



## 1 Cover Page

# TEST REPORT

**Application No.:** SHCR2202000363HS  
**FCC ID:** 2A5AUTX-MODEL1  
**Applicant:** Ningbo Haishu Tianxiang Winch Co.,Ltd.  
**Address of Applicant:** No.3 Lingfeng Road,Meiliangqiao Village,Hengjie Town,Haishu,Ningbo, 315181 Zhejiang,China.  
**Manufacturer:** Ningbo Haishu Tianxiang Winch Co.,Ltd.  
**Address of Manufacturer:** No.3 Lingfeng Road,Meiliangqiao Village,Hengjie Town,Haishu,Ningbo, 315181 Zhejiang,China.  
**Factory:** Ningbo Haishu Tianxiang Winch Co.,Ltd.  
**Address of Factory:** No.3 Lingfeng Road,Meiliangqiao Village,Hengjie Town,Haishu,Ningbo, 315181 Zhejiang,China.  
**Equipment Under Test (EUT):**  
**EUT Name:** WIRELESS REMOTE SWITCH  
**Model No.:** TX-MODEL1  
**Standard(s) :** 47 CFR Part 15, Subpart C 15.231  
**Date of Receipt:** 2022-03-02  
**Date of Test:** 2022-03-02 to 2022-03-04  
**Date of Issue:** 2022-03-04

|                     |              |
|---------------------|--------------|
| <b>Test Result:</b> | <b>Pass*</b> |
|---------------------|--------------|

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

Parlan Zhan

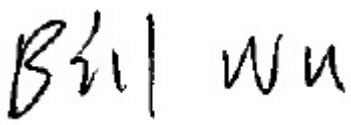
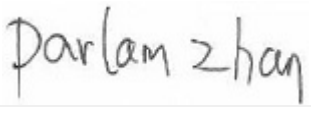
Parlan Zhan  
Laboratory Manager



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| Revision Record |             |            |        |
|-----------------|-------------|------------|--------|
| Version         | Description | Date       | Remark |
| 00              | Original    | 2022-03-04 | /      |
|                 |             |            |        |
|                 |             |            |        |

|                             |  |                                                                                     |  |
|-----------------------------|--|-------------------------------------------------------------------------------------|--|
| Authorized for issue<br>by: |  |                                                                                     |  |
|                             |  |    |  |
|                             |  | Bill Wu / Project Engineer                                                          |  |
|                             |  |  |  |
|                             |  | Parlam Zhan /Reviewer                                                               |  |



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## 2 Test Summary

| Test Item                         | FCC Requirement          | Test method                               | Result |
|-----------------------------------|--------------------------|-------------------------------------------|--------|
| Antenna Requirement               | Part 15.203              | /                                         | PASS   |
| Conducted Emission                | Part 15.207              | ANSI C63.10 (2013)<br>Section 6.2         | N/A    |
| Field Strength of the Fundamental | Part 15.231 (b)          | ANSI C63.10 (2013)<br>Section 6.4         | PASS   |
| Radiated Spurious emissions       | Part 15.209<br>15.231(b) | ANSI C63.10 (2013)<br>Section 6.4&6.5&6.6 | PASS   |
| 20dB Bandwidth                    | Part 15.231 (c)          | ANSI C63.10 (2013)<br>Section 6.9.2       | PASS   |
| Dwell Time                        | Part 15.231 (a)          | ANSI C63.10 (2013)<br>Section 7.8.4       | PASS   |

N/A: Not applicable.



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## 4 General Information

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

|               |                            |
|---------------|----------------------------|
| Power supply: | DC 12V by Alkaline battery |
| Test voltage: | DC 12V                     |

### 4.2 Technical Specifications:

|                     |                  |
|---------------------|------------------|
| Modulation Type     | ASK              |
| Number of Channels  | 1                |
| Operation Frequency | 433.92MHz        |
| Antenna Type        | Integral Antenna |
| Transmitter type    | Manually         |

### 4.3 Description of Support Units

The EUT has been tested independently

### 4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666

Fax: +86 21 6191 5678

No tests were sub-contracted.



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## 4.5 Test Facility

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

• **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 6332.01)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA).

• **FCC (Designation Number: CN1301)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized by Federal Communications Commission (FCC) as an accredited testing laboratory.

• **ISED (CAB Identifier: CN0020)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

ISED#: 8617A.

• **VCCI (Member No.: 3061)**

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• **GAC (No. ATL 0031)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the GCC Accreditation Center (GAC) in accordance with the recognised International standard ISO/IEC 17025: 2017.



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#### 4.6 Measurement Uncertainty

| No. | Item                            | Measurement Uncertainty                                                              |
|-----|---------------------------------|--------------------------------------------------------------------------------------|
| 1   | Radio Frequency                 | $8.4 \times 10^{-8}$                                                                 |
| 2   | Timeout                         | 2s                                                                                   |
| 3   | Duty cycle                      | 0.4%                                                                                 |
| 4   | Occupied Bandwidth              | 3%                                                                                   |
| 5   | RF conducted power              | 0.6dB                                                                                |
| 6   | RF power density                | 2.9dB                                                                                |
| 7   | Conducted Spurious emissions    | 0.75dB                                                                               |
| 8   | RF Radiated power               | 5.1dB (Below 1GHz)<br>5.9dB (Above 1GHz)                                             |
| 9   | Radiated Spurious emission test | 4.2dB (Below 30MHz)<br>4.5dB (30MHz-1GHz)<br>5.1dB (1GHz-6GHz)<br>5.4dB (6GHz-18GHz) |
| 10  | Temperature test                | 1°C                                                                                  |
| 11  | Humidity test                   | 3%                                                                                   |
| 12  | Supply voltages                 | 1.5%                                                                                 |
| 13  | Time                            | 3%                                                                                   |

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .



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## 5 Equipments Used during Test

| Equipment                 | Manufacturer | Model No         | Inventory No          | Cal Date   | Cal Due Date |
|---------------------------|--------------|------------------|-----------------------|------------|--------------|
| <b>RF Radiated Test</b>   |              |                  |                       |            |              |
| EMI test Receiver         | R&S          | ESU40            | SHEM051-1             | 2021-12-20 | 2022-12-19   |
| Spectrum Analyzer         | R&S          | FSP-30           | SHEM002-1             | 2021-12-20 | 2022-12-19   |
| Communication Tester      | R&S          | CMW500           | SHEM183-2             | 2021-04-16 | 2022-04-15   |
| Loop Antenna (9kHz-30MHz) | Schwarzbeck  | FMZB1519         | SHEM135-1             | 2021-12-20 | 2022-12-19   |
| Antenna (25MHz-2GHz)      | Schwarzbeck  | VULB9168         | SHEM048-1             | 2021-09-11 | 2023-09-10   |
| Antenna (25MHz-2GHz)      | Schwarzbeck  | VULB9168         | SHEM202-1             | 2020-04-30 | 2022-04-29   |
| Horn Antenna (1-18GHz)    | Schwarzbeck  | HF906            | SHEM009-1             | 2019-10-24 | 2022-10-23   |
| Horn Antenna (1-18GHz)    | Schwarzbeck  | BBHA9120D        | SHEM050-1             | 2021-09-18 | 2023-09-17   |
| Horn Antenna (14-40GHz)   | Schwarzbeck  | BBHA 9170        | SHEM049-1             | 2021-09-18 | 2023-09-17   |
| Pre-Amplifier             | HP           | 8447D            | SHEM236-1             | 2021-05-27 | 2022-05-26   |
| Pre-Amplifier             | PANSHAN      | LNA 1-18G        | SHEM235-1             | 2021-05-27 | 2022-05-26   |
| High-amplifier (14-40GHz) | Schwarzbeck  | 10001            | SHEM049-2             | 2021-12-20 | 2022-12-19   |
| Band Filter               | LORCH        | 9BRX-875/X150    | SHEM156-1             | /          | /            |
| Band Filter               | LORCH        | 13BRX-1950/X500  | SHEM083-2             | /          | /            |
| Band Filter               | LORCH        | 5BRX-2400/X200   | SHEM155-1             | /          | /            |
| Band Filter               | LORCH        | 5BRX-5500/X1000  | SHEM157-2             | /          | /            |
| High pass Filter          | Wainwright   | WHK3.0/18G       | SHEM157-1             | /          | /            |
| High pass Filter          | Wainwright   | WHKS1700         | SHEM157-3             | /          | /            |
| Semi/Fully Anechoic       | ST           | 11*6*6M          | SHEM078-2             | 2020-05-25 | 2023-05-24   |
| RE test Cable             | /            | RE01, RE02, RE06 | /                     | 2021-12-20 | 2022-12-19   |
| Test software             | ESE          | E3               | Version:<br>6.111221a | /          | /            |



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## 6 Test results and Measurement Data

### 6.1 Antenna Requirement

15.203 Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The antenna is Integral antenna and no consideration of replacement.

Antenna location: Refer to Appendix (Internal Photos)



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## 6.2 Spurious Emissions

Test frequency range: 9KHz – 5GHz

Test Site: Measurement Distance: 3m

Receiver Setup:

Limit:  
(Spurious Emissions)

Limit:  
(Field strength of the  
fundamental signal)

Test Procedure:

| Frequency          | Detector                            | RBW                | VBW           | Remark                      |
|--------------------|-------------------------------------|--------------------|---------------|-----------------------------|
| 0.009MHz-0.015MHz  | Quasi-peak                          | 200Hz              | 1KHz          | Quasi-peak                  |
| 0.015MHz-30MHz     | Quasi-peak                          | 9kHz               | 30KHz         | Quasi-peak                  |
| 30MHz-1GHz         | Quasi-peak                          | 120 kHz            | 300KHz        | Quasi-peak                  |
| Above 1GHz         | Peak                                | 1MHz               | 3MHz          | Peak                        |
|                    | Peak                                | 1MHz               | 10Hz          | Average                     |
| Frequency          | Field strength<br>(microvolt/meter) | Limit<br>(dBuV/m ) | Remark        | Measurement<br>distance (m) |
| 0.009MHz-0.490MHz  | 2400/F(kHz)                         | -                  | Quasi-peak    | 300                         |
| 0.490MHz-1.705MHz  | 24000/F(kHz)                        | -                  | Quasi-peak    | 30                          |
| 1.705MHz-30MHz     | 30                                  | -                  | Quasi-peak    | 30                          |
| 30MHz-88MHz        | 100                                 | 40.0               | Quasi-peak    | 3                           |
| 88MHz-216MHz       | 150                                 | 43.5               | Quasi-peak    | 3                           |
| 216MHz-960MHz      | 200                                 | 46.0               | Quasi-peak    | 3                           |
| 960MHz-1GHz        | 500                                 | 54.0               | Quasi-peak    | 3                           |
| Above 1GHz         | 500                                 | 54.0               | Average       | 3                           |
|                    |                                     | 74.0               | Peak          | 3                           |
| Frequency          | Limit (dBuV/m @3m)                  |                    | Remark        |                             |
| 433.09 - 434.61MHz | 80.83                               |                    | Average Value |                             |
|                    | 100.83                              |                    | Peak Value    |                             |

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- The radiation measurements are performed in X, Y, Z axis positioning. And found the Z axis positioning which it is worse case, only the test worst case



mode is recorded in the report.

### E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

Test mode a: TX mode\_Keep the EUT in transmitting with modulation mode.

### Test Setup:

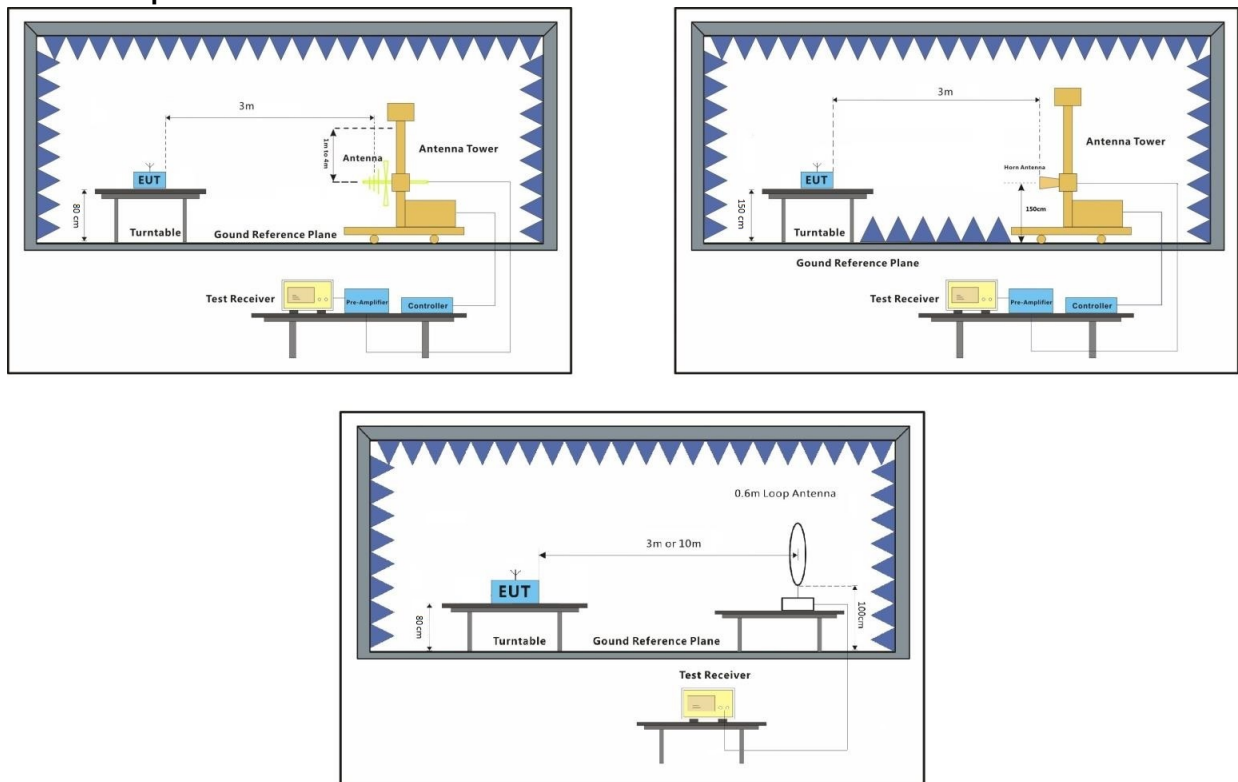


Figure1. radiated emissions test configuration

Test Results: Pass

### 6.2.1 Field Strength of the Fundamental Signal

| Test channel | Freq. (MHz) | Result Level (dBμV/m) | Limit Line (dBμV/m) | Over Limit (dB) | Detector | Polarization |
|--------------|-------------|-----------------------|---------------------|-----------------|----------|--------------|
| Channel 1    | 433.92      | 64.51                 | 80.83               | -16.32          | Peak     | Vertical     |
|              |             | 59.05                 | 80.83               | -21.78          | Peak     | Horizontal   |

Remark:

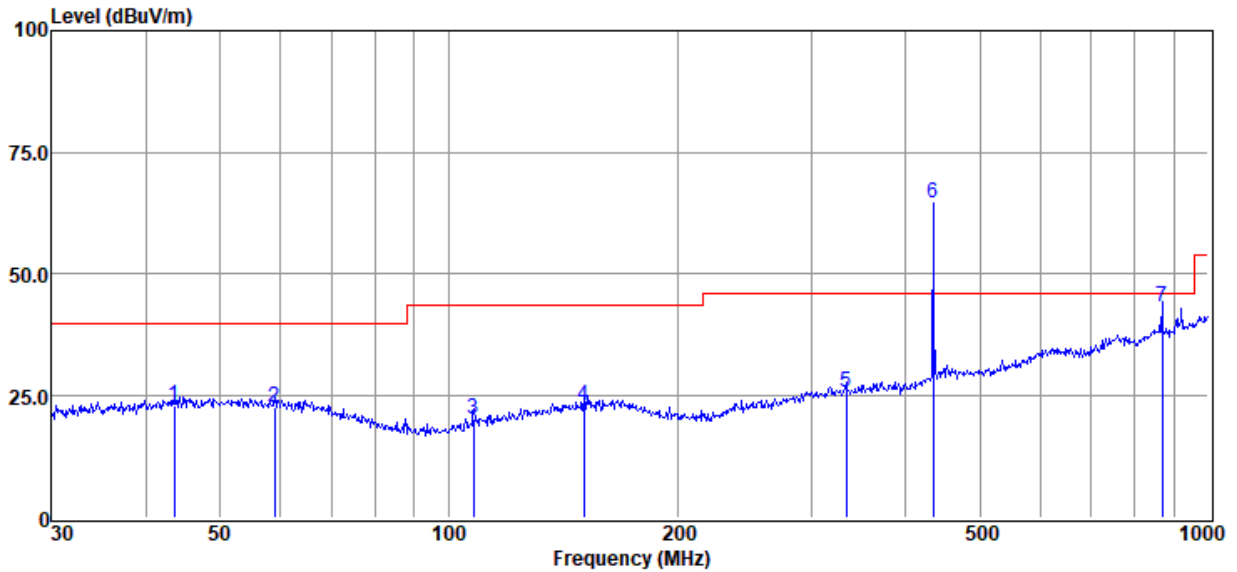
- If the Peak value below the AV Limit, the AV test doesn't perform for this submission.



## 6.2.2 Spurious Emissions

Below 1GHz

Vertical:



| Item   | Freq.   | Read   | Antenna    | Preamp | Cable | Result   | Limit              | Over   | Detector |
|--------|---------|--------|------------|--------|-------|----------|--------------------|--------|----------|
| (Mark) | (MHz)   | Level  | Factor     | Factor | Loss  | Level    | Line               | Limit  |          |
|        |         | (dBμV) | (dBμA/μVm) | (dB)   | (dB)  | (dBμA/m) | (dBμA/m)           | (dB)   |          |
| 1      | 43.506  | 34.27  | 13.65      | 26.20  | 1.15  | 22.87    | 40.00              | -17.13 | QP       |
| 2      | 59.025  | 34.27  | 13.34      | 26.20  | 1.27  | 22.68    | 40.00              | -17.32 | QP       |
| 3      | 107.888 | 35.57  | 10.11      | 27.10  | 1.79  | 20.37    | 43.50              | -23.13 | QP       |
| 4      | 150.538 | 35.01  | 13.15      | 27.10  | 2.11  | 23.17    | 43.50              | -20.33 | QP       |
| 5      | 333.687 | 34.79  | 14.38      | 26.60  | 3.17  | 25.74    | 46.00              | -20.26 | QP       |
| 6      | 434.065 | 70.79  | 16.78      | 26.70  | 3.64  | 64.51    | Fundamental Signal |        |          |
| 7      | 869.130 | 41.70  | 23.48      | 27.17  | 5.17  | 43.18    | 46.00              | -2.82  | QP       |



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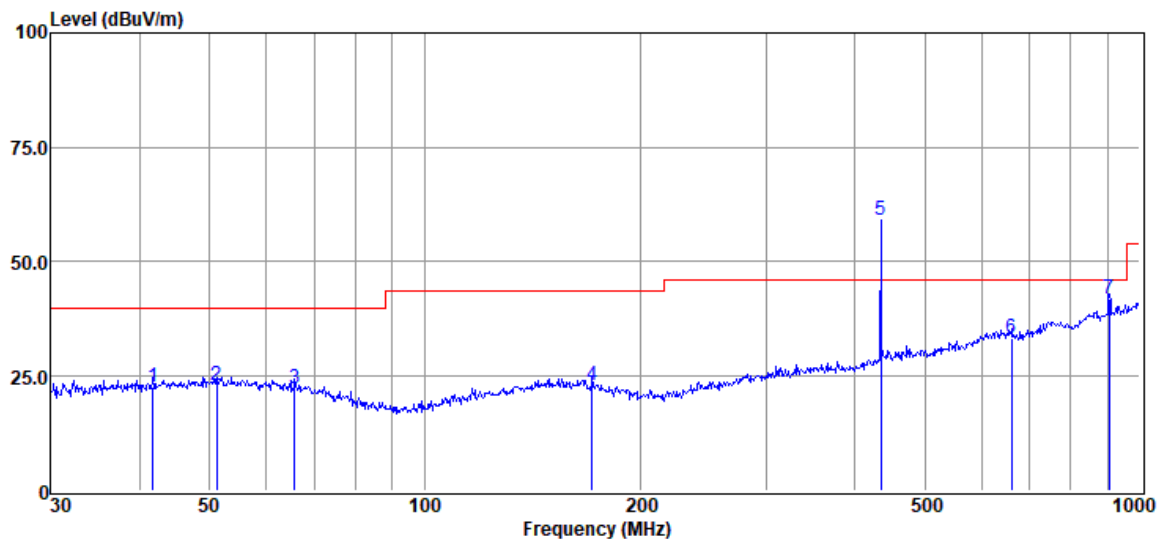
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## Horizontal:



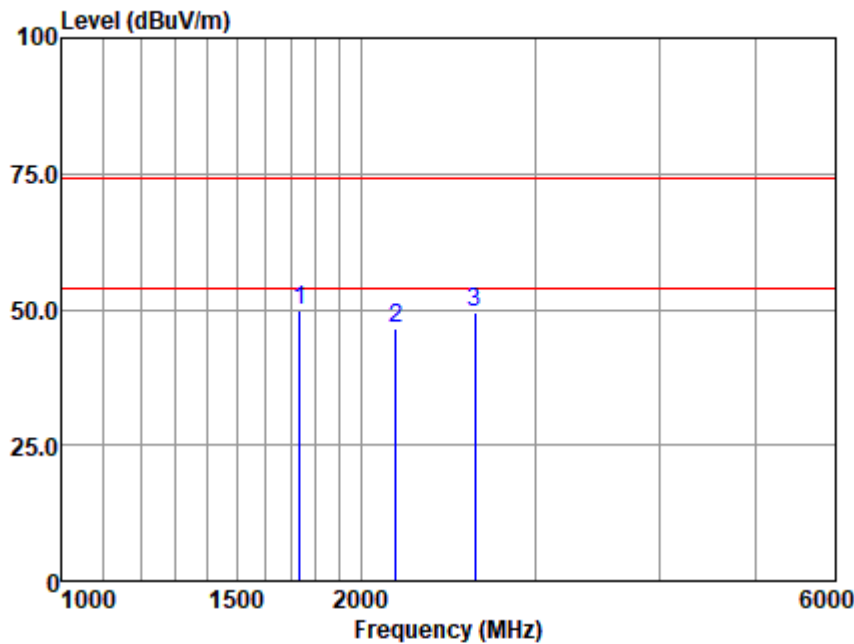
| Item   | Freq.   | Read   | Antenna    | Preamp | Cable | Result   | Limit              | Over   | Detector |
|--------|---------|--------|------------|--------|-------|----------|--------------------|--------|----------|
|        |         | Level  | Factor     | Factor | Loss  | Level    | Line               | Limit  |          |
| (Mark) | (MHz)   | (dBμV) | (dBμA/μVm) | (dB)   | (dB)  | (dBμA/m) | (dBμA/m)           | (dB)   |          |
| 1      | 41.713  | 34.28  | 13.52      | 26.20  | 1.10  | 22.70    | 40.00              | -17.30 | QP       |
| 2      | 51.121  | 34.02  | 13.82      | 26.20  | 1.25  | 22.89    | 40.00              | -17.11 | QP       |
| 3      | 65.803  | 34.58  | 12.45      | 26.14  | 1.39  | 22.28    | 40.00              | -17.72 | QP       |
| 4      | 171.393 | 35.00  | 12.82      | 26.93  | 2.30  | 23.19    | 43.50              | -20.31 | QP       |
| 5      | 434.065 | 65.33  | 16.78      | 26.70  | 3.64  | 59.05    | Fundamental Signal |        |          |
| 6      | 661.150 | 35.88  | 20.40      | 27.36  | 4.58  | 33.50    | 46.00              | -12.50 | QP       |
| 7      | 906.482 | 40.23  | 23.94      | 27.43  | 5.34  | 42.08    | 46.00              | -3.92  | QP       |





Above 1GHz

Horizontal



Antenna Polarity :HORIZONTAL

EUT/Project :0363HS

Test mode :a

|   | Freq     | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit Line | Over Limit | Remark |
|---|----------|------------|----------------|------------|---------------|----------------|------------|------------|--------|
|   | MHz      | dBuV       | dB/m           | dB         | dB            | dBuV/m         | dBuV/m     | dB         |        |
| 1 | 1736.829 | 58.00      | 25.46          | 7.81       | 41.28         | 49.99          | 74.00      | -24.01     | Peak   |
| 2 | 2169.767 | 52.88      | 26.45          | 8.79       | 41.79         | 46.33          | 74.00      | -27.67     | Peak   |
| 3 | 2603.126 | 54.18      | 27.82          | 9.83       | 42.40         | 49.43          | 74.00      | -24.57     | Peak   |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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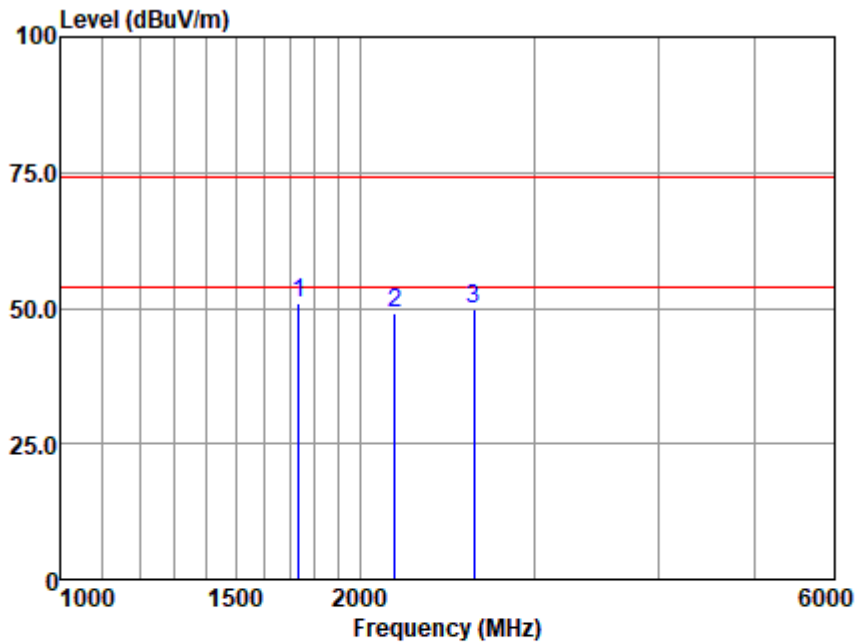
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Vertical



Antenna Polarity :VERTICAL

EUT/Project :0363HS

Test mode :a

|   | Freq     | Read Level | Antenna Factor | Cable Loss | Preamplifier Factor | Emission Level | Limit  | Over   | Remark |
|---|----------|------------|----------------|------------|---------------------|----------------|--------|--------|--------|
|   | MHz      | dBuV       | dB/m           | dB         | dB                  | dBuV/m         | dBuV/m | dB     |        |
| 1 | 1736.829 | 58.82      | 25.46          | 7.81       | 41.28               | 50.81          | 74.00  | -23.19 | Peak   |
| 2 | 2169.767 | 55.69      | 26.45          | 8.79       | 41.79               | 49.14          | 74.00  | -24.86 | Peak   |
| 3 | 2603.126 | 54.59      | 27.82          | 9.83       | 42.40               | 49.84          | 74.00  | -24.16 | Peak   |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor



## 6.3 20dB Bandwidth

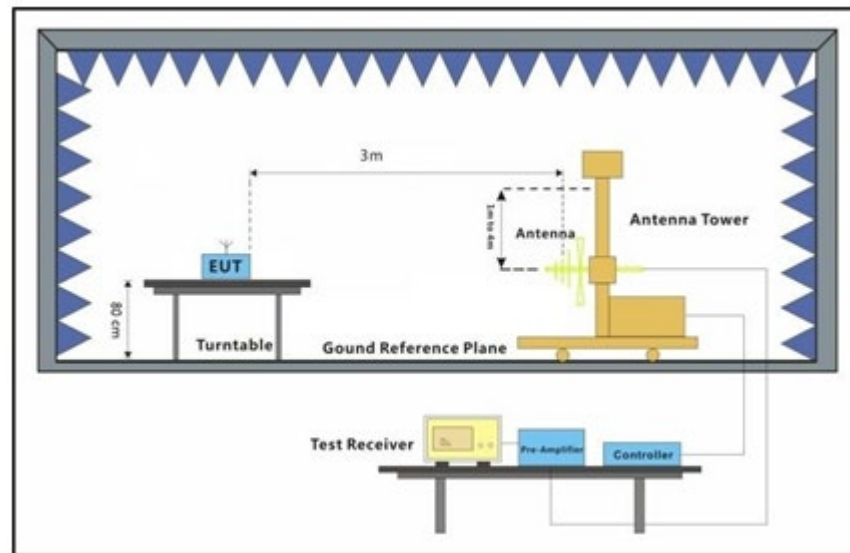
### E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

Test mode a: TX mode\_Keep the EUT in transmitting with modulation mode.

### Test Setup:



### 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. Bandwidth is determined at the points 20 dB down from the modulated carrier.

### Test Results:

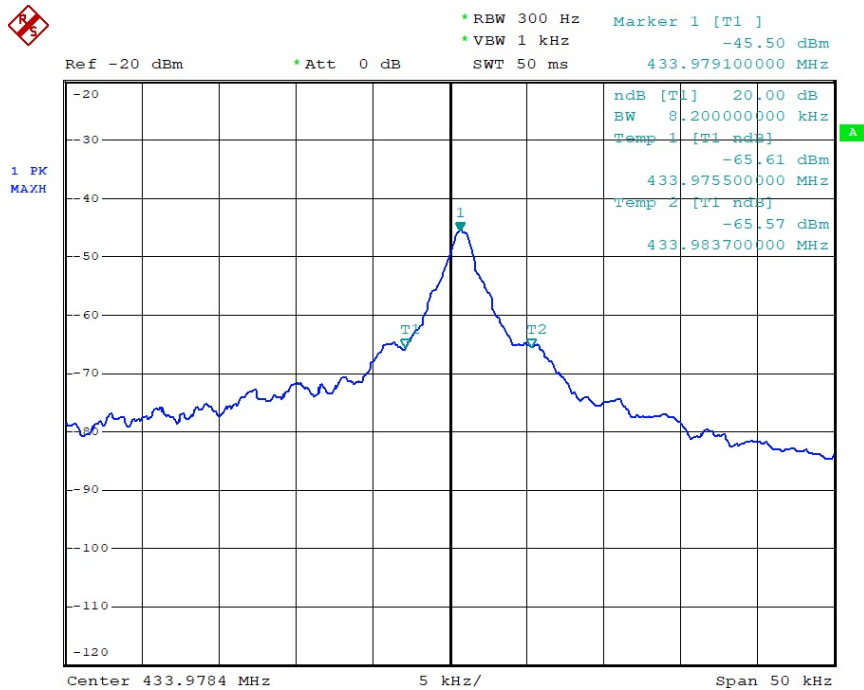
Pass

| Frequency (MHz) | 20dB bandwidth (kHz) | Limit (kHz) | Results |
|-----------------|----------------------|-------------|---------|
| 433.92          | 8.20                 | 1084.8      | Pass    |





Test plot as follows:



Date: 3.MAR.2022 13:40:58



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## 6.4 Dwell Time

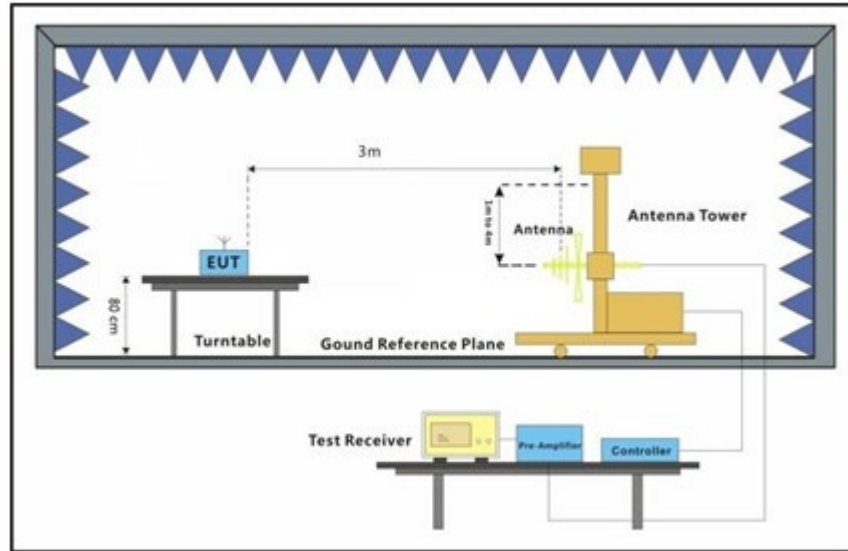
### E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

Test mode a: TX mode\_Keep the EUT in transmitting with modulation mode.

### Test Setup:



Limit: 15.231 (a): Not more than 5 seconds

Test Results: Pass

### Measurement Data:

| Test item             | Limit (s) | Results |
|-----------------------|-----------|---------|
| Transmission Duration | ≤5s       | Pass    |



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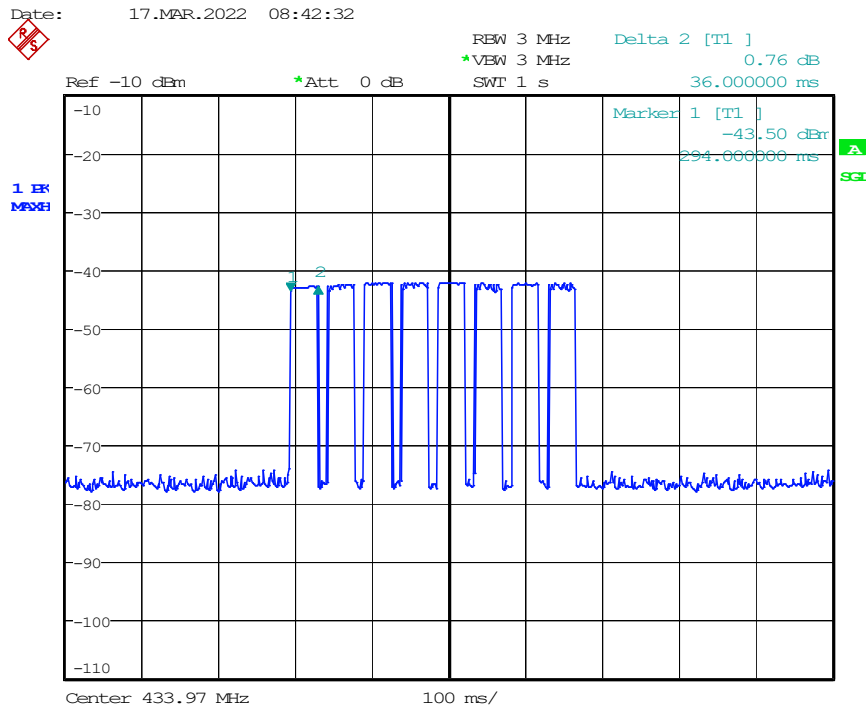
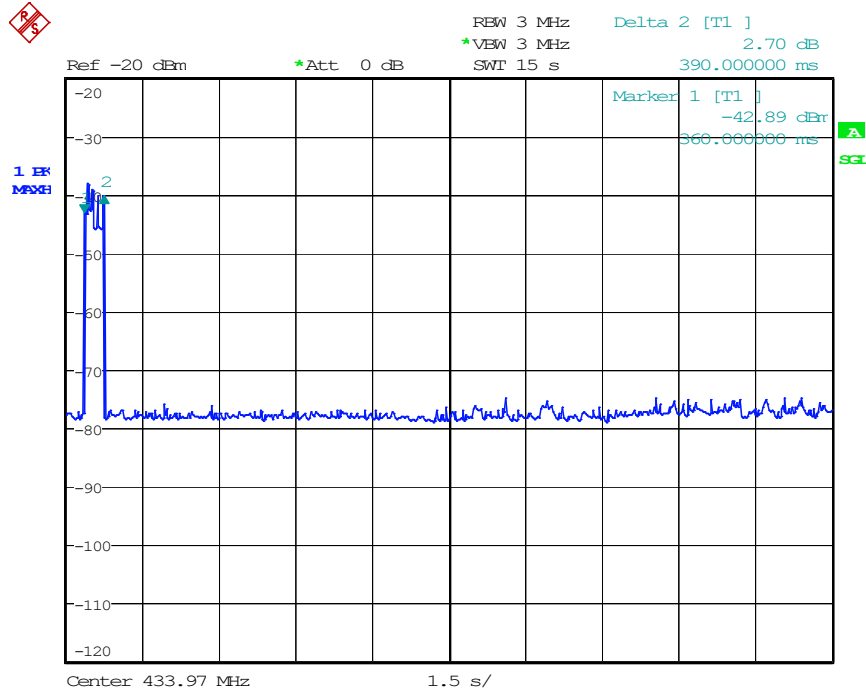
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Test plot as follows:



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## 7 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

## 8 EUT Constructional Details

Refer to the < External Photos > & <Internal Photos >.

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

