

# 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, Guangguang 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:**

**Waltek Services (Shenzhen) Co., Ltd.**

Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen,  
Guangdong, China

Tel :+86-755-83551033

Fax:+86-755-83552400

Compiled by:



Zero Zhou / Project Engineer

Approved by:



Philo Zhong / Manager

## 2 Test Summary

Test Items	Test Requirement	Result
Radiated Emissions	15.247 15.205(a) 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 (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS

### 3 Contents

	<b>Page</b>
<b>1 COVER PAGE</b> .....	<b>1</b>
<b>2 TEST SUMMARY</b> .....	<b>2</b>
<b>3 CONTENTS</b> .....	<b>3</b>
<b>4 GENERAL INFORMATION</b> .....	<b>5</b>
4.1 GENERAL DESCRIPTION OF E.U.T. ....	5
4.2 DETAILS OF E.U.T. ....	5
4.3 CHANNEL LIST.....	5
4.4 TEST MODE .....	6
4.5 TEST FACILITY.....	6
<b>5 EQUIPMENT USED DURING TEST</b> .....	<b>7</b>
5.1 EQUIPMENTS LIST .....	7
5.2 DESCRIPTION OF SUPPORT UNITS .....	8
5.3 MEASUREMENT UNCERTAINTY .....	8
5.4 TEST EQUIPMENT CALIBRATION .....	8
<b>6 CONDUCTED EMISSION</b> .....	<b>9</b>
6.1 E.U.T. OPERATION .....	9
6.2 EUT SETUP.....	9
6.3 MEASUREMENT DESCRIPTION .....	9
6.4 CONDUCTED EMISSION TEST RESULT .....	10
<b>7 RADIATED EMISSIONS</b> .....	<b>12</b>
7.1 EUT OPERATION.....	12
7.2 TEST SETUP .....	13
7.3 SPECTRUM ANALYZER SETUP .....	14
7.4 TEST PROCEDURE .....	15
7.5 CORRECTED AMPLITUDE & MARGIN CALCULATION .....	15
7.6 SUMMARY OF TEST RESULTS .....	16
<b>8 BAND EDGE MEASUREMENT</b> .....	<b>18</b>
8.1 TEST PROCEDURE.....	18
8.2 TEST RESULT .....	19
<b>9 6 DB BANDWIDTH MEASUREMENT</b> .....	<b>21</b>
9.1 TEST PROCEDURE: .....	21
9.2 TEST RESULT: .....	21
<b>10 MAXIMUM PEAK OUTPUT POWER</b> .....	<b>24</b>
10.1 TEST PROCEDURE:.....	24
10.2 TEST RESULT: .....	25
<b>11 POWER SPECTRAL DENSITY</b> .....	<b>27</b>
11.1 TEST PROCEDURE:.....	27
11.2 TEST RESULT: .....	27
<b>12 ANTENNA REQUIREMENT</b> .....	<b>30</b>
<b>13 RF EXPOSURE</b> .....	<b>31</b>
13.1 REQUIREMENTS.....	31
13.2 THE PROCEDURES / LIMIT .....	31
13.3 MPE CALCULATION METHOD .....	31
<b>14 PHOTOGRAPHS –MODEL LTB210 TEST SETUP</b> .....	<b>33</b>

14.1	PHOTOGRAPH – CONDUCTED EMISSION TEST SETUP.....	33
14.2	PHOTOGRAPH – RADIATION SPURIOUS EMISSION TEST SETUP.....	33
<b>15</b>	<b>PHOTOGRAPHS - CONSTRUCTIONAL DETAILS .....</b>	<b>35</b>
15.1	MODEL LTB210 EXTERNAL VIEW.....	35
15.2	MODEL LTB210 – INTERNAL PHOTOS.....	37
15.3	RF MODULE PHOTOS.....	39

## 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

<b>Conducted Emissions Test Site 1#</b>						
<b>Item</b>	<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Last Calibration Date</b>	<b>Calibration Due Date</b>
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
<b>Conducted Emissions Test Site 2#</b>						
<b>Item</b>	<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Last Calibration Date</b>	<b>Calibration Due Date</b>
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
<b>3m Semi-anechoic Chamber for Radiation Emissions Test site 1#</b>						
<b>Item</b>	<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Last Calibration Date</b>	<b>Calibration Due Date</b>
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 Pre-amplifier	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
<b>3m Semi-anechoic Chamber for Radiation Emissions Test site 2#</b>						
<b>Item</b>	<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No</b>	<b>Last Calibration Date</b>	<b>Calibration Due Date</b>
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 (9k~26.5GHz)	Agilent	E7405A	MY45114943	Sep.15,2014	Sep.14,2015
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	Sep.15,2014	Sep.14,2015
3.	Signal Analyzer (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 56 dB $\mu$ V between 0.5MHz & 5MHz 60 dB $\mu$ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)

### 6.1 E.U.T. Operation

Operating Environment :

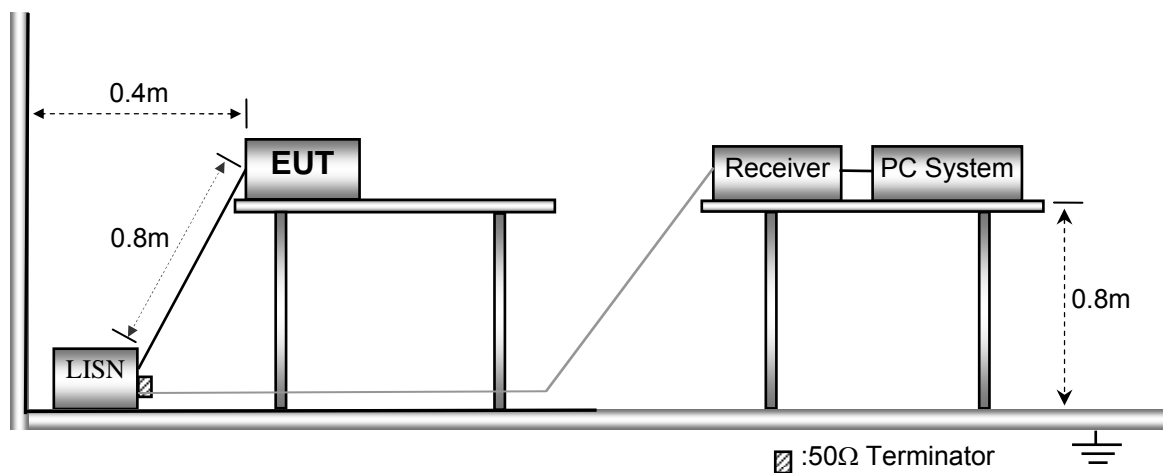
Temperature:	25.5 °C
Humidity:	51 % RH
Atmospheric Pressure:	101.2kPa

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.

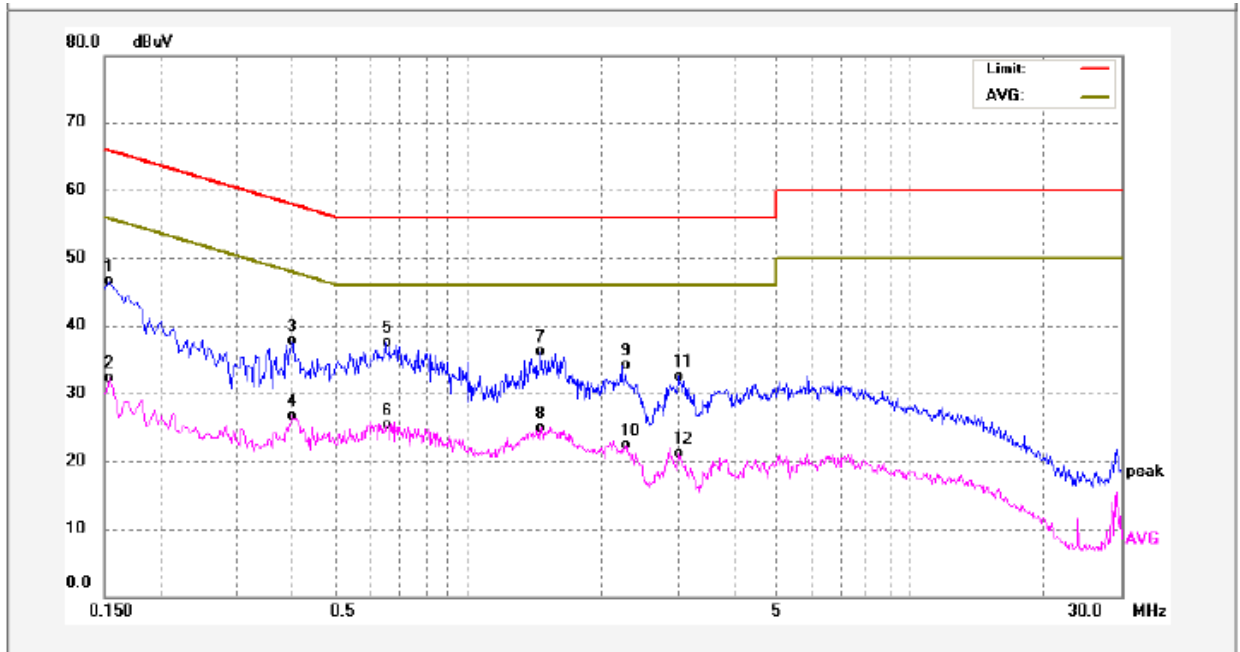


### 6.3 Measurement Description

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.

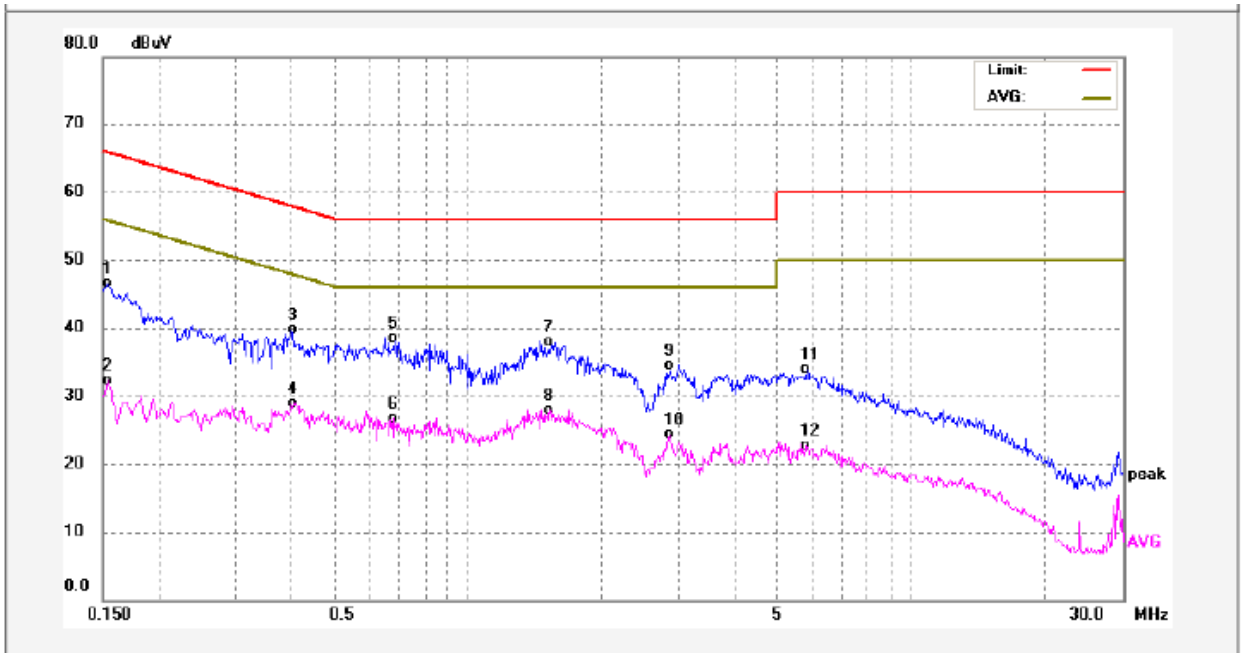
### 6.4 Conducted Emission Test Result

Live line:



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	0.3980	26.43	11.31	37.74	57.89	-20.15	QP	
4	0.3980	15.47	11.31	26.78	47.89	-21.11	AVG	
5	0.6580	26.08	11.33	37.41	56.00	-18.59	QP	
6	0.6580	13.92	11.33	25.25	46.00	-20.75	AVG	
7	1.4700	24.90	11.19	36.09	56.00	-19.91	QP	
8	1.4700	13.79	11.19	24.98	46.00	-21.02	AVG	
9	2.2820	22.98	11.20	34.18	56.00	-21.82	QP	
10	2.2820	11.20	11.20	22.40	46.00	-23.60	AVG	
11	3.0059	21.35	11.21	32.56	56.00	-23.44	QP	
12	3.0059	9.98	11.21	21.19	46.00	-24.81	AVG	

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 (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (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

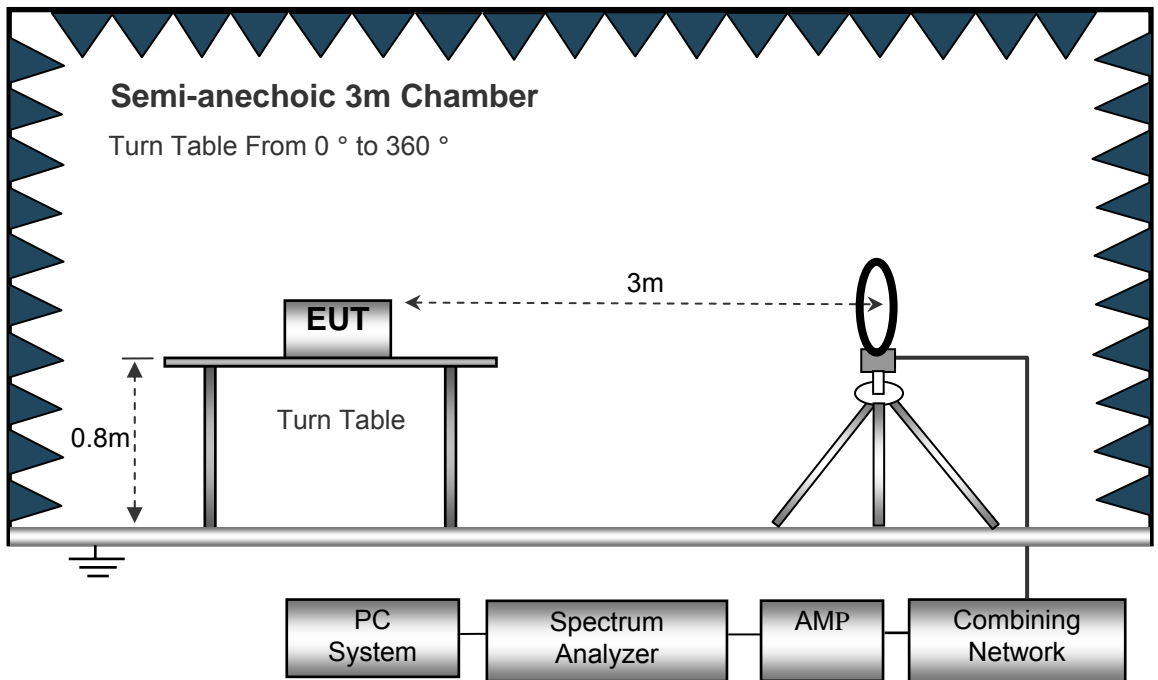
EUT Operation :

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

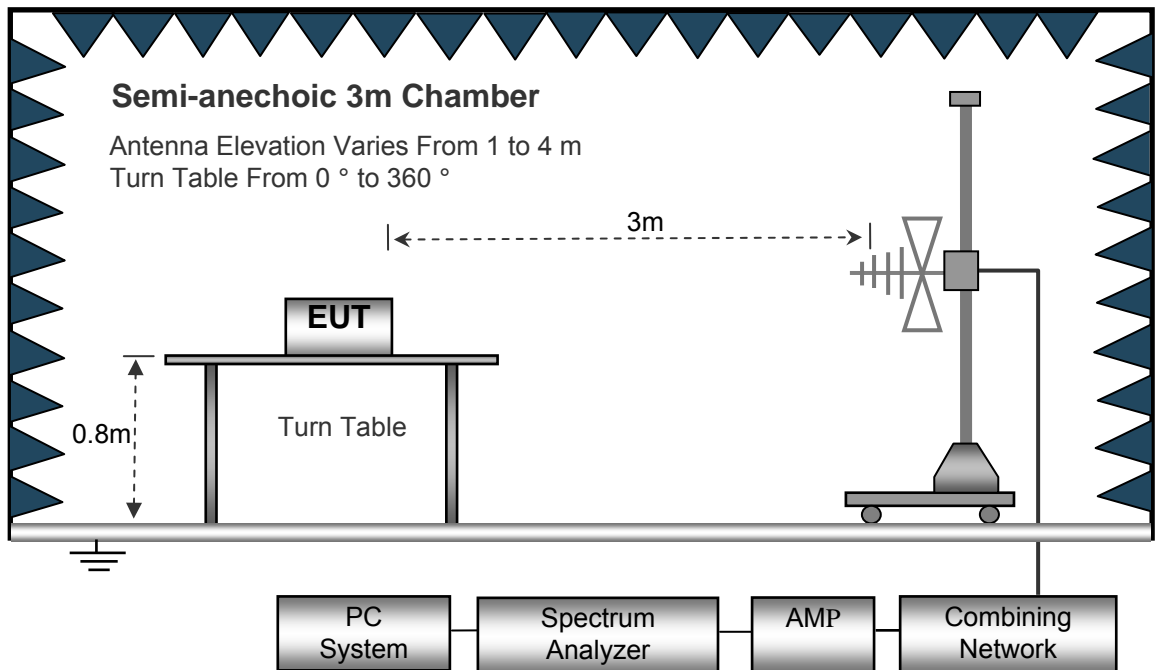
## 7.2 Test Setup

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

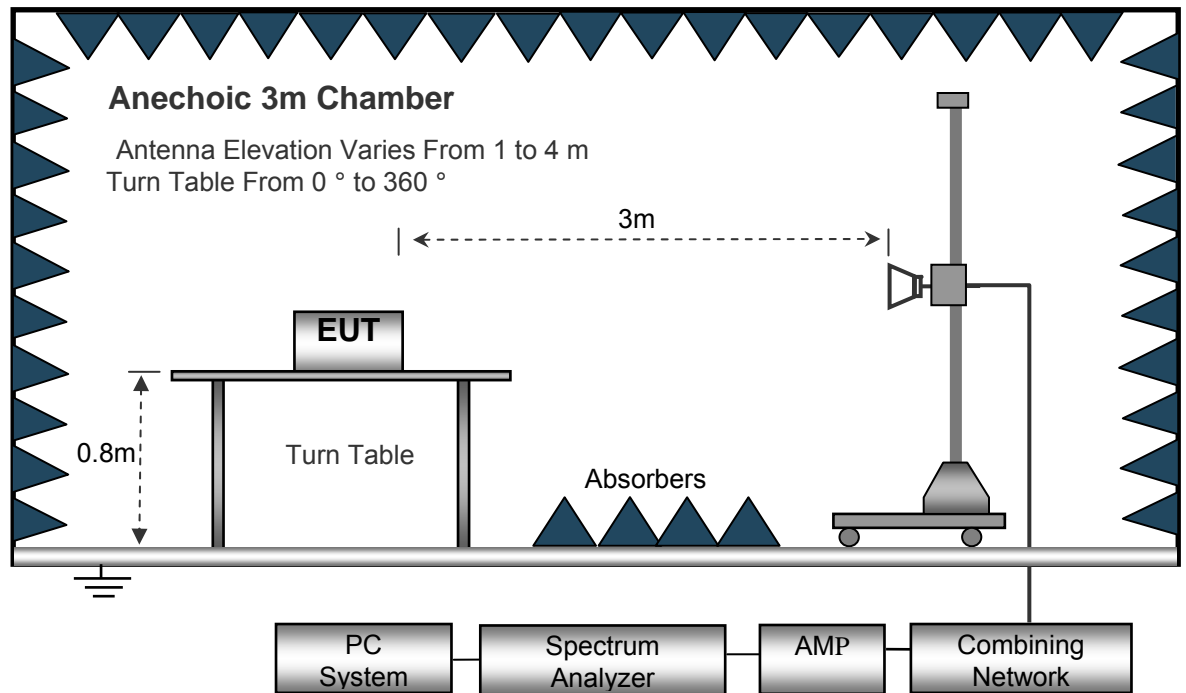
The test setup for emission measurement below 30MHz.



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 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:

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

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)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/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)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/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)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/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

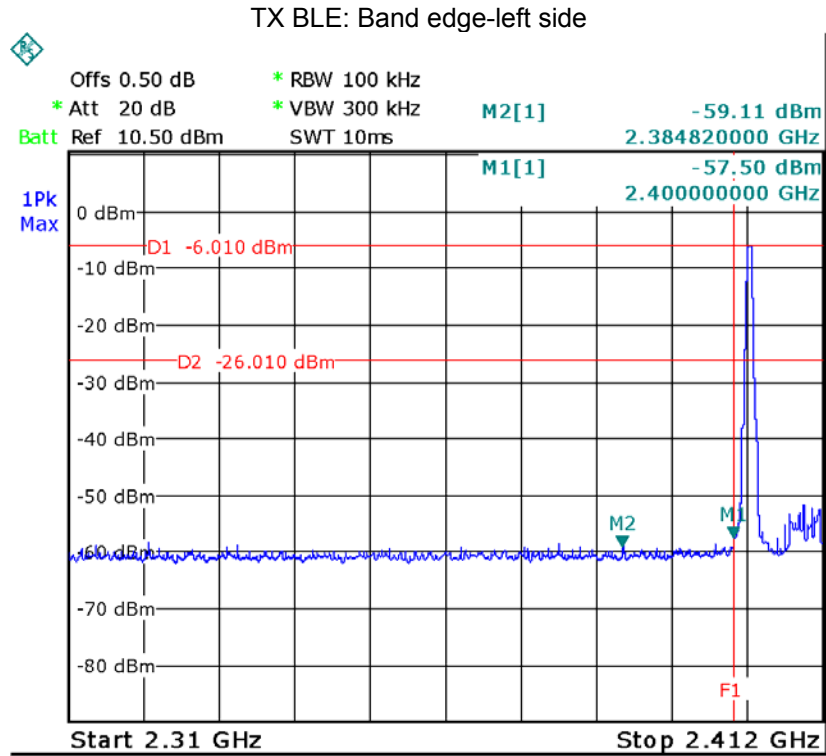
Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	KDB 558074 D01 v03r02 06/05/2014
Test Mode:	Transmitting

### 8.1 Test Produce

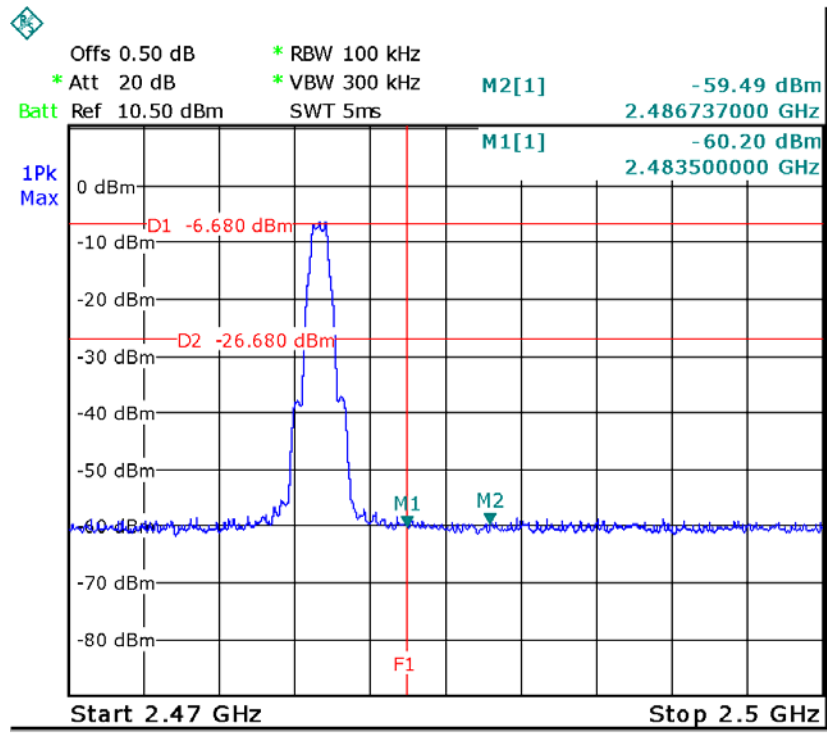
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then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

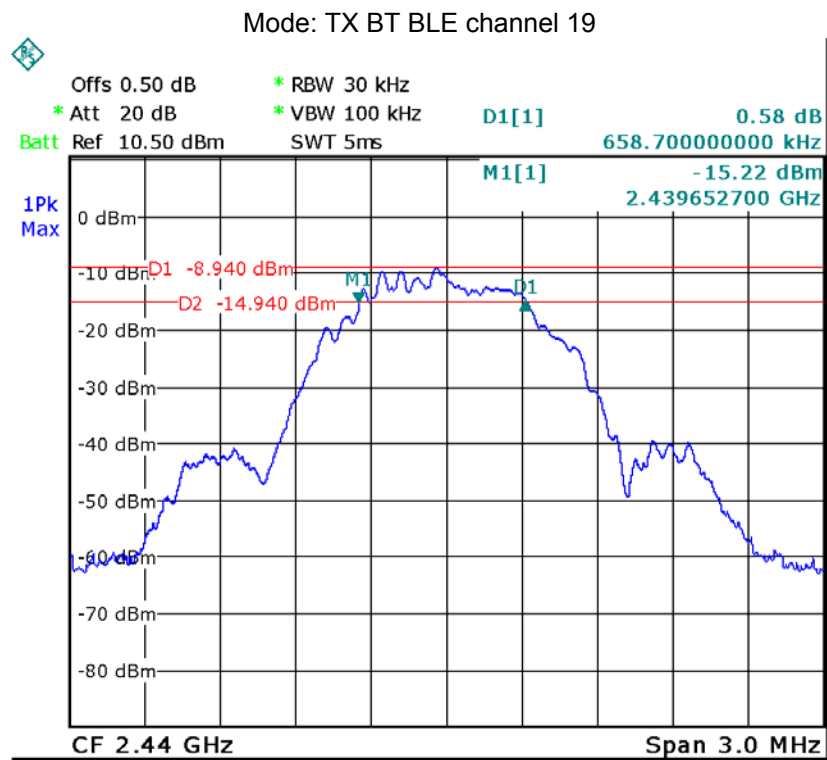
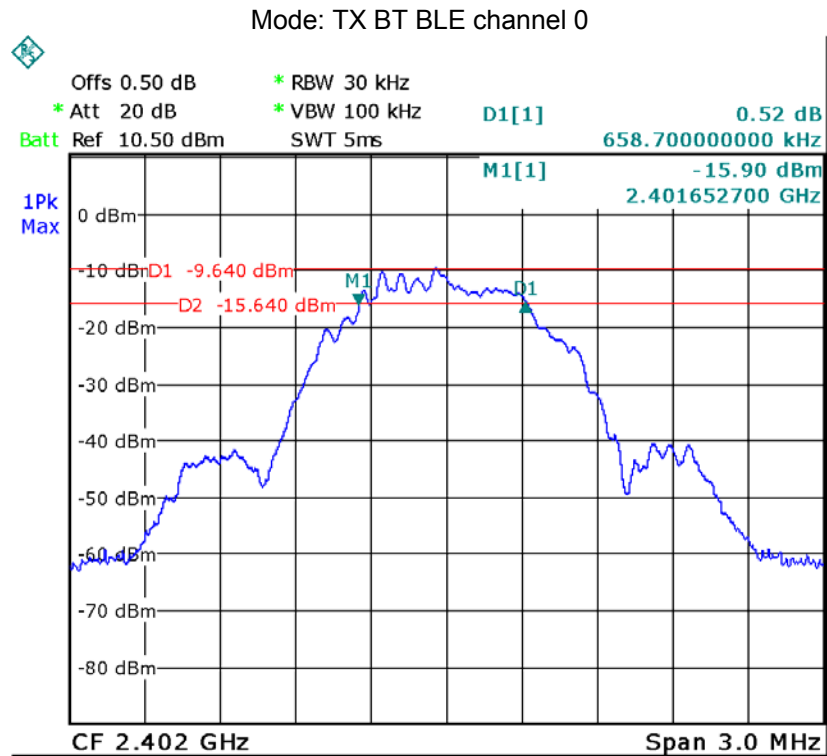
### 9.1 Test Procedure:

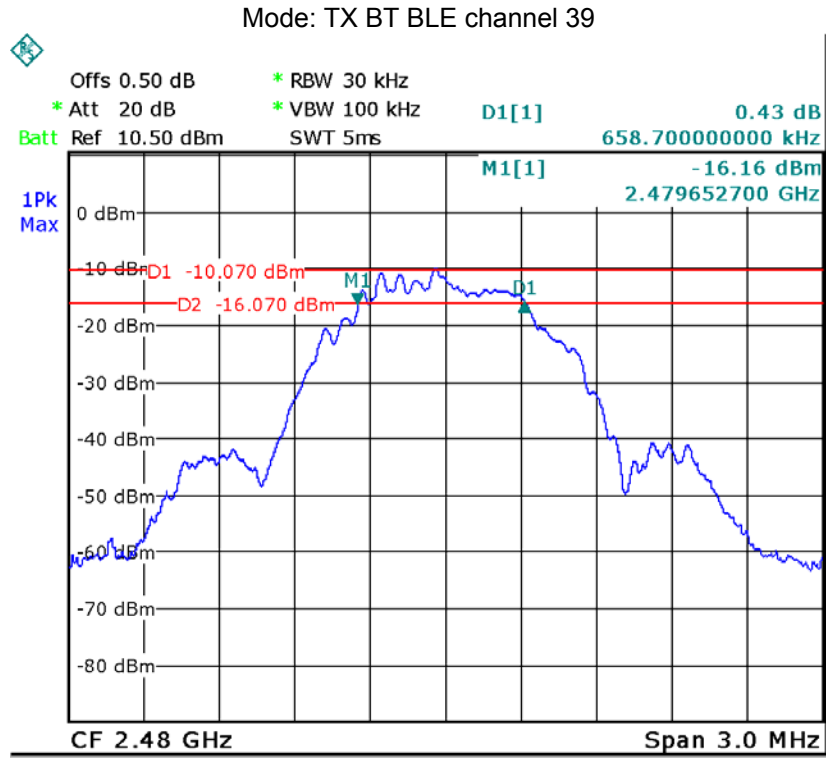
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

### 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 = DTS bandwidth.
- b) Set VBW = 3 × RBW.
- c) Set span = 3 × 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

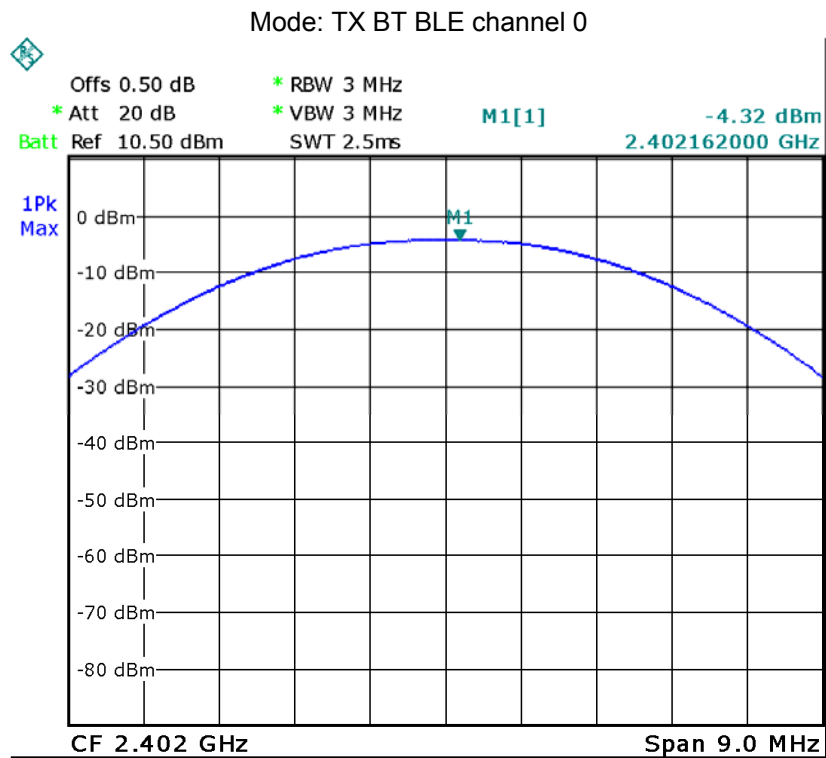
This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

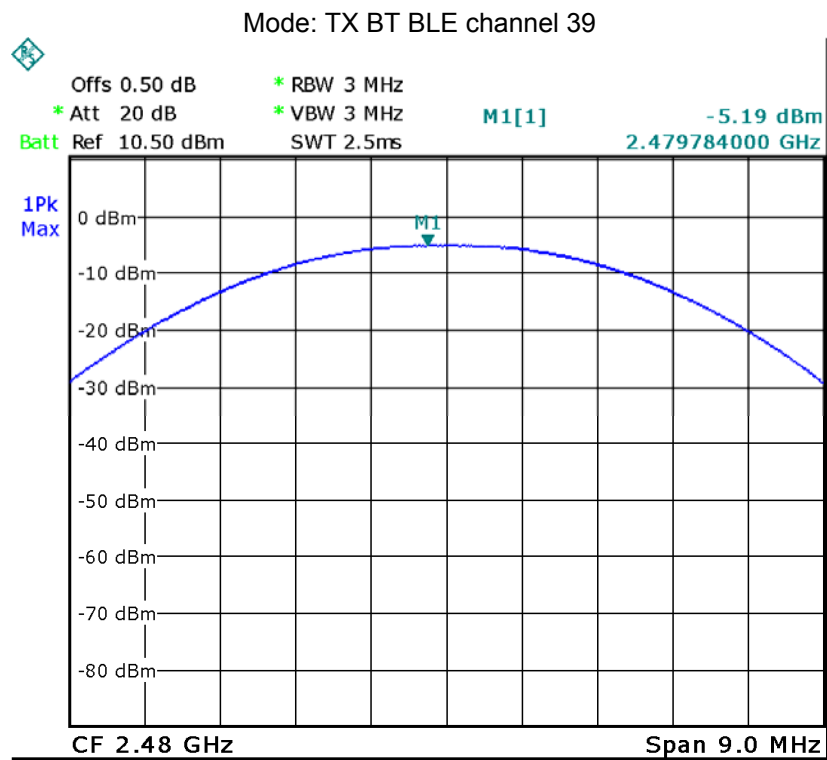
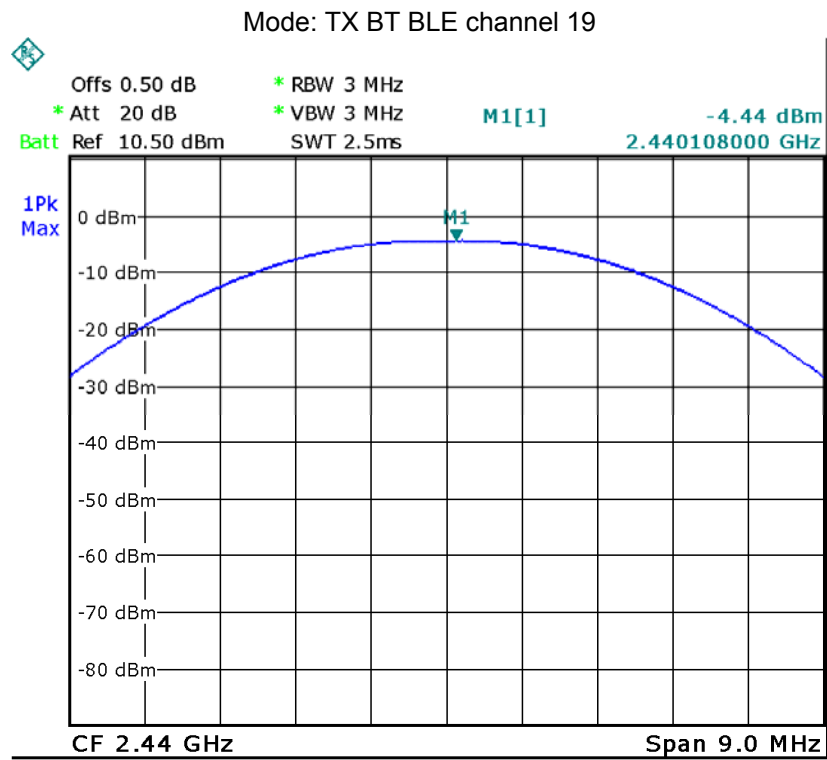
- a) Set the RBW = 1 MHz.
- b) Set the VBW = 3 × RBW
- c) Set the span = 1.5 × DTS bandwidth.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the instrument's band/channel power measurement function with the band limits set 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:

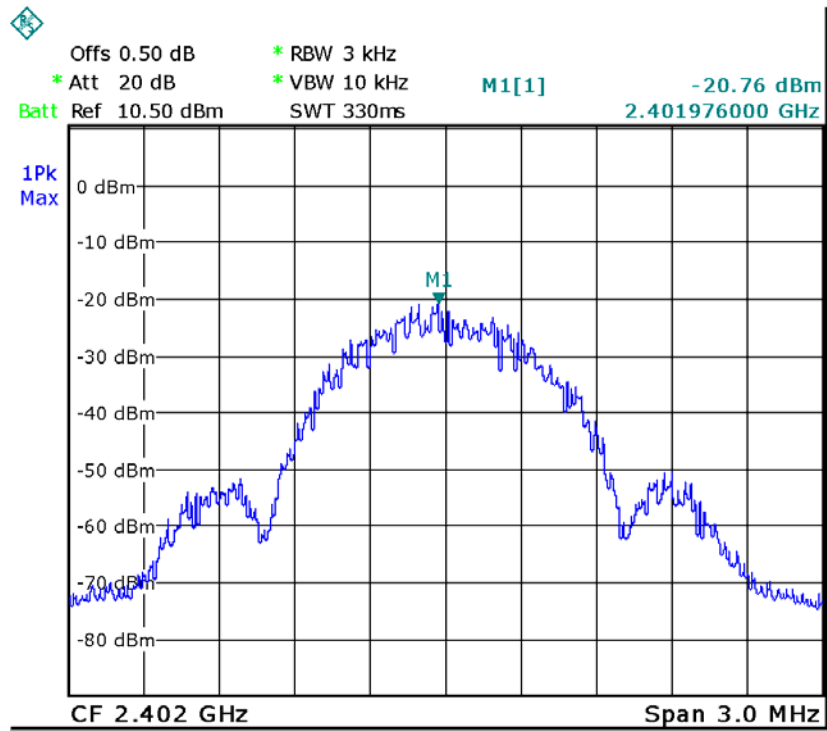
KDB 558074 D01 v03r02 06/05/2014 section 10.2

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.

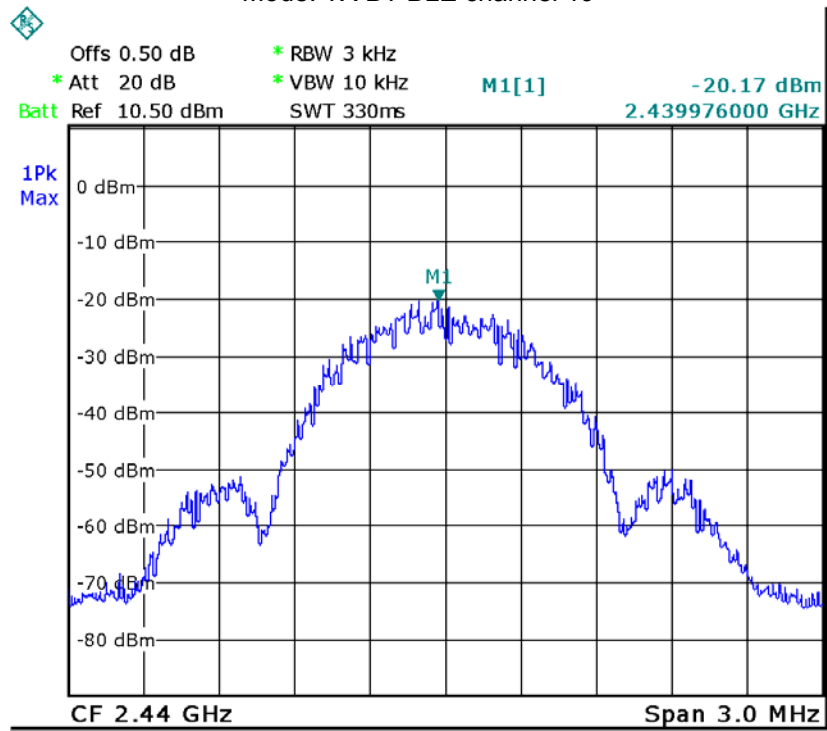
### 11.2 Test Result:

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

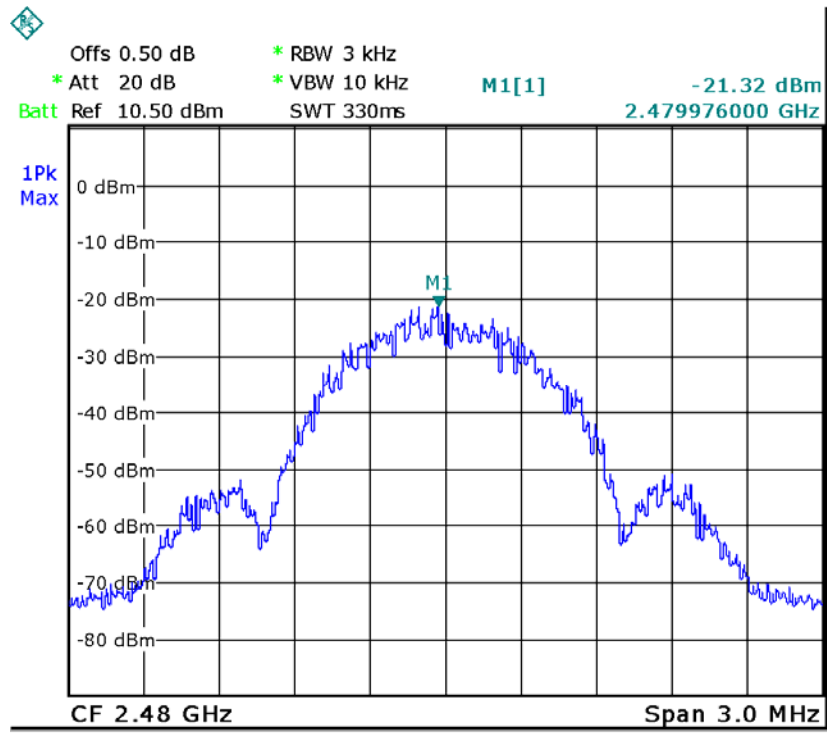
Mode: TX BT BLE channel 0



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 (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> )
1.000	-0.1	0.79	0.000158	1



## 14 Photographs –Model LTB210 Test Setup

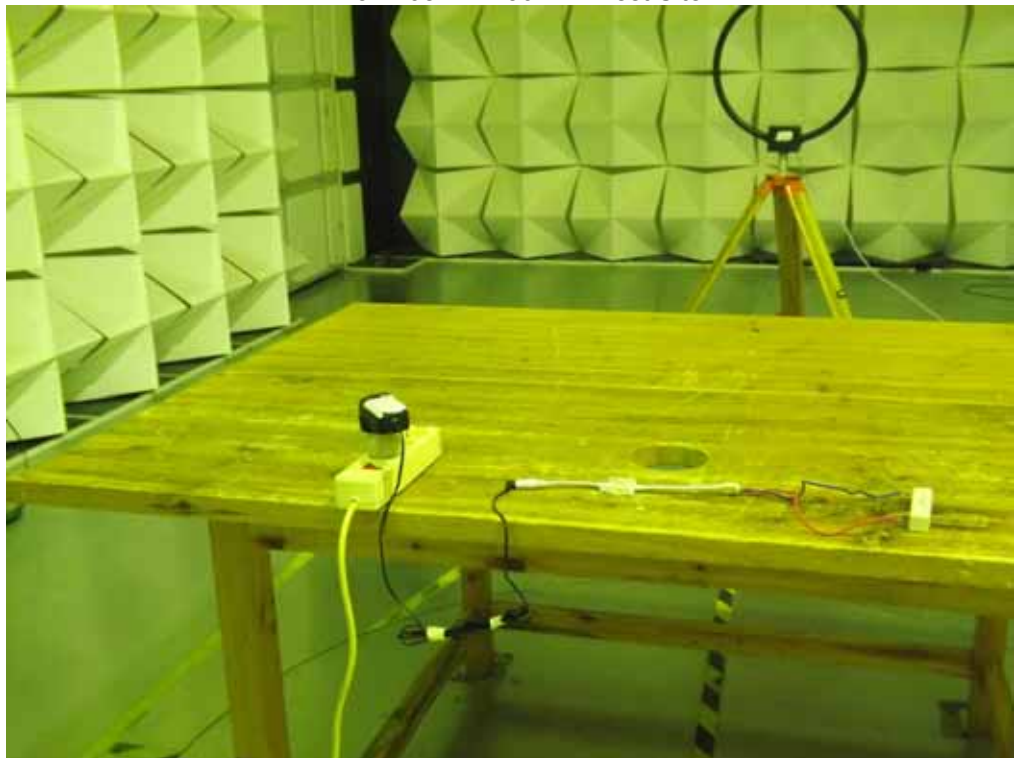
### 14.1 Photograph – Conducted Emission Test Setup

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#



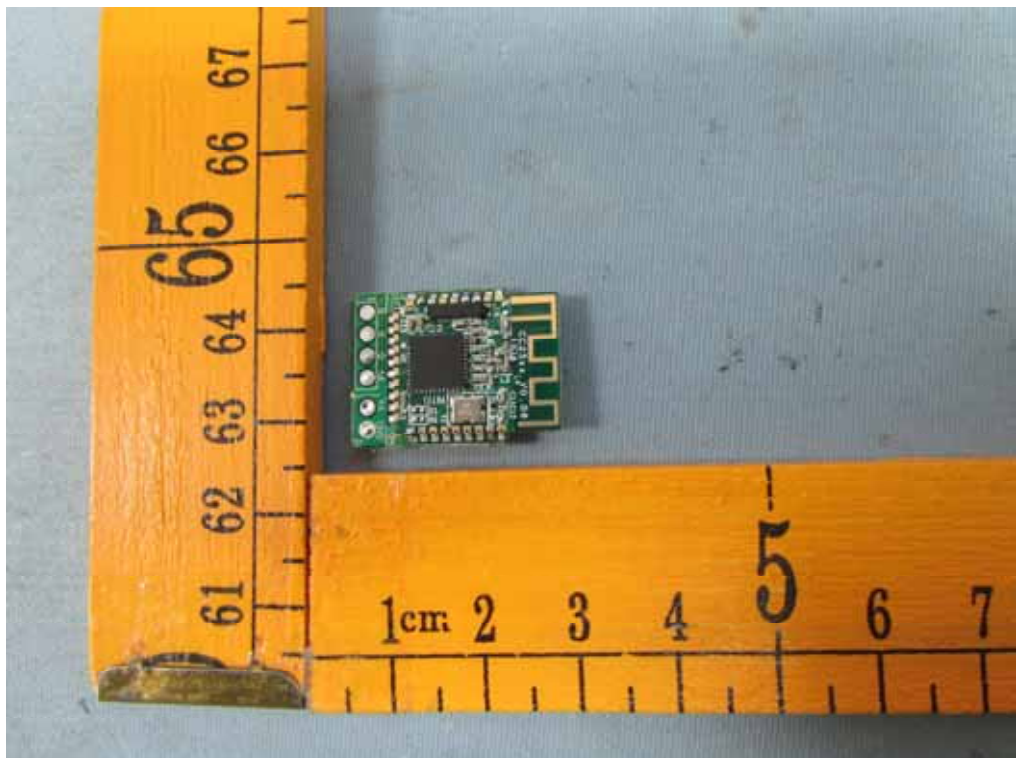
## 15 Photographs - Constructional Details

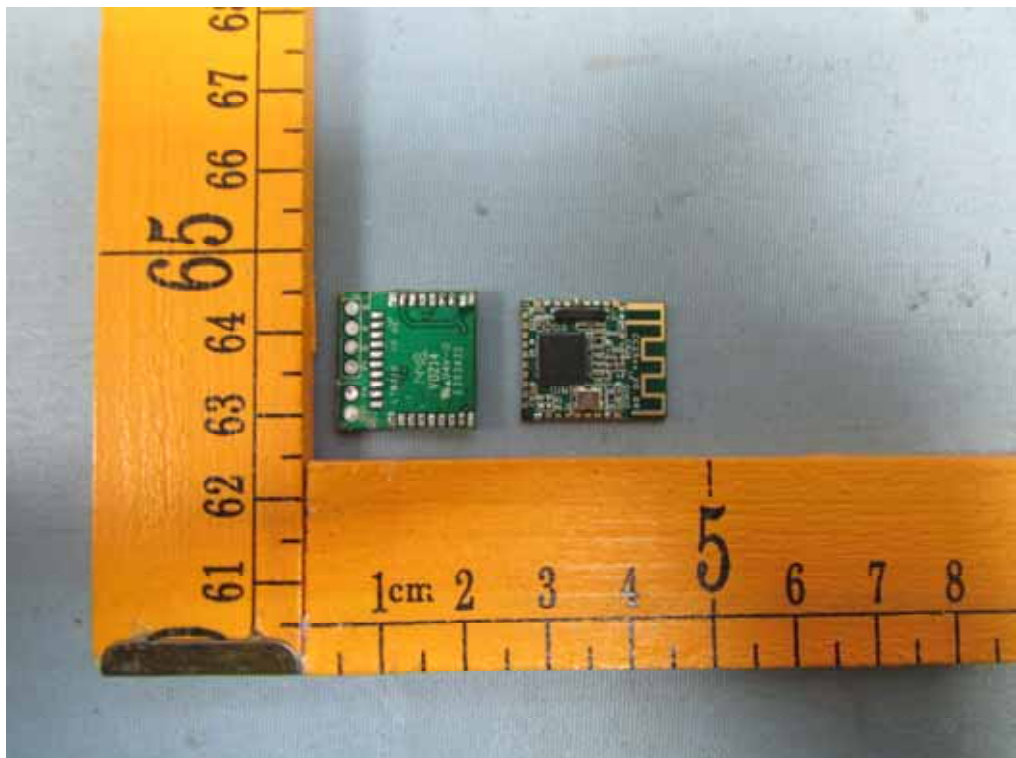
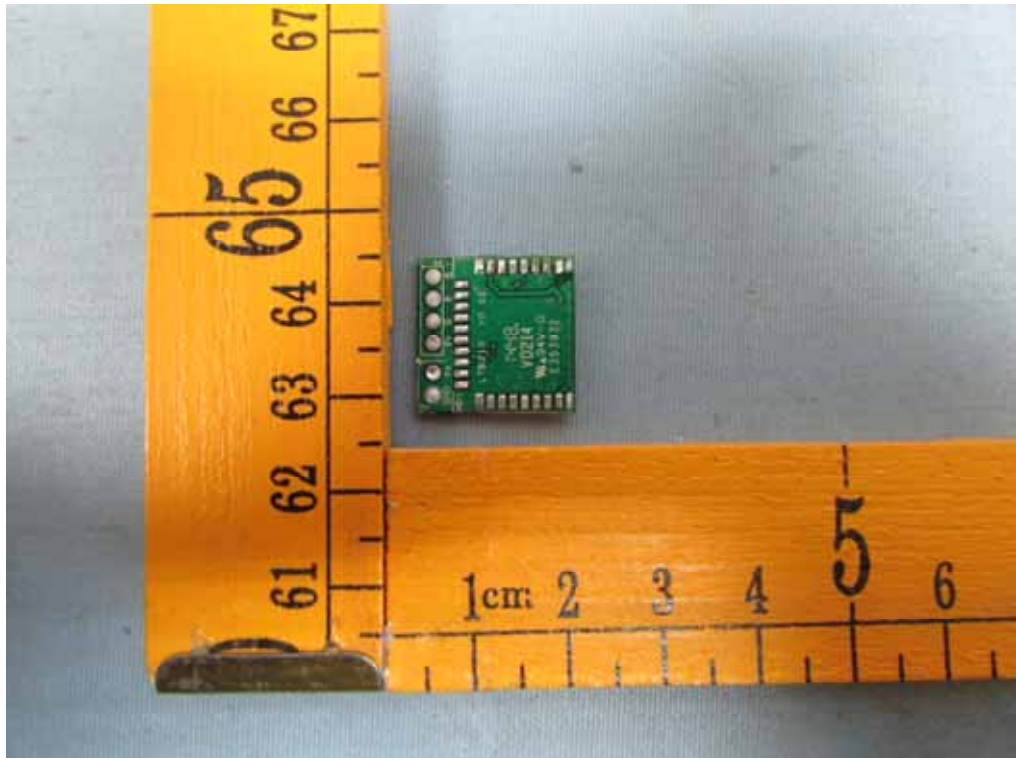
### 15.1 Model LTB210 External View



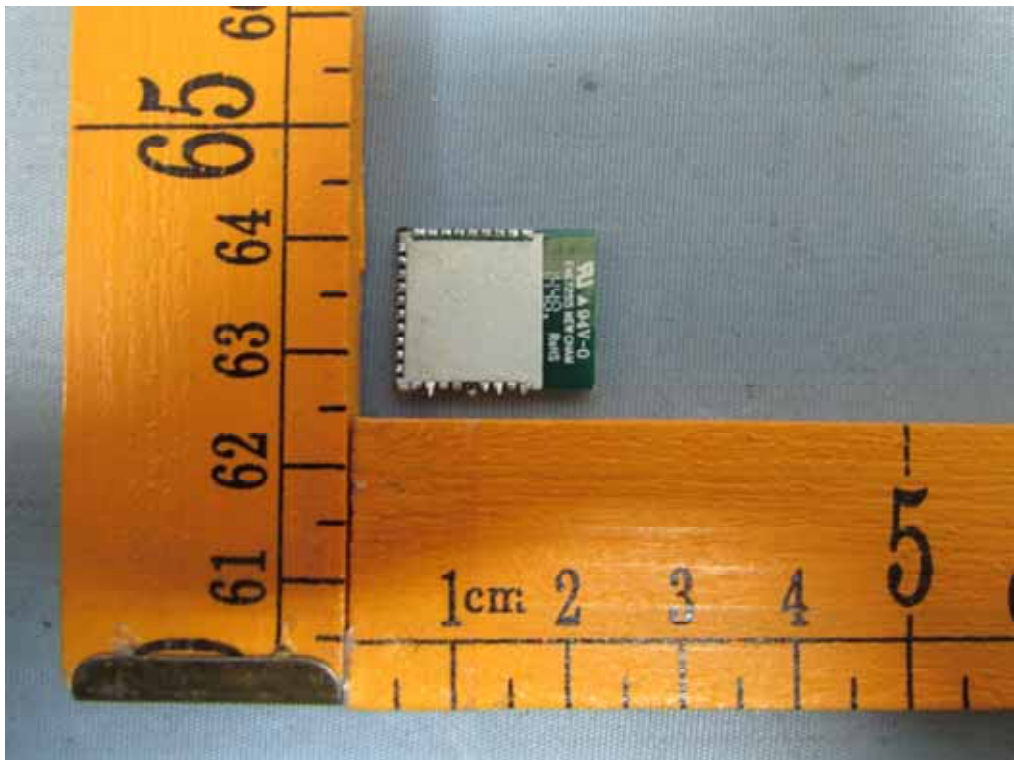
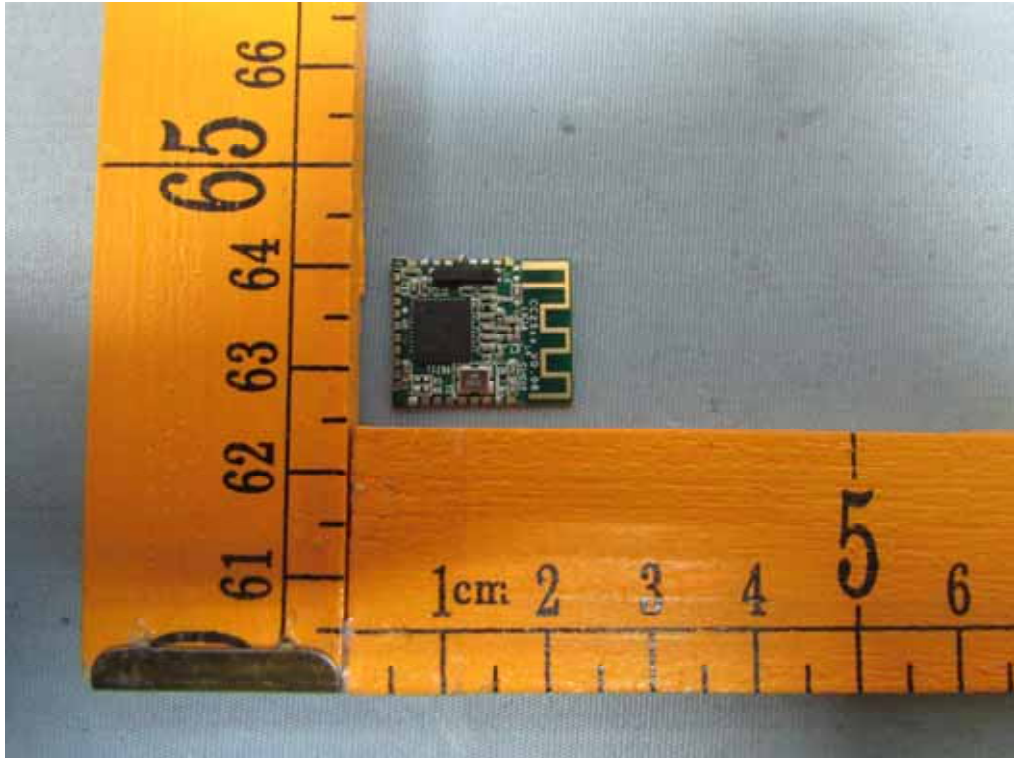


### 15.2 Model LTB210 – Internal Photos





### 15.3 RF Module Photos



====End of Report====