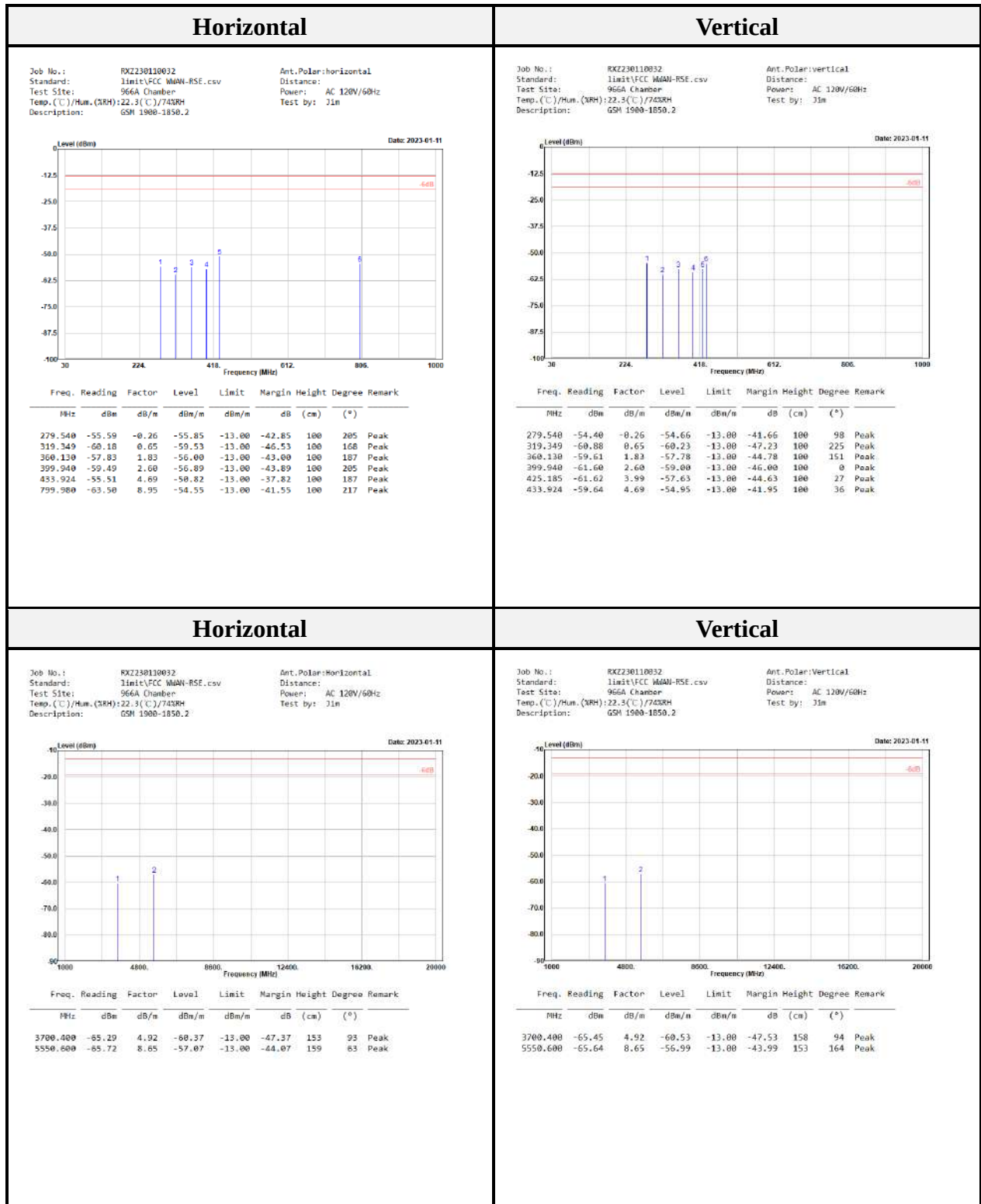
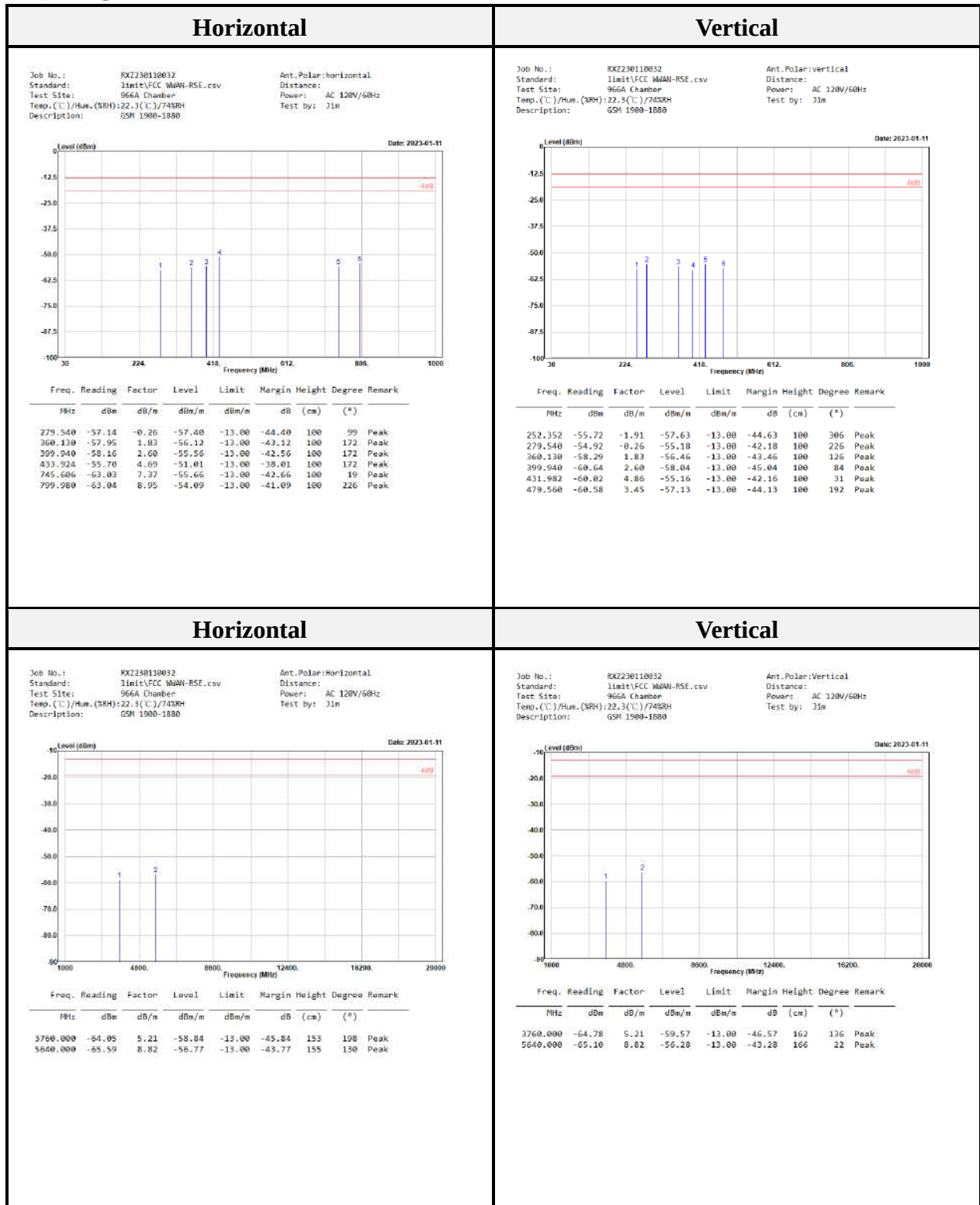


PCS_Band

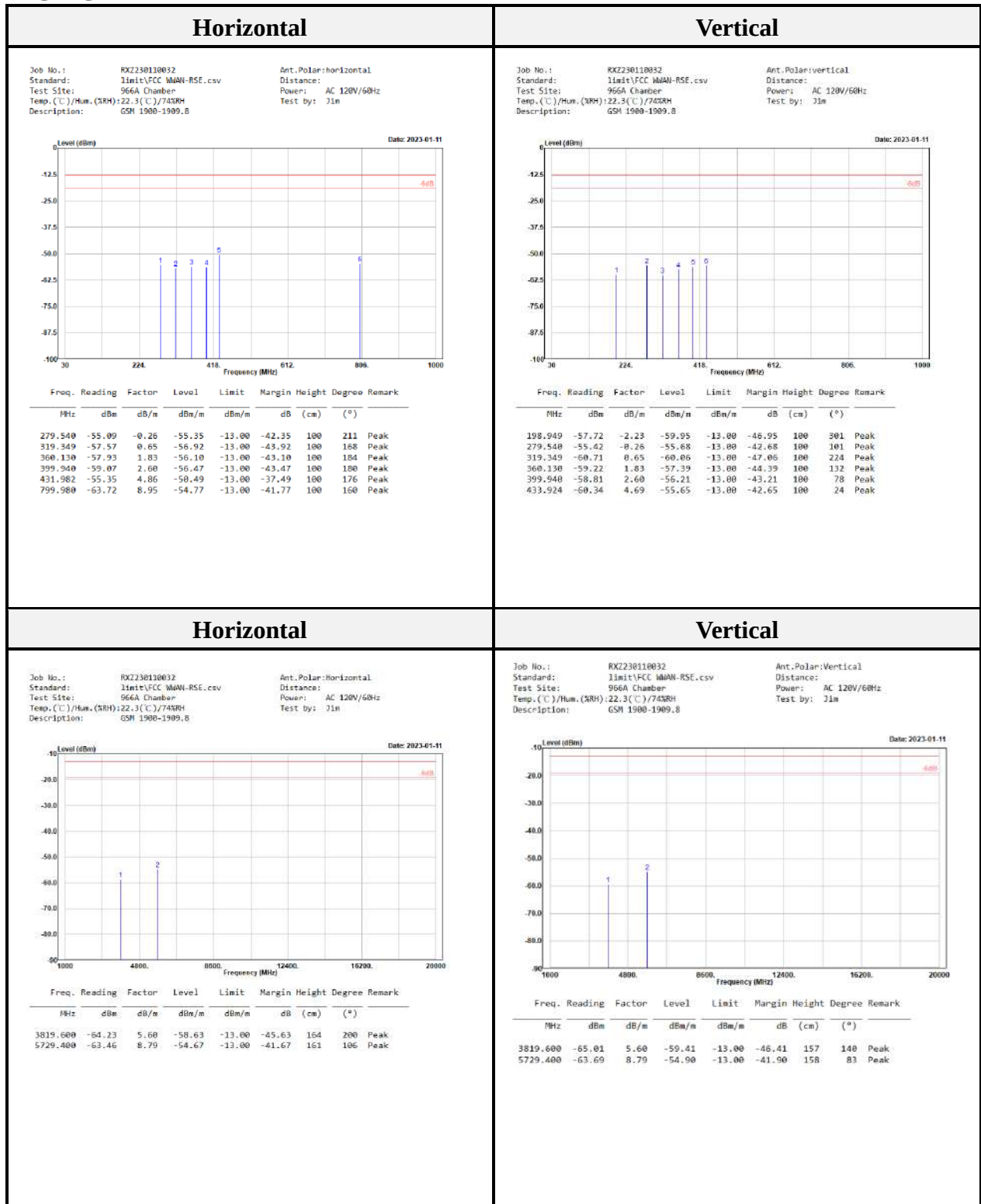
LOW CHANNEL



MIDLE CHANNEL



HIGH CHANNEL



EUT emissions correction = Reading

Level = Level + Factor (Antenna Factor + Cable Loss – Amplifier Gain.)

Margin = Level – Limit.

14.FCC§22.917(a) & §24.238(a) & §27.53 – Band Edges

14.1 Applicable Standard

FCC §22.917, § 24.238, § 27.53

IC RSS-130 Issue 2 clause 4.7 RSS-132 Issue 3 clause 5.5 RSS-133 Issue 6 clause 6.5 RSS-139 Issue 3 clause 6.6

14.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

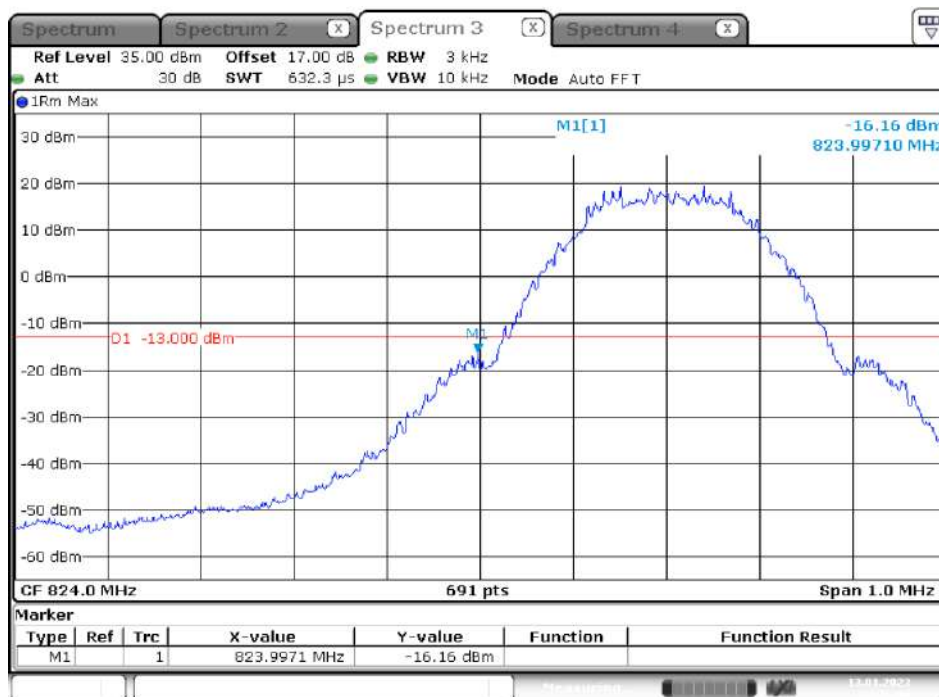
The center of the spectrum analyzer was set to block edge frequency.

14.3 Test Results

Please refer to the following plots

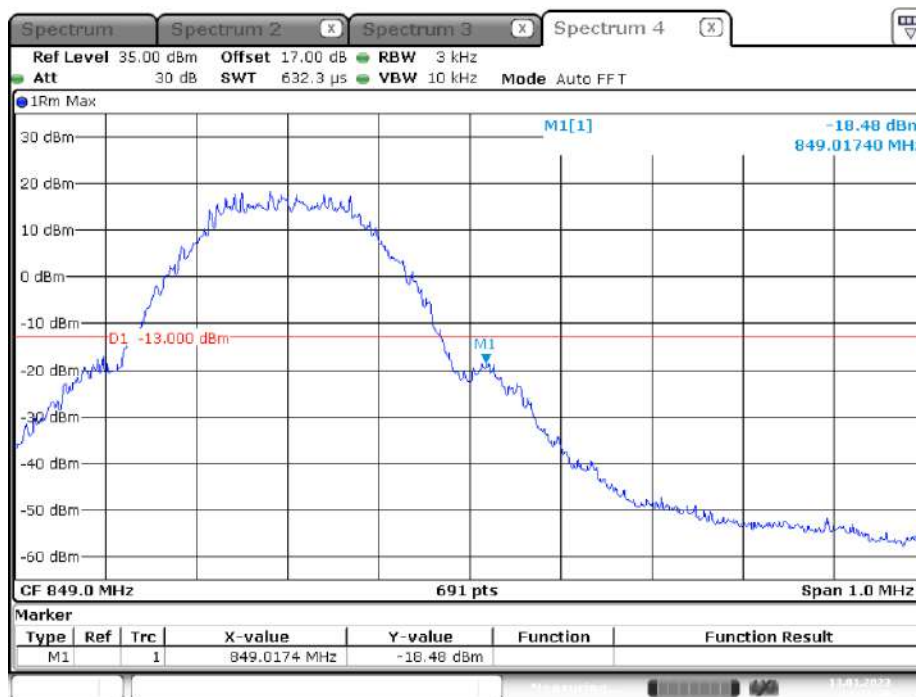
(Worst case is Resource Block & RB offset: Full RB)

Cellular Band GPRS Mode, Left Band Edge



Date: 13.JAN.2023 14:26:08

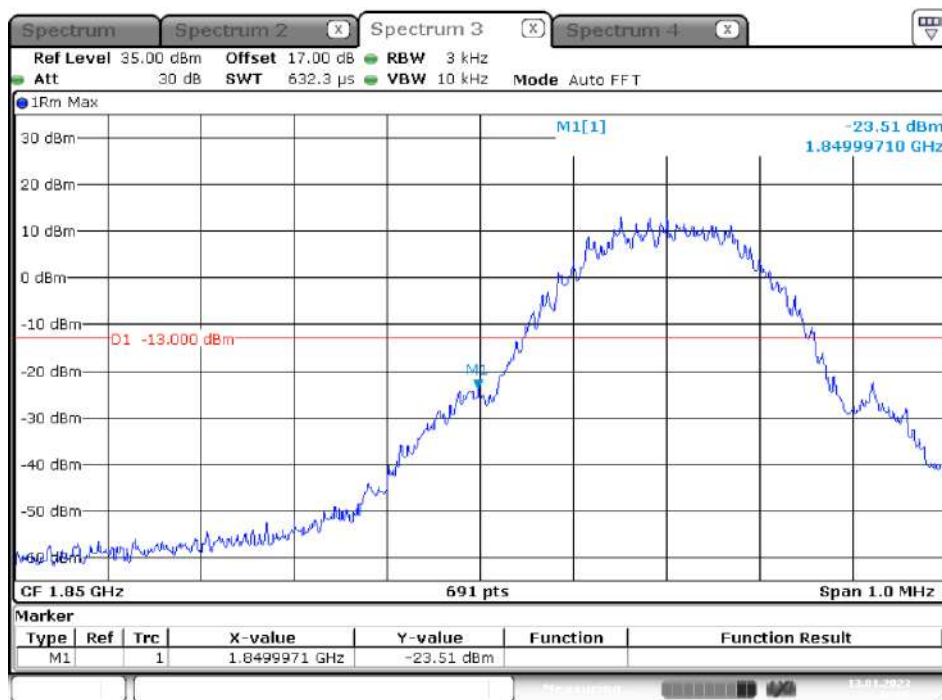
GPRS Mode, Right Band Edge



Date: 13.JAN.2023 14:33:49

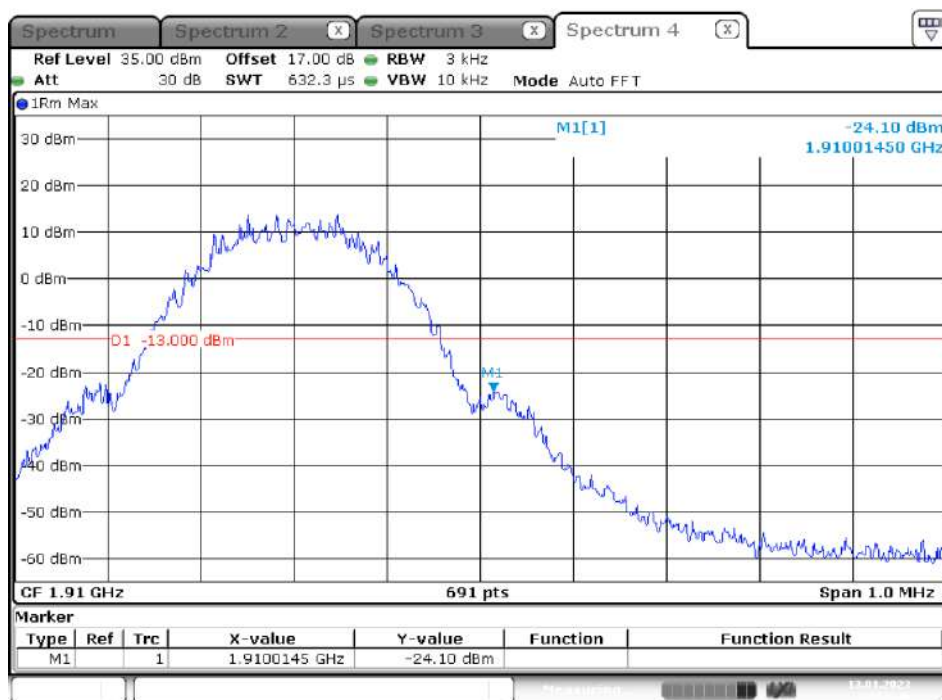
PCS Band

GPRS Mode, Left Band Edge



Date: 13.JAN.2023 14:49:56

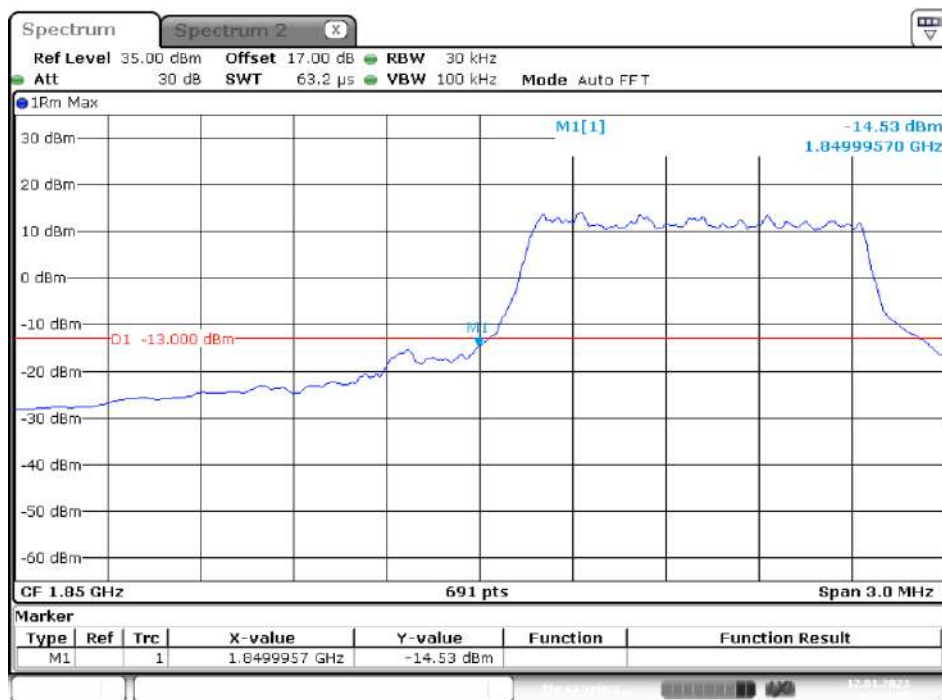
GPRS Mode, Right Band Edge



Date: 13.JAN.2023 14:52:47

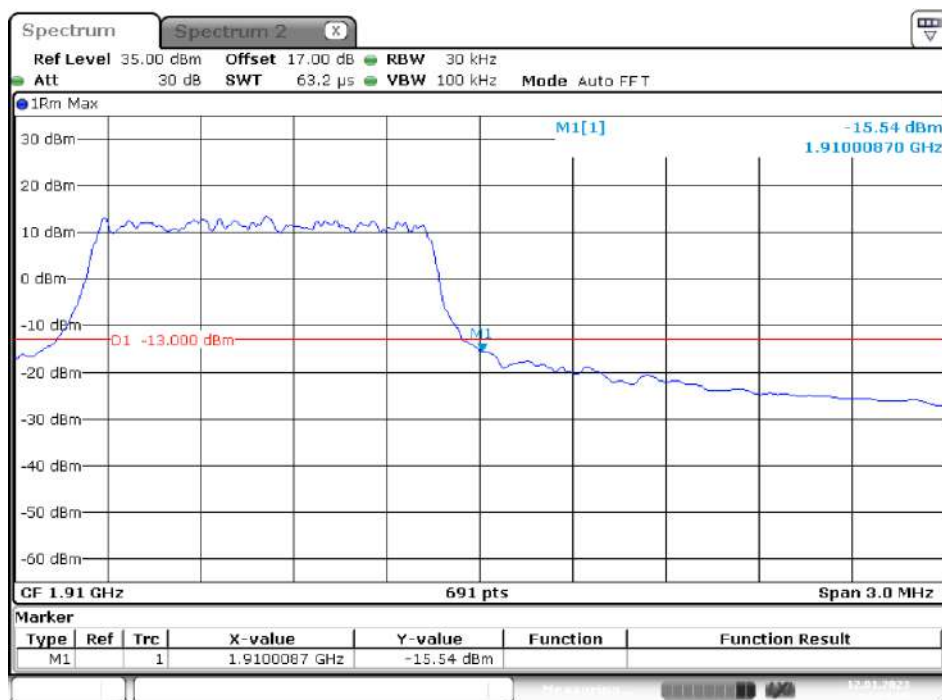
LTE Band 2

QPSK (1.4MHz, RB6) – Left Band Edge

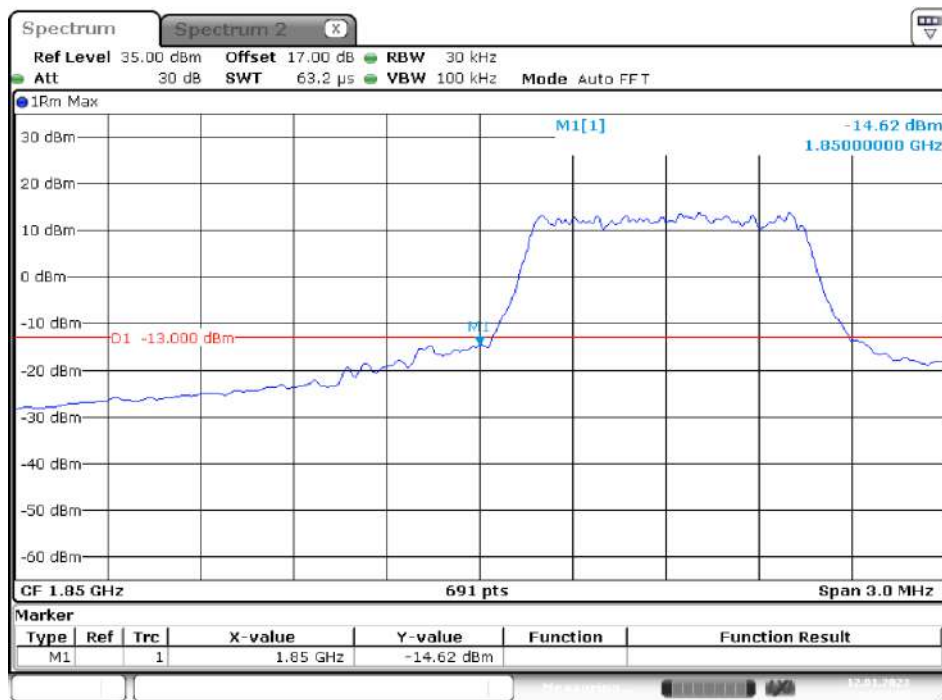


Date: 12.JAN.2023 14:52:27

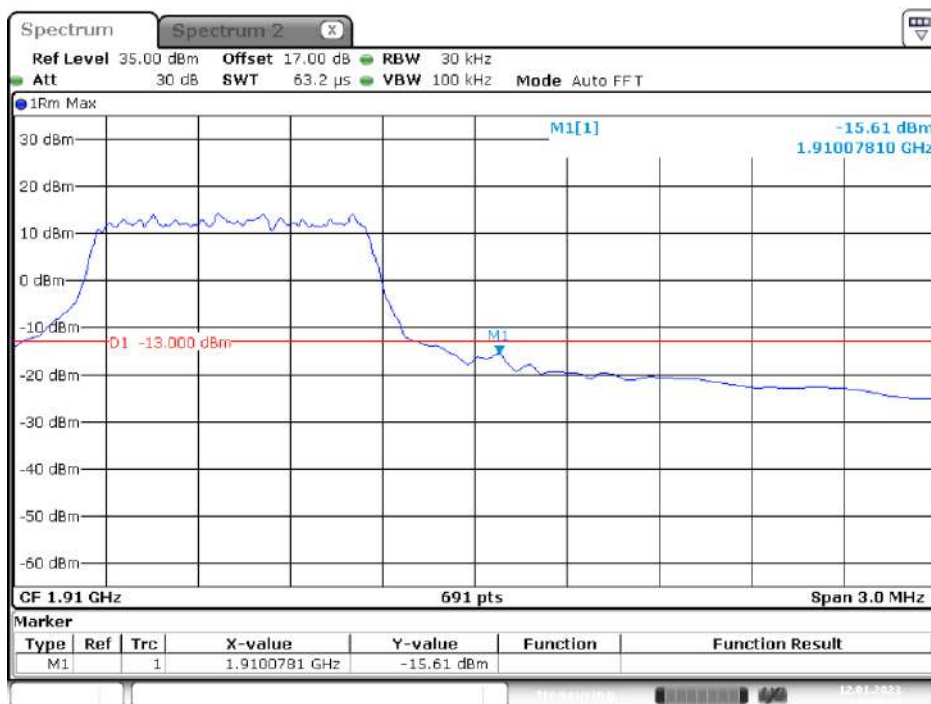
QPSK (1.4MHz, RB6) – Right Band Edge



Date: 12.JAN.2023 14:54:28

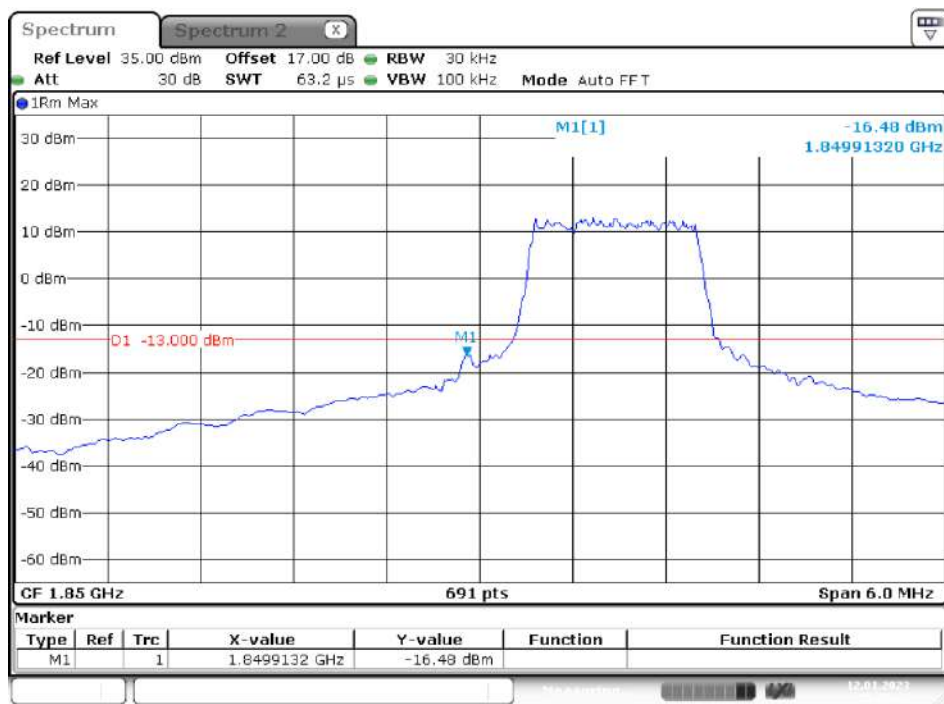
16QAM (1.4MHz, RB5) – Left Band Edge

Date: 12.JAN.2023 14:57:32

16QAM (1.4MHz, RB5) – Right Band Edge

Date: 12.JAN.2023 14:59:19

QPSK (3MHz, RB6) – Left Band Edge



Date: 12.JAN.2023 15:25:13

QPSK (3MHz, RB6) – Right Band Edge



Date: 21.APR.2023 11:56:26

16QAM (3MHz, RB5) – Left Band Edge**16QAM (3MHz, RB5) – Right Band Edge**

QPSK (5MHz, RB6) – Left Band Edge



Date: 12.JAN.2023 15:31:08

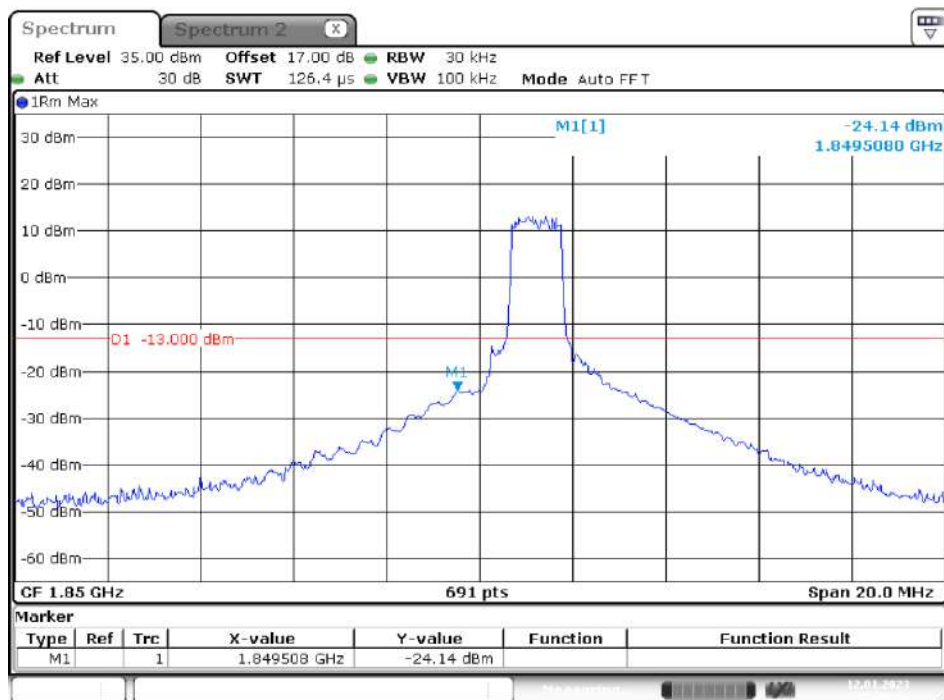
QPSK (5MHz, RB6) – Right Band Edge



Date: 21.APR.2023 12:03:03

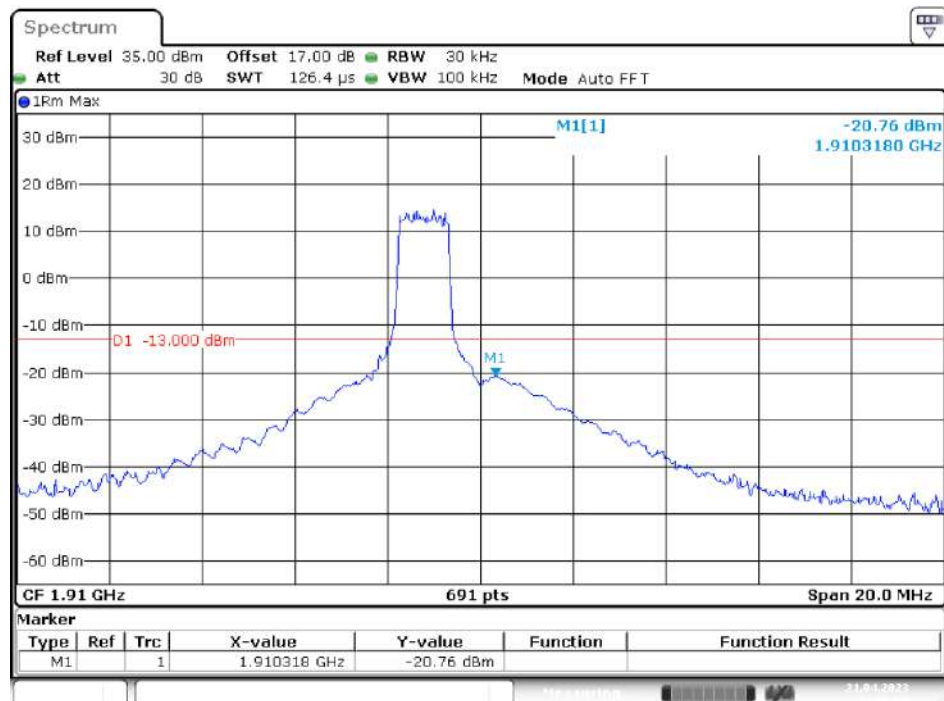
16QAM (5MHz, RB5) – Left Band Edge**16QAM (5MHz, RB5) – Right Band Edge**

QPSK (10MHz, RB6) – Left Band Edge

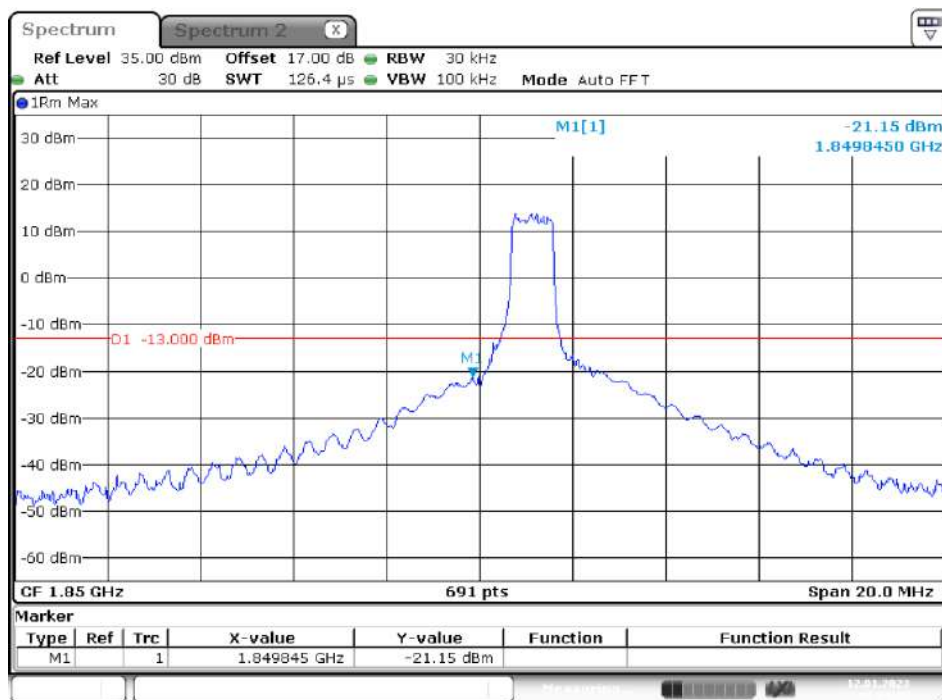


Date: 12.JAN.2023 15:49:54

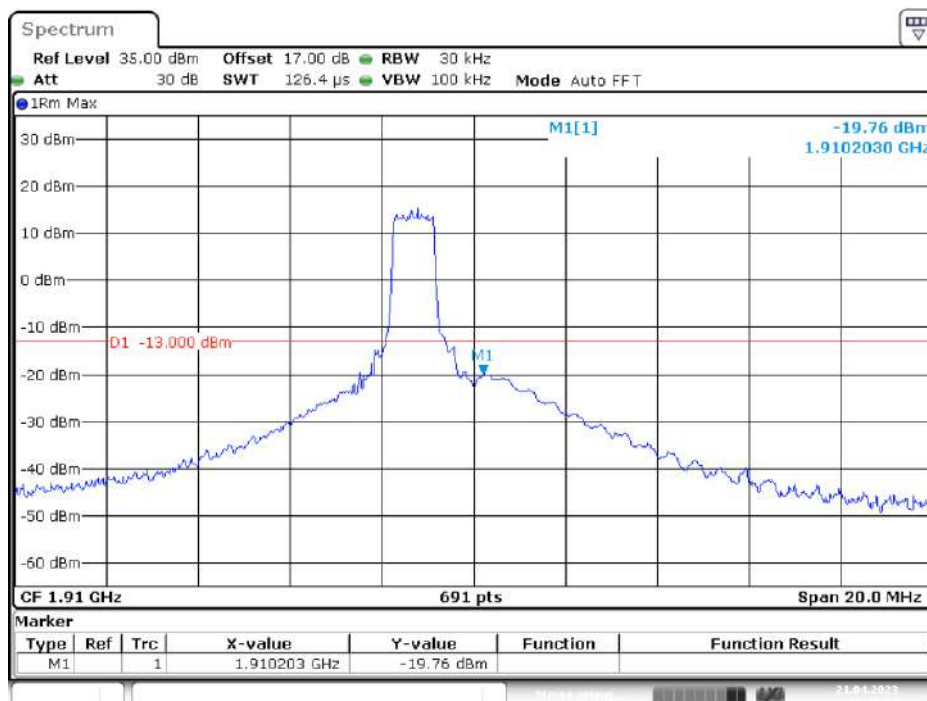
QPSK (10MHz, RB6) – Right Band Edge



Date: 21.APR.2023 12:06:58

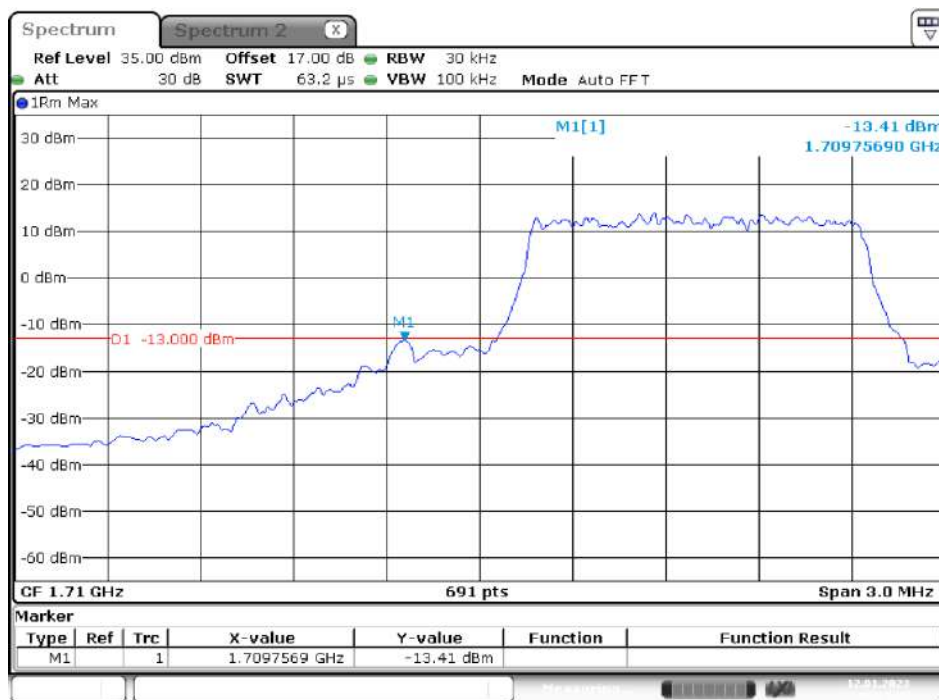
16QAM (10MHz, RB5) – Left Band Edge

Date: 12.JAN.2023 16:03:18

16QAM (10MHz, RB5) – Right Band Edge

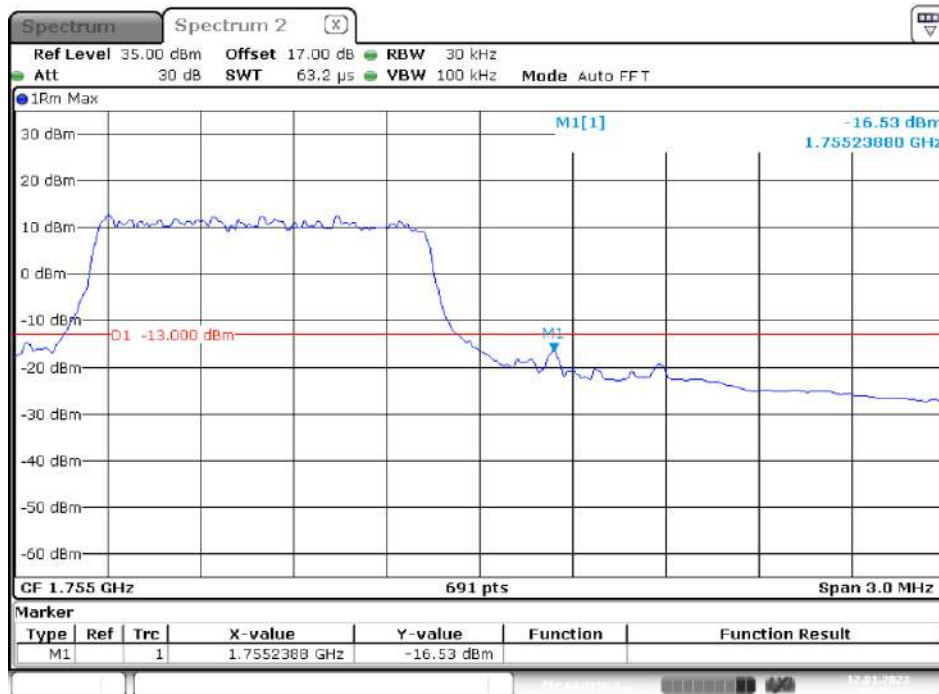
Date: 21.APR.2023 12:07:55

LTE Band 4 QPSK (1.4MHz, RB6) – Left Band Edge



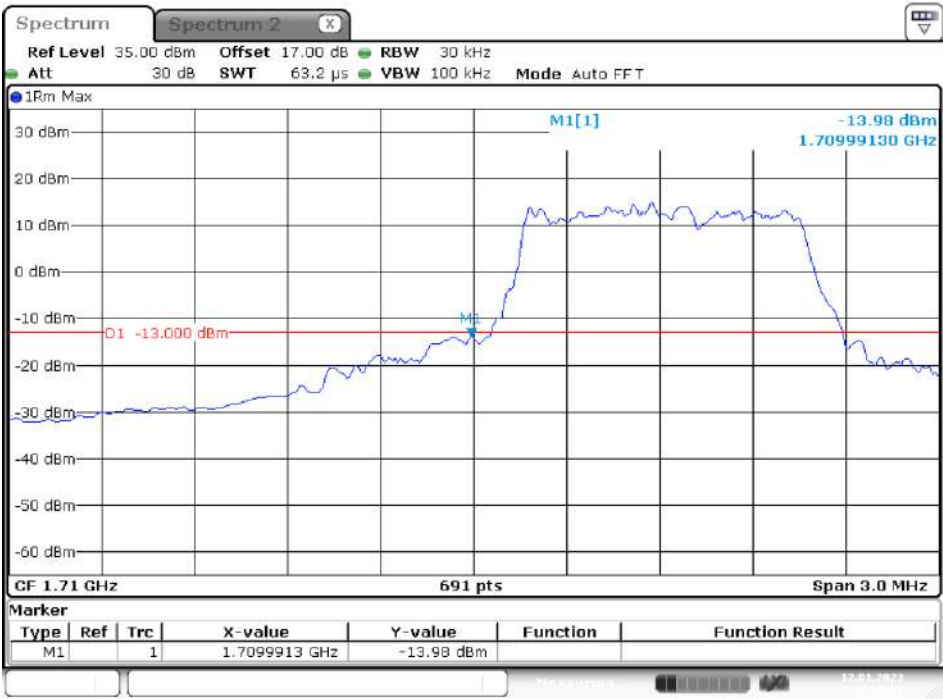
Date: 12.JAN.2023 16:15:43

QPSK (1.4MHz, RB6) – Right Band Edge



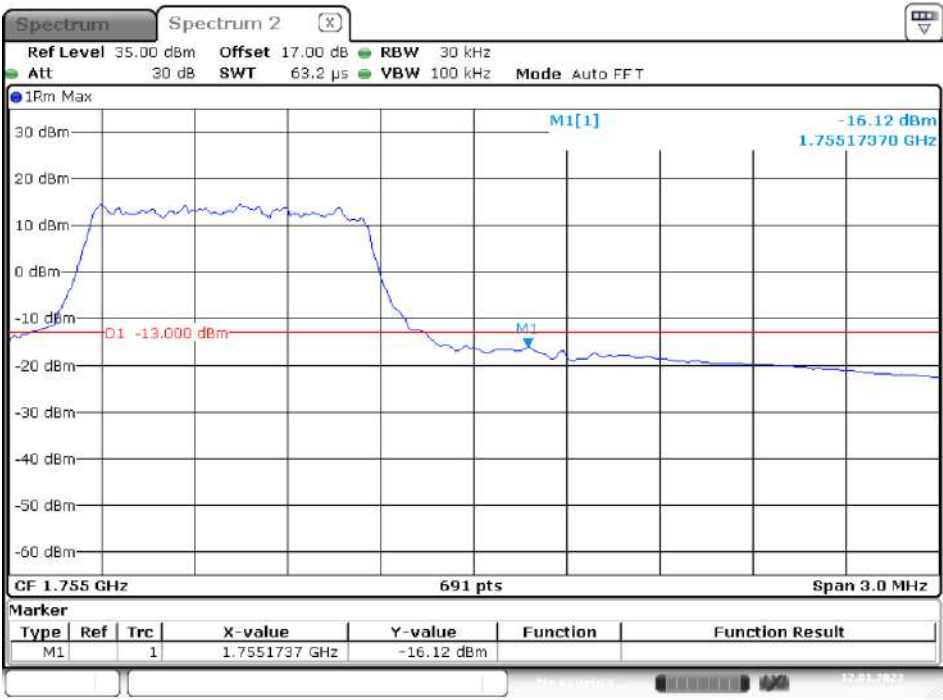
Date: 12.JAN.2023 16:14:33

16QAM (1.4MHz, RB5) – Left Band Edge



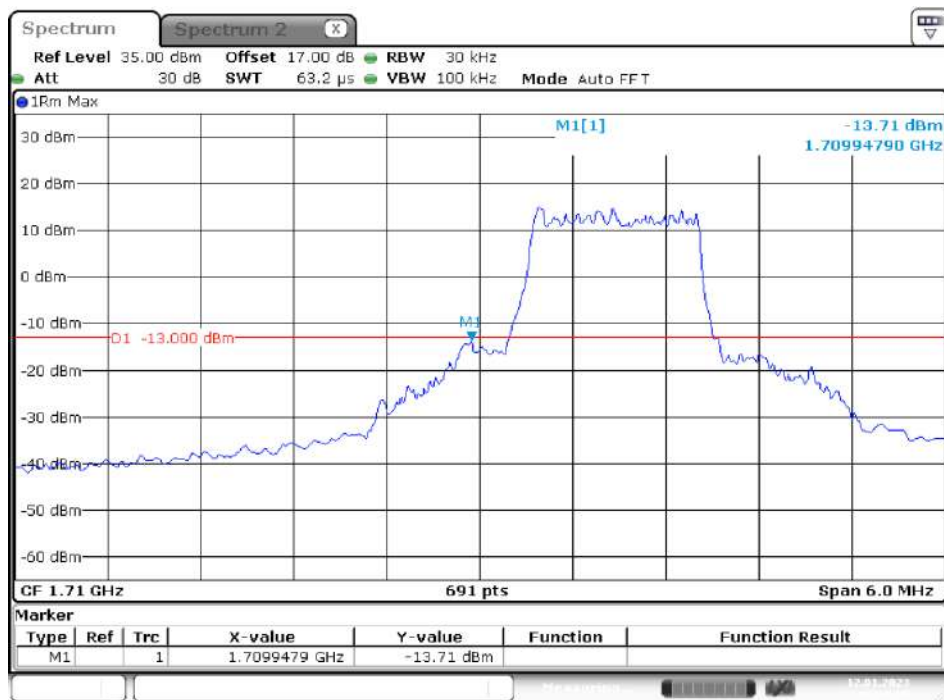
Date: 12.JAN.2023 16:06:23

16QAM (1.4MHz, RB5) – Right Band Edge



Date: 12.JAN.2023 16:12:27

QPSK (3MHz, RB6) – Left Band Edge

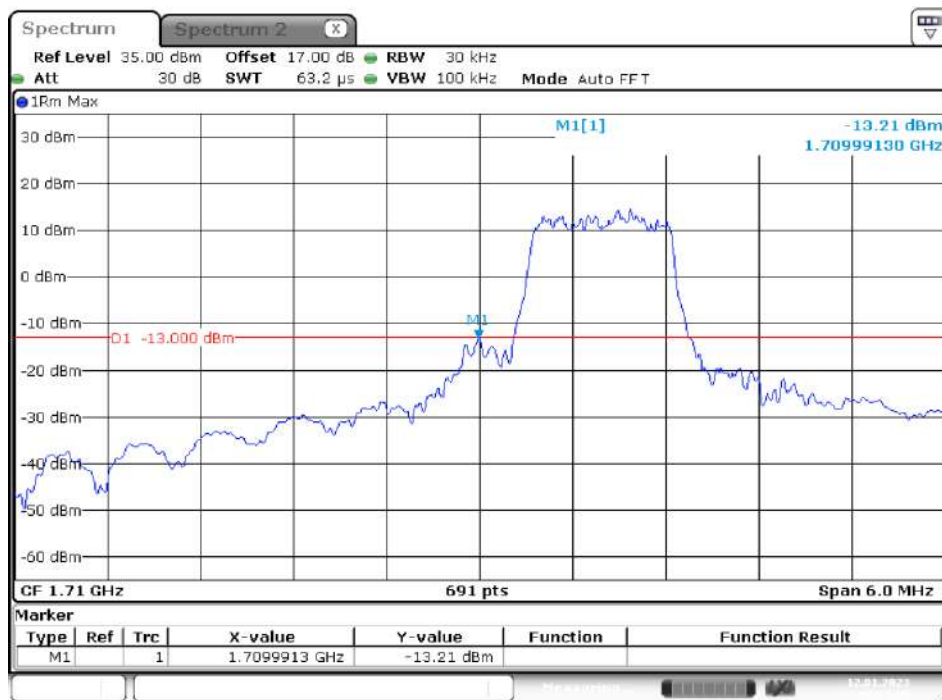


Date: 12.JAN.2023 16:18:39

QPSK (3MHz, RB6) – Right Band Edge



Date: 21.APR.2023 14:08:44

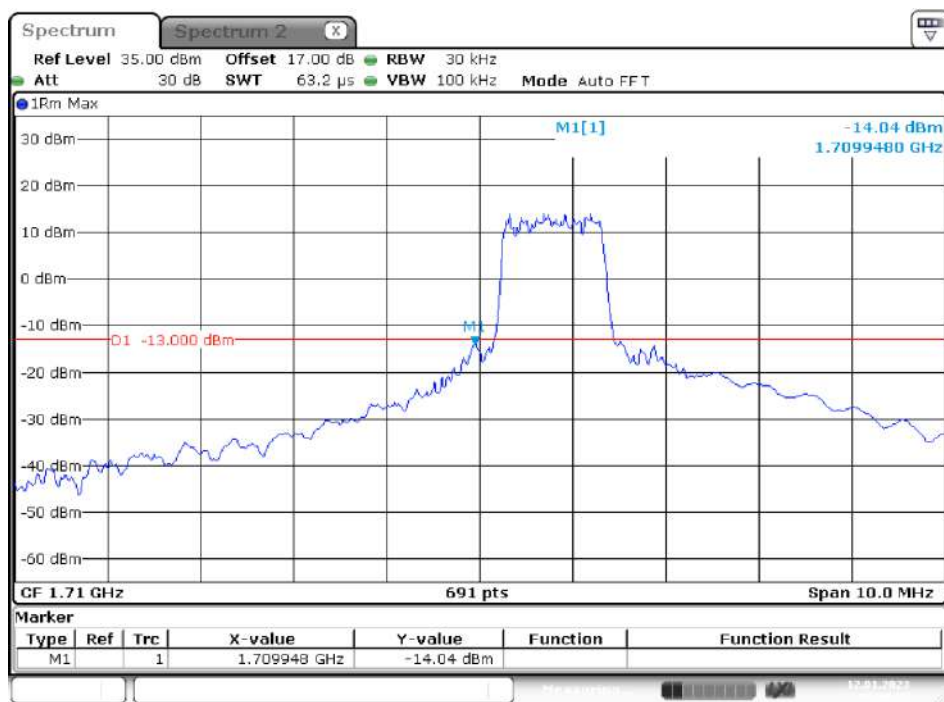
16QAM (3MHz, RB5) – Left Band Edge

Date: 12.JAN.2023 16:21:40

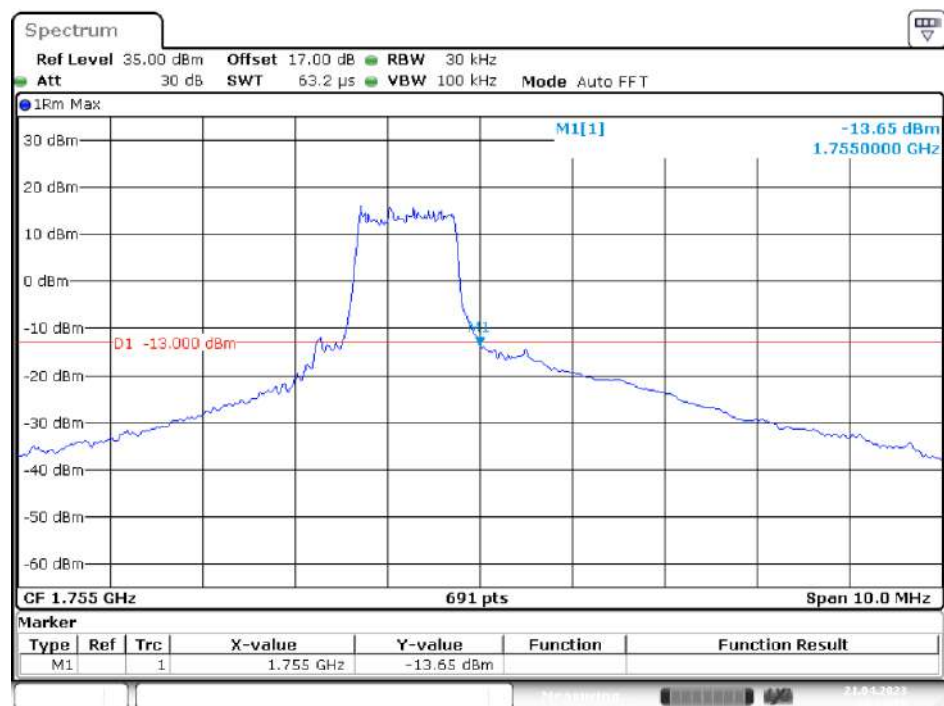
16QAM (3MHz, RB5) – Right Band Edge

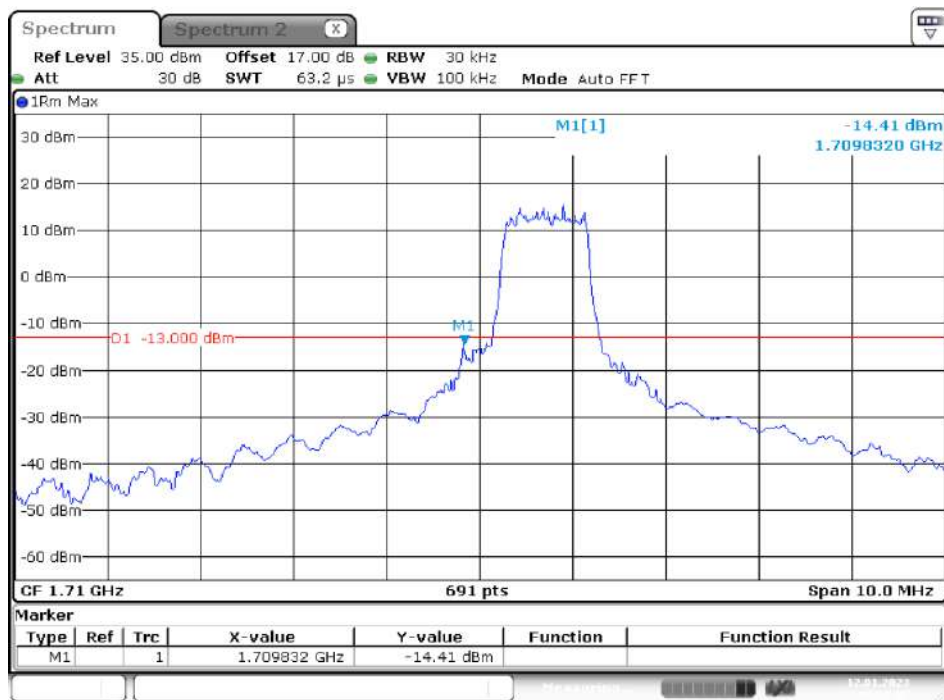
Date: 21.APR.2023 14:09:57

QPSK (5MHz, RB6) – Left Band Edge



QPSK (5MHz, RB6) – Right Band Edge



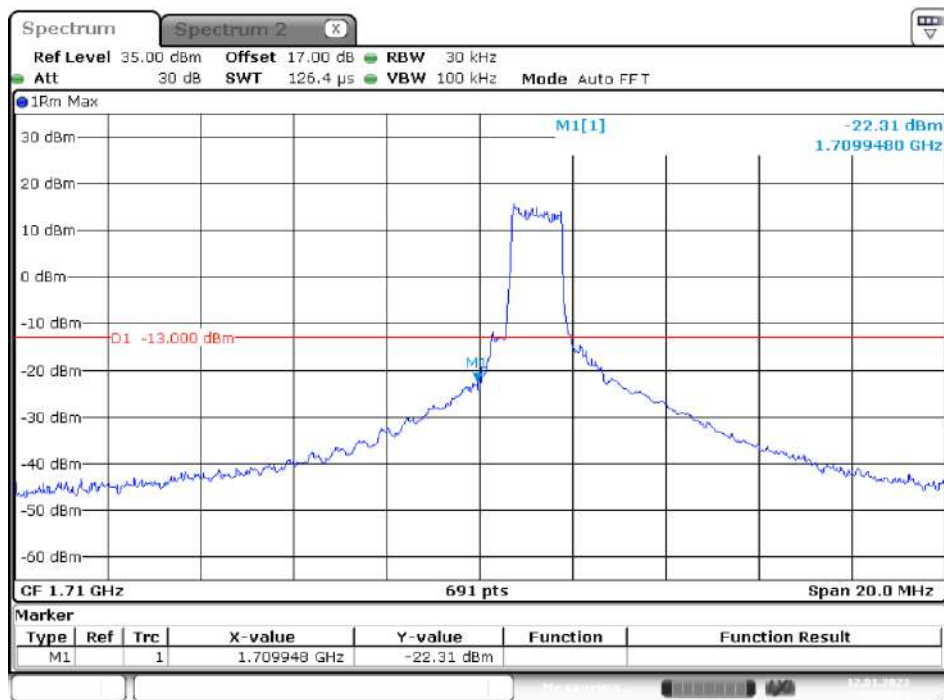
16QAM (5MHz, RB5) – Left Band Edge

Date: 12.JAN.2023 16:25:08

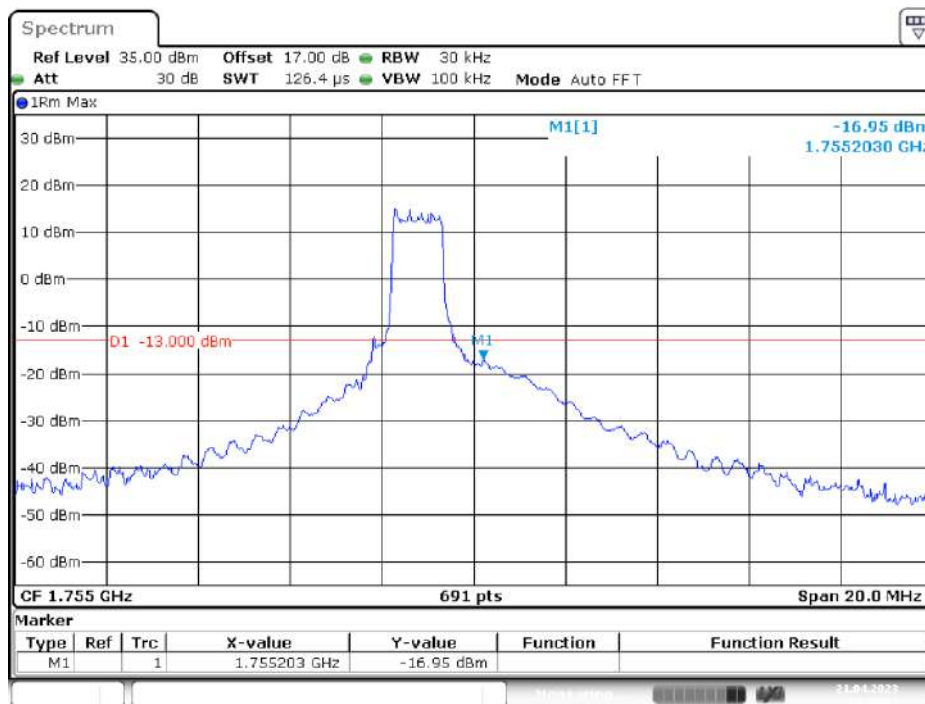
16QAM (5MHz, RB5) – Right Band Edge

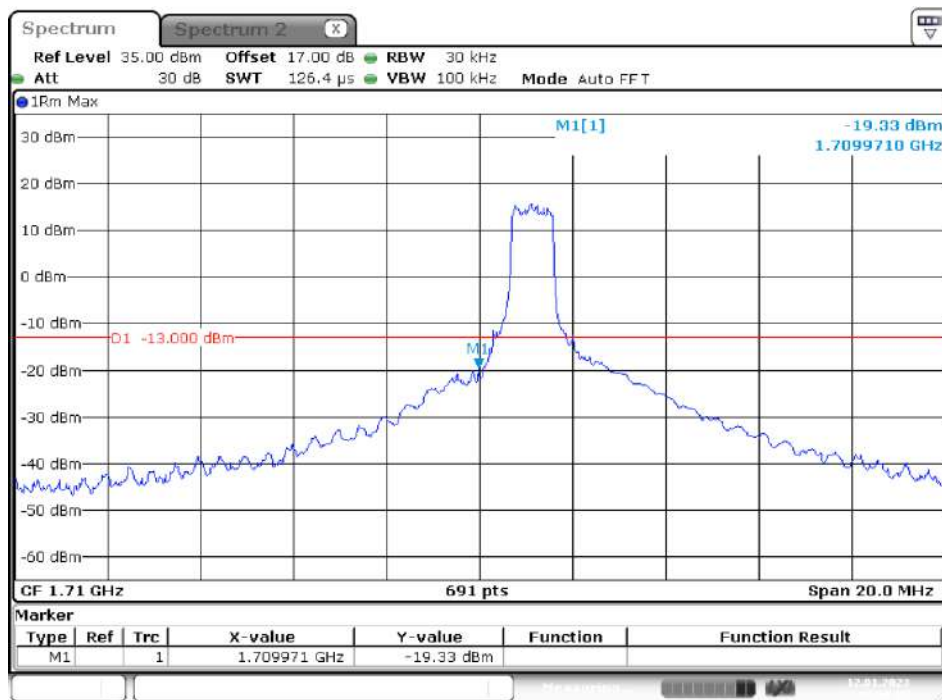
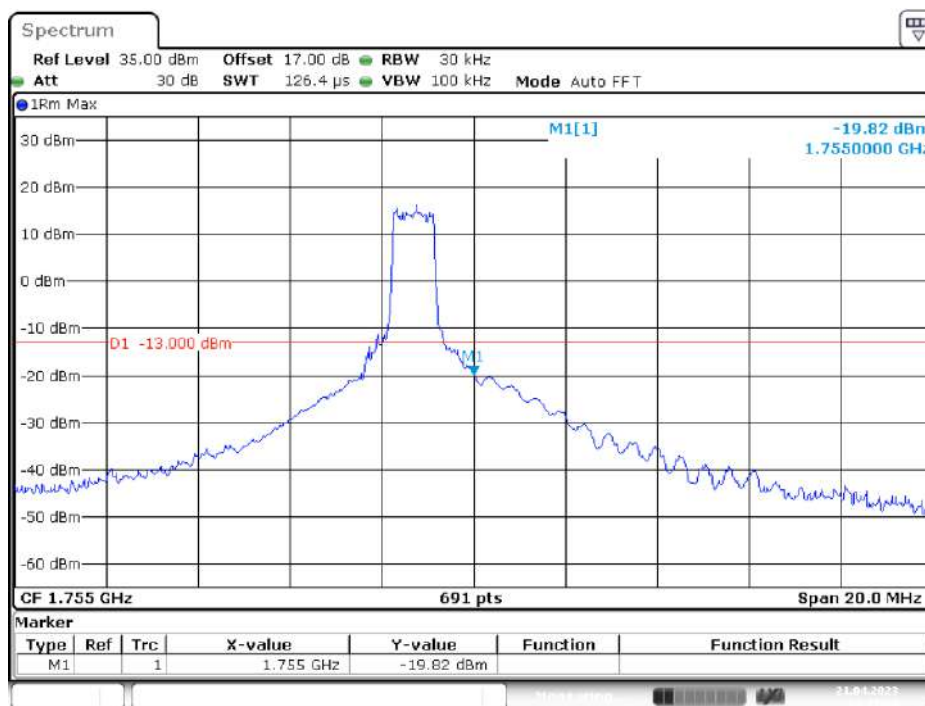
Date: 21.APR.2023 14:12:35

QPSK (10MHz, RB6) – Left Band Edge



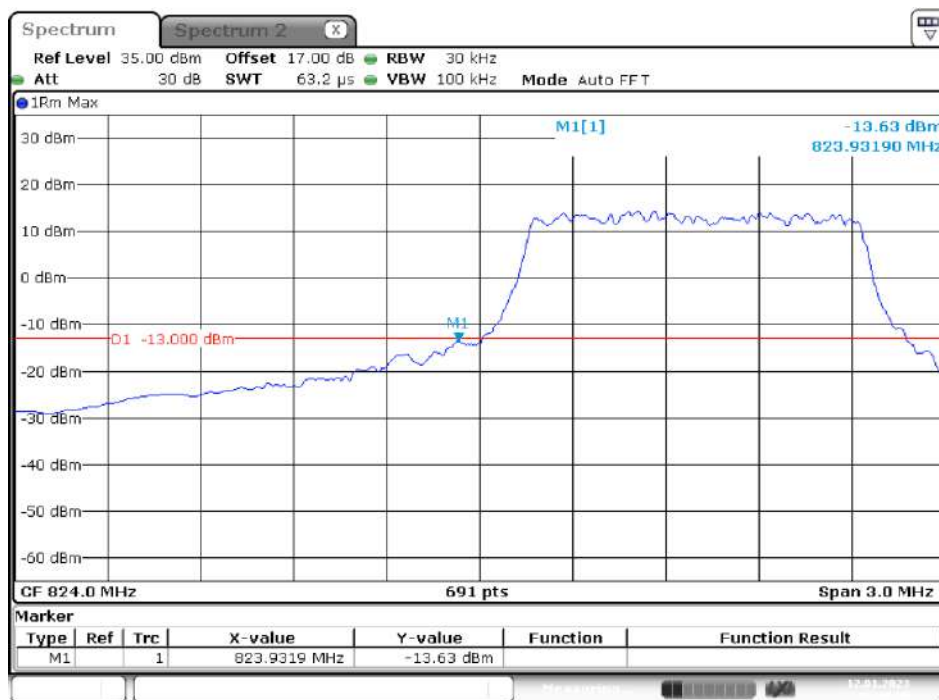
QPSK (10MHz, RB6) – Right Band Edge



16QAM (10MHz, RB5) – Left Band Edge**16QAM (10MHz, RB5) – Right Band Edge**

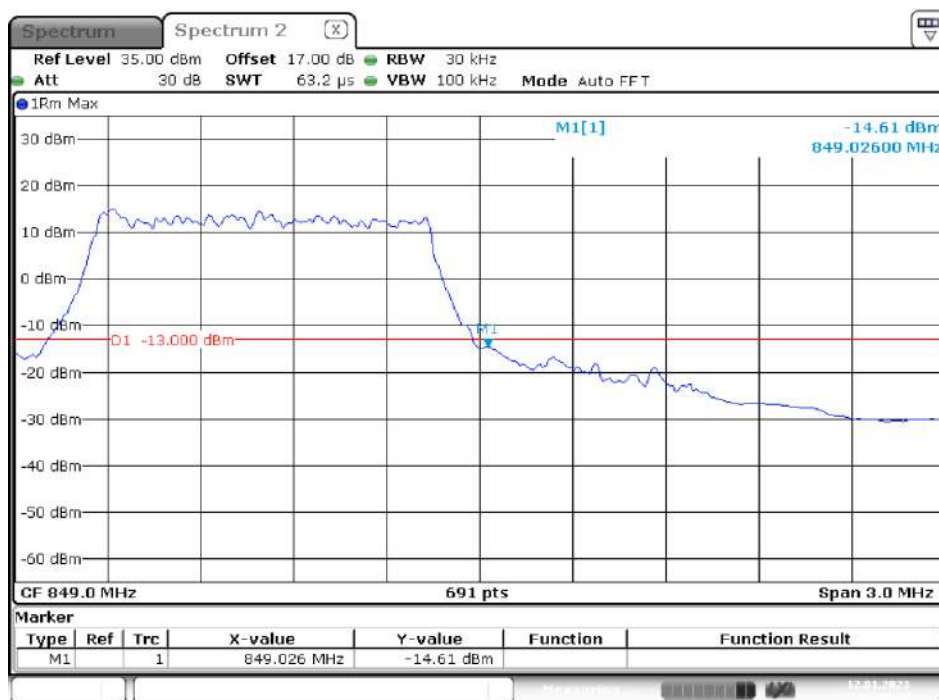
LTE Band 5

QPSK (1.4MHz, RB6) – Left Band Edge

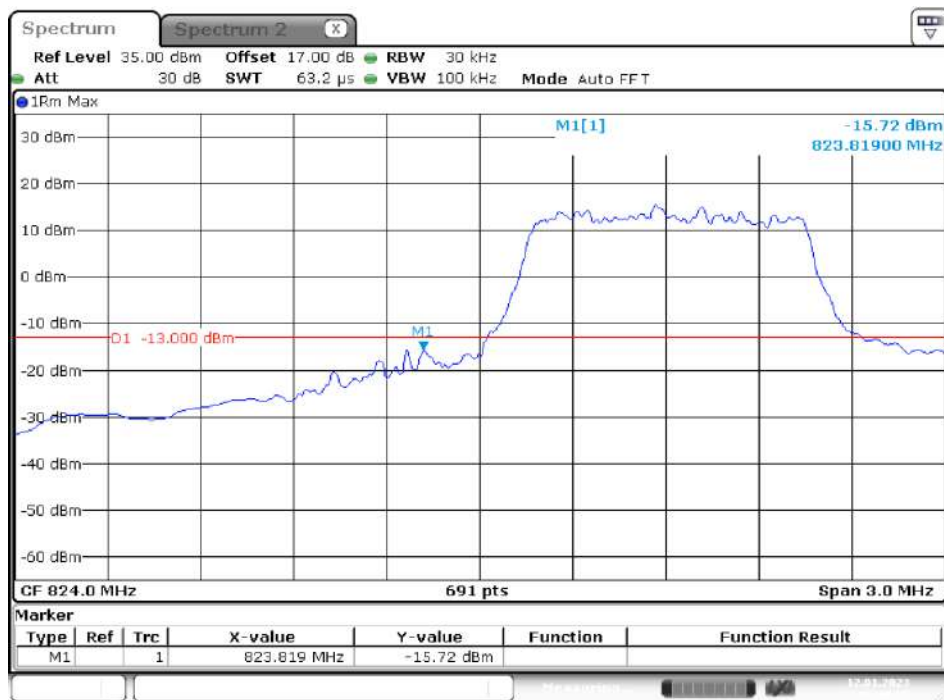


Date: 12.JAN.2023 16:48:00

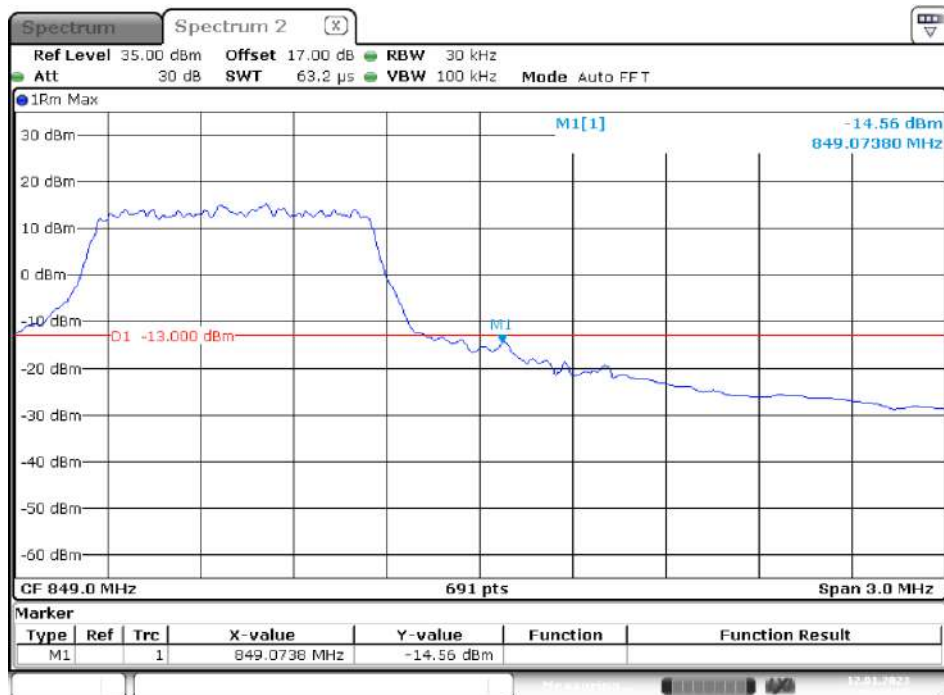
QPSK (1.4MHz, RB6) – Right Band Edge



Date: 12.JAN.2023 16:46:33

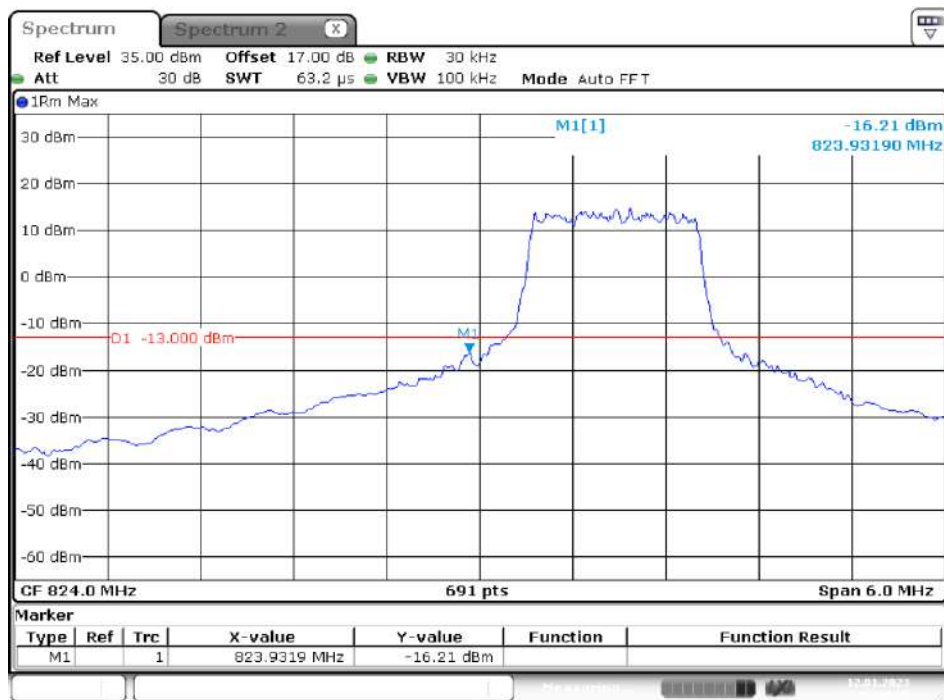
16QAM (1.4MHz, RB5) – Left Band Edge

Date: 12.JAN.2023 16:40:05

16QAM (1.4MHz, RB5) – Right Band Edge

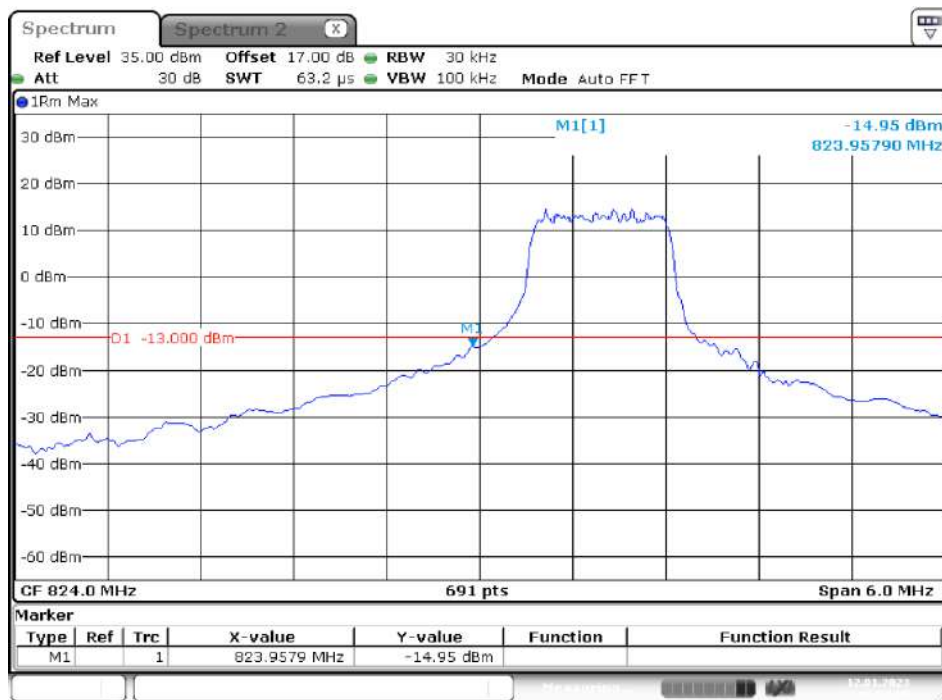
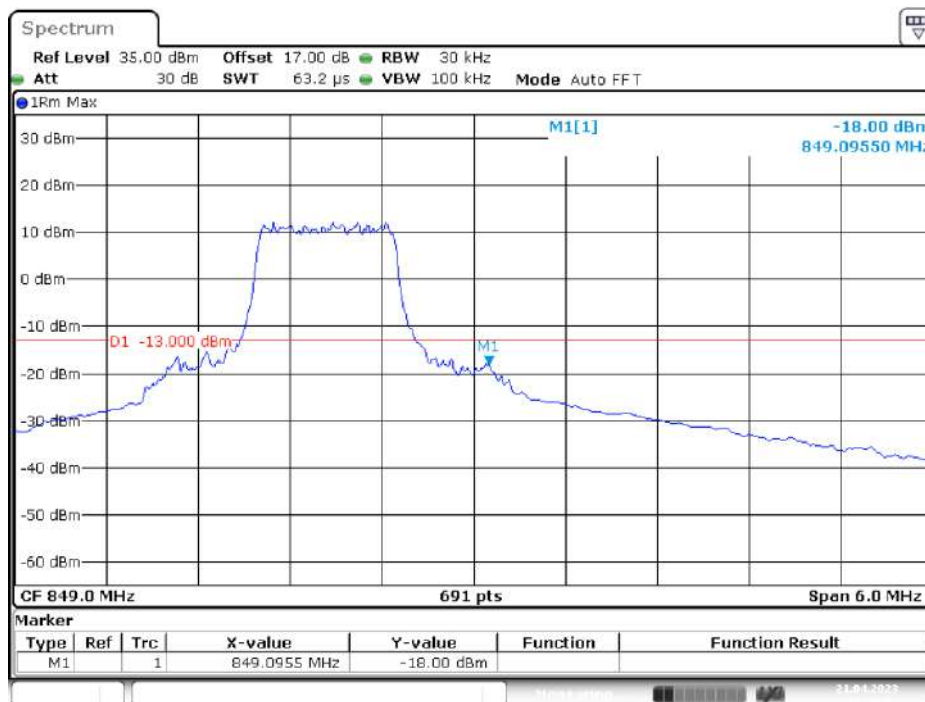
Date: 12.JAN.2023 16:44:56

QPSK (3MHz, RB6) – Left Band Edge

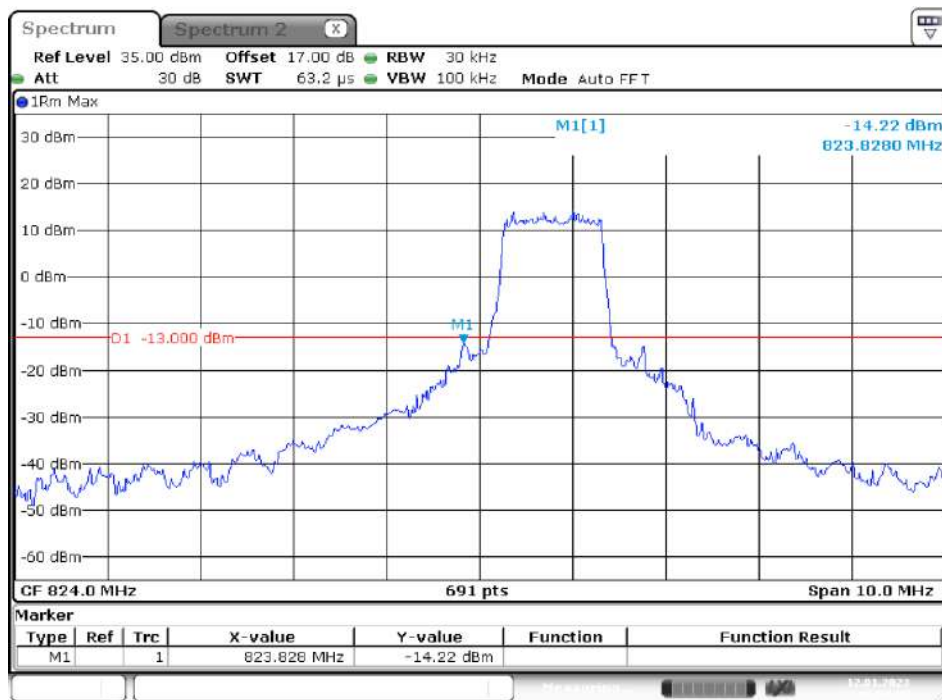


QPSK (3MHz, RB6) – Right Band Edge



16QAM (3MHz, RB5) – Left Band Edge**16QAM (3MHz, RB5) – Right Band Edge**

QPSK (5MHz, RB6) – Left Band Edge

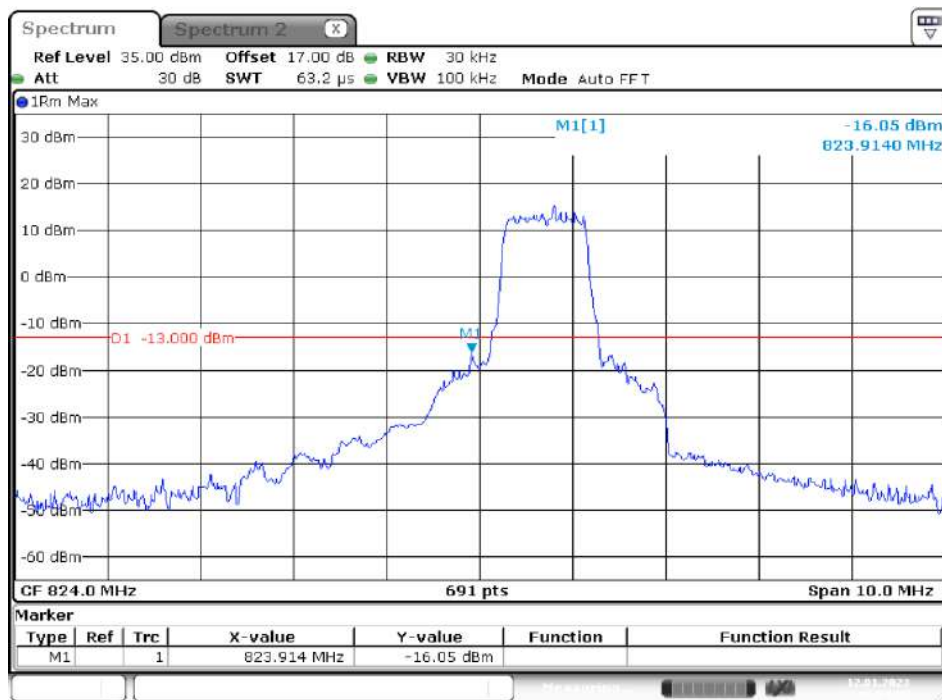


Date: 12.JAN.2023 16:59:03

QPSK (5MHz, RB6) – Right Band Edge



Date: 21.APR.2023 14:45:51

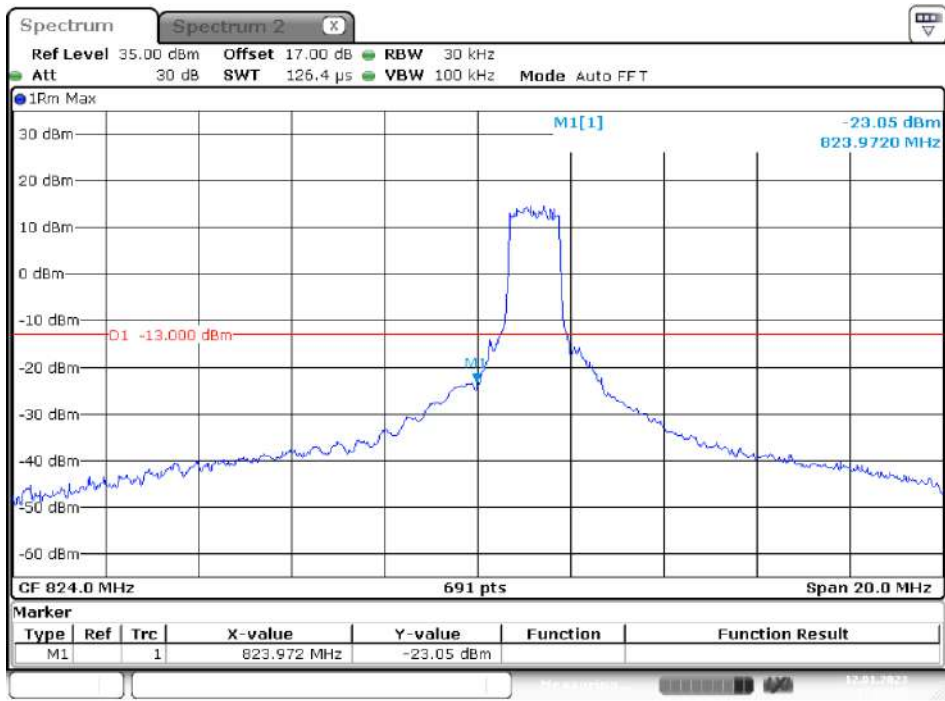
16QAM (5MHz, RB5) – Left Band Edge

Date: 12.JAN.2023 16:54:54

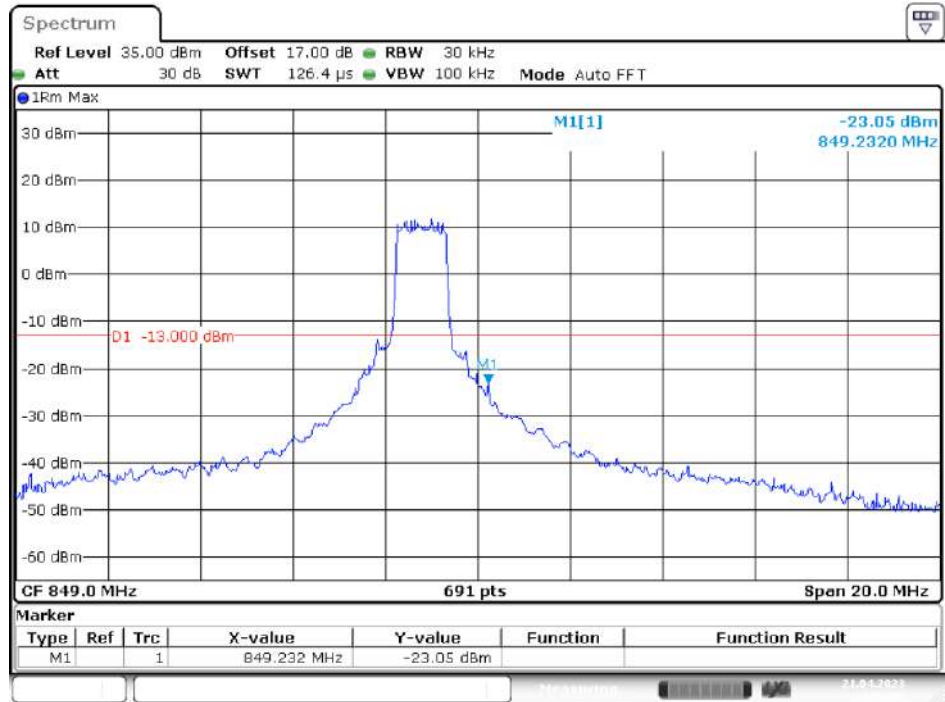
16QAM (5MHz, RB5) – Right Band Edge

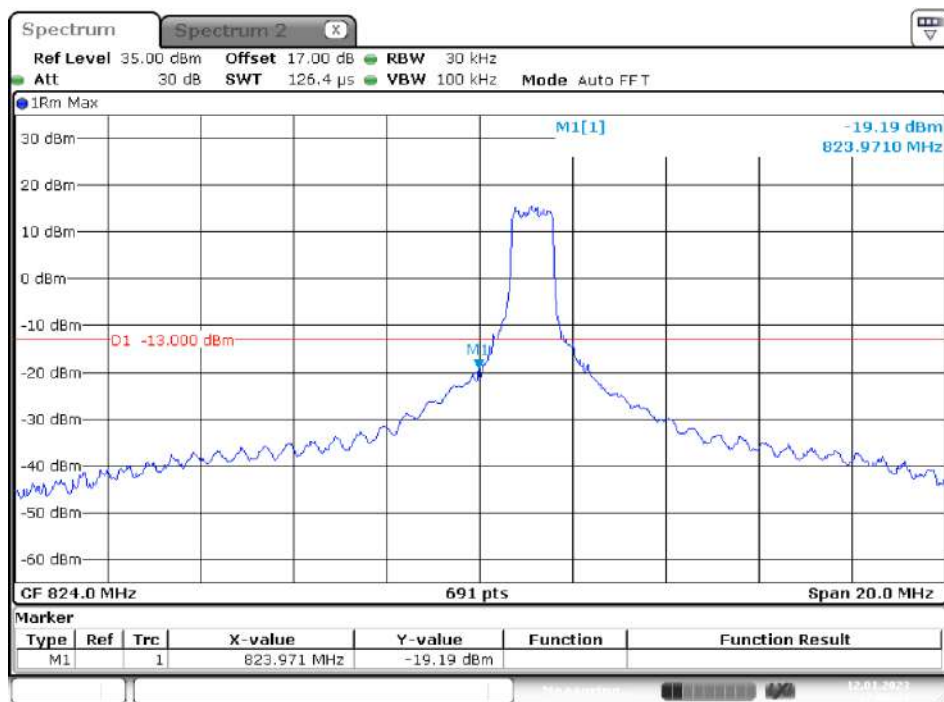
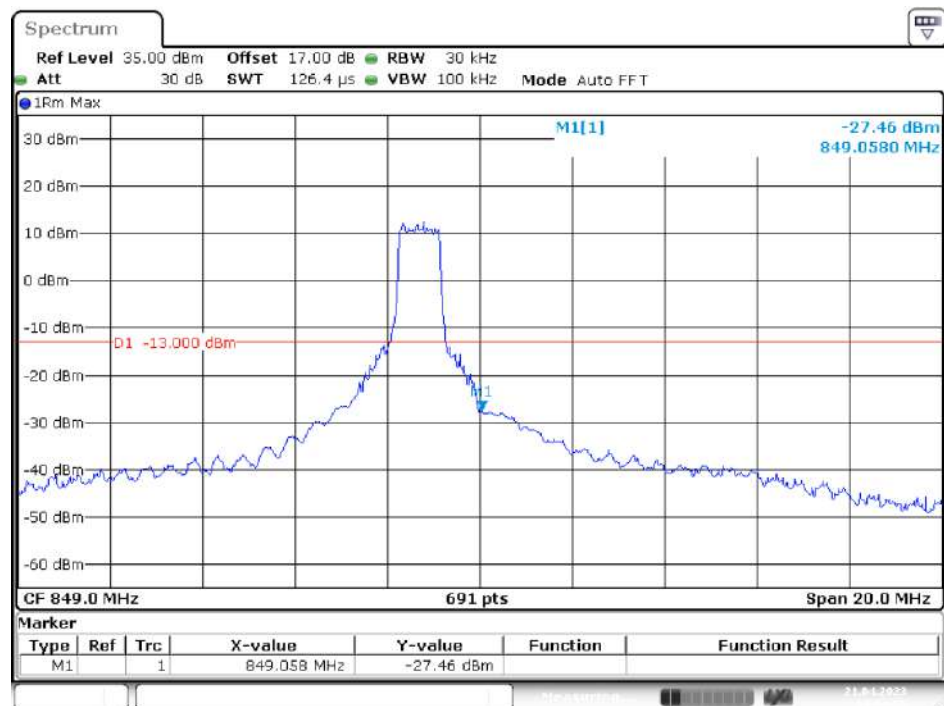
Date: 21.APR.2023 14:48:10

QPSK (10MHz, RB6) – Left Band Edge



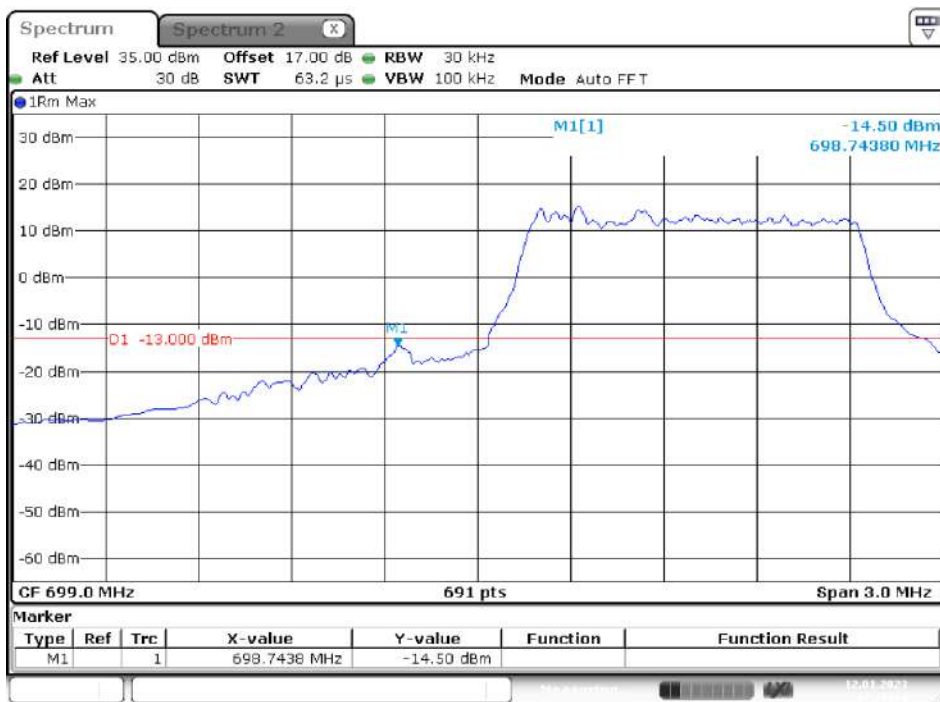
QPSK (10MHz, RB6) – Right Band Edge



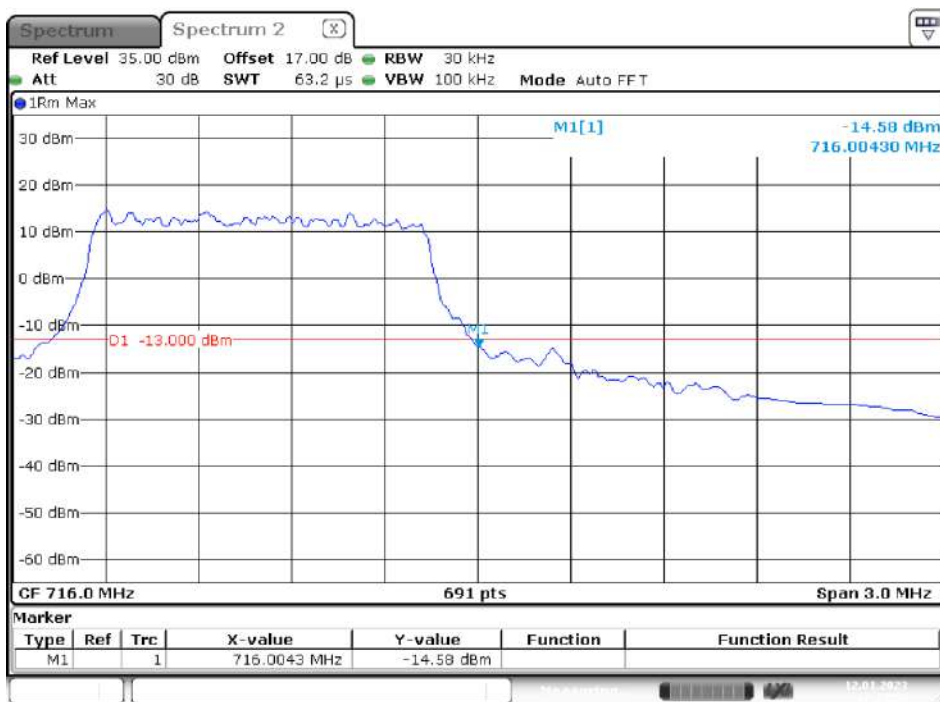
16QAM (10MHz, RB5) – Left Band Edge**16QAM (10MHz, RB5) – Right Band Edge**

LTE Band 12

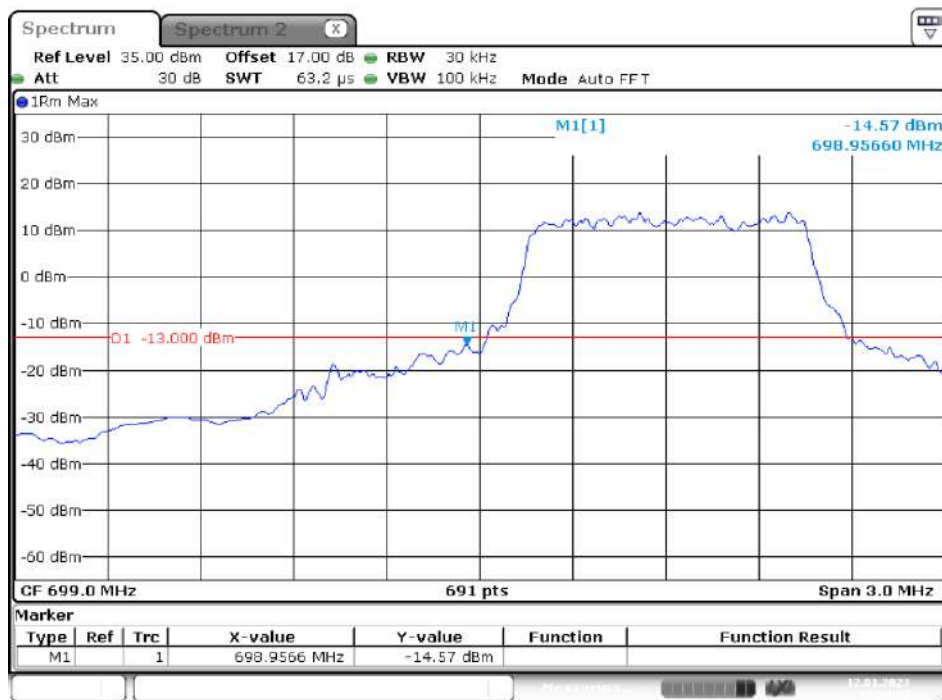
QPSK (1.4MHz, RB6) – Left Band Edge



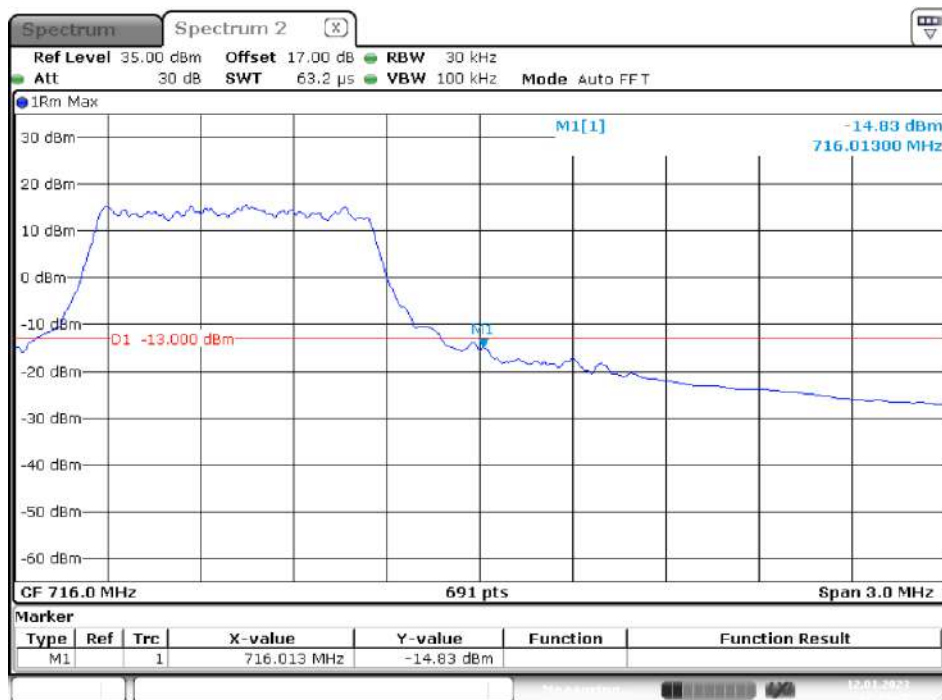
QPSK (1.4MHz, RB6) – Right Band Edge



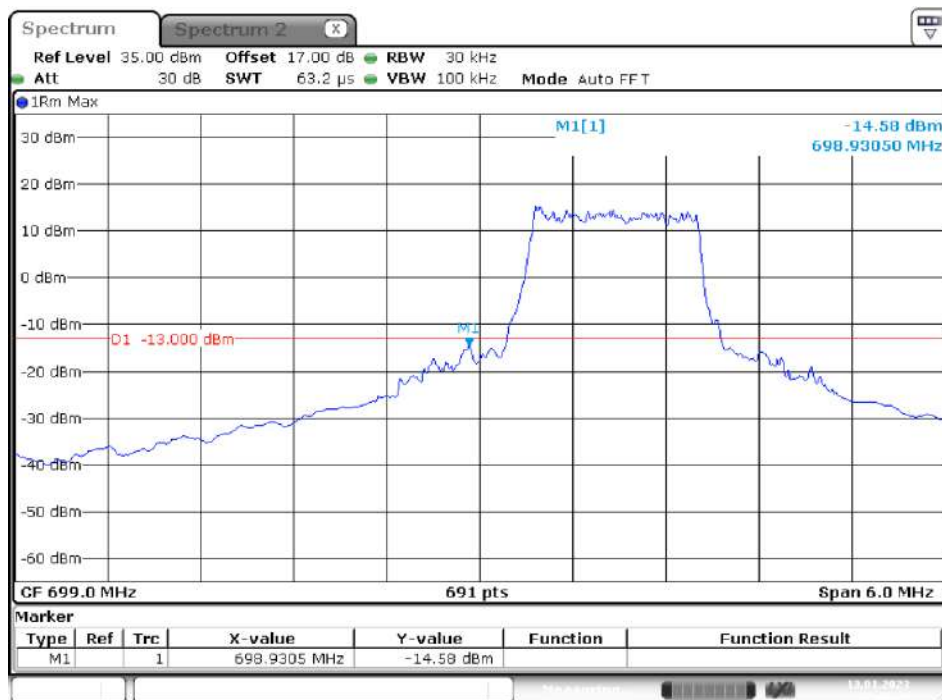
16QAM (1.4MHz, RB5) – Left Band Edge



16QAM (1.4MHz, RB5) – Right Band Edge



QPSK (3MHz, RB66) – Left Band Edge



Date: 13.JAN.2023 07:48:18

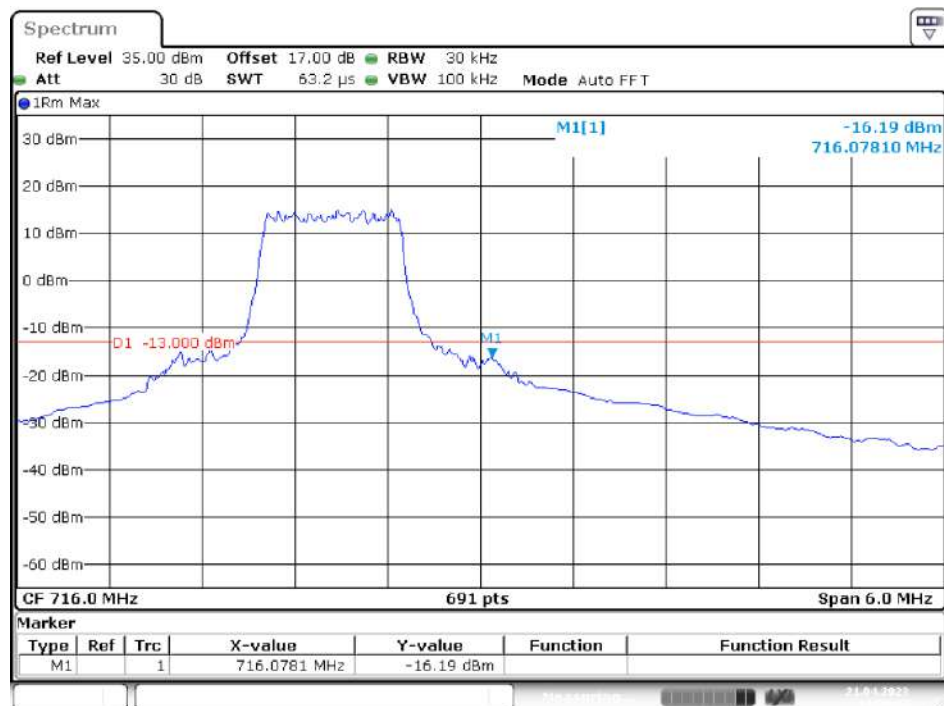
QPSK (3MHz, RB6) – Right Band Edge



Date: 21.APR.2023 14:57:54

16QAM (3MHz, RB5) – Left Band Edge

Date: 13.JAN.2023 07:46:35

16QAM (3MHz, RB5) – Right Band Edge

Date: 21.APR.2023 14:59:26

QPSK (5MHz, RB6) – Left Band Edge

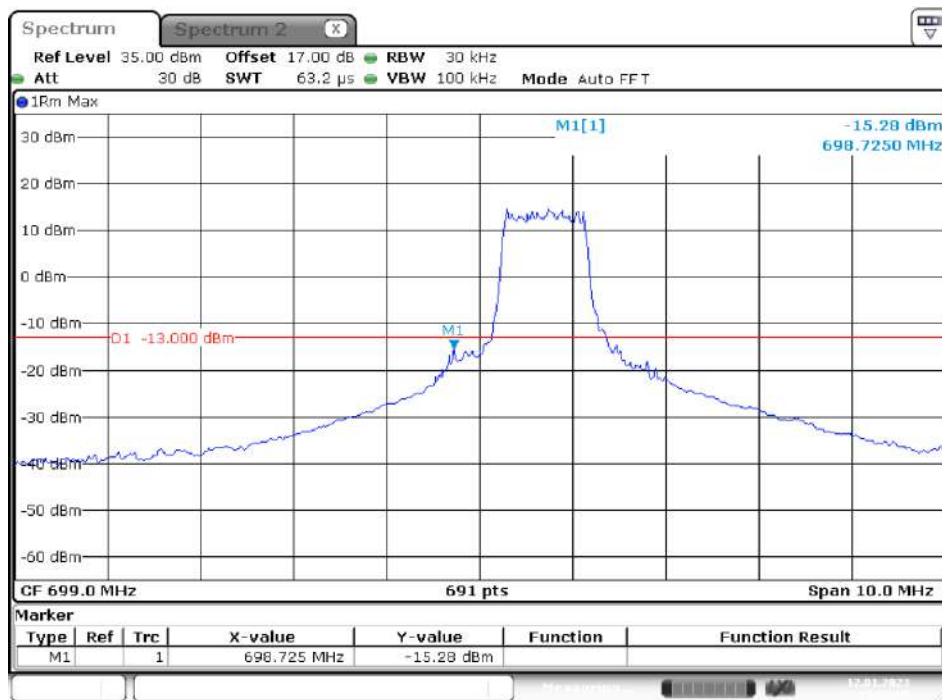


Date: 12.JAN.2023 17:35:36

QPSK (5MHz, RB6) – Right Band Edge



Date: 21.APR.2023 15:02:16

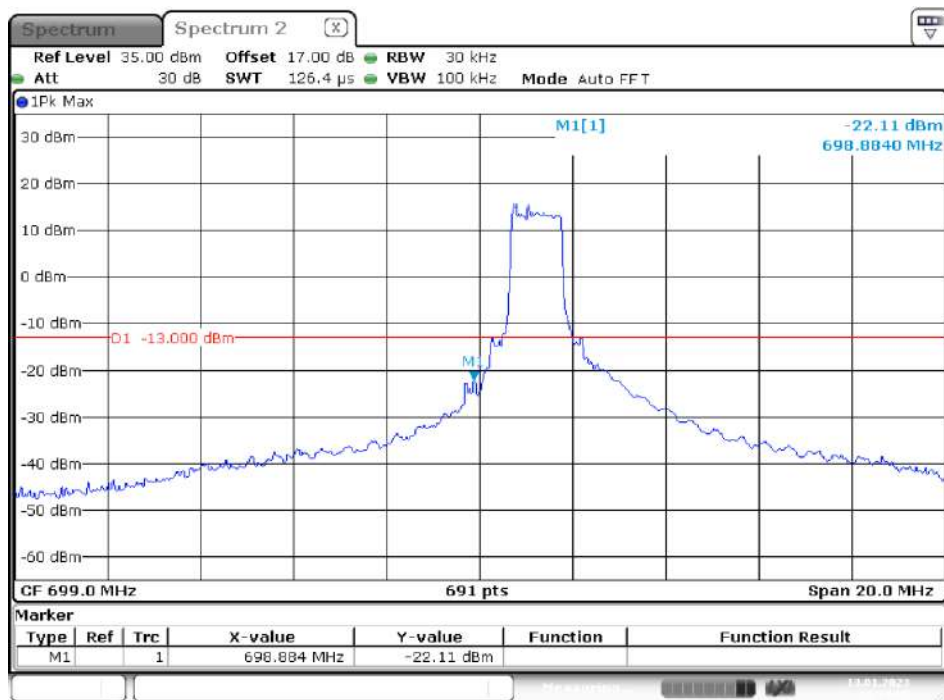
16QAM (5MHz, RB5) – Left Band Edge

Date: 12.JAN.2023 17:37:11

16QAM (5MHz, RB5) – Right Band Edge

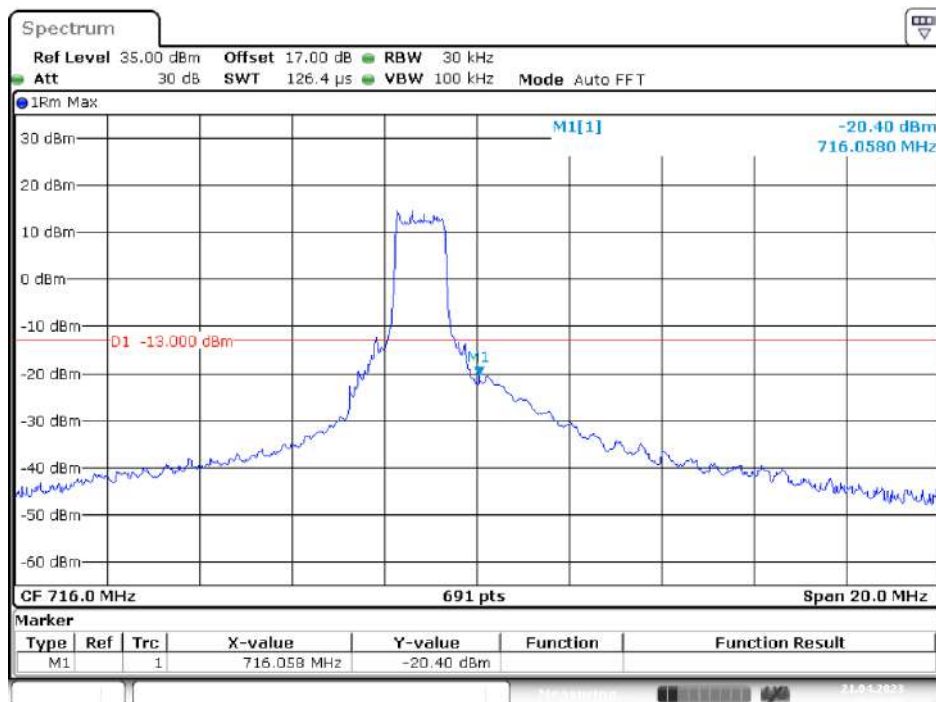
Date: 21.APR.2023 15:00:42

QPSK (10MHz, RB6) – Left Band Edge

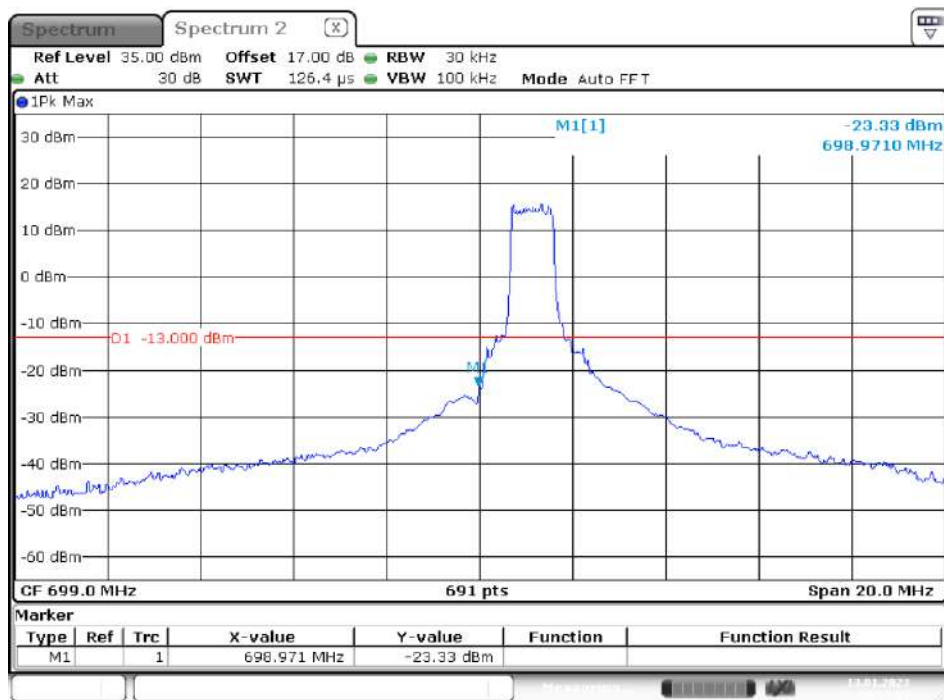


Date: 13.JAN.2023 13:14:05

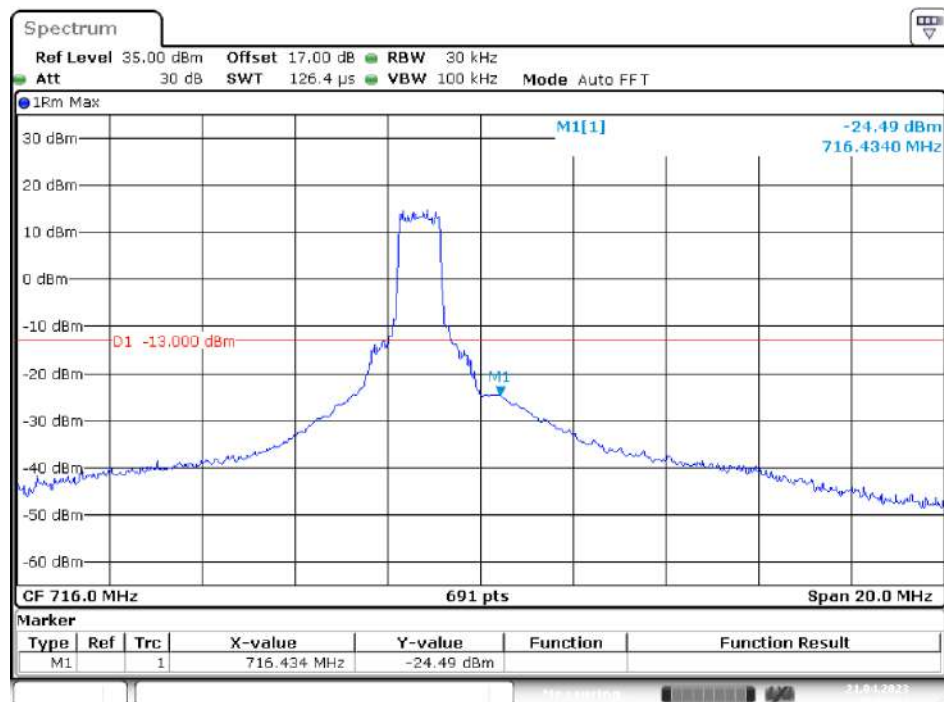
QPSK (10MHz, RB6) – Right Band Edge



Date: 21.APR.2023 15:06:39

16QAM (10MHz, RB5) – Left Band Edge

Date: 13.JAN.2023 13:15:01

16QAM (10MHz, RB5) – Right Band Edge

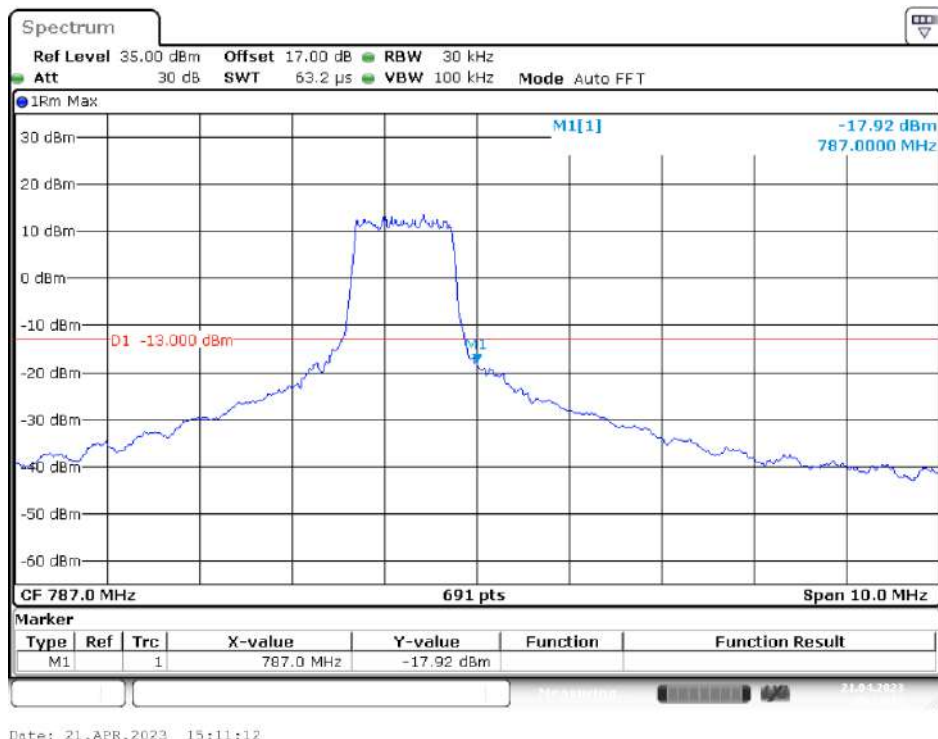
Date: 21.APR.2023 15:07:23

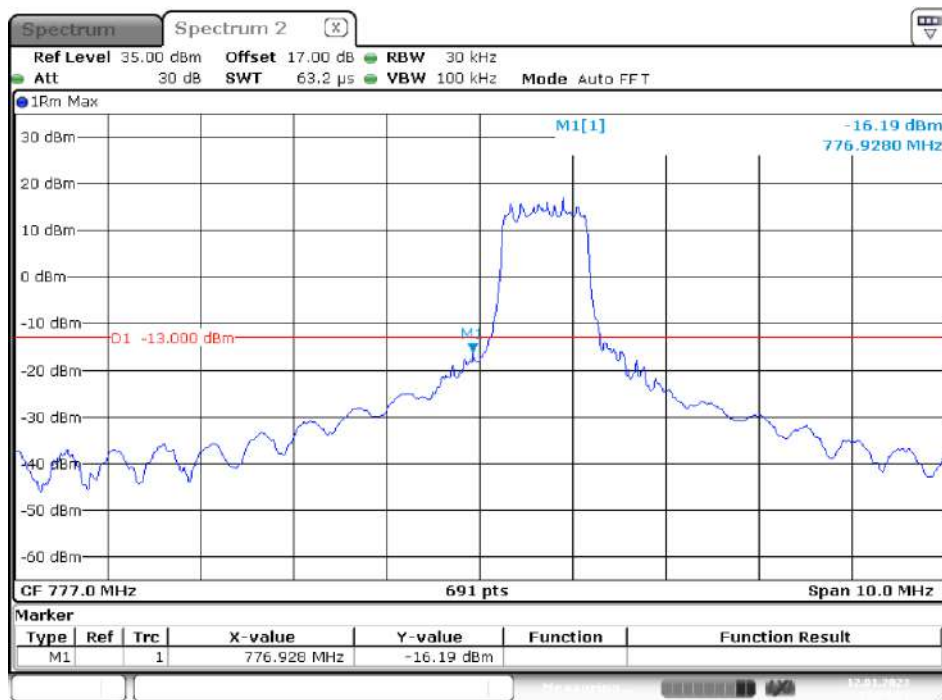
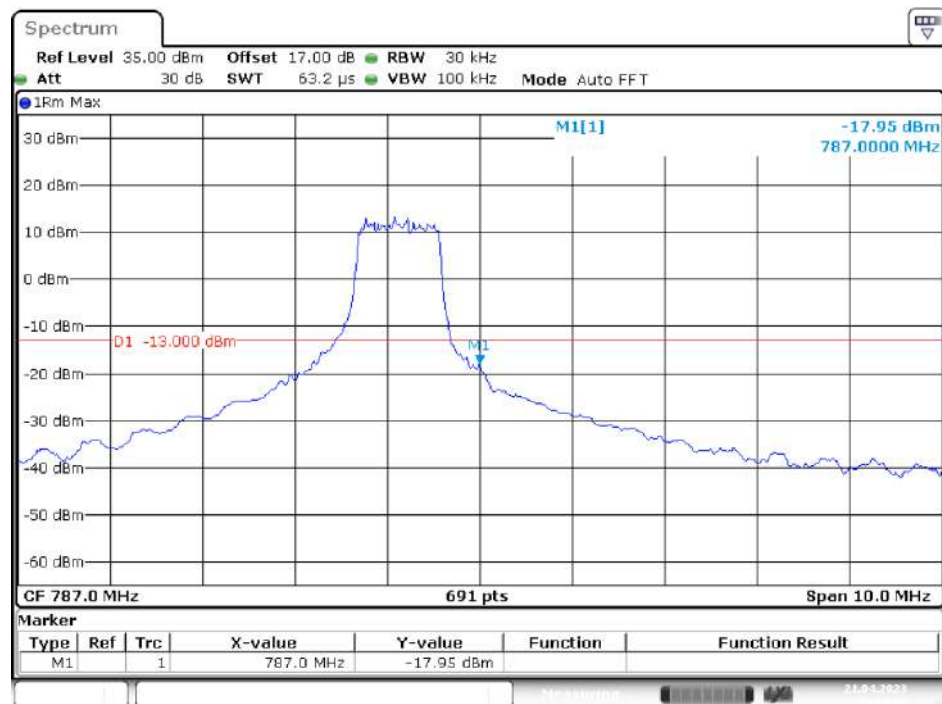
LTE Band 13

QPSK (5MHz, RB6) – Left Band Edge

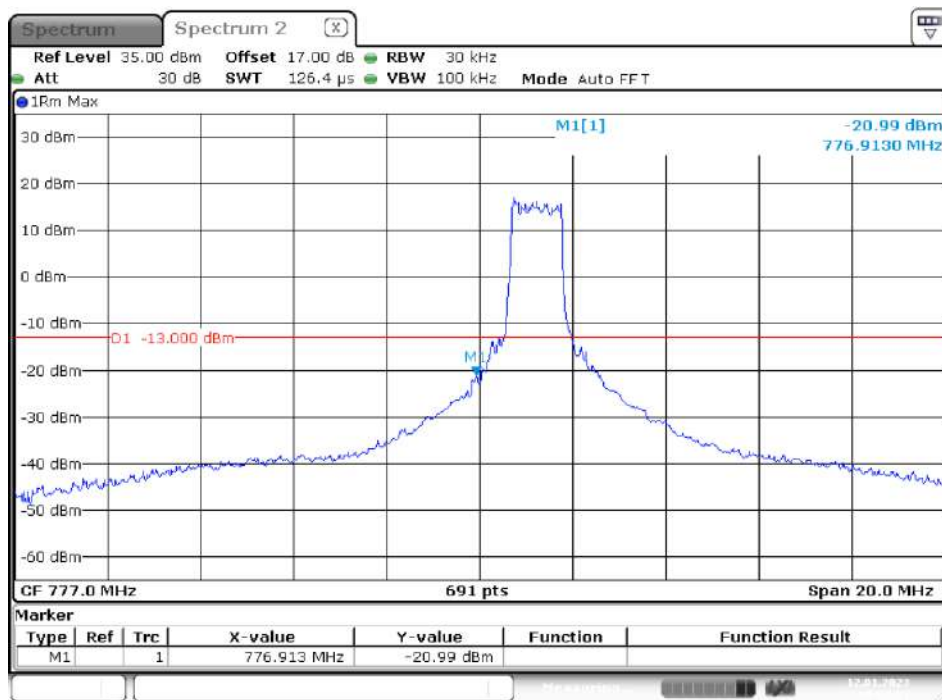


QPSK (5MHz, RB6) – Right Band Edge



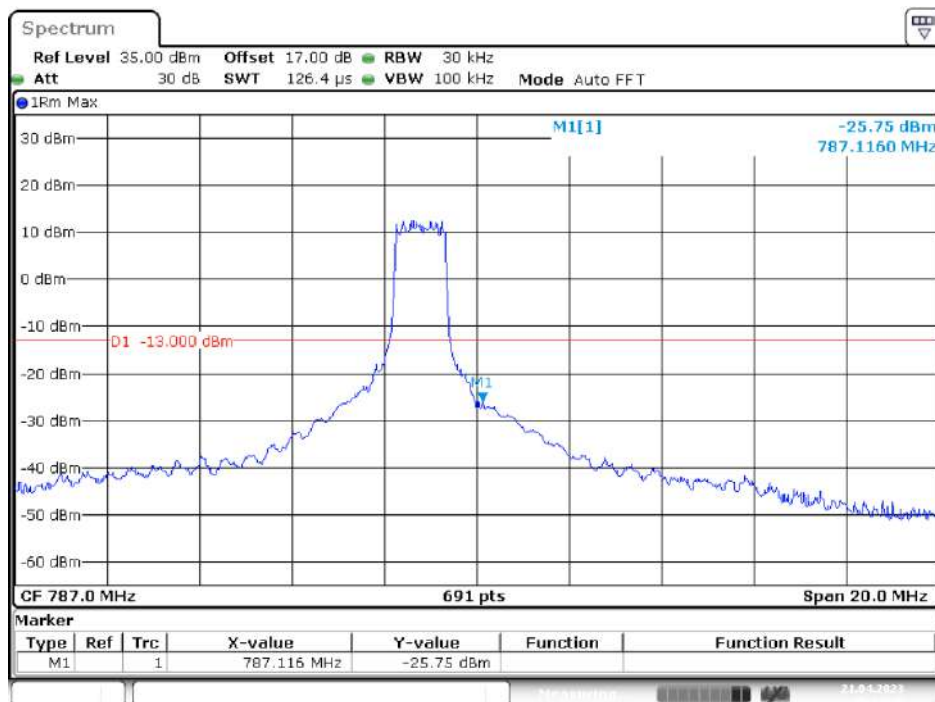
16QAM (5MHz, RB5) – Left Band Edge**16QAM (5MHz, RB5) – Right Band Edge**

QPSK (10MHz, RB6) – Left Band Edge

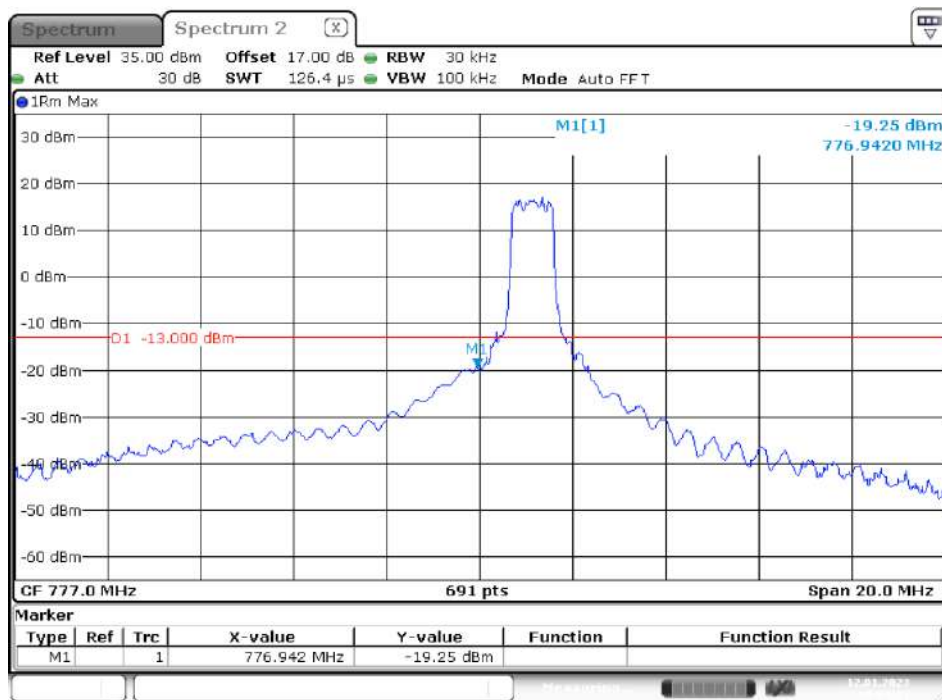


Date: 12.JAN.2023 18:02:21

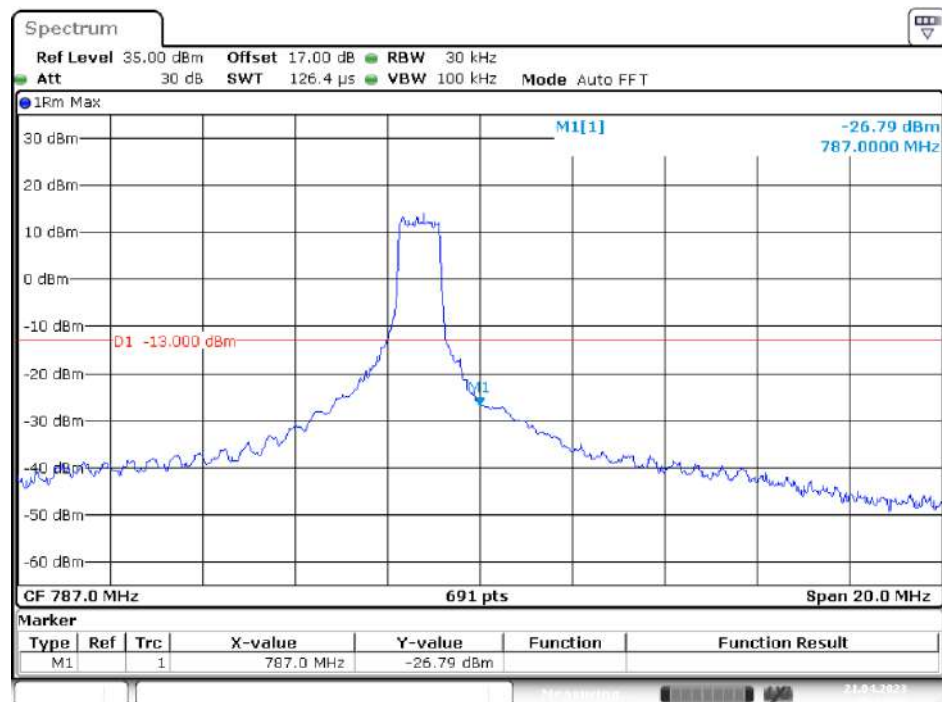
QPSK (10MHz, RB6) – Right Band Edge



Date: 21.APR.2023 15:12:36

16QAM (10MHz, RB5) – Left Band Edge

Date: 12.JAN.2023 18:03:12

16QAM (10MHz, RB5) – Right Band Edge

Date: 21.APR.2023 15:14:05

15.FCC §2.1055, §22.355 & §24.235 & §27.54 – FREQUENCY STABILITY

15.1 Applicable Standard

FCC § 2.1055 (a)(d), §22.355, §24.235 · §27.54

IC RSS-130 Issue 2 clause 4.7 RSS-132 Issue 3 clause 5.5 RSS-133 Issue 6 clause 6.5 RSS-139 Issue 3 clause 6.6

According to FCC §2.1055, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency Range (MHz)	Base, fixed (ppm)	Mobile > 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929.	5.0	N/A	N/A
929 to 960.	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

According to §27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

According to RSS-130 Issue 2 clause 4.5

For equipment that is capable of transmitting numerous channels simultaneously for different applications (e.g. LTE and narrowband – Internet of Things (IoT)), the occupied bandwidth shall be the bandwidth representing the sum of the occupied bandwidths of these channels.

The frequency stability shall be sufficient to ensure that the occupied bandwidth remains within each frequency block range when tested at the temperature and supply voltage variations specified in RSS-Gen.

According to RSS-132 Issue 3 clause 5.3

The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations and ± 1.5 ppm for base stations.

In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the occupied bandwidth stays within each of the sub-bands (see Section 5.1) when tested to the temperature and supply voltage variations specified in RSS-Gen.

According to RSS-133 Issue 6 clause 6.3

The carrier frequency shall not depart from the reference frequency, in excess of ± 2.5 ppm for mobile stations and ± 1.0 ppm for base stations.

In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

According to RSS-139 Issue 3 clause 6.4

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

15.2 Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

15.3 Test Results

LTE Band 2

Low Channel & High Channel (QPSK)					
Temperature (°C)	Voltage Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.8	1850.57	1909.51	1850	1910
-20		1850.53	1909.51	1850	1910
-10		1850.57	1909.51	1850	1910
0		1850.53	1909.53	1850	1910
10		1850.49	1909.43	1850	1910
20		1850.49	1909.43	1850	1910
30		1850.57	1909.51	1850	1910
40		1850.49	1909.47	1850	1910
50		1850.57	1909.43	1850	1910
20	V min.=3.42	1850.49	1909.47	1850	1910
20	V max.=4.18	1850.53	1909.51	1850	1910

Low Channel & High Channel (16-QAM)					
Temperature (°C)	Voltage Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.8	1850.53	1909.47	1850	1910
-20		1850.53	1909.51	1850	1910
-10		1850.49	1909.51	1850	1910
0		1850.57	1909.53	1850	1910
10		1850.53	1909.51	1850	1910
20		1850.53	1909.51	1850	1910
30		1850.49	1909.47	1850	1910
40		1850.53	1909.51	1850	1910
50		1850.53	1909.53	1850	1910
20	V min.=3.42	1850.49	1909.43	1850	1910
20	V max.=4.18	1850.57	1909.47	1850	1910

LTE Band 4

Low Channel & High Channel (QPSK)					
Temperature (°C)	Voltage Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.8	1710.03	1754.94	1710	1755
-20		1710.05	1754.91	1710	1755
-10		1710.09	1754.93	1710	1755
0		1710.01	1754.95	1710	1755
10		1710.05	1754.93	1710	1755
20		1710.08	1754.96	1710	1755
30		1710.06	1754.97	1710	1755
40		1710.05	1754.99	1710	1755
50		1710.03	1754.91	1710	1755
20	V min.=3.42	1710.06	1754.93	1710	1755
20	V max.=4.18	1710.02	1754.98	1710	1755

Low Channel & High Channel (16-QAM)					
Temperature (°C)	Voltage Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.8	1710.09	1754.78	1710	1755
-20		1710.01	1754.73	1710	1755
-10		1710.08	1754.70	1710	1755
0		1710.05	1754.77	1710	1755
10		1710.03	1754.76	1710	1755
20		1710.09	1754.75	1710	1755
30		1710.05	1754.76	1710	1755
40		1710.09	1754.77	1710	1755
50		1710.03	1754.71	1710	1755
20	V min.=3.42	1710.08	1754.76	1710	1755
20	V max.=4.18	1710.03	1754.73	1710	1755

LTE Band 5

10.0 MHz Middle Channel, fo =836.5 MHz_QPSK				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	4.29	0.0051	±2.5
-20		5.99	0.0072	±2.5
-10		5.01	0.0060	±2.5
0		4.29	0.0051	±2.5
10		5.82	0.0070	±2.5
20		5.44	0.0065	±2.5
30		5.39	0.0064	±2.5
40		5.18	0.0062	±2.5
50		6.02	0.0072	±2.5
20	V min.= 3.42	5.72	0.0068	±2.5
20	V max.= 4.18	5.65	0.0068	±2.5

10.0 MHz Middle Channel, fo =836.5 MHz_16QAM				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	4.42	0.0053	±2.5
-20		4.62	0.0055	±2.5
-10		5.19	0.0062	±2.5
0		5.22	0.0062	±2.5
10		4.39	0.0052	±2.5
20		5.17	0.0062	±2.5
30		6.22	0.0074	±2.5
40		5.91	0.0071	±2.5
50		4.98	0.0060	±2.5
20	V min.= 3.42	5.26	0.0063	±2.5
20	V max.= 4.18	5.11	0.0061	±2.5

LTE Band 12

Low Channel & High Channel (QPSK)					
Temperature (°C)	Voltage Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.8	700.01	715.77	699	716
-20		700.08	715.75	699	716
-10		700.07	715.73	699	716
0		700.06	715.77	699	716
10		700.04	715.71	699	716
20		700.09	715.74	699	716
30		700.03	715.78	699	716
40		700.08	715.77	699	716
50		700.03	715.79	699	716
20	V min.= 3.42	700.08	715.74	699	716
20	V max.= 4.18	700.01	715.79	699	716

Low Channel & High Channel (16-QAM)					
Temperature (°C)	Voltage Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.8	700.36	715.97	699	716
-20		700.31	715.95	699	716
-10		700.33	715.93	699	716
0		700.39	715.99	699	716
10		700.3	715.97	699	716
20		700.33	715.92	699	716
30		700.38	715.97	699	716
40		700.35	715.93	699	716
50		700.34	715.98	699	716
20	V min.= 3.42	700.33	715.93	699	716
20	V max.= 4.18	700.37	715.95	699	716

LTE Band 13

Low Channel & High Channel (QPSK)					
Temperature (°C)	Voltage Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.8	799.63	784.64	777	787
-20		799.59	784.61	777	787
-10		799.62	784.64	777	787
0		799.63	784.58	777	787
10		799.64	784.61	777	787
20		799.63	784.65	777	787
30		799.59	784.62	777	787
40		799.61	784.65	777	787
50		799.64	784.60	777	787
20	V min.= 3.42	799.59	784.62	777	787
20	V max.= 4.18	799.62	784.62	777	787

Low Channel & High Channel (16-QAM)					
Temperature (°C)	Voltage Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.8	799.59	784.58	777	787
-20		799.60	784.58	777	787
-10		799.59	784.64	777	787
0		799.59	784.65	777	787
10		799.64	784.62	777	787
20		799.65	784.64	777	787
30		799.64	784.63	777	787
40		799.61	784.60	777	787
50		799.64	784.63	777	787
20	V min.= 3.42	799.64	784.61	777	787
20	V max.= 4.18	799.62	784.61	777	787

Cellular Band**GPRS**

Middle Channel, fo=836.6MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	17.66	0.0211	±2.5
-20		16.70	0.0200	±2.5
-10		16.40	0.0196	±2.5
0		17.89	0.0214	±2.5
10		18.10	0.0216	±2.5
20		18.9	0.0226	±2.5
30		18.00	0.0215	±2.5
40		16.50	0.0197	±2.5
50		14.90	0.0178	±2.5
20	V min.= 3.42	16.10	0.0192	±2.5
20	V max.= 4.18	16.20	0.0194	±2.5

PCS Band**GPRS**

Low Channel & High Channel (QPSK)					
Temperature (°C)	Voltage Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.8	1850.45	1909.63	1850	1910
-20		1850.49	1909.59	1850	1910
-10		1850.53	1909.59	1850	1910
0		1850.45	1909.63	1850	1910
10		1850.45	1909.59	1850	1910
20		1850.53	1909.63	1850	1910
30		1850.49	1909.55	1850	1910
40		1850.53	1909.55	1850	1910
50		1850.45	1909.59	1850	1910
20	V min.=3.42	1850.45	1909.63	1850	1910
20	V max.=4.18	1850.49	1909.59	1850	1910

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