



# TEST REPORT

Report Number: C21T00061-SRD02-V01

|              |                                    |
|--------------|------------------------------------|
| Applicant    | Shanghai Sunmi Technology Co.,Ltd. |
| Product Name | Handheld Wireless Terminal         |
| Model Name   | T8911                              |
| Brand Name   | SUNMI                              |
| FCC ID       | 2AH25T8911                         |
| IC           | 22621-T8911                        |

Industrial Internet Innovation Center (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in FCC Part15, ANSI C63.10-2013, KDB 558074, RSS-Gen Issue 5, RSS-247 Issue 2.

Prepared by 

Reviewed by 

Approved by 

Issue Date 2021-11-26

**Industrial Internet Innovation Center (Shanghai) Co., Ltd.**



## NOTE

1. This report is invalid without the signature of the writer, reviewer and authorizer.
2. This report is invalid if altered.
3. For the benefit of clients, if you have any objection to the report, please inform the testing laboratory within 15 days from the date of receiving this report.
4. Samples in the test report are provided by the client. The test results are only applicable to the samples received by the laboratory. The source information of samples (such as sample sender, manufacturer, etc.) in the test report is provided by the client, and the laboratory is not responsible for its authenticity and the measurement accuracy.
5. The test report does not represent the identification of a product by a certification body or an authorized body.
6. This report is only valid as a whole, and no part of the report can be reproduced without the written approval of Industrial Internet Innovation Center (Shanghai) Co., Ltd.
7. Without the written permission of testing institutions and accreditation bodies, this report cannot be used in part or in whole for publicity or product introduction.
8. "N/A" is used in this report to indicate that it is not applicable or available.
9. Industrial Internet Innovation Center (Shanghai) Co., Ltd. assumes the legal responsibility for the report.
10. The measurement uncertainty is not taken into account when deciding conformity, and the results of measurement (or the average of measurement results) are directly used as the criterion for the stating conformity.

### **Test Laboratory:**

Industrial Internet Innovation Center (Shanghai) Co., Ltd.

Add: Building 4, No. 766 Jingang Rd, Pudong, Shanghai, China

Tel: +86 21 68866880



### Revision Version

| Report Number       | Revision | Date       | Memo   |
|---------------------|----------|------------|--|
| C21T00061-SRD02-V00 | 00       | 2021-11-03 | Initial creation of test report  |
| C21T00061-SRD02-V01 | 00       | 2021-11-26 | 1. The normal voltage of the prototype in the report has been corrected. |



## CONTENTS

|  |    |
|--|----|
| 1. TEST LABORATORY .....   | 6  |
| 1.1. TESTING LOCATION .....                                      | 6  |
| 1.2. TESTING ENVIRONMENT .....                                   | 6  |
| 1.3. PROJECT INFORMATION .....                                   | 6  |
| 2. CLIENT INFORMATION .....                                      | 7  |
| 2.1. APPLICANT INFORMATION .....                                 | 7  |
| 2.2. MANUFACTURER INFORMATION .....                              | 7  |
| 3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) ..... | 8  |
| 3.1. ABOUT EUT .....   | 8  |
| 3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST .....   | 8  |
| 3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST .....    | 8  |
| 4. REFERENCE DOCUMENTS .....                                     | 9  |
| 4.1. REFERENCE DOCUMENTS FOR TESTING .....                       | 9  |
| 4.2. REFERENCE INFORMATION FROM CLIENT .....                     | 9  |
| 5. TEST SUMMARY .....  | 10 |
| 5.1. SUMMARY OF TEST RESULTS .....                               | 10 |
| 5.2. STATEMENTS .....  | 11 |
| 6. MEASUREMENT RESULTS .....                                     | 12 |
| 6.1. PEAK OUTPUT POWER-CONDUCTED .....                           | 13 |
| 6.2. 99% OCCUPIED BANDWIDTH .....                                | 15 |
| 6.3. PEAK POWER SPECTRAL DENSITY .....                           | 17 |
| 6.4. 6DB BANDWIDTH .....   | 19 |
| 6.5. FREQUENCY BAND EDGES-CONDUCTED .....                        | 21 |



|   |    |
|---|----|
| 6.6. CONDUCTED EMISSION .....           | 23 |
| 6.7. RADIATED EMISSION .....            | 26 |
| 7. TEST EQUIPMENT LIST .....            | 32 |
| 7.1. CONDUCTED TEST SYSTEM.....         | 32 |
| 7.2. RADIATED EMISSION TEST SYSTEM..... | 32 |
| ANNEX A: MEASUREMENT UNCERTAINTY .....  | 33 |
| ANNEX B: ACCREDITATION CERTIFICATE..... | 34 |

## 1. Test Laboratory

### 1.1. Testing Location

Primary Lab:

|                      |  |
|----------------------|--|
| Company Name         | Industrial Internet Innovation Center (Shanghai) Co., Ltd. |
| Address              | Building 4, No. 766 Jingang Rd, Pudong, Shanghai, China    |
| FCC Registration No. | 958356   |
| FCC Designation No.  | CN1177   |
| IC designation No.   | CN0067   |

Subcontracting Lab #1:

|              |     |
|--------------|-----|
| Company Name | N/A |
| Address      | N/A |

### 1.2. Testing Environment

|                    |             |
|--------------------|-------------|
| Normal Temperature | 15°C~35°C   |
| Relative Humidity  | 30%RH~60%RH |
| Supply Voltage     | 120V/60Hz   |

### 1.3. Project Information

|                    |            |
|--------------------|------------|
| Project Leader     | Wang Wenen |
| Testing Start Date | 2021-07-01 |
| Testing End Date   | 2021-08-18 |



## 2. Client Information

### 2.1. Applicant Information

|              |   |
|--------------|---|
| Company Name | Shanghai Sunmi Technology Co.,Ltd.  |
| Address      | Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China |
| Telephone    | +86 18721763396   |

### 2.2. Manufacturer Information

|              |   |
|--------------|---|
| Company Name | Shanghai Sunmi Technology Co.,Ltd.  |
| Address      | Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China |
| Telephone    | +86 18721763396   |

### 3. Equipment under Test (EUT) and Ancillary Equipment (AE)

#### 3.1. About EUT

|                                      |   |
|--------------------------------------|---|
| Product Name                         | Handheld Wireless Terminal  |
| Model name                           | T8911   |
| Supported Radio Technology and Bands | GSM850/GSM900/GSM1800/GSM1900<br>WCDMA Band I /Band II/Band IV/Band V /Band VIII<br>CDMA Band BC0/BC1/BC10<br>LTE 1/2/3/4/5/7/12/13/14/17/18/19/25/26/28/38/41/66/71<br>LTE CA Up Link 2CA: 7C,41C<br>BT5.0<br>WLAN 802.11b,g,n<br>WLAN 802.11a,n,ac<br>NFC<br>GPS<br>GLONASS<br>Galileo<br>BDS |
| Hardware Version                     | V1.02   |
| Software Version                     | V01_T46   |
| FCC ID                               | 2AH25T8911  |
| IC                                   | 22621-T8911   |

Note: Photographs of EUT are shown in ANNEX B of this test report.

#### 3.2. Internal Identification of EUT used during the test

| EUT ID* | SN or IMEI                         | HW Version | SW Version | Date of Receipt |
|---------|------------------------------------|------------|------------|-----------------|
| N01     | 864679050005368<br>864679050014659 | V1.02      | V01_T46    | 2021-06-04      |
| N05     | 864679050005574<br>864679050014865 | V1.02      | V01_T46    | 2021-06-18      |

\*EUT ID: is internally used to identify the test sample in the lab.

#### 3.3. Internal Identification of AE used during the test

| AE ID* | Description | Model | SN/Remark |
|--------|-------------|-------|-----------|
| AE1    | RF Cable    | N/A   | N/A       |

\*AE ID: is internally used to identify the test sample in the lab.

\*The AE is provided by the client.



## 4. Reference Documents

### 4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

| Reference       | Title  | Version    |
|-----------------|--|------------|
| FCC Part15      | FCC CFR 47, Part 15, Subpart C:<br>15.205 Restricted bands of operation;<br>15.209 Radiated emission limits, general requirements;<br>15.247 Operation within the bands 902-928MHz,<br>2400-2483.5MHz, and 5725-5850MHz. | 2018-10-01 |
| ANSI C63.10     | American National Standard of Procedures for<br>Compliance Testing of Unlicensed Wireless Devices  | 2013       |
| KDB 558074      | Guidance for Performing Compliance Measurements on<br>Frequency Hopping Spread Spectrum systems (DSS)<br>Operating Under §15.247   | v05r02     |
| RSS-247 Issue 2 | Digital Transmission Systems (DTSs), Frequency Hopping<br>Systems (FHSs) and Licence-Exempt Local Area Network<br>(LE-LAN) Devices   | 2017       |
| RSS-Gen Issue 5 | General Requirements for Compliance of Radio Apparatus   | 2019       |

### 4.2. Reference Information from client

Information of the test sample provided by the client.

Antenna gain of EUT 2.71 dBi

Note: The product T8911 use an integral antenna which compliance with the requirement of 15.203.

## 5. Test Summary

### 5.1. Summary of Test Results

| Measurement Items                       | Sub-clause of Part15C | Sub-clause of IC | Verdict |
|---|-----------------------|------------------|---------|
| Maximum Peak Output Power               | 15.247(b)             | RSS-247 5.4      | Pass    |
| Peak Power Spectral Density             | 15.247(e)             | RSS-247 5.2      | Pass    |
| 6dB Occupied Bandwidth                  | 15.247(a)             | RSS-247 5.2      | Pass    |
| 99% Occupied Bandwidth                  | N/A                   | RSS-Gen 6.7      | Pass    |
| Band Edges Compliance                   | 15.247(d)             | RSS-247 5.5      | Pass    |
| Transmitter Spurious Emission-Conducted | 15.247(d)             | RSS-247 5.5      | Pass    |
| Transmitter Spurious Emission-Radiated  | 15.247/15.205/15.209  | RSS-Gen 8.9,8.10 | Pass    |

#### Test Conditions

|      |                    |
|------|--------------------|
| Tnom | Normal Temperature |
| Tmin | Low Temperature    |
| Tmax | High Temperature   |
| Vnom | Normal Voltage     |
| Vmin | Low Voltage        |
| Vmax | High Voltage       |
| Hnom | Norm Humidity      |
| Anom | Norm Air Pressure  |

For this report, all the test case listed above are tested under Normal Temperature and Normal Voltage, and also under norm humidity, the specific conditions as following:

|              |      |         |
|--------------|------|---------|
| Temperature  | Tnom | 25°C    |
| Voltage      | Vnom | 3.8V    |
| Humidity     | Hnom | 48%     |
| Air Pressure | Anom | 1010hPa |

#### Note:

a. All the test data for each data were verified, but only the worst case was reported.



## 5.2. Statements

The T8911 manufactured by Shanghai Sunmi Technology Co.,Ltd., Incorporated are new products for testing.

Industrial Internet Innovation Center (Shanghai) Co., Ltd. only performed test cases which identified with Pass/Fail/Inc result in section 5.1.

Industrial Internet Innovation Center (Shanghai) Co., Ltd. has verified that the compliance of the tested device specified in section 3 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 4 of this test report.

## 6. Measurement Results

**Shielding Room1** (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

|                          |                            |
|--------------------------|----------------------------|
| Temperature              | Min. = 15 °C, Max. = 35 °C |
| Relative humidity        | Min. = 20 %, Max. = 75 %   |
| Shielding effectiveness  | > 100 dB                   |
| Ground system resistance | < 0.5 Ω                    |
| Temperature              | Min. = 15 °C, Max. = 35 °C |

**Control room** did not exceed following limits along the EMC testing:

|                          |                            |
|--------------------------|----------------------------|
| Temperature              | Min. = 15 °C, Max. = 35 °C |
| Relative humidity        | Min. = 30 %, Max. = 60 %   |
| Shielding effectiveness  | > 100 dB                   |
| Electrical insulation    | > 10 kΩ                    |
| Ground system resistance | < 0.5 Ω                    |

**Fully-anechoic chamber1** (6.9 meters×10.9 meters×5.4 meters) did not exceed following limits along the EMC testing:

|                              |  |
|------------------------------|--|
| Temperature                  | Min. = 15 °C, Max. = 35 °C                 |
| Relative humidity            | Min. = 25 %, Max. = 75 %                   |
| Shielding effectiveness      | > 100 dB                                   |
| Electrical insulation        | > 10 kΩ                                    |
| Ground system resistance     | < 0.5 Ω                                    |
| VSWR                         | Between 0 and 6 dB, from 1GHz to 18GHz     |
| Site Attenuation Deviation   | Between -4 and 4 dB, 30MHz to 1GHz         |
| Uniformity of field strength | Between 0 and 6 dB, from 80MHz to 3000 MHz |

## 6.1. Peak Output Power-Conducted

### 6.1.1. Measurement Limit

| Standard                 | Limit (dBm) |
|--------------------------|-------------|
| FCC 47 Part 15.247(b)(3) | <30         |
| RSS-247 5.4(d)           | <30         |

### 6.1.2. Test Condition

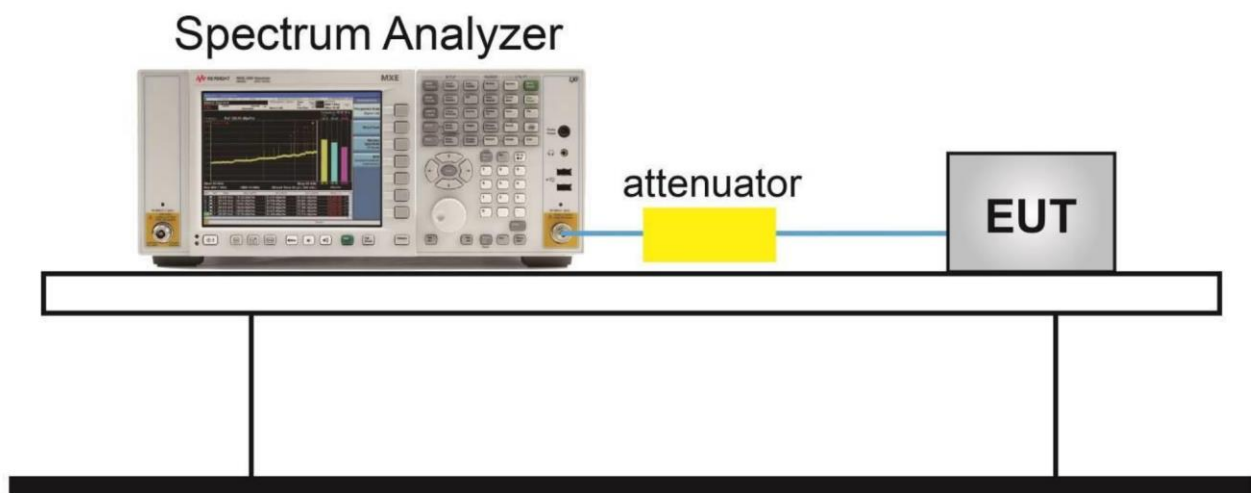
| DTS procedure | RBW  | VBW   | Span | Sweeptime |
|---------------|------|-------|------|-----------|
| BT-LE         | 3MHz | 10MHz | 9MHz | Auto      |

### 6.1.3. Test procedure

The measurement is according to ANSI C63.10 clause 11.9.1

- a) Set the RBW  $\geq$  DTS bandwidth.
- b) Set VBW  $\geq$  [3  $\times$  RBW].
- c) Set span  $\geq$  [3  $\times$  RBW].
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

### 6.1.4. Test Setup





### Measurement Results

Note: Bold font is the maximum Value

|   |             |   |             |
|---|-------------|---|-------------|
| <b>Peak Conducted Output Power<br/>CH0 (dBm)</b>  | <b>5.31</b> | <b>Peak Conducted Output Power<br/>CH19 (dBm)</b> | <b>3.50</b> |
|   |             |   |             |
| <b>Peak Conducted Output Power<br/>CH39 (dBm)</b> | <b>6.47</b> | /   |             |
|   |             | /   |             |

## 6.2. 99% Occupied Bandwidth

### 6.2.1. Measurement Limit

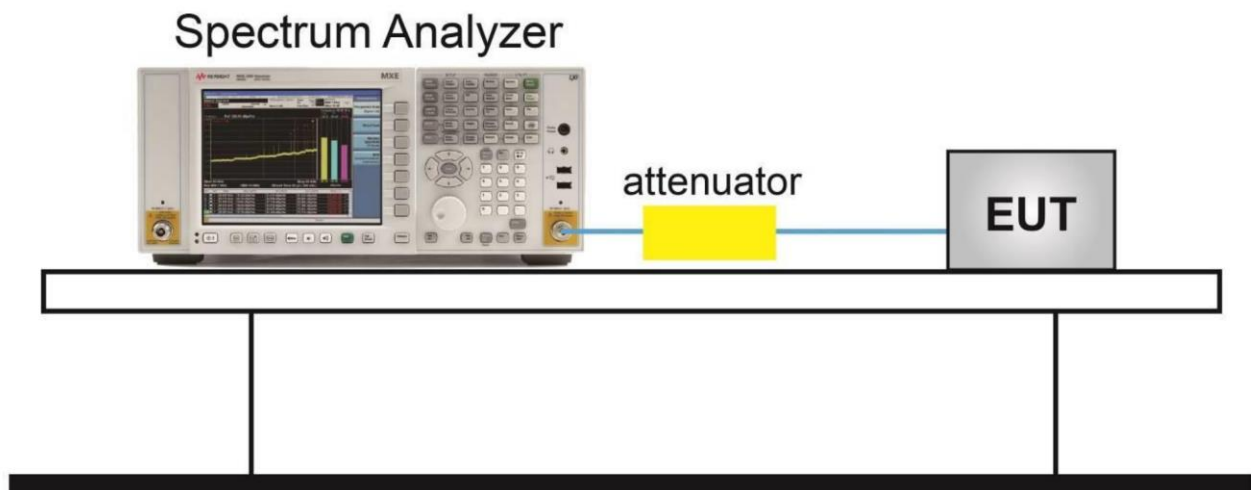
| Standard    | Limit |
|-------------|-------|
| RSS-Gen 6.7 | N/A   |

### 6.2.2. Test procedures

The measurement is according to ANSI C63.10 clause 6.9.3.

1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Set RBW shall be in the range of 1% to 5% of the OBW.
4. Set the VBW  $\geq [3 \times \text{RBW}]$ .
5. Detector = peak.
6. Trace mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize.
9. The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

### 6.2.3. Test Setup

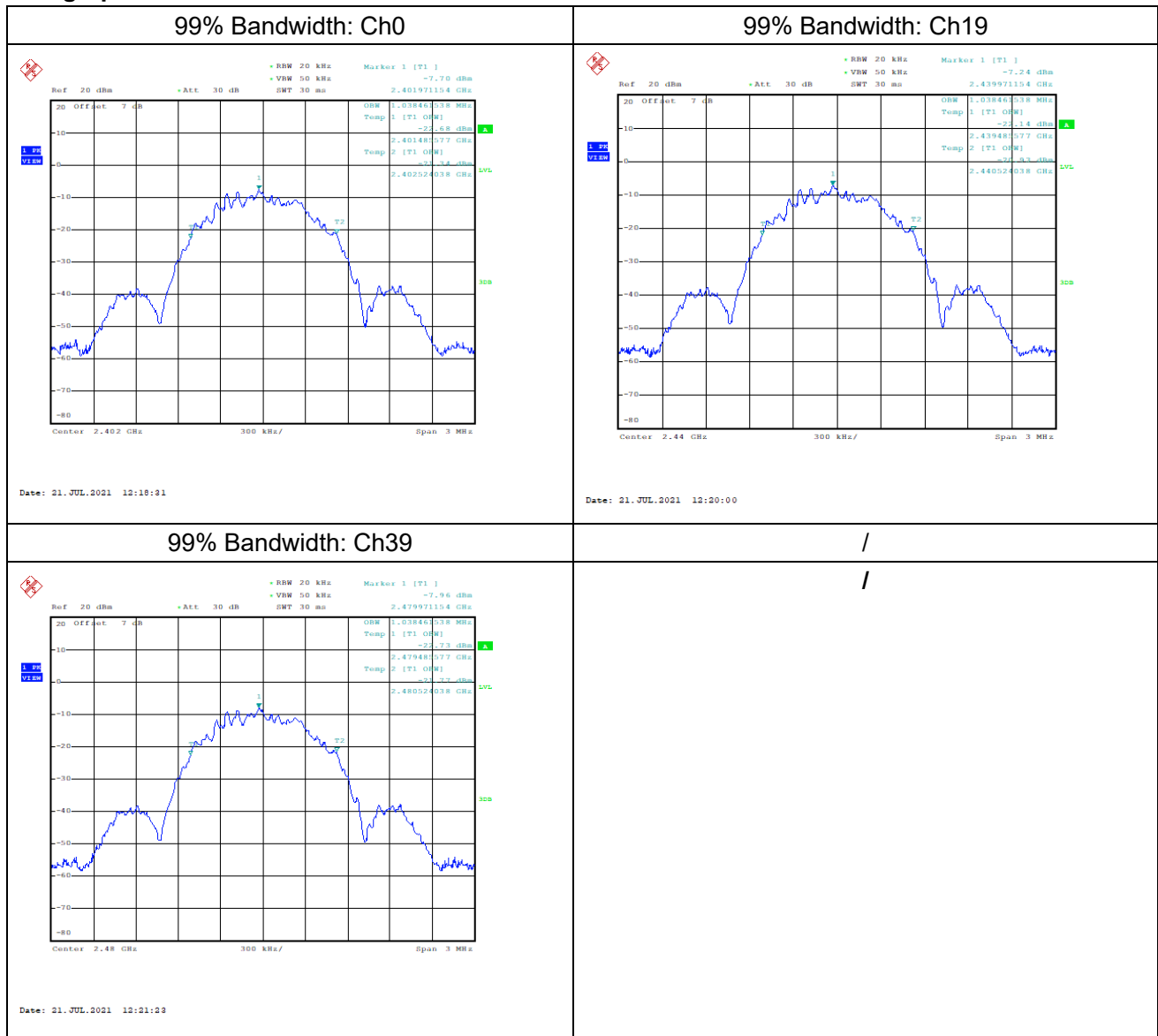




Measurement Result

| Modulation type | Channel | 99% Bandwidth (MHz) |
|-----------------|---------|---------------------|
| GFSK DH5        | Ch 0    | 1.038               |
|                 | Ch 19   | 1.038               |
|                 | Ch 39   | 1.038               |

Test graphs as below





### 6.3. Peak Power Spectral Density

#### 6.3.1. Measurement Limit

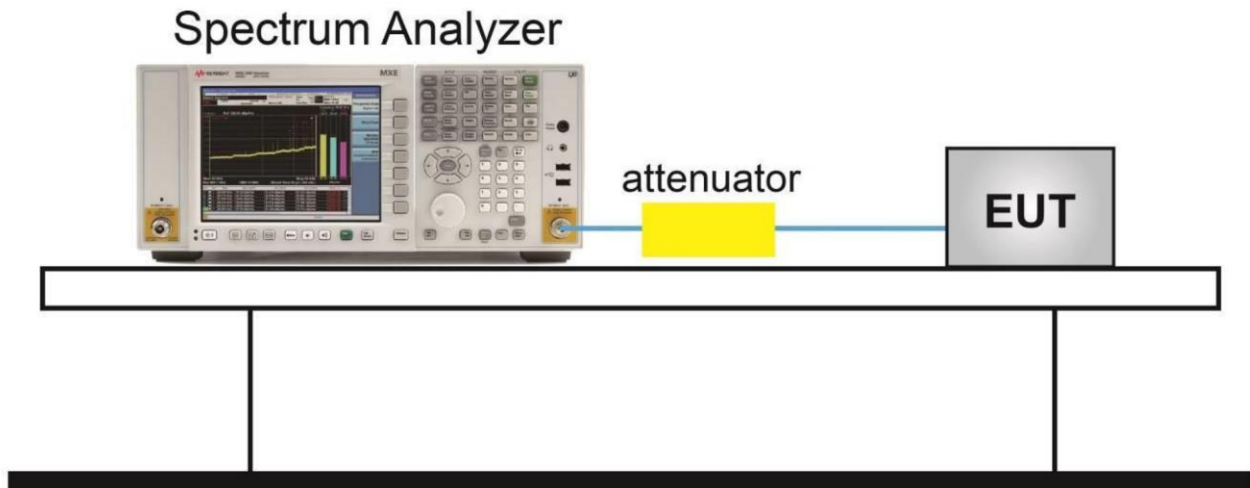
| Standard              | Limit                           |
|-----------------------|---------------------------------|
| FCC 47 Part 15.247(e) | $\leq 8\text{dBm}/3\text{ kHz}$ |
| RSS-247 5.2(b)        | $\leq 8\text{dBm}/3\text{ kHz}$ |

#### 6.3.2. Test procedures

The measurement is according to ANSI C63.10 clause 11.10.

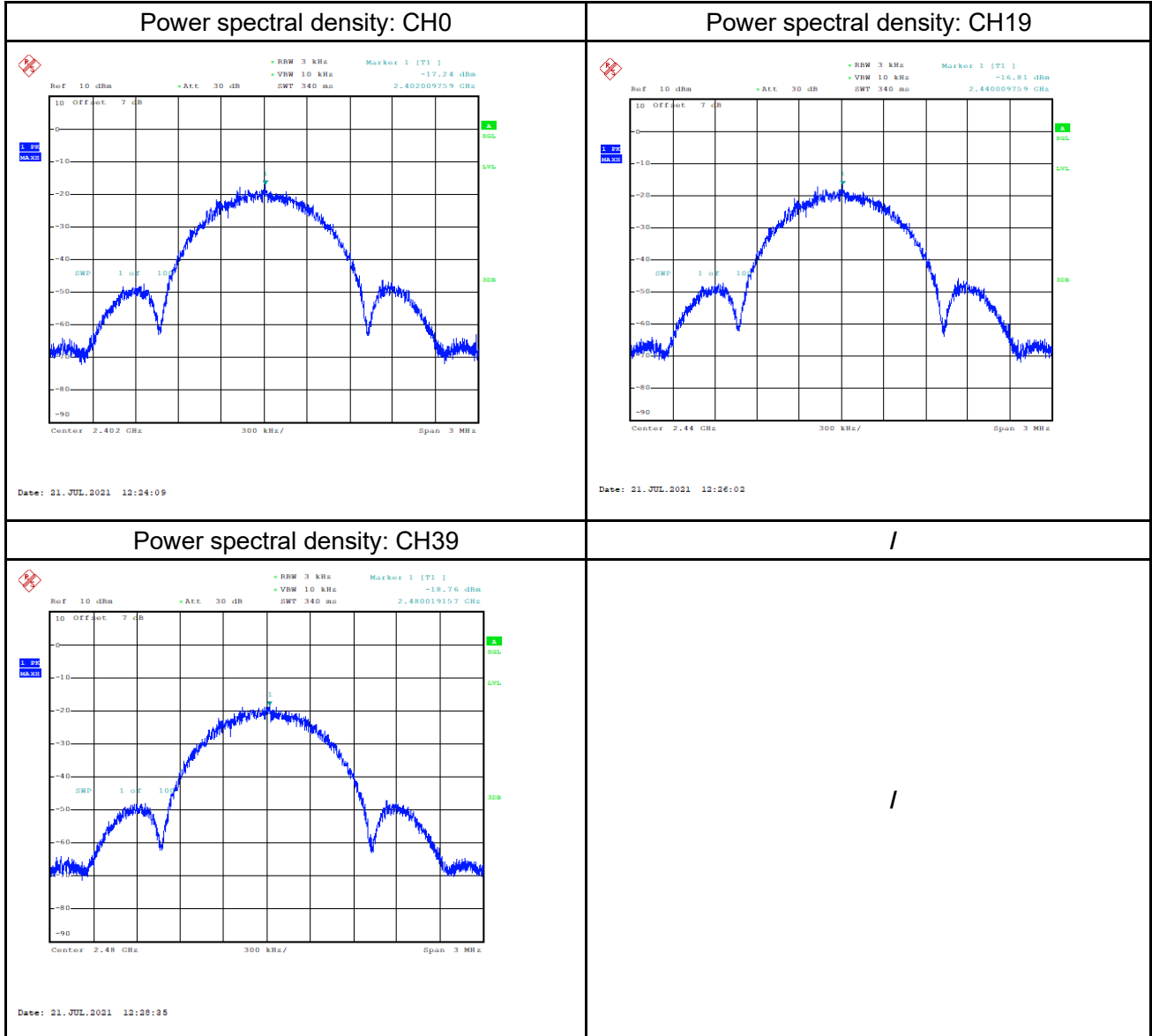
1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Set analyzer center frequency to DTS channel center frequency.
4. Set the span to 1.5 times the DTS bandwidth.
5. Set the RBW to  $3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$ .
6. Set the VBW  $\geq [3 \times \text{RBW}]$ .
7. Detector = peak.
8. Sweep time = auto couple.
9. Trace mode = max hold.
10. Allow trace to fully stabilize.
11. Use the peak marker function to determine the maximum amplitude level within the RBW.
12. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

#### 6.3.2. Test Setup



### Measurement Results

| Modulation type | Channel | PSD (dBm/3kHz) |
|-----------------|---------|----------------|
| GFSK DH5        | Ch 0    | -17.238        |
|                 | Ch 19   | -16.81         |
|                 | Ch 39   | -18.761        |



## 6.4. 6dB Bandwidth

### 6.4.1. Measurement Limit

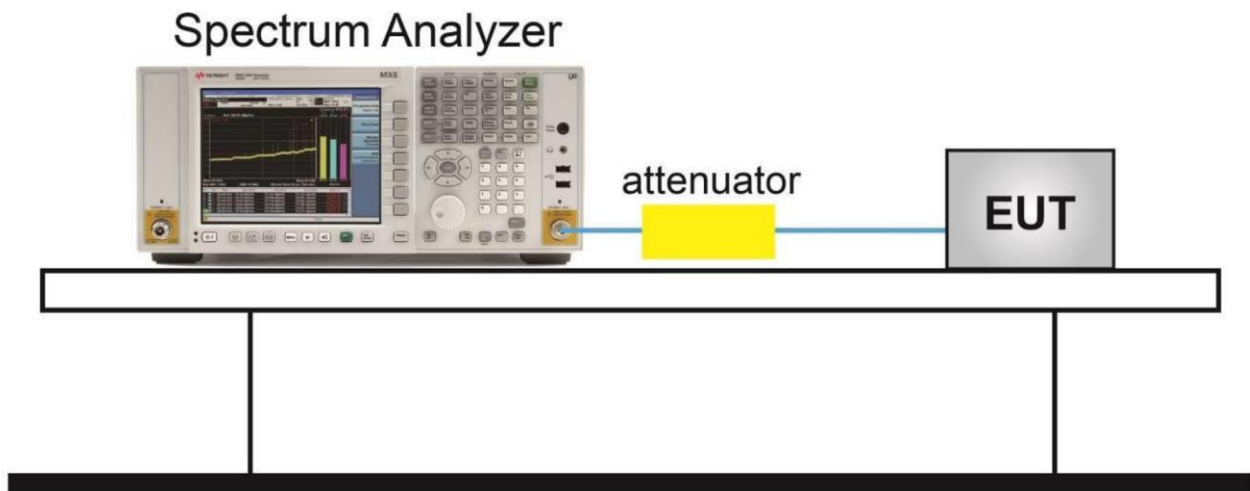
| Standard                   | Limit                |
|----------------------------|----------------------|
| FCC 47 Part 15.247 (a) (2) | $\geq 500\text{kHz}$ |
| RSS-247 5.2(a)             | $\geq 500\text{kHz}$ |

### 6.4.2. Test procedures

The measurement is according to ANSI C63.10 clause 11.8.

1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Set RBW = 100 kHz.
4. Set the VBW  $\geq [3 \times \text{RBW}]$ .
5. Detector = peak.
6. Trace mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize.
9. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

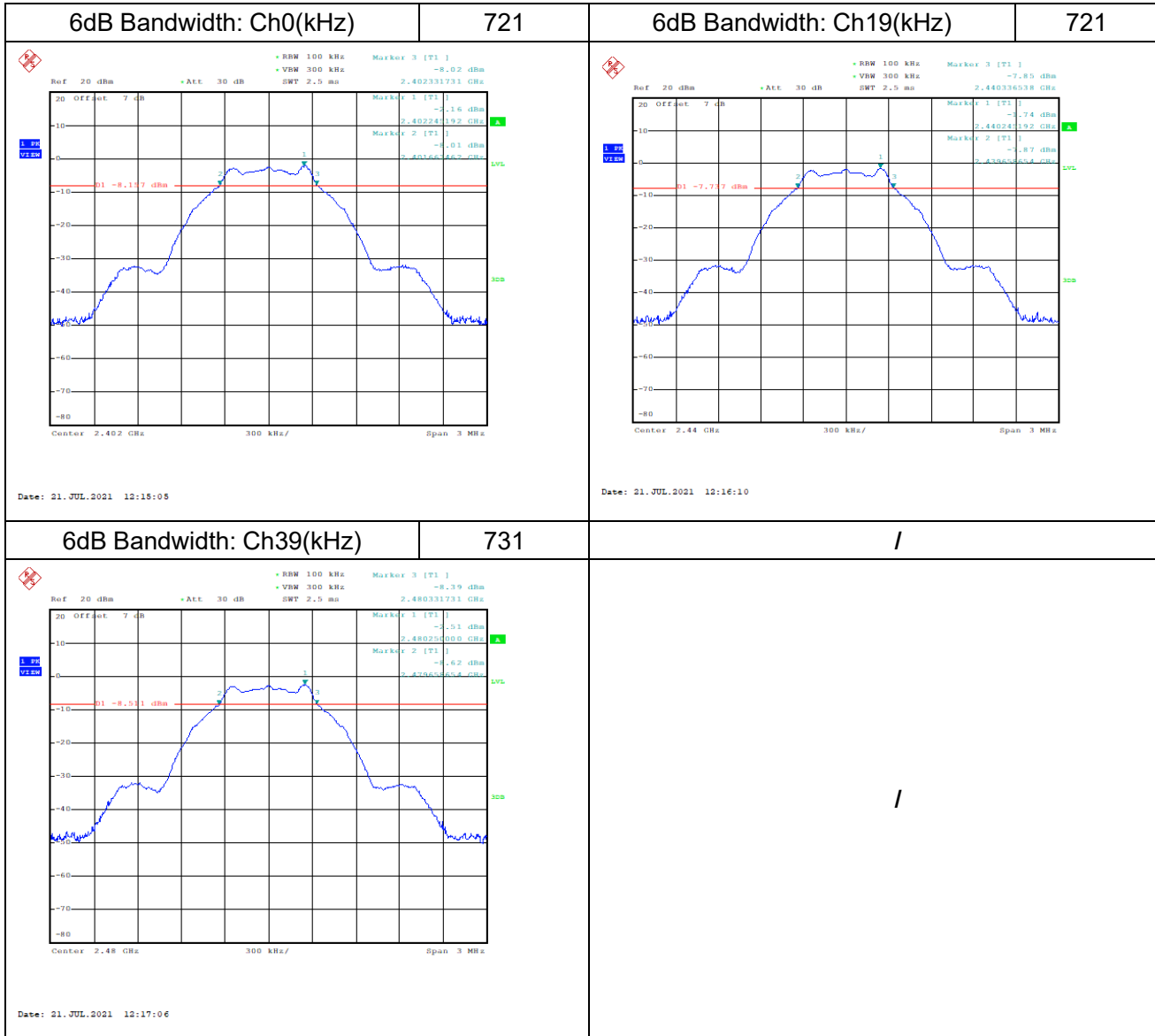
### 6.4.3. Test Setup





Measurement Result

| Modulation type | Channel | 6dB Bandwidth (kHz) |
|-----------------|---------|---------------------|
| GFSK DH5        | Ch 0    | 668                 |
|                 | Ch 19   | 678                 |
|                 | Ch 39   | 673                 |



## 6.5. Frequency Band Edges-Conducted

### 6.5.1. Measurement Limit

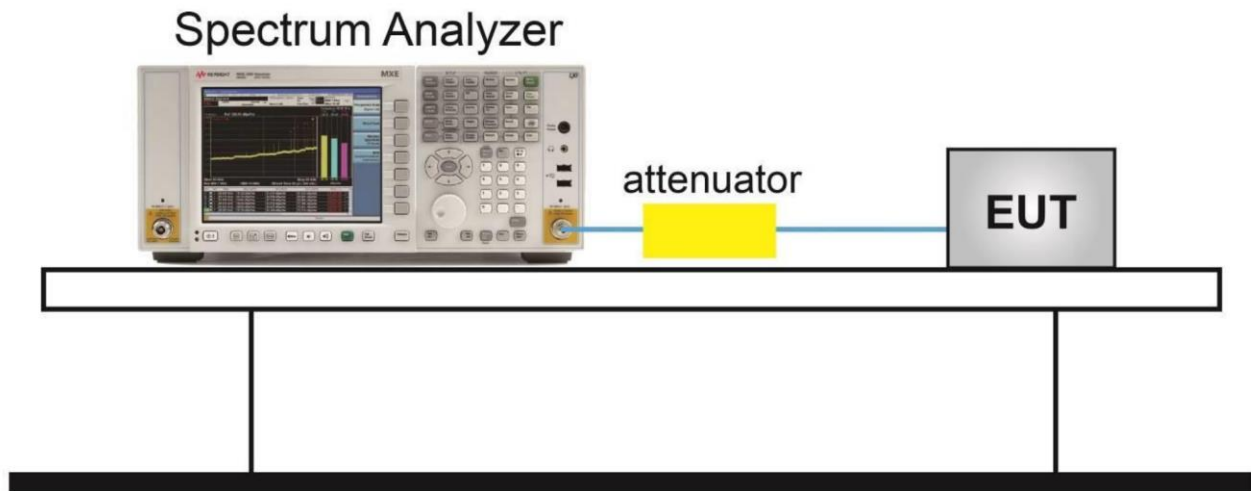
| Standard              | Limited(dBc) |
|-----------------------|--------------|
| FCC 47 Part 15.247(d) | >20          |
| RSS-247 5.5           | >20          |

### 6.5.2. Test procedure

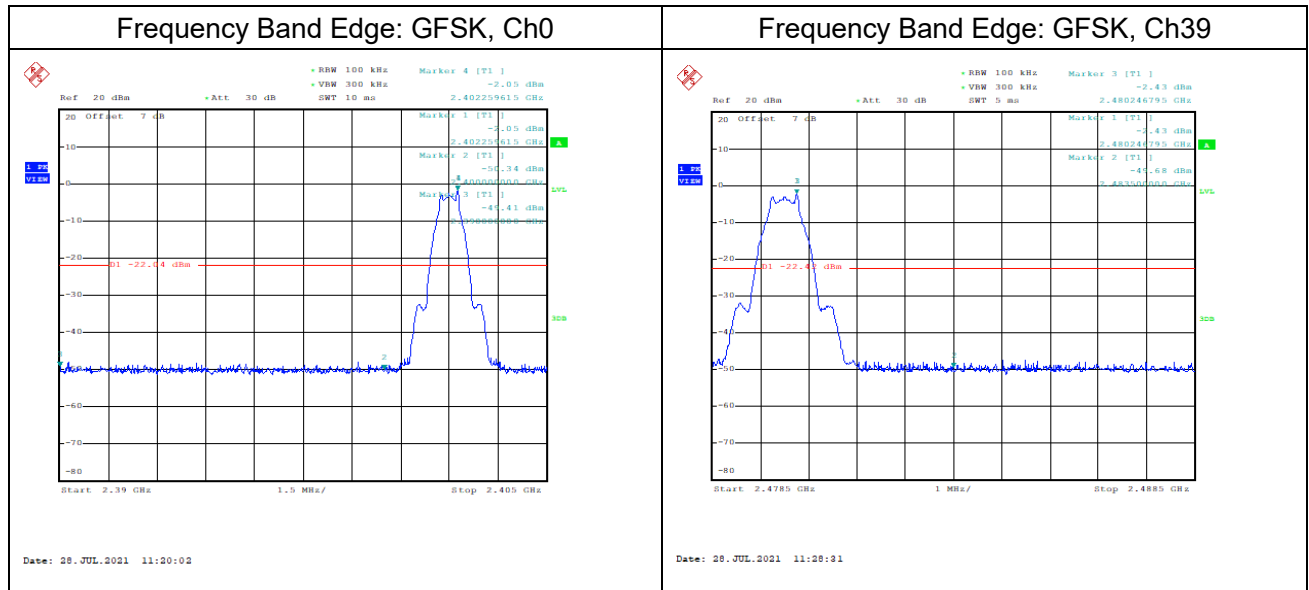
The measurement is according to ANSI C63.10 clause 11.13.2

- 1) Span: Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products that fall outside of the authorized band of operation.
- 2) Reference level: As required to keep the signal from exceeding the maximum instrument input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than  $[10 \log (OBW/RBW)]$  below the reference level. Specific guidance is given in 4.1.5.2.
- 3) Attenuation: Auto (at least 10 dB preferred).
- 4) Sweep time: Coupled.
- 5) Resolution bandwidth: 100 kHz.6) Video bandwidth: 300 kHz.7) Detector: Peak.8) Trace: Max hold.

### 6.5.3. Test Setup



### Measurement results



## 6.6. Conducted Emission

### 6.6.1. Measurement Limit

| Standard              | Limit  |
|-----------------------|--|
| FCC 47 Part15.247 (d) | 20dB below peak output power in 100KHz bandwidth |
| RSS-247 5.5           | 20dB below peak output power in 100KHz bandwidth |

### 6.6.2. Test procedures

This measurement is according to ANSI C63.10 clause 11.11.

1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.

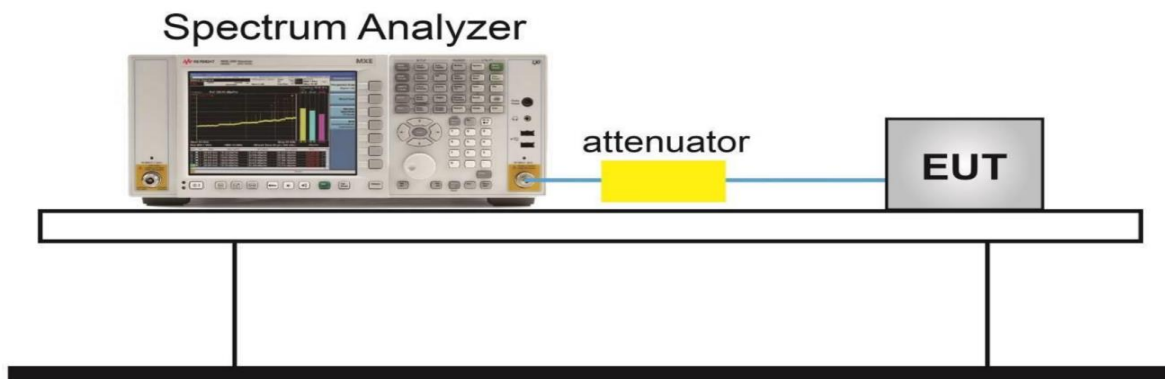
Reference level measurement

3. Set instrument center frequency to DTS channel center frequency.
4. Set the span to  $\geq 1.5$  times the DTS bandwidth.
5. Set the RBW = 100 kHz.
6. Set the VBW  $\geq [3 \times \text{RBW}]$ .
7. Detector = peak.
8. Sweep time = auto couple.
9. Trace mode = max hold.
10. Allow trace to fully stabilize.
11. Use the peak marker function to determine the maximum PSD level.

Emission level measurement

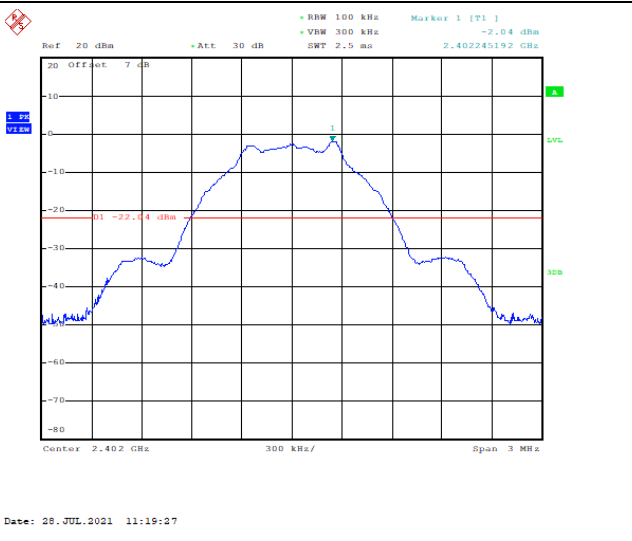
12. Set the center frequency and span to encompass frequency range to be measured.
13. Set the RBW = 100 kHz.
14. Set the VBW  $\geq [3 \times \text{RBW}]$ .
15. Detector = peak.
16. Sweep time = auto couple.
17. Trace mode = max hold.
18. Allow trace to fully stabilize.
19. Use the peak marker function to determine the maximum amplitude level.

### 6.6.3. Test Setup

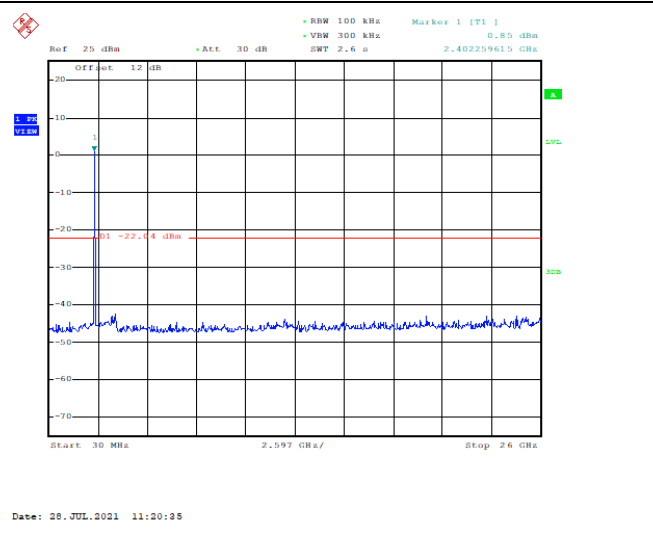


### Measurement Results

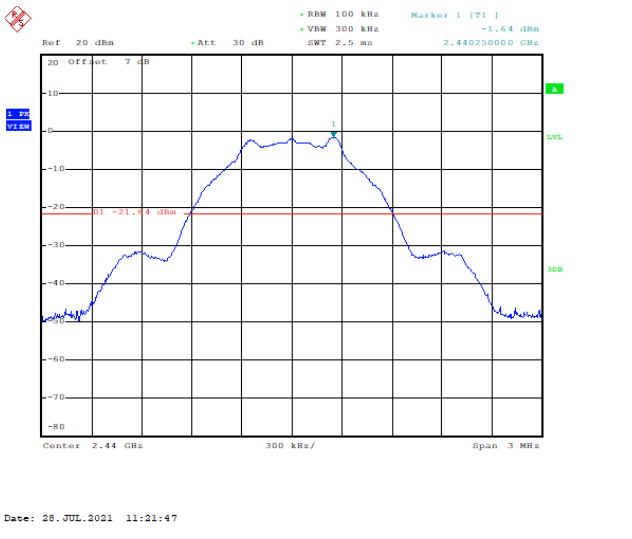
Conducted spurious emission: Ch0, 2402MHz



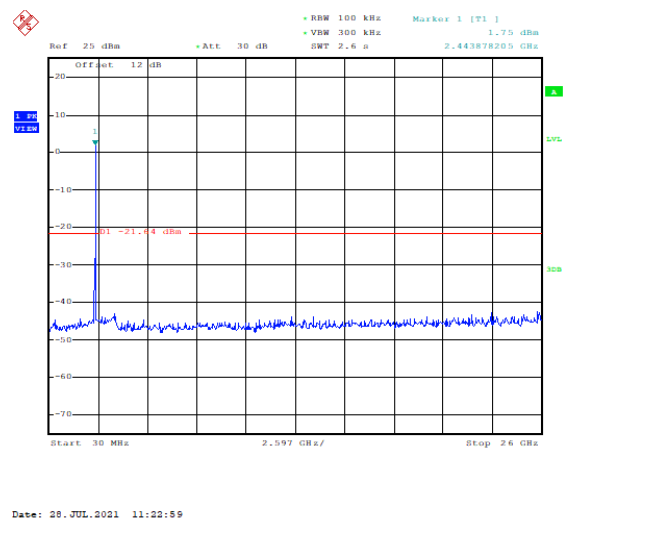
Conducted spurious emission: Ch0, 30MHz~26GHz



Conducted spurious emission: Ch19, 2441MHz



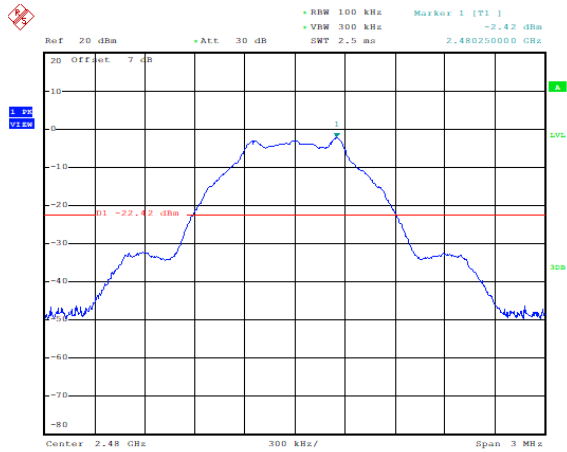
Conducted spurious emission: Ch19, 30MHz~26GHz



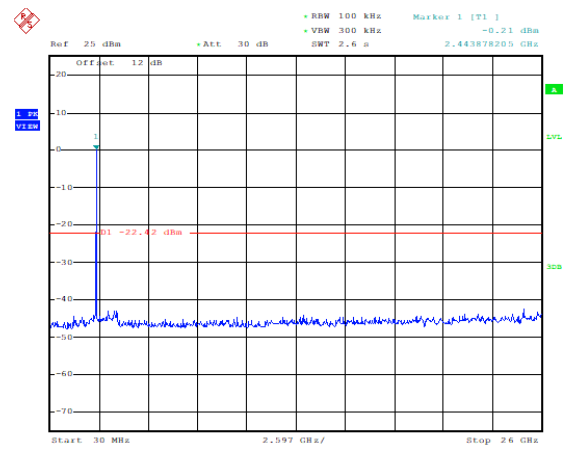


Conducted spurious emission: Ch39, 2480MHz

Conducted spurious emission: Ch39,  
30MHz~26GHz



Date: 28.JUL.2021 11:27:56



Date: 28.JUL.2021 11:29:04

## 6.7. Radiated Emission

### 6.7.1. Measurement Limit

| Standard                                     | Limit                        |
|--|------------------------------|
| FCC 47<br>Part 15.247(d),15.205(a),15.209(a) | 20dB below peak output power |
| RSS-Gen 8.9,8.10                             | 20dB below peak output power |

In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see 15.205(c)).

#### Limit in restricted band

| Frequency of emission | Field strength (uV/m) | Field strength (dBuV/m) |
|-----------------------|-----------------------|-------------------------|
| 30~88                 | 100                   | 40                      |
| 88~216                | 150                   | 43.5                    |
| 216~960               | 200                   | 46                      |
| Above 960             | 500                   | 54                      |

### 6.7.2. Test Method

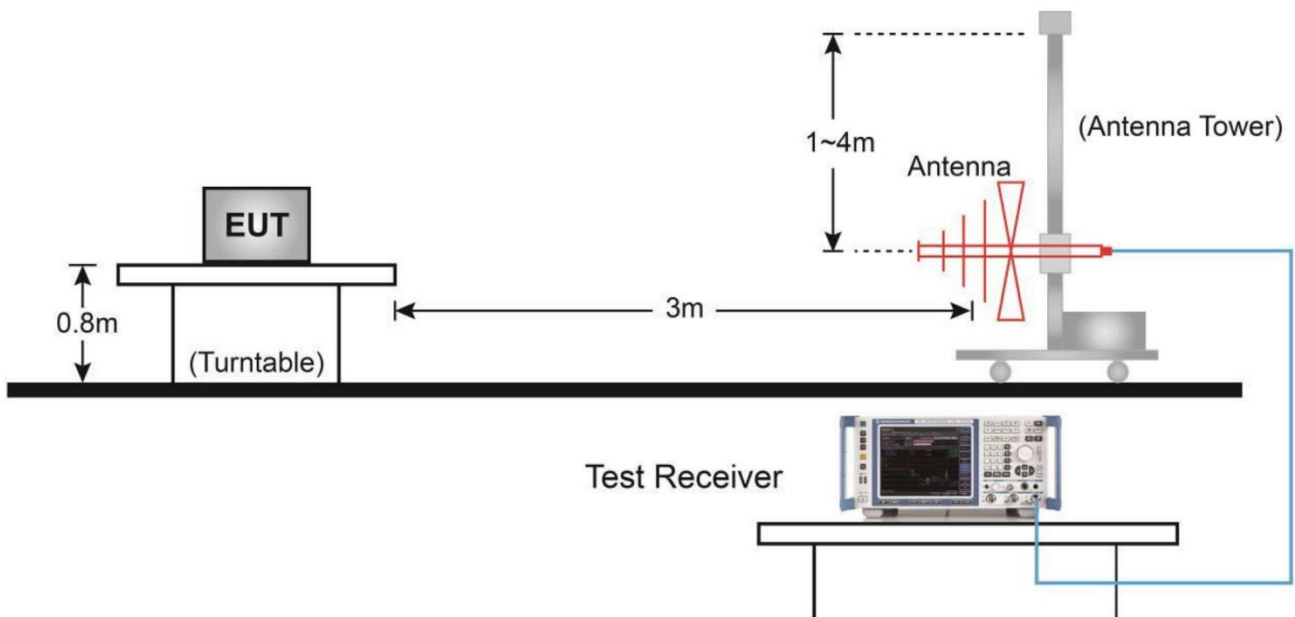
Portable, small, lightweight, or modular devices that may be handheld, worn on the body, or placed on a table during operation shall be positioned on a non-conducting platform, the top of which is 80 cm above the reference ground plane. The preferred area occupied by the EUT arrangement is 1 m by 1.5 m, but it may be larger or smaller to accommodate various sized EUTs. For testing purposes, ceiling- and wall-mounted devices also shall be positioned on a tabletop (see also ANSI C63.10-2013 section 6.3.4 and 6.3.5). In making any tests involving handheld, body-worn, or ceiling-mounted equipment, it is essential to recognize that the measured levels may be dependent on the orientation (attitude) of the three orthogonal axes of the EUT. Thus, exploratory tests as specified in 8.3.1 shall be carried out for various axes orientations to determine the attitude having maximum or near-maximum emission level.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

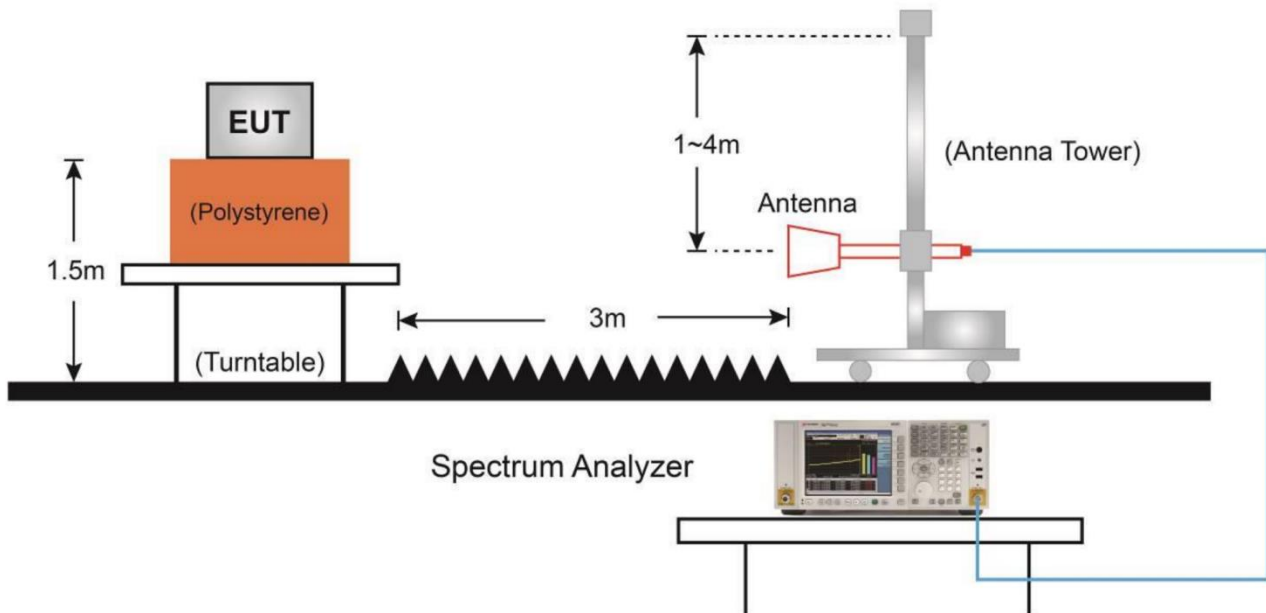
| Frequency of emission (MHz) | RBW/VBW       | Sweep Time (s) |
|-----------------------------|---------------|----------------|
| 30~1000                     | 100KHz/300KHz | 5              |
| 1000~4000                   | 1MHz/3MHz     | 15             |
| 4000~18000                  | 1MHz/3MHz     | 40             |
| 18000~26500                 | 1MHz/3MHz     | 20             |

### 6.7.3. Test Setup

#### Below 1GHz Test Setup



#### Above 1GHz Test Setup



### Measurement Results:

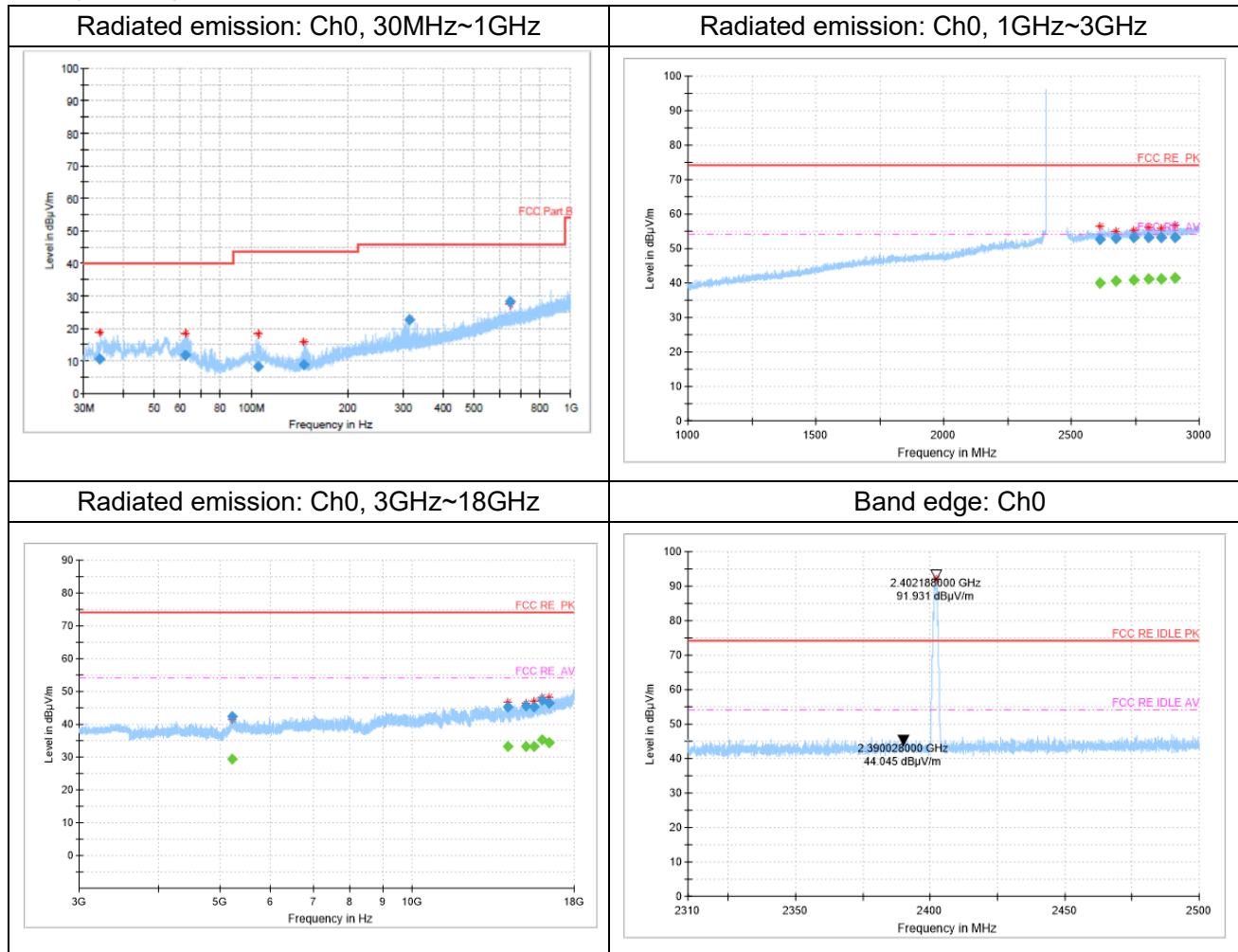
A “reference path loss” is established and  $A_{Rpi}$  is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

The measurement results are obtained as described below:

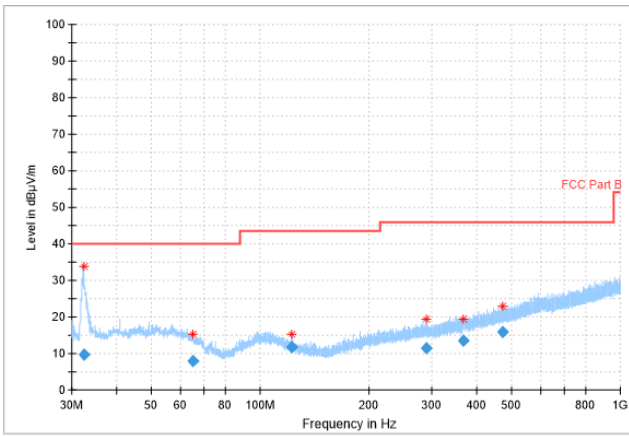
$$A_{Rpi} = \text{Cable loss} + \text{Antenna Gain} - \text{Preamplifier gain}$$

$$\text{Result} = P_{\text{Mea}} + A_{Rpi}$$

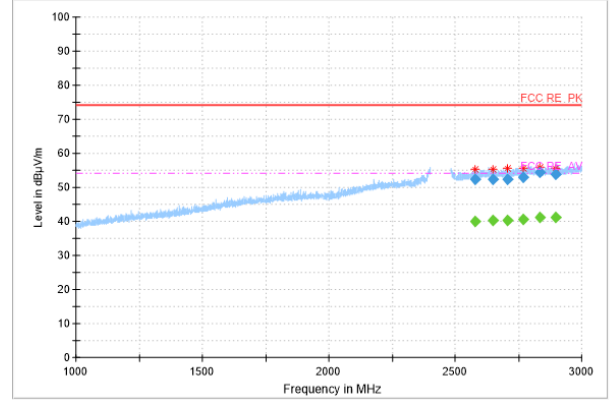
### Mainly Supply



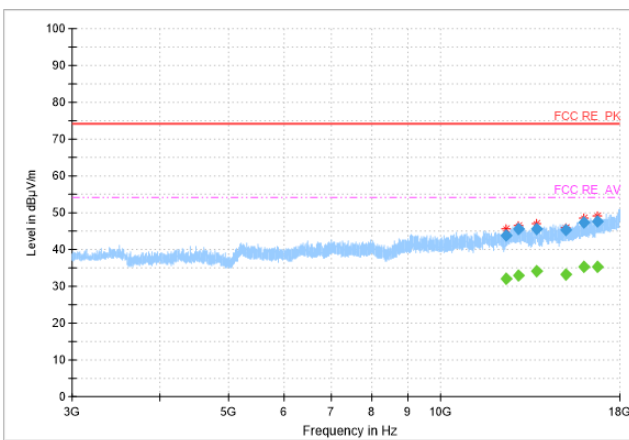
Radiated emission: Ch39, 30MHz~1GHz



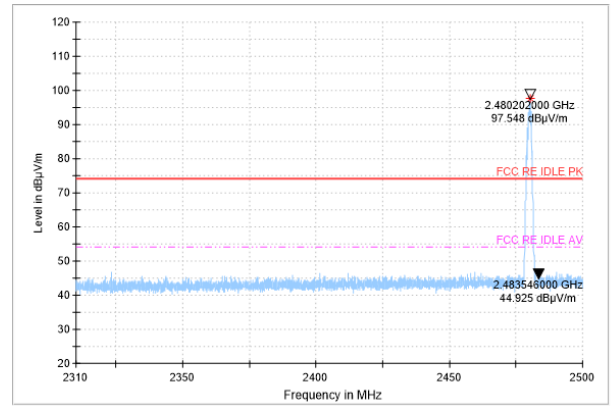
Radiated emission: Ch39, 1GHz~3GHz



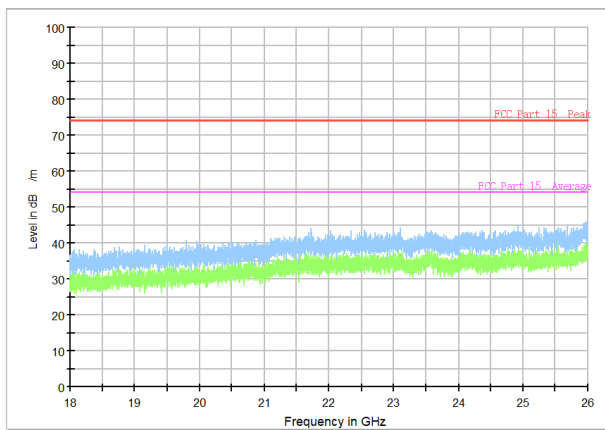
Radiated emission: Ch39, 3GHz~18GHz



Bandedge:Ch39



ALL Channel 18GHz~26GHz



/

/



Mainly Supply

Ch0 30MHz-1GHz

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 32.0           | 9.99           | -14.3     | 24.29        | H        |
| 60.7           | 9.64           | -12.5     | 22.14        | H        |
| 122.7          | 13.08          | -15.3     | 28.38        | H        |
| 340.8          | 12.94          | -9.5      | 22.44        | H        |
| 437.1          | 15.94          | -7.7      | 23.64        | V        |
| 552.4          | 17.74          | -4.7      | 22.44        | V        |

Ch0 1GHz-3GHz

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 2613.0         | 52.63          | 15.6      | 37.03        | H        |
| 2673.2         | 53.02          | 15.9      | 37.12        | V        |
| 2745.5         | 53.12          | 16.2      | 36.92        | H        |
| 2803.1         | 53.25          | 16.6      | 36.65        | V        |
| 2851.6         | 53.27          | 16.6      | 36.67        | H        |
| 2903.7         | 53.18          | 16.7      | 36.48        | V        |

Ch0 3GHz-18GHz

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 5226.8         | 42.25          | -1.3      | 43.55        | V        |
| 14159.1        | 45.15          | 4.9       | 40.25        | V        |
| 15137.2        | 45.72          | 5.8       | 39.92        | H        |
| 15550.2        | 45.22          | 6.5       | 38.72        | H        |
| 16001.6        | 47.33          | 7.7       | 39.63        | H        |
| 16404.1        | 46.52          | 8.1       | 38.42        | H        |

Ch39 30MHz-1GHz

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 32.4           | 9.69           | -14.2     | 23.89        | H        |
| 65.1           | 8.06           | -14.1     | 22.16        | V        |
| 122.7          | 11.67          | -15.3     | 26.97        | V        |
| 289.6          | 11.49          | -11       | 22.49        | H        |
| 367.6          | 13.62          | -8.9      | 22.52        | H        |
| 469.6          | 15.97          | -6.6      | 22.57        | V        |

**Ch39 1GHz-3GHz**

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 2580.4         | 52.47          | 15.4      | 37.07        | H        |
| 2647.6         | 52.49          | 15.9      | 36.59        | H        |
| 2708.0         | 52.5           | 15.9      | 36.6         | H        |
| 2767.4         | 53.07          | 16.4      | 36.67        | V        |
| 2836.5         | 54.35          | 16.6      | 37.75        | H        |
| 2895.1         | 53.81          | 16.7      | 37.11        | V        |

**Ch39 1GHz-3GHz (Average)**

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 2836.5         | 41.07          | 16.6      | 24.47        | H        |

**Ch39 3GHz-18GHz**

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 12388.4        | 43.94          | 2.1       | 41.84        | H        |
| 12920.7        | 45.45          | 3.3       | 42.15        | H        |
| 13724.2        | 45.51          | 4.1       | 41.41        | V        |
| 15061.5        | 45.44          | 5.7       | 39.74        | H        |
| 16022.8        | 47.47          | 7.7       | 39.77        | H        |
| 16738.6        | 47.63          | 8.7       | 38.93        | H        |

## 7. Test Equipment List

### 7.1. Conducted Test System

| Item | Equipment Name         | Type                      | Serial Number    | Manufacturer | Cal. Date  | Cal. interval |
|------|------------------------|---------------------------|------------------|--------------|------------|---------------|
| 1    | Vector Signal Analyzer | FSQ26                     | 101091           | R&S          | 2020-05-11 | 1 year        |
|      |                        |                           |                  |              | 2021-05-10 |               |
| 2    | DC Power Supply        | ZUP60-14                  | LOC-220Z006-0007 | TDL-Lambda   | 2020-05-11 | 1 year        |
|      |                        |                           |                  |              | 2021-05-10 |               |
| 3    | Eagle Test Software    | Eagle V3.1<br>FCC BT/WIFI | N/A              | ECIT         | N/A        | N/A           |

### 7.2. Radiated Emission Test System

| Item | Equipment Name                       | Type               | Serial Number | Manufacturer | Cal. Date  | Cal. interval |
|------|--------------------------------------|--------------------|---------------|--------------|------------|---------------|
| 1    | Universal Radio Communication Tester | CMU200             | 123123        | R&S          | 2020-05-11 | 1 year        |
|      |                                      |                    |               |              | 2021-05-10 |               |
| 2    | EMI Test Receiver                    | ESU40              | 100307        | R&S          | 2021-03-03 | 1 year        |
| 3    | TRILOG Broadband Antenna             | VULB9163           | VULB9163-515  | Schwarzbeck  | 2021-02-03 | 2 years       |
| 4    | Double-ridged Waveguide Antenna      | ETS-3117           | 00135890      | ETS          | 2020-02-28 | 3 years       |
| 5    | Universal Radio Communication Tester | CMW500             | 104178        | R&S          | 2020-05-11 | 1 year        |
|      |                                      |                    |               |              | 2021-05-10 |               |
| 6    | EMI Test Software                    | EMC32<br>V 9.15.00 | N/A           | R&S          | N/A        | N/A           |

Anechoic chamber

Fully anechoic chamber by ETS.



## Annex A: Measurement Uncertainty

Measurement uncertainty for all the testing in this report are within the limit specified in 3IN documents. The detailed measurement uncertainty is defined in 3IN documents.

| Measurement Items                      | Range              | Confidence Level | Calculated Uncertainty |
|--|--------------------|------------------|------------------------|
| Peak Output Power-Conducted            | 2402MHz-2480MHz    | 95%              | 0.544dB                |
| Peak Power Spectral Density            | 2402MHz-2480MHz    | 95%              | 0.544dB                |
| 6dB Bandwidth                          | 2402MHz-2480MHz    | 95%              | 62.04Hz                |
| Frequency Band Edges-Conducted         | 2390MHz-2488.5MHz  | 95%              | 0.544dB                |
| Conducted Emission                     | 30MHz-2GHz         | 95%              | 0.90dB                 |
| Conducted Emission                     | 2GHz-3.6GHz        | 95%              | 0.88dB                 |
| Conducted Emission                     | 3.6GHz-8GHz        | 95%              | 0.96dB                 |
| Conducted Emission                     | 8GHz-20GHz         | 95%              | 0.94dB                 |
| Conducted Emission                     | 20GHz-22GHz        | 95%              | 0.88dB                 |
| Conducted Emission                     | 22GHz-26GHz        | 95%              | 0.86dB                 |
| Transmitter Spurious Emission-Radiated | 9KHz-30MHz         | 95%              | 5.66dB                 |
| Transmitter Spurious Emission-Radiated | 30MHz-1000MHz      | 95%              | 4.98dB                 |
| Transmitter Spurious Emission-Radiated | 1000MHz -18000MHz  | 95%              | 5.06dB                 |
| Transmitter Spurious Emission-Radiated | 18000MHz -40000MHz | 95%              | 5.20dB                 |
| AC Power line Conducted Emission       | 0.15MHz-30MHz      | 95%              | 3.66 dB                |

## Annex B: Accreditation Certificate



### Accredited Laboratory

A2LA has accredited

## INDUSTRIAL INTERNET INNOVATION CENTER (SHANGHAI) CO., LTD.

Shanghai, People's Republic of China

for technical competence in the field of

### Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 12<sup>th</sup> day of April 2021.

Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 3682.01  
Valid to February 28, 2023

*For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.*

\*\*\*\*\*END OF REPORT\*\*\*\*\*