# TEST REPORT

| | | |
|---|---|---|
| **Reference No.** ..... | : | WTS14S0312322E |
| **FCC ID**..... | : | XBASH001 |
| **Applicant** ..... | : | Aeon Labs LLC. |
| **Address** ..... | : | 121 Buckingham Drive Unit 36 Santa Claras California United States |
| **Manufacturer** ..... | : | Aeon Labs LLC. |
| **Address** ..... | : | 121 Buckingham Drive Unit 36 Santa Claras California United States |
| **Product Name** ..... | : | Power Supply for SONTE Film |
| **Model No**. ..... | : | SH001 |
| **Trademark** ..... | : | SONTE |
| **Standards**..... | : | FCC CFR47 Part 15 C Section 15.247:2012 |
| **Date of Receipt sample**..... | : | Mar.21, 2014 |
| **Date of Test**..... | : | Mar.26-Apr.11, 2014 |
| **Date of Issue** ..... | : | Apr.28, 2014 |
| **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.

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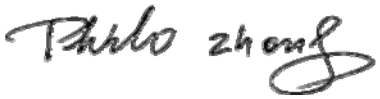
Compiled by:

Zero Zhou / Project Engineer

Approved by:



Philo Zhong / Manager

# 2 Test Summary

| Test Items | Test Requirement | Result |
|---|---|---|
| Radiated Emissions | 15.247<br>15.205(a)<br>15.209(a) | PASS |
| Conducted Emissions | 15.207(a) | PASS |
| 6dB Bandwidth | 15.247(a)(2) | PASS |
| Maximum Peak Output Power | 15.247(b)(3),(4) | PASS |
| Power Spectral Density | 15.247(e) | PASS |
| Band Edge | 15.247(d) | PASS |
| Antenna Requirement | 15.203 | PASS |
| Maximum Permissible Exposure<br>(Exposure of Humans to RF Fields) | 1.1307(b)(1) | PASS |

# 3 Contents

# 4 General Information

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

| | |
|---|---|
| Product Name | : Power Supply for SONTE Film |
| Model No. | : SH001 |
| Model Difference | : N/A |
| Operation Frequency | : 2412MHz ~ 2462MHz |
| The Lowest Oscillator | : 32.768kHz |
| Antenna Gain | : 3dBi |
| Type of modulation | : IEEE 802.11b (CCK/QPSK/BPSK,11Mbps max.)<br>IEEE 802.11g (BPSK/QPSK/16QAM/64QAM,54Mbps max.) |

## 4.2 Details of E.U.T.

| | |
|---|---|
| Technical Data | : Input: AC 100-240V, 50/60Hz, 35W Max<br>Output: AC 0-70V, 100mA*2 |

## 4.3 Test Mode

**Table 1 Tests Carried Out Under FCC part 15.247**

| Test Items | Test 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 |
| Power Spectral Density | 802.11b | 11 Mbps | 1/6/11 | TX |
| | 802.11g | 54 Mbps | 1/6/11 | TX |
| 6 dB Bandwidth | 802.11b | 11 Mbps | 1/11 | TX |
| | 802.11g | 54 Mbps | 1/11 | TX |
| Band Emissions | 802.11b | 11 Mbps | 1/6/11 | TX |
| | 802.11g | 54 Mbps | 1/6/11 | TX |
| Radiated Emissions | 802.11b | 11 Mbps | 1/6/11 | TX |
| | 802.11g | 54 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 .

**Table 2 Tests Carried Out Under FCC part 15.207 & FCC part 15.209**

| Test Item | Test Mode |
|---|---|
| Conduction Emission, 0.15MHz to 30MHz | Communication |

## 4.4 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A-1**

  Waltek Services(Shenzhen) Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A-1, July 12, 2012.

- **FCC – Registration No.: 880581**

  Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, May 26, 2011.

# 5 Equipment Used during Test

## 5.1 Equipments List

| Conducted Emissions at Mains Terminals Disturbance Voltage | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Calibration Date** | **Calibration Due Date** |
| 1. | EMI Test Receiver | R&S | ESCI | 100947 | Sep.18,2013 | Sep.17,2014 |
| 2. | LISN | R&S | ENV216 | 101215 | Nov. 29,2013 | Nov. 28,2014 |
| 3. | Cable | Top | TYPE16(3.5M) | - | Sep.18,2013 | Sep.17,2014 |
| **3m Semi-anechoic Chamber for Radiation** | | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Calibration Date** | **Calibration Due Date** |
| 1 | EMC Analyzer | Agilent | E7405A | MY45114943 | Sep.18,2013 | Sep.17,2014 |
| 2 | Active Loop Antenna | Beijing Dazhi | ZN30900A | - | Sep.18,2013 | Sep.17,2014 |
| 3 | Trilog Broadband Antenna | SCHWARZBECK | VULB9163 | 336 | Apr.20,2013 | Apr.19,2014 |
| 4 | Coaxial Cable (below 1GHz) | Top | TYPE16(13M) | - | Sep.18,2013 | Sep.17,2014 |
| 5 | Broad-band Horn Antenna | SCHWARZBECK | BBHA 9120 D | 667 | Apr.20,2013 | Apr.19,2014 |
| 6 | Broad-band Horn Antenna | SCHWARZBECK | BBHA 9170 | 335 | Apr.20,2013 | Apr.19,2014 |
| 7 | Broadband Preamplifier | COMPLIANCE DIRECTION | PAP-1G18 | 2004 | Mar.17,2014 | Mar.16,2015 |
| 8 | Coaxial Cable (above 1GHz) | Top | 1GHz-25GHz | EW02014-7 | Apr.10,2014 | Apr.09,2015 |

## 5.2 Measurement Uncertainty

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

## 5.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

# 6 Conducted Emission

| | |
|---|---|
| Test Requirement: | FCC CFR 47 Part 15 Section 15.207 |
| Test Method: | ANSI C63.4:2003 |
| Test Result: | PASS |
| Frequency Range: | 150kHz to 30MHz |
| Class: | Class B |
| Limit: | 66-56 dBμV between 0.15MHz & 0.5MHz<br>56 dBμV between 0.5MHz & 5MHz<br>60 dBμV between 5MHz & 30MHz |
| Detector: | Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit |

## 6.1 E.U.T. Operation

**Operating Environment:**

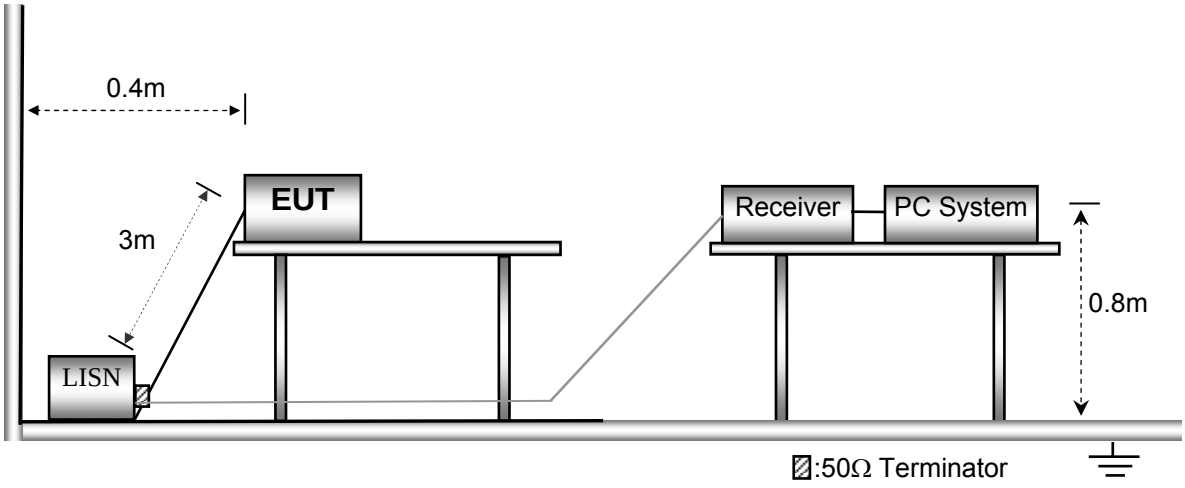
Temperature: 22.5 °C
Humidity: 52.6 % RH
Atmospheric Pressure: 101.2 kPa

**EUT Operation:**

The pre-test was performed in communication mode, and the test data were shown as follow.
The EUT was tested according to ANSI C63.4:2003. The frequency spectrum from 150kHz to 30MHz was investigated.
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.

## 6.2 EUT Setup

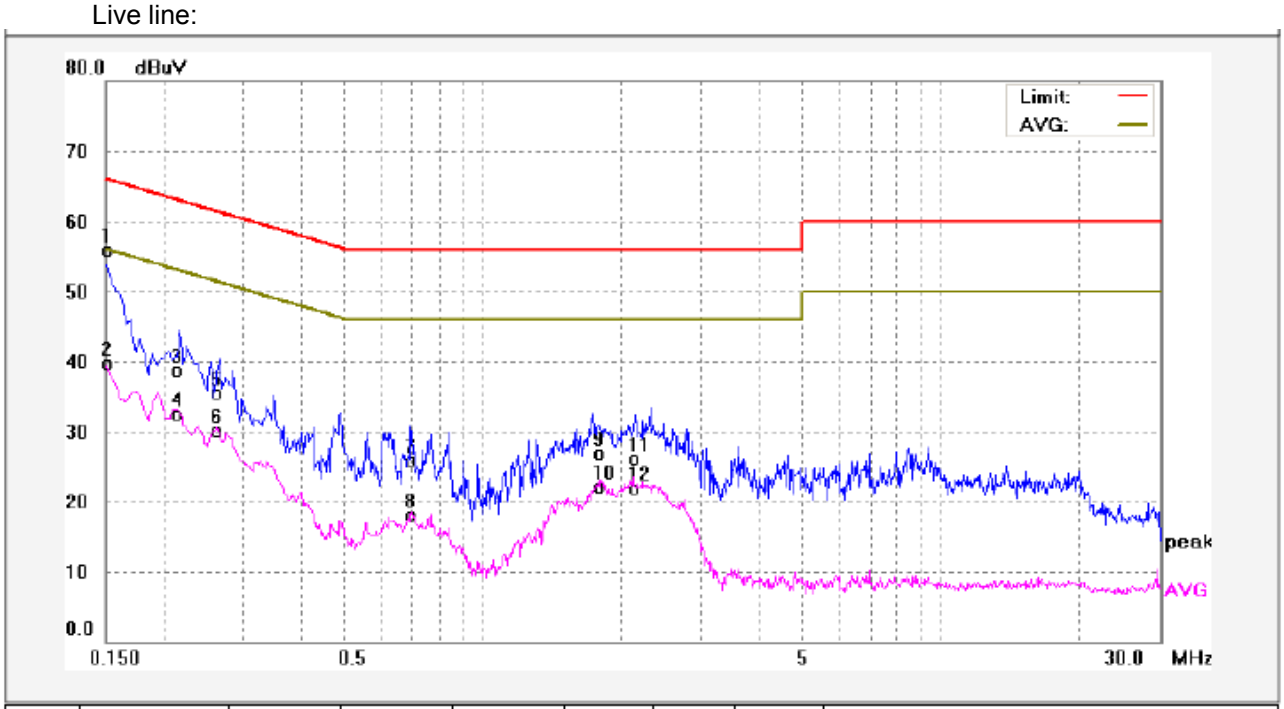
The conducted emission tests were performed using the setup accordance with the ANSI C63.4:2003.



## 6.3 Conducted Emission Test Result

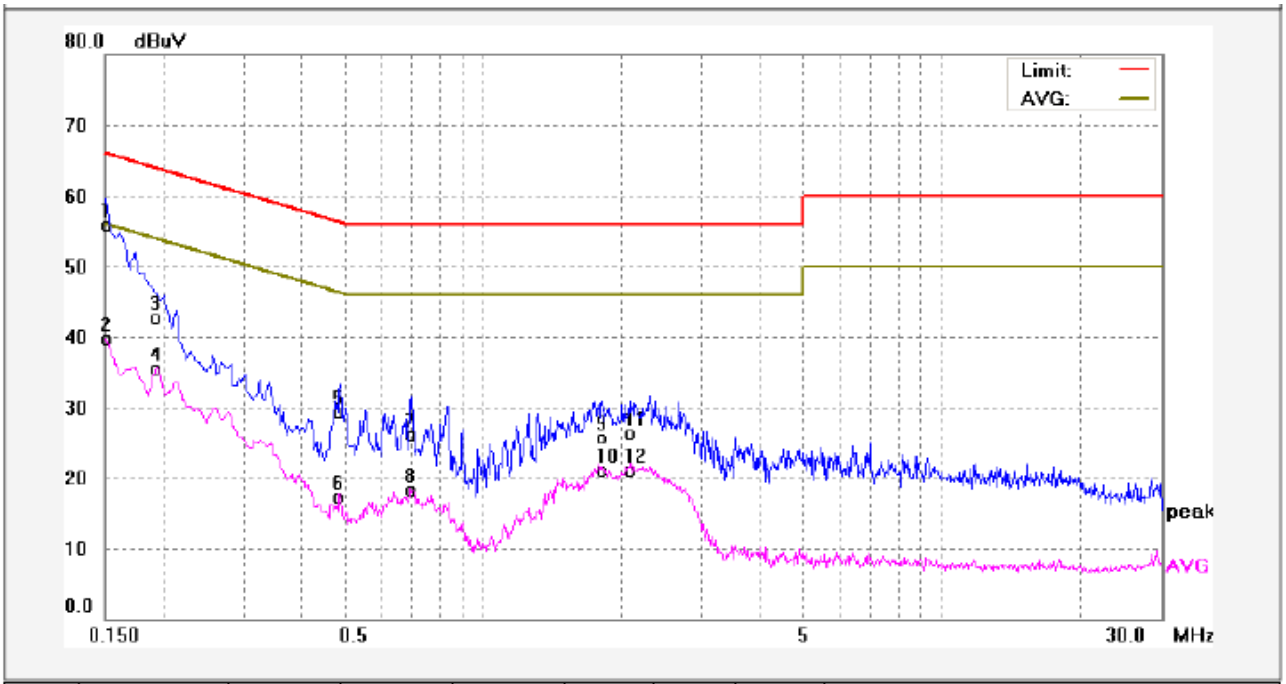
An initial pre-scan was performed on the live and neutral lines.

Live line:




| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit dBuV | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.1500 | 46.02 | 9.80 | 55.82 | 65.99 | -10.17 | QP | |
| 2 | 0.1500 | 29.97 | 9.80 | 39.77 | 55.99 | -16.22 | AVG | |
| 3 | 0.2140 | 28.85 | 9.84 | 38.69 | 63.04 | -24.35 | QP | |
| 4 | 0.2140 | 22.59 | 9.84 | 32.43 | 53.04 | -20.61 | AVG | |
| 5 | 0.2620 | 25.65 | 9.86 | 35.51 | 61.36 | -25.85 | QP | |
| 6 | 0.2620 | 20.22 | 9.86 | 30.08 | 51.36 | -21.28 | AVG | |
| 7 | 0.6940 | 15.87 | 9.95 | 25.82 | 56.00 | -30.18 | QP | |
| 8 | 0.6940 | 8.09 | 9.95 | 18.04 | 46.00 | -27.96 | AVG | |
| 9 | 1.8100 | 16.90 | 10.00 | 26.90 | 56.00 | -29.10 | QP | |
| 10 | 1.8100 | 12.02 | 10.00 | 22.02 | 46.00 | -23.98 | AVG | |
| 11 | 2.1380 | 16.17 | 10.00 | 26.17 | 56.00 | -29.83 | QP | |
| 12 | 2.1380 | 11.92 | 10.00 | 21.92 | 46.00 | -24.08 | AVG | |

Neutral line:




| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit dBuV | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.1500 | 46.08 | 9.80 | 55.88 | 65.99 | -10.11 | QP | |
| 2 | 0.1500 | 29.99 | 9.80 | 39.79 | 55.99 | -16.20 | AVG | |
| 3 | 0.1955 | 32.79 | 9.84 | 42.63 | 63.80 | -21.17 | QP | |
| 4 | 0.1955 | 25.63 | 9.84 | 35.47 | 53.80 | -18.33 | AVG | |
| 5 | 0.4900 | 19.46 | 9.93 | 29.39 | 56.17 | -26.78 | QP | |
| 6 | 0.4900 | 7.34 | 9.93 | 17.27 | 46.17 | -28.90 | AVG | |
| 7 | 0.6980 | 16.15 | 9.95 | 26.10 | 56.00 | -29.90 | QP | |
| 8 | 0.6980 | 8.35 | 9.95 | 18.30 | 46.00 | -27.70 | AVG | |
| 9 | 1.8180 | 15.66 | 10.00 | 25.66 | 56.00 | -30.34 | QP | |
| 10 | 1.8180 | 11.10 | 10.00 | 21.10 | 46.00 | -24.90 | AVG | |
| 11 | 2.1020 | 16.22 | 10.00 | 26.22 | 56.00 | -29.78 | QP | |
| 12 | 2.1020 | 11.12 | 10.00 | 21.12 | 46.00 | -24.88 | AVG | |

# 7 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.4:2003

Test Result: PASS

Measurement Distance: 3m

Limit:

| Frequency (MHz) | Field Strength | | Field Strength Limit at 3m Measurement Dist | |
|---|---|---|---|---|
| | uV/m | Distance (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 | $20\log^{(500)}$ |

## 7.1 EUT Operation :

Operating Environment:

Temperature: 22.8 °C

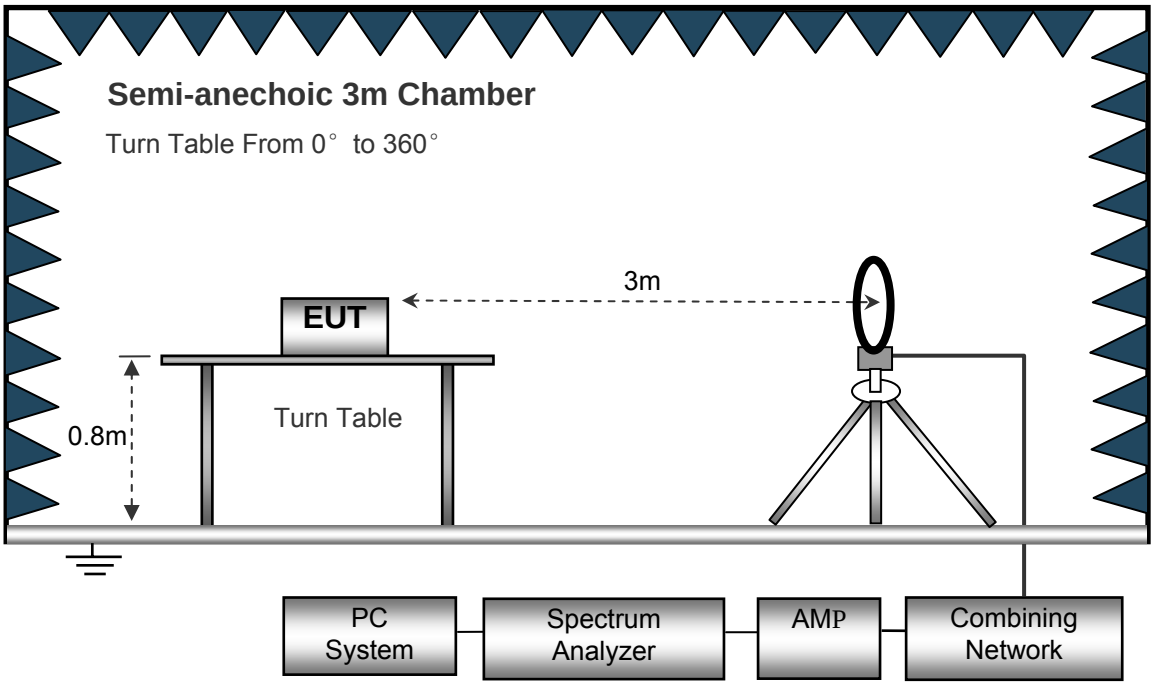
Humidity: 51.9 % RH

Atmospheric Pressure: 101.3 kPa

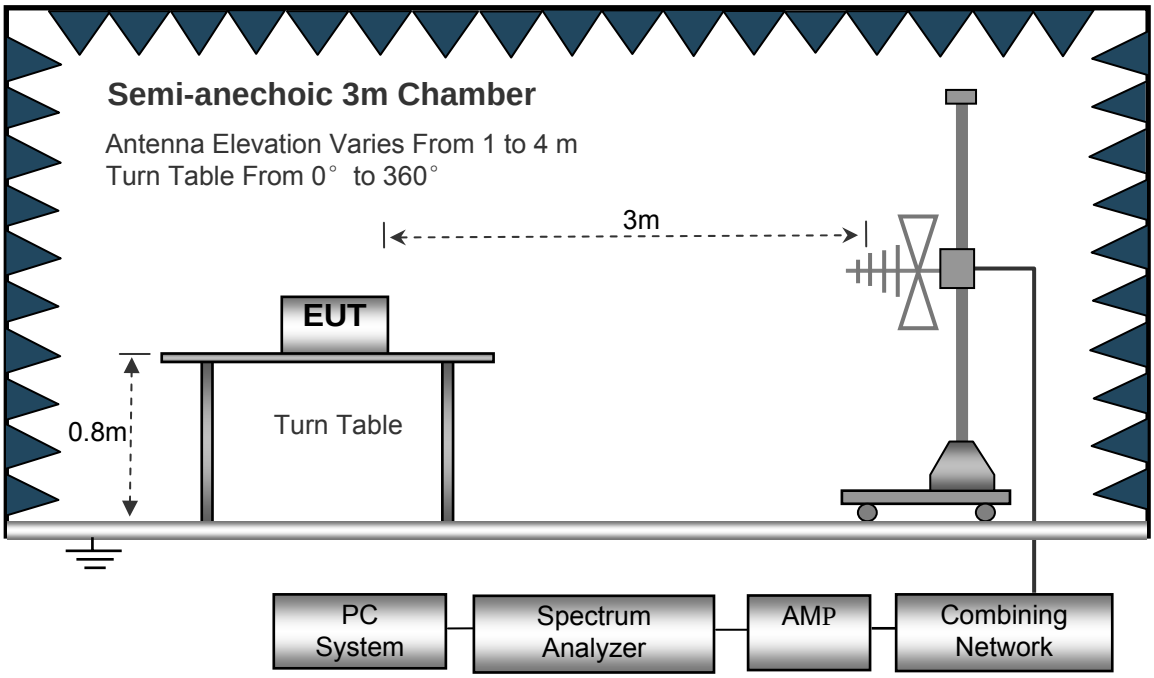
## 7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4: 2003.

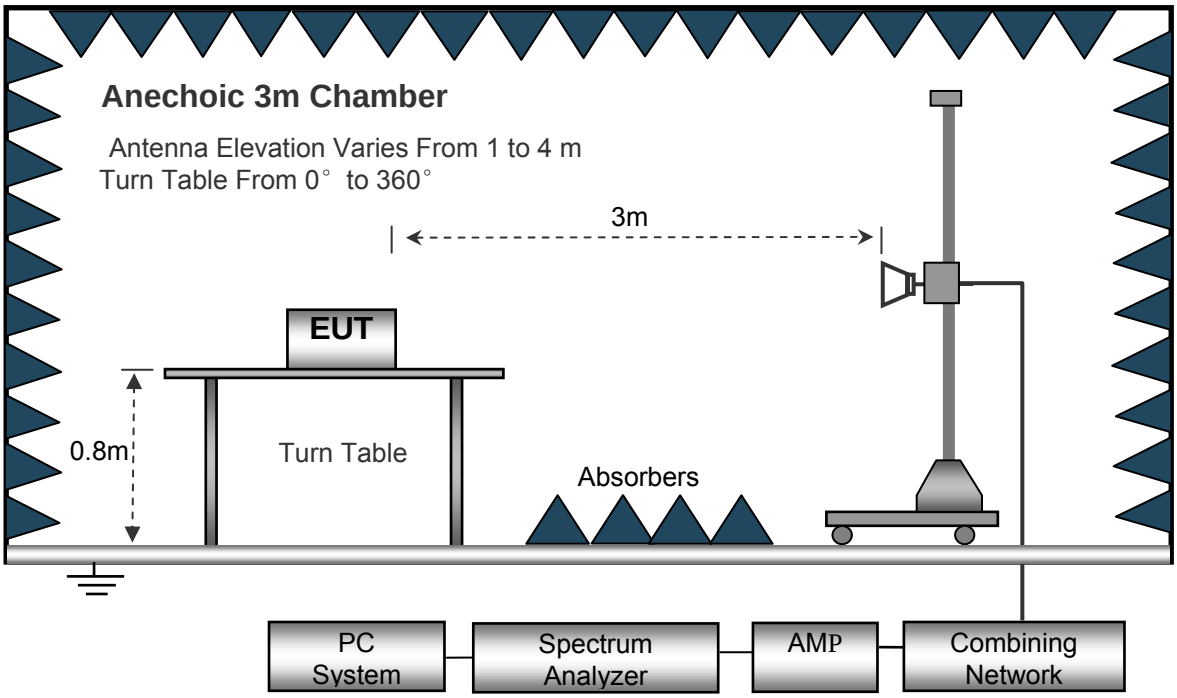
The test setup for emission measurement below 30MHz.




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



The test setup for emission measurement above 1 GHz.




## 7.3 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested from 32.768kHz to 25000MHz.

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

## 7.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is 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 druing radiated emissions above 1GHz measurement.

## 7.5 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:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - 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:

Margin = Corr. Ampl. – Limit

## 7.6 Summary of Test Results

**Test Frequency : Below 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 | | | | | | | | | |
| 105.27 | 19.52 | PK | 339 | 1.5 | H | 14.41 | 33.93 | 40.00 | -6.07 |
| 105.27 | 21.78 | PK | 217 | 1.7 | V | 14.41 | 36.19 | 40.00 | -3.81 |
| 4824.00 | 52.74 | PK | 287 | 1.4 | V | -1.06 | 51.68 | 74.00 | -22.32 |
| 4824.00 | 44.07 | Ave | 287 | 1.4 | V | -1.06 | 43.01 | 54.00 | -10.99 |
| 7236.00 | 40.22 | PK | 295 | 1.8 | H | 1.33 | 41.55 | 74.00 | -32.45 |
| 7236.00 | 37.95 | Ave | 295 | 1.8 | H | 1.33 | 39.28 | 54.00 | -14.72 |
| 2321.45 | 45.04 | PK | 192 | 1.2 | V | -13.19 | 31.85 | 74.00 | -42.15 |
| 2321.45 | 37.09 | Ave | 192 | 1.2 | V | -13.19 | 23.90 | 54.00 | -30.10 |
| 2387.21 | 44.16 | PK | 307 | 1.3 | H | -13.14 | 31.02 | 74.00 | -42.98 |
| 2387.21 | 38.96 | Ave | 307 | 1.3 | H | -13.14 | 25.82 | 54.00 | -28.18 |
| 2499.53 | 42.77 | PK | 201 | 2.0 | V | -13.08 | 29.69 | 74.00 | -44.31 |
| 2499.53 | 37.68 | Ave | 201 | 2.0 | V | -13.08 | 24.60 | 54.00 | -29.40 |

| 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 | | | | | | | | | |
| 105.27 | 18.31 | PK | 195 | 1.1 | H | 14.41 | 32.72 | 40.00 | -7.28 |
| 105.27 | 20.69 | PK | 181 | 1.6 | V | 14.41 | 35.10 | 40.00 | -4.90 |
| 4874.00 | 51.46 | PK | 267 | 1.1 | V | -0.62 | 50.84 | 74.00 | -23.16 |
| 4874.00 | 45.24 | Ave | 267 | 1.1 | V | -0.62 | 44.62 | 54.00 | -9.38 |
| 7311.00 | 39.72 | PK | 335 | 1.3 | H | 2.21 | 41.93 | 74.00 | -32.07 |
| 7311.00 | 39.40 | Ave | 335 | 1.3 | H | 2.21 | 41.61 | 54.00 | -12.39 |
| 2346.24 | 46.46 | PK | 154 | 1.7 | V | -13.19 | 33.27 | 74.00 | -40.73 |
| 2346.24 | 39.72 | Ave | 154 | 1.7 | V | -13.19 | 26.53 | 54.00 | -27.47 |
| 2350.81 | 43.16 | PK | 42 | 1.7 | H | -13.14 | 30.02 | 74.00 | -43.98 |
| 2350.81 | 37.01 | Ave | 42 | 1.7 | H | -13.14 | 23.87 | 54.00 | -30.13 |
| 2494.79 | 42.05 | PK | 175 | 1.7 | V | -13.08 | 28.97 | 74.00 | -45.03 |
| 2494.79 | 37.24 | Ave | 175 | 1.7 | V | -13.08 | 24.16 | 54.00 | -29.84 |

| 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 | | | | | | | | | |
| 105.27 | 19.14 | PK | 351 | 1.3 | H | 14.41 | 33.55 | 40.00 | -6.45 |
| 105.27 | 21.92 | PK | 350 | 1.8 | V | 14.41 | 36.33 | 40.00 | -3.67 |
| 4924.00 | 50.25 | PK | 257 | 1.7 | V | -0.24 | 50.01 | 74.00 | -23.99 |
| 4924.00 | 46.47 | Ave | 257 | 1.7 | V | -0.24 | 46.23 | 54.00 | -7.77 |
| 7386.00 | 40.83 | PK | 330 | 1.4 | H | 2.84 | 43.67 | 74.00 | -30.33 |
| 7386.00 | 38.05 | Ave | 330 | 1.4 | H | 2.84 | 40.89 | 54.00 | -13.11 |
| 2323.54 | 45.03 | PK | 2 | 1.4 | V | -13.19 | 31.84 | 74.00 | -42.16 |
| 2323.54 | 38.25 | Ave | 2 | 1.4 | V | -13.19 | 25.06 | 54.00 | -28.94 |
| 2350.76 | 43.65 | PK | 78 | 1.4 | H | -13.14 | 30.51 | 74.00 | -43.49 |
| 2350.76 | 36.21 | Ave | 78 | 1.4 | H | -13.14 | 23.07 | 54.00 | -30.93 |
| 2493.98 | 44.18 | PK | 288 | 1.7 | V | -13.08 | 31.10 | 74.00 | -42.90 |
| 2493.98 | 36.47 | Ave | 288 | 1.7 | V | -13.08 | 23.39 | 54.00 | -30.61 |

| 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 | | | | | | | | | |
| 105.27 | 19.29 | PK | 350 | 2.0 | H | 14.41 | 33.70 | 40.00 | -6.30 |
| 105.27 | 21.17 | PK | 15 | 1.0 | V | 14.41 | 35.58 | 40.00 | -4.42 |
| 4824.00 | 51.33 | PK | 2 | 1.4 | V | -1.06 | 50.27 | 74.00 | -23.73 |
| 4824.00 | 46.79 | Ave | 2 | 1.4 | V | -1.06 | 45.73 | 54.00 | -8.27 |
| 7236.00 | 39.54 | PK | 297 | 1.5 | H | 1.33 | 40.87 | 74.00 | -33.13 |
| 7236.00 | 37.84 | Ave | 297 | 1.5 | H | 1.33 | 39.17 | 54.00 | -14.83 |
| 2328.31 | 46.76 | PK | 186 | 1.9 | V | -13.19 | 33.57 | 74.00 | -40.43 |
| 2328.31 | 38.33 | Ave | 186 | 1.9 | V | -13.19 | 25.14 | 54.00 | -28.86 |
| 2366.30 | 43.03 | PK | 57 | 1.1 | H | -13.14 | 29.89 | 74.00 | -44.11 |
| 2366.30 | 38.10 | Ave | 57 | 1.1 | H | -13.14 | 24.96 | 54.00 | -29.04 |
| 2487.68 | 44.86 | PK | 329 | 1.0 | V | -13.08 | 31.78 | 74.00 | -42.22 |
| 2487.68 | 36.23 | Ave | 329 | 1.0 | V | -13.08 | 23.15 | 54.00 | -30.85 |

| 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 | | | | | | | | | |
| 105.27 | 19.78 | PK | 26 | 1.4 | H | 14.41 | 34.19 | 40.00 | -5.81 |
| 105.27 | 22.19 | PK | 219 | 1.4 | V | 14.41 | 36.60 | 40.00 | -3.40 |
| 4874.00 | 52.60 | PK | 37 | 1.2 | V | -0.62 | 51.98 | 74.00 | -22.02 |
| 4874.00 | 47.29 | Ave | 37 | 1.2 | V | -0.62 | 46.67 | 54.00 | -7.33 |
| 7311.00 | 39.06 | PK | 301 | 1.9 | H | 2.21 | 41.27 | 74.00 | -32.73 |
| 7311.00 | 38.34 | Ave | 301 | 1.9 | H | 2.21 | 40.55 | 54.00 | -13.45 |
| 2349.92 | 46.92 | PK | 212 | 2.0 | V | -13.19 | 33.73 | 74.00 | -40.27 |
| 2349.92 | 39.94 | Ave | 212 | 2.0 | V | -13.19 | 26.75 | 54.00 | -27.25 |
| 2389.12 | 43.66 | PK | 308 | 1.5 | H | -13.14 | 30.52 | 74.00 | -43.48 |
| 2389.12 | 37.18 | Ave | 308 | 1.5 | H | -13.14 | 24.04 | 54.00 | -29.96 |
| 2485.96 | 42.78 | PK | 225 | 1.9 | V | -13.08 | 29.70 | 74.00 | -44.30 |
| 2485.96 | 37.62 | Ave | 225 | 1.9 | V | -13.08 | 24.54 | 54.00 | -29.46 |

| 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 | | | | | | | | | |
| 105.27 | 18.91 | PK | 201 | 1.3 | H | 14.41 | 33.32 | 40.00 | -6.68 |
| 105.27 | 21.70 | PK | 288 | 1.6 | V | 14.41 | 36.11 | 40.00 | -3.89 |
| 4924.00 | 51.31 | PK | 296 | 1.5 | V | -0.24 | 51.07 | 74.00 | -22.93 |
| 4924.00 | 48.25 | Ave | 296 | 1.5 | V | -0.24 | 48.01 | 54.00 | -5.99 |
| 7386.00 | 40.22 | PK | 304 | 1.3 | H | 2.84 | 43.06 | 74.00 | -30.94 |
| 7386.00 | 38.79 | Ave | 304 | 1.3 | H | 2.84 | 41.63 | 54.00 | -12.37 |
| 2311.17 | 45.19 | PK | 19 | 1.4 | V | -13.19 | 32.00 | 74.00 | -42.00 |
| 2311.17 | 37.14 | Ave | 19 | 1.4 | V | -13.19 | 23.95 | 54.00 | -30.05 |
| 2367.49 | 44.54 | PK | 133 | 1.3 | H | -13.14 | 31.40 | 74.00 | -42.60 |
| 2367.49 | 36.69 | Ave | 133 | 1.3 | H | -13.14 | 23.55 | 54.00 | -30.45 |
| 2491.45 | 43.97 | PK | 354 | 1.0 | V | -13.08 | 30.89 | 74.00 | -43.11 |
| 2491.45 | 36.40 | Ave | 354 | 1.0 | V | -13.08 | 23.32 | 54.00 | -30.68 |

**Test Frequency: Above 18GHz**

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

# 8 Band Edge Measurement

| | |
|---|---|
| Test Requirement: | FCC CFR47 Part 15 Section 15.247 |
| Test Method: | KDB558074 D01 v03r01 04/09/2013 |
| Detector: | For Peak value:<br>RBW = 100kHz<br>VBW = 100kHz; Sweep = auto<br>Detector function = p<br>Trace = max hold |

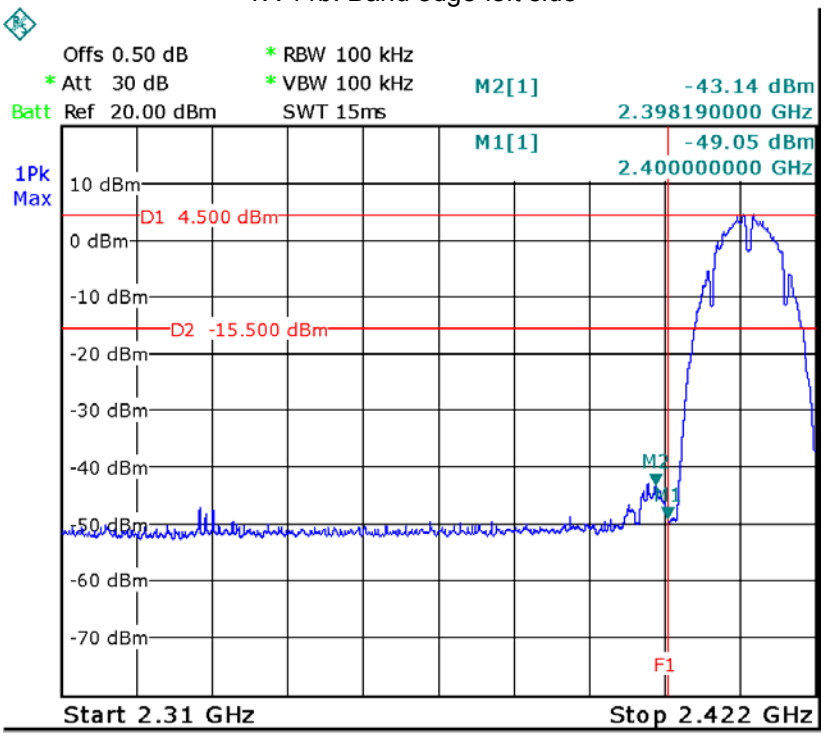
## 8.1 Test Produce

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.

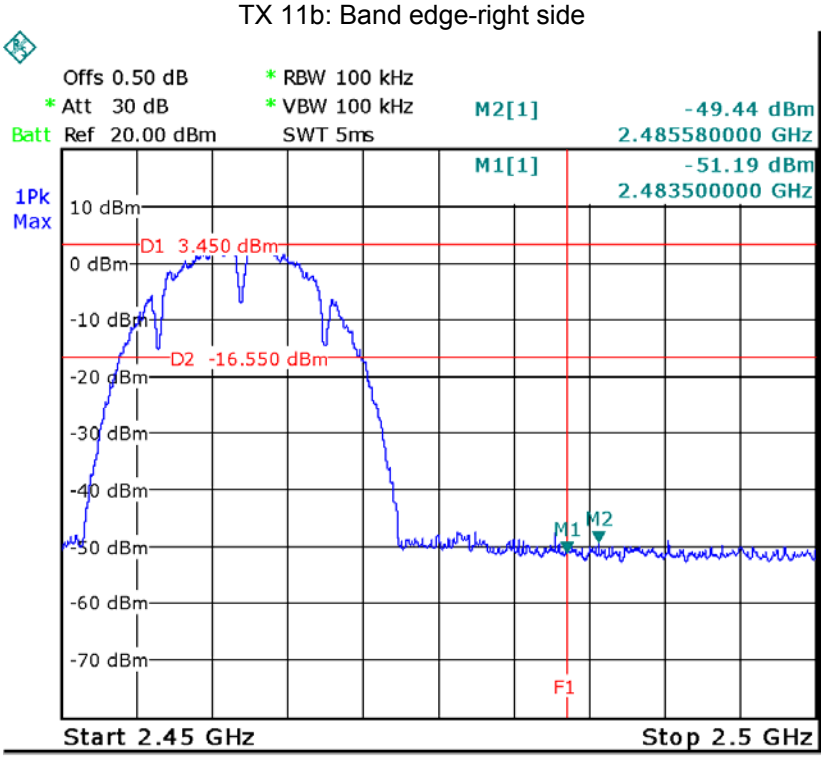
## 8.2 Test Result

Test result plots shown as follows:

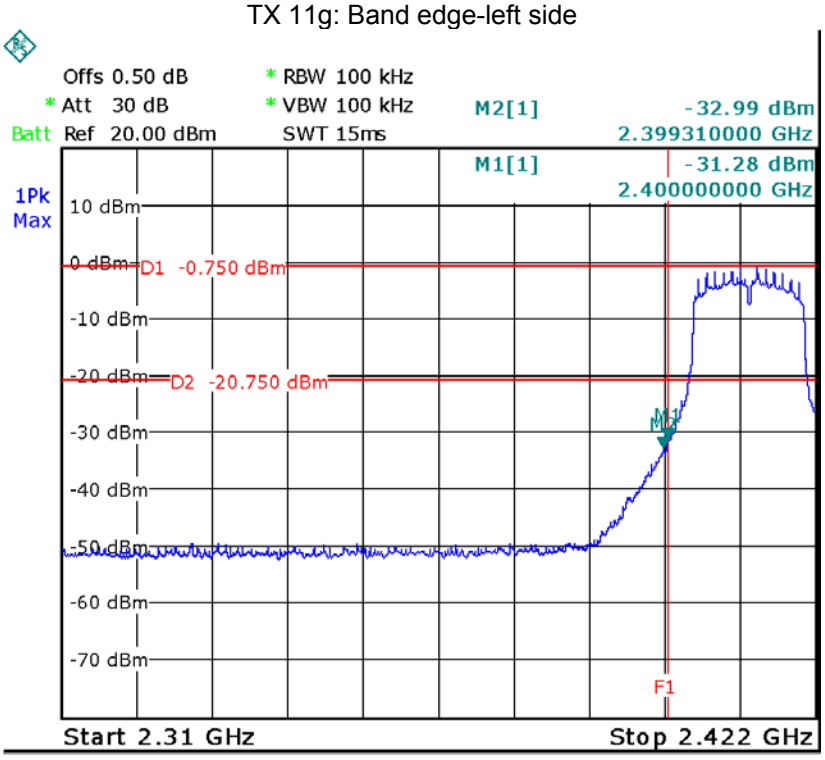
TX 11b: Band edge-left side



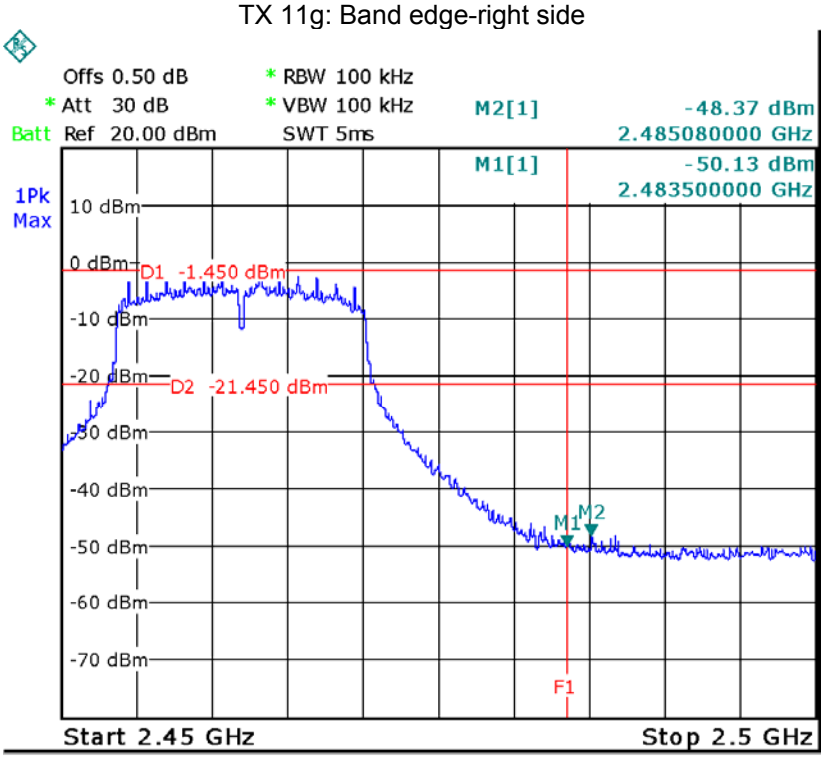

TX 11b: Band edge-right side



TX 11g: Band edge-left side




TX 11g: Band edge-right side



# 9 6 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB558074 D01 v03r01 04/09/2013

## 9.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

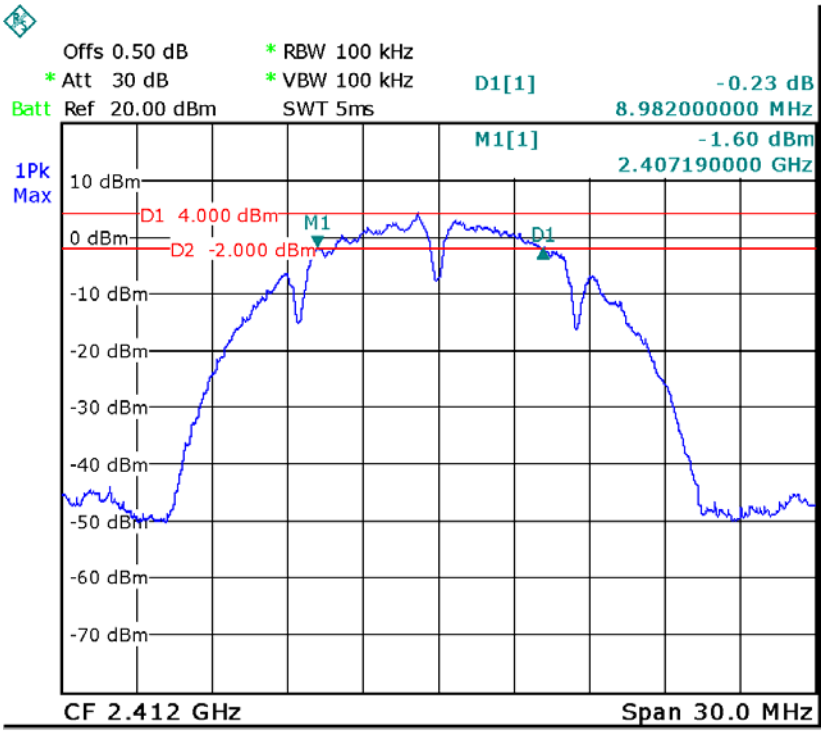
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 100kHz

## 9.2 Test Result:

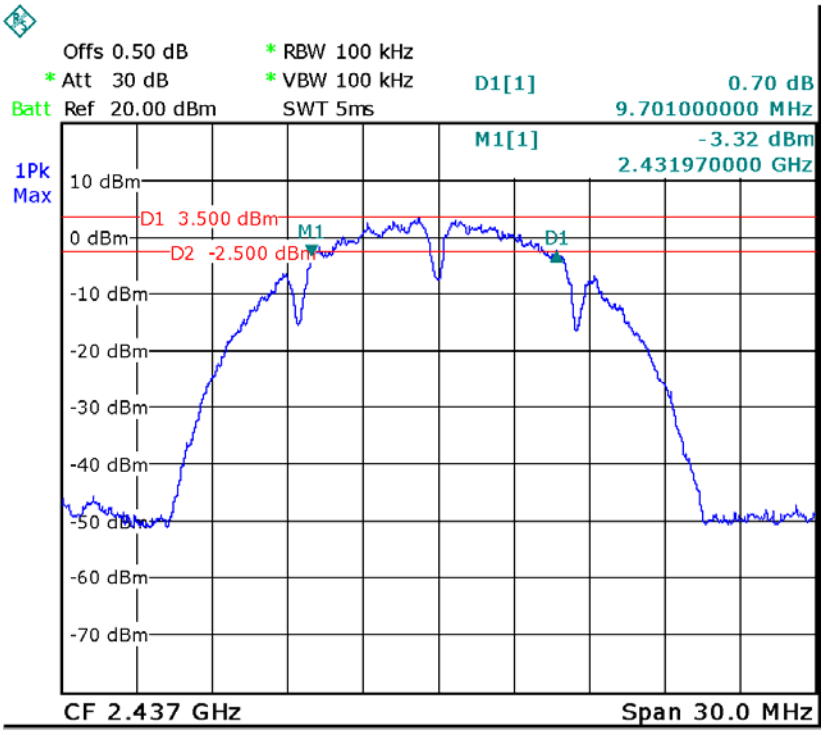
| Operation mode | Bandwidth (MHz) | | |
|---|---|---|---|
| TX 11b | Channel 1 | Channel 6 | Channel 11 |
| | 8.982 | 9.701 | 9.820 |
| TX 11g | Channel 1 | Channel 6 | Channel 11 |
| | 16.048 | 16.287 | 16.108 |

Test result plot as follows:

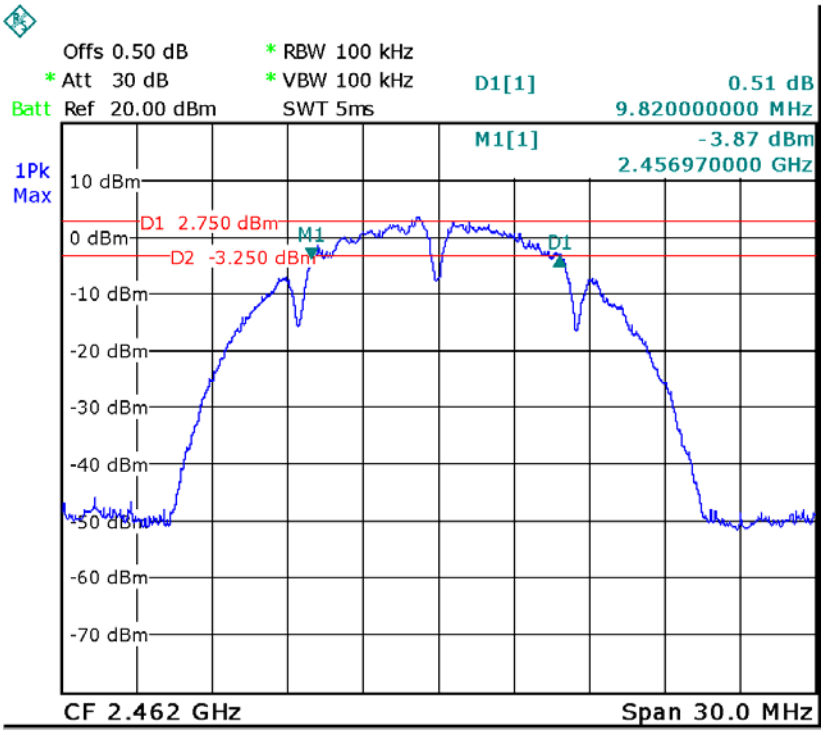
Mode: TX 11b channel 1



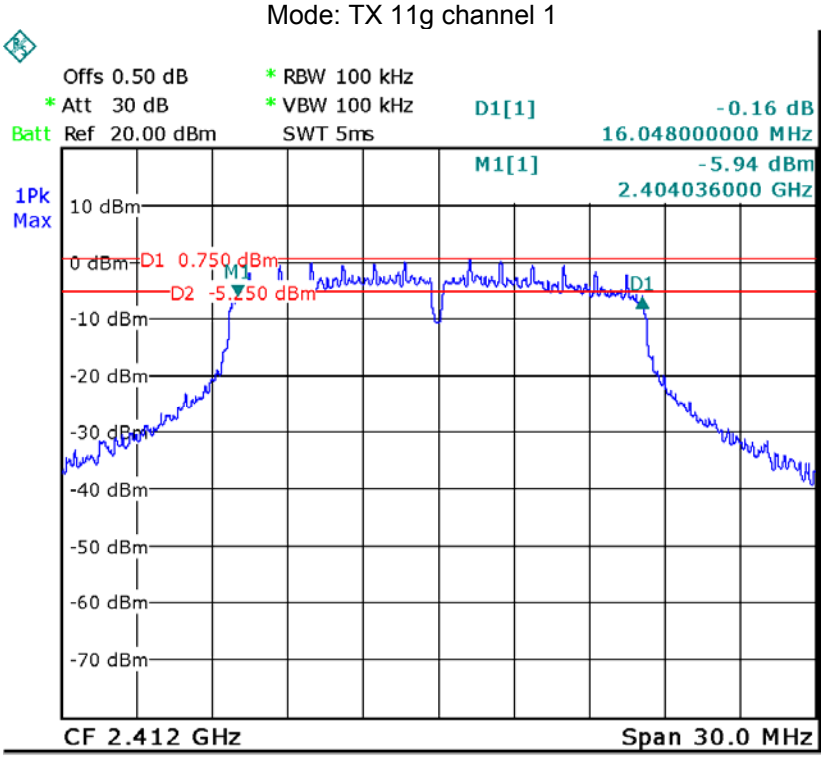
Mode: TX 11b channel 6



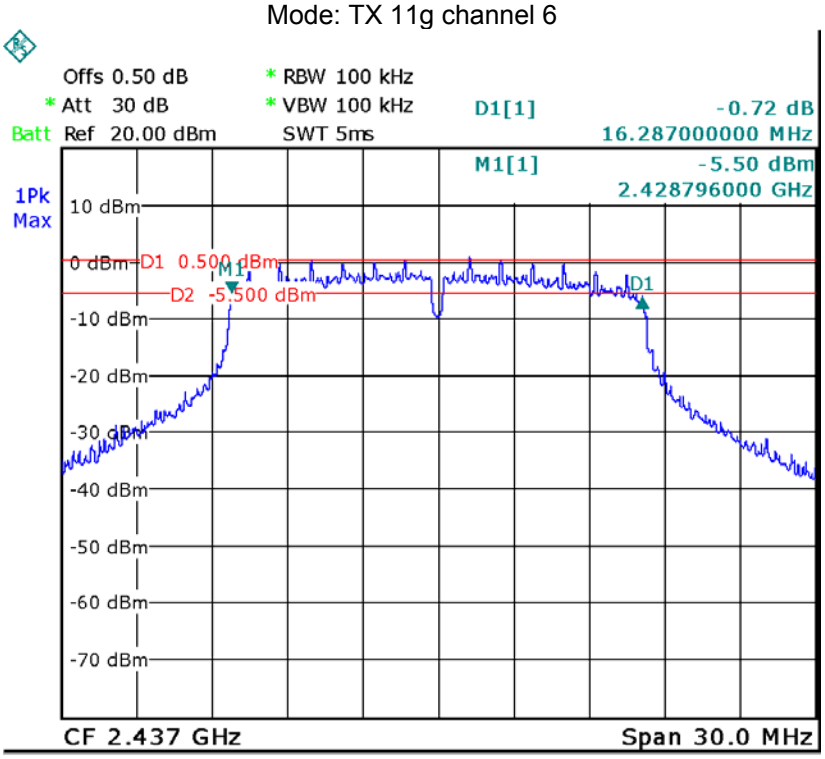

Mode: TX 11b channel 11



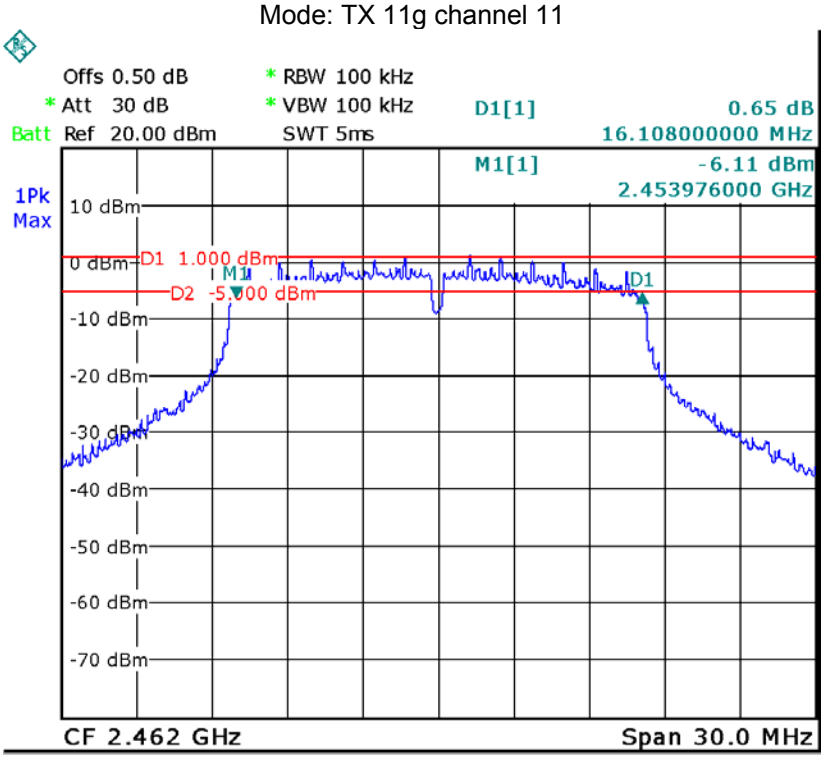
Mode: TX 11g channel 1




Mode: TX 11g channel 6



Mode: TX 11g channel 11



# 10 Maximum Peak Output Power

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB558074 D01 v03r01 04/09/2013

## 10.1 Test Procedure:

KDB558074 D01 v03r01 04/09/2013 section 9.1.2

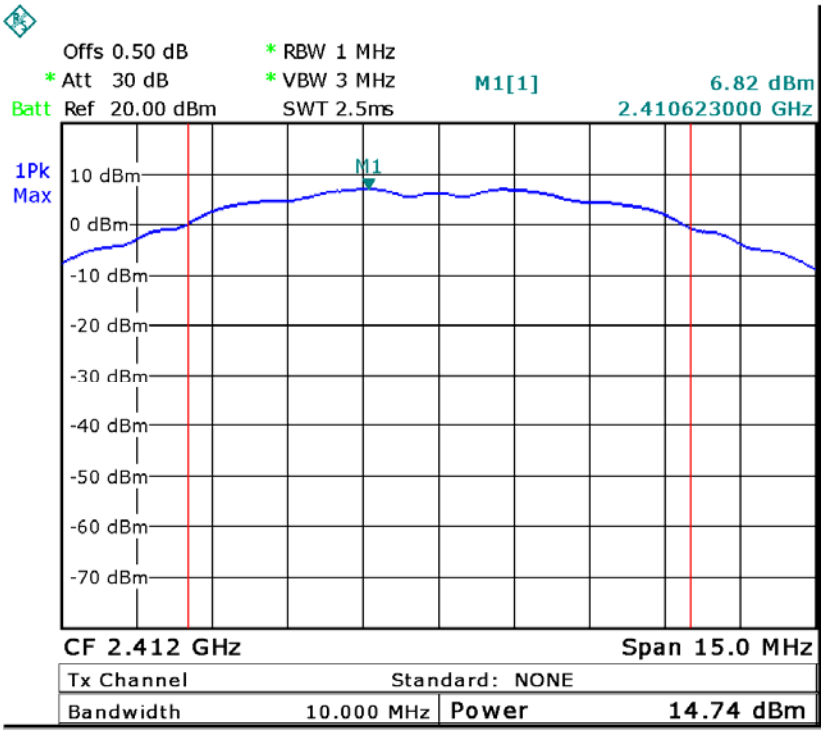
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak, Set the span to fully encompass the DTS bandwidth.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

## 10.2 Test Result:

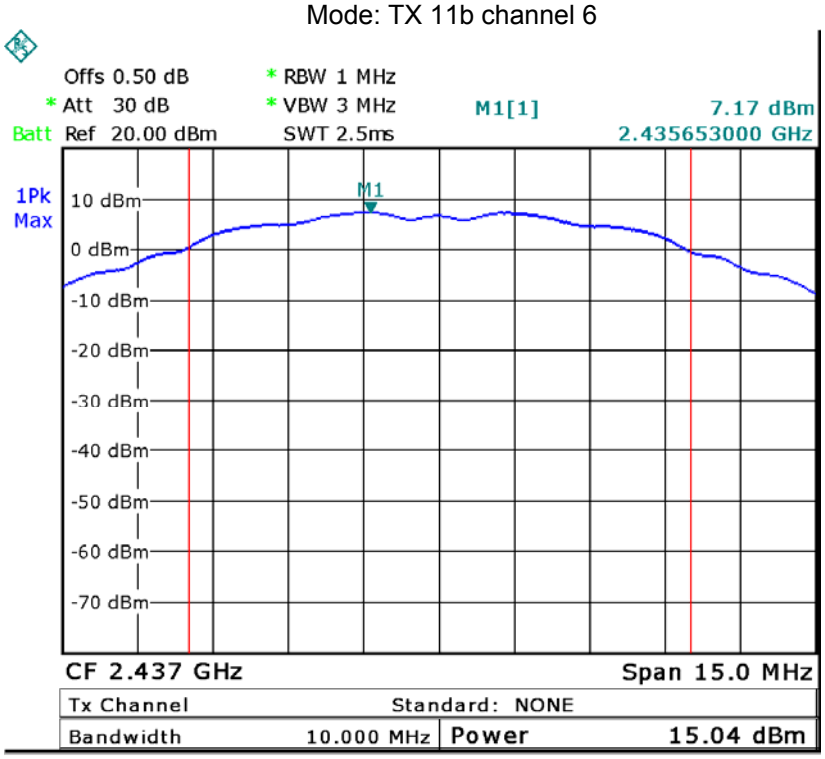
| Test mode :TX 11b | | |
|---|---|---|
| 10 Maximum Peak Output Power (dBm) | | |
| 2412MHz | 2437MHz | 2462MHz |
| 14.74 | 15.04 | 15.09 |
| Limit | | |
| 1W/30dBm | | |

| Test mode :TX 11g | | |
|---|---|---|
| 10 Maximum Peak Output Power (dBm) | | |
| 2412MHz | 2437MHz | 2462MHz |
| 15.14 | 15.10 | 15.30 |
| Limit | | |
| 1W/30dBm | | |

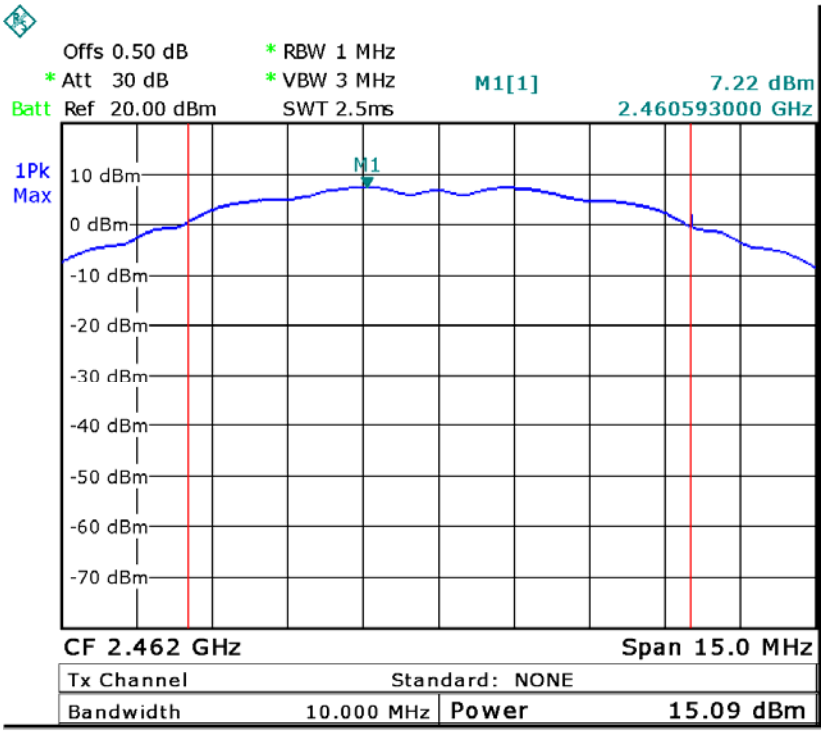
Mode: TX 11b channel 1



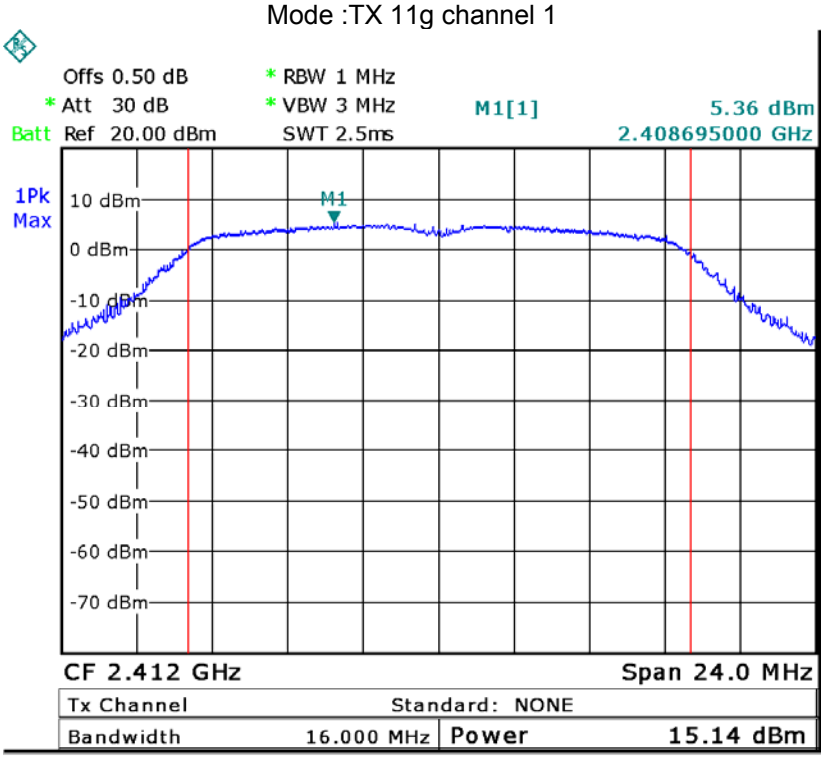

Mode: TX 11b channel 6



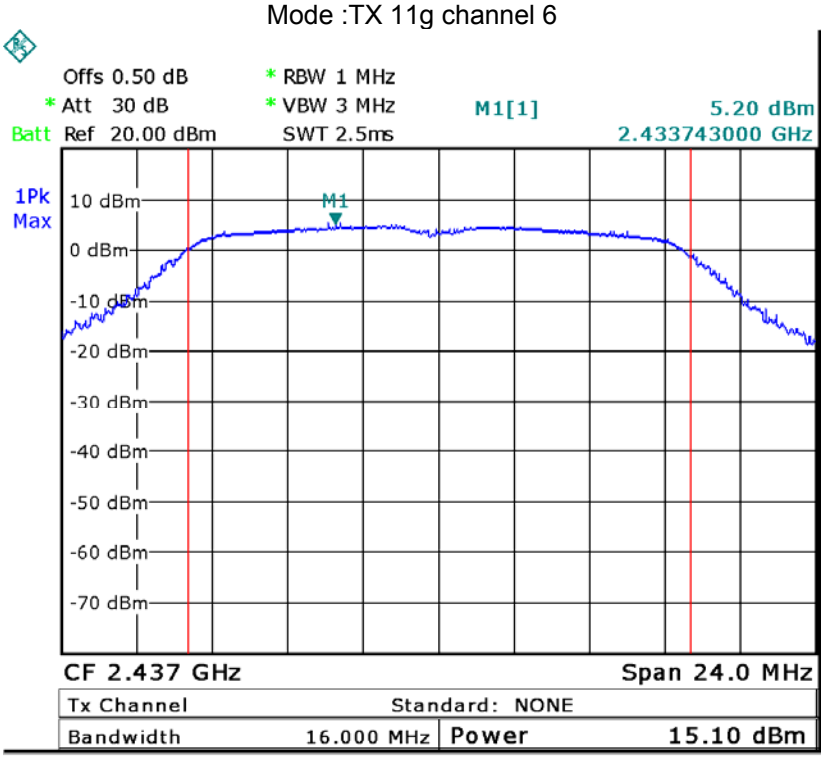
Mode: TX 11b channel 11



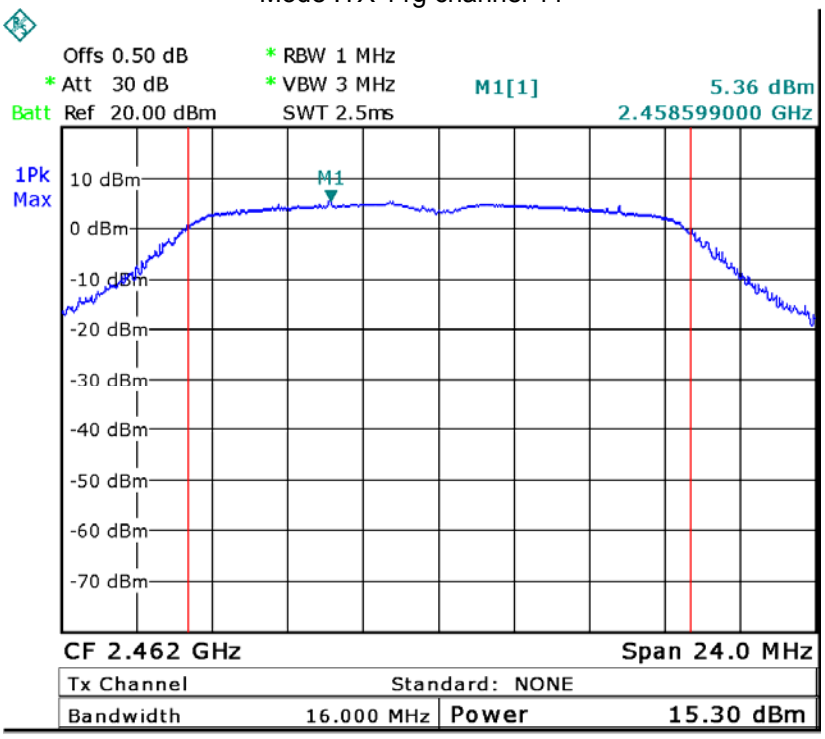

Mode :TX 11g channel 1



Mode :TX 11g channel 6




Mode :TX 11g channel 11



# 11 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB558074 D01 v03r01 04/09/2013

## 11.1 Test Procedure:

KDB558074 D01 v03r01 04/09/2013 section 10.2

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.

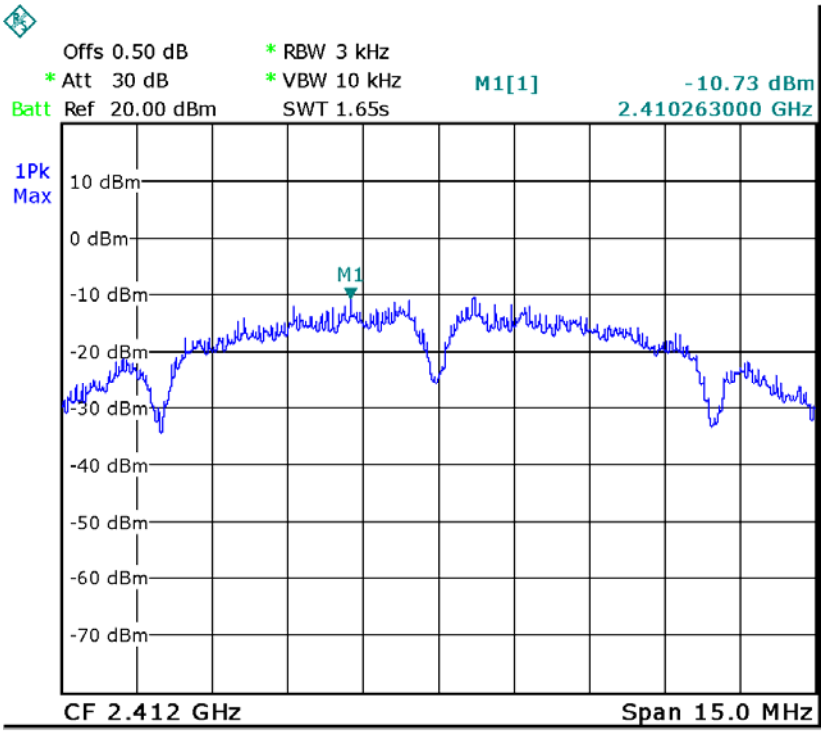
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

## 11.2 Test Result:

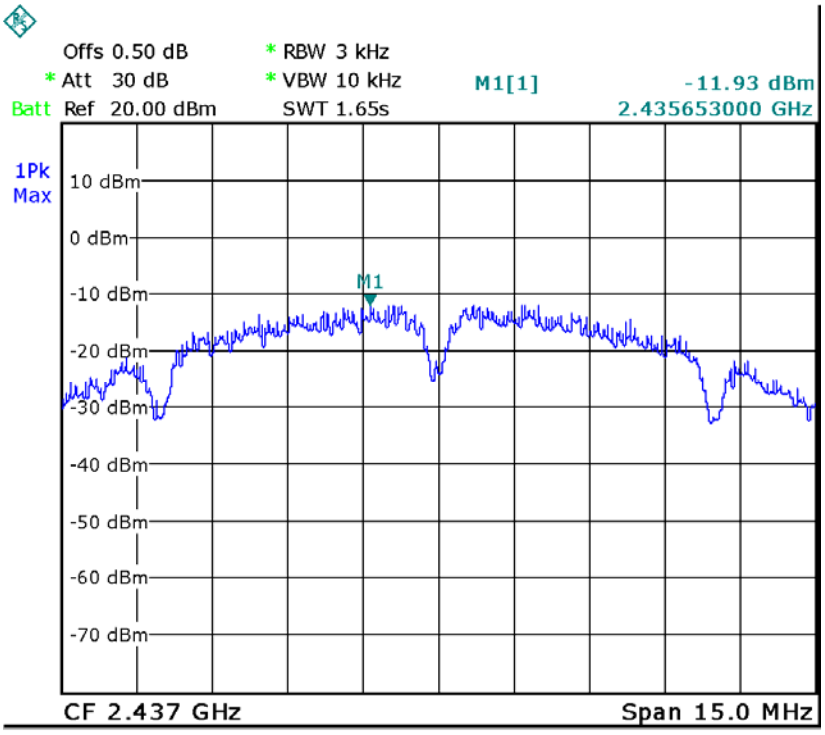
| Test mode :TX 11b | | |
|---|---|---|
| 10 Maximum Peak Output Power (dBm per 3kHz) | | |
| 2412MHz | 2437MHz | 2462MHz |
| -10.73 | -11.93 | -11.38 |
| Limit | | |
| 8dBm per 3kHz | | |

| Test mode :TX 11g | | |
|---|---|---|
| 10 Maximum Peak Output Power (dBm per 3kHz) | | |
| 2412MHz | 2437MHz | 2462MHz |
| -14.04 | -14.19 | -14.19 |
| Limit | | |
| 8dBm per 3kHz | | |

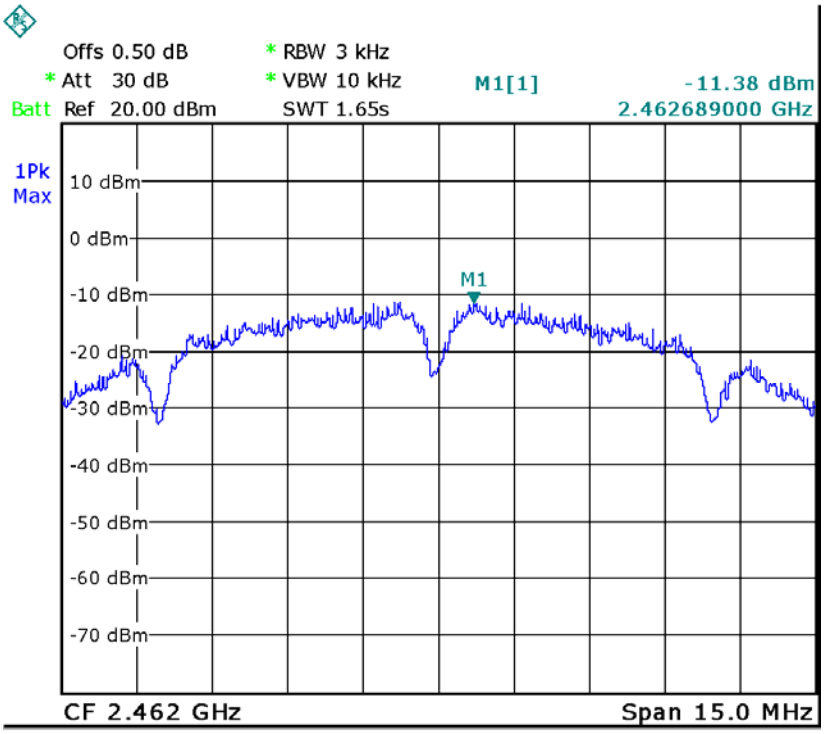
Mode: TX 11b channel 1



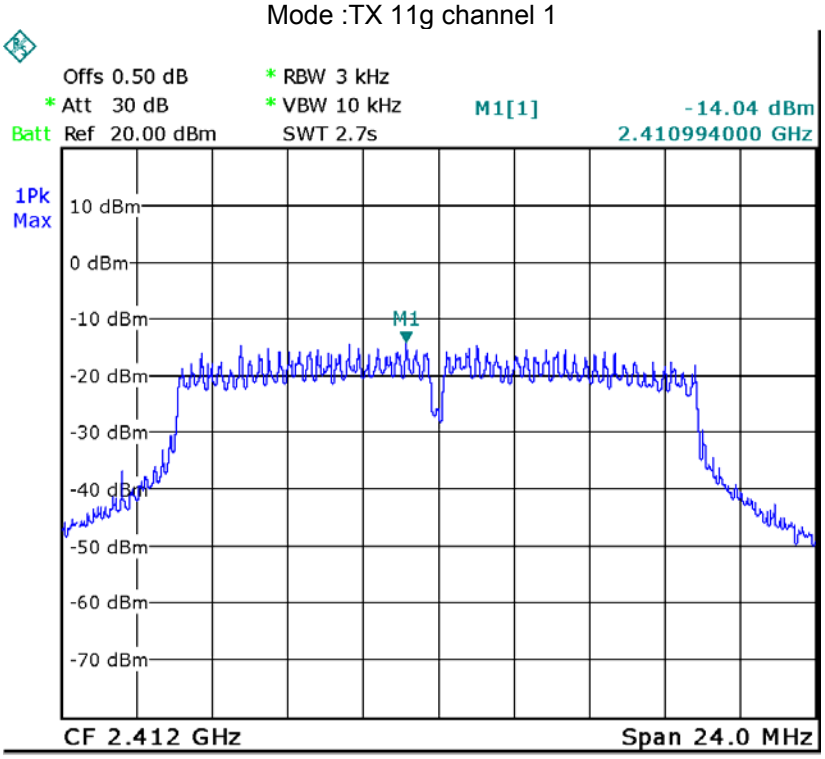

Mode: TX 11b channel 6



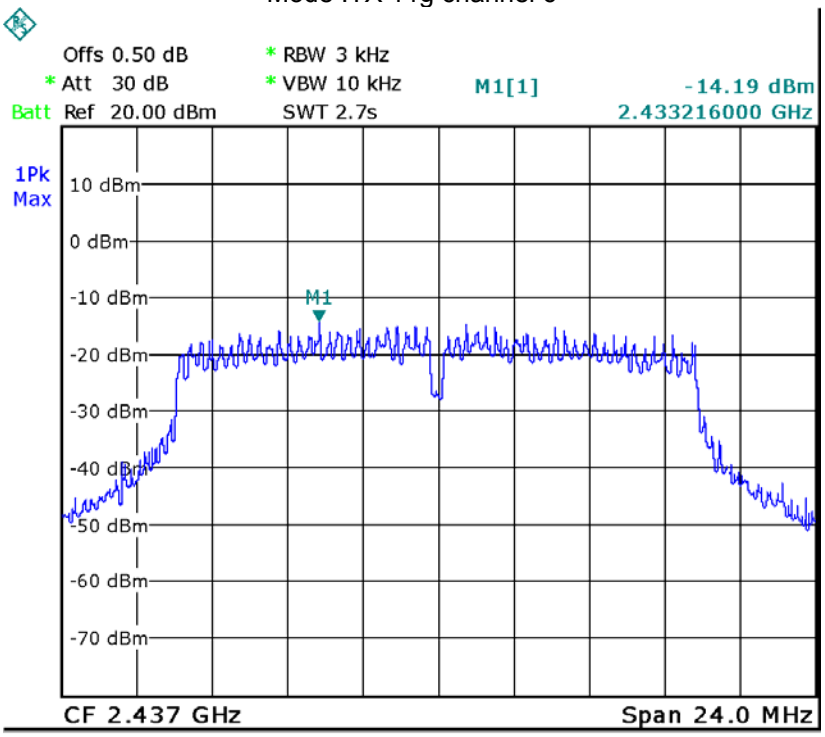
Mode: TX 11b channel 11



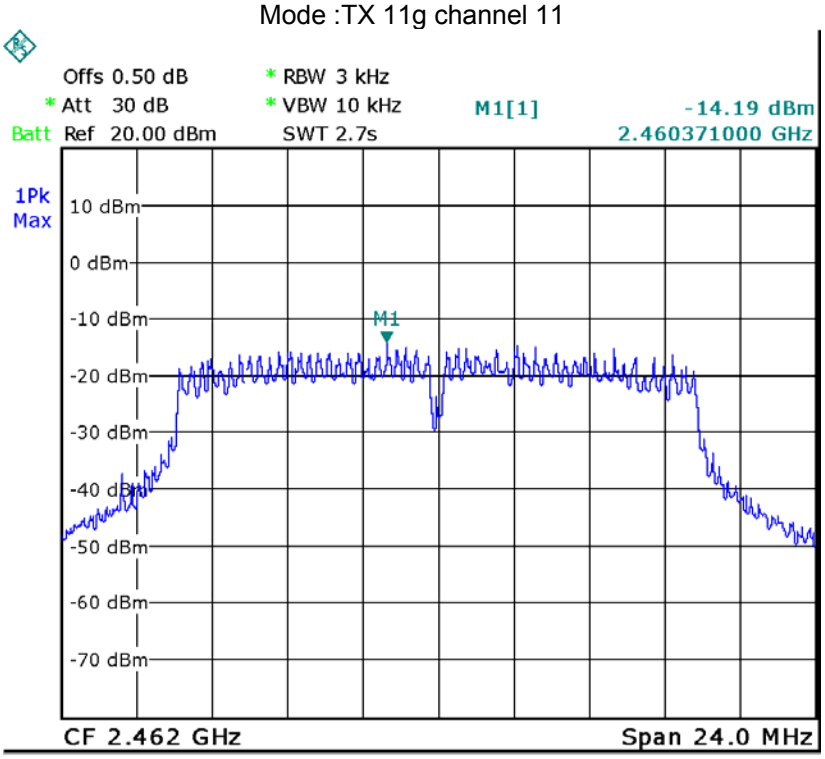

Mode :TX 11g channel 1



Mode :TX 11g channel 6




Mode :TX 11g channel 11



# 12 Antenna Requirement

According to the FCC Part 15 Paragraph 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. This product has a PCB printed antenna fulfill the requirement of this section.

# 13 RF Exposure

Test Requirement: FCC Part 1.1307

Evaluation Method: FCC Part 2.1091

## 13.1 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.

## 13.2 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/ $cm^2$) | Averaging Time $\|E\|^2$,$\|H\|^2$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/ $cm^2$) | Averaging Time $\|E\|^2$,$\|H\|^2$ 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

## 13.3 MPE Calculation Method

$$\text{E (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m²)} = \frac{E^2}{377}$$

**E** = Electric field (V/m)
**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

$$\boldsymbol{Pd} = \frac{30 \times P \times G}{377 \times d^2}$$

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

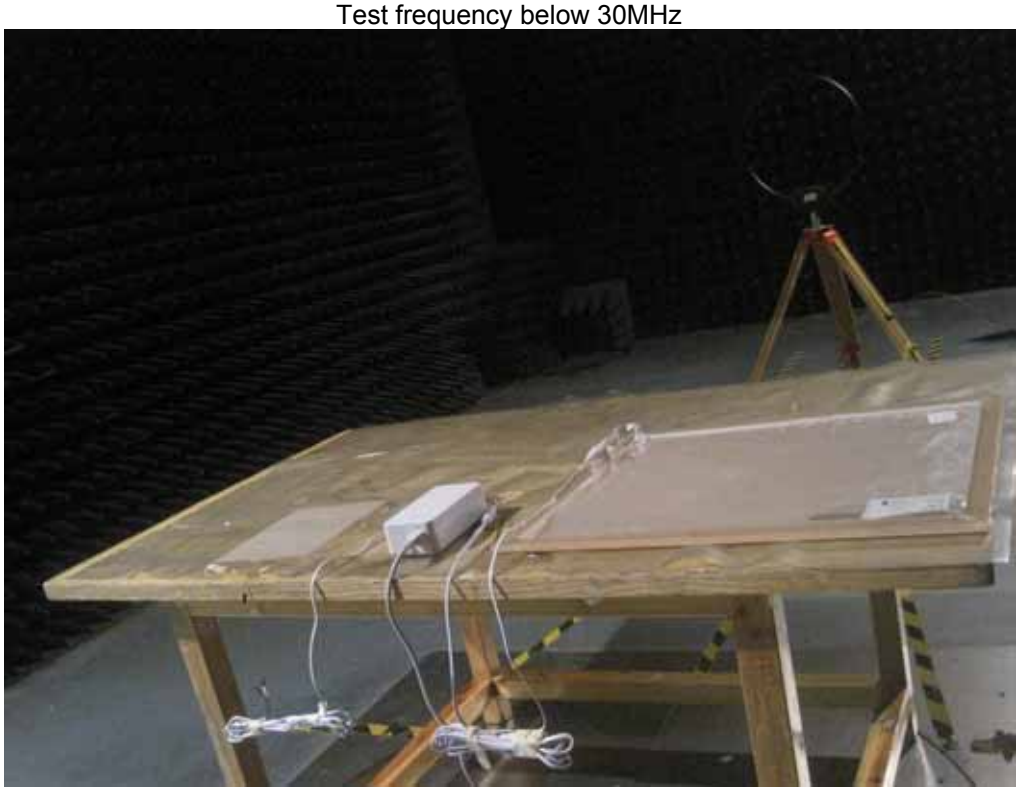
| Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (mW/cm2) | Limit of Power Density (mW/cm2) |
|---|---|---|---|---|
| 1.995 | 15.30 | 33.884 | 0.01345 | 1 |

# 14 Photographs – Test Setup

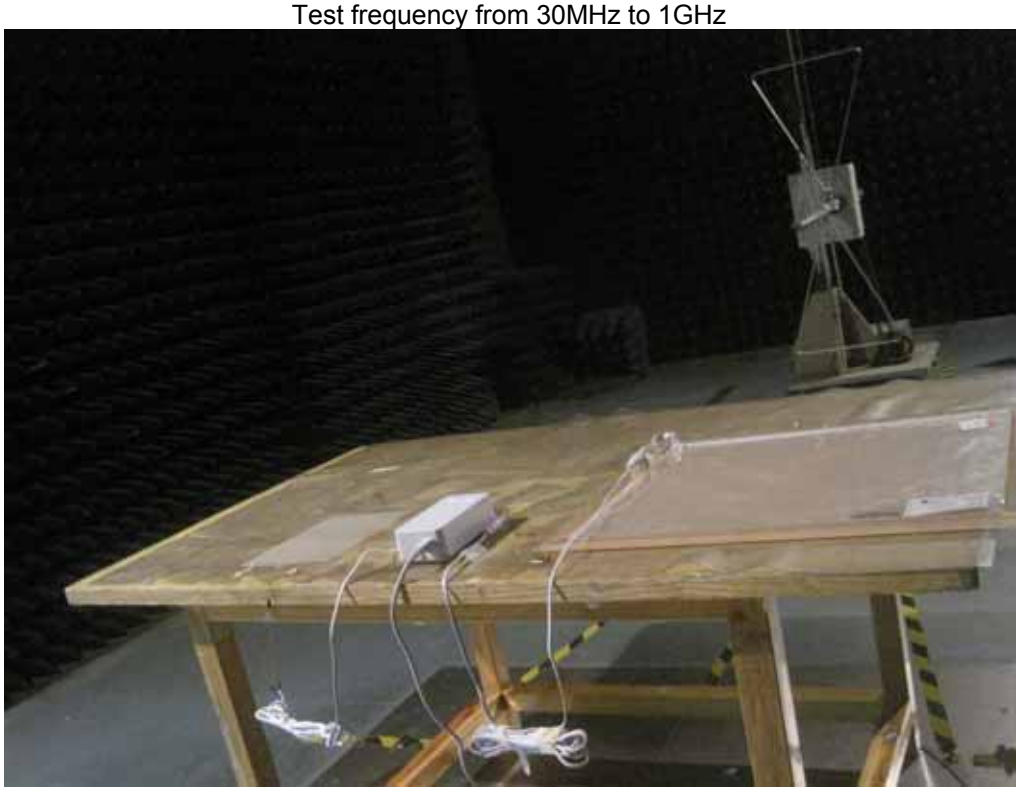
## 14.1 Conducted Emission

## 14.2 Radiated Emission

Test frequency below 30MHz



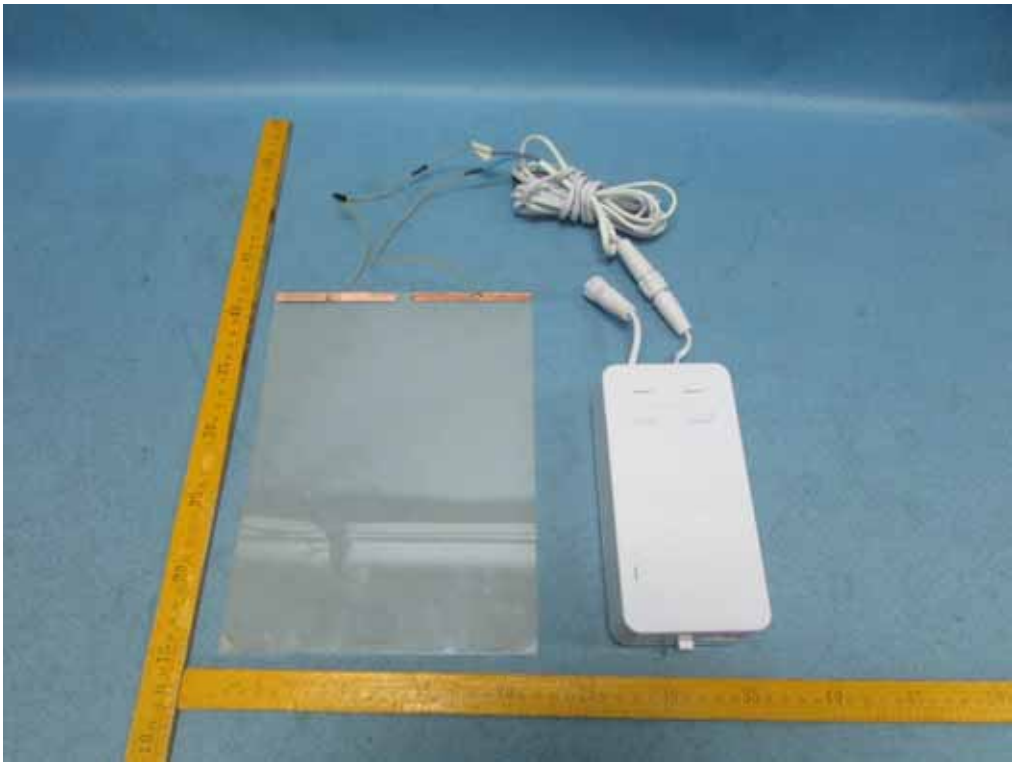
Test frequency from 30MHz to 1GHz

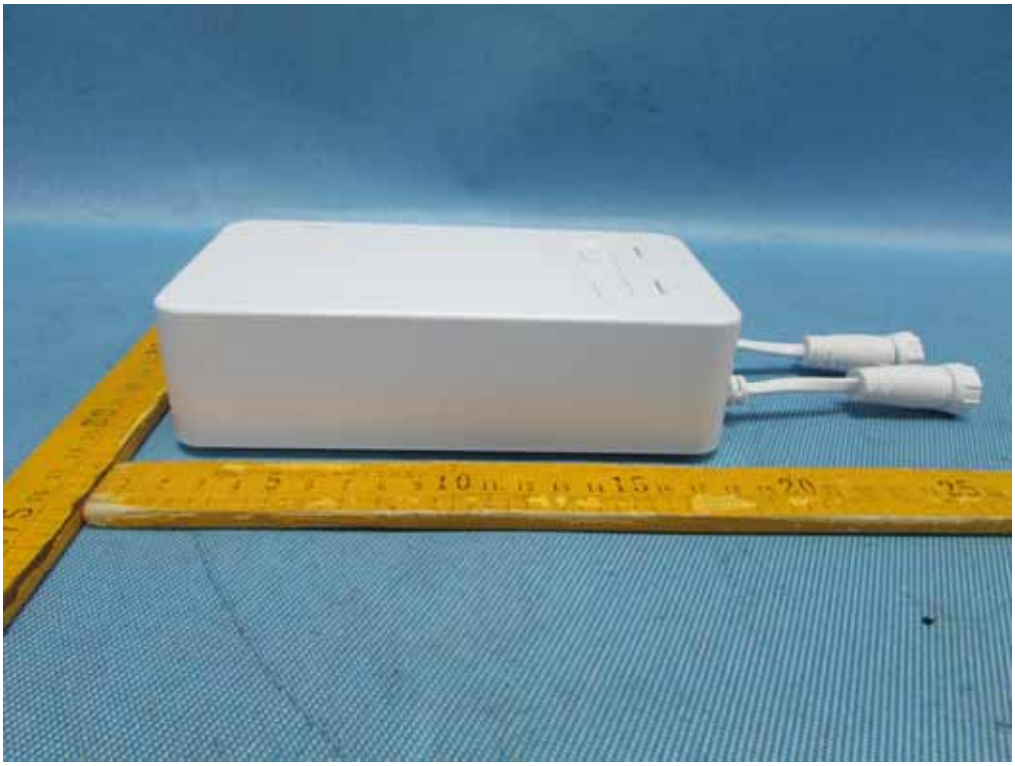


Test frequency above 1GHz

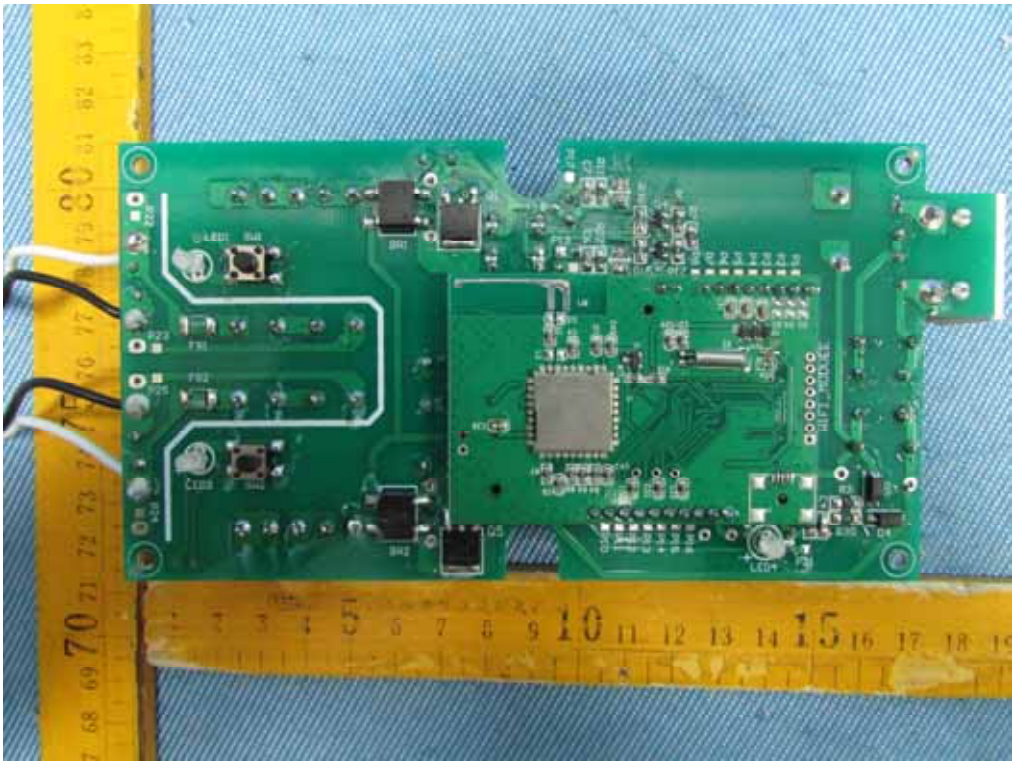
# 15 Photographs - Constructional Details

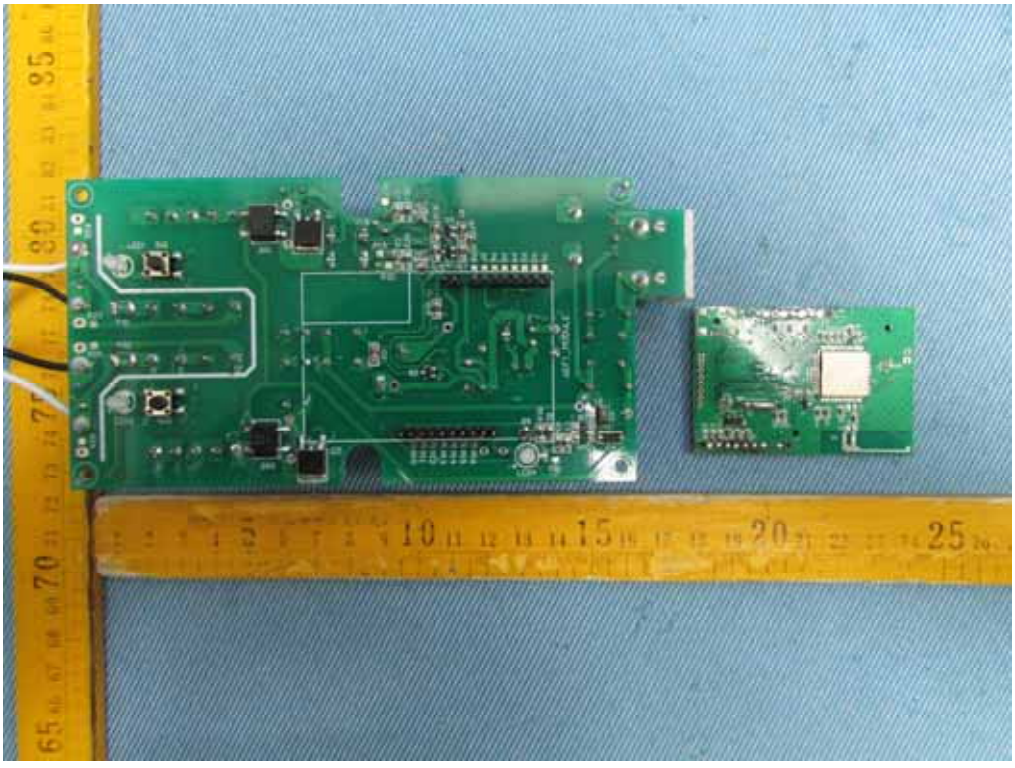
## 15.1 EUT –External View

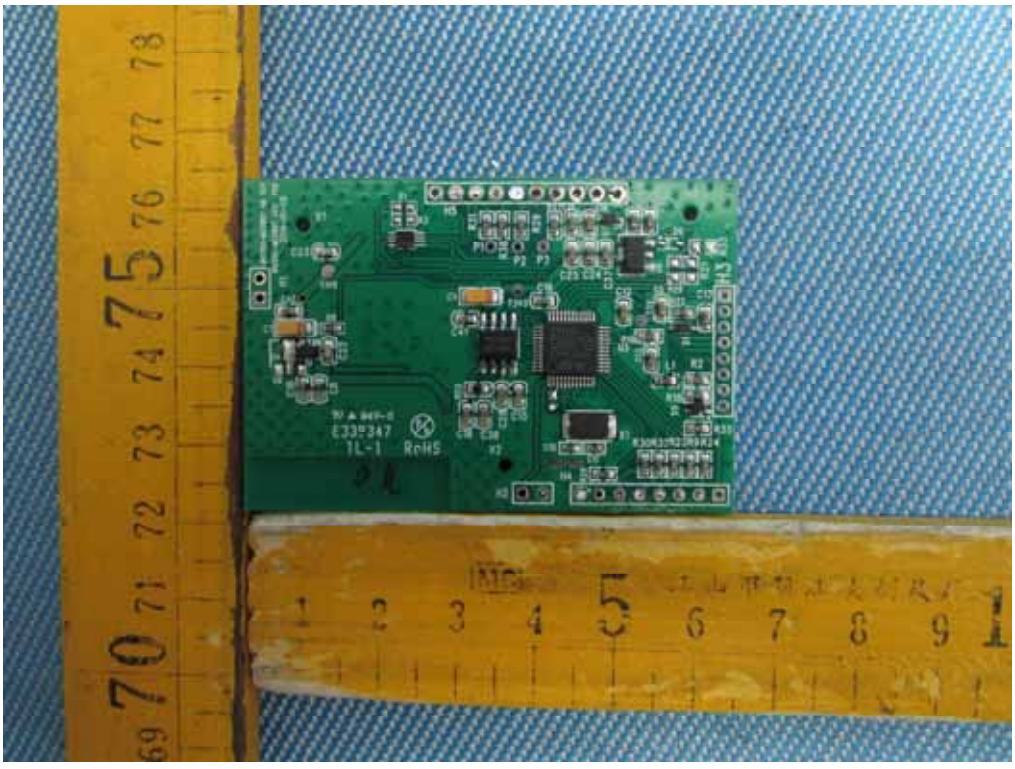




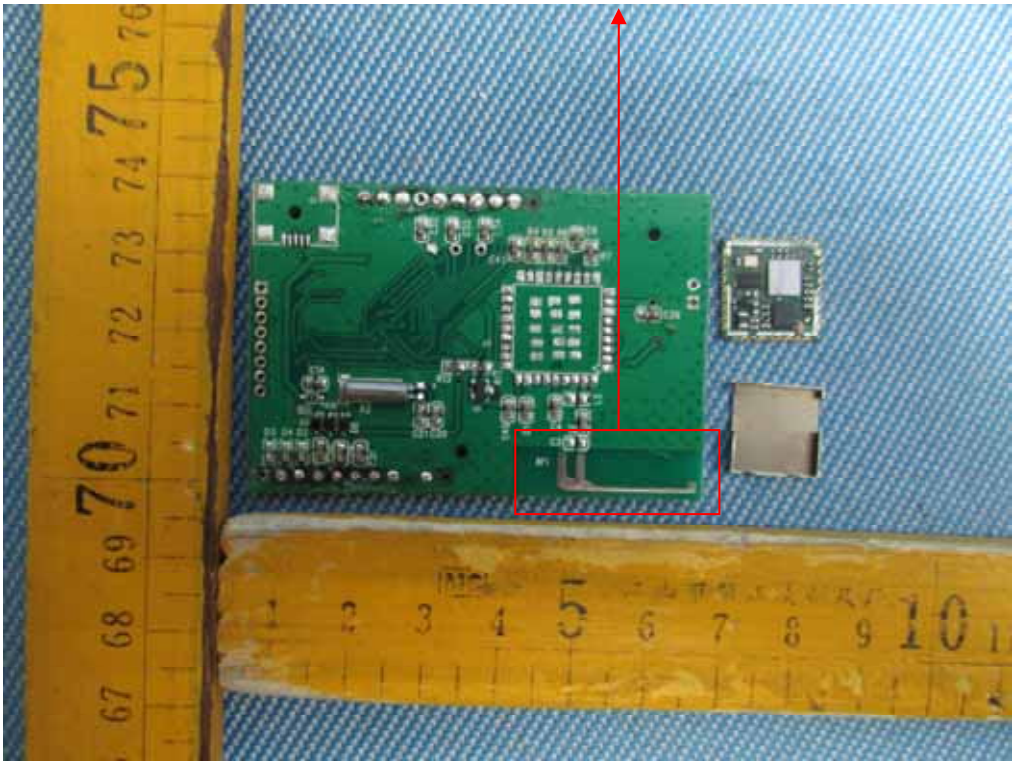
## 15.2 EUT – Internal View



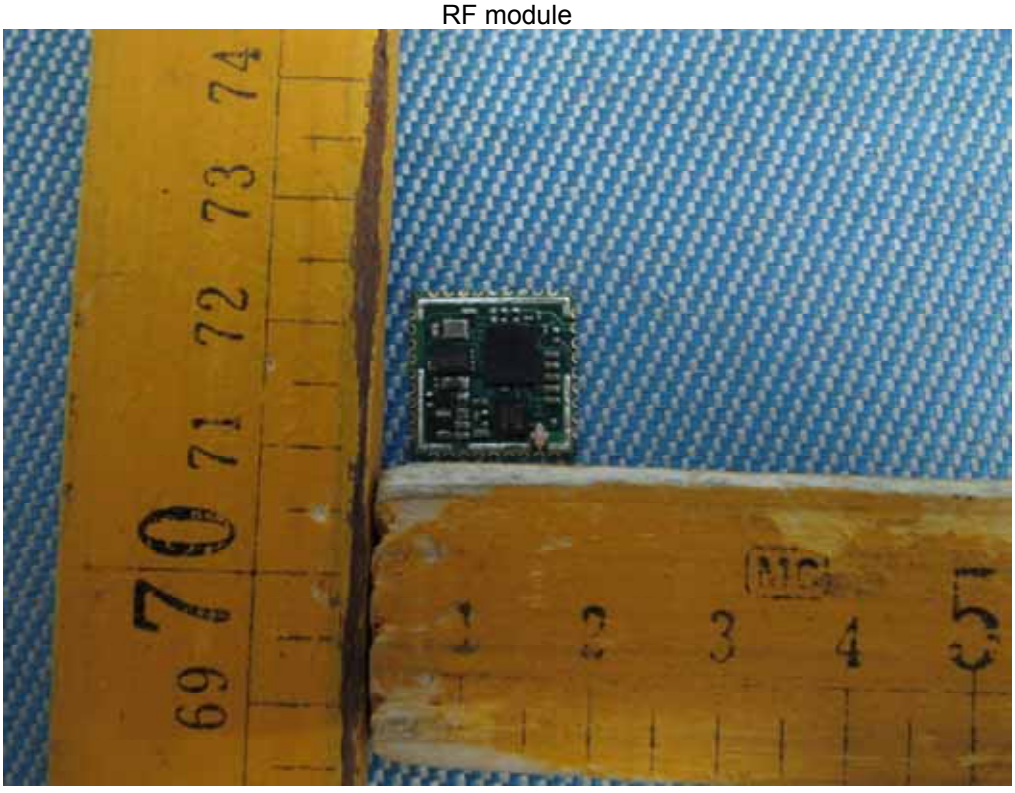


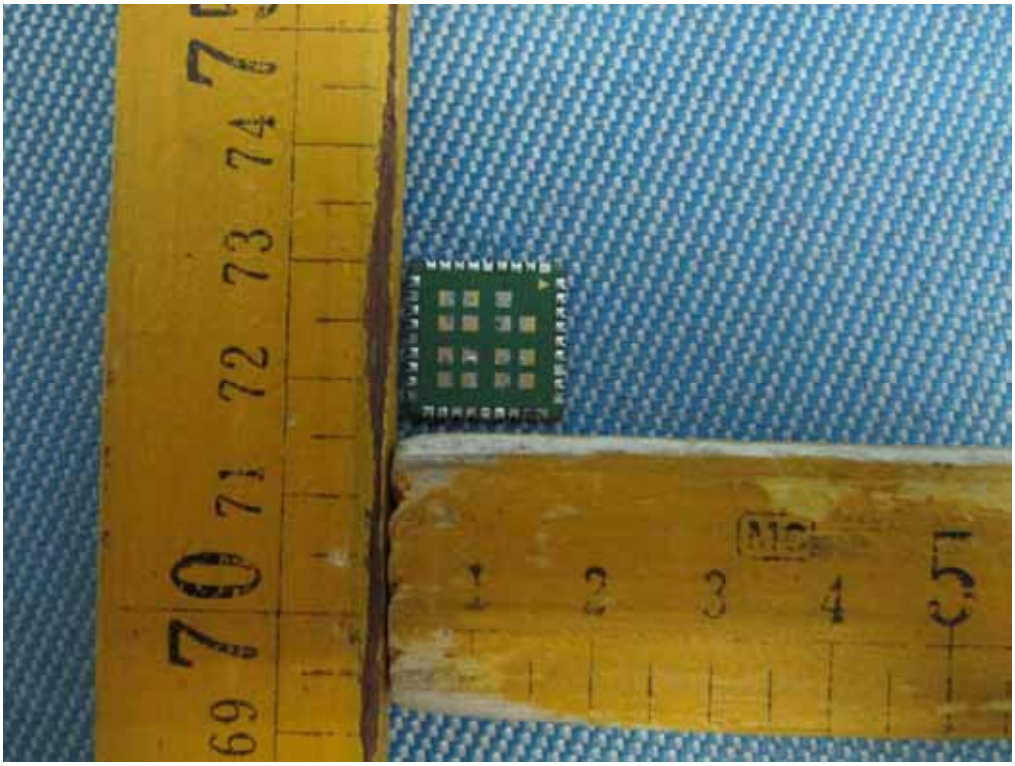

E333347
TL-1
RoHS

ANT



RF module





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