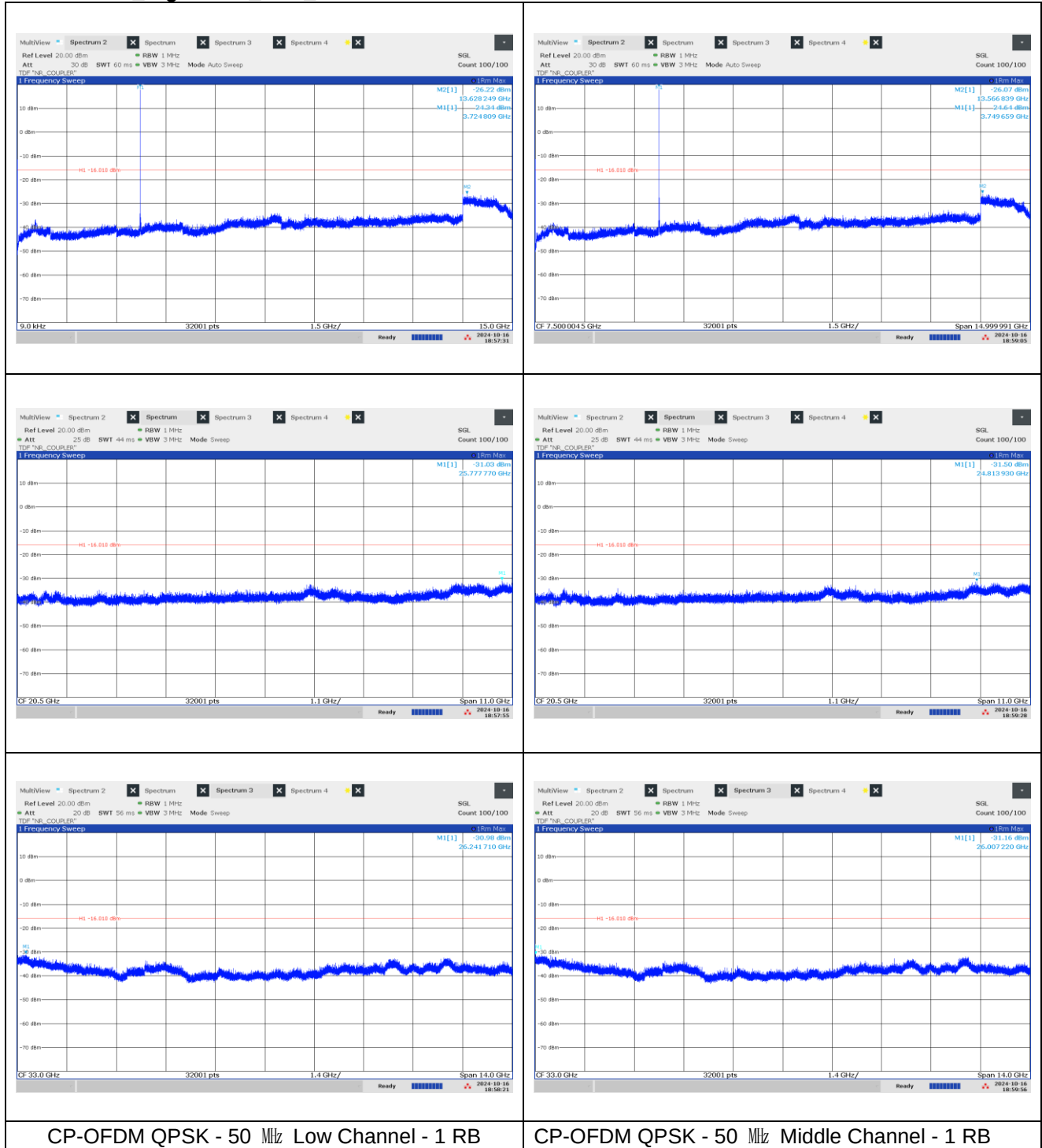
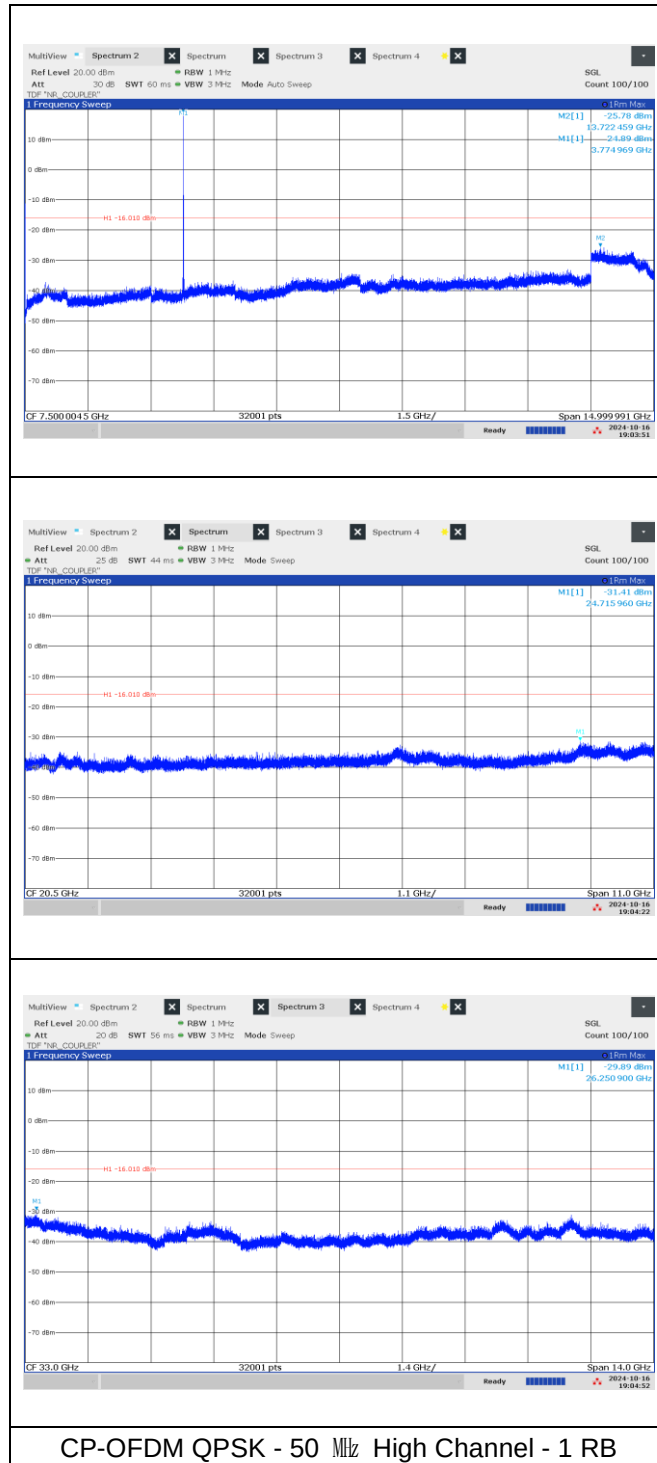


### NR band 78\_High Band\_FCC\_Port 2





## 7. Band Edge and Emission Mask

### 7.1. Limit

#### FCC

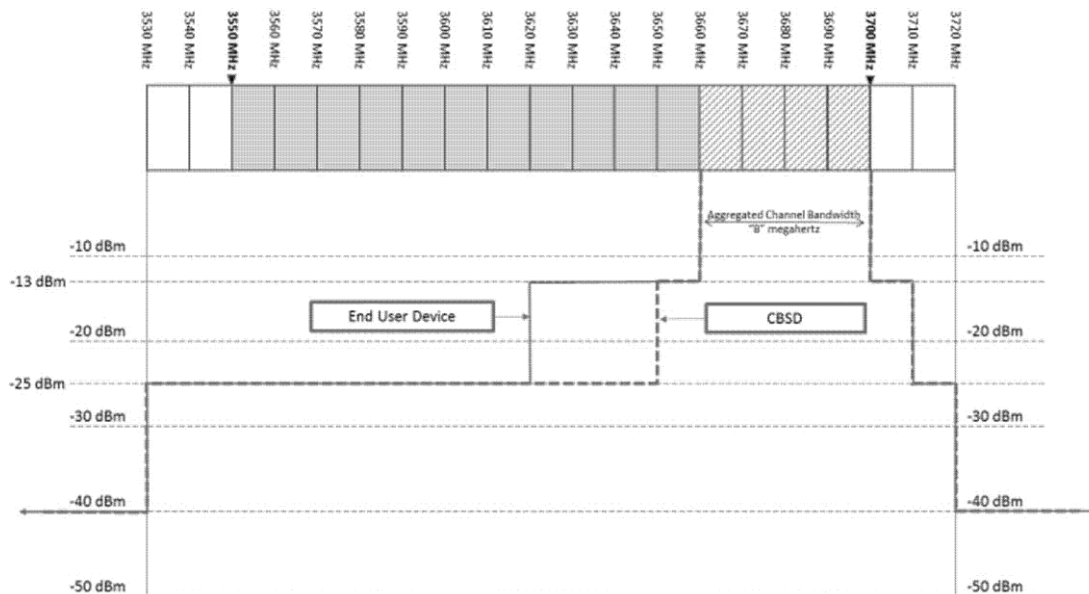
- §27.53(l)(2), for mobile operations in the 3 700-3 980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm /MHz. Compliance with this paragraph (l)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

- §27.53(n)(2), for mobile operations in the 3 450-3 550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm /MHz. Compliance with this paragraph (n)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

- §96.41(e), 3.5GHz Emissions and Interference Limits

(1) General protection levels.

Figure 1 to paragraph (e) – Protection levels



(i) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside the fundamental emission bandwidth as specified in paragraph (e)(3) of this section (whether the emission

is inside or outside of the authorized band) shall not exceed  $-13 \text{ dB m/MHz}$  within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed  $-25 \text{ dB m/MHz}$ . The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

(ii) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by a CBSD to End User Devices, the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed  $-13 \text{ dB m/MHz}$  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  $-25 \text{ dB m/MHz}$ . Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

(2) **Additional protection levels.** Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3 540 MHz or above 3 710 MHz shall not exceed  $-25 \text{ dB m/MHz}$ , and the conducted power of emissions below 3 530 MHz or above 3 720 MHz shall not exceed  $-40 \text{ dB m/MHz}$ .

## IC

### - RSS-192 Issue 5

5.6, unwanted emissions shall be measured in terms of average values when the transmitter is operating at the manufacturer's rated power and modulated as specified in RSS-Gen.

Equipment shall meet the unwanted emission limits, specified below, outside each frequency block group. For each channel bandwidth supported by the equipment under test, the unwanted emissions shall be measured and reported for two channel frequencies: one located as close as possible to the low end and one located as close as possible to the high end of the equipment's operating frequency range.

If the transmitter is designed for multi-carrier operation, the tests shall be carried out using both the maximum and minimum number of carriers intended for the equipment.

5.6.3, subscriber equipment shall have the TRP or conducted power (per antenna), where applicable, of unwanted emission not exceeding the following:

a. the limits in table 6

b. a limit of -30 dBm/MHz in the frequency range greater than (B+5) MHz from the edge of the frequency band

Table 6: Unwanted emission limits for subscriber equipment

| Frequency block group (B)         | Offset frequency from the edge of the frequency block group (MHz) |             |             |             |
|-----------------------------------|-------------------------------------------------------------------|-------------|-------------|-------------|
|                                   | 0-1                                                               | 1-5         | 5-B         | >B          |
| 10 MHz, 20 MHz, 30 MHz and 40 MHz | -13 dBm/1% of B                                                   | -10 dBm/MHz | -13 dBm/MHz | -25 dBm/MHz |
| > 40 MHz                          | -13 dBm/400 kHz                                                   | -10 dBm/MHz | -13 dBm/MHz | -25 dBm/MHz |

### - RSS-198 Issue 1

5.6, unwanted emissions shall be measured in term of average value when the transmitter is operating at the manufacturer's rated power and modulated as specified in RSS-Gen.

Equipment shall meet the unwanted emission limits, specified below, outside each frequency block group. For each channel bandwidth supported by the equipment under test, the unwanted emissions shall be measured and reported for two channel frequencies: one located as close as possible to the low end and one located as close as possible to the high end of the equipment's operating frequency range.

5.6.1, the unwanted emission outside the frequency block group shall not exceed the TRP or total conducted power (sum of conducted power across all antenna connectors) limits as specified in table 2.

Table 2: Unwanted emission limits for all equipment

| Offset frequency from the edge of the frequency block group (MHz) | Unwanted emission limits for all equipment |
|-------------------------------------------------------------------|--------------------------------------------|
| ≤1                                                                | -13 dBm/1% OB*                             |
| >1                                                                | -13 dBm/MHz                                |

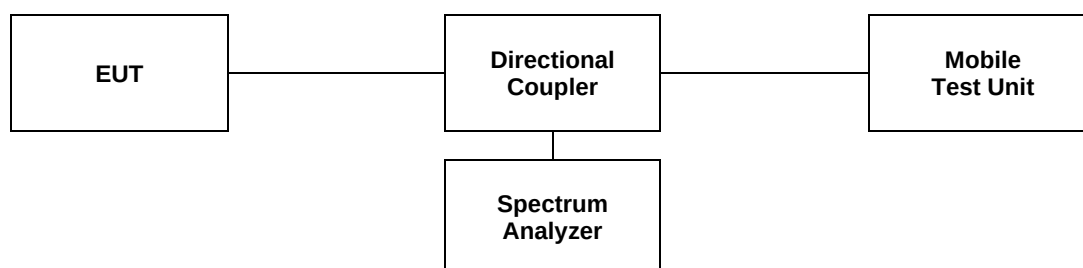
\*OB is the occupied bandwidth

5.6.2, for frequencies between 4 200 MHz and 4 400 MHz, the unwanted emission of outdoor base station, indoor base station and fixed service equipment shall not exceed a TRP or total conducted power (sum of conducted power across all antenna connectors) limit of -30 dBm/MHz.

## 7.2. Test Procedure

The test follows section 5.7 of ANSI C63.26-2015.

- Span was set large enough so as to capture all out of band emissions near the band edge.
- RBW  $\geq 1$  % of OBW
- VBW  $\geq 3 \times$  RBW.
- Detector = RMS.
- Trace mode = Average.
- Sweep time = Auto.
- The trace was allowed to stabilize.
- All path loss of frequency range was investigated and compensated to spectrum analyzer as TDF function.



### Note;

- In case of MIMO mode, the limits were adjusted by a factor of  $10 \cdot \log(2)$  dB to account for the device operation as a 2 port MIMO transmitter, as per KDB 622911. MIMO factor calculation as below:  
MIMO Factor =  $10 \cdot \log(2) = 3.01$  dB

### n77/78 (FCC)

| Frequency Range                                  | Basic Limit (dB m) | MIMO Factor (dB) | Adjusted Limit (dB m) |
|--------------------------------------------------|--------------------|------------------|-----------------------|
| 1 MHz above and below the channel edges          | -13                | 3.01             | -16.01                |
| 1 MHz to 5 MHz above and below the channel edges | -13                | 3.01             | -16.01                |
| 5 MHz above and below the channel edges          | -13                | 3.01             | -16.01                |

### n48 (FCC)

| Frequency Range                                  | Basic Limit (dB m) | MIMO Factor (dB) | Adjusted Limit (dB m) |
|--------------------------------------------------|--------------------|------------------|-----------------------|
| 0 MHz to B MHz above and below the channel edges | -13                | 3.01             | -16.01                |
| B MHz above and below the channel edges          | -25                | 3.01             | -28.01                |
| below 3 540 MHz or above 3 710 MHz               | -25                | 3.01             | -28.01                |
| below 3 530 MHz or above 3 720 MHz               | -40                | 3.01             | -43.01                |

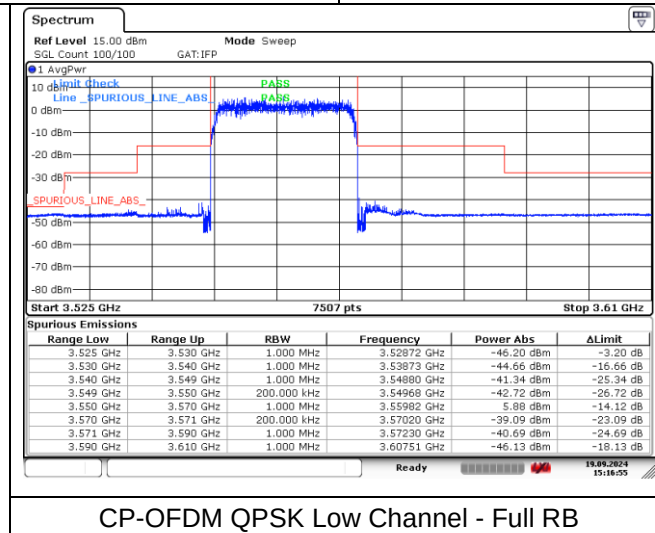
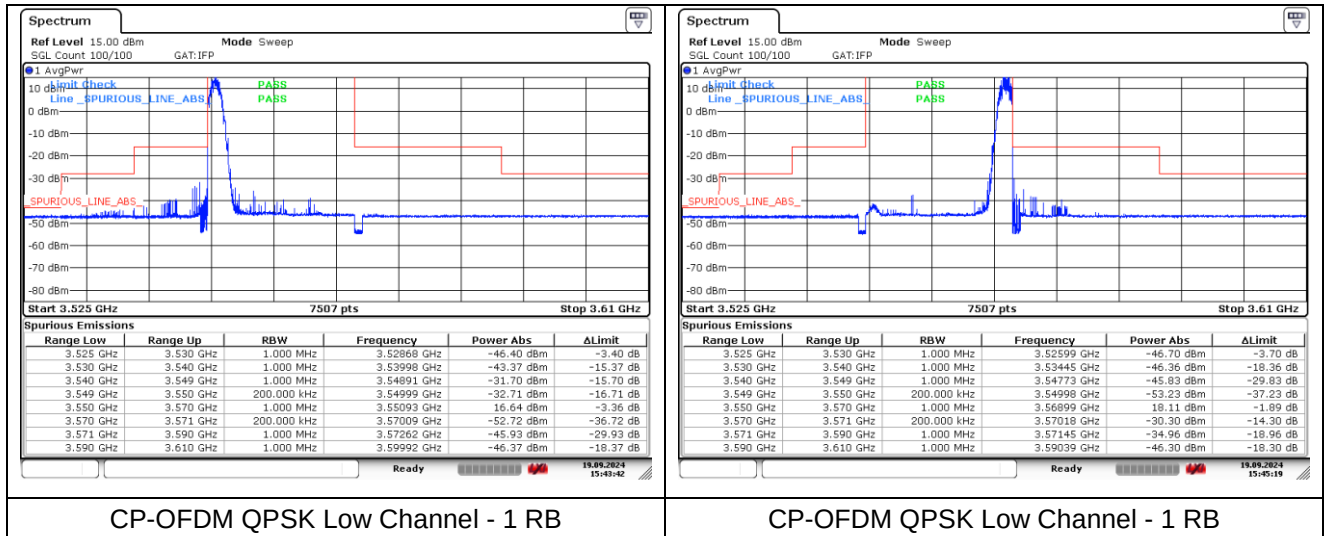
**n48/77/78 Low band (IC)**

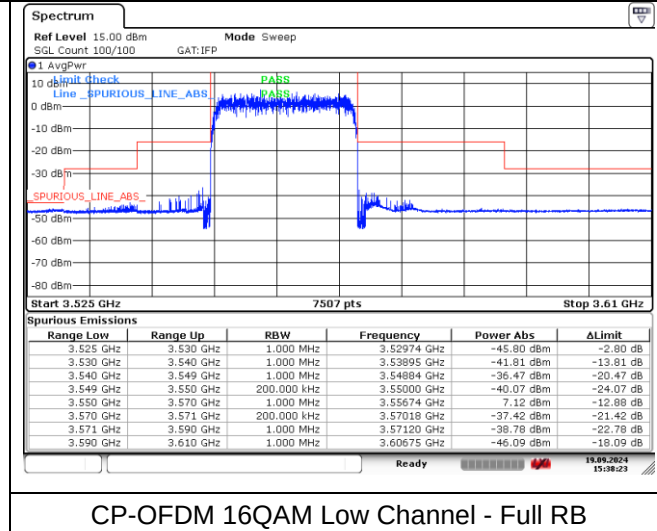
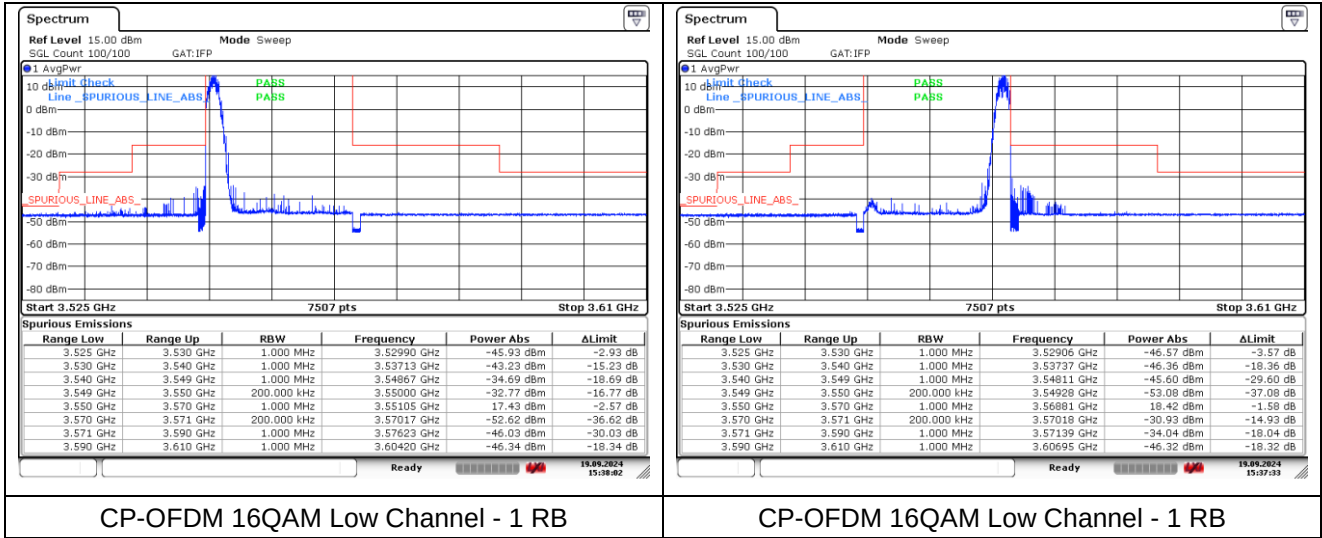
| Frequency block group (B)         | Offset frequency from the edge of the frequency block group (MHz) |                |                |                |
|-----------------------------------|-------------------------------------------------------------------|----------------|----------------|----------------|
|                                   | 0-1                                                               | 1-5            | 5-B            | >B             |
| 10 MHz, 20 MHz, 30 MHz and 40 MHz | Basic Limit                                                       | Basic Limit    | Basic Limit    | Basic Limit    |
|                                   | -13 dBm/1% of B                                                   | -10 dBm/MHz    | -13 dBm/MHz    | -25 dBm/MHz    |
|                                   | Adjusted Limit                                                    | Adjusted Limit | Adjusted Limit | Adjusted Limit |
|                                   | -16.01 dBm/1% of B                                                | -13.01 dBm/MHz | -16.01 dBm/MHz | -28.01 dBm/MHz |
| > 40 MHz                          | Basic Limit                                                       | Basic Limit    | Basic Limit    | Basic Limit    |
|                                   | -13 dBm/400 kHz                                                   | -10 dBm/MHz    | -13 dBm/MHz    | -25 dBm/MHz    |
|                                   | Adjusted Limit                                                    | Adjusted Limit | Adjusted Limit | Adjusted Limit |
|                                   | -16.01 dBm/1% of B                                                | -13.01 dBm/MHz | -16.01 dBm/MHz | -28.01 dBm/MHz |

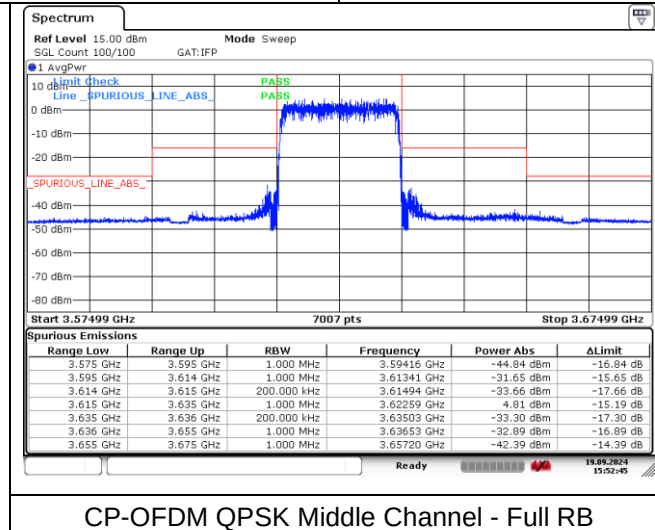
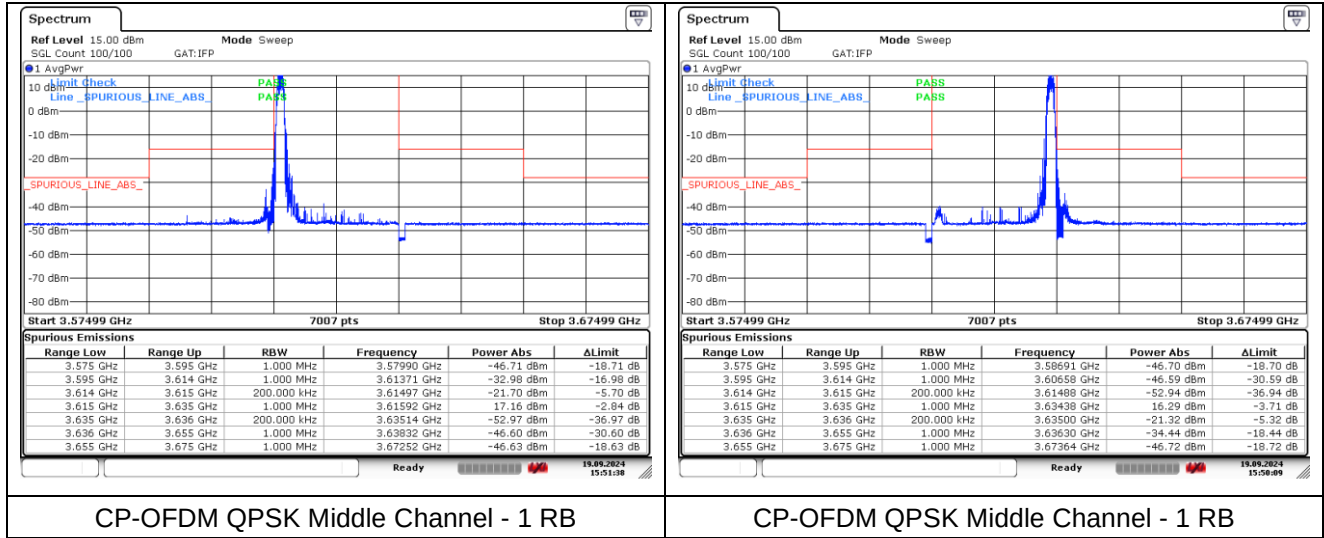
**n77 High band (IC)**

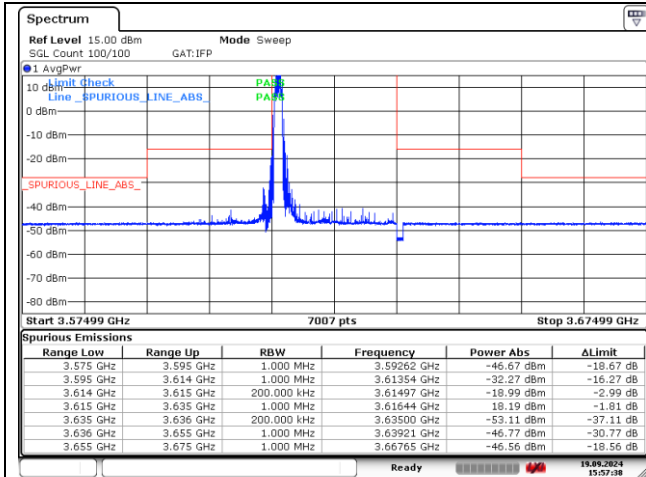
| Offset frequency from the edge of the frequency block group (MHz) | Unwanted emission limits for all equipment (Basic Limit) | Unwanted emission limits for all equipment (Adjusted Limit) |
|-------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------|
| ≤1                                                                | -13 dBm/1% OB*                                           | -16.01 dBm/1% OB*                                           |
| >1                                                                | -13 dBm/MHz                                              | -16.01 dBm/MHz                                              |

## NR band 48\_FCC (20 MHz)\_Ant. 1

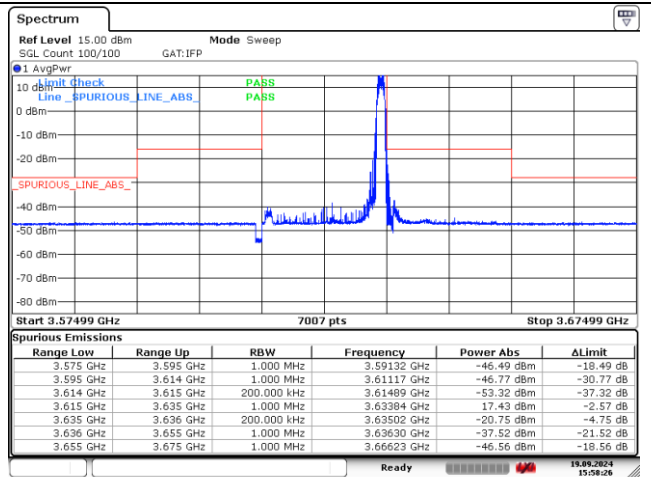




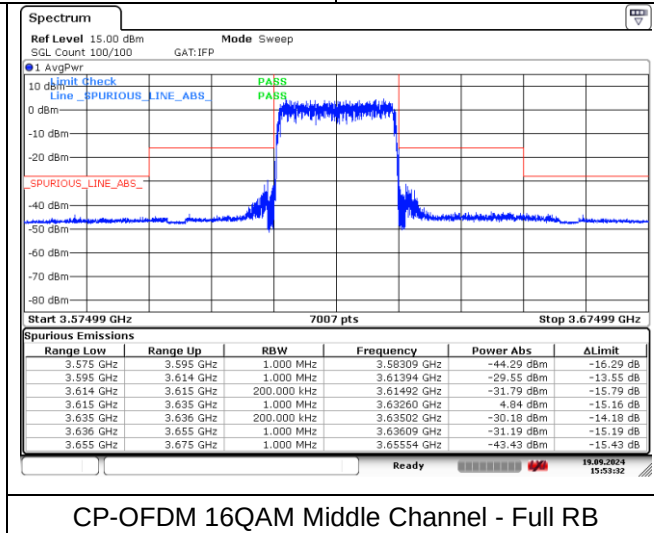




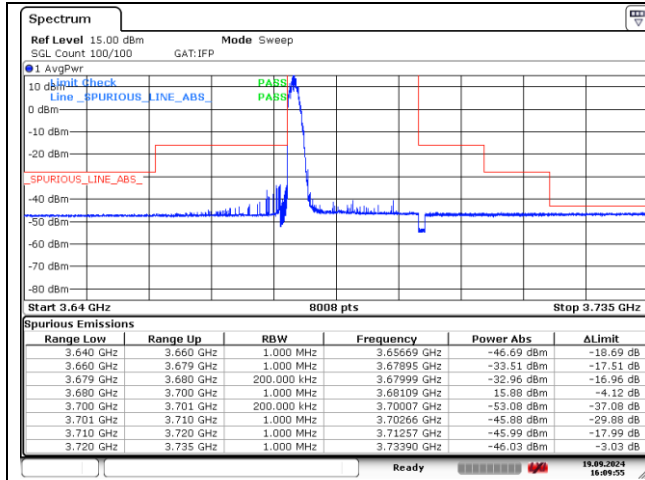
CP-OFDM 16QAM Middle Channel - 1 RB



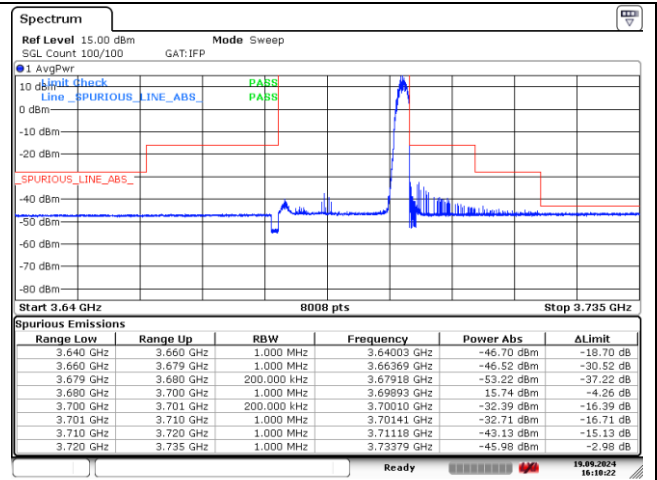
CP-OFDM 16QAM Middle Channel - 1 RB



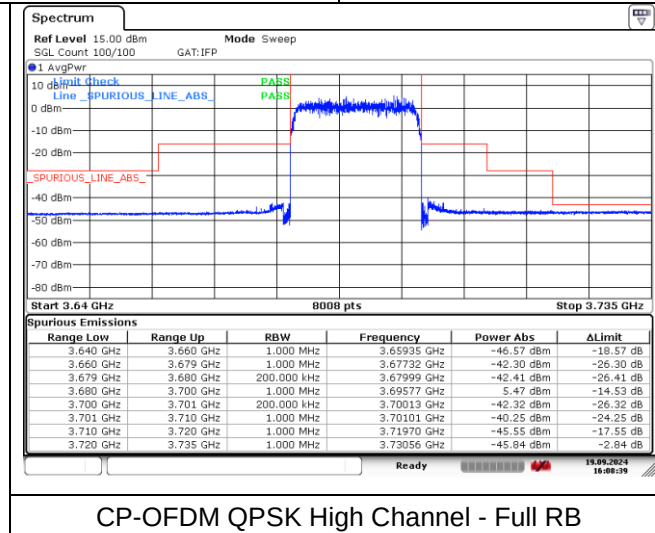
CP-OFDM 16QAM Middle Channel - Full RB



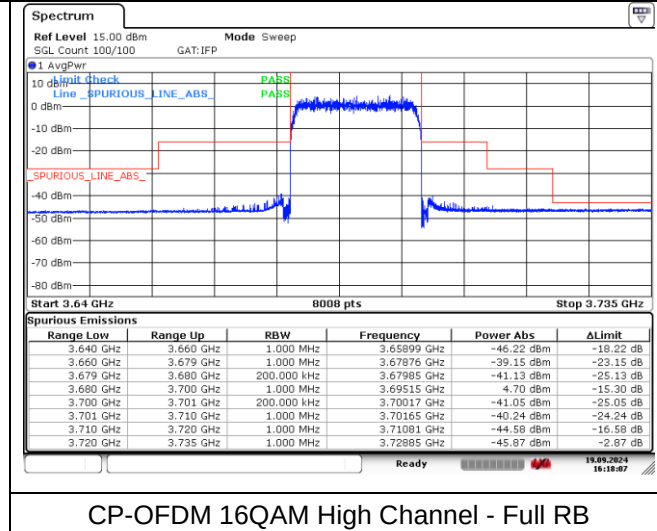
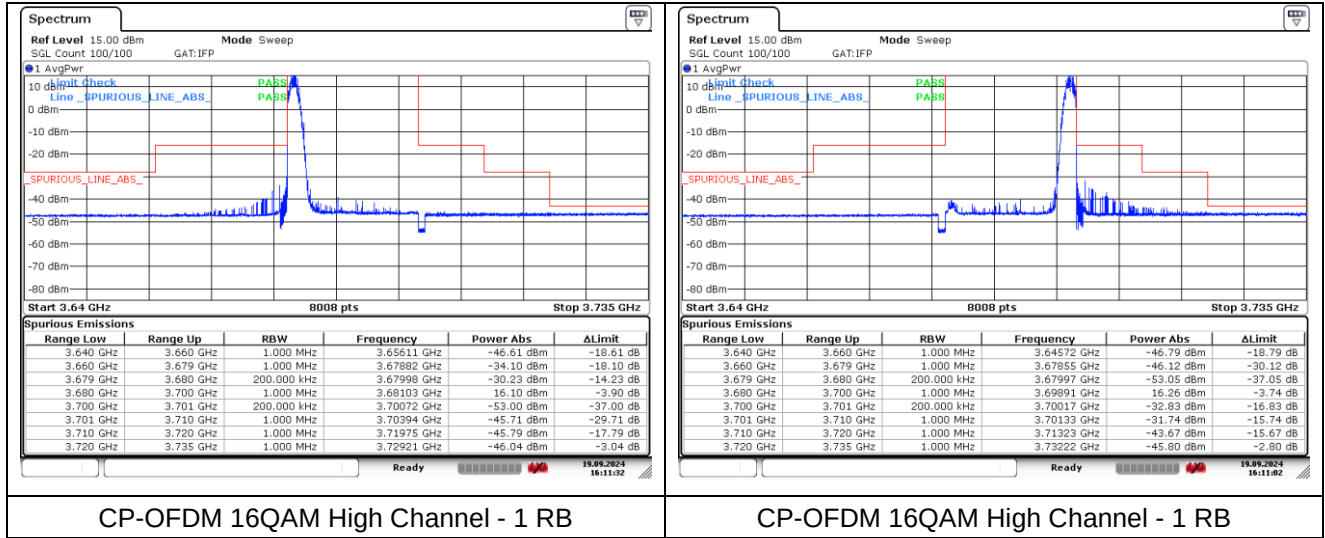
CP-OFDM QPSK High Channel - 1 RB



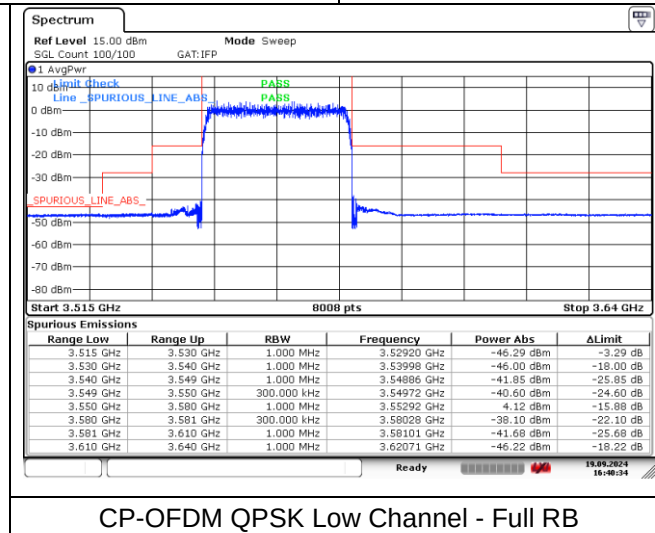
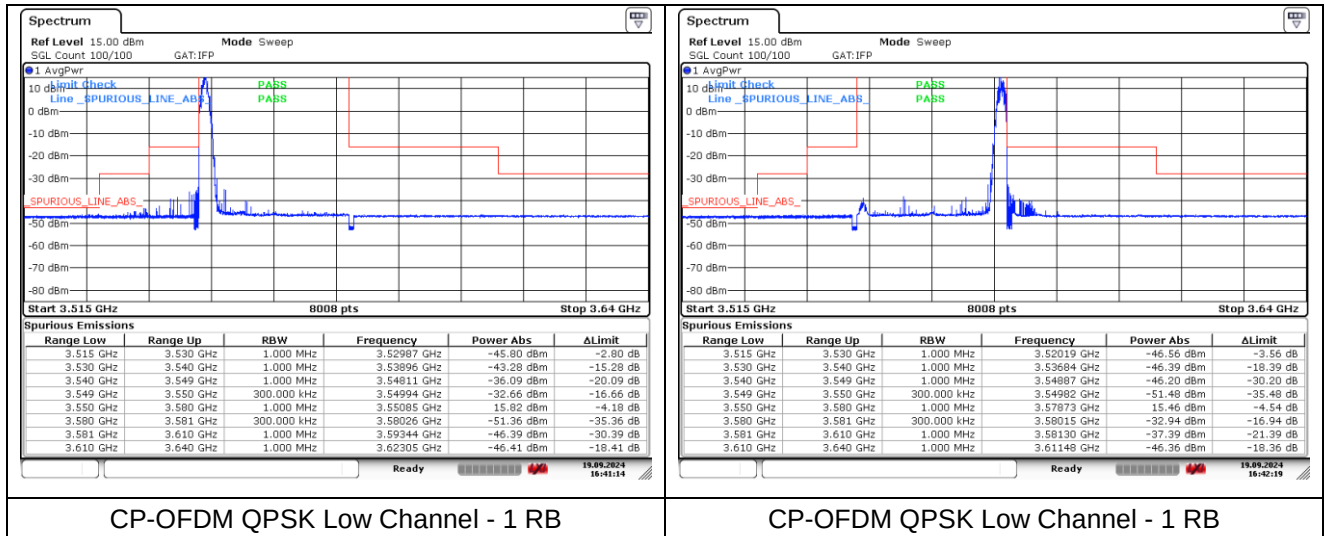
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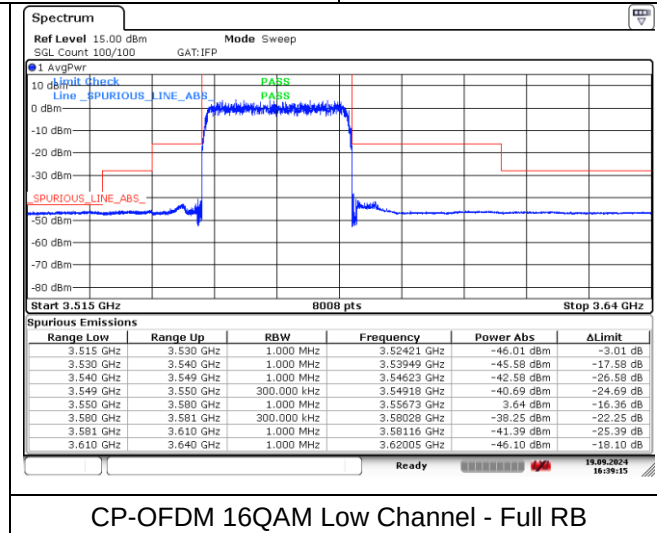
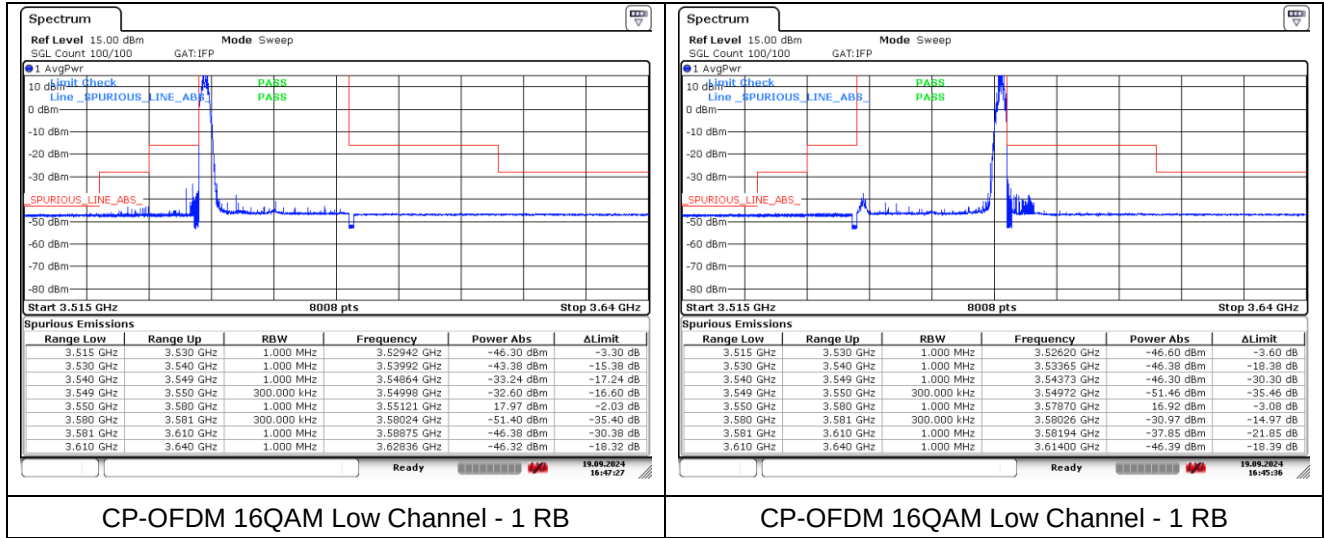


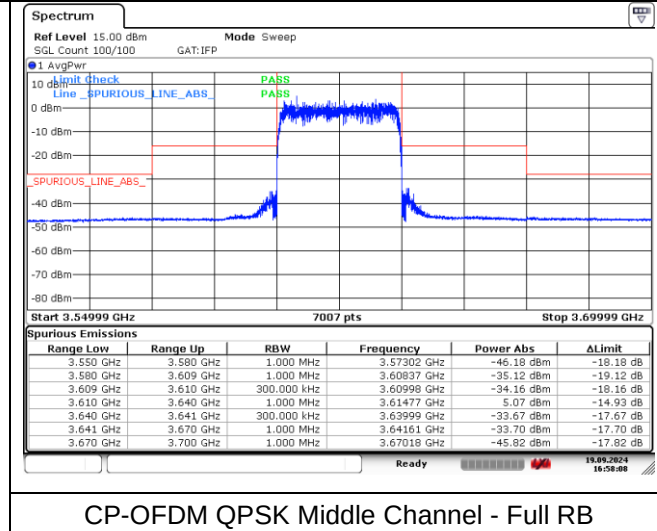
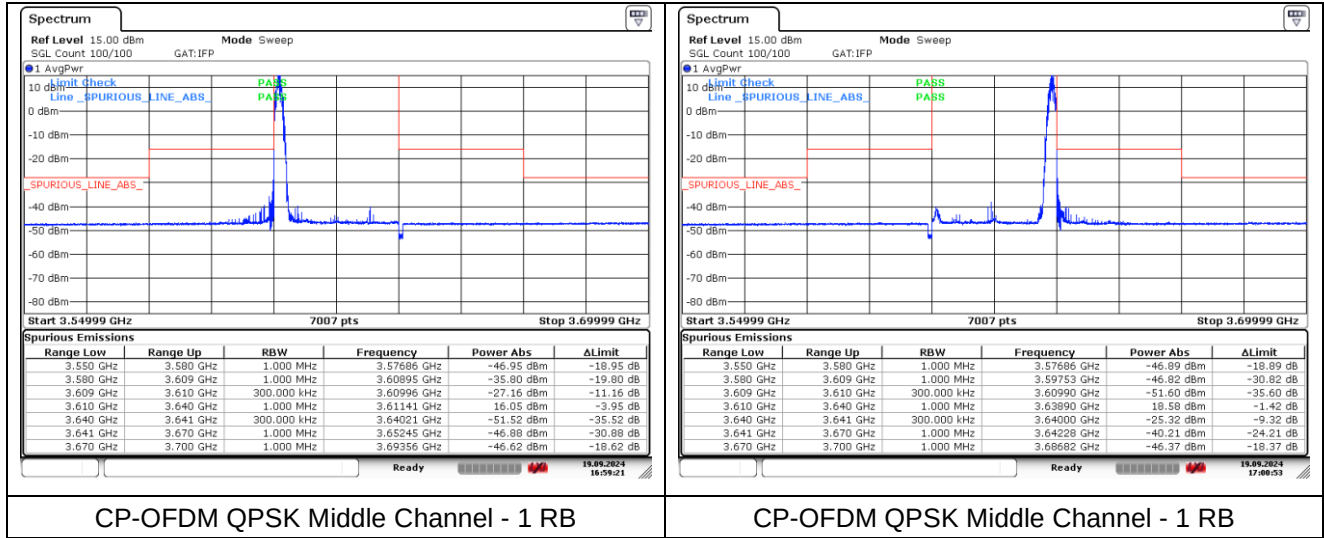
CP-OFDM QPSK High Channel - Full RB

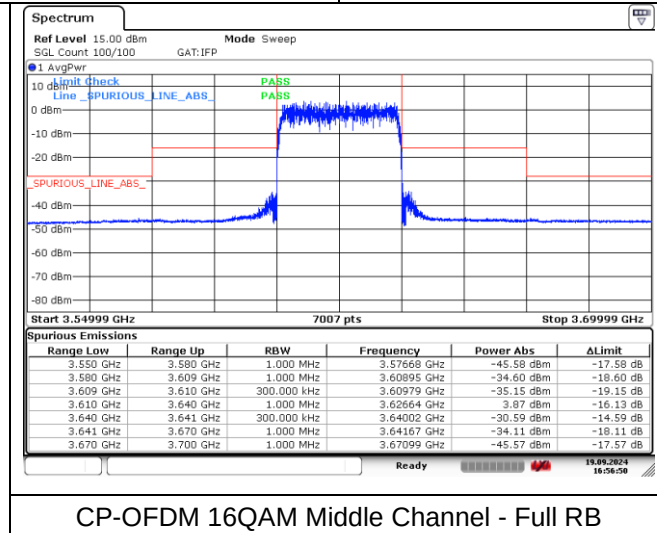
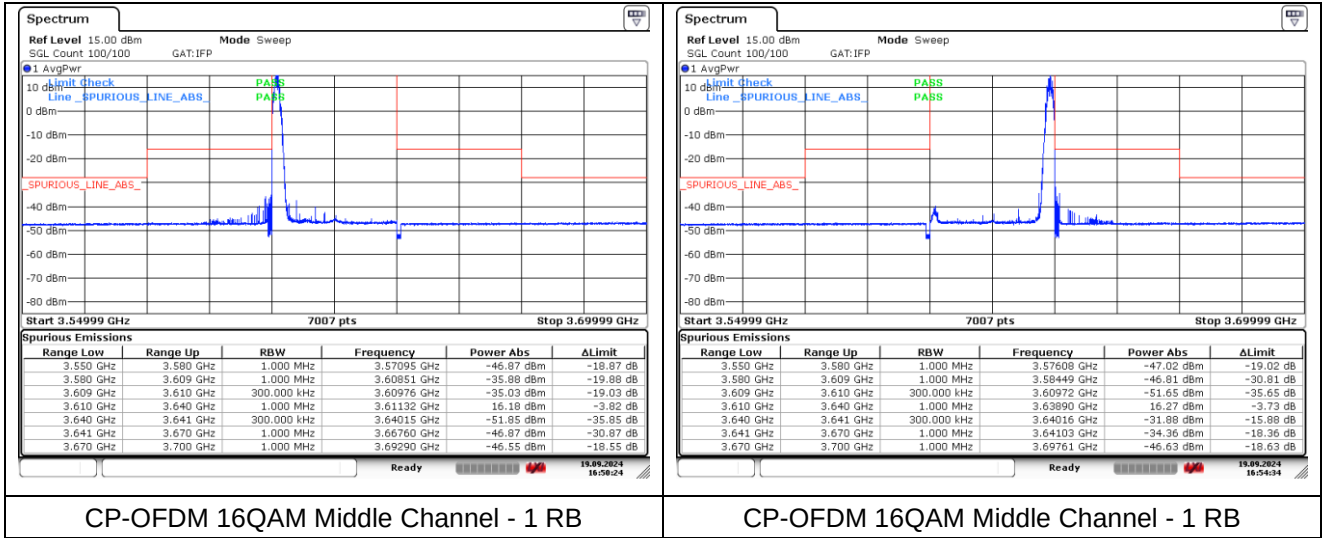


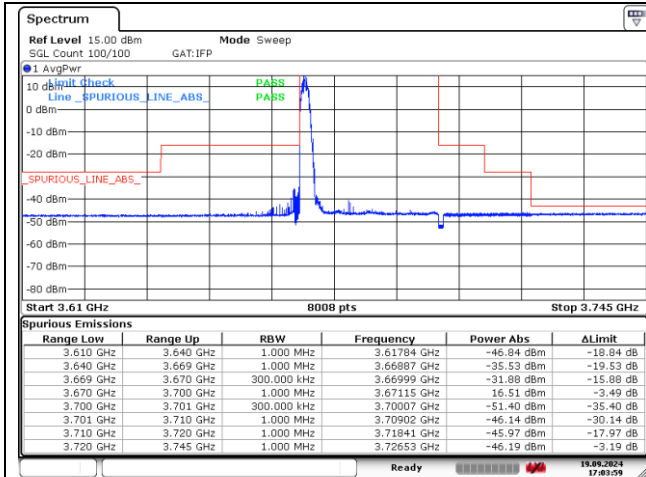
## NR band 48\_FCC (30 MHz)\_Ant. 1



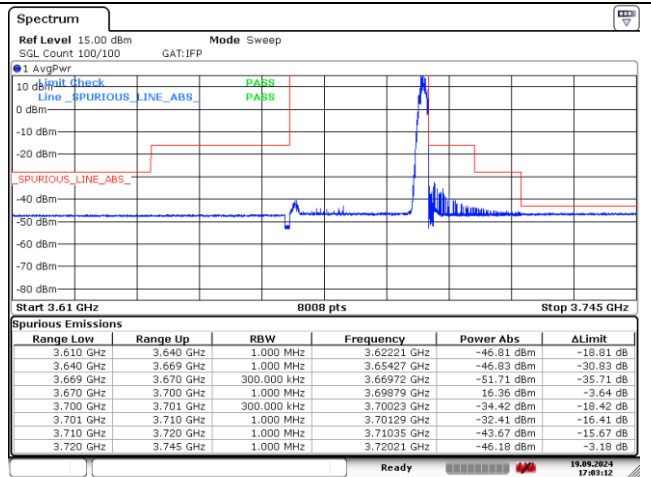




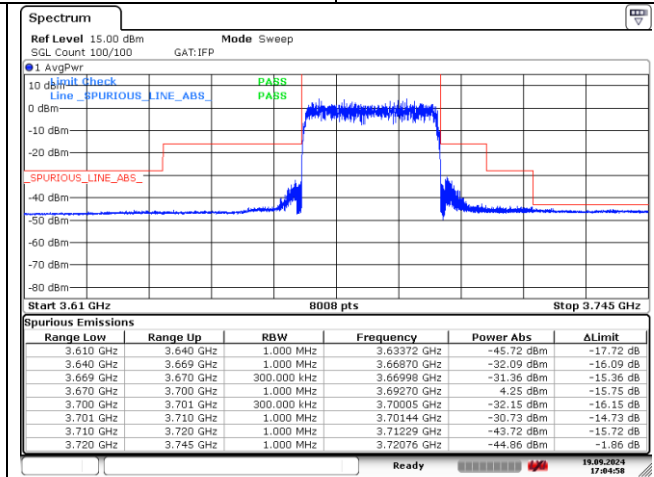




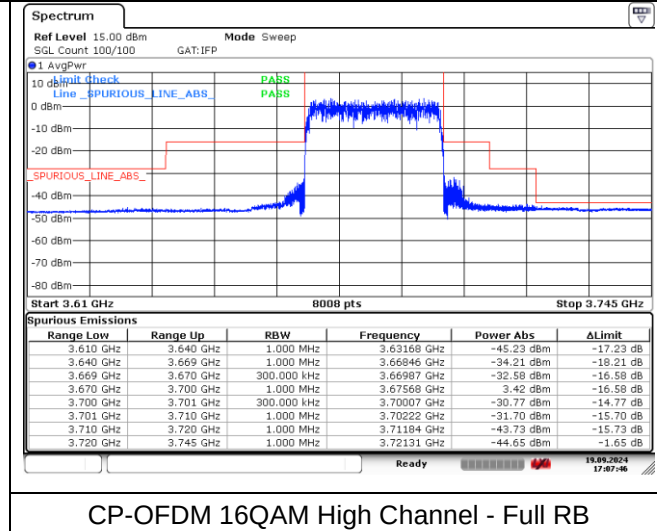
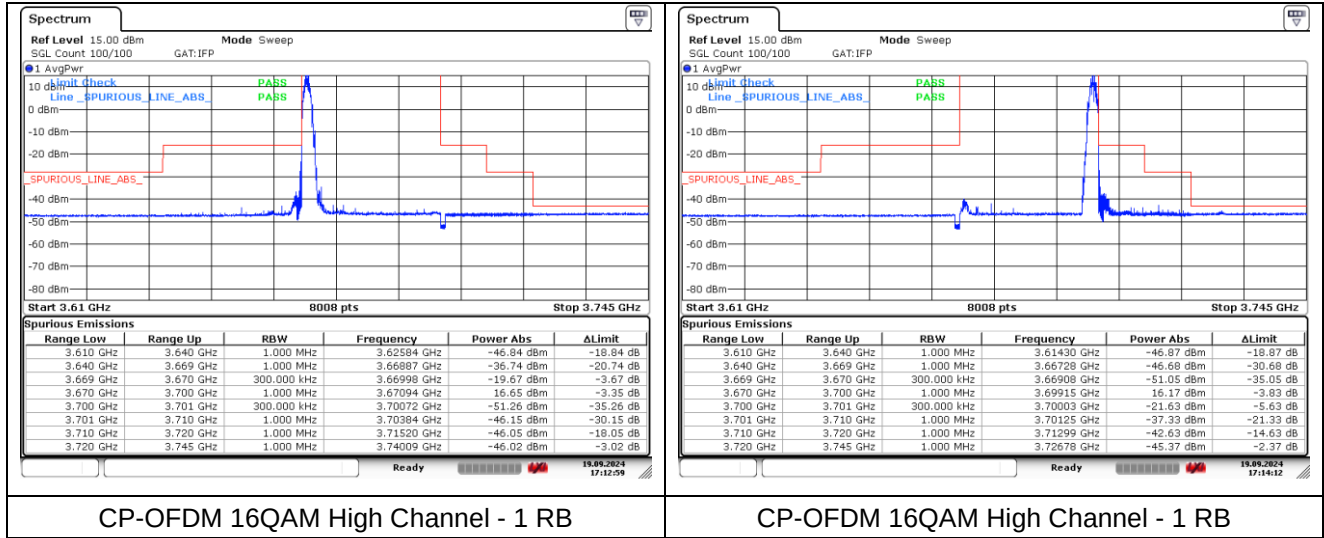
CP-OFDM QPSK High Channel - 1 RB



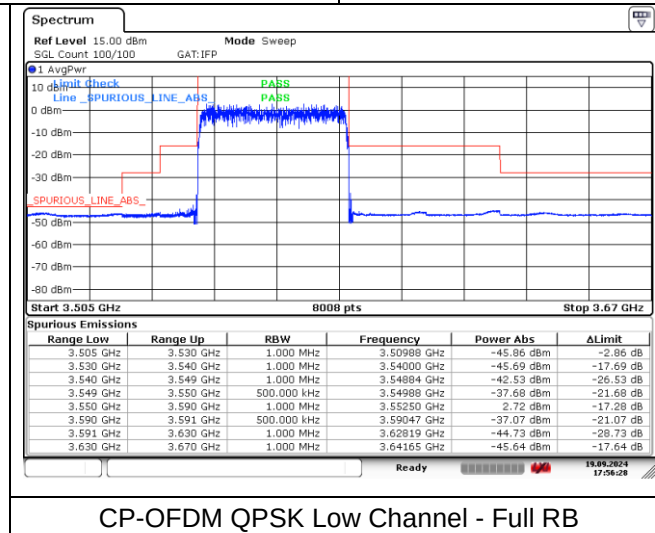
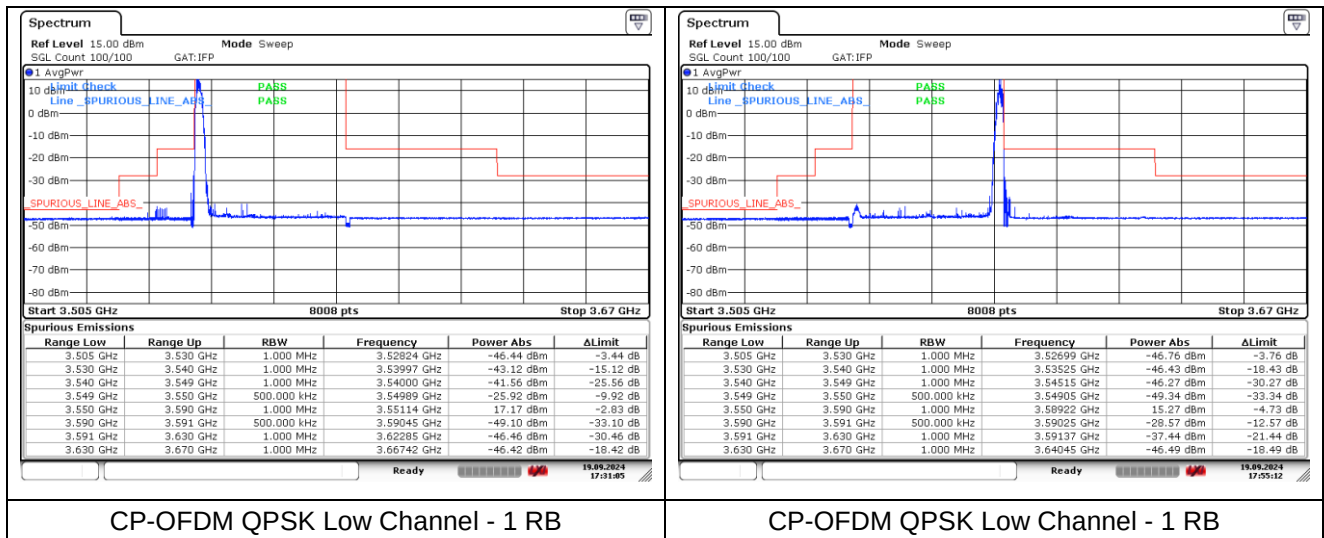
CP-OFDM QPSK High Channel - 1 RB



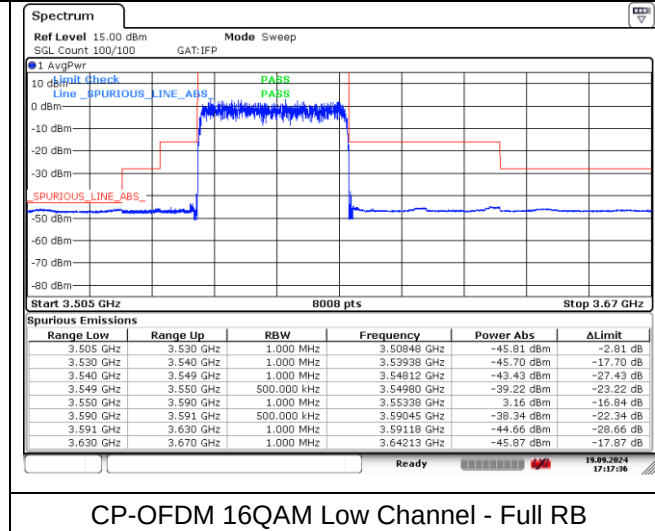
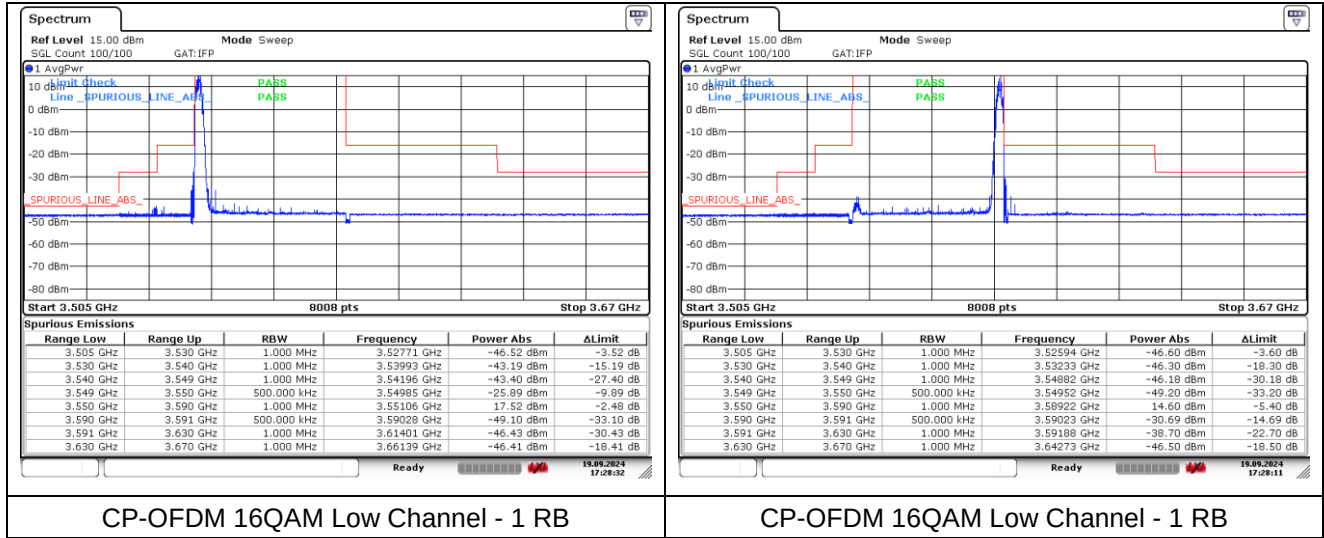
CP-OFDM QPSK High Channel - Full RB

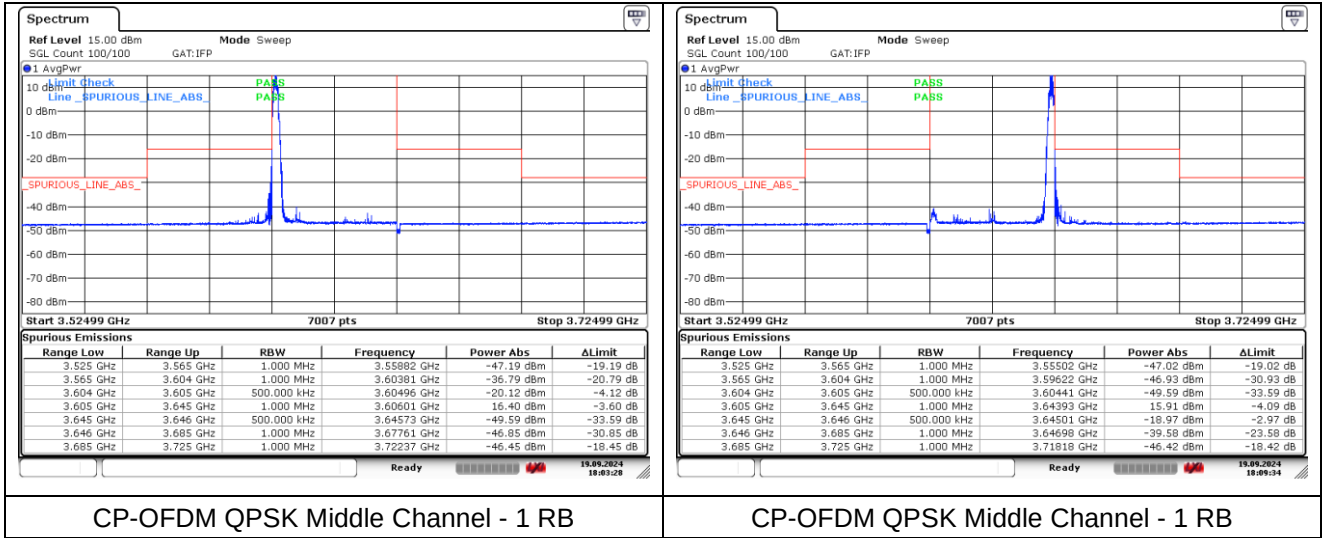


## NR band 48\_FCC (40 MHz)\_Ant. 1



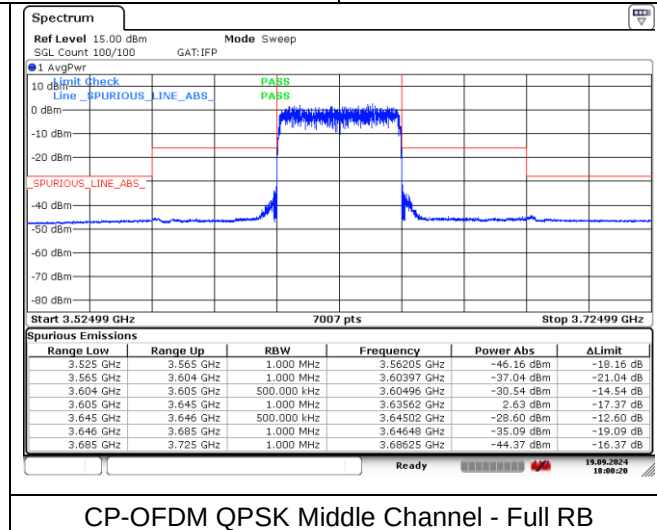
CP-OFDM QPSK Low Channel - Full RB



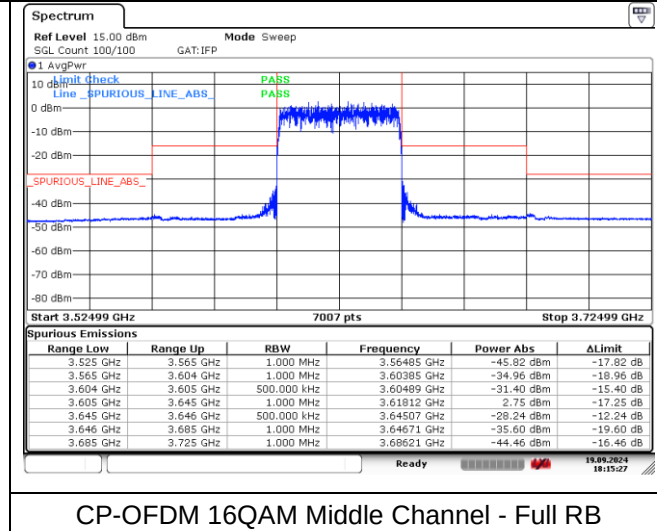
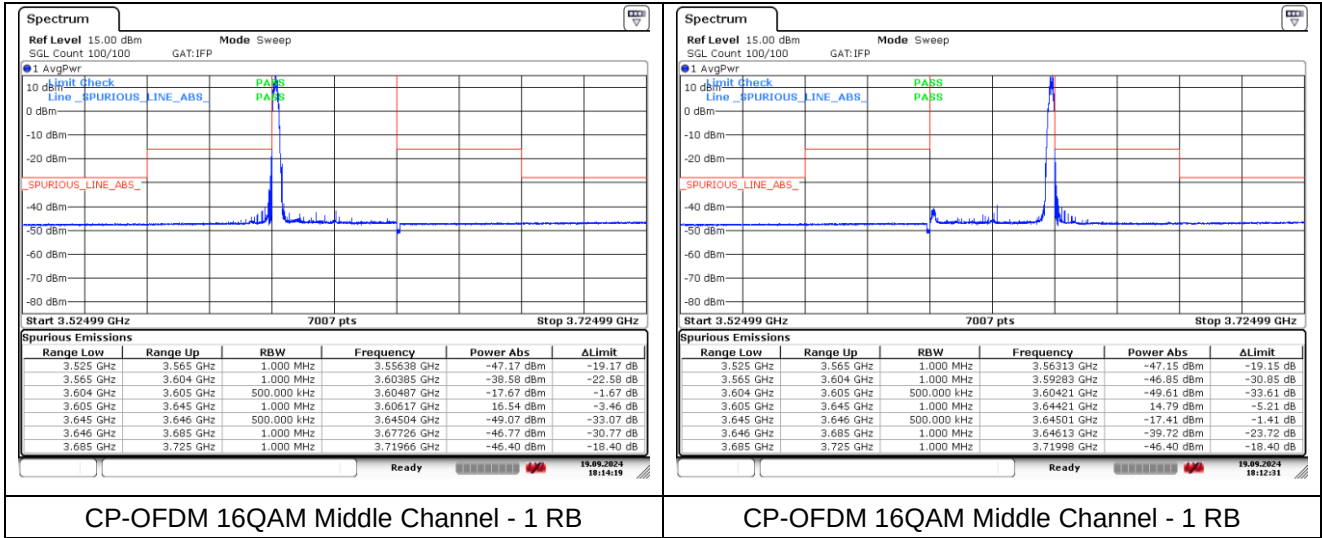


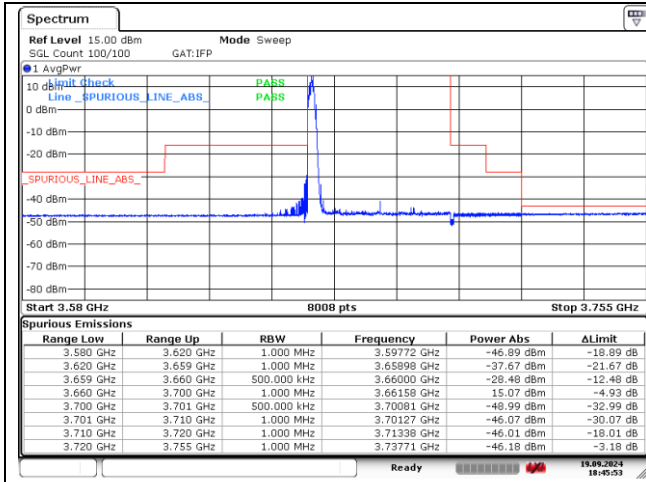
CP-OFDM QPSK Middle Channel - 1 RB

CP-OFDM QPSK Middle Channel - 1 RB

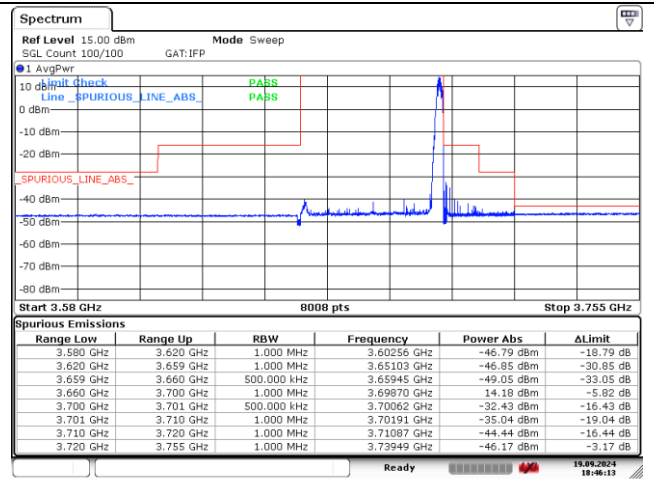


CP-OFDM QPSK Middle Channel - Full RB

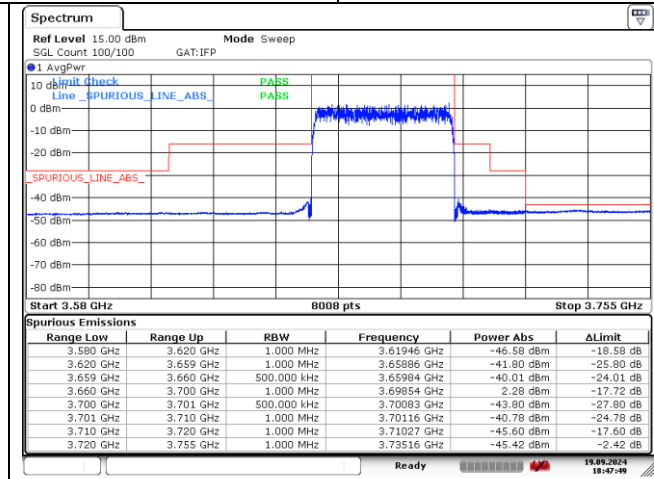




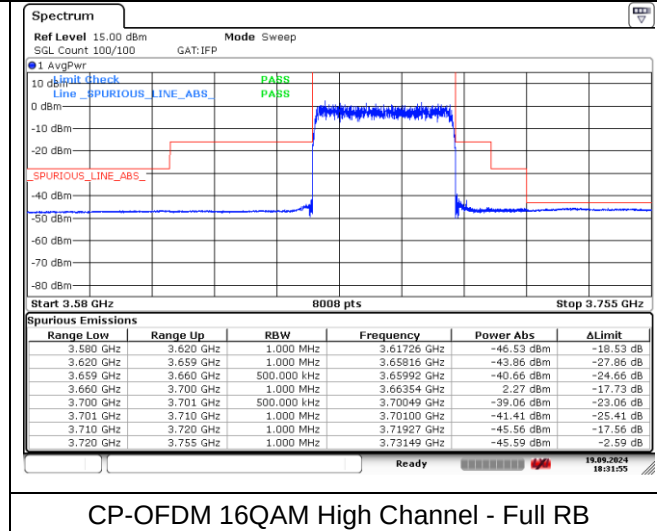
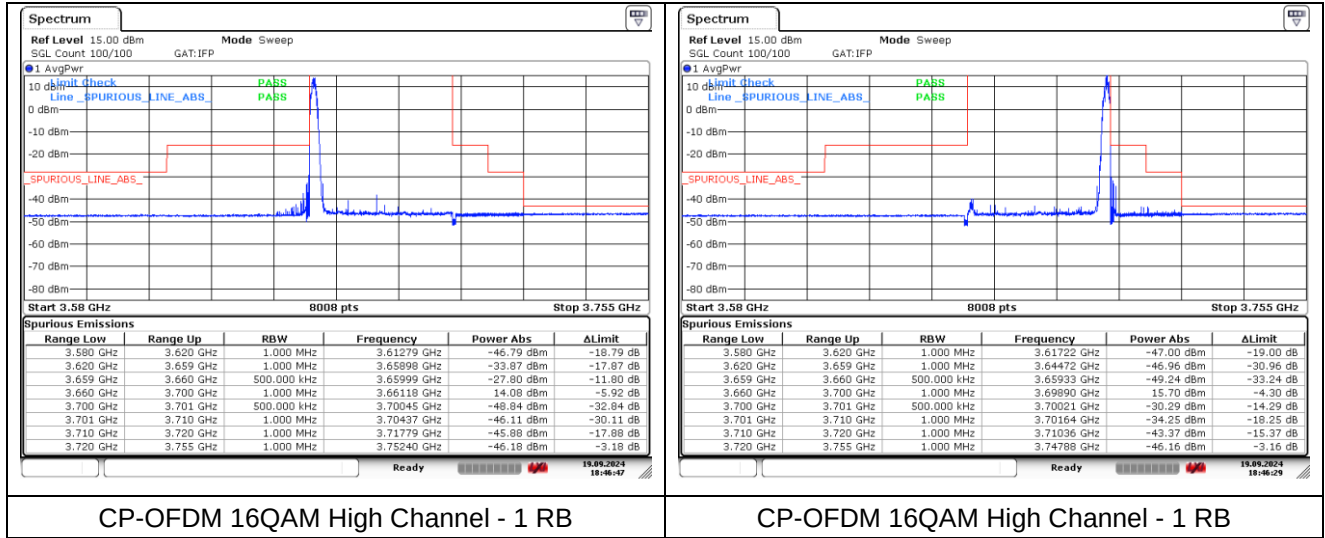
CP-OFDM QPSK High Channel - 1 RB



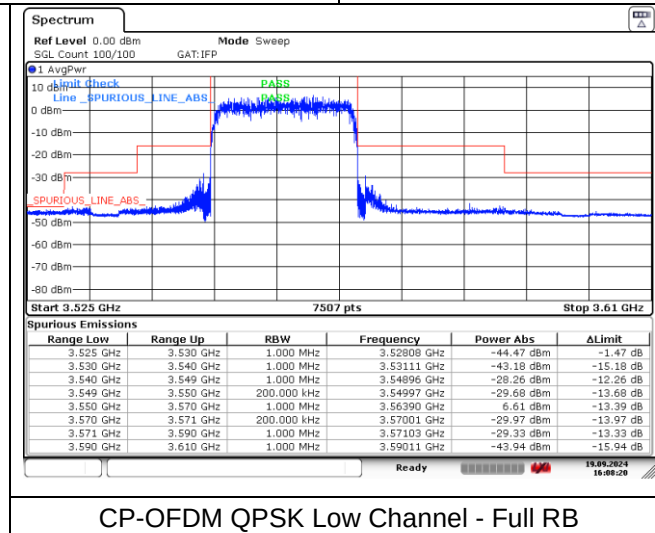
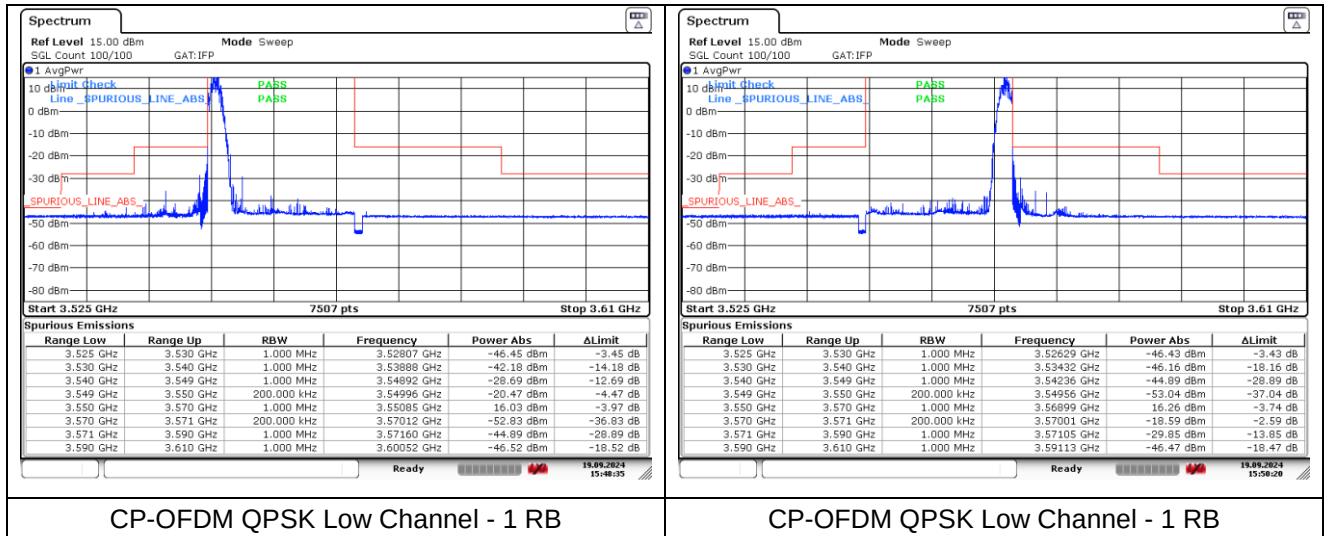
CP-OFDM QPSK High Channel - 1 RB

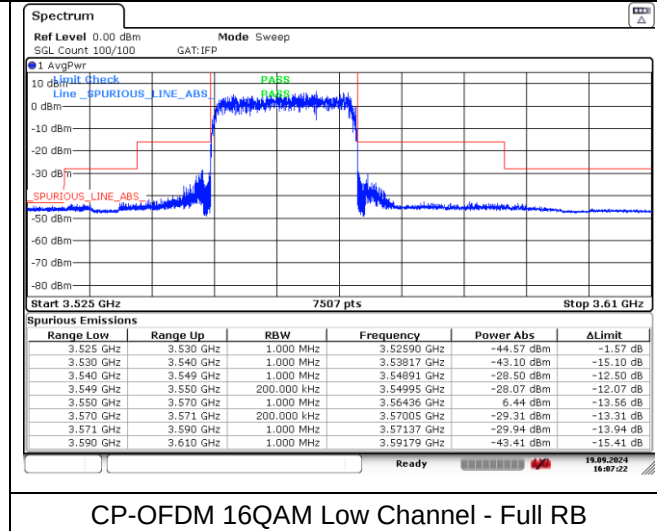
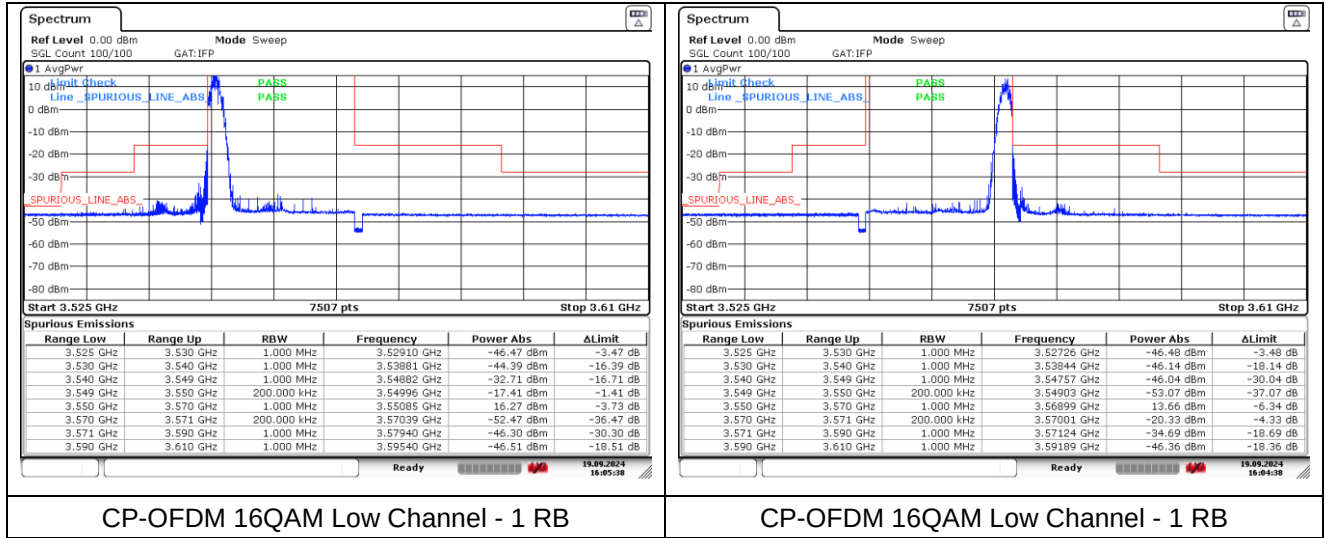


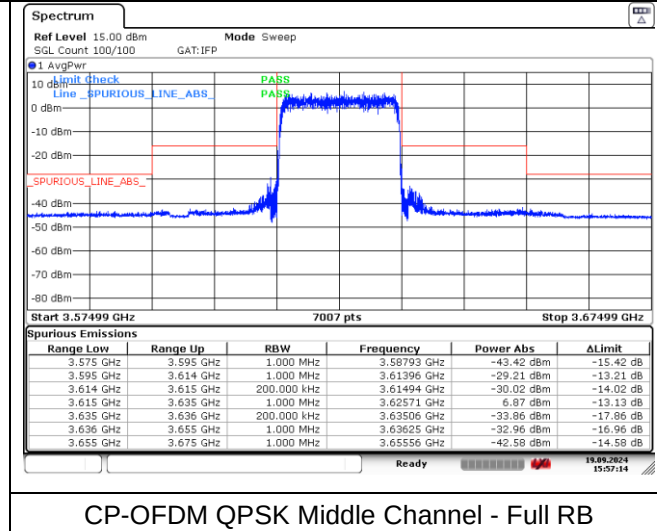
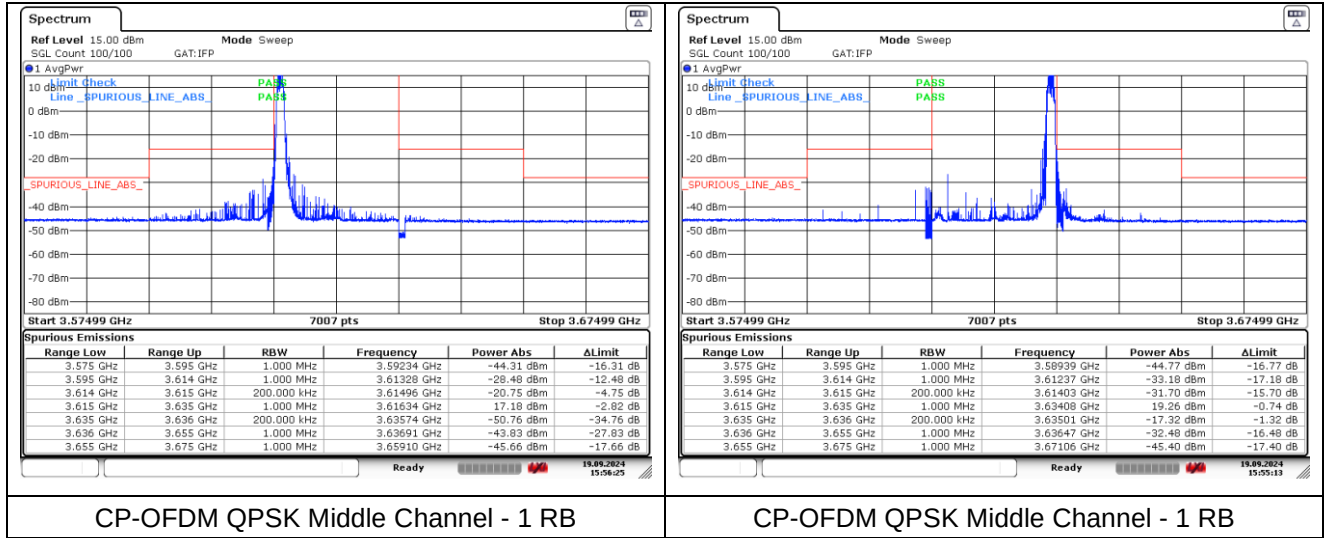
CP-OFDM QPSK High Channel - Full RB

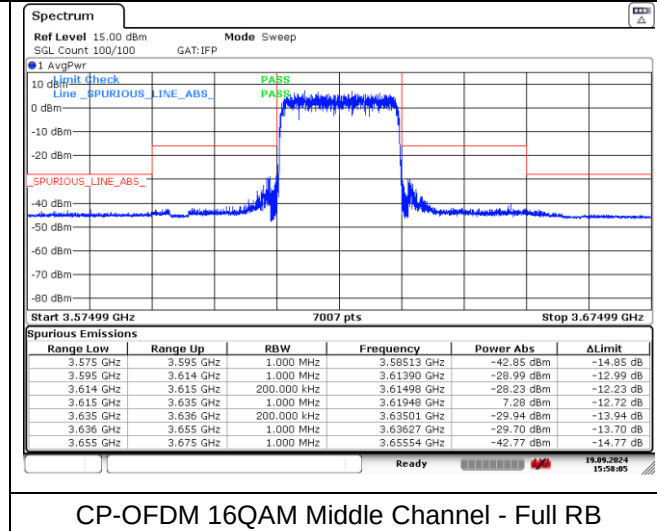
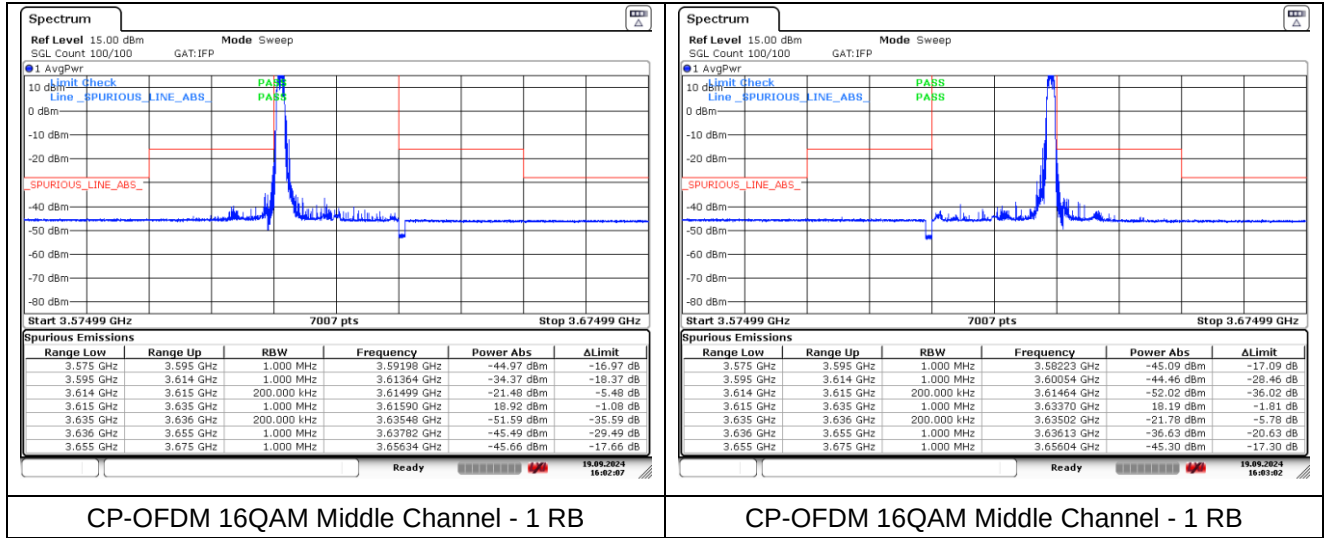


## NR band 48\_FCC (20 MHz)\_Ant. 2

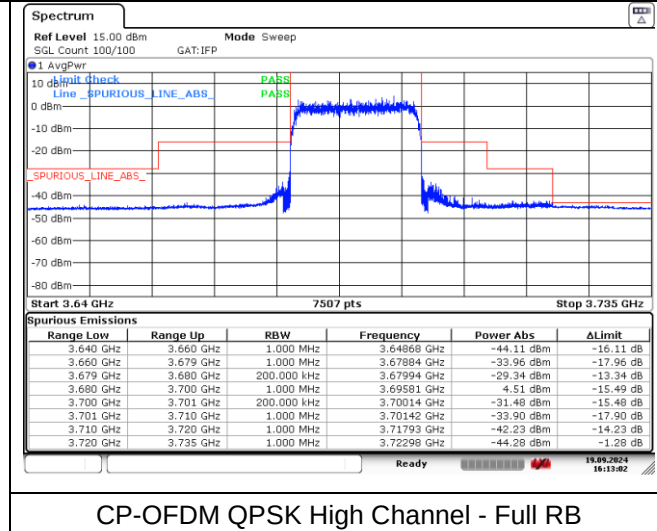
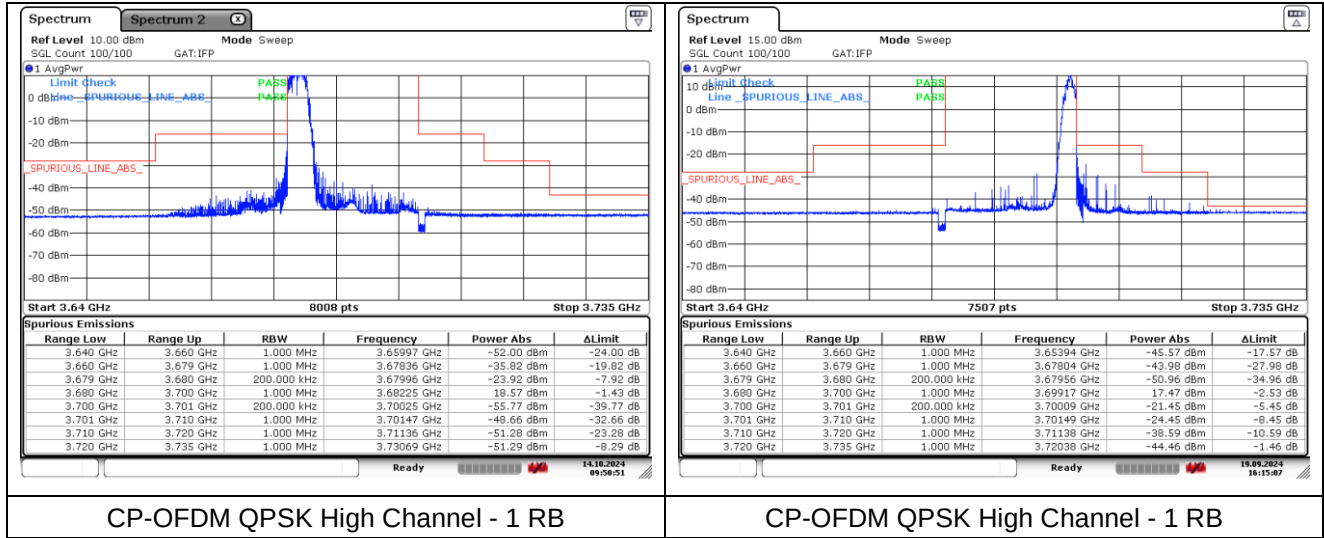


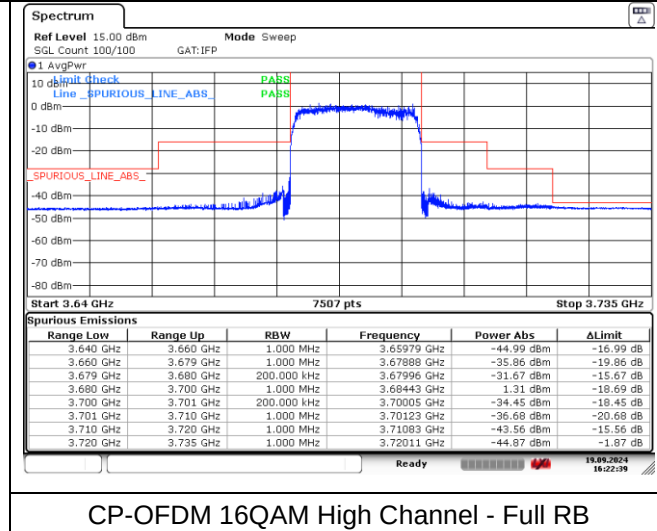
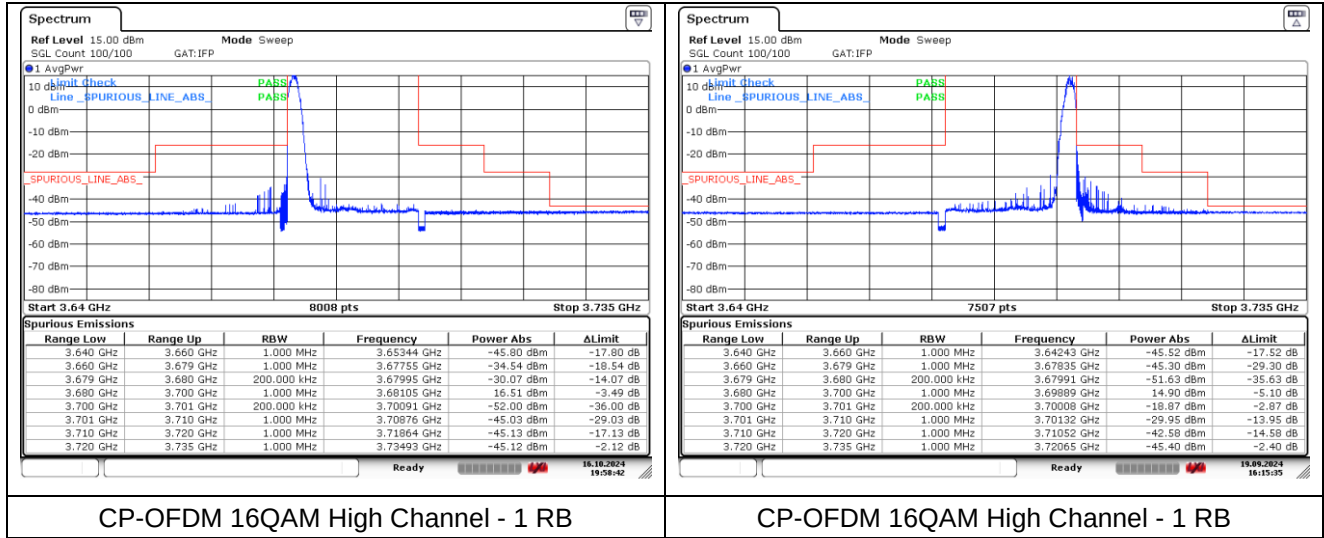




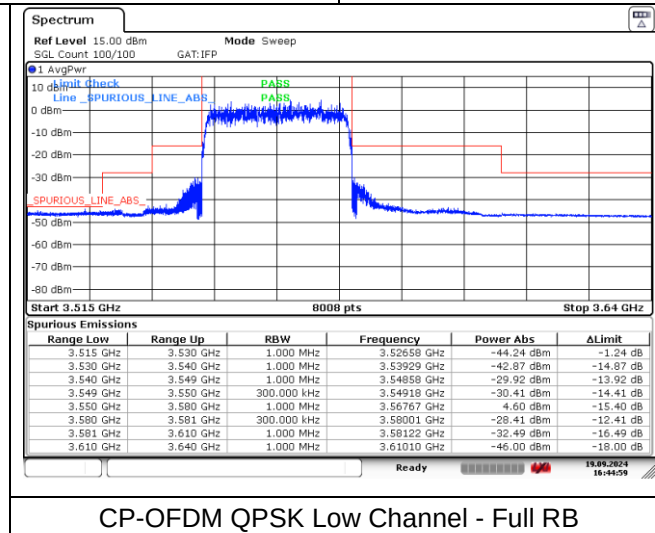
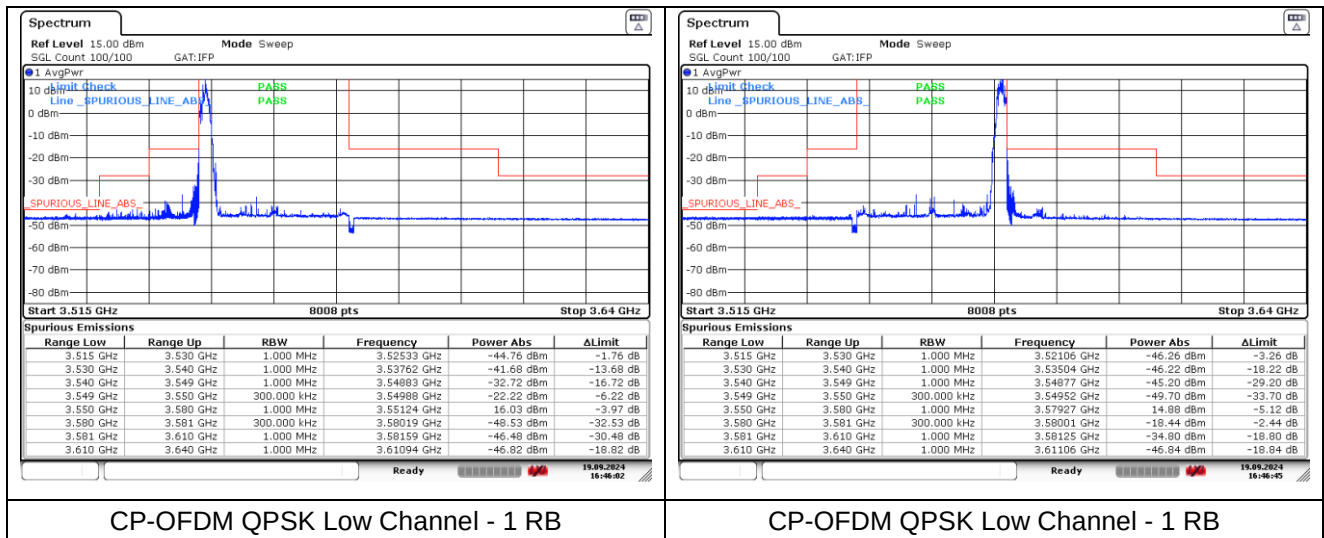


CP-OFDM 16QAM Middle Channel - Full RB

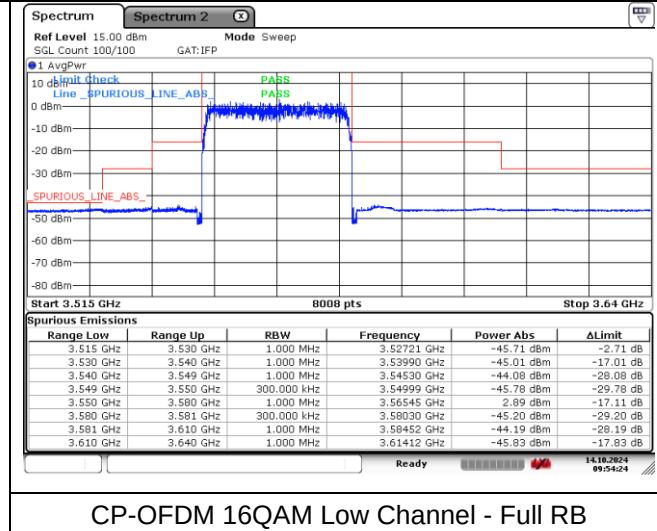
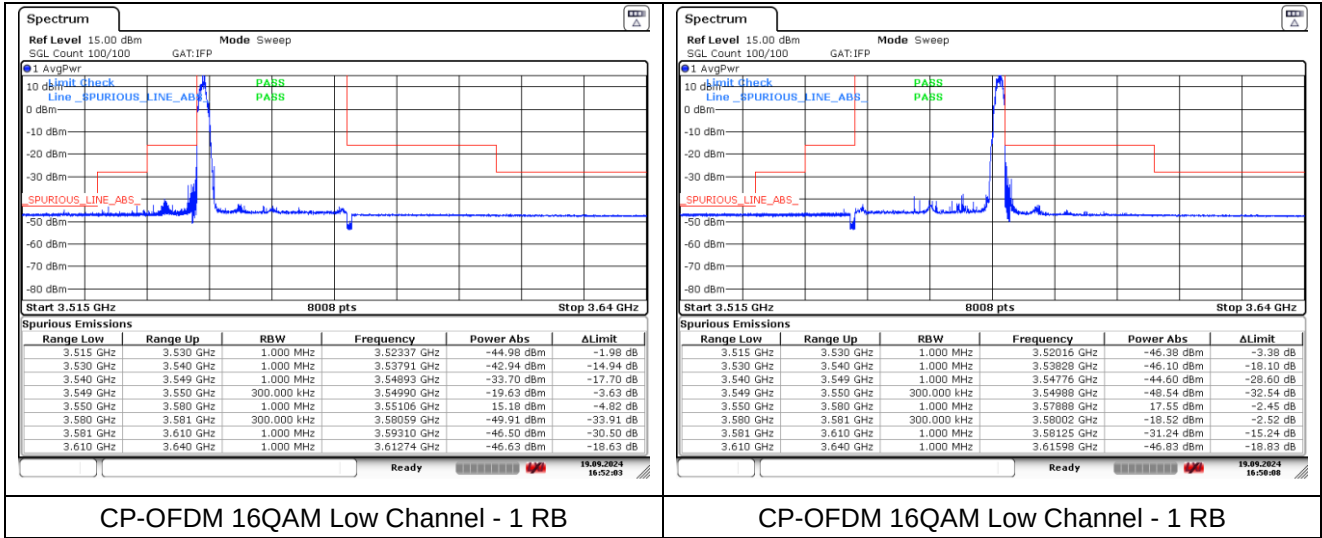


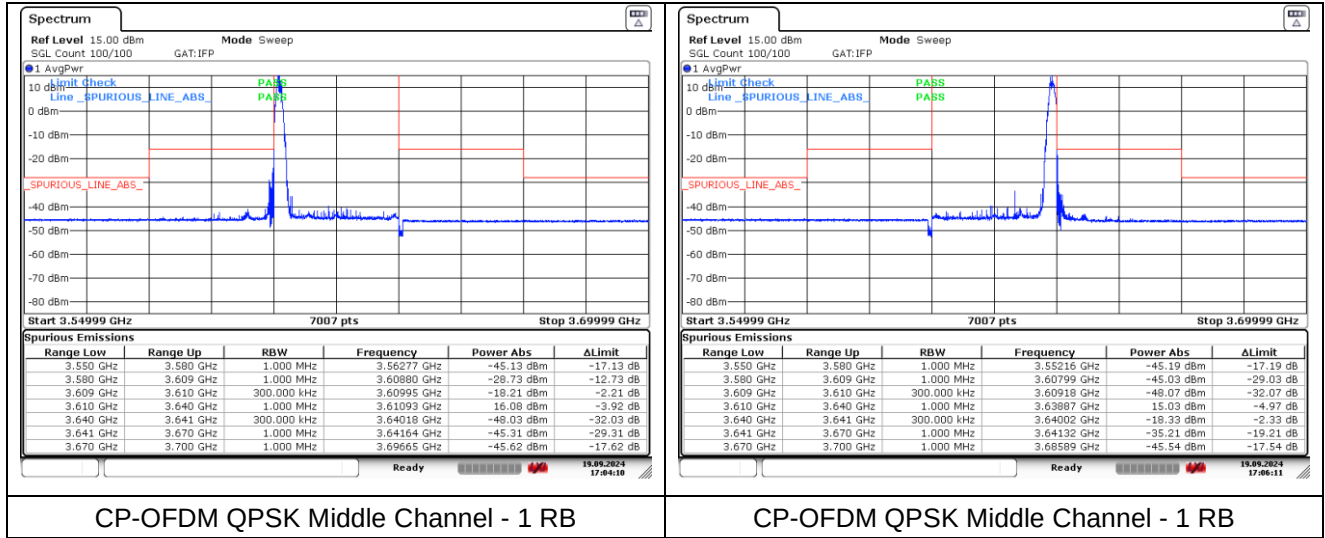


## NR band 48\_FCC (30 MHz)\_Ant. 2



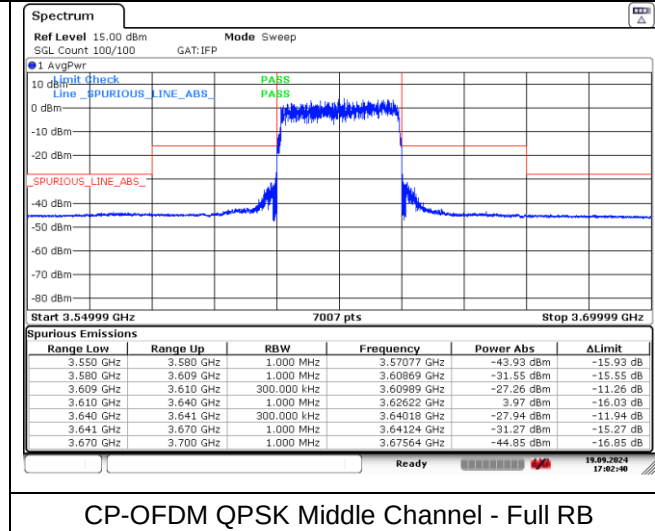
CP-OFDM QPSK Low Channel - Full RB



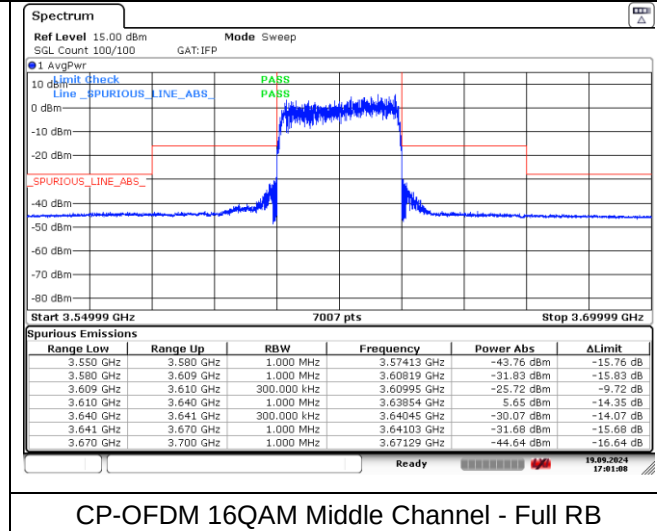
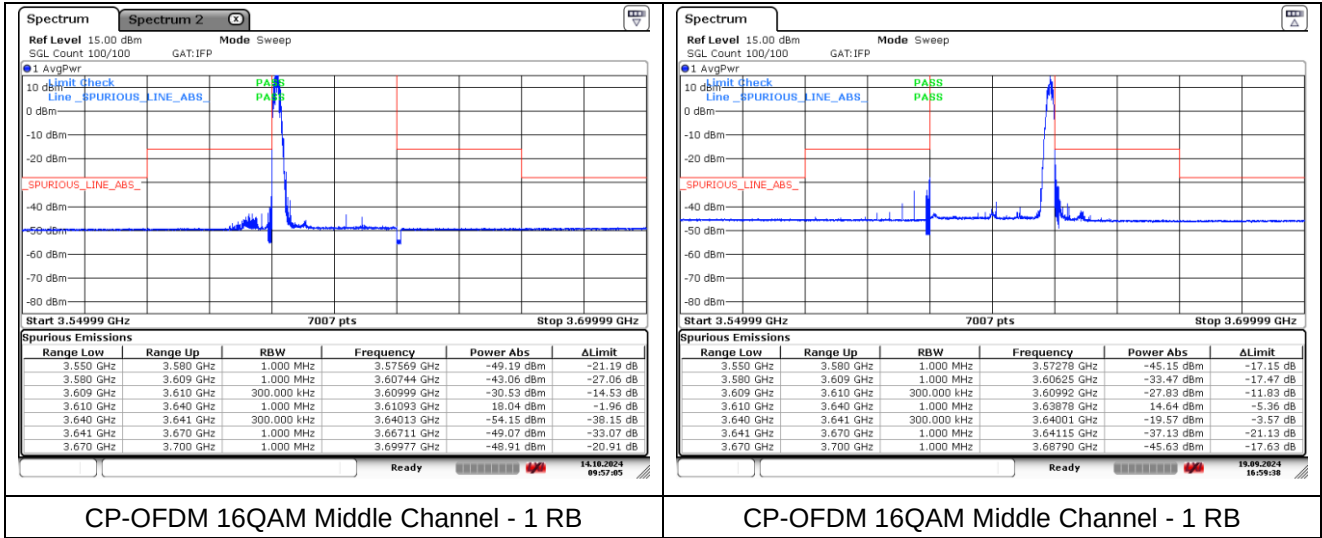


CP-OFDM QPSK Middle Channel - 1 RB

CP-OFDM QPSK Middle Channel - 1 RB



CP-OFDM QPSK Middle Channel - Full RB



CP-OFDM 16QAM Middle Channel - Full RB