

# FCC PART 15B, CLASS B MEASUREMENT AND TEST REPORT

For

**Grandstream Networks, Inc.**

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

**FCC ID: YZZUCM6308**

|                                                                                                                                                                                                                                                                                                                             |                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <b>Report Type:</b><br>Original Report                                                                                                                                                                                                                                                                                      | <b>Product Type:</b><br>IP PBX |
| <b>Report Number:</b> RSZ200727013-EM-00                                                                                                                                                                                                                                                                                    |                                |
| <b>Report Date:</b> 2020-08-24                                                                                                                                                                                                                                                                                              |                                |
| <b>Reviewed By:</b> EMC Engineer                                                                                                                                                                                                                                                                                            | Joson Xiao                     |
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## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

|                             |                                                                                               |
|-----------------------------|-----------------------------------------------------------------------------------------------|
| Product                     | IP PBX                                                                                        |
| Tested Model                | UCM6308                                                                                       |
| Multiple Model              | UCM6304                                                                                       |
| Model Differences           | Refer to the DOS letter                                                                       |
| Voltage Range               | DC 12.0V from adapter or DC 48V from POE                                                      |
| Highest operating frequency | 1.8GHz                                                                                        |
| Date of Test                | 2020-07-30 to 2020-08-14                                                                      |
| Sample serial number        | RSZ200727013-EM-S1<br>RSZ200727013-EM-S2<br>(Assigned by BACL, Shenzhen)                      |
| Received date               | 2020-07-27                                                                                    |
| Sample/EUT Status           | Good condition                                                                                |
| Adapter 1 information       | Model: NBS24J120200HU<br>Input: AC 100-240V, 50/60Hz, 0.6A<br>Output: DC 12.0V, 2.0A          |
| Adapter 2 information       | Model: GQ24-120200-AU<br>Input: AC 100-240V, 50/60Hz, 1.0A Max<br>Output: DC 12.0V, 2.0A      |
| Adapter 3 information       | Model: RD1202000-C55-154MG<br>Input: AC 100-240V, 50/60Hz, 1.0A MAX<br>Output: DC 12.0V, 2.0A |

### 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).

### 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

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expanded combined standard uncertainty of test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will be taken into consideration for the test data recorded in the report

| Parameter           |            | uncertainty         |
|---------------------|------------|---------------------|
| Conducted Emissions |            | $\pm 1.95\text{dB}$ |
| Radiated Emissions  | Below 1GHz | $\pm 4.75\text{dB}$ |
|                     | Above 1GHz | $\pm 4.88\text{dB}$ |

*Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. 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 operation mode: Normal Working

### EUT Exercise Software

No exercise software was used.

### Special Accessories

No special accessory.

### Equipment Modifications

No modification was made to the EUT tested.

### Support Equipment List and Details

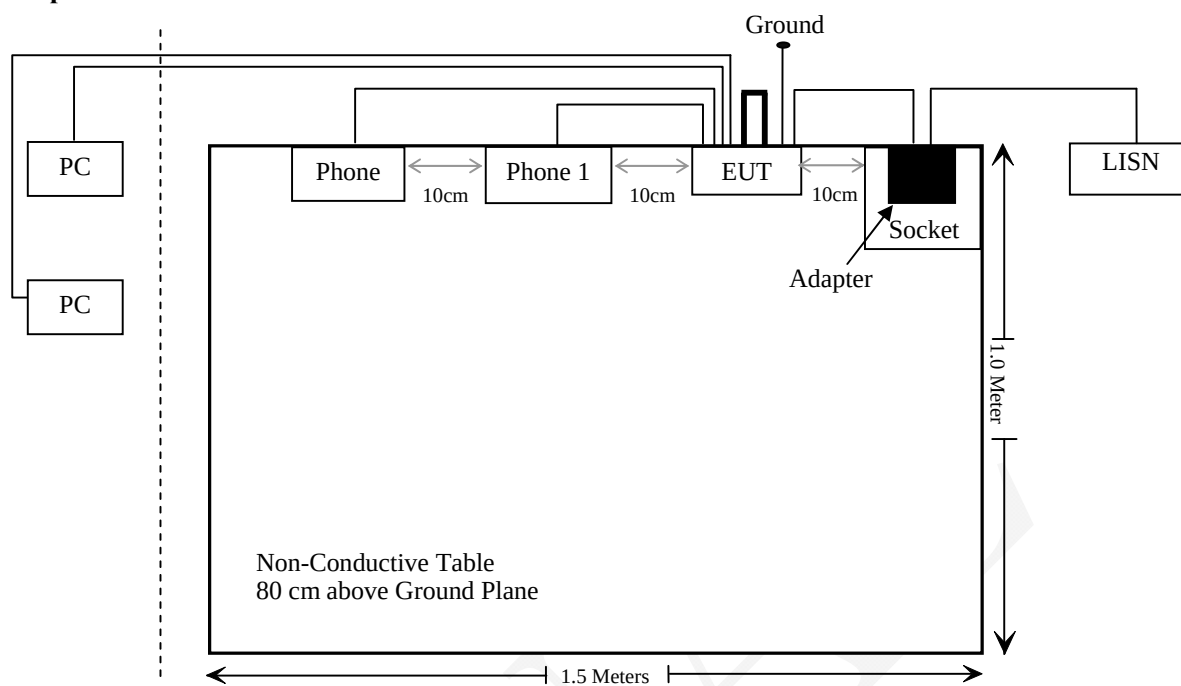
| Manufacturer | Description | Model          | Serial Number    |
|--------------|-------------|----------------|------------------|
| BULL         | Socket      | GN-415K        | 5503290068073    |
| DELL         | PC          | Latitude E5430 | JG3NLV1          |
| DELL         | PC          | Optiplex380    | Optiplex380      |
| GOSPELL      | POE         | G0720-480-050  | G0720-480-050    |
| Kinhao       | Phone       | E001           | E001             |
| Grandstream  | Phone1      | GRP2612W       | 20EZ2XAJC0F4BEDE |

**External I/O Cable**

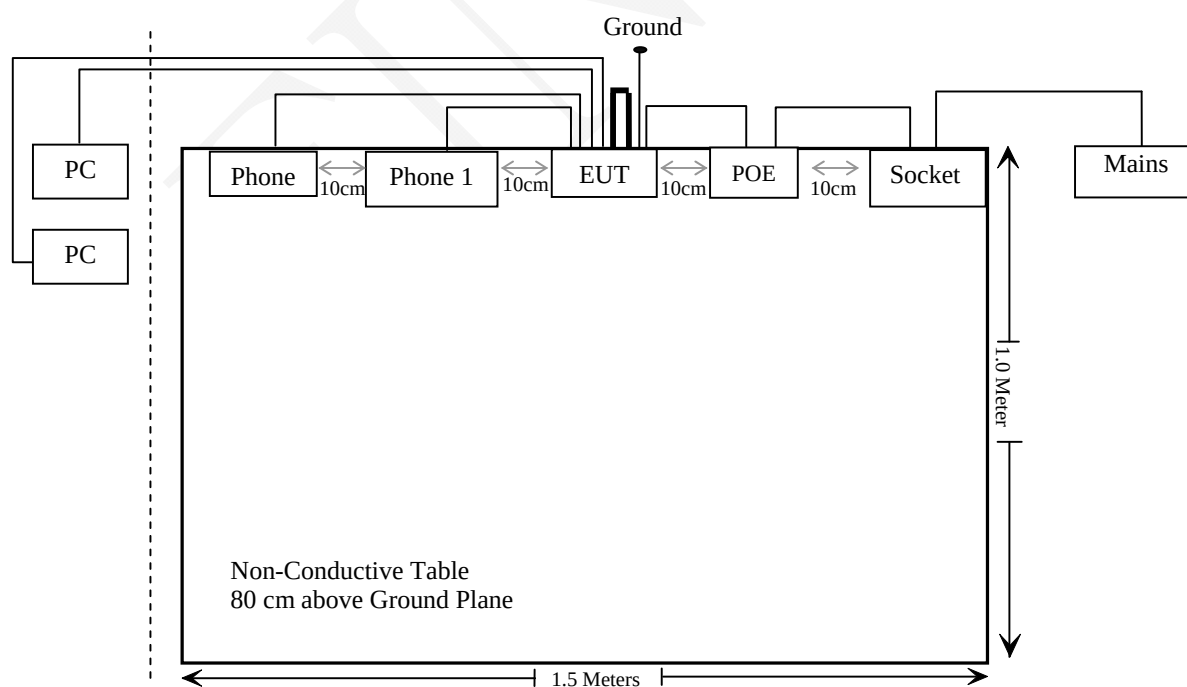
| Cable Description                  | Length (m) | From/Port | To     |
|------------------------------------|------------|-----------|--------|
| Unshielded un-detachable AC cable  | 1.2        | Socket    | Mains  |
| Unshielded detachable RJ11 cable   | 3.0        | Phone     | EUT    |
| Unshielded un-detachable DC cable  | 1.5        | Adapter   | EUT    |
| Unshielded detachable RJ45 cable*2 | 8.0        | EUT       | PC     |
| Unshielded detachable RJ45 cable   | 3.0        | EUT       | Phone1 |
| Unshielded detachable AC cable     | 1.0        | POE       | Socket |
| Unshielded detachable RJ45 cable   | 3.0        | POE       | EUT    |
| Unshielded detachable RJ11 cables  | 0.5        | EUT       | EUT    |
| Unshielded detachable ground cable | 1.0        | EUT       | Ground |

## Block Diagram of Test Setup

### Adapter:



### POE:



**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 |
|--------------------|--------------------|------------------|------------------------|------------------|----------------------|
| Rohde & Schwarz    | EMI Test Receiver  | ESCI             | 101120                 | 2020/7/8         | 2021/7/7             |
| Rohde & Schwarz    | LISN               | ENV216           | 101613                 | 2020/1/22        | 2021/1/21            |
| Rohde & Schwarz    | Transient Limitor  | ESH3Z2           | DE25985                | 2019/11/29       | 2020/11/28           |
| Unknown            | CE Cable           | CE Cable         | UF A210B-1-0720-504504 | 2019/11/29       | 2020/11/28           |
| Rohde & Schwarz    | CE Test software   | EMC 32           | V8.53.0                | NCR              | NCR                  |
| R&S                | EMI Test Receiver  | ESR3             | 102455                 | 2020/08/04       | 2021/08/03           |
| Sonoma instrument  | Pre-amplifier      | 310 N            | 186238                 | 2020/08/04       | 2021/08/03           |
| Sunol Sciences     | Broadband Antenna  | JB1              | A040904-1              | 2017/12/22       | 2020/12/21           |
| Unknown            | Cable 2            | RF Cable 2       | F-03-EM197             | 2019/11/29       | 2020/11/28           |
| Unknown            | Cable              | Chamber Cable 4  | EC-007                 | 2019/11/29       | 2020/11/28           |
| Rohde & Schwarz    | Auto test software | EMC 32           | V9.10                  | NCR              | NCR                  |
| Rohde & Schwarz    | Spectrum Analyzer  | FSV40-N          | 102259                 | 2020/7/22        | 2021/07/21           |
| COM-POWER          | Pre-amplifier      | PA-122           | 181919                 | 2019/11/29       | 2020/11/28           |
| Sunol Sciences     | Horn Antenna       | DRH-118          | A052604                | 2017/12/22       | 2020/12/21           |
| Insulted Wire Inc. | RF Cable           | SPS-2503-3150    | 02222010               | 2019/11/29       | 2020/11/28           |
| Unknown            | RF Cable           | W1101-EQ1<br>OUT | F-19-EM005             | 2019/11/29       | 2020/11/28           |

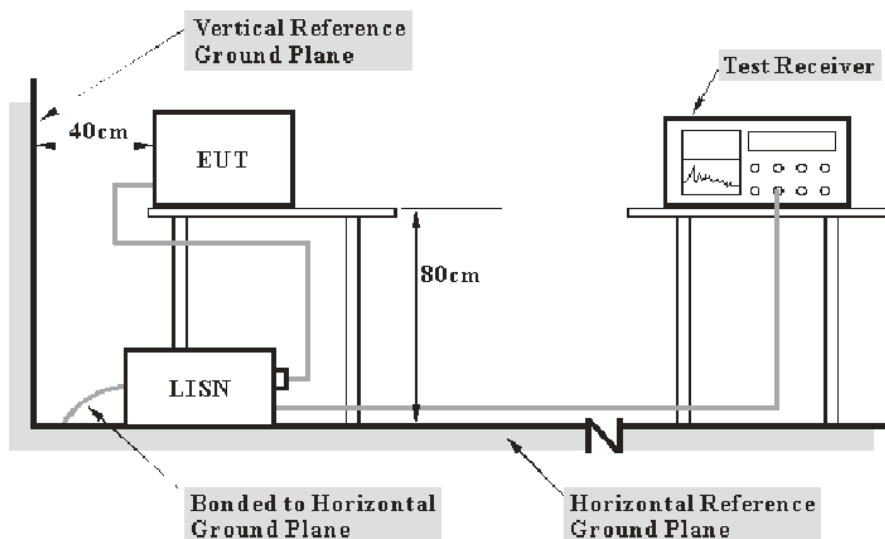
\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## 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

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 Data

### Environmental Conditions

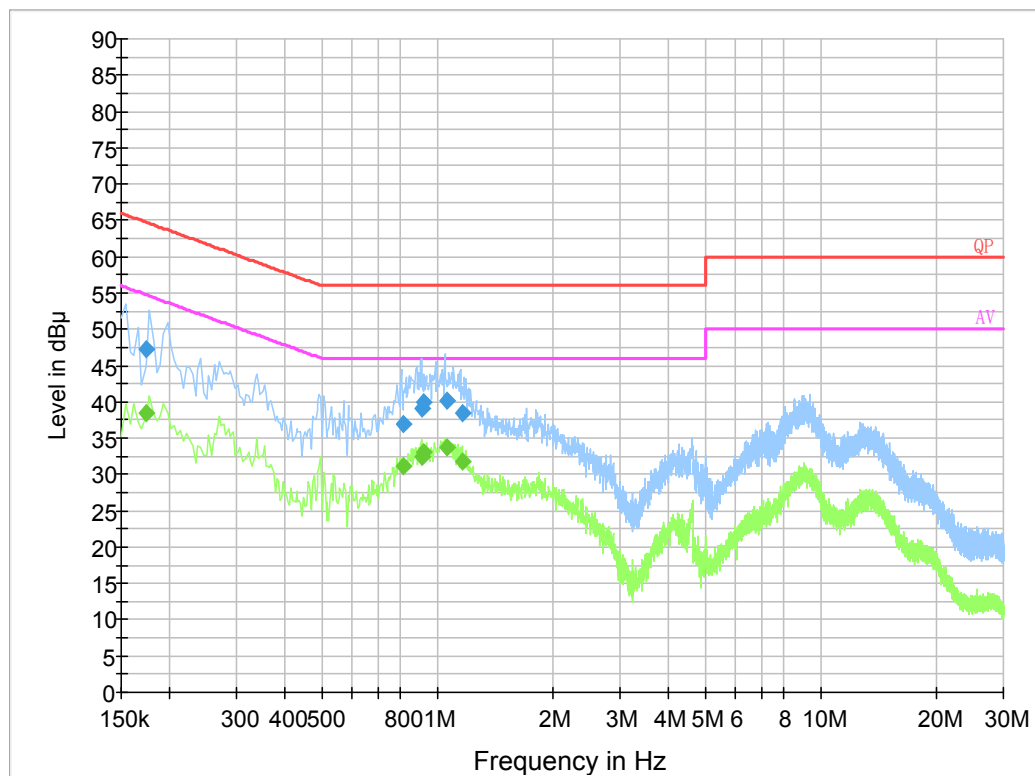
|                    |           |
|--------------------|-----------|
| Temperature:       | 25 °C     |
| Relative Humidity: | 65 %      |
| ATM Pressure:      | 101.0 kPa |

*The testing was performed by Haiguo Li on 2020-07-31.*

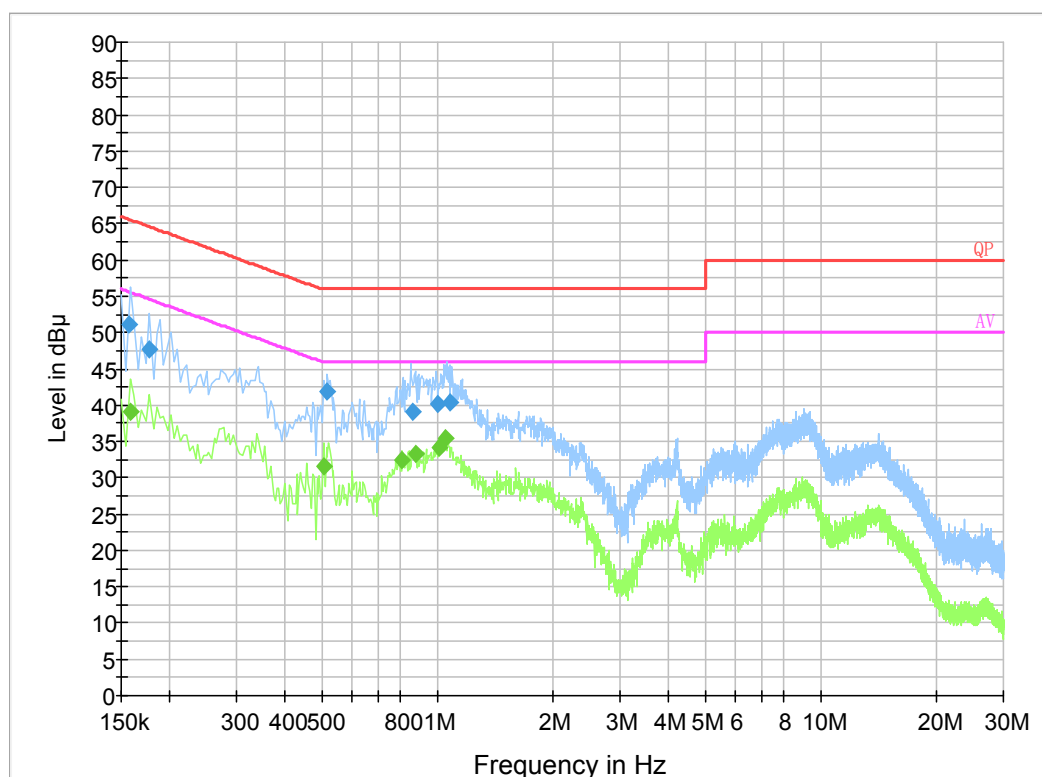
*EUT Operation Mode: Normal Working*

**For adapter 1 (NBS24J120200HU):**

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



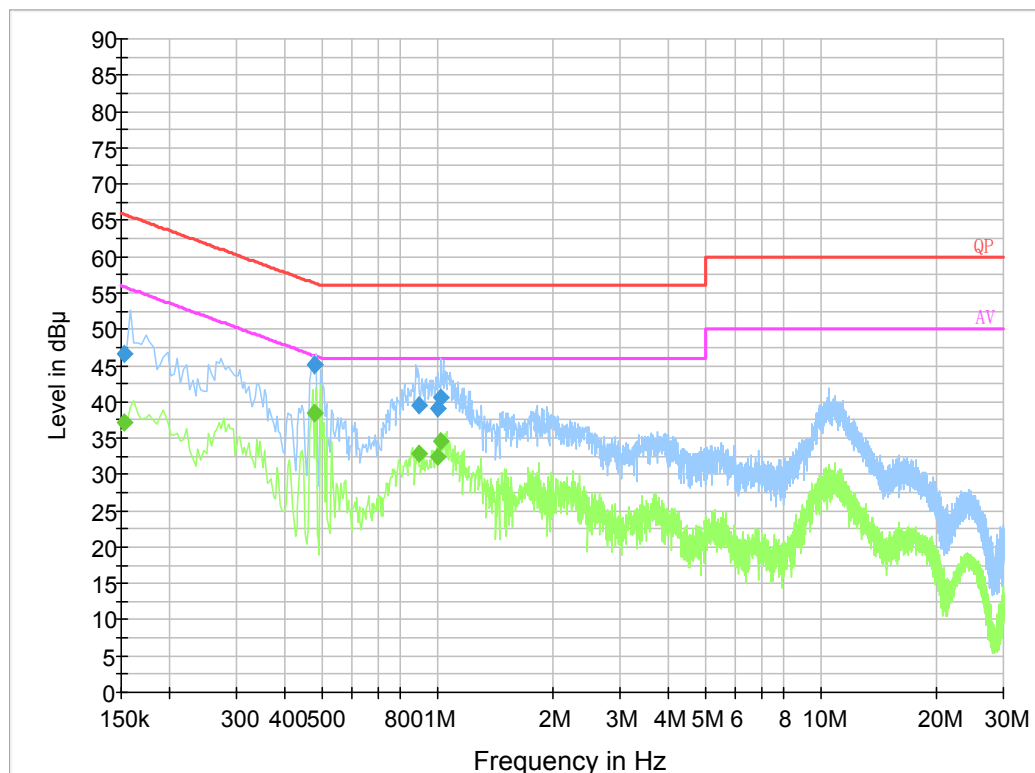
| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.173500        | 47.3                       | 19.9                   | 64.8         | 17.5        | QP                    |
| 0.813910        | 37.0                       | 19.8                   | 56.0         | 19.0        | QP                    |
| 0.916410        | 39.1                       | 19.8                   | 56.0         | 16.9        | QP                    |
| 0.920350        | 39.9                       | 19.8                   | 56.0         | 16.1        | QP                    |
| 1.062250        | 40.3                       | 19.9                   | 56.0         | 15.7        | QP                    |
| 1.164750        | 38.4                       | 19.8                   | 56.0         | 17.6        | QP                    |
| 0.173500        | 38.4                       | 19.9                   | 54.8         | 16.3        | Ave.                  |
| 0.813910        | 31.2                       | 19.8                   | 46.0         | 14.8        | Ave.                  |
| 0.916410        | 32.4                       | 19.8                   | 46.0         | 13.6        | Ave.                  |
| 0.920350        | 33.0                       | 19.8                   | 46.0         | 13.0        | Ave.                  |
| 1.062250        | 33.7                       | 19.9                   | 46.0         | 12.3        | Ave.                  |
| 1.164750        | 31.8                       | 19.8                   | 46.0         | 14.2        | Ave.                  |

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

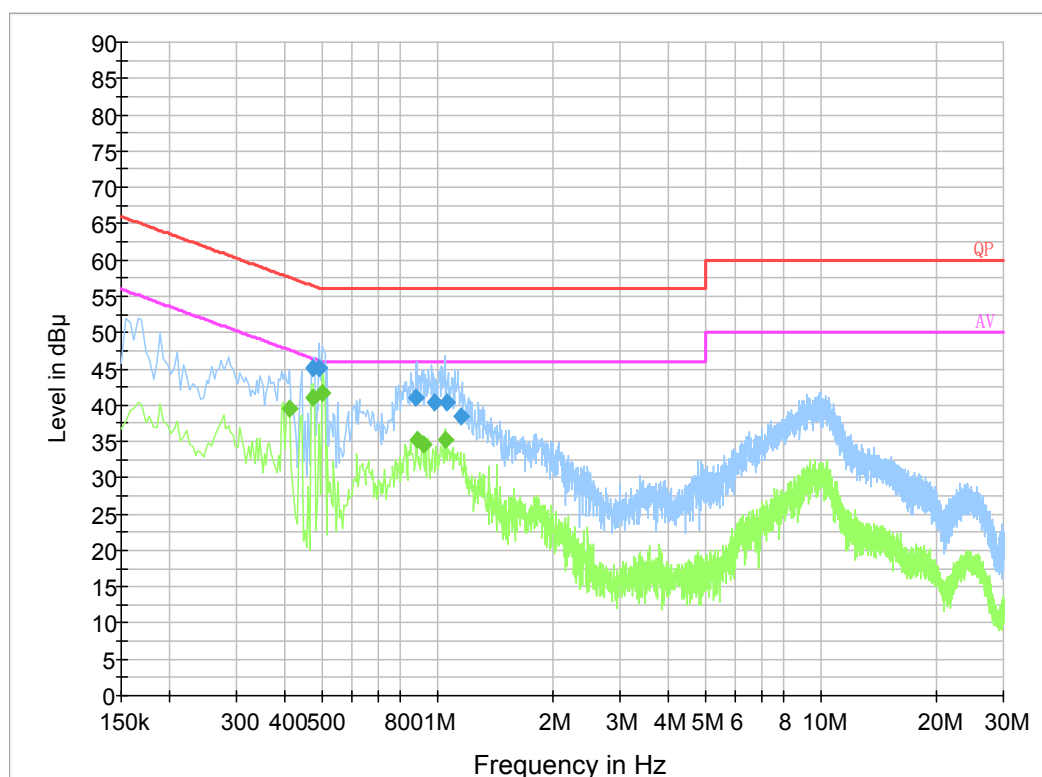
| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.157500        | 51.1                       | 19.8                   | 65.6         | 14.5        | QP                    |
| 0.177500        | 47.8                       | 19.8                   | 64.6         | 16.8        | QP                    |
| 0.514230        | 41.9                       | 19.8                   | 56.0         | 14.1        | QP                    |
| 0.866810        | 39.1                       | 19.7                   | 56.0         | 16.9        | QP                    |
| 1.003030        | 40.1                       | 19.8                   | 56.0         | 15.9        | QP                    |
| 1.078010        | 40.5                       | 19.8                   | 56.0         | 15.5        | QP                    |
| 0.158000        | 39.0                       | 19.8                   | 55.6         | 16.6        | Ave.                  |
| 0.506000        | 31.5                       | 19.8                   | 46.0         | 14.5        | Ave.                  |
| 0.810000        | 32.4                       | 19.8                   | 46.0         | 13.6        | Ave.                  |
| 0.882000        | 33.3                       | 19.7                   | 46.0         | 12.7        | Ave.                  |
| 1.010000        | 34.2                       | 19.8                   | 46.0         | 11.8        | Ave.                  |
| 1.050000        | 35.4                       | 19.8                   | 46.0         | 10.6        | Ave.                  |

**For adapter 2 (GQ24-120200-AU):**

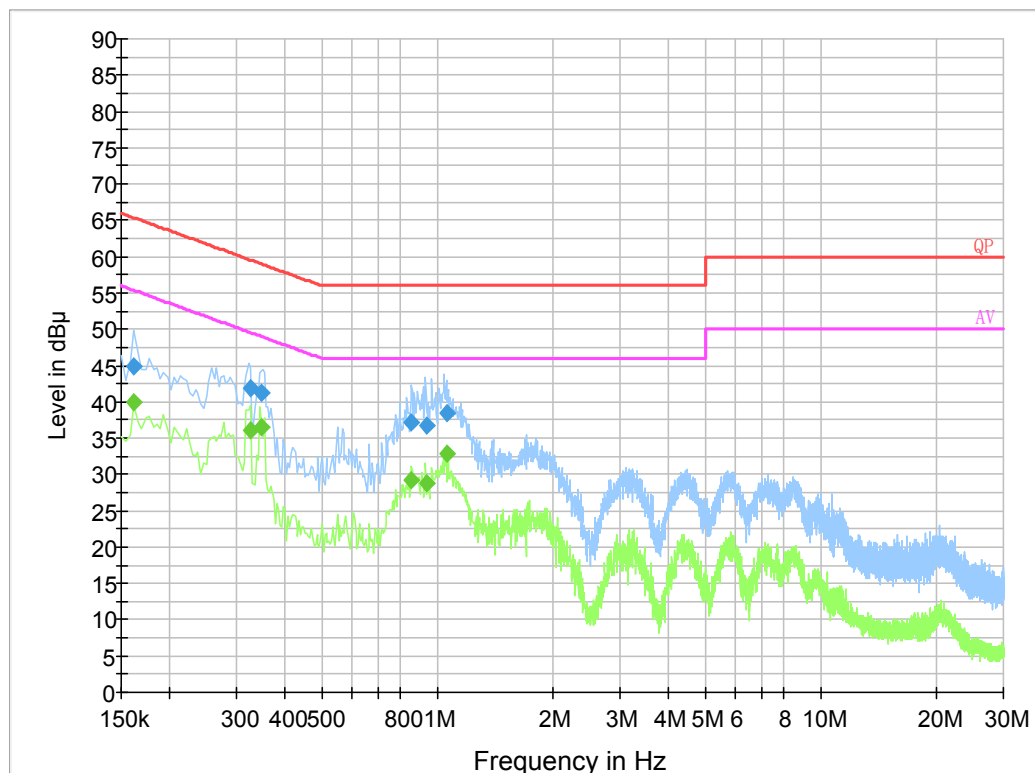
**AC 120V/60 Hz, Line**



| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.153500        | 46.6                       | 19.8                   | 65.8         | 19.2        | QP                    |
| 0.478770        | 45.1                       | 19.8                   | 56.4         | 11.3        | QP                    |
| 0.478890        | 45.2                       | 19.8                   | 56.4         | 11.2        | QP                    |
| 0.895230        | 39.6                       | 19.8                   | 56.0         | 16.4        | QP                    |
| 1.006910        | 39.1                       | 19.9                   | 56.0         | 16.9        | QP                    |
| 1.022670        | 40.6                       | 19.9                   | 56.0         | 15.4        | QP                    |
| 0.153500        | 37.1                       | 19.8                   | 55.8         | 18.7        | Ave.                  |
| 0.478770        | 38.4                       | 19.8                   | 46.4         | 8.0         | Ave.                  |
| 0.478890        | 38.4                       | 19.8                   | 46.4         | 7.9         | Ave.                  |
| 0.895230        | 32.8                       | 19.8                   | 46.0         | 13.2        | Ave.                  |
| 1.006910        | 32.4                       | 19.9                   | 46.0         | 13.6        | Ave.                  |
| 1.022670        | 34.6                       | 19.9                   | 46.0         | 11.4        | Ave.                  |

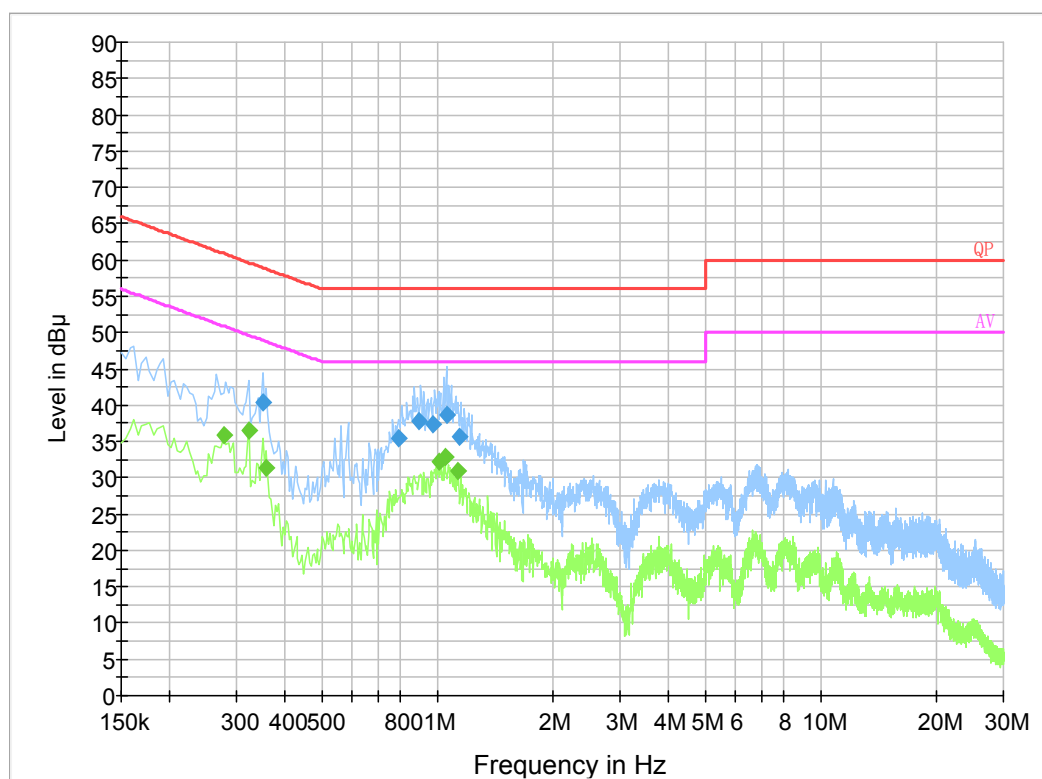
**AC 120V/60 Hz, Neutral**

| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.474830        | 45.2                       | 19.8                   | 56.4         | 11.2        | QP                    |
| 0.490590        | 45.2                       | 19.8                   | 56.2         | 11.0        | QP                    |
| 0.880710        | 41.0                       | 19.7                   | 56.0         | 15.0        | QP                    |
| 0.984550        | 40.4                       | 19.8                   | 56.0         | 15.6        | QP                    |
| 1.062250        | 40.4                       | 19.8                   | 56.0         | 15.6        | QP                    |
| 1.151010        | 38.4                       | 19.8                   | 56.0         | 17.6        | QP                    |
| 0.414000        | 39.6                       | 19.8                   | 47.6         | 8.0         | Ave.                  |
| 0.474000        | 41.1                       | 19.8                   | 46.4         | 5.3         | Ave.                  |
| 0.502000        | 41.6                       | 19.8                   | 46.0         | 4.4         | Ave.                  |
| 0.886000        | 35.3                       | 19.7                   | 46.0         | 10.7        | Ave.                  |
| 0.918000        | 34.5                       | 19.8                   | 46.0         | 11.5        | Ave.                  |
| 1.050000        | 35.3                       | 19.8                   | 46.0         | 10.7        | Ave.                  |

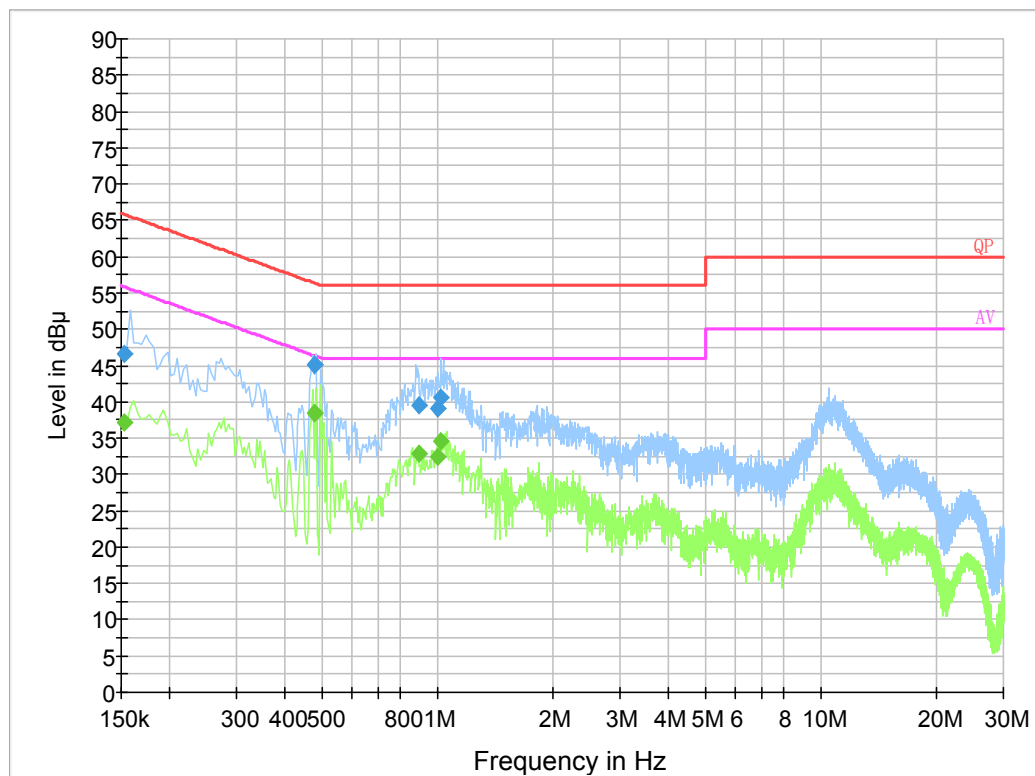
**For adapter 3 (RD1202000-C55-154MG):****AC 120V/60 Hz, Line**

| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.161500        | 44.9                       | 19.9                   | 65.4         | 20.5        | QP                    |
| 0.325170        | 42.0                       | 19.8                   | 59.6         | 17.6        | QP                    |
| 0.348690        | 41.2                       | 19.9                   | 59.0         | 17.8        | QP                    |
| 0.857130        | 37.2                       | 19.8                   | 56.0         | 18.8        | QP                    |
| 0.935990        | 36.8                       | 19.8                   | 56.0         | 19.2        | QP                    |
| 1.058310        | 38.4                       | 19.9                   | 56.0         | 17.6        | QP                    |
| 0.161500        | 40.0                       | 19.9                   | 55.4         | 15.4        | Ave.                  |
| 0.325170        | 36.0                       | 19.8                   | 49.6         | 13.6        | Ave.                  |
| 0.348690        | 36.5                       | 19.9                   | 49.0         | 12.5        | Ave.                  |
| 0.857130        | 29.3                       | 19.8                   | 46.0         | 16.7        | Ave.                  |
| 0.935990        | 28.8                       | 19.8                   | 46.0         | 17.2        | Ave.                  |
| 1.058310        | 32.8                       | 19.9                   | 46.0         | 13.2        | Ave.                  |

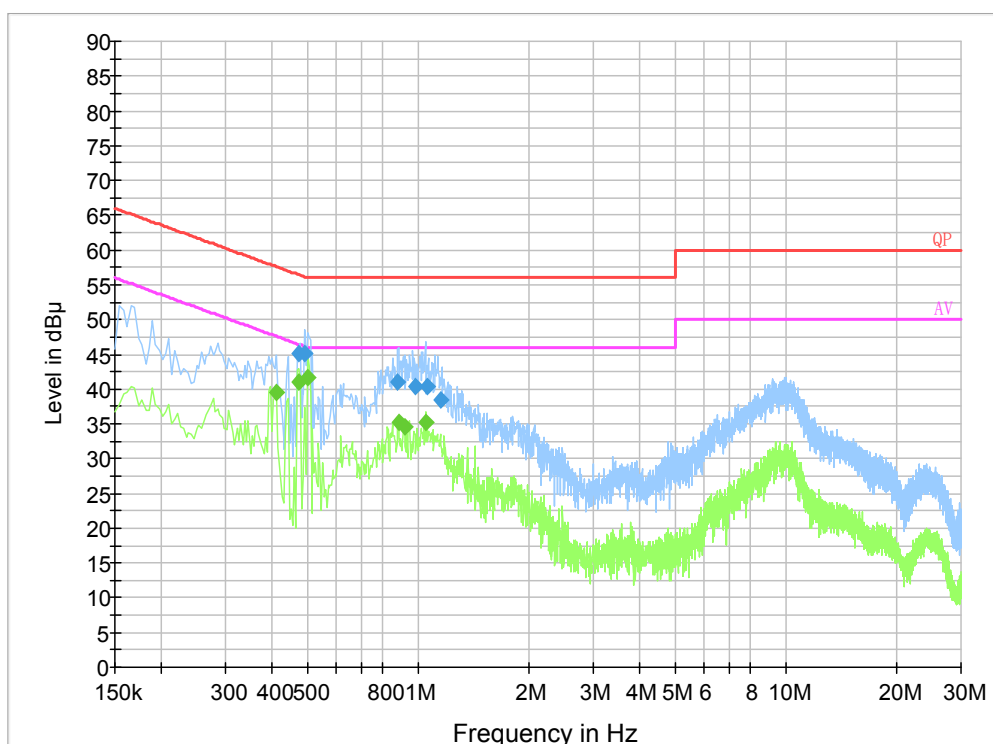


**AC 120V/60 Hz, Neutral**

| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.352750        | 40.5                       | 19.9                   | 58.9         | 18.4        | QP                    |
| 0.793910        | 35.5                       | 19.8                   | 56.0         | 20.5        | QP                    |
| 0.900410        | 37.7                       | 19.7                   | 56.0         | 18.3        | QP                    |
| 0.975210        | 37.3                       | 19.8                   | 56.0         | 18.7        | QP                    |
| 1.062130        | 38.7                       | 19.8                   | 56.0         | 17.3        | QP                    |
| 1.144690        | 35.6                       | 19.8                   | 56.0         | 20.4        | QP                    |
| 0.278000        | 35.9                       | 19.7                   | 50.9         | 15.0        | Ave.                  |
| 0.322000        | 36.5                       | 19.8                   | 49.7         | 13.1        | Ave.                  |
| 0.358000        | 31.4                       | 19.9                   | 48.8         | 17.4        | Ave.                  |
| 1.010000        | 32.3                       | 19.8                   | 46.0         | 13.7        | Ave.                  |
| 1.050000        | 32.9                       | 19.8                   | 46.0         | 13.1        | Ave.                  |
| 1.138000        | 30.9                       | 19.8                   | 46.0         | 15.1        | Ave.                  |

**For POE:****AC 120V/60 Hz, Line**

| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.153500        | 46.6                       | 19.8                   | 65.8         | 19.2        | QP                    |
| 0.478770        | 45.1                       | 19.8                   | 56.4         | 11.3        | QP                    |
| 0.478890        | 45.2                       | 19.8                   | 56.4         | 11.2        | QP                    |
| 0.895230        | 39.6                       | 19.8                   | 56.0         | 16.4        | QP                    |
| 1.006910        | 39.1                       | 19.9                   | 56.0         | 16.9        | QP                    |
| 1.022670        | 40.6                       | 19.9                   | 56.0         | 15.4        | QP                    |
| 0.153500        | 37.1                       | 19.8                   | 55.8         | 18.7        | Ave.                  |
| 0.478770        | 38.4                       | 19.8                   | 46.4         | 8.0         | Ave.                  |
| 0.478890        | 38.4                       | 19.8                   | 46.4         | 7.9         | Ave.                  |
| 0.895230        | 32.8                       | 19.8                   | 46.0         | 13.2        | Ave.                  |
| 1.006910        | 32.4                       | 19.9                   | 46.0         | 13.6        | Ave.                  |
| 1.022670        | 34.6                       | 19.9                   | 46.0         | 11.4        | Ave.                  |

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

| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.474830        | 45.2                       | 19.8                   | 56.4         | 11.2        | QP                    |
| 0.490590        | 45.2                       | 19.8                   | 56.2         | 11.0        | QP                    |
| 0.880710        | 41.0                       | 19.7                   | 56.0         | 15.0        | QP                    |
| 0.984550        | 40.4                       | 19.8                   | 56.0         | 15.6        | QP                    |
| 1.062250        | 40.4                       | 19.8                   | 56.0         | 15.6        | QP                    |
| 1.151010        | 38.4                       | 19.8                   | 56.0         | 17.6        | QP                    |
| 0.414000        | 39.6                       | 19.8                   | 47.6         | 8.0         | Ave.                  |
| 0.474000        | 41.1                       | 19.8                   | 46.4         | 5.3         | Ave.                  |
| 0.502000        | 41.6                       | 19.8                   | 46.0         | 4.4         | Ave.                  |
| 0.886000        | 35.3                       | 19.7                   | 46.0         | 10.7        | Ave.                  |
| 0.918000        | 34.5                       | 19.8                   | 46.0         | 11.5        | Ave.                  |
| 1.050000        | 35.3                       | 19.8                   | 46.0         | 10.7        | 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

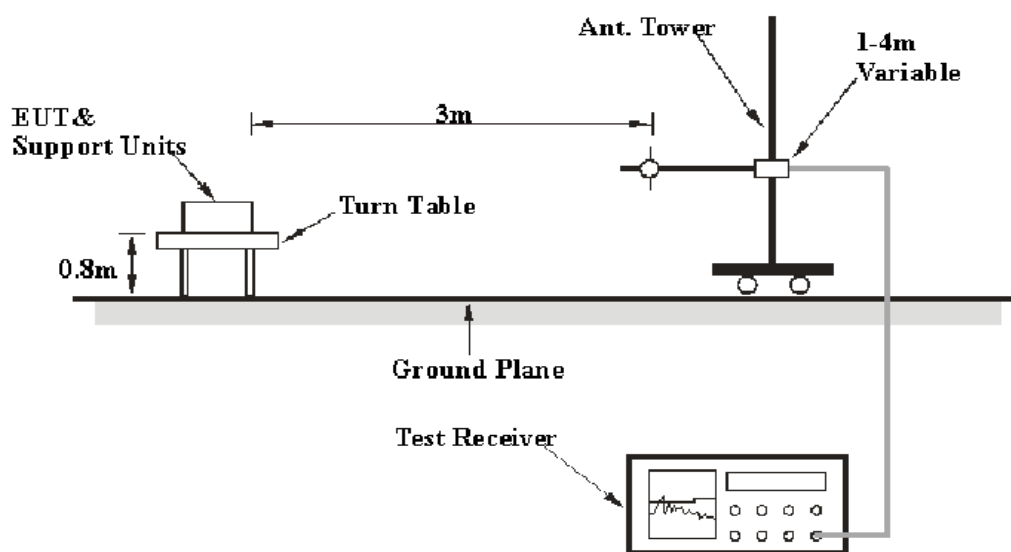
## FCC §15.109 - RADIATED SPURIOUS EMISSIONS

### Applicable Standard

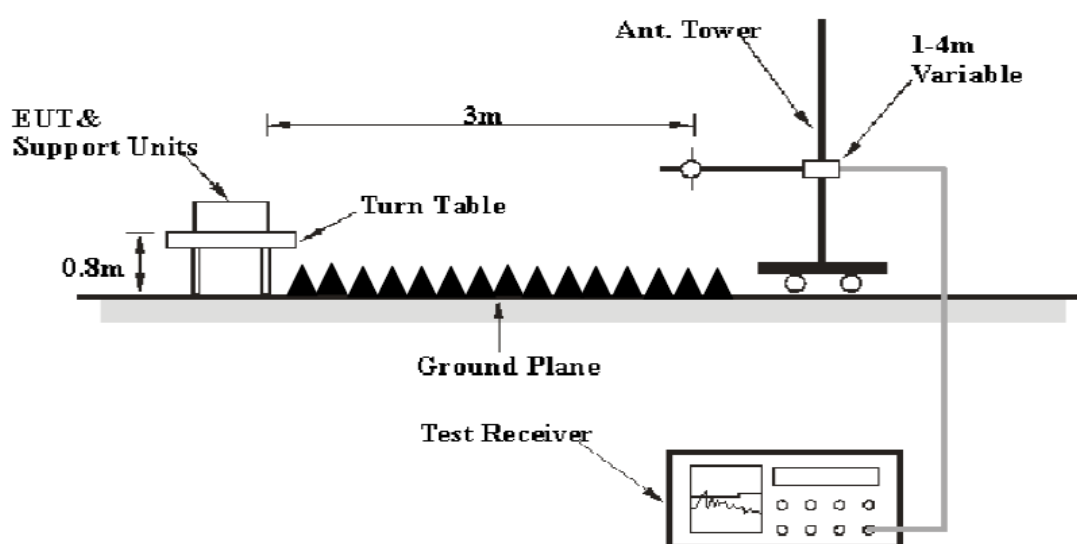
FCC §15.109

### 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 9 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 Data

#### Environmental Conditions

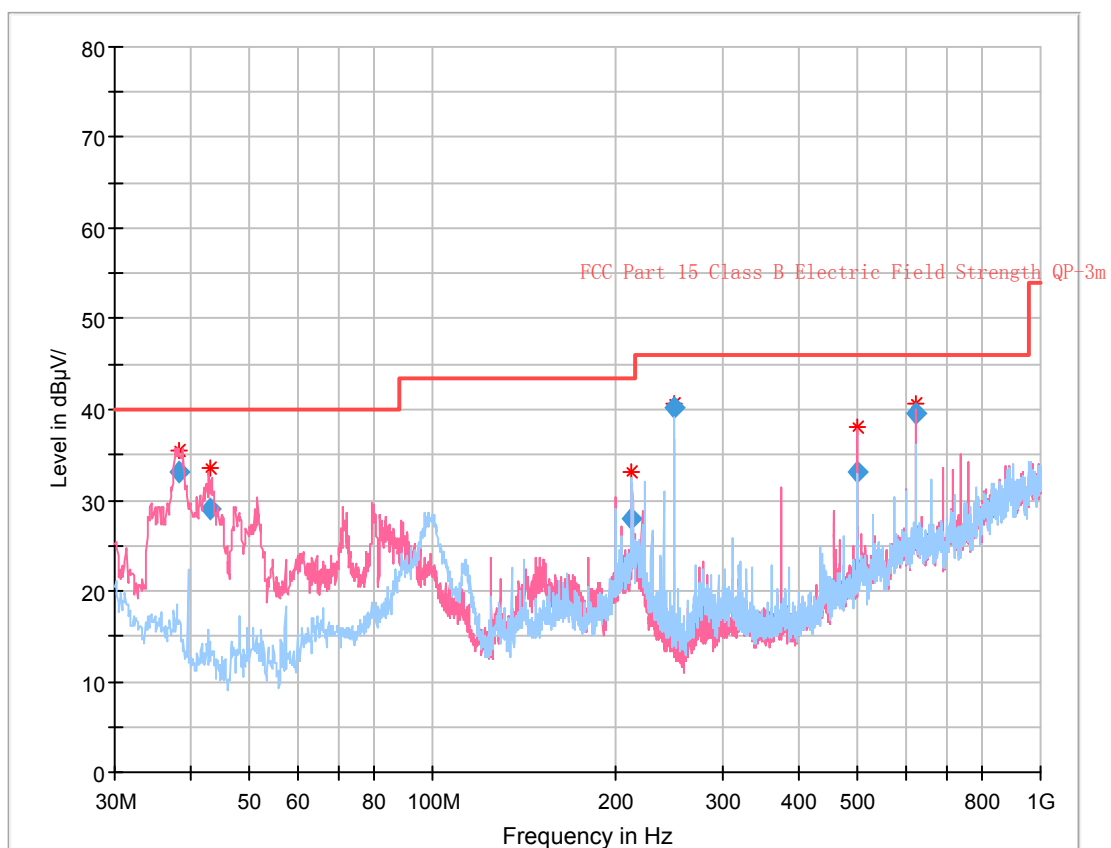
|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 29 °C     |
| <b>Relative Humidity:</b> | 56~58 %   |
| <b>ATM Pressure:</b>      | 101.0 kPa |

The testing was performed by Holland Yang and Harris He from 2020-08-12 to 2020-08-13 for below 1GHz and Leven Gan and Leo Huang from 2020-07-30 to 2020-08-14 for above 1GHz.

*EUT Operation Mode: Normal Working*

**For adapter 1 (NBS24J120200HU):**

**30 MHz – 1 GHz:**



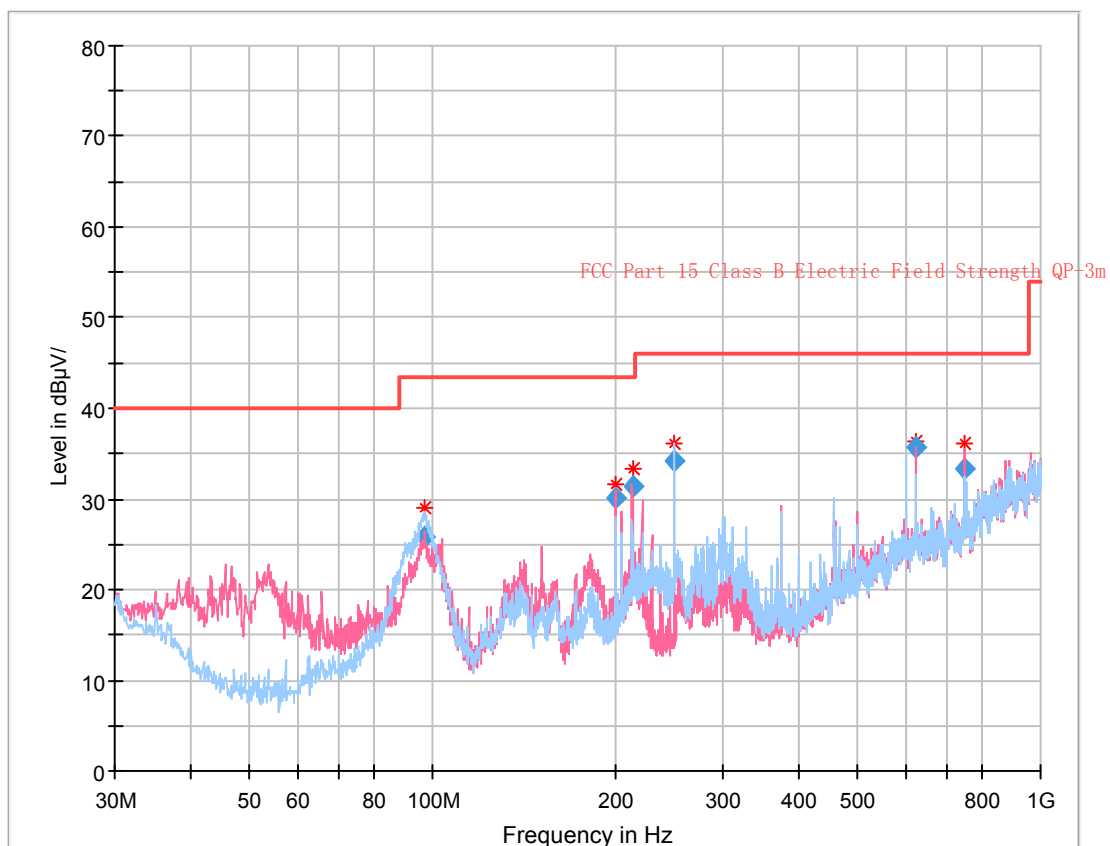
| Frequency (MHz) | Corrected Amplitude (dBμV/m) | Antenna height (cm) | Antenna Polarity | Turntable position (degree) | Correction Factor (dB/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|------------------------------|---------------------|------------------|-----------------------------|--------------------------|----------------|-------------|
| 38.273750       | 33.15                        | 110.0               | V                | 60.0                        | -12.7                    | 40.00          | 6.85        |
| 42.923125       | 29.05                        | 115.0               | V                | 91.0                        | -15.8                    | 40.00          | 10.95       |
| 212.962000      | 27.92                        | 138.0               | H                | 309.0                       | -13.9                    | 43.50          | 15.58       |
| 250.001000      | 40.11                        | 130.0               | H                | 293.0                       | -14.1                    | 46.00          | 5.89        |
| 499.976250      | 33.07                        | 146.0               | V                | 91.0                        | -5.2                     | 46.00          | 12.93       |
| 625.001000      | 39.62                        | 109.0               | V                | 161.0                       | -1.6                     | 46.00          | 6.38        |

## Above 1 GHz

| Frequency<br>(MHz) | Measurement             |            | Turntable<br>Degree | Rx Antenna    |                  | Corrected<br>Factor<br>(dB/m) | Corrected<br>Amplitude<br>(dB $\mu$ V/m) | FCC Part 15B            |                |
|--------------------|-------------------------|------------|---------------------|---------------|------------------|-------------------------------|------------------------------------------|-------------------------|----------------|
|                    | Reading<br>(dB $\mu$ V) | PK/QP/Ave. |                     | Height<br>(m) | Polar<br>(H / V) |                               |                                          | Limit<br>(dB $\mu$ V/m) | Margin<br>(dB) |
| 1308.00            | 52.76                   | PK         | 75                  | 1.3           | H                | -4.31                         | 48.45                                    | 74                      | 25.55          |
| 1308.00            | 28.42                   | Ave.       | 75                  | 1.3           | H                | -4.31                         | 24.11                                    | 54                      | 29.89          |
| 1308.00            | 55.39                   | PK         | 214                 | 1.1           | V                | -4.31                         | 51.08                                    | 74                      | 22.92          |
| 1308.00            | 28.69                   | Ave.       | 214                 | 1.1           | V                | -4.31                         | 24.38                                    | 54                      | 29.62          |
| 2207.00            | 59.60                   | PK         | 172                 | 2.4           | H                | -0.56                         | 59.04                                    | 74                      | 14.96          |
| 2207.00            | 31.19                   | Ave.       | 172                 | 2.4           | H                | -0.56                         | 30.63                                    | 54                      | 23.37          |
| 2207.00            | 61.81                   | PK         | 29                  | 1.6           | V                | -0.56                         | 61.25                                    | 74                      | 12.75          |
| 2207.00            | 34.22                   | Ave.       | 29                  | 1.6           | V                | -0.56                         | 33.66                                    | 54                      | 20.34          |

**For adapter 2 (GQ24-120200-AU):**

**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) |
|-----------------|------------------------------|---------------------|------------------|-----------------------------|--------------------------|----------------|-------------|
| 96.679250       | 25.74                        | 395.0               | H                | 76.0                        | -17.8                    | 43.50          | 17.76       |
| 200.011500      | 30.15                        | 109.0               | V                | 355.0                       | -13.8                    | 43.50          | 13.35       |
| 212.976375      | 31.35                        | 102.0               | V                | 329.0                       | -13.9                    | 43.50          | 12.15       |
| 250.014875      | 34.29                        | 170.0               | H                | 104.0                       | -14.1                    | 46.00          | 11.71       |
| 625.003750      | 35.71                        | 130.0               | V                | 269.0                       | -1.6                     | 46.00          | 10.29       |
| 749.980000      | 33.33                        | 123.0               | V                | 307.0                       | -0.4                     | 46.00          | 12.67       |

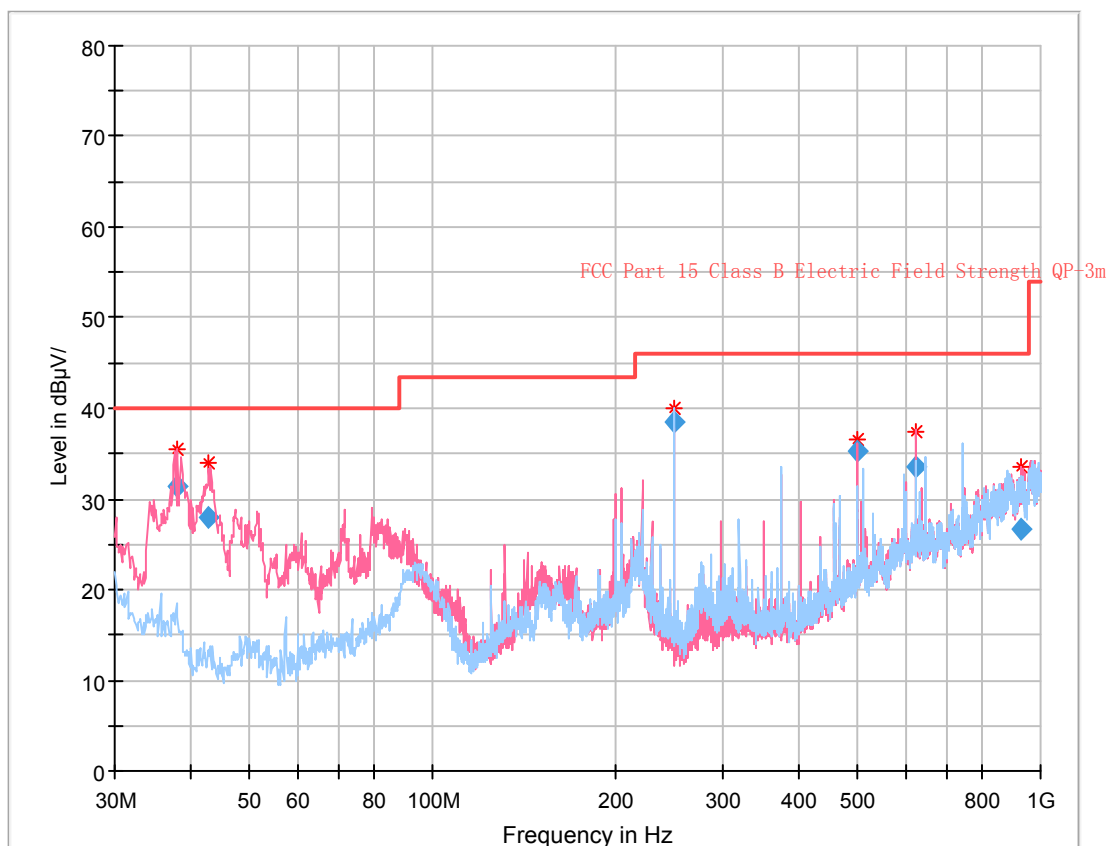


## Above 1 GHz

| Frequency<br>(MHz) | Measurement             |            | Turntable<br>Degree | Rx Antenna    |                  | Corrected<br>Factor<br>(dB/m) | Corrected<br>Amplitude<br>(dB $\mu$ V/m) | FCC Part 15B            |                |
|--------------------|-------------------------|------------|---------------------|---------------|------------------|-------------------------------|------------------------------------------|-------------------------|----------------|
|                    | Reading<br>(dB $\mu$ V) | PK/QP/Ave. |                     | Height<br>(m) | Polar<br>(H / V) |                               |                                          | Limit<br>(dB $\mu$ V/m) | Margin<br>(dB) |
| 2197.54            | 63.47                   | PK         | 180                 | 1.2           | H                | -0.56                         | 62.91                                    | 74                      | 11.09          |
| 2197.54            | 32.88                   | Ave.       | 180                 | 1.2           | H                | -0.56                         | 32.32                                    | 54                      | 21.68          |
| 2197.54            | 58.17                   | PK         | 91                  | 1.4           | V                | -0.56                         | 57.61                                    | 74                      | 16.39          |
| 2197.54            | 30.57                   | Ave.       | 91                  | 1.4           | V                | -0.56                         | 30.01                                    | 54                      | 23.99          |
| 2298.80            | 56.96                   | PK         | 110                 | 2.0           | H                | -1.15                         | 55.81                                    | 74                      | 18.19          |
| 2298.80            | 28.02                   | Ave.       | 110                 | 2.0           | H                | -1.15                         | 26.87                                    | 54                      | 27.13          |
| 2298.80            | 57.65                   | PK         | 90                  | 1.6           | V                | -1.15                         | 56.50                                    | 74                      | 17.50          |
| 2298.80            | 29.09                   | Ave.       | 90                  | 1.6           | V                | -1.15                         | 27.94                                    | 54                      | 26.06          |

**For adapter 3 (RD1202000-C55-154MG):**

**30 MHz – 1 GHz:**



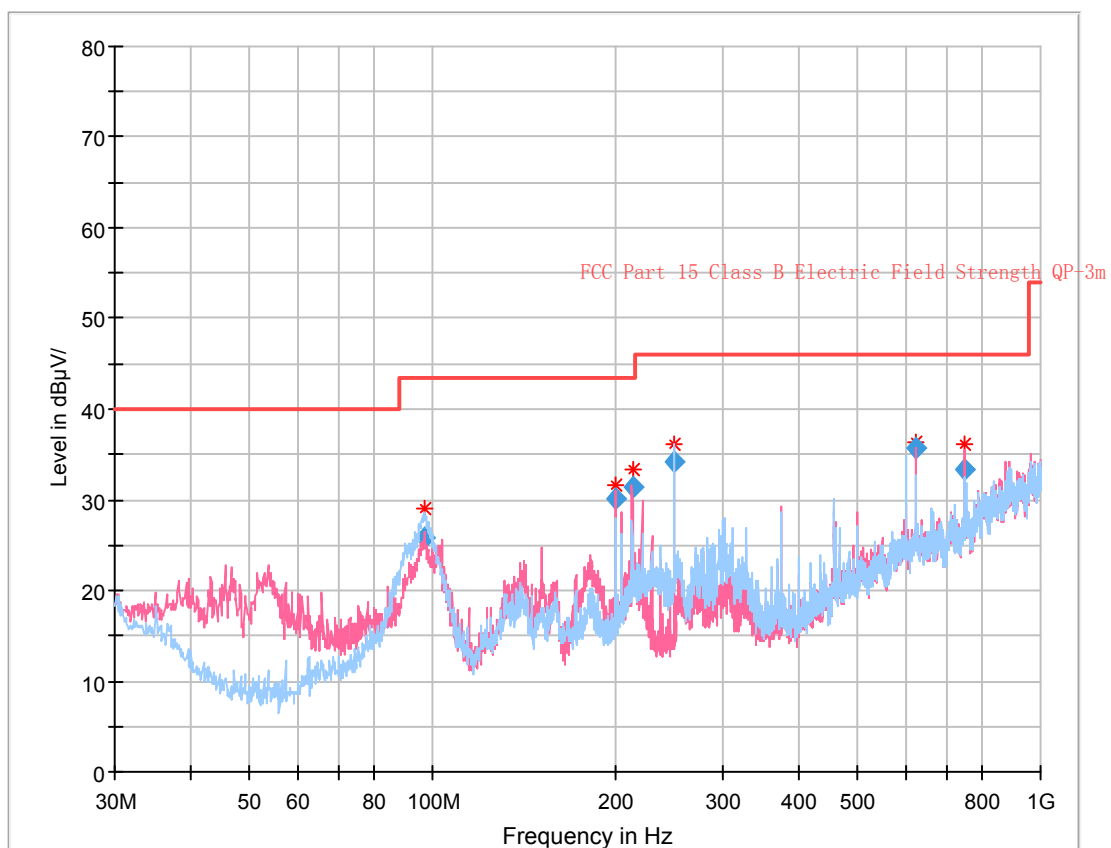
| Frequency (MHz) | Corrected Amplitude (dBμV/m) | Antenna height (cm) | Antenna Polarity | Turntable position (degree) | Correction Factor (dB/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|------------------------------|---------------------|------------------|-----------------------------|--------------------------|----------------|-------------|
| 38.056250       | 31.37                        | 123.0               | V                | 299.0                       | -12.5                    | 40.00          | 8.63        |
| 42.706125       | 27.89                        | 103.0               | V                | 298.0                       | -15.7                    | 40.00          | 12.11       |
| 250.008625      | 38.48                        | 208.0               | H                | 314.0                       | -14.1                    | 46.00          | 7.52        |
| 499.994250      | 35.22                        | 156.0               | V                | 58.0                        | -5.2                     | 46.00          | 10.78       |
| 625.026500      | 33.63                        | 134.0               | V                | 61.0                        | -1.6                     | 46.00          | 12.37       |
| 926.397125      | 26.57                        | 116.0               | V                | 157.0                       | 4.7                      | 46.00          | 19.43       |

## Above 1 GHz

| Frequency<br>(MHz) | Measurement             |            | Turntable<br>Degree | Rx Antenna    |                  | Corrected<br>Factor<br>(dB/m) | Corrected<br>Amplitude<br>(dB $\mu$ V/m) | FCC Part 15B            |                |
|--------------------|-------------------------|------------|---------------------|---------------|------------------|-------------------------------|------------------------------------------|-------------------------|----------------|
|                    | Reading<br>(dB $\mu$ V) | PK/QP/Ave. |                     | Height<br>(m) | Polar<br>(H / V) |                               |                                          | Limit<br>(dB $\mu$ V/m) | Margin<br>(dB) |
| 1308.00            | 52.37                   | PK         | 85                  | 2.0           | H                | -4.31                         | 48.06                                    | 74                      | 25.94          |
| 1308.00            | 28.69                   | Ave.       | 85                  | 2.0           | H                | -4.31                         | 24.38                                    | 54                      | 29.62          |
| 1308.00            | 56.92                   | PK         | 117                 | 2.4           | V                | -4.31                         | 52.61                                    | 74                      | 21.39          |
| 1308.00            | 28.90                   | Ave.       | 117                 | 2.4           | V                | -4.31                         | 24.59                                    | 54                      | 29.41          |
| 2206.59            | 62.12                   | PK         | 11                  | 1.8           | H                | -0.56                         | 61.56                                    | 74                      | 12.44          |
| 2206.59            | 33.95                   | Ave.       | 11                  | 1.8           | H                | -0.56                         | 33.39                                    | 54                      | 20.61          |
| 2206.59            | 62.56                   | PK         | 330                 | 1.9           | V                | -0.56                         | 62.00                                    | 74                      | 12.00          |
| 2206.59            | 31.63                   | Ave.       | 330                 | 1.9           | V                | -0.56                         | 31.07                                    | 54                      | 22.93          |

For POE:

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) |
|-----------------|------------------------------|---------------------|------------------|-----------------------------|--------------------------|----------------|-------------|
| 96.679250       | 25.74                        | 395.0               | H                | 76.0                        | -17.8                    | 43.50          | 17.76       |
| 200.011500      | 30.15                        | 109.0               | V                | 355.0                       | -13.8                    | 43.50          | 13.35       |
| 212.976375      | 31.35                        | 102.0               | V                | 329.0                       | -13.9                    | 43.50          | 12.15       |
| 250.014875      | 34.29                        | 170.0               | H                | 104.0                       | -14.1                    | 46.00          | 11.71       |
| 625.003750      | 35.71                        | 130.0               | V                | 269.0                       | -1.6                     | 46.00          | 10.29       |
| 749.980000      | 33.33                        | 123.0               | V                | 307.0                       | -0.4                     | 46.00          | 12.67       |

**Above 1 GHz**

| Frequency<br>(MHz) | Measurement             |            | Turntable<br>Degree | Rx Antenna    |                  | Corrected<br>Factor<br>(dB/m) | Corrected<br>Amplitude<br>(dB $\mu$ V/m) | FCC Part 15B            |                |
|--------------------|-------------------------|------------|---------------------|---------------|------------------|-------------------------------|------------------------------------------|-------------------------|----------------|
|                    | Reading<br>(dB $\mu$ V) | PK/QP/Ave. |                     | Height<br>(m) | Polar<br>(H / V) |                               |                                          | Limit<br>(dB $\mu$ V/m) | Margin<br>(dB) |
| 1133.90            | 47.30                   | PK         | 258                 | 1.5           | H                | -5.43                         | 41.87                                    | 74                      | 32.13          |
| 1133.90            | 30.22                   | Ave.       | 258                 | 1.5           | H                | -5.43                         | 24.79                                    | 54                      | 29.21          |
| 1133.90            | 49.53                   | PK         | 65                  | 1.8           | V                | -5.43                         | 44.10                                    | 74                      | 29.90          |
| 1133.90            | 33.30                   | Ave.       | 65                  | 1.8           | V                | -5.43                         | 27.87                                    | 54                      | 26.13          |
| 2200.05            | 53.57                   | PK         | 345                 | 1.1           | H                | -0.56                         | 53.01                                    | 74                      | 20.99          |
| 2200.05            | 33.22                   | Ave.       | 345                 | 1.1           | H                | -0.56                         | 32.66                                    | 54                      | 21.34          |
| 2200.05            | 56.91                   | PK         | 223                 | 2.4           | V                | -0.56                         | 56.35                                    | 74                      | 17.65          |
| 2200.05            | 34.15                   | Ave.       | 223                 | 2.4           | V                | -0.56                         | 33.59                                    | 54                      | 20.41          |

**Note:**

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

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