RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC & ISED Certification Report

L3Harris Technologies
221 Jefferson Ridge Parkway
Lynchburg, VA 24501

Model: XL-90D

FCC ID: OWDTR-0167-E
IC: 3636B-0167

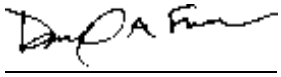
November 3, 2022

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: 2022085TNB

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 3, 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 Harris Corporation. Test results relate only to the item tested.
This report replaces R1.2.

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

Grant Note	FCC Rule Part	Frequency Range (MHz)	Conducted Output Power (W)	Frequency Tolerance (ppm)	Emission Designator	Transmit Mode
EF	90	768 – 776	2.7	0.3	8K40F1D/E	C4FM Data/Voice
EF	90	798 – 806	2.7	0.3	8K40F1D/E	
	90	806 – 816	3.2	0.3	8K40F1D/E	
	90	851 – 862	3.1	0.3	8K40F1D/E	
	90	896 – 901	3.0	0.3	8K40F1D/E	
	90	935 – 940	2.7	0.3	8K40F1D/E	
EF	90	768 – 776	2.7	0.3	8K10DXW	H-CPM (TDMA) Data/Voice
EF	90	798 – 806	2.7	0.3	8K10DXW	
	90	806 – 816	3.2	0.3	8K10DXW	
	90	851 – 862	3.1	0.3	8K10DXW	
	90	896 – 901	3.0	0.3	8K10DXW	
	90	935 – 940	2.7	0.3	8K10DXW	

** low power itinerant channels are limited to 2 W ERP.*

This device contains functions that are not operational in U.S Territories except as noted in the filing. The grant is requested to list extended frequencies as noted in the filing and Section 2.927(b) applies to this application.

Additionally, as this is a combined FCC and ISED test report, there are test frequencies contained within this report that may not be authorized for use in either the United States or Canada.

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1 Test Result Summary

Test	FCC Reference	ISED Reference	Result
RF Power Output	2.1046(a), 90.541(d), 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, 90.543(c)	RSS-119 5.5, 5.8	Complies
Occupied Bandwidth/Emission Masks	2.1049(c)(1), 90.210	RSS-119 5.5, 5.8	Complies
Adjacent Channel Power	90.543	RSS-119 4.3	Complies
Frequency Stability vs. Temperature and Voltage	2.1055, 90.213, 90.539	RSS-119 5.3	Complies
Modulation Characteristics	2.1047(a)(b)	RSS-119 5.2	Complies
Transient Frequency Response	90.214	RSS-119 5.9	N/A
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 XL-90D; FCC ID: OWDTR-0167-E, IC: 3636B-0167.

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: XL-90D, FCC ID: OWDTR- 0167-E, IC: 3636B-0167.

2.3 Grant Notes

Extended Frequency (EF) and Power is continuously variable from 0.5 W to 3.2 W.

2.4 Tested System Details

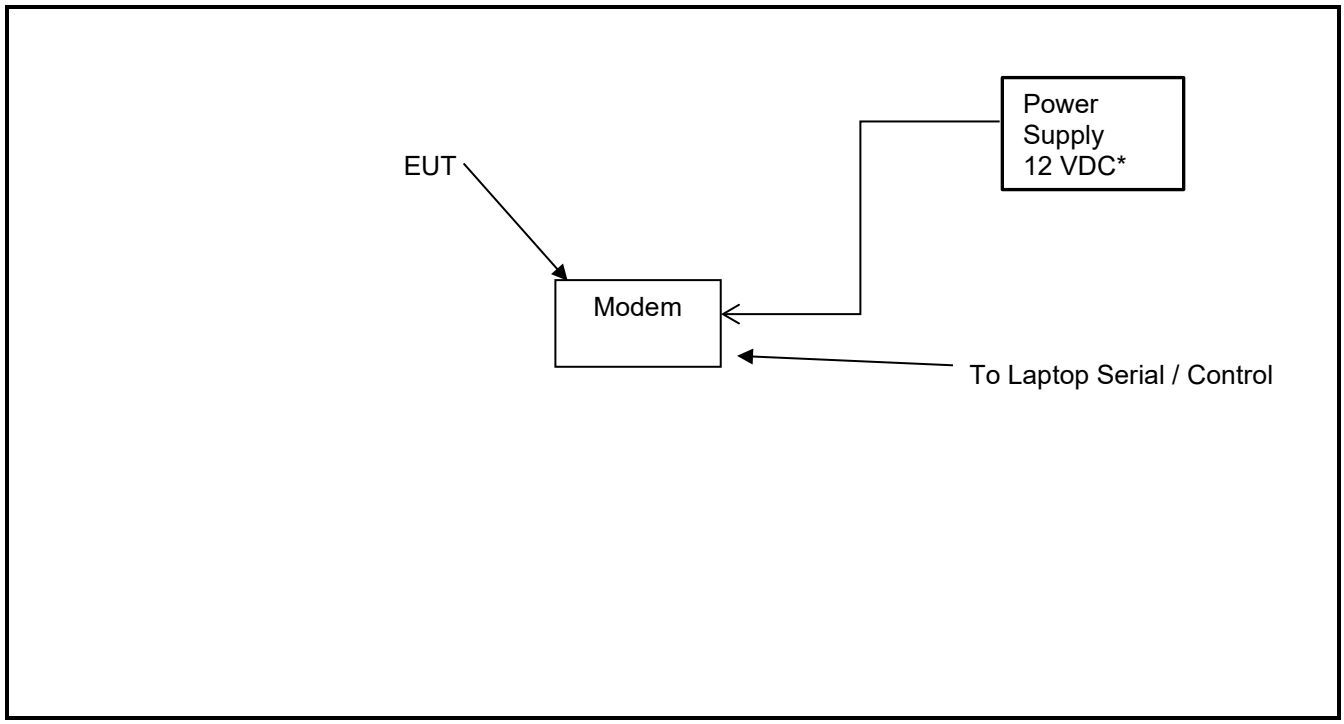
The test sample was received on August 16, 2022. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

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	RTL Bar Code
Modem	L3Harris Technologies	XL-90D	A40333E1C001	OWDTR-0167-E	24115
Modem	L3Harris Technologies	XL-90D	A40333E1C002	OWDTR-0167-E	24116

2.5 Configuration of Tested System



** EUT power input range is 9 to 57 VDC. 12 VDC was used for all testing except frequency stability vs temperature.*

Figure 2-1: Configuration of Tested System

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

22 VDC / 0.53 A

9 VDC / 1.349

4 FCC Part 2.1046(a): RF Power Output: Conducted; Part 90.541(d) Transmitting power and antenna height requirements; Part 90.635 Limitations on power and antenna height; ISED RSS-119 4.1: Transmitter Output Power

4.1 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: 3.0 W for 700, 800 and 900 MHz bands.

4.2 Test Data

Table 4-1: RF Conducted Output Power – Measured

Frequency (MHz)	Rated High Power (dBm)	Rated High Power (W)	High Power (dBm)	High Power (W)	Low Power (dBm)	Low Power (W)
768.0125	34.3	2.7	34.3	2.7	27.8	0.6
775.9875	34.3	2.7	34.4	2.7	27.6	0.6
798.0125	34.3	2.7	34.3	2.7	27.4	0.5
805.9875	34.3	2.7	34.3	2.7	27.2	0.5
806.0125	35.1	3.2	35.0	3.2	27.4	0.5
815.9875	35.1	3.2	34.9	3.1	27.3	0.5
851.0125	35.1	3.2	34.8	3.1	27.1	0.5
861.9875	35.1	3.2	34.8	3.0	27.1	0.5
896.0125	35.1	3.2	34.8	3.0	27.0	0.5
900.9875	35.1	3.2	34.8	3.0	27.1	0.5
935.0125	34.3	2.7	34.3	2.7	27.0	0.5
939.9875	34.3	2.7	34.4	2.7	27.0	0.5

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 4-2: Test Equipment Used For Testing RF Power Output – Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901773	Rohde & Schwarz	FSW50	Analyzer	101021	02/02/2025
901724	API Weinschel, Inc.	48-40-34	40 dB 100W Attenuator	CJ8921	09/21/2022
901338	Weinschel Corporation	46-40-34	40 dB 25 W Attenuator	BM0556	02/21/2023

Test Personnel:

Daniel W. Baltzell		August 16 and November 1, 2022
EMC Test Engineer	Signature	Dates of Test

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

5.1 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.

5.2 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

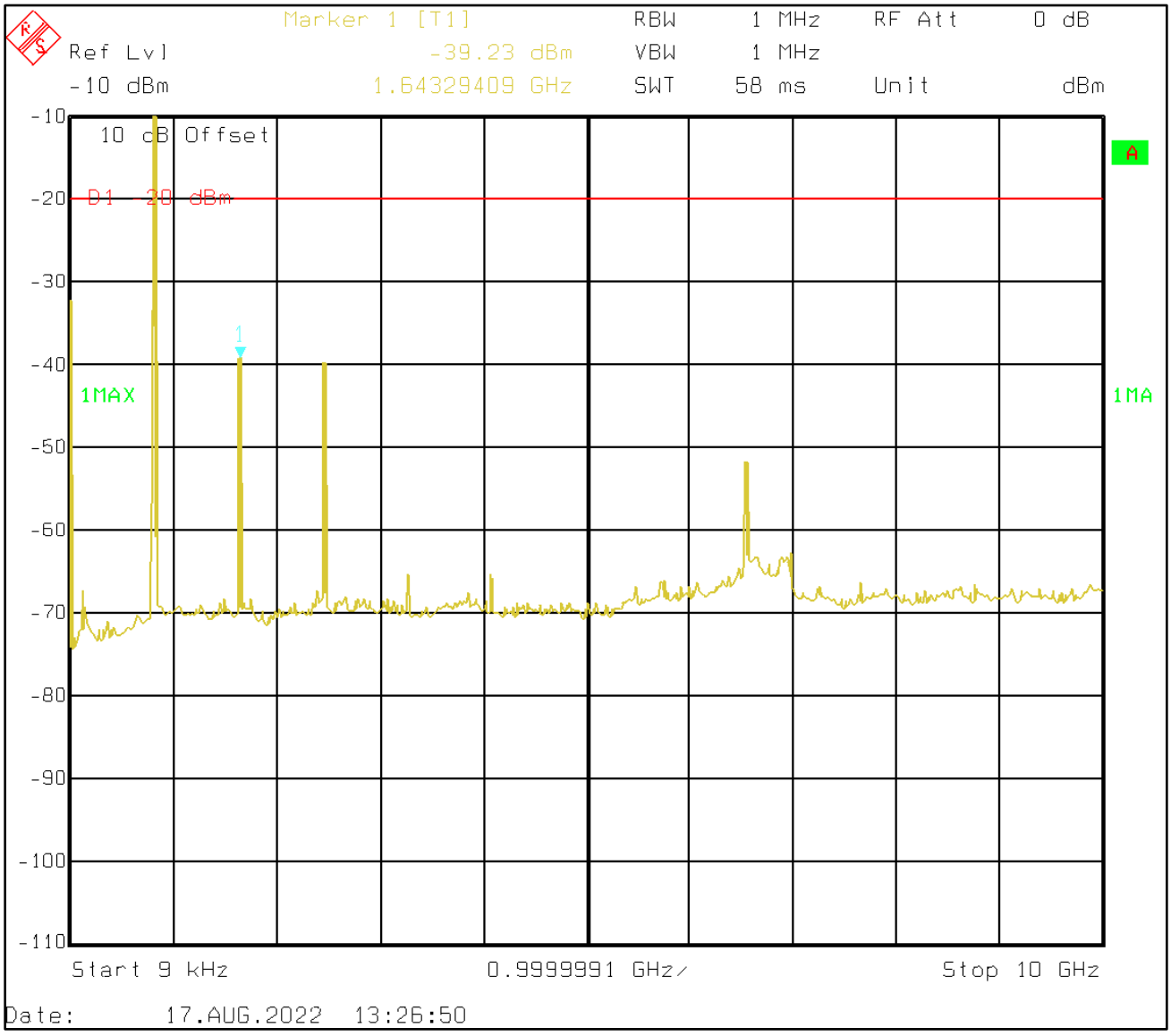
The following channels (in MHz) were investigated:

700 MHz	800 MHz	900 MHz
768.0125	806.0125	896.0125
769.0125	815.9875	900.9875
774.9875		
775.9875		
798.0125	851.0125	935.0125
799.0125	861.9875	939.9875
804.9875		
805.9875		

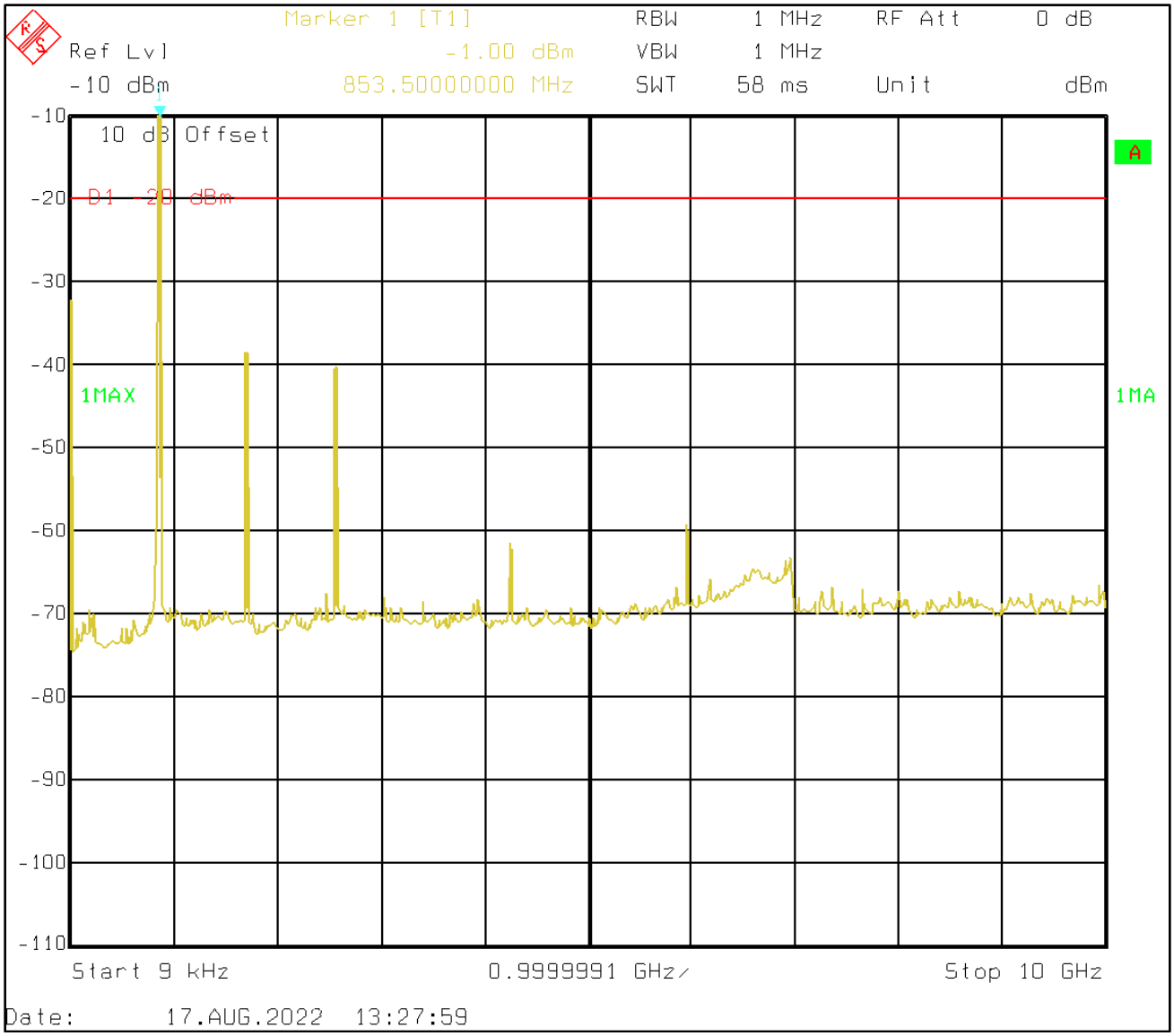
Both high and low power settings were checked; high power was found to be worst case and is presented. Data is presented only for frequencies above 20 dB below the limit. All modes were investigated and no other emissions were found within 20 dB below the limit.

5.3 Test Data

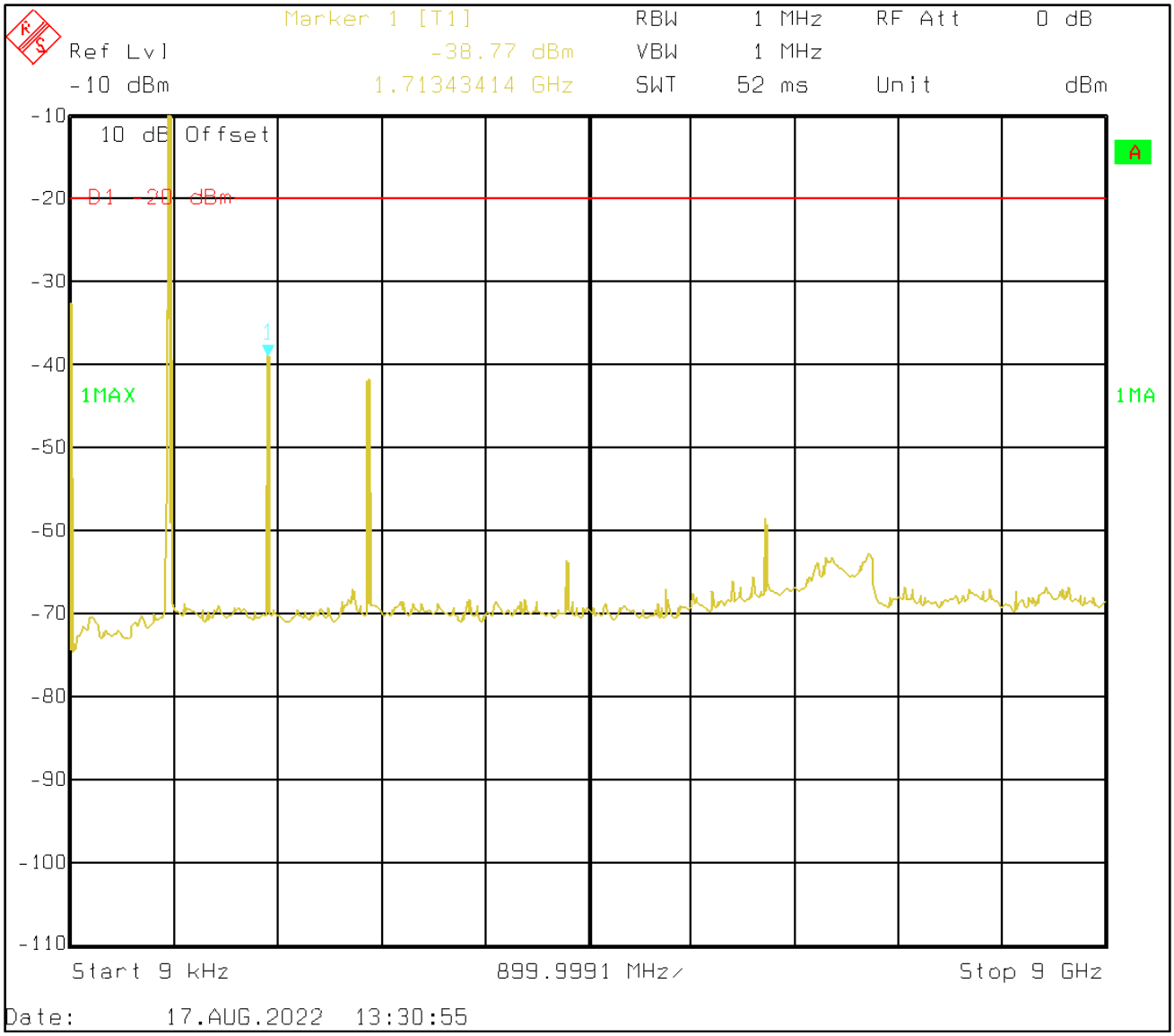
Plot 5-1: Conducted Spurious Emissions – 815.9875 MHz



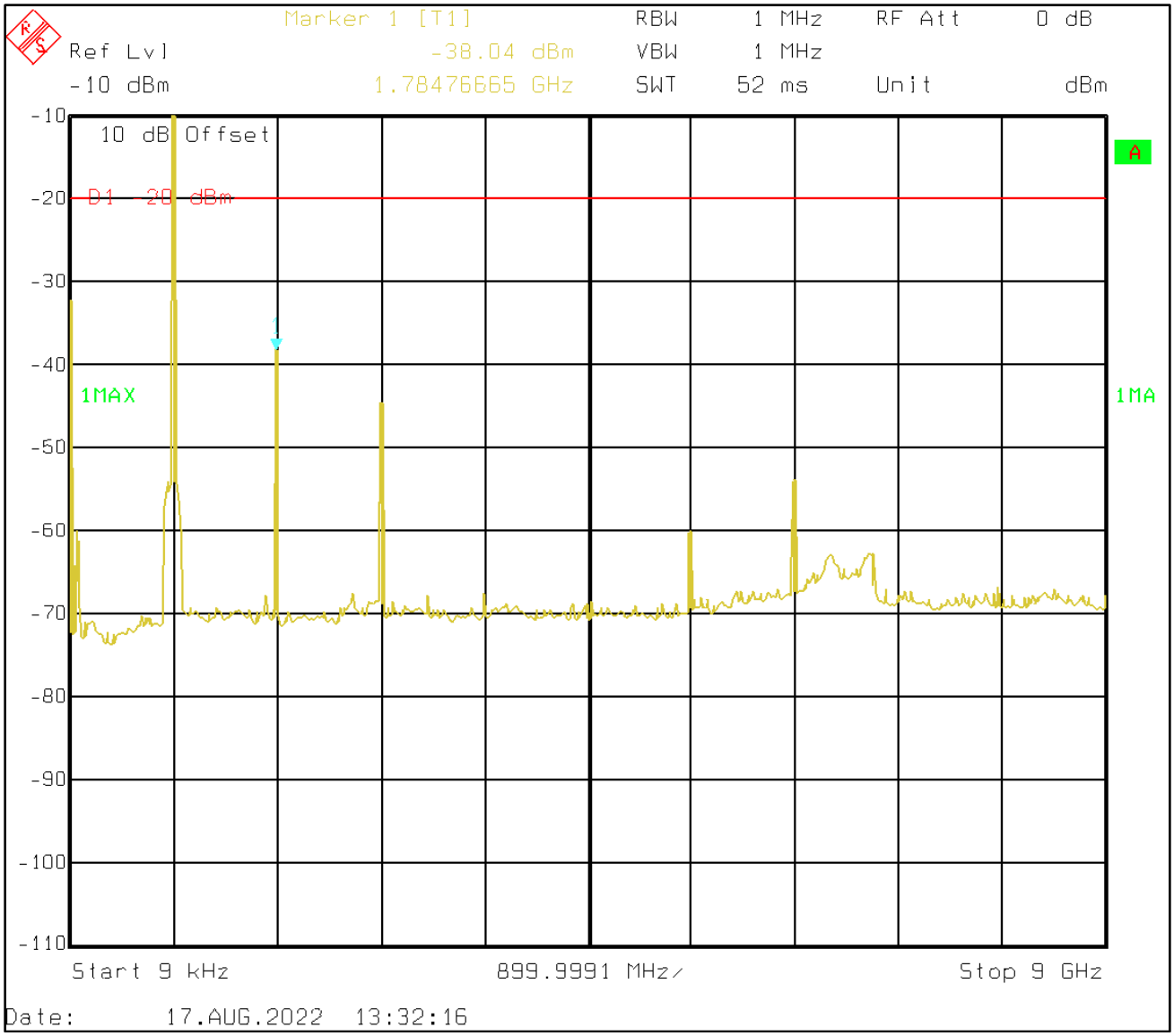
Plot 5-2: Conducted Spurious Emissions – 851.0125 MHz



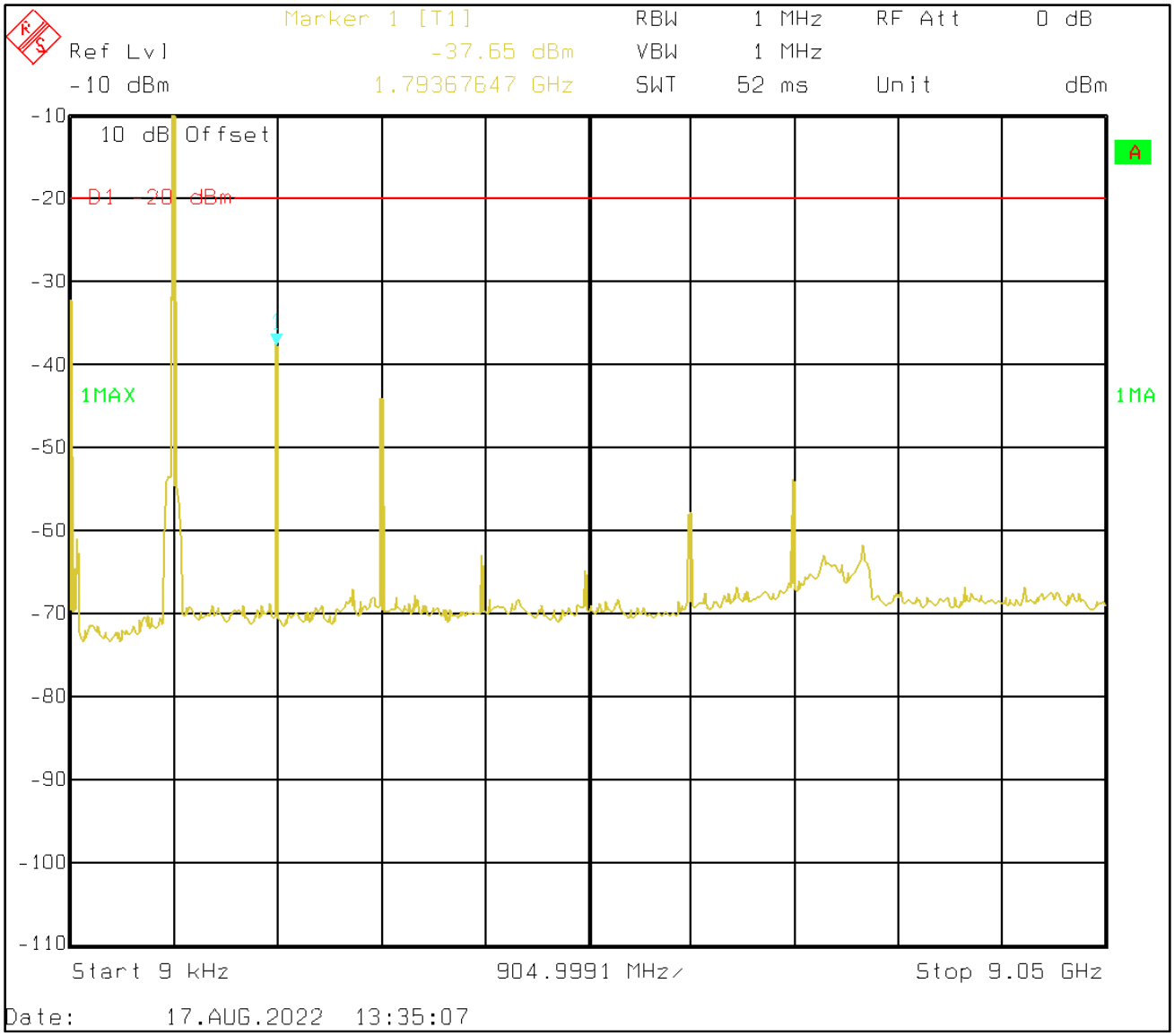
Plot 5-3: Conducted Spurious Emissions – 861.9875 MHz



Plot 5-4: Conducted Spurious Emissions – 896.9875 MHz



Plot 5-5: Conducted Spurious Emissions – 900.9875 MHz



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 5-1: Test Equipment Used For Testing Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901672	Rohde & Schwarz	FSEM30	Spectrum Analyzer	FSEM30	04/25/2023
901337	Narda Microline	766-10	Attenuator (DC-4GHz, 10 dB, 20W)	6242	02/21/2023
901128	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	10/15/2022

Test Personnel:

Daniel Baltzell		August 17, 2022
EMC Test Engineer	Signature	Date of Test

6 FCC Part 90.543(a): Emission Limitations: ACP Requirements; ISED RSS-119 4.3: Adjacent Channel Power (ACP) Measurement for Equipment in the Bands 764-776 MHz and 794-806 MHz

Effective October 23, 2007, transmitters designed to operate in the 769–775 MHz and 799–805 MHz frequency bands must meet the emission limitations in paragraphs (a) through (d) of this section. Transmitters operating in the 763–768 MHz and 793–798 MHz bands must meet the emission limitations in (e) of this section.

6.1 Test Procedure

ANSI C63.26, Section 6.5.2.4

Adjacent channel power measurements for equipment operating in the 769 MHz to 775 MHz and 799 MHz to 805 MHz (public safety) bands.

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

For a Mobile transmitter designed to operate with a 12.5 kHz channel bandwidth, the ACP shall be in accordance with the values in the following table:

Offset from Center Frequency (kHz)	Measurement Bandwidth (kHz)	Maximum ACP Relative (dBc)
(+/-)9.375	6.25	-40
(+/-)15.625	6.25	-60
(+/-)21.875	6.25	-60
(+/-)37.5	25	-60
(+/-)62.5	25	-65
(+/-)87.5	25	-65
(+/-)150	100	-65
(+/-)250	100	-65
(+/-)350	100	-65
>400 kHz to 12 MHz	30(s)	-75
12 MHz to paired receive band	30(s)	-75
In the paired receive band	30(s)	-100

For a Mobile transmitter designed to operate with a 25 kHz channel bandwidth, the ACP shall be in accordance with the values in the following table:

Offset from Center Frequency (kHz)	Measurement Bandwidth (kHz)	Maximum ACP Relative (dBc)
(+/-)15.625	6.25	-40
(+/-)21.875	6.25	-60
(+/-)37.5	25	-60
(+/-)62.5	25	-65
(+/-)87.5	25	-65
(+/-)150	100	-65
(+/-)250	100	-65
(+/-)350	100	-65
>400 kHz to 12 MHz	30(s)	-75
12 MHz to paired receive band	30(s)	-75
In the paired receive band	30(s)	-100

FCC Rules and Regulations - 90.543(b)

Setting Reference Level - 90.543(b)(1): Using a spectrum analyzer capable of ACP measurements, set the measurement bandwidth to the channel size. Set the frequency offset of the measurement to zero and adjust the center frequency of the spectrum analyzer to give the power level in the measurement bandwidth. Record this power as the reference power level.

Measuring the power level at the frequency offset <600 kHz - §90.543(b)(2): Using a spectrum analyzer capable of adjacent channel power (ACP) measurements, set the measurement bandwidth as shown in the table. Measure ACP in dBm. These measurements are made at maximum power. Calculate the coupled power by subtracting the measurements made in this step from the reference power level. The absolute ACP values must be less than the values given in the table for each condition.

Measuring the power level at the frequency offset >600 kHz - §90.543(b)(3): Set the spectrum analyzer to 30 kHz resolution bandwidth, 1 MHz video bandwidth and sample detection mode. Sweep +/-6 MHz from the carrier frequency. Set the reference level to the RMS value of the transmitter power and note the power. The response at frequencies >600 kHz must be less than the values listed in the table.

6.2 Test Data

Plot 6-1: Adjacent Channel Power - 768.0125 MHz; C4FM Mode (9.375 kHz - 350 kHz)

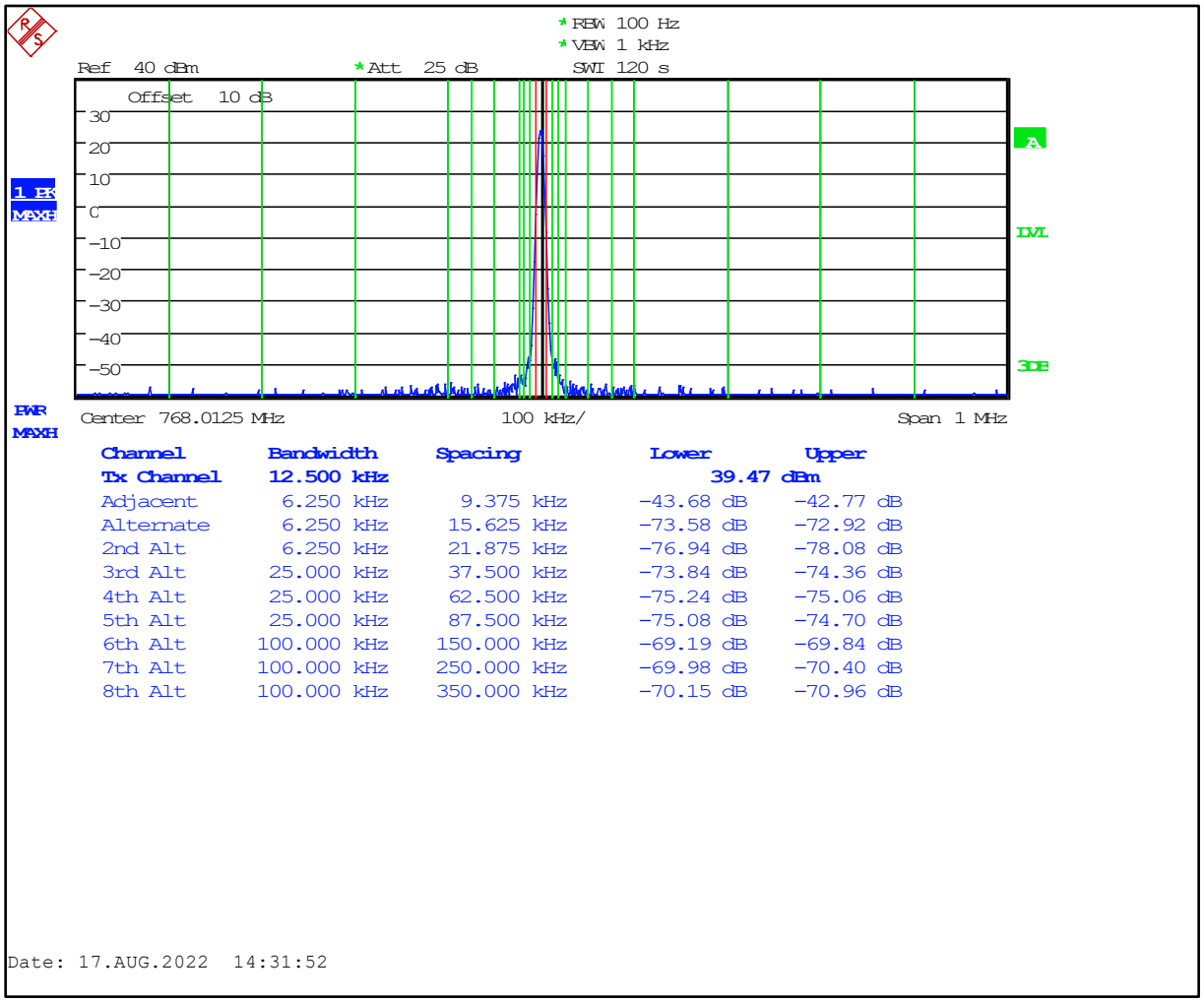


Table 6-1: Adjacent Channel Power - 768.0125 MHz; C4FM Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-89.7
12 MHz to receive band	30(s)	-75	-97.3
In receive band	30(s)	-100	-117.0

Plot 6-2: Adjacent Channel Power - 772.0000 MHz; C4FM Mode (9.375 kHz - 350 kHz)

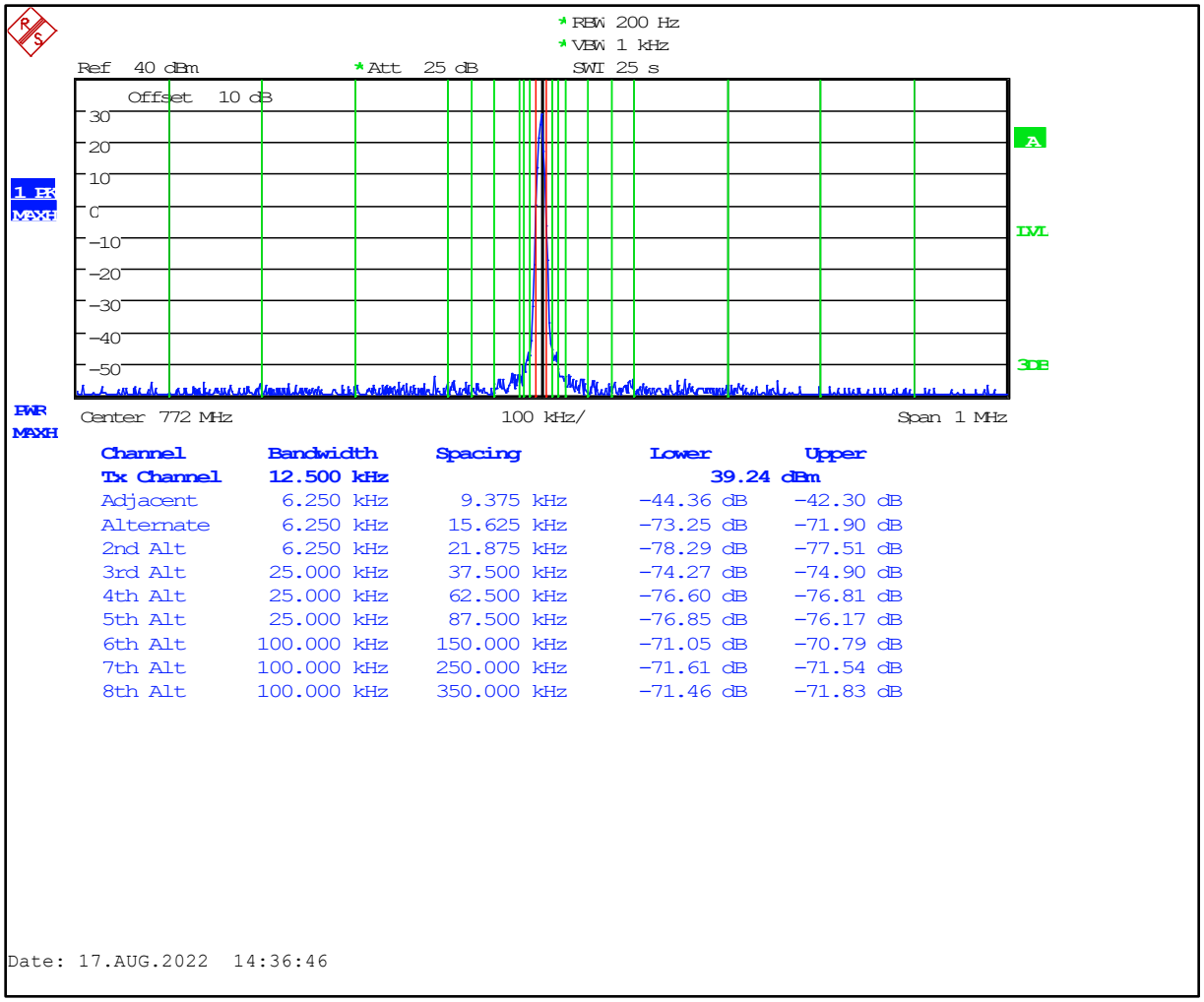


Table 6-2: Adjacent Channel Power - 772.0000 MHz; C4FM Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-87.9
12 MHz to receive band	30(s)	-75	-97.7
In receive band	30(s)	-100	-115.6

Plot 6-3: Adjacent Channel Power - 775.9875 MHz; C4FM Mode (9.375 kHz - 350 kHz)

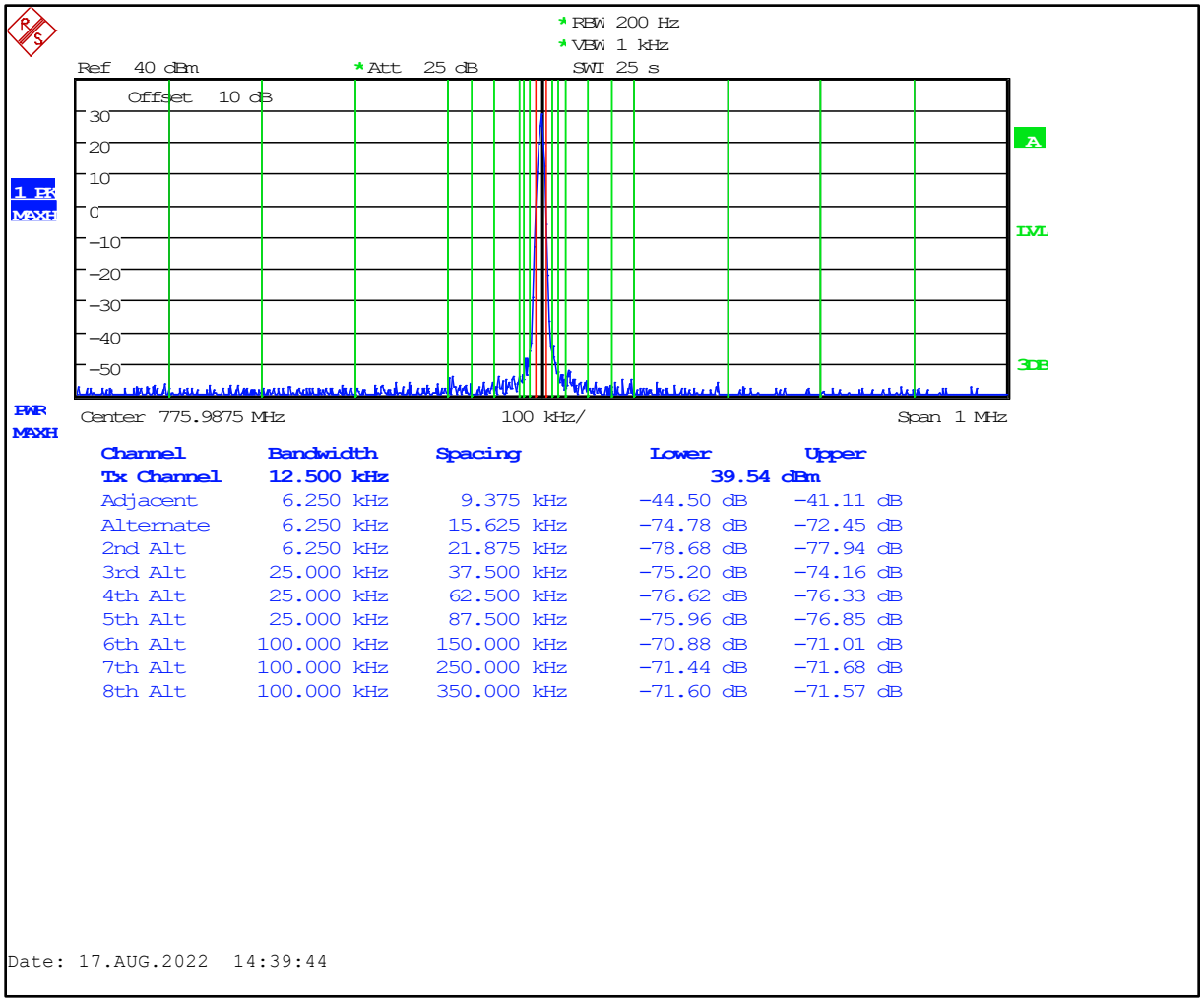


Table 6-3: Adjacent Channel Power - 775.9875 MHz; C4FM Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-88.0
12 MHz to receive band	30(s)	-75	-96.9
In receive band	30(s)	-100	-112.0

Plot 6-4: Adjacent Channel Power – 798.0125 MHz; C4FM Mode (9.375 kHz - 350 kHz)

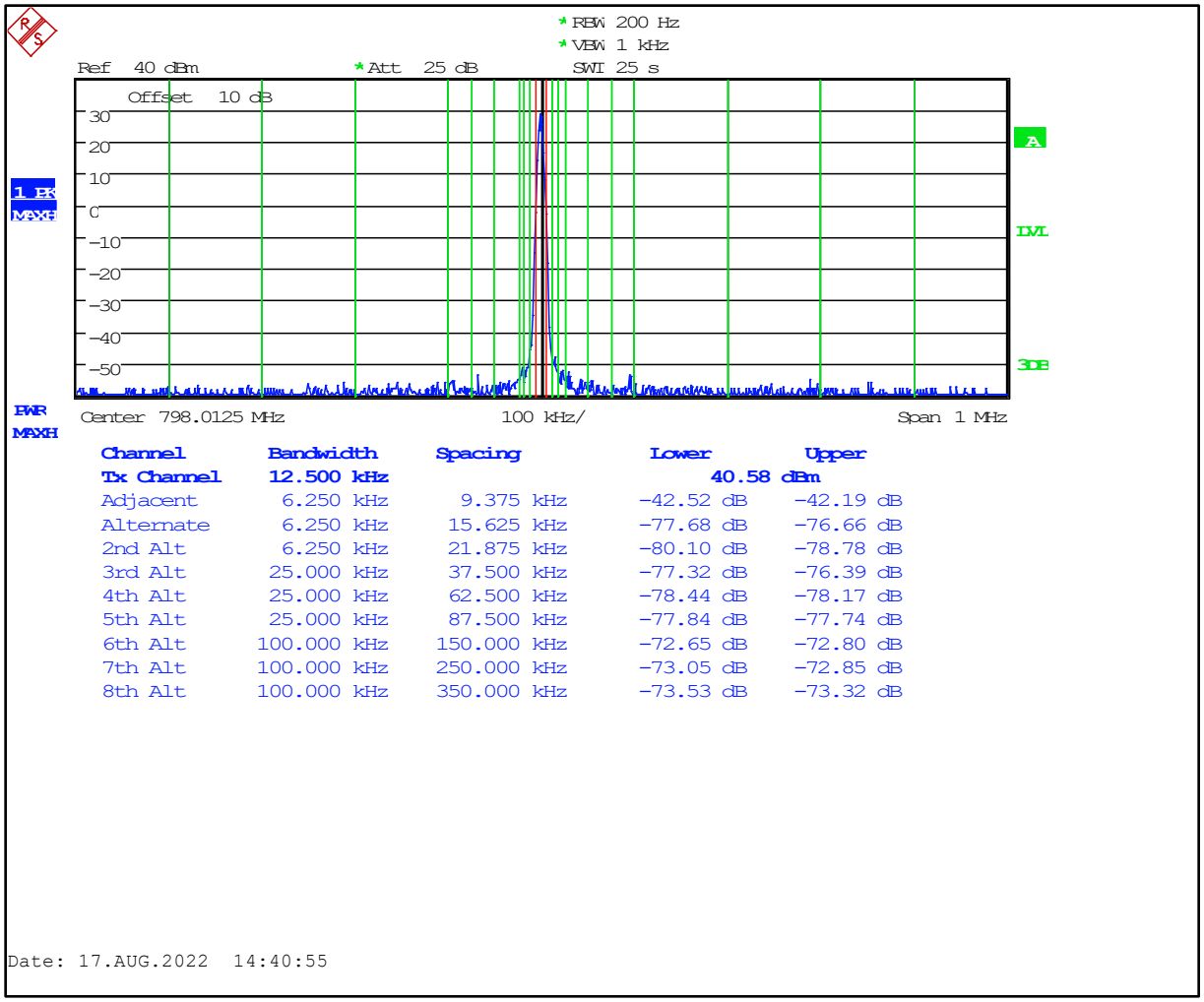


Table 6-4: Adjacent Channel Power – 798.0125 MHz; C4FM Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-87.6
12 MHz to receive band	30(s)	-75	-99.9
In receive band	30(s)	-100	-105.2

Plot 6-5: Adjacent Channel Power – 802.0000 MHz; C4FM Mode (9.375 kHz - 350 kHz)

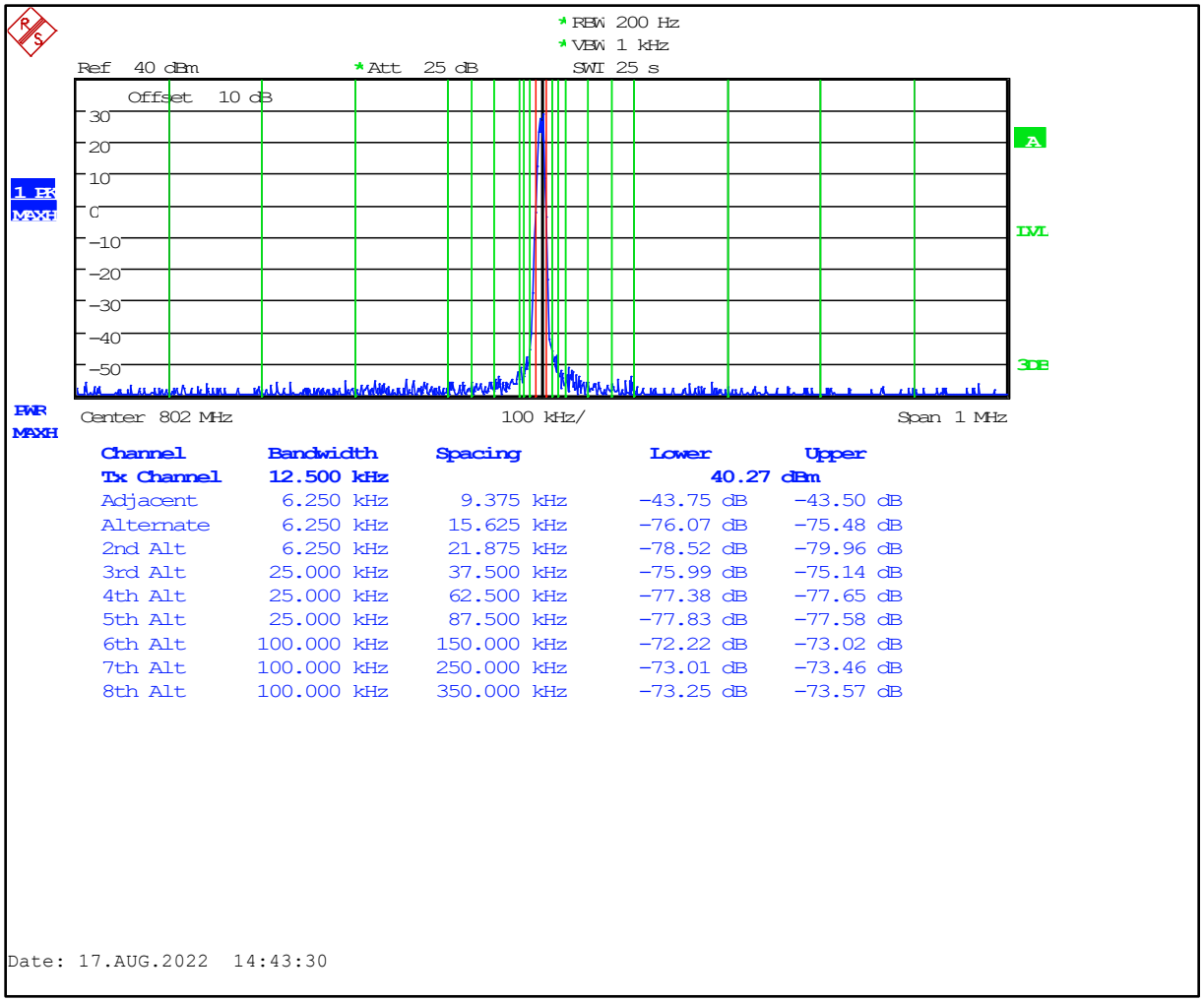


Table 6-5: Adjacent Channel Power – 802.0000 MHz; C4FM Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-94.9
12 MHz to receive band	30(s)	-75	-95.3
In receive band	30(s)	-100	-108.7

Plot 6-6: Adjacent Channel Power – 805.9875 MHz; C4FM Mode (9.375 kHz - 350 kHz)

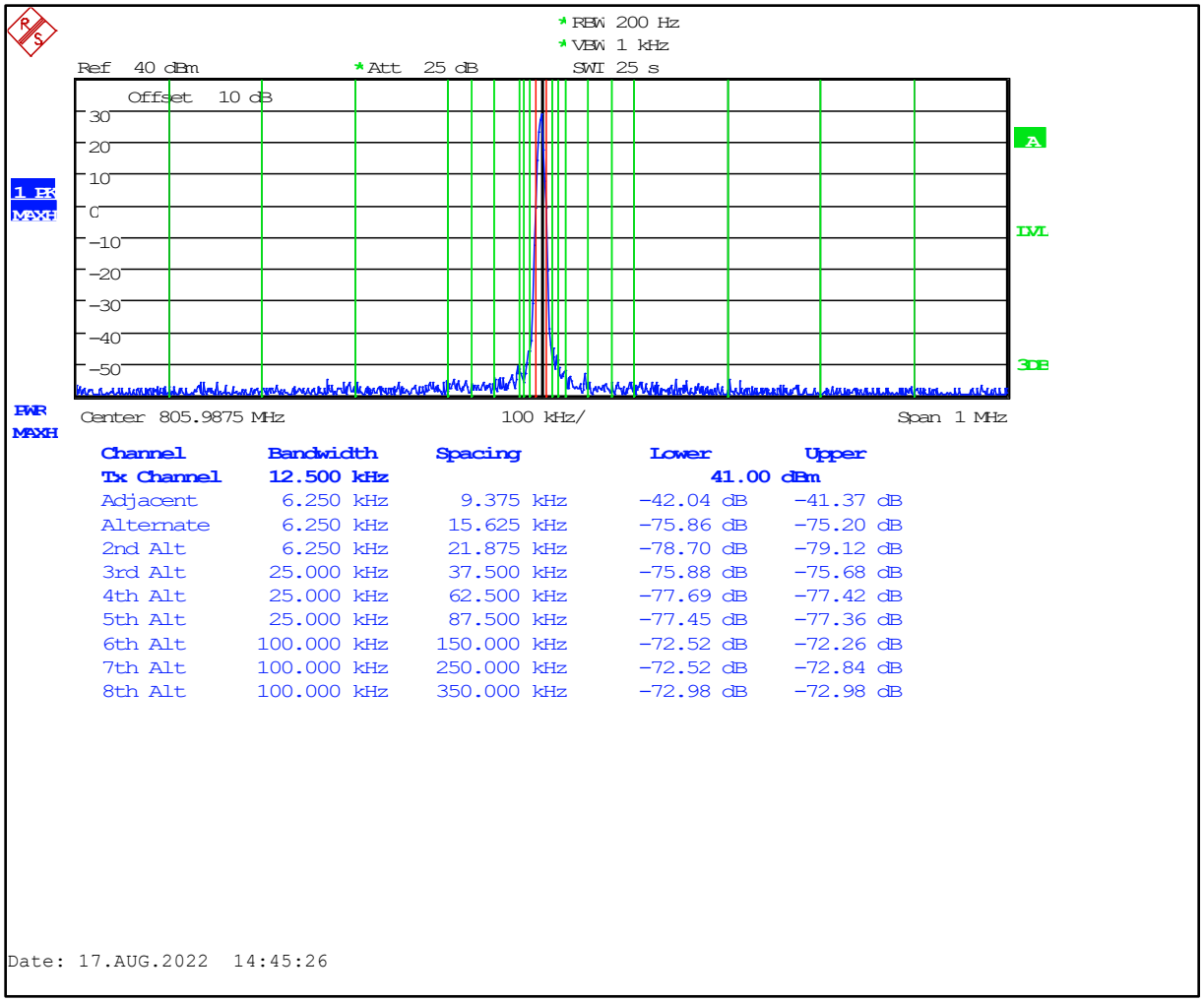


Table 6-6: Adjacent Channel Power – 805.9875 MHz; C4FM Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-92.9
12 MHz to receive band	30(s)	-75	-97.0
In receive band	30(s)	-100	-112.5

Plot 6-7: Adjacent Channel Power - 768.0125 MHz; H-CPM (TDMA) Mode (9.375 kHz - 350 kHz)

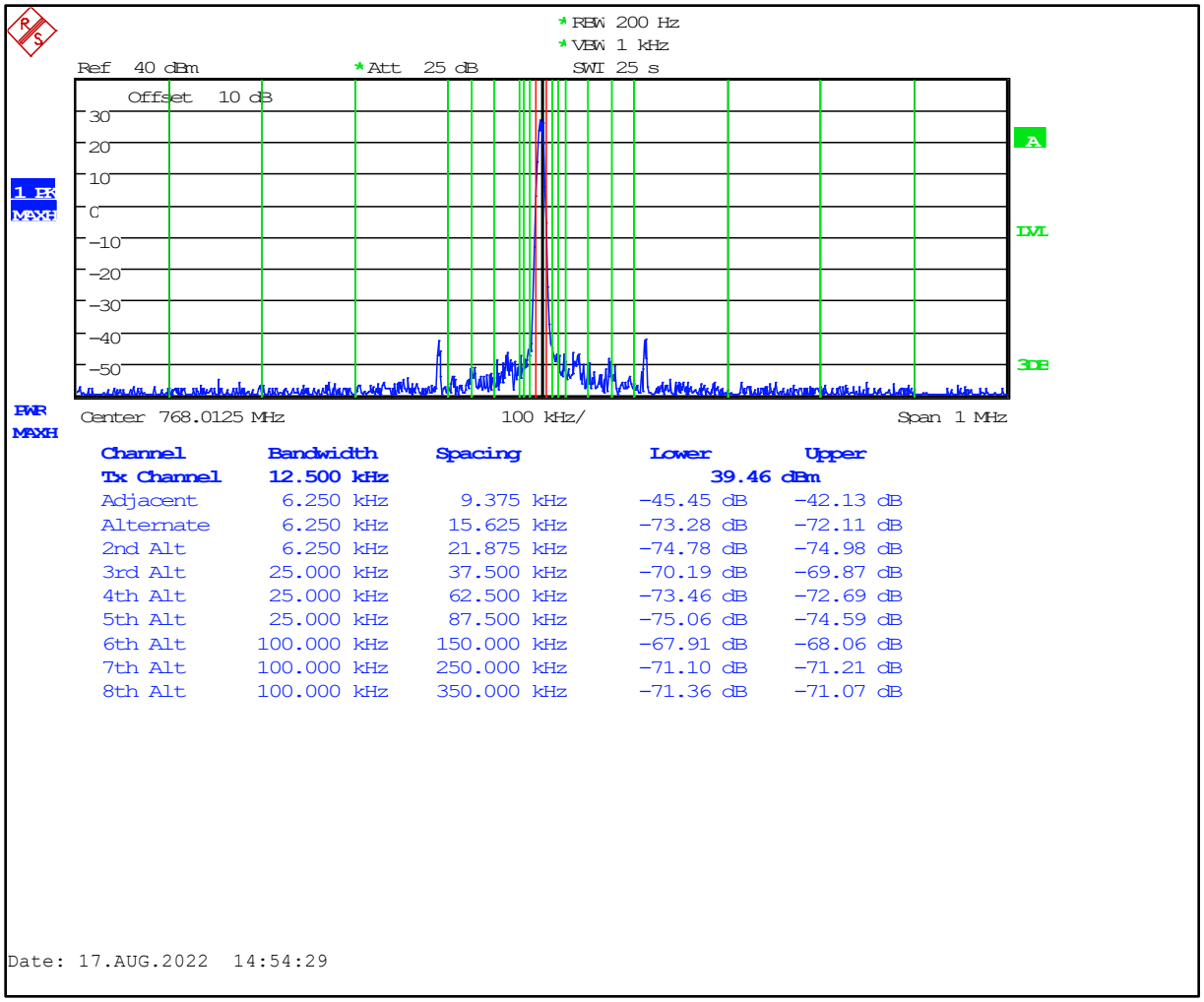


Table 6-7: Adjacent Channel Power - 768.0125 MHz; H-CPM (TDMA) Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-90.4
12 MHz to receive band	30(s)	-75	-97.2
In receive band	30(s)	-100	-114.0

Plot 6-8: Adjacent Channel Power - 772.0000 MHz; H-CPM (TDMA) Mode (9.375 kHz - 350 kHz)

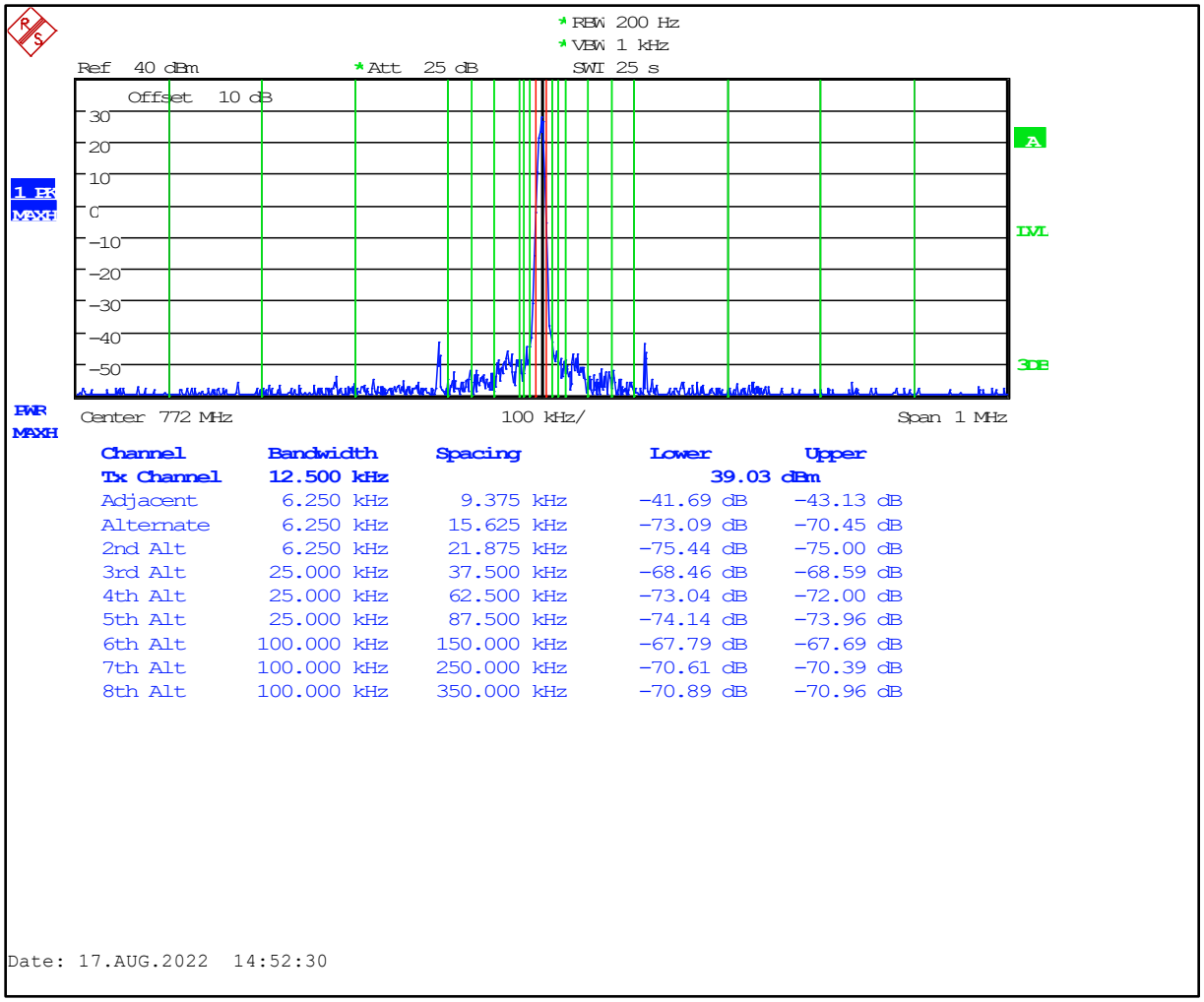


Table 6-8: Adjacent Channel Power - 772.0000 MHz; H-CPM (TDMA) Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-87.7
12 MHz to receive band	30(s)	-75	-97.9
In receive band	30(s)	-100	-112.5

Plot 6-9: Adjacent Channel Power - 775.9875 MHz; H-CPM (TDMA) Mode (9.375 kHz - 350 kHz)

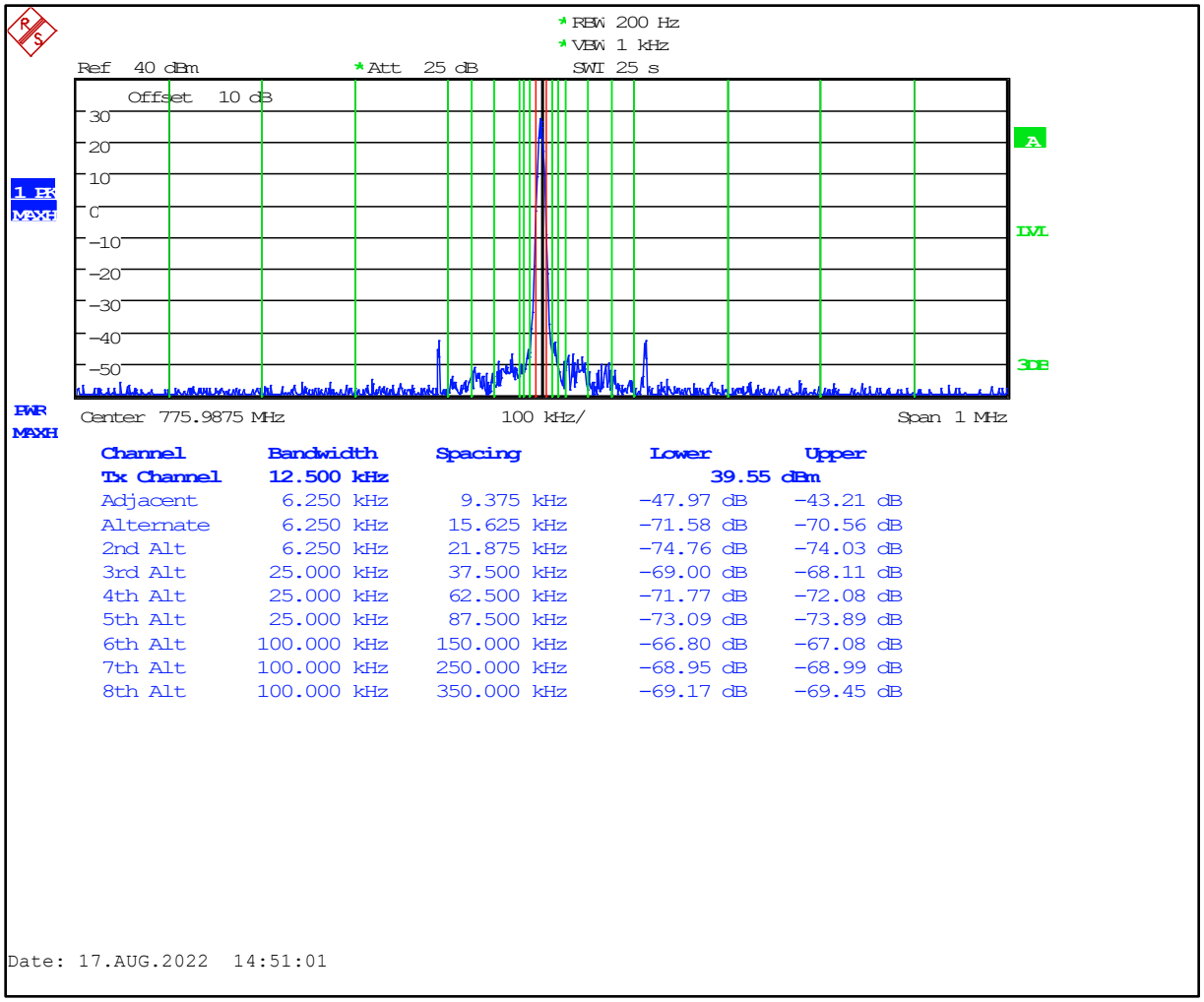


Table 6-9: Adjacent Channel Power - 775.9875 MHz; H-CPM (TDMA) Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-88.4
12 MHz to receive band	30(s)	-75	-96.8
In receive band	30(s)	-100	-112.2

Plot 6-10: Adjacent Channel Power – 798.0125 MHz; H-CPM (TDMA) Mode; (9.375 kHz - 350 kHz)

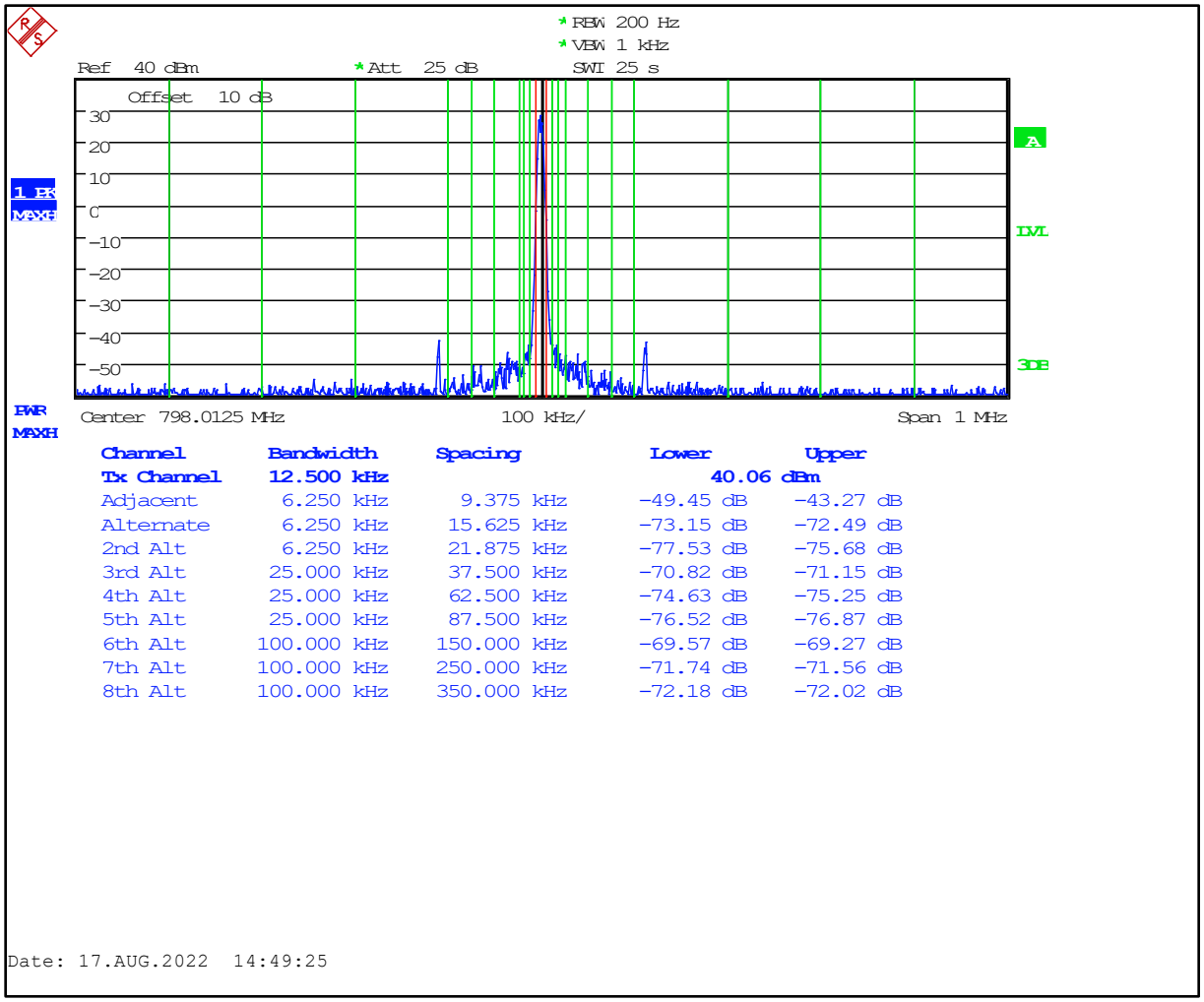


Table 6-10: Adjacent Channel Power – 798.0125 MHz; H-CPM (TDMA) Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-88.5
12 MHz to receive band	30(s)	-75	-100.1
In receive band	30(s)	-100	-105.2

Plot 6-11: Adjacent Channel Power – 802.0000 MHz; H-CPM (TDMA) Mode; (9.375 kHz - 350 kHz)

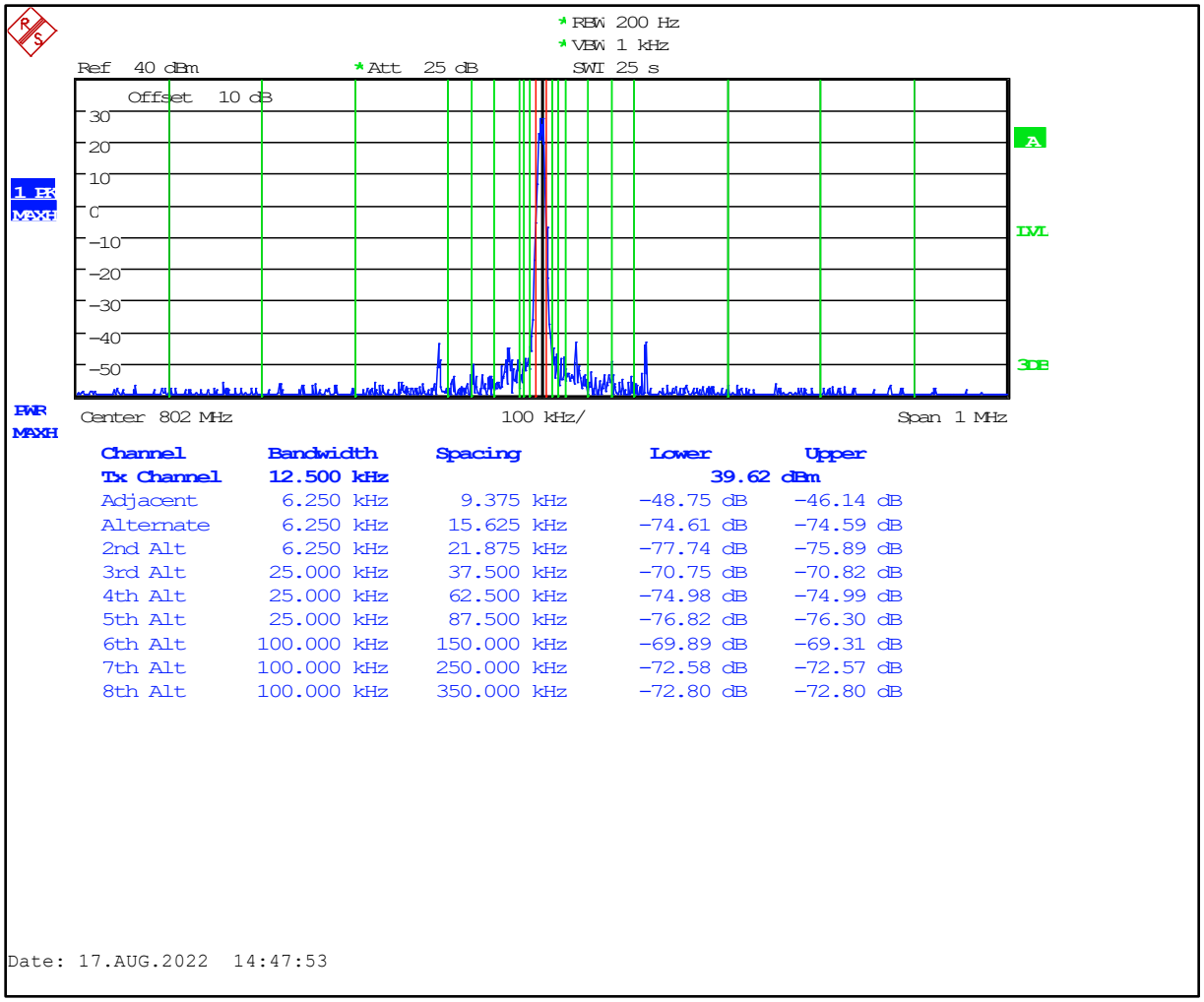


Table 6-11: Adjacent Channel Power – 802.0000 MHz; H-CPM (TDMA) Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-95.7
12 MHz to receive band	30(s)	-75	-93.5
In receive band	30(s)	-100	-108.7

Plot 6-12: Adjacent Channel Power – 805.9875 MHz; H-CPM (TDMA) Mode; (9.375 kHz - 350 kHz)

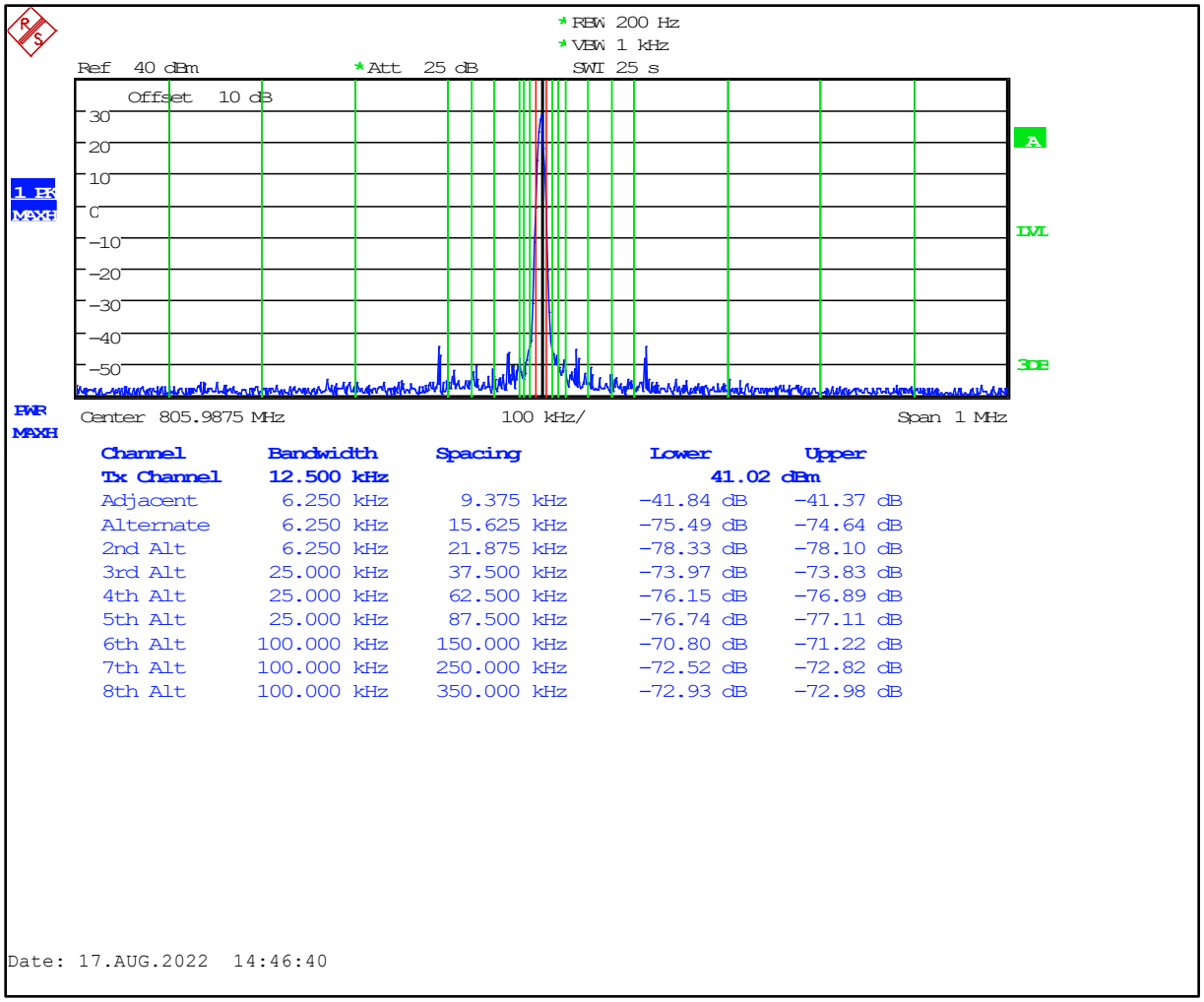


Table 6-12: Adjacent Channel Power – 805.9875 MHz; H-CPM (TDMA) Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-94.3
12 MHz to receive band	30(s)	-75	-98.2
In receive band	30(s)	-100	-112.0

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 dB

Results: Pass

Table 6-13: Test Equipment Used For Testing ACP Requirements

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	12/01/2024
900819	Weinschel Corporation	2	Attenuator DC-18 GHz 10 dB 5W	BF0830	09/21/2022
901337	Microline	766-10	Attenuator DC-18 GHz 10 dB 20W	06242	02/21/2023

Test Personnel:

Daniel Baltzell		August 17-18, 2022
EMC Test Engineer	Signature	Dates of Test

7 FCC Part 90.210 and Part 2.1053(a): Field Strength of Spurious Emissions; Part 90.543(c): Out of Band Emissions Limit; 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, and compared to the limit.

For emissions in the 1559-1610 band, Part 90.543(f) states: "For operations in the 763–775 MHz and 793–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation."

7.2 Test Data

Table 7-1: Field Strength of Spurious Radiation – 768.0125 MHz

Conducted Power 34.3 dBm; 2.7 W; Limit = 43+10 Log P = 47.3 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)
1536.0250	25.7	-44.8	0.9	6.5	74.4	-27.1
2304.0375	32.0	-45.9	1.1	7.3	75.0	-27.7
3072.0500	11.9	-64.4	1.3	7.2	93.9	-46.6
3840.0625	9.9	-64.8	1.5	7.0	94.6	-47.3
4608.0750	-7.5	-78.6	1.7	8.9	106.7	-59.4
5376.0875	-4.1	-74	1.8	8.5	102.5	-55.2
6144.1000	2.7	-66.8	1.9	9.2	94.8	-47.5
6912.1125	-3.6	-72.3	2.0	9.5	100.1	-52.8
7680.1250	-8.8	-76.4	2.1	9.2	104.6	-57.3

Table 7-2: Field Strength of Spurious Radiation – 775.9875 MHz

Conducted Power 34.4 dBm; 2.7 W; Limit = 43+10 Log P = 47.3 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)
1551.9750	31.9	-38.6	0.9	6.6	68.0	-20.7
2327.9625	27.8	-50	1.1	7.3	78.9	-31.6
3103.9500	14.0	-62.1	1.3	7.1	91.4	-44.1
3879.9375	20.9	-53.8	1.5	7.0	83.5	-36.2
4655.9250	-6.1	-77.1	1.7	8.9	104.9	-57.6
5431.9125	0.9	-68.9	1.8	8.5	97.3	-50.0
6207.9000	9.5	-59.9	1.9	9.1	87.8	-40.5
6983.8875	0.2	-68.6	2.0	9.5	96.2	-48.9
7759.8750	-8.4	-76.1	2.1	9.3	104.0	-56.7

Table 7-3: Field Strength of Spurious Radiation – 798.0125 MHz

Conducted Power 34.3 dBm; 2.7 W; Limit = 43+10 Log P = 47.3 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)
1596.0250	34.0	-36.4	0.9	6.8	65.6	-18.3
2394.0375	30.8	-47.1	1.1	7.3	76.0	-28.7
3192.0500	20.1	-55.6	1.3	7.0	85.0	-37.7
3990.0625	27.9	-46.6	1.5	7.5	75.8	-28.5
4788.0750	-6.1	-76.7	1.7	8.9	104.6	-57.3
5586.0875	7.7	-62.1	1.8	8.7	90.3	-43.0
6384.1000	11.4	-58	1.9	9.5	85.5	-38.2
7182.1125	-9.2	-77.4	2.0	9.2	105.3	-58.0
7980.1250	-7.2	-74.3	2.1	9.2	102.3	-55.0

Table 7-4: Field Strength of Spurious Radiation – 805.9875 MHz

Conducted Power 34.3 dBm; 2.7 W; Limit = 43+10 Log P = 47.3 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)
1611.9750	23.3	-47	0.9	6.7	76.2	-28.9
2417.9625	36.4	-41.54	1.1	7.3	70.4	-23.1
3223.9500	3.3	-72.3	1.3	7.1	101.6	-54.3
4029.9375	2.4	-67.3	1.5	7.7	96.2	-48.9
4835.9250	-5.8	-76.6	1.7	8.9	104.4	-57.1
5641.9125	7.6	-62.1	1.8	8.8	90.1	-42.8
6447.9000	6.6	-62.8	2.0	9.7	90.1	-42.8
7253.8875	-9.7	-77.4	2.1	8.9	105.5	-58.2
8059.8750	-8.0	-75	2.1	9.2	102.9	-55.6

Table 7-5: Field Strength of Spurious Radiation – 806.0125 MHz

Conducted Power 35.0 dBm; 3.2 W; Limit = 50 + 10 Log P = 55.1 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)
1612.0250	21.3	-49.0	0.9	6.7	78.9	-23.8
2418.0375	35.8	-42.1	1.1	7.3	71.6	-16.5
3224.0500	2.3	-73.3	1.3	7.1	103.3	-48.2
4030.0625	3.4	-66.3	1.5	7.7	95.9	-40.8
4836.0750	-6.2	-77	1.7	8.9	105.5	-50.4
5642.0875	7.8	-61.9	1.8	8.8	90.6	-35.5
6448.1000	6.2	-63.2	2.0	9.7	91.2	-36.1
7254.1125	-10.0	-77.7	2.1	8.9	106.5	-51.4
8060.1250	-8.9	-75.9	2.1	9.2	104.5	-49.4

Table 7-6: Field Strength of Spurious Radiation – 815.9875 MHz

Conducted Power 34.9 dBm; 3.1 W; Limit = 50 + 10 Log P = 54.9 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)
1631.9750	24.0	-46.0	0.9	6.7	76.0	-21.1
2447.9625	36.2	-41.6	1.1	7.3	71.2	-16.3
3263.9500	4.9	-70.9	1.4	7.1	101.0	-46.1
4079.9375	4.2	-65.7	1.5	7.9	95.1	-40.2
4895.9250	-7.7	-78	1.7	8.8	106.7	-51.8
5711.9125	11.4	-58.7	1.8	9.0	87.3	-32.4
6527.9000	9.7	-59.9	2.0	9.7	87.9	-33.0
7343.8875	-7.5	-75	2.1	8.7	104.2	-49.3
8159.8750	-8.9	-75.7	2.2	9.3	104.4	-49.5

Table 7-7: Field Strength of Spurious Radiation – 851.0125 MHz

Conducted Power 34.8 dBm; 3.1 W; Limit = 50 + 10 Log P = 54.9 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)
1702.0250	23.1	-44.9	0.9	6.4	75.2	-20.3
2553.0375	46.7	-30.6	1.2	7.4	60.2	-5.3
3404.0500	9.6	-66.4	1.4	7.6	96.0	-41.1
4255.0625	5.1	-65.5	1.6	8.6	94.3	-39.4
5106.0750	-5.4	-75.3	1.7	8.7	104.1	-49.2
5957.0875	7.0	-62.8	1.9	9.6	90.9	-36.0
6808.1000	2.6	-66.2	2.0	9.5	94.5	-39.6
7659.1125	-8.2	-75.8	2.1	9.2	104.5	-49.6
8510.1250	-7.9	-70.7	2.2	9.4	99.3	-44.4

Table 7-8: Field Strength of Spurious Radiation – 861.9875 MHz

Conducted Power 34.8 dBm; 3.0 W; Limit = 50 + 10 Log P = 54.8 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)
1723.9750	23.2	-44.8	0.9	6.5	75.1	-20.3
2585.9625	44.9	-32.3	1.2	7.4	61.9	-7.1
3447.9500	3.9	-72	1.4	7.6	101.6	-46.8
4309.9375	8.8	-61.8	1.6	8.8	90.4	-35.6
5171.9250	-3.1	-72.6	1.8	8.6	101.5	-46.7
6033.9125	3.6	-66.1	1.9	9.4	94.4	-39.6
6895.9000	0.7	-68.1	2.0	9.5	96.5	-41.7
7757.8875	-9.5	-77.2	2.1	9.3	105.8	-51.0
8619.8750	-8.1	-70.5	2.2	9.6	98.9	-44.1

Table 7-9: Field Strength of Spurious Radiation – 896.0125 MHz

Conducted Power 34.8 dBm; 3.0 W; Limit = 50 + 10 Log P = 54.8 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)
1792.0250	22.8	-45.2	0.9	6.7	75.3	-20.5
2688.0375	45.6	-32	1.2	7.7	61.3	-6.5
3584.0500	-0.5	-76.3	1.4	7.6	105.9	-51.1
4480.0625	8.0	-62.6	1.6	8.8	91.2	-36.4
5376.0750	7.6	-62.3	1.8	8.5	91.3	-36.5
6272.0875	29.5	-39.8	1.9	9.2	68.3	-13.5
7168.1000	11.3	-56.8	2.0	9.3	85.4	-30.6
8064.1125	-1.1	-68.11	2.1	9.2	96.8	-42.0
8960.1250	2.5	-59.9	2.2	8.9	89.0	-34.2

Table 7-10: Field Strength of Spurious Radiation – 900.9875 MHz

Conducted Power 34.8 dBm; 3.0 W; Limit = 50 + 10 Log P = 54.8 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)
1801.9750	22.1	-46.0	0.9	6.7	76.2	-21.4
2702.9625	29.7	-48	1.2	7.7	77.4	-22.6
3603.9500	-2.4	-78.1	1.4	7.6	107.9	-53.1
4504.9375	8.4	-62.2	1.6	8.8	90.9	-36.1
5405.9250	8.6	-61.1	1.8	8.5	90.3	-35.5
6306.9125	28.2	-41	1.9	9.3	69.6	-14.8
7207.9000	10.2	-57.6	2.1	9.1	86.4	-31.6
8108.8875	-2.5	-69.6	2.1	9.2	98.4	-43.6
9009.8750	5.1	-57.4	2.2	9.0	86.5	-31.7

Table 7-11: Field Strength of Spurious Radiation – 935.0125 MHz

Conducted Power 34.3 dBm; 2.7 W; Limit = 50 + 10 Log P = 54.3 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)
1870.0250	17.9	-48.6	1.0	6.4	78.5	-24.2
2805.0375	35.1	-42.4	1.2	7.9	71.0	-16.7
3740.0500	1.2	-73.8	1.5	7.1	103.5	-49.2
4675.0625	3.5	-67.4	1.7	8.9	95.4	-41.1
5610.0750	16.0	-53.9	1.8	8.8	82.3	-28.0
6545.0875	8.9	-60.6	2.0	9.7	88.2	-33.9
7480.1000	2.9	-64.5	2.1	8.9	93.0	-38.7
8415.1125	-5.3	-68.3	2.2	9.3	96.4	-42.1
9350.1250	-5.9	-68.4	2.3	9.4	96.6	-42.3

Table 7-12: Field Strength of Spurious Radiation – 939.9875 MHz

Conducted Power 34.3 dBm; 2.7 W; Limit = 50 + 10 Log P = 54.3 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)
1879.9750	23.6	-42.7	1.0	6.3	72.5	-18.2
2819.9625	32.9	-44.5	1.2	7.9	73.1	-18.8
3759.9500	2.0	-72.9	1.5	7.0	102.5	-48.2
4699.9375	-1.0	-71.8	1.7	9.0	99.7	-45.4
5639.9250	11.6	-58.2	1.8	8.8	86.4	-32.1
6579.9125	17.0	-52.3	2.0	9.7	79.8	-25.5
7519.9000	-2.2	-69.72	2.1	9.0	98.0	-43.7
8459.8875	-6.1	-69.2	2.2	9.4	97.2	-42.9
9399.8750	-8.0	-70.1	2.3	9.4	98.2	-43.9

Table 7-13: Part 90.543(f): Out of Band Emissions Limit

Frequency (MHz)	Spectrum Analyzer Level (dBm)	SCF (dB/m)	Corrected (dBuV/m)	Corrected (dBW)	Limit (dBW)	Margin (dB)
1596.025	41.1	12.7	53.8	-71.4	-70.0	-1.4
1598.025	41.9	12.8	54.7	-70.6	-70.0	-0.6
1609.975	34.4	13.1	47.4	-77.8	-70.0	-7.8

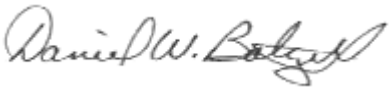
Measurement uncertainties shown for these tests are expanded uncertainties expressed at the 95% confidence level using a coverage factor K=2. Measurement uncertainty: ±4.6 dB

Results: Pass

Table 7-14: 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	10/15/2022
901727	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	09/21/2022
901242	Rhein Tech Laboratories	WRT-000-0003	Wood rotating table	N/A	N/A
900791	Chase	CBL6111B	Bilog Antenna (30 MHz – 2000 MHz)	N/A	10/04/2022
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 Baltzell		September 2, 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

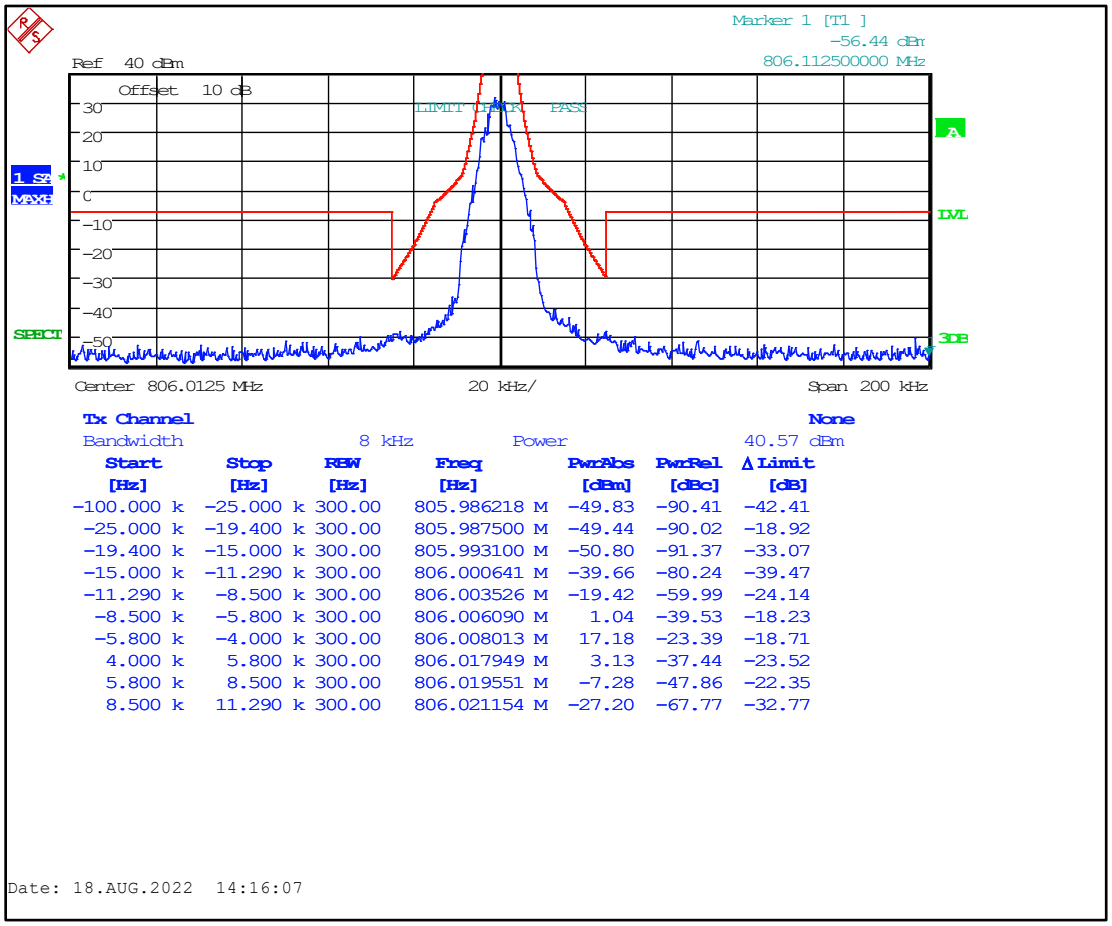
Applicable Emission Masks		
Frequency Band (MHz)	**Mask for Equipment With Audio Low Pass Filter**	**Mask for Equipment Without Audio Low Pass Filter**
Below 25 [1]	A or B	A or C
25–50	B	C
72–76	B	C
150–174 [2]	B, D, or E	C, D, or E
150 Paging-only	B	C
220–222	F	F
421–512 [2]	B, D, or E	C, D, or E
450 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.

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 – 806.0125 MHz; P25; Mask H



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-25.000 k	300.00	805.986218 M	-49.83	-90.41	-42.41
-25.000 k	-19.400 k	300.00	805.987500 M	-49.44	-90.02	-18.92
-19.400 k	-15.000 k	300.00	805.993100 M	-50.80	-91.37	-33.07
-15.000 k	-11.290 k	300.00	806.000641 M	-39.66	-80.24	-39.47
-11.290 k	-8.500 k	300.00	806.003526 M	-19.42	-59.99	-24.14
-8.500 k	-5.800 k	300.00	806.006090 M	1.04	-39.53	-18.23
-5.800 k	-4.000 k	300.00	806.008013 M	17.18	-23.39	-18.71
4.000 k	5.800 k	300.00	806.017949 M	3.13	-37.44	-23.52
5.800 k	8.500 k	300.00	806.019551 M	-7.28	-47.86	-22.35
8.500 k	11.290 k	300.00	806.021154 M	-27.20	-67.77	-32.77

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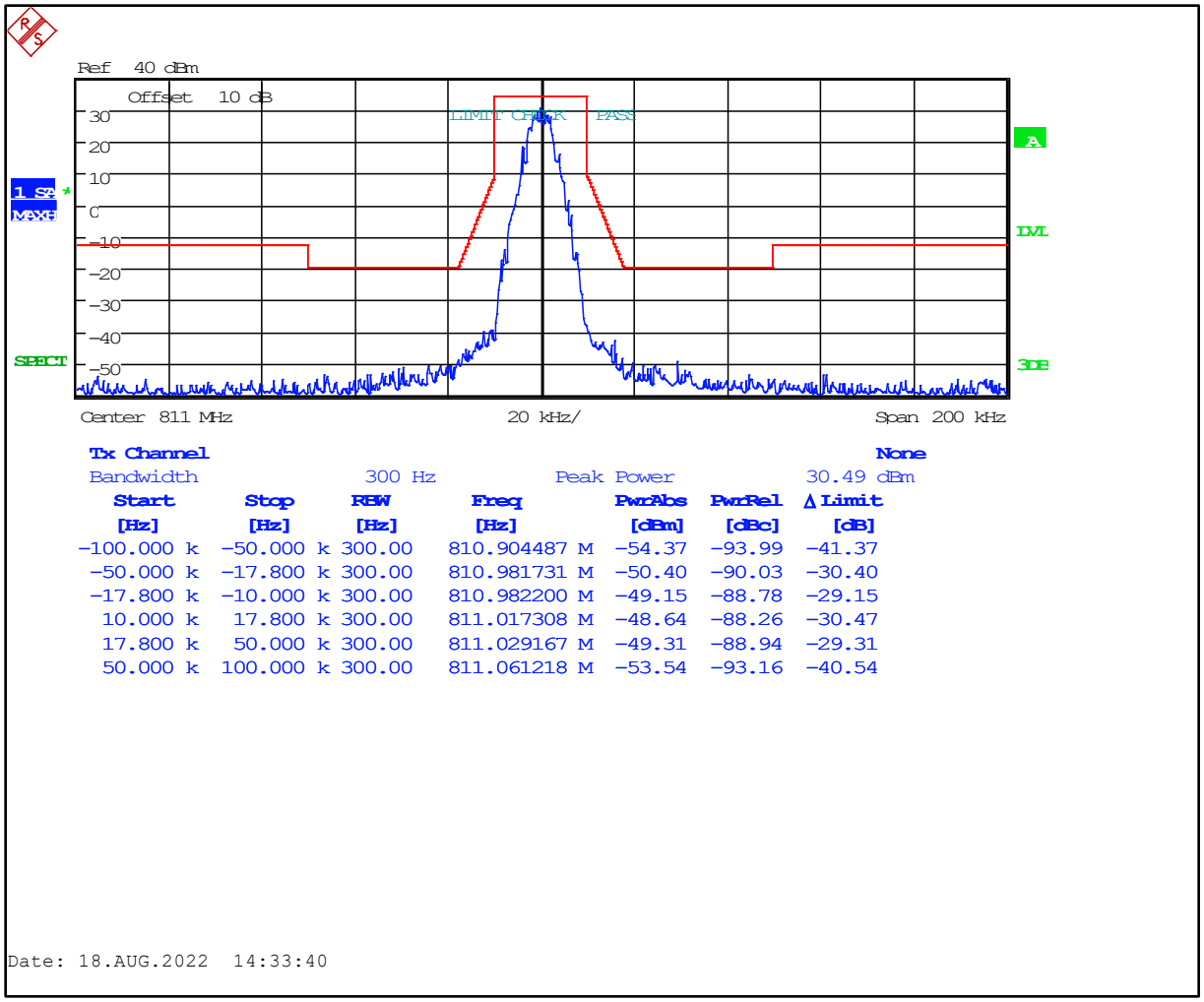
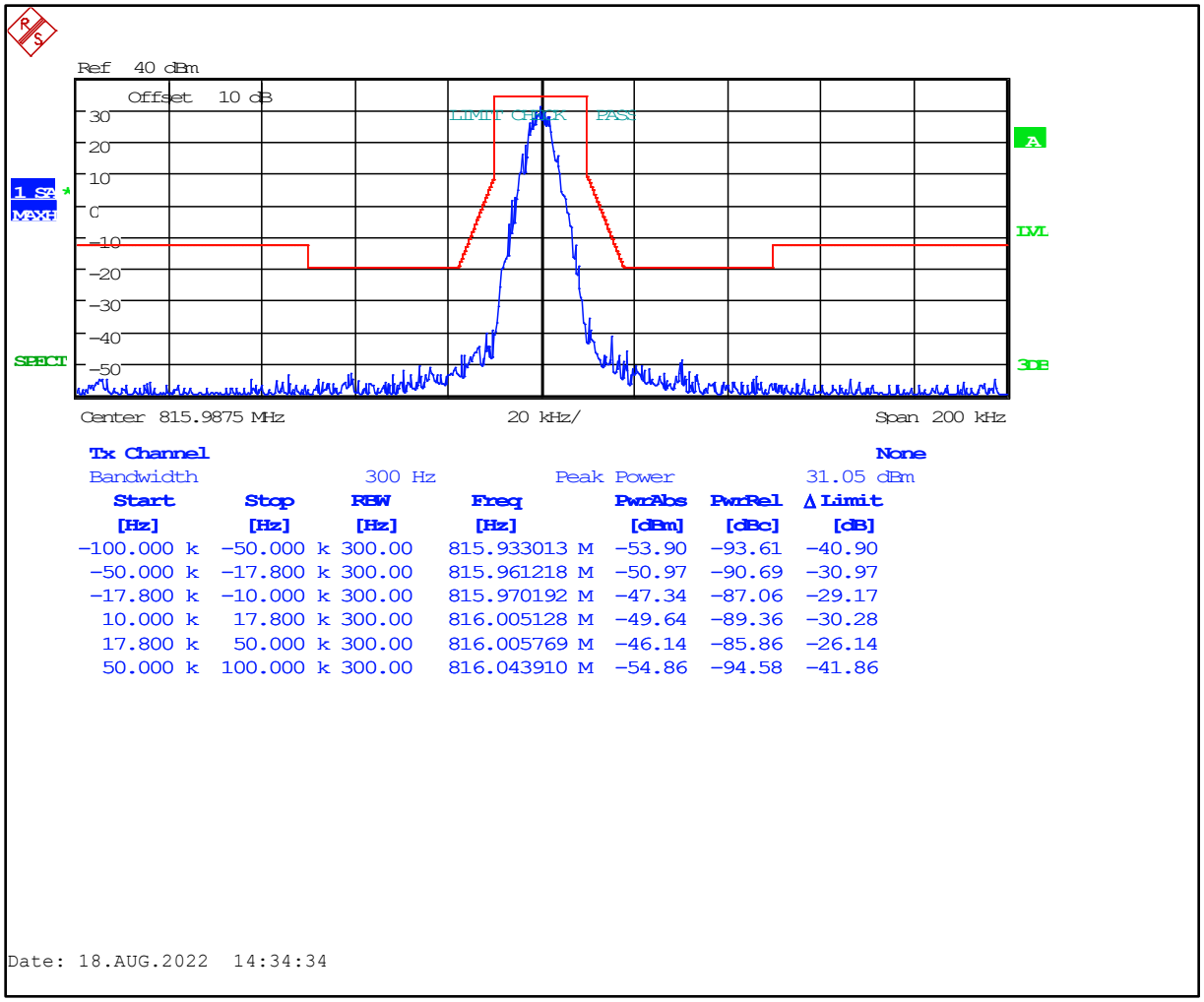
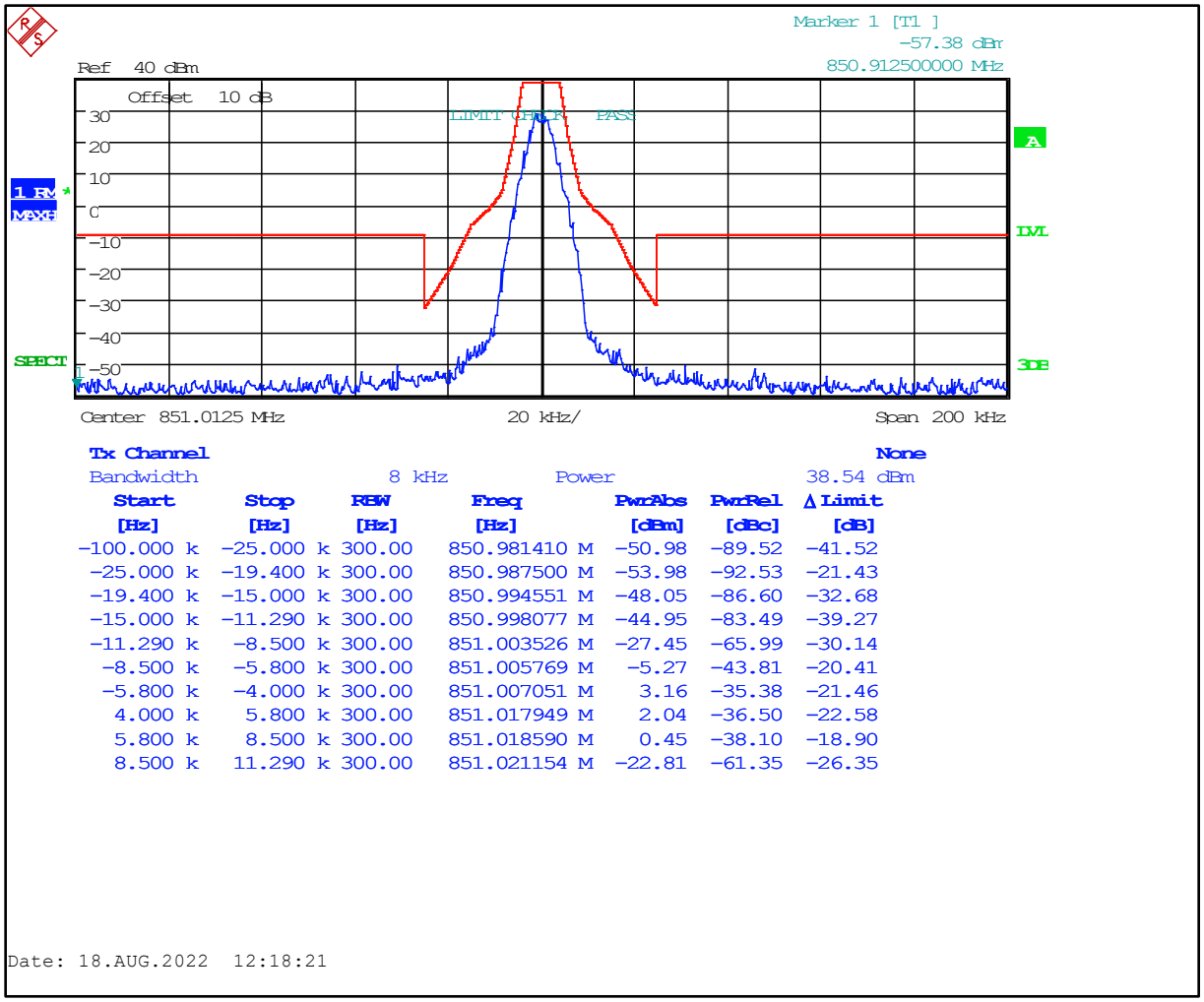
Plot 8-2: Occupied Bandwidth – 811.000 MHz; P25; Mask G



Plot 8-3: Occupied Bandwidth – 815.9875 MHz; P25; Mask G



Plot 8-4: Occupied Bandwidth – 851.0125 MHz; P25; Mask H



Tx Channel			None			
Bandwidth		8 kHz	Power		38.54 dBm	
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-25.000 k	300.00	850.981410 M	-50.98	-89.52	-41.52
-25.000 k	-19.400 k	300.00	850.987500 M	-53.98	-92.53	-21.43
-19.400 k	-15.000 k	300.00	850.994551 M	-48.05	-86.60	-32.68
-15.000 k	-11.290 k	300.00	850.998077 M	-44.95	-83.49	-39.27
-11.290 k	-8.500 k	300.00	851.003526 M	-27.45	-65.99	-30.14
-8.500 k	-5.800 k	300.00	851.005769 M	-5.27	-43.81	-20.41
-5.800 k	-4.000 k	300.00	851.007051 M	3.16	-35.38	-21.46
4.000 k	5.800 k	300.00	851.017949 M	2.04	-36.50	-22.58
5.800 k	8.500 k	300.00	851.018590 M	0.45	-38.10	-18.90
8.500 k	11.290 k	300.00	851.021154 M	-22.81	-61.35	-26.35

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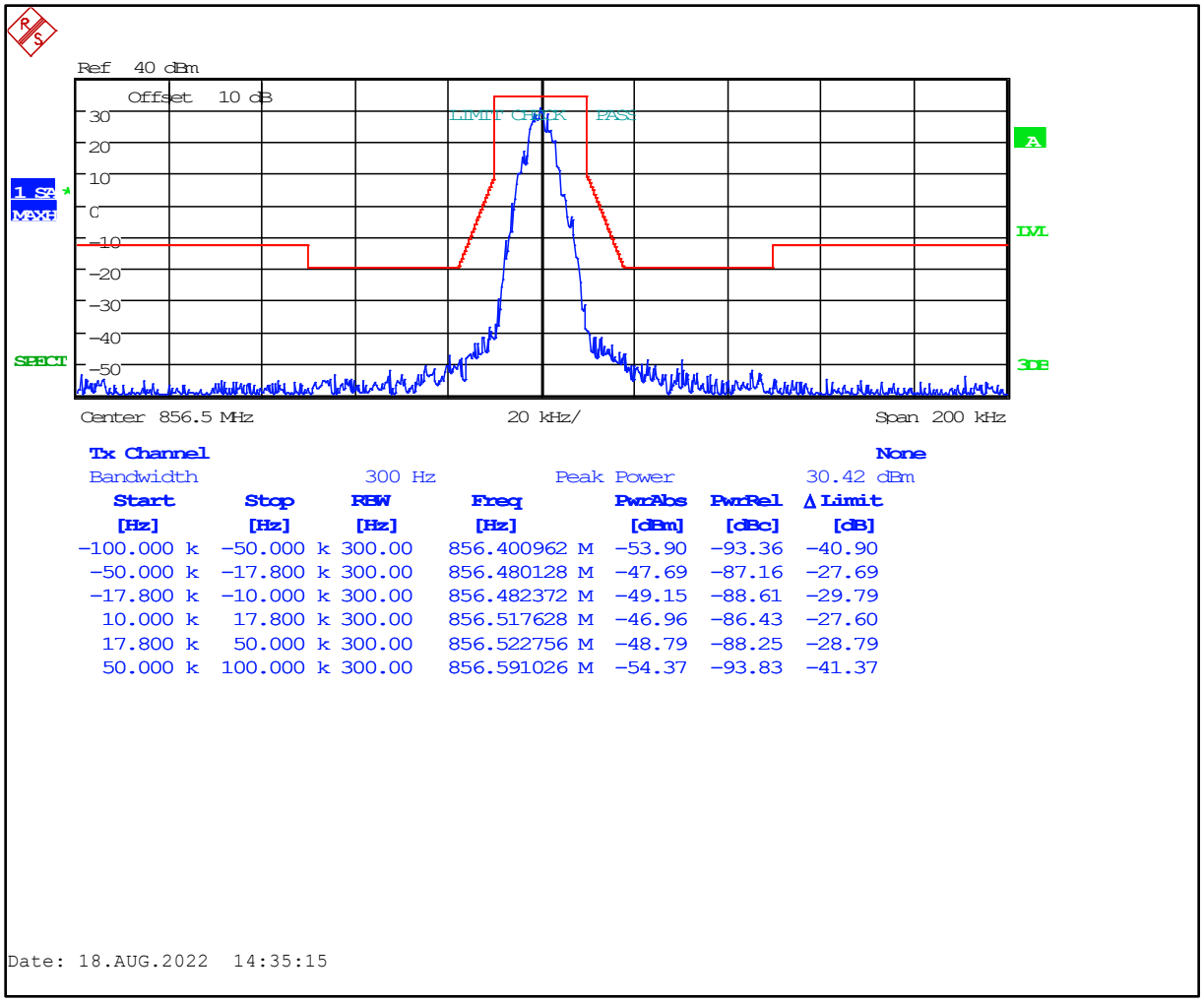
Plot 8-5: Occupied Bandwidth – 856.500 MHz; P25; Mask G



Tx Channel						None
Bandwidth		300 Hz		Peak Power		30.42 dBm
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-50.000 k	300.00	856.400962 M	-53.90	-93.36	-40.90
-50.000 k	-17.800 k	300.00	856.480128 M	-47.69	-87.16	-27.69
-17.800 k	-10.000 k	300.00	856.482372 M	-49.15	-88.61	-29.79
10.000 k	17.800 k	300.00	856.517628 M	-46.96	-86.43	-27.60
17.800 k	50.000 k	300.00	856.522756 M	-48.79	-88.25	-28.79
50.000 k	100.000 k	300.00	856.591026 M	-54.37	-93.83	-41.37

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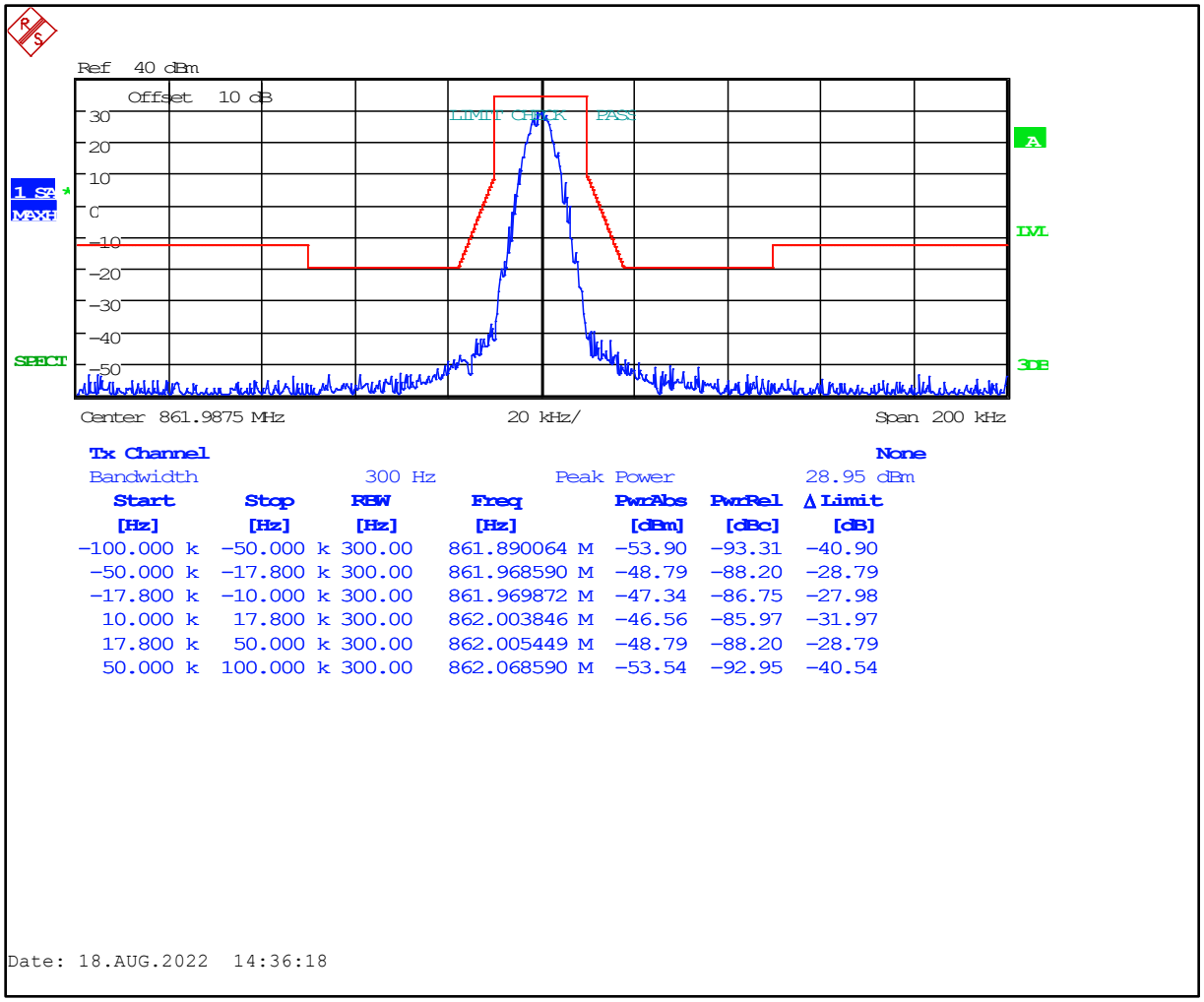
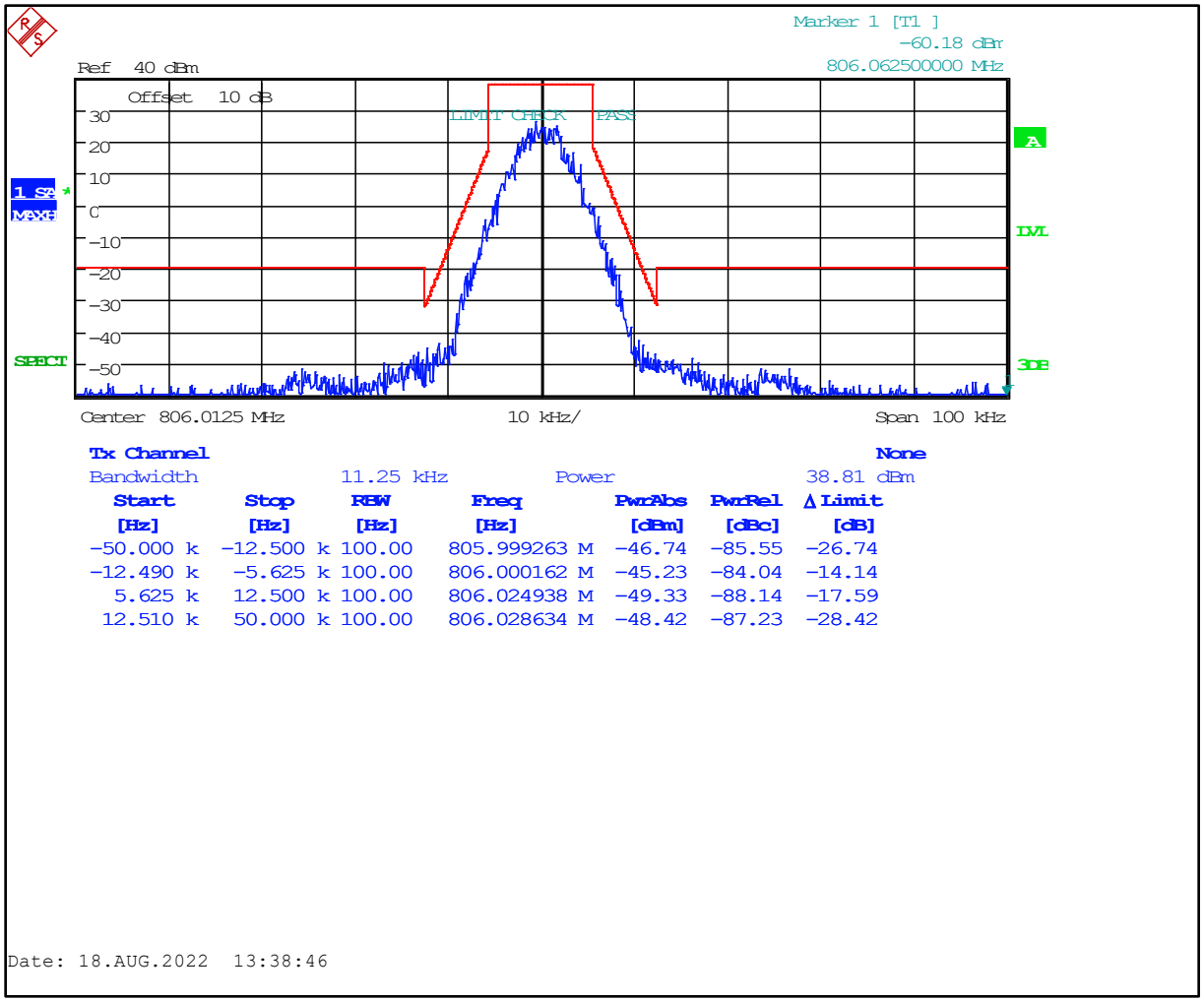
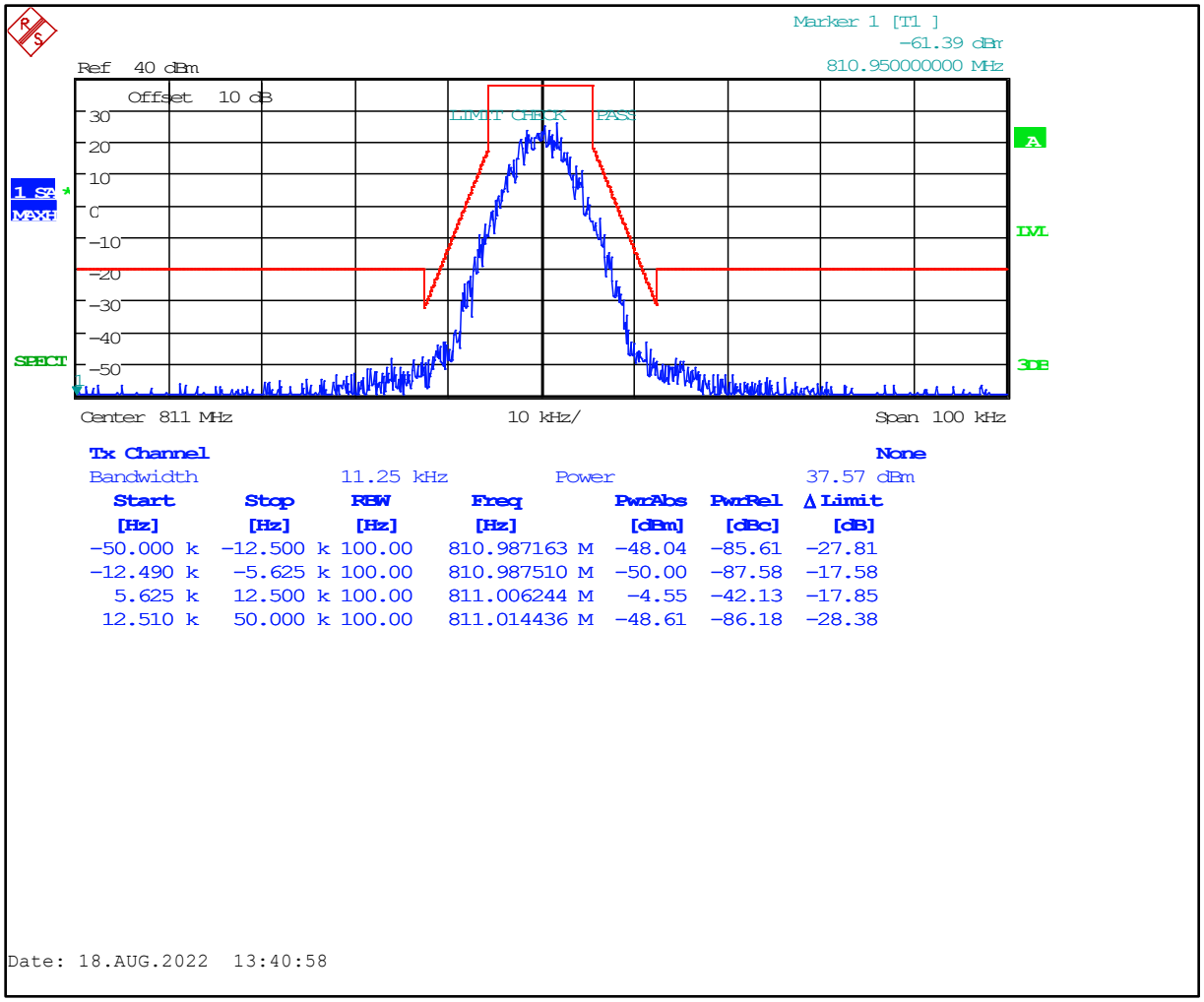
Plot 8-6: Occupied Bandwidth – 861.9875 MHz; P25; Mask G



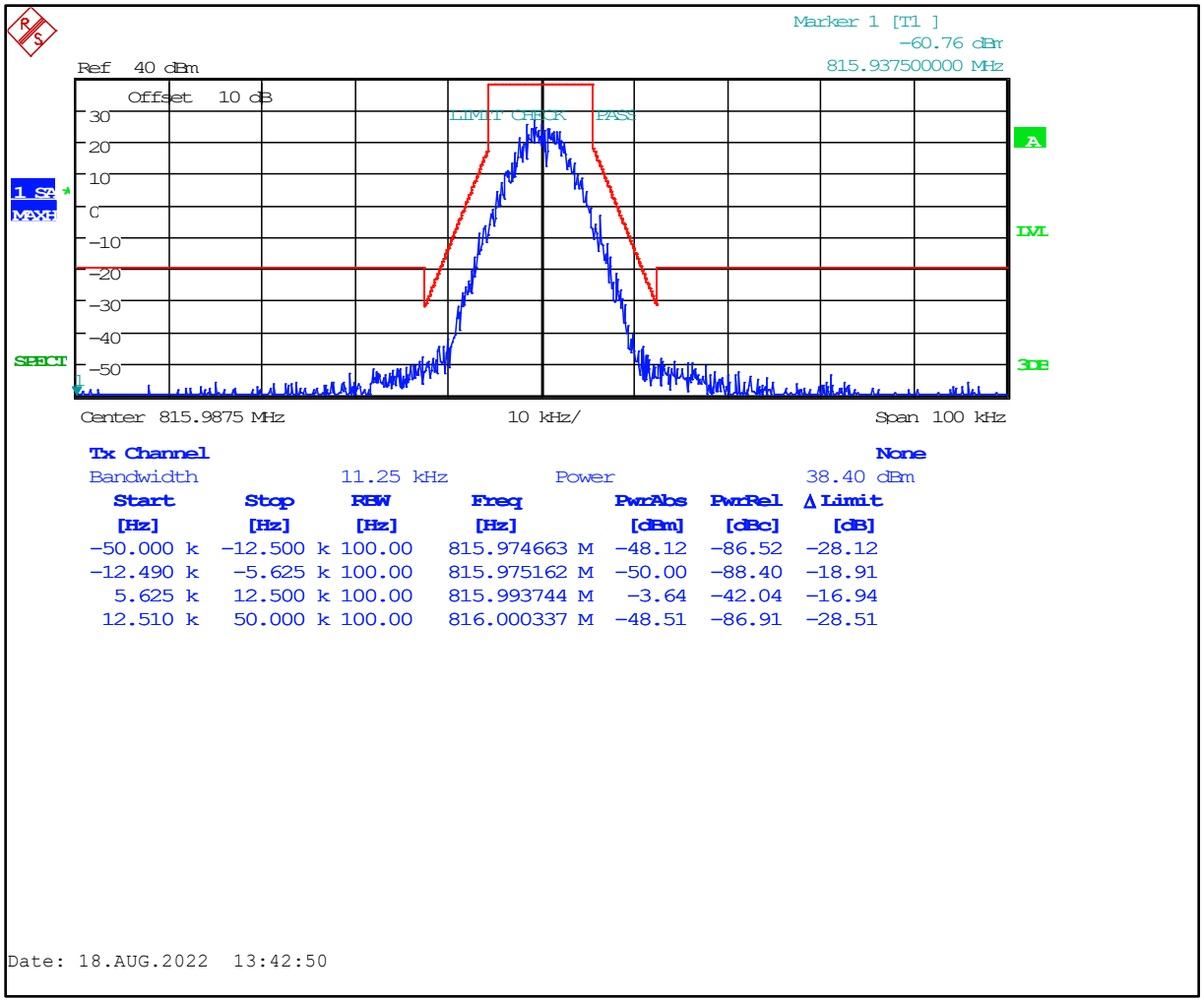
Plot 8-7: Occupied Bandwidth – 806.0125 MHz; P25; Mask D



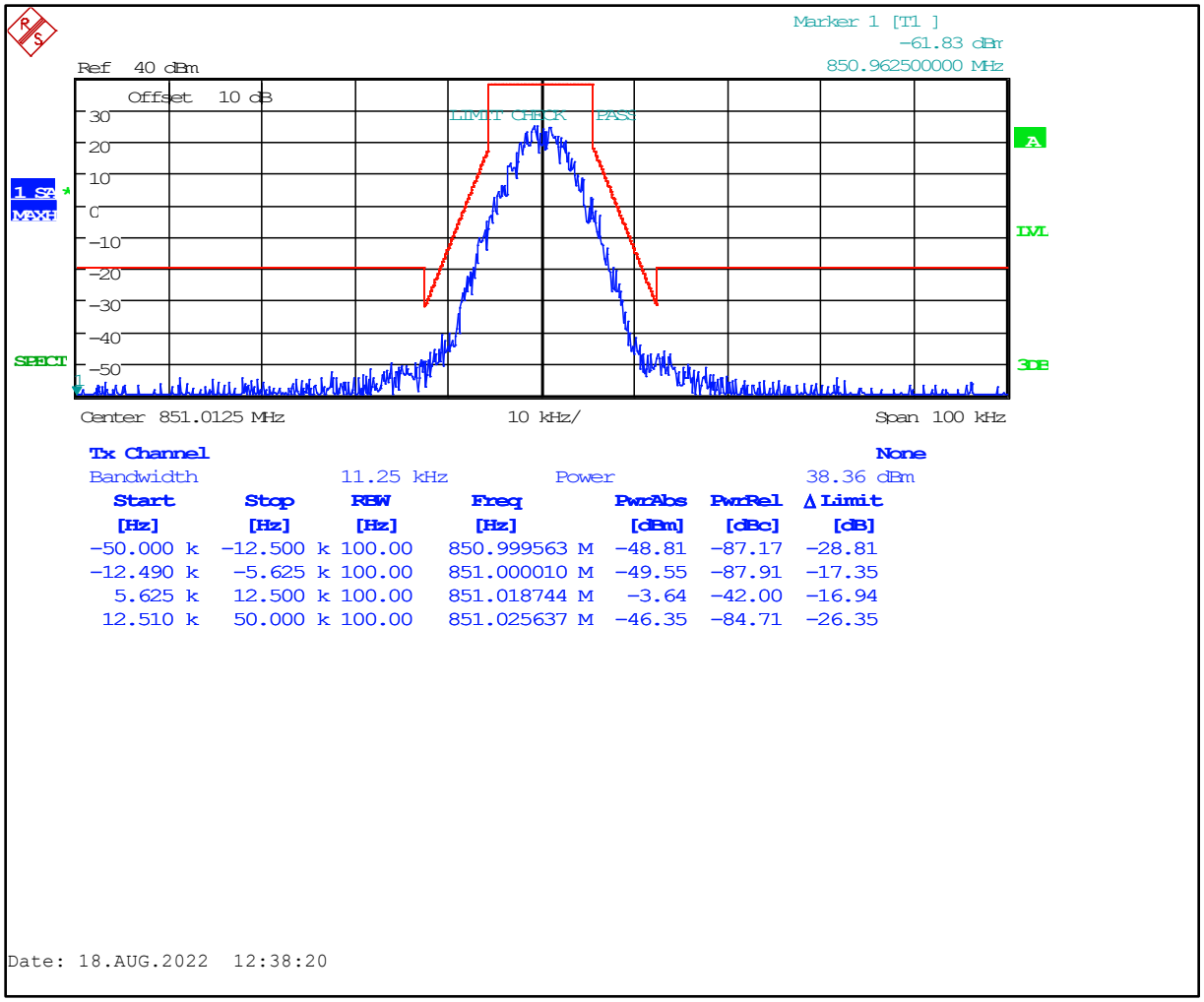
Plot 8-8: Occupied Bandwidth – 811.000 MHz; P25; Mask D



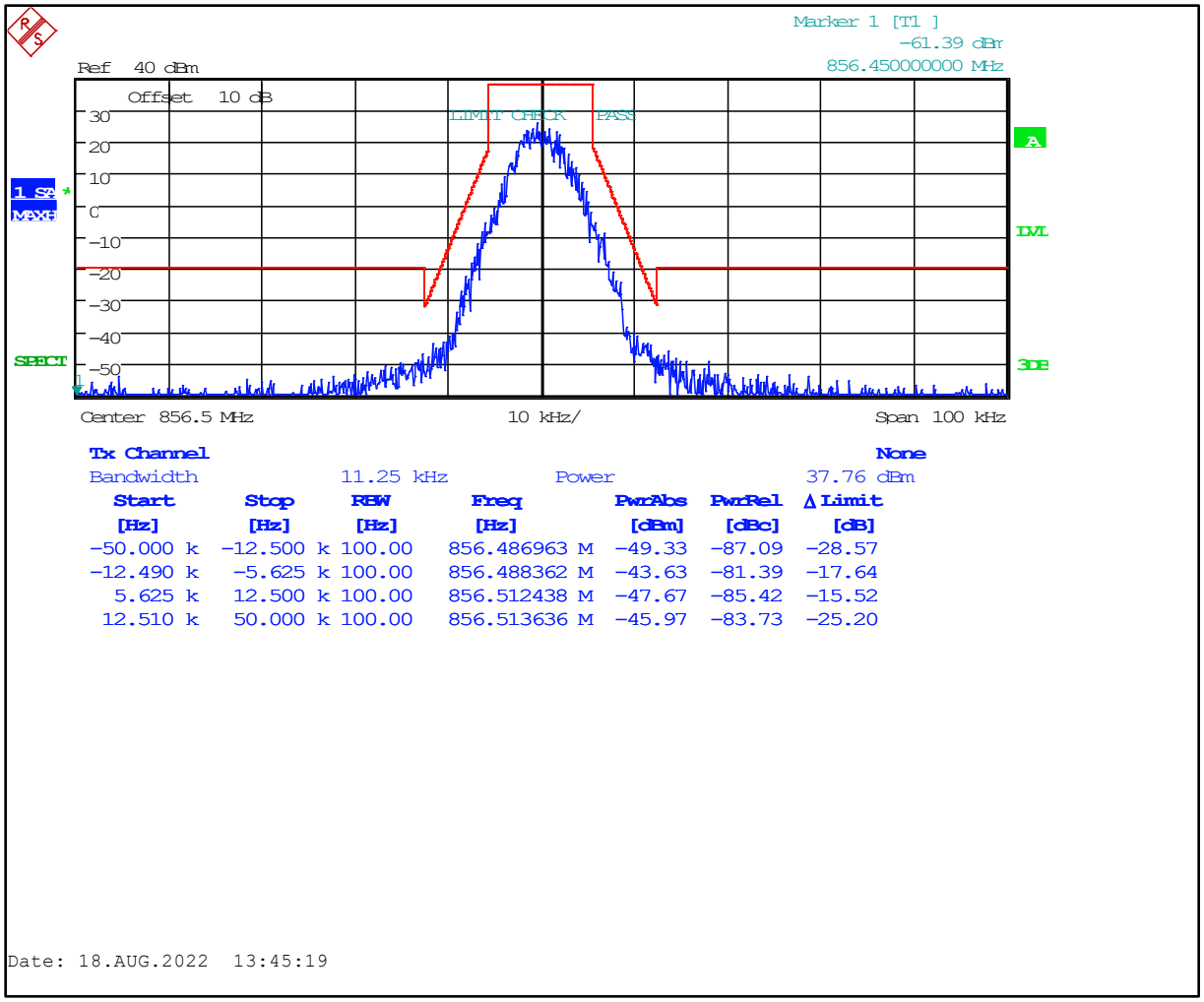
Plot 8-9: Occupied Bandwidth – 815.9875 MHz; P25; Mask D



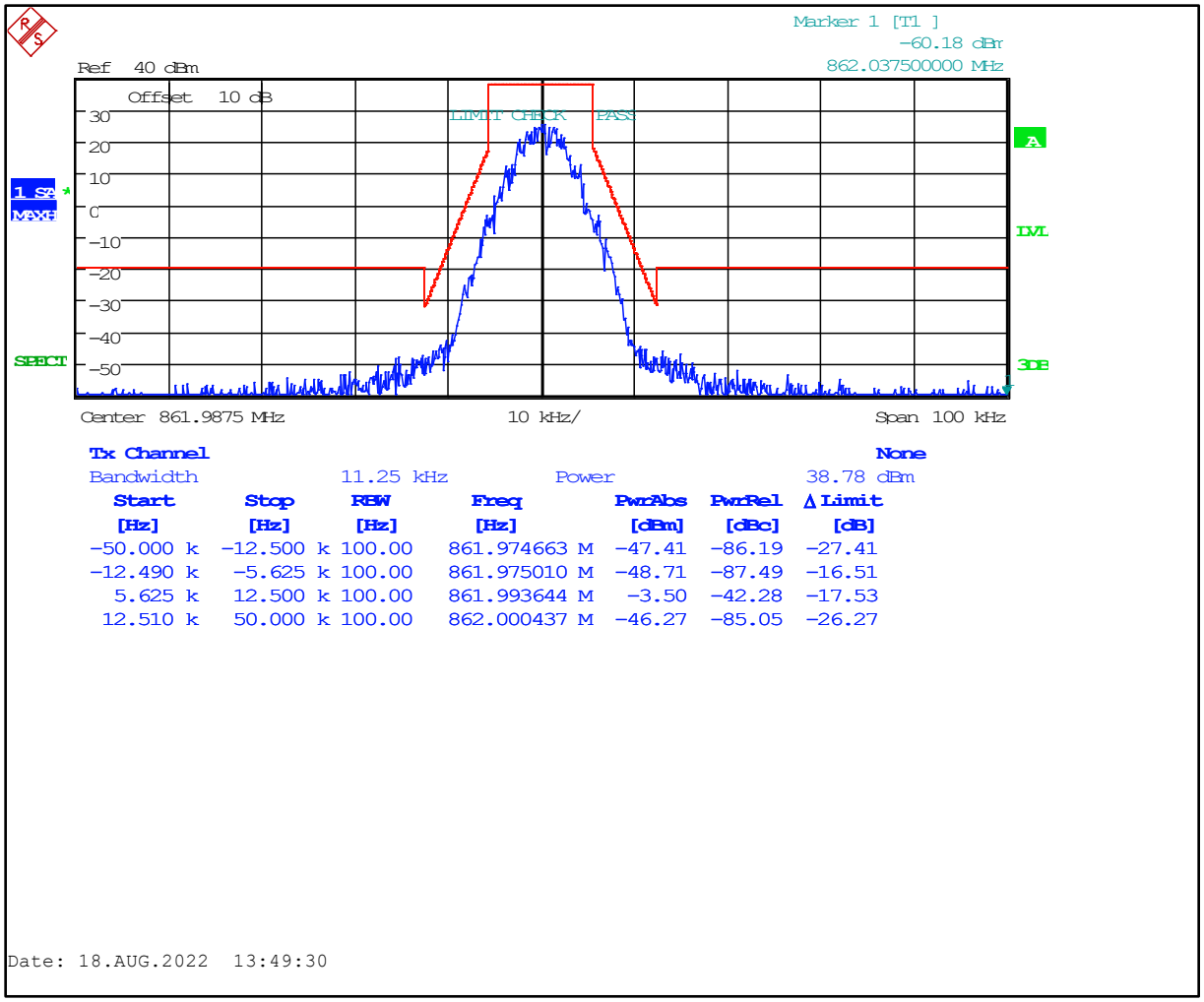
Plot 8-10: Occupied Bandwidth – 851.0125 MHz; P25; Mask D



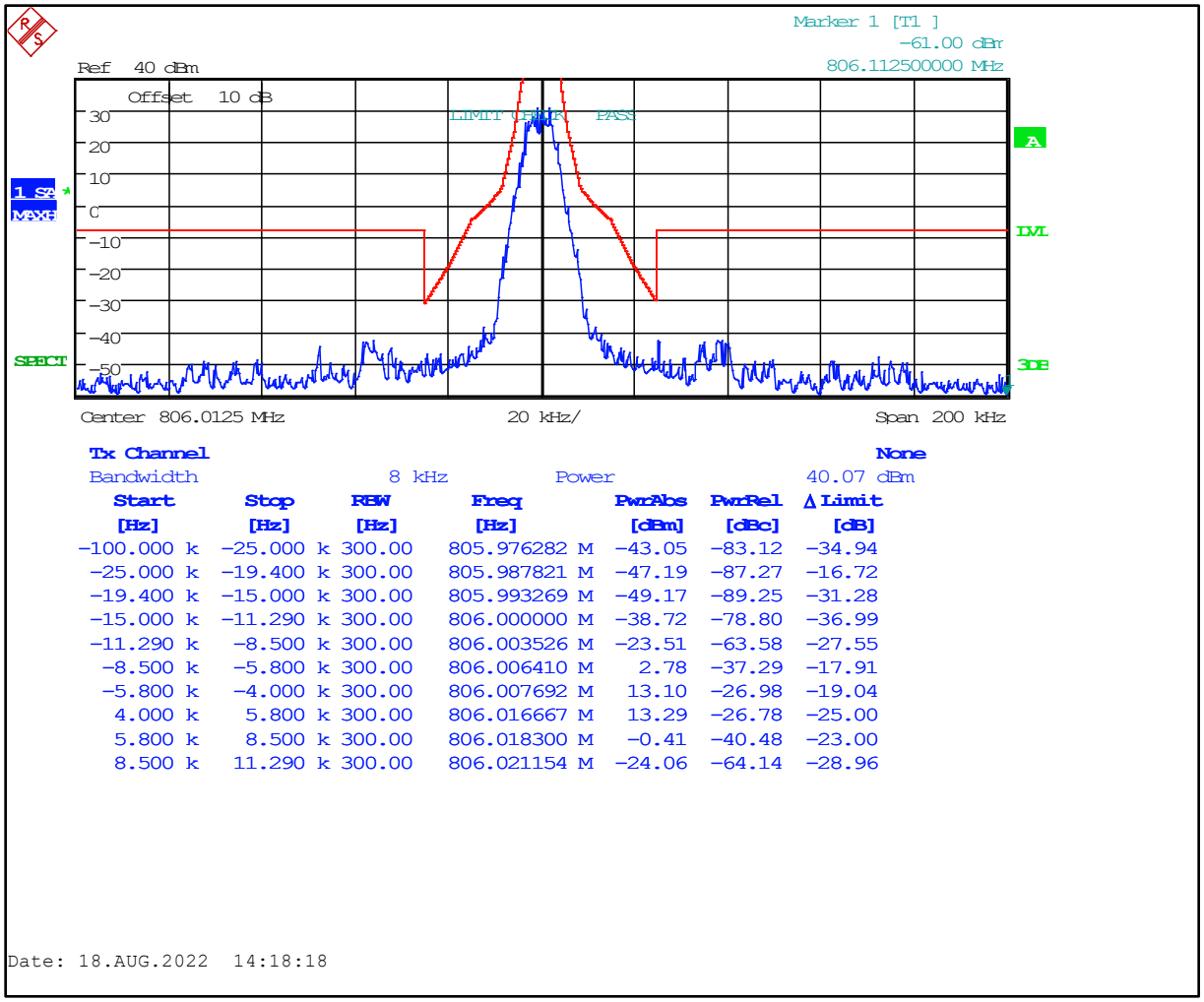
Plot 8-11: Occupied Bandwidth – 856.500 MHz; P25; Mask D



Plot 8-12: Occupied Bandwidth – 861.9875 MHz; P25; Mask D



Plot 8-13: Occupied Bandwidth – 806.0125 MHz; P25 Phase 2; Mask H



Tx Channel				None		
Bandwidth		8 kHz	Power		40.07 dBm	
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-100.000 k	-25.000 k	300.00	805.976282 M	-43.05	-83.12	-34.94
-25.000 k	-19.400 k	300.00	805.987821 M	-47.19	-87.27	-16.72
-19.400 k	-15.000 k	300.00	805.993269 M	-49.17	-89.25	-31.28
-15.000 k	-11.290 k	300.00	806.000000 M	-38.72	-78.80	-36.99
-11.290 k	-8.500 k	300.00	806.003526 M	-23.51	-63.58	-27.55
-8.500 k	-5.800 k	300.00	806.006410 M	2.78	-37.29	-17.91
-5.800 k	-4.000 k	300.00	806.007692 M	13.10	-26.98	-19.04
4.000 k	5.800 k	300.00	806.016667 M	13.29	-26.78	-25.00
5.800 k	8.500 k	300.00	806.018300 M	-0.41	-40.48	-23.00
8.500 k	11.290 k	300.00	806.021154 M	-24.06	-64.14	-28.96

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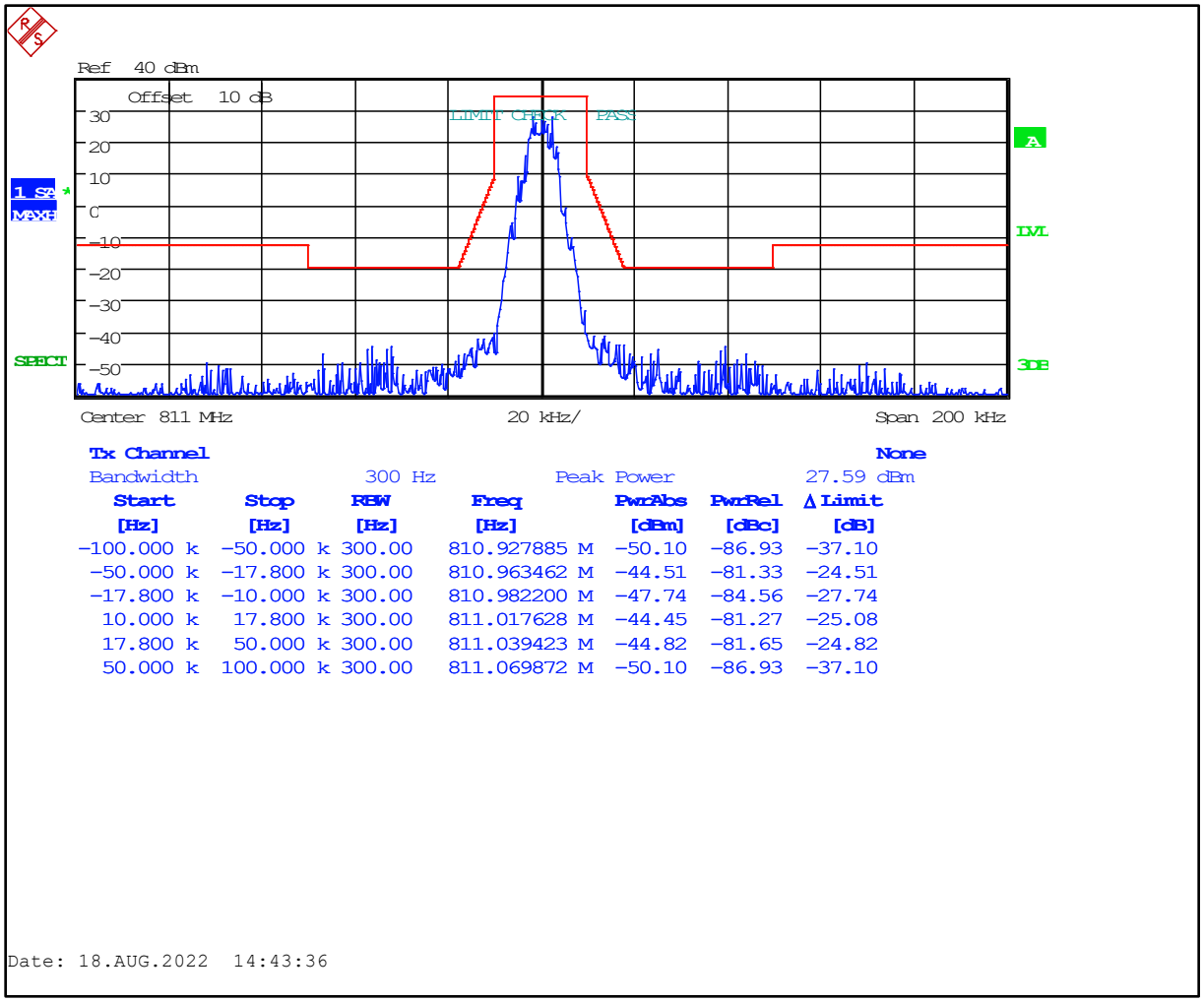
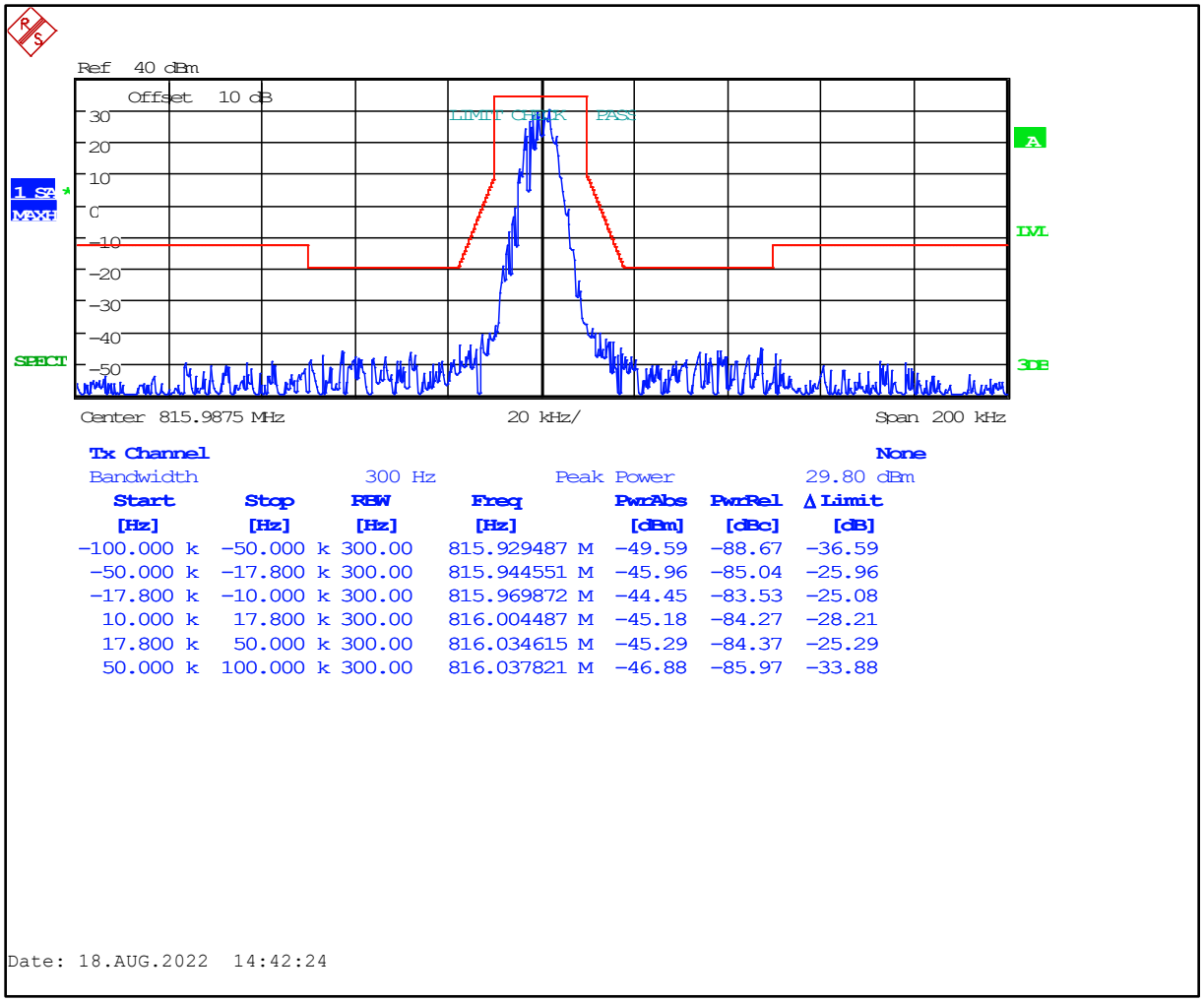
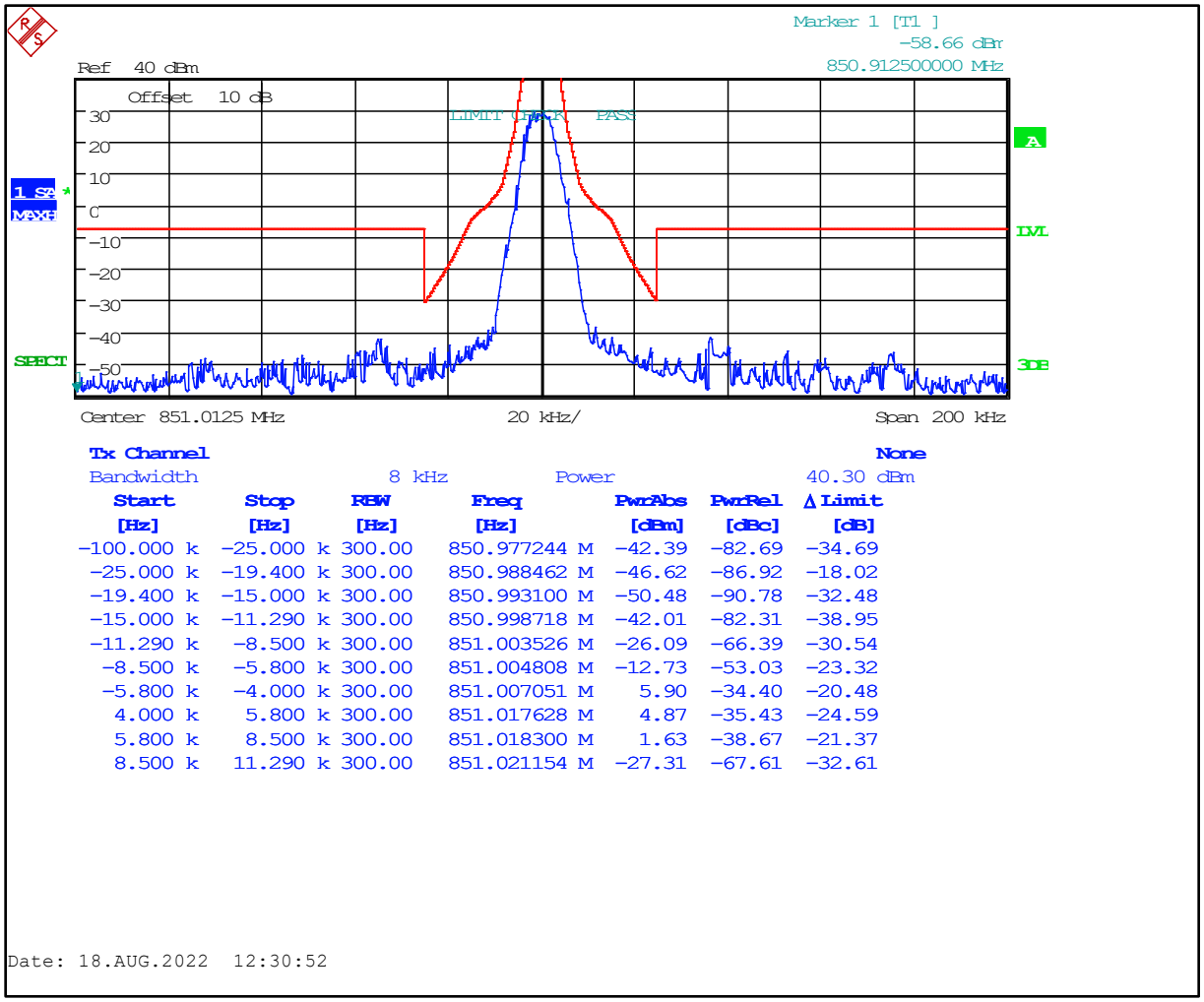
Plot 8-14: Occupied Bandwidth – 811.000 MHz; P25 Phase 2; Mask G



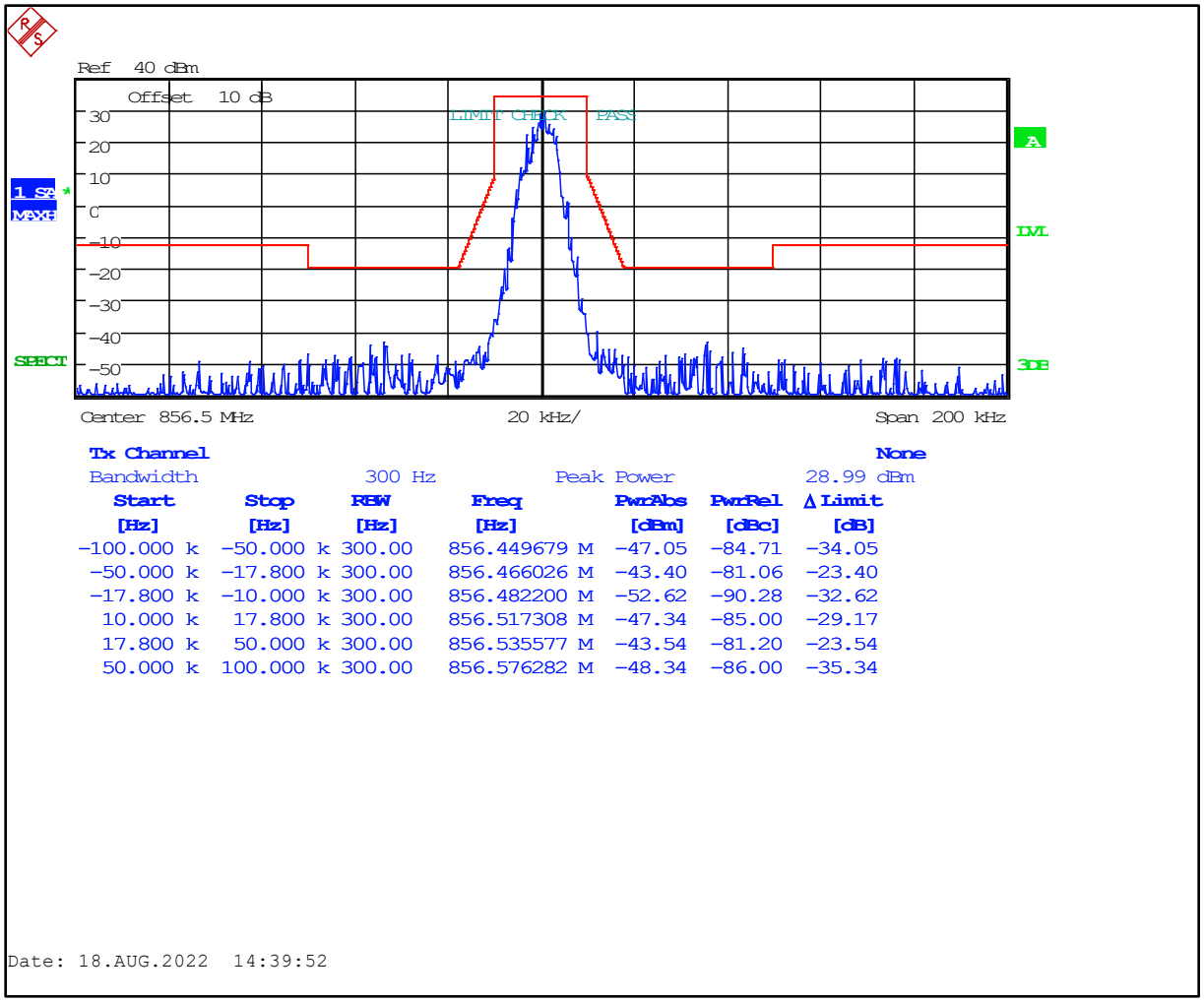
Plot 8-15: Occupied Bandwidth – 815.9875 MHz; P25 Phase 2; Mask G



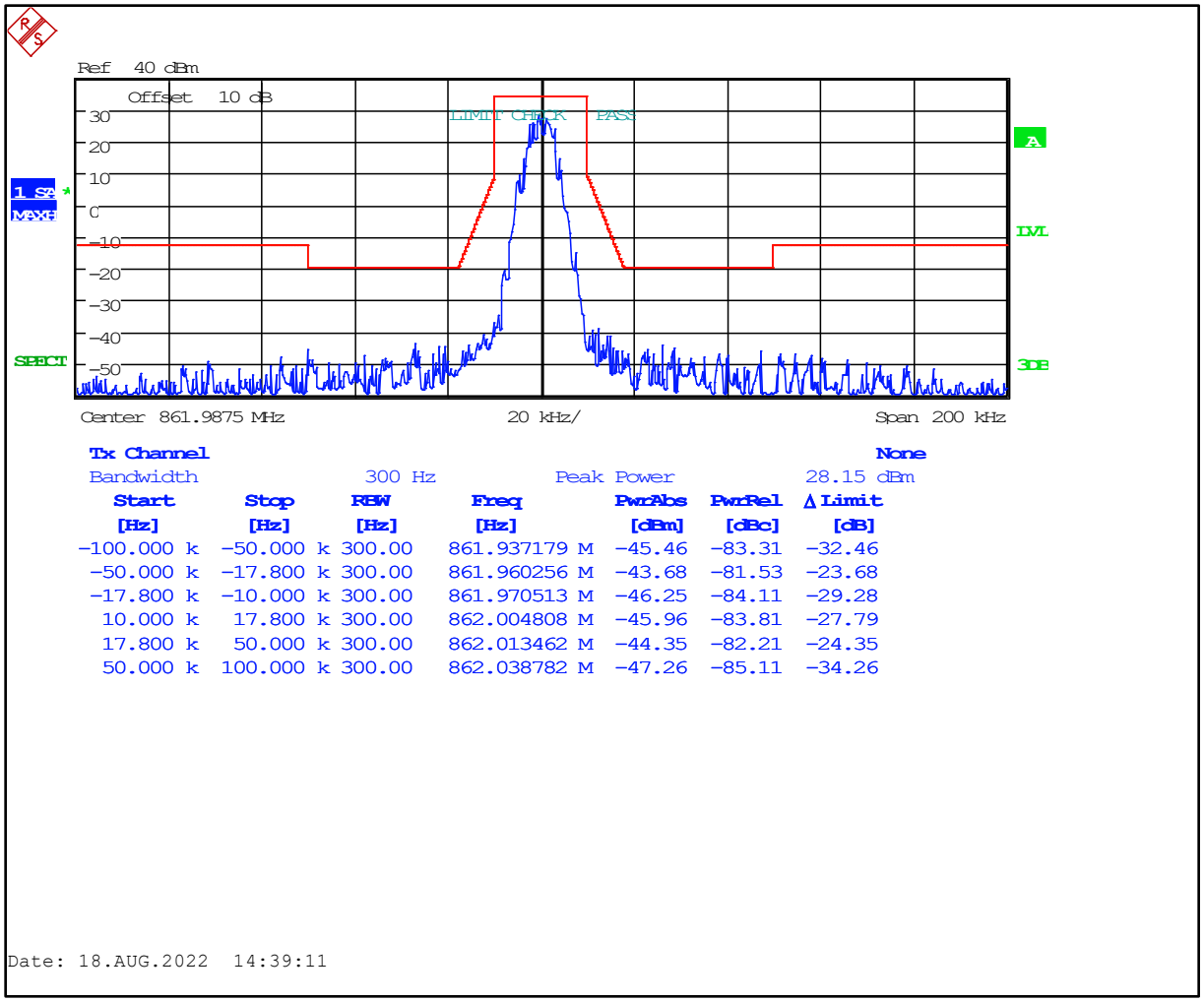
Plot 8-16: Occupied Bandwidth – 851.0125 MHz; P25 Phase 2; Mask H



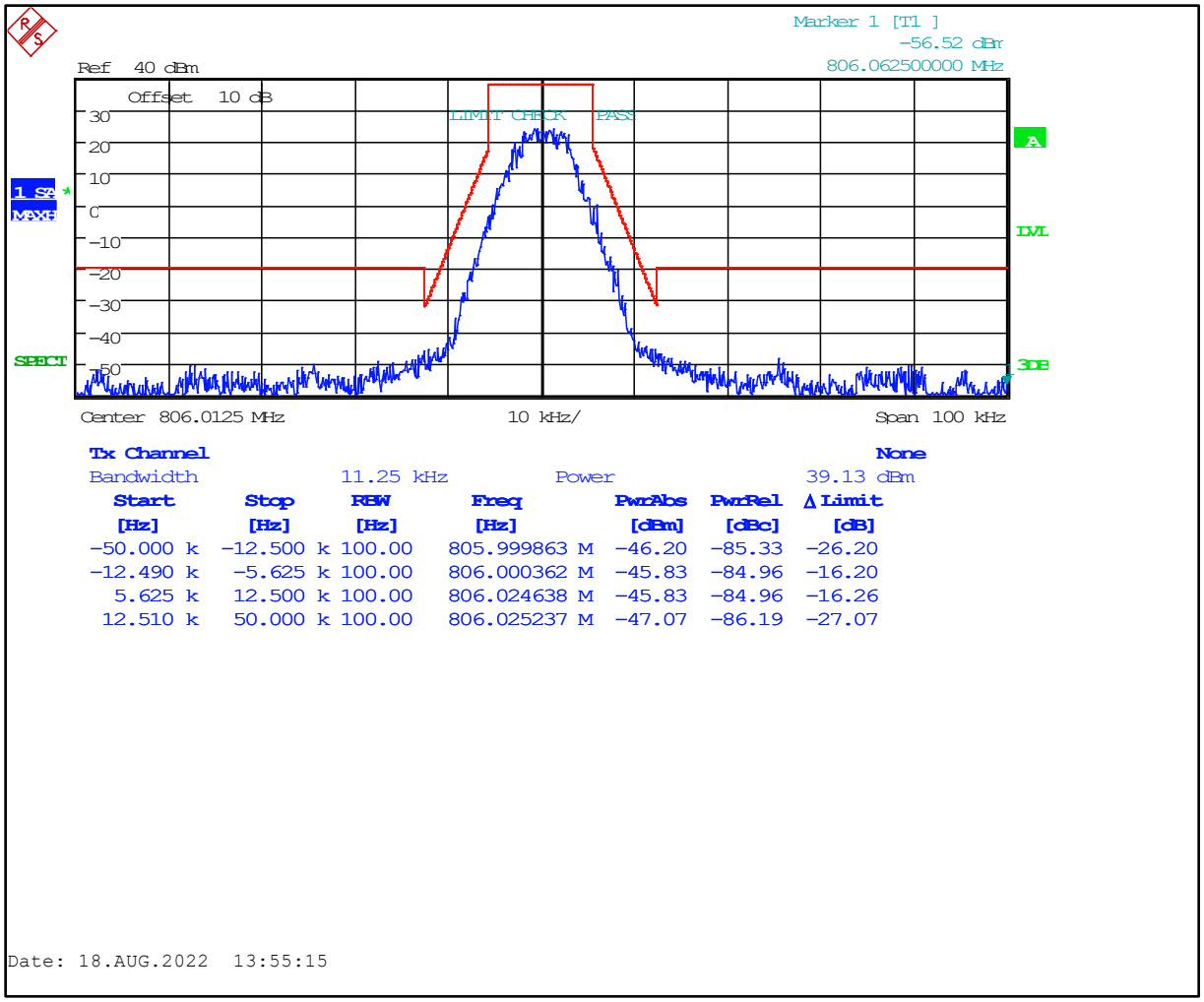
Plot 8-17: Occupied Bandwidth – 856.500 MHz; P25 Phase 2; Mask G



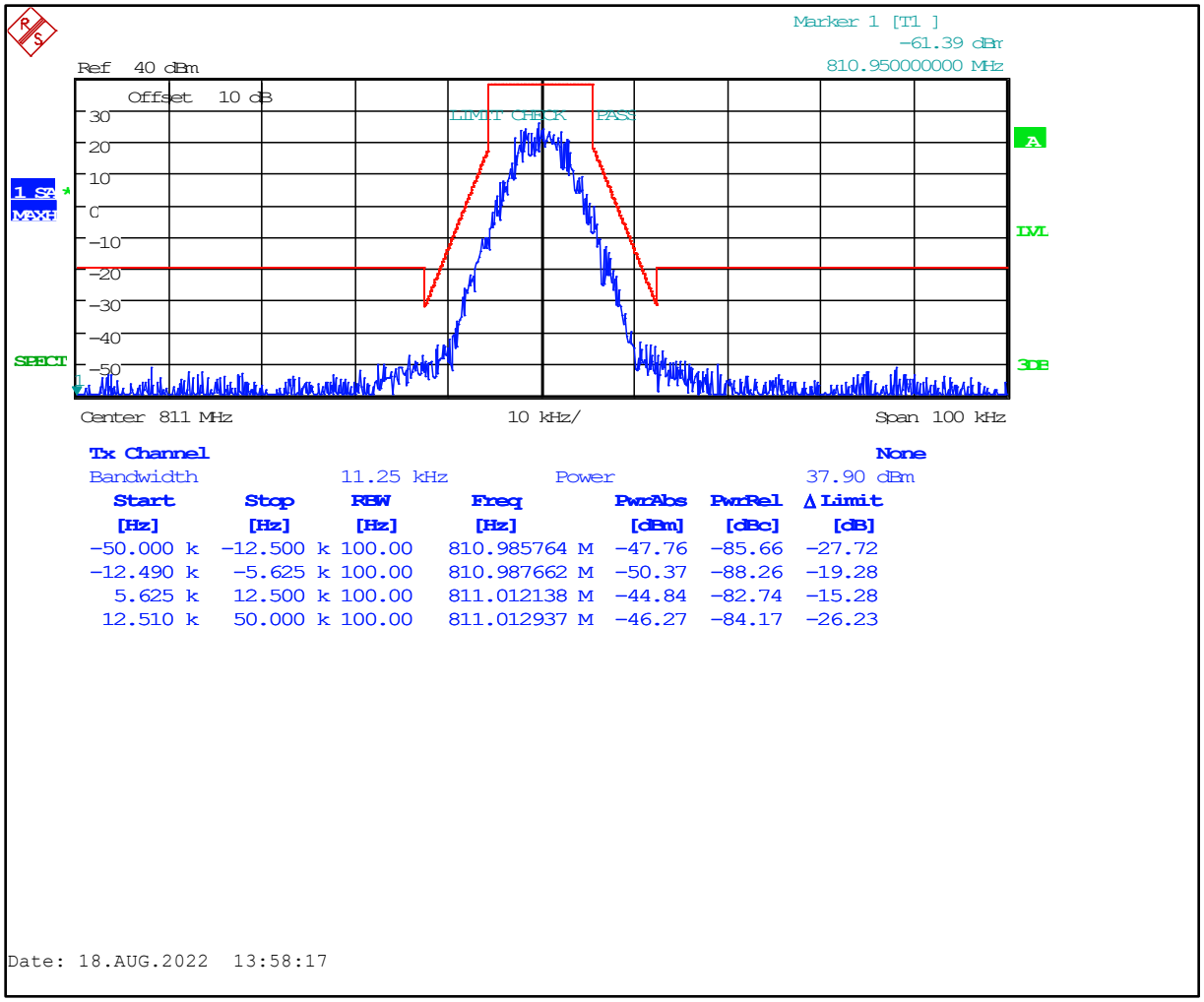
Plot 8-18: Occupied Bandwidth – 861.9875 MHz; P25 Phase 2; Mask G



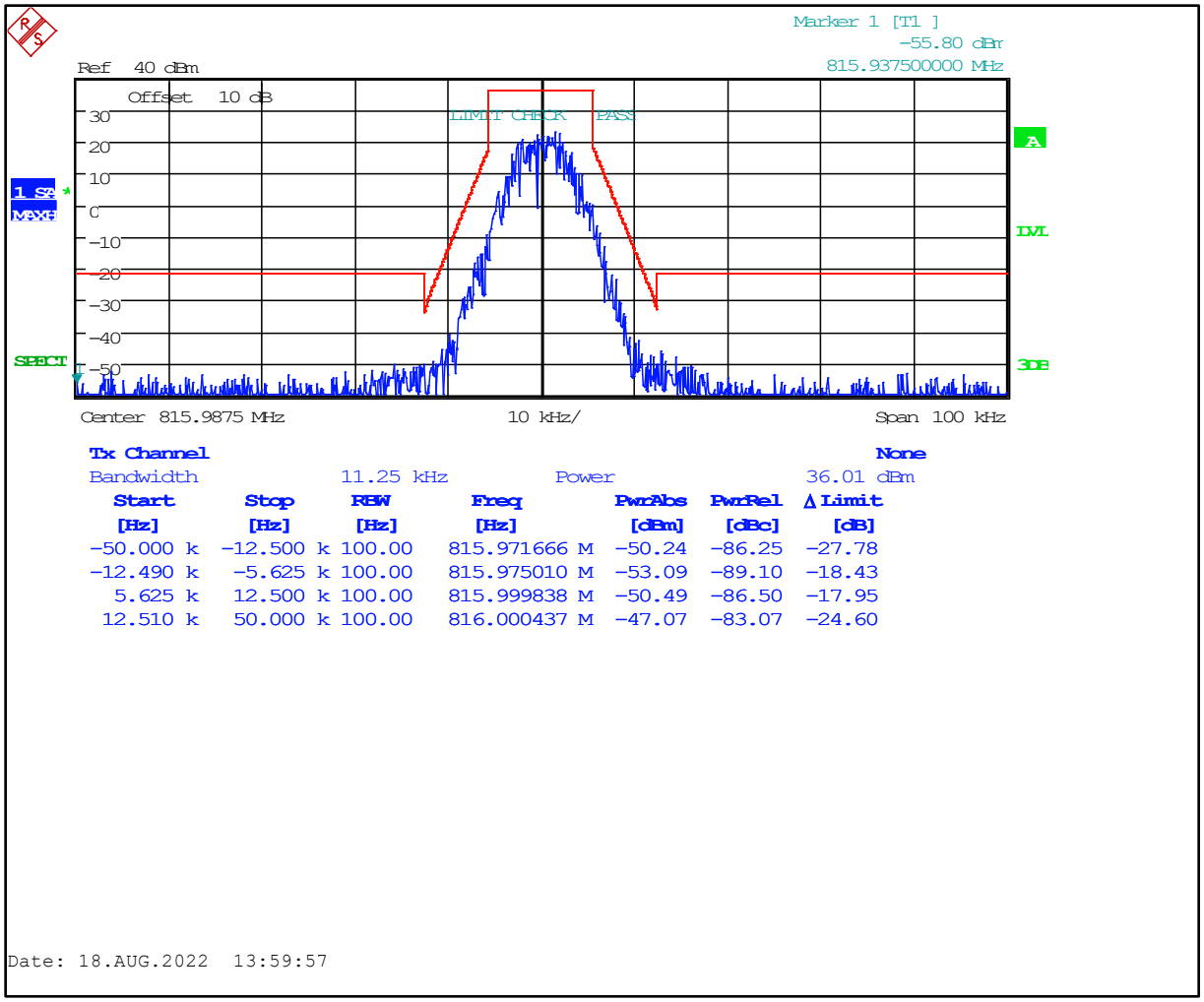
Plot 8-19: Occupied Bandwidth – 806.0125 MHz; P25 Phase 2; Mask D



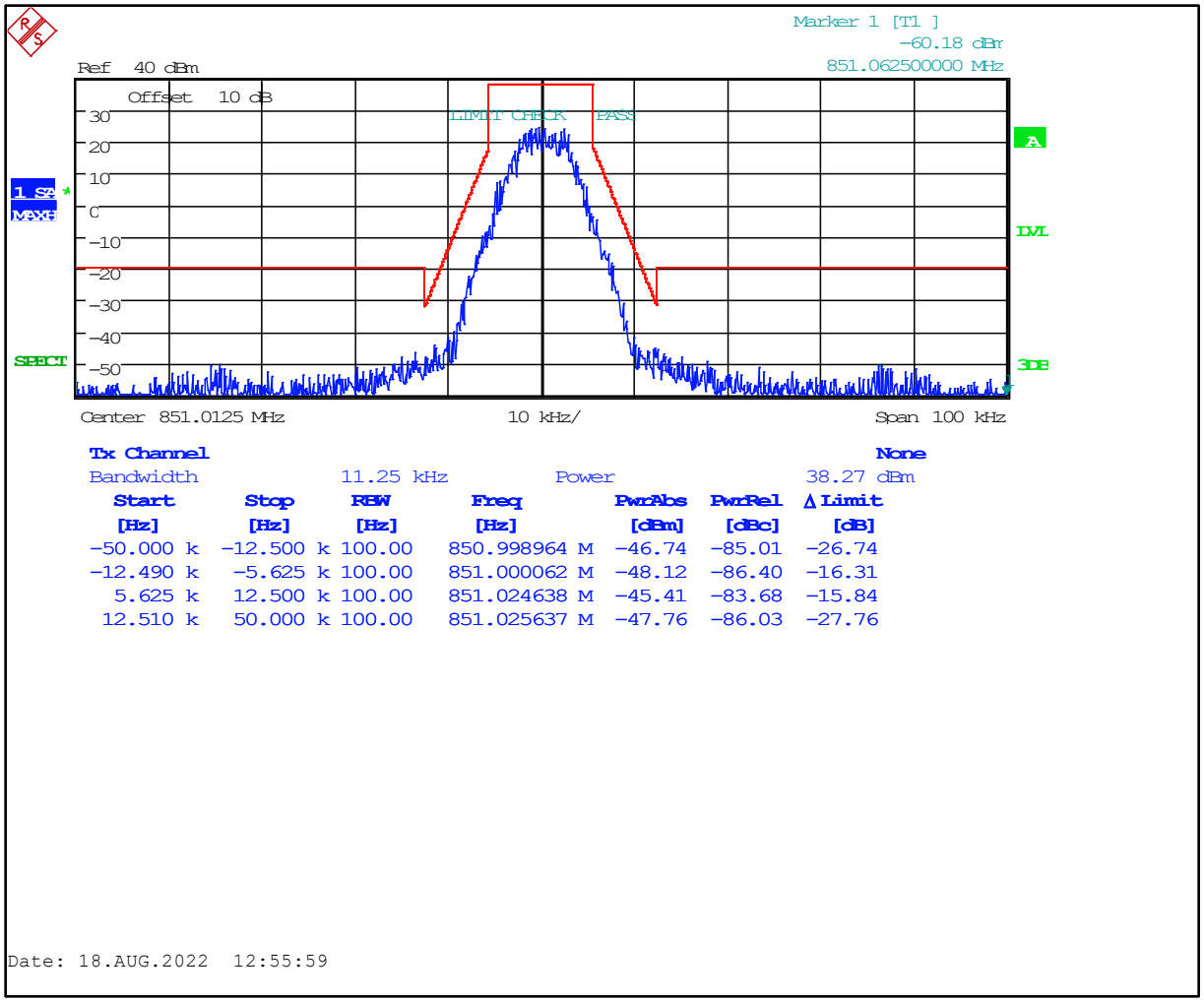
Plot 8-20: Occupied Bandwidth – 811.000 MHz; P25 Phase 2; Mask D



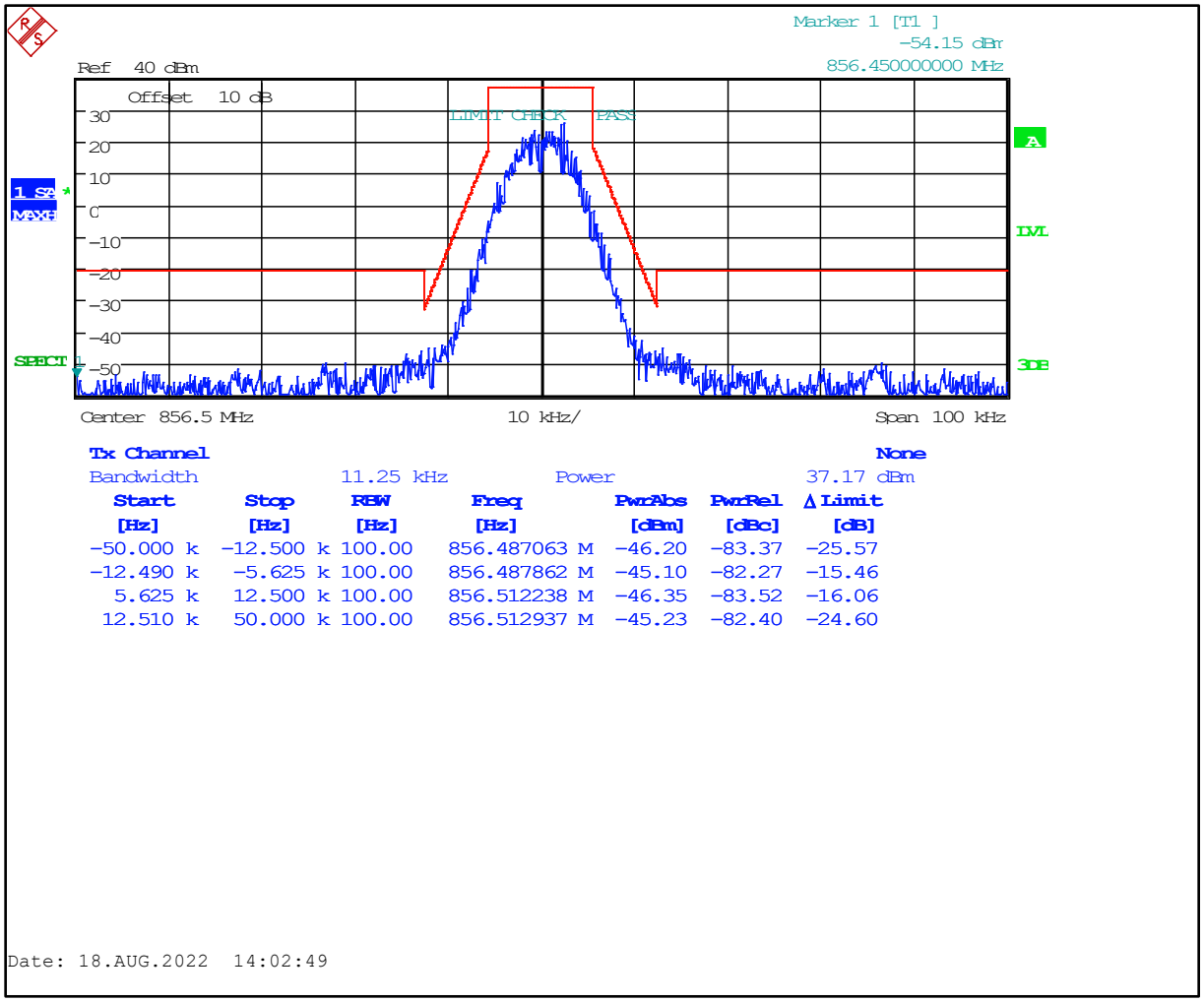
Plot 8-21: Occupied Bandwidth – 815.9875 MHz; P25 Phase 2; Mask D



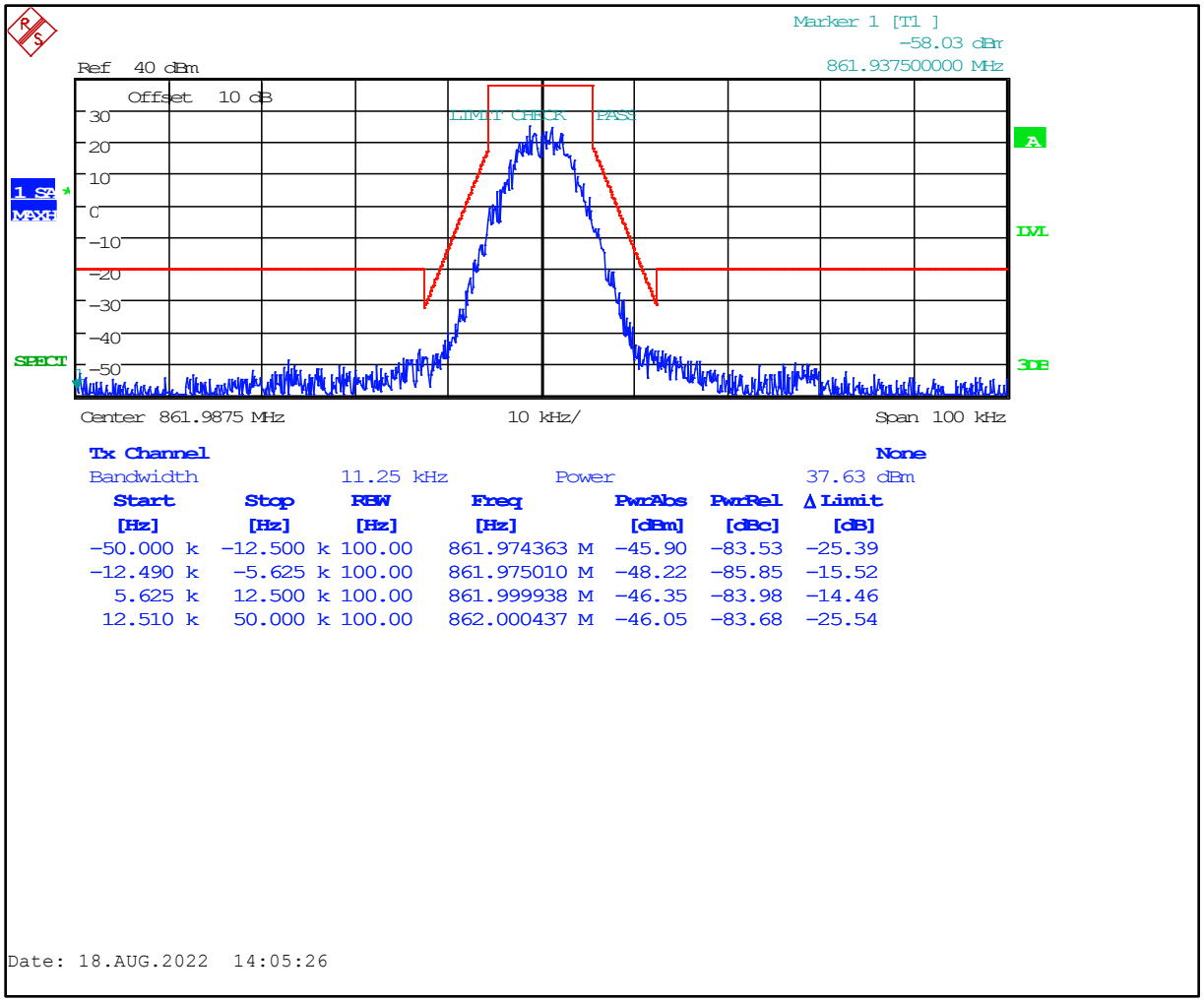
Plot 8-22: Occupied Bandwidth – 851.0125 MHz; P25 Phase 2; Mask D



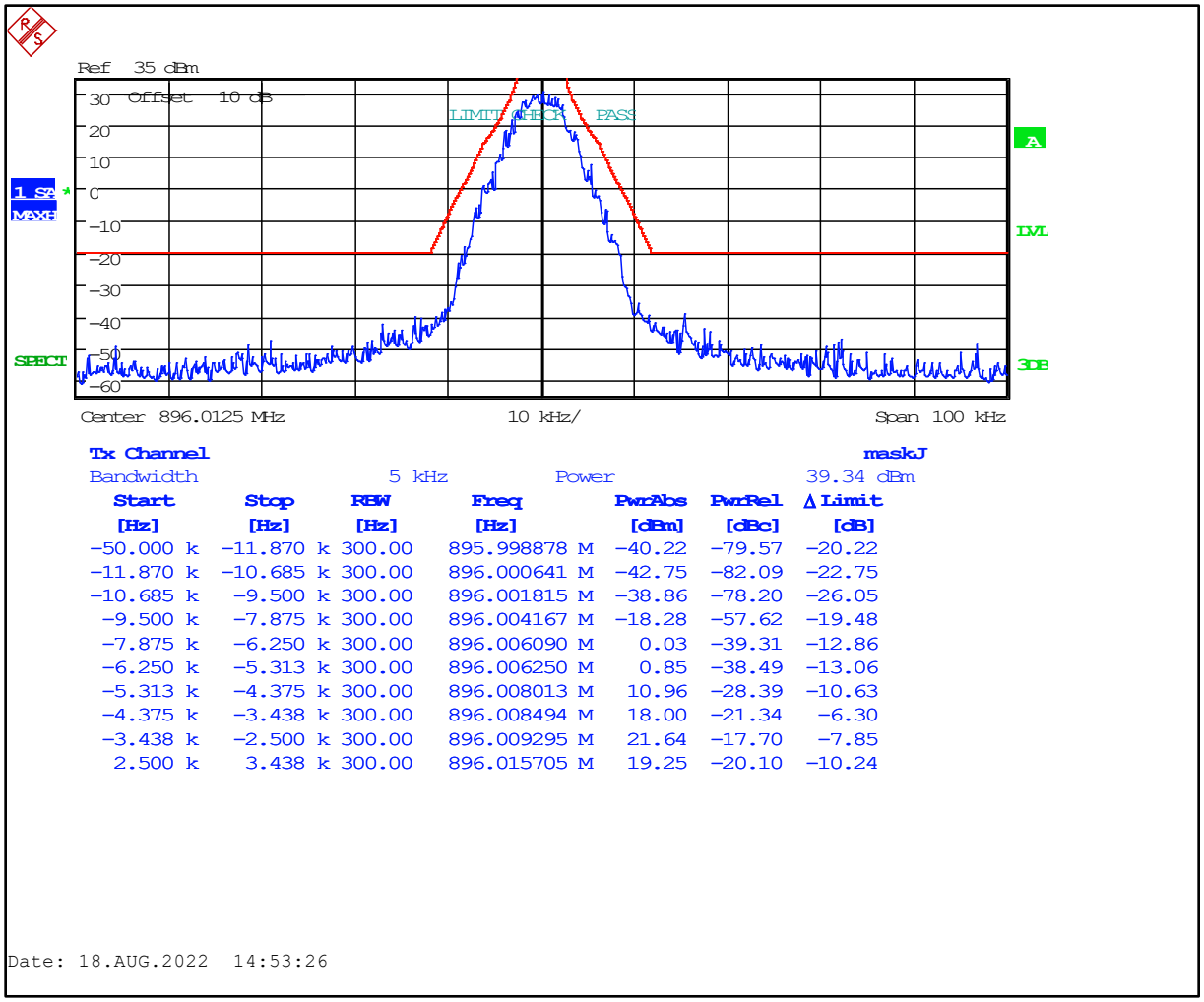
Plot 8-23: Occupied Bandwidth – 856.500 MHz; P25 Phase 2; Mask D



Plot 8-24: Occupied Bandwidth – 861.9875 MHz; P25 Phase 2; Mask D



Plot 8-25: Occupied Bandwidth – 896.0125 MHz; P25; Mask J



Tx Channel — maskJ

Bandwidth 5 kHz — Power 39.34 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
−50.000 k	−11.870 k	300.00	895.998878 M	−40.22	−79.57	−20.22
−11.870 k	−10.685 k	300.00	896.000641 M	−42.75	−82.09	−22.75
−10.685 k	−9.500 k	300.00	896.001815 M	−38.86	−78.20	−26.05
−9.500 k	−7.875 k	300.00	896.004167 M	−18.28	−57.62	−19.48
−7.875 k	−6.250 k	300.00	896.006090 M	0.03	−39.31	−12.86
−6.250 k	−5.313 k	300.00	896.006250 M	0.85	−38.49	−13.06
−5.313 k	−4.375 k	300.00	896.008013 M	10.96	−28.39	−10.63
−4.375 k	−3.438 k	300.00	896.008494 M	18.00	−21.34	−6.30
−3.438 k	−2.500 k	300.00	896.009295 M	21.64	−17.70	−7.85
2.500 k	3.438 k	300.00	896.015705 M	19.25	−20.10	−10.24

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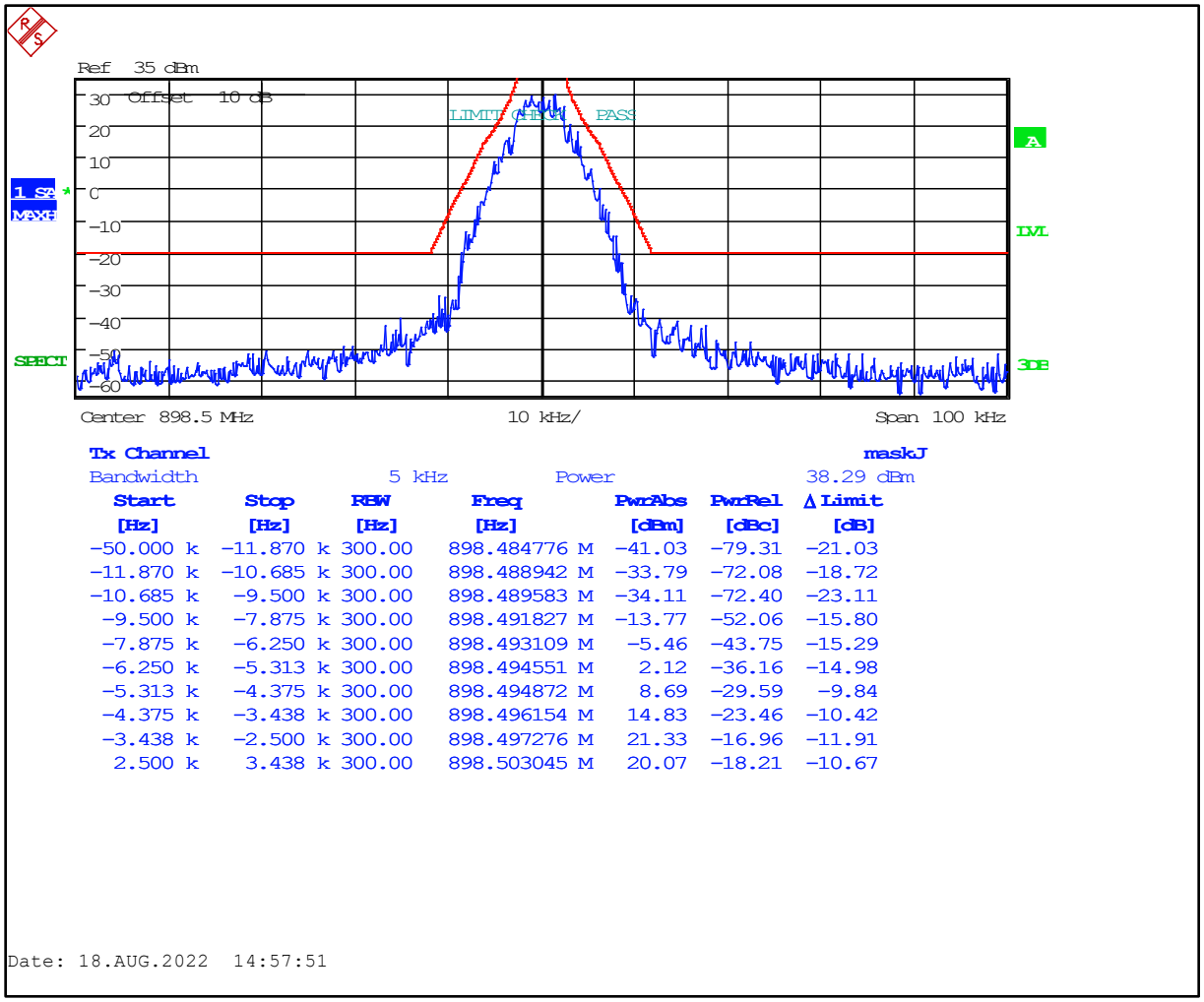
Plot 8-26: Occupied Bandwidth – 898.5000 MHz; P25; Mask J



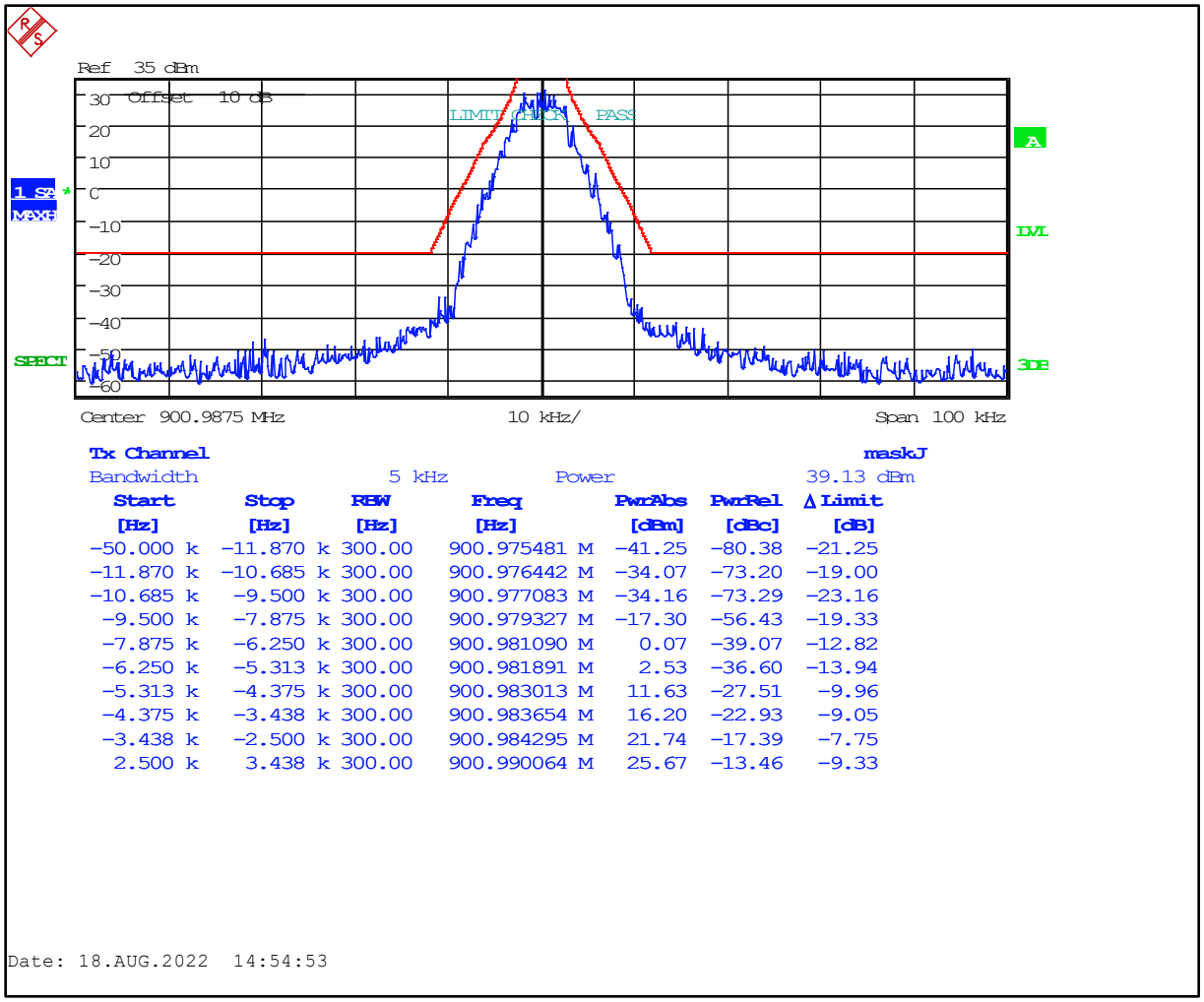
Tx Channel **maskJ**

Bandwidth 5 kHz Power 38.29 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-11.870 k	300.00	898.484776 M	-41.03	-79.31	-21.03
-11.870 k	-10.685 k	300.00	898.488942 M	-33.79	-72.08	-18.72
-10.685 k	-9.500 k	300.00	898.489583 M	-34.11	-72.40	-23.11
-9.500 k	-7.875 k	300.00	898.491827 M	-13.77	-52.06	-15.80
-7.875 k	-6.250 k	300.00	898.493109 M	-5.46	-43.75	-15.29
-6.250 k	-5.313 k	300.00	898.494551 M	2.12	-36.16	-14.98
-5.313 k	-4.375 k	300.00	898.494872 M	8.69	-29.59	-9.84
-4.375 k	-3.438 k	300.00	898.496154 M	14.83	-23.46	-10.42
-3.438 k	-2.500 k	300.00	898.497276 M	21.33	-16.96	-11.91
2.500 k	3.438 k	300.00	898.503045 M	20.07	-18.21	-10.67

Date: 18.AUG.2022 14:57:51

Plot 8-27: Occupied Bandwidth – 900.9875 MHz; P25; Mask J



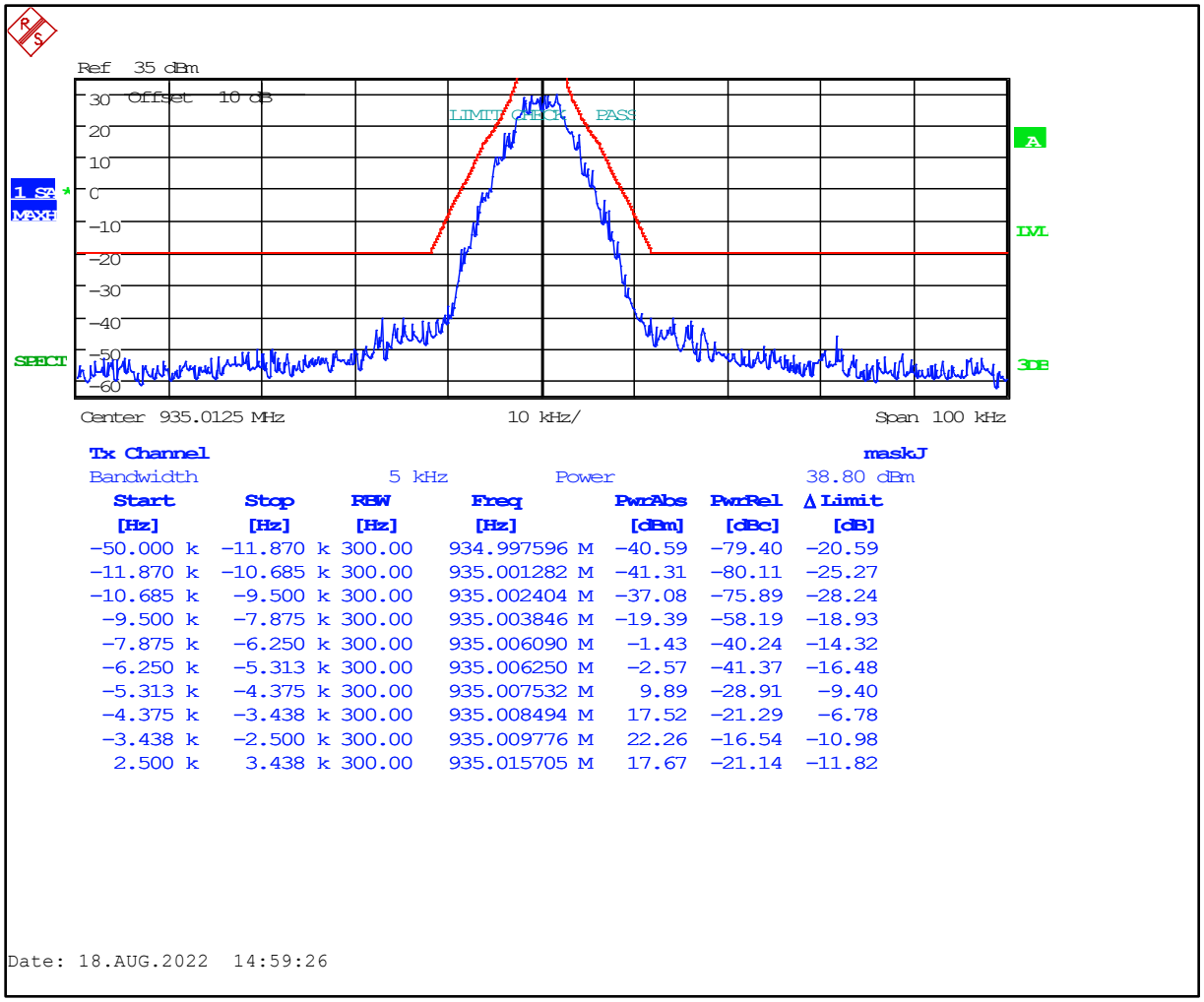
Tx Channel **maskJ**

Bandwidth 5 kHz Power 39.13 dBm

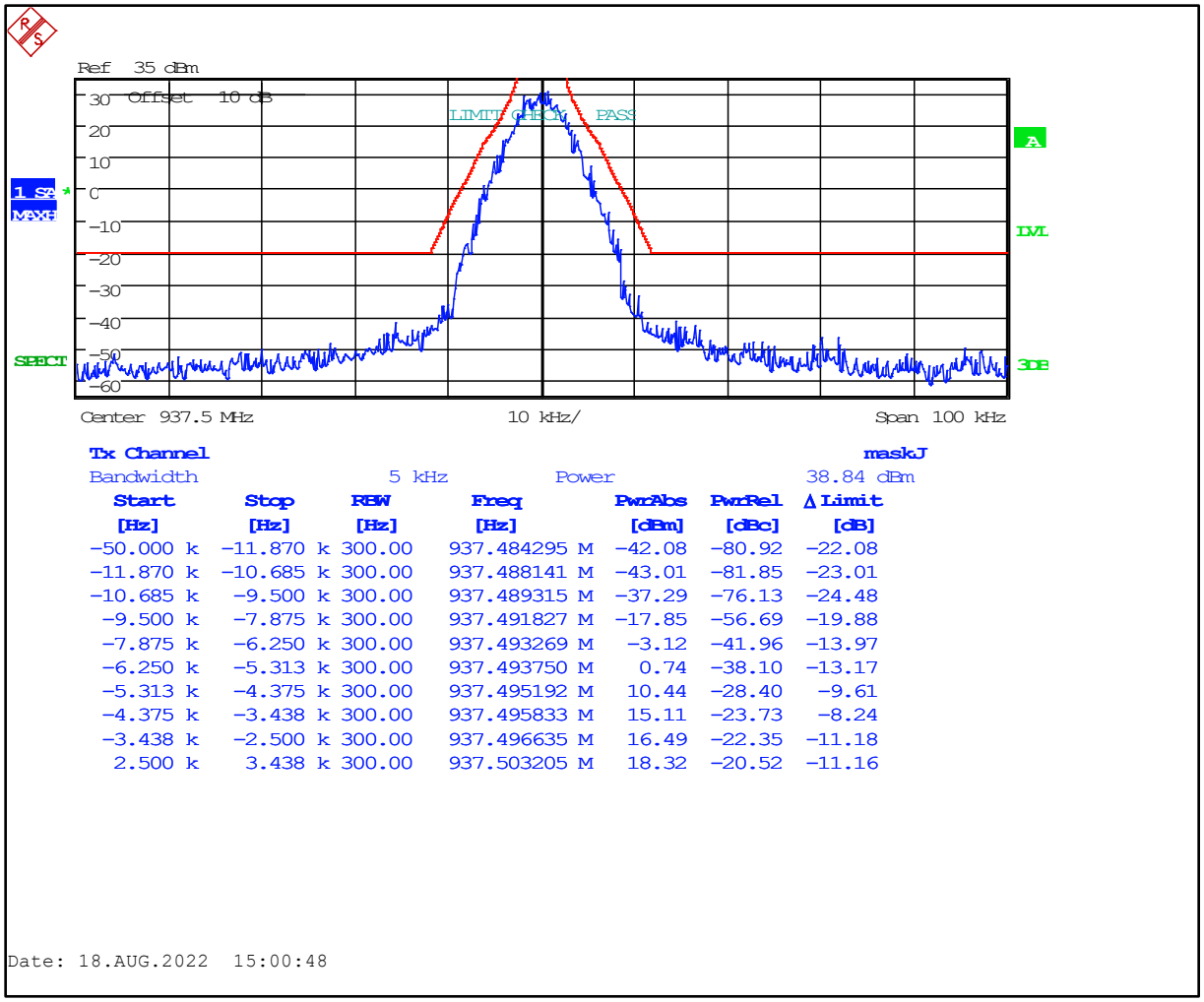
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-11.870 k	300.00	900.975481 M	-41.25	-80.38	-21.25
-11.870 k	-10.685 k	300.00	900.976442 M	-34.07	-73.20	-19.00
-10.685 k	-9.500 k	300.00	900.977083 M	-34.16	-73.29	-23.16
-9.500 k	-7.875 k	300.00	900.979327 M	-17.30	-56.43	-19.33
-7.875 k	-6.250 k	300.00	900.981090 M	0.07	-39.07	-12.82
-6.250 k	-5.313 k	300.00	900.981891 M	2.53	-36.60	-13.94
-5.313 k	-4.375 k	300.00	900.983013 M	11.63	-27.51	-9.96
-4.375 k	-3.438 k	300.00	900.983654 M	16.20	-22.93	-9.05
-3.438 k	-2.500 k	300.00	900.984295 M	21.74	-17.39	-7.75
2.500 k	3.438 k	300.00	900.990064 M	25.67	-13.46	-9.33

Date: 18.AUG.2022 14:54:53

Plot 8-28: Occupied Bandwidth – 935.0125 MHz; P25; Mask J



Plot 8-29: Occupied Bandwidth – 937.5000 MHz; P25; Mask J



Tx Channel — maskJ

Bandwidth 5 kHz — Power 38.84 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
−50.000 k	−11.870 k	300.00	937.484295 M	−42.08	−80.92	−22.08
−11.870 k	−10.685 k	300.00	937.488141 M	−43.01	−81.85	−23.01
−10.685 k	−9.500 k	300.00	937.489315 M	−37.29	−76.13	−24.48
−9.500 k	−7.875 k	300.00	937.491827 M	−17.85	−56.69	−19.88
−7.875 k	−6.250 k	300.00	937.493269 M	−3.12	−41.96	−13.97
−6.250 k	−5.313 k	300.00	937.493750 M	0.74	−38.10	−13.17
−5.313 k	−4.375 k	300.00	937.495192 M	10.44	−28.40	−9.61
−4.375 k	−3.438 k	300.00	937.495833 M	15.11	−23.73	−8.24
−3.438 k	−2.500 k	300.00	937.496635 M	16.49	−22.35	−11.18
2.500 k	3.438 k	300.00	937.503205 M	18.32	−20.52	−11.16

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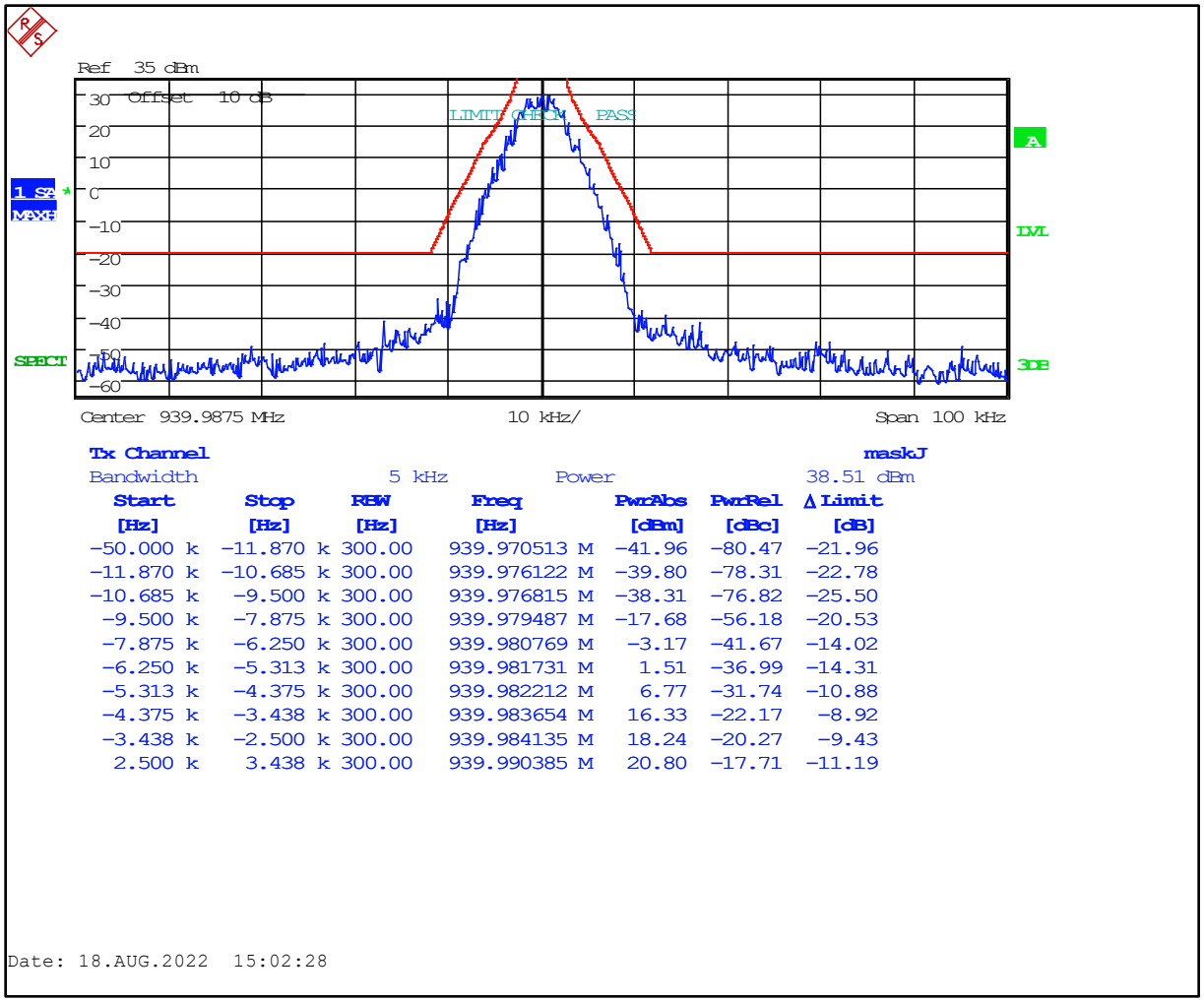
Plot 8-30: Occupied Bandwidth – 939.9875 MHz; P25; Mask J



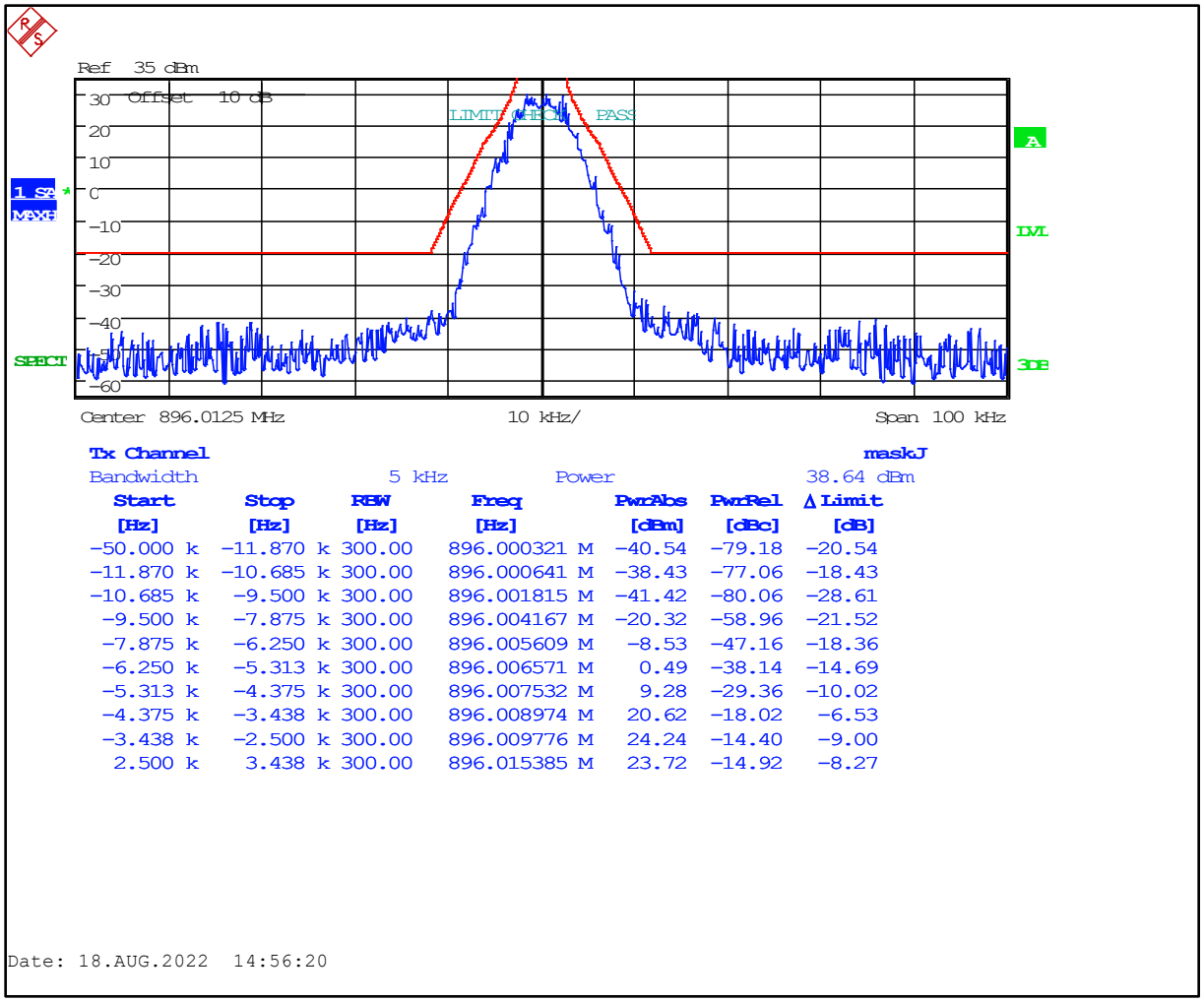
Tx Channel **maskJ**

Bandwidth 5 kHz Power 38.51 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-11.870 k	300.00	939.970513 M	-41.96	-80.47	-21.96
-11.870 k	-10.685 k	300.00	939.976122 M	-39.80	-78.31	-22.78
-10.685 k	-9.500 k	300.00	939.976815 M	-38.31	-76.82	-25.50
-9.500 k	-7.875 k	300.00	939.979487 M	-17.68	-56.18	-20.53
-7.875 k	-6.250 k	300.00	939.980769 M	-3.17	-41.67	-14.02
-6.250 k	-5.313 k	300.00	939.981731 M	1.51	-36.99	-14.31
-5.313 k	-4.375 k	300.00	939.982212 M	6.77	-31.74	-10.88
-4.375 k	-3.438 k	300.00	939.983654 M	16.33	-22.17	-8.92
-3.438 k	-2.500 k	300.00	939.984135 M	18.24	-20.27	-9.43
2.500 k	3.438 k	300.00	939.990385 M	20.80	-17.71	-11.19

Date: 18.AUG.2022 15:02:28

Plot 8-31: Occupied Bandwidth – 896.0125 MHz; P25 Phase 2; Mask J



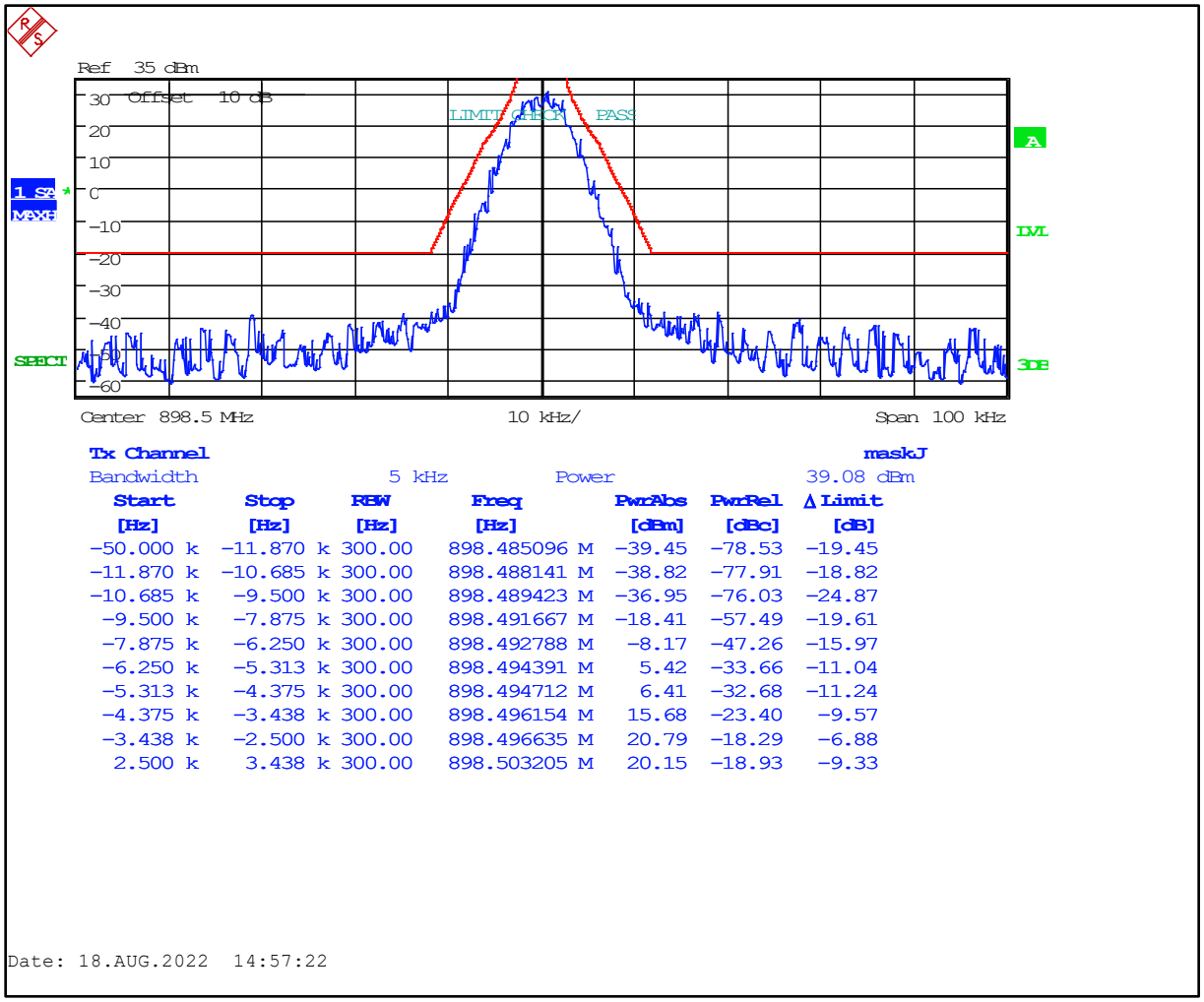
Tx Channel **maskJ**

Bandwidth 5 kHz Power 38.64 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-11.870 k	300.00	896.000321 M	-40.54	-79.18	-20.54
-11.870 k	-10.685 k	300.00	896.000641 M	-38.43	-77.06	-18.43
-10.685 k	-9.500 k	300.00	896.001815 M	-41.42	-80.06	-28.61
-9.500 k	-7.875 k	300.00	896.004167 M	-20.32	-58.96	-21.52
-7.875 k	-6.250 k	300.00	896.005609 M	-8.53	-47.16	-18.36
-6.250 k	-5.313 k	300.00	896.006571 M	0.49	-38.14	-14.69
-5.313 k	-4.375 k	300.00	896.007532 M	9.28	-29.36	-10.02
-4.375 k	-3.438 k	300.00	896.008974 M	20.62	-18.02	-6.53
-3.438 k	-2.500 k	300.00	896.009776 M	24.24	-14.40	-9.00
2.500 k	3.438 k	300.00	896.015385 M	23.72	-14.92	-8.27

Date: 18.AUG.2022 14:56:20

Plot 8-32: Occupied Bandwidth – 898.5000 MHz; P25 Phase 2; Mask J



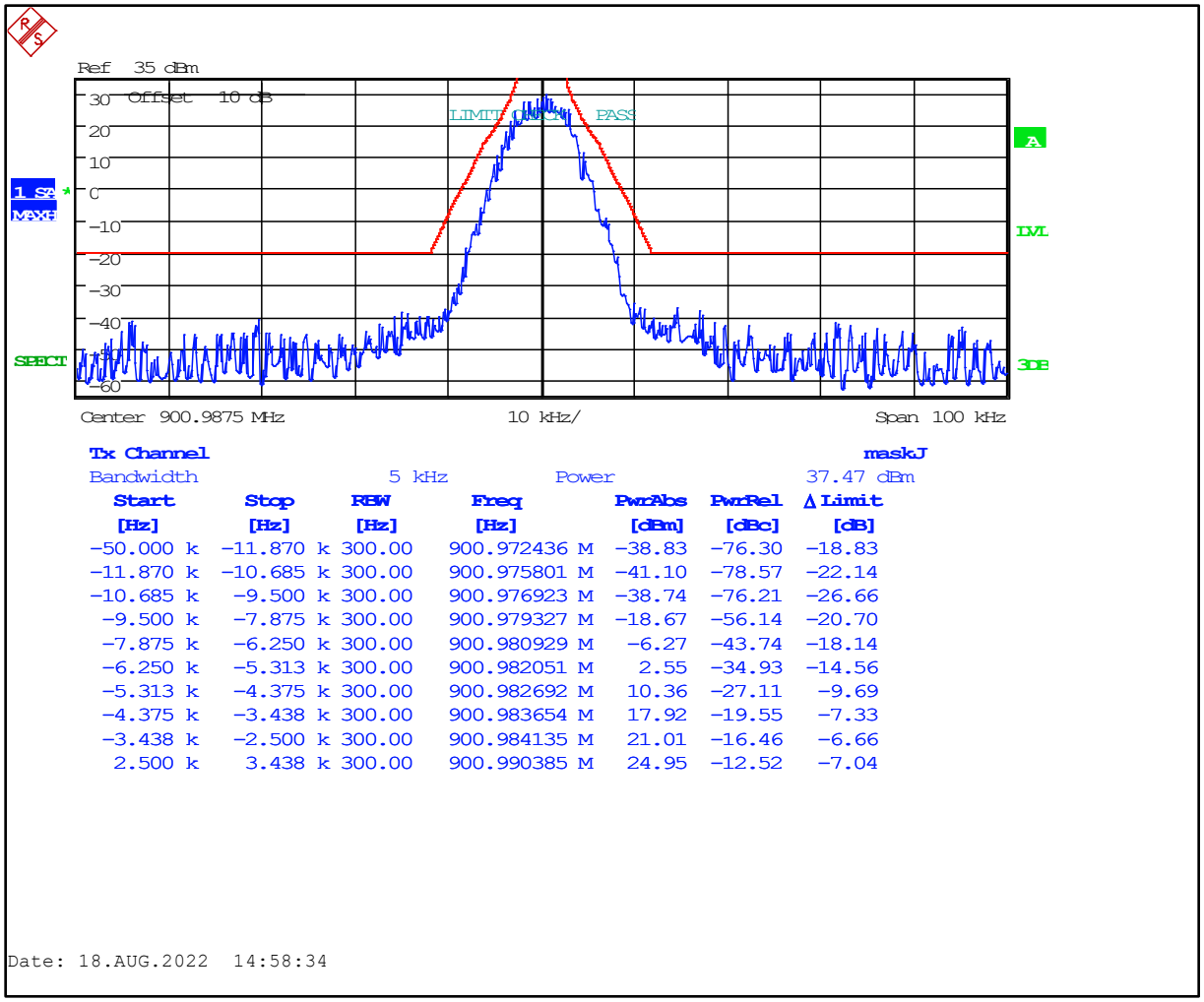
Tx Channel **maskJ**

Bandwidth 5 kHz Power 39.08 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-11.870 k	300.00	898.485096 M	-39.45	-78.53	-19.45
-11.870 k	-10.685 k	300.00	898.488141 M	-38.82	-77.91	-18.82
-10.685 k	-9.500 k	300.00	898.489423 M	-36.95	-76.03	-24.87
-9.500 k	-7.875 k	300.00	898.491667 M	-18.41	-57.49	-19.61
-7.875 k	-6.250 k	300.00	898.492788 M	-8.17	-47.26	-15.97
-6.250 k	-5.313 k	300.00	898.494391 M	5.42	-33.66	-11.04
-5.313 k	-4.375 k	300.00	898.494712 M	6.41	-32.68	-11.24
-4.375 k	-3.438 k	300.00	898.496154 M	15.68	-23.40	-9.57
-3.438 k	-2.500 k	300.00	898.496635 M	20.79	-18.29	-6.88
2.500 k	3.438 k	300.00	898.503205 M	20.15	-18.93	-9.33

Date: 18.AUG.2022 14:57:22

Plot 8-33: Occupied Bandwidth – 900.9875 MHz; P25 Phase 2; Mask J



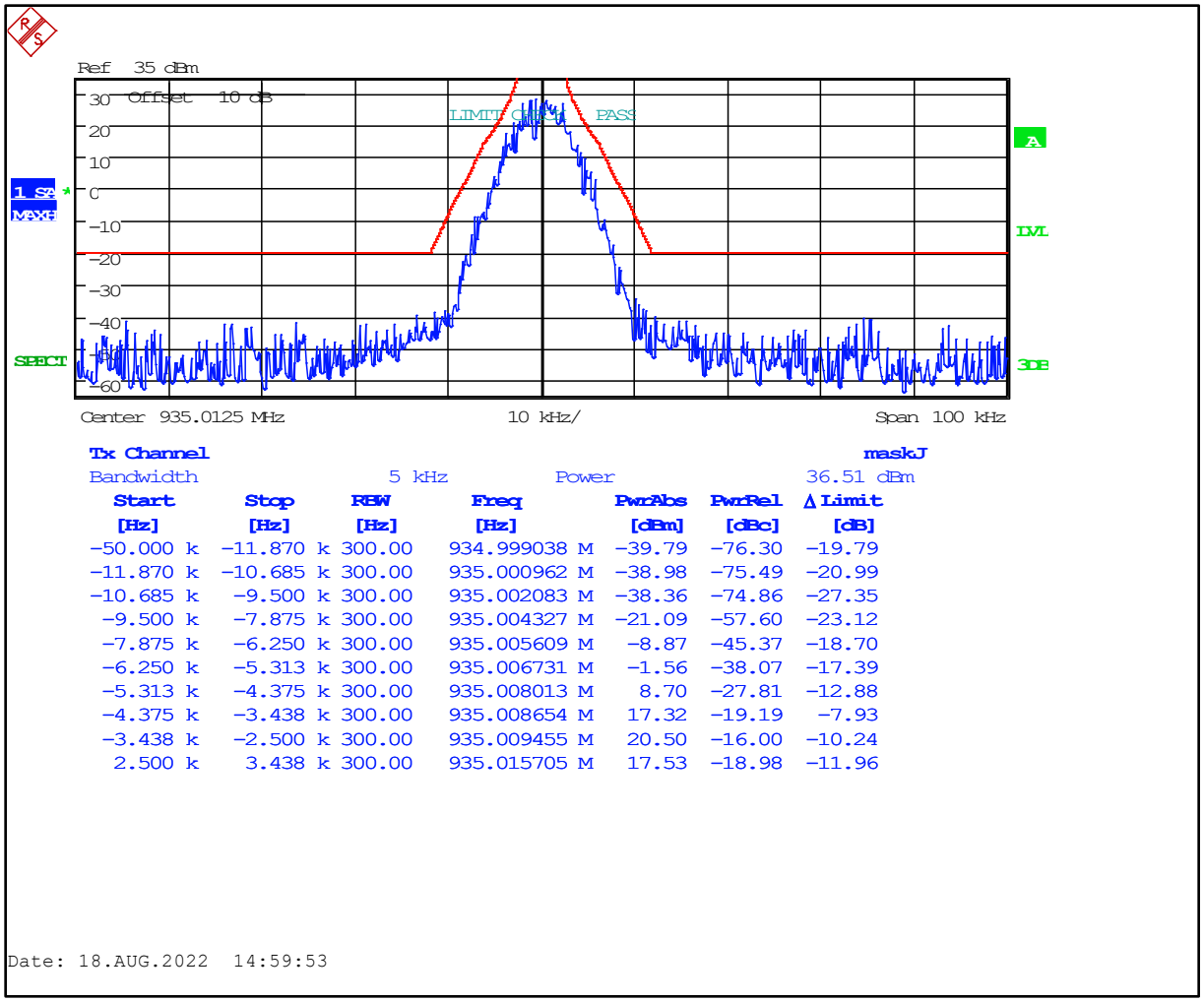
Tx Channel **maskJ**

Bandwidth 5 kHz Power 37.47 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-11.870 k	300.00	900.972436 M	-38.83	-76.30	-18.83
-11.870 k	-10.685 k	300.00	900.975801 M	-41.10	-78.57	-22.14
-10.685 k	-9.500 k	300.00	900.976923 M	-38.74	-76.21	-26.66
-9.500 k	-7.875 k	300.00	900.979327 M	-18.67	-56.14	-20.70
-7.875 k	-6.250 k	300.00	900.980929 M	-6.27	-43.74	-18.14
-6.250 k	-5.313 k	300.00	900.982051 M	2.55	-34.93	-14.56
-5.313 k	-4.375 k	300.00	900.982692 M	10.36	-27.11	-9.69
-4.375 k	-3.438 k	300.00	900.983654 M	17.92	-19.55	-7.33
-3.438 k	-2.500 k	300.00	900.984135 M	21.01	-16.46	-6.66
2.500 k	3.438 k	300.00	900.990385 M	24.95	-12.52	-7.04

Date: 18.AUG.2022 14:58:34

Plot 8-34: Occupied Bandwidth – 935.0125 MHz; P25 Phase 2; Mask J



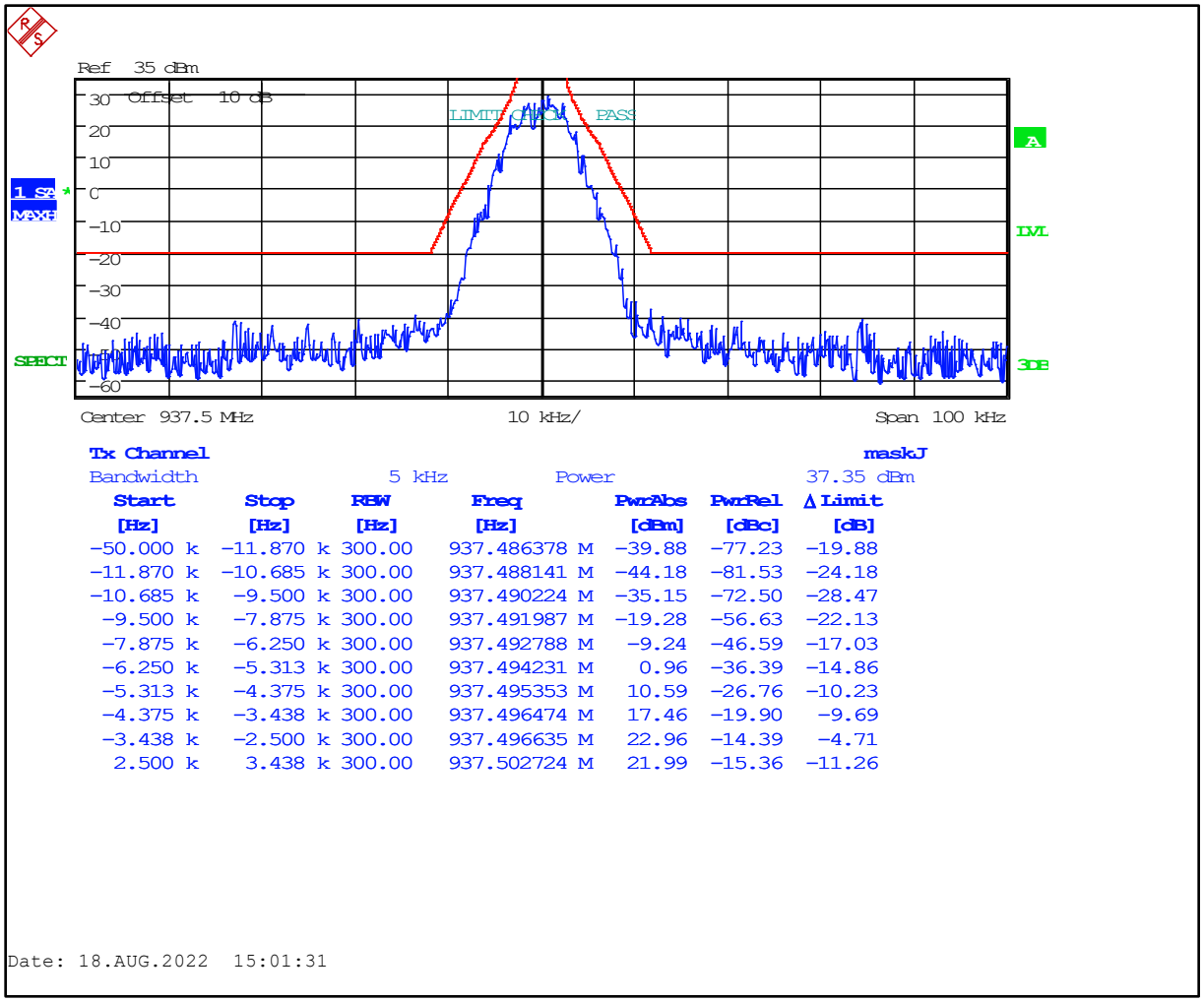
Tx Channel **maskJ**

Bandwidth 5 kHz Power 36.51 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-11.870 k	300.00	934.999038 M	-39.79	-76.30	-19.79
-11.870 k	-10.685 k	300.00	935.000962 M	-38.98	-75.49	-20.99
-10.685 k	-9.500 k	300.00	935.002083 M	-38.36	-74.86	-27.35
-9.500 k	-7.875 k	300.00	935.004327 M	-21.09	-57.60	-23.12
-7.875 k	-6.250 k	300.00	935.005609 M	-8.87	-45.37	-18.70
-6.250 k	-5.313 k	300.00	935.006731 M	-1.56	-38.07	-17.39
-5.313 k	-4.375 k	300.00	935.008013 M	8.70	-27.81	-12.88
-4.375 k	-3.438 k	300.00	935.008654 M	17.32	-19.19	-7.93
-3.438 k	-2.500 k	300.00	935.009455 M	20.50	-16.00	-10.24
2.500 k	3.438 k	300.00	935.015705 M	17.53	-18.98	-11.96

Date: 18.AUG.2022 14:59:53

Plot 8-35: Occupied Bandwidth – 937.5000 MHz; P25 Phase 2; Mask J



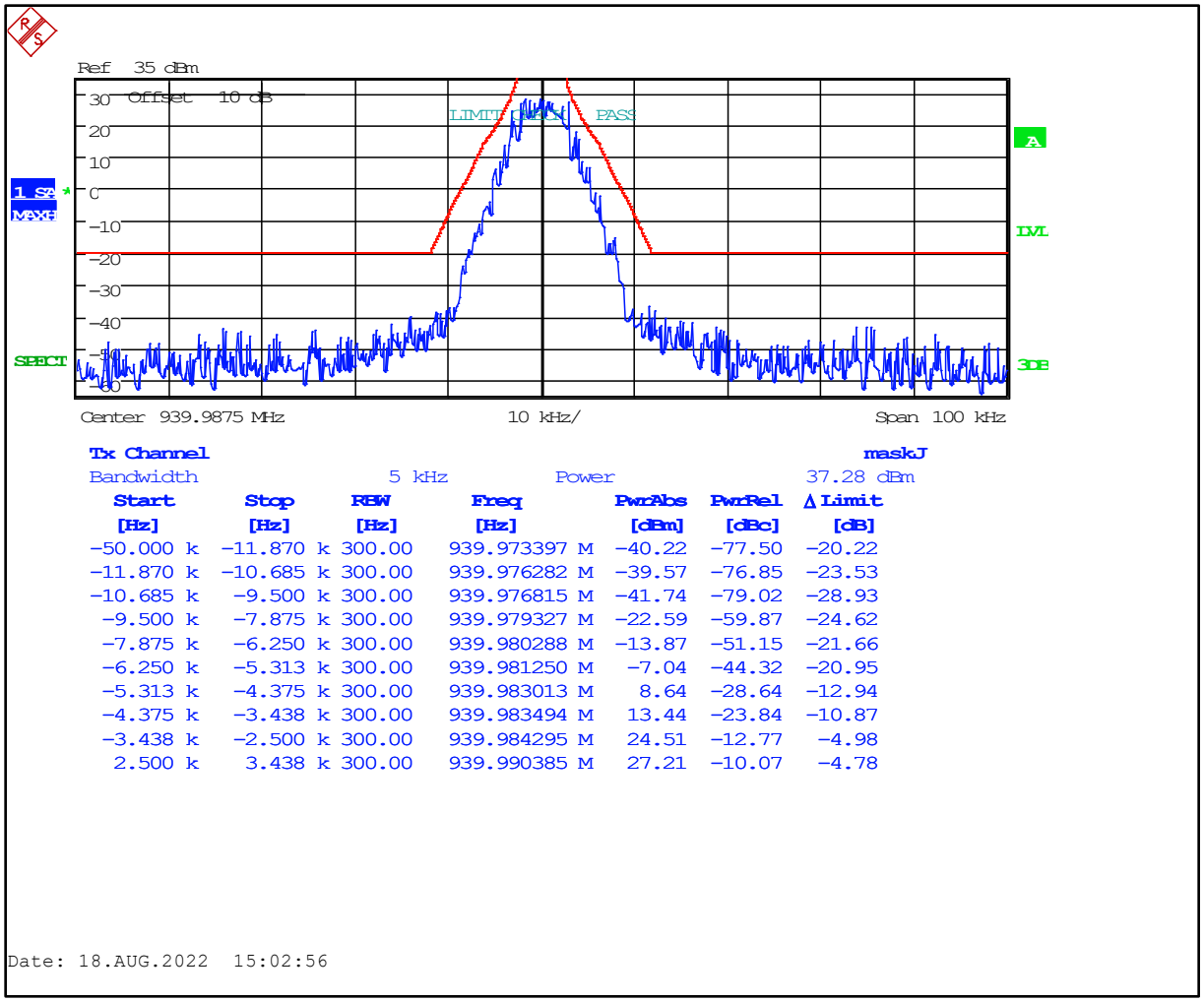
Tx Channel **maskJ**

Bandwidth 5 kHz Power 37.35 dBm

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-11.870 k	300.00	937.486378 M	-39.88	-77.23	-19.88
-11.870 k	-10.685 k	300.00	937.488141 M	-44.18	-81.53	-24.18
-10.685 k	-9.500 k	300.00	937.490224 M	-35.15	-72.50	-28.47
-9.500 k	-7.875 k	300.00	937.491987 M	-19.28	-56.63	-22.13
-7.875 k	-6.250 k	300.00	937.492788 M	-9.24	-46.59	-17.03
-6.250 k	-5.313 k	300.00	937.494231 M	0.96	-36.39	-14.86
-5.313 k	-4.375 k	300.00	937.495353 M	10.59	-26.76	-10.23
-4.375 k	-3.438 k	300.00	937.496474 M	17.46	-19.90	-9.69
-3.438 k	-2.500 k	300.00	937.496635 M	22.96	-14.39	-4.71
2.500 k	3.438 k	300.00	937.502724 M	21.99	-15.36	-11.26

Date: 18.AUG.2022 15:01:31

Plot 8-36: Occupied Bandwidth – 939.9875 MHz; P25 Phase 2; Mask J



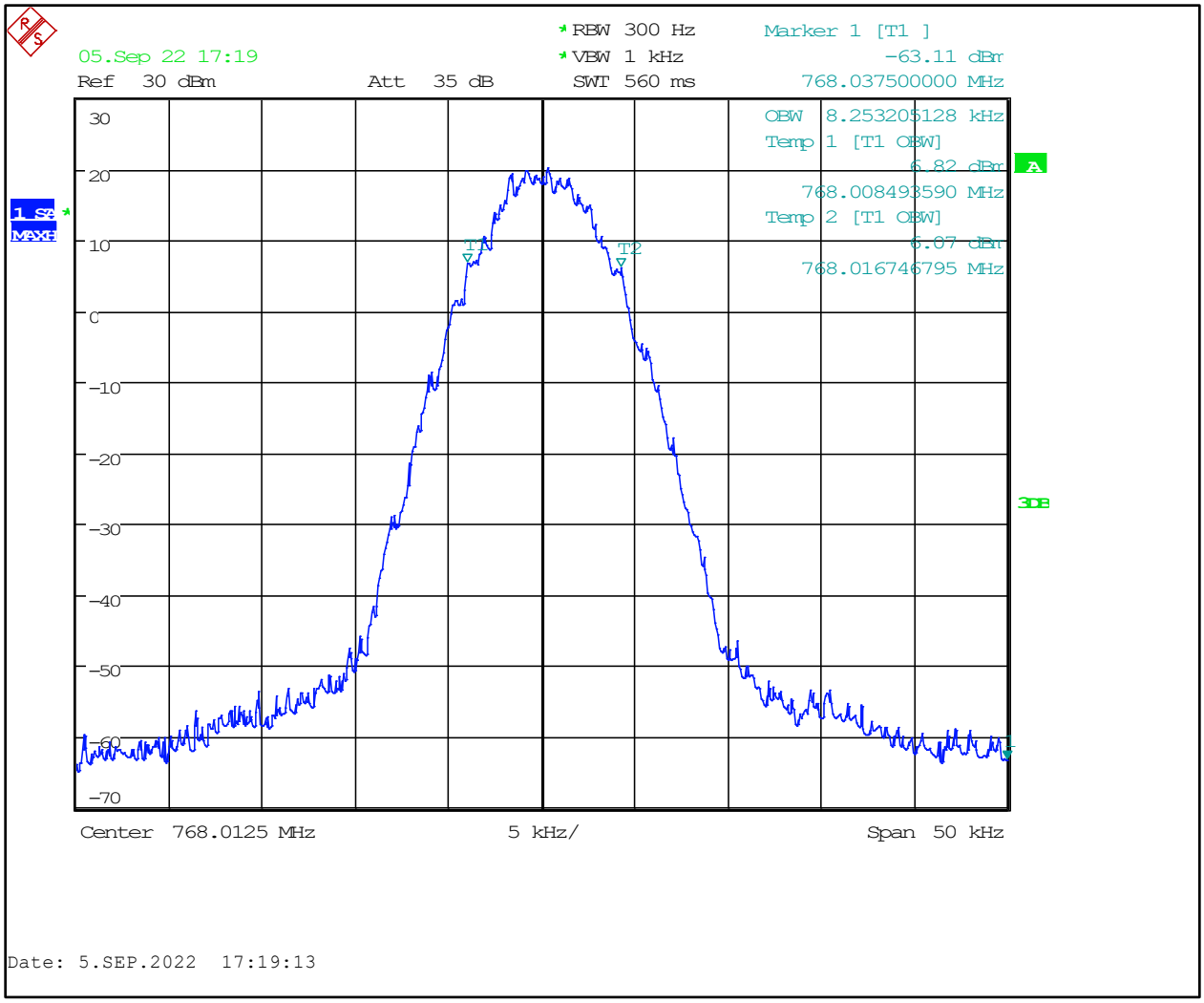
Tx Channel **maskJ**

Bandwidth 5 kHz Power 37.28 dBm

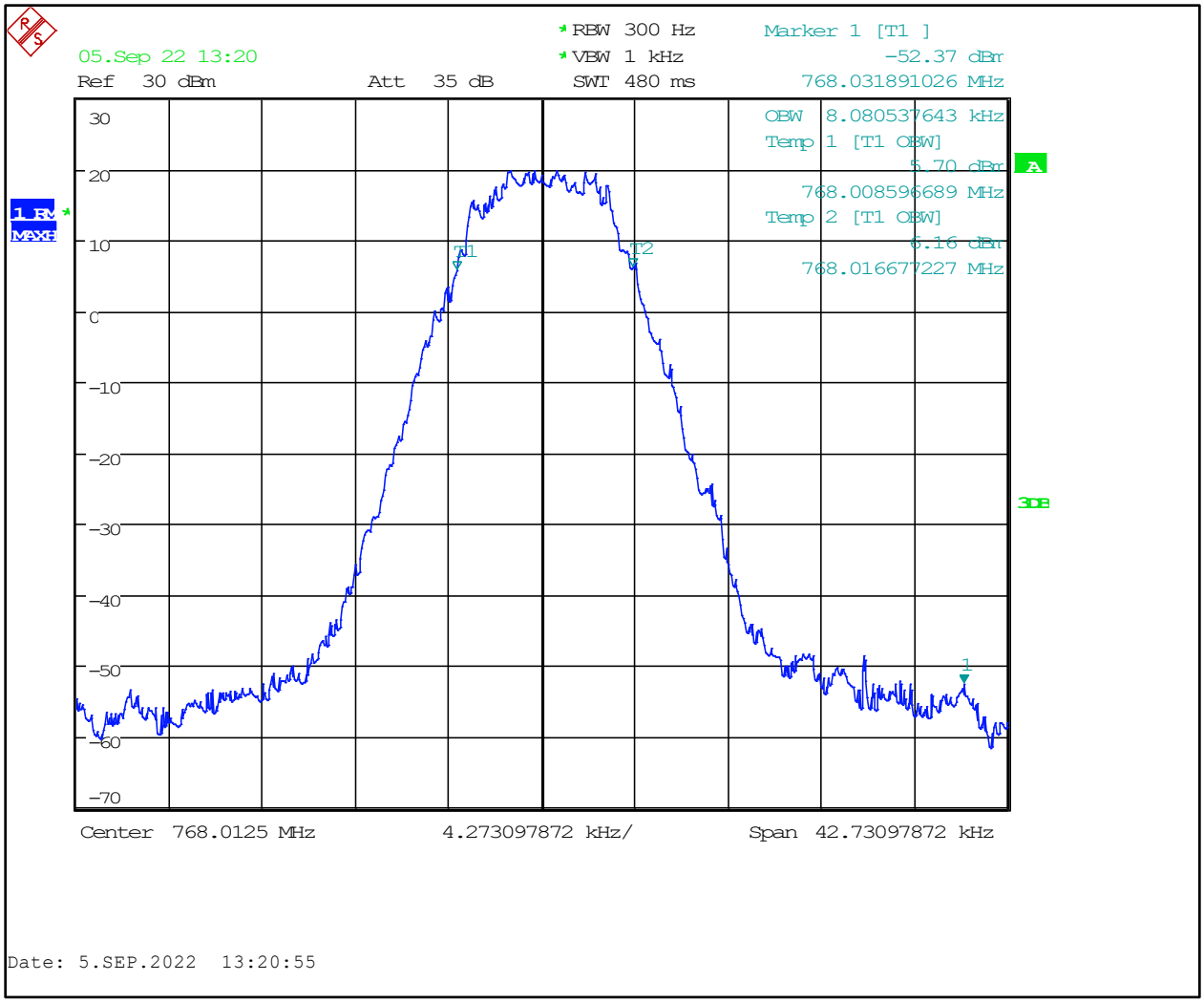
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Δ Limit [dB]
-50.000 k	-11.870 k	300.00	939.973397 M	-40.22	-77.50	-20.22
-11.870 k	-10.685 k	300.00	939.976282 M	-39.57	-76.85	-23.53
-10.685 k	-9.500 k	300.00	939.976815 M	-41.74	-79.02	-28.93
-9.500 k	-7.875 k	300.00	939.979327 M	-22.59	-59.87	-24.62
-7.875 k	-6.250 k	300.00	939.980288 M	-13.87	-51.15	-21.66
-6.250 k	-5.313 k	300.00	939.981250 M	-7.04	-44.32	-20.95
-5.313 k	-4.375 k	300.00	939.983013 M	8.64	-28.64	-12.94
-4.375 k	-3.438 k	300.00	939.983494 M	13.44	-23.84	-10.87
-3.438 k	-2.500 k	300.00	939.984295 M	24.51	-12.77	-4.98
2.500 k	3.438 k	300.00	939.990385 M	27.21	-10.07	-4.78

Date: 18.AUG.2022 15:02:56

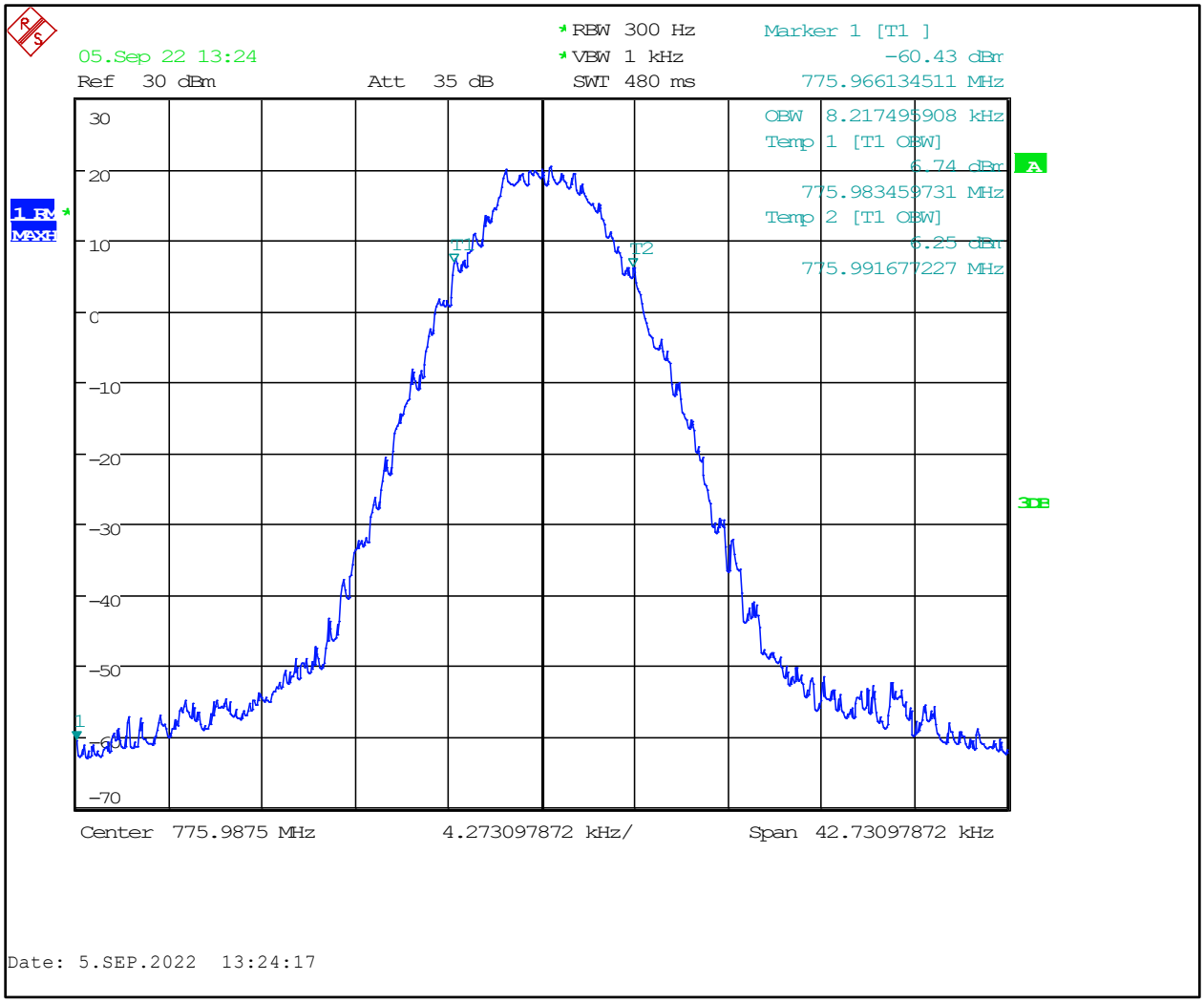
Plot 8-37: OBW 99%, 768.0125 MHz, C4FM



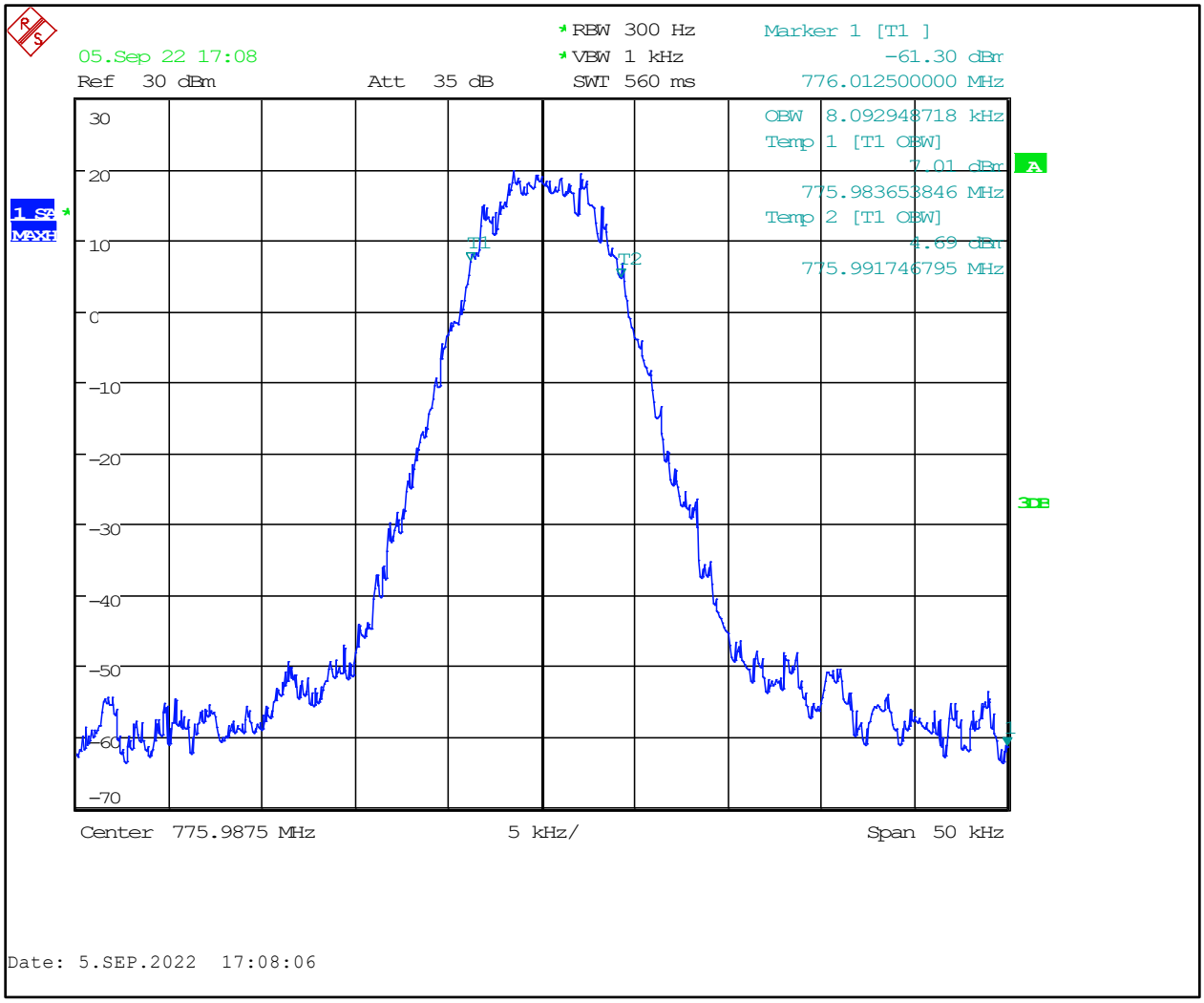
Plot 8-38: OBW 99%, 768.0125 MHz, H-CPM TDMA



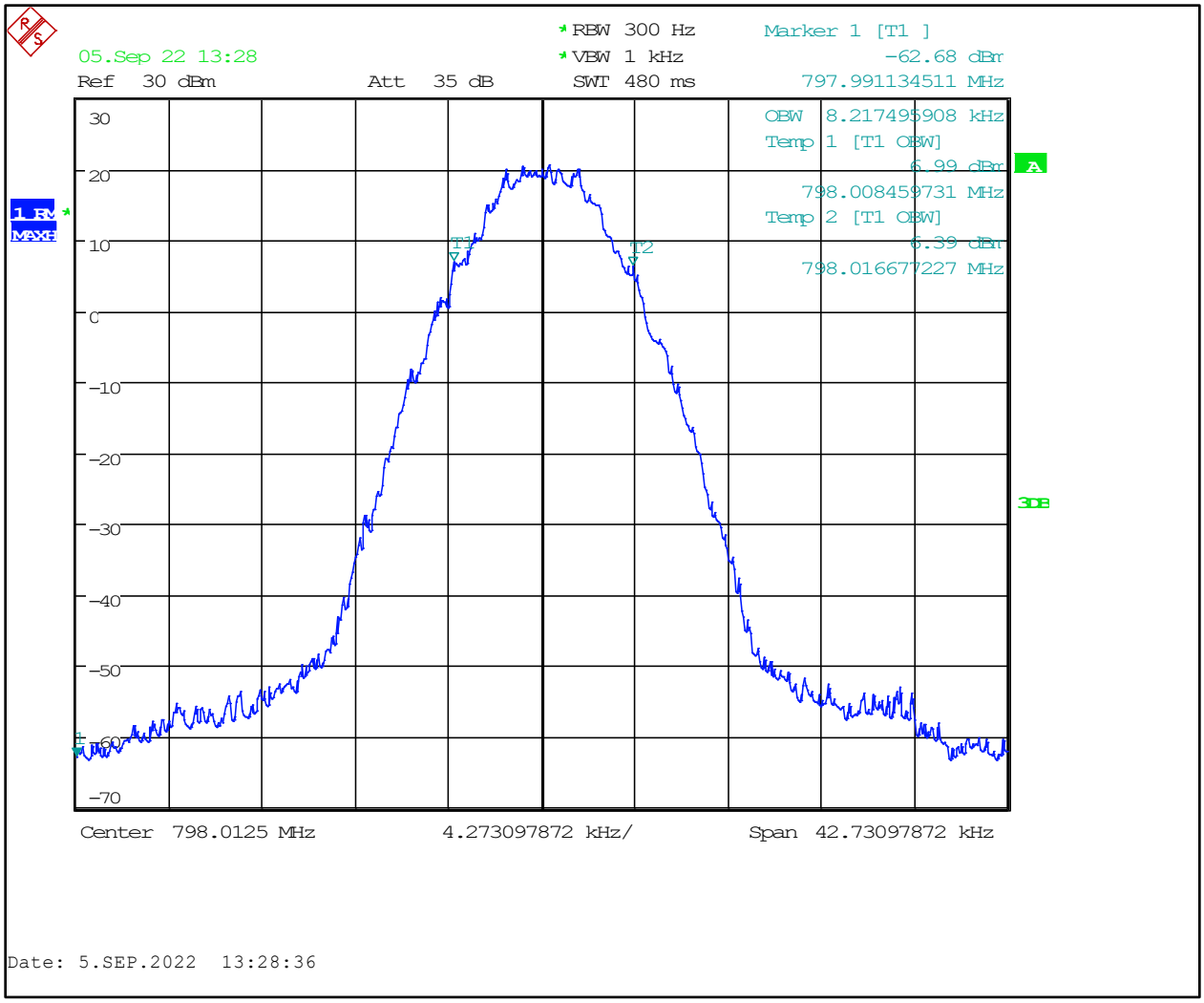
Plot 8-39: OBW 99%, 775.9875 MHz, C4FM



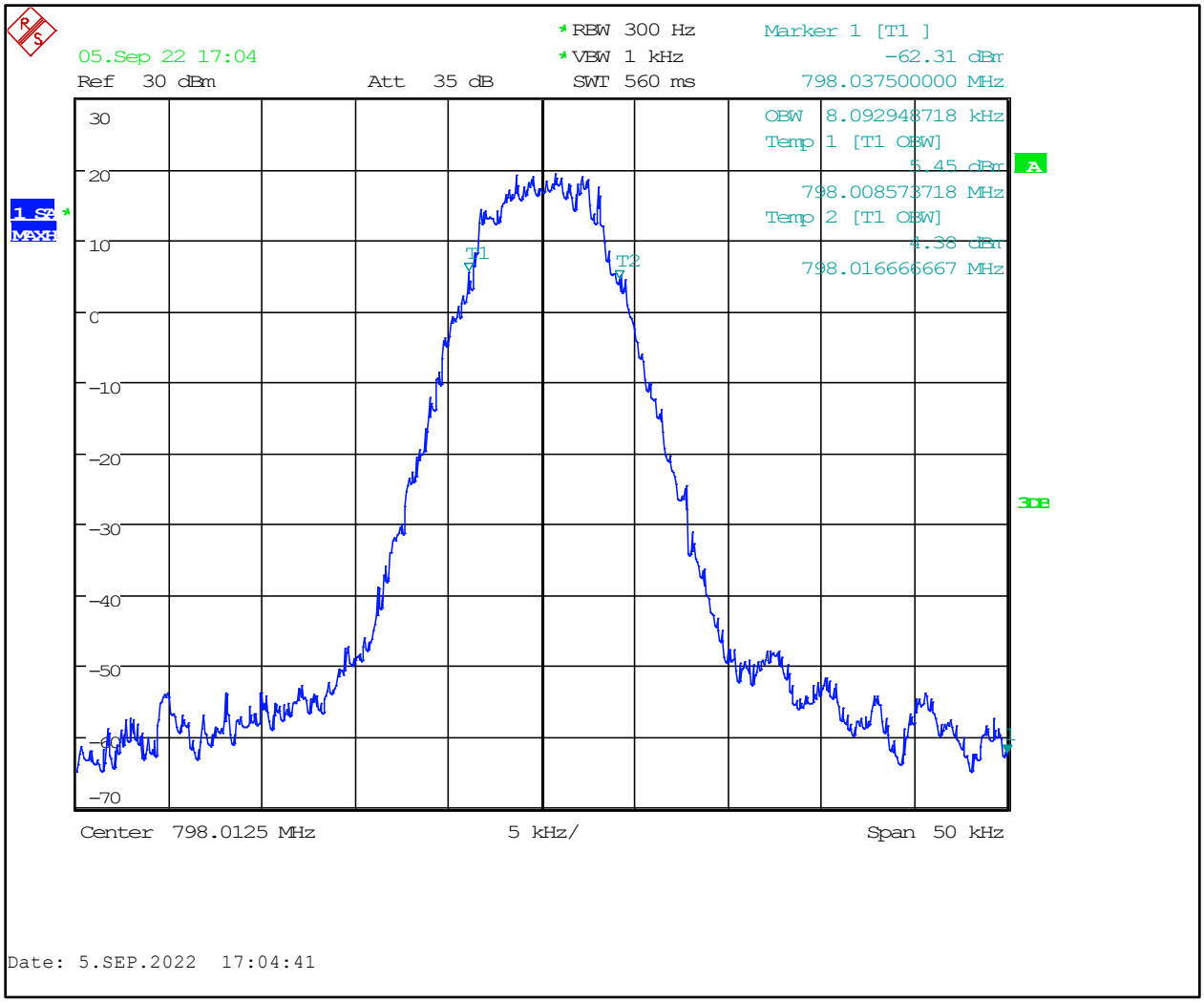
Plot 8-40: OBW 99%, 775.9875 MHz, H-CPM TDMA



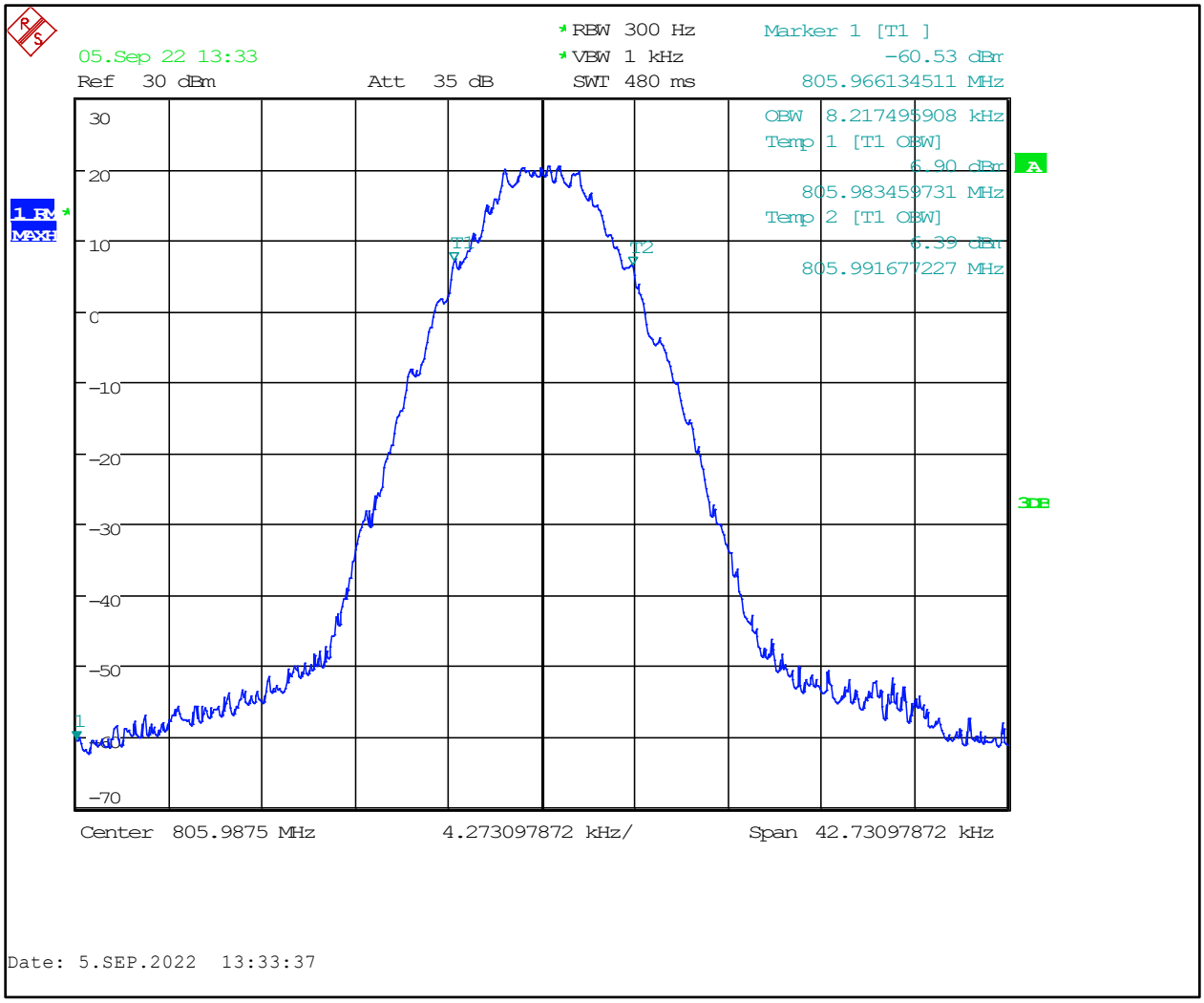
Plot 8-41: OBW 99%, 798.0125 MHz, C4FM



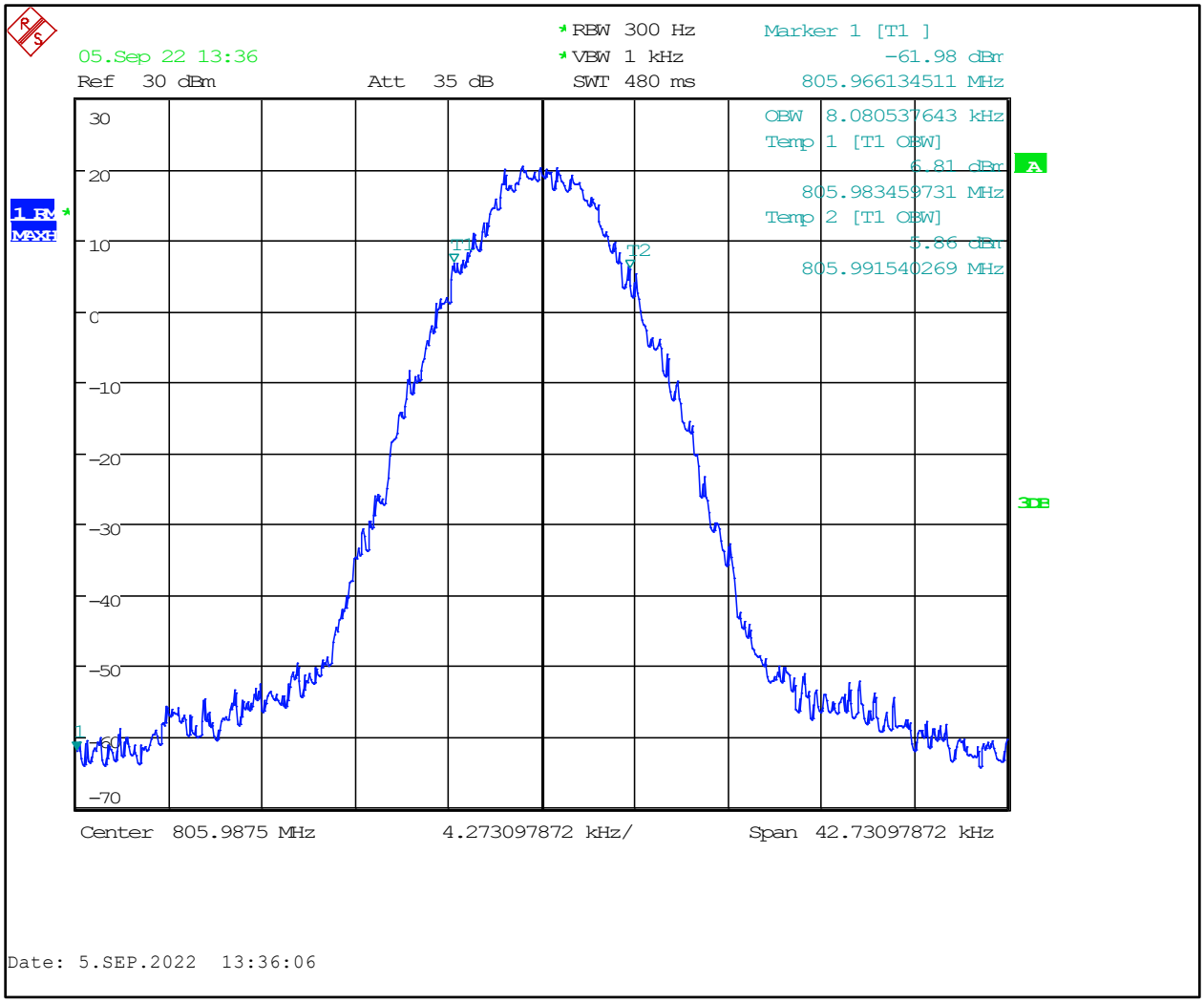
Plot 8-42: OBW 99%, 798.0125 MHz, H-CPM TDMA



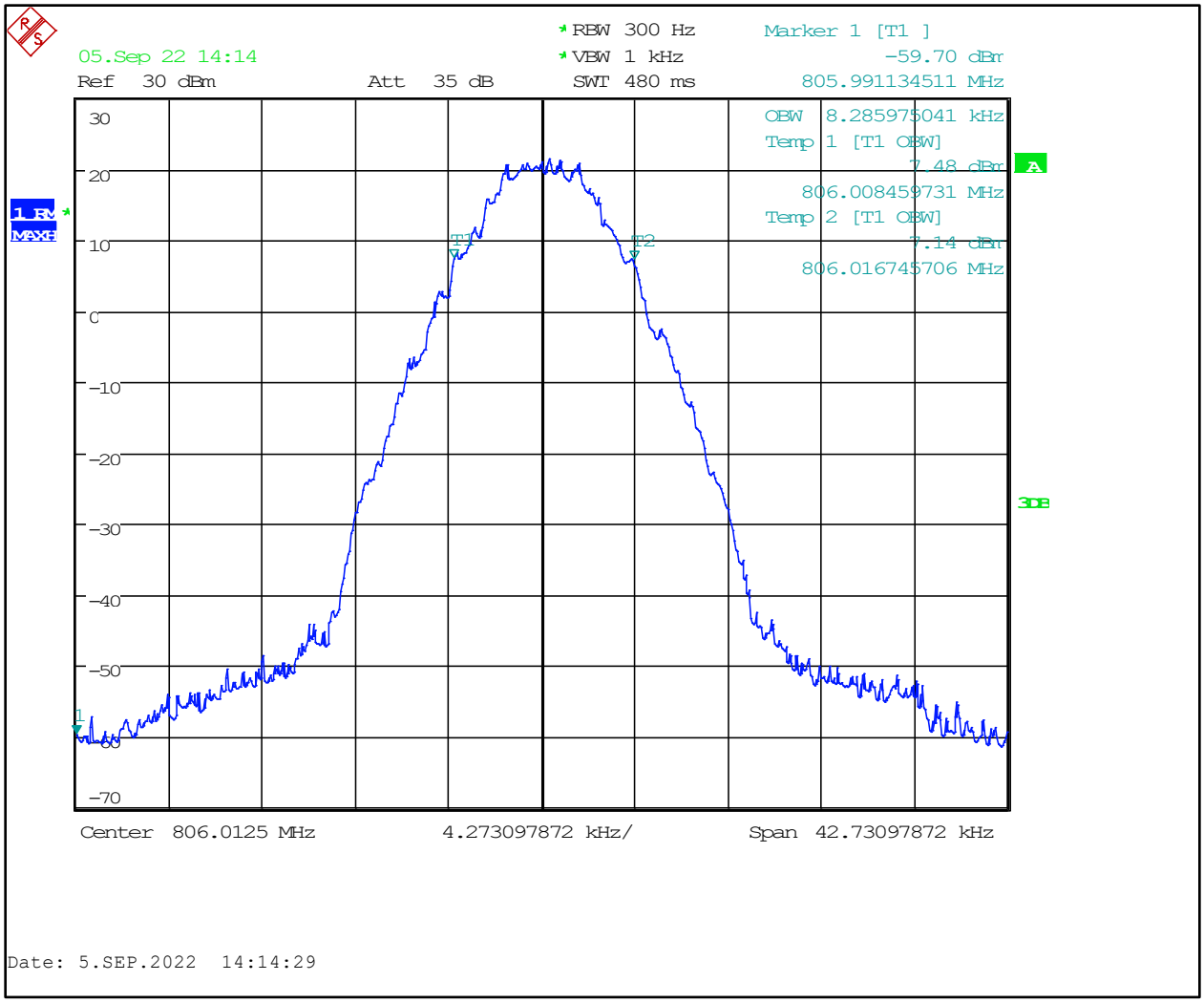
Plot 8-43: OBW 99%, 805.9875 MHz, C4FM



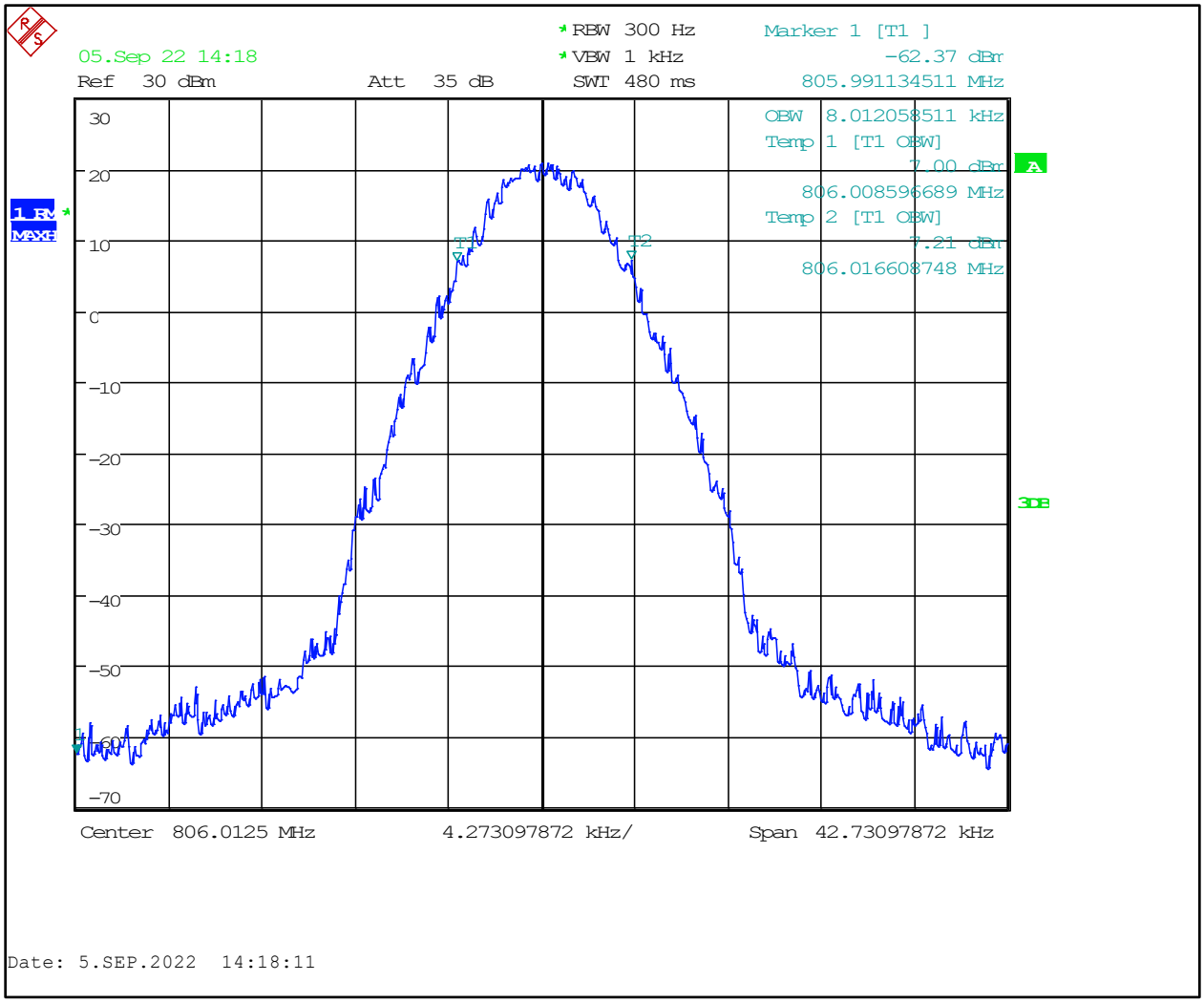
Plot 8-44: OBW 99%, 805.9875 MHz, H-CPM TDMA



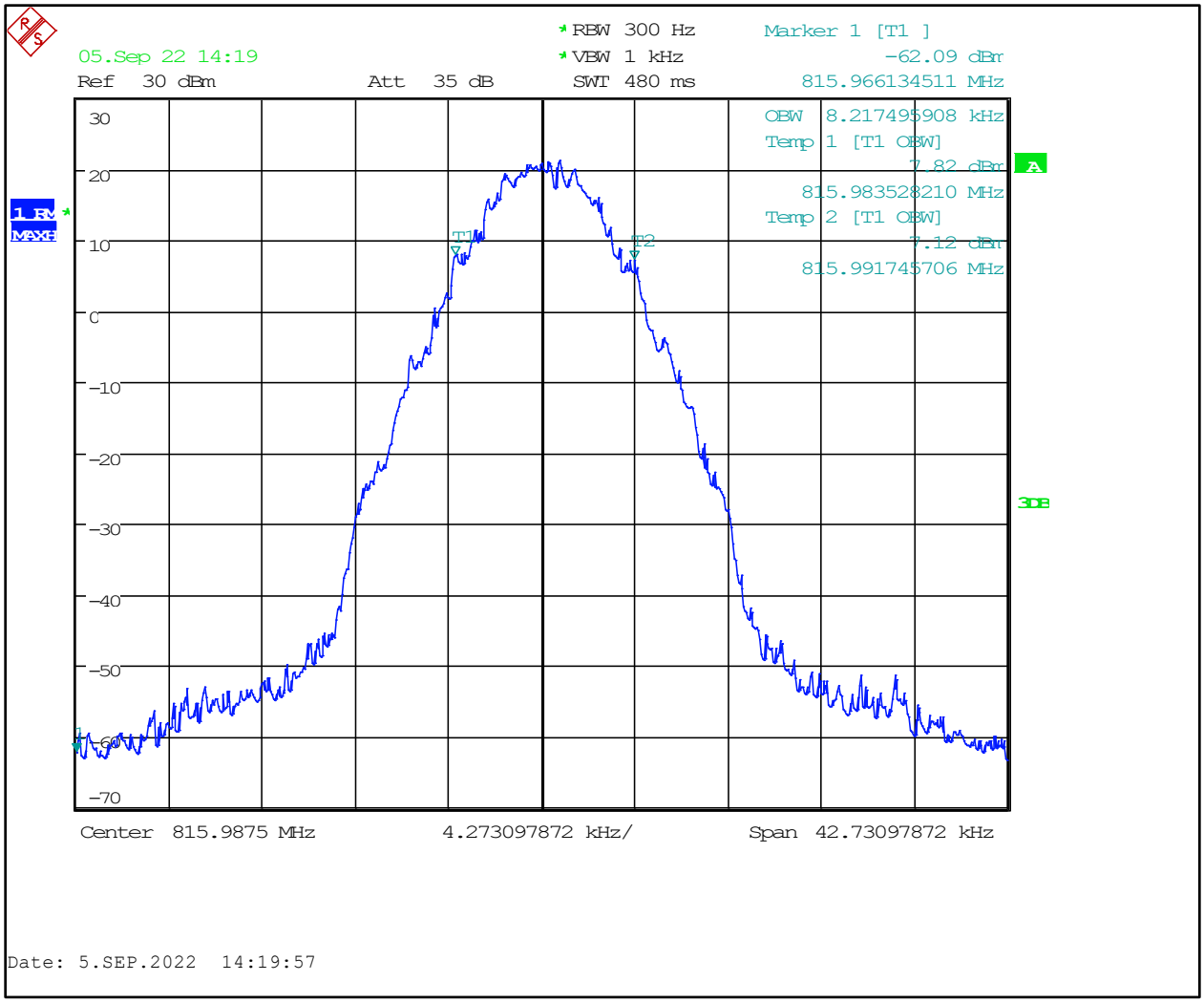
Plot 8-45: OBW 99%, 806.0125 MHz, C4FM



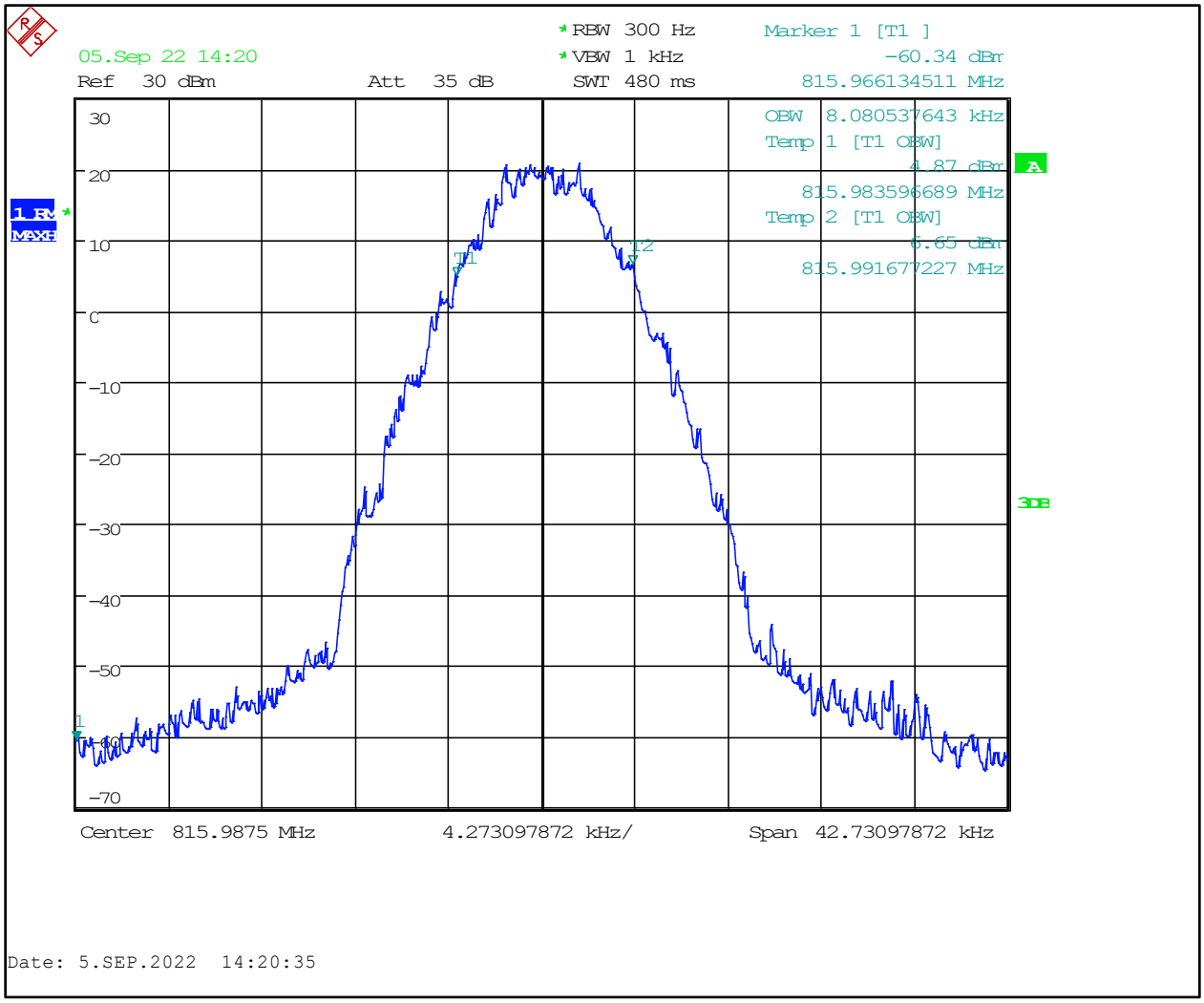
Plot 8-46: OBW 99%, 806.0125 MHz, H-CPM TDMA



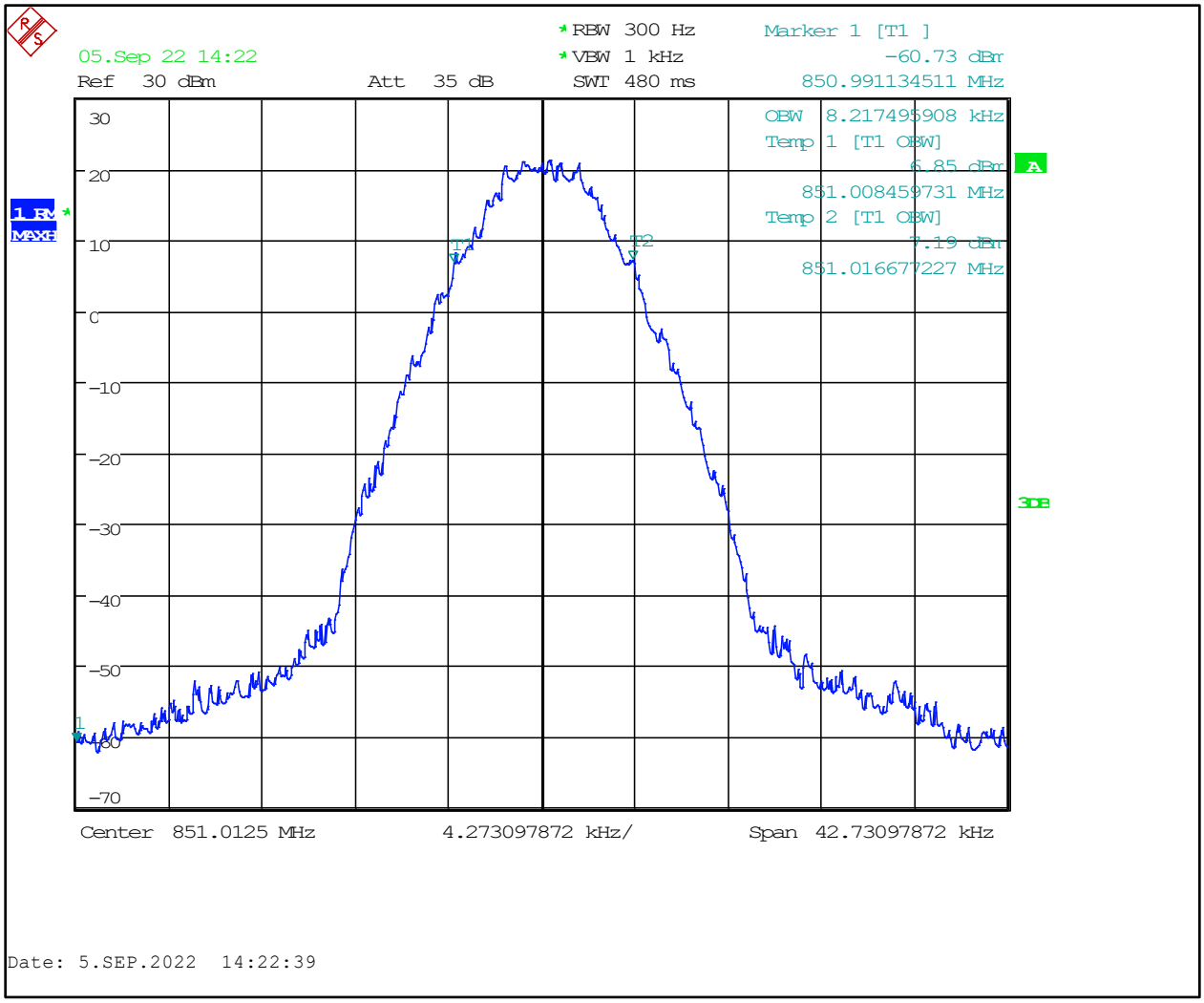
Plot 8-47: OBW 99%, 815.9875 MHz, C4FM



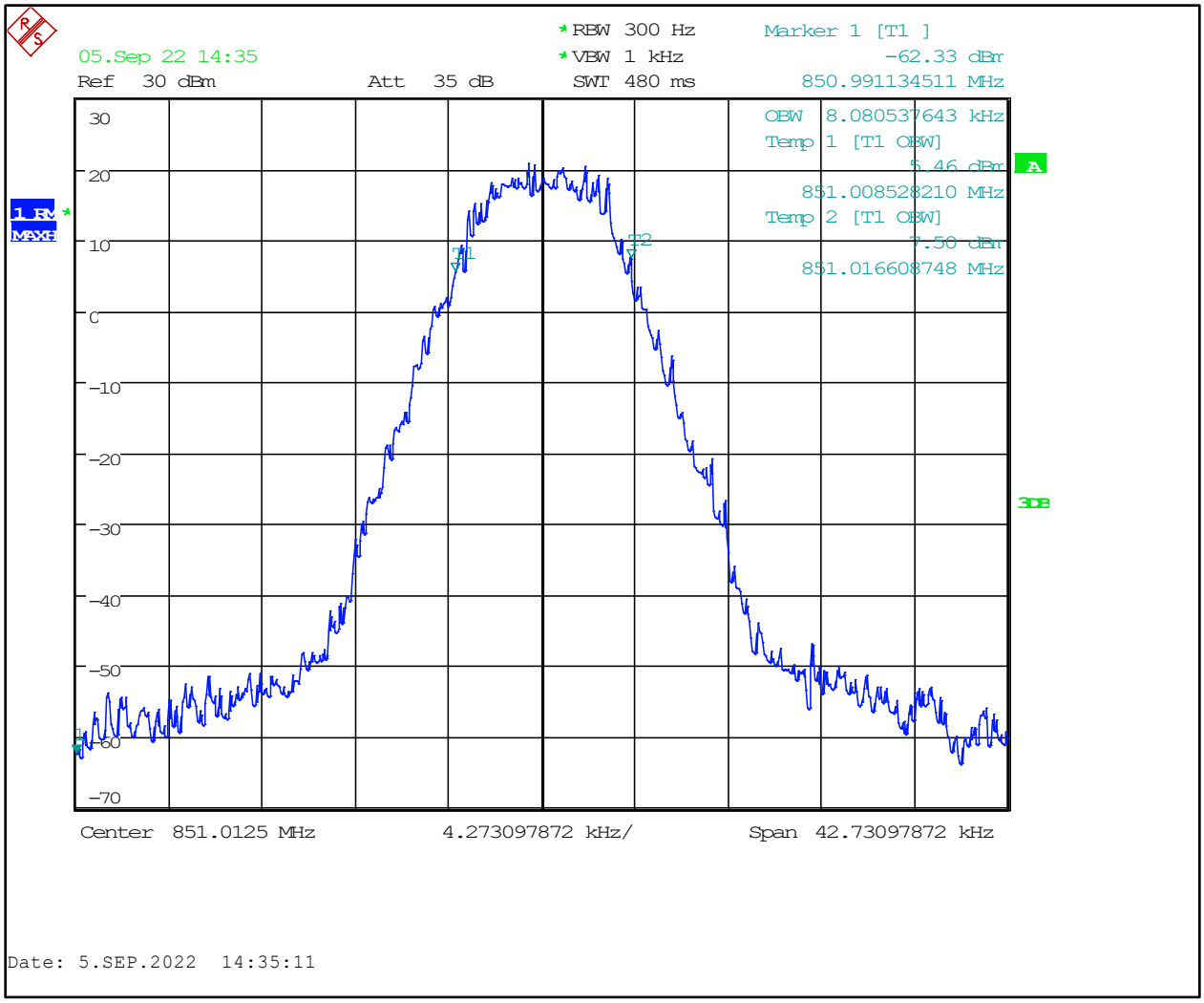
Plot 8-48: OBW 99%, 815.9875 MHz, H-CPM TDMA



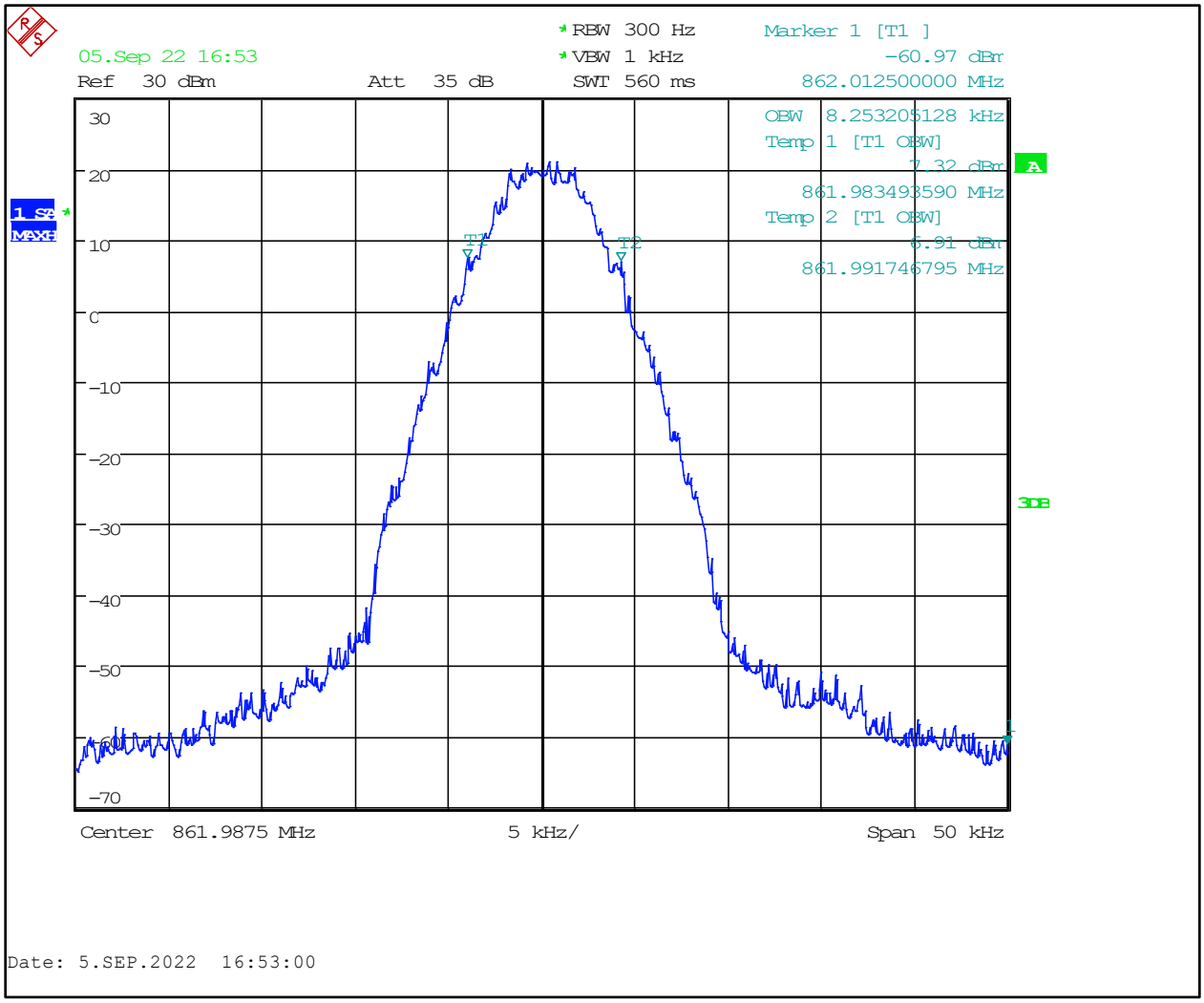
Plot 8-49: OBW 99%, 851.0125 MHz, C4FM



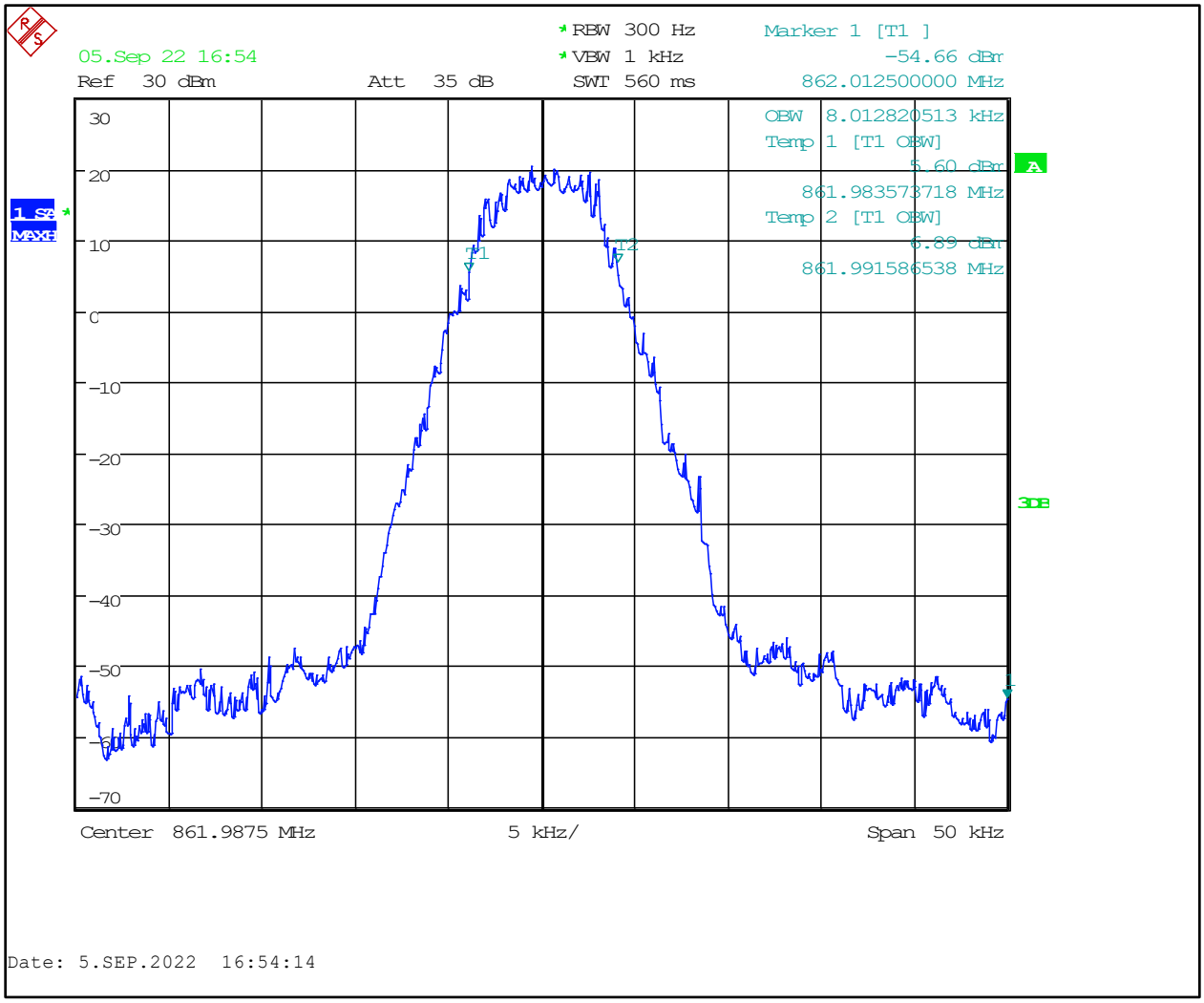
Plot 8-50: OBW 99%, 851.0125 MHz, H-CPM TDMA



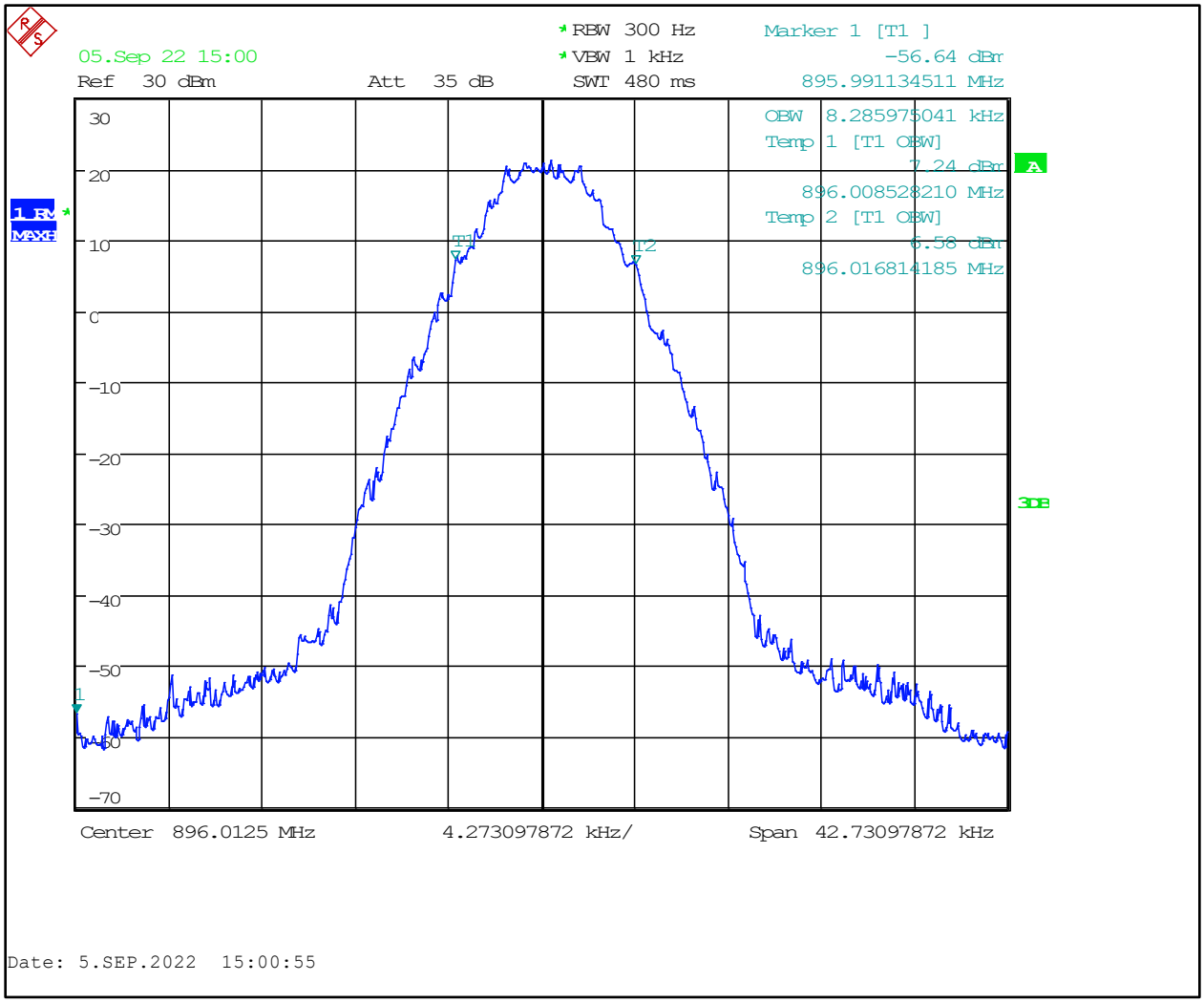
Plot 8-51: OBW 99%, 861.9875 MHz, C4FM



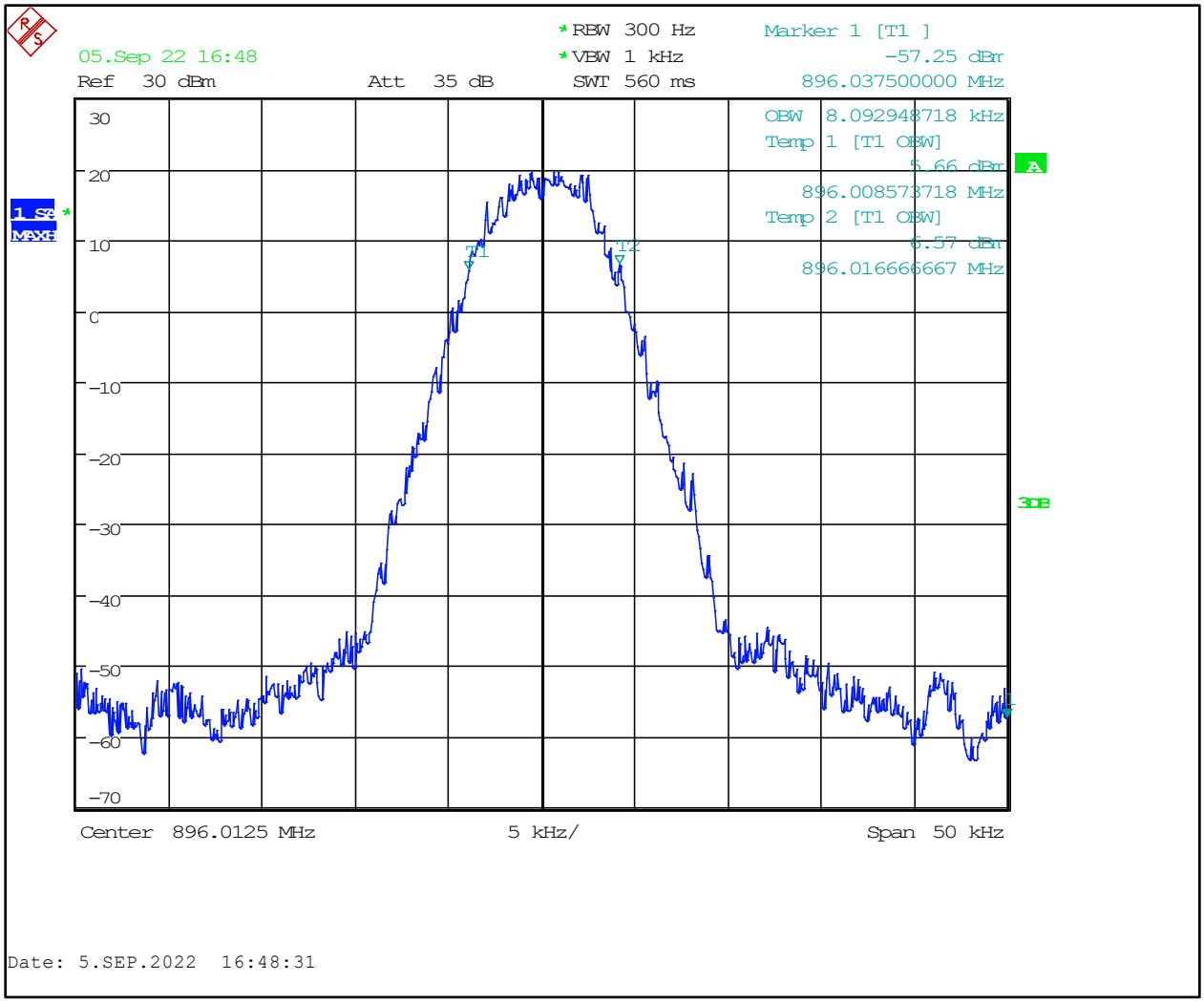
Plot 8-52: OBW 99%, 861.9875 MHz, H-CPM TDMA



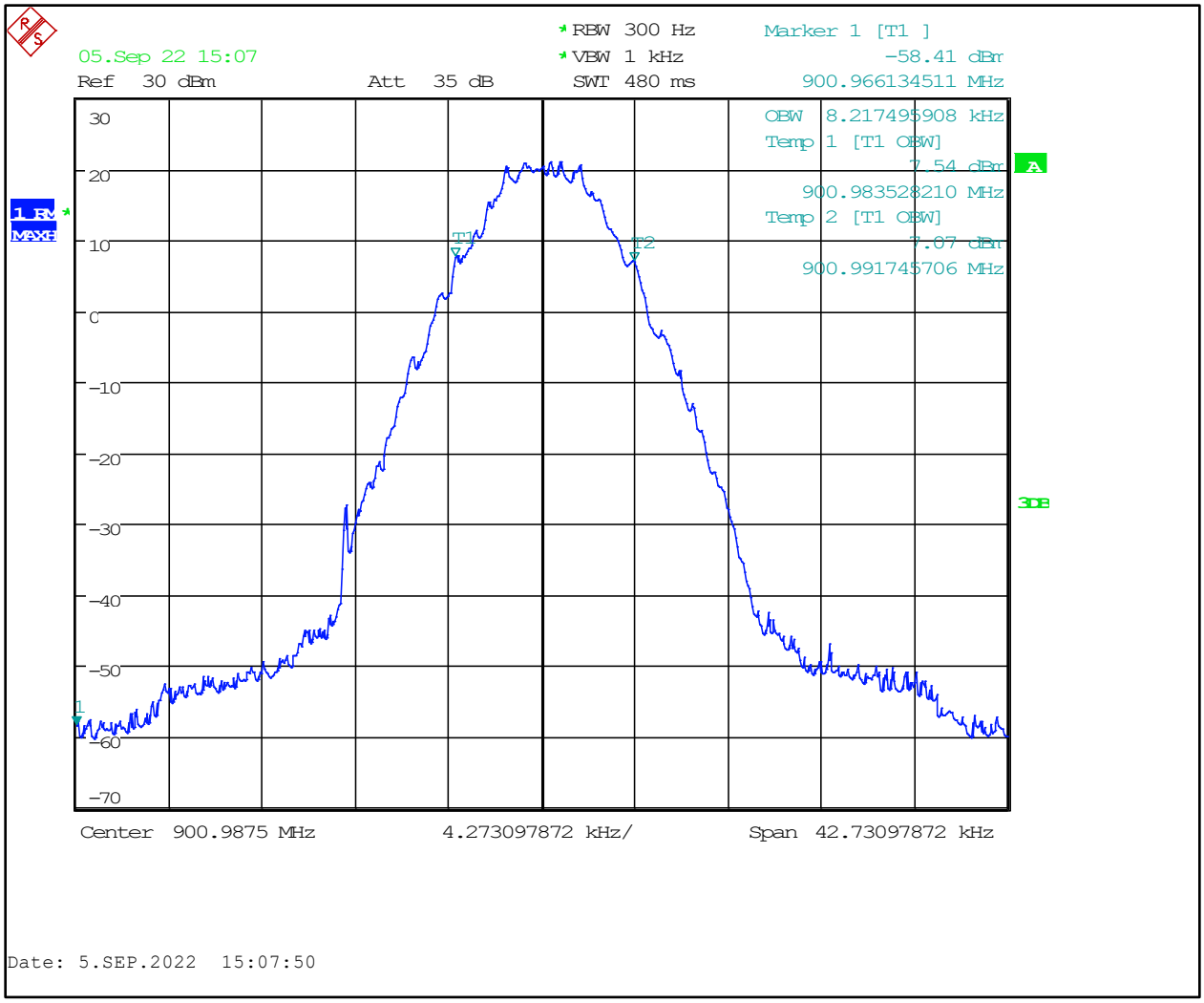
Plot 8-53: OBW 99%, 896.0125 MHz, C4FM



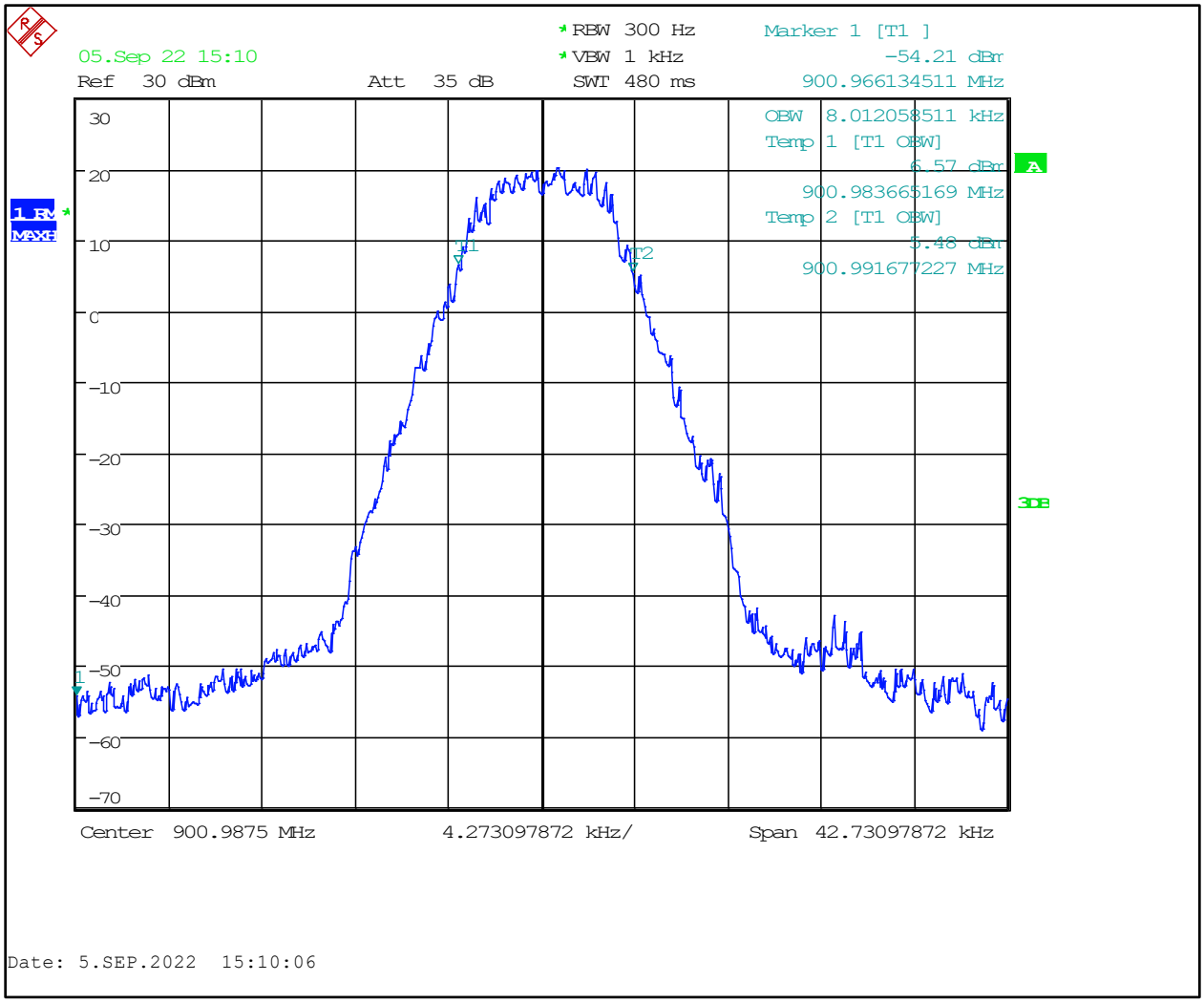
Plot 8-54: OBW 99%, 896.0125 MHz, H-CPM TDMA



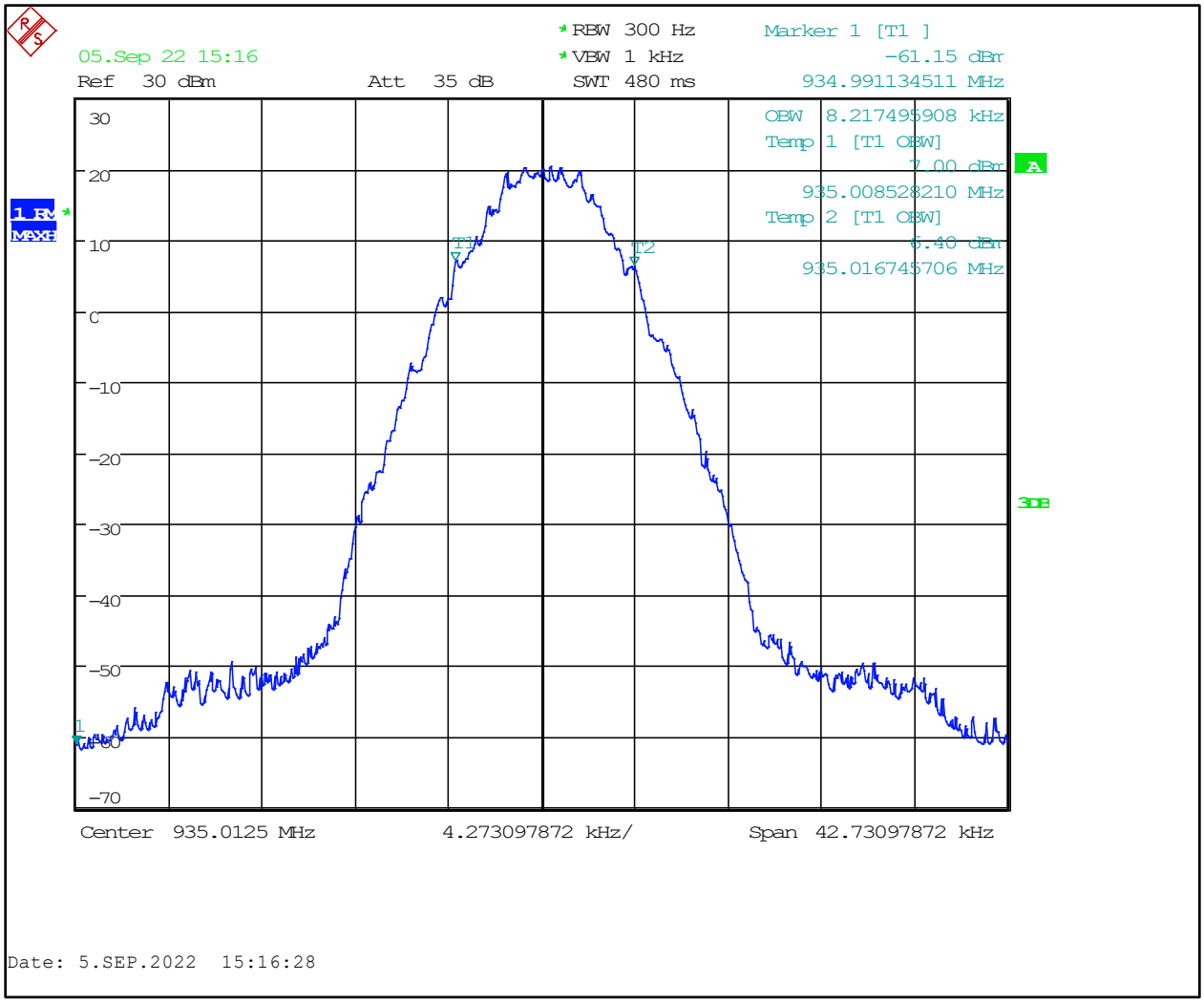
Plot 8-55: OBW 99%, 900.9875 MHz, C4FM



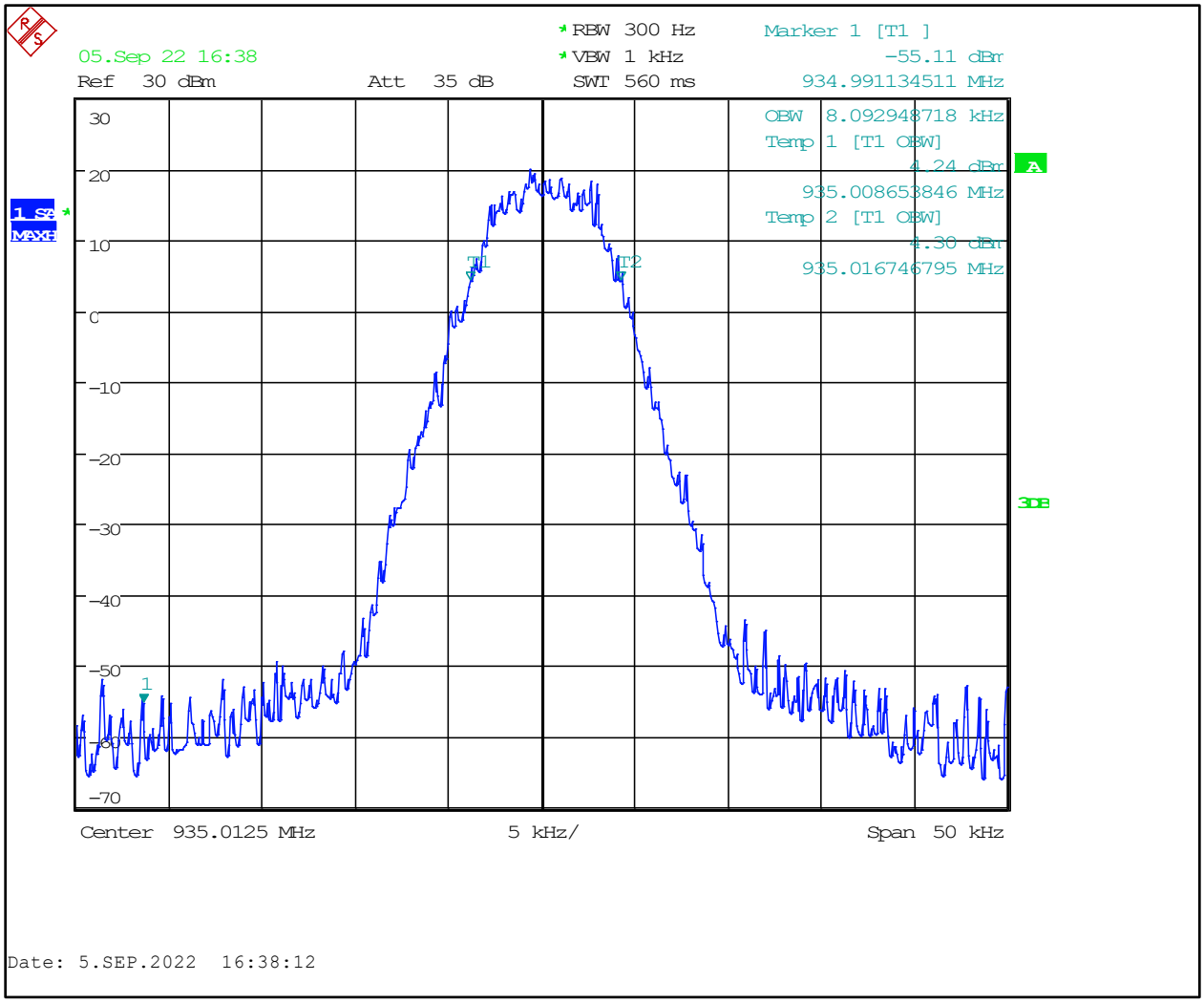
Plot 8-56: OBW 99%, 900.9875 MHz, H-CPM TDMA



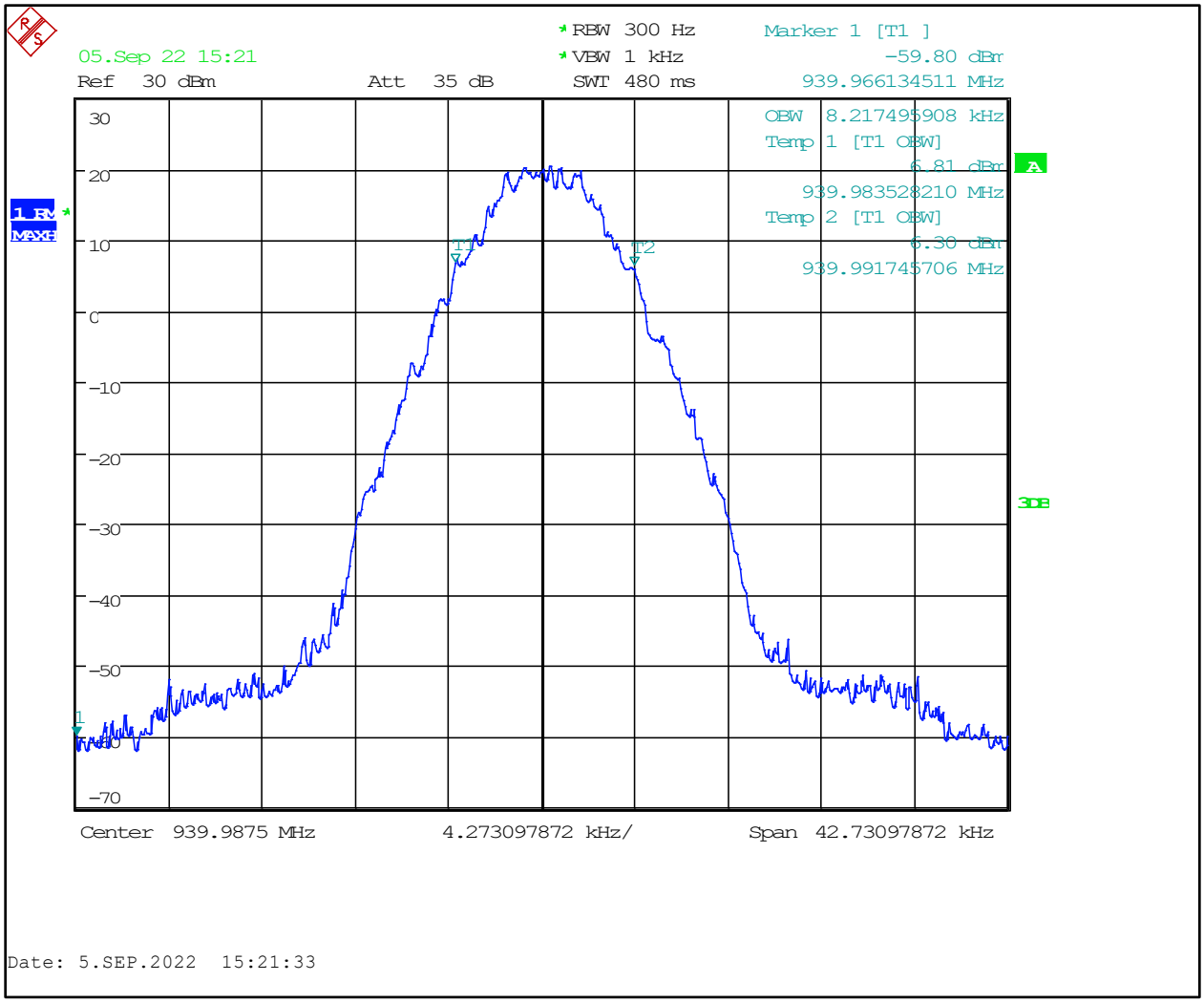
Plot 8-57: OBW 99%, 935.0125 MHz, C4FM



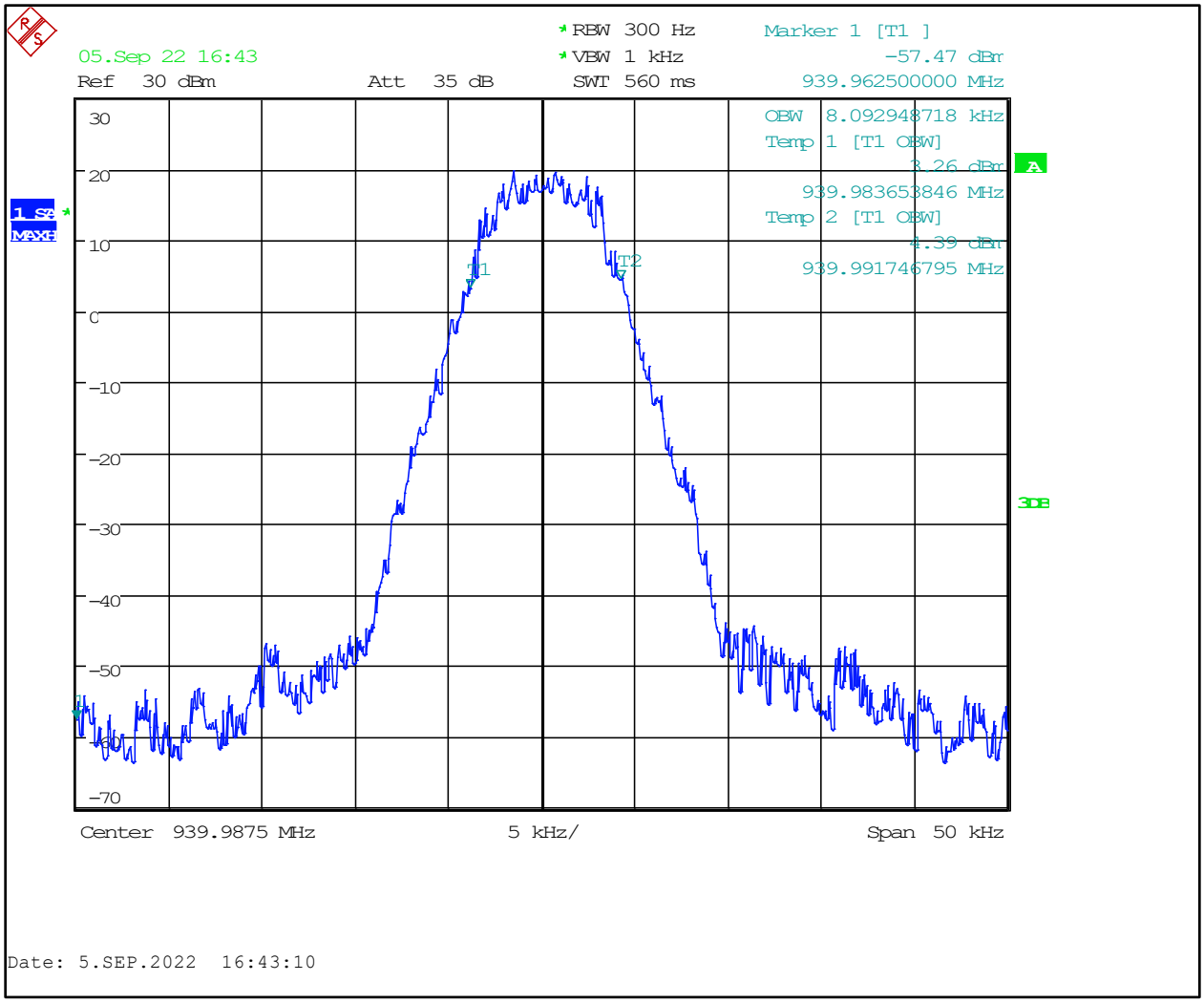
Plot 8-58: OBW 99%, 935.0125 MHz, H-CPM TDMA



Plot 8-59: OBW 99%, 939.9875 MHz, C4FM



Plot 8-60: OBW 99%, 939.9875 MHz, H-CPM TDMA



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
901337	Microline	766-10	Attenuator DC-18 GHz 10 dB 20W	06242	02/21/2023

Test Personnel:

Daniel Baltzell		August 18, 2022 September 5, 2022
EMC Test Engineer	Signature	Dates of Test

9 FCC Part 2.1055: Frequency Stability; Part 90.213, Part 90.539: Frequency Stability; 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: Mobile over 2 Watts 1.5 ppm (806-809 MHz, 851-854 MHz), 1.5 (896-901 MHz, and 935-940 MHz); 2.5 ppm (809-824 MHz, and 854-869 MHz)

Part 90.539 Frequency Stability

Transmitters designed to operate in 769–775 MHz and 799–805 MHz frequency bands must meet the frequency stability requirements in this section.

(a) Mobile, portable and control transmitters must normally use automatic frequency control (AFC) to lock on to the base station signal.
(b) The frequency stability of base transmitters operating in the narrowband segment must be 100 parts per billion or better.

(c) The frequency stability of mobile, portable and control transmitters operating in the narrowband segment must be 400 parts per billion or better when AFC is locked to the base station. When AFC is not locked to the base station, the frequency stability must be at least 1.0 ppm for 6.25 kHz, 1.5 ppm for 12.5 kHz (2 channel aggregate), and 2.5 ppm for 25 kHz (4 channel aggregate).

The EUT was tested while the AFC was not locked, therefore, the limit is 1.5 ppm. The worst-case deviation was found to be 0.26 ppm.

RSS-119 Limits

Frequency Band (MHz)	Channel Bandwidth (kHz)	Frequency Stability (ppm)		
		Base/Fixed	Mobile Station	
			Output Power > 2 W	Output Power ≤ 2 W
27.41-28 and 29.7-50	20	20	20	50
72-76	20	5	20	50
138-174	30	5	5	5
	15	2.5	5	5
	7.5	1	2	5
217-218 and 219-220	12.5	1	5	5
220-222 (Note 1)	5	0.1	1.5	1.5
406.1-430 and 450-470 (Note 6)	25 (Note 2)	0.5	1	1
	25	2.5	5	5
	12.5	1.5	2.5	2.5
	6.25	0.5	1	1
768-776 and 798-806 (Note 3)	25 12.5 6.25	0.1	0.4 (Note 4)	0.4 (Note 4)
	50	1	1.25 (Note 5)	1.25 (Note 5)
806-821/851-866 and 821-824/866-869 (Note 6)	25 (Note 2)	0.1	0.1	0.1
	25	1.5	2.5	2.5
	12.5	1	1.5	1.5
	6.25	0.1	0.4	0.4
896-901/935-940 (Note 6)	12.5	0.1	1.5	1.5
929-930/931-932	25	1.5	N/A	N/A
928-929/952-953 and 932-932.5/941-941.5	25	1.5	N/A	N/A
	12.5	1	3 (for remote station)	N/A
932.5-935/941.5-944	25	2.5	N/A	N/A
	12.5	2.5	N/A	N/A

Note 4:
When the mobile, portable and control transmitters are operating with channel bandwidths equal to 6.25 kHz, 12.5 kHz or 25 kHz in the band 768-776 MHz and the AFC is not locked onto the base station signal, the frequency stability must be equal to or better than 1 ppm for 6.25 kHz, 1.5 ppm for 12.5 kHz (2-channel aggregate), and 2.5 ppm for 25 kHz (4-channel aggregate).

9.2 Test Data

Table 9-1: Temperature Frequency Stability – 772 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	772.000094	0.12
-20	772.000157	0.20
-10	772.000157	0.20
0	772.000063	0.08
10	772.000063	0.08
20 (reference)	772.000000	0.00
30	772.000031	0.04
40	771.999937	-0.08
50	771.999937	-0.08
60	771.999937	-0.08

Table 9-2: Temperature Frequency Stability – 802 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	802.000157	0.20
-20	802.000188	0.23
-10	802.000188	0.23
0	802.000094	0.12
10	802.000094	0.12
20 (reference)	802.000000	0.00
30	801.999969	-0.04
40	801.999969	-0.04
50	801.999937	-0.08
60	801.999937	-0.08

Table 9-3: Temperature Frequency Stability – 811 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	811.000125	0.15
-20	811.000157	0.19
-10	811.000125	0.15
0	811.000063	0.08
10	811.000000	0.00
20 (reference)	811.000000	0.00
30	810.999906	-0.12
40	810.999906	-0.12
50	810.999906	-0.12
60	810.999875	-0.15

Table 9-4: Temperature Frequency Stability – 856.5 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	856.500157	0.18
-20	856.500157	0.18
-10	856.500157	0.18
0	856.500166	0.19
10	856.500031	0.04
20 (reference)	856.500000	0.00
30	856.499781	-0.26
40	856.499906	-0.11
50	856.499906	-0.11
60	856.499875	-0.15

Table 9-5: Temperature Frequency Stability – 898.5 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	898.500157	0.17
-20	898.500157	0.17
-10	898.500157	0.17
0	898.500094	0.10
10	898.500031	0.03
20 (reference)	898.500000	0.00
30	898.499781	-0.24
40	898.499906	-0.10
50	898.499875	-0.14
60	898.499843	-0.17

Table 9-6: Temperature Frequency Stability – 937.5 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	937.500188	0.20
-20	937.500188	0.20
-10	937.500157	0.17
0	937.500157	0.17
10	937.500031	0.03
20 (reference)	937.500000	0.00
30	937.499812	-0.20
40	937.499906	-0.10
50	937.499906	-0.10
60	937.499843	-0.17

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 9-7: 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
901337	Narda Microline	766-10	10 dB 20W Attenuator	6242	02/21/2023
901014	Kikusui	PCR4000L	Power Supply	DB001921	Not Required
900946	Tenney Engineering	TH65	Temperature Chamber with Humidity	11380	06/23/2025

Test Personnel:

Daniel W. Baltzell		August 22, 2022
EMC Test Engineer	Signature	Date of Test

9.2.1 Frequency Stability/Voltage Variation

Table 9-8: Frequency Stability/Voltage Variation – 772 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
7.65	771.999969	-0.04
9.0	771.999969	-0.04
28.05	771.999969	-0.04
33.0 (reference)	772.000000	0.00
37.95	772.000000	0.00
57.0	772.000000	0.00
65.55	772.000000	0.00

Table 9-9: Frequency Stability/Voltage Variation – 802 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
7.65	802.000000	0.00
9.0	802.000000	0.00
28.05	802.000000	0.00
33.0 (reference)	802.000000	0.00
37.95	802.000000	0.00
57.0	802.000000	0.00
65.55	802.000000	0.00

Table 9-10: Frequency Stability/Voltage Variation – 811 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
7.65	811.000000	0.00
9.0	811.000000	0.00
28.05	811.000000	0.00
33.0 (reference)	811.000000	0.00
37.95	810.999969	-0.04
57.0	810.999969	-0.04
65.55	810.999969	-0.04

Table 9-11: Frequency Stability/Voltage Variation – 856.5 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
7.65	856.499969	-0.04
9.0	856.500000	0.00
28.05	856.500000	0.00
33.0 (reference)	856.500000	0.00
37.95	856.500000	0.00
57.0	856.500000	0.00
65.55	856.500000	0.00

Table 9-12: Frequency Stability/Voltage Variation – 898.5 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
7.65	898.500000	0.00
9.0	898.500000	0.00
28.05	898.500000	0.00
33.0 (reference)	898.500000	0.00
37.95	898.500000	0.00
57.0	898.500000	0.00
65.55	898.499969	-0.03

Table 9-13: Frequency Stability/Voltage Variation – 937.5 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
7.65	937.500000	0.00
9.0	937.500000	0.00
28.05	937.500000	0.00
33.0 (reference)	937.500000	0.00
37.95	937.500000	0.00
57.0	937.500000	0.00
65.55	937.500000	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 9-14: 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
901337	Narda Microline	766-10	10 dB 20W Attenuator	6242	02/21/2023
901014	Kikusui	PCR4000L	Power Supply	DB001921	Not Required
900946	Tenney Engineering	TH65	Temperature Chamber with Humidity	11380	06/23/2025

Test Personnel:

Daniel Baltzell		August 22, 2022
EMC Test Engineer	Signature	Date of Test

10 FCC Part 2.202: Necessary Bandwidth and Emission Bandwidth

C4FM Data/Voice (P25 Phase 1)
Calculation:
Data rate in bps (R) = 9600
Peak deviation of carrier (D) = 1800
Bn = [9600/$\log_2$(4) + 2 (1800) (1)] = 8.400 kHz
Emission designator: 8K40F1D, 8K40F1E

H-CPM (TDMA) Data/Voice (P25 Phase 2)
Calculation:
Data rate in bps (R) =12000
Peak deviation of carrier (D) = 1050
Bn = [12000/$\log_2$(4) + 2 (1050) (1)] = 8.1 kHz
Emission designator: 8K10DXW

11 Conclusion

The data in this measurement report shows that the L3Harris Technologies XL-90D, FCC ID: OWDTR-0167-E, IC: 3636B-0167, complies with the applicable requirements of Parts 2 and 90 of the FCC Rules and Industry Canada RSS-119.