# FCC PART 15B, CLASS B

# TEST REPORT

For

## Grandstream Networks, Inc.

126 Brookline Ave, 3rd Floor Boston, MA 02215, USA

**FCC ID: YZZ-GXW4248**

| **Report Type:** | **Product Type:** |
|---|---|
| Original Report | Analog IP Gateway |

| | |
|---|---|
| **Report Number:** | RSZ181225012-00 |
| **Report Date:** | 2019-02-20 |
| **Reviewed By:** | Xiangguang Kong<br>Engineer |
| **Prepared By:** | Bay Area Compliance Laboratories Corp. (Shenzhen)<br>6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China<br>Tel: +86-755-33320018<br>Fax: +86-755-33320008<br>www.baclcorp.com.cn |

**Note**: This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA* or any agency of the Federal Government. * This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*".

The information marked # is provided by the applicant, the laboratory is not responsible for its authenticity.

# TABLE OF CONTENTS

**GENERAL INFORMATION** ..... **3**
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) ..... 3
OBJECTIVE ..... 3
RELATED SUBMITTAL(S)/GRANT(S) ..... 3
TEST METHODOLOGY ..... 3
MEASUREMENT UNCERTAINTY ..... 3
TEST FACILITY ..... 4
**SYSTEM TEST CONFIGURATION** ..... **5**
DESCRIPTION OF TEST CONFIGURATION ..... 5
EUT EXERCISE SOFTWARE ..... 5
SPECIAL ACCESSORIES ..... 5
EQUIPMENT MODIFICATIONS ..... 5
SUPPORT EQUIPMENT LIST AND DETAILS ..... 5
EXTERNAL I/O CABLE ..... 5
BLOCK DIAGRAM OF TEST SETUP ..... 6
**SUMMARY OF TEST RESULTS** ..... **7**
**TEST EQUIPMENT LIST** ..... **8**
**FCC §15.107 – AC LINE CONDUCTED EMISSIONS** ..... **9**
APPLICABLE STANDARD ..... 9
EUT SETUP ..... 9
EMI TEST RECEIVER SETUP ..... 9
TEST PROCEDURE ..... 9
CORRECTED FACTOR & MARGIN CALCULATION ..... 10
TEST RESULTS SUMMARY ..... 10
TEST DATA ..... 10
**FCC §15.109 - RADIATED SPURIOUS EMISSIONS** ..... **13**
APPLICABLE STANDARD ..... 13
EUT SETUP ..... 13
EMI TEST RECEIVER SETUP ..... 14
TEST PROCEDURE ..... 14
CORRECTED AMPLITUDE & MARGIN CALCULATION ..... 14
TEST RESULTS SUMMARY ..... 14
TEST DATA ..... 15

# GENERAL INFORMATION

## Product Description for Equipment under Test (EUT)

| | |
|---|---|
| Product | Analog IP Gateway |
| Tested Model | GXW4248 |
| Voltage Range | DC 24V from adapter. |
| Measure | 44.0 cm (L) * 25.5 cm (W) *4.4 cm (H) |
| Highest operating frequency | 400 MHz |
| Date of Test | Jan 23, 2019~ Feb 15, 2019 |
| Sample serial number | 181225012 |
| Received date | 2018-12-25 |
| Sample/EUT Status | Good condition |
| Adapter information | Model: FSP150-AAAN2<br>Input: AC 100-240V, 50/60Hz, 2A<br>Output: DC 24V, 6.25A |

## Objective

This test report is prepared on behalf of *Grandstream Networks, Inc.* 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)

No Related Submittal(s)/Grant(s).

## 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 |

*Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.*

## 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 Exercise Software

No test software was used

## Special Accessories

No special accessory.

## Equipment Modifications

No modification was made to the EUT tested.

## Support Equipment List and Details

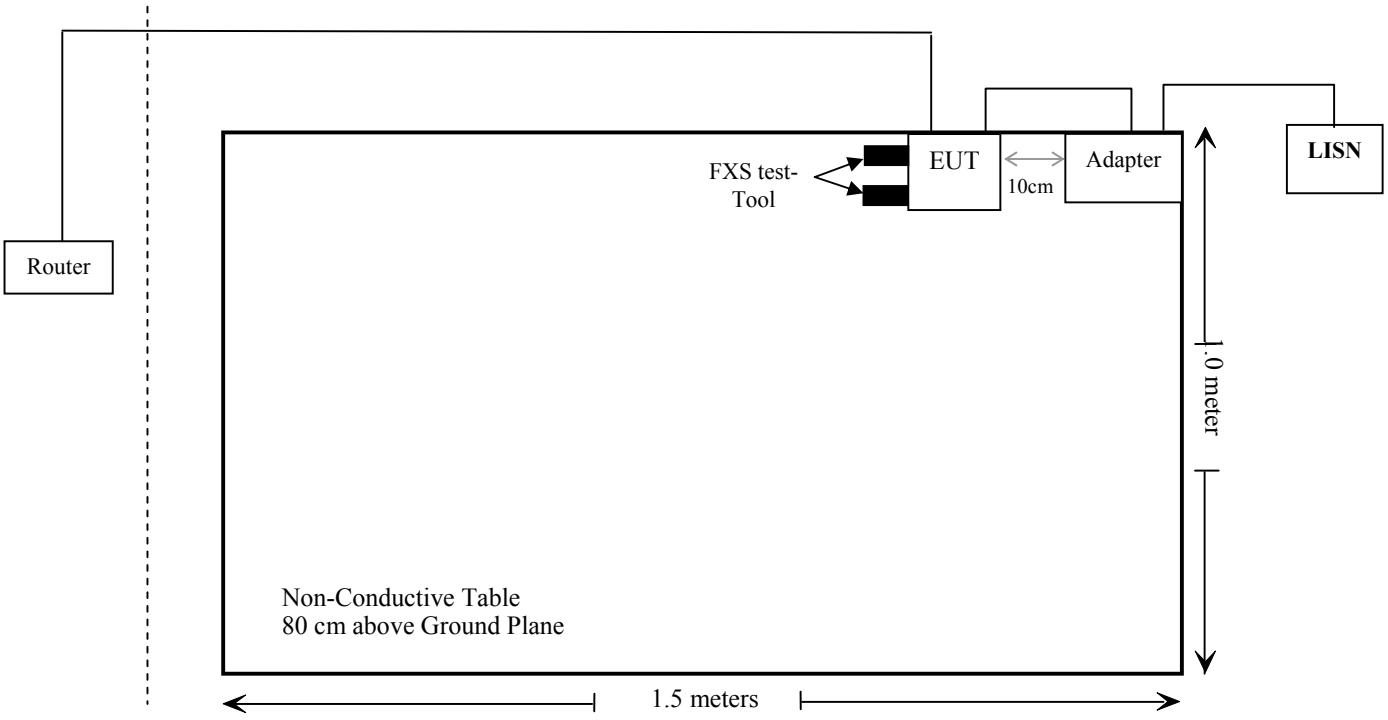
| Manufacturer | Description | Model | Serial Number |
|---|---|---|---|
| ASKPCB | FXS test tool | E239218 | N/A |
| Sagem | Router | F@ST 1704N | 3c81d839027c |

## External I/O Cable

| Cable Description | Length (m) | From/Port | To |
|---|---|---|---|
| Unshielded detachable AC cable | 1.0 | Adapter | LISN |
| Unshielded un-detachable DC cable | 1.78 | Adapter | EUT |
| Unshielded detachable RJ45 cable | 10.0 | EUT | Router |

## 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 | 2018-07-11 | 2019-07-11 |
| Rohde & Schwarz | LISN | ENV216 | 3560.6650.12-101613-Yb | 2018-12-21 | 2019-12-21 |
| Rohde & Schwarz | Transient Limiter | ESH3Z2 | DE25985 | 2018-11-12 | 2019-05-12 |
| Rohde & Schwarz | CE Test software | EMC 32 | V8.53.0 | NCR | NCR |
| Unknown | Conducted Emission Cable | 78652 | UF A210B-1-0720-504504 | 2018-11-12 | 2019-05-12 |
| **Radiated Emission Test** | | | | | |
| A.H. System | Horn Antenna | SAS-200/571 | 135 | 2018-09-01 | 2021-08-31 |
| Rohde & Schwarz | Signal Analyzer | FSEM | 845987/005 | 2018-06-23 | 2019-06-23 |
| Sunol Sciences | Broadband Antenna | JB1 | A040904-1 | 2017-12-22 | 2020-12-21 |
| COM-POWER | Pre-amplifier | PA-122 | 181919 | 2018-11-12 | 2019-05-12 |
| Sonoma instrument | Amplifier | 310N | 186238 | 2018-11-12 | 2019-05-12 |
| Rohde & Schwarz | EMI Test Receiver | ESCI | 101120 | 2019-01-11 | 2020-01-11 |
| Ducommun technologies | RF Cable | UFA147A-2362-100100 | MFR64639 231029-003 | 2018-07-11 | 2021-07-10 |
| Ducommun technologies | RF Cable | 104PEA | 218124002 | 2018-11-12 | 2019-05-12 |
| Ducommun technologies | RF Cable | RG-214 | 1 | 2018-11-12 | 2019-05-12 |
| Ducommun technologies | RF Cable | RG-214 | 2 | 2018-11-12 | 2019-05-12 |
| Rohde & Schwarz | Auto test software | EMC 32 | V9.10 | NCR | NCR |
| Rohde & Schwarz | Auto test software | EMC 32 | V9.10 | NCR | NCR |

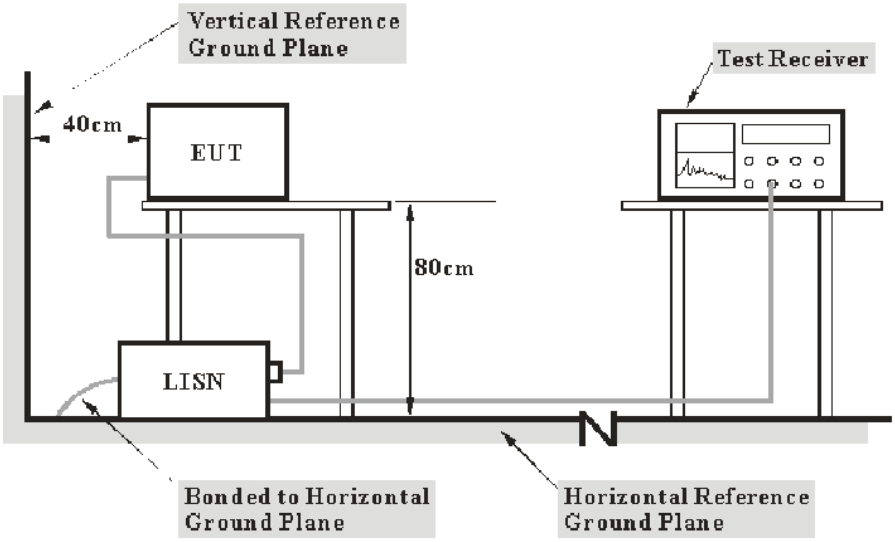
*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

# 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 conncected 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:

Correction Factor = LISN VDF + Cable Loss + 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:

Margin = Limit – 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

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

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

## Test Data

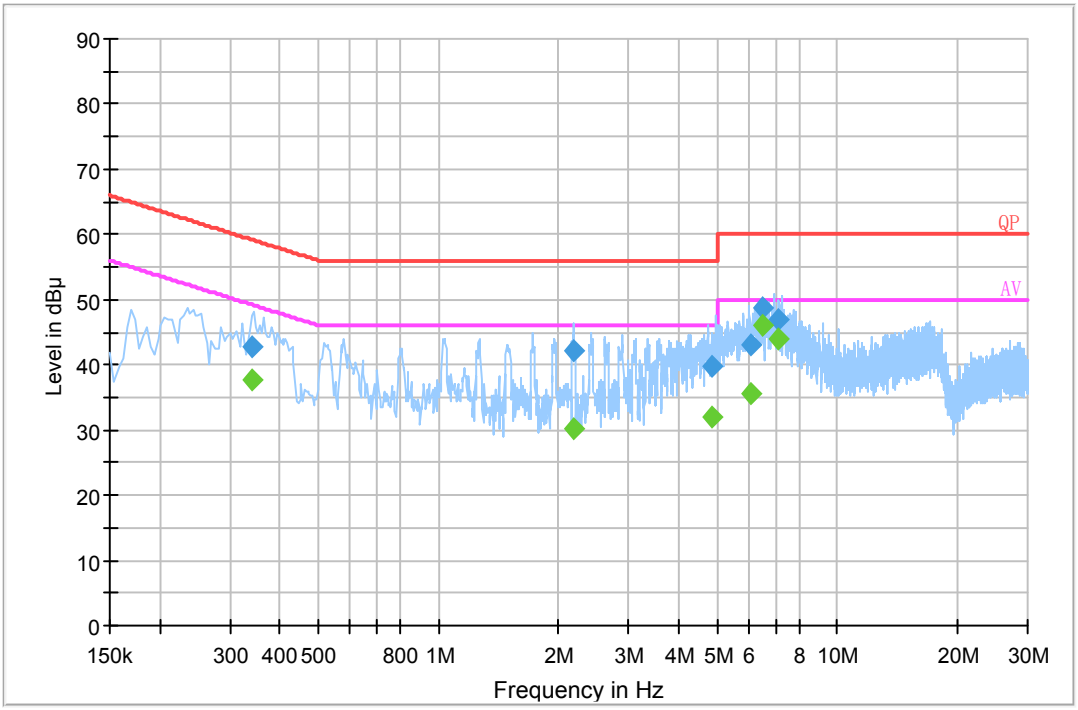
### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 25 ℃ |
| **Relative Humidity:** | 50 % |
| **ATM Pressure:** | 101.0 kPa |

*The testing was performed by Joson Xiao on 2019-02-15.*

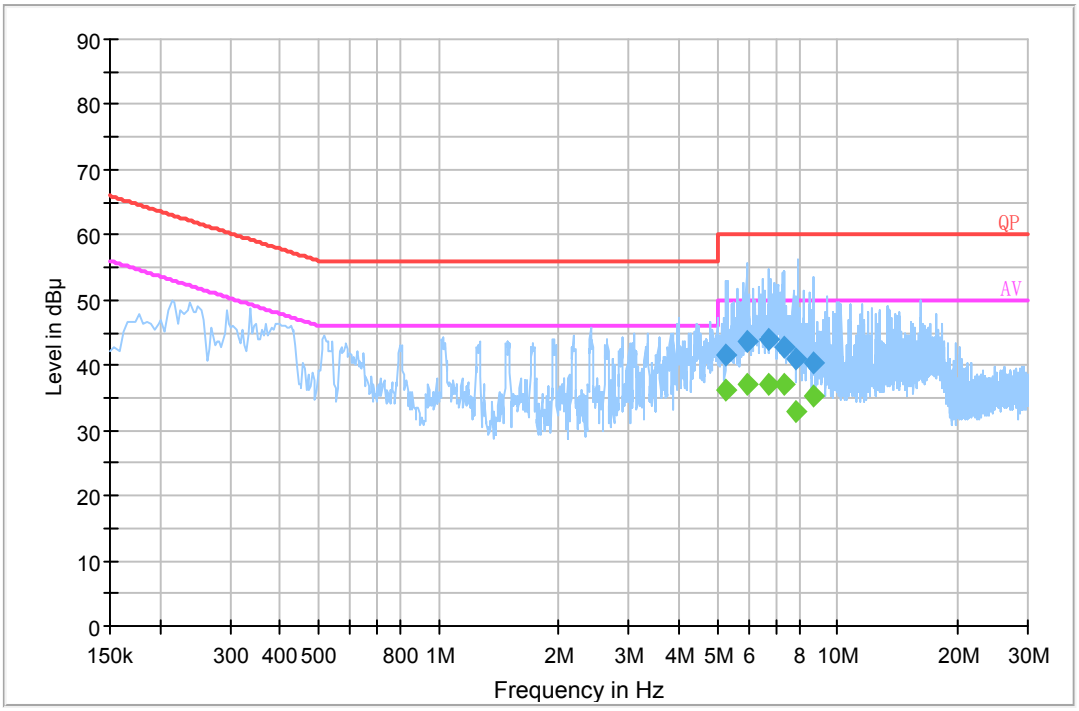
*EUT Operation Mode: Full load*

**AC 120V/60 Hz, Line**




| Frequency (MHz) | Corrected Amplitude (dBµV) | Correction Factor (dB) | Limit (dBµV) | Margin (dB) | Detector (PK/Ave./QP) |
|---|---|---|---|---|---|
| 0.340810 | 42.7 | 19.7 | 59.2 | 16.5 | QP |
| 2.181210 | 42.1 | 19.9 | 56.0 | 13.9 | QP |
| 4.875930 | 39.9 | 20.1 | 56.0 | 16.1 | QP |
| 6.047610 | 43.1 | 20.1 | 60.0 | 16.9 | QP |
| 6.517130 | 48.6 | 20.1 | 60.0 | 11.4 | QP |
| 7.069510 | 46.9 | 20.1 | 60.0 | 13.1 | QP |
| 0.340810 | 37.6 | 19.7 | 49.2 | 11.6 | Ave. |
| 2.181210 | 30.2 | 19.9 | 46.0 | 15.8 | Ave. |
| 4.875930 | 32.0 | 20.1 | 46.0 | 14.0 | Ave. |
| 6.047610 | 35.7 | 20.1 | 50.0 | 14.3 | Ave. |
| 6.517130 | 46.1 | 20.1 | 50.0 | 3.9 | Ave. |
| 7.069510 | 44.0 | 20.1 | 50.0 | 6.0 | Ave. |

**AC 120V/60 Hz, Neutral**




| Frequency (MHz) | Corrected Amplitude (dBµV) | Correction Factor (dB) | Limit (dBµV) | Margin (dB) | Detector (PK/Ave./QP) |
|---|---|---|---|---|---|
| 5.234530 | 41.5 | 20.1 | 60.0 | 18.5 | QP |
| 5.909350 | 43.6 | 20.1 | 60.0 | 16.4 | QP |
| 6.705470 | 43.9 | 20.1 | 60.0 | 16.1 | QP |
| 7.312290 | 42.8 | 20.1 | 60.0 | 17.2 | QP |
| 7.855170 | 41.0 | 20.1 | 60.0 | 19.0 | QP |
| 8.719230 | 40.4 | 20.1 | 60.0 | 19.6 | QP |
| 5.234530 | 36.2 | 20.1 | 50.0 | 13.8 | Ave. |
| 5.909350 | 37.1 | 20.1 | 50.0 | 12.9 | Ave. |
| 6.705470 | 37.1 | 20.1 | 50.0 | 12.9 | Ave. |
| 7.312290 | 37.0 | 20.1 | 50.0 | 13.0 | Ave. |
| 7.855170 | 32.9 | 20.1 | 50.0 | 17.1 | Ave. |
| 8.719230 | 35.4 | 20.1 | 50.0 | 14.6 | 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

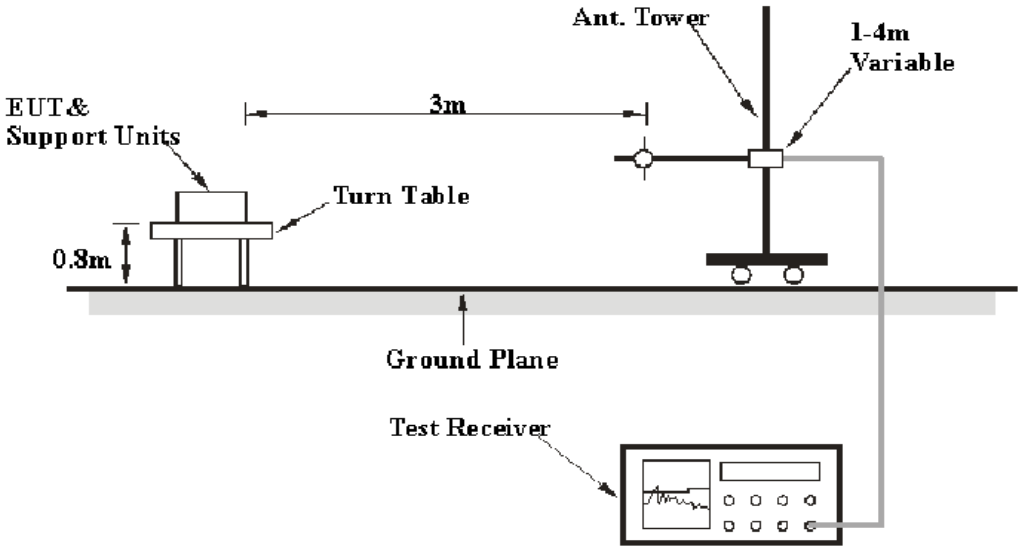
# FCC §15.109 - RADIATED SPURIOUS EMISSIONS

## Applicable Standard

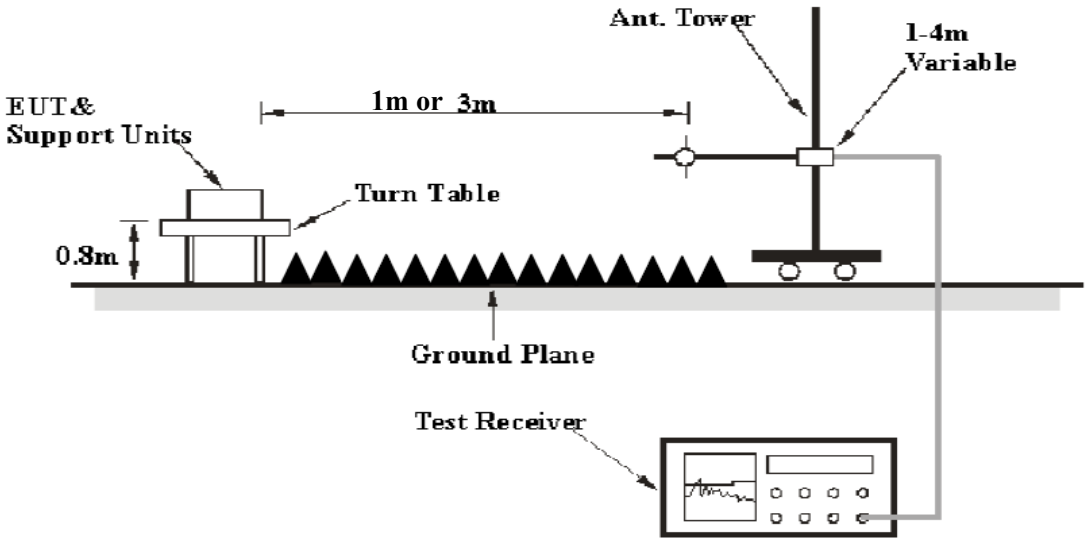
FCC §15.109

## 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 2 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 | Measurment |
|---|---|---|---|---|
| 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:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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:

Margin = Limit – 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

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

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

# Test Data

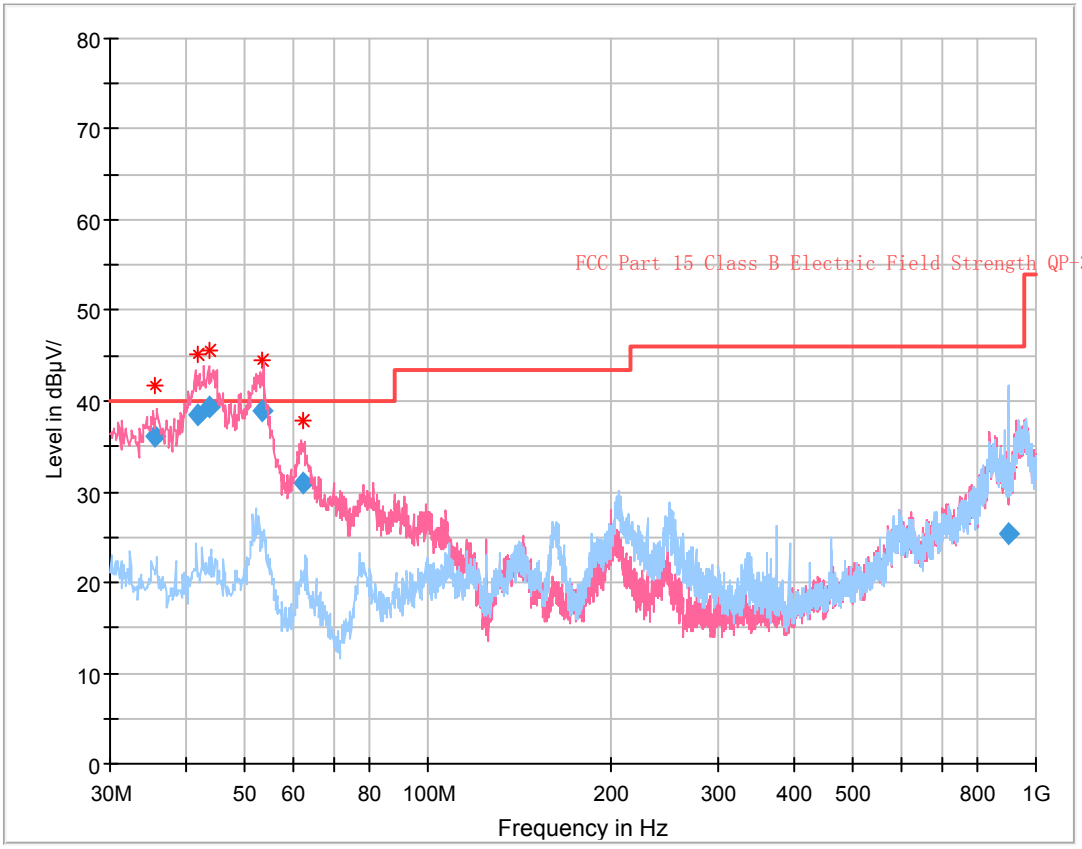
## Environmental Conditions

| | |
|---|---|
| **Temperature:** | 25 ℃ |
| **Relative Humidity:** | 50 % |
| **ATM Pressure:** | 101.0 kPa |

*The testing was performed by Andy Yu and Leo Huang on 2019-01-23and 2019-02-15.*

*EUT Operation Mode: Full load*

**30 MHz~1 GHz:**




| Frequency (MHz) | Corrected Amplitude (dBµV/m) | Antenna height (cm) | Antenna Polarity | Turntable position (degree) | Correction Factor (dB/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 35.589625 | 36.19 | 107.0 | V | 356.0 | -10.9 | 40.00 | 3.81 |
| 41.812875 | 38.42 | 113.0 | V | 0.0 | -15.1 | 40.00 | 1.58 |
| 43.769500 | 39.35 | 100.0 | V | 0.0 | -16.4 | 40.00 | 0.65 |
| 53.398625 | 38.82 | 107.0 | V | 51.0 | -19.8 | 40.00 | 1.18 |
| 62.507375 | 30.90 | 143.0 | V | 144.0 | -20.3 | 40.00 | 9.10 |
| 903.670125 | 25.35 | 140.0 | H | 19.0 | 4.6 | 46.00 | 20.65 |

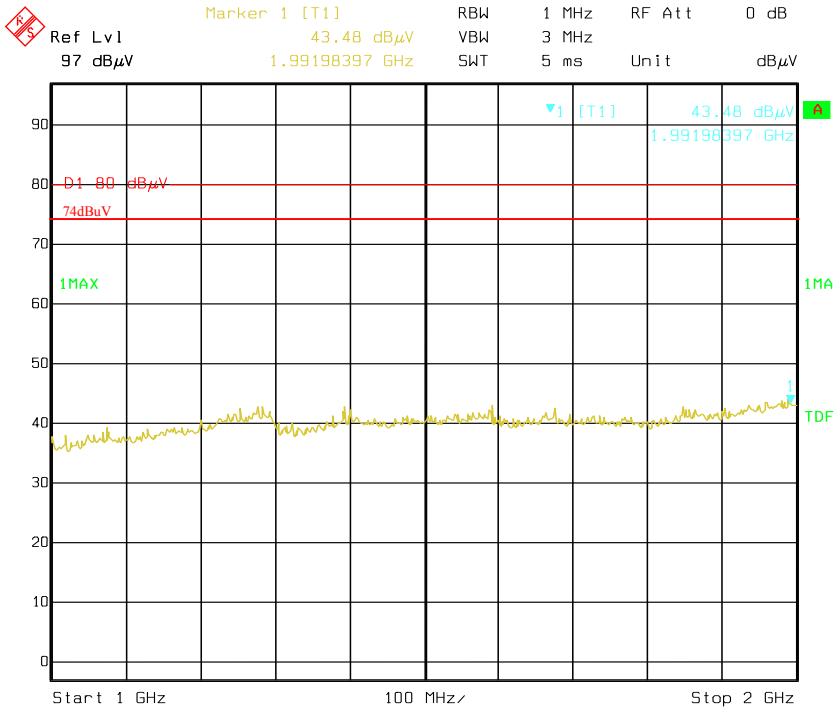
**1 GHz – 2 GHz:**

| Frequency (MHz) | Receiver | | Turntable Degree | Rx Antenna | | Corrected Factor (dB/m) | Corrected Amplitude (dBuV/m) | FCC Part 15B | |
|---|---|---|---|---|---|---|---|---|---|
| | Reading (dBμV) | PK/QP/Ave. | | Height (m) | Polar (H / V) | | | Limit (dBuV/m) | Margin (dB) |
| 1453.62 | 44.32 | PK | 335 | 2.4 | H | -2.10 | 42.22 | 74 | 31.78 |
| 1453.62 | 29.62 | Ave. | 335 | 2.4 | H | -2.10 | 27.52 | 54 | 26.48 |
| 1453.62 | 43.31 | PK | 244 | 1.2 | V | -2.10 | 41.21 | 74 | 32.79 |
| 1453.62 | 28.61 | Ave. | 244 | 1.2 | V | -2.10 | 26.51 | 54 | 27.49 |
| 1991.98 | 45.62 | PK | 322 | 2.4 | H | -1.50 | 44.12 | 74 | 29.88 |
| 1991.98 | 29.91 | Ave. | 322 | 2.4 | H | -1.50 | 28.41 | 54 | 25.59 |
| 1991.98 | 44.54 | PK | 247 | 1.6 | V | -1.50 | 43.04 | 74 | 30.96 |
| 1991.98 | 29.93 | Ave. | 247 | 1.6 | V | -1.50 | 28.43 | 54 | 25.57 |

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

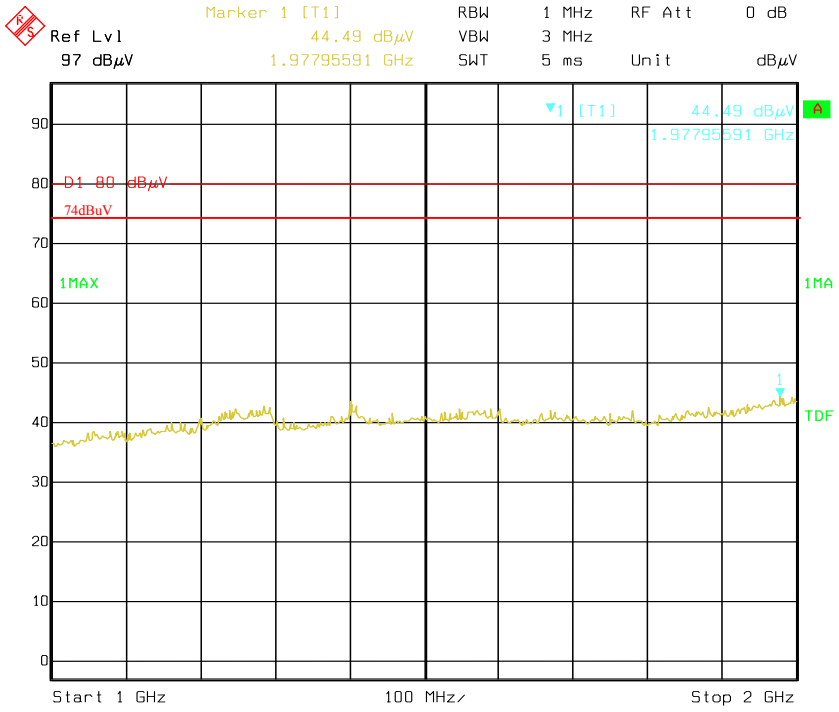
## Pre-scan for peak

### Horizontal



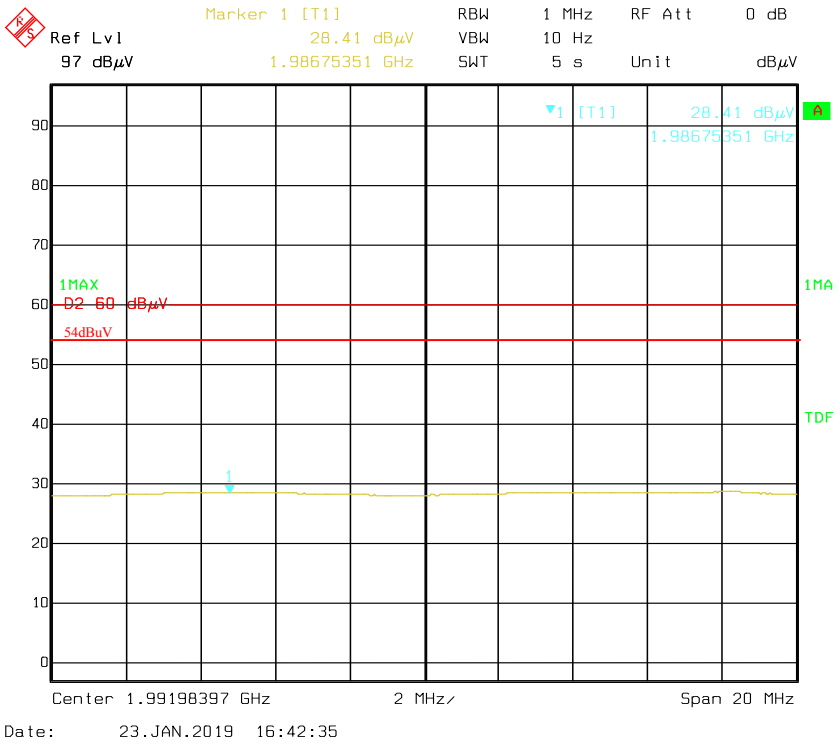

Date: 23.JAN.2019 16:40:08

### Vertical

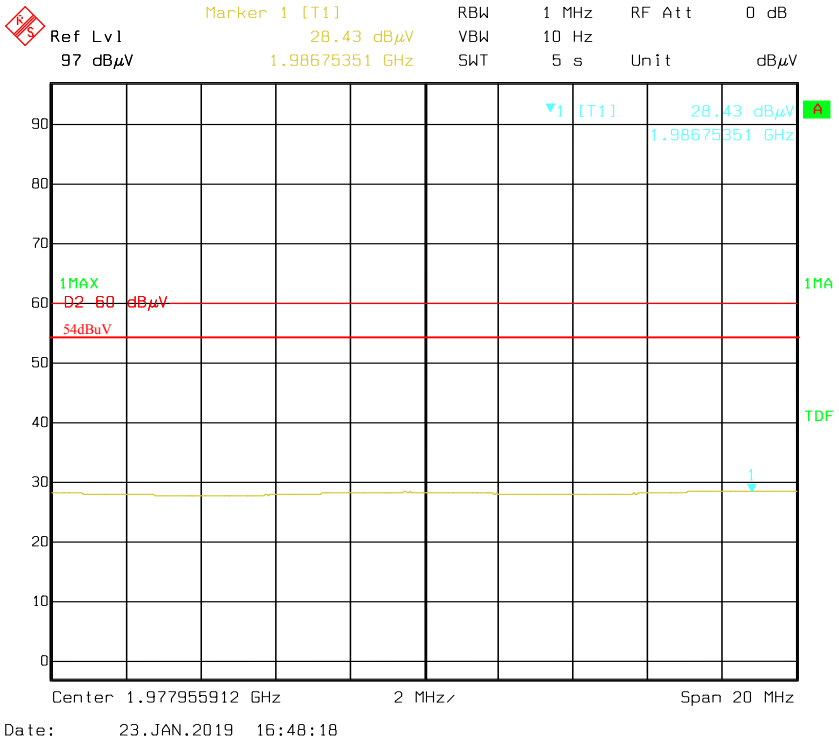



Date: 23.JAN.2019 16:44:55

**Horizontal – Average**




**Vertical - Average**




******* END OF REPORT *******