



## FCC CERTIFICATION TEST REPORT

|                                |   |                                                                                                                                                           |
|--------------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Applicant</b>               | : | Dong Guan Jia Sheng Lighting Technology Co. Ltd.                                                                                                          |
| <b>Address of Applicant</b>    | : | HUMEN TOWN, SHUTIAN VILLAGE, DONGGUAN, GUANGDONG                                                                                                          |
| <b>Manufacturer</b>            | : | Dong Guan Jia Sheng Lighting Technology Co. Ltd.                                                                                                          |
| <b>Address of Manufacturer</b> | : | HUMEN TOWN, SHUTIAN VILLAGE, DONGGUAN, GUANGDONG                                                                                                          |
| <b>Equipment under Test</b>    | : | LED LanternSpeaker ULTIMA                                                                                                                                 |
| <b>Model No.</b>               | : | SP0000113-01                                                                                                                                              |
| <b>FCC ID</b>                  | : | 2AZYT-SP0000113-01                                                                                                                                        |
| <b>Test Standard(s)</b>        | : | FCC Rules and Regulations Part 15 Subpart C, ANSI C63.10:2020                                                                                             |
| <b>Report No.</b>              | : | DDT-RE24112815-1E01                                                                                                                                       |
| <b>Issue Date</b>              | : | 2024/12/14                                                                                                                                                |
| <b>Issue By</b>                | : | Guangdong Dongdian Testing Service Co., Ltd.<br>Unit 2, Building 1, No. 17, Zongbu 2nd Road,<br>Songshan Lake Park, Dongguan, Guangdong, China,<br>523808 |

# REPORT

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Test Report Declare

|                         |   |                                                  |
|-------------------------|---|--------------------------------------------------|
| Applicant               | : | Dong Guan Jia Sheng Lighting Technology Co. Ltd. |
| Address of Applicant    | : | HUMEN TOWN, SHUTIAN VILLAGE, DONGGUAN, GUANGDONG |
| Equipment under Test    | : | LED LanternSpeaker ULTIMA                        |
| Model No.               | : | SP0000113-01                                     |
| Manufacturer            | : | Dong Guan Jia Sheng Lighting Technology Co. Ltd. |
| Address of Manufacturer | : | HUMEN TOWN, SHUTIAN VILLAGE, DONGGUAN, GUANGDONG |

Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C,  
ANSI C63.10:2020

We Declare:

The equipment described above is tested by Guangdong Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Guangdong Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

|                  |                     |               |                         |
|------------------|---------------------|---------------|-------------------------|
| Report No.:      | DDT-RE24112815-1E01 |               |                         |
| Date of Receipt: | 2024/11/29          | Date of Test: | 2024/11/29 - 2024/12/13 |

Prepared By:

Jacky Huang

Jacky Huang/Engineer

Approved By:



Damon Hu/EMC Manager

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Guangdong Dongdian Testing Service Co., Ltd.

Revision History

| Rev. | Revisions     | Issue Date | Revised By |
|------|---------------|------------|------------|
| ---  | Initial issue | 2024/12/14 |            |
|      |               |            |            |

## 1. Summary of Test Results

| No.                                                                                                                                              | Test Parameter                  | Clause No.                                                              | Condition | Result |
|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-------------------------------------------------------------------------|-----------|--------|
| 1                                                                                                                                                | Maximum Peak Output Power       | FCC Part 15: 15.247(b)(1),                                              | /         | Pass   |
| 2                                                                                                                                                | 20 dB Bandwidth                 | FCC Part 15: 15.247(a)(1),                                              | /         | Pass   |
| 3                                                                                                                                                | Carrier Frequency Separation    | FCC Part 15: 15.247(a)(1),                                              | /         | Pass   |
| 4                                                                                                                                                | Number of Hopping Channel       | FCC Part 15: 15.247(a)(1)(iii),                                         | /         | Pass   |
| 5                                                                                                                                                | Dwell Time                      | FCC Part 15: 15.247(a)(1)(iii),                                         | /         | Pass   |
| 6                                                                                                                                                | RF Conducted Spurious Emissions | FCC Part 15: 15.247(d),                                                 | /         | Pass   |
| 7                                                                                                                                                | Radiated Emission               | FCC Part 15: 15.205,<br>FCC Part 15: 15.209,<br>FCC Part 15: 15.247(d), | /         | Pass   |
| 8                                                                                                                                                | Band Edge Compliance            | FCC Part 15: 15.205,<br>FCC Part 15: 15.209,<br>FCC Part 15: 15.247(d), | /         | Pass   |
| 9                                                                                                                                                | Power Line Conducted Emissions  | FCC Part 15: 15.207(a),                                                 | /         | Pass   |
| 10                                                                                                                                               | Antenna Requirement             | FCC Part 15: 15.203,                                                    | /         | Pass   |
| Note: N/A is an abbreviation for Not Applicable, and means this item is not applicable for this device or no need to test according to standard. |                                 |                                                                         |           |        |

## 2. General Test Information

### 2.1. Description of EUT

|                            |                                                                |
|----------------------------|----------------------------------------------------------------|
| EUT Name                   | : LED LanternSpeaker ULTIMA                                    |
| Model Number               | : SP0000113-01                                                 |
| Difference of model number | : /                                                            |
| EUT Function Description   | : Please reference user manual of this device                  |
| Power Supply               | : DC 5V/2A from USB type-C port or DC 3.7V from Li-ion battery |
| Hardware Version           | : /                                                            |
| Software Version           | : /                                                            |
| Antenna Type               | : PCB antenna                                                  |
| Max Antenna Gain (dBi)     | : -0.58                                                        |

Note: This EUT support Bluetooth BR/EDR, this report only for Bluetooth BR/EDR.

|                     |                       |
|---------------------|-----------------------|
| Radio Specification | : Bluetooth BR/EDR    |
| Operation Frequency | : 2402 MHz-2480 MHz   |
| Modulation          | : GFSK, $\pi/4$ DQPSK |

| Channel information |                 |         |                 |         |                 |
|---------------------|-----------------|---------|-----------------|---------|-----------------|
| Channel             | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 0                   | 2402            | 27      | 2429            | 54      | 2456            |
| 1                   | 2403            | 28      | 2430            | 55      | 2457            |
| 2                   | 2404            | 29      | 2431            | 56      | 2458            |
| 3                   | 2405            | 30      | 2432            | 57      | 2459            |
| 4                   | 2406            | 31      | 2433            | 58      | 2460            |
| 5                   | 2407            | 32      | 2434            | 59      | 2461            |
| 6                   | 2408            | 33      | 2435            | 60      | 2462            |
| 7                   | 2409            | 34      | 2436            | 61      | 2463            |
| 8                   | 2410            | 35      | 2437            | 62      | 2464            |
| 9                   | 2411            | 36      | 2438            | 63      | 2465            |
| 10                  | 2412            | 37      | 2439            | 64      | 2466            |
| 11                  | 2413            | 38      | 2440            | 65      | 2467            |
| 12                  | 2414            | 39      | 2441            | 66      | 2468            |
| 13                  | 2415            | 40      | 2442            | 67      | 2469            |
| 14                  | 2416            | 41      | 2443            | 68      | 2470            |
| 15                  | 2417            | 42      | 2444            | 69      | 2471            |
| 16                  | 2418            | 43      | 2445            | 70      | 2472            |
| 17                  | 2419            | 44      | 2446            | 71      | 2473            |
| 18                  | 2420            | 45      | 2447            | 72      | 2474            |
| 19                  | 2421            | 46      | 2448            | 73      | 2475            |

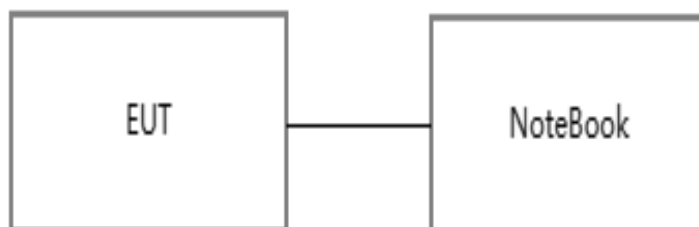
|    |      |    |      |    |      |
|----|------|----|------|----|------|
| 20 | 2422 | 47 | 2449 | 74 | 2476 |
| 21 | 2423 | 48 | 2450 | 75 | 2477 |
| 22 | 2424 | 49 | 2451 | 76 | 2478 |
| 23 | 2425 | 50 | 2452 | 77 | 2479 |
| 24 | 2426 | 51 | 2453 | 78 | 2480 |
| 25 | 2427 | 52 | 2454 |    |      |
| 26 | 2428 | 53 | 2455 |    |      |

Note: The above EUT information is declared by manufacturer and for more detailed features description please refer to the manufacturer's specifications or User's Manual. The above Antenna information is declared by manufacturer and for more detailed features description please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

## 2.2. Accessories of EUT

| Accessories | Manufacturer | Model number | Description |
|-------------|--------------|--------------|-------------|
| /           | /            | /            | /           |

## 2.3. Block diagram of EUT configuration for test



## 2.4. Decision of final test mode

According pre-test, the worst test modes were reported as below:

Test software: FCC\_assist\_1.0.2.2.exe

The test software was used to control EUT work in Continuous Tx mode, and select test channel, wireless mode as below table.

The pathloss of external cable: 0.5 dB (According to the manufacturer's claims)

| Tested mode, channel, information                                     |                  |             |                 |
|-----------------------------------------------------------------------|------------------|-------------|-----------------|
| Mode                                                                  | Setting Tx Power | Channel     | Frequency (MHz) |
| GFSK hopping on Tx mode                                               | 10               | CH0 to CH78 | 2402 to 2480    |
| $\pi/4$ DQPSK hopping on Tx mode                                      | 10               | CH0 to CH78 | 2402 to 2480    |
| GFSK hopping off Tx mode                                              | 10               | CH0         | 2402            |
|                                                                       | 10               | CH39        | 2441            |
|                                                                       | 10               | CH78        | 2480            |
| $\pi/4$ DQPSK hopping off Tx mode                                     | 10               | CH0         | 2402            |
|                                                                       | 10               | CH39        | 2441            |
|                                                                       | 10               | CH78        | 2480            |
| Worst-case data rates were: GFSK mode: DH5, $\pi/4$ DQPSK mode: 2DH5. |                  |             |                 |

## 2.5. Deviations of test standard

No deviation.

## 2.6. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

|                    |                   |
|--------------------|-------------------|
| Temperature range: | +15°C to +35 °C   |
| Humidity range:    | 20% to 75%        |
| Pressure range:    | 86 kPa to 106 kPa |

Note: The specific temperature and humidity information of each test item refers to the temperature and humidity record in the corresponding test data.

## 2.7. Test laboratory

Guangdong Dongdian Testing Service Co., Ltd.

Add.: Unit 2, Building 1, No. 17, Zongbu 2nd Road, Songshan Lake Park, Dongguan, Guangdong, China, 523808.

Tel.: +86-0769-38826678, <http://www.dgddt.com>, Email: ddt@dgddt.com.

CNAS Accreditation No. L6451; A2LA Accreditation Number: 3870.01

FCC Designation Number: CN1182, Test Firm Registration Number: 540522

Innovation, Science and Economic Development Canada Site Registration Number: 10288A

Conformity Assessment Body identifier: CN0048

VCCI facility registration number: C-20087, T-20088, R-20123, R-20155, G-20118

## 2.8. Measurement uncertainty

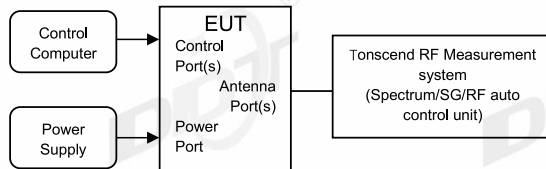
| Test Item                                                                                                                                     | Uncertainty                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Bandwidth                                                                                                                                     | 1.1%                                                   |
| Peak Output Power (Conducted) (Spectrum analyzer)                                                                                             | 0.86 dB ( $10 \text{ MHz} \leq f < 3.6 \text{ GHz}$ ); |
|                                                                                                                                               | 1.38 dB ( $3.6 \text{ GHz} \leq f < 8 \text{ GHz}$ )   |
| Peak Output Power (Conducted) (Power Sensor)                                                                                                  | 0.74 dB                                                |
| Power Spectral Density                                                                                                                        | 0.74 dB ( $10 \text{ MHz} \leq f < 3.6 \text{ GHz}$ ); |
|                                                                                                                                               | 1.38 dB ( $3.6 \text{ GHz} \leq f < 8 \text{ GHz}$ )   |
| Frequencies Stability                                                                                                                         | $6.7 \times 10^{-8}$ (Antenna couple method)           |
|                                                                                                                                               | $5.5 \times 10^{-8}$ (Conducted method)                |
| Conducted spurious emissions                                                                                                                  | 0.86 dB ( $10 \text{ MHz} \leq f < 3.6 \text{ GHz}$ ); |
|                                                                                                                                               | 1.40 dB ( $3.6 \text{ GHz} \leq f < 8 \text{ GHz}$ )   |
|                                                                                                                                               | 1.66 dB ( $8 \text{ GHz} \leq f < 26.5 \text{ GHz}$ )  |
| Uncertainty for radio frequency (RBW < 20 kHz)                                                                                                | $3 \times 10^{-8}$                                     |
| Temperature                                                                                                                                   | 0.4 °C                                                 |
| Humidity                                                                                                                                      | 2 %                                                    |
| Uncertainty for Radiation Emission test<br>(9 kHz – 30 MHz)                                                                                   | 3.44 dB                                                |
| Uncertainty for Radiation Emission test<br>(30 MHz - 1 GHz)                                                                                   | 4.70 dB (Antenna Polarize: V)                          |
|                                                                                                                                               | 4.84 dB (Antenna Polarize: H)                          |
| Uncertainty for Radiation Emission test<br>(1 GHz - 40 GHz)                                                                                   | 4.10 dB (1 - 6 GHz)                                    |
|                                                                                                                                               | 4.40 dB (6 GHz - 18 GHz)                               |
|                                                                                                                                               | 3.54 dB (18 GHz - 26 GHz)                              |
|                                                                                                                                               | 4.30 dB (26 GHz - 40 GHz)                              |
| Uncertainty for Power line conduction emission test                                                                                           | 3.34dB (150KHz-30MHz)                                  |
|                                                                                                                                               | 3.72dB (9KHz-150KHz)                                   |
| Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. |                                                        |

### 3. Equipment Used During Conductive Test

| Equipment                                                                        | Manufacturer | Model No. | Serial Number | Due Date   | Cal. Interval |
|----------------------------------------------------------------------------------|--------------|-----------|---------------|------------|---------------|
| <input checked="" type="checkbox"/> RF Connected Test (RF Measurement System 2#) |              |           |               |            |               |
| SPECTRUM ANALYZER                                                                | R&S          | FSU26     | 201124        | 2025/07/08 | 1 Year        |
| Power Sensor                                                                     | R&S          | NRP-Z22   | 101254        | 2025/07/08 | 1 Year        |
| Test Software                                                                    | Tonscend     | JS1120-3  | Ver.3.2.22    | N/A        | N/A           |

## 4. 20 dB Bandwidth

### 4.1. Block diagram of test setup



### 4.2. Limits

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

### 4.3. Test procedure

- (1) The test according to ANSI C63.10-2020 clause 6.9.2.
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously
- (4) Use the following spectrum analyzer settings for the 20 dB bandwidth measurement:

|                |                                     |
|----------------|-------------------------------------|
| RBW:           | 1% to 5% of the OBW                 |
| VBW:           | approximately three times RBW       |
| Span:          | between 2 times and 5 times the OBW |
| Detector Mode: | Peak                                |
| Sweep time:    | Auto                                |
| Trace mode:    | Max hold                            |

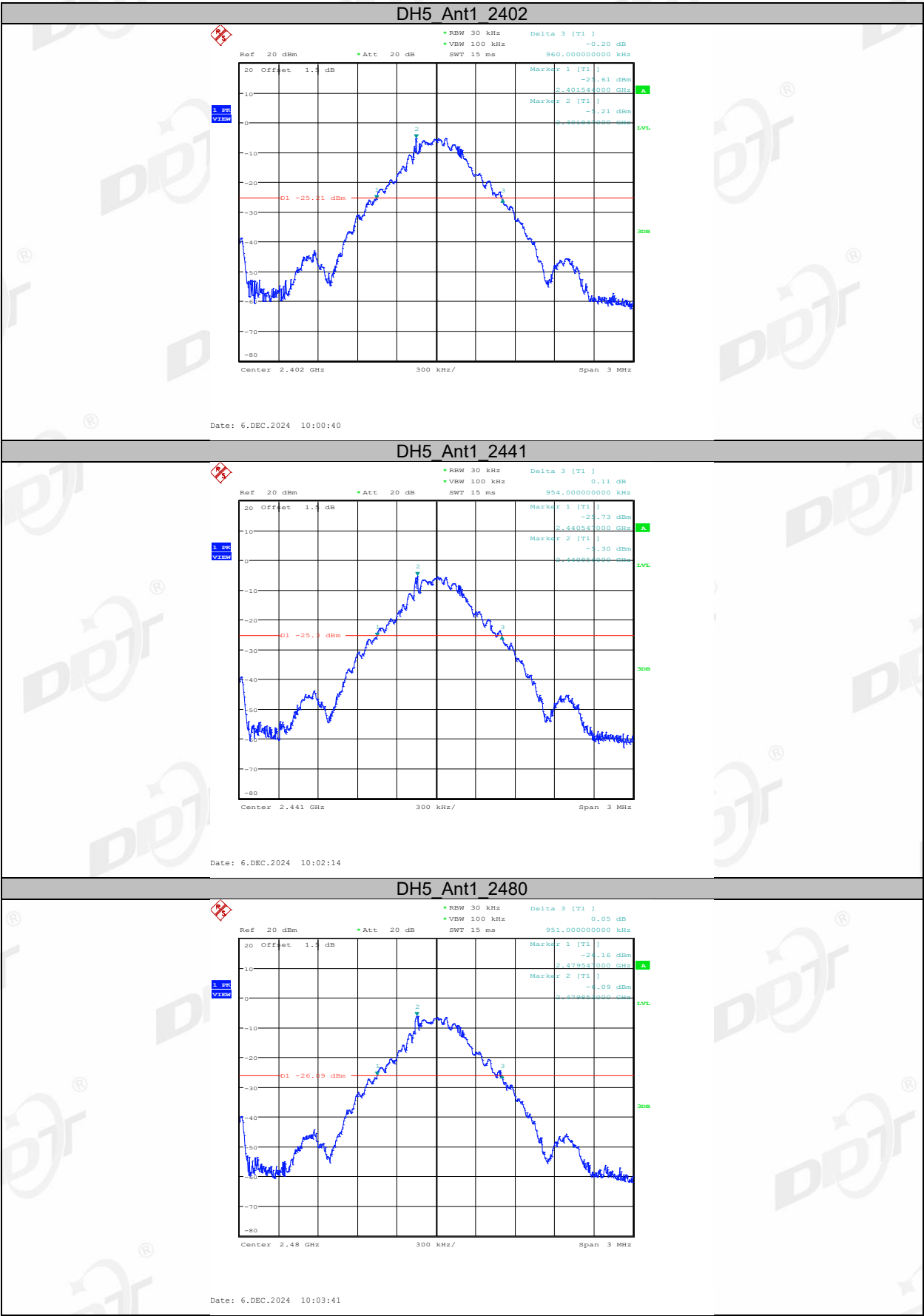
- (5) Measure and record the results in the report.

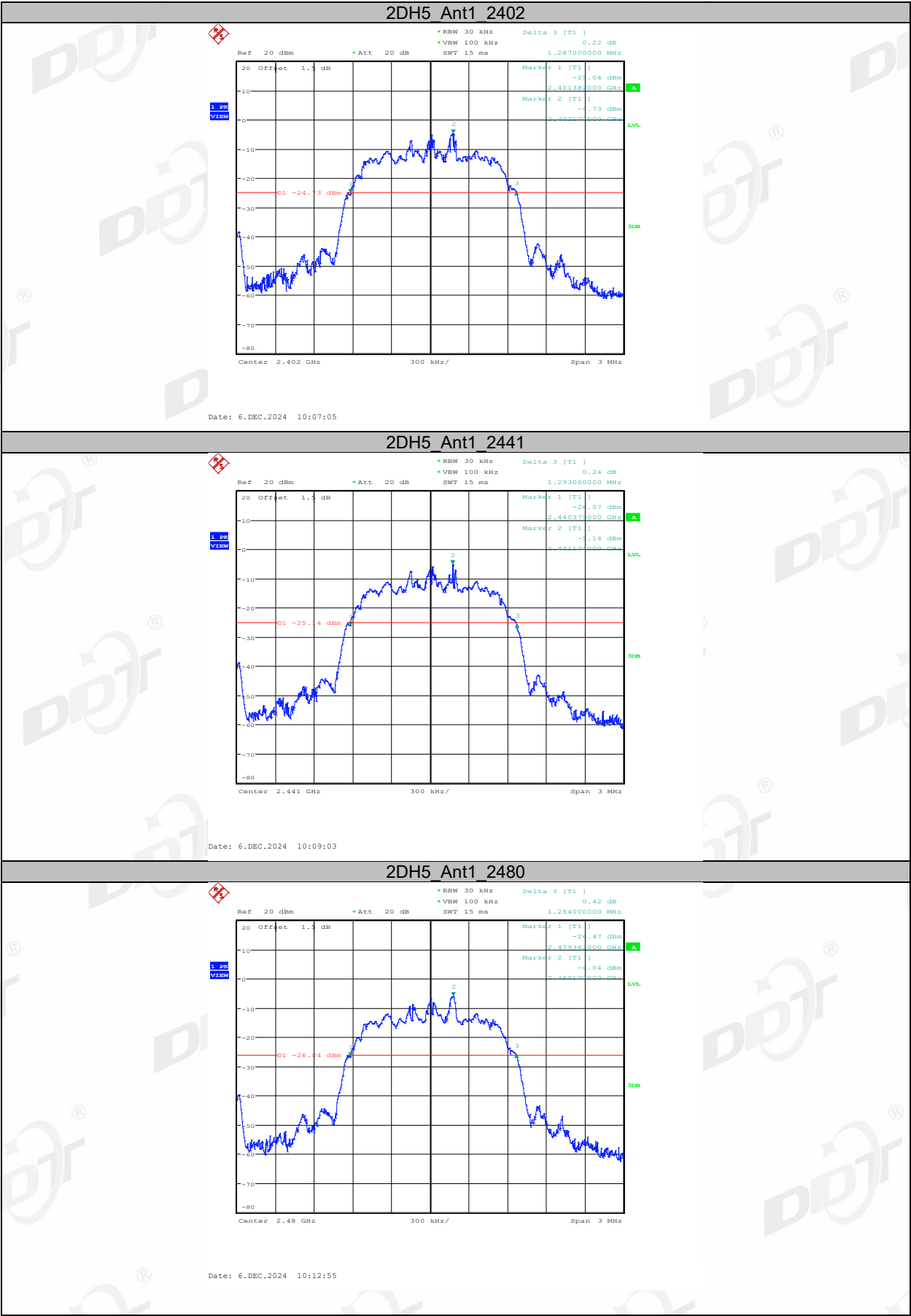
4.4. Test result

|                    |                |                |                          |
|--------------------|----------------|----------------|--------------------------|
| Test Engineer:     | Zoe            | Test Site:     | RF Measurement System 2# |
| Ambient Condition: | 24.3℃, 46.2%RH | Test Date:     | 2024.12.06-2024.12.06    |
| Test Power Supply: | DC 5V          | Sample Number: | S24112815-002            |

| Test Mode | Antenna | Frequency [MHz] | 20dB EBW [MHz] |
|-----------|---------|-----------------|----------------|
| DH5       | Ant1    | 2402            | 0.96           |
|           |         | 2441            | 0.95           |
|           |         | 2480            | 0.95           |
| 2DH5      | Ant1    | 2402            | 1.29           |
|           |         | 2441            | 1.29           |
|           |         | 2480            | 1.28           |

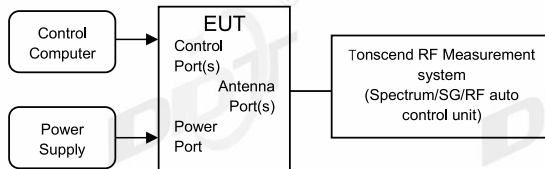
4.5. Test graphs





## 5. 99% Bandwidth

### 5.1. Block diagram of test setup



### 5.2. Limits

Just for Report.

### 5.3. Test procedure

- (1) The test according to ANSI C63.10-2020 clause 6.9.3.
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously
- (4) Use the following spectrum analyzer settings for the 99% bandwidth measurement:

|                |                                         |
|----------------|-----------------------------------------|
| RBW:           | 1% to 5% of the OBW                     |
| VBW:           | approximately three times RBW           |
| Span:          | between 1.5 times and 5.0 times the OBW |
| Detector Mode: | Peak                                    |
| Sweep time:    | Auto                                    |
| Trace mode:    | Max hold                                |
- (5) Measure and record the results in the report.

5.4. Test result

|                    |                |                |                          |
|--------------------|----------------|----------------|--------------------------|
| Test Engineer:     | Zoe            | Test Site:     | RF Measurement System 2# |
| Ambient Condition: | 24.3℃, 46.2%RH | Test Date:     | 2024.12.06-2024.12.06    |
| Test Power Supply: | DC 5V          | Sample Number: | S24112815-002            |

| Test Mode | Antenna | Frequency [MHz] | OCB [MHz] | FL [MHz]  | FH [MHz]  |
|-----------|---------|-----------------|-----------|-----------|-----------|
| DH5       | Ant1    | 2402            | 0.870     | 2401.5740 | 2402.4440 |
|           |         | 2441            | 0.861     | 2440.5770 | 2441.4380 |
|           |         | 2480            | 0.867     | 2479.5770 | 2480.4440 |
| 2DH5      | Ant1    | 2402            | 1.179     | 2401.4210 | 2402.6000 |
|           |         | 2441            | 1.179     | 2440.4210 | 2441.6000 |
|           |         | 2480            | 1.179     | 2479.4210 | 2480.6000 |

**DH5 Ant1 2402**

Ref 20 dBm Att 20 dB SWT 15 ms Marker 1 [T1] -4.87 dBm

OBW8 0.000000000 kHz Temp 1 [T1 OBW] -23.23 dBm

2.401574000 GHz -23.08 dBm

2.402444000 GHz

Center 2.402 GHz 300 kHz/ Span 3 MHz

Date: 6.DEC.2024 10:00:46

**DH5 Ant1 2441**

Ref 20 dBm Att 20 dB SWT 15 ms Marker 1 [T1] -5.28 dBm

OBW8 1.000000000 kHz Temp 1 [T1 OBW] -23.72 dBm

2.440574000 GHz -23.44 dBm

2.441434000 GHz

Center 2.441 GHz 300 kHz/ Span 3 MHz

Date: 6.DEC.2024 10:02:20

**DH5 Ant1 2480**

Ref 20 dBm Att 20 dB SWT 15 ms Marker 1 [T1] -6.11 dBm

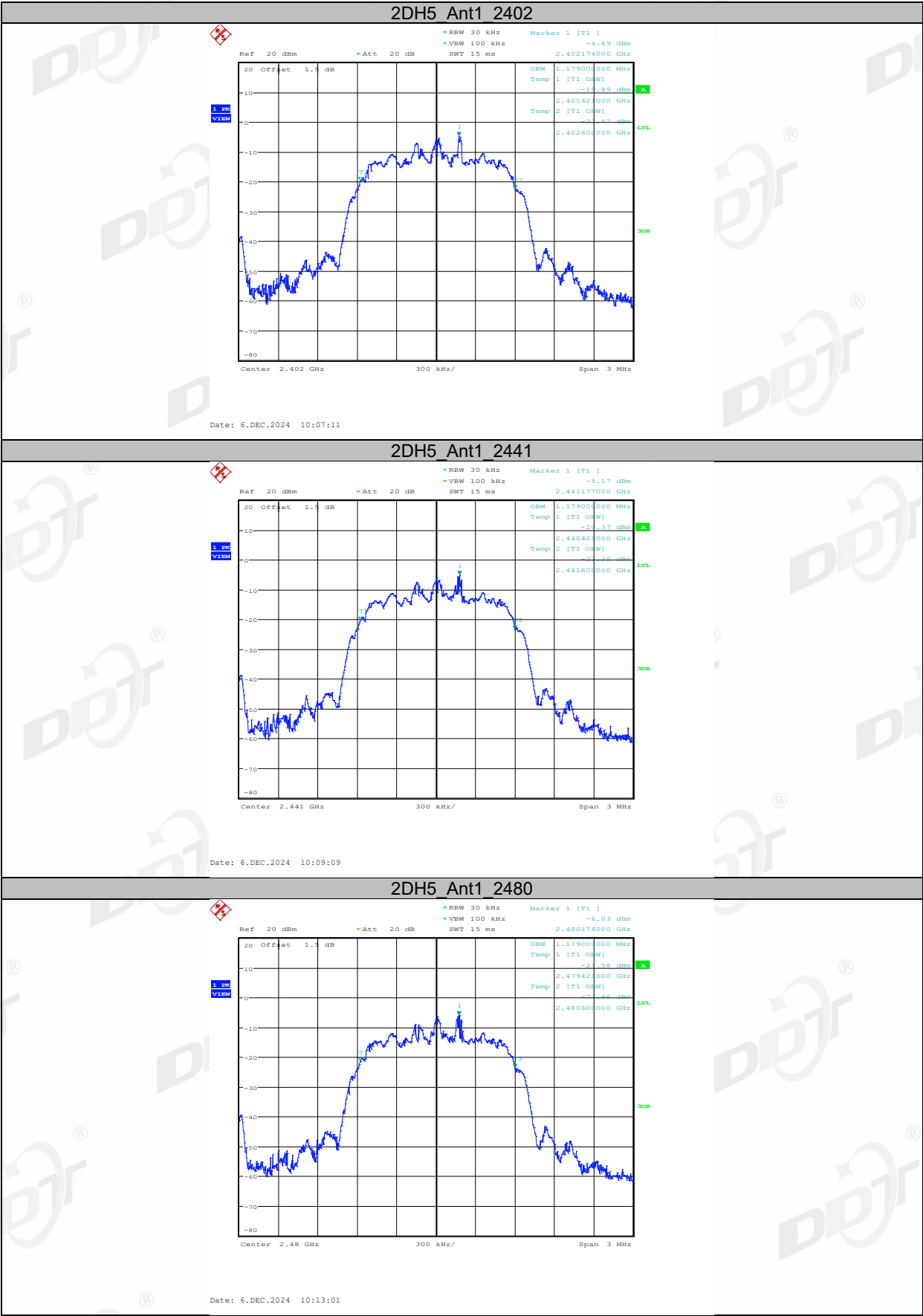
OBW8 7.000000000 kHz Temp 1 [T1 OBW] -23.44 dBm

2.479574000 GHz -23.43 dBm

2.480444000 GHz

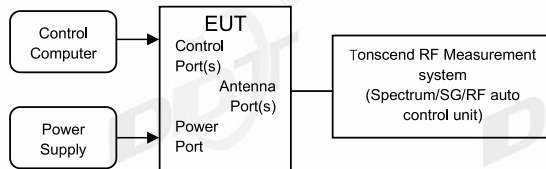
Center 2.48 GHz 300 kHz/ Span 3 MHz

Date: 6.DEC.2024 10:03:48



## 6. Maximum Peak Output Power

### 6.1. Block diagram of test setup



### 6.2. Limits

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts, the e.i.r.p shall not exceed 4W.

### 6.3. Test procedure

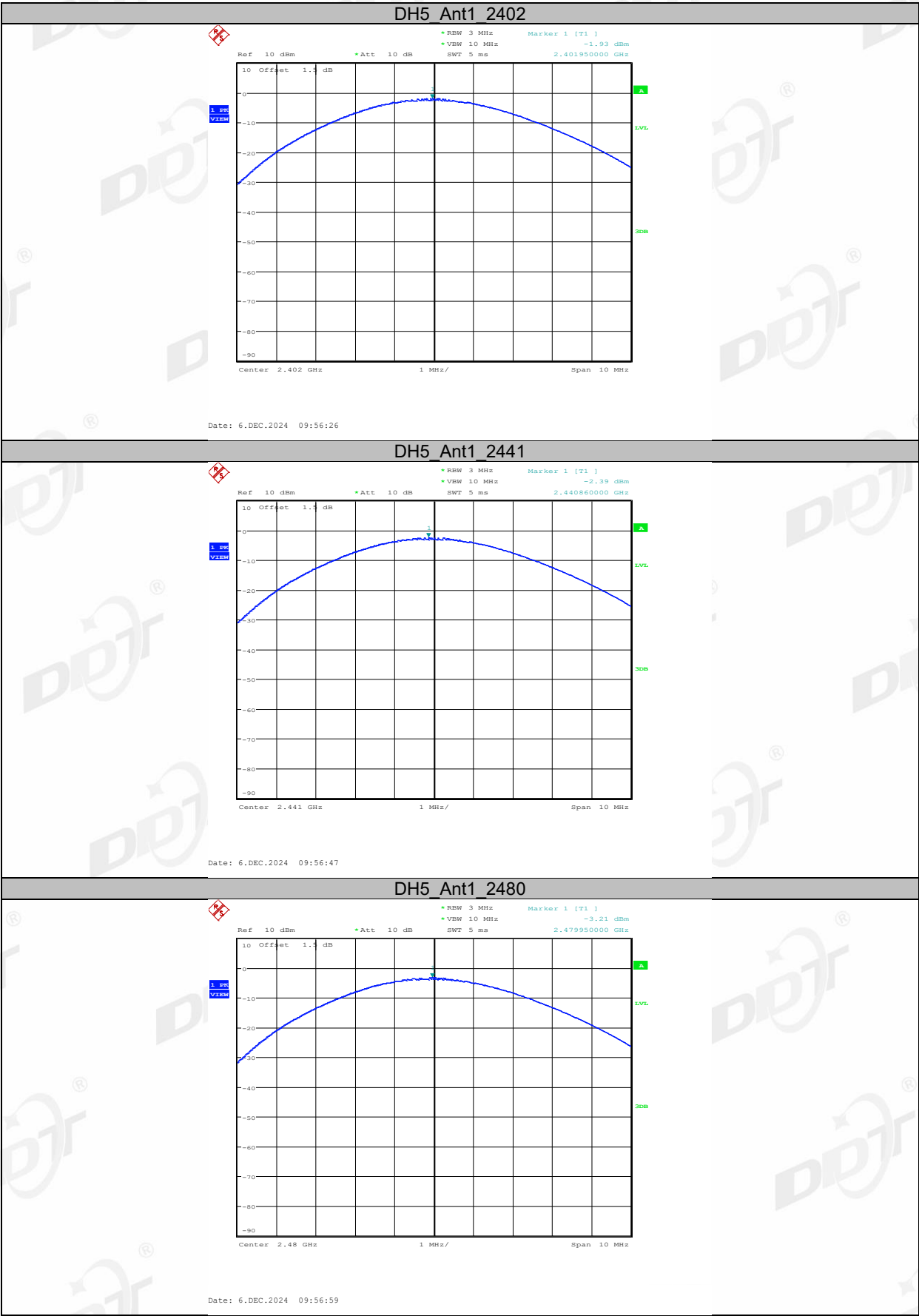
- (1) The test according to ANSI C63.10-2020 clause 7.8.5.
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results.
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously.
- (4) Use the following spectrum analyzer settings for the maximum peak output power measurement:
  - RBW: > 20 dB bandwidth of the emission being measured.
  - VBW: VBW  $\geq$  RBW.
  - Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
  - Detector Mode: Peak
  - Sweep time: Auto
  - Trace mode: Max hold
- (5) Use the marker-to-peak function to set the marker to the peak of the emission and record the results in the report.

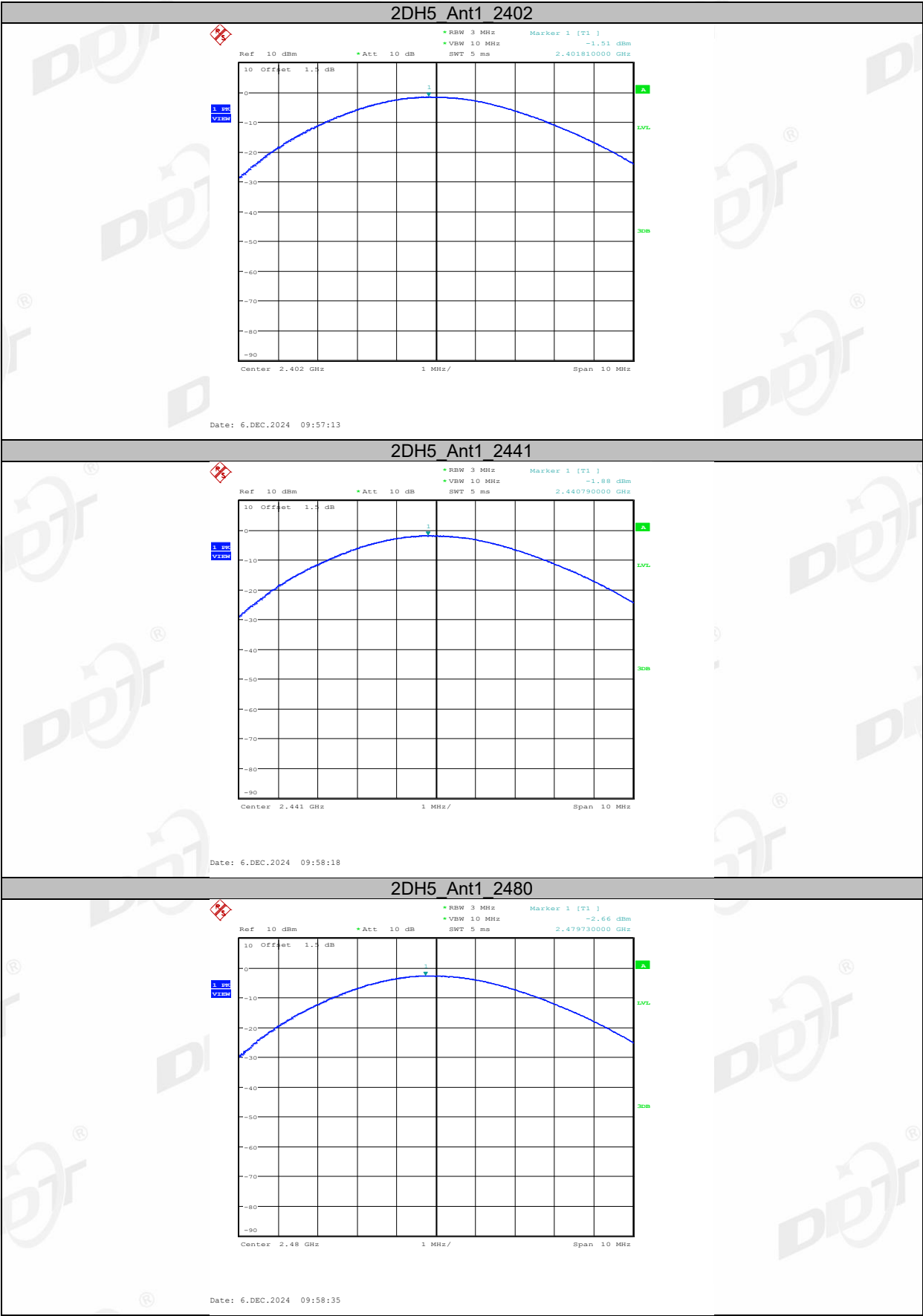
6.4. Test result

|                    |                |                |                          |  |  |  |  |
|--------------------|----------------|----------------|--------------------------|--|--|--|--|
| Test Engineer:     | Zoe            | Test Site:     | RF Measurement System 2# |  |  |  |  |
| Ambient Condition: | 24.3℃, 46.2%RH | Test Date:     | 2024.12.06-2024.12.06    |  |  |  |  |
| Test Power Supply: | DC 5V          | Sample Number: | S24112815-002            |  |  |  |  |

| Test Mode | Antenna | Frequency [MHz] | Conducted Peak Power [dBm] | Conducted Limit [dBm] | EIRP [dBm] | EIRP Limit [dBm] | Verdict |
|-----------|---------|-----------------|----------------------------|-----------------------|------------|------------------|---------|
| DH5       | Ant1    | 2402            | -1.93                      | ≤20.97                | -2.51      | ≤30              | PASS    |
|           |         | 2441            | -2.39                      | ≤20.97                | -2.97      | ≤30              | PASS    |
|           |         | 2480            | -3.21                      | ≤20.97                | -3.79      | ≤30              | PASS    |
| 2DH5      | Ant1    | 2402            | -1.51                      | ≤20.97                | -2.09      | ≤30              | PASS    |
|           |         | 2441            | -1.88                      | ≤20.97                | -2.46      | ≤30              | PASS    |
|           |         | 2480            | -2.66                      | ≤20.97                | -3.24      | ≤30              | PASS    |

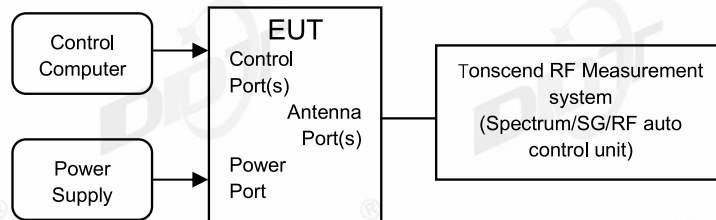
6.5.Test graphs





## 7. Carrier Frequency Separation

### 7.1. Block diagram of test setup



### 7.2. Limits

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### 7.3. Test procedure

- (1) The test according to ANSI C63.10-2020 clause 7.8.2.
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results.
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously.
- (4) Use the following spectrum analyzer settings for the maximum peak output power measurement:

|                |                                                            |
|----------------|------------------------------------------------------------|
| RBW:           | approximately 30% of the channel spacing                   |
| VBW:           | $VBW \geq RBW$ .                                           |
| Span:          | Wide enough to capture the peaks of two adjacent channels. |
| Detector Mode: | Peak                                                       |
| Sweep time:    | Auto                                                       |
| Trace mode:    | Max hold                                                   |
- (5) Use the marker-delta function to determine the separation between the peaks of the adjacent channels and record the results in the report.

7.4. Test result

|                    |                |                |                          |  |  |
|--------------------|----------------|----------------|--------------------------|--|--|
| Test Engineer:     | Zoe            | Test Site:     | RF Measurement System 2# |  |  |
| Ambient Condition: | 24.3℃, 46.2%RH | Test Date:     | 2024.12.06-2024.12.06    |  |  |
| Test Power Supply: | DC 5V          | Sample Number: | S24112815-002            |  |  |

| Test Mode | Antenna | Frequency [MHz] | Result [MHz] | Limit [MHz] | Verdict |
|-----------|---------|-----------------|--------------|-------------|---------|
| DH5       | Ant1    | Hop             | 0.997        | ≥0.640      | PASS    |
| 2DH5      | Ant1    | Hop             | 0.990        | ≥0.860      | PASS    |

**DH5 Ant1\_Hop**

RBW 300 kHz Delta 2 [T1] -0.03 dB  
VBW 300 kHz  
SWT 2.5 ms 996.784871795 kHz

Ref 10 dBm \*Att 10 dB

10 Offset 1.5 dB

Marker 1 [T1] -1.34 dBm  
2 2.44100000 GHz

Start 2.4405 GHz 200 kHz/ Stop 2.4425 GHz

Date: 6.DEC.2024 10:21:38

**2DH5 Ant1\_Hop**

RBW 300 kHz Delta 2 [T1] -0.04 dB  
VBW 300 kHz  
SWT 2.5 ms 990.384615385 kHz

Ref 10 dBm \*Att 10 dB

10 Offset 1.5 dB

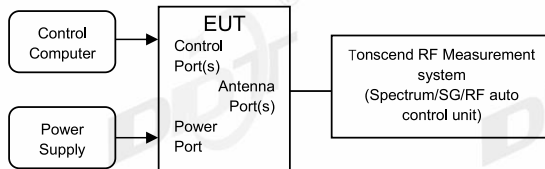
Marker 1 [T1] -1.20 dBm  
2 2.44100000 GHz

Start 2.4405 GHz 200 kHz/ Stop 2.4425 GHz

Date: 6.DEC.2024 13:26:59

## 8. Dwell Time

### 8.1. Block diagram of test setup



### 8.2. Limits

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### 8.3. Test procedure

- (1) The test according to ANSI C63.10-2020 clause 7.8.4.
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results.
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously.
- (4) Use the following spectrum analyzer settings for the maximum peak output power measurement:
 

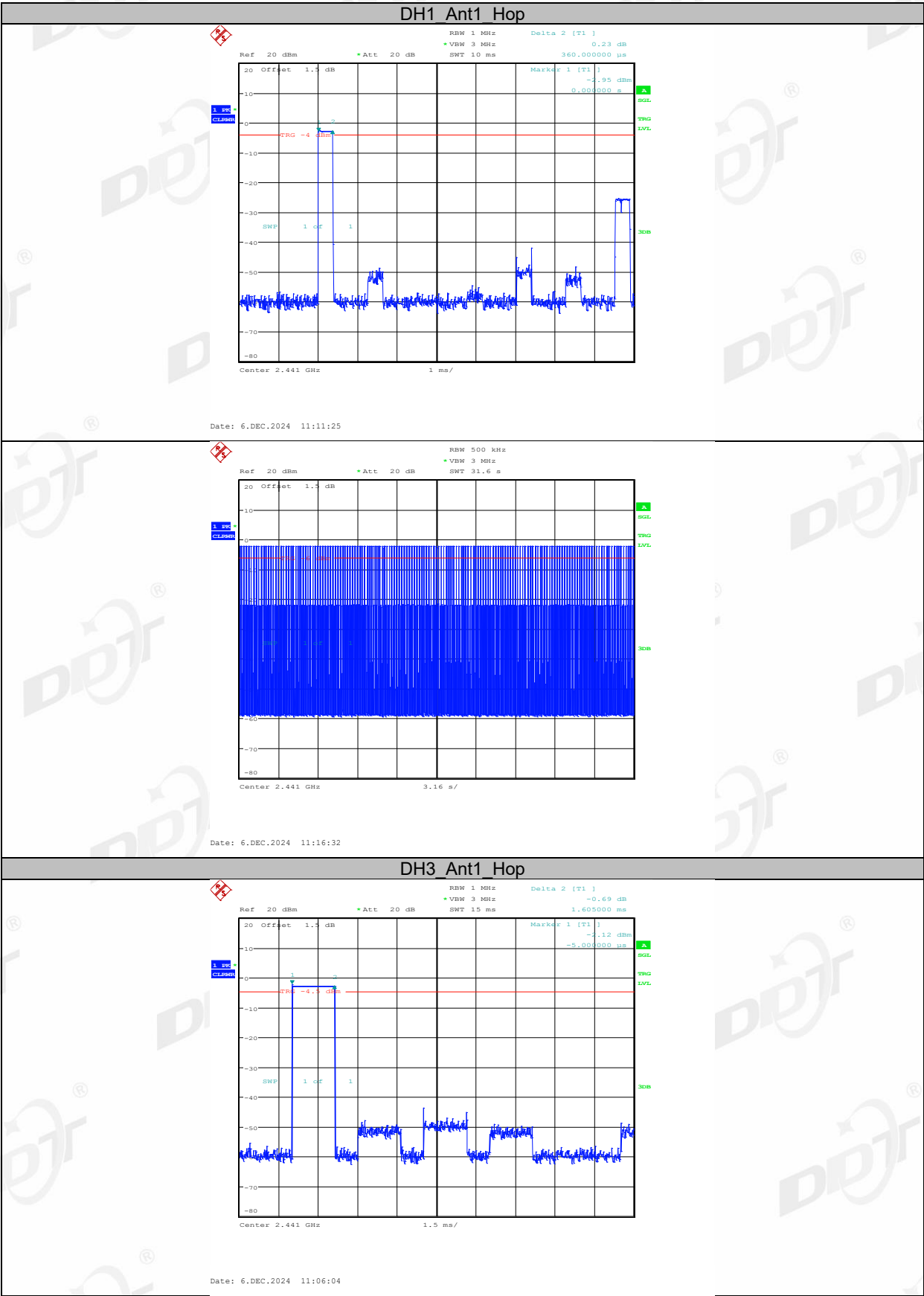
|                |                                                                         |
|----------------|-------------------------------------------------------------------------|
| RBW:           | $\leq$ channel spacing and where possible RBW should be set $\gg 1 / T$ |
| VBW:           | $VBW \geq RBW$ .                                                        |
| Span:          | Zero span, centered on a hopping channel.                               |
| Detector Mode: | Peak                                                                    |
| Sweep time:    | Auto                                                                    |
| Trace mode:    | Clear Write.                                                            |
- (5) The test period:  $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$
- (6) Measure the hopping number and on time of each pulse with spectrum analyzer in zero span set, and calculate dwell time with formula Dwell time = total hops \* pulse's on time.
- (7) Measure and record the results in the report.

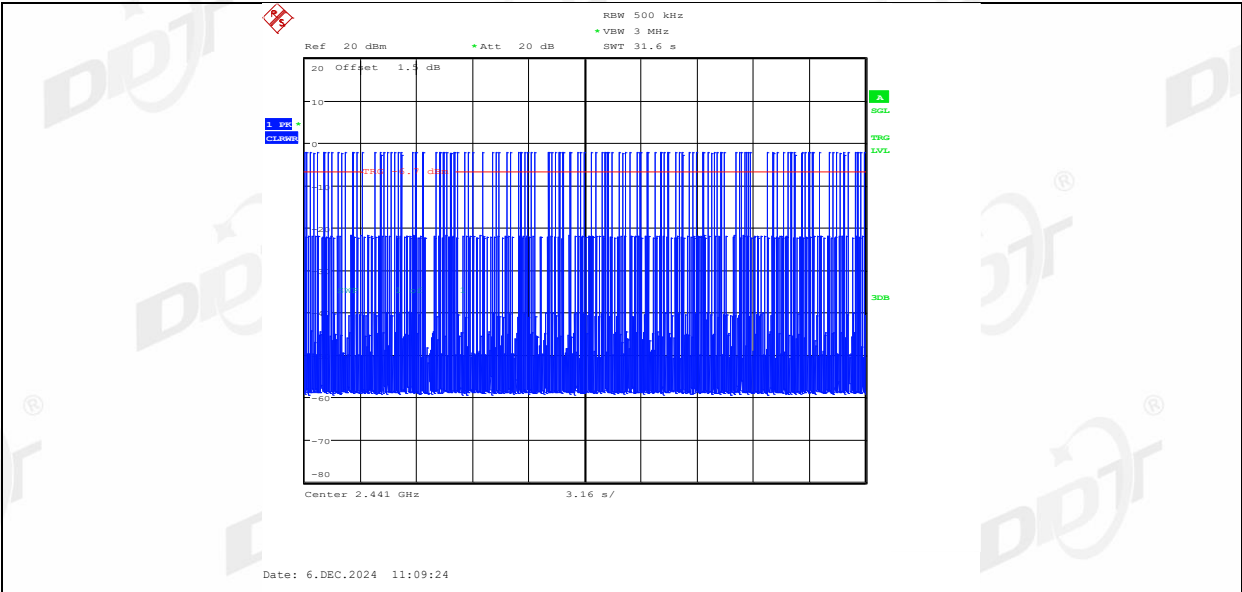
8.4. Test result

|                    |                |                |                          |
|--------------------|----------------|----------------|--------------------------|
| Test Engineer:     | Zoe            | Test Site:     | RF Measurement System 2# |
| Ambient Condition: | 24.3℃, 46.2%RH | Test Date:     | 2024.12.06-2024.12.06    |
| Test Power Supply: | DC 5V          | Sample Number: | S24112815-002            |

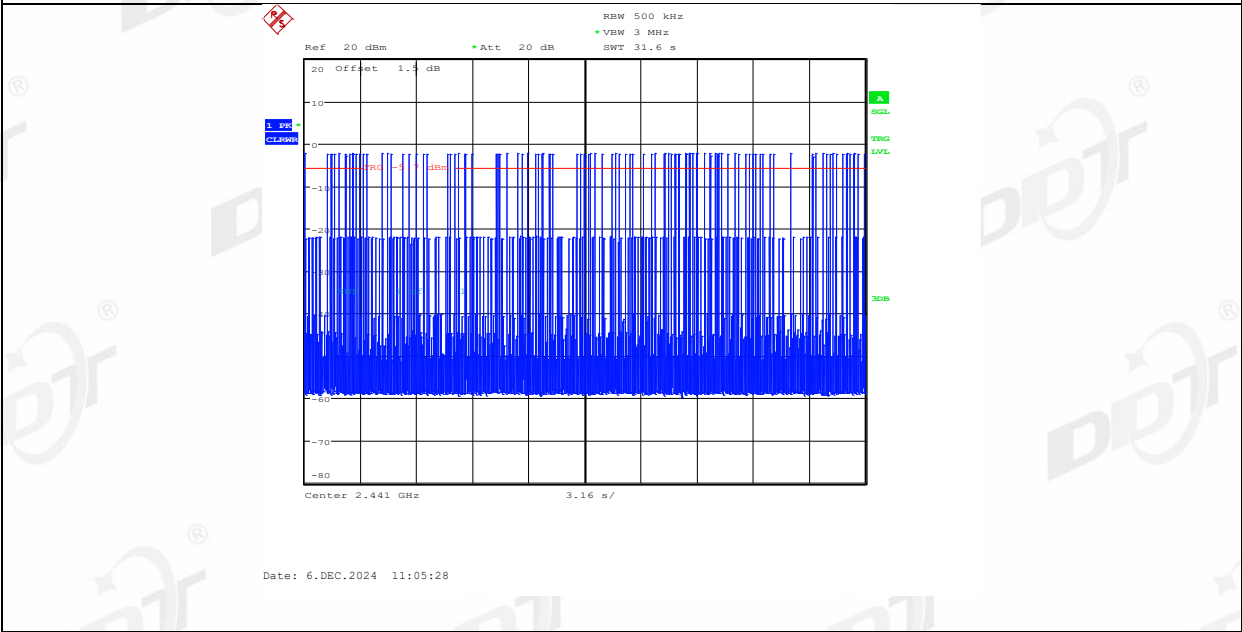
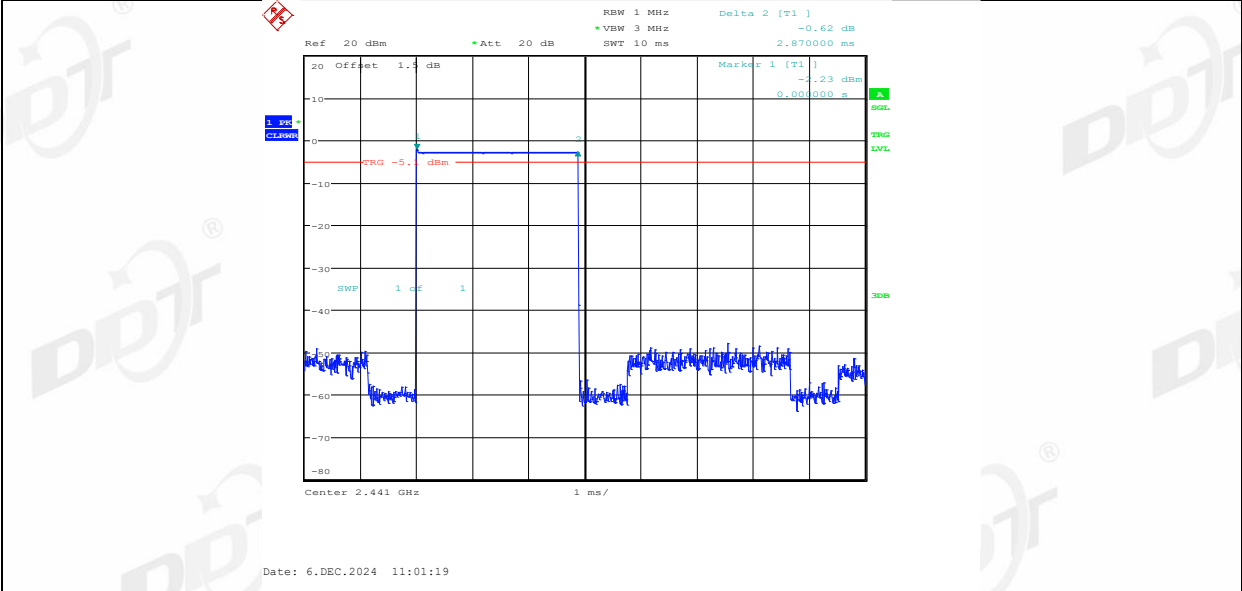
| Test Mode | Antenna | Frequency [MHz] | Burst Width [ms] | Total Hops [Num] | Result [s] | Limit [s] | Verdict |
|-----------|---------|-----------------|------------------|------------------|------------|-----------|---------|
| DH1       | Ant1    | Hop             | 0.360            | 321              | 0.116      | ≤0.4      | PASS    |
| DH3       | Ant1    | Hop             | 1.605            | 151              | 0.242      | ≤0.4      | PASS    |
| DH5       | Ant1    | Hop             | 2.870            | 113              | 0.324      | ≤0.4      | PASS    |
| 2DH1      | Ant1    | Hop             | 0.360            | 320              | 0.115      | ≤0.4      | PASS    |
| 2DH3      | Ant1    | Hop             | 1.620            | 153              | 0.248      | ≤0.4      | PASS    |
| 2DH5      | Ant1    | Hop             | 2.880            | 110              | 0.317      | ≤0.4      | PASS    |

8.5.Test graphs





DH5\_Ant1\_Hop

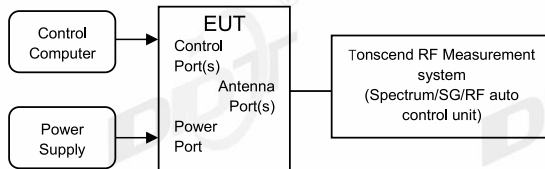






## 9. Number of Hopping Channel

### 9.1. Block diagram of test setup



### 9.2. Limits

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

### 9.3. Test procedure

- (1) The test according to ANSI C63.10-2020 clause 7.8.3.
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results.
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously.
- (4) Use the following spectrum analyzer settings for the maximum peak output power measurement:

RBW: RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.

VBW:  $VBW \geq RBW$ .

Span: The frequency band of operation

Detector Mode: Peak

Sweep time: Auto

Trace mode: Max hold

- (5) Measure the hopping number and record the results in the report.
- (6) Measure and record the results in the report.

9.4. Test result

|                    |                |                |                          |  |  |
|--------------------|----------------|----------------|--------------------------|--|--|
| Test Engineer:     | Zoe            | Test Site:     | RF Measurement System 2# |  |  |
| Ambient Condition: | 24.3℃, 46.2%RH | Test Date:     | 2024.12.06-2024.12.06    |  |  |
| Test Power Supply: | DC 5V          | Sample Number: | S24112815-002            |  |  |

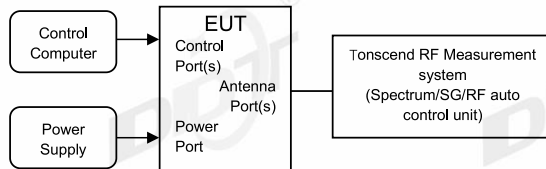
| Test Mode | Antenna | Frequency [MHz] | Result [Num] | Limit [Num] | Verdict |
|-----------|---------|-----------------|--------------|-------------|---------|
| DH5       | Ant1    | Hop             | 79           | ≥15         | PASS    |
| 2DH5      | Ant1    | Hop             | 79           | ≥15         | PASS    |

9.5. Test graphs



## 10. Band Edge Compliance (Conducted Method)

### 10.1. Block diagram of test setup



### 10.2. Limit

All restriction band should comply with 15.209, other emission should be at least 20dB below the fundamental.

### 10.3. Test procedure

- (1) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (2) Establish a reference level by using the following procedure:

|                |                                          |
|----------------|------------------------------------------|
| RBW:           | 100 kHz                                  |
| VBW:           | 300 kHz                                  |
| Span           | Encompass frequency range to be measured |
| Detector Mode: | Peak                                     |
| Sweep time:    | Auto                                     |
| Trace mode     | Max hold                                 |
- (3) Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.
- (4) Then mark the maximum amplitude of all unwanted emissions outside of the authorized frequency band.

10.4. Test result

|                    |                |                |                          |
|--------------------|----------------|----------------|--------------------------|
| Test Engineer:     | Zoe            | Test Site:     | RF Measurement System 2# |
| Ambient Condition: | 24.3℃, 46.2%RH | Test Date:     | 2024.12.06-2024.12.06    |
| Test Power Supply: | DC 5V          | Sample Number: | S24112815-002            |

| Mode | Frequency (MHz)  | Verdict |
|------|------------------|---------|
| DH5  | Hopping off 2402 | Pass    |
|      | Hopping off 2480 | Pass    |
|      | Hopping on       | Pass    |
| 2DH5 | Hopping off 2402 | Pass    |
|      | Hopping off 2480 | Pass    |
|      | Hopping on       | Pass    |

**DH5 Ant1 Low 2402**

Ref 20 dBm Att 20 dB RBW 100 kHz VBW 300 kHz Marker 4 [T1] -50.23 dBm  
SWT 10 ms 2.399262821 GHz

20 Offset 1.3 dB

Marker 1 [T1] -1.53 dBm  
2.401981179 GHz  
Marker 2 [T1] -50.14 dBm  
2.400000000 GHz  
Marker 3 [T1] -50.10 dBm  
2.399000000 GHz

D1 -22.33 dBm

Start 2.31 GHz 10 MHz/ Stop 2.41 GHz

Date: 6.DEC.2024 10:00:56

**DH5 Ant1 High 2480**

Ref 20 dBm Att 20 dB RBW 100 kHz VBW 300 kHz Marker 4 [T1] -50.58 dBm  
SWT 15 ms 2.483509615 GHz

20 Offset 1.3 dB

Marker 1 [T1] -1.43 dBm  
2.480040777 GHz  
Marker 2 [T1] -50.58 dBm  
2.483509615 GHz  
Marker 3 [T1] -50.87 dBm  
2.500000000 GHz

D1 -24.43 dBm

Start 2.47 GHz 3 MHz/ Stop 2.5 GHz

Date: 6.DEC.2024 10:03:58

**DH5 Ant1 Low Hop 2402**

Ref 20 dBm Att 20 dB RBW 100 kHz VBW 300 kHz Marker 4 [T1] -51.52 dBm  
SWT 10 ms 2.399102564 GHz

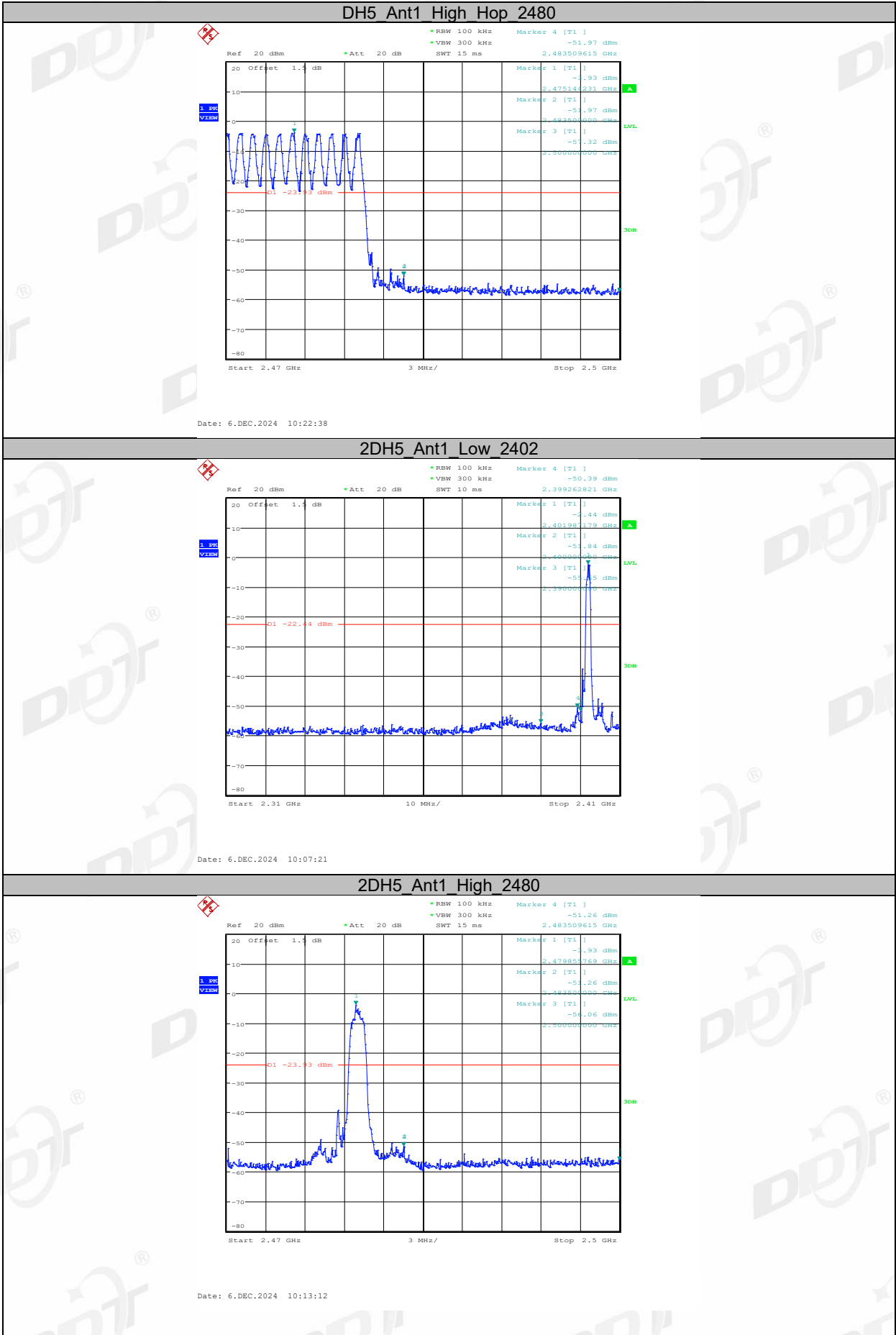
20 Offset 1.3 dB

Marker 1 [T1] -1.50 dBm  
2.401981179 GHz  
Marker 2 [T1] -50.71 dBm  
2.400000000 GHz  
Marker 3 [T1] -50.71 dBm  
2.399000000 GHz

D1 -22.33 dBm

Start 2.31 GHz 10 MHz/ Stop 2.41 GHz

Date: 6.DEC.2024 10:20:10





## 11. RF Conducted Spurious Emissions

### 11.1. Block diagram of test setup

Same as 10.1

### 11.2. Limits

In any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

### 11.3. Test procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Establish a reference level by using the following procedure:

|                  |                                                               |
|------------------|---------------------------------------------------------------|
| Center frequency | Test frequency                                                |
| RBW:             | 100 kHz                                                       |
| VBW:             | 300 kHz                                                       |
| Span             | Wide enough to capture the peak level of the in-band emission |
| Detector Mode:   | Peak                                                          |
| Sweep time:      | Auto                                                          |
| Trace mode       | Max hold                                                      |

(3) Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.

(4) Set the spectrum analyzer as follows:

|                              |                                          |
|------------------------------|------------------------------------------|
| RBW:                         | 100 kHz                                  |
| VBW:                         | 300 kHz                                  |
| Span                         | Encompass frequency range to be measured |
| Number of measurement points | $\geq \text{Span/RBW}$                   |
| Detector Mode:               | Peak                                     |
| Sweep time:                  | Auto                                     |
| Trace mode                   | Max hold                                 |

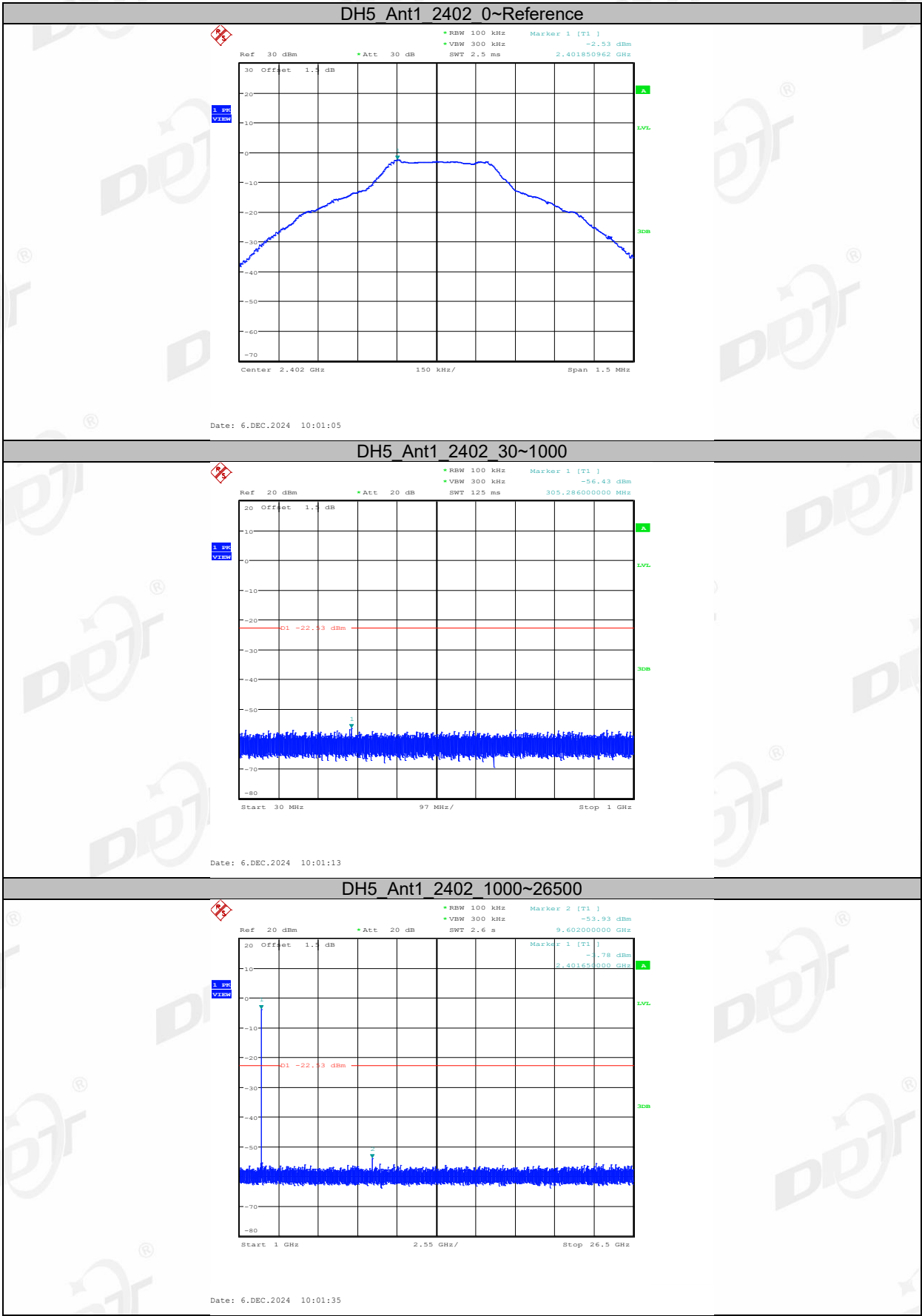
(5) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude of all unwanted emissions outside of the authorized frequency band

11.4. Test result

|                    |                |                |                          |
|--------------------|----------------|----------------|--------------------------|
| Test Engineer:     | Zoe            | Test Site:     | RF Measurement System 2# |
| Ambient Condition: | 24.3℃, 46.2%RH | Test Date:     | 2024.12.06-2024.12.06    |
| Test Power Supply: | DC 5V          | Sample Number: | S24112815-002            |

| Mode | Frequency (MHz)  | Verdict |
|------|------------------|---------|
| DH5  | Hopping off 2402 | Pass    |
|      | Hopping off 2441 | Pass    |
|      | Hopping off 2480 | Pass    |
| 2DH5 | Hopping off 2402 | Pass    |
|      | Hopping off 2441 | Pass    |
|      | Hopping off 2480 | Pass    |

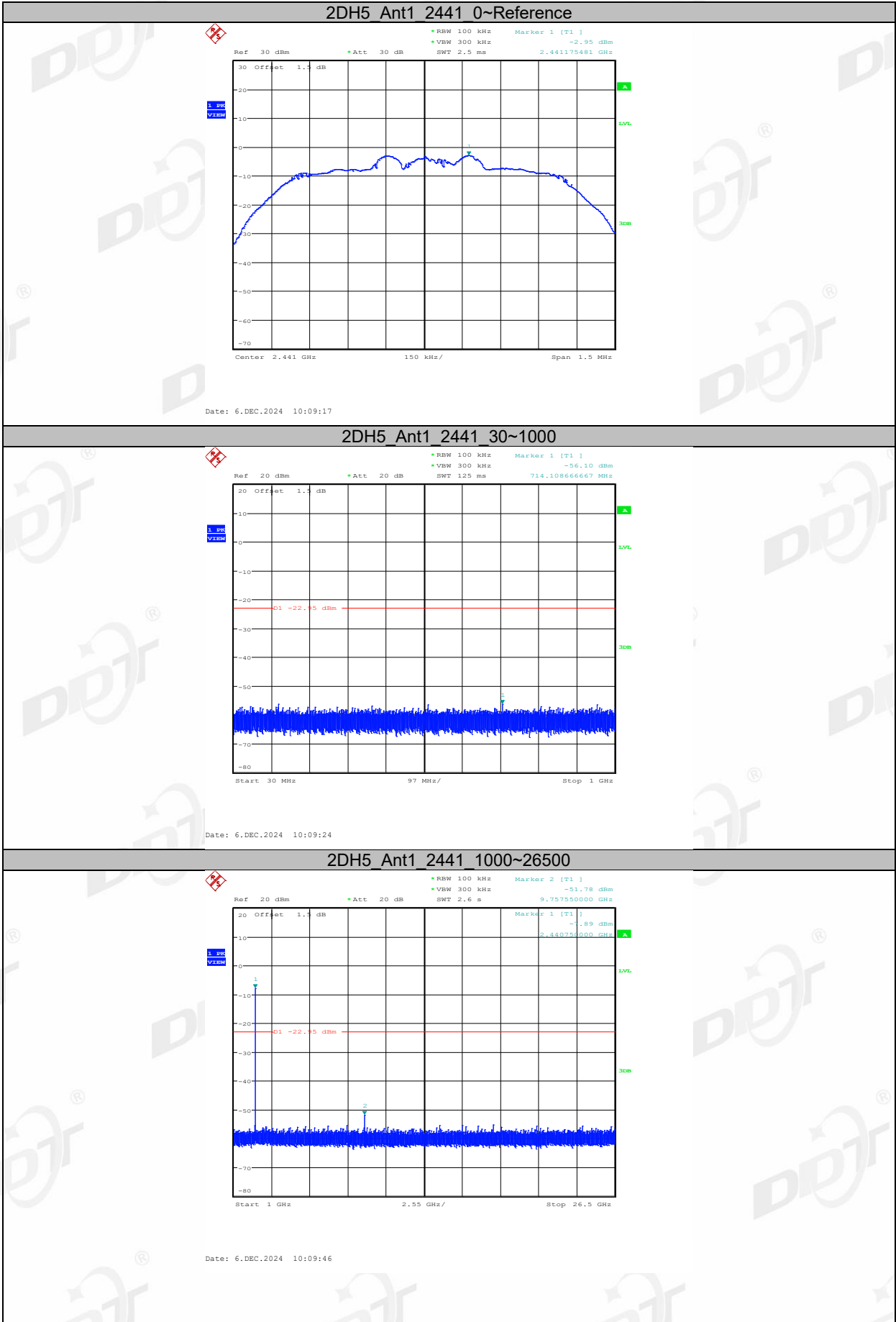
11.5. Test graphs

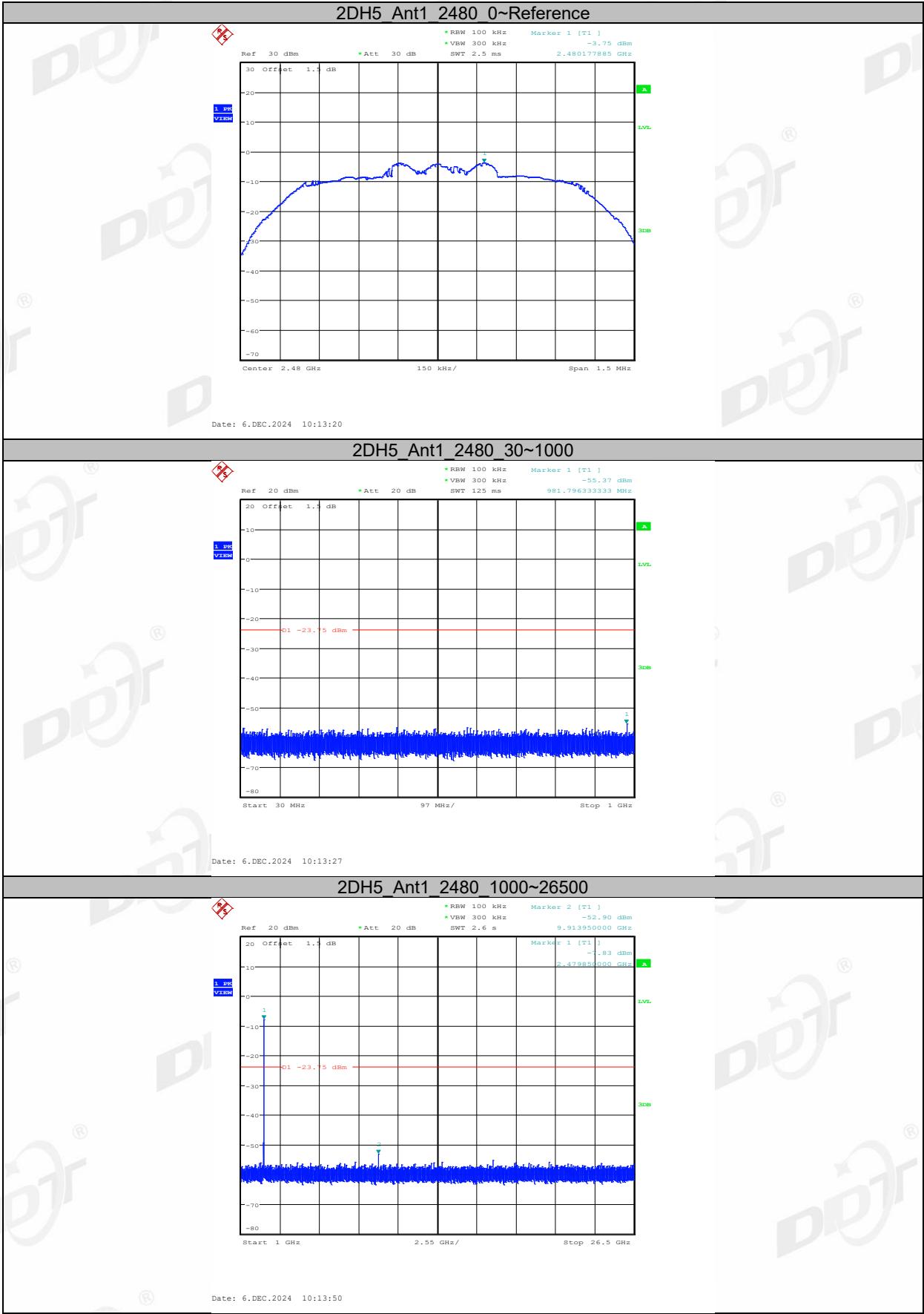












2DH5\_Ant1\_2480\_1000~26500

Ref 20 dBm

Offset 1.5 dB

Att 20 dB

RBW 100 kHz

VBW 300 kHz

SWT 2.6 s

Marker 1 [T1]

-52.90 dBm

9.913950000 GHz

Start 1 GHz

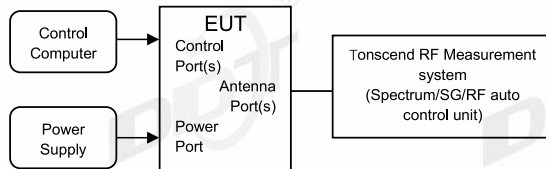
2.55 GHz/

Stop 26.5 GHz

Date: 6.DEC.2024 10:13:50

## 12. Duty cycle

### 12.1. Block diagram of test setup



### 12.2. Limit

Just for Report.

### 12.3. Test procedure

- (1) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, The cable loss and attenuator loss have been put into spectrum analyzer as amplitude offset.

set the Spectrum Analyzer as below:

Centre Frequency: The centre frequency of the middle hopping channel.

Resolution BW: 10 MHz.

Video BW: 10 MHz.

Span: Zero span.

Detector: Peak.

Trace Mode: Clear Write.

Sweep: Video Trigger

- (2) When the trace is complete, measure the sending time of 1 burst and the duty cycle of 1 burst cycle.

- (3) Calculate dwell time follow below formula:

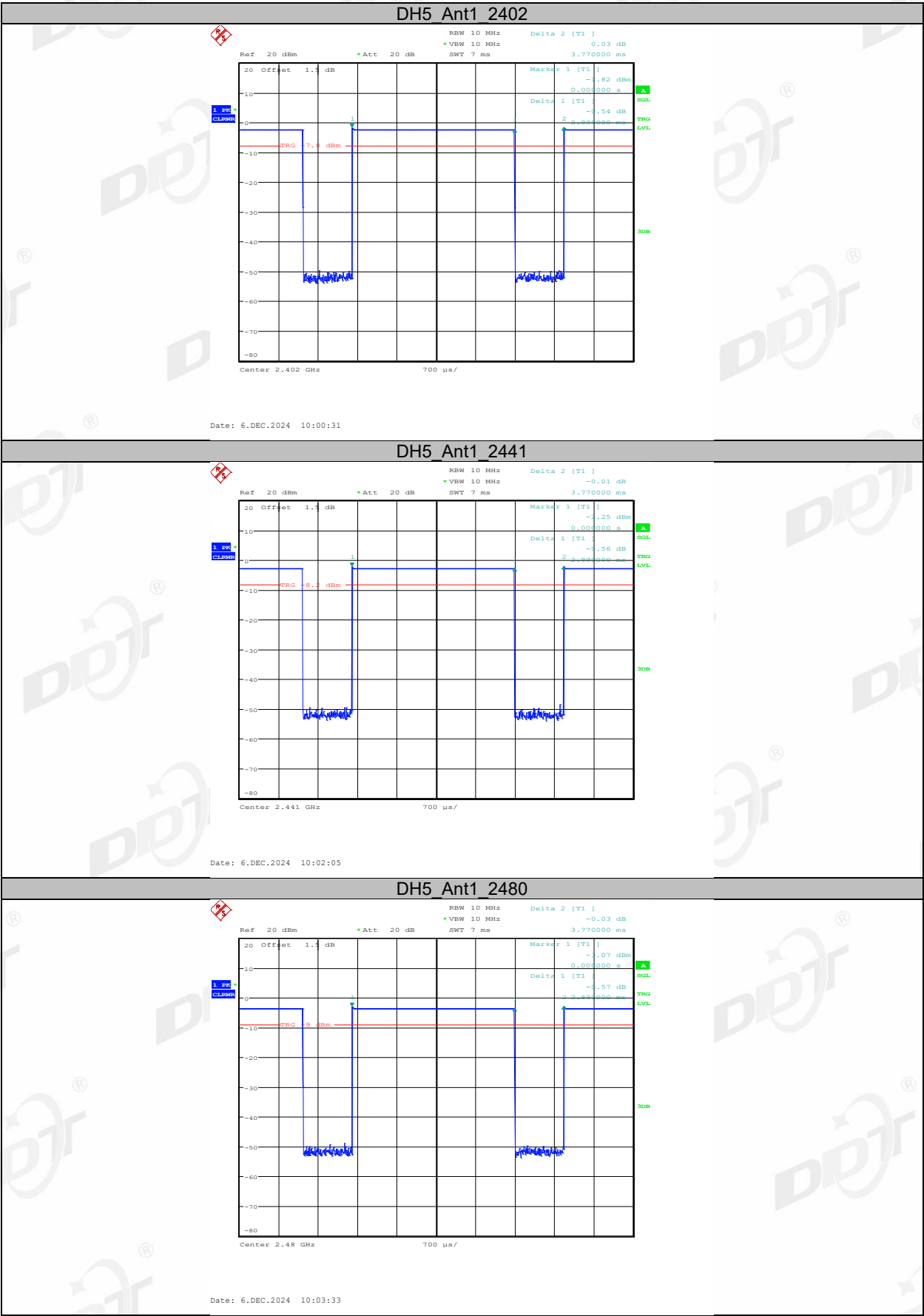
Duty cycle= Pulse's on time / Burst cycle

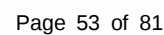
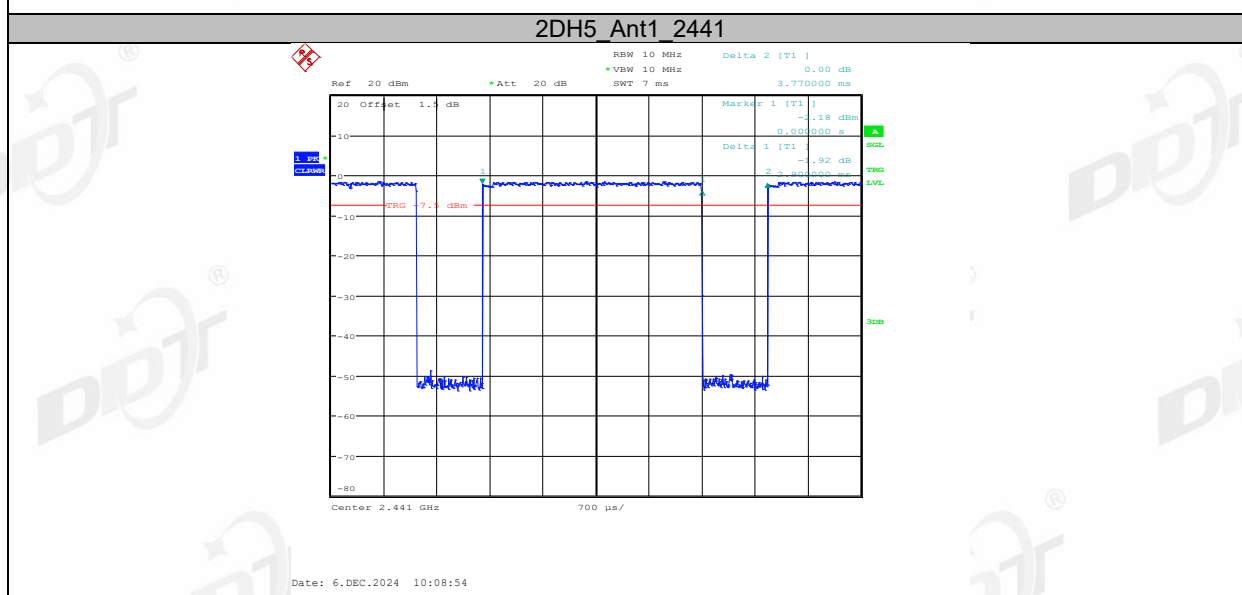
12.4. Test result

|                    |                |                |                          |
|--------------------|----------------|----------------|--------------------------|
| Test Engineer:     | Zoe            | Test Site:     | RF Measurement System 2# |
| Ambient Condition: | 24.3℃, 46.2%RH | Test Date:     | 2024.12.06-2024.12.06    |
| Test Power Supply: | DC 5V          | Sample Number: | S24112815-002            |

| Test Mode | Antenna | Frequency [MHz] | ON Time [ms] | Period [ms] | Duty Cycle [%] | Duty Cycle Factor [dB] |
|-----------|---------|-----------------|--------------|-------------|----------------|------------------------|
| DH5       | Ant1    | 2402            | 2.89         | 3.77        | 76.66          | 1.15                   |
|           |         | 2441            | 2.89         | 3.77        | 76.66          | 1.15                   |
|           |         | 2480            | 2.89         | 3.77        | 76.66          | 1.15                   |
| 2DH5      | Ant1    | 2402            | 2.90         | 3.77        | 76.92          | 1.14                   |
|           |         | 2441            | 2.90         | 3.77        | 76.92          | 1.14                   |
|           |         | 2480            | 2.90         | 3.76        | 77.13          | 1.13                   |

12.5. Test graphs





## 13. Antenna Requirements

### 13.1. Limit

For intentional device, according to FCC 47 CFR Section 15.203, 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 13.2. Result

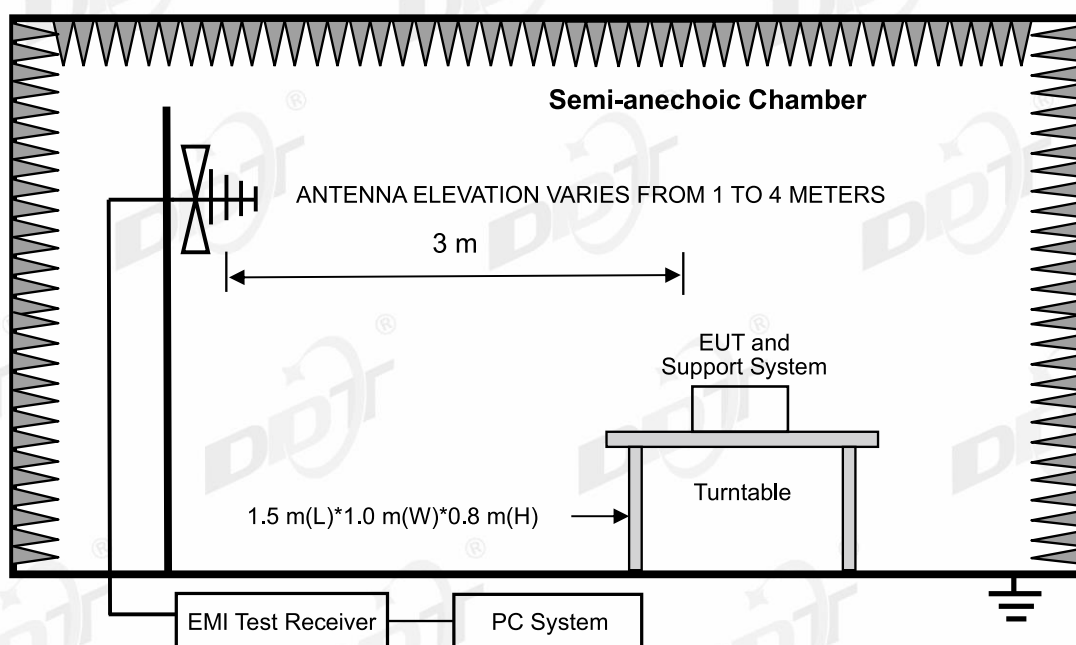
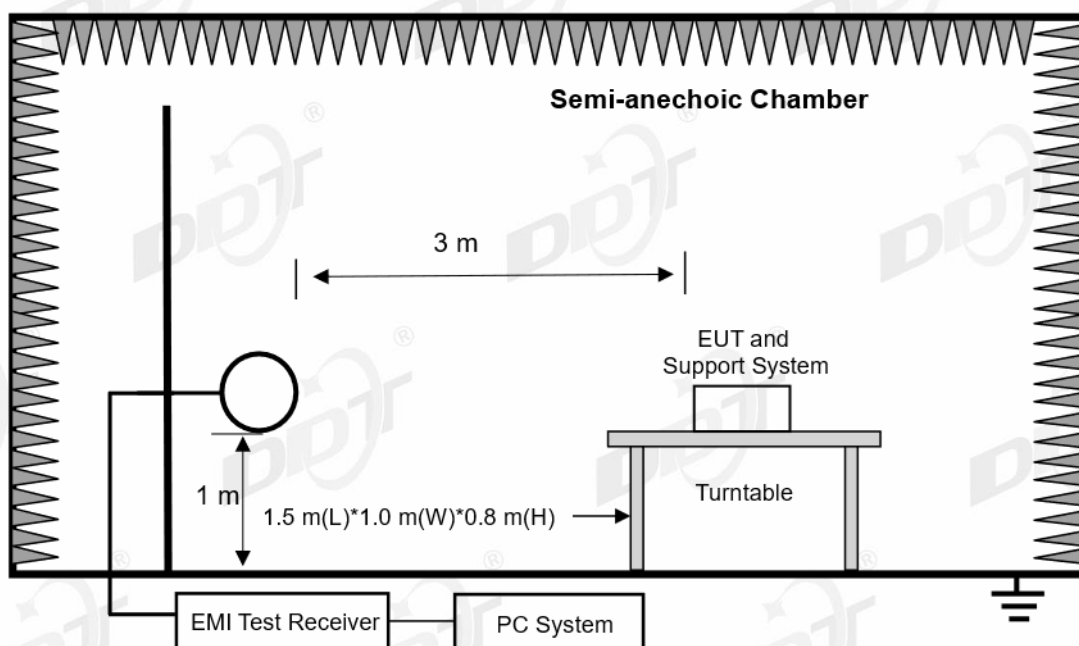
The antenna used for this product as Antenna information described in section 2.1 of the report, and there is no other antenna than that furnished by the responsible party shall be used with the device.

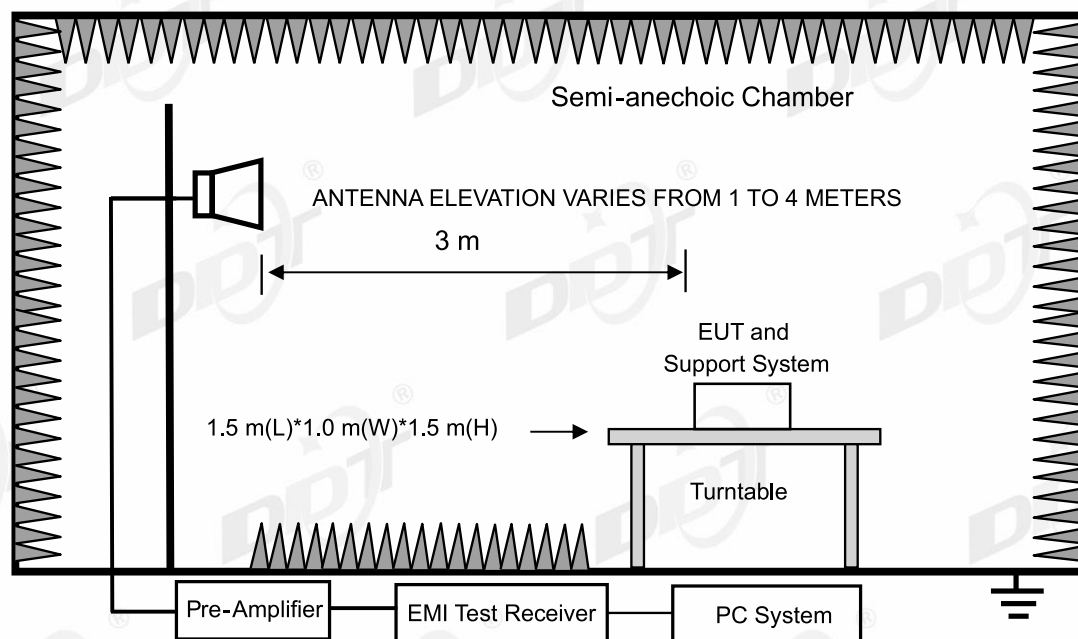
## 14. Radiated Emission

### 14.1. Test equipment

| Equipment                    | Manufacturer      | Model No.          | Serial No.  | Cal Due To | Cal. Interval |
|------------------------------|-------------------|--------------------|-------------|------------|---------------|
| EMI TEST RECEIVER            | R&S               | ESU26              | DDT-ZC01909 | 2025/03/31 | 1 Year        |
| High Pass filter             | Xi'an Xingbo      | XBLBQ-GTA67        | DDT-ZC02179 | 2025/04/22 | 1 Year        |
| Hochgewinn-Hornantenne       | SCHWARZBECK       | BBHA 9120 D        | DDT-ZC02129 | 2025/09/18 | 2 Year        |
| RF cable                     | Yuhu Technology   | ZT26S-SMAJ-SMAJ-1M | DDT-ZC02037 | 2025/03/31 | 1 Year        |
| RF cable                     | Zhongke Junchuang | JCT26S-NJ-NJ-1.5M  | DDT-ZC02762 | 2025/03/31 | 1 Year        |
| RF cable                     | Yuhu Technology   | JCTB810-NJ-NJ-9M   | DDT-ZC02538 | 2025/03/31 | 1 Year        |
| Micro-Tronics filters        | REBES             | BRM50716           | DDT-ZC03240 | /          | /             |
| RF Cable                     | N/A               | W13.02 AP1-X2      | DDT-ZC04023 | 2025/03/31 | 1 Year        |
| Pre-amplifier                | COM-POWER         | PAM-840A           | DDT-ZC01693 | 2025/03/31 | 1 Year        |
| High pass filter             | Micro-Tronics     | HPM50102           | DDT-ZC00561 | 2025/04/22 | 1 Year        |
| Active Loop Antenna          | Schwarzbeck       | FMZB1519           | DDT-ZC00524 | 2025/09/11 | 2 Year        |
| Micro-Tronics filters        | REBES             | BRM50702           | DDT-ZC03242 | /          | /             |
| High pass filter             | Micro-Tronics     | HPM50108           | DDT-ZC00560 | 2025/04/22 | 1 Year        |
| PSA Series Spectrum Analyzer | Agilent           | E4447A             | DDT-ZC00517 | 2025/03/31 | 1 Year        |
| Broad-Band Horn Antenna      | Schwarzbeck       | BBHA 9170          | DDT-ZC00506 | 2025/04/26 | 1 Year        |
| RF Cable                     | N/A               | W24.02 HL-562      | DDT-ZC04022 | 2025/03/31 | 1 Year        |
| Trilog Broadband Antenna     | Schwarzbeck       | VULB 9163          | DDT-ZC02050 | 2025/07/11 | 1 Year        |
| Pre-amplifier                | COM-POWER         | PAM-118A           | DDT-ZC01293 | 2025/08/25 | 1 Year        |

## 14.2. Block diagram of test setup





### 14.3. Limits

#### (1) FCC 15.205 Restricted frequency band

| MHz                      | MHz                 | MHz           | GHz              |
|--------------------------|---------------------|---------------|------------------|
| 0.090-0.110              | 16.42-16.423        | 399.9-410     | 4.5-5.15         |
| <sup>1</sup> 0.495-0.505 | 16.69475-16.69525   | 608-614       | 5.35-5.46        |
| 2.1735-2.1905            | 16.80425-16.80475   | 960-1240      | 7.25-7.75        |
| 4.125-4.128              | 25.5-25.67          | 1300-1427     | 8.025-8.5        |
| 4.1772&4.17775           | 37.5-38.25          | 1435-1626.5   | 9.0-9.2          |
| 4.2072&4.20775           | 73-74.6             | 1645.5-1646.5 | 9.3-9.5          |
| 6.215-6.218              | 74.8-75.2           | 1660-1710     | 10.6-12.7        |
| 6.26775-6.26825          | 108-121.94          | 1718.8-1722.2 | 13.25-13.4       |
| 6.31175-6.31225          | 123-138             | 2200-2300     | 14.47-14.5       |
| 8.291-8.294              | 149.9-150.05        | 2310-2390     | 15.35-16.2       |
| 8.362-8.366              | 156.52475-156.52525 | 2483.5-2500   | 17.7-21.4        |
| 8.37625-8.38675          | 156.7-156.9         | 2690-2900     | 22.01-23.12      |
| 8.41425-8.41475          | 162.0125-167.17     | 3260-3267     | 23.6-24.0        |
| 12.29-12.293             | 167.72-173.2        | 3332-3339     | 31.2-31.8        |
| 12.51975-12.52025        | 240-285             | 3345.8-3358   | 36.43-36.5       |
| 12.57675-12.57725        | 322-335.4           | 3600-4400     | ( <sup>2</sup> ) |
| 13.36-13.41              |                     |               |                  |

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

<sup>2</sup>Above 38.6

## (2) FCC 15.209 Limit

| FREQUENCY<br>MHz | DISTANCE<br>Meters | FIELD STRENGTHS LIMIT                       |               |
|------------------|--------------------|---------------------------------------------|---------------|
|                  |                    | uV/m                                        | dBuV/m        |
| 0.009 ~ 0.490    | 300                | 2400/F(kHz)                                 | 67.6-20log(F) |
| 0.490 ~ 1.705    | 30                 | 24000/F(kHz)                                | 87.6-20log(F) |
| 1.705 ~ 30.0     | 30                 | 30                                          | 29.54         |
| 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 dBuV/m (Peak)<br>54.0 dBuV/m (Average) |               |

Note:

(1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9 - 90 kHz, 110 - 490 kHz and above 1000 MHz, radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30 MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$\text{Limit}_{3\text{m}}(\text{dBuV/m}) = \text{Limit}_{30\text{m}}(\text{dBuV/m}) + 40\text{Log}(30\text{m}/3\text{m})$$

## (3) Limit for this EUT

The emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20 dB below the fundamental emissions or comply with 15.209 limits.

**14.4. Assistant equipment used for test**

| Assistant equipment | Manufacturer | Model number | Description | other |
|---------------------|--------------|--------------|-------------|-------|
| /                   | /            | /            | /           | /     |

**14.5. Test procedure**

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber for below 1G and 150 cm above the ground plane inside a fully-anechoic chamber for above 1G.

(2) Test antenna was located 3 m from the EUT on an adjustable mast, and the antenna used as below table.

| Test frequency range | Test antenna used                         | Test antenna distance |
|----------------------|-------------------------------------------|-----------------------|
| 9 kHz - 30 MHz       | Active Loop antenna                       | 3 m                   |
| 30 MHz - 1 GHz       | Trilog Broadband Antenna                  | 3 m                   |
| 1 GHz - 18 GHz       | Double Ridged Horn Antenna (1 GHz-18 GHz) | 3 m                   |
| 18 GHz - 40 GHz      | Horn Antenna (18 GHz-40 GHz)              | 1 m                   |

According ANSI C63.10:2020 clause 6.4.6 and 6.5.3, for measurements below 30 MHz, Antenna was located 3 m from EUT, the loop antenna was positioned in three antenna orientations (parallel, perpendicular, and round-parallel), for each measurement antenna alignment, the EUT shall be rotated through 0° to 360° on a turntable, and the lowest height of the magnetic antenna shall be 1 m above the ground. For measurement above 30MHz, the trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9 kHz to 25 GHz:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1 m to 4 m (Except loop antenna, it's fixed 1 m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Change power supply range from 85% to 115% of the rated supply voltage

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

Spectrum frequency from 9 kHz to 25 GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 18 GHz to 25 GHz, so below final test was performed with frequency range from 9 kHz to 18 GHz.

(4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed according to ANSI C63.10:2020 on Radiated Emission test.

(5) The emissions from 9 kHz to 1 GHz were measured based on CISPR QP detector except for the frequency bands 9 - 90 kHz, 110 - 490 kHz, for emissions from 9 kHz - 90 kHz, 110 kHz - 490 kHz and above 1 GHz were measured based on average detector, for emissions above 1 GHz, peak emissions also be measured and need comply with Peak limit.

(6) The emissions from 9 kHz to 1 GHz, QP or average values were measured with EMI receiver with below RBW.

| Frequency band   | RBW     |
|------------------|---------|
| 9 kHz - 150 kHz  | 200 Hz  |
| 150 kHz - 30 MHz | 9 kHz   |
| 30 MHz - 1 GHz   | 120 kHz |

(7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1 MHz, VBW is set at 3 MHz for Peak measure; According ANSI C63.10:2020 clause 4.1.4.2.2 procedure for average measure.

(8) For portable device, X axis, Y axis, Z axis are tested, and worse setup is reported.

(9) According exploratory test, the emission levels are 20 dB below the limit detected from 9 kHz to 30 MHz and 18 GHz to 25 GHz, so the final test was performed with frequency range from 30 MHz to 18 GHz and recorded in below.

(10) For 30 MHz ~ 25 GHz: (Scan with GFSK,  $\pi/4$ DQPSK, the worst case is record and reported)

(11) For emissions below 1 GHz, according exploratory explorer test, when change Tx mode and channel, have no distinct influence on emissions level, so for emissions below 1 GHz, the final test was only performed with EUT working in worst mode.

#### 14.6. Test result

**PASS. (See below detailed test result)**

14.7. Test data

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-05

Tested By:

Gen Liu

EUT:

LED LanternSpeaker ULTIMA

Model Number:

SP0000113-01

Test Mode:

TX DH5

Power Supply:

DC 5V

Condition:

Temp:21.5°C;Humi:48.4%

Test Site:

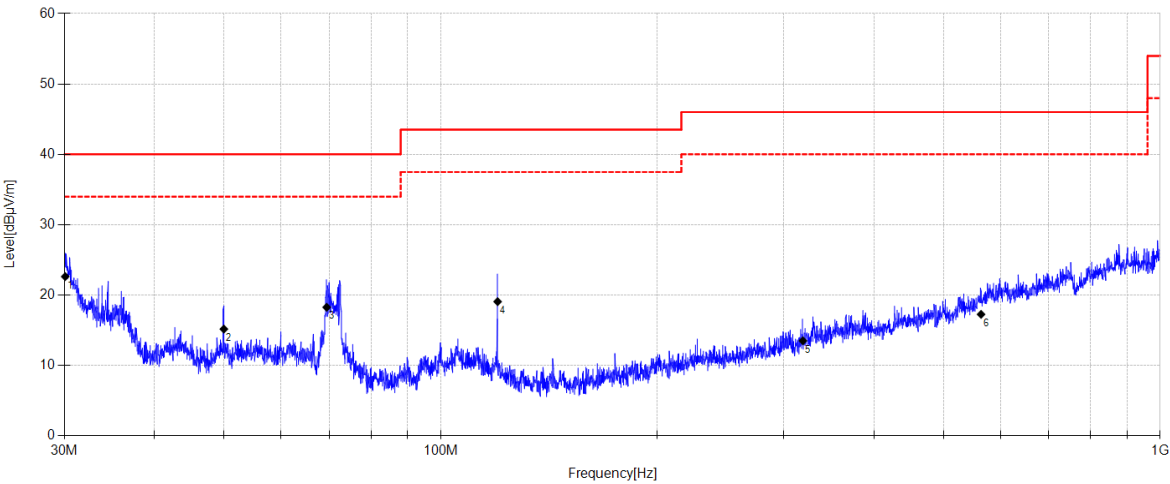
DDT 3# Chamber

File Path:

d:\ts\2024 report data\Q24112815-1E\FCC BELOW 1G\20241205-205811\_H

Memo:

Sample Numble:S24112815-001 Power Setting:10



| Data List |             |                  |                     |                 |                 |                |             |          |            |
|-----------|-------------|------------------|---------------------|-----------------|-----------------|----------------|-------------|----------|------------|
| NO.       | Freq. [MHz] | Reading [dBμV/m] | Antenna Factor [dB] | Cable Loss [dB] | Result [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Detector | Polarity   |
| 1         | 30.084      | 39.66            | 10.31               | 3.76            | 22.63           | 40.00          | 17.37       | QP       | Horizontal |
| 2         | 49.981      | 29.4             | 12.99               | 3.88            | 15.17           | 40.00          | 24.83       | QP       | Horizontal |
| 3         | 69.443      | 35.16            | 10.19               | 4.02            | 18.27           | 40.00          | 21.73       | QP       | Horizontal |
| 4         | 119.991     | 35.86            | 10.00               | 4.33            | 19.07           | 43.50          | 24.43       | QP       | Horizontal |
| 5         | 318.666     | 25.75            | 13.87               | 5.29            | 13.50           | 46.00          | 32.50       | QP       | Horizontal |
| 6         | 563.517     | 24.7             | 17.82               | 6.24            | 17.26           | 46.00          | 28.74       | QP       | Horizontal |

Note:

1. Result Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-05

Tested By:

Gen Liu

EUT:

LED LanternSpeaker ULTIMA

Model Number:

SP0000113-01

Test Mode:

TX DH5

Power Supply:

DC 5V

Condition:

Temp:21.5°C;Humi:48.4%

Test Site:

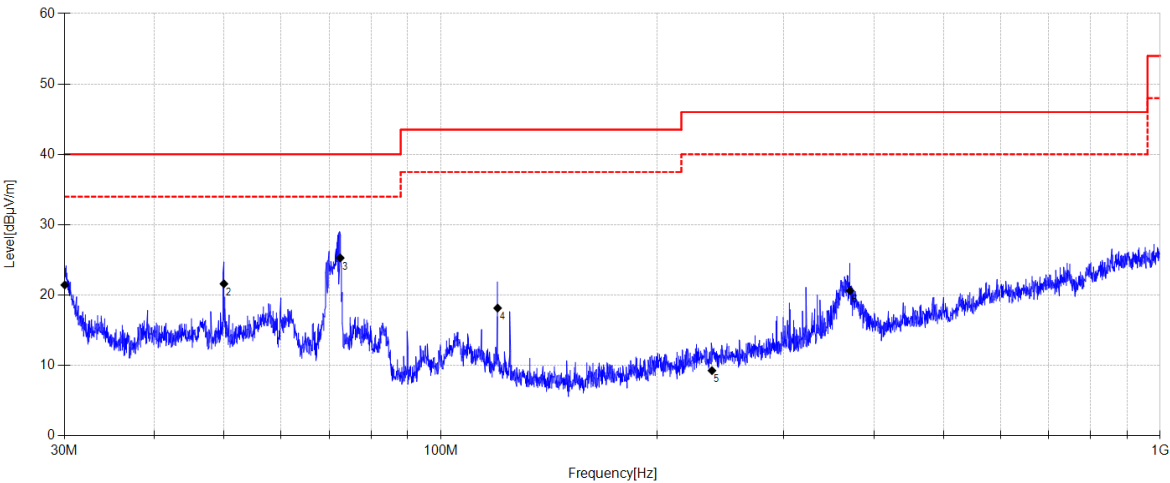
DDT 3# Chamber

File Path:

d:\ts\2024 report data\Q24112815-1E\FCC BELOW 1G\20241205-205859\_V

Memo:

Sample Numbel:S24112815-001 Power Setting:10



| Data List |             |                  |                     |                 |                 |                |             |          |          |
|-----------|-------------|------------------|---------------------|-----------------|-----------------|----------------|-------------|----------|----------|
| NO.       | Freq. [MHz] | Reading [dBμV/m] | Antenna Factor [dB] | Cable Loss [dB] | Result [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Detector | Polarity |
| 1         | 30.042      | 38.47            | 10.30               | 3.76            | 21.43           | 40.00          | 18.57       | QP       | Vertical |
| 2         | 49.981      | 35.83            | 12.99               | 3.88            | 21.60           | 40.00          | 18.40       | QP       | Vertical |
| 3         | 72.528      | 42.95            | 9.39                | 4.04            | 25.28           | 40.00          | 14.72       | QP       | Vertical |
| 4         | 119.991     | 34.94            | 10.00               | 4.33            | 18.15           | 43.50          | 25.35       | QP       | Vertical |
| 5         | 238.211     | 23.95            | 11.66               | 4.94            | 9.27            | 46.00          | 36.73       | QP       | Vertical |
| 6         | 370.516     | 30.8             | 15.76               | 5.50            | 20.62           | 46.00          | 25.38       | QP       | Vertical |

Note:

1. Result Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-05

Tested By:

Gen Liu

EUT:

LED LanternSpeaker ULTIMA

Model Number:

SP0000113-01

Test Mode:

TX DH5 2402MHz

Power Supply:

DC 5V

Condition:

Temp:21.5°C;Humi:48.4%

Test Site:

DDT 3# Chamber

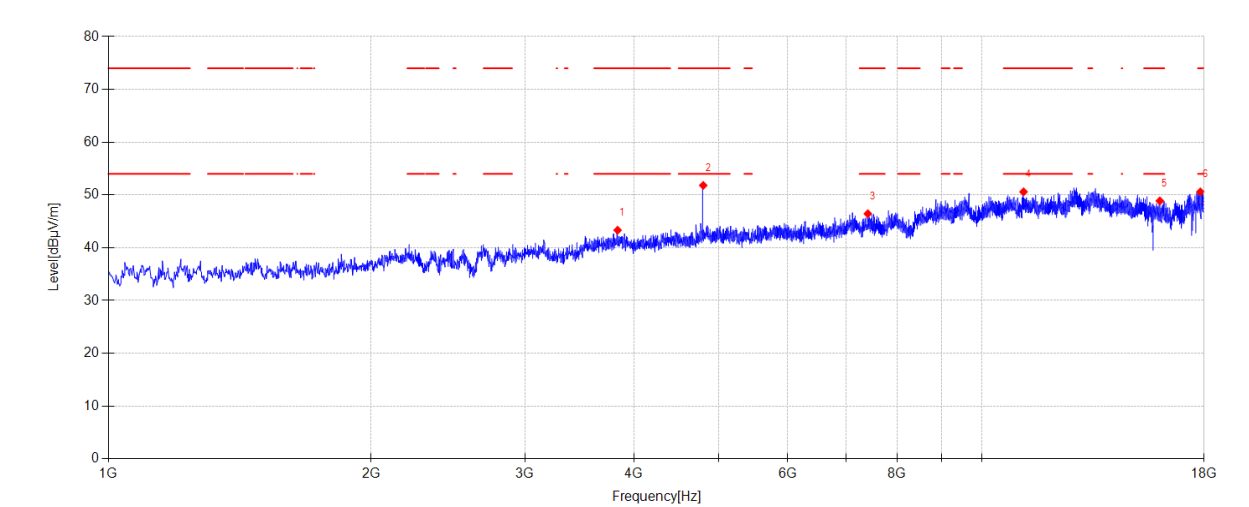
File Path:

d:\ts\2024 report data\Q24112815-1E\FCC ABOVE 1G\1

Memo:

Sample Numble:S24112815-001 Power Setting:10

Test Graph



| Data List |             |                  |                     |                 |          |                |                |             |          |            |
|-----------|-------------|------------------|---------------------|-----------------|----------|----------------|----------------|-------------|----------|------------|
| NO.       | Freq. [MHz] | Reading [dBμV/m] | Antenna Factor [dB] | Cable loss [dB] | AMP [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Detector | Polarity   |
| 1         | 3830.500    | 47.06            | 30.82               | 5.08            | -39.64   | 43.32          | 74.00          | 30.68       | PK       | Horizontal |
| 2         | 4801.200    | 53.37            | 32.53               | 5.53            | -39.62   | 51.81          | 74.00          | 22.19       | PK       | Horizontal |
| 3         | 7410.700    | 43.73            | 36.68               | 6.66            | -40.63   | 46.44          | 74.00          | 27.56       | PK       | Horizontal |
| 4         | 11174.500   | 42.29            | 39.23               | 8.24            | -39.17   | 50.59          | 74.00          | 23.41       | PK       | Horizontal |
| 5         | 16007.600   | 40.15            | 37.99               | 10.15           | -39.41   | 48.88          | 74.00          | 25.12       | PK       | Horizontal |
| 6         | 17813.000   | 37.01            | 40.94               | 12.66           | -40.02   | 50.59          | 74.00          | 23.41       | PK       | Horizontal |

Note:

- Level = Reading + Cable loss + Antenna Factor + AMP
- If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
- Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-05

Tested By:

Gen Liu

EUT:

LED LanternSpeaker ULTIMA

Model Number:

SP0000113-01

Test Mode:

TX DH5 2402MHz

Power Supply:

DC 5V

Condition:

Temp:21.5°C;Humi:48.4%

Test Site:

DDT 3# Chamber

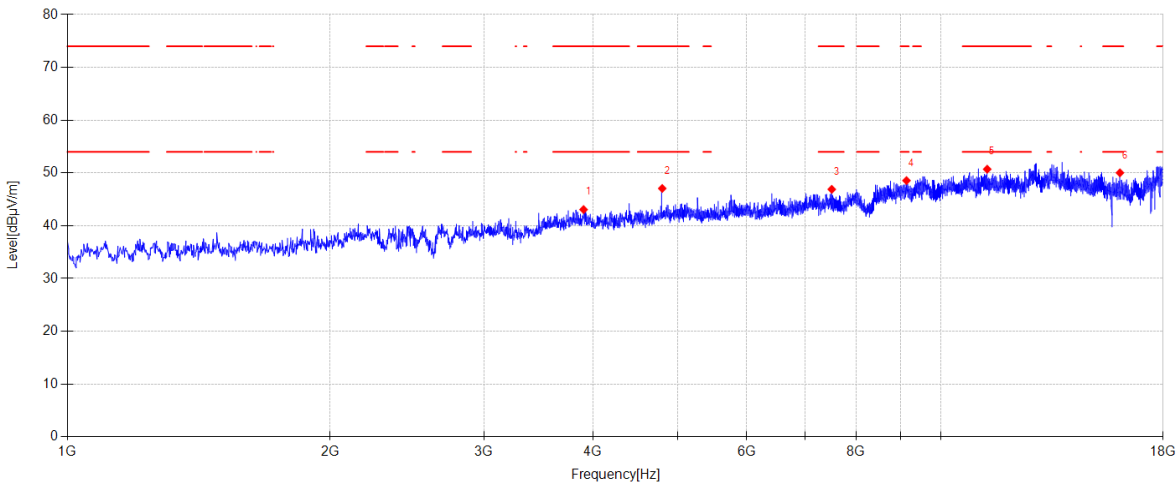
File Path:

d:\ts\2024 report data\Q24112815-1E\FCC ABOVE 1G\2

Memo:

Sample Numbler:S24112815-001 Power Setting:10

Test Graph



| Data List |             |                  |                     |                 |          |                |                |             |          |          |  |
|-----------|-------------|------------------|---------------------|-----------------|----------|----------------|----------------|-------------|----------|----------|--|
| NO.       | Freq. [MHz] | Reading [dBµV/m] | Antenna Factor [dB] | Cable loss [dB] | AMP [dB] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Detector | Polarity |  |
| 1         | 3901.900    | 46.45            | 31.20               | 5.07            | -39.66   | 43.06          | 74.00          | 30.94       | PK       | Vertical |  |
| 2         | 4801.200    | 48.63            | 32.53               | 5.53            | -39.62   | 47.07          | 74.00          | 26.93       | PK       | Vertical |  |
| 3         | 7507.600    | 44.25            | 36.48               | 6.71            | -40.54   | 46.90          | 74.00          | 27.10       | PK       | Vertical |  |
| 4         | 9143.000    | 41.62            | 38.50               | 7.35            | -38.91   | 48.56          | 74.00          | 25.44       | PK       | Vertical |  |
| 5         | 11312.200   | 42.48            | 39.21               | 8.33            | -39.31   | 50.71          | 74.00          | 23.29       | PK       | Vertical |  |
| 6         | 16053.500   | 41.36            | 37.95               | 10.16           | -39.44   | 50.03          | 74.00          | 23.97       | PK       | Vertical |  |

Note:

1. Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-05

Tested By:

Gen Liu

EUT:

LED LanternSpeaker ULTIMA

Model Number:

SP0000113-01

Test Mode:

TX DH5 2441MHz

Power Supply:

DC 5V

Condition:

Temp:21.5°C;Humi:48.4%

Test Site:

DDT 3# Chamber

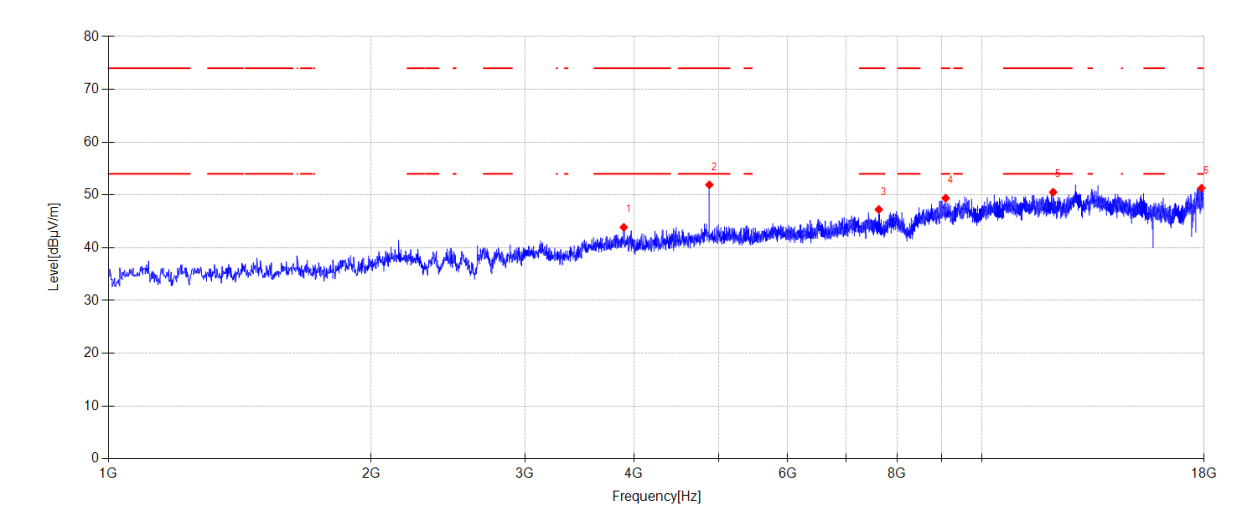
File Path:

d:\ts\2024 report data\Q24112815-1E\FCC ABOVE 1G\3

Memo:

Sample Numbre:S24112815-001 Power Setting:10

Test Graph



| Data List |             |                  |                     |                 |          |                |                |             |          |            |  |
|-----------|-------------|------------------|---------------------|-----------------|----------|----------------|----------------|-------------|----------|------------|--|
| NO.       | Freq. [MHz] | Reading [dBµV/m] | Antenna Factor [dB] | Cable loss [dB] | AMP [dB] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Detector | Polarity   |  |
| 1         | 3893.400    | 47.29            | 31.16               | 5.07            | -39.65   | 43.87          | 74.00          | 30.13       | PK       | Horizontal |  |
| 2         | 4879.400    | 52.63            | 33.33               | 5.58            | -39.61   | 51.93          | 74.00          | 22.07       | PK       | Horizontal |  |
| 3         | 7628.300    | 44.34            | 36.56               | 6.77            | -40.43   | 47.24          | 74.00          | 26.76       | PK       | Horizontal |  |
| 4         | 9098.800    | 42.44            | 38.50               | 7.33            | -38.88   | 49.39          | 74.00          | 24.61       | PK       | Horizontal |  |
| 5         | 12080.600   | 42.43            | 39.28               | 8.80            | -39.98   | 50.53          | 74.00          | 23.47       | PK       | Horizontal |  |
| 6         | 17870.800   | 36.90            | 41.58               | 12.82           | -40.01   | 51.29          | 74.00          | 22.71       | PK       | Horizontal |  |

Note:

- Level = Reading + Cable loss + Antenna Factor + AMP
- If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
- Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-05

Tested By:

Gen Liu

EUT:

LED LanternSpeaker ULTIMA

Model Number:

SP0000113-01

Test Mode:

TX DH5 2441MHz

Power Supply:

DC 5V

Condition:

Temp:21.5°C;Humi:48.4%

Test Site:

DDT 3# Chamber

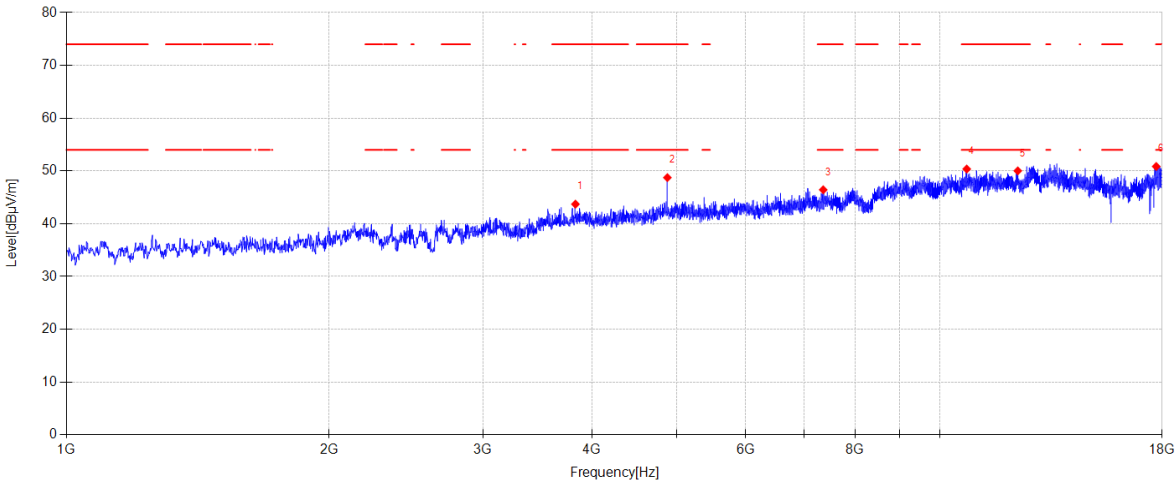
File Path:

d:\ts\2024 report data\Q24112815-1E\FCC ABOVE 1G\4

Memo:

Sample Numble:S24112815-001 Power Setting:10

Test Graph



| Data List |             |                  |                     |                 |          |                |                |             |          |          |
|-----------|-------------|------------------|---------------------|-----------------|----------|----------------|----------------|-------------|----------|----------|
| NO.       | Freq. [MHz] | Reading [dBµV/m] | Antenna Factor [dB] | Cable loss [dB] | AMP [dB] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Detector | Polarity |
| 1         | 3828.800    | 47.45            | 30.82               | 5.08            | -39.64   | 43.71          | 74.00          | 30.29       | PK       | Vertical |
| 2         | 4879.400    | 49.44            | 33.33               | 5.58            | -39.61   | 48.74          | 74.00          | 25.26       | PK       | Vertical |
| 3         | 7359.700    | 43.70            | 36.78               | 6.63            | -40.68   | 46.43          | 74.00          | 27.57       | PK       | Vertical |
| 4         | 10746.100   | 42.12            | 39.40               | 8.00            | -39.15   | 50.37          | 74.00          | 23.63       | PK       | Vertical |
| 5         | 12294.800   | 41.75            | 39.30               | 8.91            | -39.94   | 50.02          | 74.00          | 23.98       | PK       | Vertical |
| 6         | 17714.400   | 38.04            | 40.46               | 12.38           | -40.03   | 50.85          | 74.00          | 23.15       | PK       | Vertical |

Note:

1. Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-05

Tested By:

Gen Liu

EUT:

LED LanternSpeaker ULTIMA

Model Number:

SP0000113-01

Test Mode:

TX DH5 2480MHz

Power Supply:

DC 5V

Condition:

Temp:21.5°C;Humi:48.4%

Test Site:

DDT 3# Chamber

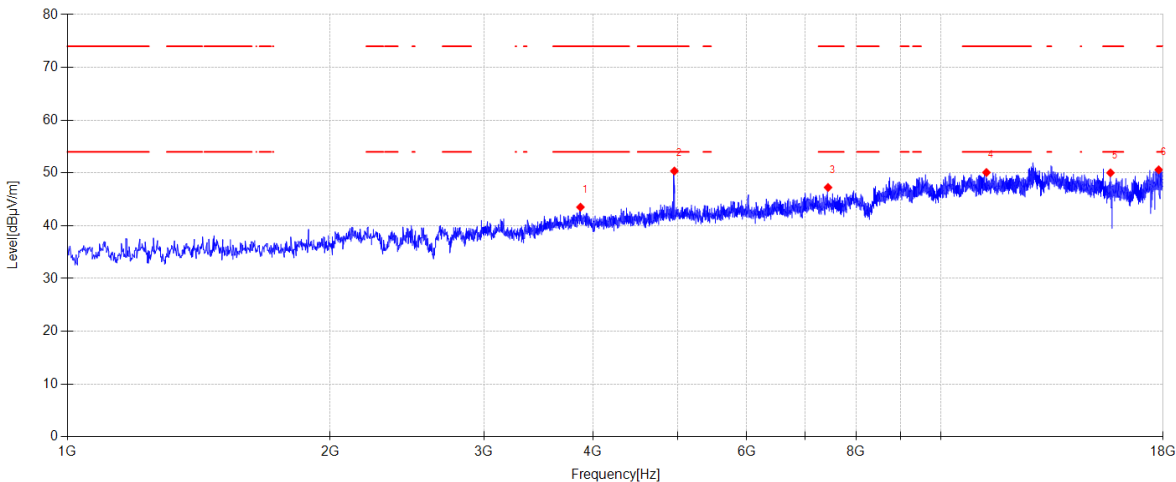
File Path:

d:\ts\2024 report data\Q24112815-1E\FCC ABOVE 1G\5

Memo:

Sample Numble:S24112815-001 Power Setting:10

Test Graph



| Data List |             |                  |                     |                 |          |                |                |             |          |            |  |
|-----------|-------------|------------------|---------------------|-----------------|----------|----------------|----------------|-------------|----------|------------|--|
| NO.       | Freq. [MHz] | Reading [dBμV/m] | Antenna Factor [dB] | Cable loss [dB] | AMP [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Detector | Polarity   |  |
| 1         | 3869.600    | 47.08            | 31.02               | 5.07            | -39.65   | 43.52          | 74.00          | 30.48       | PK       | Horizontal |  |
| 2         | 4957.600    | 51.22            | 33.12               | 5.62            | -39.60   | 50.36          | 74.00          | 23.64       | PK       | Horizontal |  |
| 3         | 7434.500    | 44.56            | 36.63               | 6.67            | -40.61   | 47.25          | 74.00          | 26.75       | PK       | Horizontal |  |
| 4         | 11288.400   | 41.87            | 39.20               | 8.31            | -39.29   | 50.09          | 74.00          | 23.91       | PK       | Horizontal |  |
| 5         | 15657.400   | 40.96            | 38.54               | 9.92            | -39.40   | 50.02          | 74.00          | 23.98       | PK       | Horizontal |  |
| 6         | 17782.400   | 37.31            | 40.73               | 12.57           | -40.02   | 50.59          | 74.00          | 23.41       | PK       | Horizontal |  |

Note:

- Level = Reading + Cable loss + Antenna Factor + AMP
- If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
- Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-05

Tested By:

Gen Liu

EUT:

LED LanternSpeaker ULTIMA

Model Number:

SP0000113-01

Test Mode:

TX DH5 2480MHz

Power Supply:

DC 5V

Condition:

Temp:21.5°C;Humi:48.4%

Test Site:

DDT 3# Chamber

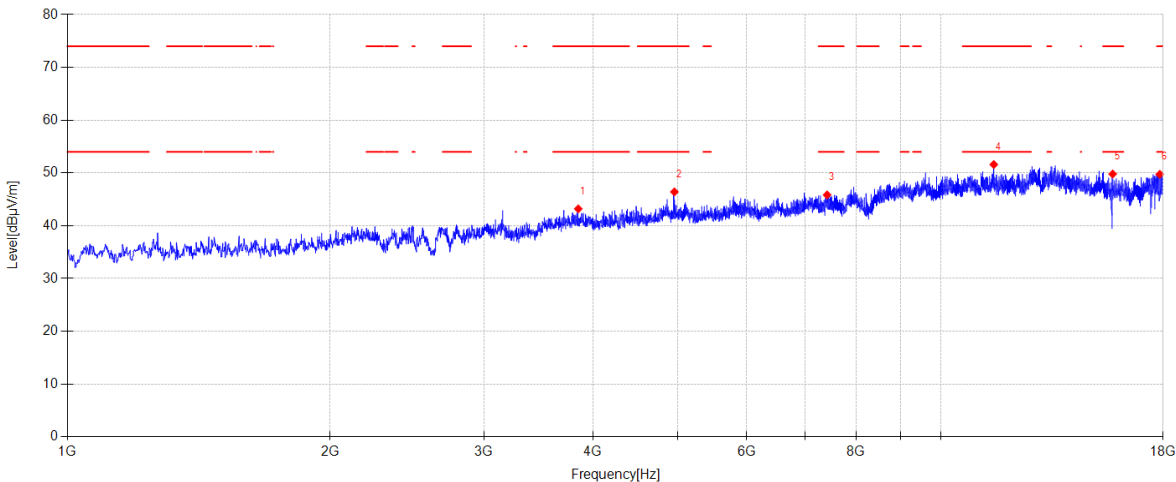
File Path:

d:\ts\2024 report data\Q24112815-1E\FCC ABOVE 1G\6

Memo:

Sample Numble:S24112815-001 Power Setting:10

Test Graph



| Data List |             |                  |                     |                 |          |                |                |             |          |          |
|-----------|-------------|------------------|---------------------|-----------------|----------|----------------|----------------|-------------|----------|----------|
| NO.       | Freq. [MHz] | Reading [dBµV/m] | Antenna Factor [dB] | Cable loss [dB] | AMP [dB] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Detector | Polarity |
| 1         | 3847.500    | 46.87            | 30.89               | 5.08            | -39.64   | 43.20          | 74.00          | 30.80       | PK       | Vertical |
| 2         | 4957.600    | 47.28            | 33.12               | 5.62            | -39.60   | 46.42          | 74.00          | 27.58       | PK       | Vertical |
| 3         | 7415.800    | 43.14            | 36.67               | 6.66            | -40.63   | 45.84          | 74.00          | 28.16       | PK       | Vertical |
| 4         | 11511.100   | 43.48            | 39.18               | 8.45            | -39.51   | 51.60          | 74.00          | 22.40       | PK       | Vertical |
| 5         | 15749.200   | 40.82            | 38.40               | 9.98            | -39.40   | 49.80          | 74.00          | 24.20       | PK       | Vertical |
| 6         | 17831.700   | 35.91            | 41.15               | 12.71           | -40.02   | 49.75          | 74.00          | 24.25       | PK       | Vertical |

Note:

1. Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

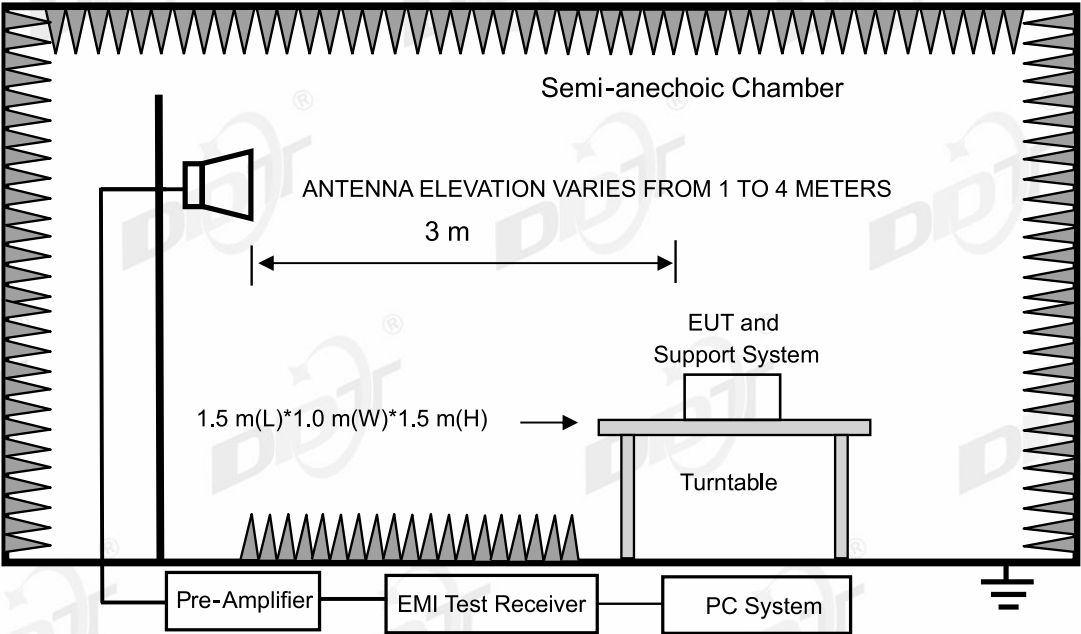
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

## 15. Band Edge Compliance

### 15.1. Test equipment

| Equipment                    | Manufacturer      | Model No.          | Serial No.  | Cal Due To | Cal. Interval |
|------------------------------|-------------------|--------------------|-------------|------------|---------------|
| Hochgewinn-Hornantenne       | SCHWARZBECK       | BBHA 9120 D        | DDT-ZC02129 | 2025/09/18 | 2 Year        |
| High pass filter             | Micro-Tronics     | HPM50108           | DDT-ZC00560 | 2025/04/22 | 1 Year        |
| RF Cable                     | N/A               | W24.02 HL-562      | DDT-ZC04022 | 2025/03/31 | 1 Year        |
| EMI TEST RECEIVER            | R&S               | ESU26              | DDT-ZC01909 | 2025/03/31 | 1 Year        |
| High pass filter             | Micro-Tronics     | HPM50102           | DDT-ZC00561 | 2025/04/22 | 1 Year        |
| Active Loop Antenna          | Schwarzbeck       | FMZB1519           | DDT-ZC00524 | 2025/09/11 | 2 Year        |
| Pre-amplifier                | COM-POWER         | PAM-118A           | DDT-ZC01293 | 2025/08/25 | 1 Year        |
| High Pass filter             | Xi'an Xingbo      | XBLBQ-GTA67        | DDT-ZC02179 | 2025/04/22 | 1 Year        |
| Broad-Band Horn Antenna      | Schwarzbeck       | BBHA 9170          | DDT-ZC00506 | 2025/04/26 | 1 Year        |
| RF cable                     | Yuhu Technology   | ZT26S-SMAJ-SMAJ-1M | DDT-ZC02037 | 2025/03/31 | 1 Year        |
| Pre-amplifier                | COM-POWER         | PAM-840A           | DDT-ZC01693 | 2025/03/31 | 1 Year        |
| RF cable                     | Zhongke Junchuang | JCT26S-NJ-NJ-1.5M  | DDT-ZC02762 | 2025/03/31 | 1 Year        |
| Micro-Tronics filters        | REBES             | BRM50716           | DDT-ZC03240 | /          | /             |
| PSA Series Spectrum Analyzer | Agilent           | E4447A             | DDT-ZC00517 | 2025/03/31 | 1 Year        |
| Micro-Tronics filters        | REBES             | BRM50702           | DDT-ZC03242 | /          | /             |
| RF cable                     | Yuhu Technology   | JCTB810-NJ-NJ-9M   | DDT-ZC02538 | 2025/03/31 | 1 Year        |
| Trilog Broadband Antenna     | Schwarzbeck       | VULB 9163          | DDT-ZC02050 | 2025/07/11 | 1 Year        |
| RF Cable                     | N/A               | W13.02 AP1-X2      | DDT-ZC04023 | 2025/03/31 | 1 Year        |

15.2. Block diagram of test setup



15.3. Limits

All restriction band should comply with 15.209, other emission should be at least 20 dB below the fundamental.

15.4. Assistant equipment used for test

| Assistant equipment | Manufacturer | Model number | Description | other |
|---------------------|--------------|--------------|-------------|-------|
| /                   | /            | /            | /           | /     |

15.5. Test procedure

Same with Radiated Emission except change investigated frequency range.  
Remark: All restriction band have been tested, and only the worst case is shown in report. According to the results of the radiated Emission test, it can be judged that the Horizontal direction is the Worst case.

15.6. Test result

PASS. (See below detailed test result)

15.7. Test data

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-05

Tested By:

Gen Liu

EUT:

LED LanternSpeaker ULTIMA

Model Number:

SP0000113-01

Test Mode:

TX DH5 2480MHz

Power Supply:

DC 5V

Condition:

Temp:21.5°C;Humi:48.4%

Test Site:

DDT 3# Chamber

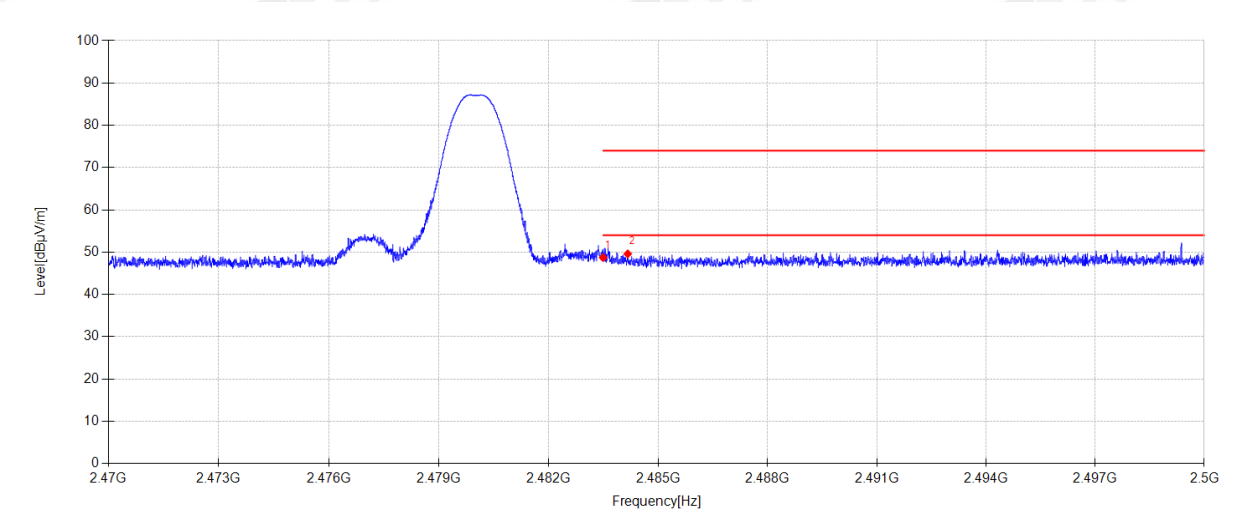
File Path:

d:\ts\2024 report data\Q24112815-1E\FCC ABOVE 1G\7

Memo:

Sample Numbler:S24112815-001 Power Setting:10

Test Graph



| Data List |             |                  |                     |                 |          |                |                |             |          |            |
|-----------|-------------|------------------|---------------------|-----------------|----------|----------------|----------------|-------------|----------|------------|
| NO.       | Freq. [MHz] | Reading [dBμV/m] | Antenna Factor [dB] | Cable loss [dB] | AMP [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Detector | Polarity   |
| 1         | 2483.500    | 17.56            | 27.53               | 3.62            | 0.00     | 48.71          | 74.00          | 25.29       | PK       | Horizontal |
| 2         | 2484.172    | 18.44            | 27.54               | 3.62            | 0.00     | 49.60          | 74.00          | 24.40       | PK       | Horizontal |

Note:

1. Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-05

Tested By:

Gen Liu

EUT:

LED LanternSpeaker ULTIMA

Model Number:

SP0000113-01

Test Mode:

TX 2DH5 2480MHz

Power Supply:

DC 5V

Condition:

Temp:21.5°C;Humi:48.4%

Test Site:

DDT 3# Chamber

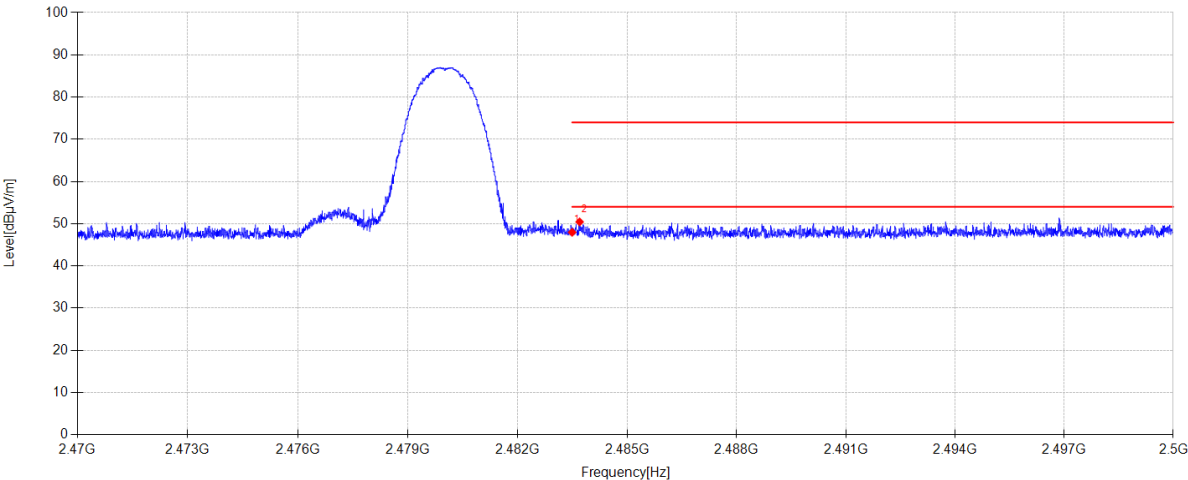
File Path:

d:\ts\2024 report data\Q24112815-1E\FCC ABOVE 1G\8

Memo:

Sample Numble:S24112815-001 Power Setting:10

Test Graph



| Data List |             |                  |                     |                 |          |                |                |             |          |            |
|-----------|-------------|------------------|---------------------|-----------------|----------|----------------|----------------|-------------|----------|------------|
| NO.       | Freq. [MHz] | Reading [dBμV/m] | Antenna Factor [dB] | Cable loss [dB] | AMP [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Detector | Polarity   |
| 1         | 2483.500    | 16.82            | 27.53               | 3.62            | 0.00     | 47.97          | 74.00          | 26.03       | PK       | Horizontal |
| 2         | 2483.704    | 19.29            | 27.53               | 3.62            | 0.00     | 50.44          | 74.00          | 23.56       | PK       | Horizontal |

Note:

1. Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-05

Tested By:

Gen Liu

EUT:

LED LanternSpeaker ULTIMA

Model Number:

SP0000113-01

Test Mode:

TX DH5 2402MHz

Power Supply:

DC 5V

Condition:

Temp:21.5°C;Humi:48.4%

Test Site:

DDT 3# Chamber

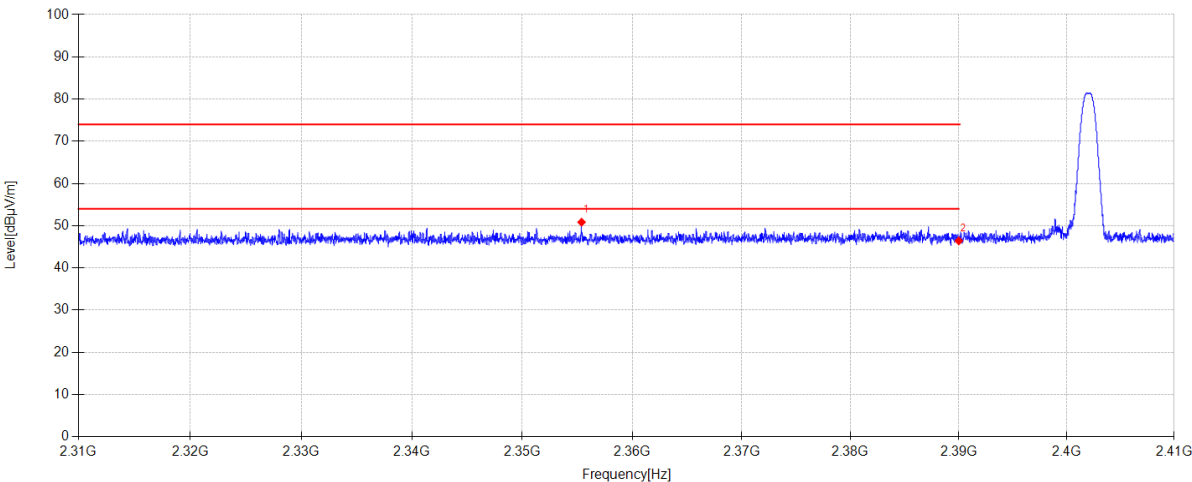
File Path:

d:\ts\2024 report data\Q24112815-1E\FCC ABOVE 1G\10

Memo:

Sample Numbel:S24112815-001 Power Setting:10

Test Graph



| Data List |             |                  |                     |                 |          |                |                |             |          |            |
|-----------|-------------|------------------|---------------------|-----------------|----------|----------------|----------------|-------------|----------|------------|
| NO.       | Freq. [MHz] | Reading [dBμV/m] | Antenna Factor [dB] | Cable loss [dB] | AMP [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Detector | Polarity   |
| 1         | 2355.390    | 20.17            | 27.12               | 3.55            | 0.00     | 50.84          | 74.00          | 23.16       | PK       | Horizontal |
| 2         | 2390.000    | 15.58            | 27.26               | 3.57            | 0.00     | 46.41          | 74.00          | 27.59       | PK       | Horizontal |

Note:

1. Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-05

Tested By:

Gen Liu

EUT:

LED LanternSpeaker ULTIMA

Model Number:

SP0000113-01

Test Mode:

TX 2DH5 2402MHz

Power Supply:

DC 5V

Condition:

Temp:21.5°C;Humi:48.4%

Test Site:

DDT 3# Chamber

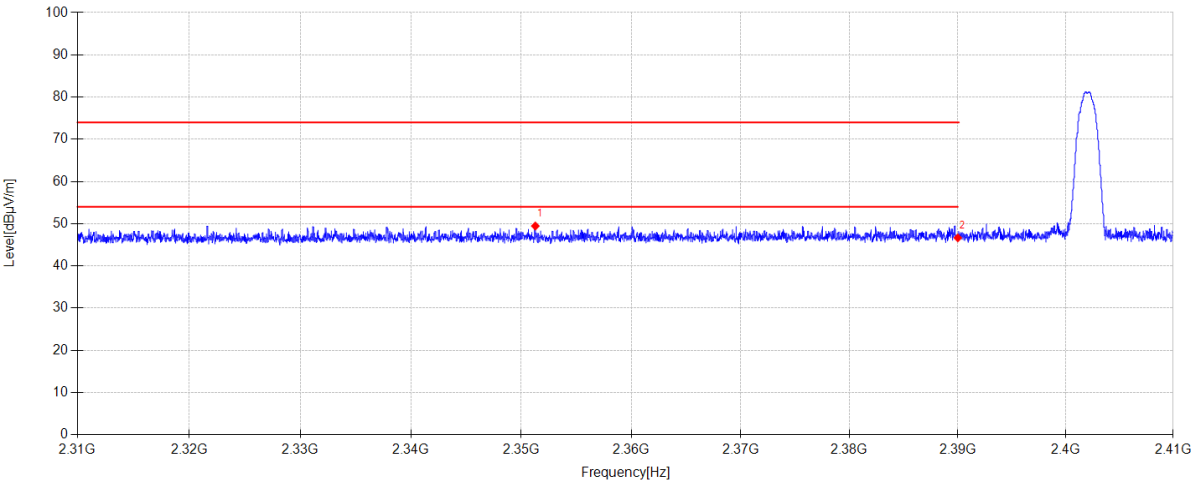
File Path:

d:\ts\2024 report data\Q24112815-1E\FCC ABOVE 1G\11

Memo:

Sample Numbre:S24112815-001 Power Setting:10

Test Graph



| Data List |             |                  |                     |                 |          |                |                |             |          |            |
|-----------|-------------|------------------|---------------------|-----------------|----------|----------------|----------------|-------------|----------|------------|
| NO.       | Freq. [MHz] | Reading [dBμV/m] | Antenna Factor [dB] | Cable loss [dB] | AMP [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Detector | Polarity   |
| 1         | 2351.270    | 18.80            | 27.11               | 3.55            | 0.00     | 49.46          | 74.00          | 24.54       | PK       | Horizontal |
| 2         | 2390.000    | 15.82            | 27.26               | 3.57            | 0.00     | 46.65          | 74.00          | 27.35       | PK       | Horizontal |

Note:

1. Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

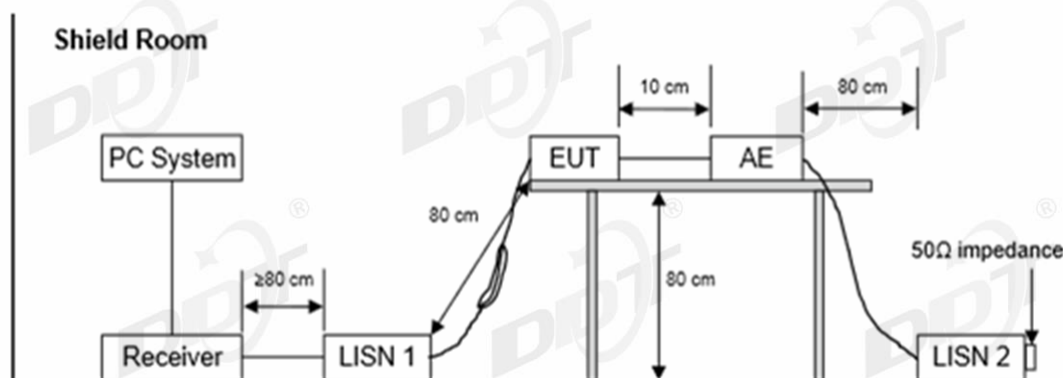
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

## 16. Power Line Conducted Emissions

### 16.1. Test equipment

| Equipment                                 | Manufacturer    | Model No.     | Serial No.  | Cal Due To | Cal. Interval |
|-------------------------------------------|-----------------|---------------|-------------|------------|---------------|
| Two Line V-Network                        | R&S             | ENV216        | DDT-ZC02059 | 2025/07/08 | 1 Year        |
| $\Delta$ -shaped artificial power network | SCHWARZBECK     | PVDC 8301     | DDT-ZC03939 | 2025/03/31 | 1 Year        |
| RF Cable                                  | Yuhu Technology | Z806-NJ-NJ-6M | DDT-ZC02004 | 2025/07/08 | 1 Year        |
| EMI Test Receiver                         | R&S             | ESCI/E3       | DDT-ZC01297 | 2025/07/08 | 1 Year        |
| Three-phase artificial power network      | SCHWARZBECK     | NSLK 8163     | DDT-ZC01572 | 2025/07/08 | 1 Year        |
| Two Line V-Network                        | R&S             | ENV216        | DDT-ZC02056 | 2025/07/08 | 1 Year        |
| Pulse Limiter                             | SCHWARZBECK     | VTSD 9561     | DDT-ZC02128 | 2025/07/08 | 1 Year        |
| Conducted Radiated Software               | Audix           | E3            | DDT-ZC00562 | /          | /             |

### 16.2. Block diagram of test setup



### 16.3. Limits

| Frequency       | Quasi-Peak Level<br>dB(uV) | Average Level<br>dB(uV) |
|-----------------|----------------------------|-------------------------|
| 150 kHz~500 kHz | 66 ~ 56*                   | 56 ~ 46*                |
| 500 kHz~5 MHz   | 56                         | 46                      |
| 5 MHz~30 MHz    | 60                         | 50                      |

Note 1: \* Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

#### 16.4. Assistant equipment used for test

| Assistant equipment | Manufacturer | Model number | Description | other |
|---------------------|--------------|--------------|-------------|-------|
| /                   | /            | /            | /           | /     |

#### 16.5. Test procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, 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.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 kHz.

#### 16.6. Test result

##### **PASS. (See below detailed test result)**

Note1: All emissions not reported below are too low against the prescribed limits.

Note2: “----” means Peak detection; “-----” means Average detection.

Note3: Pre-test AC conducted emission at both voltage AC 120V/60Hz and AC 240V/50Hz, recorded the worst case.

## 16.7. Test data

## TR-4-E-010 Conducted Emission Test Result

Test Site : DDT 6# Shield Room

D:\2024 Report Date\Q24112815-1E\1212 CE.EM6

Test Date : 2024-12-12

Tested By : Gen Liu

EUT : LED LanternSpeaker ULTIMA

Model Number : SP0000113-01

Power Supply : AC 120V/60Hz

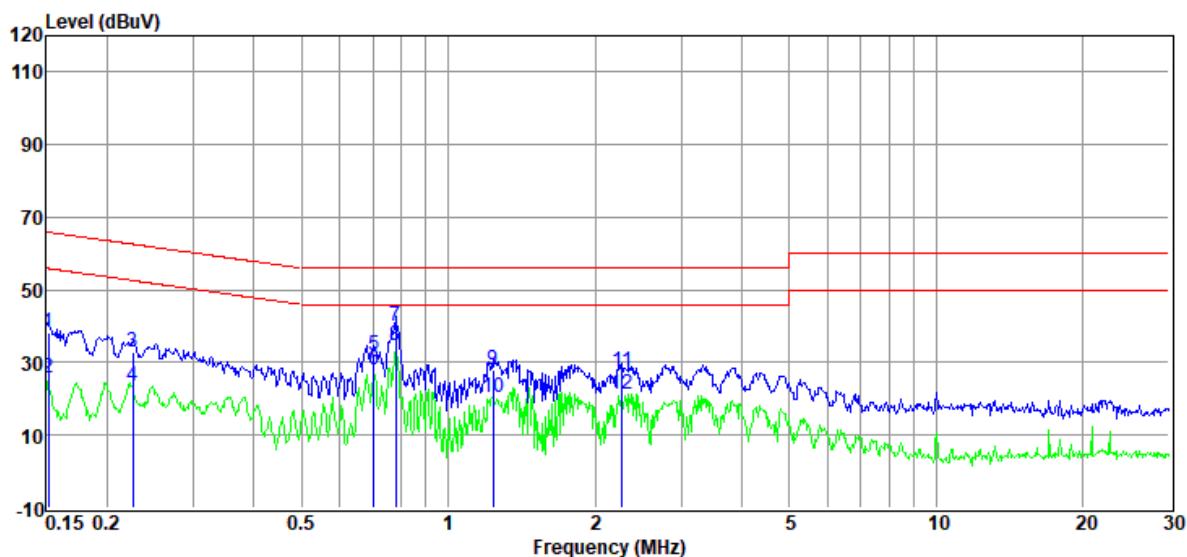
Test Mode : Bluetooth mode

Condition : Temp:21.6°C,Humi:52.8%

LISN : 2024 ENV216 3#/LINE

Memo :

Data: 2



| Item   | Freq. | Read Level | LISN Factor | Cable Loss | Pulse Limiter Factor | Result Level | Limit Line | Over Limit | Detector | Phase |
|--------|-------|------------|-------------|------------|----------------------|--------------|------------|------------|----------|-------|
| (Mark) | (MHz) | (dBμV)     | (dB)        | (dB)       | (dB)                 | (dBμV)       | (dBμV)     | (dB)       |          |       |
| 1      | 0.15  | 18.41      | 9.78        | 0.07       | 9.83                 | 38.09        | 65.91      | -27.82     | QP       | LINE  |
| 2      | 0.15  | 6.06       | 9.78        | 0.07       | 9.83                 | 25.74        | 55.91      | -30.17     | Average  | LINE  |
| 3      | 0.23  | 13.35      | 9.76        | 0.06       | 9.83                 | 33.00        | 62.61      | -29.61     | QP       | LINE  |
| 4      | 0.23  | 3.64       | 9.76        | 0.06       | 9.83                 | 23.29        | 52.61      | -29.32     | Average  | LINE  |
| 5      | 0.70  | 12.15      | 9.75        | 0.07       | 9.83                 | 31.80        | 56.00      | -24.20     | QP       | LINE  |
| 6      | 0.70  | 8.36       | 9.75        | 0.07       | 9.83                 | 28.01        | 46.00      | -17.99     | Average  | LINE  |
| 7      | 0.78  | 20.20      | 9.75        | 0.05       | 9.84                 | 39.84        | 56.00      | -16.16     | QP       | LINE  |
| 8      | 0.78  | 14.97      | 9.75        | 0.05       | 9.84                 | 34.61        | 46.00      | -11.39     | Average  | LINE  |
| 9      | 1.24  | 8.41       | 9.74        | 0.12       | 9.84                 | 28.11        | 56.00      | -27.89     | QP       | LINE  |
| 10     | 1.24  | 0.82       | 9.74        | 0.12       | 9.84                 | 20.52        | 46.00      | -25.48     | Average  | LINE  |
| 11     | 2.27  | 7.60       | 9.75        | 0.11       | 9.84                 | 27.30        | 56.00      | -28.70     | QP       | LINE  |
| 12     | 2.27  | 1.46       | 9.75        | 0.11       | 9.84                 | 21.16        | 46.00      | -24.84     | Average  | LINE  |

Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).

4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

TR-4-E-010 Conducted Emission Test Result

Test Site

: DDT 6# Shield Room

Test Date

: 2024-12-12

EUT

: LED LanternSpeaker ULTIMA

Power Supply

: AC 120V/60Hz

Condition

: Temp:21.6°C,Humi:52.8%

Tested By

: Gen Liu

Model Number

: SP0000113-01

Test Mode

: Bluetooth mode

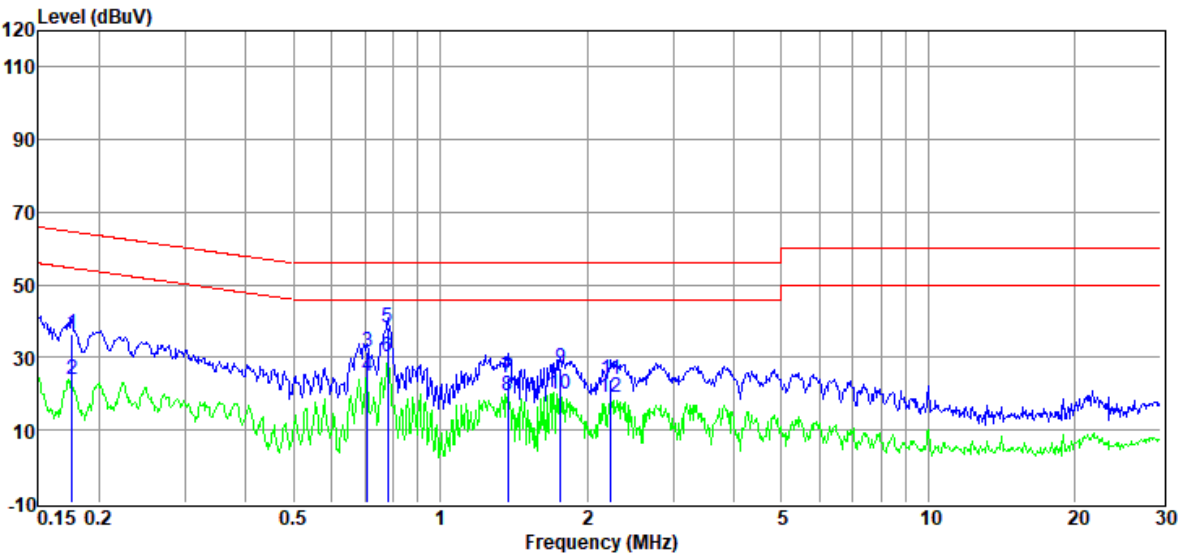
LISN

: 2024 ENV216 3#/NEUTRAL

Memo

:

Data: 4



| Item   | Freq. | Read Level | LISN Factor | Cable Loss | Pulse Limiter Factor | Result Level | Limit Line | Over Limit | Detector | Phase   |
|--------|-------|------------|-------------|------------|----------------------|--------------|------------|------------|----------|---------|
| (Mark) | (MHz) | (dBμV)     | (dB)        | (dB)       | (dB)                 | (dBμV)       | (dBμV)     | (dB)       |          |         |
| 1      | 0.18  | 16.69      | 9.77        | 0.06       | 9.83                 | 36.35        | 64.68      | -28.33     | QP       | NEUTRAL |
| 2      | 0.18  | 4.42       | 9.77        | 0.06       | 9.83                 | 24.08        | 54.68      | -30.60     | Average  | NEUTRAL |
| 3      | 0.71  | 11.71      | 9.75        | 0.07       | 9.84                 | 31.37        | 56.00      | -24.63     | QP       | NEUTRAL |
| 4      | 0.71  | 5.37       | 9.75        | 0.07       | 9.84                 | 25.03        | 46.00      | -20.97     | Average  | NEUTRAL |
| 5      | 0.78  | 18.55      | 9.75        | 0.05       | 9.84                 | 38.19        | 56.00      | -17.81     | QP       | NEUTRAL |
| 6      | 0.78  | 10.41      | 9.75        | 0.05       | 9.84                 | 30.05        | 46.00      | -15.95     | Average  | NEUTRAL |
| 7      | 1.37  | 4.56       | 9.76        | 0.12       | 9.84                 | 24.28        | 56.00      | -31.72     | QP       | NEUTRAL |
| 8      | 1.37  | -0.14      | 9.76        | 0.12       | 9.84                 | 19.58        | 46.00      | -26.42     | Average  | NEUTRAL |
| 9      | 1.76  | 7.30       | 9.77        | 0.11       | 9.84                 | 27.02        | 56.00      | -28.98     | QP       | NEUTRAL |
| 10     | 1.76  | 0.37       | 9.77        | 0.11       | 9.84                 | 20.09        | 46.00      | -25.91     | Average  | NEUTRAL |
| 11     | 2.24  | 4.23       | 9.77        | 0.11       | 9.84                 | 23.95        | 56.00      | -32.05     | QP       | NEUTRAL |
| 12     | 2.24  | -0.56      | 9.77        | 0.11       | 9.84                 | 19.16        | 46.00      | -26.84     | Average  | NEUTRAL |

Note: 1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.  
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).  
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

## 18. Photos of the EUT

Please refer to DDT-Q24112815-2E appendix I

-----End Report-----