FCC EMC TEST REPORT

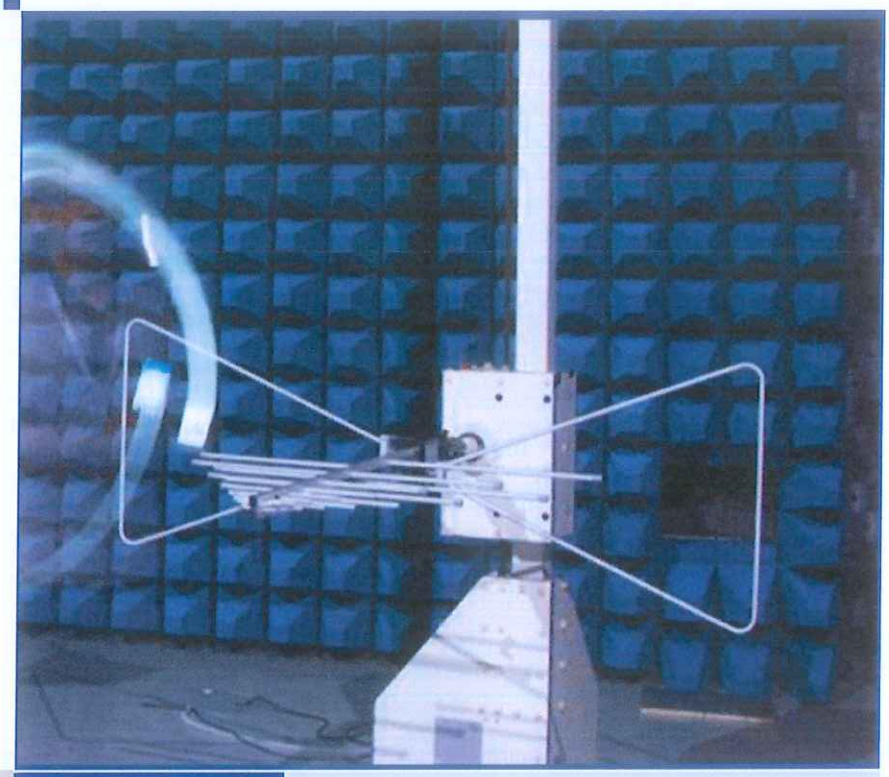
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

Smart Projetor

ISSUED TO
Guizhou CVIM Technology Co., Ltd.

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



Tested by: Xia Long
Xia Long
(Engineer)
Date Aug.16.2017

Approved by:
Wei Yanquan
(Chief Engineer)
Date Aug.16.2017

Report No.:	BL-SZ1760349-401
EUT Name:	Smart Projector
Model Name:	T8e
Brand Name:	wowoto
Test Standard:	47 CFR Part 15 Subpart B
FCC ID:	2AKWS-TXSERIES
Test Conclusion:	Pass
Test Date:	Jun. 28, 2017~ Jul. 05, 2017
Date of Issue:	Aug. 16, 2017

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Revision History

Version	Issue Date	Revisions Content
Rev. 01	Aug. 16, 2017	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 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	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196. The laboratory is a testing organization accredited by American Association for Laboratory Accreditation (A2LA) according to ISO/IEC 17025.The accreditation certificate is 4344.01. 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 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 v6.5.

(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	Huizhou Goldenchip Electronics Co., Ltd
Address	Factory workshop, No.12, Songyang Road, Zhongkai High-tech Zone, Huizhou City, Guangdong

2.4 General Description for Equipment under Test (EUT)

EUT Name	Smart Projector
Model Name Under Test	T8e
Series Model Name	T8e, X6, X8, X9, T6, T8, T9, T9e, Pro X15
Description of Model name differentiation	Above basic model name and additional model name are totally the same configuration including circuit, PCB layout, electrical part and outlook. Above basic model name and additional model name is just name different.
Hardware Version	TBD
Software Version	TBD
Dimensions (Approx.)	153x120x31mm
Weight (Approx.)	500g
Network and Wireless connectivity	Bluetooth, WIFI, 5.8G SRD

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	Goldenchip Electronics
	Model No.	783194-3S1P
	Serial No.	N/A
	Capacitance	2600 mAh
	Rated Voltage	11.1 V
	Limit Charge Voltage	12.6 V
Ancillary Equipment 2	Adapter	
	Brand Name	Huntkey
	Model No.	HKA03619021-8C
	Serial No.	N/A
	Rated Input	100-240 V~, 1.0 A, 50/60 Hz
	Rated Output	19 V⎓, 2.1 A
Ancillary Equipment 3	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 (10-1-16 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	2017.06.22	2018.06.21	☒
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-977	2016.07.19	2018.07.18	☒
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1600	2016.07.12	2018.07.11	☐
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60 *7.35m	N/A	2016.08.09	2018.08.08	☒

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	☒
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-624	2015.07.22	2017.07.21	☐
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1148	2015.07.22	2017.07.21	☒
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2019.02.20	☒

Conducted Emission Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2017.06.22	2018.06.21	☒
LISN	SCHWARZBECK	NSLK 8127	8127-687	2017.06.22	2018.06.21	☒
LISN	SCHWARZBECK	NNLK 8129	8129-462	2016.09.14	2017.09.13	☐
AMN	SCHWARZBECK	NNBM8124	8124-509	2017.06.22	2018.06.21	☐
AMN	SCHWARZBECK	NNBM8124	8124-510	2017.06.22	2018.06.21	☐
ISN	TESEQ	ISN T800	34449	2017.06.22	2018.06.21	☐
Shielded Enclosure	ChangNing	CN-130701	130703	N/A	N/A	☒

4.3 Test Enclosure list

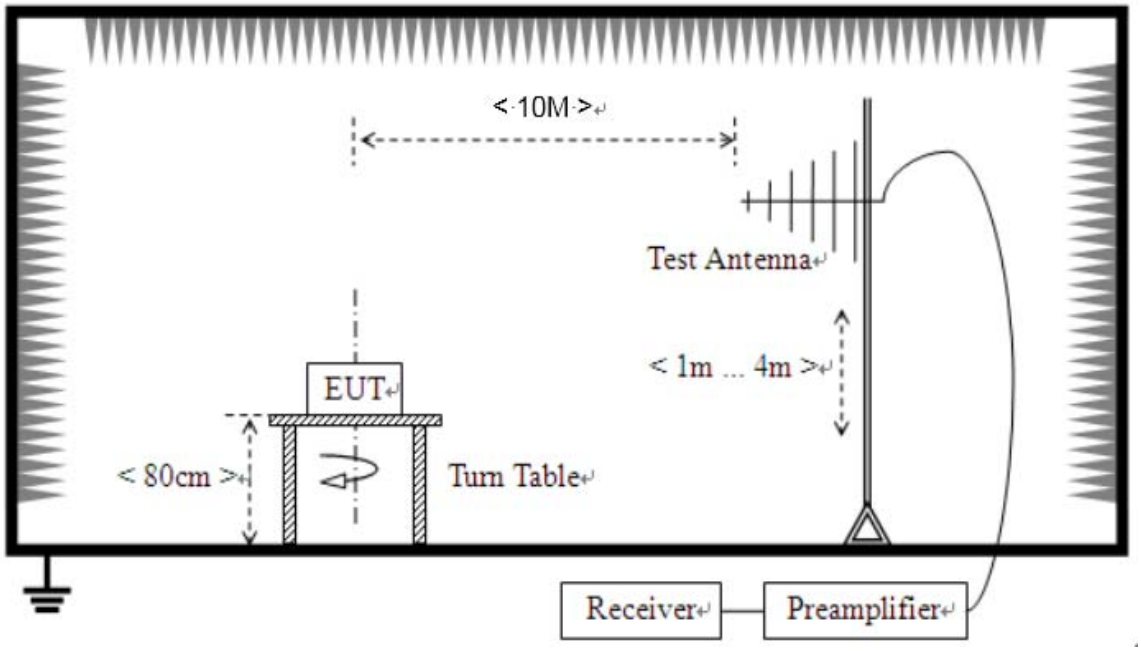
Description	Manufacturer	Model	Serial No.	Length	Description	Use
PC	Dell	015K3N	N/A	N/A	Special Handled	☐
Laptop	Lenovo	E31-80	N/A	N/A	N/A	☒
Printer	HP	DESKJET 1000	N/A	N/A	N/A	☐
Keyboard	Logitech	Y-BP62a	N/A	N/A	N/A	☐
Mouse	Logitech	M100	N/A	N/A	N/A	☒
USB disk	Kingston	N/A	N/A	N/A	N/A	☒
TF Card	Kingston	N/A	N/A	N/A	N/A	☒
VGA Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
HDMI Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☒
DVI Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
Coaxial video cable	N/A	N/A	N/A	2.0 m	Shielded with core	☐
iPhone	Apple	A1586	N/A	N/A	N/A	☐
Phone	MI	M4	N/A	N/A	N/A	☐
Bluetooth Earphone	SAMSUNG	Gear Circle	N/A	N/A	N/A	☒
GPS/GLONASS Vector signal generator	R&S	N5172B EXG	N/A	N/A	N/A	☐
WIFI Router	TP-LINK	TL-WDR7500	N/A	N/A	N/A	☒
Earphone	N/A	OPPO	N/A	1.1 m	N/A	☒
Car Battery	Camel	55530	N/A	N/A	12 V/55 Ah	☐
Artificial load	N/A	N/A	N/A	N/A	2.5 Ω/100 W	☐
Artificial load	N/A	N/A	N/A	N/A	5 Ω/100 W	☐
Electronic Load	ITECH	IT8511	N/A	N/A	N/A	☐
USB Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
DC Power Supply	ITECH	IT6863A	600014010687210006	N/A	N/A	☐
LCD Monitor	SAMSUNG	UA32C4000P	N/A	N/A	N/A	☐
LCD Monitor	Dell	U241HB	N/A	N/A	N/A	☐
RJ45 Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☒

4.4 Test Configurations

Test Configurations (TC) No.	Description
TC01	The HDMI Play Test Mode EUT + Adapter + Battery + Remote Control + Mouse + Earphone + TF Card + Laptop + HDMI Cable + USB Disk + WIFI Link (5G) + BT Link + RJ45 Cable
TC02	The USB Disk Play Test Mode EUT + Adapter + Battery + Remote Control + Mouse + Earphone + TF Card + Laptop + HDMI Cable+ USB Disk + 5.8G SRD + BT Link + RJ45 Cable
TC03	The TF Card Play Test Mode EUT + Adapter + Battery + Remote Control + Mouse + Earphone + TF Card + + Laptop HDMI Cable+ USB Disk + WIFI Link (2.4G) + BT Link + RJ45 Cable

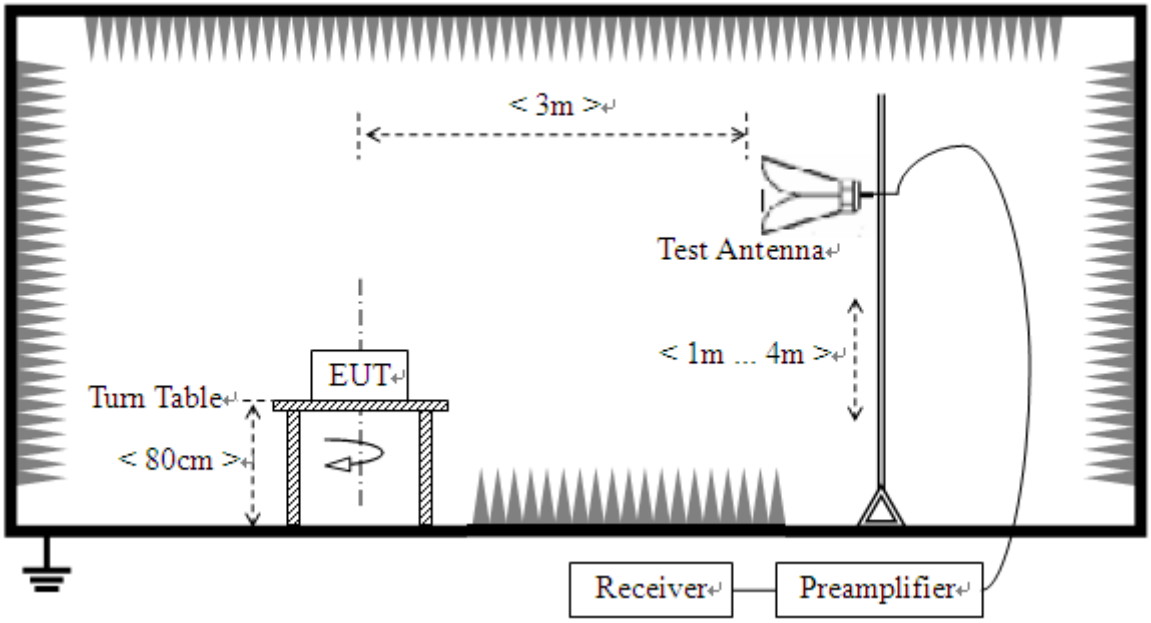
4.5 Test Setups

Test Setup 1



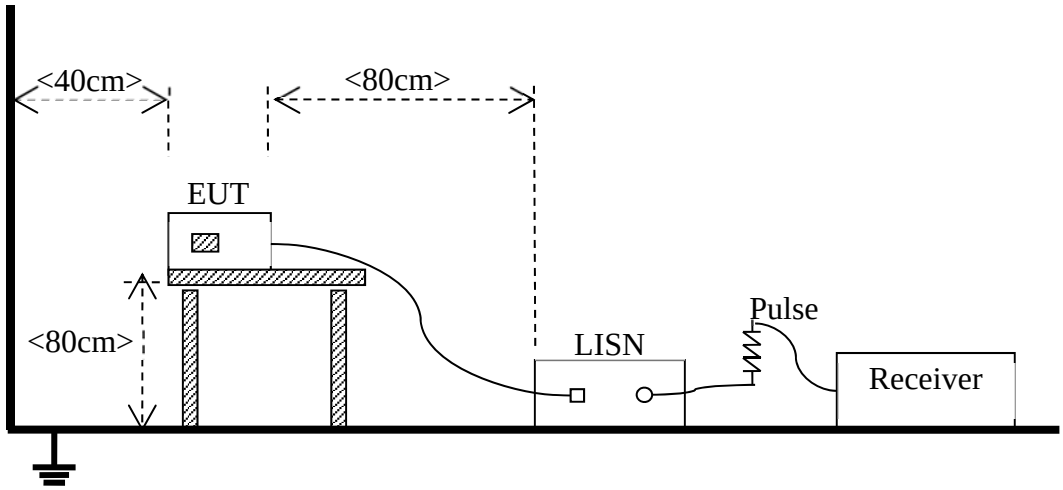
(For Radiated Emission Test (30 MHz-1 GHz))

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 TF Card 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 3 m)		Class B (at 10 m)	Class A (at 10 m)	
	Field Strength (μV/m)	Field Strength (dBμV/m)	Field Strength (dBμV/m)	Field Strength (μV/m)	Field Strength (dBμV/m)
30 - 88	100	40	30	90	39
88 - 216	150	43.5	33.5	150	43.5
216 - 960	200	46	36	210	46.4
Above 960	500	54	44	300	49.5

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 Setup

Refer to 4.5 section (test setup 1 to test setup 2) 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 (dBμV)	Average (dBμV)
0.15 - 0.50	79	66
0.50 - 30	73	60

Frequency range (MHz)	Class B	
	Quasi-peak (dBμV)	Average (dBμV)
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 μH 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

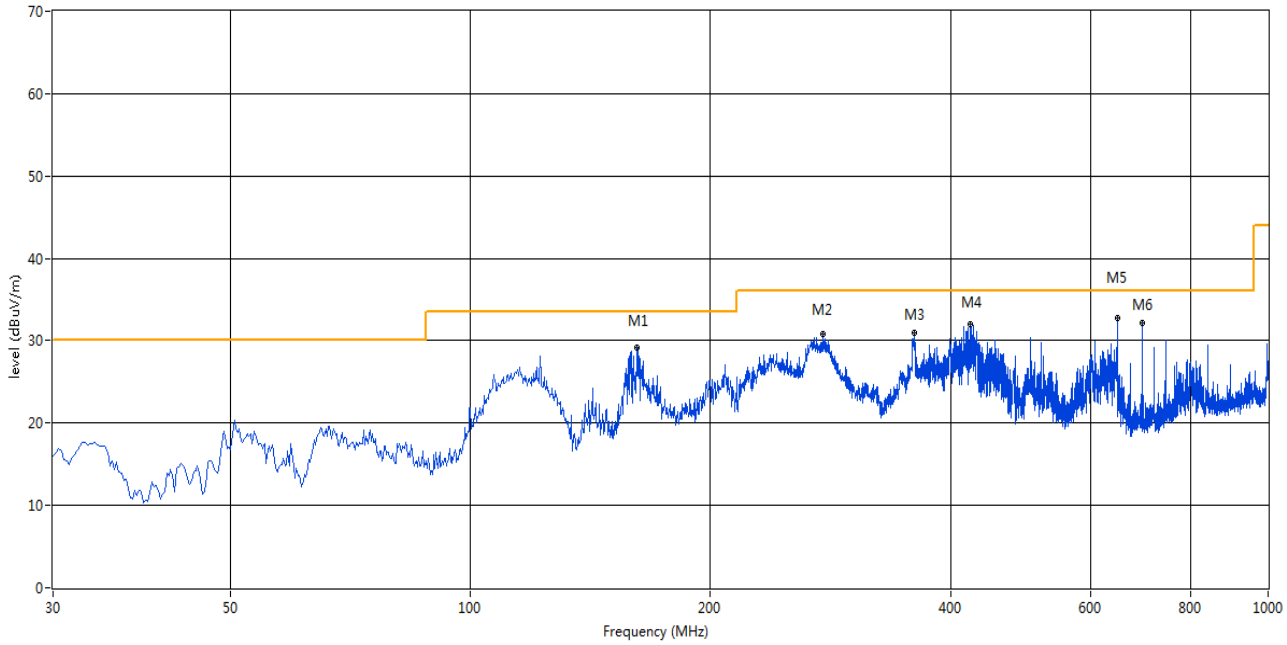
Note 1: The symbol of "--" in the table which means not application.

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

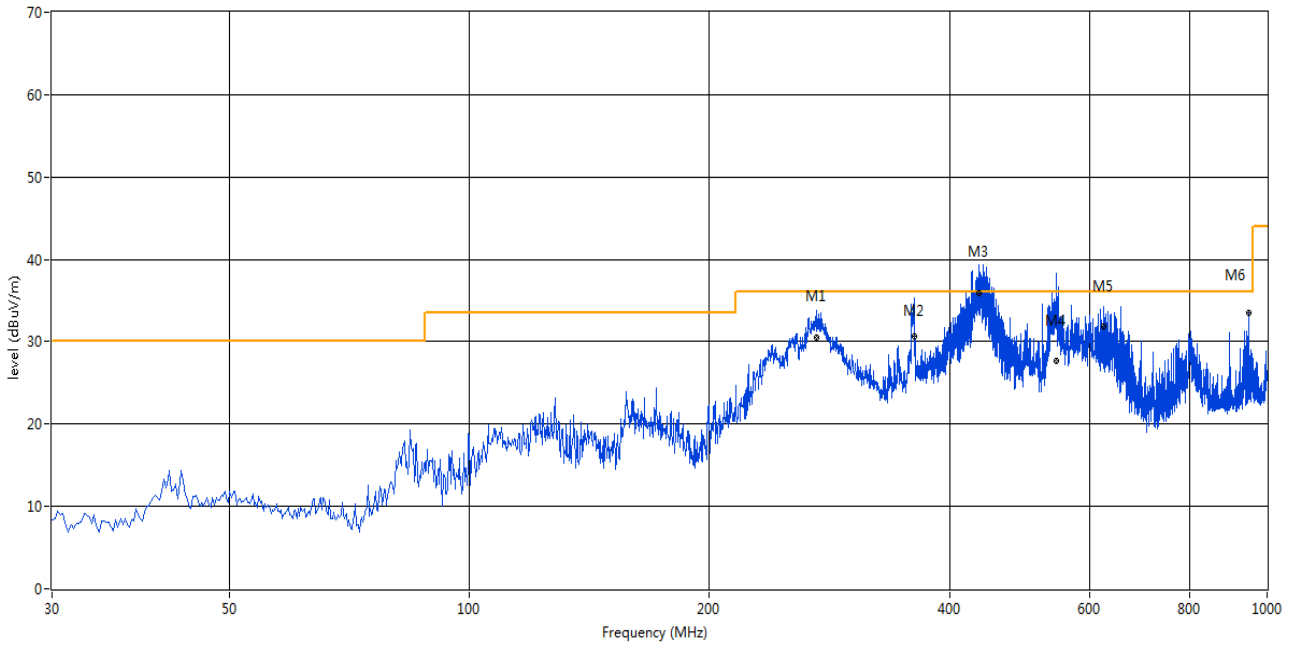
The TF Card Play Test Mode

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



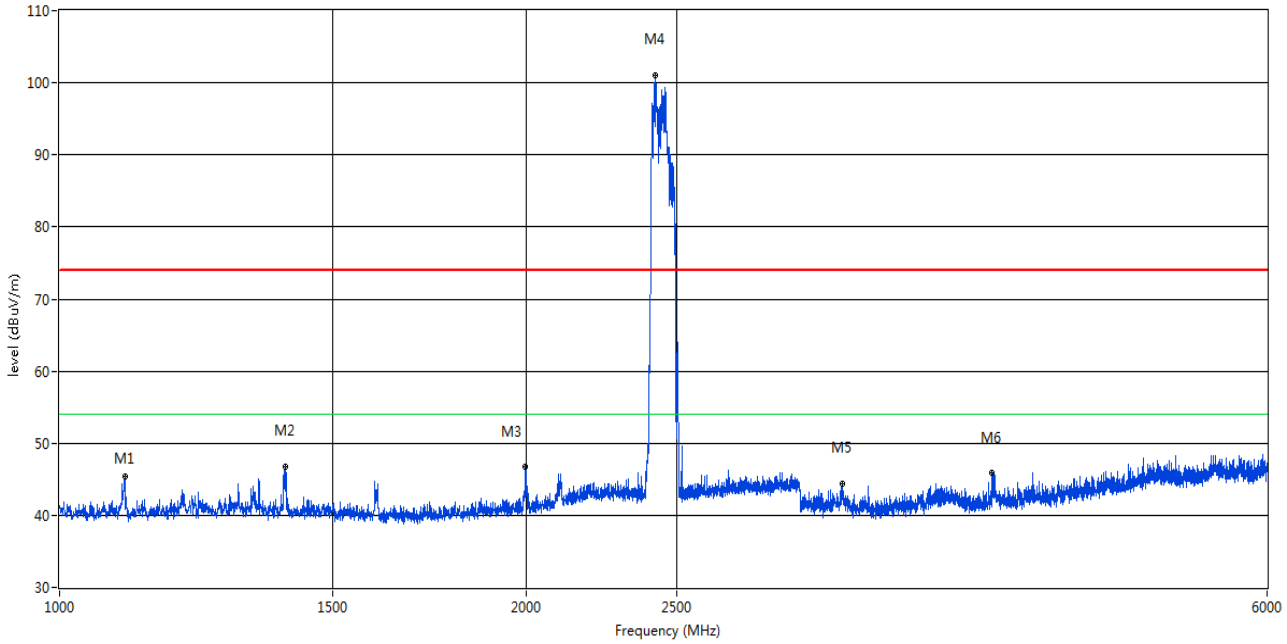
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	161.887	29.15	-17.85	33.5	4.35	Peak	234.00	100	Vertical	Pass
2	276.318	30.77	-12.91	36.0	5.23	Peak	268.00	100	Vertical	Pass
3	360.445	30.89	-10.55	36.0	5.11	Peak	128.00	100	Vertical	Pass
4	423.964	32.05	-9.10	36.0	3.95	Peak	90.00	100	Vertical	Pass
5	647.978	32.72	-4.97	36.0	3.28	Peak	215.00	400	Vertical	Pass
6	695.981	32.15	-4.10	36.0	3.85	Peak	165.00	300	Vertical	Pass

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



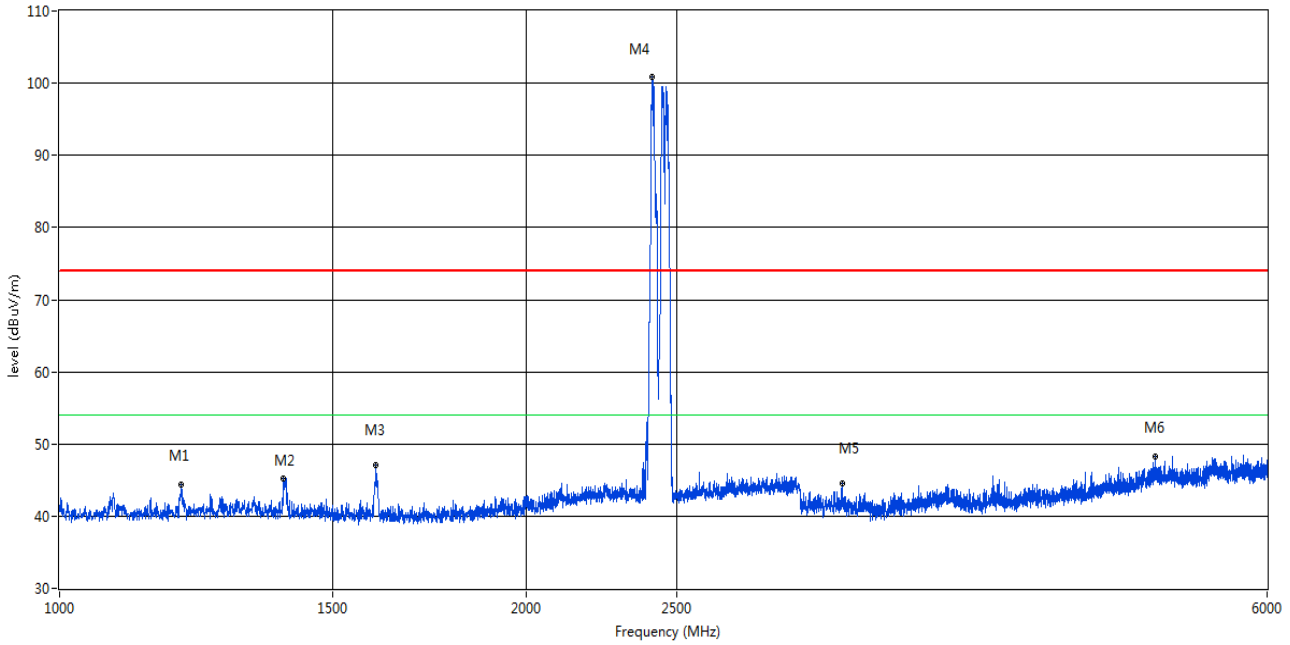
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	272.435	35.13	-13.06	36.0	0.87	Peak	199.00	400.00	Horizontal	N/A
1*	272.435	30.51	-13.06	36.0	5.49	QP	199.00	400.00	Horizontal	Pass
2	361.292	36.96	-10.56	36.0	-0.96	Peak	80.00	299.00	Horizontal	N/A
2*	361.292	30.63	-10.56	36.0	5.37	QP	80.00	299.00	Horizontal	Pass
3	435.518	40.91	-8.90	36.0	-4.91	Peak	134.00	237.00	Horizontal	N/A
3*	435.518	35.89	-8.90	36.0	0.11	QP	134.00	237.00	Horizontal	Pass
4	544.733	37.51	-6.94	36.0	-1.51	Peak	213.00	171.00	Horizontal	N/A
4*	544.733	27.69	-6.94	36.0	8.31	QP	213.00	171.00	Horizontal	Pass
5	623.668	35.34	-5.25	36.0	0.66	Peak	176.00	156.00	Horizontal	N/A
5*	623.668	31.92	-5.25	36.0	4.08	QP	176.00	156.00	Horizontal	Pass
6	948.002	35.72	-0.94	36.0	0.28	Peak	215.00	103.00	Horizontal	N/A
6*	948.002	33.56	-0.94	36.0	2.44	QP	215.00	103.00	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	1101.500	45.36	-7.49	74.0	28.64	Peak	161.70	100	Vertical	Pass
2	1399.000	46.75	-5.97	74.0	27.25	Peak	336.10	100	Vertical	Pass
3	1997.000	46.79	-4.53	74.0	27.21	Peak	181.10	100	Vertical	Pass
4	2418.500	101.03	-2.57	74.0	-27.03	Peak	31.20	100	Vertical	N/A
5	3195.750	44.32	6.49	74.0	29.68	Peak	151.40	100	Vertical	Pass
6	3990.750	45.84	8.55	74.0	28.16	Peak	359.10	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	1198.500	44.40	-6.86	74.0	29.60	Peak	5.20	100	Horizontal	Pass
2	1394.500	45.30	-6.01	74.0	28.70	Peak	3.00	100	Horizontal	Pass
3	1599.000	47.04	-6.06	74.0	26.96	Peak	8.60	100	Horizontal	Pass
4	2408.000	100.94	-2.37	74.0	-26.94	Peak	5.20	100	Horizontal	N/A
5	3192.750	44.59	6.43	74.0	29.41	Peak	228.20	100	Horizontal	Pass
6	5085.750	48.22	11.01	74.0	25.78	Peak	321.10	100	Horizontal	Pass

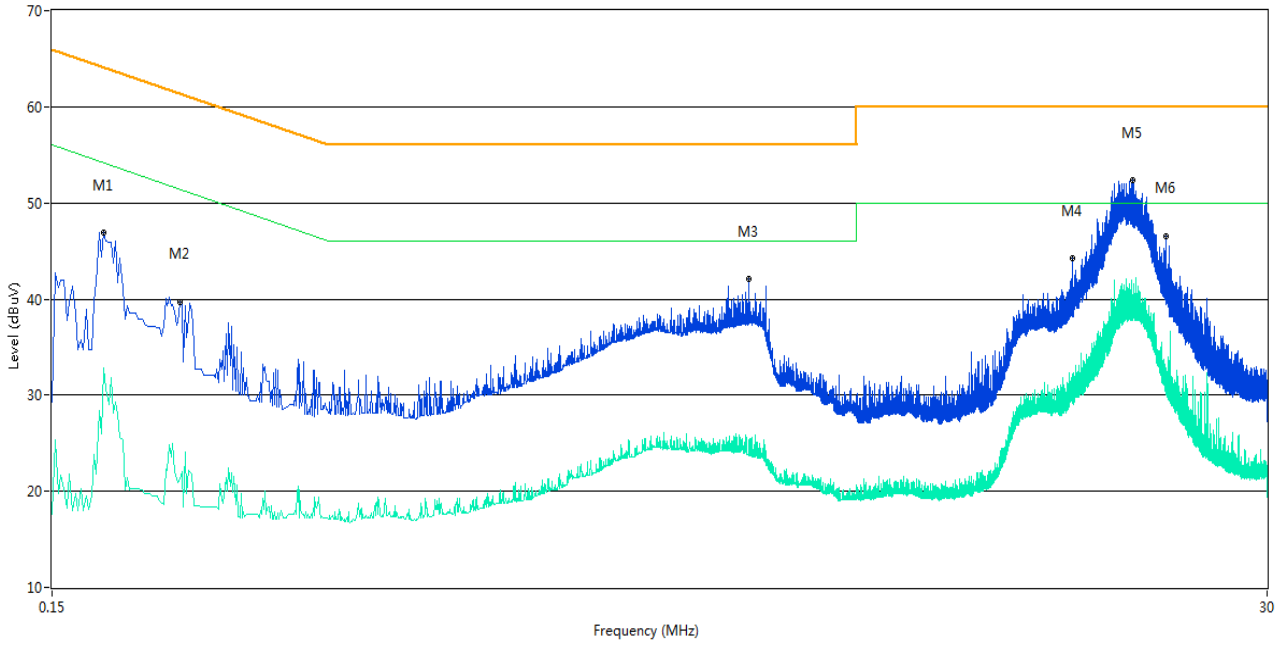
A.2 Conducted Emission

Test Data and Plots

The TF Card Play Test Mode

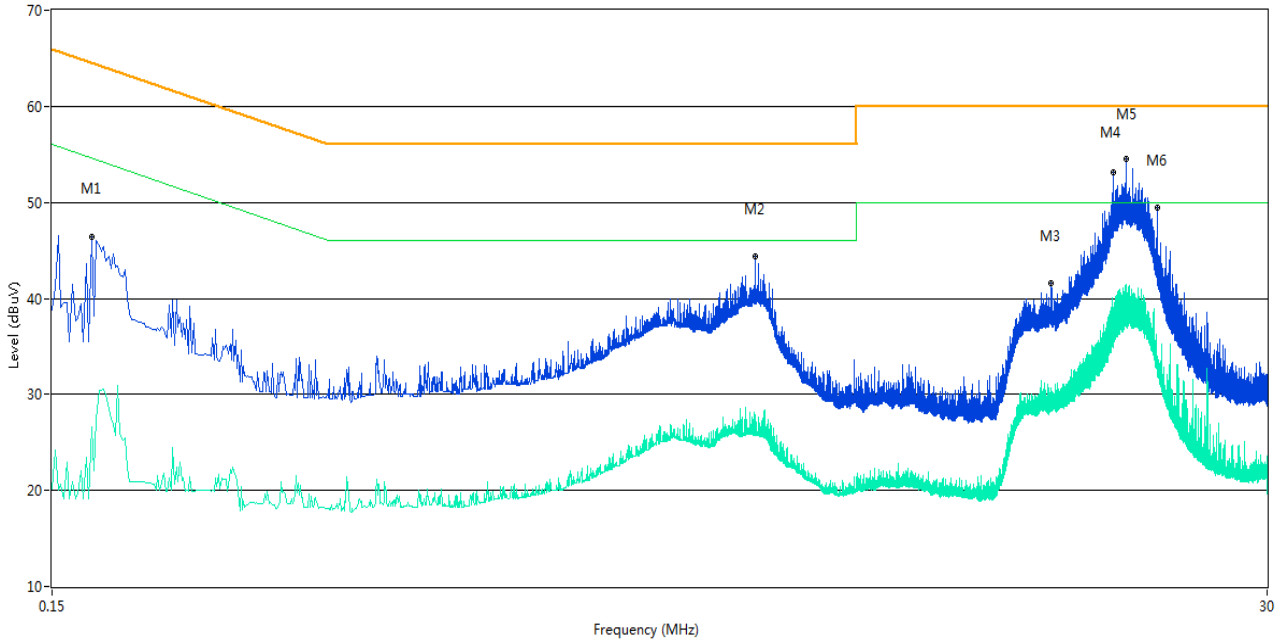
Note: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst 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	0.188	46.9	9.49	64.1	17.20	Peak	L Line	Pass
1**	0.188	32.9	9.49	54.1	21.20	AV	L Line	Pass
2	0.262	39.7	9.11	61.4	21.70	Peak	L Line	Pass
2**	0.262	21.2	9.11	51.4	30.20	AV	L Line	Pass
3	3.134	42.1	10.76	56.0	13.90	Peak	L Line	Pass
3**	3.134	25.2	10.76	46.0	20.80	AV	L Line	Pass
4	12.854	44.3	11.27	60.0	15.70	Peak	L Line	Pass
4**	12.854	31.4	11.27	50.0	18.60	AV	L Line	Pass
5	16.664	52.4	11.37	60.0	7.60	Peak	L Line	Pass
5**	16.664	39.1	11.37	50.0	10.90	AV	L Line	Pass
6	19.294	46.5	10.92	60.0	13.50	Peak	L Line	Pass
6**	19.294	32.9	10.92	50.0	17.10	AV	L Line	Pass

A.2.2 N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.178	46.5	10.16	64.6	18.10	Peak	N Line	Pass
1**	0.178	26.7	10.16	54.6	27.90	AV	N Line	Pass
2	3.222	44.3	11.01	56.0	11.70	Peak	N Line	Pass
2**	3.222	26.0	11.01	46.0	20.00	AV	N Line	Pass
3	11.696	41.6	10.32	60.0	18.40	Peak	N Line	Pass
3**	11.696	30.6	10.32	50.0	19.40	AV	N Line	Pass
4	15.368	53.1	11.41	60.0	6.90	Peak	N Line	Pass
4**	15.368	38.4	11.41	50.0	11.60	AV	N Line	Pass
5	16.204	54.5	11.40	60.0	5.50	Peak	N Line	Pass
5**	16.204	40.2	11.40	50.0	9.80	AV	N Line	Pass
6	18.560	49.4	10.91	60.0	10.60	Peak	N Line	Pass
6**	18.560	32.5	10.91	50.0	17.50	AV	N Line	Pass

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ1760349-AE.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ1760349-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ1760349-AI.PDF”.

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