



EMI Test Report for FCC

CoC / Verification

Test Report No. : KES-E2-14T0033
Date of Issue : 12. 05. 2014
Description of Product : BLUETOOTH SPEAKER
Model No. : JS DR50
Variant Model : -
Applicant : SHINHAN TECHNOLOGY CO.,LTD.
Applicant's Address : 195, Wonmi-ro, Wonmi-gu, Bucheon-Shi, Gyeonggi-Do, KOREA
Manufacturer : SHINHAN TECHNOLOGY CO.,LTD.
Manufacturer's Address : 195, Wonmi-ro, Wonmi-gu, Bucheon-Shi, Gyeonggi-Do, KOREA
Standards : FCC Part 15 Subpart B
- Part 15.107(b) : Conducted Emission
- Part 15.109(b) : Radiated Emission
Date of Receipt : 11. 11. 2014
Test Date : 11. 17. 2014
Test Results : ☒ Pass ☐ Fail
The test results relate only to the items tested.

Tested by:

Young Jun, Jo
Test Engineer

Reviewed by:

Dong Hun, Jang
Technical Manager



Testing Laboratories for EMS and Safety and RF Compliance
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Revision history

Revision	Date of issue	Test report No.	Description
-	12. 05. 2014	KES-E2-14T0033	Initial

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1. General Information

1.1 Introduction

The EMI Test Report of Information Technology Equipment is prepared on behalf of named applicant in accordance with the ANSI C63.4-2009. The test results reported in this document relate only to the item that was tested.

The detailed description of the measurement facility was found to be in compliance with the requirement of Section 2.948 of the FCC Rules. The Federal Communications Commission has the reports on file and is listed under Registration Number. The scope of the accreditation covers the FCC Method - 47 CFR Part 15 or 18 of the Commission's Rules.

All measurements contained in this report were conducted in accordance with ANSI C63.4-2009. The instrumentation utilized for the measurements conforms with CISPR16 Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. Calibration checks are performed yearly on the instruments by a local calibration laboratories.

All radiated and conducted emission measurements are performed manually at KES Co., Ltd. (hereinafter referred to as "KES"), 473-29, Gayeo-ro, Yeosu-si, Gyeonggi-do, 469-803 Korea

The radiated emission measurements required by the FCC Rules were performed on 3 meter or 10 meter, Open Area Test Site, test range maintained by KES. Complete ANSI 63.4-2009 description and site attenuation measurement data records are maintained at the test facility and have been placed on file with the Federal Communications Commission. The power line conducted emission measurements were performed in a shielded enclosure also located at the same facility.

The KES EMC test facilities in Anyang-City and Yeosu-City are designated testing laboratory according to ISO/IEC 17025 by Radio Research Agency(RRA), Korea Communications Commission.

1.2 Geographic location







KES Office Latitude : 37°23'54.59"N, Longitude : 126°58'14.66"E



KES OATS Latitude : 37°13'58.03"N, Longitude : 127°37'21.95"E

1.3 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	
KOREA	KCC	EMC (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site)	 KR0100
Canada	IC	3 & 10 meter Open Area Test Sites and one conducted site	 4769B-1
Europe	TUV_SUD	EMC EN 55011, EN 55022, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 55014-1, EN 61326 EN 50130-4, EN 55024, EN 55014-2 EN 61204-3, EN 60601-1-2, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11	

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1.4 Product Description

SHINHAN TECHNOLOGY CO.,LTD., BLUETOOTH SPEAKER, Model No: JS DR50, or the "E.U.T".

Main Specifications of EUT are :

Model name	JSDR50
Power	AC 120 V / 60 Hz
I / O	Micro 5 PIN, 3.5 mm
Dimension	(75 × 87 × 135) mm
Keys	4 Keys

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1.5 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
BLUETOOTH SPEAKER	JSDR50	-	SHINHAN TECHNOLOGY.,LTD.	E.U.T
AC/DC Adapter	LCP-05001200U	-	LC POWER ELECTRONICS CO.,LTD	-

1.6 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
IPad	A1432	-	APPLE	-
				-
				-

1.7 External I/O Cabling

Description	Length (m)	Port / From	Port/To	Remarks
BLUETOOTH SPEAKER	-	- / BLUETOOTH SPEAKER	- / IPad	

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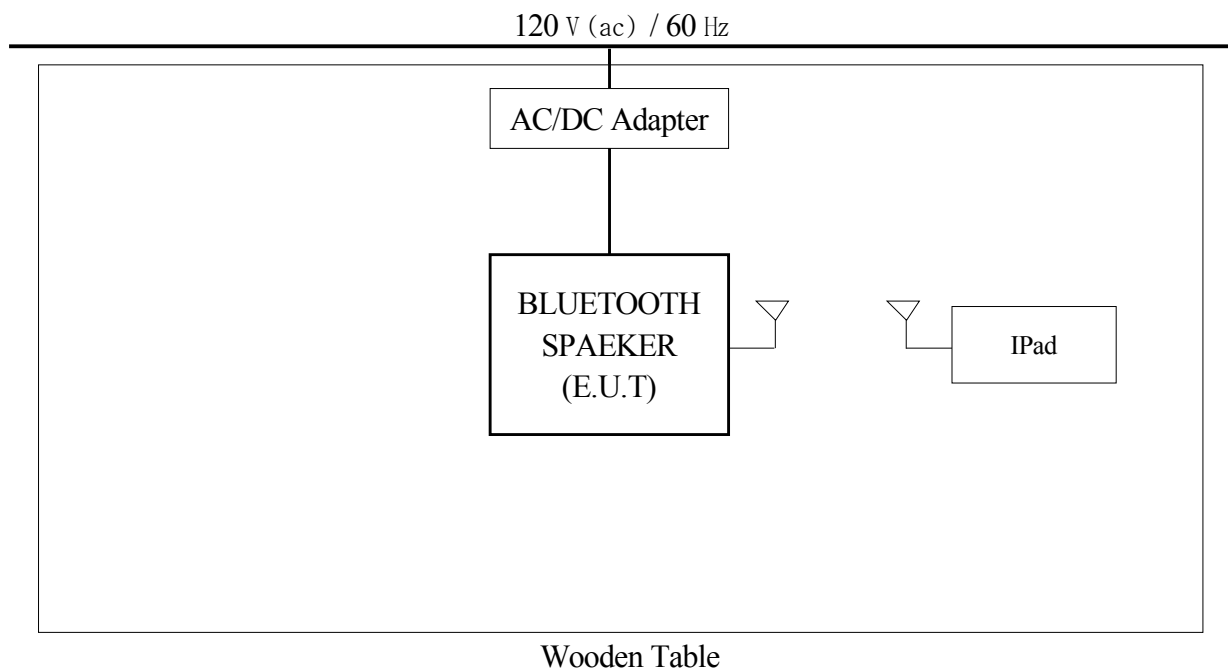
1.8 Special Accessories

As shown in section 1.10, all interface cables used for compliance testing are shielded as normally supplied or by use respective component manufacturers.

1.9 E.U.T Modifications

No modifications were made to the E.U.T in order to achieve and maintain compliance to the standards described in this report.

1.10 Configuration of Test System



1.11 Operating condition

Charging and Bluetooth Mode

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2. Summary of Tests

FCC Part Section(s)	Parameter	Test Condition	Status (note 1)
15.109(b)	Emission limits	Radiated	C
15.107(b)	Emission limits	Conducted	C

Note 1 : C=Complies N/C=Not Complies N/T=Not Tested N/A=Not Applicable

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2.1 Conducted Emission Measurements

2.1.1 Test Methods

The power line conducted emission measurements were performed in a shielded enclosure, using the setup in accordance with ANSI C63.4-2009 conducted emission measurement procedure.

2.1.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
EMI Receiver/Signal Analyzer	Narda S.T.S / PMM	PMM 9010F	020WW31006	04. 04. 2015
LISN	R&S	ENV216	101137	02. 21. 2015
Electro wave Shieldroom	SEMITEC	-	-	-

2.1.3 Test Environments

Ambient Temperatures	Relative Humidity
See the data	See the data

2.1.4 Test Limits

Frequency (MHz)	15.107 Conducted limits			
	Class B (dB μ V)		Class A (dB μ V)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.50	66.0 to 56.0	56.0 to 46.0	79.0	66.0
0.50 to 5.00	56.0	46.0	73.0	60.0
5.00 to 30.00	60.0	50.0	73.0	60.0

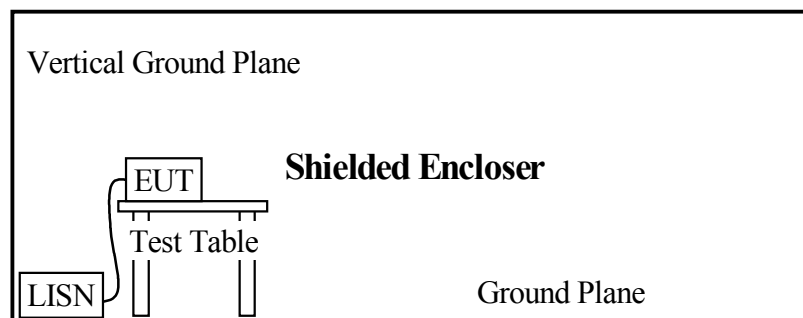
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2.1.5 Test Procedure

Conducted emission levels were measured on each current-carrying line with the EMI TEST Receiver operating in the CISPR quasi-peak mode (or peak mode if applicable). The Receiver's 6 dB bandwidth was set to 9 kHz. The initial step in collecting conducted data is a EMI TEST Receiver peak scan of the measurement range. If the conducted emission exceed the average limit with the instrument set to the quasi-peak mode, the measurements are made in the average mode. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded. Quasi-peak readings are distinguished with a "QP".

The conducted emission test was performed with the E.U.T exercise program loaded, and the emissions were scanned between 150 kHz to 30 MHz on the HOT side and NEUTRAL side, herein referred to as H and N, respectively.

2.1.6 Test Configuration



2.1.7 Test Results

According to the data in section 2.1.8, the E.U.T complied with the FCC 15.107 limits.



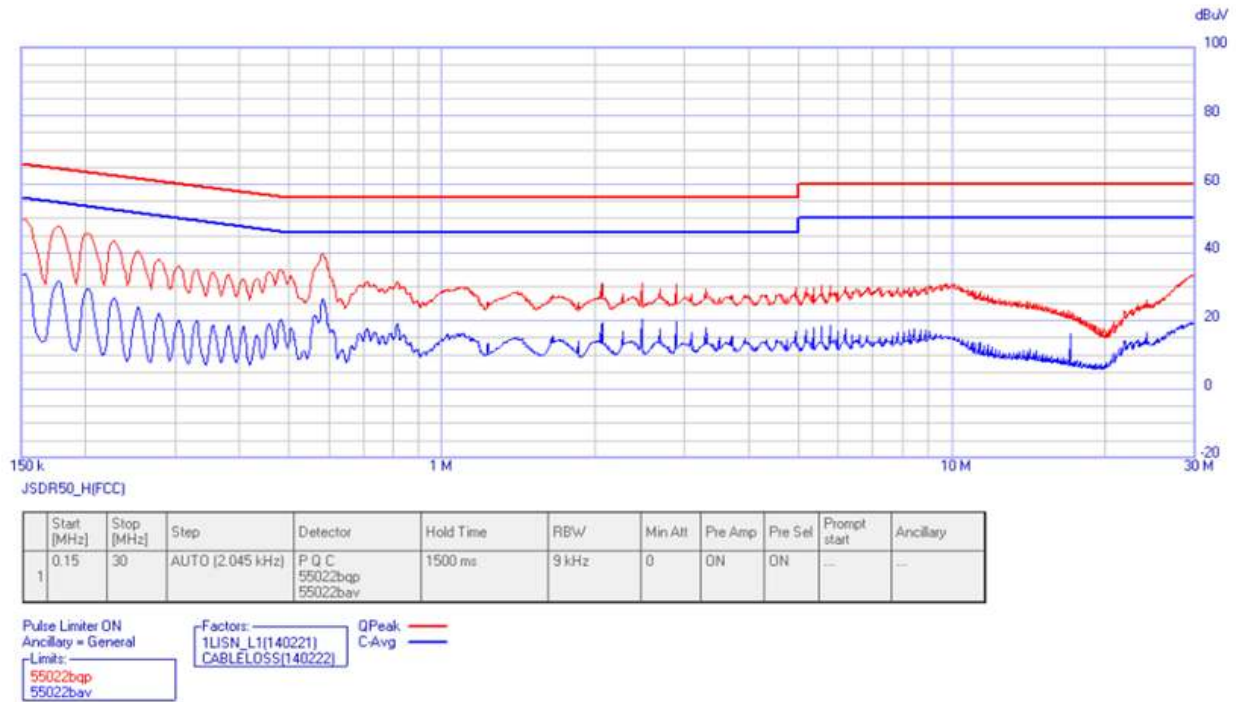
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2.1.8 Test Data

Temperature: 18.9 °C Humidity: 37.3 % R.H. Test Date: 11. 17. 2014 Tested by: Young Jun, Jo
Polarization: HOT



Frequency [MHz]	QPeak [dBuV]	Limit [dBuV]	Margin [dB]	C-Avg [dBuV]	Limit [dBuV]	Margin [dB]	Factor (LISN) [dB]	Factor (CABLELOSS) [dB]
0.152	49.650	65.890	-16.240	33.790	55.890	-22.100	9.660	0.010
0.154	48.880	65.780	-16.900	32.260	55.780	-23.520	9.660	0.010
0.177	47.700	64.640	-16.940	31.600	54.640	-23.040	9.650	0.020
0.201	45.670	63.560	-17.890	29.150	53.560	-24.410	9.650	0.010
0.228	43.300	62.530	-19.230	26.790	52.530	-25.740	9.650	0.020
0.506	33.110	56.000	-22.890	17.360	46.000	-28.640	9.650	0.030
0.508	33.110	56.000	-22.890	17.360	46.000	-28.640	9.650	0.030
0.584	39.520	56.000	-16.480	26.210	46.000	-19.790	9.650	0.040
0.586	39.520	56.000	-16.480	26.210	46.000	-19.790	9.650	0.040
0.819	31.530	56.000	-24.470	19.100	46.000	-26.900	9.650	0.040
0.821	31.530	56.000	-24.470	19.100	46.000	-26.900	9.650	0.040
2.469	31.220	56.000	-24.780	20.450	46.000	-25.550	9.650	0.130

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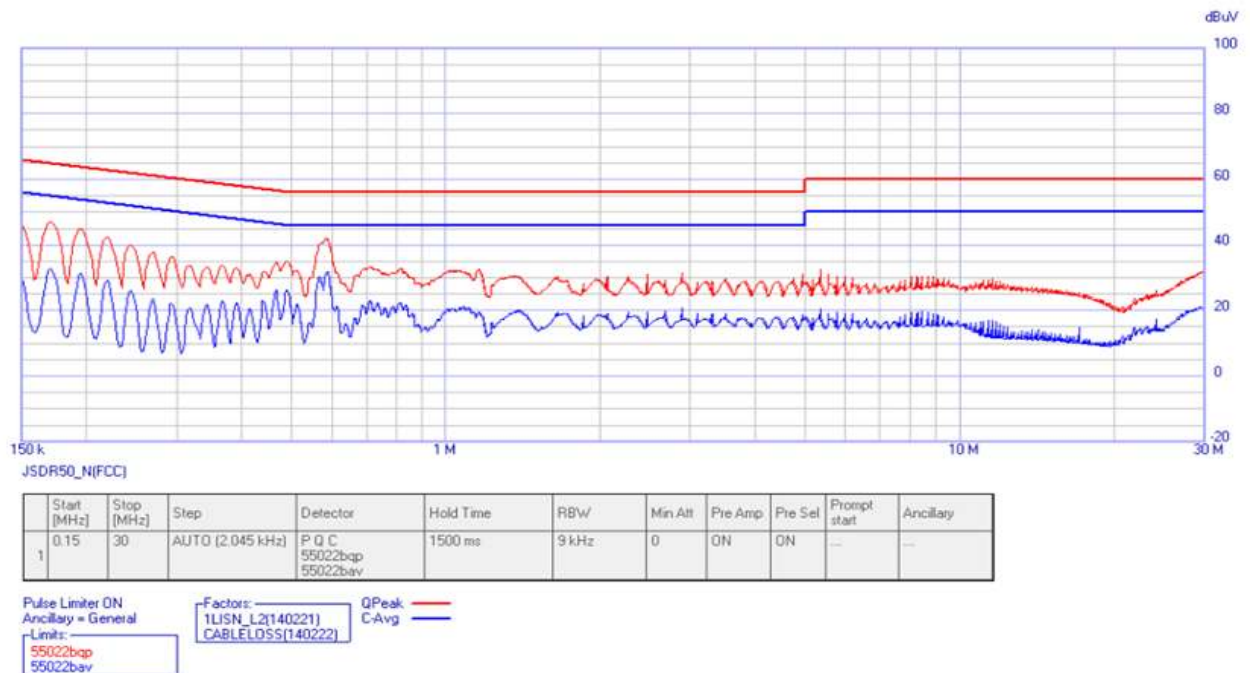


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Polarization: NEUTRAL



Frequency [MHz]	QPeak [dBuV]	Limit [dBuV]	Margin [dB]	C-Avg [dBuV]	Limit [dBuV]	Margin [dB]	Factor (LISN) [dB]	Factor (CABLELOSS) [dB]
0.150	46.210	66.000	-19.790	30.080	56.000	-25.920	9.660	0.010
0.154	40.370	65.780	-25.410	17.690	55.780	-38.090	9.660	0.010
0.170	47.020	64.940	-17.920	32.690	54.940	-22.250	9.660	0.020
0.195	44.990	63.820	-18.830	31.320	53.820	-22.500	9.660	0.010
0.220	42.360	62.840	-20.480	29.260	52.840	-23.580	9.660	0.010
0.586	42.070	56.000	-13.930	31.100	46.000	-14.900	9.650	0.040
0.714	33.200	56.000	-22.800	22.780	46.000	-23.220	9.650	0.050
1.164	32.490	56.000	-23.510	19.330	46.000	-26.670	9.650	0.060
5.348	32.400	60.000	-27.600	20.520	50.000	-29.480	9.670	0.200

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2.2 Radiated Emission Measurements

2.2.1 Test Methods

The radiated emission measurements were performed in Open Area Test Site (OATS). using the setup in accordance with ANSI C63.4-2009 radiated emission measurement procedure.

2.2.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
EMI TEST Receiver	R&S	ESVS10	826008/014	04. 04. 2015
Trilog-Broadband ANT	Schwarzbeck	VULB 9168	9168-385	05. 09. 2015
EMC Analyzer	R&S	ESR7	101190	08. 16. 2014
PREAMPLIFIER	H.P	8449B	3008A00538	07. 23. 2015
DOUBLE RIDGED HORN ANTENNA	A.H.SYSTEM,INC	SAS-571	781	05. 13. 2015
OATS	KES	-	-	-
Antenna Mast	DAEIL EMC	-	-	-
Turn Table	DAEIL EMC	-	-	-

2.2.3 Test Environments

Ambient Temperatures	Relative Humidity
see the data	see the data

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2.2.4 Test Limits

Frequency (MHz)	15.109 Radiated emission limits			
	Class B @ 3 m		Class A @ 10 m	
	(dB μ V/m)	(μ V/m)	(dB μ V/m)	(μ V/m)
30 to 88	40.0	100	39.0	90
88 to 216	43.5	150	43.5	150
216 to 960	46.0	200	46.5	210
above 960	54.0	500	49.5	300

Frequency (MHz)	15.109 Radiated emission limits			
	Class B @ 3 m (dB μ V/m)		Class A @ 3 m (dB μ V/m)	
	PK	AV	PK	AV
above 1 000	74	54	80	60

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2.2.5 Test Procedure

Before final measurements of radiated emission were made at the OATS, the E.U.T was scanned in semi-anechoic chamber in order to determine its emission spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the E.U.T's emission in amplitude, direction and frequency. This process was repeated during final radiated emission measurements at the OATS range, at each frequency, in order to ensure that maximum emissions amplitudes were attained.

The radiated emission test was performed with E.U.T exercise program loaded, and the emissions were scanned between 30 MHz to 1 000 MHz using a R&S ESVS10 EMI TEST Receiver and 1 000 MHz to 6 000 MHz using a ESR7 EMC ANALYZER. The EMI TEST Receiver's 6 dB bandwidth was set to 120 kHz and 1 MHz, and EMI TEST Receiver was operated in the CISPR quasi-peak detection mode.

At each frequency, the E.U.T was rotated 360 degrees, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum emission levels. Measurements were taken using both HORIZONTAL and VERTICAL antenna polarization, herein referred to as H and V, respectively.

- above 1 GHz : Antenna height is fixed to 1.00 m

2.2.6 Field Strength Calculation

F.S = Field Strength

M.R = Meter Reading

A.F = Antenna Factor

C.L = Cable Loss

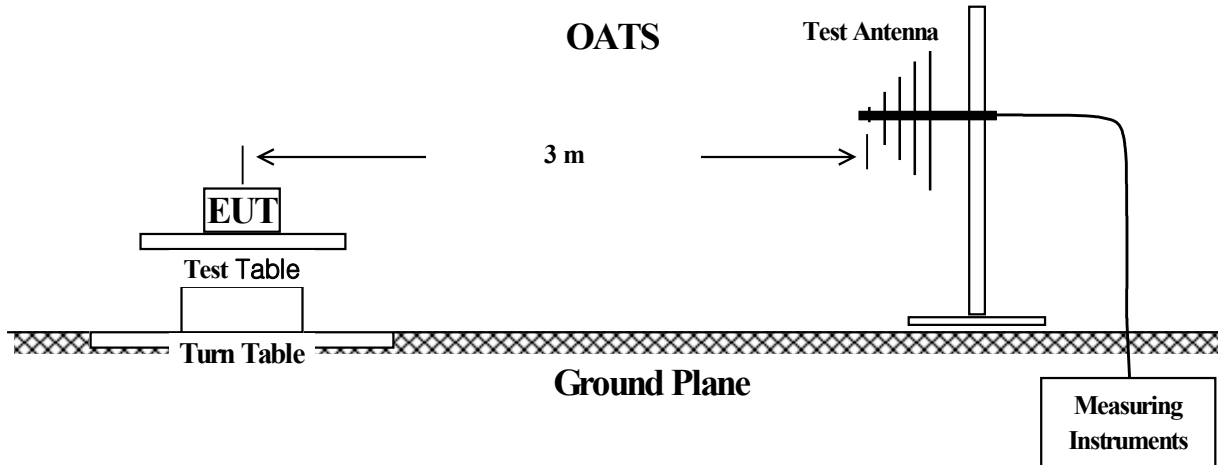
A.G= Amplifier Gain

* Below 1 GHz : $F.S(dB\mu V/m) = M.R(dB\mu V) + [A.F(dB/m) + C.L(dB)]$

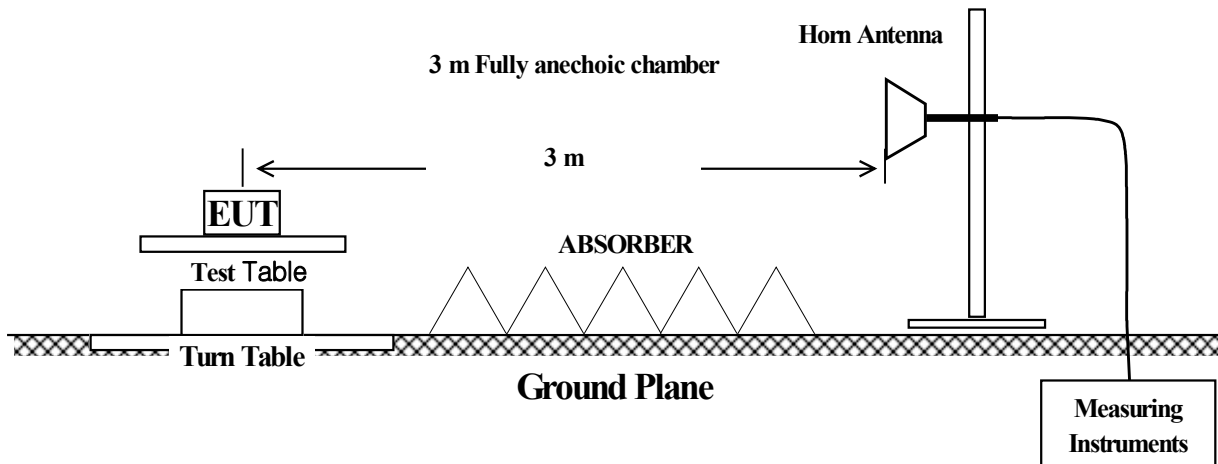
* Above 1 GHz : $F.S(dB\mu V/m) = M.R(dB\mu V) + [A.F(dB/m) + C.L(dB)] - A.G(dB)$

2.2.7 Test Configuration

* Below 1 GHz



* Above 1 GHz



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2.2.8 Test Results

Below 1 GHz : According to the data in section 2.2.9, the E.U.T complied with the FCC 15.109 limits.

Above 1 GHz : According to the data in section 2.2.10, the E.U.T complied with the FCC 15.109 limits.

2.2.9 Test Data*** Below 1 GHz**

Temperature: 10.0 °C Humidity: 40 % R.H. Test Date: 11. 17. 2014 Tested by: Young Jun, Jo

Indicated		Antenna		Correction Factor		Results	Class B Limit	Margin
Frequency (MHz)	Reading Value (dB μ V/m)	Polar. (H/V)	Height (m)	Ant. (dB)	Cable (dB)	(dB μ V/m)	(dB μ V/m)	(dB)
32.394	11.800	V	1.170	12.750	0.950	25.500	40.000	14.500
44.523	9.600	V	1.540	13.510	1.110	24.220	40.000	15.780
61.306	6.000	H	3.610	12.930	1.430	20.360	40.000	19.640
184.364	8.000	H	3.890	11.310	2.880	22.190	43.500	21.310
192.536	10.600	V	1.250	10.560	2.980	24.140	43.500	19.360
339.421	6.400	V	2.310	14.260	4.320	24.980	46.000	21.020
344.201	6.900	H	2.950	14.360	4.360	25.620	46.000	20.380
352.611	7.900	V	1.230	14.550	4.440	26.890	46.000	19.110

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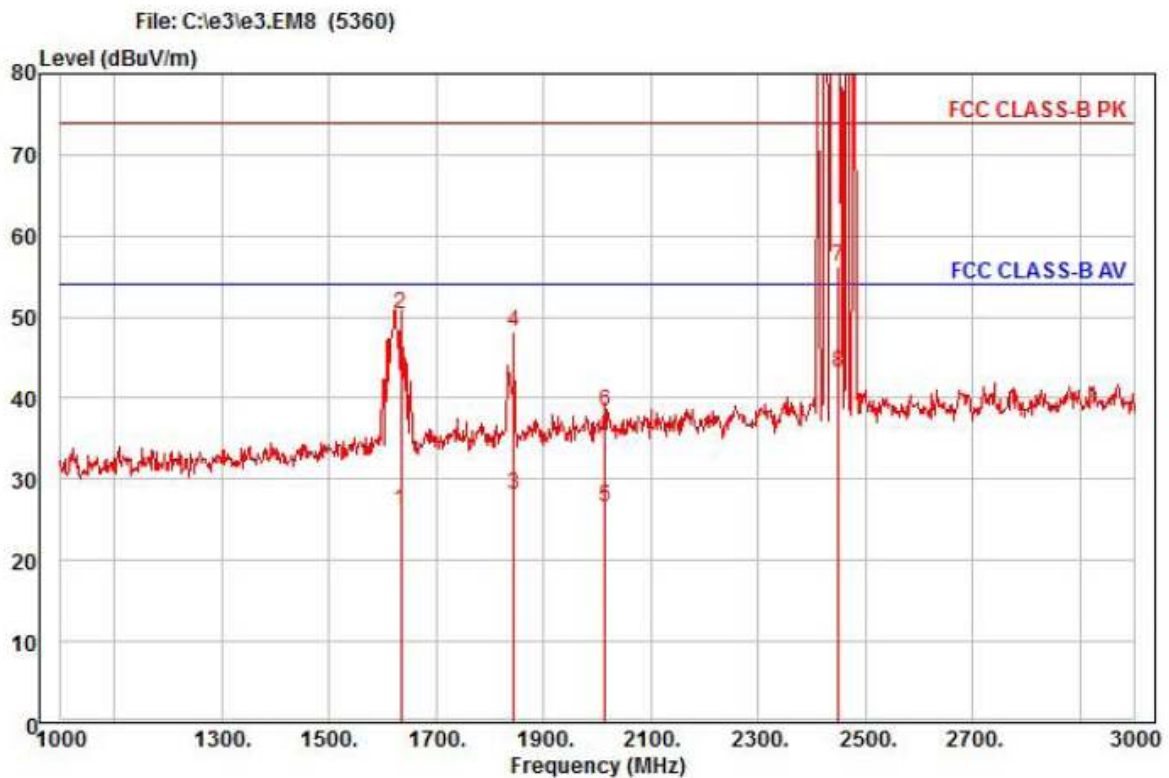
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* Above 1 GHz

Temperature: 18.9 °C Humidity: 37.3 % R.H. Test Date: 11. 17. 2014 Tested by: Young Jun, Jo

2.2.10 Test Graph

Polarization: HORIZONTAL



Site : chamber
Condition: FCC CLASS-B PK 3m HORN ANT (2014.03.10) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Product :
EUT : JS DR50
Mode : FCC
Memo : 1 - 3 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamplifier Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1634.00	28.12	25.87	7.41	35.14	168	54.00	-27.74	horizontal	Average
2 pk	1634.00	52.25	25.87	7.41	35.14	168	74.00	-23.61	horizontal	Peak
3	1844.00	27.91	27.20	7.82	34.79	311	54.00	-25.86	horizontal	Average
4	1844.00	47.94	27.20	7.82	34.79	311	74.00	-25.83	horizontal	Peak
5	2014.00	24.73	28.22	8.15	34.52	273	54.00	-27.42	horizontal	Average
6	2014.00	36.52	28.22	8.15	34.52	273	74.00	-35.63	horizontal	Peak
7 pp	2450.00	52.42	29.15	8.98	34.22	192	54.00	2.33	horizontal	Average
8	2450.00	39.16	29.15	8.98	34.22	192	74.00	-30.93	horizontal	Peak

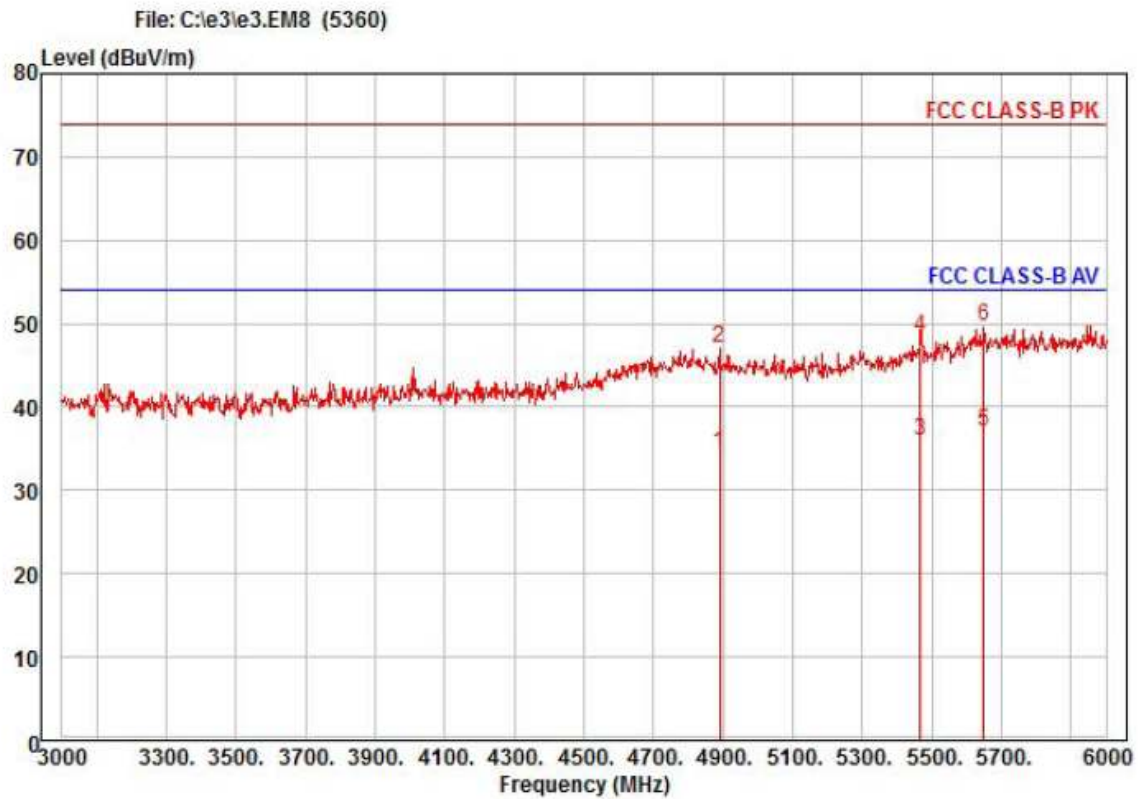
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Site : chamber
Condition: FCC CLASS-B PK 3m HORN ANT (2014.03.10) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Product :
EUT : JSDR50
Mode : FCC
Memo : 3 - 6 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamplifier Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	4890.00	20.30	33.36	14.15	33.40	286	54.00	-19.59	horizontal	Average
2	4890.00	33.07	33.36	14.15	33.40	286	74.00	-26.82	horizontal	Peak
3	5466.00	20.21	33.70	15.23	33.28	149	54.00	-18.14	horizontal	Average
4	5466.00	32.74	33.70	15.23	33.28	149	74.00	-25.61	horizontal	Peak
5 pp	5649.00	20.79	34.17	15.41	33.30	302	54.00	-16.93	horizontal	Average
6 pk	5649.00	33.34	34.17	15.41	33.30	302	74.00	-24.38	horizontal	Peak

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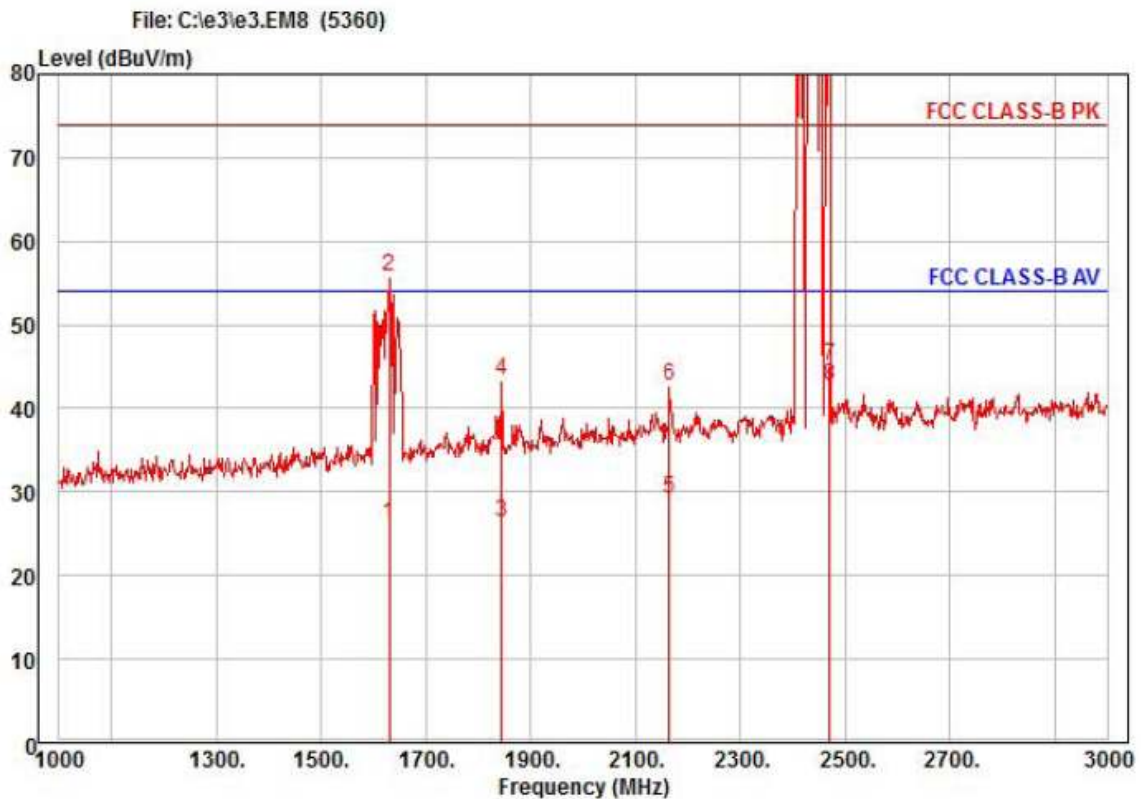


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Test report No.:
KES-E2-14T0033
Page (22) of (34)

Polarization: VERTICAL



Site : chamber
Condition: FCC CLASS-B PK 3m HORN ANT (2014.03.10) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Product :
EUT : JSDR50
Mode : FCC
Memo : 1 - 3 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1630.00	28.11	25.84	7.40	35.15	180	54.00	-27.80	vertical	Average
2 pk	1630.00	57.82	25.84	7.40	35.15	180	74.00	-18.09	vertical	Peak
3	1844.00	26.13	27.20	7.82	34.79	338	54.00	-27.64	vertical	Average
4	1844.00	43.13	27.20	7.82	34.79	338	74.00	-30.64	vertical	Peak
5	2164.00	26.57	28.54	8.42	34.42	267	54.00	-24.89	vertical	Average
6	2164.00	40.08	28.54	8.42	34.42	267	74.00	-31.38	vertical	Peak
7 pp	2470.00	41.18	29.20	9.04	34.21	175	54.00	-8.79	vertical	Average
8	2470.00	38.64	29.20	9.04	34.21	175	74.00	-31.33	vertical	Peak

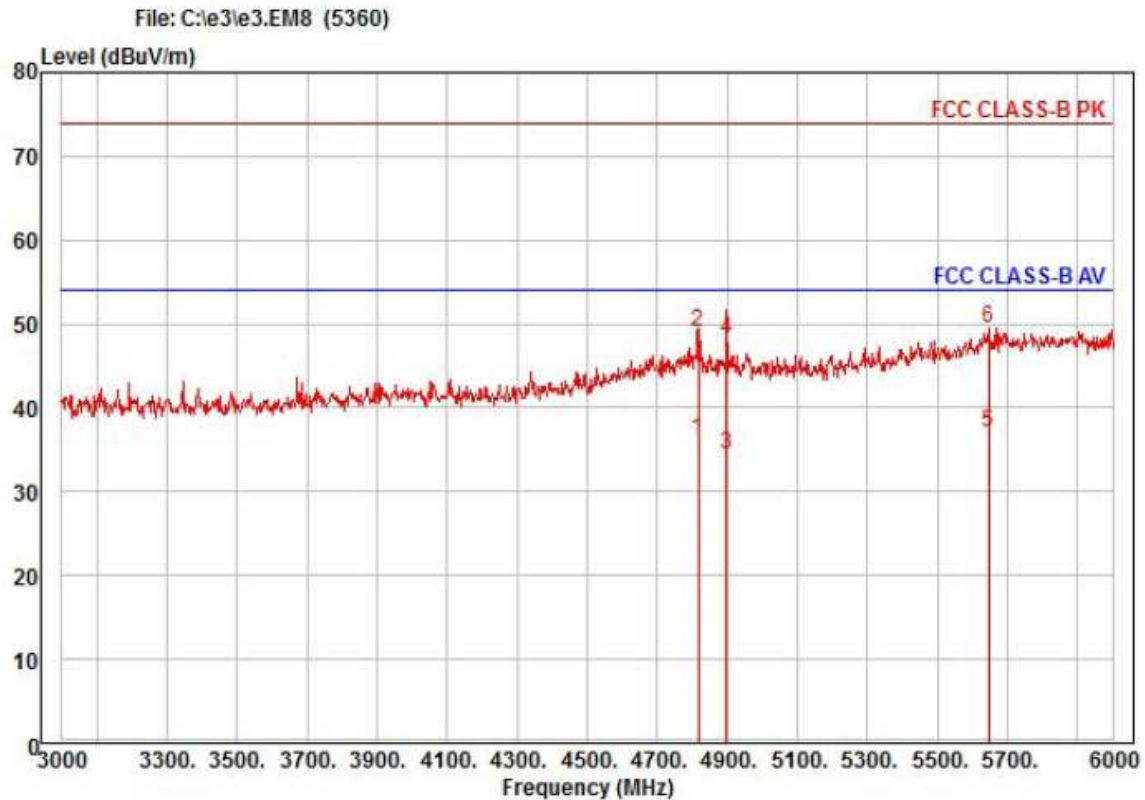
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Test report No.:
KES-E2-14T0033
Page (23) of (34)



Site : chamber
Condition: FCC CLASS-B PK 3m HORN ANT (2014.03.10) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Product :
EUT : JS DR50
Mode : FCC
Memo : 3 - 6 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamplifier Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	4818.00	22.56	33.12	14.05	33.53	103	54.00	-17.80	vertical	Average
2	4818.00	35.40	33.12	14.05	33.53	103	74.00	-24.96	vertical	Peak
3	4899.00	20.29	33.39	14.17	33.39	165	54.00	-19.54	vertical	Average
4	4899.00	33.93	33.39	14.17	33.39	165	74.00	-25.90	vertical	Peak
5 pp	5646.00	20.75	34.16	15.41	33.30	49	54.00	-16.98	vertical	Average
6 pk	5646.00	33.31	34.16	15.41	33.30	49	74.00	-24.42	vertical	Peak

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3. Product Labelling Requirements

3.1 FCC Statement

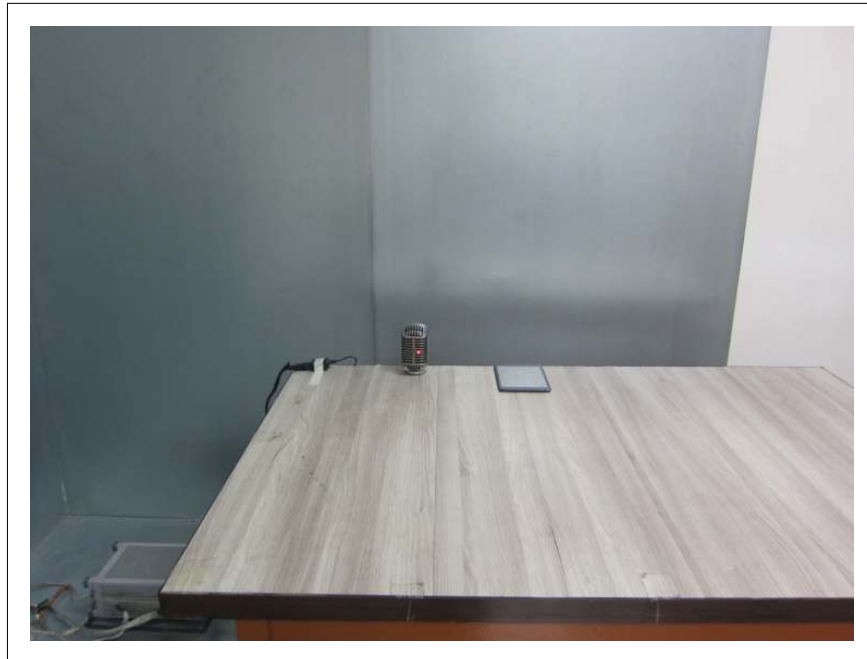
Product shall be labelled the following statement on the user's manual:

This device complies with part 15 of the FCC Rules. Operation in subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note : When the device is so small or for such use that it is not practicable to place the statement on it, the information shall be placed in prominent location in the instruction manual or pamphlet supplied to the user. However, the FCC identifier or unique identifier, as appropriate, must be displayed on the device.

4. Test Setup Photographs

4.1 Conducted Emission



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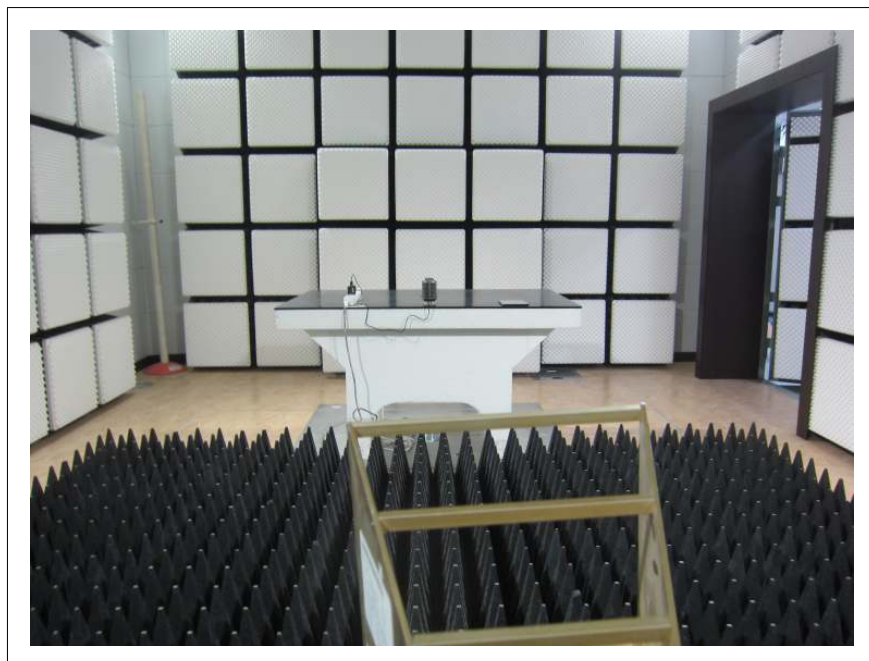
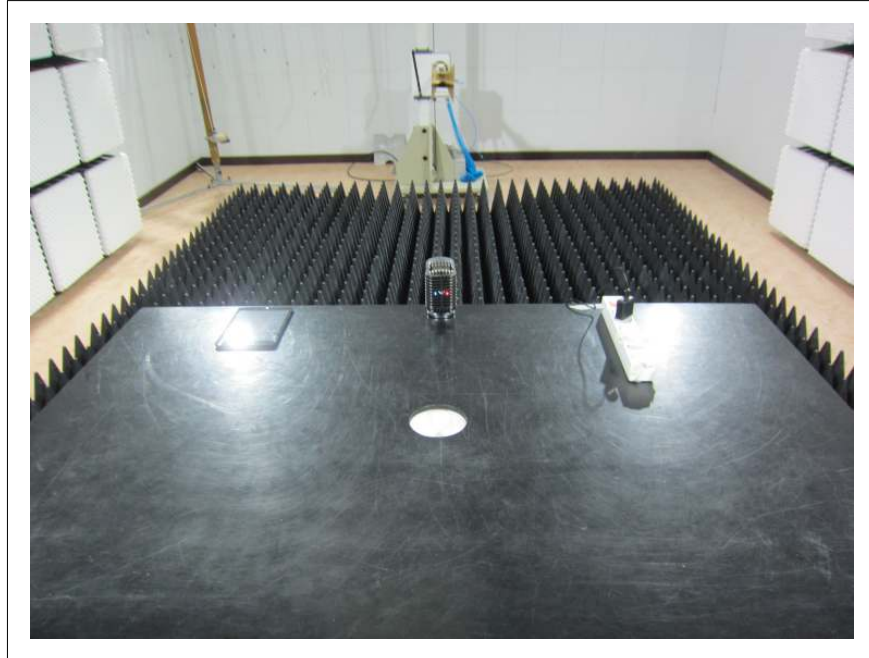
4.2 Radiated Emission

* Below 1 GHz



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* Above 1 GHz



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5. External Photographs

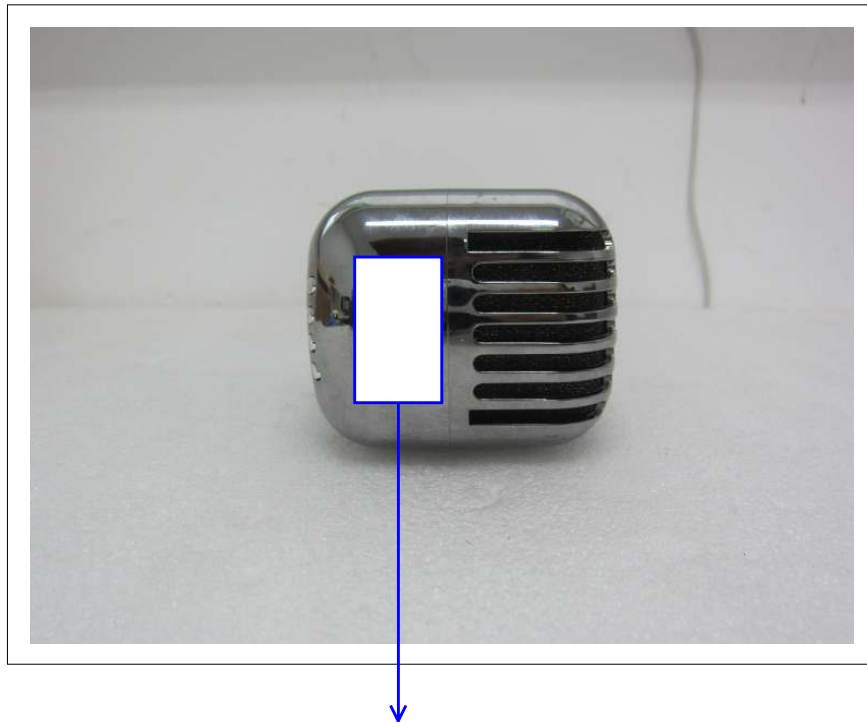
5.1 E.U.T: Front View



5.2 E.U.T: Rear View

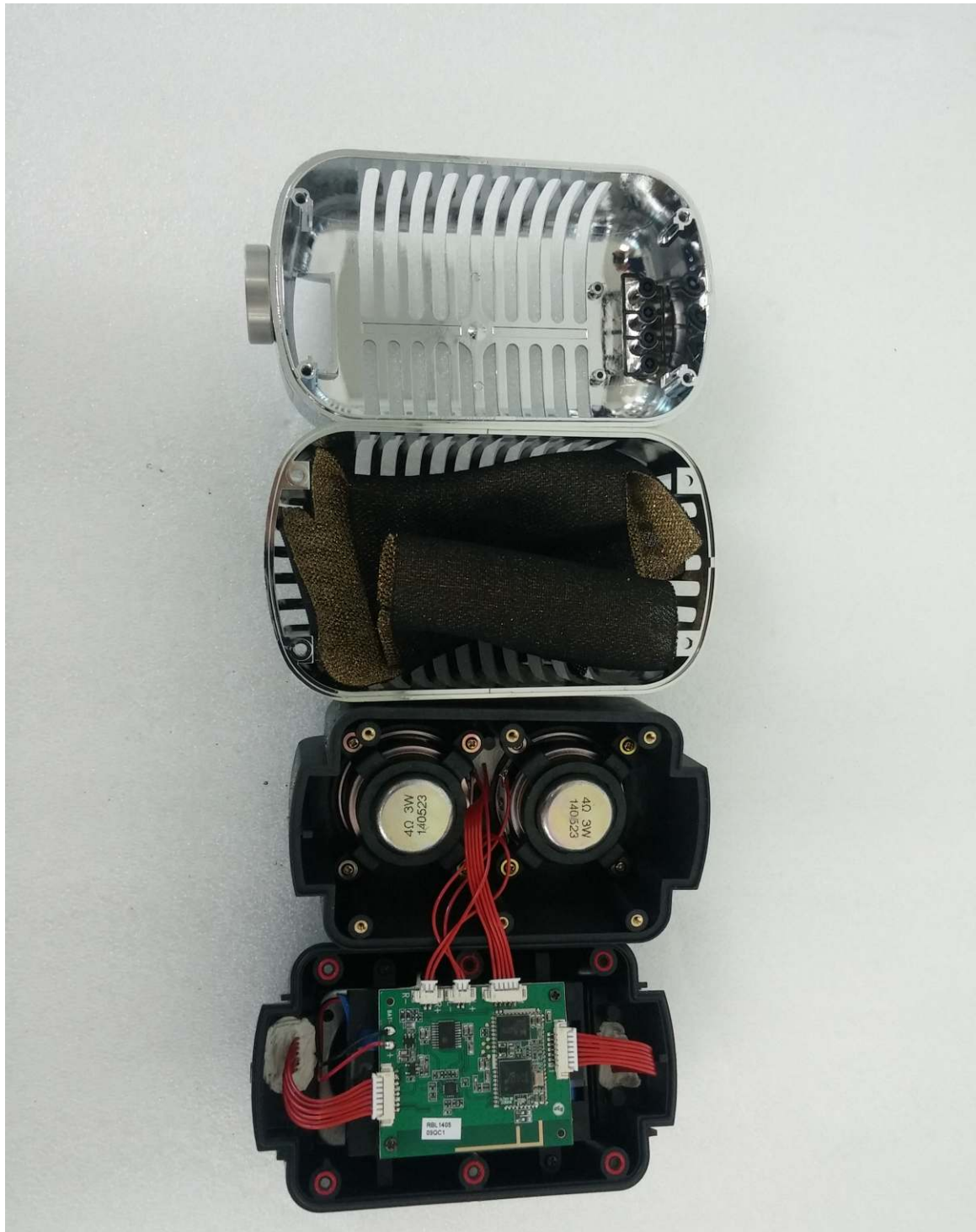


5.3 E.U.T: Label View



6. Internal Photographs

E.U.T: Internal View



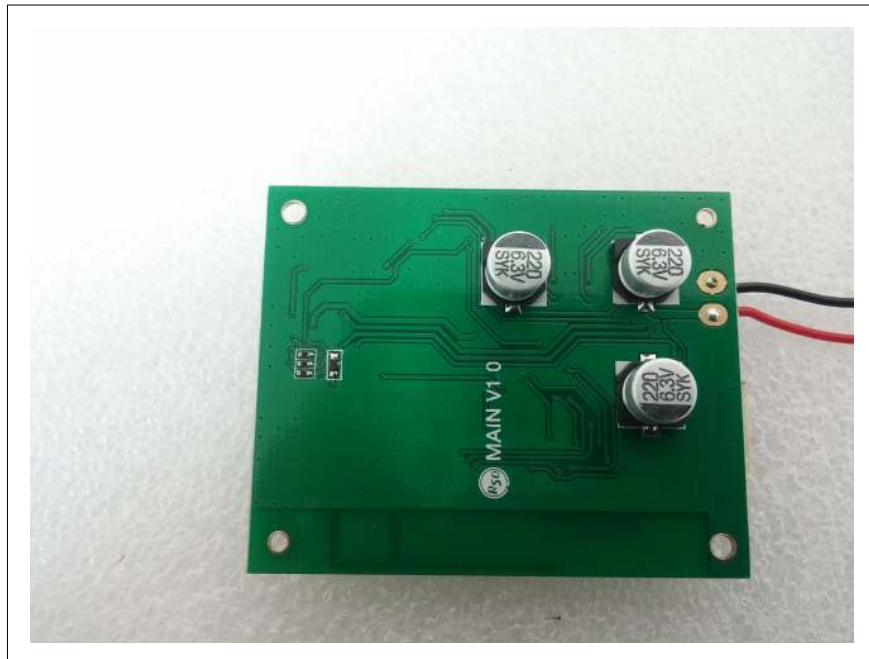
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○ MAIN BOARD

E.U.T: Internal View(Top)



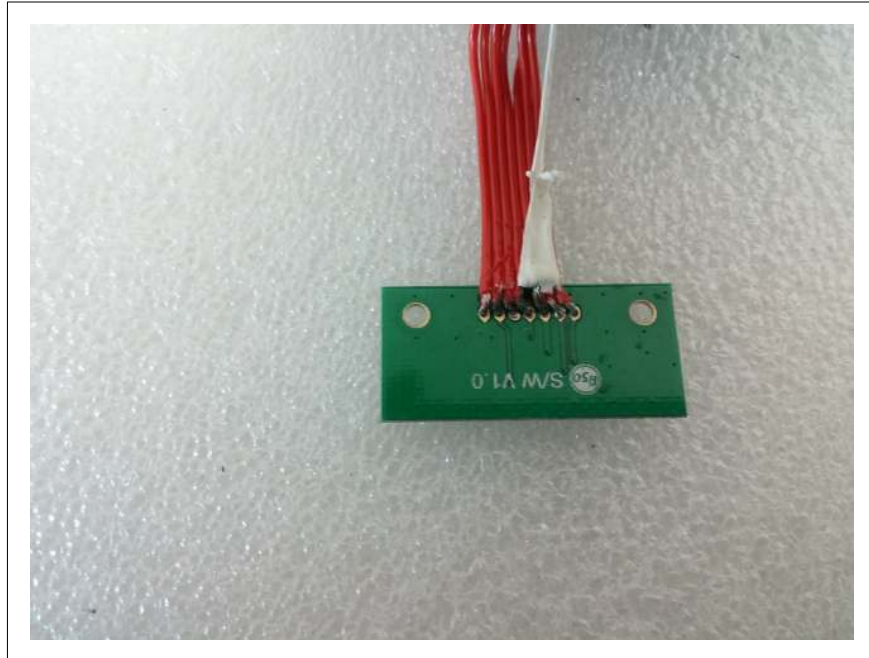
E.U.T: Internal View(Bottom)



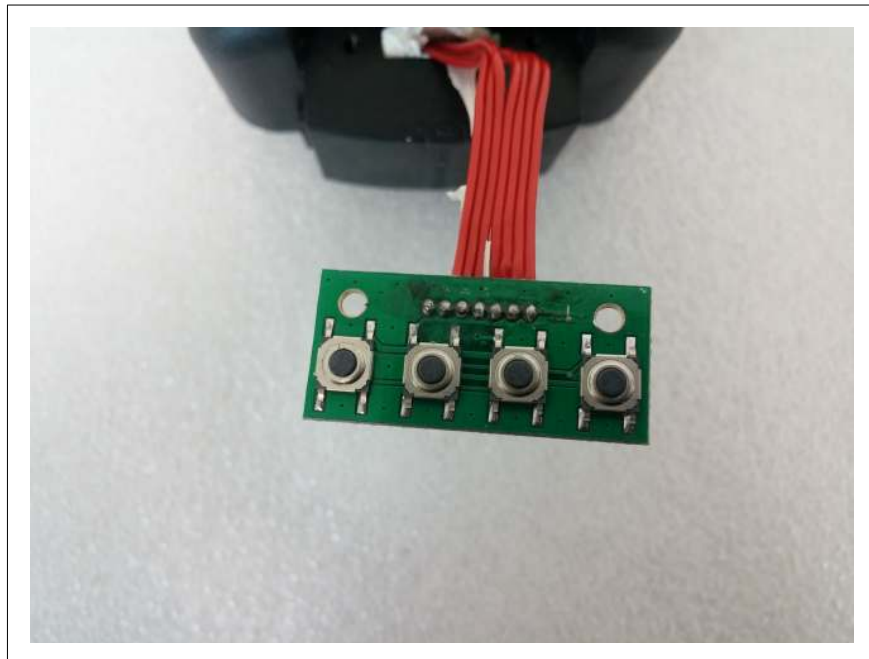
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○ SWITCH BOARD

E.U.T: Internal View(Top)



E.U.T: Internal View(Bottom)



○ SUB BOARD

E.U.T: Internal View(Top)



E.U.T: Internal View(Bottom)



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○ Battery

E.U.T: Internal View(Top)



E.U.T: Internal View(Bottom)

