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# FCC Test Report

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Report No.: AGC07434240906FR03

**FCC ID** : 2ARXB-K2A

**APPLICATION PURPOSE** : Original Equipment

**PRODUCT DESIGNATION** : Smart Label Printer

**BRAND NAME** : NIIMBOT

**MODEL NAME** : NIIMBOT K2

**APPLICANT** : Wuhan Jingchen Intelligent Identification Technology Co., Ltd.

**DATE OF ISSUE** : Oct. 12, 2024

**STANDARD(S)** : FCC Part 15 Subpart C §15.225

**REPORT VERSION** : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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**Report Revise Record**

| Report Version | Revise Time | Issued Date   | Valid Version | Notes           |
|----------------|-------------|---------------|---------------|-----------------|
| V1.0           | /           | Oct. 12, 2024 | Valid         | Initial Release |

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## Table of Contents

|                                                              |           |
|--------------------------------------------------------------|-----------|
| <b>1. General Information .....</b>                          | <b>5</b>  |
| <b>2. Product Information .....</b>                          | <b>6</b>  |
| 2.1 Product Technical Description .....                      | 6         |
| 2.2 Test Frequency List .....                                | 6         |
| 2.3 Related Submittal(S) / Grant (S) .....                   | 7         |
| 2.4 Test Methodology .....                                   | 7         |
| 2.5 Special Accessories .....                                | 7         |
| 2.6 Equipment Modifications .....                            | 7         |
| 2.7 Antenna Requirement.....                                 | 7         |
| <b>3. Test Environment .....</b>                             | <b>8</b>  |
| 3.1 Address of The Test Laboratory .....                     | 8         |
| 3.2 Test Facility .....                                      | 8         |
| 3.3 Environmental Conditions .....                           | 9         |
| 3.4 Measurement Uncertainty .....                            | 9         |
| 3.5 List of Equipment Used .....                             | 10        |
| <b>4. System Test Configuration.....</b>                     | <b>11</b> |
| 4.1 EUT Configuration.....                                   | 11        |
| 4.2 EUT Exercise.....                                        | 11        |
| 4.3 Configuration of Tested System .....                     | 11        |
| 4.4 Equipment Used in Tested System.....                     | 11        |
| 4.5 Summary of Test Results .....                            | 12        |
| <b>5. Description of Test Modes .....</b>                    | <b>13</b> |
| <b>6. Field Strength of Fundamental .....</b>                | <b>14</b> |
| 6.1 Provisions Applicable .....                              | 14        |
| 6.2 Measurement Procedure.....                               | 14        |
| 6.3 Measurement Setup (Block Diagram of Configuration) ..... | 16        |
| 6.4 Measurement Result .....                                 | 17        |
| <b>7. Radiated Spurious Emissions .....</b>                  | <b>19</b> |
| 7.1 Provisions Applicable .....                              | 19        |
| 7.2 Measurement Procedure.....                               | 19        |
| 7.3 Measurement Setup (Block Diagram of Configuration) ..... | 21        |
| 7.4 Measurement Result .....                                 | 22        |
| <b>8. 20dB Bandwidth Measurement.....</b>                    | <b>28</b> |
| 8.1 Provisions Applicable .....                              | 28        |
| 8.2 Measurement Procedure.....                               | 28        |
| 8.3 Measurement Setup (Block Diagram of Configuration) ..... | 28        |
| 8.4 Measurement Result .....                                 | 29        |
| <b>9. Frequency Stability Measurement.....</b>               | <b>30</b> |
| 9.1 Provisions Applicable .....                              | 30        |
| 9.2 Measurement Procedure.....                               | 30        |

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|                                                                  |           |
|------------------------------------------------------------------|-----------|
| 9.3 Measurement Setup (Block Diagram of Configuration) .....     | 30        |
| 9.4 Measurement Result .....                                     | 31        |
| <b>10. AC Power Line Conducted Emission Test.....</b>            | <b>32</b> |
| 10.1 Measurement Limit.....                                      | 32        |
| 10.2 Measurement Setup (Block Diagram of Configuration) .....    | 32        |
| 10.3 Preliminary Procedure of Line Conducted Emission Test ..... | 33        |
| 10.4 Final Procedure of Line Conducted Emission Test .....       | 33        |
| 10.5 Measurement Result .....                                    | 34        |
| <b>Appendix I: Photographs of Test Setup.....</b>                | <b>36</b> |
| <b>Appendix II: Photographs of Test EUT .....</b>                | <b>36</b> |

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## 1. General Information

|                              |                                                                                                |
|------------------------------|------------------------------------------------------------------------------------------------|
| Applicant                    | Wuhan Jingchen Intelligent Identification Technology Co., Ltd.                                 |
| Address                      | No. 5, Creative Workshop, Creative World, Yezhihu West Road, Hongshan District, Wuhan, China   |
| Manufacturer                 | Wuhan Jingchen Intelligent Identification Technology Co., Ltd.                                 |
| Address                      | No. 5, Creative Workshop, Creative World, Yezhihu West Road, Hongshan District, Wuhan, China   |
| Factory                      | Dongxihu branch of Wuhan Jingchen Intelligent Identification Technology Co., Ltd.              |
| Address                      | No. 20, Xincheng Shiba Road, Changqing Street, Dongxihu District, Wuhan, Hubei Province, China |
| Product Designation          | Smart Label Printer                                                                            |
| Brand Name                   | NIIMBOT                                                                                        |
| Test Model                   | NIIMBOT K2                                                                                     |
| Series Model(s)              | N/A                                                                                            |
| Difference Description       | N/A                                                                                            |
| Date of receipt of test item | Sep.19, 2024                                                                                   |
| Date of Test                 | Sep.19, 2024~Oct. 12, 2024                                                                     |
| Deviation from Standard      | No any deviation from the test method                                                          |
| Condition of Test Sample     | Normal                                                                                         |
| Test Result                  | Pass                                                                                           |
| Test Report Form No          | AGCER-FCC-NFC-V1                                                                               |

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

Prepared By



Cici Li

(Project Engineer)

Oct. 12, 2024

Reviewed By



Calvin Liu

(Reviewer)

Oct. 12, 2024

Approved By



Max Zhang

(Authorized Officer)

Oct. 12, 2024

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## 2. Product Information

### 2.1 Product Technical Description

|                               |                                |
|-------------------------------|--------------------------------|
| Equipment Category            | Near Field Communication (NFC) |
| Operation Frequency           | 13.56MHz                       |
| Hardware Version              | C01                            |
| Software Version              | 1.04                           |
| Modulation Type               | ASK                            |
| Field Strength of Fundamental | 63.80dB $\mu$ V/m (Peak)       |
| Antenna Designation           | Coil Antenna                   |
| Antenna Gain                  | 0dBi                           |
| Power Supply                  | DC 12V by adapter              |

### 2.2 Test Frequency List

| Frequency Band    | Channel Number | Frequency |
|-------------------|----------------|-----------|
| 13.110~14.010 MHz | 01             | 13.56 MHz |

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## 2.3 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: **2ARXB-K2A**, filing to comply with Part 2, Part 15 of the Federal Communication Commission rules.

## 2.4 Test Methodology

The tests were performed according to following standards:

| No. | Identity           | Document Title                                                                |
|-----|--------------------|-------------------------------------------------------------------------------|
| 1   | FCC 47 CFR Part 2  | Frequency allocations and radio treaty matters; general rules and regulations |
| 2   | FCC 47 CFR Part 15 | Radio Frequency Devices                                                       |
| 3   | ANSI C63.10-2013   | American National Standard for Testing Unlicensed Wireless Devices            |

## 2.5 Special Accessories

Not available for this EUT intended for grant.

## 2.6 Equipment Modifications

Not available for this EUT intended for grant.

## 2.7 Antenna Requirement

| Standard Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>15.203 requirement:</b><br>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. |
| <b>EUT Antenna:</b><br>The non-detachable antenna inside the device cannot be replaced by the user at will. The gain of the antenna is 0 dBi.                                                                                                                                                                                                                                                                                                                                    |

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### 3. Test Environment

#### 3.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

#### 3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

##### **CNAS-Lab Code: L5488**

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories.)

##### **A2LA-Lab Cert. No.: 5054.02**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

##### **FCC-Registration No.: 975832**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

##### **IC-Registration No.: 24842(CAB identifier: CN0063)**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.



### 3.3 Environmental Conditions

|                         | Normal Conditions | Extreme Conditions    |
|-------------------------|-------------------|-----------------------|
| Temperature range (°C)  | 15 - 35           | -20 - 50              |
| Relative humidity range | 20 % - 75 %       | 20 % - 75 %           |
| Pressure range (kPa)    | 86 - 106          | 86 - 106              |
| Power supply            | DC 12.0V          | LV:DC10.8V/HV:DC13.2V |

Note: The Extreme Temperature and Extreme Voltages declared by the manufacturer.

### 3.4 Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%.

| Item                                          | Measurement Uncertainty    |
|-----------------------------------------------|----------------------------|
| Uncertainty of Conducted Emission for AC Port | $U_c = \pm 2.9 \text{ dB}$ |
| Uncertainty of Radiated Emission below 150kHz | $U_c = \pm 4.2 \text{ dB}$ |
| Uncertainty of Radiated Emission below 30MHz  | $U_c = \pm 3.8 \text{ dB}$ |
| Uncertainty of Radiated Emission below 1GHz   | $U_c = \pm 3.9 \text{ dB}$ |
| Uncertainty of total RF power, conducted      | $U_c = \pm 0.8 \text{ dB}$ |
| Uncertainty of RF power density, conducted    | $U_c = \pm 2.6 \text{ dB}$ |
| Uncertainty of spurious emissions, conducted  | $U_c = \pm 2 \%$           |
| Uncertainty of Occupied Channel Bandwidth     | $U_c = \pm 2.7 \%$         |

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### 3.5 List of Equipment Used

| ● RF Conducted Test System          |               |                            |              |           |            |                           |                           |
|-------------------------------------|---------------|----------------------------|--------------|-----------|------------|---------------------------|---------------------------|
| Used                                | Equipment No. | Test Equipment             | Manufacturer | Model No. | Serial No. | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
| <input checked="" type="checkbox"/> | AGC-ER-E036   | Spectrum Analyzer          | Agilent      | N9020A    | MY49100060 | 2024-05-24                | 2025-05-23                |
| <input checked="" type="checkbox"/> | AGC-ER-E075   | Small Environmental Tester | SH-242       | ESPEC     | 93008290   | 2024-07-24                | 2026-07-23                |
| <input checked="" type="checkbox"/> | N/A           | RF Connection Cable        | N/A          | 1#        | N/A        | Each time                 | N/A                       |
| <input checked="" type="checkbox"/> | N/A           | RF Connection Cable        | N/A          | 2#        | N/A        | Each time                 | N/A                       |

| ● Radiated Spurious Emission        |               |                   |              |            |            |                           |                           |
|-------------------------------------|---------------|-------------------|--------------|------------|------------|---------------------------|---------------------------|
| Used                                | Equipment No. | Test Equipment    | Manufacturer | Model No.  | Serial No. | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
| <input checked="" type="checkbox"/> | AGC-EM-E116   | EMI Test Receiver | R&S          | ESCI       | 100034     | 2024-05-24                | 2025-05-23                |
| <input checked="" type="checkbox"/> | AGC-EM-E086   | Loop Antenna      | ZHINAN       | ZN30900C   | 18051      | 2024-03-05                | 2026-03-04                |
| <input checked="" type="checkbox"/> | AGC-EM-E001   | Wideband Antenna  | SCHWARZBECK  | VULB9168   | D69250     | 2023-05-11                | 2025-05-10                |
| <input checked="" type="checkbox"/> | AGC-EM-A138   | 6dB Attenuator    | Eeatsheep    | LM-XX-6-5W | N/A        | 2023-06-09                | 2025-06-08                |

| ● AC Power Line Conducted Emission  |               |                   |              |            |            |                           |                           |
|-------------------------------------|---------------|-------------------|--------------|------------|------------|---------------------------|---------------------------|
| Used                                | Equipment No. | Test Equipment    | Manufacturer | Model No.  | Serial No. | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
| <input checked="" type="checkbox"/> | AGC-EM-E045   | EMI Test Receiver | R&S          | ESPI       | 101206     | 2024-05-28                | 2025-05-27                |
| <input checked="" type="checkbox"/> | AGC-EM-A130   | 6dB Attenuator    | Eeatsheep    | LM-XX-6-5W | DC-6GZ     | 2023-06-09                | 2025-06-08                |
| <input checked="" type="checkbox"/> | AGC-EM-E023   | AMN               | R&S          | 100086     | ESH2-Z5    | 2024-05-28                | 2025-05-27                |

| ● Test Software                     |               |                |              |           |                     |
|-------------------------------------|---------------|----------------|--------------|-----------|---------------------|
| Used                                | Equipment No. | Test Equipment | Manufacturer | Model No. | Version Information |
| <input checked="" type="checkbox"/> | AGC-EM-S003   | RE Test System | FARA         | EZ-EMC    | V.RA-03A            |
| <input checked="" type="checkbox"/> | AGC-EM-S001   | CE Test System | R&S          | ES-K1     | V1.71               |

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## 4. System Test Configuration

### 4.1 EUT Configuration

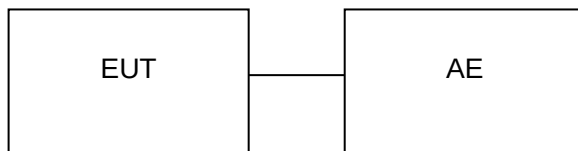
The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 4.2 EUT Exercise

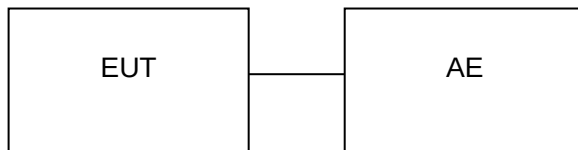
The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

### 4.3 Configuration of Tested System

Radiated Emission Configure:



Conducted Emission Configure:



### 4.4 Equipment Used in Tested System

The following peripheral devices and interface cables were connected during the measurement:

☒ Test Accessories Come From The Laboratory

| No. | Equipment   | Manufacturer | Model No. | Specification Information | Cable |
|-----|-------------|--------------|-----------|---------------------------|-------|
| 1   | Control Box | --           | USB-TTL   | --                        | --    |

☒ Test Accessories Come From The Manufacturer

| No. | Equipment | Manufacturer                           | Model No.        | Specification Information                               | Cable |
|-----|-----------|----------------------------------------|------------------|---------------------------------------------------------|-------|
| 1   | Adapter   | Dongguan Dongsong Electronic Co., Ltd. | DYS836-120250W-K | Input: 100-240V~50/60Hz 1.0A<br>MAX<br>Output: 12V=2.5A | --    |

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#### 4.5 Summary of Test Results

| Item | FCC Rules       | Description of Test              | Result |
|------|-----------------|----------------------------------|--------|
| 1    | §15.203         | Antenna Equipment                | Pass   |
| 2    | 15.225(a)(b)(c) | Field Strength of Fundamental    | Pass   |
| 3    | §15.209         | Radiated Spurious Emissions      | Pass   |
| 4    | §15.215(c)      | 20dB Bandwidth                   | Pass   |
| 5    | §15.205(a)      | Restricted Bands of Operation    | Pass   |
| 6    | §15.225(e)      | Frequency Stability              | Pass   |
| 7    | §15.207         | AC Power Line Conducted Emission | Pass   |

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## 5. Description of Test Modes

| Summary table of Test Cases                                                                                                                                                                                                                                                             |                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Test Item                                                                                                                                                                                                                                                                               | Equipment category / Modulation             |
|                                                                                                                                                                                                                                                                                         | Near Field Communication / ASK              |
| Radiated & Conducted Test Cases                                                                                                                                                                                                                                                         | Mode 1: NFC TX _13.56 MHz (Connect adapter) |
| AC Conducted Emission                                                                                                                                                                                                                                                                   | Mode 2: NFC TX _13.56 MHz (Connect adapter) |
| <b>Note:</b><br>1. Only the result of the worst case was recorded in the report, if no other cases.<br>2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.<br>3. For Conducted Test method, a temporary antenna connector is provided by the manufacture. |                                             |

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## 6. Field Strength of Fundamental

### 6.1 Provisions Applicable

| Rules and specifications | FCC CFR 47 Part 15 section 15.225                                 |                                |                                |                               |
|--------------------------|-------------------------------------------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Description              | Compliance with the spectrum mask is tested with RBW set to 9kHz. |                                |                                |                               |
| Freq. of Emission (MHz)  | Field Strength (μV/m) at 30m                                      | Field Strength (dBμV/m) at 30m | Field Strength (dBμV/m) at 10m | Field Strength (dBμV/m) at 3m |
| 1.705~13.110             | 30                                                                | 29.5                           | 48.58                          | 69.5                          |
| 13.110~13.410            | 106                                                               | 40.5                           | 59.58                          | 80.5                          |
| 13.410~13.553            | 334                                                               | 50.5                           | 69.58                          | 90.5                          |
| 13.553~13.567            | 15848                                                             | 84.0                           | 103.08                         | 124.0                         |
| 13.567~13.710            | 334                                                               | 50.5                           | 69.58                          | 90.5                          |
| 13.710~14.010            | 106                                                               | 40.5                           | 59.58                          | 80.5                          |
| 14.010~30.000            | 30                                                                | 29.5                           | 48.58                          | 69.5                          |

### 6.2 Measurement Procedure

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the

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- pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
  9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
  10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter    | Setting                                                   |
|-----------------------|-----------------------------------------------------------|
| Start ~Stop Frequency | 9kHz~150kHz/RB 200Hz for QP                               |
| Start ~Stop Frequency | 150kHz~30MHz/RB 9kHz for QP                               |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120kHz for QP                            |
| Start ~Stop Frequency | 1GHz~26.5GHz<br>1MHz/3MHz for Peak, 1MHz/3MHz for Average |

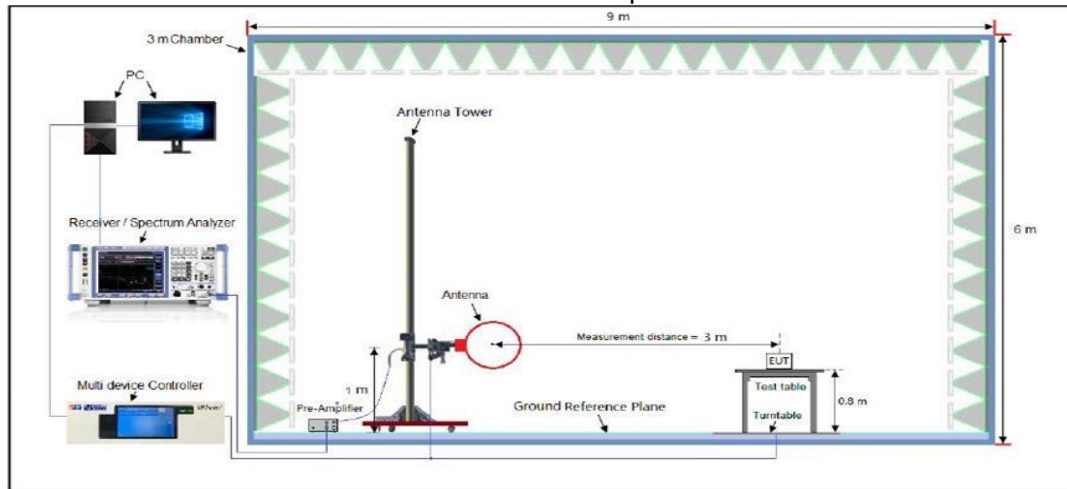
| Receiver Parameter    | Setting                        |
|-----------------------|--------------------------------|
| Start ~Stop Frequency | 9kHz~150kHz/RB 200Hz for QP    |
| Start ~Stop Frequency | 150kHz~30MHz/RB 9kHz for QP    |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120kHz for QP |

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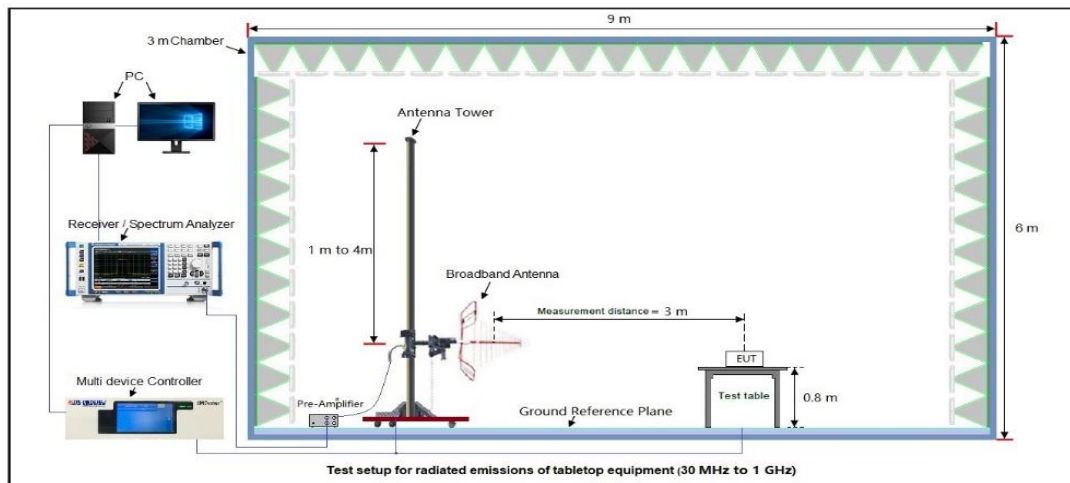


### 6.3 Measurement Setup (Block Diagram of Configuration)

Radiated Emission Test Setup 9kHz-30MHz



Radiated Emission Test Setup 30MHz-1000MHz

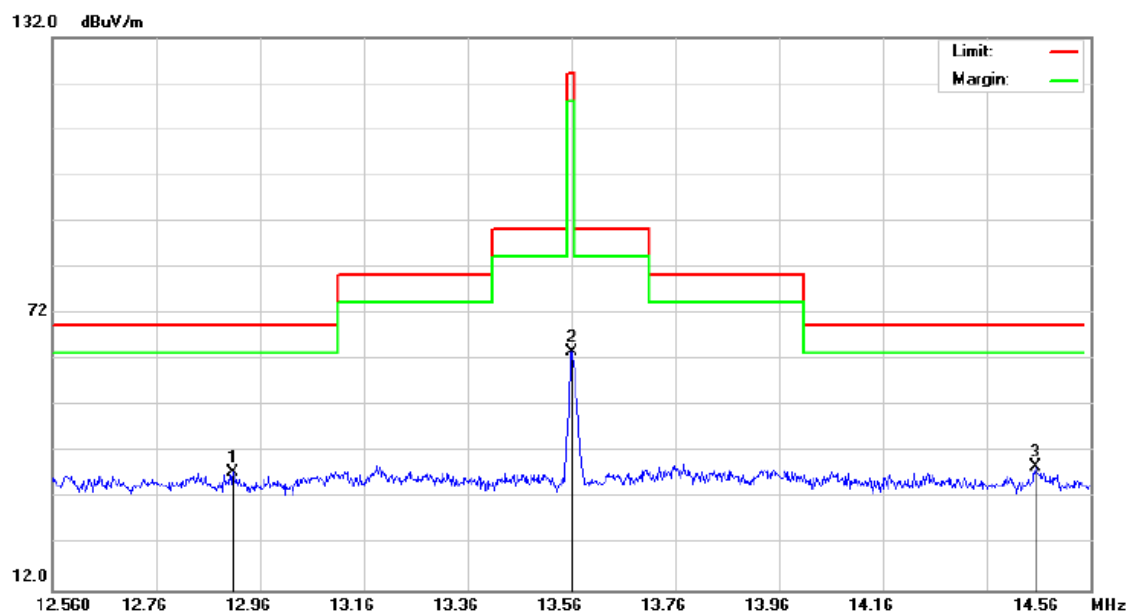


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## 6.4 Measurement Result

|             |                     |                   |                   |
|-------------|---------------------|-------------------|-------------------|
| EUT Name    | Smart Label Printer | Model Name        | NIIMBOT K2        |
| Temperature | 23.5 °C             | Relative Humidity | 61.4 %            |
| Pressure    | 960hPa              | Test Voltage      | DC 12V by adapter |
| Test Mode   | Mode 1              | Antenna Polarity  | Face              |

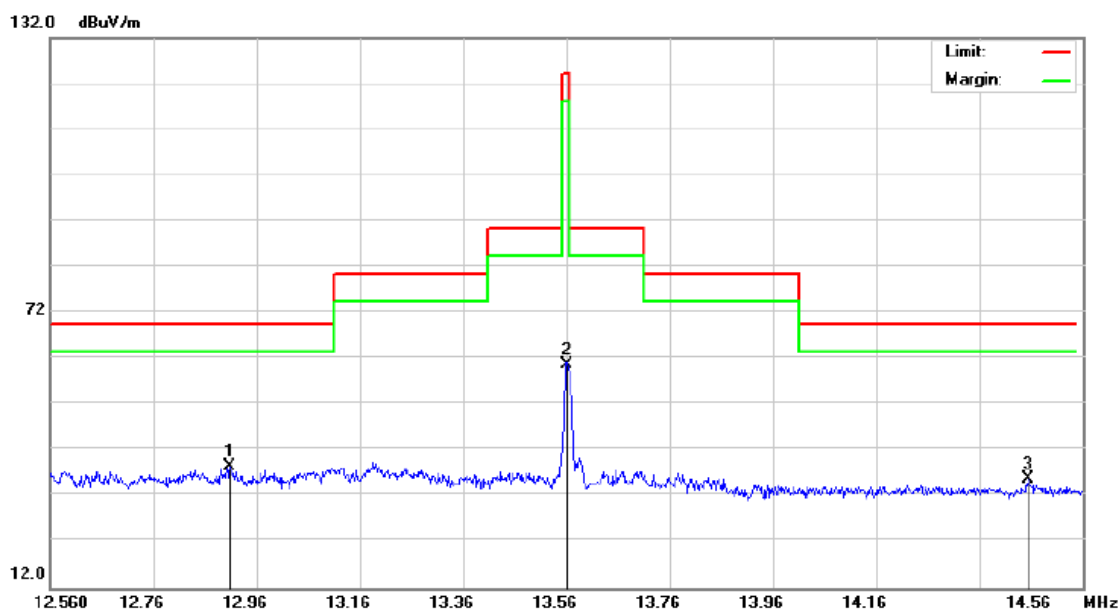


| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   |     | 12.9077      | 13.02                    | 24.59                   | 37.61                      | 69.50           | -31.89     | peak     |
| 2   |     | 13.5600      | 39.16                    | 24.64                   | 63.80                      | 124.0           | -60.20     | peak     |
| 3   | *   | 14.4540      | 14.12                    | 24.70                   | 38.82                      | 69.50           | -30.68     | peak     |

## RESULT: Pass

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|             |                     |                   |                   |
|-------------|---------------------|-------------------|-------------------|
| EUT Name    | Smart Label Printer | Model Name        | NIIMBOT K2        |
| Temperature | 23.5 °C             | Relative Humidity | 61.4 %            |
| Pressure    | 960hPa              | Test Voltage      | DC 12V by adapter |
| Test Mode   | Mode 1              | Antenna Polarity  | Side              |



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   | *   | 12.9077      | 14.02                    | 24.59                   | 38.61                      | 69.50           | -30.89     | peak     |
| 2   |     | 13.5600      | 36.16                    | 24.64                   | 60.80                      | 124.0           | -63.20     | peak     |
| 3   |     | 14.4540      | 11.12                    | 24.70                   | 35.82                      | 69.50           | -33.68     | peak     |

### RESULT: Pass

- Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.
- The "Factor" value can be calculated automatically by software of measurement system.

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## 7. Radiated Spurious Emissions

### 7.1 Provisions Applicable

According to 15.35, on any frequency or frequencies below or equal to 1000 MHz, the limits Shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test.

The field strength of any emissions which appear outside of 13.110 ~14.010MHz band shall not exceed the general radiated emissions limits.

15.209 Limit in the below table has to be followed:

| Frequency<br>(MHz) | Distance<br>Meters | Field Strengths Limit                                                                             |                                   |
|--------------------|--------------------|---------------------------------------------------------------------------------------------------|-----------------------------------|
|                    |                    | $\mu\text{V}/\text{m}$                                                                            | $\text{dB}(\mu\text{V})/\text{m}$ |
| 0.009 ~ 0.490      | 300                | 2400/F(kHz)                                                                                       | ---                               |
| 0.490 ~ 1.705      | 30                 | 24000/F(kHz)                                                                                      | ---                               |
| 1.705 ~ 30         | 30                 | 30                                                                                                | ---                               |
| 30 ~ 88            | 3                  | 100                                                                                               | 40.0                              |
| 88 ~ 216           | 3                  | 150                                                                                               | 43.5                              |
| 216 ~ 960          | 3                  | 200                                                                                               | 46.0                              |
| 960 ~ 1000         | 3                  | 500                                                                                               | 54.0                              |
| Above 1000         | 3                  | 74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak)<br>54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average) |                                   |

Remark:

(1) Emission level  $\text{dB}\mu\text{V} = 20 \log \text{Emission level } \mu\text{V}/\text{m}$

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

### 7.2 Measurement Procedure

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.

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6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

The following table is the setting of spectrum analyzer and receiver.

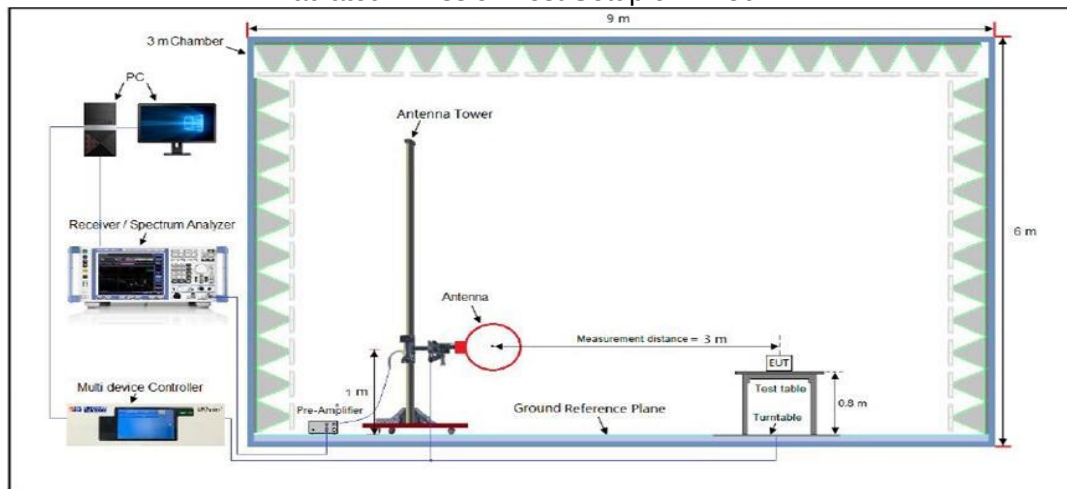
| Spectrum Parameter    | Setting                                                   |
|-----------------------|-----------------------------------------------------------|
| Start ~Stop Frequency | 9kHz~150kHz/RB 200Hz for QP                               |
| Start ~Stop Frequency | 150kHz~30MHz/RB 9kHz for QP                               |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120kHz for QP                            |
| Start ~Stop Frequency | 1GHz~26.5GHz<br>1MHz/3MHz for Peak, 1MHz/3MHz for Average |

| Receiver Parameter    | Setting                        |
|-----------------------|--------------------------------|
| Start ~Stop Frequency | 9kHz~150kHz/RB 200Hz for QP    |
| Start ~Stop Frequency | 150kHz~30MHz/RB 9kHz for QP    |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120kHz for QP |

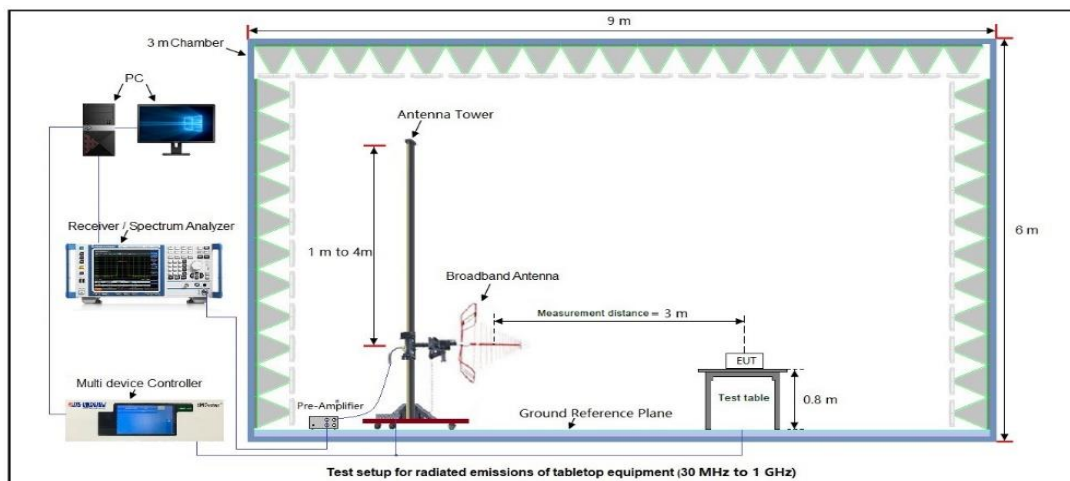
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### 7.3 Measurement Setup (Block Diagram of Configuration)

Radiated Emission Test Setup 9kHz-30MHz



Radiated Emission Test Setup 30MHz-1000MHz

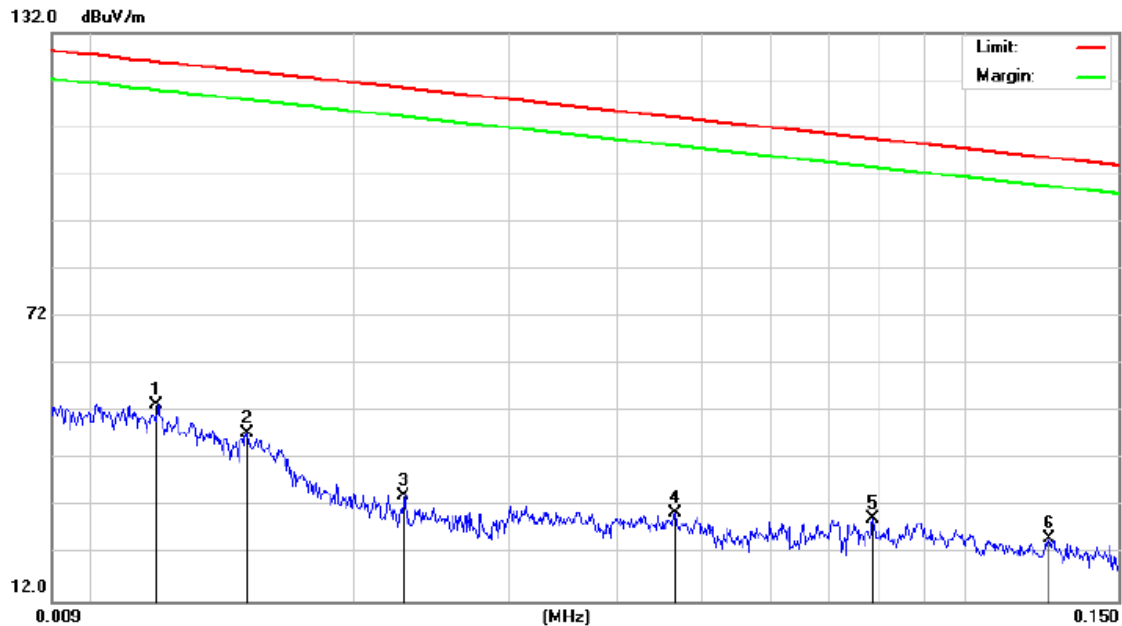


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## 7.4 Measurement Result

### RADIATED EMISSION FROM 9kHz-150kHz

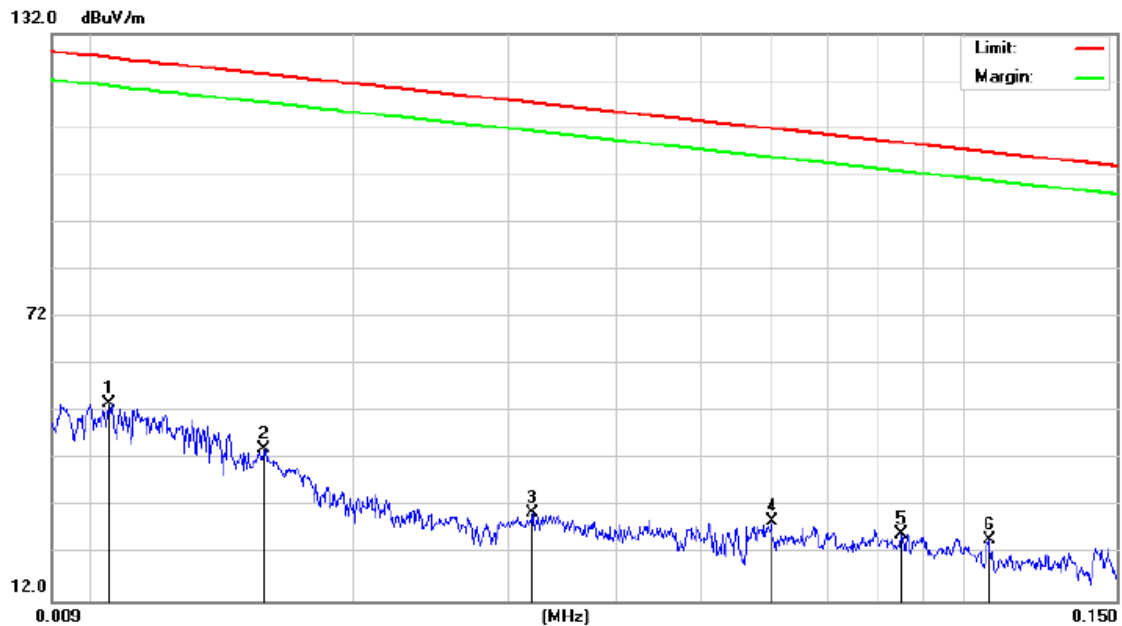
|             |                     |                   |                   |
|-------------|---------------------|-------------------|-------------------|
| EUT         | Smart Label Printer | Model Name        | NIIMBOT K2        |
| Temperature | 22.8 °C             | Relative Humidity | 59.7 %            |
| Pressure    | 960hPa              | Test Voltage      | DC 12V by adapter |
| Test Mode   | Mode 1              | Antenna           | Face              |



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   | *   | 0.0119       | 10.97                    | 42.54                   | 53.51                      | 125.8           | -72.38     | peak     |
| 2   |     | 0.0151       | 6.79                     | 40.74                   | 47.53                      | 123.8           | -76.31     | peak     |
| 3   |     | 0.0228       | -3.09                    | 37.33                   | 34.24                      | 120.2           | -86.04     | peak     |
| 4   |     | 0.0466       | -3.23                    | 33.84                   | 30.61                      | 114.1           | -83.50     | peak     |
| 5   |     | 0.0785       | -2.85                    | 32.48                   | 29.63                      | 109.6           | -79.98     | peak     |
| 6   |     | 0.1249       | -6.89                    | 32.26                   | 25.37                      | 105.6           | -80.23     | peak     |

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|             |                     |                   |                   |
|-------------|---------------------|-------------------|-------------------|
| EUT         | Smart Label Printer | Model Name        | NIIMBOT K2        |
| Temperature | 22.8 °C             | Relative Humidity | 59.7 %            |
| Pressure    | 960hPa              | Test Voltage      | DC 12V by adapter |
| Test Mode   | Mode 1              | Antenna           | Side              |



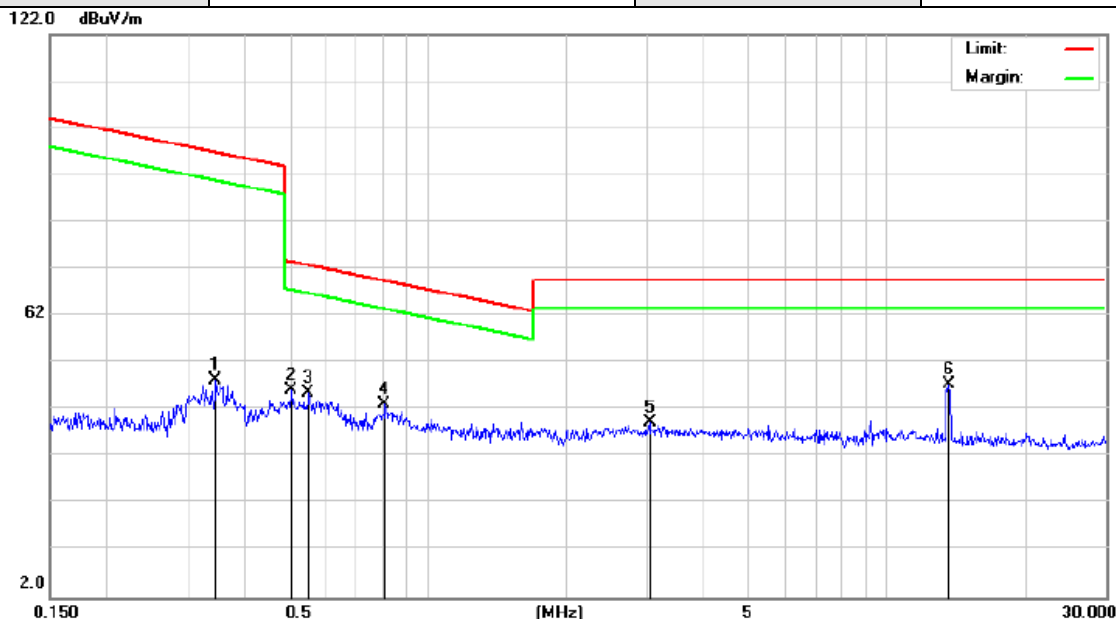
| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   | *   | 0.0105       | 10.41                    | 43.32                   | 53.73                      | 126.9           | -73.25     | peak     |
| 2   |     | 0.0158       | 3.93                     | 40.34                   | 44.27                      | 123.4           | -79.18     | peak     |
| 3   |     | 0.0320       | -4.63                    | 35.40                   | 30.77                      | 117.3           | -86.58     | peak     |
| 4   |     | 0.0602       | -4.03                    | 33.06                   | 29.03                      | 111.9           | -82.87     | peak     |
| 5   |     | 0.0850       | -5.95                    | 32.34                   | 26.39                      | 108.9           | -82.53     | peak     |
| 6   |     | 0.1069       | -7.20                    | 32.17                   | 24.97                      | 106.9           | -81.97     | peak     |

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### RADIATED EMISSION FROM 150kHz-30MHz

|                    |                     |                          |                   |
|--------------------|---------------------|--------------------------|-------------------|
| <b>EUT</b>         | Smart Label Printer | <b>Model Name</b>        | NIIMBOT K2        |
| <b>Temperature</b> | 22.8 °C             | <b>Relative Humidity</b> | 59.7 %            |
| <b>Pressure</b>    | 960hPa              | <b>Test Voltage</b>      | DC 12V by adapter |
| <b>Test Mode</b>   | Mode 1              | <b>Antenna</b>           | Face              |

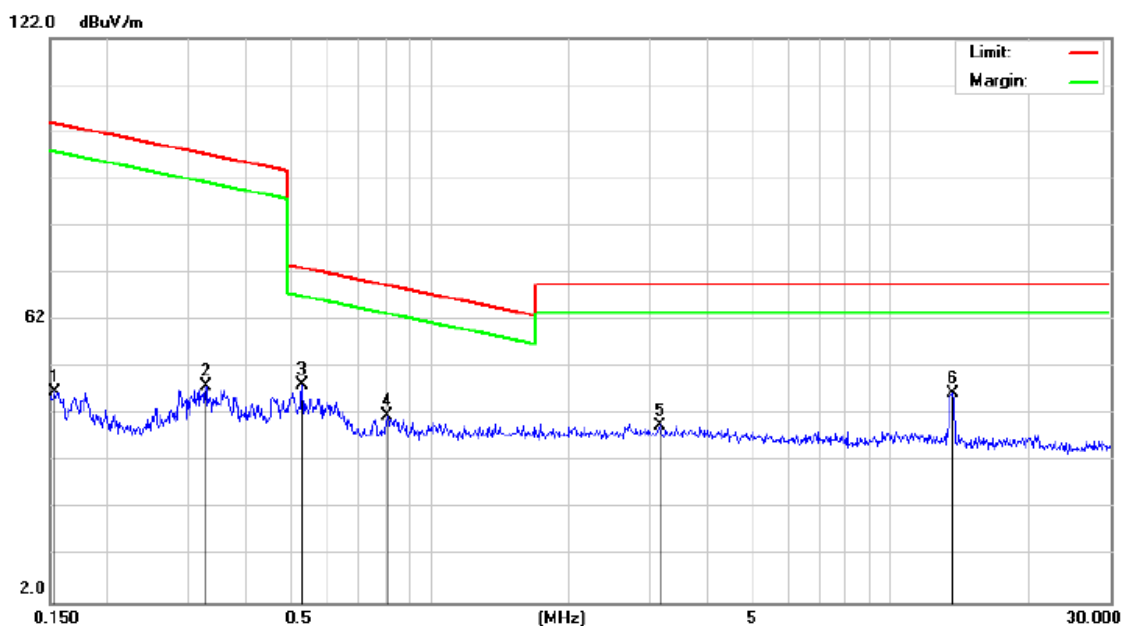


| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   |     | 0.3446       | 16.03                    | 32.37                   | 48.40                      | 96.84           | -48.44     | peak     |
| 2   |     | 0.5047       | 14.16                    | 32.21                   | 46.37                      | 73.54           | -27.17     | peak     |
| 3   |     | 0.5493       | 13.34                    | 32.20                   | 45.54                      | 72.81           | -27.27     | peak     |
| 4   |     | 0.8044       | 11.12                    | 32.14                   | 43.26                      | 69.49           | -26.23     | peak     |
| 5   |     | 3.0412       | 8.18                     | 31.20                   | 39.38                      | 69.54           | -30.16     | peak     |
| 6   | *   | 13.5600      | 17.57                    | 29.91                   | 47.48                      | 69.54           | -22.06     | peak     |

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|             |                     |                   |                   |
|-------------|---------------------|-------------------|-------------------|
| EUT         | Smart Label Printer | Model Name        | NIIMBOT K2        |
| Temperature | 22.8 °C             | Relative Humidity | 59.7 %            |
| Pressure    | 960hPa              | Test Voltage      | DC 12V by adapter |
| Test Mode   | Mode 1              | Antenna           | Side              |

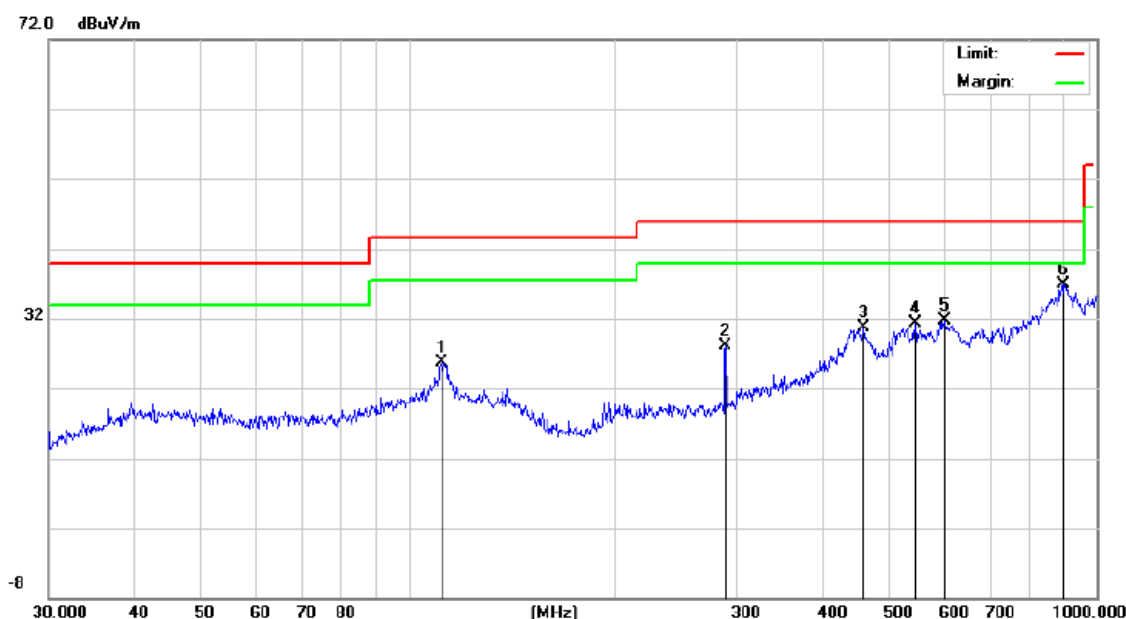


| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   |     | 0.1532       | 14.35                    | 32.41                   | 46.76                      | 103.8           | -57.08     | peak     |
| 2   |     | 0.3266       | 15.69                    | 32.38                   | 48.07                      | 97.30           | -49.23     | peak     |
| 3   |     | 0.5292       | 16.12                    | 32.20                   | 48.32                      | 73.13           | -24.81     | peak     |
| 4   |     | 0.8087       | 9.62                     | 32.14                   | 41.76                      | 69.45           | -27.69     | peak     |
| 5   |     | 3.1562       | 8.69                     | 31.11                   | 39.80                      | 69.54           | -29.74     | peak     |
| 6   | *   | 13.5600      | 16.64                    | 29.91                   | 46.55                      | 69.54           | -22.99     | peak     |

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### Radiated Emission From 30MHz to 1000MHz

|             |                     |                   |                   |
|-------------|---------------------|-------------------|-------------------|
| EUT Name    | Smart Label Printer | Model Name        | NIIMBOT K2        |
| Temperature | 22.9 °C             | Relative Humidity | 59.1 %            |
| Pressure    | 960hPa              | Test Voltage      | DC 12V by adapter |
| Test Mode   | Mode 1              | Antenna Polarity  | Horizontal        |



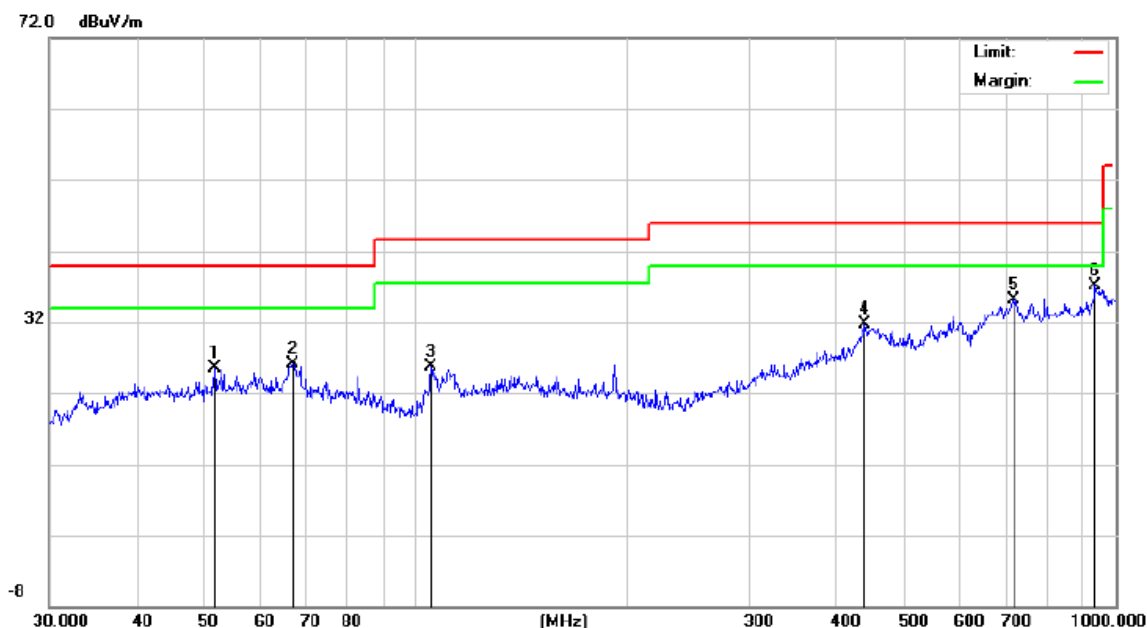
| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   |     | 111.7380     | 9.48                     | 16.32                   | 25.80                      | 43.50           | -17.70     | peak     |
| 2   |     | 289.0021     | 12.47                    | 15.62                   | 28.09                      | 46.00           | -17.91     | peak     |
| 3   |     | 459.1144     | 6.36                     | 24.43                   | 30.79                      | 46.00           | -15.21     | peak     |
| 4   |     | 545.1826     | 7.37                     | 23.98                   | 31.35                      | 46.00           | -14.65     | peak     |
| 5   |     | 601.4265     | 6.64                     | 25.11                   | 31.75                      | 46.00           | -14.25     | peak     |
| 6   | *   | 896.9965     | 5.44                     | 31.42                   | 36.86                      | 46.00           | -9.14      | peak     |

**RESULT: PASS**

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|             |                     |                   |                   |
|-------------|---------------------|-------------------|-------------------|
| EUT Name    | Smart Label Printer | Model Name        | NIIMBOT K2        |
| Temperature | 22.9 °C             | Relative Humidity | 59.1 %            |
| Pressure    | 960hPa              | Test Voltage      | DC 12V by adapter |
| Test Mode   | Mode 1              | Antenna Polarity  | Vertical          |



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   |     | 51.6615      | 8.51                     | 17.02                   | 25.53                      | 40.00           | -14.47     | peak     |
| 2   |     | 66.9668      | 9.11                     | 17.03                   | 26.14                      | 40.00           | -13.86     | peak     |
| 3   |     | 105.2717     | 10.51                    | 15.12                   | 25.63                      | 43.50           | -17.87     | peak     |
| 4   |     | 438.6553     | 5.85                     | 25.88                   | 31.73                      | 46.00           | -14.27     | peak     |
| 5   |     | 714.1734     | 6.56                     | 28.60                   | 35.16                      | 46.00           | -10.84     | peak     |
| 6   | *   | 935.5462     | 6.80                     | 30.40                   | 37.20                      | 46.00           | -8.80      | peak     |

### RESULT: Pass

- Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.
- The "Factor" value can be calculated automatically by software of measurement system.

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## 8. 20dB Bandwidth Measurement

### 8.1 Provisions Applicable

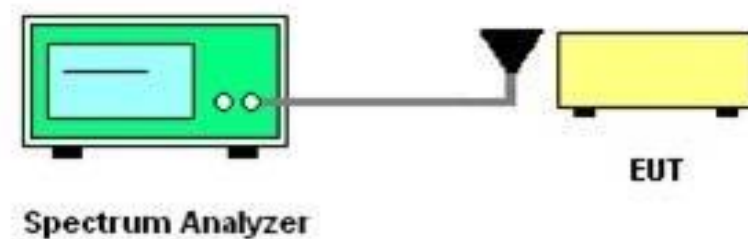
Intentional radiators must be designed to ensure that the 20dB and 99% emission bandwidth in the specific band 13.553~13.567MHz.

### 8.2 Measurement Procedure

Set the parameters of SPA as below:

1. The spectrum analyzer connected via a receive antenna placed near the EUT in peak Max hold mode.
2. Centre frequency = Operation Frequency
3. The resolution bandwidth of 10 kHz and the video bandwidth of 30 kHz were used.
4. Span: 100kHz, Sweep time: Auto
5. Set the EUT to continue transmitting mode. Allow the trace to stabilize. Use the “N dB down” function of SPA to define the bandwidth.
6. Measured the spectrum width with power higher than 20dB below carrier.
7. Measured the 99% OBW.
8. Record the plots and reported.

### 8.3 Measurement Setup (Block Diagram of Configuration)

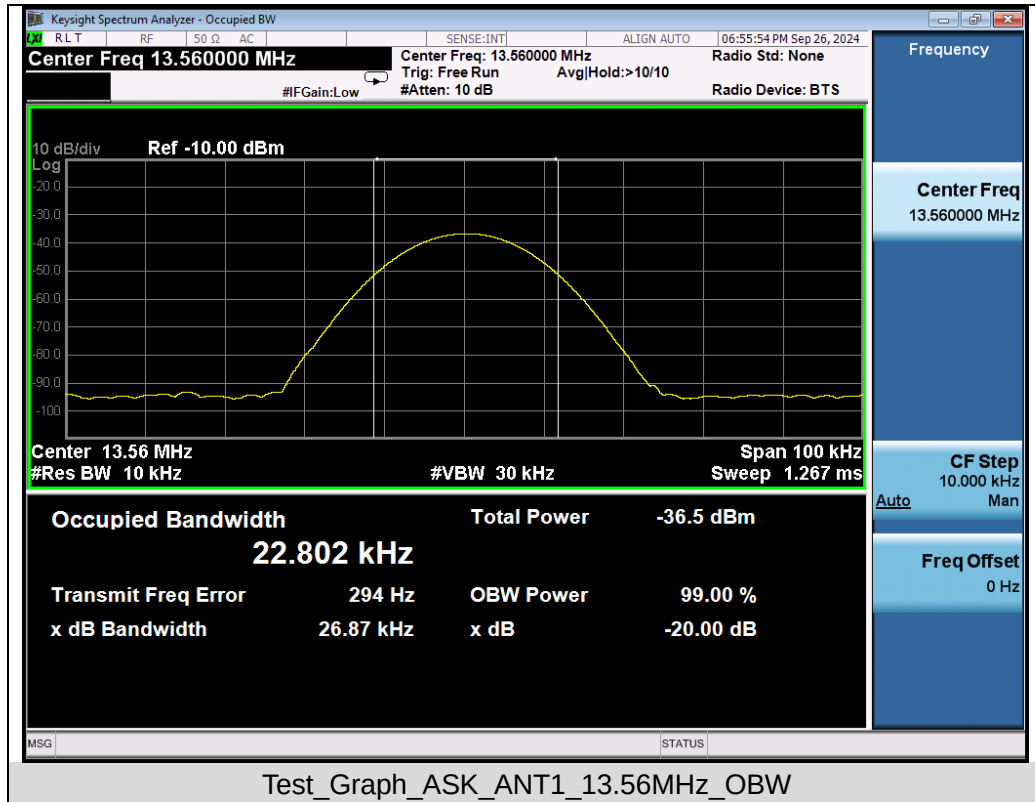


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## 8.4 Measurement Result

| Test Data of Bandwidth Measurement |            |                              |                       |              |              |
|------------------------------------|------------|------------------------------|-----------------------|--------------|--------------|
| Test Channel (MHz)                 | Modulation | 99% Occupied Bandwidth (kHz) | -20dB Bandwidth (kHz) | Limits (kHz) | Pass or Fail |
| 13.56                              | ASK        | 22.802                       | 26.87                 | N/A          | Pass         |

Test Graphs of Occupied Bandwidth and -20dB Bandwidth



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## 9. Frequency Stability Measurement

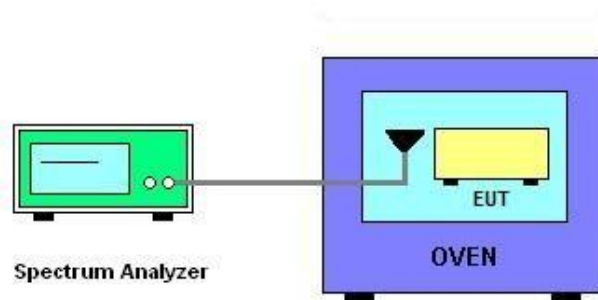
### 9.1 Provisions Applicable

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  (100ppm) 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.

### 9.2 Measurement Procedure

1. The spectrum analyzer connected via a receive antenna placed near the EUT.
2. EUT have transmitted signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire emissions bandwidth.
4. Set RBW = 1 kHz, VBW = 3 kHz with peak detector and max hold settings.
5. The  $f_c$  is declaring of channel frequency. Then the frequency error formula is  $(f_c - f)/f_c \times 10^6$  ppm and the limit is less than  $\pm 100$ ppm.
6. Extreme temperature rule is -20°C~50°C.

### 9.3 Measurement Setup (Block Diagram of Configuration)



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#### 9.4 Measurement Result

| Test Data of Frequency Stability Measurement |                        |                     |                             |                 |              |
|----------------------------------------------|------------------------|---------------------|-----------------------------|-----------------|--------------|
| Test Channel<br>(MHz)                        | Measurement Conditions |                     | Measurement Result<br>(ppm) | Limits<br>(ppm) | Pass or Fail |
|                                              | Voltage<br>(V)         | Temperature<br>(°C) |                             |                 |              |
| 13.56                                        | 12.0                   | -20                 | 32                          | ±100            | Pass         |
|                                              |                        | -10                 | 30                          | ±100            | Pass         |
|                                              |                        | 0                   | 44                          | ±100            | Pass         |
|                                              |                        | 10                  | 31                          | ±100            | Pass         |
|                                              |                        | 25                  | 27                          | ±100            | Pass         |
|                                              |                        | 30                  | 25                          | ±100            | Pass         |
|                                              |                        | 40                  | 22                          | ±100            | Pass         |
|                                              |                        | 50                  | 30                          | ±100            | Pass         |
|                                              | 12.0                   | 25                  | 26                          | ±100            | Pass         |
|                                              | 10.2                   | 25                  | 27                          | ±100            | Pass         |
|                                              | 13.8                   | 25                  | 29                          | ±100            | Pass         |

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## 10. AC Power Line Conducted Emission Test

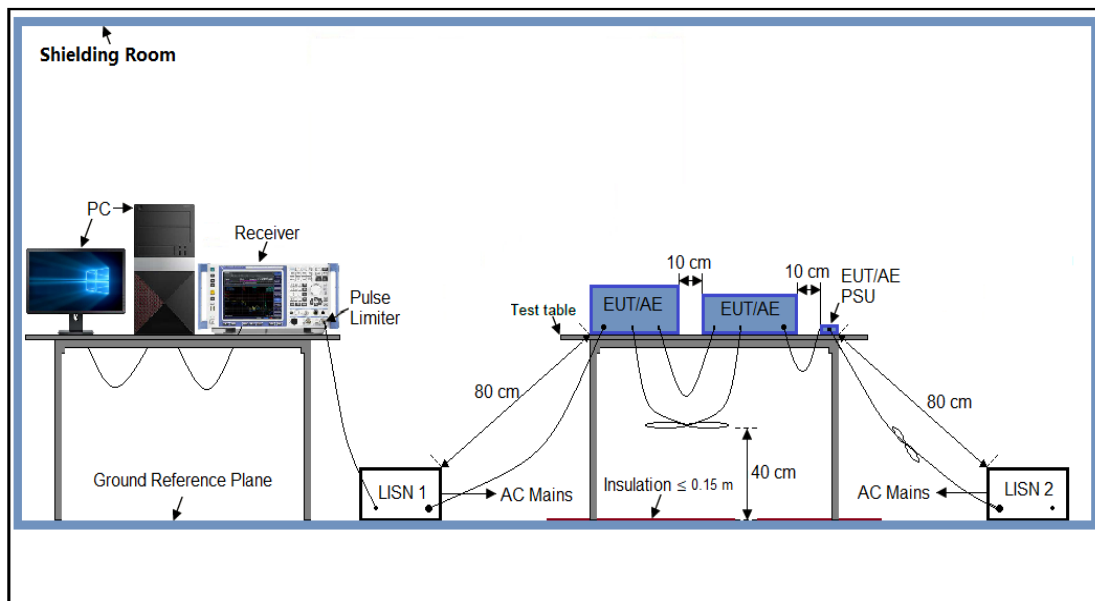
### 10.1 Measurement Limit

| Frequency Range | Maximum RF Line Voltage |                      |
|-----------------|-------------------------|----------------------|
|                 | Q.P. (dB $\mu$ V)       | Average (dB $\mu$ V) |
| 150kHz~500kHz   | 66-56                   | 56-46                |
| 500kHz~5MHz     | 56                      | 46                   |
| 5MHz~30MHz      | 60                      | 50                   |

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### 10.2 Measurement Setup (Block Diagram of Configuration)



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### 10.3 Preliminary Procedure of Line Conducted Emission Test

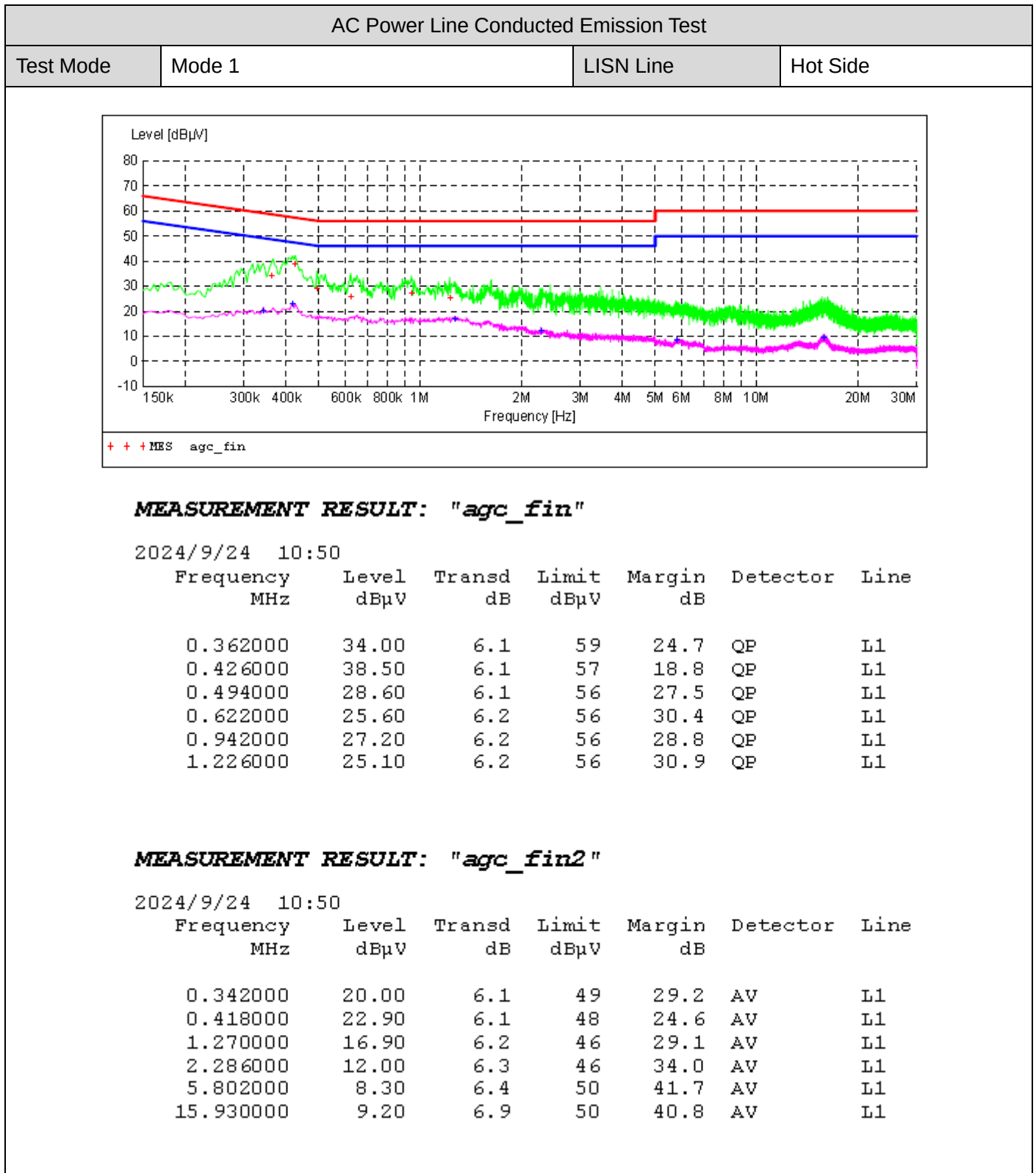
1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipment received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC 12V power from adapter which received AC120V/60Hz power from a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

### 10.4 Final Procedure of Line Conducted Emission Test

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less – 2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

## 10.5 Measurement Result

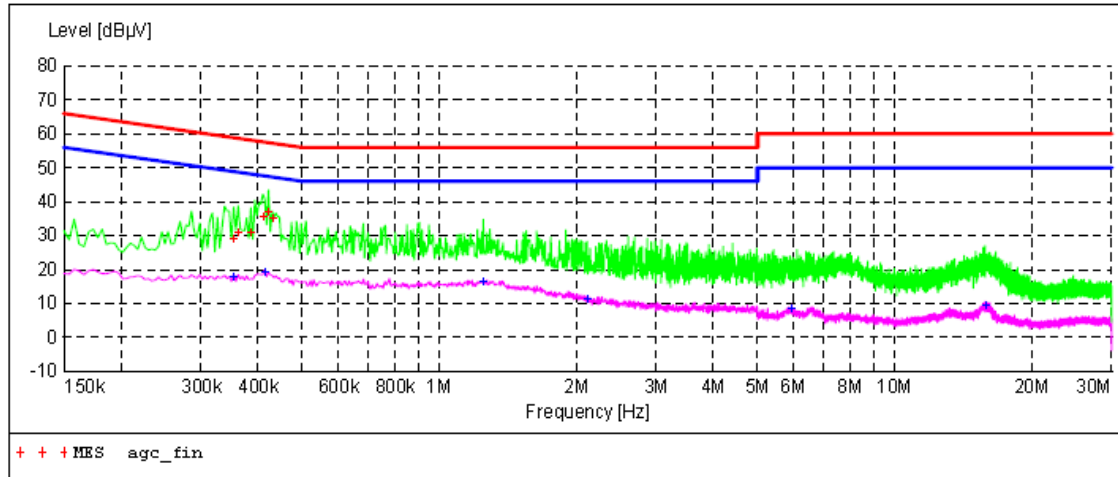


## RESULT: Pass

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## AC Power Line Conducted Emission Test

|           |        |           |              |
|-----------|--------|-----------|--------------|
| Test Mode | Mode 1 | LISN Line | Neutral Side |
|-----------|--------|-----------|--------------|

**MEASUREMENT RESULT: "agc\_fin"**

2024/9/24 10:52

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Detector | Line |
|------------------|---------------|--------------|---------------|--------------|----------|------|
| 0.354000         | 28.90         | 6.1          | 59            | 30.0         | QP       | N    |
| 0.362000         | 30.60         | 6.1          | 59            | 28.1         | QP       | N    |
| 0.386000         | 30.80         | 6.1          | 58            | 27.3         | QP       | N    |
| 0.410000         | 35.30         | 6.1          | 58            | 22.3         | QP       | N    |
| 0.422000         | 36.90         | 6.1          | 57            | 20.5         | QP       | N    |
| 0.430000         | 34.80         | 6.1          | 57            | 22.5         | QP       | N    |

**MEASUREMENT RESULT: "agc\_fin2"**

2024/9/24 10:52

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Detector | Line |
|------------------|---------------|--------------|---------------|--------------|----------|------|
| 0.354000         | 17.60         | 6.1          | 49            | 31.3         | AV       | N    |
| 0.414000         | 19.00         | 6.1          | 48            | 28.6         | AV       | N    |
| 1.250000         | 16.10         | 6.2          | 46            | 29.9         | AV       | N    |
| 2.126000         | 11.30         | 6.2          | 46            | 34.7         | AV       | N    |
| 5.954000         | 8.10          | 6.4          | 50            | 41.9         | AV       | N    |
| 15.814000        | 9.20          | 6.9          | 50            | 40.8         | AV       | N    |

**RESULT: Pass**

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### **Appendix I: Photographs of Test Setup**

Refer to the Report No.: AGC07434240906AP02

### **Appendix II: Photographs of Test EUT**

Refer to the Report No.: AGC07434240906AP03

**-----End of Report-----**

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7. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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