



# EMC TEST REPORT

**Applicant**      Xiaomi Communications Co., Ltd.

**FCC ID**          2AFZZN86G

**Product**        Mobile Phone

**Brand**           Redmi

**Model**          22120RN86G

**Report No.**     R2209A0817-E1

**Issue Date**     November 19, 2022

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC Code CFR47 Part15B (2021)/ ANSI C63.4-2014**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

*Liu Wei*

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### Summary of measurement results

| Number                                                                                                                                                                                                                                                                                | Test Case          | Clause in FCC Rules             | Conclusion |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------------------|------------|
| 1                                                                                                                                                                                                                                                                                     | Radiated Emission  | FCC Part15.109, ANSI C63.4-2014 | PASS       |
| 2                                                                                                                                                                                                                                                                                     | Conducted Emission | FCC Part15.107, ANSI C63.4-2014 | PASS       |
| Date of Testing: October 10, 2022 ~ October 21, 2022                                                                                                                                                                                                                                  |                    |                                 |            |
| Date of Sample Received: October 8, 2022                                                                                                                                                                                                                                              |                    |                                 |            |
| Note: All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. |                    |                                 |            |

**22120RN86G (Report No.: R2209A0817-E1) is a variant model of 2212ARNC4L (Report No.: R2209A0813-E1). Test values all duplicated from Original for variant. There is only verified Radiated Emission (Worst case), and did not worsen, so they were not recorded in the report. The detailed product change description please refers to the *Difference Declaration Letter*.**

# 1 Test Laboratory

## 1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA Technology (Shanghai) Co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

## 1.2 Test facility

### **FCC (Designation number: CN1179, Test Firm Registration Number: 446626)**

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

### **A2LA (Certificate Number: 3857.01)**

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform measurement.

## 1.3 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.  
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City: Shanghai  
Post code: 201201  
Country: P. R. China  
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E-mail: [fanguangchang@ta-shanghai.com](mailto:fanguangchang@ta-shanghai.com)

## 2 General Description of Equipment under Test

### 2.1 Applicant and Manufacturer Information

|                             |                                                                                               |
|-----------------------------|-----------------------------------------------------------------------------------------------|
| <b>Applicant</b>            | Xiaomi Communications Co., Ltd.                                                               |
| <b>Applicant address</b>    | #019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085 |
| <b>Manufacturer</b>         | Xiaomi Communications Co., Ltd.                                                               |
| <b>Manufacturer address</b> | #019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085 |

### 2.2 General information

| EUT Description        |                                    |                                                    |               |
|------------------------|------------------------------------|----------------------------------------------------|---------------|
| Device Type            | Portable Device                    |                                                    |               |
| Model                  | 22120RN86G                         |                                                    |               |
| IMEI                   | Original<br>(2212ARNC4L)           | IMEI 1: 861591060035587<br>IMEI 2: 861591060035595 |               |
|                        | Variant<br>(22120RN86G)            | IMEI 1: 863075060012968<br>IMEI 2: 863075060012976 |               |
| HW Version             | P1.1                               |                                                    |               |
| SW Version             | MIUI 13                            |                                                    |               |
| Connecting I/O Port(s) | Please refer to the User's Manual. |                                                    |               |
| Antenna Type           | PIFA Antenna                       |                                                    |               |
| Frequency              | Band                               | Tx (MHz)                                           | Rx (MHz)      |
|                        | GSM 850                            | 824 ~ 849                                          | 869 ~ 894     |
|                        | GSM 1900                           | 1850 ~ 1910                                        | 1930 ~ 1990   |
|                        | WCDMA Band V                       | 824 ~ 849                                          | 869 ~ 894     |
|                        | LTE Band 5                         | 824 ~ 849                                          | 869 ~ 894     |
|                        | LTE Band 7                         | 2500 ~ 2570                                        | 2620 ~ 2690   |
|                        | LTE Band 38                        | 2570 ~ 2620                                        | 2570 ~ 2620   |
|                        | LTE Band 41                        | 2496 ~ 2690                                        | 2496 ~ 2690   |
|                        | Bluetooth                          | 2400 ~ 2483.5                                      | 2400 ~ 2483.5 |
|                        | Wi-Fi 2.4G                         | 2400 ~ 2483.5                                      | 2400 ~ 2483.5 |
|                        | Wi-Fi 5G(U-NII-1)                  | 5150 ~ 5250                                        | 5150 ~ 5250   |
|                        | Wi-Fi 5G(U-NII-2A)                 | 5250 ~ 5350                                        | 5250 ~ 5350   |
|                        | Wi-Fi 5G(U-NII-2C)                 | 5470 ~ 5725                                        | 5470 ~ 5725   |
|                        | Wi-Fi 5G(U-NII-3)                  | 5725 ~ 5850                                        | 5725 ~ 5850   |



| Auxiliary test equipment                                                                                          |                                                                           |
|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| PC                                                                                                                | PC Manufacturer: Microsoft Corporation<br>Model: 1724<br>SN: 032324771953 |
| Note:<br>1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant. |                                                                           |



## 2.3 Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

### Test standards

**FCC Code CFR47 Part15B (2021)**

**ANSI C63.4-2014**

## 2.4 Test Mode

| Test Mode |                                              |
|-----------|----------------------------------------------|
| Mode 1    | Adapter +USB cable+ Front camera On          |
| Mode 2    | Adapter +USB cable+ Rear camera On           |
| Mode 3    | Adapter + USB cable +PLAY COLORBAR (1KHz)    |
| Mode 4    | Adapter + USB cable + FM(98MHz)+Earphone     |
| Mode 5    | Adapter + USB cable + Bluetooth WLAN Traffic |
| Mode 6    | USB Copy(PC with EUT) + USB cable            |
| Mode 7    | USB Copy(EUT with PC) + USB cable            |
| Mode 8    | USB Copy(PC card with SD) + USB cable        |
| Mode 9    | USB Copy(SD card with PC) + USB cable        |
| Mode 10   | Front Camera On                              |
| Mode 11   | Rear camera On                               |
| Mode 12   | Earphone + FM(98MHz)                         |

During the test, the preliminary test was performed in all modes, mode 6 is selected as the worst condition. The test data of the worst-case condition was recorded in this report.

### 3 Test Case Results

#### 3.1 Radiated Emission

##### Ambient condition

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 15°C~35°C   | 30%~60%           | 101.5kPa |

##### Methods of Measurement

The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The distance between EUT and receive antenna should be 3 meters. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier. During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum of radiated signal level.

The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing. During the test, the EUT is worked at maximum output power.

Set the spectrum analyzer in the following:

Below 1GHz:

RBW=100 kHz / VBW=300 kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK Detector: RBW=1MHz / VBW=3MHz/ Sweep=AUTO

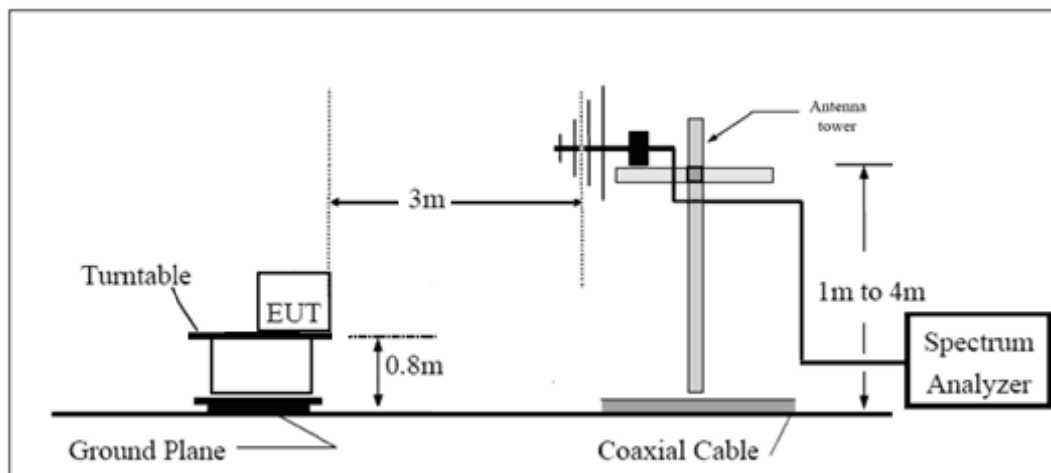
(b) AVERAGE Detector: RBW=1MHz / VBW=3MHz / Sweep=AUTO

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

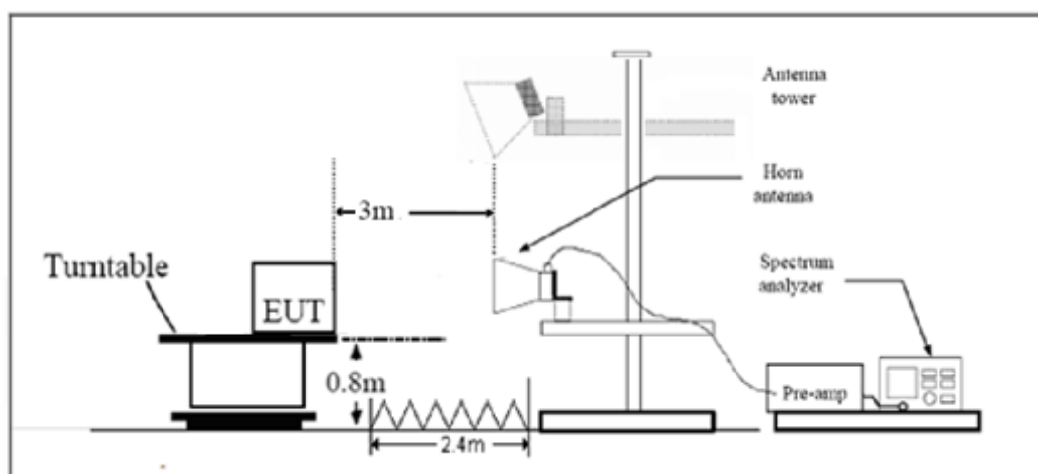
During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC;

## Test Setup

### Below 1GHz



### Above 1GHz



Note: Area side: 2.4mX3.6m

Antenna Tower meets ANSI C63.4 requirements for measurements above 1 GHz by keeping the antenna aimed at the EUT during the antenna's ascent/ descent along the antenna mast.

**Limits****Class B**

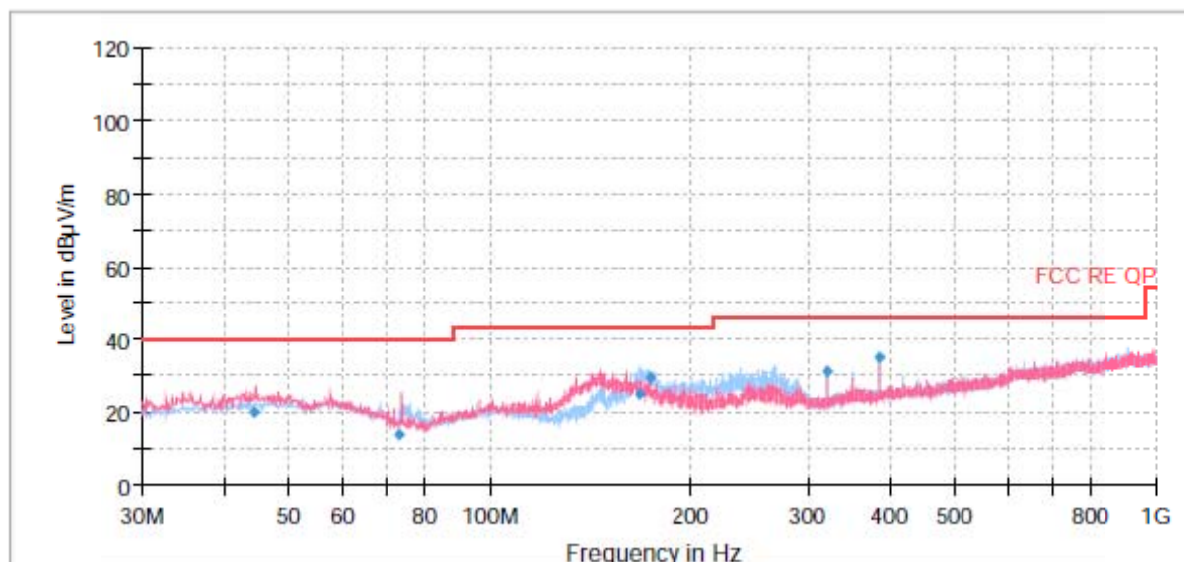
| Frequency<br>(MHz)                                                                 | Field Strength<br>(dB $\mu$ V/m) | Detector        |
|------------------------------------------------------------------------------------|----------------------------------|-----------------|
| 30 -88                                                                             | 40.0                             | Quasi-peak      |
| 88-216                                                                             | 43.5                             | Quasi-peak      |
| 216 – 960                                                                          | 46.0                             | Quasi-peak      |
| 960-1000                                                                           | 54.0                             | Quasi-peak      |
| 1000-5 <sup>th</sup> harmonic of the highest<br>frequency or 40GHz, which is lower | 54<br>74                         | Average<br>Peak |

## Test Results

Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier. The Emissions in the frequency band 18GHz – 40GHz is more than 20dB below the limit are not reported.

The following graphs display the maximum values of horizontal and vertical by software.

For above 1GHz, Blue trace uses the peak detection, Green trace uses the average detection.

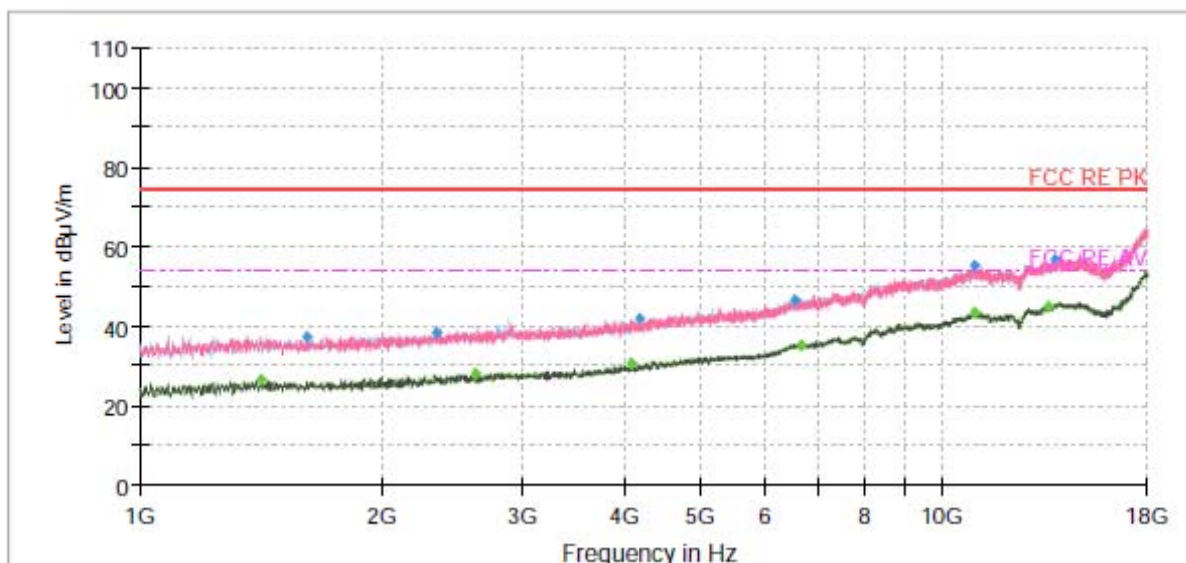


Radiated Emission from 30MHz to 1GHz

| Frequency (MHz) | Quasi-Peak (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Height (cm) | Polarization | Azimuth (deg) | Correct Factor (dB) |
|-----------------|---------------------|----------------|-------------|-------------|--------------|---------------|---------------------|
| 44.11           | 20.31               | 40.00          | 19.69       | 125.0       | V            | 16.00         | 15                  |
| 73.25           | 14.04               | 40.00          | 25.96       | 118.0       | V            | 22.00         | 10                  |
| 168.06          | 25.30               | 43.50          | 18.20       | 105.0       | H            | 258.00        | 11                  |
| 173.93          | 29.42               | 43.50          | 14.08       | 206.0       | H            | 266.00        | 11                  |
| 320.19          | 31.22               | 46.00          | 14.78       | 125.0       | V            | 350.00        | 16                  |
| 384.01          | 34.99               | 46.00          | 11.01       | 100.0       | H            | 354.00        | 18                  |

Remark: 1. Correction Factor = Antenna factor + Insertion loss(cable loss+amplifier gain)

2. Margin = Limit – Quasi-Peak



Radiated Emission from 1GHz to 18GHz

| Frequency (MHz) | MaxPeak (dBμV/m) | Average (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Meas. Time (ms) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-----------------|-------------|-----|---------------|--------------|
| 1417.16         | ---              | 26.58            | 54.00          | 27.42       | 500.00          | 200.0       | V   | 0.00          | -17          |
| 1614.30         | 37.23            | ---              | 74.00          | 36.77       | 500.00          | 100.0       | V   | 309.00        | -16          |
| 2339.52         | 38.31            | ---              | 74.00          | 35.69       | 500.00          | 200.0       | H   | 338.00        | -14          |
| 2615.17         | ---              | 27.92            | 54.00          | 26.08       | 500.00          | 200.0       | H   | 284.00        | -14          |
| 4095.91         | ---              | 30.49            | 54.00          | 23.51       | 500.00          | 100.0       | V   | 235.00        | -10          |
| 4194.36         | 41.83            | ---              | 74.00          | 32.17       | 500.00          | 100.0       | V   | 0.00          | -10          |
| 6568.07         | 46.53            | ---              | 74.00          | 27.47       | 500.00          | 100.0       | H   | 239.00        | -2           |
| 6663.95         | ---              | 35.31            | 54.00          | 18.69       | 500.00          | 200.0       | V   | 94.00         | -2           |
| 10927.74        | ---              | 43.61            | 54.00          | 10.39       | 500.00          | 200.0       | V   | 112.00        | 4            |
| 10966.19        | 55.41            | ---              | 74.00          | 18.59       | 500.00          | 200.0       | H   | 247.00        | 4            |
| 13547.58        | ---              | 45.26            | 54.00          | 8.74        | 500.00          | 100.0       | H   | 165.00        | 7            |
| 13748.68        | 57.00            | ---              | 74.00          | 17.00       | 500.00          | 100.0       | V   | 244.00        | 7            |

Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

2. Peak Margin = Limit –MAX Peak/ Average

## 3.2 Conducted Emission

### Ambient condition

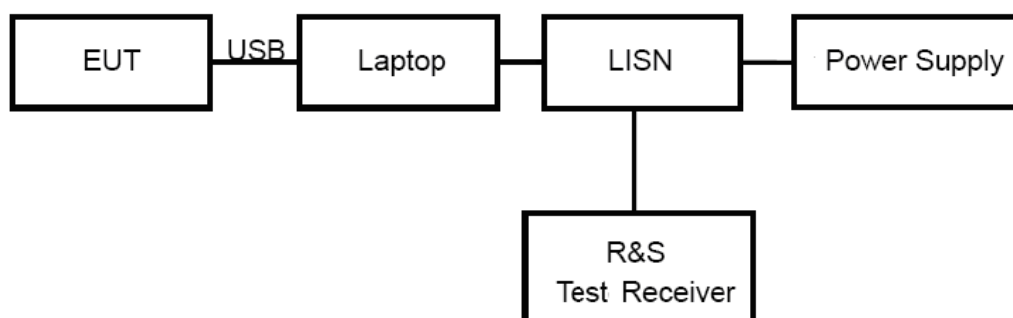
| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 15°C~35°C   | 30%~60%           | 101.5kPa |

### Methods of Measurement

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC;

### Test Setup



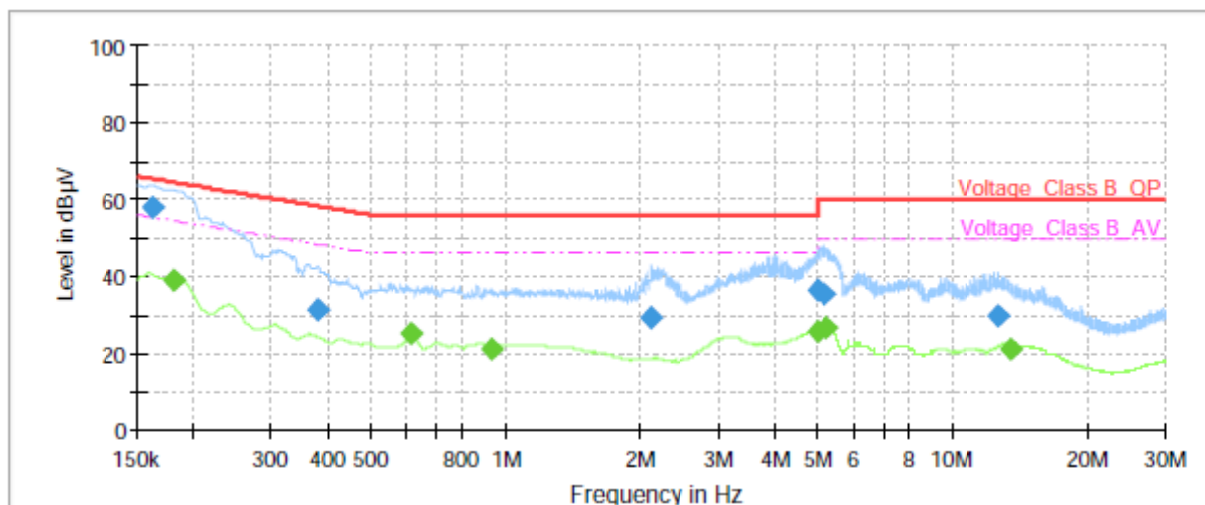
Note: Power Supply is AC Power source and it is used to change the voltage 120V/60Hz.

### Limits

| Frequency<br>(MHz)                                | Conducted Limits(dBμV) |            |
|---------------------------------------------------|------------------------|------------|
|                                                   | Quasi-peak             | Average    |
| 0.15 - 0.5                                        | 66 to 56 *             | 56 to 46 * |
| 0.5 - 5                                           | 56                     | 46         |
| 5 - 30                                            | 60                     | 50         |
| *: Decreases with the logarithm of the frequency. |                        |            |

## Test Results

Following plots, Blue trace uses the peak detection; Green trace uses the average detection.

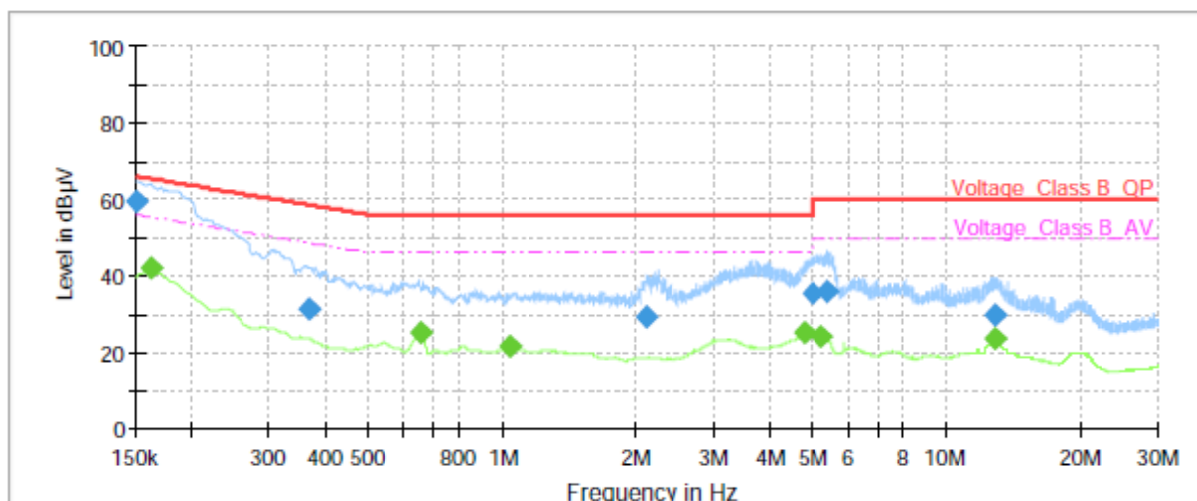


| Frequency (MHz) | QuasiPeak (dBμV) | Average (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.161250        | 58.07            | ---            | 65.40        | 7.33        | 1000.0          | 9.000           | N    | ON     | 20.8       |
| 0.181500        | ---              | 38.73          | 54.42        | 15.69       | 1000.0          | 9.000           | N    | ON     | 20.7       |
| 0.379500        | 31.10            | ---            | 58.29        | 27.19       | 1000.0          | 9.000           | N    | ON     | 20.5       |
| 0.615750        | ---              | 25.35          | 46.00        | 20.65       | 1000.0          | 9.000           | N    | ON     | 20.2       |
| 0.926250        | ---              | 21.27          | 46.00        | 24.73       | 1000.0          | 9.000           | N    | ON     | 20.0       |
| 2.109750        | 29.28            | ---            | 56.00        | 26.72       | 1000.0          | 9.000           | N    | ON     | 19.5       |
| 4.989750        | 36.54            | ---            | 56.00        | 19.46       | 1000.0          | 9.000           | N    | ON     | 19.5       |
| 4.996500        | ---              | 25.43          | 46.00        | 20.57       | 1000.0          | 9.000           | N    | ON     | 19.5       |
| 5.174250        | 35.41            | ---            | 60.00        | 24.59       | 1000.0          | 9.000           | N    | ON     | 19.5       |
| 5.205750        | ---              | 26.60          | 50.00        | 23.40       | 1000.0          | 9.000           | N    | ON     | 19.5       |
| 12.621750       | 29.66            | ---            | 60.00        | 30.34       | 1000.0          | 9.000           | N    | ON     | 19.7       |
| 13.456500       | ---              | 20.88          | 50.00        | 29.12       | 1000.0          | 9.000           | N    | ON     | 19.7       |

Remark: Correct factor=cable loss + LISN factor

L line

Conducted Emission from 150 KHz to 30 MHz



| Frequency (MHz) | QuasiPeak (dBμV) | Average (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.150000        | 59.43            | ---            | 66.00        | 6.57        | 1000.0          | 9.000           | L1   | ON     | 20.8       |
| 0.161250        | ---              | 42.18          | 55.40        | 13.22       | 1000.0          | 9.000           | L1   | ON     | 20.8       |
| 0.368250        | 31.28            | ---            | 58.54        | 27.26       | 1000.0          | 9.000           | L1   | ON     | 20.5       |
| 0.654000        | ---              | 25.14          | 46.00        | 20.86       | 1000.0          | 9.000           | L1   | ON     | 20.2       |
| 1.038750        | ---              | 21.30          | 46.00        | 24.70       | 1000.0          | 9.000           | L1   | ON     | 19.9       |
| 2.121000        | 29.14            | ---            | 56.00        | 26.86       | 1000.0          | 9.000           | L1   | ON     | 19.5       |
| 4.785000        | ---              | 24.98          | 46.00        | 21.02       | 1000.0          | 9.000           | L1   | ON     | 19.5       |
| 4.987500        | 35.36            | ---            | 56.00        | 20.64       | 1000.0          | 9.000           | L1   | ON     | 19.5       |
| 5.241750        | ---              | 24.15          | 50.00        | 25.85       | 1000.0          | 9.000           | L1   | ON     | 19.5       |
| 5.421750        | 35.95            | ---            | 60.00        | 24.05       | 1000.0          | 9.000           | L1   | ON     | 19.5       |
| 12.954750       | ---              | 23.41          | 50.00        | 26.59       | 1000.0          | 9.000           | L1   | ON     | 19.7       |
| 12.997500       | 29.91            | ---            | 60.00        | 30.09       | 1000.0          | 9.000           | L1   | ON     | 19.7       |

Remark: Correct factor=cable loss + LISN factor

N line

Conducted Emission from 150 KHz to 30 MHz

## 4 Uncertainty Measurement

| Case                              | Uncertainty | Factor k |
|-----------------------------------|-------------|----------|
| Radiated Emission 30MHz – 200MHz  | 4.17 dB     | 1.96     |
| Radiated Emission 200MHz – 1GHz   | 4.84 dB     | 1.96     |
| Radiated Emission 1GHz – 18GHz    | 4.35 dB     | 1.96     |
| Radiated Emission 18GHz – 26.5GHz | 5.90 dB     | 1.96     |
| Conducted Emission                | 2.57 dB     | 2        |



## 5 Main Test Instruments

| Name of Equipment        | Manufacturer | Type/Model        | Serial Number | Calibration Date | Expiration Time |
|--------------------------|--------------|-------------------|---------------|------------------|-----------------|
| Radiated Emission        |              |                   |               |                  |                 |
| EMI Test Receiver        | R&S          | ESR               | 102389        | 2022-05-25       | 2023-05-24      |
| Signal Analyzer          | R&S          | FSV40             | 100816        | 2021-12-12       | 2022-12-11      |
| TRILOG Broadband Antenna | SCHWARZBECK  | VULB 9163         | 1023          | 2020-05-05       | 2023-05-04      |
| Horn Antenna             | R&S          | HF907             | 102723        | 2020-08-11       | 2023-08-10      |
| Horn Antenna             | ETS-Lindgren | 3160-09           | 00102643      | 2021-10-10       | 2024-10-09      |
| Horn Antenna             | STEATITE     | QSH-SL-26-40-K-15 | 16779         | 2019-12-24       | 2022-12-23      |
| Software                 | R&S          | EMC32             | 9.26.01       | /                | /               |
| Conducted Emission       |              |                   |               |                  |                 |
| Artificial main network  | R&S          | ENV216            | 102191        | 2020-12-13       | 2022-12-12      |
| EMI Test Receiver        | R&S          | ESR               | 101667        | 2022-05-25       | 2023-05-24      |
| Software                 | R&S          | EMC32             | 10.35.10      | /                | /               |

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



## **ANNEX A: The EUT Appearance**

The EUT Appearance are submitted separately.



## **ANNEX B: Test Setup Photos**

The Test Setup Photos are submitted separately.



## **ANNEX C: Product Change Description**

The Product Change Description are submitted separately.