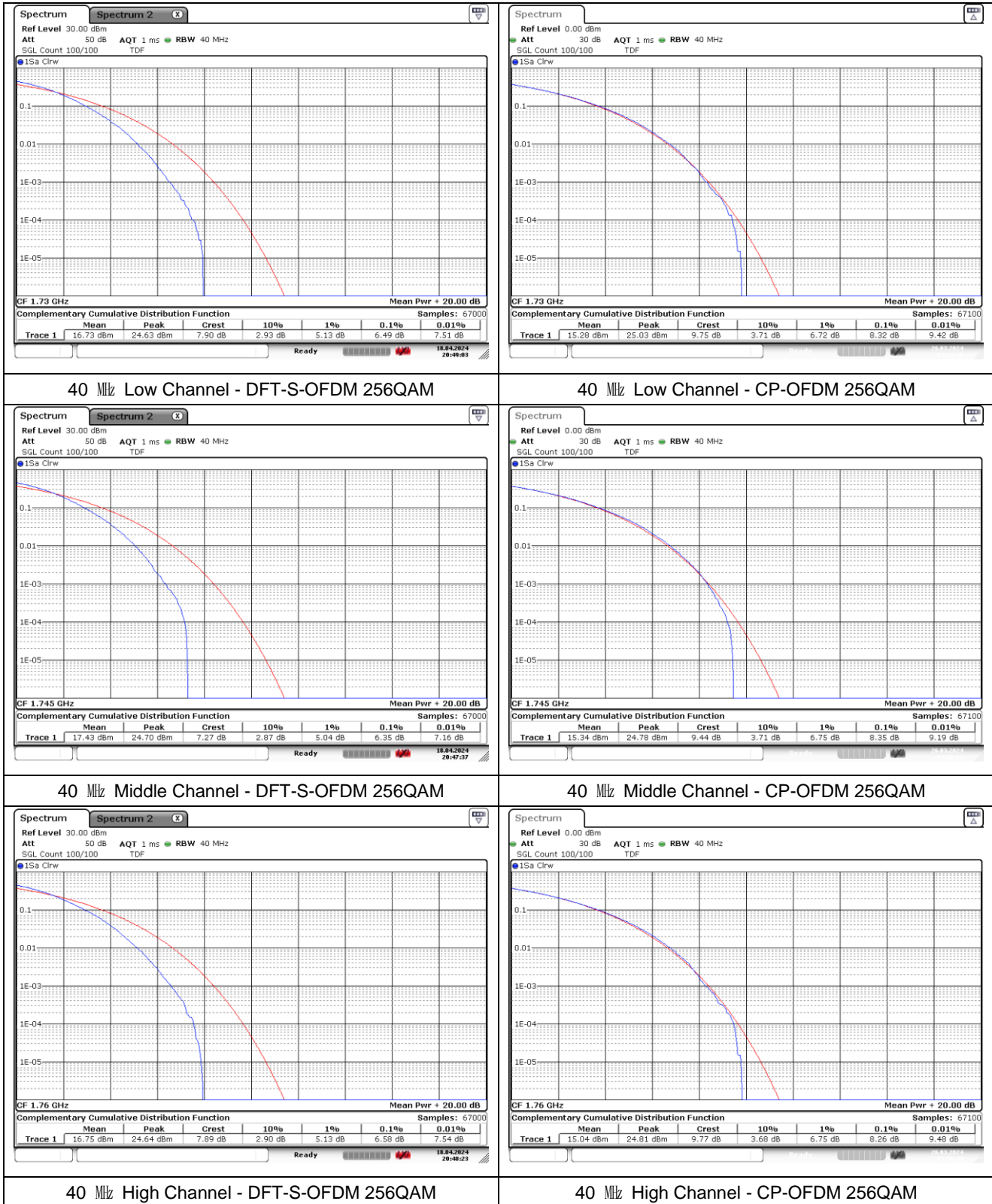


**NR band 66**



## 6. Spurious Emissions at Antenna Terminal

### 6.1. Limit

- §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10\log(P)$  dB.

- §24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

- §27.53(h)(1), for operations in the 1 695-1 710 MHz, 1 710-1 755 MHz, 1 755-1 780 MHz, 1 915-1 920 MHz, 1 995-2 000 MHz, 2 000-2 020 MHz, 2 110-2 155 MHz, 2 155-2 180 MHz, and 2 180-2 200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  dB.

- §27.53(m)(4), for mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log_{10}(P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log_{10}(P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log_{10}(P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than  $43 + 10 \log_{10}(P)$  dB on all frequencies between 2 490.5 MHz and 2 496 MHz and  $55 + 10 \log_{10}(P)$  dB at or below 2 490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2 495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

- §90.691(a), out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

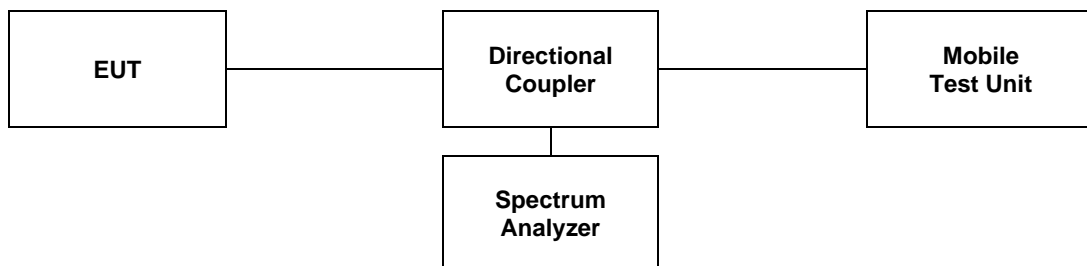
(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \log_{10}(f / 6.1)$  decibels or  $50 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

## 6.2. Test Procedure

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

1. Start frequency was set to 9 kHz and stop frequency was set to at least 10\* the fundamental frequency.
2. Detector = RMS.
3. Trace mode = Max hold.
4. Sweep time = Auto couple.
5. The trace was allowed to stabilize.
6. Please see notes below for RBW and VBW settings.
7. For plots showing conducted spurious emissions from 9 kHz to 26 GHz, all path loss of wide frequency range was investigated and compensated to spectrum analyzer as TDF function.



### Note;

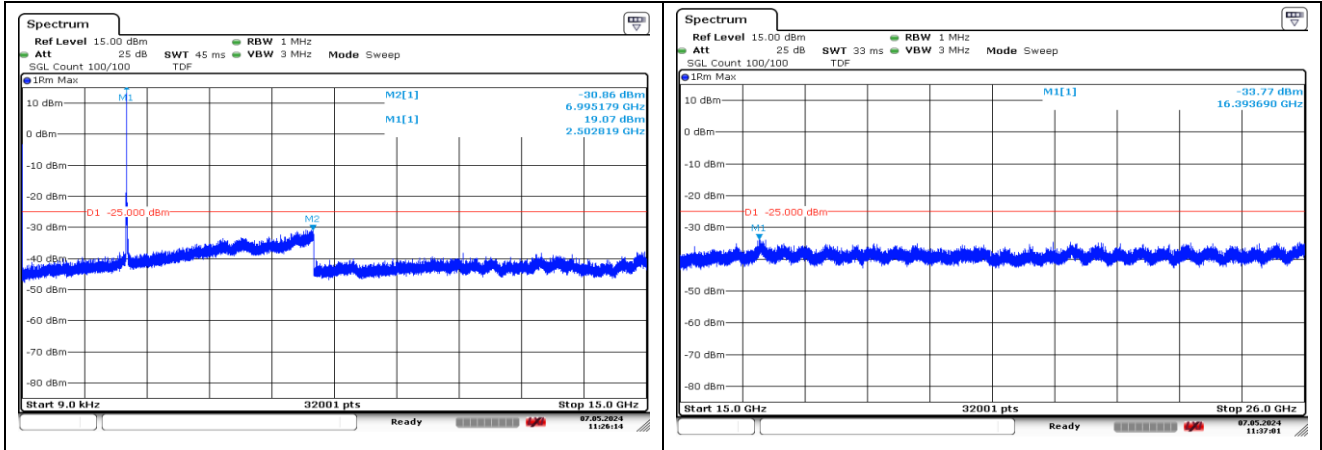
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two point, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

**6.3. Test Results**

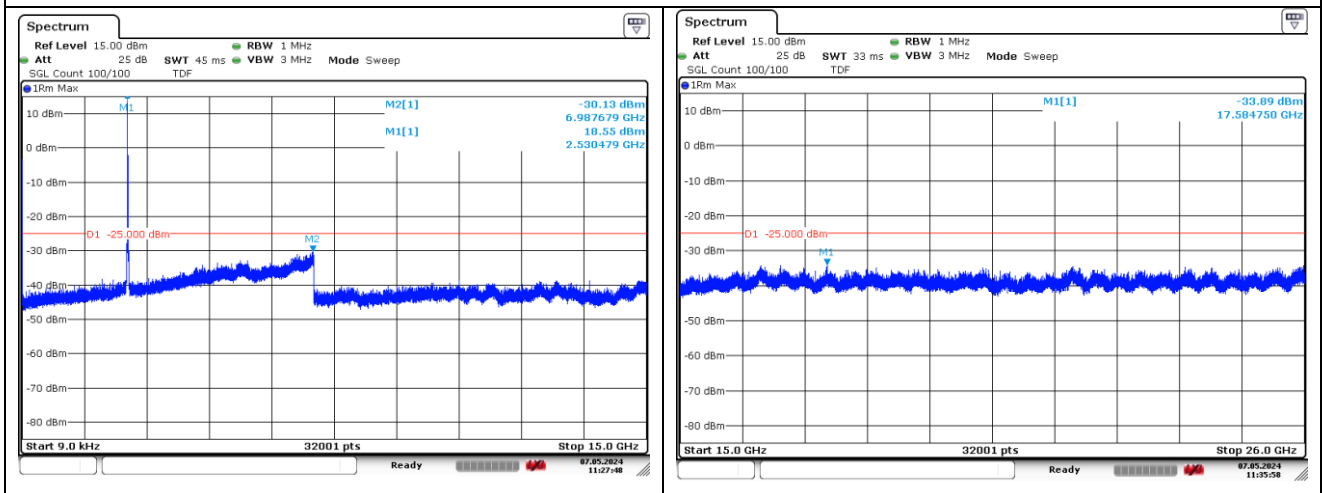
Ambient temperature : (23 ± 1) °C  
 Relative humidity : 47 % R.H.

**- Test plots**

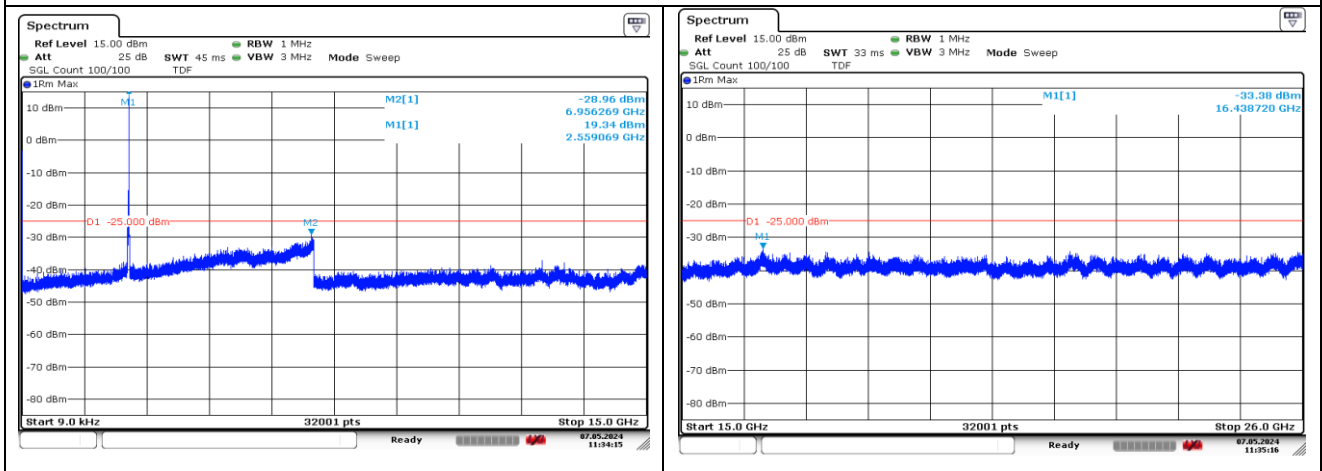
**NR band 7**



**DFT-S-OFDM QPSK - 15 MHz Low Channel - 1 RB**

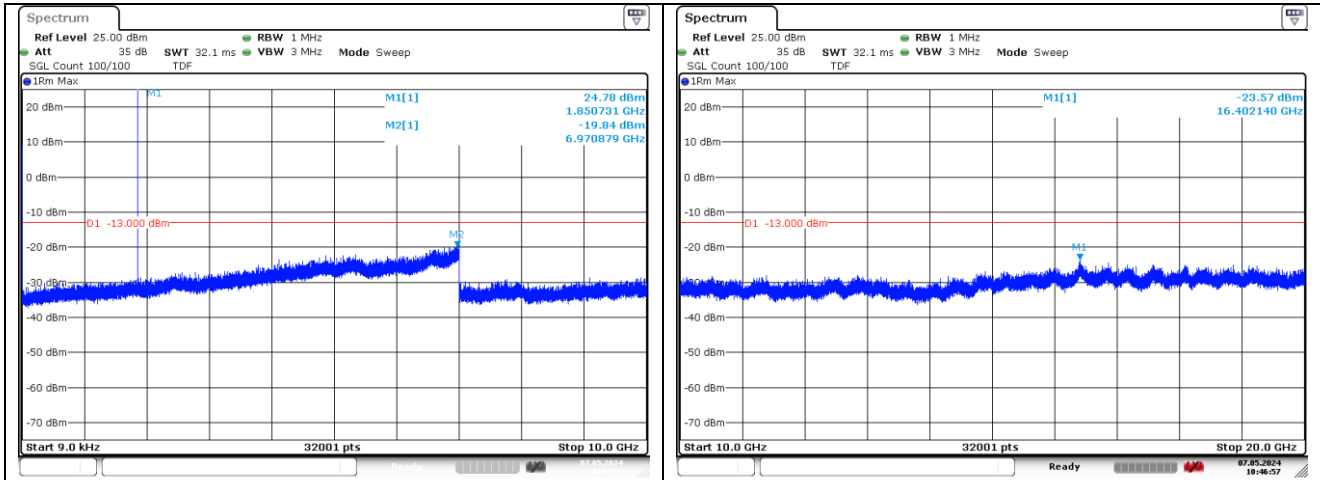


**DFT-S-OFDM QPSK - 15 MHz Middle Channel - 1 RB**

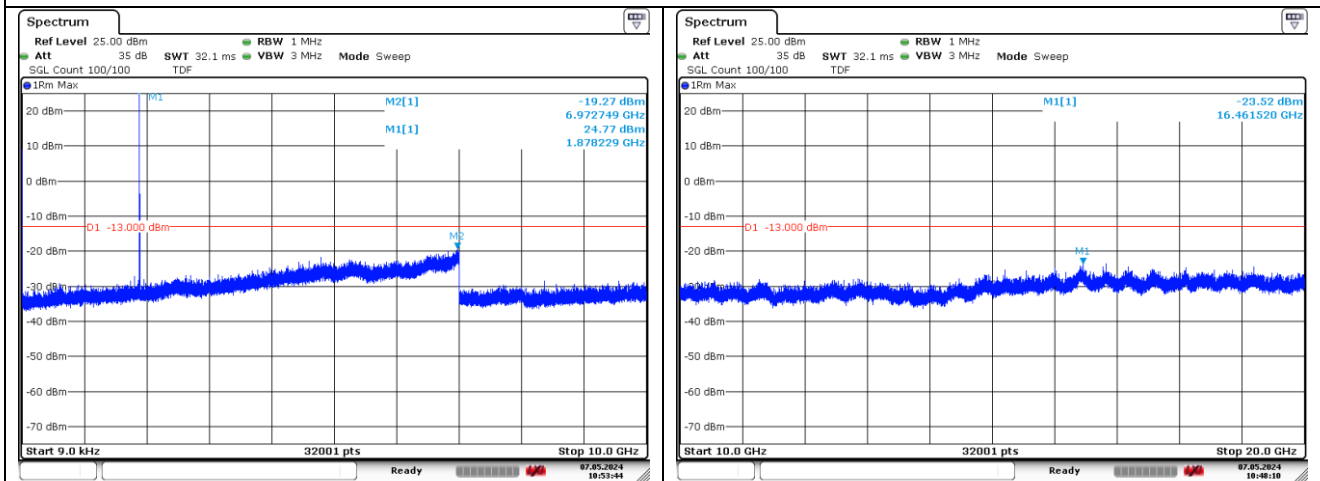


**DFT-S-OFDM QPSK - 15 MHz High Channel - 1 RB**

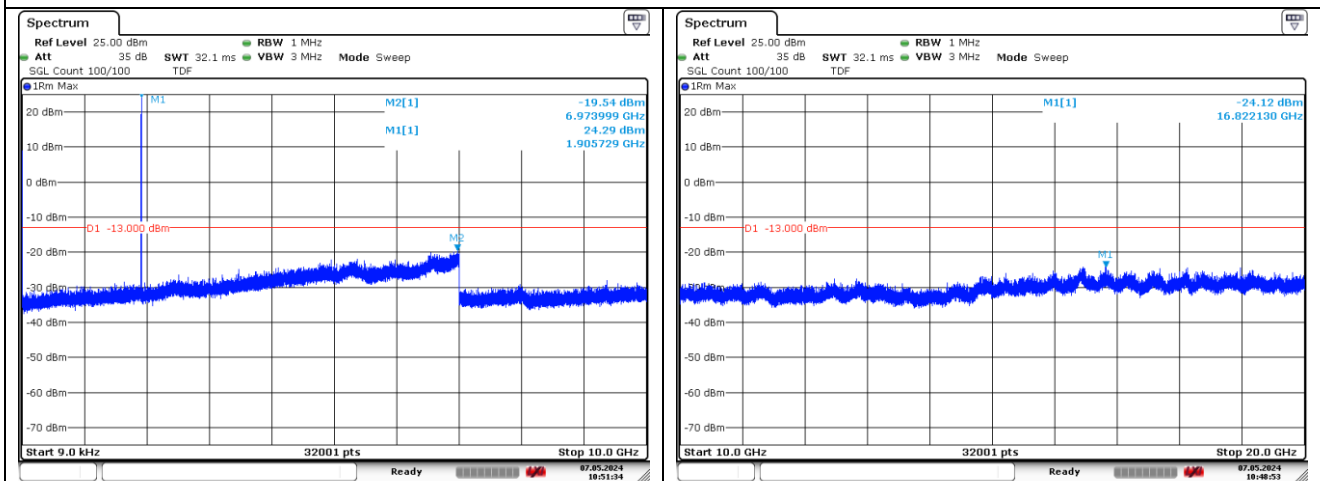
**NR band 25/2**



**DFT-S-OFDM BPSK - 10 MHz Low Channel - 1 RB**

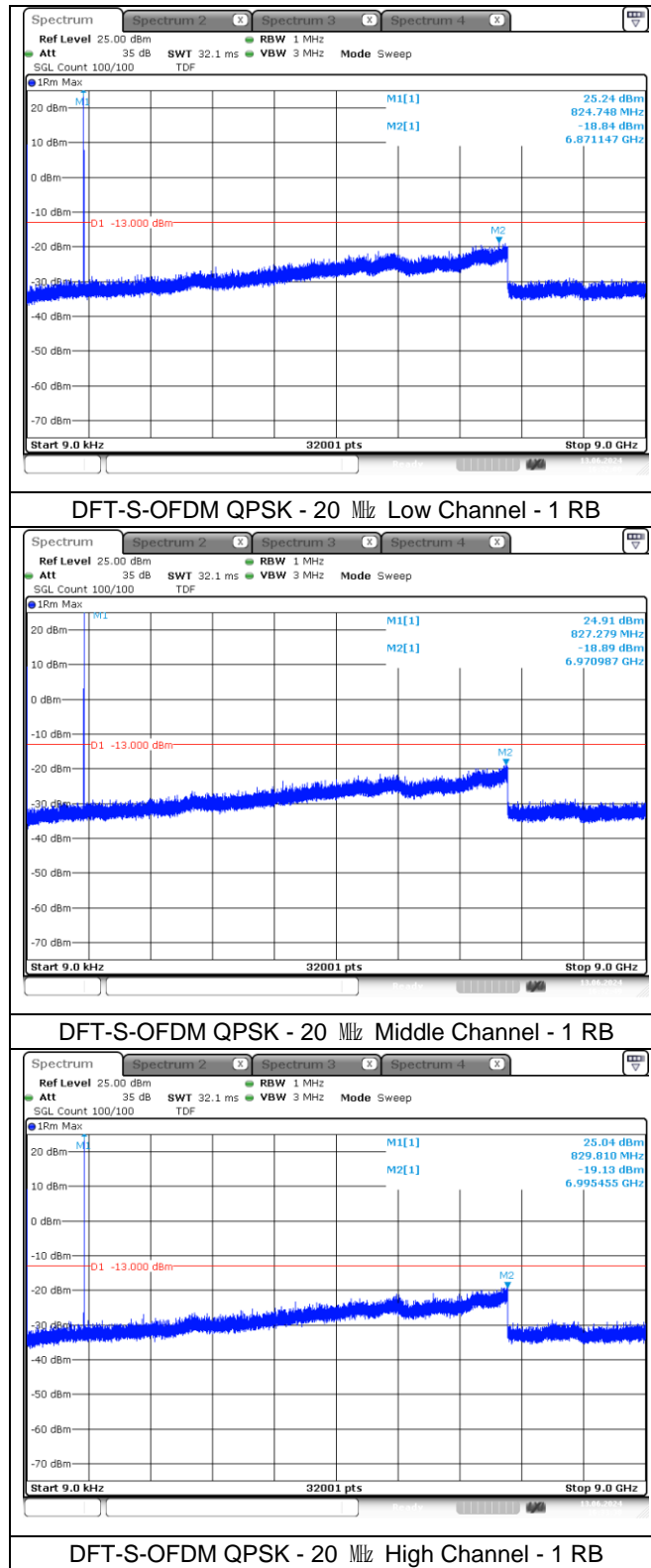


**DFT-S-OFDM BPSK - 10 MHz Middle Channel - 1 RB**

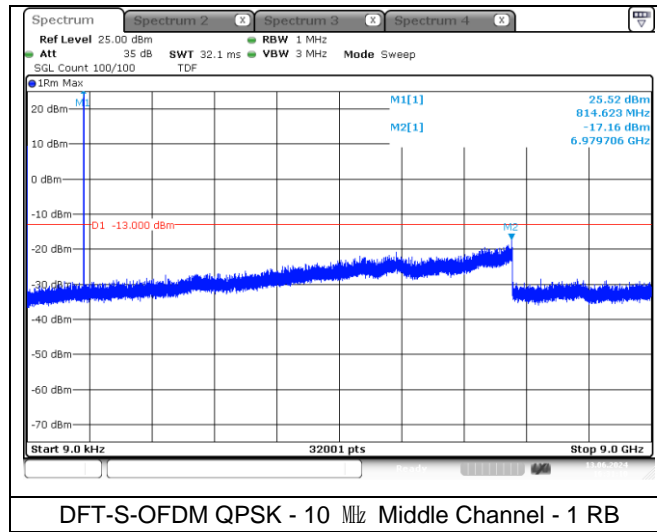


**DFT-S-OFDM BPSK - 10 MHz High Channel - 1 RB**

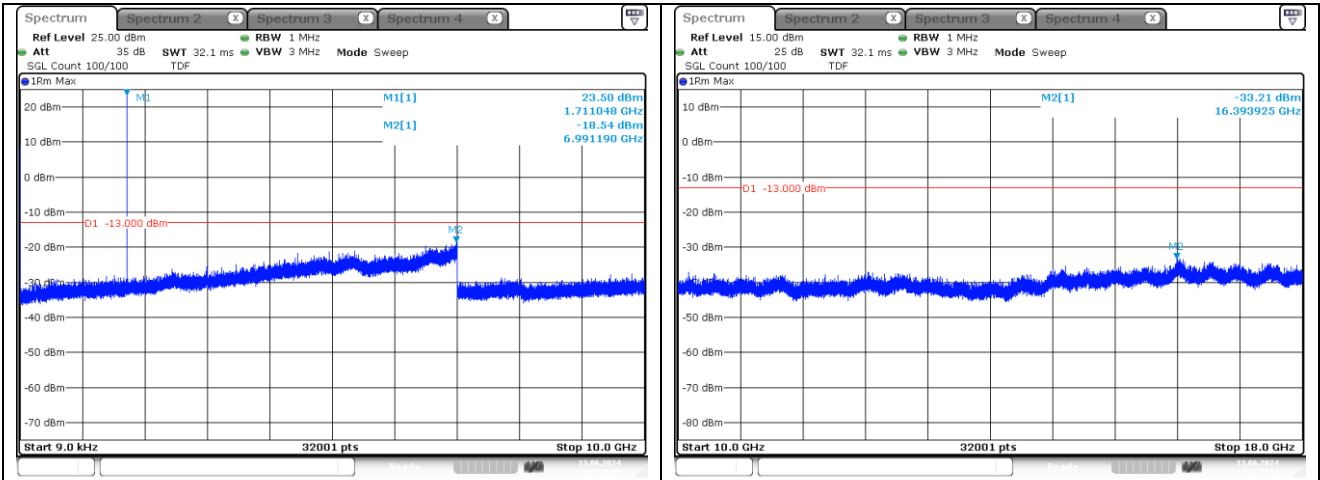
NR band 26/5\_Part 22



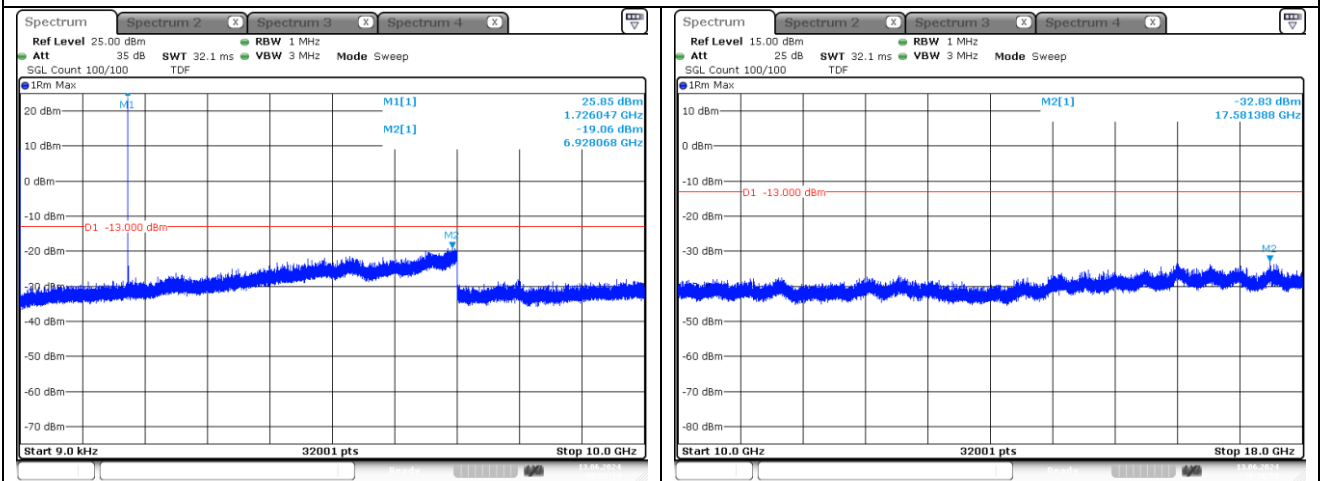
NR band 26/5\_Part 90



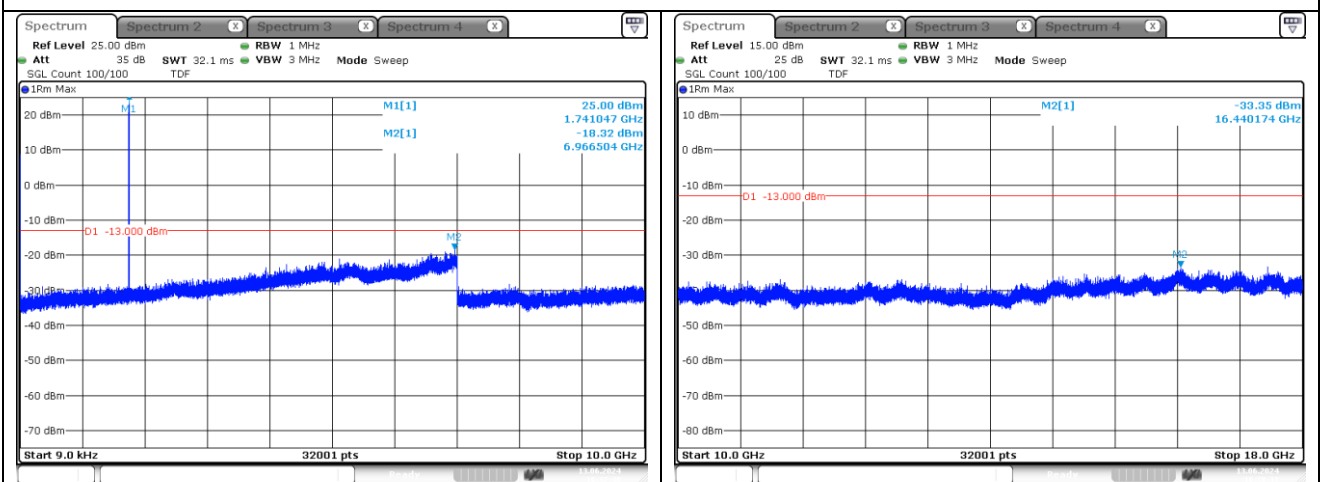
**NR band 66**



**DFT-S-OFDM BPSK - 40 MHz Low Channel - 1 RB**



**DFT-S-OFDM BPSK - 40 MHz Middle Channel - 1 RB**



**DFT-S-OFDM BPSK - 40 MHz High Channel - 1 RB**



## 7. Band Edge and Emission Mask

### 7.1. Limit

- §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10\log(P)$  dB.

- §24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

- §27.53(h)(1), for operations in the 1 695-1 710 MHz, 1 710-1 755 MHz, 1 755-1 780 MHz, 1 915-1 920 MHz, 1 995-2 000 MHz, 2 000-2 020 MHz, 2 110-2 155 MHz, 2 155-2 180 MHz, and 2 180-2 200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  dB.

- §27.53(m)(4), for mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log_{10}(P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log_{10}(P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log_{10}(P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than  $43 + 10 \log_{10}(P)$  dB on all frequencies between 2 490.5 MHz and 2 496 MHz and  $55 + 10 \log_{10}(P)$  dB at or below 2 490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2 495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

- §90.691(a), out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

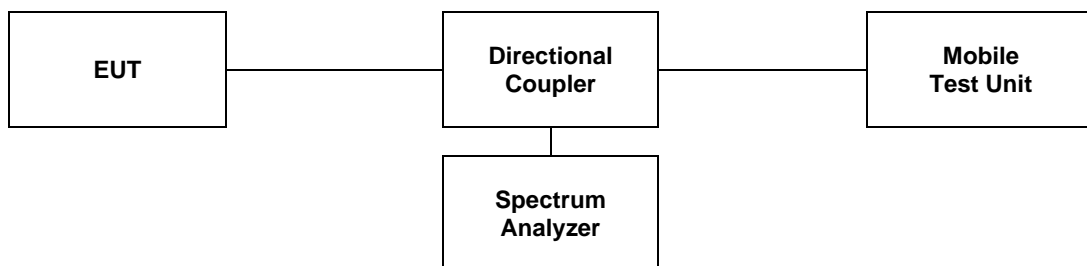
(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \text{Log}_{10}(f / 6.1)$  decibels or  $50 + 10 \text{Log}_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \text{Log}_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

## 7.2. Test Procedure

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

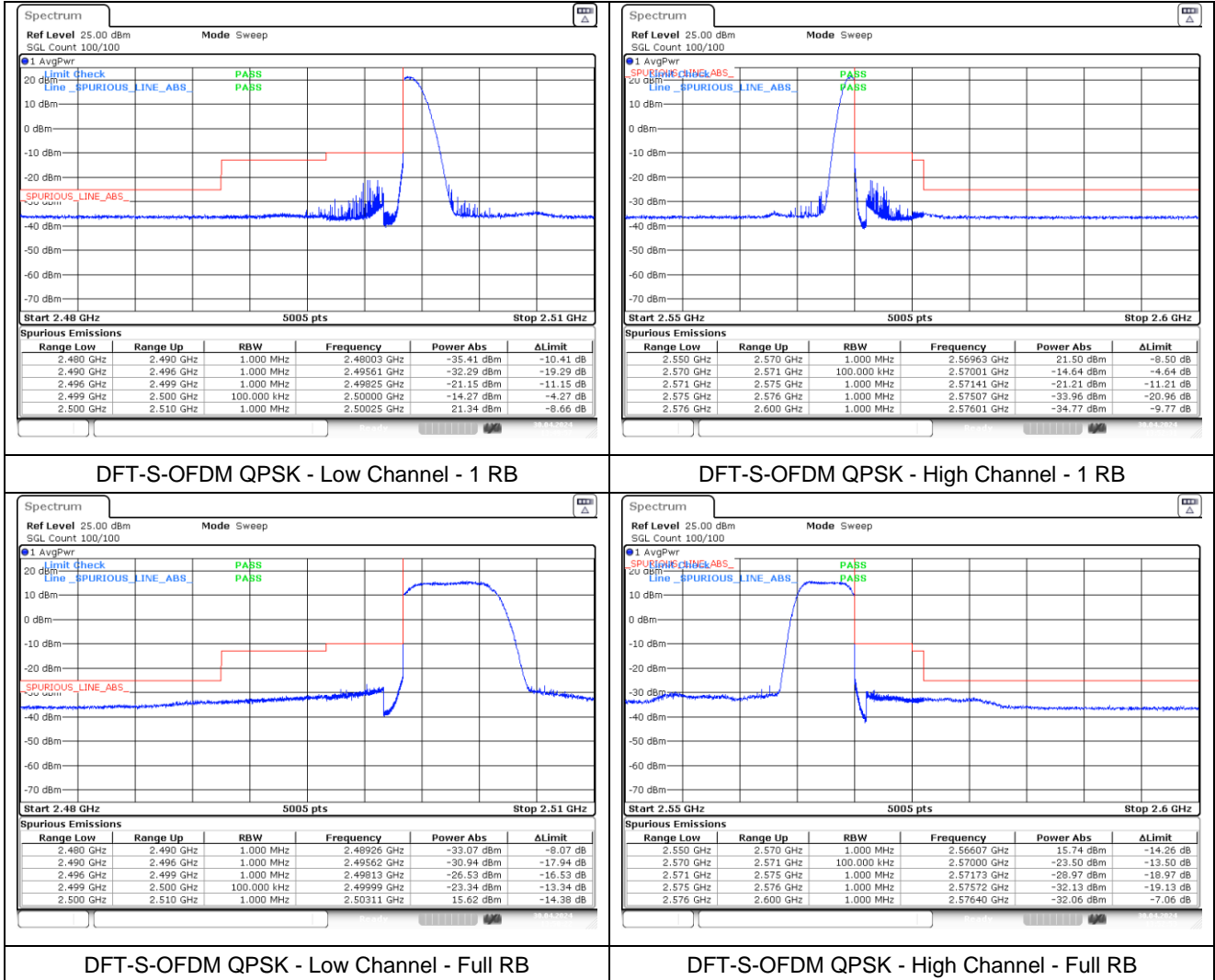
- a. Span was set large enough so as to capture all out of band emissions near the band edge.
- b.  $RBW \geq 1\%$  of OBW
- c.  $VBW \geq 3 \times RBW$ .
- d. Detector = RMS.
- e. Trace mode = Average.
- f. Sweep time = Auto.
- g. The trace was allowed to stabilize.
- h. All path loss of frequency range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



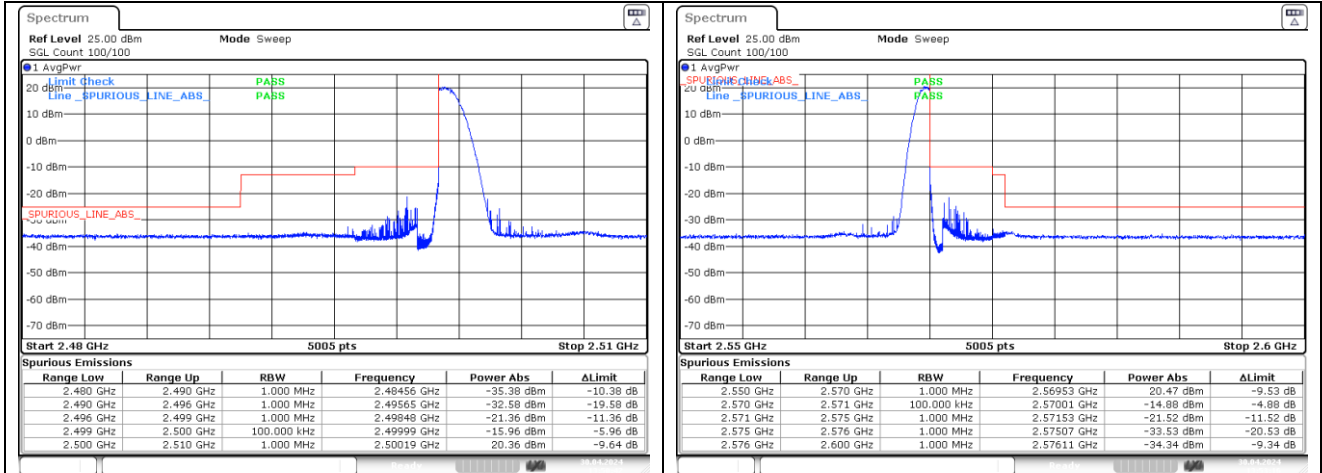
**7.3. Test Results**

Ambient temperature : (23 ± 1) °C  
 Relative humidity : 47 % R.H.

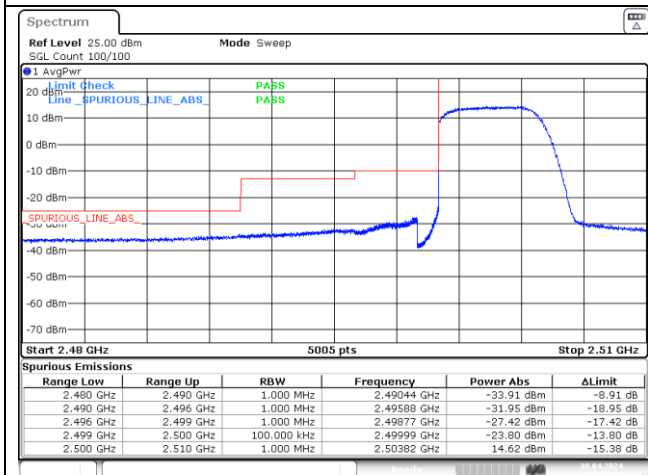
**- Test plots**  
**NR band 7 (5 MHz)**



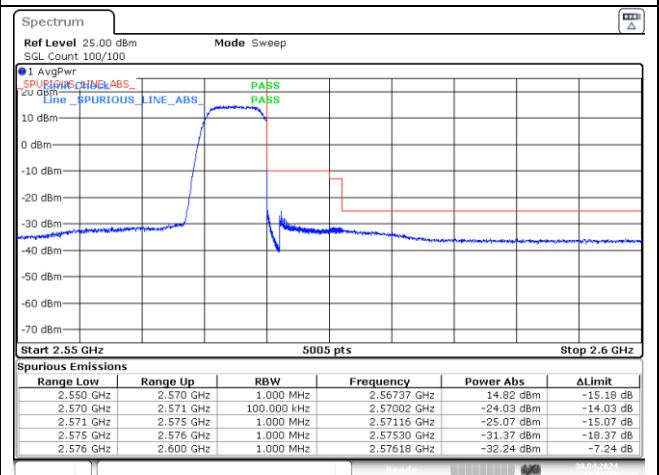
**NR band 7 (5 MHz)**



**DFT-S-OFDM 16QAM - Low Channel - 1 RB**



**DFT-S-OFDM 16QAM - High Channel - 1 RB**



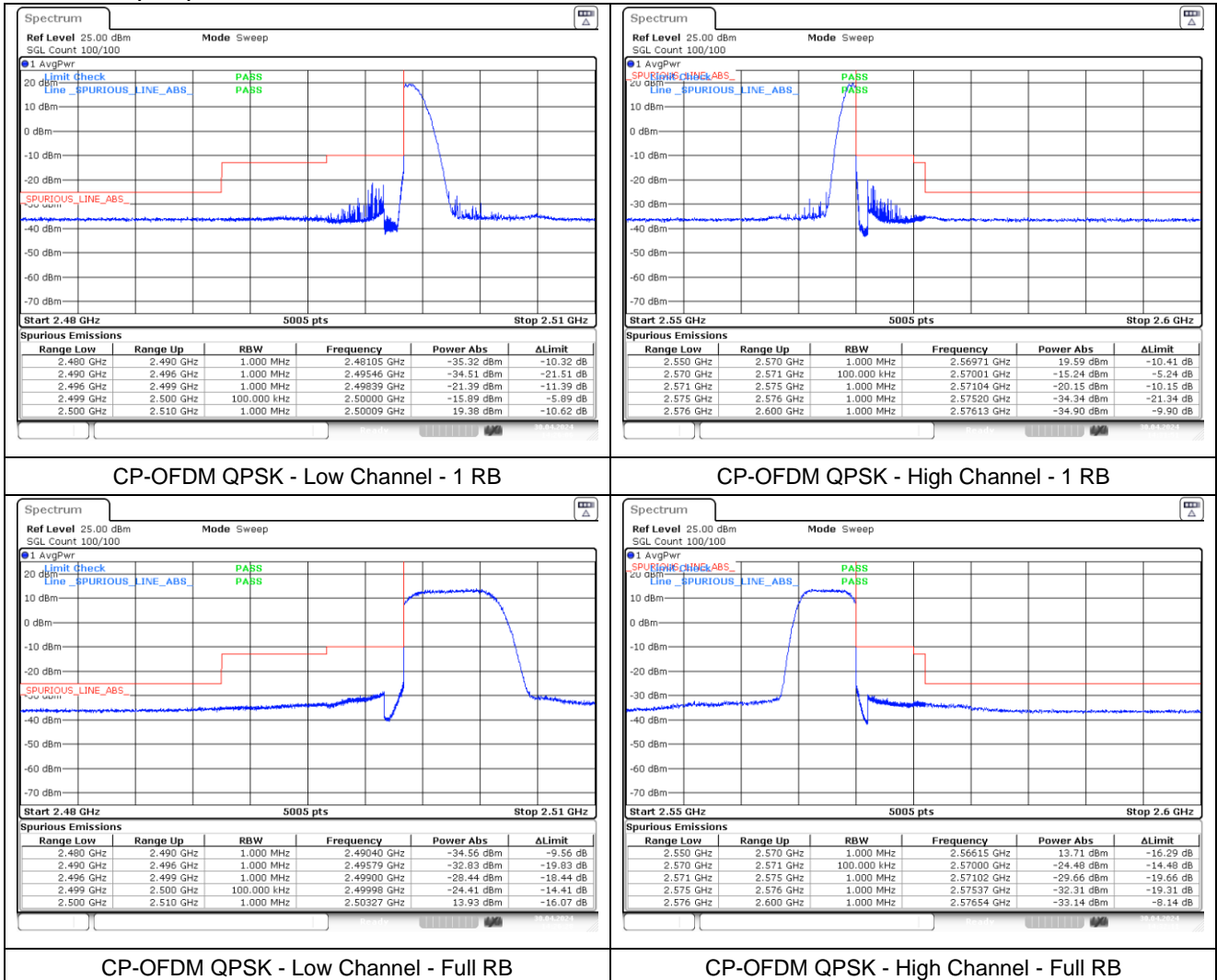
**DFT-S-OFDM 16QAM - Low Channel - Full RB**



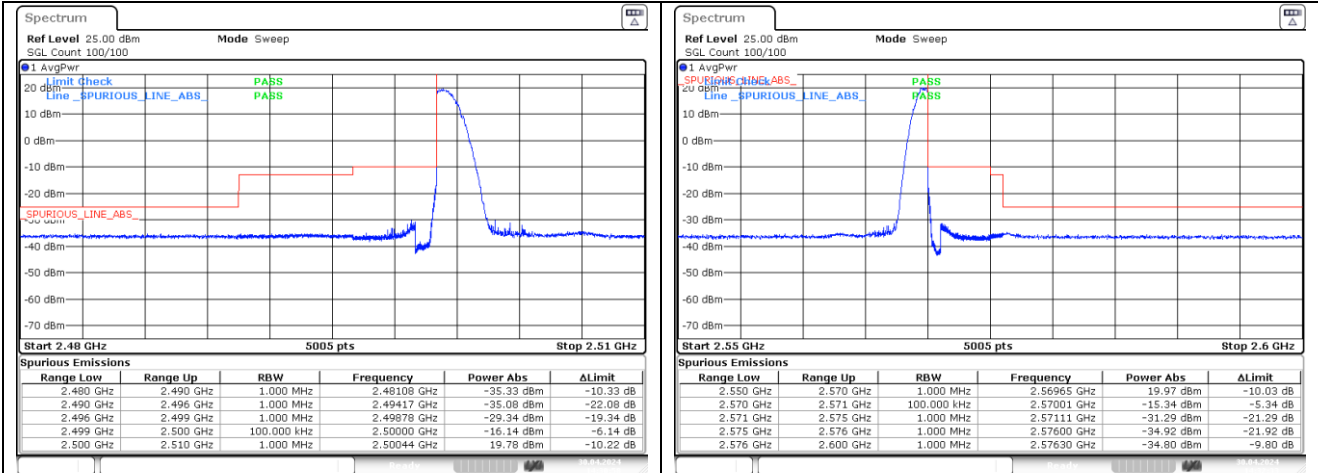
**DFT-S-OFDM 16QAM - High Channel - Full RB**



**NR band 7 (5 MHz)**

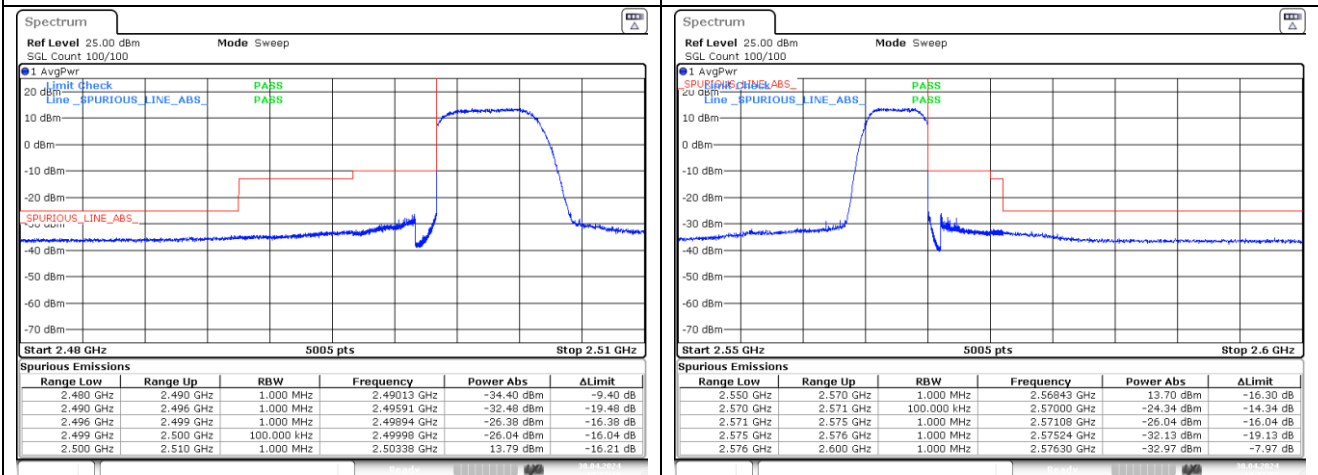


**NR band 7 (5 MHz)**



**CP-OFDM 16QAM - Low Channel - 1 RB**

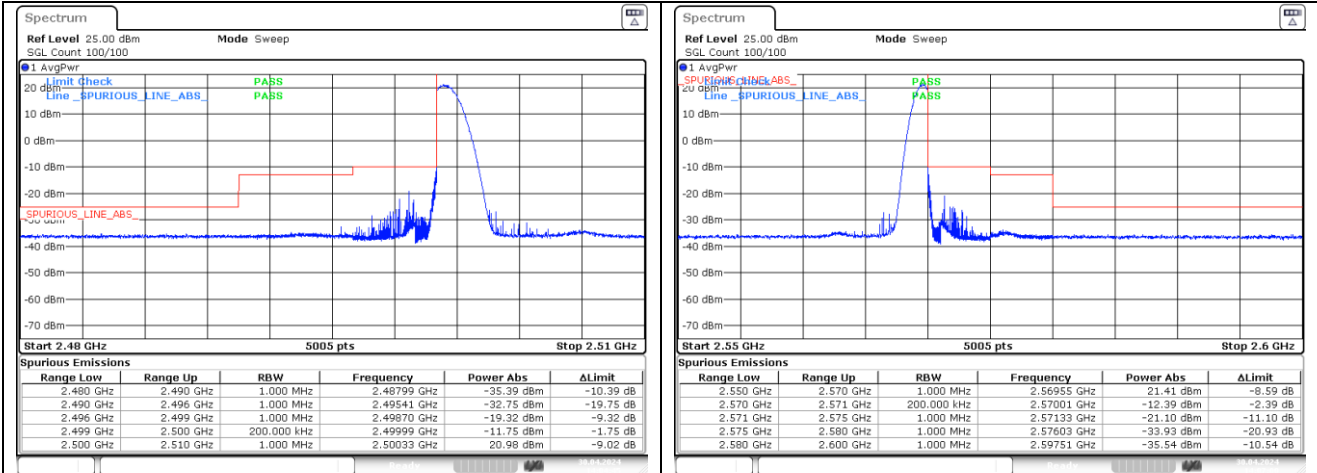
**CP-OFDM 16QAM - High Channel - 1 RB**



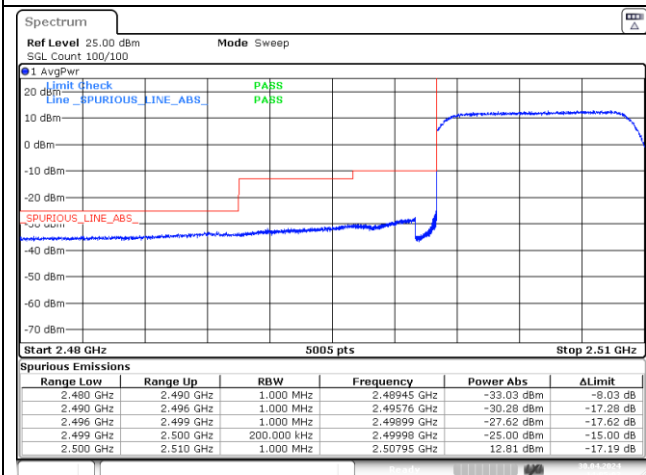
**CP-OFDM 16QAM - Low Channel - Full RB**

**CP-OFDM 16QAM - High Channel - Full RB**

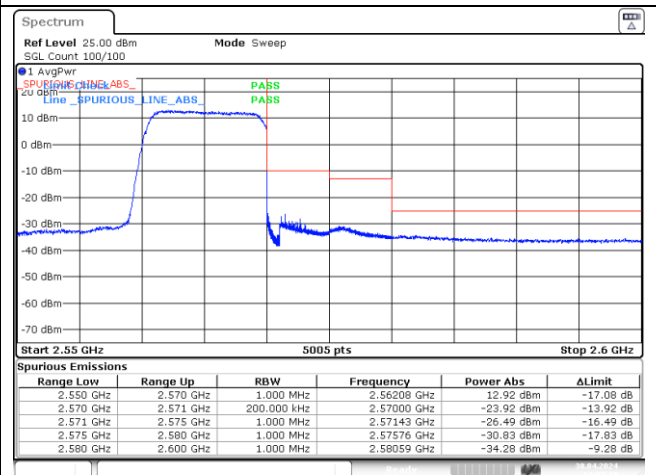
**NR band 7 (10 MHz)**



**DFT-S-OFDM QPSK - Low Channel - 1 RB**



**DFT-S-OFDM QPSK - High Channel - 1 RB**



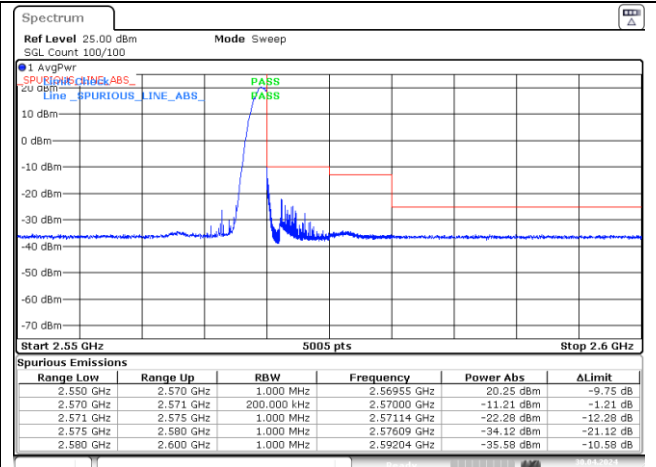
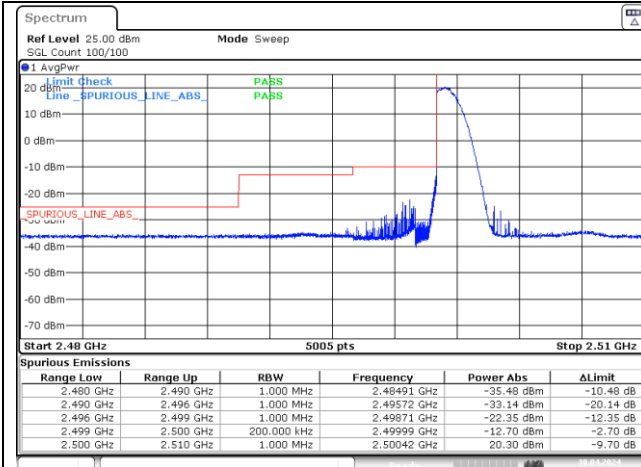
**DFT-S-OFDM QPSK - Low Channel - Full RB**



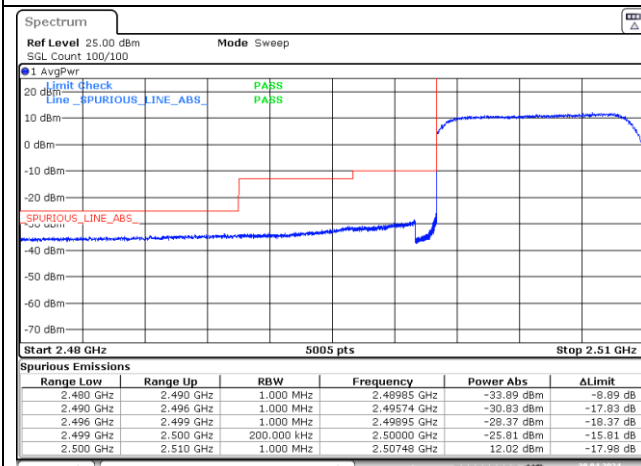
**DFT-S-OFDM QPSK - High Channel - Full RB**



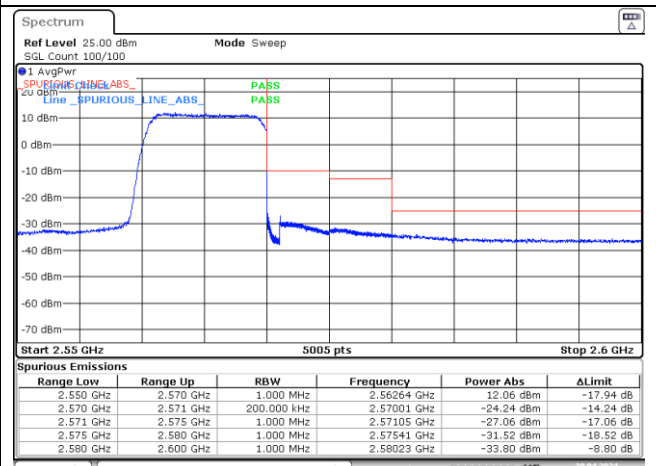
**NR band 7 (10 MHz)**



**DFT-S-OFDM 16QAM - Low Channel - 1 RB**



**DFT-S-OFDM 16QAM - High Channel - 1 RB**

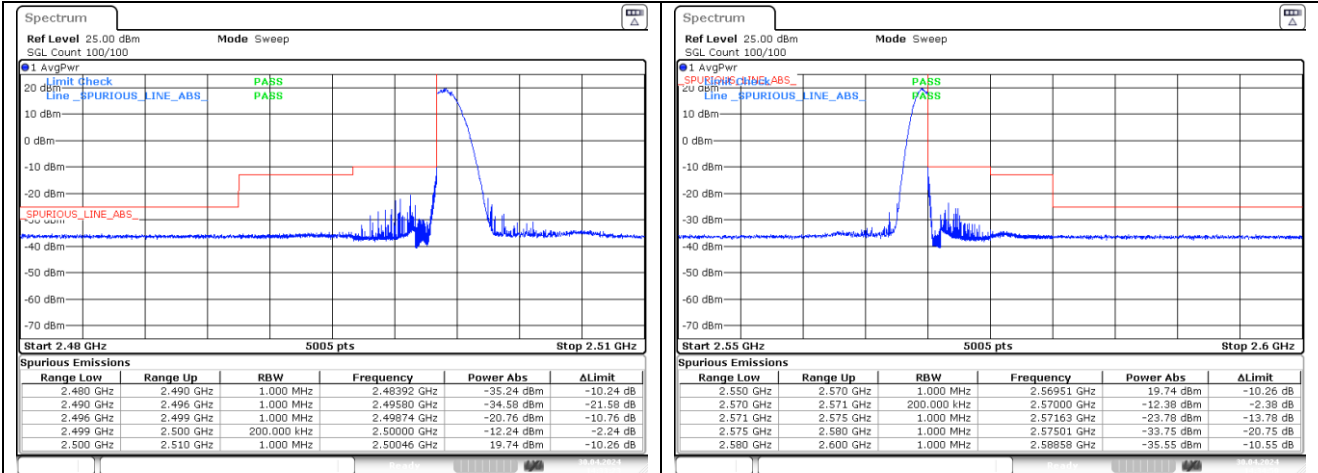


**DFT-S-OFDM 16QAM - Low Channel - Full RB**

**DFT-S-OFDM 16QAM - High Channel - Full RB**

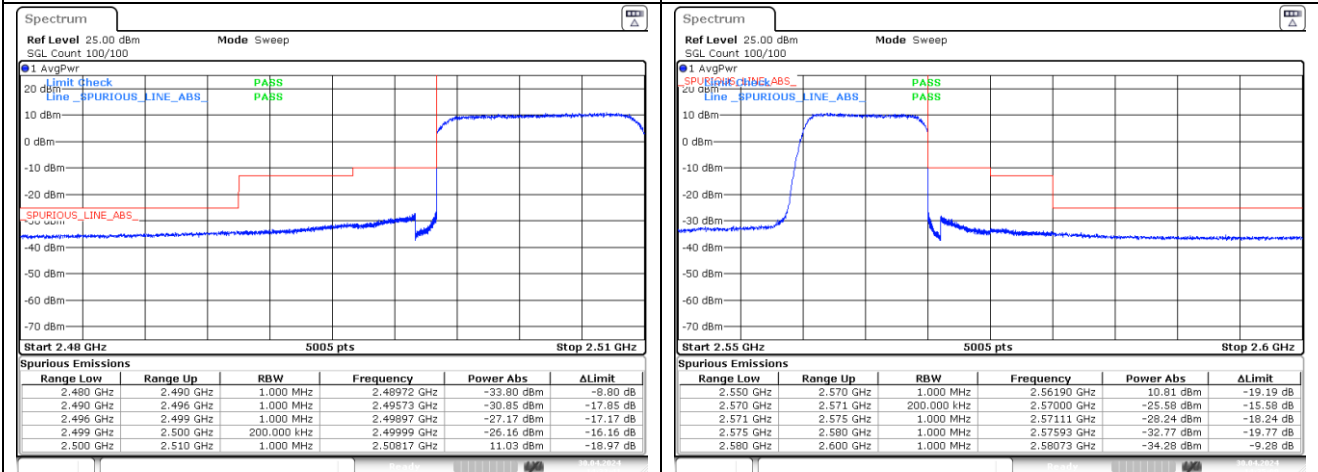


**NR band 7 (10 MHz)**



**CP-OFDM QPSK - Low Channel - 1 RB**

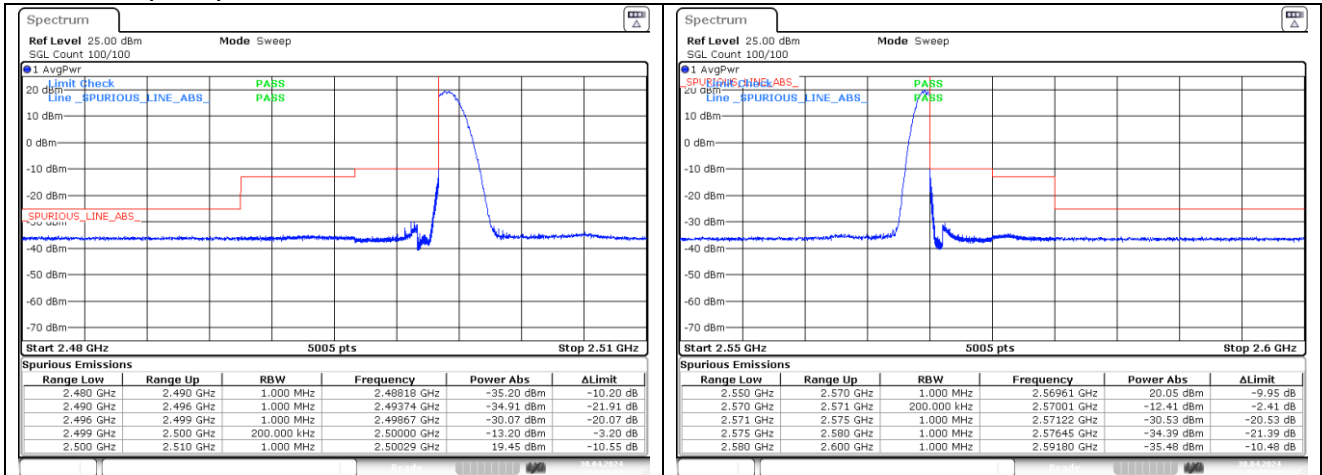
**CP-OFDM QPSK - High Channel - 1 RB**



**CP-OFDM QPSK - Low Channel - Full RB**

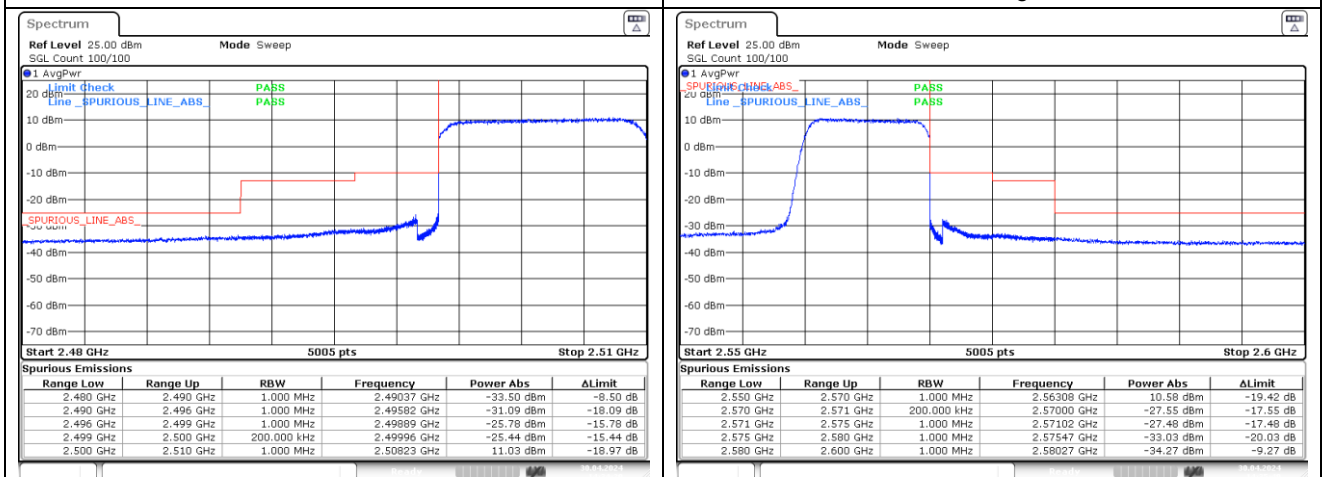
**CP-OFDM QPSK - High Channel - Full RB**

**NR band 7 (10 MHz)**



**CP-OFDM 16QAM - Low Channel - 1 RB**

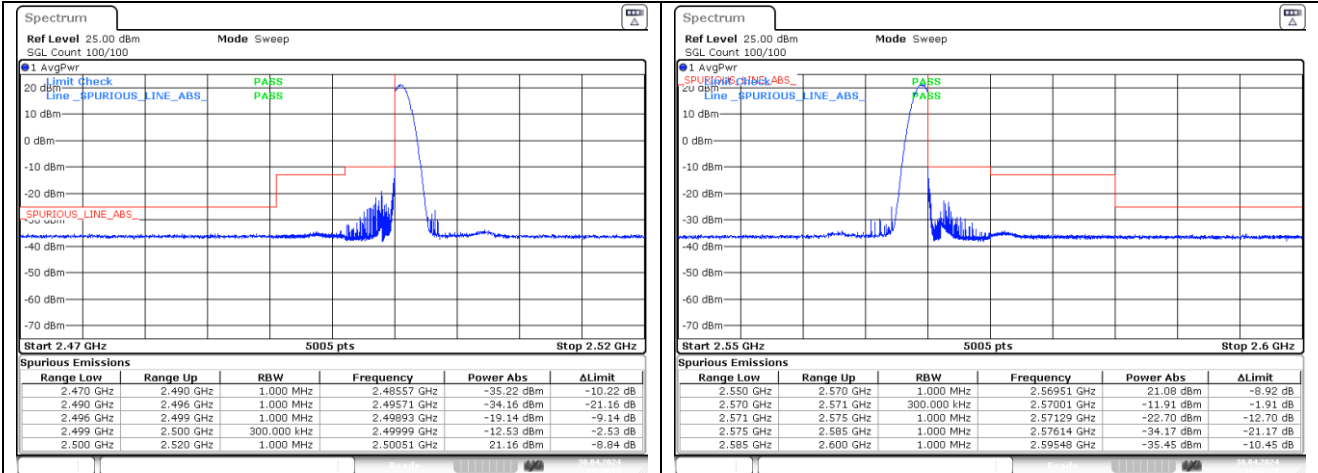
**CP-OFDM 16QAM - High Channel - 1 RB**



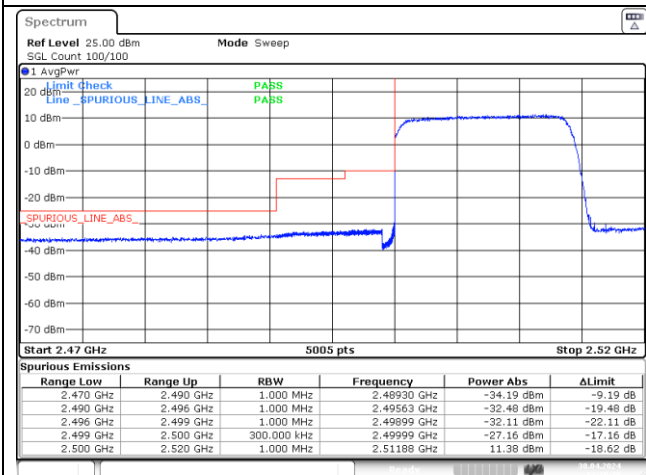
**CP-OFDM 16QAM - Low Channel - Full RB**

**CP-OFDM 16QAM - High Channel - Full RB**

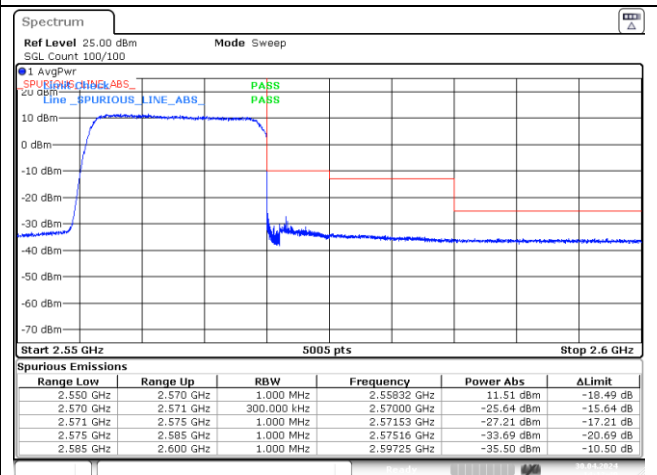
**NR band 7 (15 MHz)**



**DFT-S-OFDM QPSK - Low Channel - 1 RB**



**DFT-S-OFDM QPSK - High Channel - 1 RB**



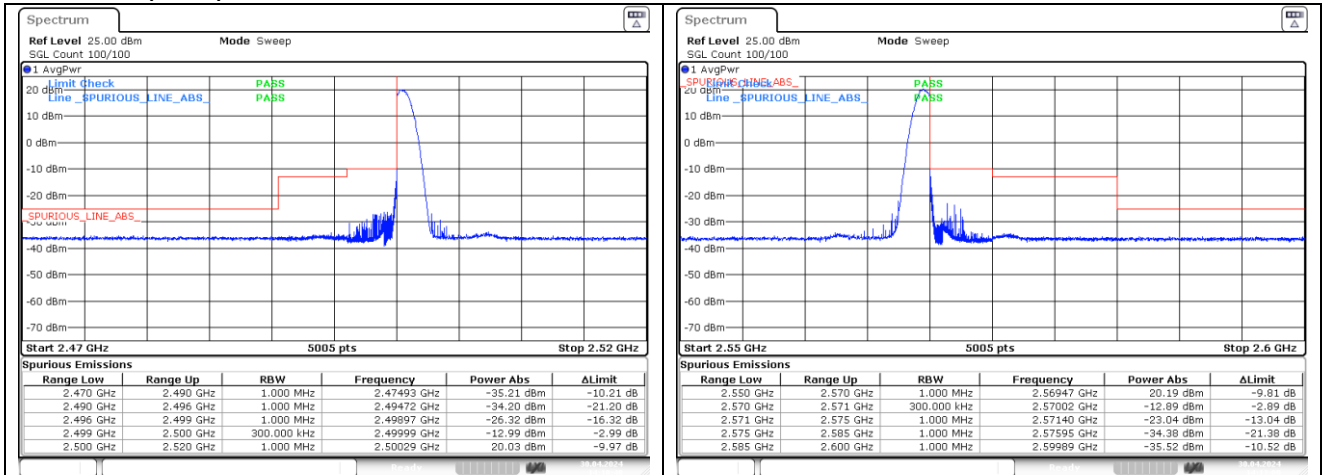
**DFT-S-OFDM QPSK - Low Channel - Full RB**



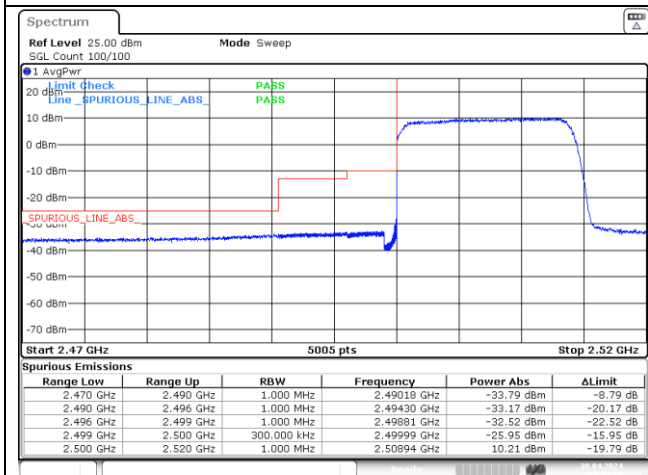
**DFT-S-OFDM QPSK - High Channel - Full RB**



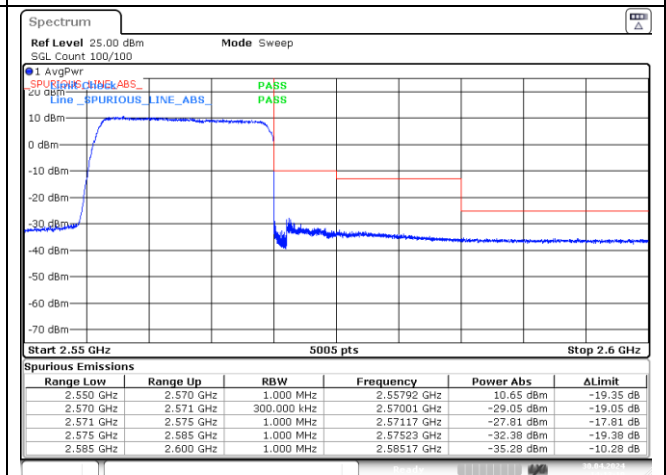
**NR band 7 (15 MHz)**



**DFT-S-OFDM 16QAM - Low Channel - 1 RB**



**DFT-S-OFDM 16QAM - High Channel - 1 RB**



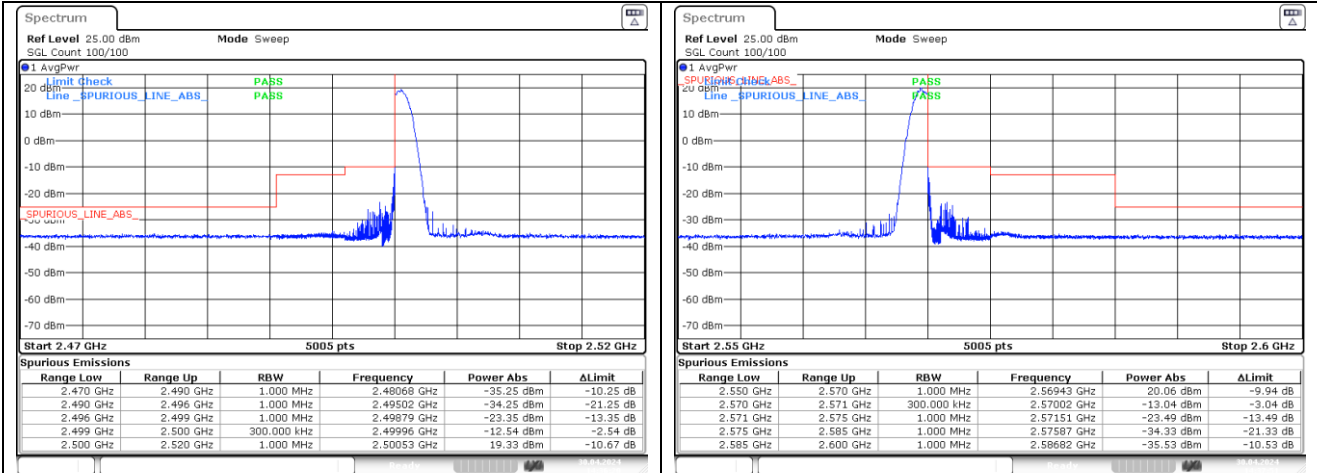
**DFT-S-OFDM 16QAM - Low Channel - Full RB**



**DFT-S-OFDM 16QAM - High Channel - Full RB**

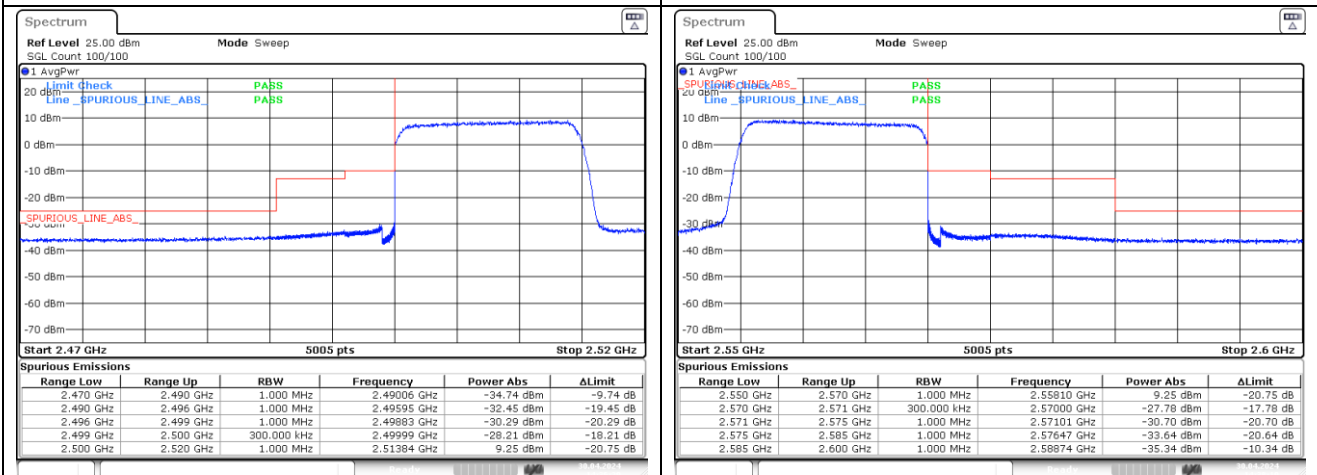


**NR band 7 (15 MHz)**



**CP-OFDM QPSK - Low Channel - 1 RB**

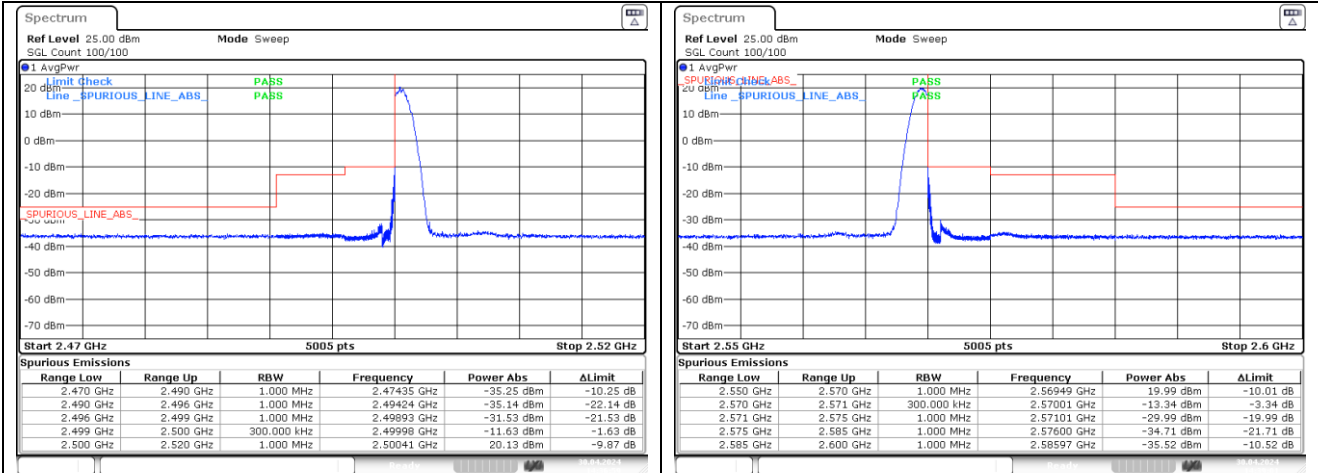
**CP-OFDM QPSK - High Channel - 1 RB**



**CP-OFDM QPSK - Low Channel - Full RB**

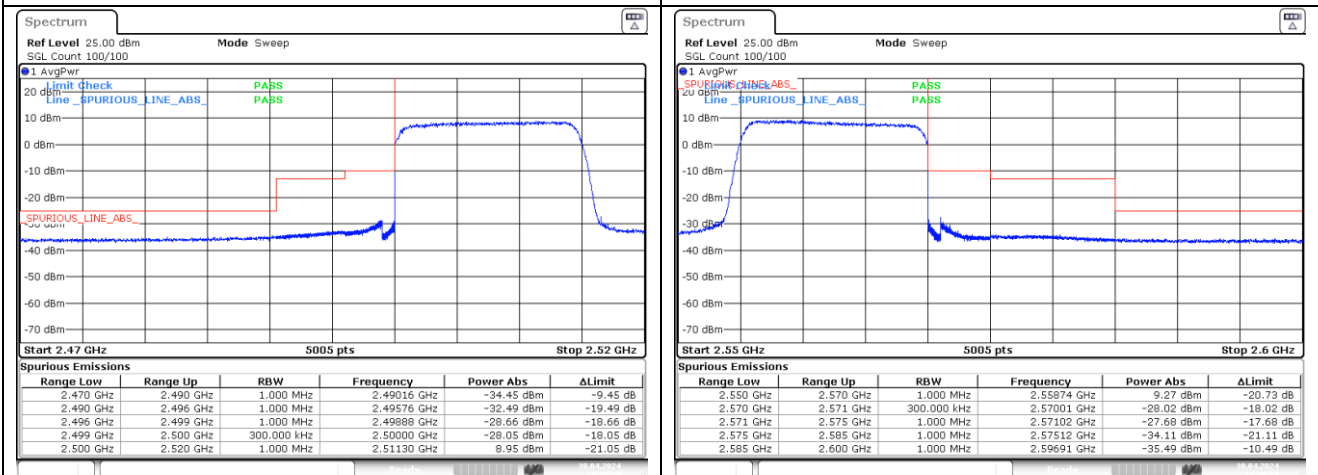
**CP-OFDM QPSK - High Channel - Full RB**

**NR band 7 (15 MHz)**



**CP-OFDM 16QAM - Low Channel - 1 RB**

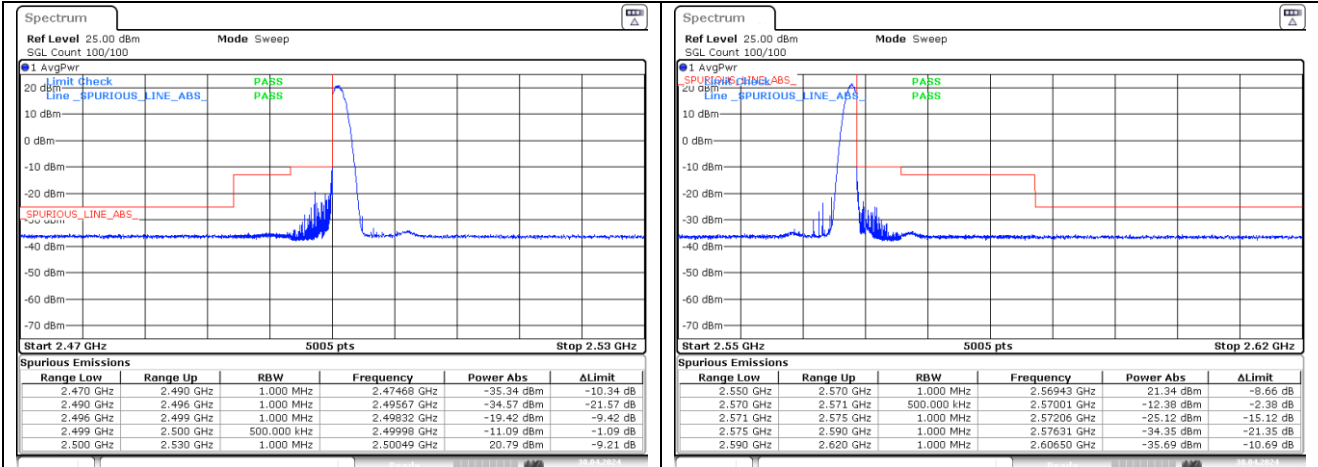
**CP-OFDM 16QAM - High Channel - 1 RB**



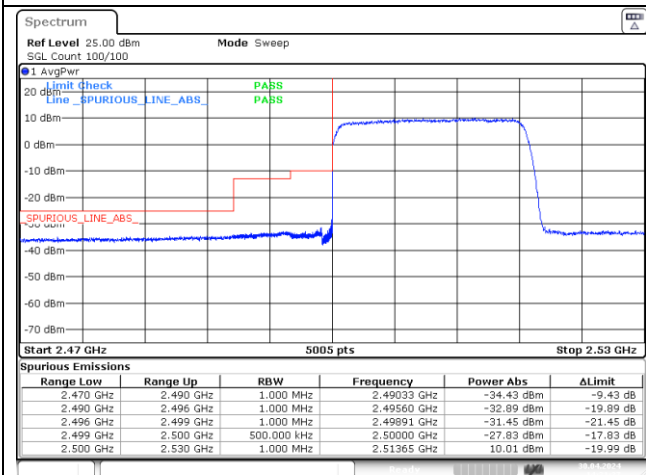
**CP-OFDM 16QAM - Low Channel - Full RB**

**CP-OFDM 16QAM - High Channel - Full RB**

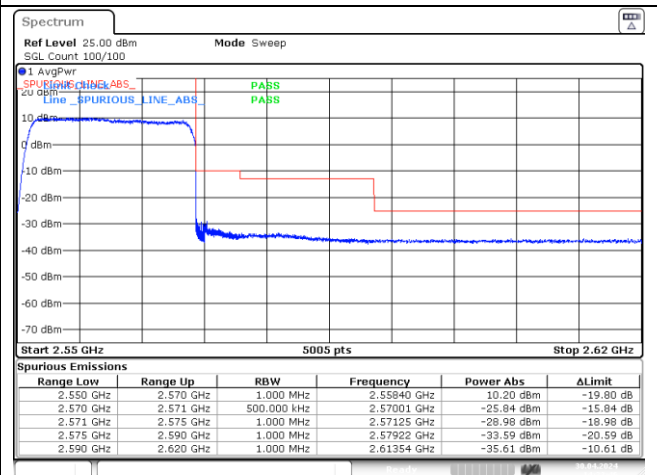
**NR band 7 (20 MHz)**



**DFT-S-OFDM QPSK - Low Channel - 1 RB**



**DFT-S-OFDM QPSK - High Channel - 1 RB**



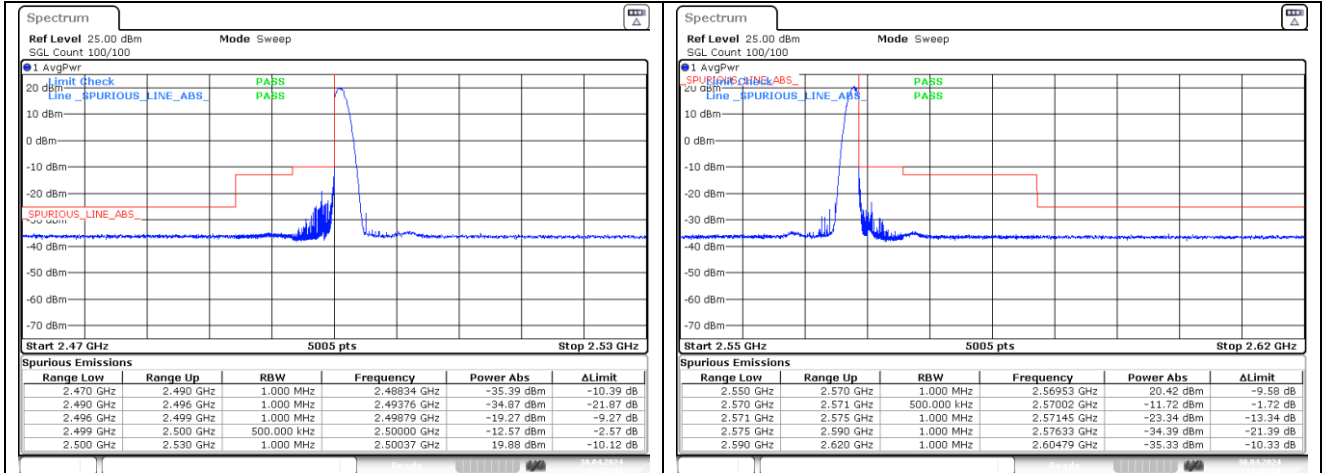
**DFT-S-OFDM QPSK - Low Channel - Full RB**



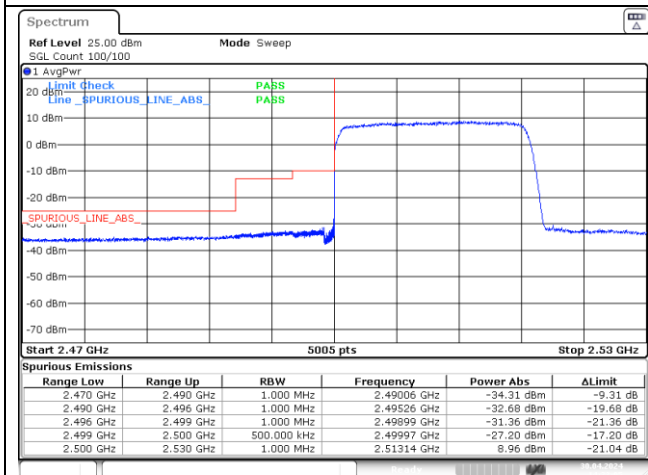
**DFT-S-OFDM QPSK - High Channel - Full RB**



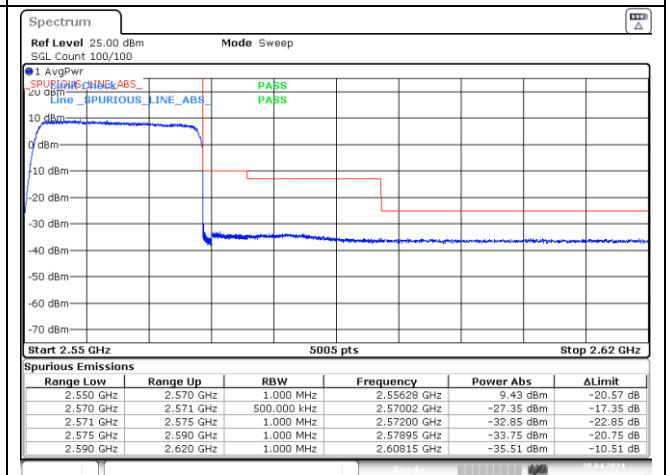
**NR band 7 (20 MHz)**



**DFT-S-OFDM 16QAM - Low Channel - 1 RB**



**DFT-S-OFDM 16QAM - High Channel - 1 RB**



**DFT-S-OFDM 16QAM - Low Channel - Full RB**

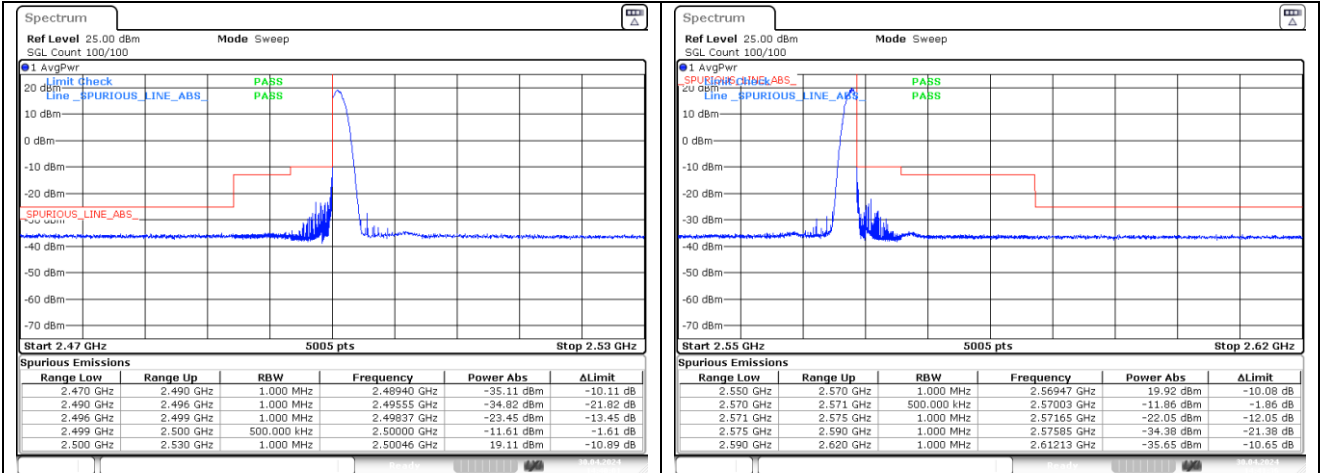


**DFT-S-OFDM 16QAM - High Channel - Full RB**



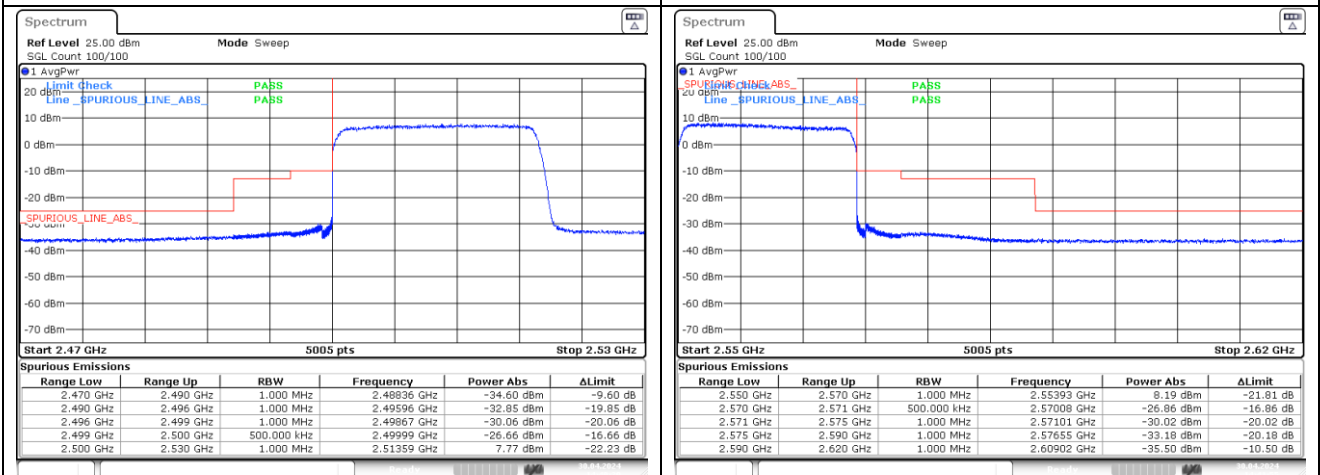


**NR band 7 (20 MHz)**



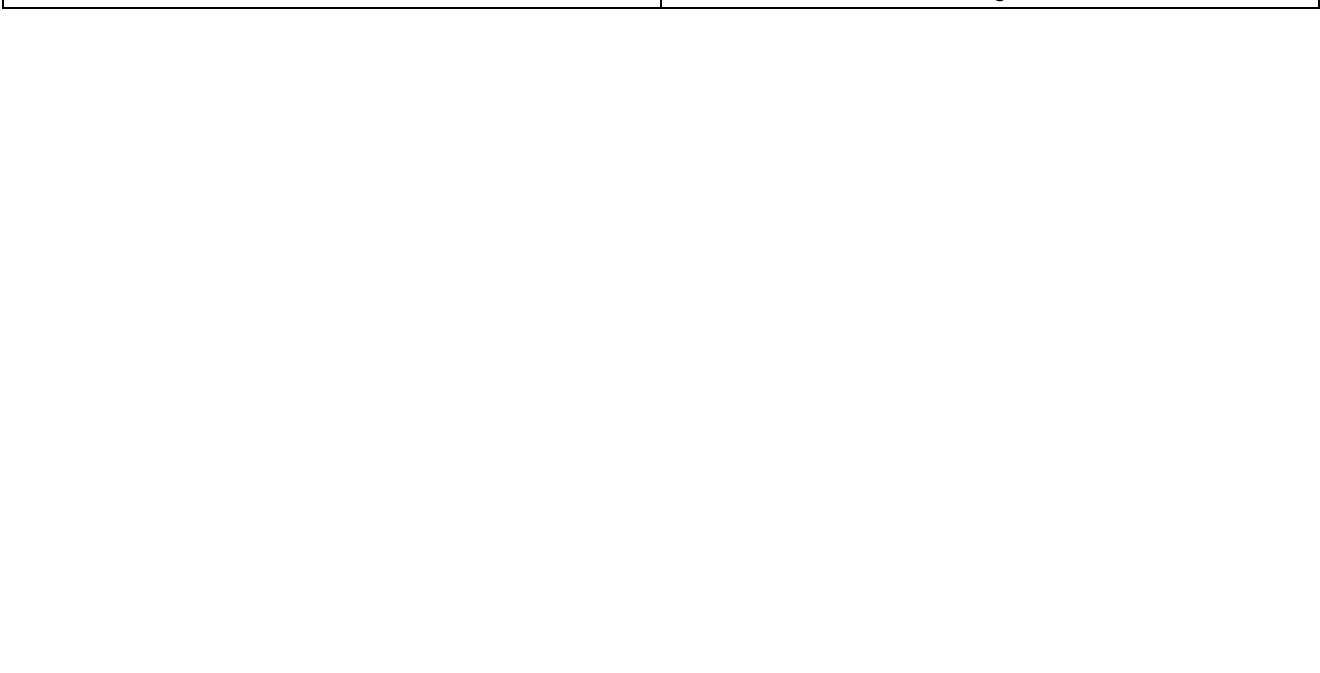
**CP-OFDM QPSK - Low Channel - 1 RB**

**CP-OFDM QPSK - High Channel - 1 RB**

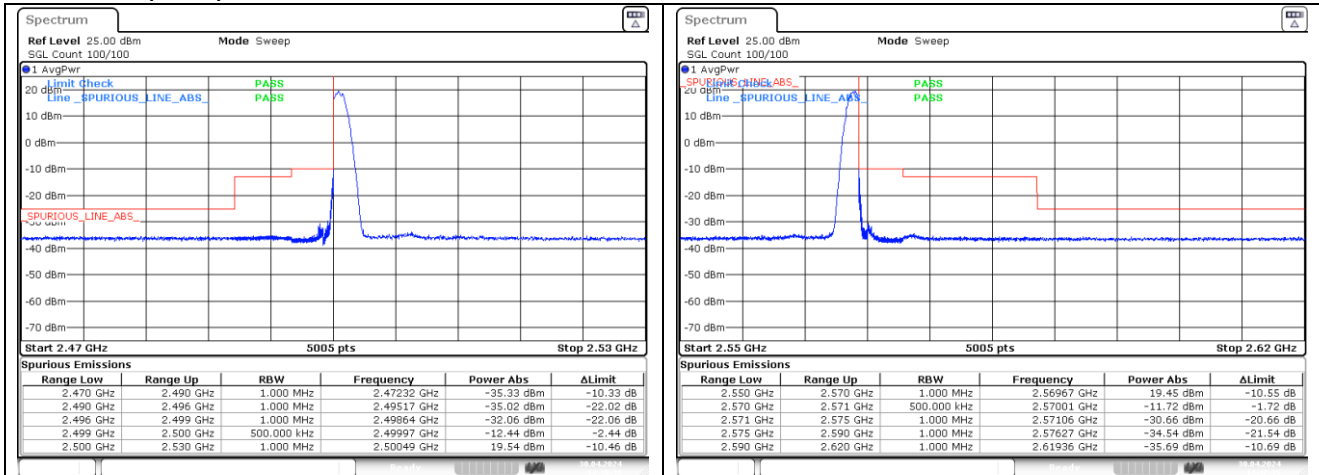


**CP-OFDM QPSK - Low Channel - Full RB**

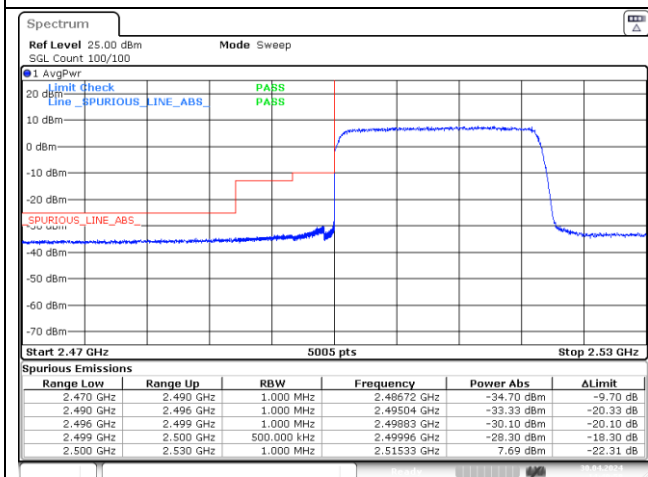
**CP-OFDM QPSK - High Channel - Full RB**



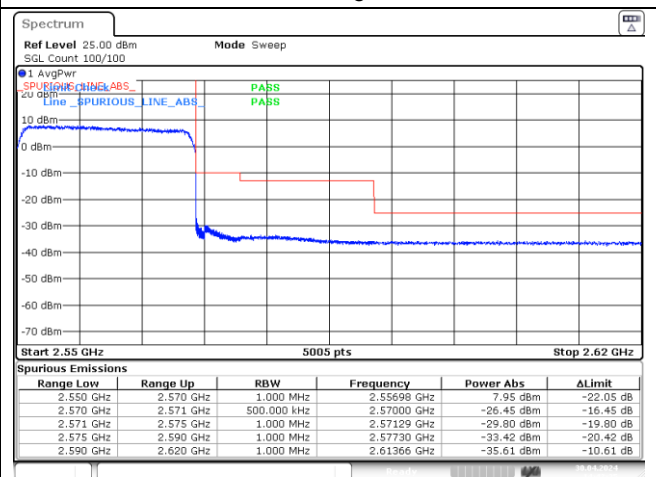
**NR band 7 (20 MHz)**



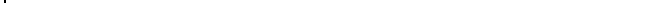
**CP-OFDM 16QAM - Low Channel - 1 RB**



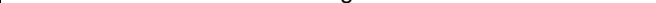
**CP-OFDM 16QAM - High Channel - 1 RB**



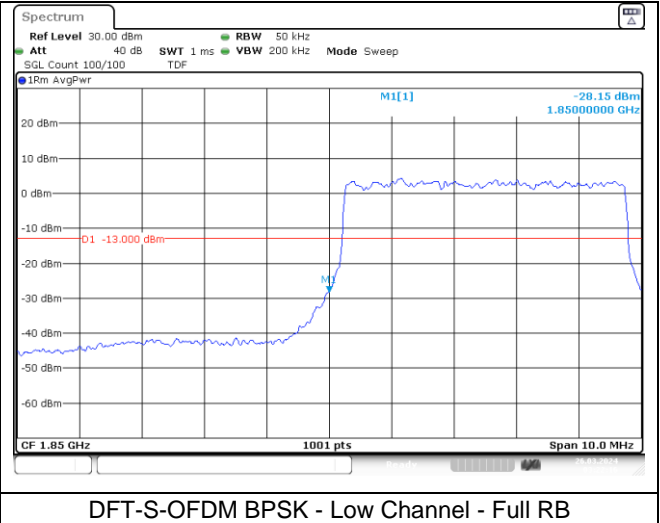
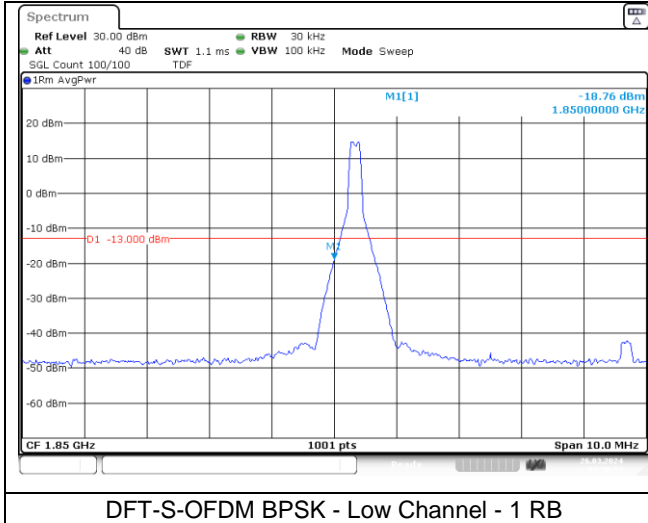
**CP-OFDM 16QAM - Low Channel - Full RB**



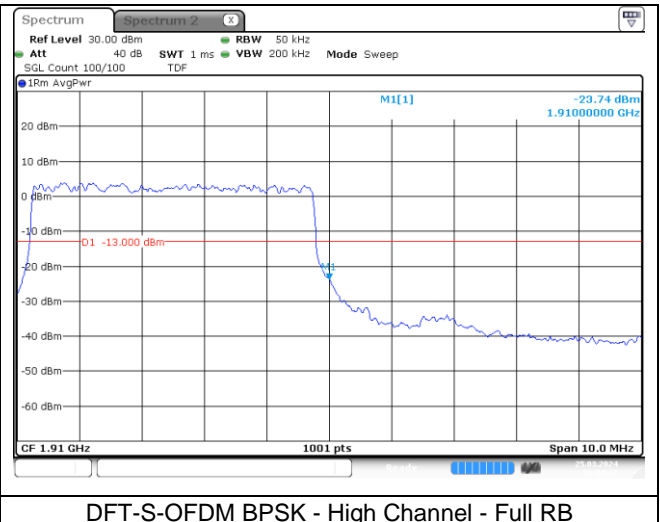
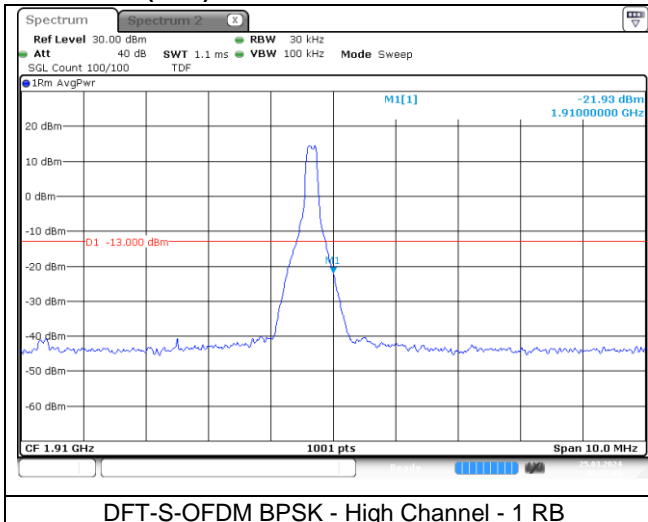
**CP-OFDM 16QAM - High Channel - Full RB**



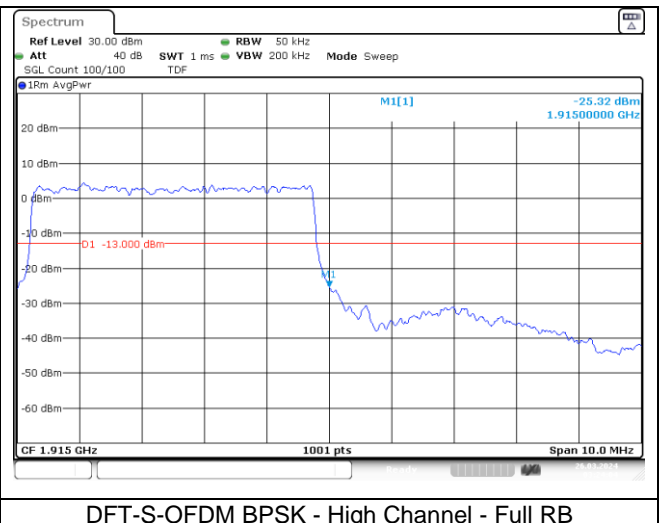
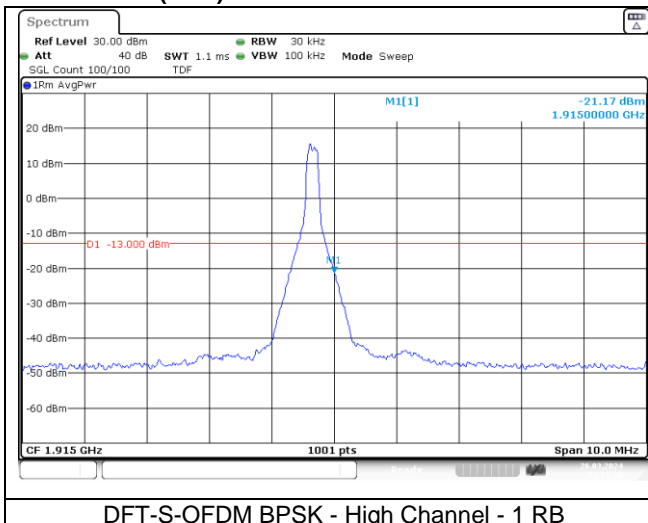
**NR band 25/2 (5 MHz)**



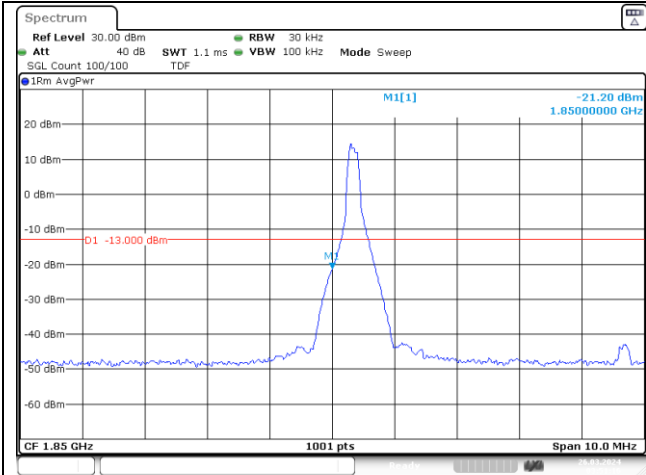
**NR band 2 (5 MHz)**



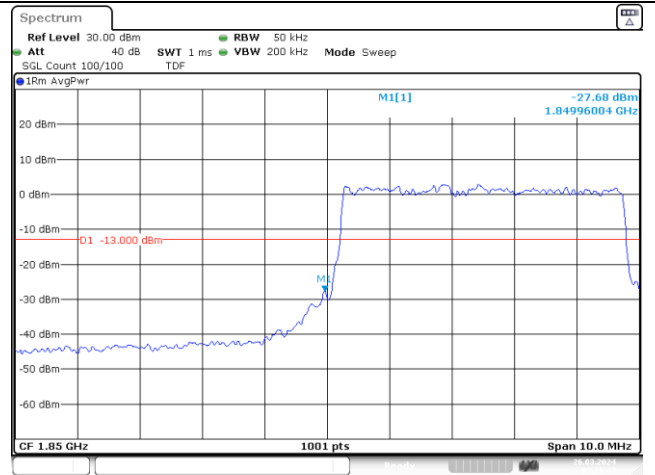
**NR band 25 (5 MHz)**



**NR band 25/2 (5 MHz)**

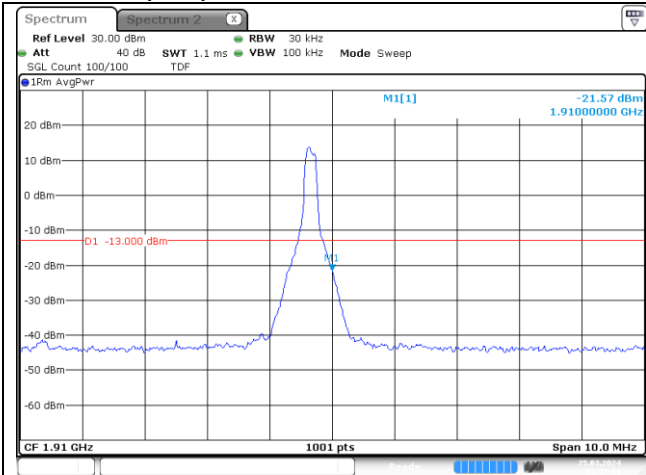


DFT-S-OFDM 16QAM - Low Channel - 1 RB

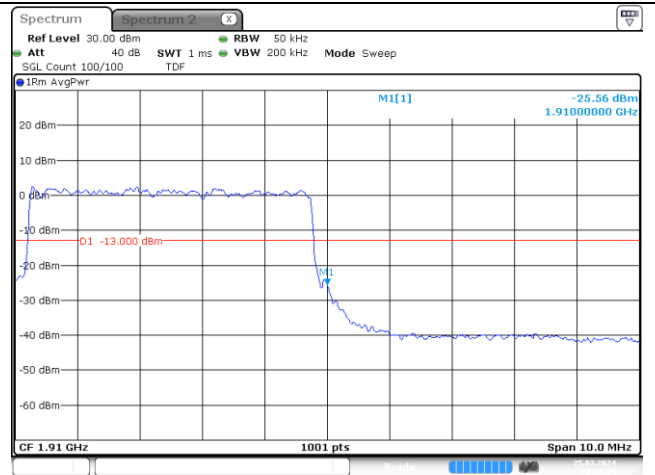


DFT-S-OFDM 16QAM - Low Channel - Full RB

**NR band 2 (5 MHz)**

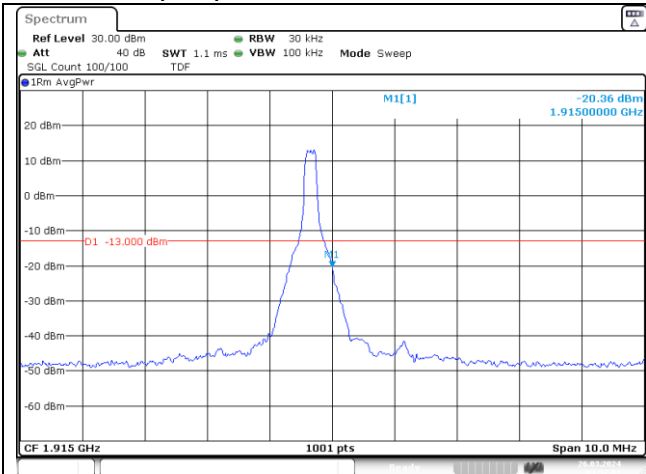


DFT-S-OFDM 16QAM - High Channel - 1 RB

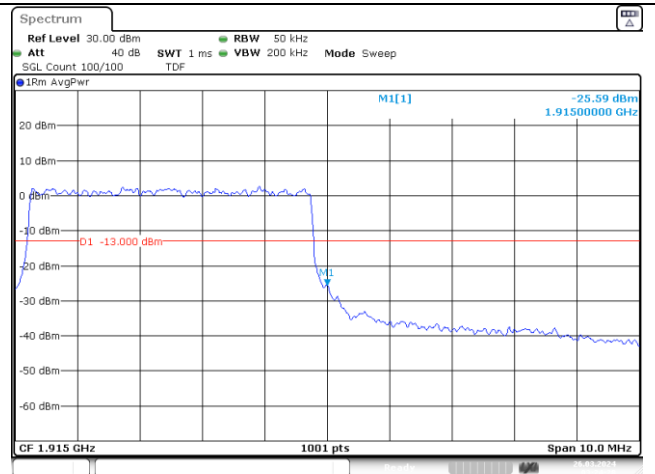


DFT-S-OFDM 16QAM - High Channel - Full RB

**NR band 25 (5 MHz)**

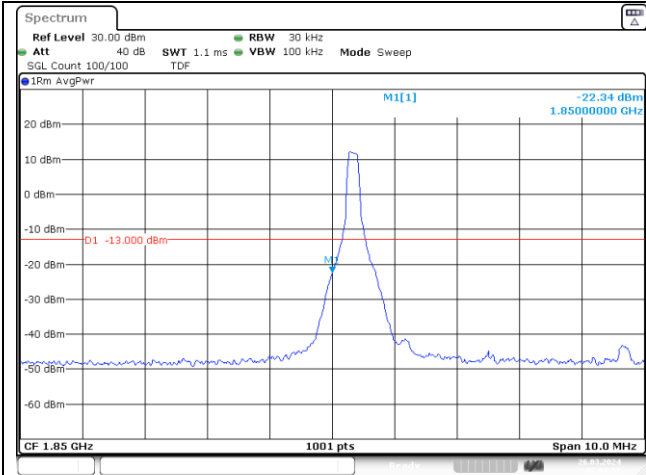


DFT-S-OFDM 16QAM - High Channel - 1 RB

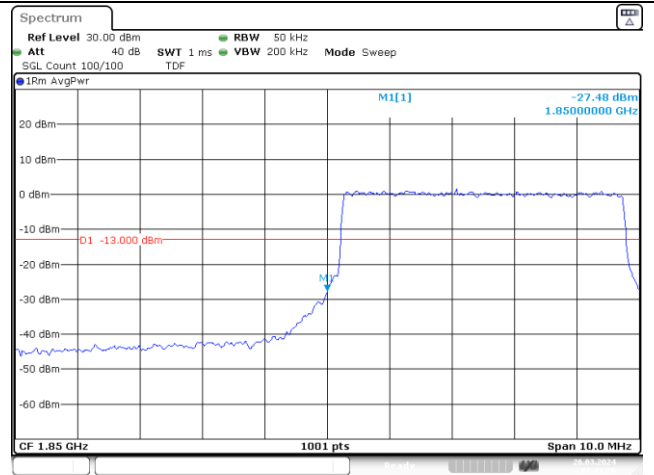


DFT-S-OFDM 16QAM - High Channel - Full RB

**NR band 25/2 (5 MHz)**

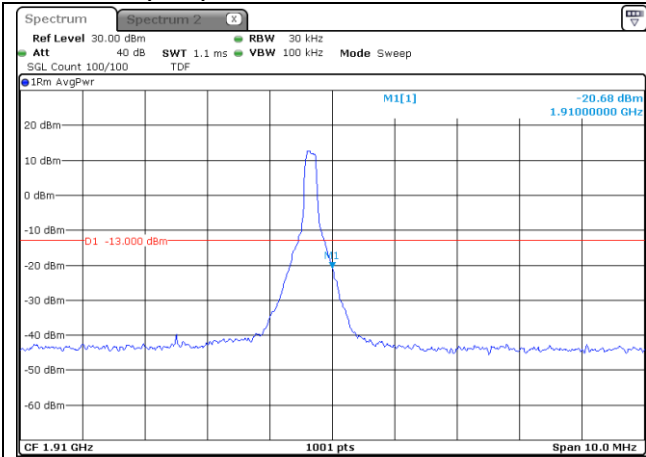


CP-OFDM QPSK - Low Channel - 1 RB

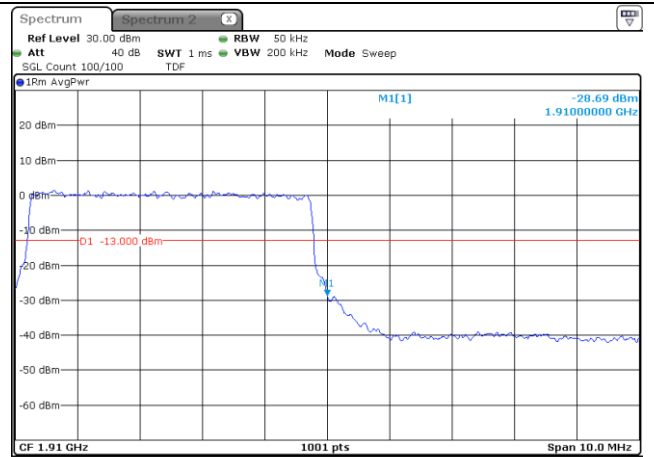


CP-OFDM QPSK - Low Channel - Full RB

**NR band 2 (5 MHz)**

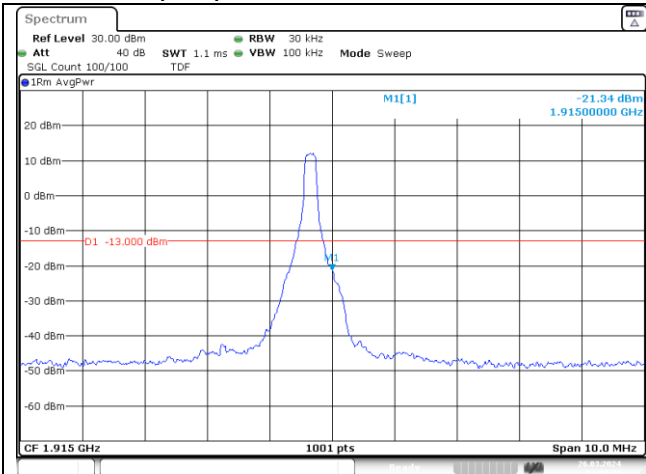


CP-OFDM QPSK - High Channel - 1 RB

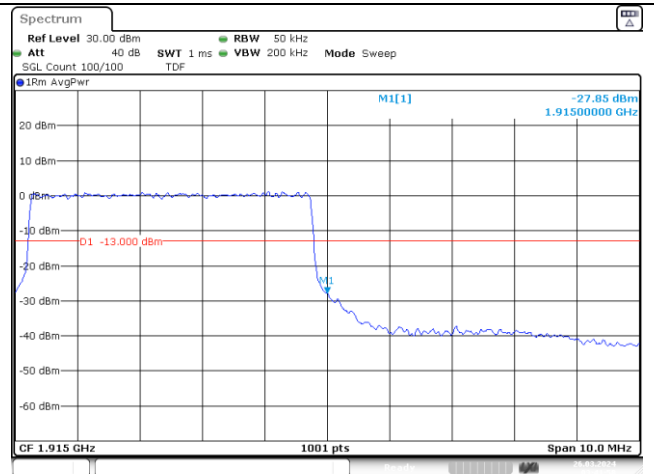


CP-OFDM QPSK - High Channel - Full RB

**NR band 25 (5 MHz)**

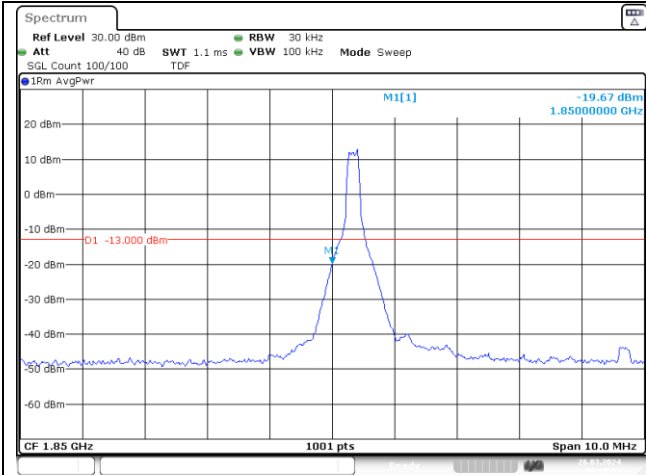


CP-OFDM QPSK - High Channel - 1 RB

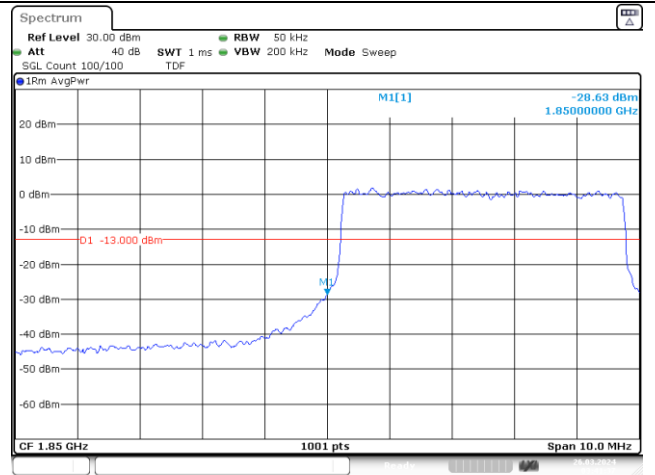


CP-OFDM QPSK - High Channel - Full RB

**NR band 25/2 (5 MHz)**

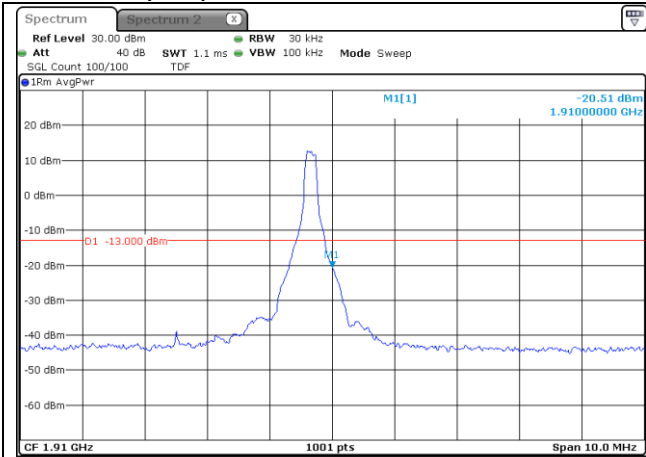


CP-OFDM 16QAM - Low Channel - 1 RB

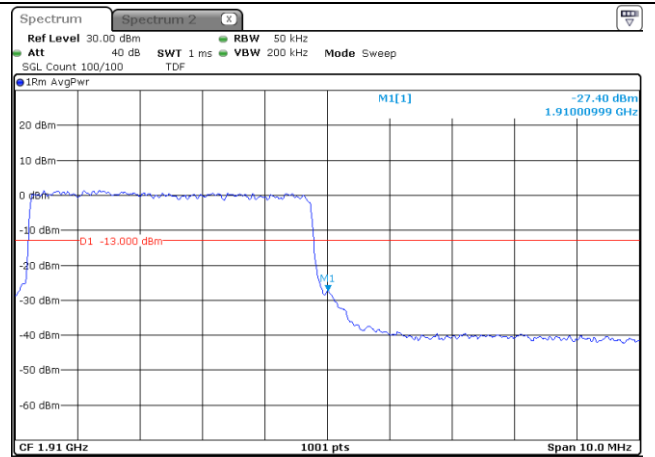


CP-OFDM 16QAM - Low Channel - Full RB

**NR band 2 (5 MHz)**

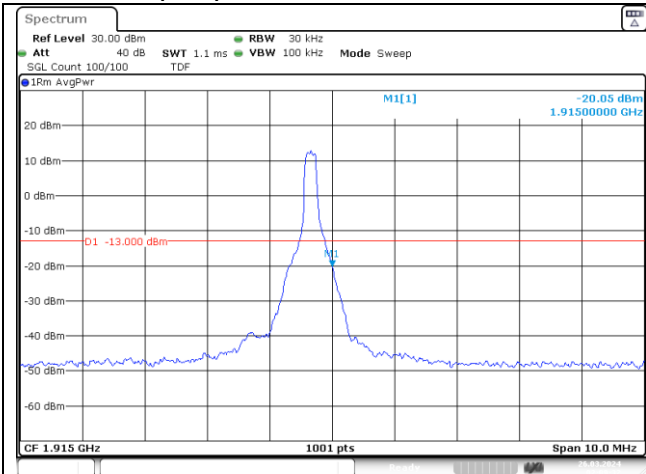


CP-OFDM 16QAM - High Channel - 1 RB

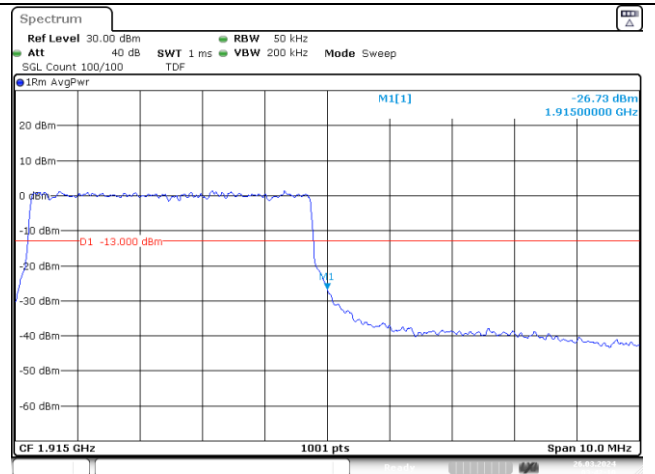


CP-OFDM 16QAM - High Channel - Full RB

**NR band 25 (5 MHz)**



CP-OFDM 16QAM - High Channel - 1 RB



CP-OFDM 16QAM - High Channel - Full RB