

# TEST REPORT

**Reference No.**..... : WTF24D06135526W001  
**FCC ID**..... : 2BAJD-GHANDLE  
**Applicant** ..... : Idea DC Motor & LED Co. Ltd  
**Address** ..... : No.26 Lianxingfa Street, Dongsheng Area, XiaoLan Town, Zhongshan, China  
**Manufacturer** ..... : Idea DC Motor & LED Co. Ltd  
**Address** ..... : No.26 Lianxingfa Street, Dongsheng Area, XiaoLan Town, Zhongshan, China  
**Product** ..... : G handle  
**Model(s)**..... : G handle  
**Standards** ..... : FCC 47CFR Part 15 Subpart C Section 15.231  
**Date of Receipt sample** .... : 2024-06-14  
**Date of Test** ..... : 2024-06-14 to 2024-06-24  
**Date of Issue** ..... : 2024-06-26  
**Test Result** ..... : **Pass**

**Remarks:**

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

**Prepared By:**

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3 Revision History

| Test Report No.    | Date of Receipt Sample | Date of Test             | Date of Issue | Purpose  | Comment | Approved |
|--------------------|------------------------|--------------------------|---------------|----------|---------|----------|
| WTF24D06135526W001 | 2024-06-14             | 2024-06-14 to 2024-06-24 | 2024-06-26    | Original | -       | Valid    |

## 4 General Information

### 4.1 General Description of E.U.T.

Product Name: G handle  
Model No.: G handle  
Model Description: N/A  
Test Sample No.: 1-1/1  
Hardware Version: HB-8022-RF02-V3.0  
Software Version: HB-8022

### 4.2 Details of E.U.T.

Frequency Range: 433.92±0.5MHz  
Type of Modulation: ASK  
The Lowest Oscillator: XTAL: 13.560MHz  
Antenna installation: PCB printed antenna  
Antenna Gain 3.0dBi

Note:

#: The antenna gain is provided by the applicant, and the applicant should be responsible for its authenticity, WALTEK lab has not verified the authenticity of its information.

Battery: DC 3V from battery

### 4.3 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

| Test mode    | Channel    |
|--------------|------------|
| Transmitting | 433.934MHz |

## 5 Equipment Used during Test

### 5.1 Equipments List

| 3m Semi-anechoic Chamber for Radiation Emissions 1#           |                            |                      |               |            |                       |                      |
|---------------------------------------------------------------|----------------------------|----------------------|---------------|------------|-----------------------|----------------------|
| Item                                                          | Equipment                  | Manufacturer         | Model No.     | Serial No. | Last Calibration Date | Calibration Due Date |
| 1                                                             | Spectrum Analyzer          | R&S                  | FSP30         | 100091     | 2024-04-22            | 2025-04-21           |
| 2                                                             | Amplifier                  | Agilent              | 8447D         | 2944A10178 | 2023-07-27            | 2024-07-26           |
| 3                                                             | Trilog Broadband Antenna   | SCHWARZBECK          | VULB9163      | 336        | 2023-08-07            | 2024-08-06           |
| 4                                                             | Coaxial Cable (below 1GHz) | Top                  | TYPE16(13M)   | -          | 2024-04-22            | 2025-04-21           |
| 5                                                             | Broad-band Horn Antenna    | SCHWARZBECK          | BBHA 9120 D   | 667        | 2024-01-23            | 2025-01-22           |
| 6                                                             | Broad-band Horn Antenna    | SCHWARZBECK          | BBHA 9170     | 335        | 2023-08-02            | 2024-08-01           |
| 7                                                             | Broadband Preamplifier     | COMPLIANCE DIRECTION | PAP-1G18      | 2004       | 2023-07-27            | 2024-07-26           |
| 8                                                             | Coaxial Cable (above 1GHz) | ZT26-NJ-NJ-8M/FA     | 1GHz-18GHz    | NA         | 2024-04-22            | 2025-04-21           |
| 3m Semi-anechoic Chamber for Radiation Emissions Test site 2# |                            |                      |               |            |                       |                      |
| Item                                                          | Equipment                  | Manufacturer         | Model No.     | Serial No. | Last Calibration Date | Calibration Due Date |
| 1                                                             | Test Receiver              | R&S                  | ESCI          | 101296     | 2024-04-22            | 2025-04-21           |
| 2                                                             | Trilog Broadband Antenna   | SCHWARZBECK          | VULB9160      | 9160-3325  | 2023-11-04            | 2024-11-03           |
| 3                                                             | Active Loop Antenna        | Com-Power Corp.      | AL-130R       | 10160007   | 2024-04-27            | 2025-04-26           |
| 4                                                             | Amplifier                  | ANRITSU              | MH648A        | M43381     | 2024-04-22            | 2025-04-21           |
| 5                                                             | Cable                      | HUBER+SUHNER         | CBL2          | 525178     | 2024-04-22            | 2025-04-21           |
| RF Conducted Testing                                          |                            |                      |               |            |                       |                      |
| Item                                                          | Equipment                  | Manufacturer         | Model No.     | Serial No. | Last Calibration Date | Calibration Due Date |
| 1.                                                            | Spectrum Analyzer          | Agilent              | N9020A        | MY49100060 | 2023-07-27            | 2024-07-26           |
| 2                                                             | Spectrum Analyzer          | R&S                  | FSP30         | 100091     | 2024-04-22            | 2025-04-21           |
| 3                                                             | Humidity Chamber           | GF                   | GTH-225-40-1P | IAA061213  | 2023-07-27            | 2024-07-26           |
| 4                                                             | EXA Signal Analyzer        | Keysight             | N9010A        | MY50520207 | 2024-04-22            | 2025-04-21           |

#### Test Software:

| Test Item             | Software name | Software version  |
|-----------------------|---------------|-------------------|
| Radiated Emission(3m) | EZ-EMC        | EZ-EMC(RA-03A1-1) |

## 5.2 Measurement Uncertainty

| Parameter                                       | Uncertainty                    |
|-------------------------------------------------|--------------------------------|
| Radio Frequency                                 | $\pm 1 \times 10^{-6}$         |
| RF Power                                        | $\pm 1.0$ dB                   |
| RF Power Density                                | $\pm 2.2$ dB                   |
| Radiated Spurious Emissions test                | $\pm 5.03$ dB (30M~1000MHz)    |
|                                                 | $\pm 5.47$ dB (1000M~25000MHz) |
| Confidence interval:95%. Confidence factor: k=2 |                                |

## 5.3 Test Facility

The test facility has a test site registered with the following organizations:

**ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.**

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.

Registration number 7760A, October 15, 2016.

**FCC Designation No.: CN1201. Test Firm Registration No.: 523476.**

Waltek Testing Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

## 5.4 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test Lab: N/A

Lab address: N/A

Test items: N/A

## 6 Test Summary

| Test Items                                                                                                                                                             | Test Requirement                 | Result |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------|
| Conduct Emission                                                                                                                                                       | 15.207                           | N/A*   |
| Radiated Spurious Emissions                                                                                                                                            | 15.205(a)<br>15.209<br>15.231(a) | Pass   |
| Periodic Operation                                                                                                                                                     | 15.231(a)                        | Pass   |
| Emission Bandwidth                                                                                                                                                     | 15.231(c)                        | Pass   |
| Antenna Requirement                                                                                                                                                    | 15.203                           | Pass   |
| Maximum Permissible Exposure<br>(Exposure of Humans to RF Fields)                                                                                                      | 1.1307(b)(1)                     | Pass   |
| Note: Pass=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable<br>*: The EUT is only powered by battery, no need to evaluate AC Power Conducted Emission. |                                  |        |

## 7 Radiated Spurious Emissions

Test Requirement: FCC Part15 §15.231(a), (b)

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

| Fundamental Frequency (MHz) | Field Strength of Fundamental (uV/m) | Field Strength of Fundamental (dBuV/m) | Field Strength of Spurious Emission (uV/m) | Field Strength of Spurious Emission (dBuV/m) |
|-----------------------------|--------------------------------------|----------------------------------------|--------------------------------------------|----------------------------------------------|
| 44.66-40.70                 | 2250                                 | 67                                     | 225                                        | 47                                           |
| 70-130                      | 1250                                 | 62                                     | 125                                        | 42                                           |
| 130-174                     | 1250 to 3750*                        | 62 to 71.48*                           | 125 to 375*                                | 42 to 51.48*                                 |
| 174-260                     | 3750                                 | 71.48                                  | 375                                        | 51.48                                        |
| 260-470                     | 3750 to 12500*                       | 71.48 to 81.94*                        | 375 to 1250*                               | 51.48 to 61.94*                              |
| Above 470                   | 12500                                | 81.94                                  | 1250                                       | 61.94                                        |
| * linear interpolations     |                                      |                                        |                                            |                                              |

### 7.1 EUT Operation

Operating Environment:

Temperature: 21.5 °C

Humidity: 53.4 % RH

Atmospheric Pressure: 101.3kPa

Test Voltage: DC 3V by Battery

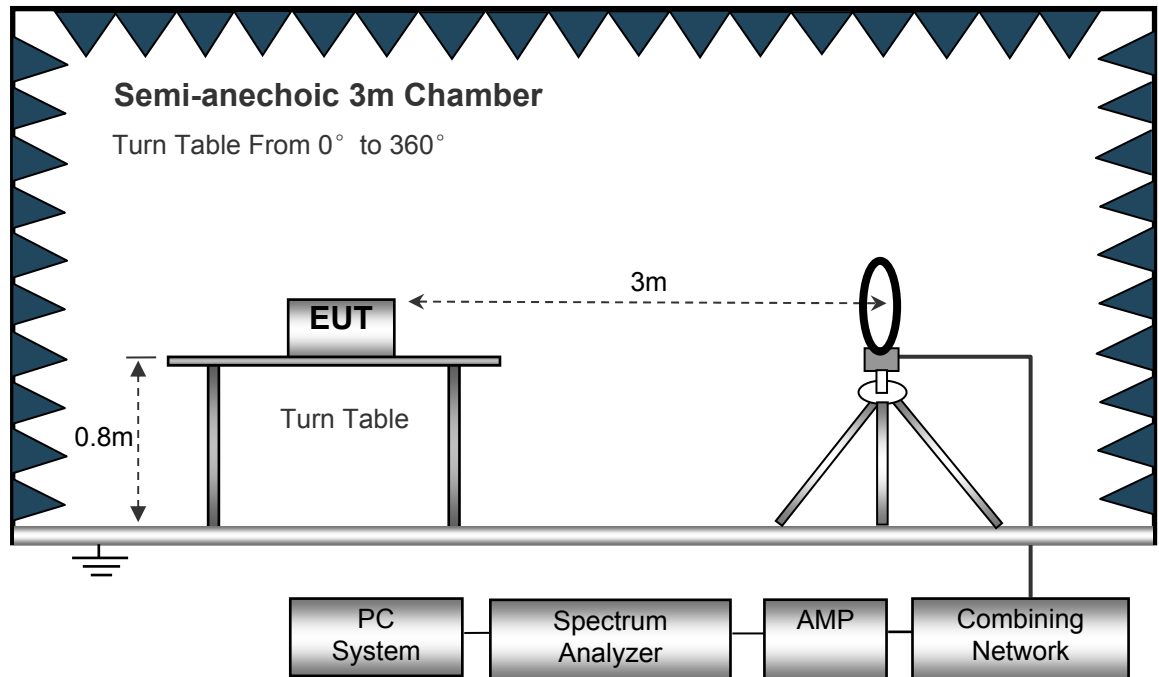
EUT Operation:

The test was performed in transmitting mode, the test data were shown in the report.

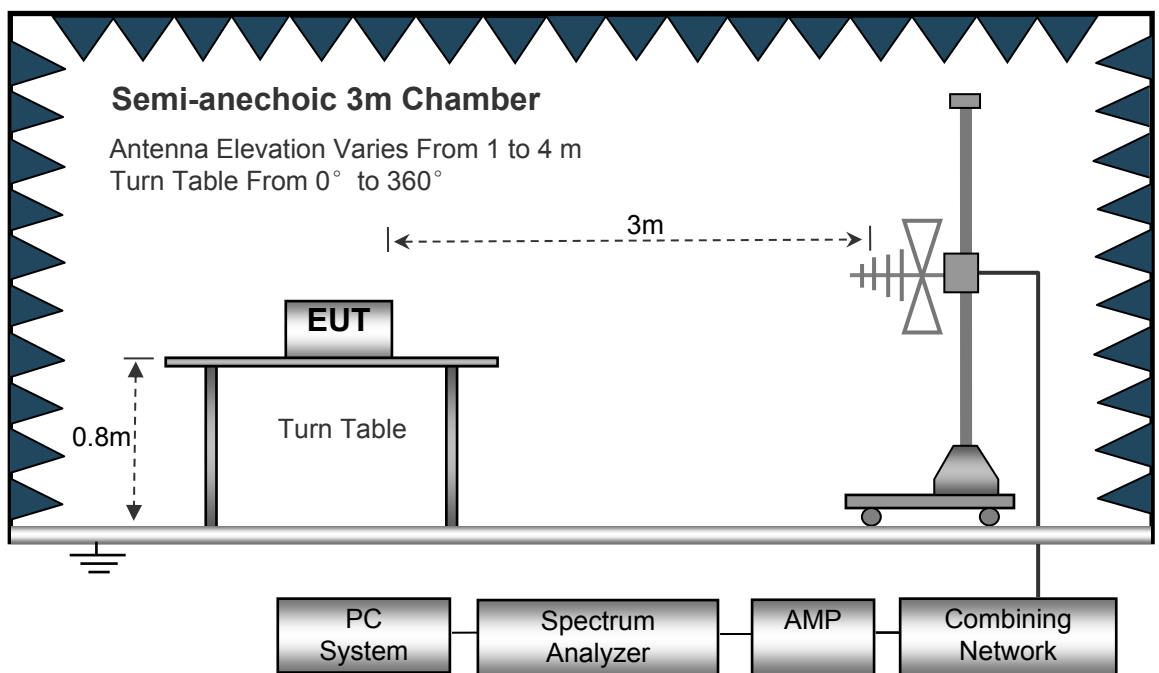
## 7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

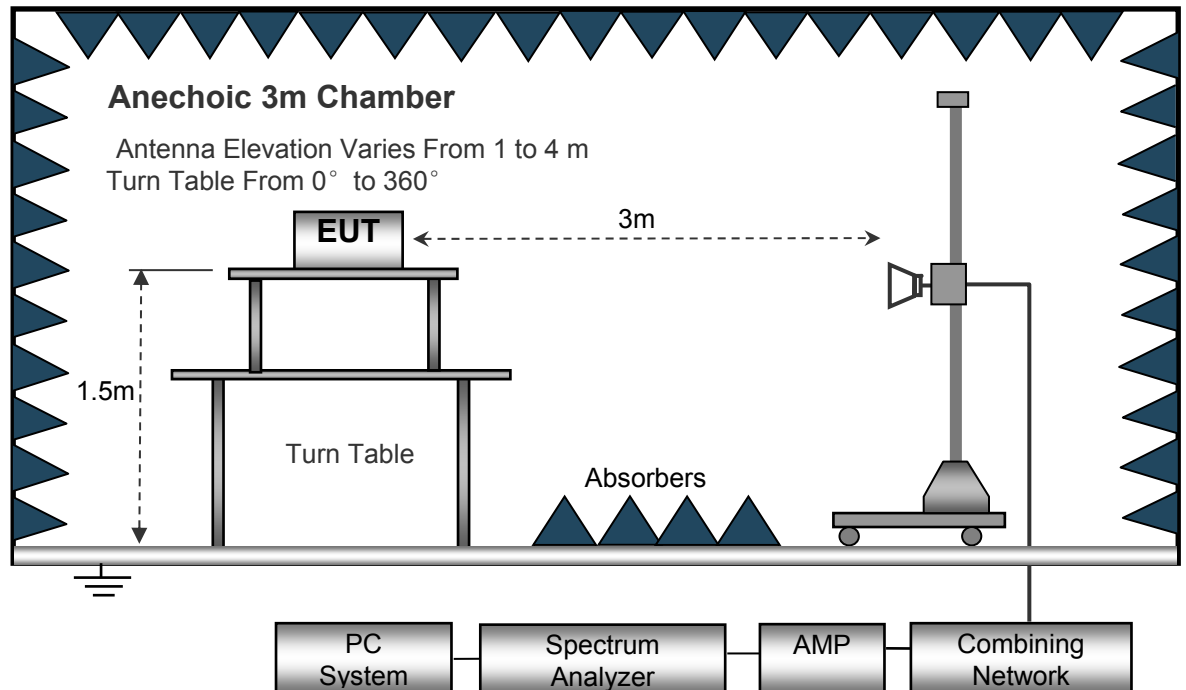
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



### 7.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed .....Auto  
 IF Bandwidth.....10kHz  
 Video Bandwidth.....10kHz  
 Resolution Bandwidth.....10kHz

30MHz ~ 1GHz

Sweep Speed .....Auto  
 Detector .....PK  
 Resolution Bandwidth.....100kHz  
 Video Bandwidth.....300kHz

Above 1GHz

Sweep Speed .....Auto  
 Detector .....PK  
 Resolution Bandwidth.....1MHz  
 Video Bandwidth.....3MHz

## 7.4 Test Procedure

1. The EUT is placed on a turntable. For below 1GHz, the EUT is 0.8m above ground plane; For above 1GHz, the EUT is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under 3-axes(X, Y, Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

## 7.5 Summary of Test Results

### Test Frequency: 9 kHz~30 MHz

The measurements were more than 20 dB below the limit and not reported.

**Test Frequency: 30MHz ~ 5GHz**

| Frequency<br>(MHz) | Receiver<br>Reading<br>(PK)<br>(dBμV) | Turn<br>table<br>Angle<br>Degree | RX Antenna    |                | Corrected<br>Factor<br>(dB/m) | Corrected<br>Amplitude<br>(PK)<br>(dBμV/m) | FCC Part<br>15.231/15.209/205 |                |
|--------------------|---------------------------------------|----------------------------------|---------------|----------------|-------------------------------|--------------------------------------------|-------------------------------|----------------|
|                    |                                       |                                  | Height<br>(m) | Polar<br>(H/V) |                               |                                            | Limit<br>(dBμV/m)             | Margin<br>(dB) |
| 433.94             | 63.49                                 | 329                              | 1.7           | H              | 19.06                         | 82.55                                      | 100.83                        | -18.28         |
| 433.94             | 63.28                                 | 125                              | 1.1           | V              | 19.06                         | 82.34                                      | 100.83                        | -18.49         |
| 867.88             | 55.14                                 | 283                              | 1.7           | H              | -3.44                         | 51.70                                      | 80.83                         | -29.13         |
| 867.88             | 60.28                                 | 178                              | 1.9           | V              | -2.71                         | 57.57                                      | 80.83                         | -23.26         |
| 1301.82            | 63.70                                 | 158                              | 1.8           | H              | -12.83                        | 50.87                                      | 74.00                         | -23.13         |
| 1301.82            | 78.16                                 | 357                              | 1.2           | V              | -12.83                        | 65.33                                      | 74.00                         | -8.67          |
| 2169.70            | 74.59                                 | 65                               | 1.9           | H              | -9.19                         | 65.40                                      | 80.83                         | -15.43         |
| 2169.70            | 75.43                                 | 256                              | 1.5           | V              | -9.19                         | 66.24                                      | 80.83                         | -14.59         |
| 3037.58            | 56.33                                 | 327                              | 1.9           | H              | -8.37                         | 47.96                                      | 74.00                         | -26.04         |
| 3037.58            | 57.72                                 | 107                              | 1.8           | V              | -8.36                         | 49.36                                      | 74.00                         | -24.64         |

**Note:** the measurements were more than 20 dB below the limit and not reported.

**AV = Peak +20Log<sub>10</sub>(duty cycle) =PK+(-7.49)** (refer to section 8 for more detail)

| Frequency<br>(MHz) | PK<br>(dBμV/m) | RX Antenna     | Duty cycle<br>Factor<br>(dB) | Calculated<br>AV<br>(dBμV/m) | FCC Part<br>15.231/209/205 |                |
|--------------------|----------------|----------------|------------------------------|------------------------------|----------------------------|----------------|
|                    |                | Polar<br>(H/V) |                              |                              | Limit<br>(dBμV/m)          | Margin<br>(dB) |
| 433.94             | 82.55          | H              | -7.49                        | 75.06                        | 80.83                      | -5.77          |
| 433.94             | 82.34          | V              | -7.49                        | 74.85                        | 80.83                      | -5.98          |
| 867.88             | 51.70          | H              | -7.49                        | 44.21                        | 60.83                      | -16.62         |
| 867.88             | 57.57          | V              | -7.49                        | 50.08                        | 60.83                      | -10.75         |
| 1301.82            | 50.87          | H              | -7.49                        | 43.38                        | 54.00                      | -10.62         |
| 1301.82            | 65.33          | V              | -7.49                        | 57.84                        | 54.00                      | 3.84           |
| 2169.70            | 65.40          | H              | -7.49                        | 57.91                        | 60.83                      | -2.92          |
| 2169.70            | 66.24          | V              | -7.49                        | 58.75                        | 60.83                      | -2.08          |
| 3037.58            | 47.96          | H              | -7.49                        | 40.47                        | 54.00                      | -13.53         |
| 3037.58            | 49.36          | V              | -7.49                        | 41.87                        | 54.00                      | -12.13         |

## 8 Periodic Operation

The duty cycle was determined by the following equation:

To calculate the actual field intensity, the duty cycle correction factor in decibel is needed for later use and can be obtained from following conversion

Duty Cycle(%)=Total On interval in a complete pulse train/ Length of a complete pulse train \* %

Duty Cycle Correction Factor(dB)=20 \* Log<sub>10</sub>(Duty Cycle (%)/100)

|                                              |                     |
|----------------------------------------------|---------------------|
| Total transmission time(ms)                  | 0.7*8+0.28*18=10.64 |
| Length of a complete transmission period(ms) | 25.2                |
| Duty Cycle (%)                               | 42.2                |
| Duty Cycle Correction Factor(dB)             | -7.49               |

Refer to the duty cycle plot (as below), this device meets the FCC requirement.

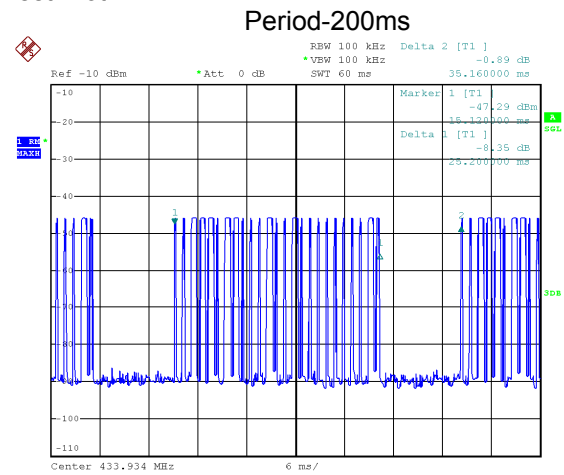
Length of a complete pulse train:

Remark:

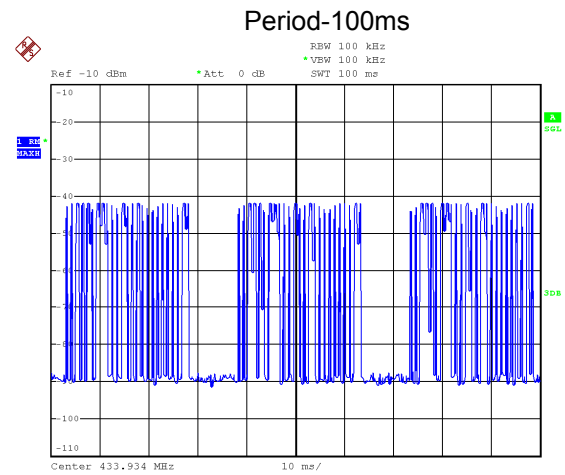
According to FCC part15.35(c) required that a complete pulse train is more than 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

Refer to the duty cycle plot (as below)

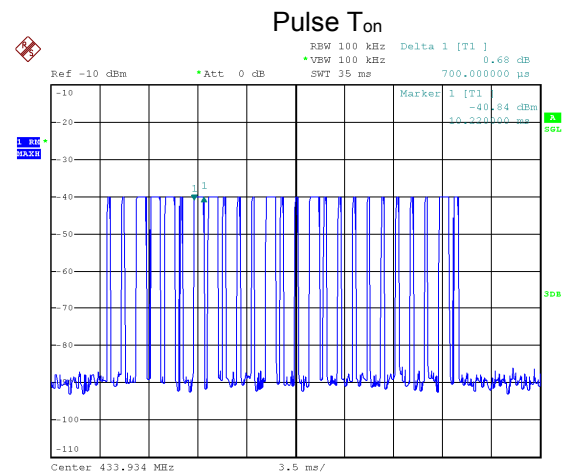
Test Plot



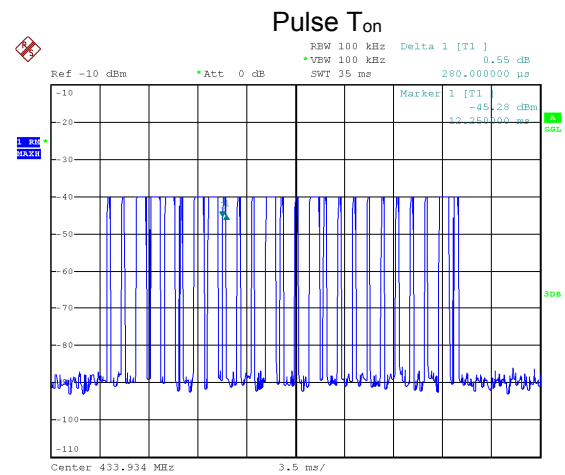
Date: 18.JUN.2024 11:28:46



Date: 18.JUN.2024 11:25:06



Date: 18.JUN.2024 11:26:21



Date: 18.JUN.2024 11:26:51



9 Emission Bandwidth

Test Requirement:

FCC Part15.231(c)

Test Method:

FCC Part15.231(c)

Limit

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency.

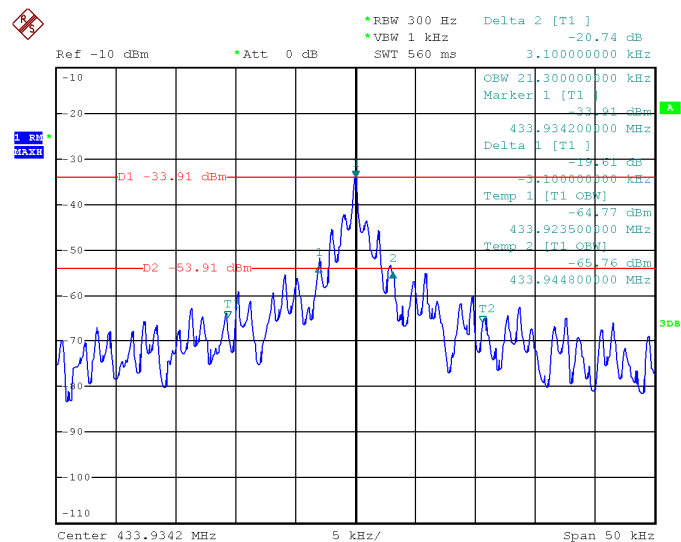
9.1 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer. EUT and its simulators are placed on a table, let EUT working in test mode, then test it.
2. The bandwidth of the fundamental frequency was measure by spectrum analyser with:  
RBW=1% to 5% of OBW, VBW=3 times of RBW.  
The 20 dB bandwidth and 99% bandwidth were recorded.

9.2 Test Result

| Frequency (MHz) | 20dB Bandwidth Emission(kHz) | 99% Bandwidth Emission(kHz) | Limit (kHz) | Result     |
|-----------------|------------------------------|-----------------------------|-------------|------------|
| 433.934         | 6.2                          | 21.3                        | 1084.5      | Compliance |

Test Plot



Date: 19.JUN.2024 15:47:28

## **10 Antenna Requirement**

According to the FCC Part 15 Paragraph 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. This product has a PCB printed antenna fulfil the requirement of this section.

Note: Please refer to EUT photos for more details.

## **11 RF Exposure**

Remark: Please refer to MPE test report: WTF24D06135526W002.

## **12 Photographs –Test Setup and EUT**

Note: Please refer to appendix: Appendix-G handle-Photos.

=====End of Report=====