FCC/ISED RF TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

Ring Keypad

ISSUED TO
LEEDARSON LIGHTING CO., LTD.

Xingtai Industrial Zone, Changtai County, Zhangzhou, Fujian, China

Report No.:	BL-SZ1850267-601
EUT Name:	Ring Keypad
Model Name:	4AK1S70EN0
Brand Name:	LEEDARSON
Test Standard:	47 CFR Part 15 Subpart C
	RSS-210 Issue 9(2016-08)
	RSS-Gen Issue 4(2014-11)
FCC ID:	2AB2Q-BHAKP001
ISED Number	10256A-BHAKP001
Test Conclusion:	Pass
Test Date:	Sep. 04, 2017 ~ Sep. 06, 2017
Date of Issue:	Jun. 13, 2018

Tested by: Hu Chao
Hu Chao
(Engineer)
Date: Jun. 13, 2018

Approved by:
Wei Yanquan
(Chief Engineer)
Date:

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Revision History

Version	Issue Date	Revisions Content
Rev. 01	Jun. 13, 2018	Initial Issue

TABLE OF CONTENTS

1 ADMINISTRATIVE DATA (GENERAL INFORMATION) 5
1.1 Identification of the Testing Laboratory 5
1.2 Identification of the Responsible Testing Location 5
1.3 Laboratory Condition 5
1.4 Announce 5
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
2.6 Technical Information 7
2.7 Additional Instructions 8
3 SUMMARY OF TEST RESULTS 9
3.1 Test Standards 9
3.2 Verdict 9
4 GENERAL TEST CONFIGURATIONS 10
4.1 Test Environments 10
4.2 Test Equipment List 10
4.3 Measurement Uncertainty 11
4.4 Description of Test Setup 12
4.4.1 For Antenna Port Test 12
4.4.2 For AC Power Supply Port Test 12
4.4.3 For Radiated Test (Below 30 MHz) 13
4.4.4 For Radiated Test (30 MHz-1 GHz) 13
4.4.5 For Radiated Test (Above 1 GHz) 14

5 TEST ITEMS 15
5.1 Antenna Requirements 15
5.1.1 Relevant Standards 15
5.1.2 Antenna Anti-Replacement Construction 15
5.1.3 Antenna Gain 15
5.2 20 dB and 99% Bandwidth 16
5.2.1 Limit 16
5.2.2 Test Setups 16
5.2.3 Test Procedure 16
5.2.4 Test Result 16
5.3 AC Conducted Emission 17
5.3.1 Limit 17
5.3.2 Test Setups 17
5.3.3 Test Procedure 17
5.3.4 Test Result 17
5.4 Field strength of Fundamental emissions 18
5.4.1 Limit 18
5.4.2 Test Setups 18
5.4.3 Test Procedure 18
5.4.4 Test Result 18
5.5 Radiated Spurious Emission and Band Edge Measurement 19
5.5.1 Limit 19
5.5.2 Test Setups 19
5.5.3 Test Procedure 19
5.5.4 Test Result 20
ANNEX A TEST RESULT 21
A.1 20 dB and 99% Bandwidth 21
A.2 AC Conducted Emission 21
A.3 Field Strength of Fundamental Emission 22
A.4 Radiated Emission and Bandedge Measurement 23
ANNEX B TEST SETUP PHOTOS 32
ANNEX C EUT EXTERNAL PHOTOS 32

ANNEX D EUT INTERNAL PHOTOS..... 32

1 ADMINISTRATIVE DATA (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℃ to 25℃
Ambient Relative Humidity	45% to 55%
Ambient Pressure	100 kPa to 102 kPa

1.4 Announce

(1) The test report reference to the report template version v2.5.

(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	LEEDARSON LIGHTING CO., LTD.
Address	Xingtai Industrial Zone, Changtai County, Zhangzhou, Fujian, China

2.2 Manufacturer Information

Manufacturer	N/A
Address	N/A

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	Ring Keypad
Model Name Under Test	4AK1S70EN0
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

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	Great Power
	Model No.	GSP454487
	Serial No.	N/A
	Capacitance	2200 mAh
	Rated Voltage	3.7 V
	Limit Charge Voltage	4.2 V
Ancillary Equipment 2	Adapter	
	Brand Name	INNOV
	Model No.	IVP0500-1000U
	Serial No.	N/A
	Rated Input	100-240 V~, 0.5 A, 50/60 Hz
	Rated Output	5 V⎓ 1 A
Ancillary Equipment 3	USB Cable	
	Length (Approx.)	2.0 m

2.6 Technical Information

Network and Wireless connectivity	Z-Wave

The requirement for the following technical information of the EUT was tested in this report:

Modulation Type	Z-wave
Product Type	☒ Mobile ☐ Portable ☐ Fix Location
Frequency Range	902 MHz to 928 MHz
Tested Channel	Low (908.4 MHz), Middle (908.42 MHz), High (916 MHz)
Antenna Type	PCB Antenna
Antenna Gain	2.7 dBi (All involve the antenna gain test item, has been included in the final results)

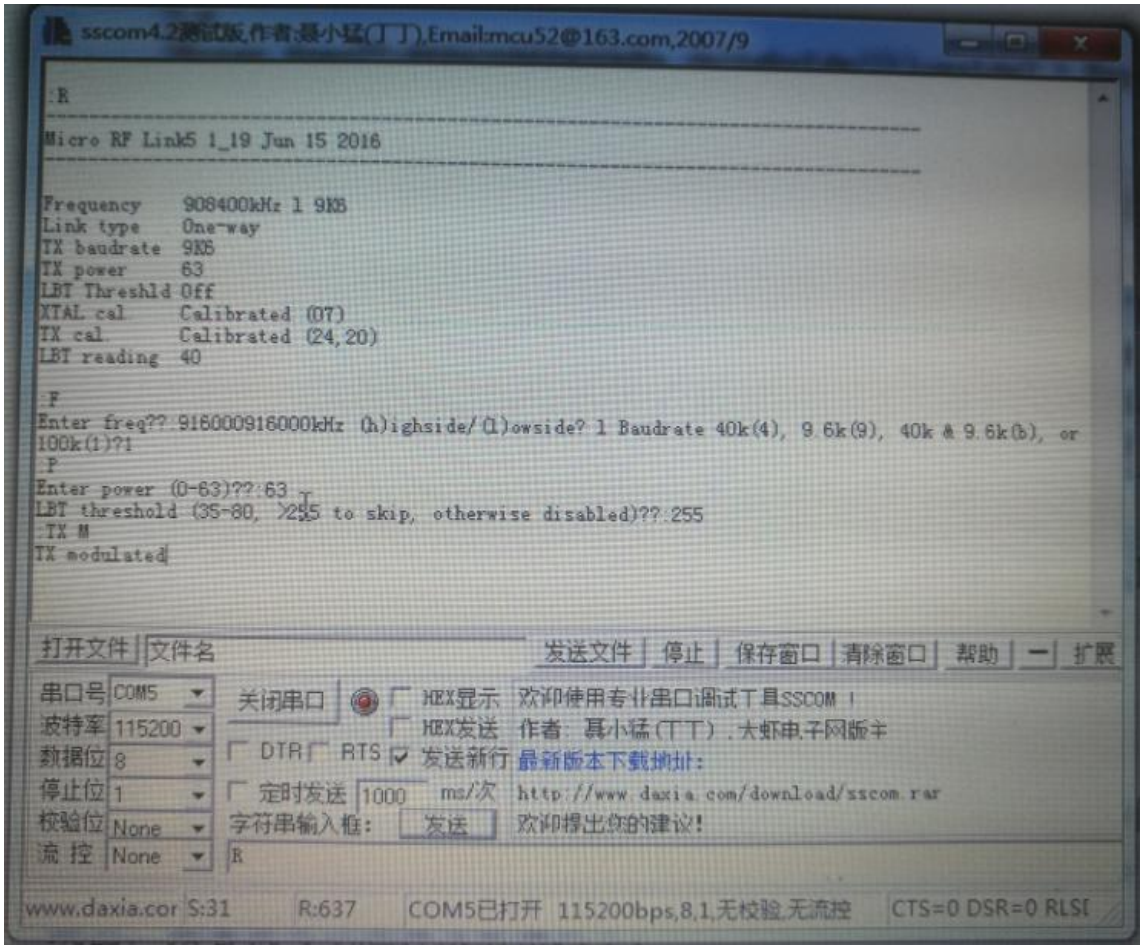
2.7 Additional Instructions

EUT Software Settings:

Mode	☒ Special software is used. The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

Power level setup in software			
Test Software Version	SSCOM3.2		
Support Units (Software installation media)	Description	Manufacturer	Model
	Laptop	Lenovo	E31-80
Mode	Channel	Frequency (MHz)	Soft Set
GFSK	High	916	Power parameter Settings is 63
FSK	Middle	908.42	
	Low	908.4	

Run Software:



3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C (10-1-16 Edition)	Intentional Radiators
2	RSS-Gen (Issue 4, Nov. 2014)	General Requirements for Compliance of Radio Apparatus
3	RSS-210 (Issue 9, August 2016)	Licence-Exempt Radio Apparatus: Category I Equipment
4	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

3.2 Verdict

No.	Description	FCC Part No.	ISED Part No.	Test Result	Verdict	Remark
1	Antenna Requirement	15.203	RSS-Gen 8.3	--	Pass	Note[1]
2	20 dB and 99% Bandwidth	15.215(c)	RSS-Gen 6.6	ANNEX A.1	Pass	--
3	AC Conducted Emission	15.207	RSS-Gen 8.8	ANNEX A.2	Pass	--
4	Field Strength of Fundamental Emissions	15.249(a)	RSS-210 B.10 RSS-Gen 8.9	ANNEX A.3	Pass	--
5	Radiated Emission Test and Band Edge Measurement	15.249(a) 15.249(d) 15.209	RSS-210 B.10 RSS-Gen 8.10	ANNEX A.4	Pass	Note[2]

Note[1]: The EUT has a permanently and irreplaceable attached antenna, which complies with the requirement FCC 15.203.

Note[2]: the limit is 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 15.209

Note[3]: The only difference between the EUT (test samples in this report) and testing sample of report No. is BL-SZ1790048-601, which was issued by Shenzhen BALUN Technology Co., Ltd. on Sep. 11, 2017) is product information, just changed the information as below:

1, Changed Filter model;

2, Changed Flash model;

3, Remove Component D12, and Component Q16 pin D to pin S short circuit.

And others hardware circuit and software were all the same. Therefore, only the items Radiated Spurious Emission was retested in this report, other test data please refer to the report No. is BL-SZ1790048-601, which was issued by Shenzhen BALUN Technology Co., Ltd. on Sep. 11, 2017.

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	45% to 55%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22℃ to +25℃
Working Voltage of the EUT	NV (Normal Voltage)	5 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-30	103118	2017.06.12	2018.06.11
Vector Signal Generator	ROHDE&SCHWARZ	SMBV100A	260592	2017.06.12	2018.06.11
Signal Generator	ROHDE&SCHWARZ	SMB100A	177746	2017.06.12	2018.06.11
Switch Unit with OSP-B157	ROHDE&SCHWARZ	OSP120	101270	2017.06.12	2018.06.11
Spectrum Analyzer	AGILENT	E4440A	MY45304434	2017.11.07	2018.11.06
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2017.06.22	2018.06.21
LISN	SCHWARZBECK	NSLK 8127	8127-687	2017.06.22	2018.06.21
Bluetooth Tester	ROHDE&SCHWARZ	CBT	101005	2017.06.12	2018.06.11
Power Splitter	KMW	DCPD-LDC	1305003215	--	--
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2017.06.12	2018.06.11
Attenuator (20 dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189	--	--
DC Power Supply	ROHDE&SCHWARZ	HMP2020	018141664	2017.06.22	2018.06.21
Temperature Chamber	ANGELANTIONI SCIENCE	NTH64-40A	1310	2017.06.27	2018.06.26
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2017.11.07	2019.11.08
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2017.07.22	2019.07.21
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2016.07.12	2018.07.11
Test Antenna-Horn(15-26.5 GHz)	SCHWARZBECK	BBHA 9170	9170-305	2017.06.22	2018.06.21
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2019.02.20
Anechoic Chamber	EMC TECHNOLOGY LTD	21.1m*11.6m*7.35m	N/A	2016.08.09	2018.08.08
Shielded Enclosure	ChangNing	CN-130701	130703	--	--
Signal Generator	ROHDE&SCHWARZ	SMB100A	177746	2017.06.12	2018.06.11
Power Amplifier	OPHIR RF	5225F	1037	2018.02.17	2019.02.16
Power Amplifier	OPHIR RF	5273F	1016	2018.02.17	2019.02.16

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Directional Coupler	Werlantone	C5982-10	109275	N/A	N/A
Directional Coupler	Werlantone	CHP-273E	S00801z-01	N/A	N/A
Feld Strength Meter	Narda	EP601	511WX51129	2017.05.22	2019.05.21
Mouth Simulator	B&K	4227	2423931	2017.11.16	2018.11.15
Sound Calibrator	B&K	4231	2430337	2017.11.16	2018.11.15
Sound Level Meter	B&K	NL-20	00844023	2017.11.16	2018.11.15
Ear Simulator	B&K	4185	2409449	2017.11.16	2018.11.15
Ear Simulator	B&K	4195	2418189	2017.11.16	2018.11.15
Audio analyzer	B&K	UPL 16	100129	2017.11.16	2018.11.15

4.3 Measurement 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.

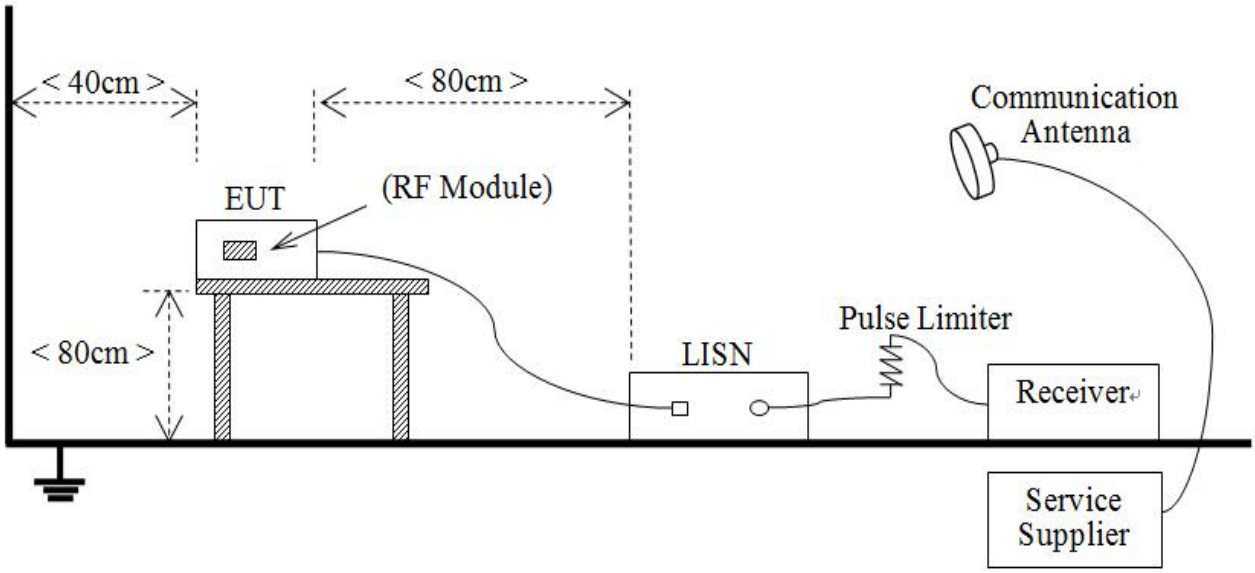
Measurement	Value
Occupied Channel Bandwidth	±4%
RF output power, conducted	±1.4 dB
Power Spectral Density, conducted	±2.5 dB
Unwanted Emissions, conducted	±2.8 dB
All emissions, radiated	±5.4 dB
Temperature	±1°C
Humidity	±4%

4.4 Description of Test Setup

4.4.1 For Antenna Port Test

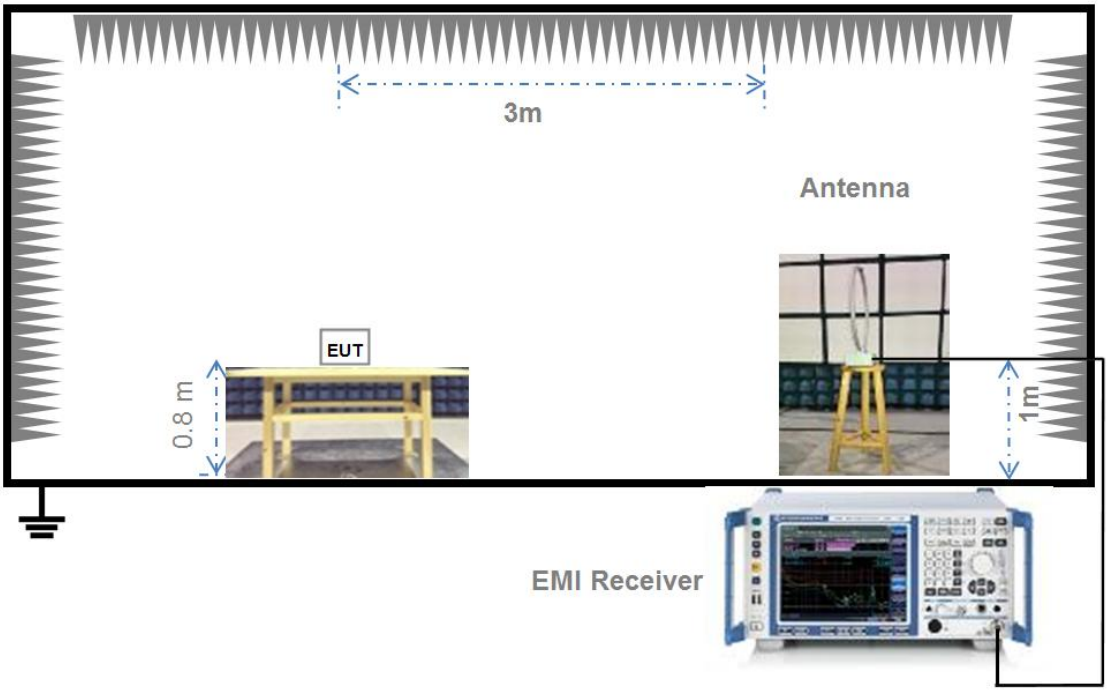
(Diagram 1)

4.4.2 For AC Power Supply Port Test



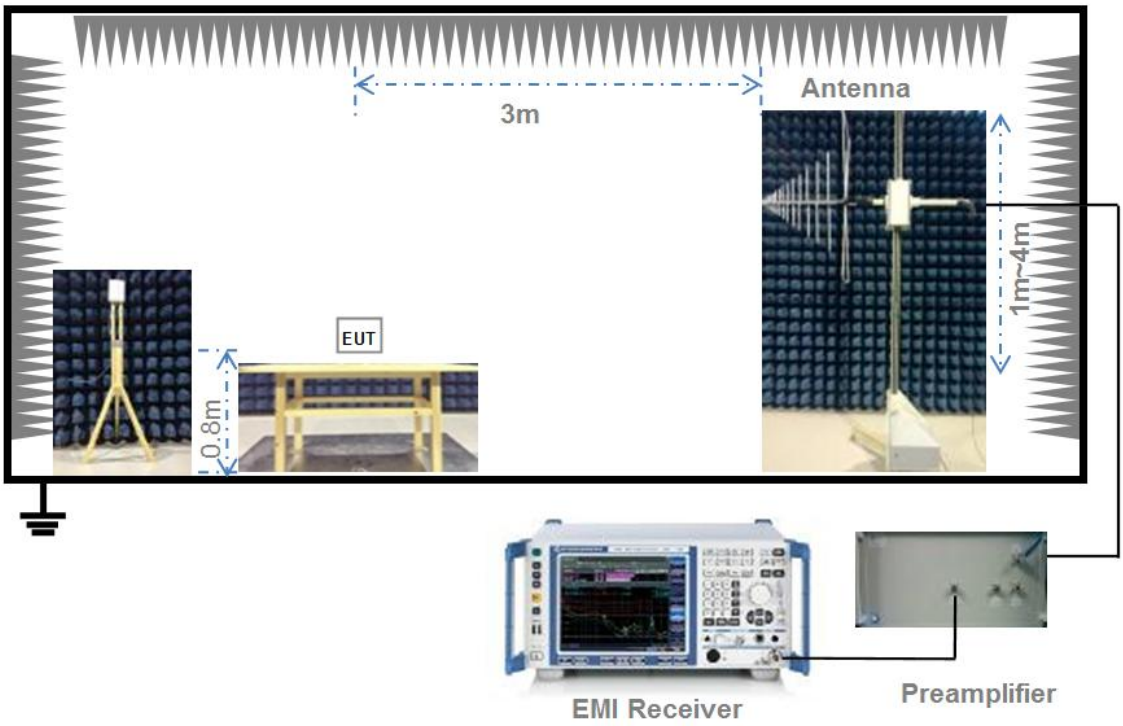
(Diagram 2)

4.4.3 For Radiated Test (Below 30 MHz)



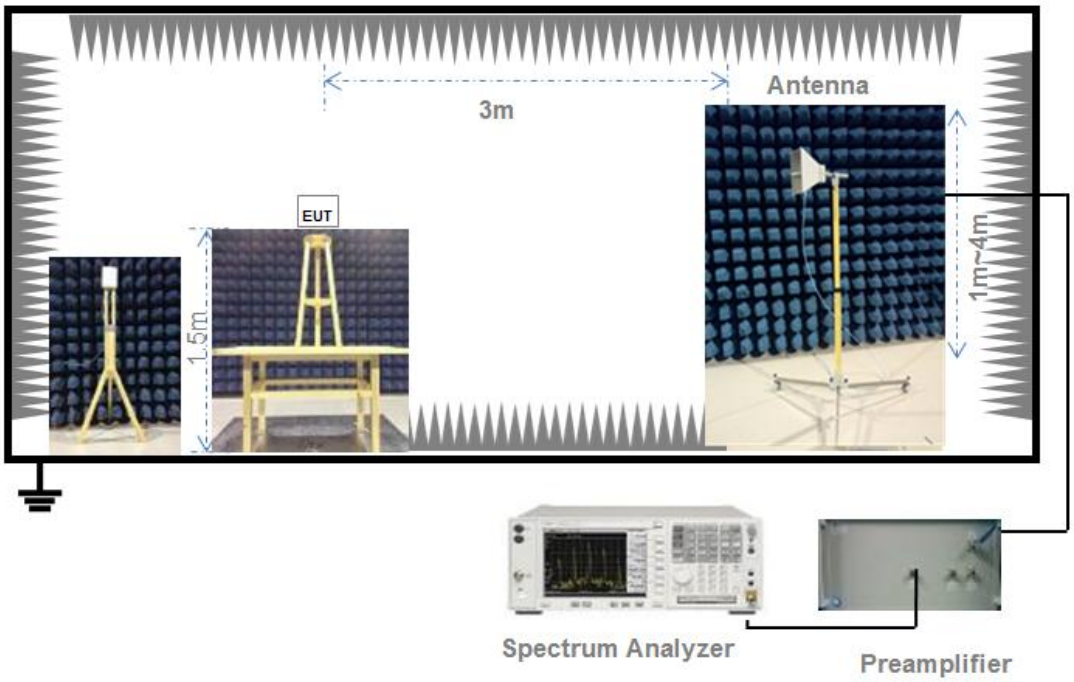
(Diagram 3)

4.4.4 For Radiated Test (30 MHz-1 GHz)



(Diagram 4)

4.4.5 For Radiated Test (Above 1 GHz)



(Diagram 5)

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Relevant Standards

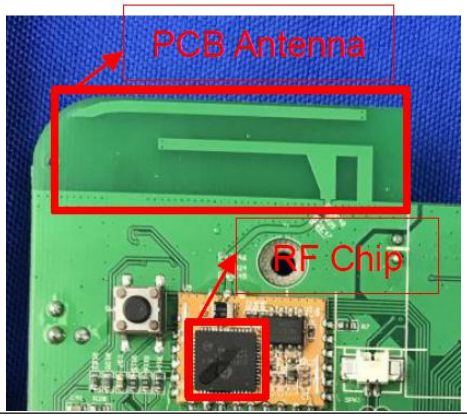
FCC §15.203 & 15.247(b)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.
If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

Protected Method	Description
The antenna is embedded in the product.	An embedded-in antenna design is used.

Reference Documents	Item
Photo	

5.1.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

5.2 20 dB and 99% Bandwidth

5.2.1 Limit

FCC §15.215(c)

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

RSS-Gen 6.6

The emission bandwidth (×dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated × dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3× the resolution bandwidth.

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured

5.2.2 Test Setups

See section 4.1.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW ≥ 1% of the 20 dB bandwidth

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

5.2.4 Test Result

Please refer to ANNEX A.1.

5.3 AC Conducted Emission

5.3.1 Limit

FCC §15.207; RSS-Gen 8.8

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56*	56 to 46*
0.50 - 5	56	46
5 - 30	60	50

5.3.2 Test Setups

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.3.3 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels 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.

5.3.4 Test Result

Please refer to ANNEX A.2.

5.4 Field strength of Fundamental emissions

5.4.1 Limit

FCC&15.249(a);RSS-Gen 8.7

Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	**Field strength of fundamental (millivolts/meter)**	**Field strength of harmonics (microvolts/meter)**
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

As shown in § 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

5.4.2 Test Setups

See section 4.1.2-4.4.5 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.4.3 Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented. The power of the EUT transmitting frequency should be ignored.

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.
Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

5.4.4 Test Result

Please refer to ANNEX A.3.

.

5.5 Radiated Spurious Emission and Band Edge Measurement

5.5.1 Limit

FCC §15.249(a);RSS-210 B.10 RSS-Gen 8.9/8.10

Except as provided in paragraph (a) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Frequency (MHz)	Field Strength of Fundamental (mV/m)	Field Strength of Harmonics (μV/m)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note:

1. For Above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

2. For above 1000 MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

5.5.2 Test Setups

See section 4.1.2-4.4.5 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented. The power of the EUT transmitting frequency should be ignored.

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.
Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

5.5.4 Test Result

Please refer to ANNEX A.4.

ANNEX A TEST RESULT

A.1 20 dB and 99% Bandwidth

Note: 20 dB and 99% Bandwidth result reference from original test report: BL-SZ1790048-601 (issued by Shenzhen BALUN Technology Co., Ltd. On Sep. 11, 2017) A.1 20 dB and 99% Bandwidth.

A.2 AC Conducted Emission

Note: AC Conducted Emission result reference from original test report: BL-SZ1790048-601 (issued by Shenzhen BALUN Technology Co., Ltd. On Sep. 11, 2017) A.2 AC Conducted Emission.

A.3 Field Strength of Fundamental Emission

The Field Strength of Fundamental Emission (Operating Frequency) is:
50000 uV/m = 20*log (50000) dBuV/m = 93.98 dBuV/m

Test data

Operating Frequency (MHz)	Field Strength (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Antenna
908.4	81.46	93.98	12.54	Vertical
	81.37	93.98	12.61	Horizontal
908.42	81.42	93.98	12.56	Vertical
	81.36	93.98	12.62	Horizontal
916	81.68	93.98	12.30	Vertical
	81.56	93.98	12.42	Horizontal

A.4 Radiated Emission and Bandedge Measurement

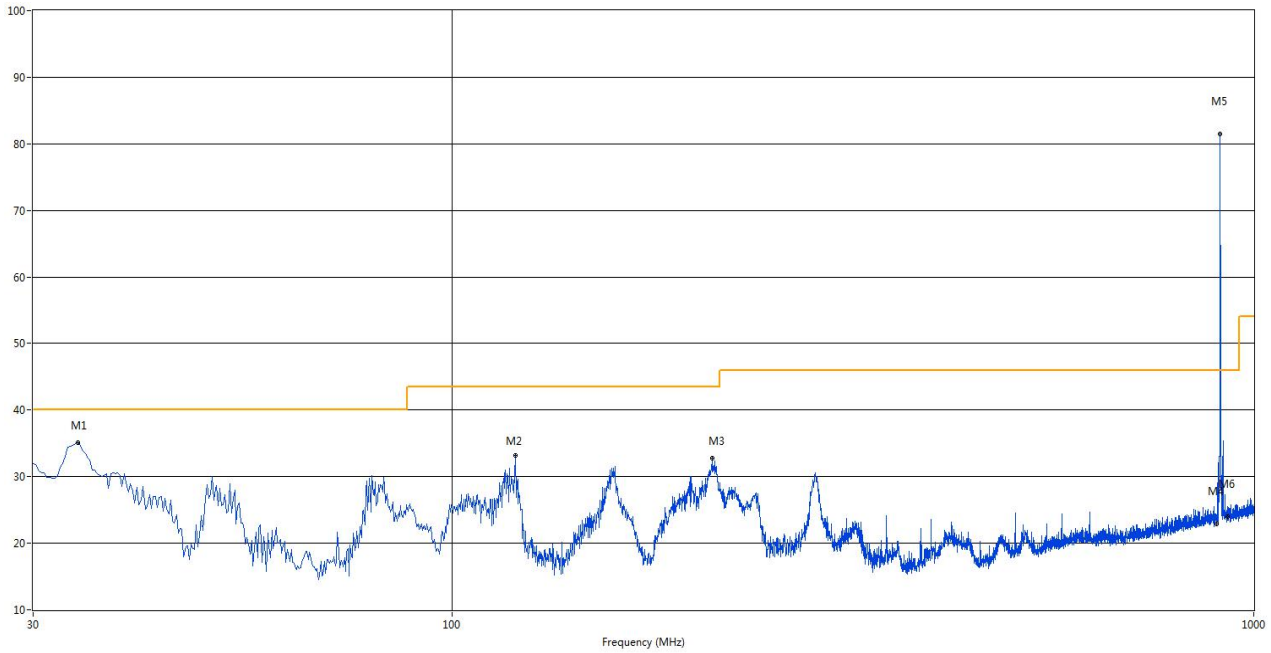
The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

Test Data and Plots (30 MHz ~ 1 GHz)

Note: The bold frequency is the fundamental.

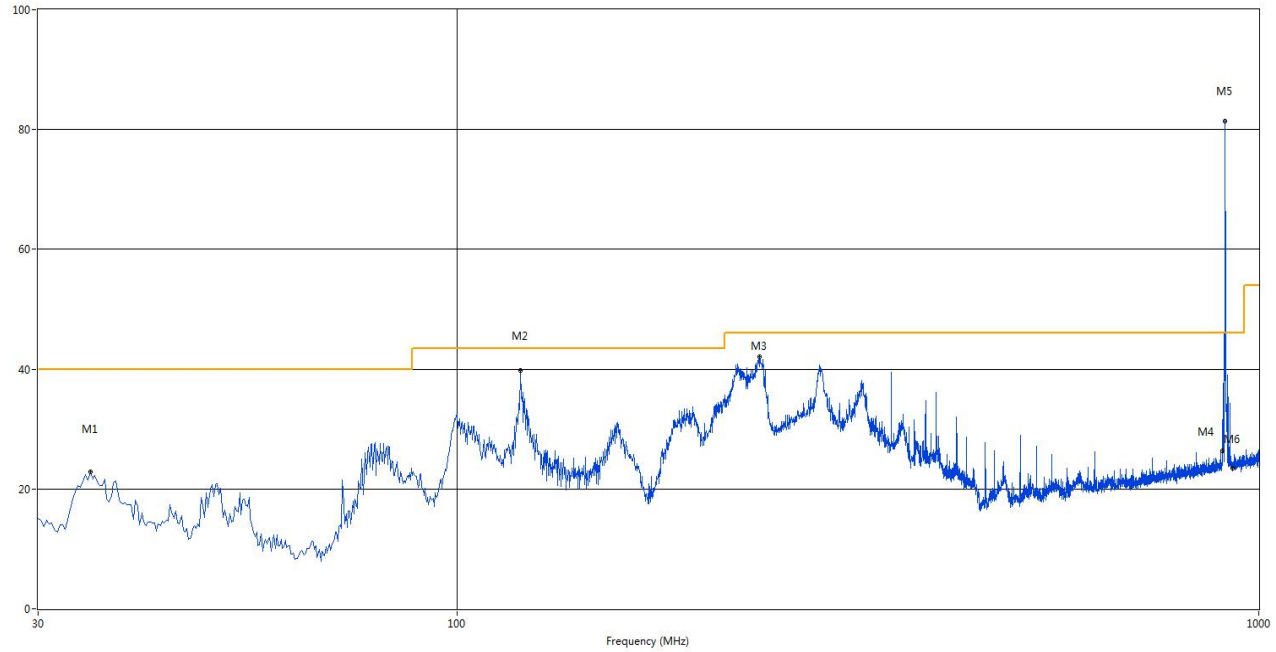
Note: The bolded part indicates that the test value with allowed-Bandedge.

Low Channel 30 MHz to 1 GHz, ANT V



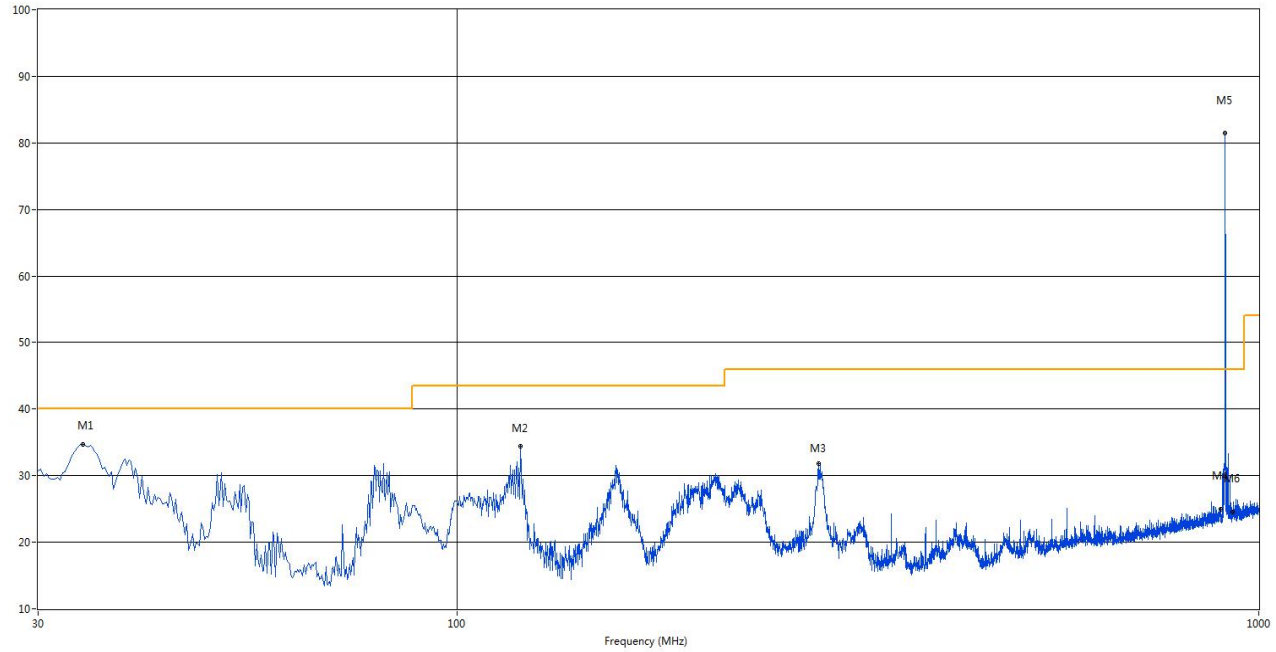
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	34.123	35.08	-27.22	40.0	4.92	Peak	166.30	100	Vertical	Pass
2	119.967	33.19	-27.15	43.5	10.31	Peak	192.70	100	Vertical	Pass
3	210.905	32.74	-25.23	43.5	10.76	Peak	3.40	100	Vertical	Pass
4	**902.000**	22.89	-10.67	46.0	23.11	Peak	302.72	112	Vertical	Pass
5	**908.335**	81.46	-10.60	114.0	32.54	Peak	211.00	200	Vertical	Pass
6	**928.000**	23.98	-10.38	46.0	22.02	Peak	230.67	109	Vertical	Pass

Low Channel 30 MHz to 1 GHz, ANT H



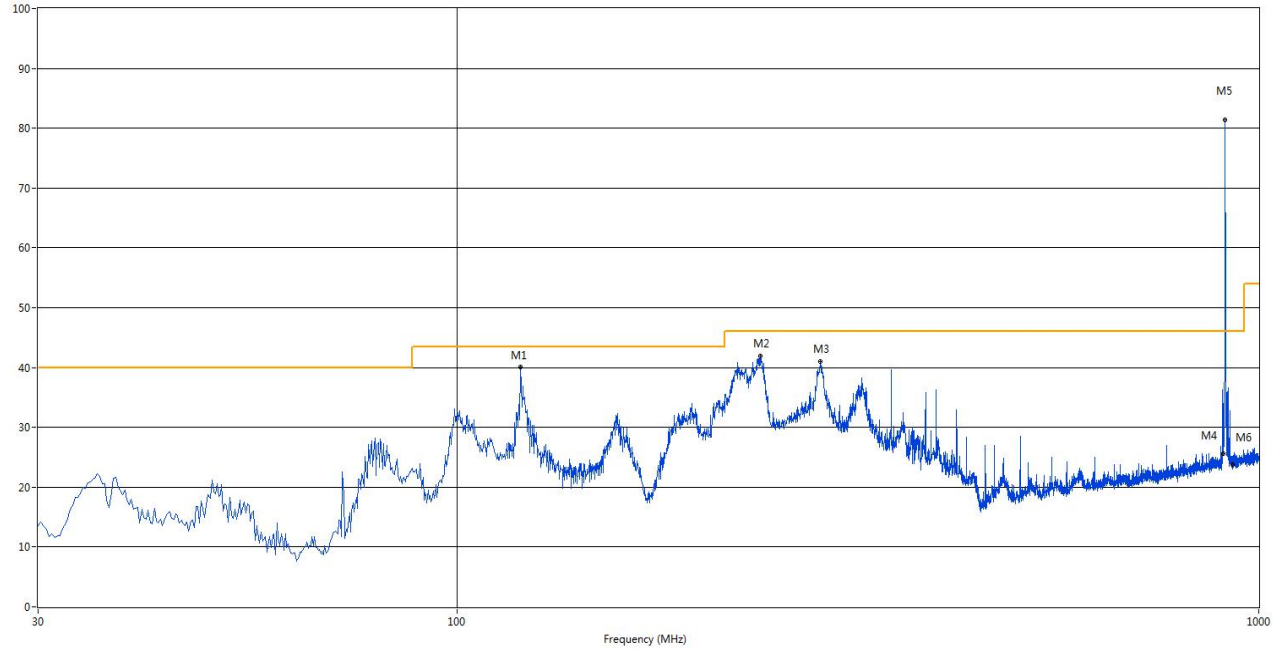
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	34.850	22.82	-26.98	40.0	17.18	Peak	70.80	200	Horizontal	Pass
2	119.967	39.85	-27.15	43.5	3.65	Peak	252.70	200	Horizontal	Pass
3	238.550	42.05	-24.39	46.0	3.95	Peak	113.90	100	Horizontal	Pass
4	**902.000**	26.51	-10.67	46.0	19.49	Peak	333.30	100	Horizontal	Pass
5	**908.335**	81.37	-10.60	114.0	32.63	Peak	128.30	200	Horizontal	Pass
6	**928.000**	23.43	-10.38	46.0	22.57	Peak	32.13	191	Horizontal	Pass

Middle Channel 30 MHz to 1 GHz, ANT V



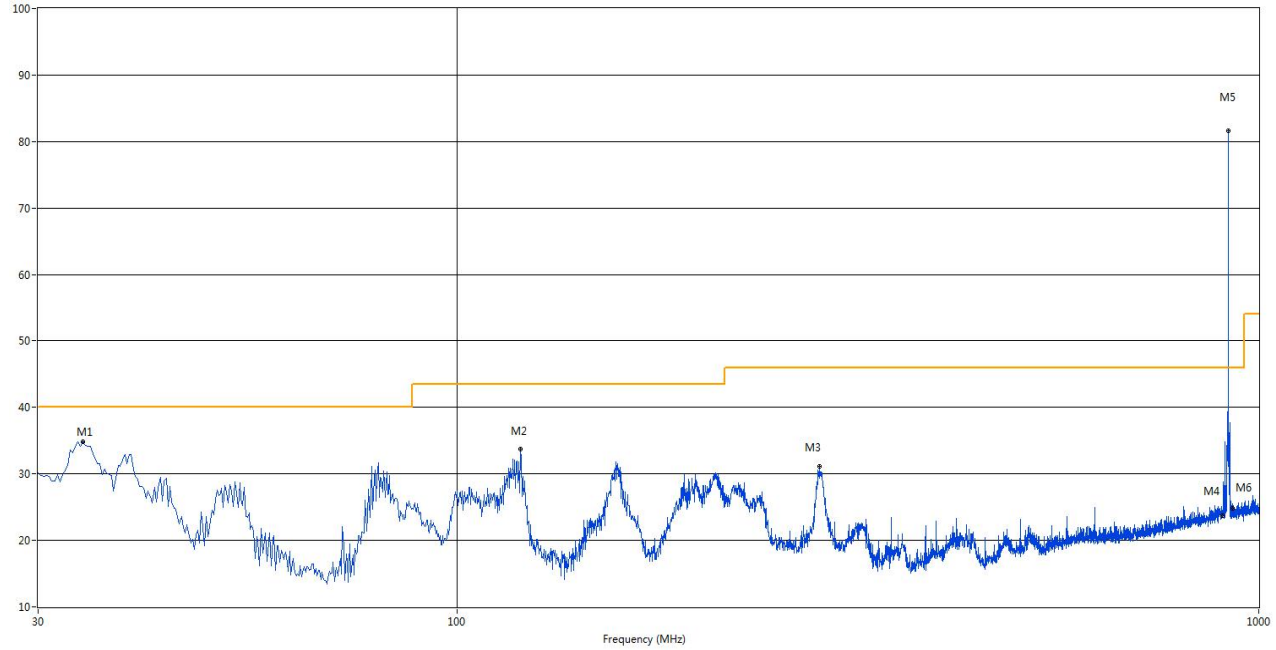
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	34.123	34.67	-27.22	40.0	5.33	Peak	298.50	100	Vertical	Pass
2	119.967	34.41	-27.15	43.5	9.09	Peak	152.00	100	Vertical	Pass
3	282.442	31.78	-23.19	46.0	14.22	Peak	360.00	200	Vertical	Pass
4	**902.000**	24.97	-10.67	46.0	21.03	Peak	319.27	200	Vertical	Pass
5	**908.335**	81.42	-10.60	114.0	32.58	Peak	222.20	200	Vertical	Pass
6	**928.000**	24.57	-10.38	46.0	21.43	Peak	244.33	109	Vertical	Pass

Middle Channel 30 MHz to 1 GHz, ANT H



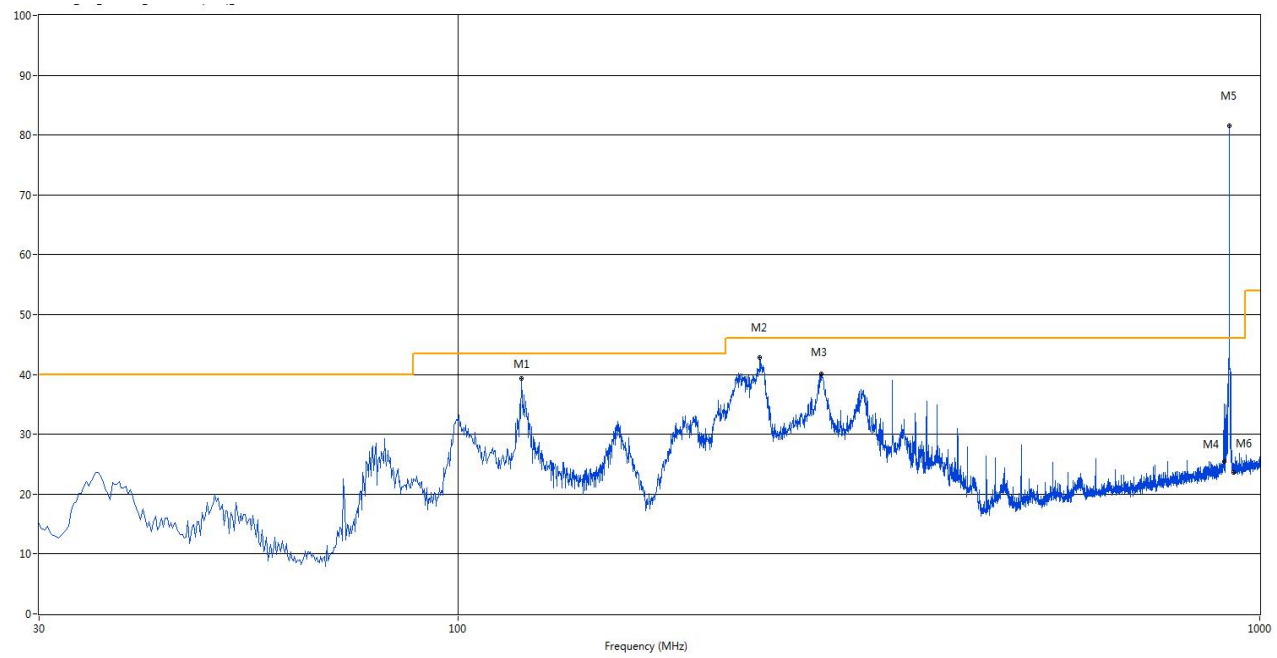
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	119.967	40.12	-27.15	43.5	3.38	Peak	79.90	200	Horizontal	Pass
2	238.792	41.92	-24.38	46.0	4.08	Peak	102.20	100	Horizontal	Pass
3	284.140	41.02	-23.17	46.0	4.98	Peak	360.00	200	Horizontal	Pass
4	**902.000**	25.95	-10.67	46.0	20.05	Peak	329.20	188	Horizontal	Pass
5	**908.335**	81.36	-10.60	114.0	32.64	Peak	5.40	200	Horizontal	Pass
6	**928.000**	23.73	-10.38	46.0	22.27	Peak	343.08	200	Horizontal	Pass

High Channel 30 MHz to 1 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	34.123	34.87	-27.22	40.0	5.13	Peak	360.00	200	Vertical	Pass
2	119.967	33.71	-27.15	43.5	9.79	Peak	110.70	100	Vertical	Pass
3	283.413	31.10	-23.18	46.0	14.90	Peak	360.00	200	Vertical	Pass
4	**902.000**	23.76	-10.67	46.0	22.24	Peak	169.06	112	Vertical	Pass
5	**916.095**	81.68	-10.34	114.0	32.32	Peak	0.60	100	Vertical	Pass
6	**928.000**	24.78	-10.38	46.0	21.22	Peak	359.91	109	Vertical	Pass

High Channel 30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	119.967	39.35	-27.15	43.5	4.15	Peak	261.20	200	Horizontal	Pass
2	237.822	42.91	-24.42	46.0	3.09	Peak	99.00	100	Horizontal	Pass
3	283.898	40.05	-23.17	46.0	5.95	Peak	0.70	100	Horizontal	Pass
4	**902.000**	25.43	-10.67	46.0	20.57	Peak	45.16	112	Horizontal	Pass
5	**916.095**	81.56	-10.34	114.0	32.44	Peak	142.80	200	Horizontal	Pass
6	**928.000**	23.66	-10.38	46.0	22.34	Peak	330.50	191	Horizontal	Pass

Test Data and Plots (1 GHz ~ 10th Harmonic)

Note [1]: The marked is the harmonic signal.

Note [2]: Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Note [3]: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Note [4]: Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Note [5]: Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.

LOW CHANNEL 1 GHz to 10 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1212.500	33.7	4.26	54.0	20.30	AV	196.60	150	Vertical	Pass
1	1212.500	40.64	4.26	74.0	33.36	Peak	196.60	150	Vertical	Pass
2**	1830.000	33.6	5.00	54.0	20.40	AV	347.60	150	Vertical	Pass
2	1830.000	40.75	5.00	74.0	33.25	Peak	347.60	150	Vertical	Pass
3**	2801.000	37.9	9.40	54.0	16.10	AV	55.60	150	Vertical	Pass
3	2801.000	45.23	9.40	74.0	28.77	Peak	55.60	150	Vertical	Pass
4**	3480.000	43.7	11.39	54.0	10.30	AV	353.60	150	Vertical	Pass
4	3480.000	46.57	11.39	74.0	27.43	Peak	353.60	150	Vertical	Pass
5**	5374.500	49.6	20.07	54.0	4.40	AV	360.00	150	Vertical	Pass
5	5374.500	54.39	20.07	74.0	19.61	Peak	360.00	150	Vertical	Pass
6**	5868.000	49.5	17.17	54.0	4.50	AV	46.60	150	Vertical	Pass
6	5868.000	52.15	17.17	74.0	21.85	Peak	46.60	150	Vertical	Pass

LOW CHANNEL 1 GHz to 10 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1330.000	33.2	4.47	54.0	20.80	AV	175.40	150	Horizontal	Pass
1	1330.000	41.60	4.47	74.0	32.40	Peak	175.40	150	Horizontal	Pass
2**	2083.500	35.2	6.86	54.0	18.80	AV	102.70	150	Horizontal	Pass
2	2083.500	43.88	6.86	74.0	30.12	Peak	102.70	150	Horizontal	Pass
3**	2895.500	37.4	9.42	54.0	16.60	AV	131.60	150	Horizontal	Pass
3	2895.500	45.06	9.42	74.0	28.94	Peak	131.60	150	Horizontal	Pass
4**	3599.250	44.0	11.78	54.0	10.00	AV	360.00	150	Horizontal	Pass
4	3599.250	46.67	11.78	74.0	27.33	Peak	360.00	150	Horizontal	Pass
5**	5331.750	49.3	20.12	54.0	4.70	AV	248.50	150	Horizontal	Pass
5	5331.750	53.76	20.12	74.0	20.24	Peak	248.50	150	Horizontal	Pass
6**	5878.500	47.2	17.22	54.0	6.80	AV	359.10	150	Horizontal	Pass
6	5878.500	51.92	17.22	74.0	22.08	Peak	359.10	150	Horizontal	Pass

MIDDLE CHANNEL 1 GHz to 10 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1201.000	33.0	4.12	54.0	21.00	AV	184.90	150	Vertical	Pass
1	1201.000	40.18	4.12	74.0	33.82	Peak	184.90	150	Vertical	Pass
2**	1816.500	34.3	4.70	54.0	19.70	AV	247.50	150	Vertical	Pass
2	1816.500	40.62	4.70	74.0	33.38	Peak	247.50	150	Vertical	Pass
3**	2636.500	37.5	9.08	54.0	16.50	AV	1.00	150	Vertical	Pass
3	2636.500	45.18	9.08	74.0	28.82	Peak	1.00	150	Vertical	Pass
4**	3502.500	39.8	11.45	54.0	14.20	AV	360.00	150	Vertical	Pass
4	3502.500	46.96	11.45	74.0	27.04	Peak	360.00	150	Vertical	Pass
5**	5309.250	50.8	19.28	54.0	3.20	AV	251.80	150	Vertical	Pass
5	5309.250	54.03	19.28	74.0	19.97	Peak	251.80	150	Vertical	Pass
6**	5943.000	47.1	18.10	54.0	6.90	AV	305.70	150	Vertical	Pass
6	5943.000	51.73	18.10	74.0	22.27	Peak	305.70	150	Vertical	Pass

MIDDLE CHANNEL 1 GHz to 10 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1271.500	33.9	4.72	54.0	20.10	AV	0.20	150	Horizontal	Pass
1	1271.500	41.62	4.72	74.0	32.38	Peak	0.20	150	Horizontal	Pass
2**	1817.000	35.7	4.65	54.0	18.30	AV	252.90	150	Horizontal	Pass
2	1817.000	41.20	4.65	74.0	32.80	Peak	252.90	150	Horizontal	Pass
3**	2500.000	35.6	8.09	54.0	18.40	AV	11.70	150	Horizontal	Pass
3	2500.000	44.20	8.09	74.0	29.80	Peak	11.70	150	Horizontal	Pass
4**	3176.250	43.8	11.73	54.0	10.20	AV	353.80	150	Horizontal	Pass
4	3176.250	46.33	11.73	74.0	27.67	Peak	353.80	150	Horizontal	Pass
5**	5357.250	52.0	19.93	54.0	2.00	AV	317.30	150	Horizontal	Pass
5	5357.250	55.07	19.93	74.0	18.93	Peak	317.30	150	Horizontal	Pass
6**	5832.000	46.9	16.87	54.0	7.10	AV	214.10	150	Horizontal	Pass
6	5832.000	51.98	16.87	74.0	22.02	Peak	214.10	150	Horizontal	Pass

HIGH CHANNEL 1 GHz to 10 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1190.500	34.2	4.09	54.0	19.80	AV	56.60	150	Vertical	Pass
1	1190.500	41.05	4.09	74.0	32.95	Peak	56.60	150	Vertical	Pass
2**	1675.500	32.7	4.42	54.0	21.30	AV	318.60	150	Vertical	Pass
2	1675.500	41.17	4.42	74.0	32.83	Peak	318.60	150	Vertical	Pass
3**	2157.000	35.2	7.60	54.0	18.80	AV	226.50	150	Vertical	Pass
3	2157.000	43.13	7.60	74.0	30.87	Peak	226.50	150	Vertical	Pass
4**	3156.000	42.7	11.18	54.0	11.30	AV	229.90	150	Vertical	Pass
4	3156.000	46.83	11.18	74.0	27.17	Peak	229.90	150	Vertical	Pass
5**	5329.500	49.2	20.07	54.0	4.80	AV	170.60	150	Vertical	Pass
5	5329.500	55.11	20.07	74.0	18.89	Peak	170.60	150	Vertical	Pass
6**	5942.250	47.1	18.10	54.0	6.90	AV	84.20	150	Vertical	Pass
6	5942.250	52.45	18.10	74.0	21.55	Peak	84.20	150	Vertical	Pass

HIGH CHANNEL 1 GHz to 10 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1191.500	33.2	4.08	54.0	20.80	AV	41.70	150	Horizontal	Pass
1	1191.500	41.28	4.08	74.0	32.72	Peak	41.70	150	Horizontal	Pass
2**	1603.500	33.4	4.27	54.0	20.60	AV	0.00	150	Horizontal	Pass
2	1603.500	40.73	4.27	74.0	33.27	Peak	0.00	150	Horizontal	Pass
3**	2217.500	36.1	8.06	54.0	17.90	AV	275.70	150	Horizontal	Pass
3	2217.500	43.91	8.06	74.0	30.09	Peak	275.70	150	Horizontal	Pass
4**	3185.250	42.9	11.88	54.0	11.10	AV	117.40	150	Horizontal	Pass
4	3185.250	46.21	11.88	74.0	27.79	Peak	117.40	150	Horizontal	Pass
5**	5379.000	49.5	19.98	54.0	4.50	AV	359.60	150	Horizontal	Pass
5	5379.000	54.29	19.98	74.0	19.71	Peak	359.60	150	Horizontal	Pass
6**	5831.250	47.2	16.87	54.0	6.80	AV	338.20	150	Horizontal	Pass
6	5831.250	52.85	16.87	74.0	21.15	Peak	338.20	150	Horizontal	Pass

Note: The restricted-band bandedge is far from the main frequency, and all of them are bottom noise, so they are not reported.

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ1850267-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ1850267-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ1850267-AI.PDF”.

--END OF REPORT--