



FCC PART 15B, CLASS B

TEST REPORT

For

MFOURTEL MEXICO S.A. DE C.V.

Av. Ejercito Nacional 436 Piso 3 Chapultepec, Morales Miguel Hidalgo D.F 11570,
Mexico

FCC ID: CLNM4WILINK1

| | |
|---|---|
| Report Type: Original Report | Product Type: M4 WiLink1 |
| Report Number: <u>RSZ180614004-00A</u> | |
| Report Date: | <u>2018-07-11</u> |
| | Bibo Zhang |
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *MFOURTEL MEXICO S.A. DE C.V.*'s product, model number: *M4 WiLink1 (FCC ID: CLNM4WILINK1)* or the "EUT" in this report was a *M4 WiLink1*, which was measured approximately: 175mm (L) *168 mm (W) * 52mm (H), rated with input voltage: DC 12V from adapter. The highest operating frequency is 2690 MHz.

Adapter Information:

Model: ZL-A012W1201000
Input: AC 100-240V, 50/60Hz, 0.5A
Output: DC 12V, 1A

**All measurement and test data in this report was gathered from production sample serial number: 180614004. (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2018-06-14.*

Objective

This test report is prepared on behalf of *MFOURTEL MEXICO S.A. DE C.V.* in accordance with Part 2-Subpart J, Part 15-Subparts A, B of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine the compliance of the EUT with FCC Part 15 B.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS, FCC Part 22H&24E&27 PCB submissions with FCC ID: CLNM4WILINK1.

Test Methodology

All measurements contained in this report were conducted with 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.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

| Parameter | uncertainty | |
|------------------------|-------------|---------|
| Conducted Emissions | ±1.95dB | |
| Emissions, radiated | Below 1GHz | ±4.75dB |
| | Above 1GHz | ±4.88dB |

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a manufacturer testing fashion.

EUT operation mode: Working

EUT Exercise Software

“BurnIn test v5.3” exercise software was used.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

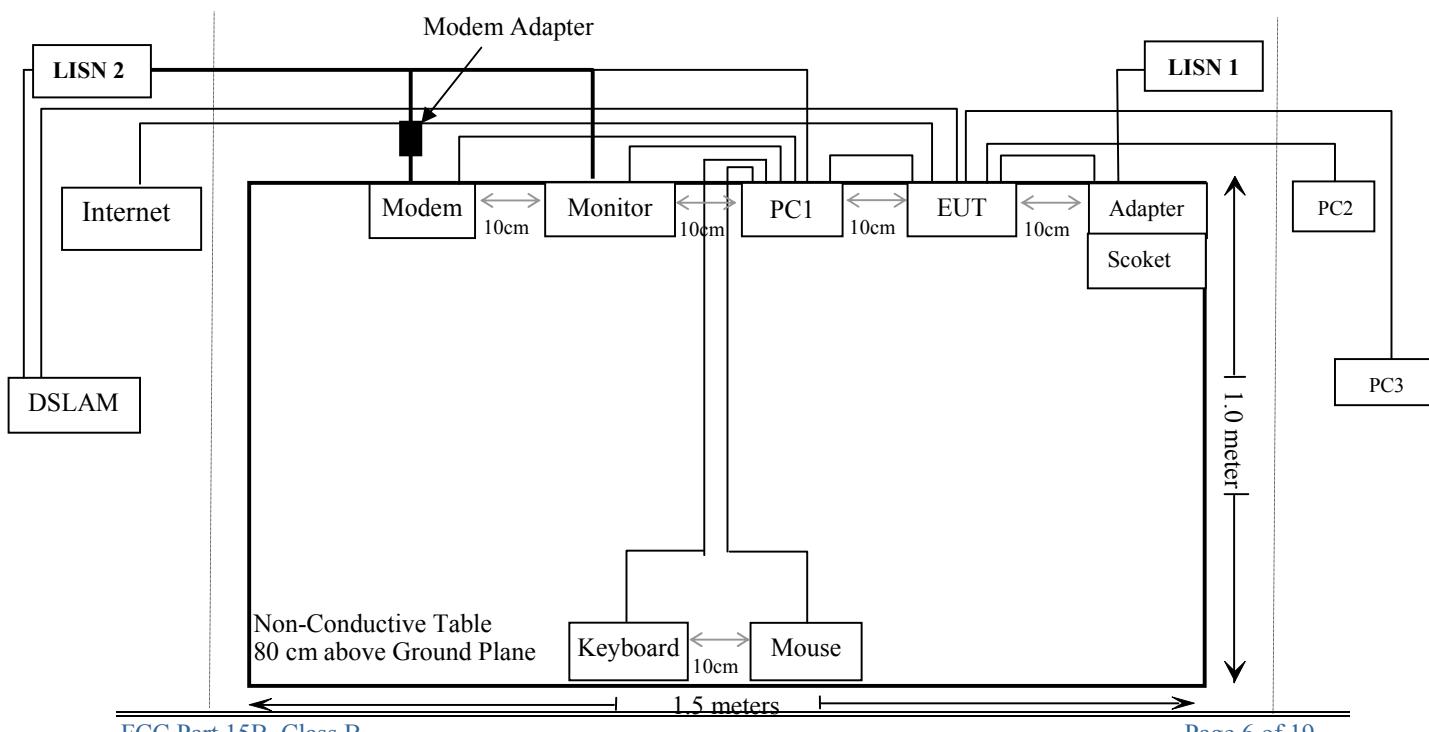
| Manufacturer | Description | Model | Serial Number |
|--------------|-------------|-----------|------------------|
| DELL | Host PC1 | DCSCSF | 127BP2X |
| TCL | Monitor | TFT1560PS | ALA560806C160409 |
| Microsoft | Keyboard | 1406 | 0200706128743 |
| DELL | Mouse | MOC5UO | G1900NKD |
| ARESCOM | DSLAM | CDS6020 | N/A |
| SAST | Modem | AEM-2100 | 0293 |
| IBM | PC2 | D7J | L3AE8DW |
| IBM | PC3 | D9J | L5AE9DW |

External I/O Cable

| Cable Description | Length (m) | From/Port | To |
|--|------------|-------------------|---------|
| Un-shielded undetachable AC cable | 1.0 | Scoket | LISN1 |
| Un-shielded Detachable AC Power Cable | 2.0 | PC1/Host | LISN2 |
| Un-shielded Detachable AC Power Cable | 2.0 | Monitor | LISN2 |
| Un-shielded Detachable AC Power Cable | 2.0 | DSLAM | LISN2 |
| Un-shielded Detachable Mouse Cable | 1.5 | Mouse Port / Host | Mouse |
| Un-shielded Detachable VGA Cable | 1.5 | VGA Port / Host | Monitor |
| Un-shielded Detachable RS232Cable | 1.8 | PC | Modem |
| Un-shielded Un-detachable DC Cable | 1.7 | Modem | Adapter |
| Shielded Un-detachable USB Cable | 1.5 | Keyboard | PC1 |
| Shielded Un-detachable USB Cable | 1.5 | Mouse | PC1 |
| Un-shielding undetachable DC Power Cable | 1.0 | EUT | Adapter |
| Un-shielded Detachable RJ45 Line | 1.0 | PC1 | EUT |
| Un-shielded Detachable RJ45 Line | 5.0 | Internet | EUT |
| Un-shielded Detachable RJ11 Line | 5.0 | DSLAM | EUT |
| Un-shielded Detachable RJ45 Line | 5.0 | PC2 | EUT |
| Un-shielded Detachable RJ45 Line | 5.0 | PC3 | EUT |

Block Diagram of Test Setup

For conducted emission:



SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Results |
|-----------|-----------------------------|------------|
| §15.107 | AC Line Conducted Emissions | Compliance |
| §15.109 | Radiated Spurious Emissions | Compliance |

TEST EQUIPMENT LIST

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|--|--------------------------|-----------------------|------------------------|------------------|----------------------|
| AC Line Conducted Emission Test | | | | | |
| Rohde & Schwarz | EMI Test Receiver | ESCS30 | 100176 | 2017-08-04 | 2018-08-04 |
| Rohde & Schwarz | LISN | ENV216 | 3560.6650.12-101613-Yb | 2017-12-21 | 2018-12-21 |
| Rohde & Schwarz | Transient Limiter | ESH3Z2 | DE25985 | 2018-05-21 | 2018-11-19 |
| Rohde & Schwarz | CE Test software | EMC 32 | V8.53.0 | NCR | NCR |
| N/A | Conducted Emission Cable | N/A | UF A210B-1-0720-504504 | 2018-05-12 | 2018-11-12 |
| Radiated Emission Test | | | | | |
| A.H.System | Horn Antenna | SAS-200/571 | 135 | 2015-08-18 | 2018-08-17 |
| Rohde & Schwarz | Signal Analyzer | FSEM | 845987/005 | 2018-04-24 | 2019-04-24 |
| Sunol Sciences | Broadband Antenna | JB1 | A040904-1 | 2017-12-22 | 2020-12-21 |
| Mini | Pre-amplifier | ZVA-183-S+ | 5969001149 | 2018-05-21 | 2019-05-21 |
| HP | Amplifier | HP8447E | 1937A01046 | 2018-05-21 | 2018-11-19 |
| Rohde & Schwarz | EMI Test Receiver | ESCI | 101120 | 2018-01-11 | 2019-01-11 |
| Ducommun technologies | RF Cable | UFA210A-1-4724-30050U | MFR64369 223410-001 | 2018-05-21 | 2018-11-19 |
| Ducommun technologies | RF Cable | 104PEA | 218124002 | 2018-05-21 | 2018-11-19 |
| Ducommun technologies | RF Cable | RG-214 | 1 | 2018-05-21 | 2018-11-19 |
| Ducommun technologies | RF Cable | RG-214 | 2 | 2018-05-22 | 2018-11-22 |
| Ducommun Technologies | Pre-amplifier | ALN-22093530-01 | 991373-01 | 2017-08-03 | 2018-08-03 |
| Rohde & Schwarz | Auto test software | EMC 32 | V9.10 | NCR | NCR |
| Agilent | Spectrum Analyzer | 8564E | 3943A01781 | 2018-01-04 | 2019-01-04 |
| Ducommun Technologies | Horn Antenna | ARH-4223-02 | 1007726-04 | 2017-12-06 | 2020-12-05 |

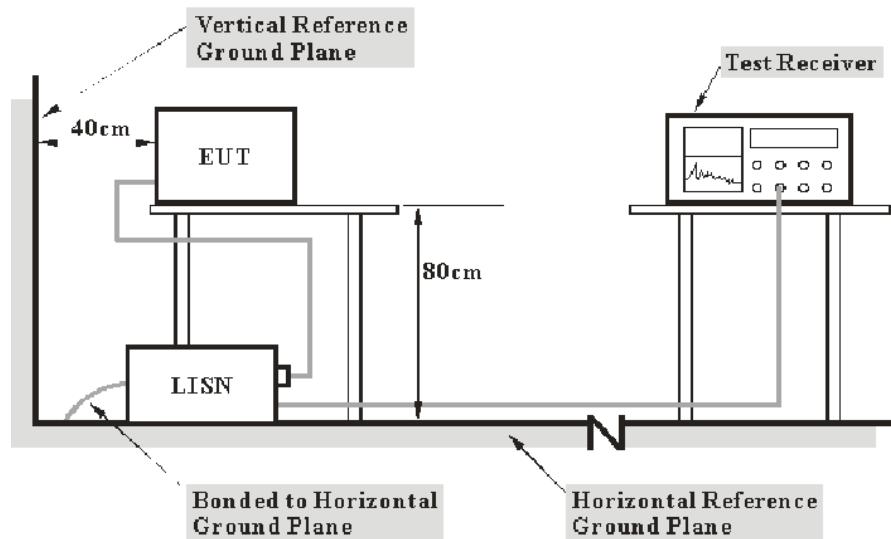
*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

According to FCC §15.107

EUT Setup



Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with per ANSI C63.4-2014. The related limit was specified in FCC Part 15.107 Class B.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

| Frequency Range | IF B/W |
|------------------|--------|
| 150 kHz – 30 MHz | 9 kHz |

Test Procedure

During the conducted emission test, the host PC was connected to the first LISN and the other relevant equipments were connected to the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.107,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{\text{lim}} + U_{\text{cisp}}$$

In BACL., $U_{(Lm)}$ is less than U_{cisp} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data

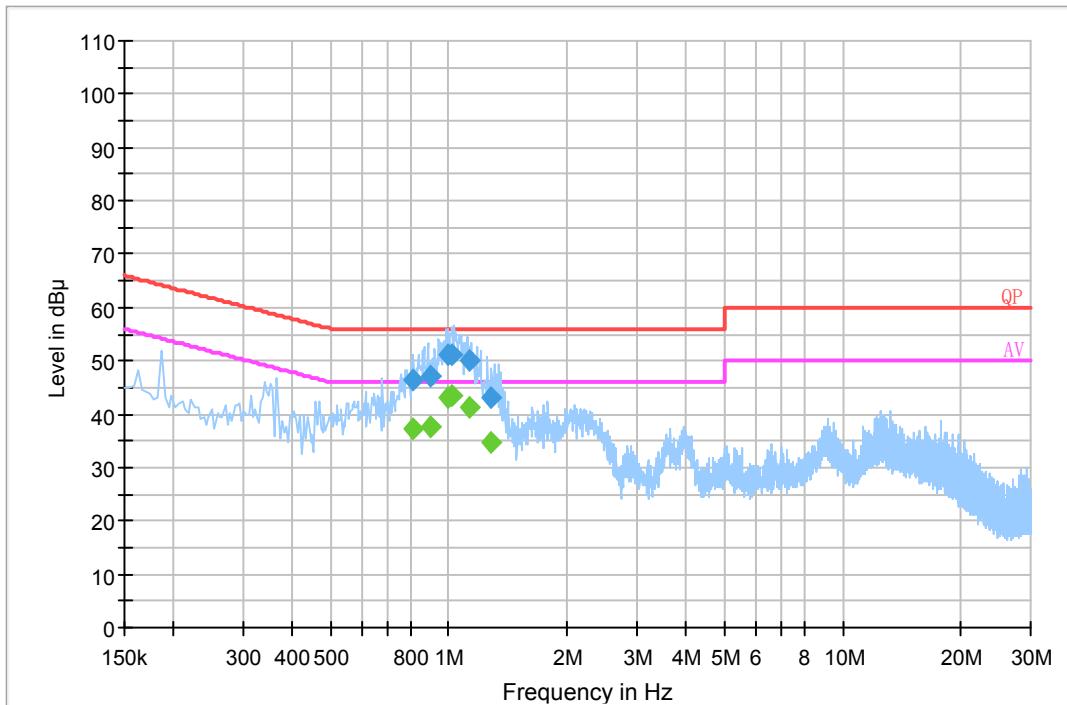
Environmental Conditions

| | |
|---------------------------|-----------|
| Temperature: | 24 °C |
| Relative Humidity: | 60 % |
| ATM Pressure: | 101.0 kPa |

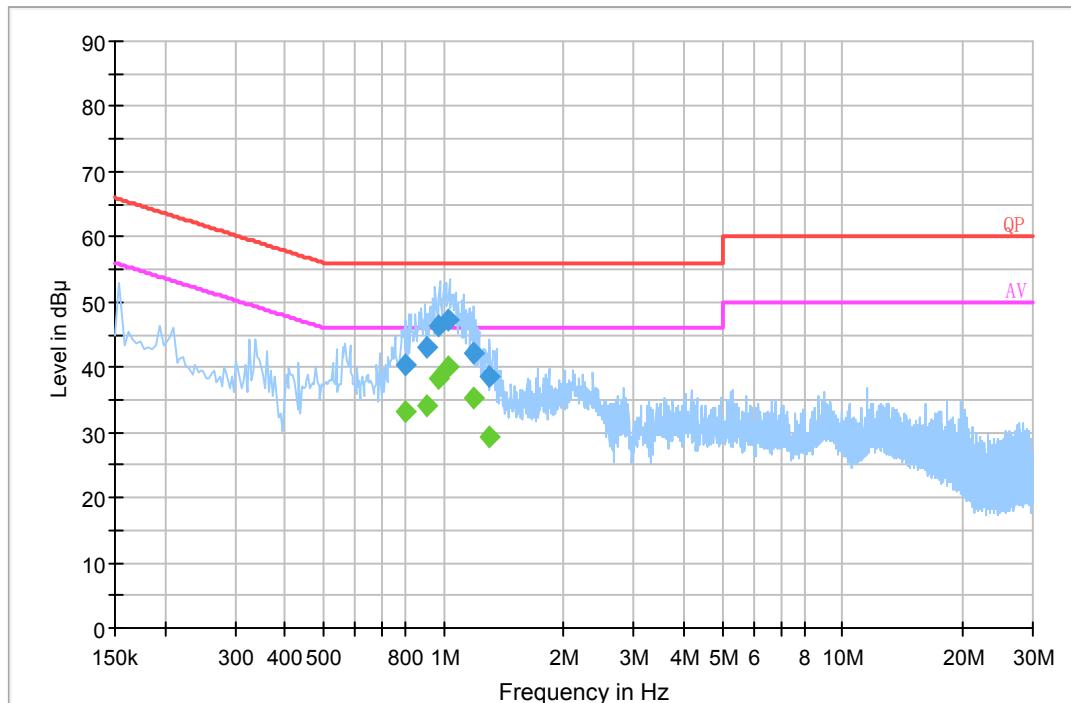
The testing was performed by Bibo Zhang on 2018-07-09.

EUT Operation Mode: Working

AC 120V/60 Hz, Line



| Frequency (MHz) | Corrected Amplitude (dB μ V) | Correction Factor (dB) | Limit (dB μ V) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------------|------------------------|--------------------|-------------|-----------------------|
| 0.809790 | 46.4 | 19.9 | 56.0 | 9.6 | QP |
| 0.892710 | 47.1 | 20.0 | 56.0 | 8.9 | QP |
| 0.995090 | 51.2 | 20.0 | 56.0 | 4.8 | QP |
| 1.022490 | 51.2 | 20.0 | 56.0 | 4.8 | QP |
| 1.124870 | 50.0 | 20.0 | 56.0 | 6.0 | QP |
| 1.272810 | 43.2 | 20.0 | 56.0 | 12.8 | QP |
| 0.809790 | 37.4 | 19.9 | 46.0 | 8.6 | Ave. |
| 0.892710 | 37.8 | 20.0 | 46.0 | 8.2 | Ave. |
| 0.995090 | 43.2 | 20.0 | 46.0 | 2.8 | Ave. |
| 1.022490 | 43.4 | 20.0 | 46.0 | 2.6 | Ave. |
| 1.124870 | 41.4 | 20.0 | 46.0 | 4.6 | Ave. |
| 1.272810 | 34.7 | 20.0 | 46.0 | 11.3 | Ave. |

AC 120V/60 Hz, Neutral

| Frequency (MHz) | Corrected Amplitude (dB μ V) | Correction Factor (dB) | Limit (dB μ V) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------------|------------------------|--------------------|-------------|-----------------------|
| 0.801910 | 40.3 | 19.9 | 56.0 | 15.7 | QP |
| 0.904470 | 43.0 | 20.0 | 56.0 | 13.0 | QP |
| 0.971330 | 46.4 | 20.0 | 56.0 | 9.6 | QP |
| 1.022490 | 47.3 | 20.0 | 56.0 | 8.7 | QP |
| 1.184090 | 42.1 | 20.0 | 56.0 | 13.9 | QP |
| 1.302410 | 38.6 | 20.0 | 56.0 | 17.4 | QP |
| 0.801910 | 33.1 | 19.9 | 46.0 | 12.9 | Ave. |
| 0.904470 | 34.1 | 20.0 | 46.0 | 11.9 | Ave. |
| 0.971330 | 38.4 | 20.0 | 46.0 | 7.6 | Ave. |
| 1.022490 | 40.1 | 20.0 | 46.0 | 5.9 | Ave. |
| 1.184090 | 35.2 | 20.0 | 46.0 | 10.8 | Ave. |
| 1.302410 | 29.4 | 20.0 | 46.0 | 16.6 | Ave. |

Note:

- 1) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
- 2) Corrected Amplitude = Reading + Correction Factor
- 3) Margin = Limit – Corrected Amplitude

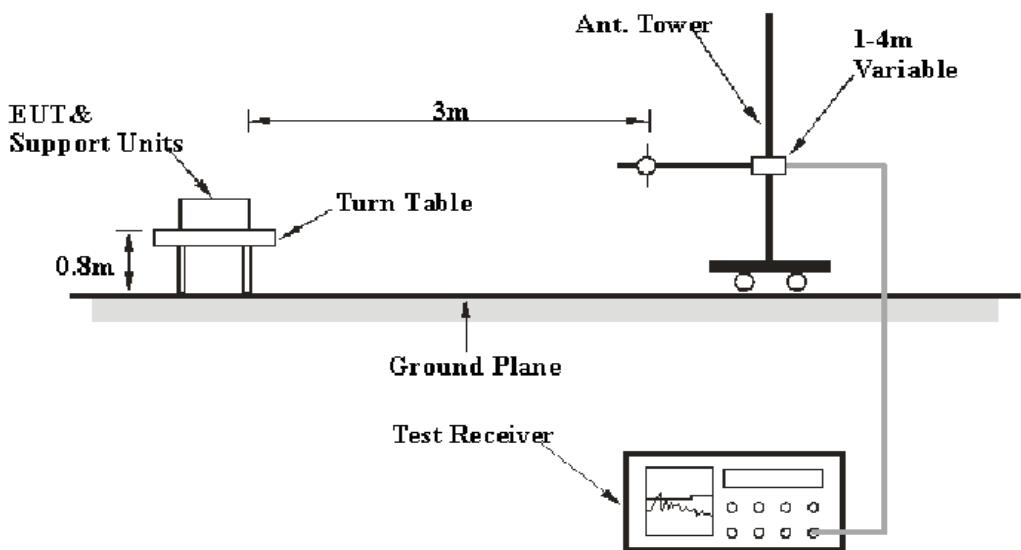
FCC §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

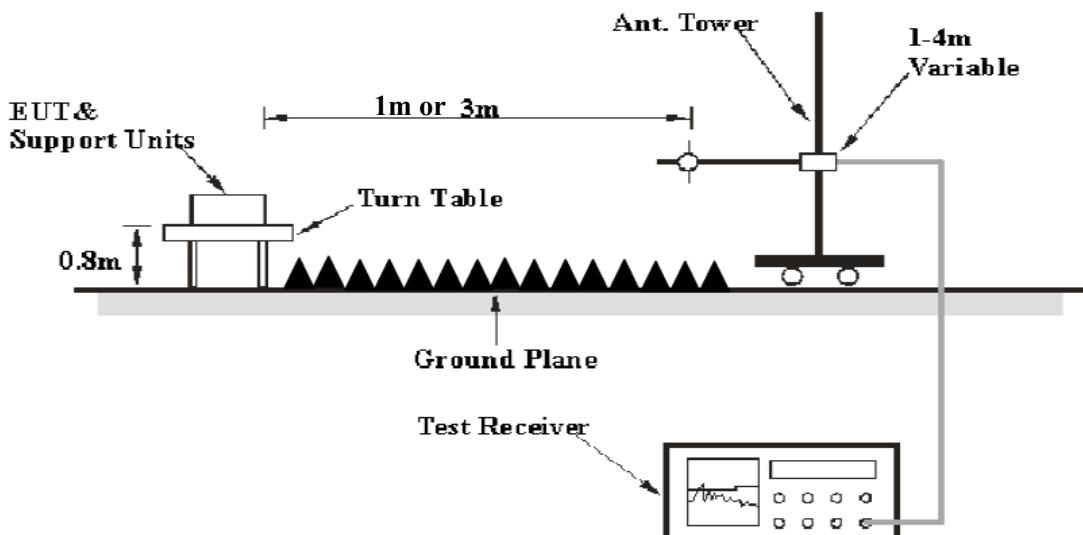
FCC §15.109

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2014. The specification used was the FCC Part 15.109 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 13.5 GHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

| Frequency Range | RBW | Video B/W | IF B/W | Measurement |
|-------------------|---------|-----------|---------|-------------|
| 30 MHz – 1000 MHz | 100 kHz | 300 kHz | 120 kHz | QP |
| Above 1 GHz | 1MHz | 3 MHz | / | PK |
| | 1MHz | 10 Hz | / | Ave. |

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.109 Class B,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cisp}$$

In BACL, $U_{(Lm)}$ is less than U_{cisp} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

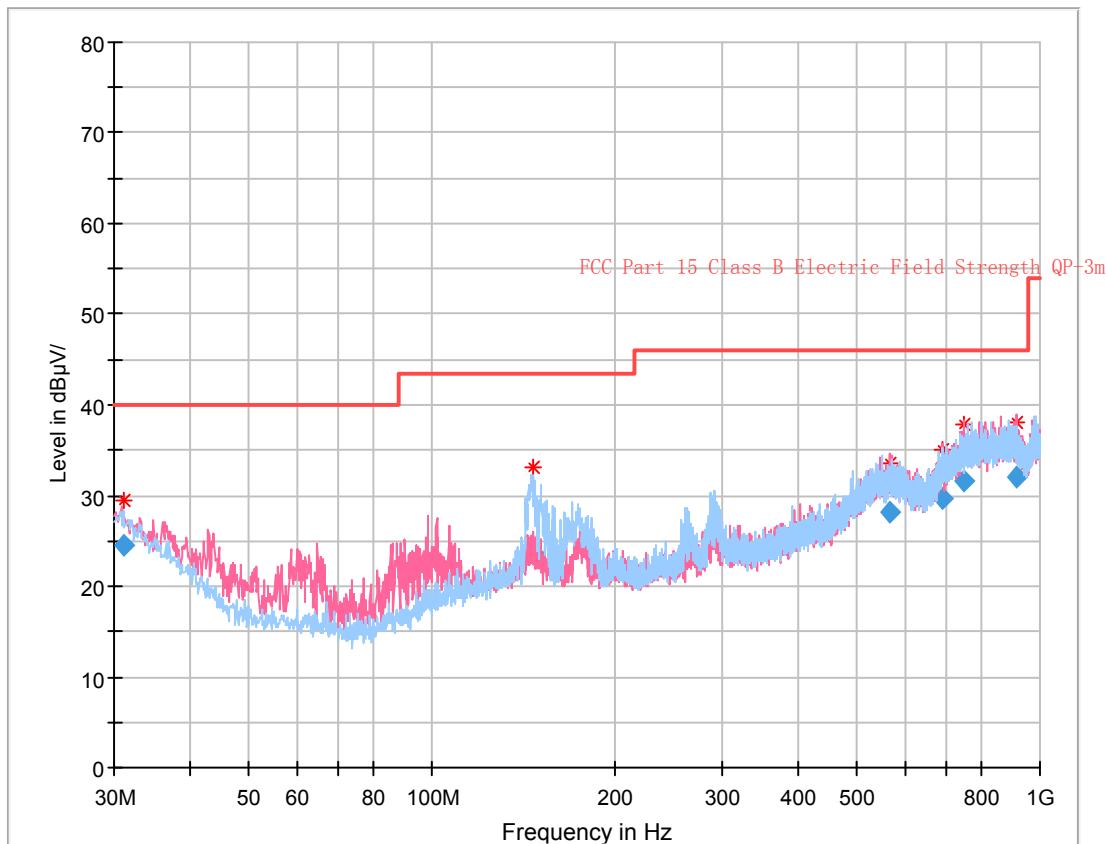
Test Data

Environmental Conditions

| | |
|---------------------------|-----------|
| Temperature: | 25 °C |
| Relative Humidity: | 52 % |
| ATM Pressure: | 101.0 kPa |

The testing was performed by Bibo Zhang on 2018-07-07.

EUT Operation Mode: Working

30 MHz~1 GHz:

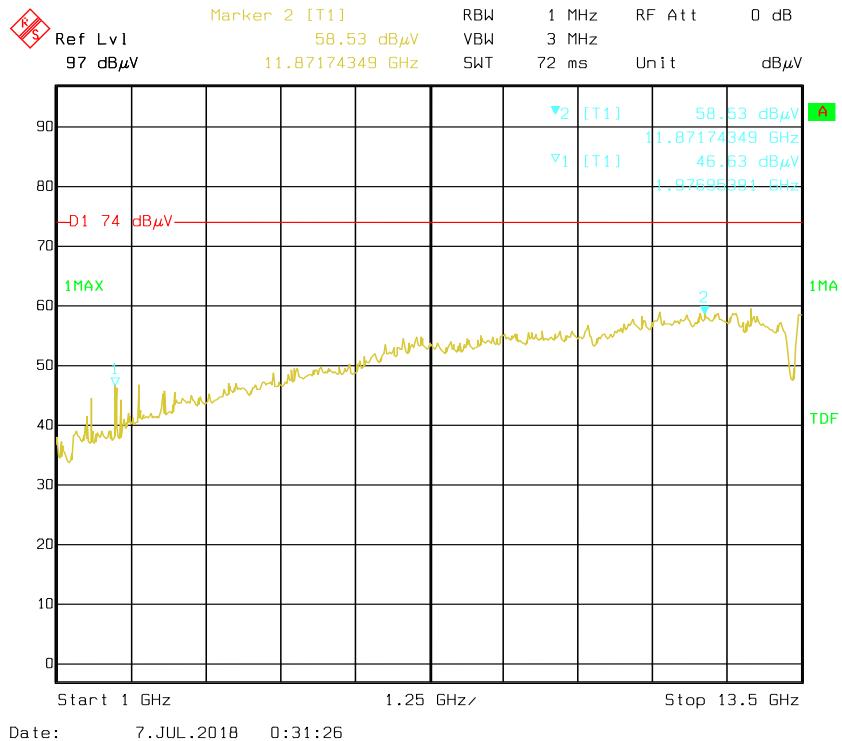
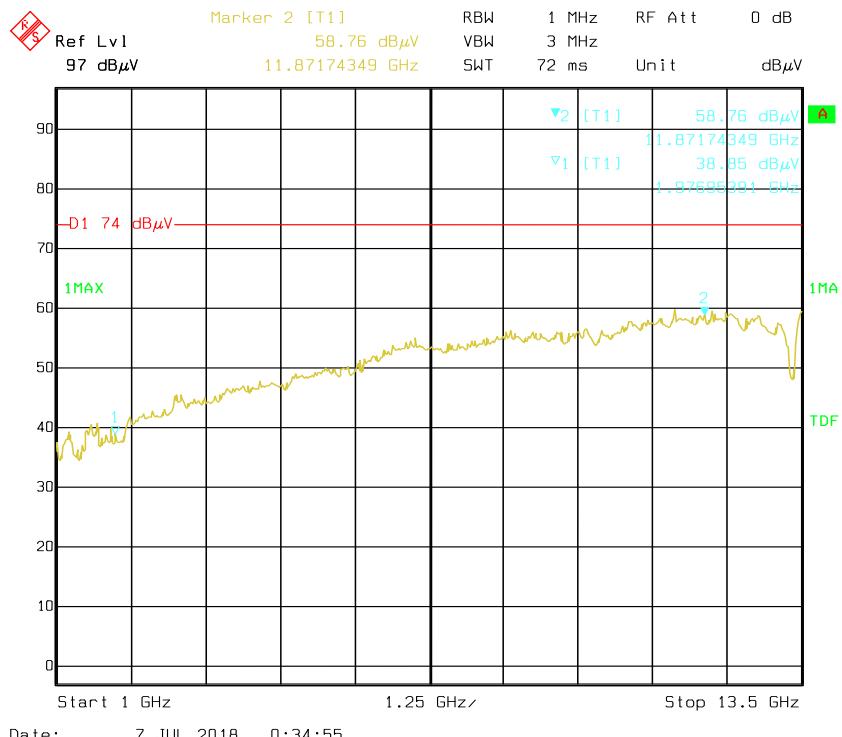
| Frequency (MHz) | Corrected Amplitude (dB μ V/m) | Antenna height (cm) | Antenna Polarity | Turntable position (degree) | Correction Factor (dB/m) | Limit (dB μ V/m) | Margin (dB) |
|-----------------|------------------------------------|---------------------|------------------|-----------------------------|--------------------------|----------------------|-------------|
| 31.202500 | 24.51 | 137.0 | V | 36.0 | -0.1 | 40.00 | 15.49 |
| 147.189625 | 23.70 | 210.0 | H | 64.0 | -4.7 | 43.50 | 19.80 |
| 565.546875 | 28.23 | 251.0 | V | 153.0 | 5.1 | 46.00 | 17.77 |
| 690.495125 | 29.63 | 244.0 | V | 186.0 | 6.4 | 46.00 | 16.37 |
| 751.768250 | 31.65 | 329.0 | V | 32.0 | 8.7 | 46.00 | 14.35 |
| 913.510125 | 32.13 | 329.0 | V | 0.0 | 9.7 | 46.00 | 13.87 |

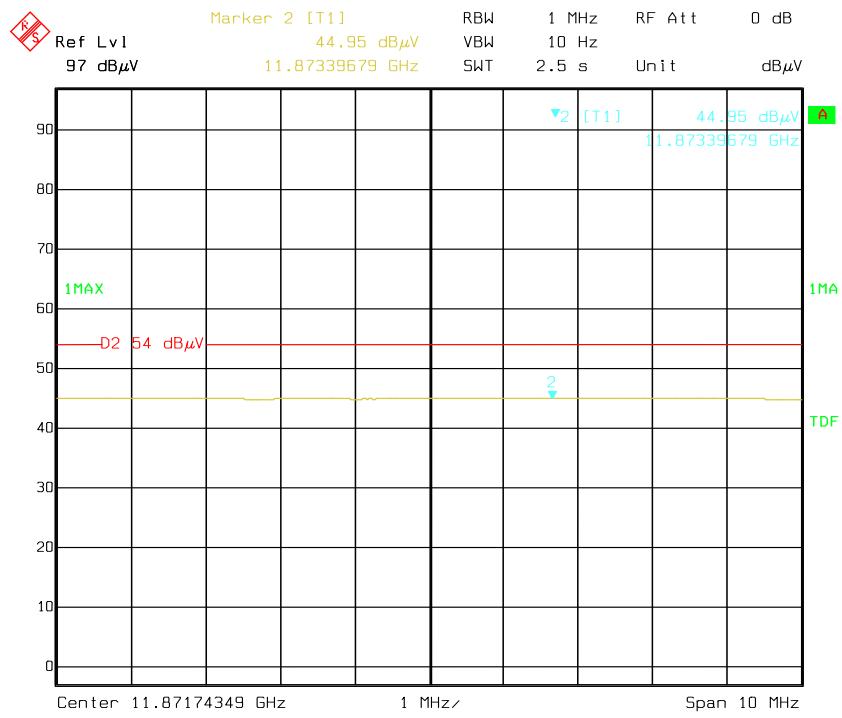
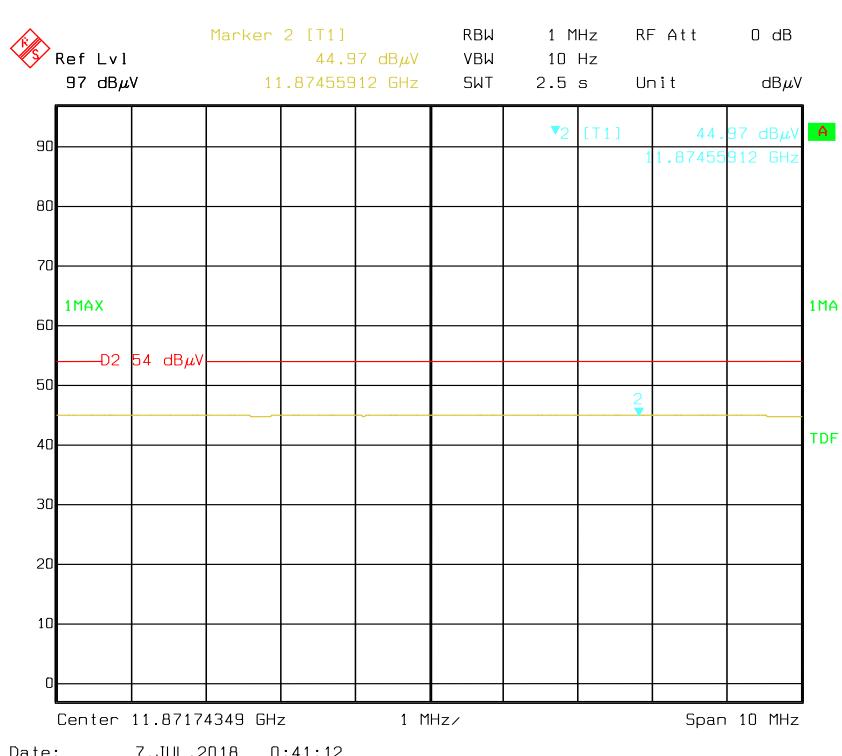
1 GHz –13.5 GHz:

| Frequency (MHz) | Receiver | | Turntable Degree | Rx Antenna | | Corrected Factor (dB/m) | Corrected Amplitude (dBuV/m) | FCC Part 15B | |
|--------------------|-------------------------|------------|---------------------|---------------|------------------|-------------------------------|------------------------------------|-------------------|----------------|
| | Reading (dB μ V) | PK/QP/Ave. | | Height (m) | Polar (H / V) | | | Limit (dBuV/m) | Margin (dB) |
| 1157.84 | 43.67 | PK | 106 | 2.4 | H | -8.48 | 35.19 | 74 | 38.81 |
| 1157.84 | 29.28 | Ave. | 106 | 2.4 | H | -8.48 | 20.80 | 54 | 33.20 |
| 1568.40 | 44.96 | PK | 102 | 1.7 | V | -5.35 | 39.61 | 74 | 34.39 |
| 1568.40 | 29.71 | Ave. | 102 | 1.7 | V | -5.35 | 24.36 | 54 | 29.64 |
| 1976.95 | 47.62 | PK | 7 | 2.2 | H | -0.99 | 46.63 | 74 | 27.37 |
| 1976.95 | 26.32 | Ave. | 7 | 2.2 | H | -0.99 | 25.33 | 54 | 28.67 |

Note:

- 1) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
- 2) Corrected Amplitude = Correction Factor + Reading
- 3) Margin = Limit - Corrected Amplitude

Pre-scan for peak**Horizontal – Peak (1-13.5 GHz)****Vertical - Peak (1-13.5 GHz)**

Horizontal – Average**Vertical - Average********* END OF REPORT *******