

FCC
EMC
TEST REPORT

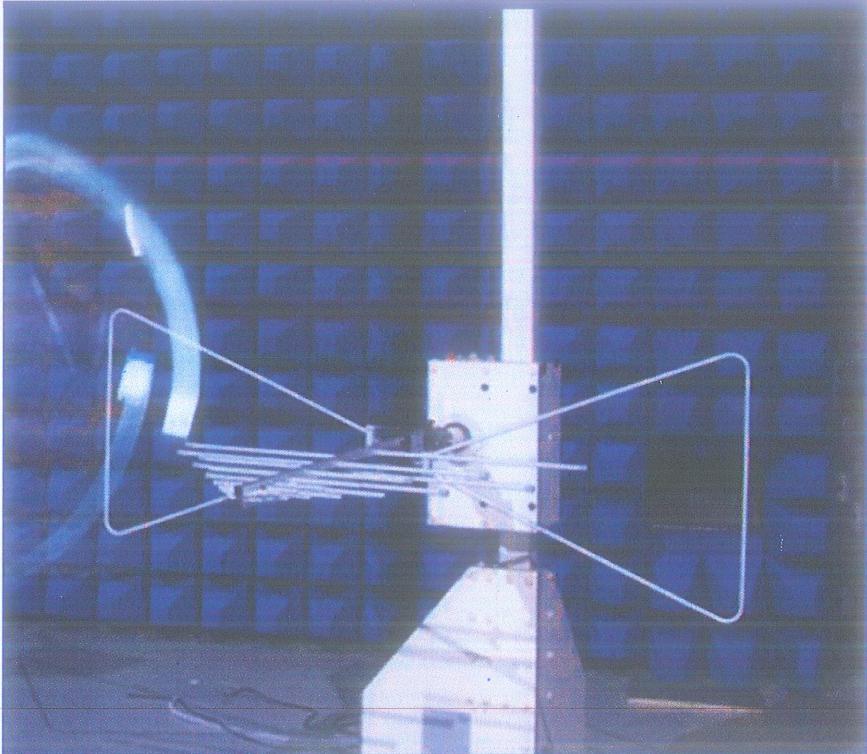
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
Smart Projector

ISSUED TO
Guizhou CVIM Technology Co., Ltd.

4th Floor, 5th R&D Building, Zunyi Software Park, Xiazi Town, Xinpu
New District, Zunyi, Guizhou



Report No.: BL-SZ1710090-401
EUT Name: Smart Projector
Model Name: A5
Brand Name: WOWOTO
Test Standard: 47 CFR Part 15 Subpart B
FCC ID: 2AKWS-ASERIES

Test Conclusion: Pass
Test Date: Mar. 07, 2017 ~ Mar. 13, 2017
Date of Issue: Mar. 28, 2017

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Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Mar. 28, 2017</u>	<u>Initial Issue</u>

TABLE OF CONTENTS

1	GENERAL INFORMATION	4
1.1	Identification of the Testing Laboratory	4
1.2	Identification of the Responsible Testing Location	4
1.3	Laboratory Condition	4
1.4	Announce	4
2	PRODUCT INFORMATION	5
2.1	Applicant Information	5
2.2	Manufacturer Information	5
2.3	Factory Information	5
2.4	General Description for Equipment under Test (EUT)	5
2.5	Ancillary Equipment	6
2.6	Technical Information	6
3	SUMMARY OF TEST RESULTS	7
3.1	Test Standards	7
3.2	Verdict	7
3.3	Test Uncertainty	7
4	GENERAL TEST CONFIGURATIONS	8
4.1	Test Environments	8
4.2	Test Equipment List	8
4.3	Test Enclosure list	9
4.4	Test Configurations	10
4.5	Test Setups	11
4.6	Test Conditions	13
5	TEST ITEMS	14
5.1	Emission Tests	14
	ANNEX A TEST RESULTS	16

A.1	Radiated Emission	16
A.2	Conducted Emission	20
ANNEX B	TEST SETUP PHOTOS	22
ANNEX C	EUT EXTERNAL PHOTOS	22
ANNEX D	EUT INTERNAL PHOTOS	22

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 6685 0100

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 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 Laboratory Condition

Ambient Temperature	20°C~25°C
Ambient Relative Humidity	45% - 55%
Ambient Pressure	100 kPa - 102 kPa

1.4 Announce

- (1) The test report reference to the report template version v6.3.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (5) 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.
- (6) 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 Information

Applicant	Guizhou CVIM Technology Co., Ltd.
Address	4th Floor, 5th R&D Building, Zunyi Software Park, Xiazi Town, Xinpu New District, Zunyi, Guizhou

2.2 Manufacturer Information

Manufacturer	Guizhou CVIM Technology Co., Ltd.
Address	4th Floor, 5th R&D Building, Zunyi Software Park, Xiazi Town, Xinpu New District, Zunyi, Guizhou

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	Smart Projector
Model Name Under Test	A5
Series Model Name	A1, A3, A5, A8, V1, V3, V6, V8, Q1, Q3, Q6, Q8
Description of Model name differentiation	All models share the same hardware circuit design, including LAYOUT, system architecture, software, etc. electrical parameters and internal circuit structure, These different models are for different Sales channels. The sales channels are as follows: Distributor, Amazon and so on.
Hardware Version	TDB
Software Version	TDB
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A
The Highest Speed of Processor	N/A
Network and Wireless connectivity	Bluetooth, WIFI

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	N/A
	Model No.	654659-2S1P
	Serial No.	N/A
	Capacitance	2100 mAh
	Rated Voltage	7.4 V
	Limit Charge Voltage	8.4 V
Ancillary Equipment 2	Adatper	
	Brand Name	N/A
	Model Name	AW018WR-1200150UH
	Rated Input	100-240 V~, 50/60 Hz, 0.5 A
Ancillary Equipment 3	Rated Output	12 V⎓, 1.5 A
	Remote Control	

2.6 Technical Information

Note: Not applicable.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	FCC 47 CFR Part 15 Subpart B (10-1-15 Edition)	Unintentional Radiators
2	ANSI C63.4-2014	American National 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 (9 kHz-30 MHz)	3.23 dB
Radiated emissions (30 MHz-1 GHz)	4.30 dB
Radiated emissions (1 GHz-18 GHz)	4.81 dB
Radiated emissions (18 GHz-40 GHz)	5.71 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

Environment Parameter	Selected Values During Tests			
	Temperature	Voltage	Relative Humidity	Ambient Pressure
Normal Temperature, Normal Voltage (NTNV)	23°C~26°C	AC 120 V/60 Hz	50%-55%	100 to 102 kPa

4.2 Test Equipment List

Radiated Emission Test For Frequency Below 1 GHz						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2016.07.05	2017.07.04	<input checked="" type="checkbox"/>
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-977	2016.07.19	2018.07.18	<input checked="" type="checkbox"/>
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1148	2015.07.22	2017.07.21	<input type="checkbox"/>
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60 *7.35m	N/A	2016.08.09	2018.08.08	<input checked="" type="checkbox"/>

Radiated Emission Test For Frequency Above 1 GHz						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2016.09.09	2017.09.08	<input checked="" type="checkbox"/>
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-624	2015.07.22	2017.07.21	<input type="checkbox"/>
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1148	2015.07.22	2017.07.21	<input checked="" type="checkbox"/>
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2019.02.20	<input checked="" type="checkbox"/>

Conducted disturbance Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2016.07.05	2017.07.04	<input checked="" type="checkbox"/>
LISN	SCHWARZBECK	NSLK 8127	8127-687	2016.07.05	2017.07.04	<input checked="" type="checkbox"/>
Shielded Enclosure	ChangNing	CN-130701	130703	N/A	N/A	<input checked="" type="checkbox"/>

4.3 Test Enclosure list

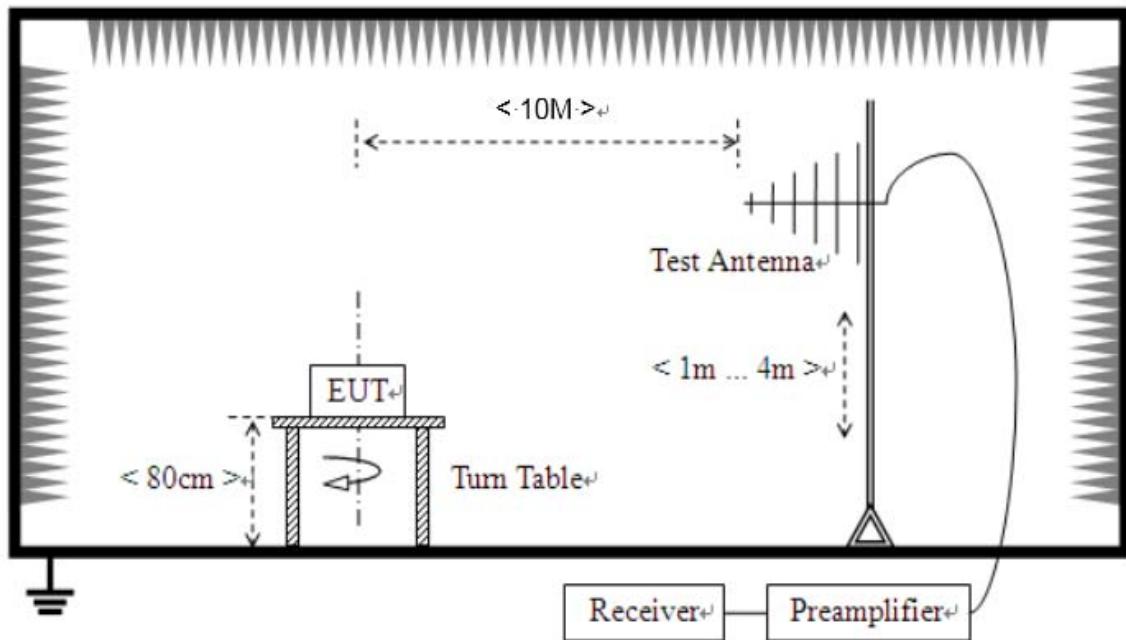
Description	Manufacturer	Model	Serial No.	Length	Description	Use
PC	Dell	015K3N	N/A	N/A	Special Handled	<input type="checkbox"/>
Laptop	Apple	A1465	N/A	N/A	N/A	<input type="checkbox"/>
Laptop	Lenovo	E31	R3026PU9	N/A	N/A	<input checked="" type="checkbox"/>
Printer	HP	DESKJET 1000	N/A	N/A	N/A	<input type="checkbox"/>
Keyboard	Logitech	Y-BP62a	N/A	N/A	N/A	<input 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 checked="" type="checkbox"/>
TF Card	Kingston	N/A	N/A	N/A	N/A	<input checked="" type="checkbox"/>
VGA Cable	N/A	N/A	N/A	1.5 m	Shielded with core	<input type="checkbox"/>
HDMI Cable	N/A	N/A	N/A	1.5 m	Shielded with core	<input checked="" type="checkbox"/>
DVI Cable	N/A	N/A	N/A	1.5 m	Shielded with core	<input type="checkbox"/>
Coaxial video cable	N/A	N/A	N/A	2.0 m	Shielded with core	<input type="checkbox"/>
iPhone	Apple	A1586	N/A	N/A	N/A	<input type="checkbox"/>
Phone	MI	M4	N/A	N/A	N/A	<input type="checkbox"/>
Bluetooth Earphone	SAMSUNG	Gear Circle	N/A	N/A	N/A	<input checked="" type="checkbox"/>
GPS/GLONAS S Vector signal generator	R&S	N5172B EXG	N/A	N/A	N/A	<input type="checkbox"/>
WIFI Router	TP-LINK	TL-WDR7500	N/A	N/A	N/A	<input checked="" type="checkbox"/>
Earphone	N/A	OPPO	N/A	1.1 m	N/A	<input checked="" type="checkbox"/>
Car Battery	Camel	55530	N/A	N/A	12 V/55 Ah	<input type="checkbox"/>
Artificial load	N/A	N/A	N/A	N/A	2.5 Ω/100 W	<input type="checkbox"/>
Artificial load	N/A	N/A	N/A	N/A	5 Ω/100 W	<input type="checkbox"/>
Electronic Load	ITECH	IT8511	N/A	N/A	N/A	<input type="checkbox"/>
USB Cable	N/A	N/A	N/A	1.5 m	Shielded with core	<input type="checkbox"/>
DC Power Supply	ITECH	IT6863A	60001401068 7210006	N/A	N/A	<input type="checkbox"/>
LCD Monitor	SAMSUNG	UA32C4000P	N/A	N/A	N/A	<input type="checkbox"/>
LCD Monitor	Dell	U241HB	N/A	N/A	N/A	<input type="checkbox"/>
RJ45 Cable	N/A	N/A	N/A	1.5 m	Shielded with core	<input type="checkbox"/>

4.4 Test Configurations

Test Configurations (TC) No.	Description
TC01	<u>The HDMI Play Test Mode</u> EUT + Adapter + Battery + Remote Control + Mouse + Earphone + TF Card + Laptop + HDMI Cable + WIFI Link (2.4G) + BT Link
TC02	<u>The USB Disk Play Test Mode</u> EUT + Adapter + Battery + Remote Control + Mouse + Earphone + TF Card + USB Disk + WIFI Link (5G) + BT Link
TC03	<u>The TF Card Play Test Mode</u> EUT + Adapter + Battery + Remote Control + Mouse + Earphone + TF Card + 5.8G SRD + BT Link

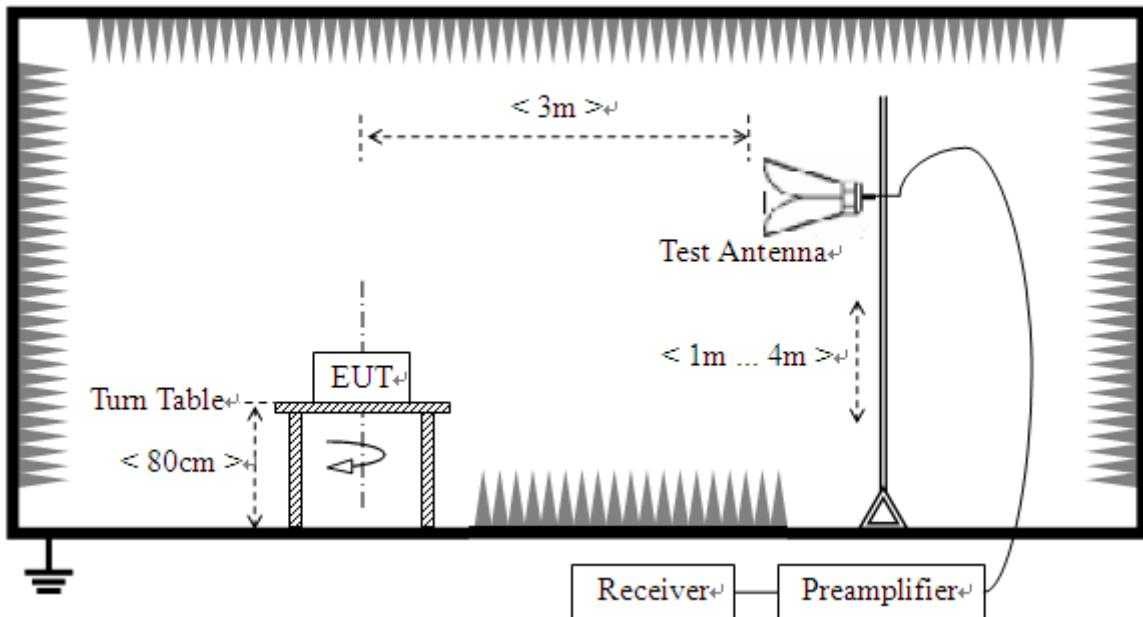
4.5 Test Setups

Test Setup 1

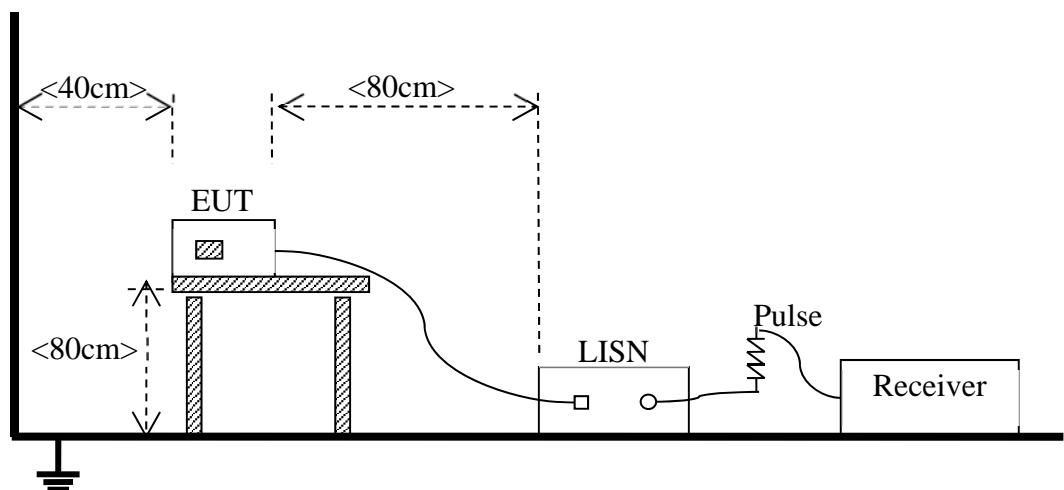


(For Radiated Emission Test (30 MHz-1 GHz))

Test Setup 2



(For Radiated Emission Test (above 1 GHz))

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~TC03 ^{Note}
Conducted Emission, AC Ports	Test Env.	NTNV
	Test Setup	Test Setup 3
	Test Configuration	TC01~TC03 ^{Note}
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. The HDMI Play Test Mode is the worst mode in this report.		

5 TEST ITEMS

5.1 Emission Tests

5.1.1 Radiated Emission

5.1.1.1 Limit

Frequency range (MHz)	Class B (at 10 m)		Class A (at 10 m)	
	Field Strength (μ V/m)	Field Strength (dB μ V/m)	Field Strength (μ V/m)	Field Strength (dB μ V/m)
30 - 88	100	30	90	39
88 - 216	150	33.5	150	43.5
216 - 960	200	36	210	46.4
Above 960	500	44	300	49.5

NOTE:

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

5.1.1.2 Test Setup

Refer to 4.5 section (test setups1 to test setups2) for radiated emission test, the photo of test setup please refer to ANNEX B.

5.1.1.3 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.

5.1.1.4 Test Result

Please refer to ANNEX A.1.

5.1.2 Conducted Emission

5.1.2.1 Test Limit

Frequency range (MHz)	Class A	
	Quasi-peak (dB μ V)	Average (dB μ V)
0.15 - 0.50	79	66
0.50 - 30	73	60

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

NOTE:

- 1) The lower limit shall apply at the band edges.
- 2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

5.1.2.2 Test Setup

Refer to 4.5 section test (test setup 3) for conducted emission, the photo of test setup please refer to ANNEX B.

5.1.2.3 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 150 kHz to 30 MHz. 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.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

5.1.2.4 Test Result

Please refer to ANNEX A.2.

ANNEX A TEST RESULTS

A.1 Radiated Emission

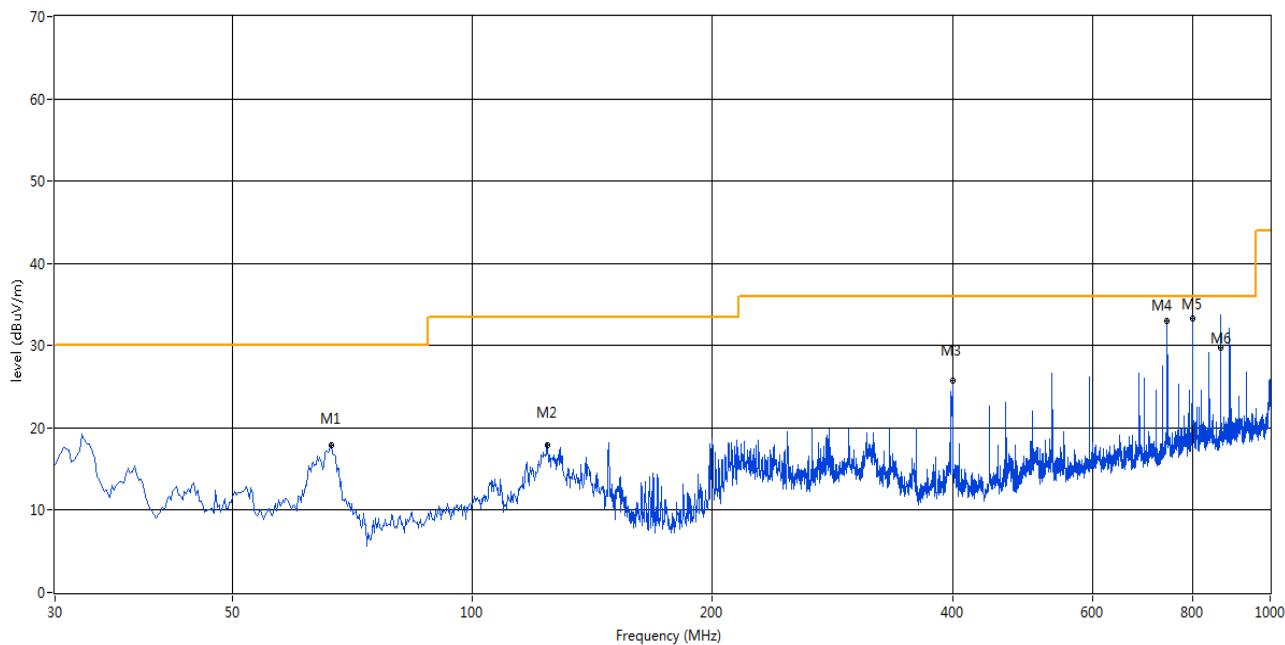
Note 1: The symbol of “--” in the table which means not application.

Note 2: For the test data above 1 GHz, according the ANSI C63.4-2014, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Test Data and Plots

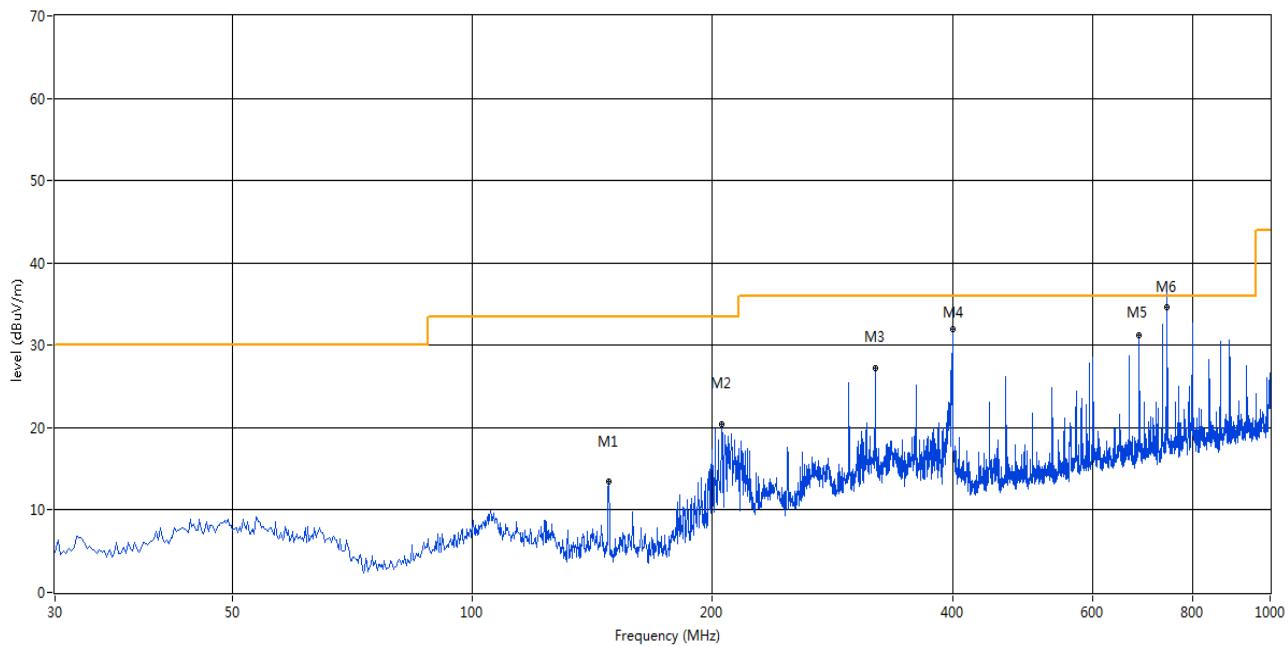
The HDMI Play Test Mode

A.1.1 Test Antenna Vertical, 30 MHz – 1 GHz



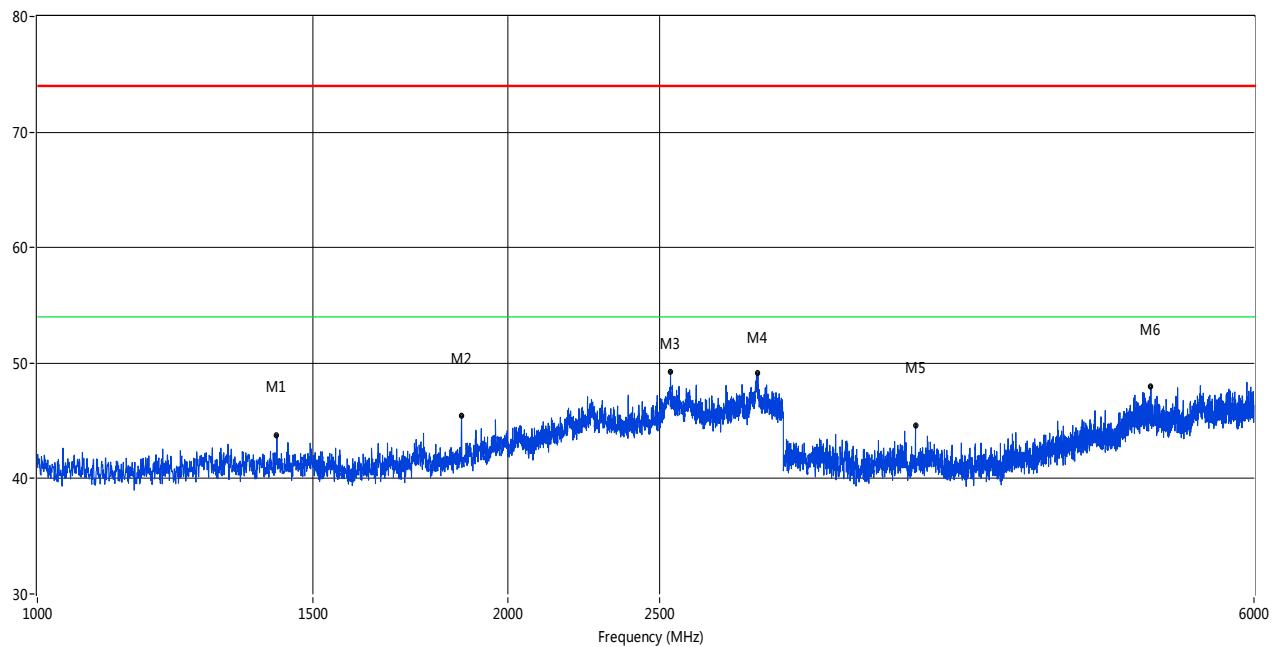
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	66.608	17.85	-16.83	30.0	12.15	Peak	360.00	200	Vertical	Pass
2	124.066	17.78	-18.85	33.5	15.72	Peak	129.00	100	Vertical	Pass
3	399.963	25.80	-10.87	36.0	10.20	Peak	129.00	100	Vertical	Pass
4	741.560	32.89	-4.92	36.0	3.11	Peak	38.00	200	Vertical	Pass
5	799.988	32.78	-4.16	36.0	3.22	Peak	346.00	200	Vertical	Pass
6	866.749	34.03	-2.99	36.0	1.97	Peak	327.00	214.00	Vertical	N/A
6*	866.749	29.81	-2.99	36.0	6.19	QP	327.00	214.00	Vertical	Pass

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



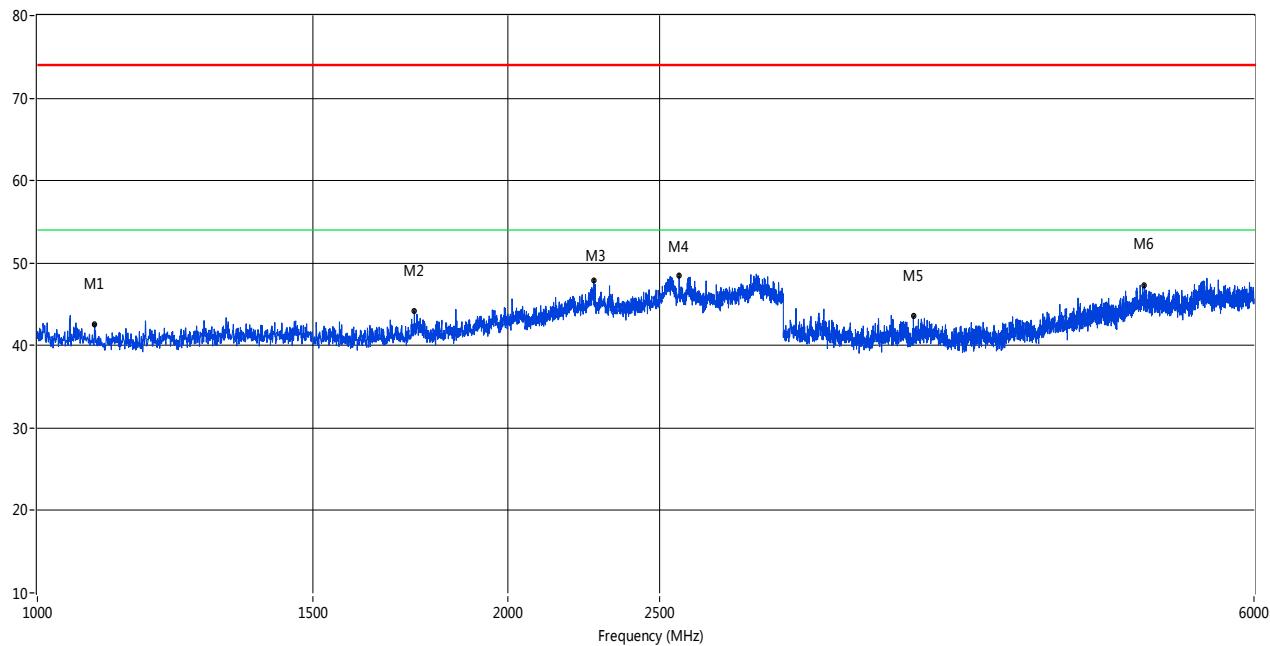
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	148.310	13.41	-19.56	33.5	20.09	Peak	52.00	200	Horizontal	Pass
2	205.526	20.49	-16.19	33.5	13.01	Peak	129.00	200	Horizontal	Pass
3	319.958	27.28	-12.62	36.0	8.72	Peak	284.00	200	Horizontal	Pass
4	399.963	31.99	-10.87	36.0	4.01	Peak	168.00	200	Horizontal	Pass
5	685.556	31.25	-6.01	36.0	4.75	Peak	207.00	200	Horizontal	Pass
6	741.756	36.65	-4.92	36.0	-0.65	Peak	0.000	133.00	Horizontal	N/A
6*	741.756	34.63	-4.92	36.0	1.37	QP	0.00	133.00	Horizontal	Pass

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



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1423.000	43.75	-3.03	74.0	30.25	Peak	312.90	100	Vertical	Pass
2	1868.000	45.41	-1.80	74.0	28.59	Peak	294.80	100	Vertical	Pass
3	2541.000	49.23	3.54	74.0	24.77	Peak	44.70	100	Vertical	Pass
4	2890.000	49.11	5.28	74.0	24.89	Peak	0.80	100	Vertical	Pass
5	3645.000	44.64	6.68	74.0	29.36	Peak	214.50	100	Vertical	Pass
6	5155.500	47.94	10.08	74.0	26.06	Peak	184.20	100	Vertical	Pass

A.1.4 Test Antenna Horizontal, 1 GHz – 6 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1088.000	42.62	-5.22	74.0	31.38	Peak	106.00	100	Horizontal	Pass
2	1742.500	44.14	-1.82	74.0	29.86	Peak	1.00	100	Horizontal	Pass
3	2269.000	47.90	1.66	74.0	26.10	Peak	2.00	100	Horizontal	Pass
4	2573.500	48.45	3.10	74.0	25.55	Peak	10.00	100	Horizontal	Pass
5	3633.750	43.55	6.44	74.0	30.45	Peak	1.00	100	Horizontal	Pass
6	5107.500	47.33	10.25	74.0	26.67	Peak	3.00	100	Horizontal	Pass

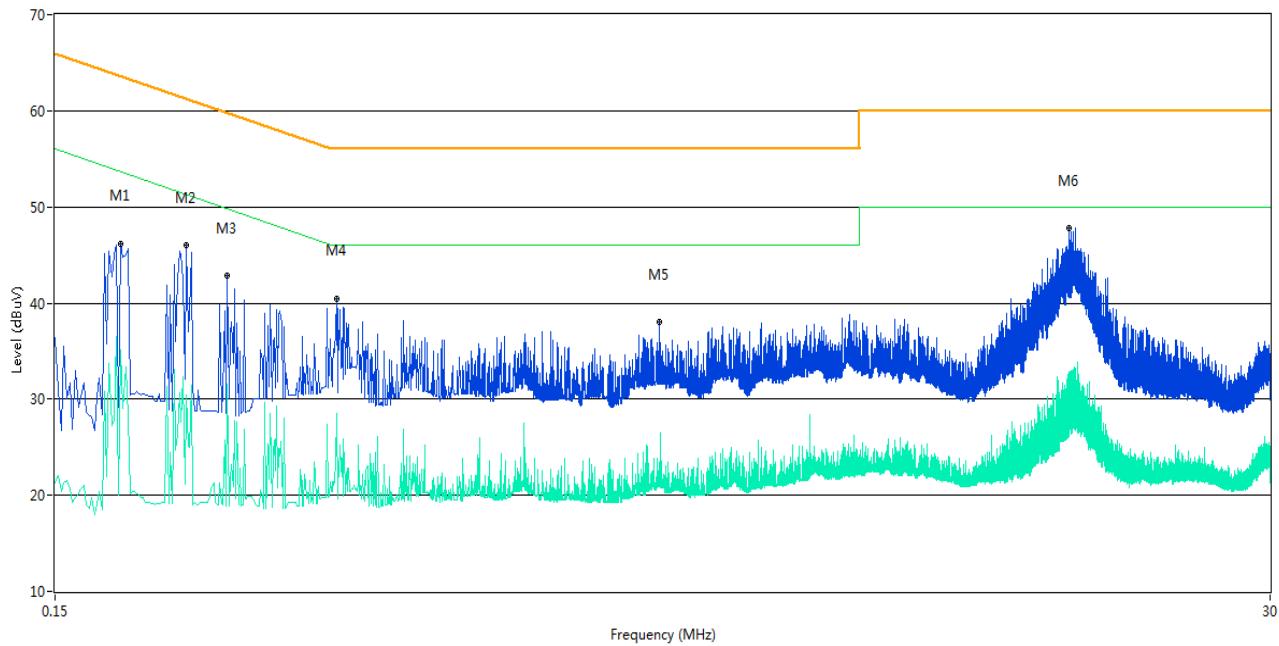
A.2 Conducted Emission

Test Data and Plots

The HDMI Play Test Mode

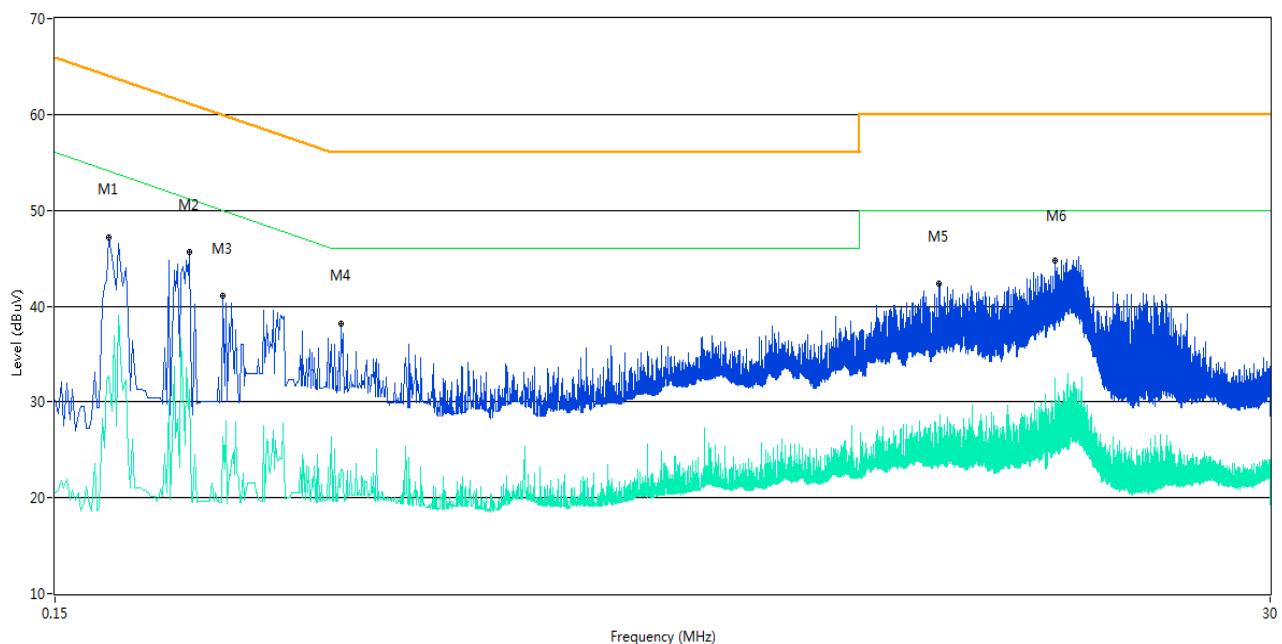
Note: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration (120 VAC, 60 Hz) shown here.

A.2.1 L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.200	46.2	11.00	63.6	17.40	Peak	L Line	Pass
1**	0.200	35.2	11.00	53.6	18.40	AV	L Line	Pass
2	0.266	46.0	11.00	61.2	15.20	Peak	L Line	Pass
2**	0.266	30.5	11.00	51.2	20.70	AV	L Line	Pass
3	0.318	42.9	11.00	59.8	16.90	Peak	L Line	Pass
3**	0.318	31.6	11.00	49.8	18.20	AV	L Line	Pass
4	0.512	40.5	11.00	56.0	15.50	Peak	L Line	Pass
4**	0.512	28.5	11.00	46.0	17.50	AV	L Line	Pass
5	2.092	38.0	11.00	56.0	18.00	Peak	L Line	Pass
5**	2.092	23.5	11.00	46.0	22.50	AV	L Line	Pass
6	12.512	47.8	11.00	60.0	12.20	Peak	L Line	Pass
6**	12.512	28.2	11.00	50.0	21.80	AV	L Line	Pass

A.2.2 N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.190	47.2	11.00	64.0	16.80	Peak	N Line	Pass
1**	0.190	32.7	11.00	54.0	21.30	AV	N Line	Pass
2	0.270	45.6	11.00	61.1	15.50	Peak	N Line	Pass
2**	0.270	31.3	11.00	51.1	19.80	AV	N Line	Pass
3	0.312	41.0	11.00	59.9	18.90	Peak	N Line	Pass
3**	0.312	26.3	11.00	49.9	23.60	AV	N Line	Pass
4	0.522	38.2	11.00	56.0	17.80	Peak	N Line	Pass
4**	0.522	22.9	11.00	46.0	23.10	AV	N Line	Pass
5	7.094	42.3	11.00	60.0	17.70	Peak	N Line	Pass
5**	7.094	27.0	11.00	50.0	23.00	AV	N Line	Pass
6	11.772	44.7	11.00	60.0	15.30	Peak	N Line	Pass
6**	11.772	26.0	11.00	50.0	24.00	AV	N Line	Pass

ANNEX B TEST SETUP PHOTOS

Please refer the document "BL-SZ1710090-AE.PDF".

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document "BL-SZ1710090-AW.PDF".

ANNEX D EUT INTERNAL PHOTOS

Please refer the document "BL-SZ1710090-AI.PDF".

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