

# TEST REPORT

|                                   |                                                                                                                                                                                                                                                                                                   |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Applicant:</b>                 | NINGBO JINGHUI OPTO-ELECTRONIC CO., LTD                                                                                                                                                                                                                                                           |
| <b>Address of Applicant:</b>      | No.616 Qingqing Road, The District B, Zhenhai Economic Development Zone, Ningbo, China                                                                                                                                                                                                            |
| <b>Manufacturer:</b>              | NINGBO JINGHUI OPTO-ELECTRONIC CO., LTD                                                                                                                                                                                                                                                           |
| <b>Address of Manufacturer:</b>   | No.616 Qingqing Road, The District B, Zhenhai Economic Development Zone, Ningbo, China                                                                                                                                                                                                            |
| <b>Factory:</b>                   | 1. Ningbo Jinghui Opto-Electronic Co., Ltd.<br>2. JINGHUI OPTO ELECTRONIC (THAILAND) CO., LTD.                                                                                                                                                                                                    |
| <b>Address of Factory:</b>        | 1. No. 616 Qingqing Road, The District B, Zhenhai Economic Development Zone, NINGBO Zhejiang<br>2. 61/6.Moo15,Tambon Narerk, Amphur Phanat Nikhom,Chon Buri,Thailand 20240                                                                                                                        |
| <b>Equipment Under Test (EUT)</b> |                                                                                                                                                                                                                                                                                                   |
| <b>Product Name:</b>              | LED Splicing lamp                                                                                                                                                                                                                                                                                 |
| <b>Model No.:</b>                 | HL/RF/D/32/56/16/448/120, HL/RF/D/32/X/16/y/120(x=quantity of LED units, it can be 06, 11,15, 19, 21, 23, 24, 26, 27, 30, 31, 34, 36, 38, 41,42, 45, 46, 48, 50; y= total power, it can be 48, 88, 120, 152, 168, 184, 208, 216, 240, 248, 272, 288, 304, 328, 336, 360, 368, 384, 400, 408, 448) |
| <b>FCC ID:</b>                    | 2ACNS-GT-BU-24LB                                                                                                                                                                                                                                                                                  |
| <b>Applicable standards:</b>      | FCC CFR Title 47 Part 15 Subpart C Section 15.231                                                                                                                                                                                                                                                 |
| <b>Date of sample receipt:</b>    | December 30, 2024                                                                                                                                                                                                                                                                                 |
| <b>Date of Test:</b>              | December 30, 2024-February 13, 2025                                                                                                                                                                                                                                                               |
| <b>Date of report issued:</b>     | February 13, 2025                                                                                                                                                                                                                                                                                 |
| <b>Test Result :</b>              | PASS *                                                                                                                                                                                                                                                                                            |

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

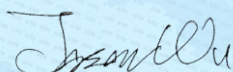
Robinson Luo  
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

## 2 Version

| Version No. | Date              | Description |
|-------------|-------------------|-------------|
| 01          | February 13, 2025 | Original    |
|             |                   |             |
|             |                   |             |
|             |                   |             |
|             |                   |             |

Prepared By:

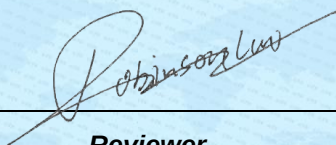


Project Engineer

Date:

February 13, 2025

Check By:



Reviewer

Date:

February 13, 2025

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## 4 Test Summary

| Test Item                                | Section in CFR 47 | Result |
|------------------------------------------|-------------------|--------|
| Antenna Requirement                      | 15.203            | Pass   |
| Conduction Emission                      | 15.207            | N/A    |
| Field strength of the Fundamental Signal | 15.231 (b)        | Pass   |
| Spurious Emissions                       | 15.231 (b)/15.209 | Pass   |
| 20dB Bandwidth                           | 15.231 (c)        | Pass   |
| Deactivation Testing                     | 15.231 (a)(2)     | Pass   |

Pass: The EUT complies with the essential requirements in the standard.

N/A: Not applicable.

### 4.1 Measurement Uncertainty

| No. | Item                             | Measurement Uncertainty              |
|-----|----------------------------------|--------------------------------------|
| 1   | Radio Frequency                  | $\pm 7.25 \times 10^{-8}$            |
| 2   | Duty cycle                       | $\pm 0.37\%$                         |
| 3   | Occupied Bandwidth               | $\pm 3\%$                            |
| 4   | RF conducted power               | $\pm 0.75\text{dB}$                  |
| 5   | RF power density                 | $\pm 3\text{dB}$                     |
| 6   | Conducted Spurious emissions     | $\pm 2.58\text{dB}$                  |
| 7   | AC Power Line Conducted Emission | $\pm 3.44\text{dB}$ (0.15MHz~30MHz)  |
| 8   | Radiated Spurious emission test  | $\pm 3.1\text{dB}$ (9kHz-30MHz)      |
|     |                                  | $\pm 3.8039\text{dB}$ (30MHz-200MHz) |
|     |                                  | $\pm 3.9679\text{dB}$ (200MHz-1GHz)  |
|     |                                  | $\pm 4.29\text{dB}$ (1GHz-18GHz)     |
|     |                                  | $\pm 3.30\text{dB}$ (18GHz-40GHz)    |
| 9   | Temperature test                 | $\pm 1^\circ\text{C}$                |
| 10  | Humidity test                    | $\pm 3\%$                            |
| 11  | Time                             | $\pm 3\%$                            |

## 5 General Information

### 5.1 General Description of EUT

|                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name:                                                                                                                                                                          | LED Splicing lamp                                                                                                                                                                                                                                                                                 |
| Model No.:                                                                                                                                                                             | HL/RF/D/32/56/16/448/120, HL/RF/D/32/X/16/y/120(x=quantity of LED units, it can be 06, 11,15, 19, 21, 23, 24, 26, 27, 30, 31, 34, 36, 38, 41,42, 45, 46, 48, 50; y= total power, it can be 48, 88, 120, 152, 168, 184, 208, 216, 240, 248, 272, 288, 304, 328, 336, 360, 368, 384, 400, 408, 448) |
| Test Model No.:                                                                                                                                                                        | HL/RF/D/32/56/16/448/120                                                                                                                                                                                                                                                                          |
| Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are appearance color and model name for commercial purpose. |                                                                                                                                                                                                                                                                                                   |
| S/N:                                                                                                                                                                                   | N/A                                                                                                                                                                                                                                                                                               |
| Test sample(s) ID:                                                                                                                                                                     | GTS2024120694-1                                                                                                                                                                                                                                                                                   |
| Sample(s) Status:                                                                                                                                                                      | Engineer sample                                                                                                                                                                                                                                                                                   |
| Operation Frequency:                                                                                                                                                                   | 433.92MHz                                                                                                                                                                                                                                                                                         |
| Modulation technology:                                                                                                                                                                 | ASK                                                                                                                                                                                                                                                                                               |
| Antenna Type:                                                                                                                                                                          | PCB Antenna                                                                                                                                                                                                                                                                                       |
| Antenna gain:                                                                                                                                                                          | -14.81dBi(declare by applicant)                                                                                                                                                                                                                                                                   |
| Power supply:                                                                                                                                                                          | DC 3V(1*3V Size“CR2025” Battery)                                                                                                                                                                                                                                                                  |

Remark:

1. Antenna gain information provided by the customer
2. The relevant information of the sample is provided by the entrusting company, and the laboratory is not responsible for its authenticity.

## 5.2 Test mode

|                                              |                                   |
|----------------------------------------------|-----------------------------------|
| Transmitting mode                            | Keep the EUT in transmitting mode |
| Remark: New battery is used during all test. |                                   |

### Per-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which only the worst case was shown in this test report(Only show the worst case:Y axis) and defined as follows:

|           |                        |       |       |       |
|-----------|------------------------|-------|-------|-------|
| 433.92MHz | Axis                   | X     | Y     | Z     |
|           | Field Strength(dBuV/m) | 62.54 | 63.93 | 61.27 |

## 5.3 Description of Support Units

None.

## 5.4 Test Facility

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

- **FCC —Registration No.: 381383**

Designation Number: CN5029

Global United Technology Services Co., Ltd., Shenzhen 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 files.

- **ISED—Registration No.: 9079A**

CAB identifier: CN0091

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of ISED for radio equipment testing.

- **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

## 5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

No.123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone,  
Xixiang Road, Baoan District, Shenzhen, Guangdong, China

Tel: 0755-27798480

Fax: 0755-27798960

## 5.6 Other Information Requested by the Customer

None.

## 5.7 Additional Instructions

EUT Software Settings:

|      |                                                             |
|------|-------------------------------------------------------------|
| Mode | Continuously transmitter by manufacturer, power set default |
|------|-------------------------------------------------------------|

## 6 Test Instruments list

| Radiated Emission: |                                     |                             |                       |               |                     |                         |
|--------------------|-------------------------------------|-----------------------------|-----------------------|---------------|---------------------|-------------------------|
| Item               | Test Equipment                      | Manufacturer                | Model No.             | Inventory No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
| 1                  | 3m Semi- Anechoic Chamber           | ZhongYu Electron            | 9.2(L)*6.2(W)* 6.4(H) | GTS250        | Jun. 22, 2024       | Jun. 21, 2027           |
| 2                  | Control Room                        | ZhongYu Electron            | 6.2(L)*2.5(W)* 2.4(H) | GTS251        | N/A                 | N/A                     |
| 3                  | EMI Test Receiver                   | Rohde & Schwarz             | ESU26                 | GTS203        | Apr. 11, 2024       | Apr. 10, 2025           |
| 4                  | BiConiLog Antenna                   | SCHWARZBECK MESS-ELEKTRONIK | VULB9168              | GTS640        | Mar. 19, 2023       | Mar. 18, 2025           |
| 5                  | Double -ridged waveguide horn       | SCHWARZBECK MESS-ELEKTRONIK | BBHA 9120 D           | GTS208        | Apr. 17, 2023       | Apr. 16, 2025           |
| 6                  | Wideband Radio Communication Tester | Rohde & Schwarz             | CMW500                | GTS575        | Apr. 11, 2024       | Apr. 10, 2025           |
| 7                  | Loop Antenna                        | ZHINAN                      | ZN30900A              | GTS534        | Nov.12, 2024        | Nov.11, 2025            |
| 8                  | Broadband Preamplifier              | SCHWARZBECK                 | BBV9718               | GTS535        | Apr. 11, 2024       | Apr. 10, 2025           |
| 9                  | Amplifier(1GHz-26.5GHz)             | HP                          | 8449B                 | GTS601        | Apr. 11, 2024       | Apr. 10, 2025           |
| 10                 | Horn Antenna (15GH-40GHz)           | SCHWARZBECK                 | 01296                 | GTS691        | Mar. 07, 2024       | Mar. 06, 2025           |
| 11                 | FSV-Signal Analyzer (10Hz-40GHz)    | Keysight                    | FSV-40-N              | GTS666        | Mar. 12, 2024       | Mar. 11, 2025           |
| 12                 | Amplifier                           | /                           | LNA-1000-30S          | GTS650        | Apr. 11, 2024       | Apr. 10, 2025           |
| 13                 | CDNE M2+M3-16A                      | HCT                         | 30MHz-300MHz          | GTS692        | Nov. 07, 2024       | Nov. 06, 2025           |
| 14                 | Wideband Amplifier                  | /                           | WDA-01004000-15P35    | GTS602        | Apr. 11, 2024       | Apr. 10, 2025           |
| 15                 | Thermo meter                        | JINCHUANG                   | GSP-8A                | GTS643        | Apr. 18, 2024       | Apr. 17, 2025           |
| 16                 | RE cable 1                          | GTS                         | N/A                   | GTS675        | Jul. 02, 2024       | Jul. 01, 2025           |
| 17                 | RE cable 2                          | GTS                         | N/A                   | GTS676        | Jul. 02, 2024       | Jul. 01, 2025           |
| 18                 | RE cable 3                          | GTS                         | N/A                   | GTS677        | Jul. 02, 2024       | Jul. 01, 2025           |
| 19                 | RE cable 4                          | GTS                         | N/A                   | GTS678        | Jul. 02, 2024       | Jul. 01, 2025           |
| 20                 | RE cable 5                          | GTS                         | N/A                   | GTS679        | Jul. 02, 2024       | Jul. 01, 2025           |
| 21                 | RE cable 6                          | GTS                         | N/A                   | GTS680        | Jul. 02, 2024       | Jul. 01, 2025           |
| 22                 | RE cable 7                          | GTS                         | N/A                   | GTS681        | Jul. 05, 2024       | Jul. 04, 2025           |
| 23                 | RE cable 8                          | GTS                         | N/A                   | GTS682        | Jul. 05, 2024       | Jul. 04, 2025           |
| 24                 | EMI Test Software                   | AUDIX                       | E3-6.100614a          | GTS725        | N/A                 | N/A                     |

| RF Conducted Test: |                                                |              |                  |            |                        |                            |
|--------------------|------------------------------------------------|--------------|------------------|------------|------------------------|----------------------------|
| Item               | Test Equipment                                 | Manufacturer | Model No.        | Serial No. | Cal.Date<br>(mm-dd-yy) | Cal.Due date<br>(mm-dd-yy) |
| 1                  | MXA Signal Analyzer                            | Agilent      | N9020A           | GTS566     | Apr. 13, 2024          | Apr. 12, 2025              |
| 2                  | EMI Test Receiver                              | R&S          | ESCI 7           | GTS552     | Apr. 13, 2024          | Apr. 12, 2025              |
| 3                  | PSA Series Spectrum Analyzer                   | Agilent      | E4440A           | GTS536     | Apr. 13, 2024          | Apr. 12, 2025              |
| 4                  | MXG vector Signal Generator                    | Agilent      | N5182A           | GTS567     | Apr. 13, 2024          | Apr. 12, 2025              |
| 5                  | ESG Analog Signal Generator                    | Agilent      | E4428C           | GTS568     | Apr. 13, 2024          | Apr. 12, 2025              |
| 6                  | USB RF Power Sensor                            | DARE         | RPR3006W         | GTS569     | Apr. 13, 2024          | Apr. 12, 2025              |
| 7                  | RF Switch Box                                  | Shongyi      | RFSW3003328      | GTS571     | Apr. 13, 2024          | Apr. 12, 2025              |
| 8                  | Programmable Constant Temp & Humi Test Chamber | WEWON        | WHTH-150L-40-880 | GTS572     | Apr. 13, 2024          | Apr. 12, 2025              |
| 9                  | Thermo meter                                   | JINCHUANG    | GSP-8A           | GTS641     | Apr. 18, 2024          | Apr. 17, 2025              |

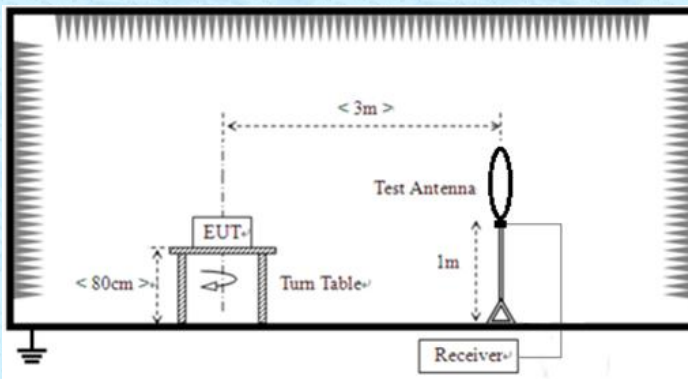
| General used equipment: |                |              |           |               |                        |                            |
|-------------------------|----------------|--------------|-----------|---------------|------------------------|----------------------------|
| Item                    | Test Equipment | Manufacturer | Model No. | Inventory No. | Cal.Date<br>(mm-dd-yy) | Cal.Due date<br>(mm-dd-yy) |
| 1                       | Barometer      | KUMAO        | SF132     | GTS647        | Apr. 18, 2024          | Apr. 17, 2025              |

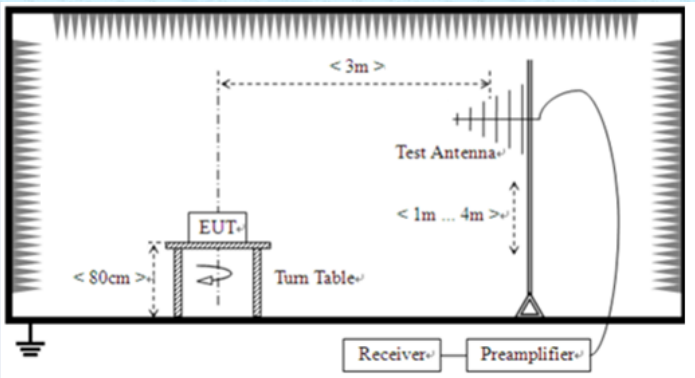
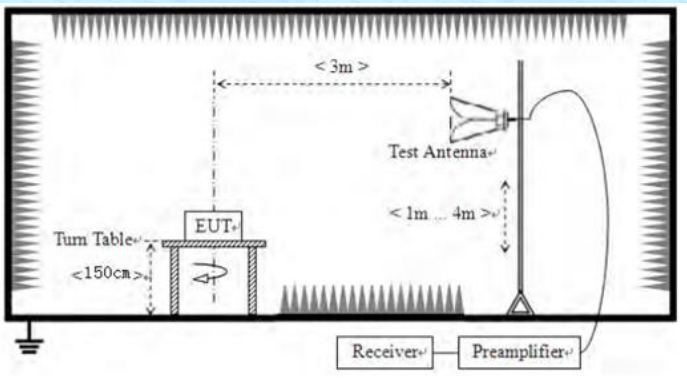
## 7 Test results and Measurement Data

### 7.1 Antenna requirement

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <b>Standard requirement:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                     | FCC Part15 C Section 15.203 |
| <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>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                             |
| The antenna is PCB antenna, reference to the appendix II for details.                                                                                                                                                                                                                                                                                                                                                                                                            |                             |

## 7.2 Radiated Emission Method

|                                                         |                                                                                                                                                        |                                                                                      |                                                  |               |                                                         |  |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------|---------------|---------------------------------------------------------|--|
| Test Requirement:                                       | FCC Part15 C Section 15.231 (b)& Section 15.209                                                                                                        |                                                                                      |                                                  |               |                                                         |  |
| Test Method:                                            | ANSI C63.10:2013                                                                                                                                       |                                                                                      |                                                  |               |                                                         |  |
| Test Frequency Range:                                   | 9kHz to 6000MHz                                                                                                                                        |                                                                                      |                                                  |               |                                                         |  |
| Test site:                                              | Measurement Distance: 3m                                                                                                                               |                                                                                      |                                                  |               |                                                         |  |
| Receiver setup:                                         | Frequency                                                                                                                                              | Detector                                                                             | RBW                                              | VBW           | Value                                                   |  |
|                                                         | 9KHz-150KHz                                                                                                                                            | Quasi-peak                                                                           | 200Hz                                            | 600Hz         | Quasi-peak                                              |  |
|                                                         | 150KHz-30MHz                                                                                                                                           | Quasi-peak                                                                           | 9KHz                                             | 30KHz         | Quasi-peak                                              |  |
|                                                         | 30MHz-1GHz                                                                                                                                             | Quasi-peak                                                                           | 120KHz                                           | 300KHz        | Quasi-peak                                              |  |
|                                                         | Above 1GHz                                                                                                                                             | Peak                                                                                 | 1MHz                                             | 3MHz          | Peak                                                    |  |
|                                                         |                                                                                                                                                        | Peak                                                                                 | 1MHz                                             | 10Hz          | Average                                                 |  |
| Limit:<br>(Field strength of the<br>fundamental signal) | Frequency                                                                                                                                              | Limit (dBuV/m @3m)                                                                   |                                                  | Remark        |                                                         |  |
|                                                         | 433.92MHz                                                                                                                                              | 100.83                                                                               |                                                  | Peak Value    |                                                         |  |
|                                                         |                                                                                                                                                        | 80.83                                                                                |                                                  | Average Value |                                                         |  |
| Limit:<br>(Spurious Emissions)                          | Fundamental Frequency (MHz)                                                                                                                            |                                                                                      | Field Strength of fundamental (microvolts/meter) |               | Field Strength of Unwanted Emissions (microvolts/meter) |  |
|                                                         | 40.66-40.70                                                                                                                                            |                                                                                      | 2250                                             |               | 225                                                     |  |
|                                                         | 70-130                                                                                                                                                 |                                                                                      | 1250                                             |               | 125                                                     |  |
|                                                         | 130-174                                                                                                                                                |                                                                                      | 1250 to 3750**                                   |               | 125 to 735                                              |  |
|                                                         | 174-260                                                                                                                                                |                                                                                      | 3750                                             |               | 375                                                     |  |
|                                                         | 260-470                                                                                                                                                |                                                                                      | 3750 to12500                                     |               | 375 to 1250                                             |  |
|                                                         | Above 470                                                                                                                                              |                                                                                      | 12500                                            |               | 1250                                                    |  |
|                                                         | Frequency (MHz)                                                                                                                                        |                                                                                      | Class B(dBuV/m @3m)                              |               |                                                         |  |
|                                                         |                                                                                                                                                        |                                                                                      | Peak                                             |               | Average                                                 |  |
|                                                         | Above 1000                                                                                                                                             |                                                                                      | 74                                               |               | 54                                                      |  |
|                                                         | Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits higher field strength. |                                                                                      |                                                  |               |                                                         |  |
|                                                         | Test setup:                                                                                                                                            | Below 30MHz                                                                          |                                                  |               |                                                         |  |
|                                                         |                                                                                                                                                        |  |                                                  |               |                                                         |  |
|                                                         | Below 1GHz                                                                                                                                             |                                                                                      |                                                  |               |                                                         |  |

|                   |                                  |                                                                                     |         |     |         |           |  |  |  |
|-------------------|----------------------------------|-------------------------------------------------------------------------------------|---------|-----|---------|-----------|--|--|--|
|                   |                                  |   |         |     |         |           |  |  |  |
|                   |                                  | Above 1GHz                                                                          |         |     |         |           |  |  |  |
|                   |                                  |  |         |     |         |           |  |  |  |
| Test Instruments: | Refer to section 6.0 for details |                                                                                     |         |     |         |           |  |  |  |
| Test mode:        | Refer to section 5.2 for details |                                                                                     |         |     |         |           |  |  |  |
| Test environment: | Temp.:                           | 25 °C                                                                               | Humid.: | 50% | Press.: | 1 010mbar |  |  |  |
| Test results:     | Pass                             |                                                                                     |         |     |         |           |  |  |  |

## Measurement data:

### 7.2.1 Field Strength of The Fundamental Signal

#### Peak value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------|----------------|---------------------|-----------------|--------------|
| 433.92          | 66.32             | 15.58                 | 3.99            | 32.23              | 53.66          | 100.83              | -47.17          | Vertical     |
| 433.92          | 76.59             | 15.58                 | 3.99            | 32.23              | 63.93          | 100.83              | -36.90          | Horizontal   |

#### Average value:

| Frequency (MHz) | Peak Value (dBuV/m) | Duty cycle factor | Average value (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|---------------------|-------------------|------------------------|---------------------|-----------------|--------------|
| 433.92          | 53.66               | -8.54             | 45.12                  | 80.83               | -35.71          | Vertical     |
| 433.92          | 63.93               | -8.54             | 55.39                  | 80.83               | -25.44          | Horizontal   |

#### Remarks:

1. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

#### Average value:

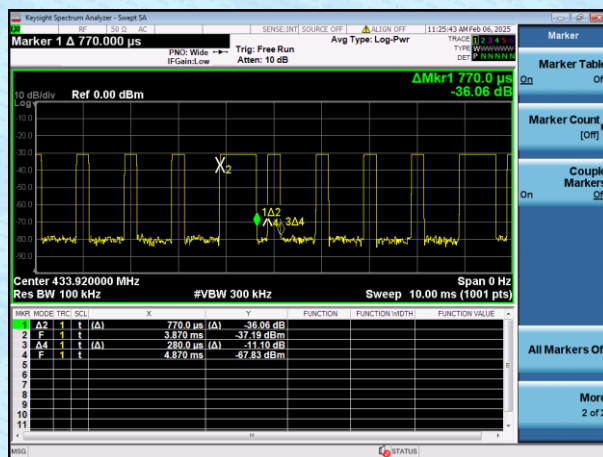
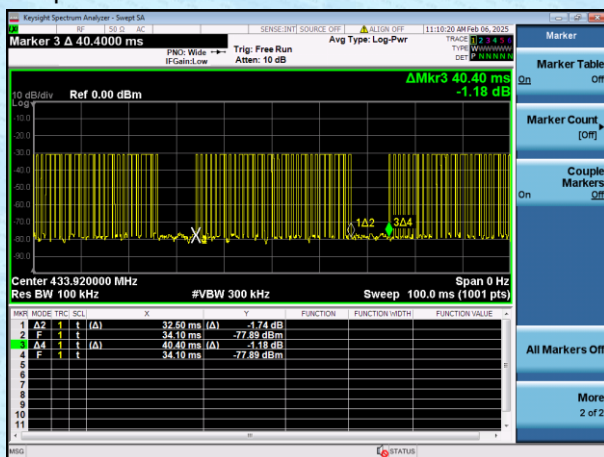
|                    |                                                                  |
|--------------------|------------------------------------------------------------------|
| Calculate Formula: | Average value=Peak value + Duty Cycle Factor                     |
|                    | Duty cycle factor=20 log(Duty cycle)                             |
|                    | Duty cycle=on time/100 milliseconds or period, whichever is less |
| Test data:         | T on time =15.12(ms)                                             |
|                    | T period =40.4(ms)                                               |
|                    | Duty cycle=0.374                                                 |
|                    | duty cycle factor=-8.54                                          |

The formula as below:

$$T \text{ on time} = (0.77 \times 12) + (0.28 \times 21) = 9.24 + 5.88 = 15.12$$

$$\text{Duty cycle} = T \text{ on time} / T \text{ period} = 15.12 / 40.4 = 0.374$$

Test plot as follows:



## 7.2.2 Spurious Emissions

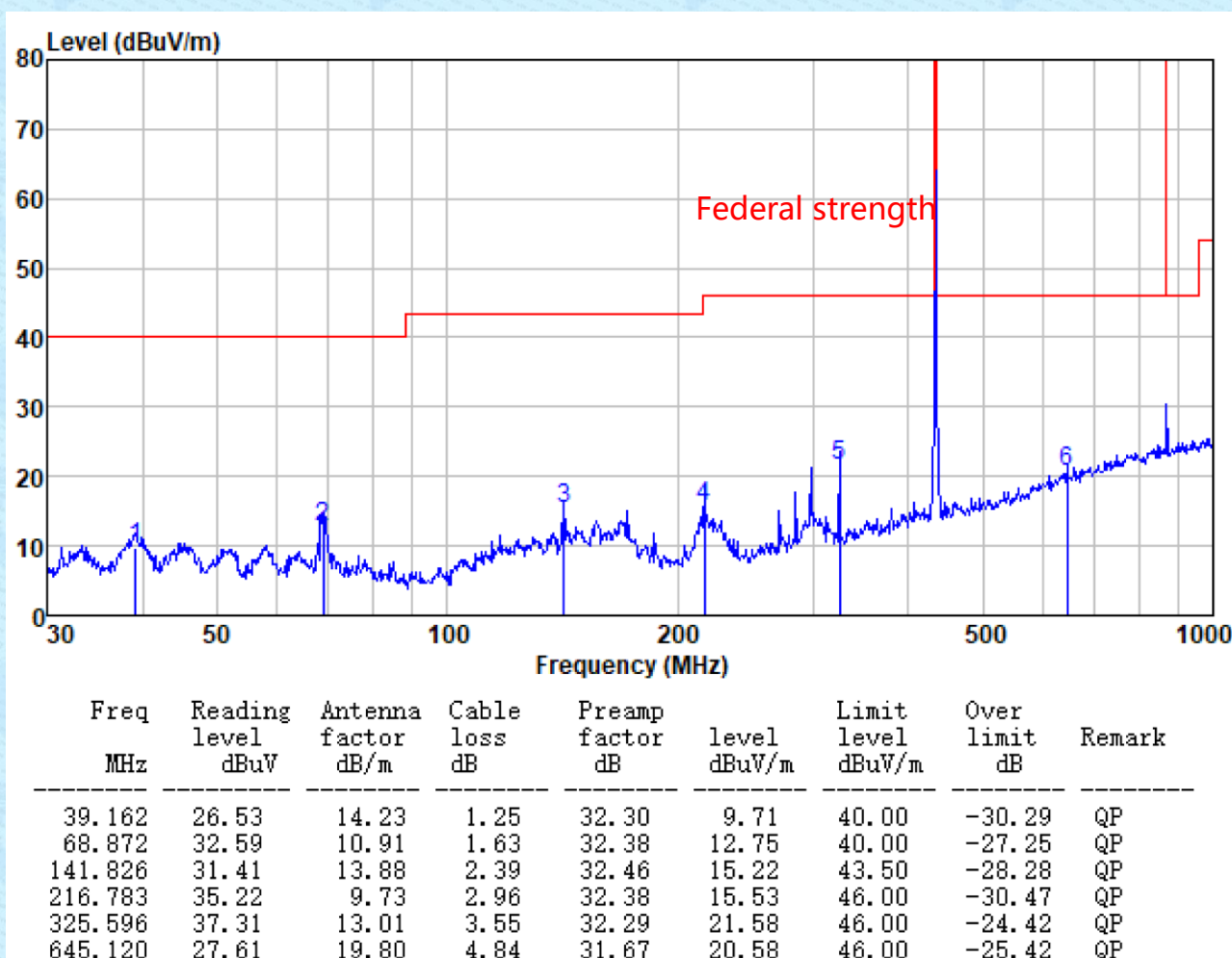
### Measurement data:

#### 9 kHz ~ 30 MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

#### Below 1GHz:

|       |                   |               |            |
|-------|-------------------|---------------|------------|
| Mode: | Transmitting mode | Polarization: | Horizontal |
|-------|-------------------|---------------|------------|



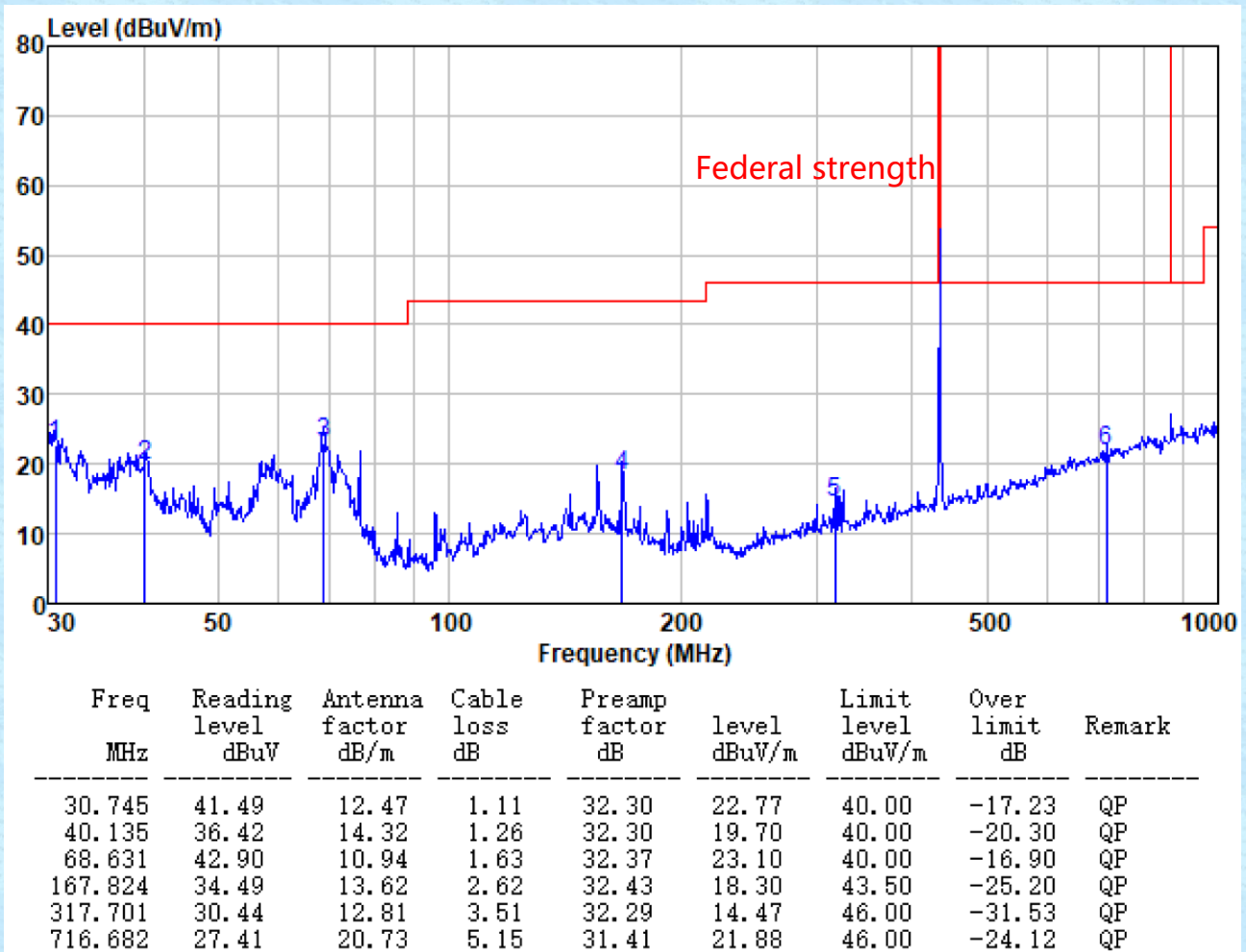
#### Peak value:

| Frequency<br>(MHz) | Read<br>Level<br>(dBuV) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Factor<br>(dB) | Level<br>(dBuV/m) | Limit Line<br>(dBuV/m) | Over<br>Limit<br>(dB) | Polarization |
|--------------------|-------------------------|-----------------------------|-----------------------|--------------------------|-------------------|------------------------|-----------------------|--------------|
| 867.84             | 32.99                   | 22.76                       | 5.65                  | 31.10                    | 30.30             | 80.83                  | -50.53                | Horizontal   |

#### Average value:

| Frequency<br>(MHz) | Level<br>(dBuV/m) | Duty cycle<br>factor | Average<br>Level<br>(dBuV/m) | Limit Line<br>(dBuV/m) | Over Limit<br>(dB) | Polarization |
|--------------------|-------------------|----------------------|------------------------------|------------------------|--------------------|--------------|
| 867.84             | 30.30             | -8.54                | 21.76                        | 60.83                  | -39.07             | Horizontal   |

|       |                   |               |          |
|-------|-------------------|---------------|----------|
| Mode: | Transmitting mode | Polarization: | Vertical |
|-------|-------------------|---------------|----------|

**Peak value:**

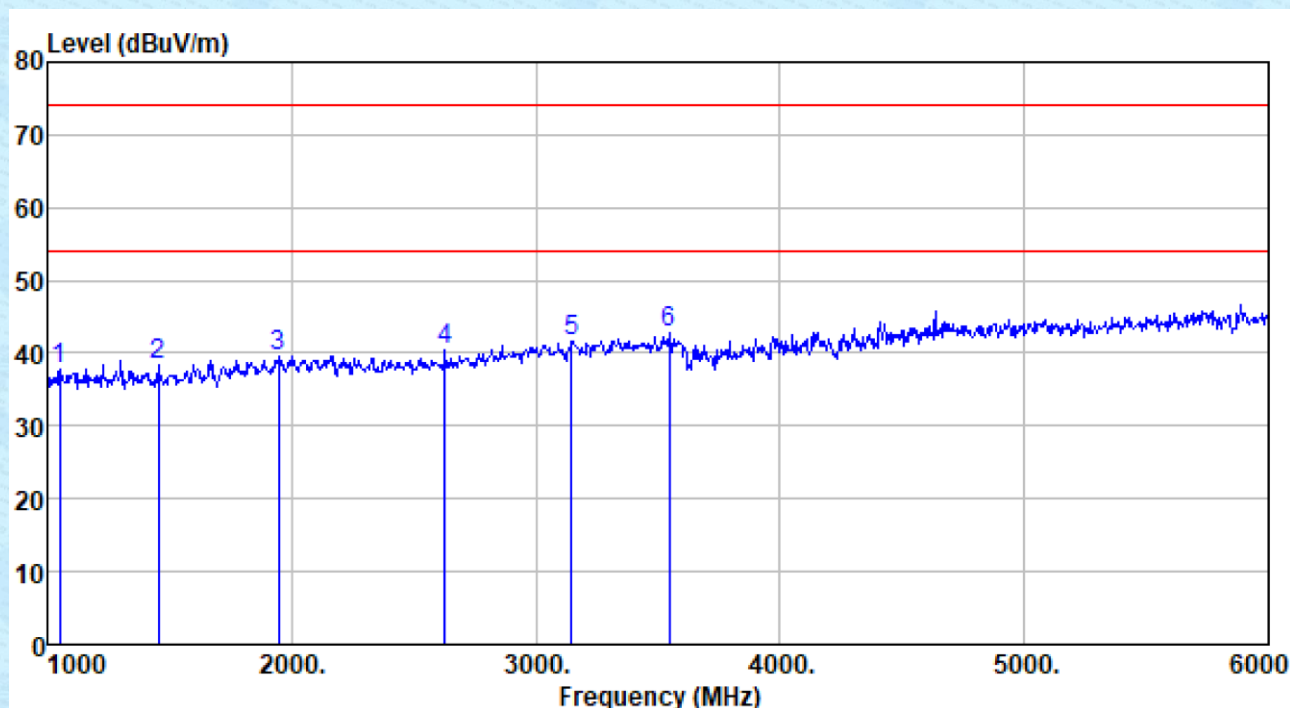
| Frequency<br>(MHz) | Read<br>Level<br>(dBuV) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Factor<br>(dB) | Level<br>(dBuV/m) | Limit Line<br>(dBuV/m) | Over<br>Limit<br>(dB) | Polarization |
|--------------------|-------------------------|-----------------------------|-----------------------|--------------------------|-------------------|------------------------|-----------------------|--------------|
| 867.84             | 29.75                   | 22.76                       | 5.65                  | 31.10                    | 27.06             | 80.83                  | -53.77                | Vertical     |

**Average value:**

| Frequency<br>(MHz) | Level<br>(dBuV/m) | Duty cycle<br>factor | Average<br>Level<br>(dBuV/m) | Limit Line<br>(dBuV/m) | Over Limit<br>(dB) | Polarization |
|--------------------|-------------------|----------------------|------------------------------|------------------------|--------------------|--------------|
| 867.84             | 27.06             | -8.54                | 18.52                        | 60.83                  | -42.31             | Vertical     |

Above 1G:

|       |                   |               |            |
|-------|-------------------|---------------|------------|
| Mode: | Transmitting mode | Polarization: | Horizontal |
|-------|-------------------|---------------|------------|



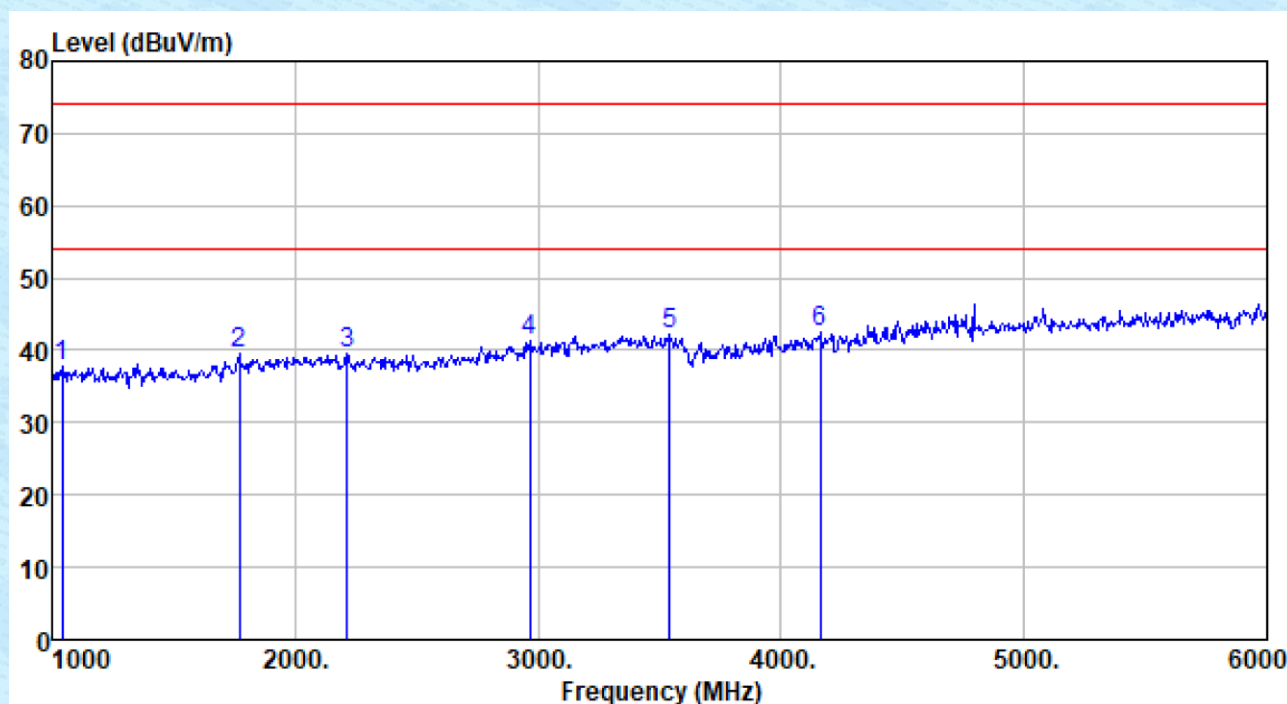
Peak value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 1050.00         | 50.25             | 25.30                 | 2.93            | 40.68                    | 37.80          | 74.00               | -36.2           | Horizontal   |
| 1455.00         | 49.30             | 24.99                 | 3.62            | 39.71                    | 38.20          | 74.00               | -35.8           | Horizontal   |
| 1945.00         | 47.83             | 25.76                 | 4.40            | 38.53                    | 39.46          | 74.00               | -34.54          | Horizontal   |
| 2630.00         | 48.11             | 27.72                 | 4.00            | 39.44                    | 40.39          | 74.00               | -33.61          | Horizontal   |
| 3145.00         | 46.75             | 28.99                 | 4.75            | 38.91                    | 41.58          | 74.00               | -32.42          | Horizontal   |
| 3545.00         | 47.03             | 29.49                 | 4.99            | 38.66                    | 42.85          | 74.00               | -31.15          | Horizontal   |

Average value:

| Frequency (MHz) | Level (dBuV/m) | Duty cycle factor | Average Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|----------------|-------------------|------------------------|---------------------|-----------------|--------------|
| 1050.00         | 37.80          | -8.54             | 29.26                  | 54.00               | -24.74          | Horizontal   |
| 1455.00         | 38.20          | -8.54             | 29.66                  | 54.00               | -24.34          | Horizontal   |
| 1945.00         | 39.46          | -8.54             | 30.92                  | 54.00               | -23.08          | Horizontal   |
| 2630.00         | 40.39          | -8.54             | 31.85                  | 54.00               | -22.15          | Horizontal   |
| 3145.00         | 41.58          | -8.54             | 33.04                  | 54.00               | -20.96          | Horizontal   |
| 3545.00         | 42.85          | -8.54             | 34.31                  | 54.00               | -19.69          | Horizontal   |

|       |                   |               |          |
|-------|-------------------|---------------|----------|
| Mode: | Transmitting mode | Polarization: | Vertical |
|-------|-------------------|---------------|----------|

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------|----------------|---------------------|-----------------|--------------|
| 1040.00         | 50.38             | 25.28                 | 2.90            | 40.70              | 37.86          | 74.00               | -36.14          | Vertical     |
| 1770.00         | 48.92             | 24.94                 | 4.55            | 38.95              | 39.46          | 74.00               | -34.54          | Vertical     |
| 2215.00         | 47.52             | 26.83                 | 4.09            | 38.92              | 39.52          | 74.00               | -34.48          | Vertical     |
| 2965.00         | 47.08             | 28.73                 | 4.57            | 39.04              | 41.34          | 74.00               | -32.66          | Vertical     |
| 3540.00         | 46.42             | 29.48                 | 4.99            | 38.67              | 42.22          | 74.00               | -31.78          | Vertical     |
| 4160.00         | 44.77             | 30.72                 | 5.27            | 38.40              | 42.36          | 74.00               | -31.64          | Vertical     |

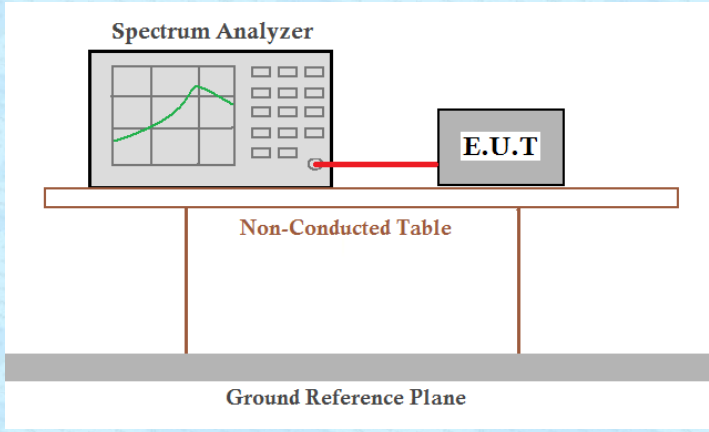
**Average value:**

| Frequency (MHz) | Level (dBuV/m) | Duty cycle factor | Average Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|----------------|-------------------|------------------------|---------------------|-----------------|--------------|
| 1040.00         | 37.86          | -8.54             | 29.32                  | 54.00               | -24.68          | Vertical     |
| 1770.00         | 39.46          | -8.54             | 30.92                  | 54.00               | -23.08          | Vertical     |
| 2215.00         | 39.52          | -8.54             | 30.98                  | 54.00               | -23.02          | Vertical     |
| 2965.00         | 41.34          | -8.54             | 32.80                  | 54.00               | -21.20          | Vertical     |
| 3540.00         | 42.22          | -8.54             | 33.68                  | 54.00               | -20.32          | Vertical     |
| 4160.00         | 42.36          | -8.54             | 33.82                  | 54.00               | -20.18          | Vertical     |

**Remarks:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. Average value = Peak value + Duty cycle factor

## 7.3 20dB Occupy Bandwidth

|                   |                                                                                                                                                                                                                                                                                                                             |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC Part15 C Section 15.231 (c)                                                                                                                                                                                                                                                                                             |
| Test Method:      | ANSI C63.10:2013                                                                                                                                                                                                                                                                                                            |
| Limit:            | The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier. |
| Test setup:       |  <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>             |
| Test Instruments: | Refer to section 6.0 for details                                                                                                                                                                                                                                                                                            |
| Test mode:        | Refer to section 5.2 for details                                                                                                                                                                                                                                                                                            |
| Test results:     | Pass                                                                                                                                                                                                                                                                                                                        |

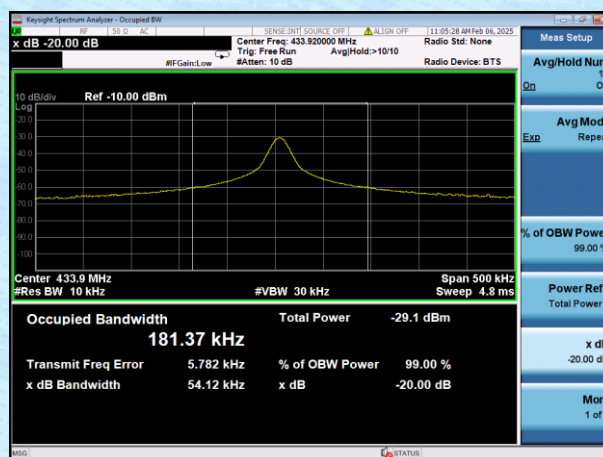
### Measurement Data

| Test Frequency (MHz) | 20dB bandwidth (kHz) | Limit (MHz) | Result |
|----------------------|----------------------|-------------|--------|
| 433.92               | 54.12                | 1.0848      | Pass   |

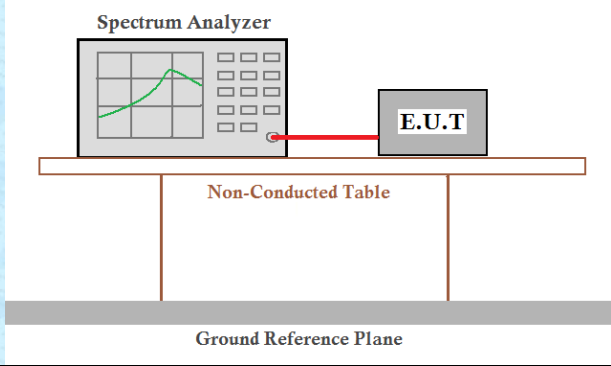
Note: Limit= Fundamental frequency×0.25%

$433.92 \times 0.25\% = 1.0848 \text{ MHz}$

Test plot as follows:



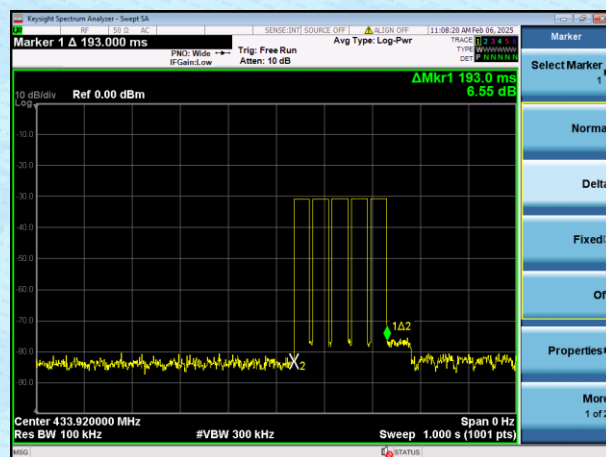
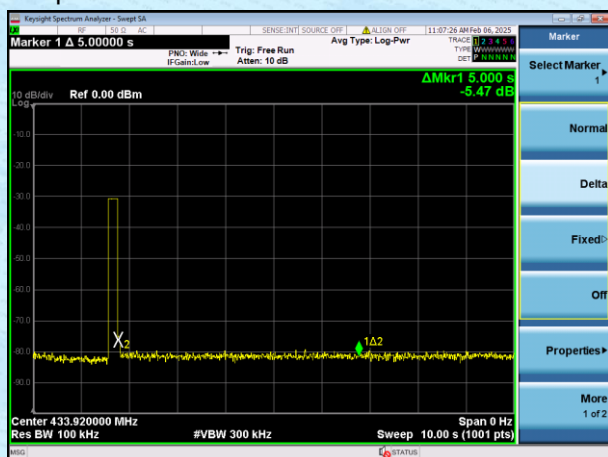
## 7.4 Deactivation Testing

|                   |                                                                                    |
|-------------------|------------------------------------------------------------------------------------|
| Test Requirement: | FCC Part15 C Section 15.231 (a)(1)                                                 |
| Test Method:      | ANSI C63.10:2013                                                                   |
| Receiver setup:   | RBW=1MHz, VBW=1MHz, span=0Hz, detector: Peak                                       |
| Limit:            | Not more than 5 seconds                                                            |
| Test setup:       |  |
| Test Instruments: | Refer to section 6.0 for details                                                   |
| Test mode:        | Refer to section 5.2 for details                                                   |
| Test results:     | Pass                                                                               |

### Measurement data:

| Frequency (MHz) | Duration of each TX (ms) | Limit (second) | Result |
|-----------------|--------------------------|----------------|--------|
| 433.92          | 0.193                    | <5.0           | Pass   |

### Test plot as follows:



## 8 Test Setup Photo

Reference to the **appendix I** for details.

## 9 EUT Constructional Details

Reference to the **appendix II** for details.

----- End -----