

FCC

RF

TEST REPORT

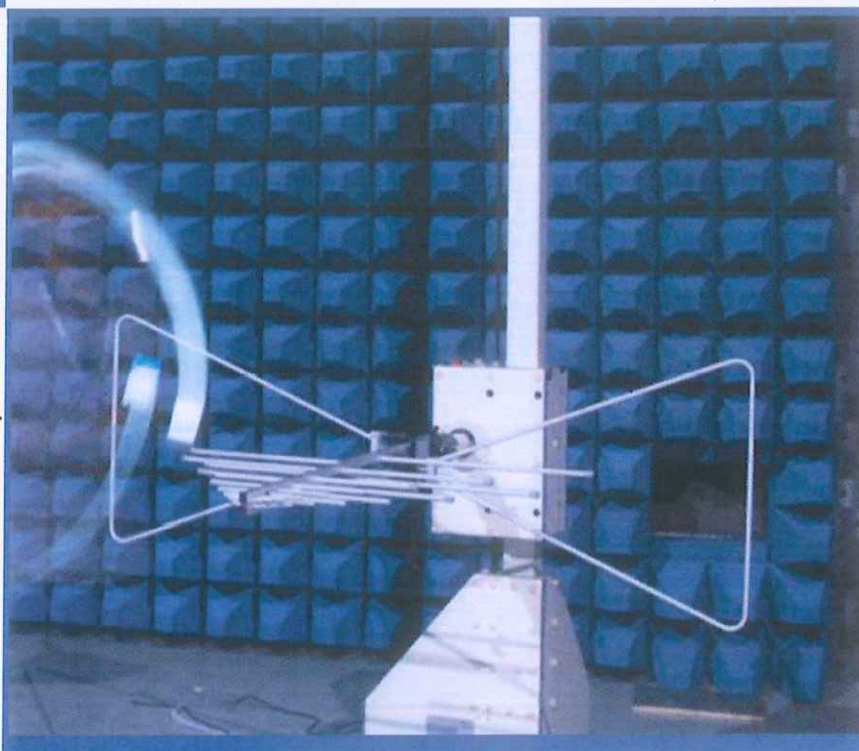
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
Wireless Charger

ISSUED TO
Chongqing MINE Technologies Co., Ltd.

NO.99, Xingai Ave., Yubei District, Chongqing



Tested by: Xia Long
Xia Long
(Engineer)

Date: Nov. 16, 2017

Approved by: Liao Jianming
Liao Jianming
(Technical Director)

Date: Nov. 16, 2017

Report No.: BL-EC1790068-402

EUT Name: Wireless Charger

Model Name: W100

Brand Name: MINE AIRE

Test Standard: 47 CFR Part 15 Subpart C

FCC ID: 2ANRY-MINEAIREA100

Test conclusion: Pass

Test Date: Sep. 01, 2017 ~ Oct. 23, 2017

Date of Issue: Nov. 16, 2017

NOTE: This test report of test results only related to testing samples, which 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 contact us.

Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Nov. 14, 2017</u>	<u>Initial Issue</u>
<u>Rev. 02</u>	<u>Nov. 16, 2017</u>	<u>Added note 4 on Page 16</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
2.6 Technical Information	7
3 SUMMARY OF TEST RESULTS.....	8
3.1 Test Standards	8
3.2 Verdict	8
3.3 Test Uncertainty	8
4 GENERAL TEST CONFIGURATIONS	9
4.1 Test Environments	9
4.2 Test Equipment List.....	9
4.3 Test Setups	10
5 TEST ITEMS.....	12
5.1 Emission Tests	12
ANNEX A TEST RESULTS	16
A.1 Radiated Emission	16
A.2 Conducted Emission	20

A.3 20 dB Bandwidth	22
ANNEX B TEST SETUP PHOTOS	23
ANNEX C EUT EXTERNAL PHOTOS	23
ANNEX D EUT INTERNAL PHOTOS	23

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	<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°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	Chongqing MINE Technologies Co., Ltd.
Address	NO.99, Xingai Ave., Yubei District, Chongqing

2.2 Manufacturer Information

Manufacturer	Chongqing Naxin Technologies Co., Ltd.
Address	NO.2, Fuxing Ave., Shuangfu New District, Jiangjin, Chongqing

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Type	Wireless Charger
Model Name Under Test	W100
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Network and Wireless connectivity	Qi

2.5 Ancillary Equipment

Ancillary Equipment 1	Pocket Lightening Mirror	
	Brand Name	N/A
	Model Name	U100
	Rated Input	N/A
	Rated Output	5 V $\overline{\text{---}}$, 1 A
Ancillary Equipment 2	USB Cable	
	Length(Approx.)	100 cm

2.6 Technical Information

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

Operating Frequency	110~205 kHz
Product Type	<input type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> Fix Location
Antenna Type	Coil Antenna
Antenna Gain	0 dBi

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	Pass	Annex A.2
3	20 dB Bandwidth	15.215(c)	Pass	Annex A.3

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

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

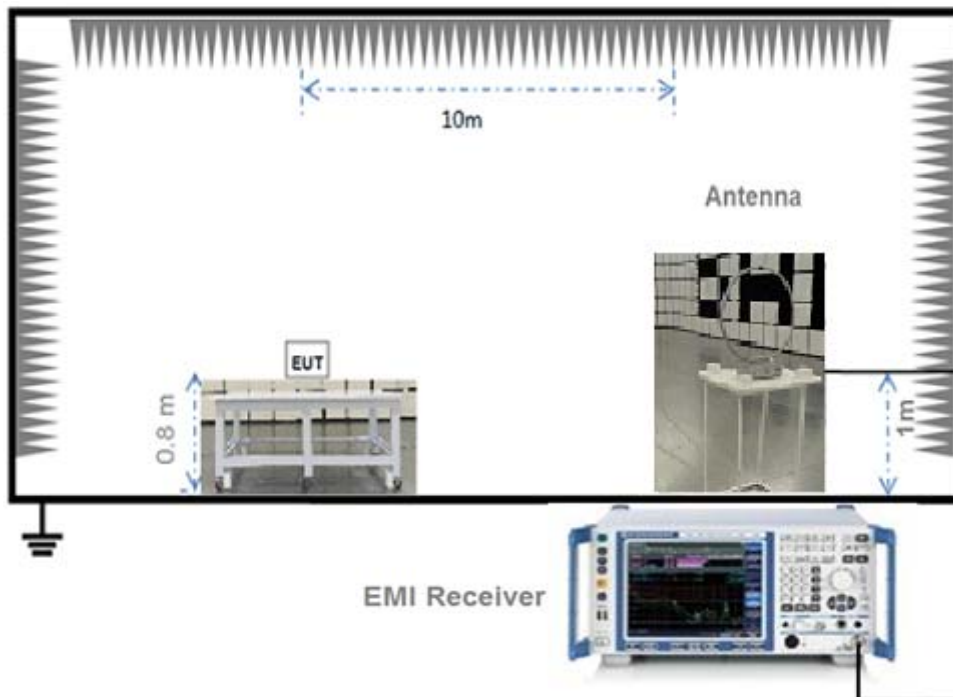
Relative Humidity	45% - 55%	
Atmospheric Pressure	100 kPa - 102 kPa	
Temperature	NT (Normal Temperature)	+22°C to +25°C
Working Voltage of the EUT	NV (Normal Voltage)	AC 120V/60Hz

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2017.06.22	2018.06.21
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
LISN	SCHWARZBECK	NSLK 8127	8127-687	2017.06.22	2018.06.21
Shielded Enclosure	ChangNing	CN-130701	130703	N/A	N/A

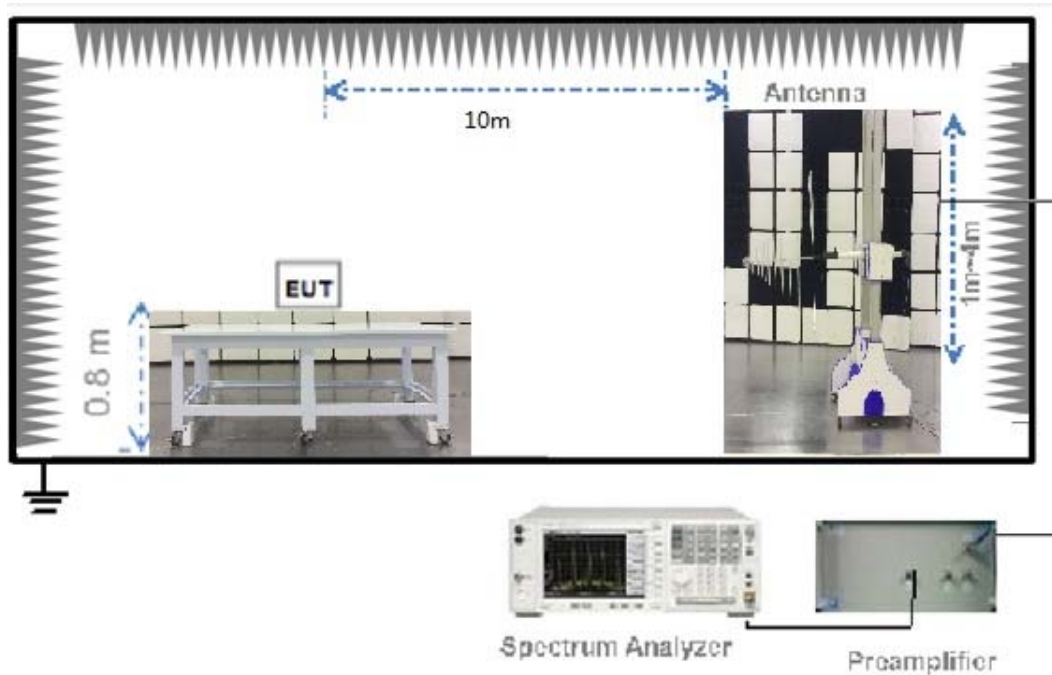
4.3 Test Setups

Test Setup 1



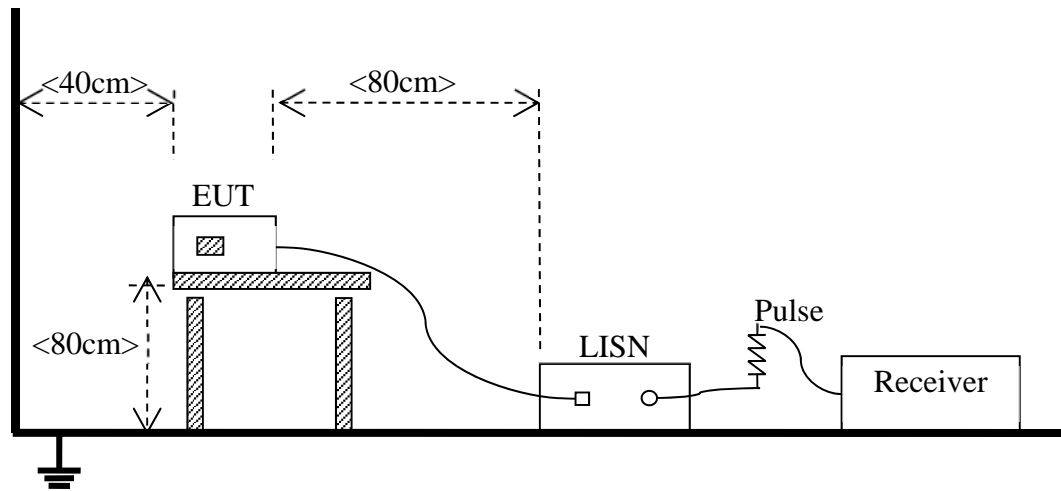
For Radiated Emission Test (Below 30 MHz))

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 (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 dB $\mu\text{V/m}$ @3 m (AV) and 74 dB $\mu\text{V/m}$ @3 m (PK)
- 4) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). For example, at the frequency 9 kHz, limit @10m = $20 \cdot \log (2400/f) + 40 \log (d_{\text{limit}}/d_{\text{measure}})$ where limit = 300m, $d_{\text{measure}}=10\text{m}$. limit @10m = $20 \cdot \log (2400/9) + 40 \log (300/10) = 107.5$ (dB $\mu\text{V/m}$).
- 5) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided, When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements). For example, at the frequency 30 MHz, limit @10m = $20 \cdot \log (100) + 20 \log (d_{\text{limit}}/d_{\text{measure}})$ where limit = 3m, $d_{\text{measure}}=10\text{m}$. limit @10m = $20 \cdot \log (100) + 20 \log (3/10) = 29.5$ (dB $\mu\text{V/m}$).

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.

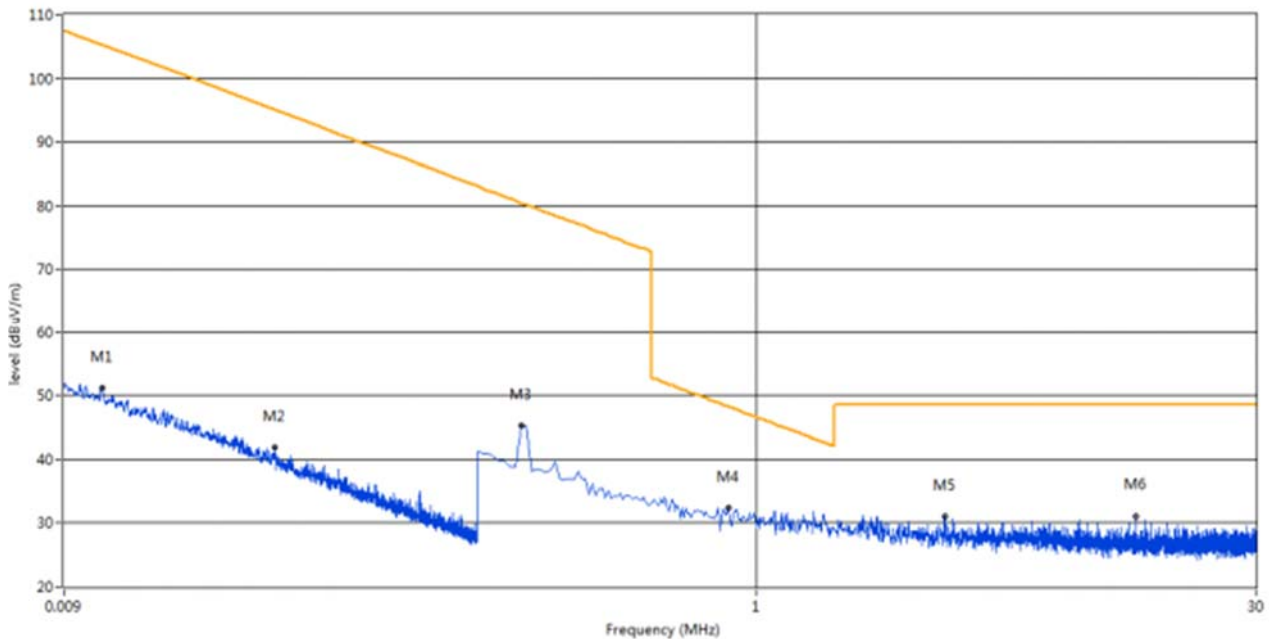
Note ²: For the test data above 1 GHz, according the ANSI C63.4-2014, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note ³: The frequency which mark N/A is the fundamental.

Note ⁴: 9 kHz -150 kHz level of the emission is the background noise, the unwanted emission generating by the equipment buried in the background noise.

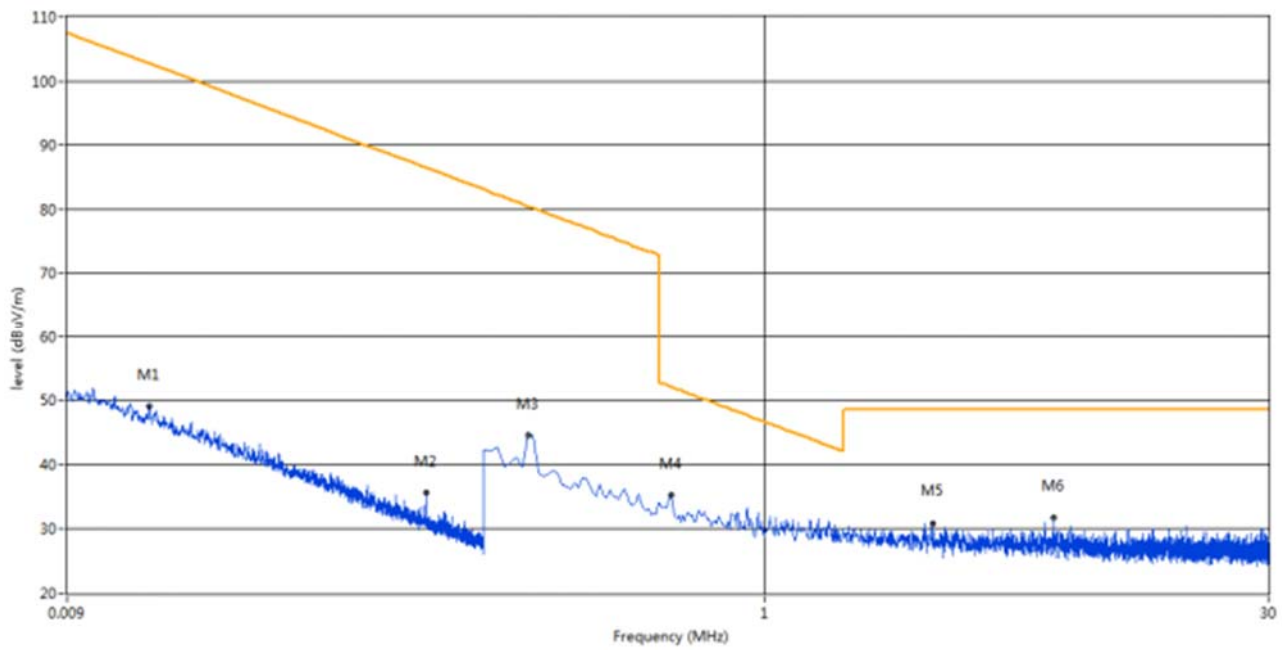
QI Test Data and Plots

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



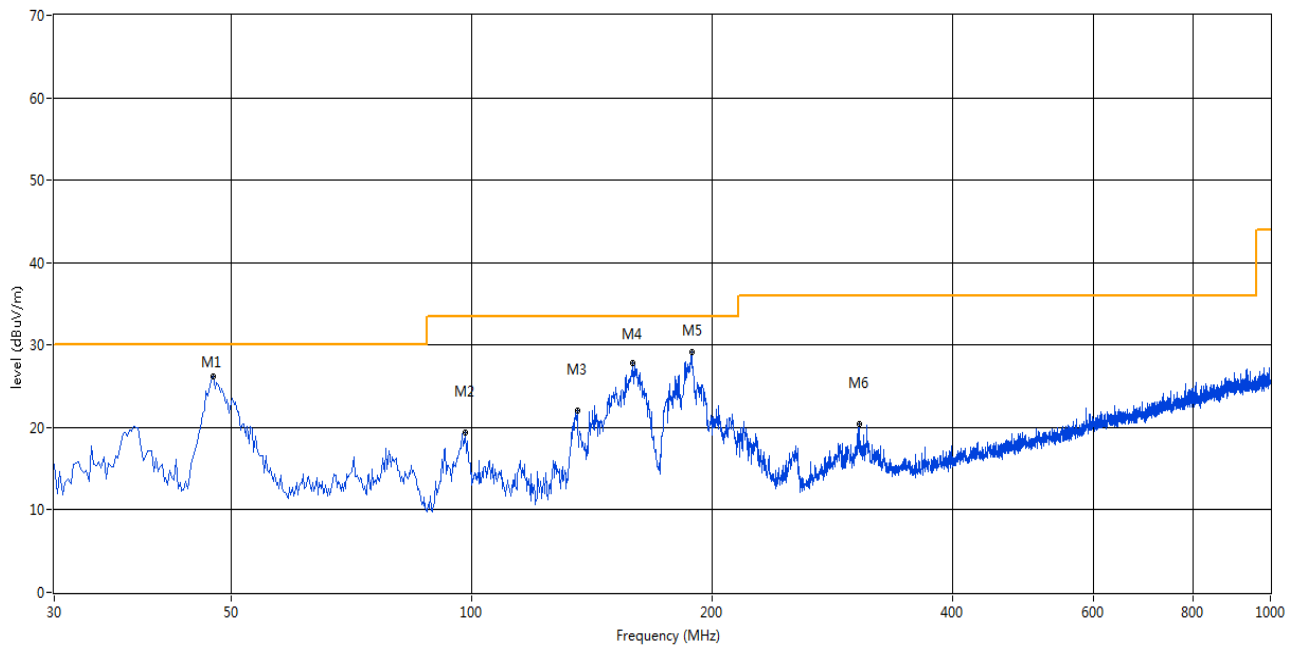
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	0.012	51.18	20.01	105.3	54.12	Peak	37.00	100	Vertical	Pass
2	0.038	41.84	20.23	95.1	53.26	Peak	1.00	100	Vertical	Pass
3	0.205	45.29	20.10	80.4	35.11	Peak	0.00	100	Vertical	N/A
4	0.829	32.31	20.49	48.2	15.89	Peak	5.00	100	Vertical	Pass
5	3.605	30.94	20.63	48.5	17.56	Peak	239.00	100	Vertical	Pass
6	13.262	31.12	20.89	48.5	17.38	Peak	96.00	100	Vertical	Pass

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



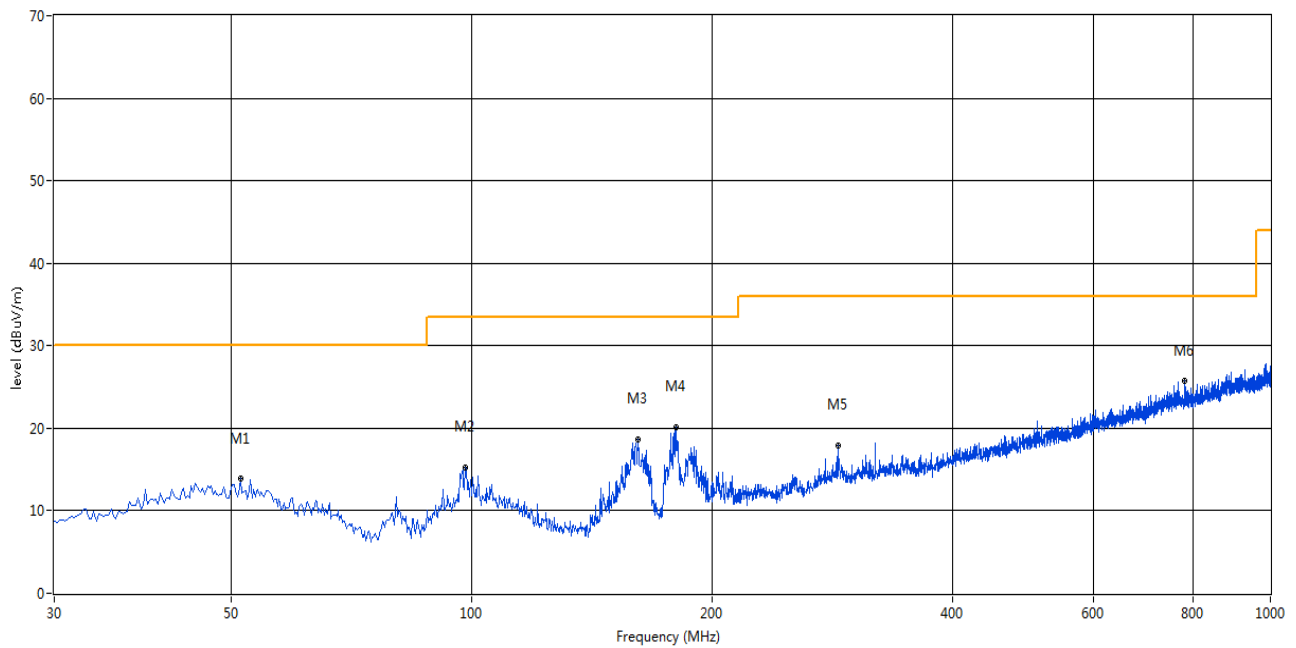
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	0.016	49.04	20.12	102.7	53.66	Peak	186.00	100	Horizontal	Pass
2	0.101	35.62	20.17	86.5	50.88	Peak	1.00	100	Horizontal	Pass
3	0.205	44.50	20.10	80.4	35.90	Peak	351.00	100	Horizontal	N/A
4	0.531	35.16	20.28	52.1	16.94	Peak	96.00	100	Horizontal	Pass
5	3.120	30.92	20.54	48.5	17.58	Peak	335.00	100	Horizontal	Pass
6	7.016	31.83	20.82	48.5	16.67	Peak	358.00	100	Horizontal	Pass

A.1.3 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	47.460	26.16	-13.35	30.0	3.84	Peak	360.00	300	Vertical	Pass
2	98.143	19.46	-15.46	33.5	14.04	Peak	68.00	300	Vertical	Pass
3	135.488	22.12	-18.69	33.5	11.38	Peak	352.00	100	Vertical	Pass
4	158.768	27.76	-18.06	33.5	5.74	Peak	0.00	200	Vertical	Pass
5	188.595	29.22	-15.97	33.5	4.28	Peak	123.00	100	Vertical	Pass
6	305.480	20.46	-12.11	36.0	15.54	Peak	311.00	100	Vertical	Pass

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

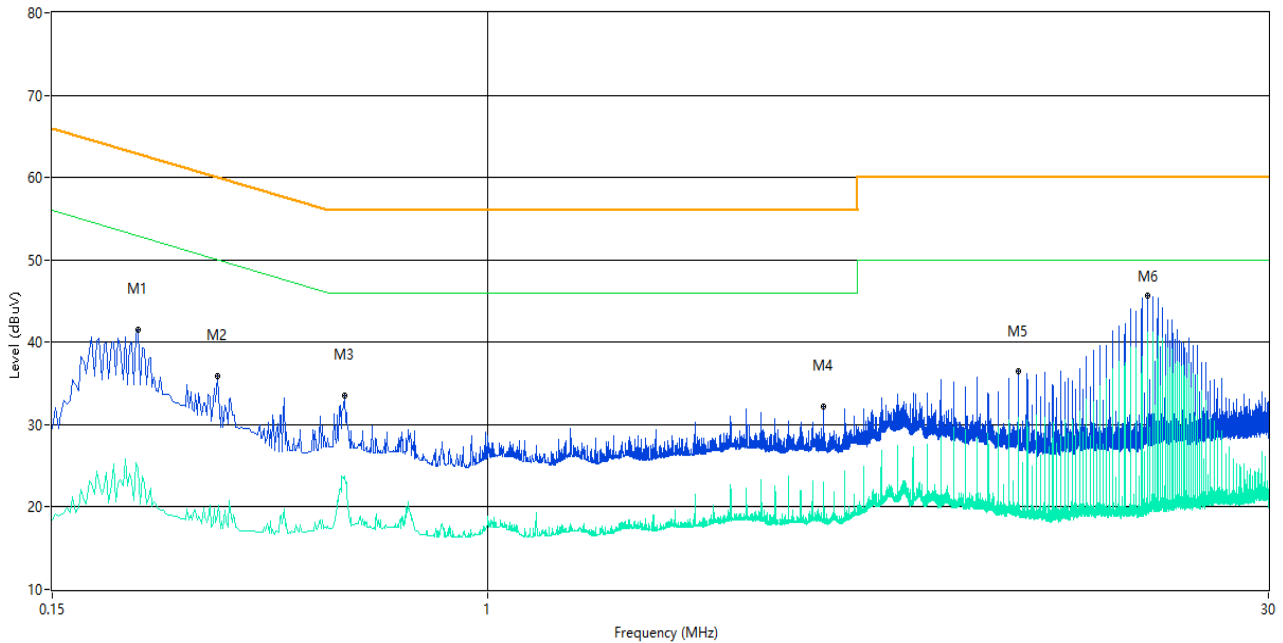


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	51.340	13.98	-13.34	30.0	16.02	Peak	271.00	100	Horizontal	Pass
2	98.143	15.19	-15.46	33.5	18.31	Peak	347.00	300	Horizontal	Pass
3	161.435	18.66	-17.90	33.5	14.84	Peak	295.00	300	Horizontal	Pass
4	180.108	20.09	-16.89	33.5	13.41	Peak	97.00	300	Horizontal	Pass
5	288.020	17.92	-12.52	36.0	18.08	Peak	360.00	200	Horizontal	Pass
6	780.780	25.75	-2.49	36.0	10.25	Peak	254.00	100	Horizontal	Pass

A.2 Conducted Emission

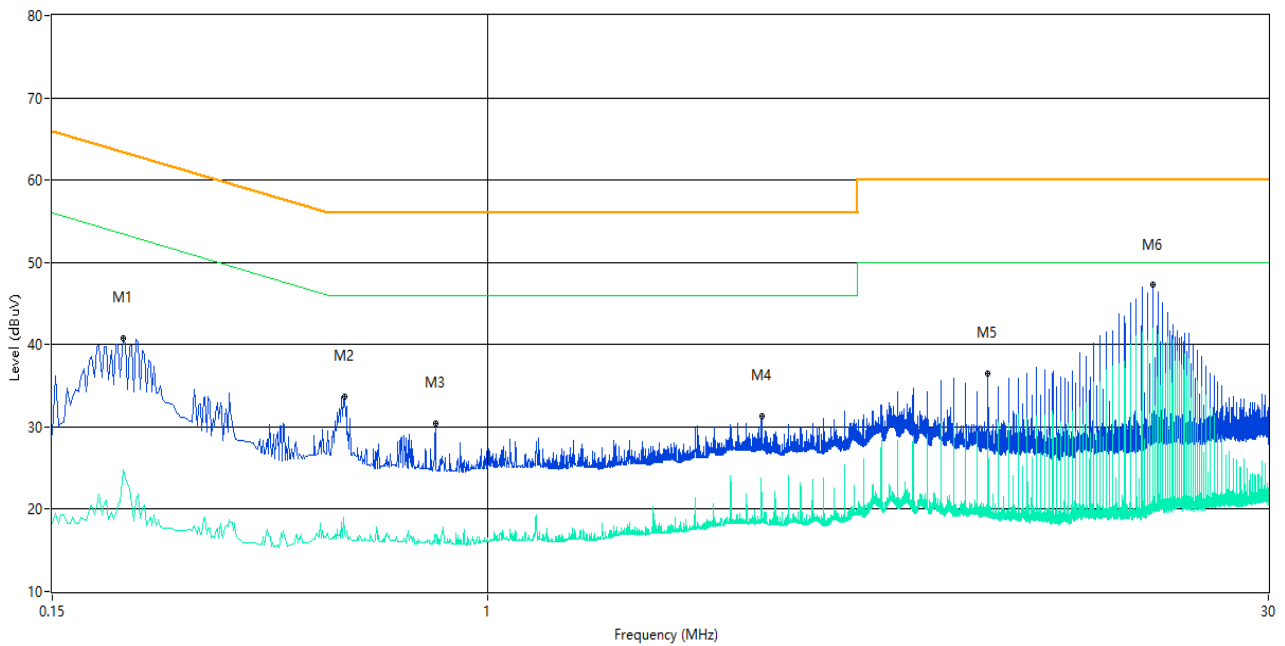
QI Test Data and Plots

A.2.1 L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.218	41.5	11.34	62.9	21.40	Peak	L Line	Pass
1**	0.218	24.7	11.34	52.9	28.20	AV	L Line	Pass
2	0.308	35.9	9.81	60.0	24.10	Peak	L Line	Pass
2**	0.308	19.1	9.81	50.0	30.90	AV	L Line	Pass
3	0.536	33.6	9.34	56.0	22.40	Peak	L Line	Pass
3**	0.536	23.8	9.34	46.0	22.20	AV	L Line	Pass
4	4.322	32.2	9.96	56.0	23.80	Peak	L Line	Pass
4**	4.322	23.0	9.96	46.0	23.00	AV	L Line	Pass
5	10.084	36.4	10.28	60.0	23.60	Peak	L Line	Pass
5**	10.084	30.9	10.28	50.0	19.10	AV	L Line	Pass
6	17.700	45.7	11.13	60.0	14.30	Peak	L Line	Pass
6**	17.700	41.2	11.13	50.0	8.80	AV	L Line	Pass

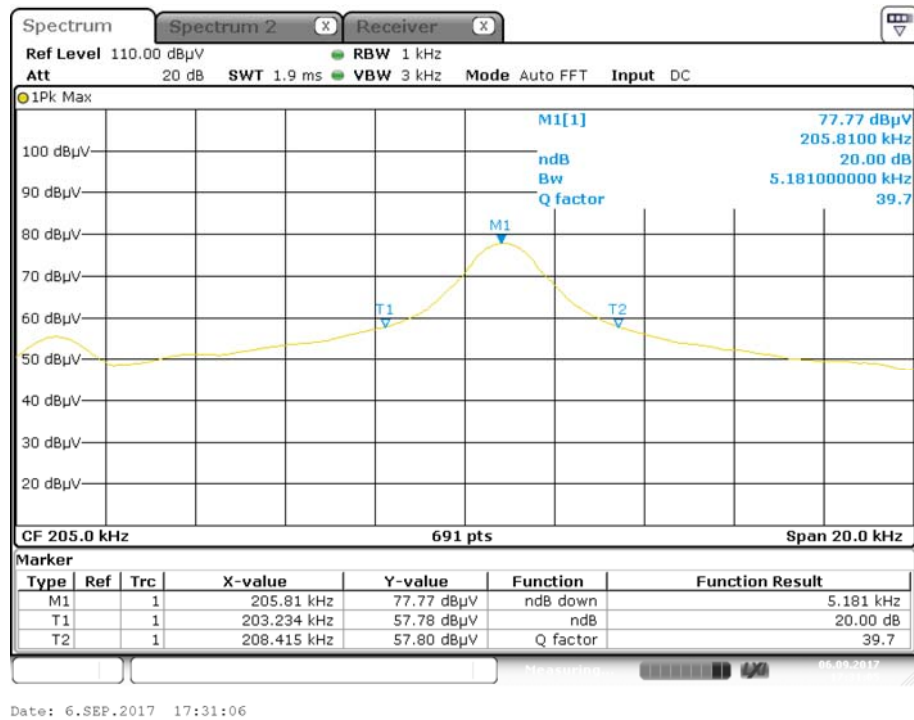
A.2.2 N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.204	40.8	9.11	63.4	22.60	Peak	N Line	Pass
1**	0.204	24.9	9.11	53.4	28.50	AV	N Line	Pass
2	0.536	33.7	9.34	56.0	22.30	Peak	N Line	Pass
2**	0.536	17.1	9.34	46.0	28.90	AV	N Line	Pass
3	0.796	30.5	10.53	56.0	25.50	Peak	N Line	Pass
3**	0.796	16.6	10.53	46.0	29.40	AV	N Line	Pass
4	3.298	31.4	10.57	56.0	24.60	Peak	N Line	Pass
4**	3.298	21.2	10.57	46.0	24.80	AV	N Line	Pass
5	8.846	36.4	10.07	60.0	23.60	Peak	N Line	Pass
5**	8.846	29.4	10.07	50.0	20.60	AV	N Line	Pass
6	18.116	47.3	11.16	60.0	12.70	Peak	N Line	Pass
6**	18.116	42.0	11.16	50.0	8.00	AV	N Line	Pass

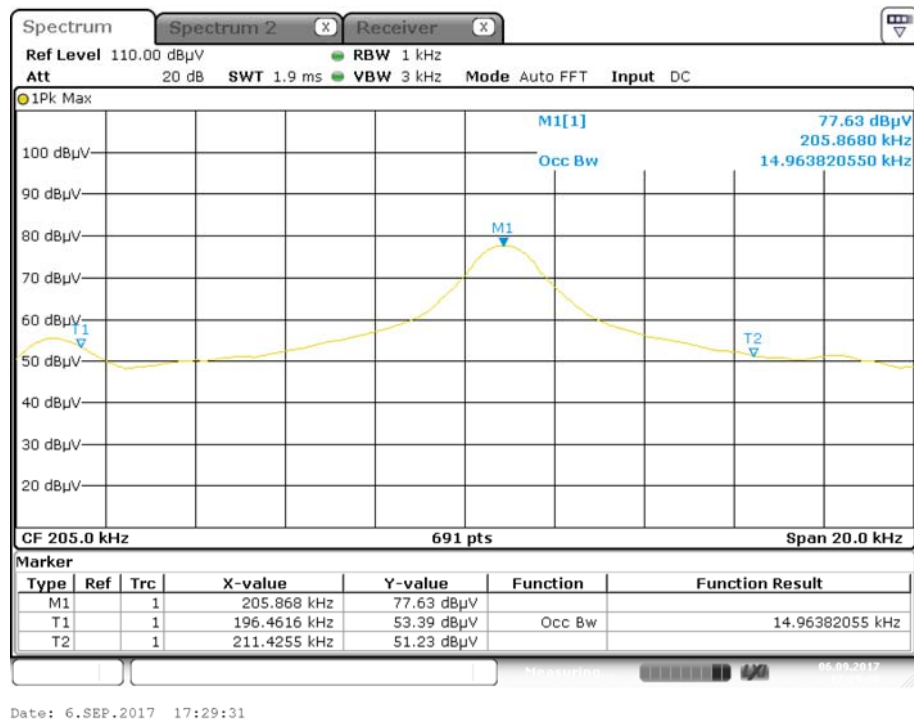
A.3 20 dB Bandwidth

QI Test Data and Plots



99% Occupied Bandwidth

QI Test Data and Plots



ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-EC1790068-AE.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-EC1790068-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-EC1790068-AI.PDF”.

--END OF REPORT--