FCC EMC TEST REPORT

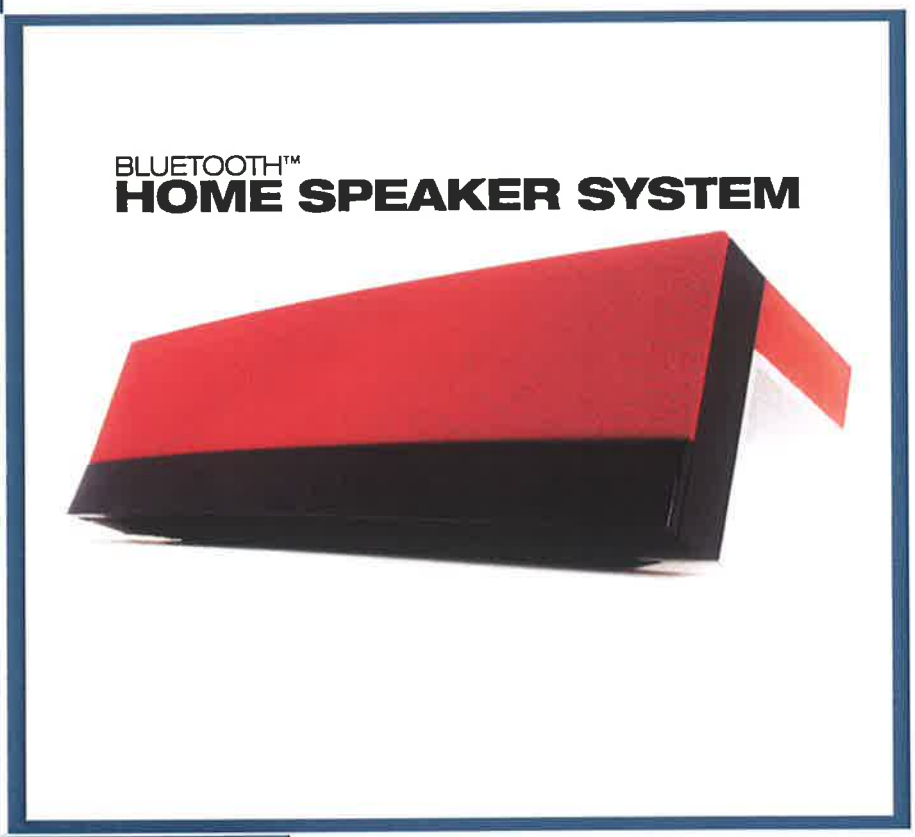
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

Bluetooth speaker 2.1

ISSUED TO
Guoguang Electric Co., Ltd

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



Prepared by: Cao Shaodong
(Reporting Specialist)
Date 2014.5.26

Approved by: Wei Yanquan
(Chief Engineer)
Date 2014.5.26

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:	2014.05.26

Block B, 1st FL,Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong, P. R. China 518055
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Revision History

Version	Issue Date	Revisions
Rev. 01	2014.05.26	Initial Issue

TABLE OF CONTENTS

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	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625. 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. 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.
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℃
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)	Radio Frequency Devices

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

Note: The tests were performed according to the method of measurements prescribed in ANSI C63.4 2009.

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	☒
Attenuator	KMW	20dB	110617091	2014.05.10	2015.05.09	☒
Test Antenna-Loop(9kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2013.07.02	2014.07.01	☐
Test Antenna-Bi-Log(30MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2013.07.03	2014.07.02	☒
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2013.07.02	2014.07.01	☒
Test Antenna-Horn(15-26.5 GHz)	SCHWARZBECK	BBHA 9170	9170-305	2013.07.02	2014.07.01	☐
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2013.10.07	2014.10.06	☒

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	☒
LISN	SCHWARZBECK	NSLK 8127	8127-687	2013.06.04	2014.06.03	☒
AMN	SCHWARZBECK	NNBM8124	8124-509	2013.06.29	2014.06.28	☐
AMN	SCHWARZBECK	NNBM8124	8124-510	2013.06.29	2014.06.28	☐
ISN	TESEQ	ISN T800	34449	2013.06.29	2014.06.28	☐

4.3 Test Enclosure list

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

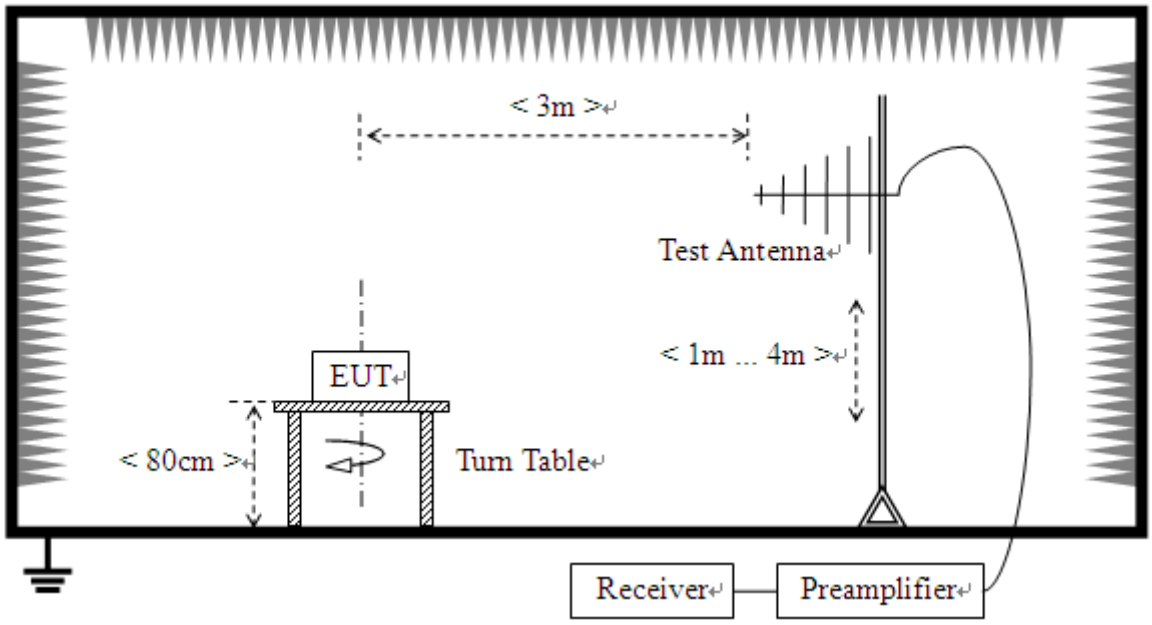
4.4 Test Configurations

Test Configurations (TC) No.	Description
TC01	Bluetooth mode 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	The AUX mode 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.

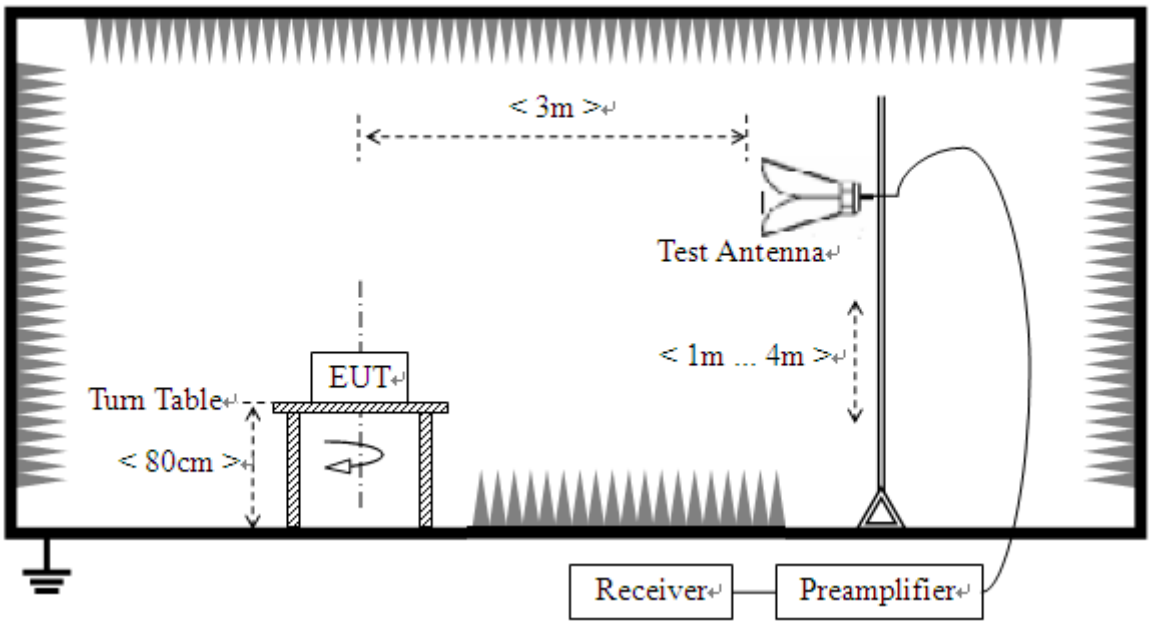
4.5 Test Setups

Test Setup 1



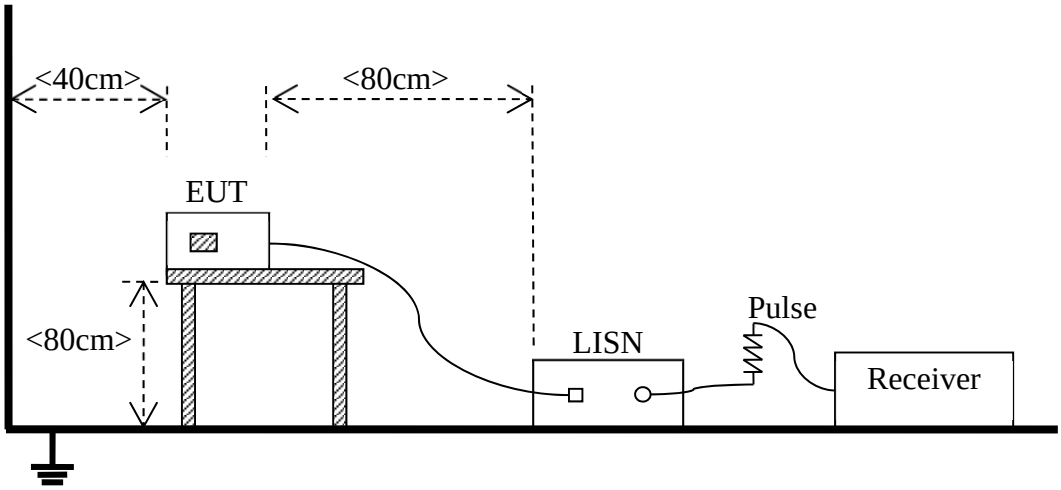
(For Radiated Emission Test (30MHz-1GHz))

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 range (MHz)	Field Strength	
	μV/m	dBμV/m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

NOTE:

1) Field Strength (dBμV/m) = 20*log[Field Strength (μV/m)].
2) In the emission tables above, the tighter limit applies at the band edges.

5.1.1.2 Test Procedure

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 (dBμV)	
	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 50Ω/50μH 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.

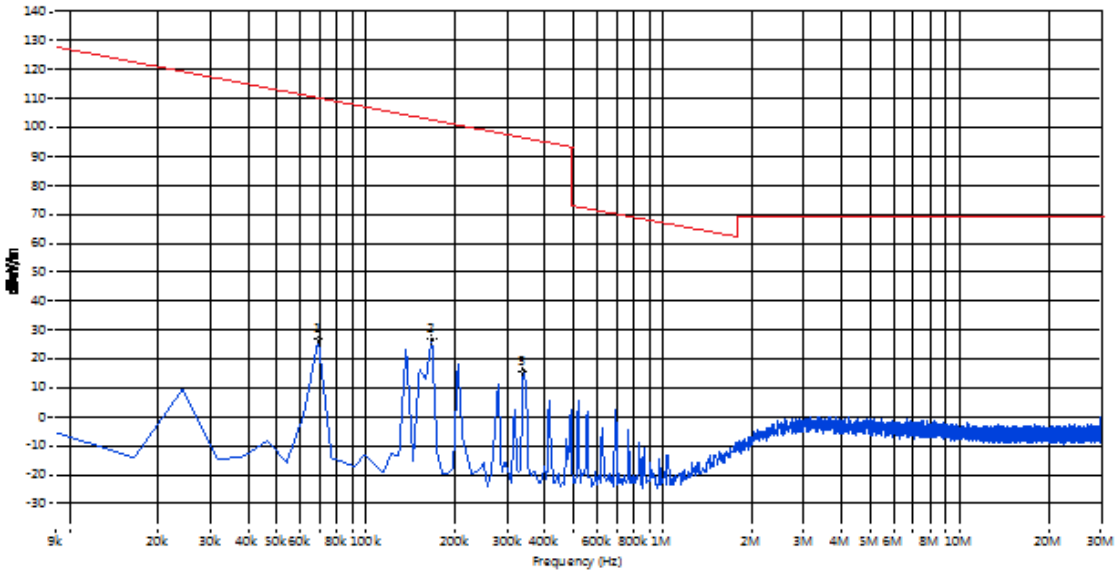
ANNEX A TEST RESULTS

A.1 Radiated Emission

Test Data

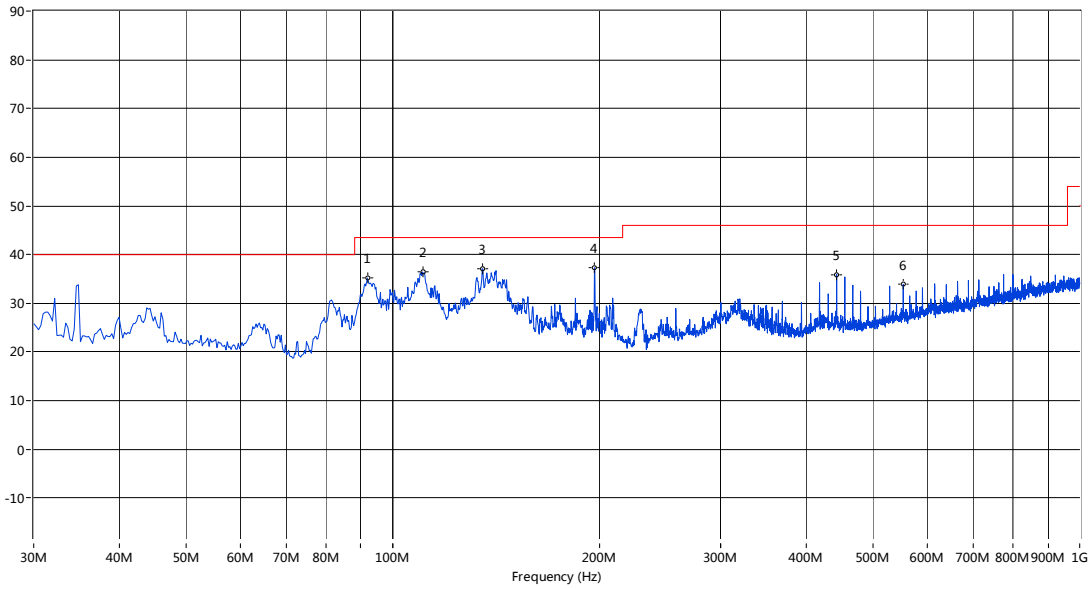
Note: The marked spikes near 2400MHz with circle should be ignored because they are Bluetooth carrier frequency.

A.1.1 9kHz – 30MHz



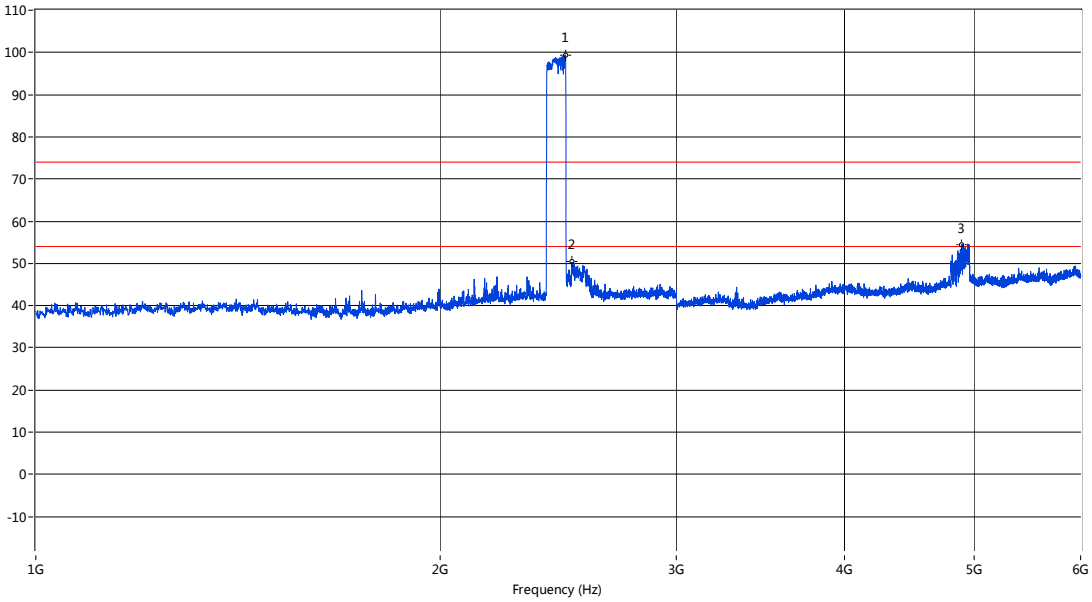
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Verdical
0.069	28.92	--	--	--	110.8	--	--	Pass
0.166	29.48	--	--	--	103.2	--	--	Pass
0.339	18.51	--	--	--	97.0	--	--	Pass

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



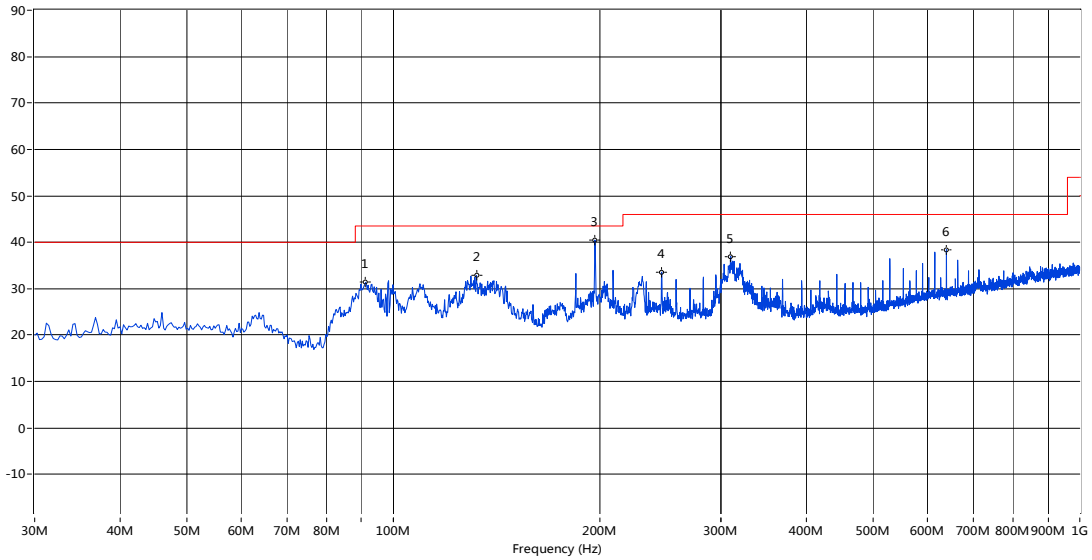
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
91.822	35.20	--	--	--	43.5	--	162.8	Vertical	Pass
110.490	36.45	--	--	--	43.5	--	21.3	Vertical	Pass
134.976	37.08	--	--	--	43.5	--	270.3	Vertical	Pass
196.798	37.34	--	--	--	43.5	--	27.8	Vertical	Pass
442.632	35.92	--	--	--	46.0	--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

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



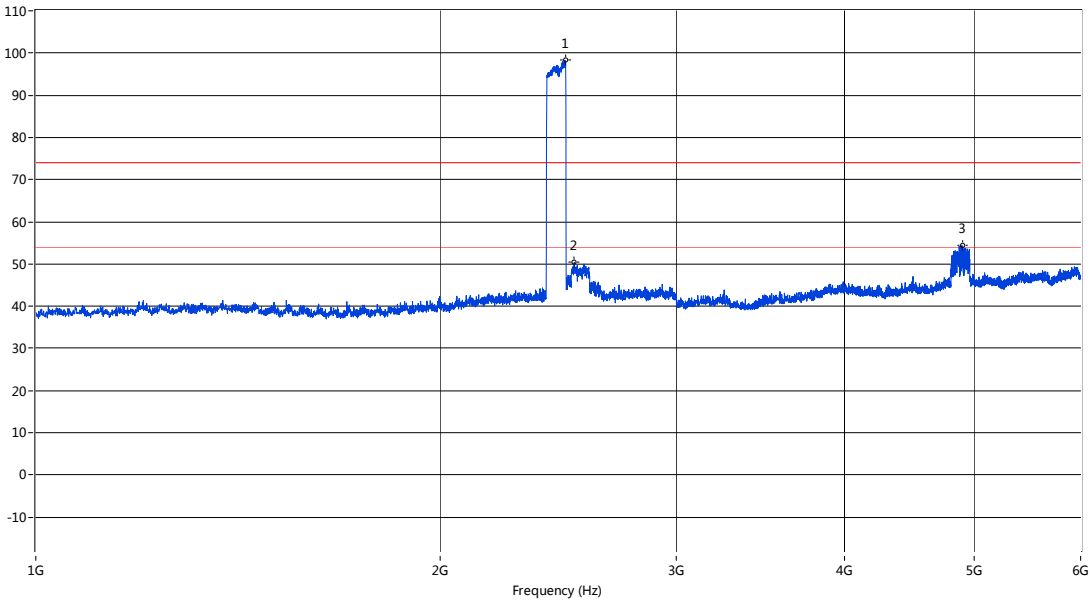
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
2478.630	99.23	--	--	--	--	--	146.1	Vertical	--
2508.123	50.37	--	--	74.0	--	54.0	317.9	Vertical	Pass
4954.011	54.44	--	46.95	74.0	--	54.0	344.5	Vertical	Pass

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

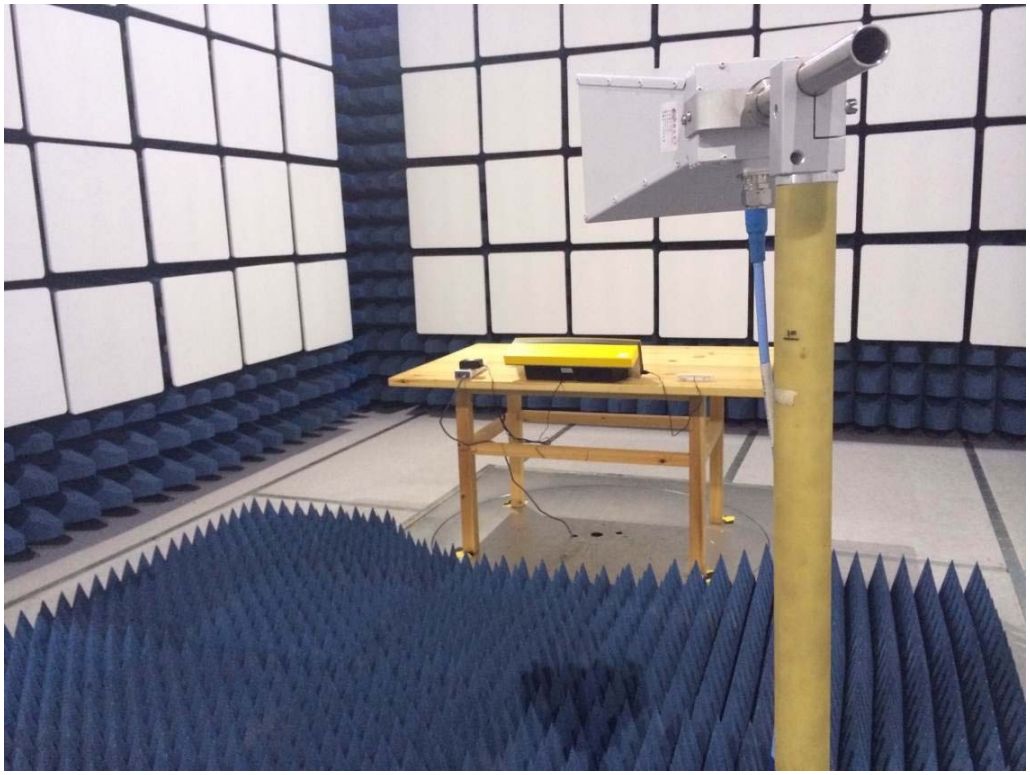
A.2.1 L Phase

A.2.2 N Phase

ANNEX B TEST SETUP PHOTOS

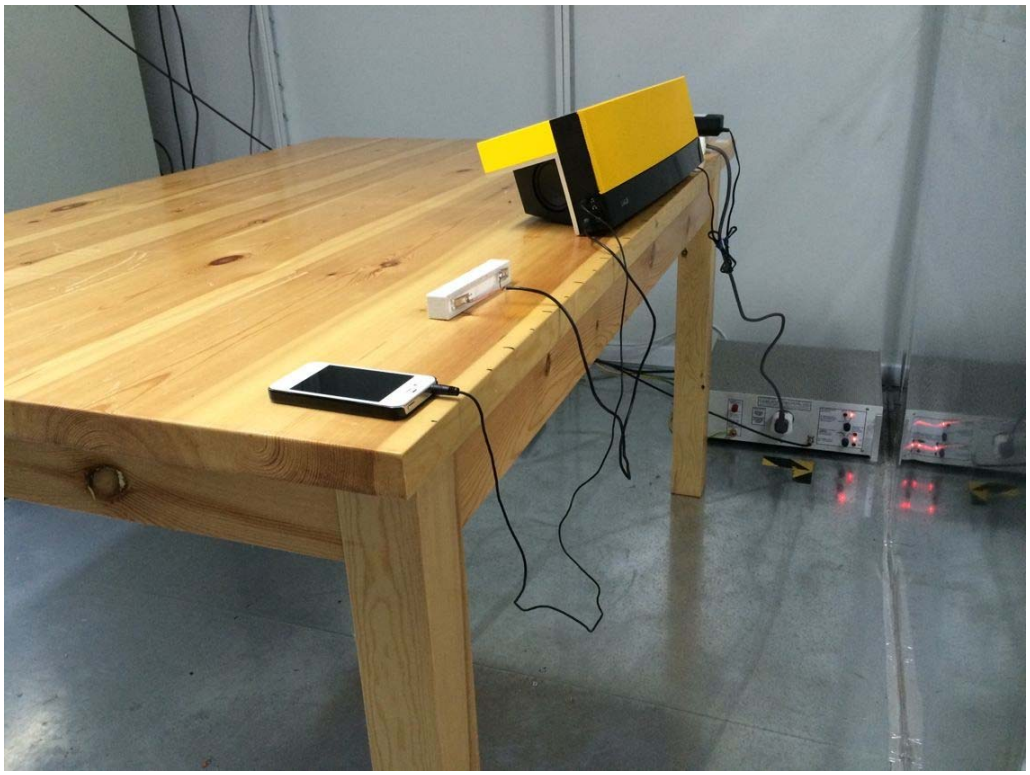
B.1 Radiated Field Strength Measurement

30MHz-1GHz



Above 1GHz

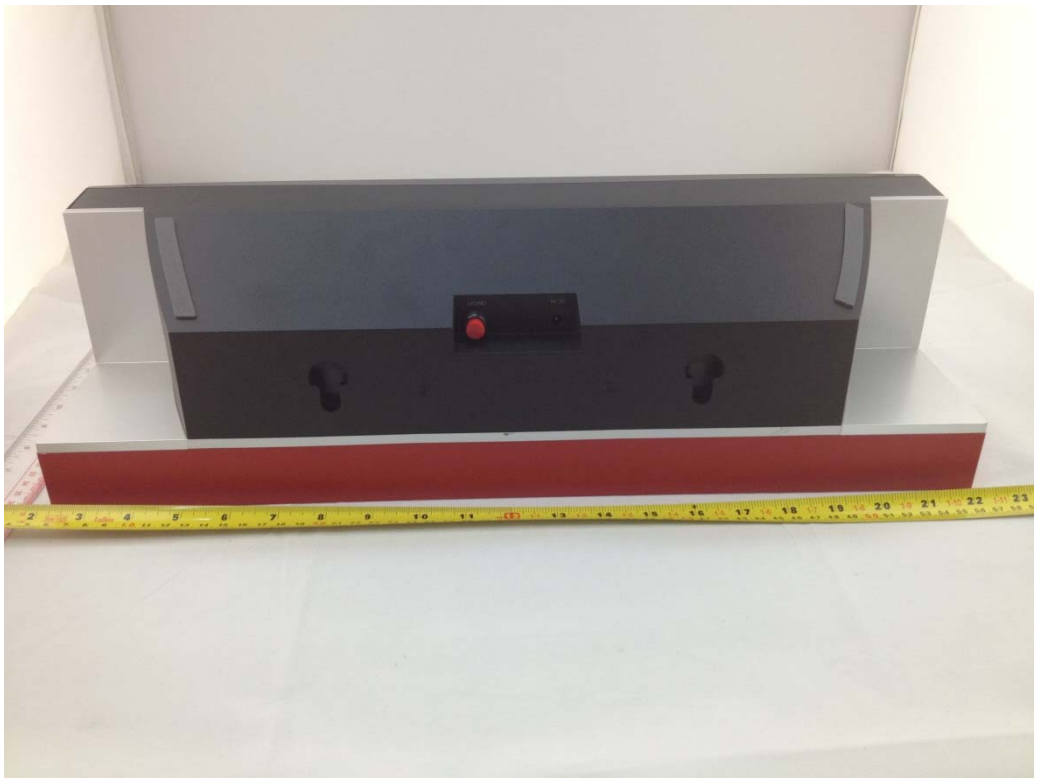
B.2 Conducted Emission



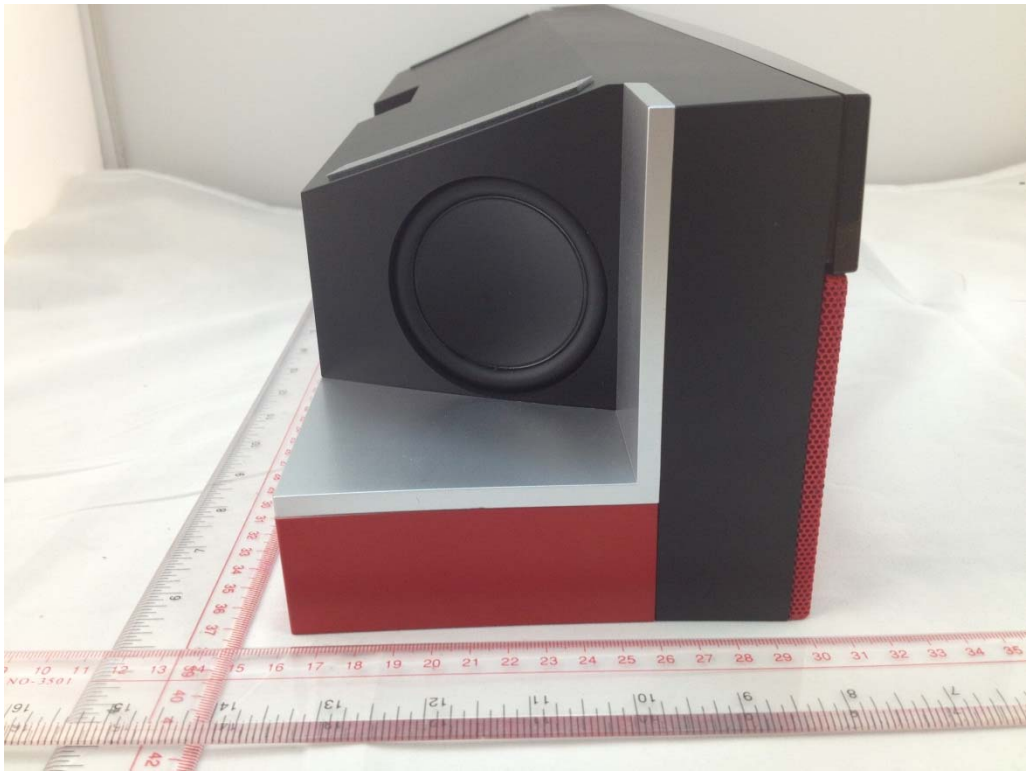
ANNEX C EUT PHOTOS

C.1 Appearance of the EUT

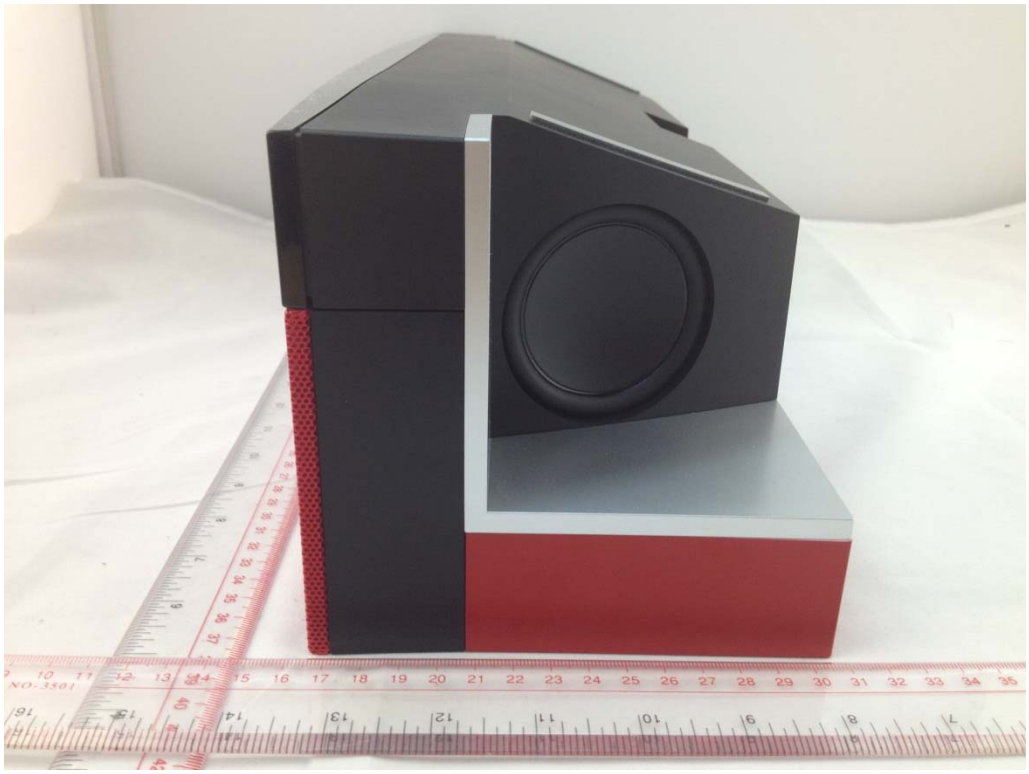
THE FRONT OF EUT



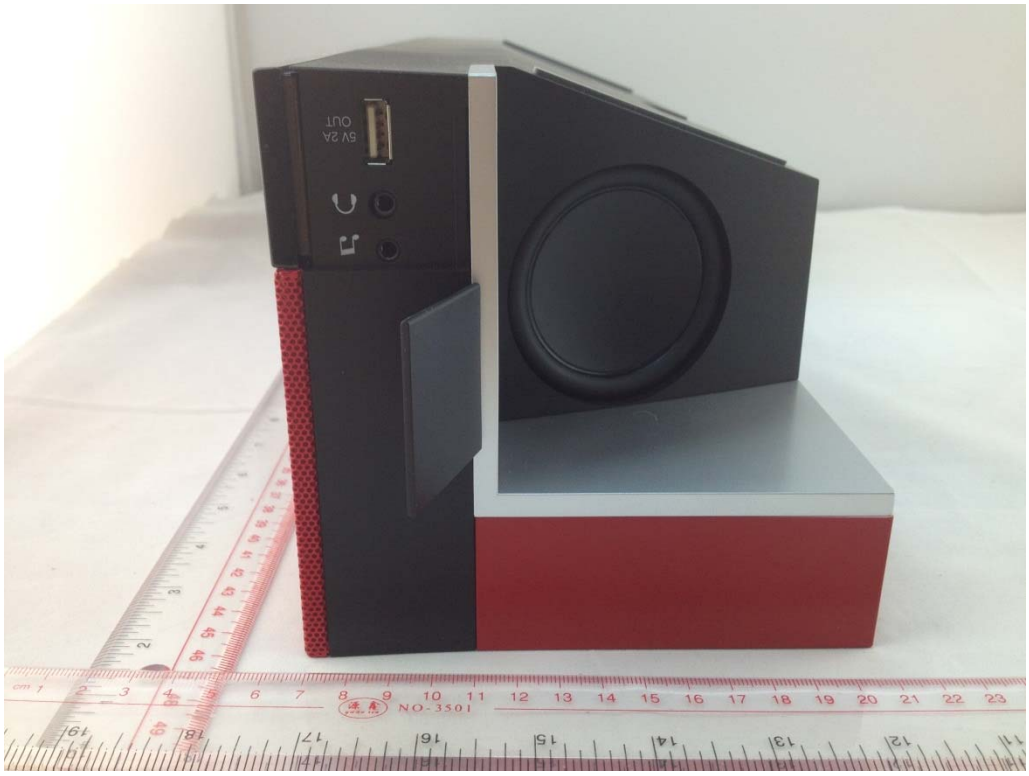
THE BACK OF EUT



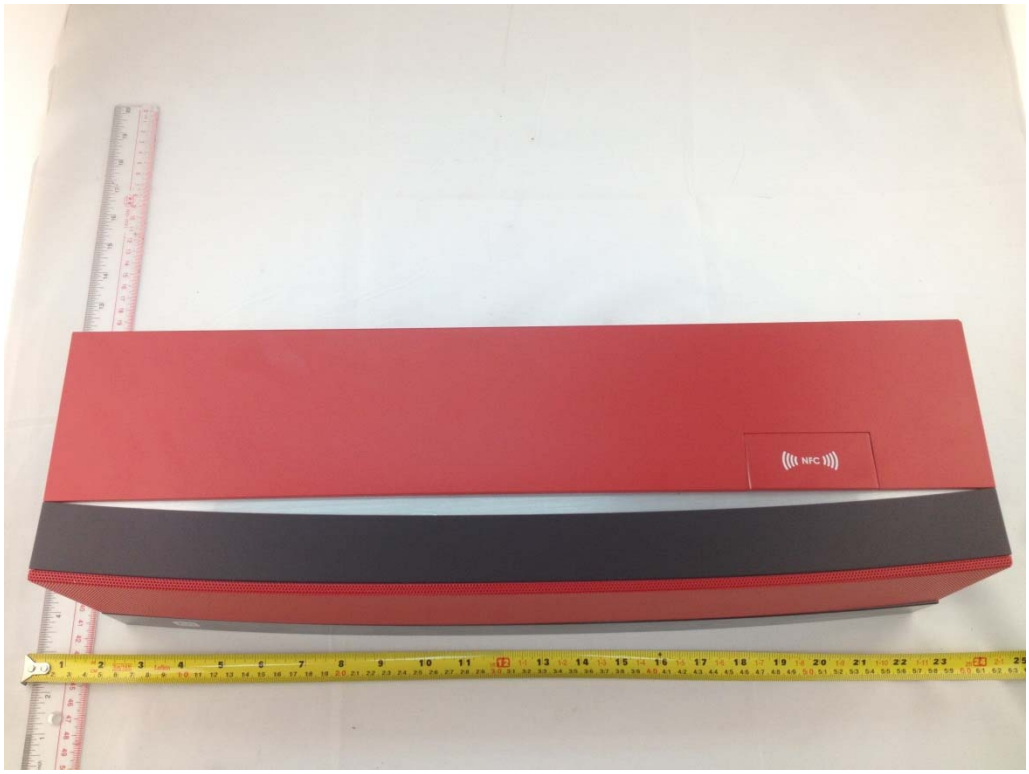
THE LEFT OF EUT



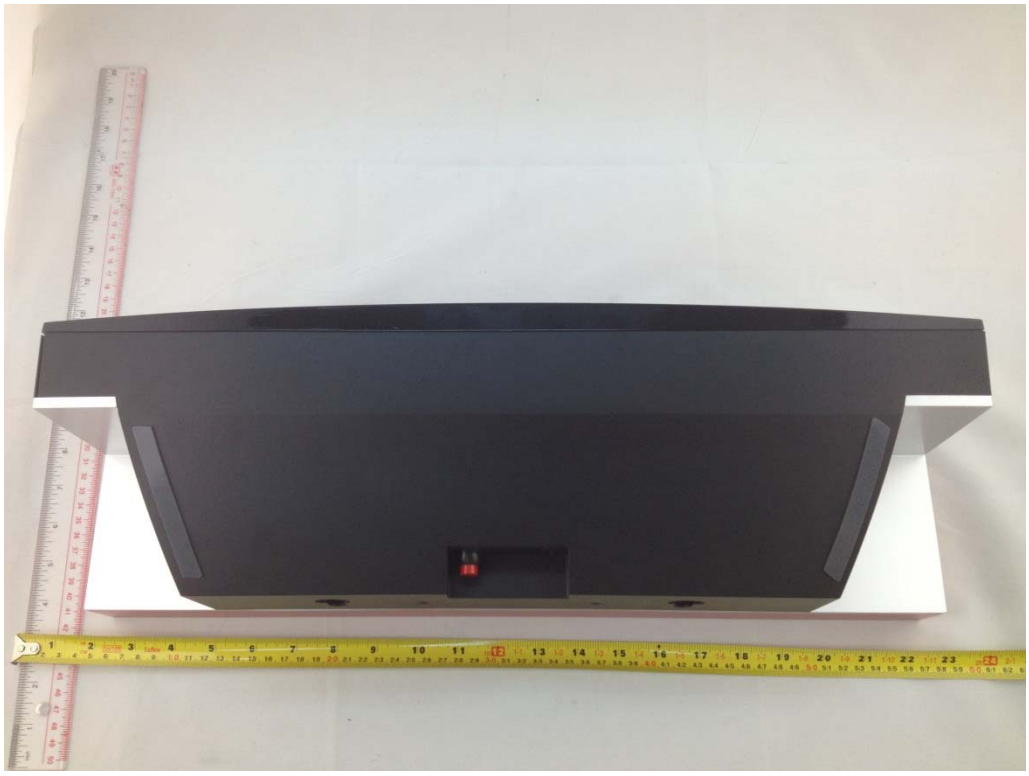
THE RIGHT OF EUT (1)



THE RIGHT OF EUT (2)



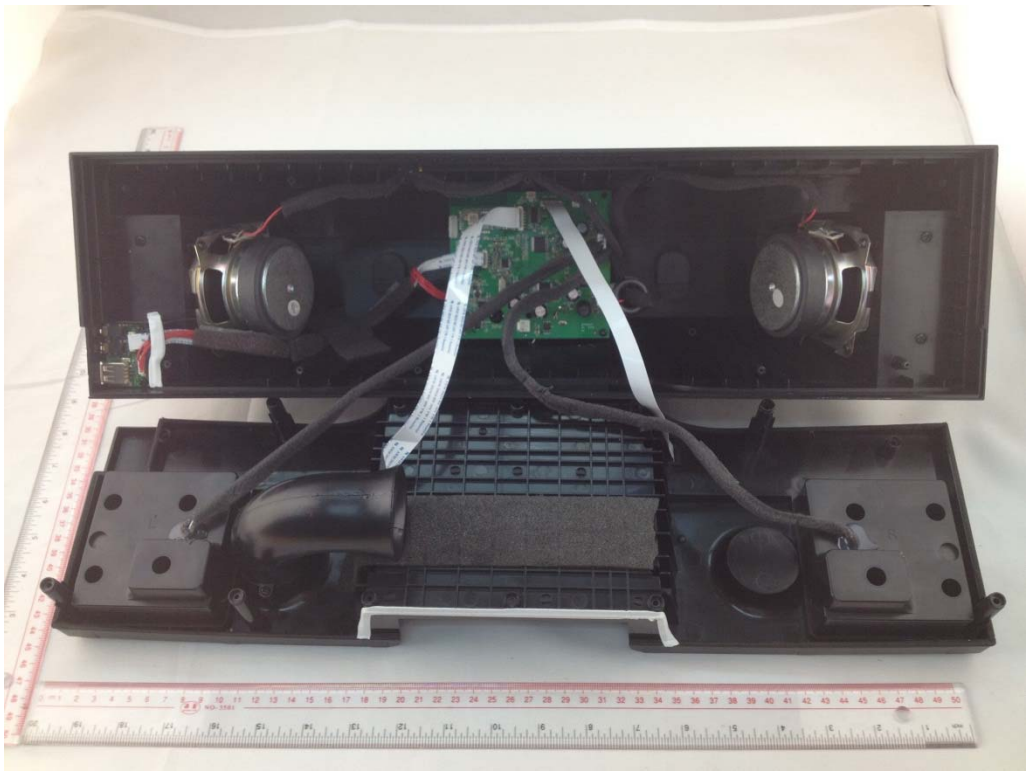
THE UP OF EUT

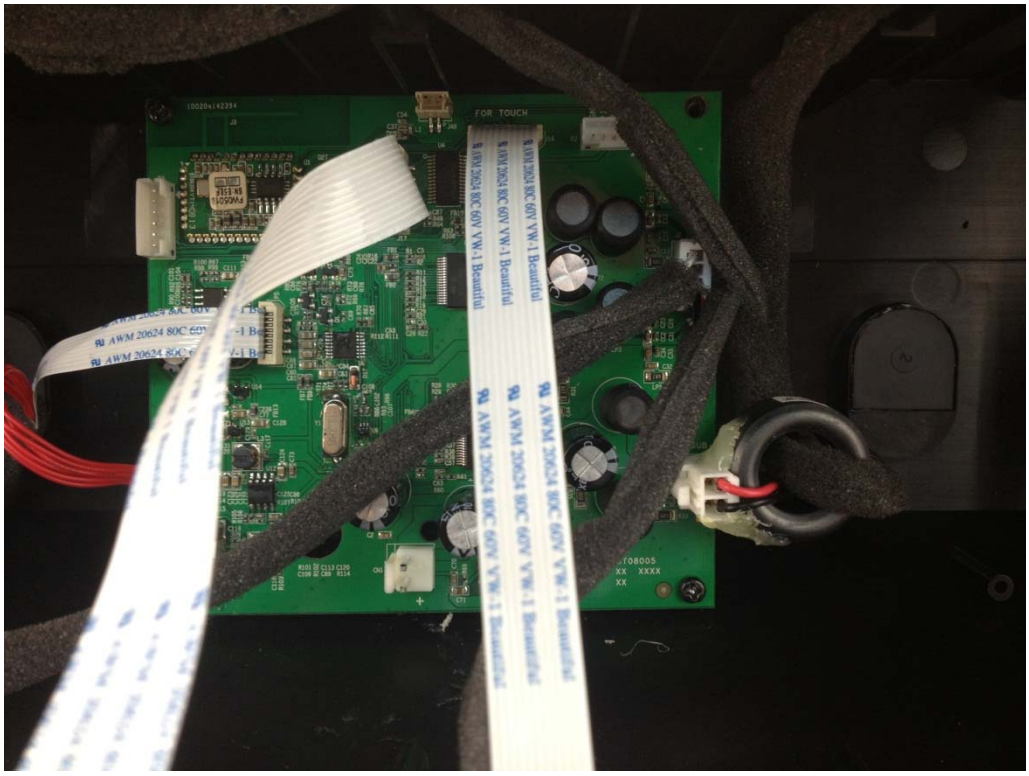


THE DOWN OF EUT

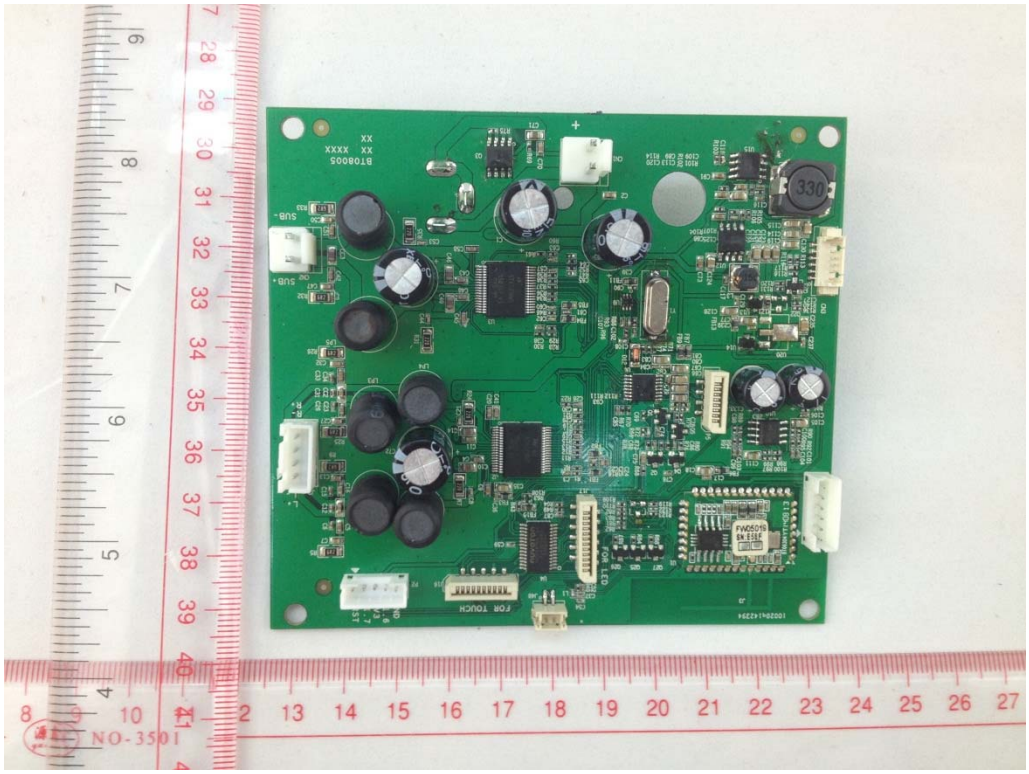
CHARGER

C.2 Inside of the EUT

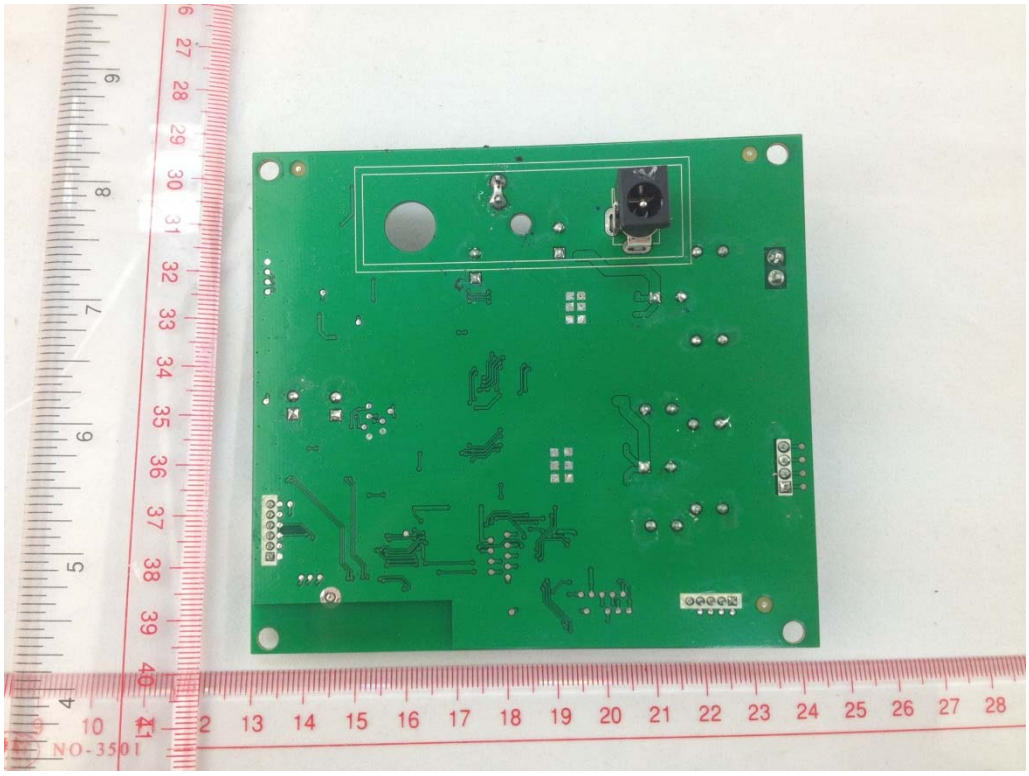




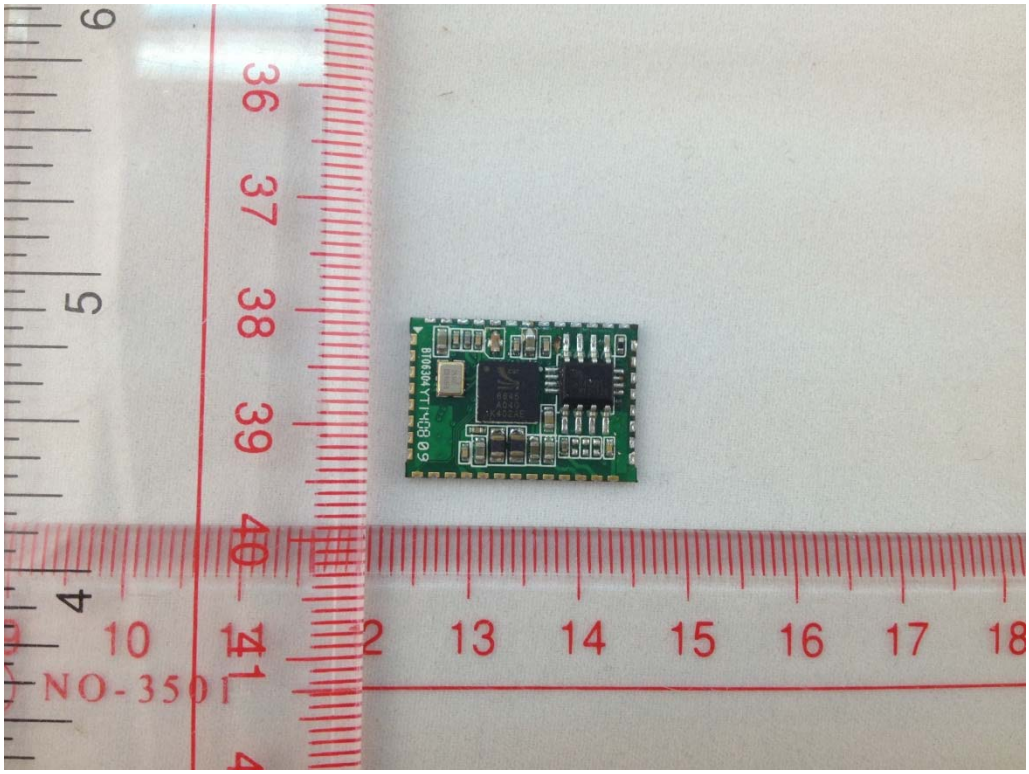
Main Board



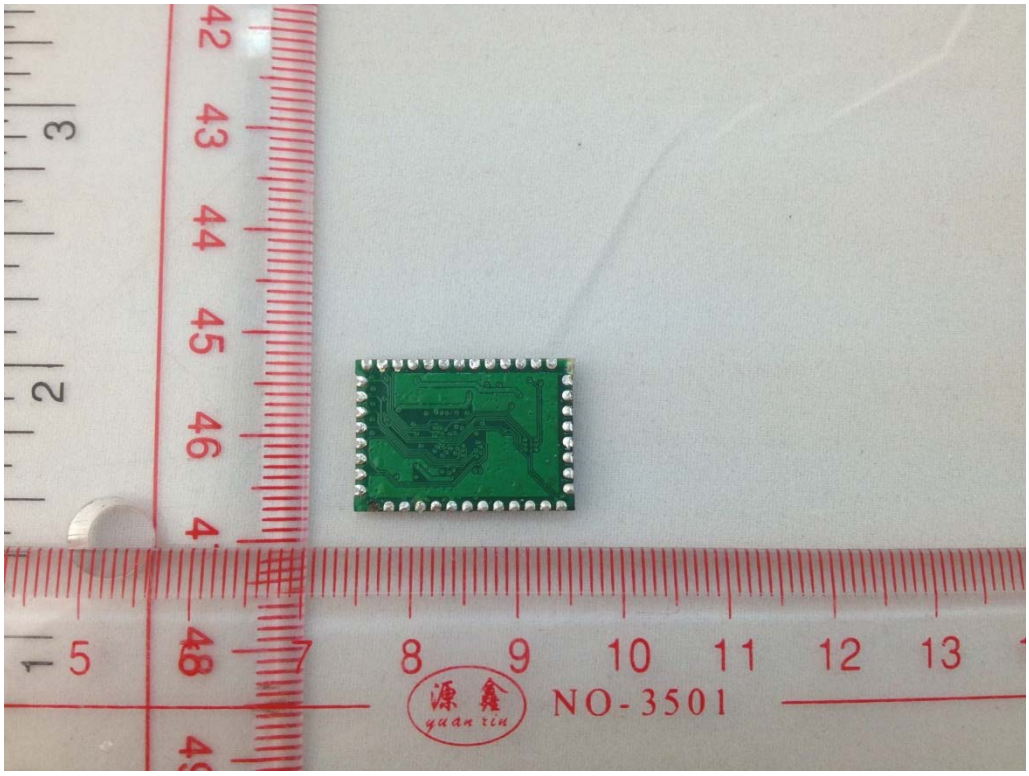
Main Board



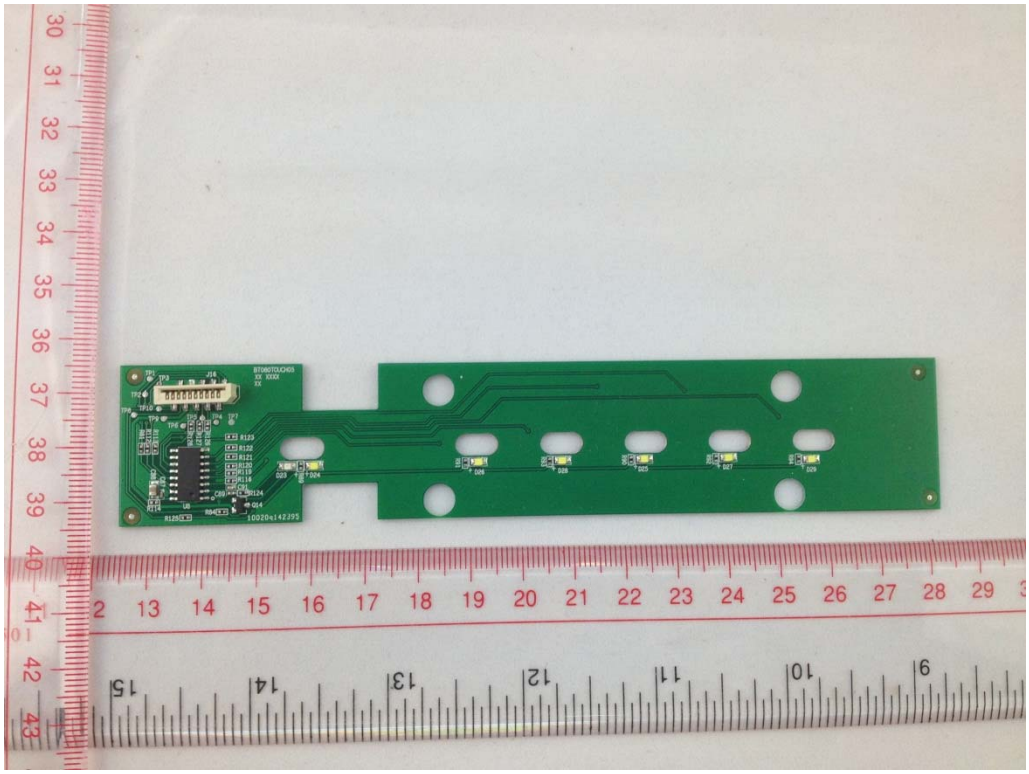
Main Board

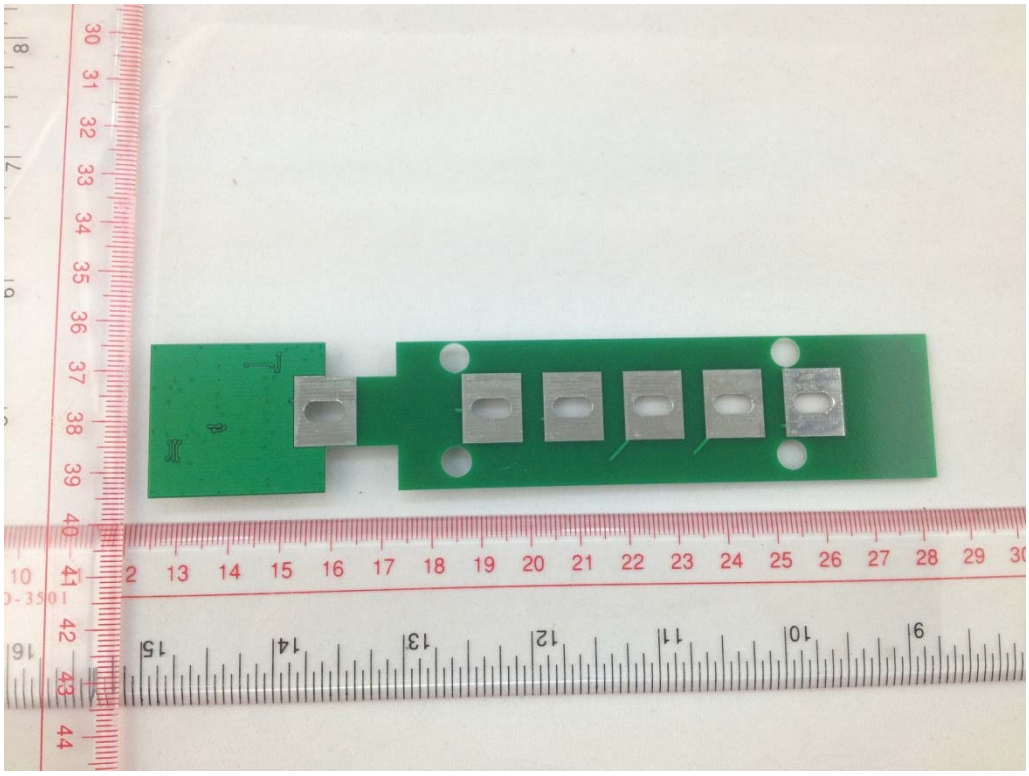


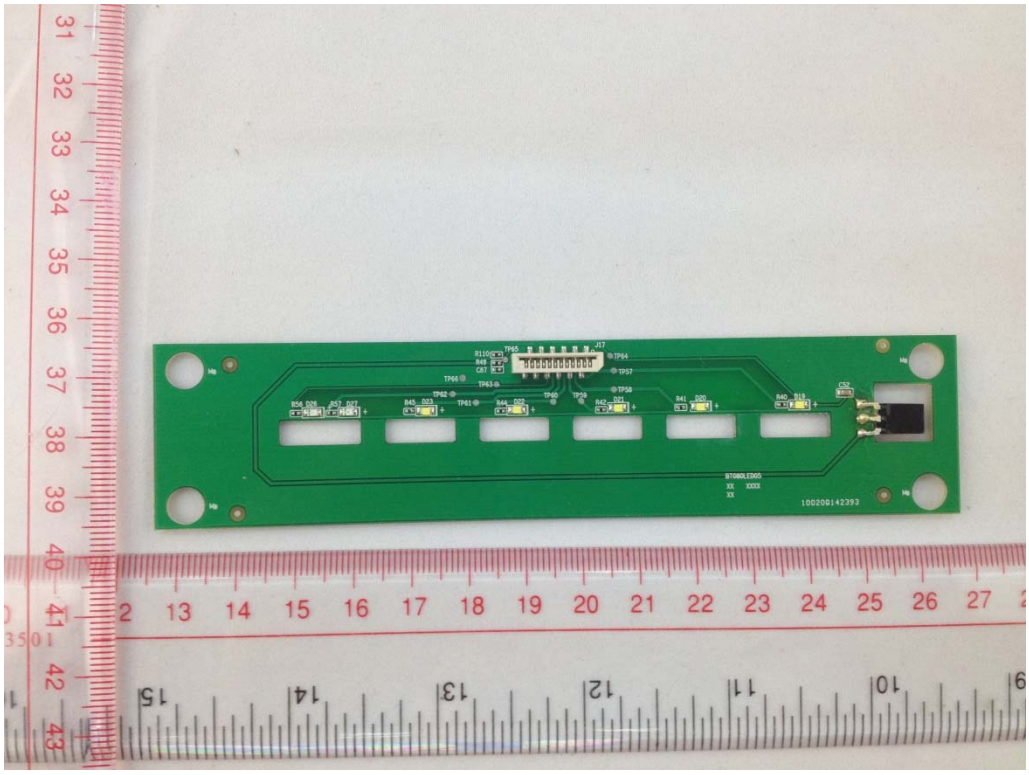
RF Board (FRONT)

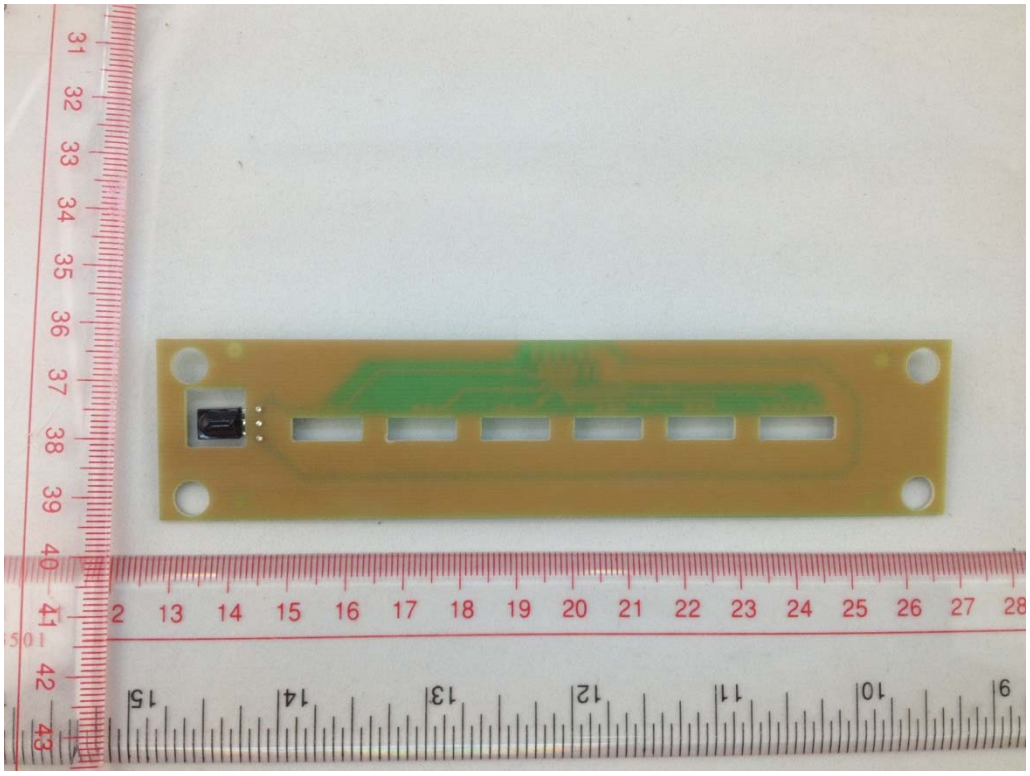


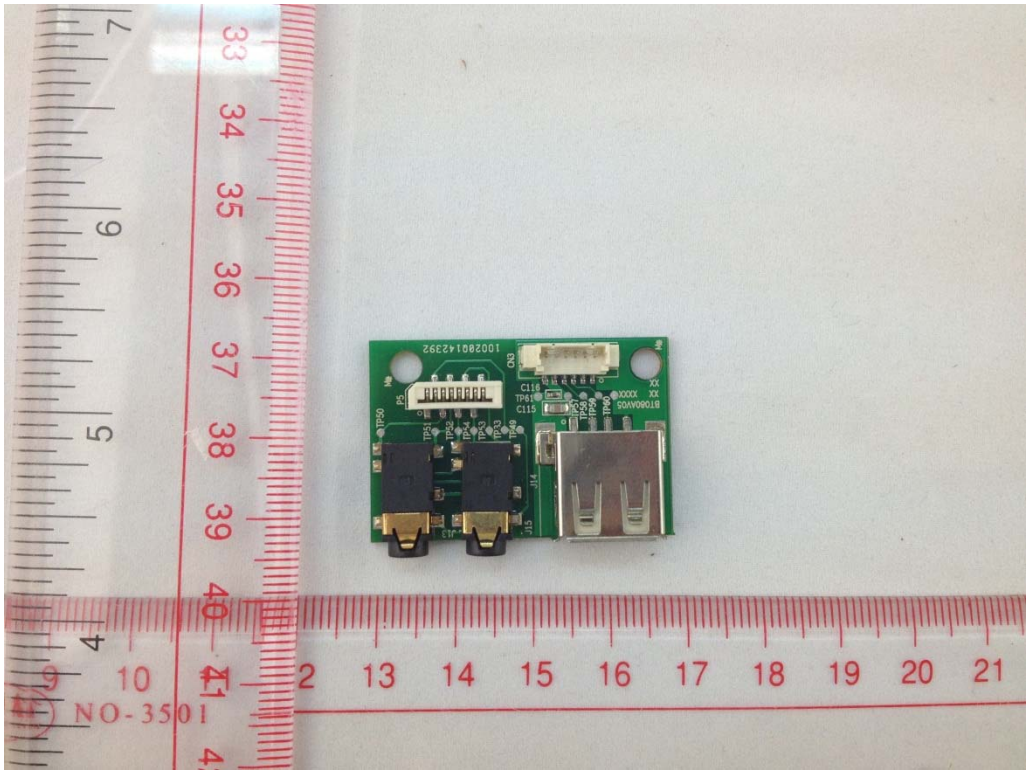
RF Board (BACK)

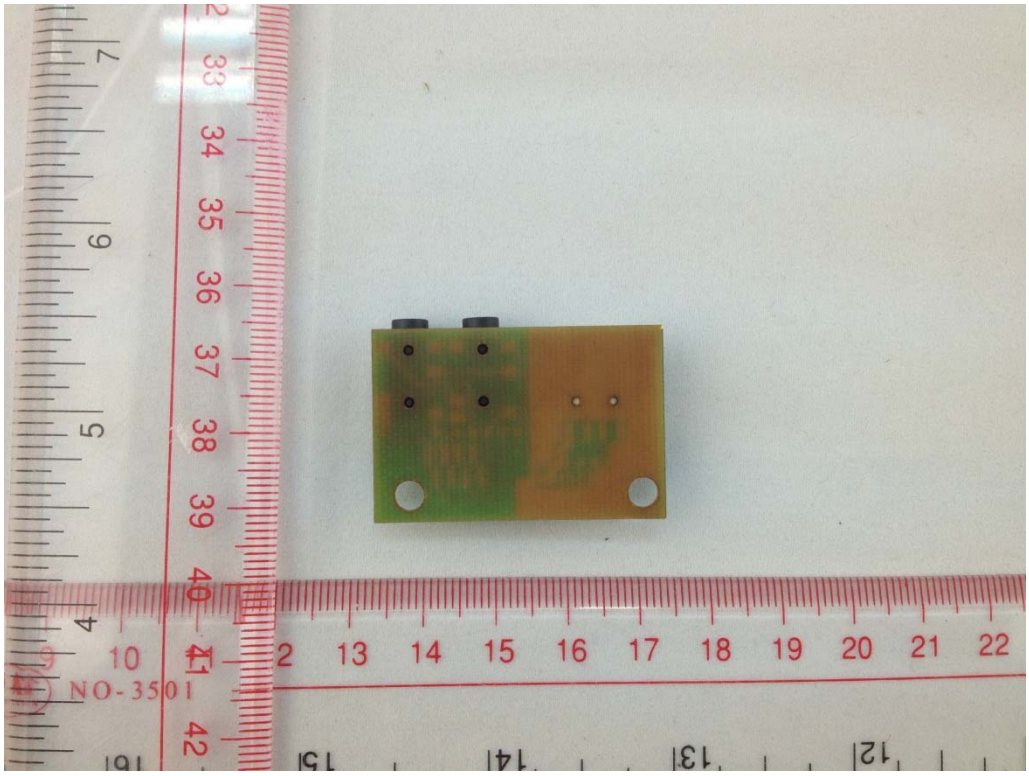












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