



## RF MEASUREMENT REPORT

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**FCC ID:** 2A3Y9STA792S019A  
**Applicant:** WHST CO., LTD.  
**Product:** High Resolution Short Range Corner Radar  
**Model No.:** STA79-2S  
**Brand Name** WHST  
**FCC Classification:** Part 95 Vehicular Radar Systems (VRD)  
**FCC Rule(s):** FCC Part 95, Subpart M  
**Test Procedure(s):** ANSI C63.10-2013  
**Test Date:** February 24 ~ March 16, 2022

**Reviewed By:**

Kevin Guo

**Approved By:**

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

### Revision History

| Report No.    | Version | Description    | Issue Date | Note  |
|---------------|---------|----------------|------------|-------|
| 2201RSU062-U1 | Rev. 01 | Initial Report | 03-17-2022 | Valid |
|               |         |                |            |       |

## CONTENTS

| Description   | Page      |
|---|-----------|
| <b>1. General Information</b>                       | <b>5</b>  |
| 1.1. Applicant                                      | 5         |
| 1.2. Manufacturer                                   | 5         |
| 1.3. Testing Facility                               | 5         |
| 1.4. Product Information                            | 6         |
| 1.5. Radio Specification                            | 6         |
| <b>2. Test Configuration</b>                        | <b>7</b>  |
| 2.1. Test Mode                                      | 7         |
| 2.2. Test System Connection Diagram                 | 7         |
| 2.3. Test System Details                            | 7         |
| 2.4. Test Software                                  | 7         |
| 2.5. Applied Standards                              | 8         |
| 2.6. Test Environment Condition                     | 8         |
| <b>3. Measuring Instrument</b>                      | <b>9</b>  |
| <b>4. Measurement Uncertainty</b>                   | <b>11</b> |
| <b>5. Test Result</b>                               | <b>12</b> |
| 5.1. Summary  | 12        |
| 5.2. Equivalent Isotropically Radiated Power (EIRP) | 13        |
| 5.2.1. Test Limit                                   | 13        |
| 5.2.2. Test Procedure used                          | 13        |
| 5.2.3. Test Setting                                 | 13        |
| 5.2.4. Test Setup                                   | 14        |
| 5.2.5. Test Result                                  | 15        |
| 5.3. Occupied bandwidth                             | 16        |
| 5.3.1. Test Limit                                   | 16        |
| 5.3.2. Test Procedure used                          | 16        |
| 5.3.3. Test Setting                                 | 16        |
| 5.3.4. Test Setup                                   | 16        |
| 5.3.5. Test Result                                  | 17        |
| 5.4. Unwanted Emissions                             | 18        |
| 5.4.1. Test Limit                                   | 18        |
| 5.4.2. Test Procedure used                          | 18        |
| 5.4.3. Test Procedure                               | 19        |
| 5.4.4. Test Setup                                   | 20        |
| 5.4.5. Test Results                                 | 22        |

|   |                           |           |
|---|---------------------------|-----------|
| 5.5.  | Frequency Stability ..... | 25        |
| 5.5.1.  | Test Limit.....           | 25        |
| 5.5.2.  | Test Procedure used.....  | 25        |
| 5.5.3.  | Test Procedure.....       | 25        |
| 5.5.4.  | Test Setup.....           | 26        |
| 5.5.5.  | Test Result .....         | 27        |
| <b>6.</b>                                       | <b>Conclusion.....</b>    | <b>28</b> |
| <b>Appendix A - Test Setup Photograph .....</b> |                           | <b>29</b> |
| <b>Appendix B - EUT Photograph.....</b>         |                           | <b>30</b> |

## 1. General Information

### 1.1. Applicant

WHST CO., LTD.

Factory 1, Wanchun High-tech Innovation Park, East District of Economic & Technological Development Zone, Wuhu, Anhui

### 1.2. Manufacturer

WHST CO., LTD.

Factory 1, Wanchun High-tech Innovation Park, East District of Economic & Technological Development Zone, Wuhu, Anhui

### 1.3. Testing Facility

|                                     |  |   |                                  |                                  |  |  |  |  |
|-------------------------------------|--|---|----------------------------------|----------------------------------|--|--|--|--|
| <input checked="" type="checkbox"/> | <b>Test Site – MRT Suzhou Laboratory</b>   |   |                                  |                                  |  |  |  |  |
|                                     | <b>Laboratory Location (Suzhou - Wuzhong)</b>  |   |                                  |                                  |  |  |  |  |
|                                     | D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China           |   |                                  |                                  |  |  |  |  |
|                                     | <b>Laboratory Location (Suzhou - SIP)</b>  |   |                                  |                                  |  |  |  |  |
|                                     | 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China |   |                                  |                                  |  |  |  |  |
|                                     | <b>Laboratory Accreditations</b>   |   |                                  |                                  |  |  |  |  |
|                                     | A2LA: 3628.01  | CNAS: L10551  |                                  |                                  |  |  |  |  |
|                                     | FCC: CN1166  | ISED: CN0001  |                                  |                                  |  |  |  |  |
|                                     | VCCI:  | <input type="checkbox"/> R-20025  | <input type="checkbox"/> G-20034 | <input type="checkbox"/> C-20020 |  |  |  |  |
|                                     |  | <input type="checkbox"/> R-20141  | <input type="checkbox"/> G-20134 | <input type="checkbox"/> T-20020 |  |  |  |  |
|                                     | <input type="checkbox"/>   | <b>Test Site – MRT Shenzhen Laboratory</b>  |                                  |                                  |  |  |  |  |
|                                     |  | <b>Laboratory Location (Shenzhen)</b>   |                                  |                                  |  |  |  |  |
|                                     |  | 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China |                                  |                                  |  |  |  |  |
|                                     |  | <b>Laboratory Accreditations</b>  |                                  |                                  |  |  |  |  |
|                                     |  | A2LA: 3628.02   | CNAS: L10551                     |                                  |  |  |  |  |
|                                     |  | FCC: CN1284   | ISED: CN0105                     |                                  |  |  |  |  |
|                                     | <input type="checkbox"/>   | <b>Test Site – MRT Taiwan Laboratory</b>  |                                  |                                  |  |  |  |  |
|                                     |  | <b>Laboratory Location (Taiwan)</b>   |                                  |                                  |  |  |  |  |
|                                     |  | No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)                        |                                  |                                  |  |  |  |  |
|                                     |  | <b>Laboratory Accreditations</b>  |                                  |                                  |  |  |  |  |
|                                     |  | TAF: L3261-190725   | ISED: TW3261                     |                                  |  |  |  |  |
|                                     |  | FCC: 291082, TW3261   |                                  |                                  |  |  |  |  |

#### 1.4. Product Information

|                           |  |
|---------------------------|--|
| Product Name              | High Resolution Short Range Corner Radar   |
| Model No.                 | STA79-2S   |
| Product Voltage           | DC 9V-16V  |
| Working Temperature Range | -40°C ~ 85°C   |
| Test Devices No.          | 77#  |
| Remark:                   | <p>The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.</p> |

#### 1.5. Radio Specification

|                         |                              |
|-------------------------|------------------------------|
| Working Frequency Range | 76 ~ 77GHz                   |
| Modulation              | FMCW                         |
| Antenna Gain Tx         | 16.5dBi                      |
| Antenna Gain Rx         | 18dBi                        |
| Bandwidth               | 650MHz                       |
| Cycle time              | 50ms                         |
| Radar Type              | Fixed Beam, Non-pulsed Radar |

## 2. Test Configuration

### 2.1. Test Mode

#### Mode 1: Collocated Tx/Rx mode

Note: The test sample was provided by the manufacturer, which was configured into Collocated Tx/Rx mode after power on.

### 2.2. Test System Connection Diagram

The device was tested per the guidance ANSI C63.10: 2013 was used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.

| Connection Diagram – Radiated Emission |                    |
|--|--------------------|
| A                                      | B — DC Supply      |
| EUT                                    | CAN Tool           |
|  | C                  |
|  | 1                  |
| Cable Type                             |                    |
| A                                      | Power Cable        |
| B                                      | Power Cable        |
| C                                      | USB Cable          |
| Cable Description                      |                    |
| A                                      | Non shielded, 2.0m |
| B                                      | Non shielded, 2.0m |
| C                                      | Shielded, 1.0m     |

### 2.3. Test System Details

| Product | Manufacturer | Model No. |
|---------|--------------|-----------|
| 1       | Lenovo       | E495      |

### 2.4. Test Software

The test utility software used during testing was “STA79\_2S\_SOD Lotus lambda DV\_EMCA.exe”, and the version was 1.0.4.

## 2.5. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 95, Subpart M
- KDB 653005 D01v01r01
- ANSI C63.10-2013

## 2.6. Test Environment Condition

|                     |             |
|---------------------|-------------|
| Ambient Temperature | 15 ~ 35°C   |
| Relative Humidity   | 20% ~ 75%RH |

### 3. Measuring Instrument

| Instrument               | Manufacturer | Model No.   | Asset No.   | Cali. Interval | Cali. Due Date | Test Site |
|--------------------------|--------------|-------------|-------------|----------------|----------------|-----------|
| EMI Test Receiver        | R&S          | ESR3        | MRTSUE06185 | 1 year         | 2022/12/29     | SIP-AC1   |
| Anechoic Chamber         | RIKEN        | SIP-AC1     | MRTSUE06554 | 1 year         | 2022/12/23     | SIP-AC1   |
| Signal Analyzer          | Keysight     | N9010B      | MRTSUE06559 | 1 year         | 2022/6/24      | SIP-AC1   |
| Preamplifier             | EMCI         | EMC051845SE | MRTSUE06600 | 1 year         | 2022/11/8      | SIP-AC1   |
| Signal Analyzer          | Keysight     | N9010B      | MRTSUE06603 | 1 year         | 2022/10/31     | SIP-AC1   |
| Signal Analyzer          | Keysight     | N9020B      | MRTSUE06604 | 1 year         | 2022/9/7       | SIP-AC1   |
| Horn Antenna             | R&S          | HF907       | MRTSUE06610 | 1 year         | 2022/8/5       | SIP-AC1   |
| EMI Test Receiver        | R&S          | ESR3        | MRTSUE06613 | 1 year         | 2022/6/24      | SIP-AC1   |
| Thermohygrometer         | testo        | 608-H1      | MRTSUE06616 | 1 year         | 2022/11/2      | SIP-AC1   |
| Thermohygrometer         | testo        | 608-H1      | MRTSUE06620 | 1 year         | 2022/11/28     | SIP-AC1   |
| Preamplifier             | EMCI         | EMC001330   | MRTSUE06643 | 1 year         | 2023/1/13      | SIP-AC1   |
| TRILOG Antenna           | Schwarzbeck  | VULB 9168   | MRTSUE06645 | 1 year         | 2022/8/26      | SIP-AC1   |
| Loop Antenna             | Schwarzbeck  | FMZB 1519 B | MRTSUE06937 | 1 year         | 2023/3/14      | SIP-AC1   |
| Signal Analyzer          | Keysight     | N9010B      | MRTSUE07028 | 1 year         | 2022/12/9      | SIP-AC1   |
| Waveguide Harmonic Mixer | Keysight     | M1970V      | MRTSUE06271 | /              | /              | SIP-TR2   |
| Waveguide Harmonic Mixer | Keysight     | M1970W      | MRTSUE06272 | /              | /              | SIP-TR2   |
| mmWave Antenna           | MI-WWAVE     | 261U-25/383 | MRTSUE06273 | /              | /              | SIP-TR2   |
| mmWave Antenna           | MI-WWAVE     | 261G/387    | MRTSUE06274 | /              | /              | SIP-TR2   |
| mmWave Antenna           | MI-WWAVE     | 261F/387    | MRTSUE06275 | /              | /              | SIP-TR2   |
| mmWave Antenna           | MI-WWAVE     | 261E-25/387 | MRTSUE06276 | /              | /              | SIP-TR2   |
| mmWave Antenna           | VDI          | WR3/4       | MRTSUE06277 | /              | /              | SIP-TR2   |
| mmWave Antenna           | VDI          | WR2/2       | MRTSUE06278 | /              | /              | SIP-TR2   |
| mmWave Extension Module  | Keysight     | N9029AV03   | MRTSUE06366 | /              | /              | SIP-TR2   |
| mmWave Extension Module  | Keysight     | N9029AV05   | MRTSUE06367 | /              | /              | SIP-TR2   |
| mmWave Extension Module  | Keysight     | N9029AV06   | MRTSUE06368 | /              | /              | SIP-TR2   |
| mmWave Extension Module  | Keysight     | N9029AV02   | MRTSUE06369 | /              | /              | SIP-TR2   |
| mmWave Antenna           | A-INFO       | LB-15-25-A  | MRTSUE06409 | /              | /              | SIP-TR2   |
| mmWave Antenna           | A-INFO       | LB-10-25-A  | MRTSUE06410 | /              | /              | SIP-TR2   |
| USB Power Sensor         | Keysight     | U8489A      | MRTSUE06448 | /              | /              | SIP-TR2   |

| Instrument Name         | Manufacturer | Model No. | Asset No.   | Cali. Interval | Cal. Due Date | Test Site |
|-------------------------|--------------|-----------|-------------|----------------|---------------|-----------|
| mmWave Extension Module | Keysight     | E8257DV15 | MRTSUE06456 | /              | /             | SIP-TR2   |
| mmWave Extension Module | Keysight     | E8257DV10 | MRTSUE06458 | /              | /             | SIP-TR2   |
| Thermohygrometer        | testo        | 622       | MRTSUE06628 | 1 year         | 2023/1/6      | SIP-TR2   |
| Signal Analyzer         | Keysight     | N9030B    | MRTSUE06395 | 1 year         | 2022/8/8      | SIP-TR2   |

| Software          | Version | Function          |
|-------------------|---------|-------------------|
| EMI Test Software | V3      | EMI Test Software |

#### 4. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

##### Radiated Emission Measurement

Measurement Uncertainty for a Level of Confidence of 95% ( $U=2U_{c(y)}$ ):

Horizontal:

30MHz~300MHz: 5.04dB

300MHz~1GHz: 4.95dB

1GHz~40GHz: 6.40dB

Vertical:

30MHz~300MHz: 5.24dB

300MHz~1GHz: 6.03dB

1GHz~40GHz: 6.40dB

## 5. Test Result

### 5.1. Summary

| FCC Part Section(s) | Test Description    | Test Condition | Verdict |
|---------------------|---------------------|----------------|---------|
| 95.3367             | EIRP                | Radiated       | Pass    |
| 2.1049              | Occupied bandwidth  |                | Pass    |
| 95.3379(a)          | Unwanted Emissions  |                | Pass    |
| 95.3379(b)          | Frequency stability |                | Pass    |

**Notes:** The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case data are shown in the report.

## 5.2. Equivalent Isotropically Radiated Power (EIRP)

### 5.2.1. Test Limit

The fundamental radiated emission limits within the 76-81 GHz band are expressed in terms of Equivalent Isotropically Radiated Power (EIRP) and are as follows:

- (a) The maximum power (EIRP) within the 76-81 GHz band shall not exceed 50 dBm based on measurements employing a power averaging detector with a 1 MHz Resolution Bandwidth (RBW).
- (b) The maximum peak power (EIRP) within the 76-81 GHz band shall not exceed 55 dBm based on measurements employing a peak detector with a 1 MHz RBW.

### 5.2.2. Test Procedure used

ANSI C63.10 Section 9.10

Note: Far-field boundary calculation as below.

According to ANSI C63.10-2013, Clause 9, for mm-wave measurements,  $L \gg \lambda$  and a more suitable formula for the far-field boundary distance:  $R_{(\text{Far Field})} = 2L^2/\lambda$

- $L$  is the largest antenna dimension of the transmit antenna in m
- $\lambda$  is the wavelength in m

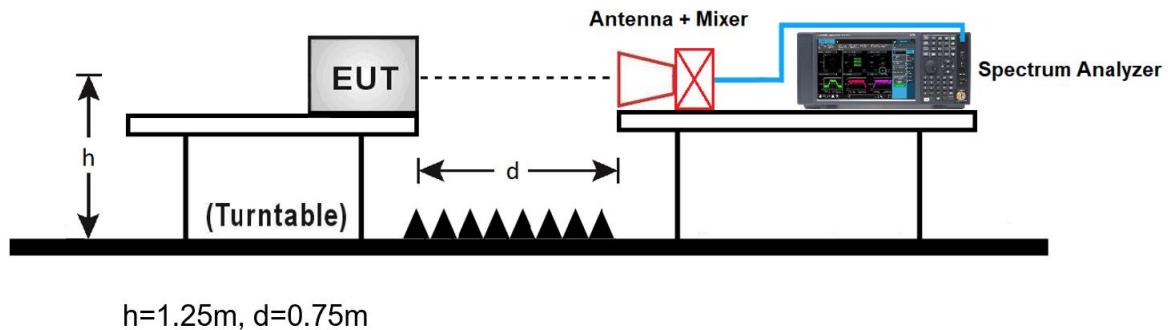
| Far-field boundary calculation |               |         |                              |
|--------------------------------|---------------|---------|------------------------------|
| Frequency Range (GHz)          | $\lambda$ (m) | $L$ (m) | $R_{(\text{Far Field})}$ (m) |
| 76 ~ 77                        | 0.0039        | 0.0267  | 0.366                        |

Our measurement is performed at a minimum distance of 0.75m >  $R_{(\text{Far Field})}$

### 5.2.3. Test Setting

1. Span = approximately two times to three times the EBW, centered on the carrier frequency
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector function = Peak for peak EIRP, Average for average EIRP.
5. Sweep time = auto
6. Trace mode = max hold.
7. Allow the trace to stabilize.
8. Use the peak search function to mark the max of the emission.

#### 5.2.4. Test Setup



### 5.2.5. Test Result

|               |           |                   |        |
|---------------|-----------|-------------------|--------|
| Test Engineer | Chase Zhu | Temperature       | 25.6°C |
| Test Site     | SIP-TR2   | Relative Humidity | 42.2%  |
| Test Date     | 2022/2/28 |                   |        |

| EIRP (dBm) |         | EIRP Limit (dBm) |         | Result |
|------------|---------|------------------|---------|--------|
| Peak       | Average | Peak             | Average |        |
| 16.57      | 10.87   | ≤ 55             | ≤ 50    | Pass   |

Note: Average EIRP measurement was not performed when the Peak EIRP level lower than average limit.



### 5.3. Occupied bandwidth

#### 5.3.1. Test Limit

N/A

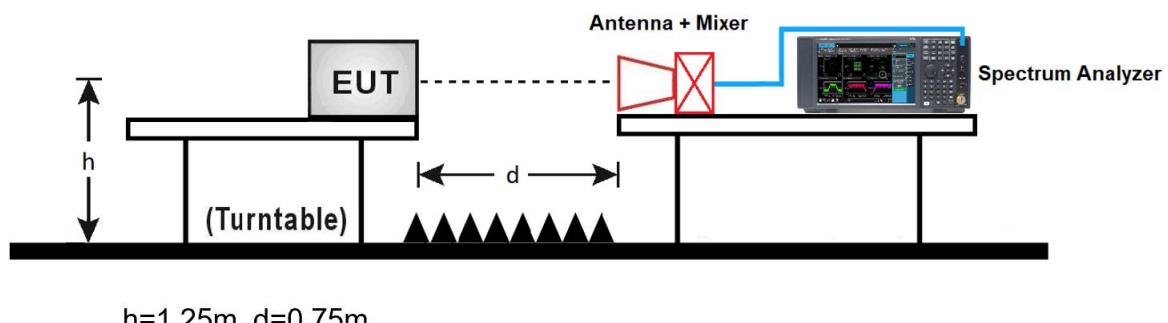
#### 5.3.2. Test Procedure used

ANSI C63.10 Section 6.9.3

#### 5.3.3. Test Setting

1. Span = approximately 1.5 times to 5 times the OBW, centered on the carrier frequency
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector function = Peak
5. Sweep time = auto
6. Trace mode = max hold.
7. The EUT shall be transmitting at its maximum data rate. Allow the trace to stabilize.

#### 5.3.4. Test Setup

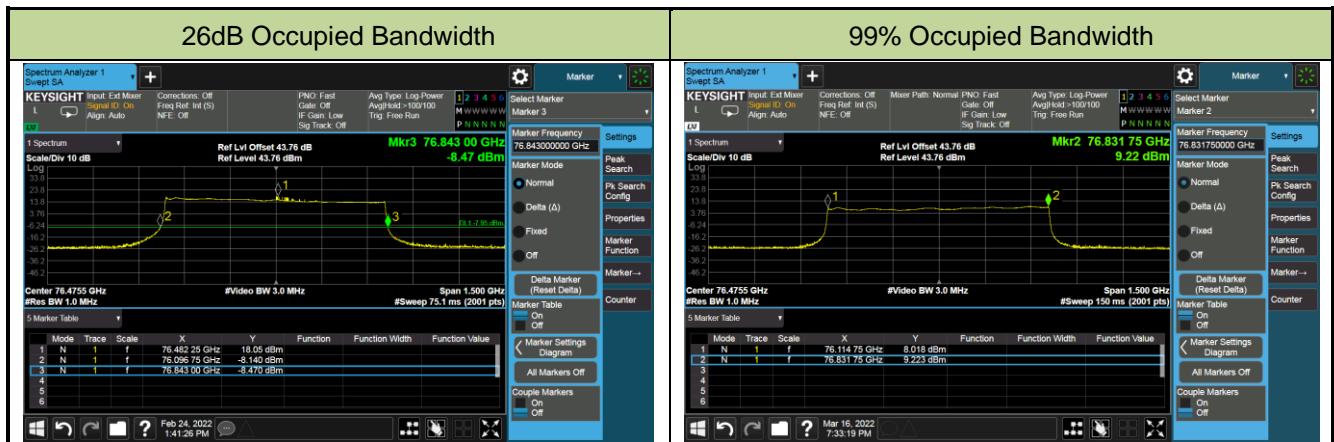


### 5.3.5. Test Result

|               |                       |                   |        |
|---------------|-----------------------|-------------------|--------|
| Test Engineer | Chase Zhu             | Temperature       | 25.6°C |
| Test Site     | SIP-TR2               | Relative Humidity | 42.2%  |
| Test Date     | 2022/2/24 ~ 2022/3/16 |                   |        |

| 26dB Bandwidth (MHz) | f <sub>L</sub> (MHz) | f <sub>L</sub> Limit (MHz) | f <sub>H</sub> (MHz) | f <sub>H</sub> Limit (MHz) | Result |
|----------------------|----------------------|----------------------------|----------------------|----------------------------|--------|
| 746.25               | 76096.75             | ≥ 76000                    | 76843.00             | ≤ 77000                    | Pass   |

| 99% Bandwidth (MHz) | f <sub>L</sub> (MHz) | f <sub>L</sub> Limit (MHz) | f <sub>H</sub> (MHz) | f <sub>H</sub> Limit (MHz) | Result |
|---------------------|----------------------|----------------------------|----------------------|----------------------------|--------|
| 717.00              | 76114.75             | ≥ 76000                    | 76831.75             | ≤ 77000                    | Pass   |



Note: For 99% Occupied Bandwidth:

width of a frequency band such that, below the lower and above the upper frequency limits the mean powers emitted are each equal to 0,5 % of the total mean power of a given emission. Therefore, we need to calculate the upper and lower limits of the frequency.

For example, f<sub>H</sub> is the frequency of the upper marker resulting from the OBW.

f<sub>L</sub> is the frequency of the lower marker resulting from the OBW.

99% Occupied Bandwidth = f<sub>H</sub> - f<sub>L</sub>.

## 5.4. Unwanted Emissions

### 5.4.1. Test Limit

The power density of any emissions outside the 76-81 GHz band shall consist solely of spurious emissions and shall not exceed the following:

(1) Radiated emissions below 40 GHz shall not exceed the field strength as shown in the following emissions table.

| Frequency (MHz) | Field Strength (uV/m) | Measurement Distance (m) |
|-----------------|-----------------------|--------------------------|
| 0.009 ~ 0.490   | 2400/F(kHz)           | 300                      |
| 0.490 ~ 1.705   | 24000/F(kHz)          | 30                       |
| 1.705 ~ 30.0    | 30                    | 30                       |
| 30 ~ 88         | 100                   | 3                        |
| 88 ~ 216        | 150                   | 3                        |
| 216 ~ 960       | 200                   | 3                        |
| Above 960       | 500                   | 3                        |

(i) The tighter limit applies at the band edges.  
(ii) The limits in the table are based on the frequency of the unwanted emissions and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.  
(iii) The emissions limits shown in the table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9.0-90.0 kHz, 110.0-490.0 kHz, and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector with a 1 MHz RBW.

(2) The power density of radiated emissions outside the 76-81 GHz band above 40.0 GHz shall not exceed the following, based on measurements employing an average detector with a 1 MHz RBW:

(i) For radiated emissions between 40 GHz and 200 GHz: 600 pW/cm<sup>2</sup> at a distance of 3 meters from the exterior surface of the radiating structure.  
(ii) For radiated emissions above 200 GHz: 1000 pW/cm<sup>2</sup> at a distance of 3 meters from the exterior surface of the radiating structure.  
(3) For field disturbance sensors and radar systems operating in the 76-81 GHz band, the spectrum shall be investigated up to 231.0 GHz.

### 5.4.2. Test Procedure used

ANSI C63.10 Section 9.12 and Section 9.13

### 5.4.3. Test Procedure

#### **Measurement of harmonic and spurious emissions above 40 GHz**

1. Connect the test antenna covering the appropriate frequency range to a spectrum analyzer via an external mixer.
2. Set spectrum analyzer RBW = 1MHz, VBW = 3MHz, average detector.
3. Maximize all observed emissions. Note the maximum power indicated on the spectrum analyzer. Adjust this reading, if necessary, by the conversion loss of the external mixer used at the frequency under investigation and the external mixer IF cable loss.
4. Calculate the maximum field strength of the emission at the measurement distance.
5. Calculate the power density at the distance specified by the limit from the field strength at the distance specified by the limit.
6. Repeat the preceding sequence for every emission observed in the frequency band under investigation.

#### **Measurement of harmonic and spurious emissions below 40 GHz**

##### **Peak Field Strength Measurements**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. VBW = 3 x RBW
4. Detector = Peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

**Table 1 – RBW**

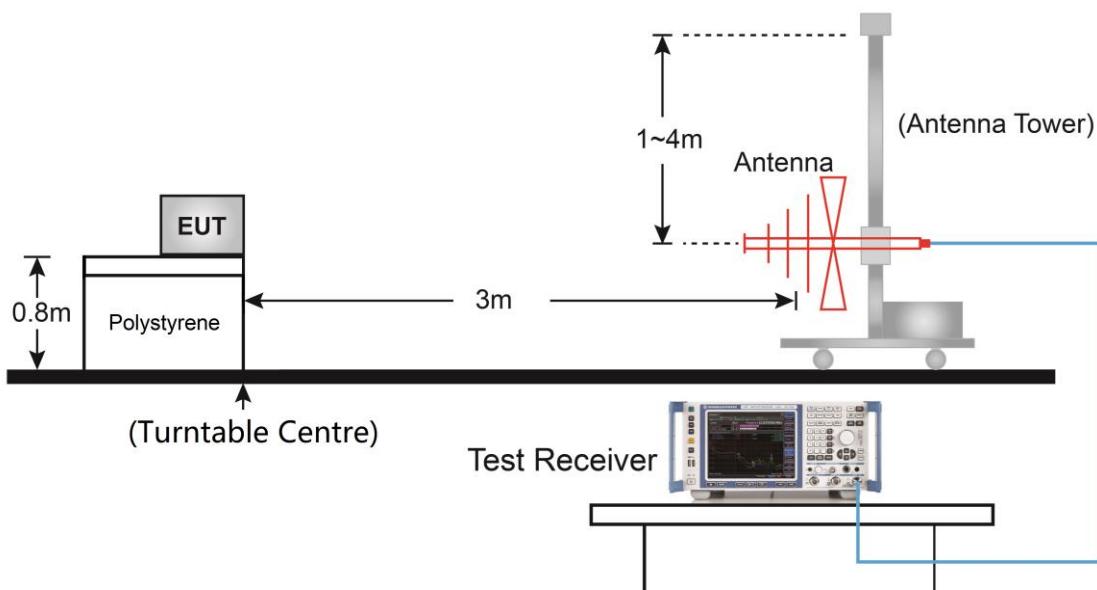
| Frequency     | RBW     |
|---------------|---------|
| 9 ~ 90 kHz    | 1 MHz   |
| 90 ~ 110 kHz  | 200 Hz  |
| 110 ~ 490 kHz | 1 MHz   |
| 0.49 ~ 30 MHz | 9 kHz   |
| 30 ~ 1000 MHz | 120 kHz |
| > 1000 MHz    | 1 MHz   |

### Average Field Strength Measurements

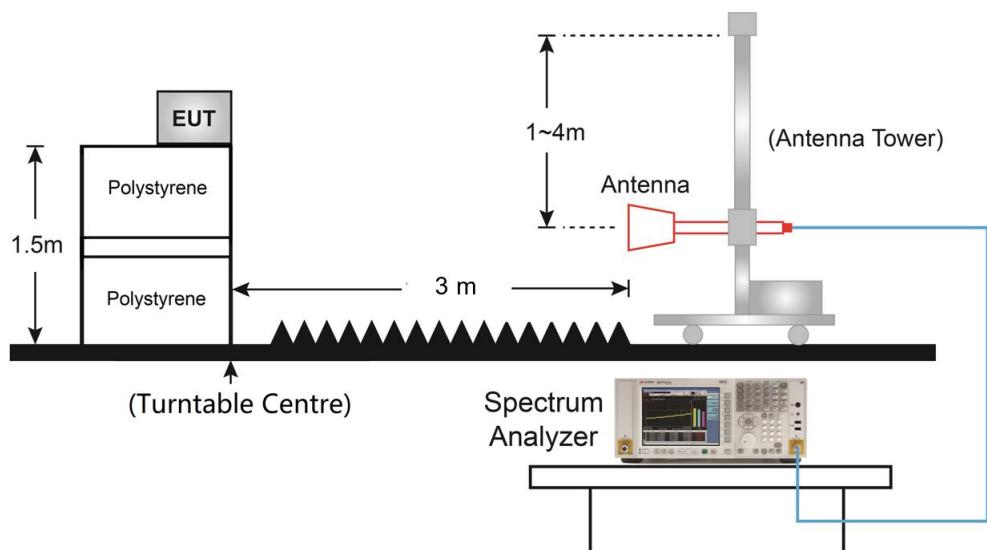
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = Peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow max hold to run for at least 50 times (1/duty cycle) traces

#### 5.4.4. Test Setup

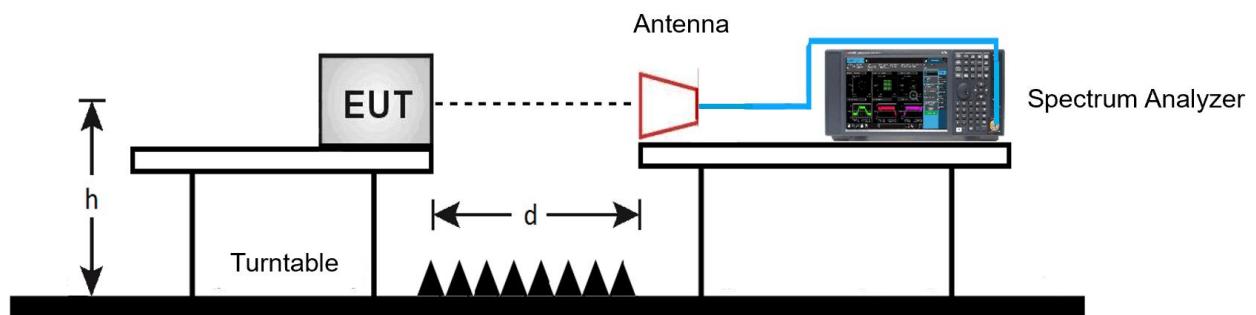
Below 1GHz Test Setup:



## 1GHz ~ 40GHz Test Setup:

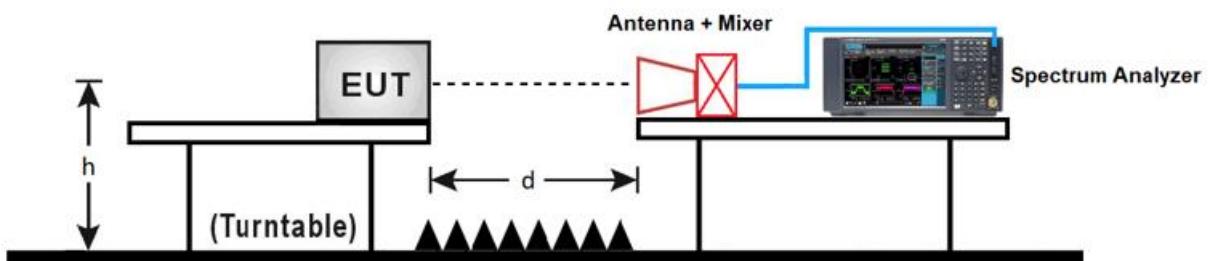


## Above 40GHz Test Setup:



$$h = 1.25\text{m}, d = 0.75\text{m}$$

## Above 50GHz Test Setup:



$$h=1.25\text{m}, d=0.75\text{m}$$

#### 5.4.5. Test Results

|               |           |                   |        |
|---------------|-----------|-------------------|--------|
| Test Engineer | Kyrie Xie | Temperature       | 16°C   |
| Test Site     | SIP-AC1   | Relative Humidity | 62.1%  |
| Test Date     | 2022/3/1  | Test Mode         | Mode 1 |

| Frequency<br>(MHz) | Reading Level<br>(dB $\mu$ V) | Factor<br>(dB/m) | Measure Level<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m) | Margin<br>(dB) | Detector | Polarization |
|--------------------|-------------------------------|------------------|---------------------------------|-------------------------|----------------|----------|--------------|
| Below 1GHz         |                               |                  |                                 |                         |                |          |              |
| 39.7               | -0.7                          | 17.3             | 16.6                            | 40.0                    | -23.4          | Peak     | Horizontal   |
| 67.8               | 2.6                           | 16.2             | 18.8                            | 40.0                    | -21.2          | Peak     | Horizontal   |
| 135.7              | 6.2                           | 17.1             | 23.3                            | 43.5                    | -20.2          | Peak     | Horizontal   |
| 608.1              | 1.0                           | 25.8             | 26.8                            | 46.0                    | -19.2          | Peak     | Horizontal   |
| 845.3              | 1.4                           | 28.9             | 30.3                            | 46.0                    | -15.7          | Peak     | Horizontal   |
| 956.4              | 1.4                           | 29.9             | 31.3                            | 46.0                    | -14.7          | Peak     | Horizontal   |
| 53.3               | -0.3                          | 17.9             | 17.6                            | 40.0                    | -22.4          | Peak     | Vertical     |
| 152.7              | -0.1                          | 18.3             | 18.2                            | 43.5                    | -25.3          | Peak     | Vertical     |
| 249.7              | 1.8                           | 16.4             | 18.2                            | 46.0                    | -27.8          | Peak     | Vertical     |
| 350.1              | 4.8                           | 19.3             | 24.1                            | 46.0                    | -21.9          | Peak     | Vertical     |
| 839.0              | 1.4                           | 28.9             | 30.3                            | 46.0                    | -15.7          | Peak     | Vertical     |
| 963.6              | 1.2                           | 30.1             | 31.3                            | 54.0                    | -22.7          | Peak     | Vertical     |

##### Notes:

1. Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB/m)  
Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)
2. The amplitude of radiated emissions (frequency range from 9KHz to 30MHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

|               |           |                   |        |
|---------------|-----------|-------------------|--------|
| Test Engineer | Kyrie Xie | Temperature       | 16.3°C |
| Test Site     | SIP-AC2   | Relative Humidity | 52.1%  |
| Test Date     | 2022/3/1  | Test Mode         | Mode 1 |

| Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB/m) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|-----------------|----------------------------|---------------|------------------------------|----------------------|-------------|----------|--------------|
| 1 ~ 40 GHz      |                            |               |                              |                      |             |          |              |
| 11140.5         | 41.5                       | 7.5           | 49.0                         | 54.0                 | -5.0        | Peak     | Horizontal   |
| 12033.0         | 40.7                       | 7.8           | 48.5                         | 54.0                 | -5.5        | Peak     | Horizontal   |
| 13971.0         | 40.0                       | 10.3          | 50.3                         | 54.0                 | -3.7        | Peak     | Horizontal   |
| 22246.0         | 55.1                       | -9.3          | 45.8                         | 54.0                 | -8.2        | Peak     | Horizontal   |
| 26030.0         | 55.2                       | -8.3          | 46.9                         | 54.0                 | -7.1        | Peak     | Horizontal   |
| 11574.0         | 40.5                       | 8.7           | 49.2                         | 54.0                 | -4.8        | Peak     | Vertical     |
| 12092.5         | 40.4                       | 8.2           | 48.6                         | 54.0                 | -5.4        | Peak     | Vertical     |
| 15008.0         | 38.9                       | 11.6          | 50.5                         | 54.0                 | -3.5        | Peak     | Vertical     |
| 22565.0         | 54.9                       | -9.1          | 45.8                         | 54.0                 | -8.2        | Peak     | Vertical     |
| 25634.0         | 55.8                       | -8.2          | 47.6                         | 54.0                 | -6.4        | Peak     | Vertical     |

Notes:

1. Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB/m)  

$$\text{Factor (dB/m)} = \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)} - \text{Pre\_Amplifier Gain (dB)}$$
2. Average measurement was not performed when the peak level lower than average limit

|               |           |                   |        |
|---------------|-----------|-------------------|--------|
| Test Engineer | Chase Zhu | Temperature       | 25.6°C |
| Test Site     | SIP-TR2   | Relative Humidity | 42.2%  |
| Test Date     | 2022/2/24 | Test Mode         | Mode 1 |

| Frequency<br>(GHz)    | Reading Level<br>@0.75m<br>(dB $\mu$ V) | Factor<br>(dB/m) | Measure Level<br>@0.75m<br>(dB $\mu$ V/m) | Measure Level<br>@3m<br>(dB $\mu$ V/m) | Power<br>Density<br>(pW/cm <sup>2</sup> ) | Limit<br>(pW/cm <sup>2</sup> ) | Result |
|-----------------------|---|------------------|---|--|---|--------------------------------|--------|
| <b>40GHz ~ 231GHz</b> |   |                  |   |  |   |                                |        |
| 42.9                  | 2.6                                     | 46.3             | 48.9                                      | 36.9                                   | 0.001                                     | 600.0                          | Pass   |
| 60.9                  | 26.5                                    | 42.7             | 69.2                                      | 57.2                                   | 0.138                                     | 600.0                          | Pass   |
| 85.8                  | 29.7                                    | 44.8             | 74.5                                      | 62.5                                   | 0.467                                     | 600.0                          | Pass   |
| 110.4                 | 4.5                                     | 57.4             | 61.9                                      | 49.9                                   | 0.026                                     | 600.0                          | Pass   |
| 141.6                 | 5.4                                     | 62.1             | 67.5                                      | 55.5                                   | 0.093                                     | 600.0                          | Pass   |
| 228.9                 | 5.0                                     | 60.4             | 65.4                                      | 53.4                                   | 0.057                                     | 1000.0                         | Pass   |

Notes:

1. Measure Level @0.75m = Reading Level @0.75m + Factor  
Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) + Mixer Conversion Loss (dB)
2. Measure Level @3m = Measure Level @0.75m + 20 \* log(0.75m / 3m)
3. Power Density =  $(10^8 / 377) * \{10^{[(\text{Measure Level @3m} - 120) / 20]}\}^2$

Note: The Vertical and Horizontal polarization were evaluated, only the worst case test results are shown in the table.

## 5.5. Frequency Stability

### 5.5.1. Test Limit

Fundamental emissions must be contained within the frequency bands 76 - 81GHz during all conditions of operation. Equipment is presumed to operate over the temperature range -20 to +50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

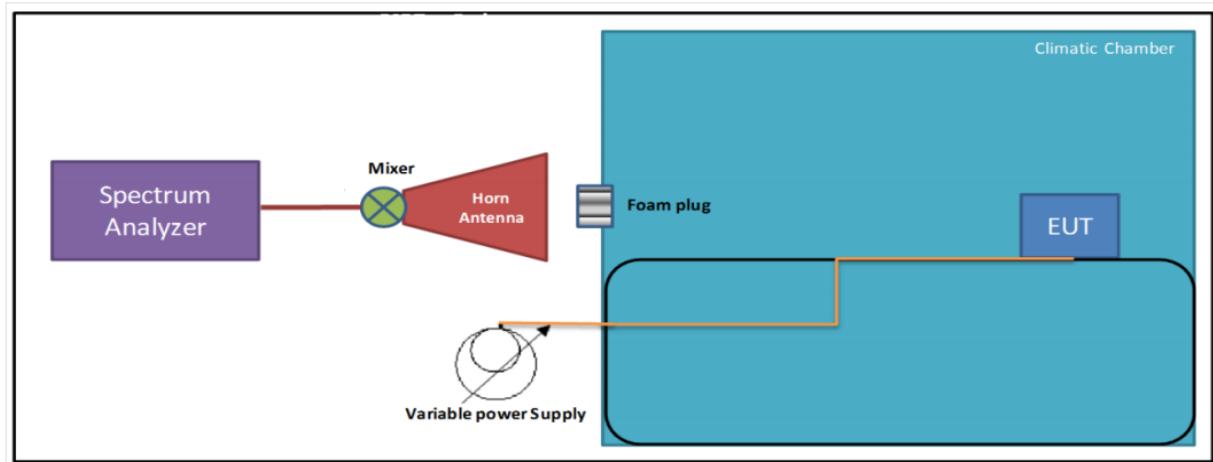
### 5.5.2. Test Procedure used

ANSI C63.10 Section 9.14

### 5.5.3. Test Procedure

1. Arrange EUT and test equipment according Section 6.5.4.
2. With the EUT at ambient temperature (20 °C) and voltage source set to the EUT nominal operating voltage (12VDC, 100%)
3. RBW = 1MHz, VBW = 3MHz
4. Detector = Peak
5. Trace Mode = Max Hold
6. Record the Low and high frequencies ( $f_L$  and  $f_H$ ) of the fundamental frequency emission. The applicable spurious emissions limit 600pW/cm<sup>2</sup> (-1.61dBm) was used to define  $f_L$  and  $f_H$ .
7. Vary EUT power supply between 85% (10.2VDC) and 115% (13.8VDC) of nominal, record the  $f_L$  and  $f_H$ .
8. Set the power supply to 100% nominal setting, and raise EUT operating temperature to 85 °C.
9. Record the  $f_L$  and  $f_H$  of the fundamental frequency emission.
10. Repeat step 9 at each 10°C increment down to -40 °C.

#### 5.5.4. Test Setup



### 5.5.5. Test Result

|               |                         |                   |        |
|---------------|-------------------------|-------------------|--------|
| Test Engineer | Nandy Zhang             | Temperature       | 19.8°C |
| Test Site     | SIP-TR1                 | Relative Humidity | 59.3%  |
| Test Date     | 2022/02/26 ~ 2022/03/07 | Test Mode         | Mode 1 |

| Voltage (%) | Power (VDC) | Temp (°C)  | f <sub>L</sub> (GHz) | f <sub>H</sub> (GHz) | Limit (GHz) | Result |
|-------------|-------------|------------|----------------------|----------------------|-------------|--------|
| 100%        | 12.0        | - 40       | 76.110               | 76.842               | 76 ~ 81     | Pass   |
|             |             | - 30       | 76.110               | 76.840               | 76 ~ 81     | Pass   |
|             |             | - 20       | 76.102               | 76.850               | 76 ~ 81     | Pass   |
|             |             | - 10       | 76.102               | 76.848               | 76 ~ 81     | Pass   |
|             |             | 0          | 76.098               | 76.850               | 76 ~ 81     | Pass   |
|             |             | + 10       | 76.100               | 76.846               | 76 ~ 81     | Pass   |
|             |             | + 20 (Ref) | 76.100               | 76.848               | 76 ~ 81     | Pass   |
|             |             | + 30       | 76.100               | 76.846               | 76 ~ 81     | Pass   |
|             |             | + 40       | 76.104               | 76.844               | 76 ~ 81     | Pass   |
|             |             | + 50       | 76.102               | 76.844               | 76 ~ 81     | Pass   |
|             |             | + 60       | 76.108               | 76.838               | 76 ~ 81     | Pass   |
|             |             | + 70       | 76.106               | 76.840               | 76 ~ 81     | Pass   |
|             |             | + 80       | 76.106               | 76.840               | 76 ~ 81     | Pass   |
|             |             | + 85       | 76.106               | 76.840               | 76 ~ 81     | Pass   |
| 115%        | 13.8        | + 20       | 76.102               | 76.848               | 76 ~ 81     | Pass   |
| 85%         | 10.2        | + 20       | 76.098               | 76.848               | 76 ~ 81     | Pass   |

## 6. Conclusion

The data collected relate only the item(s) tested and show that this device is in compliance with Part 95M of the FCC Rules.

## Appendix A - Test Setup Photograph

Refer to "2201RSU062-UT" file.

## Appendix B - EUT Photograph

Refer to "2201RSU062-EE" file.