

FCC

EMC

TEST REPORT

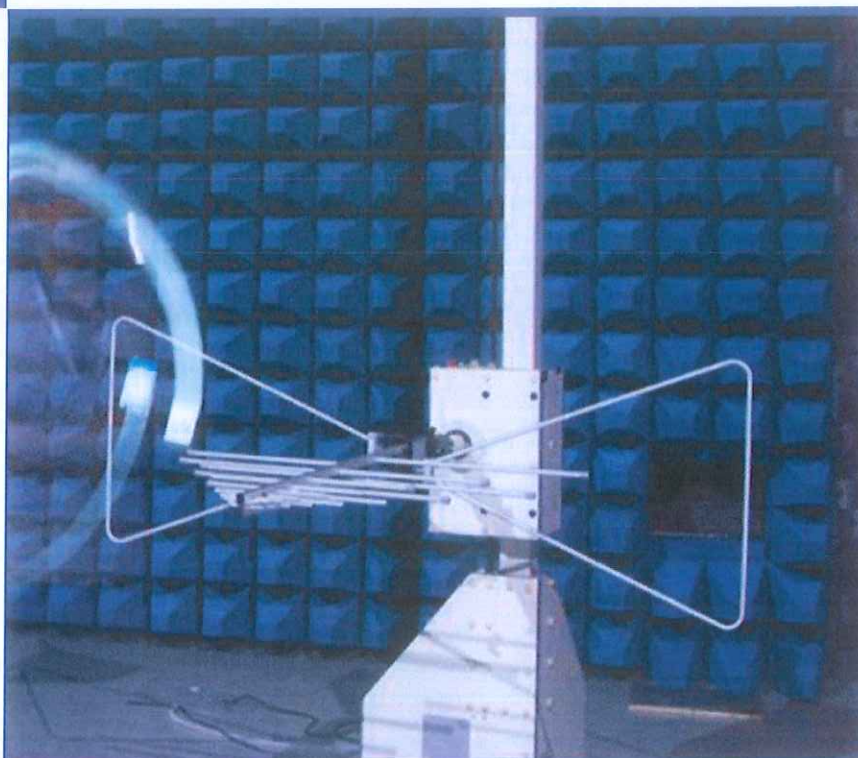
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
Automotive Diagnosis Terminal

ISSUED TO
Launch Tech Co., Ltd

Launch Industrial Park, North of Wuhe Road, Banxuegang Industrial Zone, Longgang District, Shenzhen City, Guangdong Province, China



Tested by: Xia Long
Xia Long

(Engineer)

Date: 09.06.2017

Approved by: Wei Yanquan

Wei Yanquan
(Chief Engineer)

Date: 09.21.2017



Report No.: BL-SZ1790067-401
EUT Name: Automotive Diagnosis Terminal
Model Name: DS401
Brand Name: LAUNCH
Test Standard: 47 CFR Part 15 Subpart B

Test Conclusion: Pass
Test Date: Sep. 06, 2017 ~ Sep. 12, 2017
Date of Issue: Sep. 21, 2017

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Revision History

<u>Version</u>	<u>Issue Date</u>	<u>Revisions Content</u>
<u>Rev. 01</u>	<u>Sep. 21, 2017</u>	<u>Initial Issue</u>

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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	<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 is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.</p> <p>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.</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 to 25°C
Ambient Relative Humidity	45% - 55%
Ambient Pressure	100 kPa - 102 kPa

1.4 Announce

- (1) The test report refer to the BALUN report mode 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	Launch Tech Co., Ltd
Address	Launch Industrial Park, North of Wuhe Road, Banxuegang Industrial Zone, Longgang District, Shenzhen City, Guangdong Province, China

2.2 Manufacturer Information

Manufacturer	Launch Tech Co., Ltd
Address	Launch Industrial Park, North of Wuhe Road, Banxuegang Industrial Zone, Longgang District, Shenzhen City, Guangdong Province, China

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	Automotive Diagnosis Terminal
Model Name Under Test	DS401
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A
Network and Wireless connectivity	Bluetooth

2.5 Ancillary Equipment

Note: Not applicable.

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	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	DC 9-18V	50%-55%	100 to 102 kPa

4.2 Test Equipment List

Radiated Emission						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2016.09.09	2018.09.08	<input checked="" type="checkbox"/>
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-624	2015.07.22	2018.07.20	<input checked="" type="checkbox"/>
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1148	2015.07.22	2018.07.20	<input checked="" type="checkbox"/>
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2019.02.20	<input checked="" type="checkbox"/>

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	<input checked="" type="checkbox"/>
LISN	SCHWARZBECK	NSLK 8127	8127-687	2017.06.22	2018.06.21	<input checked="" type="checkbox"/>
LISN	SCHWARZBECK	NNLK 8129	8129-462	2016.09.14	2017.09.13	<input type="checkbox"/>
AMN	SCHWARZBECK	NNBM8124	8124-509	2017.06.22	2018.06.21	<input type="checkbox"/>
AMN	SCHWARZBECK	NNBM8124	8124-510	2017.06.22	2018.06.21	<input type="checkbox"/>
ISN	TESEQ	ISN T800	34449	2017.06.22	2018.06.21	<input type="checkbox"/>
Shielded Enclosure	ChangNing	CN-130701	130703	N/A	N/A	<input checked="" type="checkbox"/>

4.3 Test Enclosure list

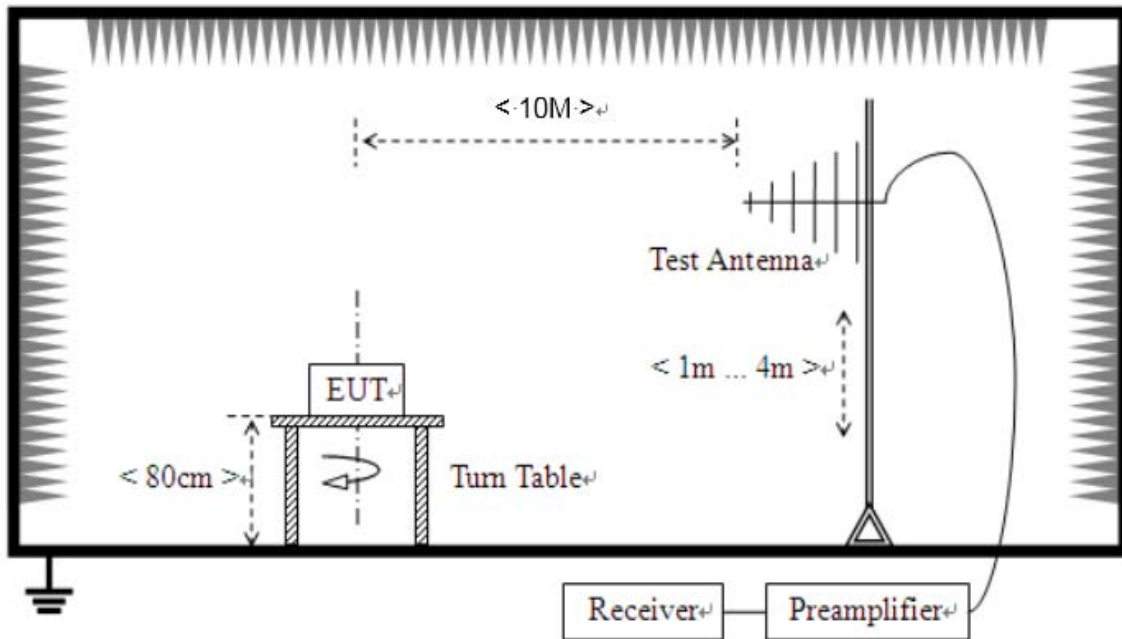
Description	Manufacturer	Model	Serial No.	Length	Description	Use
PC	Dell	015K3N	N/A	N/A	Special Handled	<input type="checkbox"/>
Laptop	Apple	A1465	N/A	N/A	N/A	<input type="checkbox"/>
Printer	HP	DESKJET 1000	N/A	N/A	N/A	<input type="checkbox"/>
Keyboard	Logitech	Y-BP62a	N/A	N/A	N/A	<input type="checkbox"/>
Mouse	Logitech	M100	N/A	N/A	N/A	<input type="checkbox"/>
USB disk	Kingston	N/A	N/A	N/A	N/A	<input type="checkbox"/>
TF Card	Kingston	N/A	N/A	N/A	N/A	<input 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 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 type="checkbox"/>
GPS/GLONASS 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 type="checkbox"/>
Earphone	N/A	OPPO	N/A	1.1 m	N/A	<input 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"/>
DC Power Supply	ITECH	IT6720	N/A	N/A	N/A	<input checked="" type="checkbox"/>
Tablet	LAUNCH	LenovoTB3-730F	N/A	N/A	N/A	<input checked="" type="checkbox"/>

4.4 Test Configurations

Test Configurations (TC) No.	Description
TC01	<u>The Working Test Mode (DC 9V Input)</u> EUT + DC Power Supply + Tablet
TC02	<u>The Working Test Mode (DC 12V Input)</u> EUT + DC Power Supply + Tablet
TC03	<u>The Working Test Mode (DC 18V Input)</u> EUT + DC Power Supply + Tablet

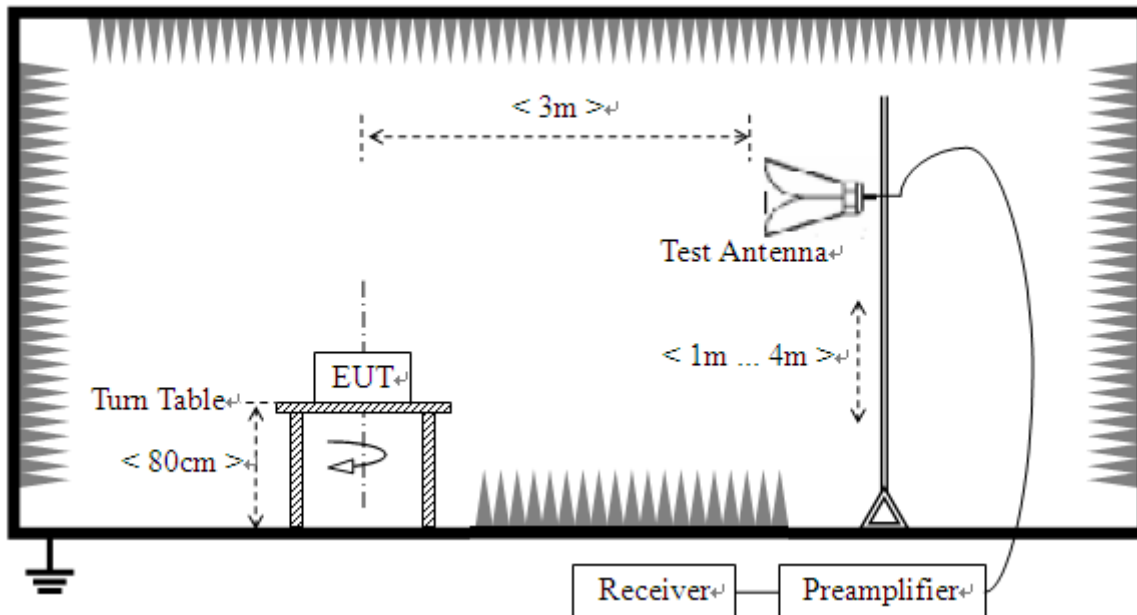
4.5 Test Setups

Test Setup 1



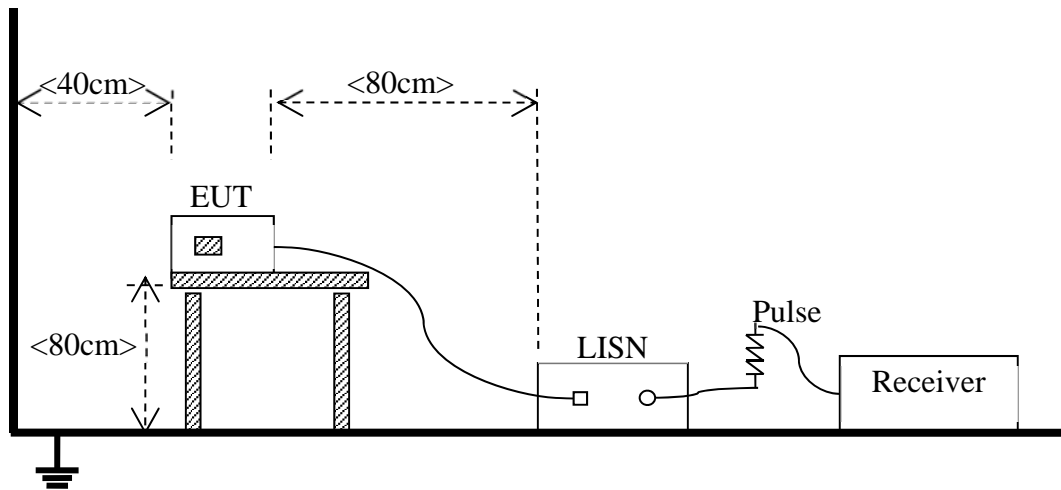
(For Radiated Emission Test (30 MHz-1 GHz))

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	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 Working Test Mode (DC 12V Input) 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 ($\mu\text{V/m}$)	Field Strength ($\text{dB}\mu\text{V/m}$)	Field Strength ($\text{dB}\mu\text{V/m}$)	Field Strength ($\mu\text{V/m}$)	Field Strength ($\text{dB}\mu\text{V/m}$)
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 ($\text{dB}\mu\text{V/m}$) = $20 \cdot \log$ [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 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 (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.

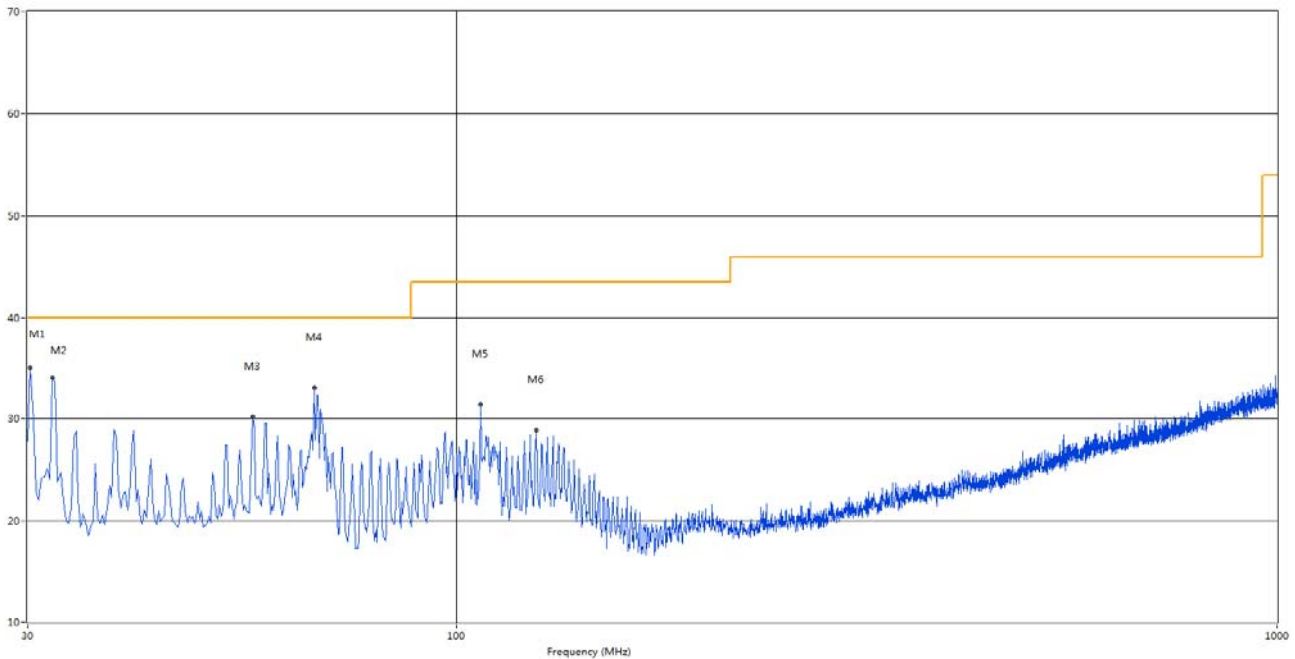
Note 2: For the test data above 1 GHz, according the ANSI C63.4-2014, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note 3: The marked spikes near 2400 MHz with circle should be ignored because they are Bluetooth carrier frequency.

Test Data and Plots

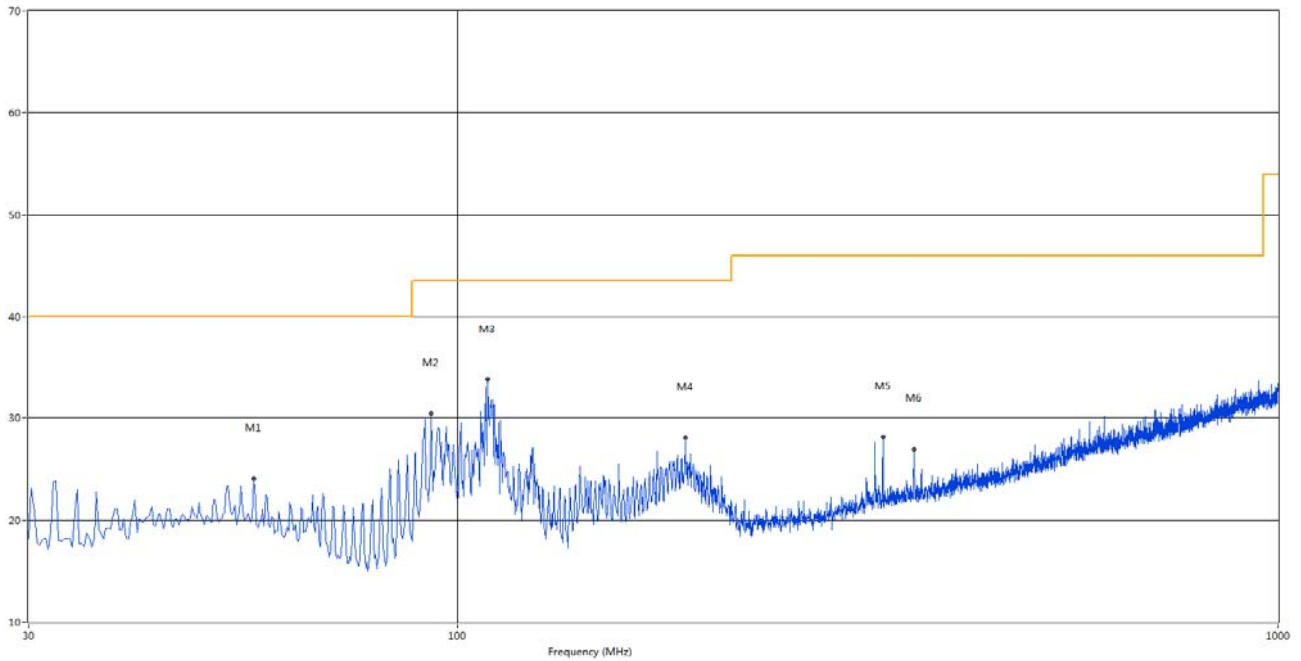
The Working Test Mode (DC 12V Input)

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



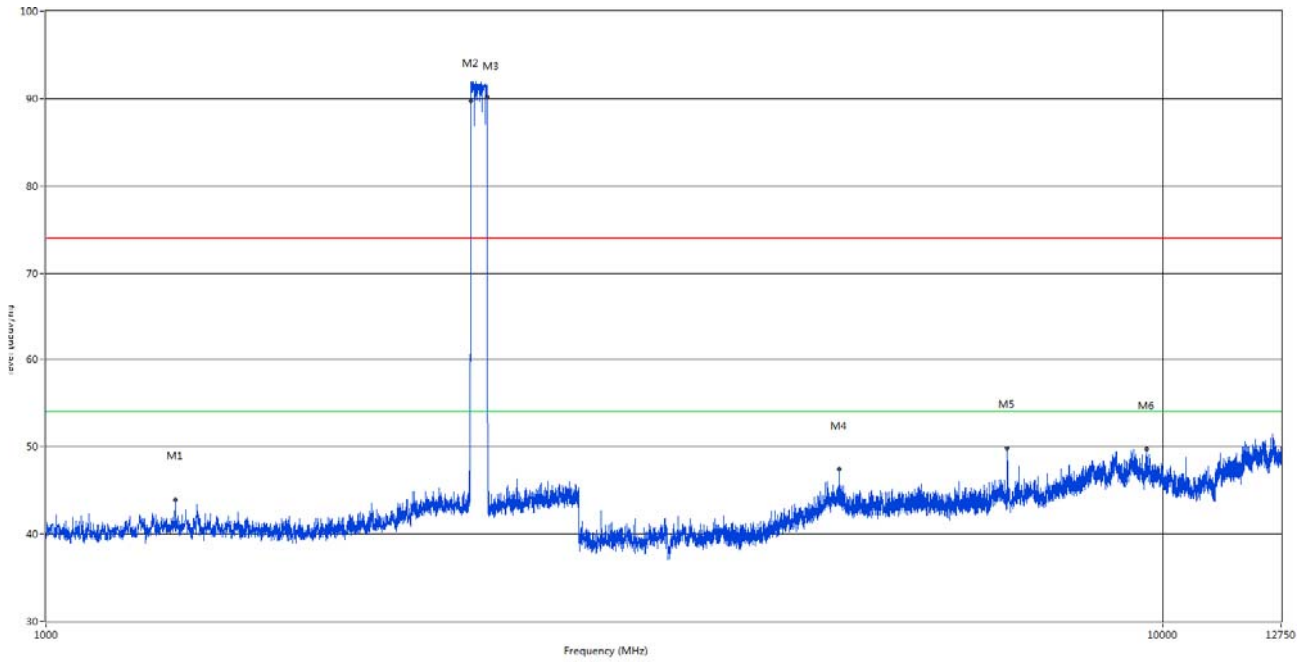
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	30.242	35.05	-22.38	40.0	4.95	Peak	0.00	200	Vertical	Pass
2	32.182	34.01	-22.50	40.0	5.99	Peak	0.00	200	Vertical	Pass
3	56.432	30.22	-20.02	40.0	9.78	Peak	34.60	100	Vertical	Pass
4	67.103	33.03	-22.09	40.0	6.97	Peak	0.00	200	Vertical	Pass
5	106.872	31.43	-20.90	43.5	12.07	Peak	78.30	100	Vertical	Pass
6	125.060	28.88	-23.46	43.5	14.62	Peak	178.70	100	Vertical	Pass

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



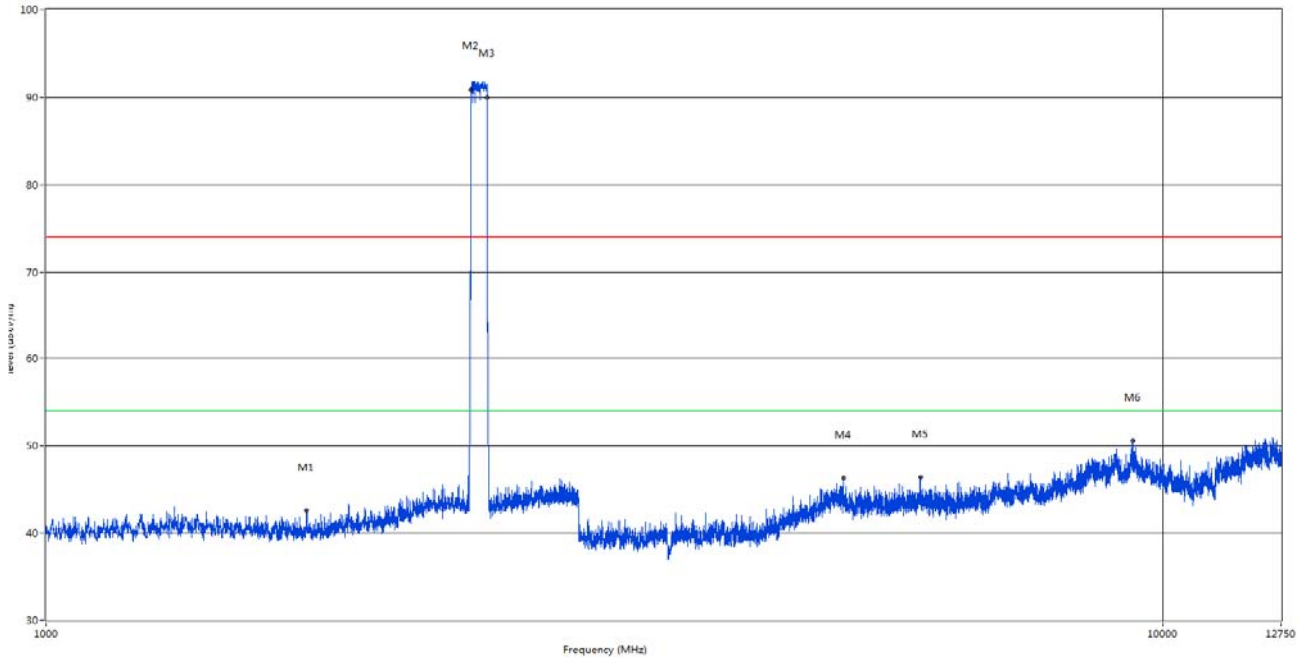
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	56.432	24.08	-20.02	40.0	15.92	Peak	1.00	300	Horizontal	Pass
2	92.808	30.42	-22.00	43.5	13.08	Peak	15.00	300	Horizontal	Pass
3	108.812	33.80	-20.97	43.5	9.70	Peak	0.00	300	Horizontal	Pass
4	189.322	28.03	-21.93	43.5	15.47	Peak	25.80	100	Horizontal	Pass
5	329.973	28.12	-17.75	46.0	17.88	Peak	73.50	100	Horizontal	Pass
6	360.042	26.96	-17.05	46.0	19.04	Peak	307.40	100	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	1304.500	43.95	-5.64	74.0	30.05	Peak	76.90	100	Vertical	Pass
2	2401.000	89.71	-1.72	74.0	-15.71	Peak	356.40	100	Vertical	N/A
3	2480.500	90.18	-2.09	74.0	-16.18	Peak	358.00	100	Vertical	N/A
4	5129.000	47.44	13.38	74.0	26.56	Peak	10.70	100	Vertical	Pass
5	7253.000	49.88	14.19	74.0	24.12	Peak	353.50	100	Vertical	Pass
6	9659.375	49.73	19.16	74.0	24.27	Peak	173.00	100	Vertical	Pass

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



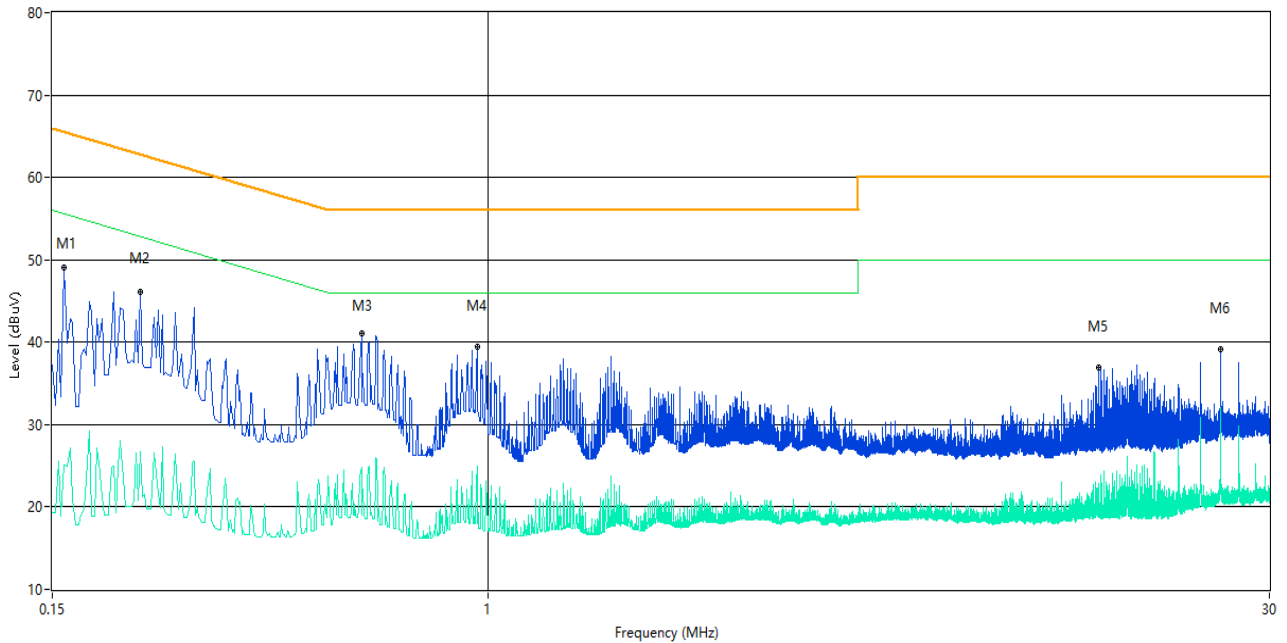
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1711.000	42.57	-5.28	74.0	31.43	Peak	287.20	100	Horizontal	Pass
2	2401.500	90.80	-1.72	74.0	-16.80	Peak	0.10	100	Horizontal	N/A
3	2480.500	89.94	-2.09	74.0	-15.94	Peak	54.30	100	Horizontal	N/A
4	5169.000	46.31	13.21	74.0	27.69	Peak	34.40	100	Horizontal	Pass
5	6065.000	46.37	13.21	74.0	27.63	Peak	211.70	100	Horizontal	Pass
6	9387.688	50.60	19.70	74.0	23.40	Peak	325.20	100	Horizontal	Pass

A.2 Conducted Emission

Test Data and Plots

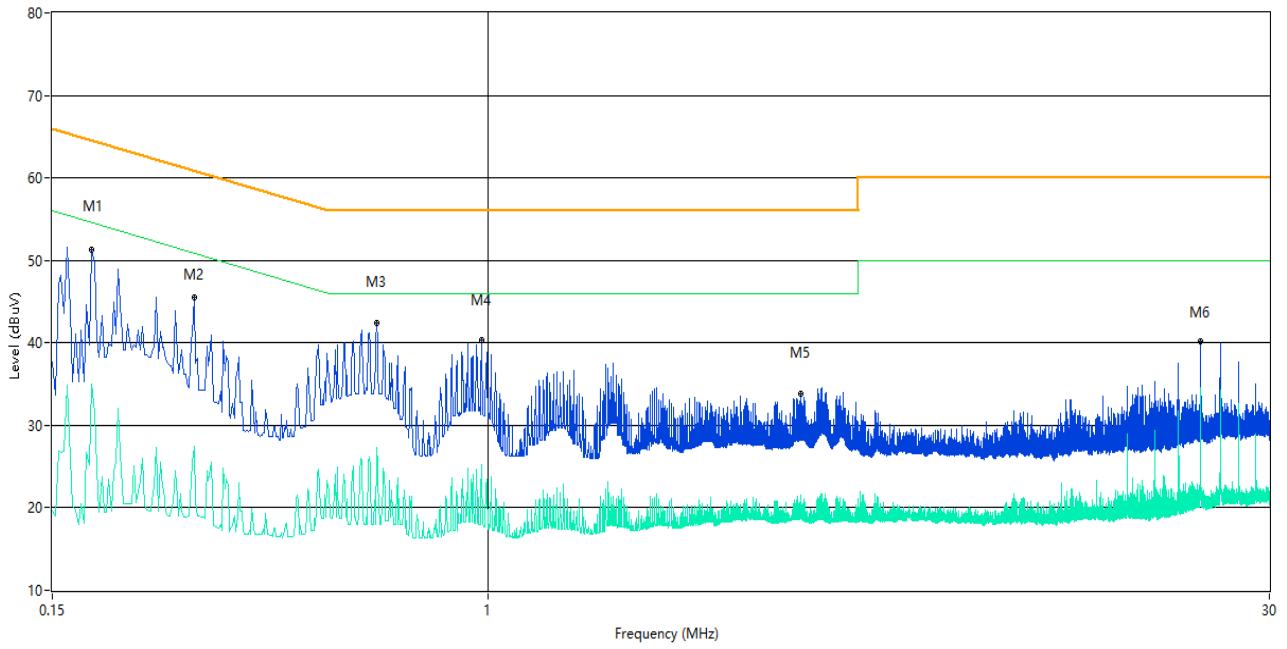
The Working Test Mode (DC 12V Input)

A.2.1 L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.158	49.0	10.41	65.6	16.60	Peak	L Line	Pass
1**	0.158	25.0	10.41	55.6	30.60	AV	L Line	Pass
2	0.220	46.1	11.35	62.8	16.70	Peak	L Line	Pass
2**	0.220	26.7	11.35	52.8	26.10	AV	L Line	Pass
3	0.576	41.0	10.26	56.0	15.00	Peak	L Line	Pass
3**	0.576	24.8	10.26	46.0	21.20	AV	L Line	Pass
4	0.954	39.5	10.22	56.0	16.50	Peak	L Line	Pass
4**	0.954	25.0	10.22	46.0	21.00	AV	L Line	Pass
5	14.290	36.9	11.29	60.0	23.10	Peak	L Line	Pass
5**	14.290	22.9	11.29	50.0	27.10	AV	L Line	Pass
6	24.256	39.2	11.64	60.0	20.80	Peak	L Line	Pass
6**	24.256	31.3	11.64	50.0	18.70	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	51.3	10.16	64.6	13.30	Peak	N Line	Pass
1**	0.178	35.0	10.16	54.6	19.60	AV	N Line	Pass
2	0.278	45.5	10.72	60.9	15.40	Peak	N Line	Pass
2**	0.278	27.5	10.72	50.9	23.40	AV	N Line	Pass
3	0.616	42.5	11.40	56.0	13.50	Peak	N Line	Pass
3**	0.616	27.3	11.40	46.0	18.70	AV	N Line	Pass
4	0.972	40.3	9.80	56.0	15.70	Peak	N Line	Pass
4**	0.972	25.2	9.80	46.0	20.80	AV	N Line	Pass
5	3.910	33.8	10.02	56.0	22.20	Peak	N Line	Pass
5**	3.910	21.6	10.02	46.0	24.40	AV	N Line	Pass
6	22.228	40.2	11.22	60.0	19.80	Peak	N Line	Pass
6**	22.228	32.9	11.22	50.0	17.10	AV	N Line	Pass

ANNEX B TEST SETUP PHOTOS

Please refer the document "BL-SZ1790067-AE.PDF".

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document "BL-SZ1790067-AW.PDF".

ANNEX D EUT INTERNAL PHOTOS

Please refer the document "BL-SZ1790067-AI.PDF".

--END OF REPORT--