

FCC
EMC
TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
Bluetooth speaker 2.1

ISSUED TO
Guoguang Electric Co., Ltd

No. 8 Jinghu Road, Xinhua Town, Huadu Region, Guangzhou, 510800
P. R. China

BLUETOOTH™
HOME SPEAKER SYSTEM



Prepared by: 
Cao Shaocong
(Reporting Specialist)
Date: 2014.5.30
Approved by: 
Wei Yanquan
(Chief Engineer)
Date: 2014.5.30



Report No.: BL-SZ1440034-401
EUT Type: Bluetooth speaker 2.1
Model Name: Mercury
Brand Name: N/A
Test Standard: 47 CFR Part 15 Subpart B
FCC ID: 2AAP800005
Test conclusion: PASS
Test Date: 2014.05.04- 2014.05.10
Date of Issue: 2014.05.30

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Revision History

| Version | Issue Date | Revisions |
|----------------|-------------------|-------------------------|
| <u>Rev. 01</u> | <u>2014.05.26</u> | <u>Initial Issue</u> |
| <u>Rev. 01</u> | <u>2014.05.30</u> | <u>The Second Issue</u> |

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

| | |
|--------------|---|
| Company Name | Shenzhen BALUN Technology Co., Ltd. |
| Address | Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China |
| Phone Number | +86 755 6683 3402 |
| Fax Number | +86 755 6182 4271 |

1.2 Identification of the Responsible Testing Location

| | |
|---------------------------|---|
| Test Location | Shenzhen BALUN Technology Co., Ltd. |
| Address | Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China |
| Accreditation Certificate | <p>The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1.</p> <p>The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625.</p> <p>The laboratory has met the requirements of the IAS Accreditation Criteria for Testing Laboratories (AC89), has demonstrated compliance with ISO/IEC Standard 17025:2005. The accreditation certificate number is TL-588.</p> <p>The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.</p> |
| Description | All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055 |

1.3 Test Environment Condition

| | |
|---------------------------|--------------|
| Ambient Temperature | 15 to 35°C |
| Ambient Relative Humidity | 30 to 60% |
| Ambient Pressure | 86 to 106kPa |

1.4 Announce

- (1) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (2) The test report is invalid if there is any evidence and/or falsification.
- (3) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (4) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant

| | |
|-----------|---|
| Applicant | Guoguang Electric Co., Ltd |
| Address | No. 8 Jinghu Road, Xinhua Town, Huadu Region, Guangzhou, 510800 P. R. China |

2.2 Manufacturer

| | |
|--------------|---|
| Manufacturer | Guoguang Electric Co., Ltd |
| Address | No. 8 Jinghu Road, Xinhua Town, Huadu Region, Guangzhou, 510800 P. R. China |

2.3 General Description for Equipment under Test (EUT)

| | |
|-----------------------------------|---|
| EUT Type | Bluetooth speaker 2.1 |
| Model Name | Mercury |
| Hardware Version | N/A |
| Software Version | N/A |
| Network and Wireless connectivity | BT 2.1+EDR |
| Display | N/A |
| About the Product | The EUT is a Bluetooth speaker, it contains Bluetooth Module operating at 2.4GHz ISM band which supports Bluetooth 2.1+EDR. The EUT is equipped with a USB power port, and an AUX port. |

2.4 Ancillary Equipment

| | | |
|-----------------------|--------------|-------------------------------|
| Ancillary Equipment 1 | AC Adapter | |
| | Brand Name | N/A |
| | Model No | S048CU1500300 |
| | Serial No | (N/A. marked #1 by test site) |
| | Rated Input | ~ 100-240V, 1.5A Max, 50/60Hz |
| | Rated Output | ≡ 15V, 3000mA |

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

| No. | Identity | Document Title |
|-----|--|--|
| 1 | FCC 47 CFR Part 15 Subpart B (10-1-09 Edition) | Unintentional Radiators |
| 2 | ANSI C63.4-2009 | American National Standard for Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |

3.2 Verdict

| No. | Description | FCC Rule | Test Verdict | Result |
|-----|------------------------------|----------|--------------|------------|
| 1 | Radiated Emission | 15.109 | PASS | Annex A .1 |
| 2 | Conducted Emission, AC Ports | 15.107 | PASS | Annex A .2 |

3.3 Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

| Measurement | Value |
|----------------------------------|--------|
| Conducted emissions (9KHz-30MHz) | 1.12dB |
| Radiated emissions (30MHz-1GHz) | 2.11dB |
| Radiated emissions (1GHz-25GHz) | 3.31dB |

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

| Environment Parameter | Selected Values During Tests | | |
|---|------------------------------|---------|-------------------|
| | Temperature | Voltage | Relative Humidity |
| Normal Temperature, Normal Voltage (NTNV) | 23°C~25°C | 15.0V | 50%-55% |

4.2 Test Equipment List

| Radiated Emission Test | | | | | | |
|---|---------------|---------------|------------|------------|------------|-------------------------------------|
| Description | Manufacturer | Model | Serial No. | Cal. Date | Cal. Due | Use |
| EMI Receiver | ROHDE&SCHWARZ | ESRP | 101036 | 2013.06.04 | 2014.06.03 | <input checked="" type="checkbox"/> |
| Attenuator | KMW | 20dB | 110617091 | 2014.05.10 | 2015.05.09 | <input checked="" type="checkbox"/> |
| Test Antenna- Loop(9kHz-30 MHz) | SCHWARZBECK | FMZB 1519 | 1519-037 | 2013.07.02 | 2014.07.01 | <input type="checkbox"/> |
| Test Antenna- Bi-Log(30MHz-3 GHz) | SCHWARZBECK | VULB 9163 | 9163-624 | 2013.07.03 | 2014.07.02 | <input checked="" type="checkbox"/> |
| Test Antenna- Horn(1-18 GHz) | SCHWARZBECK | BBHA 9120D | 9120D-1148 | 2013.07.02 | 2014.07.01 | <input checked="" type="checkbox"/> |
| Test Antenna- Horn(15-26.5 GHz) | SCHWARZBECK | BBHA 9170 | 9170-305 | 2013.07.02 | 2014.07.01 | <input type="checkbox"/> |
| Anechoic Chamber | RAINFORD | 9m*6m*6m | N/A | 2013.10.07 | 2014.10.06 | <input checked="" type="checkbox"/> |

| Conducted disturbance Test | | | | | | |
|----------------------------|---------------|--------------|------------|------------|------------|-------------------------------------|
| Description | Manufacturer | Model | Serial No. | Cal. Date | Cal. Due | Use |
| EMI Receiver | ROHDE&SCHWARZ | ESRP | 101036 | 2013.06.04 | 2014.06.03 | <input checked="" type="checkbox"/> |
| LISN | SCHWARZBECK | NSLK 8127 | 8127-687 | 2013.06.04 | 2014.06.03 | <input checked="" type="checkbox"/> |
| AMN | SCHWARZBECK | NNBM812 4 | 8124-509 | 2013.06.29 | 2014.06.28 | <input type="checkbox"/> |
| AMN | SCHWARZBECK | NNBM812 4 | 8124-510 | 2013.06.29 | 2014.06.28 | <input type="checkbox"/> |
| ISN | TESEQ | ISN T800 | 34449 | 2013.06.29 | 2014.06.28 | <input type="checkbox"/> |

4.3 Test Enclosure list

| Description | Manufacturer | Model | Serial No. | Length | Description | Use |
|-----------------|--------------|--------------|------------|--------|--------------------|-------------------------------------|
| PC | SOEYI | B123 | N/A | N/A | N/A | <input checked="" type="checkbox"/> |
| Printer | HP | DESKJET 1000 | N/A | N/A | N/A | <input checked="" type="checkbox"/> |
| Keyboard | logitech | Y-BP62a | N/A | N/A | N/A | <input checked="" type="checkbox"/> |
| Mouse | logitech | M100 | N/A | N/A | N/A | <input checked="" type="checkbox"/> |
| USB disk | Kingston | N/A | N/A | N/A | N/A | <input type="checkbox"/> |
| TF Card | Kingston | N/A | N/A | N/A | N/A | <input type="checkbox"/> |
| VGA Cable | N/A | N/A | N/A | 1.5m | Shielded with core | <input type="checkbox"/> |
| HDMI Cable | N/A | N/A | N/A | 1.5m | Shielded with core | <input type="checkbox"/> |
| DVI Cable | N/A | N/A | N/A | 1.5m | Shielded with core | <input type="checkbox"/> |
| IPhone | Apple | A1387 | N/A | N/A | N/A | <input checked="" type="checkbox"/> |
| Cement Resistor | N/A | N/A | N/A | N/A | 2.5Ω, 100W | <input checked="" type="checkbox"/> |

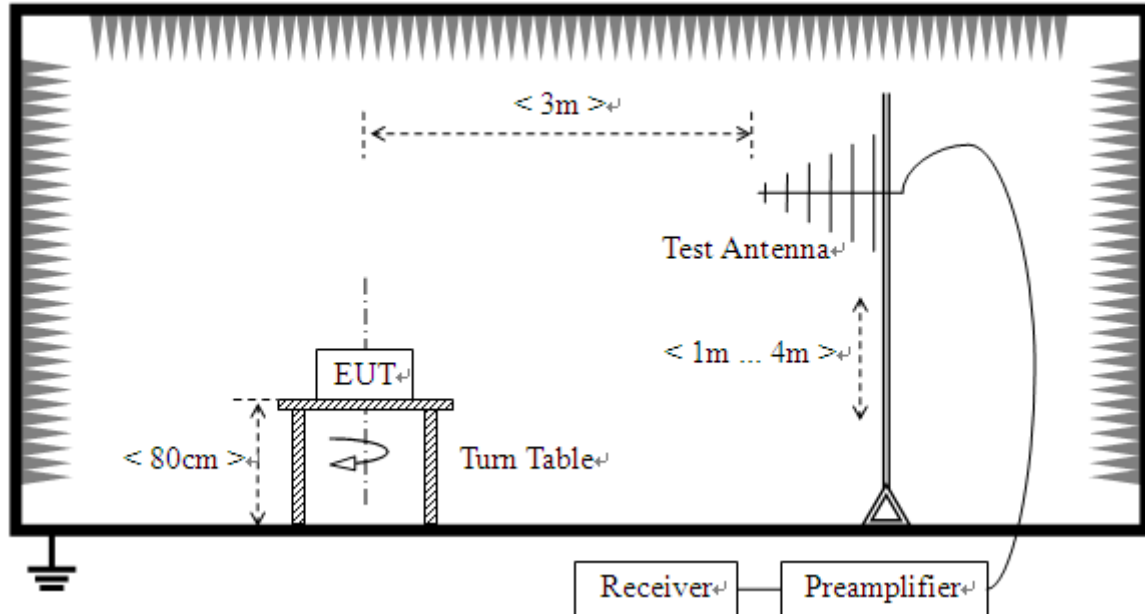
4.4 Test Configurations

| Test Configurations (TC) No. | Description |
|------------------------------|--|
| TC01 | <u>Bluetooth mode</u> The EUT configuration of the emission tests is EUT + PC+ Charger+ iphone+ Cement Resistor. During the measurement, the EUT was powered by AC charger. A Bluetooth link was established between the EUT and the iPhone, the EUT was working normally as a music player. And the EUT was powered to the Cement Resistor through the USB cable. |
| TC02 | <u>The AUX mode</u> The EUT configuration of the emission tests is EUT + Charger+ Iphone+ Cement Resistor. During the measurement, the EUT was powered by AC charger. And the EUT was connected with the Iphone through the AUX cable, working normally as a music player, the EUT was powered to the Cement Resistor through the USB cable. |

Note: Based on client request, all normal using modes of the normal function were tested but only the worst test data of the worst mode is reported by this report.

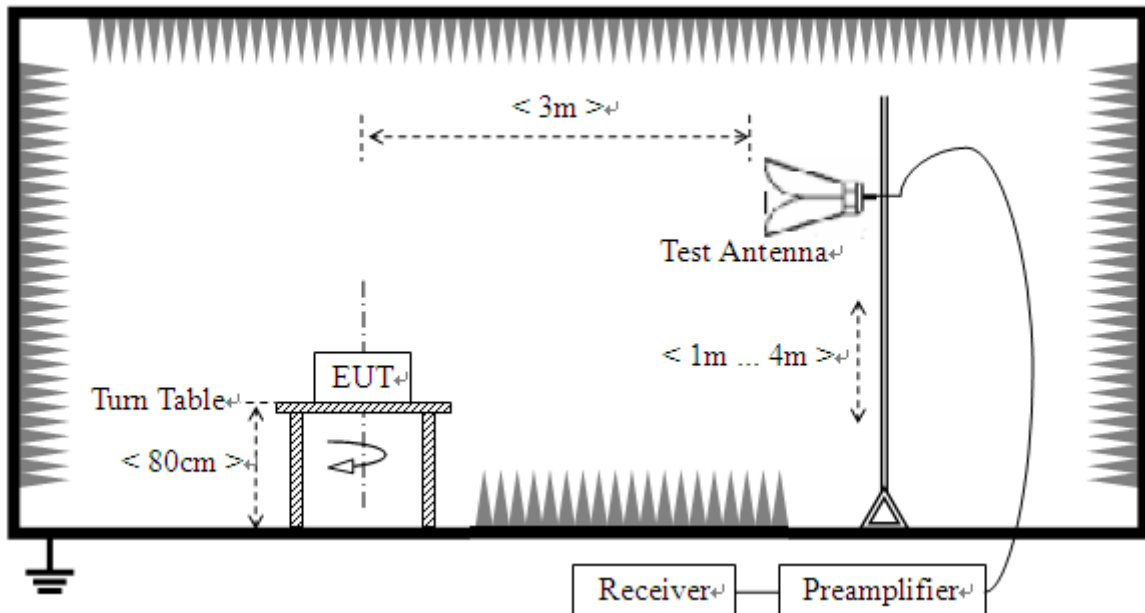
4.5 Test Setups

Test Setup 1



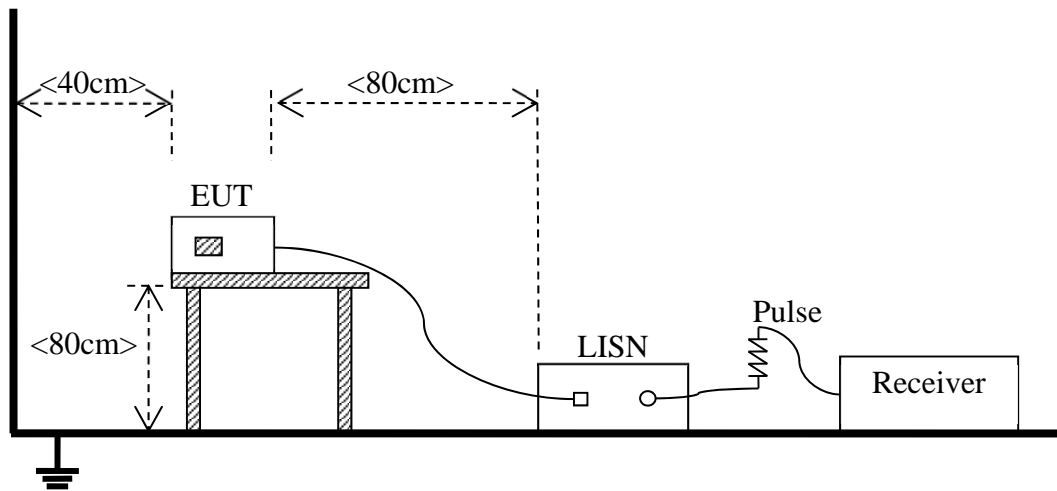
(For Radiated Emission Test (30MHz-1GHz))

Test Setup 2



(For Radiated Emission Test (above 1GHz))

Test Setup 3



(For Conducted Emission, AC Ports Test)

4.6 Test Conditions

| Test Case | Test Conditions | |
|------------------------------|--------------------|----------------|
| Radiated Emission | Test Env. | NTNV |
| | Test Setup | Test Setup 1&2 |
| | Test Configuration | TC01~TC02 |
| Conducted Emission, AC Ports | Test Env. | NTNV |
| | Test Setup | Test Setup 3 |
| | Test Configuration | TC01~TC02 |

5 TEST ITEMS

5.1 Emission Tests

5.1.1 Radiated Emission

5.1.1.1 Limit

| Frequency (MHz) | Field Strength ($\mu\text{V/m}$) | Measurement Distance (m) |
|-----------------|------------------------------------|--------------------------|
| 0.009 - 0.490 | 2400/F(kHz) | 300 |
| 0.490 - 1.705 | 24000/F(kHz) | 30 |
| 1.705 - 30.0 | 30 | 30 |
| 30 - 88 | 100 | 3 |
| 88 - 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| Above 960 | 500 | 3 |

NOTE:

- 1) Field Strength ($\text{dB}\mu\text{V/m}$) = $20 \cdot \log[\text{Field Strength } (\mu\text{V/m})]$.
- 2) In the emission tables above, the tighter limit applies at the band edges.
- 3) For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

5.1.1.2 Test Procedure

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

An initial pre-scan was performed in the chamber using the EMI Receiver in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bi-Log antenna with 2 orthogonal polarities.

5.1.2 Conducted Emission

5.1.2.1 Test Limit

| Frequency range (MHz) | Conducted Limit (dB μ V) | |
|-----------------------|------------------------------|----------|
| | Quasi-peak | Average |
| 0.15 - 0.50 | 66 to 56 | 56 to 46 |
| 0.50 - 5 | 56 | 46 |
| 5 - 30 | 60 | 50 |

NOTE:

- 1) The limit is applicable to Class B ITE.
- 2) The lower limit shall apply at the band edges.
- 3) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

5.1.2.2 Test Procedure

The EUT is connected to the power mains through a LISN which provides 50 Ω /50 μ H of coupling impedance for the measuring instrument. The test frequency range is from 150kHz to 30MHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels that are more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed.

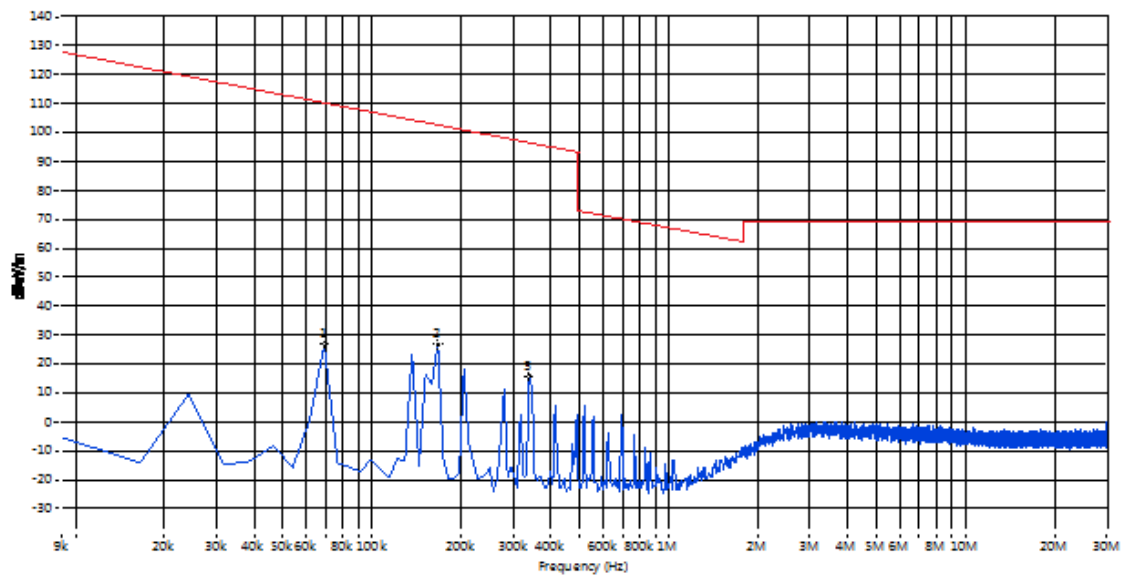
ANNEX A TEST RESULTS

A.1 Radiated Emission

Test Data

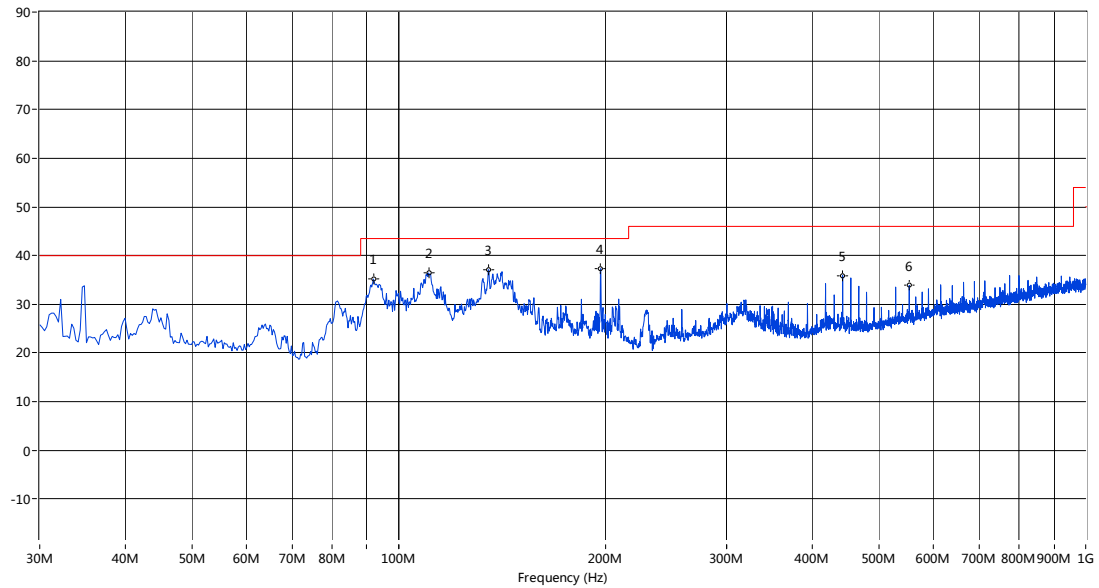
Note: The marked spikes near 2400MHz with circle should be ignored because they are Bluetooth carrier frequency.

A.1.1 9kHz – 30MHz



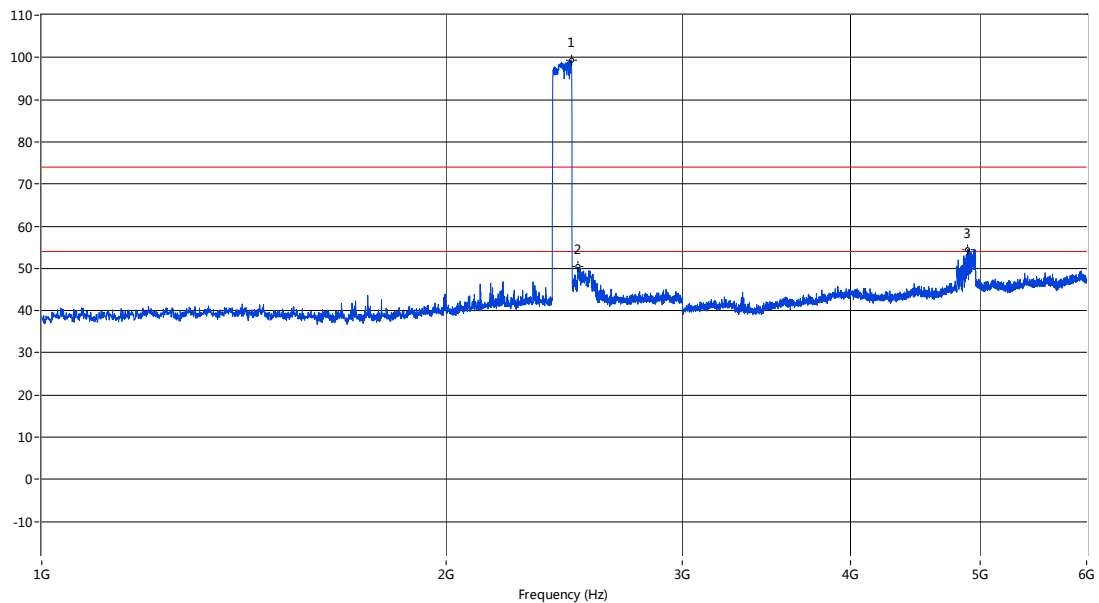
| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Degree | Verdical |
|------------|-------|----|----|----------|----------|----------|--------|----------|
| 0.069 | 28.92 | -- | -- | -- | 110.8 | -- | -- | Pass |
| 0.166 | 29.48 | -- | -- | -- | 103.2 | -- | -- | Pass |
| 0.339 | 18.51 | -- | -- | -- | 97.0 | -- | -- | Pass |

A.1.2 Test Antenna Vertical, 30MHz – 1GHz



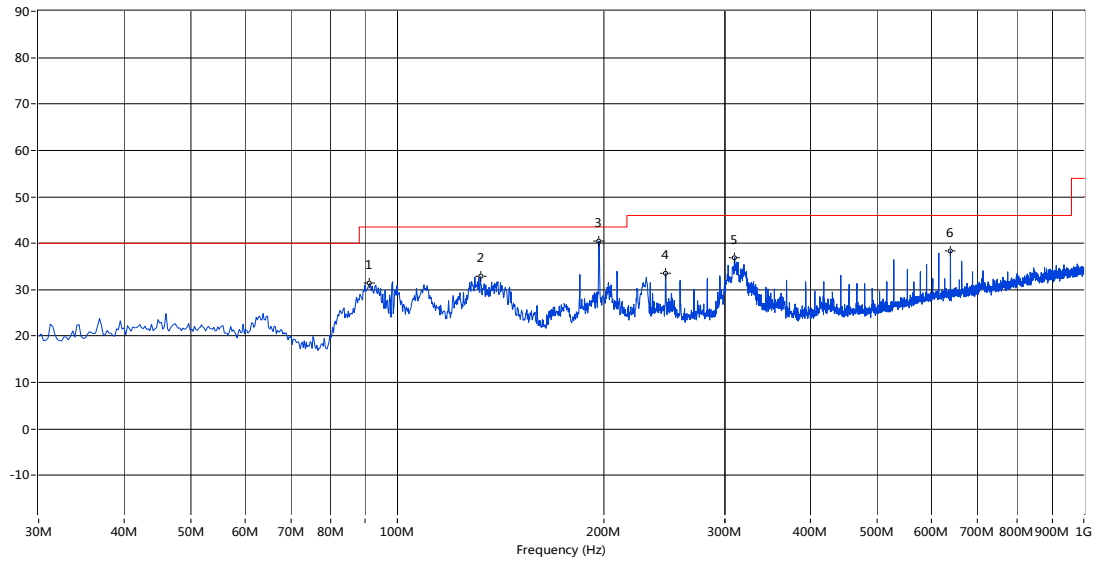
| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Degree | Antenna | Verdical |
|------------|-------|----|----|----------|----------|----------|--------|----------|----------|
| 91.822 | 35.20 | -- | -- | -- | 43.5 | -- | 162.8 | Vertical | Pass |
| 110.490 | 36.45 | -- | -- | -- | 43.5 | -- | 21.3 | Vertical | Pass |
| 134.976 | 37.08 | -- | -- | -- | 43.5 | -- | 270.3 | Vertical | Pass |
| 196.798 | 37.34 | -- | -- | -- | 43.5 | -- | 27.8 | Vertical | Pass |
| 442.632 | 35.92 | -- | -- | -- | 46.0 | -- | 38.1 | Vertical | Pass |
| 553.427 | 33.86 | -- | -- | -- | 46.0 | -- | 17.4 | Vertical | Pass |

A.1.3 Test Antenna Vertical, 1GHz – 6GHz



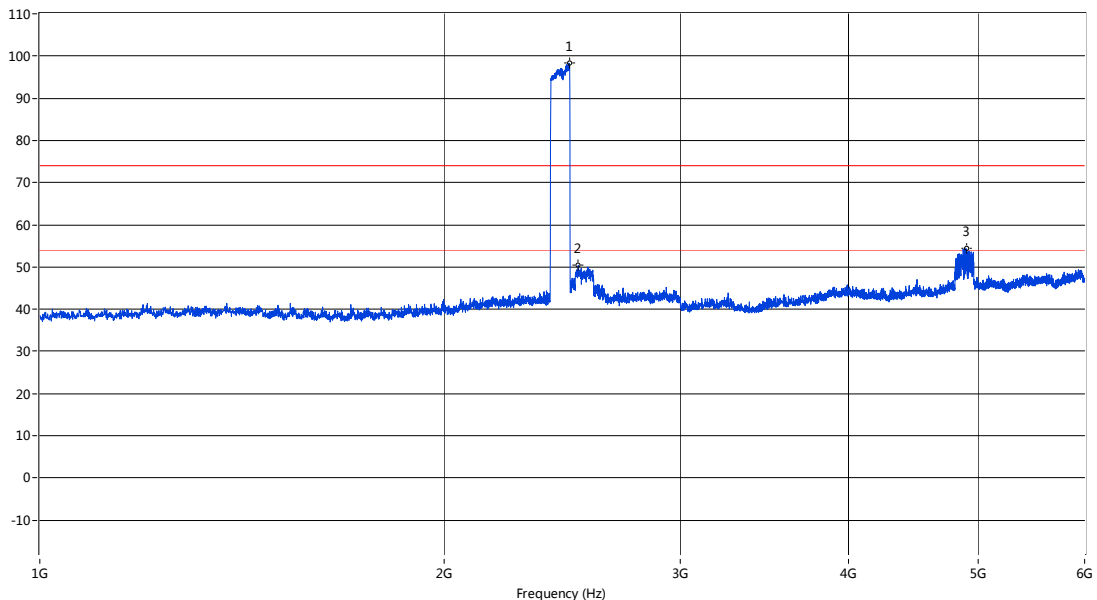
| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Degree | Antenna | Verdical |
|------------|-------|----|-------|----------|----------|----------|--------|----------|----------|
| 2478.630 | 99.23 | -- | -- | -- | -- | -- | 146.1 | Vertical | -- |
| 2508.123 | 50.37 | -- | -- | 74.0 | -- | 54.0 | 317.9 | Vertical | Pass |
| 4954.011 | 54.44 | -- | 46.95 | 74.0 | -- | 54.0 | 344.5 | Vertical | Pass |

A.1.4 Test Antenna Horizontal, 30MHz – 1GHz



| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Degree | Antenna | Verdical |
|------------|-------|----|----|----------|----------|----------|--------|------------|----------|
| 91.095 | 31.37 | -- | -- | -- | 43.5 | -- | 357.6 | Horizontal | Pass |
| 132.067 | 32.83 | -- | -- | -- | 43.5 | -- | 360.0 | Horizontal | Pass |
| 196.556 | 40.47 | -- | -- | -- | 43.5 | -- | 360.0 | Horizontal | Pass |
| 245.771 | 33.55 | -- | -- | -- | 46.0 | -- | 360.0 | Horizontal | Pass |
| 310.017 | 36.95 | -- | -- | -- | 46.0 | -- | 338.0 | Horizontal | Pass |
| 639.493 | 38.44 | -- | -- | -- | 46.0 | -- | 360.0 | Horizontal | Pass |

A.1.5 Test Antenna Horizontal, 1GHz – 6GHz



| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Degree | Antenna | Verdical |
|------------|-------|----|-------|----------|----------|----------|--------|------------|----------|
| 2479.130 | 98.24 | -- | -- | -- | -- | -- | 343.0 | Horizontal | -- |
| 2518.120 | 50.40 | -- | -- | 74.0 | -- | 54.0 | 348.9 | Horizontal | Pass |
| 4896.276 | 54.35 | -- | 47.85 | 74.0 | -- | 54.0 | 327.9 | Horizontal | Pass |

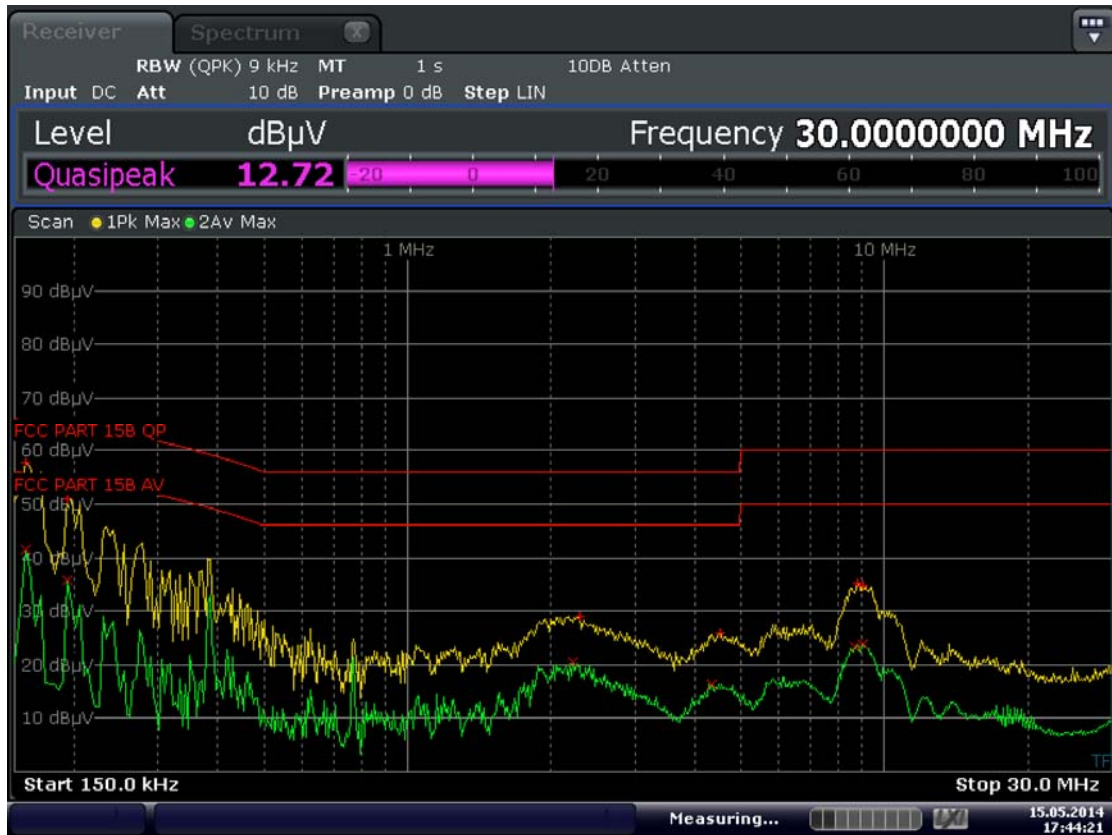
A.2 Conducted Emission

Test Data

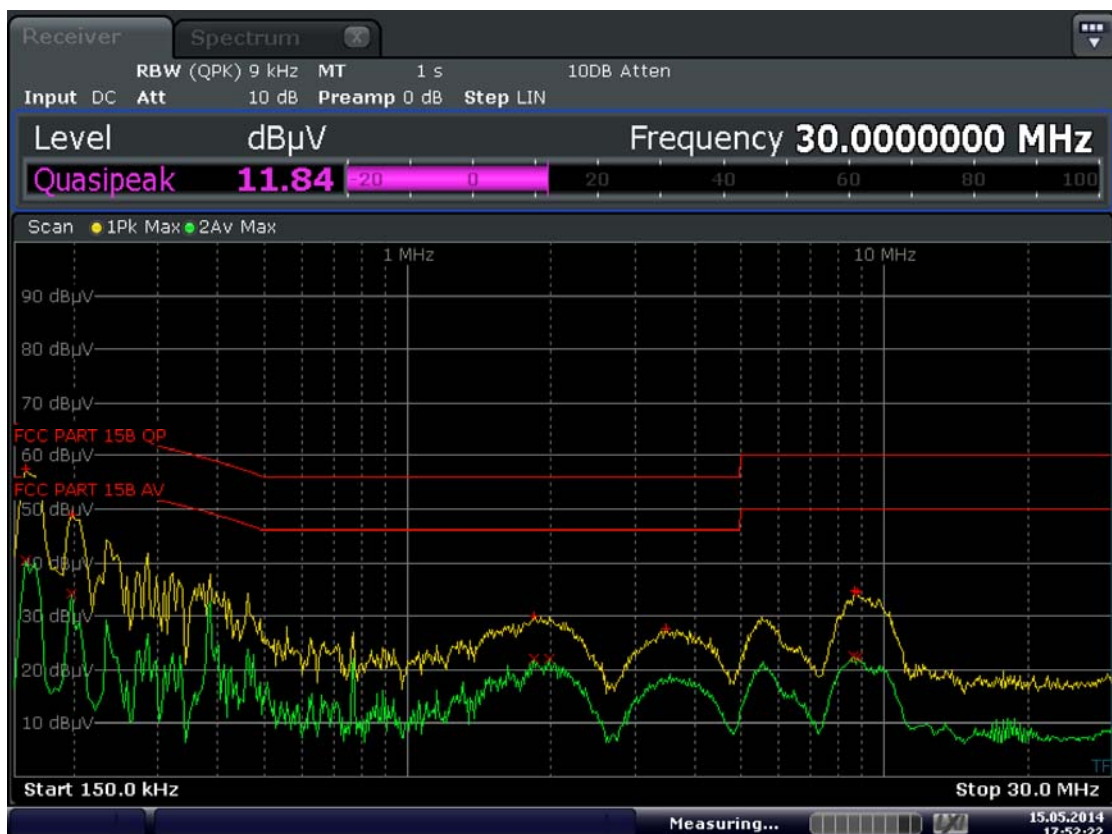
| No. | Frequency (MHz) | Measurement Level (dBuV) | Limit (dBuV) | Margin (dB) | Phase | Detector | Result |
|-----|-----------------|--------------------------|--------------|-------------|-------|----------|--------|
| 1 | 0.158 | 57.76 | 65.77 | -8.01 | L | QP | PASS |
| 2 | 0.158 | 41.46 | 55.77 | -14.31 | L | AV | PASS |
| 3 | 0.194 | 51.15 | 64.74 | -13.59 | L | QP | PASS |
| 4 | 0.194 | 35.72 | 54.74 | -19.02 | L | AV | PASS |
| 5 | 2.226 | 20.55 | 46.00 | -25.45 | L | AV | PASS |
| 6 | 2.294 | 29.04 | 56.00 | -26.96 | L | QP | PASS |
| 7 | 4.338 | 16.44 | 46.00 | -29.56 | L | AV | PASS |
| 8 | 4.534 | 25.92 | 56.00 | -30.08 | L | QP | PASS |
| 9 | 8.674 | 23.38 | 50.00 | -26.62 | L | AV | PASS |
| 10 | 8.802 | 35.22 | 60.00 | -24.78 | L | QP | PASS |
| 11 | 9.022 | 23.83 | 50.00 | -26.17 | L | AV | PASS |
| 12 | 9.030 | 34.63 | 60.00 | -25.37 | L | QP | PASS |
| 13 | 0.158 | 57.41 | 65.77 | -8.36 | N | QP | PASS |
| 14 | 0.158 | 40.52 | 55.77 | -15.25 | N | AV | PASS |
| 15 | 0.198 | 49.07 | 64.63 | -15.56 | N | QP | PASS |
| 16 | 0.198 | 34.11 | 54.63 | -20.52 | N | AV | PASS |
| 17 | 1.842 | 30.07 | 56.00 | -25.93 | N | QP | PASS |
| 18 | 1.842 | 22.06 | 46.00 | -23.94 | N | AV | PASS |
| 19 | 1.990 | 21.93 | 46.00 | -24.07 | N | AV | PASS |
| 20 | 3.490 | 27.84 | 56.00 | -28.16 | N | QP | PASS |
| 21 | 8.590 | 22.5 | 50.00 | -27.50 | N | AV | PASS |
| 22 | 8.678 | 34.63 | 60.00 | -25.37 | N | QP | PASS |
| 23 | 8.774 | 22.38 | 50.00 | -27.62 | N | AV | PASS |
| 24 | 8.810 | 34.34 | 60.00 | -25.66 | N | QP | PASS |

Test Plots

A.2.1 L Phase



A.2.2 N Phase

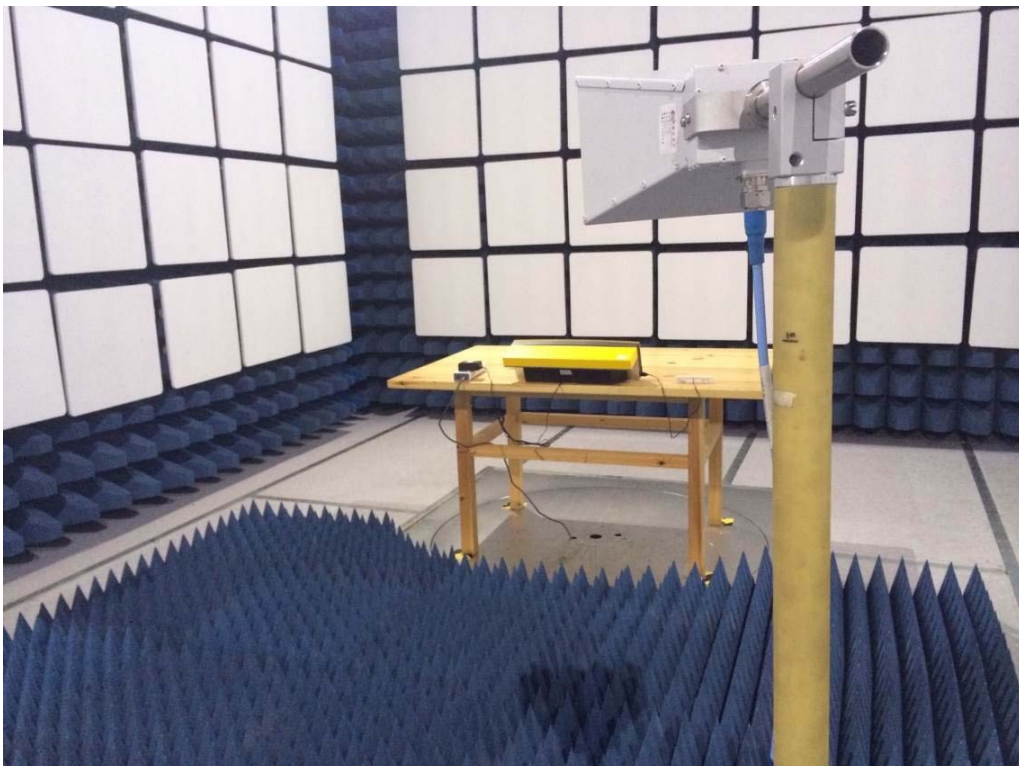


ANNEX B TEST SETUP PHOTOS

B.1 Radiated Field Strength Measurement

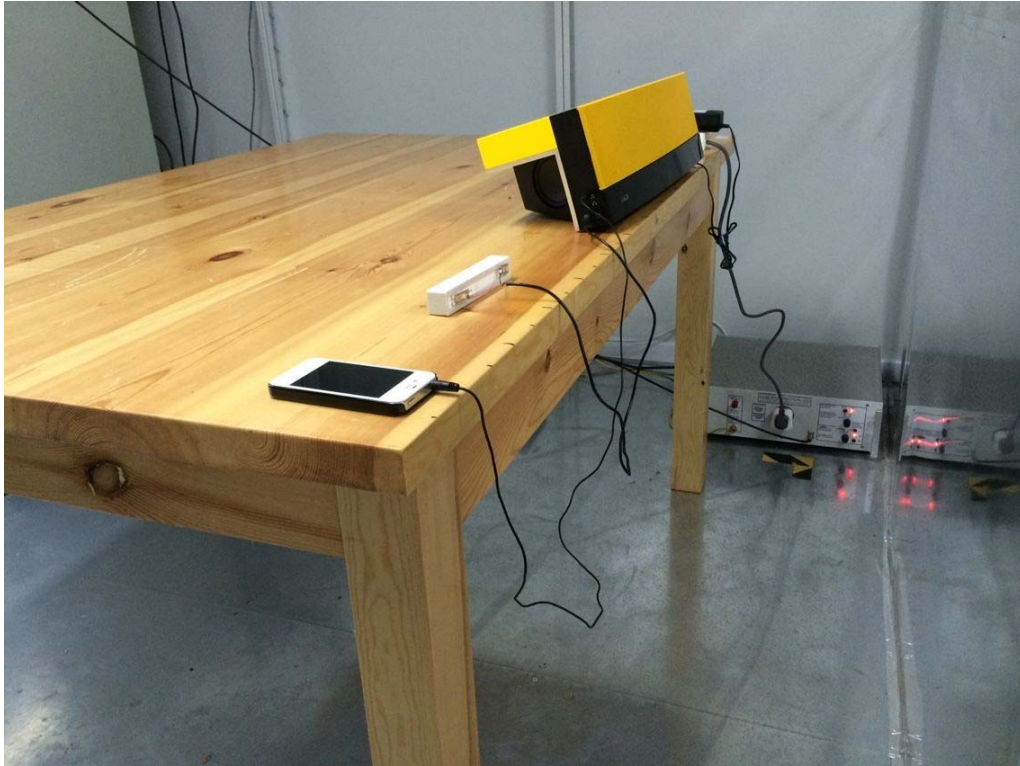


30MHz-1GHz



Above 1GHz

B.2 Conducted Emission



ANNEX C EUT PHOTOS

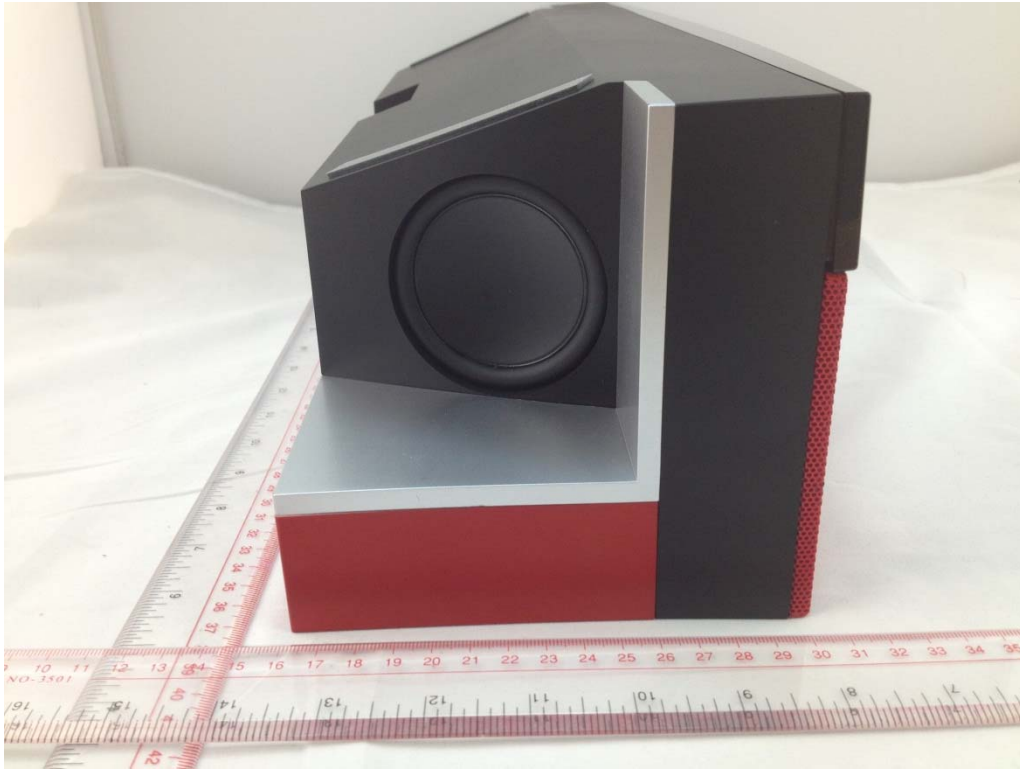
C.1 Appearance of the EUT



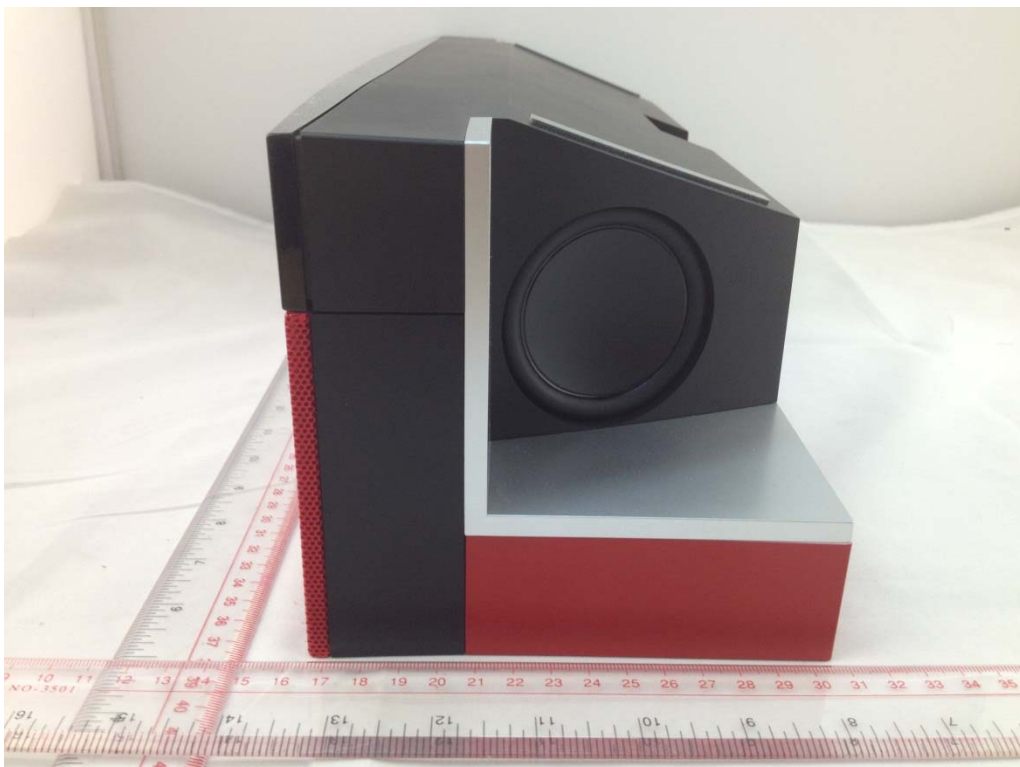
THE FRONT OF EUT



THE BACK OF EUT



THE LEFT OF EUT



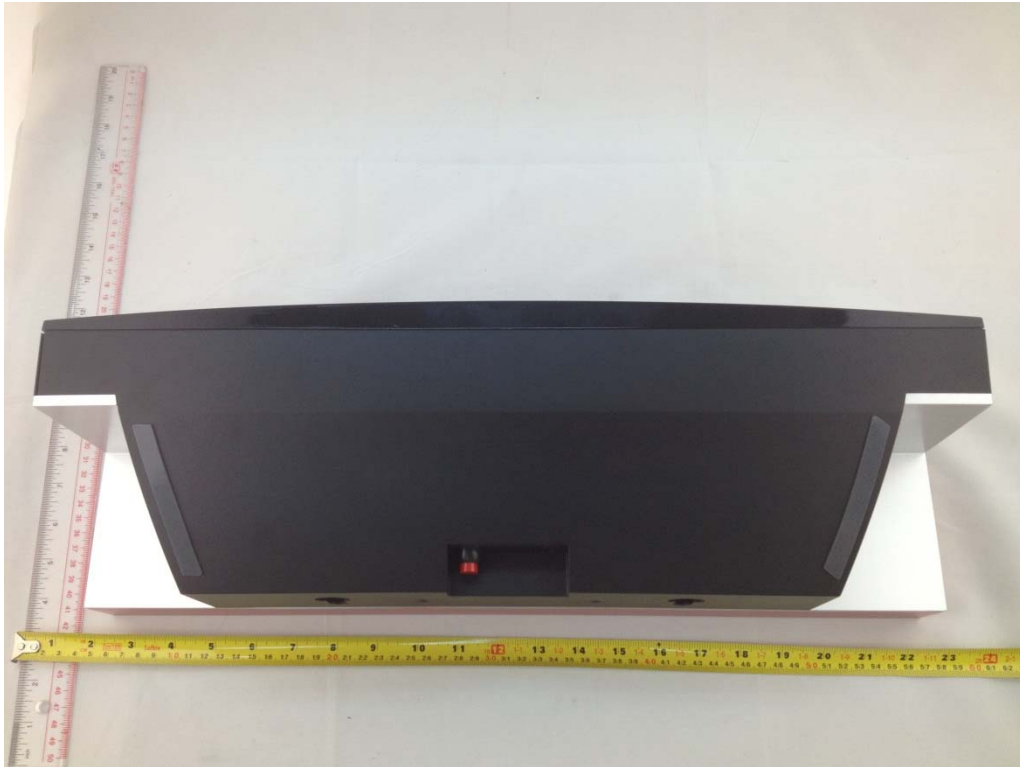
THE RIGHT OF EUT (1)



THE RIGHT OF EUT (2)



THE UP OF EUT

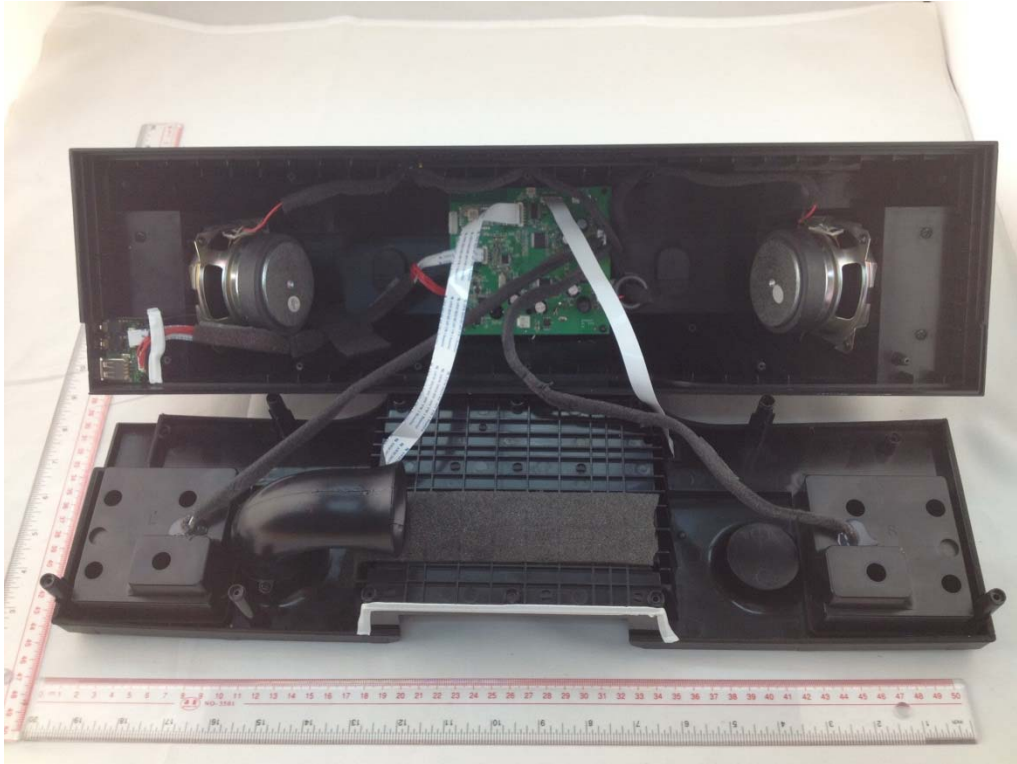


THE DOWN OF EUT



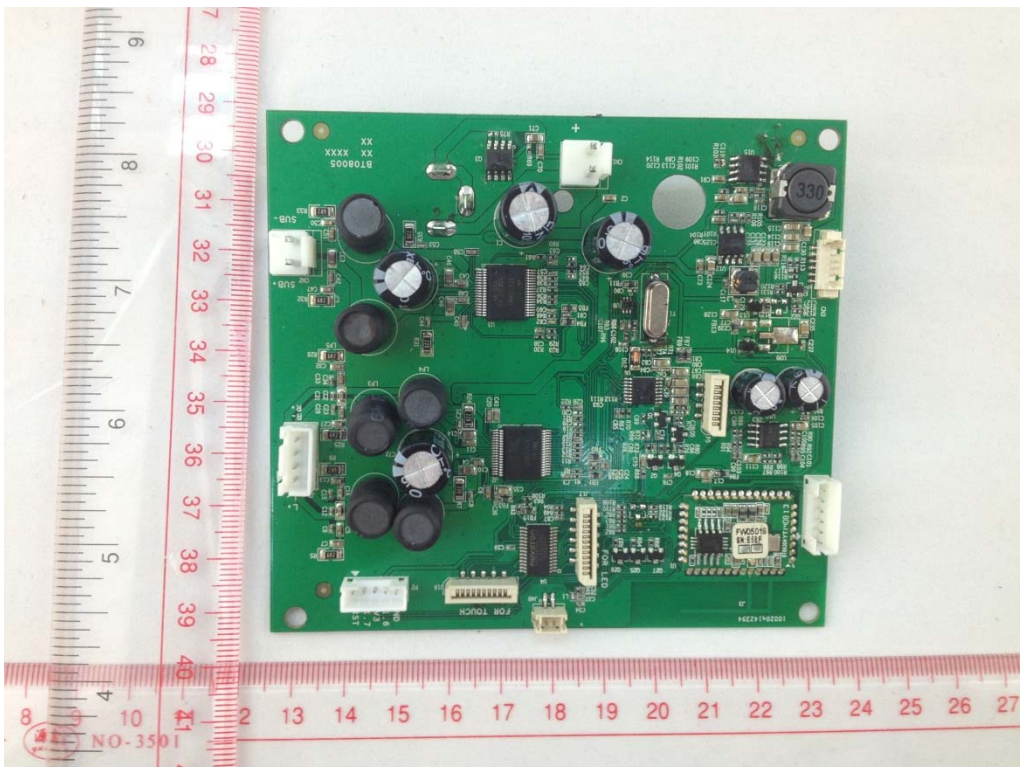
CHARGER

C.2 Inside of the EUT

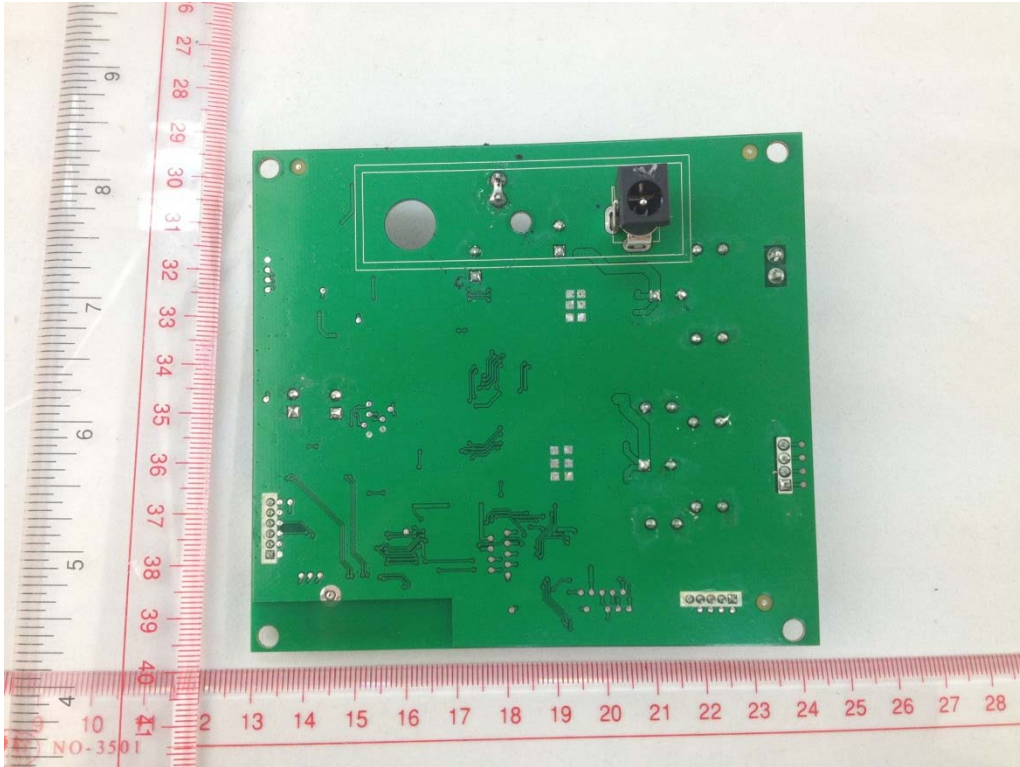




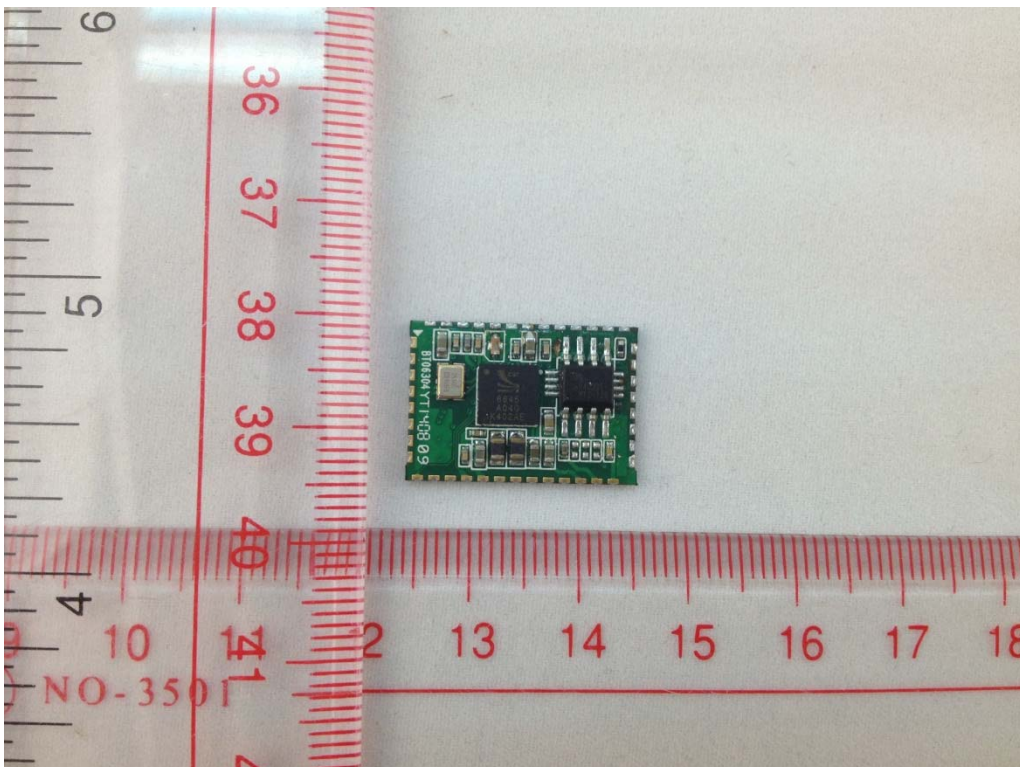
Main Board



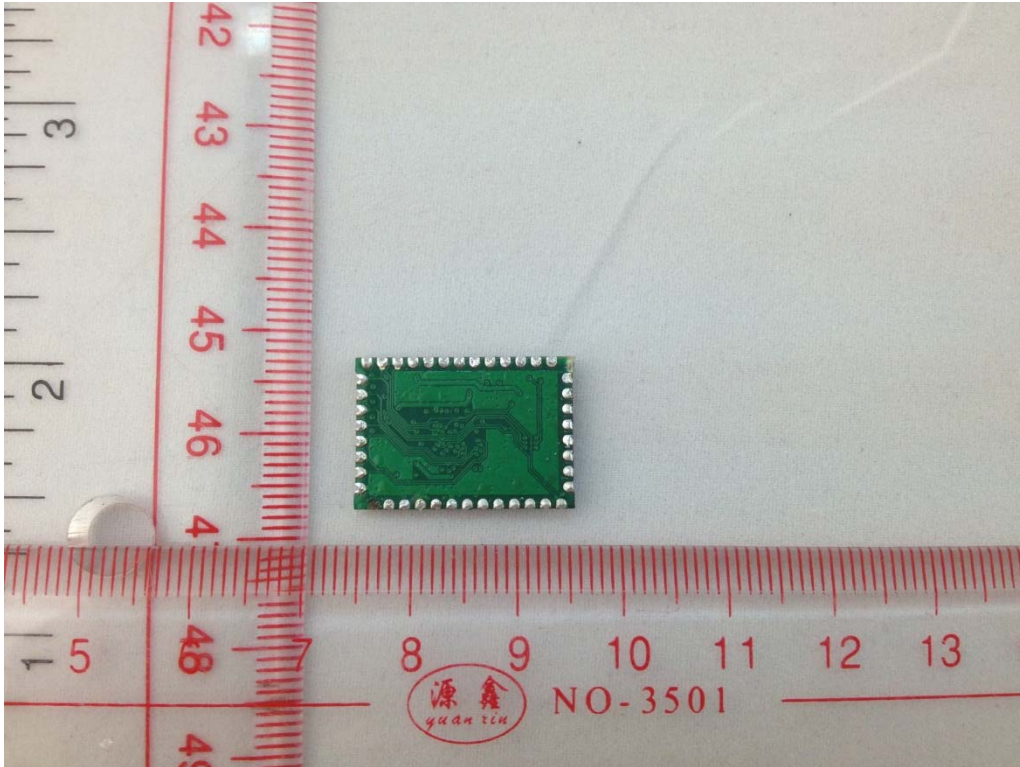
Main Board



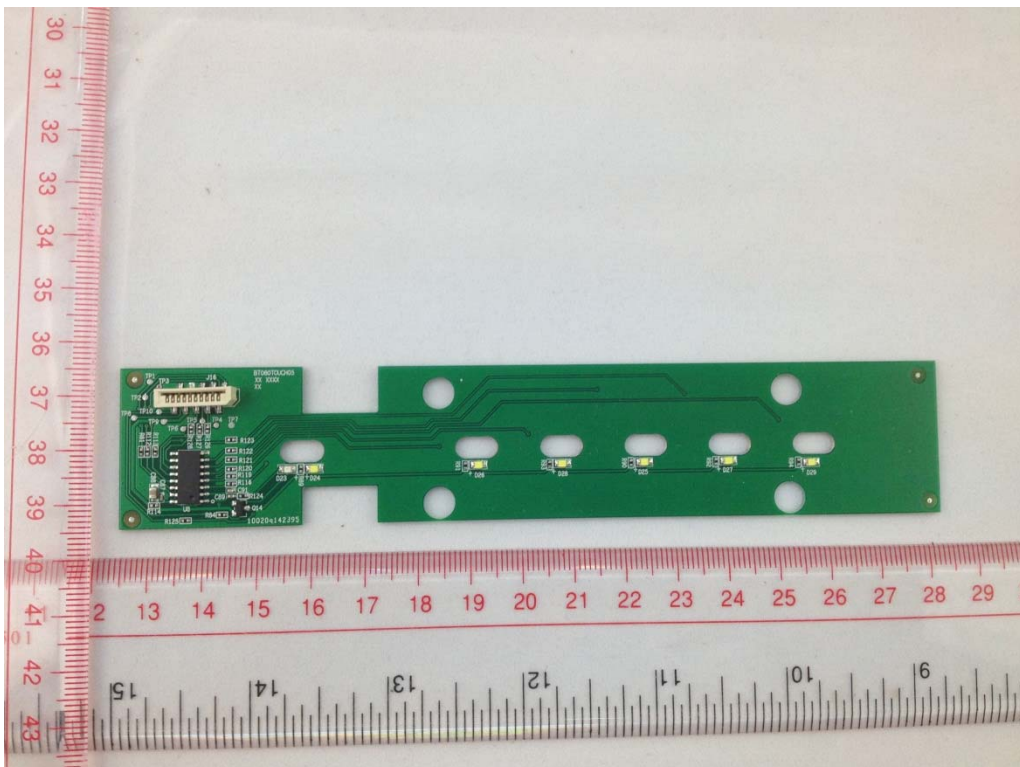
Main Board

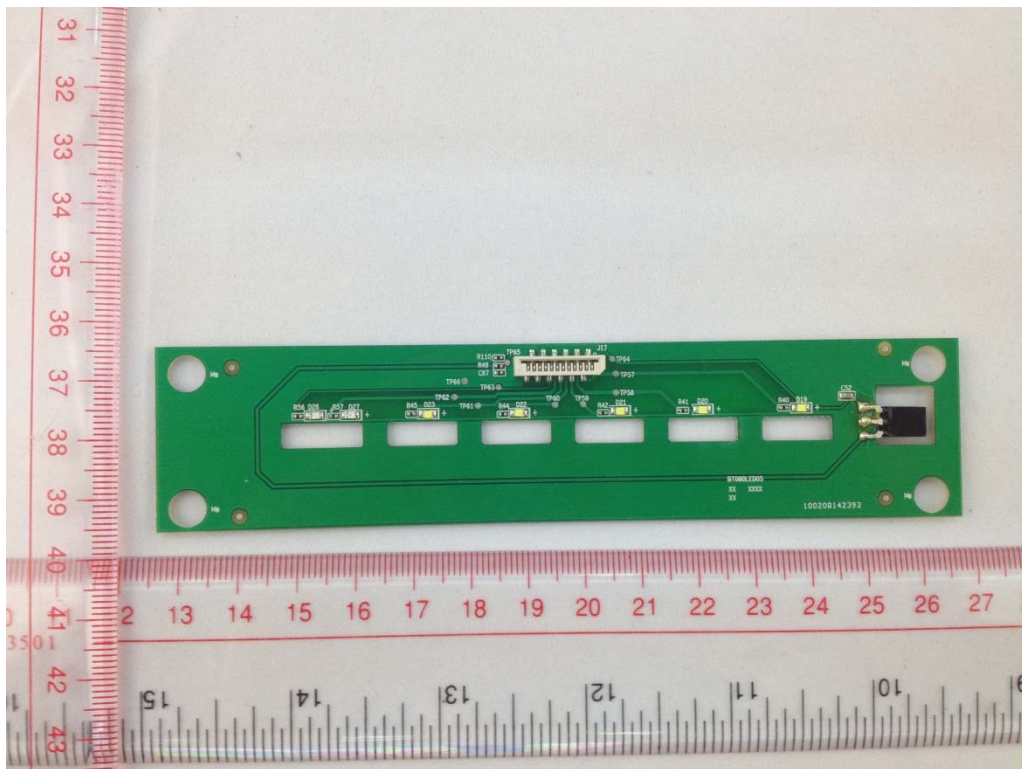
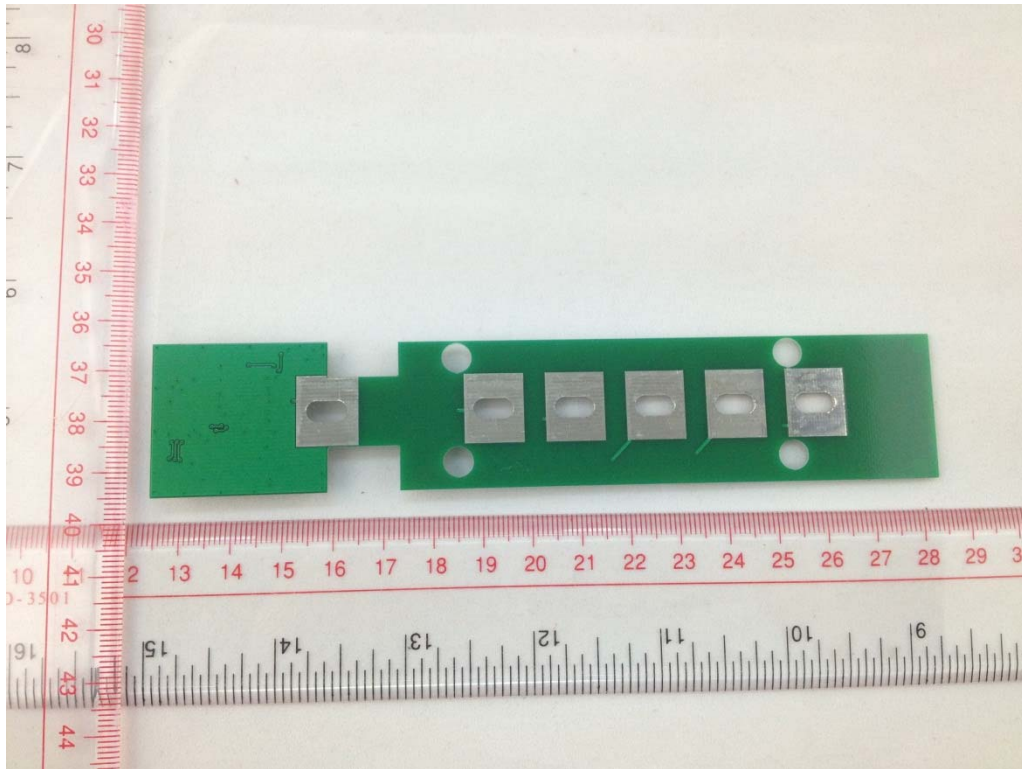


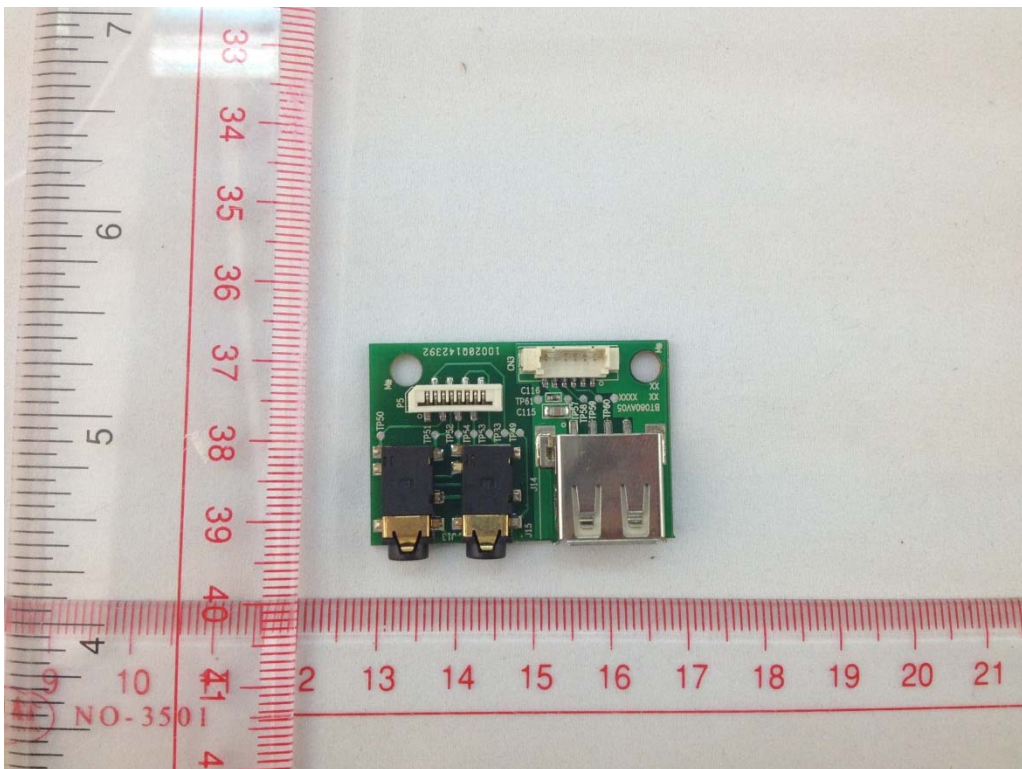
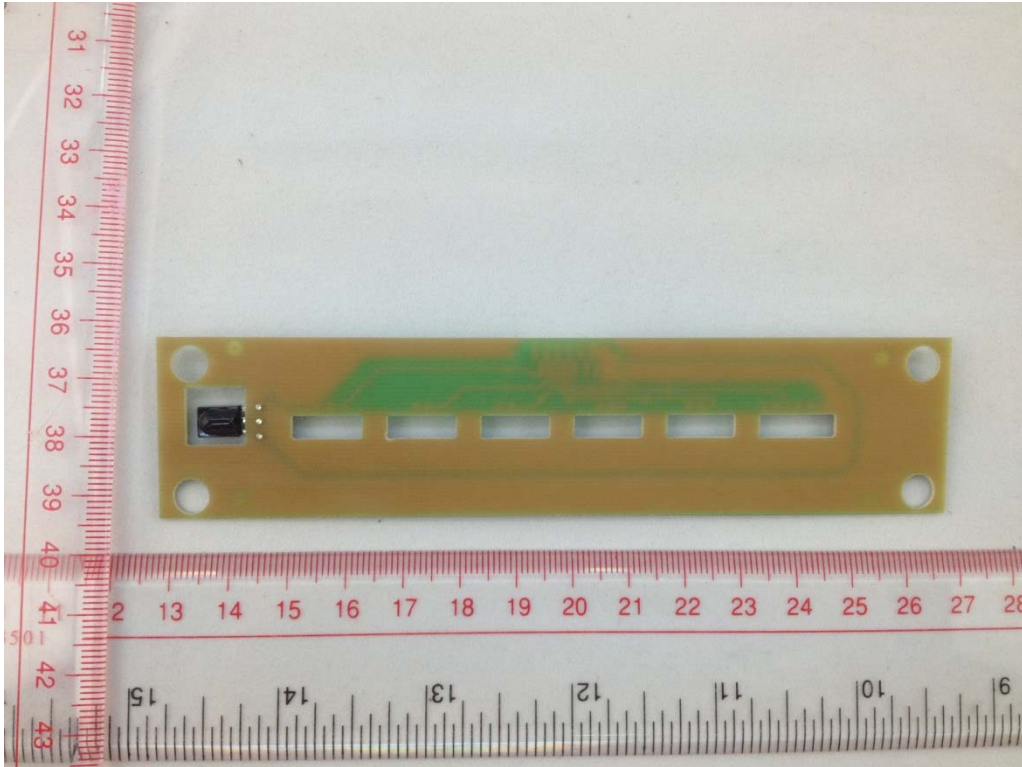
RF Board (FRONT)

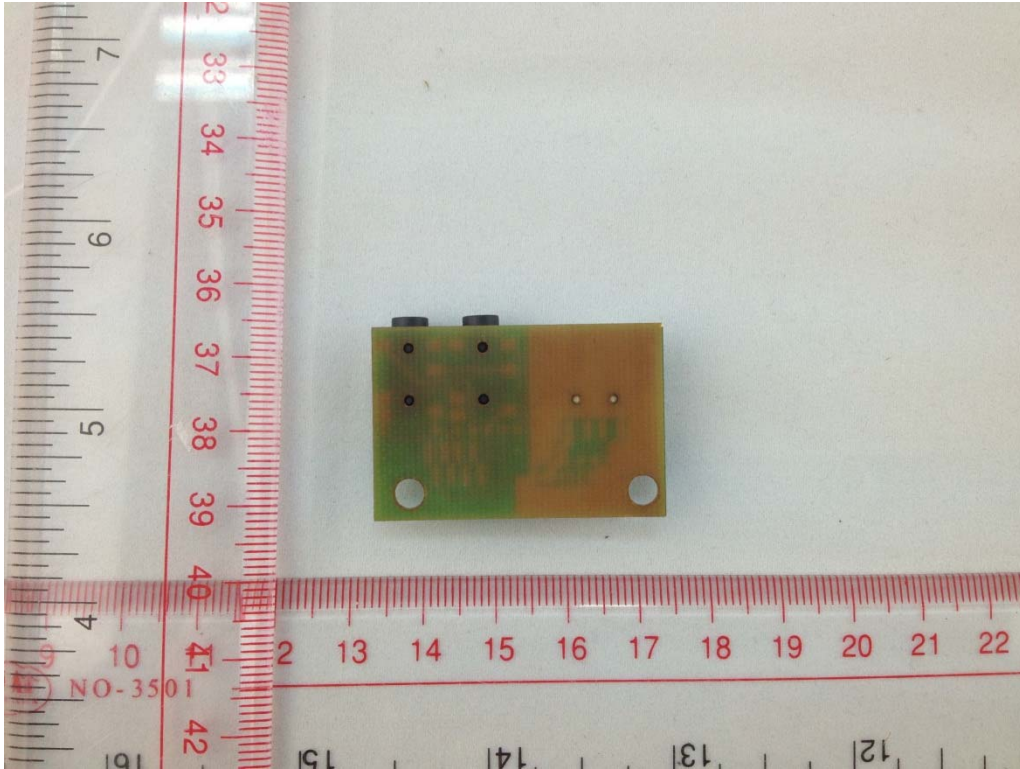


RF Board (BACK)









--END OF REPORT--