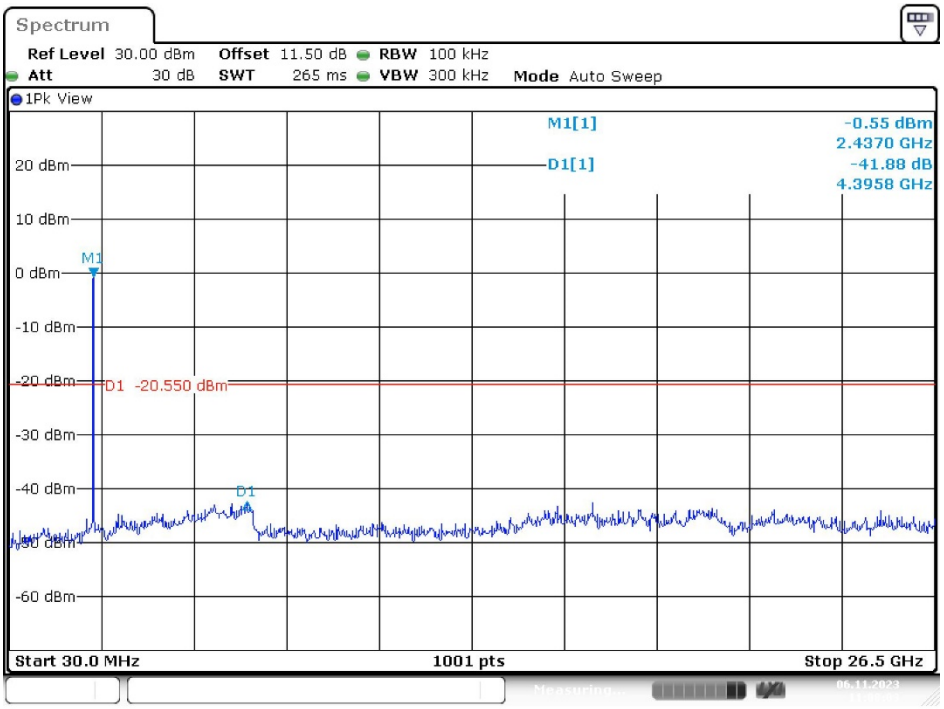
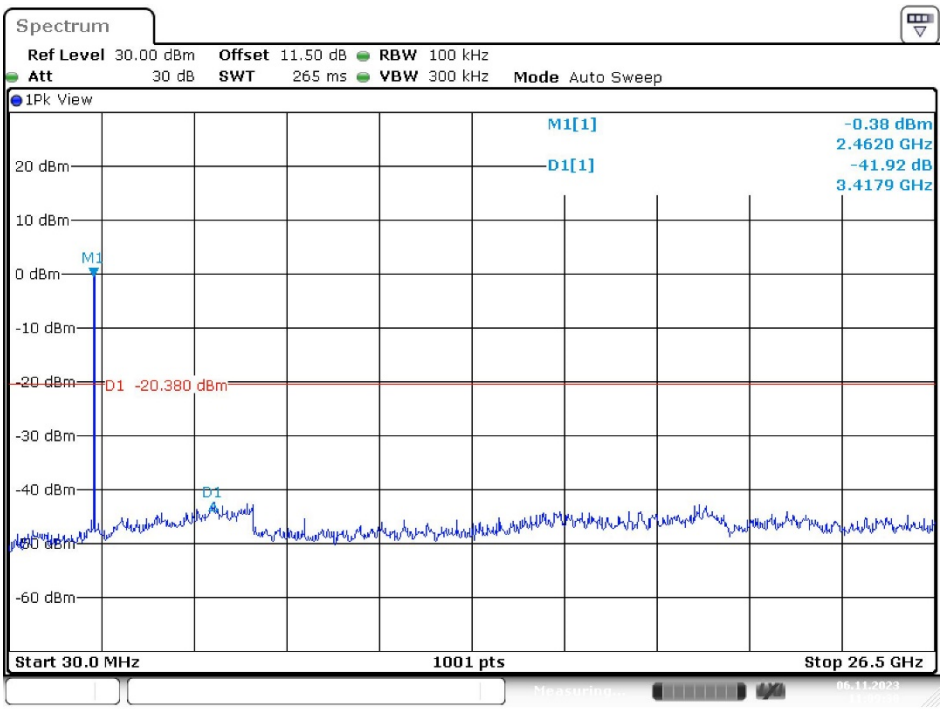
Middle Channel



Date: 6.NOV.2023 11:08:03

High Channel



Date: 6.NOV.2023 11:09:31

9 FCC §15.247(a)(2) – 6 dB Emission Bandwidth & Occupied Bandwidth

9.1 Applicable Standard

According to FCC §15.247(a)(2).

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

9.2 Test Procedure

According to ANSI C63.10-2013, section 11.8

The steps for the first option are as follows:

a) Set RBW = 100 kHz.

b) Set the VBW ≥ [3 × RBW].

c) Detector = peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

According to ANSI C63.10-2013 Section 6.9.3

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

9.3 Test Results

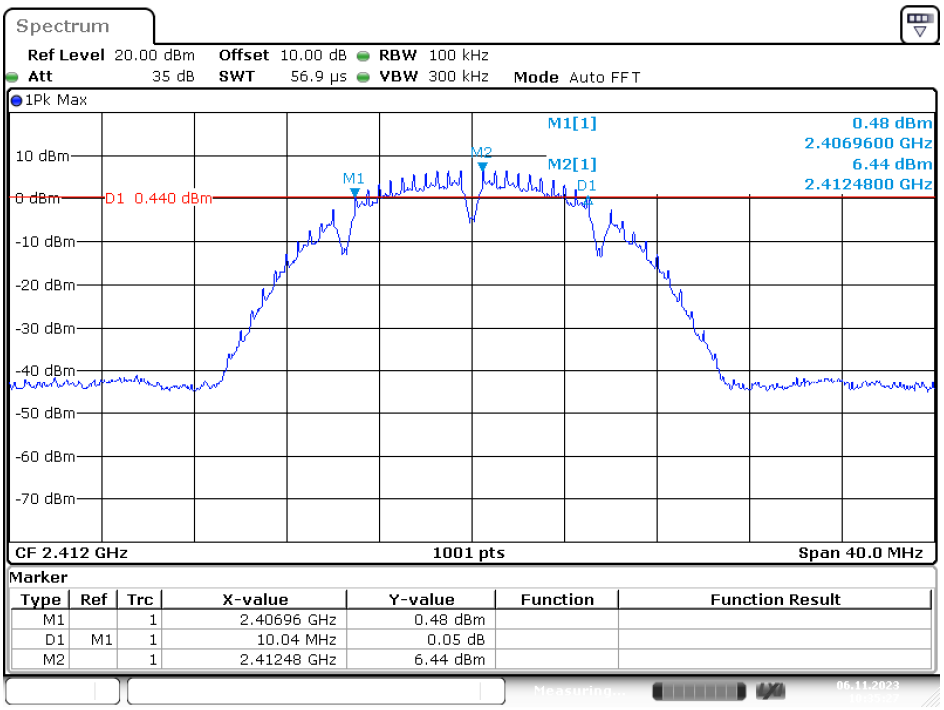
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (kHz)	Result
B Mode					
Low	2412	10.04	13.91	> 500	PASS
Middle	2437	10.04	13.87	> 500	PASS
High	2462	10.04	13.87	> 500	PASS
G Mode					
Low	2412	15.12	16.18	> 500	PASS
Middle	2437	15.12	16.14	> 500	PASS
High	2462	15.12	16.22	> 500	PASS
N20 Mode					
Low	2412	15.12	17.34	> 500	PASS
Middle	2437	15.12	17.30	> 500	PASS
High	2462	15.12	17.30	> 500	PASS

Please refer to the following plots

6 dB Emission Bandwidth

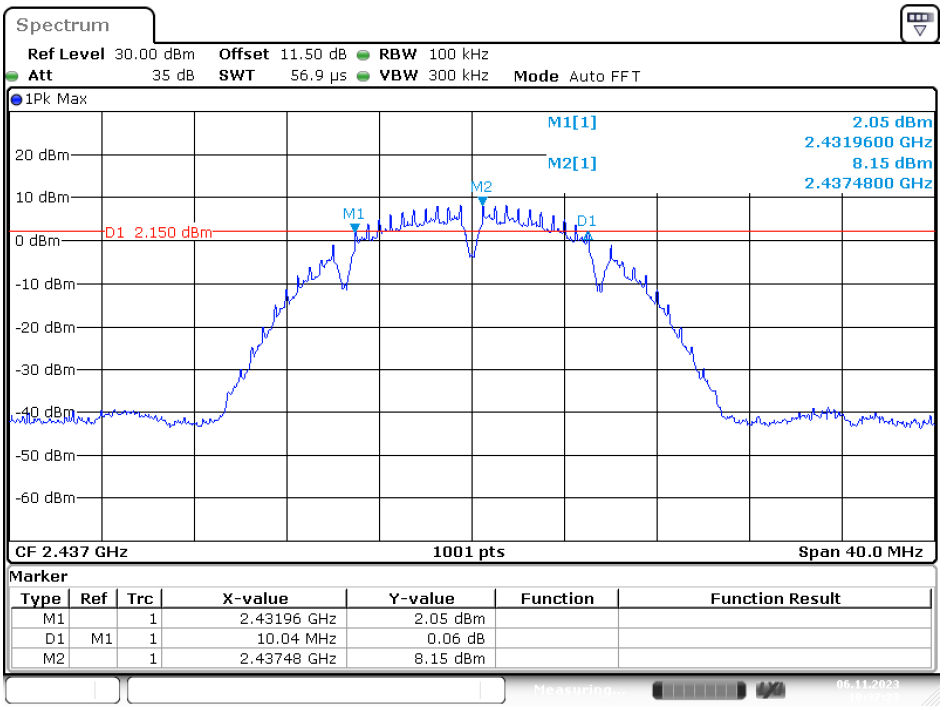
B Mode

Low Channel



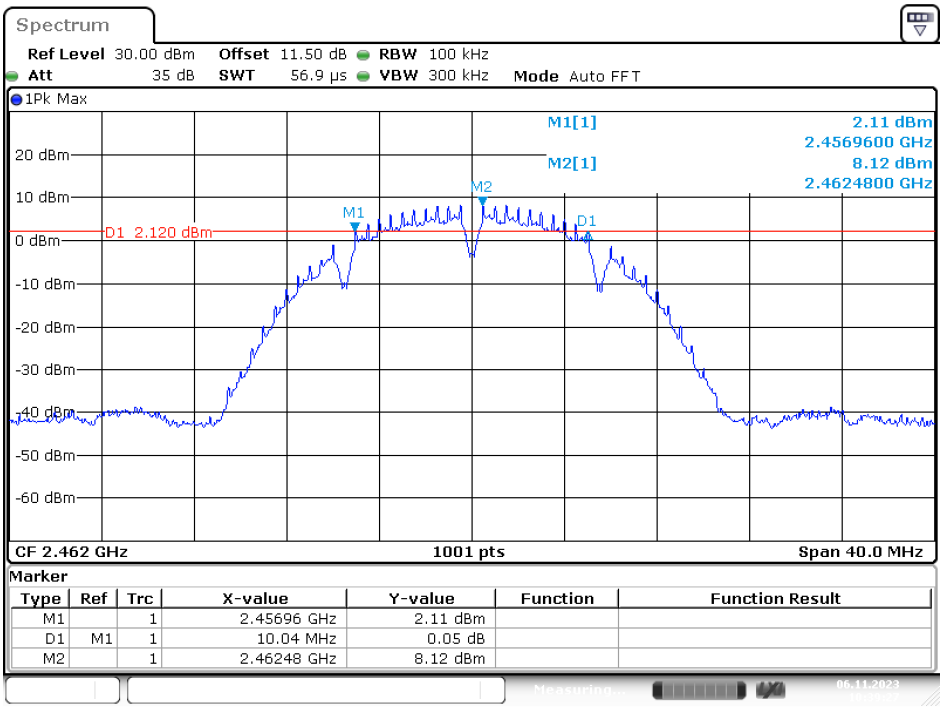
Date: 6.NOV.2023 10:35:28

Middle Channel



Date: 6.NOV.2023 10:37:23

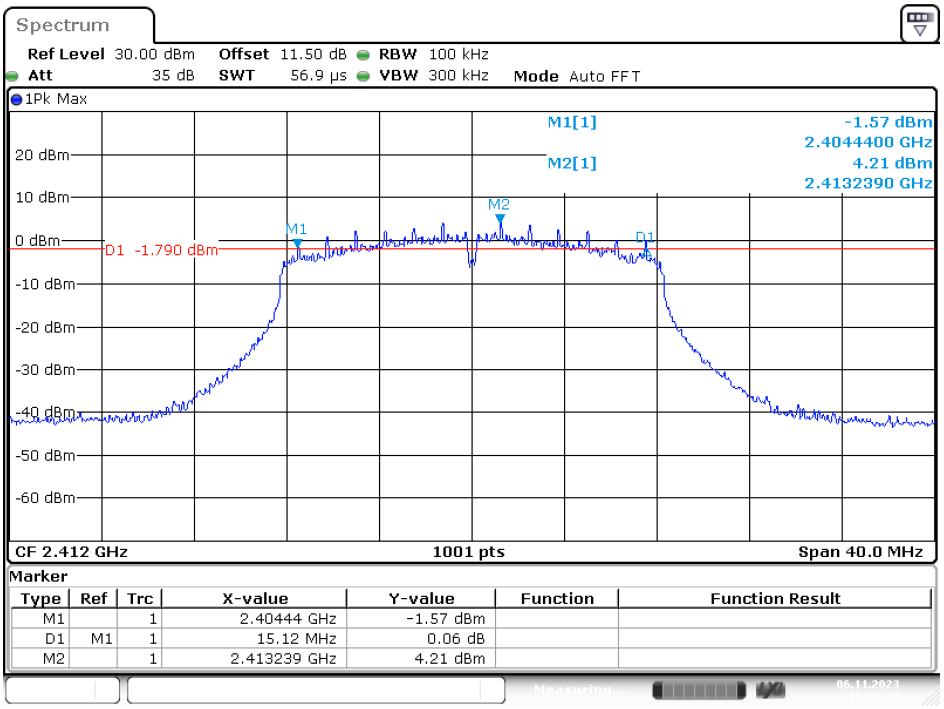
High Channel



Date: 6.NOV.2023 10:39:28

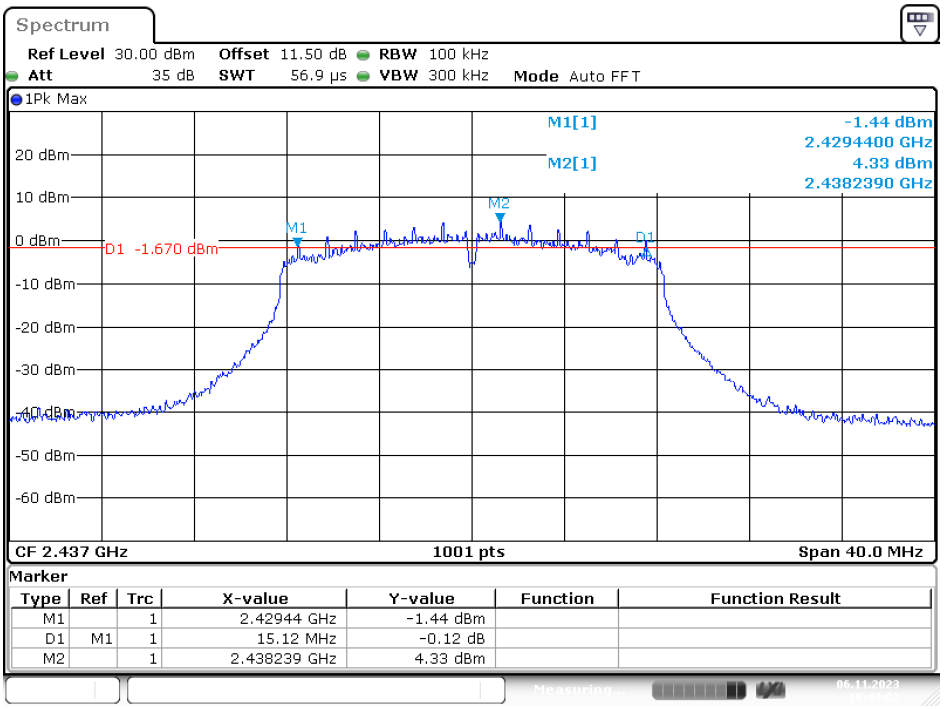
G Mode

Low Channel



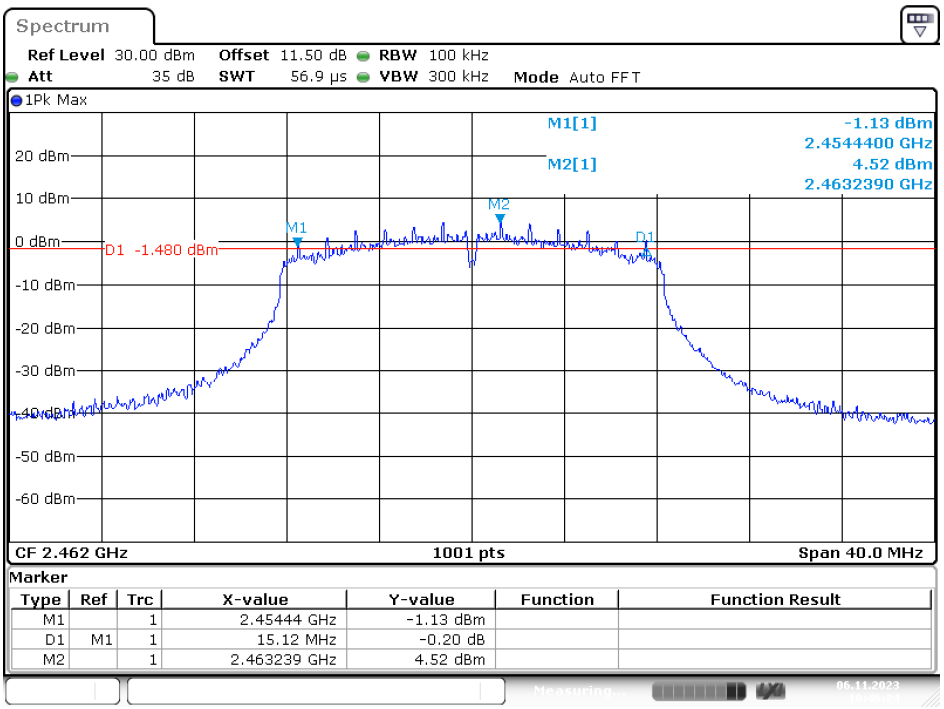
Date: 6.NOV.2023 10:42:14

Middle Channel



Date: 6.NOV.2023 10:44:02

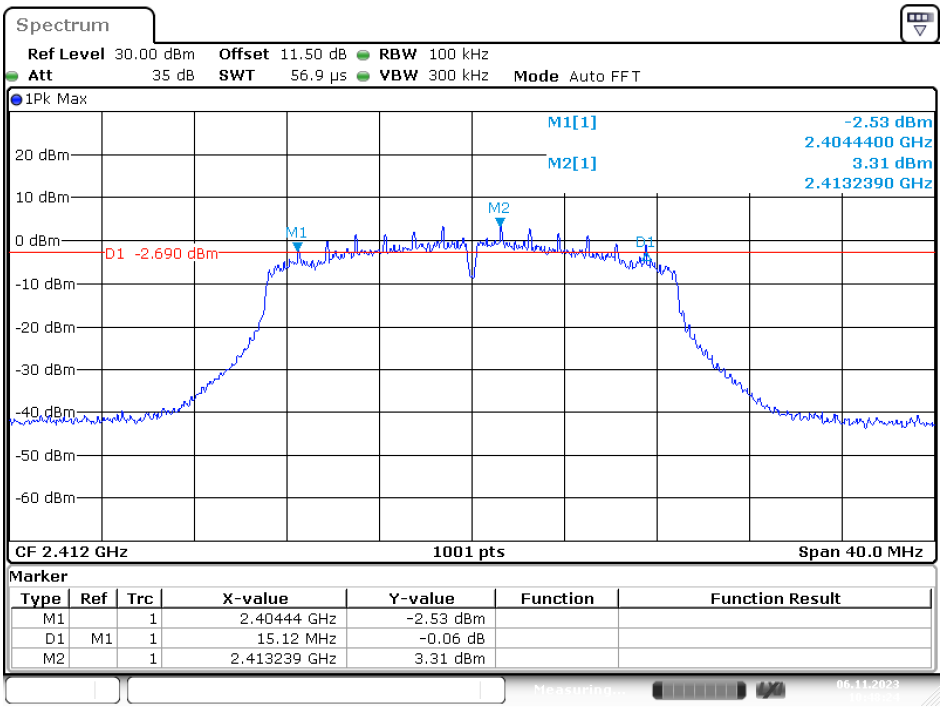
High Channel



Date: 6.NOV.2023 10:46:24

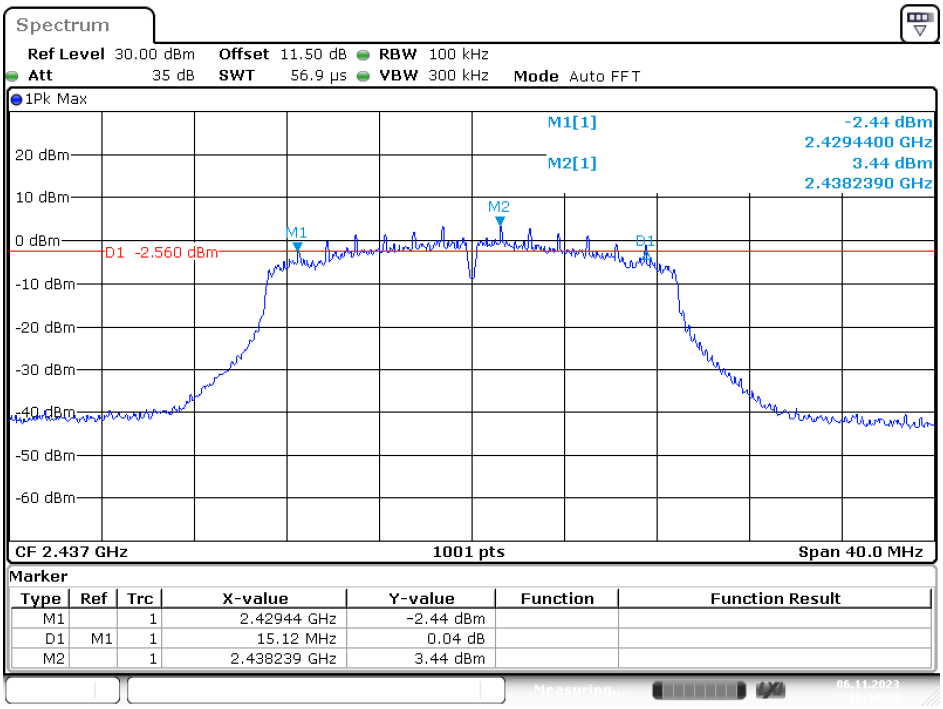
N20 Mode

Low Channel



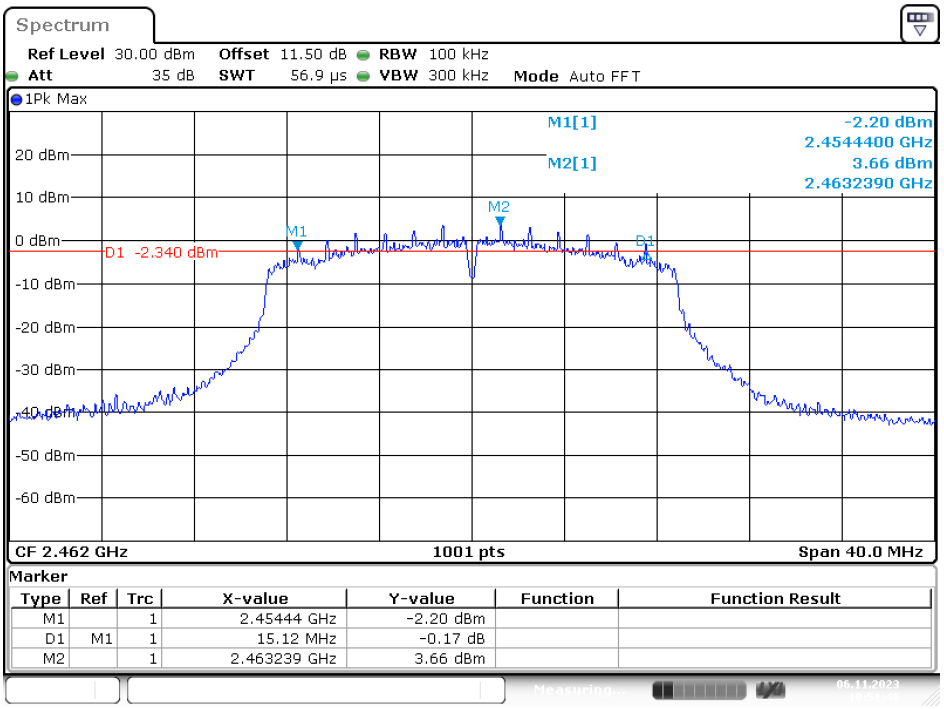
Date: 6.NOV.2023 10:48:25

Middle Channel



Date: 6.NOV.2023 10:50:20

High Channel

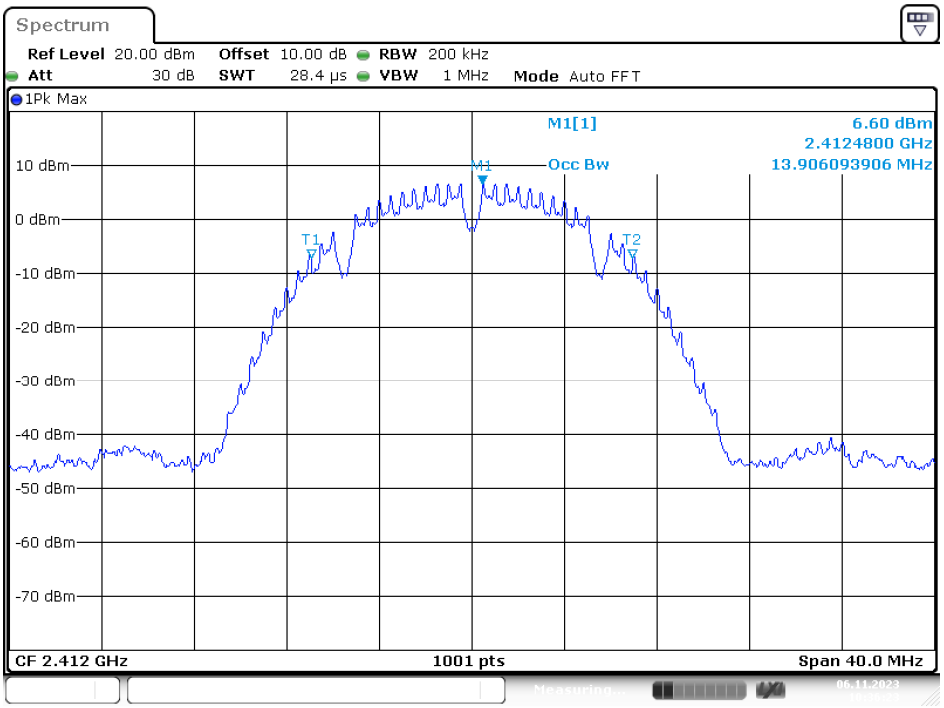


Date: 6.NOV.2023 10:51:47

99% Bandwidth

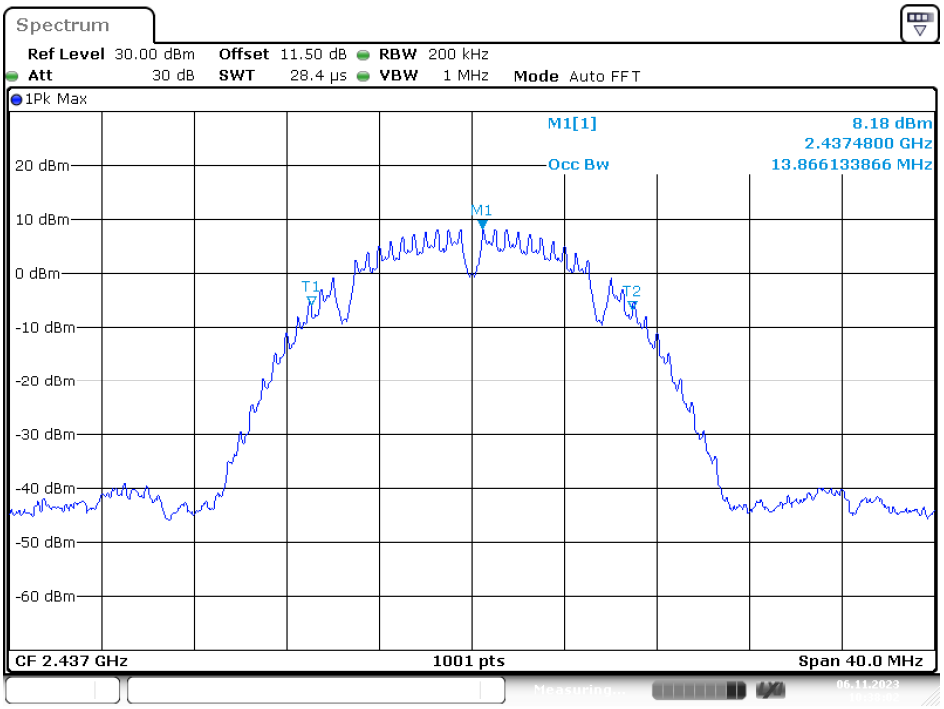
B Mode

Low Channel



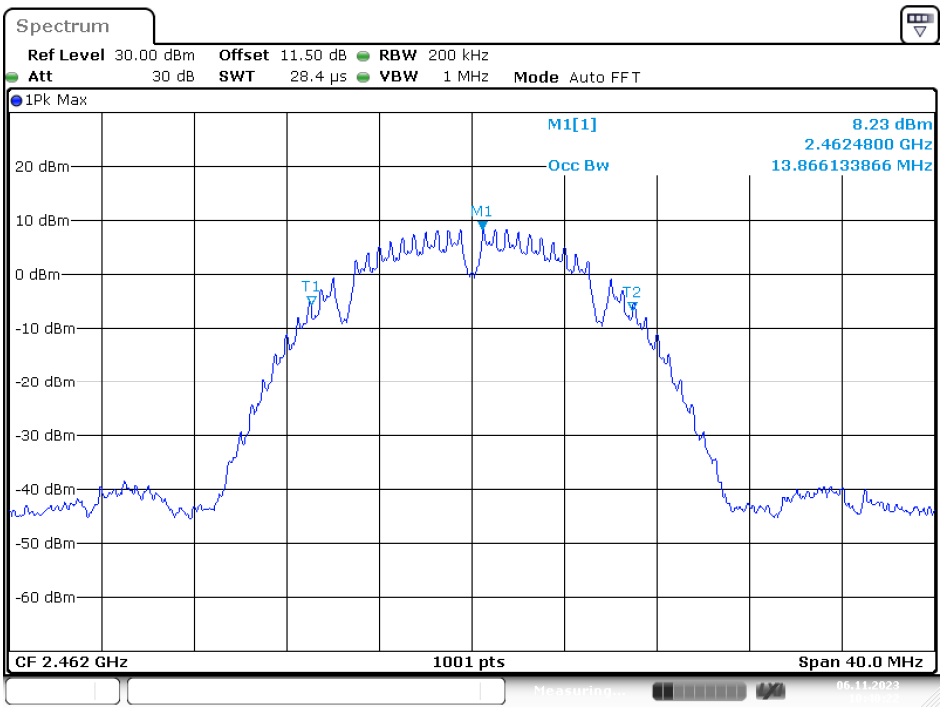
Date: 6.NOV.2023 10:36:23

Middle Channel



Date: 6.NOV.2023 10:38:03

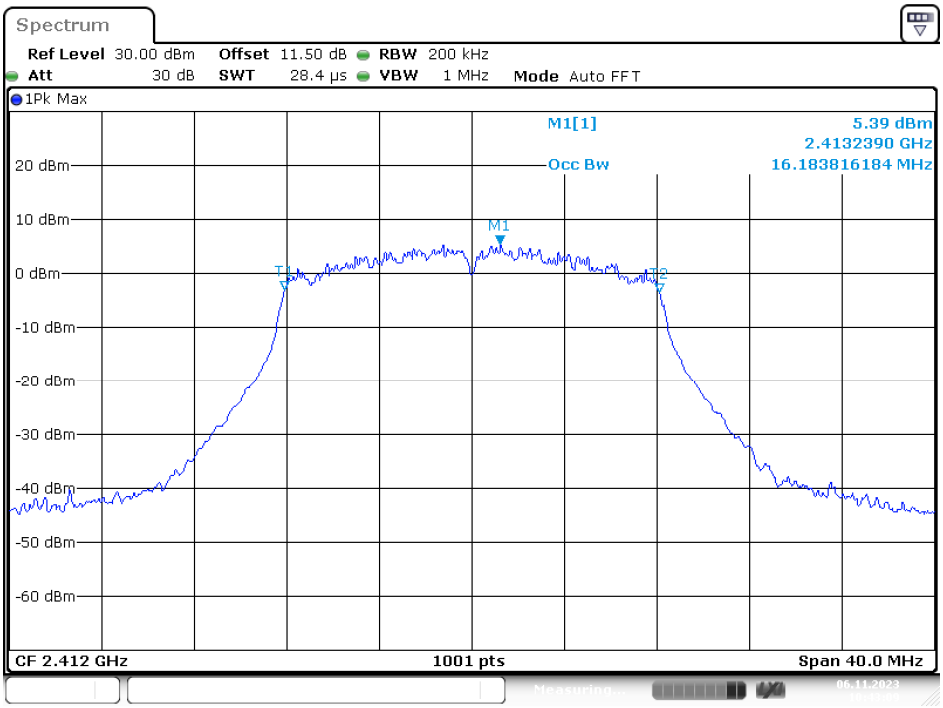
High Channel



Date: 6.NOV.2023 10:40:23

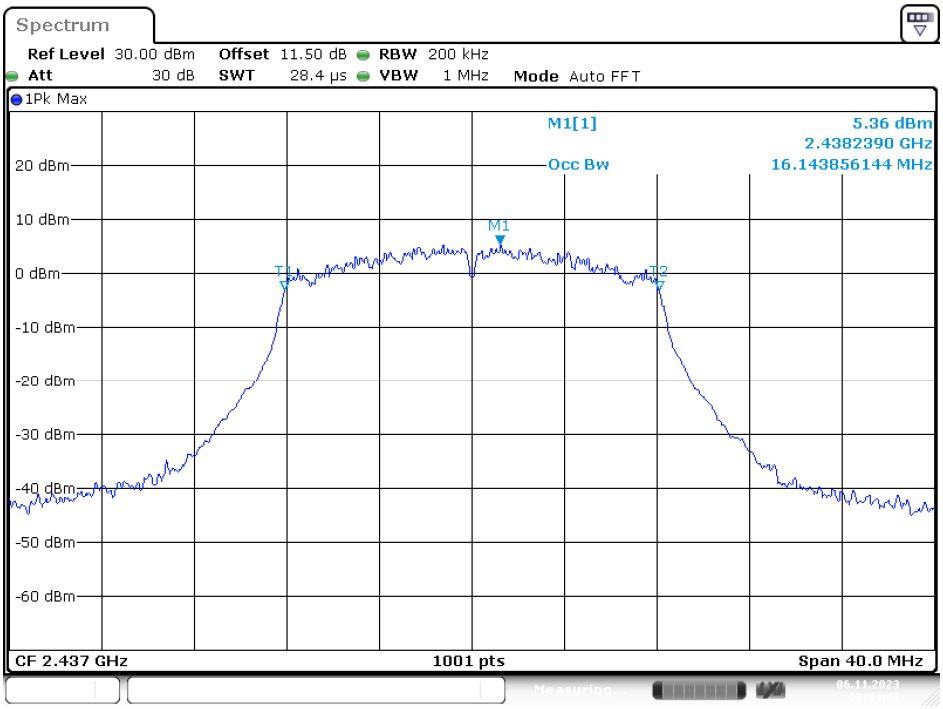
G Mode

Low Channel



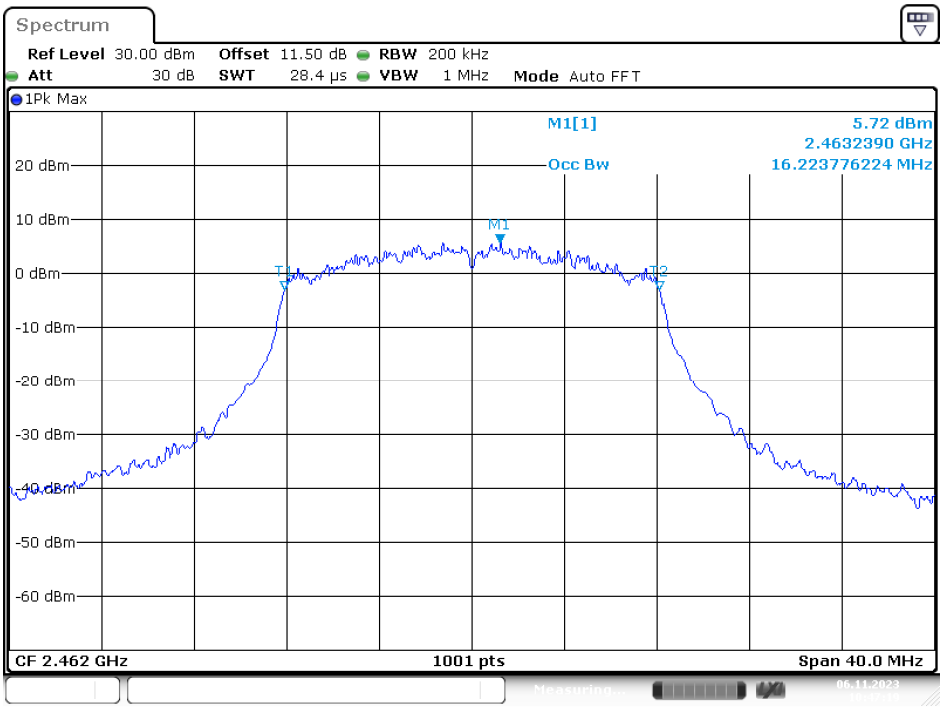
Date: 6.NOV.2023 10:43:09

Middle Channel



Date: 6.NOV.2023 10:44:42

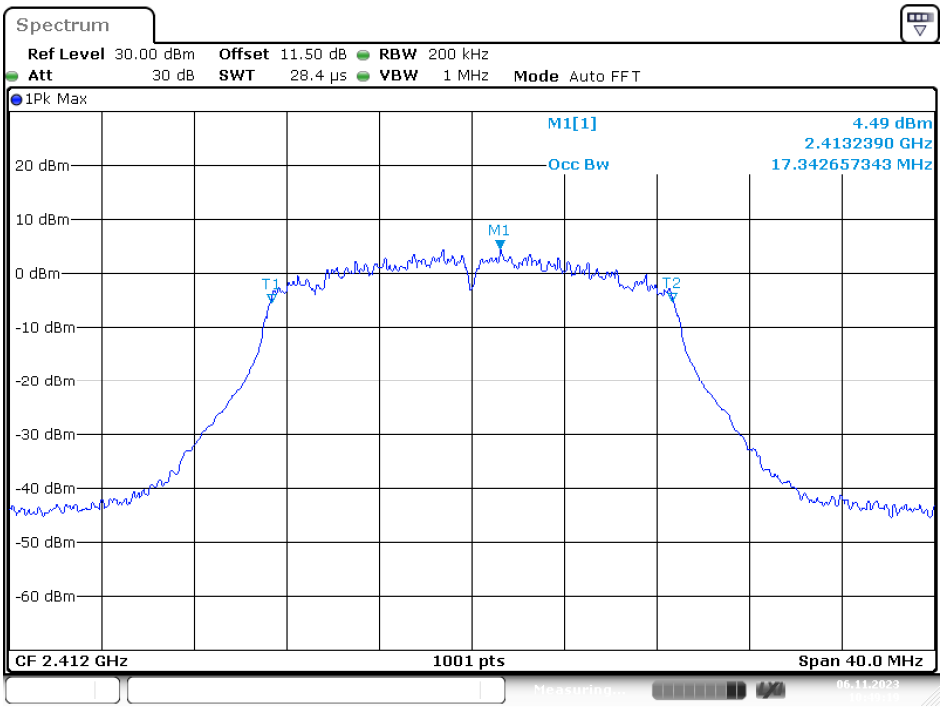
High Channel



Date: 6.NOV.2023 10:47:20

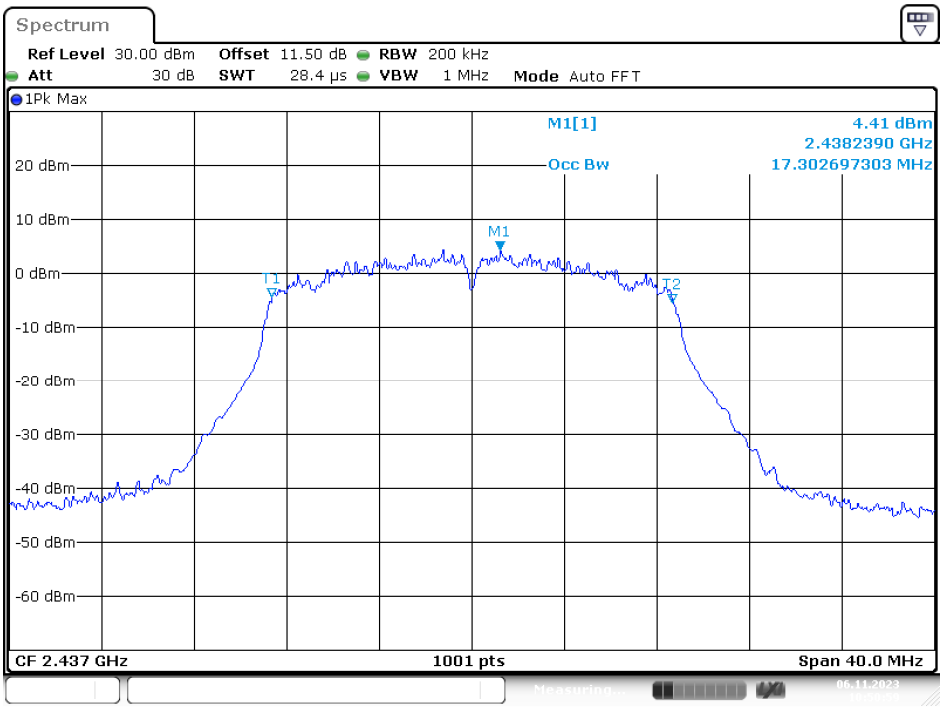
N20 Mode

Low Channel



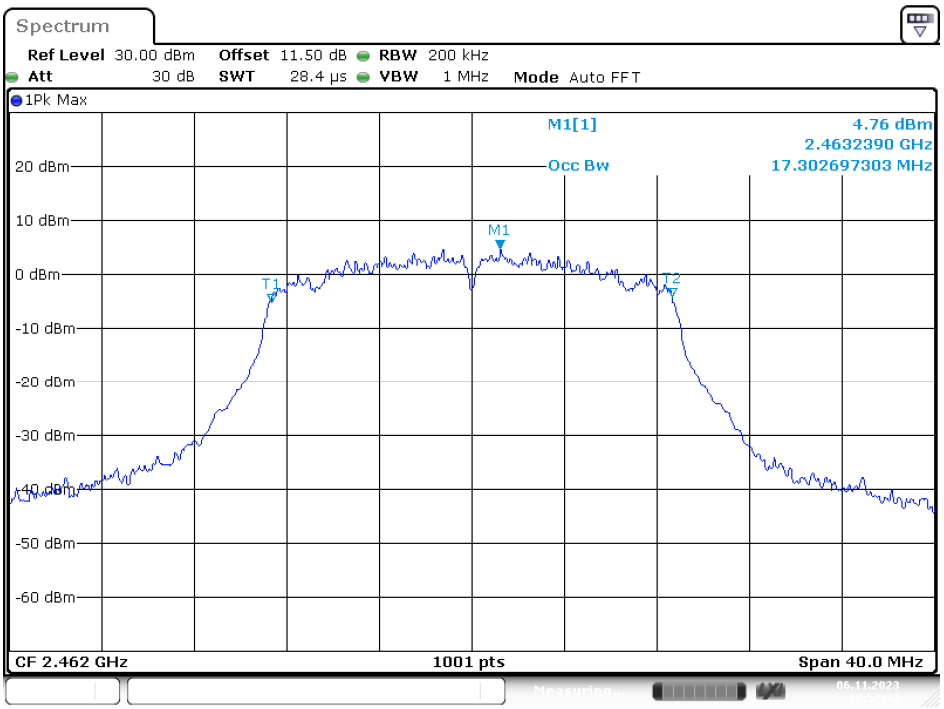
Date: 6.NOV.2023 10:49:20

Middle Channel



Date: 6.NOV.2023 10:51:00

High Channel



Date: 6.NOV.2023 10:52:42

10 FCC §15.247(b)(3) – Maximum Output Power

10.1 Applicable Standard

According to FCC §15.247(b) (3).

Systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode.

10.2 Test Procedure

According to ANSI C63.10-2013, section 11.9.1.3

1. Place the EUT on a bench and set it in transmitting mode.

2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to measuring equipment.

10.3 Test Results

Conducted Peak Output Power

Channel	Frequency (MHz)	Conducted Peak Output Power (dBm)	Limit (dBm)
802.11b Mode			
Low	2412	19.25	30
Middle	2437	19.19	30
High	2462	19.30	30
802.11g Mode			
Low	2412	23.76	30
Middle	2437	23.87	30
High	2462	24.14	30
802.11n HT20 Mode			
Low	2412	22.94	30
Middle	2437	22.33	30
High	2462	23.24	30

11 FCC §15.247(d) – 100 kHz Bandwidth of Frequency Band Edge

11.1 Applicable Standard

According to FCC §15.247(d).

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

11.2 Test Procedure

According to ANSI C63.10-2013 Section 11.11

1. Set the center frequency and span to encompass frequency range to be measured.
2. Set the RBW = 100 kHz.
3. Set the VBW ≥ [3 × RBW].
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

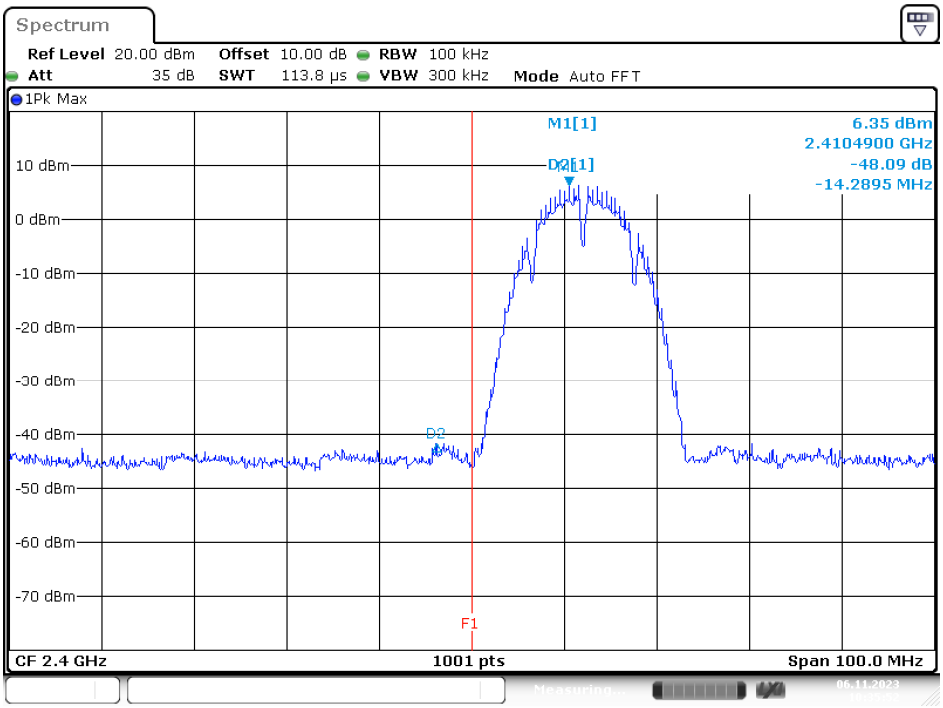
11.3 Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	48.09	≥ 20	PASS
High	2462	48.38	≥ 20	PASS
G Mode				
Low	2412	41.93	≥ 20	PASS
High	2462	43.05	≥ 20	PASS
N20 Mode				
Low	2412	42.22	≥ 20	PASS
High	2462	44.51	≥ 20	PASS

Please refer to the following plots

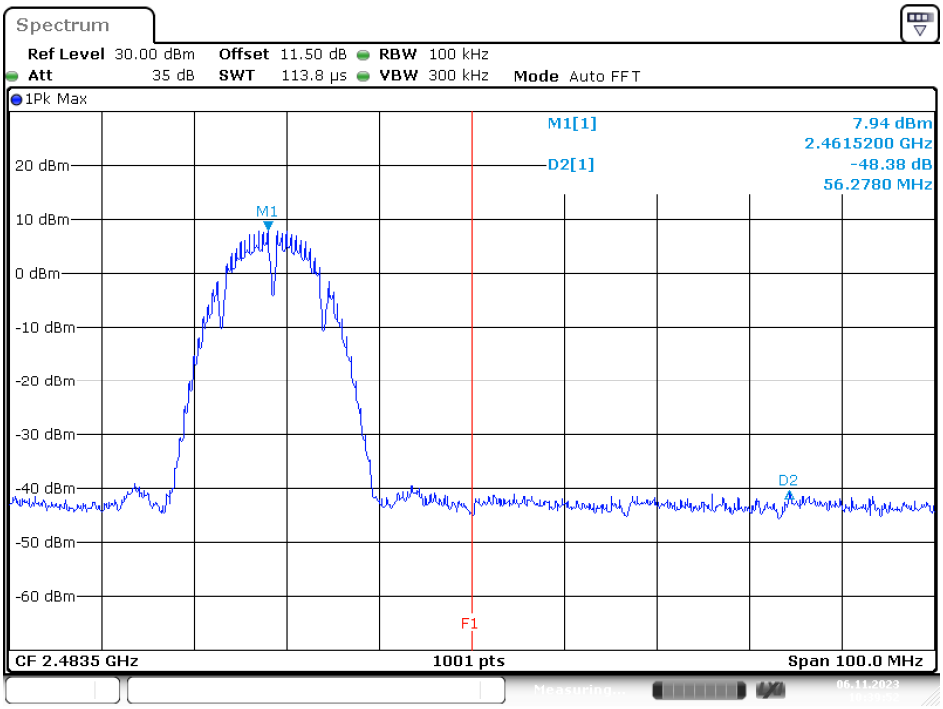
B Mode

Band Edge, Left Side



Date: 6.NOV.2023 10:35:52

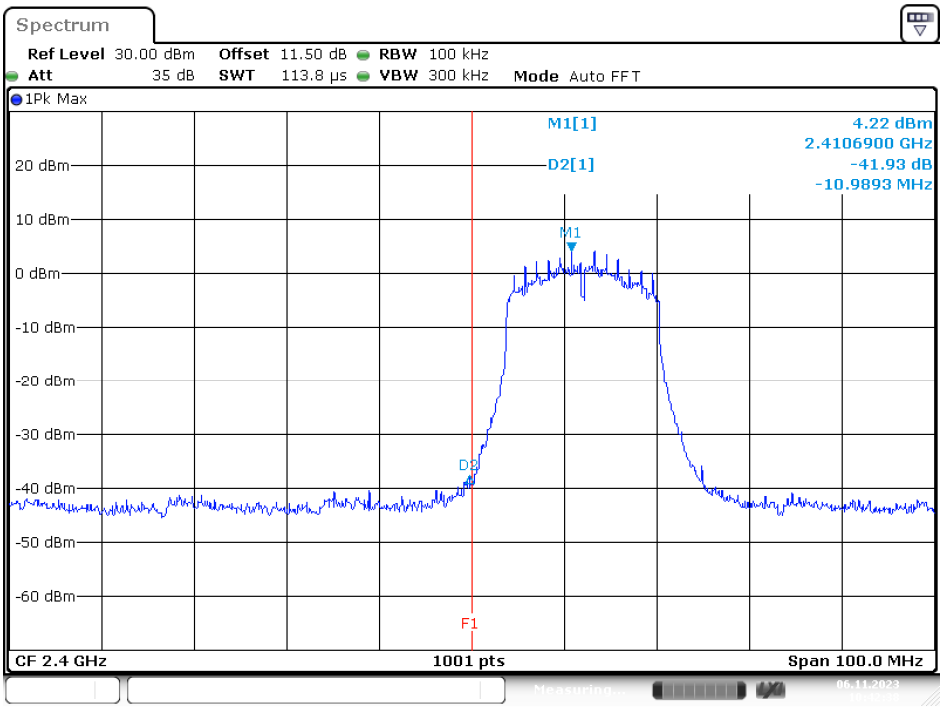
Band Edge, Right Side



Date: 6.NOV.2023 10:39:53

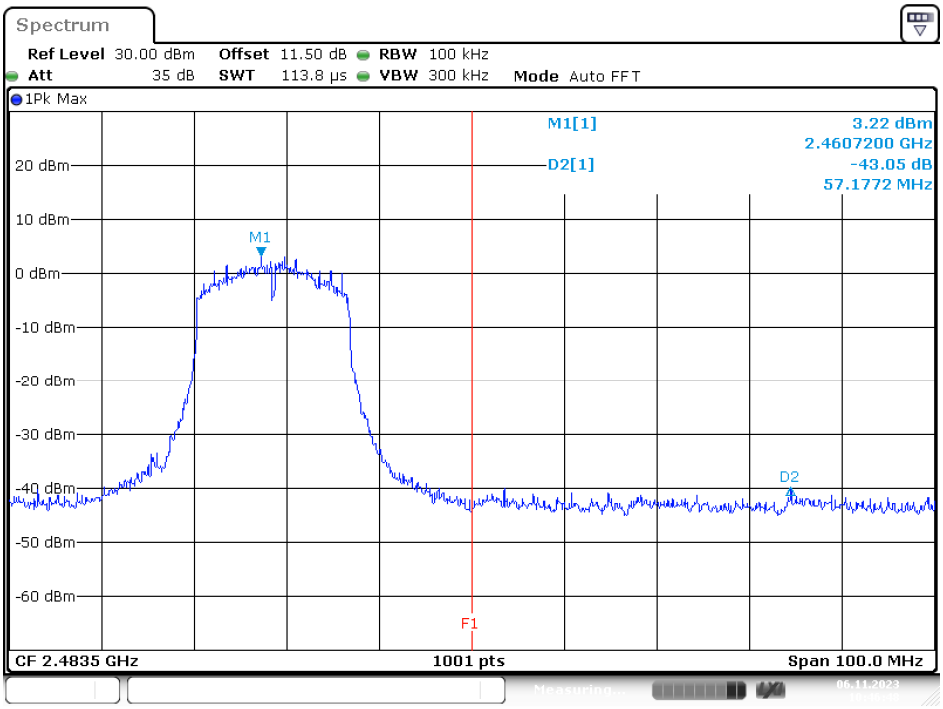
G Mode

Band Edge, Left Side



Date: 6.NOV.2023 10:42:39

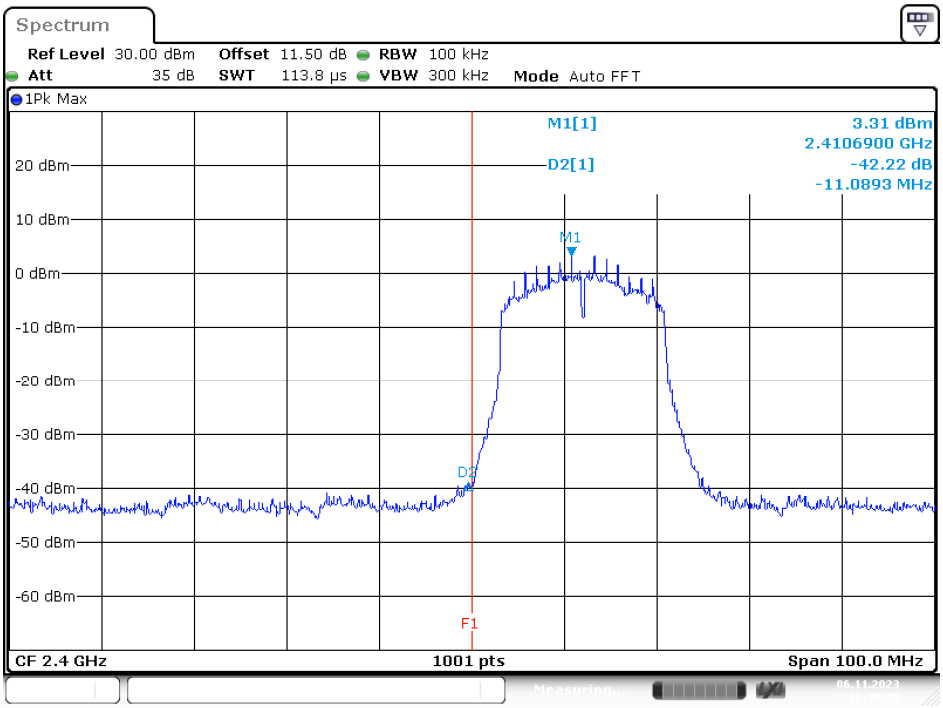
Band Edge, Right Side



Date: 6.NOV.2023 10:46:49

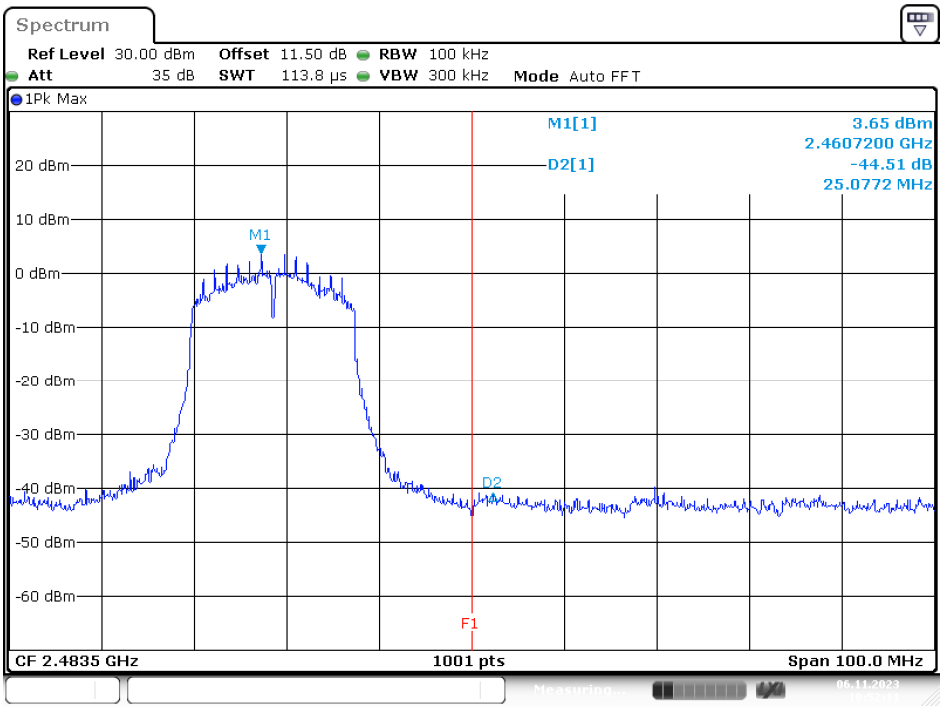
N20 Mode

Band Edge, Left Side



Date: 6.NOV.2023 10:48:49

Band Edge, Right Side



Date: 6.NOV.2023 10:52:12

12 FCC §15.247(e) – Power Spectral Density

12.1 Applicable Standard

According to FCC §15.247(e).

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

12.2 Test Procedure

According to ANSI C63.10-2013, section 11.10.2

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ [3 × RBW].
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat

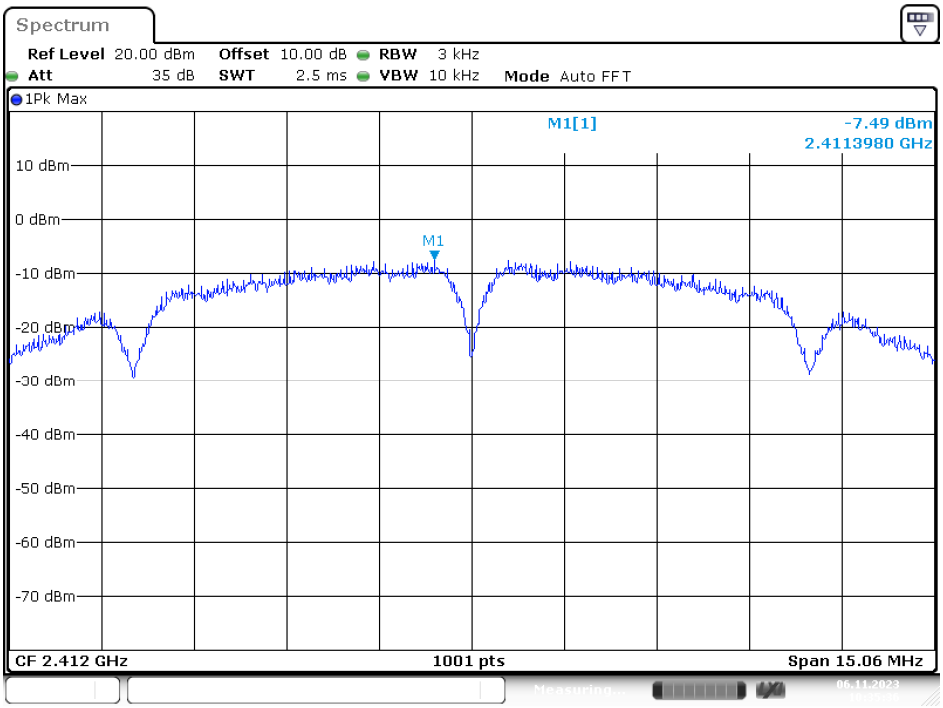
12.3 Test Results

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
B Mode				
Low	2412	-7.49	8	PASS
Middle	2437	-5.90	8	PASS
High	2462	-5.74	8	PASS
G Mode				
Low	2412	-10.79	8	PASS
Middle	2437	-10.70	8	PASS
High	2462	-10.39	8	PASS
N20 Mode				
Low	2412	-10.48	8	PASS
Middle	2437	-10.36	8	PASS
High	2462	-10.12	8	PASS

Please refer to the following plots

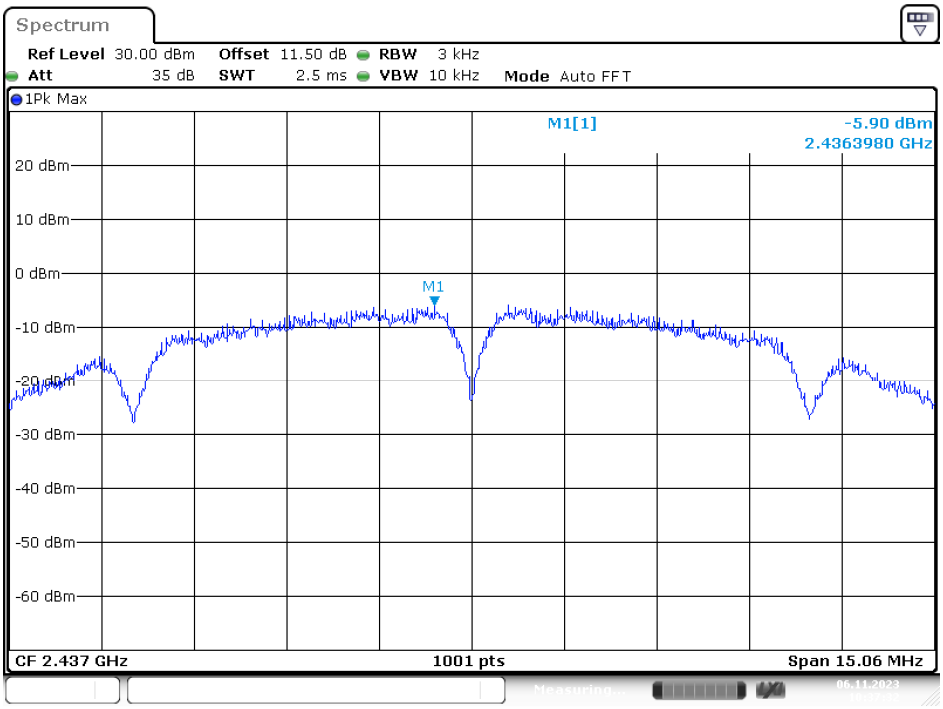
B Mode

Low Channel



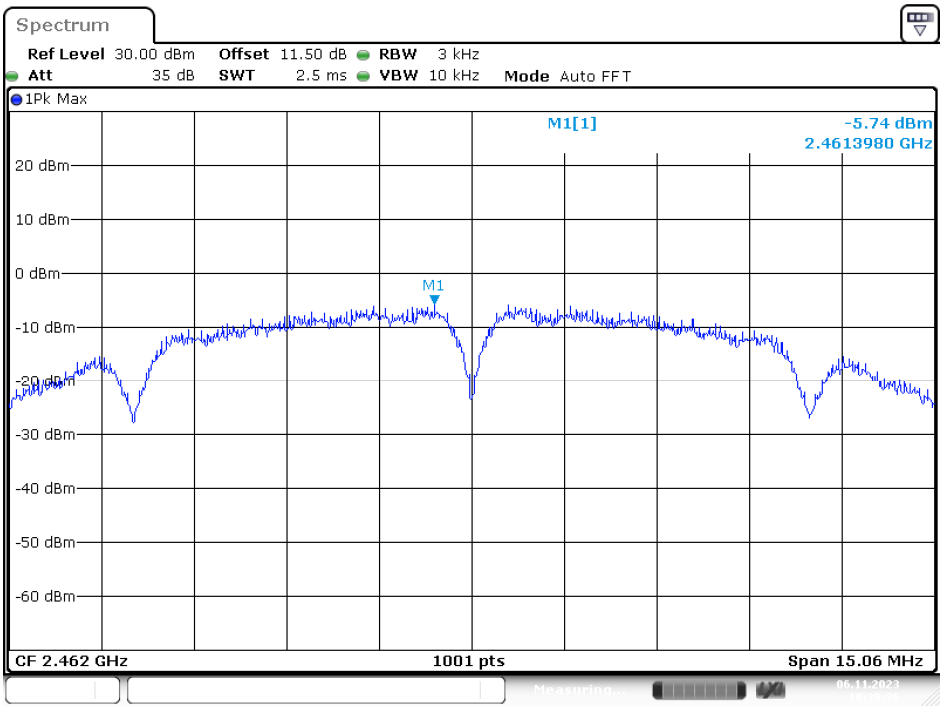
Date: 6.NOV.2023 10:35:37

Middle Channel



Date: 6.NOV.2023 10:37:32

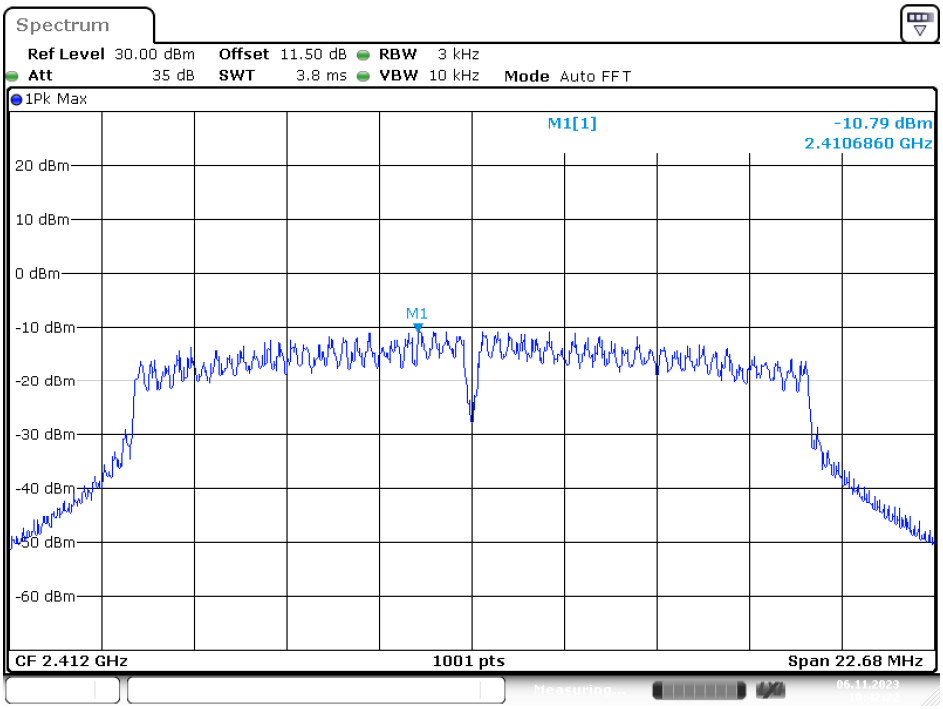
High Channel



Date: 6.NOV.2023 10:39:37

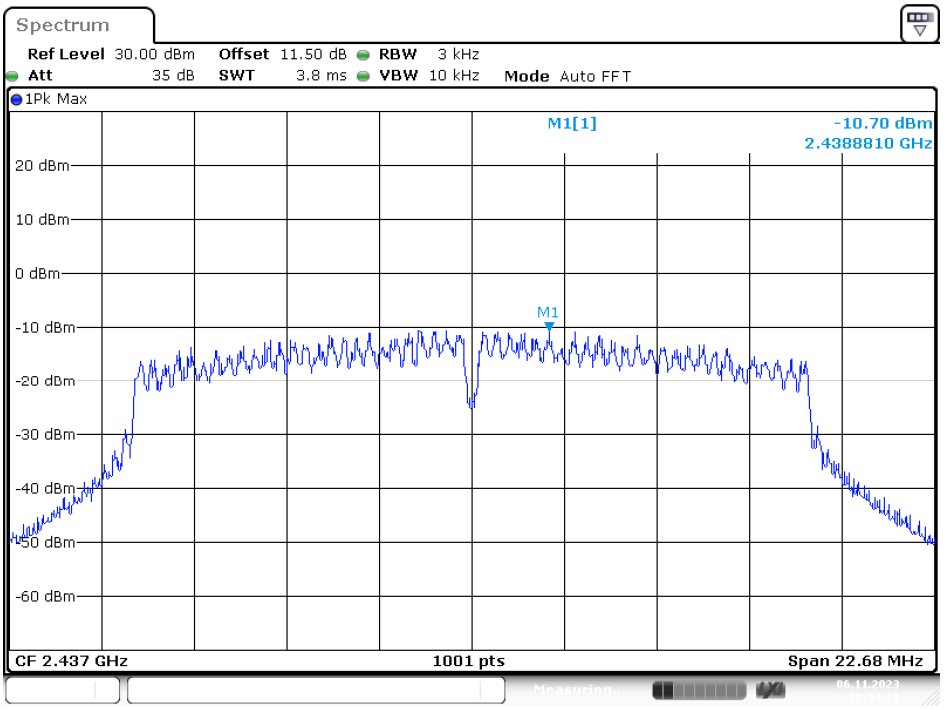
G Mode

Low Channel



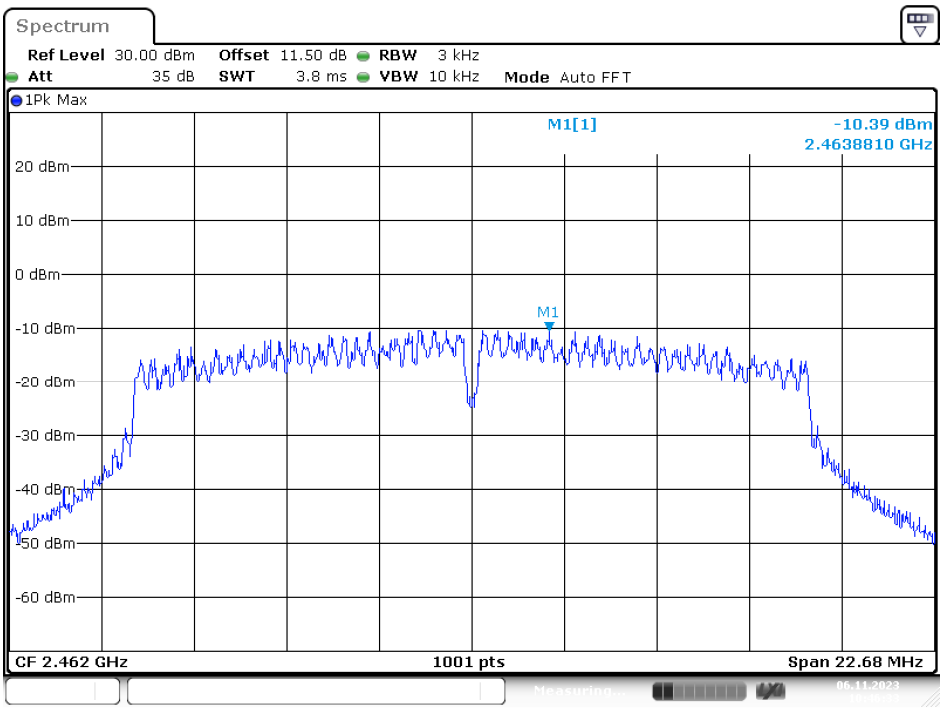
Date: 6.NOV.2023 10:42:23

Middle Channel



Date: 6.NOV.2023 10:44:11

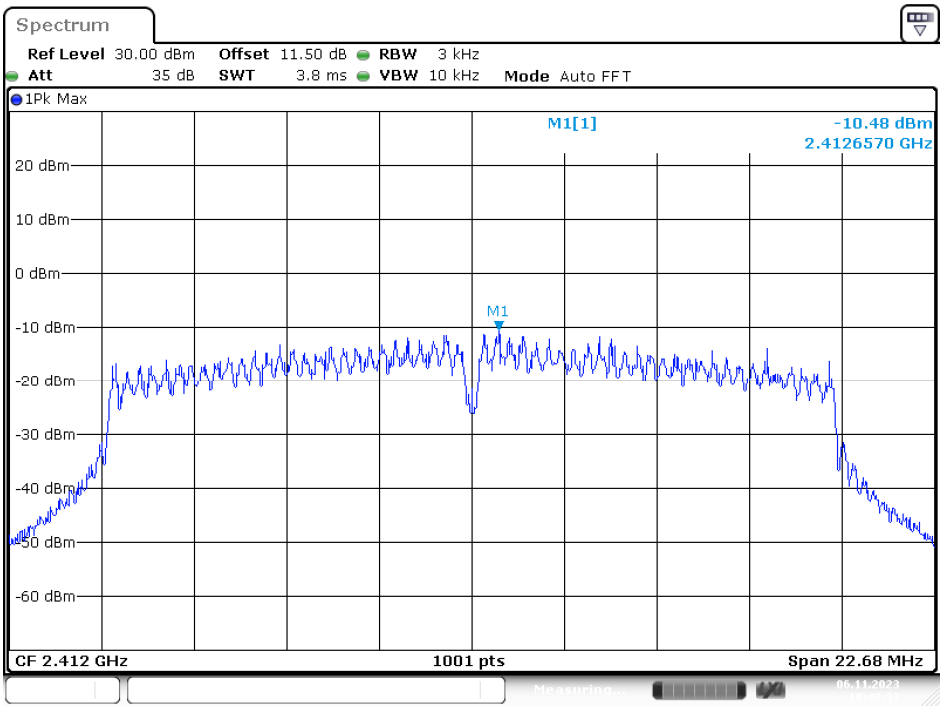
High Channel



Date: 6.NOV.2023 10:46:33

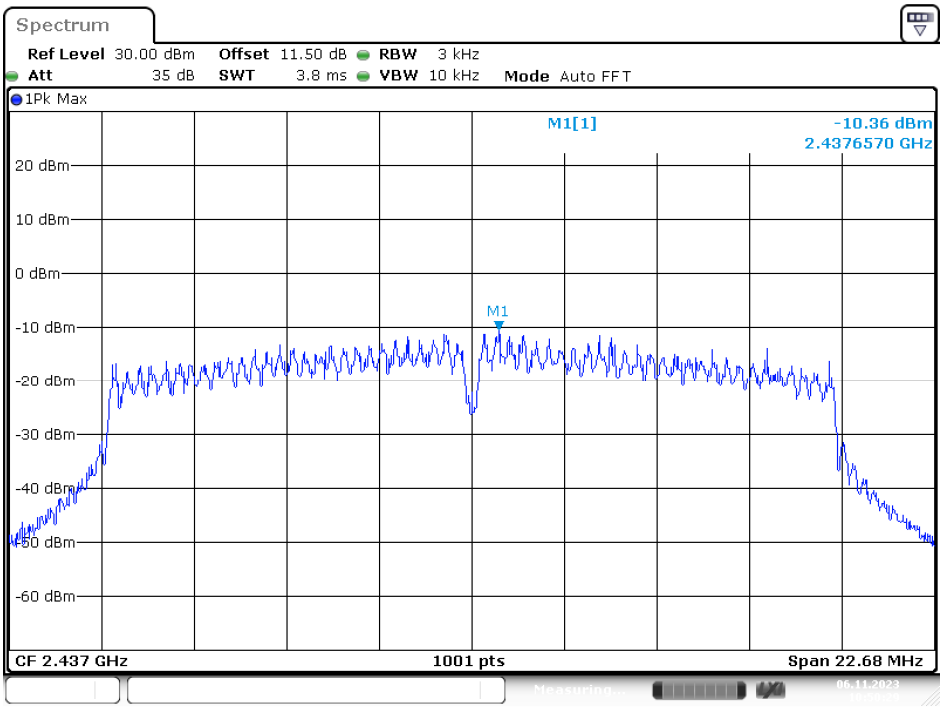
N20 Mode

Low Channel



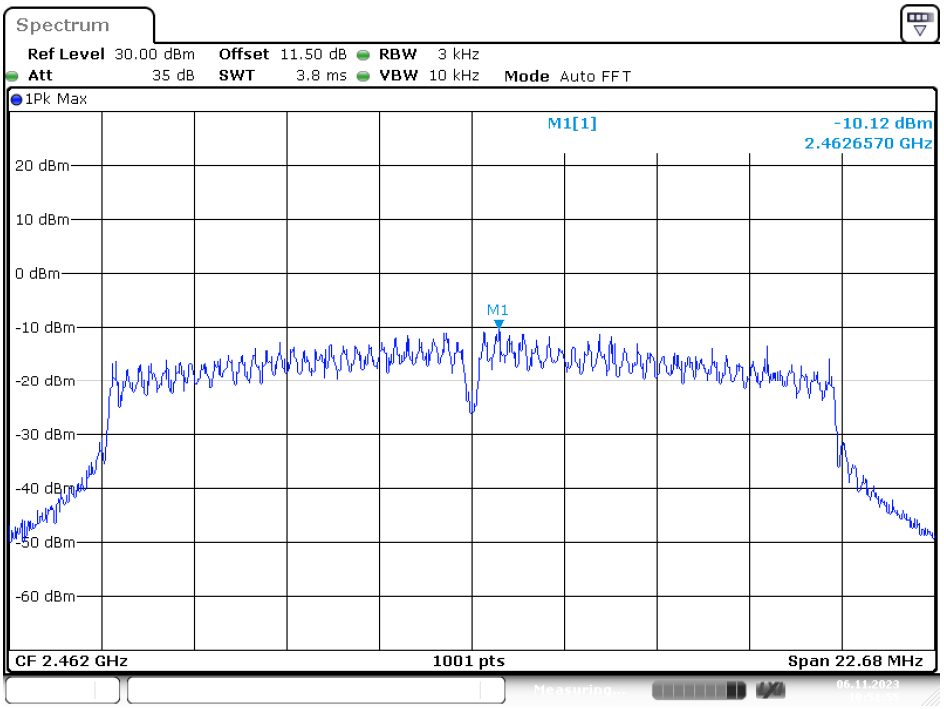
Date: 6.NOV.2023 10:48:34

Middle Channel



Date: 6.NOV.2023 10:50:29

High Channel



Date: 6.NOV.2023 10:51:56

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