

# TEST REPORT

**Applicant:** Realtek Semiconductor Corp.  
**Address:** No. 2, Innovation Road II, Hsinchu Science Park,  
Hsinchu 300, Taiwan  
**Equipment Type:** 11ax RTL8852CE Combo module  
**Model Name:** RTL8852CE  
**Brand Name:** N/A  
**FCC ID:** TX2-RTL8852CE  
**Test Standard:** 47 CFR Part 15 Subpart E  
(refer section 3.1)  
**Sample Arrival Date:** Nov. 23, 2022  
**Test Date:** Dec. 06, 2022 - Jan. 06, 2023  
**Date of Issue:** Jan. 13, 2023

**ISSUED BY:**

Shenzhen BALUN Technology Co., Ltd.

**Tested by:** Yu Yingyuan

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**Approved by:** Liao Jianming  
(Technical Director)

*Yu Ying Yuan*

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### Revision History

| Version        | Issue Date           | Revisions            |
|----------------|----------------------|----------------------|
| <u>Rev. 01</u> | <u>Jan. 13, 2023</u> | <u>Initial Issue</u> |

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# 1 GENERAL INFORMATION

## 1.1 Test Laboratory

|              |                                                                                                                              |
|--------------|------------------------------------------------------------------------------------------------------------------------------|
| Name         | Shenzhen BALUN Technology Co., Ltd.                                                                                          |
| Address      | Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China |
| Phone Number | +86 755 6685 0100                                                                                                            |

## 1.2 Test Location

|                           |                                                                                                                                                                                                                         |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name                      | Shenzhen BALUN Technology Co., Ltd.                                                                                                                                                                                     |
| Location                  | <input checked="" type="checkbox"/> Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China                                                        |
|                           | <input type="checkbox"/> 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China |
| Accreditation Certificate | The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.                                                                                        |

## 2 PRODUCT INFORMATION

### 2.1 Applicant Information

|           |                                                                         |
|-----------|-------------------------------------------------------------------------|
| Applicant | Realtek Semiconductor Corp.                                             |
| Address   | No. 2, Innovation Road II, Hsinchu Science Park, Hsinchu 300,<br>Taiwan |

### 2.2 Manufacturer Information

|              |                                                                         |
|--------------|-------------------------------------------------------------------------|
| Manufacturer | Realtek Semiconductor Corp.                                             |
| Address      | No. 2, Innovation Road II, Hsinchu Science Park, Hsinchu 300,<br>Taiwan |

### 2.3 General Description for Equipment under Test (EUT)

|                                           |                             |
|-------------------------------------------|-----------------------------|
| EUT Name                                  | 11ax RTL8852CE Combo module |
| Model Name Under Test                     | RTL8852CE                   |
| Series Model Name                         | N/A                         |
| Description of Model name differentiation | N/A                         |
| Serial Number                             | YX05G5BF                    |
| Hardware Version                          | N/A                         |
| Software Version                          | N/A                         |
| Dimensions (Approx.)                      | N/A                         |
| Weight (Approx.)                          | N/A                         |

#### 2.3.1 Host Information:

|              |                      |
|--------------|----------------------|
| Product Name | Notebook Computer    |
| Model Name   | IdeaPad Pro 5 14ARP8 |
| Brand Name   | Lenovo               |

#### 2.3.2 Antenna Information:

| Antenna Port      | Model Name      | Antenna Manufacturer | Antenna Type | Antenna Gain (dBi) |                 |                 |                  |                   |                   |                   |                   |                   |
|-------------------|-----------------|----------------------|--------------|--------------------|-----------------|-----------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|                   |                 |                      |              | 2.4 GHz            | 5.15 - 5.25 GHz | 5.25 - 5.35 GHz | 5.47 - 5.725 GHz | 5.725 - 5.895 GHz | 5.925 - 6.425 GHz | 6.425 - 6.525 GHz | 6.525 - 6.875 GHz | 6.875 - 7.125 GHz |
| Main Antenna      | AYP6Y-200059    | AWAN                 | PIFA         | 2.64               | 3.07            | 3.12            | 3.33             | 3.68              | <b>3.39</b>       | <b>3.27</b>       | <b>3.56</b>       | <b>3.59</b>       |
| Auxiliary Antenna | AYP6Y-200059    |                      | PIFA         | 2.38               | 2.98            | 3.08            | 3.21             | 3.70              | <b>3.22</b>       | <b>3.43</b>       | <b>3.73</b>       | <b>3.95</b>       |
| Main Antenna      | F00197313110001 | INNOWAVE             | PIFA         | 2.12               | 3.08            | 3.11            | 2.90             | 3.22              | 3.08              | 2.85              | 3.17              | 3.36              |
| Auxiliary Antenna | F00197313110001 |                      | PIFA         | 2.21               | 3.22            | 2.89            | 3.07             | 3.39              | 3.14              | 2.97              | 3.26              | 3.10              |

## 2.4 Technical Information

|                                   |                                                                                                                                                                                                                                                                         |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Network and Wireless connectivity | Bluetooth (BR+EDR+BLE)<br>2.4G WIFI 802.11b, 802.11g, 802.11n(HT20/40), VHT20/40 and 802.11ax(HE20/40)<br>5G WIFI 802.11a, 802.11n(HT20/40), 802.11ac(VHT20/40/80/160) and 802.11ax(HE20/40/80/160), U-NII-1/2A/2C/3<br>6G WIFI 802.11ax(HE20/40/80/160), U-NII-5/6/7/8 |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

The requirement for the following technical information of the EUT was tested in this report:

|                                                         |                                                                                                                                  |                                                                                                                                                                          |
|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency Range                                         | U-NII-5: 5925 MHz to 6425 MHz<br>U-NII-6: 6425 MHz to 6525 MHz<br>U-NII-7: 6525 MHz to 6875 MHz<br>U-NII-8: 6875 MHz to 7125 MHz |                                                                                                                                                                          |
| Product Type                                            | <input type="checkbox"/> Mobile<br><input checked="" type="checkbox"/> Portable<br><input type="checkbox"/> Fix Location         |                                                                                                                                                                          |
| Modulation technology                                   | OFDM, OFDMA                                                                                                                      |                                                                                                                                                                          |
| Modulation Type                                         | 1024QAM, 256QAM, 64QAM, 16QAM, BPSK, QPSK                                                                                        |                                                                                                                                                                          |
| Product Type                                            | Indoor for IC standard                                                                                                           |                                                                                                                                                                          |
| Transfer Rate (Mbps) (Single RF path)                   | 802.11ax up to 1021 Mbps                                                                                                         |                                                                                                                                                                          |
| Channel Bandwidth                                       | 802.11ax: 20 MHz, 40 MHz, 80 MHz, 160MHz                                                                                         |                                                                                                                                                                          |
| Maximum Output Power                                    | U-NII-5: 16.67 dBm<br>U-NII-6: 16.83 dBm<br>U-NII-7: 16.71 dBm<br>U-NII-8: 17.02 dBm                                             |                                                                                                                                                                          |
| Antenna System (eg., MIMO, Smart Antenna)               | Multi Input Multi Output (MIMO) for 802.11ax                                                                                     |                                                                                                                                                                          |
| Categorization as Correlated or Completely Uncorrelated | Categorization as Uncorrelated for 802.11ax                                                                                      |                                                                                                                                                                          |
| Antenna Type                                            | Main Antenna                                                                                                                     | PIFA Antenna                                                                                                                                                             |
|                                                         | Aux. Antenna                                                                                                                     |                                                                                                                                                                          |
| Antenna Gain                                            | Main Antenna                                                                                                                     | U-NII-5: 5925 MHz to 6425 MHz: 3.39 dBi<br>U-NII-6: 6425 MHz to 6525 MHz: 3.27 dBi<br>U-NII-7: 6525 MHz to 6875 MHz: 3.56 dBi<br>U-NII-8: 6875 MHz to 7125 MHz: 3.59 dBi |
|                                                         | Aux. Antenna                                                                                                                     | U-NII-5: 5925 MHz to 6425 MHz: 3.22 dBi<br>U-NII-6: 6425 MHz to 6525 MHz: 3.43 dBi<br>U-NII-7: 6525 MHz to 6875 MHz: 3.73 dBi<br>U-NII-8: 6875 MHz to 7125 MHz: 3.95 dBi |
| Total directional gain                                  | For power spectral density(PSD)                                                                                                  | N/A                                                                                                                                                                      |

|                   |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   | measurements           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                   | For power measurements | <p>Correlated:</p> <p>U-NII-5: 5925 MHz to 6425 MHz: 6.32 dBi</p> <p>U-NII-6: 6425 MHz to 6525 MHz: 6.36 dBi</p> <p>U-NII-7: 6525 MHz to 6875 MHz: 6.66 dBi</p> <p>U-NII-8: 6875 MHz to 7125 MHz: 6.78 dBi</p> <p>Formulas: Directional gain = <math>10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / NANT]</math> dBi</p> <p>Uncorrelated:</p> <p>U-NII-5: 5925 MHz to 6425 MHz: 3.31 dBi</p> <p>U-NII-6: 6425 MHz to 6525 MHz: 3.35 dBi</p> <p>U-NII-7: 6525 MHz to 6875 MHz: 3.65 dBi</p> <p>U-NII-8: 6875 MHz to 7125 MHz: 3.77 dBi</p> <p>Formulas: Directional gain = <math>10 \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10}) / NANT]</math> dBi</p> |
| About the Product |                        | The equipment is 11ax RTL8852CE Combo module, intended for used with information technology equipment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## 2.5 Channel List

| 20 MHz         |                 | 40 MHz         |                 | 80 MHz         |                 | 160 MHz        |                 |
|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|
| Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) |
| 1              | 5955            | 3              | 5965            | 7              | 5985            | 15             | 6025            |
| 5              | 5975            | 11             | 6005            | 23             | 6065            | <b>47</b>      | <b>6185</b>     |
| 9              | 5995            | 19             | 6045            | 39             | 6145            | 79             | 6345            |
| 13             | 6015            | 27             | 6085            | 55             | 6225            | <b>111</b>     | <b>6505</b>     |
| 17             | 6035            | 35             | 6125            | 71             | 6305            | <b>143</b>     | <b>6665</b>     |
| 21             | 6055            | 43             | 6165            | 87             | 6385            | 175            | 6825            |
| 25             | 6075            | 51             | 6205            | 103            | 6465            | <b>207</b>     | <b>6985</b>     |
| 29             | 6095            | 59             | 6245            | 119            | 6545            |                |                 |
| 33             | 6115            | 67             | 6285            | 135            | 6625            |                |                 |
| 37             | 6135            | 75             | 6325            | 151            | 6705            |                |                 |
| 41             | 6155            | 83             | 6365            | 167            | 6785            |                |                 |
| 45             | 6175            | 91             | 6405            | 183            | 6865            |                |                 |
| 49             | 6195            | 99             | 6445            | 199            | 6945            |                |                 |
| <b>53</b>      | <b>6215</b>     | 107            | 6485            | 215            | 7025            |                |                 |
| 57             | 6235            | 115            | 6525            |                |                 |                |                 |
| 61             | 6255            | 123            | 6565            |                |                 |                |                 |
| 65             | 6275            | 131            | 6605            |                |                 |                |                 |
| 69             | 6295            | 139            | 6645            |                |                 |                |                 |
| 73             | 6315            | 147            | 6685            |                |                 |                |                 |
| 77             | 6335            | 155            | 6725            |                |                 |                |                 |
| 81             | 6355            | 163            | 6765            |                |                 |                |                 |
| 85             | 6375            | 171            | 6805            |                |                 |                |                 |
| 89             | 6395            | 179            | 6845            |                |                 |                |                 |
| 93             | 6415            | 187            | 6885            |                |                 |                |                 |
| 97             | 6435            | 195            | 6925            |                |                 |                |                 |
| <b>101</b>     | <b>6455</b>     | 203            | 6965            |                |                 |                |                 |
| 105            | 6475            | 211            | 7005            |                |                 |                |                 |
| 109            | 6495            | 219            | 7045            |                |                 |                |                 |
| 113            | 6515            | 227            | 7085            |                |                 |                |                 |
| 117            | 6535            |                |                 |                |                 |                |                 |
| 121            | 6555            |                |                 |                |                 |                |                 |
| 125            | 6575            |                |                 |                |                 |                |                 |
| 129            | 6595            |                |                 |                |                 |                |                 |
| 133            | 6615            |                |                 |                |                 |                |                 |
| 137            | 6635            |                |                 |                |                 |                |                 |
| 141            | 6655            |                |                 |                |                 |                |                 |
| 145            | 6675            |                |                 |                |                 |                |                 |
| <b>149</b>     | <b>6695</b>     |                |                 |                |                 |                |                 |



|            |             |  |  |  |  |  |  |
|------------|-------------|--|--|--|--|--|--|
| 153        | 6715        |  |  |  |  |  |  |
| 157        | 6735        |  |  |  |  |  |  |
| 161        | 6755        |  |  |  |  |  |  |
| 165        | 6775        |  |  |  |  |  |  |
| 169        | 6795        |  |  |  |  |  |  |
| 173        | 6815        |  |  |  |  |  |  |
| 177        | 6835        |  |  |  |  |  |  |
| 181        | 6855        |  |  |  |  |  |  |
| 185        | 6875        |  |  |  |  |  |  |
| 189        | 6895        |  |  |  |  |  |  |
| 193        | 6915        |  |  |  |  |  |  |
| 197        | 6935        |  |  |  |  |  |  |
| 201        | 6955        |  |  |  |  |  |  |
| 205        | 6975        |  |  |  |  |  |  |
| 209        | 6995        |  |  |  |  |  |  |
| <b>213</b> | <b>7015</b> |  |  |  |  |  |  |
| 217        | 7035        |  |  |  |  |  |  |
| 221        | 7055        |  |  |  |  |  |  |
| 225        | 7075        |  |  |  |  |  |  |
| 229        | 7095        |  |  |  |  |  |  |
| 233        | 7115        |  |  |  |  |  |  |

The Lowest frequency, the middle frequency and the highest frequency of channel were selected to perform the test, and the selected channel see below:

For 802.11ax(HE20)

| U-NII-5 (5925 - 6425 MHz) |         |                 | U-NII-6 (6425 - 6525 MHz) |         |                 |
|---------------------------|---------|-----------------|---------------------------|---------|-----------------|
| Channel Number            | Channel | Frequency (MHz) | Channel Number            | Channel | Frequency (MHz) |
| 53                        | Mid     | 6215            | 101                       | Mid     | 6455            |

| U-NII-7 (6425 - 6875 MHz) |         |                 | U-NII-8 (6875 - 7125 MHz) |         |                 |
|---------------------------|---------|-----------------|---------------------------|---------|-----------------|
| Channel Number            | Channel | Frequency (MHz) | Channel Number            | Channel | Frequency (MHz) |
| 149                       | Mid     | 6695            | 213                       | Mid     | 7015            |

For 802.11ax(HE160)

| U-NII-5 (5925 - 6425 MHz) |         |                 | U-NII-6 (6425 - 6525 MHz) |         |                 |
|---------------------------|---------|-----------------|---------------------------|---------|-----------------|
| Channel Number            | Channel | Frequency (MHz) | Channel Number            | Channel | Frequency (MHz) |
| 47                        | Mid     | 6185            | 111                       | Mid     | 6505            |

| U-NII-7 (6425 - 6875 MHz) |         |                 | U-NII-8 (6875 - 7125 MHz) |         |                 |
|---------------------------|---------|-----------------|---------------------------|---------|-----------------|
| Channel Number            | Channel | Frequency (MHz) | Channel Number            | Channel | Frequency (MHz) |
| 143                       | Mid     | 6665            | 207                       | Mid     | 6985            |

Note: Preliminary tests were performed in different data rate in above table to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

| Test Items                | Mode          | Data Rate | Modulation Type | U-NII-5 | U-NII-6 | U-NII-7 | U-NII-8 |
|---------------------------|---------------|-----------|-----------------|---------|---------|---------|---------|
|                           |               |           |                 | Channel | Channel | Channel | Channel |
| Contention Based Protocol | 11ax(20 MHz)  | 4         | OFDMA           | 53      | 101     | 149     | 213     |
|                           | 11ax(160 MHz) | 34        |                 | 47      | 111     | 143     | 207     |

### 3 SUMMARY OF TEST RESULTS

#### 3.1 Test Standards

| No. | Identity                            | Document Title                                                                                                               |
|-----|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| 1   | 47 CFR Part 15 Subpart E            | Unlicensed National Information Infrastructure Devices                                                                       |
| 2   | KDB Publication<br>789033 D02v02r01 | Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E       |
| 3   | KDB Publication<br>987594 D03v01    | Guidelines for Compliance Testing of Unlicensed National Information Infrastructure 6 GHz (U-NII) Devices Part 15, Subpart E |
| 4   | KDB Publication<br>662911 D01v02r01 | Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)                    |
| 5   | ANSI C63.10-2013                    | American National Standard for Testing Unlicensed Wireless Devices                                                           |

#### 3.2 Test Verdict

| No. | Description                                                 | FCC Part No. | Test Result | Verdict               |
|-----|-------------------------------------------------------------|--------------|-------------|-----------------------|
| 1   | Antenna Requirement                                         | 15.203       | --          | Pass <sup>Note1</sup> |
| 2   | RF Output Power                                             | 15.407(a)    | ANNEX A.1   | N/A <sup>Note4</sup>  |
| 3   | Emission Bandwidth & 99% Occupied Bandwidth                 | 15.407(a)    | ANNEX A.2   | N/A <sup>Note4</sup>  |
| 4   | 6 dB bandwidth                                              | 15.407(e)    | ANNEX A.3   | N/A <sup>Note4</sup>  |
| 5   | Power Spectral Density                                      | 15.407(a)    | ANNEX A.4   | N/A <sup>Note4</sup>  |
| 6   | Conducted Emission                                          | 15.207       | ANNEX A.5   | N/A <sup>Note4</sup>  |
| 7   | Radiated Spurious Emissions and Band Edge (Restricted-band) | 15.407(b)    | ANNEX A.6   | N/A <sup>Note4</sup>  |
| 8   | Contention Based Protocol                                   | 15.407(d)    | ANNEX A.7   | Pass                  |
| 9   | In-Band Emissions                                           | 15.407(b)    | ANNEX A.8   | N/A <sup>Note4</sup>  |
| 10  | Receiver Spurious Emissions                                 | --           | --          | N/A <sup>Note2</sup>  |

Note <sup>1</sup>: The EUT has a permanently and irreplaceable attached antenna, which complies with the requirement FCC 15.203.

Note <sup>2</sup>: Only radio communication receivers operating in stand-alone mode within the U-NII-30-960 MHz, as well as scanner receivers, are subject to Industry Canada requirements, so this test is not applicable.

Note <sup>3</sup>: Under all normal operating conditions specified in the user manual, frequency stability can keep radiation within the operating frequency band.

Note <sup>4</sup>: This test report applies to class IV permissive changes, only test the output power, other test case no need to test.

## 4 GENERAL TEST CONFIGURATIONS

### 4.1 Test Environments

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

|                            |                         |                    |
|----------------------------|-------------------------|--------------------|
| Relative Humidity          | 33% to 68%              |                    |
| Atmospheric Pressure       | 100 kPa to 102 kPa      |                    |
| Temperature                | NT (Normal Temperature) | +19.9°C to +22.9°C |
| Working Voltage of the EUT | NV (Normal Voltage)     | 15.56 V            |

### 4.2 Test Equipment List

| Description       | Manufacturer  | Model  | Serial No. | Cal. Date  | Cal. Due   |
|-------------------|---------------|--------|------------|------------|------------|
| Spectrum Analyzer | ROHDE&SCHWARZ | FSV-40 | 101544     | 2022.01.04 | 2023.01.03 |
| Spectrum Analyzer | ROHDE&SCHWARZ | FSV-40 | 101544     | 2022.12.28 | 2023.12.27 |
| Signaling Unit    | ROHDE&SCHWARZ | CMW500 | 171150     | 2022.06.29 | 2023.06.28 |

### 4.3 Test Software List

| Description | Manufacturer | Software Version | Serial No. | Applicable test Setup               |
|-------------|--------------|------------------|------------|-------------------------------------|
| BL410R      | BALUN        | V2.1.1.488       | N/A        | The section 4.5.1                   |
| BL410E      | BALUN        | V19.8.28.435     | N/A        | The section 4.5.2&4.5.3&4.5.4&4.5.5 |

### 4.4 Measurement Uncertainty

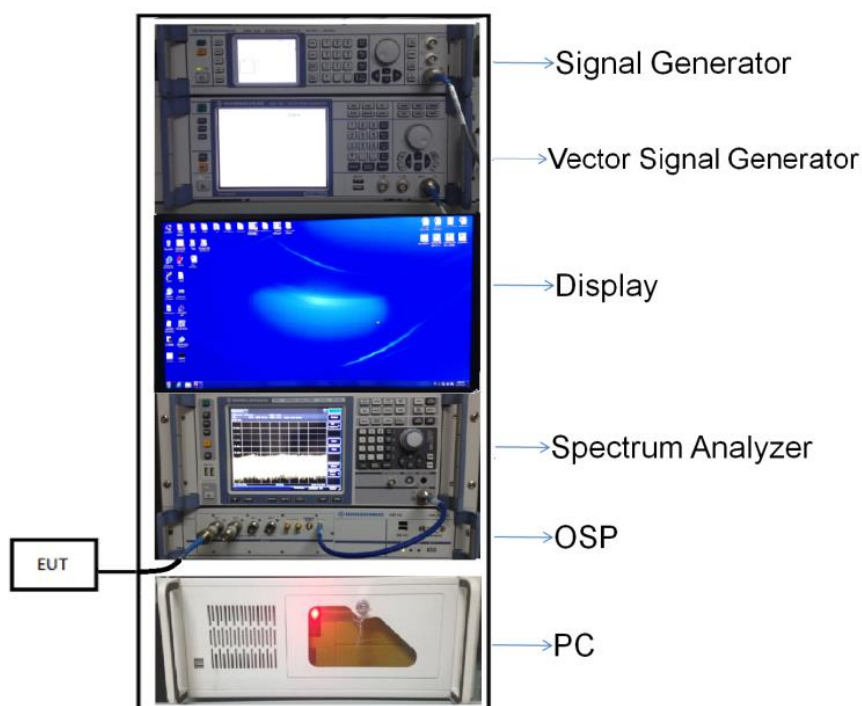
The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

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

| Parameters                        | Uncertainty |
|-----------------------------------|-------------|
| Occupied Channel Bandwidth        | 2.8%        |
| RF output power, conducted        | 1.28 dB     |
| Power Spectral Density, conducted | 1.30 dB     |
| Unwanted Emissions, conducted     | 1.84 dB     |
| All emissions, radiated           | 5.36 dB     |
| Temperature                       | 0.82°C      |
| Humidity                          | 4.1%        |

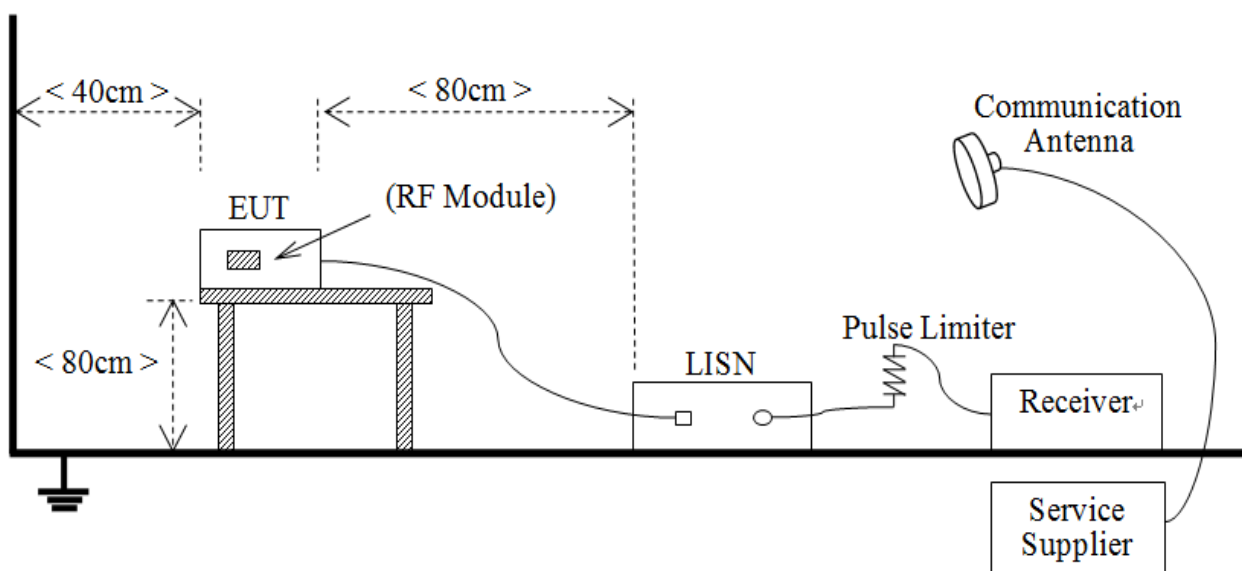
## 4.5 Description of Test Setup

### 4.5.1 For Antenna Port Test



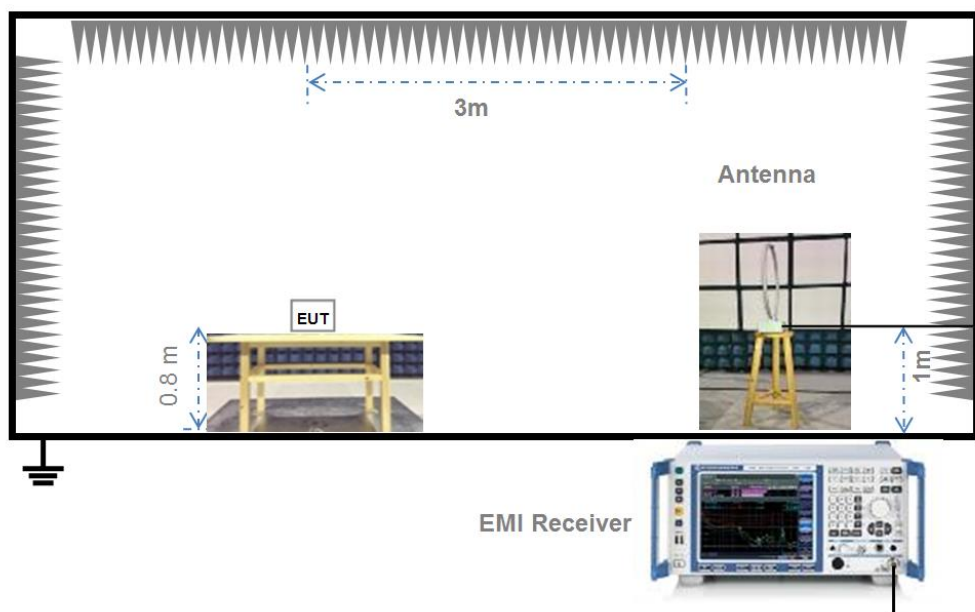
(Diagram 1)

### 4.5.2 For AC Power Supply Port Test



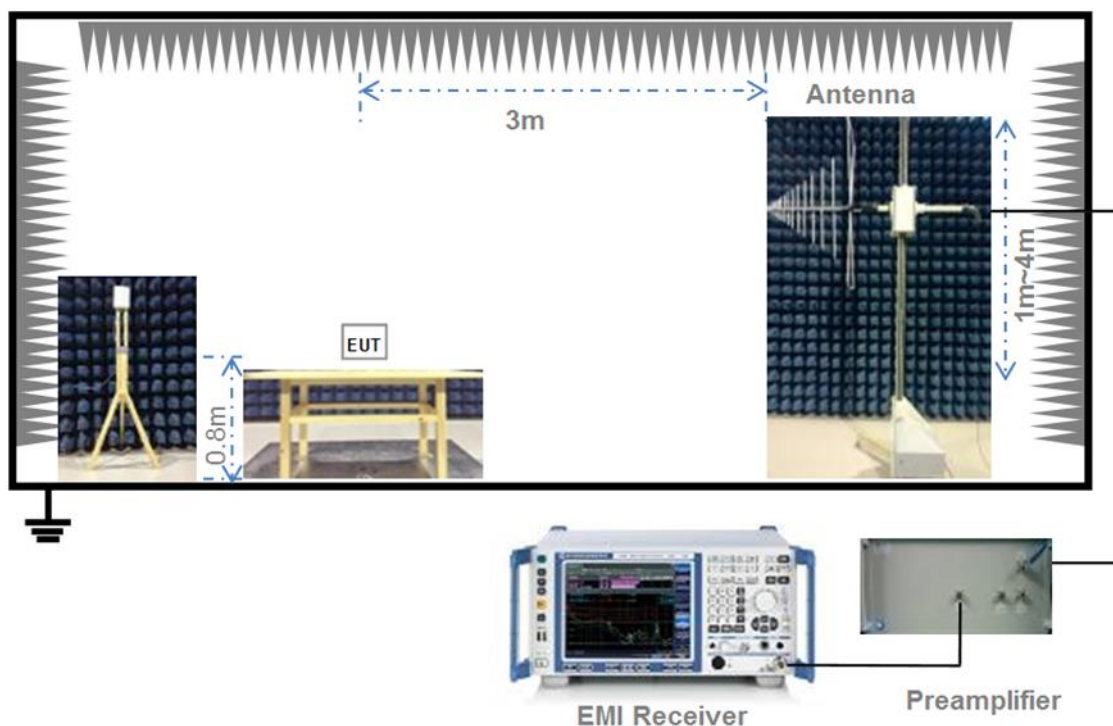
(Diagram 2)

#### 4.5.3 For Radiated Test (Below 30 MHz)



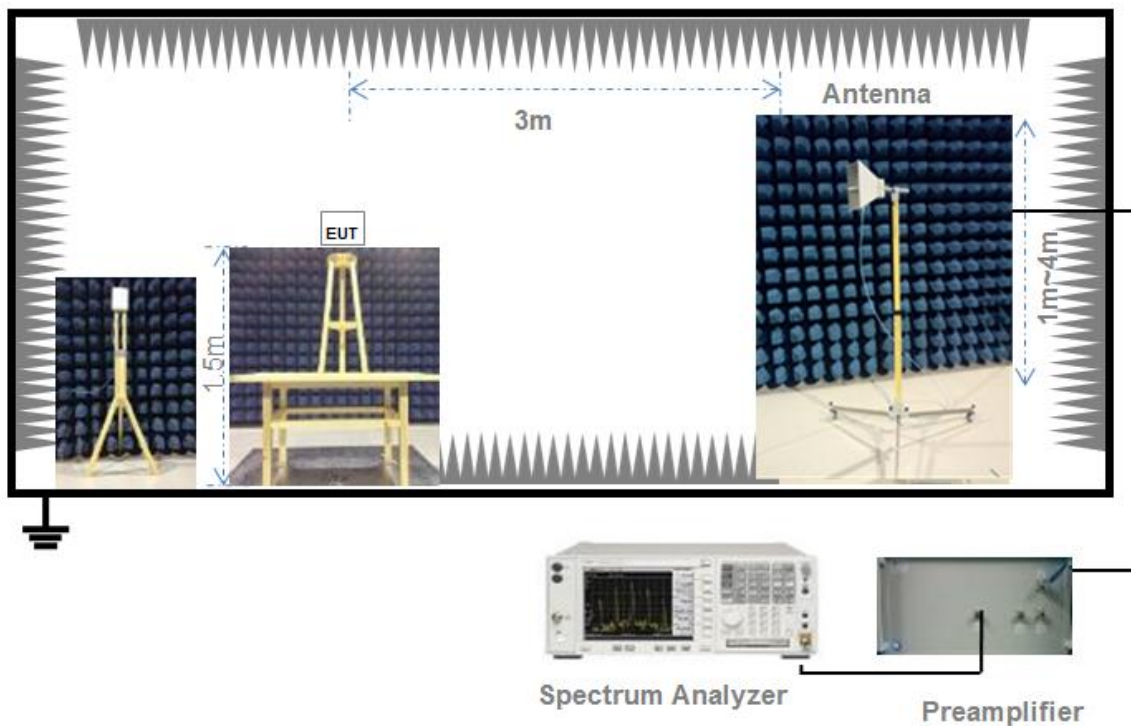
(Diagram 3)

#### 4.5.4 For Radiated Test (30 MHz-1 GHz)



(Diagram 4)

## 4.5.5 For Radiated Test (Above 1 GHz)



(Diagram 5)

## 5 TEST ITEMS

### 5.1 RF Output Power

#### 5.1.1 Test Limit

FCC §15.407(a)

The maximum conducted output power should not exceed:

| Frequency Band (MHz)                                     | Limit                                          |
|----------------------------------------------------------|------------------------------------------------|
| 5150-5250                                                | 250 mW                                         |
| 5250-5350                                                | 250 mW or 11 dBm + 10log B, whichever is less. |
| 5470-5725                                                | 250 mW or 11 dBm + 10log B, whichever is less. |
| 5725-5850                                                | 1 W                                            |
| 5925-7125                                                | 24 dBm (e.i.r.p.)                              |
| Note: Where "B" is the 26 dB emissions bandwidth in MHz. |                                                |

#### 5.1.2 Test Setup

The section 4.5.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

#### 5.1.3 Test Procedure

The maximum peak conducted output power may be measured using a broadband Average RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the emission bandwidth and utilize a fast-responding diode detector.

The E.I.R.P used radiated test method. At a test site that has been validated using the procedures of ANSI C63.4 or the latest CISPR 16-1-4 for measurements above 1 GHz, so as to simulate a near free-space environment.

#### 5.1.4 Test Result

Please refer to ANNEX A.1.



## 5.2 Emission Bandwidth and 6 dB Bandwidth

### 5.2.1 Limit

#### FCC §15.407(a)

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

The maximum transmitter channel bandwidth for U-NII devices in the 5.925-7.125 GHz band is 320 megahertz.

### 5.2.2 Test Setup

The test setup photo please refer to 4.5.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

### 5.2.3 Test Procedure

#### Emission bandwidth

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set VBW  $\geq 3 \times$  RBW,
3. Detector = Peak.
4. Trace mode = Max hold.
5. Measure the maximum width of the emission that is 26 dB down from the peak of the emission.

#### Occupied Bandwidth

1. Set Span = 1.5 times to 5.0 times the OBW
2. Set RBW = 1% to 5% of the OBW.
3. Set VBW  $\geq 3 \times$  RBW, Detector = Peak.
4. Trace mode = Max hold.
5. Use the 99% power bandwidth function of the instrument.

#### 6 dB bandwidth

1. Set RBW = 100 kHz, VBW = 300 kHz.
2. Detector = Peak. Trace mode = Max hold.
3. Allow the trace to stabilize.
4. 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.

### 5.2.4 Test Result

Please refer to ANNEX A.2 and ANNEX A.3.

## 5.3 Power Spectral density (PSD)

### 5.3.1 Limit

FCC §15.407(a)

The maximum power spectral density should not exceed:

| Frequency Band (MHz) | Limit                 |
|----------------------|-----------------------|
| 5150-5250            | 11 dBm/MHz            |
| 5250-5350            | 11 dBm/MHz            |
| 5470-5725            | 11 dBm/MHz            |
| 5725-5850            | 30 dBm/500kHz         |
| 5925-7125            | -1 dBm/MHz (e.i.r.p.) |

### 5.3.2 Test Setup

The section 4.5.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

### 5.3.3 Test Procedure

Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth.

1. Set RBW = 510 kHz/1 MHz, VBW  $\geq 3 \times$  RBW, Sweep time = Auto, Detector = RMS.
2. Allow the sweeps to continue until the trace stabilizes.
3. Use the peak marker function to determine the maximum amplitude level.
4. The E.I.R.P spectral density used radiated test method. At a test site that has been validated using the procedures of ANSI C63.4 or the latest CISPR 16-1-4 for measurements above 1 GHz, so as to simulate a near free-space environment.

### 5.3.4 Test Result

Please refer to ANNEX A.4.

## 5.4 Conducted Emission

### 5.4.1 Limit

FCC §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the U-NII-150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 $\mu$ H/50 $\Omega$  line impedance stabilization network (LISN).

| Frequency range<br>(MHz) | Conducted Limit (dB $\mu$ V) |          |
|--------------------------|------------------------------|----------|
|                          | Quai-peak                    | Average  |
| 0.15 - 0.50              | 66 to 56                     | 56 to 46 |
| 0.50 - 5                 | 56                           | 46       |
| 0.50 - 30                | 60                           | 50       |

### 5.4.2 Test Setup

The section 4.5.2 (Diagram 2) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

### 5.4.3 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

### 5.4.4 Test Result

Please refer to ANNEX A.5.

## 5.5 Radiated Spurious Emissions and Band Edge (Restricted-band)

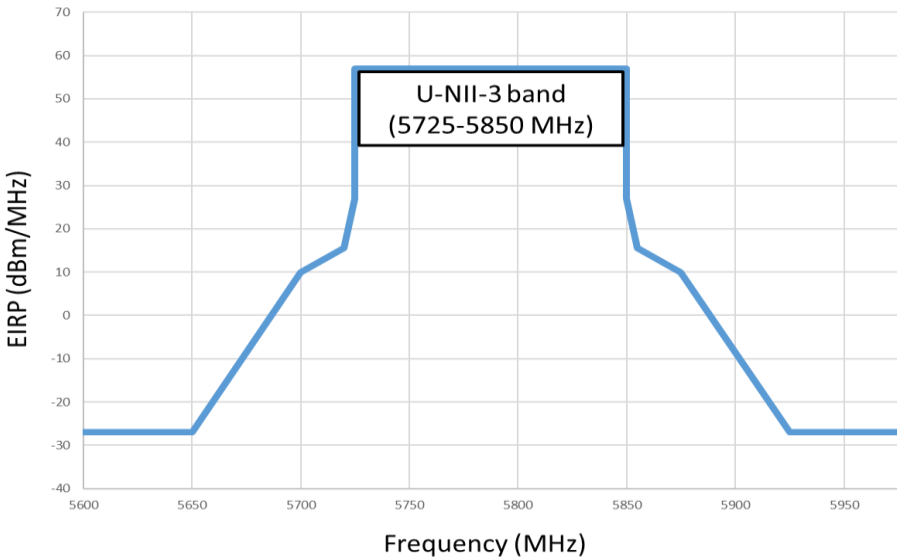
### 5.5.1 Limit

FCC §15.209 & 15.407(b)

| Frequency (MHz) | Field Strength ( $\mu\text{V/m}$ ) | 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                        |

Note<sup>1</sup>: The Limit for radiated test was performed according to FCC Part 15C

Note<sup>2</sup>: The tighter limit applies at the band edge.

| Un-restricted band emissions |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Out Operating Band (MHz)     | Limit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 5150 - 5250                  | e.i.r.p. -27 dBm (68.2 dBuV/m@3m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5250 - 5350                  | e.i.r.p. -27 dBm (68.2 dBuV/m@3m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5470 - 5725                  | e.i.r.p. -27 dBm (68.2 dBuV/m@3m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5725 - 5850                  | <p>All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.</p>  |

Note: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength.

### 5.5.2 Test Setup

The section 4.5.3-4.5.5 (Diagram 3 - Diagram 5) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

### 5.5.3 Test Procedure

Since the emission limits are specified in terms of radiated field strength levels, measurements performed to demonstrate compliance have traditionally relied on a radiated test configuration. Radiated measurements remain the principal method for demonstrating compliance to the specified limits; however antenna-port conducted measurements are also now acceptable to demonstrate compliance (see below for details). When radiated measurements are utilized, test site requirements and procedures for maximizing and measuring radiated emissions that are described in ANSI C63.10 shall be followed.

Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

#### General Procedure for conducted measurements in restricted bands

- a) Measure the conducted output power (in dBm) using the detector specified (see guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
- b) Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see guidance on determining the applicable antenna gain)
- c) Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies  $\leq 30$  MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies  $> 1000$  MHz).
- d) For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).
- e) Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:

$$E = \text{EIRP} - 20\log D + 104.8$$

where:

E = electric field strength in dB $\mu$ V/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

- f) Compare the resultant electric field strength level to the applicable limit.
- g) Perform radiated spurious emission test.

#### Quasi-Peak measurement procedure

The specifications for measurements using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Frequency Interference (CISPR) of the International

Electrotechnical Commission.

As an alternative to CISPR quasi-peak measurement, compliance can be demonstrated to the applicable emission limits using a peak detector.

#### Peak power measurement procedure

Peak emission levels are measured by setting the instrument as follows:

- a) RBW = as specified in Table 1.
- b) VBW  $\geq 3 \times$  RBW.
- c) Detector = Peak.
- d) Sweep time = auto.
- e) Trace mode = max hold.
- f) Allow sweeps to continue until the trace stabilizes. (Note that the required measurement time may be longer for low duty cycle applications).

Table 1—RBW as a function of frequency

| Frequency   | RBW         |
|-------------|-------------|
| 9-150 kHz   | 200-300 Hz  |
| 0.15-30 MHz | 9-10 kHz    |
| 30-1000 MHz | 100-120 kHz |
| > 1000 MHz  | 1 MHz       |

If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

#### Trace averaging across on and off times of the EUT transmissions followed by duty cycle correction

If continuous transmission of the EUT (i.e., duty cycle  $\geq 98$  percent) cannot be achieved and the duty cycle is constant (i.e., duty cycle variations are less than  $\pm 2$  percent), then the following procedure shall be used:

- a) The EUT shall be configured to operate at the maximum achievable duty cycle.
  - b) Measure the duty cycle,  $x$ , of the transmitter output signal as described in section 6.0.
  - c) RBW = 1 MHz (unless otherwise specified).
  - d) VBW  $\geq 3 \times$  RBW.
  - e) Detector = RMS, if  $\text{span}/(\# \text{ of points in sweep}) \leq (\text{RBW}/2)$ . Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
  - f) Averaging type = power (i.e., RMS).
- 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
  - 2) Some instruments require linear display mode in order to use linear voltage averaging. Log or dB

averaging shall not be used.

g) Sweep time = auto.

h) Perform a trace average of at least 100 traces.

i) A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:

1) If power averaging (RMS) mode was used in step f), then the applicable correction factor is  $10 \log(1/x)$ , where  $x$  is the duty cycle.

2) If linear voltage averaging mode was used in step f), then the applicable correction factor is  $20 \log(1/x)$ , where  $x$  is the duty cycle.

3) If a specific emission is demonstrated to be continuous ( $\geq 98$  percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

NOTE: Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.

#### Determining the applicable transmit antenna gain

A conducted power measurement will determine the maximum output power associated with a restricted band emission; however, in order to determine the associated EIRP level, the gain of the transmitting antenna (in dBi) must be added to the measured output power (in dBm).

Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.

See KDB 662911 for guidance on calculating the additional array gain term when determining the effective antenna gain for a EUT with multiple outputs occupying the same or overlapping frequency ranges in the same band.

#### Radiated spurious emission test

An additional consideration when performing conducted measurements of restricted band emissions is that unwanted emissions radiating from the EUT cabinet, control circuits, power leads, or intermediate circuit elements will likely go undetected in a conducted measurement configuration. To address this concern, a radiated test shall be performed to ensure that emissions emanating from the EUT cabinet (rather than the antenna port) also comply with the applicable limits.

For these cabinet radiated spurious emission measurements the EUT transmit antenna may be replaced with a termination matching the nominal impedance of the antenna. Procedures for performing radiated measurements are specified in ANSI C63.10. All detected emissions shall comply with the applicable limits.

The measurement frequency range is from 30 MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

#### 5.5.4 Test Result

Please refer to ANNEX A.6.



## 5.6 Contention Based Protocol

### 5.6.1 Limit

#### FCC §15.15.407(d)

Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 GHz band (herein referred to as unlicensed devices) are required to use technologies that include a contention-based protocol to avoid co-channel interference with incumbent devices sharing the band. To ensure incumbent co-channel operations are detected in a technology-agnostic manner, unlicensed devices are required to detect co-channel radio frequency energy (energy detect) and avoid simultaneous transmission.

Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel and stay off the channel as long as detected radio frequency power is equal to or greater than the threshold (-62 dBm). The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain.

### 5.6.2 Test Setup

The section 4.5.2 (Diagram 2) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

### 5.6.3 Test Procedure

The AWGN interference signal level is corrected according to the antenna gain, and the AWGN interference signal is modulated by the vector signal source. When AWGN interference exists, a spectrum analyzer is used to detect whether the EUT recognizes and stops transmission.

### 5.6.4 Test Result

Please refer to ANNEX A.7.

## 5.7 In-Band Emissions

### 5.7.1 Limit

#### FCC §15.15.407(b)

Using the measuring equipment limit line function, develop the emissions mask based on the following requirements. The emissions power spectral density must be reduced below the peak power spectral density (in dB) as follows:

- a. Suppressed by 20 dB at 1 MHz outside of the channel edge. (The channel edge is defined as the 26-dB point on either side of the carrier center frequency.)
- b. Suppressed by 28 dB at one channel bandwidth from the channel center.
- c. Suppressed by 40 dB at one- and one-half times the channel bandwidth from the channel center.

### 5.7.2 Test Setup

The section 4.5.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

### 5.7.3 Test Procedure

1. Connect output of the antenna port to a spectrum analyzer or EMI receiver, with appropriate attenuation, as to not damage the instrumentation.
2. Set the reference level of the measuring equipment in accordance with procedure 4.1.5.2 of ANSI C63.10-2013.
3. Measure the 26 dB EBW using the test procedure 12.4.1 of ANSI C63.10-2013. (This will be used to determine the channel edge.)
4. Measure the power spectral density (which will be used for emissions mask reference) using the following procedure:
  - a) Set the span to encompass the entire 26 dB EBW of the signal.
  - b) Set RBW = same RBW used for 26 dB EBW measurement.
  - c) Set VBW  $\geq 3 \times$  RBW
  - d) Number of points in sweep  $\geq [2 \times \text{span} / \text{RBW}]$ .
  - e) Sweep time = auto.
  - f) Detector = RMS (i.e., power averaging)
  - g) Trace average at least 100 traces in power averaging (rms) mode.
  - h) Use the peak search function on the instrument to find the peak of the spectrum.
5. For the purposes of developing the emission mask, the channel bandwidth is defined as the 26 dB EBW.
6. Using the measuring equipment limit line function, develop the emissions mask based on the following requirements. The emissions power spectral density must be reduced below the peak power spectral density (in dB) as follows:
  - a. Suppressed by 20 dB at 1 MHz outside of the channel edge. (The channel edge is defined as the 26-dB point on either side of the carrier center frequency.)
  - b. Suppressed by 28 dB at one channel bandwidth from the channel center.
  - c. Suppressed by 40 dB at one- and one-half times the channel bandwidth from the channel

center.

7. Adjust the span to encompass the entire mask as necessary.

8. Clear trace.

9. Trace average at least 100 traces in power averaging (rms) mode.

10. Adjust the reference level as necessary so that the crest of the channel touches the top of the emission mask

#### 5.7.4 Test Result

Please refer to ANNEX A.8.

## **ANNEX A TEST RESULT**

### **A.1 RF Output Power**

Note: Not applicable.

### **A.2 Emission Bandwidth & 99% Bandwidth**

Note: Not applicable.

### **A.3 6 dB Bandwidth**

Note: Not applicable.

### **A.4 Power Spectral Density**

Note: Not applicable.

### **A.5 Conducted Emissions**

Note: Not applicable.

### **A.6 Radiated Spurious Emissions and Band Edge (Restricted-band)**

Note: Not applicable.

## A.7 Contention Based Protocol

### Interference Signals used for Tests

| Interference Signals Type | Bandwidth (MHz) |
|---------------------------|-----------------|
| AWGN                      | 10              |

### Regulated Threshold Level

| Test Method                                                                         | Interference threshold level                                                                                                                                                                      |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Conducted<br><input type="checkbox"/> Radiation | <p>The Regulated Threshold Level = -62 dBm (assumes a 0 dBi receive antenna) and minimum antenna gain is 3.08 dBi.</p> <p>The Regulated Threshold Level = -62 dBm + G (3.08 dBi) = -58.92 dBm</p> |

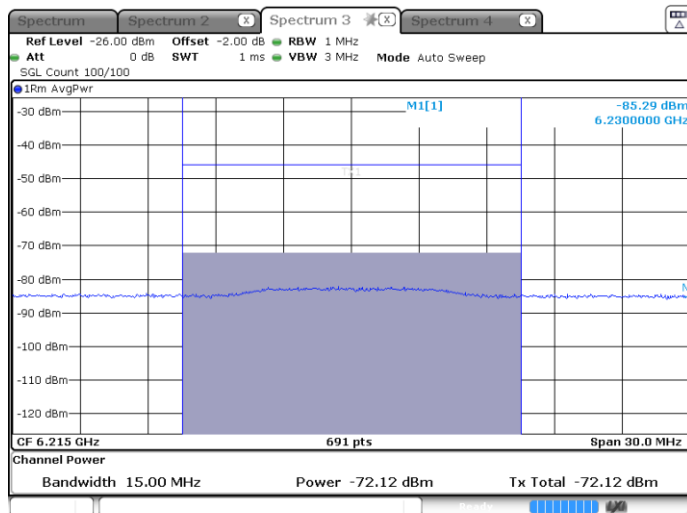
### Test Data

| U-NII-5 (5925 MHz to 6425 MHz) |                |                         |                             |                                |                |                                 |             |         |
|--------------------------------|----------------|-------------------------|-----------------------------|--------------------------------|----------------|---------------------------------|-------------|---------|
| Operation Mode                 | Channel Number | Channel Frequency (MHz) | AWGN Signal Frequency (MHz) | Measured Detection Level (dBm) | Detection Rate | Regulated Threshold Level (dBm) | Margin (dB) | Verdict |
| 802.11ax (HE20)                | 53             | 6215                    | 6215                        | -72.12                         | 90%            | -58.92                          | -13.20      | pass    |
| 802.11ax (HE160)               | 47             | 6185                    | 6110                        | -72.38                         | 100%           | -58.92                          | -13.46      | pass    |
|                                |                |                         | 6185                        | -73.02                         | 100%           | -58.92                          | -14.10      | pass    |
|                                |                |                         | 6260                        | -72.81                         | 100%           | -58.92                          | -13.89      | pass    |

## Test Plots

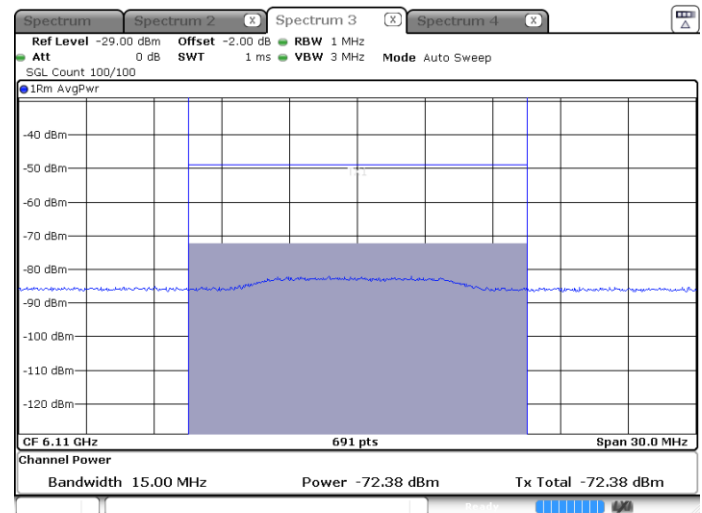
### Plots of Incumbent signal(AWGN) Level

802.11ax (HE20)-Channel 53



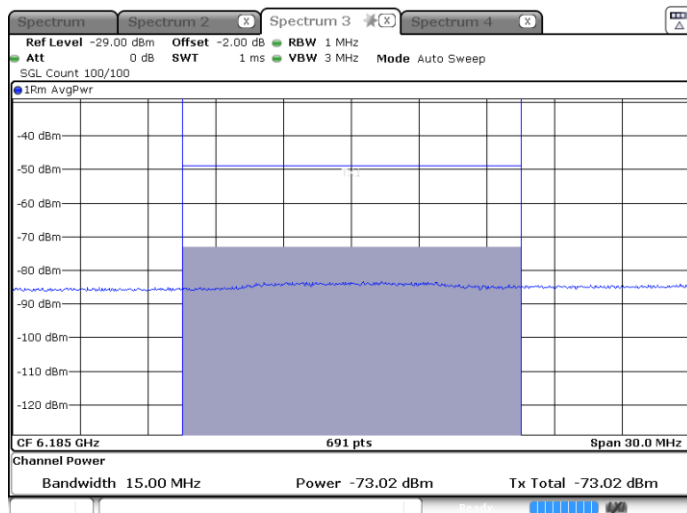
Date: 6 JAN 2023 09:30:51

802.11ax (HE160)-Channel 47 (Low Edge)



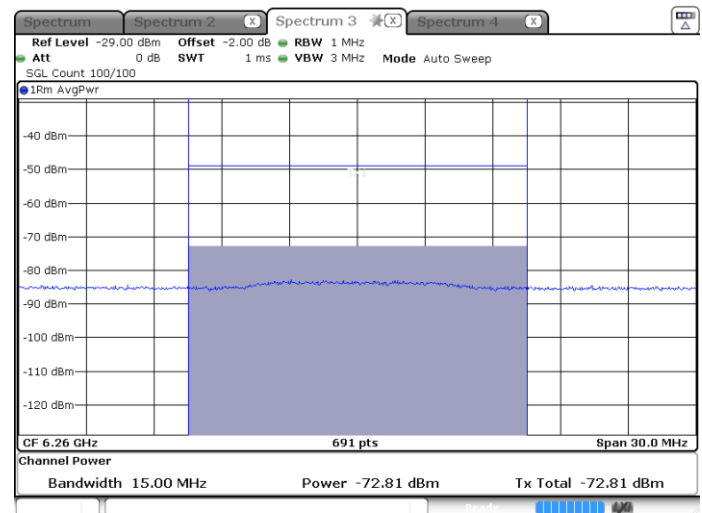
Date: 6 JAN 2023 09:34:31

802.11ax (HE160)-Channel 47 (Middle Edge)



Date: 6 JAN 2023 09:35:55

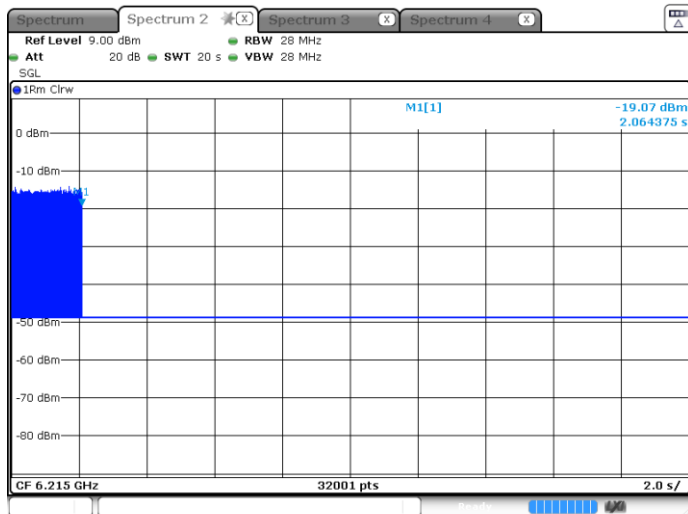
802.11ax (HE160)-Channel 47 (High Edge)



Date: 6 JAN 2023 09:35:32

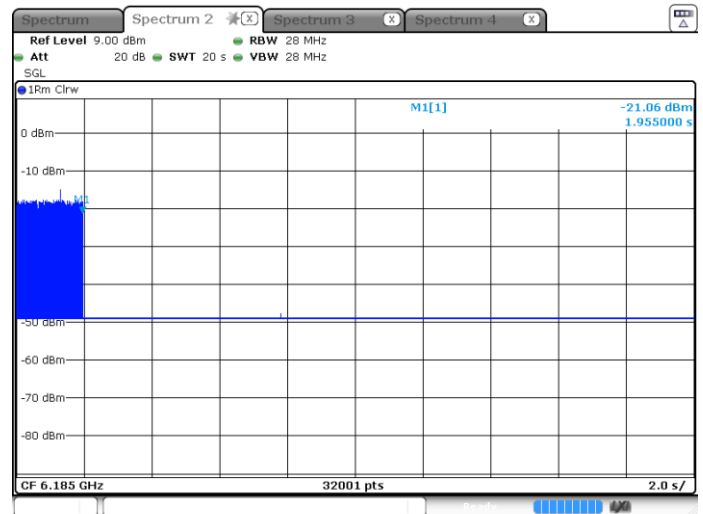
## Plots of EUT Tx waveform

802.11ax (HE20)-Channel 53



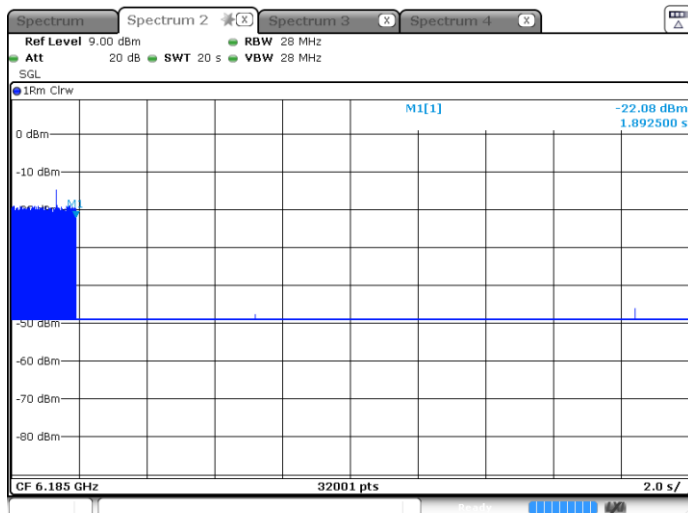
Date: 6 JAN 2023 09:01:39

802.11ax (HE160)-Channel 47 (Low Edge)



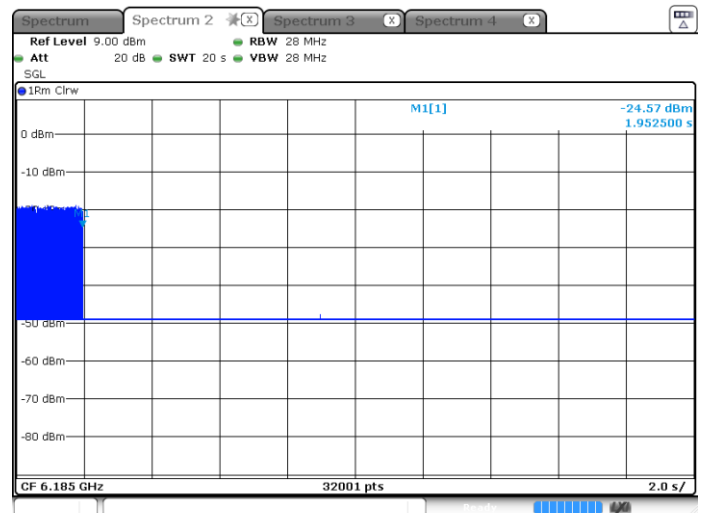
Date: 6 JAN 2023 07:31:31

802.11ax (HE160)-Channel 47 (Middle Edge)



Date: 6 JAN 2023 07:39:37

802.11ax (HE160)-Channel 47 (High Edge)



Date: 6 JAN 2023 07:43:18

Interference Signals used for Tests

| Interference Signals Type | Bandwidth (MHz) |
|---------------------------|-----------------|
| AWGN                      | 10              |

Regulated Threshold Level

| Test Method                                                                         | Interference threshold level                                                                                                                                                                      |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Conducted<br><input type="checkbox"/> Radiation | <p>The Regulated Threshold Level = -62 dBm (assumes a 0 dBi receive antenna) and minimum antenna gain is 2.85 dBi.</p> <p>The Regulated Threshold Level = -62 dBm + G (2.85 dBi) = -59.15 dBm</p> |

Test Data

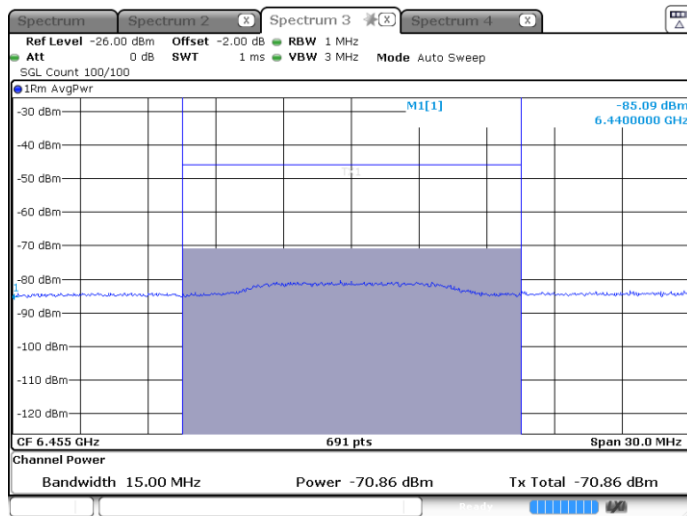
| U-NII-6 (6425 MHz to 6525 MHz) |                |                         |                             |                                |                |                                 |             |         |
|--------------------------------|----------------|-------------------------|-----------------------------|--------------------------------|----------------|---------------------------------|-------------|---------|
| Operation Mode                 | Channel Number | Channel Frequency (MHz) | AWGN Signal Frequency (MHz) | Measured Detection Level (dBm) | Detection Rate | Regulated Threshold Level (dBm) | Margin (dB) | Verdict |
| 802.11ax (HE20)                | 101            | 6455                    | 6455                        | -70.86                         | 90%            | -59.15                          | -11.71      | pass    |
| 802.11ax (HE160)               | 111            | 6505                    | 6430                        | -70.36                         | 100%           | -59.15                          | -11.21      | pass    |
|                                |                |                         | 6505                        | -71.59                         | 100%           | -59.15                          | -12.44      | pass    |
|                                |                |                         | 6580                        | -71.62                         | 100%           | -59.15                          | -12.47      | pass    |



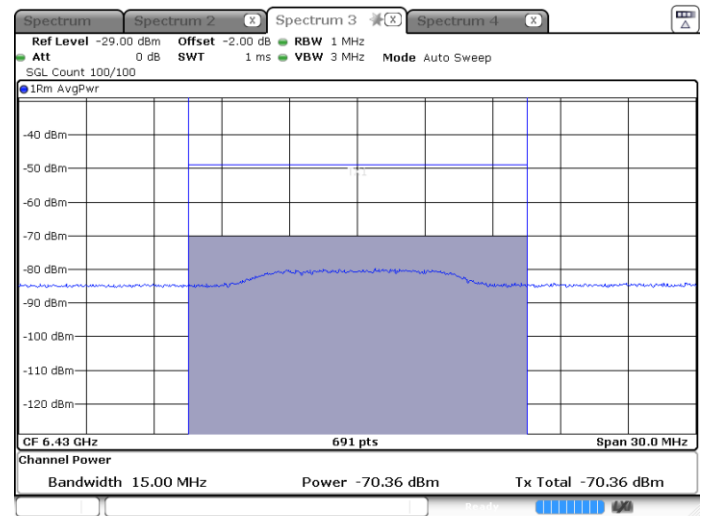
## Test Plots

### Plots of Incumbent signal(AWGN) Level

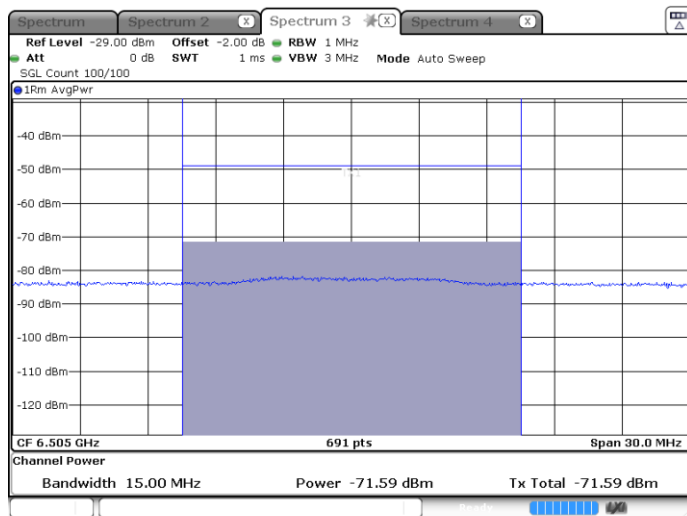
802.11ax (HE20)-Channel 101



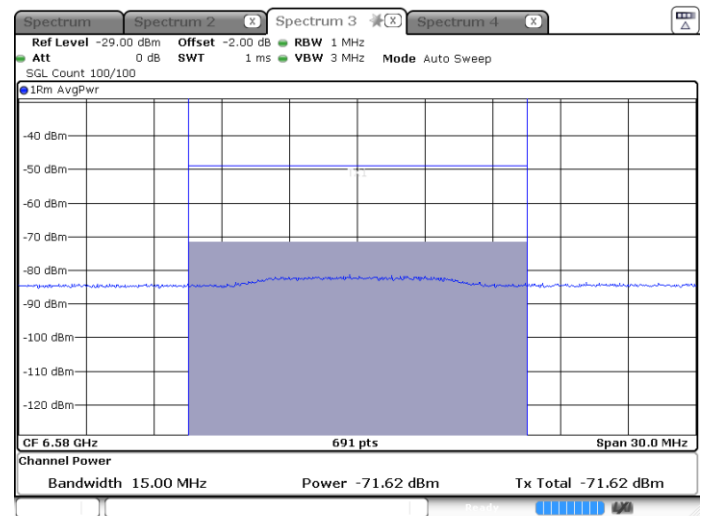
802.11ax (HE160)-Channel 111 (Low Edge)



802.11ax (HE160)-Channel 111 (Middle Edge)

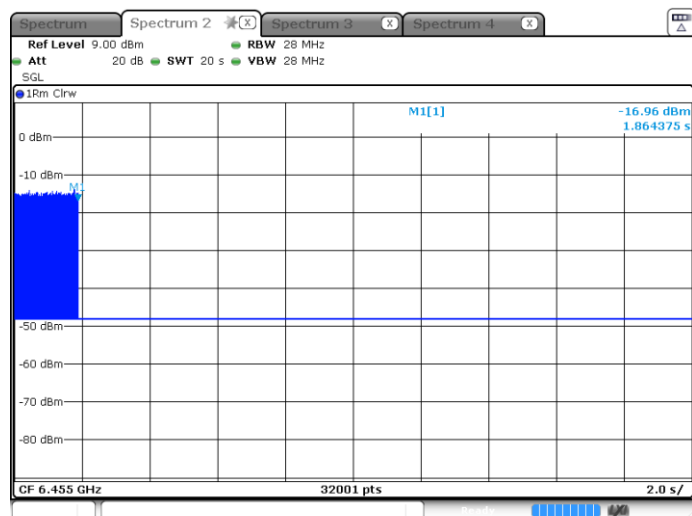


802.11ax (HE160)-Channel 111 (High Edge)



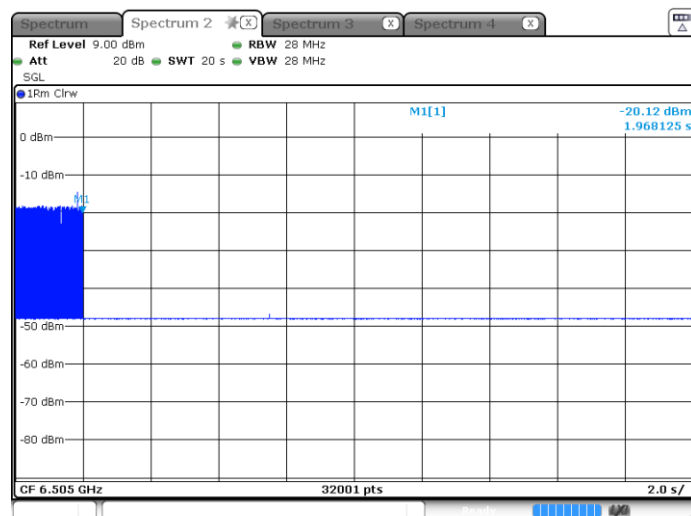
## Plots of EUT Tx waveform

802.11ax (HE20)-Channel 101



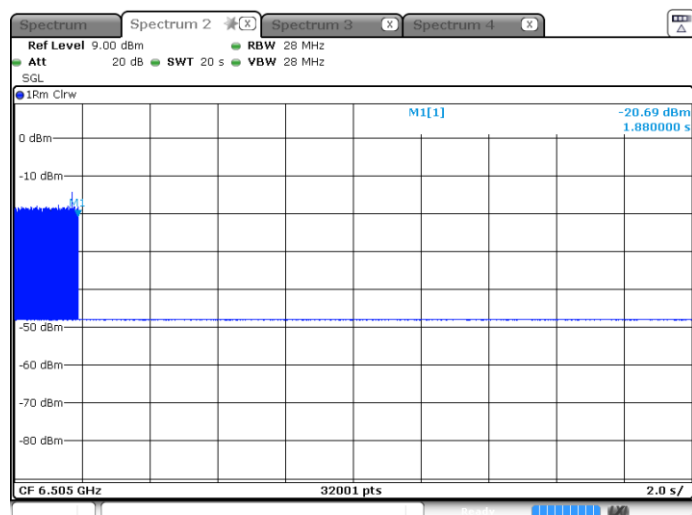
Date: 6 JAN 2023 09:13:16

802.11ax (HE160)-Channel 111 (Low Edge)



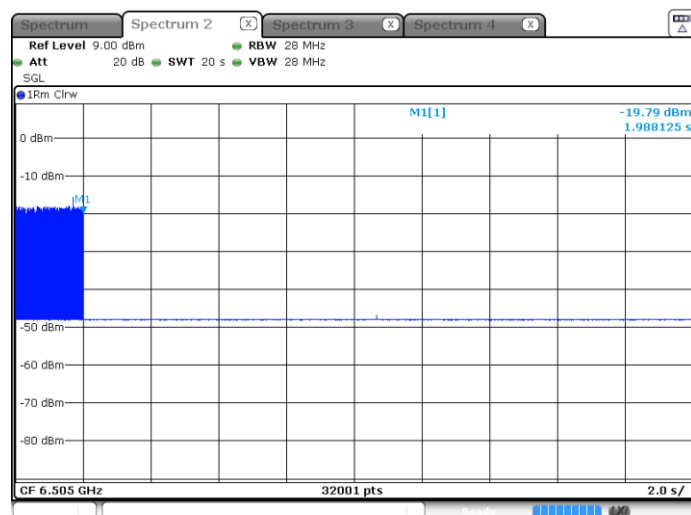
Date: 6 JAN 2023 07:56:40

802.11ax (HE160)-Channel 111 (Middle Edge)



Date: 6 JAN 2023 07:59:55

802.11ax (HE160)-Channel 111 (High Edge)



Date: 6 JAN 2023 08:04:51

Interference Signals used for Tests

| Interference Signals Type | Bandwidth (MHz) |
|---------------------------|-----------------|
| AWGN                      | 10              |

Regulated Threshold Level

| Test Method                                                                         | Interference threshold level                                                                                                                                                                      |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Conducted<br><input type="checkbox"/> Radiation | <p>The Regulated Threshold Level = -62 dBm (assumes a 0 dBi receive antenna) and minimum antenna gain is 3.17 dBi.</p> <p>The Regulated Threshold Level = -62 dBm + G (3.17 dBi) = -58.83 dBm</p> |

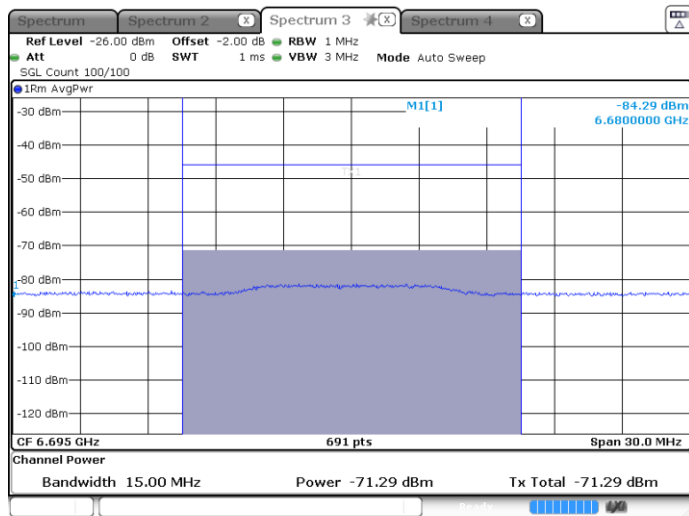
Test Data

| U-NII-7 (6425 MHz to 6875 MHz) |                |                         |                             |                                |                |                                 |             |         |
|--------------------------------|----------------|-------------------------|-----------------------------|--------------------------------|----------------|---------------------------------|-------------|---------|
| Operation Mode                 | Channel Number | Channel Frequency (MHz) | AWGN Signal Frequency (MHz) | Measured Detection Level (dBm) | Detection Rate | Regulated Threshold Level (dBm) | Margin (dB) | Verdict |
| 802.11ax (HE20)                | 149            | 6695                    | 6695                        | -71.29                         | 90%            | -58.83                          | -12.46      | pass    |
| 802.11ax (HE160)               | 143            | 6665                    | 6590                        | -70.96                         | 100%           | -58.83                          | -12.13      | pass    |
|                                |                |                         | 6665                        | -71.26                         | 100%           | -58.83                          | -12.43      | pass    |
|                                |                |                         | 6740                        | -70.98                         | 100%           | -58.83                          | -12.15      | pass    |

## Test Plots

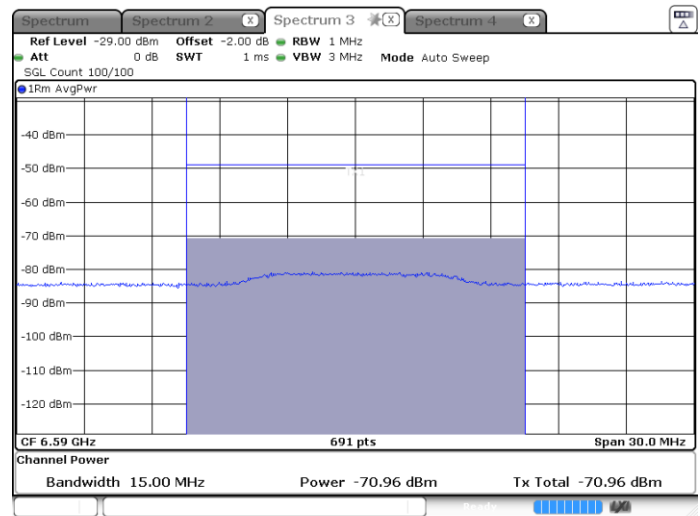
### Plots of Incumbent signal(AWGN) Level

802.11ax (HE20)-Channel 149



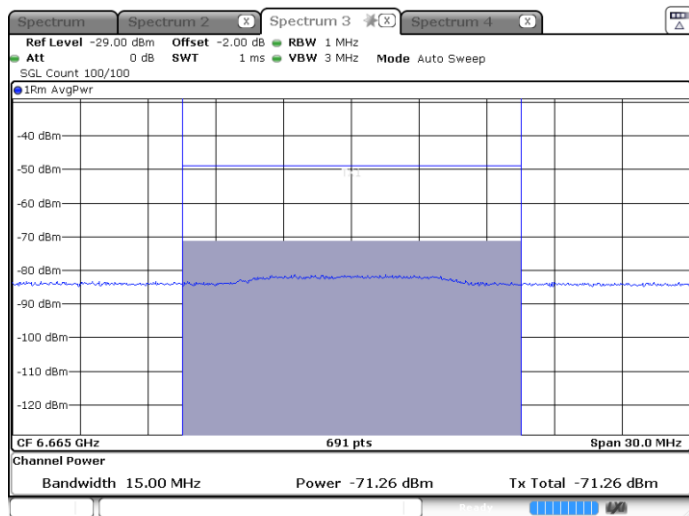
Date: 6 JAN 2023 09:31:57

802.11ax (HE160)-Channel 143 (Low Edge)



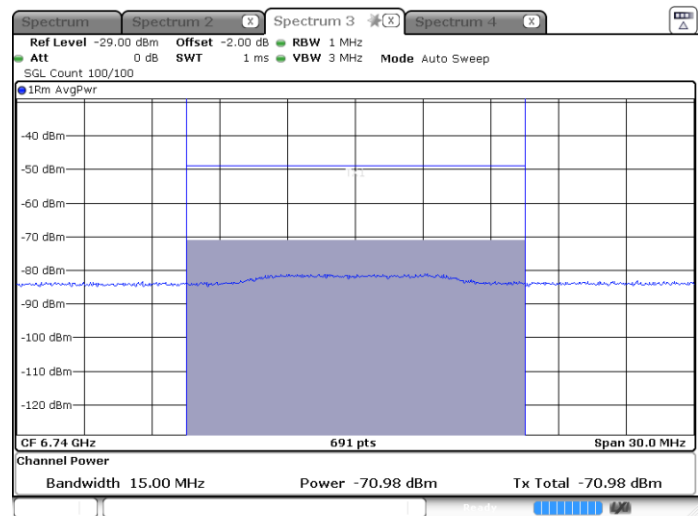
Date: 6 JAN 2023 09:38:23

802.11ax (HE160)-Channel 143 (Middle Edge)



Date: 6 JAN 2023 09:38:54

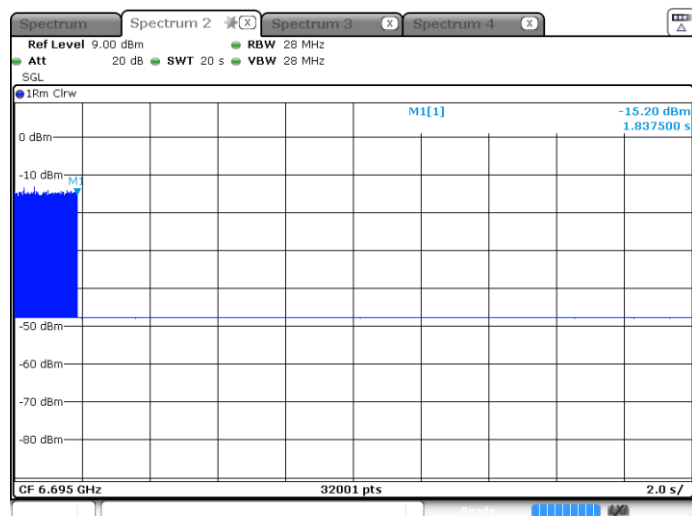
802.11ax (HE160)-Channel 143 (High Edge)



Date: 6 JAN 2023 09:39:15

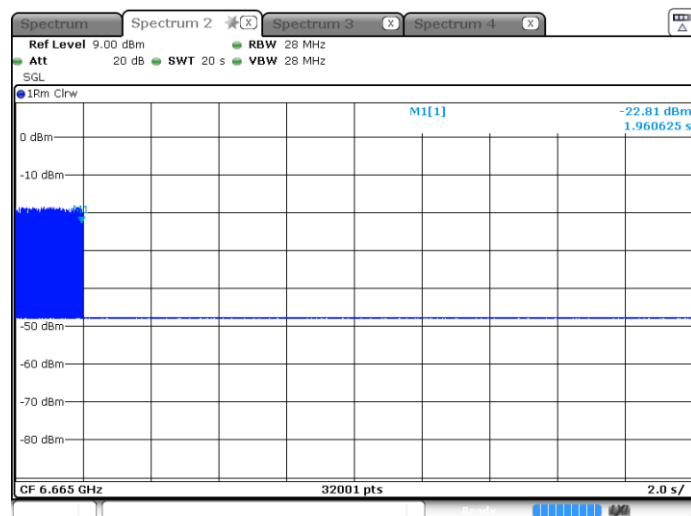
## Plots of EUT Tx waveform

## 802.11ax (HE20)-Channel 149



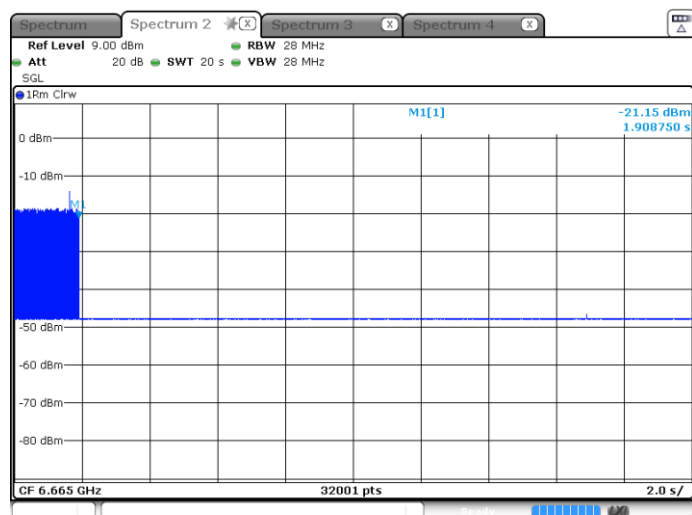
Date: 6 JAN 2023 09:19:30

## 802.11ax (HE160)-Channel 143 (Low Edge)



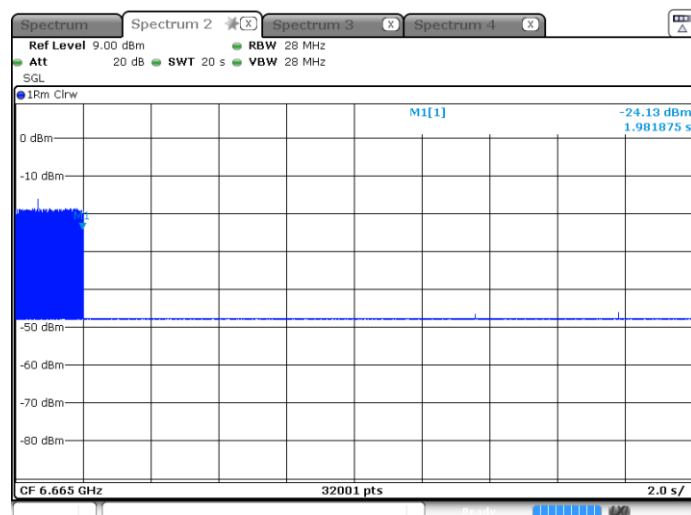
Date: 6 JAN 2023 08:14:21

## 802.11ax (HE160)-Channel 143 (Middle Edge)



Date: 6 JAN 2023 08:18:34

## 802.11ax (HE160)-Channel 143 (High Edge)



Date: 6 JAN 2023 08:26:50

Interference Signals used for Tests

| Interference Signals Type | Bandwidth (MHz) |
|---------------------------|-----------------|
| AWGN                      | 10              |

Regulated Threshold Level

| Test Method                                                                         | Interference threshold level                                                                                                                                                                      |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Conducted<br><input type="checkbox"/> Radiation | <p>The Regulated Threshold Level = -62 dBm (assumes a 0 dBi receive antenna) and minimum antenna gain is 3.10 dBi.</p> <p>The Regulated Threshold Level = -62 dBm + G (3.10 dBi) = -58.90 dBm</p> |

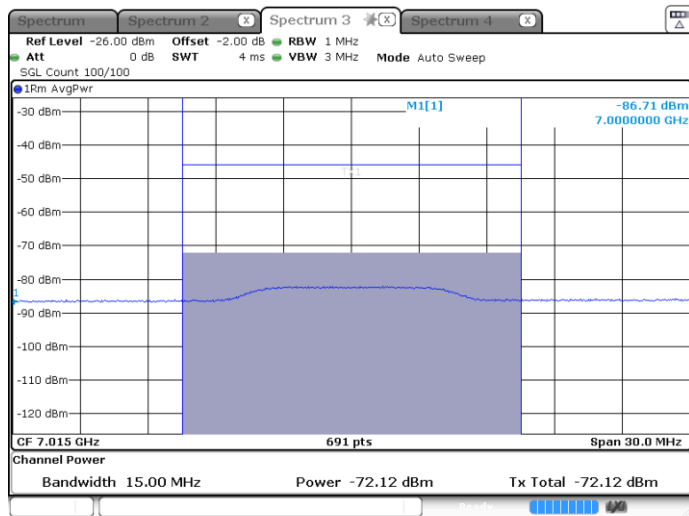
Test Data

| U-NII-8 (6875 MHz to 7125 MHz) |                |                         |                             |                                |                |                                 |             |         |
|--------------------------------|----------------|-------------------------|-----------------------------|--------------------------------|----------------|---------------------------------|-------------|---------|
| Operation Mode                 | Channel Number | Channel Frequency (MHz) | AWGN Signal Frequency (MHz) | Measured Detection Level (dBm) | Detection Rate | Regulated Threshold Level (dBm) | Margin (dB) | Verdict |
| 802.11ax (HE20)                | 213            | 7015                    | 7015                        | -72.12                         | 100%           | -58.90                          | -13.22      | pass    |
| 802.11ax (HE160)               | 207            | 6985                    | 6910                        | -70.24                         | 100%           | -58.90                          | -11.34      | pass    |
|                                |                |                         | 6985                        | -70.75                         | 100%           | -58.90                          | -11.85      | pass    |
|                                |                |                         | 7060                        | -72.68                         | 100%           | -58.90                          | -13.78      | pass    |

## Test Plots

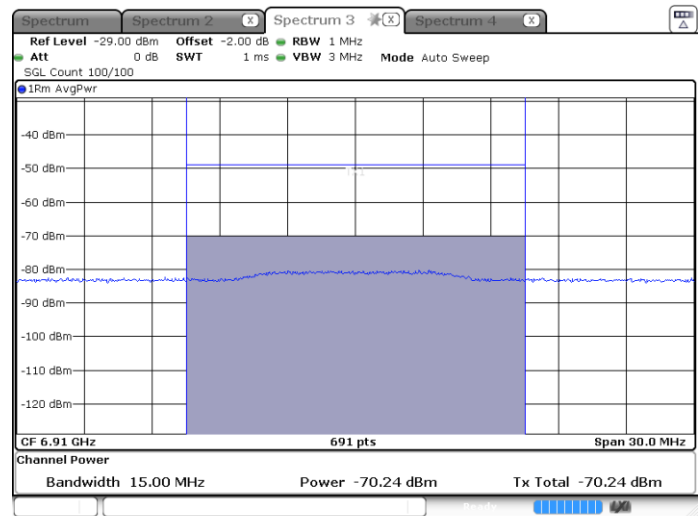
### Plots of Incumbent signal(AWGN) Level

802.11ax (HE20)-Channel 213



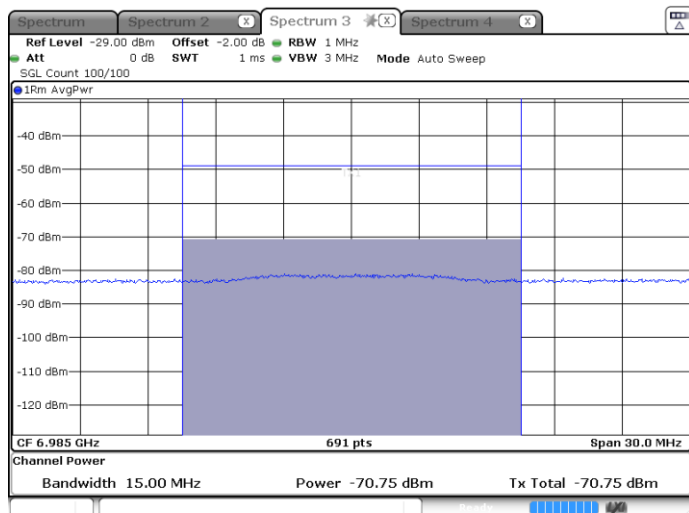
Date: 6 JAN 2023 09:32:32

802.11ax (HE160)-Channel 207 (Low Edge)



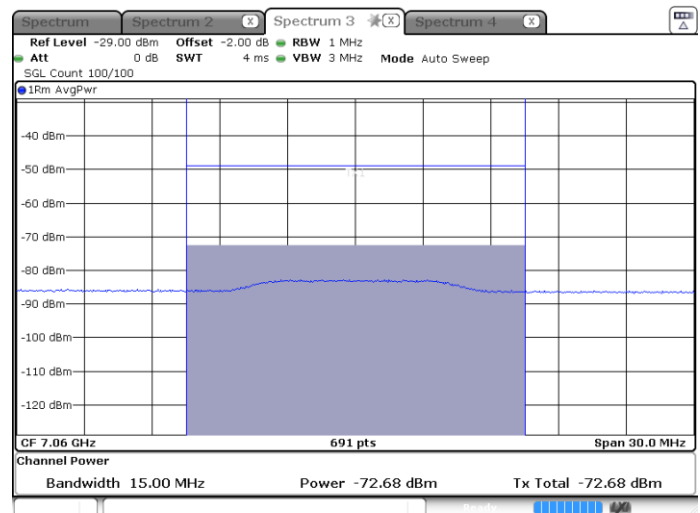
Date: 6 JAN 2023 09:39:43

802.11ax (HE160)-Channel 207 (Middle Edge)



Date: 6 JAN 2023 09:40:18

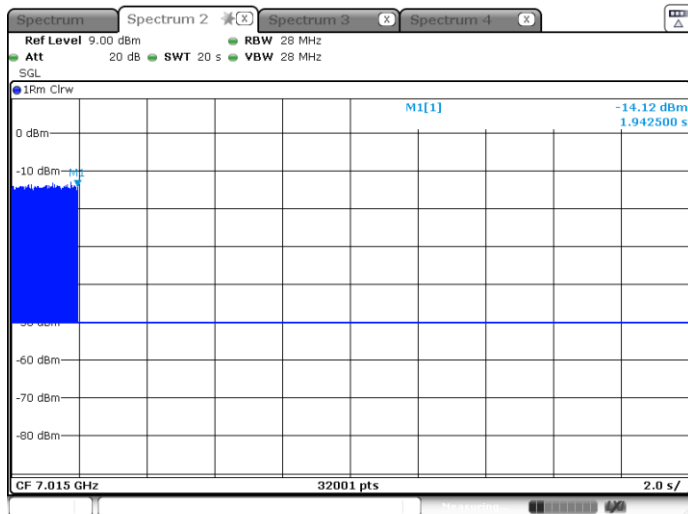
802.11ax (HE160)-Channel 207 (High Edge)



Date: 6 JAN 2023 09:40:44

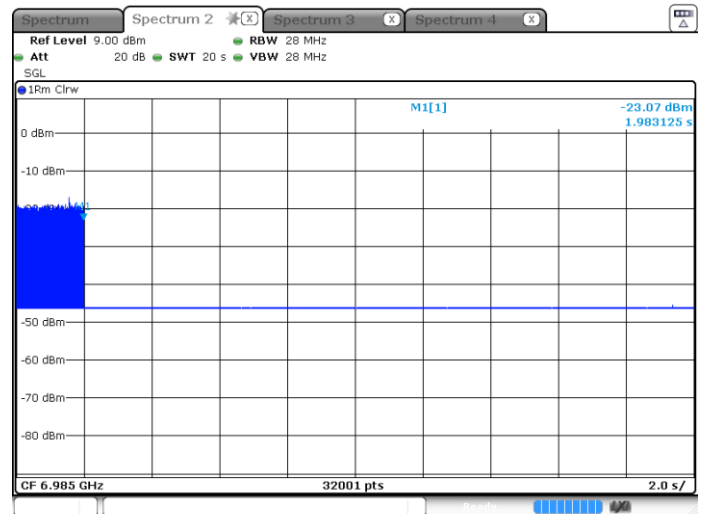
Plots of EUT Tx waveform

## 802.11ax (HE20)-Channel 213



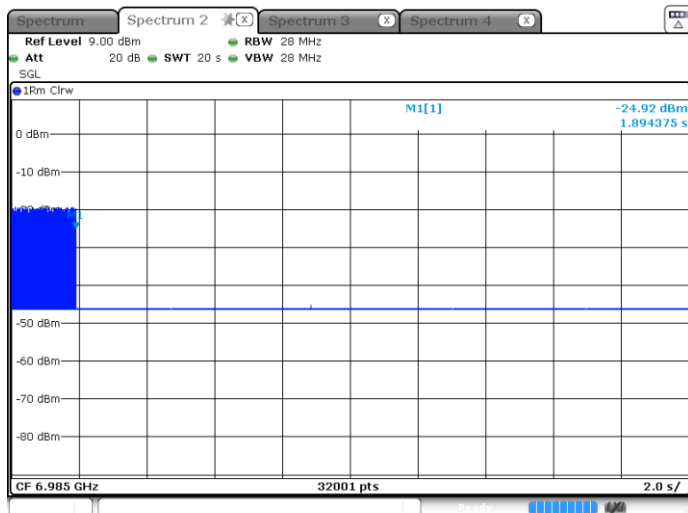
Date: 6 JAN 2023 09:22:52

## 802.11ax (HE160)-Channel 207 (Low Edge)



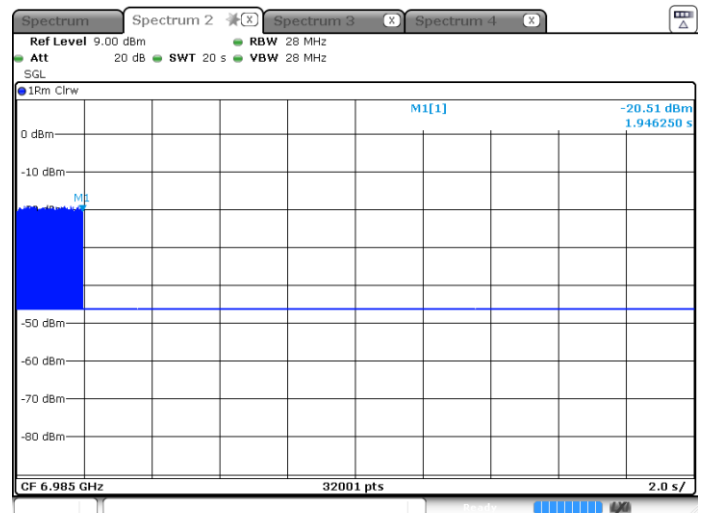
Date: 6 JAN 2023 08:34:46

## 802.11ax (HE160)-Channel 207 (Middle Edge)



Date: 6 JAN 2023 08:39:19

## 802.11ax (HE160)-Channel 207 (High Edge)



Date: 6 JAN 2023 08:45:00



## A.8 In-Band Emissions

Note: Not applicable.

## **ANNEX B TEST SETUP PHOTOS**

Please refer the document “BL-SZ22B0940-AR-2.PDF”.

## **ANNEX C EUT EXTERNAL PHOTOS**

Please refer the document “BL-SZ22B0940-AW.PDF”.

## **ANNEX D EUT INTERNAL PHOTOS**

Please refer the document “BL-SZ22B0940-AI.PDF”.

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--END OF REPORT--