

FCC

EMC

TEST REPORT

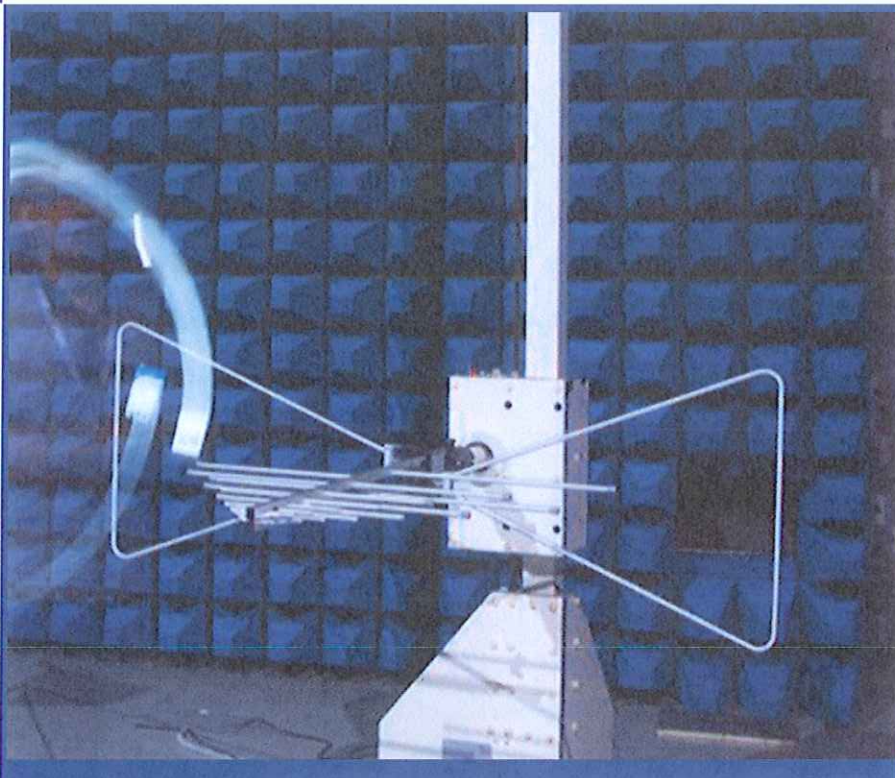
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
HP Tri-Mode Wireless Charging Pad

ISSUED TO
Neosen Energy LLC

1506 Capital Ave., Suite 150, Plano, TX, 75074



Tested by:

Cao Shaocong

(Engineer)

Date Feb. 23, 2016

Approved by:

Wei Yanquan

(Chief Engineer)

Date Feb. 23, 2016

Report No.: BL-SZ15A0079-602

EUT Type: HP Tri-Mode Wireless Charging Pad

Model Name: NEO-031-1-1-3-5-2HP,
NEO-032-1-1-3-5-2HP

Brand Name: HP

Test Standard: FCC Part 18

FCC ID: 2AF633211352HP

Test conclusion: Pass

Test Date: Nov. 2, 2015 ~ Feb. 21, 2016

Date of Issue: Feb. 23, 2016

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Revision History

| Version | Issue Date | Revisions |
|----------------|----------------------|----------------------|
| <u>Rev. 01</u> | <u>Feb. 23, 2016</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 has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625.</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 v1.2.
- (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 | Neosen Energy LLC |
| Address | 1506 Capital Ave., Suite 150, Plano, TX, 75074 |

2.2 Manufacturer Information

| | |
|--------------|--|
| Manufacturer | Surface Mount Technology Ltd. |
| Address | 12/F, Wyler Centre Phase 2, 200 Tai Lin Pai Road, Kwai Chung, NT, HKSAR. |

2.3 Factory Information

| | |
|---------|--|
| Factory | Dongguan Superior Manufacturing Technology Co., Ltd |
| Address | No.1, 14 Hong Ye Road North, Tangxia Town, Dongguan, Guangdong Province, PR China 523710 |

2.4 General Description for Equipment under Test (EUT)

| | |
|-----------------------------------|--|
| EUT Type | HP Tri-Mode Wireless Charging Pad |
| Model Name Under Test | NEO-031-1-1-3-5-2HP |
| Series Model Name | NEO-031-1-1-3-5-2HP, NEO-032-1-1-3-5-2HP |
| Hardware Version | 3.0 |
| Software Version | 4.0 |
| Network and Wireless connectivity | Qi, PMA, A4WP, Bluetooth |
| About the Product | Only the A4WP was tested in this report. |

2.5 Ancillary Equipment

| | | |
|-----------------------|--------------|-----------------------------|
| Ancillary Equipment 1 | Charger | |
| | Brand Name | N/A |
| | Model No. | WAE009 |
| | Serial No. | N/A |
| | Rated Input | 100-240 V~, 0.6 A, 50/60 Hz |
| | Rated Output | 12 V=, 1.5 A |

2.6 Technical Information

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

| | |
|---------------------|-------------------------|
| Operating Frequency | 6.78 MHz |
| Antenna Type | PCB Antenna |
| FCC Classification | Part 18 Consumer Device |
| Antenna Gain | 0 dBi |

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

| No. | Identity | Document Title |
|-----|-------------------|--|
| 1 | 47 CFR Part 18 | INDUSTRIAL, SCIENTIFIC, AND MEDICAL EQUIPMENT |
| 2 | ANSI C63.4-2014 | American National Standard for 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 | FCC/OST MP-5:1986 | Methods of Measurements of Radio Noise Emissions from ISM equipment |

3.2 Verdict

| No. | Description | FCC Rule | Test Verdict | Result |
|-----|------------------------------|-----------|--------------|-----------|
| 1 | Radiated Emission | 18.305 | Pass | Annex A.1 |
| 2 | Conducted Emission, AC Ports | 18.307(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) | 2.79 dB |
| Radiated emissions (30 MHz-1 GHz) | 3.45 dB |
| Radiated emissions (1 GHz-18 GHz) | 3.67 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 110 V/60 Hz |

4.2 Test Equipment List

| Description | Manufacturer | Model | Serial No. | Cal. Date | Cal. Due |
|--|---------------|-------------|------------|------------|------------|
| EMI Receiver | ROHDE&SCHWARZ | ESRP | 101036 | 2015.07.14 | 2016.07.13 |
| Test Antenna- Loop(9 kHz- 30 MHz) | SCHWARZBECK | FMZB 1519 | 1519-037 | 2015.07.22 | 2017.07.21 |
| Test Antenna- Bi-Log(30 MHz-3 GHz) | SCHWARZBECK | VULB 9163 | 9163-624 | 2015.07.22 | 2017.07.21 |
| Test Antenna- Horn(1- 18 GHz) | SCHWARZBECK | BBHA 9120D | 9120D-1148 | 2015.07.22 | 2017.07.21 |
| Test Antenna- Horn(15- 26.5 GHz) | SCHWARZBECK | BBHA 9170 | 9170-305 | 2015.07.22 | 2017.07.21 |
| Anechoic Chamber | RAINFORD | 9 m*6 m*6 m | N/A | 2015.02.28 | 2016.02.27 |
| DC Power Supply | ROHDE&SCHWARZ | HMP2020 | 018141664 | 2015.07.17 | 2016.07.16 |
| EMI Receiver | ROHDE&SCHWARZ | ESRP | 101036 | 2015.07.14 | 2016.07.13 |
| LISN | SCHWARZBECK | NSLK 8127 | 8127-687 | 2015.07.14 | 2016.07.13 |
| AMN | SCHWARZBECK | NNBM8124 | 8124-509 | 2015.07.14 | 2016.07.13 |
| AMN | SCHWARZBECK | NNBM8124 | 8124-510 | 2015.07.14 | 2016.07.13 |
| ISN | TESEQ | ISN T800 | 34449 | 2015.07.14 | 2016.07.13 |
| Shielded Enclosure | ChangNing | CN-130701 | 130703 | N/A | N/A |

4.3 Test Enclosure list

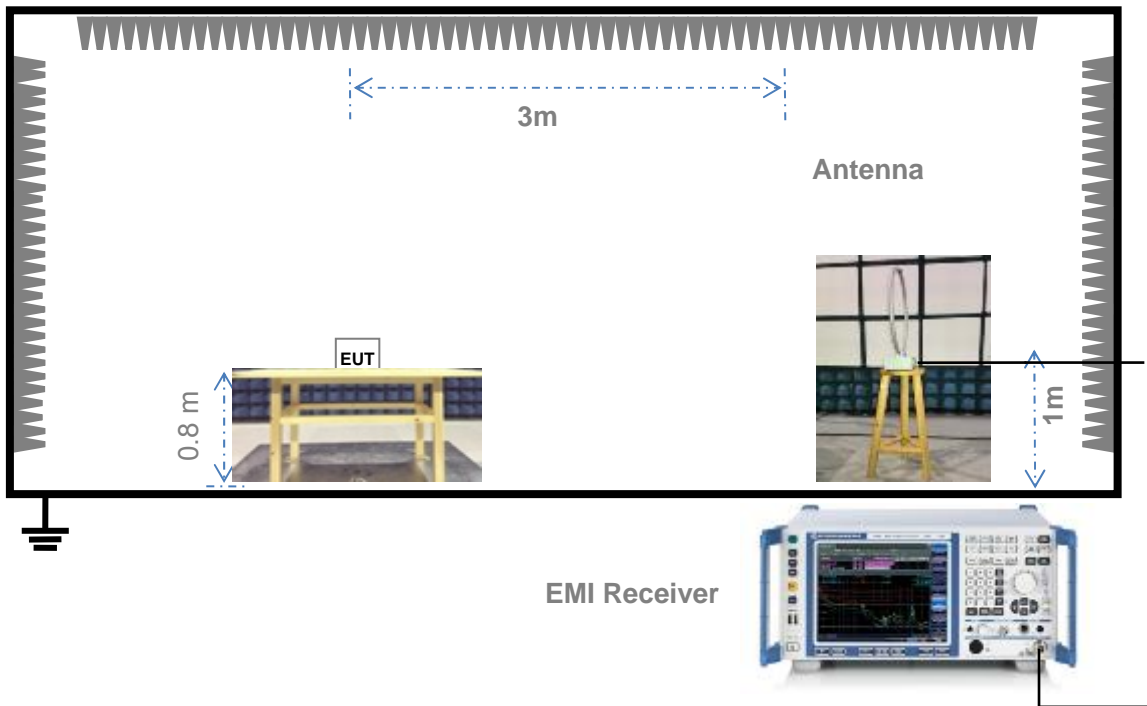
| Description | Manufacturer | Model | Serial No. | Length | Description | Use |
|-------------|--------------|--------------|------------|--------|--------------------|-------------------------------------|
| PC | N/A | N/A | N/A | N/A | Special Handled | <input type="checkbox"/> |
| Printer | HP | 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"/> |
| A4WP Load | N/A | N/A | N/A | N/A | N/A | <input checked="" type="checkbox"/> |

4.4 Test Configurations

| Test Configurations (TC) No. | Description |
|------------------------------|--|
| TC01 | <u>The A4WP Test Mode</u> The EUT configuration of the emission tests is EUT + A4WP Load + Charger. During the measurement, the EUT is connected with the A4WP load and recharge for the QI load. The EUT is also connected with the charger and working normally. |
| TC02 | <u>The Idle test mode</u> The EUT configuration of the emission tests is EUT + Charger. During the measurement, the EUT is in the idle test mode. |

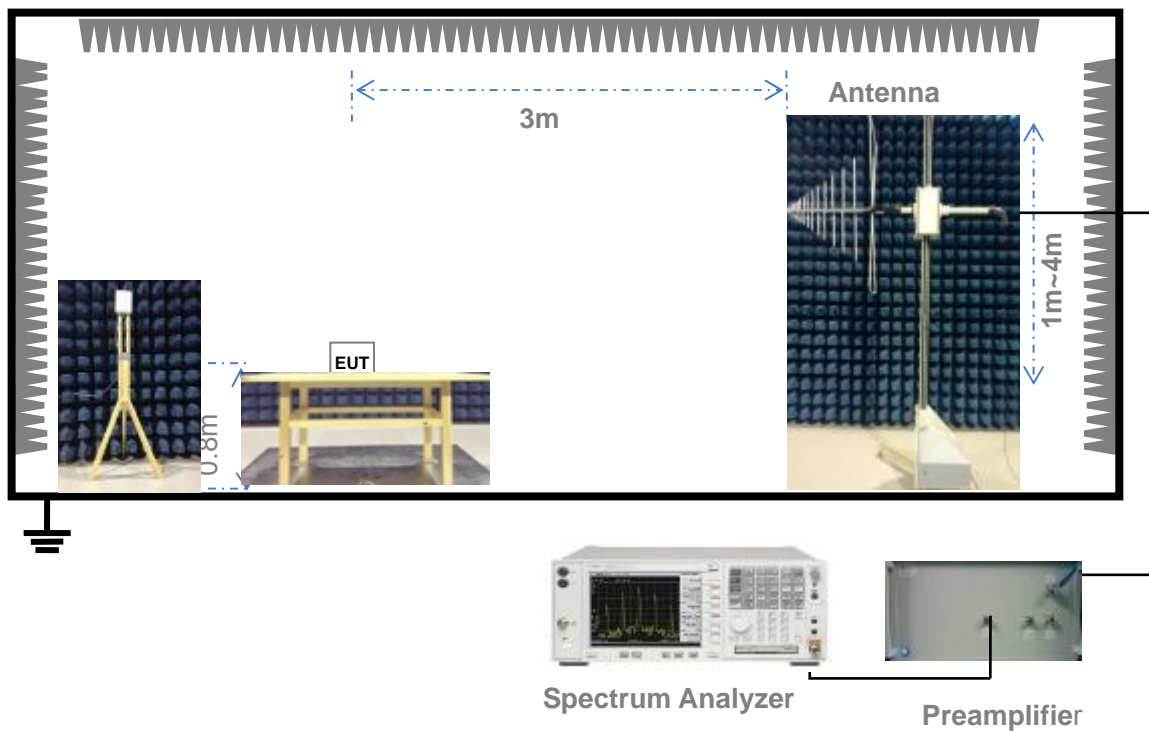
4.5 Test Setups

Test Setup 1



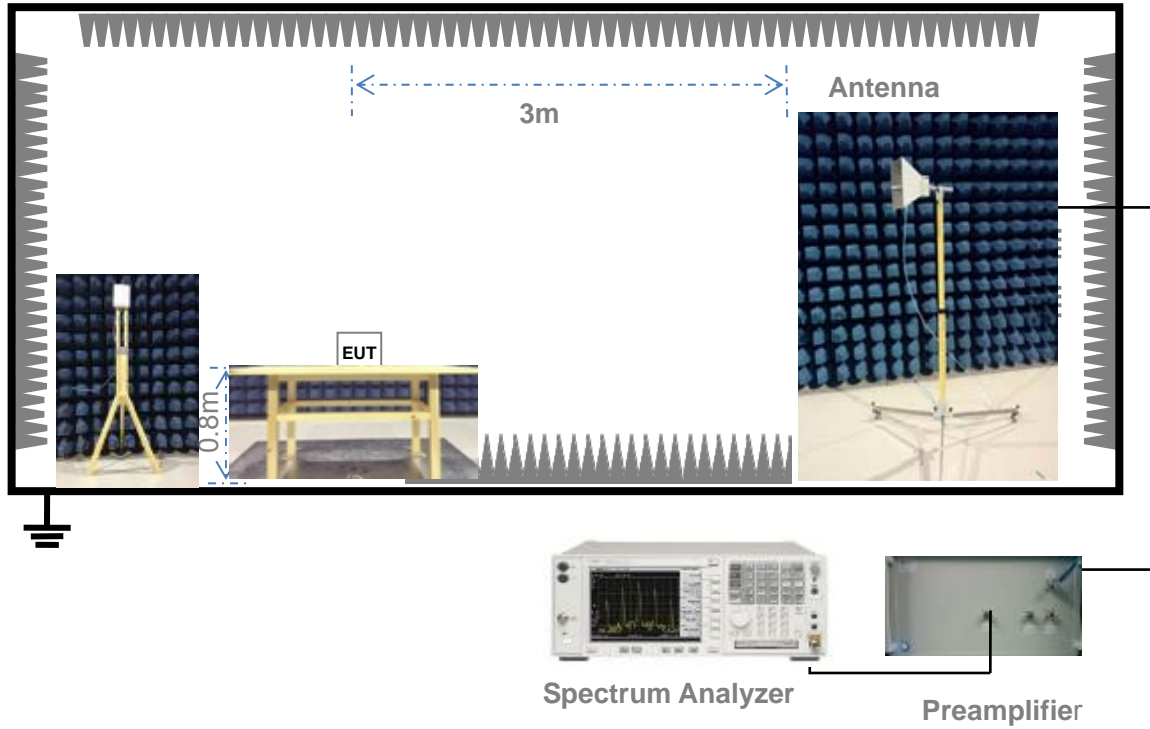
For Radiated Emission Test (Below 30 MHz))

Test Setup 2



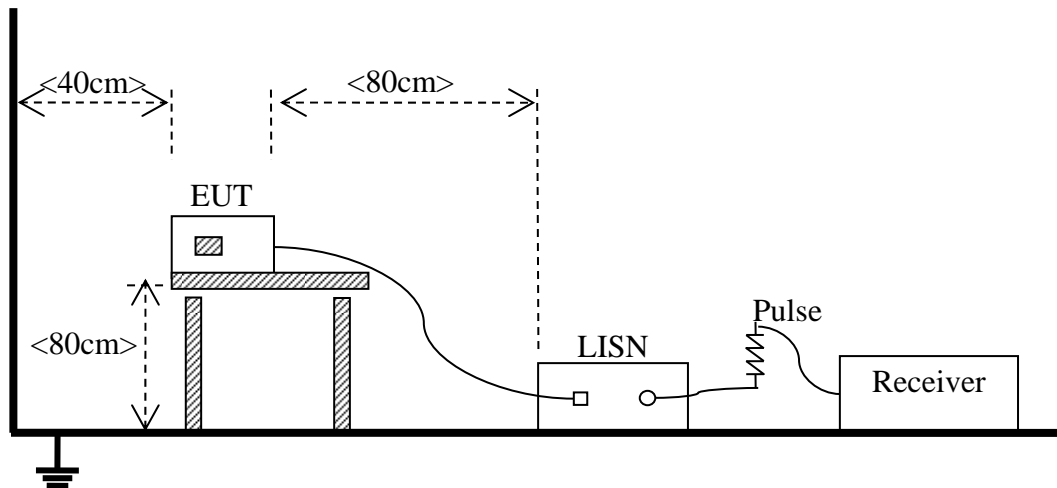
(For Radiated Emission Test (30 MHz-1 GHz))

Test Setup 3



(For Radiated Emission Test (above 1 GHz))

Test Setup 4



(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 | Test Env. | NTNV |
| | Test Setup | Test Setup 4 |
| | 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 test mode is reported in this report. And the A4WP test mode are the worst mode in this report.

5 TEST ITEMS

5.1 Emission Tests

5.1.1.1 Limit

- (a) ISM equipment operating on a frequency specified in §18.301 is permitted unlimited radiated energy in the band specified for that frequency.

| ISM frequency | Tolerance |
|---------------|-----------|
| 6.78 MHz | ± 15 kHz |

- (b) The field strength levels of emissions which lie outside the bands specified in §18.301, unless otherwise indicated, shall not exceed the following:

| Frequency (MHz) | Field Strength (µV/m @300m) | Field Strength (dBµV/m @300m) | Field Strength (µV/m @3m) | Field Strength (dBµV/m @3m) |
|-----------------|-----------------------------|-------------------------------|---------------------------|-----------------------------|
| 0.009 - 1000 | 25 | 27.96 | 2500 | 67.96 |

Note: According to the article 18.305(b), the operating frequency is ISM frequency, RF power generated by equipment is below 500 (watts).

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) | 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 lower limit shall apply at the band edges.
- 2) Decreases with the logarithm of the frequency.

5.1.2.2 Test Setup

Refer to 4.5 section test (test setup 4) 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.

5.1.2.4 Test Result

Please refer to ANNEX A.2.

ANNEX A TEST RESULTS

A.1 Radiated Emission

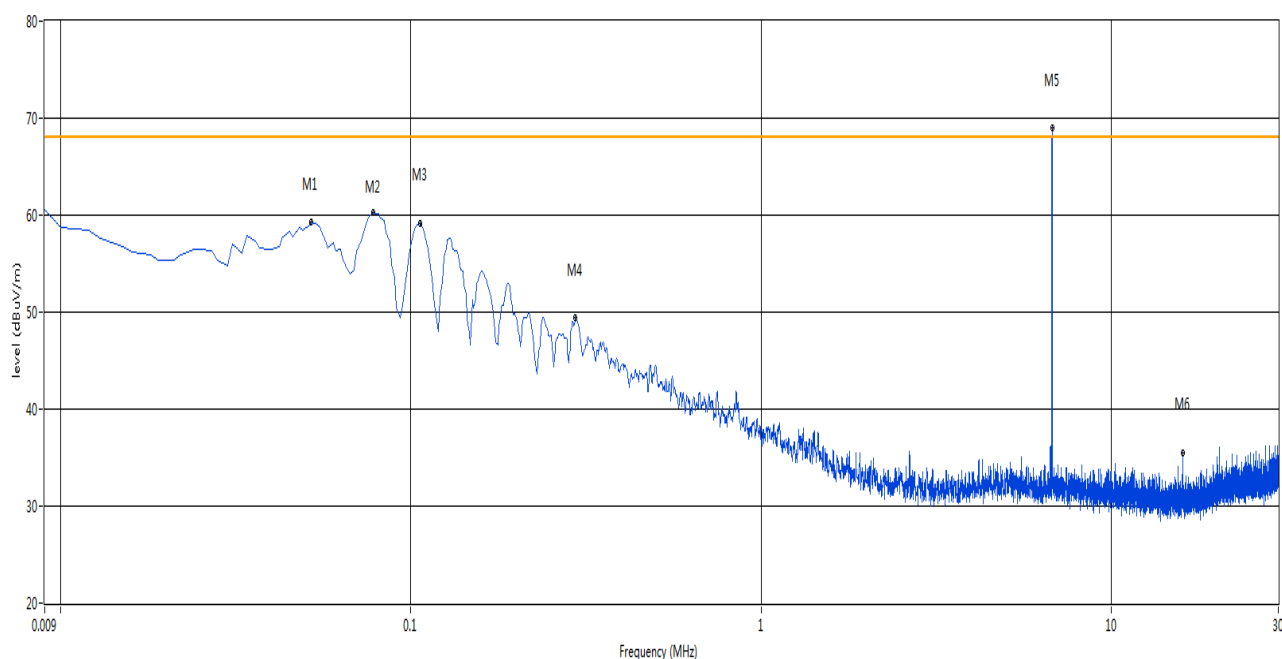
Note 1: The symbol of “--” in the table which means not application.

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

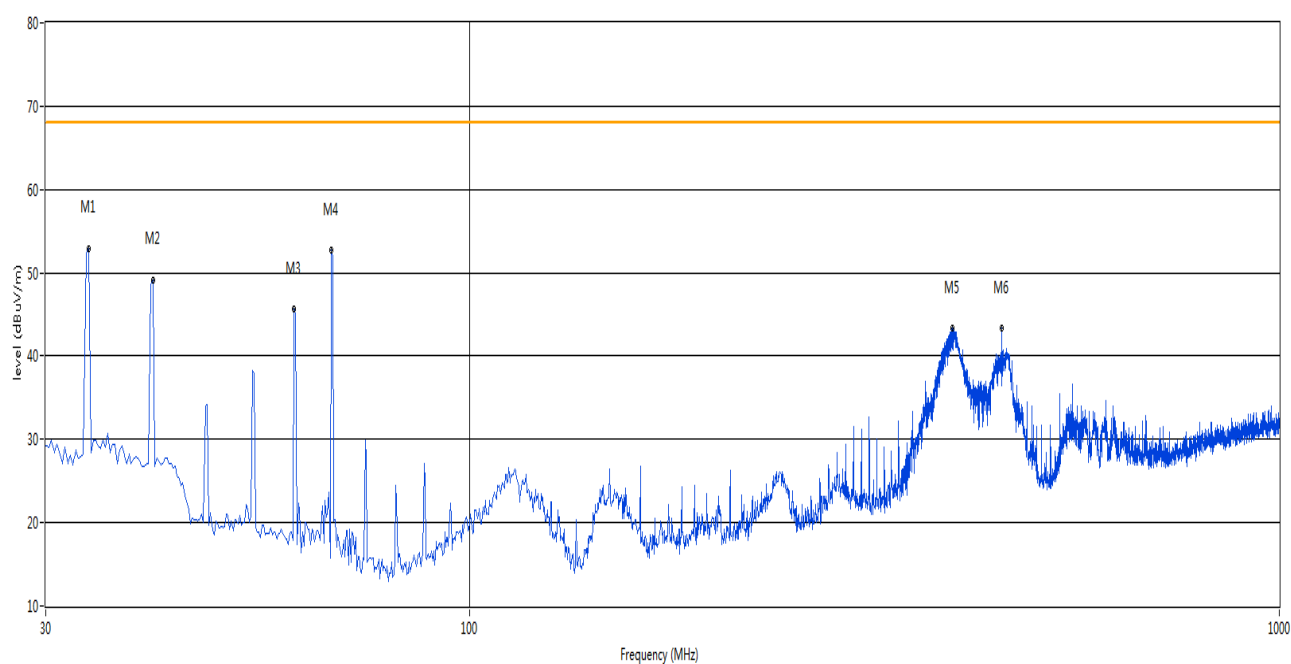
A4WP TEST MODE

A.1.1 9 kHz –30 MHz



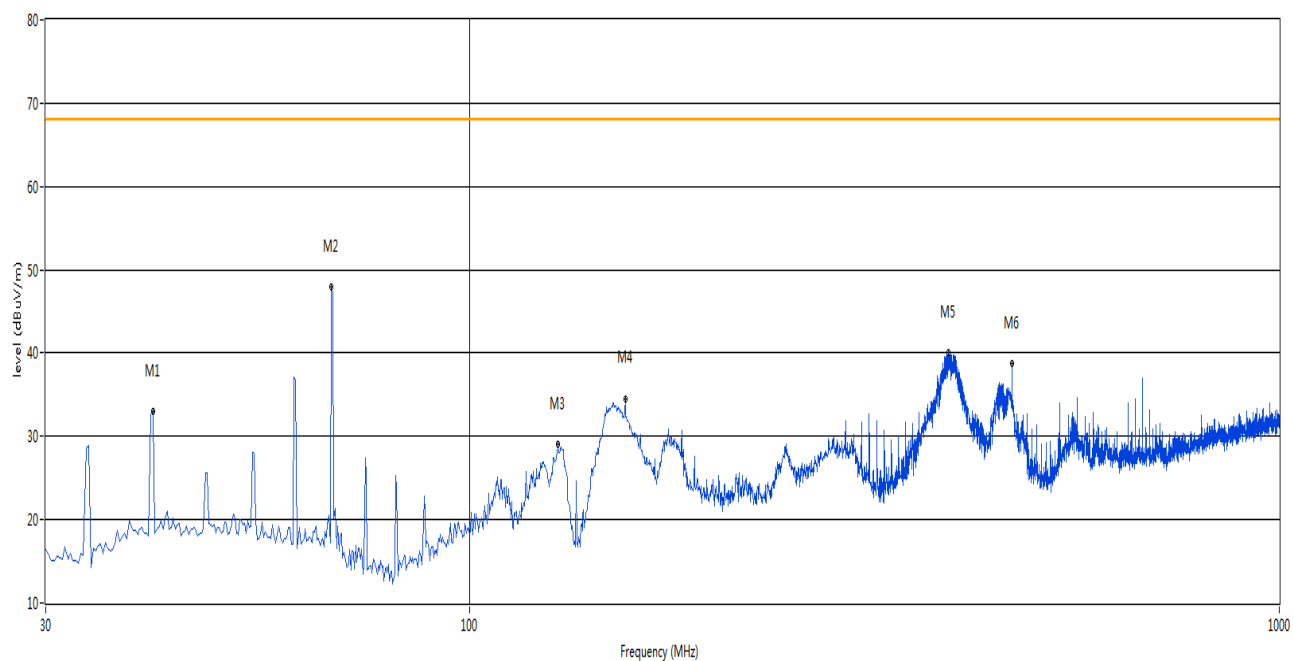
| No. | Frequency (MHz) | Results (dBuV/m) | Factor (dB) | Limit (dBuV/m) | Margin (dB) | Detector | Table (o) | Height (cm) | ANT | Verdict |
|-----|-----------------|------------------|-------------|----------------|-------------|----------|-----------|-------------|----------|---------|
| 1 | 0.05 | 59.23 | 19.89 | 67.96 | 8.73 | Peak | 298.00 | 100 | Vertical | Pass |
| 2 | 0.08 | 60.25 | 19.86 | 67.96 | 7.71 | Peak | 179.00 | 100 | Vertical | Pass |
| 3 | 0.11 | 59.21 | 19.82 | 67.96 | 8.75 | Peak | 6.00 | 100 | Vertical | Pass |
| 4 | 0.29 | 49.41 | 19.83 | 67.96 | 18.55 | Peak | 348.00 | 100 | Vertical | Pass |
| 5 | 6.78 | 68.95 | 20.71 | 67.96 | -0.99 | Peak | 216.00 | 100 | Vertical | N/A |
| 6 | 16.00 | 35.43 | 21.07 | 67.96 | 32.53 | Peak | 52.00 | 100 | Vertical | Pass |

A.1.2 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 | 33.88 | 52.96 | -21.72 | 67.96 | 15.00 | Peak | 290.00 | 100 | Vertical | Pass |
| 2 | 40.67 | 49.13 | -19.55 | 67.96 | 18.83 | Peak | 262.00 | 100 | Vertical | Pass |
| 3 | 60.79 | 45.59 | -20.18 | 67.96 | 22.37 | Peak | 126.00 | 100 | Vertical | Pass |
| 4 | 67.58 | 52.68 | -21.72 | 67.96 | 15.28 | Peak | 161.00 | 100 | Vertical | Pass |
| 5 | 394.63 | 43.33 | -15.35 | 67.96 | 24.63 | Peak | 312.00 | 100 | Vertical | Pass |
| 6 | 454.27 | 43.34 | -14.41 | 67.96 | 24.62 | Peak | 111.00 | 100 | Vertical | Pass |

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 | 40.67 | 33.08 | -19.55 | 67.96 | 34.88 | Peak | 206.00 | 100 | Horizontal | Pass |
| 2 | 67.58 | 47.88 | -21.72 | 67.96 | 20.08 | Peak | 274.00 | 100 | Horizontal | Pass |
| 3 | 128.67 | 29.11 | -23.00 | 67.96 | 38.85 | Peak | 68.00 | 100 | Horizontal | Pass |
| 4 | 155.83 | 34.56 | -23.23 | 67.96 | 33.40 | Peak | 358.00 | 100 | Horizontal | Pass |
| 5 | 390.26 | 40.05 | -15.51 | 67.96 | 27.91 | Peak | 160.00 | 100 | Horizontal | Pass |
| 6 | 467.60 | 38.77 | -13.99 | 67.96 | 29.19 | Peak | 20.00 | 100 | Horizontal | Pass |

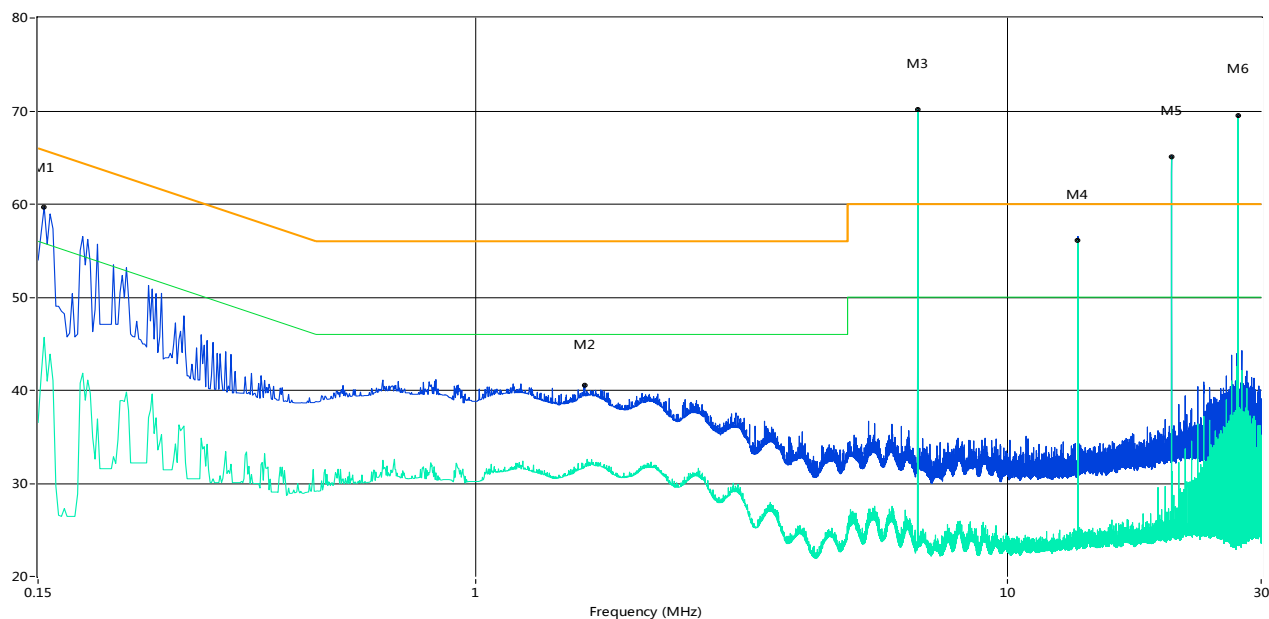
A.2 Conducted Emission

Note 1: Based on §18.307(e), conduction limits in the table above apply only outside the frequency bands specified in §18.301. Therefore, emissions at 6.78 MHz, 13.56 MHz, 20.34 MHz and 27.12 MHz are not subject to the conduction limits of §18.307.

Test Data and Plots

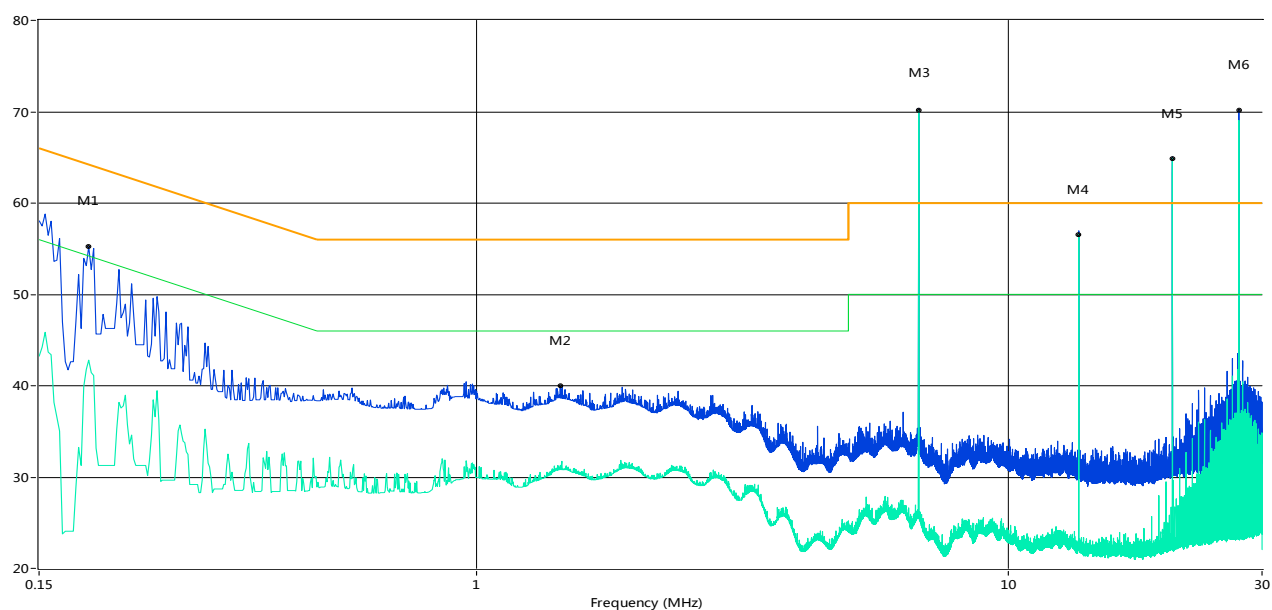
A4WP TEST MODE

A.2.1 L Phase



| No. | Frequency (MHz) | Results (dBuV) | Factor (dB) | Limit (dBuV) | Margin (dB) | Detector | Line | Verdict |
|-----|-----------------|----------------|-------------|--------------|-------------|----------|--------|---------|
| 1 | 0.15 | 59.7 | 13.00 | 65.9 | 6.20 | Peak | L Line | Pass |
| 1** | 0.15 | 45.7 | 13.00 | 55.9 | 10.20 | AV | L Line | Pass |
| 2 | 1.60 | 40.5 | 13.00 | 56.0 | 15.50 | Peak | L Line | Pass |
| 2** | 1.60 | 31.4 | 13.00 | 46.0 | 14.60 | AV | L Line | Pass |
| 3 | 6.78 | 70.36 | 13.00 | 60.0 | -10.36 | Peak | L Line | N/A |
| 3** | 6.78 | 70.15 | 13.00 | 50.0 | -20.15 | AV | L Line | N/A |
| 4 | 13.56 | 57.20 | 13.00 | 60.0 | 2.80 | Peak | L Line | N/A |
| 4** | 13.56 | 56.50 | 13.00 | 50.0 | -6.50 | AV | L Line | N/A |
| 5 | 20.34 | 65.45 | 13.00 | 60.0 | -5.45 | Peak | L Line | N/A |
| 5** | 20.34 | 65.14 | 13.00 | 50.0 | -15.14 | AV | L Line | N/A |
| 6 | 27.12 | 70.67 | 13.00 | 60.0 | -10.67 | Peak | L Line | N/A |
| 6** | 27.12 | 69.29 | 13.00 | 50.0 | -19.29 | AV | L Line | N/A |

A.2.2 N Phase



| No. | Frequency (MHz) | Results (dBuV) | Factor (dB) | Limit (dBuV) | Margin (dB) | Detector | Line | Verdict |
|-----|-----------------|----------------|-------------|--------------|-------------|----------|--------|---------|
| 1 | 0.19 | 55.2 | 13.00 | 65.0 | 9.80 | Peak | N Line | Pass |
| 1** | 0.19 | 42.8 | 13.00 | 55.0 | 12.20 | AV | N Line | Pass |
| 2 | 1.43 | 40.0 | 13.00 | 56.0 | 16.00 | Peak | N Line | Pass |
| 2** | 1.43 | 31.3 | 13.00 | 46.0 | 14.70 | AV | N Line | Pass |
| 3 | 6.78 | 70.29 | 13.00 | 60.0 | -10.29 | Peak | N Line | N/A |
| 3** | 6.78 | 70.05 | 13.00 | 50.0 | -20.05 | AV | N Line | N/A |
| 4 | 13.56 | 57.13 | 13.00 | 60.0 | 2.87 | Peak | N Line | N/A |
| 4** | 13.56 | 56.64 | 13.00 | 50.0 | -6.64 | AV | N Line | N/A |
| 5 | 20.34 | 65.17 | 13.00 | 60.0 | -5.17 | Peak | N Line | N/A |
| 5** | 20.34 | 64.91 | 13.00 | 50.0 | -14.91 | AV | N Line | N/A |
| 6 | 27.12 | 70.32 | 13.00 | 60.0 | -10.32 | Peak | N Line | N/A |
| 6** | 27.12 | 68.95 | 13.00 | 50.0 | -18.95 | AV | N Line | N/A |

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ15A0079-AR2.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ15A0079-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ15A0079-AI.PDF”.

--END OF REPORT--