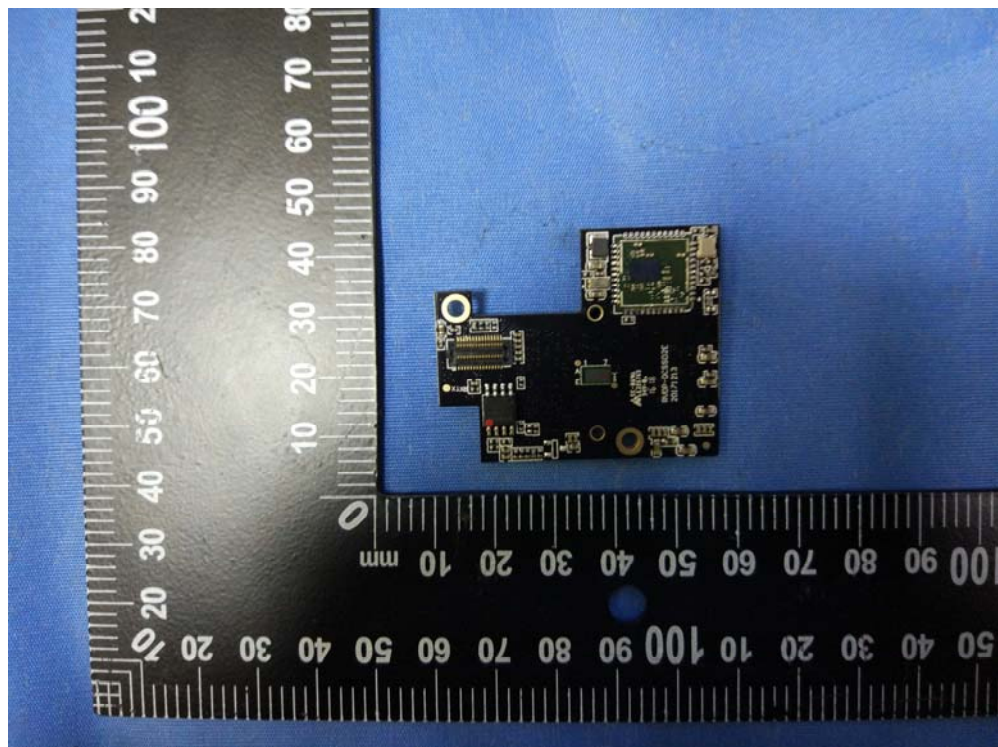
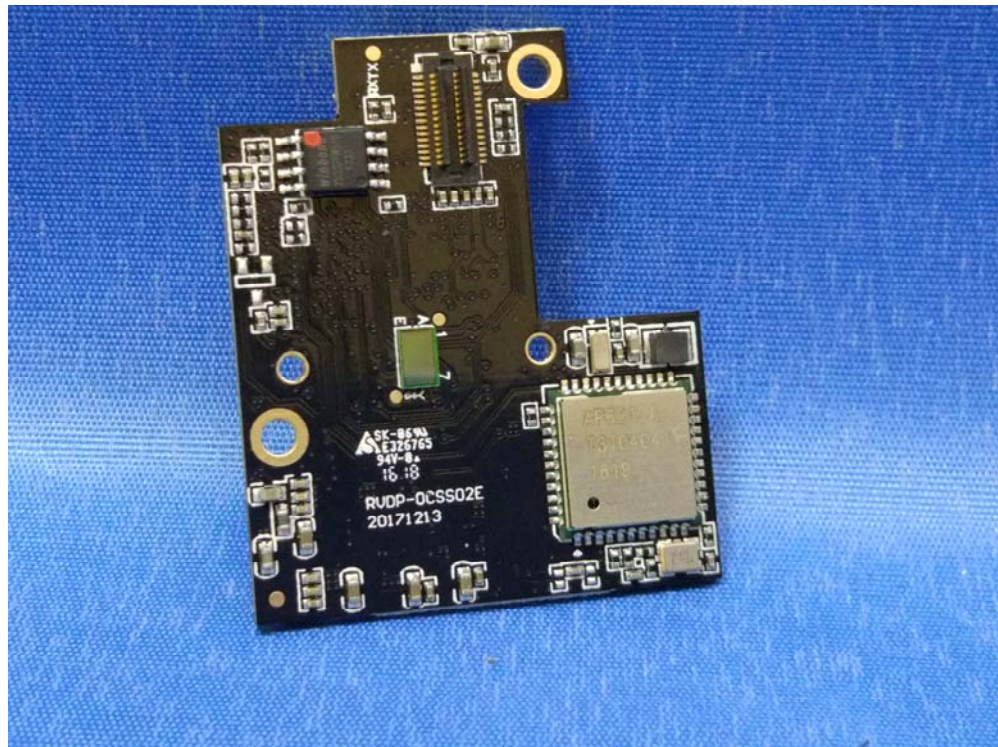


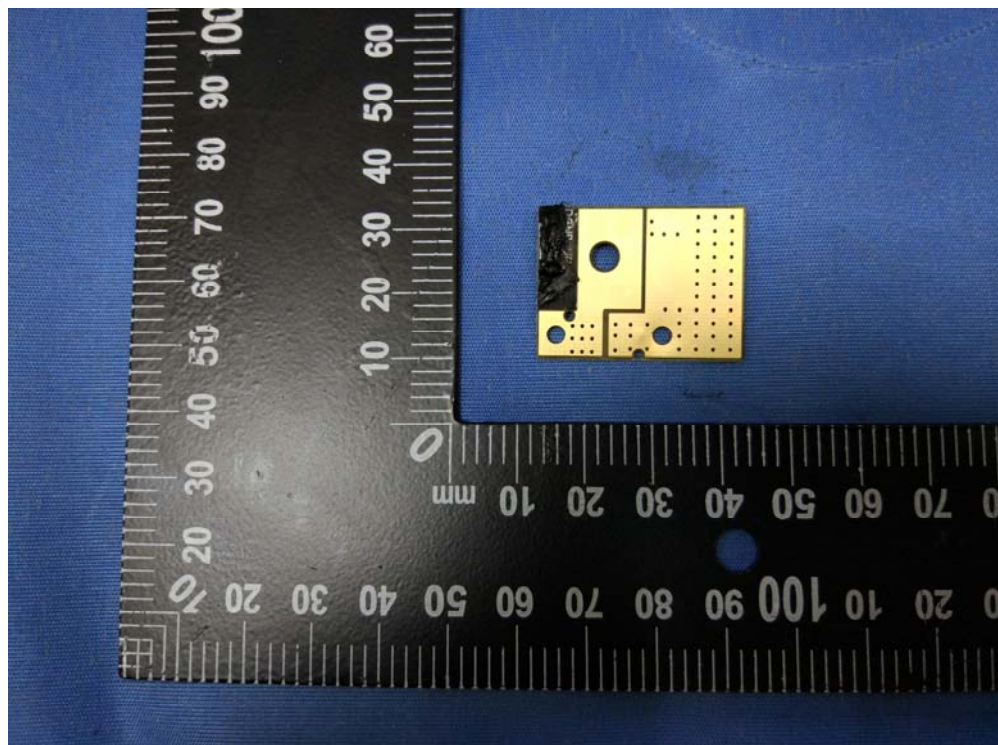


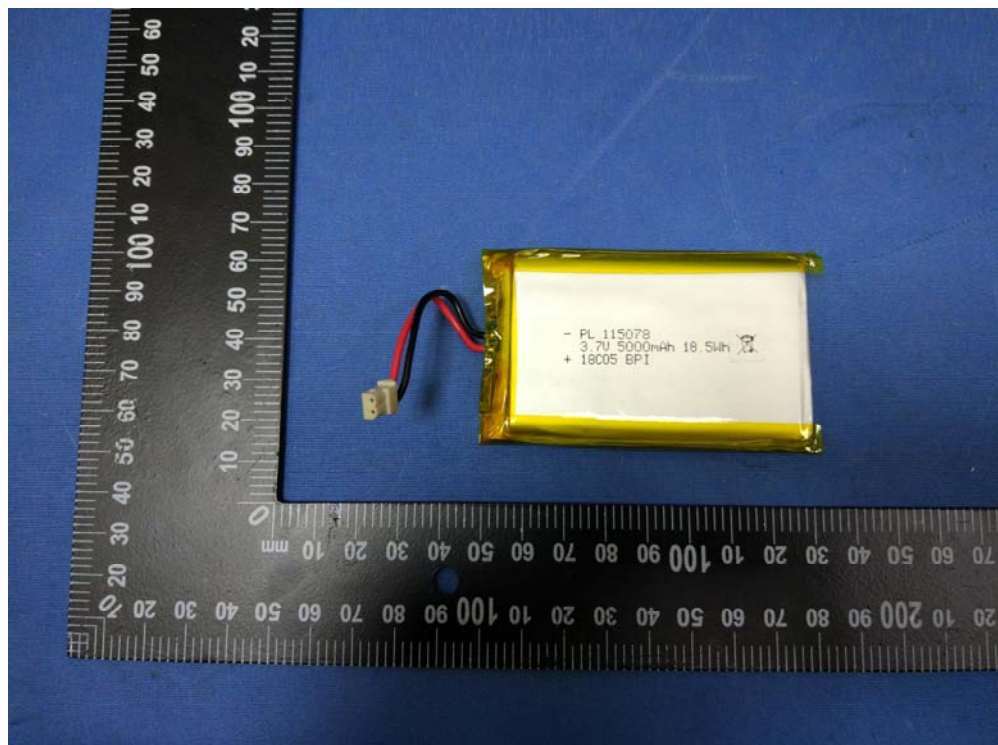
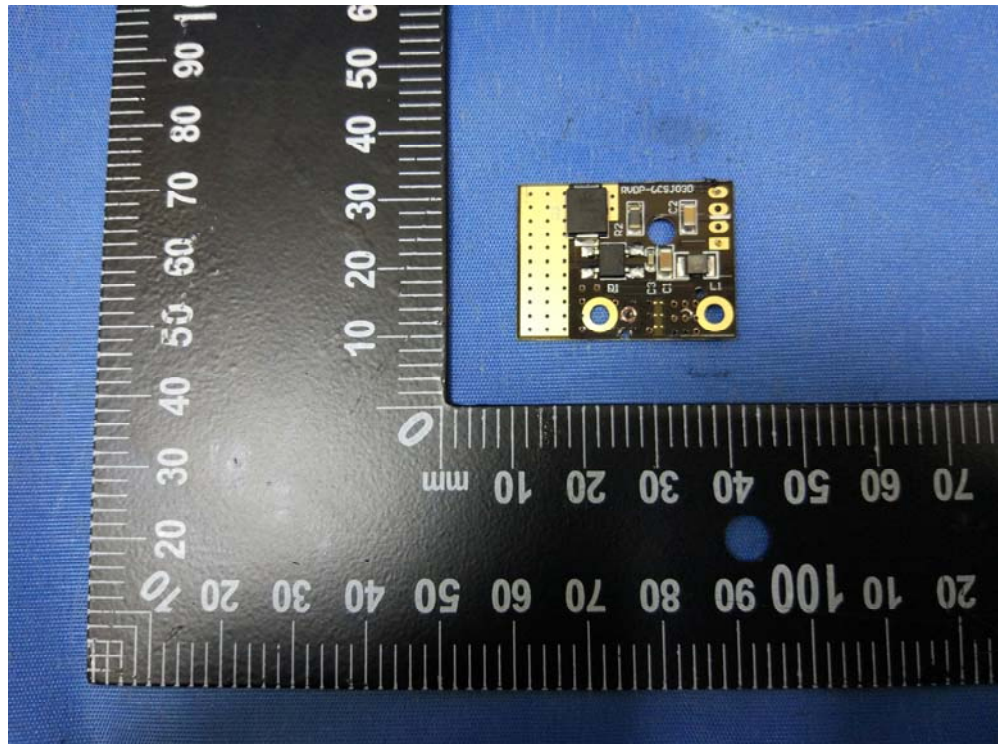


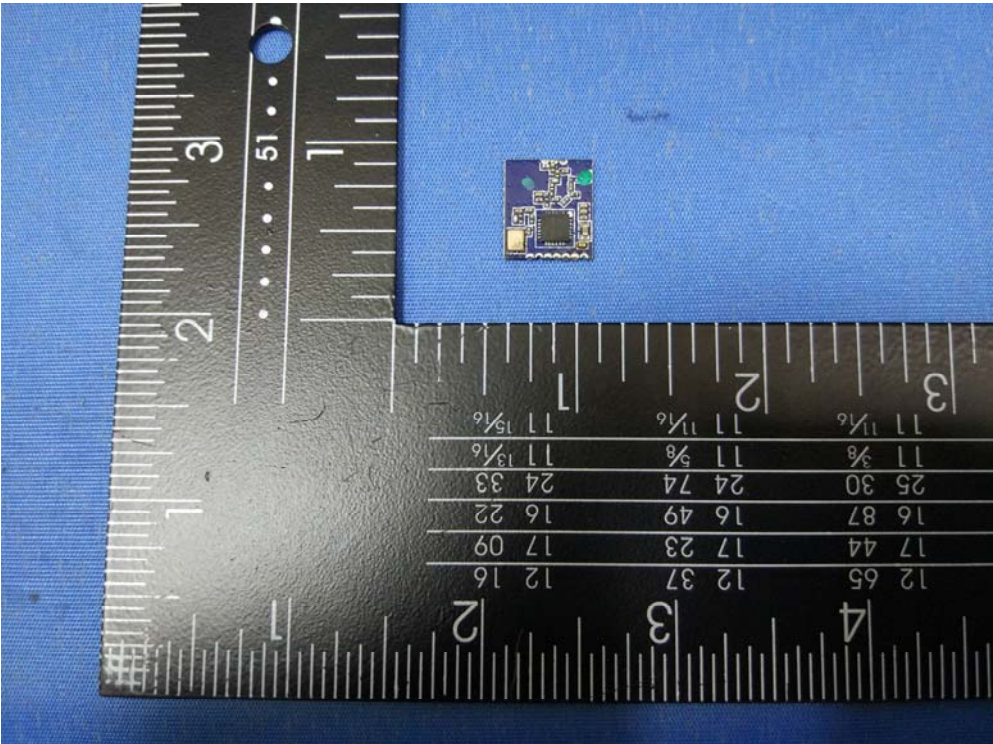
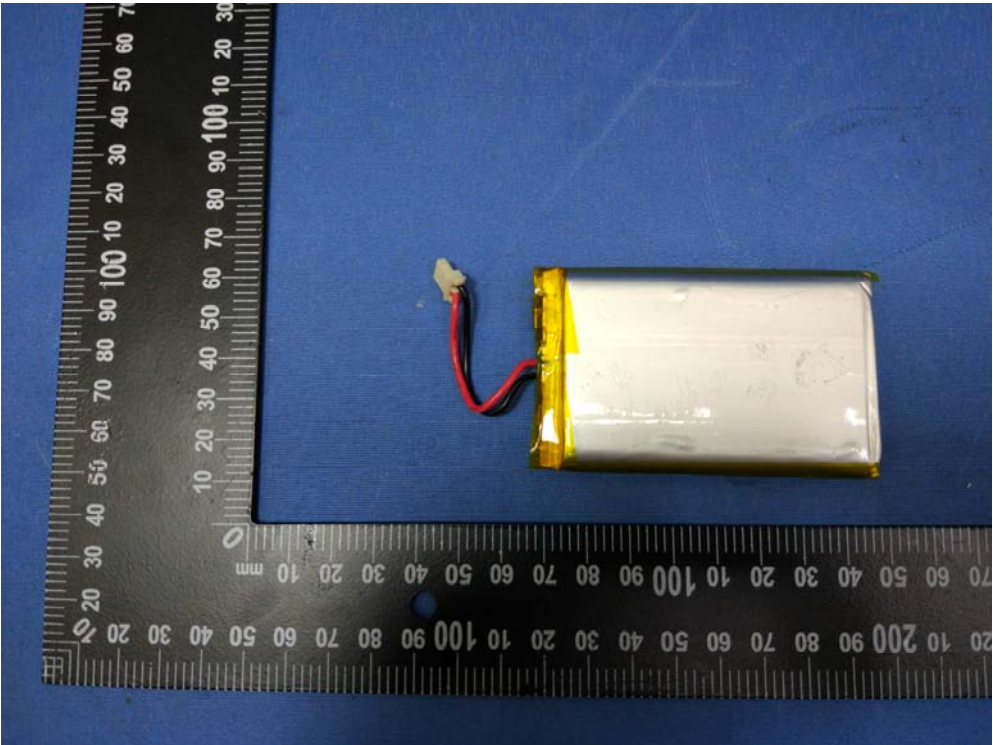


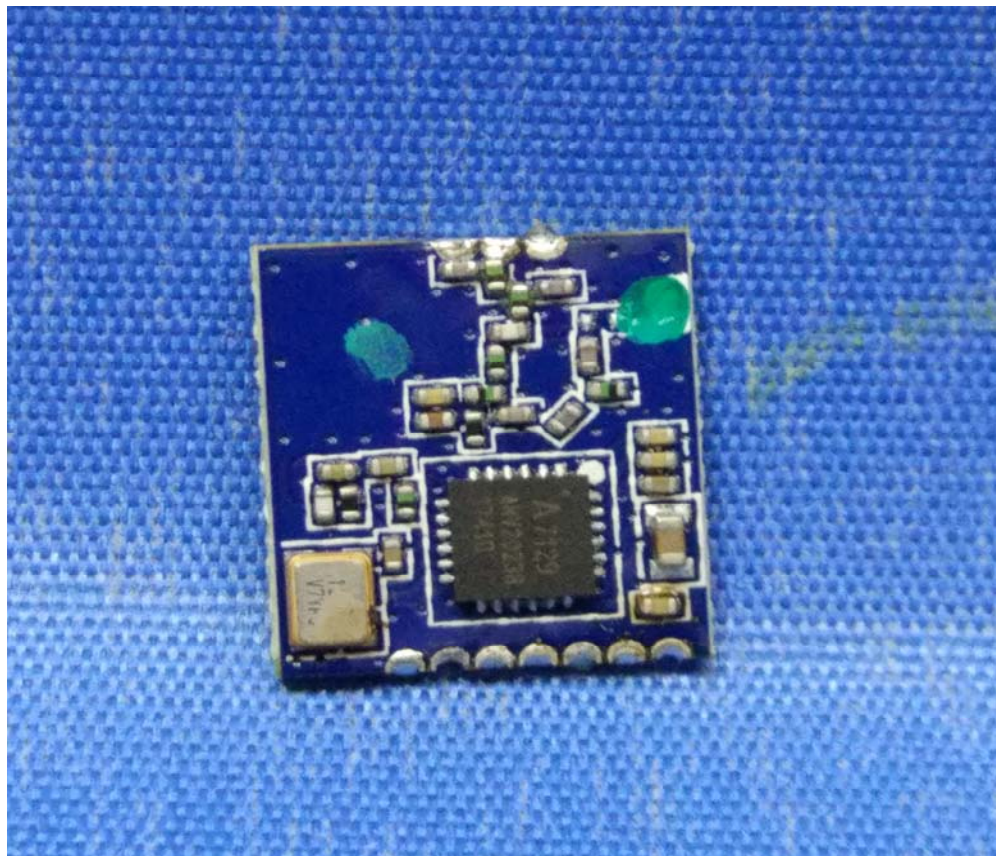
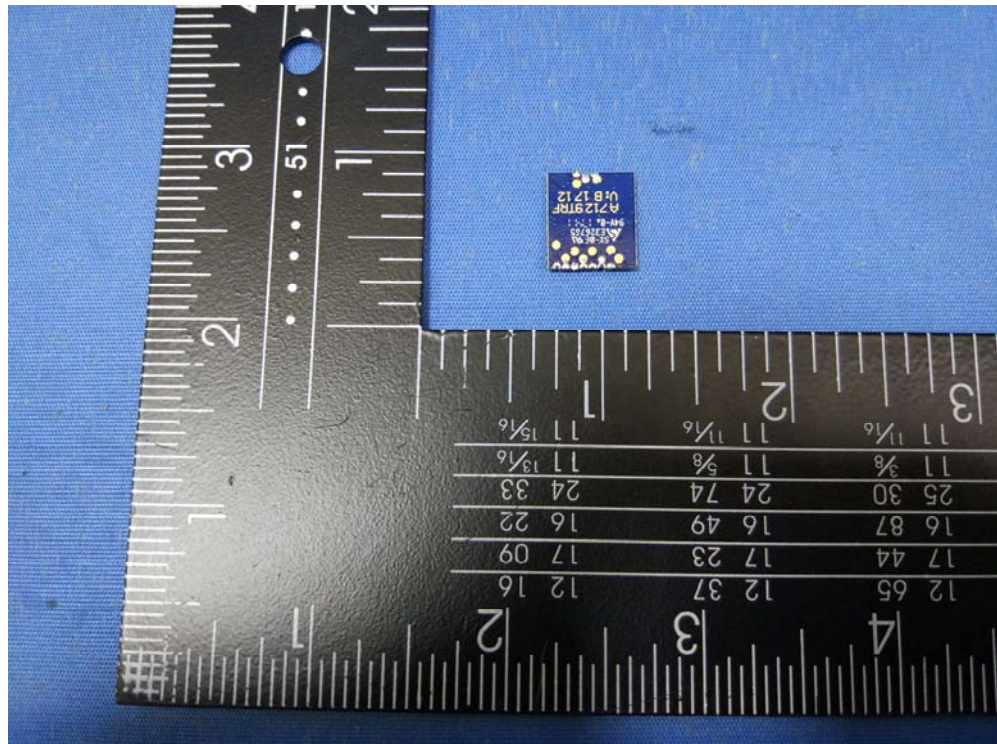












=====End of Report=====