

FCC
RF
TEST REPORT

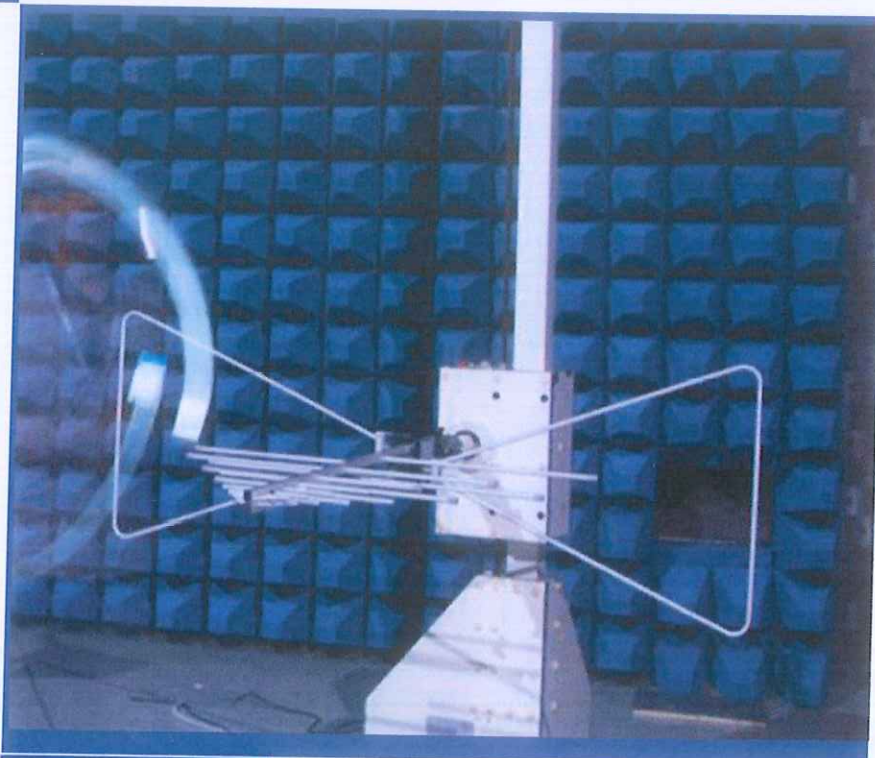
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
EARIN M-2

ISSUED TO
EARIN AB

GRIMSBYGATAN 24, 21120 Malmö, Sweden



Tested by: Xia Long
Xia Long
(Engineer)

Date: Oct. 25, 2017

Approved by: Wei Yanquan
Wei Yanquan
(Chief Engineer)

Date: Oct. 25, 2017

Report No.: BL-SZ1750192-402
EUT Name: EARIN M-2
Model Name: EARIN M-2
Brand Name: EARIN
Test Standard: FCC Part 15 C
FCC ID: 2AEI2EARINM2

Test conclusion: Pass
Test Date: May 31, 2017 ~ Sep. 30, 2017
Date of Issue: Oct. 25, 2017

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Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Oct. 16, 2017</u>	<u>Initial Issue</u>
Rev. 02	Oct. 23, 2017	Modify the Accreditation Certificate on page 4.
<u>Rev. 03</u>	<u>Oct. 25, 2017</u>	<u>Update the data A.1 Radiated Emission</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

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 v2.4.
- (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	EARIN AB
Address	GRIMSBYGATAN 24, 21120 Malmö, Sweden

2.2 Manufacturer Information

Manufacturer	EARIN AB
Address	GRIMSBYGATAN 24, 21120 Malmö, Sweden

2.3 Factory Information

Factory	Flex LTD
Address	Zhuhai Xin Qing Science & Technology Industrial Park Doumen, Zhuhai, 519125 Jing'anzen China

2.4 General Description for Equipment under Test (EUT)

EUT Type	EARIN M-2
Model Name Under Test	EARIN M-2
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Network and Wireless connectivity	Bluetooth, NFMI

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery Cell (for charge base)	
	Brand Name	N/A
	Model No.	ICR17280
	Serial No.	N/A
	Capacity	600 mAh
	Rated Voltage	3.7 V
	Limit Charge Voltage	4.2 V
Ancillary Equipment 2	Battery Cell (for earphone)	
	Brand Name	N/A
	Model No.	CP1254 A3
	Serial No.	N/A
	Capacity	60 mAh
	Rated Voltage	3.7 V
	Limit Charge Voltage	4.2 V
Ancillary Equipment 3	The Charging Base	

2.6 Technical Information

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

Operating Frequency	10.579 MHz
Product Type	☒ Portable
Antenna Type	Coil Antenna
Antenna Gain	0 dBi
About Product	The equipment is EARIN M-2, intended for used with information technology equipment. Only NFMI was tested in this report.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C (10-1-15 Edition)	Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

3.2 Verdict

No.	Description	FCC Rule	Test Verdict	Result
1	Radiated Emission	15.209,15.215(b)	Pass	Annex A.1
2	Conducted Emission, AC Ports	15.207	N/A	Annex A.2
3	20 dB Bandwidth	15.215(c)	Pass	Annex A.3

Note: The 10.6MHz bands was not active during the charge mode.

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 (9 kHz-30 MHz)	3.97 dB
Radiated emissions (30 MHz-1 GHz)	4.30 dB
Radiated emissions (1 GHz-18 GHz)	4.81 dB
Radiated emissions (18 GHz-26.5 GHz)	5.71 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

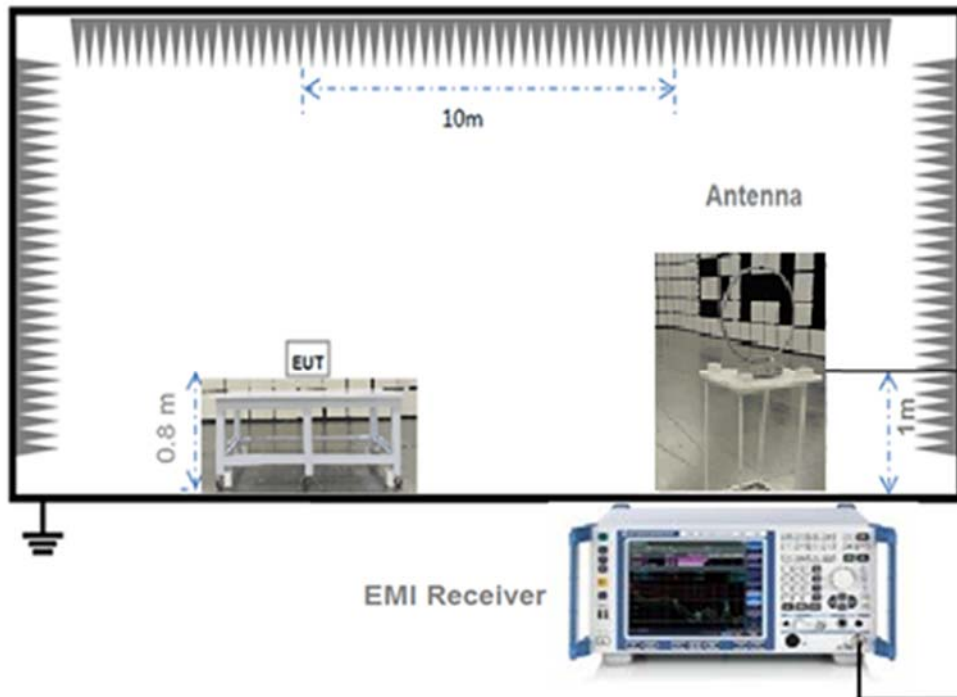
Relative Humidity	45% - 55%	
Atmospheric Pressure	100 kPa - 102 kPa	
Temperature	NT (Normal Temperature)	+22°C to +25°C
Working Voltage of the EUT	NV (Normal Voltage)	3.7V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2017.09.09	2018.09.08
Test Antenna- Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2017.06.22	2018.06.21
Test Antenna- Bi-Log(30 MHz- 3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2017.06.22	2018.06.21
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60*7 .35m	N/A	2016.08.09	2018.08.08
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2017.06.22	2018.06.21
LISN	SCHWARZBECK	NSLK 8127	8127-687	2017.06.22	2018.06.21
Shielded Enclosure	ChangNing	CN-130701	130703	N/A	N/A

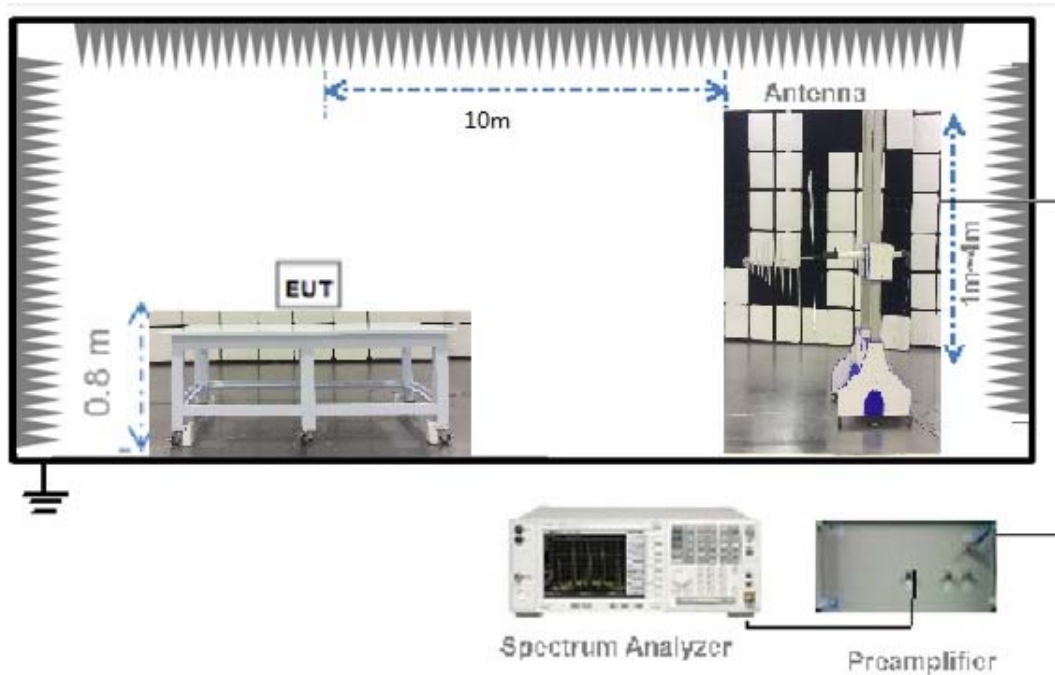
4.3 Test Setups

Test Setup 1



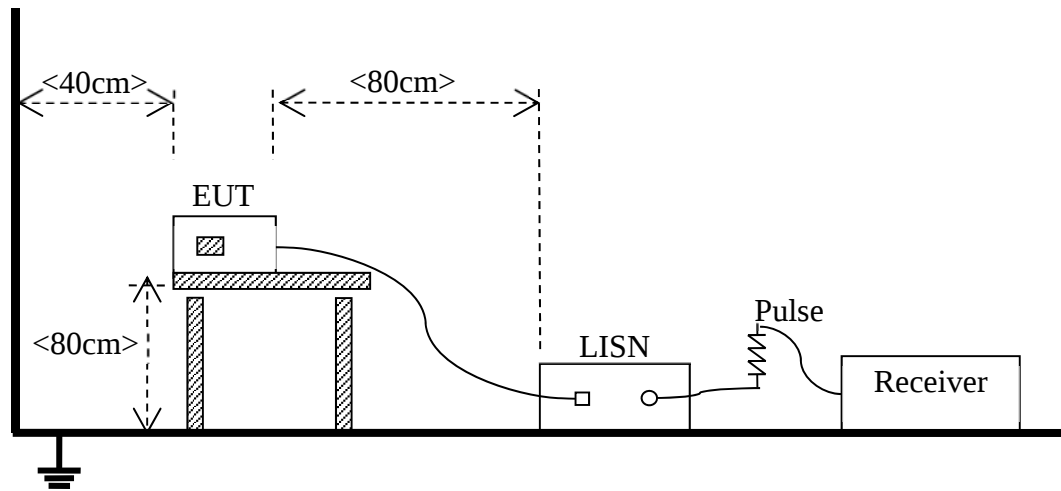
For Radiated Emission Test (Below 30 MHz))

Test Setup 2



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

Test Setup 3



(For Conducted Emission, AC Ports Test)

5 TEST ITEMS

5.1 Emission Tests

5.1.1 Radiated Emission

5.1.1.1 Limit

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	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) Field Strength ($\text{dB}\mu\text{V/m}$) = $20 \cdot \log [\text{Field Strength } (\mu\text{V/m})]$.
- 2) In the emission tables above, the tighter limit applies at the band edges.
- 3) For above 1000 MHz, limit field strength of harmonics: 54 $\text{dBuV/m}@3\text{ m}$ (AV) and 74 $\text{dBuV/m}@3\text{ m}$ (PK)

5.1.1.2 Test Setup

Refer to 4.3 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)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:

- 1) The limit is applicable to Class B ITE.
- 2) The lower limit shall apply at the band edges.
- 3) 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 4.3 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.

5.1.3 20 dB Bandwidth

5.1.3.1 Limit

FCC §15.215(c)

The 20 dB bandwidth is known as the 99% emission bandwidth, or 20 dB bandwidth ($10 \cdot \log 1\% = 20$ dB) taking the total RF output power.

5.1.3.2 Test Setup

Refer to 4.3 section test (test setup 1) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.1.3.3 Test Procedure

Use the following spectrum analyzer settings:

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

RBW $\geq$ 1% of the 20 dB bandwidth

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate, Allow the trace to stabilize.

5.1.3.4 Test Result

Please refer to ANNEX A.3.

ANNEX A TEST RESULTS

A.1 Radiated Emission

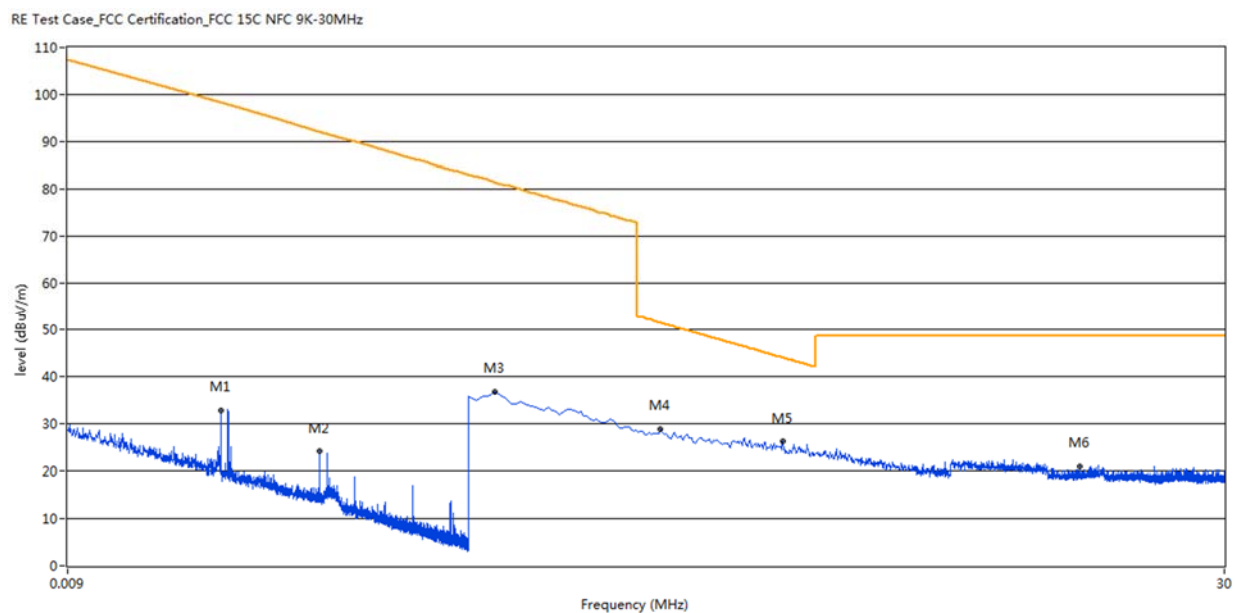
Note ¹: The symbol of “--” in the table which means not application.

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 main frequency signal 10.579 MHz is lower than the base noise and not shown in this report.

Test Data and Plots

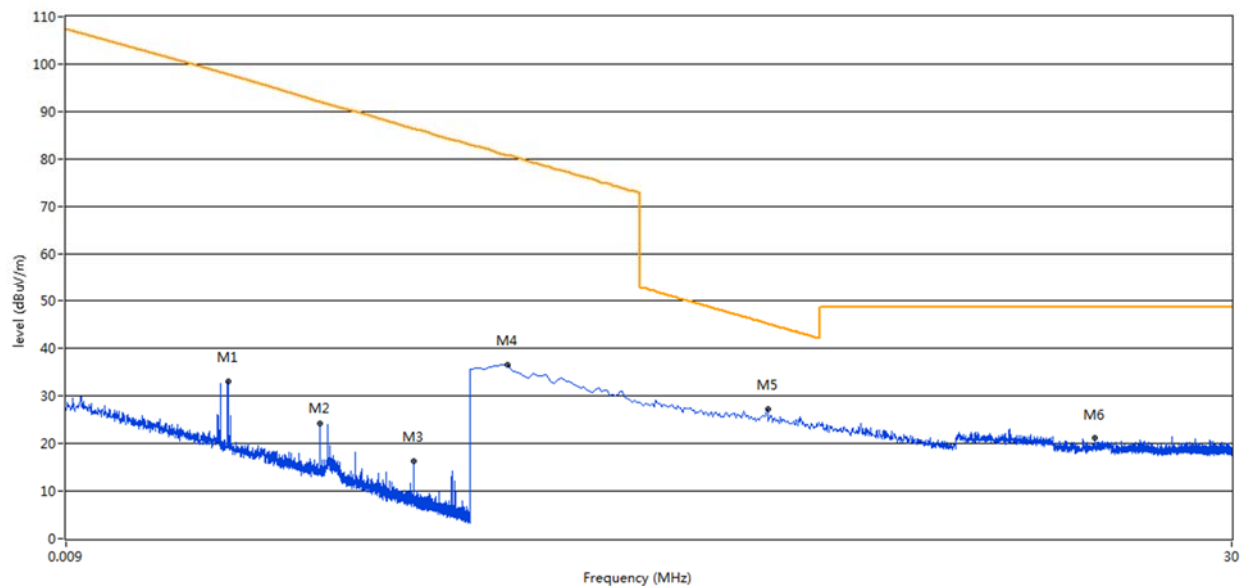
A.1.1 Test Antenna Vertical, 9 kHz –30 MHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	0.026	32.80	10.36	98.2	65.40	Peak	243.00	100	Vertical	Pass
2	0.053	24.17	10.36	92.1	67.93	Peak	215.00	100	Vertical	Pass
3	0.180	36.77	10.32	81.5	44.73	Peak	166.00	100	Vertical	Pass
4	0.575	28.83	10.40	51.4	22.57	Peak	114.00	100	Vertical	Pass
5	1.359	26.20	10.45	43.9	17.70	Peak	196.00	100	Vertical	Pass
6	10.579	20.74	10.72	48.5	27.76	Peak	272.00	100	Vertical	Pass ^{Note 3}

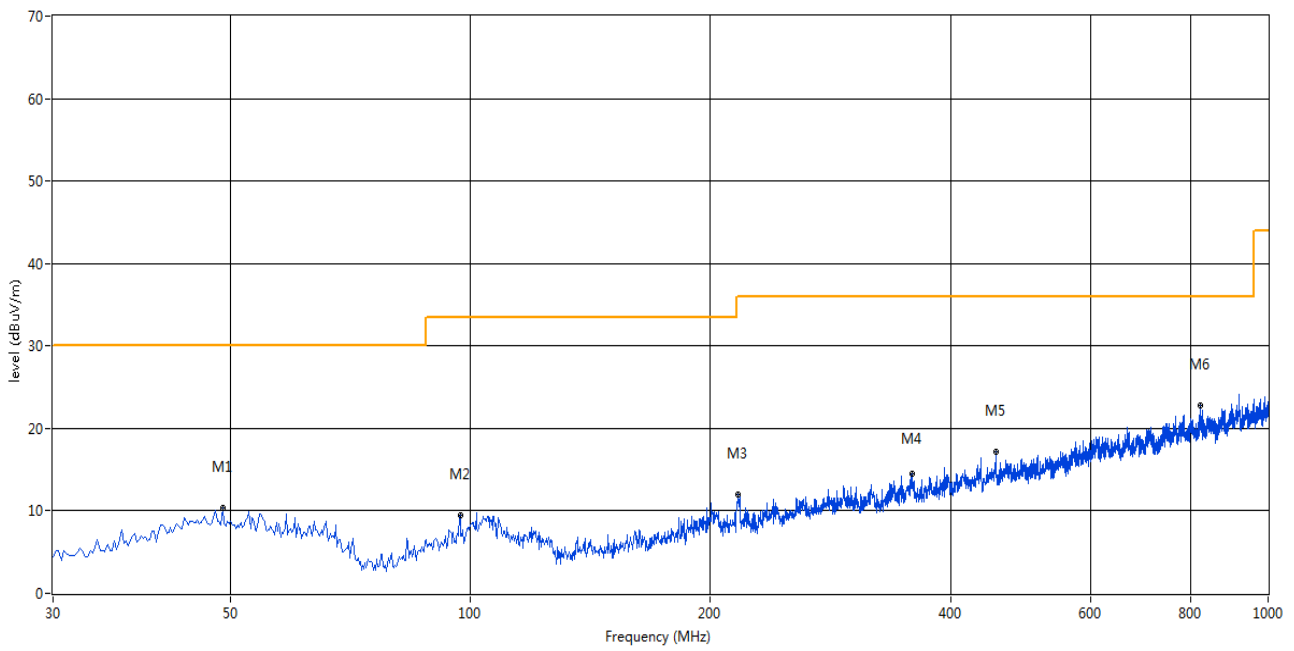
A.1.2 Test Antenna Horizontal, 9 kHz –30 MHz

RE Test Case_FCC Certification_FCC 15C NFC 9K-30MHz



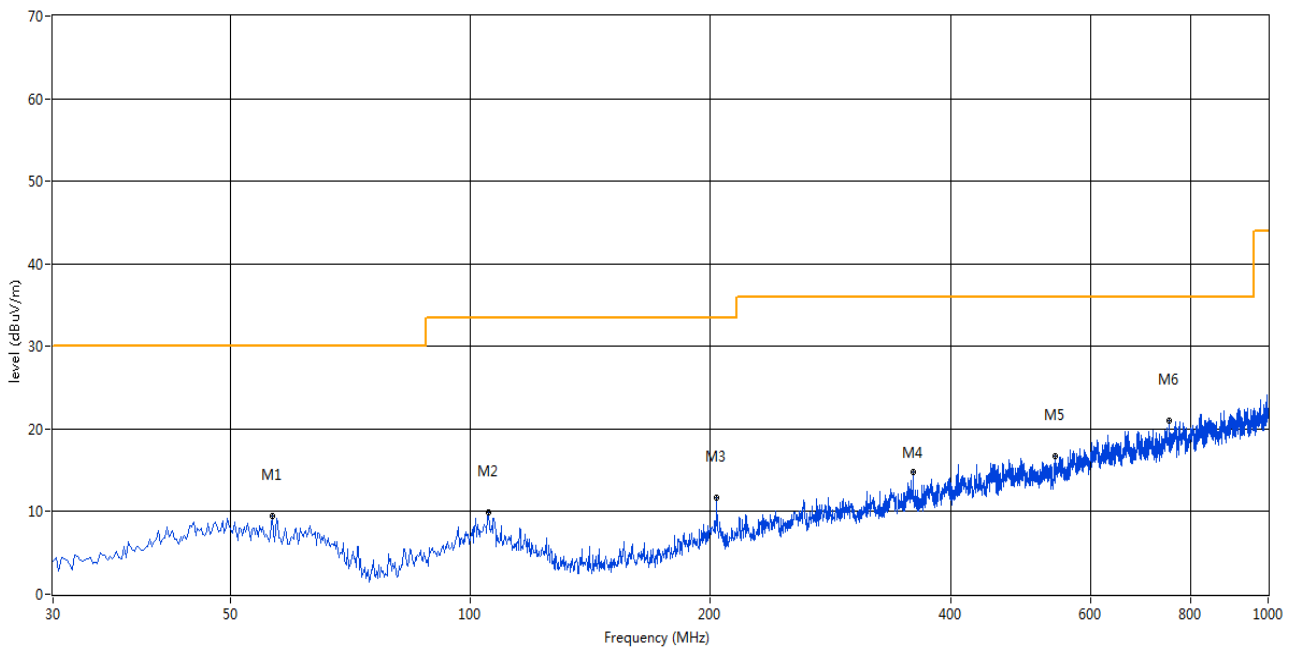
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	0.028	33.03	10.36	97.8	64.77	Peak	328.00	100	Horizontal	Pass
2	0.053	24.20	10.36	92.1	67.90	Peak	358.00	100	Horizontal	Pass
3	0.101	16.33	10.37	86.5	70.17	Peak	360.00	100	Horizontal	Pass
4	0.195	36.45	10.33	80.8	44.35	Peak	131.00	100	Horizontal	Pass
5	1.187	27.23	10.44	45.1	17.87	Peak	227.00	100	Horizontal	Pass
6	10.579	20.88	10.72	48.5	27.62	Peak	5.00	100	Horizontal	Pass ^{Note 3}

A.1.3 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	48.910	10.40	-13.27	30.0	19.60	Peak	360.00	200	Vertical	Pass
2	97.156	9.46	-15.76	33.5	24.04	Peak	360.00	300	Vertical	Pass
3	216.678	11.99	-15.03	36.0	24.01	Peak	360.00	200	Vertical	Pass
4	358.263	14.55	-10.69	36.0	21.45	Peak	228.00	300	Vertical	Pass
5	455.481	17.15	-8.79	36.0	18.85	Peak	360.00	200	Vertical	Pass
6	821.322	22.79	-2.25	36.0	13.21	Peak	138.00	100	Vertical	Pass

A.1.4 Test Antenna Horizontal, 30 MHz – 1 GHz



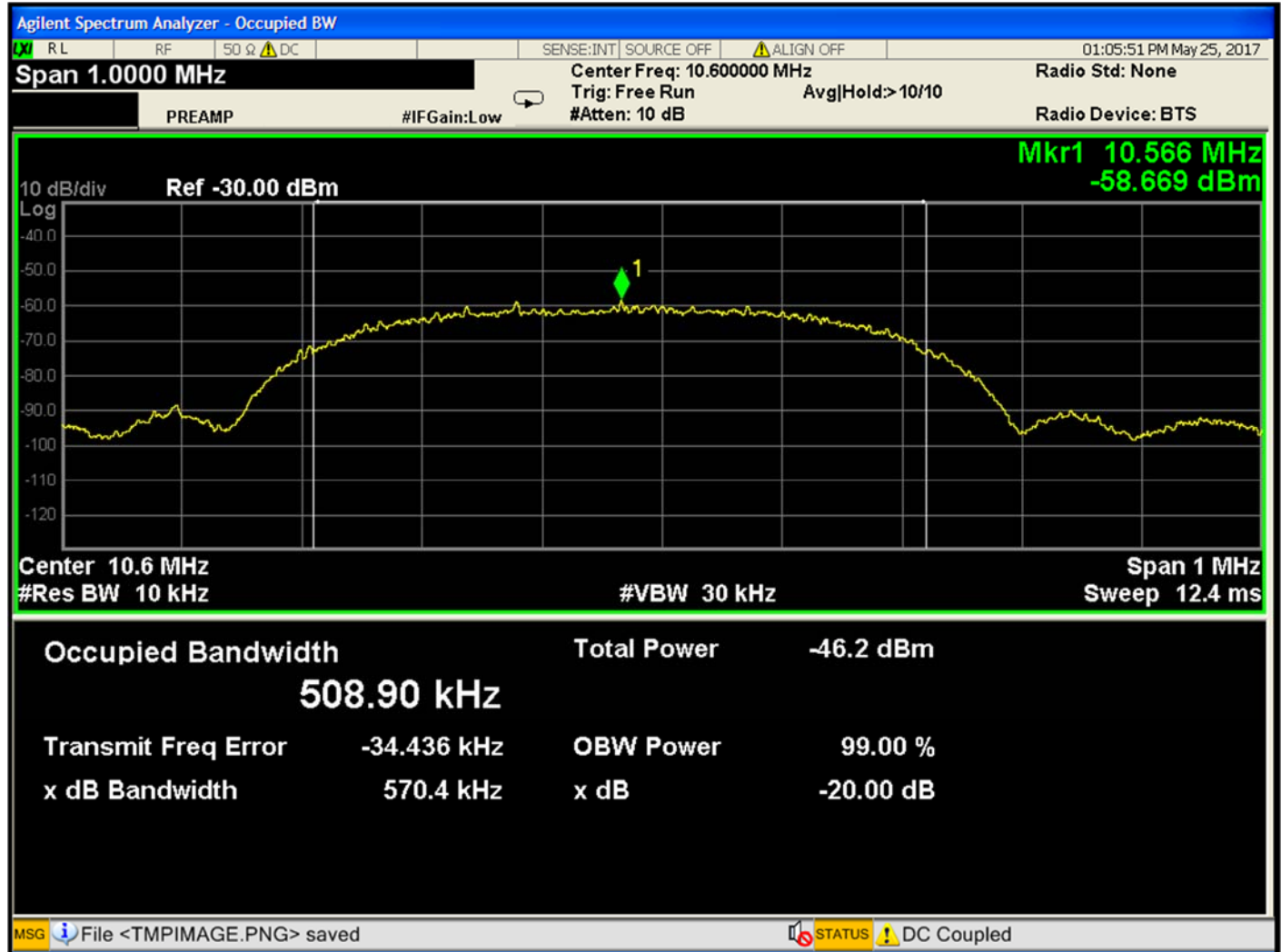
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	56.426	9.46	-14.19	30.0	20.54	Peak	54.00	100	Horizontal	Pass
2	105.399	9.93	-15.04	33.5	23.57	Peak	138.00	200	Horizontal	Pass
3	203.587	11.73	-14.94	33.5	21.77	Peak	245.00	100	Horizontal	Pass
4	359.233	14.73	-10.63	36.0	21.27	Peak	227.00	200	Horizontal	Pass
5	540.335	16.71	-6.99	36.0	19.29	Peak	0.00	300	Horizontal	Pass
6	752.712	20.98	-3.01	36.0	15.02	Peak	0.00	100	Horizontal	Pass

A.2 Conducted Emission

Note: Not applicable.

A.3 20 dB Bandwidth

Test Data and Plots



ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ1750192-AE.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ1750192-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ1750192-AI.PDF”.

--END OF REPORT--