



# FCC RADIO TEST REPORT

FCC ID : J9C-M2X72  
Equipment : Module  
Brand Name : Qualcomm  
Model Name : M2X72  
Applicant : Qualcomm Technologies, Inc.  
5775 Morehouse Drive, San Diego, California 92121, United States  
Manufacturer : Qualcomm Technologies, Inc.  
5775 Morehouse Drive, San Diego, California 92121, United States  
Standard : FCC 47 CFR Part 2, 96

The product was received on Mar. 27, 2024 and testing was performed from May 02, 2024 to Jul. 26, 2024. We, Sporton International Inc. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

*Louis Wu*

Approved by: Louis Wu

**Sporton International Inc. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)



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History of this test report

| Report No.   | Version | Description             | Issue Date    |
|--------------|---------|-------------------------|---------------|
| FG3D2803-02E | 01      | Initial issue of report | Aug. 08, 2024 |
|              |         |                         |               |
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### Summary of Test Result

| Report Clause | Ref Std. Clause   | Test Items                                    | Result (PASS/FAIL) | Remark                                        |
|---------------|-------------------|-----------------------------------------------|--------------------|-----------------------------------------------|
| 3.2           | §2.1046           | Conducted Output Power                        | Pass               | -                                             |
| 3.3           | §96.41            | Peak-to-Average Ratio                         | Pass               | -                                             |
| 3.4           | §96.41            | Effective Isotropic Radiated Power            | Pass               | -                                             |
| 3.5           | §2.1049<br>§96.41 | Occupied Bandwidth                            | Pass               | -                                             |
| 3.6           | §2.1051<br>§96.41 | Conducted Band Edge Measurement               | Pass               | -                                             |
| 3.7           | §2.1051<br>§96.41 | Conducted Spurious Emission                   | Pass               | -                                             |
| 3.8           | §2.1055           | Frequency Stability for Temperature & Voltage | Pass               | -                                             |
| 4.4           | §2.1053<br>§96.41 | Radiated Spurious Emission                    | Pass               | 4.78 dB<br>under the limit at<br>14436.00 MHz |

**Conformity Assessment Condition:**

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty".

**Disclaimer:**

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

**Reviewed by: Keven Cheng****Report Producer: Rebecca Wu**

# 1 General Description

## 1.1 Product Feature of Equipment Under Test

| Product Feature                                                |                 |              |              |                 |                    |                         |
|----------------------------------------------------------------|-----------------|--------------|--------------|-----------------|--------------------|-------------------------|
| <b>General Specs</b><br>WCDMA/LTE/5G NR and GNSS.              |                 |              |              |                 |                    |                         |
| <b>Support band and evaluated information</b>                  |                 |              |              |                 |                    |                         |
| <b>Supported band</b>                                          |                 |              | n48          |                 |                    |                         |
| <b>Evaluated and Tested band</b>                               |                 |              | n48          |                 |                    |                         |
| <b>TDD band Power Class</b>                                    |                 |              |              |                 |                    |                         |
| n48                                                            | <b>SISO PC3</b> |              |              | <b>MIMO PC3</b> |                    |                         |
|                                                                | V               |              |              | V               |                    |                         |
| <b>RF Exposure</b><br><b>Max Antenna Gain information(dBi)</b> |                 |              |              |                 |                    |                         |
| <b>Band</b>                                                    | <b>Ant 0</b>    | <b>Ant 1</b> | <b>Ant 2</b> | <b>Ant 3</b>    | <b>Main Ant. #</b> | <b>MIMO Main Ant. #</b> |
| n48                                                            | 1.2             | 1.2          | 1.2          | 1.2             | 0                  | 0&2                     |

**Remark:** The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.

## 1.2 Modification of EUT

No modifications made to the EUT during the testing.



### 1.3 Testing Site

|                       |                                                                                                                           |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------|
| Test Site             | Sporton International Inc. EMC & Wireless Communications Laboratory                                                       |
| Test Site Location    | No.52, Huaya 1st Rd., Guishan Dist.,<br>Taoyuan City 333, Taiwan (R.O.C.)<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |
| Test Site No.         | <b>Sporton Site No.</b><br>TH03-HY                                                                                        |
| Test Engineer         | Sherry Wu and Kelvin Lu                                                                                                   |
| Temperature (°C)      | 20~24                                                                                                                     |
| Relative Humidity (%) | 50~58                                                                                                                     |

|                       |                                                                                                                                                  |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Site             | Sporton International Inc. Wensan Laboratory                                                                                                     |
| Test Site Location    | No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist.,<br>Taoyuan City 333010, Taiwan (R.O.C.)<br>TEL: +886-3-327-0868<br>FAX: +886-3-327-0855 |
| Test Site No.         | <b>Sporton Site No.</b><br>03CH11-HY (TAF Code: 3786)                                                                                            |
| Test Engineer         | Yuan Lee, Sam Chou, Fu Chen, and Troye Hsieh                                                                                                     |
| Temperature (°C)      | 19.2~21.8                                                                                                                                        |
| Relative Humidity (%) | 50.1~67.6                                                                                                                                        |
| Remark                | The Radiated Spurious Emission test item subcontracted to Sporton International Inc. Wensan Laboratory.                                          |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: TW1190 and TW3786



## 1.4 Applied Standards

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

- ♦ ANSI C63.26-2015
- ♦ FCC 47 CFR Part 2, 96
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- ♦ FCC KDB 940660 D01 Part 96 CBRS Eqpt v03
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

**Remark:**

1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.
3. The TAF code is not including all the FCC KDB listed without accreditation.

## 2 Test Configuration of Equipment Under Test

### 2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.26 exploratory test procedures and only the worst case emissions were reported in this report.

| Modulation Type | Modulation           | Modulation Type | Modulation     |
|-----------------|----------------------|-----------------|----------------|
| A               | DFT-s-OFDM PI/2 BPSK | N/A             | N/A            |
| B               | DFT-s-OFDM QPSK      | F               | CP-OFDM QPSK   |
| C               | DFT-s-OFDM 16QAM     | G               | CP-OFDM 16QAM  |
| D               | DFT-s-OFDM 64QAM     | H               | CP-OFDM 64QAM  |
| E               | DFT-s-OFDM 256QAM    | I               | CP-OFDM 256QAM |

#### <SISO Mode>

| Test Item           | Modulation Type  | Bandwidth | RB Size       | Channel |
|---------------------|------------------|-----------|---------------|---------|
| Conducted Power     | A, B, C, D, E    | All       | 1, Half, Full | L, M, H |
| EIRP                | A, B, C, D, E    | All       | 1, Half, Full | L, M, H |
| PAR                 | A, B, C, D, E    | 20 MHz    | Full          | M       |
| Bandwidth           | A, F, G, H, I    | All       | Full          | M       |
| ACLR, Mask          | A, B, C, D, E, F | All       | 1RB<br>Full   | L, M, H |
| CSE                 | B                | All       | 1RB           | L, M, H |
| Frequency Stability | A                | 20 MHz    | Full          | M       |
| RSE                 | A                | 40 MHz    | 1RB           | L, M, H |

#### Remark:

1. Evaluated all the transmitter signal and reporting worst-case configuration among all modulation types.
2. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst-case emissions are reported.
3. One representative bandwidth is selected to perform PAR and frequency stability.
4. For 5G NR n48 support SISO Mode Antenna 0 (Main Ant.) and Antenna 1& 2& 3; Radiated Spurious Emission is full test. Conducted test items are verified and the worst case is Antenna 0. Therefore, the report only performed Antenna 0 test results.
5. The test country code is set to MCC 310.
6. For 5G NR n48 SISO Mode Modulation support CP-OFDM & DFT-s-OFDM. Therefore, the report only performed Higher Conducted power (DFT-s-OFDM) test results.

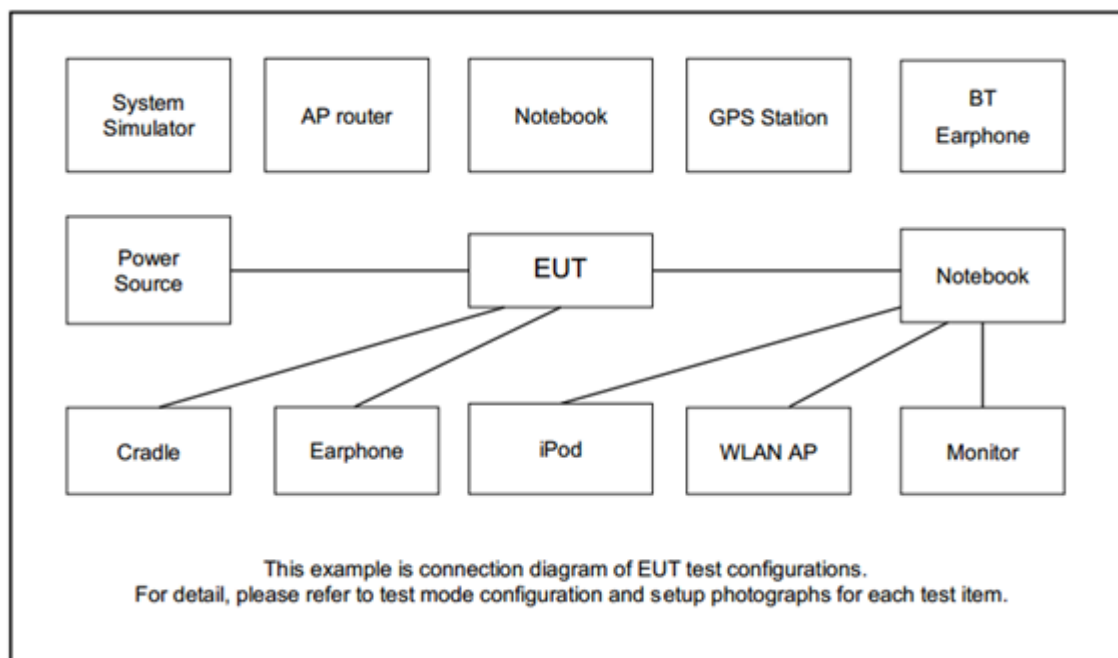
**<MIMO Mode>**

| Test Item           | Modulation Type | Bandwidth | RB Size       | Channel |
|---------------------|-----------------|-----------|---------------|---------|
| Conducted Power     | F, G, H, I      | All       | 1, Half, Full | L, M, H |
| EIRP                | F, G, H, I      | All       | 1, Half, Full | L, M, H |
| PAR                 | F, G, H, I      | 20 MHz    | Full          | M       |
| Bandwidth           | F, G, H, I      | All       | Full          | M       |
| ACLR, Mask          | F, G, H, I      | All       | 1RB<br>Full   | L, M, H |
| CSE                 | F               | All       | 1RB           | L, M, H |
| Frequency Stability | F               | 20 MHz    | Full          | M       |
| RSE                 | F               | 40 MHz    | 1RB           | L, M, H |

**Remark:**

1. Evaluated all the transmitter signal and reporting worst-case configuration among all modulation types.
2. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst-case emissions are reported.
3. One representative bandwidth is selected to perform PAR& frequency stability.
4. For 5G NR n48 support MIMO Mode Antenna 0+2 (Main Ant.) and Antenna 0+1& 0+3& 1+2& 1+0& 1+3& 2+0& 2+1& 2+3& 3+2& 3+0& 3+1; Radiated Spurious Emission is full test. Conducted test items are verified and the worst case is Antenna 0+2. Therefore, the report only performed Antenna 0+2 test results.
5. For 5G NR n48 MIMO Mode Modulation support CP-OFDM only.
6. The test country code is set to MCC 310.

## 2.2 Connection Diagram of Test System



## 2.3 Support Unit used in test configuration and system

| Item | Equipment        | Brand Name | Model No.    | FCC ID | Data Cable | Power Cord        |
|------|------------------|------------|--------------|--------|------------|-------------------|
| 1.   | Carrier board    | Qualcomm   | 30-35174-500 | N/A    | N/A        | N/A               |
| 2.   | System Simulator | Anritsu    | MT8821C      | N/A    | N/A        | Unshielded, 1.8 m |
| 3.   | System Simulator | Anritsu    | MT8000A      | N/A    | N/A        | Unshielded, 1.8 m |

## 2.4 Measurement Results Explanation Example

### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.5 dB and 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

$$= 4.5 + 10 = 14.5 \text{ (dB)}$$



## 2.5 Frequency List of Low/Middle/High Channels

| 5G NR n48 Channel and Frequency List |                        |         |         |         |
|--------------------------------------|------------------------|---------|---------|---------|
| BW [MHz]                             | Channel/Frequency(MHz) | Lowest  | Middle  | Highest |
| 40                                   | Channel                | 638000  | 641666  | 645332  |
|                                      | Frequency              | 3570    | 3624.99 | 3679.98 |
| 30                                   | Channel                | 637668  | 641666  | 645666  |
|                                      | Frequency              | 3565.02 | 3624.99 | 3684.99 |
| 20                                   | Channel                | 637334  | 641666  | 646000  |
|                                      | Frequency              | 3560.01 | 3624.99 | 3690    |
| 15                                   | Channel                | 637168  | 641666  | 646166  |
|                                      | Frequency              | 3557.52 | 3624.99 | 3692.49 |
| 10                                   | Channel                | 637000  | 641666  | 646332  |
|                                      | Frequency              | 3555    | 3624.99 | 3694.98 |

### 3 Conducted Test Items

#### 3.1 Measuring Instruments

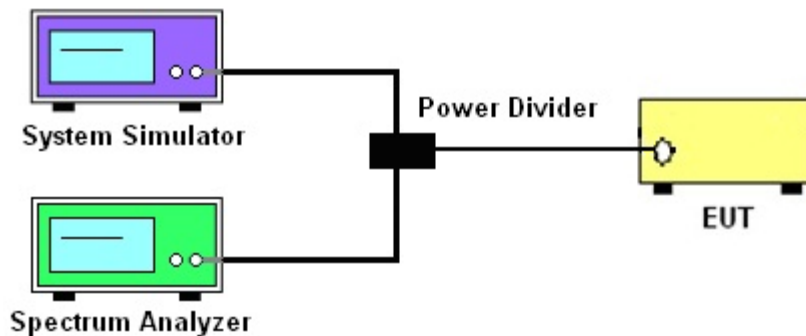
See list of measuring instruments of this test report.

##### 3.1.1 Test Setup

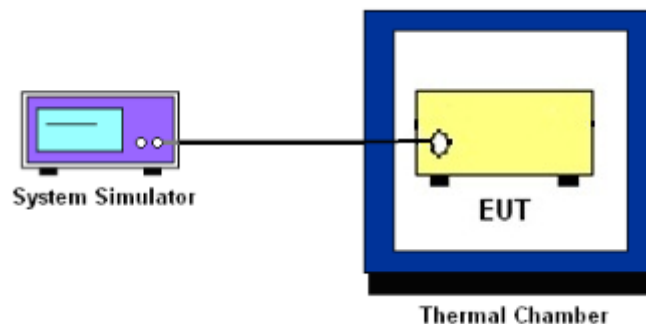
##### 3.1.2 Conducted Output Power



##### 3.1.3 EIRP, Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge, and Conducted Spurious Emission



##### 3.1.4 Frequency Stability



##### 3.1.5 Test Result of Conducted Test

Please refer to Appendix A.



## **3.2 Conducted Output Power Measurement**

### **3.2.1 Description of the Conducted Output Power Measurement**

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

### **3.2.2 Test Procedures**

1. The transmitter output port was connected to base station.
2. Set EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

### 3.3 Peak-to-Average Ratio

#### 3.3.1 Description of the PAR Measurement

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

#### 3.3.2 Test Procedures

The testing follows ANSI C63.26-2015 Section 5.2.6

1. The EUT was connected to spectrum and system simulator via a power divider.
2. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
3. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
4. Record the deviation as Peak to Average Ratio.



### 3.4 EIRP

#### 3.4.1 Description of the EIRP Measurement

The EIRP of mobile transmitters must not exceed 23 dBm /10 megahertz for 5G NR n48.

The testing follows ANSI C63.26-2015 Section 5.2.5.5.

According to KDB 412172 D01 Power Approach,

$EIRP = PT + GT - LC$ , where

PT = transmitter output power in dBm

GT = gain of the transmitting antenna in dBi

LC = signal attenuation in the connecting cable between the transmitter and antenna in dB

| Device          | Maximum EIRP<br>(dBm/10 MHz) | Maximum PSD<br>(dBm/MHz) |
|-----------------|------------------------------|--------------------------|
| End User Device | 23                           | n/a                      |

**Remark:**

1. Total channel power is complied with EIRP limit 23dBm/10MHz.
2. The MIMO mode is completely uncorrelated, so the directional gain is selected the maximum gain among all antennas.

#### 3.4.2 Test Procedures

The testing follows procedure in Section 5.2 of ANSI C63.26-2015 and KDB 940660 D01 Part 96 CBRS Eqpt v03 Section 3.2(b)(2)

Determine the EIRP by adding the effective antenna gain to the measured average conducted power level.

## 3.5 Occupied Bandwidth

### 3.5.1 Description of Occupied Bandwidth Measurement

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

### 3.5.2 Test Procedures

The testing follows ANSI C63.26-2015 Section 5.4.3 (26dB) and Section 5.4.4 (99OB)

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
3. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
4. Set the detection mode to peak, and the trace mode to max hold.
5. Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace.  
(this is the reference value)
6. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
7. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
8. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

## 3.6 Conducted Band Edge

### 3.6.1 Description of Conducted Band Edge Measurement

The conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed  $-13$  dBm/MHz within 0 to B megahertz (where B is the bandwidth in megahertz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B megahertz below the lower CBSD-assigned channel edge. At all frequencies greater than B megahertz above the upper CBSD assigned channel edge and less than B megahertz below the lower CBSD-assigned channel edge, the conducted power of any End User Device emission shall not exceed  $-25$  dBm/MHz. Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

### 3.6.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.1.

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The band edges of low and high channels for the highest RF powers were measured.
3. Set RBW  $\geq 1\%$  EBW in the 1MHz band immediately outside and adjacent to the band edge.
4. Beyond the 1 MHz band from the band edge, RBW=1MHz was used
5. Set spectrum analyzer with RMS detector.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. For MIMO mode, add additional MIMO factor  $10\log(\text{NTX}=2) = 3.01\text{dB}$  into the spectrum analyzer offset.

For Adjacent Channel Leakage Ratio (ACLR) measurement,

1. The Adjacent Channel Leakage Ratio (ACLR) is the ratio of the average power in the assigned aggregated channel bandwidth to the average power over the equivalent adjacent channel bandwidth.
2. The option ACLR of spectrum analyzer is used and measures the ACLR ratio by setting equivalent channel bandwidth.
3. The measured ACLR ratio shall be at least 30 dB.

## 3.7 Conducted Spurious Emission

### 3.7.1 Description of Conducted Spurious Emission Measurement

96.41 (e)(2)

The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

### 3.7.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.1.

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.  
The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz.
6. Set spectrum analyzer with RMS detector.
7. Taking the record of maximum spurious emission.
8. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
9. The limit line is -40dBm/MHz.
10. For MIMO mode, add additional MIMO factor  $10\log(\text{NTX}=2) = 3.01\text{dB}$  into the spectrum analyzer offset.



## **3.8 Frequency Stability**

### **3.8.1 Description of Frequency Stability Measurement**

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block.

### **3.8.2 Test Procedures for Temperature Variation**

The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.

1. The EUT was set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

### **3.8.3 Test Procedures for Voltage Variation**

The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.

1. The EUT was placed in a temperature chamber at 25±5° C and connected with the system simulator.
2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

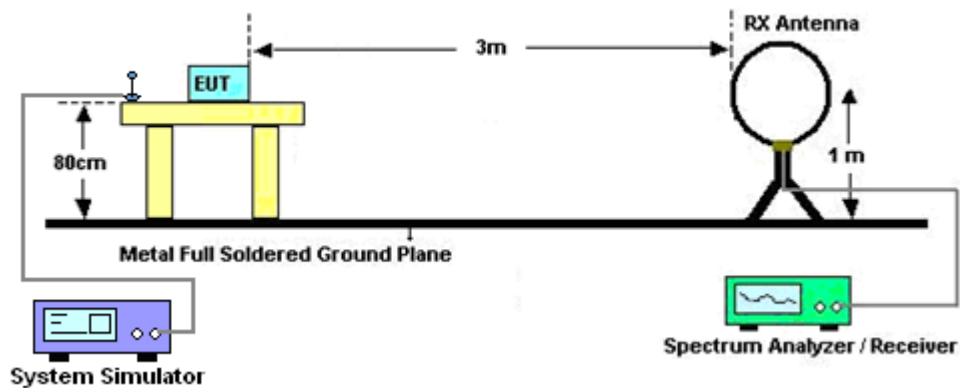
## 4 Radiated Test Items

### 4.1 Measuring Instruments

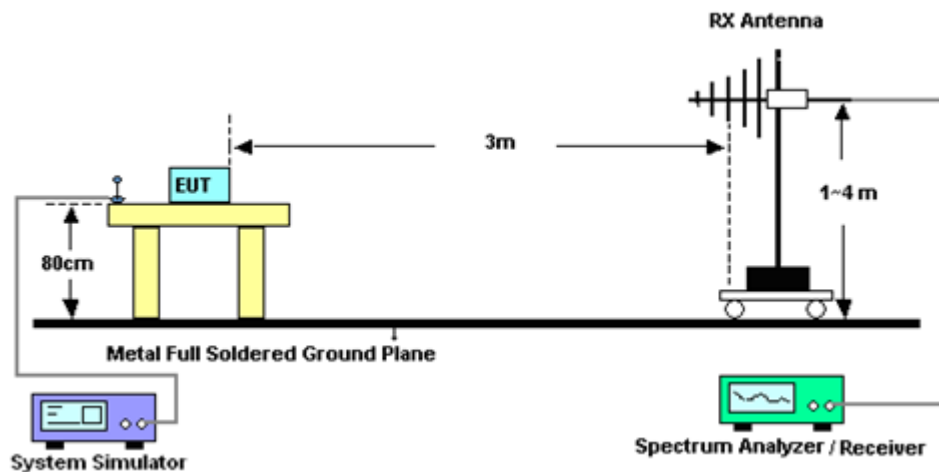
See list of measuring instruments of this test report.

### 4.2 Test Setup

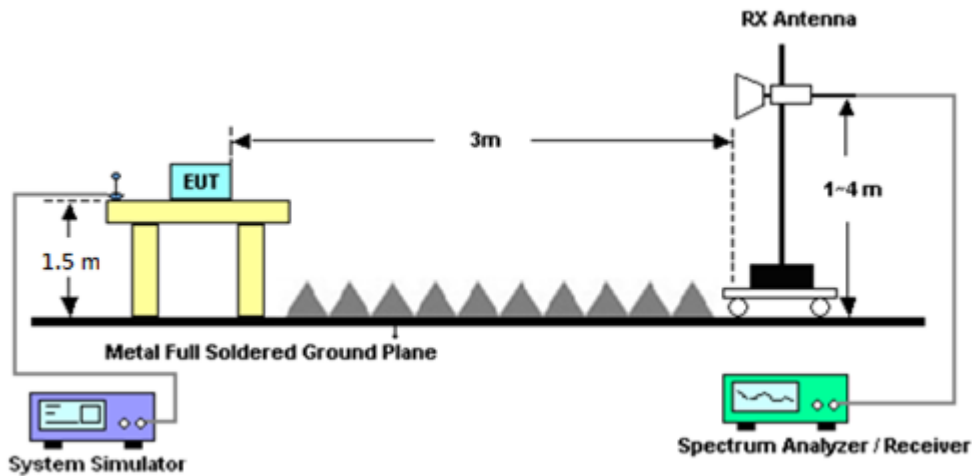
For radiated test below 30MHz



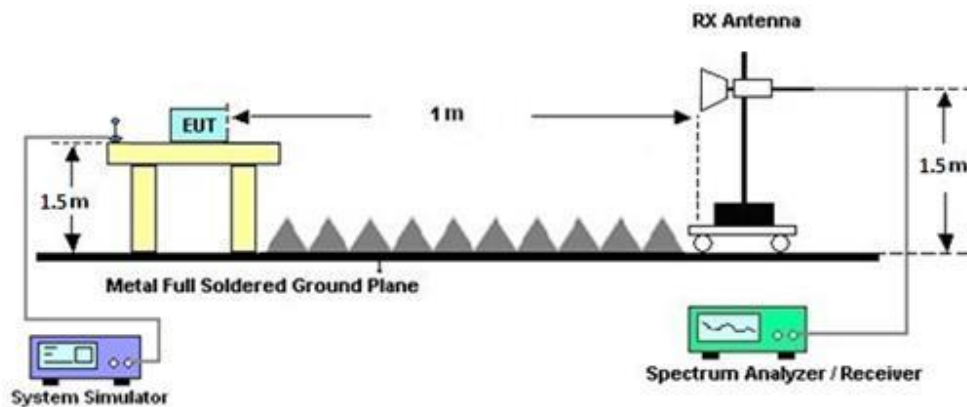
For radiated test from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



## 4.3 Test Result of Radiated Test

Please refer to Appendix B.

### Note:

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

## 4.4 Radiated Spurious Emission

### 4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI C63.26-2015.

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least -40dBm / MHz

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

### 4.4.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 7 and ANSI C63.26-2015 section 5.5.4 Radiated measurement using the field strength method.

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
5. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
7. To convert spectrum reading E(dBuV/m) to EIRP(dBm)  
$$\text{EIRP(dBm)} = \text{Level (dBuV/m)} + 20\log(d) - 104.77,$$
where d is the distance at which field strength limit is specified in the rules
8. Field Strength Level (dBm) = Spectrum Reading (dBm) + Antenna Factor + Cable Loss + Read Level - Preamp Factor.
9. ERP (dBm) = EIRP (dBm) - 2.15
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.



## 5 List of Measuring Equipment

| Instrument           | Brand Name      | Model No.                    | Serial No.       | Characteristics               | Calibration Date | Test Date                   | Due Date      | Remark                |
|----------------------|-----------------|------------------------------|------------------|-------------------------------|------------------|-----------------------------|---------------|-----------------------|
| Bilog Antenna        | TESEQ           | CBL 6111D & N-6-06           | 35414 & AT-N0602 | 30MHz~1GHz                    | Oct. 07, 2023    | May 14, 2024~Jul. 26, 2024  | Oct. 06, 2024 | Radiation (03CH11-HY) |
| Loop Antenna         | Rohde & Schwarz | HFH2-Z2                      | 100488           | 9 kHz~30 MHz                  | Sep. 12, 2023    | May 14, 2024~Jul. 26, 2024  | Sep. 11, 2024 | Radiation (03CH11-HY) |
| Horn Antenna         | SCHWARZBECK     | BBHA 9120 D                  | 9120D-01620      | 1GHz~18GHz                    | Aug. 17, 2023    | May 14, 2024~Jul. 26, 2024  | Aug. 16, 2024 | Radiation (03CH11-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK     | BBHA 9170                    | 00993            | 18GHz~40GHz                   | Nov. 24, 2023    | May 14, 2024~Jul. 26, 2024  | Nov. 23, 2024 | Radiation (03CH11-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK     | BBHA 9170                    | 1223             | 18GHz~40GHz                   | Jul. 10, 2023    | May 14, 2024~Jun. 23, 2024  | Jul. 09, 2024 | Radiation (03CH11-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK     | BBHA 9170                    | 1223             | 18GHz~40GHz                   | Jun. 24, 2024    | Jun 24, 2024~Jul. 26, 2024  | Jun. 23, 2025 | Radiation (03CH11-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK     | BBHA 9170                    | 1224             | 18GHz~40GHz                   | Jul. 10, 2023    | May 14, 2024~Jun. 23, 2024  | Jul. 09, 2024 | Radiation (03CH11-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK     | BBHA 9170                    | 1224             | 18GHz~40GHz                   | Jun. 24, 2024    | Jun 24, 2024~Jul. 26, 2024  | Jun. 23, 2025 | Radiation (03CH11-HY) |
| Amplifier            | SONOMA          | 310N                         | 187312           | 9kHz~1GHz                     | Dec. 08, 2023    | May 14, 2024~Jul. 26, 2024  | Dec. 07, 2024 | Radiation (03CH11-HY) |
| Preamplifier         | Keysight        | 83017A                       | MY53270080       | 1GHz~26.5GHz                  | Mar. 25, 2024    | May 14, 2024~Jul. 26, 2024  | Mar. 24, 2025 | Radiation (03CH11-HY) |
| Preamplifier         | Jet-Power       | JPA0118-55-303               | 1710001800055007 | 1GHz~18GHz                    | Jun. 14, 2023    | May 14, 2024~Jun. 12, 2024  | Jun. 13, 2024 | Radiation (03CH11-HY) |
| Preamplifier         | Jet-Power       | JPA0118-55-303               | 1710001800055007 | 1GHz~18GHz                    | Jun. 13, 2024    | Jun. 13, 2024~Jul. 26, 2024 | Jun. 12, 2025 | Radiation (03CH11-HY) |
| Preamplifier         | EMEC            | EM18G40G                     | 060801           | 18GHz~40GHz                   | Jun. 27, 2023    | May 14, 2024~May 26, 2024   | Jun. 26, 2024 | Radiation (03CH11-HY) |
| Preamplifier         | EMEC            | EM18G40G                     | 060801           | 18GHz~40GHz                   | May 27, 2024     | May 27, 2024~Jul. 26, 2024  | May 26, 2025  | Radiation (03CH11-HY) |
| Preamplifier         | EMEC            | EM18G40G                     | 060871           | 18GHz~40GHz                   | Aug. 30, 2023    | May 14, 2024~Jul. 12, 2024  | Aug. 29, 2024 | Radiation (03CH11-HY) |
| Preamplifier         | EMEC            | EM18G40G                     | 060872           | 18GHz~40GHz                   | Sep. 06, 2023    | May 14, 2024~Jul. 26, 2024  | Sep. 05, 2024 | Radiation (03CH11-HY) |
| Spectrum Analyzer    | Keysight        | N9010A                       | MY54200486       | 10Hz~44GHz                    | Oct. 05, 2023    | May 14, 2024~Jul. 26, 2024  | Oct. 04, 2024 | Radiation (03CH11-HY) |
| EMI Test Receiver    | Keysight        | N9038A(MXE)                  | MY55420170       | 20MHz~8.4GHz                  | Aug. 02, 2023    | May 14, 2024~Jul. 26, 2024  | Aug. 01, 2024 | Radiation (03CH11-HY) |
| Controller           | EMEC            | EM 1000                      | N/A              | Control Turn table & Ant Mast | N/A              | May 14, 2024~Jul. 26, 2024  | N/A           | Radiation (03CH11-HY) |
| Antenna Mast         | EMEC            | AM-BS-4500-B                 | N/A              | 1~4m                          | N/A              | May 14, 2024~Jul. 26, 2024  | N/A           | Radiation (03CH11-HY) |
| Turn Table           | EMEC            | TT 2000                      | N/A              | 0~360 Degree                  | N/A              | May 14, 2024~Jul. 26, 2024  | N/A           | Radiation (03CH11-HY) |
| Software             | Audix           | E3 6.2009-8-24               | RK-001053        | N/A                           | N/A              | May 14, 2024~Jul. 26, 2024  | N/A           | Radiation (03CH11-HY) |
| Hygrometer           | TECPEL          | DTM-303B                     | TP140325         | N/A                           | Dec. 08, 2023    | May 14, 2024~Jul. 26, 2024  | Dec. 07, 2024 | Radiation (03CH11-HY) |
| RF Cable             | HUBER + SUHNER  | SUCOFLEX 102                 | 801595/2         | 30M~40G                       | Mar. 06, 2024    | May 14, 2024~May 22, 2024   | Mar. 05, 2025 | Radiation (03CH11-HY) |
| RF Cable             | HUBER + SUHNER  | SUCOFLEX 102                 | 804013/2         | 30M~40G                       | May 23, 2024     | May 23, 2024~Jul. 26, 2024  | May 22, 2025  | Radiation (03CH11-HY) |
| RF Cable             | HUBER + SUHNER  | SUCOFLEX 102                 | MY2859/2         | 30MHz~40GHz                   | Mar. 06, 2024    | May 14, 2024~Jul. 26, 2024  | Mar. 05, 2025 | Radiation (03CH11-HY) |
| RF Cable             | HUBER + SUHNER  | SUCOFLEX 102                 | 803951/2         | 9K~30M                        | Mar. 06, 2024    | May 14, 2024~Jul. 26, 2024  | Mar. 05, 2025 | Radiation (03CH11-HY) |
| RF Cable             | HUBER + SUHNER  | SUCOFLEX 102                 | 803951/2         | 30M~40G                       | Mar. 06, 2024    | May 14, 2024~Jul. 26, 2024  | Mar. 05, 2025 | Radiation (03CH11-HY) |
| Filter               | Wainwright      | WHKX12-900-1000-15000-60SS   | SN12             | 1GHz High Pass Filter         | Sep. 11, 2023    | May 14, 2024~Jul. 26, 2024  | Sep. 10, 2024 | Radiation (03CH11-HY) |
| Filter               | Wainwright      | WHKX12-2700-3000-18000-60SS  | SN3              | 3GHz High Pass Filter         | Sep. 11, 2023    | May 14, 2024~Jul. 26, 2024  | Sep. 10, 2024 | Radiation (03CH11-HY) |
| Filter               | Wainwright      | WHKX8-5872.5-6750-18000-40SS | SN3              | 6.75GHz High Pass Filter      | Sep. 11, 2023    | May 14, 2024~Jul. 26, 2024  | Sep. 10, 2024 | Radiation (03CH11-HY) |



| Instrument             | Brand Name      | Model No.                        | Serial No. | Characteristics        | Calibration Date | Test Date                   | Due Date      | Remark              |
|------------------------|-----------------|----------------------------------|------------|------------------------|------------------|-----------------------------|---------------|---------------------|
| DC Power Supply        | GW Instek       | GPE2323                          | GET910884  | 0V~64V ;0A~6A          | Nov. 16, 2023    | May 02, 2024~Jul. 24, 2024  | Nov. 15, 2024 | Conducted (TH03-HY) |
| Signal Analyzer        | Rohde & Schwarz | FSV3044                          | 101049     | 10Hz~44GHz             | Sep. 26, 2023    | May 02, 2024~Jul. 24, 2024  | Sep. 25, 2024 | Conducted (TH03-HY) |
| Temperature Chamber    | ESPEC           | LHU-113                          | 1012005860 | -20℃ ~85℃              | Dec. 13, 2023    | May 02, 2024~Jul. 24, 2024  | Dec. 12, 2024 | Conducted (TH03-HY) |
| Hygrometer             | TECEPEL         | DTM-303B                         | TP200886   | NA                     | Mar. 14, 2024    | May 02, 2024~Jul. 24, 2024  | Mar. 13, 2025 | Conducted (TH03-HY) |
| Base Station (Measure) | Anritsu         | MT8821C                          | 6262116725 | LTE                    | Oct. 25, 2023    | May 02, 2024~Jul. 24, 2024  | Oct. 24, 2024 | Conducted (TH03-HY) |
| Base Station (Measure) | Anritsu         | MT8000A                          | 6262148275 | FR1                    | Oct. 24, 2023    | May 02, 2024~Jul. 24, 2024  | Oct. 23, 2024 | Conducted (TH03-HY) |
| Coupler                | MVE             | MVE4816-10                       | A800024    | N/A                    | Mar. 12, 2024    | May 02, 2024~Jul. 24, 2024  | Mar. 11, 2025 | Conducted (TH03-HY) |
| Power divider          | Anritsu         | K241C                            | 2143398    | 9KHz~40GHz             | Jun. 13, 2023    | May 02, 2024~Jun. 11, 2024  | Jun. 12, 2024 | Conducted (TH03-HY) |
| Power divider          | Anritsu         | K241C                            | 2143398    | 9KHz~40GHz             | Jun. 13, 2024    | Jun. 13, 2024~Jul. 24, 2024 | Jun. 12, 2025 | Conducted (TH03-HY) |
| Software 1             | Sporton         | FCC<br>5GNR_FSV3044_<br>20231106 | N/A        | Conducted<br>Test Item | N/A              | May 02, 2024~Jul. 24, 2024  | N/A           | Conducted (TH03-HY) |



## 6 Measurement Uncertainty

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

|                                                                            |          |
|----------------------------------------------------------------------------|----------|
| Measuring Uncertainty for a Level of<br>Confidence of 95% ( $U = 2Uc(y)$ ) | 3.290 dB |
|----------------------------------------------------------------------------|----------|

### Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

|                                                                            |          |
|----------------------------------------------------------------------------|----------|
| Measuring Uncertainty for a Level of<br>Confidence of 95% ( $U = 2Uc(y)$ ) | 2.076 dB |
|----------------------------------------------------------------------------|----------|

### Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

|                                                                            |          |
|----------------------------------------------------------------------------|----------|
| Measuring Uncertainty for a Level of<br>Confidence of 95% ( $U = 2Uc(y)$ ) | 2.082 dB |
|----------------------------------------------------------------------------|----------|



## Appendix A. Test Results of Conducted Test

### Conducted Output Power(Average power) and EIRP

<SISO Mode>

| NR n48 Maximum Average Power [dBm] (GT - LC = 1.2 dB) |                    |           |           |        |        |         |            |         |  |  |
|-------------------------------------------------------|--------------------|-----------|-----------|--------|--------|---------|------------|---------|--|--|
| BW [MHz]                                              | RB Size            | RB Offset | Mod       | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |  |  |
| 10                                                    | 1                  | 1         | PI/2 BPSK | 21.66  | 21.77  | 21.72   | 22.98      | 0.1986  |  |  |
| 10                                                    | 1                  | 22        |           | 21.75  | 21.76  | 21.77   |            |         |  |  |
| 10                                                    | 12                 | 6         |           | 21.70  | 21.78  | 21.71   |            |         |  |  |
| 10                                                    | 1                  | 0         |           | 20.98  | 21.15  | 21.03   |            |         |  |  |
| 10                                                    | 1                  | 23        |           | 21.06  | 21.08  | 21.04   |            |         |  |  |
| 10                                                    | 24                 | 0         |           | 21.22  | 21.29  | 21.22   |            |         |  |  |
| 10                                                    | 1                  | 1         | QPSK      | 21.60  | 21.72  | 21.58   |            |         |  |  |
| 10                                                    | 1                  | 22        |           | 21.69  | 21.78  | 21.67   |            |         |  |  |
| 10                                                    | 12                 | 6         |           | 21.59  | 21.74  | 21.57   |            |         |  |  |
| 10                                                    | 1                  | 0         |           | 20.51  | 20.63  | 20.47   |            |         |  |  |
| 10                                                    | 1                  | 23        |           | 20.61  | 20.61  | 20.60   |            |         |  |  |
| 10                                                    | 24                 | 0         |           | 20.66  | 20.80  | 20.72   |            |         |  |  |
| 10                                                    | 1                  | 1         | 16-QAM    | 20.42  | 20.55  | 20.48   | 21.75      | 0.1496  |  |  |
| 10                                                    | 1                  | 1         | 64-QAM    | 19.02  | 19.19  | 19.04   |            |         |  |  |
| 10                                                    | 1                  | 1         | 256-QAM   | 17.04  | 17.28  | 17.13   |            |         |  |  |
| Limit                                                 | EIRP < 23dBm/10MHz |           |           | Result |        |         | Pass       |         |  |  |

Total EIRP power is less than partial EIRP limit 23 dBm/10MHz.

| NR n48 Maximum Average Power [dBm] (GT - LC = 1.2 dB) |                    |           |           |        |        |         |            |         |  |  |
|-------------------------------------------------------|--------------------|-----------|-----------|--------|--------|---------|------------|---------|--|--|
| BW [MHz]                                              | RB Size            | RB Offset | Mod       | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |  |  |
| 15                                                    | 1                  | 1         | PI/2 BPSK | 17.65  | 21.75  | 21.64   | 22.96      | 0.1977  |  |  |
| 15                                                    | 1                  | 36        |           | 21.71  | 21.67  | 17.51   |            |         |  |  |
| 15                                                    | 18                 | 9         |           | 21.76  | 21.74  | 21.65   |            |         |  |  |
| 15                                                    | 1                  | 0         |           | 17.57  | 21.19  | 21.05   |            |         |  |  |
| 15                                                    | 1                  | 37        |           | 21.12  | 21.13  | 17.44   |            |         |  |  |
| 15                                                    | 36                 | 0         |           | 17.70  | 21.29  | 17.64   |            |         |  |  |
| 15                                                    | 1                  | 1         | QPSK      | 17.62  | 21.73  | 21.62   |            |         |  |  |
| 15                                                    | 1                  | 36        |           | 21.63  | 21.65  | 17.49   |            |         |  |  |
| 15                                                    | 18                 | 9         |           | 21.71  | 21.73  | 21.56   |            |         |  |  |
| 15                                                    | 1                  | 0         |           | 17.60  | 20.73  | 20.57   |            |         |  |  |
| 15                                                    | 1                  | 37        |           | 20.62  | 20.60  | 17.45   |            |         |  |  |
| 15                                                    | 36                 | 0         |           | 17.73  | 20.79  | 17.57   |            |         |  |  |
| 15                                                    | 1                  | 1         | 16-QAM    | 16.45  | 20.49  | 20.56   | 21.76      | 0.1500  |  |  |
| 15                                                    | 1                  | 1         | 64-QAM    | 16.69  | 19.15  | 19.13   |            |         |  |  |
| 15                                                    | 1                  | 1         | 256-QAM   | 17.18  | 17.23  | 17.11   |            |         |  |  |
| Limit                                                 | EIRP < 23dBm/10MHz |           |           | Result |        |         | Pass       |         |  |  |

Total EIRP power is less than partial EIRP limit 23 dBm/10MHz.



| NR n48 Maximum Average Power [dBm] (GT - LC = 1.2 dB) |                    |           |           |        |        |         |            |         |  |  |
|-------------------------------------------------------|--------------------|-----------|-----------|--------|--------|---------|------------|---------|--|--|
| BW [MHz]                                              | RB Size            | RB Offset | Mod       | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |  |  |
| 20                                                    | 1                  | 1         | PI/2 BPSK | 17.66  | 21.74  | 21.59   | 22.99      | 0.1991  |  |  |
| 20                                                    | 1                  | 49        |           | 21.71  | 21.69  | 17.54   |            |         |  |  |
| 20                                                    | 25                 | 12        |           | 21.74  | 21.73  | 21.77   |            |         |  |  |
| 20                                                    | 1                  | 0         |           | 17.58  | 21.15  | 21.04   |            |         |  |  |
| 20                                                    | 1                  | 50        |           | 21.10  | 21.06  | 17.42   |            |         |  |  |
| 20                                                    | 50                 | 0         |           | 17.78  | 21.27  | 17.68   |            |         |  |  |
| 20                                                    | 1                  | 1         | QPSK      | 17.66  | 21.67  | 21.56   |            |         |  |  |
| 20                                                    | 1                  | 49        |           | 21.67  | 21.60  | 17.48   |            |         |  |  |
| 20                                                    | 25                 | 12        |           | 21.79  | 21.79  | 21.65   |            |         |  |  |
| 20                                                    | 1                  | 0         |           | 17.54  | 20.64  | 20.53   |            |         |  |  |
| 20                                                    | 1                  | 50        |           | 20.59  | 20.56  | 17.35   |            |         |  |  |
| 20                                                    | 50                 | 0         |           | 17.77  | 20.75  | 17.60   |            |         |  |  |
| 20                                                    | 1                  | 1         | 16-QAM    | 16.47  | 20.53  | 20.54   | 21.74      | 0.1493  |  |  |
| 20                                                    | 1                  | 1         | 64-QAM    | 16.66  | 19.23  | 19.14   |            |         |  |  |
| 20                                                    | 1                  | 1         | 256-QAM   | 16.95  | 17.18  | 17.03   |            |         |  |  |
| Limit                                                 | EIRP < 23dBm/10MHz |           |           | Result |        |         | Pass       |         |  |  |

Total EIRP power is less than partial EIRP limit 23 dBm/10MHz.

| NR n48 Maximum Average Power [dBm] (GT - LC = 1.2 dB) |                    |           |           |        |        |         |            |         |  |  |
|-------------------------------------------------------|--------------------|-----------|-----------|--------|--------|---------|------------|---------|--|--|
| BW [MHz]                                              | RB Size            | RB Offset | Mod       | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |  |  |
| 30                                                    | 1                  | 1         | PI/2 BPSK | 11.35  | 17.91  | 11.40   | 22.99      | 0.1991  |  |  |
| 30                                                    | 1                  | 76        |           | 11.23  | 17.78  | 11.14   |            |         |  |  |
| 30                                                    | 36                 | 18        |           | 11.28  | 21.78  | 21.75   |            |         |  |  |
| 30                                                    | 1                  | 0         |           | 11.30  | 17.77  | 11.39   |            |         |  |  |
| 30                                                    | 1                  | 77        |           | 11.33  | 17.68  | 11.25   |            |         |  |  |
| 30                                                    | 75                 | 0         |           | 11.35  | 17.93  | 11.35   |            |         |  |  |
| 30                                                    | 1                  | 1         | QPSK      | 11.28  | 17.81  | 11.37   |            |         |  |  |
| 30                                                    | 1                  | 76        |           | 11.15  | 17.71  | 11.23   |            |         |  |  |
| 30                                                    | 36                 | 18        |           | 11.30  | 21.77  | 21.79   |            |         |  |  |
| 30                                                    | 1                  | 0         |           | 11.30  | 17.78  | 11.38   |            |         |  |  |
| 30                                                    | 1                  | 77        |           | 11.15  | 17.76  | 11.17   |            |         |  |  |
| 30                                                    | 75                 | 0         |           | 11.22  | 17.84  | 11.36   |            |         |  |  |
| 30                                                    | 1                  | 1         | 16-QAM    | 10.76  | 17.56  | 10.70   | 19.01      | 0.0796  |  |  |
| 30                                                    | 1                  | 1         | 64-QAM    | 10.90  | 17.81  | 10.90   |            |         |  |  |
| 30                                                    | 1                  | 1         | 256-QAM   | 10.78  | 17.27  | 10.92   |            |         |  |  |
| Limit                                                 | EIRP < 23dBm/10MHz |           |           | Result |        |         | Pass       |         |  |  |

Total EIRP power is less than partial EIRP limit 23 dBm/10MHz.



| NR n48 Maximum Average Power [dBm] (GT - LC = 1.2 dB) |                    |           |           |        |        |         |            |         |  |  |
|-------------------------------------------------------|--------------------|-----------|-----------|--------|--------|---------|------------|---------|--|--|
| BW [MHz]                                              | RB Size            | RB Offset | Mod       | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |  |  |
| 40                                                    | 1                  | 1         | PI/2 BPSK | 11.29  | 17.66  | 11.13   | 22.95      | 0.1972  |  |  |
| 40                                                    | 1                  | 104       |           | 11.26  | 17.81  | 11.07   |            |         |  |  |
| 40                                                    | 50                 | 25        |           | 11.25  | 21.75  | 11.33   |            |         |  |  |
| 40                                                    | 1                  | 0         |           | 11.28  | 17.61  | 11.16   |            |         |  |  |
| 40                                                    | 1                  | 105       |           | 11.27  | 17.60  | 11.08   |            |         |  |  |
| 40                                                    | 100                | 0         |           | 11.31  | 17.33  | 11.22   |            |         |  |  |
| 40                                                    | 1                  | 1         | QPSK      | 11.25  | 17.64  | 11.10   |            |         |  |  |
| 40                                                    | 1                  | 104       |           | 11.23  | 17.65  | 11.01   |            |         |  |  |
| 40                                                    | 50                 | 25        |           | 11.33  | 21.70  | 11.21   |            |         |  |  |
| 40                                                    | 1                  | 0         |           | 11.09  | 17.60  | 11.11   |            |         |  |  |
| 40                                                    | 1                  | 105       |           | 11.21  | 17.59  | 11.09   |            |         |  |  |
| 40                                                    | 100                | 0         |           | 11.24  | 17.33  | 11.20   |            |         |  |  |
| 40                                                    | 1                  | 1         | 16-QAM    | 10.76  | 17.48  | 10.53   | 18.83      | 0.0764  |  |  |
| 40                                                    | 1                  | 1         | 64-QAM    | 10.72  | 17.63  | 10.67   |            |         |  |  |
| 40                                                    | 1                  | 1         | 256-QAM   | 10.80  | 17.20  | 10.61   |            |         |  |  |
| Limit                                                 | EIRP < 23dBm/10MHz |           |           | Result |        |         | Pass       |         |  |  |

Total EIRP power is less than partial EIRP limit 23 dBm/10MHz.



<MIMO Mode>

| Part96 NR n48 Maximum Average Power [dBm], DG = 1.2 dBi |                    |        |         |           |        |         |           |        |         |         |        |         |       |        |
|---------------------------------------------------------|--------------------|--------|---------|-----------|--------|---------|-----------|--------|---------|---------|--------|---------|-------|--------|
| BW                                                      | RB                 | RB     | Mod     | Antenna 0 |        |         | Antenna 2 |        |         | Combine |        |         | EIRP  | EIRP   |
| (MHz)                                                   | Size               | Offset |         | Lowest    | Middle | Highest | Lowest    | Middle | Highest | Lowest  | Middle | Highest | (dBm) | (W)    |
| 10                                                      | 1                  | 1      | QPSK    | 17.25     | 17.22  | 17.21   | 16.66     | 16.69  | 16.53   | 19.98   | 19.97  | 19.89   | 21.23 | 0.1327 |
| 10                                                      | 1                  | 22     |         | 17.25     | 17.27  | 17.31   | 16.78     | 16.76  | 16.49   | 20.03   | 20.03  | 19.93   |       |        |
| 10                                                      | 12                 | 6      |         | 17.01     | 17.07  | 17.07   | 16.56     | 16.61  | 16.41   | 19.80   | 19.86  | 19.76   |       |        |
| 10                                                      | 1                  | 0      |         | 15.79     | 15.67  | 15.61   | 15.18     | 15.17  | 14.98   | 18.51   | 18.44  | 18.32   |       |        |
| 10                                                      | 1                  | 23     |         | 15.67     | 15.68  | 15.77   | 15.12     | 15.23  | 14.99   | 18.41   | 18.47  | 18.41   |       |        |
| 10                                                      | 24                 | 0      |         | 15.60     | 15.60  | 15.64   | 15.12     | 15.17  | 15.03   | 18.38   | 18.40  | 18.36   |       |        |
| 10                                                      | 1                  | 1      | 16-QAM  | 16.58     | 16.69  | 16.63   | 16.26     | 16.39  | 16.19   | 19.43   | 19.55  | 19.43   | 20.75 | 0.1189 |
| 10                                                      | 1                  | 1      | 64-QAM  | 15.17     | 15.17  | 15.07   | 14.51     | 14.52  | 14.42   | 17.86   | 17.87  | 17.77   |       |        |
| 10                                                      | 1                  | 1      | 256-QAM | 12.31     | 12.30  | 12.33   | 11.66     | 11.65  | 11.50   | 15.01   | 15.00  | 14.95   |       |        |
| Limit                                                   | EIRP < 23dBm/10MHz |        |         | Result    |        |         |           |        |         |         |        |         | Pass  |        |

| Part96 NR n48 Maximum Average Power [dBm], DG = 1.2 dBi |                    |        |         |           |        |         |           |        |         |         |        |         |       |        |
|---------------------------------------------------------|--------------------|--------|---------|-----------|--------|---------|-----------|--------|---------|---------|--------|---------|-------|--------|
| BW                                                      | RB                 | RB     | Mod     | Antenna 0 |        |         | Antenna 2 |        |         | Combine |        |         | EIRP  | EIRP   |
| (MHz)                                                   | Size               | Offset |         | Lowest    | Middle | Highest | Lowest    | Middle | Highest | Lowest  | Middle | Highest | (dBm) | (W)    |
| 15                                                      | 1                  | 1      | QPSK    | 12.81     | 17.28  | 17.08   | 12.31     | 16.64  | 16.40   | 15.58   | 19.98  | 19.76   | 21.18 | 0.1312 |
| 15                                                      | 1                  | 36     |         | 17.07     | 17.14  | 12.63   | 16.74     | 16.61  | 12.01   | 19.92   | 19.89  | 15.34   |       |        |
| 15                                                      | 19                 | 9      |         | 16.94     | 16.97  | 17.02   | 16.52     | 16.48  | 16.22   | 19.75   | 19.74  | 19.65   |       |        |
| 15                                                      | 1                  | 0      |         | 12.75     | 15.74  | 15.71   | 12.18     | 15.39  | 15.01   | 15.48   | 18.58  | 18.38   |       |        |
| 15                                                      | 1                  | 37     |         | 15.63     | 15.71  | 12.69   | 15.40     | 15.33  | 12.01   | 18.53   | 18.53  | 15.37   |       |        |
| 15                                                      | 38                 | 0      |         | 12.68     | 15.48  | 12.53   | 12.18     | 15.18  | 11.86   | 15.45   | 18.34  | 15.22   |       |        |
| 15                                                      | 1                  | 1      | 16-QAM  | 12.71     | 16.58  | 16.53   | 12.39     | 16.10  | 15.79   | 15.56   | 19.36  | 19.19   | 20.56 | 0.1138 |
| 15                                                      | 1                  | 1      | 64-QAM  | 12.69     | 15.19  | 15.23   | 12.09     | 14.70  | 14.41   | 15.41   | 17.96  | 17.85   |       |        |
| 15                                                      | 1                  | 1      | 256-QAM | 12.34     | 12.34  | 12.22   | 11.57     | 11.61  | 11.23   | 14.98   | 15.00  | 14.76   |       |        |
| Limit                                                   | EIRP < 23dBm/10MHz |        |         | Result    |        |         |           |        |         |         |        |         | Pass  |        |

Total EIRP power is less than partial EIRP limit 23 dBm/ 10MHz.



| Part96 NR n48 Maximum Average Power [dBm], DG = 1.2 dBi |                    |        |         |           |        |         |           |        |         |         |        |         |       |        |
|---------------------------------------------------------|--------------------|--------|---------|-----------|--------|---------|-----------|--------|---------|---------|--------|---------|-------|--------|
| BW                                                      | RB                 | RB     | Mod     | Antenna 0 |        |         | Antenna 2 |        |         | Combine |        |         | EIRP  | EIRP   |
| (MHz)                                                   | Size               | Offset |         | Lowest    | Middle | Highest | Lowest    | Middle | Highest | Lowest  | Middle | Highest | (dBm) | (W)    |
| 20                                                      | 1                  | 1      | QPSK    | 12.75     | 17.18  | 17.12   | 12.31     | 16.70  | 16.36   | 15.55   | 19.96  | 19.77   | 21.21 | 0.1321 |
| 20                                                      | 1                  | 49     |         | 17.19     | 17.08  | 12.66   | 16.81     | 16.67  | 11.84   | 20.01   | 19.89  | 15.28   |       |        |
| 20                                                      | 25                 | 12     |         | 17.02     | 17.03  | 16.92   | 16.66     | 16.50  | 16.29   | 19.85   | 19.78  | 19.63   |       |        |
| 20                                                      | 1                  | 0      |         | 12.70     | 15.65  | 15.58   | 12.17     | 15.23  | 14.86   | 15.45   | 18.46  | 18.25   |       |        |
| 20                                                      | 1                  | 50     |         | 15.57     | 15.58  | 12.56   | 15.28     | 15.21  | 11.87   | 18.44   | 18.41  | 15.24   |       |        |
| 20                                                      | 51                 | 0      |         | 12.74     | 15.61  | 12.55   | 12.26     | 15.30  | 11.86   | 15.52   | 18.47  | 15.23   |       |        |
| 20                                                      | 1                  | 1      | 16-QAM  | 12.69     | 16.57  | 16.46   | 12.22     | 16.28  | 15.59   | 15.47   | 19.44  | 19.06   | 20.64 | 0.1159 |
| 20                                                      | 1                  | 1      | 64-QAM  | 12.73     | 15.13  | 15.07   | 12.08     | 14.65  | 14.31   | 15.43   | 17.91  | 17.72   |       |        |
| 20                                                      | 1                  | 1      | 256-QAM | 12.19     | 12.34  | 12.14   | 11.63     | 11.48  | 11.21   | 14.93   | 14.94  | 14.71   |       |        |
| Limit                                                   | EIRP < 23dBm/10MHz |        |         | Result    |        |         |           |        |         |         |        |         | Pass  |        |

Total EIRP power is less than partial EIRP limit 23 dBm/ 10MHz.



| Part96 NR n48 Maximum Average Power [dBm], DG = 1.2 dBi |                    |        |         |           |        |         |           |        |         |         |        |         |       |        |
|---------------------------------------------------------|--------------------|--------|---------|-----------|--------|---------|-----------|--------|---------|---------|--------|---------|-------|--------|
| BW                                                      | RB                 | RB     | Mod     | Antenna 0 |        |         | Antenna 2 |        |         | Combine |        |         | EIRP  | EIRP   |
| (MHz)                                                   | Size               | Offset |         | Lowest    | Middle | Highest | Lowest    | Middle | Highest | Lowest  | Middle | Highest | (dBm) | (W)    |
| 30                                                      | 1                  | 1      | QPSK    | 7.26      | 14.93  | 7.43    | 6.74      | 14.59  | 6.70    | 10.02   | 17.77  | 10.09   | 21.18 | 0.1312 |
| 30                                                      | 1                  | 76     |         | 7.15      | 14.84  | 7.37    | 6.62      | 14.36  | 6.63    | 9.90    | 17.62  | 10.03   |       |        |
| 30                                                      | 39                 | 19     |         | 7.10      | 17.23  | 7.21    | 6.59      | 16.70  | 6.47    | 9.86    | 19.98  | 9.87    |       |        |
| 30                                                      | 1                  | 0      |         | 7.30      | 14.93  | 7.47    | 6.74      | 14.50  | 6.71    | 10.04   | 17.73  | 10.12   |       |        |
| 30                                                      | 1                  | 77     |         | 7.13      | 14.70  | 7.26    | 6.64      | 14.39  | 6.54    | 9.90    | 17.56  | 9.93    |       |        |
| 30                                                      | 78                 | 0      |         | 7.18      | 14.63  | 7.25    | 6.61      | 14.29  | 6.49    | 9.91    | 17.47  | 9.90    |       |        |
| 30                                                      | 1                  | 1      | 16-QAM  | 7.46      | 14.90  | 7.36    | 6.93      | 14.65  | 6.88    | 10.21   | 17.79  | 10.14   | 18.99 | 0.0793 |
| 30                                                      | 1                  | 1      | 64-QAM  | 7.39      | 14.86  | 7.55    | 6.64      | 14.25  | 6.68    | 10.04   | 17.58  | 10.15   |       |        |
| 30                                                      | 1                  | 1      | 256-QAM | 7.37      | 12.58  | 7.52    | 6.72      | 11.85  | 6.68    | 10.07   | 15.24  | 10.13   |       |        |
| Limit                                                   | EIRP < 23dBm/10MHz |        |         | Result    |        |         |           |        |         |         |        |         | Pass  |        |

| Part96 NR n48 Maximum Average Power [dBm], DG = 1.2 dBi |                    |        |         |           |        |         |           |        |         |         |        |         |       |        |
|---------------------------------------------------------|--------------------|--------|---------|-----------|--------|---------|-----------|--------|---------|---------|--------|---------|-------|--------|
| BW                                                      | RB                 | RB     | Mod     | Antenna 0 |        |         | Antenna 2 |        |         | Combine |        |         | EIRP  | EIRP   |
| (MHz)                                                   | Size               | Offset |         | Lowest    | Middle | Highest | Lowest    | Middle | Highest | Lowest  | Middle | Highest | (dBm) | (W)    |
| 40                                                      | 1                  | 1      | QPSK    | 7.32      | 14.78  | 7.18    | 6.70      | 14.42  | 6.54    | 10.03   | 17.61  | 9.88    | 21.19 | 0.1315 |
| 40                                                      | 1                  | 104    |         | 7.17      | 14.74  | 7.10    | 6.74      | 14.29  | 6.55    | 9.97    | 17.53  | 9.84    |       |        |
| 40                                                      | 53                 | 26     |         | 7.07      | 17.21  | 7.17    | 6.70      | 16.73  | 6.42    | 9.90    | 19.99  | 9.82    |       |        |
| 40                                                      | 1                  | 0      |         | 7.41      | 14.81  | 7.19    | 6.71      | 14.39  | 6.52    | 10.08   | 17.62  | 9.88    |       |        |
| 40                                                      | 1                  | 105    |         | 7.19      | 14.74  | 7.10    | 6.68      | 14.37  | 6.42    | 9.95    | 17.57  | 9.78    |       |        |
| 40                                                      | 106                | 0      |         | 7.24      | 14.28  | 7.17    | 6.81      | 13.89  | 6.54    | 10.04   | 17.10  | 9.88    |       |        |
| 40                                                      | 1                  | 1      | 16-QAM  | 7.31      | 14.72  | 7.21    | 6.86      | 14.53  | 6.58    | 10.10   | 17.64  | 9.92    | 18.84 | 0.0766 |
| 40                                                      | 1                  | 1      | 64-QAM  | 7.28      | 14.76  | 7.27    | 6.58      | 14.11  | 6.30    | 9.95    | 17.46  | 9.82    |       |        |
| 40                                                      | 1                  | 1      | 256-QAM | 7.41      | 12.42  | 7.34    | 6.62      | 11.69  | 6.41    | 10.04   | 15.08  | 9.91    |       |        |
| Limit                                                   | EIRP < 23dBm/10MHz |        |         | Result    |        |         |           |        |         |         |        |         | Pass  |        |

Total EIRP power is less than partial EIRP limit 23 dBm/ 10MHz.

**FR1 n48**

&lt;SISO Mode&gt;

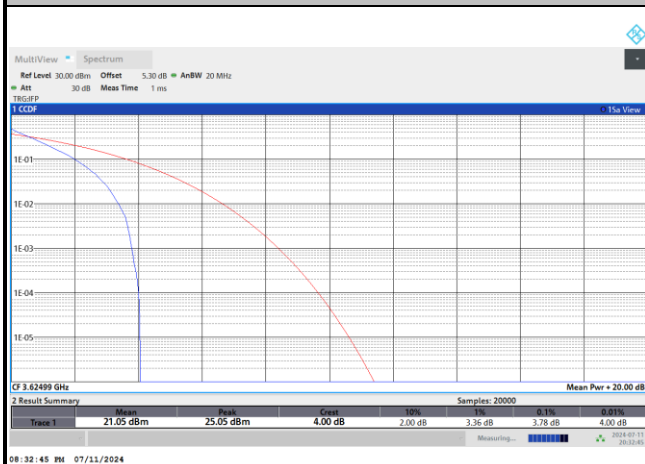
**Peak-to-Average Ratio**

| Mode      | FR1 n48 / 20MHz / DFT-S OFDM |         |         |         |             |
|-----------|------------------------------|---------|---------|---------|-------------|
| Mod.      | PI/2 BPSK                    | QPSK    | 16QAM   | 64QAM   | Limit: 13dB |
| RB Size   | Full RB                      | Full RB | Full RB | Full RB | Result      |
| Middle CH | 3.78                         | 4.46    | 5.36    | 5.80    | <b>PASS</b> |
| Mode      | FR1 n48 / 20MHz / DFT-S OFDM |         |         |         |             |
| Mod.      | 256QAM                       | -       | -       | -       | Limit: 13dB |
| RB Size   | Full RB                      | -       | -       | -       | Result      |
| Middle CH | 6.64                         | -       | -       | -       | <b>PASS</b> |

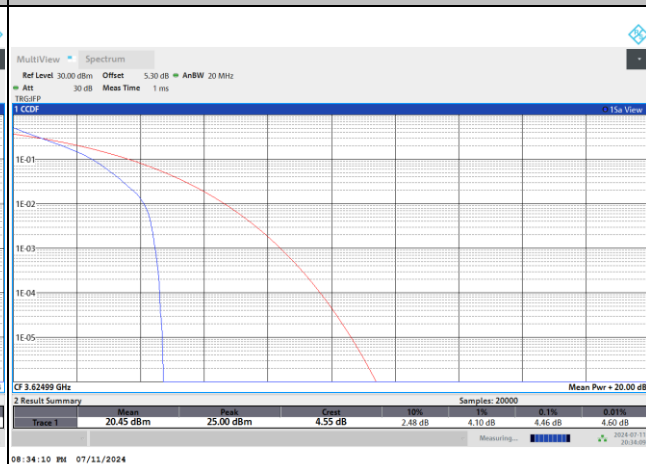


## FR1 n48 / 20MHz / DFT-S OFDM / Middle Channel / Full RB

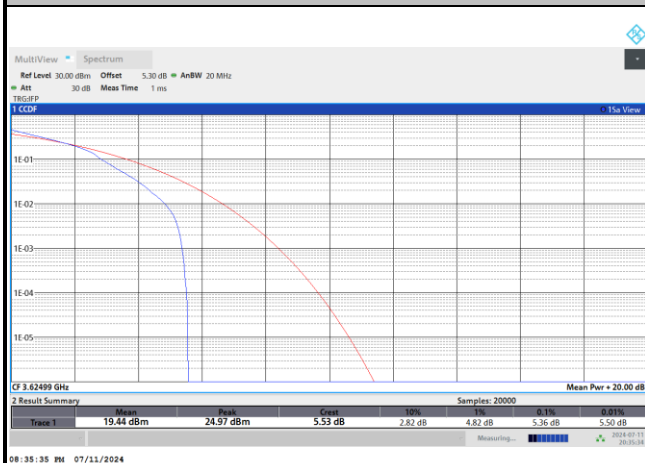
## PI/2 BPSK



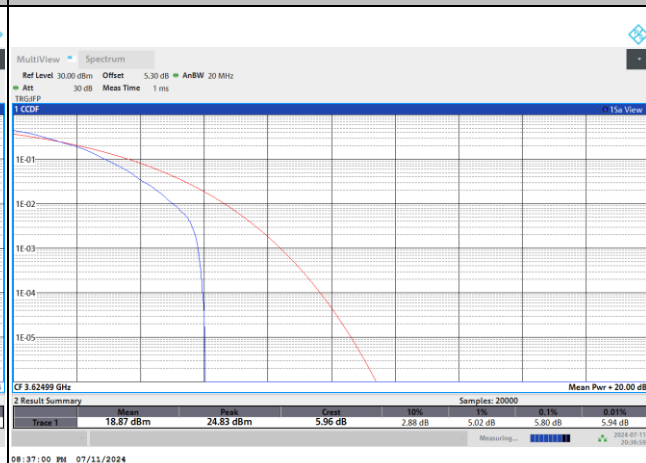
## QPSK



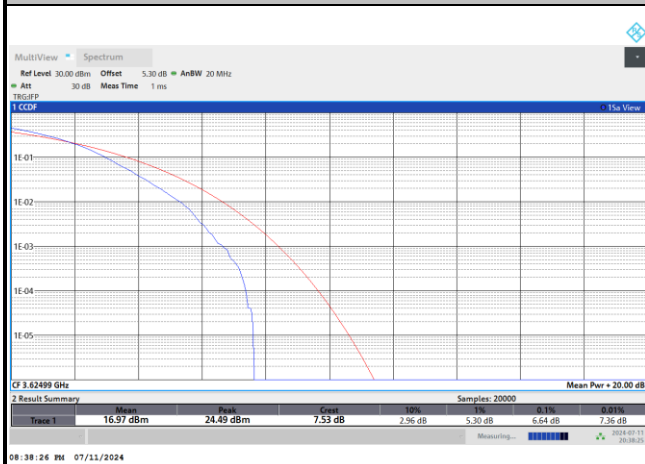
## 16QAM



## 64QAM



## 256QAM



**26dB Bandwidth**

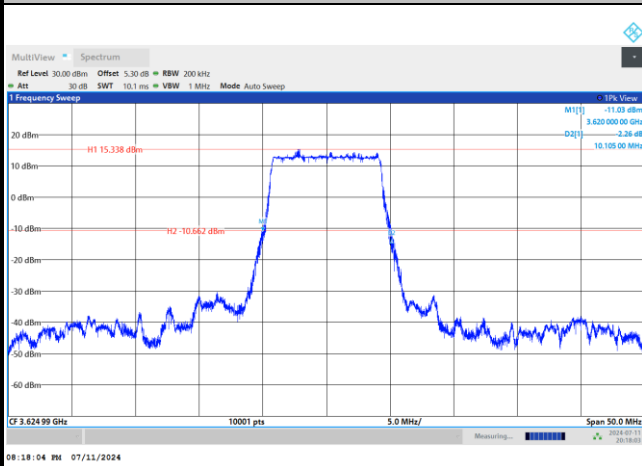
| Mode      | FR1 n48 : 26dB BW(MHz) / DFT-S OFDM |           |           |           |           |   |   |   |
|-----------|-------------------------------------|-----------|-----------|-----------|-----------|---|---|---|
| BW        | 10MHz                               | 15MHz     | 20MHz     | 30MHz     | 40MHz     | - | - | - |
| Mod.      | PI/2 BPSK                           | PI/2 BPSK | PI/2 BPSK | PI/2 BPSK | PI/2 BPSK | - | - | - |
| Middle CH | 10.10                               | 14.70     | 19.85     | 29.57     | 38.56     | - | - | - |

| Mode      | FR1 n48 : 26dB BW(MHz) / CP OFDM |        |       |        |       |        |       |        |
|-----------|----------------------------------|--------|-------|--------|-------|--------|-------|--------|
| BW        | 10MHz                            |        | 15MHz |        | 20MHz |        | 30MHz |        |
| Mod.      | QPSK                             | 16QAM  | QPSK  | 16QAM  | QPSK  | 16QAM  | QPSK  | 16QAM  |
| Middle CH | 10.15                            | 10.08  | 15.41 | 15.41  | 20.39 | 20.26  | 30.88 | 30.88  |
| Mod.      | 64QAM                            | 256QAM | 64QAM | 256QAM | 64QAM | 256QAM | 64QAM | 256QAM |
| Middle CH | 10.08                            | 10.08  | 15.33 | 15.40  | 20.36 | 20.25  | 30.87 | 30.85  |
| BW        | 40MHz                            |        | -     |        | -     |        | -     |        |
| Mod.      | QPSK                             | 16QAM  | -     | -      | -     | -      | -     | -      |
| Middle CH | 40.82                            | 41.00  | -     | -      | -     | -      | -     | -      |
| Mod.      | 64QAM                            | 256QAM | -     | -      | -     | -      | -     | -      |
| Middle CH | 40.89                            | 40.85  | -     | -      | -     | -      | -     | -      |



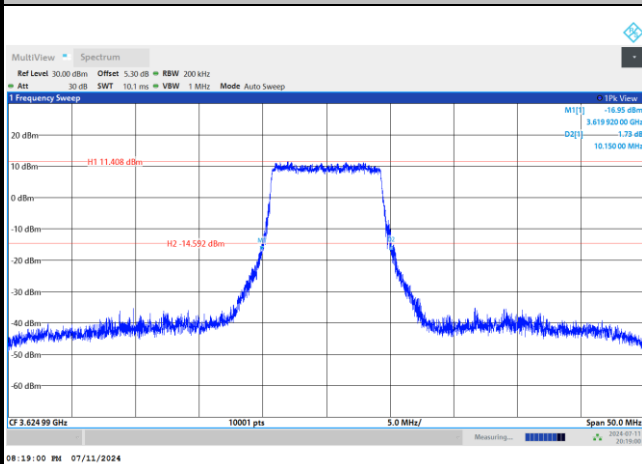
## FR1 n48 / 10MHz / DFT-S OFDM / Middle Channel / Full RB

## PI/2 BPSK

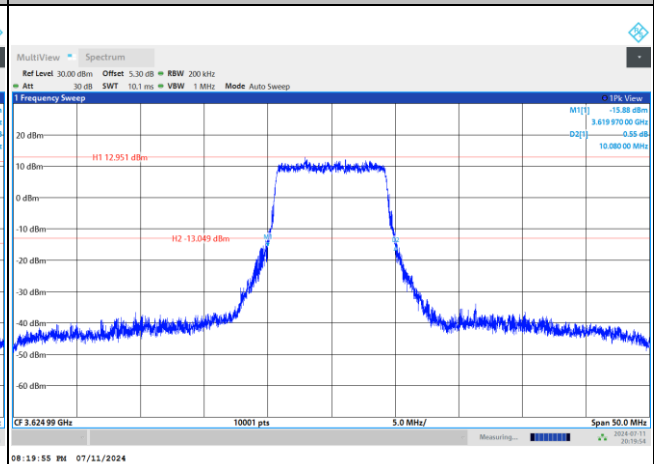


## FR1 n48 / 10MHz / CP OFDM / Middle Channel / Full RB

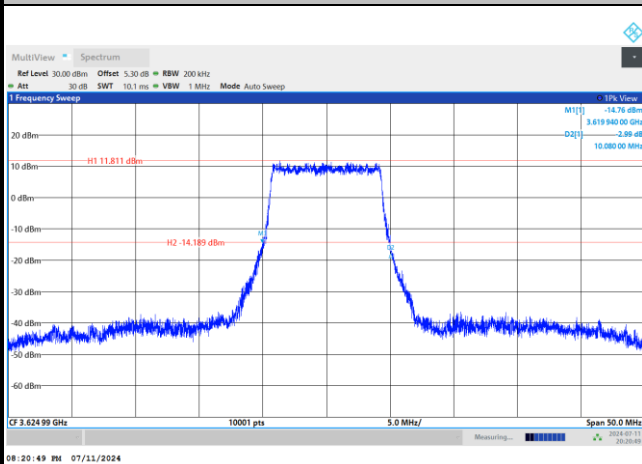
## QPSK



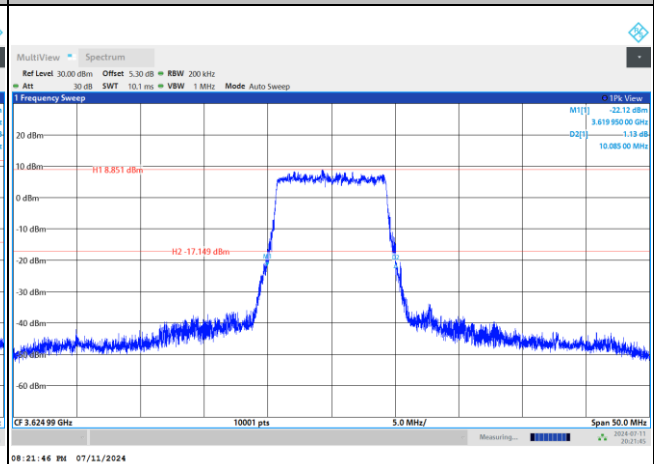
## 16QAM



## 64QAM



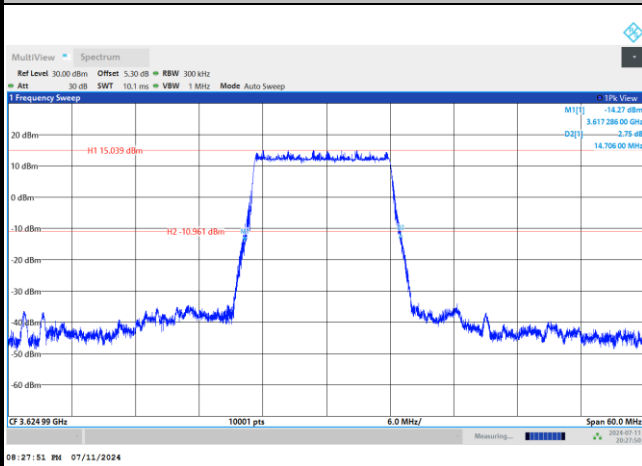
## 256QAM





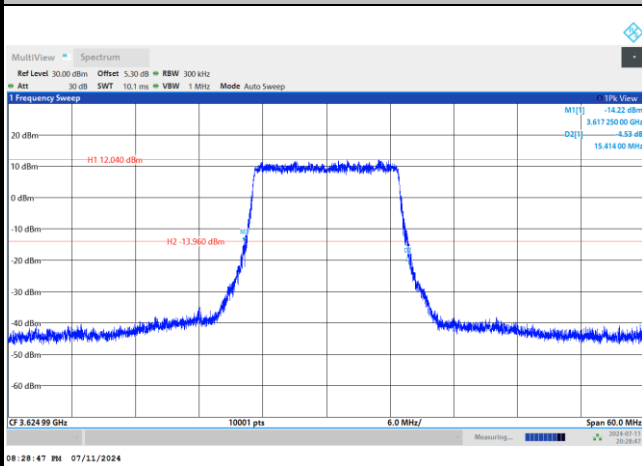
## FR1 n48 / 15MHz / DFT-S OFDM / Middle Channel / Full RB

## PI/2 BPSK

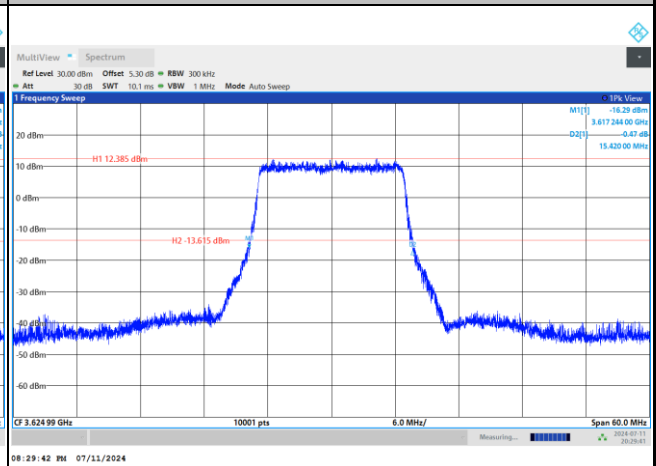


## FR1 n48 / 15MHz / CP OFDM / Middle Channel / Full RB

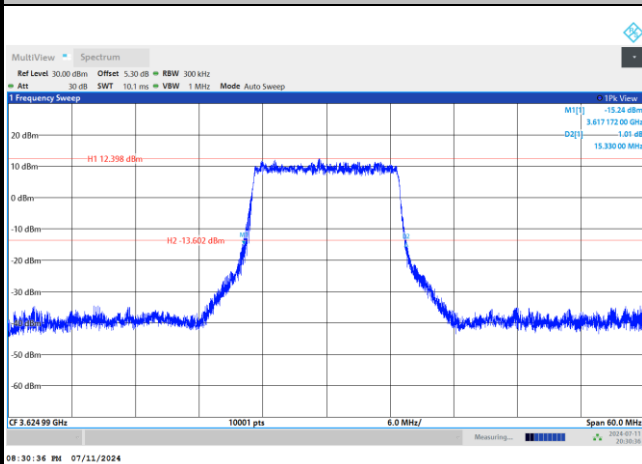
## QPSK



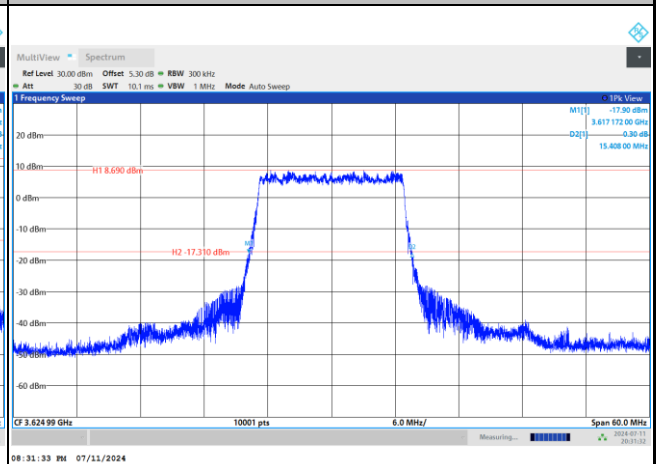
## 16QAM



## 64QAM



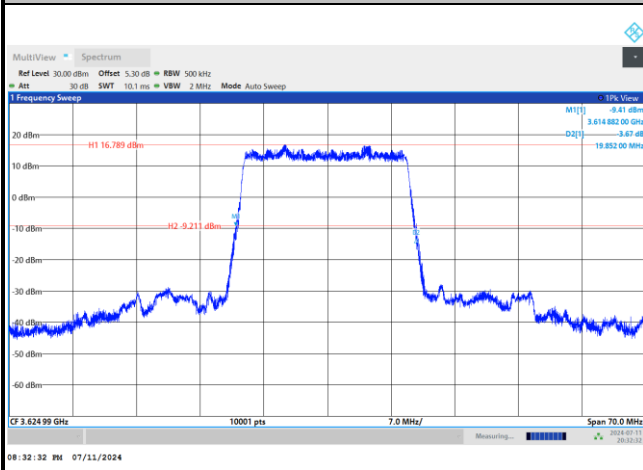
## 256QAM





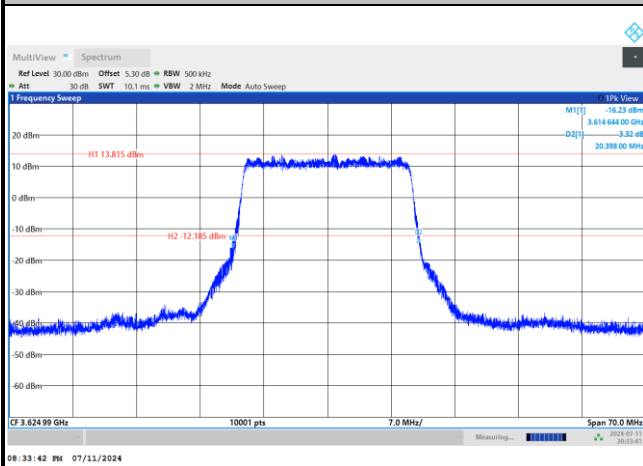
## FR1 n48 / 20MHz / DFT-S OFDM / Middle Channel / Full RB

## PI/2 BPSK

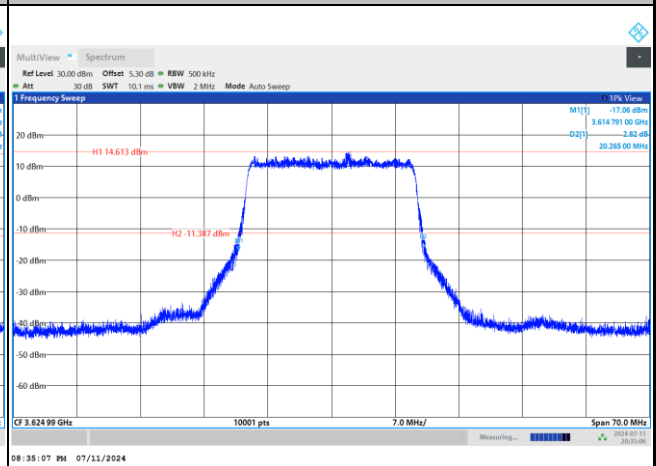


## FR1 n48 / 20MHz / CP OFDM / Middle Channel / Full RB

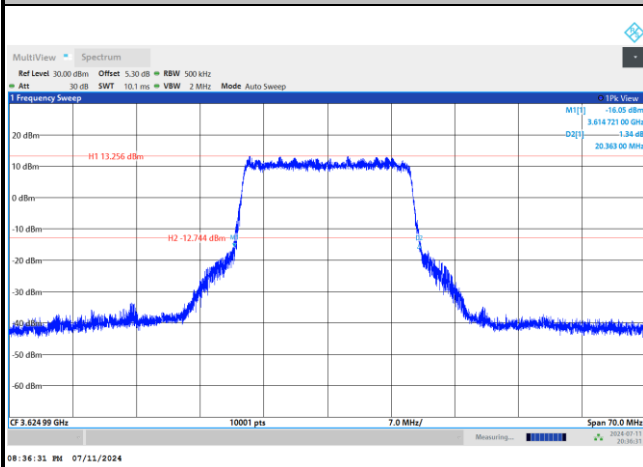
## QPSK



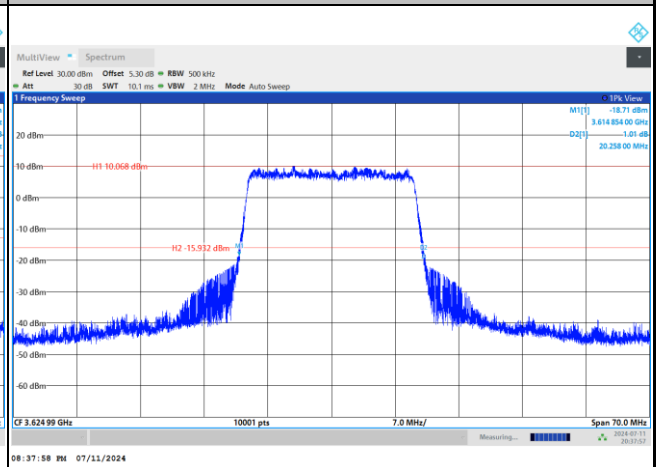
## 16QAM

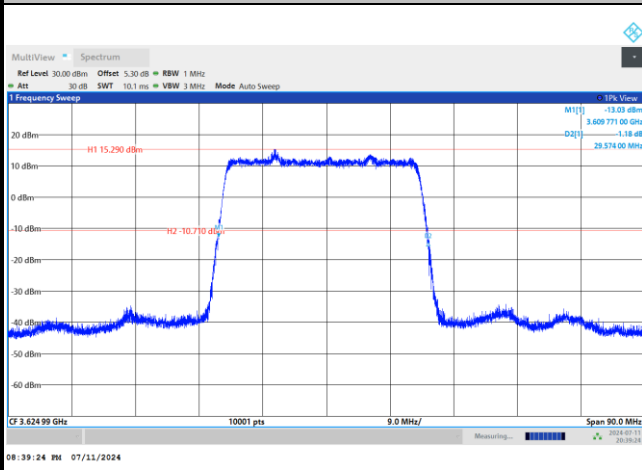
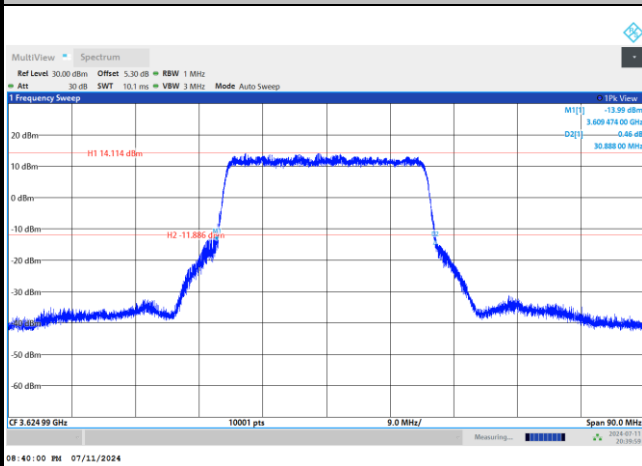
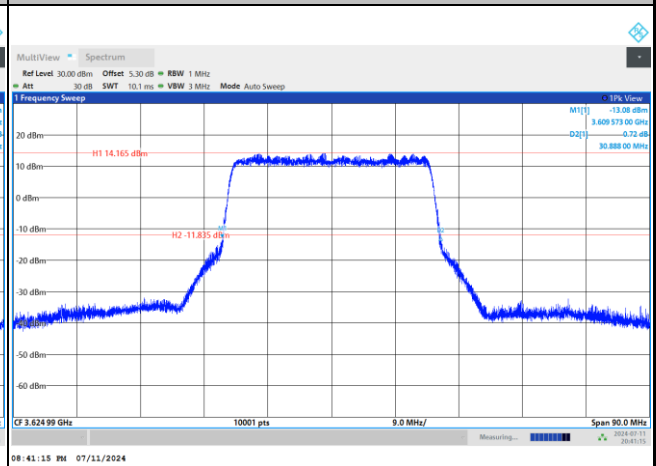
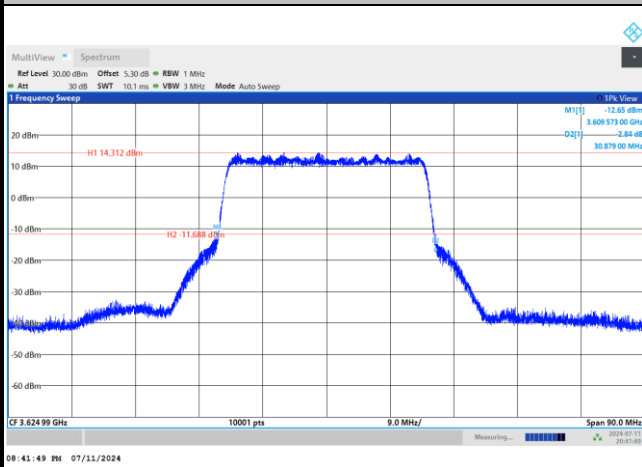
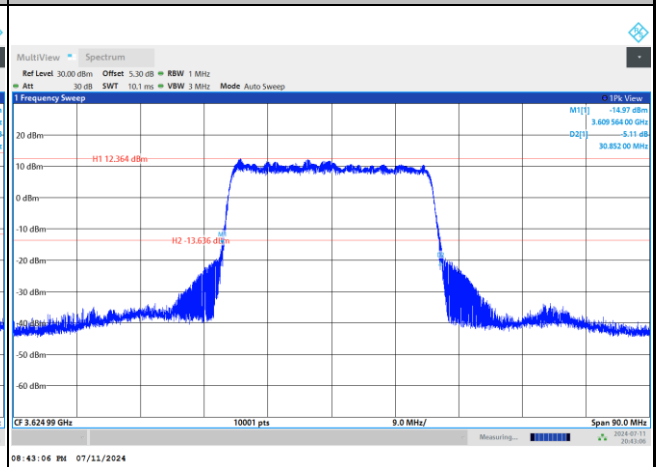


## 64QAM



## 256QAM

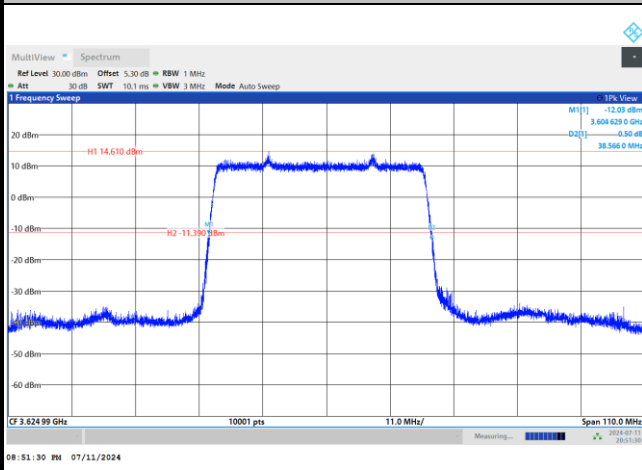


**FR1 n48 / 30MHz / DFT-S OFDM / Middle Channel / Full RB**
**PI/2 BPSK**

**FR1 n48 / 30MHz / CP OFDM / Middle Channel / Full RB**
**QPSK**

**16QAM**

**64QAM**

**256QAM**




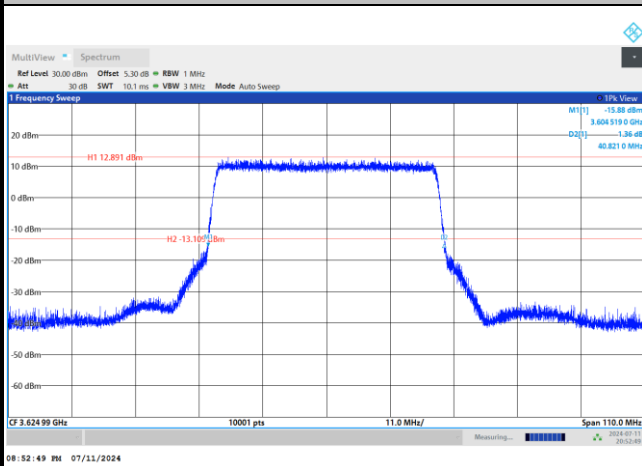
## FR1 n48 / 40MHz / DFT-S OFDM / Middle Channel / Full RB

## PI/2 BPSK

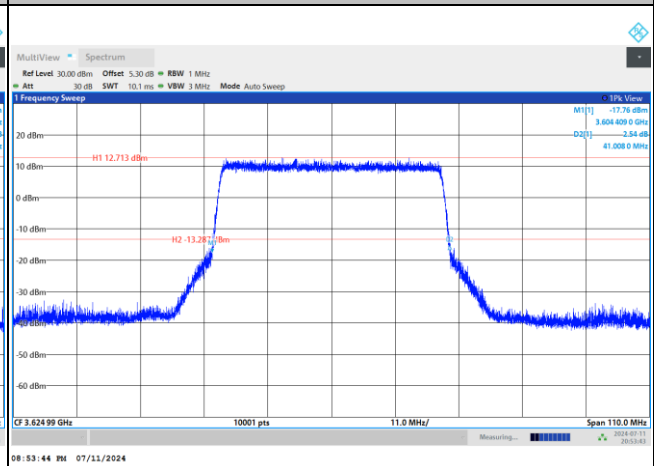


## FR1 n48 / 40MHz / CP OFDM / Middle Channel / Full RB

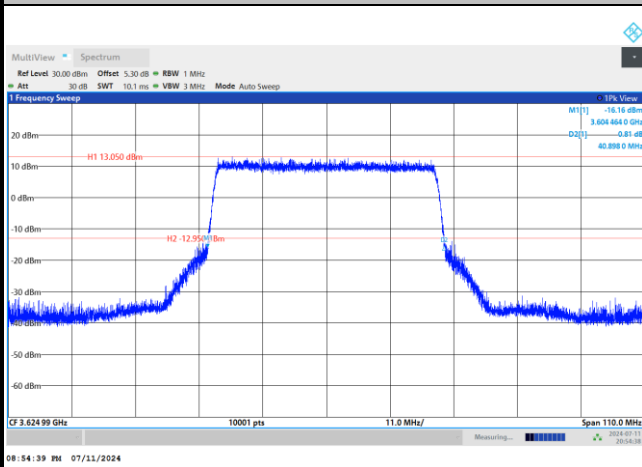
## QPSK



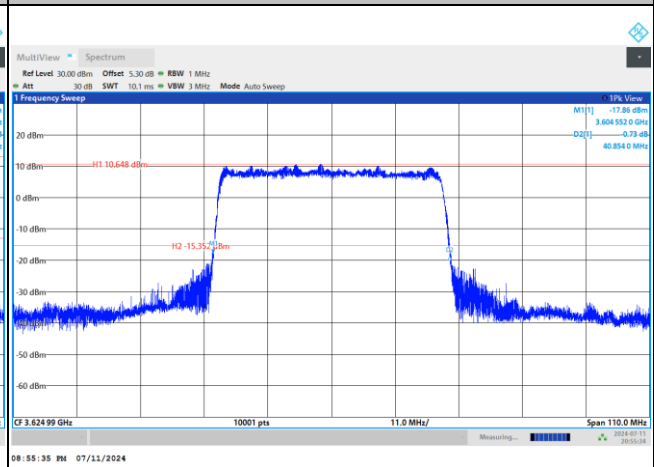
## 16QAM



## 64QAM



## 256QAM



**Occupied Bandwidth**

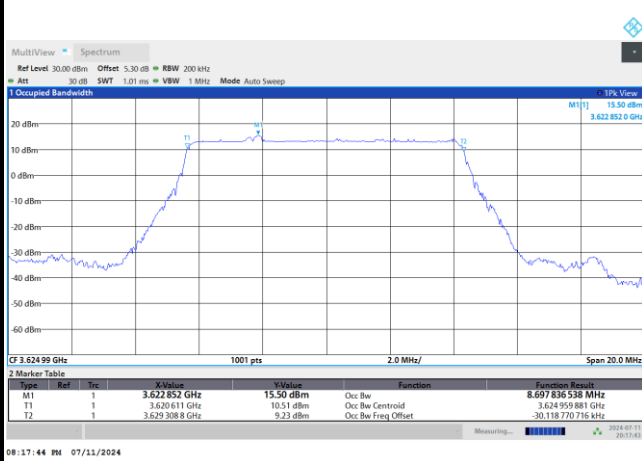
| Mode      | FR1 n48 : OB BW(MHz) / DFT-S OFDM |           |           |           |           |   |   |   |
|-----------|-----------------------------------|-----------|-----------|-----------|-----------|---|---|---|
| BW        | 10MHz                             | 15MHz     | 20MHz     | 30MHz     | 40MHz     | - | - | - |
| Mod.      | PI/2 BPSK                         | PI/2 BPSK | PI/2 BPSK | PI/2 BPSK | PI/2 BPSK | - | - | - |
| Middle CH | 8.69                              | 12.95     | 17.99     | 27.22     | 36.05     | - | - | - |

| Mode      | FR1 n48 : OB BW(MHz) / CP OFDM |        |       |        |       |        |       |        |
|-----------|--------------------------------|--------|-------|--------|-------|--------|-------|--------|
| BW        | 10MHz                          |        | 15MHz |        | 20MHz |        | 30MHz |        |
| Mod.      | QPSK                           | 16QAM  | QPSK  | 16QAM  | QPSK  | 16QAM  | QPSK  | 16QAM  |
| Middle CH | 8.65                           | 8.68   | 13.68 | 13.71  | 18.31 | 18.31  | 28.18 | 28.20  |
| Mod.      | 64QAM                          | 256QAM | 64QAM | 256QAM | 64QAM | 256QAM | 64QAM | 256QAM |
| Middle CH | 8.69                           | 8.65   | 13.67 | 13.65  | 18.35 | 18.31  | 28.18 | 28.20  |
| BW        | 40MHz                          |        | -     |        | -     |        | -     |        |
| Mod.      | QPSK                           | 16QAM  | -     | -      | -     | -      | -     | -      |
| Middle CH | 36.05                          | 38.11  | -     | -      | -     | -      | -     | -      |
| Mod.      | 64QAM                          | 256QAM | -     | -      | -     | -      | -     | -      |
| Middle CH | 38.03                          | 38.21  | -     | -      | -     | -      | -     | -      |



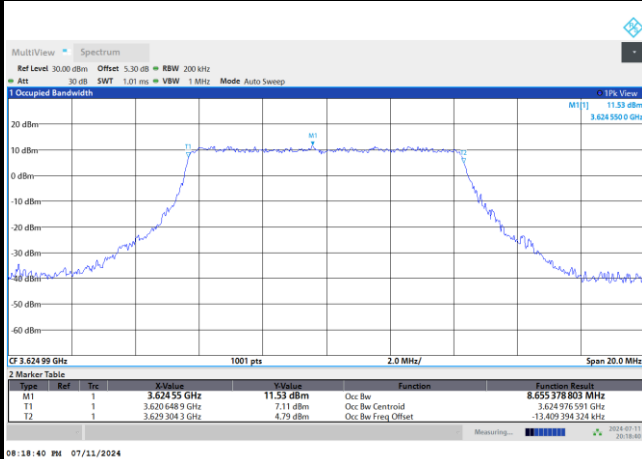
## FR1 n48 / 10MHz / DFT-S OFDM / Middle Channel / Full RB

## PI/2 BPSK

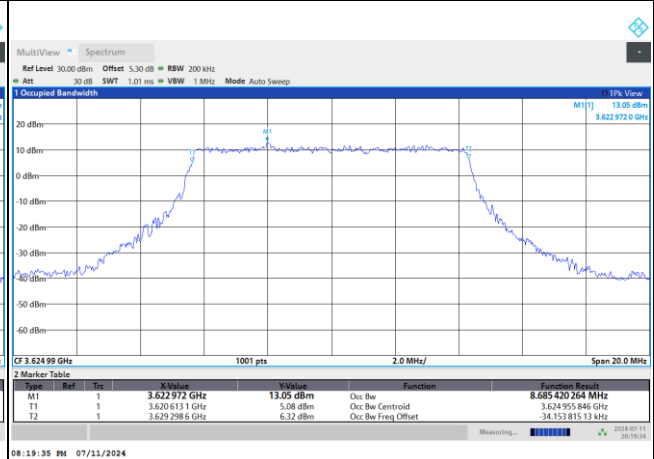


## FR1 n48 / 10MHz / CP OFDM / Middle Channel / Full RB

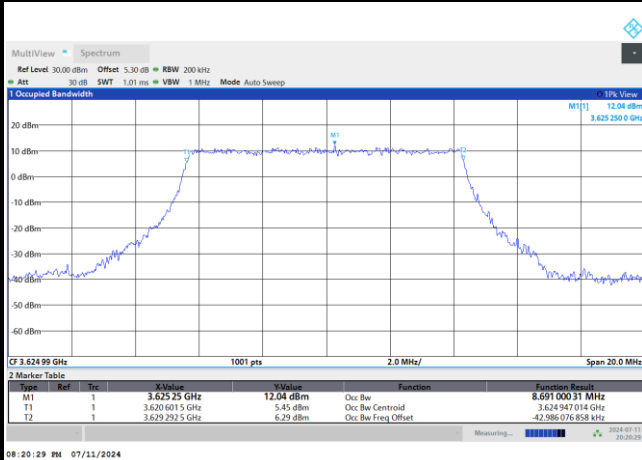
## QPSK



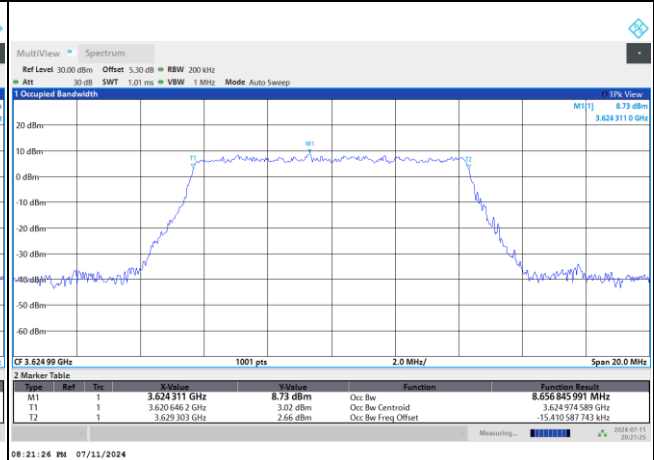
## 16QAM



## 64QAM



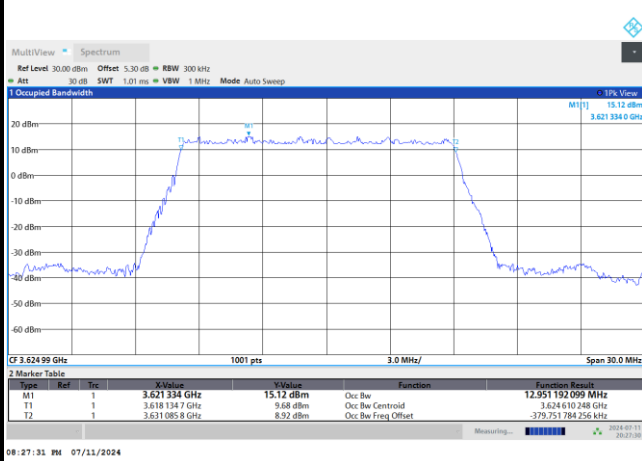
## 256QAM





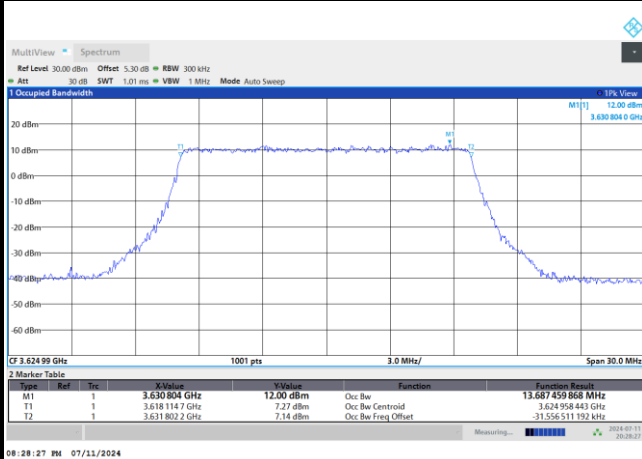
## FR1 n48 / 15MHz / DFT-S OFDM / Middle Channel / Full RB

## PI/2 BPSK

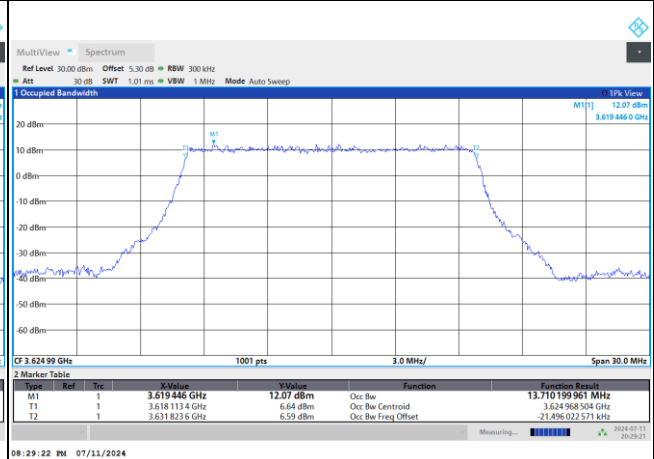


## FR1 n48 / 15MHz / CP OFDM / Middle Channel / Full RB

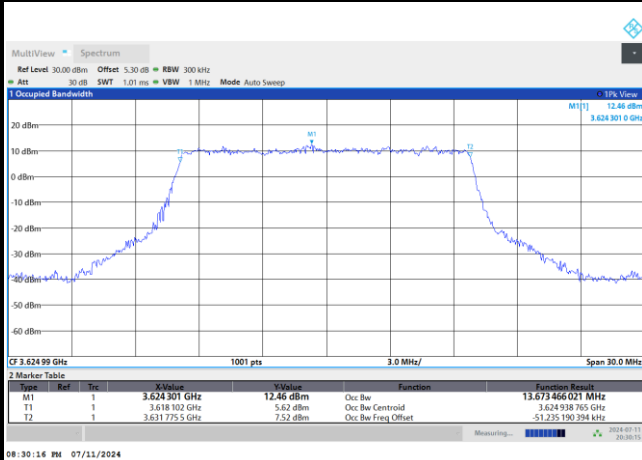
## QPSK



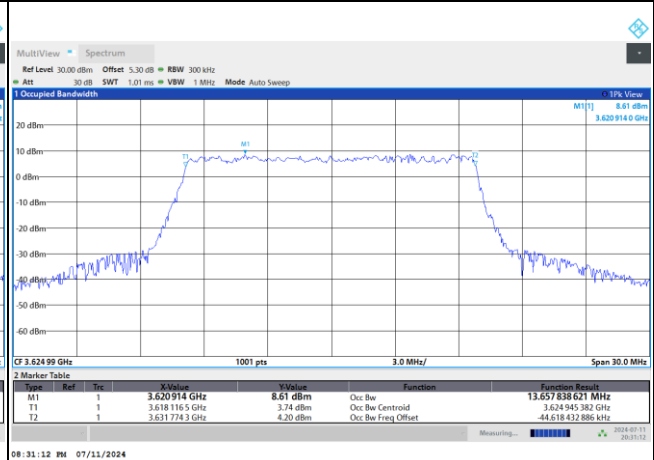
## 16QAM



## 64QAM



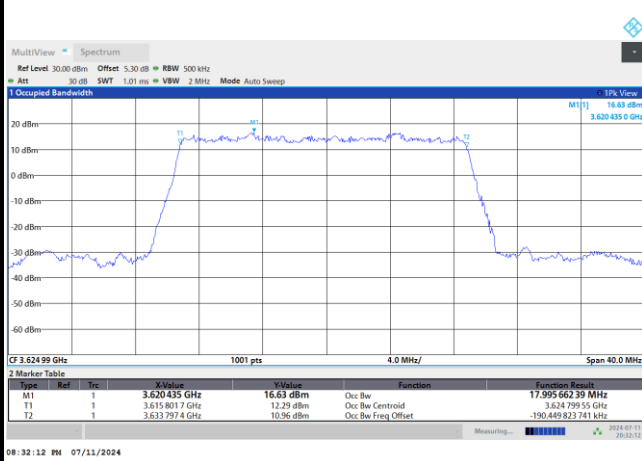
## 256QAM





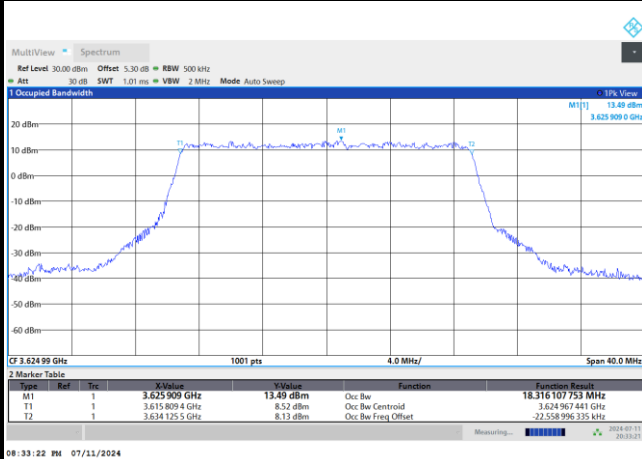
## FR1 n48 / 20MHz / DFT-S OFDM / Middle Channel / Full RB

## PI/2 BPSK

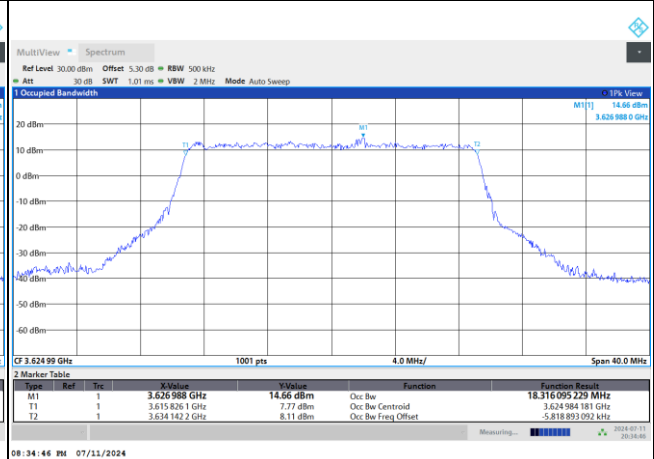


## FR1 n48 / 20MHz / CP OFDM / Middle Channel / Full RB

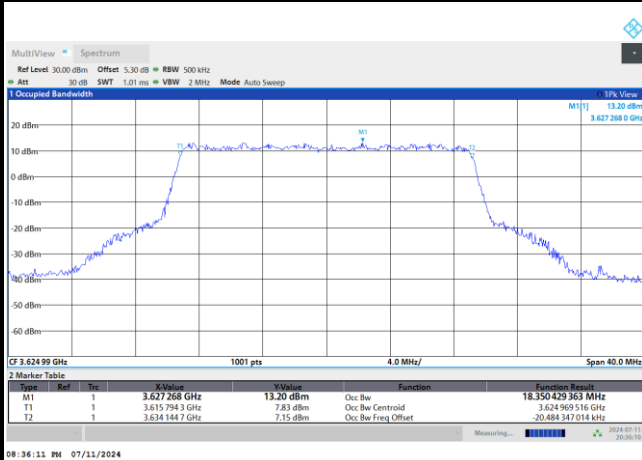
## QPSK



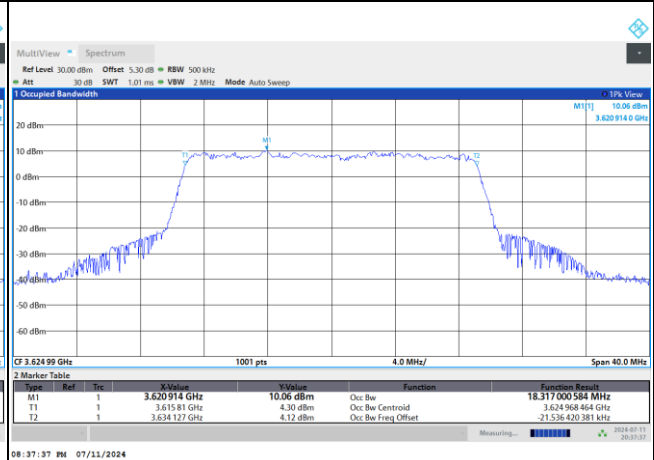
## 16QAM



## 64QAM



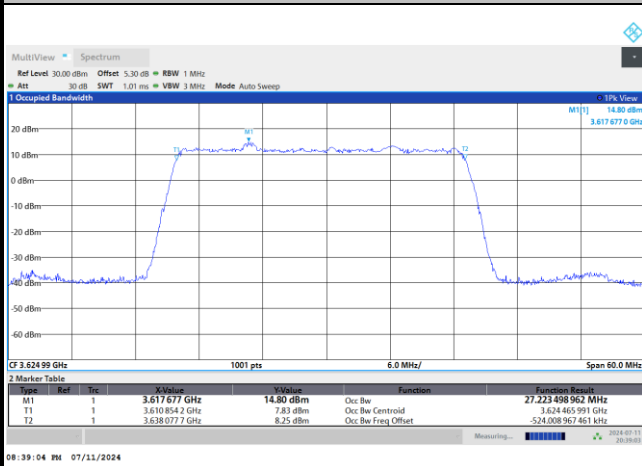
## 256QAM





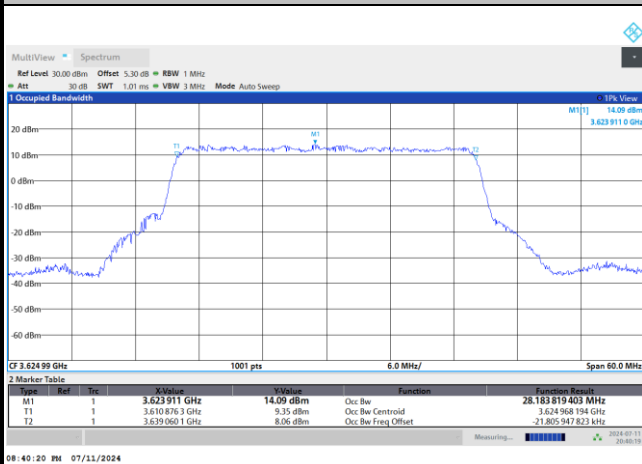
## FR1 n48 / 30MHz / DFT-S OFDM / Middle Channel / Full RB

## PI/2 BPSK

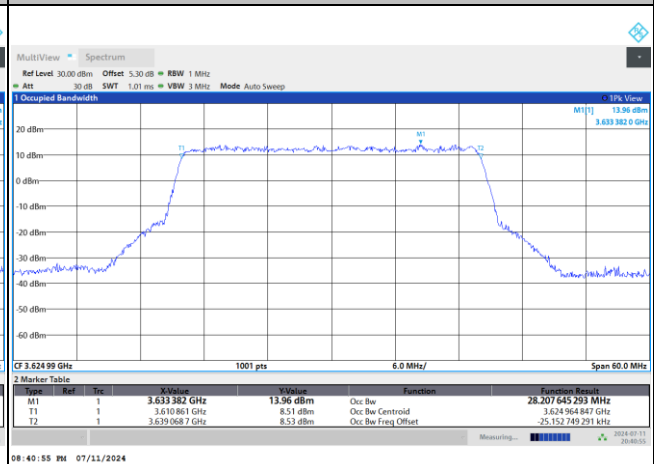


## FR1 n48 / 30MHz / CP OFDM / Middle Channel / Full RB

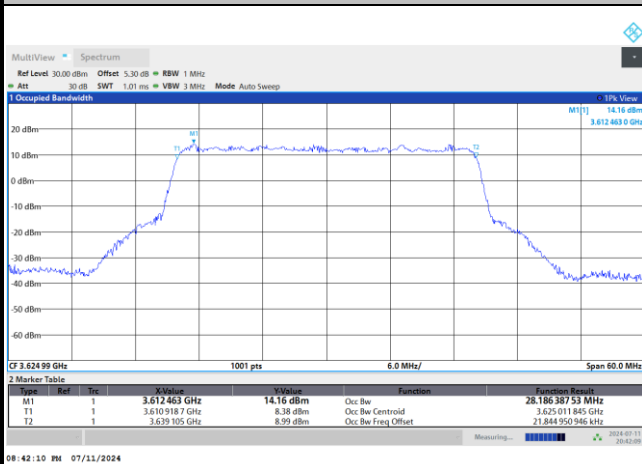
## QPSK



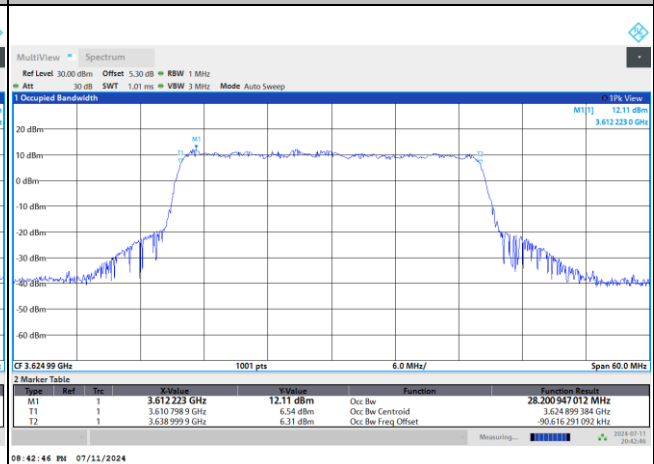
## 16QAM



## 64QAM



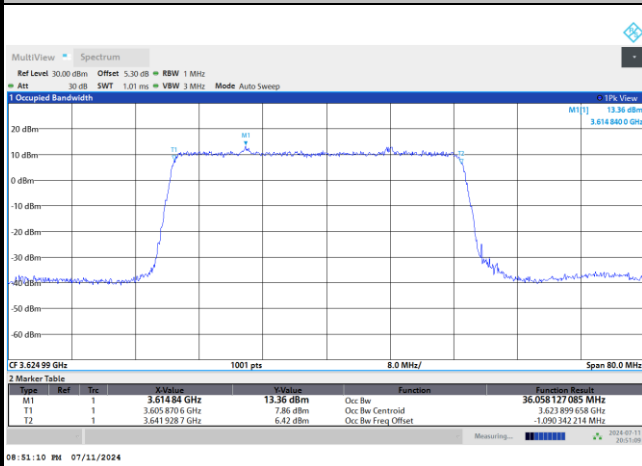
## 256QAM





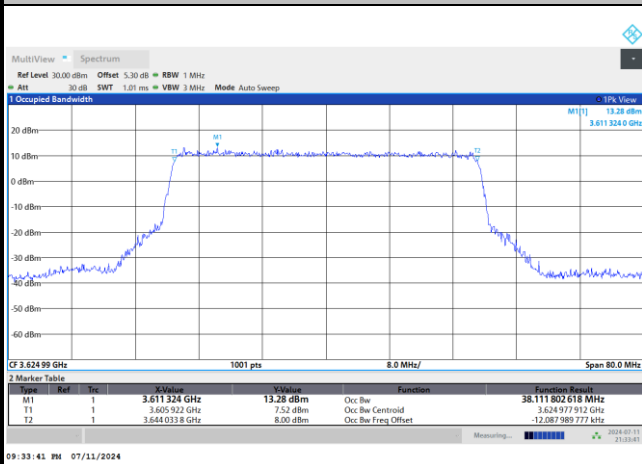
## FR1 n48 / 40MHz / DFT-S OFDM / Middle Channel / Full RB

## PI/2 BPSK

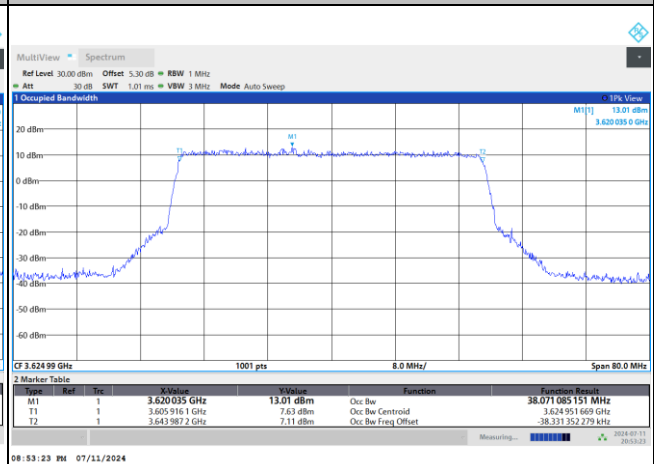


## FR1 n48 / 40MHz / CP OFDM / Middle Channel / Full RB

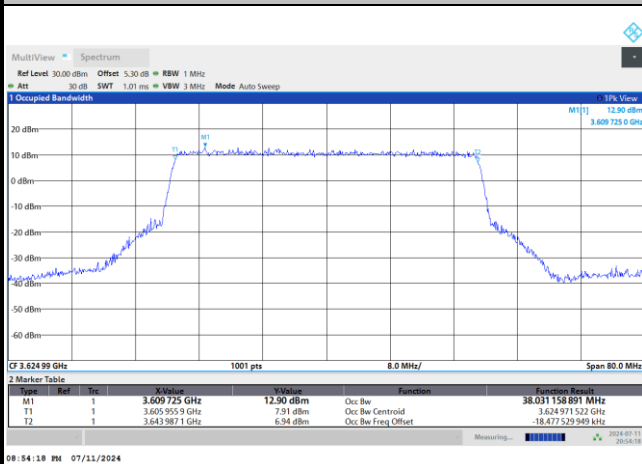
## QPSK



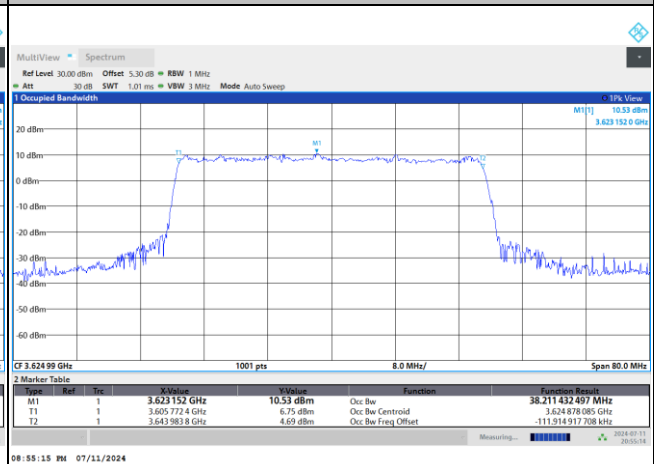
## 16QAM



## 64QAM



## 256QAM





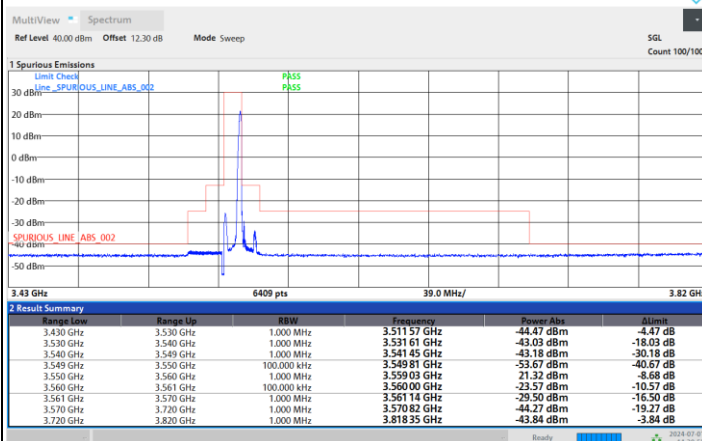
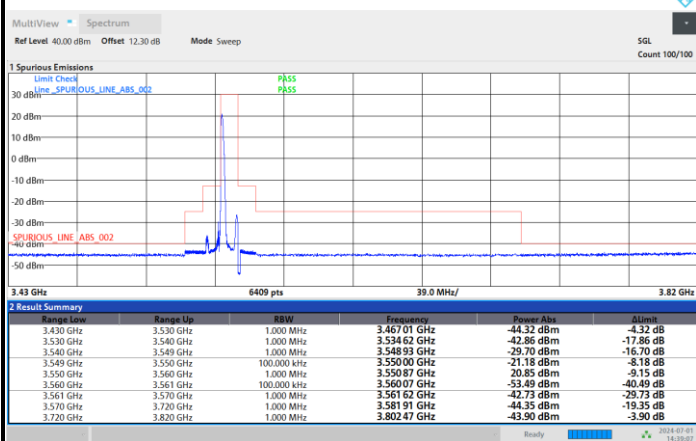
## Unwanted Emission (MASK)

FR1 n48 / 10MHz / DFT-S OFDM / PI/2 BPSK

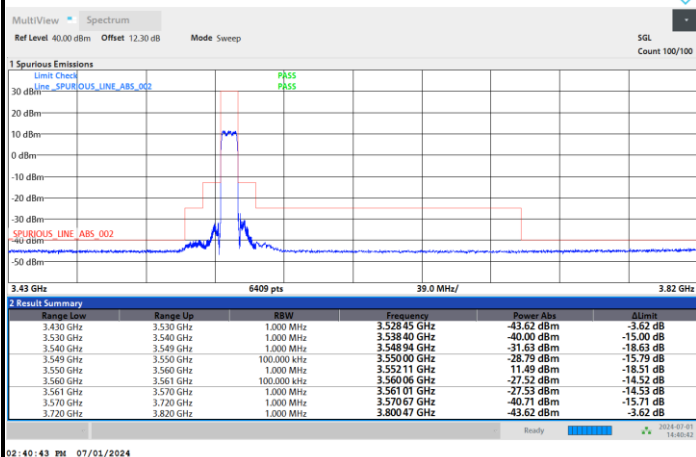
## Lowest Channel

1RB0

1RBmax



Full RB



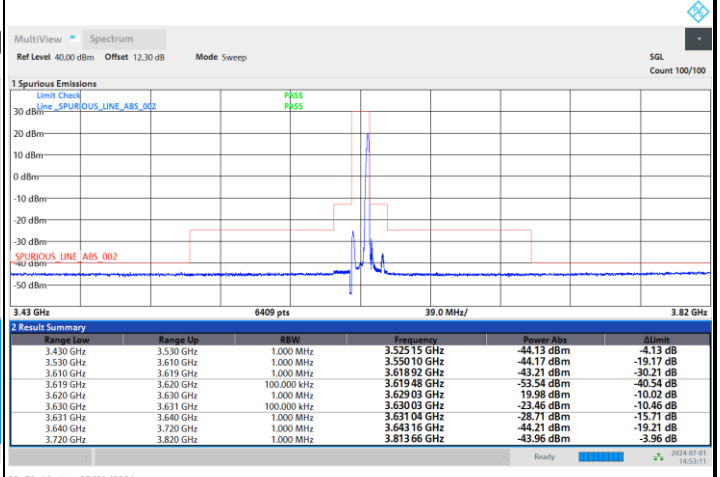
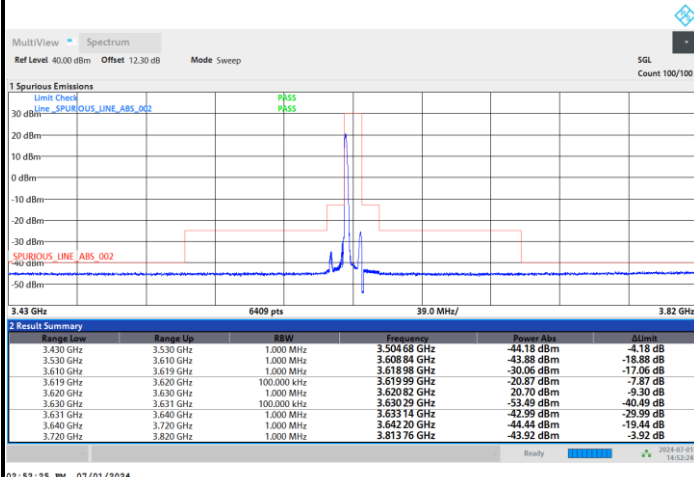


## FR1 n48 / 10MHz / DFT-S OFDM / PI/2 BPSK

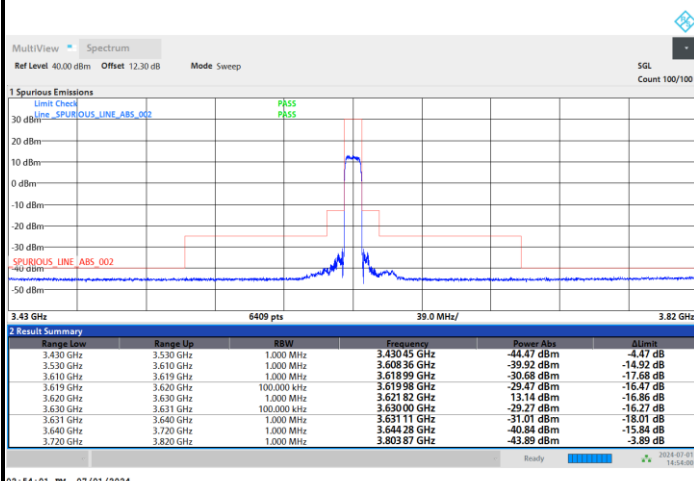
## Middle Channel

## 1RB0

## 1RBmax



## Full RB

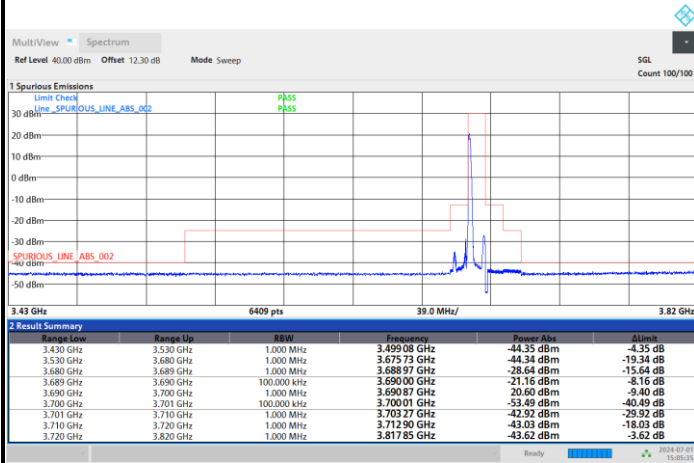




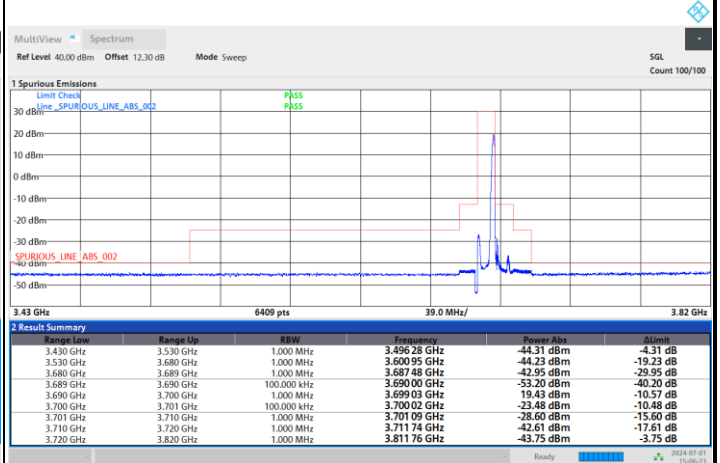
## FR1 n48 / 10MHz / DFT-S OFDM / PI/2 BPSK

## Highest Channel

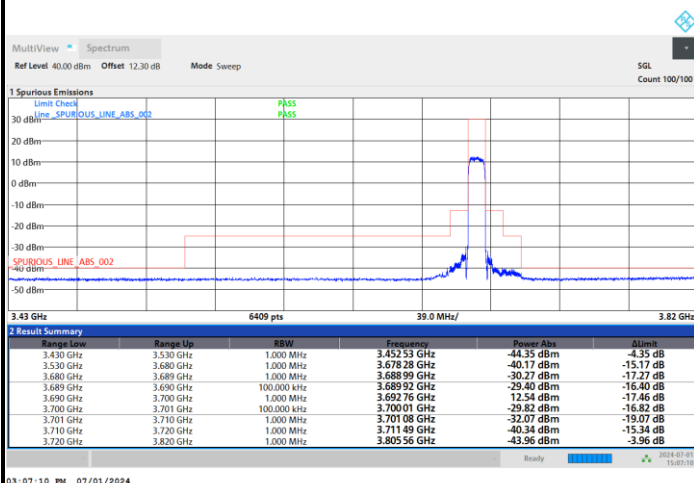
## 1RB0



## 1RBmax



## Full RB

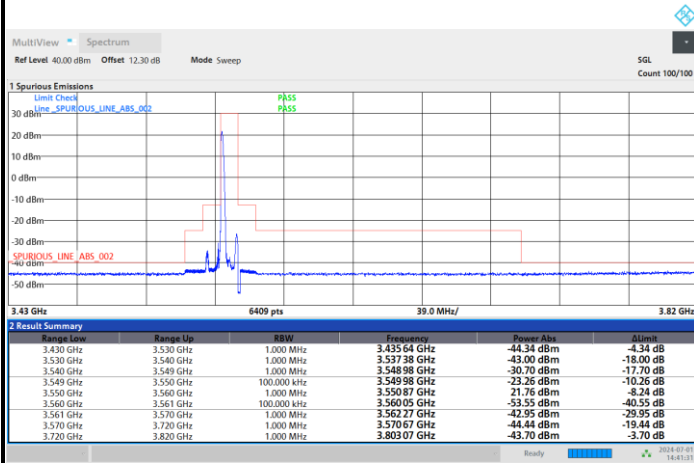




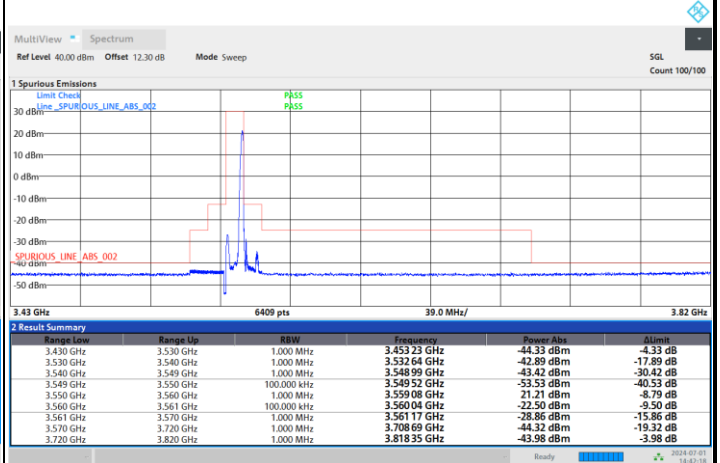
## FR1 n48 / 10MHz / DFT-S OFDM / QPSK

## Lowest Channel

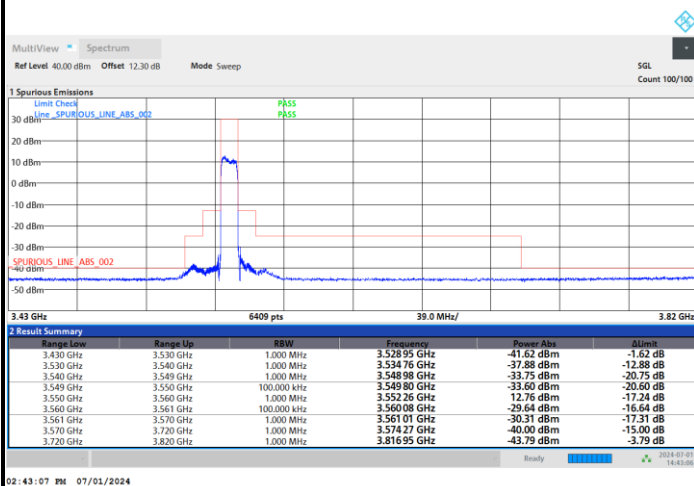
## 1RB0



## 1RBmax



## Full RB

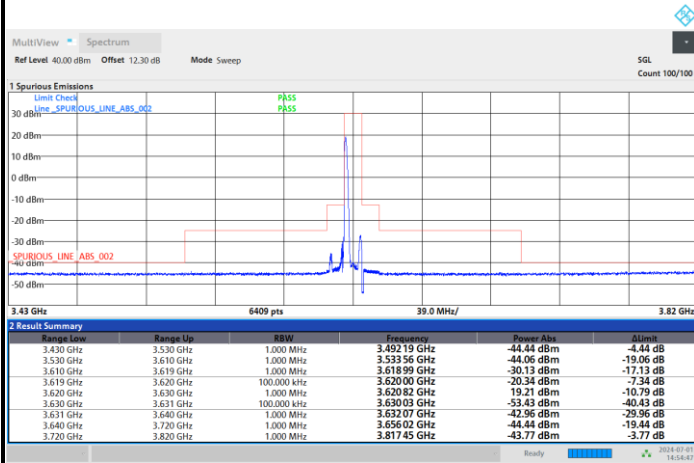




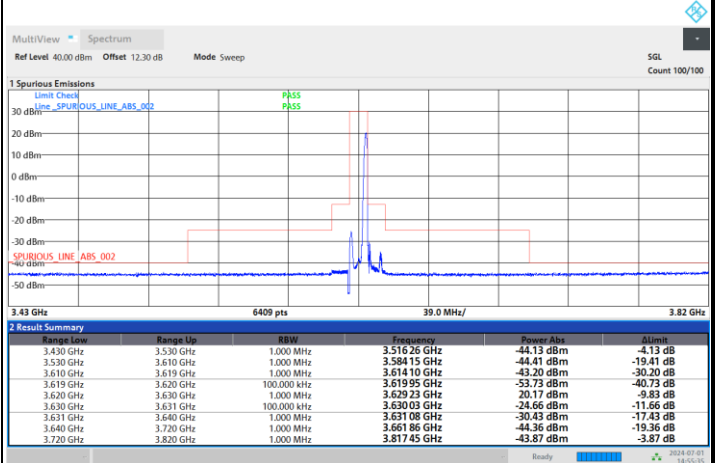
## FR1 n48 / 10MHz / DFT-S OFDM / QPSK

## Middle Channel

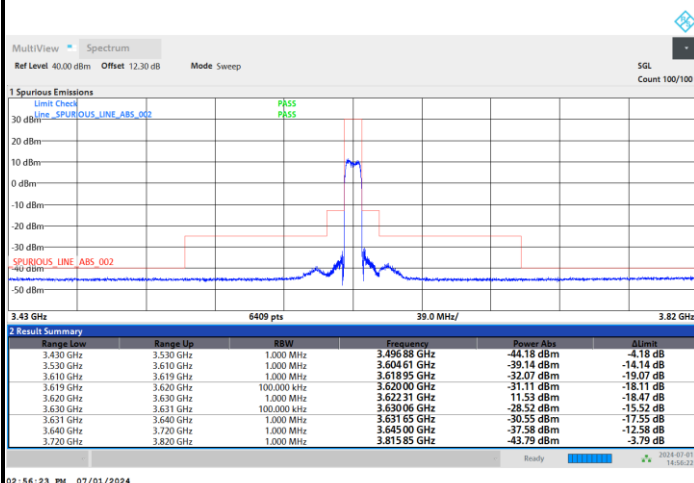
## 1RB0



## 1RBmax



## Full RB

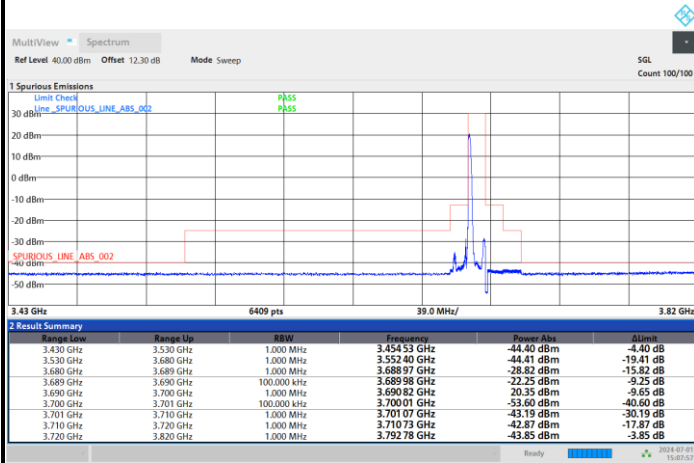




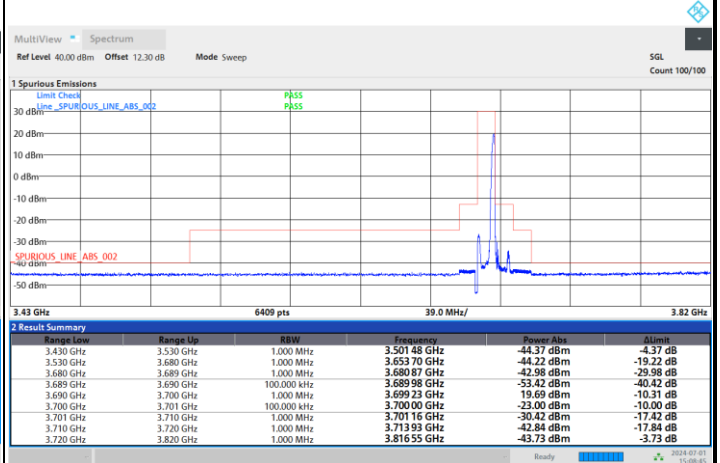
## FR1 n48 / 10MHz / DFT-S OFDM / QPSK

## Highest Channel

## 1RB0



## 1RBmax



## Full RB

