RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC & ISED Certification Report

L3Harris Technologies
221 Jefferson Ridge Parkway
Lynchburg, VA 24501

TWO47 800 MHz Base Station
Model: SN-8TXMX

FCC ID: OWDTR-0168-E
IC: 3636B-0168

November 18, 2022

Standards Referenced for this Report	
Part 2: 2021	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 90: 2021	Private Land Mobile Radio Services
ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
RSS-119 Issue 12	Land Mobile and Fixed Radio Transmitters and Receivers 27.41 to 960.0 MHz

Report Prepared By: Daniel W. Baltzell

Document Number: 2022093TNB

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards. Furthermore, there was no deviation from, additions to, or exclusions from the standards referenced above.

Signature: 

Date: November 18, 2022

Typed/Printed Name: Desmond A. Fraser

Position: President

This report may not be reproduced, except in full, without the full written approval of Rhein Tech Laboratories, Inc. and L3 Harris Technologies. Test results relate only to the item tested.
This report replaces R1.1.

These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANAB.
Refer to certificate and scope of accreditation AT-1445.

FCC Equipment Class: TNB

FCC Rule Part	Frequency Range (MHz)	Rated Conducted Output Power (W)	Frequency Tolerance (ppm)	Emission Designator	Transmit Mode
90	851 – 869	100.0	0.05	8K00F1D/E	C4FM Data/Voice
90	851 – 869	100.0	0.05	9K70D1W	WCQPSK
90	851 – 869	100.0	0.05	9K80D7W	HDQPSK
90	851 – 869	100.0	0.05	18K8D1W	HVD-SMR
90	851 – 869	100.0	0.05	12K5D1W	HVD-NPSPAC

** power is conducted*

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1 Test Result Summary

Test	FCC Reference	ISED Reference	Result
RF Power Output	2.1046(a), 90.635	RSS-119 4.1, 5.4	Complies
Spurious Emissions at Antenna Terminals	2.1051, 90.210	RSS-119 5.5, 5.8	Complies
Field Strength of Spurious Radiation	2.1053(a), 90.210	RSS-119 5.5, 5.8	Complies
Occupied Bandwidth/Emission Masks	2.1049(c)(1), 90.210	RSS-119 5.5, 5.8	Complies
Frequency Stability vs. Temperature and Voltage	2.1055, 90.213	RSS-119 5.3	Complies
99% Bandwidth	N/A	RSS-Gen	N/A

2 General Information

The following Certification Report is prepared on behalf of L3Harris Technologies in accordance with the Federal Communications Commission and ISED Canada rules and regulations. The Equipment Under Test (EUT) was the SN-8TXMX; FCC ID: OWDTR-0168-E, IC: 3636B-0168.

All measurements contained in this application were conducted in accordance with the applicable sections of FCC Rules and Regulations CFR 47 Parts 2 and 90. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

2.1 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170.

ISED CAB ID: US0079, Company Number: 2956A

2.2 Related Submittal(s)/Grant(s)

This is an original certification application for L3Harris Technologies Model/HVIN: SN-8TXMX, FCC ID: OWDTR-0168-E, IC: 3636B-0168.

2.3 Grant Notes

The output power is continuously variable from the value listed in this entry to 5%-10% of the value listed. Output power is conducted. The antenna(s) used for this transmitter must be fixed-mounts on outdoor permanent structures. RF exposure compliance at the time of licensing, as required by the responsible FCC Bureau(s) including antenna co-location requirements of §1.1307(b)(3).

2.4 Tested System Details

The test sample was received on September 30, 2022. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

The device was programmed for multiple modes of operation and modulation types.

Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model/HVIN	PN/SN	FCC ID	ISED ID	RTL Bar Code
Base Station	L3Harris Technologies	Two47 800 MHz	CK22J1300023	OWDTR-0168-E	3636B-0168	24217
Base Station	L3Harris Technologies	Two47 800 MHz	CK22J1500034	OWDTR-0168-E	3636B-0168	24218

2.5 Configuration of Tested System

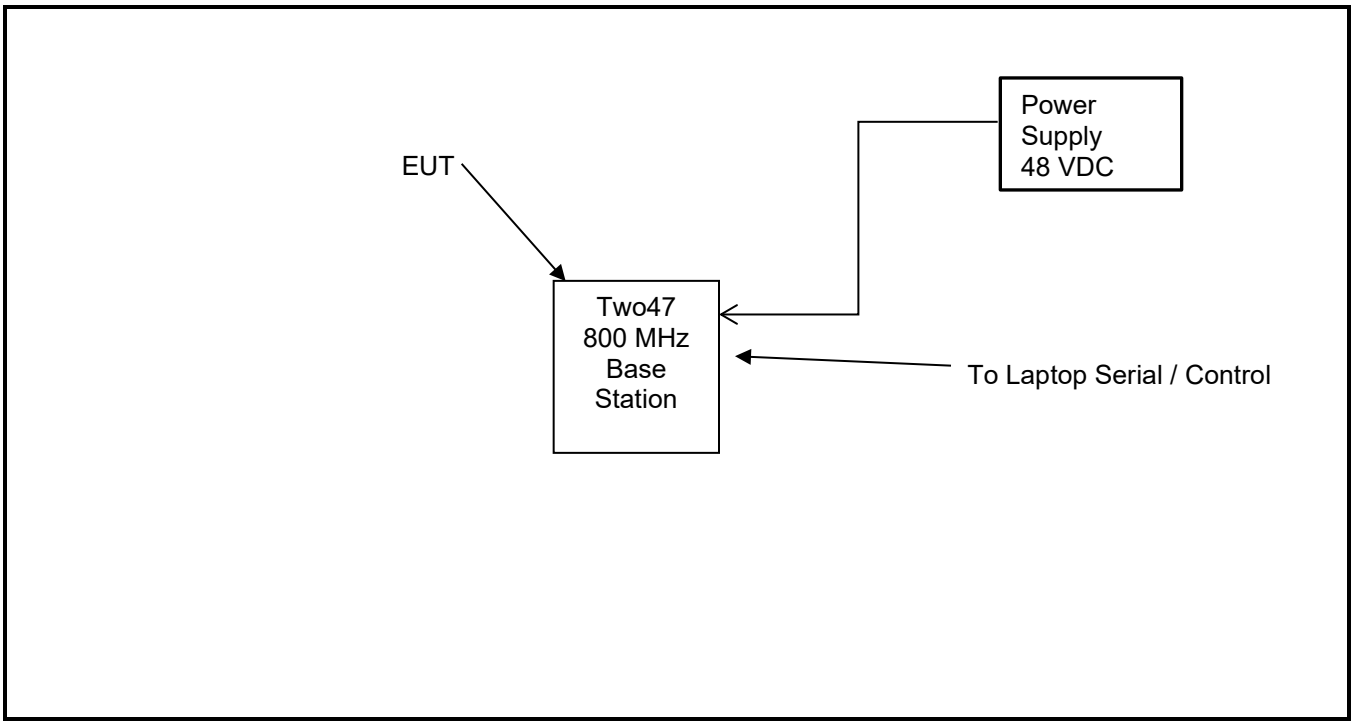


Figure 2-1: Configuration of Tested System

3 Test Modes

In accordance with C63.26-2015 Table 2, because the EUT operates over a frequency range greater than 10 MHz the following frequencies were tested:

Table 3-1: Channels Tested

Channel	Frequency (MHz)
Low	851.00625
Middle	860.00625
High	868.99375

4 FCC Part 2.1033(C)(8): Voltages and Currents through the Final Amplifying Stage

+50 VDC / 7.5 A

5 FCC Part 2.1046(a): RF Power Output: Conducted; ISED RSS-119 4.1: Transmitter Output Power

5.1 Test Procedure

ANSI C63.26, section 5.2

The EUT was connected to a coaxial attenuator having a 50 Ω load impedance.

Manufacturer's rated power: 100.0 W

5.2 Test Data

Table 5-1: RF Conducted Output Power – Measured

Frequency (MHz)	High Power (dBm)	High Power (W)	Low Power (dBm)	Low Power (W)
851.00625	50.2	104.7	40.0	10.0
860.00625	50.2	104.7	40.0	10.0
868.99375	50.2	104.7	40.0	10.0

Notes: Data presented is for analog mode. All other modes were investigated and found to have equivalent power within measurement tolerances.

Measurement uncertainties shown for these tests are expanded uncertainties expressed at the 95% confidence level using a coverage factor K=2. Measurement uncertainty: ±0.8 dB

Results: Pass

Table 5-2: Test Equipment Used For Testing RF Power Output – Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901184	Agilent	E4416A	Power Meter	GB41050573	10/15/2023
901671	Agilent	E9300	Power Sensor	MY41495766	10/15/2023
901338	Weinschel	46-40-34	40 dB 25 W Attenuator	BM0556	02/21/2023
901291	Pasternack	PE7031-20	20 dB 300 W Attenuator	901291	02/21/2023
901774	Rosenberger	LU7-022-1000	Cable	011	05/02/2023

Test Personnel:

Daniel W. Baltzell		October 7, 2022
EMC Test Engineer	Signature	Date of Test

6 FCC Part 2.1051: Spurious Emissions at Antenna Terminals; Part 90.210: Emission Limitations; ISED RSS-119 5.8: Transmitter Unwanted Emissions

6.1 Test Procedure

ANSI C63.26, Section 5.7

The transmitter is terminated with a 50 Ω load and interfaced with a spectrum analyzer.

Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence.

6.2 Test Data

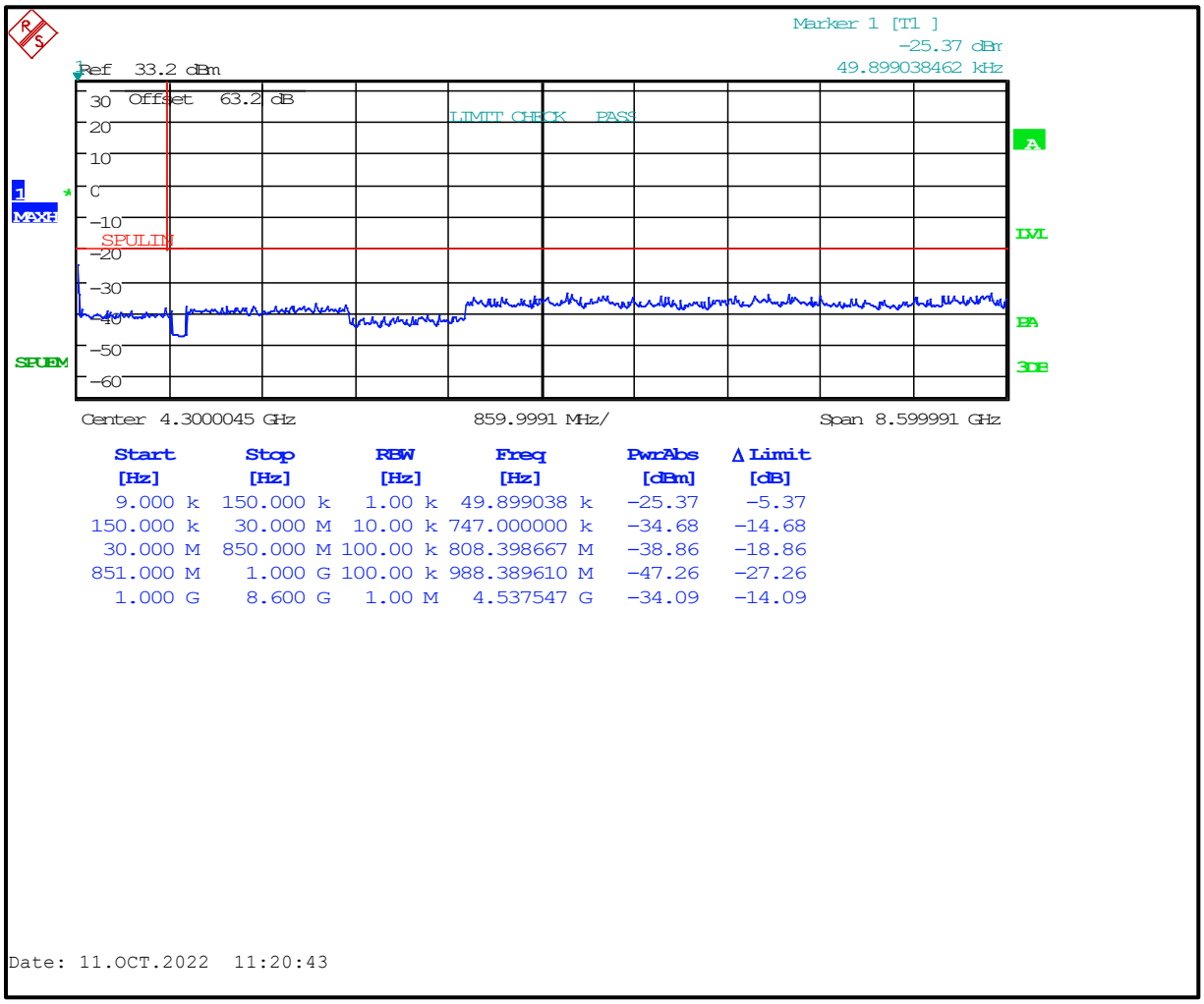
Frequency range of measurement per Part 2.1057: 9 kHz to 10 x Fc

Limits: (43+10LOG P(W)) for wideband and 50 + 10 LOG P(W)) for narrowband

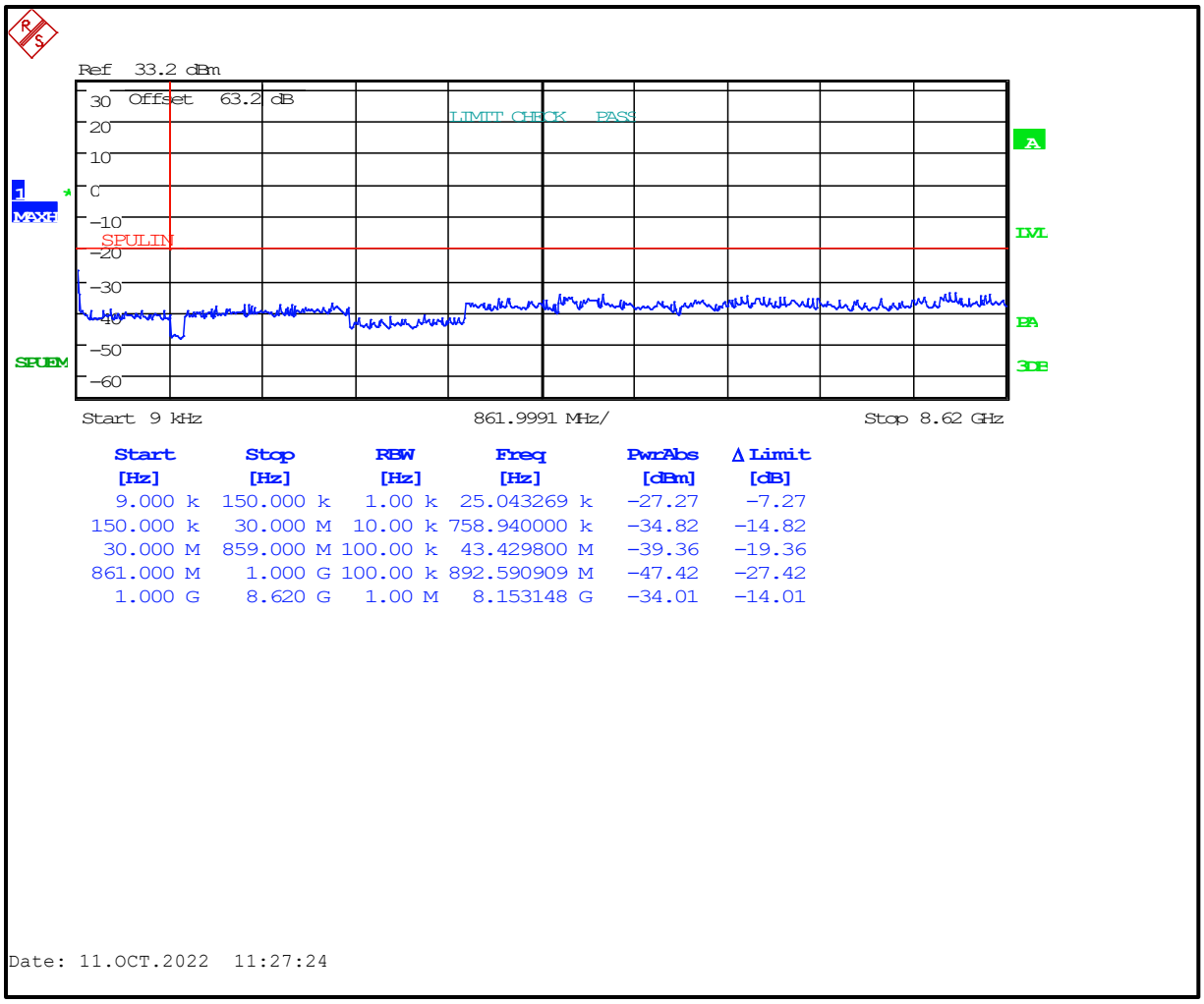
Both high and low power settings were investigated; high power was found to be worst case and is presented.

6.3 Test Data

Plot 6-1: Conducted Spurious Emissions – 851.00625 MHz

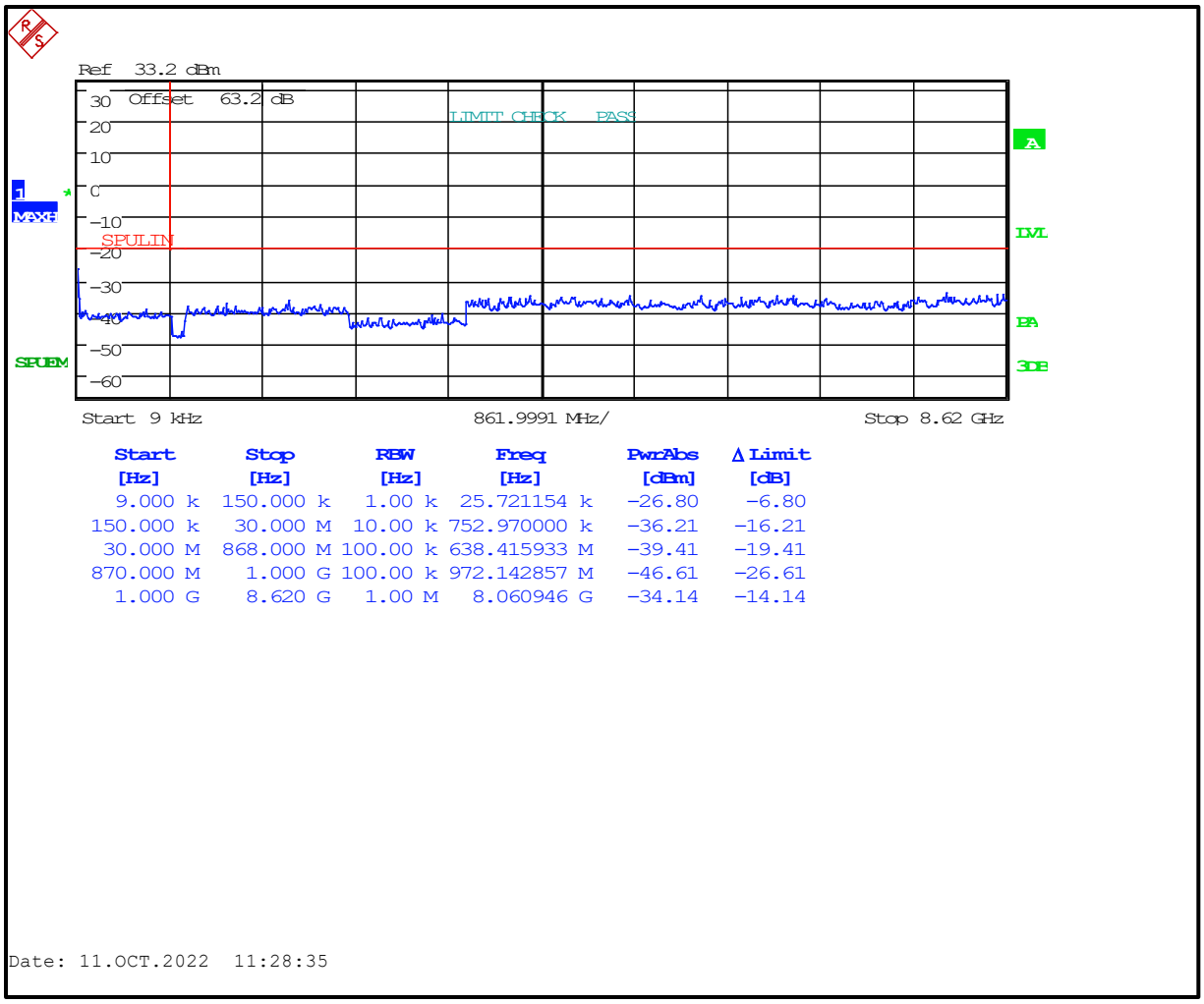


Plot 6-2: Conducted Spurious Emissions – 860.00625 MHz



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
9.000 k	150.000 k	1.00 k	25.043269 k	-27.27	-7.27
150.000 k	30.000 M	10.00 k	758.940000 k	-34.82	-14.82
30.000 M	859.000 M	100.00 k	43.429800 M	-39.36	-19.36
861.000 M	1.000 G	100.00 k	892.590909 M	-47.42	-27.42
1.000 G	8.620 G	1.00 M	8.153148 G	-34.01	-14.01

Plot 6-3: Conducted Spurious Emissions – 868.99375 MHz



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
9.000 k	150.000 k	1.00 k	25.721154 k	-26.80	-6.80
150.000 k	30.000 M	10.00 k	752.970000 k	-36.21	-16.21
30.000 M	868.000 M	100.00 k	638.415933 M	-39.41	-19.41
870.000 M	1.000 G	100.00 k	972.142857 M	-46.61	-26.61
1.000 G	8.620 G	1.00 M	8.060946 G	-34.14	-14.14

Measurement uncertainties shown for these tests are expanded uncertainties expressed at the 95% confidence level using a coverage factor K=2. Measurement uncertainty: ±0.8 dB

Results: Pass

Table 6-1: Test Equipment Used For Testing Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	12/01/2024
901338	Weinschel	46-40-34	40 dB 25 W Attenuator	BM0556	02/21/2023
901291	Pasternack	PE7031-20	20 dB 300 W Attenuator	901291	02/21/2023
901128	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	10/15/2022
901132	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	10/15/2022
901591	Sucoflex	104	6.5' SMA Cable	145880/4	04/12/2023

Test Personnel:

Daniel W. Baltzell		October 11, 2022
EMC Test Engineer	Signature	Date of Test

7 FCC Part 90.210 and Part 2.1053(a): Field Strength of Spurious Emissions; ISED RSS-119 5.8.9.2: Out-of-band Emission Limit

7.1 Test Procedure

ANSI C63.26 section 5.5

The device uses digital modulation modulated to its maximum extent using a pseudo-random data sequence.

The spurious emissions levels were measured, and the device under test was replaced by a substitution antenna connected to a signal generator. This signal generator level was then corrected by subtracting the cable loss from the substitution antenna to the signal generator, and the gain of the antenna (dBi) was added to achieve the EIRP level, then converted from the corrected signal generator level (dBm) to dBc, or dBW for GNSS band (if applicable), and compared to the limit.

7.2 Test Data

Table 7-1: Field Strength of Spurious Radiation – 851.00625 MHz

Conducted Power 50.2 dBm; 104.7 W; Limit=50+10 Log P=70.2 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1702.01250	29.0	-38.8	0.9	6.4	83.5	-13.3
2553.01875	2.0	-72.3	1.2	7.4	116.2	-46.0
3404.02500	22.5	-53.5	1.4	7.6	97.5	-27.3
4255.03125	-5.7	-76.0	1.6	8.6	119.2	-49.0
5106.03750	15.8	-54.0	1.7	8.7	97.2	-27.0
5957.04375	14.2	-55.6	1.9	9.6	98.1	-27.9
6808.05000	-0.3	-68.9	2.0	9.5	111.6	-41.4
7659.05625	4.3	-63.3	2.1	9.2	106.4	-36.2
8510.06250	-0.2	-62.9	2.2	9.4	105.9	-35.7

Table 7-2: Field Strength of Spurious Radiation – 860.00625 MHz

Conducted Power 50.2 dBm; 104.7 W; Limit=50+10 Log P=70.2 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1720.01250	27.4	-39.1	0.9	6.4	83.7	-13.5
2580.01875	11.8	-62.4	1.2	7.4	106.4	-36.2
3440.02500	15.8	-60.1	1.4	7.6	104.1	-33.9
4300.03125	5.8	-64.5	1.6	8.7	107.5	-37.3
5160.03750	3.2	-66.2	1.8	8.6	109.5	-39.3
6020.04375	23.6	-46.1	1.9	9.4	88.7	-18.5
6880.05000	6.7	-62.0	2.0	9.5	104.8	-34.6
7740.05625	4.9	-62.8	2.1	9.3	105.8	-35.6
8600.06250	-6.0	-68.7	2.2	9.6	111.5	-41.3

Table 7-3: Field Strength of Spurious Radiation – 868.99375 MHz

Conducted Power 50.2 dBm; 104.7 W; Limit=50+10 Log P=70.2 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1737.98750	25.8	-40.6	0.9	6.5	85.3	-15.1
2606.98125	18.2	-56.6	1.2	7.4	100.6	-30.4
3475.97500	22.6	-53.4	1.4	7.6	97.4	-27.2
4344.96875	-2.8	-73.4	1.6	8.8	116.4	-46.2
5213.96250	3.7	-66.1	1.8	8.6	109.5	-39.3
6082.95625	17.4	-52.3	1.9	9.3	95.1	-24.9
6951.95000	-0.7	-69.4	2.0	9.5	112.1	-41.9
7820.94375	3.7	-63.6	2.1	9.3	106.6	-36.4
8689.93750	-9.6	-71.9	2.2	9.5	114.8	-44.6

Measurement uncertainties shown for these tests are expanded uncertainties expressed at the 95% confidence level using a coverage factor K=2. Measurement uncertainty: ±4.6 dB

Results: Pass

Table 7-4: Test Equipment Used For Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter antenna mast, polarizing	OATS1	N/A
901729	Insulated Wire Inc.	KPS-1503-3150-KPR	SMK RF Cables 20'	NA	12/06/2022
901128	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	10/15/2023
901132	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	10/15/2023
901477	Micro-Coax	UFA210A-0-0360-300300	RF cable. 0.04 - 18 GHz	212349-002	4/12/2023
901242	Rhein Tech Laboratories	WRT-000-0003	Wood rotating table	N/A	N/A
901669	ETS-Lindgren	3142E	Biconilog Antenna (30 MHz – 6000 MHz)	00166065	07/11/2025
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	08/05/2024
900323	EMCO	3160-07	Horn Antenna (8.2 - 12.4 GHz)	9605-1054	08/05/2024
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	08/05/2024
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	12/01/2024
901582	Rohde & Schwarz	1167.0000.02	Signal Generator	101903	05/23/2024

Test Personnel:

Daniel W. Baltzell		October 13, 2022
Test Engineer	Signature	Date of Tests

8 FCC Part 2.1049(c)(1): Occupied Bandwidth; Part 90.210 Authorized Bandwidth; ISED RSS-119 5.5: Channel Bandwidth, Authorized Bandwidth, Occupied Bandwidth and Spectrum Masks

Occupied Bandwidth - Compliance with the Emission Masks

8.1 Test Procedure

ANSI C63.26-2015, section 5.4

Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence.

Part 90.210 Authorized Bandwidth

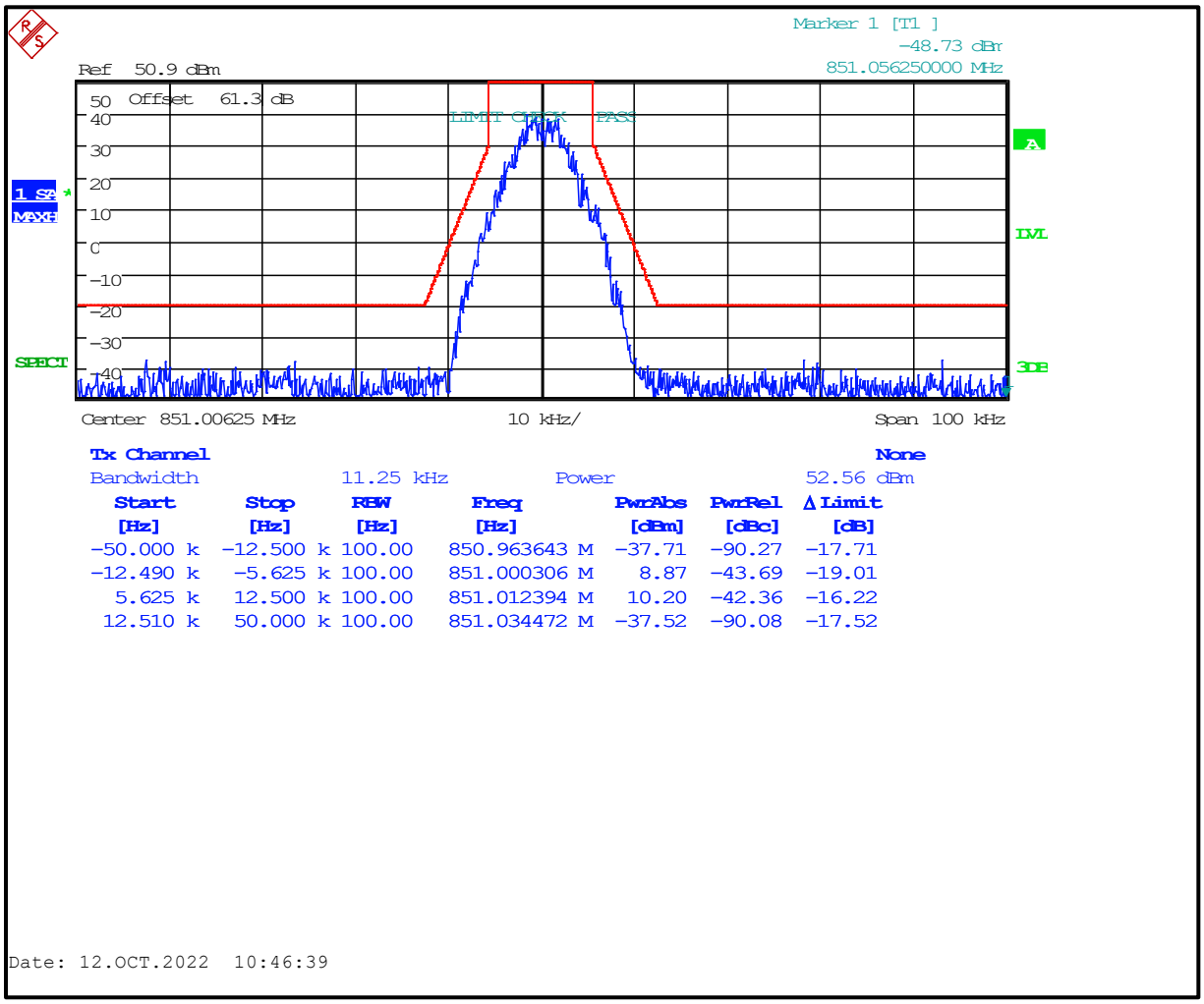
Applicable Emission Masks		
Frequency Band (MHz)	**Mask for Equipment With Audio Low Pass Filter**	**Mask for Equipment Without Audio Low Pass Filter**
Below 25 [1]	A or B	A or C
25–50	B	C
72–76	B	C
150–174 [2]	B, D, or E	C, D, or E
150 Paging-only	B	C
220–222	F	F
421–512 [2]	B, D, or E	C, D, or E
450 Paging-only	B	G
806–809/851–854	B	H
809–824/854–869 [3 5]	B	G
896–901/935–940	I	J
902–928	K	K
929–930	B	G
4940–4990 MHz	L or M	L or M
5850–5925 [4]		
All other bands	B	C

[1] Equipment using single sideband J3E emission must meet the requirements of Emission Mask A. Equipment using other emissions must meet the requirements of Emission Mask B or C, as applicable.
[2] Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth must meet the requirements of Emission Mask E.
[3] Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of §90.691.
[4] DSRCS Roadside Unit equipment in the 5850–5925 MHz band is governed under subpart M of this part.
[5] Equipment may alternatively meet the Adjacent Channel Power limits of §90.221.

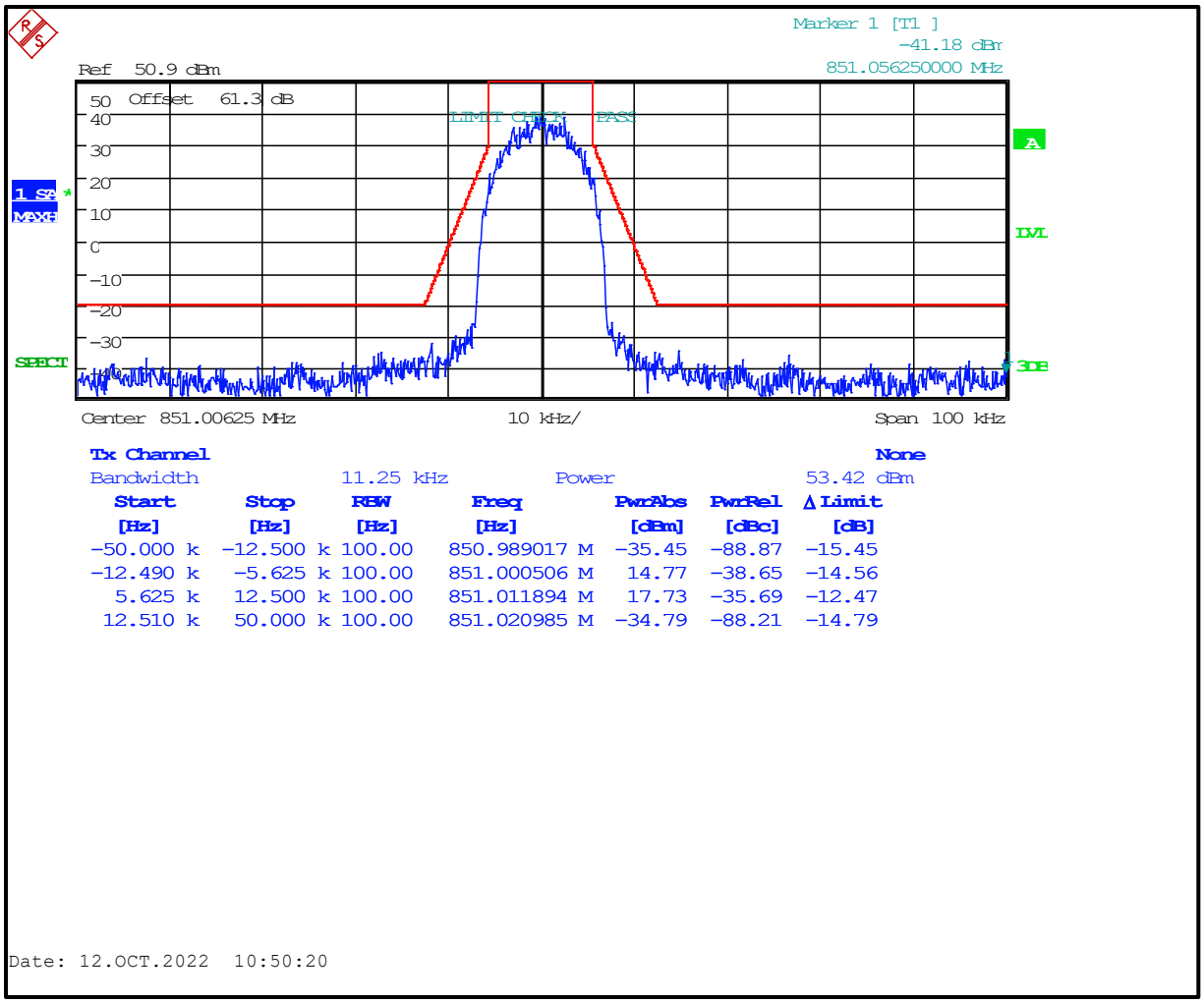
Applicable ISED Emission Masks					
Frequency Band (MHz)	**Related SRSP for Channeling Plan and ERP**	**Channel Bandwidth (kHz)**	**Authorized Bandwidth (kHz)**	**Spectrum Masks for Equipment With Audio Filter**	**Spectrum Masks for Equipment Without Audio Filter**
768-776 and 798-806	SRSP-511	6.25 12.5 25 50	(Note 2)	See Section 5.8.9	See Section 5.8.9
806-821 / 851-866 and 821-824 / 866-869	SRSP-502	25	20 22	B Y	G Y
		12.5	11.25	D	D
		6.25	6	E	E
896-901 / 935-940	SRSP-506	12.5	13.6	I	J (G) (Note 3)
929-930 and 931-932	SRSP-504 (for paging)	25	20	B	G
928-929 / 952-953 and 932-932.5 / 941-941.5	SRSP-505	25	20	B	G
		12.5	11.25	D	D
932.5-935 / 941.5-944	SRSP-507	25	20	B	G
		12.5	11.25	D	D

8.2 Test Data

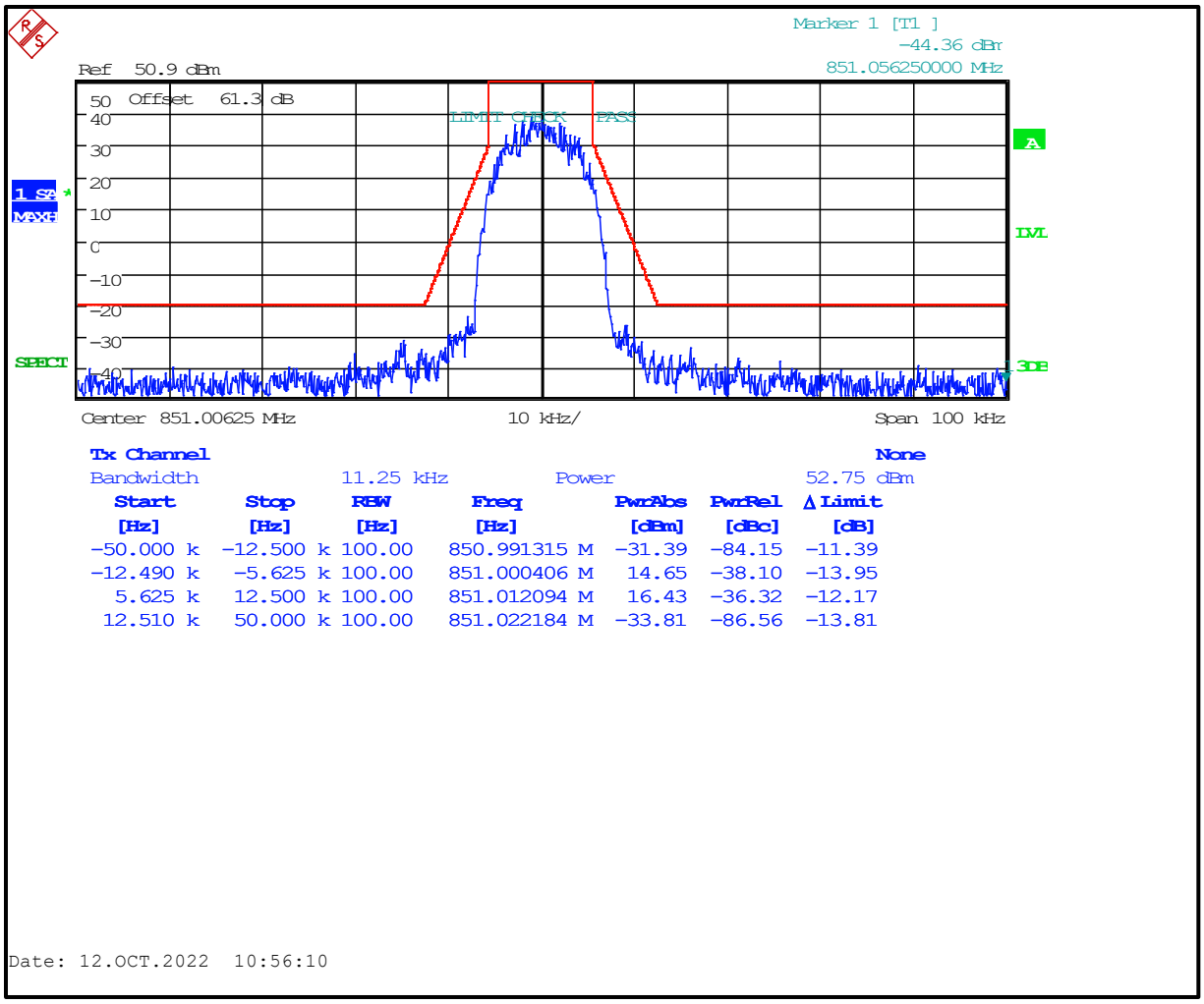
Plot 8-1: Occupied Bandwidth, 851.00625 MHz, C4FM, Mask D



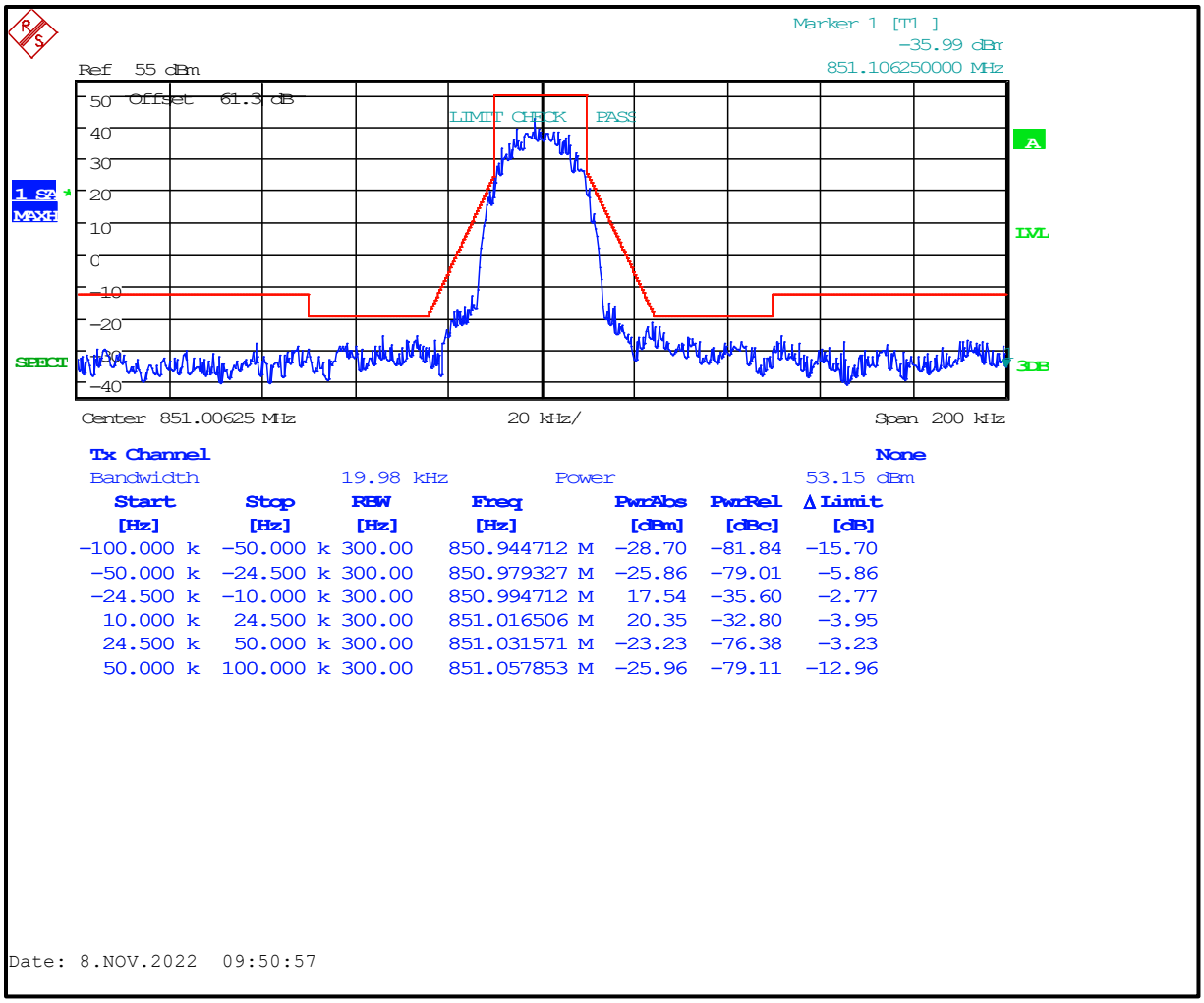
Plot 8-2: Occupied Bandwidth, 851.00625 MHz, WCQPSK, Mask D



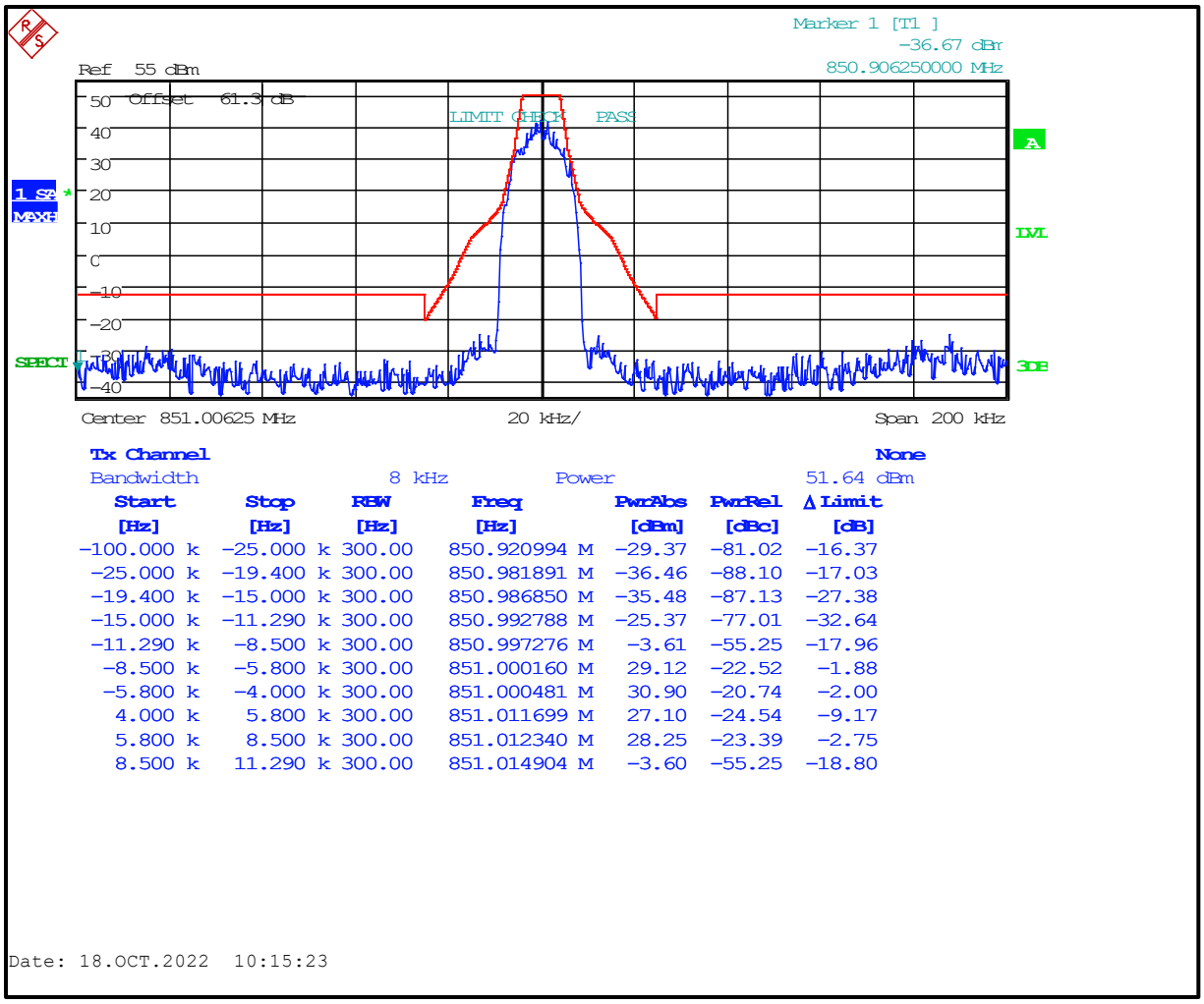
Plot 8-3: Occupied Bandwidth, 851.00625 MHz, HDQPSK, Mask D



Plot 8-4: Occupied Bandwidth, 851.00625 MHz, HVD-SMR, Mask G



Plot 8-5: Occupied Bandwidth, 851.00625 MHz, HVD-NPSPAC, Mask H

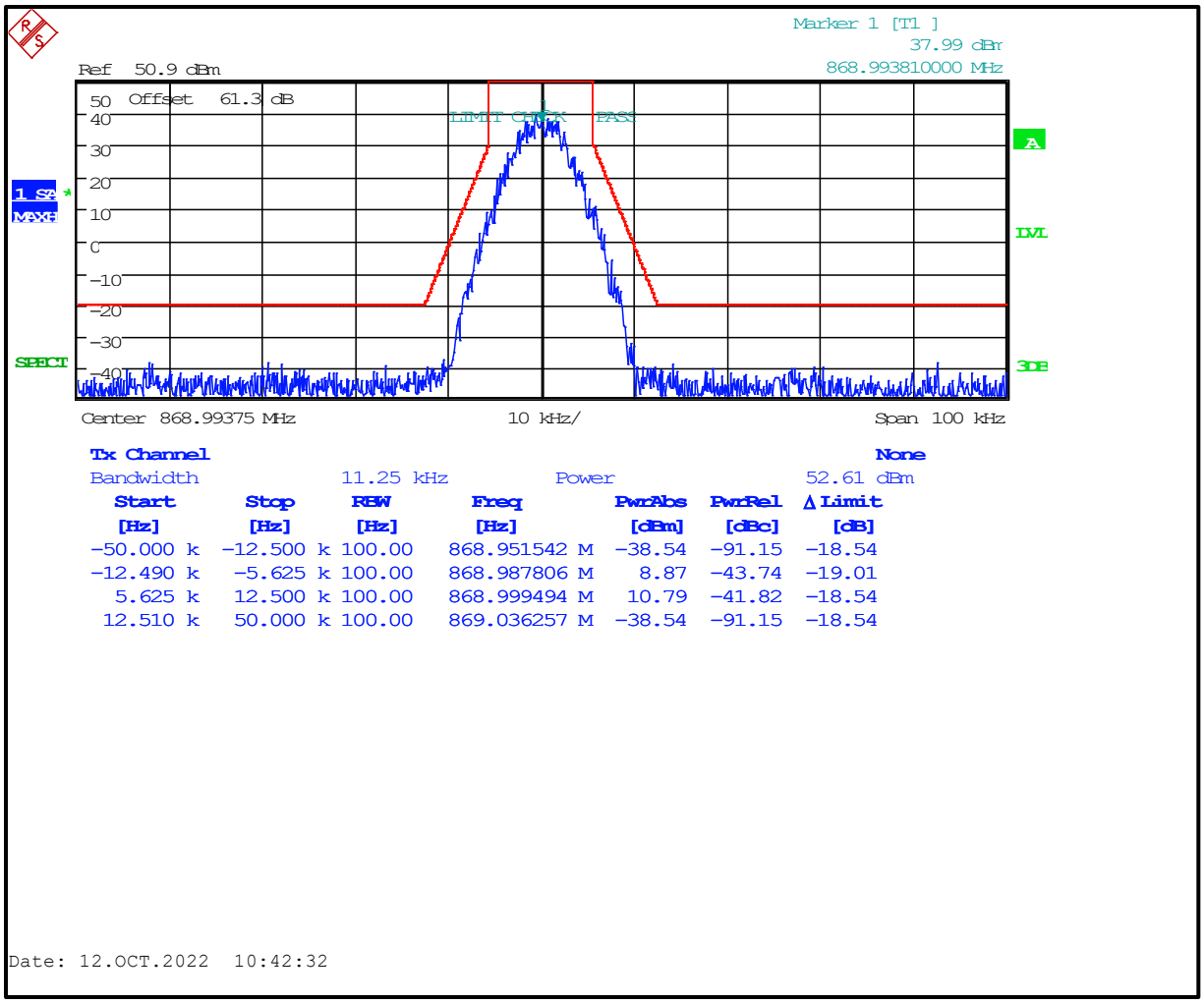


Tx Channel **None**
Bandwidth 8 kHz Power 51.64 dBm

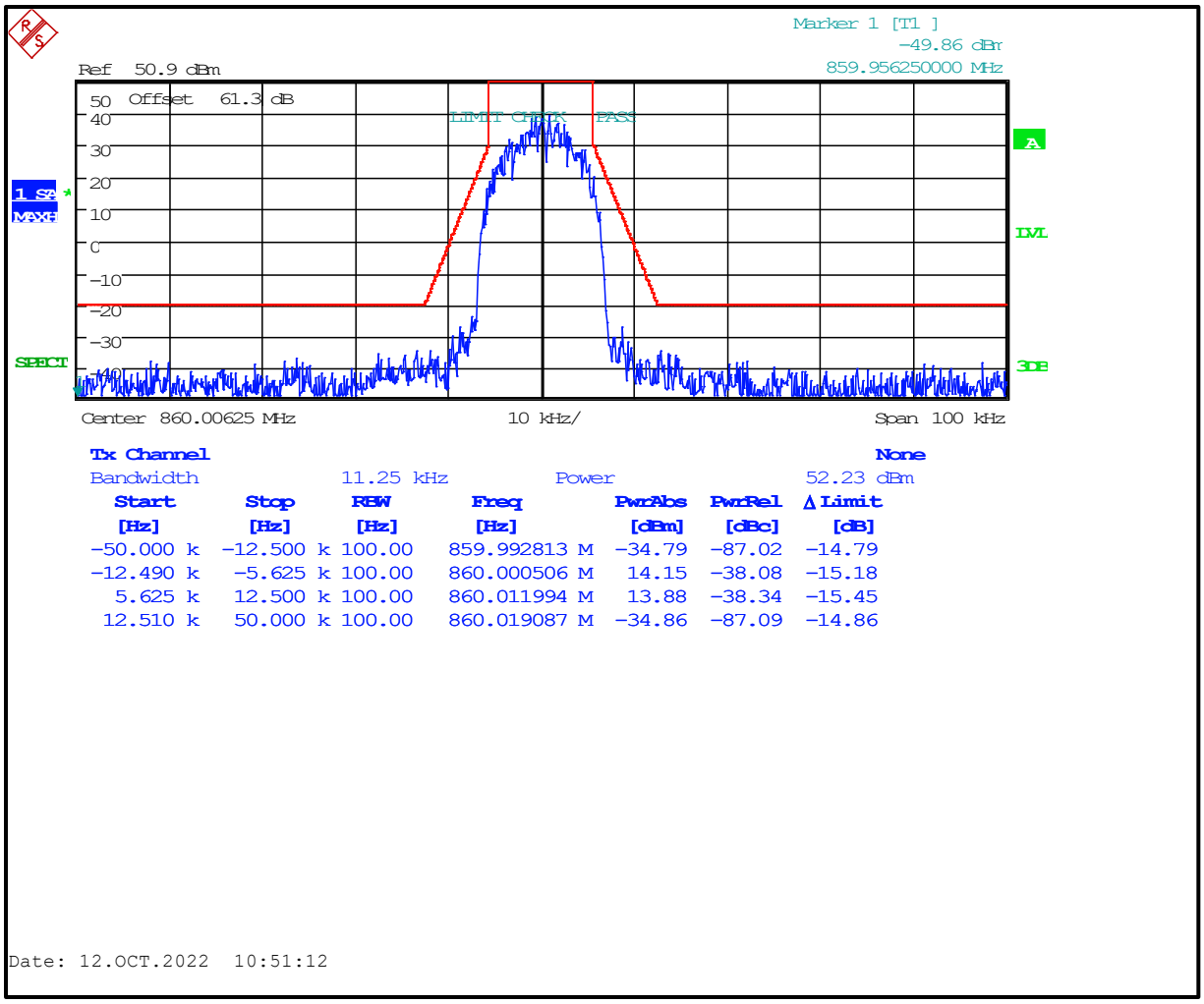
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-25.000 k	300.00	850.920994 M	-29.37	-81.02	-16.37
-25.000 k	-19.400 k	300.00	850.981891 M	-36.46	-88.10	-17.03
-19.400 k	-15.000 k	300.00	850.986850 M	-35.48	-87.13	-27.38
-15.000 k	-11.290 k	300.00	850.992788 M	-25.37	-77.01	-32.64
-11.290 k	-8.500 k	300.00	850.997276 M	-3.61	-55.25	-17.96
-8.500 k	-5.800 k	300.00	851.000160 M	29.12	-22.52	-1.88
-5.800 k	-4.000 k	300.00	851.000481 M	30.90	-20.74	-2.00
4.000 k	5.800 k	300.00	851.011699 M	27.10	-24.54	-9.17
5.800 k	8.500 k	300.00	851.012340 M	28.25	-23.39	-2.75
8.500 k	11.290 k	300.00	851.014904 M	-3.60	-55.25	-18.80

Date: 18.OCT.2022 10:15:23

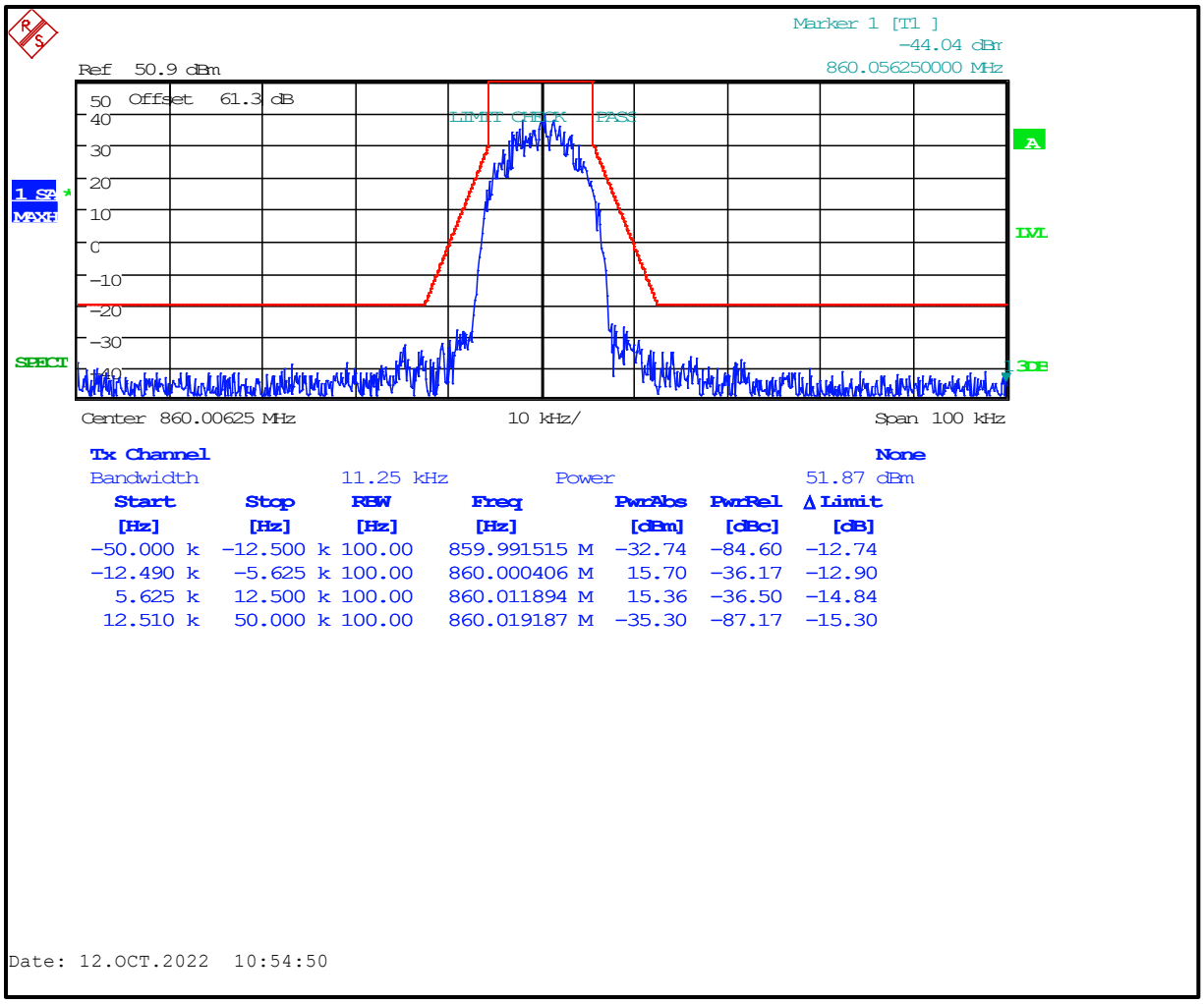
Plot 8-6: Occupied Bandwidth, 860.00625 MHz, C4FM, Mask D



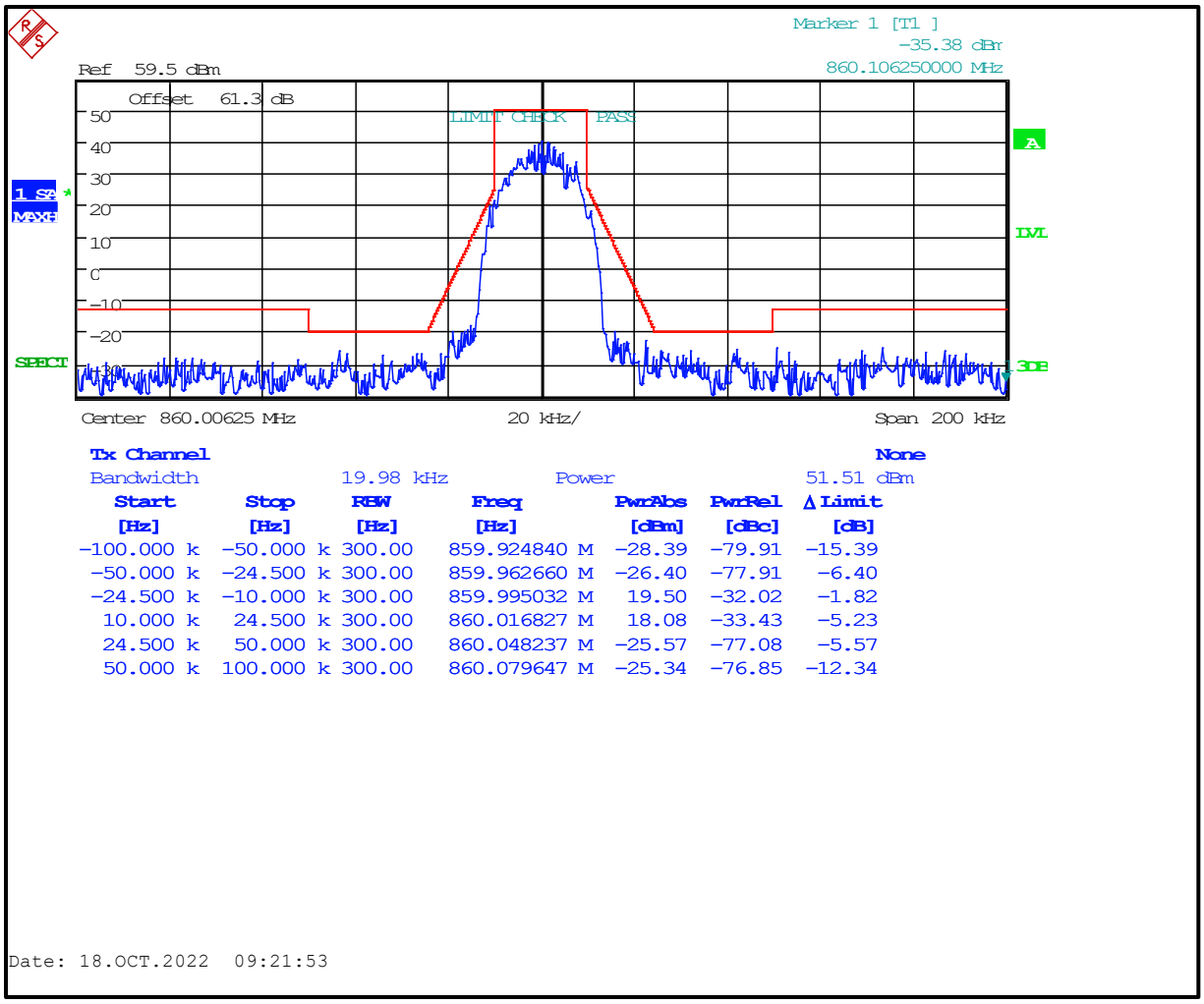
Plot 8-7: Occupied Bandwidth, 860.00625 MHz, WCQPSK, Mask D



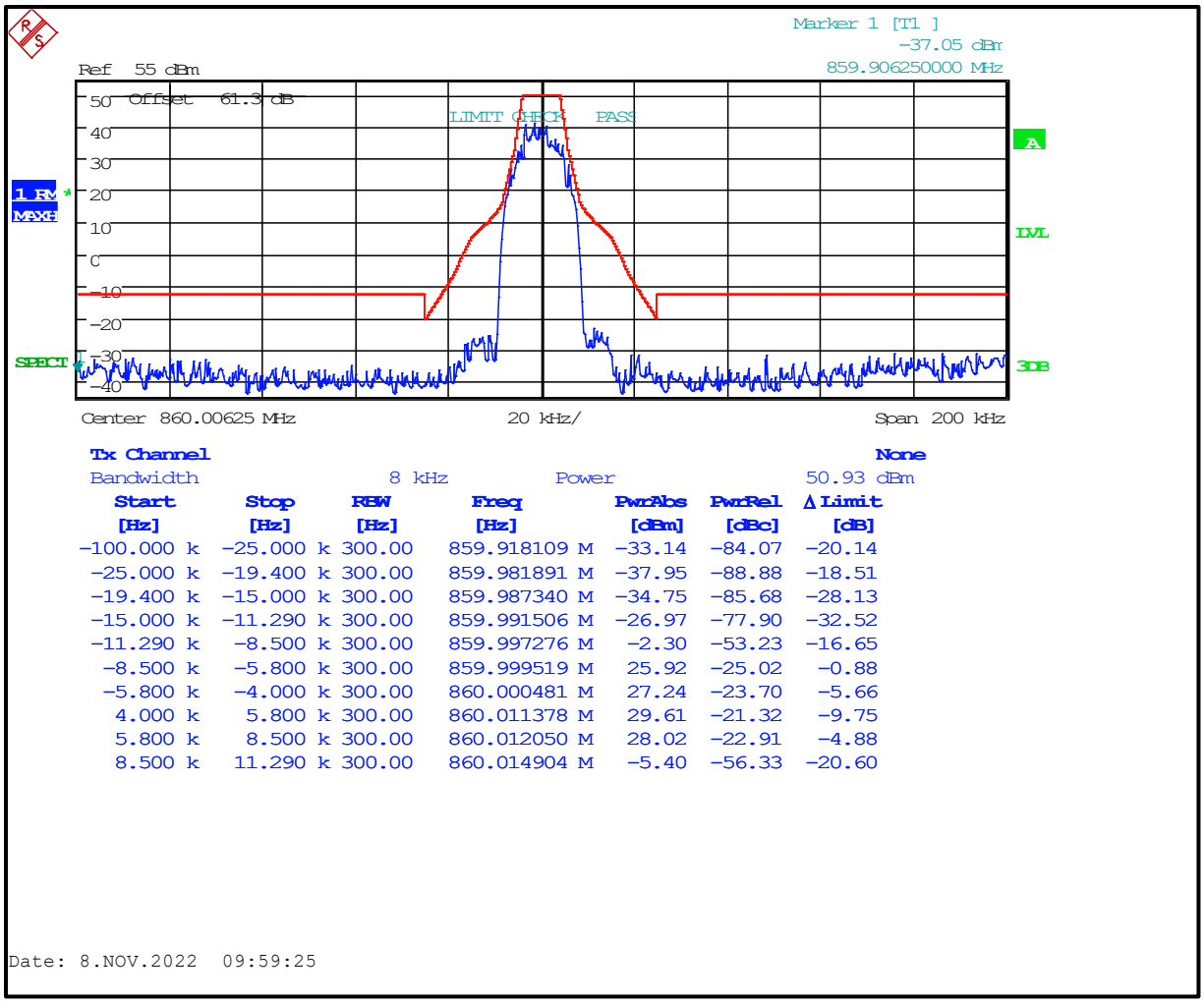
Plot 8-8: Occupied Bandwidth, 860.00625 MHz, HDQPSK, Mask D



Plot 8-9: Occupied Bandwidth, 860.00625 MHz, HVD-SMR, Mask G



Plot 8-10: Occupied Bandwidth, 860.00625 MHz, HVD-NPSPAC, Mask H



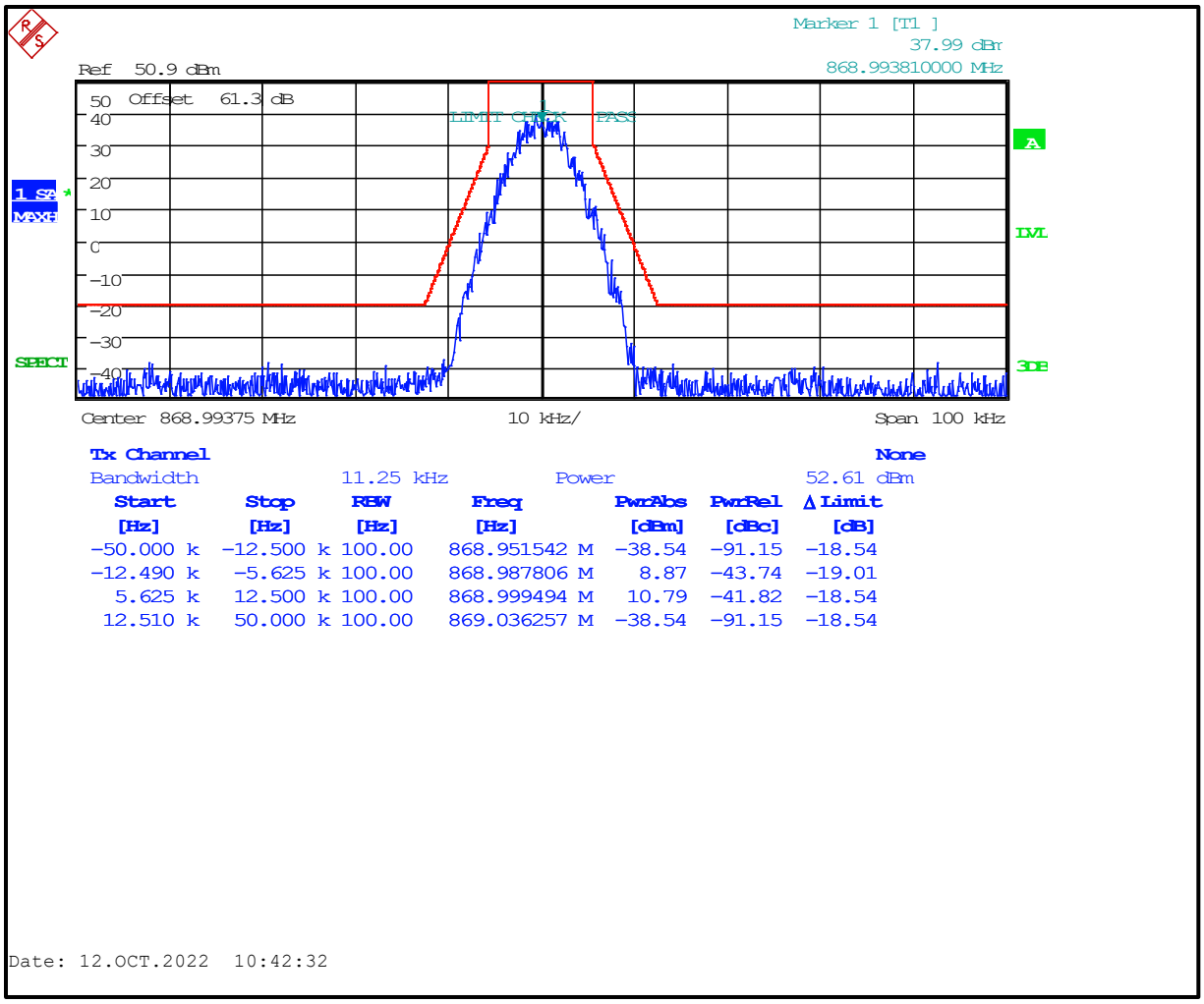
Tx Channel **None**

Bandwidth 8 kHz Power 50.93 dBm

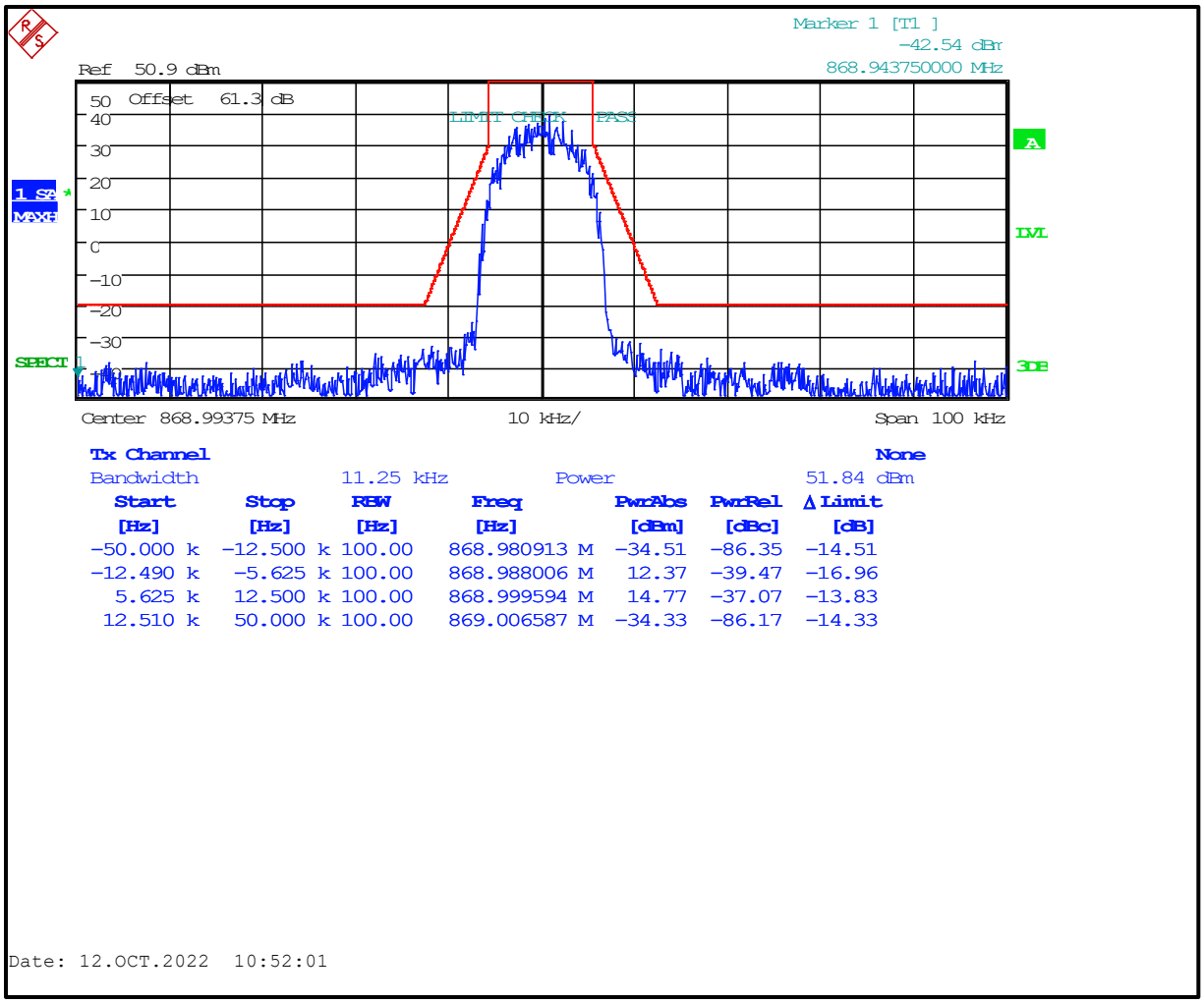
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-25.000 k	300.00	859.918109 M	-33.14	-84.07	-20.14
-25.000 k	-19.400 k	300.00	859.981891 M	-37.95	-88.88	-18.51
-19.400 k	-15.000 k	300.00	859.987340 M	-34.75	-85.68	-28.13
-15.000 k	-11.290 k	300.00	859.991506 M	-26.97	-77.90	-32.52
-11.290 k	-8.500 k	300.00	859.997276 M	-2.30	-53.23	-16.65
-8.500 k	-5.800 k	300.00	859.999519 M	25.92	-25.02	-0.88
-5.800 k	-4.000 k	300.00	860.000481 M	27.24	-23.70	-5.66
4.000 k	5.800 k	300.00	860.011378 M	29.61	-21.32	-9.75
5.800 k	8.500 k	300.00	860.012050 M	28.02	-22.91	-4.88
8.500 k	11.290 k	300.00	860.014904 M	-5.40	-56.33	-20.60

Date: 8.NOV.2022 09:59:25

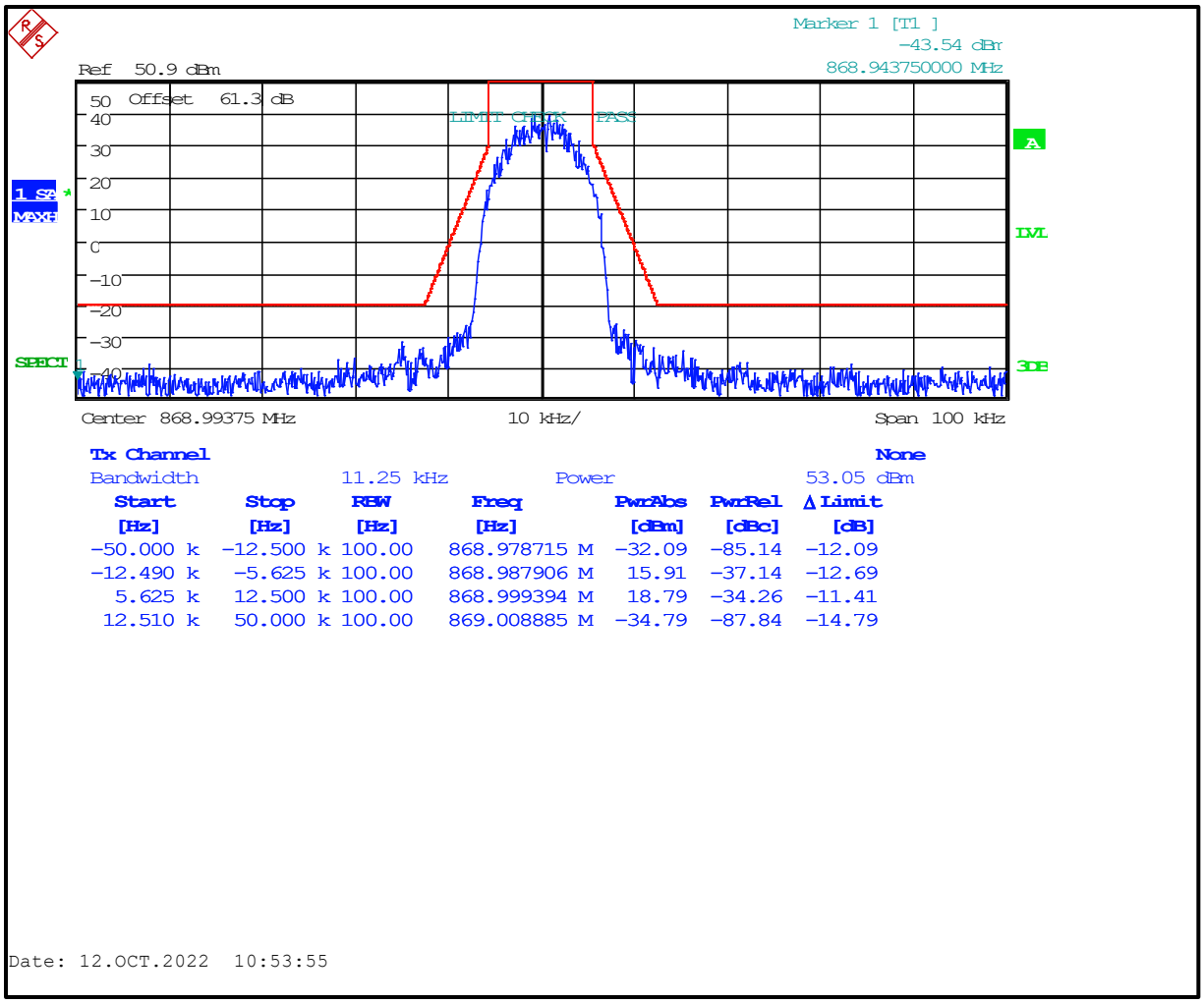
Plot 8-11: Occupied Bandwidth, 868.99375 MHz, C4FM, Mask D



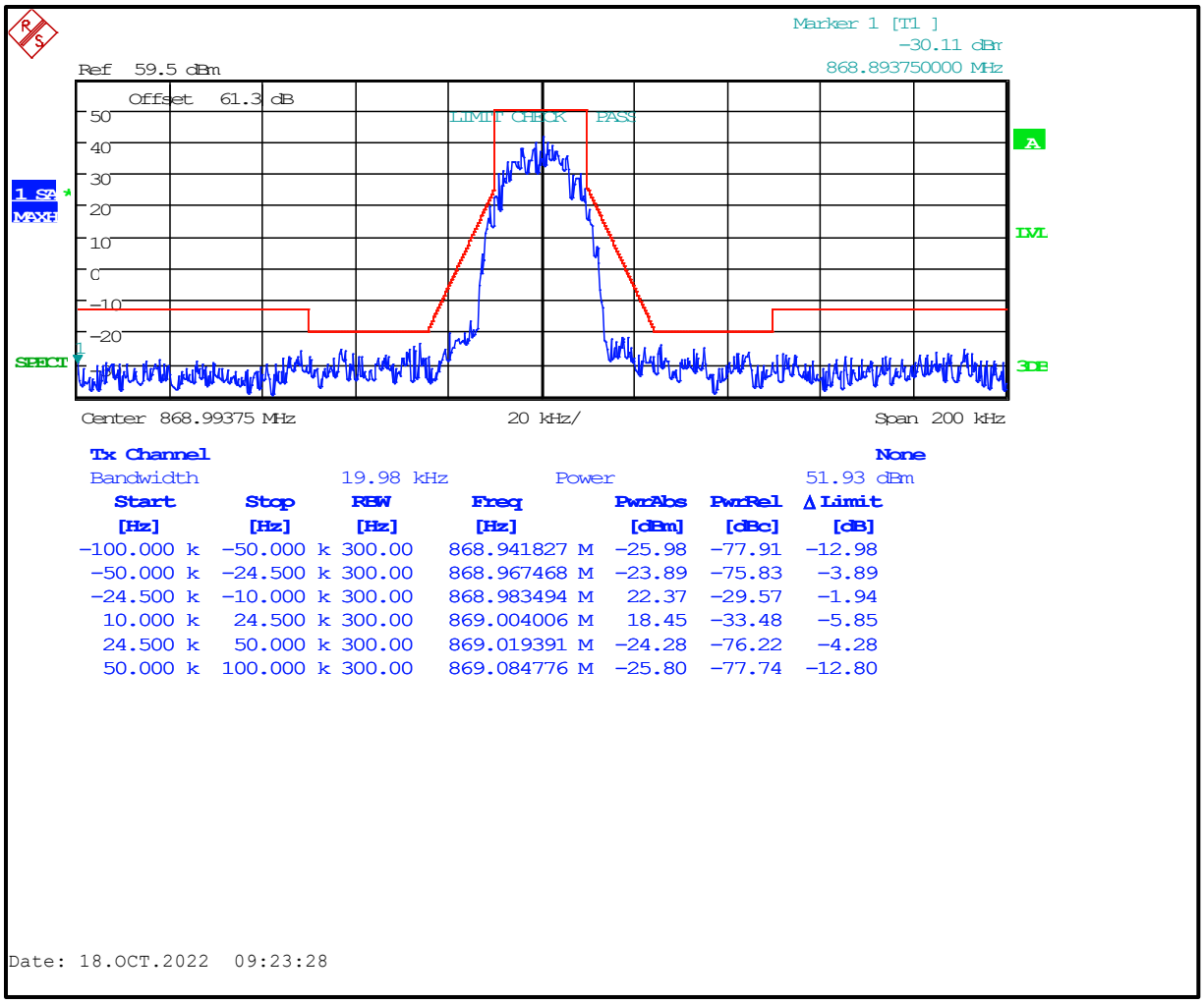
Plot 8-12: Occupied Bandwidth, 868.99375 MHz, WCQPSK, Mask D



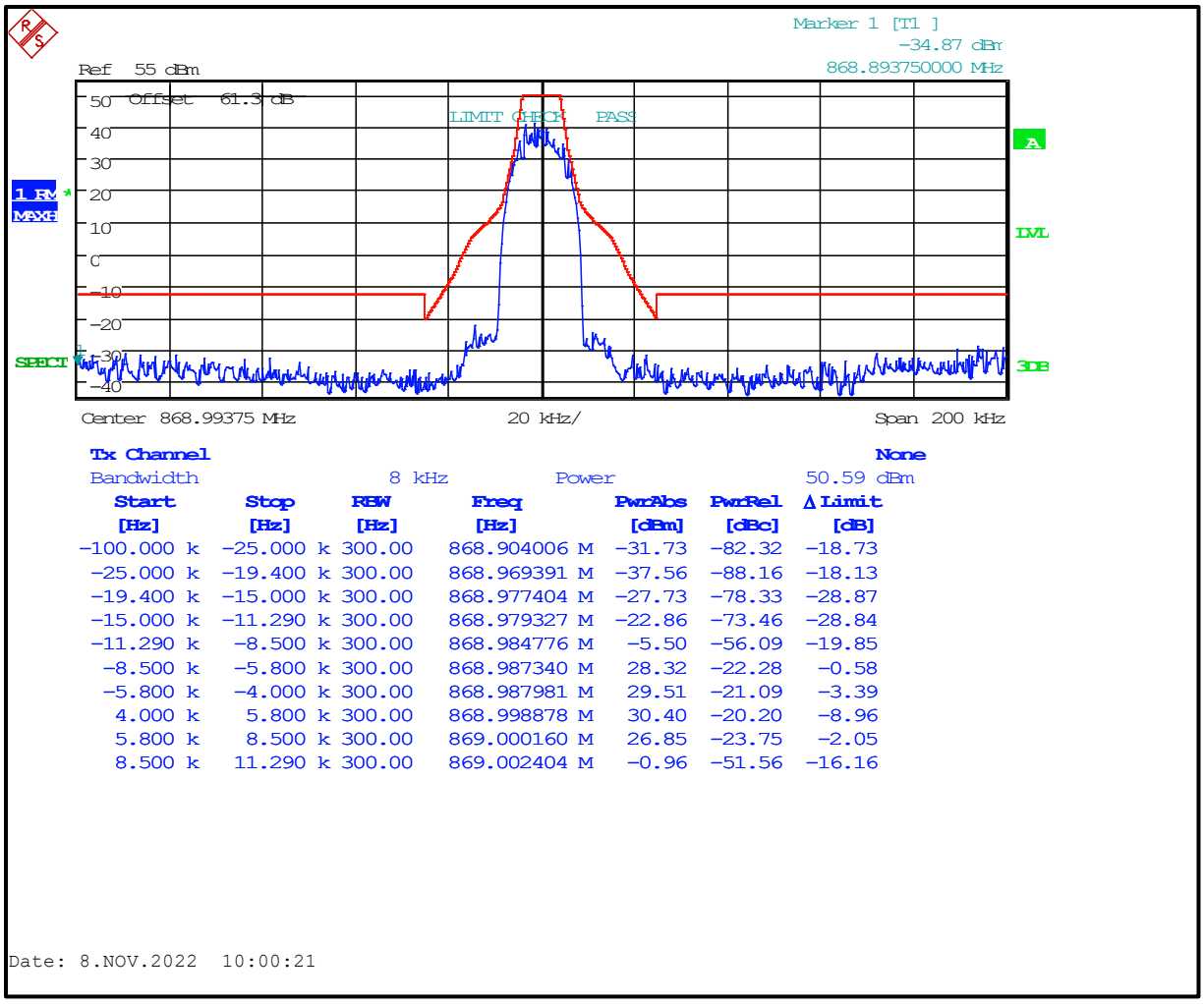
Plot 8-13: Occupied Bandwidth, 868.99375 MHz, HDQPSK, Mask D



Plot 8-14: Occupied Bandwidth, 868.99375 MHz, HVD-SMR, Mask G



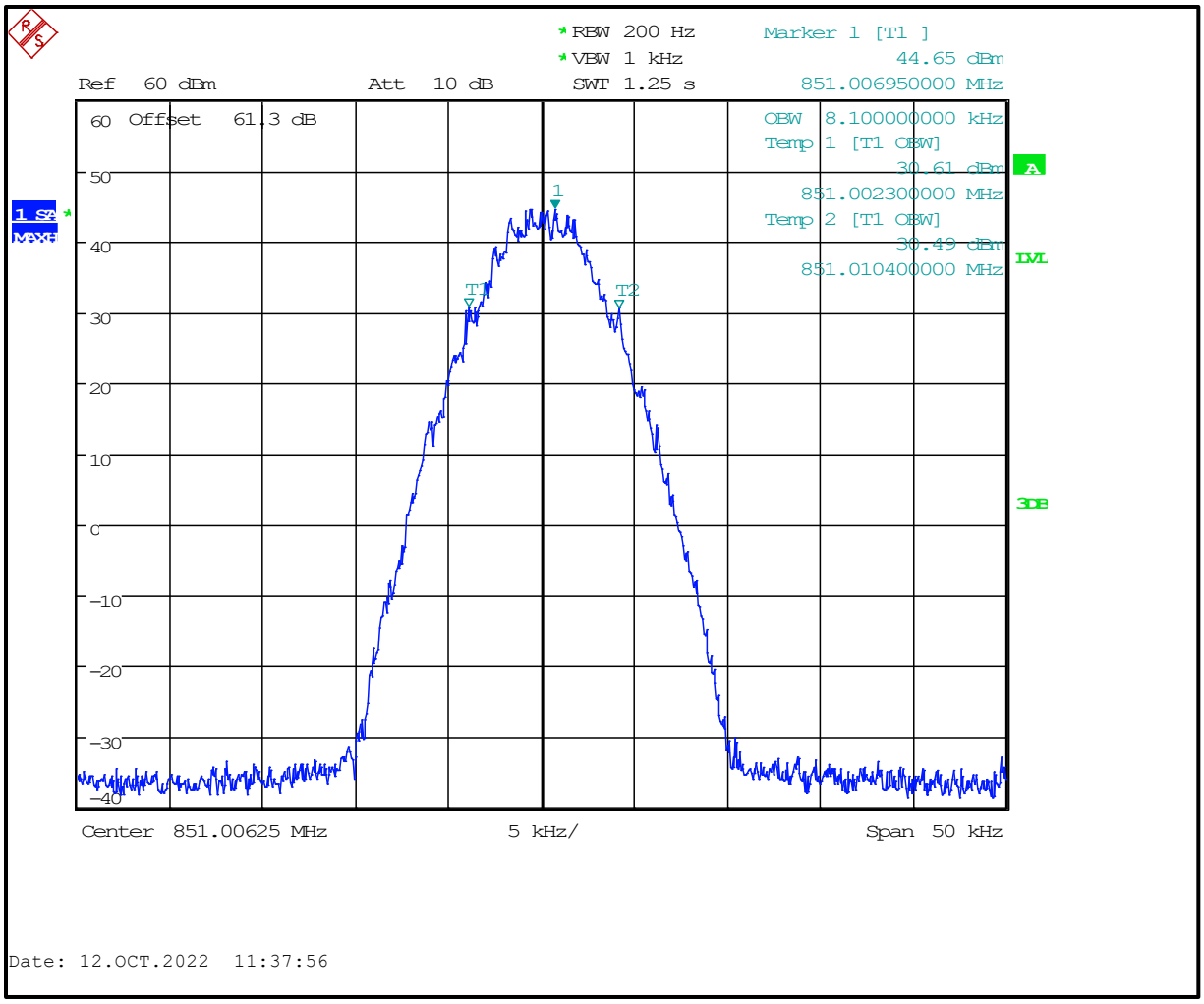
Plot 8-15: Occupied Bandwidth, 868.99375 MHz, HVD-NPSPAC, Mask H



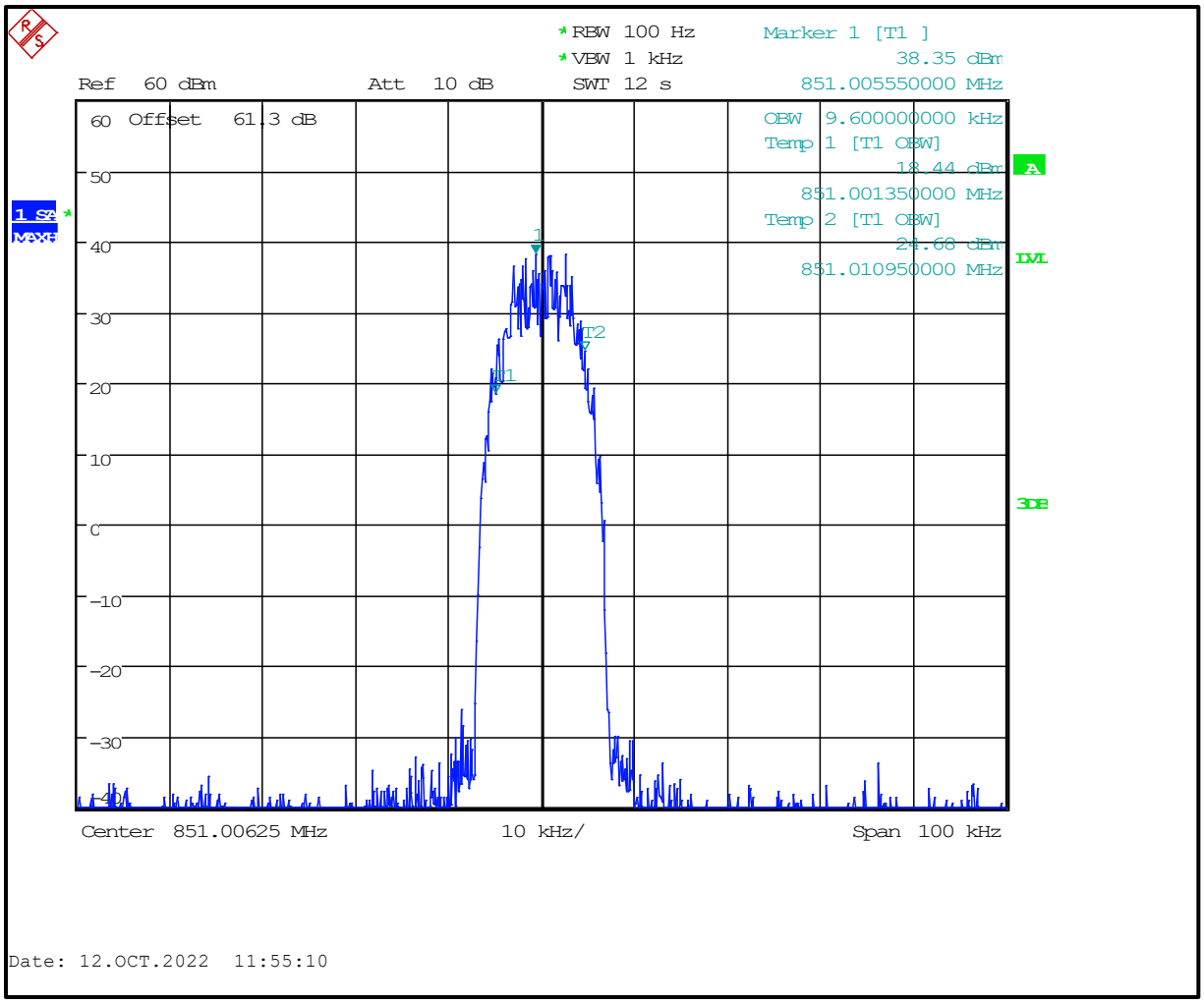
Tx Channel						None
Bandwidth			8 kHz	Power		50.59 dBm
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-25.000 k	300.00	868.904006 M	-31.73	-82.32	-18.73
-25.000 k	-19.400 k	300.00	868.969391 M	-37.56	-88.16	-18.13
-19.400 k	-15.000 k	300.00	868.977404 M	-27.73	-78.33	-28.87
-15.000 k	-11.290 k	300.00	868.979327 M	-22.86	-73.46	-28.84
-11.290 k	-8.500 k	300.00	868.984776 M	-5.50	-56.09	-19.85
-8.500 k	-5.800 k	300.00	868.987340 M	28.32	-22.28	-0.58
-5.800 k	-4.000 k	300.00	868.987981 M	29.51	-21.09	-3.39
4.000 k	5.800 k	300.00	868.998878 M	30.40	-20.20	-8.96
5.800 k	8.500 k	300.00	869.000160 M	26.85	-23.75	-2.05
8.500 k	11.290 k	300.00	869.002404 M	-0.96	-51.56	-16.16

Date: 8.NOV.2022 10:00:21

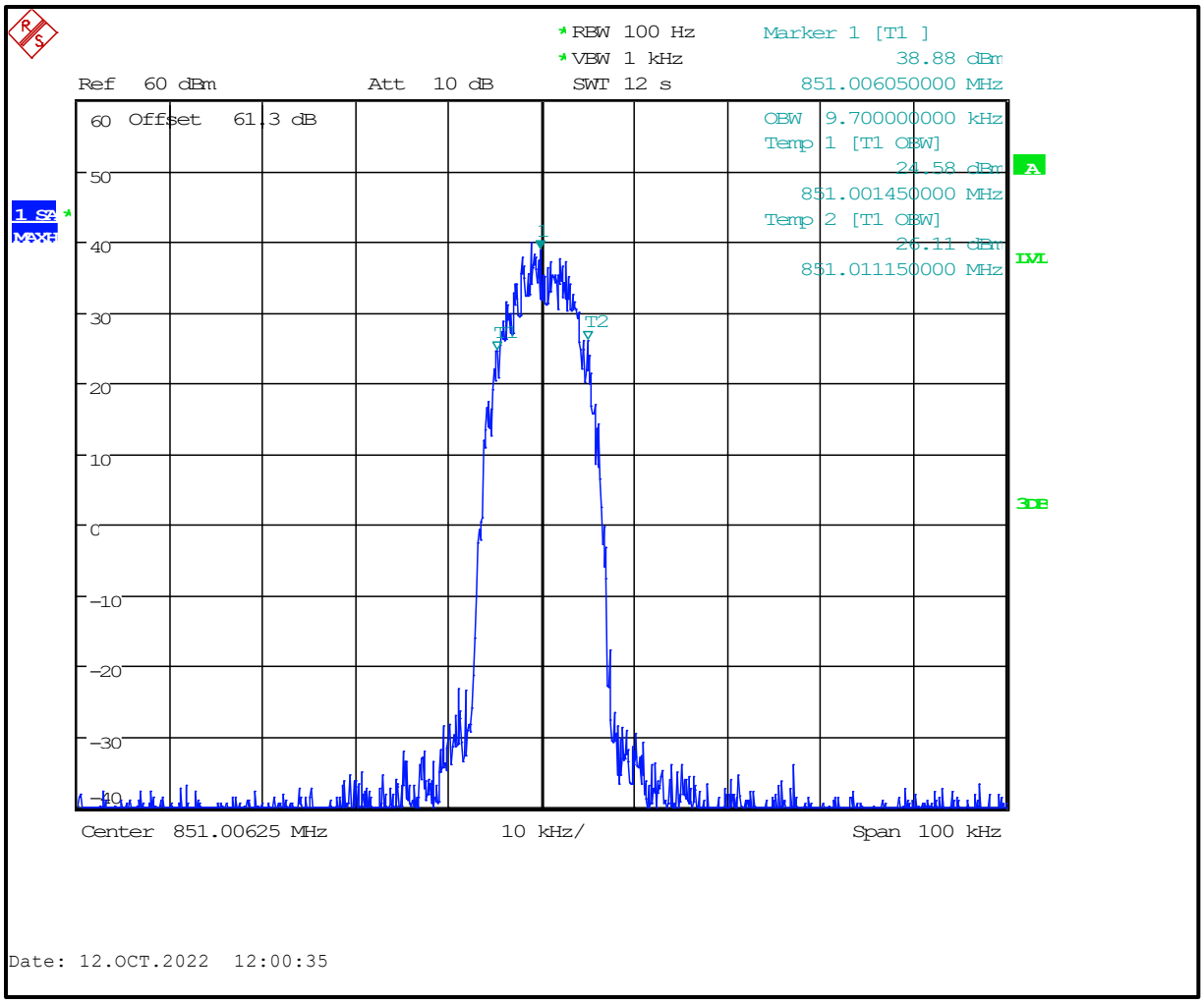
Plot 8-16: 99% BW, 851.00625 MHz, C4FM



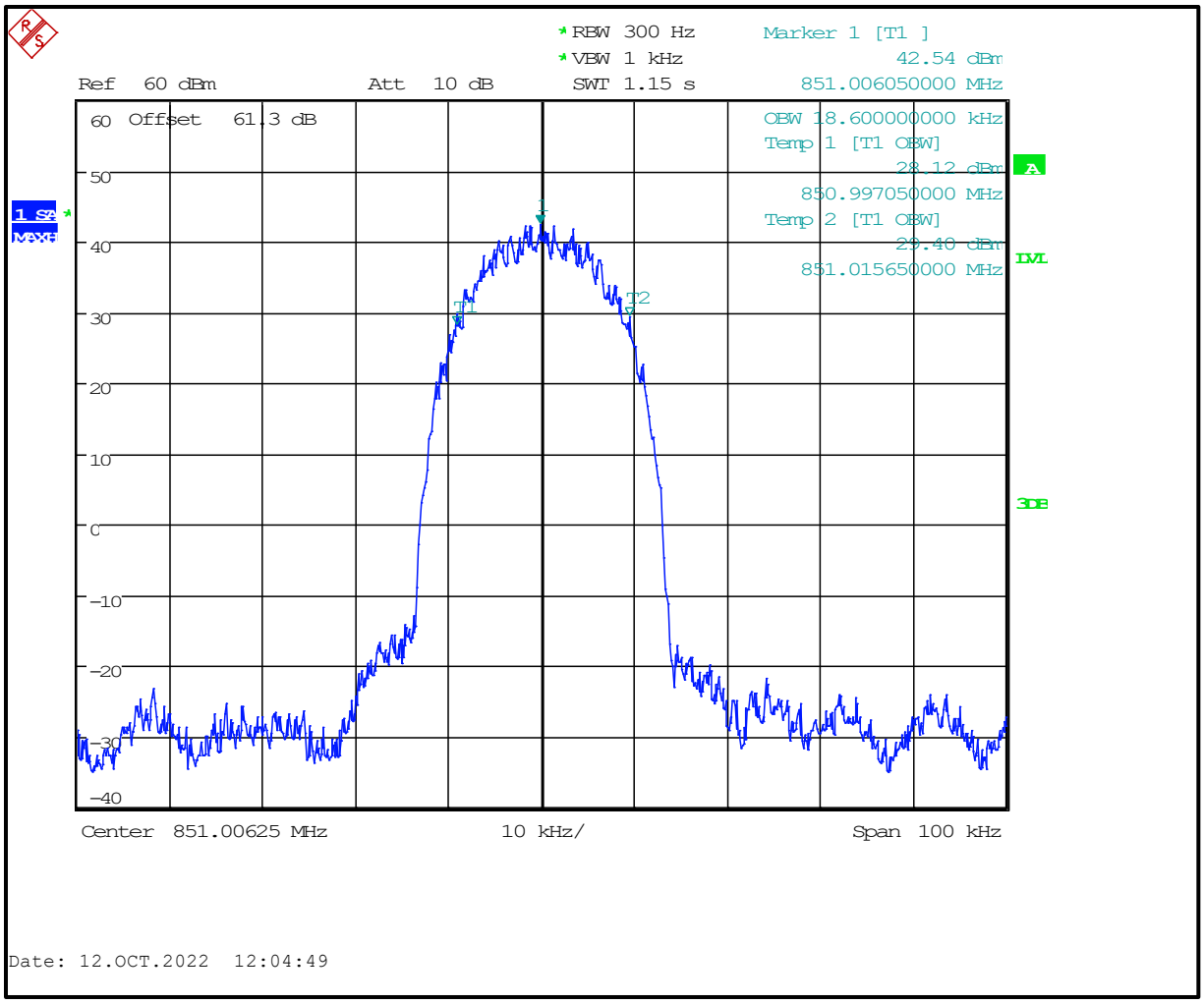
Plot 8-17: 99% BW, 851.00625 MHz, WCQPSK



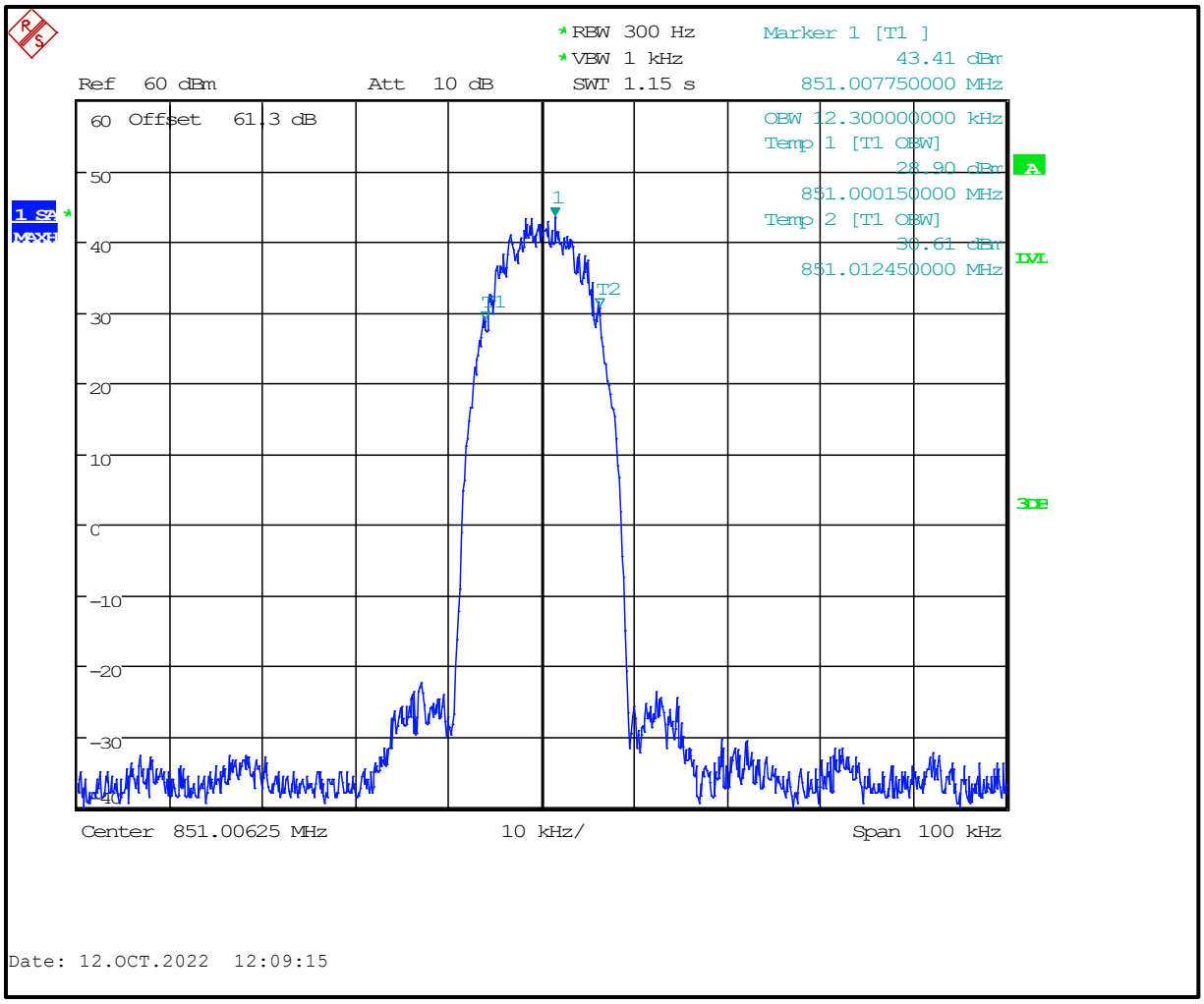
Plot 8-18: 99% BW, 851.00625 MHz, HDQPSK



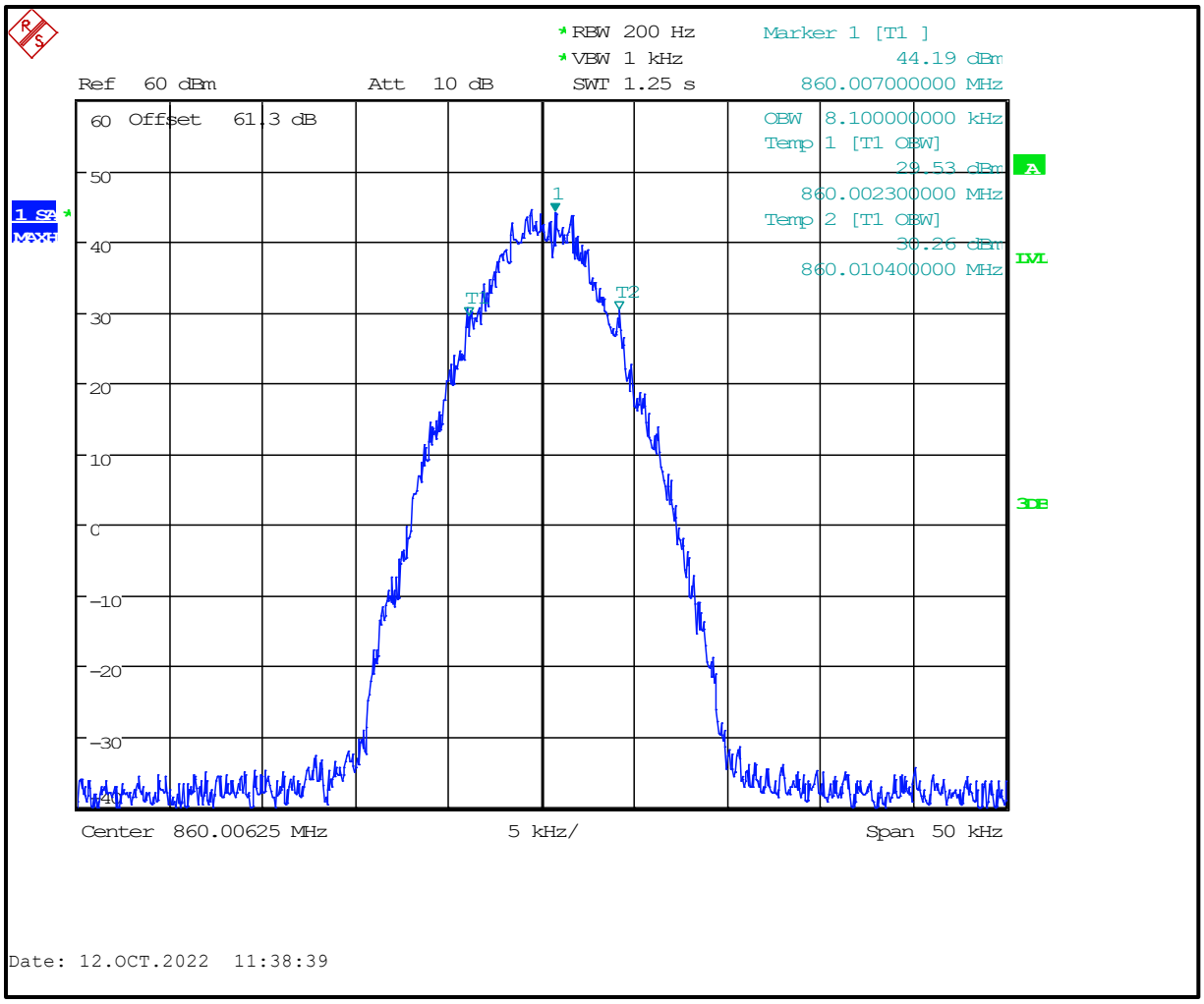
Plot 8-19: 99% BW, 851.00625 MHz, HVD-SMR



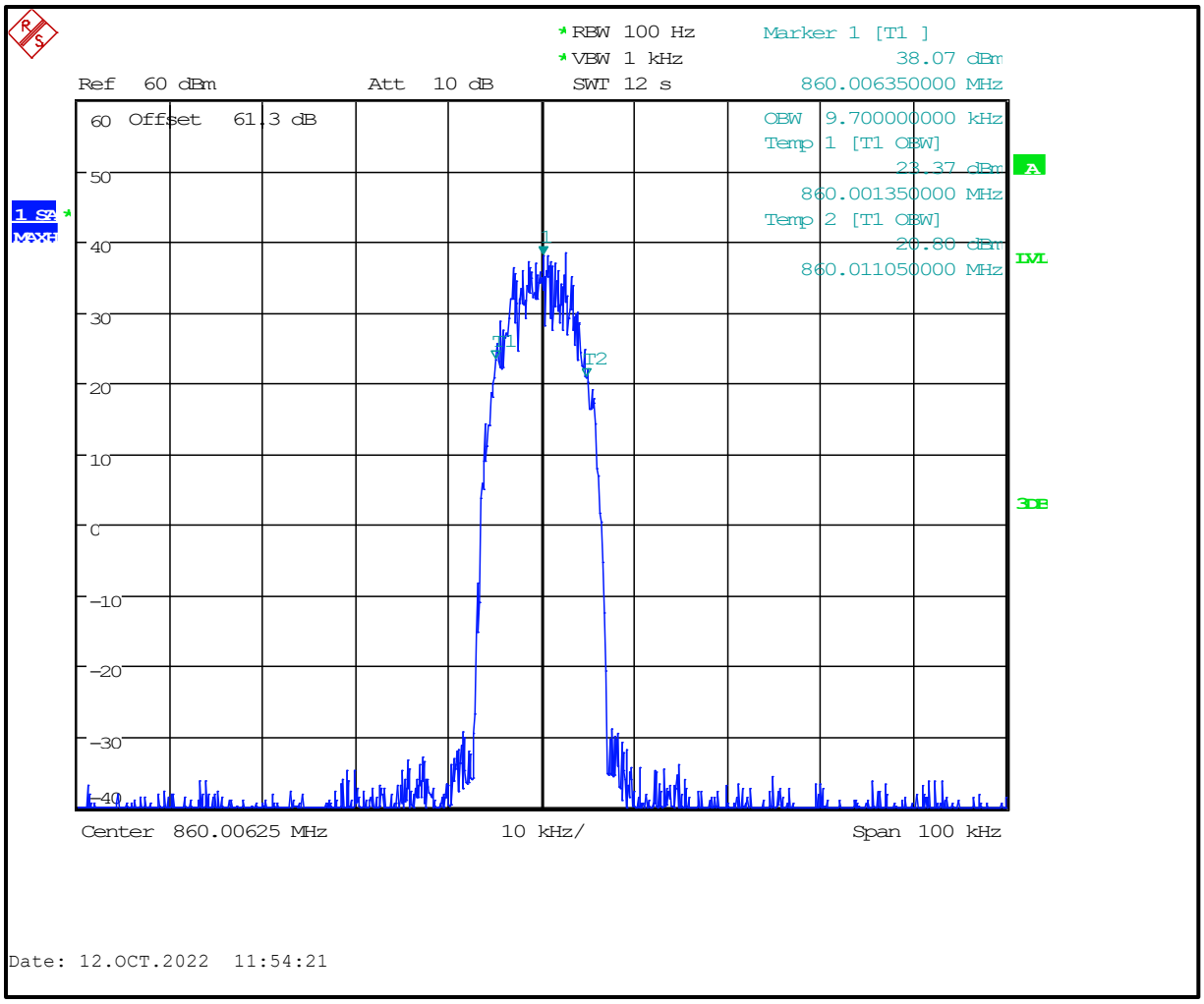
Plot 8-20: 99% BW, 851.00625 MHz, HVD-NPSPAC



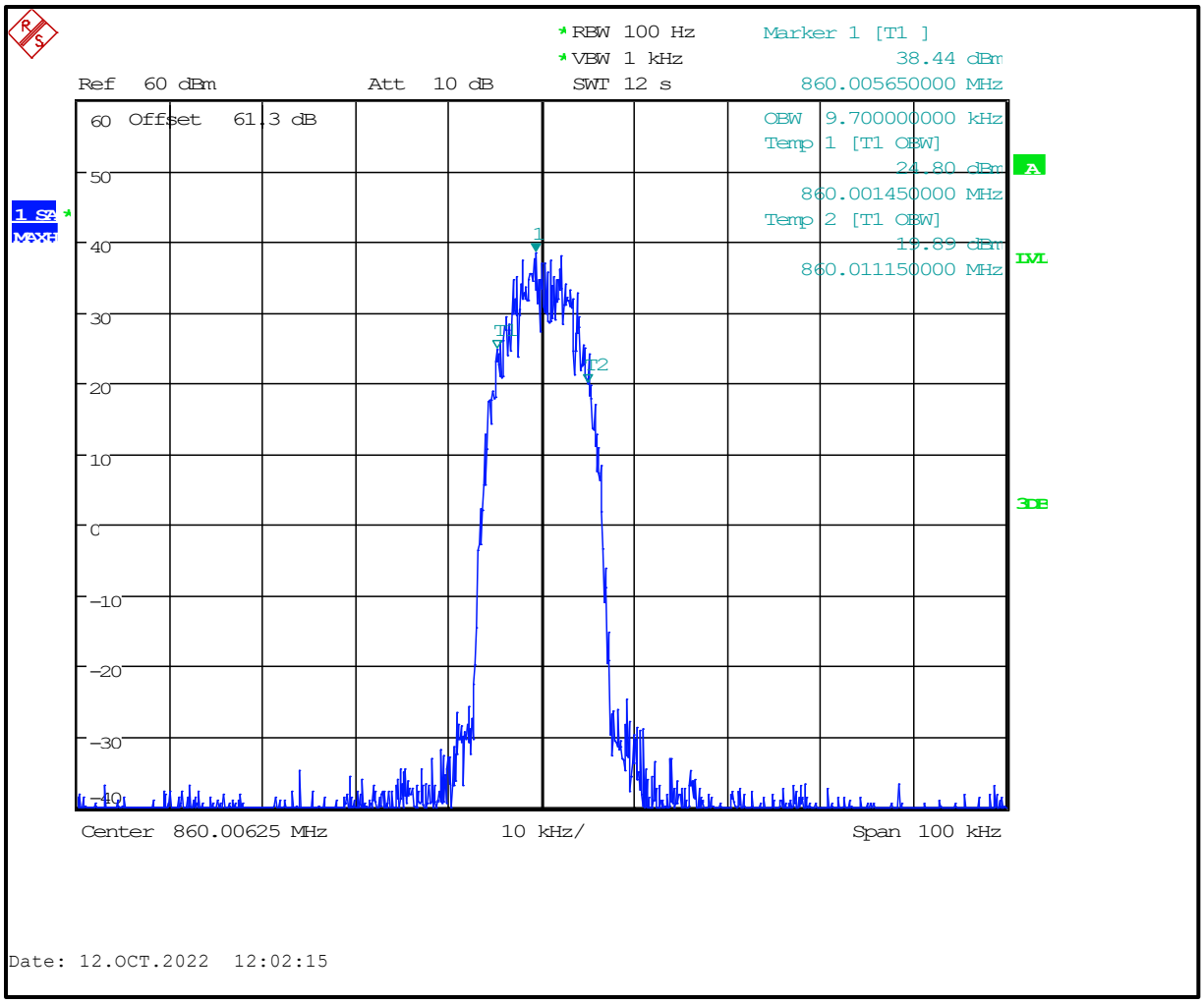
Plot 8-21: 99% BW, 860.00625 MHz, C4FM



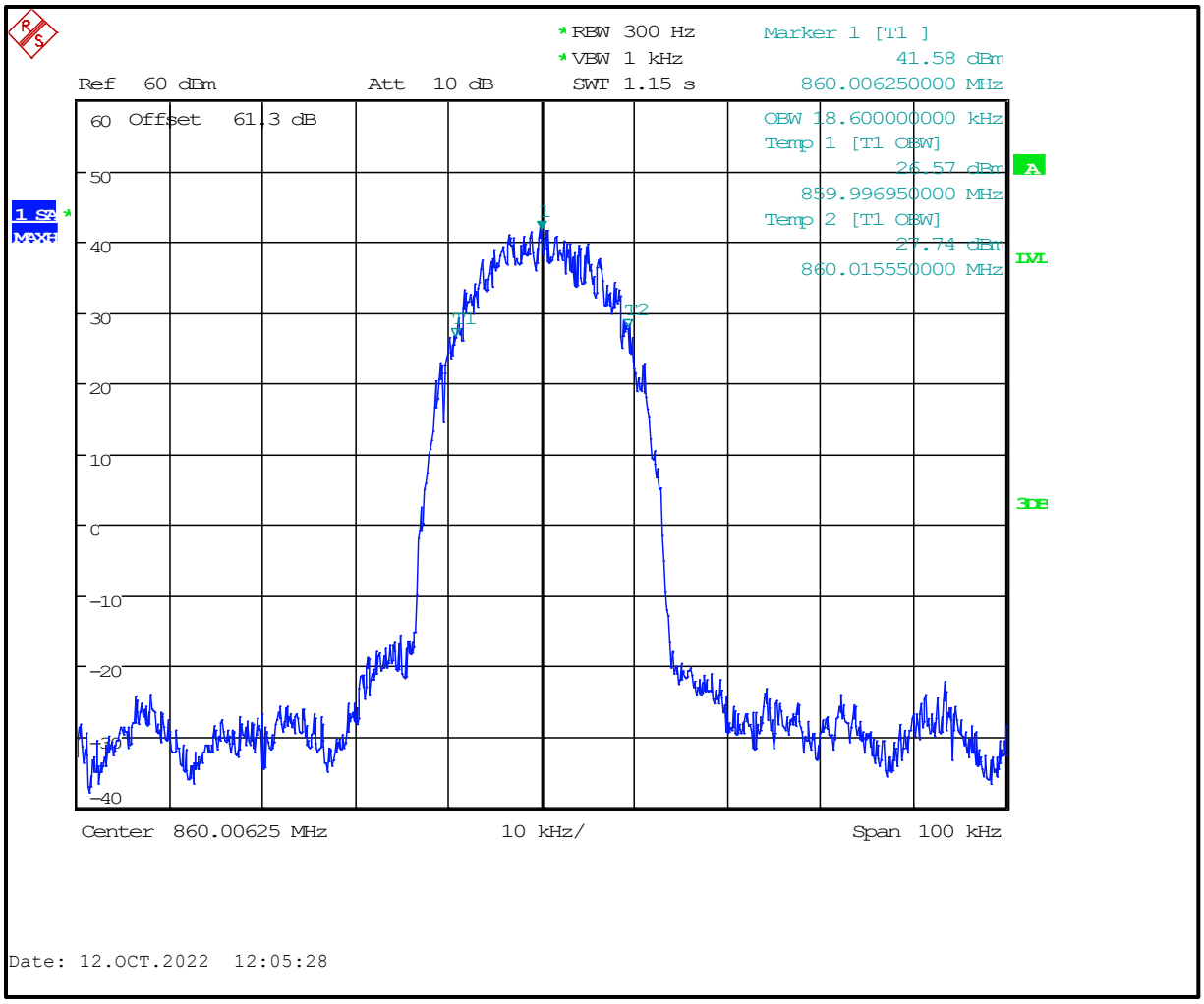
Plot 8-22: 99% BW, 860.00625 MHz, WCQPSK



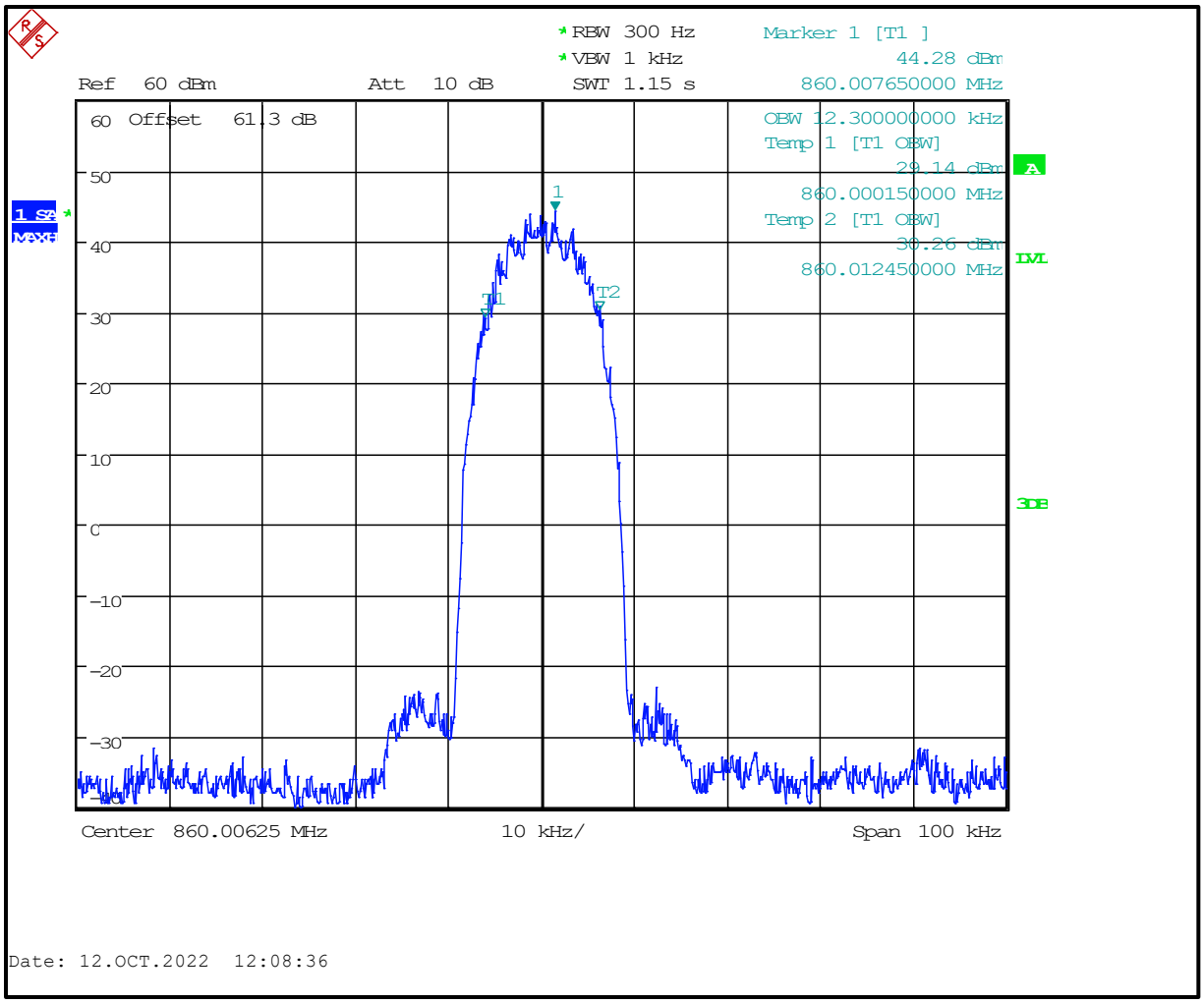
Plot 8-23: 99% BW, 860.00625 MHz, HDQPSK



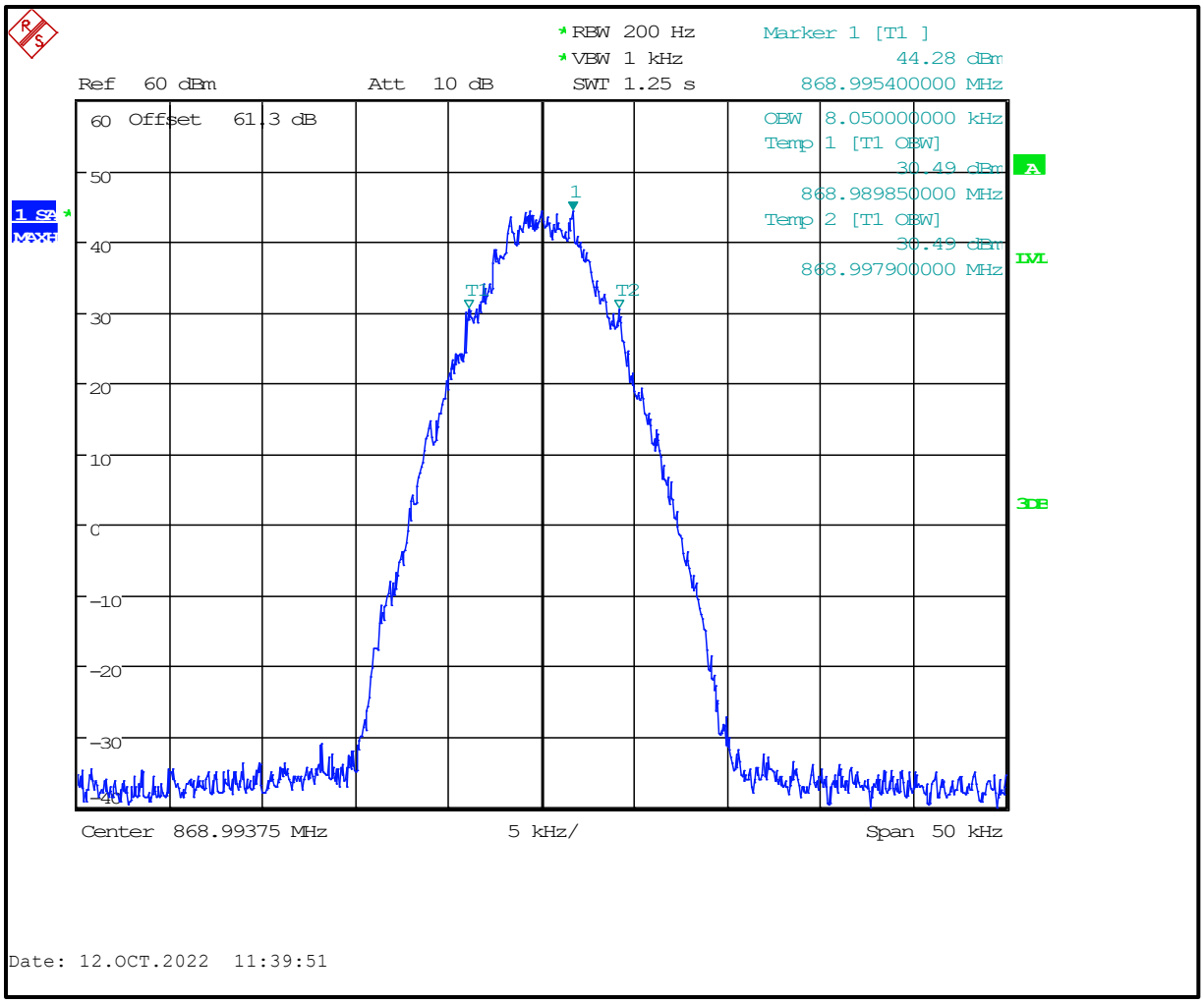
Plot 8-24: 99% BW, 860.00625 MHz, HVD-SMR



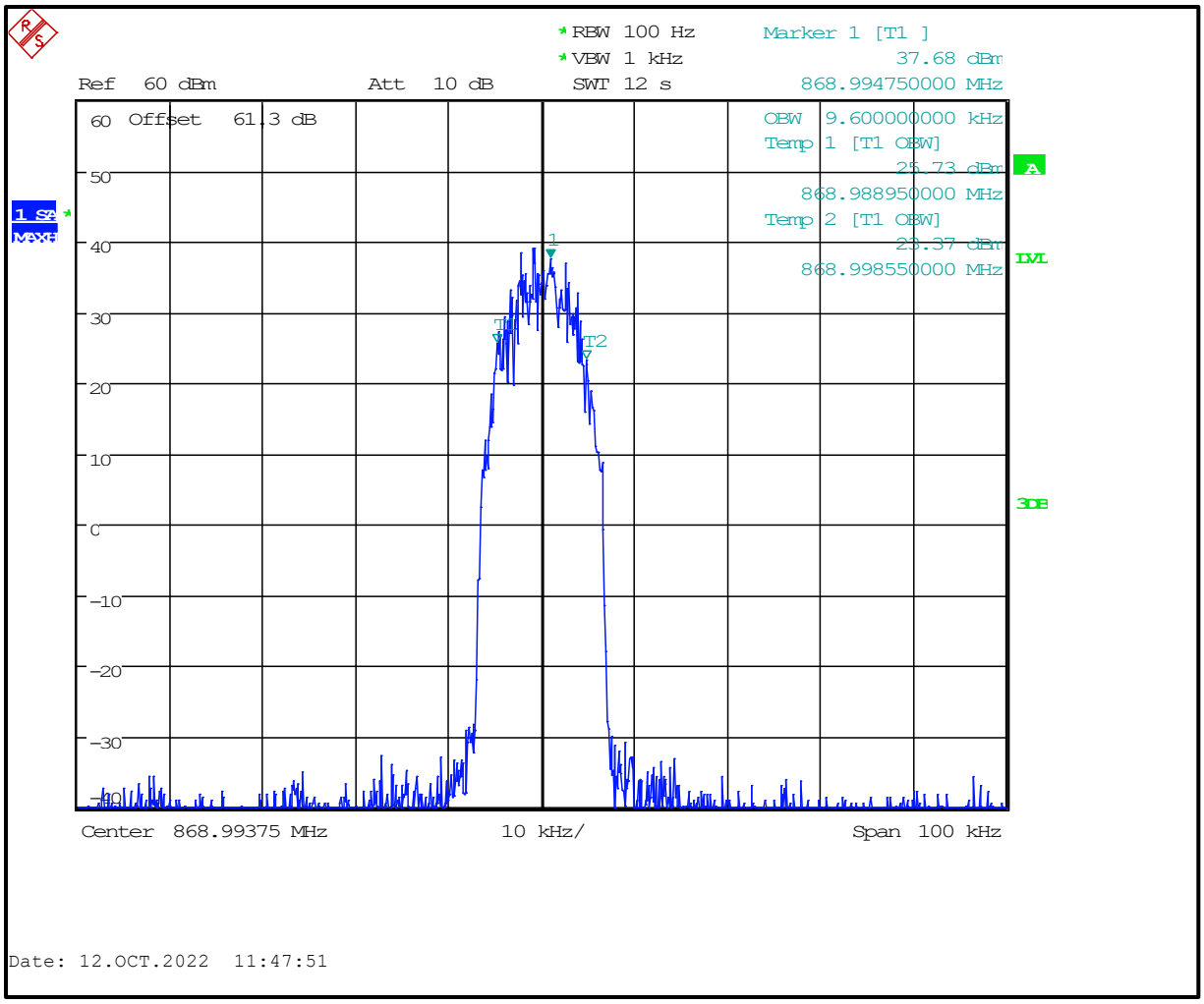
Plot 8-25: 99% BW, 860.00625 MHz, HVD-NPSPAC



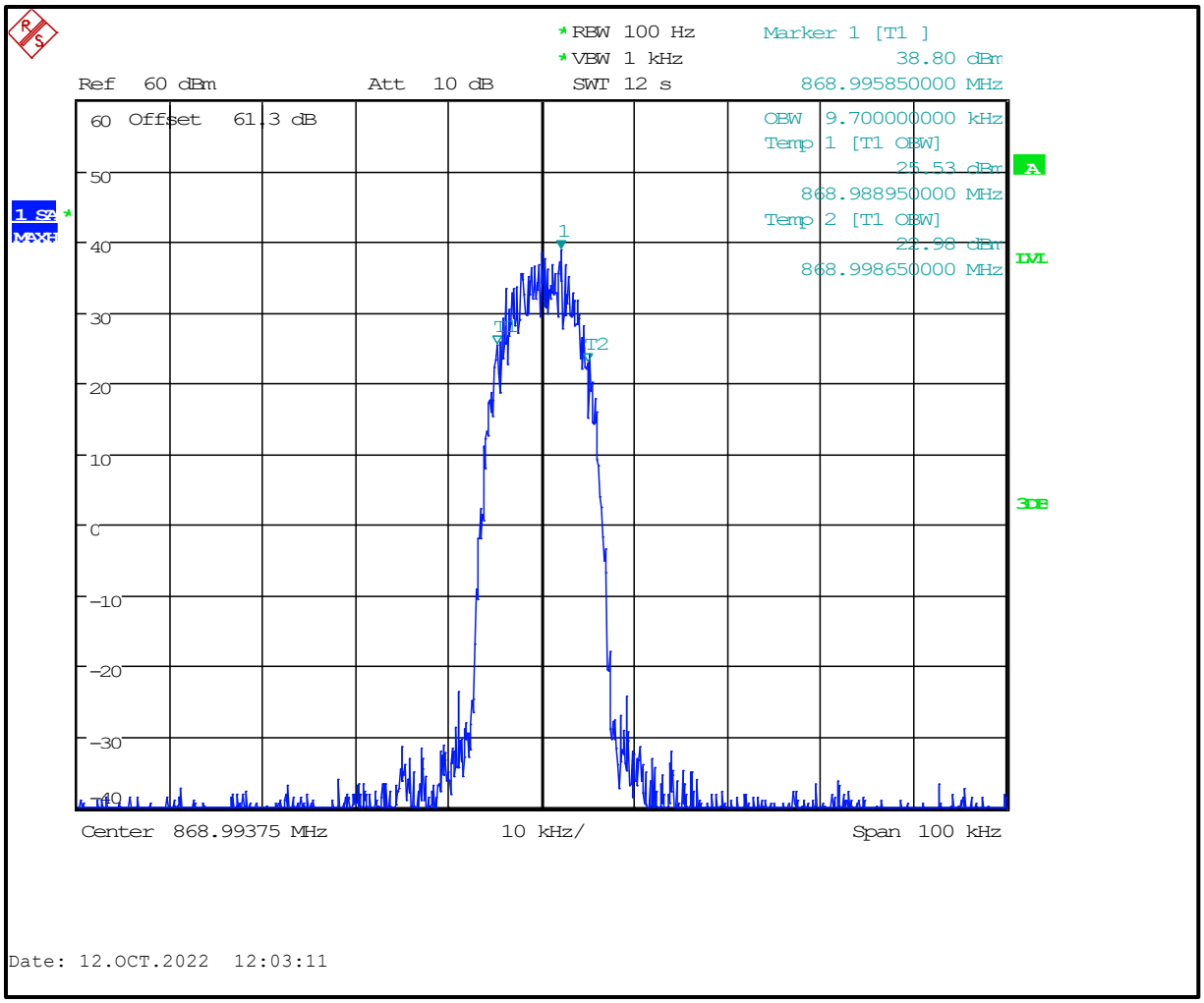
Plot 8-26: 99% BW, 868.99375 MHz, C4FM



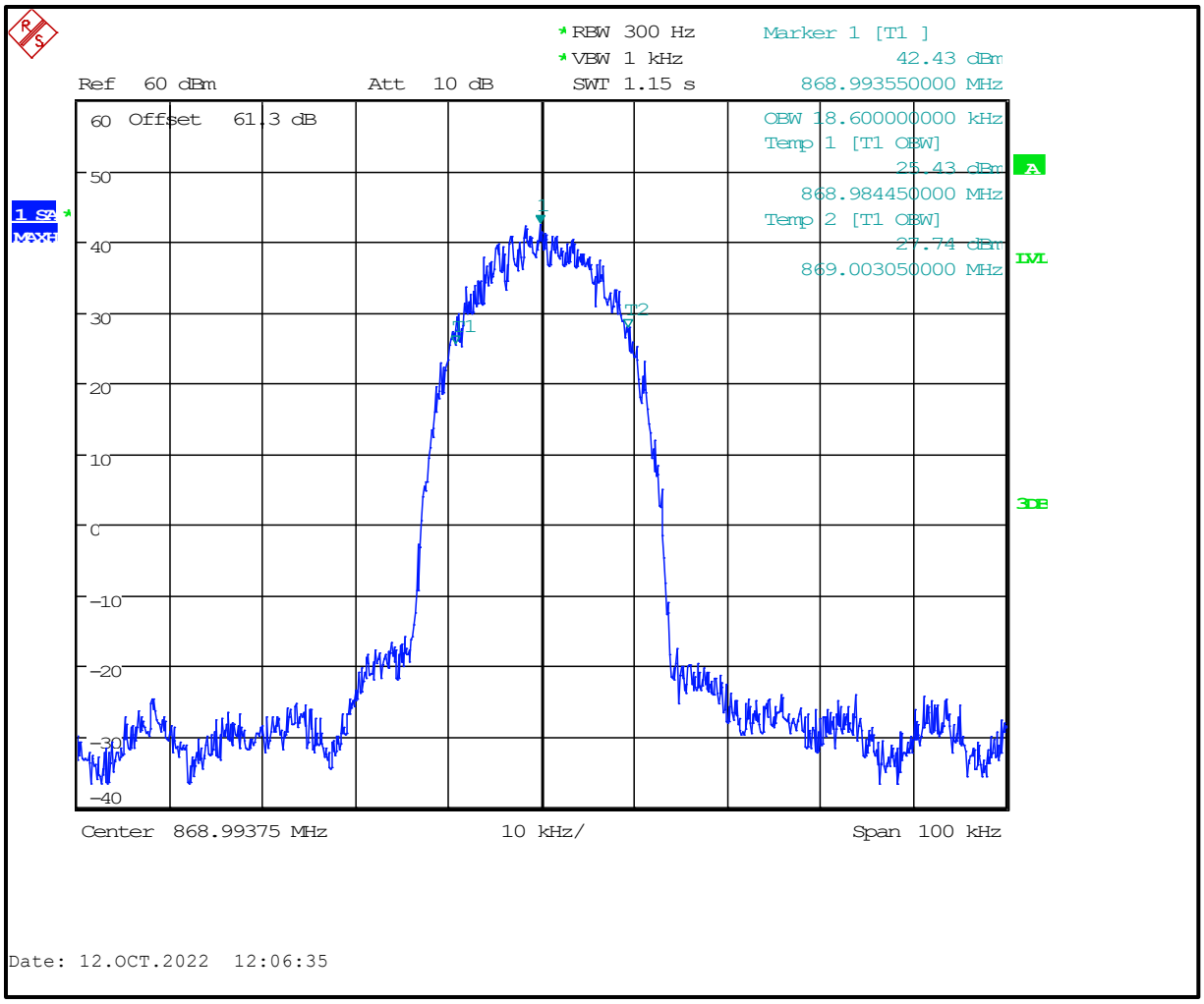
Plot 8-27: 99% BW, 868.99375 MHz, WCQPSK



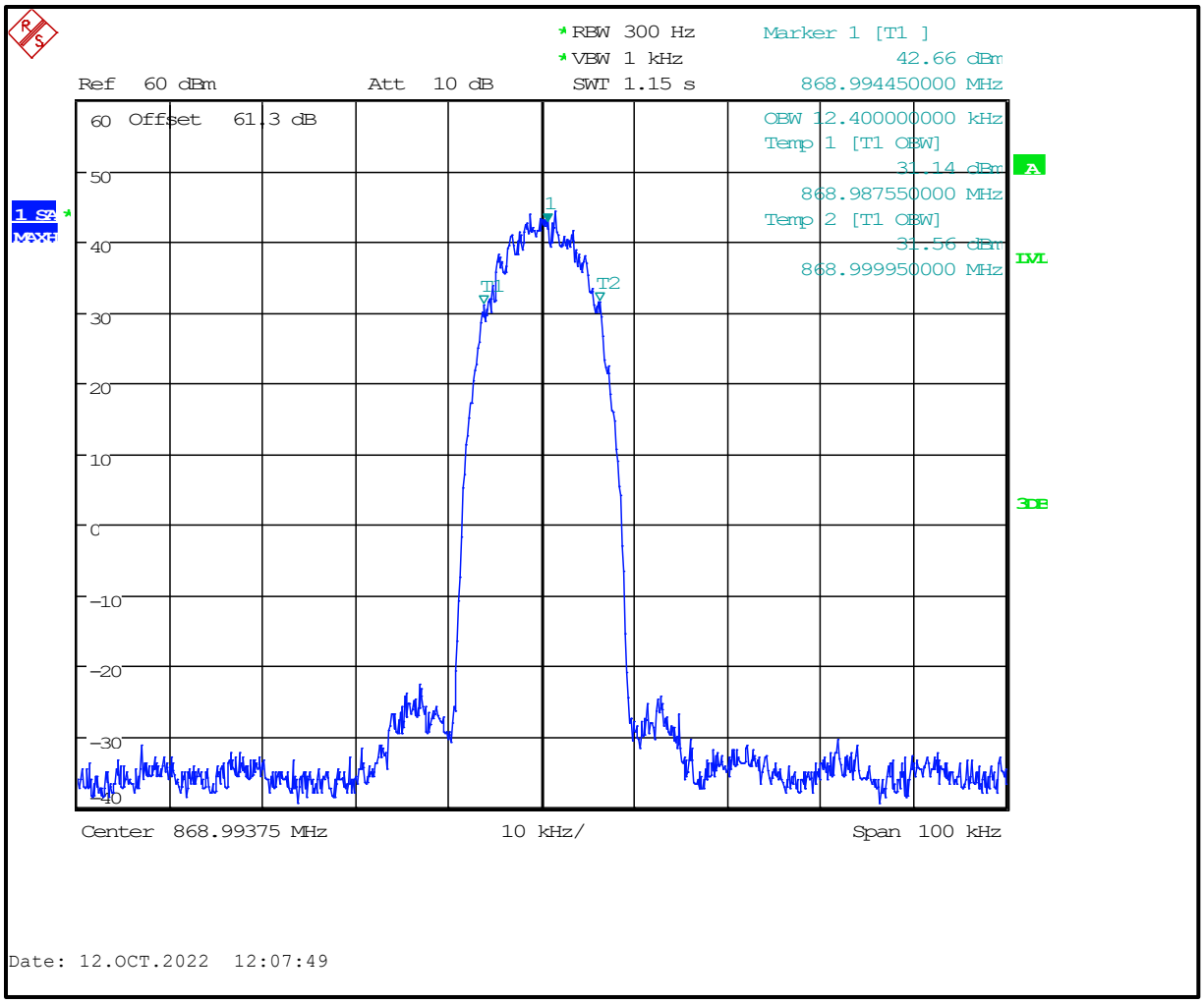
Plot 8-28: 99% BW, 868.99375 MHz, HDQPSK



Plot 8-29: 99% BW, 868.99375 MHz, HVD-SMR



Plot 8-30: 99% BW, 868.99375 MHz, HVD-NPSPAC



Measurement uncertainties shown for these tests are expanded uncertainties expressed at the 95% confidence level using a coverage factor K=2. Measurement uncertainty: ±0.5 Hz

Results: Pass

Table 8-1: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	12/01/2024
901775	Rosenberger	LU7-022-1000	Cable, SMA, 1m	001	05/02/2023
901667	RF Depot	1-foot	SMA Cable	Na	04/12/2023
901338	Weinschel	46-40-34	40 dB 25 W Attenuator	BM0556	02/21/2023
901291	Pasternack	PE7031-20	20 dB 300 W Attenuator	901291	02/21/2023

Test Personnel:

Daniel W. Baltzell		October 12 – November 8, 2022
EMC Test Engineer	Signature	Date of Test

9 FCC Part 2.1055: Frequency Stability; Part 90.213; ISED RSS-119 5.3: Transmitter Frequency Stability

9.1 Test Procedure

ANSI C63.26, section 5.6

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

The EUT was evaluated over the temperature range -30°C to +60°C. The AFC was not locked to the base station.

The temperature was initially set to -30°C and a 1-hour period was observed for stabilization of the EUT. The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10 degrees centigrade through the range. A ½-hour period was observed to stabilize the EUT at each measurement step and the frequency stability was measured within one minute after application of primary power to the transmitter. Additionally, the power supply voltage of the EUT was varied +/- 15% nominal input voltage.

Part 90.213 Frequency Stability

(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

MINIMUM FREQUENCY STABILITY
[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1,2,3] 100	100	200
25–50	20	20	50
72–76	5	.....	50
150–174	[5,11] 5	[6] 5	[4,6] 50
216–220	1.0	.....	1.0
220–222 [12]	0.1	1.5	1.5
421–512	[7,11,14] 2.5	[8] 5	[8] 5
806–809	[14] 1.0	1.5	1.5
809–824	[14] 1.5	2.5	2.5
851–854	1.0	1.5	1.5
854–869	1.5	2.5	2.5
896–901	[14] 0.1	1.5	1.5
902–928	2.5	2.5	2.5
902–928 [13]	2.5	2.5	2.5
929–930	1.5	.....	.....
935–940	0.1	1.5	1.5
1427–1435	[9] 300	300	300
Above 2450 [10]	.....	.....	.....

Part 90.213: Fixed and base stations 851 – 854 MHz: 1.0 ppm, 854 – 869 MHz: 1.5 ppm

9.2 Test Data

Table 9-1: Temperature Frequency Stability – 851.00625 MHz

Temperature (°C)	Measured Frequency (MHz)	ppm
-30	851.006294	0.05
-20	851.006292	0.05
-10	851.006272	0.03
0	851.006260	0.01
10	851.006253	0.00
20 (reference)	851.006250	0.00
30	851.006245	-0.01
40	851.006244	-0.01
50	851.006244	-0.01
60	851.006245	-0.01

Table 9-2: Temperature Frequency Stability – 860.00625 MHz

Temperature (°C)	Measured Frequency (MHz)	ppm
-30	860.006295	0.05
-20	860.006293	0.05
-10	860.006269	0.02
0	860.006260	0.01
10	860.006255	0.01
20 (reference)	860.006250	0.00
30	860.006245	-0.01
40	860.006244	-0.01
50	860.006244	-0.01
60	860.006247	0.00

Table 9-3: Temperature Frequency Stability – 868.99375 MHz

Temperature (°C)	Measured Frequency (MHz)	ppm
-30	868.993745	-0.01
-20	868.993793	0.05
-10	868.993771	0.02
0	868.993761	0.01
10	868.993755	0.01
20 (reference)	868.993750	0.00
30	868.993745	-0.01
40	868.993744	-0.01
50	868.993744	-0.01
60	868.993745	-0.01

Measurement uncertainties shown for these tests are expanded uncertainties expressed at the 95% confidence level using a coverage factor K=2. Measurement uncertainty: ±0.5 Hz

Results: Pass

Table 9-4: Test Equipment Used For Testing Temperature Frequency Stability

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901626	Amprobe	34XR-A	Multimeter	13041390A	10/18/2023
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	200106	12/01/2024
901014	Kikusui	PCR4000L	Power Supply	DB001921	Not Required
900946	Tenney Engineering	TH65	Temperature Chamber with Humidity	11380	06/23/2025
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	12/1/2024
901338	Weinschel	46-40-34	40 dB 25 W Attenuator	BM0556	02/21/2023
901291	Pasternack	PE7031-20	20 dB 300 W Attenuator	901291	02/21/2023
901591	Sucoflex	104	6.5' SMA Cable	145880/4	4/12/2023

Test Personnel:

Daniel W. Baltzell		October 11, 2022
EMC Test Engineer	Signature	Date of Test

9.2.1 Frequency Stability/Voltage Variation

Table 9-5: Frequency Stability/Voltage Variation – 851.00625 MHz

Voltage (VDC)	Measured Frequency (MHz)	ppm
40.8	851.006250	0.00
48.0 (reference)	851.006250	0.00
55.2	851.006250	0.00

Table 9-6: Frequency Stability/Voltage Variation – 860.00625 MHz

Voltage (VDC)	Measured Frequency (MHz)	ppm
40.8	860.006250	0.00
48.0 (reference)	860.006250	0.00
55.2	860.006250	0.00

Table 9-7: Frequency Stability/Voltage Variation – 868.99375 MHz

Voltage (VDC)	Measured Frequency (MHz)	ppm
40.8	868.993750	0.00
48.0 (reference)	868.993750	0.00
55.2	868.993750	0.00

Measurement uncertainties shown for these tests are expanded uncertainties expressed at the 95% confidence level using a coverage factor K=2. Measurement uncertainty: ±0.5 Hz

Results: Pass

Table 9-8: Test Equipment Used For Testing Frequency Stability/Voltage Variation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901626	Amprobe	34XR-A	Multimeter	13041390A	10/18/2023
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	200106	12/01/2024
901014	Kikusui	PCR4000L	Power Supply	DB001921	Not Required
900946	Tenney Engineering	TH65	Temperature Chamber with Humidity	11380	06/23/2025
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	12/01/2024
901338	Weinschel	46-40-34	40 dB 25 W Attenuator	BM0556	02/21/2023
901291	Pasternack	PE7031-20	20 dB 300 W Attenuator	901291	02/21/2023
901591	Sucoflex	104	6.5' SMA Cable	145880/4	04/12/2023

Test Personnel:

Daniel W. Baltzell		October 11, 2022
EMC Test Engineer	Signature	Date of Test

10 FCC Part 2.202: Necessary Bandwidth and Emission Bandwidth

C4FM Data/Voice
Calculation:
Data rate in bps (R) = 9600
Peak deviation of carrier (D) = 1800
Bn = [9600/$\log_2$(4) + 2 (1800) (0.89)] = 8.0 kHz
Emission designator: 8K00F1D, 8K00F1E

WCQPSK
Calculation:
Data rate in bps (R) =9600
Peak deviation of carrier (D) = 1800
Bn = [9600/$\log_2$(4) + 2 (1800) (1.362) = 9.7 kHz
Emission designator: 9K70D1W

HDQPSK
Calculation:
Data rate in bps (R) =12000
Peak deviation of carrier (D) = 2250
Bn = [12000/$\log_2$(4) + 2 (2250) (0.841) = 9.8 kHz
Emission designator: 9K80D7W

HVD-SMR
Calculation:
Data rate in bps (R) = 19200
Signaling states (S) = 4
B_n = 2(19200)(.98)/$\log_2$(4) = 18.8 kHz
Emission designator: 18K8D1W

HVD-NPSPAC
Calculation:
Data rate in bps (R) = 19200
Signaling states (S) = 4
B_n = 2(19200)(.65)/$\log_2$(4) = 12.5 kHz
Emission designator: 12K5D1W

11 Conclusion

The data in this measurement report shows that the L3Harris Technologies Model/HVIN SN-8TXMX, FCC ID: OWDTR-0168-E, IC: 3636B-0168, complies with the applicable requirements of Parts 2 and 90 of the FCC Rules and Innovation, Science and Economic Development Canada RSS-119.