



Test Report Serial Number:

45461998 r1.0

Test Report Date:

24 February 2025

Project Number:

1675

EMC Test Report - C2PC

Applicant:



4RF Limited
PO Box 13-506
Wellington 6440
New Zealand

FCC ID:

UIPSQ928M141

Product Model Number / HVIN

SQ928M141

Product Name / PMN

Aprisa SR+ 928

In Accordance With:

FCC 47 CFR Part 90

Private Land Mobile Radio Service

Approved By:

Ben Hewson, President

Celltech Labs Inc.
21-364 Lougheed Rd.
Kelowna, BC, V1X 7R8
Canada



Test Lab Certificate: 2470.01



**Industry
Canada**

IC Registration 3874A



FCC Registration: CA3874

This report shall not be reproduced in any form without the expressed written consent of Celltech Labs Inc.

© 2025 Celltech Labs Inc.

Table of Contents

1.0 REVISION HISTORY	5
2.0 CLIENT AND DUT INFORMATION	6
3.0 SCOPE.....	7
4.0 TEST RESULT SUMMARY	8
5.0 NORMATIVE REFERENCES	9
6.0 FACILITIES AND ACCREDITATIONS	10
7.0 CONDUCTED OUTPUT POWER.....	11
8.0 OCCUPIED BANDWIDTH	18
9.0 CONDUCTED SPURIOUS EMISSIONS – EMISSIONS MASK.....	28
10.0 CONDUCTED SPURIOUS EMISSIONS TO 10 TH HARMONIC	50
11.0 RADIATED TX SPURIOUS EMISSIONS	59
12.0 RADIATED RX SPURIOUS EMISSIONS	79
APPENDIX A – TEST SETUP DRAWINGS AND EQUIPMENT	95
APPENDIX B – EQUIPMENT LIST AND CALIBRATION.....	98
APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY.....	99
END OF REPORT.....	99

Table of Plots

Plot 7.1 – Conducted Power – 898.5MHz	12
Plot 7.2 – Conducted Power – 929.5MHz	13
Plot 7.3 – Conducted Power – 937.5MHz	14
Plot 8.1 – Occupied Bandwidth – 929.5MHz, 12.5kHz BW, QPSK	19
Plot 8.2 – Occupied Bandwidth – 929.5MHz, 12.5kHz BW, 16QAM	20
Plot 8.3 – Occupied Bandwidth – 929.5MHz, 12.5kHz BW, 64QAM	21
Plot 8.4 – Occupied Bandwidth – 929.5MHz, 12.5kHz BW, 256QAM	22
Plot 8.5 – Occupied Bandwidth – 929.5MHz, 25Hz BW, QPSK	23
Plot 8.6 – Occupied Bandwidth – 929.5MHz, 25Hz BW, 16QAM	24
Plot 8.7 – Occupied Bandwidth – 929.5MHz, 25Hz BW, 64QAM	25
Plot 8.8 – Occupied Bandwidth – 929.5MHz, 25Hz BW, 256QAM	26
Plot 9.1 – Emissions Mask – 899MHz, 12.5kHz BW, QPSK	29
Plot 9.2 – Emissions Mask – 899MHz, 12.5kHz BW, 16QAM	30
Plot 9.3 – Emissions Mask – 899MHz, 12.5kHz BW, 64QAM	31
Plot 9.4 – Emissions Mask – 899MHz, 12.5kHz BW, 256QAM	32
Plot 9.5 – Emissions Mask – 899MHz, 25kHz BW, QPSK	33
Plot 9.6 – Emissions Mask – 899MHz, 25kHz BW, 16QAM	34
Plot 9.7 – Emissions Mask – 899MHz, 25kHz BW, 64QAM	35
Plot 9.8 – Emissions Mask – 899MHz, 25kHz BW, 256QAM	36
Plot 9.9 – Emissions Mask – 937MHz, 12.5kHz BW, QPSK	37
Plot 9.10 – Emissions Mask – 937MHz, 12.5kHz BW, 16QAM	38
Plot 9.11 – Emissions Mask – 937MHz, 12.5kHz BW, 64QAM	39
Plot 9.12 – Emissions Mask – 937MHz, 12.5kHz BW, 256QAM	40
Plot 9.13 – Emissions Mask – 937MHz, 25kHz BW, QPSK	41
Plot 9.14 – Emissions Mask – 937MHz, 25kHz BW, 16QAM	42
Plot 9.15 – Emissions Mask – 937MHz, 25kHz BW, 64QAM	43
Plot 9.16 – Emissions Mask – 937MHz, 25kHz BW, 256QAM	44
Plot 9.17 – Emissions Mask – 929.5MHz, 25kHz BW, QPSK	45
Plot 9.18 – Emissions Mask – 929.5MHz, 25kHz BW, 16QAM	46
Plot 9.19 – Emissions Mask – 929.5MHz, 25kHz BW, 64QAM	47
Plot 9.20 – Emissions Mask – 929.5MHz, 25kHz BW, 256QAM	48
Plot 10.1 – Conducted Spurious Emissions 899MHz Channel, 30-200MHz	51
Plot 10.2 – Conducted Spurious Emissions 899MHz Channel, 200-400MHz	52
Plot 10.3 – Conducted Spurious Emissions 899MHz Channel, 400-600MHz	53
Plot 10.4 – Conducted Spurious Emissions 899MHz Channel, 600-800MHz	54
Plot 10.4 – Conducted Spurious Emissions 899MHz Channel, 800-1000MHz	55
Plot 10.5 – Conducted Spurious Emissions 899MHz Channel, 1 – 3GMHz	56
Plot 10.6 – Conducted Spurious Emissions 899MHz Channel, 3 – 10GMHz	57
Plot 11.1 – Radiated Tx Emissions, 929.5MHz, Horizontal, 30-200MHz	60
Plot 11.2 – Radiated Tx Emissions, 929.5MHz, Horizontal, 200-400MHz	61
Plot 11.3 – Radiated Tx Emissions, 929.5MHz, Horizontal, 400-600MHz	62
Plot 11.4 – Radiated Tx Emissions, 929.5MHz, Horizontal, 600-800MHz	63
Plot 11.5 – Radiated Tx Emissions, 929.5MHz, Horizontal, 800-1000MHz	64
Plot 11.6 – Radiated Tx Emissions, 929.5MHz, Horizontal, 1-3GHz	65
Plot 11.7 – Radiated Tx Emissions, 929.5MHz, Horizontal, 3-10GHz	66
Plot 11.8 – Radiated Tx Emissions, 929.5MHz, Horizontal, 2 nd Harmonic	67
Plot 11.9 – Radiated Tx Emissions, 929.5MHz, Horizontal, 3 rd Harmonic	68
Plot 11.10 – Radiated Tx Emissions, 929.5MHz, Vertical, 30-200MHz	69
Plot 11.11 – Radiated Tx Emissions, 929.5MHz, Vertical, 200-400MHz	70
Plot 11.12 – Radiated Tx Emissions, 929.5MHz, Vertical, 400-600MHz	71
Plot 11.13 – Radiated Tx Emissions, 929.5MHz, Vertical, 600-800MHz	72
Plot 11.14 – Radiated Tx Emissions, 929.5MHz, Vertical, 800-1000MHz	73
Plot 11.15 – Radiated Tx Emissions, 929.5MHz, Vertical, 1-3GHz	74
Plot 11.16 – Radiated Tx Emissions, 929.5MHz, Vertical, 3-10GHz	75
Plot 11.17 – Radiated Tx Emissions, 929.5MHz, Vertical, 2 nd Harmonic	76
Plot 11.18 – Radiated Tx Emissions, 929.5MHz, Vertical, 3 rd Harmonic	77

Plot 12.1 – Radiated Rx Emissions, Horizontal, 30-200MHz.....	80
Plot 12.2 – Radiated Rx Emissions, Horizontal, 200-400MHz.....	81
Plot 12.3 – Radiated Rx Emissions, Horizontal, 400-600MHz.....	82
Plot 12.4 – Radiated Rx Emissions, Horizontal, 600-800MHz.....	83
Plot 12.5 – Radiated Rx Emissions, Horizontal, 800-1000MHz.....	84
Plot 12.6 – Radiated Rx Emissions, Horizontal, 1-3GHz.....	85
Plot 12.7 – Radiated Rx Emissions, Horizontal, 3-10GHz.....	86
Plot 12.8 – Radiated Rx Emissions, Vertical, 30-200MHz.....	87
Plot 12.9 – Radiated Rx Emissions, Vertical, 200-400MHz.....	88
Plot 12.10 – Radiated Rx Emissions, Vertical, 400-600MHz.....	89
Plot 12.11 – Radiated Rx Emissions, Vertical, 600-800MHz.....	90
Plot 12.12 – Radiated Rx Emissions, Vertical, 800-1000MHz.....	91
Plot 12.13 – Radiated Rx Emissions, Vertical, 1-3GHz.....	92
Plot 12.14 – Radiated Rx Emissions, Vertical, 3-10GHz.....	93

Table of Tables

Table 7.1 - Summary of Conduct Power Measurements.....	15
Table 7.2 – Maximum Permissible Antenna Gain at Maximum Output Power.....	16
Table 7.3 – Maximum Permissible Output Power at Maximum Antenna Gain.....	17
Table 8.1 - Summary of Occupied Bandwidth Measurements.....	27
Table 9.1 - Summary of Emissions Mask Measurements.....	49
Table 10.1 - Summary of Conducted Spurious Emissions Measurements.....	58
Table 11.1 – Summary of Radiated Tx Emissions Measurements.....	78
Table 12.1 – Summary of Radiated Rx Emissions Measurements.....	94
Table A.1 – Setup - Conducted Measurements Equipment.....	95
Table A.2 – Setup - Radiated Emissions Equipment.....	96

Table of Figures

Figure A.1 – Test Setup Conducted Measurements.....	95
Figure A.2 – Test Setup Radiated Measurements 30MHz – 1GHz.....	96
Figure A.3 – Test Setup Radiated Measurements 30MHz – 1GHz, Signal Substitution.....	97
Figure A.4 – Test Setup Radiated Measurements 1 – 18GHz,.....	97

1.0 REVISION HISTORY

Revision History				
Samples Tested By:		Art Voss, P.Eng.		Date(s) of Evaluation: 3 Dec 2024 - 26 Feb 2025
Report Prepared By:		Art Voss, P.Eng.		Report Reviewed By: Ben Hewson
Report Revision	Description of Revision	Revised Section	Revised By	Revision Date
0.1	Draft	n/a	Art Voss	20 February 2025
1.0	Initial Release	n/a	Art Voss	24 February 2025

2.0 CLIENT AND DUT INFORMATION

Client Information	
Applicant Name (FCC)	4RF Limited
Applicant Address (FCC)	PO Box 13-506
	Wellington 6440,
	New Zealand
DUT Information	
Device Identifier(s):	FCC ID: UIPSQ928M141
Device Type:	Digital Transceiver
Device Model(s) / HVIN:	SQ928M141
Device Marketing Name / PMN:	Aprisa SR+ 928
Test Sample Serial No.:	R5310007031
Equipment Class (FCC):	TNB - Licensed Non-Broadcast Station Transmitter
Transmit Frequency Range:	Part 24: 901-902MHz, 930-931MHz, 940-941MHz
	Part 90: 896-901MHz, 929-930MHz, 935-940MHz
	Part 101: 928-929MHz, 932-932.5MHz, 932.5-940MHz
	Part 101: 941-941.5MHz, 941.5-944MHz, 952-960MHz
Test Channels:	Programmable
Manuf. Max. Rated Output Power:	10dBm (10mW) to 37dBm (5W), Field-Programmable
Manuf. Max. Rated BW:	Part 24. 12.5kHz, 25kHz, 50kHz, 100kHz
	Part 90. 12.5kHz, 25kHz
	Part 101. 12.5kHz, 25kHz, 50kHz
Antenna Type and Gain:	Max: 28dBi (25.85dBd)
Modulation:	QPSK, 16QAM, 64QAM, 256QAM
Mode:	Half Duplex
DUT Power Source:	10 - 30VDC
DUT Dimensions [HxWxD] (mm)	H x W x D: 40mm x 140mm x 210mm.
Deviation(s) from standard/procedure:	None
Modification of DUT:	None

*** NOTE ***

The Aprisa SR+ must be professionally installed by trained and qualified installers. The installer must ensure regulatory compliance to the requirements and standards cited herein and to the local requirements in place at the time of installation. When the maximum permissible Effective Radiated Power (ERP) or Equivalent Isotropic Radiated Power (EIPR) is regulated, knowledge of the regulation, antenna gain and feeder cable loss must be known by the installer prior to adjusting the Maximum Transmit Output Power of the Aprisa SR+.

3.0 SCOPE

Preface:

This Certification Report was prepared on behalf of:

4RF Limited

,(the '*Applicant*'), in accordance with the applicable Federal Communications Commission (FCC) CFR 47 and Innovation, Scientific and Economic Development (ISED) Canada rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and ,unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

Device:

The Aprisa SR+ 928, FCC ID: UIPSQ928M141, is a digital Land Mobile and PCS trasceiver. The transceiver synthesizers are being replaced and are not pin-to-pin compatible. All other aspects of the transmitter with regards to output power, bands of operation, bandwidths and modulations have not been changed from those in the previous filings.

Requirement:

As per FCC KDB 388624 D02v18r07, a C2PC (C2PCPX) using the procedures of FCC KDB 178919 (Notificationb 202109-001) is being sought.

Application:

This is an application for a C2PC.

Scope:

The scope of this investigation is limited to the evaluation and reporting of the wanted and spurious emissions in accordance with the rule parts cited in Normative References section of this report.

4.0 TEST RESULT SUMMARY

TEST SUMMARY					
Section	Description of Test	Procedure Reference	Applicable Rule Part(s) FCC	Test Date	Result
7.0	Conducted Power (Fundamental)	ANSI C63.26-2015	§90.205	3 Dec 2024	Pass
8.0	Occupied Bandwidth	ANSI C63.26-2015	§90.209	6 Dec 2024	Pass
9.0	Emissions Mask	ANSI C63.26-2015	§90.210	7,8 Dec 2024 6 Feb 2025	Pass
10.0	Antenna Port Conducted Spurious	ANSI C63.26-2015	§90.210	11 Dec 2024	Pass
11.0	Radiated Tx Spurious Emissions	ANSI C63.26-2015	§90.210	29 Jan 2025	Pass
12.0	Radiated Rx Spurious Emissions	ANSI C63.4-2014	§15B	29 Jan 2025	Pass

Test Station Day Log					
Date	Ambient Temp (°C)	Relative Humidity (%)	Barometric Pressure (kPa)	Test Station	Tests Performed Section(s)
3 Dec 2024	23.0	23	103.4	EMC	7
4 Dec 2024	23.6	25	103.3	EMC	8
5 Dec 2024	21.6	27	103.2	EMC	8
6 Dec 2024	22.5	25	103.2	EMC	9
7 Dec 2024	22.8	26	103.3	EMC	9
8 Dec 2024	22.1	26	103.1	EMC	9
11 Dec 2024	22.8	26	102.8	EMC	10
29 Jan 2025	-3.0	68	102.3	OATS	11, 12
6 Feb 2025	22.1	18	102.2	EMC	9

EMC - EMC Test Bench
OATS - Open Area Test Site
LISN - LISN Test Area
IMM - Immunity Test Area

SAC - Semi-Anechoic Chamber
TC - Temperature Chamber
ESD - ESD Test Bench
RI - Radiated Immunity Chamber

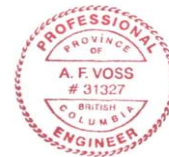
I attest that the data reported herein is true and accurate within the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements were performed in accordance with accepted practices or procedures; and that all tests and measurements were performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client which were not adjusted, modified or altered in any manner whatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance with ISO/IEC 17025.



Art Voss, P.Eng.
Technical Manager
Celltech Labs Inc.

28 January 2025

Date



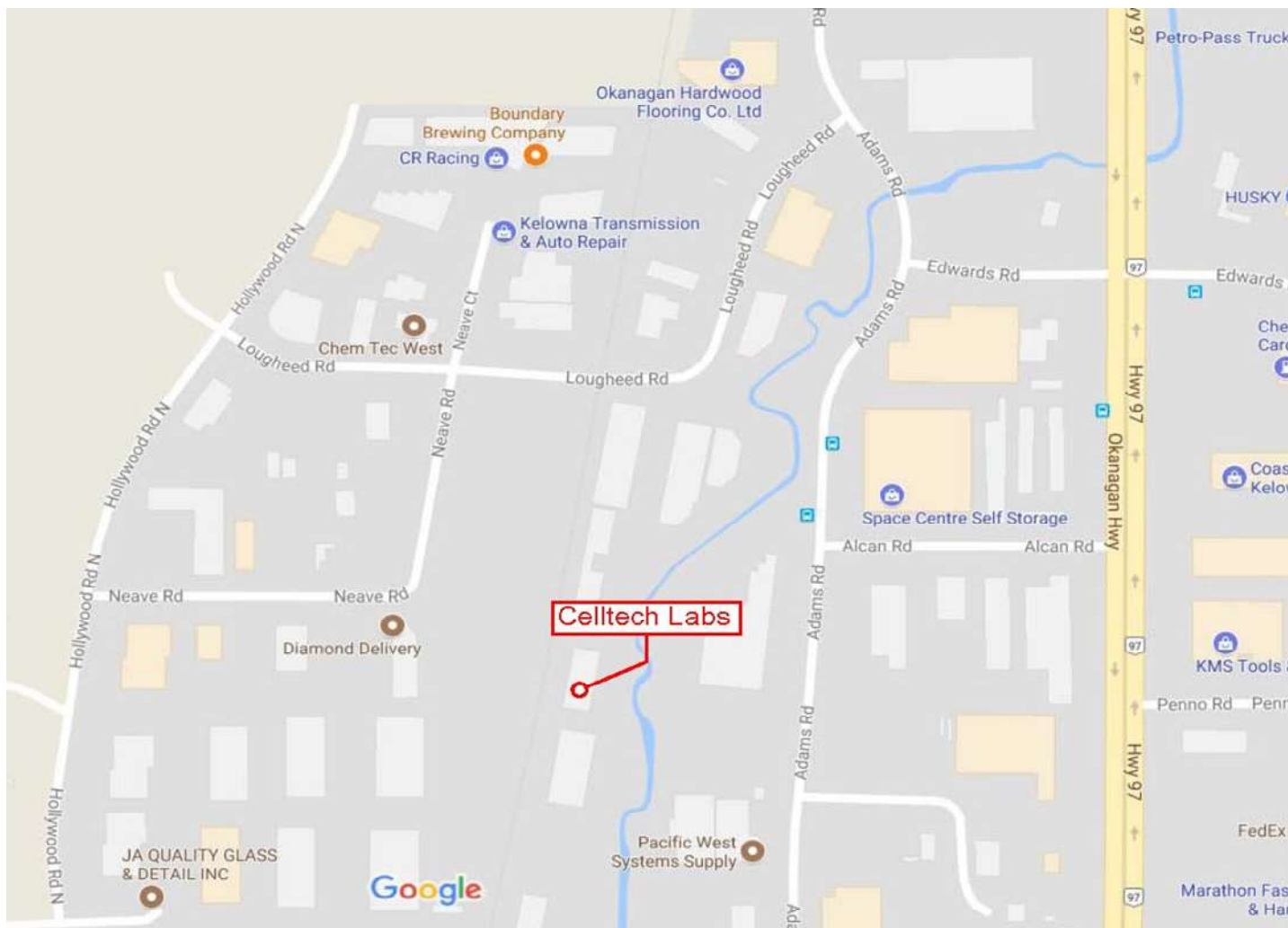
5.0 NORMATIVE REFERENCES

Normative References	
ISO/IEC 17025:2017	General requirements for the competence of testing and calibration laboratories
ANSI C63.4-2014	American National Standard of Procedures for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electric and Electronic Equipment in the Range of 9kHz to 40GHz
ANSI C63.4A-2017	American National Standard of Procedures for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electric and Electronic Equipment in the Range of 9kHz to 40GHz Amendment 1: Test Site Validation
ANSI C63.26-2015	American National Standard of Procedures for Compliance Testing of Transmitters Used in Licensed Radio Services
CFR	Code of Federal Regulations Title 47: Telecommunication Part 2: Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
CFR	Code of Federal Regulations Title 47: Telecommunication Part 15: Radio Frequency Devices Subpart B: Unintentional Radiators
CFR	Code of Federal Regulations Title 47: Telecommunication Part 90: Private Land Mobile Radio Services Sub Part I: General Technical Standards

6.0 FACILITIES AND ACCREDITATIONS

Facility and Accreditation:

The facilities used to evaluate this device outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site (OATS) conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number CA3874 and Industry Canada under Test Site File Number IC 3874A. Celltech is accredited to ISO 17025, through accrediting body A2LA and with certificate 2470.01.



7.0 CONDUCTED OUTPUT POWER

Test Procedure

Normative	FCC 47 CFR §90.205, §90.494, §90.635
References	ANSI C63.26

Requirement / Limits

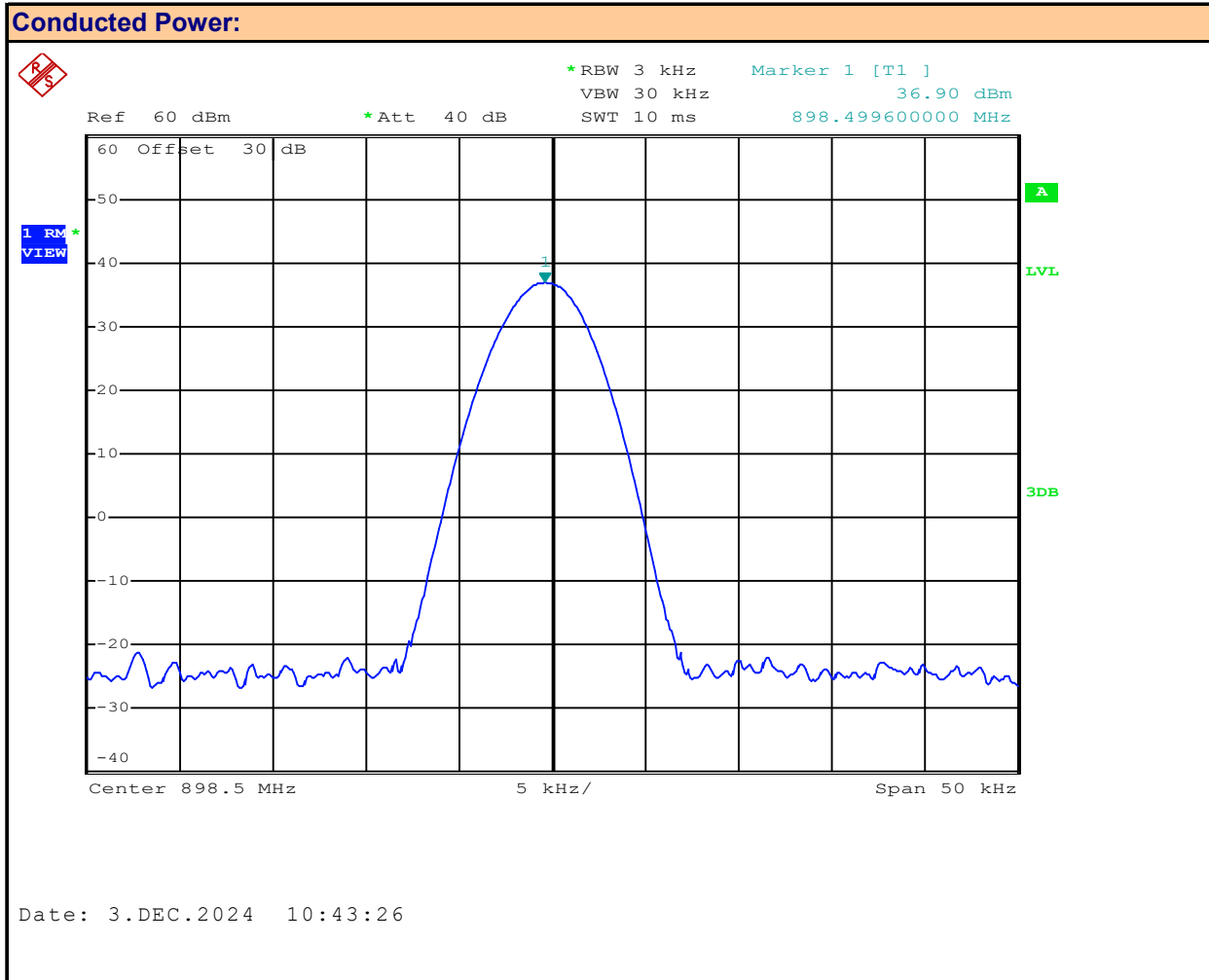
	§90.205 Power and Antenna Height Limits
47 CFR §90.205	(k) 806-824 MHz, 851-869 MHz, 896-901 MHz and 935-940 MHz. Power and height limitations for frequencies in the 806-824 MHz and 851-869 MHz bands and for narrowband operations in the 896-901/ 935-940 MHz band are specified in § 90.635.
	(m) 929-930 MHz. Limitations on power and antenna heights are specified in § 90.494.
47 CFR §90.494	(f) The effective radiated power for base stations providing paging service on the shared channels must not exceed 3500 watts.
47 CFR §90.635	(a) The effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBw)

Test Setup	Appendix A - Figure A.1
-------------------	--------------------------------

Measurement Procedure

The DUT was connected to the SA as specified above via a 30dB attenuator. The DUT was configured to transmit unmodulated at its highest output power. The Conducted Power was measured using the instrument's Marker Peak function and recorded.

Plot 7.1 – Conducted Power – 898.5MHz

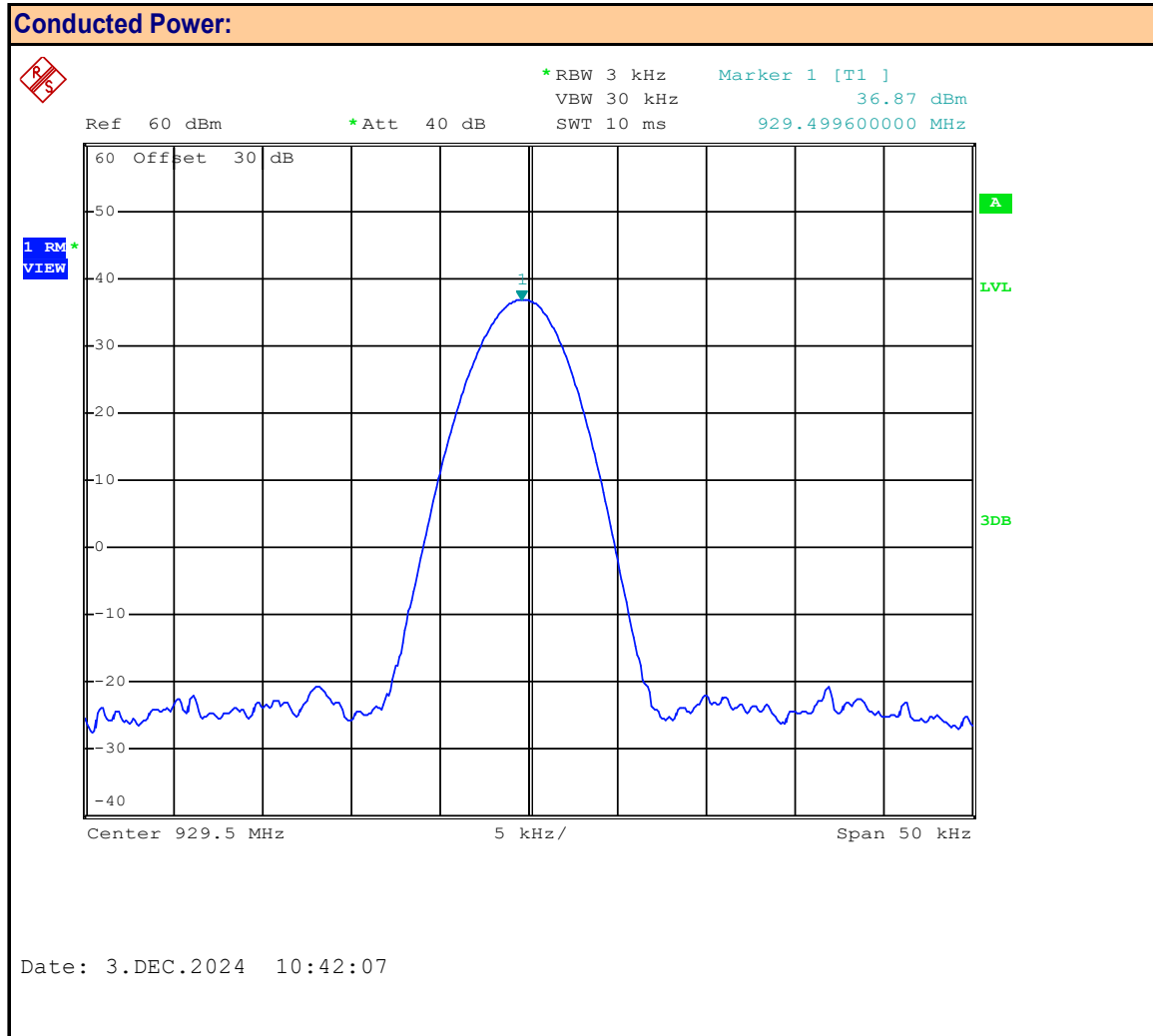


Channel Frequency: **898.5** MHz

Modulation: **CW**

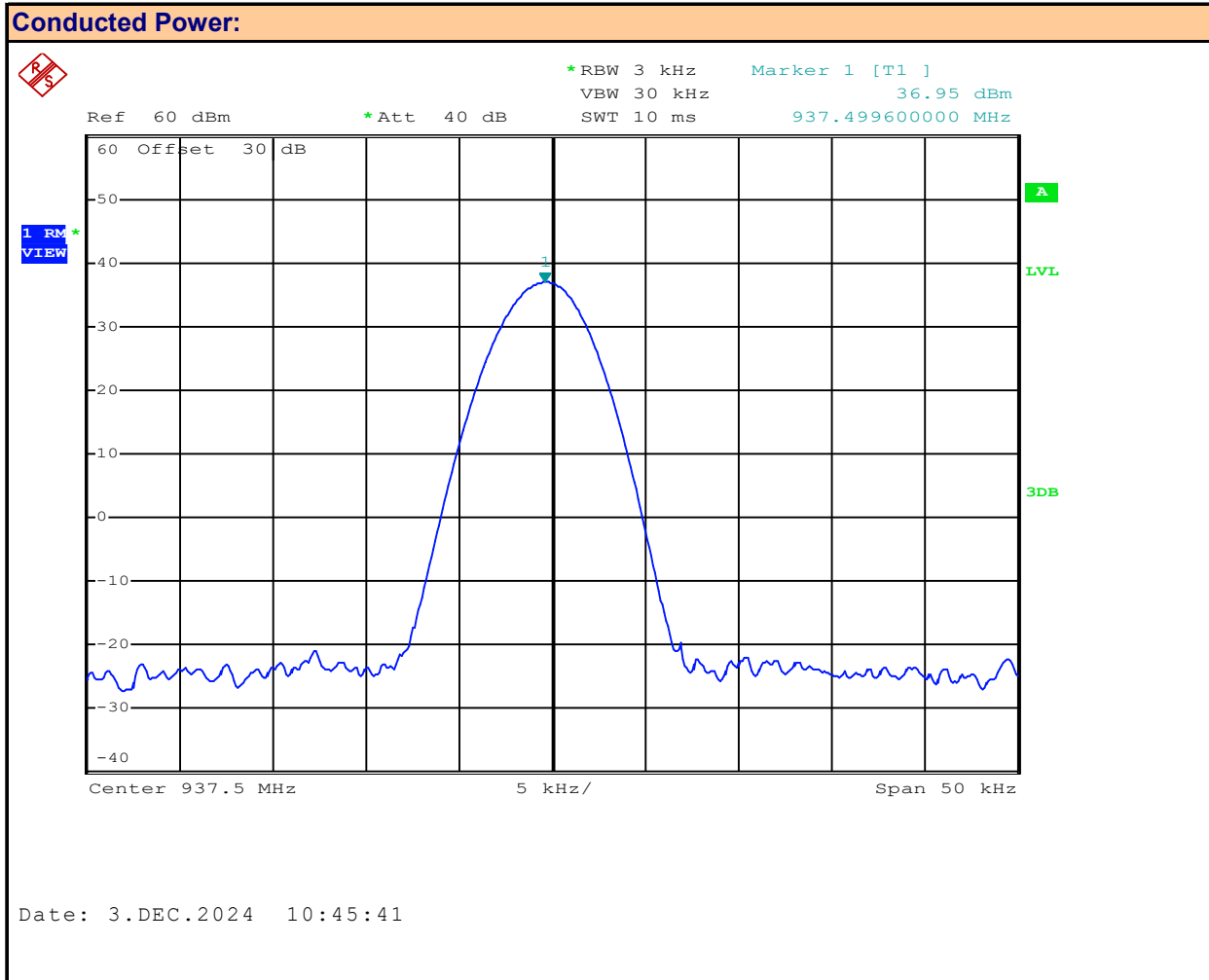
Measured Channel Power: **36.9** dBm

Plot 7.2 – Conducted Power – 929.5MHz



Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Channel Power: **36.87** dBm

Plot 7.3 – Conducted Power – 937.5MHz



Channel Frequency: **937.5** MHz

Modulation: **CW**

Measured Channel Power: **36.95** dBm

Table 7.1 - Summary of Conduct Power Measurements

Conducted Power Measurement Results: FCC Part 90							
Channel Frequency (MHz)	Channel Bandwidth (kHz)	Modulation	Measured Power [P _{meas}] (dBm)	Antenna Gain [G] (dBd)	ERP Power [P _{erp}] (dBm)	ERP Limit [P _{lim}] (dBm)	Margin (dB)
898.5	n/a	CW	36.90	0.85	37.75	60	22.3
929.5	n/a	CW	36.87		37.72	65.4	27.7
937.5	n/a	CW	36.95		37.80	60	22.2
Result:							Complies

$$\text{ERP } P_{\text{erp}} = P_{\text{meas}} + G(\text{dBd})$$

$$\text{Conducted Margin} = P_{\text{lim}} - P_{\text{erp}}$$

Conducted Power Measurement Results: ISD RSS-119							
Channel Frequency (MHz)	Channel Bandwidth (kHz)	Modulation	Measured Power [P _{Meas}] (dBm)	Antenna Gain [G] (dBd)	ERP Power [P _{erp}] (dBm)	Limit [P _{Lim}] (dBm)	Margin (dB)
898.5	n/a	CW	36.90	0.85	37.75	50.4	12.7
929.5	n/a	CW	36.87		37.72	50.4	12.7
937.5	n/a	CW	36.95		37.80	50.4	12.6
Result:							Complies

$$\text{ERP } P_{\text{erp}} = P_{\text{meas}} + G(\text{dBd})$$

$$\text{Conducted Margin} = P_{\text{lim}} - P_{\text{erp}}$$

*** NOTE ***

The Aprisa SR+ must be professionally installed by trained and qualified installers. The installer must ensure regulatory compliance to the requirements and standards cited herein and to the local requirements in place at the time of installation. When the maximum permissible Effective Radiated Power (ERP) or Equivalent Isotropic Radiated Power (EIPR) is regulated, knowledge of the regulation, antenna gain and feeder cable loss must be known by the installer prior to adjusting the Maximum Transmit Output Power of the Aprisa SR+.

Table 7.2 – Maximum Permissible Antenna Gain at Maximum Output Power

FCC Part 90: Maximum Permissible Antenna Gain at Maximum Output Power							
Channel Frequency (MHz)	Channel Bandwidth (kHz)	Modulation	Max Power [P _{meas}] (dBm)	Max Gain [G] (dBd)	ERP Power [P _{erp}] (dBm)	ERP Limit [P _{lim}] (dBm)	Margin (dB)
898.5	n/a	CW	36.90	23.10	60.00	60	0.0
929.5	n/a	CW	36.87	28.53	65.40	65.4	0.0
937.5	n/a	CW	36.95	23.05	60.00	60	0.0
Result:							Complies

$$\text{ERP } P_{\text{erp}} = P_{\text{meas}} + G(\text{dBd})$$

$$\text{Conducted Margin} = P_{\text{lim}} - P_{\text{erp}}$$

ISED RSS-119: Maximum Permissible Antenna Gain at Maximum Output Power							
Channel Frequency (MHz)	Channel Bandwidth (kHz)	Modulation	Max Power [P _{Meas}] (dBm)	Max Gain [G] (dBd)	ERP Power [P _{erp}] (dBm)	Limit [P _{Lim}] (dBm)	Margin (dB)
898.5	n/a	CW	36.90	13.50	50.40	50.4	0.0
929.5	n/a	CW	36.87	13.53	50.40	50.4	0.0
937.5	n/a	CW	36.95	13.45	50.40	50.4	0.0
Result:							Complies

$$\text{ERP } P_{\text{erp}} = P_{\text{meas}} + G(\text{dBd})$$

$$\text{Conducted Margin} = P_{\text{lim}} - P_{\text{erp}}$$

Table 7.3 – Maximum Permissible Output Power at Maximum Antenna Gain

FCC Part 90: Maximum Permissible Output Power at Maximum Antenna Gain							
Channel Frequency (MHz)	Channel Bandwidth (kHz)	Modulation	Max Power [P _{meas}] (dBm)	Max Gain [G] (dBd)	ERP Power [P _{erp}] (dBm)	ERP Limit [P _{lim}] (dBm)	Margin (dB)
898.5	n/a	CW	34.15	25.85	60.00	60	0.0
929.5	n/a	CW	39.55	25.85	65.40	65.4	0.0
937.5	n/a	CW	34.15	25.85	60.00	60	0.0
Result:							Complies

$$\text{ERP } P_{\text{erp}} = P_{\text{meas}} + G(\text{dBd})$$

$$\text{Conducted Margin} = P_{\text{lim}} - P_{\text{erp}}$$

ISED RSS-119: Maximum Permissible Output Power at Maximum Antenna Gain							
Channel Frequency (MHz)	Channel Bandwidth (kHz)	Modulation	Max Power [P _{Meas}] (dBm)	Max Gain [G] (dBd)	ERP Power [P _{erp}] (dBm)	Limit [P _{Lim}] (dBm)	Margin (dB)
898.5	n/a	CW	24.55	25.85	50.40	50.4	0.0
929.5	n/a	CW	24.55	25.85	50.40	50.4	0.0
937.5	n/a	CW	24.55	25.85	50.40	50.4	0.0
Result:							Complies

$$\text{ERP } P_{\text{erp}} = P_{\text{meas}} + G(\text{dBd})$$

$$\text{Conducted Margin} = P_{\text{lim}} - P_{\text{erp}}$$

Note: The manufacturer's maximum specified antenna gain = 28dBi

Antenna Gain (dBd) = Antenna Gain (dBi) - 2.15 = 28dBi - 2.15 = 25.85dBd

Note: Maximum Output Power is field-programmable.

8.0 OCCUPIED BANDWIDTH

Test Procedure

Normative	FCC 47 CFR §90.209(b)(5)
References	ANSI C63.26

Requirement / Limits

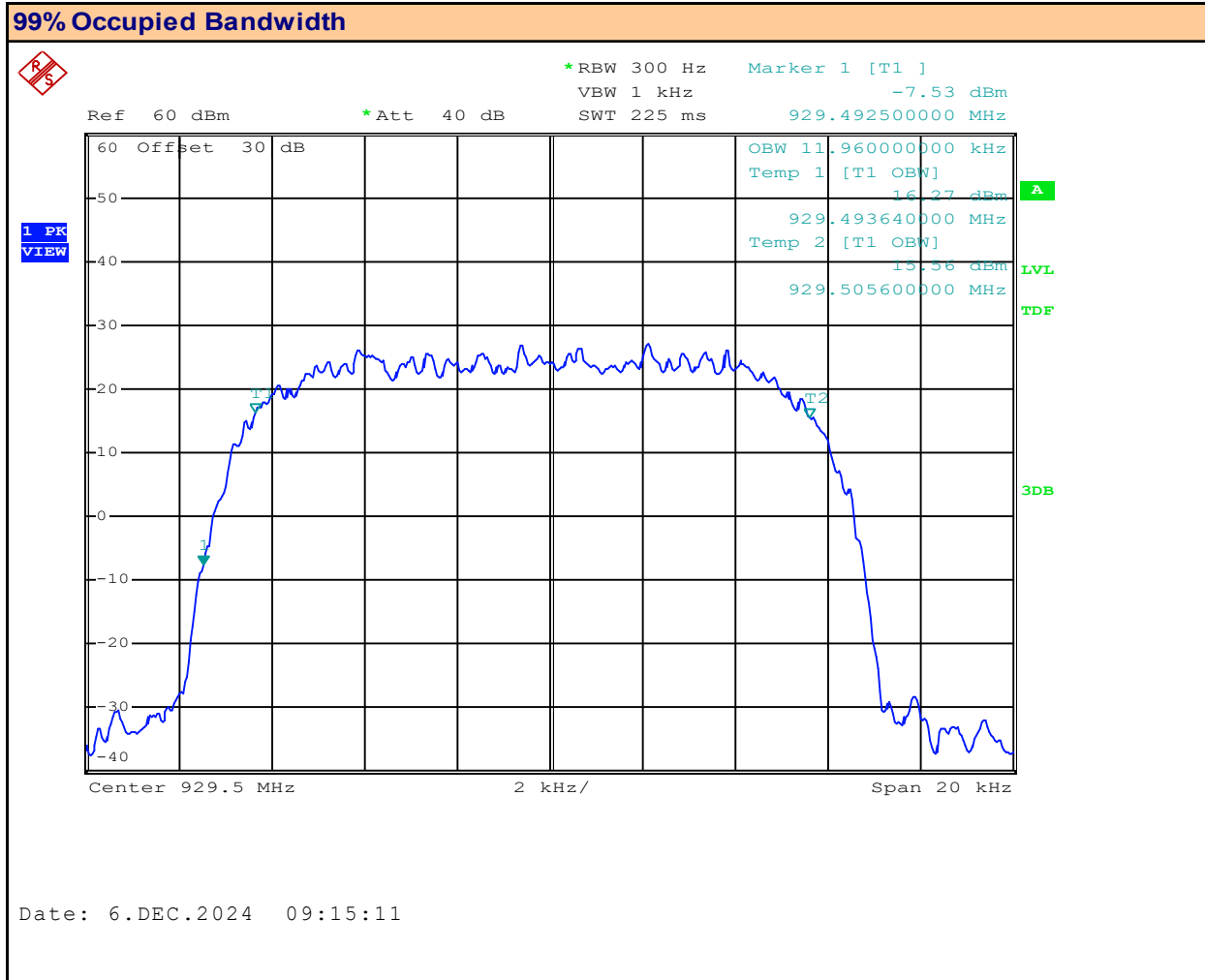
	§90.209(b)(5) Bandwidth limitations.
47 CFR §90.209(b)(5)	(5) Unless specified elsewhere, channel spacings and bandwidths that will be authorized in the following frequency bands are given in the following table
	Authorized Bandwidth (kHz)
§90.209(b)(5) Table 1	896-901/935-940MHz: 13.6
	929-930MHz: 20

Test Setup	Appendix A - Figure A.1
-------------------	--------------------------------

Measurement Procedure

The DUT was connected to a Spectrum Analyzer via a 30dB attenuator. The DUT was configured to transmit modulated at its highest output power. The Occupied Bandwidth was measured using the instrument's 99% Bandwidth function and recorded for each applicable bandwidth and modulation.

Plot 8.1 – Occupied Bandwidth – 929.5MHz, 12.5kHz BW, QPSK



Channel Frequency: 929.5 MHz

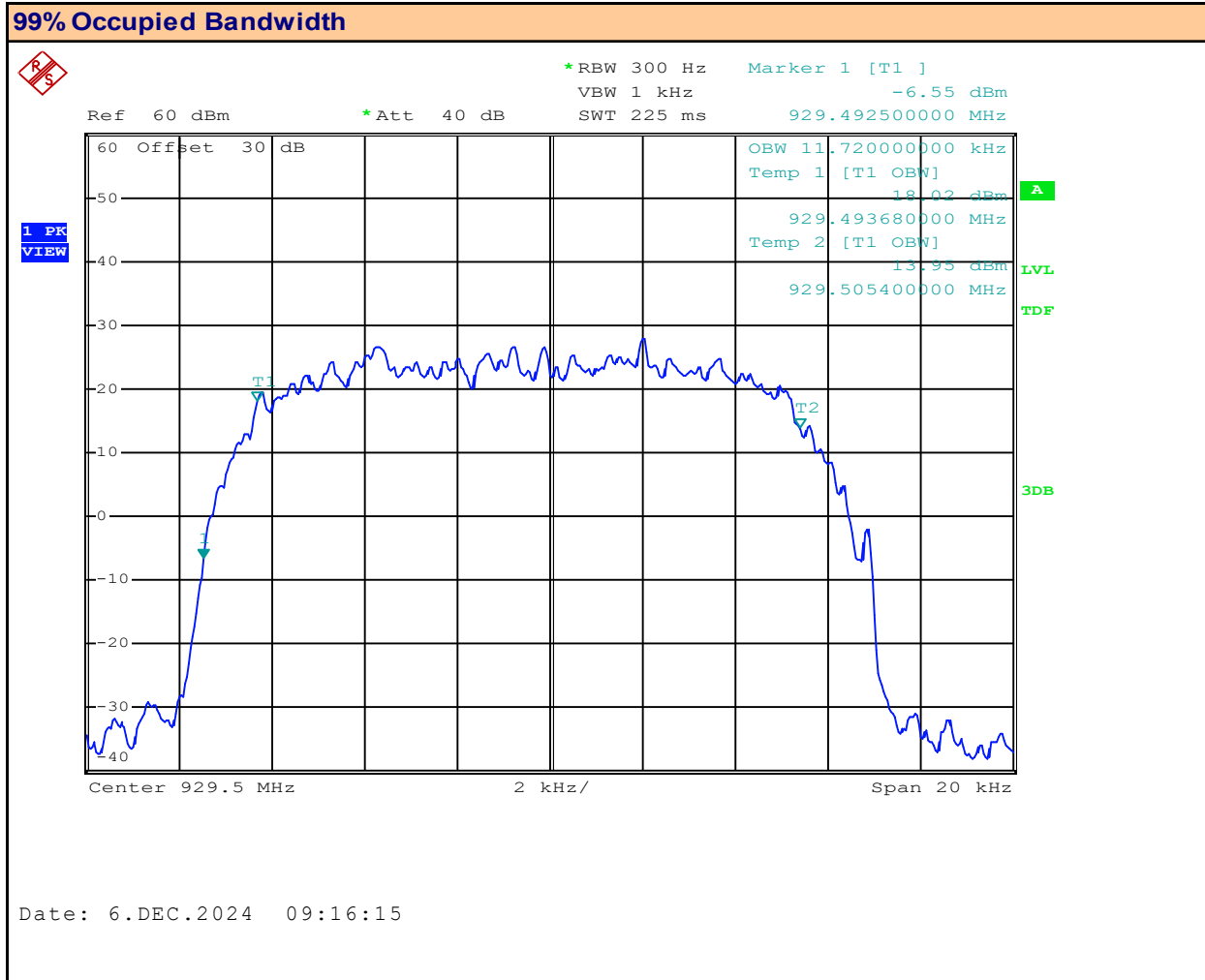
Channel Bandwidth: 12.5 kHz

Designator: G1D

Modulation: QPSK

Measured Occupied Bandwidth: 12 kHz

Plot 8.2 – Occupied Bandwidth – 929.5MHz, 12.5kHz BW, 16QAM



Channel Frequency: 929.5 MHz

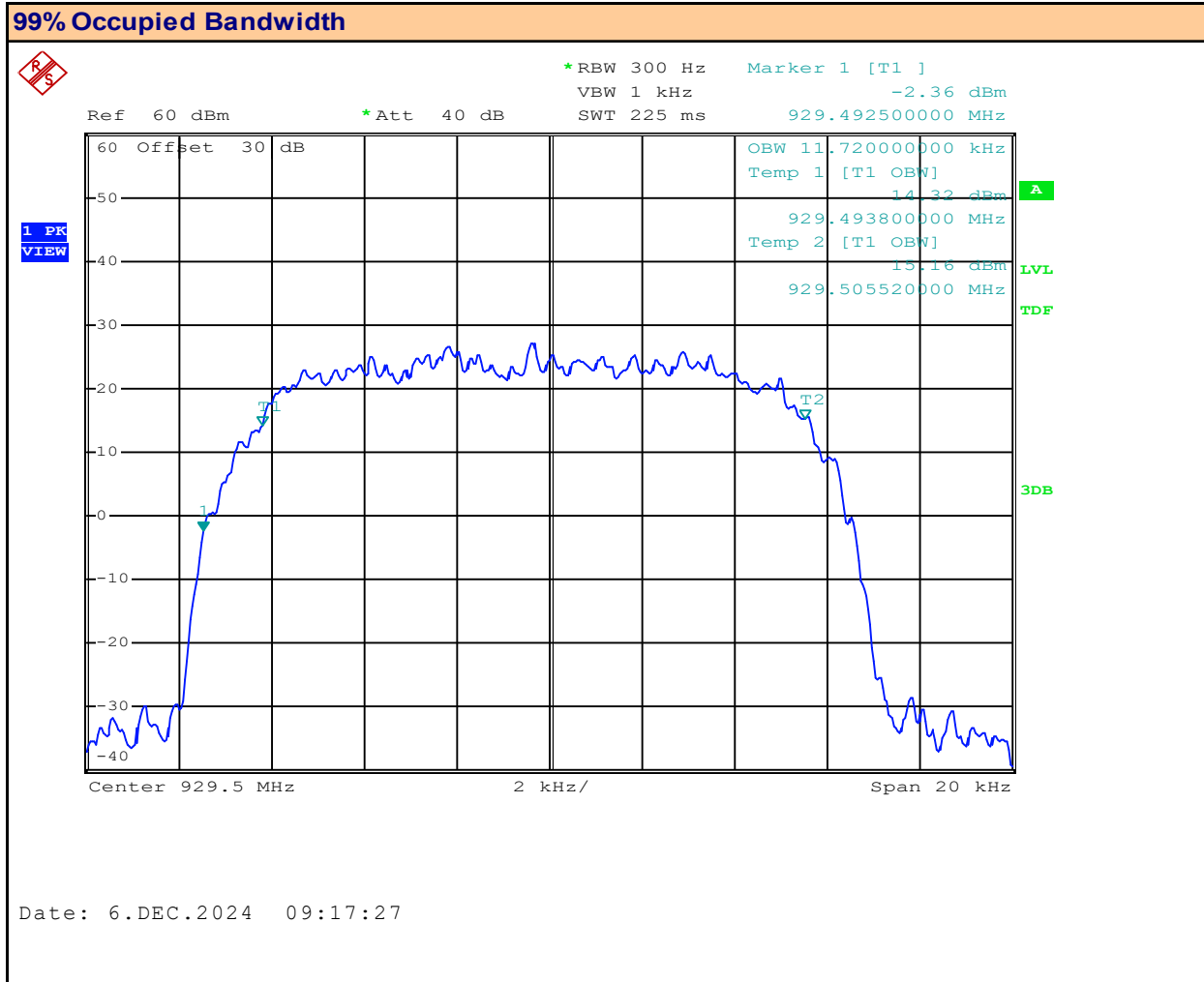
Channel Bandwidth: 12.5 kHz

Designator: D1D

Modulation: 16QAM

Measured Occupied Bandwidth: 11.7 kHz

Plot 8.3 – Occupied Bandwidth – 929.5MHz, 12.5kHz BW, 64QAM



Channel Frequency: 929.5 MHz

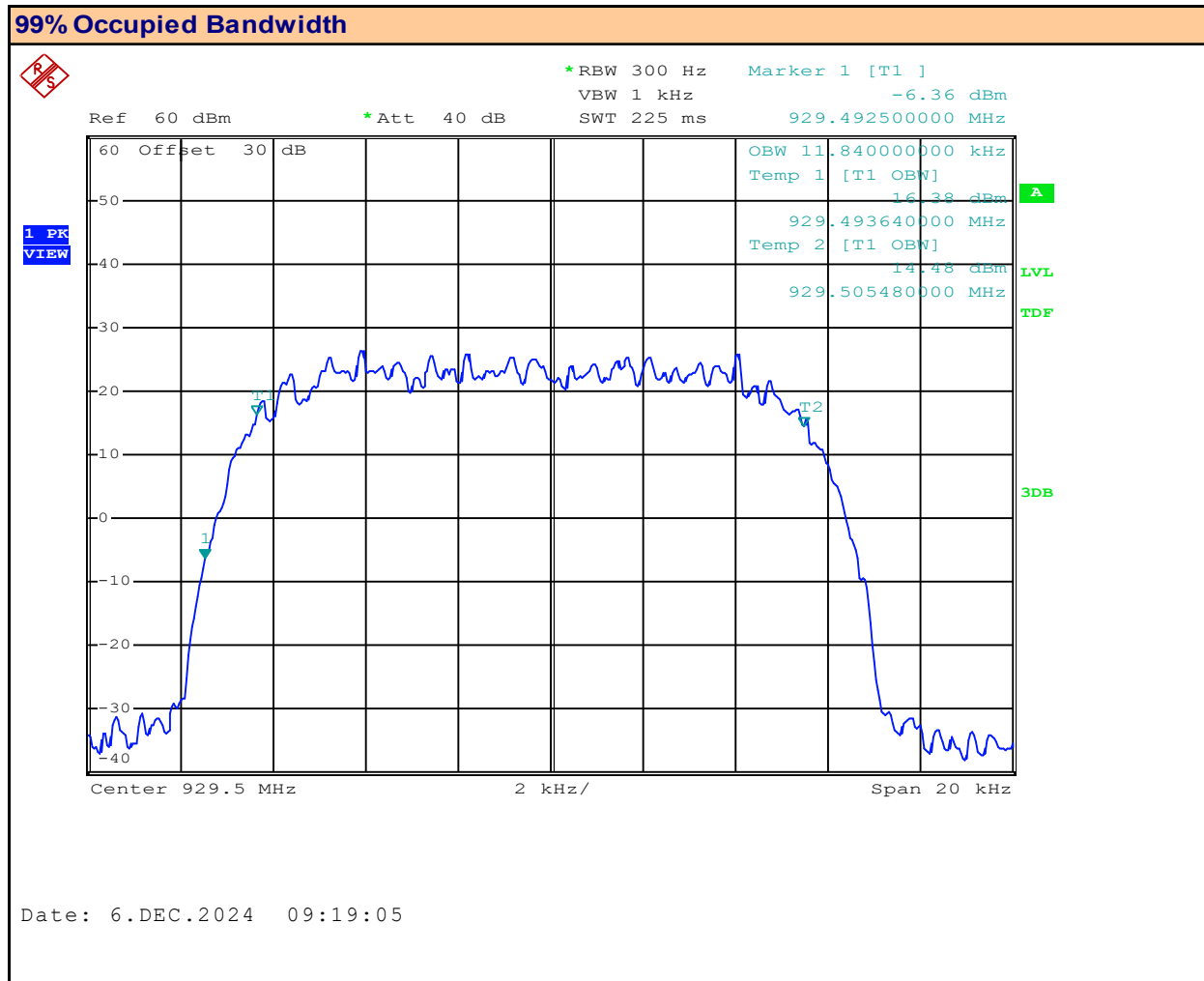
Channel Bandwidth: 12.5 kHz

Designator: D1D

Modulation: 64QAM

Measured Occupied Bandwidth: 11.7 kHz

Plot 8.4 – Occupied Bandwidth – 929.5MHz, 12.5kHz BW, 256QAM



Channel Frequency: **929.5** MHz

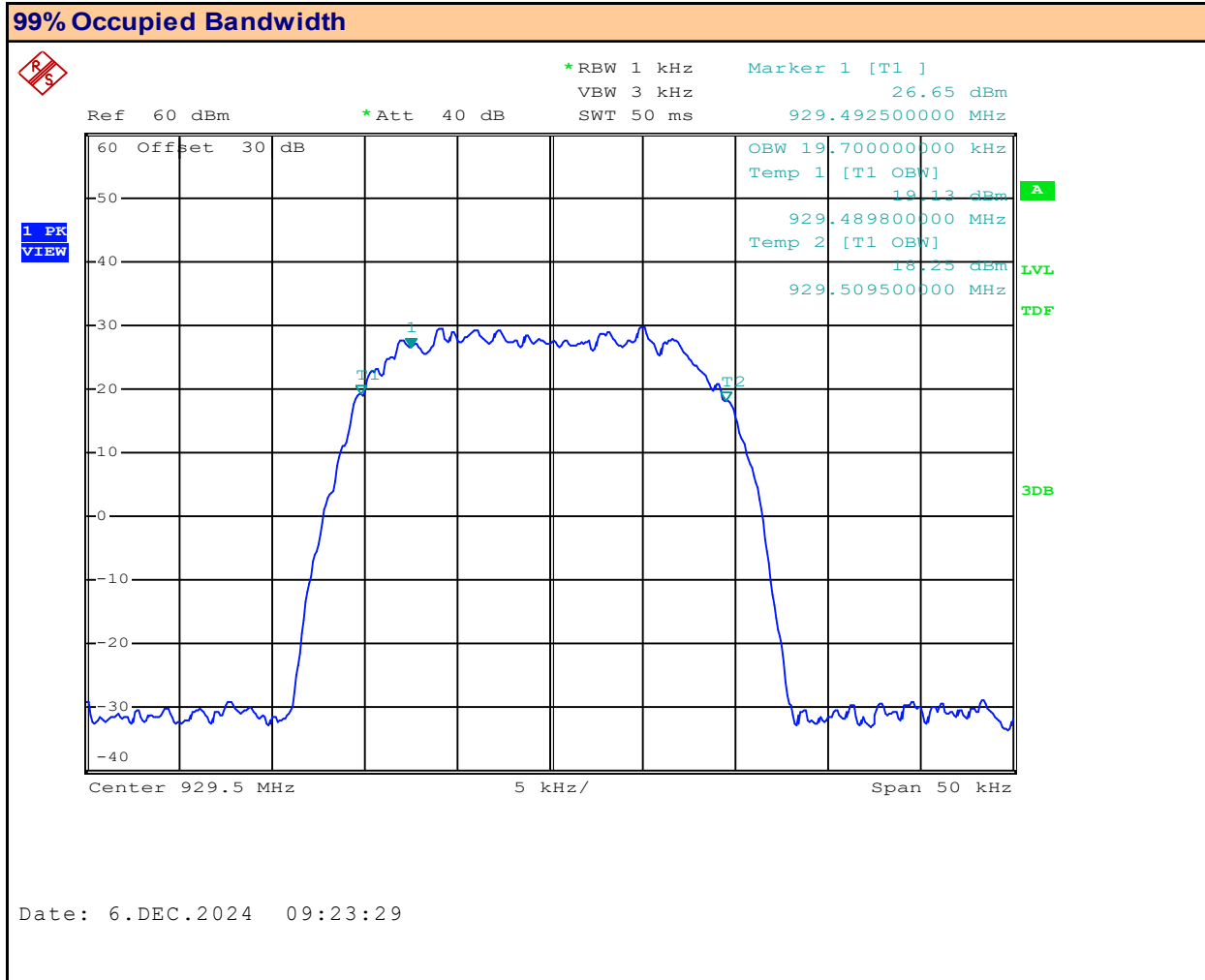
Channel Bandwidth: **12.5** kHz

Designator: **D1D**

Modulation: **256QAM**

Measured Occupied Bandwidth: **11.8** kHz

Plot 8.5 – Occupied Bandwidth – 929.5MHz, 25Hz BW, QPSK



Channel Frequency: **929.5** MHz

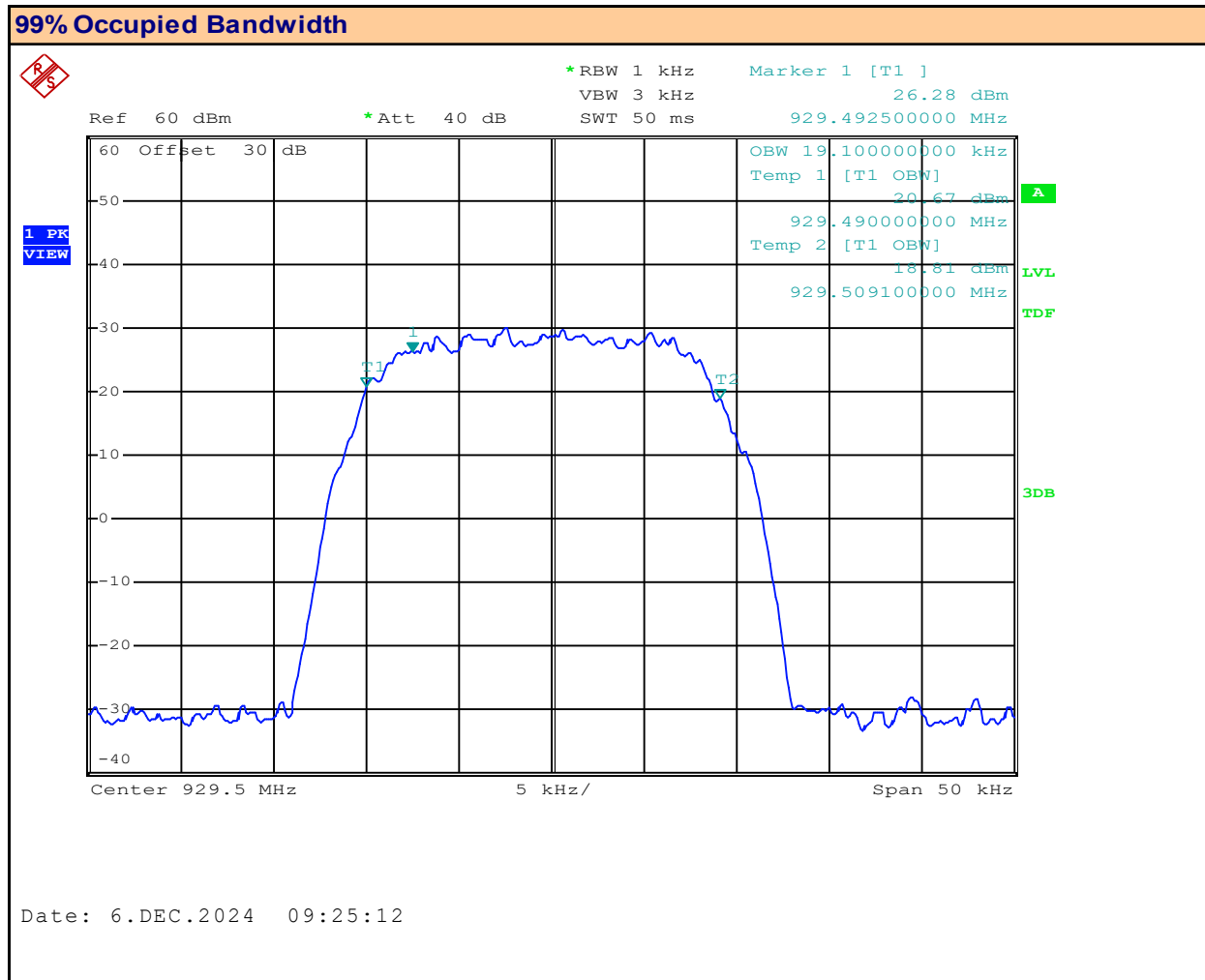
Channel Bandwidth: **25** kHz

Designator: **G1D**

Modulation: **QPSK**

Measured Occupied Bandwidth: **19.7** kHz

Plot 8.6 – Occupied Bandwidth – 929.5MHz, 25Hz BW, 16QAM



Channel Frequency: 929.5 MHz

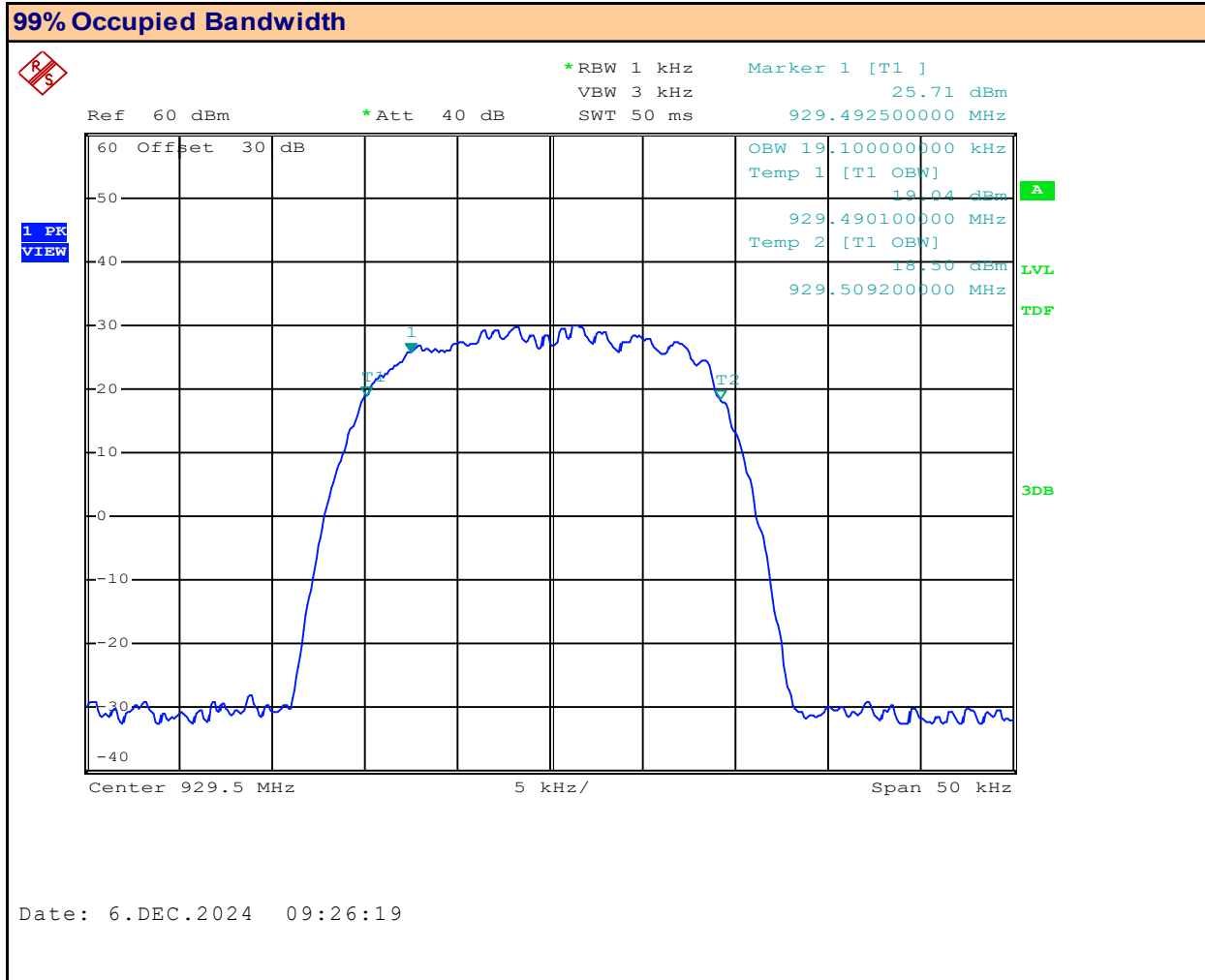
Channel Bandwidth: 25 kHz

Designator: D1D

Modulation: 16QAM

Measured Occupied Bandwidth: 19.1 kHz

Plot 8.7 – Occupied Bandwidth – 929.5MHz, 25Hz BW, 64QAM



Channel Frequency: **929.5** MHz

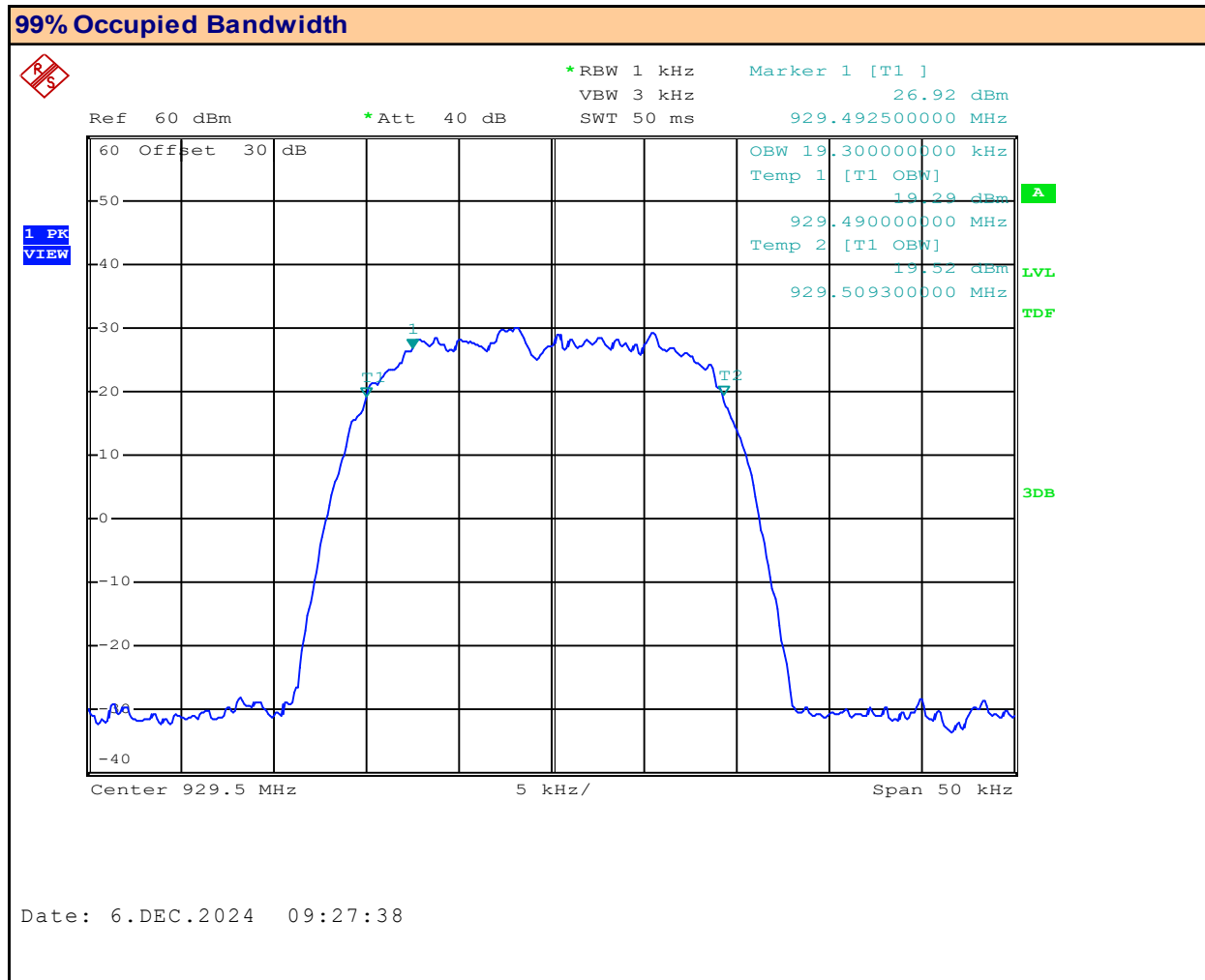
Channel Bandwidth: **25** kHz

Designator: **D1D**

Modulation: **64QAM**

Measured Occupied Bandwidth: **19.1** kHz

Plot 8.8 – Occupied Bandwidth – 929.5MHz, 25Hz BW, 256QAM



Channel Frequency: **929.5** MHz

Channel Bandwidth: **25** kHz

Designator: **D1D**

Modulation: **256QAM**

Measured Occupied Bandwidth: **19.3** kHz

Table 8.1 - Summary of Occupied Bandwidth Measurements

99% Occupied Bandwidth Results:				
Channel Frequency (MHz)	Channel Bandwidth (kHz)	Modulation	Measured Occupied Bandwidth (kHz)	Emission Designator
929.5	12.5	QPSK	12.0	12K0G1D
		16QAM	11.7	11K7D1D
		64QAM	11.7	11K7D1D
		256QAM	11.8	11K8D1D
	25.0	QPSK	19.7	19K7G1D
		16QAM	19.1	19K1D1D
		64QAM	19.1	19K1D1D
		256QAM	19.3	19K3D1D
Result:			Complies	

9.0 CONDUCTED SPURIOUS EMISSIONS – EMISSIONS MASK

Test Procedure

Normative	FCC 47 CFR §90.210
References	ANSI C63.26

Requirement / Limits

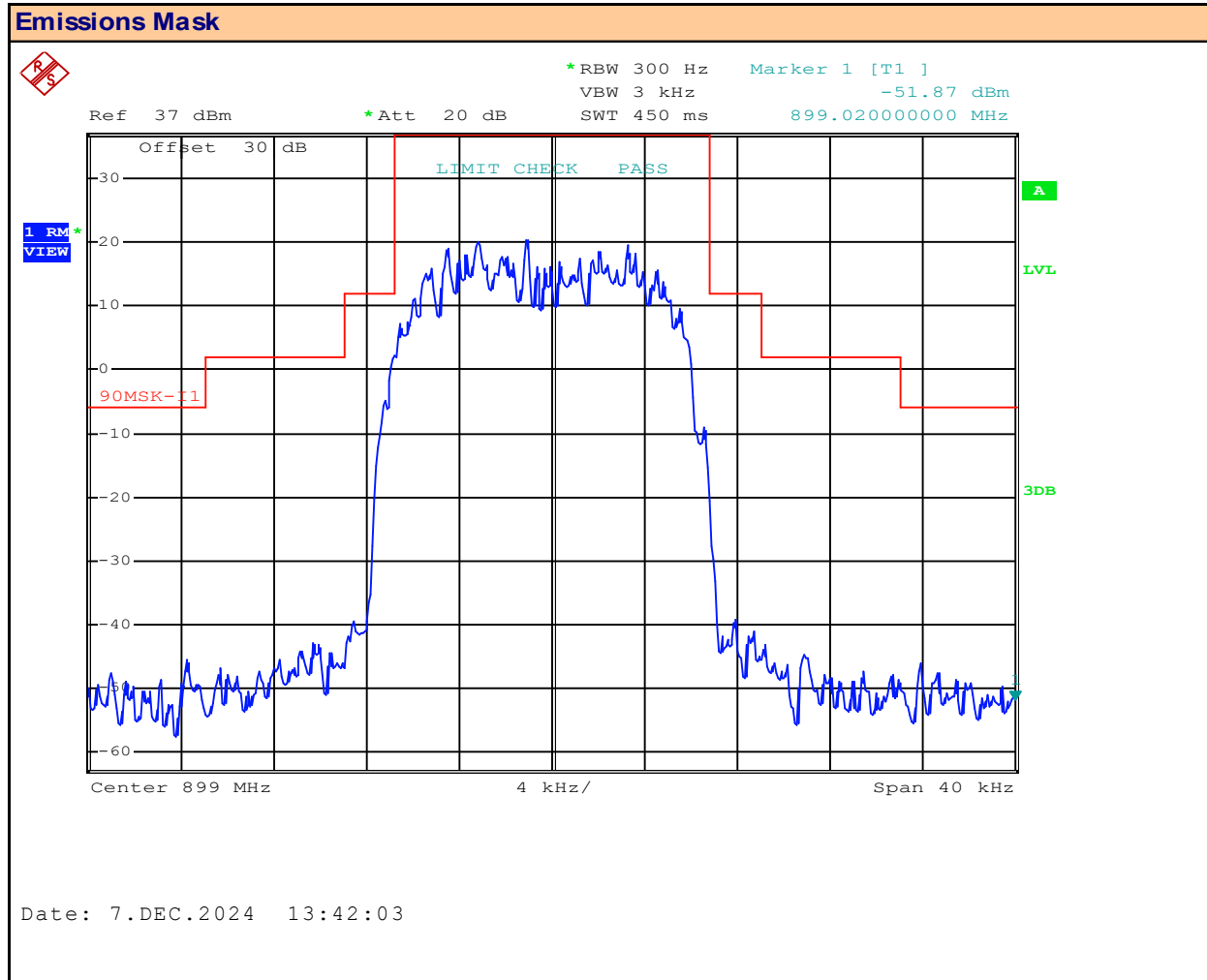
47 CFR §90.210	§90.210 Emission Mask
	(i) Emission Mask I. For transmitters that are equipped with an audio low pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:
	(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 6.8 kHz, but no more than 9.0 kHz: At least 25 dB;
	(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 9.0 kHz, but no more than 15 kHz: At least 35 dB;
	(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 15 kHz: At least 43 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation.
	(b) Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:
	(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
	(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
	(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

Test Setup	Appendix A - Figure A.1
-------------------	--------------------------------

Measurement Procedure

The DUT was connected to a Spectrum Analyzer via a 30dB attenuator. The DUT was configured to transmit modulated at its highest output power. The emissions mask was created in the SA and the SA Reference Level was set to the DUT's maximum rated power. The SA's Limit Check (Pass/Fail) was enabled and the results recorded for each applicable bandwidth and modulation.

Plot 9.1 – Emissions Mask – 899MHz, 12.5kHz BW, QPSK



Channel Frequency: **899** MHz

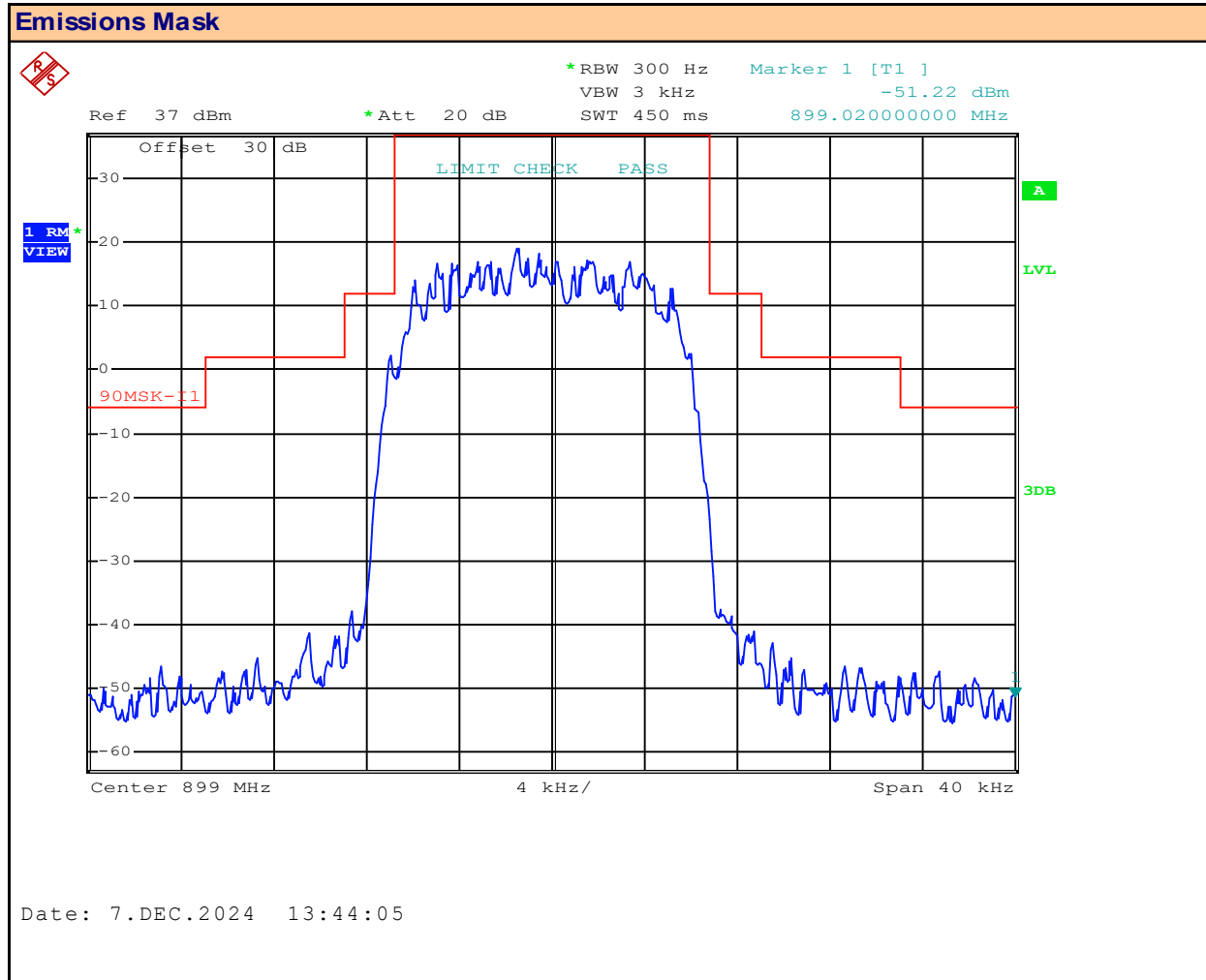
Channel Bandwidth: **12.5** kHz

Mask ID: **I**

Modulation: **QPSK**

Mask Results: **PASS**

Plot 9.2 – Emissions Mask – 899MHz, 12.5kHz BW, 16QAM



Channel Frequency: **899** MHz

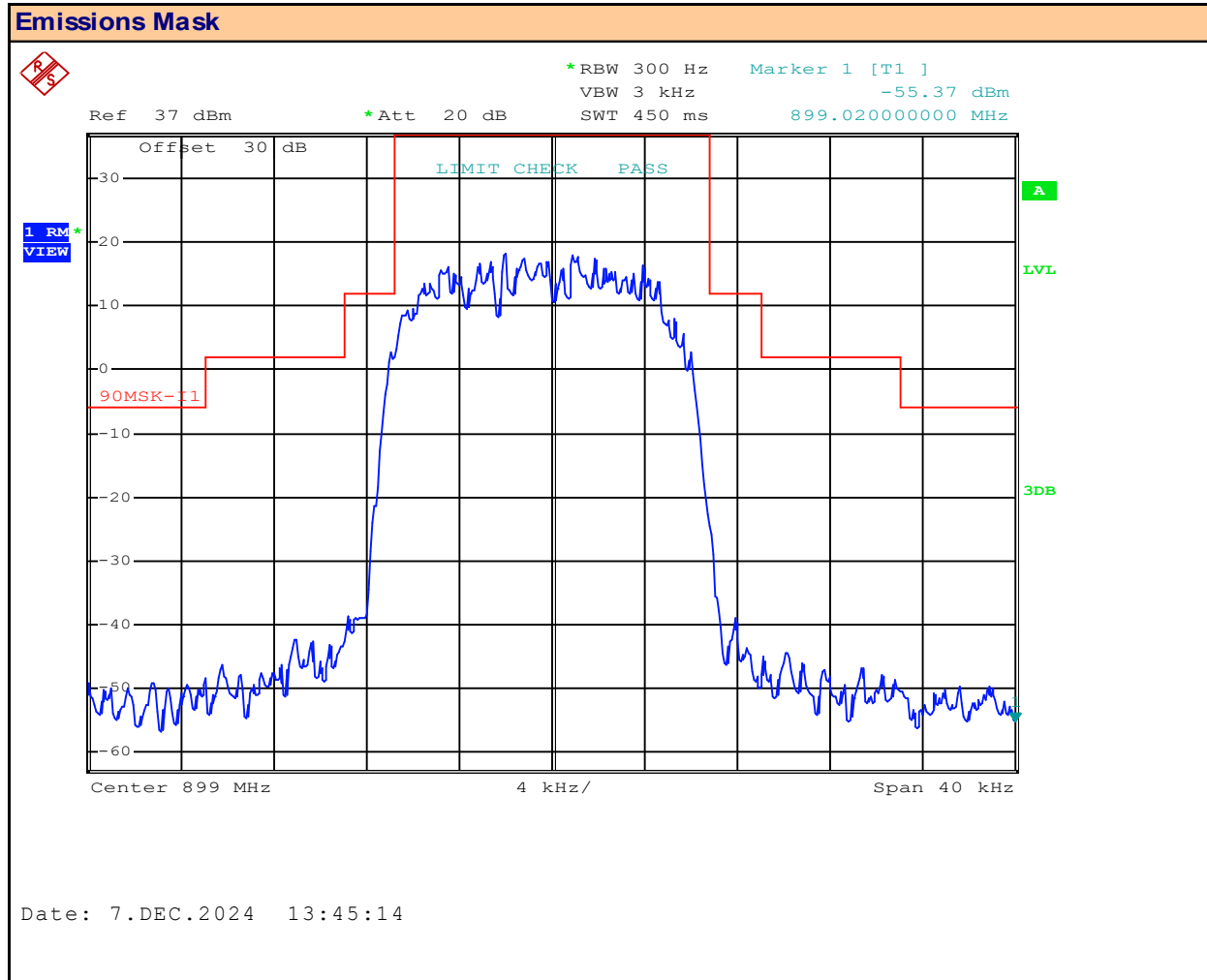
Channel Bandwidth: **12.5** kHz

Mask ID: **I**

Modulation: **16QAM**

Mask Results: **PASS**

Plot 9.3 – Emissions Mask – 899MHz, 12.5kHz BW, 64QAM



Channel Frequency: **899** MHz

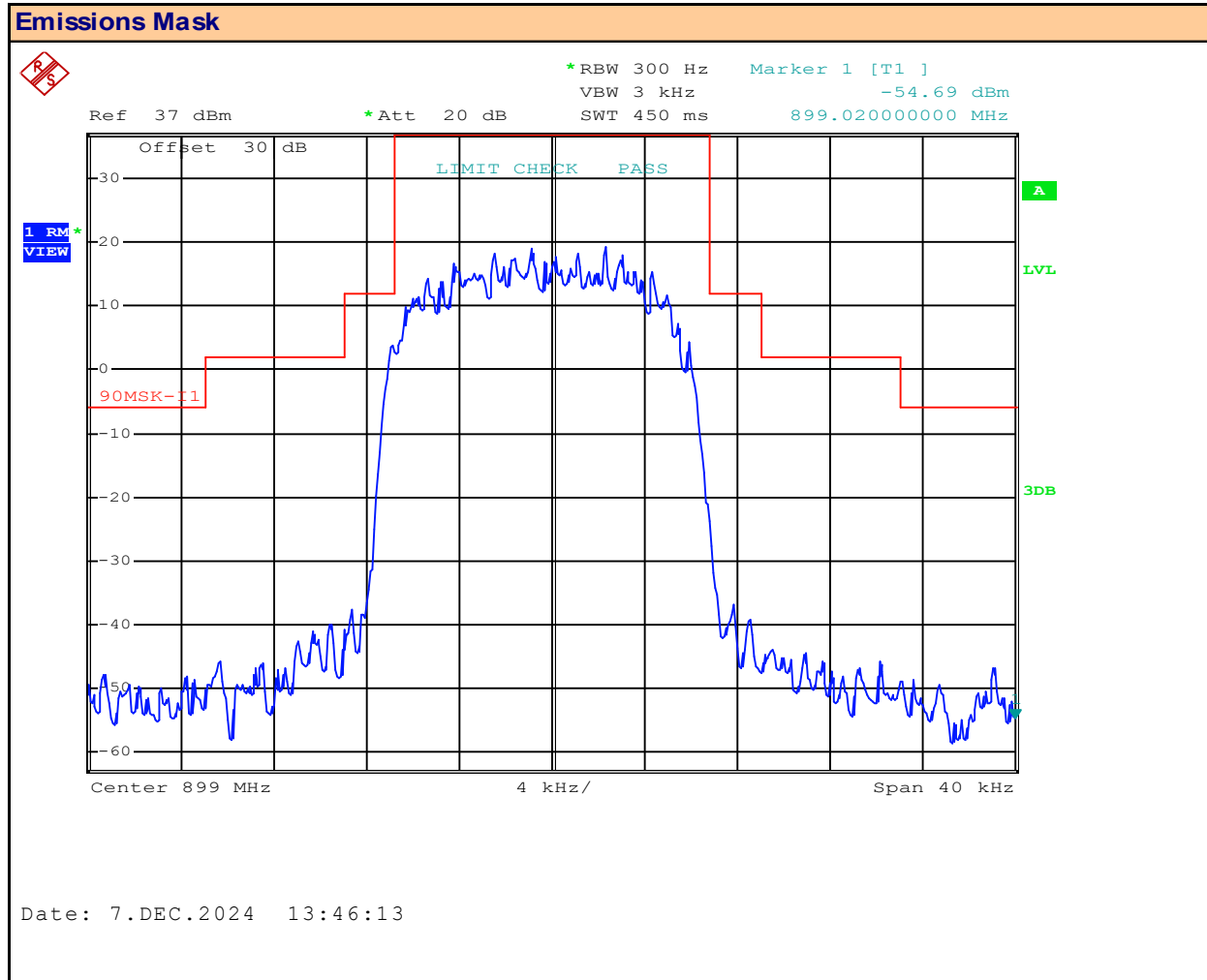
Channel Bandwidth: **12.5** kHz

Mask ID: **I**

Modulation: **64QAM**

Mask Results: **PASS**

Plot 9.4 – Emissions Mask – 899MHz, 12.5kHz BW, 256QAM



Channel Frequency: **899** MHz

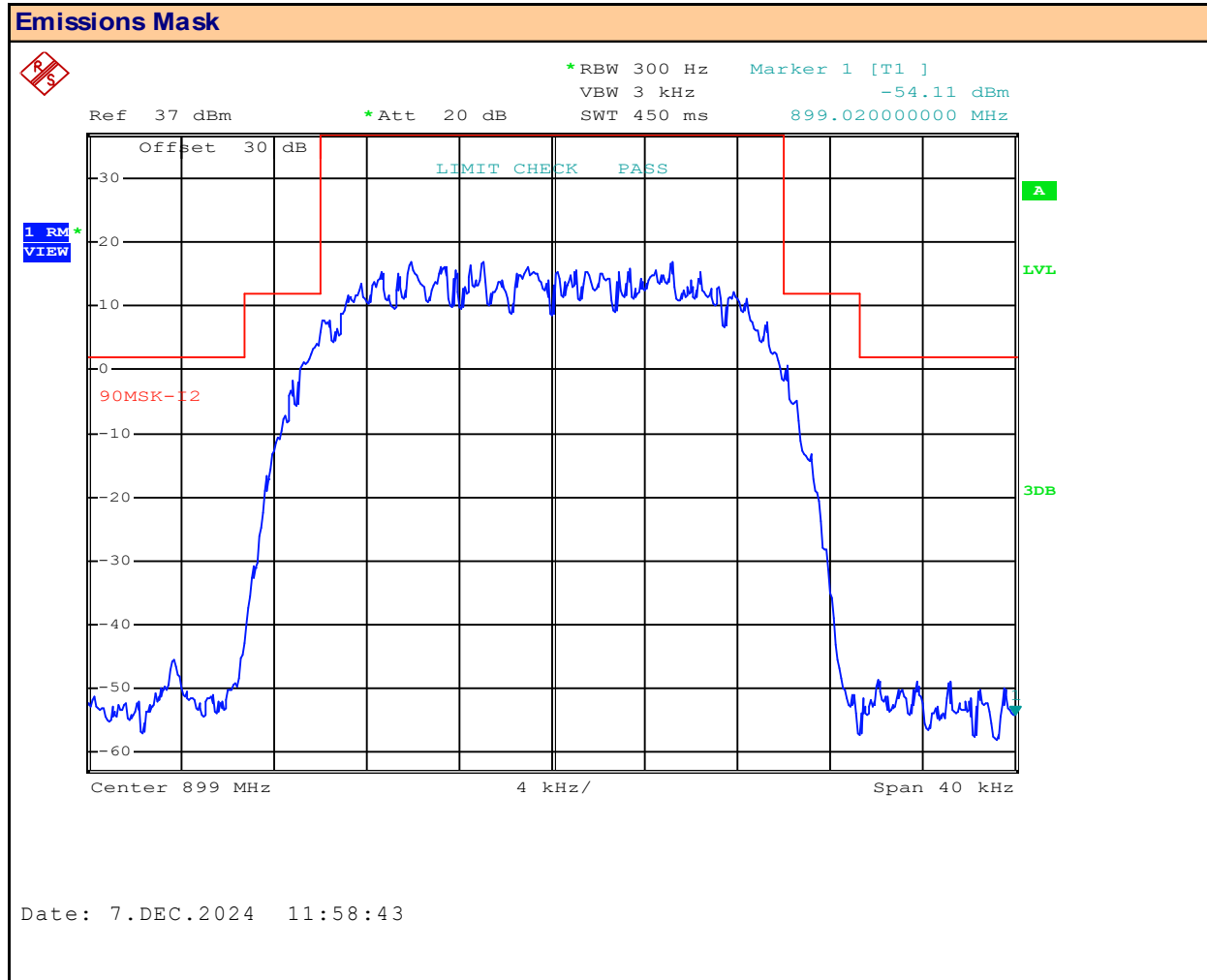
Channel Bandwidth: **12.5** kHz

Mask ID: **I**

Modulation: **256QAM**

Mask Results: **PASS**

Plot 9.5 – Emissions Mask – 899MHz, 25kHz BW, QPSK



Channel Frequency: **899** MHz

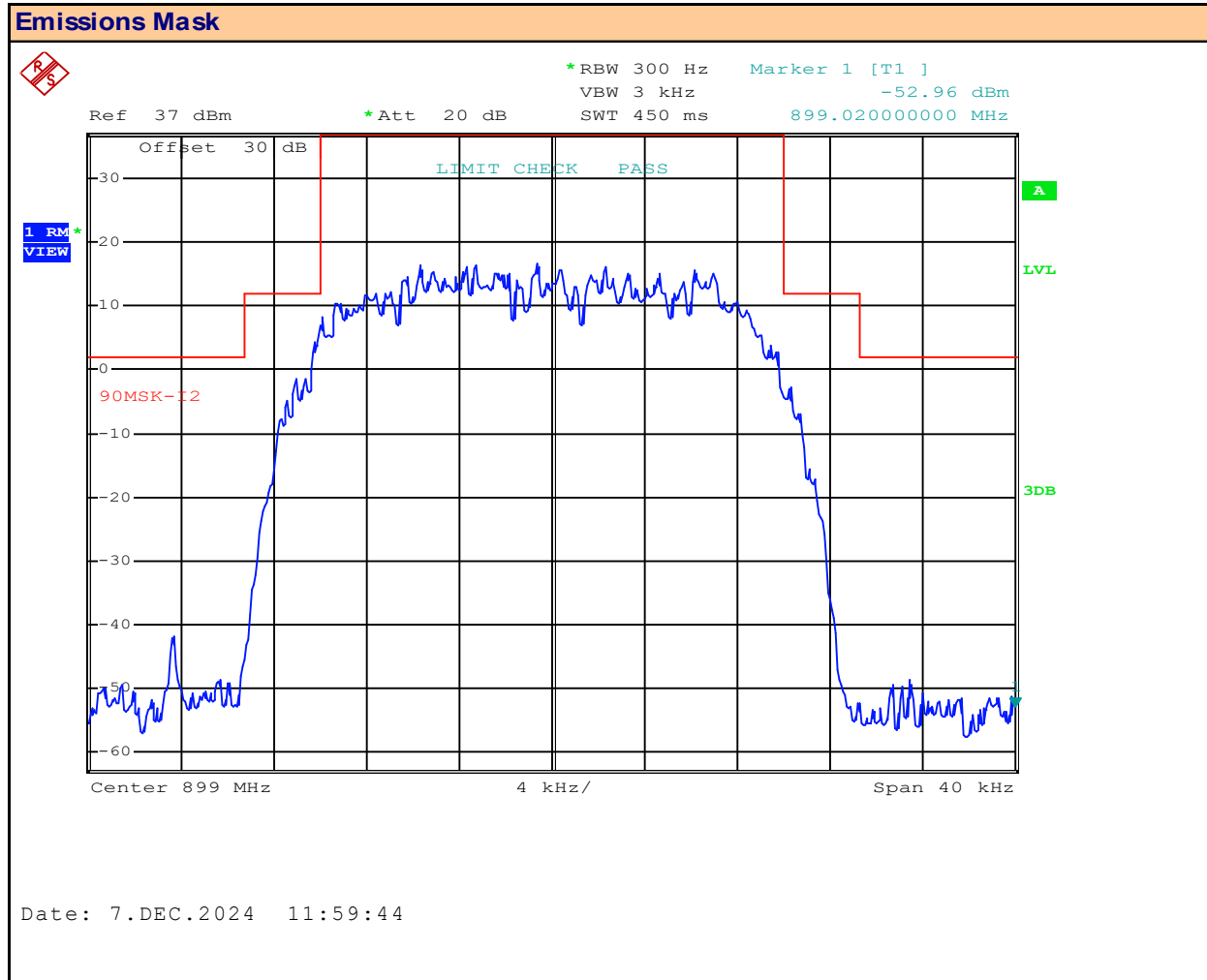
Channel Bandwidth: **25** kHz

Mask ID: **I**

Modulation: **QPSK**

Mask Results: **PASS**

Plot 9.6 – Emissions Mask – 899MHz, 25kHz BW, 16QAM



Channel Frequency: **899** MHz

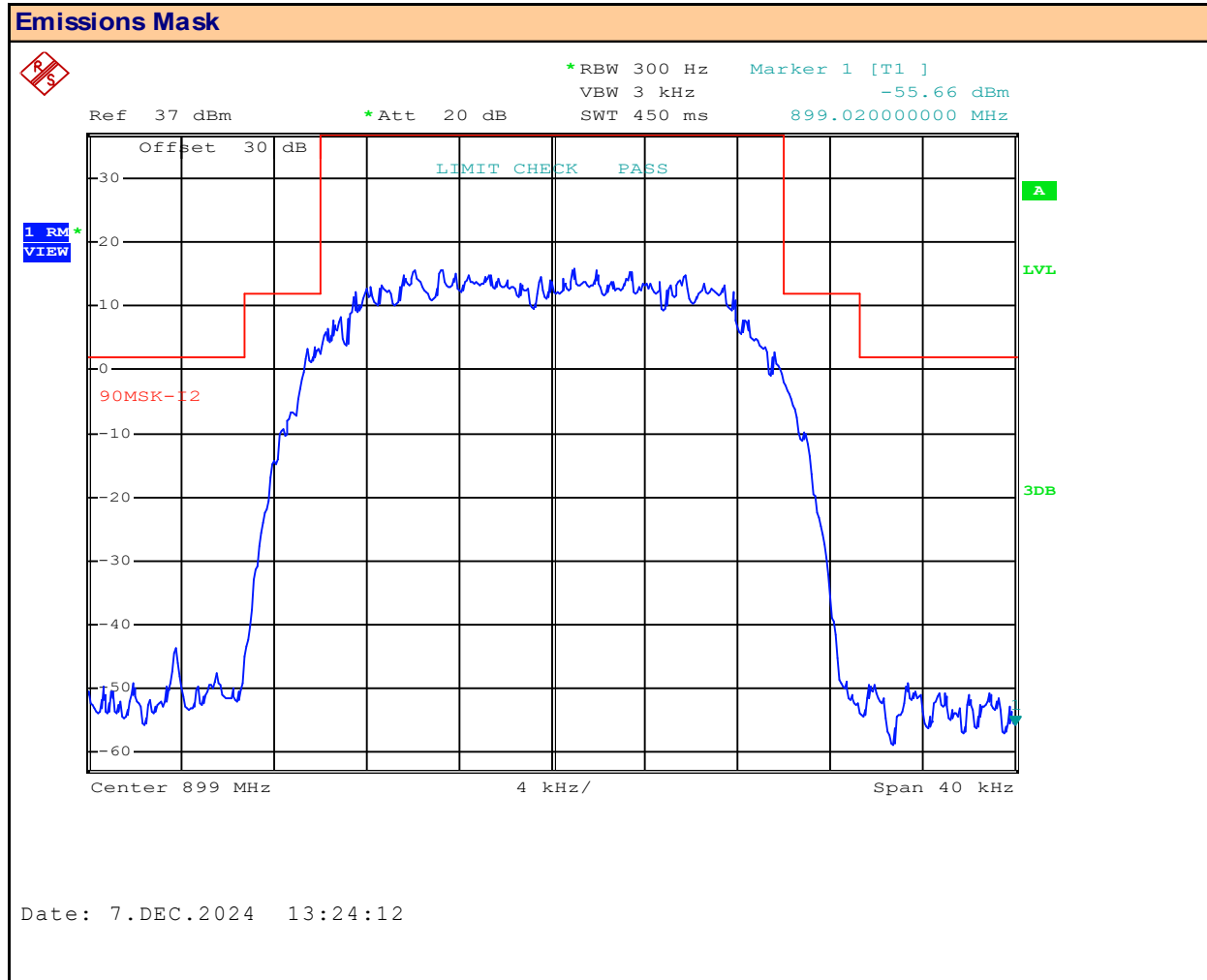
Channel Bandwidth: **25** kHz

Mask ID: **I**

Modulation: **16QAM**

Mask Results: **PASS**

Plot 9.7 – Emissions Mask – 899MHz, 25kHz BW, 64QAM



Channel Frequency: **899** MHz

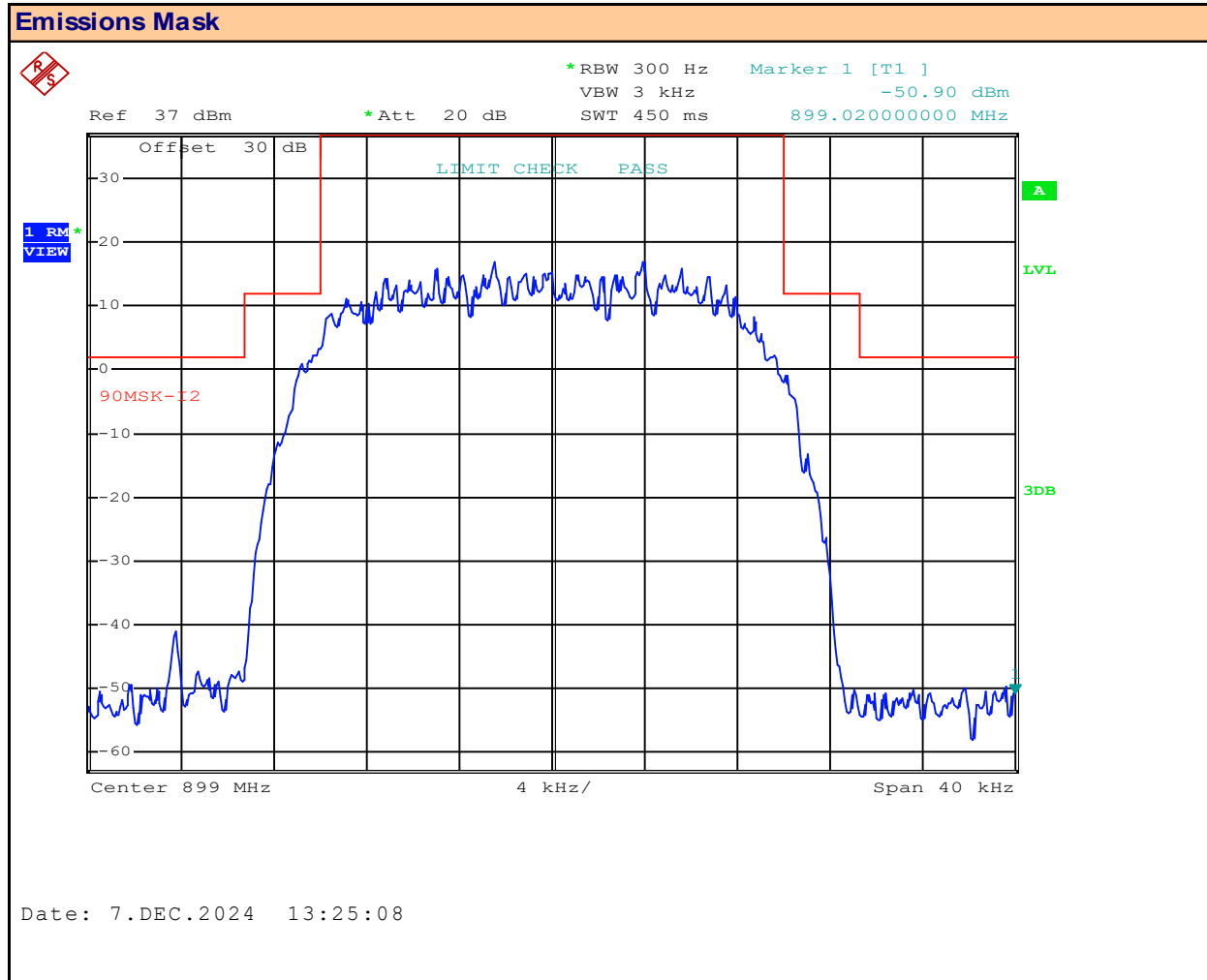
Channel Bandwidth: **25** kHz

Mask ID: **I**

Modulation: **64QAM**

Mask Results: **PASS**

Plot 9.8 – Emissions Mask – 899MHz, 25kHz BW, 256QAM



Channel Frequency: **899** MHz

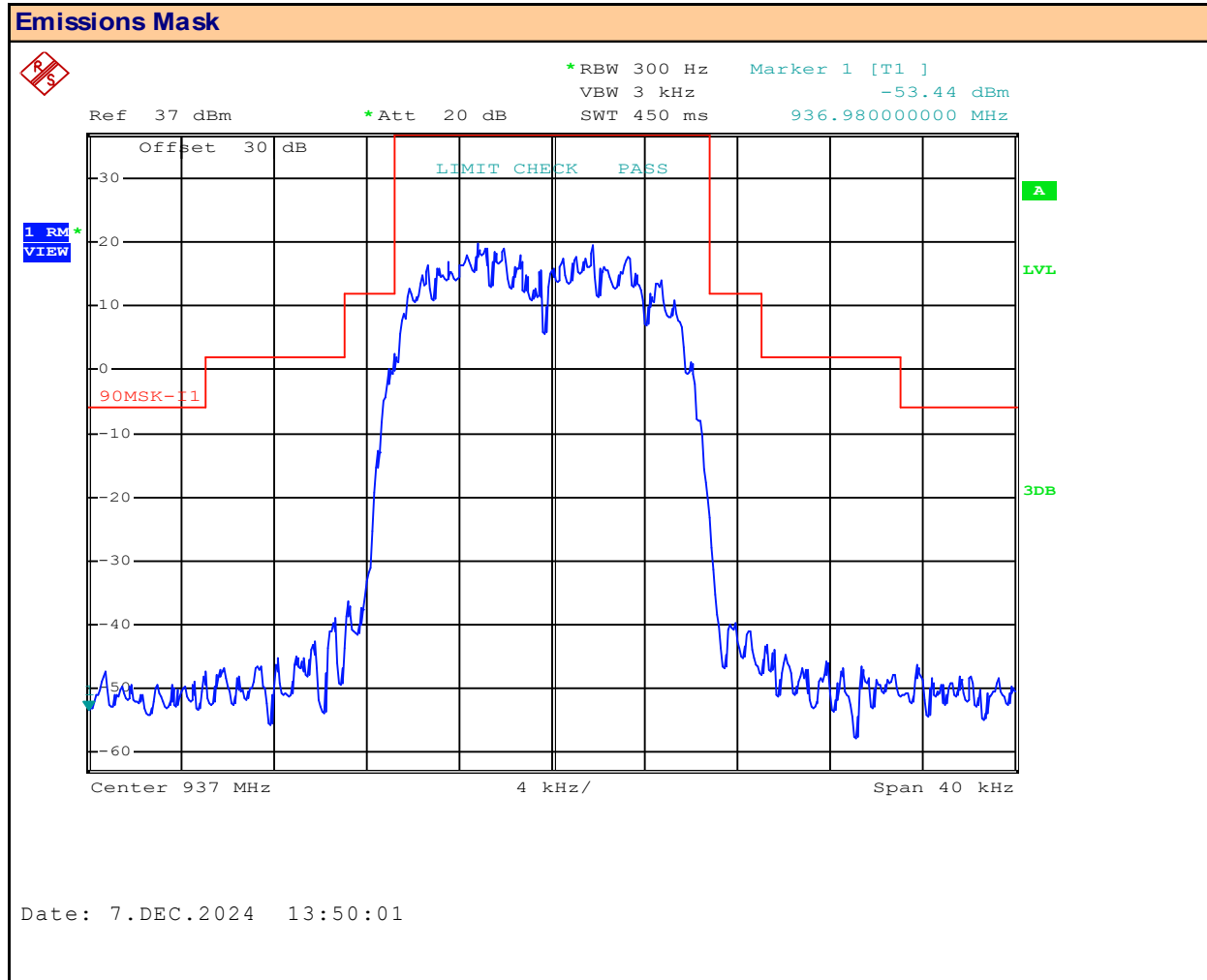
Channel Bandwidth: **25** kHz

Mask ID: **I**

Modulation: **256QAM**

Mask Results: **PASS**

Plot 9.9 – Emissions Mask – 937MHz, 12.5kHz BW, QPSK



Channel Frequency: **937** MHz

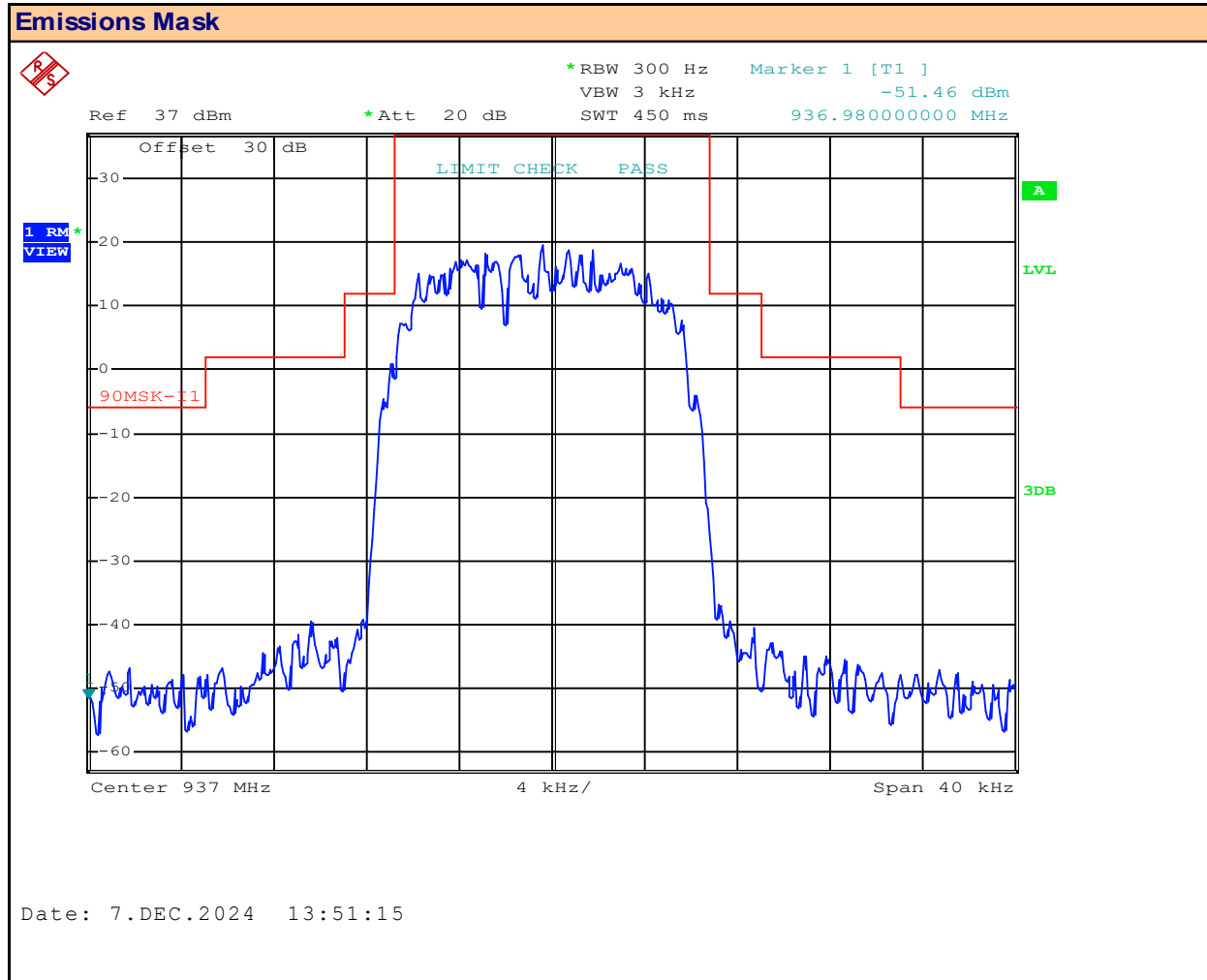
Channel Bandwidth: **12.5** kHz

Mask ID: **I**

Modulation: **QPSK**

Mask Results: **PASS**

Plot 9.10 – Emissions Mask – 937MHz, 12.5kHz BW, 16QAM



Channel Frequency: **937** MHz

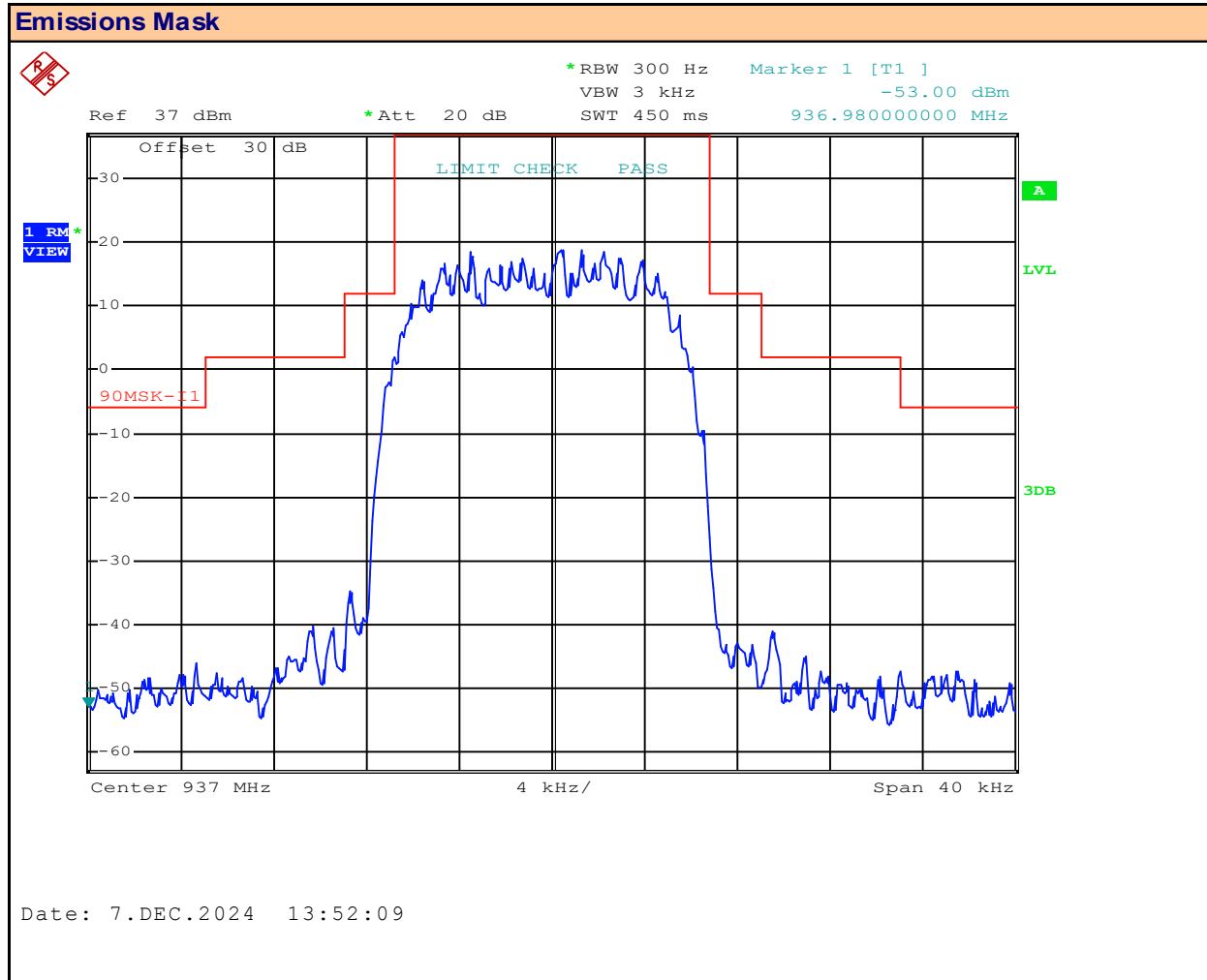
Channel Bandwidth: **12.5** kHz

Mask ID: **I**

Modulation: **16QAM**

Mask Results: **PASS**

Plot 9.11 – Emissions Mask – 937MHz, 12.5kHz BW, 64QAM



Channel Frequency: **937** MHz

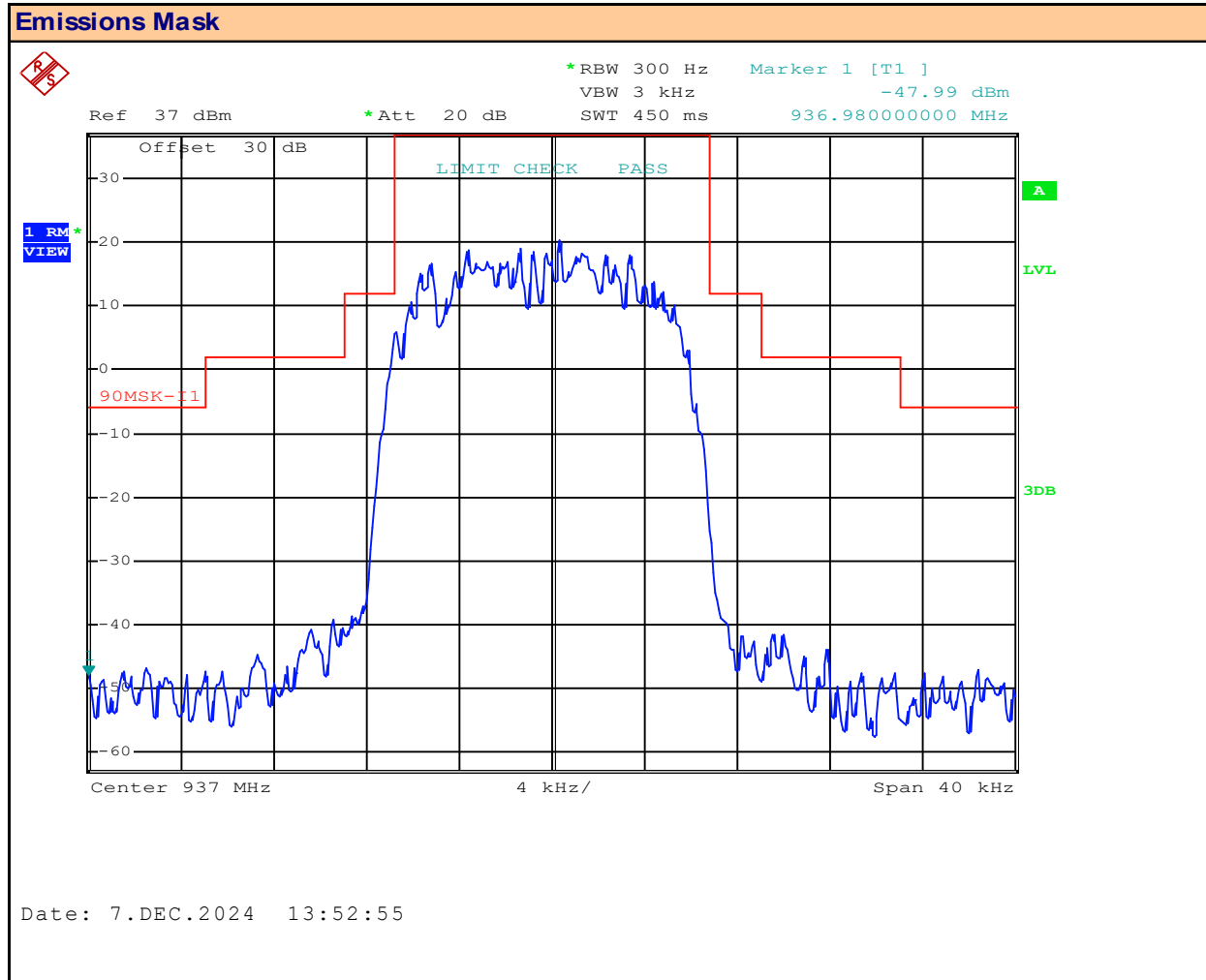
Channel Bandwidth: **12.5** kHz

Mask ID: **I**

Modulation: **64QAM**

Mask Results: **PASS**

Plot 9.12 – Emissions Mask – 937MHz, 12.5kHz BW, 256QAM



Channel Frequency: **937** MHz

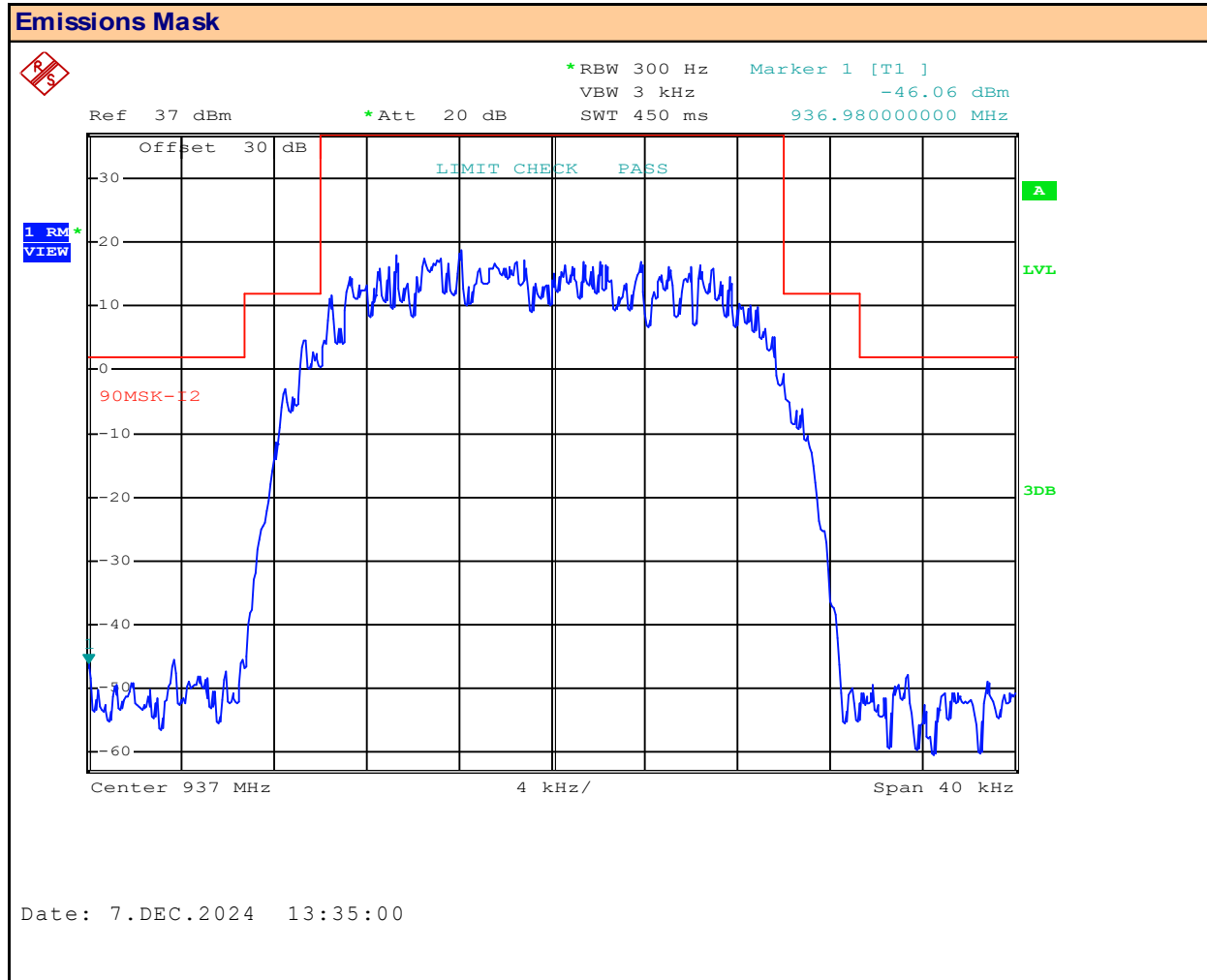
Channel Bandwidth: **12.5** kHz

Mask ID: **I**

Modulation: **256QAM**

Mask Results: **PASS**

Plot 9.13 – Emissions Mask – 937MHz, 25kHz BW, QPSK



Channel Frequency: **937** MHz

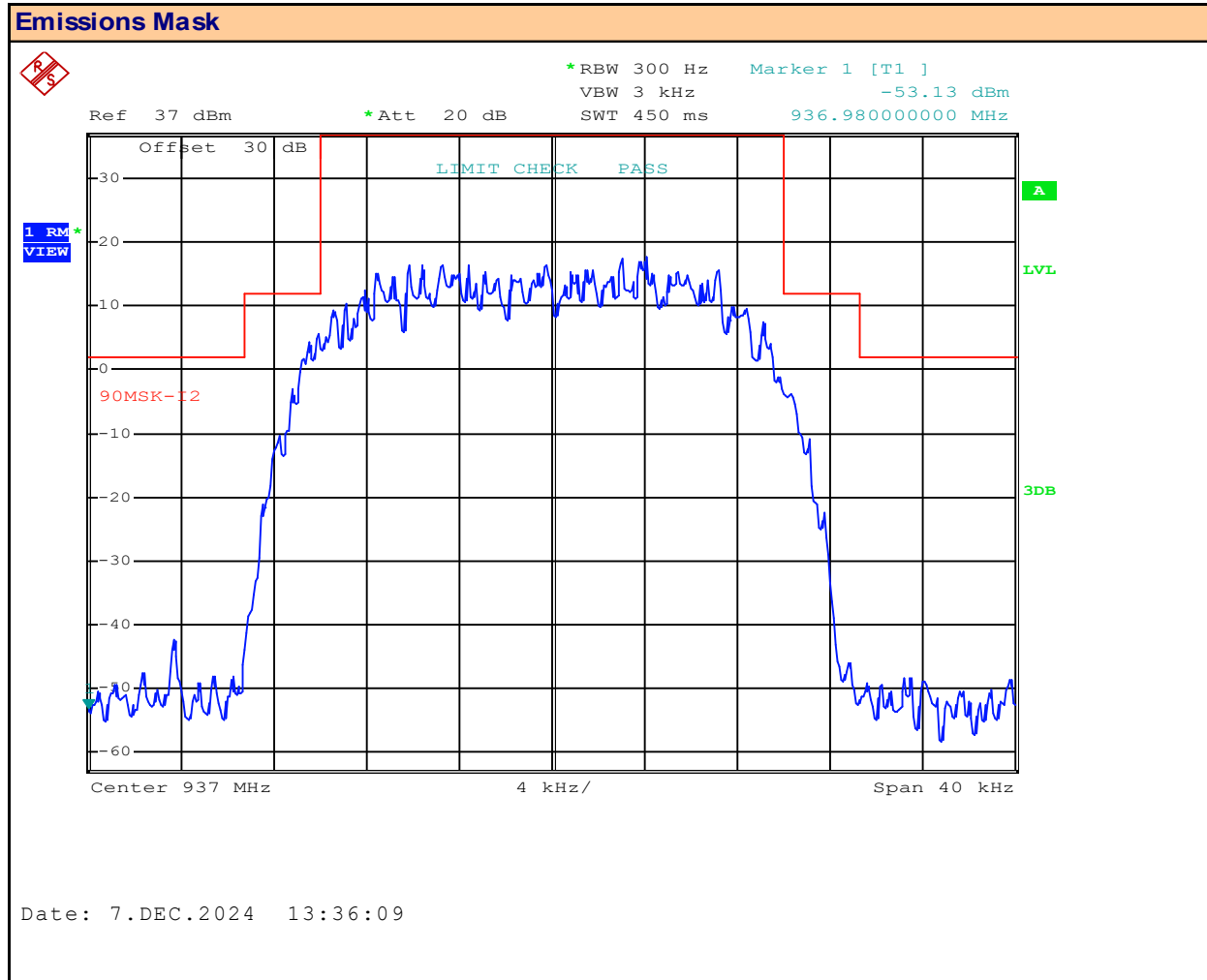
Channel Bandwidth: **25** kHz

Mask ID: **I**

Modulation: **QPSK**

Mask Results: **PASS**

Plot 9.14 – Emissions Mask – 937MHz, 25kHz BW, 16QAM



Channel Frequency: **937** MHz

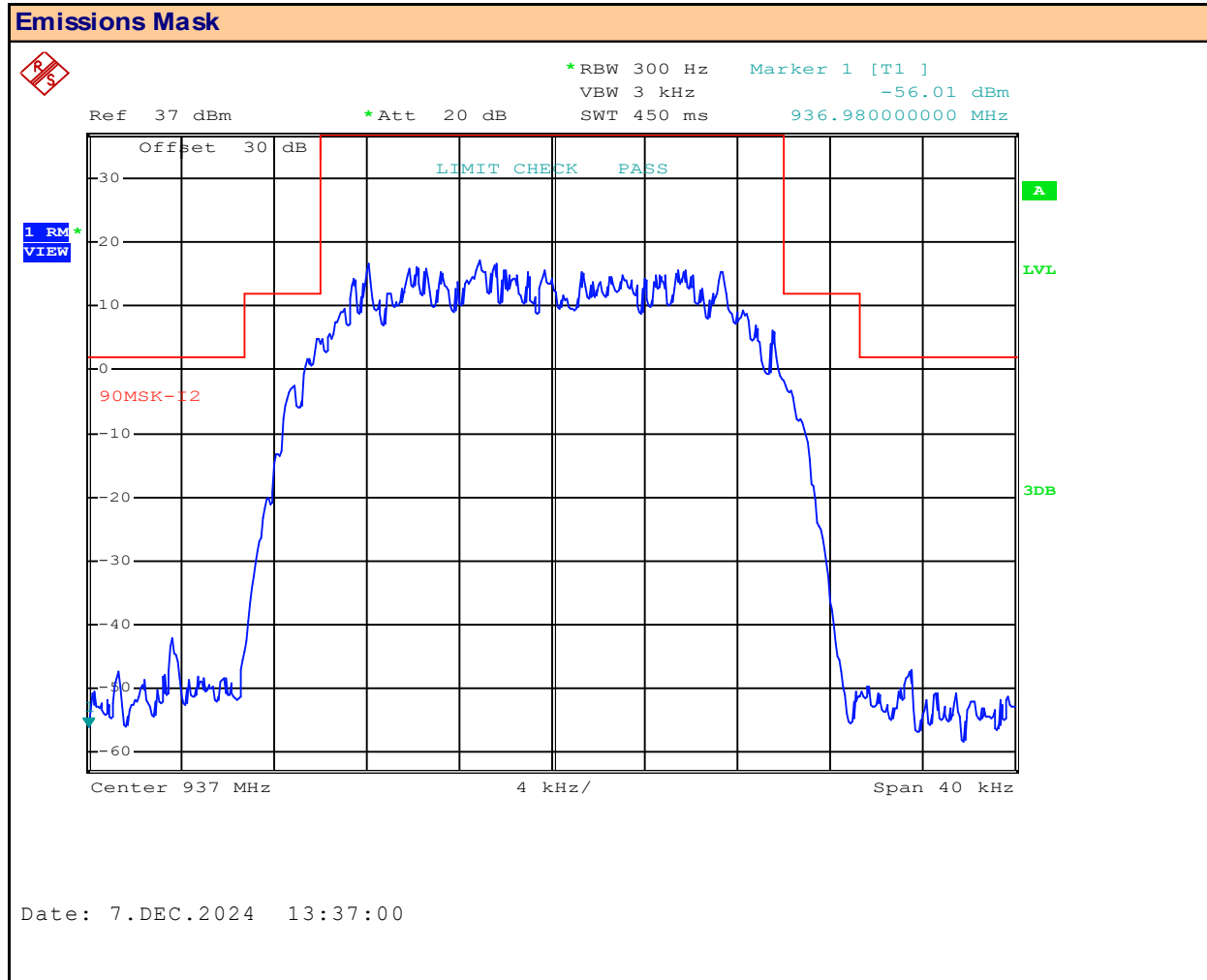
Channel Bandwidth: **25** kHz

Mask ID: **I**

Modulation: **16QAM**

Mask Results: **PASS**

Plot 9.15 – Emissions Mask – 937MHz, 25kHz BW, 64QAM



Channel Frequency: **937** MHz

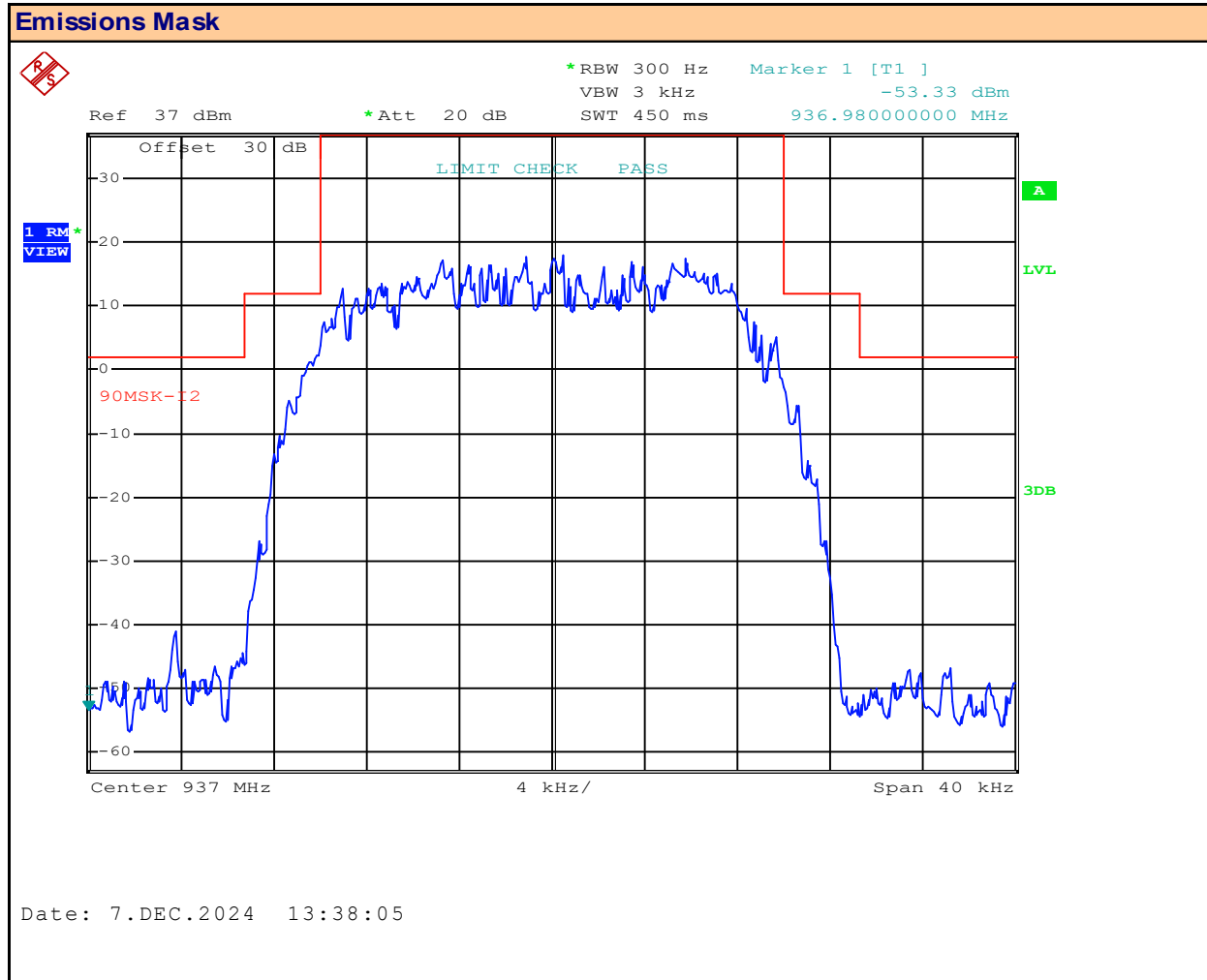
Channel Bandwidth: **25** kHz

Mask ID: **I**

Modulation: **64QAM**

Mask Results: **PASS**

Plot 9.16 – Emissions Mask – 937MHz, 25kHz BW, 256QAM



Channel Frequency: **937** MHz

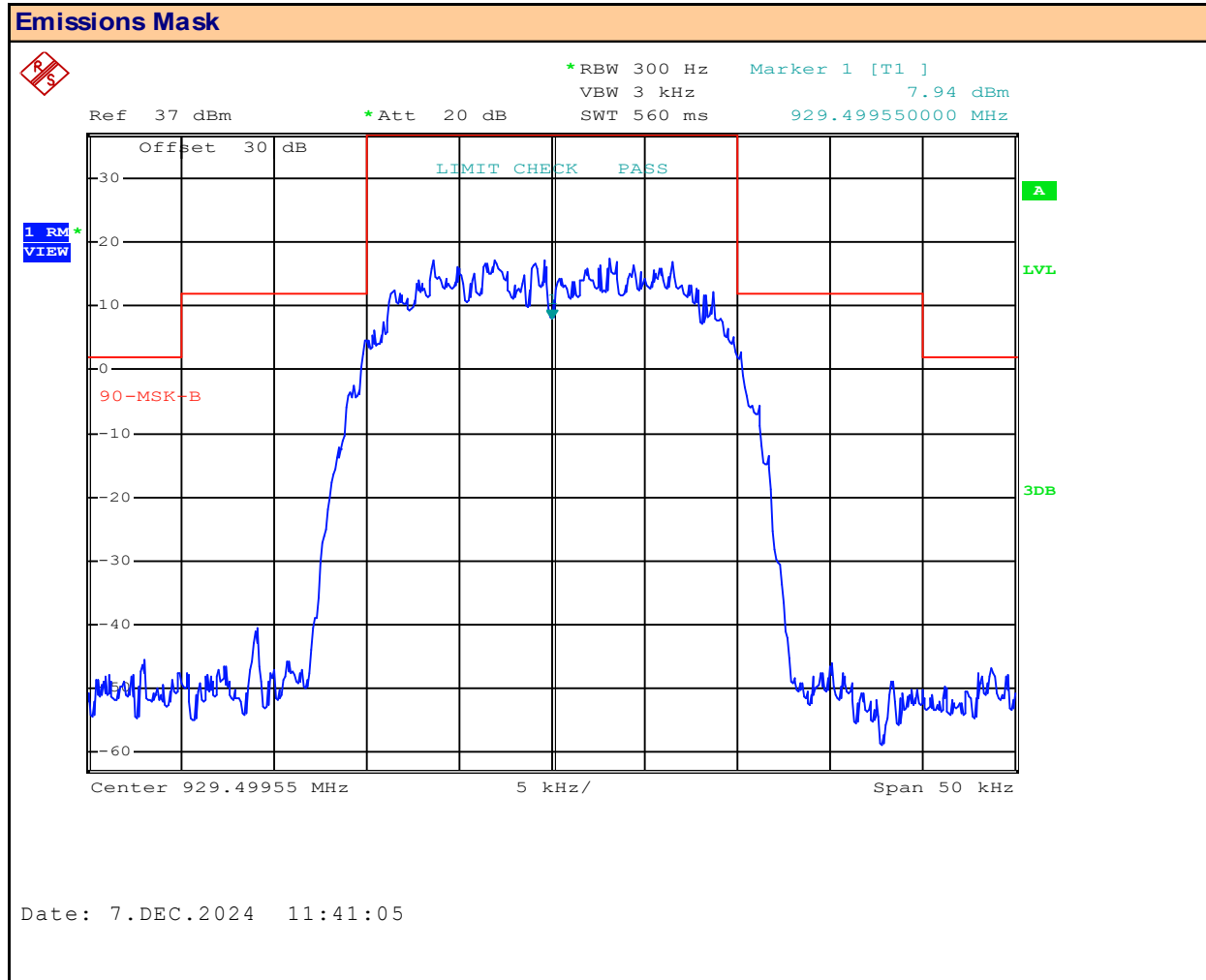
Channel Bandwidth: **25** kHz

Mask ID: **I**

Modulation: **256QAM**

Mask Results: **PASS**

Plot 9.17 – Emissions Mask – 929.5MHz, 25kHz BW, QPSK



Channel Frequency: **929.5** MHz

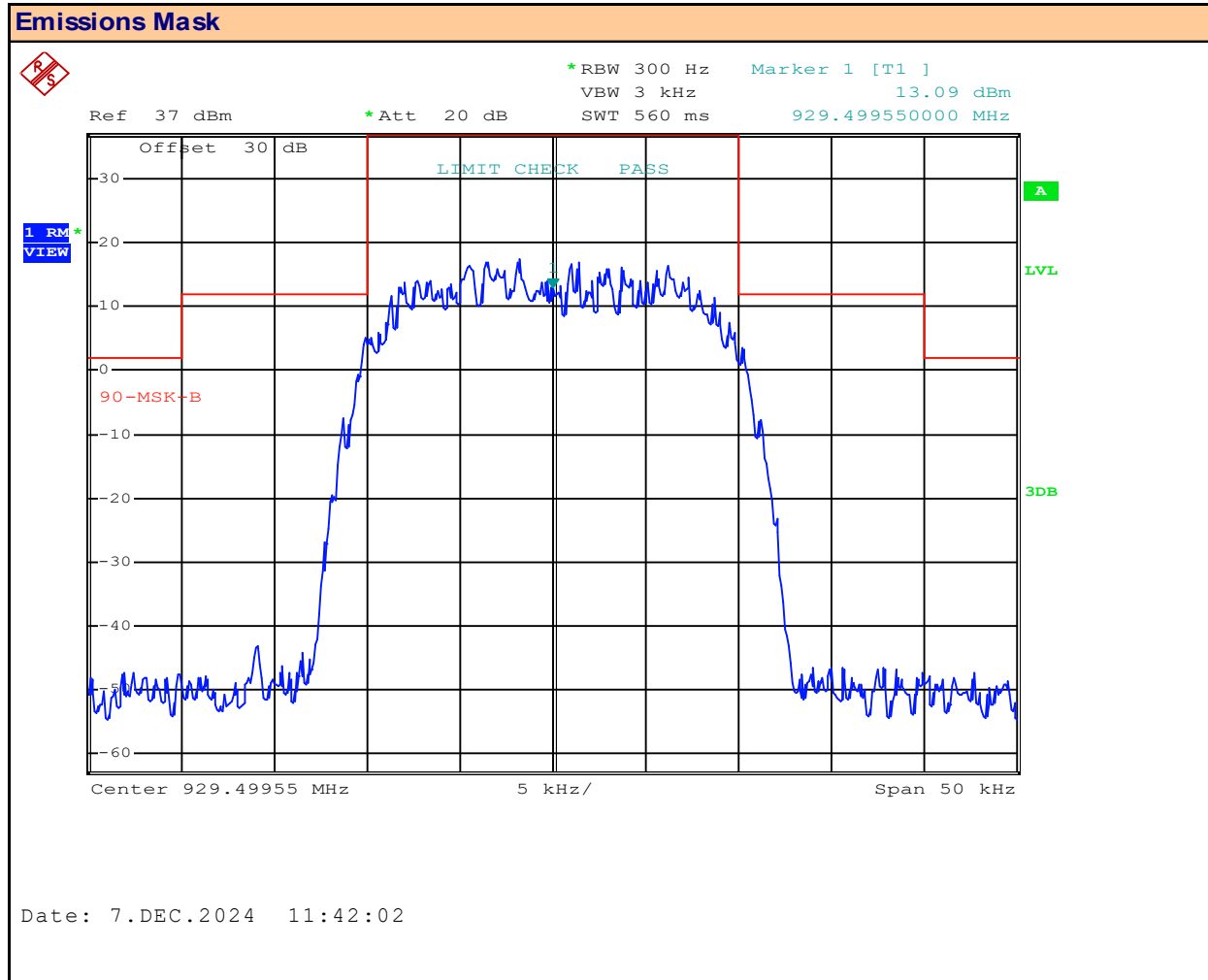
Channel Bandwidth: **25** kHz

Mask ID: **B**

Modulation: **QPSK**

Mask Results: **PASS**

Plot 9.18 – Emissions Mask – 929.5MHz, 25kHz BW, 16QAM



Channel Frequency: **929.5** MHz

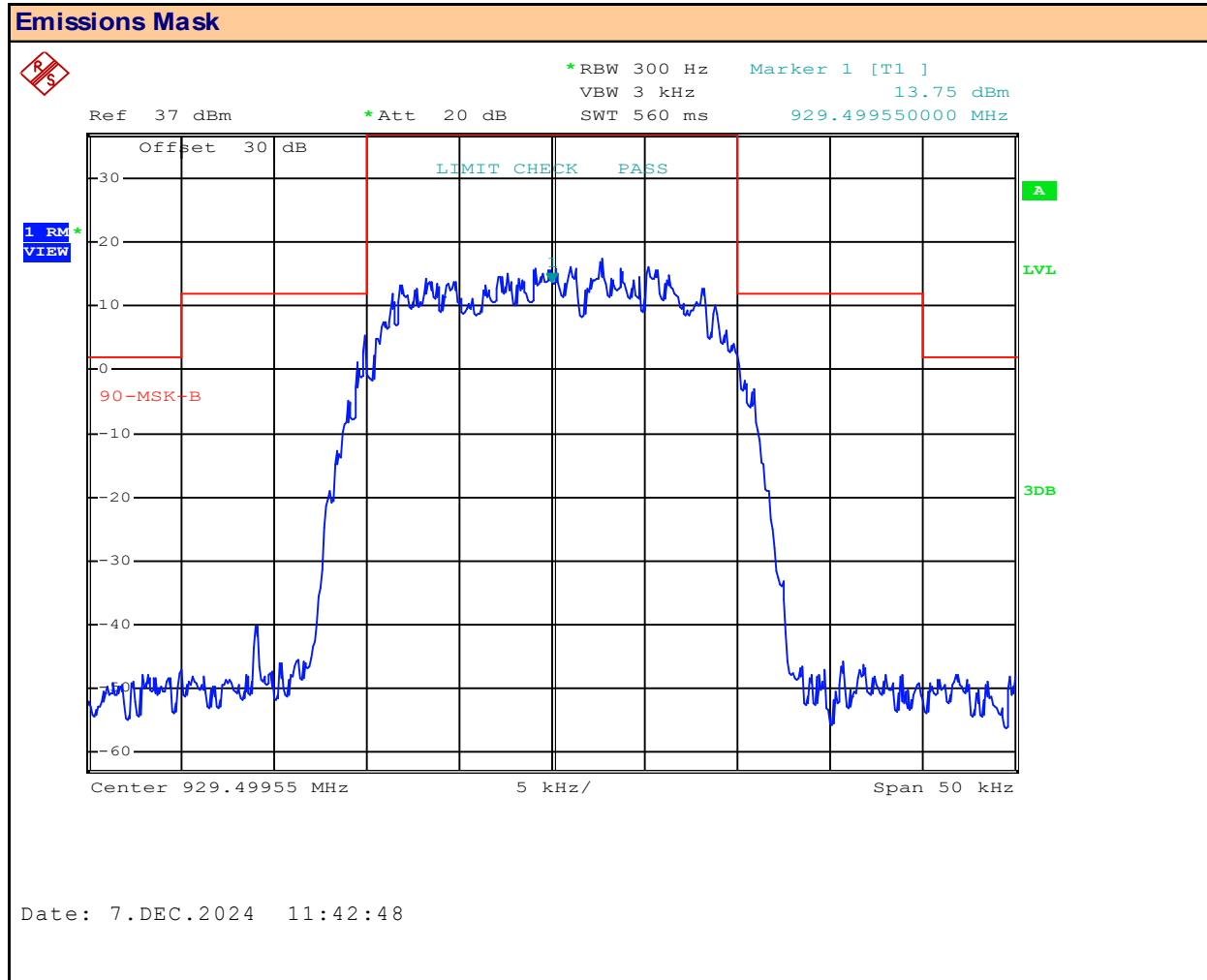
Channel Bandwidth: **25** kHz

Mask ID: **B**

Modulation: **16QAM**

Mask Results: **PASS**

Plot 9.19 – Emissions Mask – 929.5MHz, 25kHz BW, 64QAM



Channel Frequency: 929.5 MHz

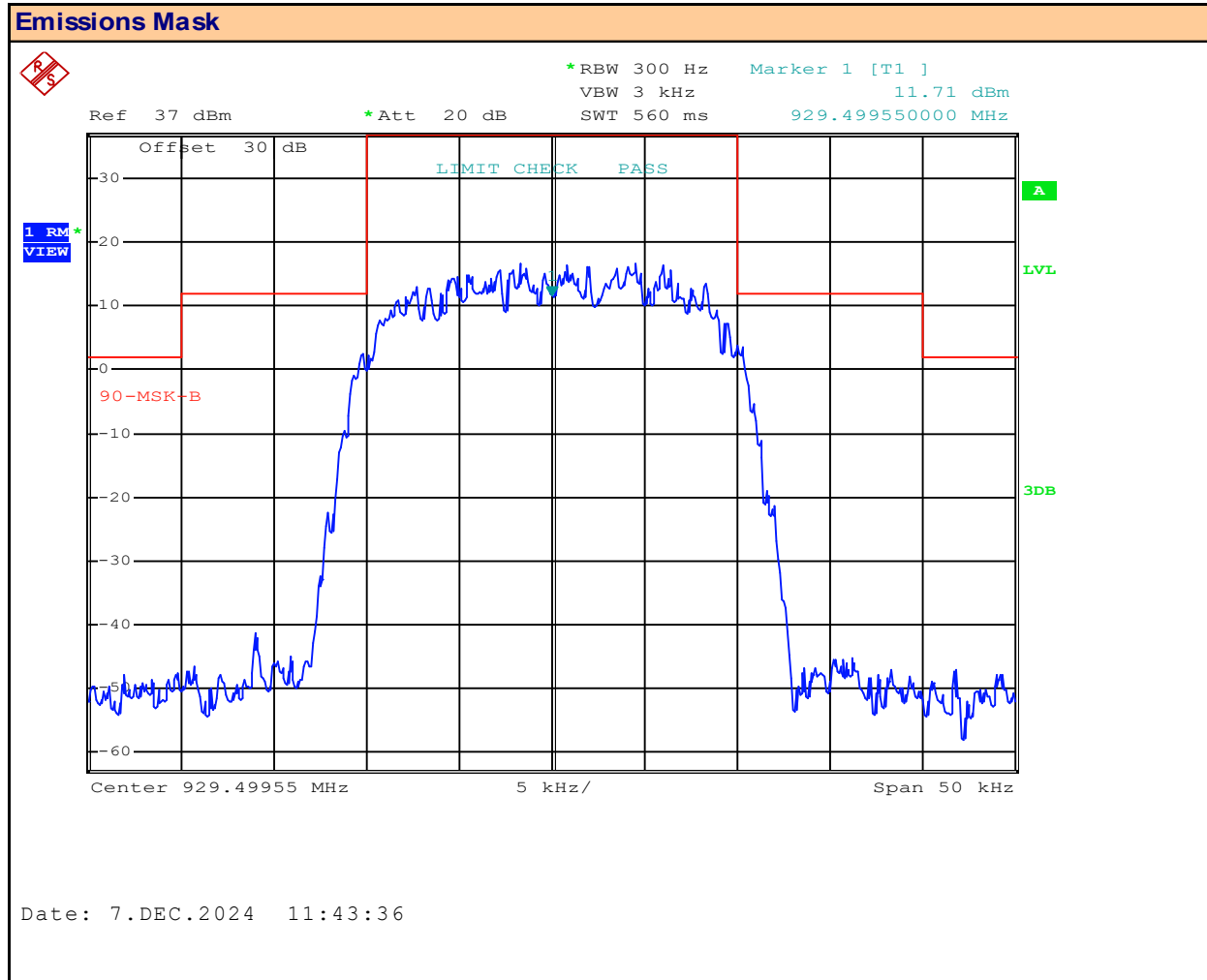
Channel Bandwidth: 25 kHz

Mask ID: B

Modulation: 64QAM

Mask Results: PASS

Plot 9.20 – Emissions Mask – 929.5MHz, 25kHz BW, 256QAM



Channel Frequency: **929.5** MHz

Channel Bandwidth: **25** kHz

Mask ID: **B**

Modulation: **256QAM**

Mask Results: **PASS**

Table 9.1 - Summary of Emissions Mask Measurements

Emissions Mask Results				
Channel Frequency (MHz)	Channel Bandwidth (kHz)	Modulation	Maks ID	Mask Results
899.0	12.5	QPSK	I	PASS
		16QAM		
		64QAM		
		256QAM		
	25.0	QPSK		
		16QAM		
		64QAM		
		256QAM		
937.0	12.5	QPSK		
		16QAM		
		64QAM		
		256QAM		
	25.0	QPSK		
		16QAM		
		64QAM		
		256QAM		
929.5	25.0	QPSK	B	
		16QAM		
		64QAM		
		256QAM		
Result:				Complies

10.0 CONDUCTED SPURIOUS EMISSIONS TO 10TH HARMONIC

Test Procedure

Normative	FCC 47 CFR §90.210
References	ANSI C63.26

Requirement / Limits

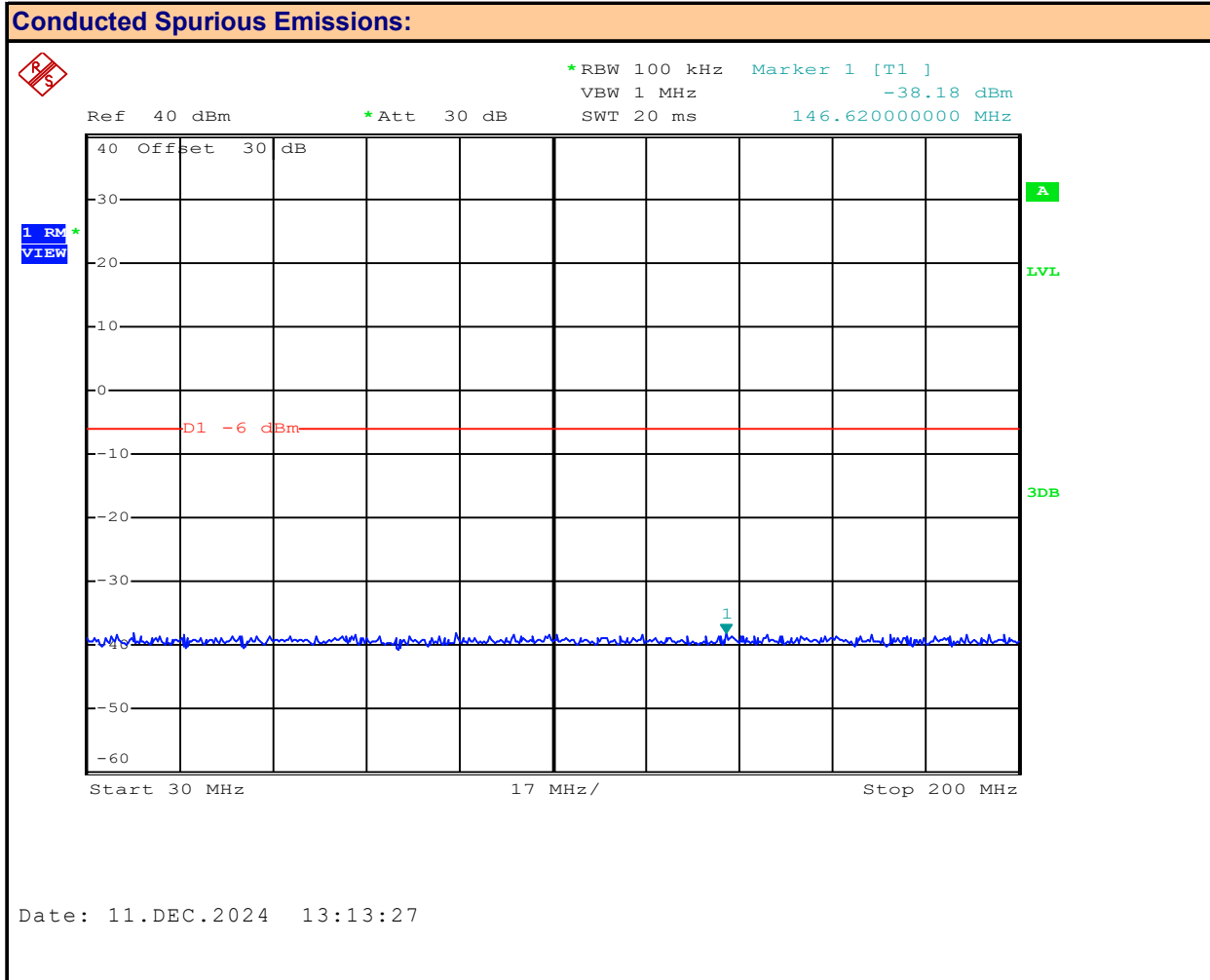
47 CFR §90.210	§90.210 Emission Mask
	(i) Emission Mask I. For transmitters that are equipped with an audio low pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:
	(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 6.8 kHz, but no more than 9.0 kHz: At least 25 dB;
	(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 9.0 kHz, but no more than 15 kHz: At least 35 dB;
	(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 15 kHz: At least 43 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation.
	(b) Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:
	(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
	(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
	(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

Test Setup	Appendix A - Figure A.1
-------------------	--------------------------------

Measurement Procedure

The DUT was connected to a Spectrum Analyzer via a 30dB attenuator. The DUT was configured to transmit modulated at its highest output power. The emissions mask was created in the SA and the SA Reference Level was set to the DUT's maximum rated power. The SA's Limit Check (Pass/Fail) was enabled and the results recorded for each applicable bandwidth and modulation.

Plot 10.1 – Conducted Spurious Emissions 899MHz Channel, 30-200MHz



Channel Frequency: 899 MHz

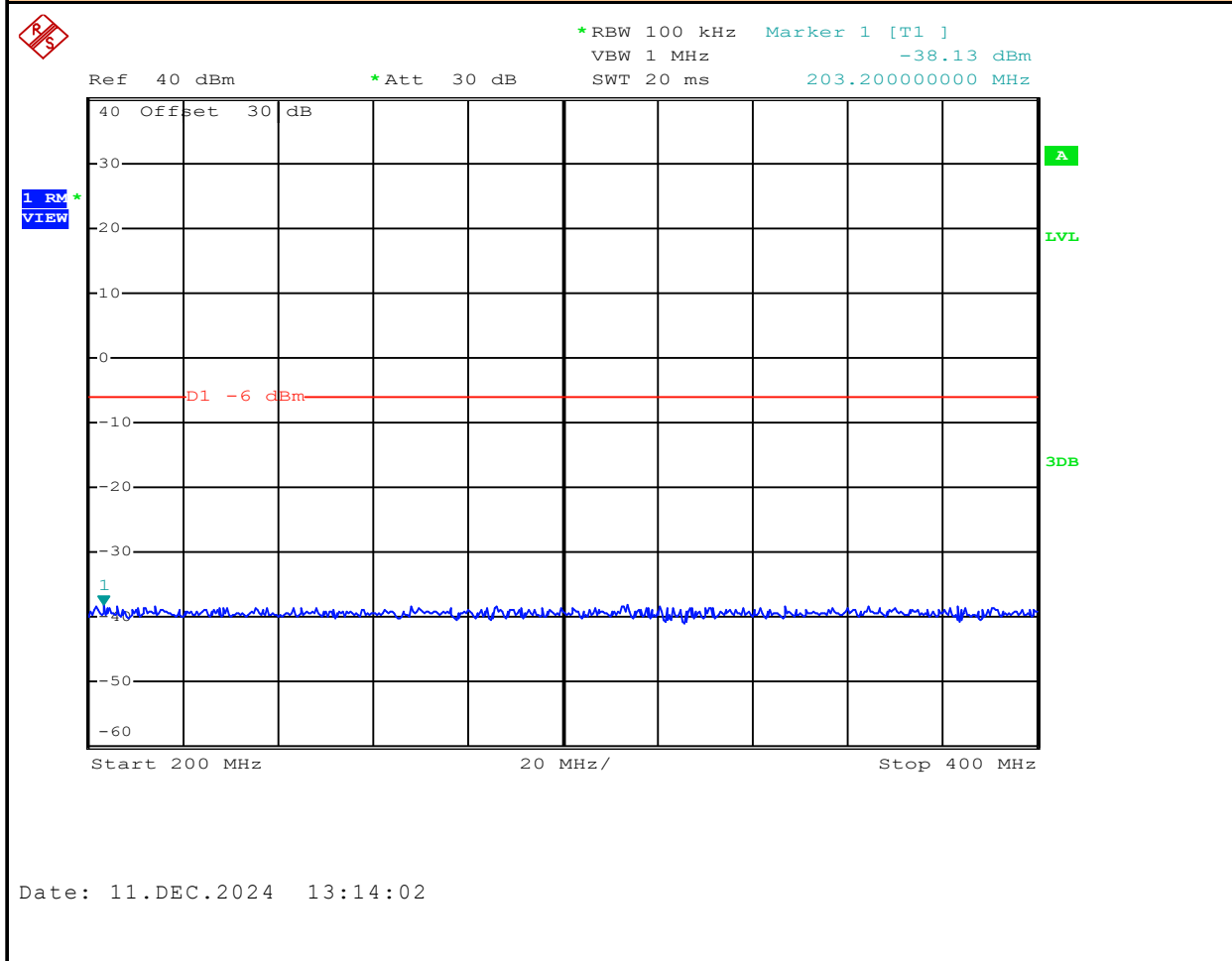
Modulation: CW

Emission Frequency: ND MHz

Measured Emission: ND dBm

Plot 10.2 – Conducted Spurious Emissions 899MHz Channel, 200-400MHz

Conducted Spurious Emissions:



Channel Frequency: MHz

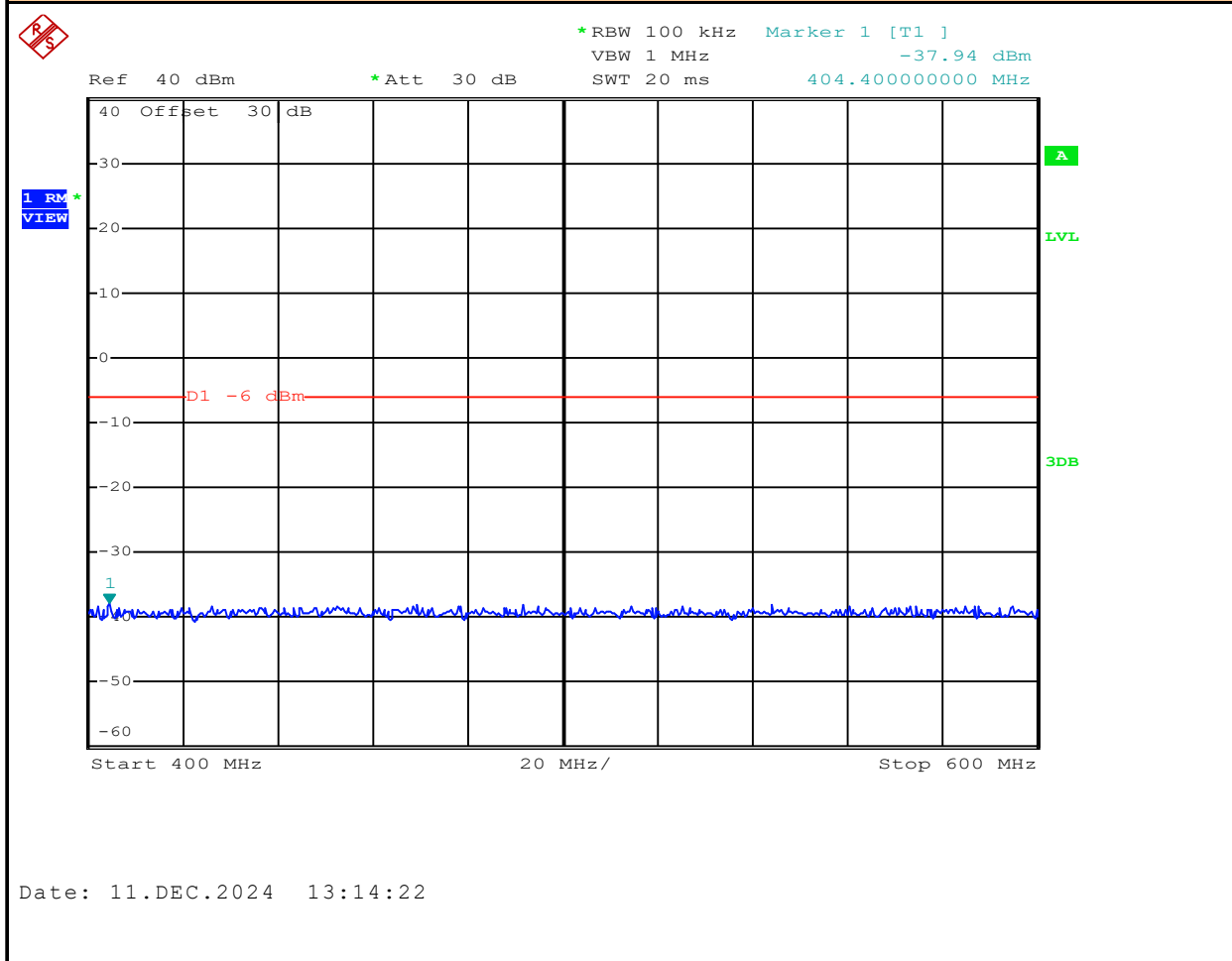
Modulation:

Emission Frequency: MHz

Measured Emission: dBm

Plot 10.3 – Conducted Spurious Emissions 899MHz Channel, 400-600MHz

Conducted Spurious Emissions:



Channel Frequency: MHz

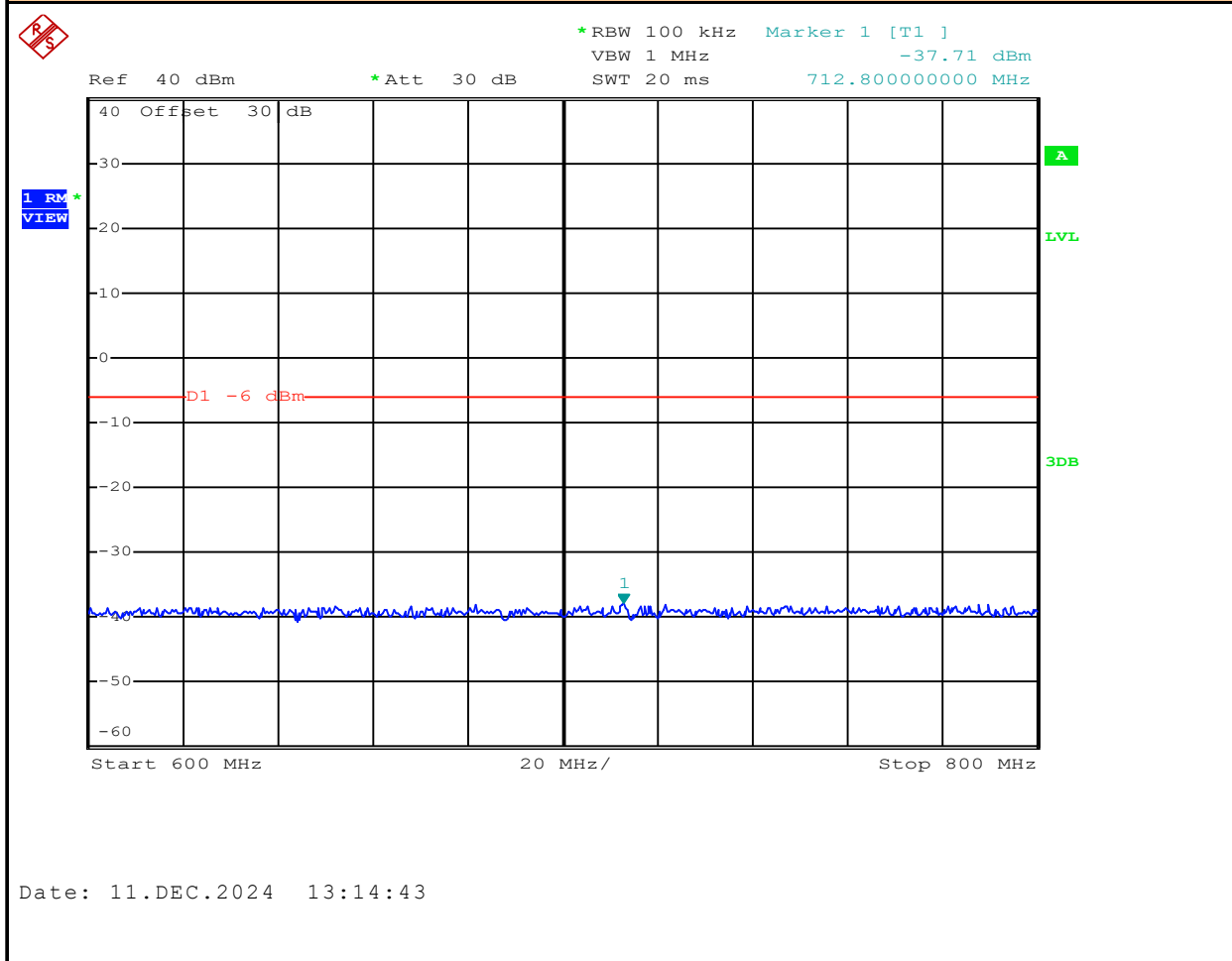
Modulation:

Emission Frequency: MHz

Measured Emission: dBm

Plot 10.4 – Conducted Spurious Emissions 899MHz Channel, 600-800MHz

Conducted Spurious Emissions:



Channel Frequency: **899** MHz

Modulation: **CW**

Emission Frequency: **ND** MHz

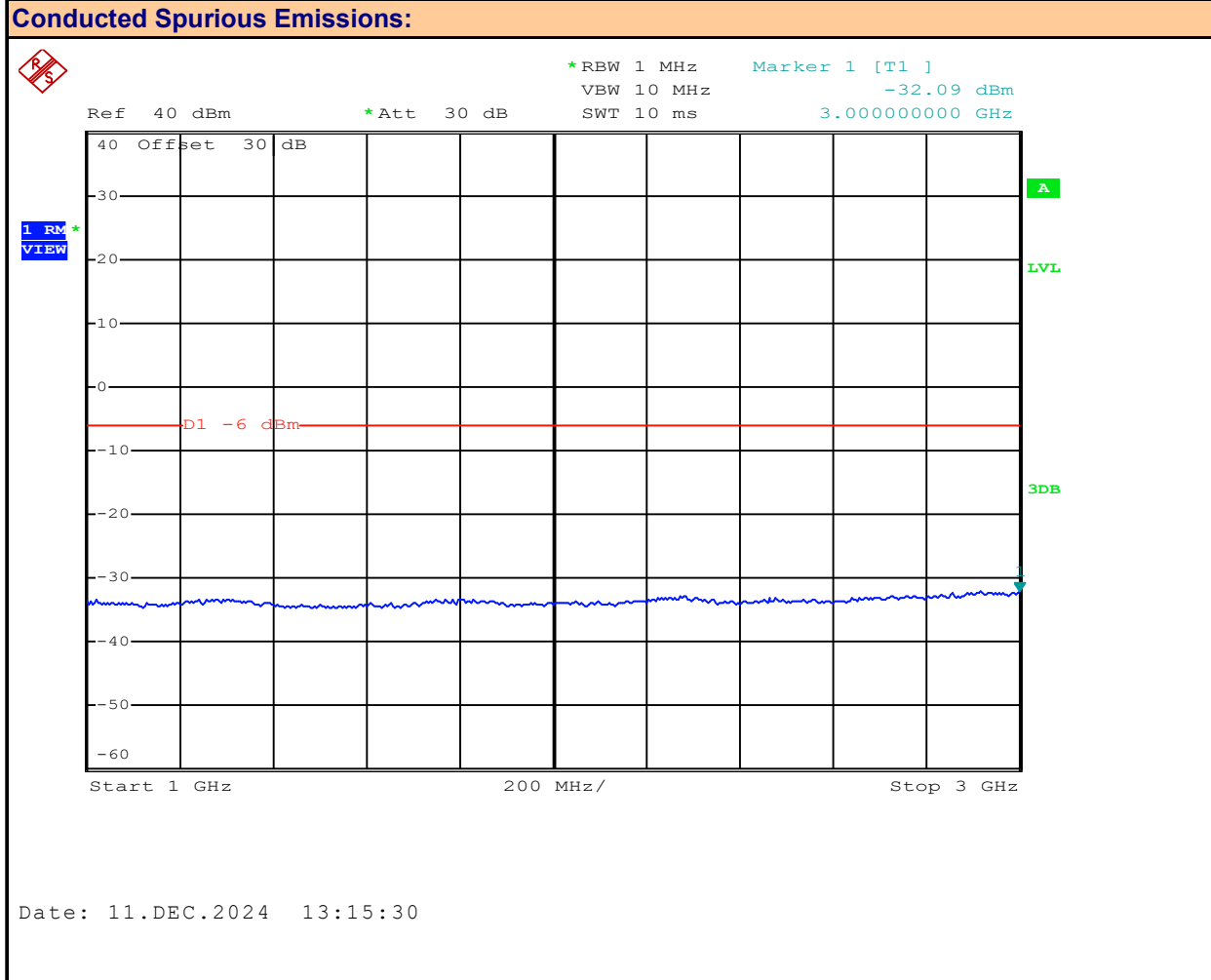
Measured Emission: **ND** dBm

Conducted Spurious Emissions:



Measured Emission: **ND** dBm

Plot 10.5 – Conducted Spurious Emissions 899MHz Channel, 1 – 3GHz



Channel Frequency: **899** MHz

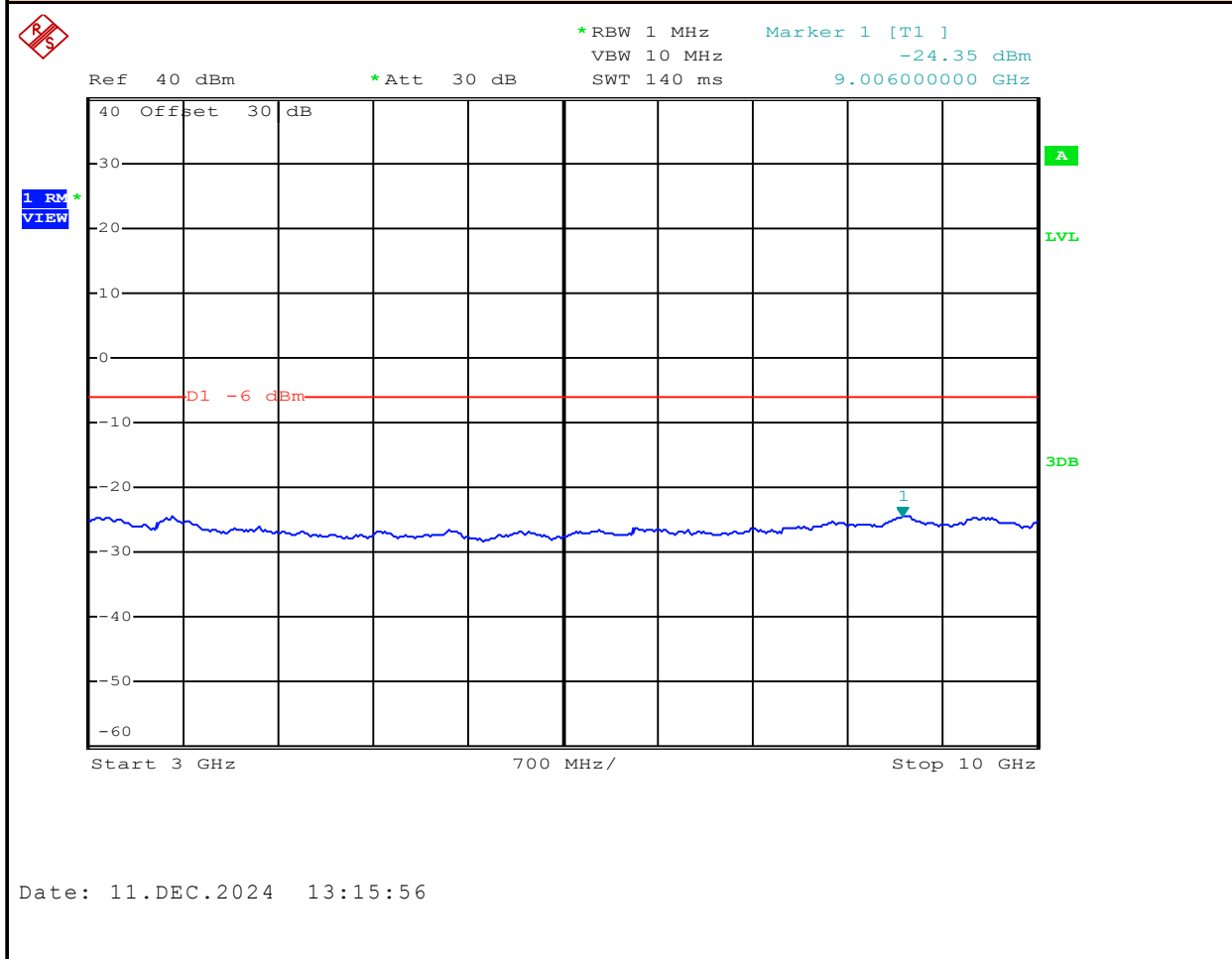
Modulation: **CW**

Emission Frequency: **ND** MHz

Measured Emission: **ND** dBm

Plot 10.6 – Conducted Spurious Emissions 899MHz Channel, 3 – 10GHz

Conducted Spurious Emissions:



Channel Frequency: **899** MHz

Modulation: **CW**

Emission Frequency: **ND** MHz

Measured Emission: **ND** dBm

Table 10.1 - Summary of Conducted Spurious Emissions Measurements

Conducted Spurious Emissions Measurement Results:							
Frequency (MHz)	Modulation	Emission Power [P _{Em}] (dBm)	Emission Frequency (MHz)	Fundamental Measurement [P _{Fund}] (dBm)	Attenuation [Atten] (dB)	Limit (dB)	Margin (dB)
899.00	CW	ND	ND	37.00	n/a	43	n/a
Results:						Complies	

Attenuation [Atten] = [P_{Fund}] - [P_{Em}]

Margin = Attenuation - Limit

ND = None Detected

n/a = Not Applicable

11.0 RADIATED TX SPURIOUS EMISSIONS

Test Procedure

Normative	FCC 47 CFR §90.210
References	ANSI C63.26

Requirement / Limits

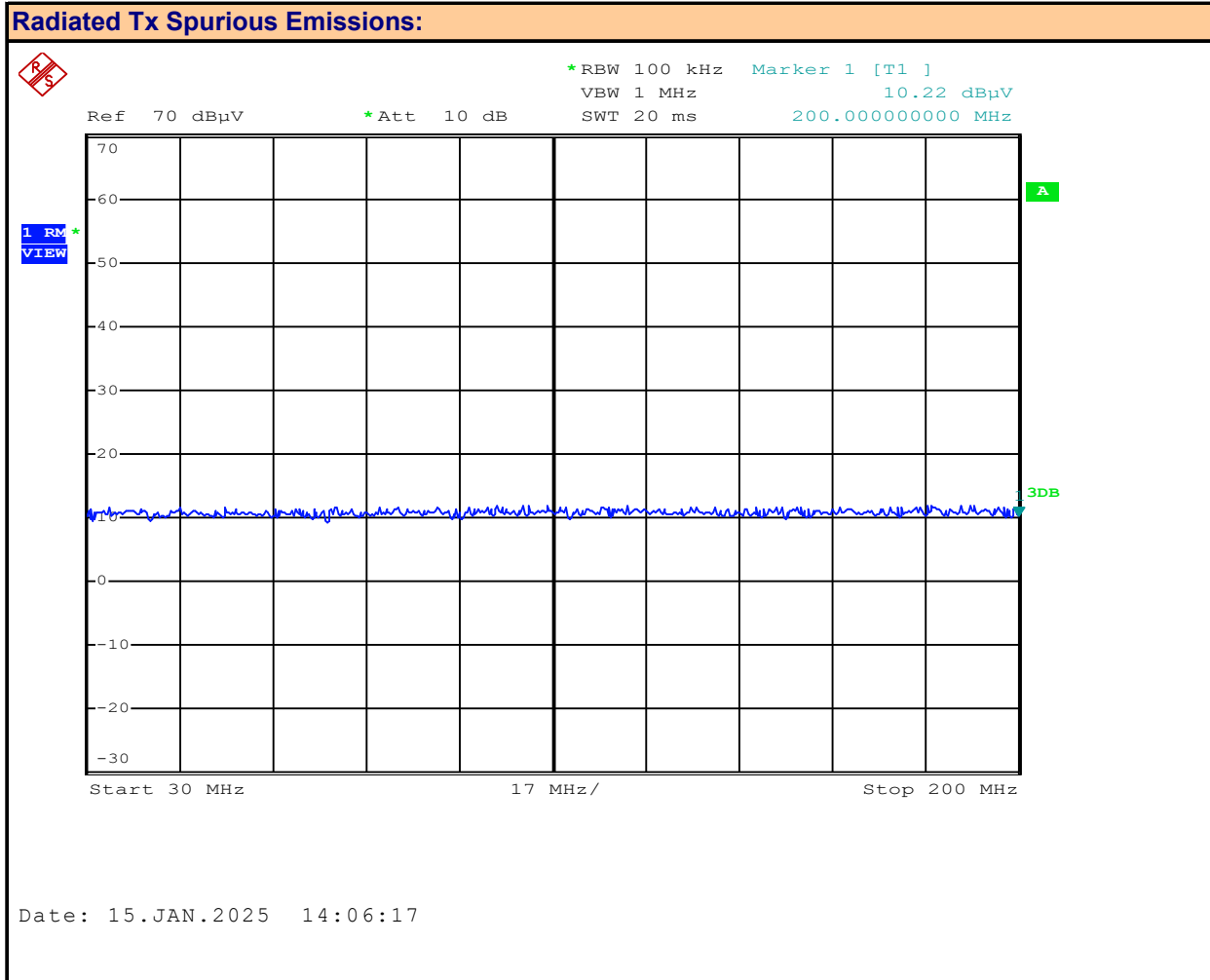
47 CFR §90.210	§90.210 Emission Mask
	(i) Emission Mask I. For transmitters that are equipped with an audio low pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:
	(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 6.8 kHz, but no more than 9.0 kHz: At least 25 dB;
	(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 9.0 kHz, but no more than 15 kHz: At least 35 dB;
	(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 15 kHz: At least 43 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation.
	(b) Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:
	(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
	(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
	(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

Test Setup	Appendix A - Figure A.2 to A.4
-------------------	---------------------------------------

Measurement Procedure

The DUT was connected to a Spectrum Analyzer via a 30dB attenuator. The DUT was configured to transmit modulated at its highest output power. The emissions mask was created in the SA and the SA Reference Level was set to the DUT's maximum rated power. The SA's Limit Check (Pass/Fail) was enabled and the results recorded for each applicable bandwidth and modulation.

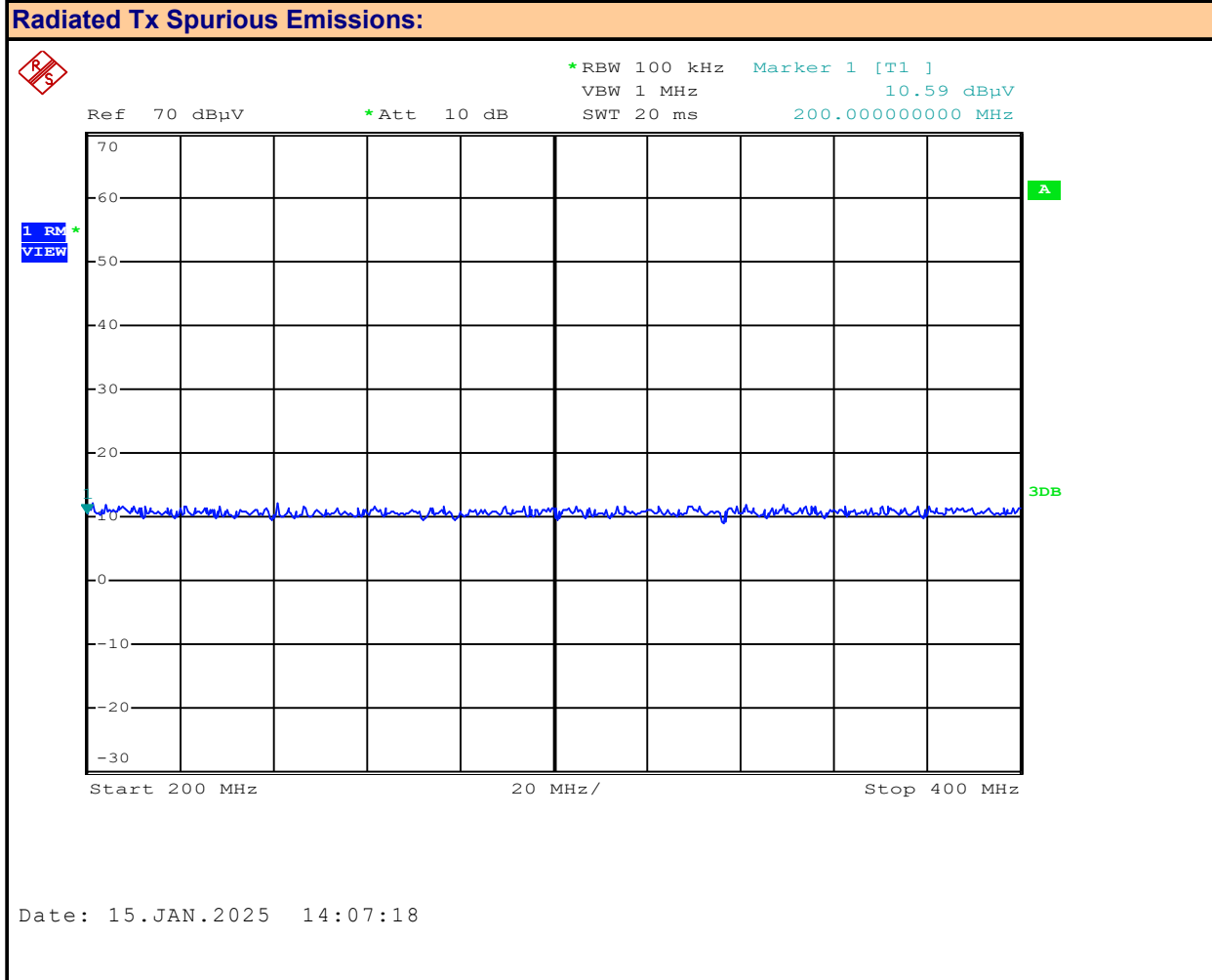
Plot 11.1 – Radiated Tx Emissions, 929.5MHz, Horizontal, 30-200MHz



Antenna Polarization: **Horizontal**
Emission Frequency: **ND** MHz

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

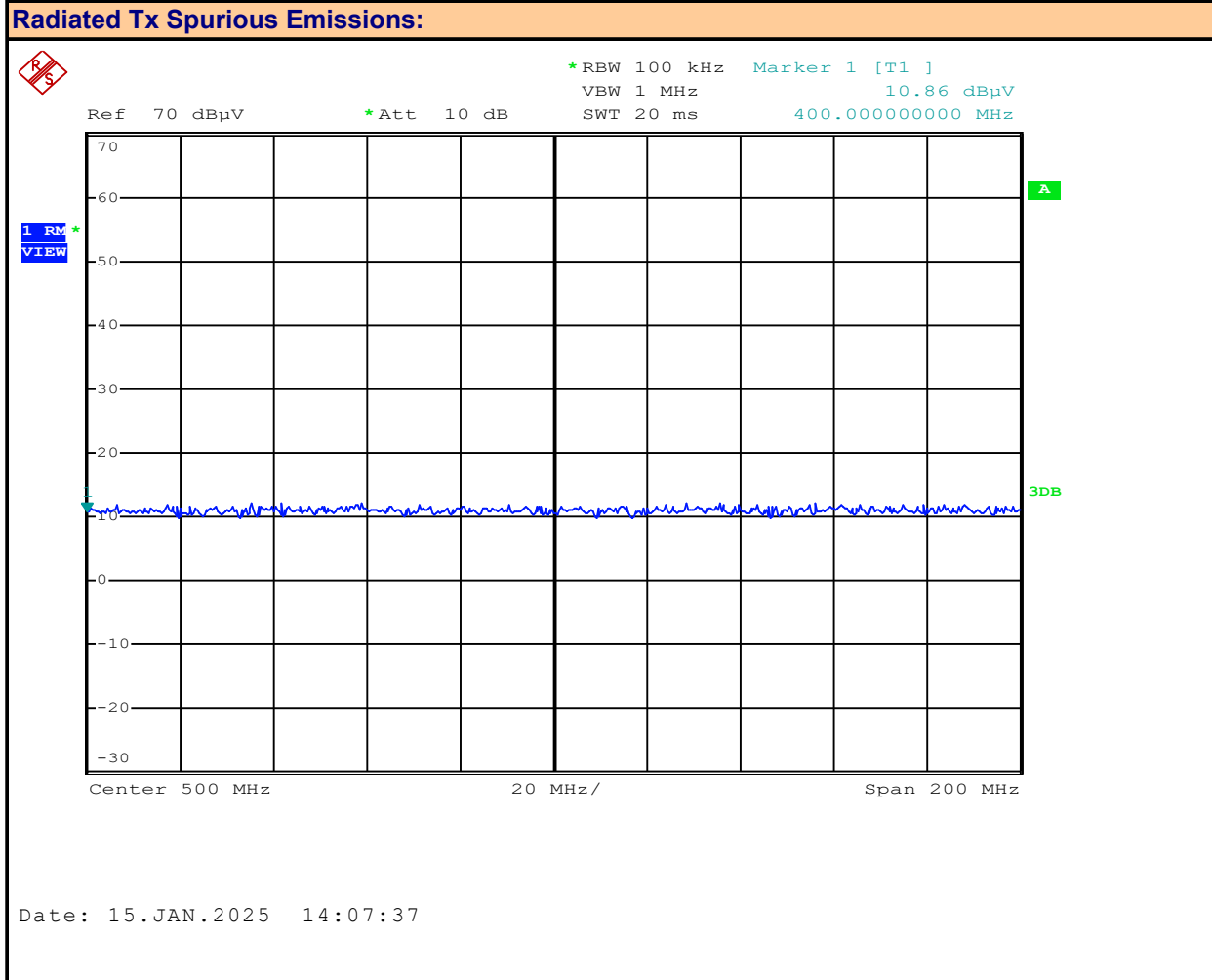
Plot 11.2 – Radiated Tx Emissions, 929.5MHz, Horizontal, 200-400MHz



Antenna Polarization: **Horizontal**
Emission Frequency: **ND** MHz

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

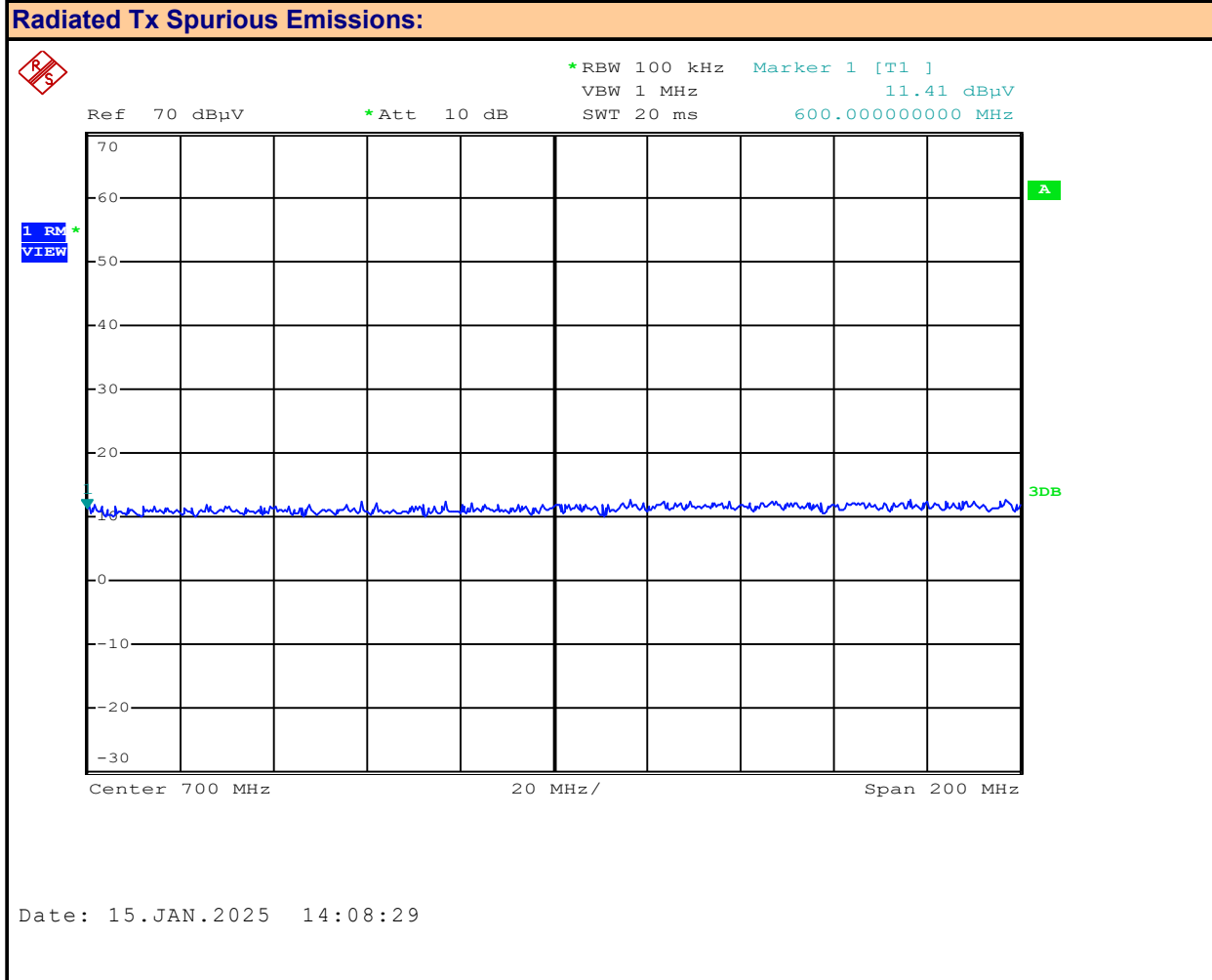
Plot 11.3 – Radiated Tx Emissions, 929.5MHz, Horizontal, 400-600MHz



Antenna Polarization: **Horizontal**
Emission Frequency: **ND** MHz

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

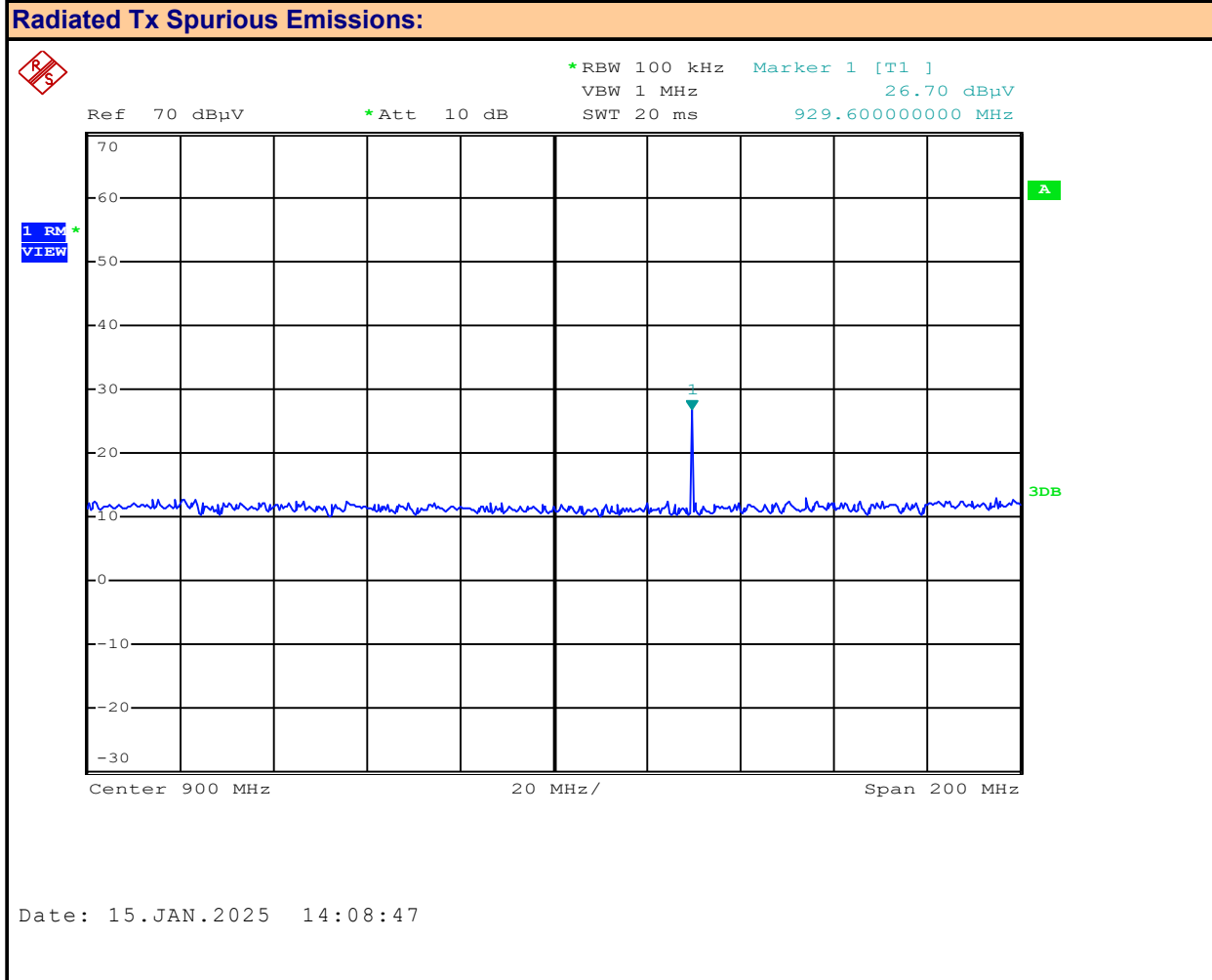
Plot 11.4 – Radiated Tx Emissions, 929.5MHz, Horizontal, 600-800MHz



Antenna Polarization: **Horizontal**
Emission Frequency: **ND** MHz

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

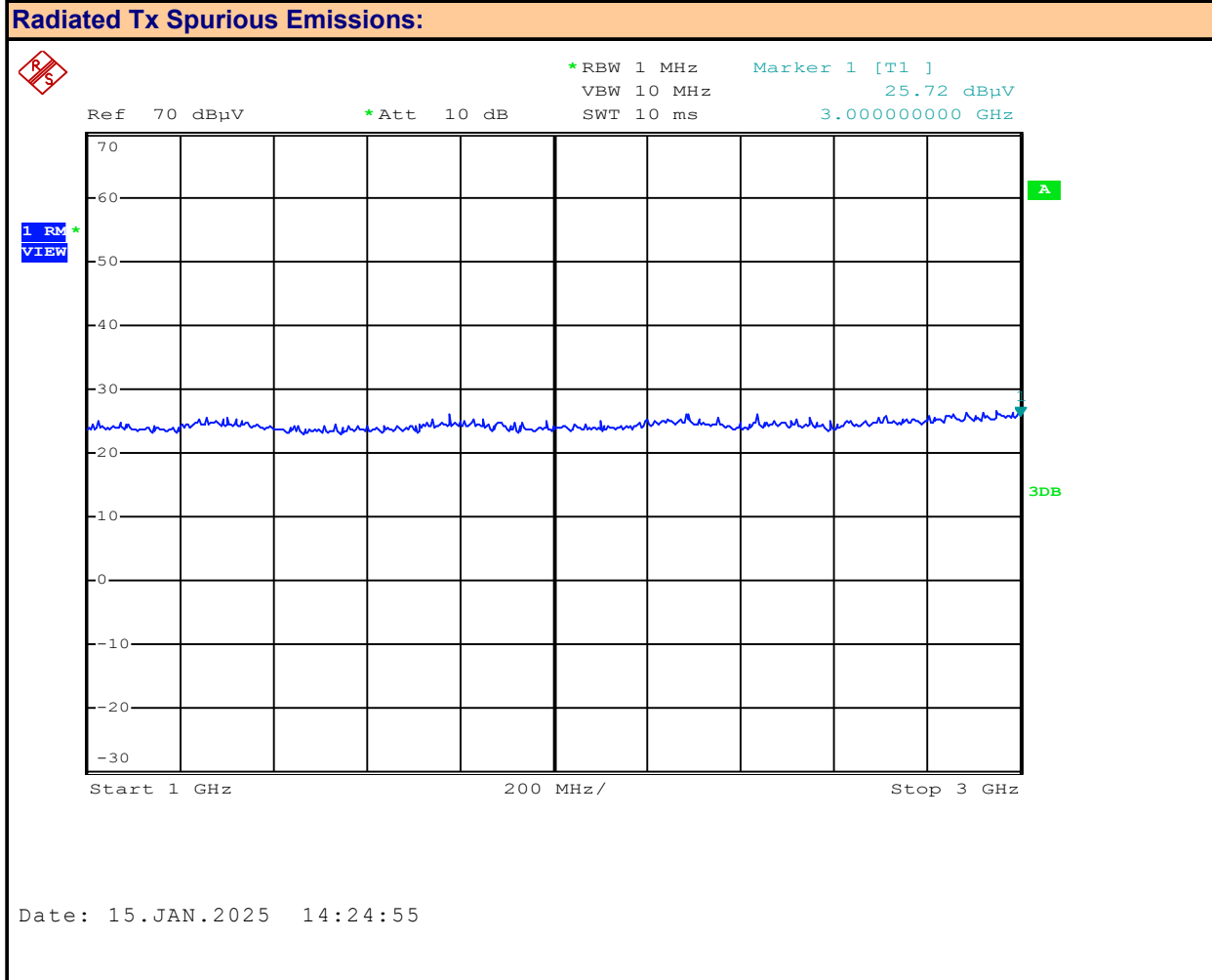
Plot 11.5 – Radiated Tx Emissions, 929.5MHz, Horizontal, 800-1000MHz



Antenna Polarization: **Horizontal**
Emission Frequency: **ND** MHz
Marker 1 = Fundamental

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

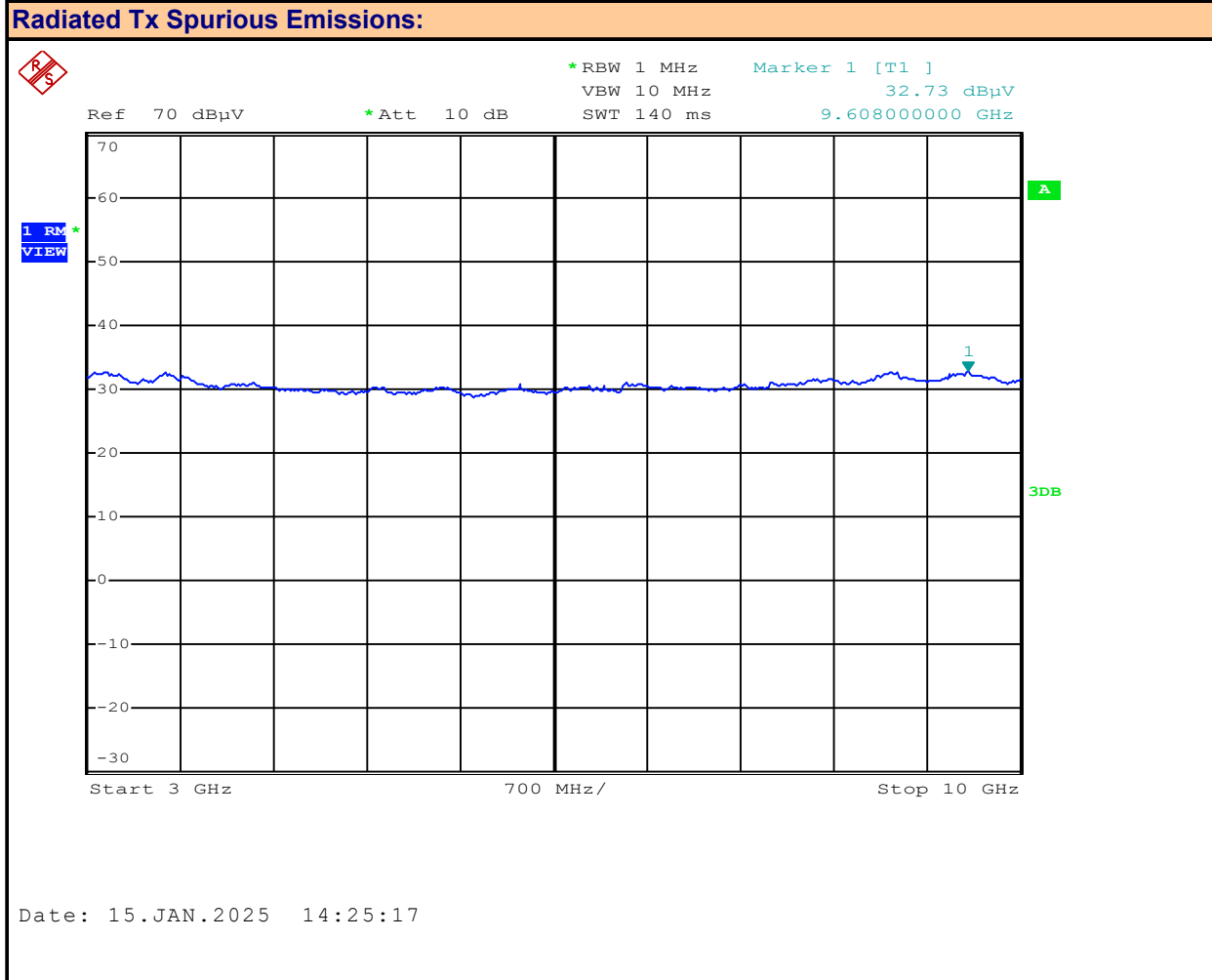
Plot 11.6 – Radiated Tx Emissions, 929.5MHz, Horizontal, 1-3GHz



Antenna Polarization: **Horizontal**
Emission Frequency: **ND** MHz

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

Plot 11.7 – Radiated Tx Emissions, 929.5MHz, Horizontal, 3-10GHz



Antenna Polarization: **Horizontal**

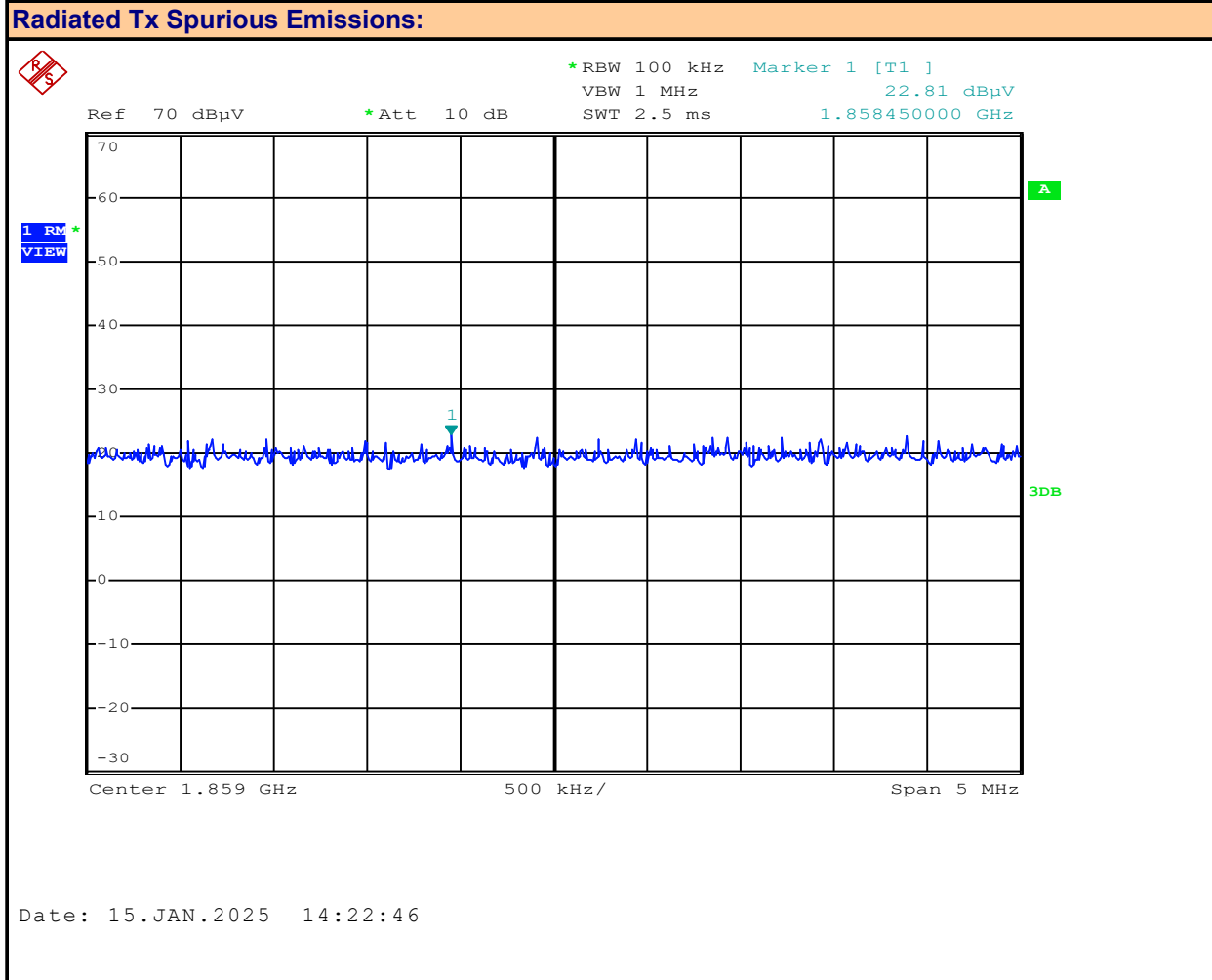
Emission Frequency: **ND** MHz

Channel Frequency: **929.5** MHz

Modulation: **CW**

Measured Emission: **ND** dBuV

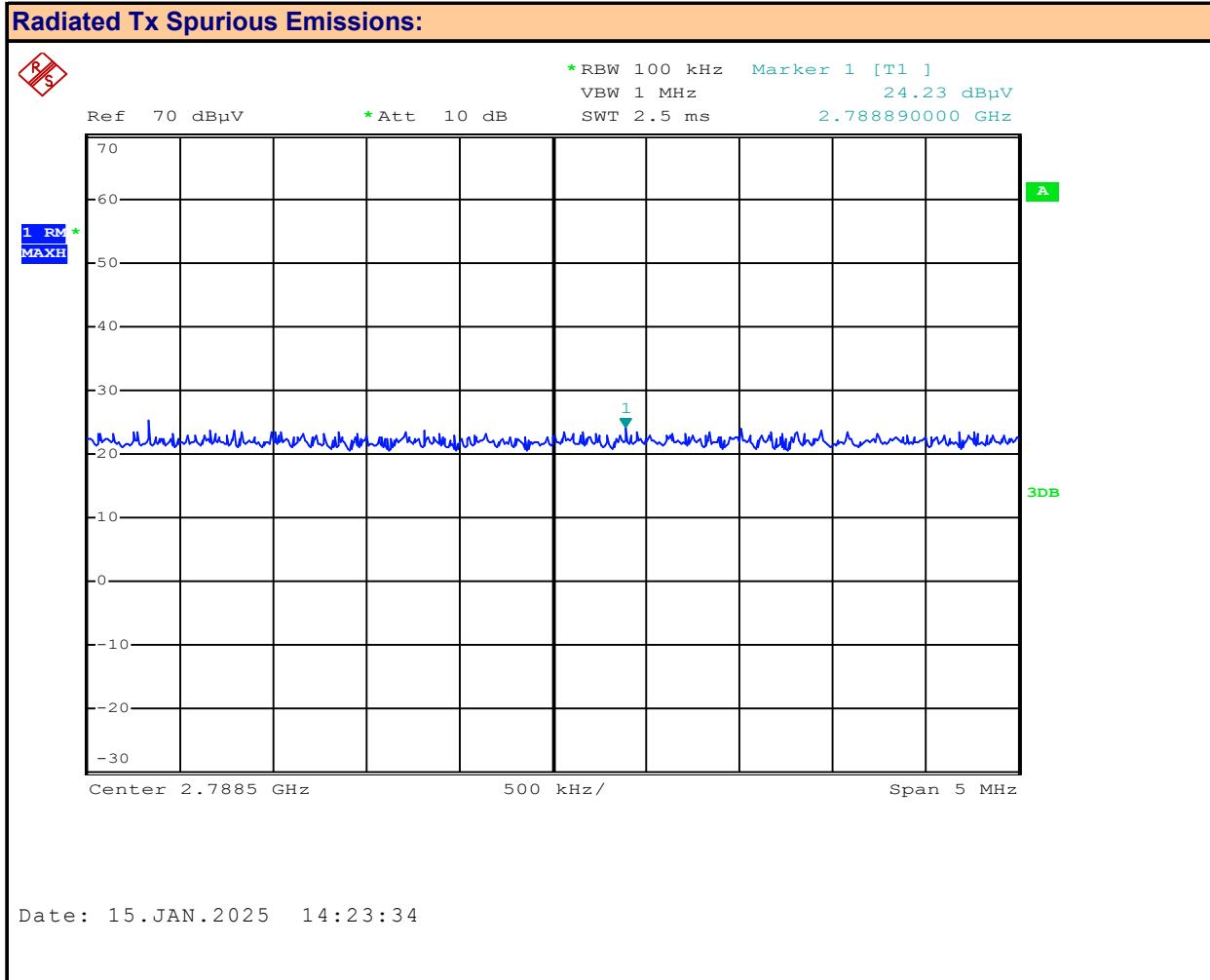
Plot 11.8 – Radiated Tx Emissions, 929.5MHz, Horizontal, 2nd Harmonic



Antenna Polarization: **Horizontal**
Emission Frequency: **ND** MHz
2nd Harmonic

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

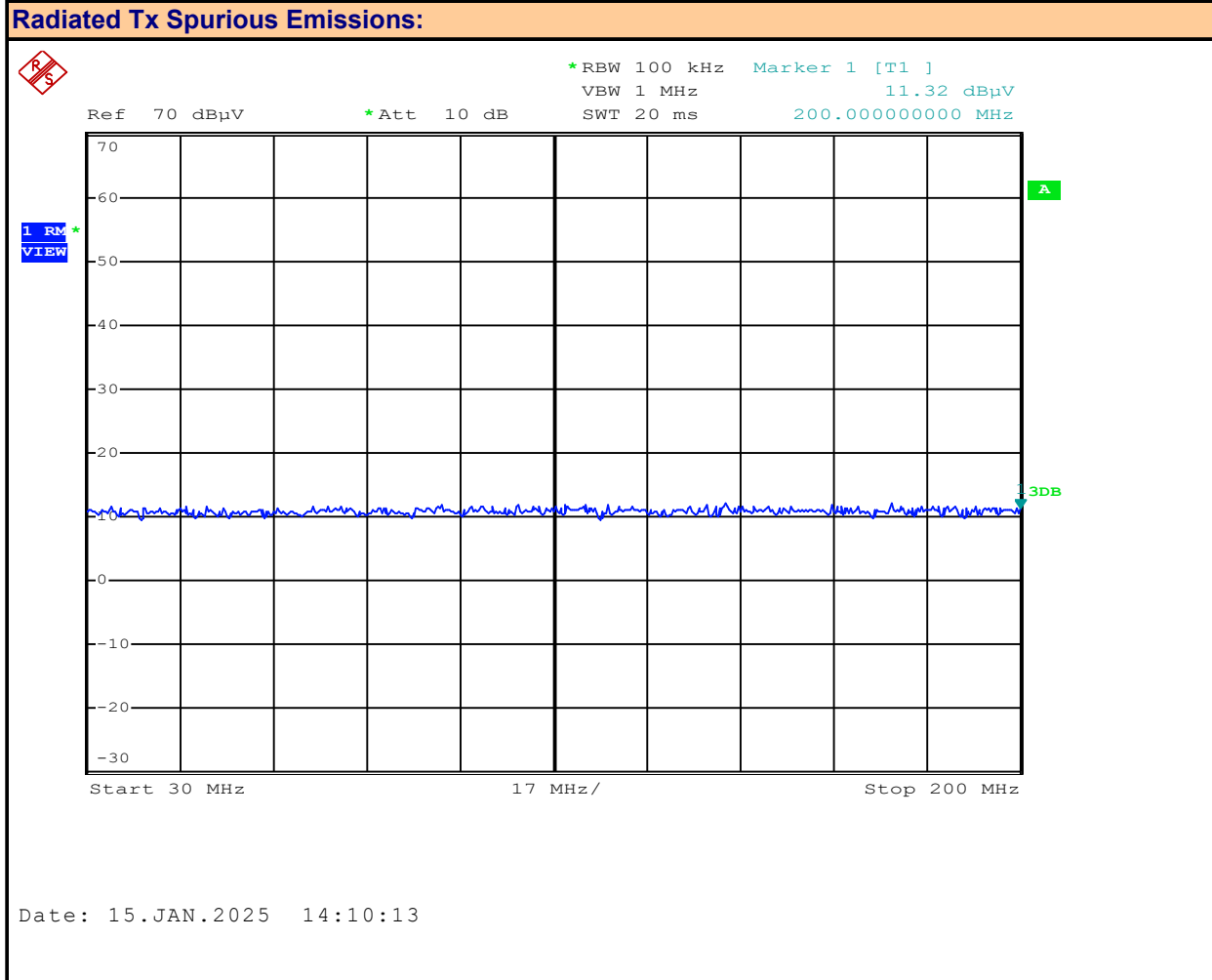
Plot 11.9 – Radiated Tx Emissions, 929.5MHz, Horizontal, 3rd Harmonic



Antenna Polarization: **Horizontal**
Emission Frequency: **ND** MHz
3rd Harmonic

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

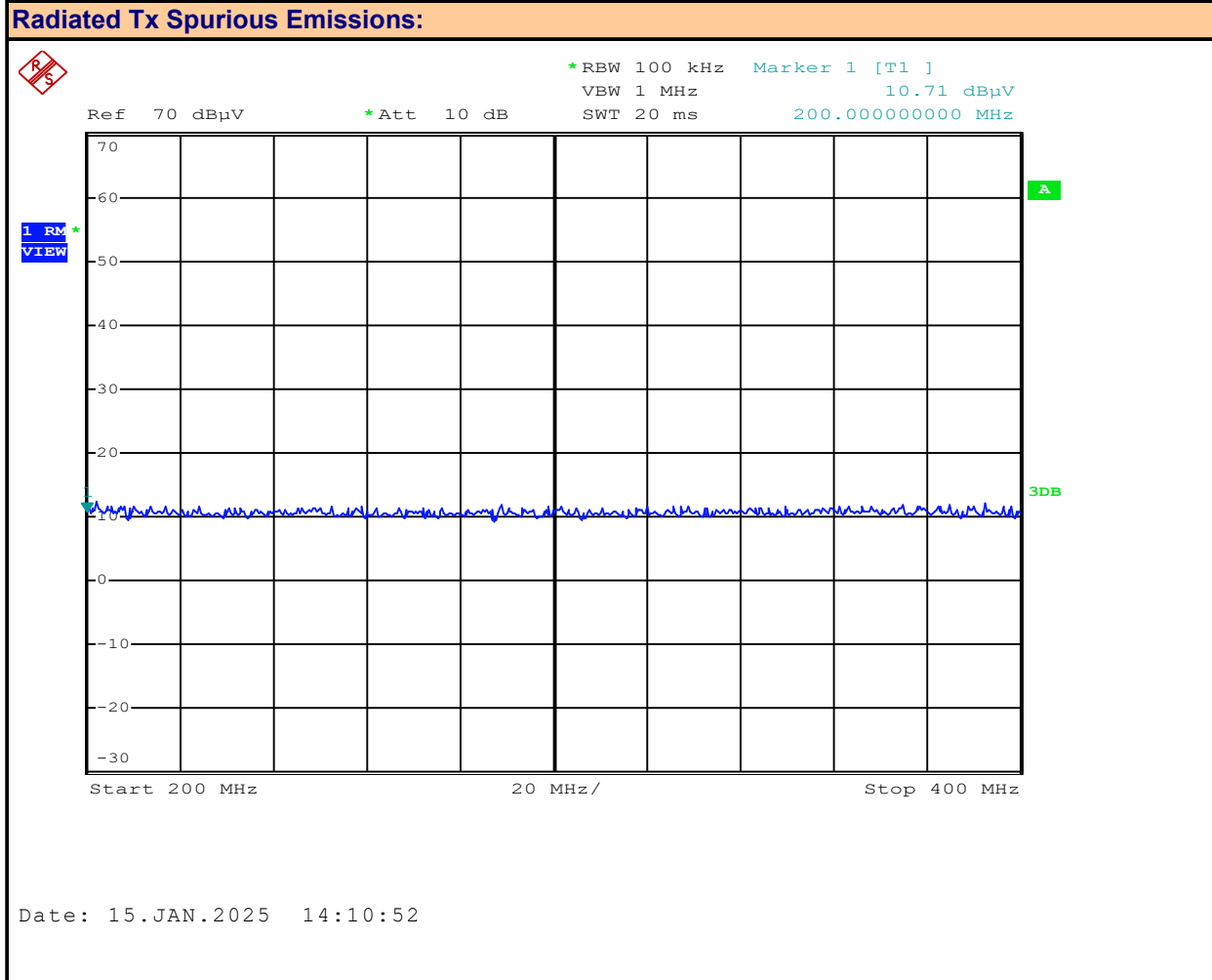
Plot 11.10 – Radiated Tx Emissions, 929.5MHz, Vertical, 30-200MHz



Antenna Polarization: **Vertical**
Emission Frequency: **ND** MHz

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

Plot 11.11 – Radiated Tx Emissions, 929.5MHz, Vertical, 200-400MHz

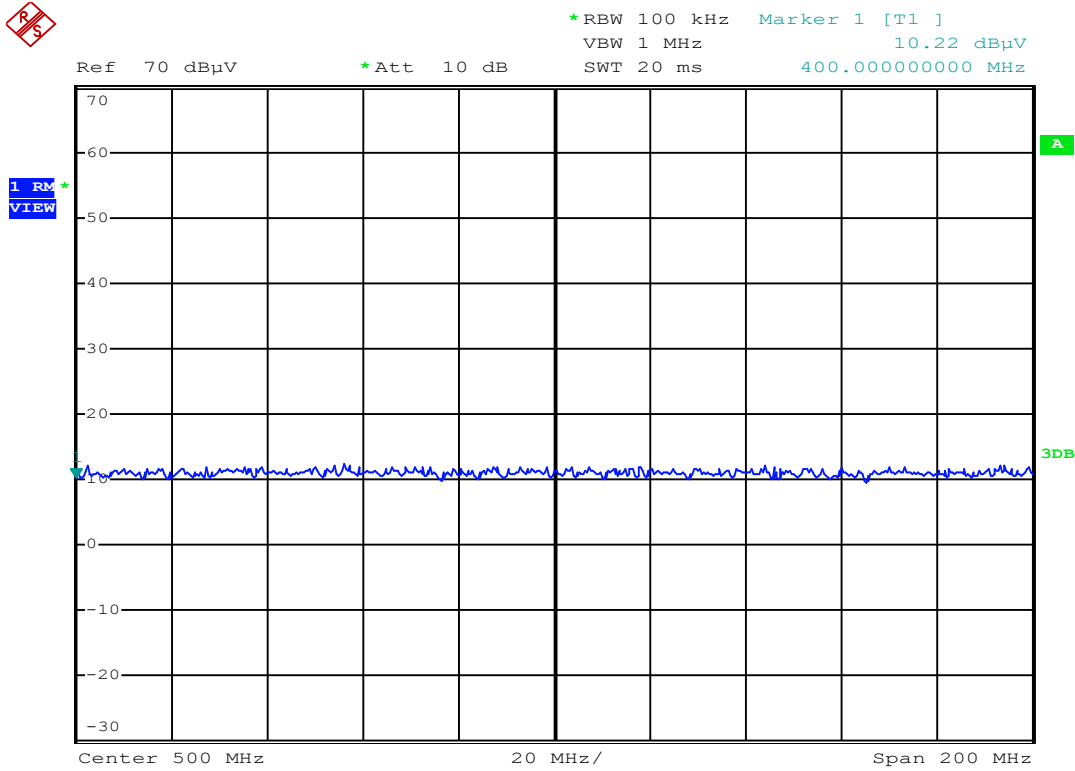


Antenna Polarization: **Vertical**
Emission Frequency: **ND** MHz

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

Plot 11.12 – Radiated Tx Emissions, 929.5MHz, Vertical, 400-600MHz

Radiated Tx Spurious Emissions:

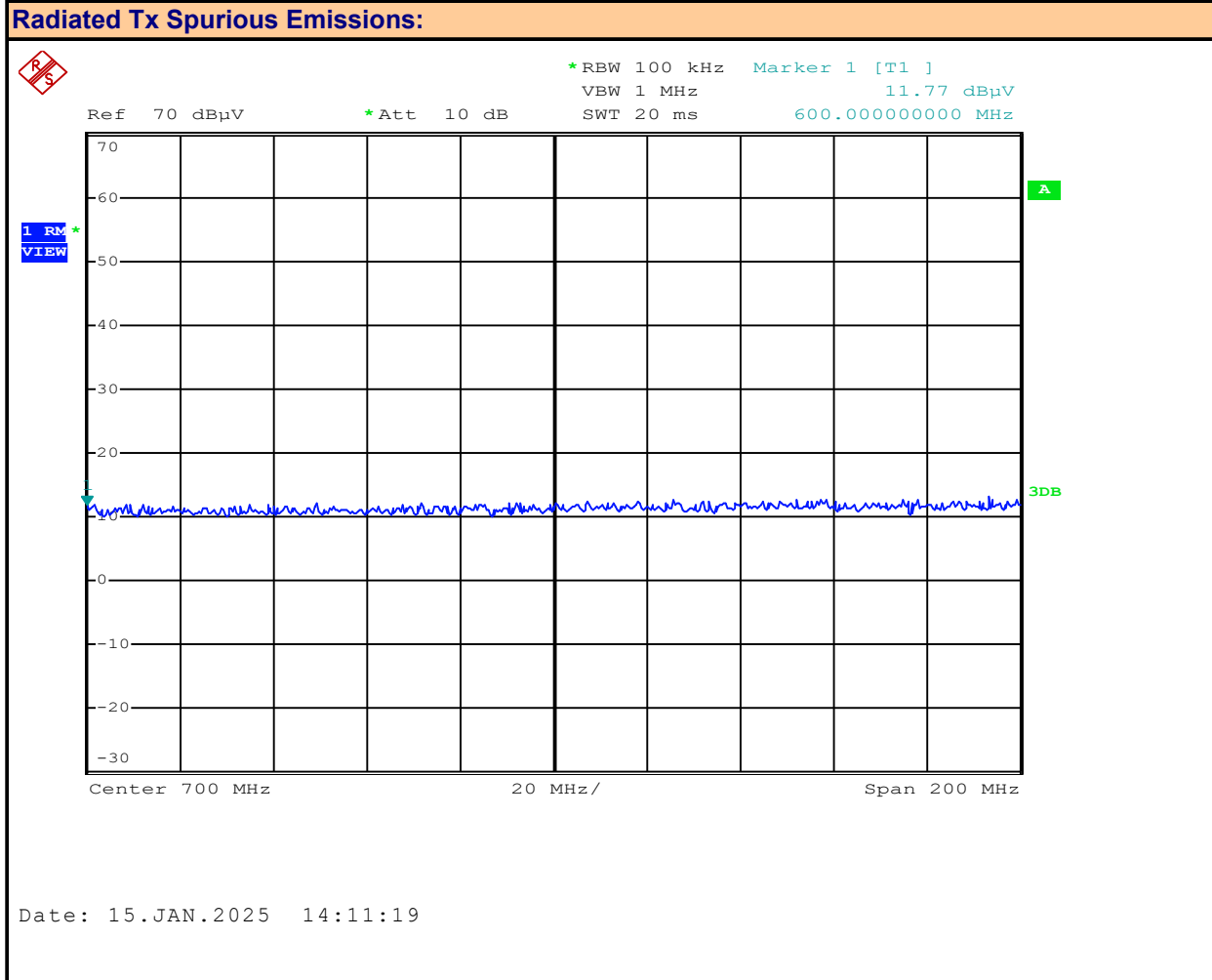


Date: 15.JAN.2025 14:11:05

Antenna Polarization: **Vertical**
Emission Frequency: **ND** MHz

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

Plot 11.13 – Radiated Tx Emissions, 929.5MHz, Vertical, 600-800MHz

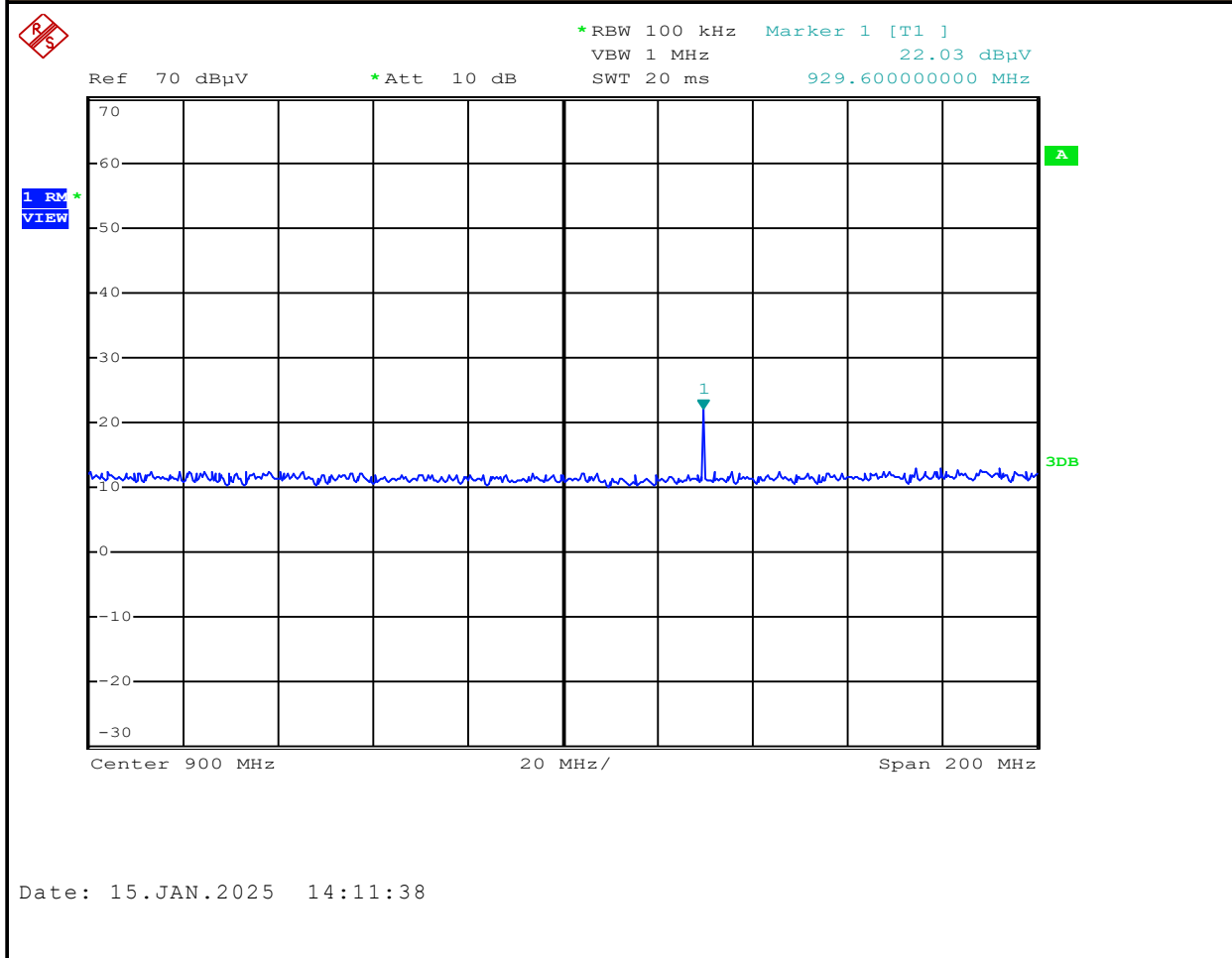


Antenna Polarization: **Vertical**
Emission Frequency: **ND** MHz

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

Plot 11.14 – Radiated Tx Emissions, 929.5MHz, Vertical, 800-1000MHz

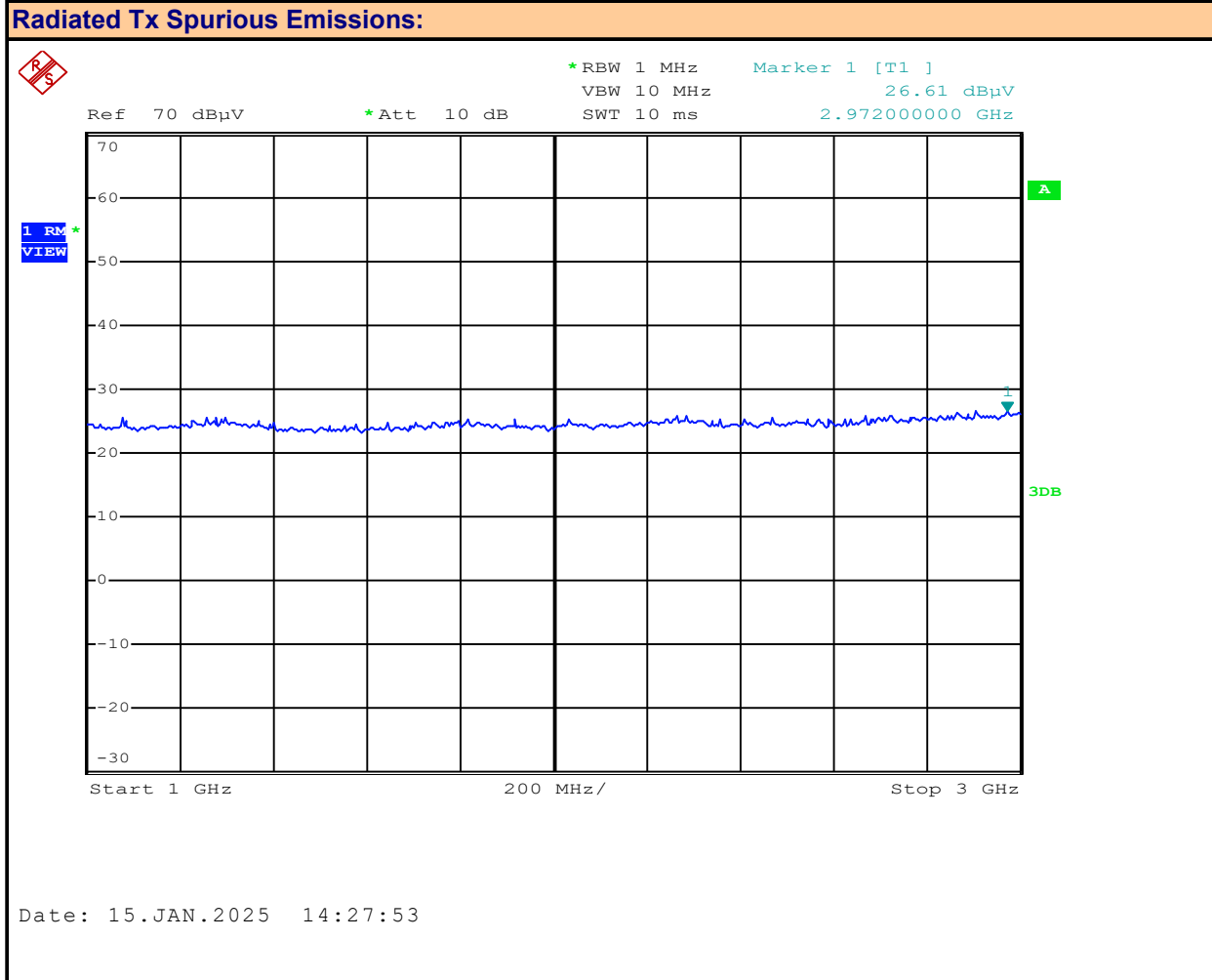
Radiated Tx Spurious Emissions:



Antenna Polarization: **Vertical**
Emission Frequency: **ND** MHz
Marker 1 = Fundamental

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

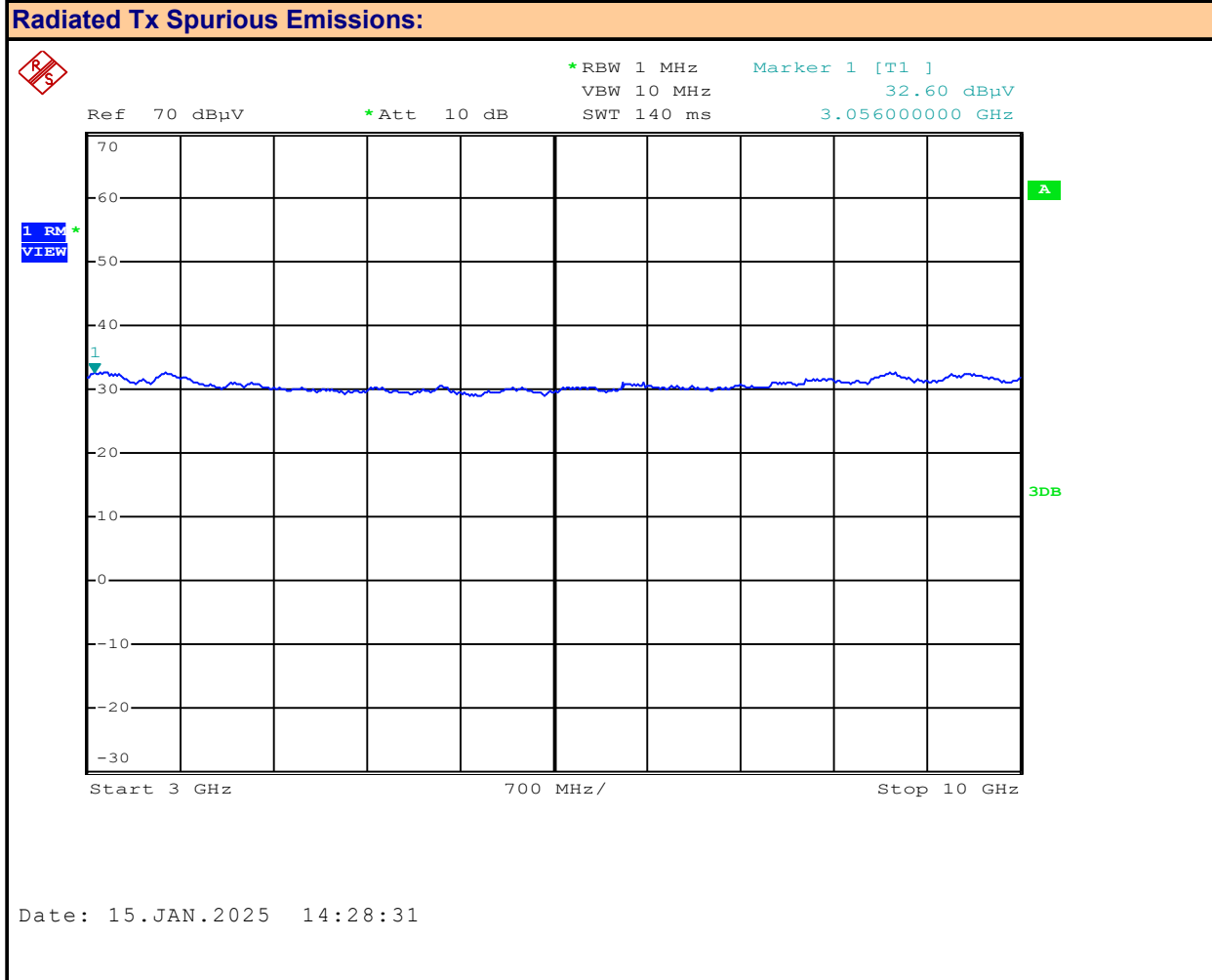
Plot 11.15 – Radiated Tx Emissions, 929.5MHz, Vertical, 1-3GHz



Antenna Polarization: **Vertical**
Emission Frequency: **ND** MHz

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

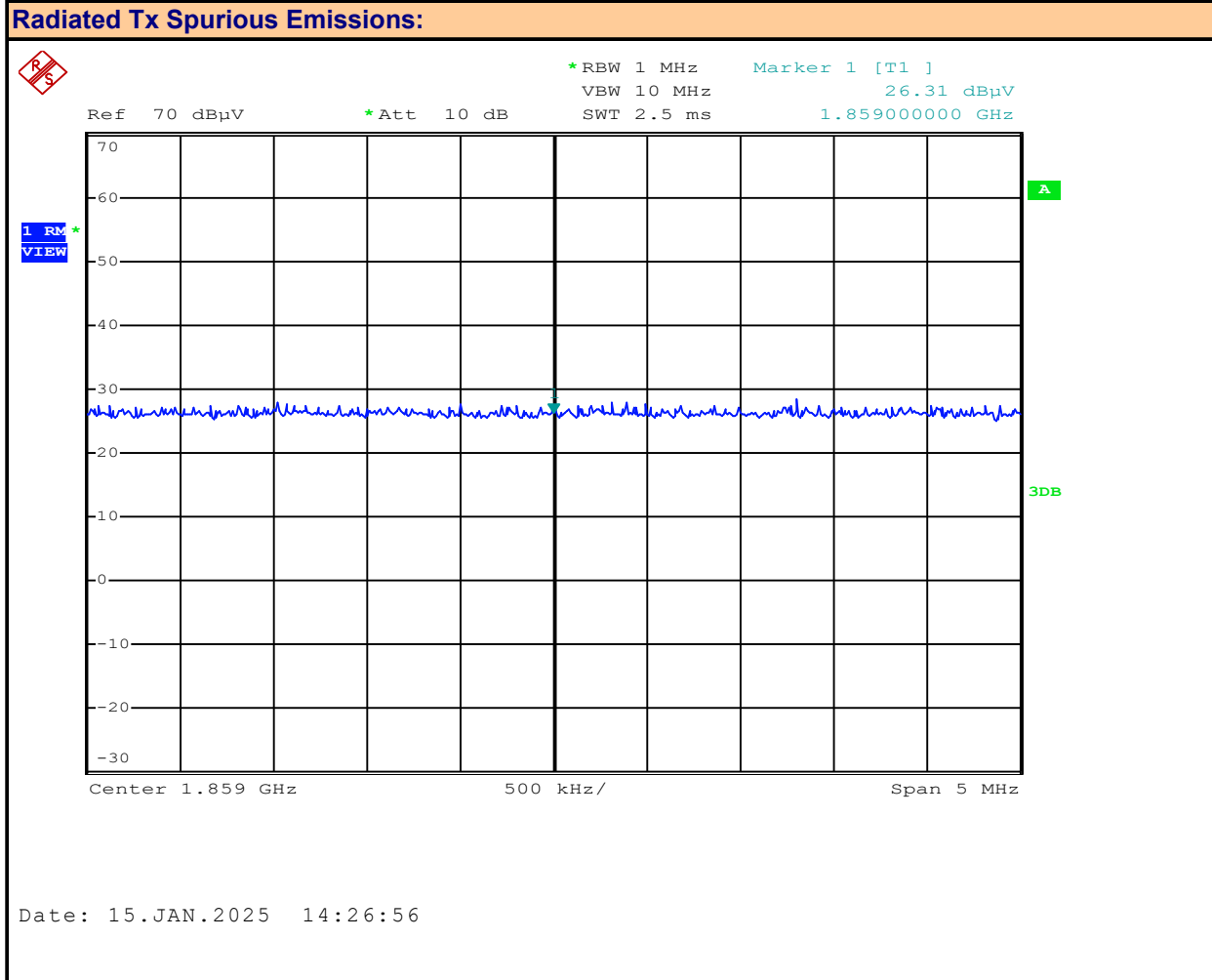
Plot 11.16 – Radiated Tx Emissions, 929.5MHz, Vertical, 3-10GHz



Antenna Polarization: **Vertical**
Emission Frequency: **ND** MHz

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

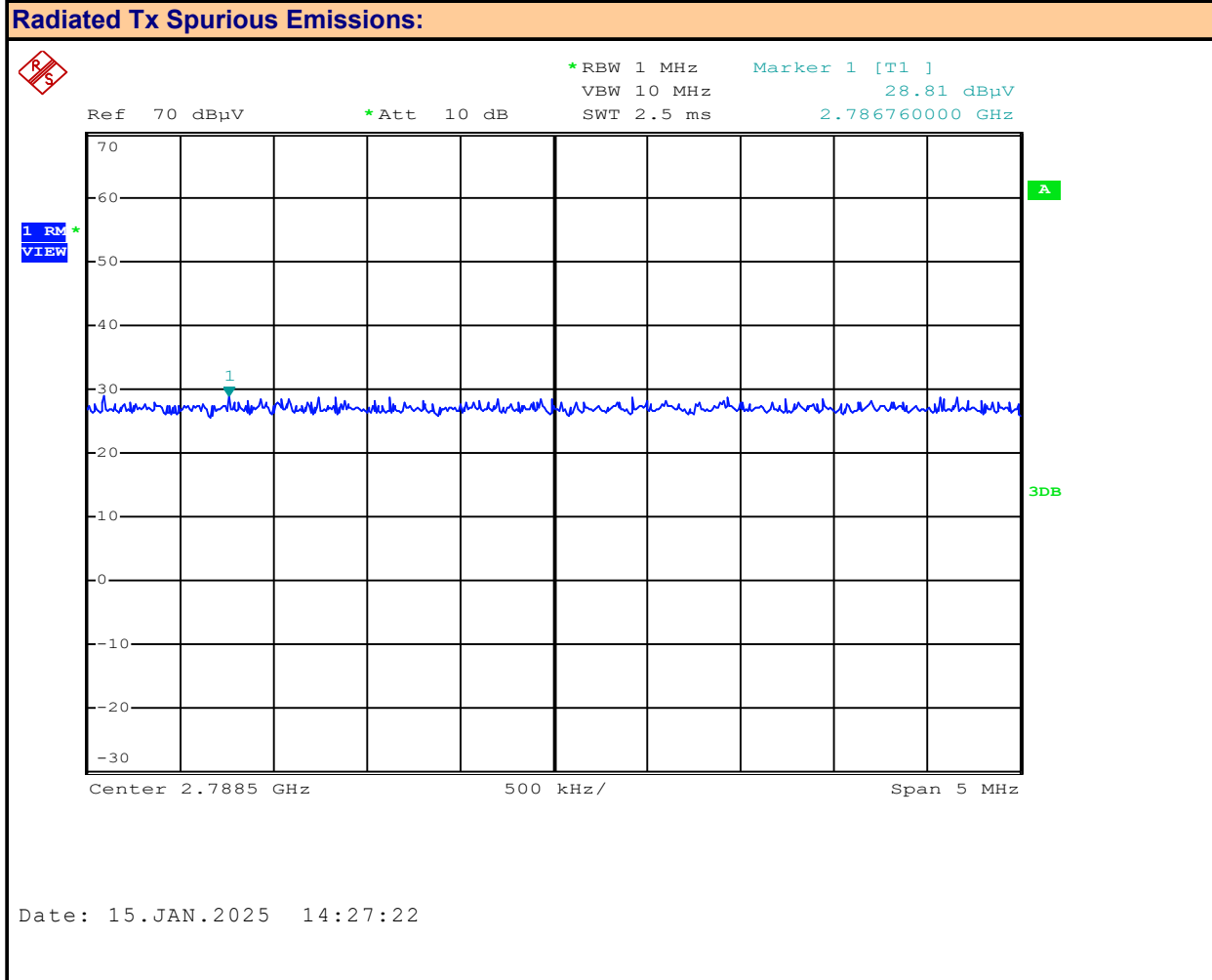
Plot 11.17 – Radiated Tx Emissions, 929.5MHz, Vertical, 2nd Harmonic



Antenna Polarization: **Vertical**
Emission Frequency: **ND** MHz
2nd Harmonic

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

Plot 11.18 – Radiated Tx Emissions, 929.5MHz, Vertical, 3rd Harmonic



Antenna Polarization: **Vertical**
Emission Frequency: **ND** MHz
3rd Harmonic

Channel Frequency: **929.5** MHz
Modulation: **CW**
Measured Emission: **ND** dBuV

Table 11.1 – Summary of Radiated Tx Emissions Measurements

Radiated Tx Spurious Emissions Measurement Results:							
Frequency (MHz)	Modulation	Emission FS [E _{Em}] (dBuV)	Emission Frequency (MHz)	Fundamental Measurment [E _{Fund}]* (dBuV)	Attenuation [Atten] (dB)	Limit (dB)	Margin (dB)
929.50	CW	ND	ND	26.70	n/a	43	n/a
Results:						Complies	

Attenuation [Atten] = [P_{Fund}] - [E_{Em}]

Margin = Attenuation - Limit

ND = None Detected

n/a = Not Applicable

* Uncorrected

12.0 RADIATED RX SPURIOUS EMISSIONS

Test Procedure

Normative Reference	FCC 47 CFR §15.109 ANSI C63.4-2014
----------------------------	---------------------------------------

Limits

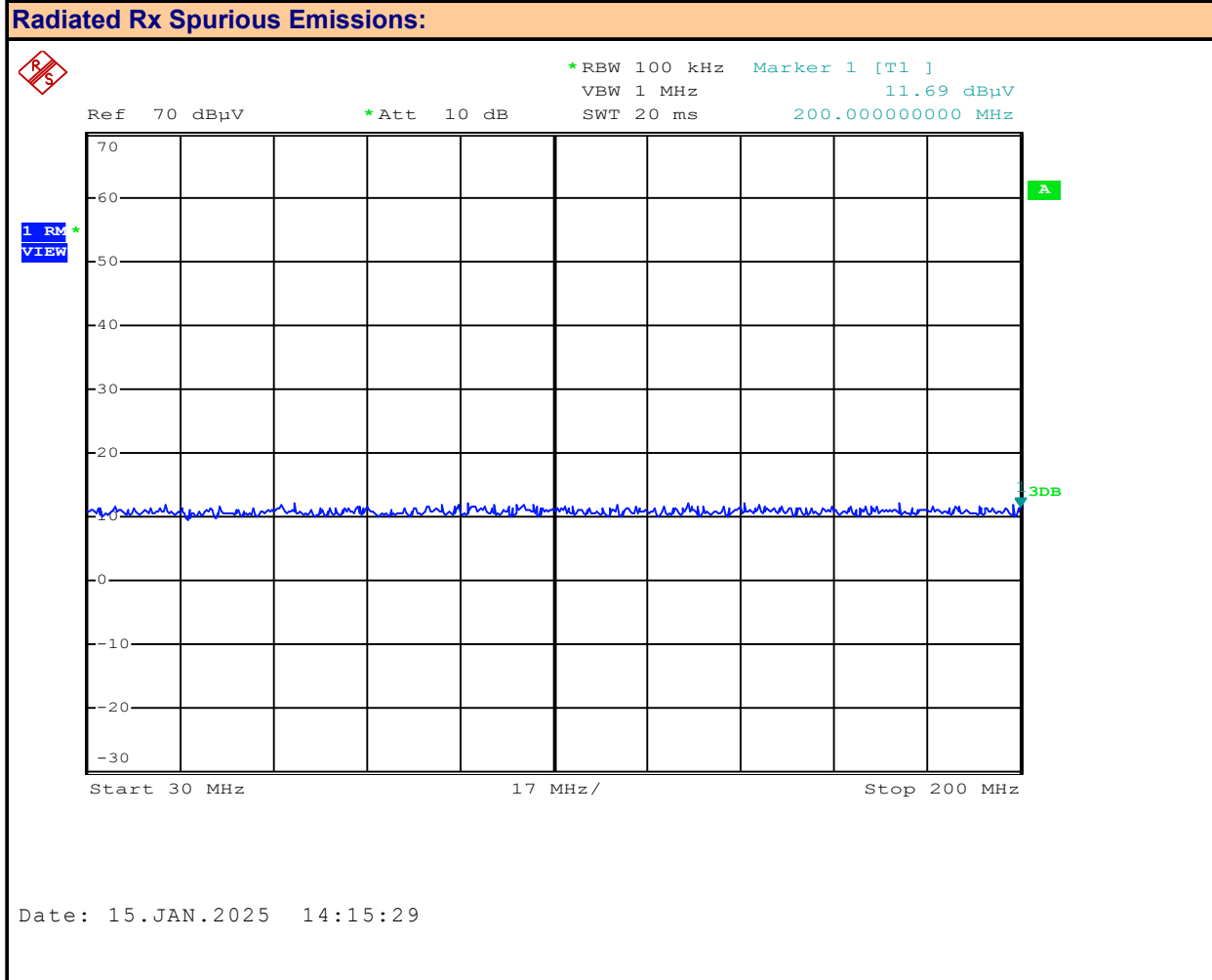
47 CFR §15.109	(b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:								
	<table border="1"> <tr> <td>30-88MHz: 39.1dBuV/m</td><td>30-88MHz: 49.6dBuV/m @ 3m</td></tr> <tr> <td>88-216MHz: 43.5dBuV/m</td><td>88-216MHz: 54.0dBuV/m @ 3m</td></tr> <tr> <td>216-960MHz: 46.4dBuV/m</td><td>216-960MHz: 56.9dBuV/m @ 3m</td></tr> <tr> <td>> 960MHz: 49.5dBuV/m</td><td>> 960MHz: 60.0dBuV/m @ 3m</td></tr> </table>	30-88MHz: 39.1dBuV/m	30-88MHz: 49.6dBuV/m @ 3m	88-216MHz: 43.5dBuV/m	88-216MHz: 54.0dBuV/m @ 3m	216-960MHz: 46.4dBuV/m	216-960MHz: 56.9dBuV/m @ 3m	> 960MHz: 49.5dBuV/m	> 960MHz: 60.0dBuV/m @ 3m
30-88MHz: 39.1dBuV/m	30-88MHz: 49.6dBuV/m @ 3m								
88-216MHz: 43.5dBuV/m	88-216MHz: 54.0dBuV/m @ 3m								
216-960MHz: 46.4dBuV/m	216-960MHz: 56.9dBuV/m @ 3m								
> 960MHz: 49.5dBuV/m	> 960MHz: 60.0dBuV/m @ 3m								

Test Setup	Appendix A	Figure A.2 to A.4
-------------------	-------------------	--------------------------

Measurement Procedure

The DUT was set up as per ANSI C63.4:2014. Emissions were scanned between 30MHz and 1000MHz. The turntable was rotated 360 degrees and the antenna was elevated to 4m to optimize the measured emissions.

Plot 12.1 – Radiated Rx Emissions, Horizontal, 30-200MHz

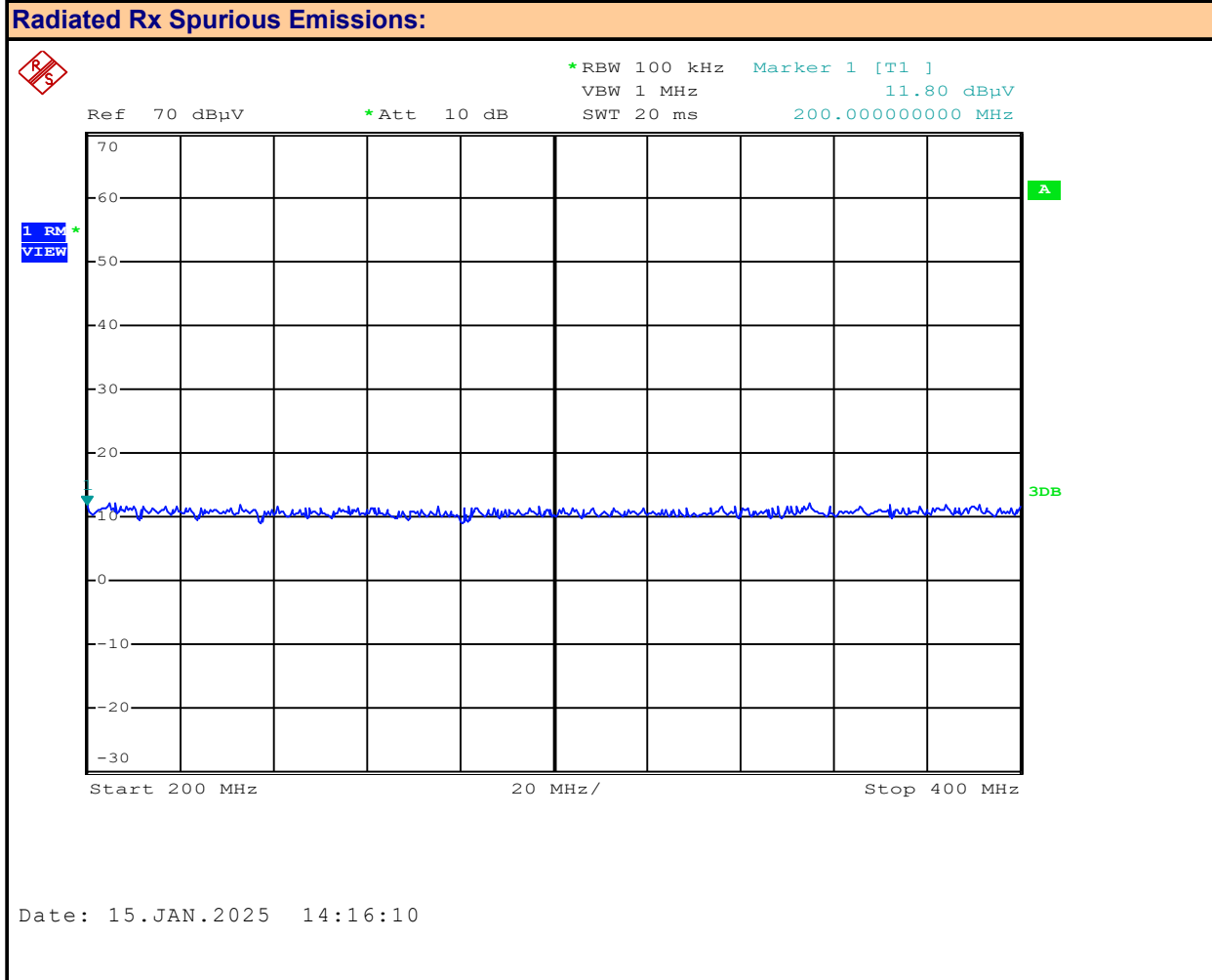


Antenna Polarization:

Measured Emission: dBuV

Emission Frequency: MHz

Plot 12.2 – Radiated Rx Emissions, Horizontal, 200-400MHz

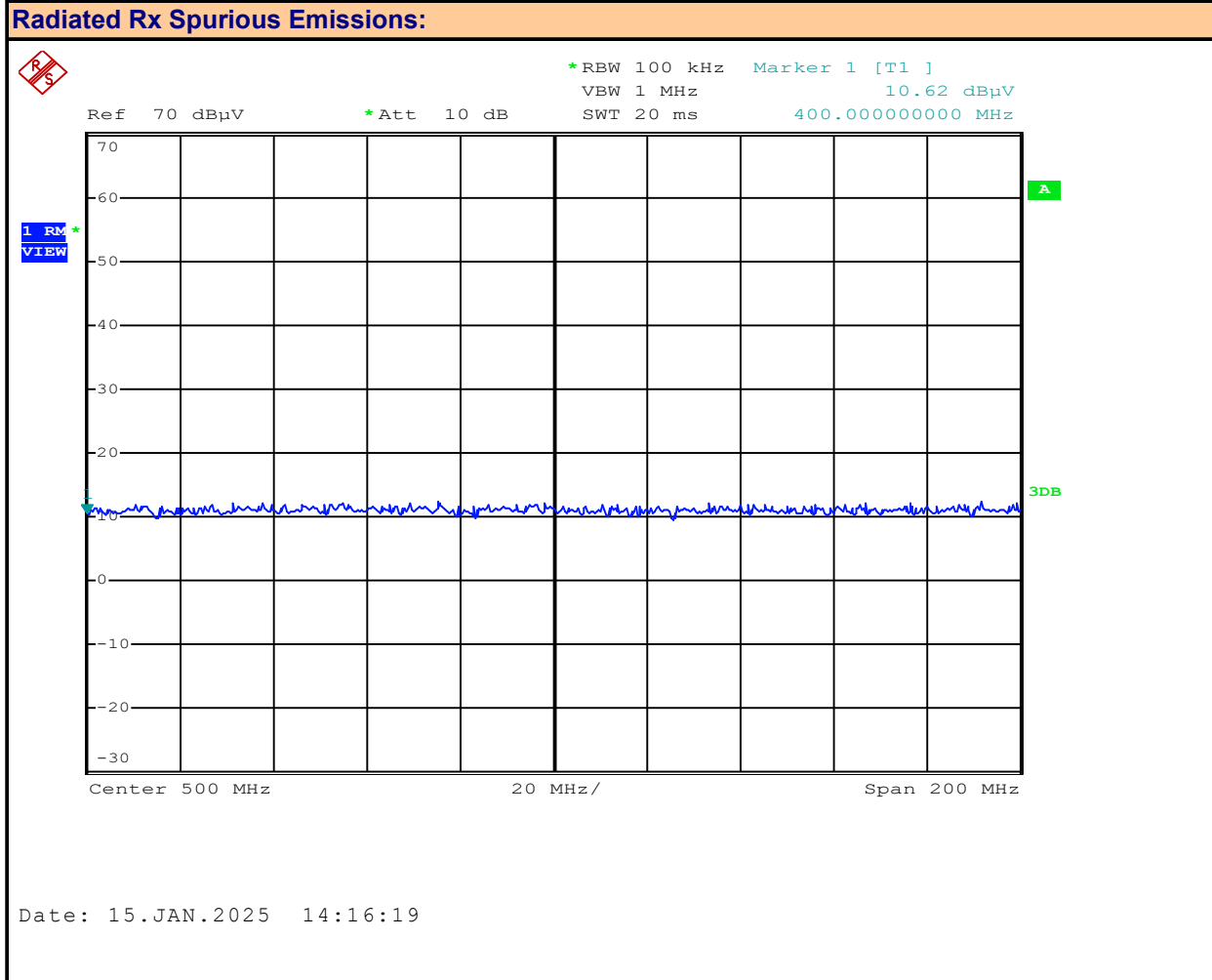


Antenna Polarization: **Horizontal**

Measured Emission: **ND** dBuV

Emission Frequency: **ND** MHz

Plot 12.3 – Radiated Rx Emissions, Horizontal, 400-600MHz

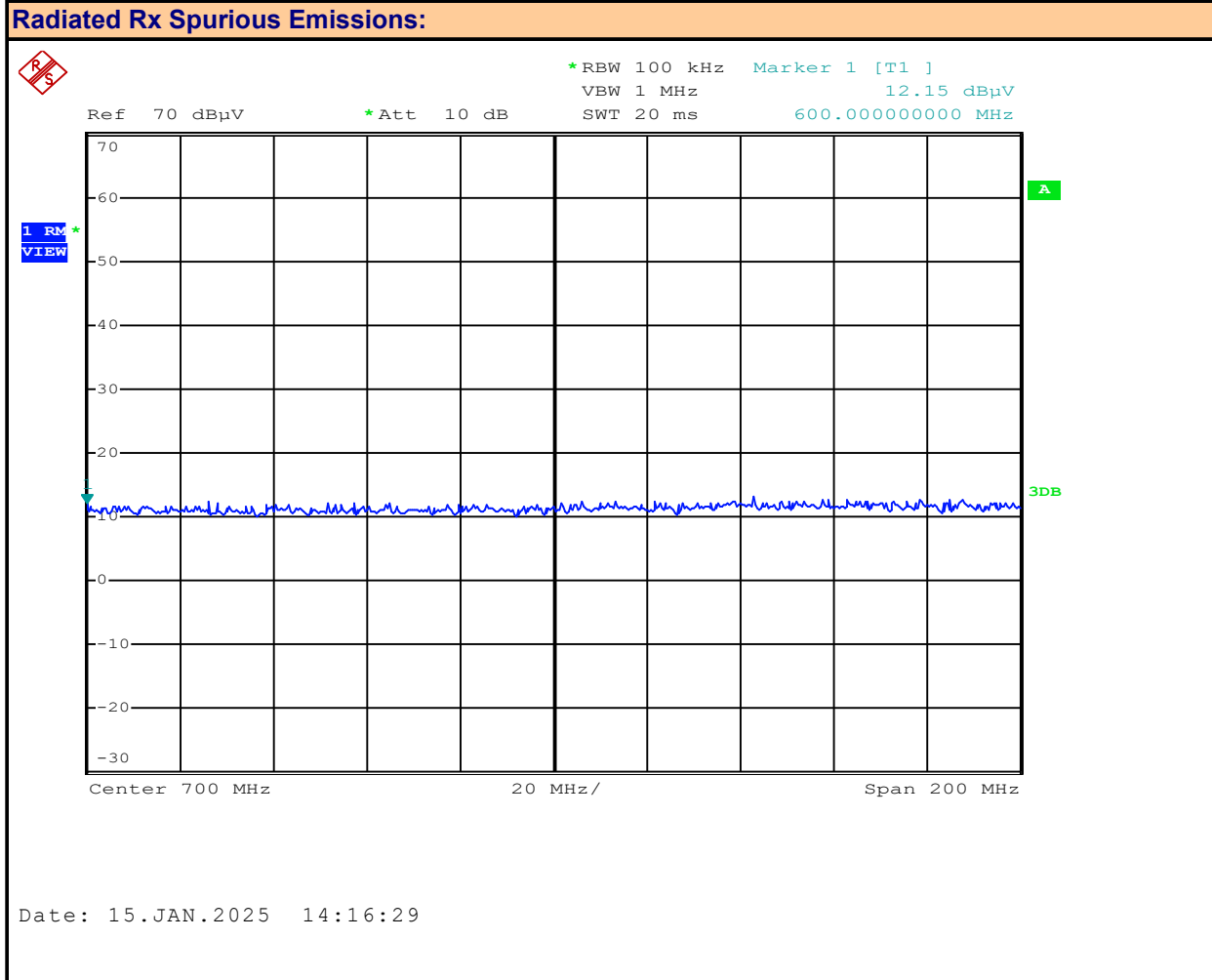


Antenna Polarization: **Horizontal**

Measured Emission: **ND** dBuV

Emission Frequency: **ND** MHz

Plot 12.4 – Radiated Rx Emissions, Horizontal, 600-800MHz



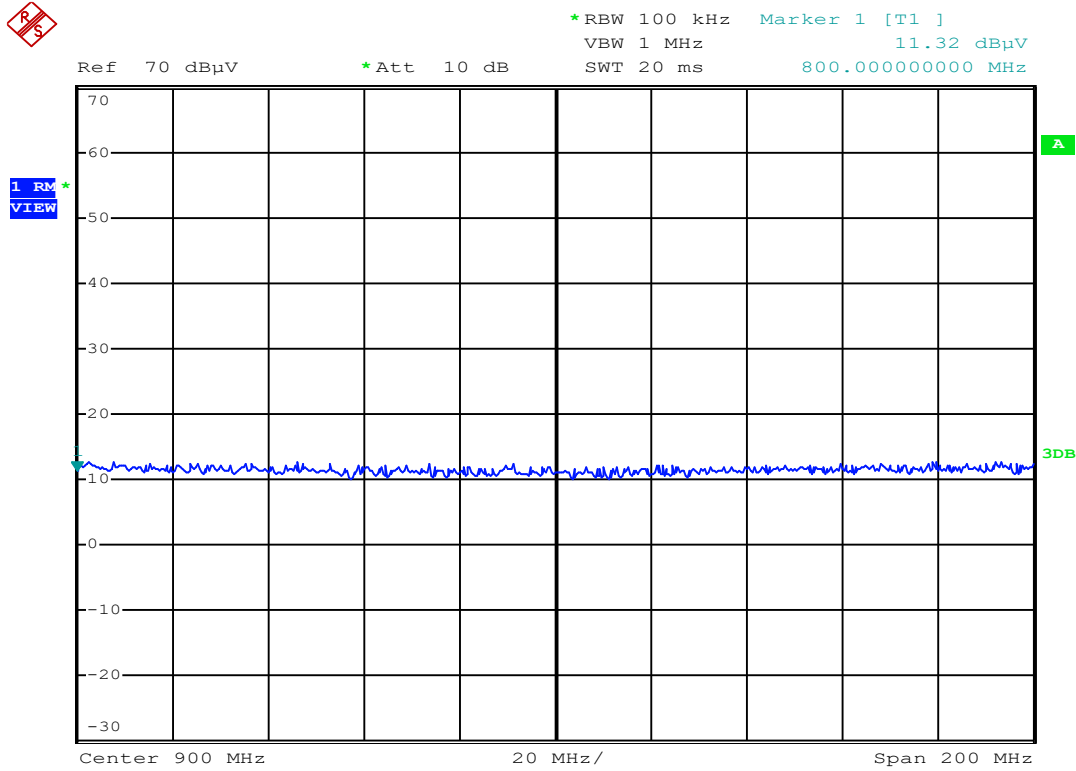
Antenna Polarization: **Horizontal**

Measured Emission: **ND** dBuV

Emission Frequency: **ND** MHz

Plot 12.5 – Radiated Rx Emissions, Horizontal, 800-1000MHz

Radiated Rx Spurious Emissions:



Date: 15.JAN.2025 14:16:39

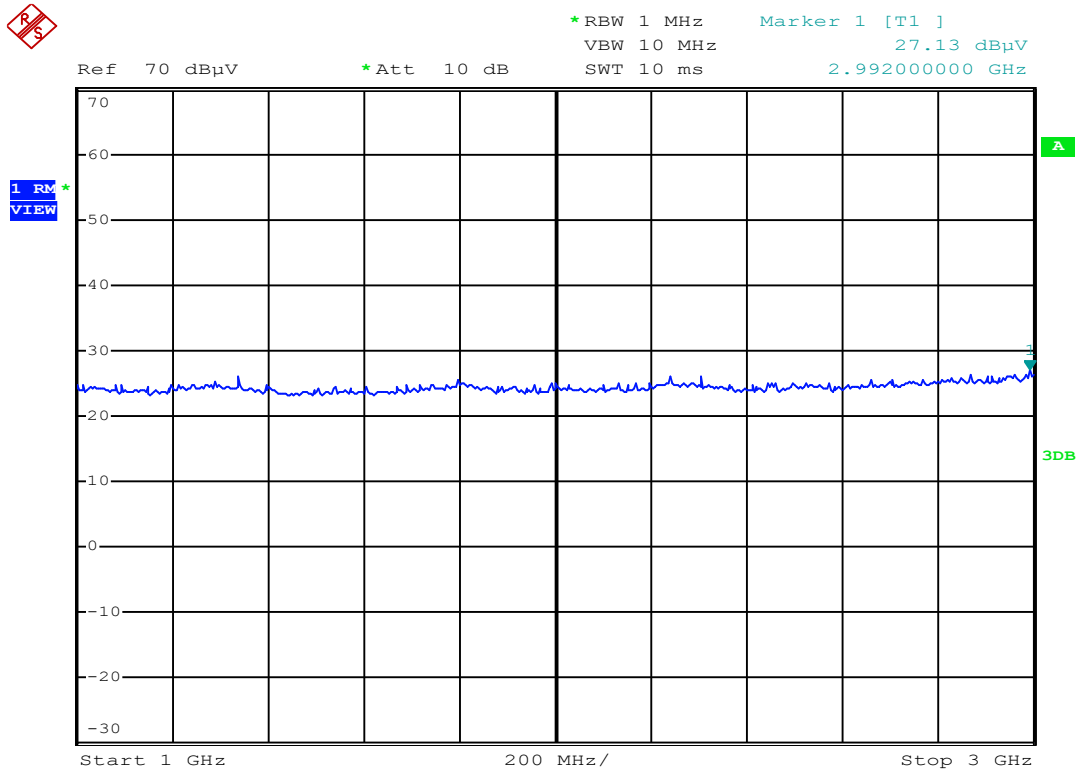
Antenna Polarization: **Horizontal**

Measured Emission: **ND** dBuV

Emission Frequency: **ND** MHz

Plot 12.6 – Radiated Rx Emissions, Horizontal, 1-3GHz

Radiated Rx Spurious Emissions:



Date: 15.JAN.2025 14:30:29

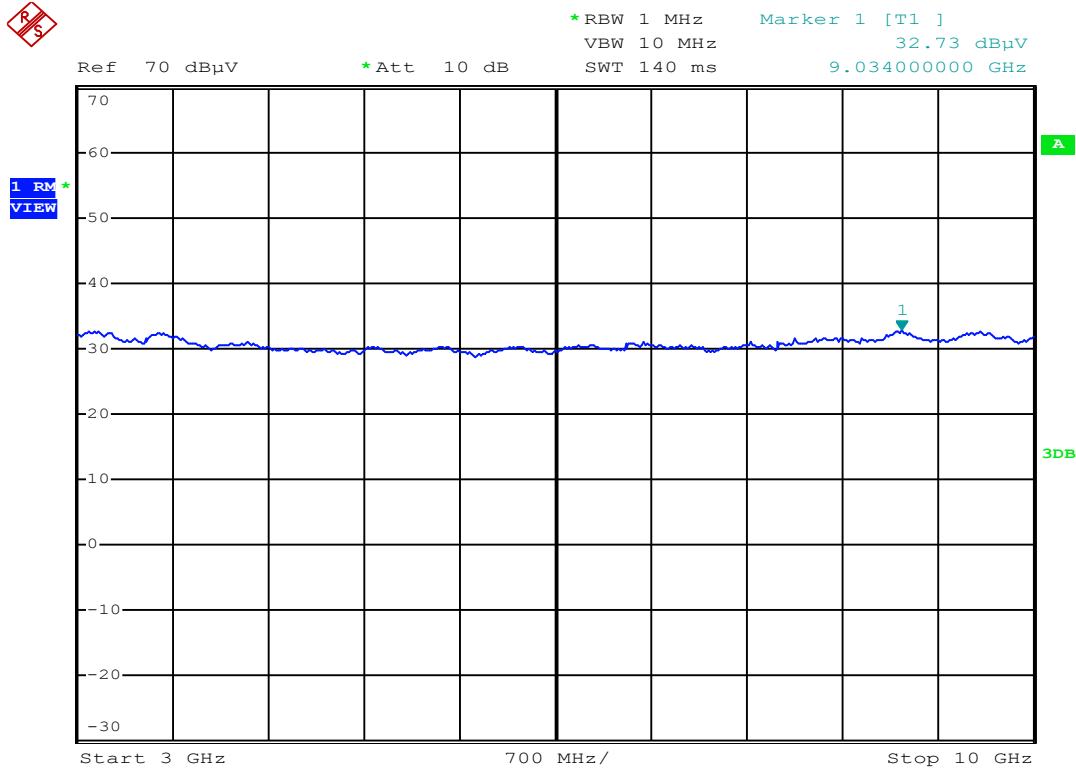
Antenna Polarization: **Horizontal**

Measured Emission: **ND** dBuV

Emission Frequency: **ND** MHz

Plot 12.7 – Radiated Rx Emissions, Horizontal, 3-10GHz

Radiated Rx Spurious Emissions:



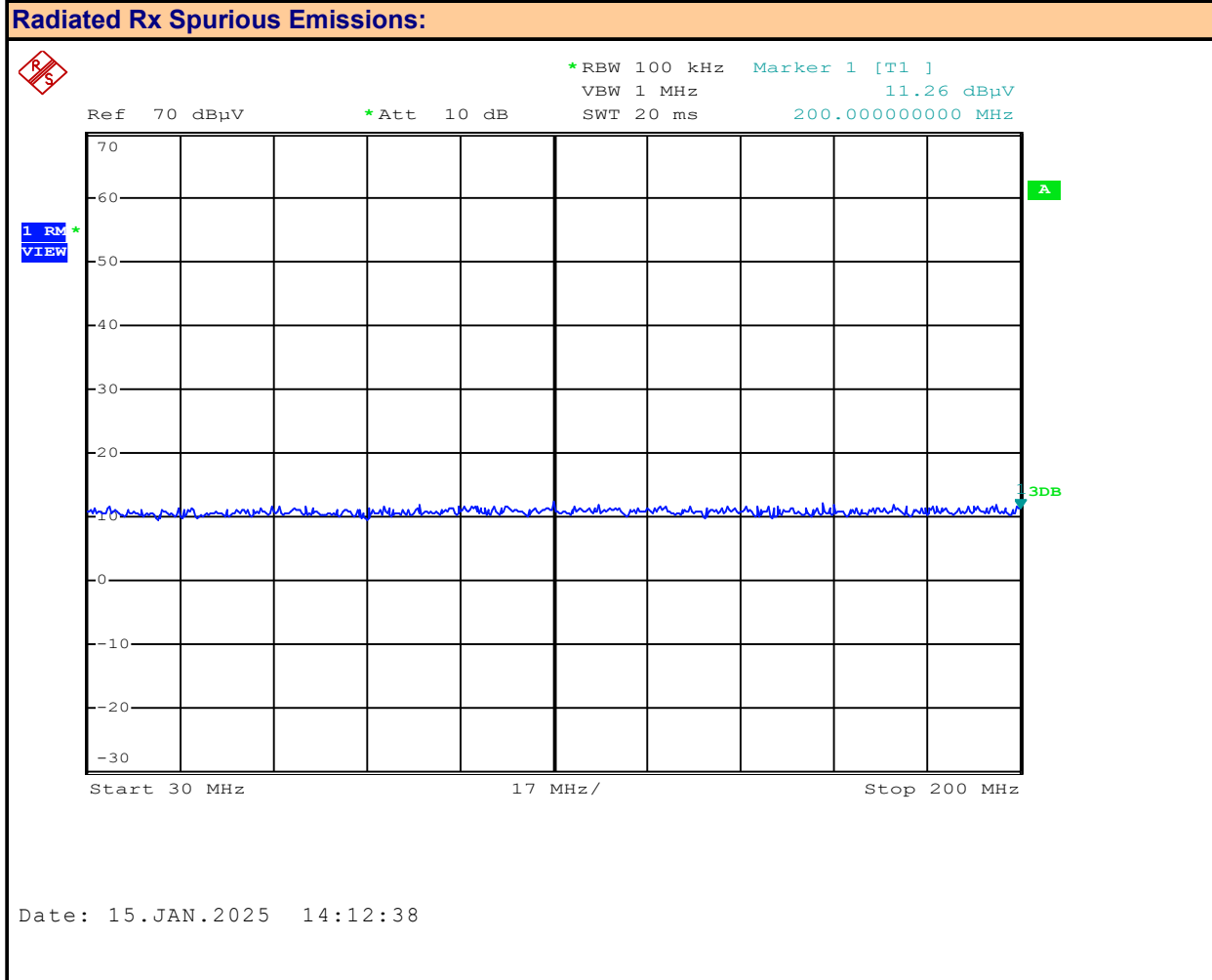
Date: 15.JAN.2025 14:30:45

Antenna Polarization: **Horizontal**

Measured Emission: **ND** dBuV

Emission Frequency: **ND** MHz

Plot 12.8 – Radiated Rx Emissions, Vertical, 30-200MHz

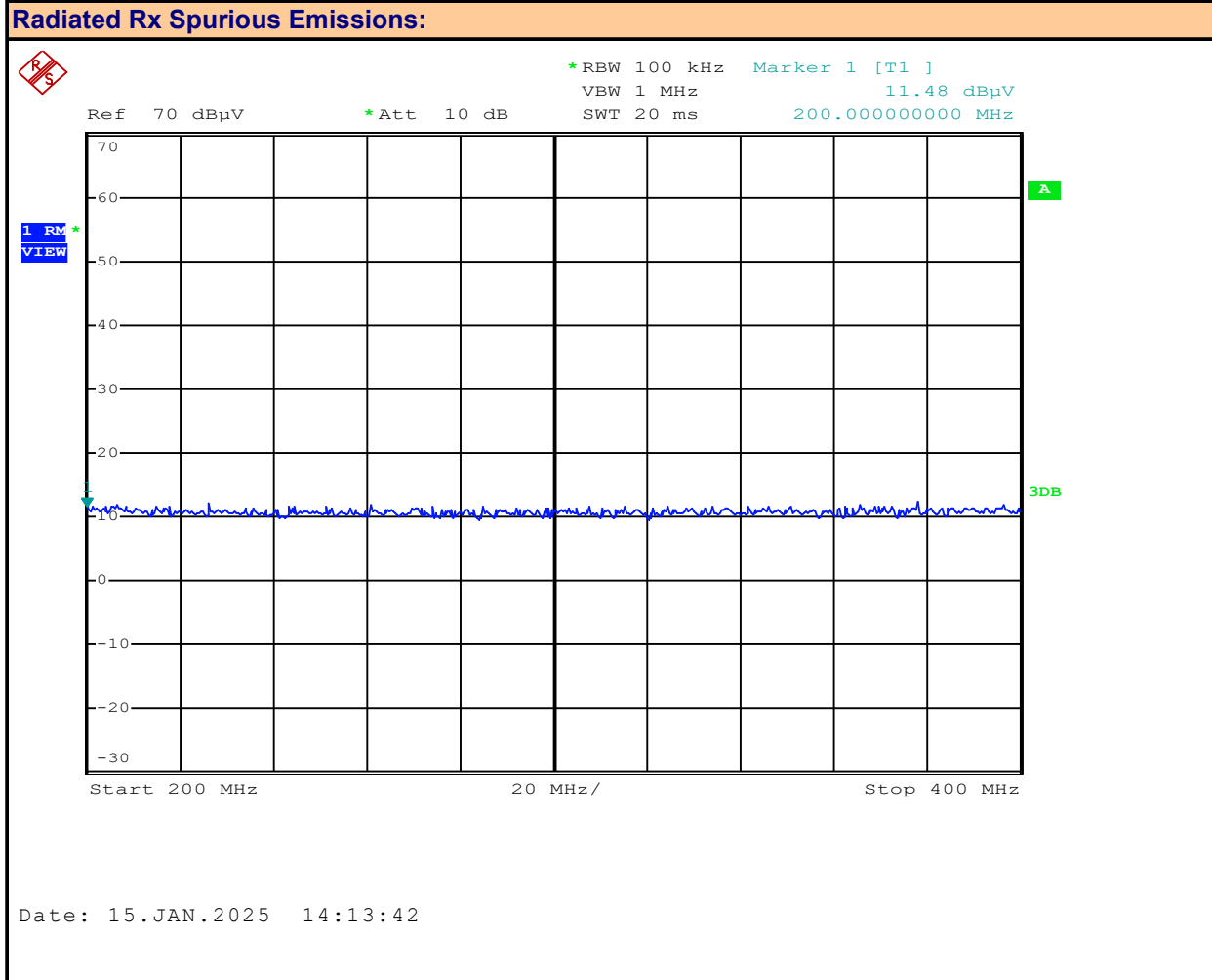


Antenna Polarization: **Vertical**

Measured Emission: **ND** dBuV

Emission Frequency: **ND** MHz

Plot 12.9 – Radiated Rx Emissions, Vertical, 200-400MHz

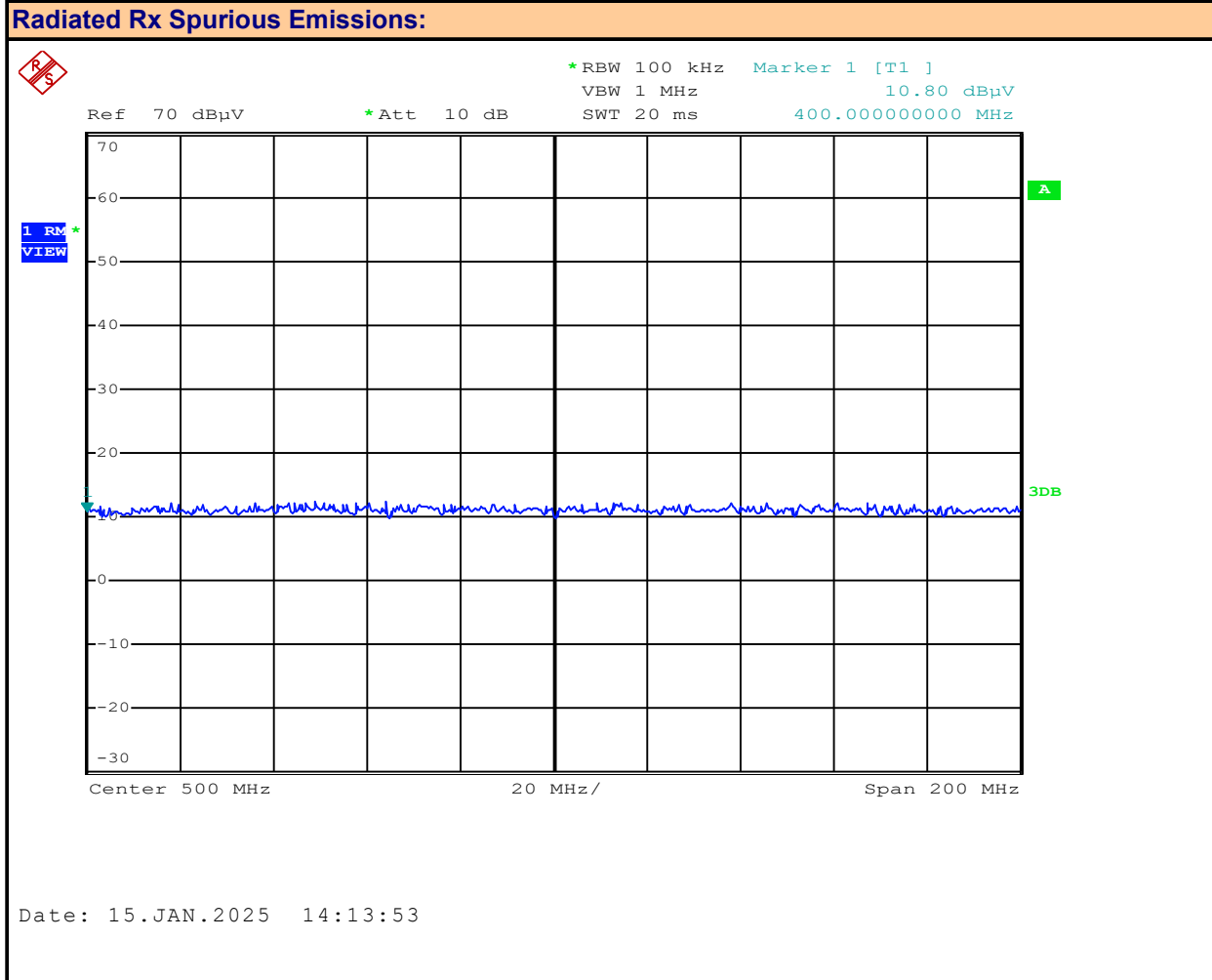


Antenna Polarization: **Vertical**

Measured Emission: **ND** dBuV

Emission Frequency: **ND** MHz

Plot 12.10 – Radiated Rx Emissions, Vertical, 400-600MHz

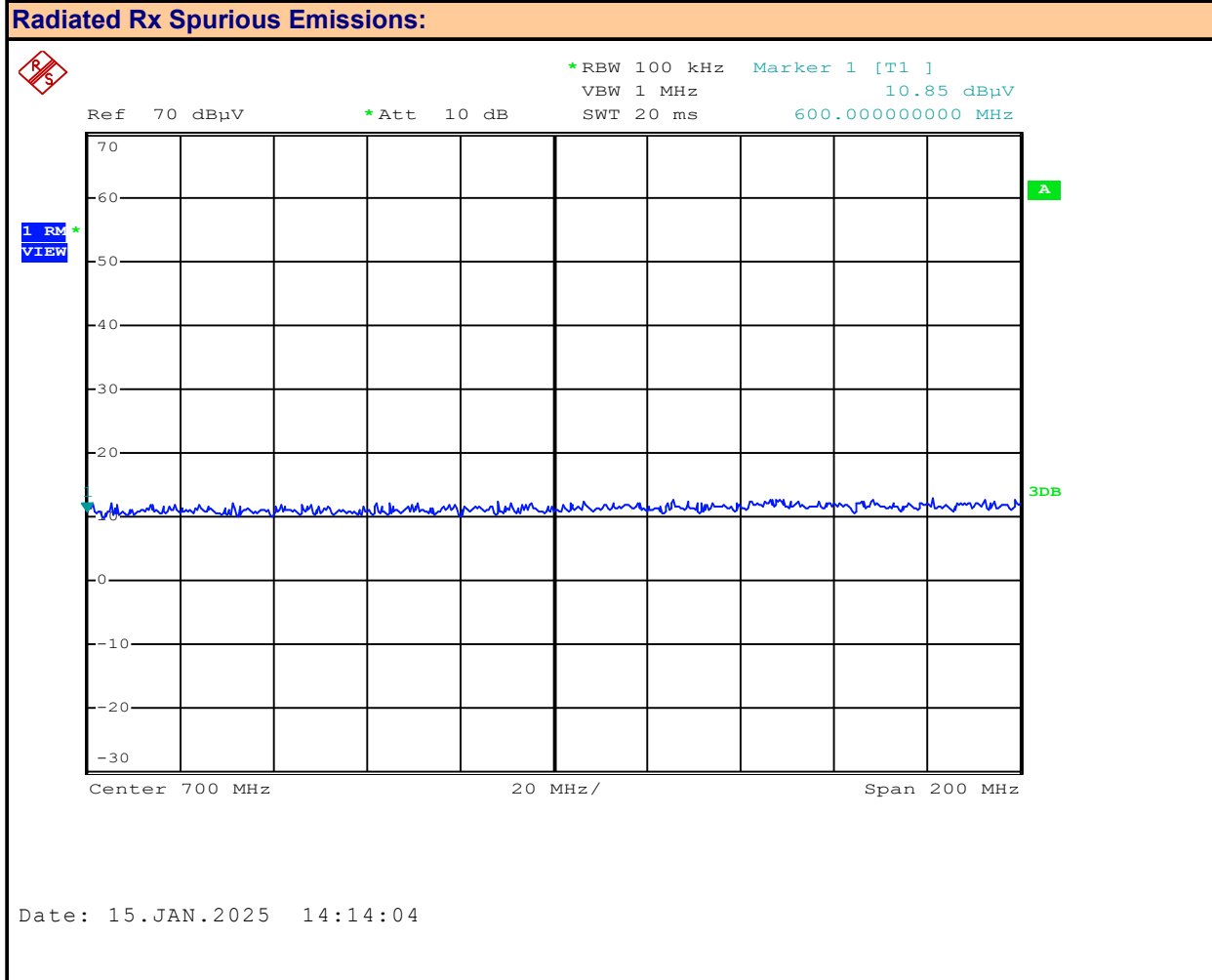


Antenna Polarization: **Vertical**

Measured Emission: **ND** dBuV

Emission Frequency: **ND** MHz

Plot 12.11 – Radiated Rx Emissions, Vertical, 600-800MHz



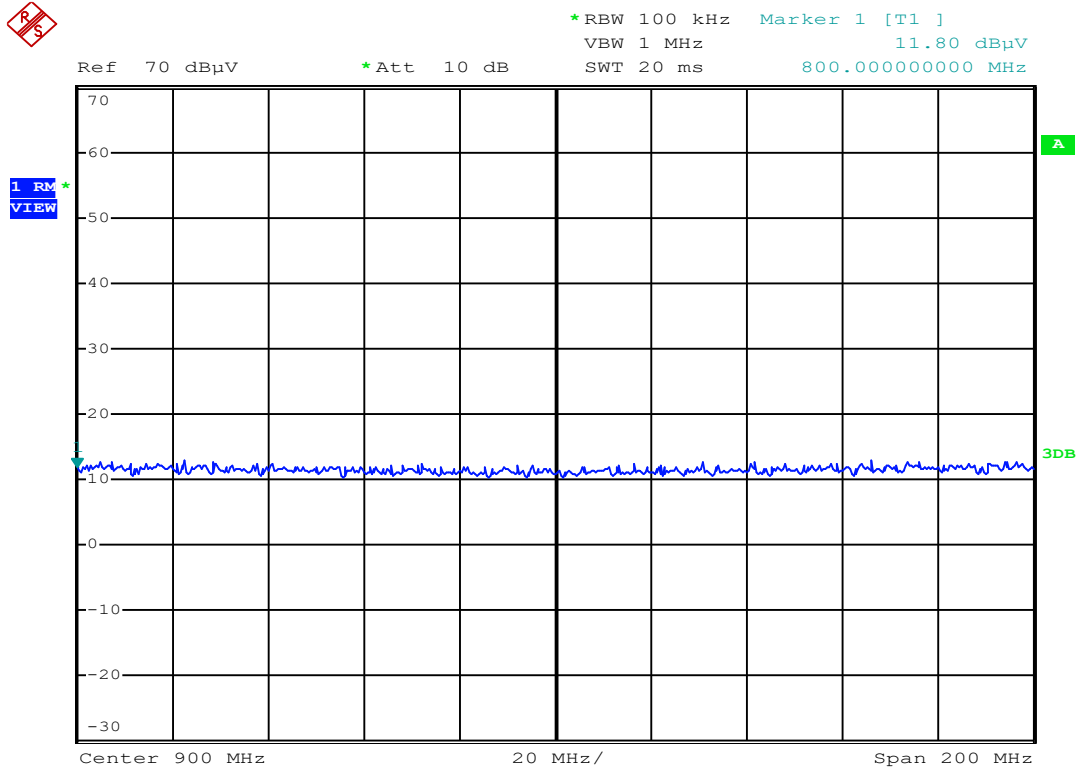
Antenna Polarization: **Vertical**

Measured Emission: **ND** dBuV

Emission Frequency: **ND** MHz

Plot 12.12 – Radiated Rx Emissions, Vertical, 800-1000MHz

Radiated Rx Spurious Emissions:



Date: 15.JAN.2025 14:14:17

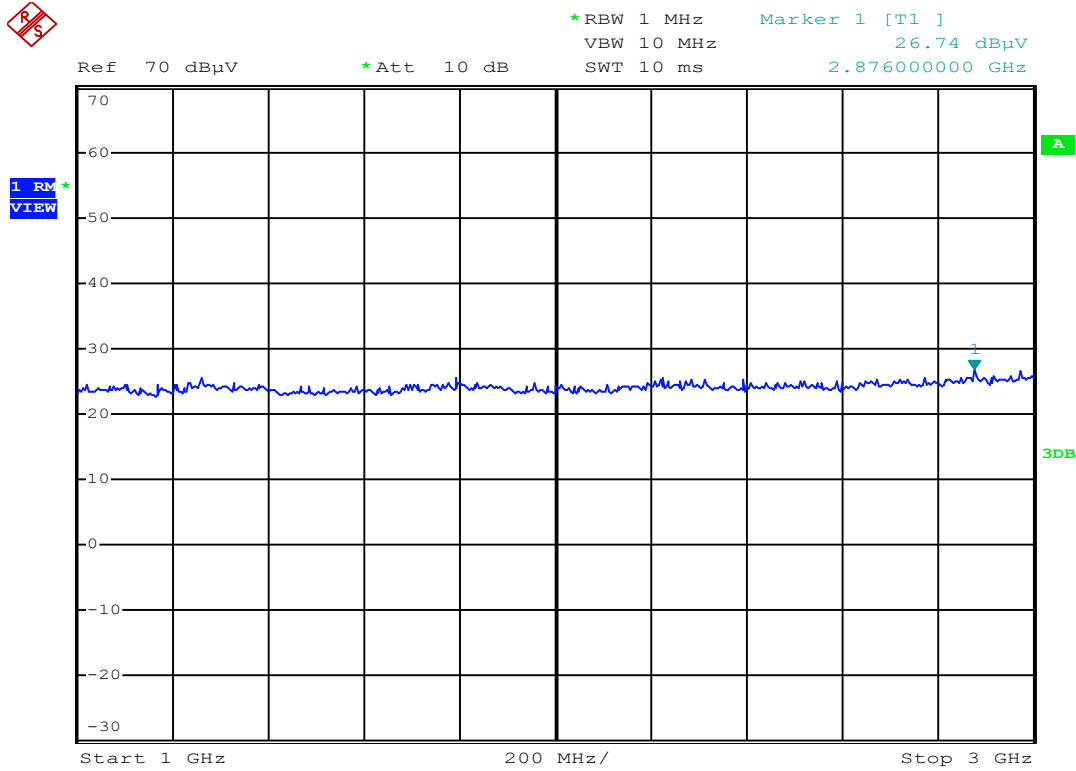
Antenna Polarization: **Vertical**

Measured Emission: **ND** dBuV

Emission Frequency: **ND** MHz

Plot 12.13 – Radiated Rx Emissions, Vertical, 1-3GHz

Radiated Rx Spurious Emissions:



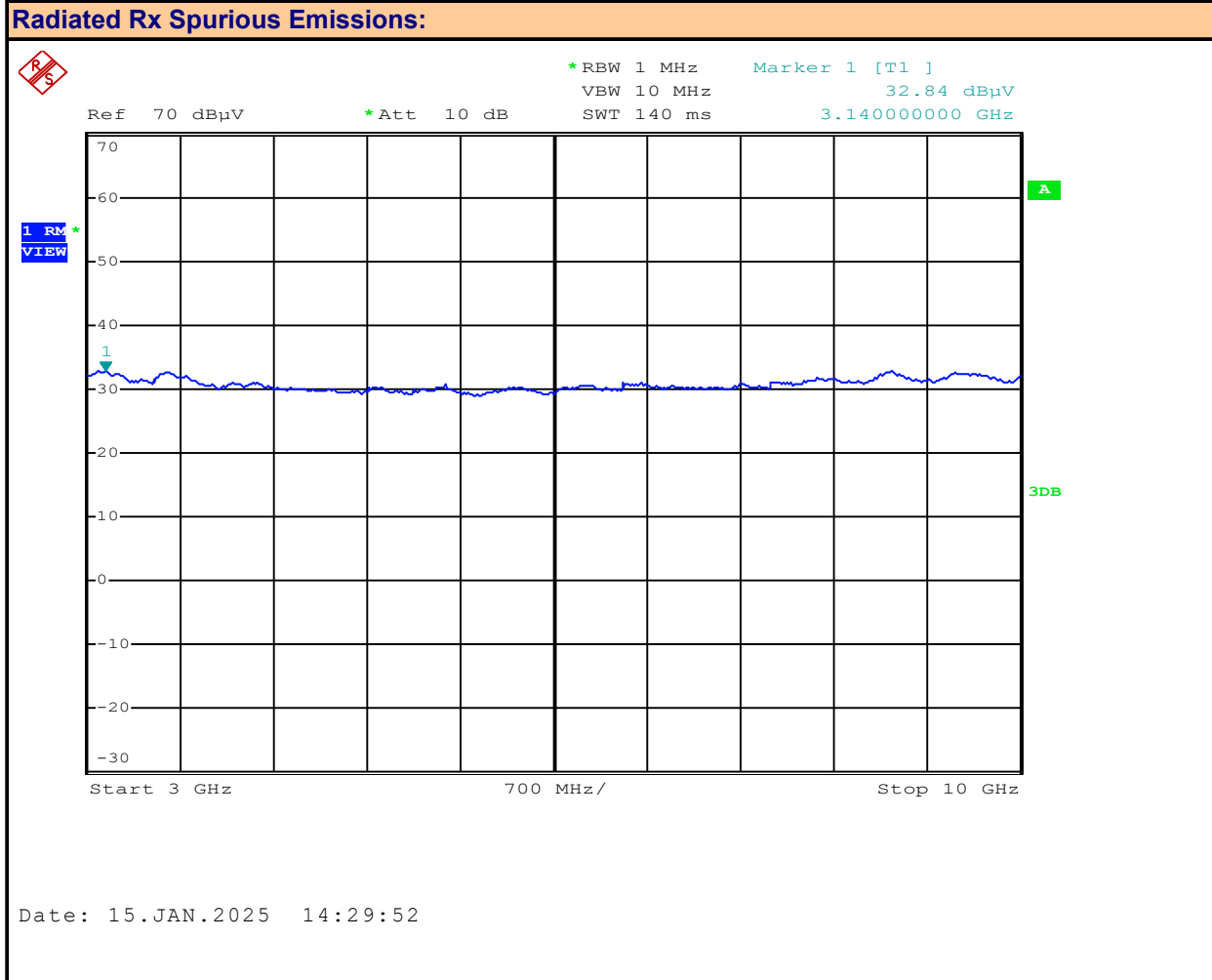
Date: 15.JAN.2025 14:29:35

Antenna Polarization: **Vertical**

Measured Emission: **ND** dBuV

Emission Frequency: **ND** MHz

Plot 12.14 – Radiated Rx Emissions, Vertical, 3-10GHz



Antenna Polarization: **Vertical**

Measured Emission: **ND** dBuV

Emission Frequency: **ND** MHz

Table 12.1 – Summary of Radiated Rx Emissions Measurements

Radiated Rx Spurious Emissions Measurement Results:					
Frequency (MHz)	Modulation	Emission FS [E _{Em}] (dBuV)	Emission Frequency (MHz)	Limit (dB)	Margin (dB)
n/a	n/a	ND	ND	-	n/a
Results:				Complies	

Attenuation [Atten] = [P_{Fund}] - [P_{Em}]

Margin = Attenuation - Limit

ND = None Detected

n/a = Not Applicable

APPENDIX A – TEST SETUP DRAWINGS AND EQUIPMENT

Table A.1 – Setup - Conducted Measurements Equipment

Equipment List			
Asset Number	Manufacturer	Model Number	Description
00241	R&S	FSU40	Spectrum Analyzer

Figure A.1 – Test Setup Conducted Measurements

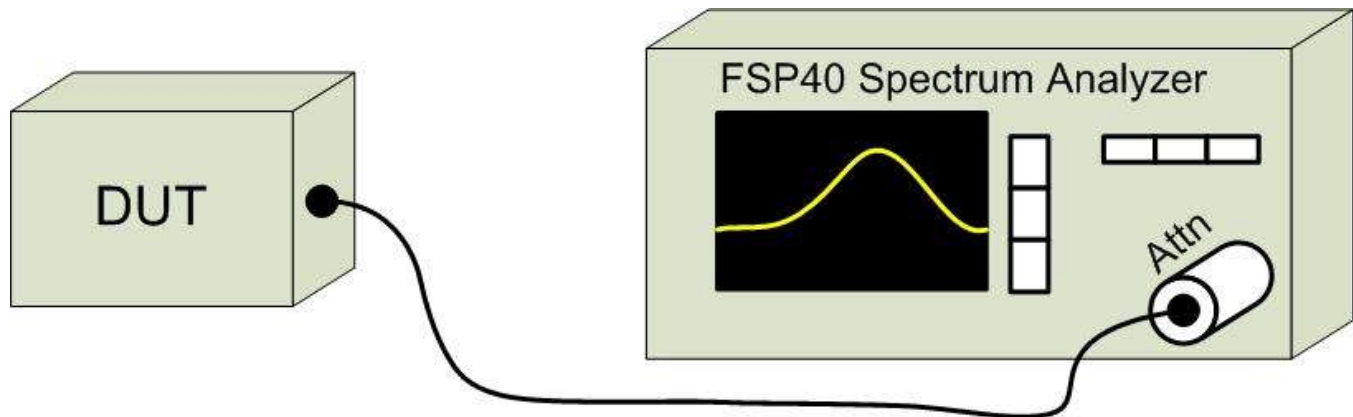


Table A.2 – Setup - Radiated Emissions Equipment

Equipment List			
Asset Number	Manufacturer	Model Number	Description
00072	EMCO	2075	Mini-mast
00073	EMCO	2080	Turn Table
00071	EMCO	2090	Multi-Device Controller
00241	R&S	FSU40	Spectrum Analyzer
00050	Chase	CBL-6111A	Bilog Antenna
00275	Coaxis	LMR400	25m Cable
00276	Coaxis	LMR400	4m Cable
00278	TILE	34G3	TILE Test Software
00034	ETS	3115	Double Ridged Guide Horn

CNR: Calibration Not Required
COU: Calibrate On Use

Figure A.2 – Test Setup Radiated Measurements 30MHz – 1GHz

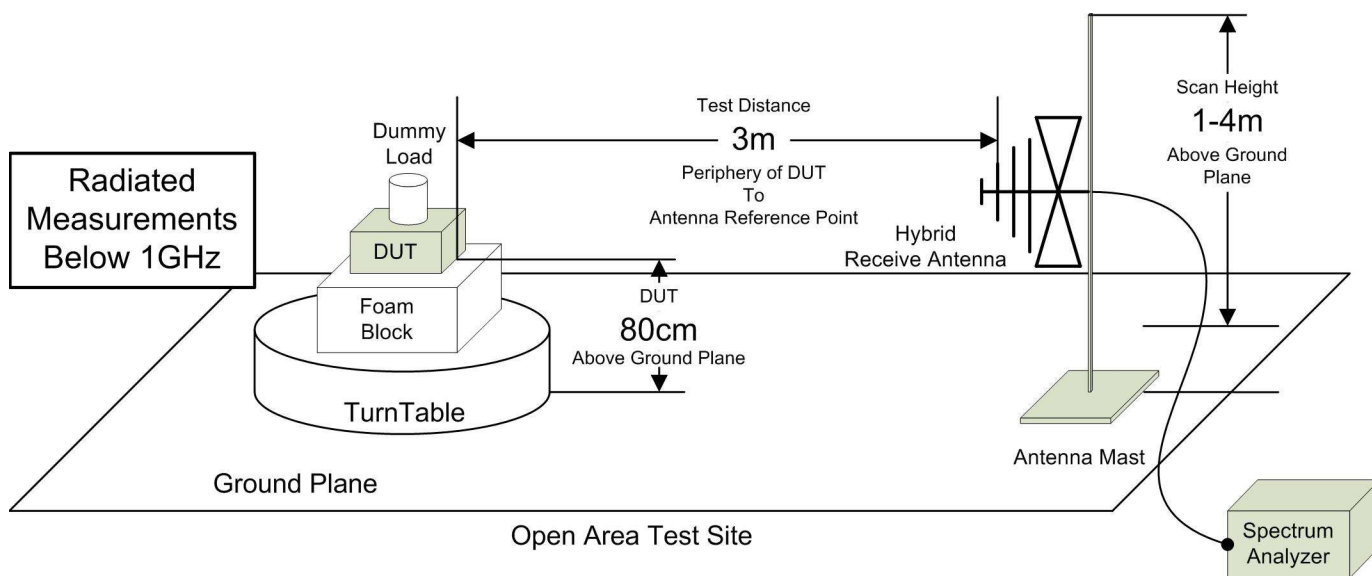


Figure A.3 – Test Setup Radiated Measurements 30MHz – 1GHz, Signal Substitution

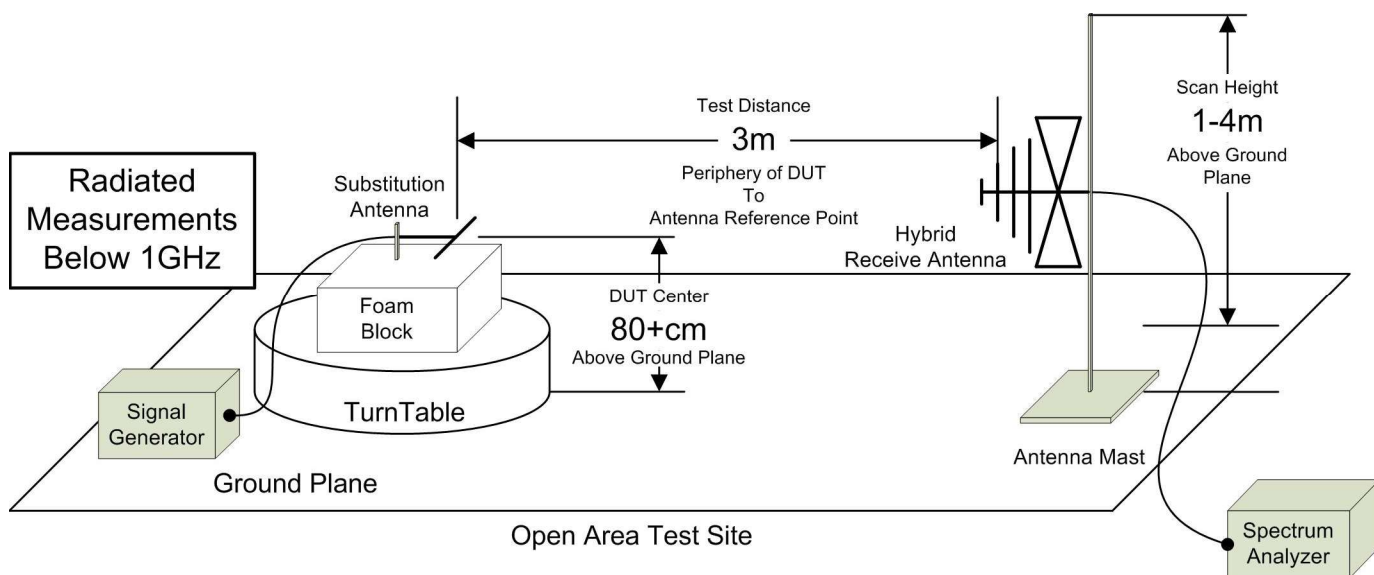
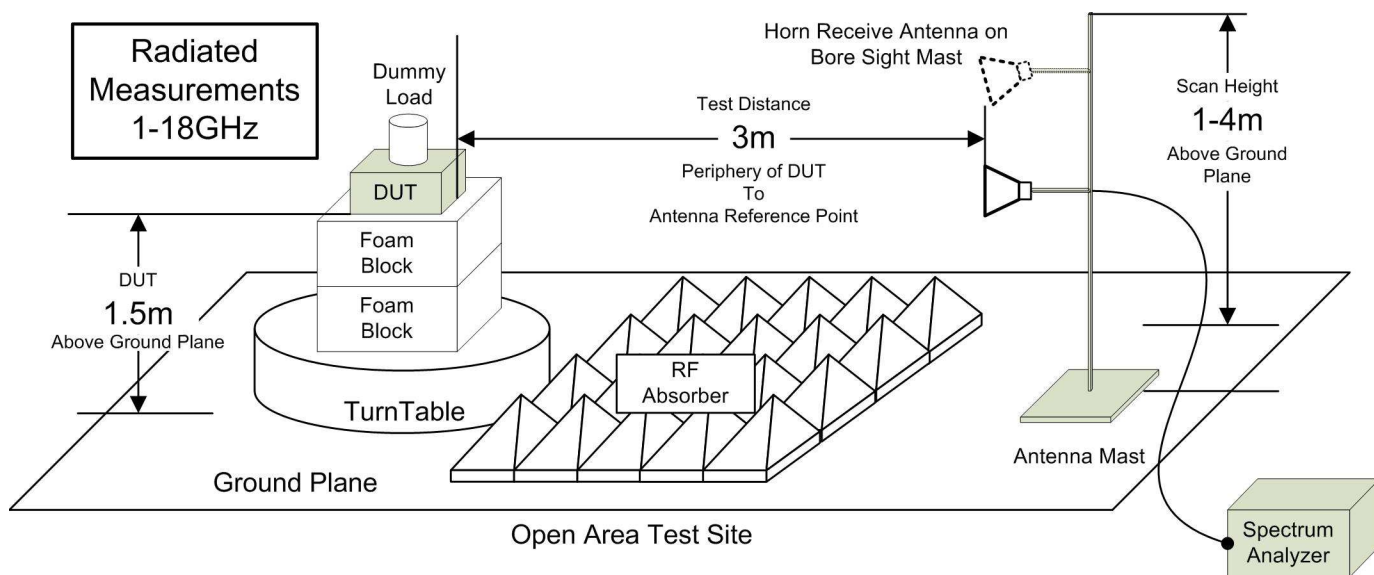


Figure A.4 – Test Setup Radiated Measurements 1 – 18GHz,



APPENDIX B – EQUIPMENT LIST AND CALIBRATION

Equipment List							
Asset Number	Manufacturer	Model Number	Serial Number	Description	Last Calibrated	Calibration Interval	Calibration Due
00050	Chase	CBL-6111A	1607	Bilog Antenna	16 Nov 2023	Triennial	16 Nov 2026
00035	ETS	3115	6276	Double Ridged Guide Horn	4 Mar 2022	Triennial	4 Mar 2025
00241	R&S	FSU40	100500	Spectrum Analyzer	6 Sep 2024	Triennial	6 Sep 2027
00250	Circuit Test	DMR-1800	TE182	Digital Multi-Meter - DVM	26 Jun 2023	Triennial	26 Jun 2026
00071	EMCO	2090	9912-1484	Multi-Device Controller	n/a	n/a	n/a
00072	EMCO	2075	0001-2277	Mini-mast	n/a	n/a	n/a
00073	EMCO	2080	0002-1002	Turn Table	n/a	n/a	n/a
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable	COU	n/a	COU
00263B	Koaxis	KP10-1.00M-TD	263B	1m Armoured Cable	COU	n/a	COU
00130	Pasternack	PE7019-30	n/a	30dB, 50W Attenuator	COU	n/a	COU
00275	TMS	LMR400	n/a	25m Cable	COU	n/a	COU
00278	TILE	34G3	n/a	TILE Test Software	NCR	n/a	NCR

NCR: No Calibration Required

COU: Calibrate On Use

APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY

CISPR 16-4 Measurement Uncertainty (U_{LAB})

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence interval using a coverage factor of $k=2$

30MHz - 200MHz

$$U_{LAB} = 5.14\text{dB} \quad U_{CISPR} = 6.3\text{dB}$$

200MHz - 1000MHz

$$U_{LAB} = 5.90\text{dB} \quad U_{CISPR} = 6.3\text{dB}$$

1GHz - 6GHz

$$U_{LAB} = 4.80\text{dB} \quad U_{CISPR} = 5.2\text{dB}$$

6GHz - 18GHz

$$U_{LAB} = 5.1\text{dB} \quad U_{CISPR} = 5.5\text{dB}$$

If the calculated uncertainty U_{lab} is **less** than U_{CISPR} then:

- | | |
|---|---|
| 1 | Compliance is deemed to occur if NO measured disturbance exceeds the disturbance limit |
| 2 | Non-Compliance is deemed to occur if ANY measured disturbance EXCEEDS the disturbance limit |

If the calculated uncertainty U_{lab} is **greater** than U_{CISPR} then:

- | | |
|---|--|
| 3 | Compliance is deemed to occur if NO measured disturbance, increased by ($U_{lab} - U_{CISPR}$), exceeds the disturbance limit |
| 4 | Non-Compliance is deemed to occur if ANY measured disturbance, increased by ($U_{lab} - U_{CISPR}$), EXCEEDS the disturbance limit |

END OF REPORT