

NR Band 48												
BW (MHz)	SCS (kHz)	Modulation		RB allocation	RB Size	RB Offset	Conducted Output Power					
							637334 (3 560.01 MHz)		641666 (3 624.99 MHz)		646000 (3 690.00 MHz)	
							(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
20	30	DFT-S OFDM	BPSK	Inner_1RB Left	1	1	22.44	0.175	22.47	0.177	22.24	0.167
			QPSK		1	1	22.42	0.175	22.45	0.176	22.22	0.167
			16QAM		1	1	21.18	0.131	21.31	0.135	21.05	0.127
			64QAM		1	1	19.87	0.097	19.96	0.099	19.73	0.094
			256QAM		1	1	17.75	0.060	17.83	0.061	17.58	0.057
			BPSK	Inner_1RB Right	1	49	22.27	0.169	22.24	0.167	22.00	0.158
			QPSK		1	49	22.24	0.167	22.21	0.166	21.99	0.158
			BPSK	Inner_Full	25	12	22.42	0.175	22.43	0.175	22.22	0.167
			QPSK		25	12	22.43	0.175	22.46	0.176	22.22	0.167
			BPSK	Outer_Full	50	0	21.43	0.139	21.42	0.139	21.19	0.132
			QPSK		50	0	21.42	0.139	21.42	0.139	21.20	0.132
			BPSK	Edge_1RB Left	1	0	21.37	0.137	21.31	0.135	21.17	0.131
			QPSK		1	0	21.35	0.136	21.27	0.134	21.16	0.131
			BPSK	Edge_Full Left	2	0	21.45	0.140	21.37	0.137	21.24	0.133
			QPSK		2	0	21.46	0.140	21.37	0.137	21.24	0.133
			BPSK	Edge_1RB Right	1	50	21.19	0.132	21.17	0.131	20.92	0.124
			QPSK		1	50	21.16	0.131	21.15	0.130	20.93	0.124
			BPSK	Edge_Full Right	2	49	21.24	0.133	21.22	0.132	21.00	0.126
			QPSK		2	49	21.24	0.133	21.23	0.133	20.99	0.126
		CP OFDM	QPSK	Inner_1RB	1	1	21.03	0.127	20.95	0.124	20.85	0.122
			16QAM	Left	1	1	20.42	0.110	20.34	0.108	20.22	0.105

NR Band 48												
BW (MHz)	SCS (kHz)	Modulation		RB allocation	RB Size	RB Offset	Conducted Output Power					
							637668 (3 565.02 MHz)		641666 (3 624.99 MHz)		645666 (3 684.99 MHz)	
							(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
30	30	DFT-S OFDM	BPSK	Inner_1RB Left	1	1	22.58	0.181	22.47	0.177	22.46	0.176
			QPSK		1	1	22.55	0.180	22.45	0.176	22.49	0.177
			16QAM		1	1	21.37	0.137	21.28	0.134	21.23	0.133
			64QAM		1	1	20.01	0.100	19.94	0.099	19.89	0.097
			256QAM		1	1	17.95	0.062	17.83	0.061	17.81	0.060
			BPSK	Inner_1RB Right	1	76	22.29	0.169	22.31	0.170	22.24	0.167
			QPSK		1	76	22.27	0.169	22.27	0.169	22.25	0.168
			BPSK	Inner_Full	36	18	22.54	0.179	22.53	0.179	22.50	0.178
			QPSK		36	18	22.45	0.176	22.48	0.177	22.51	0.178
			BPSK	Outer_Full	75	0	21.49	0.141	21.43	0.139	21.49	0.141
			QPSK		75	0	21.48	0.141	21.43	0.139	21.49	0.141
			BPSK	Edge_1RB Left	1	0	21.52	0.142	21.49	0.141	21.44	0.139
			QPSK		1	0	21.50	0.141	21.48	0.141	21.42	0.139
			BPSK	Edge_Full Left	2	0	21.56	0.143	21.53	0.142	21.49	0.141
			QPSK		2	0	21.56	0.143	21.53	0.142	21.50	0.141
			BPSK	Edge_1RB Right	1	77	21.25	0.133	21.22	0.132	21.18	0.131
			QPSK		1	77	21.24	0.133	21.22	0.132	21.16	0.131
			BPSK	Edge_Full Right	2	76	21.29	0.135	21.27	0.134	21.22	0.132
			QPSK		2	76	21.30	0.135	21.28	0.134	21.23	0.133
		CP OFDM	QPSK	Inner_1RB	1	1	21.16	0.131	21.07	0.128	21.08	0.128
			16QAM	Left	1	1	20.57	0.114	20.50	0.112	20.43	0.110

NR Band 48												
BW (MHz)	SCS (kHz)	Modulation		RB allocation	RB Size	RB Offset	Conducted Output Power					
							638000 (3 570.00 MHz)		641666 (3 624.99 MHz)		645332 (3 679.98 MHz)	
							(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
40	30	DFT-S OFDM	BPSK	Inner_1RB Left	1	1	22.59	0.182	22.37	0.173	22.35	0.172
			QPSK		1	1	22.55	0.180	22.36	0.172	22.35	0.172
			16QAM		1	1	21.42	0.139	21.33	0.136	21.14	0.130
			64QAM		1	1	20.10	0.102	19.95	0.099	19.80	0.095
			256QAM		1	1	17.92	0.062	17.77	0.060	17.65	0.058
			BPSK	Inner_1RB Right	1	104	22.19	0.166	22.08	0.161	22.00	0.158
			QPSK		1	104	22.18	0.165	22.08	0.161	22.03	0.160
			BPSK	Inner_Full	50	25	22.57	0.181	22.51	0.178	22.39	0.173
			QPSK		50	25	22.56	0.180	22.44	0.175	22.39	0.173
			BPSK	Outer_Full	100	0	21.53	0.142	21.47	0.140	21.34	0.136
			QPSK		100	0	21.54	0.143	21.40	0.138	21.34	0.136
			BPSK	Edge_1RB Left	1	0	21.53	0.142	21.39	0.138	21.26	0.134
			QPSK		1	0	21.46	0.140	21.36	0.137	21.25	0.133
			BPSK	Edge_Full Left	2	0	21.50	0.141	21.43	0.139	21.31	0.135
			QPSK		2	0	21.54	0.143	21.42	0.139	21.31	0.135
			BPSK	Edge_1RB Right	1	105	21.17	0.131	21.05	0.127	20.96	0.125
			QPSK		1	105	21.17	0.131	21.04	0.127	20.95	0.124
			BPSK	Edge_Full Right	2	104	21.25	0.133	21.11	0.129	21.01	0.126
			QPSK		2	104	21.24	0.133	21.11	0.129	21.02	0.126
		CP OFDM	QPSK	Inner_1RB	1	1	21.09	0.129	20.99	0.126	20.90	0.123
			16QAM	Left	1	1	20.50	0.112	20.39	0.109	20.30	0.107

4. Occupied Bandwidth

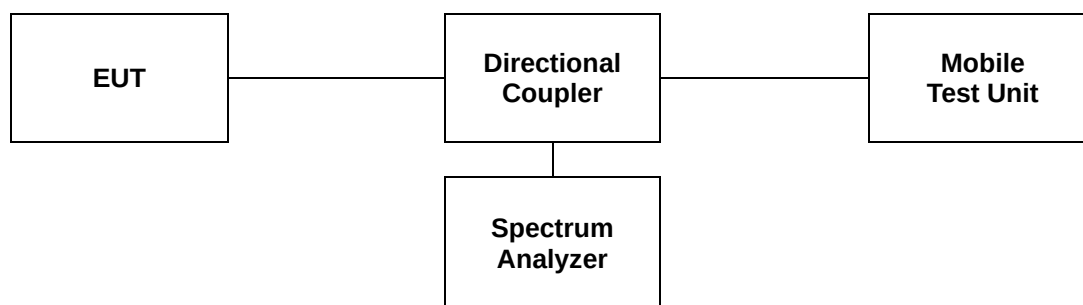
4.1. Limit

CFR 47, Section FCC §2.

4.2. Test Procedure

The test follows section 5.4.4 of ANSI C63.26-2015.

- The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation. products including the emission skirts (typically a span of $1.5 \times \text{OBW}$ is sufficient).
- The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1 % to 5 % of the anticipated OBW, and the VBW shall be set $\geq 3 \times \text{RBW}$.
- Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- Set the detection mode to peak, and the trace mode to max-hold.
- If the instrument does not have a 99 % OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5 % of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5 % of the total is reached and record that frequency as the upper OBW frequency. The 99 % power OBW can be determined by computing the difference these two frequencies.
- The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).



4.3 Test Results

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

Ant. 2

Band	Bandwidth (MHz)	Frequency (MHz)	Occupied Bandwidth (MHz)	
			QPSK	16QAM
LTE 48	5	3 625	4.530	4.530
	10		8.973	8.973
	15		13.502	13.546
	20		18.003	17.945

Band	SCS (kHz)	BW (MHz)	Frequency (MHz)	Occupied Bandwidth (MHz)				
				DFT-S-OFDM BPSK	DFT-S-OFDM QPSK	DFT-S-OFDM 16QAM	CP-OFDM QPSK	CP-OFDM 16QAM
NR 48	30	20	3 624.99	17.982	17.942	17.942	18.262	18.302
		30		26.793	26.853	26.853	27.932	27.872
		40		35.964	35.804	35.804	38.042	37.882

Switching

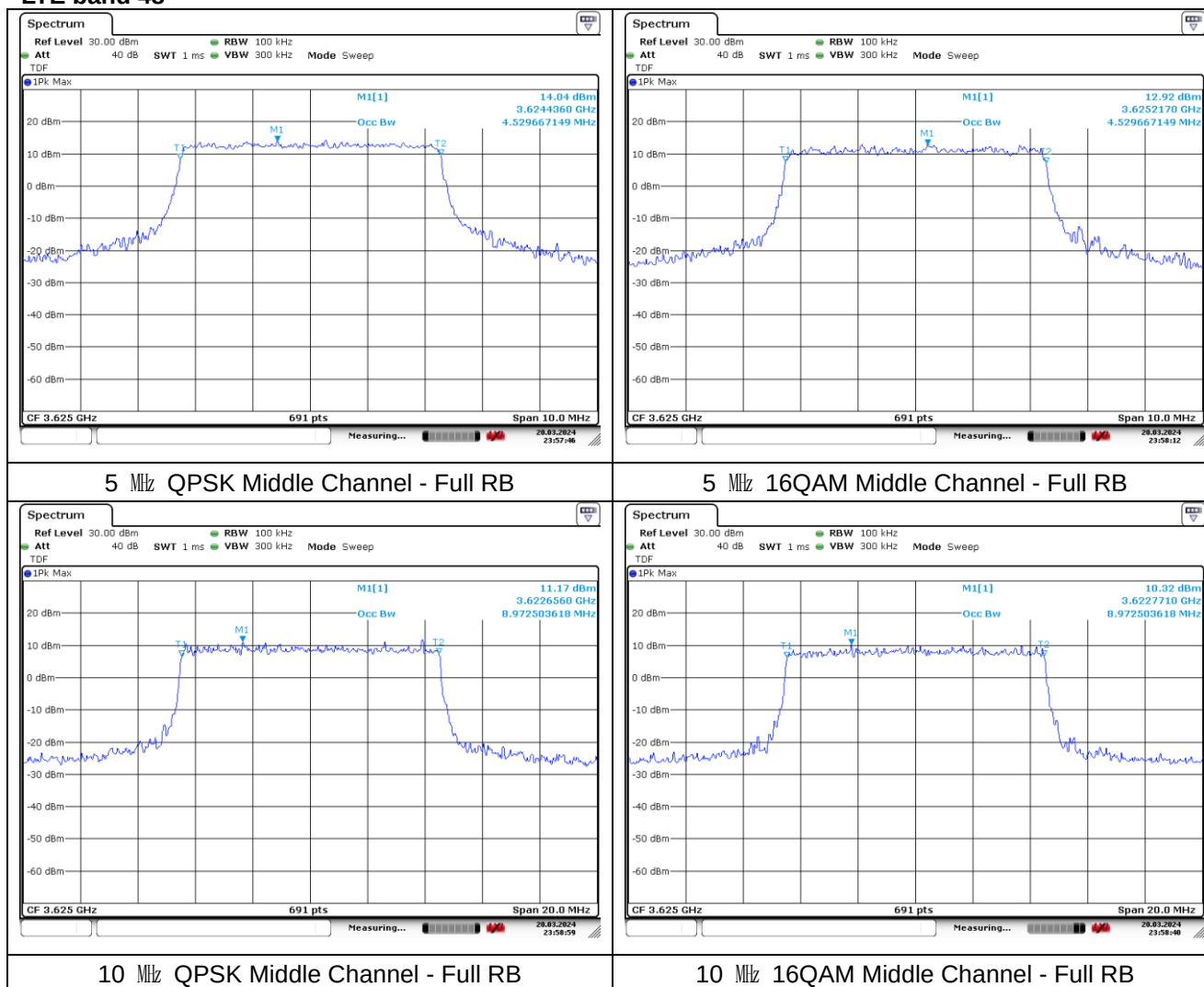
Band	Bandwidth (MHz)	Frequency (MHz)	Occupied Bandwidth (MHz)	
			QPSK	16QAM
LTE 48	5	3 625	4.502	4.502
	10		8.934	8.956
	15		13.518	13.454
	20		17.931	17.945

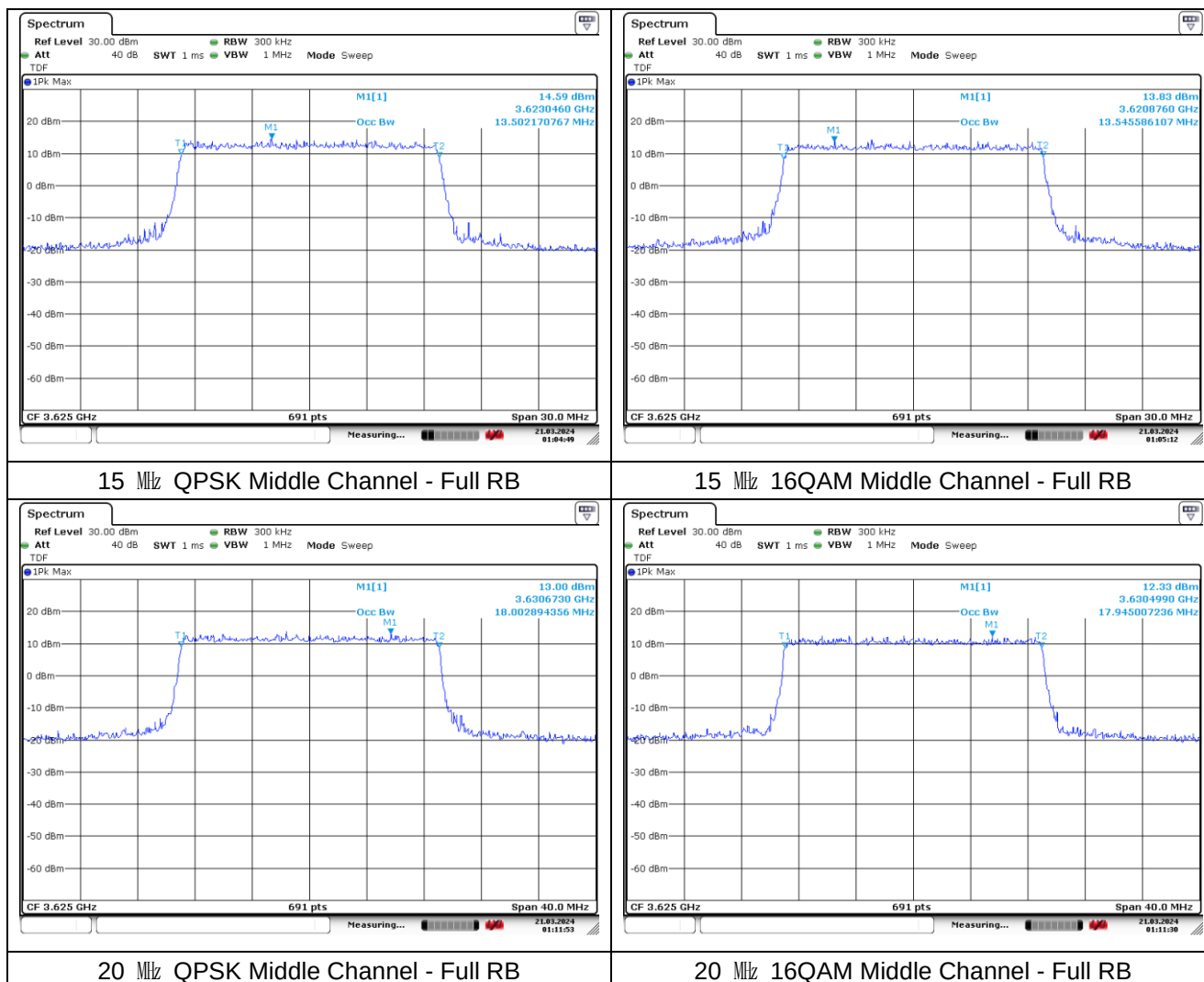
Band	SCS (kHz)	BW (MHz)	Frequency (MHz)	Occupied Bandwidth (MHz)				
				DFT-S-OFDM BPSK	DFT-S-OFDM QPSK	DFT-S-OFDM 16QAM	CP-OFDM QPSK	CP-OFDM 16QAM
NR 48	30	20	3 624.99	17.862	17.902	17.942	18.262	18.262
		30		26.793	26.853	26.793	27.872	27.872
		40		35.884	35.804	35.804	37.962	37.882

- Test plots

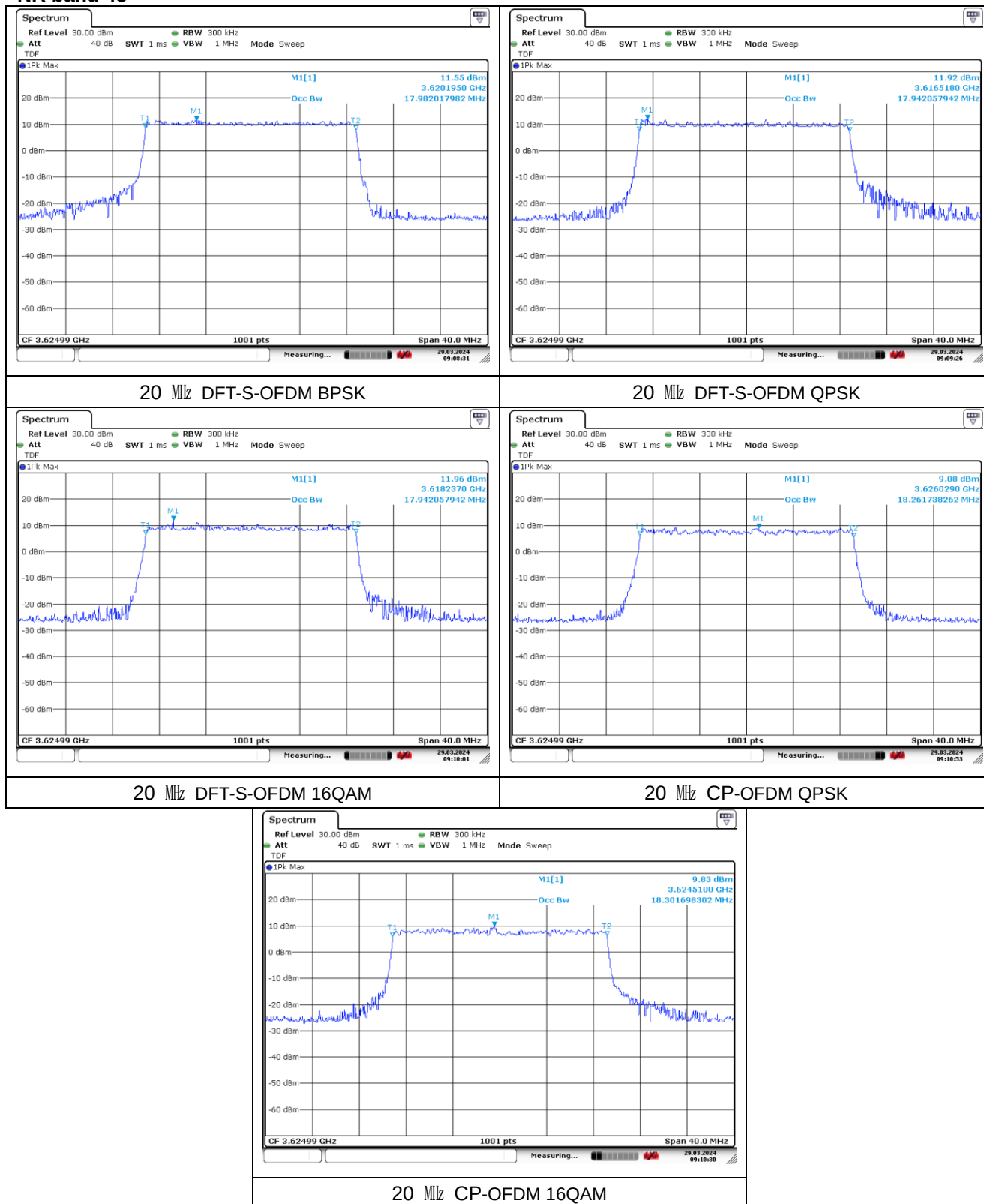
Ant. 2

LTE band 48

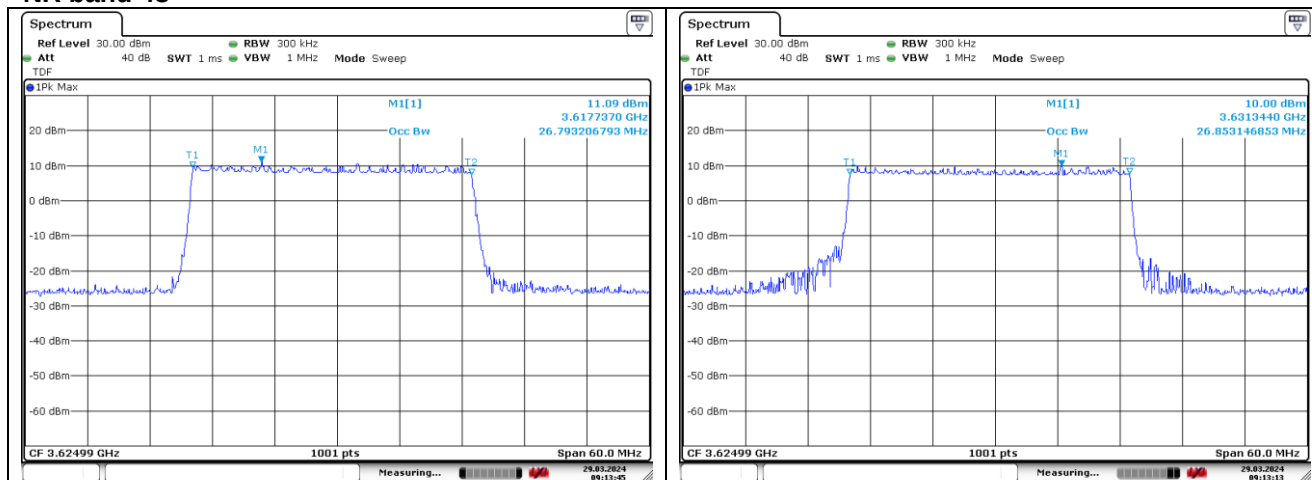




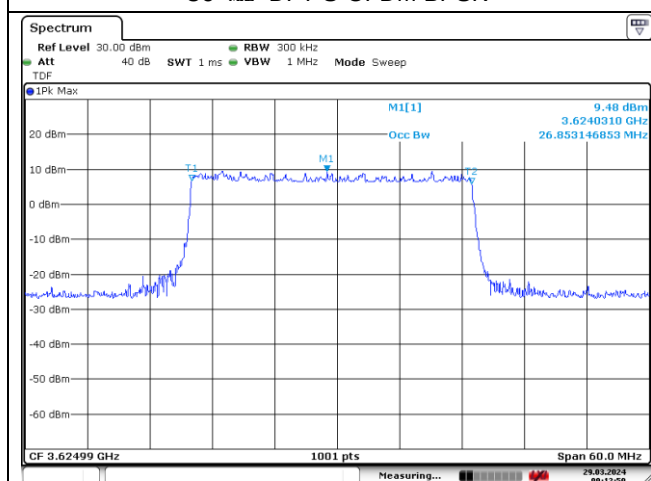
NR band 48



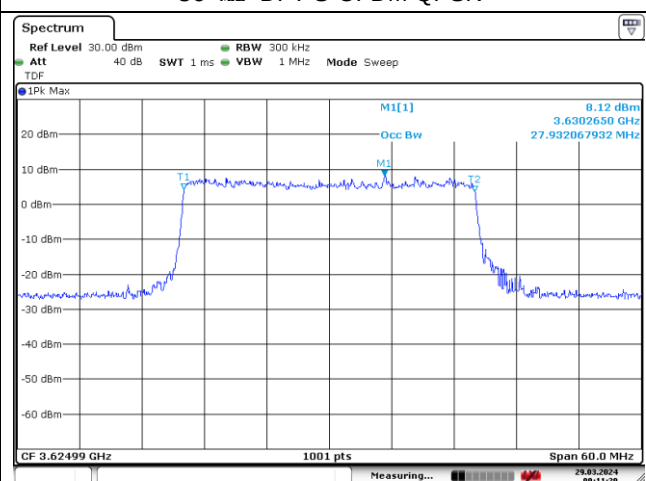
NR band 48



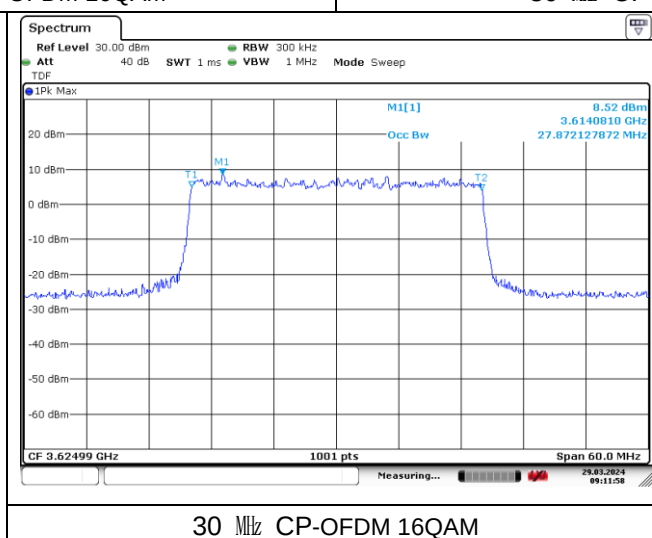
30 MHz DFT-S-OFDM BPSK



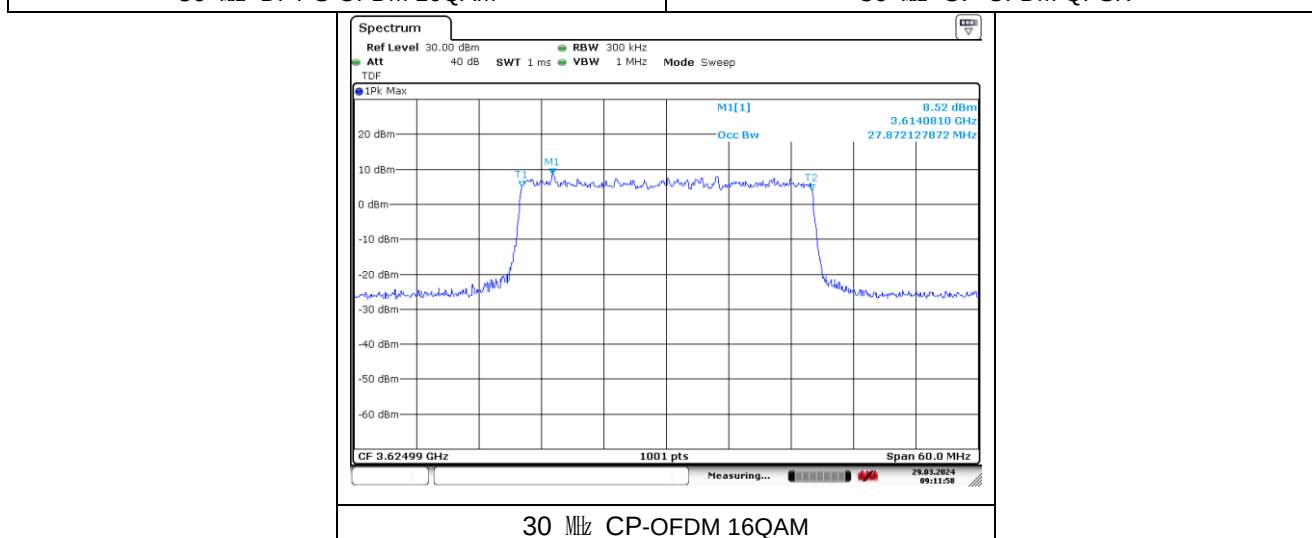
30 MHz DFT-S-OFDM QPSK



30 MHz DFT-S-OFDM 16QAM

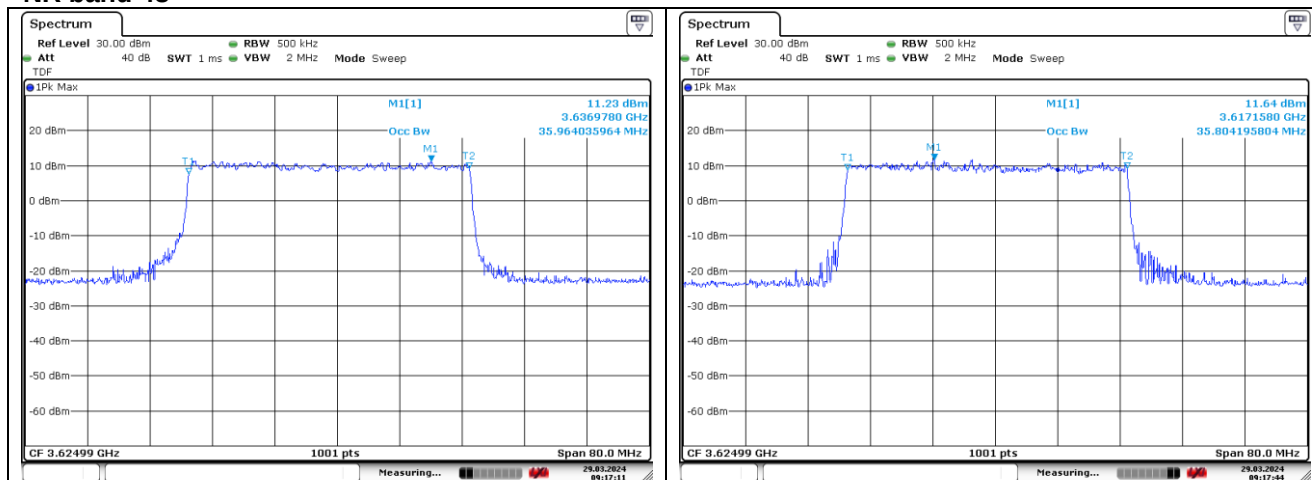


30 MHz CP-OFDM QPSK

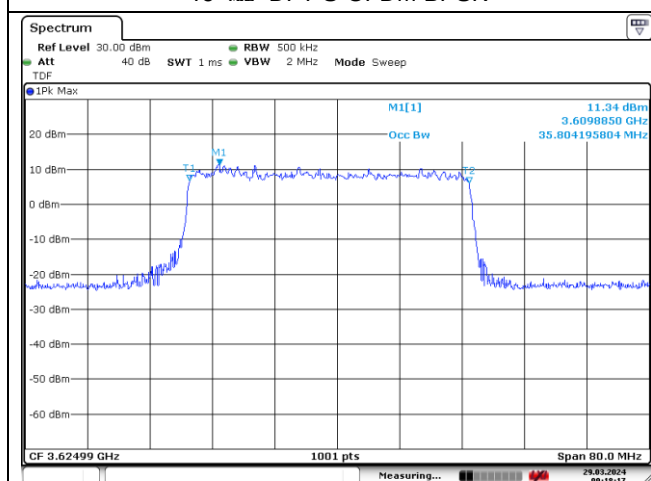


30 MHz CP-OFDM 16QAM

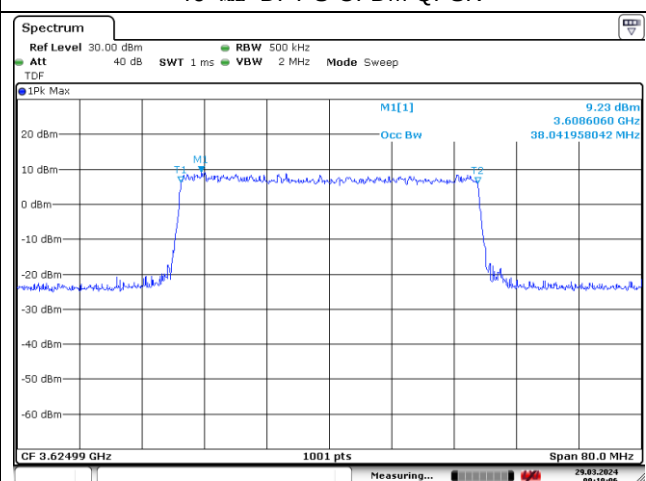
NR band 48



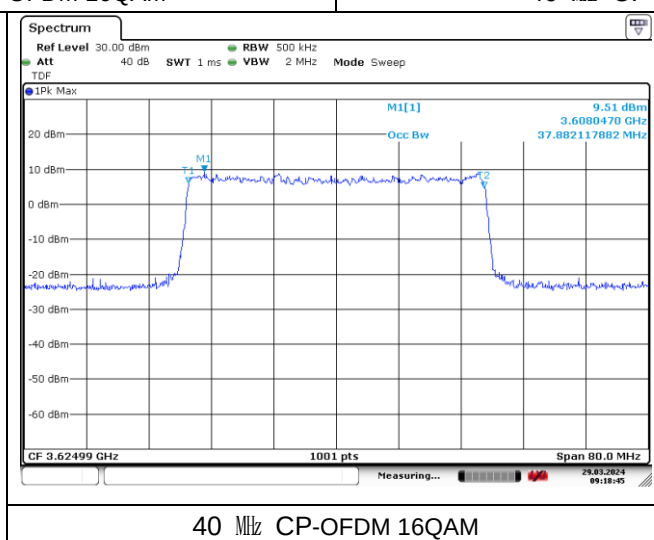
40 MHz DFT-S-OFDM BPSK



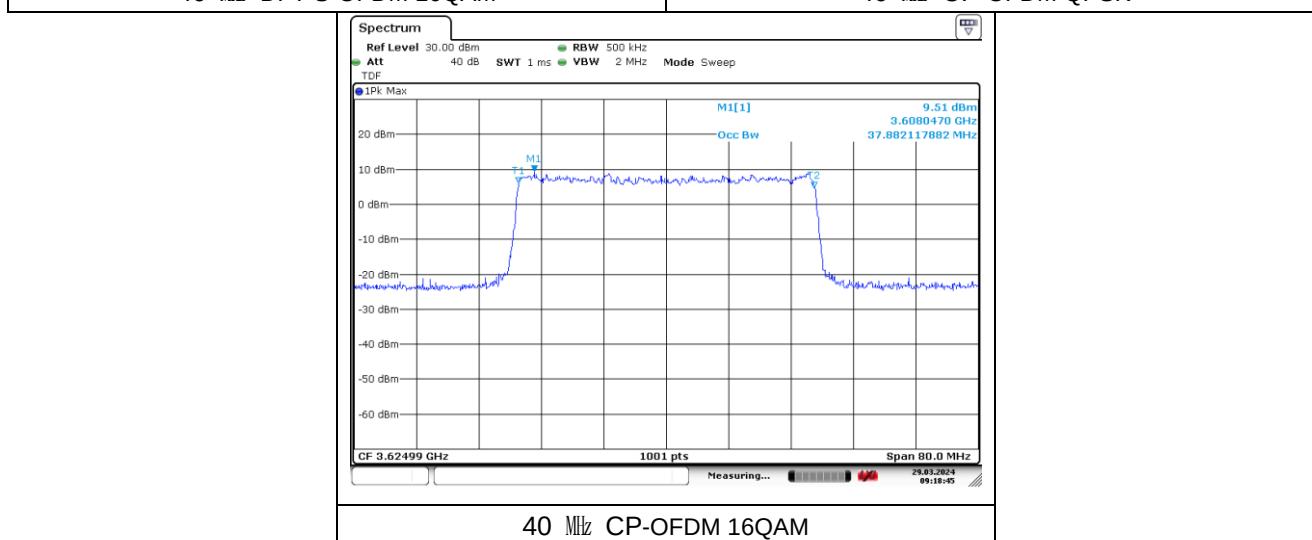
40 MHz DFT-S-OFDM QPSK



40 MHz DFT-S-OFDM 16QAM



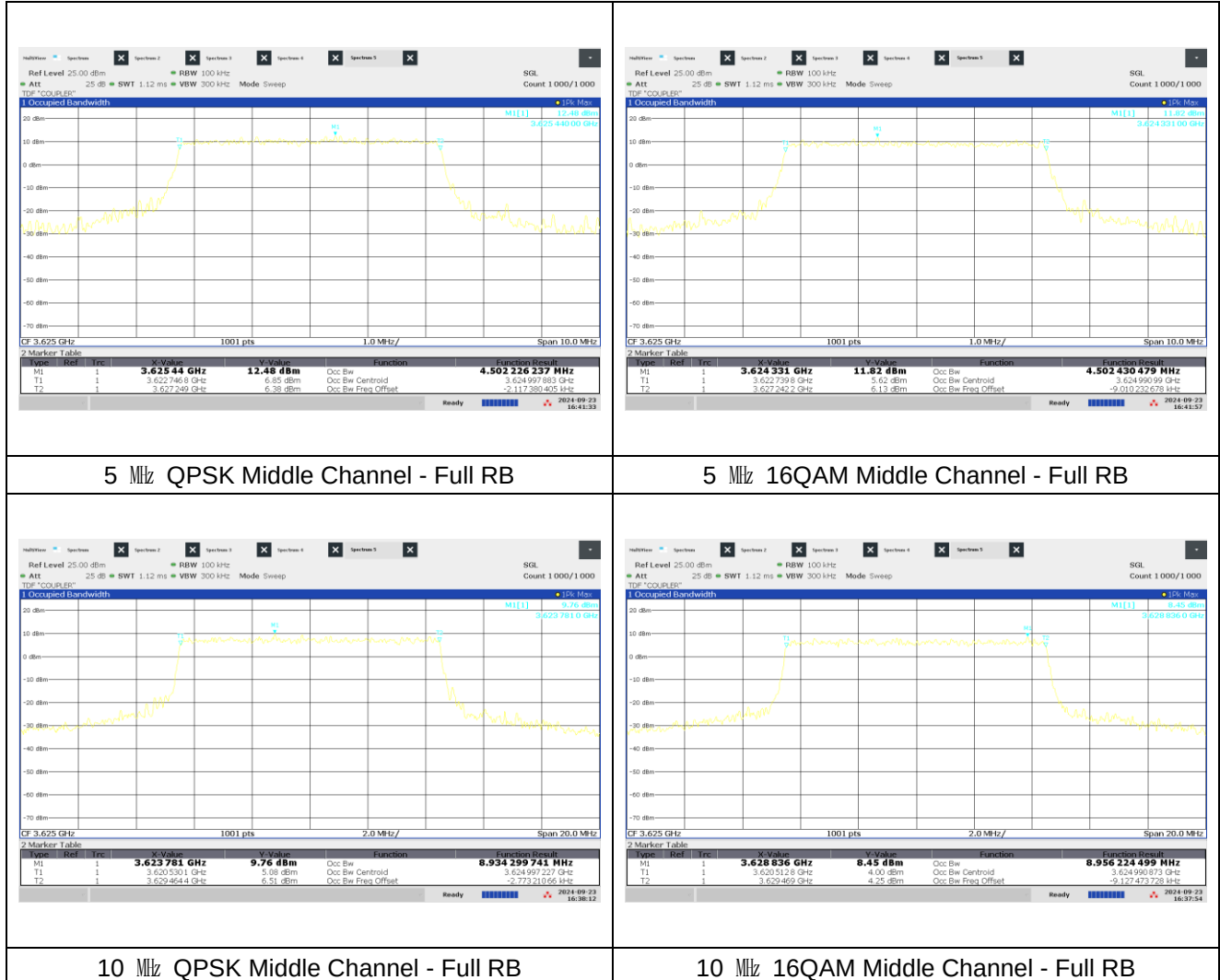
40 MHz CP-OFDM QPSK

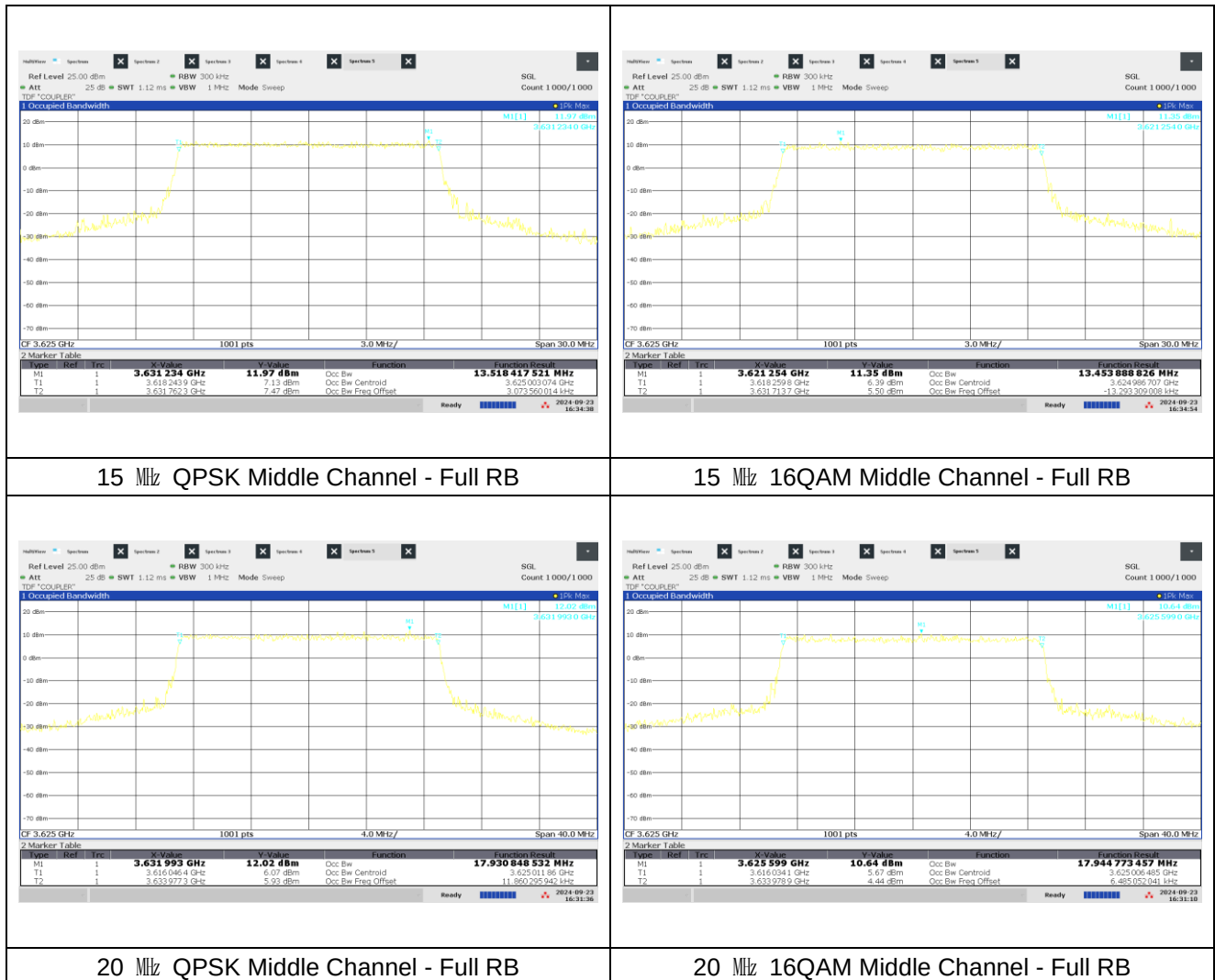


40 MHz CP-OFDM 16QAM

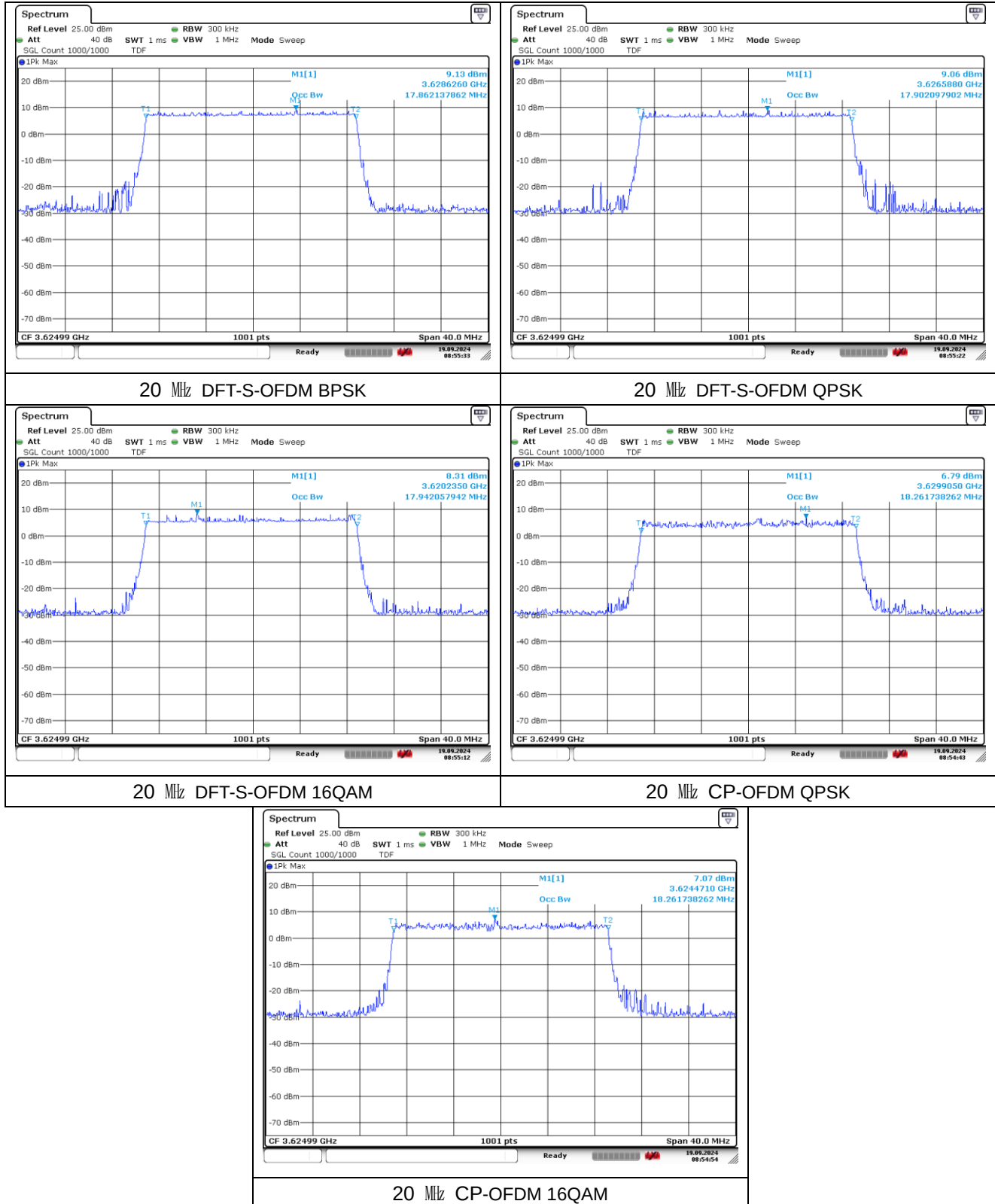
Switching

LTE band 48

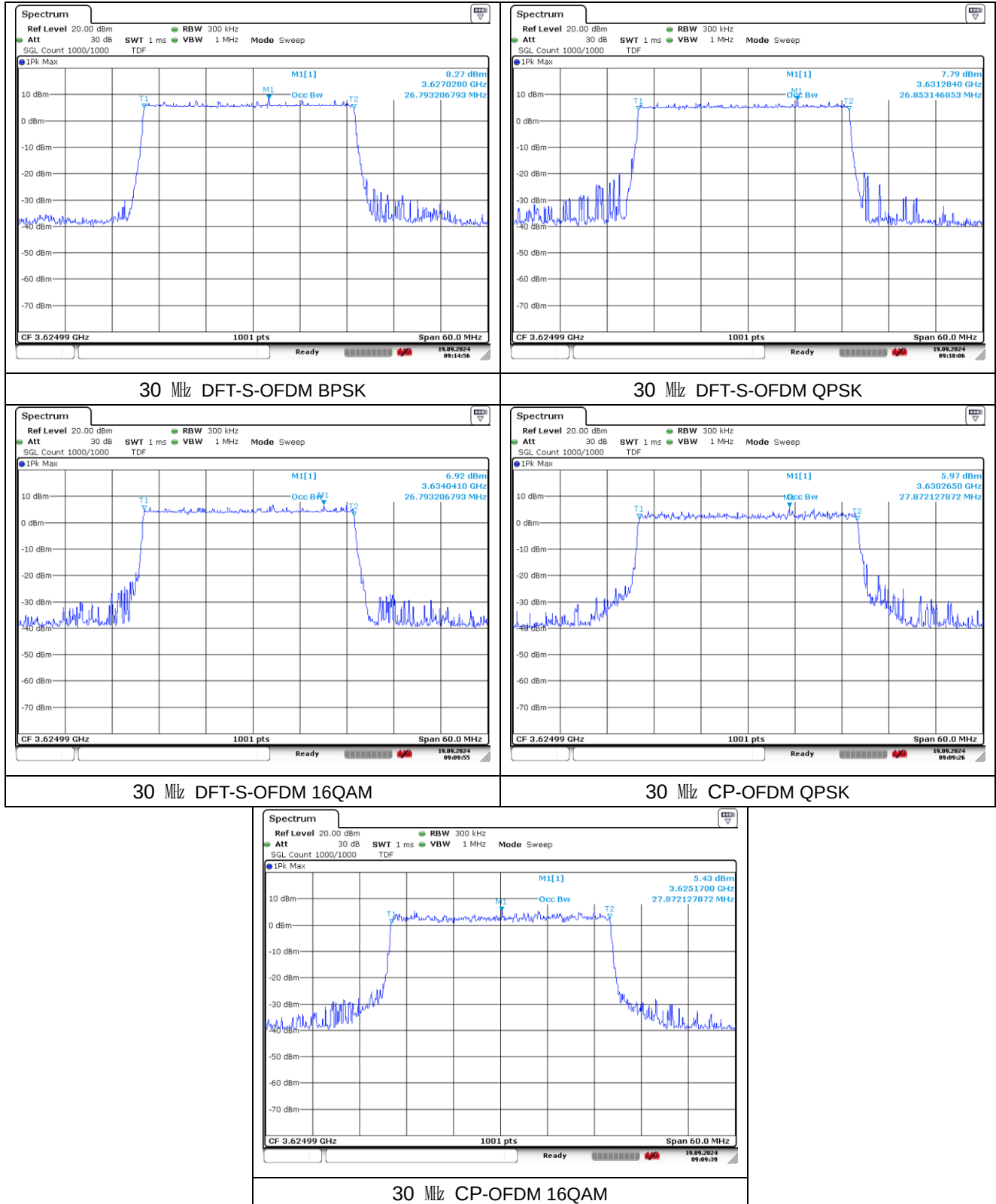




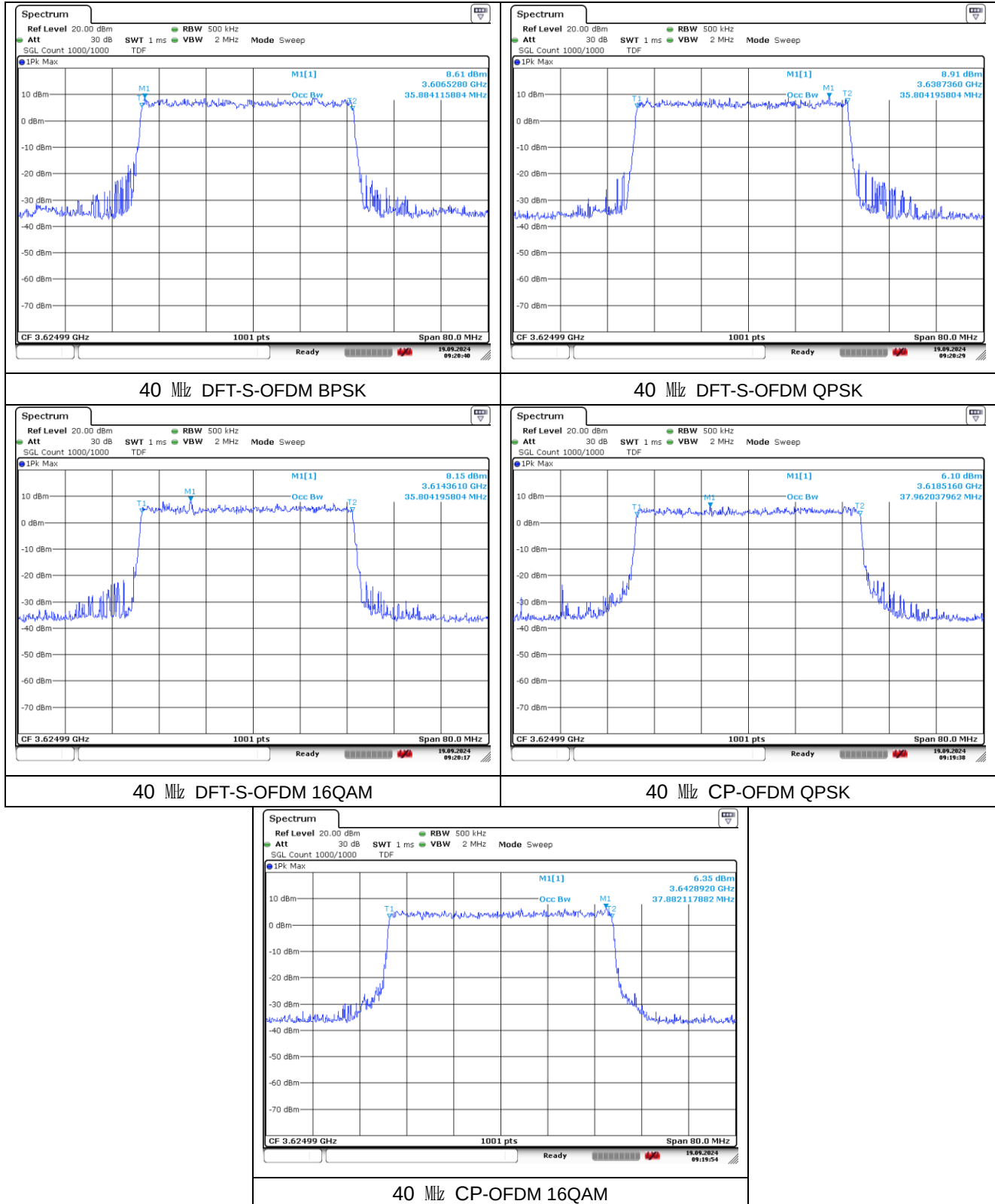
NR band 48



NR band 48



NR band 48



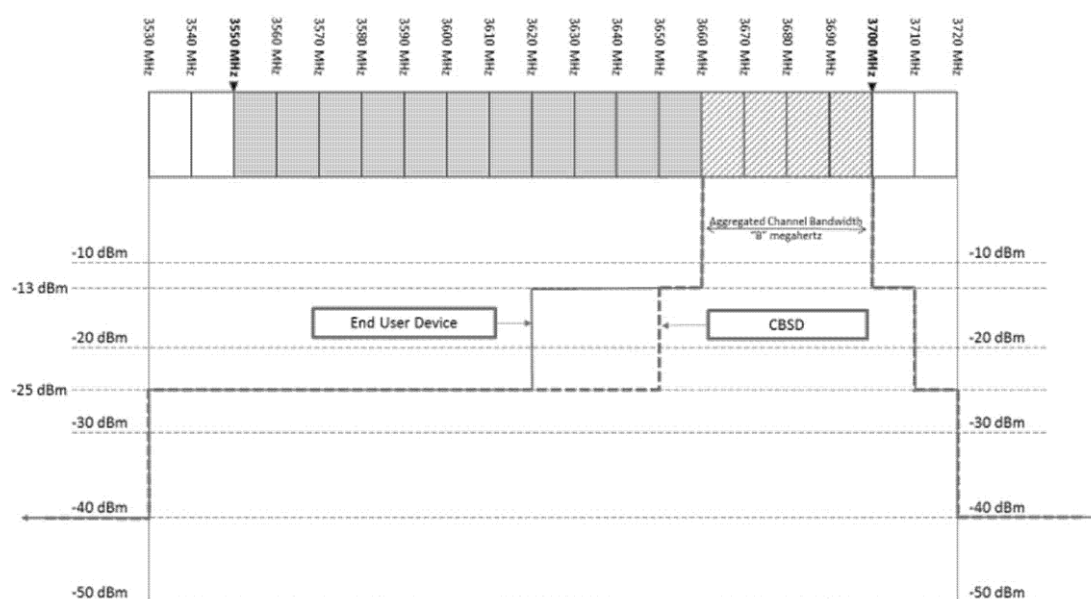
5. Spurious Emissions at Antenna Terminal

5.1. Limit

- §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 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 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.

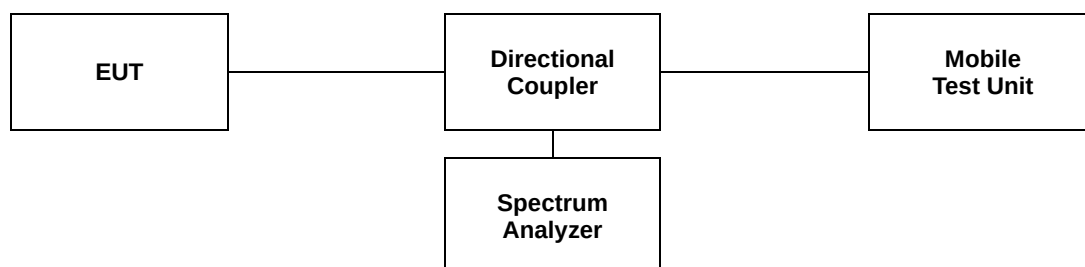
(ii) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by a CBSD to End User Devices, the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dB 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 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 dB m/MHz, and the conducted power of emissions below 3 530 MHz or above 3 720 MHz shall not exceed -40 dB m/MHz.

5.2. 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 40 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.

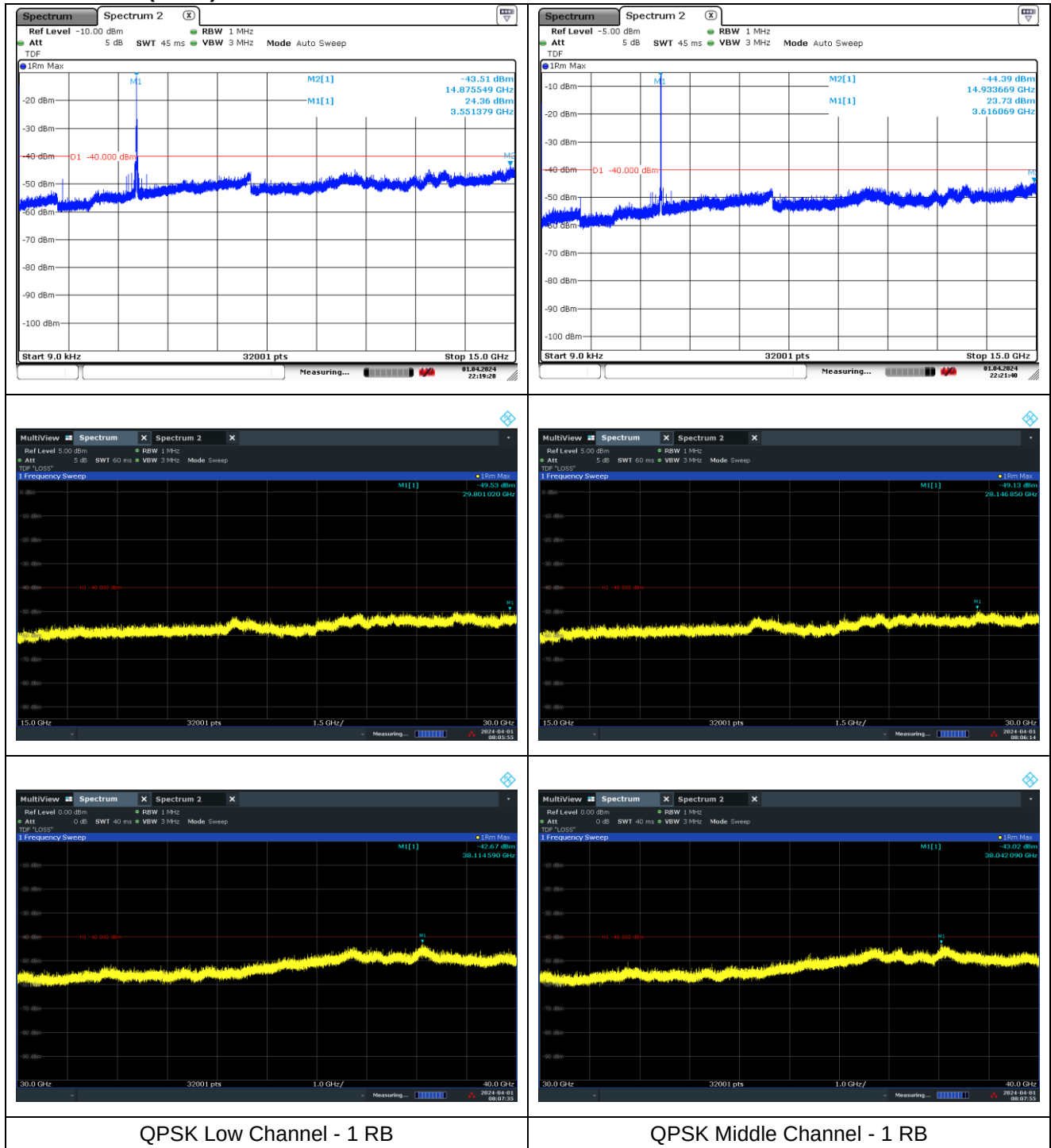
6.3. Test Results

Ambient temperature : $(23 \pm 1) ^\circ\text{C}$
Relative humidity : 47 % R.H.

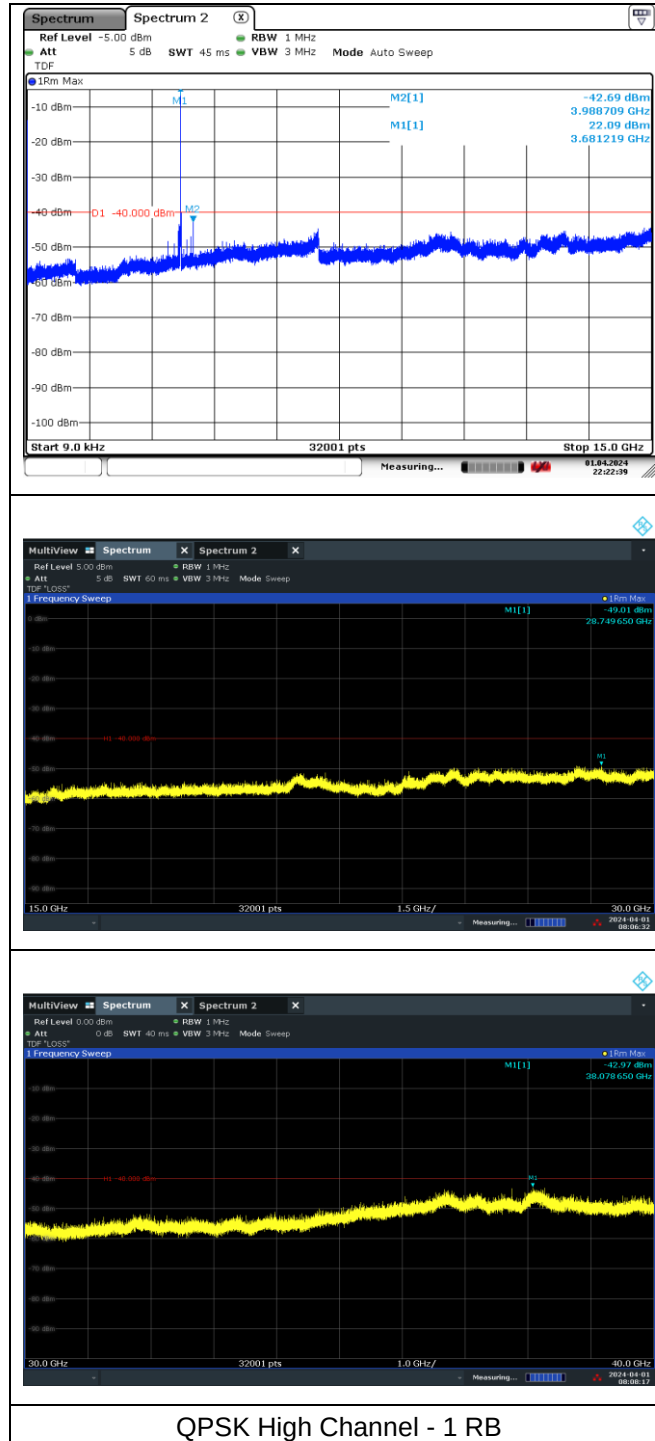
- Test plots

Ant. 2

LTE band 48 (20 MHz)

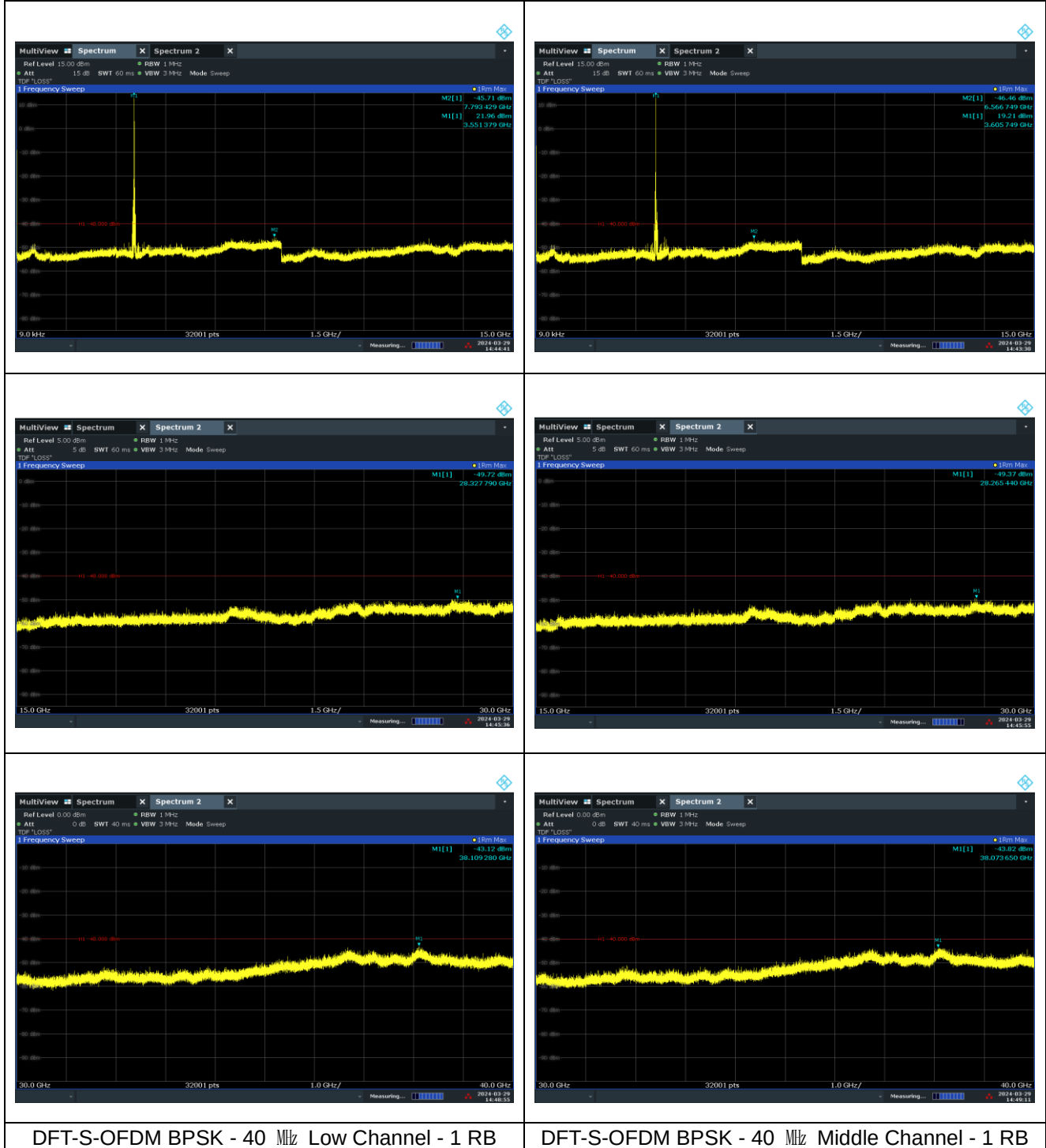


LTE band 48 (20 MHz)



QPSK High Channel - 1 RB

NR band 48

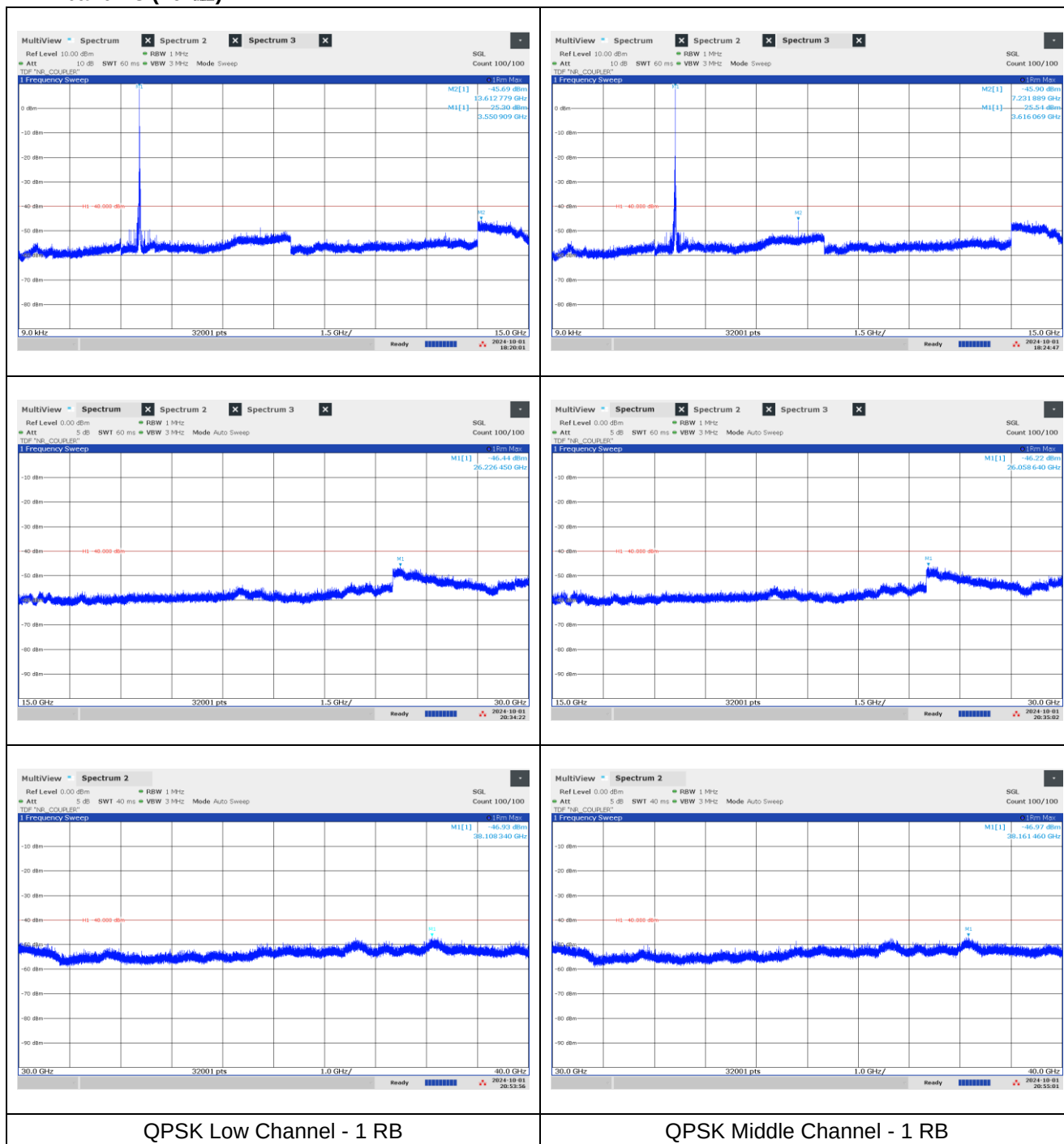


NR band 48

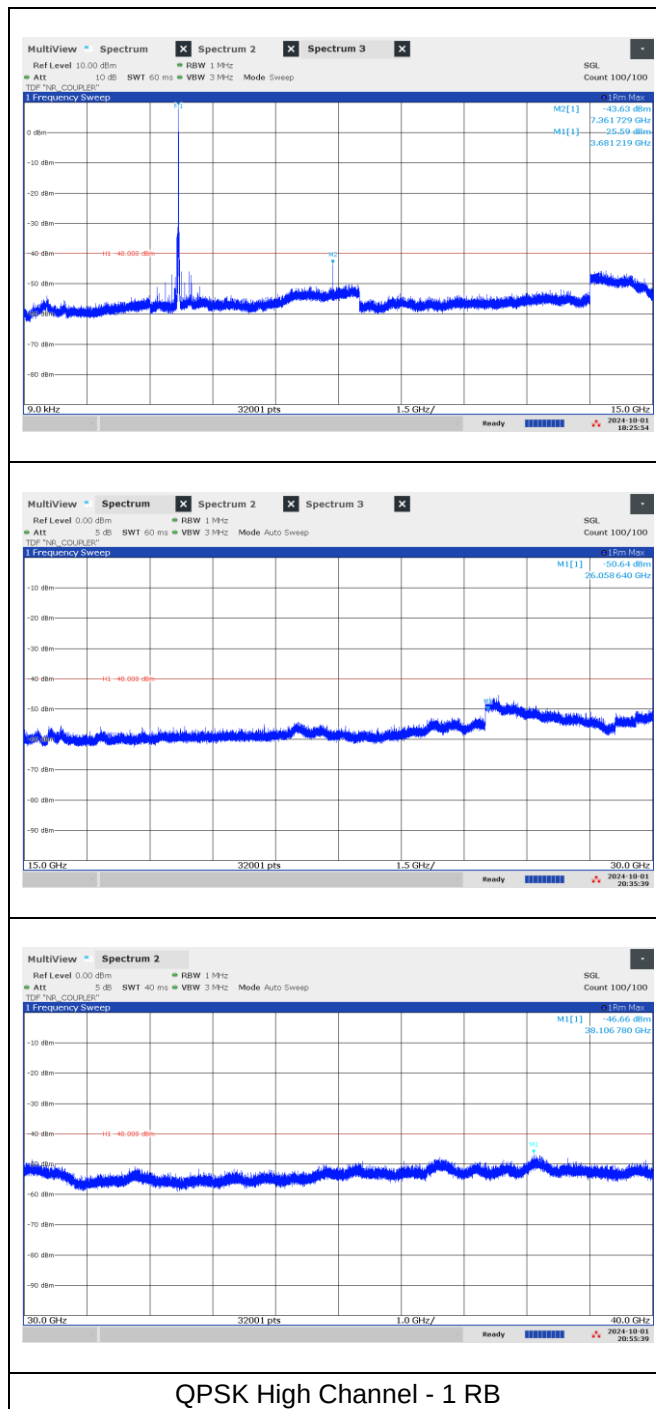


Switching

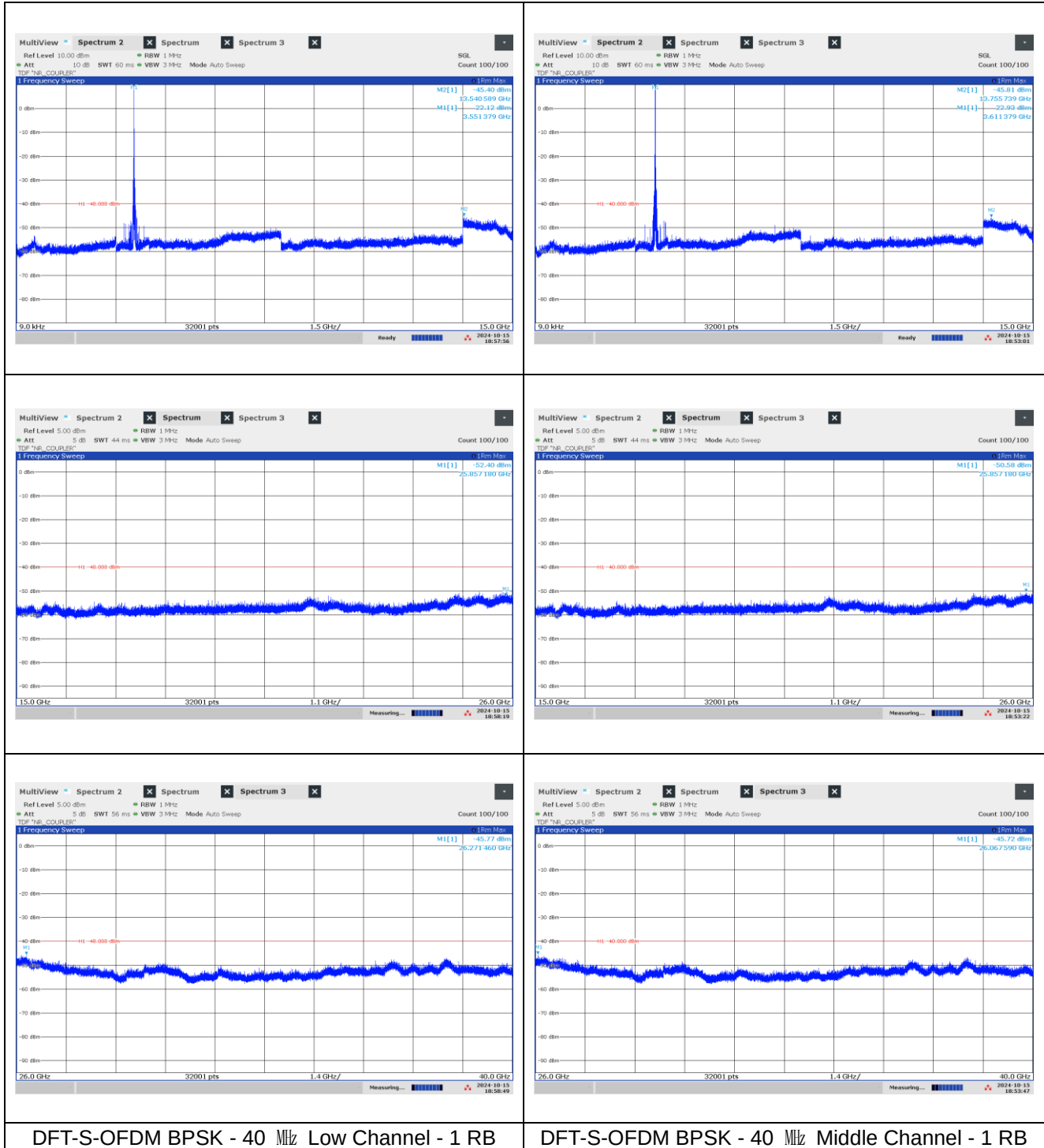
LTE band 48 (20 MHz)



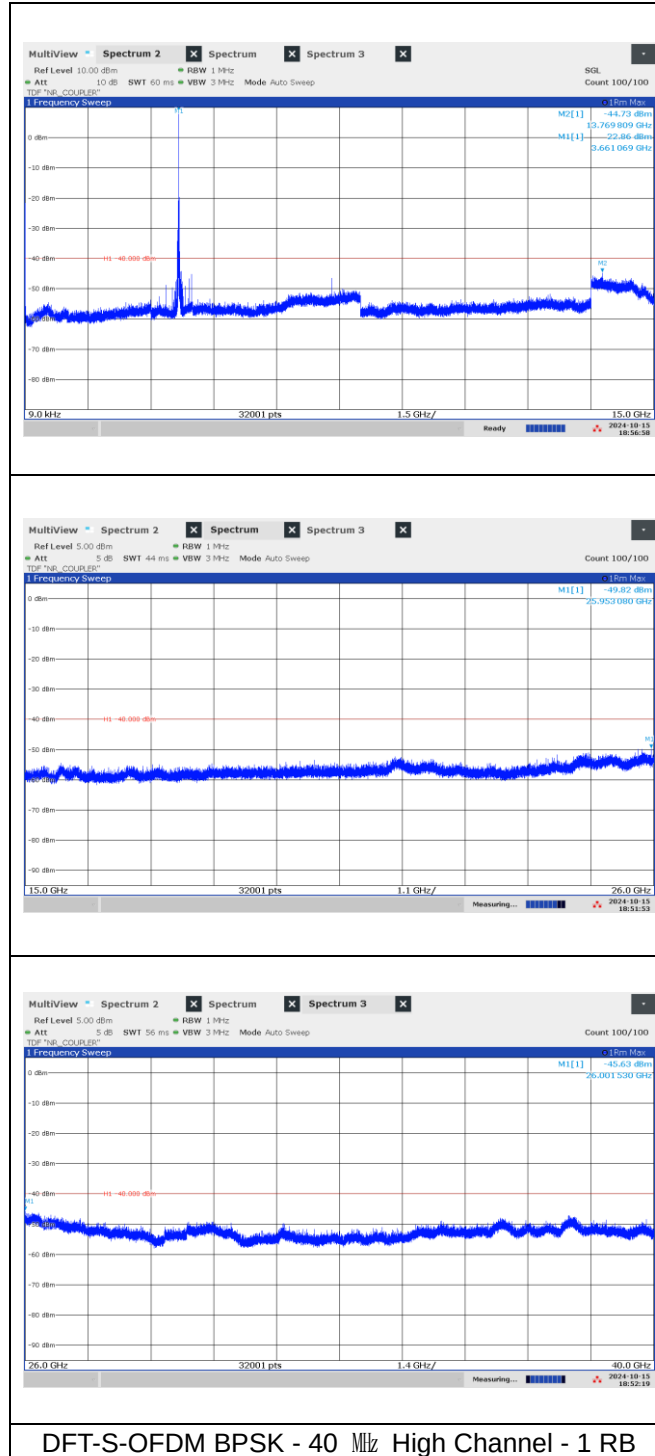
LTE band 48 (20 MHz)



NR band 48



NR band 48



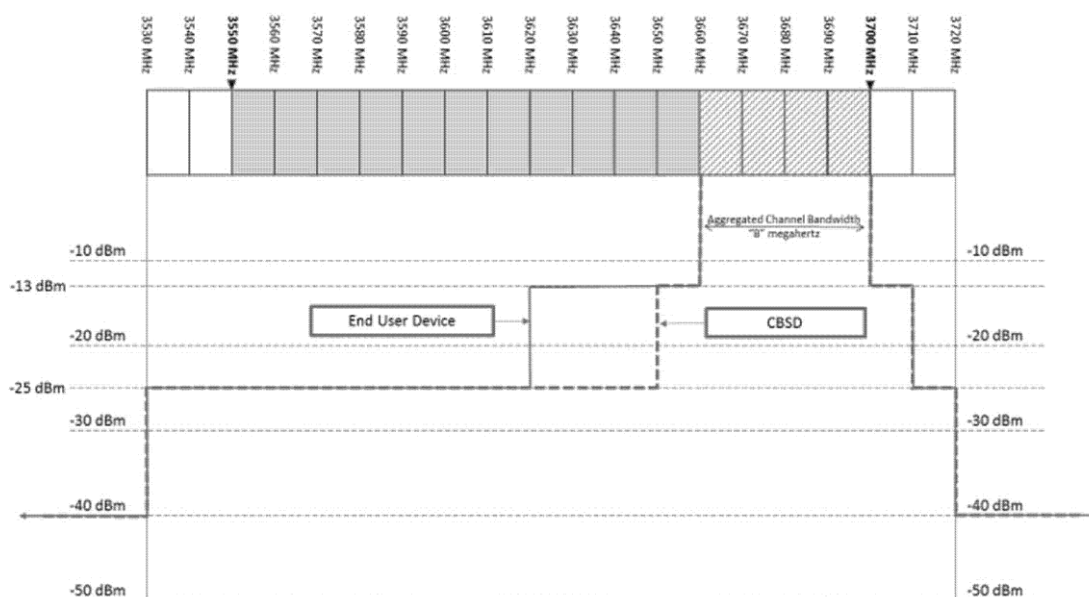
7. Band Edge and Adjacent Channel Leakage Ratio

7.1. Limit

- §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 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 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.

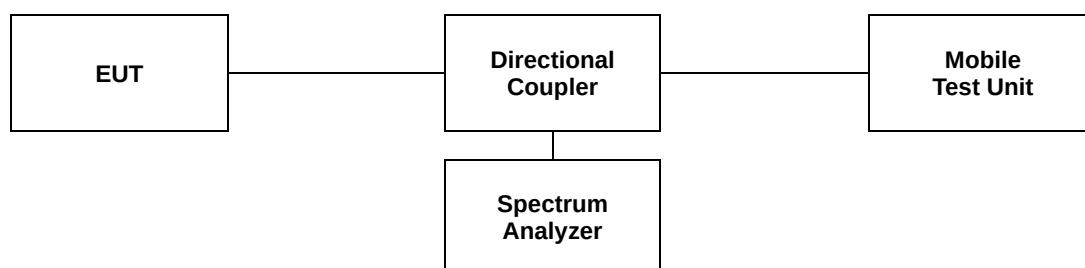
(ii) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by a CBSD to End User Devices, the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dB 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 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 dB m/MHz, and the conducted power of emissions below 3 530 MHz or above 3 720 MHz shall not exceed -40 dB m/MHz.

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

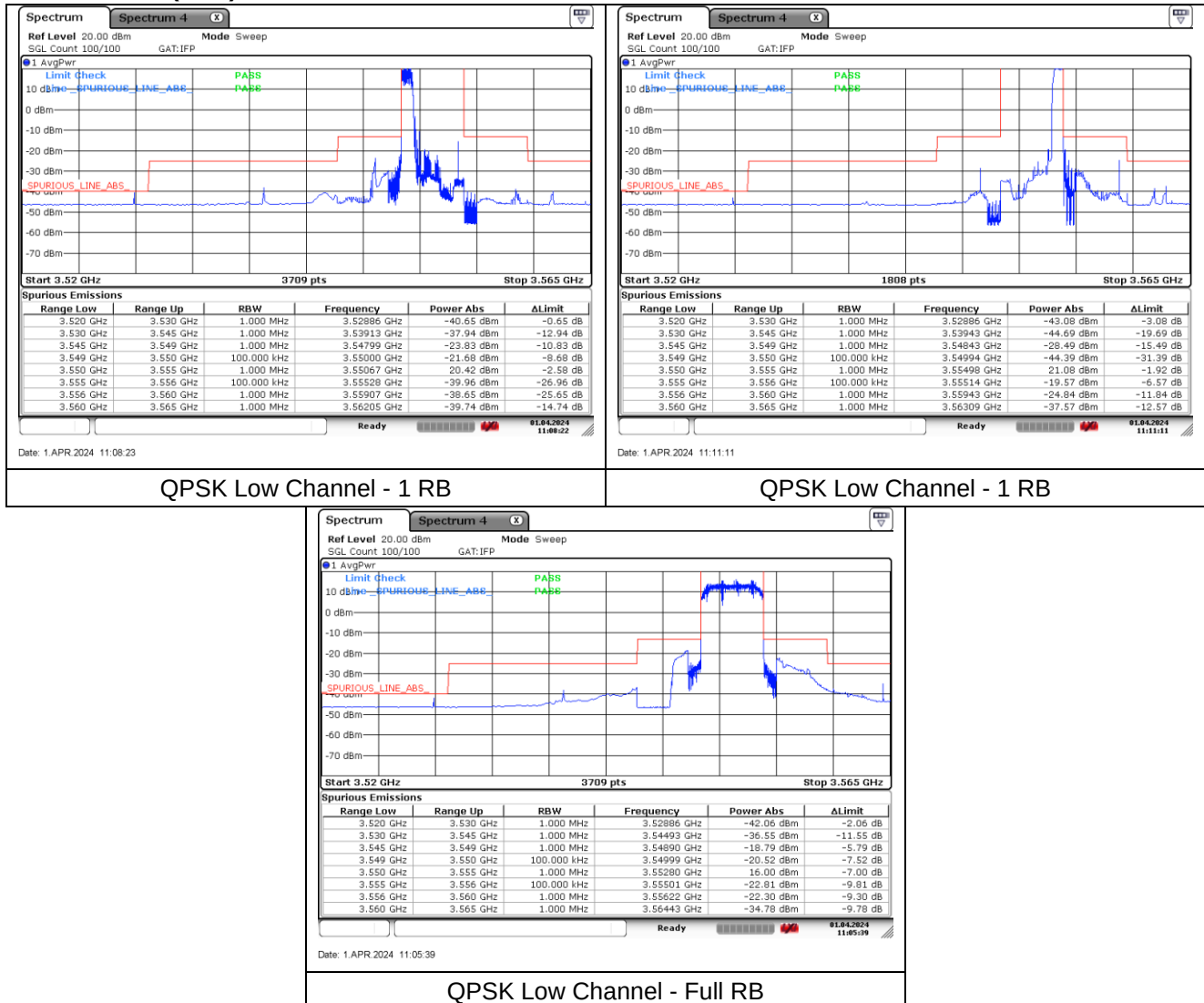
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

- Test plots

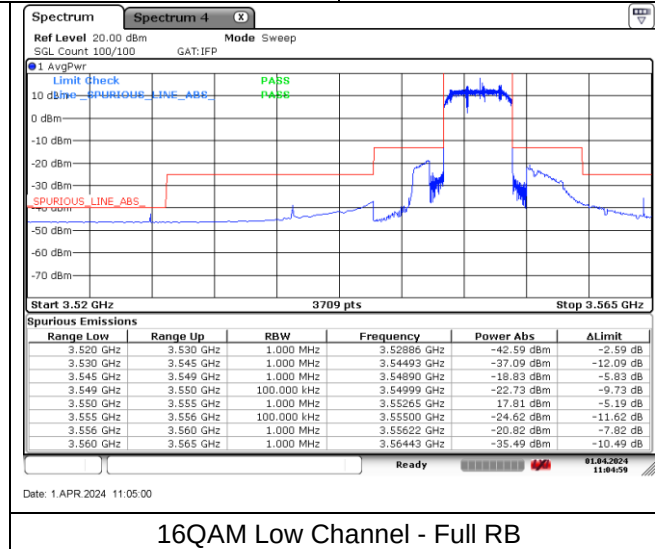
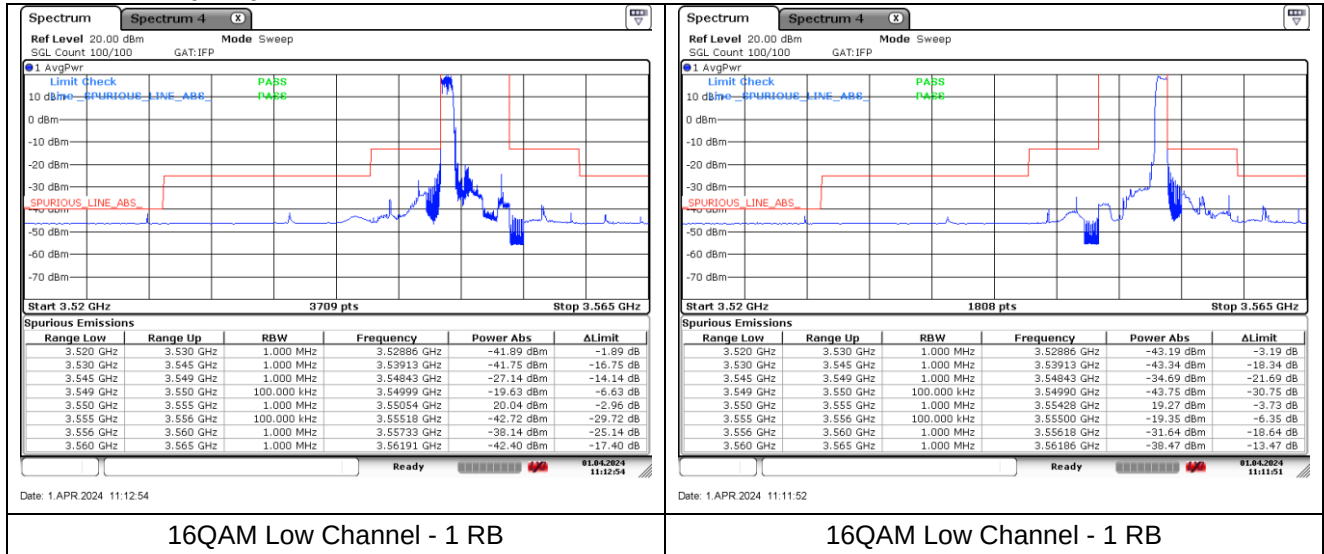
Ant. 2

Band edge

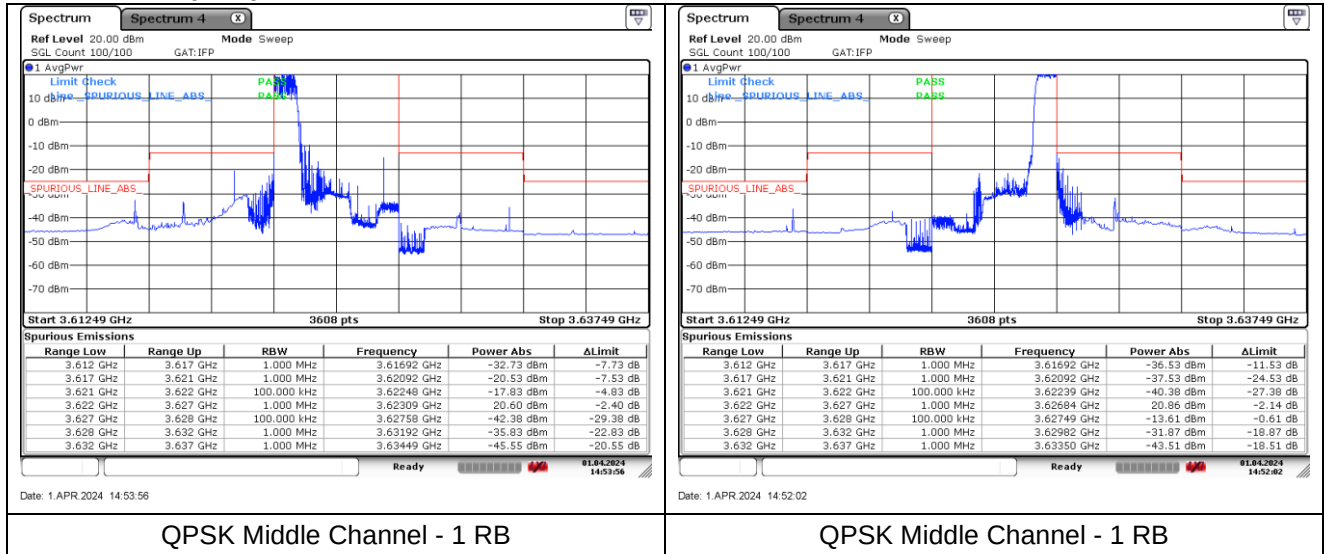
LTE band 48 (5 MHz)



LTE band 48 (5 MHz)

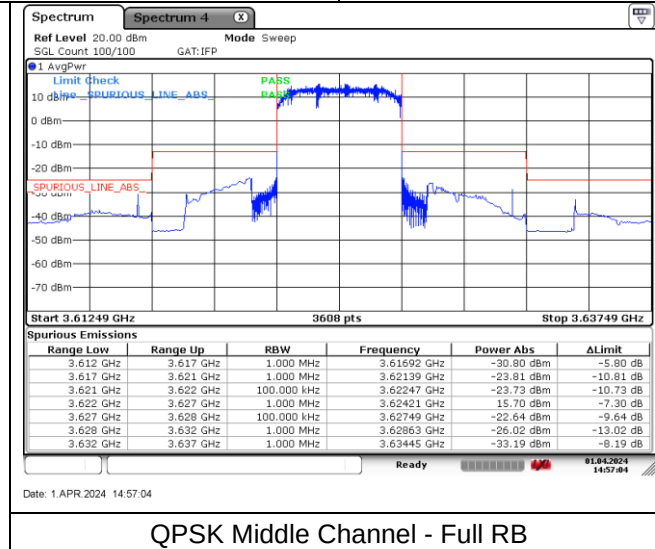


LTE band 48 (5 MHz)



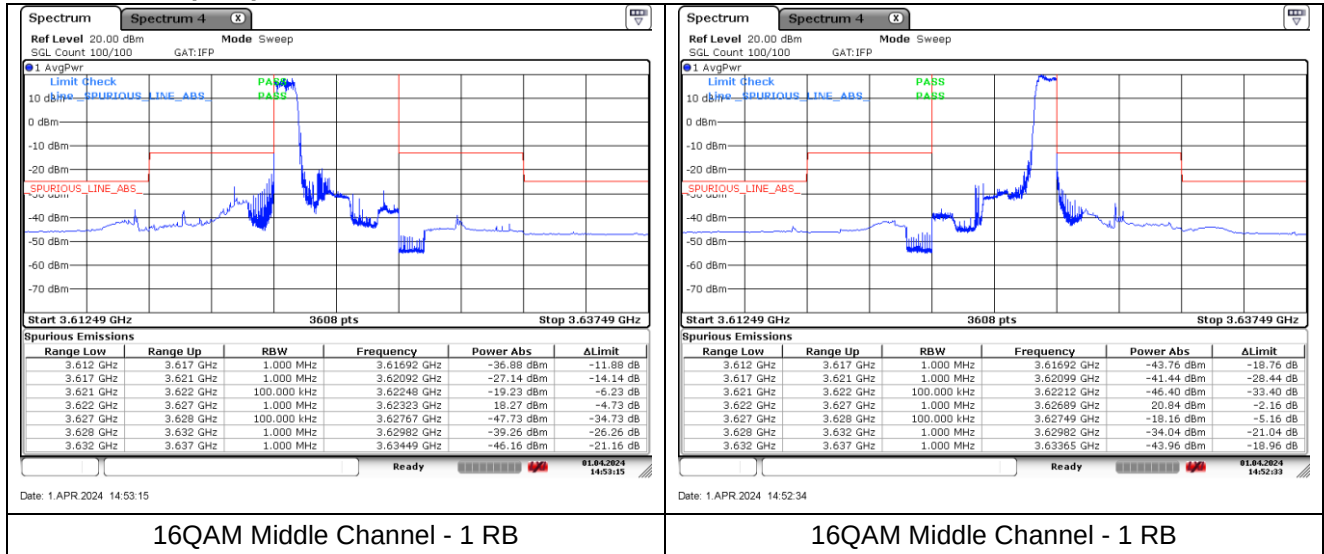
QPSK Middle Channel - 1 RB

QPSK Middle Channel - 1 RB



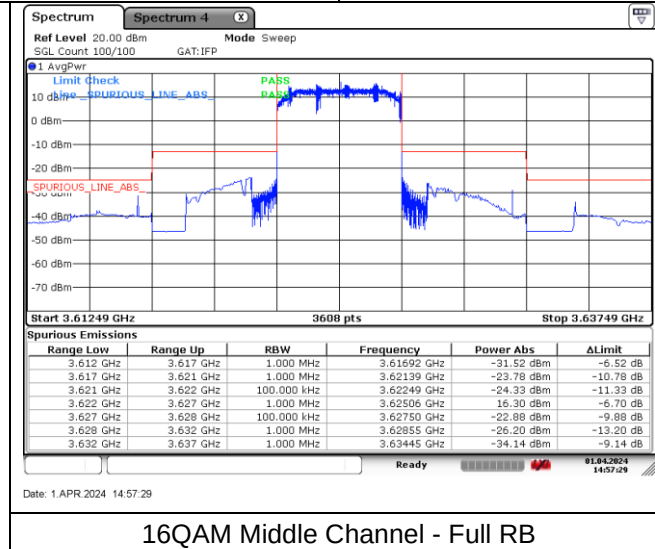
QPSK Middle Channel - Full RB

LTE band 48 (5 MHz)



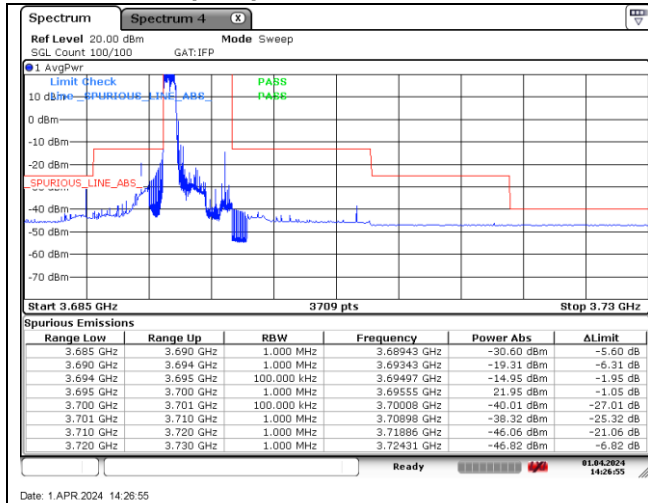
16QAM Middle Channel - 1 RB

16QAM Middle Channel - 1 RB

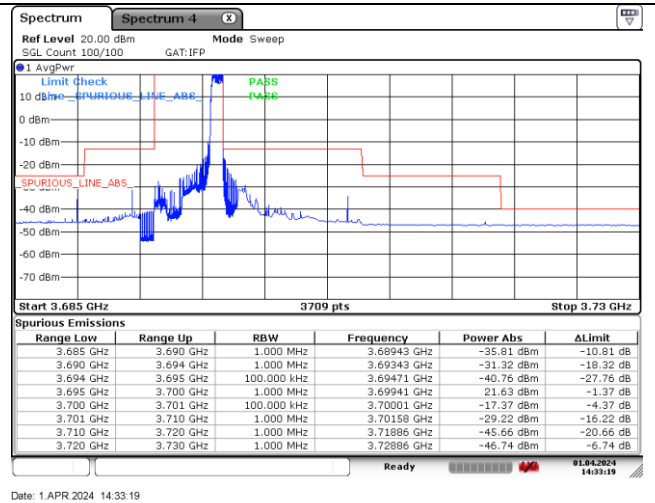


16QAM Middle Channel - Full RB

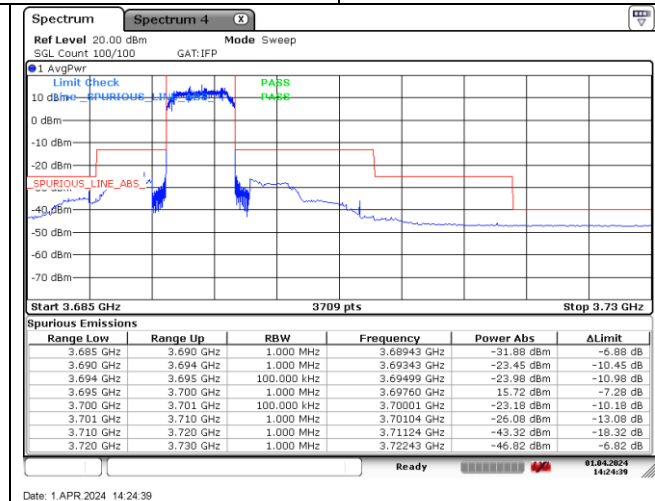
LTE band 48 (5 MHz)



QPSK High Channel - 1 RB

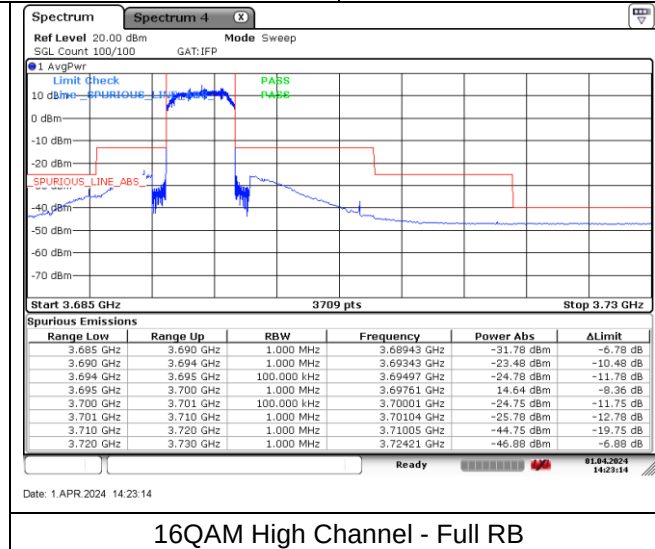
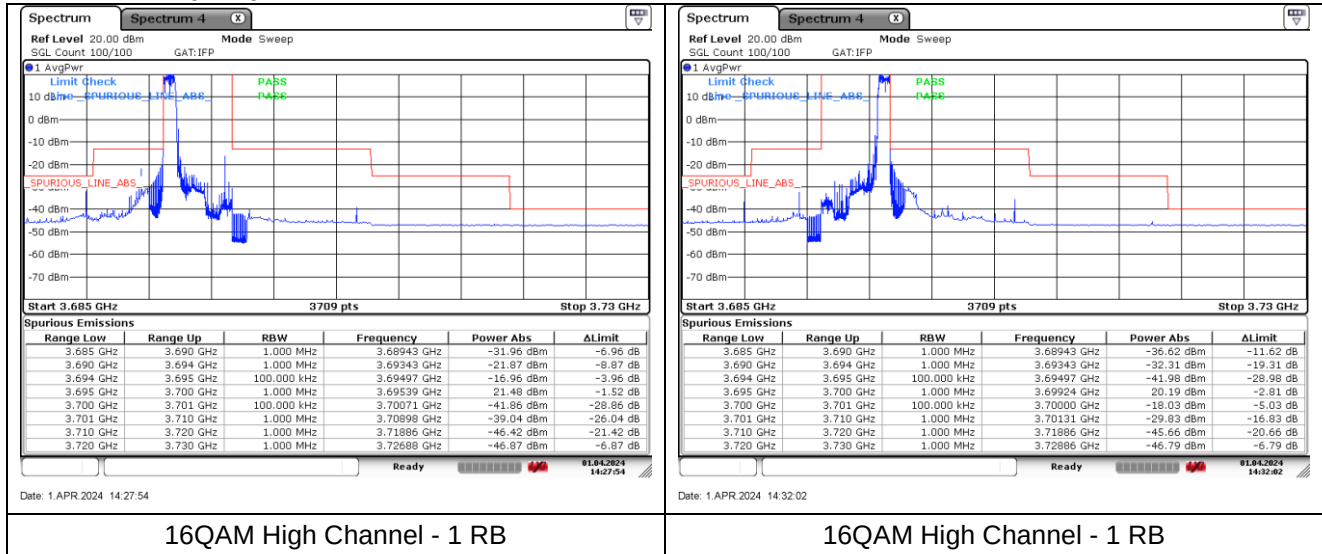


QPSK High Channel - 1 RB



QPSK High Channel - Full RB

LTE band 48 (5 MHz)



LTE band 48 (10 MHz)

