

## FCC REPORT

**Applicant:** Arts Digital Technology (HK) Limited

**Address of Applicant:** RM 1607A, 16F, Fo Tan Industrial Centre, 26-28 Au Pui Wan Street, Fo Tan, Shatin, Hong Kong.

**Equipment Under Test (EUT)**

Product Name: Bluetooth CD Boombox AM/FM Digital Read Out with 6 Speakers

Model No.: CE2300-BT

Trade Mark: AKAI / ADT

**FCC ID:** OWT-CE2300BT

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.249:2012

**Date of sample receipt:** August 29, 2013

**Date of Test:** August 29-September 03, 2013

**Date of report issued:** September 03, 2013

**Test Result :** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

A circular blue ink stamp from Global United Technology Services Co., Ltd. (GTS) is visible. The stamp contains the text "GLOBAL UNITED TECHNOLOGY SERVICES CO., LTD.", "GTS", and "HONG KONG". A handwritten signature in blue ink is written across the stamp.

**Robinson Lo**

**Laboratory Manager**

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the GTS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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## 2 Version

| Version No. | Date               | Description |
|-------------|--------------------|-------------|
| 00          | September 03, 2013 | Original    |
|             |                    |             |
|             |                    |             |
|             |                    |             |
|             |                    |             |

Prepared By:

*Sam. Gao*

Date:

September 03, 2013

**Project Engineer**

Check By:

*Hans. Hu*

Date:

September 03, 2013

**Reviewer**

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## 4 Test Summary

| Test Item                                | Section in CFR 47     | Result |
|------------------------------------------|-----------------------|--------|
| Antenna requirement                      | 15.203                | Pass   |
| AC Power Line Conducted Emission         | 15.207                | Pass   |
| Field strength of the fundamental signal | 15.249 (a)            | Pass   |
| Spurious emissions                       | 15.249 (a) (d)/15.209 | Pass   |
| Band edge                                | 15.249 (d)/15.205     | Pass   |
| 20dB Occupied Bandwidth                  | 15.215 (c)            | Pass   |

*Pass: The EUT complies with the essential requirements in the standard.*

## 5 General Information

### 5.1 Client Information

|                                  |                                                                                                                                                      |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant:                       | Arts Digital Technology (HK) Limited                                                                                                                 |
| Address of Applicant:            | RM 1607A, 16F, Fo Tan Industrial Centre 26-28 Au Pui Wan Street, Fo Tan, Shatin, Hong Kong                                                           |
| Manufacturer/Factory:            | KENG FU JIA ELECTRONICS (SHENZHEN) CO., LTD                                                                                                          |
| Address of Manufacturer/Factory: | 3-4/F Building B, 1A & 2-5/F Building C, 175# Huasheng Rd. Langkou Community Dalang Street, Bao'an District, Shenzhen, Guangdong Province, P R China |

### 5.2 General Description of EUT

|                      |                                                             |
|----------------------|-------------------------------------------------------------|
| Product Name:        | Bluetooth CD Boombox AM/FM Digital Read Out with 6 Speakers |
| Model No.:           | CE2300-BT                                                   |
| Operation Frequency: | 2402MHz~2480MHz                                             |
| Channel numbers:     | 79                                                          |
| Channel separation:  | 1MHz                                                        |
| Modulation type:     | GFSK, Pi/4QPSK, 8DPSK                                       |
| Antenna Type:        | PCB Antenna                                                 |
| Antenna gain:        | 0dBi                                                        |
| Power supply:        | AC120V/60Hz<br>DC12V 8X1.5V SIZE "D" BATTERY                |

| Operation Frequency each of channel |           |         |           |         |           |         |           |
|-------------------------------------|-----------|---------|-----------|---------|-----------|---------|-----------|
| Channel                             | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 1                                   | 2402MHz   | 21      | 2422MHz   | 41      | 2442MHz   | 61      | 2462MHz   |
| 2                                   | 2403MHz   | 22      | 2423MHz   | 42      | 2443MHz   | 62      | 2463MHz   |
| ⋮                                   | ⋮         | ⋮       | ⋮         | ⋮       | ⋮         | ⋮       | ⋮         |
| 19                                  | 2420MHz   | 39      | 2440MHz   | 59      | 2460MHz   | 79      | 2480MHz   |
| 20                                  | 2421MHz   | 40      | 2441MHz   | 60      | 2461MHz   |         |           |

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Channel             | Frequency |
|---------------------|-----------|
| The lowest channel  | 2402MHz   |
| The middle channel  | 2441MHz   |
| The Highest channel | 2480MHz   |

## 5.3 Test mode

|                                                                                                                                                                                                                                              |                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Transmitting mode                                                                                                                                                                                                                            | Keep the EUT in continuously transmitting mode with GFSK modulation. |
| <i>Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i> |                                                                      |

### Per-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

| Axis                   | X     | Y     | Z     |
|------------------------|-------|-------|-------|
| Field Strength(dBuV/m) | 85.43 | 86.88 | 86.20 |

### Final Test Mode:

The EUT was tested in GFSK, Pi/4QPSK, 8DPSK modulation, and found the GFSK modulation is the worst case.

According to ANSI C63.4 standards, the test results are both the "worst case" and "worst setup":

Y axis (see the test setup photo)

## 5.4 Description of Support Units

N/A

## 5.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS —Registration No.: CNAS L5775**

CNAS has accredited Global United Technology Services Co., Ltd. To ISO/IEC 17025 General Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen 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 files. Registration 600491, June 28, 2013.

- **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, June 26, 2013.

## 5.6 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China

Tel: 0755-27798480

Fax: 0755-27798960

## 5.7 Other Information Requested by the Customer

None.

## 6 Test Instruments list

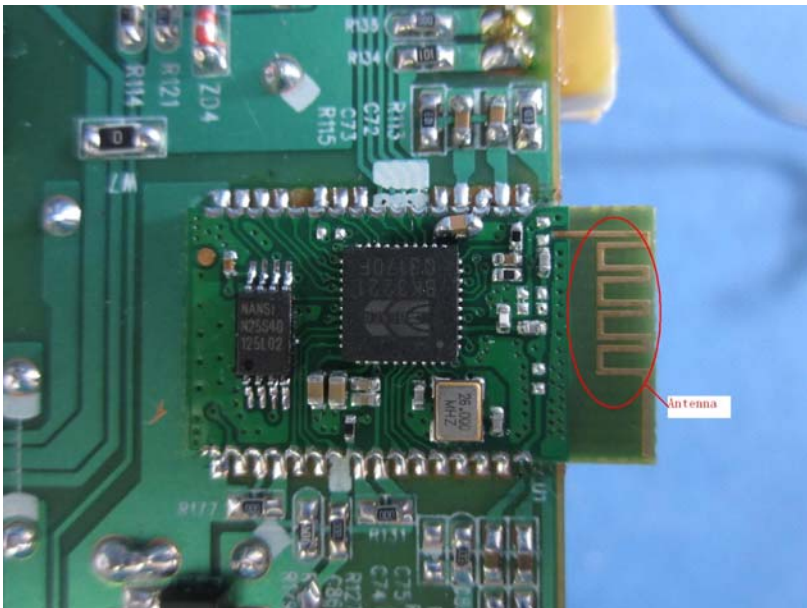
| Radiated Emission: |                               |                                |                             |               |                     |                         |
|--------------------|-------------------------------|--------------------------------|-----------------------------|---------------|---------------------|-------------------------|
| Item               | Test Equipment                | Manufacturer                   | Model No.                   | Inventory No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
| 1                  | 3m Semi- Anechoic Chamber     | ZhongYu Electron               | 9.2(L)*6.2(W)* 6.4(H)       | GTS250        | Mar. 29 2013        | Mar. 28 2014            |
| 2                  | Control Room                  | ZhongYu Electron               | 6.2(L)*2.5(W)* 2.4(H)       | GTS251        | N/A                 | N/A                     |
| 3                  | Spectrum Analyzer             | Agilent                        | E4440A                      | GTS533        | Dec. 6, 2012        | Dec. 05 2013            |
| 4                  | EMI Test Receiver             | Rohde & Schwarz                | ESU26                       | GTS203        | Jul. 02 2013        | Jul. 01 2014            |
| 5                  | BiConiLog Antenna             | SCHWARZBECK<br>MESS-ELEKTRONIK | VULB9163                    | GTS214        | Feb. 24 2013        | Feb. 23 2014            |
| 6                  | Double -ridged waveguide horn | SCHWARZBECK<br>MESS-ELEKTRONIK | 9120D-829                   | GTS208        | June 28 2013        | June 27 2014            |
| 7                  | Horn Antenna                  | ETS-LINDGREN                   | 3160                        | GTS217        | Mar. 29 2013        | Mar. 28 2014            |
| 8                  | EMI Test Software             | AUDIX                          | E3                          | N/A           | N/A                 | N/A                     |
| 9                  | Coaxial Cable                 | GTS                            | N/A                         | GTS213        | Mar. 30 2013        | Mar. 29 2014            |
| 10                 | Coaxial Cable                 | GTS                            | N/A                         | GTS211        | Mar. 30 2013        | Mar. 29 2014            |
| 11                 | Coaxial cable                 | GTS                            | N/A                         | GTS210        | Mar. 30 2013        | Mar. 29 2014            |
| 12                 | Coaxial Cable                 | GTS                            | N/A                         | GTS212        | Mar. 30 2013        | Mar. 29 2014            |
| 13                 | Amplifier(100kHz-3GHz)        | HP                             | 8347A                       | GTS204        | Jul. 02 2013        | Jul. 01 2014            |
| 14                 | Amplifier(2GHz-20GHz)         | HP                             | 8349B                       | GTS206        | Jul. 02 2013        | Jul. 01 2014            |
| 15                 | Amplifier (18-26GHz)          | Rohde & Schwarz                | AFS33-18002<br>650-30-8P-44 | GTS218        | June 28 2013        | June 27 2014            |
| 16                 | Band filter                   | Amindeon                       | 82346                       | GTS219        | Mar. 30 2013        | Mar. 29 2014            |

| Conducted Emission: |                   |                                |                      |               |                     |                         |
|---------------------|-------------------|--------------------------------|----------------------|---------------|---------------------|-------------------------|
| Item                | Test Equipment    | Manufacturer                   | Model No.            | Inventory No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
| 1                   | Shielding Room    | ZhongYu Electron               | 7.0(L)x3.0(W)x3.0(H) | GTS264        | Sep. 08 2011        | Sep. 07 2013            |
| 2                   | EMI Test Receiver | Rohde & Schwarz                | ESCS30               | GTS223        | Jul. 02 2013        | Jul. 01 2014            |
| 3                   | 10dB Pulse Limita | Rohde & Schwarz                | N/A                  | GTS224        | Jul. 02 2013        | Jul. 01 2014            |
| 4                   | Coaxial Switch    | ANRITSU CORP                   | MP59B                | GTS225        | Jul. 02 2013        | Jul. 01 2014            |
| 5                   | LISN              | SCHWARZBECK<br>MESS-ELEKTRONIK | NSLK 8127            | GTS226        | Jul. 02 2013        | Jul. 01 2014            |
| 6                   | Coaxial Cable     | GTS                            | N/A                  | GTS227        | Jul. 02 2013        | Jul. 01 2014            |
| 7                   | EMI Test Software | AUDIX                          | E3                   | N/A           | N/A                 | N/A                     |



## 7 Test results and Measurement Data

### 7.1 Antenna requirement:

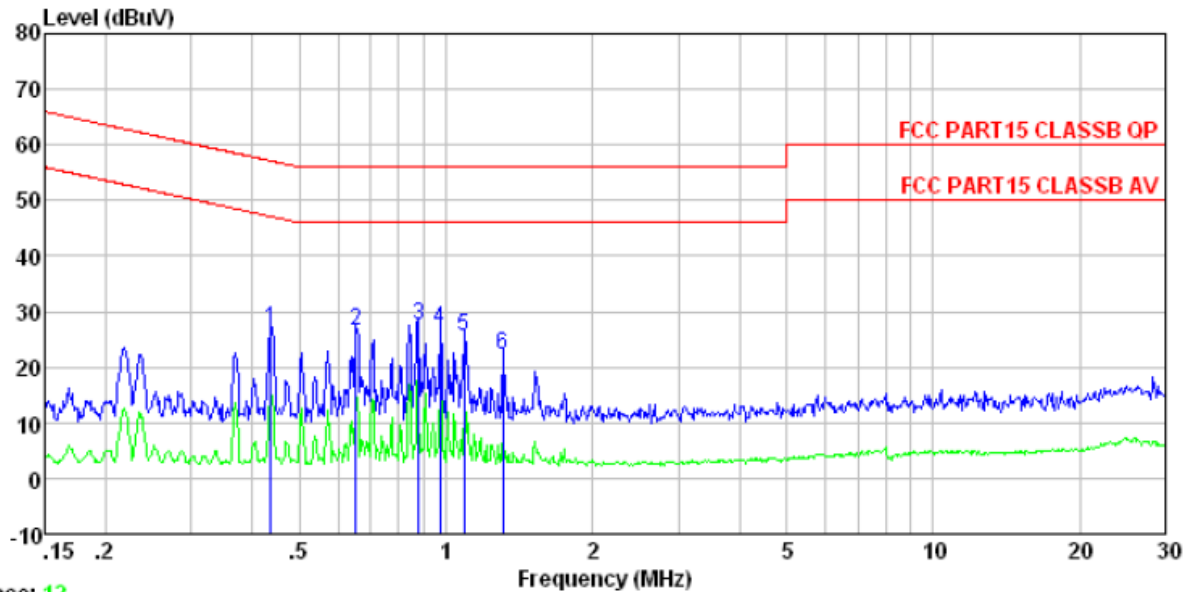
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <b>Standard requirement:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                            | FCC Part15 C Section 15.203 |
| <b>15.203 requirement:</b><br><p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> |                             |
| <b>E.U.T Antenna:</b><br><p><i>The antenna is PCB Antenna, the best case gain of the antenna is 0dBi</i></p>                                                                                                                                                                                                                                                                                                                                                                            |                             |
|                                                                                                                                                                                                                                                                                                                                                                                                      |                             |

## 7.2 Conducted Emissions

|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |           |           |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------|-----------|
| Test Requirement:                                | FCC Part15 C Section 15.207                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |           |           |
| Test Method:                                     | ANSI C63.4:2003                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |           |           |
| Test Frequency Range:                            | 150KHz to 30MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |           |           |
| Class / Severity:                                | Class B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |           |           |
| Receiver setup:                                  | RBW=9KHz, VBW=30KHz, Sweep time=auto                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |           |           |
| Limit:                                           | Frequency range (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Limit (dBuV) |           |           |
|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Quasi-peak   | Average   |           |
|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0.15-0.5     | 66 to 56* | 56 to 46* |
|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0.5-5        | 56        | 46        |
|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 5-30         | 60        | 50        |
| * Decreases with the logarithm of the frequency. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |           |           |
| Test setup:                                      | <div><p style="text-align: center;"><b>Reference Plane</b></p><p style="text-align: center;">Test table/Insulation plane</p><p><i>Remark</i><br/>E.U.T: Equipment Under Test<br/>LISN: Line Impedance Stabilization Network<br/>Test table height=0.8m</p></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |           |           |
| Test procedure:                                  | <div><div>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</div><div>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</div><div>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.</div></div> |              |           |           |
| Test Instruments:                                | Refer to section 6.0 for details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |           |           |
| Test mode:                                       | Refer to section 5.3 for details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |           |           |
| Test results:                                    | Pass                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |           |           |

### Measurement data:

Line:

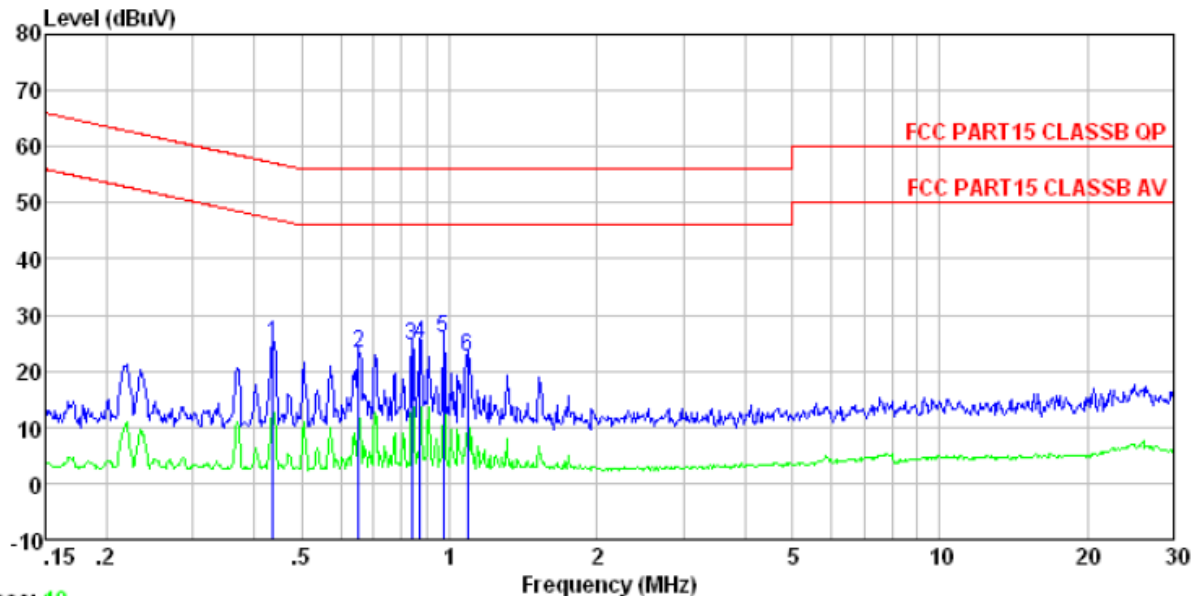


Trace: 12

Condition : FCC PART15 CLASSB QP LISN-2013 LINE  
 Job No. : 1443RF  
 Test mode : Bluetooth mode  
 Test Engineer: ying

|   | Freq  | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|-------|------------|-------------|------------|-------|------------|------------|--------|
|   | MHz   | dBuV       | dB          | dB         | dBuV  | dBuV       | dB         |        |
| 1 | 0.437 | 26.49      | 0.12        | 0.11       | 26.72 | 57.11      | -30.39     | QP     |
| 2 | 0.654 | 26.12      | 0.13        | 0.13       | 26.38 | 56.00      | -29.62     | QP     |
| 3 | 0.880 | 27.18      | 0.14        | 0.13       | 27.45 | 56.00      | -28.55     | QP     |
| 4 | 0.974 | 26.46      | 0.14        | 0.13       | 26.73 | 56.00      | -29.27     | QP     |
| 5 | 1.088 | 25.41      | 0.13        | 0.13       | 25.67 | 56.00      | -30.33     | QP     |
| 6 | 1.310 | 21.98      | 0.12        | 0.13       | 22.23 | 56.00      | -33.77     | QP     |

## Neutral:



Trace: 10

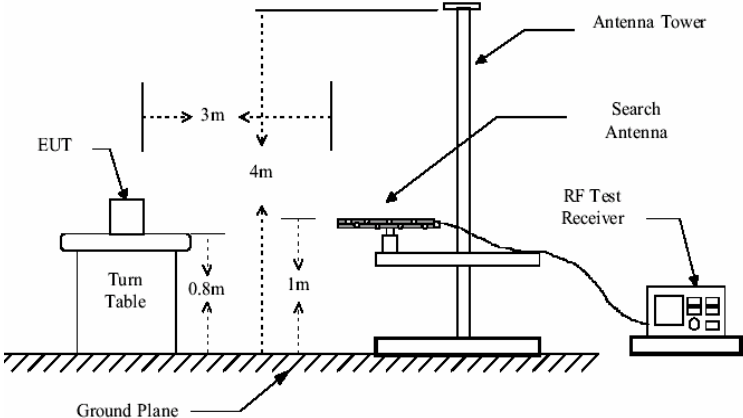
Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL  
 Job No. : 1443RF  
 Test mode : Bluetooth mode  
 Test Engineer: ying

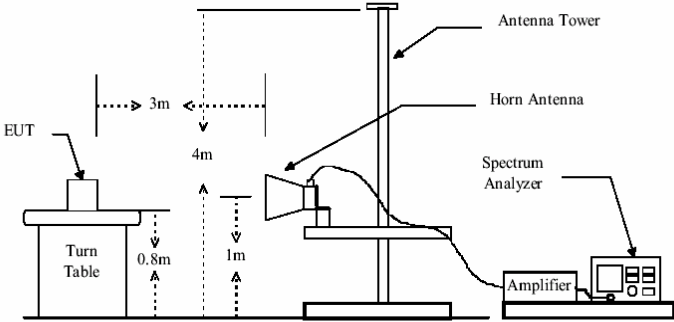
|   | Freq  | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|-------|------------|-------------|------------|-------|------------|------------|--------|
|   | MHz   | dBuV       | dB          | dB         | dBuV  | dBuV       | dB         |        |
| 1 | 0.437 | 24.70      | 0.06        | 0.11       | 24.87 | 57.11      | -32.24     | QP     |
| 2 | 0.654 | 23.02      | 0.07        | 0.13       | 23.22 | 56.00      | -32.78     | QP     |
| 3 | 0.839 | 24.40      | 0.07        | 0.13       | 24.60 | 56.00      | -31.40     | QP     |
| 4 | 0.871 | 24.78      | 0.07        | 0.13       | 24.98 | 56.00      | -31.02     | QP     |
| 5 | 0.974 | 25.71      | 0.07        | 0.13       | 25.91 | 56.00      | -30.09     | QP     |
| 6 | 1.088 | 22.48      | 0.08        | 0.13       | 22.69 | 56.00      | -33.31     | QP     |

## Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

## 7.3 Radiated Emission Method

|                                                      |                                                                                                                                                                                                                                                                |            |                    |        |                  |
|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------------|--------|------------------|
| Test Requirement:                                    | FCC Part15 C Section 15.209                                                                                                                                                                                                                                    |            |                    |        |                  |
| Test Method:                                         | ANSI C63.4:2003                                                                                                                                                                                                                                                |            |                    |        |                  |
| Test Frequency Range:                                | 30MHz to 25GHz                                                                                                                                                                                                                                                 |            |                    |        |                  |
| Test site:                                           | Measurement Distance: 3m                                                                                                                                                                                                                                       |            |                    |        |                  |
| Receiver setup:                                      | Frequency                                                                                                                                                                                                                                                      | Detector   | RBW                | VBW    | Remark           |
|                                                      | 30MHz-1GHz                                                                                                                                                                                                                                                     | Quasi-peak | 120KHz             | 300KHz | Quasi-peak Value |
|                                                      | Above 1GHz                                                                                                                                                                                                                                                     | Peak       | 1MHz               | 3MHz   | Peak Value       |
|                                                      |                                                                                                                                                                                                                                                                | Peak       | 1MHz               | 10Hz   | Average Value    |
| Limit:<br>(Field strength of the fundamental signal) | Frequency                                                                                                                                                                                                                                                      |            | Limit (dBuV/m @3m) |        | Remark           |
|                                                      | 2400MHz-2483.5MHz                                                                                                                                                                                                                                              |            | 94.00              |        | Average Value    |
|                                                      |                                                                                                                                                                                                                                                                |            | 114.00             |        | Peak Value       |
| Limit:<br>(Spurious Emissions)                       | Frequency                                                                                                                                                                                                                                                      |            | Limit (dBuV/m @3m) |        | Remark           |
|                                                      | 30MHz-88MHz                                                                                                                                                                                                                                                    |            | 40.00              |        | Quasi-peak Value |
|                                                      | 88MHz-216MHz                                                                                                                                                                                                                                                   |            | 43.50              |        | Quasi-peak Value |
|                                                      | 216MHz-960MHz                                                                                                                                                                                                                                                  |            | 46.00              |        | Quasi-peak Value |
|                                                      | 960MHz-1GHz                                                                                                                                                                                                                                                    |            | 54.00              |        | Quasi-peak Value |
|                                                      | Above 1GHz                                                                                                                                                                                                                                                     |            | 54.00              |        | Average Value    |
|                                                      |                                                                                                                                                                                                                                                                |            | 74.00              |        | Peak Value       |
| Limit:<br>(band edge)                                | Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation. |            |                    |        |                  |
| Test setup:                                          | Below 1GHz                                                                                                                                                                                                                                                     |            |                    |        |                  |
|                                                      | <div></div>                                                                                                                                                                |            |                    |        |                  |
|                                                      | Above 1GHz                                                                                                                                                                                                                                                     |            |                    |        |                  |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |  <p>The diagram illustrates the test setup. An EUT (Equipment Under Test) is placed on a Turn Table at a height of 0.8m. The Turn Table is 3m away from the Antenna Tower. The Antenna Tower has a Horn Antenna at a height of 4m. A Spectrum Analyzer is connected to the Antenna Tower via an Amplifier. The distance from the ground to the Horn Antenna is 1m.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Test Procedure:   | <ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol> |
| Test Instruments: | Refer to section 6.0 for details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Test mode:        | Refer to section 5.3 for details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Test results:     | Pass                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## Measurement data:

## 7.3.1 Field Strength of The Fundamental Signal

### Peak value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 2402.00         | 82.00             | 27.58                 | 5.39            | 30.18                    | 84.79          | 114.00              | -29.21          | Horizontal   |
| 2402.00         | 84.09             | 27.58                 | 5.39            | 30.18                    | 86.88          | 114.00              | -27.12          | Vertical     |
| 2441.00         | 81.41             | 27.48                 | 5.43            | 30.06                    | 84.26          | 114.00              | -29.74          | Horizontal   |
| 2441.00         | 83.38             | 27.48                 | 5.43            | 30.06                    | 86.23          | 114.00              | -27.77          | Vertical     |
| 2480.00         | 82.54             | 27.52                 | 5.47            | 29.93                    | 85.60          | 114.00              | -28.40          | Horizontal   |
| 2480.00         | 82.63             | 27.52                 | 5.47            | 29.93                    | 85.69          | 114.00              | -28.31          | Vertical     |

### Average value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 2402.00         | 71.00             | 27.58                 | 5.39            | 30.18                    | 73.79          | 94.00               | -20.21          | Horizontal   |
| 2402.00         | 72.09             | 27.58                 | 5.39            | 30.18                    | 74.88          | 94.00               | -19.12          | Vertical     |
| 2441.00         | 69.34             | 27.48                 | 5.43            | 30.06                    | 72.19          | 94.00               | -21.81          | Horizontal   |
| 2441.00         | 69.46             | 27.48                 | 5.43            | 30.06                    | 72.31          | 94.00               | -21.69          | Vertical     |
| 2480.00         | 70.35             | 27.52                 | 5.47            | 29.93                    | 73.41          | 94.00               | -20.59          | Horizontal   |
| 2480.00         | 69.45             | 27.52                 | 5.47            | 29.93                    | 71.51          | 94.00               | -21.49          | Vertical     |

According to the follow transmitter output power ( $P_t$ ) formula:

$$P_t = (E \times d)^2 / (30 \times g_t)$$

$P_t$  =transmitter output power in watts

$g_t$  =numeric gain of the transmitting antenna (unitless)

E=electric field strength in V/m

d= measurement distance in meters (m).

According to the above test data,  $E_{max}=86.88\text{dBuV/m}=0.0221\text{V/m}$ ,  $d=3\text{m}$ ,  $g_t=1.00$

$$P_t = (E \times d)^2 / (30 \times g_t) = (0.0221 \times 3)^2 / (30 \times 1.00) = 0.0001465\text{W} = 0.1465\text{mW}$$

## 7.3.2 Spurious emissions

### ■ Below 1GHz

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 33.10           | 45.08             | 15.76                 | 0.59            | 32.06                    | 29.37          | 40.00               | -10.63          | Vertical     |
| 143.83          | 44.48             | 11.23                 | 1.53            | 31.96                    | 25.28          | 43.50               | -18.22          | Vertical     |
| 191.75          | 44.29             | 13.56                 | 1.80            | 32.12                    | 27.53          | 43.50               | -15.97          | Vertical     |
| 207.85          | 46.49             | 13.84                 | 1.89            | 32.14                    | 30.08          | 43.50               | -13.42          | Vertical     |
| 216.02          | 46.54             | 14.12                 | 1.93            | 32.15                    | 30.44          | 46.00               | -15.56          | Vertical     |
| 223.73          | 49.85             | 14.41                 | 1.98            | 32.15                    | 34.09          | 46.00               | -11.91          | Vertical     |
| 42.75           | 36.85             | 16.57                 | 0.69            | 32.03                    | 22.08          | 40.00               | -17.92          | Horizontal   |
| 94.76           | 36.80             | 15.94                 | 1.15            | 31.74                    | 22.15          | 43.50               | -21.35          | Horizontal   |
| 223.73          | 44.31             | 14.41                 | 1.98            | 32.15                    | 28.55          | 46.00               | -17.45          | Horizontal   |
| 239.99          | 41.35             | 15.07                 | 2.07            | 32.16                    | 26.33          | 46.00               | -19.67          | Horizontal   |
| 572.61          | 36.34             | 19.98                 | 3.62            | 31.17                    | 28.77          | 46.00               | -17.23          | Horizontal   |
| 848.06          | 36.88             | 23.55                 | 4.65            | 31.25                    | 33.83          | 46.00               | -12.17          | Horizontal   |



## ■ Above 1GHz

|               |                |
|---------------|----------------|
| Test channel: | Lowest channel |
|---------------|----------------|

### Peak value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 4804.00         | 27.35             | 31.78                 | 8.60            | 24.20                    | 43.53          | 74.00               | -30.47          | Vertical     |
| 7206.00         | 28.02             | 36.15                 | 11.65           | 26.46                    | 49.36          | 74.00               | -24.64          | Vertical     |
| 9608.00         | 21.22             | 37.95                 | 14.14           | 25.45                    | 47.86          | 74.00               | -26.14          | Vertical     |
| 12010.00        | *                 |                       |                 |                          |                | 74.00               |                 | Vertical     |
| 14412.00        | *                 |                       |                 |                          |                | 74.00               |                 | Vertical     |
| 4804.00         | 28.02             | 31.78                 | 8.60            | 24.20                    | 44.20          | 74.00               | -29.80          | Horizontal   |
| 7206.00         | 28.42             | 36.15                 | 11.65           | 26.46                    | 49.76          | 74.00               | -24.24          | Horizontal   |
| 9608.00         | 23.10             | 37.95                 | 14.14           | 25.45                    | 49.74          | 74.00               | -24.26          | Horizontal   |
| 12010.00        | *                 |                       |                 |                          |                | 74.00               |                 | Horizontal   |
| 14412.00        | *                 |                       |                 |                          |                | 74.00               |                 | Horizontal   |

### Average value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 4804.00         | 17.00             | 31.78                 | 8.60            | 24.20                    | 33.18          | 54.00               | -20.82          | Vertical     |
| 7206.00         | 16.03             | 36.15                 | 11.65           | 26.46                    | 37.37          | 54.00               | -16.63          | Vertical     |
| 9608.00         | 9.65              | 37.95                 | 14.14           | 25.45                    | 36.29          | 54.00               | -17.71          | Vertical     |
| 12010.00        | *                 |                       |                 |                          |                | 54.00               |                 | Vertical     |
| 14412.00        | *                 |                       |                 |                          |                | 54.00               |                 | Vertical     |
| 4804.00         | 14.94             | 31.78                 | 8.60            | 24.20                    | 31.12          | 54.00               | -22.88          | Horizontal   |
| 7206.00         | 17.04             | 36.15                 | 11.65           | 26.46                    | 38.38          | 54.00               | -15.62          | Horizontal   |
| 9608.00         | 10.00             | 37.95                 | 14.14           | 25.45                    | 36.64          | 54.00               | -17.36          | Horizontal   |
| 12010.00        | *                 |                       |                 |                          |                | 54.00               |                 | Horizontal   |
| 14412.00        | *                 |                       |                 |                          |                | 54.00               |                 | Horizontal   |

### Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. “\*”, means this data is the too weak instrument of signal is unable to test.

|               |                |
|---------------|----------------|
| Test channel: | Middle channel |
|---------------|----------------|

## Peak value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 4882.00         | 27.05             | 31.85                 | 8.67            | 24.10                    | 43.47          | 74.00               | -30.53          | Vertical     |
| 7323.00         | 27.82             | 36.37                 | 11.72           | 26.71                    | 49.20          | 74.00               | -24.80          | Vertical     |
| 9764.00         | 19.21             | 38.35                 | 14.25           | 25.36                    | 46.45          | 74.00               | -27.55          | Vertical     |
| 12205.00        | *                 |                       |                 |                          |                | 74.00               |                 | Vertical     |
| 14646.00        | *                 |                       |                 |                          |                | 74.00               |                 | Vertical     |
| 4882.00         | 26.24             | 31.85                 | 8.67            | 24.10                    | 42.66          | 74.00               | -31.34          | Horizontal   |
| 7323.00         | 28.08             | 36.37                 | 11.72           | 26.71                    | 49.46          | 74.00               | -24.54          | Horizontal   |
| 9764.00         | 22.86             | 38.35                 | 14.25           | 25.36                    | 50.10          | 74.00               | -23.90          | Horizontal   |
| 12205.00        | *                 |                       |                 |                          |                | 74.00               |                 | Horizontal   |
| 14646.00        | *                 |                       |                 |                          |                | 74.00               |                 | Horizontal   |

## Average value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 4882.00         | 17.03             | 31.85                 | 8.67            | 24.10                    | 33.45          | 54.00               | -20.55          | Vertical     |
| 7323.00         | 14.66             | 36.37                 | 11.72           | 26.71                    | 36.04          | 54.00               | -17.96          | Vertical     |
| 9764.00         | 7.44              | 38.35                 | 14.25           | 25.36                    | 34.68          | 54.00               | -19.32          | Vertical     |
| 12205.00        | *                 |                       |                 |                          |                | 54.00               |                 | Vertical     |
| 14646.00        | *                 |                       |                 |                          |                | 54.00               |                 | Vertical     |
| 4882.00         | 15.04             | 31.85                 | 8.67            | 24.10                    | 31.46          | 54.00               | -22.54          | Horizontal   |
| 7323.00         | 16.35             | 36.37                 | 11.72           | 26.71                    | 37.73          | 54.00               | -16.27          | Horizontal   |
| 9764.00         | 9.05              | 38.35                 | 14.25           | 25.36                    | 36.29          | 54.00               | -17.71          | Horizontal   |
| 12205.00        | *                 |                       |                 |                          |                | 54.00               |                 | Horizontal   |
| 14646.00        | *                 |                       |                 |                          |                | 54.00               |                 | Horizontal   |

## Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. “\*”, means this data is the too weak instrument of signal is unable to test.

|               |                 |
|---------------|-----------------|
| Test channel: | Highest channel |
|---------------|-----------------|

## Peak value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 4960.00         | 26.99             | 31.93                 | 8.73            | 24.03                    | 43.62          | 74.00               | -30.38          | Vertical     |
| 7440.00         | 27.03             | 36.59                 | 11.79           | 27.03                    | 48.38          | 74.00               | -25.62          | Vertical     |
| 9920.00         | 19.80             | 38.81                 | 14.38           | 25.26                    | 47.73          | 74.00               | -26.27          | Vertical     |
| 12400.00        | *                 |                       |                 |                          |                | 74.00               |                 | Vertical     |
| 14880.00        | *                 |                       |                 |                          |                | 74.00               |                 | Vertical     |
| 4960.00         | 25.71             | 31.93                 | 8.73            | 24.03                    | 42.34          | 74.00               | -31.66          | Horizontal   |
| 7440.00         | 28.33             | 36.59                 | 11.79           | 27.03                    | 49.68          | 74.00               | -24.32          | Horizontal   |
| 9920.00         | 20.62             | 38.81                 | 14.38           | 25.26                    | 48.55          | 74.00               | -25.45          | Horizontal   |
| 12400.00        | *                 |                       |                 |                          |                | 74.00               |                 | Horizontal   |
| 14880.00        | *                 |                       |                 |                          |                | 74.00               |                 | Horizontal   |

## Average value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 4960.00         | 16.22             | 31.93                 | 8.73            | 24.03                    | 32.85          | 54.00               | -21.15          | Vertical     |
| 7440.00         | 17.23             | 36.59                 | 11.79           | 27.03                    | 38.58          | 54.00               | -15.42          | Vertical     |
| 9920.00         | 6.75              | 38.81                 | 14.38           | 25.26                    | 34.68          | 54.00               | -19.32          | Vertical     |
| 12400.00        | *                 |                       |                 |                          |                | 54.00               |                 | Vertical     |
| 14880.00        | *                 |                       |                 |                          |                | 54.00               |                 | Vertical     |
| 4960.00         | 13.02             | 31.93                 | 8.73            | 24.03                    | 29.65          | 54.00               | -24.35          | Horizontal   |
| 7440.00         | 14.04             | 36.59                 | 11.79           | 27.03                    | 35.39          | 54.00               | -18.61          | Horizontal   |
| 9920.00         | 8.85              | 38.81                 | 14.38           | 25.26                    | 36.78          | 54.00               | -17.22          | Horizontal   |
| 12400.00        | *                 |                       |                 |                          |                | 54.00               |                 | Horizontal   |
| 14880.00        | *                 |                       |                 |                          |                | 54.00               |                 | Horizontal   |

## Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. “\*”, means this data is the too weak instrument of signal is unable to test.

### 7.3.3 Bandedge emissions

All of the restriction bands were tested, and only the data of worst case was exhibited.

|               |                |
|---------------|----------------|
| Test channel: | Lowest channel |
|---------------|----------------|

#### Peak value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 2390.00         | 41.74             | 27.59                 | 5.38            | 30.18                    | 44.53          | 74.00               | -29.47          | Horizontal   |
| 2400.00         | 58.36             | 27.58                 | 5.39            | 30.18                    | 61.15          | 74.00               | -12.85          | Horizontal   |
| 2390.00         | 42.18             | 27.59                 | 5.38            | 30.18                    | 44.97          | 74.00               | -29.03          | Vertical     |
| 2400.00         | 60.28             | 27.58                 | 5.39            | 30.18                    | 63.07          | 74.00               | -10.93          | Vertical     |

#### Average value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 2390.00         | 32.55             | 27.59                 | 5.38            | 30.18                    | 35.34          | 54.00               | -18.66          | Horizontal   |
| 2400.00         | 43.72             | 27.58                 | 5.39            | 30.18                    | 46.51          | 54.00               | -7.49           | Horizontal   |
| 2390.00         | 32.41             | 27.59                 | 5.38            | 30.18                    | 35.20          | 54.00               | -18.80          | Vertical     |
| 2400.00         | 45.26             | 27.58                 | 5.39            | 30.18                    | 48.05          | 54.00               | -5.95           | Vertical     |

|               |                 |
|---------------|-----------------|
| Test channel: | Highest channel |
|---------------|-----------------|

#### Peak value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 2483.50         | 43.71             | 27.53                 | 5.47            | 29.93                    | 46.78          | 74.00               | -27.22          | Horizontal   |
| 2500.00         | 43.10             | 27.55                 | 5.49            | 29.93                    | 46.21          | 74.00               | -27.79          | Horizontal   |
| 2483.50         | 44.36             | 27.53                 | 5.47            | 29.93                    | 47.43          | 74.00               | -26.57          | Vertical     |
| 2500.00         | 43.99             | 27.55                 | 5.49            | 29.93                    | 47.10          | 74.00               | -26.90          | Vertical     |

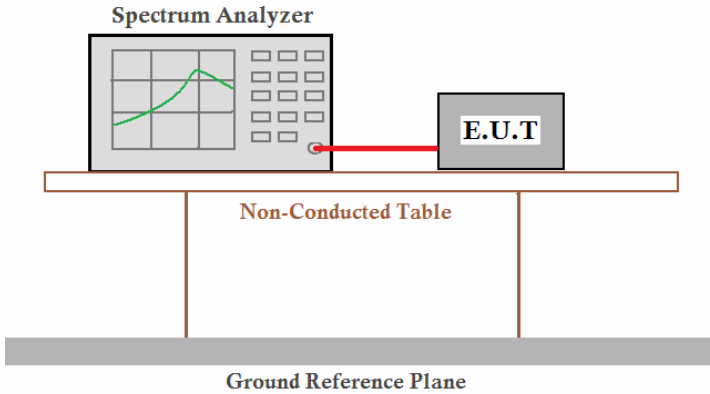
#### Average value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 2483.50         | 35.36             | 27.53                 | 5.47            | 29.93                    | 38.43          | 54.00               | -15.57          | Horizontal   |
| 2500.00         | 33.53             | 27.55                 | 5.49            | 29.93                    | 36.64          | 54.00               | -17.36          | Horizontal   |
| 2483.50         | 36.48             | 27.53                 | 5.47            | 29.93                    | 39.55          | 54.00               | -14.45          | Vertical     |
| 2500.00         | 33.35             | 27.55                 | 5.49            | 29.93                    | 36.46          | 54.00               | -17.54          | Vertical     |

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

## 7.4 20dB Occupy Bandwidth

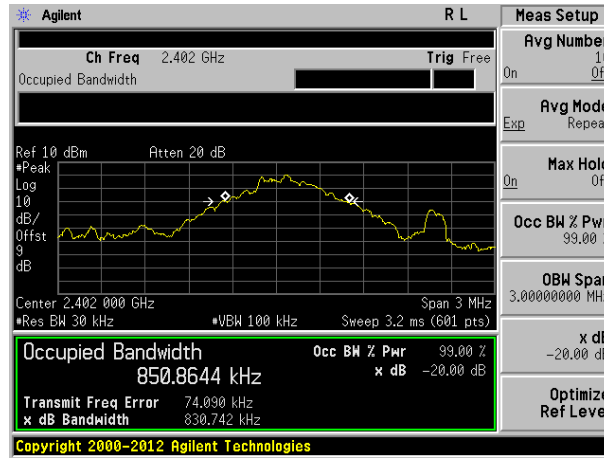
|                   |                                                                                                                                                                                                                                                                                                                                                            |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC Part15 C Section 15.249/15.215                                                                                                                                                                                                                                                                                                                         |
| Test Method:      | ANSI C63.4:2003                                                                                                                                                                                                                                                                                                                                            |
| Limit:            | Operation Frequency range 2400MHz~2483.5MHz                                                                                                                                                                                                                                                                                                                |
| Test setup:       |  <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p> |
| Test Instruments: | Refer to section 6.0 for details                                                                                                                                                                                                                                                                                                                           |
| Test mode:        | Refer to section 5.3 for details                                                                                                                                                                                                                                                                                                                           |
| Test results:     | Pass                                                                                                                                                                                                                                                                                                                                                       |

### Measurement Data

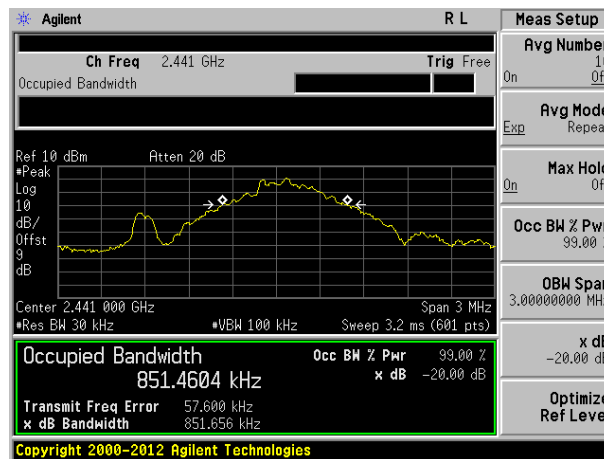
Worst case GFSK modulation

| Test channel | 20dB bandwidth(MHz) | Result |
|--------------|---------------------|--------|
| Lowest       | 0.831               | Pass   |
| Middle       | 0.852               | Pass   |
| Highest      | 0.849               | Pass   |

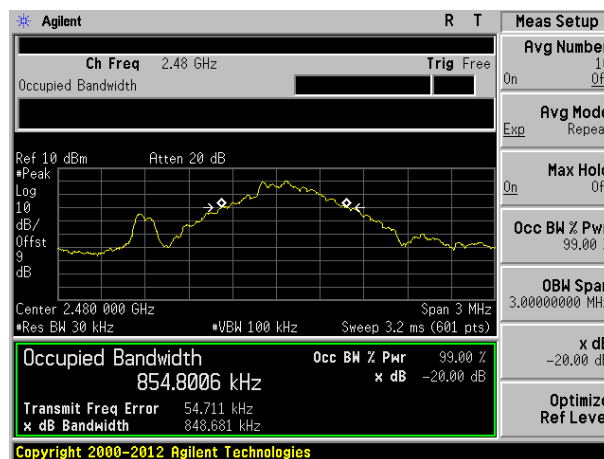
Test plot as follows:



Lowest channel



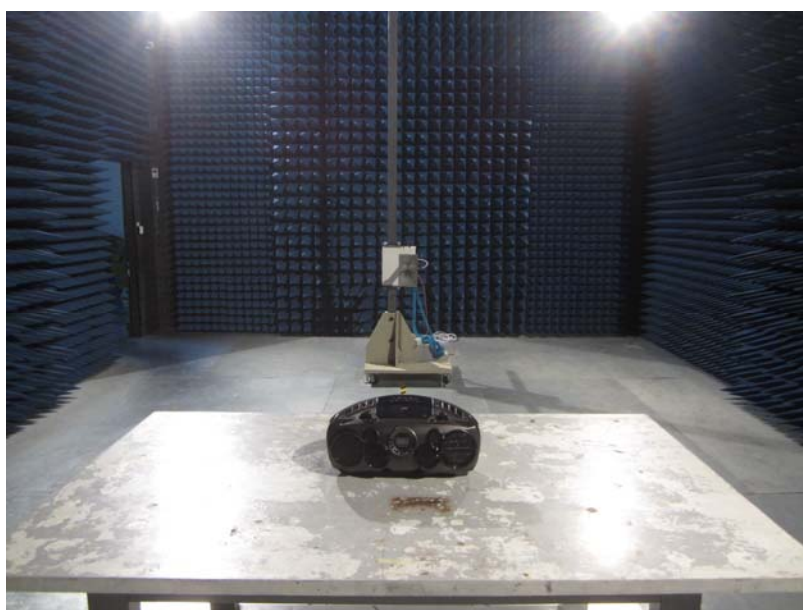
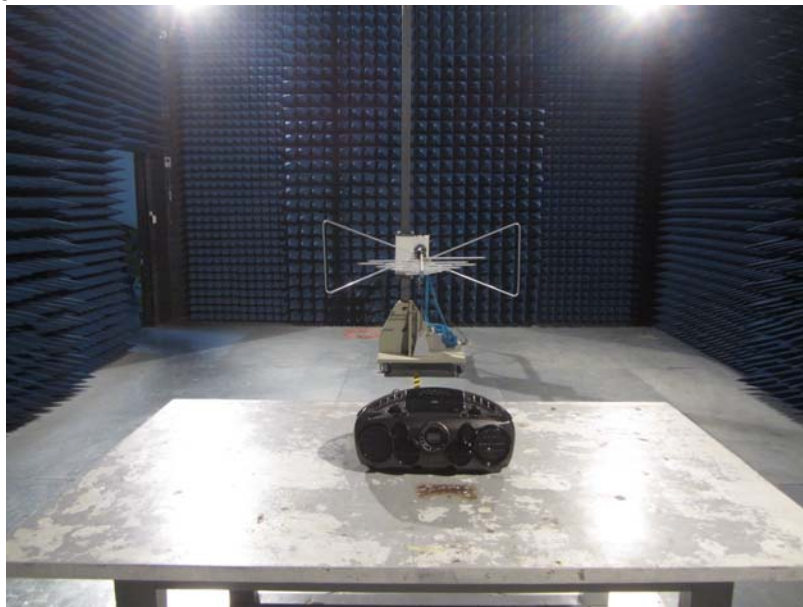
Middle channel



Highest channel

## 8 Test Setup Photo

Radiated Emission



## Conducted Emission



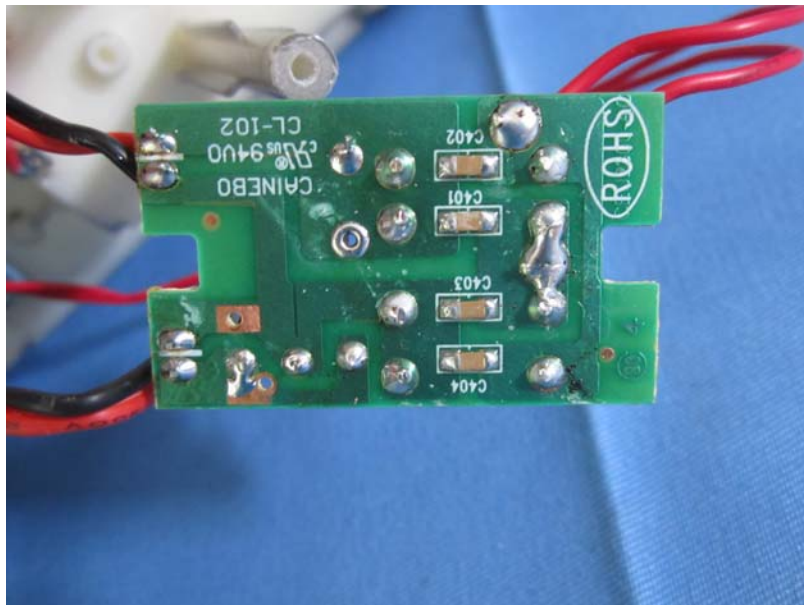
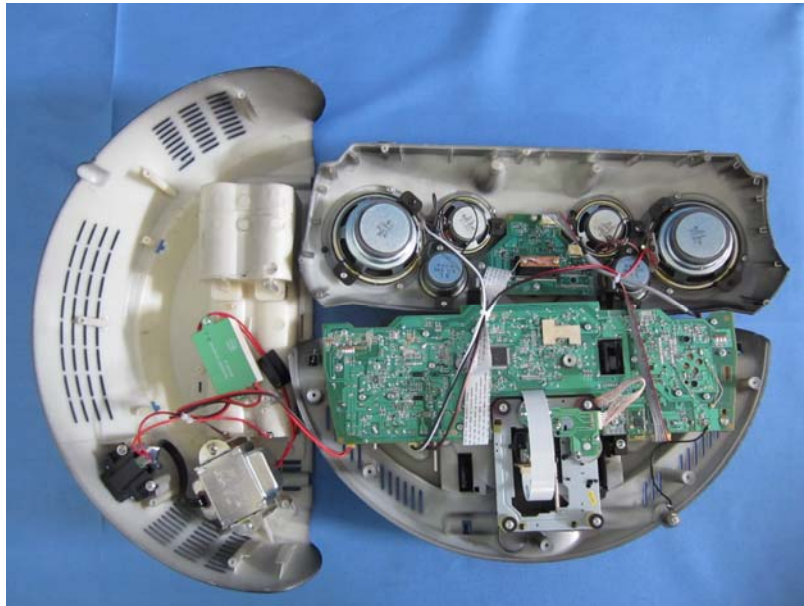


## 9 EUT Constructional Details

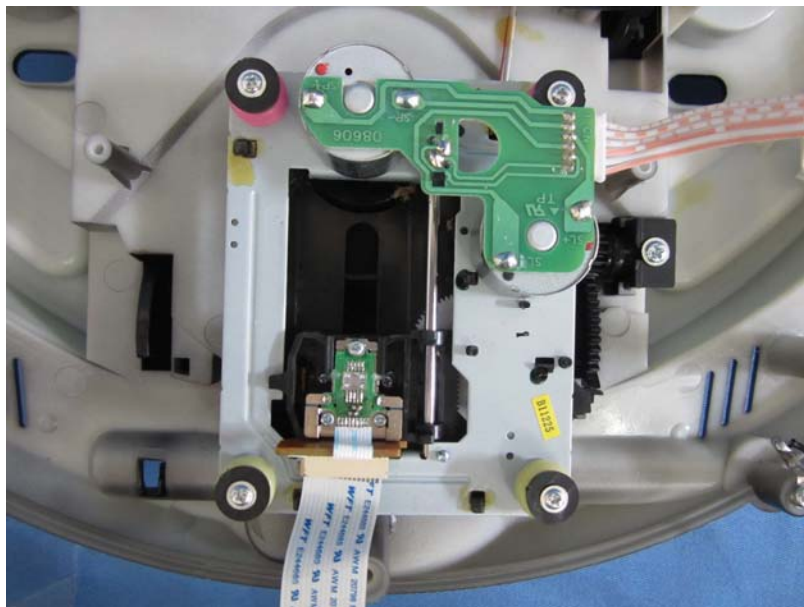
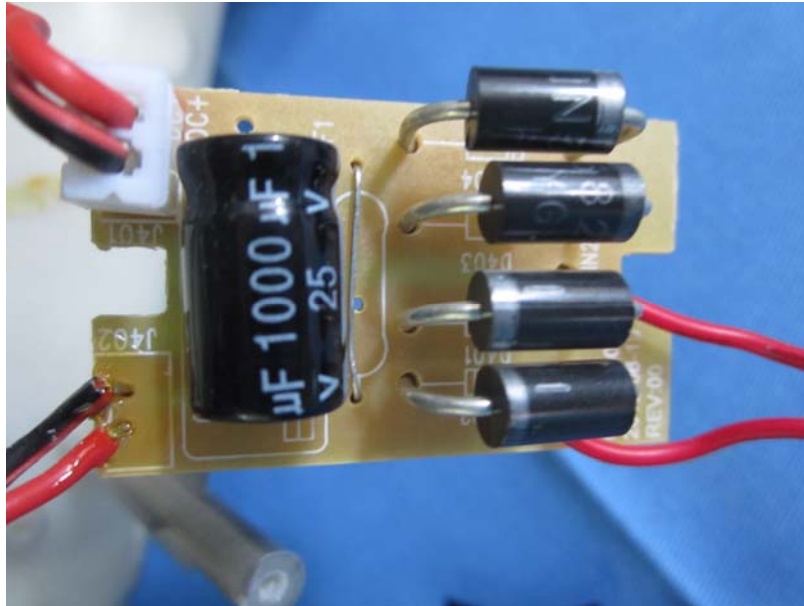


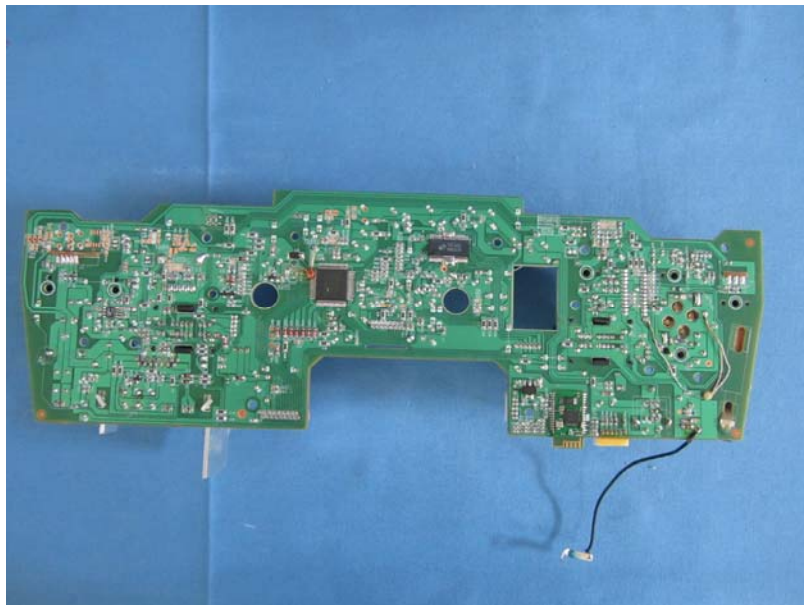
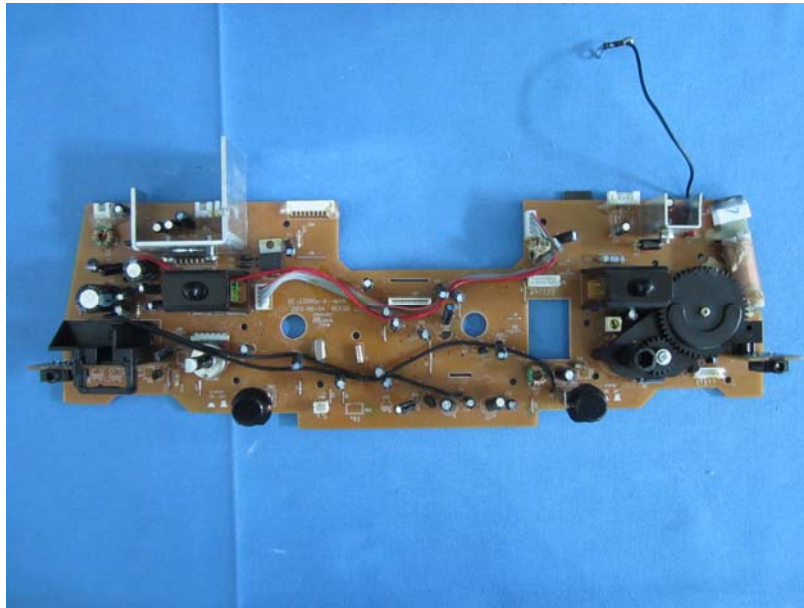


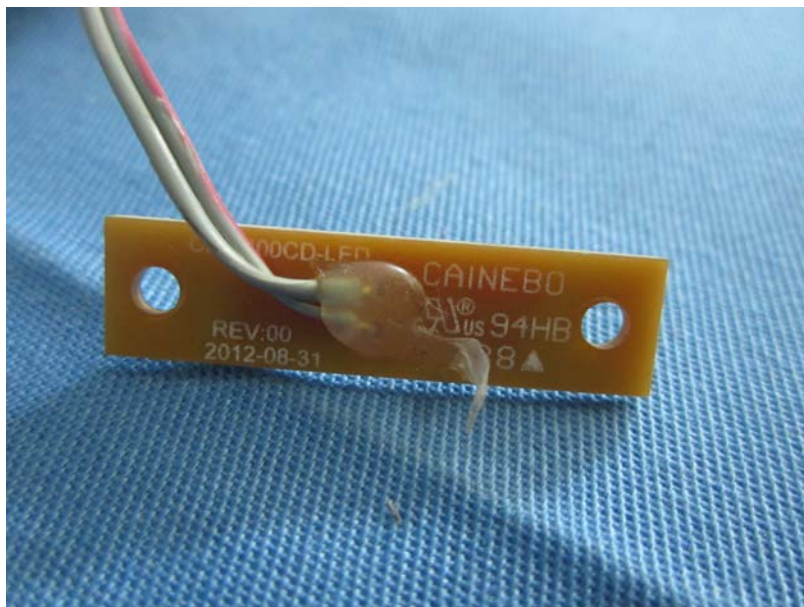
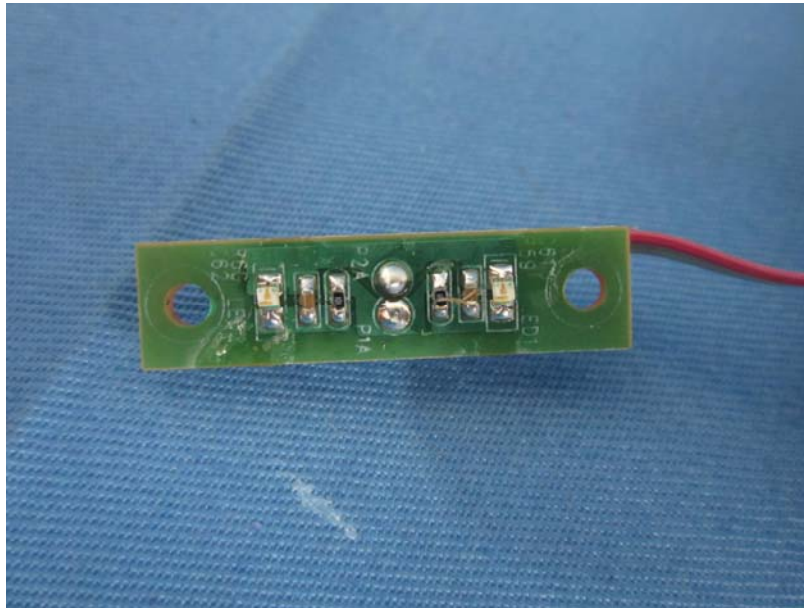




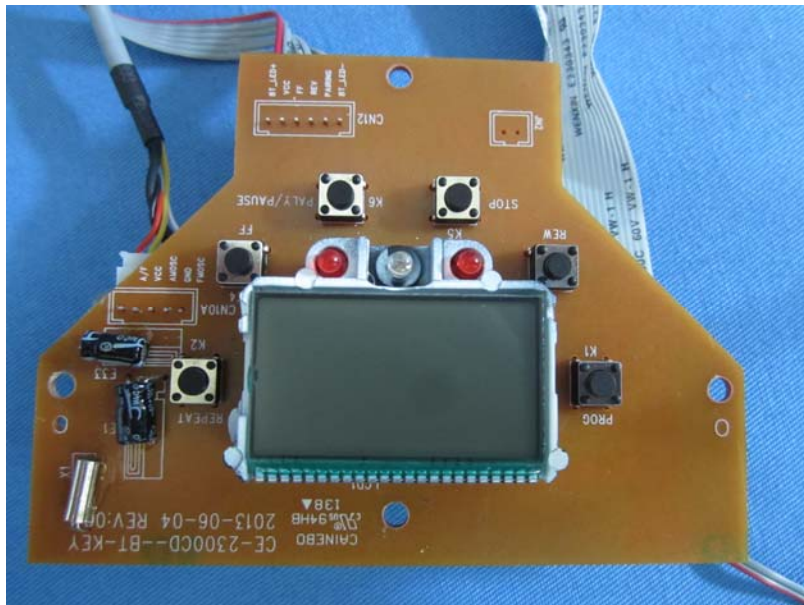
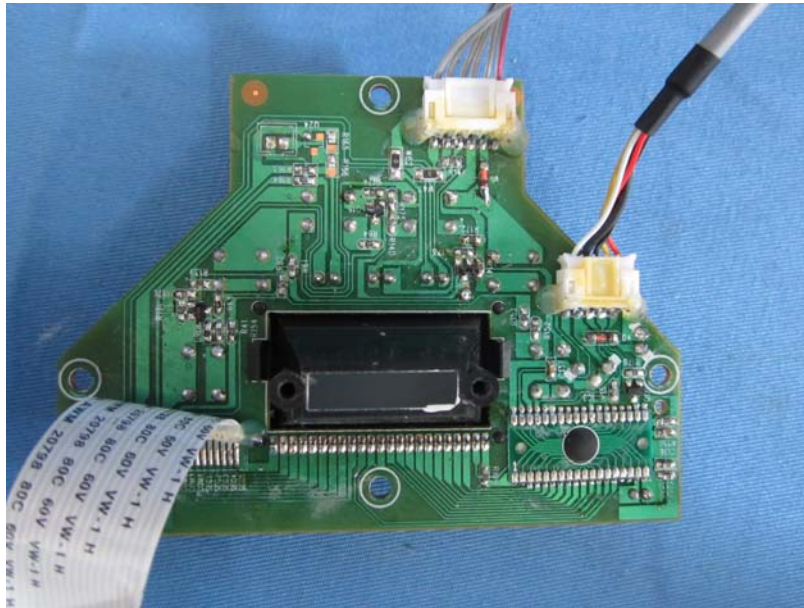




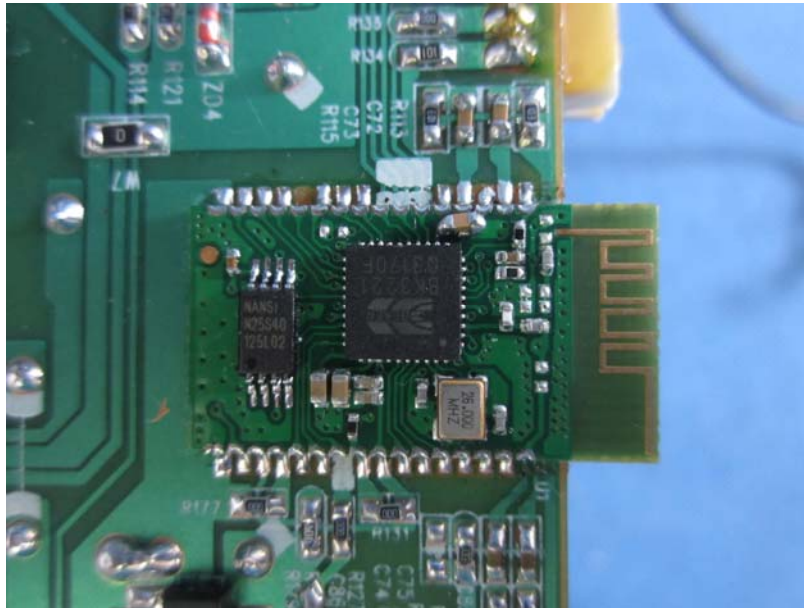












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