

Project No: TM-2409000206P  
Report No.: TMWK2409003199KR

FCC ID: 2AWUU60B04001  
IC: 26271-60B04001

Page: 1 / 35  
Rev.: 01

## FCC 47 CFR PART 15 SUBPART C & INDUSTRY CANADA RSS-210

### TEST REPORT

For

**Mullion Video Intercom with Reader**

**Model No.: TD33-HW**

**Trade Name: Verkada**

Issued to

**FCC: Verkada Inc**  
**405 E. 4th Ave. San Mateo California United States 94401**  
**IC:Verkada, Inc.**  
**405 E. 4th Ave. San Mateo CA 94401 United States Of America**  
**(Excluding The States Of Alaska)**

Issued by

**Compliance Certification Services Inc.**  
**Wugu Laboratory**  
**No.11, Wugong 6th Rd., Wugu Dist.,**  
**New Taipei City, Taiwan.**  
**Issued Date: December 4, 2024**

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



Project No: TM-2409000206P  
Report No.: TMWK2409003199KR

Page: 2 / 35  
Rev.: 01

## Revision History

| Rev. | Issue Date        | Revisions                        | Effect Page | Revised By |
|------|-------------------|----------------------------------|-------------|------------|
| 00   | November 11, 2024 | Initial Issue                    | ALL         | Peggy Tsai |
| 01   | December 4, 2024  | See the following Note Rev. (01) | P.5         | Peggy Tsai |

**Note:**

**Rev. (01)**

1. Modify antenna specification in section 2.

## TABLE OF CONTENTS

|                                                                        |            |
|------------------------------------------------------------------------|------------|
| <b>1. TEST RESULT CERTIFICATION.....</b>                               | <b>4</b>   |
| <b>2. EUT DESCRIPTION .....</b>                                        | <b>5</b>   |
| <b>3. TEST METHODOLOGY .....</b>                                       | <b>6</b>   |
| 3.1 EUT CONFIGURATION .....                                            | 6          |
| 3.2 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS.....                | 6          |
| 3.3 RSS GEN SECTION 8.10 RESTRICTED BANDS OF OPERATIONS .....          | 7          |
| 3.4 DESCRIPTION OF TEST MODES .....                                    | 8          |
| <b>4. TEST SUMMARY.....</b>                                            | <b>9</b>   |
| <b>5. INSTRUMENT CALIBRATION.....</b>                                  | <b>10</b>  |
| 5.1 MEASURING INSTRUMENT CALIBRATION .....                             | 10         |
| 5.2 MEASUREMENT EQUIPMENT USED .....                                   | 10         |
| 5.3 MEASUREMENT UNCERTAINTY .....                                      | 12         |
| 5.4 FACILITIES AND TEST LOCATION .....                                 | 12         |
| <b>6. SETUP OF EQUIPMENT UNDER TEST .....</b>                          | <b>13</b>  |
| 6.1 SUPPORT EQUIPMENT .....                                            | 13         |
| 6.2 SETUP CONFIGURATION OF EUT .....                                   | 14         |
| 6.3 TEST PROGRAM.....                                                  | 14         |
| <b>7. FCC PART 15.225 REQUIREMENTS &amp; RSS-210 REQUIREMENTS.....</b> | <b>15</b>  |
| 7.1 OCCUPIED BANDWIDTH(99%) AND 20 DB BANDWIDTH.....                   | 15         |
| 7.2 FUNDAMENTAL AND RADIATED EMISSIONS .....                           | 17         |
| 7.3 FREQUENCY STABILITY .....                                          | 27         |
| 7.4 AC POWERLINE CONDUCTED EMISSIONS .....                             | 31         |
| <b>APPENDIX A PHOTOGRAPHS OF TEST SETUP .....</b>                      | <b>A-1</b> |



Project No: TM-2409000206P  
Report No.: TMWK2409003199KR

Page: 4 / 35  
Rev.: 01

## 1. TEST RESULT CERTIFICATION

**Applicant:** FCC: Verkada Inc  
405 E. 4th Ave. San Mateo California United States 94401  
IC: Verkada, Inc.  
405 E. 4th Ave. San Mateo CA 94401 United States Of America  
(Excluding The States Of Alaska)

**Manufacturer:** CHICONY ELECTRONICS ( THAILAND) CO., LTD  
82 MOO 4 T. THAKHAM A. BANGPAKONG,  
CHACHOENGSAO, THAILAND 24130

**Equipment Under Test:** Mullion Video Intercom with Reader

**Trade Name:** Verkada

**Model No.:** TD33-HW

**Date of Test:** September 23 ~ October 4, 2024

| APPLICABLE STANDARDS                                                                                                                                   |             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| STANDARD                                                                                                                                               | TEST RESULT |
| FCC 47 CFR Part 15 Subpart C &<br>RSS-210 Issue 11 and RSS-GEN Issue 5                                                                                 | Compliance  |
| Statements of Conformity                                                                                                                               |             |
| Determination of compliance is based on the results of the compliance measurement,<br>not taking into account measurement instrumentation uncertainty. |             |

### We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.225.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

---

Dally Hong  
Sr. Engineer

## 2. EUT DESCRIPTION

|                              |                                                                                                               |
|------------------------------|---------------------------------------------------------------------------------------------------------------|
| <b>Product</b>               | Mullion Video Intercom with Reader                                                                            |
| <b>Trade</b>                 | Verkada                                                                                                       |
| <b>Model No.</b>             | TD33-HW                                                                                                       |
| <b>Model Discrepancy</b>     | N/A                                                                                                           |
| <b>Received Date</b>         | September 12, 2024                                                                                            |
| <b>Power Supply</b>          | Power from Poe Adapter.<br>ZyXEL / PoE12-60W<br>I/P: 100-240VAC, 2.0A, 50-60Hz<br>O/P: 56.0VDC, 1.161A, 65.1W |
| <b>Frequency Range</b>       | 13.56MHz                                                                                                      |
| <b>Modulation Technique</b>  | ASK                                                                                                           |
| <b>Number of Channels</b>    | 1 Channel                                                                                                     |
| <b>Antenna Specification</b> | Type: Loop Antenna<br>SPEED / F-0W-51-6006-006-00                                                             |
| <b>PMN</b>                   | TD33-HW Mullion Video Intercom Reader                                                                         |
| <b>EUT Serial #</b>          | YDAK-KEDE-TYDL                                                                                                |
| <b>HW Version</b>            | 60-B04001-A                                                                                                   |
| <b>FW Version</b>            | 5.1.4                                                                                                         |

**Remark:**

1. For more details, refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
3. The manufacturer stated that the PoE adapter will provide corresponding current according to the product.

### 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC CFR 47 Part 15.207, 15.209, 15.215, 15.225.

The tests documented in this report were performed in accordance with IC RSS-210, IC RSS-Gen, and ANSI C63.10: 2013

#### 3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### 3.2 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz                        | MHz                 | MHz             | GHz              |
|----------------------------|---------------------|-----------------|------------------|
| 0.090 - 0.110              | 16.42 - 16.423      | 399.9 - 410     | 4.5 - 5.15       |
| <sup>1</sup> 0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614       | 5.35 - 5.46      |
| 2.1735 - 2.1905            | 16.80425 - 16.80475 | 960 - 1240      | 7.25 - 7.75      |
| 4.125 - 4.128              | 25.5 - 25.67        | 1300 - 1427     | 8.025 - 8.5      |
| 4.17725 - 4.17775          | 37.5 - 38.25        | 1435 - 1626.5   | 9.0 - 9.2        |
| 4.20725 - 4.20775          | 73 - 74.6           | 1645.5 - 1646.5 | 9.3 - 9.5        |
| 6.215 - 6.218              | 74.8 - 75.2         | 1660 - 1710     | 10.6 - 12.7      |
| 6.26775 - 6.26825          | 108 - 121.94        | 1718.8 - 1722.2 | 13.25 - 13.4     |
| 6.31175 - 6.31225          | 123 - 138           | 2200 - 2300     | 14.47 - 14.5     |
| 8.291 - 8.294              | 149.9 - 150.05      | 2310 - 2390     | 15.35 - 16.2     |
| 8.362 - 8.366              | 156.52475 -         | 2483.5 - 2500   | 17.7 - 21.4      |
| 8.37625 - 8.38675          | 156.52525           | 2655 - 2900     | 22.01 - 23.12    |
| 8.41425 - 8.41475          | 156.7 - 156.9       | 3260 - 3267     | 23.6 - 24.0      |
| 12.29 - 12.293             | 162.0125 - 167.17   | 3332 - 3339     | 31.2 - 31.8      |
| 12.51975 - 12.52025        | 167.72 - 173.2      | 3345.8 - 3358   | 36.43 - 36.5     |
| 12.57675 - 12.57725        | 240 - 285           | 3600 - 4400     | ( <sup>2</sup> ) |
| 13.36 - 13.41              | 322 - 335.4         |                 |                  |

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

### 3.3 RSS GEN SECTION 8.10 RESTRICTED BANDS OF OPERATIONS

Restricted frequency bands, identified in table 7, are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following conditions related to the restricted frequency bands apply:

- (a) The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7 except for apparatus compliant with RSS-287, Emergency Position Indicating Radio Beacons (EPIRB), Emergency Locator Transmitters (ELT), Personal Locator Beacons (PLB), and Maritime Survivor Locator Devices (MSLD).
- (b) Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.
- (c) Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in table 5 and table 6.

| Table 7 – Restricted frequency bands <sup>Note 1</sup> |                     |                 |               |
|--------------------------------------------------------|---------------------|-----------------|---------------|
| MHz                                                    | MHz                 | MHz             | GHz           |
| 0.090 - 0.110                                          | 16.42 - 16.423      | 608 - 614       | 9.0 - 9.2     |
| 0.495 - 0.505                                          | 16.69475 - 16.69525 | 960 - 1427      | 9.3 - 9.5     |
| 2.1735 - 2.1905                                        | 16.80425 - 16.80475 | 1435 - 1626.5   | 10.6 - 12.7   |
| 3.020 - 3.026                                          | 25.5 - 25.67        | 1645.5 - 1646.5 | 13.25 - 13.4  |
| 4.125 - 4.128                                          | 37.5 - 38.25        | 1660 - 1710     | 14.47 - 14.5  |
| 4.17725 - 4.17775                                      | 73 - 74.6           | 1718.8 - 1722.2 | 15.35 - 16.2  |
| 4.20725 - 4.20775                                      | 74.8 - 75.2         | 2200 - 2300     | 17.7 - 21.4   |
| 5.677 - 5.683                                          | 108 - 138           | 2310 - 2390     | 22.01 - 23.12 |
| 6.215 - 6.218                                          | 149.9 - 150.05      | 2483.5 - 2500   | 23.6 - 24.0   |
| 6.26775 - 6.26825                                      | 156.52475 -         | 2655 - 2900     | 31.2 - 31.8   |
| 6.31175 - 6.31225                                      | 156.52525           | 3260 - 3267     | 36.43 - 36.5  |
| 8.291 - 8.294                                          | 156.7 - 156.9       | 3332 - 3339     | Above 38.6    |
| 8.362 - 8.366                                          | 162.0125 - 167.17   | 3345.8 - 3358   |               |
| 8.37625 - 8.38675                                      | 167.72 - 173.2      | 3500 - 4400     |               |
| 8.41425 - 8.41475                                      | 240 - 285           | 4500 - 5150     |               |
| 12.29 - 12.293                                         | 322 - 335.4         | 5350 - 5460     |               |
| 12.51975 - 12.52025                                    | 399.9 - 410         | 7250 - 7750     |               |
| 12.57675 - 12.57725                                    |                     | 8025 - 8500     |               |
| 13.36 - 13.41                                          |                     |                 |               |

**Note 1:** Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

### 3.4 DESCRIPTION OF TEST MODES

The EUT had been tested under engineering test mode condition and the EUT staying in continuous transmitting mode.

All modes and data rates were investigated and it was determined that ISO 14443A/B and ISO 18092 Type y, 106/212/424/848 kbps.

All data rates were investigated and it was determined that 106 Kbps was considered worst-case. Therefore, all testing was performed in 106 Kbps mode.

#### 3.4.1 The worst mode of measurement

| AC Power Line Conduction Emission |                                                                                                                                            |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Test Condition                    | AC Power line conduction emission for line and neutral                                                                                     |
| Power supply Mode                 | Mode 1: EUT Power by POE Adapter                                                                                                           |
| Worst Mode                        | <input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4 |

| Radiated Emission Measurement Below 1G |                                                                                                                                            |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Test Condition                         | Radiated Emission Below 1G                                                                                                                 |
| Power supply Mode                      | Mode 1: EUT power by PoE Adapter                                                                                                           |
| Worst Mode                             | <input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4 |

#### Remark:

1. The worst mode was record in this test report.
2. AC power line conducted emission were performed the EUT transmit at the highest output power channel as worse case.
3. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(Z-Plane) were recorded in this report

## 4. TEST SUMMARY

| FCC Standard Sec.                    | IC Standard Sec.                   | Chapter | Test Item                                   | Result |
|--------------------------------------|------------------------------------|---------|---------------------------------------------|--------|
| 15.203                               | RSS-GEN Sec. 6.8                   | 2       | Antenna Requirement                         | Pass   |
| 15.215                               | RSS-GEN Sec 6.7                    | 7.1     | Occupied Bandwidth (99%) and 20dB Bandwidth | Pass   |
| 15.225 (a,b,c,d)<br>15.209<br>15.205 | Sec B.6,<br>RSS-GEN Sec 8.9 / 8.10 | 7.2     | Radiated Emissions                          | Pass   |
| 15.255 (e)                           | Sec B.6, b                         | 7.3     | Frequency Stability                         | Pass   |
| 15.207                               | RSS-GEN Sec. 8.8                   | 7.4     | AC Power-line Conducted Emission            | Pass   |

## 5. INSTRUMENT CALIBRATION

### 5.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

### 5.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

| Conducted FCC/IC/NCC                  |                         |           |               |                  |                 |
|---------------------------------------|-------------------------|-----------|---------------|------------------|-----------------|
| Name of Equipment                     | Manufacturer            | Model     | Serial Number | Calibration Date | Calibration Due |
| Loop Probe                            | LANGER EMV-TECHNIK      | RF-R 50-1 | 02-2644       | 2024-01-02       | 2025-01-01      |
| Constant Temperature Humidity Chamber | TERCHY                  | MHG-150LF | 930619        | 2023-10-26       | 2024-10-25      |
| EXA Signal Analyzer                   | Keysight                | N9010B    | MY55460167    | 2024-01-03       | 2025-01-02      |
| DC Block                              | Marvelous Microwave Inc | MVE6411   | MVE-001       | 2024-08-08       | 2025-08-07      |
| Software                              | N/A                     |           |               |                  |                 |

| 966A Radiated Below 30MHz |                |              |                    |                  |                 |
|---------------------------|----------------|--------------|--------------------|------------------|-----------------|
| Name of Equipment         | Manufacturer   | Model        | Serial Number      | Calibration Date | Calibration Due |
| Signal Analyzer           | KEYSIGHT       | N9010A       | MY52220817         | 2024-03-15       | 2025-03-14      |
| Active Loop Antenna       | SCHWARZBECK    | FMZB 1513-60 | 1513-60-028        | 2023-12-13       | 2024-12-12      |
| Thermo-Hygro Meter        | WISEWIND       | 1206         | D07                | 2023-12-07       | 2024-12-06      |
| Bi-Log Antenna            | Sunol Sciences | JB3          | A030105            | 2024-07-12       | 2025-07-11      |
| Preamplifier              | EMEC           | EM330        | 060609             | 2024-02-21       | 2025-02-20      |
| Cable                     | Huber+Suhner   | 104PEA       | 20995+21000+182330 | 2024-02-21       | 2025-02-20      |
| Turn Table                | CCS            | CC-T-1F      | N/A                | N.C.R            | N.C.R           |
| Controller                | CCS            | CC-C-1F      | N/A                | N.C.R            | N.C.R           |
| Antenna Tower             | CCS            | CC-A-1F      | N/A                | N.C.R            | N.C.R           |
| Software                  | e3 V9-210616c  |              |                    |                  |                 |

#### Remark:

- Each piece of equipment is scheduled for calibration once a year.
- N.C.R. = No Calibration Request.



Project No: TM-2409000206P  
Report No.: TMWK2409003199KR

Page: 11 / 35  
Rev.: 01

| AC Mains Conduction |              |         |               |                  |                 |
|---------------------|--------------|---------|---------------|------------------|-----------------|
| Name of Equipment   | Manufacturer | Model   | Serial Number | Calibration Date | Calibration Due |
| EMI Test Receiver   | R&S          | ESCI    | 100064        | 2024-06-14       | 2025-06-13      |
| LISN                | TESEQ        | LN2-16N | 22012         | 2024-02-29       | 2025-02-27      |
| Cable               | Woken        | SFL402  | 185A          | 2024-07-08       | 2025-07-07      |
| Software            | e3 V6-110812 |         |               |                  |                 |

**Remark:**

1. Each piece of equipment is scheduled for calibration once a year.
2. N.C.R. = No Calibration Request.

### 5.3 MEASUREMENT UNCERTAINTY

| PARAMETER                       | UNCERTAINTY    |
|---------------------------------|----------------|
| AC Powerline Conducted Emission | $\pm 2.21$ dB  |
| Channel Bandwidth               | $\pm 2.79$ dB  |
| Frequency Stability             | $\pm 2.74$ dB  |
| Radiated Emission_9kHz-30MHz    | $\pm 3.492$ dB |
| Radiated Emission_30MHz-200MHz  | $\pm 3.683$ dB |
| Radiated Emission_200MHz-1GHz   | $\pm 3.966$ dB |

**Remark:** This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

### 5.4 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan.  
CAB identifier: TW1309

| Test site          | Test Engineer     | Remark |
|--------------------|-------------------|--------|
| AC Conduction Room | Ben Yang          | -      |
| Radiation          | Ray Li 、Tony Chao | -      |
| RF Conducted       | Jerry Chang       | -      |

**Remark:** The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC public Access Link (PAL) database, FCC Registration No. :444940, the FCC Designation No.:TW1309

## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SUPPORT EQUIPMENT

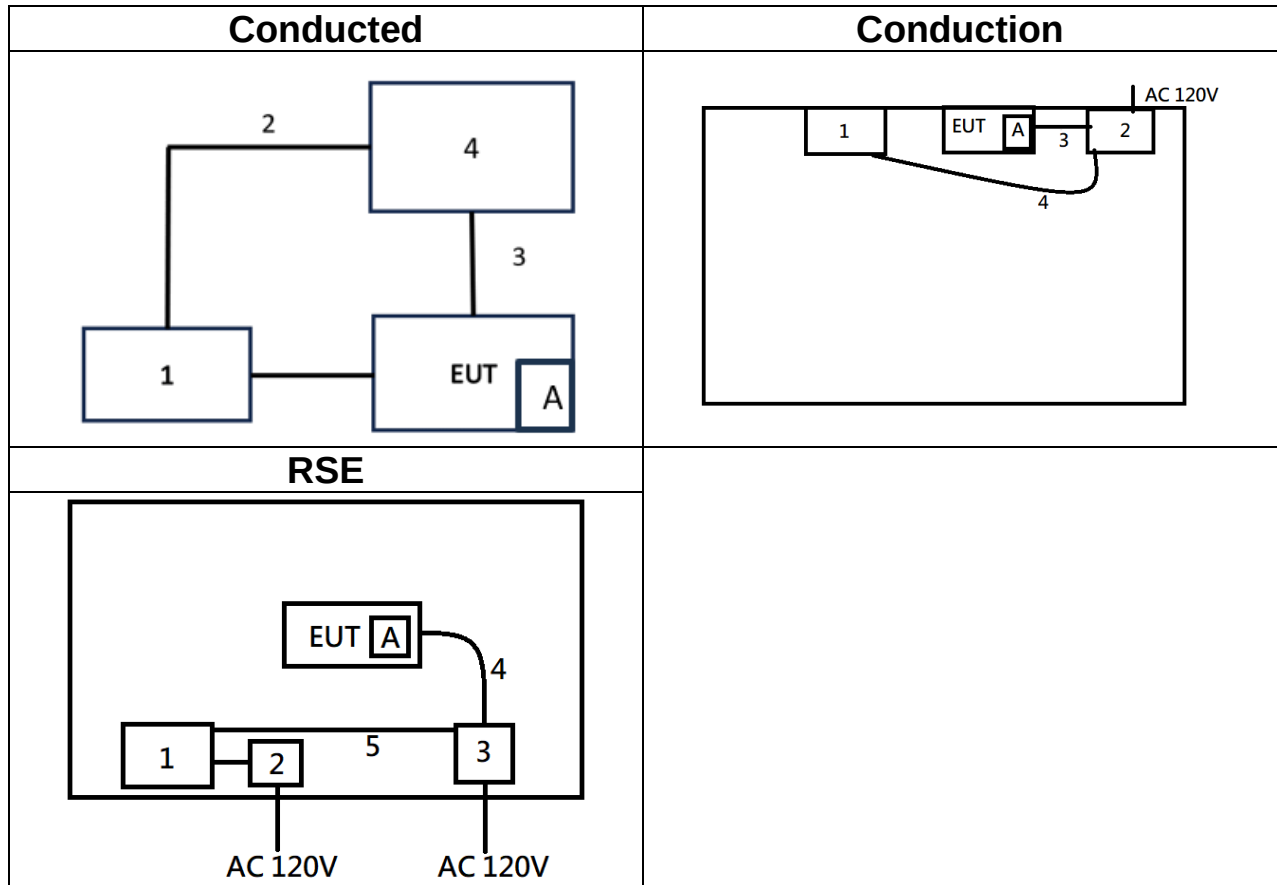
| EUT Accessories Equipment |           |       |       |            |        |    |
|---------------------------|-----------|-------|-------|------------|--------|----|
| No.                       | Equipment | Brand | Model | Series No. | FCC ID | IC |
|                           | N/A       |       |       |            |        |    |

| Support Equipment (Conducted) |             |            |           |            |        |
|-------------------------------|-------------|------------|-----------|------------|--------|
| No.                           | Equipment   | Brand      | Model     | Series No. | FCC ID |
| 1                             | NB(B)       | Lenovo     | X260      | N/A        | N/A    |
| 2                             | Lan Cable   | RASTO REC4 | R-PCC004  | N/A        | N/A    |
| 3                             | Lan Cable   | RASTO REC4 | R-PCC004  | N/A        | N/A    |
| 4                             | POE Adapter | ZYXEL      | PoE12-60W | N/A        | N/A    |
| A                             | Card        | N/A        | N/A       | N/A        | N/A    |

| Support Equipment (RSE) |                |        |               |               |        |
|-------------------------|----------------|--------|---------------|---------------|--------|
| No.                     | Equipment      | Brand  | Model         | Series No.    | FCC ID |
| 1                       | NB(D)          | Lenovo | ThinkPad X260 | N/A           | N/A    |
| 2                       | Adapter        | Lenovo | ADLX45DLC3A   | N/A           | N/A    |
| 3                       | PoE Injector   | ZYXEL  | PoE12-60W     | S212L41486914 | N/A    |
| 4                       | Ethernet Cable | Rasto  | R-PCC004      | N/A           | N/A    |
| 5                       | Ethernet Cable | Atake  | AC6-FL10      | N/A           | N/A    |
| A                       | Card           | N/A    | N/A           | N/A           | N/A    |

| Support Equipment (Conduction) |                |            |               |               |        |
|--------------------------------|----------------|------------|---------------|---------------|--------|
| No.                            | Equipment      | Brand      | Model         | Series No.    | FCC ID |
| 1                              | NB(D)          | Lenovo     | ThinkPad X260 | N/A           | N/A    |
| 2                              | PoE Injector   | Zyxel      | PoE12-60W     | S212L41486914 | N/A    |
| 3                              | Ethernet Cable | RASTO REC4 | R-PCC004      | N/A           | N/A    |
| 4                              | Ethernet Cable | RASTO REC4 | R-PCC004      | N/A           | N/A    |
| A                              | Card           | N/A        | N/A           | N/A           | N/A    |

## 6.2 SETUP CONFIGURATION OF EUT



## 6.3 TEST PROGRAM

This EUT uses "Tera term v4.73" software and setup command to set the frequency, modulation, and power to allow the sample to continuously transmit.

## **7. FCC PART 15.225 REQUIREMENTS & RSS-210 REQUIREMENTS**

### **7.1 OCCUPIED BANDWIDTH(99%) AND 20 dB BANDWIDTH TEST CONFIGURATION**

Refer to section 6.2.

### **TEST PROCEDURE**

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW & VBW (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth (VBW) shall not be smaller than three times the RBW value.
4. Record the max. reading.

### **TEST RESULTS**

Compliance

**Temperature:** 20.9°C

**Test Date:** September 23, 2024

**Humidity:** 55% RH

**Tested by:** Jerry Chang

| Test Condition | Frequency(MHz) | Occupied Bandwidth<br>99% (kHz) | 20 dB Bandwidth<br>(kHz) |
|----------------|----------------|---------------------------------|--------------------------|
| NFC            | 13.56          | 2.485                           | 2.707                    |

## Note

Because the measured signal adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice ~ three the RBW.

## Test Plot



## 7.2 FUNDAMENTAL AND RADIATED EMISSIONS

### LIMIT

According to §15.225

- (a) The field strength of any emissions within the band 13.553 – 13.567 MHz shall not exceed 15,848 microvolts / meter at 30 meters.
- (b) Within the bands 13.410 – 13.553 MHz and 13.567 -13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts / meter at 30 meters.
- (c) Within the bands 13.110 – 13.410 MHz and 13.710 – 14.010 MHz the field strength of any emissions shall not exceed 106 microvolts / meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110 – 14.010 MHz and shall not exceed the general radiated emission limits in §15.209.

According to §15.225, except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (μV/m at meter) | Measurement Distance (meter) |
|-----------------|--------------------------------|------------------------------|
| 0.009 – 0.490   | 2400 / F (kHz)                 | 300                          |
| 0.490 – 1.705   | 24000 / F (kHz)                | 30                           |
| 1.705 – 30.0    | 30                             | 30                           |
| 30 - 88         | 100**                          | 3                            |
| 88-216          | 150**                          | 3                            |
| 216-960         | 200**                          | 3                            |
| Above 960       | 500                            | 3                            |

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

According to RSS 210 §B.6

The field strength of any emission shall not exceed the following limits:

- (a) 15.848 mV/m (84 dBµV/m) at 30 m, within the band 13.553-13.567 MHz;
- (b) 334 µV/m (50.5 dBµV/m) at 30 m, within the bands 13.410-13.553 MHz and 13.567-13.710 MHz;
- (c) 106 µV/m (40.5 dBµV/m) at 30 m, within the bands 13.110-13.410 MHz and 13.710-14.010 MHz; and
- (d) RSS-Gen general field strength limits for frequencies outside the band 13.110-14.010 MHz.

#### **Below 30 MHz**

| Frequency                       | Magnetic field strength<br>(H-Field) (µA/m) | Measurement<br>Distance<br>(metres) |
|---------------------------------|---------------------------------------------|-------------------------------------|
| 9-490 kHz <small>Note 1</small> | 6.37/F (F in kHz)                           | 300                                 |
| 490-1,705 kHz                   | 63.7/F (F in kHz)                           | 30                                  |
| 1.705-30 MHz                    | 0.08                                        | 30                                  |

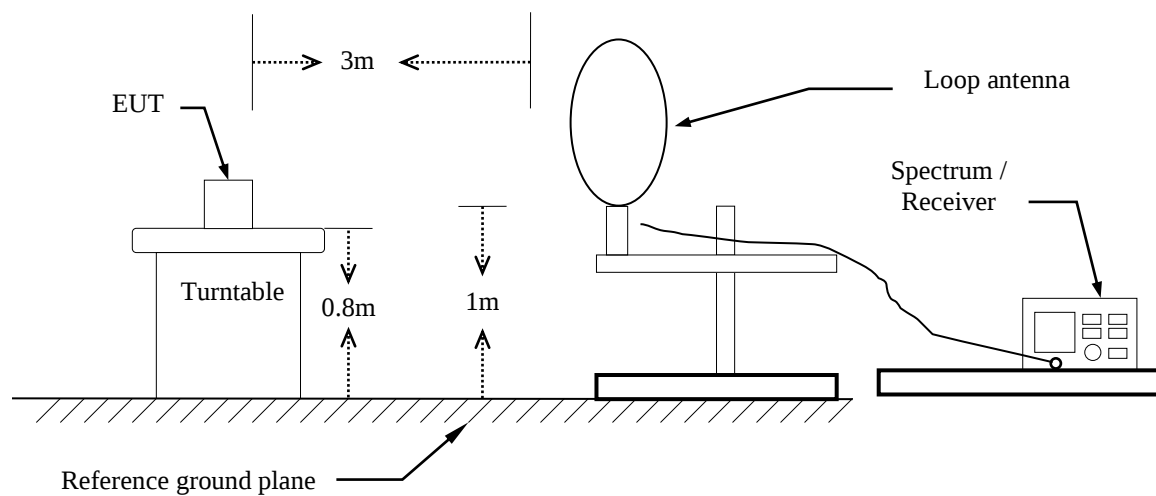
Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

#### **Above 30 MHz**

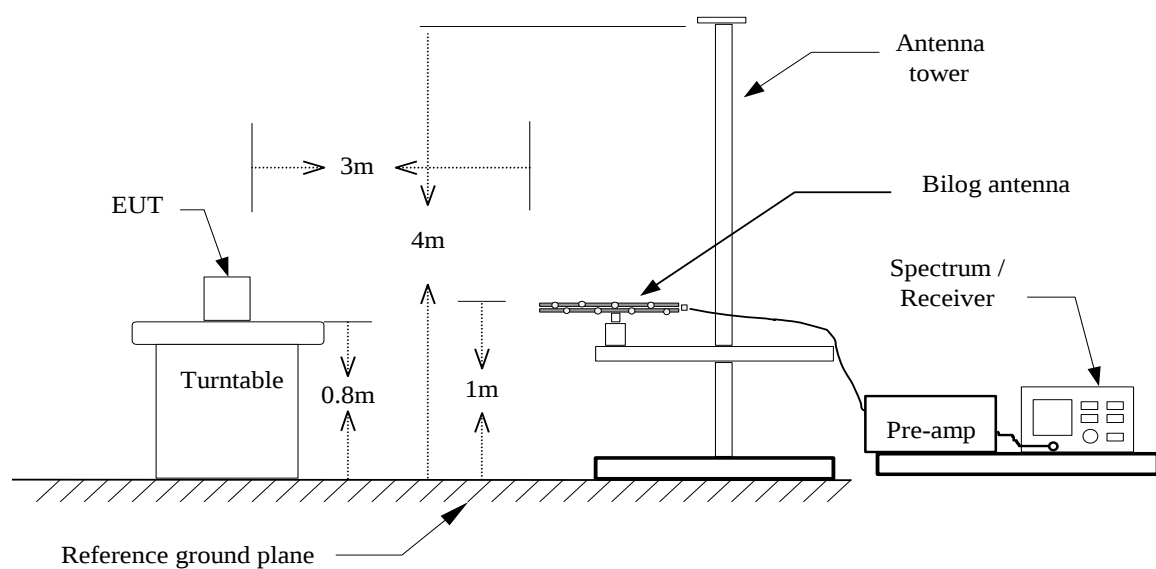
| Frequency | Field strength<br>(µV/m at 3 m) |
|-----------|---------------------------------|
| 30-88     | 100                             |
| 88-216    | 150                             |
| 216-960   | 200                             |
| Above 960 | 500                             |

## Test Configuration

### 9kHz ~ 30MHz



### 30MHz ~ 1GHz



## **TEST PROCEDURE**

### **For 9kHz ~ 30MHz**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, The lower edge of the loop shall be 1 m above the ground then to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Set the spectrum analyzer in the following setting as:  
9KHz-490KHz : RBW=200Hz / VBW=1kHz / Sweep=AUTO  
490KHz-30MHz : RBW=10kHz / VBW=30kHz / Sweep=AUTO
6. Repeat above procedures until the measurements for all frequencies are complete.

### **For 30MHz ~ 1GHz**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:  
RBW=100kHz / VBW=300kHz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

### **Remark :**

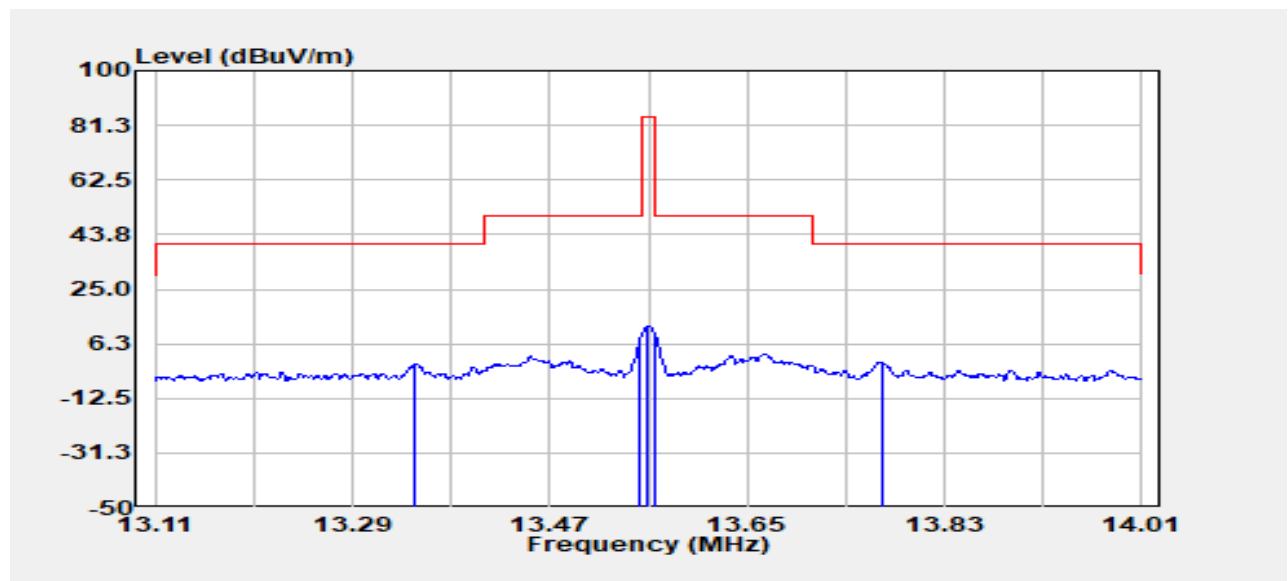
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Project No: TM-2409000206P  
Report No.: TMWK2409003199KR

Page: 21 / 35  
Rev.: 01

Project No :TM-2409000206P  
Operation Band :NFC  
Frequency :13.56 MHz  
Operation Mode :Main  
EUT Pol :H  
Setting :default

Test Date :2024-09-27  
Temp./Humi. :24.6/57  
Antenna Pol. :Horizontal  
Engineer :Ray Li  
Test Chamber : 966A



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Read Level<br>@3m<br>dBμV | Factor<br>@3m<br>dB | Actual<br>FS<br>@3m<br>dBμV/m | Factor<br>@30m&300m<br>dB | Actual<br>FS<br>@30m<br>dBμV/m | Limit<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|---------------------------------------|---------------------|-------------------------------|---------------------------|--------------------------------|-----------------|--------------|
| 13.35        | Peak                         | 17.19                                 | 21.98               | 21.98                         | -40.00                    | -0.83                          | 40.51           | -41.34       |
| 13.55        | Peak                         | 25.87                                 | 22.00               | 22.00                         | -40.00                    | 7.88                           | 50.47           | -42.59       |
| 13.56        | Peak                         | 30.43                                 | 22.00               | 22.00                         | -40.00                    | 12.44                          | 84.00           | -71.56       |
| 13.57        | Peak                         | 27.29                                 | 22.00               | 22.00                         | -40.00                    | 9.30                           | 50.47           | -41.17       |
| 13.77        | Peak                         | 17.98                                 | 22.03               | 22.03                         | -40.00                    | 0.01                           | 40.51           | -40.49       |

**Remark:**

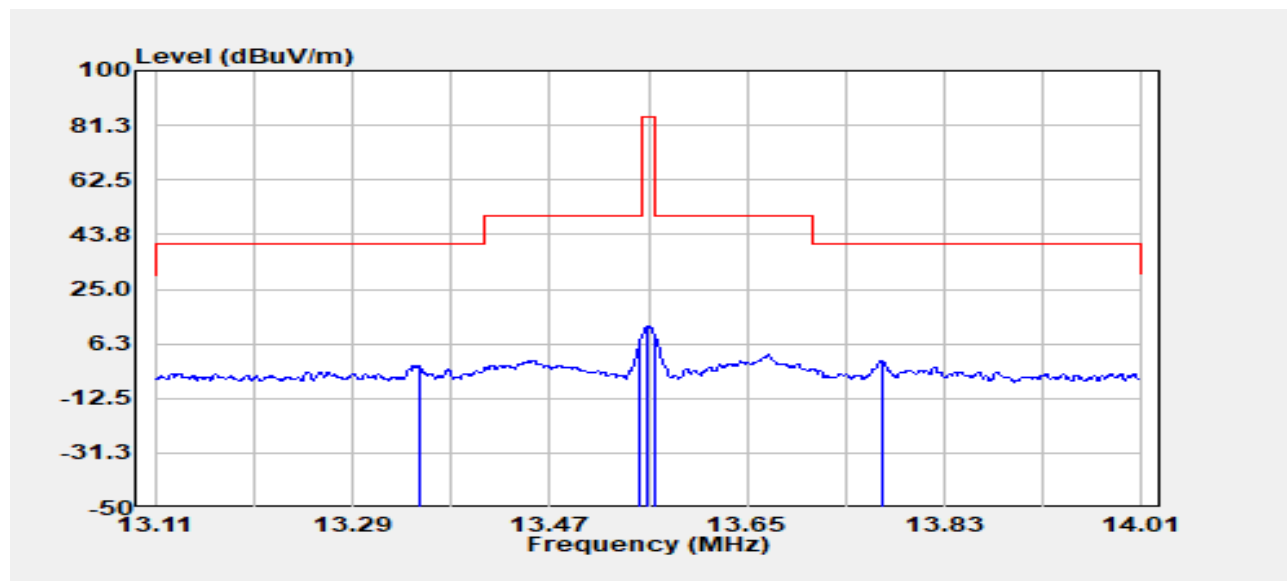
1. Radiated emissions measured were made with an instrument using peak/quasi-peak/average detector mode.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Margin (dB) = Result (dBuV/m) – Limit (dBuV/m).
4. Result=Read level+Factor@3m-Distance factor
5. Distance factor=40log(30m/3m)
6. Factor=antenna factor+cable loss

Project No: TM-2409000206P  
Report No.: TMWK2409003199KR

Page: 22 / 35  
Rev.: 01

Project No :TM-2409000206P  
Operation Band :NFC  
Frequency :13.56 MHz  
Operation Mode :Main  
EUT Pol :H  
Setting :default

Test Date :2024-09-27  
Temp./Humi. :24.6/57  
Antenna Pol. :Vertical  
Engineer :Ray Li  
Test Chamber : 966A



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Read Level<br>@3m<br>dBμV | Factor<br>@3m<br>dB | Actual<br>FS<br>@3m<br>dBμV/m | Factor<br>@30m&300m<br>dB | Actual<br>FS<br>@30m<br>dBμV/m | Limit<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|---------------------------------------|---------------------|-------------------------------|---------------------------|--------------------------------|-----------------|--------------|
| 13.35        | Peak                         | 16.73                                 | 21.98               | 38.71                         | -40.00                    | -1.29                          | 40.51           | -41.80       |
| 13.55        | Peak                         | 25.03                                 | 22.00               | 47.03                         | -40.00                    | 7.03                           | 50.47           | -43.44       |
| 13.56        | Peak                         | 30.12                                 | 22.00               | 52.13                         | -40.00                    | 12.13                          | 84.00           | -71.87       |
| 13.57        | Peak                         | 26.44                                 | 22.00               | 48.44                         | -40.00                    | 8.44                           | 50.47           | -42.03       |
| 13.77        | Peak                         | 18.24                                 | 22.03               | 40.27                         | -40.00                    | 0.27                           | 40.51           | -40.24       |

**Remark:**

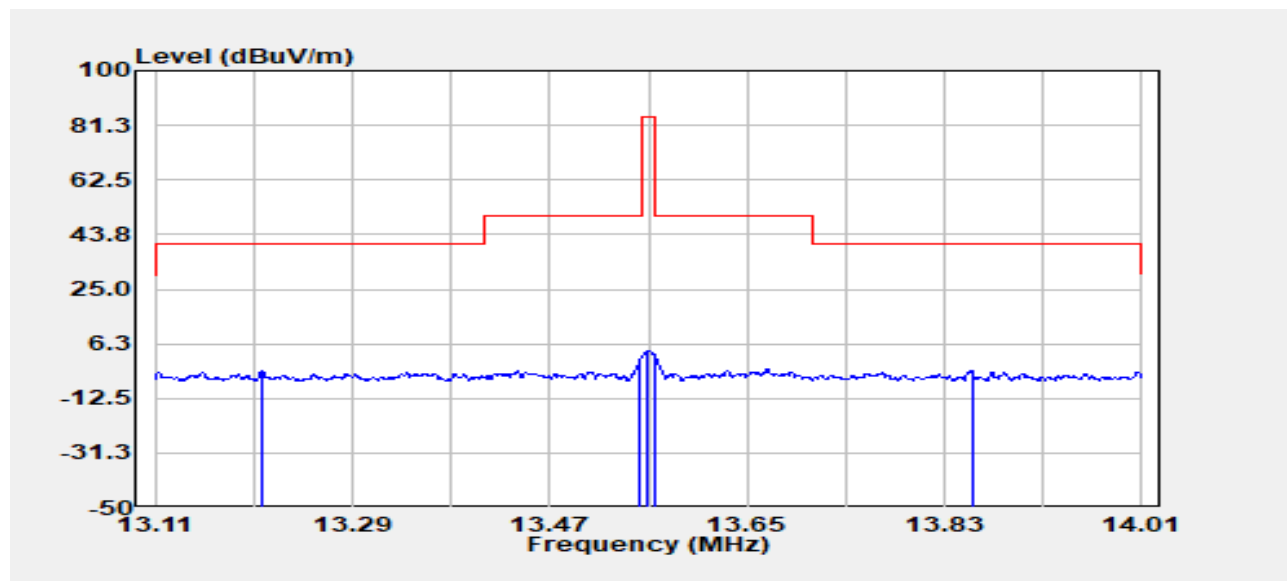
1. Radiated emissions measured were made with an instrument using peak/quasi-peak/average detector mode.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Margin (dB) = Result (dBuV/m) – Limit (dBuV/m).
4. Result=Read level+Factor@3m-Distance factor
5. Distance factor=40log(30m/3m)
6. Factor=antenna factor+cable loss

Project No: TM-2409000206P  
Report No.: TMWK2409003199KR

Page: 23 / 35  
Rev.: 01

Project No :TM-2409000206P  
Operation Band :NFC  
Frequency :13.56 MHz  
Operation Mode :Main  
EUT Pol :H  
Setting :default

Test Date :2024-09-27  
Temp./Humi. :24.6/57  
Antenna Pol. :Ground  
Engineer :Ray Li  
Test Chamber : 966A



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Read Level<br>@3m<br>dBμV | Factor<br>@3m<br>dB | Actual<br>FS<br>@3m<br>dBμV/m | Factor<br>@30m&300m<br>dB | Actual<br>FS<br>@30m<br>dBμV/m | Limit<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|---------------------------------------|---------------------|-------------------------------|---------------------------|--------------------------------|-----------------|--------------|
| 13.21        | Peak                         | 14.74                                 | 21.97               | 36.70                         | -40.00                    | -3.30                          | 40.51           | -43.80       |
| 13.55        | Peak                         | 18.39                                 | 22.00               | 40.39                         | -40.00                    | 0.39                           | 50.47           | -50.08       |
| 13.56        | Peak                         | 21.69                                 | 22.00               | 43.70                         | -40.00                    | 3.70                           | 84.00           | -80.30       |
| 13.57        | Peak                         | 19.92                                 | 22.00               | 41.92                         | -40.00                    | 1.92                           | 50.47           | -48.55       |
| 13.86        | Peak                         | 14.74                                 | 22.04               | 36.77                         | -40.00                    | -3.23                          | 40.51           | -43.73       |

**Remark:**

1. Radiated emissions measured were made with an instrument using peak/quasi-peak/average detector mode.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Margin (dB) = Result (dBuV/m) – Limit (dBuV/m).
4. Result=Read level+Factor@3m-Distance factor
5. Distance factor=40log(30m/3m)
6. Factor=antenna factor+cable loss

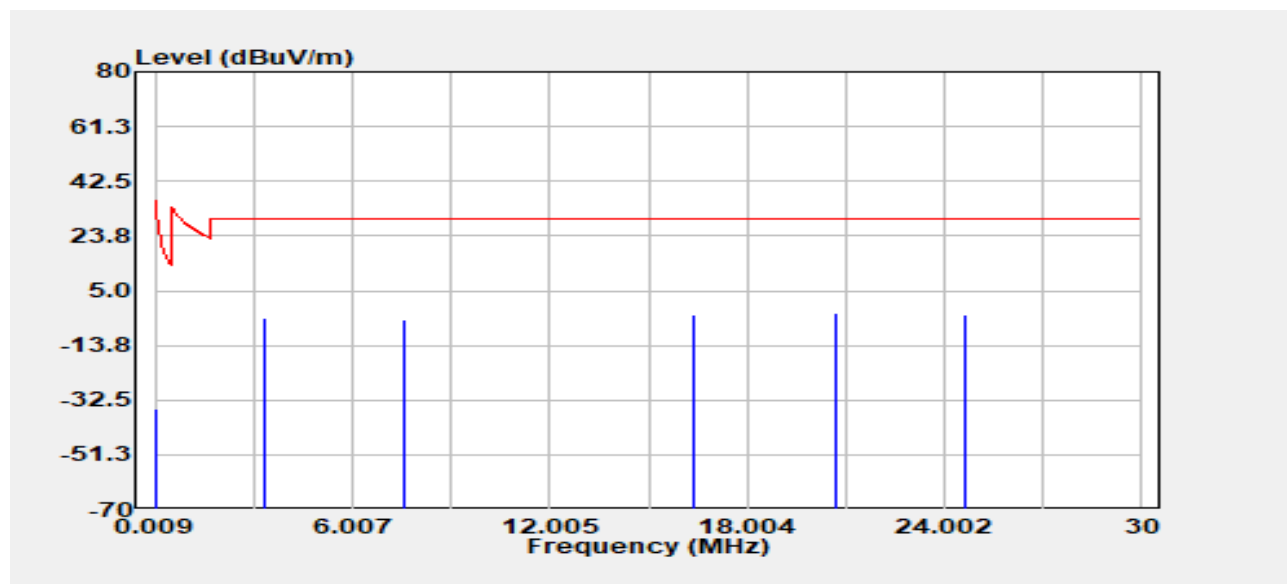
Project No: TM-2409000206P  
Report No.: TMWK2409003199KR

Page: 24 / 35  
Rev.: 01

## 9kHz ~ 30MHz

Project No :TM-2409000206P  
Operation Band :NFC  
Frequency :13.56 MHz  
Operation Mode :TX  
EUT Pol :H  
Setting :default

Test Date :2024-09-27  
Temp./Humi. :24.6/57  
Antenna Pol. :Horizontal  
Engineer :Ray Li  
Test Chamber : 966A



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Read Level<br>@3m<br>dBμV | Factor<br>@3m<br>dB | Actual<br>FS<br>@3m<br>dBμV/m | Factor<br>@30m&300m<br>dB | Actual<br>FS<br>@30m&300m<br>dBμV/m | Limit<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|---------------------------------------|---------------------|-------------------------------|---------------------------|-------------------------------------|-----------------|--------------|
| 0.06         | Peak                         | 24.60                                 | 19.67               | 44.27                         | -80.00                    | -35.73                              | 31.43           | -67.17       |
| 3.36         | Peak                         | 15.93                                 | 19.58               | 35.51                         | -40.00                    | -4.49                               | 29.54           | -34.03       |
| 7.58         | Peak                         | 14.24                                 | 20.76               | 34.99                         | -40.00                    | -5.01                               | 29.54           | -34.55       |
| 16.36        | Peak                         | 14.51                                 | 22.31               | 36.82                         | -40.00                    | -3.18                               | 29.54           | -32.72       |
| 20.72        | Peak                         | 14.61                                 | 22.68               | 37.28                         | -40.00                    | -2.72                               | 29.54           | -32.26       |
| 24.63        | Peak                         | 14.34                                 | 22.56               | 36.91                         | -40.00                    | -3.09                               | 29.54           | -32.63       |

### Remark:

- 9kHz to 490kHz Limit(@3m) = 2400(F/kHz)  
490kHz to 1.705MHz Limit (@3m) = 2400(F/kHz)  
1.705MHz to 30MHz Limit (@3m) = 29.54
- Distance factor=40log(300m/3m)@9-490kHz ; 40log(30m/3m)@490kHz-30MHz
- Result=Read level+Factor@3m-Distance factor

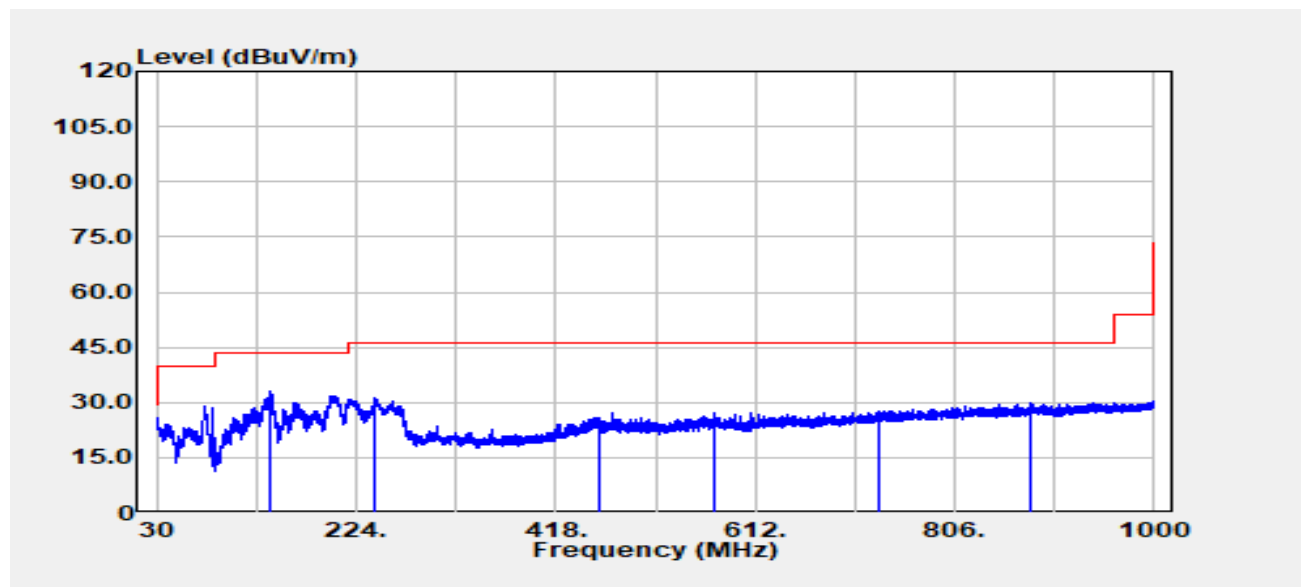
Project No: TM-2409000206P  
Report No.: TMWK2409003199KR

Page: 25 / 35  
Rev.: 01

## 30MHz ~ 1GHz

Project No :TM-2409000206P  
Operation Band :NFC  
Frequency :13.56 MHz  
Operation Mode :TX  
EUT Pol :H  
Setting :default

Test Date :2024-09-27  
Temp./Humi. :24.6/57  
Antenna Pol. :VERTICAL  
Engineer :Tony Chao  
Test Chamber : 966A



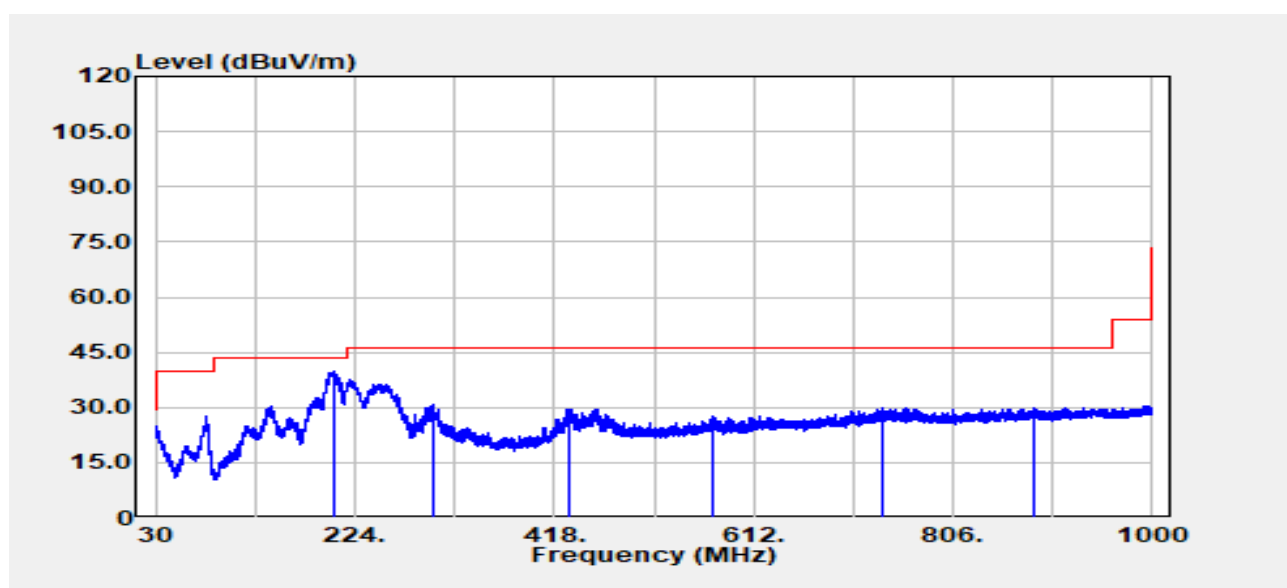
| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Read Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|--------------------------------|--------------|------------------------|-----------------|--------------|
| 140.70       | Peak                         | 43.81                          | -10.66       | 33.14                  | 43.50           | -10.36       |
| 242.43       | Peak                         | 42.42                          | -11.38       | 31.04                  | 46.00           | -14.96       |
| 459.71       | Peak                         | 31.20                          | -5.20        | 26.00                  | 46.00           | -20.00       |
| 571.75       | Peak                         | 30.19                          | -3.18        | 27.01                  | 46.00           | -18.99       |
| 733.49       | Peak                         | 28.15                          | -0.61        | 27.54                  | 46.00           | -18.46       |
| 878.51       | Peak                         | 28.21                          | 1.58         | 29.79                  | 46.00           | -16.21       |

Project No: TM-2409000206P  
Report No.: TMWK2409003199KR

Page: 26 / 35  
Rev.: 01

Project No :TM-2409000206P  
Operation Band :NFC  
Frequency :13.56 MHz  
Operation Mode :TX  
EUT Pol :H  
Setting :default

Test Date :2024-09-27  
Temp./Humi. :24.6/57  
Antenna Pol. :HORIZONTAL  
Engineer :Tony Chao  
Test Chamber : 966A



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Read Level<br>dBuV | Factor<br>dB | Actual<br>FS<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB |
|--------------|------------------------------|--------------------------------|--------------|------------------------|-----------------|--------------|
| 204.24       | Peak                         | 51.74                          | -12.10       | 39.63                  | 43.50           | -3.87        |
| 299.18       | Peak                         | 40.00                          | -9.36        | 30.64                  | 46.00           | -15.36       |
| 432.19       | Peak                         | 35.48                          | -5.82        | 29.65                  | 46.00           | -16.35       |
| 571.26       | Peak                         | 30.67                          | -3.18        | 27.50                  | 46.00           | -18.50       |
| 738.10       | Peak                         | 30.42                          | -0.53        | 29.89                  | 46.00           | -16.11       |
| 885.78       | Peak                         | 28.19                          | 1.57         | 29.77                  | 46.00           | -16.23       |

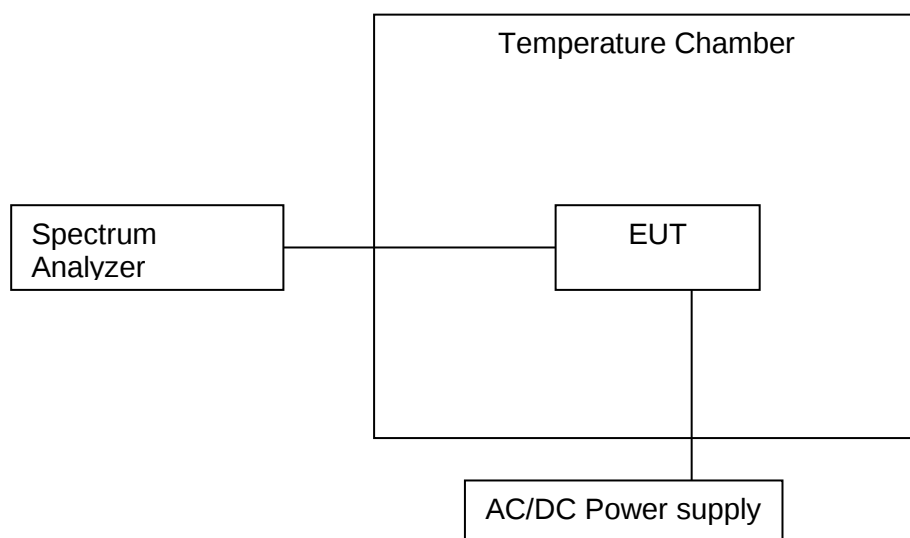
## 7.3 FREQUENCY STABILITY

### LIMIT

According to §15.225(e) and RSS-210, B.6,  
The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### Test Configuration

**Temperature and Voltage Measurement (under normal and extreme test conditions)**



### TEST PROCEDURE

1. Turn the EUT off, and place it inside the environmental temperature chamber.
2. Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.
3. Set the spectrum analyzer as RBW=1kHz, VBW = RBW, Span = 200kHz, Sweep = auto.
4. Turn the EUT on and record the operating frequency at startup and two, five, and ten minutes after the EUT is energized.
5. Switch off the EUT and Lower the chamber temperature by not more than 10 °C and allow the temperature inside the chamber to stabilize.
6. Mark the peak frequency and measure the frequency tolerance using frequency counter function.
7. Repeat step 4 through step 6 down to the specified temperature.

## TEST RESULTS

Compliance

**Temperature:** 20.9°C      **Test Date:** September 23, 2024  
**Humidity:** 55% RH      **Tested by:** Jerry Chang

## TEST DATA

| Startup                     |                  |            |             |             |
|-----------------------------|------------------|------------|-------------|-------------|
| A. Temperature Variation    |                  |            |             |             |
| Power Supply                | Environment      | Frequency  | Delta (kHz) | Limit (kHz) |
| Vdc                         | Temperature (°C) | (MHz)      |             |             |
| 120                         | -20              | 13.5600221 | 0.02210     | +/- 1.356   |
| 120                         | -10              | 13.5600264 | 0.02640     | +/- 1.356   |
| 120                         | 0                | 13.5600315 | 0.03150     | +/- 1.356   |
| 120                         | 10               | 13.5600279 | 0.02790     | +/- 1.356   |
| 120                         | 20               | 13.5600280 | 0.02800     | +/- 1.356   |
| 120                         | 30               | 13.5600298 | 0.02980     | +/- 1.356   |
| 120                         | 40               | 13.5600337 | 0.03370     | +/- 1.356   |
| 120                         | 50               | 13.5600209 | 0.02090     | +/- 1.356   |
| B. Supply Voltage Variation |                  |            |             |             |
| Power Supply                | Environment      | Frequency  | Delta (kHz) | Limit (kHz) |
| Vdc                         | Temperature (°C) | (MHz)      |             |             |
| 138                         | 20               | 13.5600258 | 0.02580     | +/- 1.356   |
| 120                         | 20               | 13.5600280 | 0.02800     | +/- 1.356   |
| 102                         | 20               | 13.5600265 | 0.02650     | +/- 1.356   |

**Note:** Extreme temperatures are declared by the manufacturer

| 2 minutes                   |                  |            |             |             |
|-----------------------------|------------------|------------|-------------|-------------|
| A. Temperature Variation    |                  |            |             |             |
| Power Supply                | Environment      | Frequency  | Delta (kHz) | Limit (kHz) |
| Vdc                         | Temperature (°C) | (MHz)      |             |             |
| 120                         | -20              | 13.5600222 | 0.02220     | +/- 1.356   |
| 120                         | -10              | 13.5600276 | 0.02760     | +/- 1.356   |
| 120                         | 0                | 13.5600295 | 0.02950     | +/- 1.356   |
| 120                         | 10               | 13.5600361 | 0.03610     | +/- 1.356   |
| 120                         | 20               | 13.5600282 | 0.02820     | +/- 1.356   |
| 120                         | 30               | 13.5600232 | 0.02320     | +/- 1.356   |
| 120                         | 40               | 13.5600361 | 0.03610     | +/- 1.356   |
| 120                         | 50               | 13.5600262 | 0.02620     | +/- 1.356   |
| B. Supply Voltage Variation |                  |            |             |             |
| Power Supply                | Environment      | Frequency  | Delta (kHz) | Limit (kHz) |
| Vdc                         | Temperature (°C) | (MHz)      |             |             |
| 138                         | 20               | 13.5600181 | 0.01810     | +/- 1.356   |
| 120                         | 20               | 13.5600282 | 0.02820     | +/- 1.356   |
| 102                         | 20               | 13.5600287 | 0.02870     | +/- 1.356   |

**Note:** Extreme temperatures are declared by the manufacturer

| 5 minutes                   |                  |            |             |             |
|-----------------------------|------------------|------------|-------------|-------------|
| A. Temperature Variation    |                  |            |             |             |
| Power Supply                | Environment      | Frequency  | Delta (kHz) | Limit (kHz) |
| Vdc                         | Temperature (°C) | (MHz)      |             |             |
| 120                         | -20              | 13.5600225 | 0.02250     | +/- 1.356   |
| 120                         | -10              | 13.5600269 | 0.02690     | +/- 1.356   |
| 120                         | 0                | 13.5600254 | 0.02540     | +/- 1.356   |
| 120                         | 10               | 13.5600273 | 0.02730     | +/- 1.356   |
| 120                         | 20               | 13.5600334 | 0.03340     | +/- 1.356   |
| 120                         | 30               | 13.5600222 | 0.02220     | +/- 1.356   |
| 120                         | 40               | 13.5600371 | 0.03710     | +/- 1.356   |
| 120                         | 50               | 13.5600226 | 0.02260     | +/- 1.356   |
| B. Supply Voltage Variation |                  |            |             |             |
| Power Supply                | Environment      | Frequency  | Delta (kHz) | Limit (kHz) |
| Vdc                         | Temperature (°C) | (MHz)      |             |             |
| 138                         | 20               | 13.5600230 | 0.02300     | +/- 1.356   |
| 120                         | 20               | 13.5600334 | 0.03340     | +/- 1.356   |
| 102                         | 20               | 13.5600363 | 0.03630     | +/- 1.356   |

**Note:** Extreme temperatures are declared by the manufacturer

| 10 minutes                  |                  |            |             |             |
|-----------------------------|------------------|------------|-------------|-------------|
| A. Temperature Variation    |                  |            |             |             |
| Power Supply                | Environment      | Frequency  | Delta (kHz) | Limit (kHz) |
| Vdc                         | Temperature (°C) | (MHz)      |             |             |
| 120                         | -20              | 13.5600194 | 0.01940     | +/- 1.356   |
| 120                         | -10              | 13.5600349 | 0.03490     | +/- 1.356   |
| 120                         | 0                | 13.5600335 | 0.03350     | +/- 1.356   |
| 120                         | 10               | 13.5600281 | 0.02810     | +/- 1.356   |
| 120                         | 20               | 13.5600236 | 0.02360     | +/- 1.356   |
| 120                         | 30               | 13.5600355 | 0.03550     | +/- 1.356   |
| 120                         | 40               | 13.5600263 | 0.02630     | +/- 1.356   |
| 120                         | 50               | 13.5600305 | 0.03050     | +/- 1.356   |
| B. Supply Voltage Variation |                  |            |             |             |
| Power Supply                | Environment      | Frequency  | Delta (kHz) | Limit (kHz) |
| Vdc                         | Temperature (°C) | (MHz)      |             |             |
| 138                         | 20               | 13.5600184 | 0.01840     | +/- 1.356   |
| 120                         | 20               | 13.5600236 | 0.02360     | +/- 1.356   |
| 102                         | 20               | 13.5600340 | 0.03400     | +/- 1.356   |

**Note:** Extreme temperatures are declared by the manufacturer

## 7.4 AC POWERLINE CONDUCTED EMISSIONS

### LIMIT

According to §15.207(a) and RSS-Gen §8.8 for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

| Frequency Range<br>(MHz) | Limits<br>(dB $\mu$ V) |           |
|--------------------------|------------------------|-----------|
|                          | Quasi-peak             | Average   |
| 0.15 to 0.50             | 66 to 56*              | 56 to 46* |
| 0.50 to 5                | 56                     | 46        |
| 5 to 30                  | 60                     | 50        |

\* Decreases with the logarithm of the frequency.

### TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

### TEST RESULTS

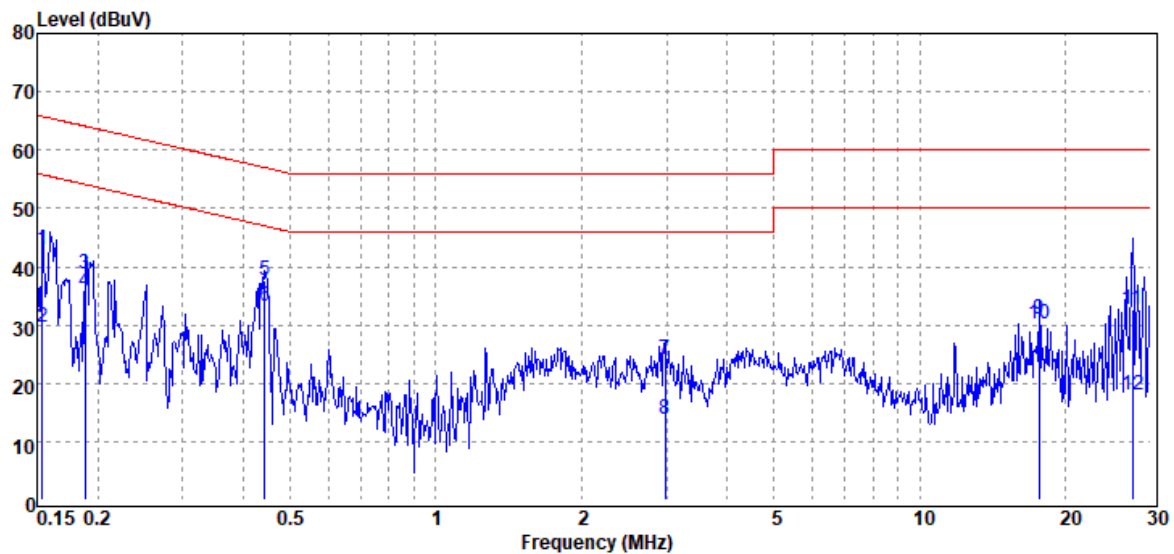
The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked and Average measurement records.

Project No: TM-2409000206P  
Report No.: TMWK2409003199KR

Page: 32 / 35  
Rev.: 01

Project No : TM-2409000206P  
Operation Mode : NFC  
Test Chamber : Conduction  
Probe : LINE  
Note :

Test Date : 2024-10-04  
Temp./Humi. : 23.4°C / 54%  
Engineer : Ben Yang  
Test Voltage : AC 120V/60Hz



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Read Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV | Limit<br>dBμV | Margin<br>dB |
|--------------|------------------------------|--------------------------------|--------------|----------------------|---------------|--------------|
| 0.154        | QP                           | 42.68                          | 0.14         | 42.82                | 65.80         | -22.98       |
| 0.154        | Average                      | 29.46                          | 0.14         | 29.60                | 55.80         | -26.20       |
| 0.188        | QP                           | 38.30                          | 0.33         | 38.63                | 64.11         | -25.48       |
| 0.188        | Average                      | 35.29                          | 0.33         | 35.62                | 54.11         | -18.49       |
| 0.444        | QP                           | 37.32                          | 0.38         | 37.70                | 56.99         | -19.29       |
| 0.444        | Average                      | 32.84                          | 0.38         | 33.22                | 46.99         | -13.77       |
| 2.976        | QP                           | 23.77                          | 0.22         | 23.99                | 56.00         | -32.01       |
| 2.976        | Average                      | 13.56                          | 0.22         | 13.78                | 46.00         | -32.22       |
| 17.626       | QP                           | 30.49                          | 0.46         | 30.95                | 60.00         | -29.05       |
| 17.626       | Average                      | 29.74                          | 0.46         | 30.20                | 50.00         | -19.80       |
| 27.469       | QP                           | 32.08                          | 0.59         | 32.67                | 60.00         | -27.33       |
| 27.469       | Average                      | 17.48                          | 0.59         | 18.07                | 50.00         | -31.93       |

Note: 1. Actual FS= Spectrum Read Level + Factor

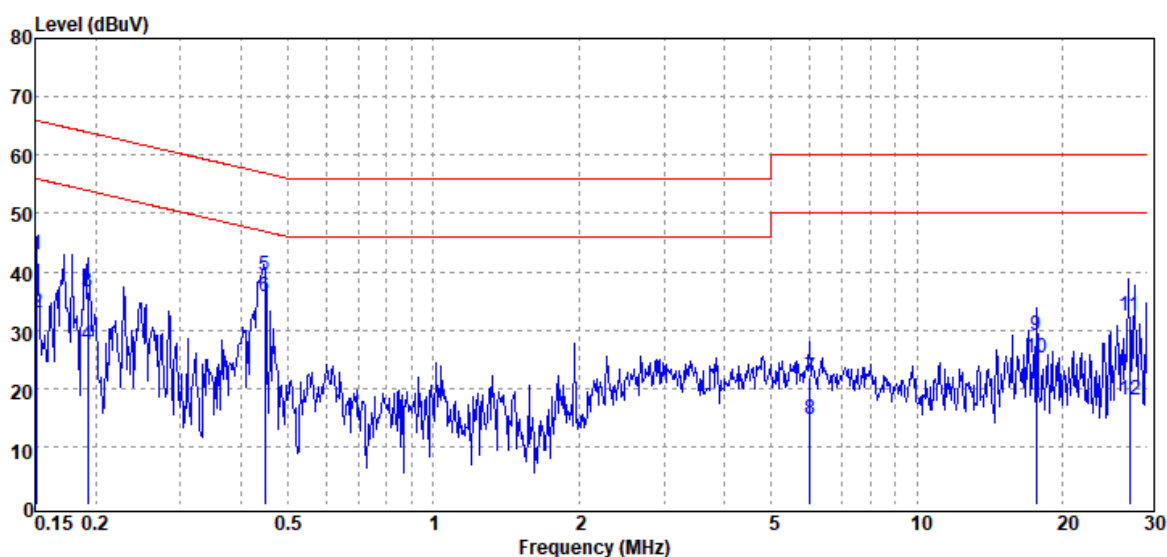
Note: 2. Margin= Actual FS - Limit

Project No: TM-2409000206P  
Report No.: TMWK2409003199KR

Page: 33 / 35  
Rev.: 01

Project No : TM-2409000206P  
Operation Mode : NFC  
Test Chamber : Conduction  
Probe : NEUTRAL  
Note :

Test Date : 2024-10-04  
Temp./Humi. : 23.4°C / 54%  
Engineer : Ben Yang  
Test Voltage : AC 120V/60Hz



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Read Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV | Limit<br>dBμV | Margin<br>dB |
|--------------|------------------------------|--------------------------------|--------------|----------------------|---------------|--------------|
| 0.151        | QP                           | 42.67                          | 0.11         | 42.78                | 65.93         | -23.15       |
| 0.151        | Average                      | 32.78                          | 0.11         | 32.89                | 55.93         | -23.04       |
| 0.193        | QP                           | 36.32                          | 0.33         | 36.65                | 63.92         | -27.27       |
| 0.193        | Average                      | 26.95                          | 0.33         | 27.28                | 53.92         | -26.64       |
| 0.447        | QP                           | 39.00                          | 0.35         | 39.35                | 56.92         | -17.57       |
| 0.447        | Average                      | 35.35                          | 0.35         | 35.70                | 46.92         | -11.22       |
| 6.003        | QP                           | 21.53                          | 0.27         | 21.80                | 60.00         | -38.20       |
| 6.003        | Average                      | 14.32                          | 0.27         | 14.59                | 50.00         | -35.41       |
| 17.622       | QP                           | 28.56                          | 0.43         | 28.99                | 60.00         | -31.01       |
| 17.622       | Average                      | 24.72                          | 0.43         | 25.15                | 50.00         | -24.85       |
| 27.510       | QP                           | 31.88                          | 0.53         | 32.41                | 60.00         | -27.59       |
| 27.510       | Average                      | 17.54                          | 0.53         | 18.07                | 50.00         | -31.93       |

Note: 1. Actual FS= Spectrum Read Level + Factor

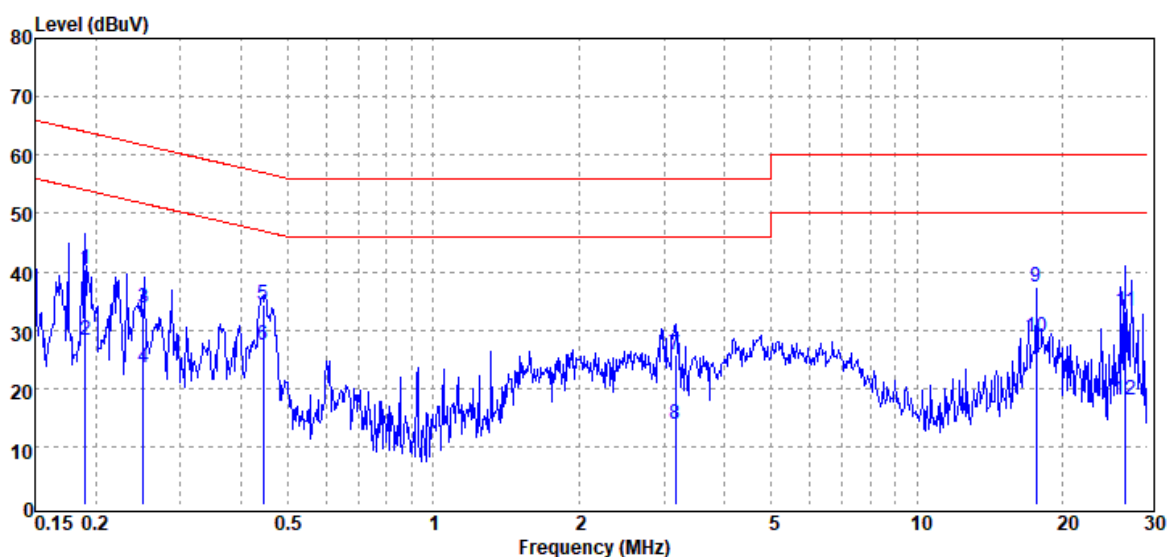
Note: 2. Margin= Actual FS - Limit

Project No: TM-2409000206P  
Report No.: TMWK2409003199KR

Page: 34 / 35  
Rev.: 01

Project No : TM-2409000206P  
Operation Mode : NFC  
Test Chamber : Conduction  
Probe : LINE  
Note :

Test Date : 2024-10-04  
Temp./Humi. : 23.4°C / 54%  
Engineer : Ben Yang  
Test Voltage : AC 230V/60Hz



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Read Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV | Limit<br>dBμV | Margin<br>dB |
|--------------|------------------------------|--------------------------------|--------------|----------------------|---------------|--------------|
| 0.191        | QP                           | 40.09                          | 0.34         | 40.43                | 64.01         | -23.58       |
| 0.191        | Average                      | 27.77                          | 0.34         | 28.11                | 54.01         | -25.90       |
| 0.252        | QP                           | 33.34                          | 0.39         | 33.73                | 61.70         | -27.97       |
| 0.252        | Average                      | 23.19                          | 0.39         | 23.58                | 51.70         | -28.12       |
| 0.445        | QP                           | 33.90                          | 0.38         | 34.28                | 56.97         | -22.69       |
| 0.445        | Average                      | 26.93                          | 0.38         | 27.31                | 46.97         | -19.66       |
| 3.169        | QP                           | 25.58                          | 0.22         | 25.80                | 56.00         | -30.20       |
| 3.169        | Average                      | 13.69                          | 0.22         | 13.91                | 46.00         | -32.09       |
| 17.624       | QP                           | 36.92                          | 0.46         | 37.38                | 60.00         | -22.62       |
| 17.624       | Average                      | 28.41                          | 0.46         | 28.87                | 50.00         | -21.13       |
| 27.000       | QP                           | 32.76                          | 0.58         | 33.34                | 60.00         | -26.66       |
| 27.000       | Average                      | 17.37                          | 0.58         | 17.95                | 50.00         | -32.05       |

Note: 1. Actual FS= Spectrum Read Level + Factor

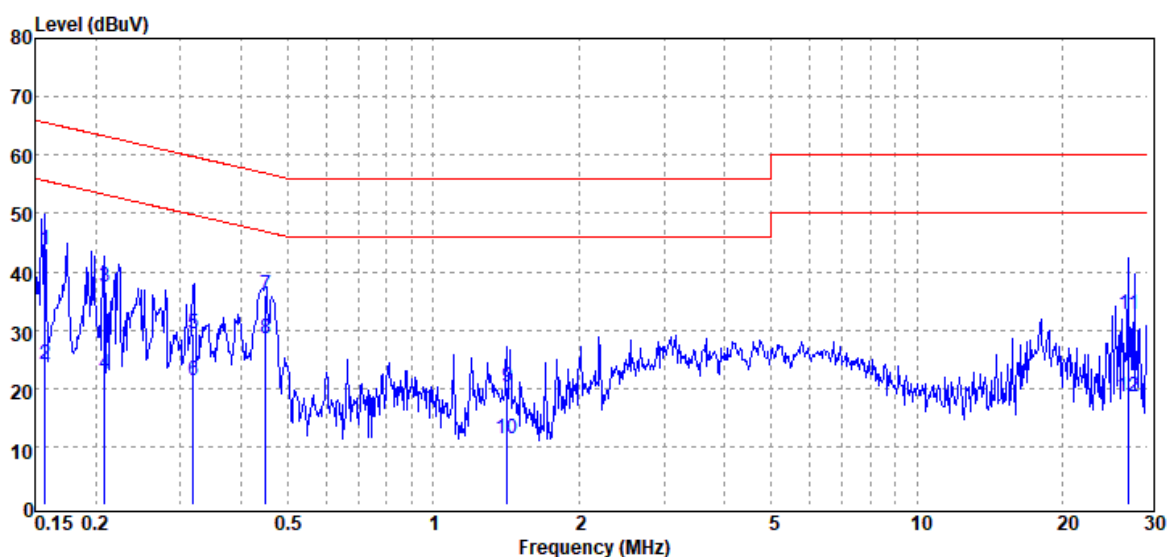
Note: 2. Margin= Actual FS - Limit

Project No: TM-2409000206P  
Report No.: TMWK2409003199KR

Page: 35 / 35  
Rev.: 01

Project No : TM-2409000206P  
Operation Mode : NFC  
Test Chamber : Conduction  
Probe : NEUTRAL  
Note :

Test Date : 2024-10-04  
Temp./Humi. : 23.4°C / 54%  
Engineer : Ben Yang  
Test Voltage : AC 230V/60Hz



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Read Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV | Limit<br>dBμV | Margin<br>dB |
|--------------|------------------------------|--------------------------------|--------------|----------------------|---------------|--------------|
| 0.158        | QP                           | 43.51                          | 0.15         | 43.66                | 65.59         | -21.93       |
| 0.158        | Average                      | 23.89                          | 0.15         | 24.04                | 55.59         | -31.55       |
| 0.209        | QP                           | 36.95                          | 0.36         | 37.31                | 63.25         | -25.94       |
| 0.209        | Average                      | 22.19                          | 0.36         | 22.55                | 53.25         | -30.70       |
| 0.319        | QP                           | 29.08                          | 0.35         | 29.43                | 59.74         | -30.31       |
| 0.319        | Average                      | 20.96                          | 0.35         | 21.31                | 49.74         | -28.43       |
| 0.450        | QP                           | 35.55                          | 0.35         | 35.90                | 56.87         | -20.97       |
| 0.450        | Average                      | 28.23                          | 0.35         | 28.58                | 46.87         | -18.29       |
| 1.421        | QP                           | 20.07                          | 0.15         | 20.22                | 56.00         | -35.78       |
| 1.421        | Average                      | 11.08                          | 0.15         | 11.23                | 46.00         | -34.77       |
| 27.383       | QP                           | 32.06                          | 0.53         | 32.59                | 60.00         | -27.41       |
| 27.383       | Average                      | 18.02                          | 0.53         | 18.55                | 50.00         | -31.45       |

Note: 1. Actual FS= Spectrum Read Level + Factor

Note: 2. Margin= Actual FS - Limit

- End of Test Report -