



Engineering Solutions & Electromagnetic Compatibility Services

FCC Class 2 Permissive Change Report

**L3Harris Technologies, Inc.
221 Jefferson Ridge Parkway
Lynchburg, VA 24501**

TWO47 VHF-H Base Station Transceiver

FCC ID: OWDTR-0175-E

March 27, 2026

Standards Referenced for this Report	
Part 2: 2023	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 22: 2023	Public Mobile Services
Part 74: 2023	Experimental Radio, Auxiliary, Special Broadcast And Other Program Distributional Services
Part 80: 2023	Stations in the Maritime Services
Part 90: 2023	Private Land Mobile Radio Services
ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

Test Frequencies (MHz)	Rated Conducted Output Power (W)	Frequency Tolerance (ppm)	Emission Designators	Transmit Mode
150 – 174	100.0	0.05	9K70D1W	WCQPSK
150 – 174	100.0	0.05	9K80D7W	HDQPSK

Document Number: 2025137TNB

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: March 27, 2026

Typed/Printed Name: Desmond A. Fraser

Position: President

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This report replaces Report R1.0_DFR2.docx.*

*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.*

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1 Test Result Summary

Test	FCC Reference	Result
RF Power Output	2.1046(a), 22.565, 22.913, 74.461, 80.215, 90.205,	Complies
Conducted Spurious Emissions	2.1046(a)	Complies
Spurious Emissions at Antenna Terminals	2.1051, 22.359, 22.917, 80.217, 90.210, 2.1046(a)	Complies
Field Strength of Spurious Radiation	2.1053(a), 22.359, 80.211(f)(3), 90.210, 2.1046(a)	Complies
Occupied Bandwidth/Emission Masks	2.1049(c)(1), 22.359(b), 74.462, 80.205, 80.211, 90.210, 80.211(f)	Complies
Frequency Stability vs. Temperature and Voltage	2.1055, 22.355, 74.464, 80.209, 90.213	Complies
Transient Frequency Behavior	74.462(c), 90.214	Complies
Modulation Characteristics	2.1047(a)(b), 74.463, 80.213	N/A

Note on Authorized Bandwidths and Masks:

The transmitter was evaluated under both authorized bandwidth configurations: Mask B (20 kHz wideband) and Mask D (11.25 kHz narrowband), as defined in FCC §2.1049(c)(1) and RSS-119 §7. All spurious emission and occupied bandwidth measurements were verified under the Mask D (narrowband) condition, which represents the most stringent case.

2 General Information

The following Class 2 Permissive Change Report is prepared on behalf of L3Harris Technologies, Inc. in accordance with the FCC rules and regulations. The Equipment Under Test (EUT) was the TWO47 VHF-H Base Station Transceiver; FCC ID: OWDTR-0175-E.

All measurements contained in this application were conducted in accordance with the applicable sections of FCC Parts 22, 74, 80, and 90. Calibration checks are performed regularly on the instruments and all accessories, including high pass filter, coaxial attenuator, preamplifier, and cables. Test software used to control power, frequency and modulation type was TWO47_TX_KEY_V 5.1.

2.1 Measurement Uncertainty

The measurement uncertainty complies with CISPR 16-4-2 limits and is not used to adjust measurements for compliance determination. Expanded uncertainty (U) for each scope, calculated per ANSI/NCSL Z540-2-1997 (R2002) with a type B evaluation, is provided in this RTL report. While this demonstrates RTL's commitment to transparency, compliance decisions are based solely on comparing measured values directly to the relevant standards' limits.

2.2 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170.

2.3 Related Submittal(s)/Grant(s)

This is a Class 2 Permissive Change application for L3Harris Technologies, Model: TWO47 VHF-H, Base Station Transceiver, FCC ID: OWDTR-0175-E, to add WCQPSK/P25 Linear Simulcast and HDQPSK/P25 Ph2 to the existing certification.

2.4 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 and mounted on outdoor permanent structures. RF exposure compliance is determined at the time of site licensing.

2.5 Tested System Details

The test sample was received on August 1, 2025. 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 preprogrammed to add WCQPSK/P25 Linear Simulcast and HDQPSK/P25 Ph2 modulation and software TWO47_TX_KEY_V2.2 was provided to transmit and change frequencies.

Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN/SN	ID	RTL Bar Code
Base Station Transceiver	L3Harris Technologies	TWO47 VHF-H	CN25F2600007	OWDTR-0175-E	24571

Table 2-2: Auxiliary Equipment

Part	Manufacturer	Model	PN/SN	Cable	RTL Bar Code
Ethernet Switch	Cisco Systems	C1000-16T-E-2G-L	F0C2711Y1JC	1.8m & 4.2m unshielded ethernet	24342
-48VDC Power Supply	MeanWell	HRPG-1000-48	TC27090884	3m unshielded DC; 2.6m unshielded AC	24338

2.6 Configuration of Tested System

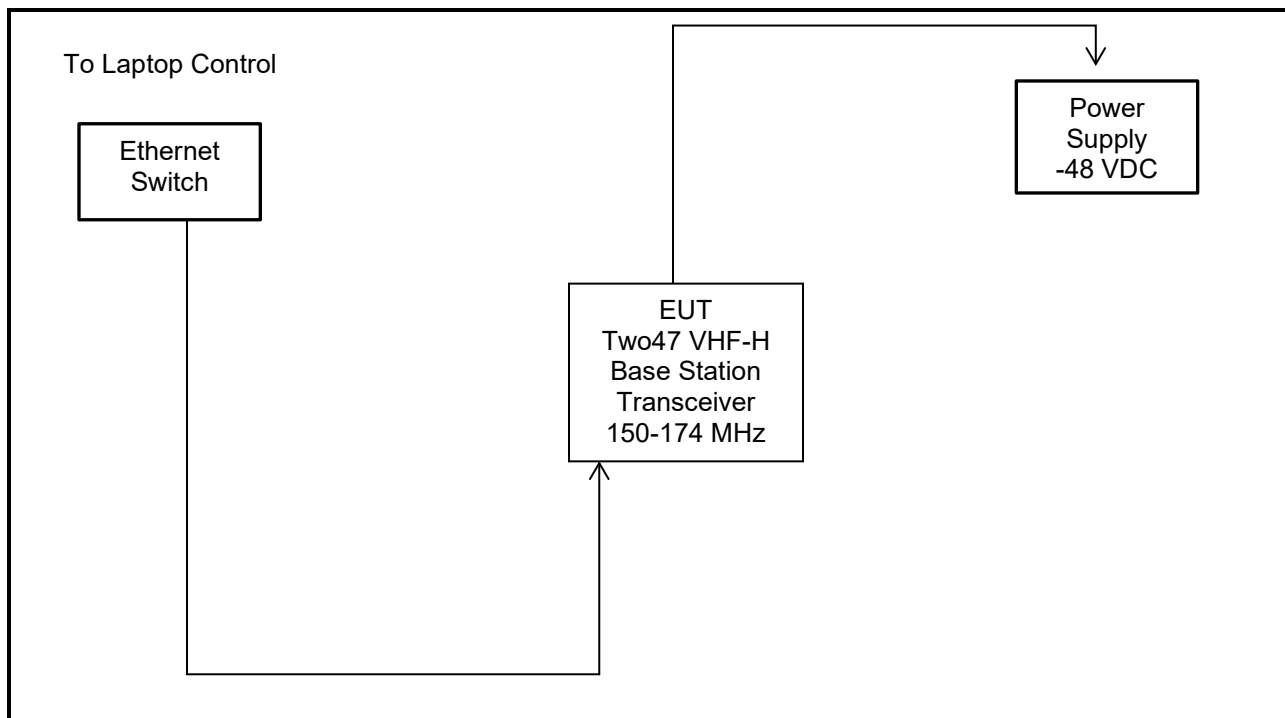


Figure 2-1: Configuration of Tested System

3 Test Modes

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

Table 3-1: Channels Tested

Channel	Frequency (MHz)
Low	150.0125
	154.0125
	155.0125
Middle	162.0000
High	173.1875
	173.9875

Test software used to control power, frequency and modulation types was TWO47_TX_KEY_V 5.1.

4 FCC 2.1046(a), 22.565, 22.913, 74.461, 80.215, 90.205: Transmitter Output Power

4.1 Test Procedure

ANSI C63.26, section 5.2

§80.215 Transmitter Power

(a) Transmitter power shown on the radio station authorization is the maximum power the licensee is authorized to use. Power is expressed in the following terms: (5) For all other emissions: the carrier power multiplied by 1.67.

(c) Coast station frequencies above 27500 kHz. The maximum power must not exceed the values listed below. (1) Coast stations: 156–162 MHz – 50W

(f) Fixed stations. The maximum power must not exceed the values listed below. (1) Maritime support (receiver test): F3E emission – 50W

Maximum Power Authorized to Use: Coast 83.5W for VHF

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

Manufacturer's Rated Power: 100.0 W

4.2 Test Data

Table 4-1: Environmental Conditions

Date	Temperature (°C)	Humidity (%)	Atmospheric Pressure (kPa)
August 1, 2025	23.2	37	100.9

Table 4-2: Transmitter Output Power – Measured

Frequency (MHz)	High Power (dBm)	High Power (W)	High Power Limit	Low Power (dBm)	Low Power (W)	Low Power Limit	Pass/Fail
150.0125	50.1	102.3	500 W ERP ¹	39.7	9.3	500 W ERP ¹	Pass
154.0125	50.1	102.3	500 W ERP ¹	39.7	9.3	500 W ERP ¹	Pass
155.0125	50.1	102.3	500 W ERP ¹	39.7	9.3	500 W ERP ¹	Pass
162.0000	50.2	104.7	500 W ERP ^{1,2}	39.8	9.6	500 W ERP ^{1,2}	Pass
173.1875	50.2	104.7	500 W ERP ^{1,3}	39.9	9.8	500 W ERP ^{1,3}	Pass
173.9875	50.2	104.7	500 W ERP ^{1,3}	39.9	9.8	500 W ERP ^{1,3}	Pass

¹ Part 90.205(d) Table 1 — The maximum ERP for base stations in the 150–174 MHz band is 500 W, subject to HAAT and service area constraints. All high and low power measurements pass under Part 90 alone.

² §80.215(c)(1) and §80.215(a)(5) —For Part 80 operation within the 156–162 MHz band, the maximum power shall be 83.5 W (49.2 dBm), consistent with the maximum authorized transmitter power derived under §80.215(a)(5) from the 50 W carrier power ceiling of §80.215(c)(1).

³ §80.215(f)(2) and §80.215(l) — For operational fixed stations above 162.025 MHz, transmitter power is specified in the station authorization. A Pass/Fail determination requires review of the applicable license authorization.

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 4-3: Test Equipment Used for Testing Transmitter Output Power

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901184	Agilent	E4416A	Power Meter	GB41050573	05/17/2027
901685	Agilent	E4412A	Power Sensor	MY41501646	05/17/2027
901291	Pasternack	PE7031-20	20 dB 300 W Attenuator	901291	02/08/2026
901355	JFW Industries	50FH-003-300	300W 3DB DC1000 MHz Attenuator	N/A	03/23/2026
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	10/13/2026

Test Personnel:

Daniel W. Baltzell EMC Test Engineer	 Signature	August 1, 2025 Date of Test
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5 FCC 2.1051, 22.359, 22.917, 80.217, 90.210: Transmitter Unwanted Emissions

5.1 Test Procedure

ANSI C63.26, Section 5.7

All spurious and out-of-band emission measurements were performed using a spectrum analyzer configured in accordance with ANSI C63.26 (2015), Section 5.7. The transmitter was terminated with a 50 Ω load and interfaced with a spectrum analyzer. The device, employing digital modulation, was modulated to its maximum extent using a pseudo-random data sequence to represent typical operating conditions during measurement. Unless otherwise stated, measurements were made using a Peak detector with no video averaging for initial sweeps to ensure capture of the maximum emission envelope. For broadband regions, RMS (power) averaging was applied to confirm the noise floor and identify broadband emission components.

Resolution bandwidth (RBW) and video bandwidth (VBW) were selected per §5.7.2 to encompass at least the measurement bandwidth required for the emission type under test. Detector type and averaging method were explicitly declared for each sweep in the analyzer setup to maintain traceability and ensure repeatability of results. All analyzer settings, including detector function, averaging, and sweep time, were verified before data capture. No undocumented smoothing or trace averaging was applied.

5.2 Test Data

Table 5-1: Environmental Conditions

Date	Temperature (°C)	Humidity (%)	Atmospheric Pressure (kPa)
August 6, 2025	24.6	37	101.7
September 17, 2025	28.2	36	100.9

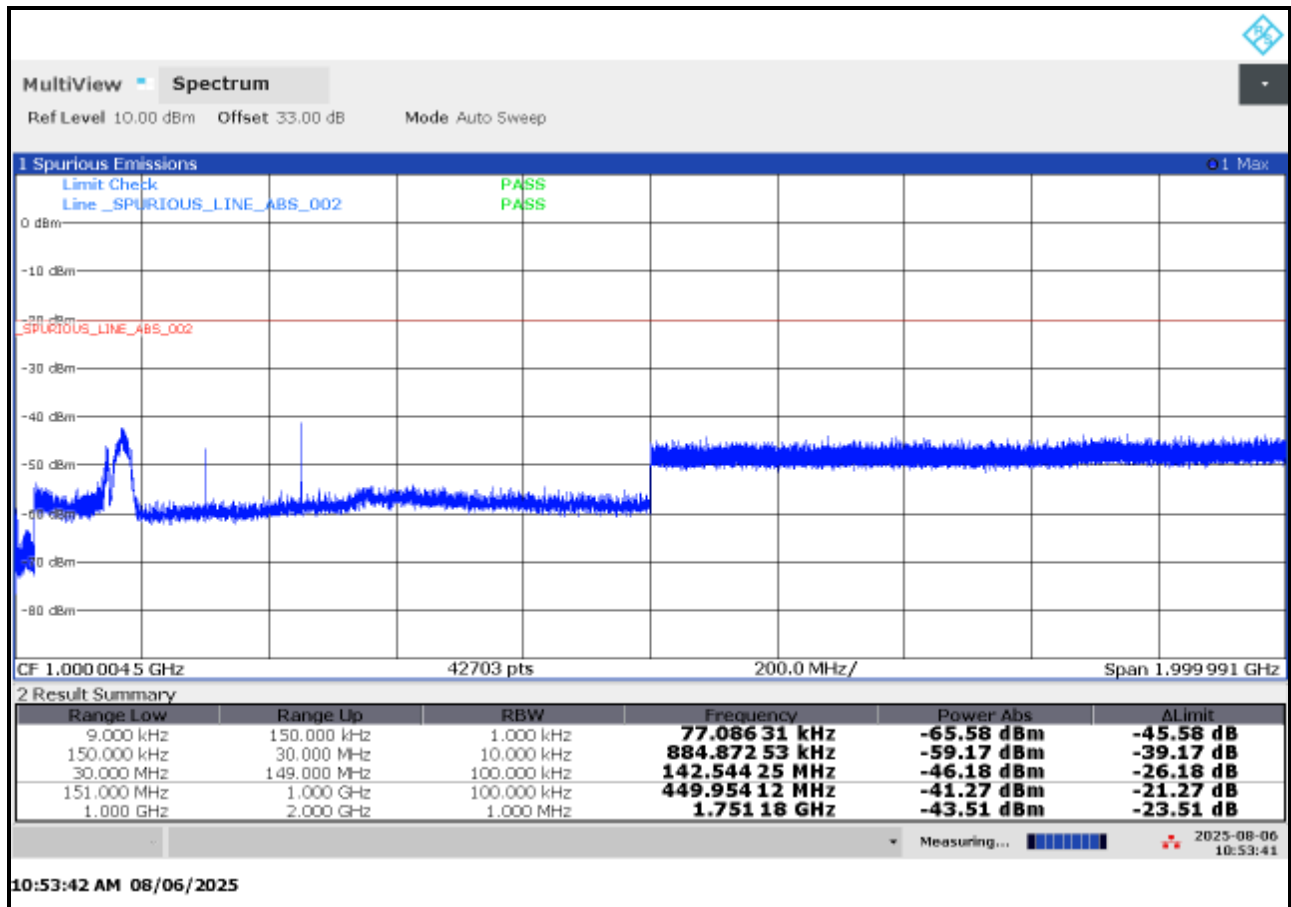
The frequency range of measurement: 9 kHz to 10 x Fc

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

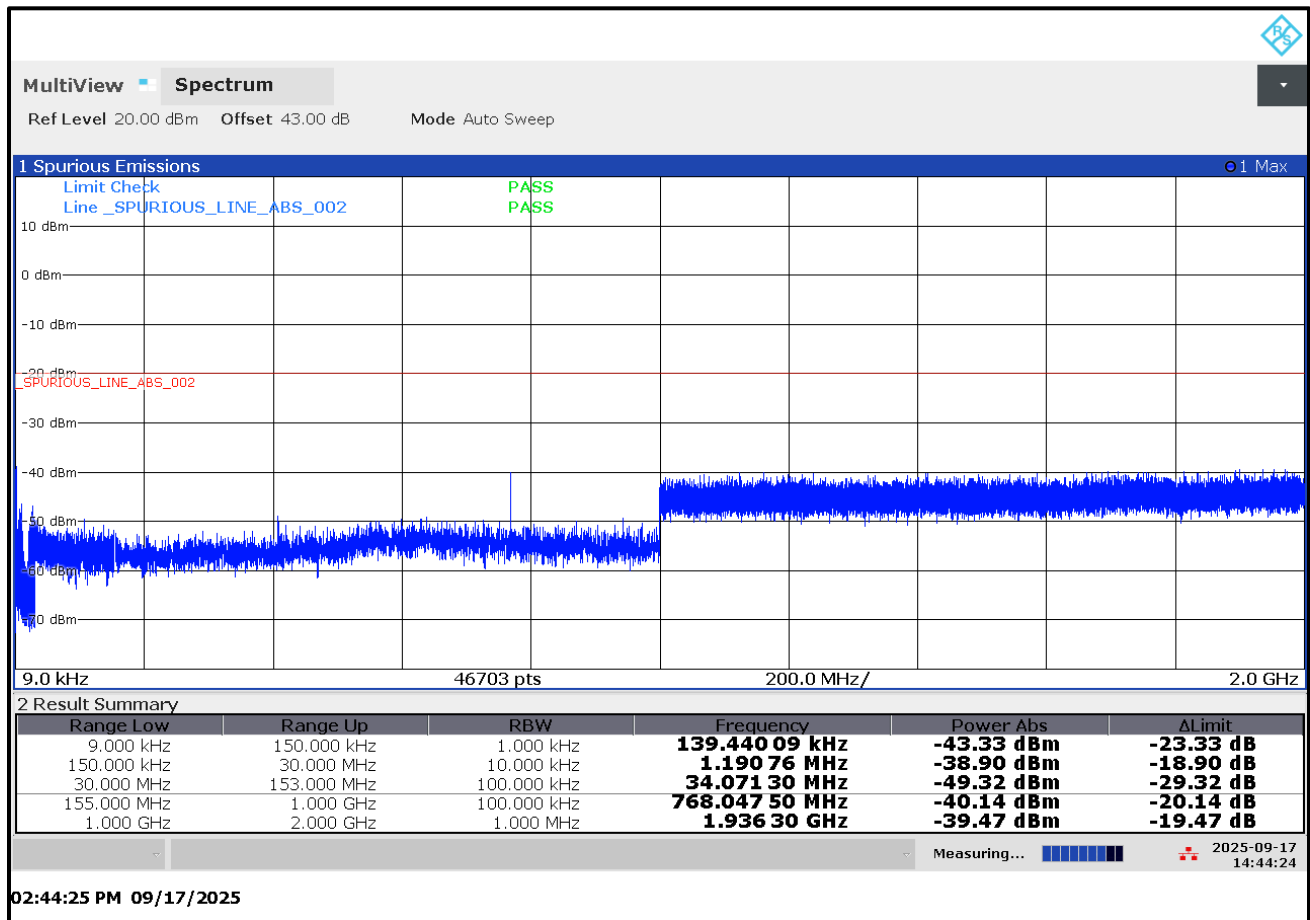
Both wideband and narrowband power settings were investigated; narrowband power was found to be the worst case and is presented.

Limits: $-(43 + 10\log P(W))$ for wideband and $-(50 + 10\log P(W))$ for narrowband emissions, per FCC §90.210. At the rated high-power output of 100 W (50.0 dBm), these limits correspond to absolute power levels of -13 dBm (wideband) and -20 dBm (narrowband).

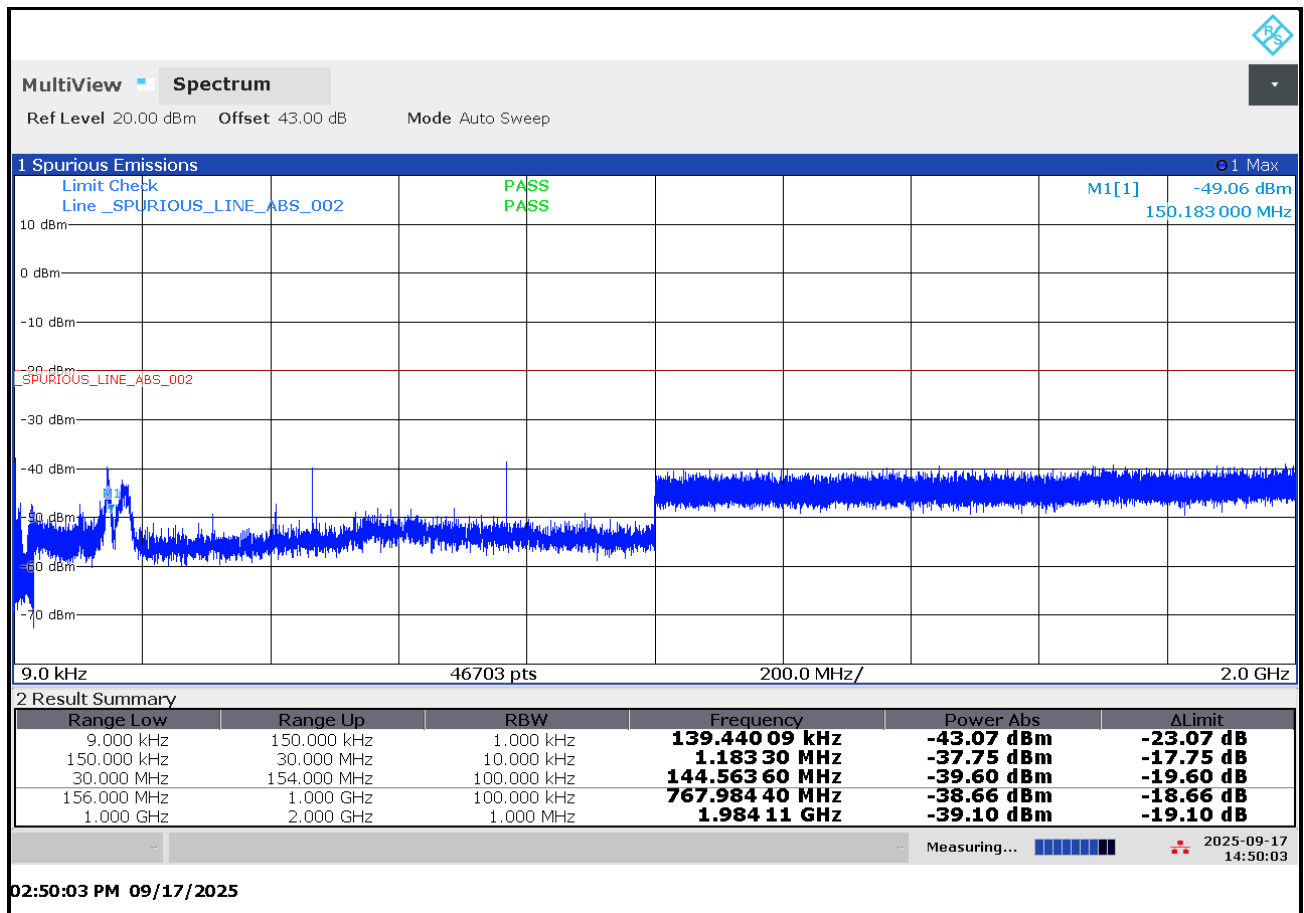
Plot 5-1: Transmitter Unwanted Emissions – 150.0125 MHz



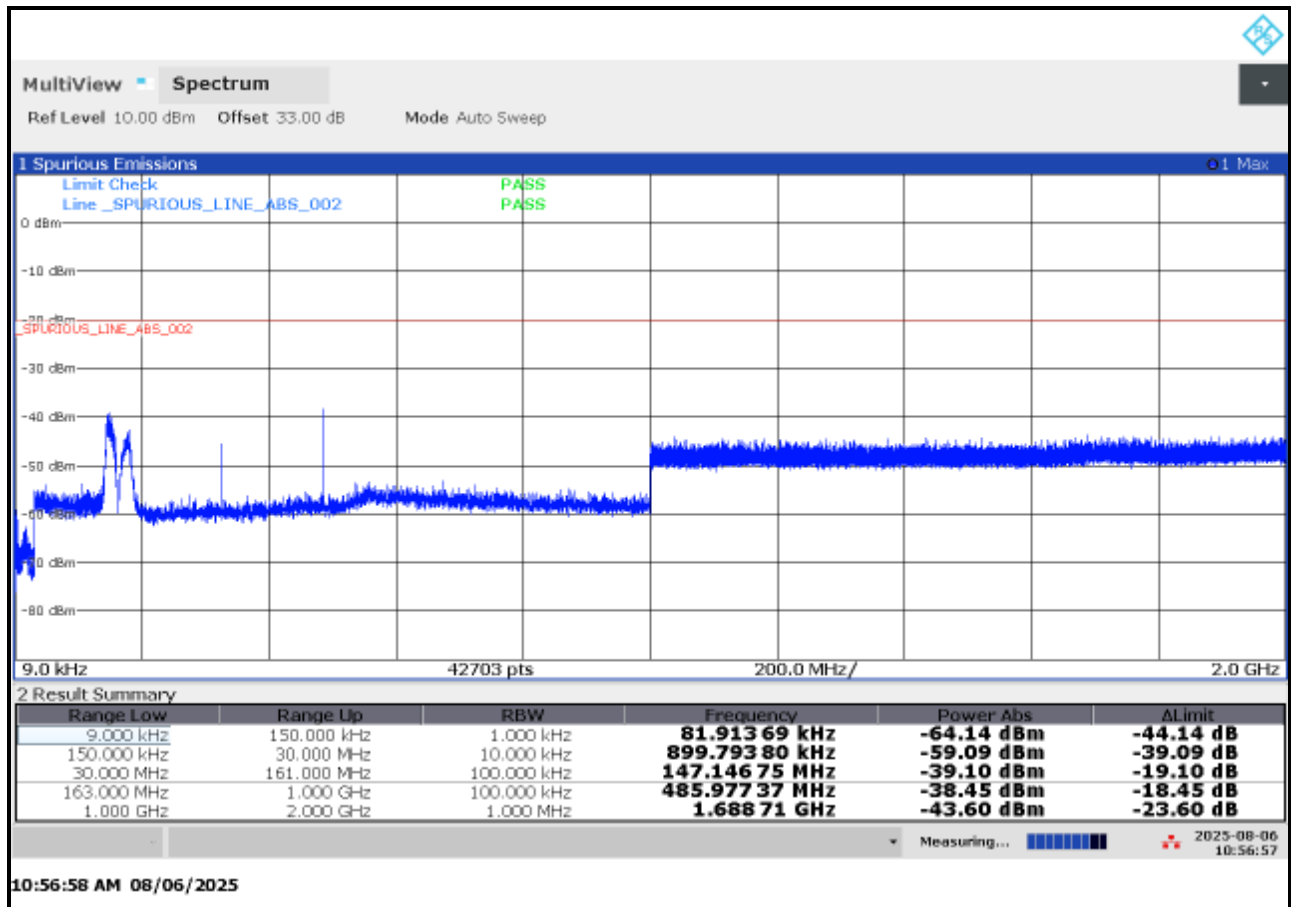
Plot 5-2: Transmitter Unwanted Emissions – 154.0125 MHz



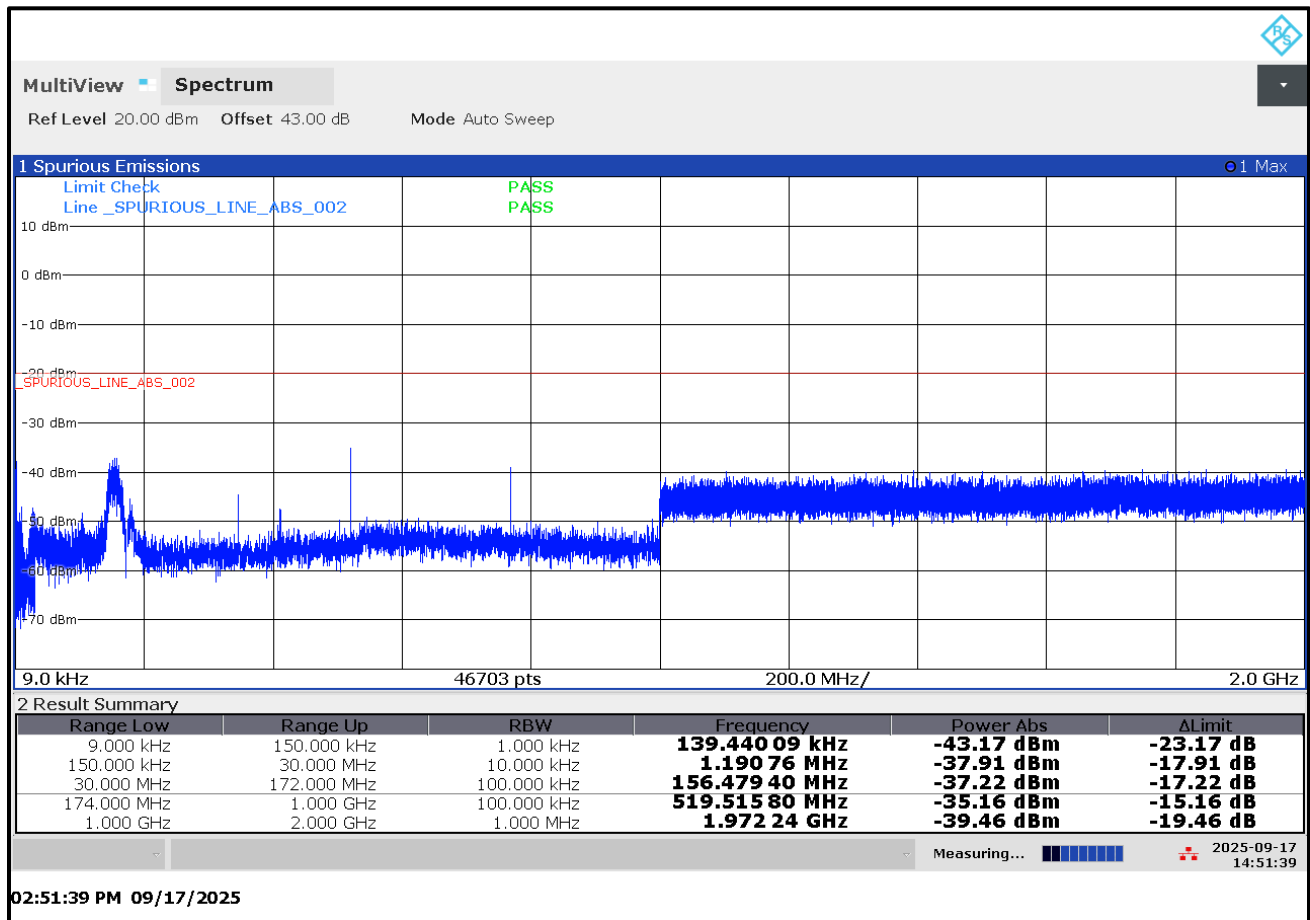
Plot 5-3: Transmitter Unwanted Emissions – 155.0125 MHz



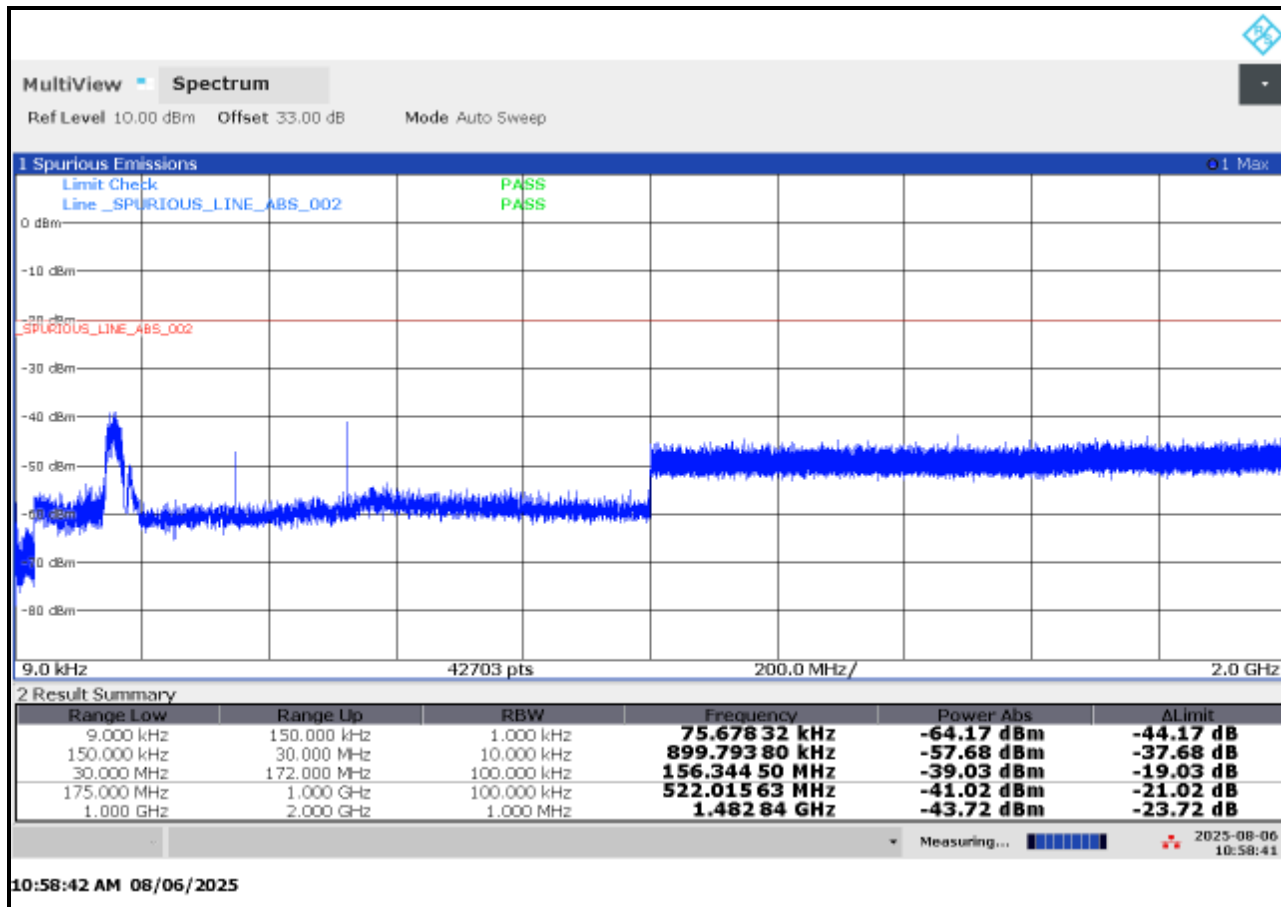
Plot 5-4: Transmitter Unwanted Emissions – 162.0000 MHz



Plot 5-5: Transmitter Unwanted Emissions – 173.1875 MHz



Plot 5-6: Transmitter Unwanted Emissions – 173.9875 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 5-2: Test Equipment Used for Testing Transmitter Unwanted Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901773	Rohde & Schwarz	FSW-50	Spectrum Analyzer	101021	05/30/2027
901131	Par Electronics	118-174 (25W)	VHF Notch Filter	N/A	11/28/2025
901291	Pasternack	PE7031-20	20 dB 300 W Attenuator	901291	02/08/2026
901355	JFW Industries	50FH-003-300	300W 3DB DC1000 MHz Attenuator	N/A	03/23/2026
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	10/13/2026

Rhein Tech Laboratories, Inc.
360 Herndon Parkway
Suite 1400
Herndon, VA 20170
<http://www.rheintech.com>

Client: L3Harris Technologies
Model: Two47 VHF-H
FCC ID: OWDTR-0175-E
Standards: Parts 22, 74, 80, 90
Report #: 2025137TNB

Test Personnel:

Daniel W. Baltzell		August 6 & September 17, 2025
EMC Test Engineer	Signature	Dates of Test

6 FCC 2.1046(a), 2.1053(a), 22.359, 80.211(f)(3), 90.210: Out-of-band Emissions

6.1 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 signal generator. The 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, and compared to the limit.

6.2 Test Data

Table 6-1: Environmental Conditions

Date	Temperature (°C)	Humidity (%)	Atmospheric Pressure (kPa)
October 5, 2025	26.7	45	101.3

Table 6-2: Field Strength of Spurious Radiation – 150.0125 MHz

Conducted Power 50.1 dBm; 102.3 W; Limit=50+10 Log P=70.1 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)
300.0250	37.7	-38.6	0.2	-0.7	89.7	-19.6
450.0375	52.0	-21.6	0.3	-0.4	72.5	-2.3
600.0500	43.4	-30.3	0.3	-0.8	81.6	-11.5
750.0625	41.4	-28.4	0.3	-1.2	80.1	-10.0
900.0750	16.7	-53.9	0.4	-1.2	105.6	-35.5
1050.0875	23.7	-48.2	0.4	4.5	94.3	-24.1
1200.1000	17.4	-54.2	0.4	4.7	100.0	-29.9
1350.1125	17.4	-53.4	0.5	5.6	98.4	-28.3
1500.1250	17.9	-52.3	0.5	6.4	96.5	-26.4

Table 6-3: Field Strength of Spurious Radiation – 154.0125 MHz

Conducted Power 50.1 dBm; 102.3 W; Limit=50+10 Log P=70.1 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)
308.0250	35.3	-46.5	0.2	-0.7	97.5	-27.4
462.0375	52.1	-22.7	0.3	-0.5	73.6	-3.5
616.0500	23.7	-48.6	0.3	-0.8	99.9	-29.8
770.0625	32.1	-37.6	0.4	-1.3	89.4	-19.3
924.0750	21.0	-48.3	0.4	-1.1	99.9	-29.8
1078.0875	22.7	-49.2	0.4	4.6	95.2	-25.1
1232.1000	22.7	-48.4	0.4	4.9	94.1	-24.0
1386.1125	22.8	-48.1	0.5	5.9	92.8	-22.7
1540.1250	23.1	-47.2	0.5	6.6	91.2	-21.1

Table 6-4: Field Strength of Spurious Radiation – 155.0125 MHz

Conducted Power 50.1 dBm; 102.3 W; Limit=50+10 Log P=70.1 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)
310.0250	34.2	-47.6	0.2	-0.6	98.6	-28.5
465.0375	48.4	-26.5	0.3	-0.5	77.4	-7.3
620.0500	37.3	-34.9	0.3	-0.8	86.2	-16.1
775.0625	22.4	-47.3	0.4	-1.3	99.1	-29.0
930.0750	20.1	-49.1	0.4	-1.1	100.7	-30.6
1085.0875	22.6	-49.3	0.4	4.6	95.2	-25.1
1240.1000	22.3	-48.8	0.4	4.9	94.5	-24.4
1395.1125	22.4	-48.5	0.4	5.9	93.1	-23.0
1550.1250	22.7	-47.6	0.5	6.6	91.6	-21.5

Table 6-5: Field Strength of Spurious Radiation – 162.0000 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)
324.0	38.6	-40.4	0.2	-0.6	91.4	-21.2
486.0	35.4	-40.1	0.3	-0.6	91.1	-21.0
648.0	26.5	-44.9	0.3	-0.8	96.2	-26.1
810.0	16.3	-53.3	0.4	-1.5	105.3	-35.2
972.0	15.6	-53.1	0.4	-0.9	104.5	-34.3
1134.0	19.1	-52.7	0.4	4.7	98.6	-28.5
1296.0	17.6	-53.3	0.5	5.1	98.8	-28.6
1458.0	17.6	-52.9	0.5	6.2	97.3	-27.2
1620.0	27.2	-43.0	0.5	6.7	87.0	-16.8

Table 6-6: Field Strength of Spurious Radiation – 173.1875 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)
346.3750	32.1	-46.8	0.2	-0.5	97.7	-27.5
519.5625	51.7	-25.2	0.3	-0.6	76.3	-6.1
692.7500	21.7	-48.4	0.3	-0.9	99.9	-29.7
865.9375	23.6	-47.3	0.4	-1.4	99.2	-29.0
1039.1250	22.8	-49.1	0.4	4.5	95.3	-25.1
1212.3125	22.3	-48.9	0.4	4.8	94.8	-24.6
1385.5000	22.4	-48.5	0.5	5.8	93.3	-23.1
1558.6875	22.6	-47.7	0.5	6.6	91.8	-21.6
1731.8750	23.4	-44.8	0.5	6.5	89.0	-18.8

Table 6-7: Field Strength of Spurious Radiation – 173.9875 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)
347.9750	41.6	-39.7	0.2	-0.5	90.6	-20.4
521.9625	45.9	-31.0	0.3	-0.6	82.1	-11.9
695.9500	17.7	-52.3	0.3	-0.9	103.8	-33.6
869.9375	33.1	-36.5	0.4	-1.4	88.4	-18.2
1043.9250	18.0	-53.9	0.4	4.5	100.0	-29.8
1217.9125	19.1	-52.4	0.4	4.8	98.2	-28.0
1391.9000	18.0	-52.9	0.4	5.9	97.6	-27.4
1565.8875	17.6	-52.7	0.5	6.7	96.7	-26.5
1739.8750	18.3	-50.1	0.5	6.5	94.3	-24.1

Measurement uncertainty 30 MHz – 6 GHz = ± 4.8 dB and from 6 GHz and above = ± 5.2 dB: This measurement uncertainty is expanded for a 95% confidence level received with a coverage factor k=2 for the entire frequency range.

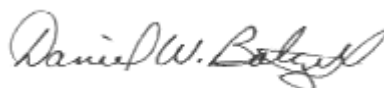
Results: Pass

Table 6-8: 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
901235	IW Microwave Products	KPS-1503-360-KPS	High Frequency RF Cables	36"	10/03/2026
901129	Par Electronics	118-174 (25W)	VHF Notch Filter	N/A	11/28/2025
901729	Insulated Wire Inc.	KPS-1503-3150-KPR	SMK RF Cables 20'	NA	10/02/2026
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	07/11/2026
901773	Rohde & Schwarz	FSW50	Analyzer	101021	05/30/2027
901582	Rohde & Schwarz	1167.0000.02	Signal Generator	101903	05/27/2027

Test Personnel:

Daniel W. Baltzell
Test Engineer



Signature

October 5, 2025
Date of Tests

7 FCC 2.1049(c)(1), 22.359(b), 74.462, 80.205, 80.211(f), 90.210: Channel, Authorized, Occupied Bandwidths and Spectrum Masks

Occupied Bandwidth - Compliance with the Emission Masks

7.1 Test Procedure

ANSI C63.26-2015, section 5.4

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

7.2 Test Data

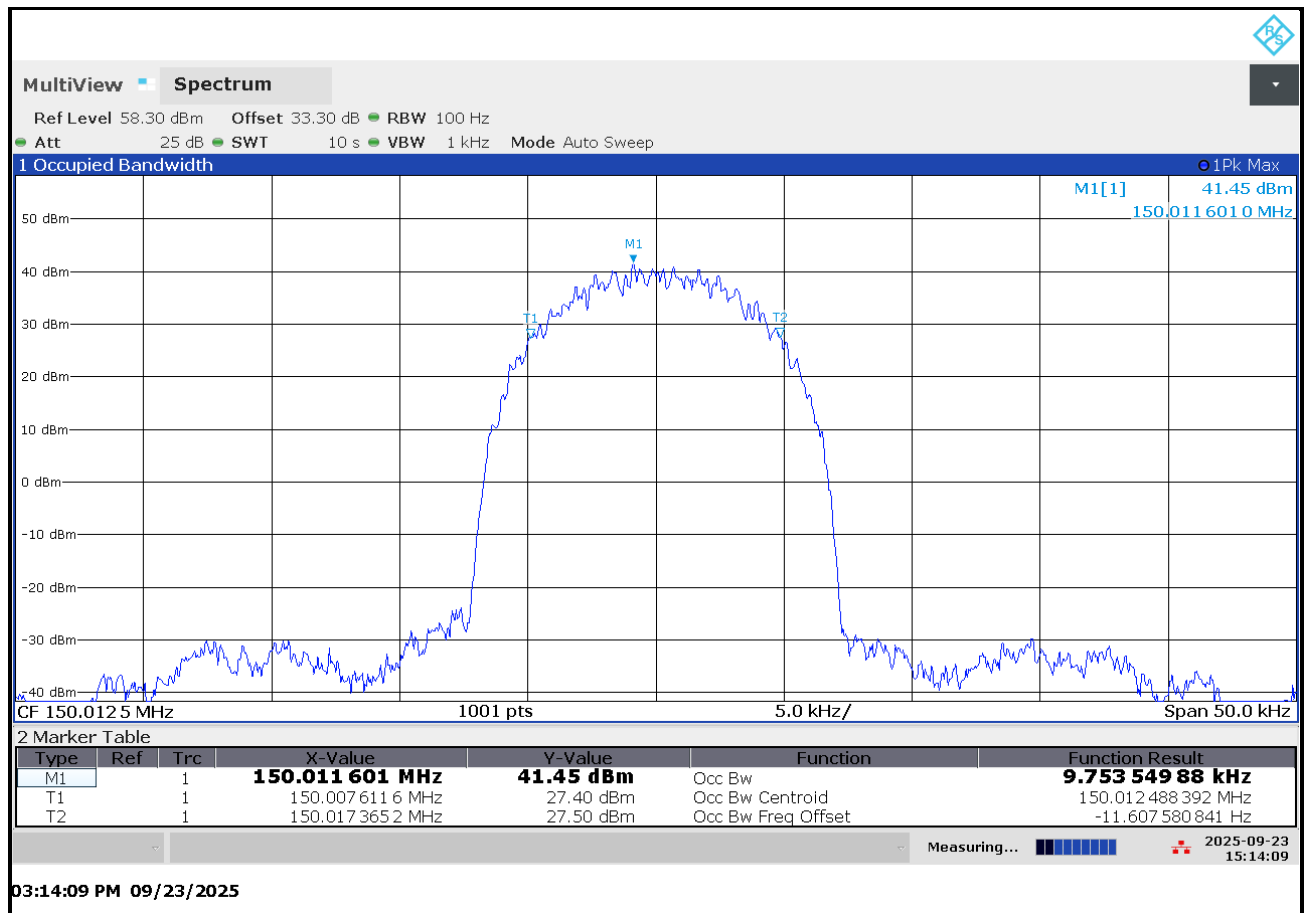
Table 7-1: Environmental Conditions

Date	Temperature (°C)	Humidity (%)	Atmospheric Pressure (kPa)
September 19, 2025	30	38	29.70"
September 23, 2025	27	60	29.67"
September 24, 2025	25	69	29.68"

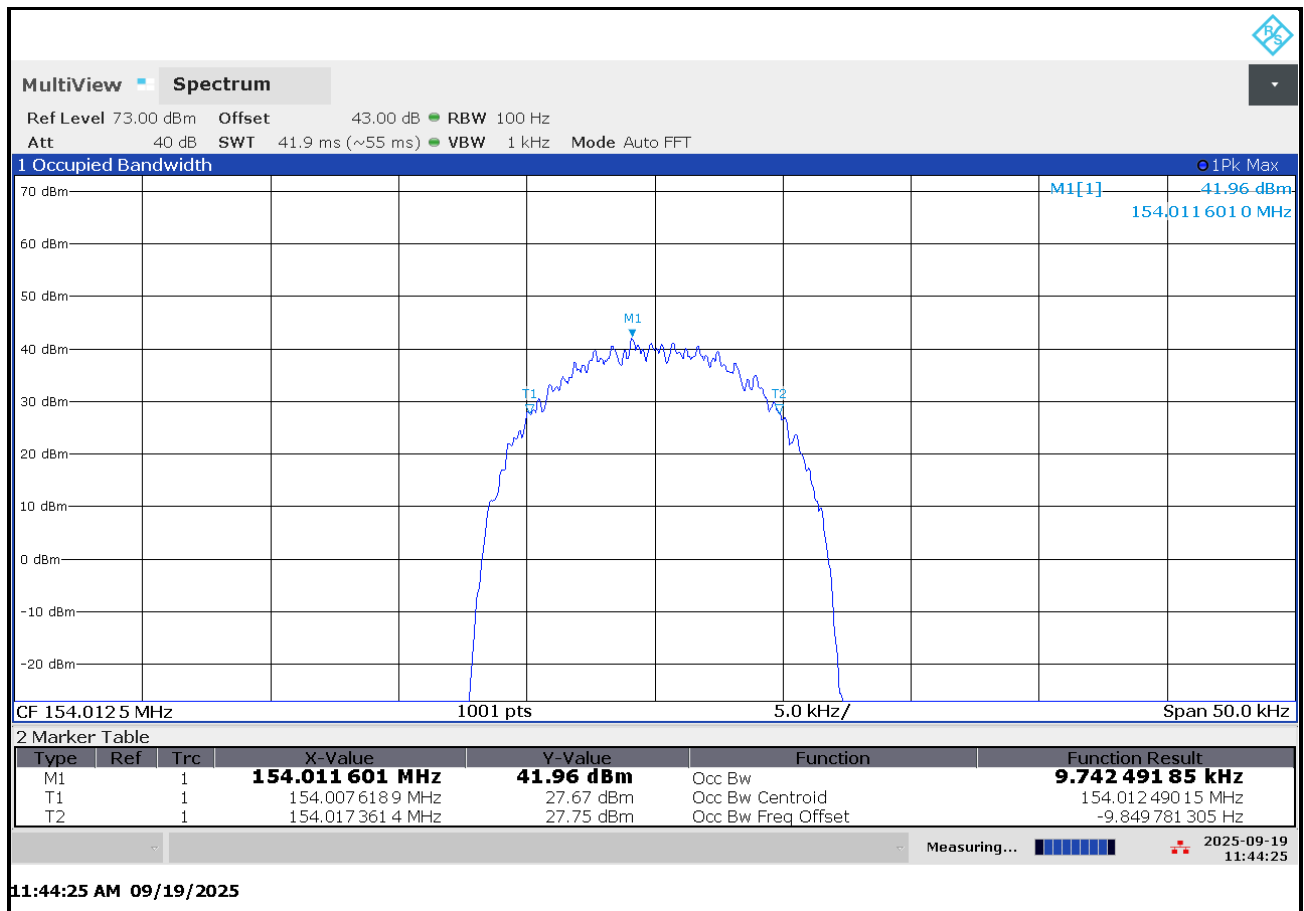
Table 7-2: 99% Occupied Bandwidth

Frequency (MHz)	HDQPSK (kHz)	WCQPSK (kHz)
150.0125	9.8	9.7
154.0125	9.7	9.7
155.0125	9.7	9.7
162.0000	9.8	9.7
173.1875	9.7	9.7
173.9875	9.8	9.7

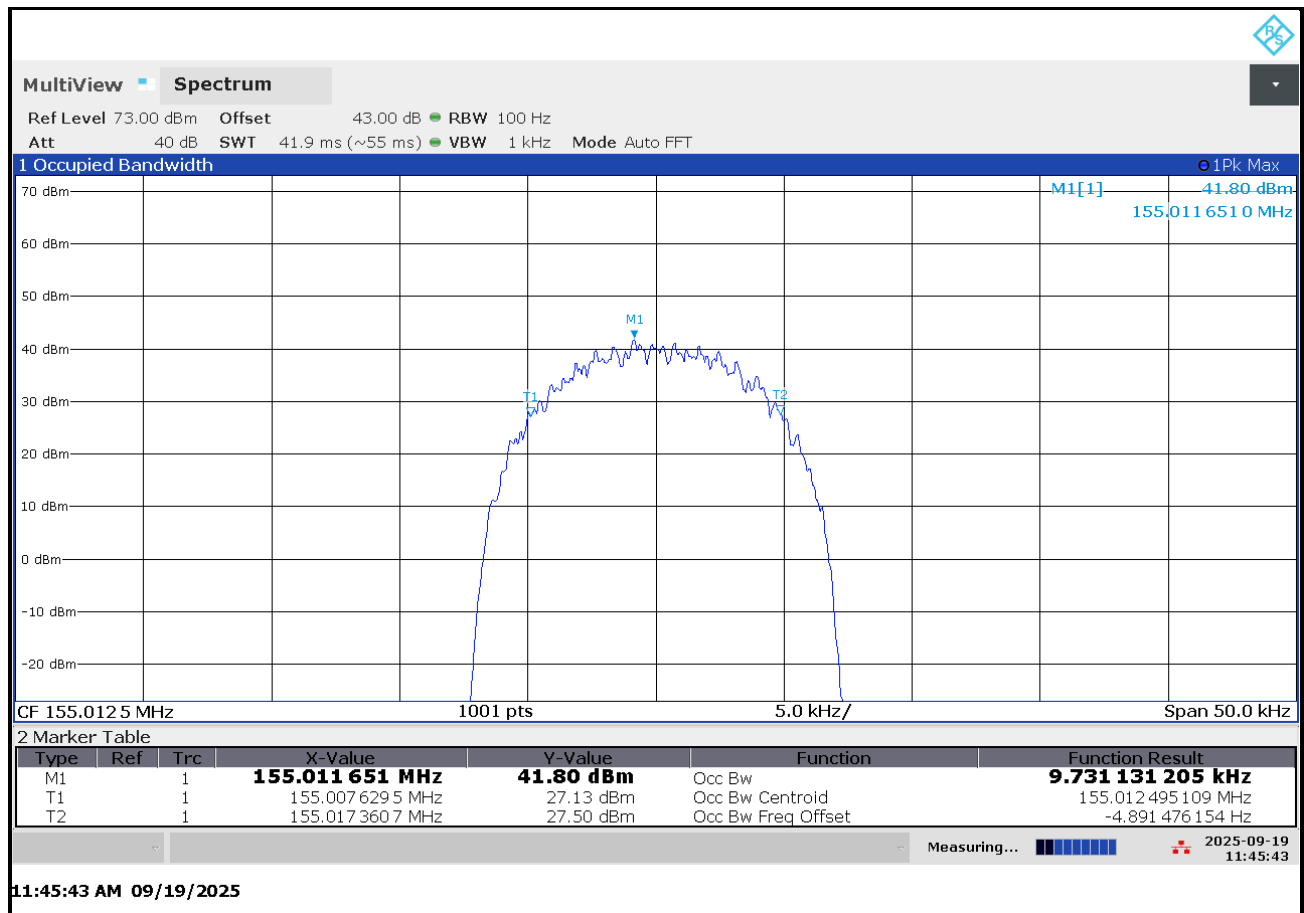
Plot 7-1: 99% Bandwidth, 150.0125 MHz, HDQPSK



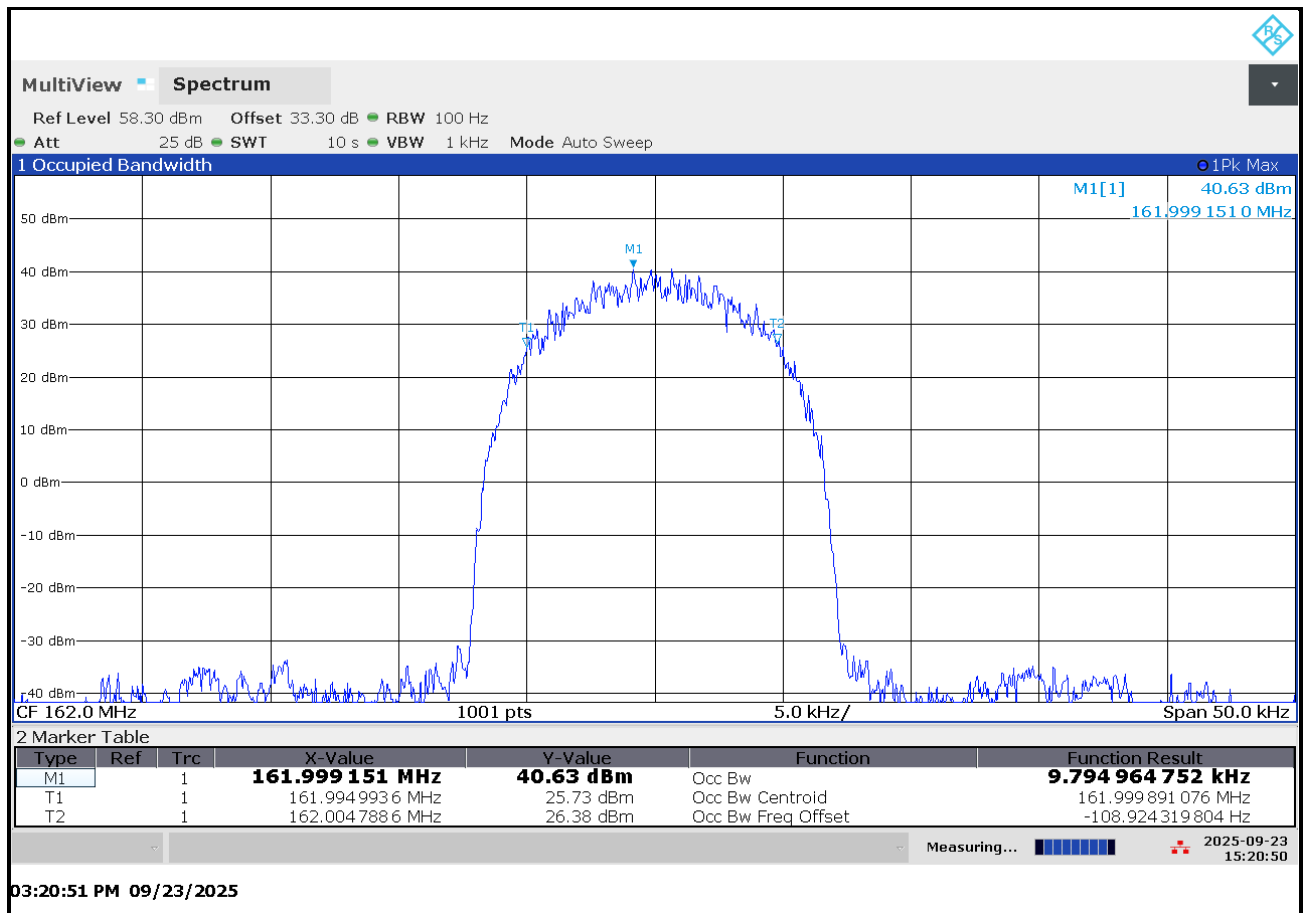
Plot 7-2: 99% Bandwidth, 154.0125 MHz, HDQPSK



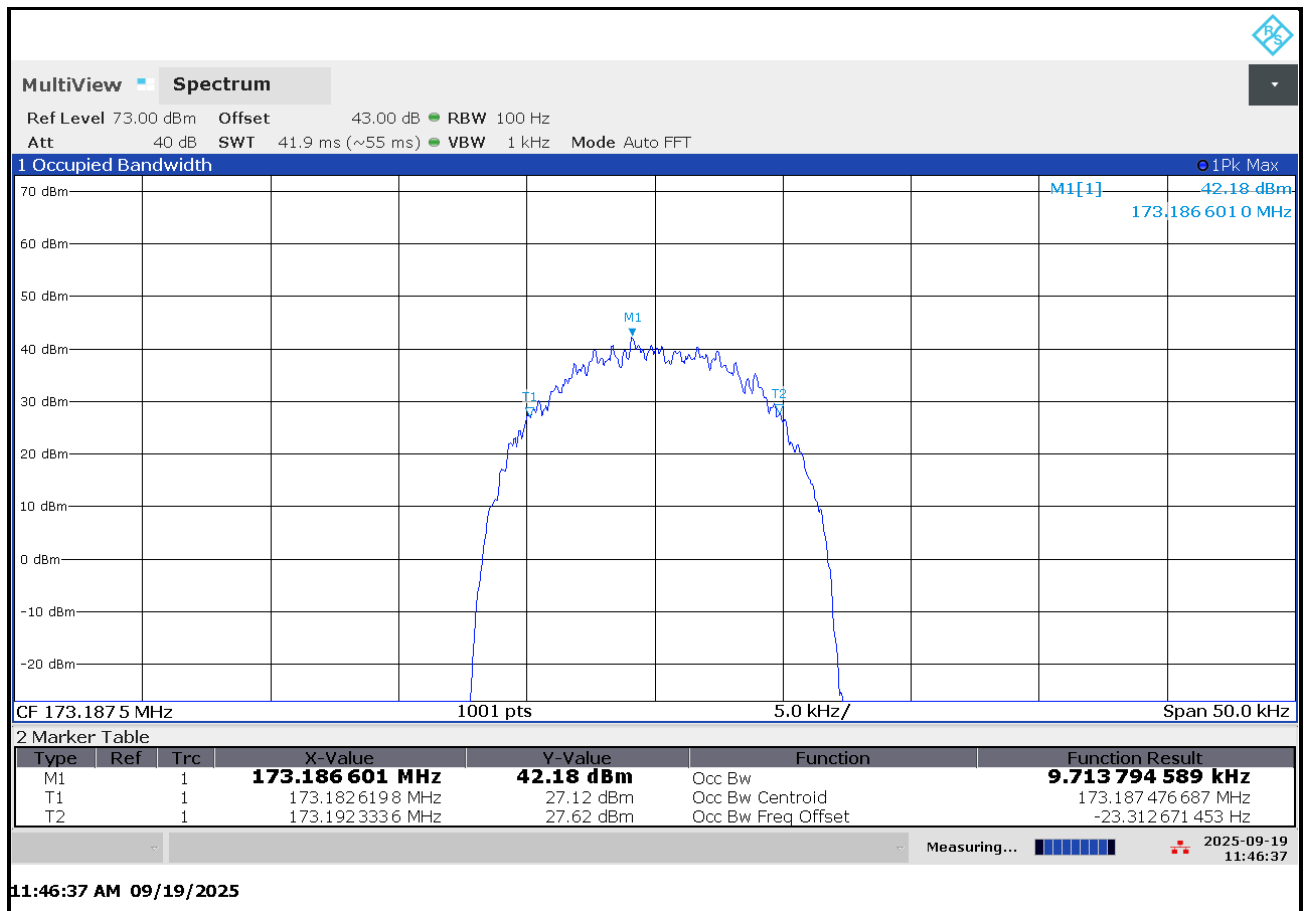
Plot 7-3: 99% Bandwidth, 155.0125 MHz, HDQPSK



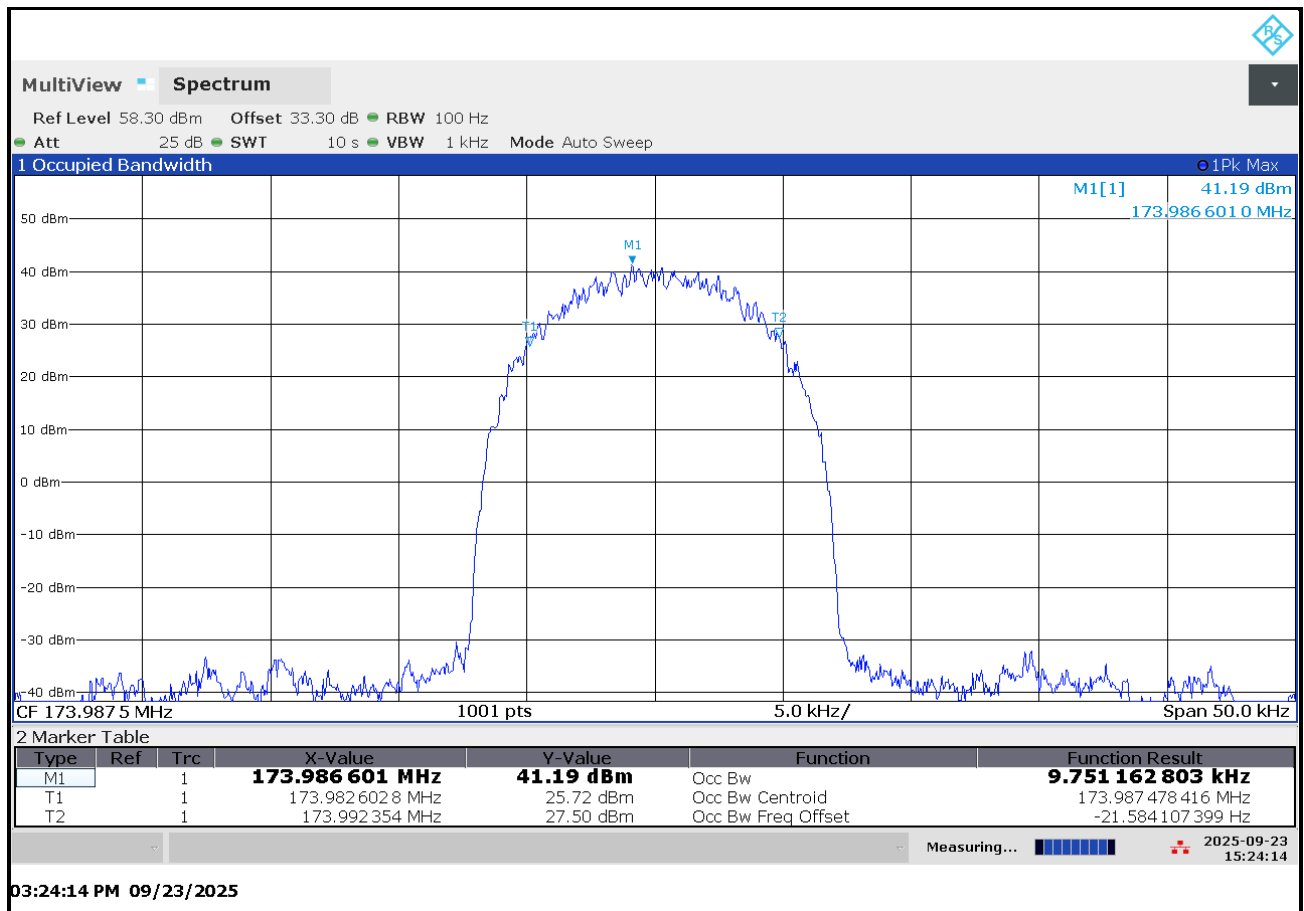
Plot 7-4: 99% Bandwidth, 162.0000 MHz, HDQPSK



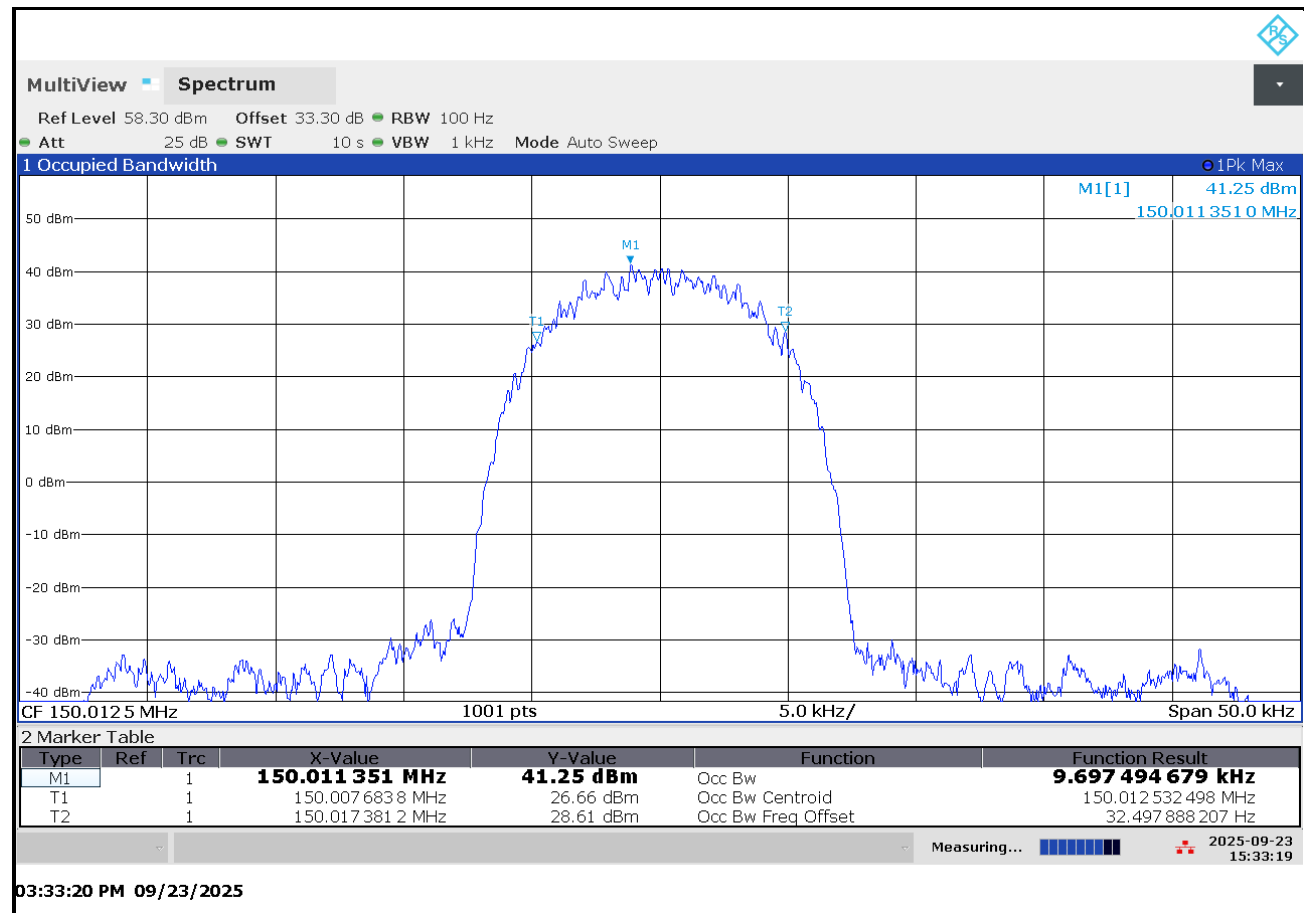
Plot 7-5: 99% Bandwidth, 173.1875 MHz, HDQPSK



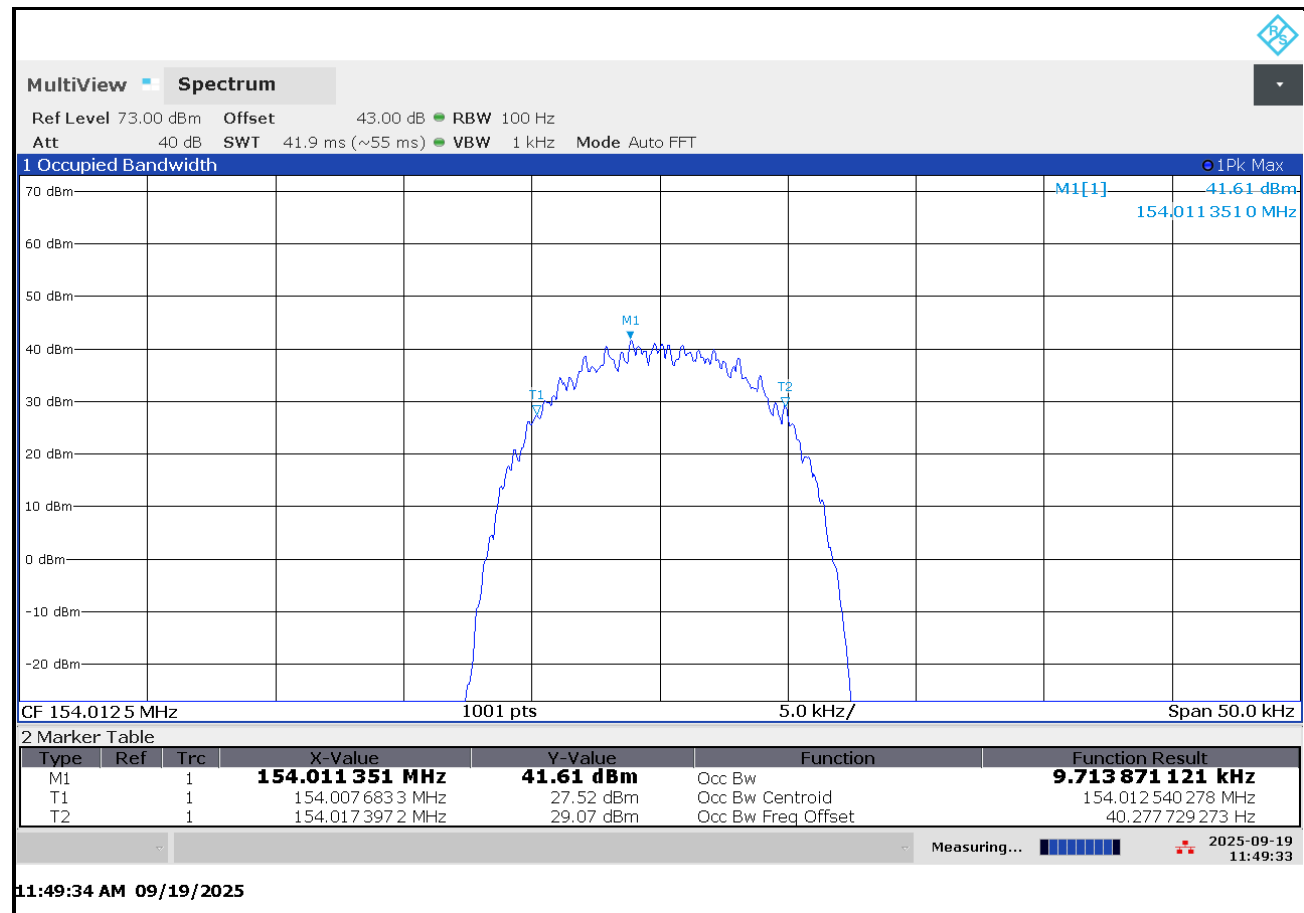
Plot 7-6: 99% Bandwidth, 173.9875 MHz, HDQPSK



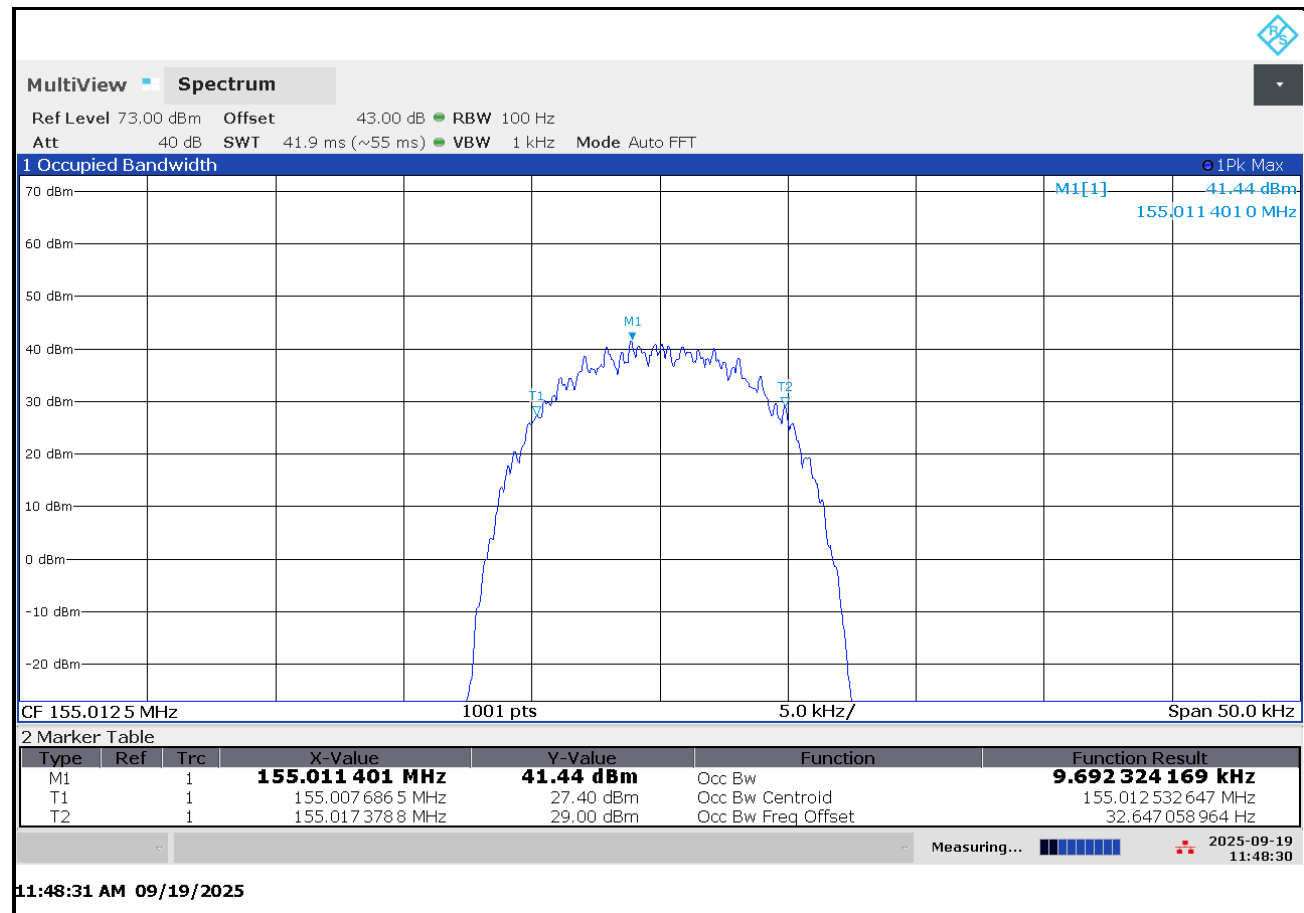
Plot 7-7: 99% Bandwidth, 150.0125 MHz, WCQPSK



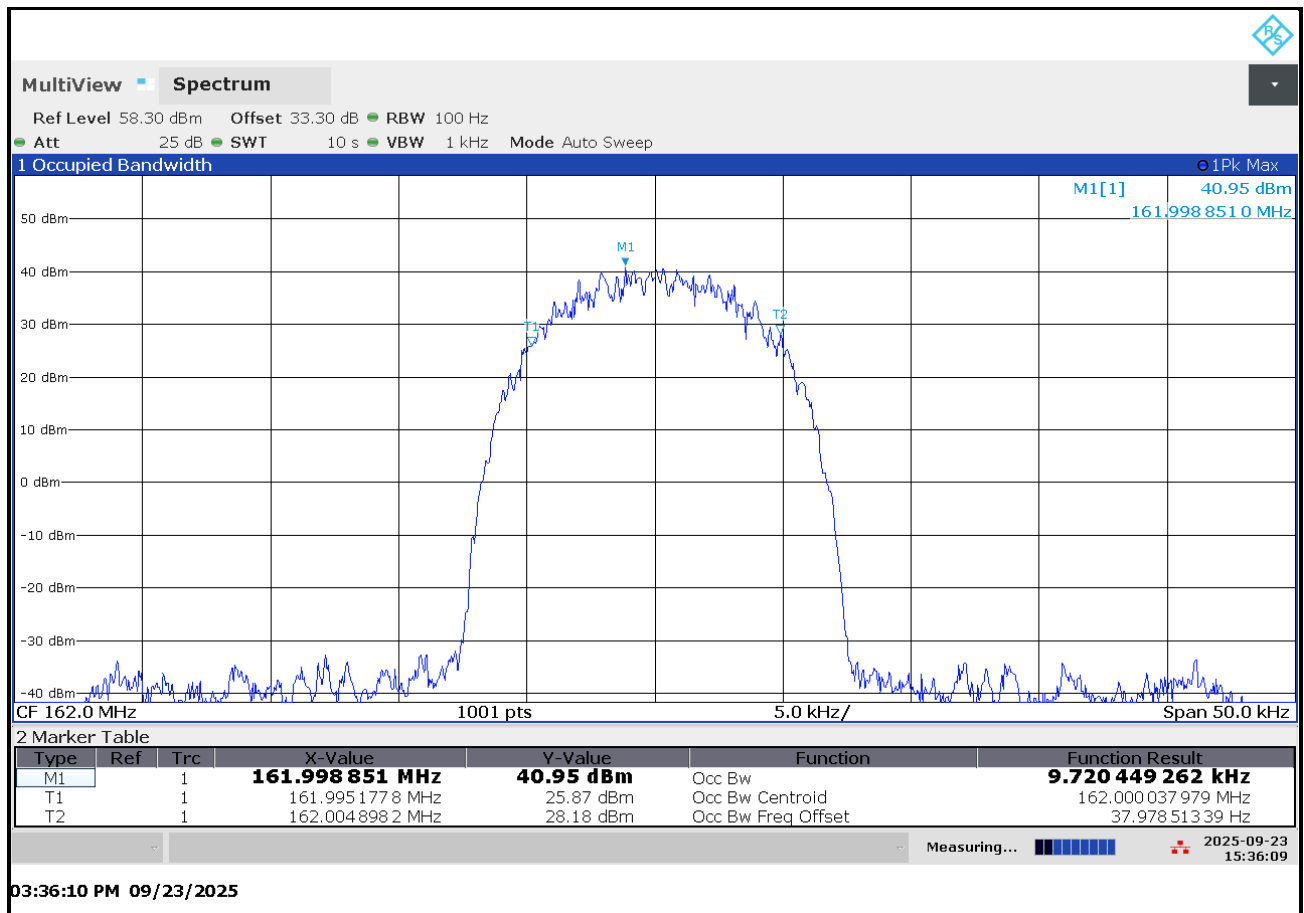
Plot 7-8: 99% Bandwidth, 154.0125 MHz, WCQPSK



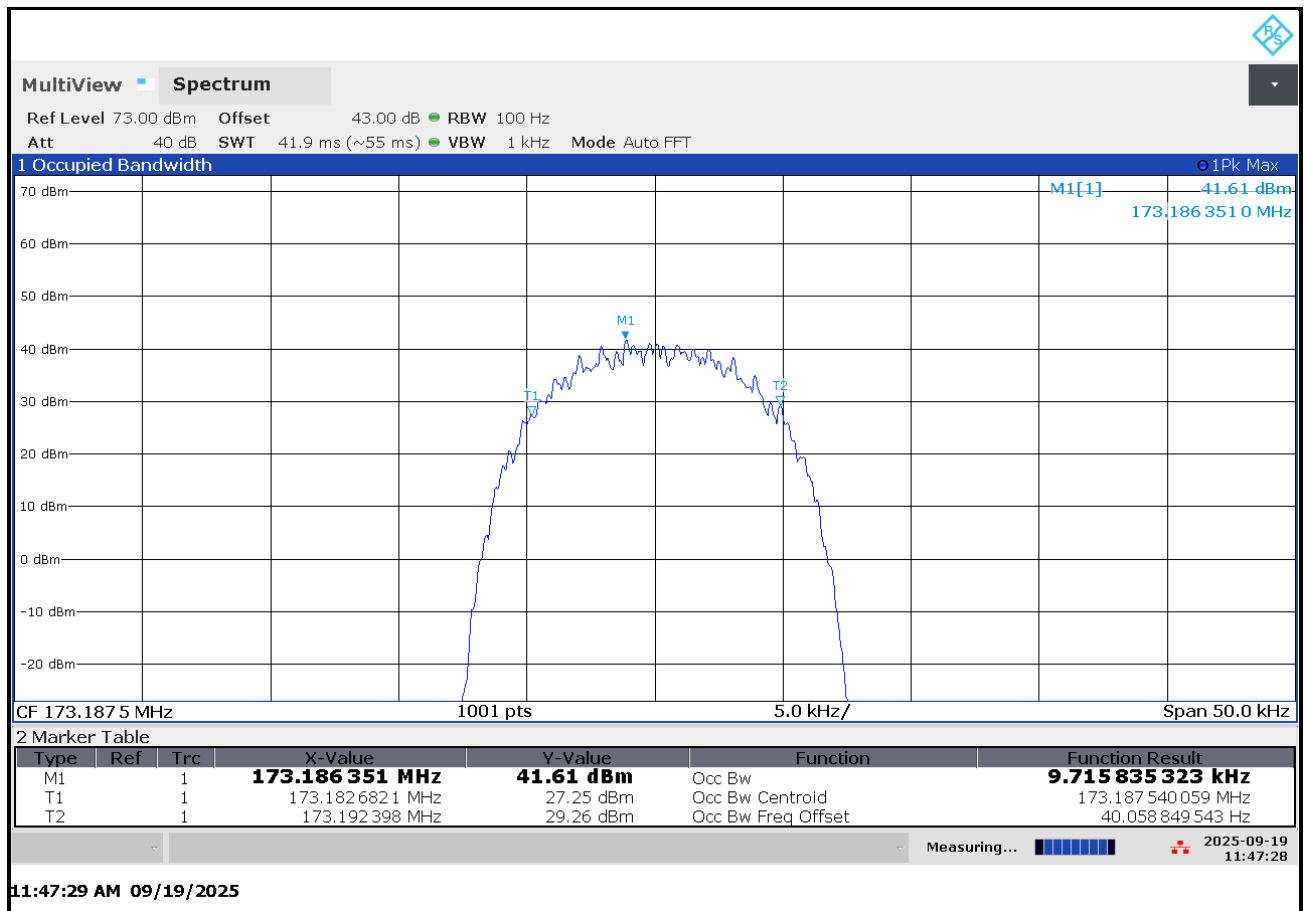
Plot 7-9: 99% Bandwidth, 155.0125 MHz, WCQPSK



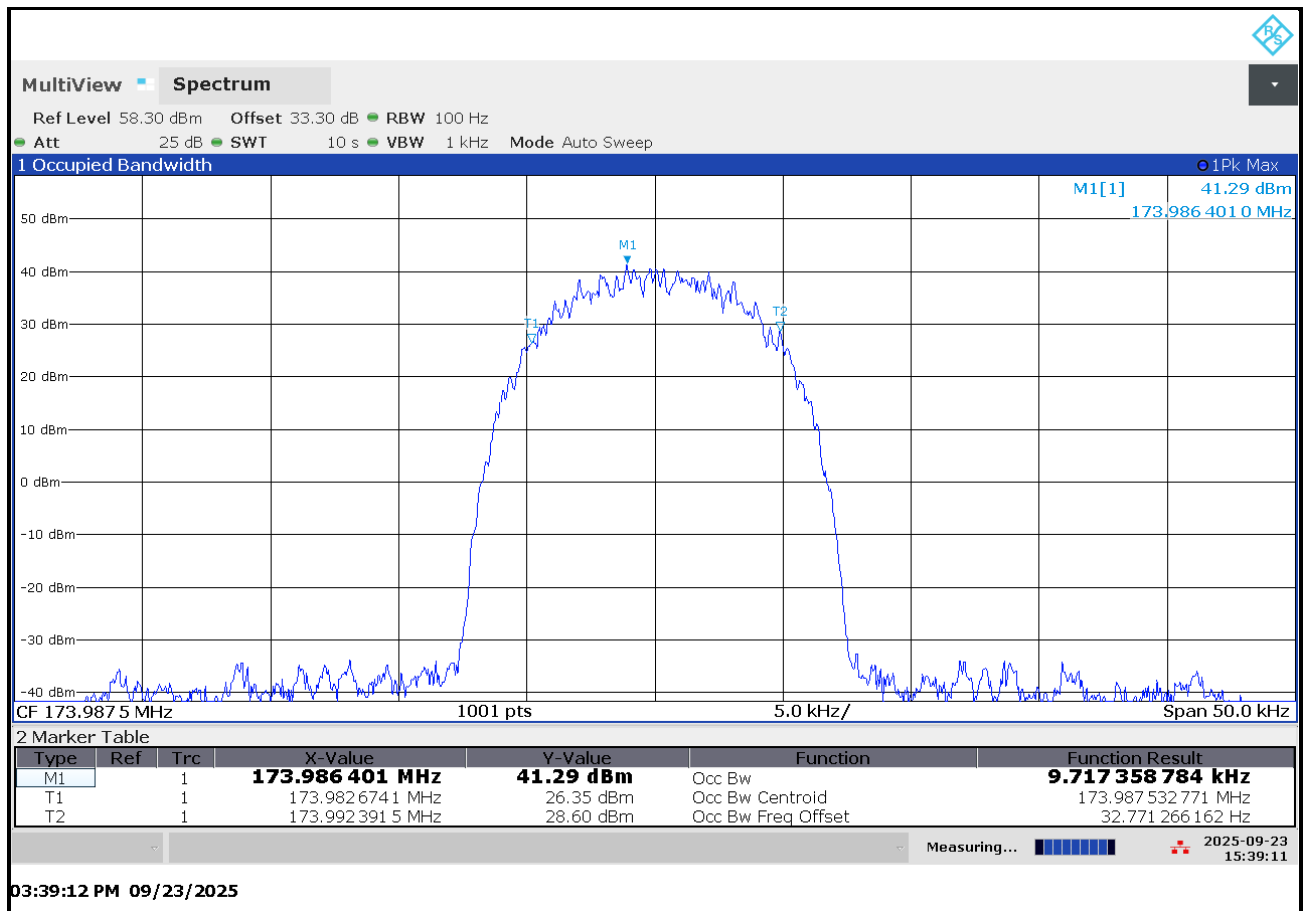
Plot 7-10: 99% Bandwidth, 162.0000 MHz, WCQPSK



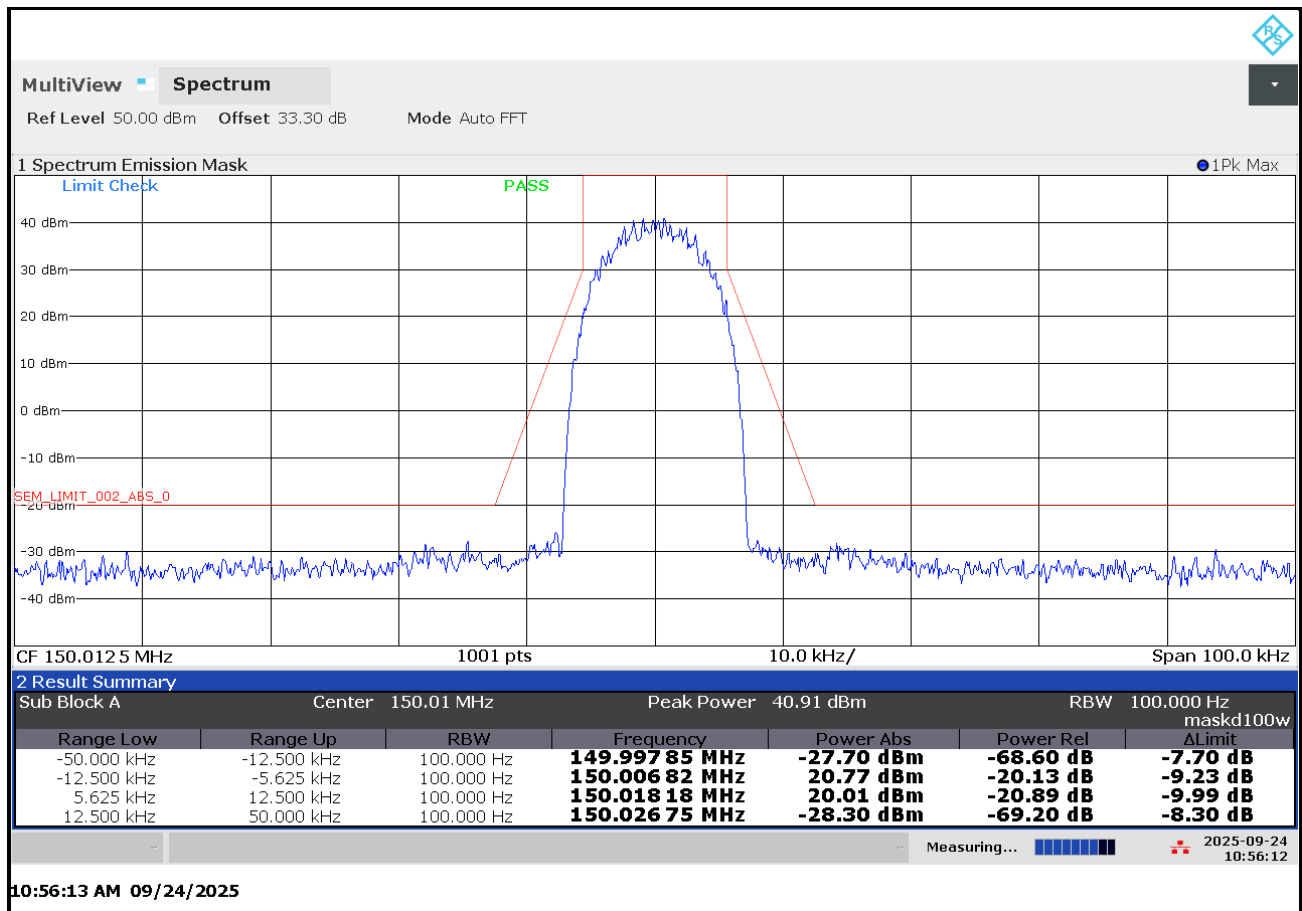
Plot 7-11: 99% Bandwidth, 173.1875 MHz, WCQPSK



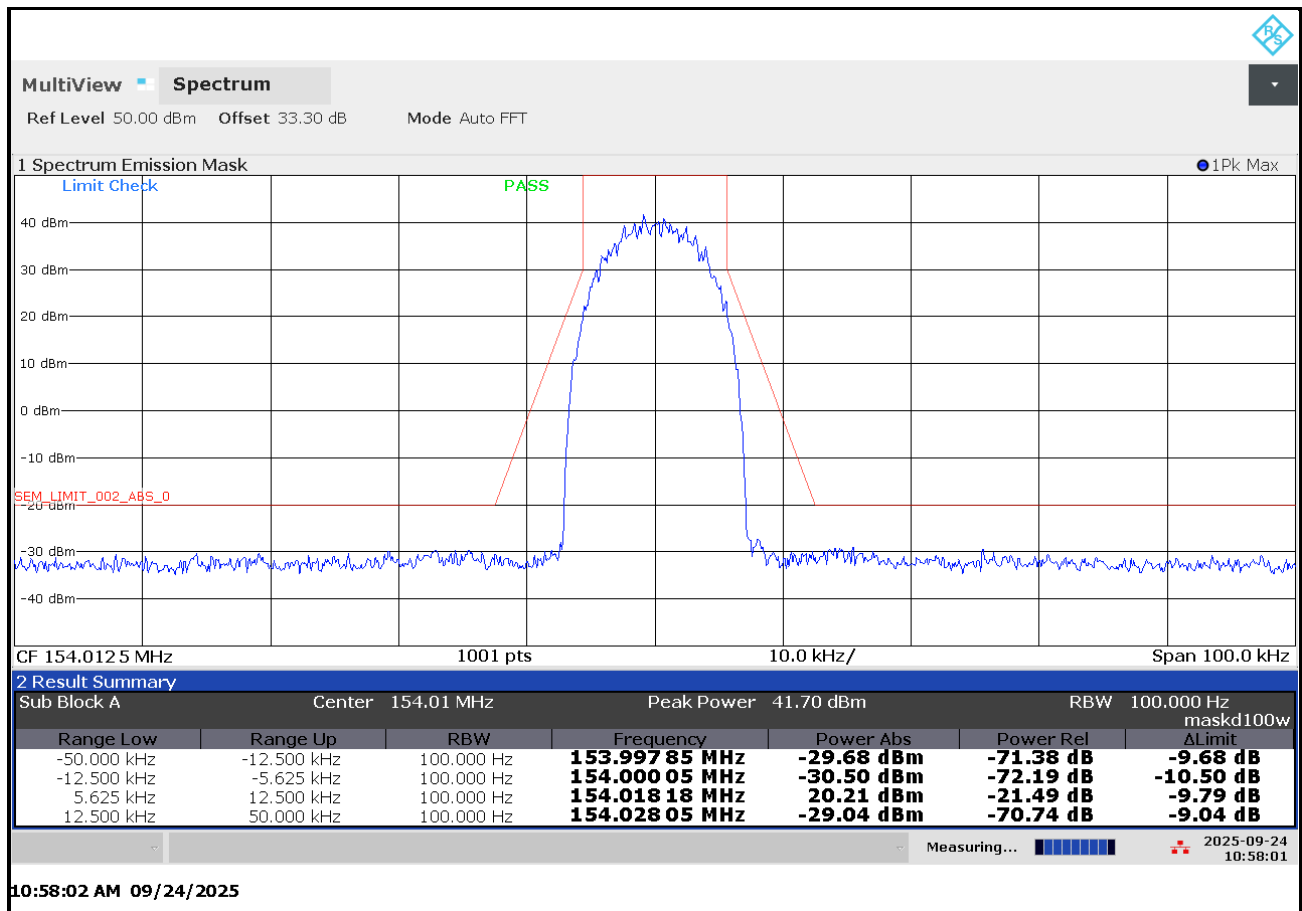
Plot 7-12: 99% Bandwidth, 173.9875 MHz, WCQPSK



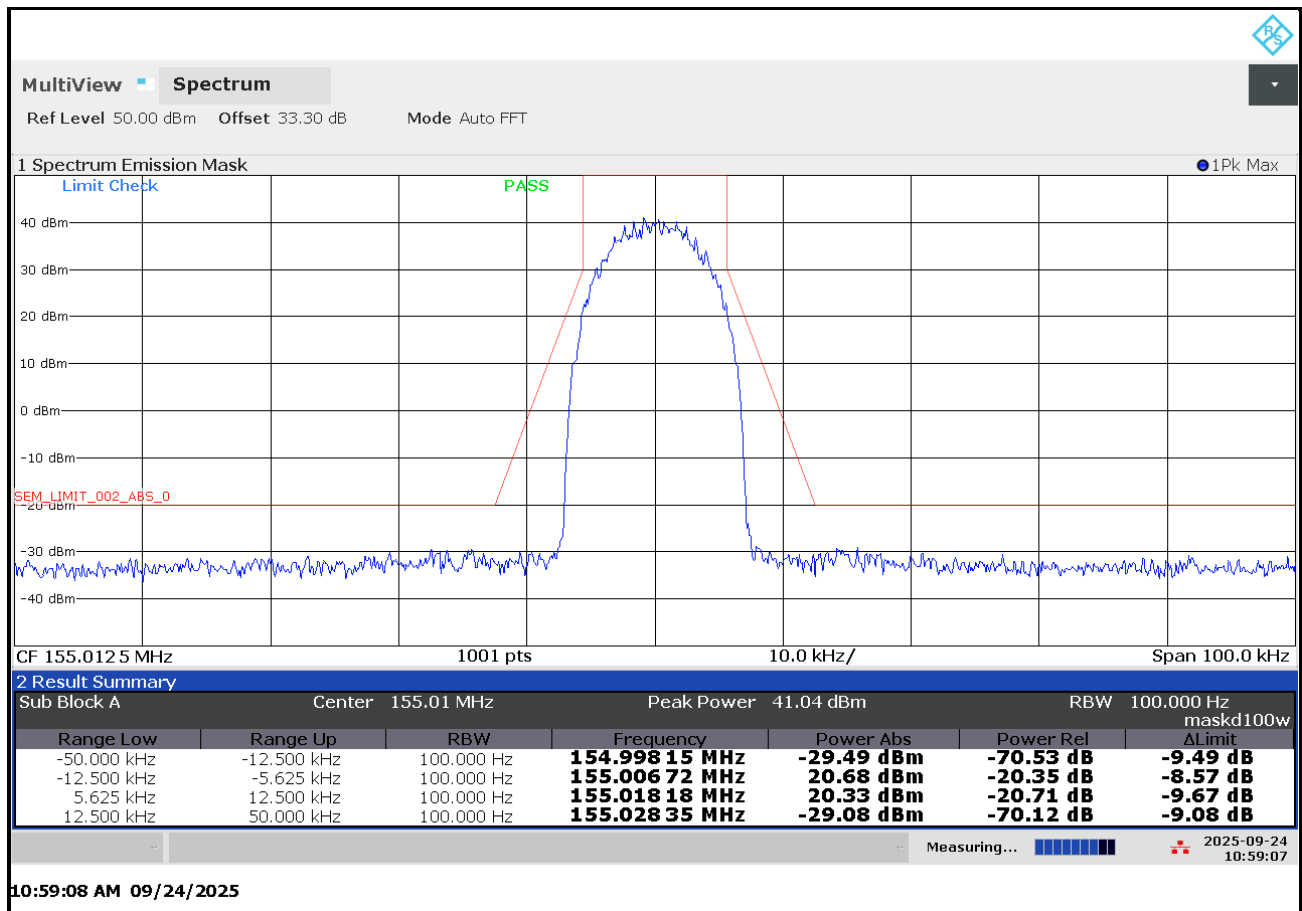
Plot 7-13: 150.0125 MHz; WCQPSK; Mask D



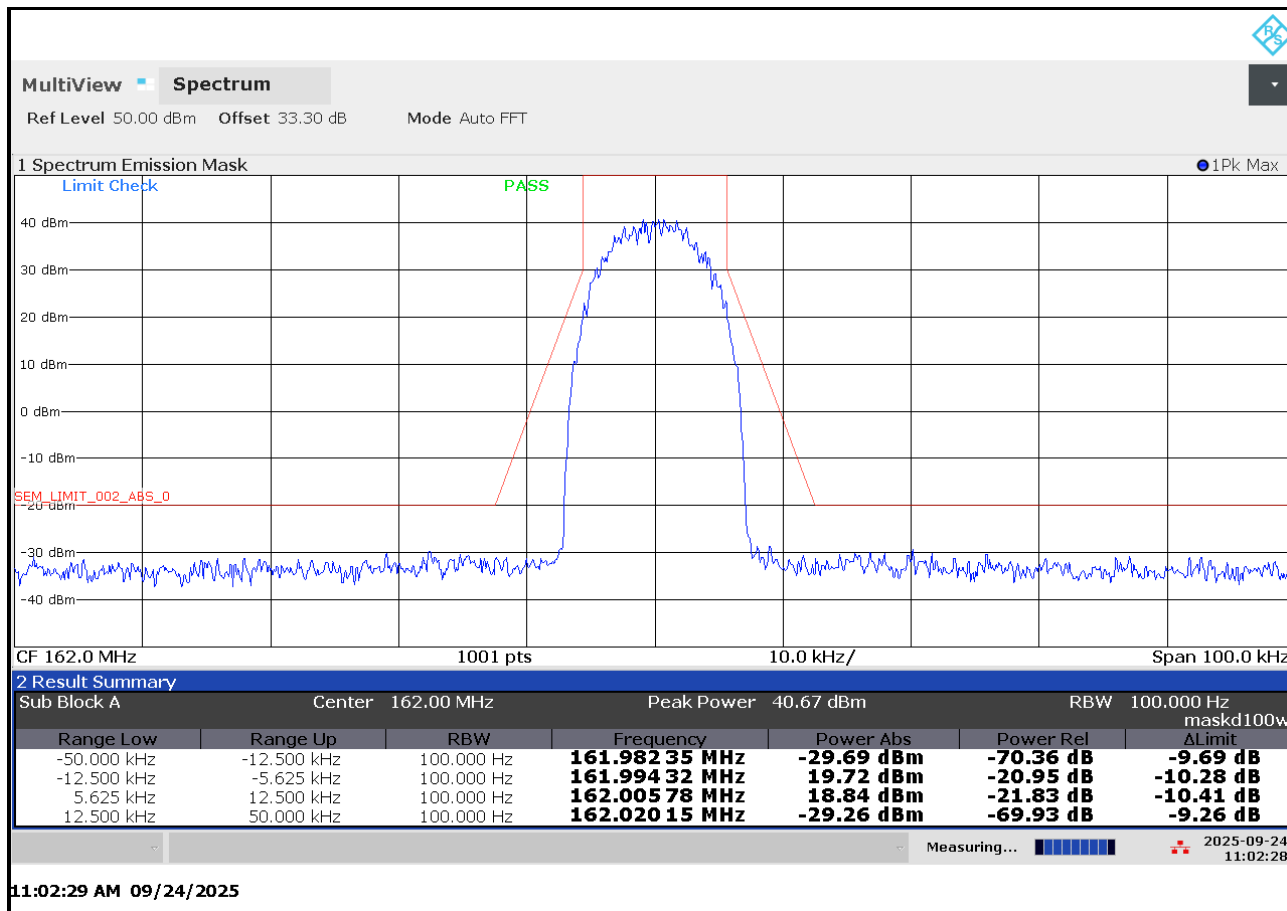
Plot 7-14: 154.0125 MHz; WCQPSK; Mask D



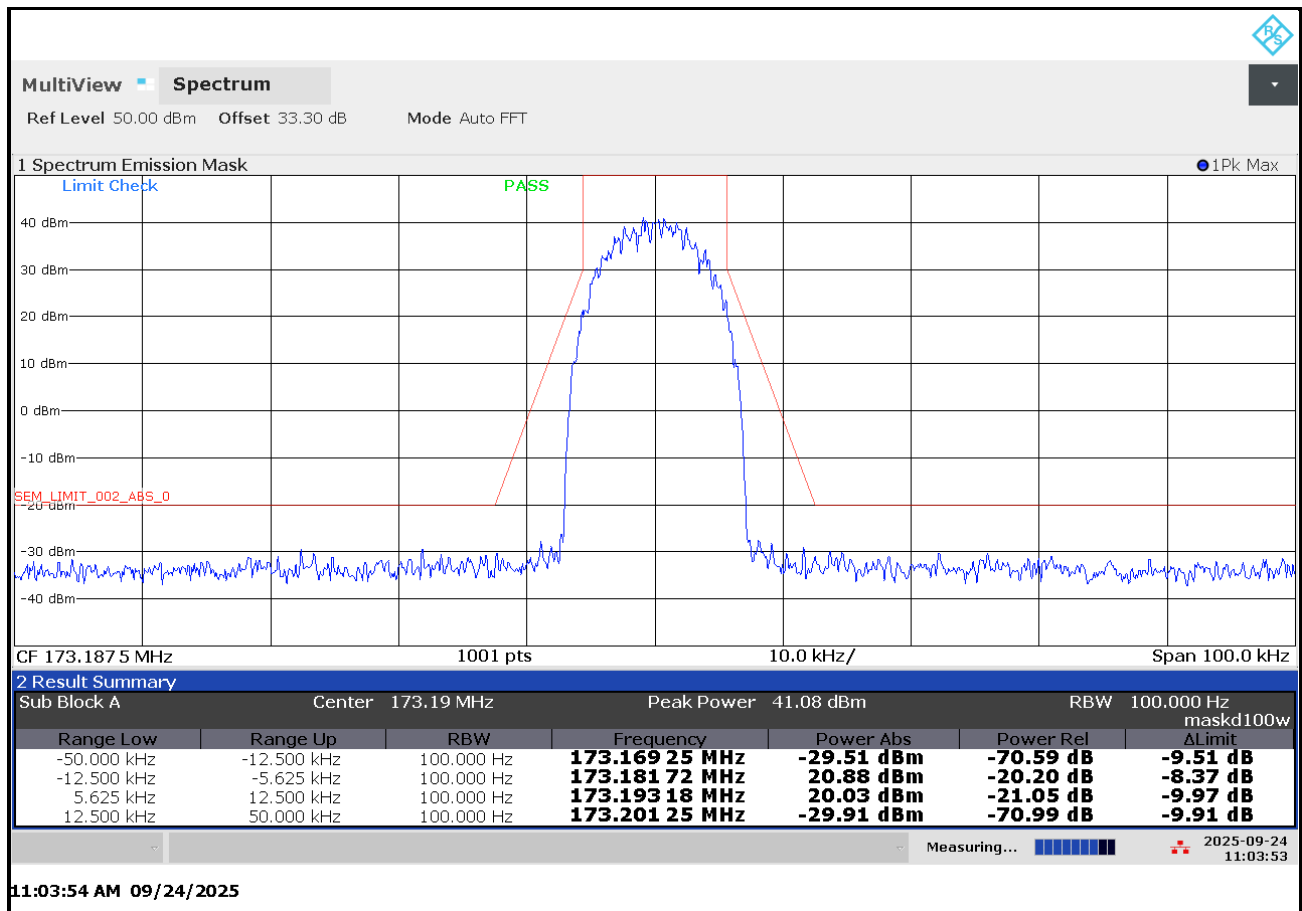
Plot 7-15: 155.0125 MHz; WCQPSK; Mask D



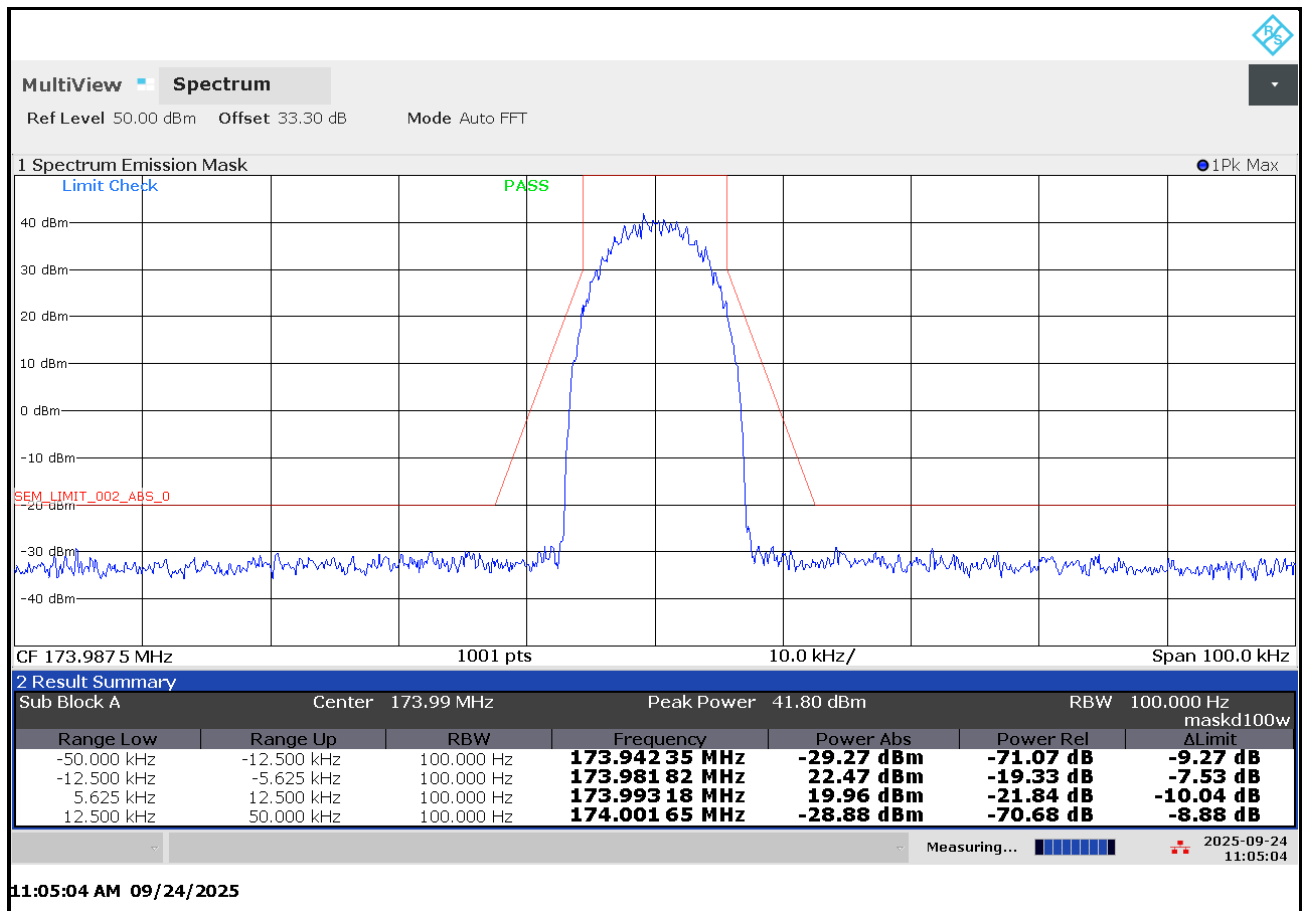
Plot 7-16: 162.0000 MHz; WCQPSK; Mask D



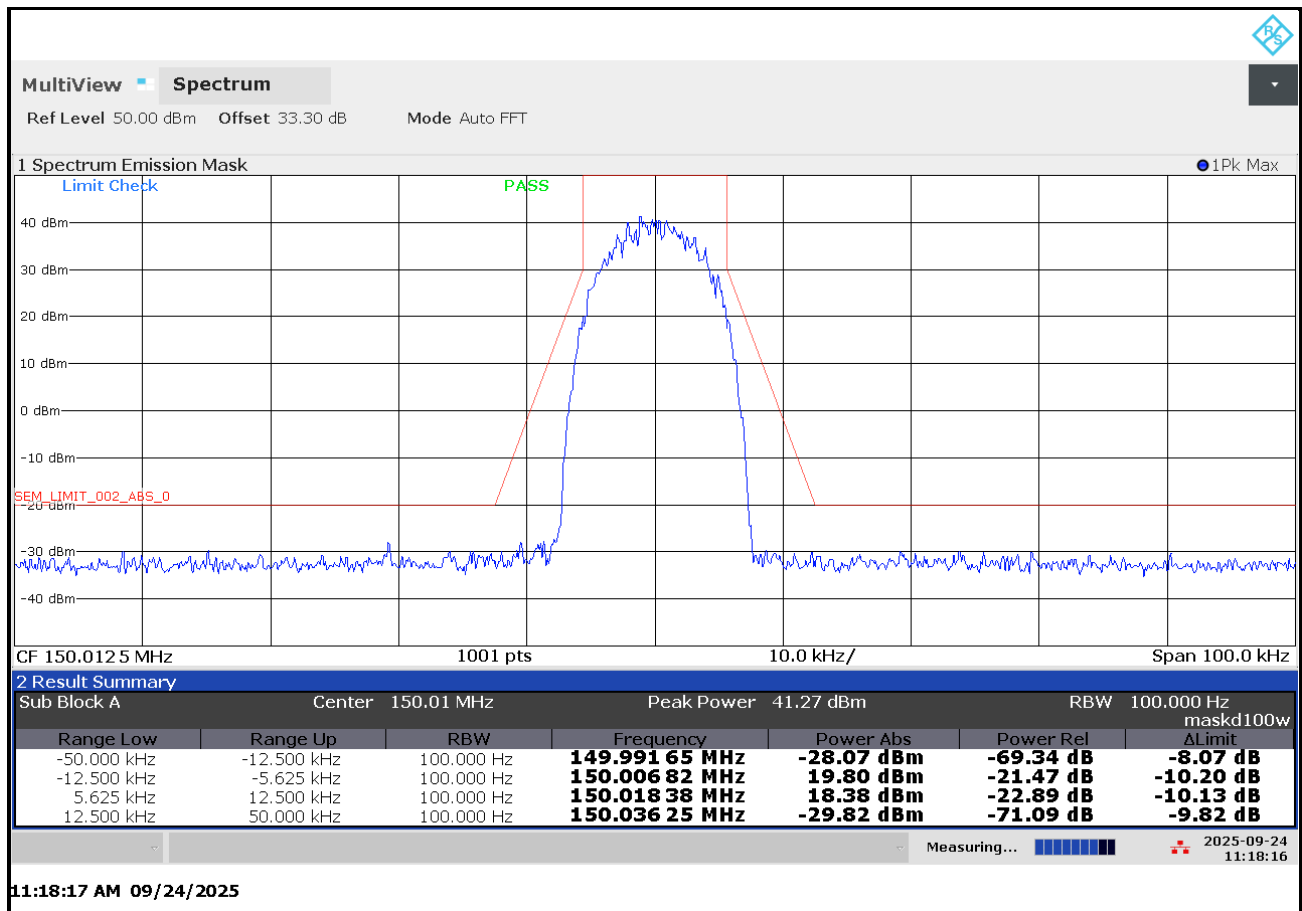
Plot 7-17: 173.1875 MHz; WCQPSK; Mask D



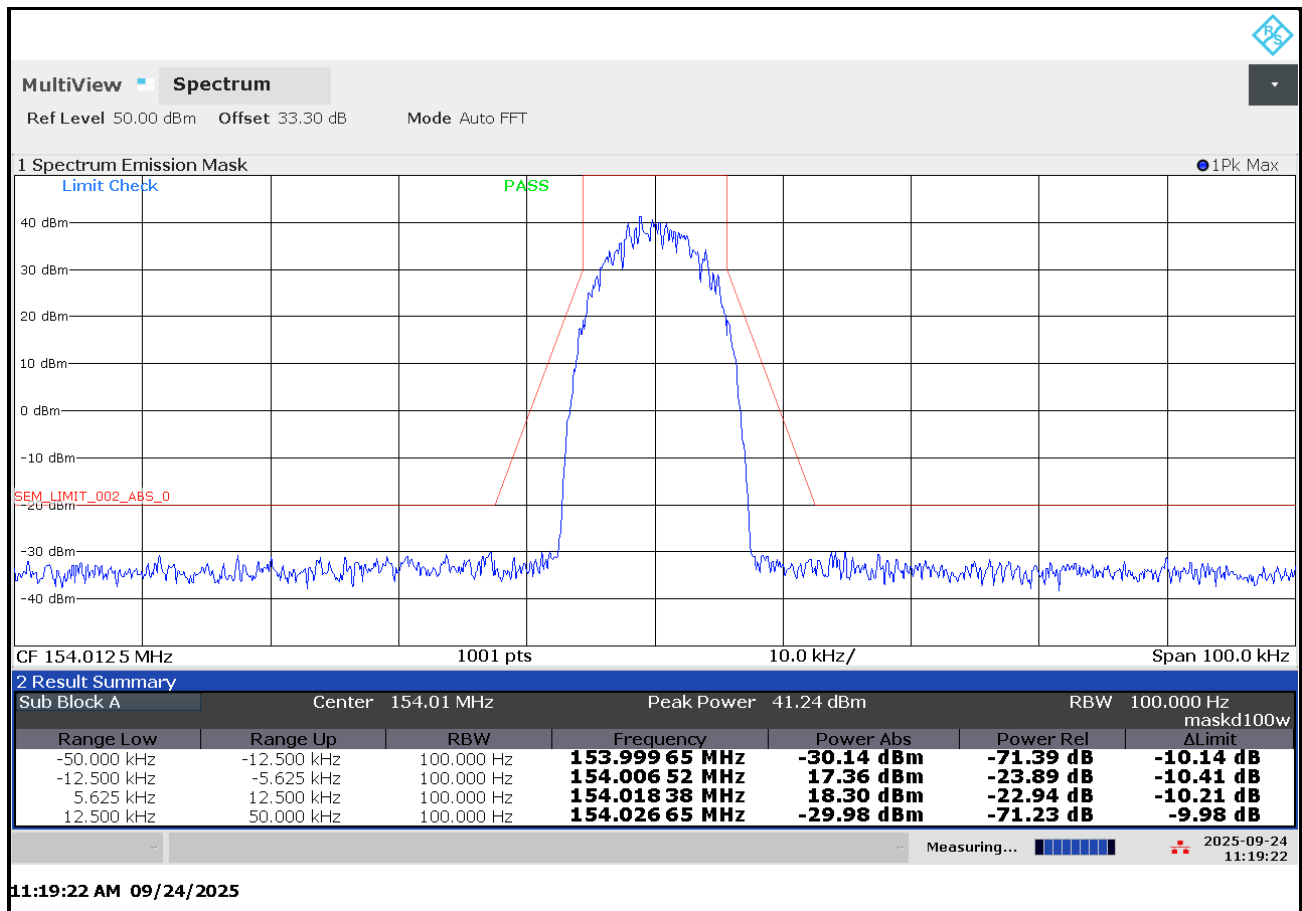
Plot 7-18: 173.9875 MHz; WCQPSK; Mask D



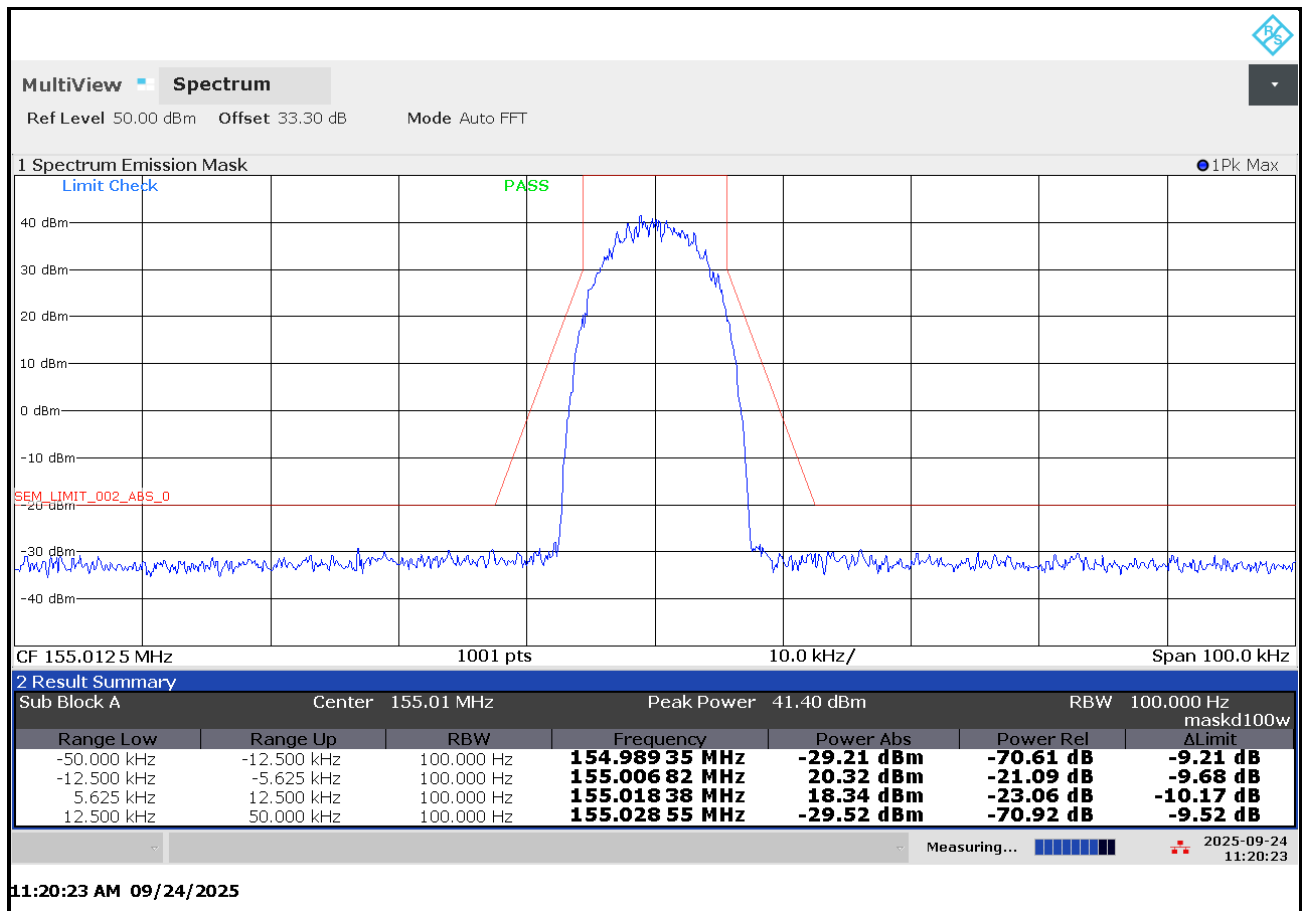
Plot 7-19: 150.0125 MHz; HDQPSK; Mask D



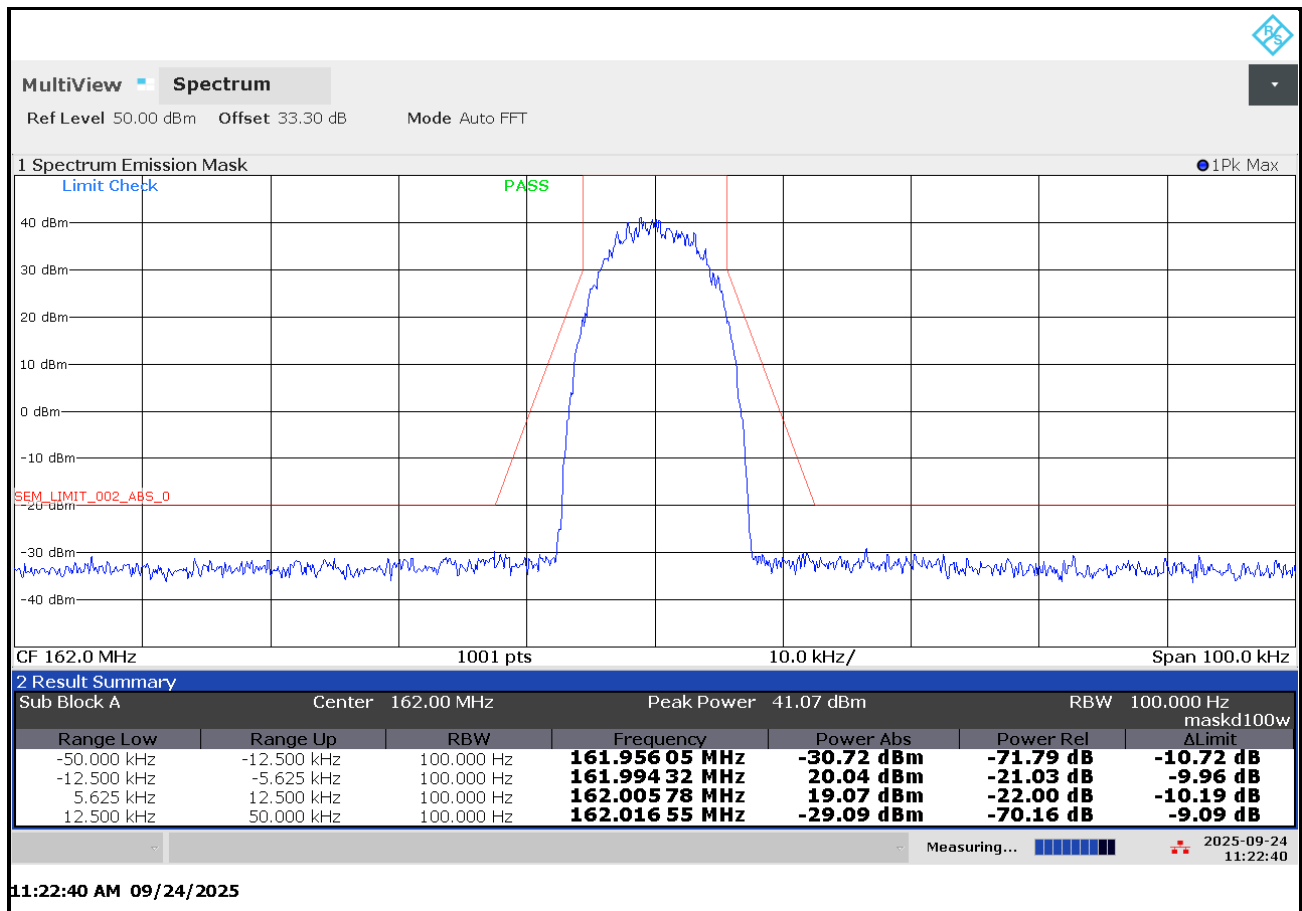
Plot 7-20: 154.0125 MHz; HDQPSK; Mask D



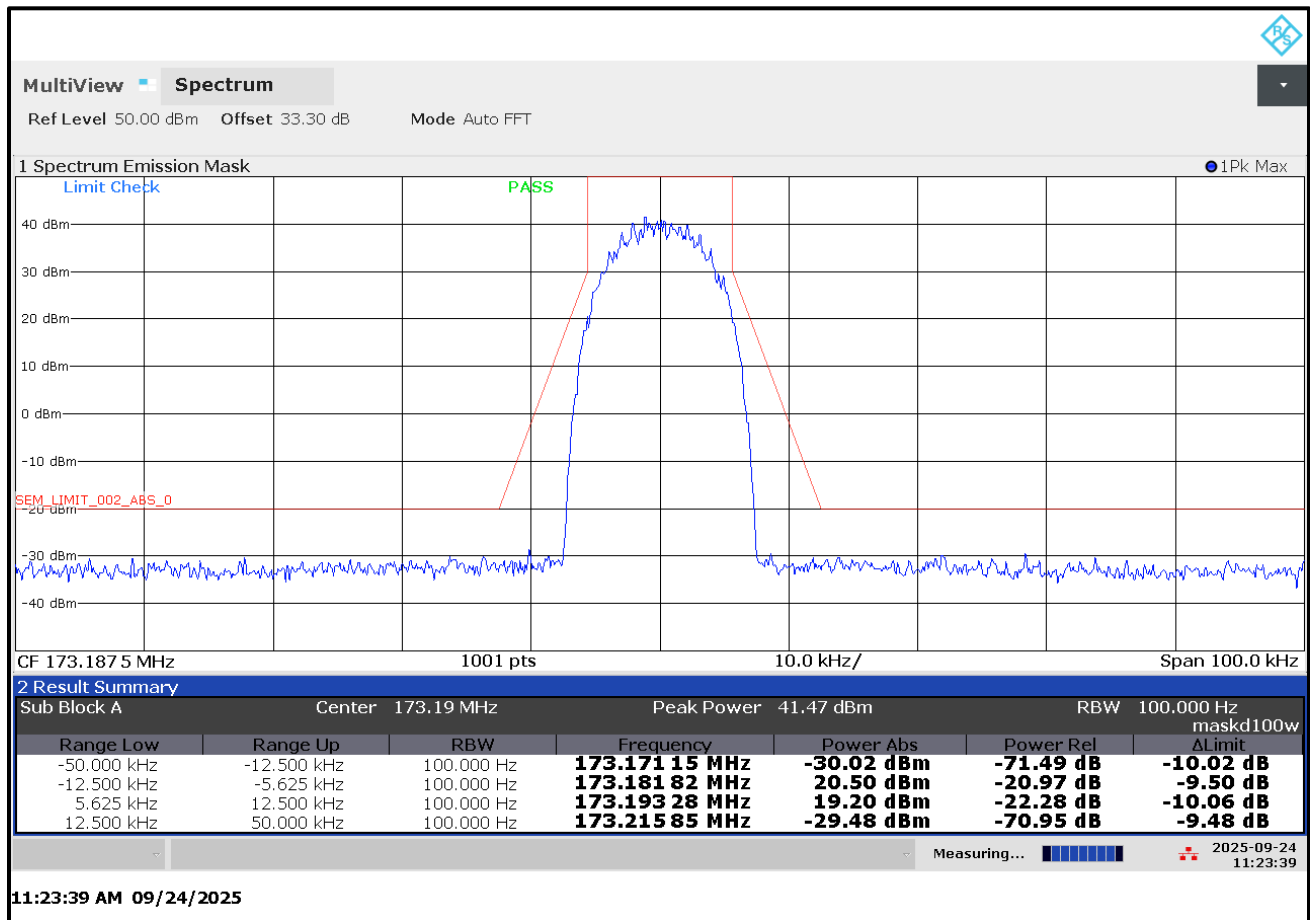
Plot 7-21: 155.0125 MHz; HDQPSK; Mask D



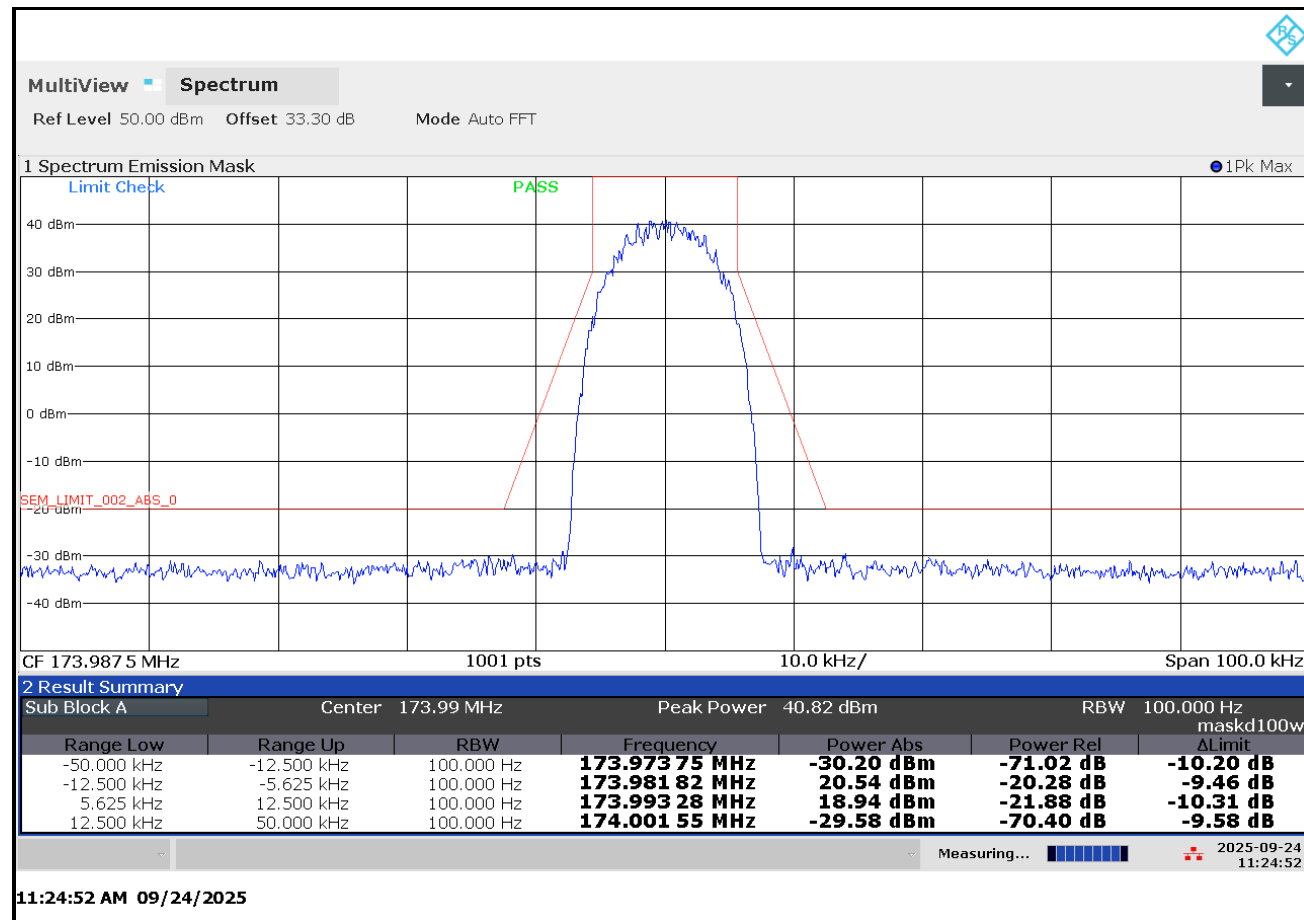
Plot 7-22: 162.0000 MHz; HDQPSK; Mask D



Plot 7-23: 173.1875 MHz; HDQPSK; Mask D



Plot 7-24: 173.9875 MHz; HDQPSK; Mask D



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 7-3: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901773	Rohde & Schwarz	FSW-50	Spectrum Analyzer	101021	05/30/2027
901291	Pasternack	PE7031-20	20 dB 300 W Attenuator	901291	02/08/2026
901355	JFW Industries	50FH-003-300	300W 3DB DC1000 MHz Attenuator	N/A	03/23/2026
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	10/13/2026

Rhein Tech Laboratories, Inc.
360 Herndon Parkway
Suite 1400
Herndon, VA 20170
<http://www.rheintech.com>

Client: L3Harris Technologies
Model: Two47 VHF-H
FCC ID: OWDTR-0175-E
Standards: Parts 22, 74, 80, 90
Report #: 2025137TNB

Test Personnel:

Daniel W. Baltzell
EMC Test Engineer



Signature

September 19, 23-24, 2025
Dates of Test

8 FCC 2.1055, 22.355, 74.464, 80.209, 90.213: Transmitter Frequency Stability

8.1 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 temperature was initially set to -30°C, and 1 hour was observed to stabilize the EUT. The frequency stability was measured within one minute after the 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 the application of primary power to the transmitter. Additionally, the power supply voltage of the EUT was varied +/-15% nominal input voltage.

8.2 Test Data

Table 8-1: Environmental Conditions

Date	Temperature (°C)	Humidity (%)	Atmospheric Pressure (kPa)
August 7, 2025	27.4	36	101.5
September 17, 2025	28.2	36	100.9

Table 8-2: Transmitter Frequency Stability – 150.0625 MHz

Temperature (°C)	Measured Frequency (MHz)	ppm
-30	150.062508	0.05
-20	150.062507	0.05
-10	150.062507	0.04
0	150.062504	0.03
10	150.062503	0.02
20 (reference)	150.062500	0.00
30	150.062500	0.00
40	150.062498	-0.01
50	150.062498	-0.02
60	150.062497	-0.02

Table 8-3: Transmitter Frequency Stability – 154.0125 MHz

Temperature (°C)	Measured Frequency (MHz)	ppm
-30	154.012507	0.05
-20	154.012506	0.04
-10	154.012506	0.04
0	154.012503	0.02
10	154.012503	0.02
20 (reference)	154.012500	0.00
30	154.012500	0.00
40	154.012500	0.00
50	154.012497	-0.02
60	154.012497	-0.02

Table 8-4: Transmitter Frequency Stability – 155.0125 MHz

Temperature (°C)	Measured Frequency (MHz)	ppm
-30	155.012507	0.05
-20	155.012507	0.05
-10	155.012505	0.04
0	155.012503	0.02
10	155.012502	0.02
20 (reference)	155.012500	0.00
30	155.012500	0.00
40	155.012500	0.00
50	155.012497	-0.02
60	155.012497	-0.02

Table 8-5: Transmitter Frequency Stability – 162.0000 MHz

Temperature (°C)	Measured Frequency (MHz)	ppm
-30	162.000007	0.04
-20	162.000006	0.04
-10	162.000005	0.03
0	162.000003	0.02
10	162.000001	0.01
20 (reference)	162.000000	0.00
30	161.999999	-0.01
40	161.999997	-0.02
50	161.999996	-0.02
60	161.999995	-0.03

Table 8-6: Transmitter Frequency Stability – 173.1875 MHz

Temperature (°C)	Measured Frequency (MHz)	ppm
-30	173.187507	0.04
-20	173.187507	0.04
-10	173.187505	0.03
0	173.187503	0.02
10	173.187501	0.01
20 (reference)	173.187500	0.00
30	173.187500	0.00
40	173.187499	-0.01
50	173.187496	-0.03
60	173.187496	-0.03

Table 8-7: Transmitter Frequency Stability – 173.9875 MHz

Temperature (°C)	Measured Frequency (MHz)	ppm
-30	173.987506	0.04
-20	173.987506	0.04
-10	173.987505	0.03
0	173.987504	0.02
10	173.987501	0.01
20 (reference)	173.987500	0.00
30	173.987499	-0.01
40	173.987496	-0.02
50	173.987496	-0.02
60	173.987495	-0.03

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

Limits:

90.213 150-174 MHz, Fixed and Base Stations 5 ppm

Note 5: In the 150–174 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.

Note 11: Paging transmitters operating on paging-only frequencies must operate with frequency stability of 5 ppm in the 150–174 MHz band and 2.5 ppm in the 421–512 MHz band.

22.355: 50-450 MHz Base, fixed: 5 ppm

80.209 (6) Band 156-162 MHz

- (i) Coast Stations: with carrier power 3-100 W: 10
- (ii) Ship stations: 5
- (iii) Survival craft stations operating on 121.5 MHz: 50
- (iv) EPIRBs: Operating on 121.500 and 243.000 MHz: 50
Operating on 156.750 and 156.800 MHz: 10

Table 8-8: Test Equipment Used for Testing Transmitter Frequency Stability

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901350	Meterman	33XR	Multimeter	040402802	10/18/2025
901773	Rohde & Schwarz	FSW-50	Spectrum Analyzer	101021	05/30/2027
901014	Kikusui	PCR4000L	Power Supply	DB001921	Not Required
900946	Tenney Engineering	TH65	Temperature Chamber with Humidity	11500	06/23/2026
901291	Pasternack	PE7031-20	20 dB 300 W Attenuator	901291	02/08/2026
901355	JFW Industries	50FH-003-300	300W 3DB DC1000 MHz Attenuator	N/A	03/23/2026
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	10/13/2026

Test Personnel:

Daniel W. Baltzell EMC Test Engineer	 Signature	August 7 & September 17, 2025 Dates of Test
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8.2.1 Frequency Stability/Voltage Variation

Table 8-9: Frequency Stability/Voltage Variation – 150.0625 MHz

Voltage (VDC)	Measured Frequency (MHz)	ppm
40.8	150.062500	0.00
48.(reference)	150.062500	0.00
55.2	150.062500	0.00

Table 8-10: Frequency Stability/Voltage Variation – 154.0125 MHz

Voltage (VDC)	Measured Frequency (MHz)	ppm
40.8	154.012500	0.00
48.(reference)	154.012500	0.00
55.2	154.012500	0.00

Table 8-11: Frequency Stability/Voltage Variation – 155.0125 MHz

Voltage (VDC)	Measured Frequency (MHz)	ppm
40.8	155.012500	0.00
48.(reference)	155.012500	0.00
55.2	155.012500	0.00

Table 8-12: Frequency Stability/Voltage Variation – 162.0000 MHz

Voltage (VDC)	Measured Frequency (MHz)	ppm
40.8	162.000000	0.00
48.(reference)	162.000000	0.00
55.2	162.000000	0.00

Table 8-13: Frequency Stability/Voltage Variation – 173.1875 MHz

Voltage (VDC)	Measured Frequency (MHz)	ppm
40.8	173.187500	0.00
48.(reference)	173.187500	0.00
55.2	173.187500	0.00

Table 8-14: Frequency Stability/Voltage Variation – 173.9875 MHz

Voltage (VDC)	Measured Frequency (MHz)	ppm
40.8	173.987500	0.00
48.(reference)	173.987500	0.00
55.2	173.987501	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 8-15: Test Equipment Used For Testing Frequency Stability/Voltage Variation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901350	Meterman	33XR	Multimeter	040402802	10/18/2025
901773	Rohde & Schwarz	FSW-50	Spectrum Analyzer	101021	05/30/2027
901014	Kikusui	PCR4000L	Power Supply	DB001921	Not Required
900946	Tenney Engineering	TH65	Temperature Chamber with Humidity	11500	06/23/2026
901291	Pasternack	PE7031-20	20 dB 300 W Attenuator	901291	02/08/2026
901355	JFW Industries	50FH-003-300	300W 3DB DC1000 MHz Attenuator	N/A	03/23/2026
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	10/13/2026

Test Personnel:

Daniel W. Baltzell EMC Test Engineer	 Signature	August 7 & September 17, 2025 Dates of Test
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9 FCC 74.462(c), 90.214: Transient Frequency Behavior

9.1 Test Procedure

ANSI C63.26-2015, section 6.5.2.2. Transmitter plots were taken with the radio set at high power.

When a transmitter is turned on, the radio frequency may take some time to stabilize. During this initial period, the frequency error or frequency difference (i.e., between the instantaneous and the steady state frequencies) shall not exceed the limits specified in Table 18.

Table 18 – Transient Frequency Behavior

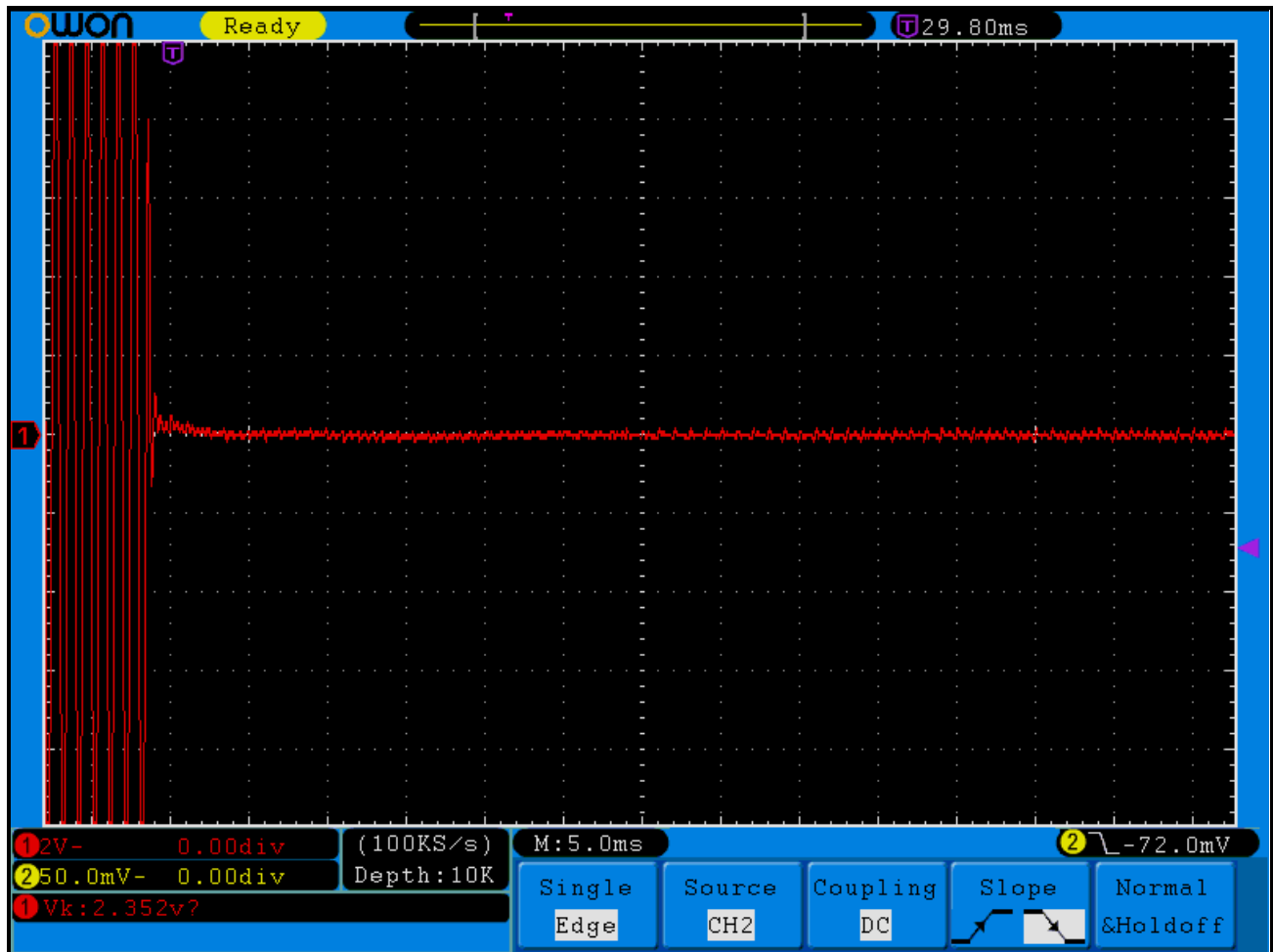
Channel Bandwidth (kHz)	Time Intervals (Notes 1, 2)	Maximum Frequency Difference (kHz)	Transient Duration Limit (ms)	
			150-174 MHz	406.1-512 MHz
25	t_1	± 25	5	10
	t_2	± 12.5	20	25
	t_3	± 25	5	10
12.5	t_1	± 12.5	5	10
	t_2	± 6.25	20	25
	t_3	± 12.5	5	10
6.25	t_1	± 6.25	5	10
	t_2	± 3.125	20	25
	t_3	± 6.25	5	10

9.2 Test Data

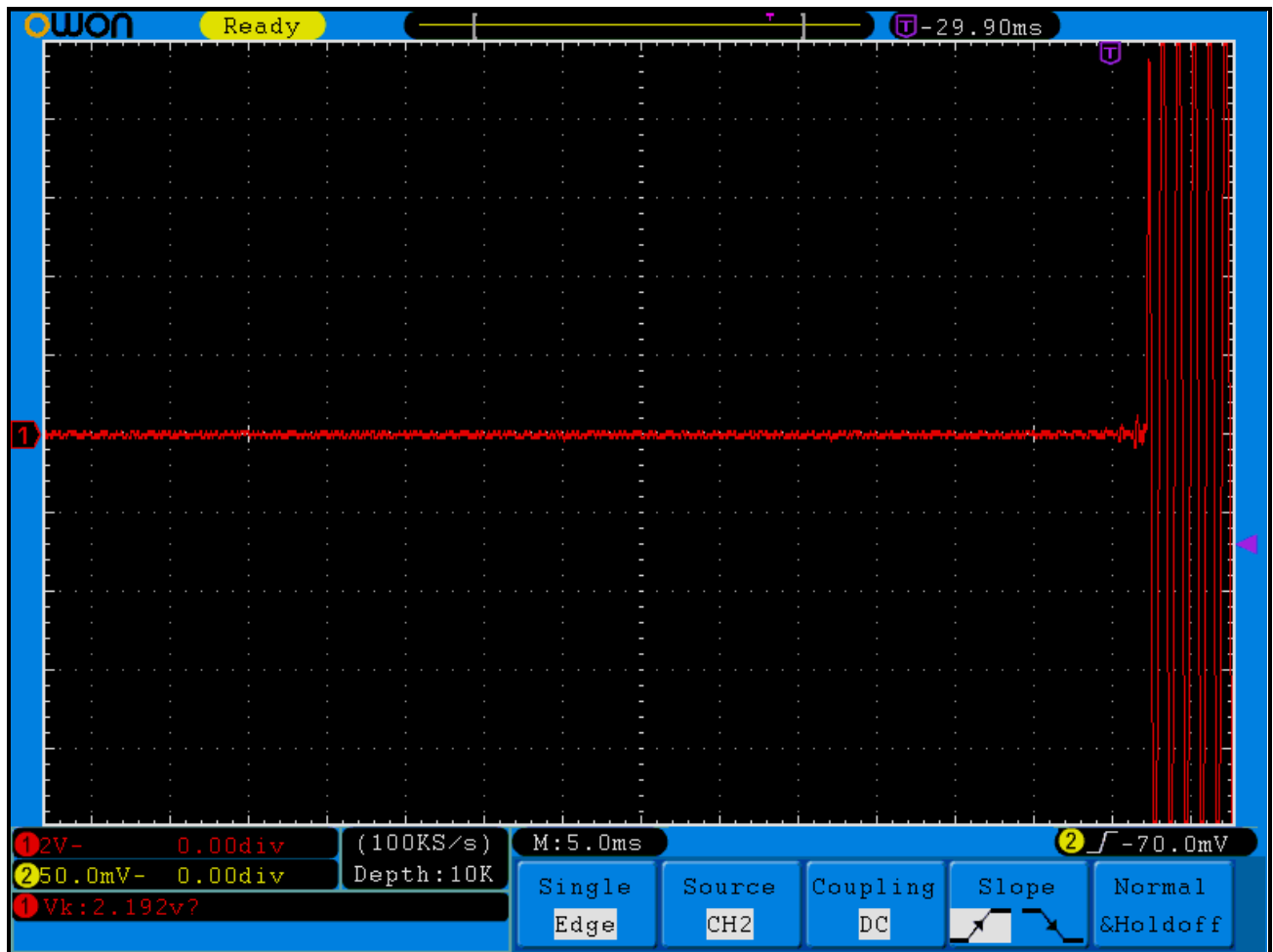
Table 9-1: Environmental Conditions

Date	Temperature (°C)	Humidity (%)	Atmospheric Pressure (kPa)
August 6, 2025	23.6	43	101.7"
September 22, 2025	26.8	59	29.66"

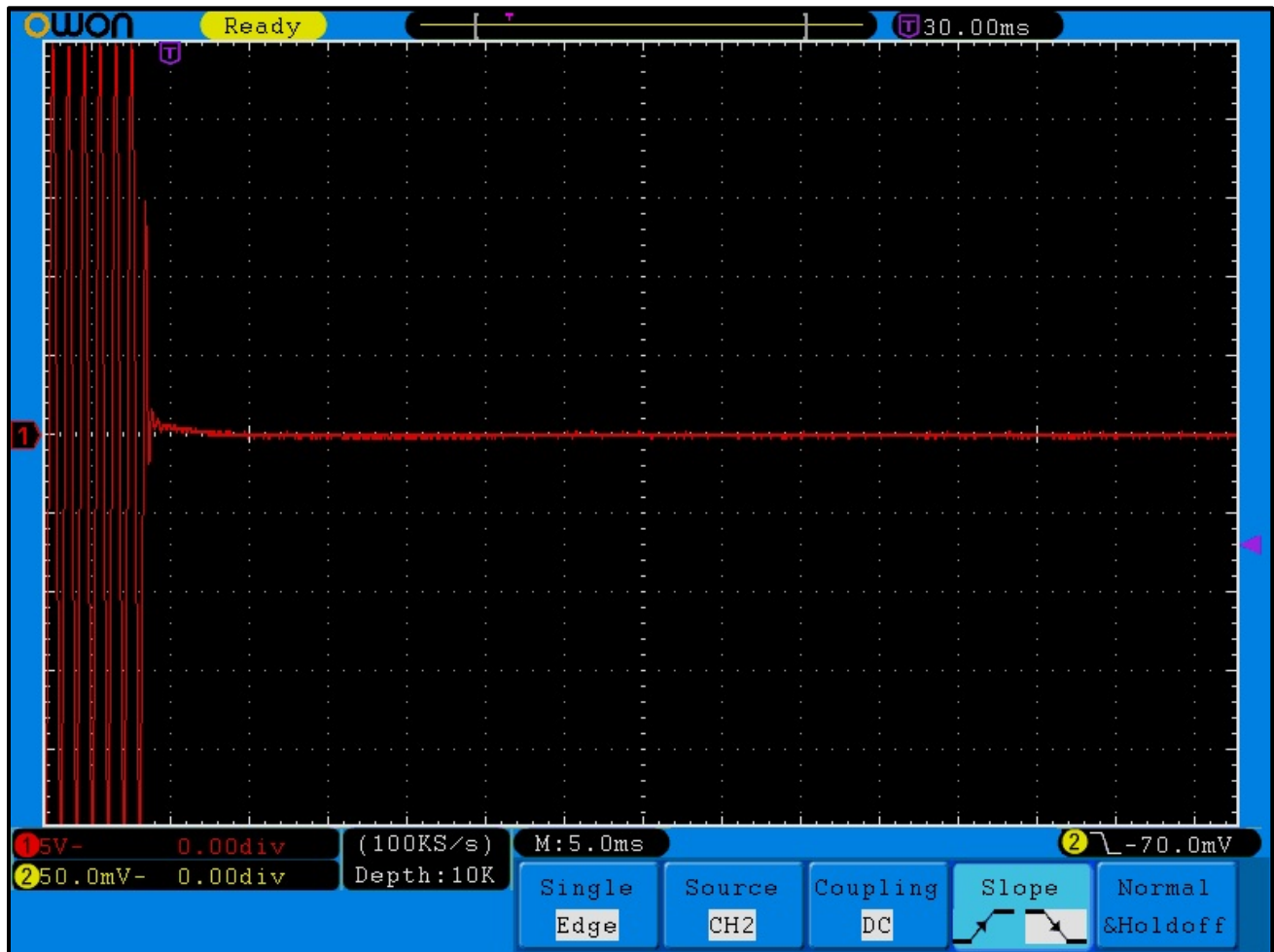
Plot 9-1: Transient Frequency Behavior – 150.0625 MHz; ON Time; Narrowband



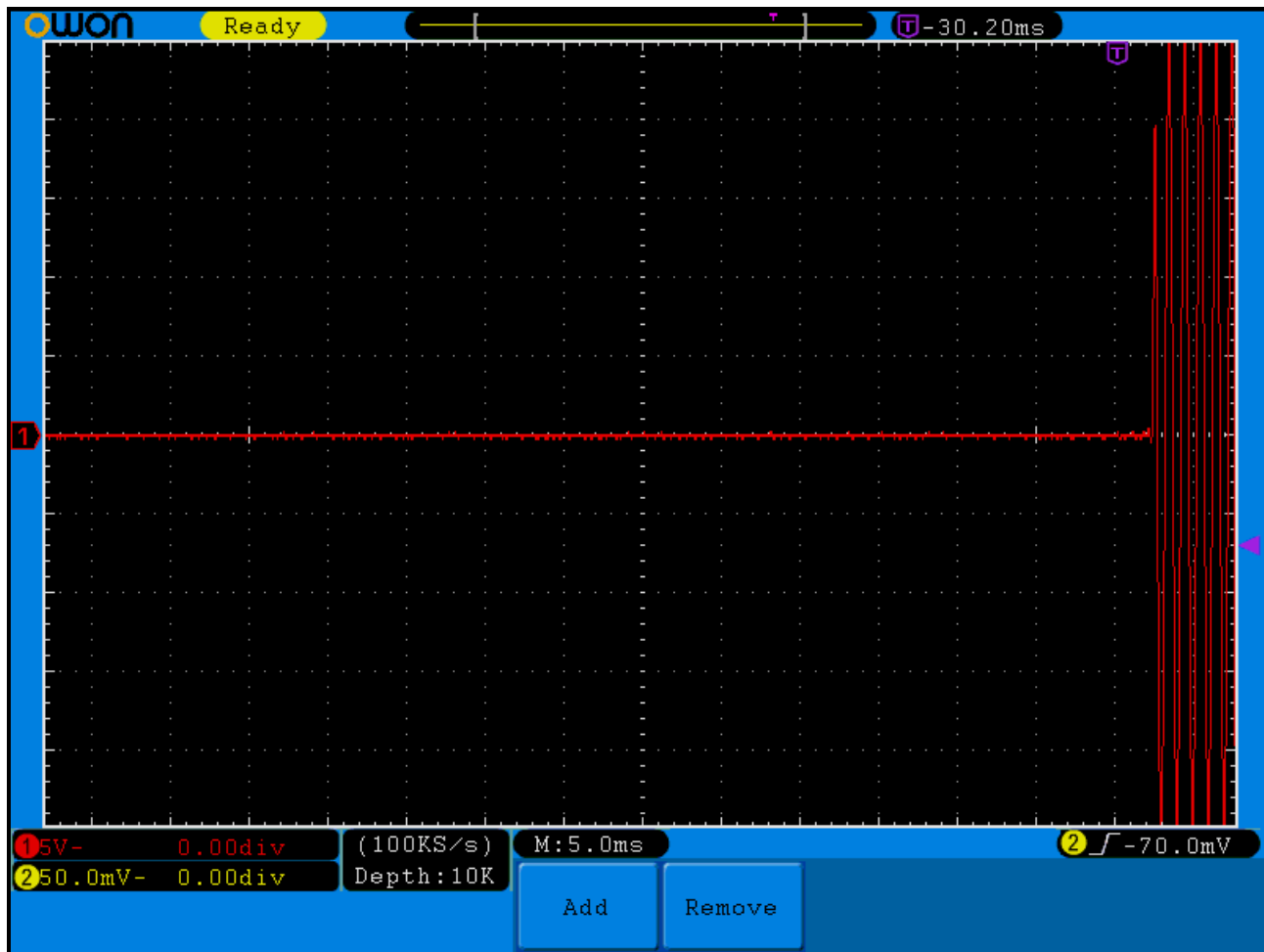
Plot 9-2: Transient Frequency Behavior – 150.0625 MHz; OFF Time; Narrowband



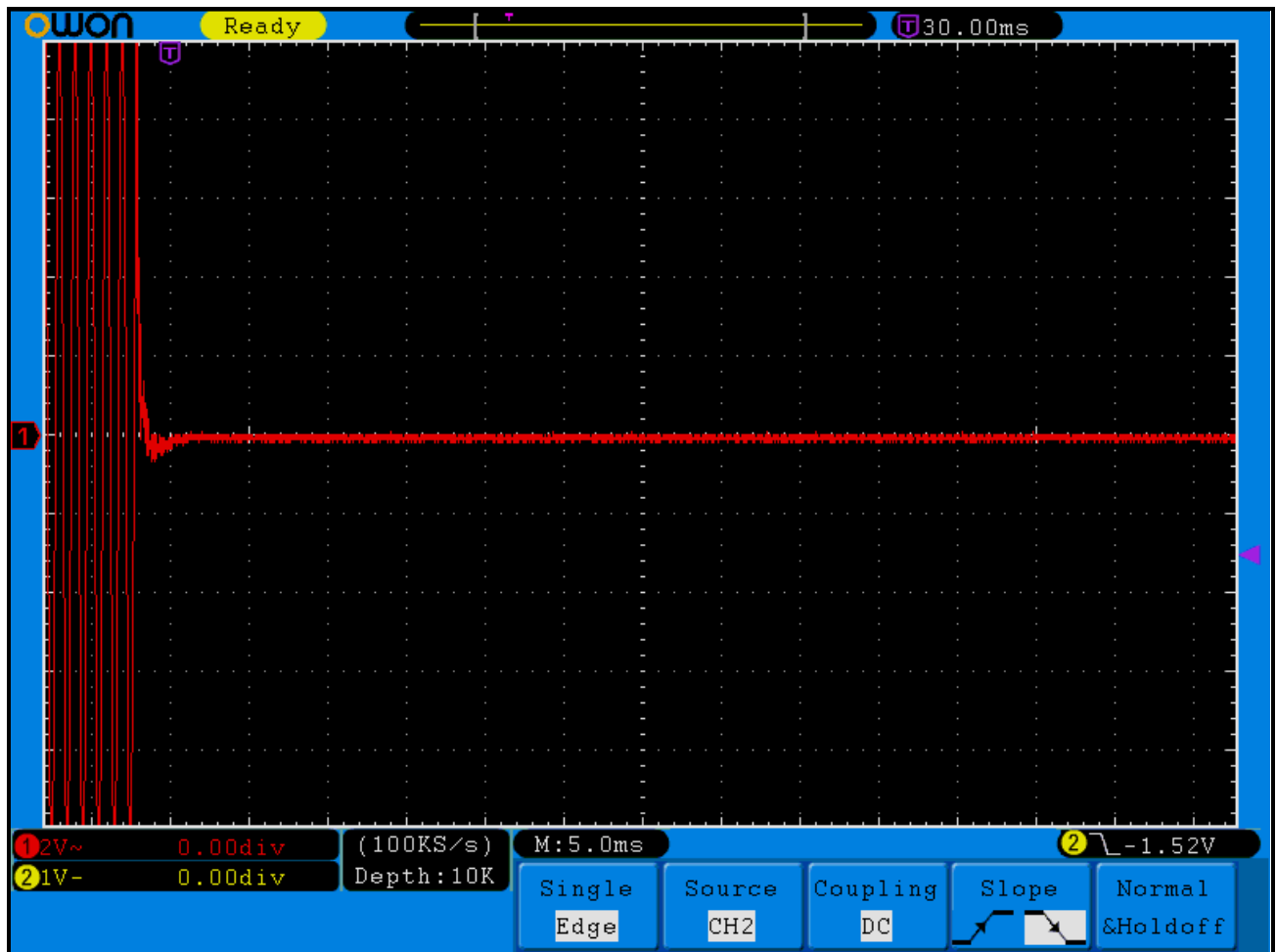
Plot 9-3: Transient Frequency Behavior – 150.0625 MHz; ON Time; Wideband



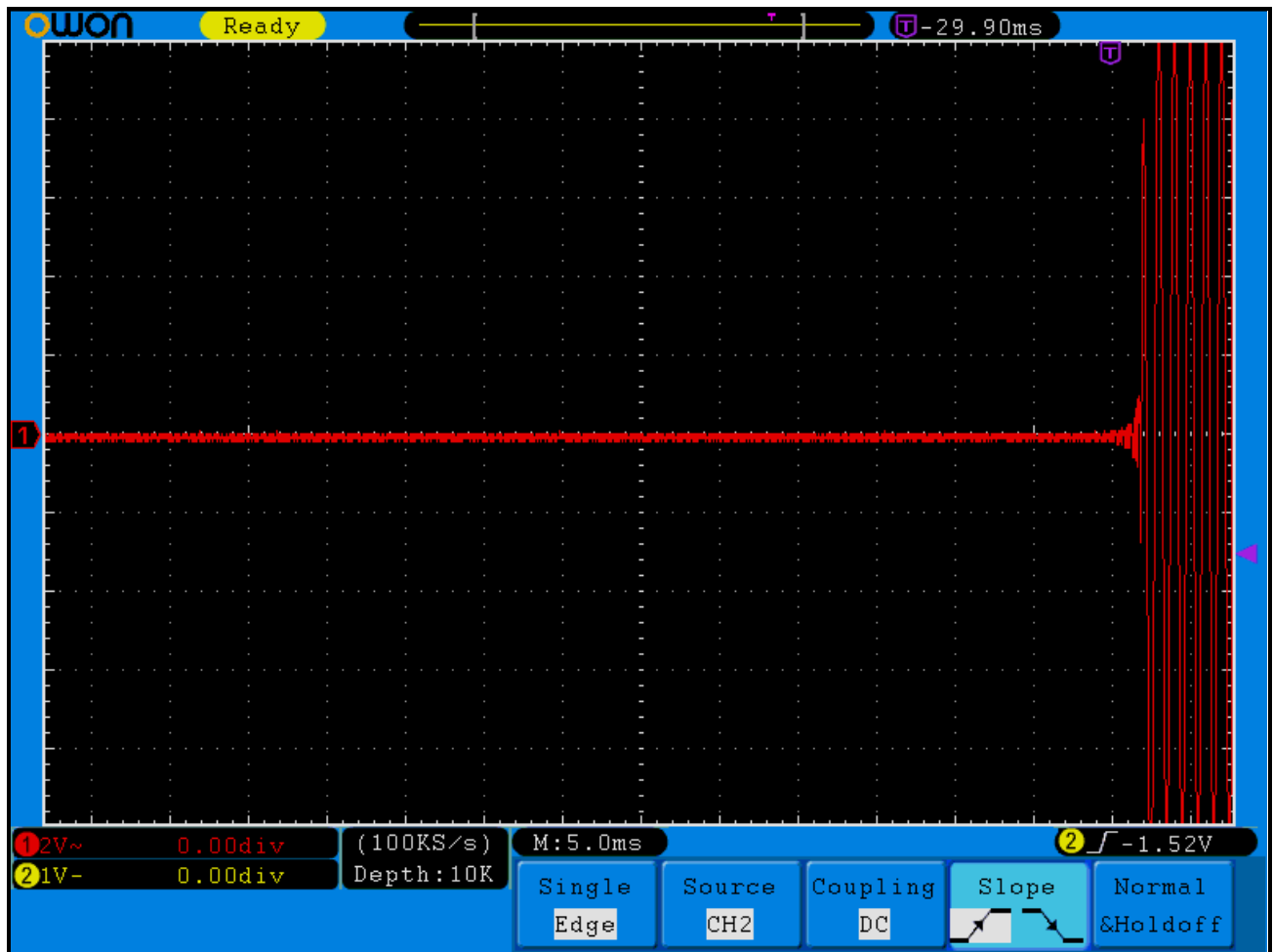
Plot 9-4: Transient Frequency Behavior – 150.0625 MHz; OFF Time; Wideband



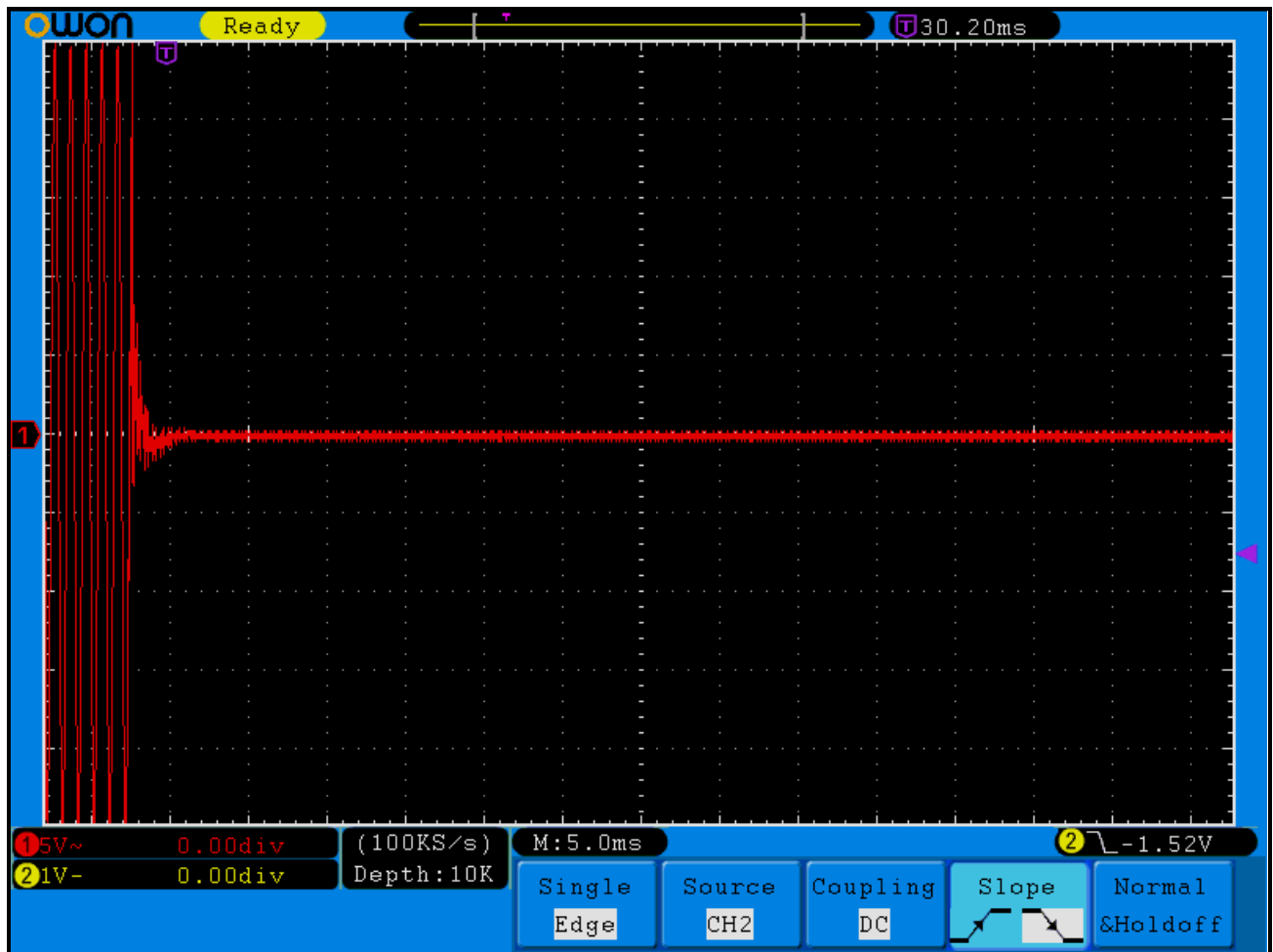
Plot 9-5: Transient Frequency Behavior – 154.0125 MHz; ON Time; Narrowband



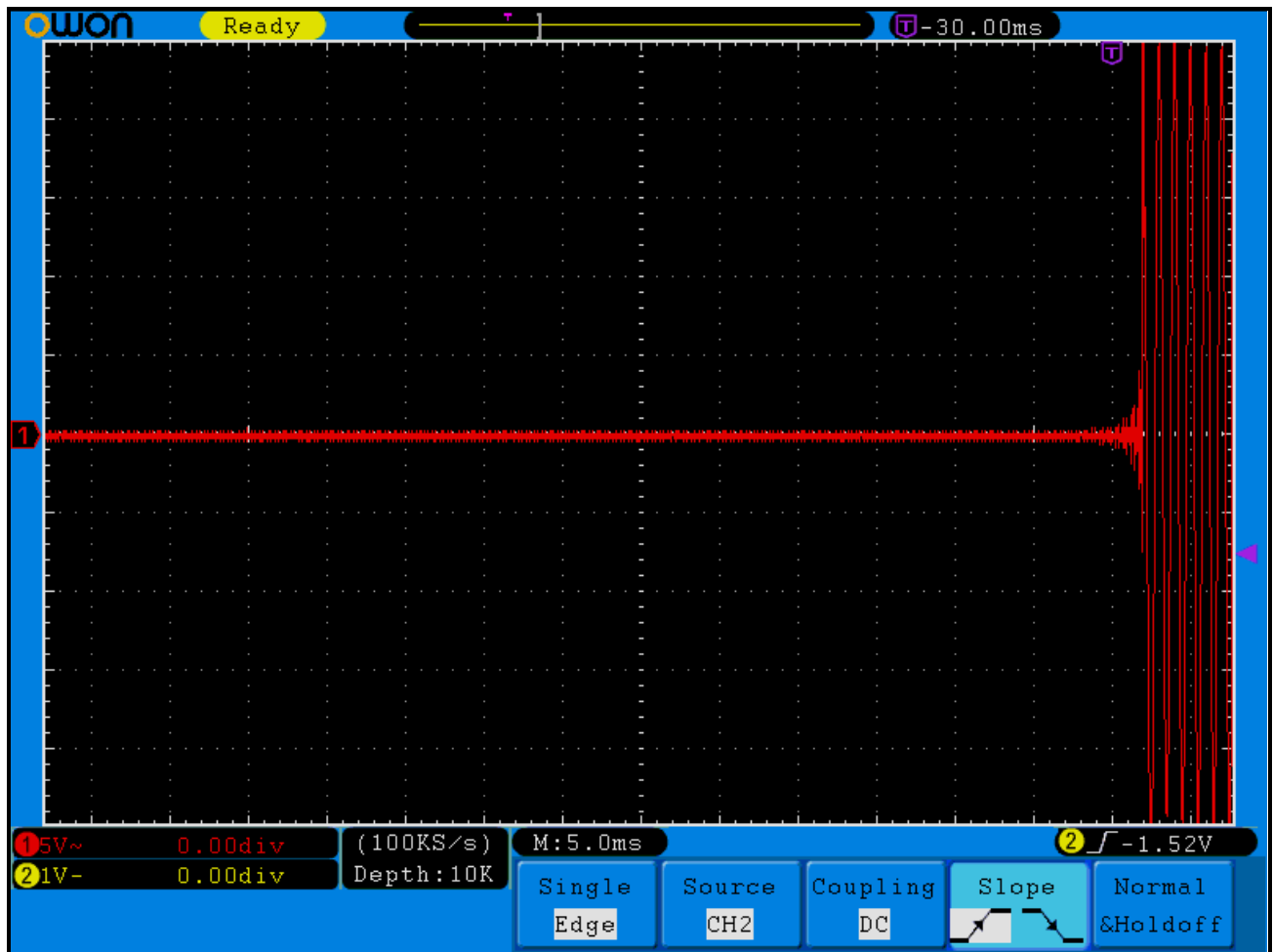
Plot 9-6: Transient Frequency Behavior – 154.0125 MHz; OFF Time; Narrowband



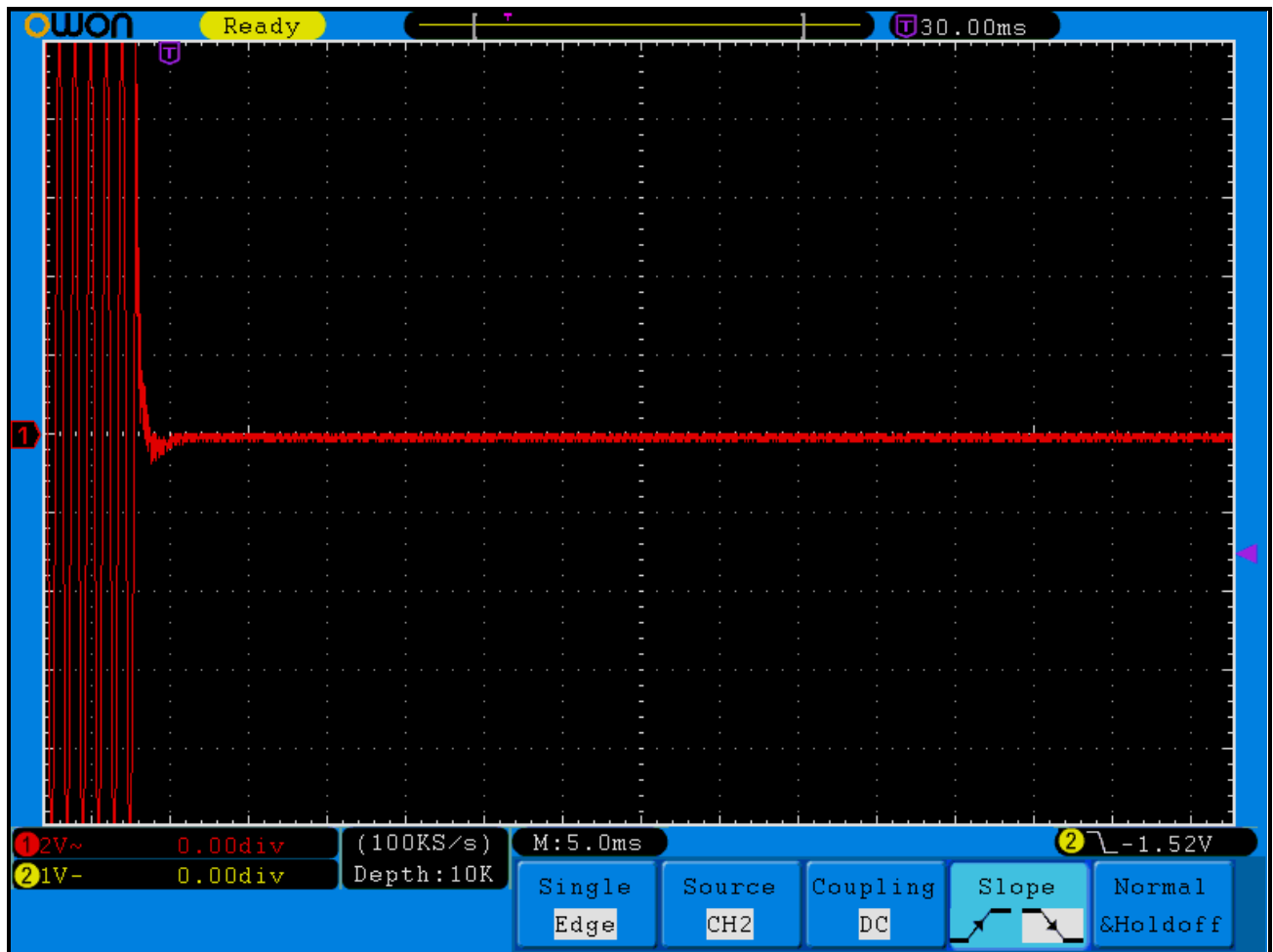
Plot 9-7: Transient Frequency Behavior – 154.0125 MHz; ON Time; Wideband



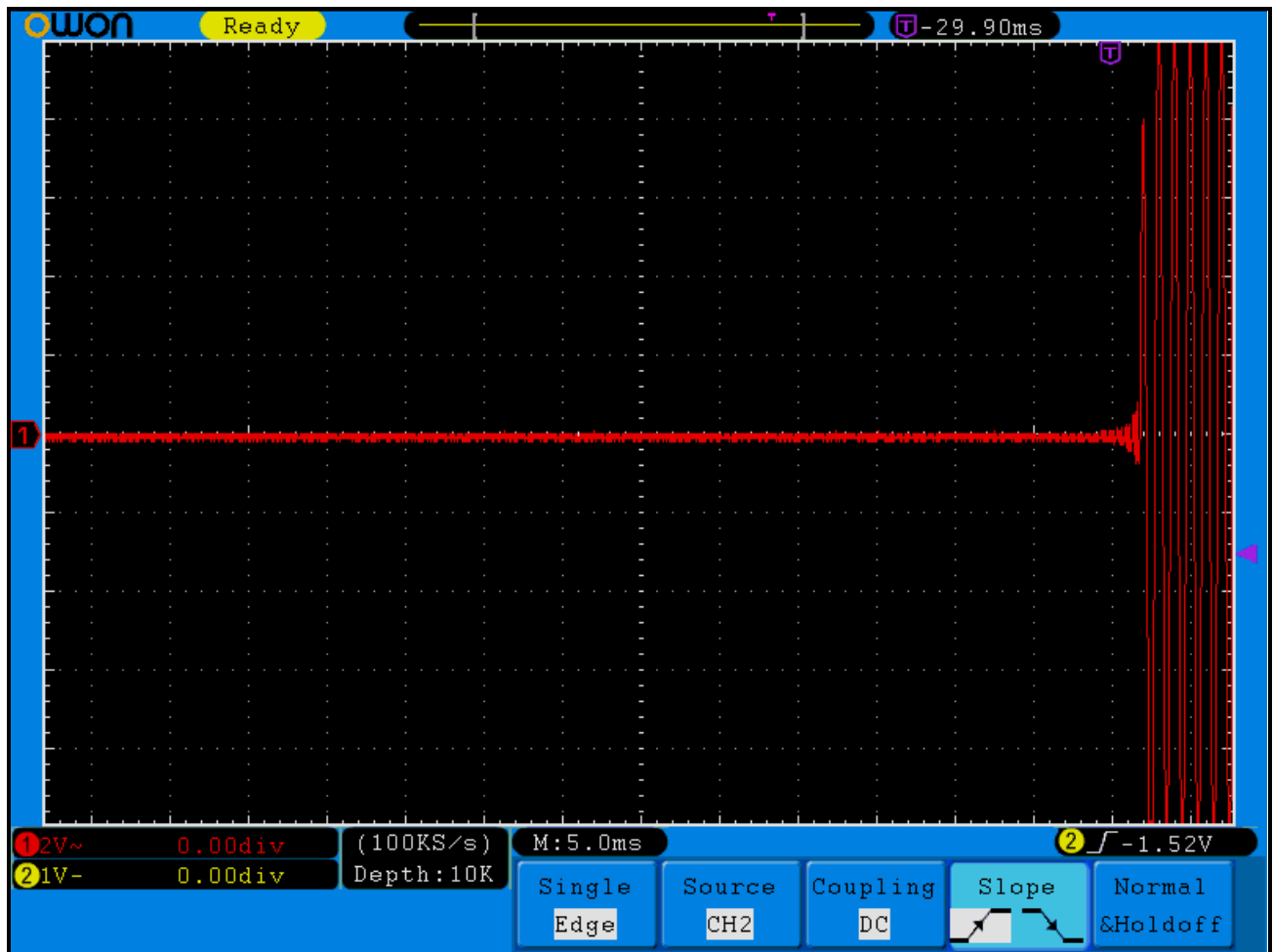
Plot 9-8: Transient Frequency Behavior – 154.0125 MHz; OFF Time; Wideband



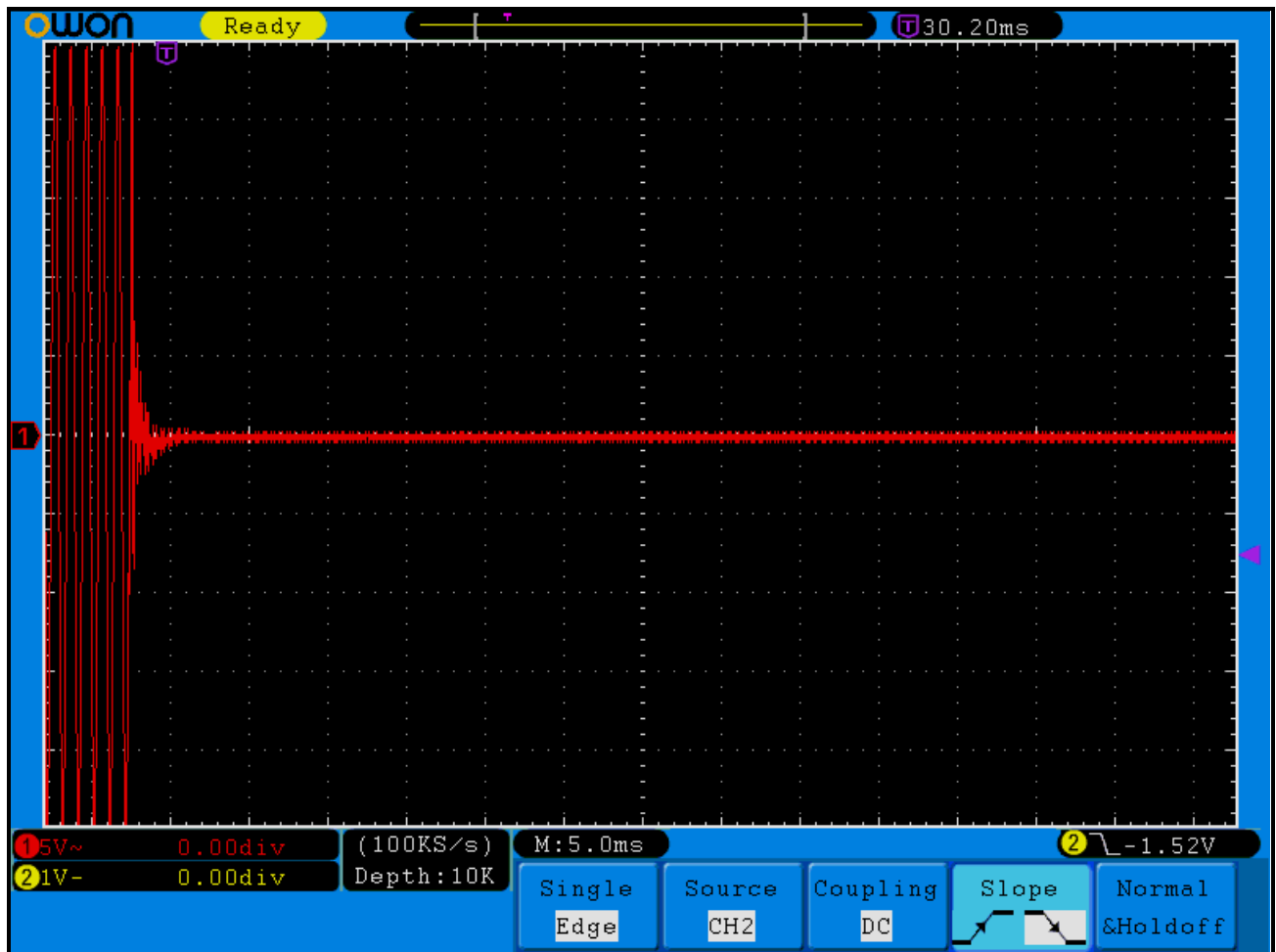
Plot 9-9: Transient Frequency Behavior – 155.0125 MHz; ON Time; Narrowband



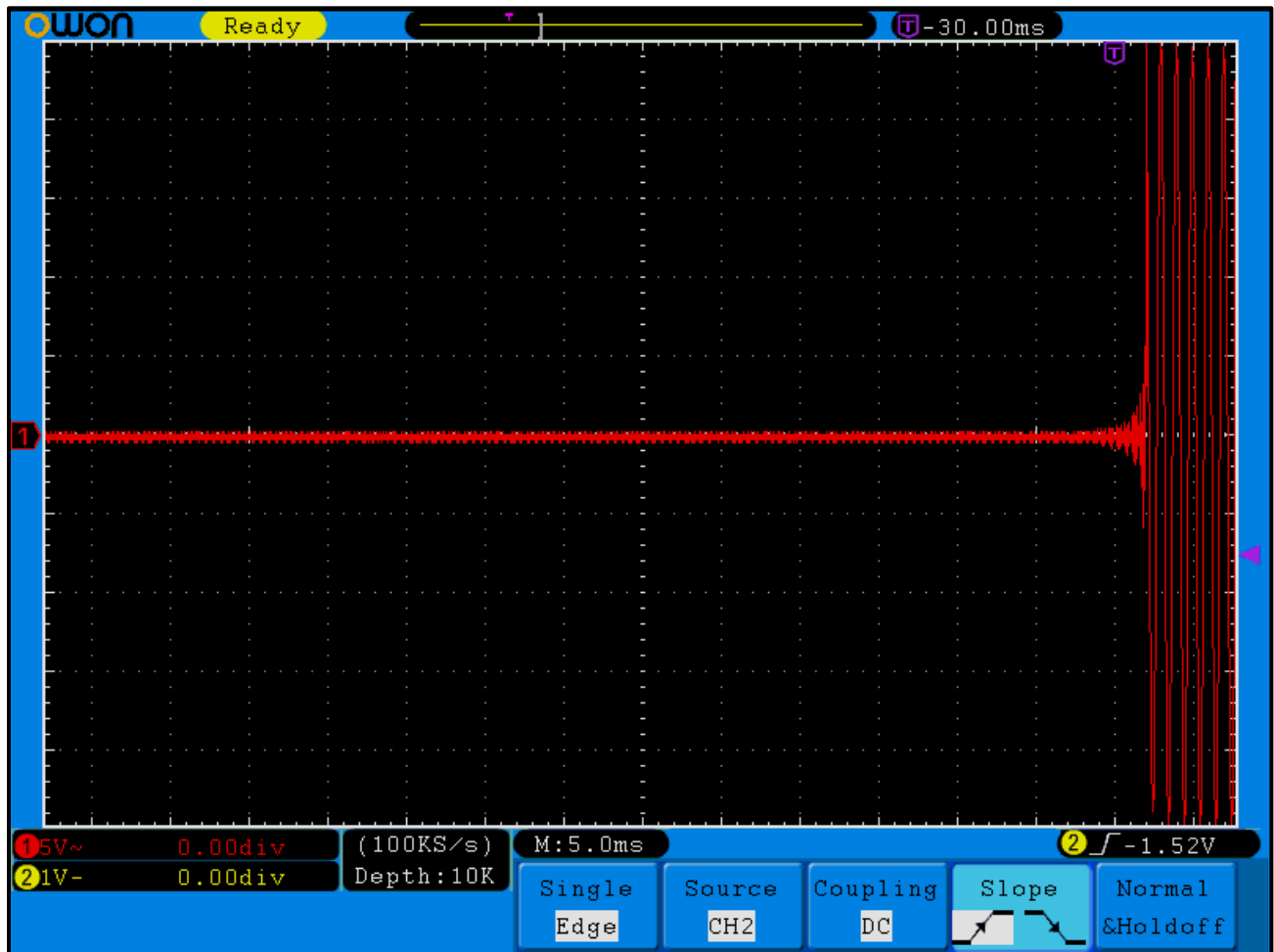
Plot 9-10: Transient Frequency Behavior – 155.0125 MHz; OFF Time; Narrowband



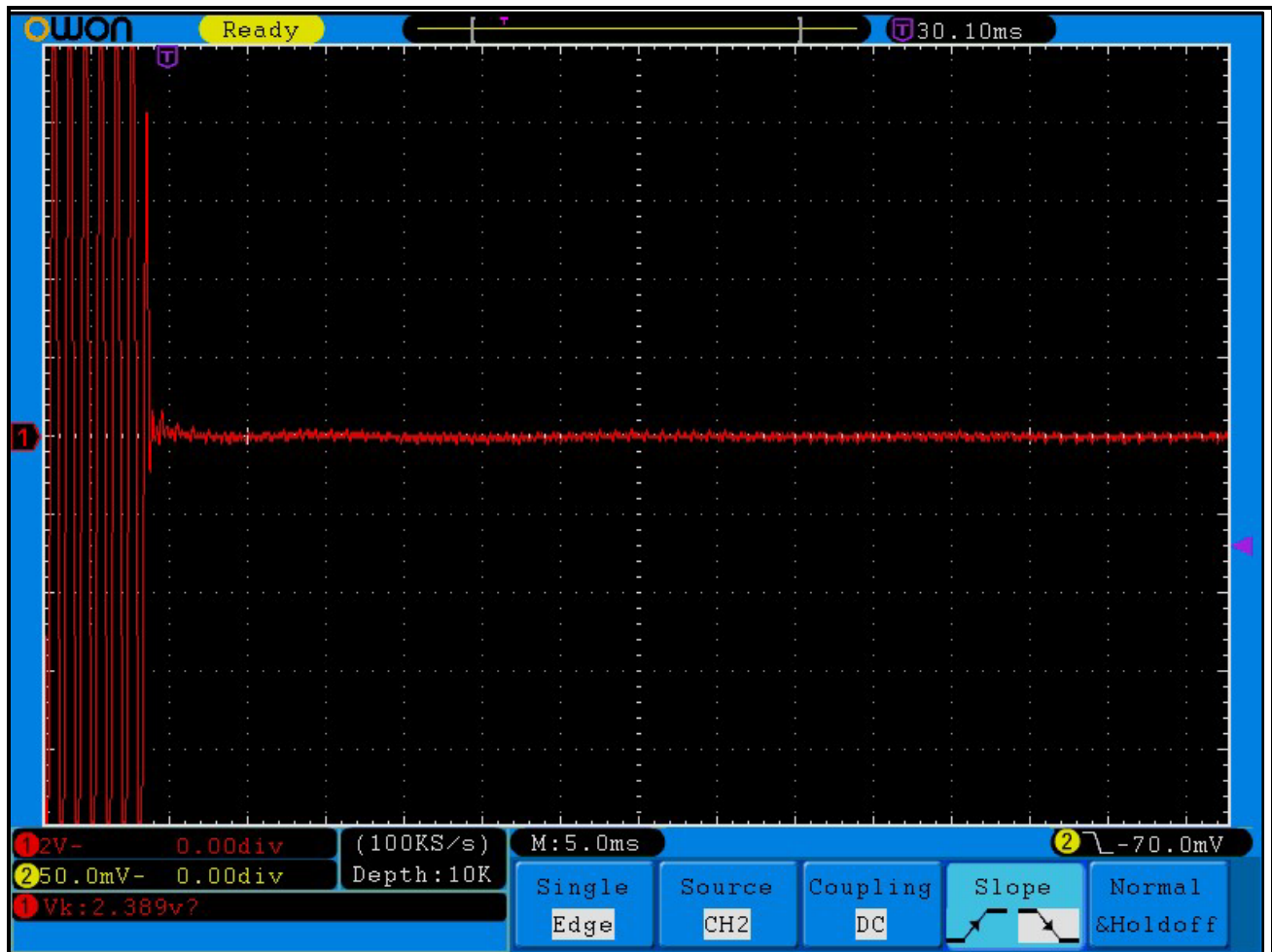
Plot 9-11: Transient Frequency Behavior – 155.0125 MHz; ON Time; Wideband



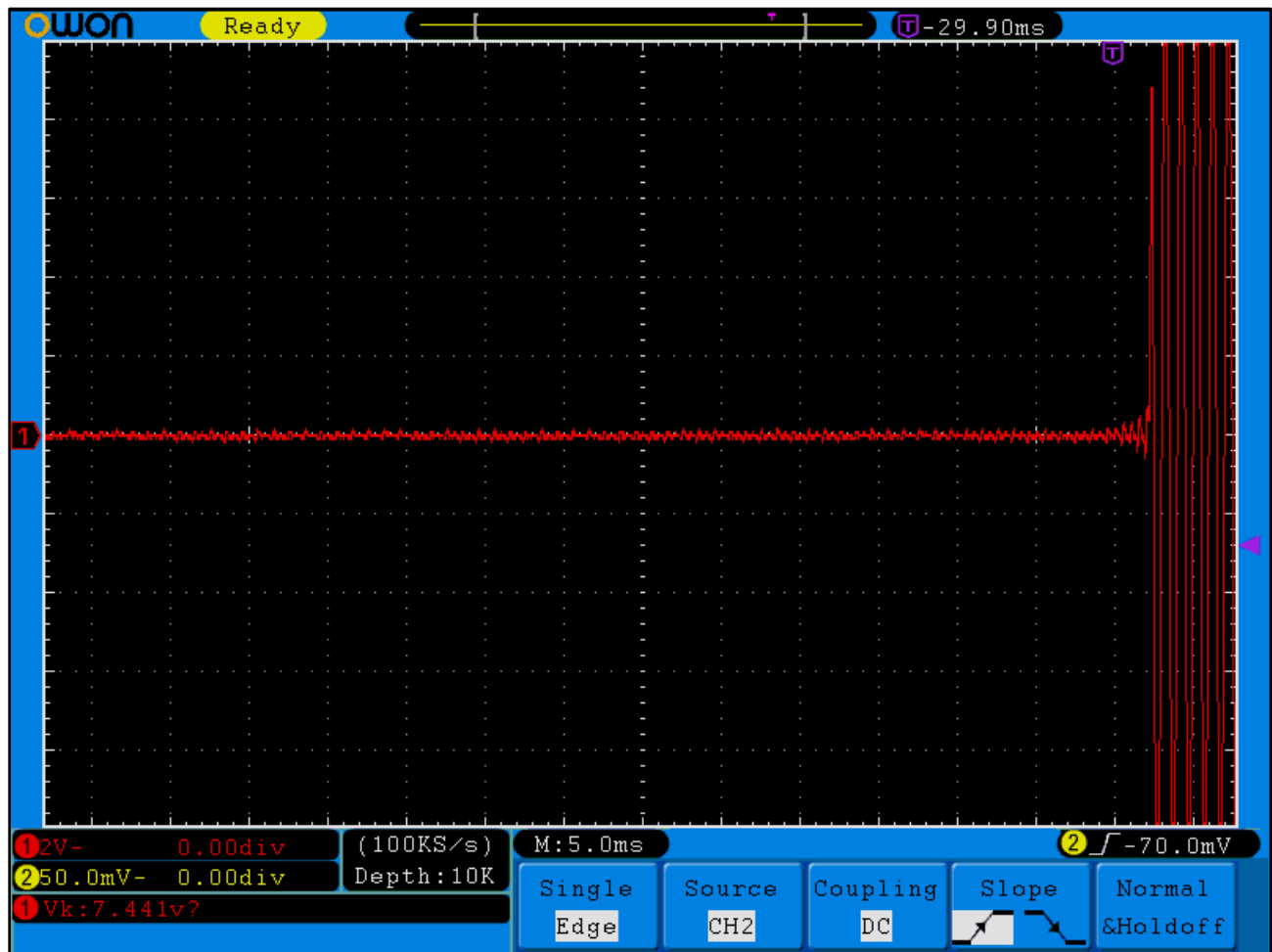
Plot 9-12: Transient Frequency Behavior – 155.0125 MHz; OFF Time; Wideband



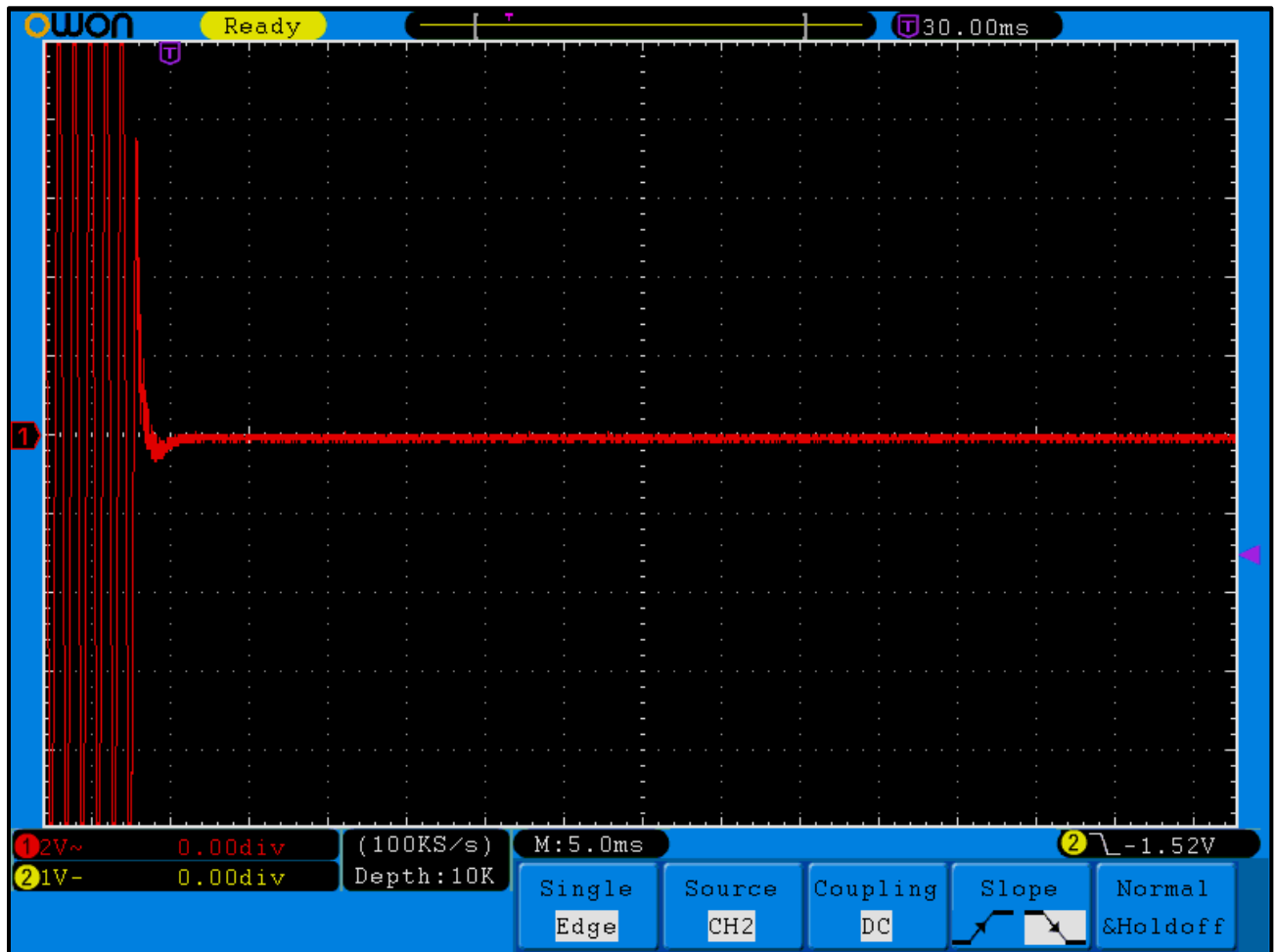
Plot 9-13: Transient Frequency Behavior – 162.0000 MHz; ON Time; Narrowband



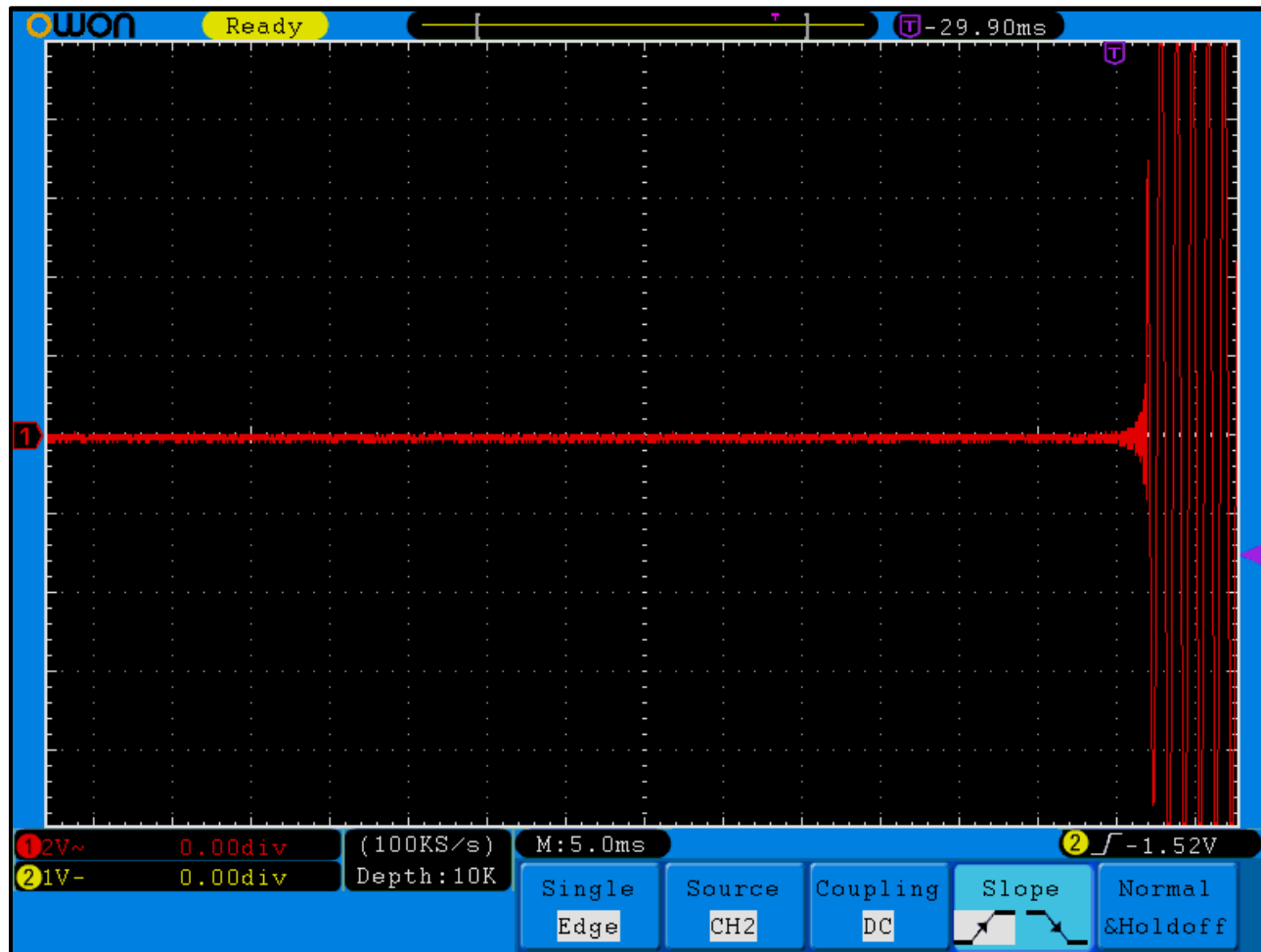
Plot 9-14: Transient Frequency Behavior – 162.0000 MHz; OFF Time; Narrowband



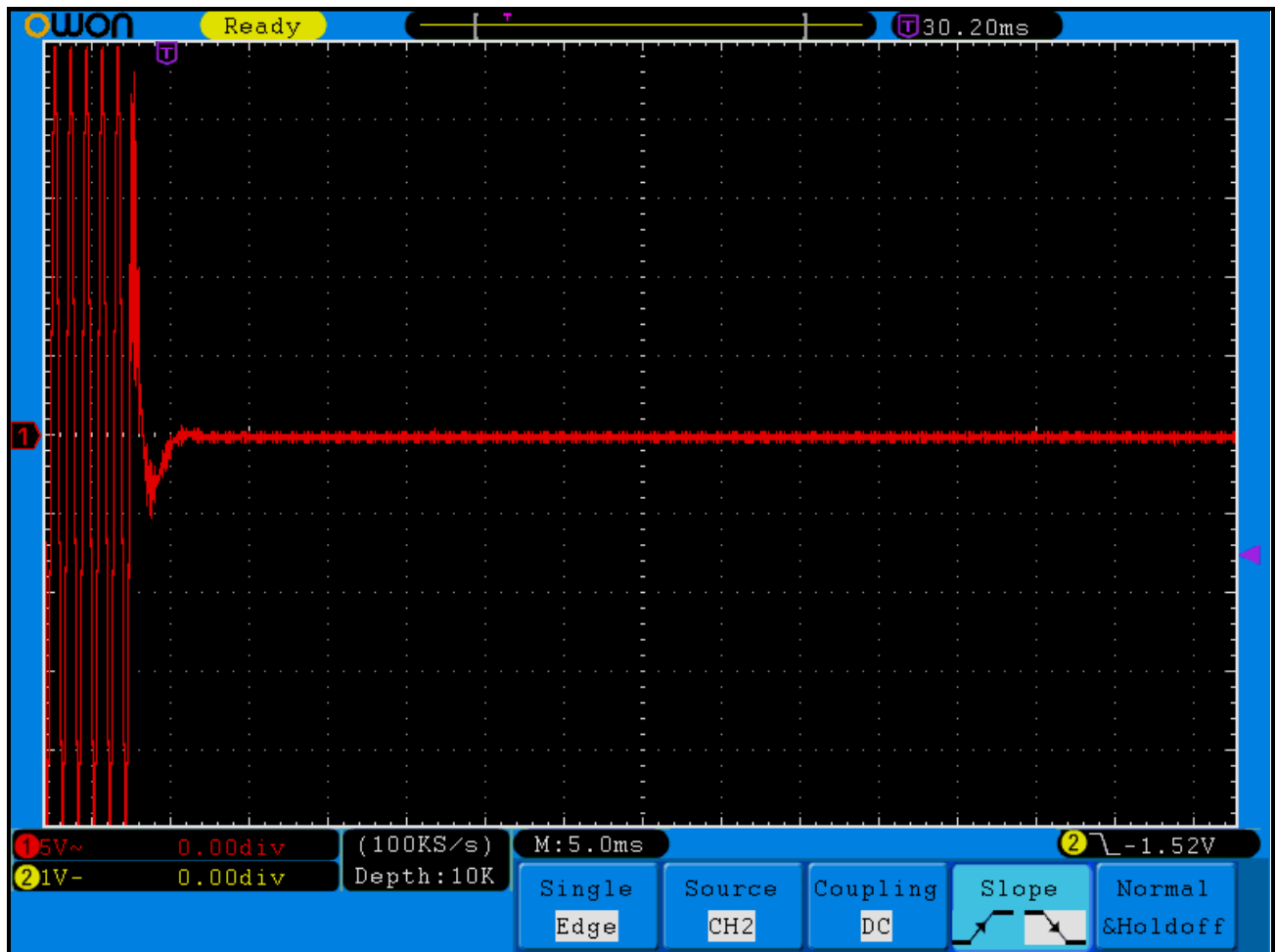
Plot 9-15: Transient Frequency Behavior – 173.1875 MHz; ON Time; Narrowband



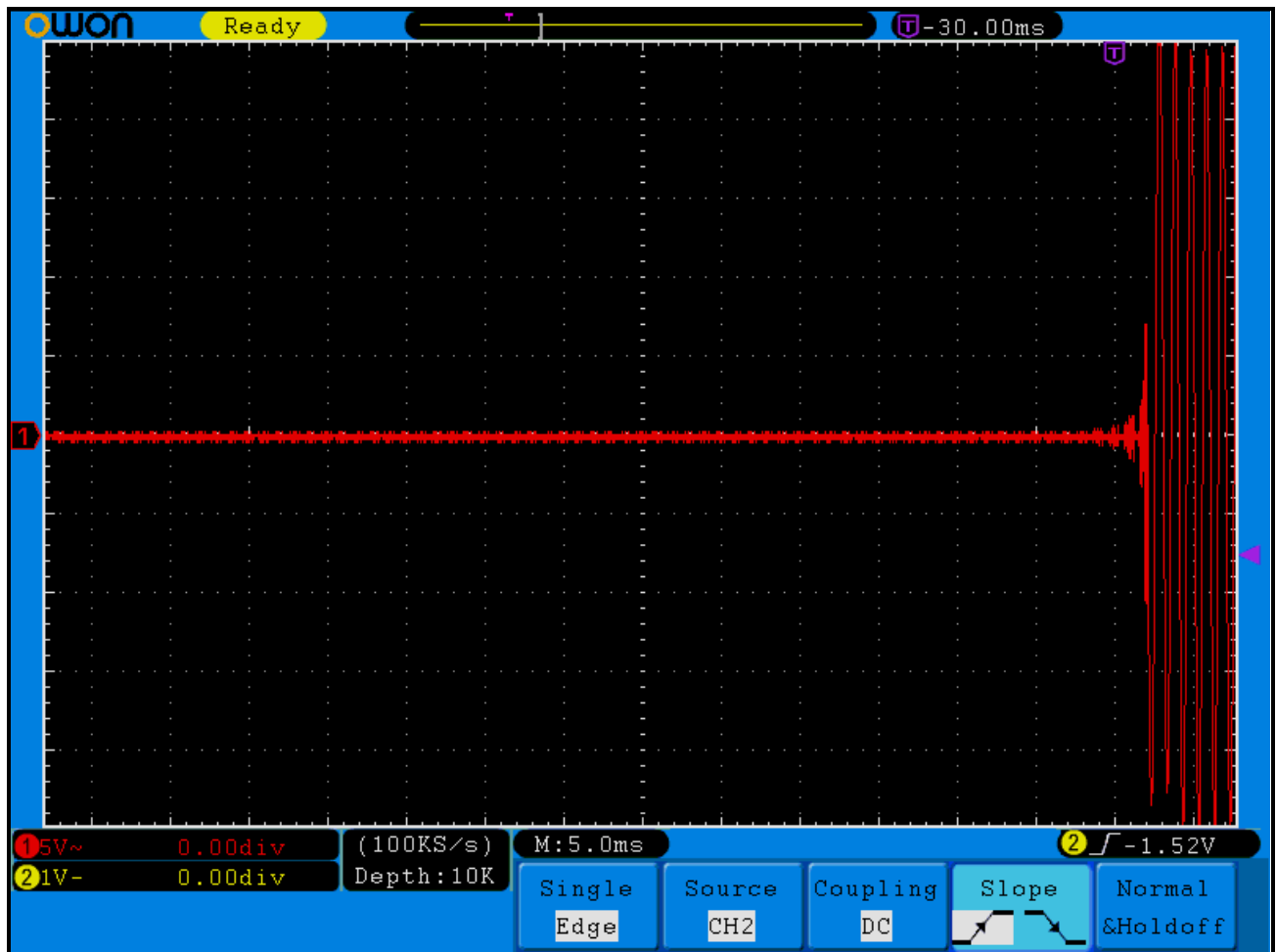
Plot 9-16: Transient Frequency Behavior – 173.1875 MHz; OFF Time; Narrowband



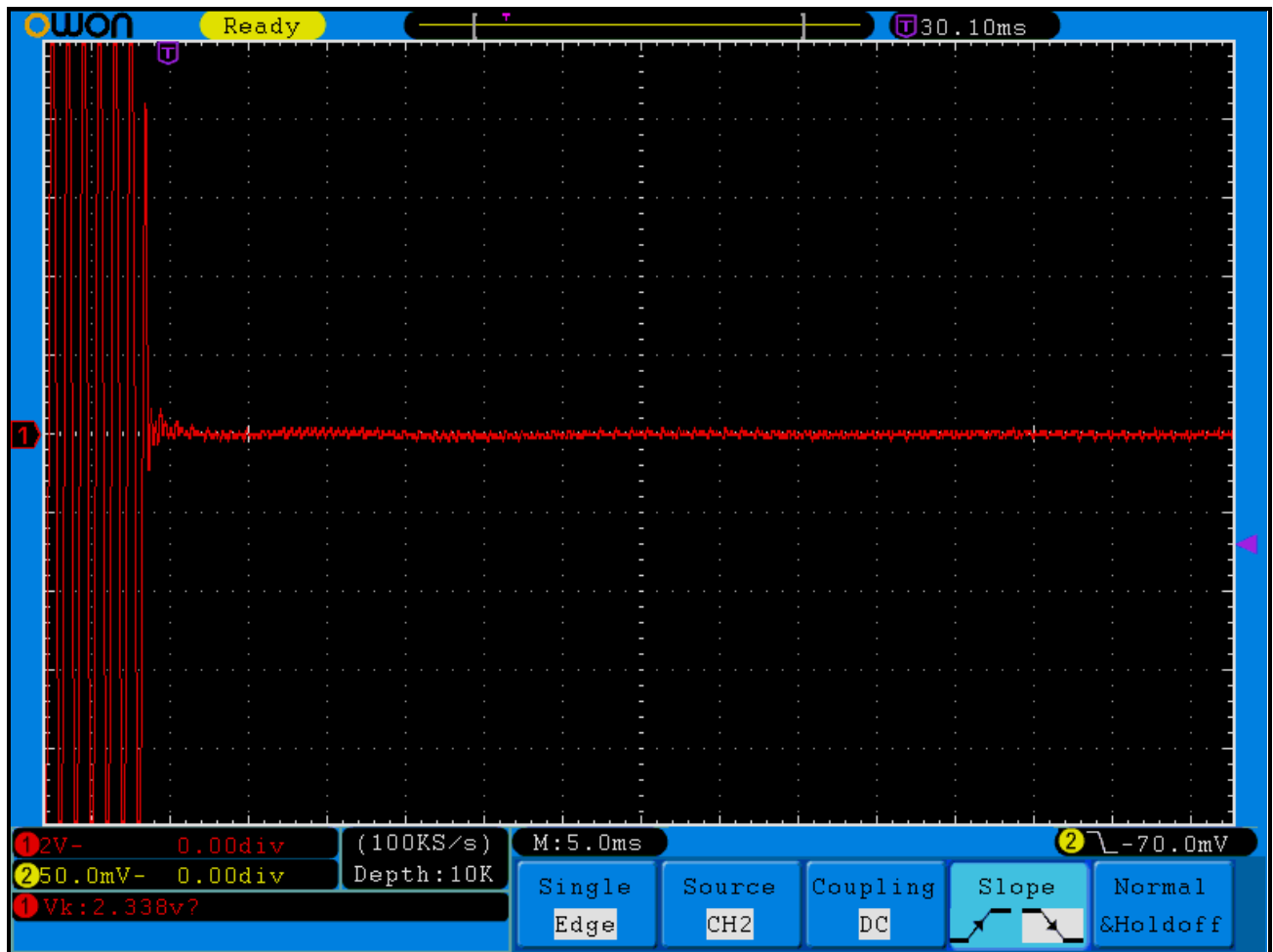
Plot 9-17: Transient Frequency Behavior – 173.1875 MHz; ON Time; Wideband



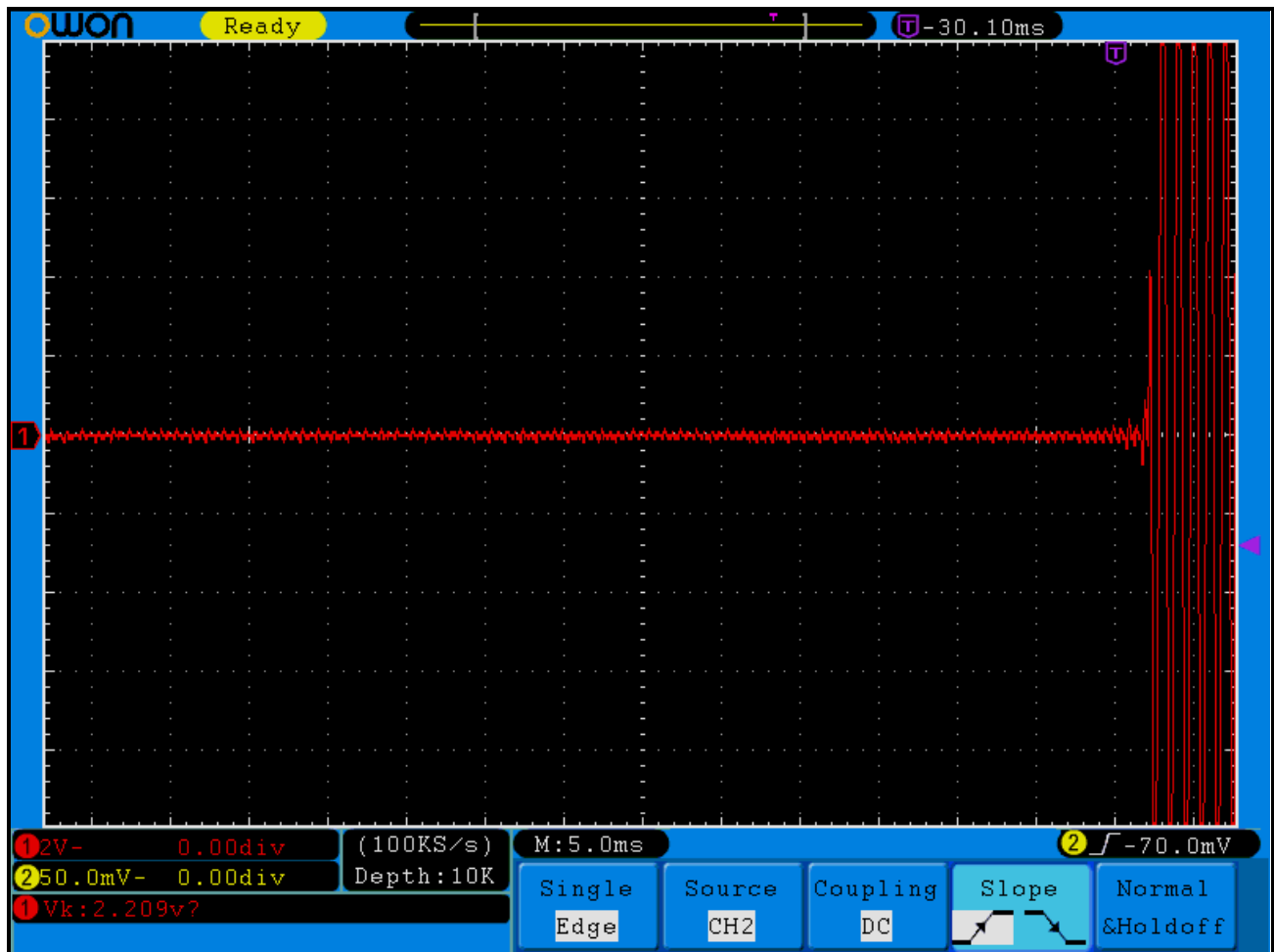
Plot 9-18: Transient Frequency Behavior – 173.1875 MHz; OFF Time; Wideband



Plot 9-19: Transient Frequency Behavior – 173.9875 MHz; ON Time; Narrowband



Plot 9-20: Transient Frequency Behavior – 173.9875 MHz; OFF Time; Narrowband



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/ ± 0.8 dB

Results: Pass

Table 9-2: Test Equipment Used For Testing Transient Frequency Behavior

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900917	Hewlett Packard	8648A	Signal Generator	3537A01741	08/16/2026
901118	Hewlett Packard	HP8901B	Modulation Analyzer (150 kHz–1300 MHz)	2406A00178	11/02/2025
901778	Tektronix	DPO3052	Oscilloscope	C010197	05/14/2027
901643	RF-Lambda	RFLT2W0002 GN	Power Divider	11140907	12/02/2025
901463	Werlatone Inc.	C1795	Directional coupler, 100W, 40 dB, 1-1000 MHz	4067	03/22/2026
901263	Agilent	.01-12 GHz	SMA Detector	2936A05505	Not Required
901338	Weinschel Corp.	46-40-34	Attenuator 40 dB, 25W	BM0556	02/27/2026
901235	IW Microwave Products	KPS-1503-360-KPS	High Frequency RF Cables	36"	10/03/2025
901291	Pasternack	PE7031-20	20 dB 300 W Attenuator	901291	02/08/2026
901355	JFW Industries	50FH-003-300	300W 3DB DC1000 MHz Attenuator	N/A	03/23/2026
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	10/13/2026

Test Personnel:

Daniel W. Baltzell
EMC Test Engineer



Signature

August 6 & September 22, 2025
Dates of Test

10 Necessary Bandwidth and Emission Bandwidth

WCQPSK

Calculation:

Data rate in bps (R) = 9600

Peak deviation of carrier (D) = 1800

$B_n = [9600/\log_2(4) + 2 (1800) (1.362)] = 9.7 \text{ kHz}$

Emission designator: 9K70D1W

HDQPSK

Calculation:

Data rate in bps (R) = 12000

Peak deviation of carrier (D) = 2250

$B_n = [12000/\log_2(4) + 2 (2250) (0.841)] = 9.8 \text{ kHz}$

Emission designator: 9K80D7W

11 Conclusion

The data in this measurement report shows that the L3Harris Technologies Model Two47 VHF-H, FCC ID: OWDTR-0175-E, complies with the applicable requirements of FCC parts 22, 74, 80, and 90.