

# TEST REPORT

**Reference No.** ..... : WTS14S1221309E  
**FCC ID**..... : 2ACQ5LTB210  
**Applicant**..... : Revogi Innovation Co., Ltd.  
**Address** ..... : 2018, Anhui Building, No.6007, Shennan Boulevard, Shenzhen, Guangdong, China  
**Manufacturer** ..... : SkyRC Technology Co., Ltd.  
**Address** ..... : 4/F, Building No. 6, Meitai Industry Park, Guanguang South Road, Guihua, Guanlan, 518110, Baoan District, Shenzhen, China  
**Product Name** ..... : Smart LED Strip Controller  
**Model No.** ..... : LTB210  
**Brand**..... : Revogi  
**Standards**..... : FCC CFR47 Part 15 Section 15.247:2014  
**Date of Receipt sample**..... : Dec. 12, 2014  
**Date of Test**..... : Dec. 12~30, 2014  
**Date of Issue** ..... : Dec. 31, 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.

## Prepared By:

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## 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   |

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## 4 General Information

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

|                       |                                            |
|-----------------------|--------------------------------------------|
| Product Name          | : Smart LED Strip Controller               |
| Model No.             | : LTB210                                   |
| Model Description     | : N/A                                      |
| Bluetooth Version     | : 4.0(including Bluetooth low energy only) |
| Frequency Range       | : 2402-2480MHz, 40(BLE) Channels in total  |
| Antenna installation  | : PCB Printed Antenna                      |
| Antenna Gain          | : 0 dBi                                    |
| Type of Modulation    | : GFSK                                     |
| EIRP                  | : -0.1 dBm                                 |
| The Lowest Oscillator | : 32.768kHz                                |

### 4.2 Details of E.U.T.

|                |          |
|----------------|----------|
| Technical Data | : DC 12V |
|----------------|----------|

### 4.3 Channel List

BT BLE

| Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) |
|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|
| 0           | 2402            | 1           | 2404            | 2           | 2406            | 3           | 2408            |
| 4           | 2410            | 5           | 2412            | 6           | 2414            | 7           | 2416            |
| 8           | 2418            | 9           | 2420            | 10          | 2422            | 11          | 2424            |
| 12          | 2426            | 13          | 2428            | 14          | 2430            | 15          | 2432            |
| 16          | 2434            | 17          | 2436            | 18          | 2438            | 19          | 2440            |
| 20          | 2442            | 21          | 2444            | 22          | 2446            | 23          | 2448            |
| 24          | 2450            | 25          | 2452            | 26          | 2454            | 27          | 2456            |
| 28          | 2458            | 29          | 2460            | 30          | 2462            | 31          | 2464            |
| 32          | 2466            | 33          | 2468            | 34          | 2470            | 35          | 2472            |
| 36          | 2474            | 37          | 2476            | 38          | 2478            | 39          | 2480            |

#### 4.4 Test Mode

Table 1 Tests Carried Out Under FCC part 15.247

| Test Items                     | Mode   | Data Rate | Channel | TX/RX |
|--------------------------------|--------|-----------|---------|-------|
| Maximum Peak Output Power      | BT BLE | 1 Mbps    | 1/19/39 | TX    |
| Power Spectral Density         | BT BLE | 1 Mbps    | 1/19/39 | TX    |
| 6dB Bandwidth                  | BT BLE | 1 Mbps    | 1/19/39 | TX    |
| Band Edge                      | BT BLE | 1 Mbps    | 1/19/39 | TX    |
| Frequency Range                | BT BLE | 1 Mbps    | 1/19/39 | TX    |
| Transmitter Spurious Emissions | BT BLE | 1 Mbps    | 1/19/39 | TX    |

#### 4.5 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 7760A-1, July 12, 2012.

- **FCC Test Site 1#– 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, April 29, 2014.

- **FCC Test Site 2#– Registration No.: 328995**

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 328995, December 3, 2014.

## 5 Equipment Used during Test

### 5.1 Equipments List

| Conducted Emissions Test Site 1#                              |                            |                                  |              |                 |                       |                      |
|---------------------------------------------------------------|----------------------------|----------------------------------|--------------|-----------------|-----------------------|----------------------|
| Item                                                          | Equipment                  | Manufacturer                     | Model No.    | Serial No.      | Last Calibration Date | Calibration Due Date |
| 1.                                                            | EMI Test Receiver          | R&S                              | ESCI         | 100947          | Sep.15,2014           | Sep.14,2015          |
| 2.                                                            | LISN                       | R&S                              | ENV216       | 101215          | Sep.15,2014           | Sep.14,2015          |
| 3.                                                            | Cable                      | Top                              | TYPE16(3.5M) | -               | Sep.15,2014           | Sep.14,2015          |
| Conducted Emissions Test Site 2#                              |                            |                                  |              |                 |                       |                      |
| Item                                                          | Equipment                  | Manufacturer                     | Model No.    | Serial No.      | Last Calibration Date | Calibration Due Date |
| 1.                                                            | EMI Test Receiver          | R&S                              | ESCI         | 101155          | Sep.15,2014           | Sep.14,2015          |
| 2.                                                            | LISN                       | SCHWARZBECK                      | NSLK 8128    | 8128-289        | Sep.15,2014           | Sep.14,2015          |
| 3.                                                            | Limiter                    | York                             | MTS-IMP-136  | 261115-001-0024 | Sep.15,2014           | Sep.14,2015          |
| 4.                                                            | Cable                      | LARGE                            | RF300        | -               | Sep.15,2014           | Sep.14,2015          |
| 3m Semi-anechoic Chamber for Radiation Emissions Test site 1# |                            |                                  |              |                 |                       |                      |
| Item                                                          | Equipment                  | Manufacturer                     | Model No.    | Serial No.      | Last Calibration Date | Calibration Due Date |
| 1                                                             | EMC Analyzer               | Agilent                          | E7405A       | MY45114943      | Sep.15,2014           | Sep.14,2015          |
| 2                                                             | Active Loop Antenna        | Beijing Dazhi                    | ZN30900A     | -               | Sep.15,2014           | Sep.14,2015          |
| 3                                                             | Trilog Broadband Antenna   | SCHWARZBECK                      | VULB9163     | 336             | Apr.19,2014           | Apr.18,2015          |
| 4                                                             | Coaxial Cable (below 1GHz) | Top                              | TYPE16(13M)  | -               | Sep.15,2014           | Sep.14,2015          |
| 5                                                             | Broad-band Horn Antenna    | SCHWARZBECK                      | BBHA 9120 D  | 667             | Apr.19,2014           | Apr.18,2015          |
| 6                                                             | Broad-band Horn Antenna    | SCHWARZBECK                      | BBHA 9170    | 335             | Apr.19,2014           | Apr.18,2015          |
| 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          |
| 3m Semi-anechoic Chamber for Radiation Emissions Test site 2# |                            |                                  |              |                 |                       |                      |
| Item                                                          | Equipment                  | Manufacturer                     | Model No.    | Serial No       | Last Calibration Date | Calibration Due Date |
| 1                                                             | Test Receiver              | R&S                              | ESCI         | 101296          | Sep.15,2014           | Sep.14,2015          |
| 2                                                             | Trilog Broadband Antenna   | SCHWARZBECK                      | VULB9160     | 9160-3325       | Sep.15,2014           | Sep.14,2015          |
| 3                                                             | Amplifier                  | Compliance pirection systems inc | PAP-0203     | 22024           | Sep.15,2014           | Sep.14,2015          |
| 4                                                             | Cable                      | HUBER+SUHNER                     | CBL2         | 525178          | Sep.15,2014           | Sep.14,2015          |

| RF Conducted Testing |                                 |              |           |            |                       |                      |
|----------------------|---------------------------------|--------------|-----------|------------|-----------------------|----------------------|
| Item                 | Equipment                       | Manufacturer | Model No. | Serial No. | Last Calibration Date | Calibration Due Date |
| 1.                   | EMC Analyzer<br>(9k~26.5GHz)    | Agilent      | E7405A    | MY45114943 | Sep.15,2014           | Sep.14,2015          |
| 2.                   | Spectrum Analyzer<br>(9k~6GHz)  | R&S          | FSL6      | 100959     | Sep.15,2014           | Sep.14,2015          |
| 3.                   | Signal Analyzer<br>(9k~26.5GHz) | Agilent      | N9010A    | MY50520207 | Sep.15,2014           | Sep.14,2015          |

## 5.2 Description of Support Units

| Equipment | Manufacturer | Model No.  | Series No. |
|-----------|--------------|------------|------------|
| Adapter   | Ktec         | K1200100FU | N/A        |

## 5.3 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) |

## 5.4 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/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)                                                                          |

### 6.1 E.U.T. Operation

Operating Environment :

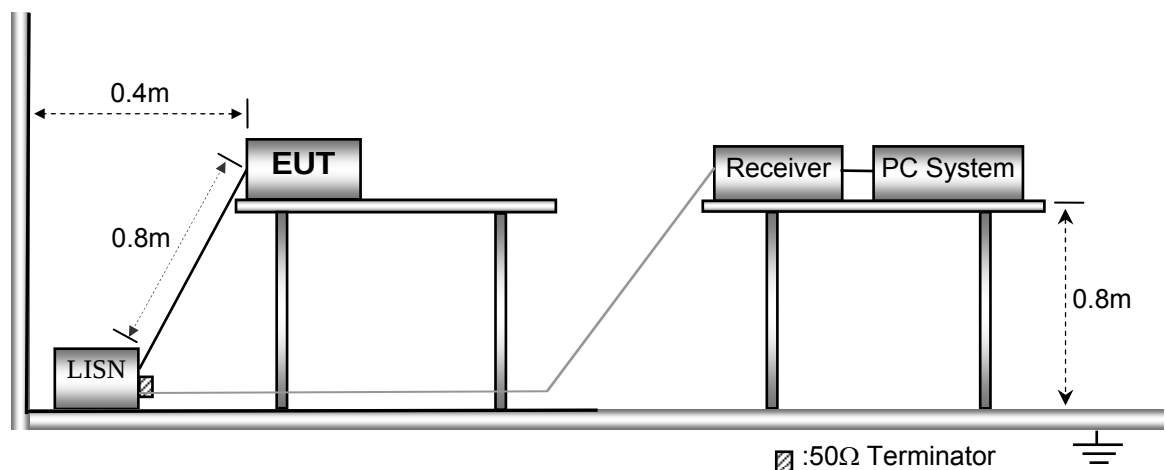
|                       |          |
|-----------------------|----------|
| Temperature:          | 25.5 °C  |
| Humidity:             | 51 % RH  |
| Atmospheric Pressure: | 101.2kPa |

EUT Operation :

The test was performed in transmitting mode(BT BLE), the test data were shown in the report.

### 6.2 EUT Setup

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

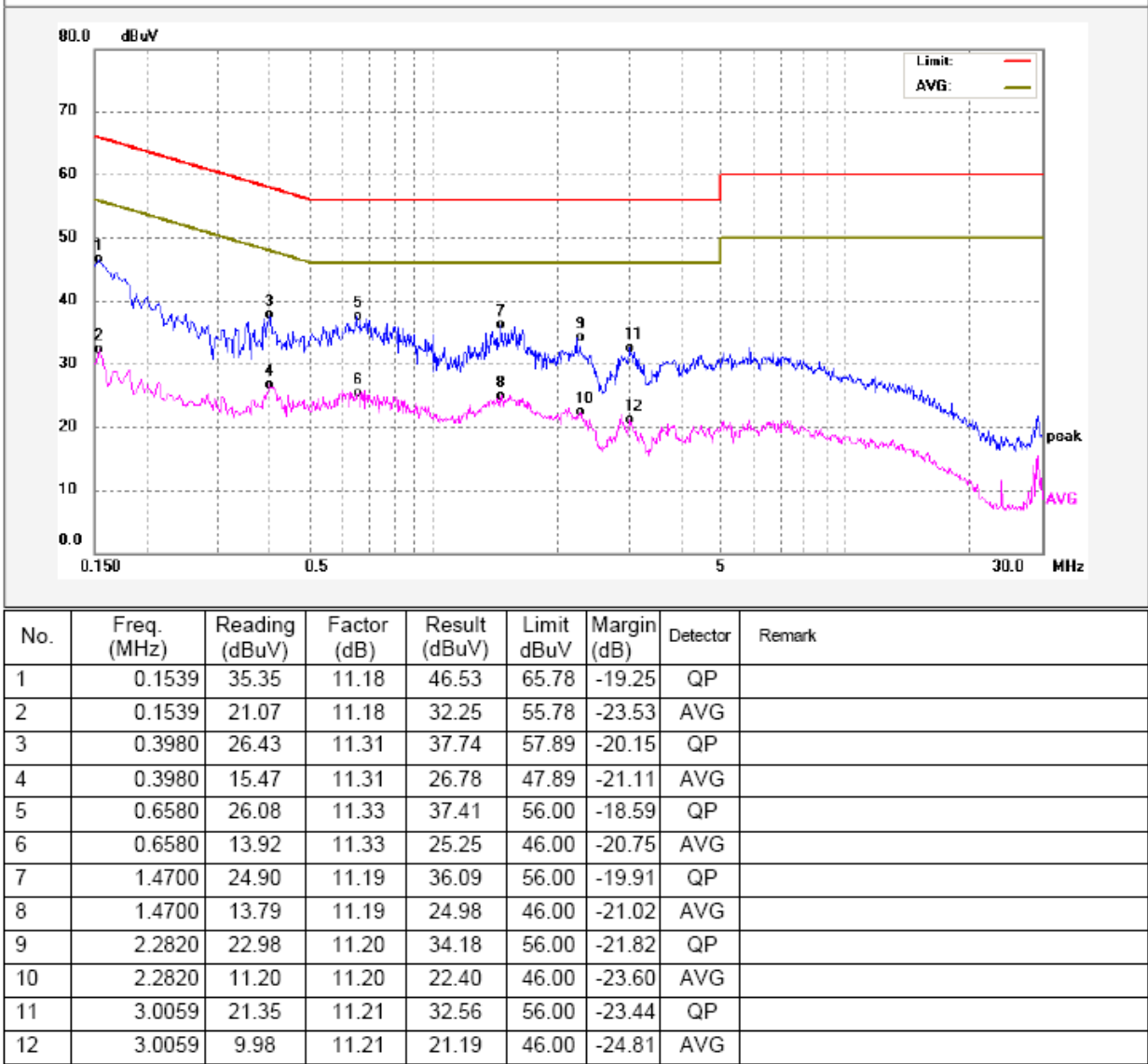


### 6.3 Measurement Description

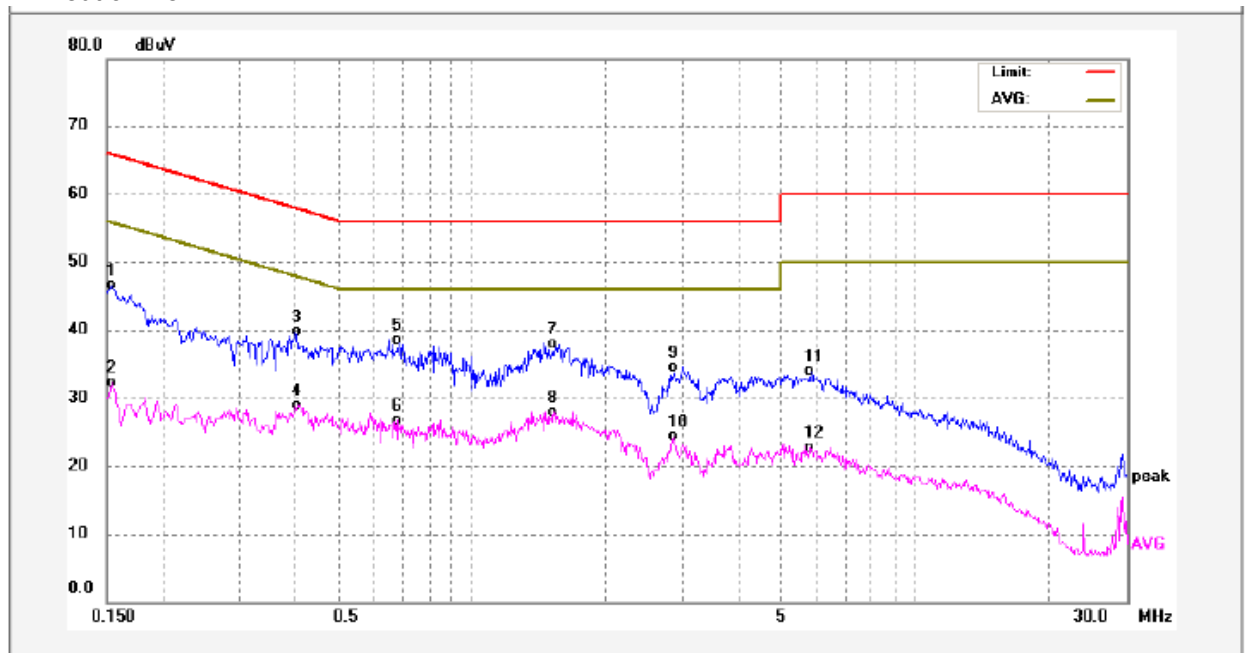
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.4 Conducted Emission Test Result

Live line:



Neutral line:



| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit dBuV | Margin (dB) | Detector | Remark |
|-----|-------------|----------------|-------------|---------------|------------|-------------|----------|--------|
| 1   | 0.1539      | 35.35          | 11.18       | 46.53         | 65.78      | -19.25      | QP       |        |
| 2   | 0.1539      | 21.07          | 11.18       | 32.25         | 55.78      | -23.53      | AVG      |        |
| 3   | 0.4060      | 28.43          | 11.31       | 39.74         | 57.73      | -17.99      | QP       |        |
| 4   | 0.4060      | 17.55          | 11.31       | 28.86         | 47.73      | -18.87      | AVG      |        |
| 5   | 0.6820      | 27.07          | 11.34       | 38.41         | 56.00      | -17.59      | QP       |        |
| 6   | 0.6820      | 15.36          | 11.34       | 26.70         | 46.00      | -19.30      | AVG      |        |
| 7   | 1.5339      | 26.72          | 11.19       | 37.91         | 56.00      | -18.09      | QP       |        |
| 8   | 1.5339      | 16.72          | 11.19       | 27.91         | 46.00      | -18.09      | AVG      |        |
| 9   | 2.8540      | 23.35          | 11.21       | 34.56         | 56.00      | -21.44      | QP       |        |
| 10  | 2.8540      | 13.18          | 11.21       | 24.39         | 46.00      | -21.61      | AVG      |        |
| 11  | 5.8460      | 22.68          | 11.25       | 33.93         | 60.00      | -26.07      | QP       |        |
| 12  | 5.8460      | 11.39          | 11.25       | 22.64         | 50.00      | -27.36      | 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<br>(MHz) | Field Strength        |                 | Field Strength Limit at 3m Measurement Dist |                                       |
|--------------------|-----------------------|-----------------|---------------------------------------------|---------------------------------------|
|                    | uV/m                  | Distance<br>(m) | uV/m                                        | dBuV/m                                |
| 0.009 ~ 0.490      | $2400/F(\text{kHz})$  | 300             | $10000 * 2400/F(\text{kHz})$                | $20\log^{(2400/F(\text{kHz}))} + 80$  |
| 0.490 ~ 1.705      | $24000/F(\text{kHz})$ | 30              | $100 * 24000/F(\text{kHz})$                 | $20\log^{(24000/F(\text{kHz}))} + 40$ |
| 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: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

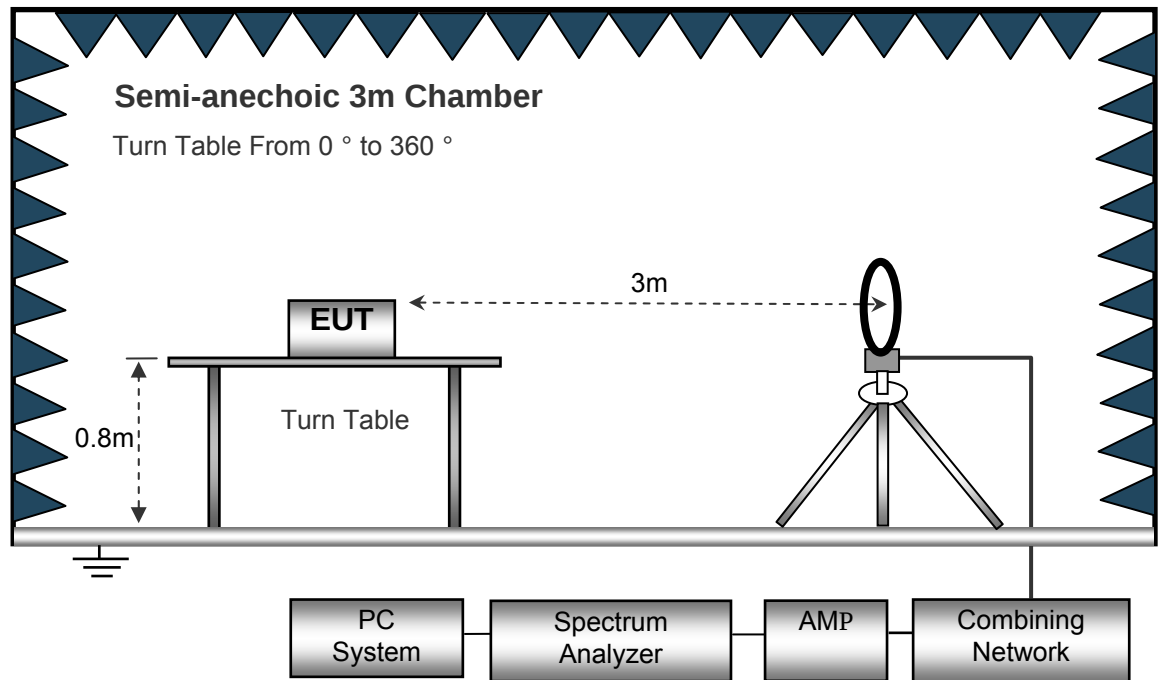
EUT Operation :

The test was performed in transmitting mode(BT BLE), the test data were shown in the report.

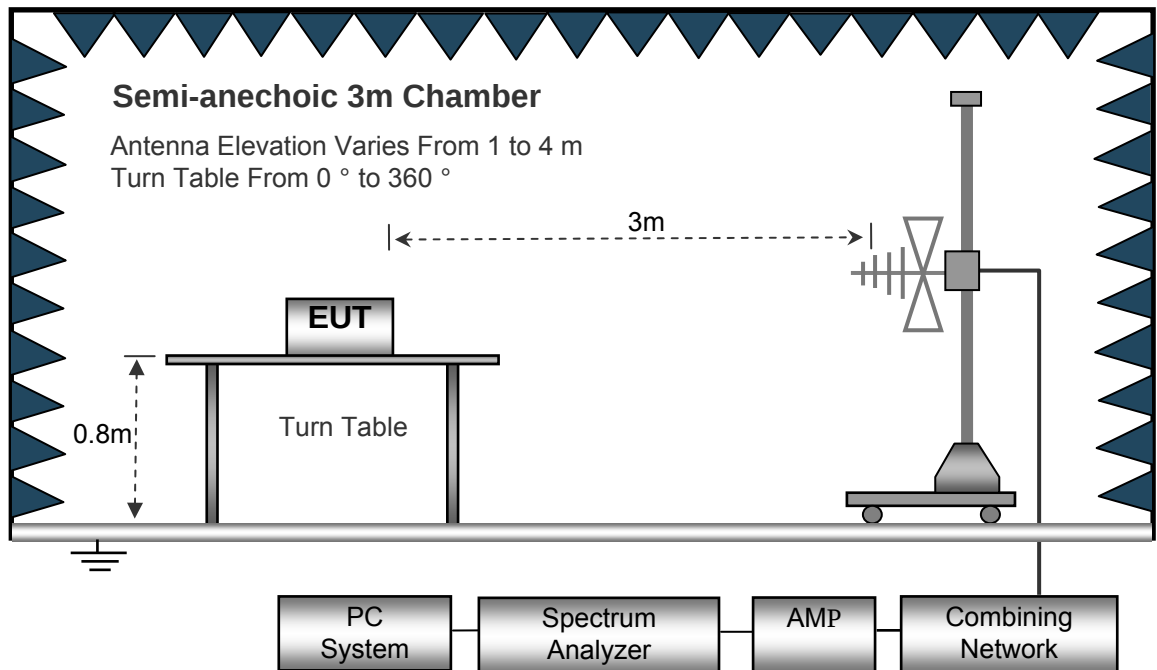
## 7.2 Test Setup

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

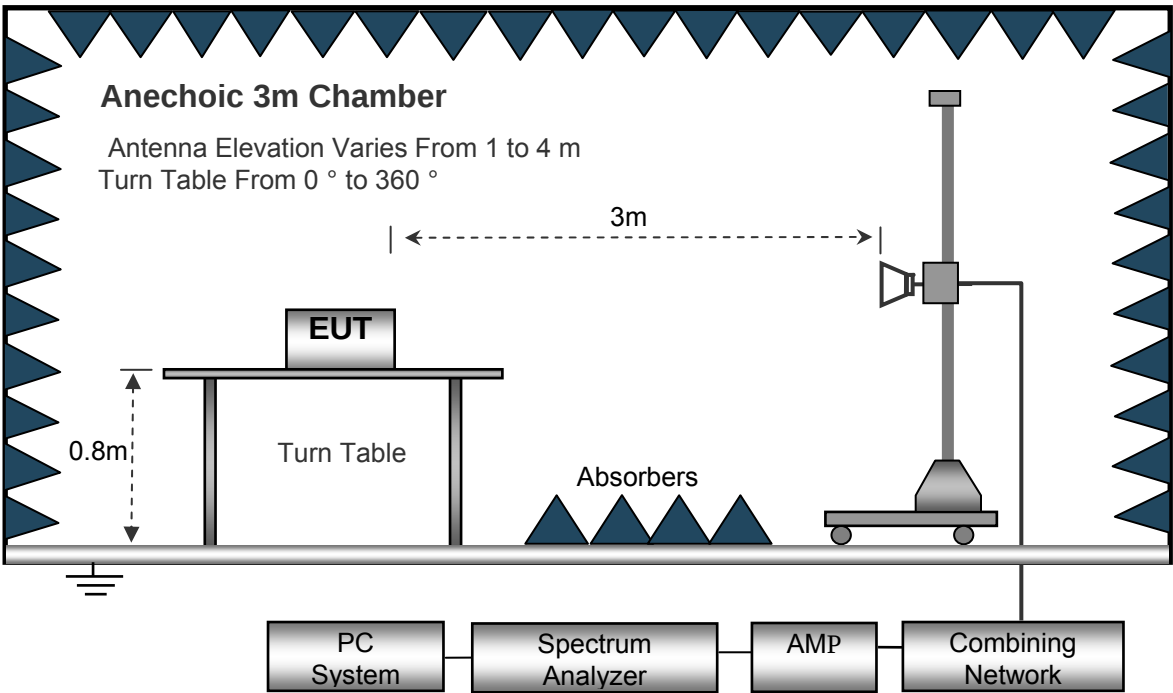
The test setup for emission measurement below 30MHz.



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

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 during 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:

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

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:

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

## 7.6 Summary of Test Results

BT BLE:

Test Frequency : 32.768kHz ~ 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 | Limit    | Margin |
|---------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------|--------|
|                     |                  |             |                  | Height     | Polar |                  |                     |          |        |
| (MHz)               | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| Low Channel 2402MHz |                  |             |                  |            |       |                  |                     |          |        |
| 166.63              | 23.25            | PK          | 139              | 1.1        | H     | 17.01            | 40.26               | 43.50    | -3.24  |
| 166.65              | 22.04            | PK          | 257              | 1.3        | V     | 17.01            | 39.05               | 43.50    | -6.95  |
| 4804.00             | 53.91            | PK          | 242              | 1.4        | V     | -1.06            | 52.85               | 74.00    | -21.15 |
| 4804.00             | 47.80            | Ave         | 242              | 1.4        | V     | -1.06            | 46.74               | 54.00    | -7.22  |
| 7206.00             | 49.98            | PK          | 346              | 1.1        | V     | 1.33             | 51.31               | 74.00    | -22.79 |
| 7206.00             | 45.42            | Ave         | 346              | 1.1        | V     | 1.33             | 46.75               | 54.00    | -7.17  |

| Frequency              | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------|--------|
|                        |                  |             |                  | Height     | Polar |                  |                     |          |        |
| (MHz)                  | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| Middle Channel 2440MHz |                  |             |                  |            |       |                  |                     |          |        |
| 166.63                 | 23.76            | PK          | 5                | 1.4        | H     | 17.01            | 40.77               | 43.50    | -2.73  |
| 166.63                 | 23.00            | PK          | 288              | 1.5        | V     | 17.01            | 40.01               | 43.50    | -3.49  |
| 4880.00                | 53.23            | PK          | 270              | 1.3        | V     | -0.62            | 52.61               | 74.00    | -21.39 |
| 4880.00                | 47.11            | Ave         | 270              | 1.3        | V     | -0.62            | 46.27               | 54.00    | -7.73  |
| 7320.00                | 49.18            | PK          | 353              | 1.3        | V     | 2.21             | 51.39               | 74.00    | -22.61 |
| 7320.00                | 45.48            | Ave         | 353              | 1.3        | V     | 2.21             | 47.69               | 54.00    | -6.31  |

| Frequency            | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|----------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------|--------|
|                      |                  |             |                  | Height     | Polar |                  |                     |          |        |
| (MHz)                | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| High Channel 2480MHz |                  |             |                  |            |       |                  |                     |          |        |
| 166.63               | 24.02            | PK          | 81               | 1.9        | H     | 17.01            | 41.03               | 43.50    | -2.47  |
| 166.63               | 23.07            | PK          | 242              | 1.8        | V     | 17.01            | 40.08               | 43.50    | -3.42  |
| 4960.00              | 53.66            | PK          | 324              | 1.6        | V     | -0.24            | 53.42               | 74.00    | -20.58 |
| 4960.00              | 47.04            | Ave         | 324              | 1.6        | V     | -0.24            | 46.80               | 54.00    | -7.20  |
| 7440.00              | 50.75            | PK          | 256              | 1.6        | V     | 2.84             | 53.59               | 74.00    | -20.41 |
| 7440.00              | 45.13            | Ave         | 256              | 1.6        | V     | 2.84             | 47.77               | 54.00    | -6.23  |

Test Frequency: 18GHz~25GHz

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

## 8 Band Edge Measurement

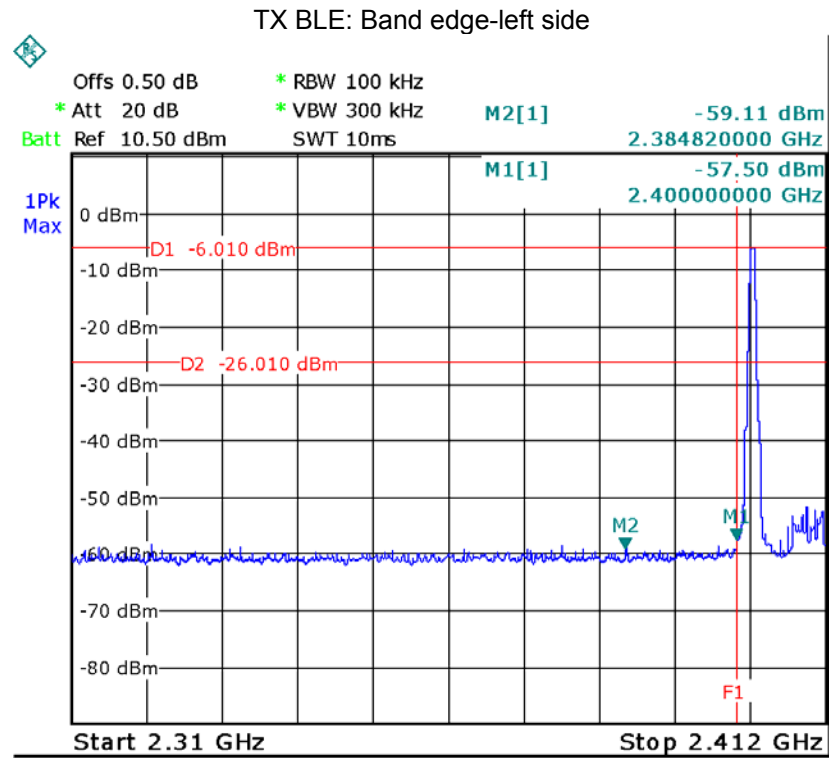
|                   |                                  |
|-------------------|----------------------------------|
| Test Requirement: | FCC CFR47 Part 15 Section 15.247 |
| Test Method:      | KDB 558074 D01 v03r02 06/05/2014 |
| Test Mode:        | Transmitting                     |

### 8.1 Test Produce

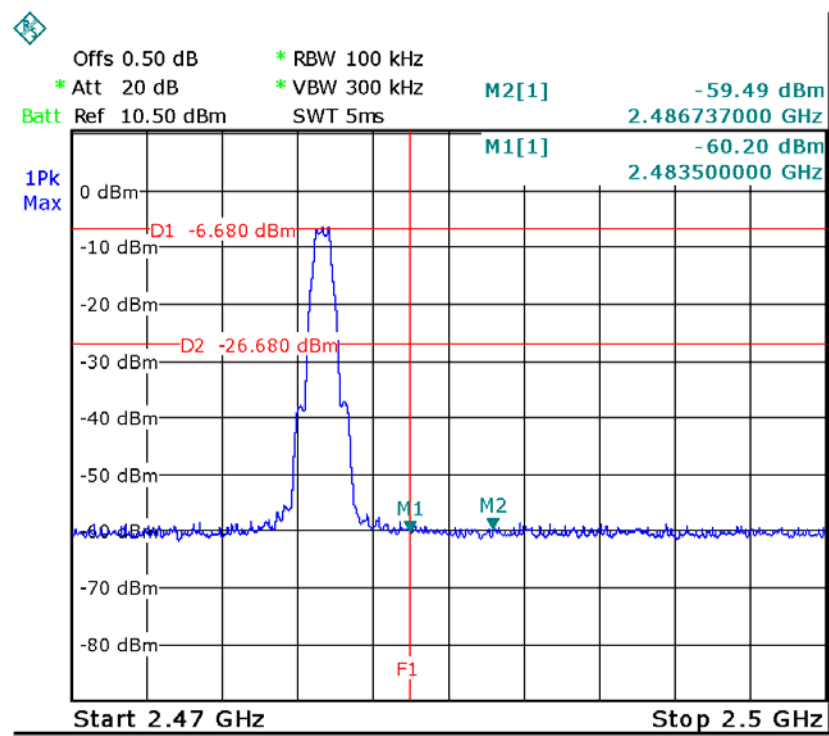
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then 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 BLE: Band edge-right side



## 9 6 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 v03r02 06/05/2014

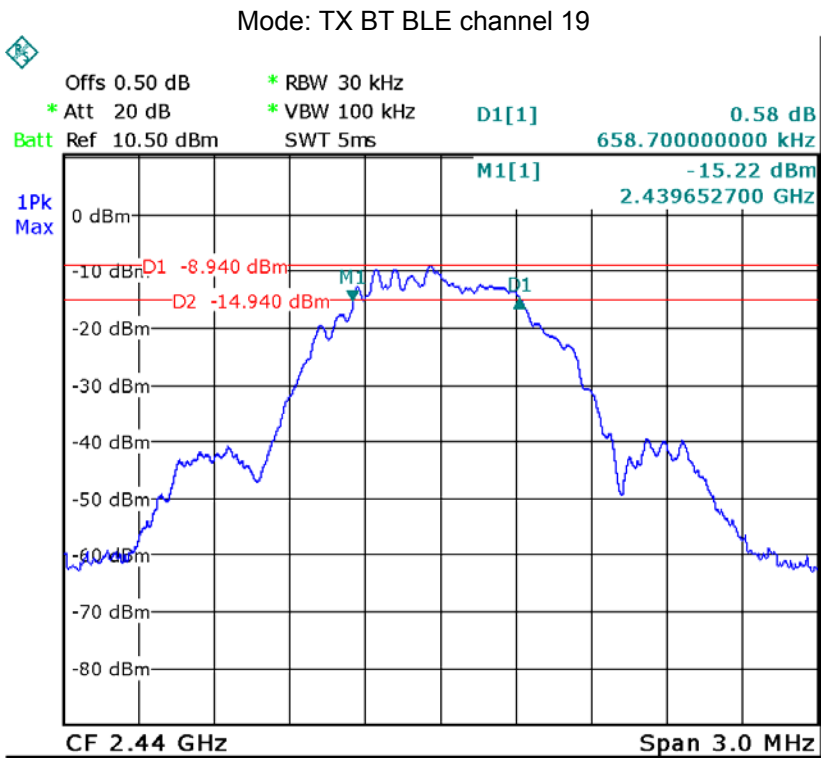
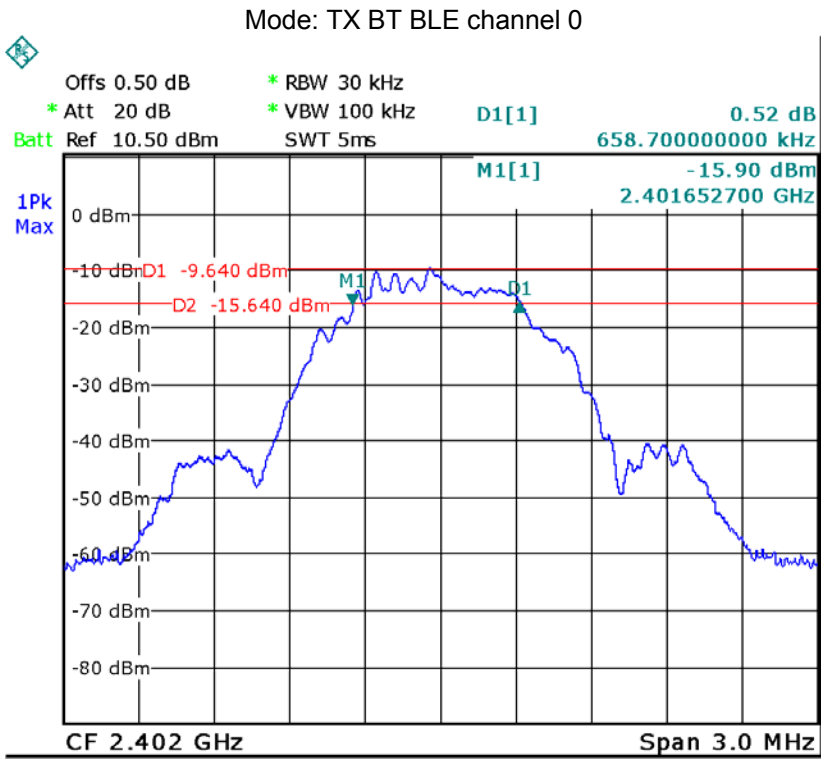
### 9.1 Test Procedure:

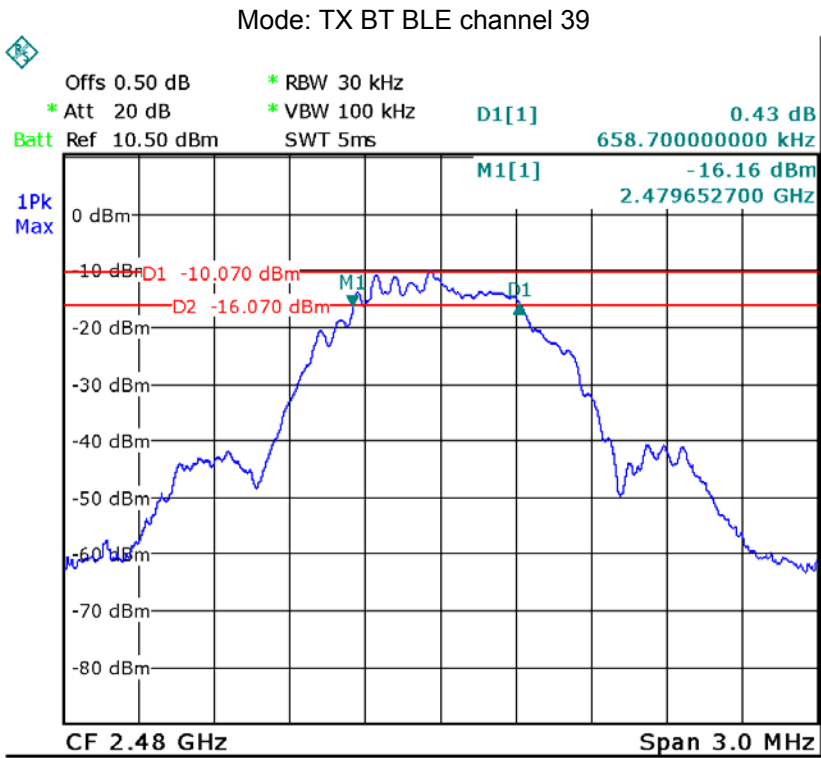
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

### 9.2 Test Result:

| Operation mode | Bandwidth (MHz) |            |            |
|----------------|-----------------|------------|------------|
|                | Channel 1       | Channel 20 | Channel 40 |
| BT BLE         | 0.659           | 0.659      | 0.659      |

Test result plot as follows:





## 10 Maximum Peak Output Power

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

KDB 558074 D01 v03r02 06/05/2014

### 10.1 Test Procedure:

KDB 558074 D01 v03r02 06/05/2014

section 9.1.1

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

- a) Set the  $RBW \geq DTS$  bandwidth.
- b) Set  $VBW \geq 3 \times RBW$ .
- c) Set  $span \geq 3 \times RBW$ .
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

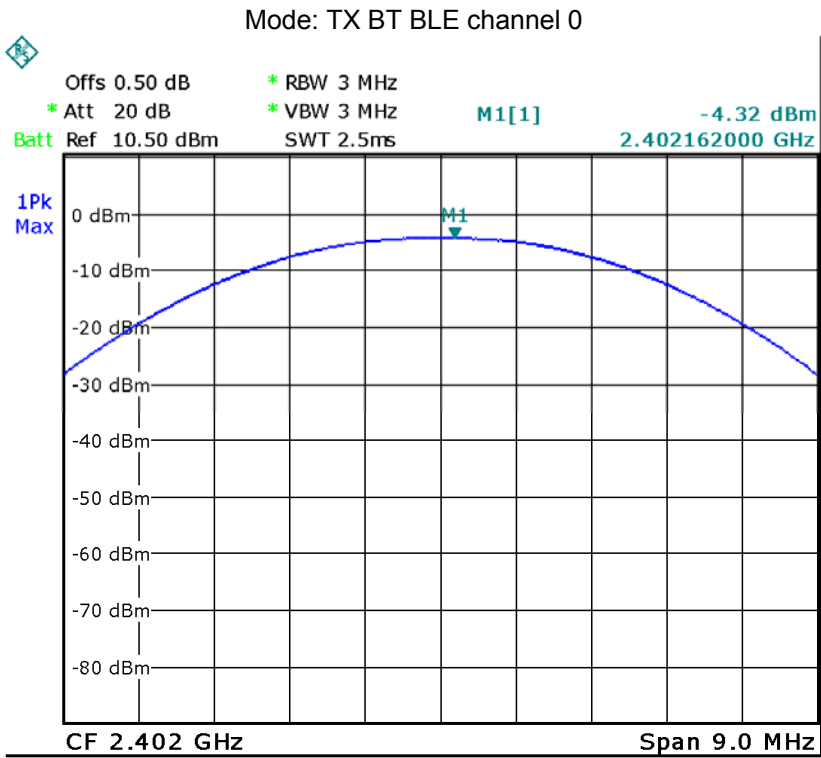
section 9.1.2

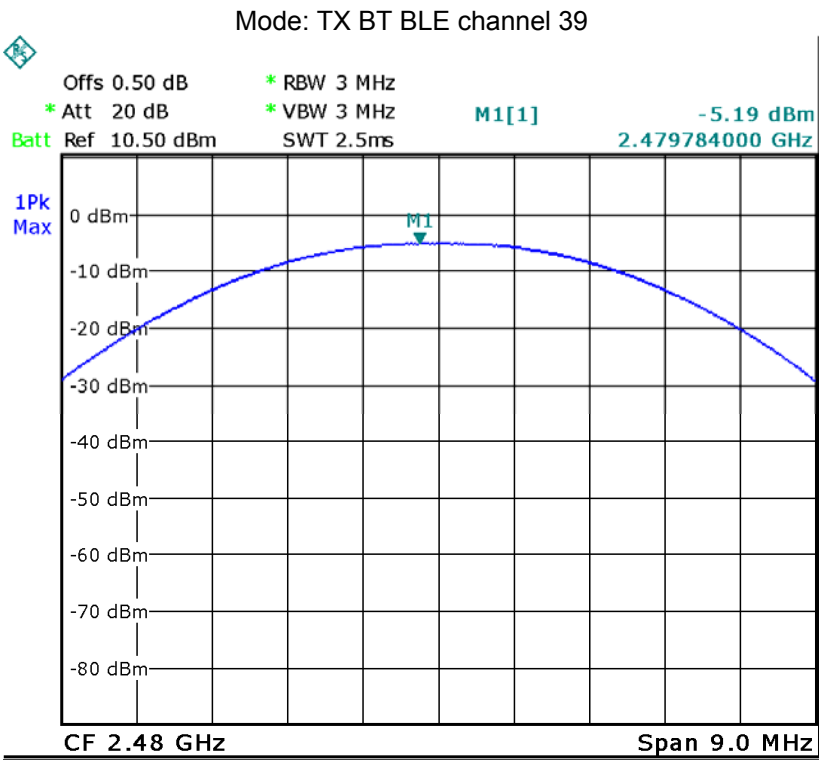
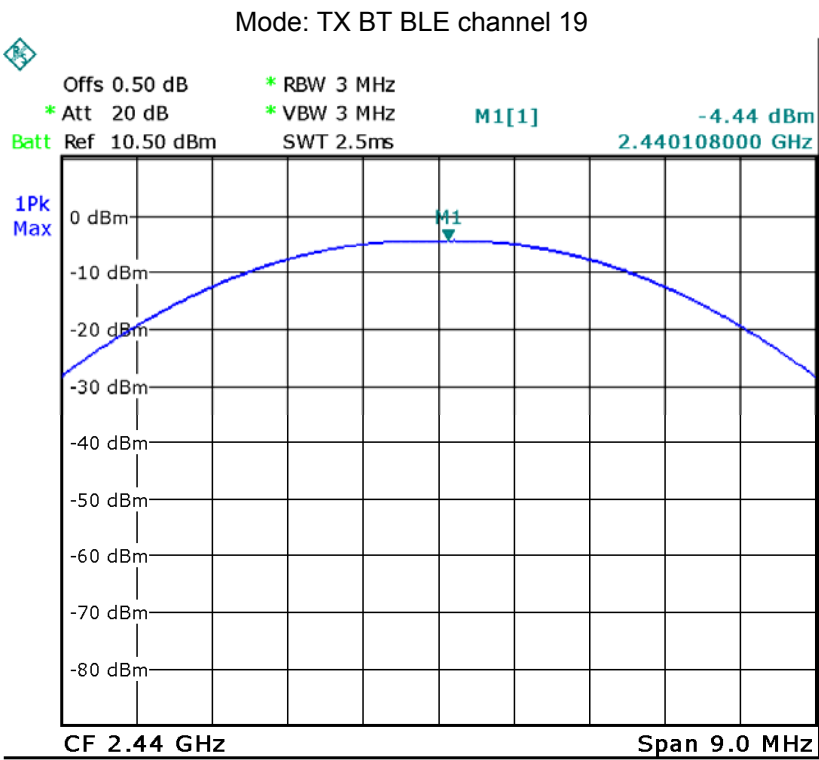
This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

- a) Set the  $RBW = 1 \text{ MHz}$ .
- b) Set the  $VBW \geq 3 \times RBW$ .
- c) Set the  $span \geq 1.5 \times DTS$  bandwidth.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

10.2 Test Result:

| Test mode : TX BT BLE              |         |         |
|------------------------------------|---------|---------|
| 10 Maximum Peak Output Power (dBm) |         |         |
| 2402MHz                            | 2440MHz | 2480MHz |
| -4.32                              | -4.44   | -5.19   |
| Limit                              |         |         |
| 1W/30dBm                           |         |         |





## 11 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 v03r02 06/05/2014

### 11.1 Test Procedure:

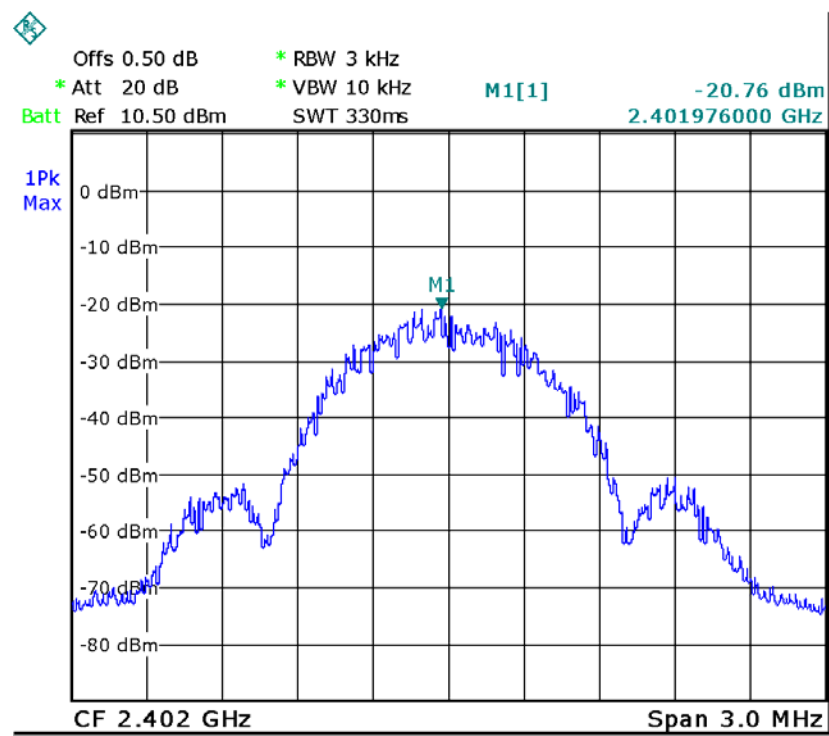
KDB 558074 D01 v03r02 06/05/2014 section 10.2

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.

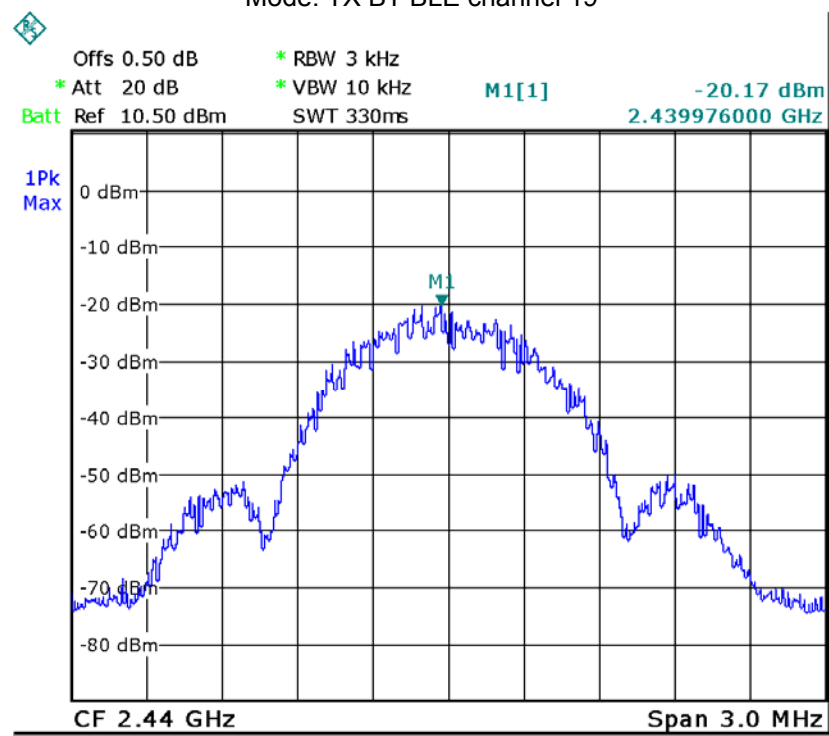
### 11.2 Test Result:

| Test mode : TX BT BLE         |         |         |
|-------------------------------|---------|---------|
| Power Spectral (dBm per 3kHz) |         |         |
| 2402MHz                       | 2440MHz | 2480MHz |
| -20.76                        | -20.17  | -21.32  |
| Limit                         |         |         |
| 8dBm per 3kHz                 |         |         |

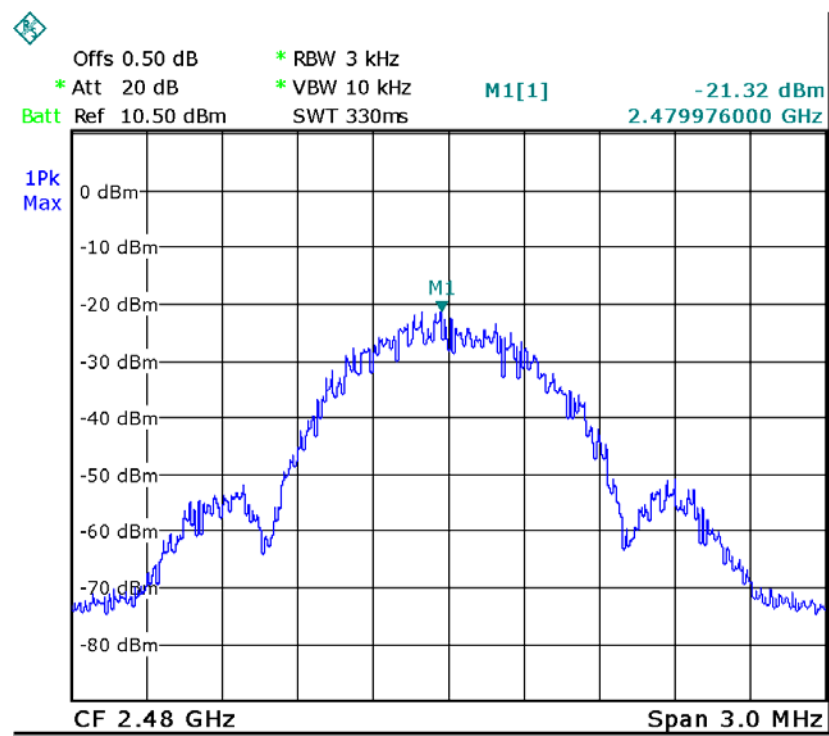
Mode: TX BT BLE channel 0



Mode: TX BT BLE channel 19



Mode: TX BT BLE channel 39



## **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

Test Mode: The EUT work in test mode(Tx).

### 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 <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

### 13.3 MPE Calculation Method

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

**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

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

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<br>(numeric) | Max.Peak Output<br>Power (dBm) | Peak Output<br>Power (mW) | Power Density<br>(mW/cm2) | Limit of Power Density<br>(mW/cm2) |
|---------------------------|--------------------------------|---------------------------|---------------------------|------------------------------------|
| 1.000                     | -0.1                           | 0.79                      | 0.000158                  | 1                                  |

## 14 Photographs –Model LTB210 Test Setup

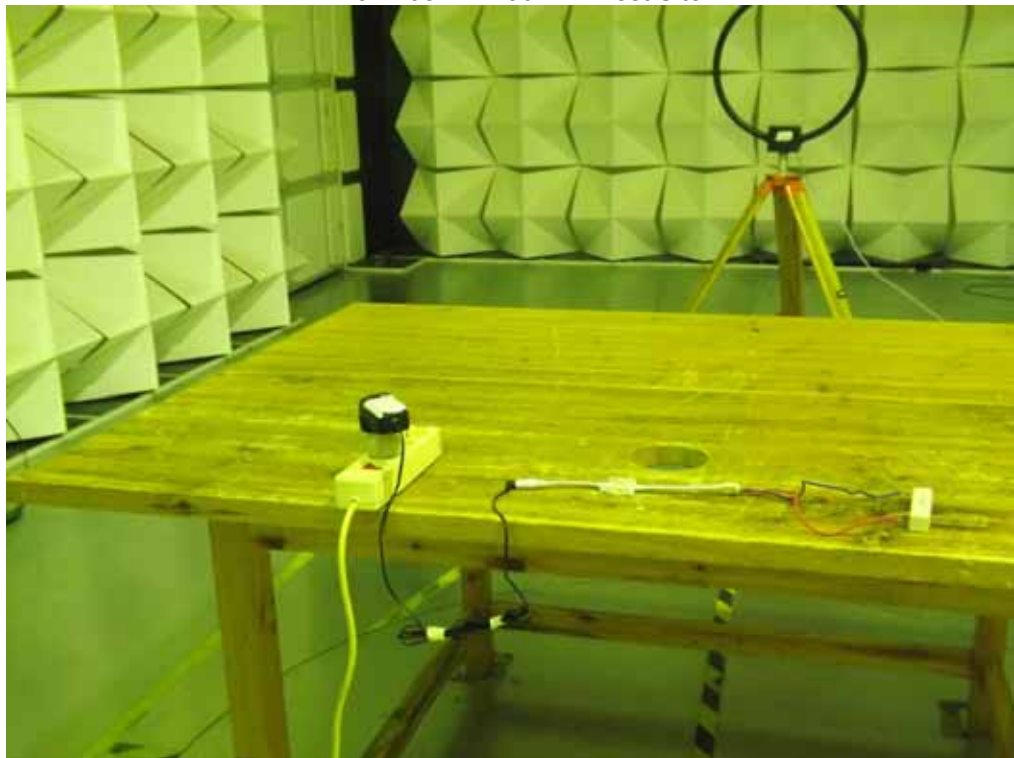
### 14.1 Photograph – Conducted Emission Test Setup

Test Site 2#



### 14.2 Photograph – Radiation Spurious Emission Test Setup

32.768kHz ~30MHz Test Site 2#



30MHz-1GHz Test Site 2#



Above 1GHz Test Site 1#



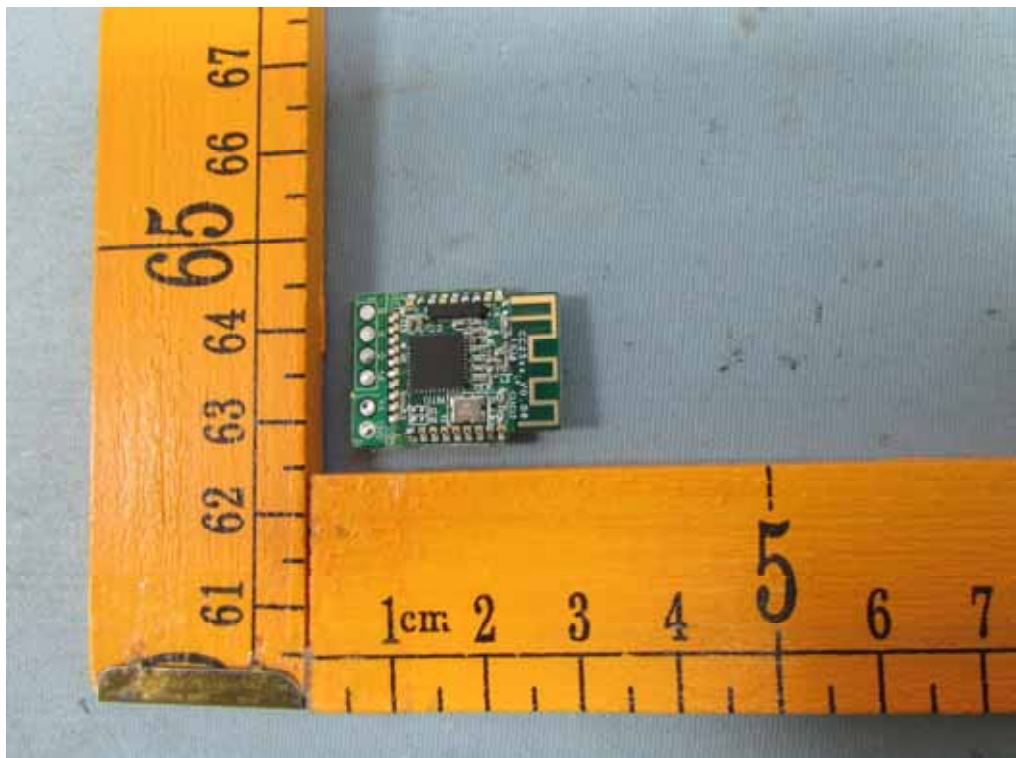
## 15 Photographs - Constructional Details

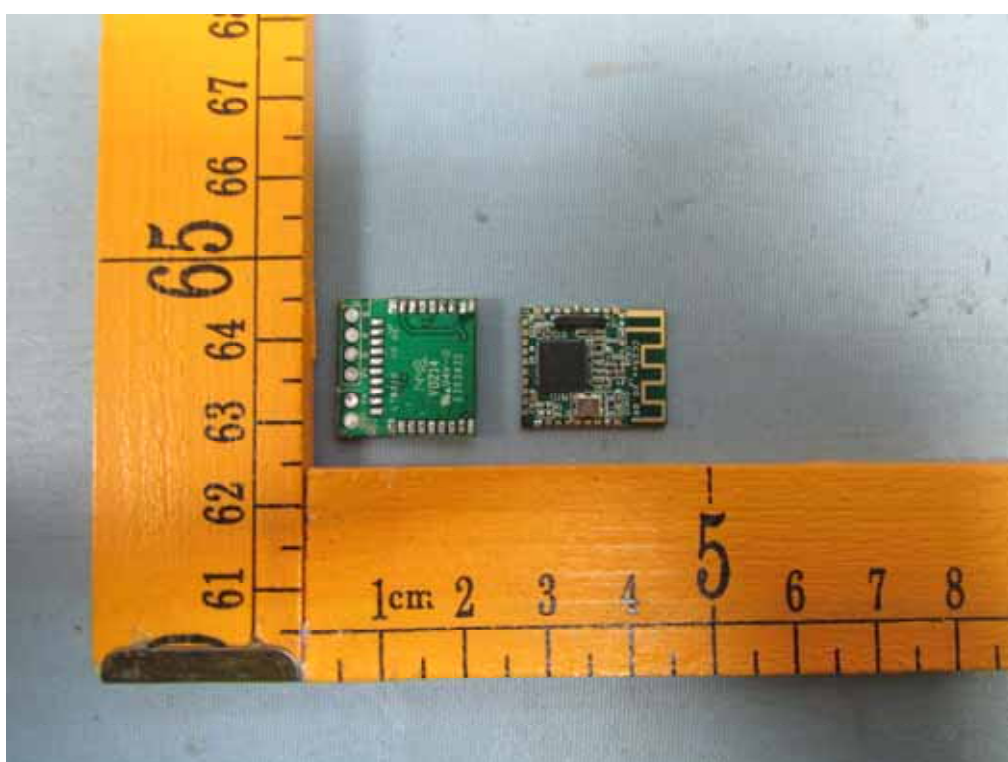
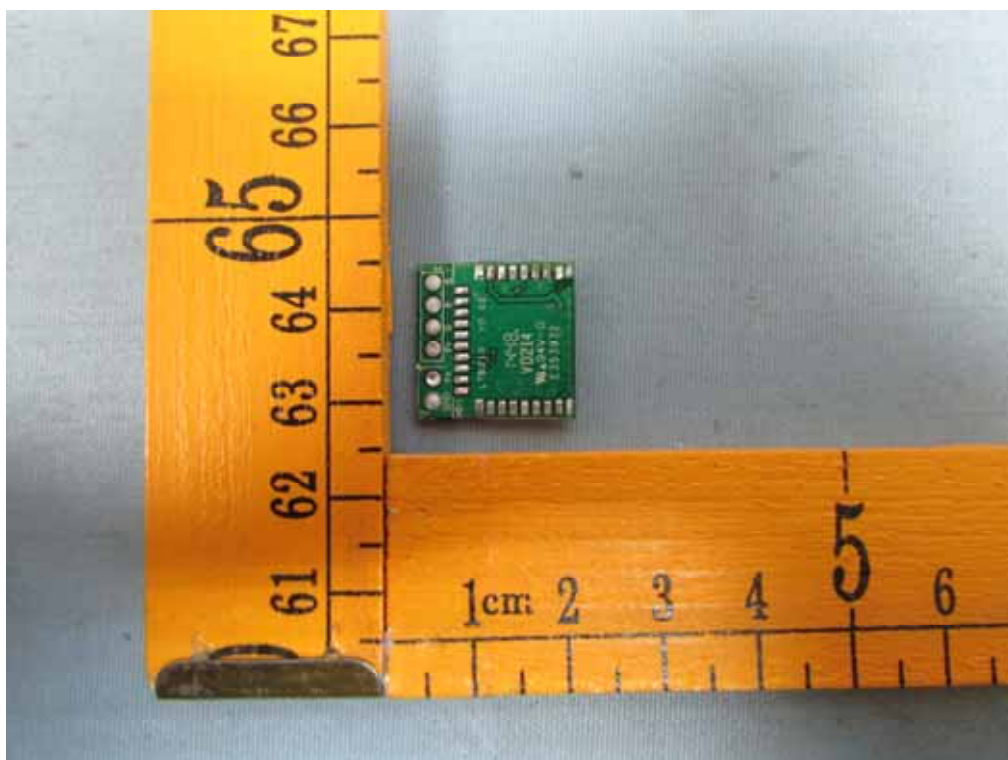
### 15.1 Model LTB210 External View



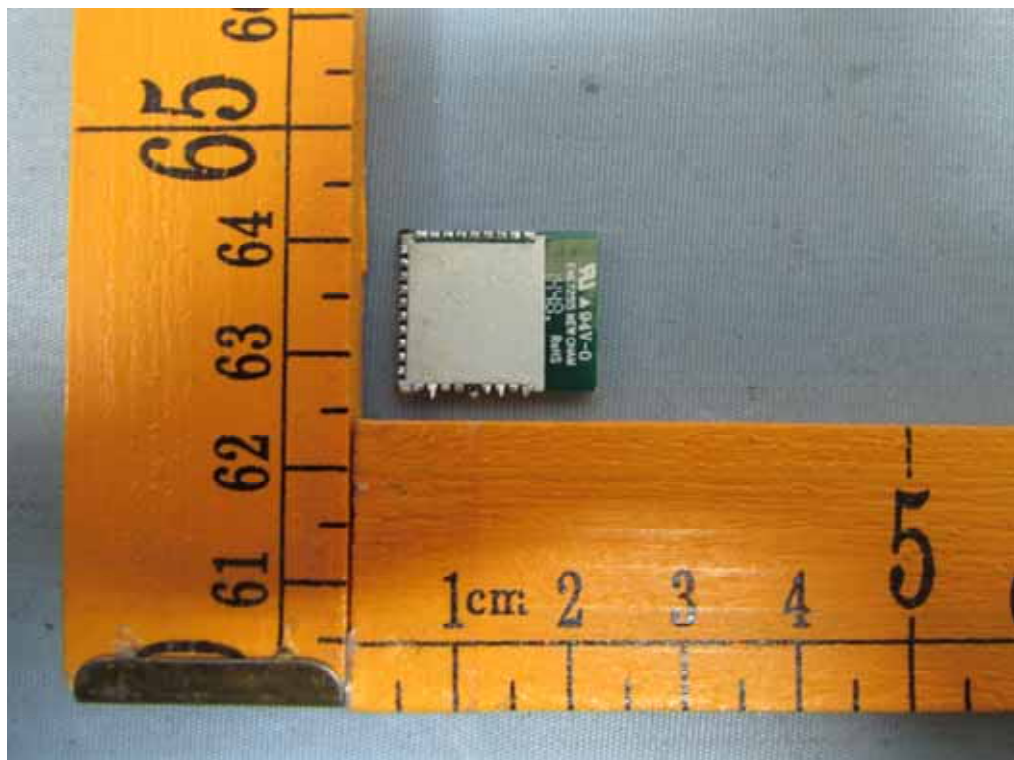
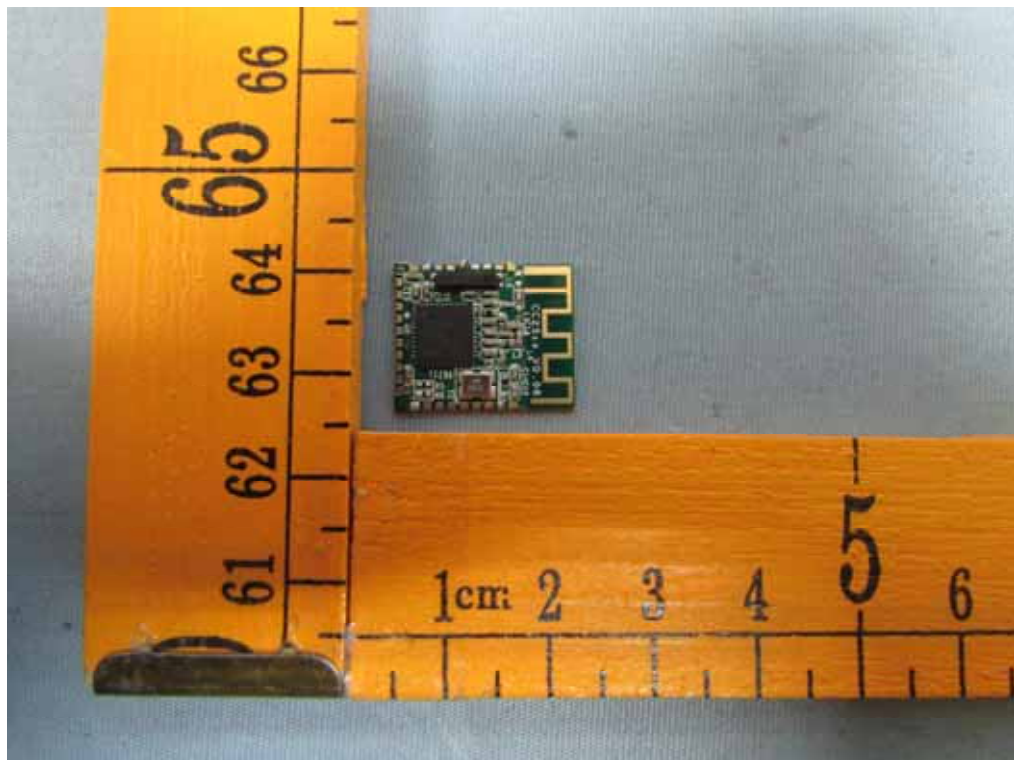


## 15.2 Model LTB210 – Internal Photos





### 15.3 RF Module Photos



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