

FCC

EMC

TEST REPORT

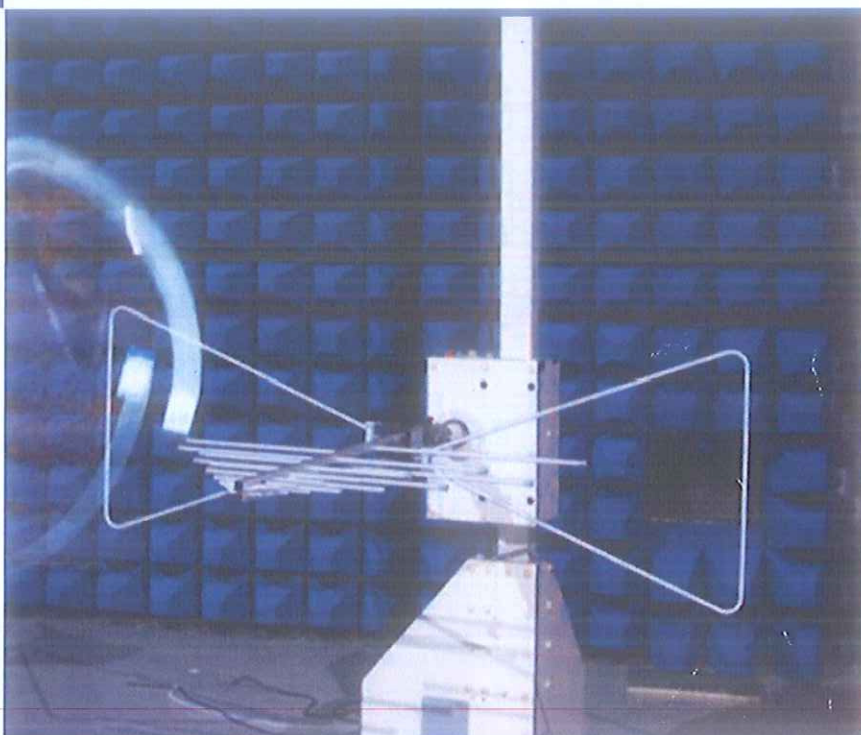
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
K2 Dual Core System

ISSUED TO
System Level Solutions Inc.

14100 Murphy Ave., San Martin, CA-95046, United States



Tested by: Xia Long

Xia Long
(Engineer)

Date: Mar. 16, 2017

Approved by: Wei Yanguan

Wei Yanguan
(Chief Engineer)

Date: Mar. 16, 2017

Report No.: BL-SZ1680264-401

EUT Type: K2 Dual Core System

Model Name: PI1WLDD000101

Brand Name: K2DC

Test Standard: 47 CFR Part 15 Subpart B

FCC ID: 2AHK5-PI1WLD101

Test Conclusion: Pass

Test Date: Aug. 26, 2016 ~ Mar. 15, 2017

Date of Issue: Mar. 16, 2017

NOTE: This test report can be duplicated completely for the legal use with the approval of the applicant; it shall not be reproduced except in full, without the written approval of Shenzhen BALUN Technology Co., Ltd. BALUN Laboratory. Any objections should be raised within thirty days from the date of issue. To validate the report, please visit BALUN website.

Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Mar. 03, 2017</u>	<u>Initial Issue</u>
<u>Rev. 02</u>	<u>Mar. 13, 2017</u>	<u>Increase FCC ID</u>
<u>Rev. 03</u>	<u>Mar. 16, 2017</u>	<u>Update Test Results</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	6
2.1	Applicant Information	6
2.2	Manufacturer Information	6
2.3	Factory Information	6
2.4	General Description for Equipment under Test (EUT)	6
2.5	Ancillary Equipment	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
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 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 v4.3.
- (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	System Level Solutions Inc.
Address	14100 Murphy Ave., San Martin, CA-95046, United States

2.2 Manufacturer Information

Manufacturer	System Level Solutions (India) Pvt. Ltd
Address	Plot #32, Zone-D/4, Phase-1, GIDC Estate, V. U. Nagar-388 121, Gujarat, India.

2.3 Factory Information

Factory	Pronology Services (China) Inc.
Address	The Second Industrial Zone, Lou Village, Gongming Town, Guangming Dist., 518106, Shenzhen, Guangdong, China

2.4 General Description for Equipment under Test (EUT)

EUT Type	K2 Dual Core System
Model Name Under Test	PI1WLDD000101
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	1B-01
Software Version	2.3.0
Dimensions (Approx.)	144mm x 55mm x 23 mm
Weight (Approx.)	0.098Kg
The Highest Speed of Processor	N/A
Network and Wireless connectivity	Bluetooth, WIFI
Product Type	Class B ITE

2.5 Ancillary Equipment

Ancillary Equipment 1	HDMI Cable	
	Length (Approx.)	30 cm
Ancillary Equipment 2	USB Data Cable	
	Length (Approx.)	103 cm
Ancillary Equipment 3	Ycable	
	Length (Approx.)	104 cm

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, Class B	Pass	Annex A .1
2	Conducted Emission, AC Ports	15.107, Class B	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)	4.12 dB
Radiated emissions (30 MHz-1 GHz)	4.16 dB
Radiated emissions (1 GHz-18 GHz)	5.97 dB
Radiated emissions (18 GHz-40 GHz)	6.71 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	DC 5 V	50%-55%	100 to 102 kPa

4.2 Test Equipment List

Radiated Emission Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHW ARZ	ESRP	101036	2016.07.05	2017.07.04	☒
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	☒
Test Antenna- Loop	SCHWARZBECK	FMZB 1519	1519-037	2015.07.22	2017.07.21	☐
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2015.02.28	2017.02.27	☒

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	☒
LISN	SCHWARZBECK	NSLK 8127	8127-687	2016.07.05	2017.07.04	☒
Shielded Enclosure	ChangNing	CN-130701	130703	N/A	N/A	☒

4.3 Test Enclosure list

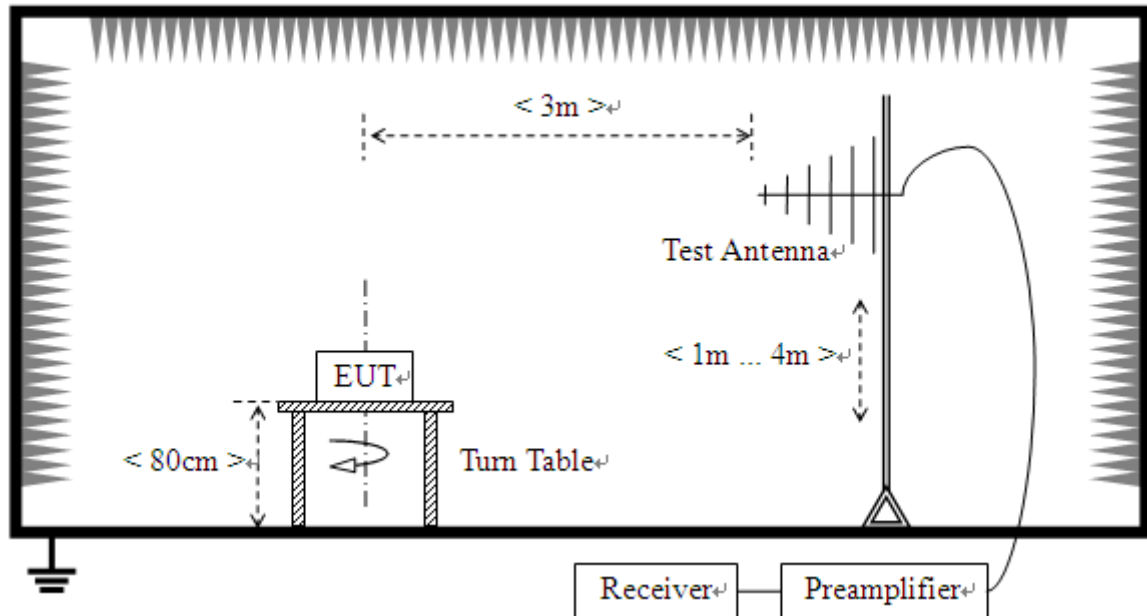
Description	Manufacturer	Model	Serial No.	Length	Description	Use
PC	N/A	N/A	N/A	N/A	Special Handled	☐
Laptop	Apple	A1465	N/A	N/A	N/A	☐
Printer	HP	DESKJET 1000	N/A	N/A	N/A	☐
Keyboard	Logitech	Y-BP62a	N/A	N/A	N/A	☐
Mouse	Logitech	M100	N/A	N/A	N/A	☐
USB disk	Kingston	N/A	N/A	N/A	N/A	☐
TF Card	Kingston	N/A	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	☐
Laptop	LENOVO	K29	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	ROHDE&SCH WARZ	HMP2020	18141664	N/A	N/A	☐
Display	Sony	KDL-32W600D	N/A	N/A	N/A	☒
RJ45 Cable	N/A	N/A	N/A	3 m	Shielded with core	☒
Adapter	Apple	N/A	N/A	N/A	N/A	☒

4.4 Test Configurations

Test Configurations (TC) No.	Description
TC01	<u>The Working test mode (Y Cable)</u> EUT + Ycable + WIFI Router + HDMI Cable+ Display + RJ45 Cable.
TC02	<u>The Working test mode (Adapter)</u> EUT + WIFI Router + HDMI Cable+ Display + Adapter + RJ45 Cable.

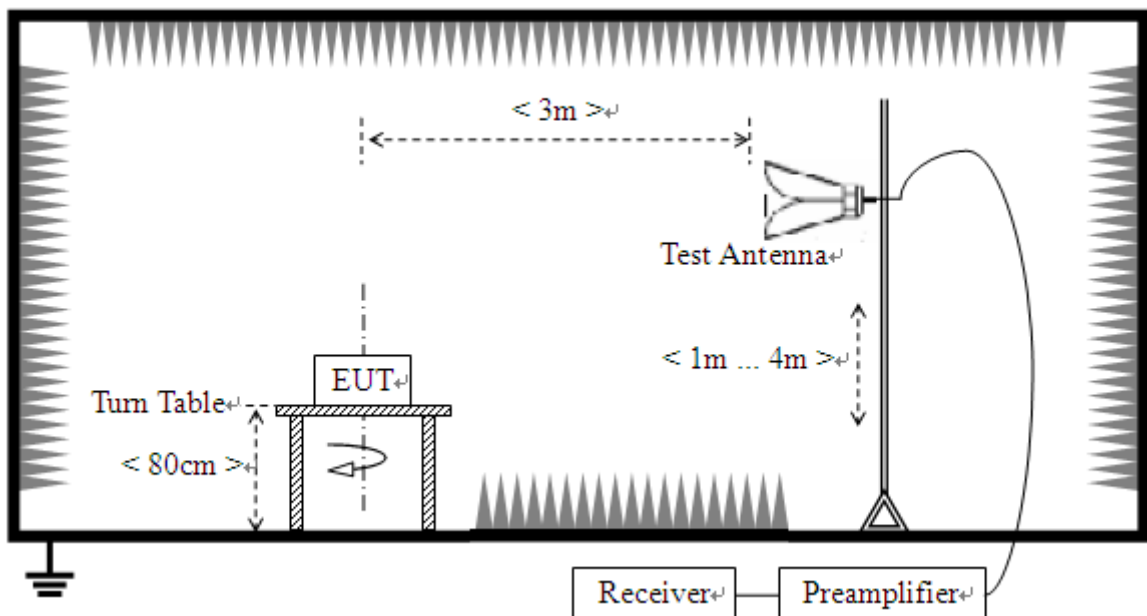
4.5 Test Setups

Test Setup 1



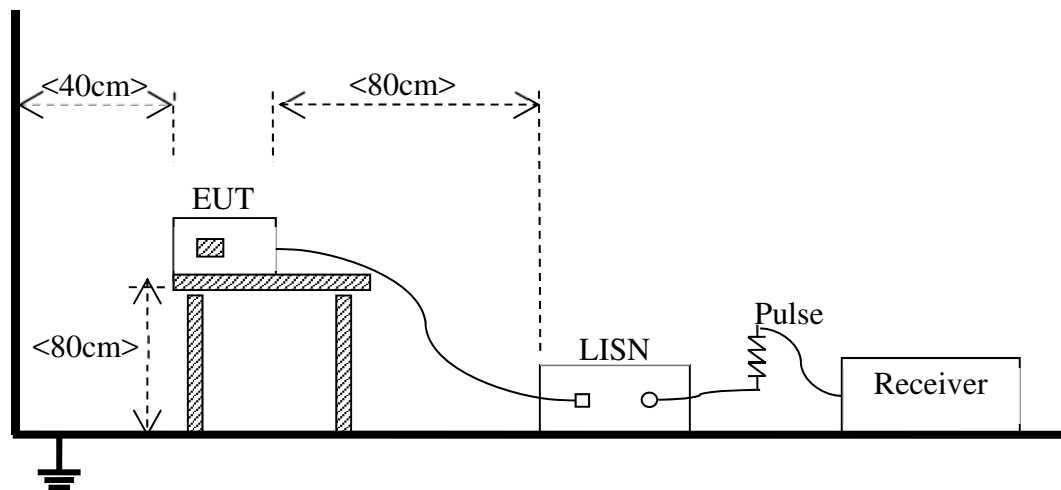
(For Radiated Emission Test (30 MHz-1 GHz))

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~TC02 ^{Note}
Conducted Emission, AC Ports	Test Env.	NTNV
	Test Setup	Test Setup 3
	Test Configuration	TC01~TC02 ^{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 Working test mode (Y Cable) 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 A (at 10 m)	
	Field Strength ($\mu\text{V/m}$)	Field Strength (dB $\mu\text{V/m}$)	Field Strength ($\mu\text{V/m}$)	Field Strength (dB $\mu\text{V/m}$)
30 - 88	100	40	90	39
88 - 216	150	43.5	150	43.5
216 - 960	200	46	210	46.4
Above 960	500	54	300	49.5

NOTE:

- 1) Field Strength (dB $\mu\text{V/m}$) = $20 \cdot \log$ [Field Strength ($\mu\text{V/m}$)].
- 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

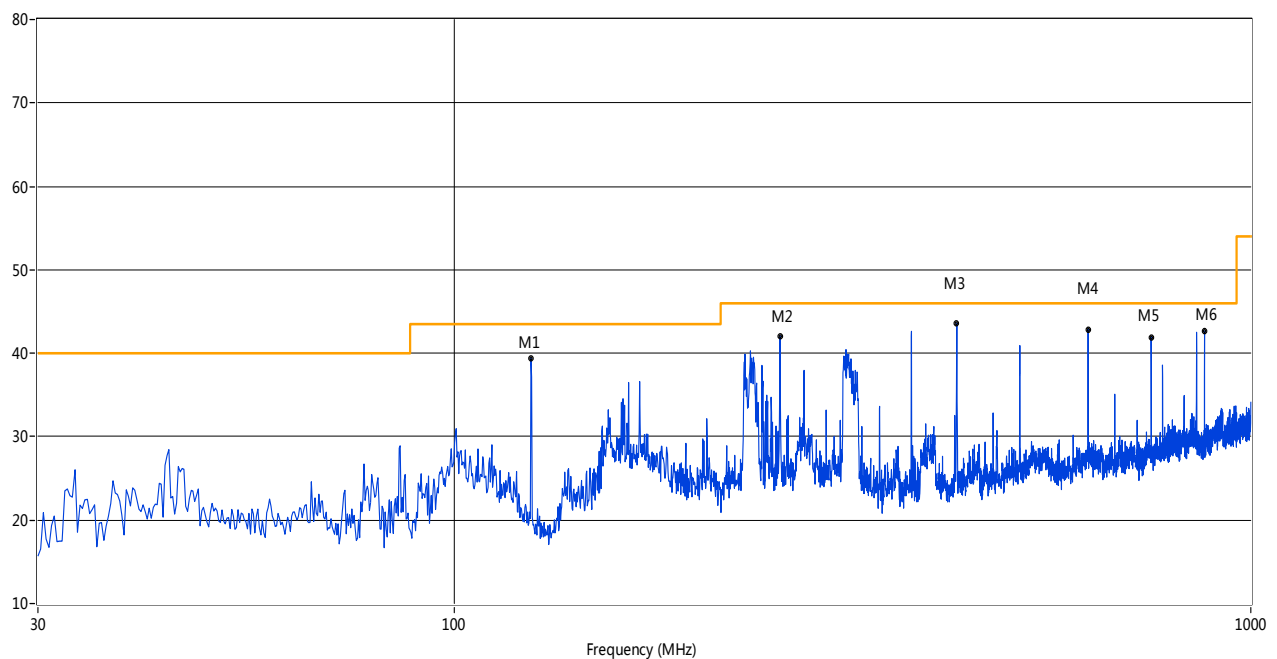
Note 1: The symbol of "--" in the table which means not application.

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

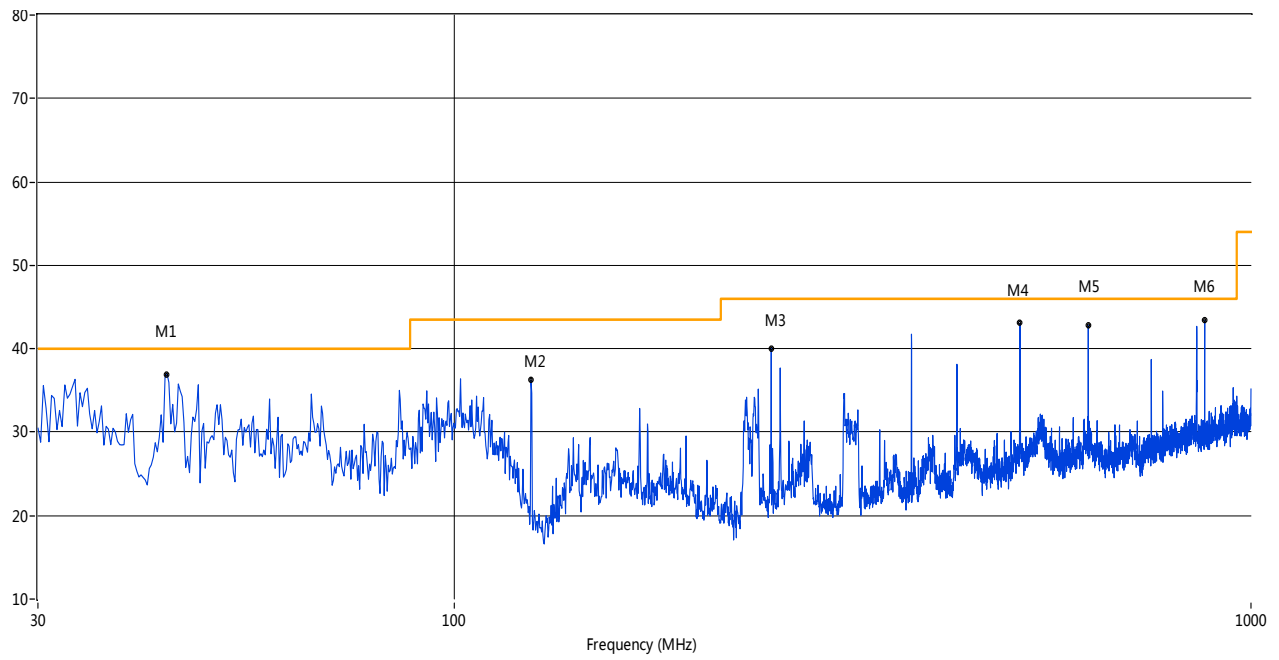
Working test mode (Y Cable)

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



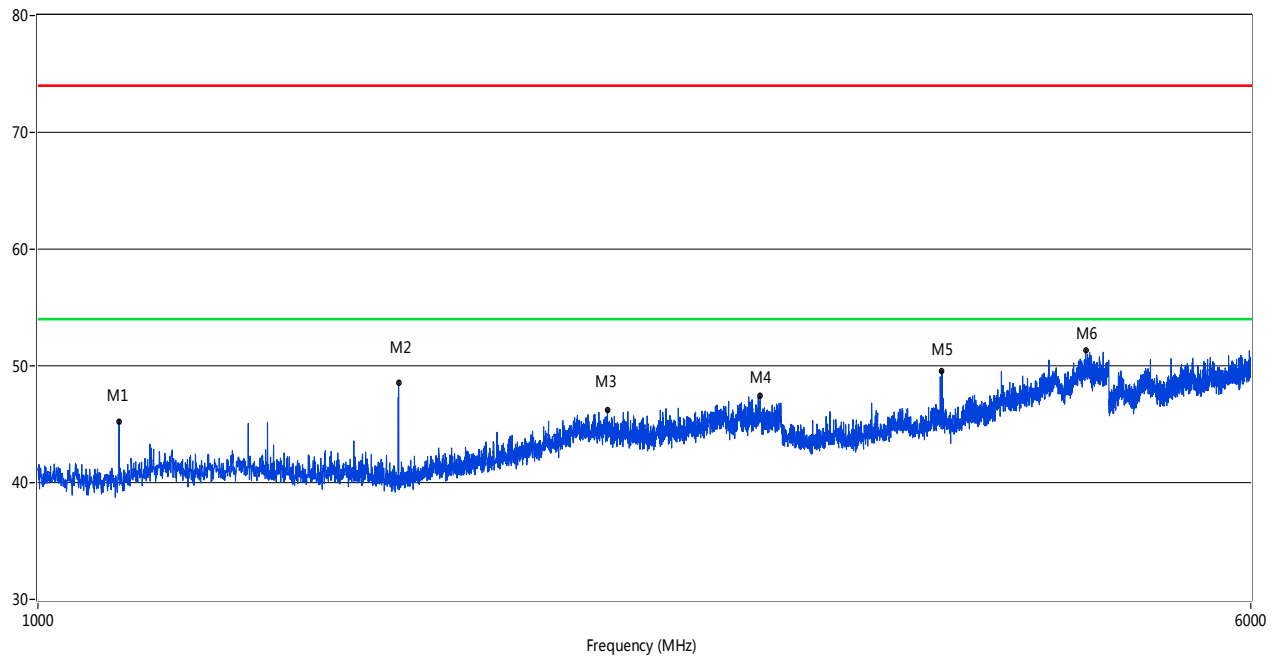
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	124.79	39.42	-22.47	43.5	4.08	Peak	338.00	100	Horizontal	Pass
2	256.44	42.08	-18.74	46.0	3.92	Peak	295.00	100	Horizontal	Pass
3	427.36	43.58	-14.62	46.0	2.42	Peak	221.00	100	Horizontal	N/A
3*	427.36	41.53	-14.62	46.0	4.47	QP	221.00	100	Horizontal	Pass
4	624.70	42.90	-10.25	46.0	3.10	Peak	73.00	100	Horizontal	Pass
5	749.80	41.95	-8.59	46.0	4.05	Peak	62.00	100	Horizontal	Pass
6	874.90	42.67	-6.24	46.0	3.33	Peak	94.00	100	Horizontal	Pass

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



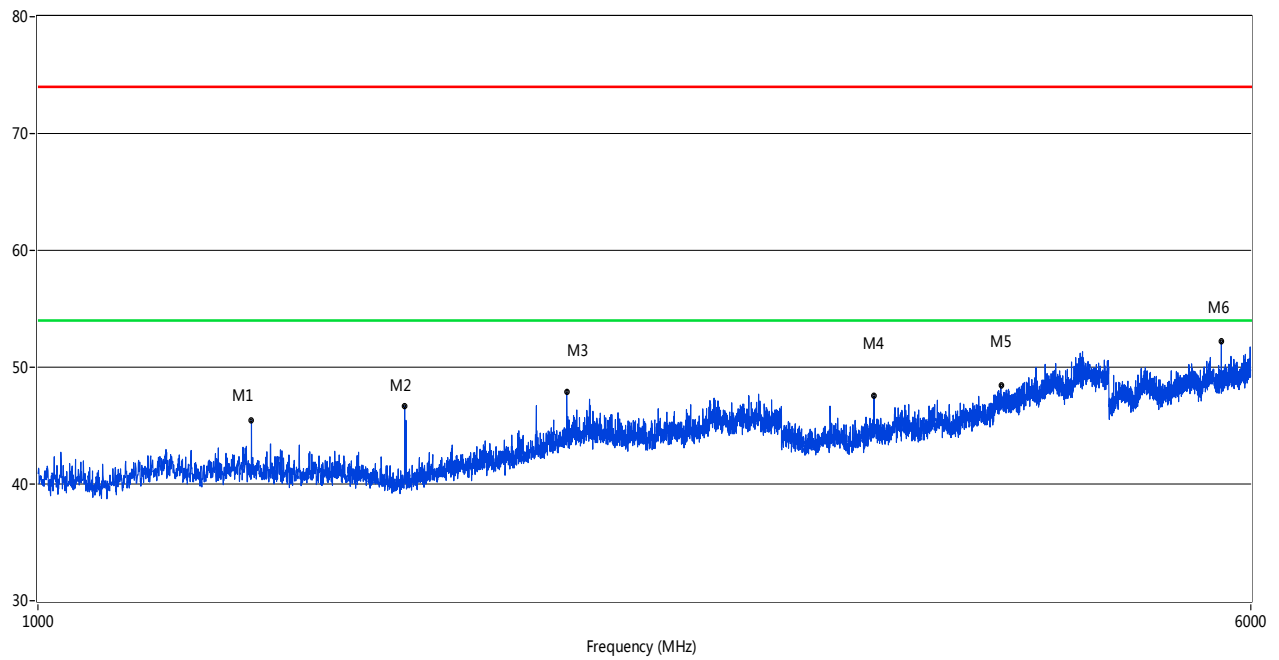
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	43.58	36.98	-18.95	40.0	3.02	Peak	178.00	100	Vertical	Pass
2	124.79	36.27	-22.47	43.5	7.23	Peak	63.00	100	Vertical	Pass
3	249.89	40.04	-18.94	46.0	5.96	Peak	227.00	100	Vertical	Pass
4	512.94	43.08	-13.01	46.0	2.92	Peak	224.00	100	Vertical	N/A
4*	512.94	40.01	-13.01	46.0	5.99	QP	224.00	100	Vertical	Pass
5	624.95	42.78	-10.27	46.0	3.22	Peak	165.00	100	Vertical	Pass
6	874.90	43.40	-6.24	46.0	2.60	Peak	61.00	100	Vertical	N/A
6*	874.90	41.74	-6.24	46.0	4.26	QP	61.00	100	Vertical	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	1127.47	45.26	-6.18	74.0	28.74	Peak	261.00	100	Vertical	Pass
2	1703.82	48.52	-4.17	74.0	25.48	Peak	195.00	100	Vertical	Pass
3	2319.67	46.21	-0.60	74.0	27.79	Peak	309.00	100	Vertical	Pass
4	2907.02	47.41	2.60	74.0	26.59	Peak	50.00	100	Vertical	Pass
5	3802.30	49.57	10.73	74.0	24.43	Peak	202.00	100	Vertical	Pass
6	4701.32	51.35	13.33	74.0	22.65	Peak	86.00	100	Vertical	Pass

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



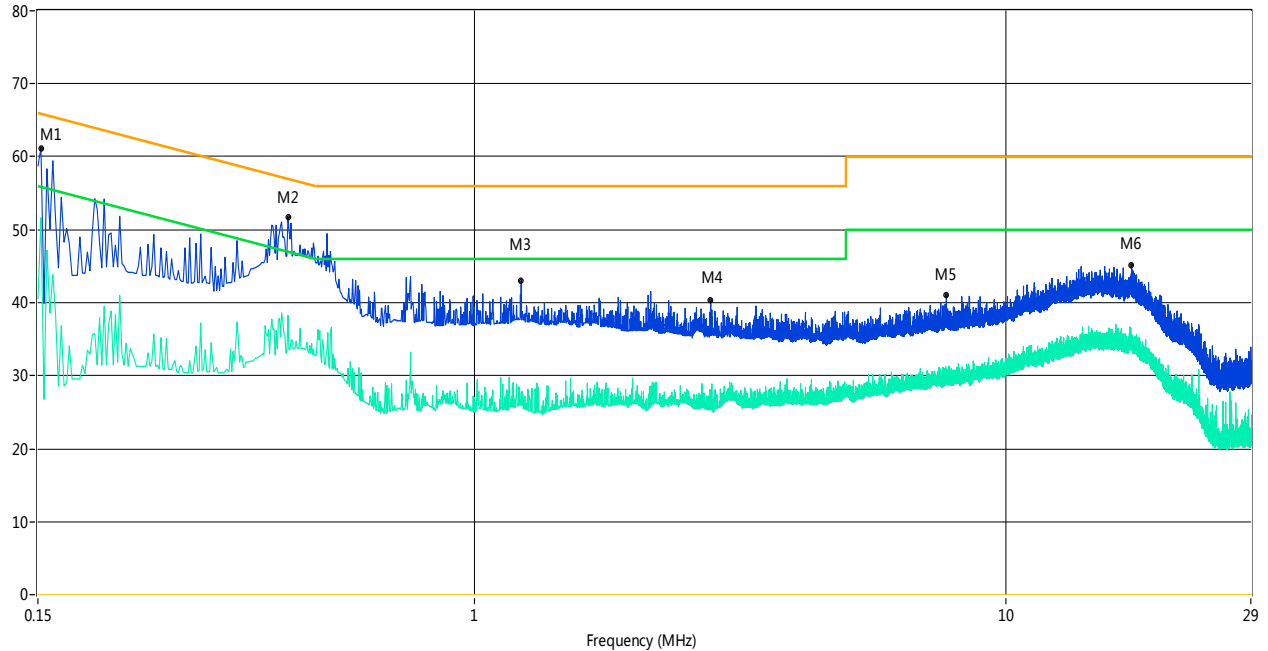
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1370.91	45.41	-4.50	74.0	28.59	Peak	117.00	100	Horizontal	Pass
2	1719.32	46.65	-4.10	74.0	27.35	Peak	274.00	100	Horizontal	Pass
3	2184.20	47.87	-0.87	74.0	26.13	Peak	257.00	100	Horizontal	Pass
4	3438.64	47.55	9.35	74.0	26.45	Peak	174.00	100	Horizontal	Pass
5	4147.96	48.40	11.44	74.0	25.60	Peak	34.00	100	Horizontal	Pass
6	5744.31	52.17	15.54	74.0	21.83	Peak	219.00	100	Horizontal	Pass

A.2 Conducted Emission

Test Data and Plots

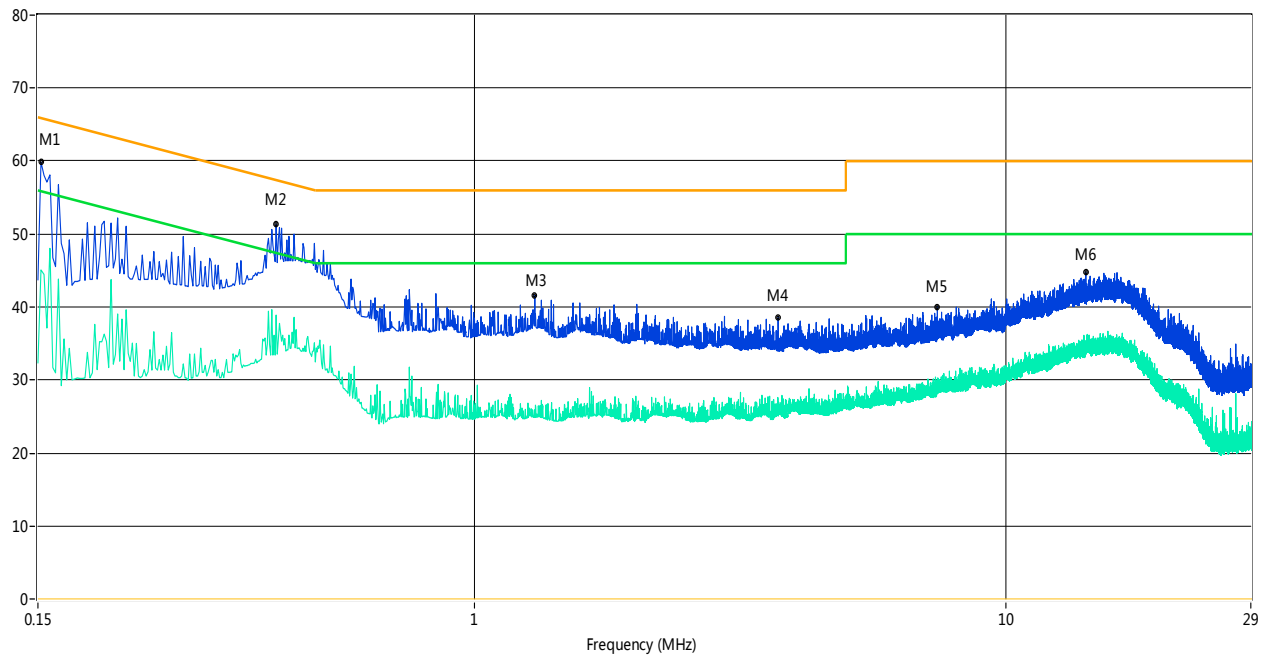
Working test mode (Y Cable)

A.2.1 L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.15	61.2	11.00	65.9	4.70	Peak	L Line	Pass
1**	0.15	51.7	11.00	55.9	4.20	AV	L Line	Pass
2	0.44	51.8	11.00	57.6	5.80	Peak	L Line	Pass
2**	0.44	38.3	11.00	47.6	9.30	AV	L Line	Pass
3	1.22	43.0	11.00	56.0	13.00	Peak	L Line	Pass
3**	1.22	27.7	11.00	46.0	18.30	AV	L Line	Pass
4	2.78	40.3	11.00	56.0	15.70	Peak	L Line	Pass
4**	2.78	25.5	11.00	46.0	20.50	AV	L Line	Pass
5	7.73	41.1	11.00	60.0	18.90	Peak	L Line	Pass
5**	7.73	30.5	11.00	50.0	19.50	AV	L Line	Pass
6	17.28	45.2	11.00	60.0	14.80	Peak	L Line	Pass
6**	17.28	34.1	11.00	50.0	15.90	AV	L Line	Pass

A.2.2 N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.15	59.9	11.00	65.9	6.00	Peak	N Line	Pass
1**	0.15	45.1	11.00	55.9	10.80	AV	N Line	Pass
2	0.42	51.3	11.00	58.2	6.90	Peak	N Line	Pass
2**	0.42	38.9	11.00	48.2	9.30	AV	N Line	Pass
3	1.30	41.6	11.00	56.0	14.40	Peak	N Line	Pass
3**	1.30	25.9	11.00	46.0	20.10	AV	N Line	Pass
4	3.73	38.6	11.00	56.0	17.40	Peak	N Line	Pass
4**	3.73	26.5	11.00	46.0	19.50	AV	N Line	Pass
5	7.44	40.0	11.00	60.0	20.00	Peak	N Line	Pass
5**	7.44	29.0	11.00	50.0	21.00	AV	N Line	Pass
6	14.17	44.8	11.00	60.0	15.20	Peak	N Line	Pass
6**	14.17	34.0	11.00	50.0	16.00	AV	N Line	Pass

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ1680264-AE.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ1680264-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ1680264-AI.PDF”.

--END OF REPORT--