LAB N° 1244 L

RADIO TEST REPORT

REP096245

Date of issue: May 13, 2025

Type of assessment:

Modular approval

Applicant:

Keysight

Model:

AV1022-66002

FCC Registration number:

2AK5OAV1022-66002

Specifications:

- FCC 47 CFR Part 90, subpart M

Intelligent Transportation Systems Radio Service

This test report shall not be partially reproduced without the prior written consent of Nemko S.p.A. The phase of sampling of equipment under testis carried out by the customer. Results indicated in this report refer exclusively to the tested samples and apply to the sample as received. This Test Report, when bearing the Nemko name and logo is only valid when issued by a Nemko laboratory or by a laboratory having agreement with Nemko.

LAB N° 1244 L

Lab locations

Company name	Nemko Spa
Address	Via del Carroccio, 4
City	Biassono
Province	MB
Postal code	20853
Country	Italy
Telephone	+39 039 220 12 01
Facsimile	+39 039 220 12 21
Website	www.nemko.com
Site number	682159 (10 m semi anechoic chamber)

Tested by	O. Frau
Test engineer signature	
Reviewed by	R. Giampaglia
Reviewer signature	Firmato digitalmente da Giampaglia Roberto

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report. This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Spa ISO/IEC 17025 accreditation.

Copyright notification

Nemko Spa authorizes the applicant to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Spa accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Table of Contents

Table of Contents **3**
Section 1 Report summary **4**
1.1 Test specifications 4
1.2 Test methods 4
1.3 Exclusions 4
1.4 Statement of compliance 4
1.5 Test report revision history 4
Section 2 Engineering considerations **5**
2.1 Modifications incorporated in the EUT for compliance 5
2.2 Technical judgment 5
2.3 Deviations from laboratory tests procedures 5
Section 3 Test conditions **6**
3.1 Atmospheric conditions 6
3.2 Power supply range 6
Section 4 Measurement uncertainty **7**
4.1 Uncertainty of measurement 7
Section 5 Information provided by the applicant **8**
5.1 Disclaimer 8
5.2 Applicant/Manufacture 8
5.3 EUT information 8
5.4 Technical information 9
5.5 EUT setup details 9
Section 6 Summary of test results **13**
6.1 Testing location 13
6.2 Testing period 13
6.3 Sample information 13
6.4 FCC Part 90 test requirements result 13
Section 7 Test equipment **14**
7.1 Test equipment list 14
Section 8 Testing data **15**
8.1 RF Power Output 15
8.2 Occupied Bandwidth 27
8.3 Out-Of-Band Emissions 49
8.4 Spurious Emissions at Antenna Terminal 63
8.5 Spurious emissions radiated measurements 84
8.6 Frequency stability measurements 126
Section 9 EUT photos **128**
9.1 Setup photos 128
9.2 External photos 128

Section 1 Report summary

1.1 Test specifications

FCC Part 90	Private Land Mobile Radio Services

1.2 Test methods

ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 511808 D01	C-V2X v02
KDB 662911 D01	Multiple Transmitter Output v02r01
KDB 662911 D02	MIMO with Cross-Polarized Antennas v01

1.3 Exclusions

None

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard except as noted in section 1.3 above. Results obtained indicate that the product under test complies In full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

1.5 Test report revision history

Table 1.5-1: *Test report revision history*

Revision #	Date of issue	Details of changes made to test report
REP096245	May 13, 2025	Original report issued

Section 2 Engineering considerations

2.1 Modifications incorporated in the EUT for compliance

There were no modifications performed to the EUT during this assessment.

2.2 Technical judgment

None

2.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 3 Test conditions

3.1 Atmospheric conditions

Temperature	15 °C – 35 °C
Relative humidity	20 % – 75 %
Air pressure	86 kPa (860 mbar) – 106 kPa (1060 mbar)

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

The following instruments are used to monitor the environmental conditions:

Equipment	Manufacturer	Model no.	Asset no.	Cal date	Next cal.
Thermo-hygrometer data loggers	Testo	175-H2	20012380/305	2025-01	2027-01
Thermo-hygrometer data loggers	Testo	175-H2	20013013/305	2025-01	2027-01
Barometer	Castle	GBP 3300	072015	2025-04	2026-04

3.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 4 Measurement uncertainty

4.1 Uncertainty of measurement

The measurement uncertainty was calculated for each test and quantity listed in this test report, according to CISPR 16-4-2, ETSI TR 100 028-1, ETSI TR 100 028-2 and other specific test standards and is documented in Nemko Spa working manuals WML1002 and WML0078.
The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report:
P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit.
F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.
Hereafter Nemko's measurement uncertainties are reported:

EUT	Type	Test	Range	Measurement Uncertainty	Notes
Transmitter	Conducted	Frequency error	0.001 MHz ÷ 40 GHz	0.08 ppm	(1)
		Carrier power RF Output Power	0.009 MHz ÷ 30 MHz	1.1 dB	(1)
			30 MHz ÷ 18 GHz	1.5 dB	(1)
			18 MHz ÷ 40 GHz	3.0 dB	(1)
			40 MHz ÷ 140 GHz	5.0 dB	(1)
		Adjacent channel power	1 MHz ÷ 18 GHz	1.4 dB	(1)
		Conducted spurious emissions	0.009 MHz ÷ 18 GHz	3.0 dB	(1)
			18 GHz ÷ 40 GHz	4.2 dB	(1)
			40 GHz ÷ 220 GHz	6.0 dB	(1)
		Intermodulation attenuation	1 MHz ÷ 18 GHz	2.2 dB	(1)
		Attack time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Attack time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Release time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Release time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Transient behaviour of the transmitter– Transient frequency behaviour	1 MHz ÷ 18 GHz	0.2 kHz	(1)
		Transient behaviour of the transmitter – Power level slope	1 MHz ÷ 18 GHz	9%	(1)
		Frequency deviation - Maximum permissible frequency deviation	0.001 MHz ÷ 18 GHz	1.3%	(1)
		Frequency deviation - Response of the transmitter to modulation frequencies above 3 kHz	0.001 MHz ÷ 18 GHz	0.5 dB	(1)
		Dwell time	-	3%	(1)
		Hopping Frequency Separation	0.01 MHz ÷ 18 GHz	1%	(1)
		Occupied Channel Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
		Modulation Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
	Radiated	Radiated spurious emissions	0.009 MHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
		Effective radiated power transmitter	10 kHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)

NOTES:
(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to a coverage probability of approximately 95 %

Section 5 Information provided by the applicant

5.1 Disclaimer

This section contains information provided by the applicant and has been utilized to support the test plan. Inaccurate information provided by the applicant can affect the validity of the results contained within this test report. Nemko accepts no responsibility for the information contained within this section and the impact it may have on the test plan and resulting measurements.

5.2 Applicant/Manufacture

Applicant name	Keysight Technologies
Applicant address	1900 Garden of the Gods Road Colorado Springs, CO 80907-3423 United States
Manufacture name	Same as applicant
Manufacture address	Same as applicant

5.3 EUT information

Product name	V2X modem
Model	AV1022-66002
Model variant(s)	--
Serial number	PRJ00746110001 (Number assigned by Nemko S.p.A.)
Part number	--
Power supply requirements	12 V DC
Product description and theory of operation	The EUT is a V2X radio module

5.4 Technical information

Frequency band	5895 to 5925 MHz
Frequency Min (MHz)	5900 MHz (OBW=10 MHz), 5910 MHz (OBW=10 MHz), 5920 MHz (OBW=10 MHz) 5905 MHz (OBW=20 MHz), 5915 MHz (OBW=20 MHz)
Frequency Max (MHz)	5900 MHz (OBW=10 MHz), 5910 MHz (OBW=10 MHz), 5920 MHz (OBW=10 MHz) 5905 MHz (OBW=20 MHz), 5915 MHz (OBW=20 MHz)
RF power Max (W), Conducted at antenna port	200 mW (23.0 dBm) @OBW 10 MHz, 5910 MHz, Antenna port 1 186 mW (22.7 dBm) @OBW 10 MHz, 5910 MHz, Antenna port 2 107 mW (20.3 dBm) @OBW 20 MHz, 5905 MHz, Antenna port 1 107 mW (20.3 dBm) @OBW 20 MHz, 5905 MHz, Antenna port 2
Measured BW (kHz), 99% OBW	8.24 MHz @OBW 10 MHz, 5920 MHz, Antenna port 1 8.24 MHz @OBW 10 MHz, 5920 MHz, Antenna port 2 16.67 MHz @20 MHz, 5905 MHz, Antenna port 1 16.66 MHz @20 MHz, 5905 MHz, Antenna port 2
Measured BW (kHz), 26 dB BW	9.11 MHz @10 MHz, 5910 MHz, Antenna port 1 9.09 MHz @10 MHz, 5910 MHz, Antenna port 2 19.98 MHz @20 MHz, 5905 MHz, Antenna port 1 19.88 MHz @20 MHz, 5905 MHz, Antenna port 2
Transmitter spurious, dBm @ 3 m	41.2 dBm
Antenna information	External antennas (MIMO 2x2), max gain 7 dBi

5.5 EUT setup details

5.5.1 Radio exercise details

Operating conditions	The EUT has been tested connected to a dedicated server. The following lines command have been used to configure the EUT: *ssh root@192.168.0.1* password: *xxx* *run_v2x_diag_usb.sh* *chan bw 0 x* → where x=1 for 10 MHz OBW, and x=2 for 20 MHz OBW *chan freq 0 yyyy* → where yyyy is the operating frequency [MHz] *chan rf_testmode 0 2 zz* → (OFDM modulation) where zz is the max RF power (46 → 23 dBm, is the highest level used, as declared by the applicant) *chan rf_testmode 0 1 zz* → (CW signal) where zz is the max RF power (46 → 23 dBm, is the highest level used, as declared by the applicant) *chan rf_testmode 0 0* *quit*

5.5.2 EUT setup configuration

Table 5.5-1: *EUT sub assemblies*

Description	Brand name	Model, Part number, Serial number, Revision level
--	--	--
--	--	--
--	--	--
--	--	--

The EUT is composed by a single unit

Table 5.5-2: *EUT interface ports*

Description	Qty.
PCB connector	1
RF output	2

Table 5.5-3: *Support equipment*

Description	Part number	Serial number
PC	--	--
Evaluation board	--	--

Table 5.5-4: *Inter-connection cables*

Cable description	From	To	Length (m)
PCB connector	EuT	Evaluation board	No cable
RF output	EuT	Dummy load	30 cm

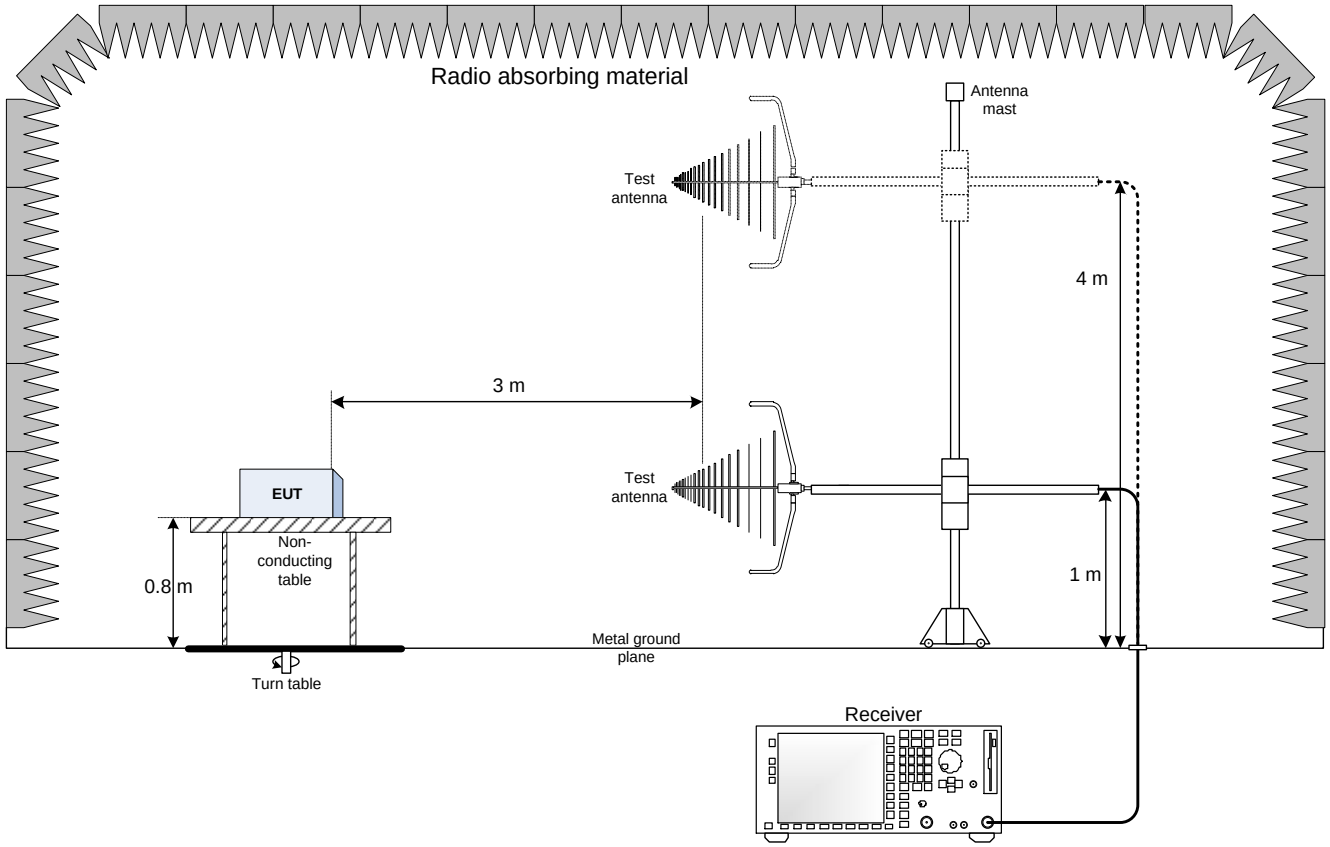


Figure 5.5-1: *Radiated emissions set-up for frequencies below 1 GHz*

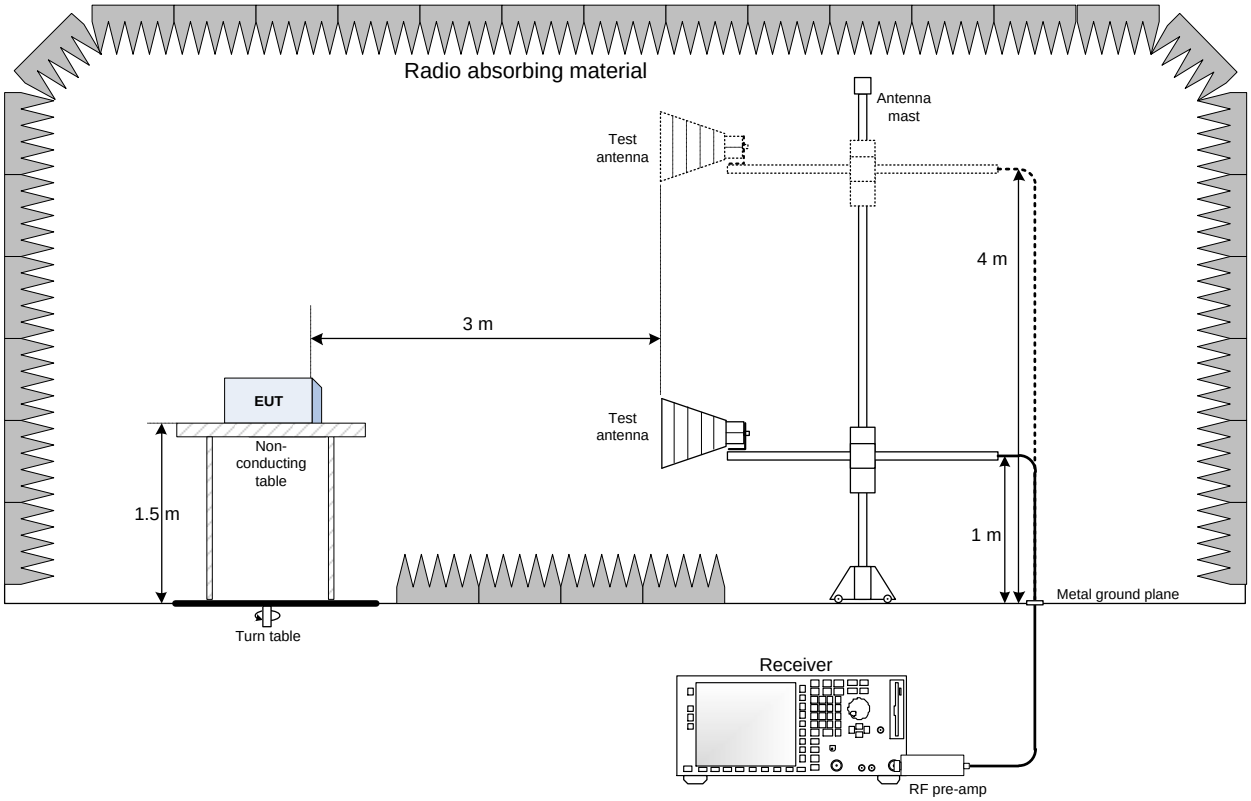


Figure 5.5-2: *Radiated emissions set-up for frequencies above 1 GHz*

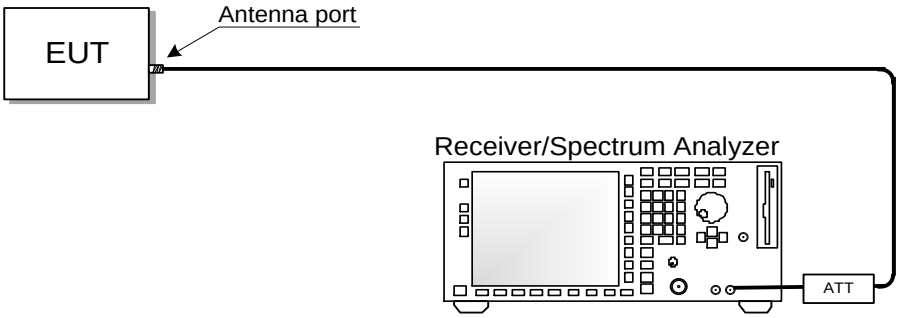


Figure 5.5-3: *Antenna port testing set-up*

Section 6 Summary of test results

6.1 Testing location

Test location (s)	Nemko Spa Via del Carroccio, 4 – 20853 Biassono (MB) - Italy

6.2 Testing period

Test start date	May 8, 2025	Test end date	May 13, 2025

6.3 Sample information

Receipt date	July 29, 2024	Nemko sample ID number(s)	PRJ00746110001

6.4 FCC Part 90 test requirements result

Table 6.4-1: *FCC requirements results*

Clause	Rule Part	Method (clause)	Test description	Verdict
90.377(b)	2.1046	KDB 511808 (3.2.2)	RF Power Output	Pass
--	2.1047	--	Modulation characteristics	Pass
--	2.1049	KDB 511808 (3.1) ANSI C63.26-2015 (5.4)	Occupied Bandwidth	Pass
--	2.1051	KDB 511808	Spurious Emissions at Antenna Terminal	Pass
--	2.1053	KDB 511808	Field Strength of Spurious Emissions	Pass
90.379	2.1053	FCC Part 2.1055	Frequency Stability	Pass

Notes:

Section 7 Test equipment

7.1 Test equipment list

Table 7.1-1: *Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767	2025-01	2026-01
EMI Receiver	Rohde & Schwarz	ESU8	100202	2024-09	2025-09
EMI Receiver	Rohde & Schwarz	ESW44	101620	2024-09	2025-09
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263254	2024-06	2025-06
Climatic Chamber	MSL	EC500DA	15022	2024-07	2026-07
Antenna Trilog 25MHz - 8GHz	Schwarzbeck Mess-Elektronik	VULB9162	9162-025	2024-08	2027-08
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STLP 9148-152	2024-10	2027-10
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40	2023-05	2026-05
Broadband Amplifier	Schwarzbeck Mess-Elektronik	BBV9718C	00121	2025-01	2026-01
Broadband Bench Top Amplifier	Sage	STB-1834034030-KFKF-L1	18490-01	2024-07	2025-07
Pyramidal Horn Antenna 40-60 GHz	Sage	SAR-2507-19VF-R2	15715-01	2024-06	2027-06
Harmonic Mixer	Radiometer Physics	FS-Z60	100988	2024-01	2027-01
Semi-anechoic chamber	Nemko Spa	10m semi-anechoic chamber	530	2023-09	2025-09
3m Semi anechoic chamber	Comtest	SAC-3	1711-150	2024-09	2026-09
Controller	Maturo	FCU3.0	10041	NCR	NCR
Tilt antenna mast	Maturo	TAM4.0-E	10042	NCR	NCR
Turntable	Maturo	TT4.0-5T	2.527	NCR	NCR
Controller	Maturo	FCU3.0	10237	NCR	NCR
Tilt antenna mast	Maturo	TAM4.0-E	3466.01	NCR	NCR
Turntable	Maturo	TT4.0	-	NCR	NCR
Coaxial cable	Rosenberger+Huber-Suhner	RE03+RE04	1.510+1.511	2025-01	2026-01
Coaxial cable	Rosenberger+Huber-Suhner	RE04+RE05	1.511+1.512	2025-01	2026-01
Coaxial cable	Rosenberger+Huber-Suhner	RE01+RE02	1.654+1.655	2025-01	2026-01
Coaxial cable	Rosenberger+Huber+Suhner	CE01+CE02	1.498+1.632	2024-12	2025-12

Section 8 Testing data

8.1 RF Power Output

8.1.1 References, definitions and limits

§ 90.377(b) Frequencies available; maximum EIRP and antenna height, and priority communications.

b) Frequencies available for assignment to eligible applicants within the 5850-5925 MHz band for RSUs and the maximum EIRP permitted for an RSU with an antenna height not exceeding 8 meters above the roadway bed surface are specified in the table below. Where two EIRP limits are given, the higher limit is permitted only for state or local governmental entities.

Channel No.	Frequency range (MHz)	Max. EIRP (dBm)	Channel use
180	5895-5905	23	Service Channel.
181	5895-5915	23	Service Channel.
182	5905-5915	23	Service Channel.
184	5915-5925	33/40	Service Channel.

(1) An RSU may employ an antenna with a height exceeding 8 meters but not exceeding 15 meters provided the EIRP specified in the table above is reduced by a factor of 20 log(H_t/8) in dB where H_t is the height of the radiation center of the antenna in meters above the roadway bed surface. The EIRP is measured as the maximum EIRP toward the horizon or horizontal, whichever is greater, of the gain associated with the main or center of the transmission beam. The RSU antenna height shall not exceed 15 meters above the roadway bed surface.

(2) Channels 180/182 may be combined to create a twenty-megahertz channel, designated Channel No. 181.

(3) Channel 184 is designated for public safety applications involving safety of life and property. Only those entities meeting the requirements of § 90.373(a) are eligible to hold an authorization to operate on this channel.

KDB 511808 D01 C-V2X v02

3.2 C-2VX Transmit Power Test Procedures

3.2.2 RSU Transmit Power Test Procedures

a. RSUs employing C-V2X technologies shall have a maximum EIRP not exceeding the limits provided in §90.391. The EIRP is measured as the maximum EIRP toward the horizon or horizontal, whichever is greater, of the gain associated with the main or center of the transmission beam. The radiation center of an RSU antenna shall not exceed 8 meters above the roadway surface bed. An RSU may employ an antenna with a height exceeding 8 meters but not exceeding 15 meters, provided the EIRP is reduced accordingly, as outlined in Table 2.

b. If an RSU transmit antenna operates between 8 and 15 meters, additional measurements shall be made to demonstrate the proper reduction in EIRP. The user/installation manual must provide adequate guidance to ensure the installer has enough information to input the correct power based on the installation height.

Channel (MHz)	Channel Bandwidth (MHz)	EIRP* (dBm/BW)
5895-5925	10	33 dBm
5895-5925	20	33 dBm
5895-5925	30	33 dBm
* Up to 8 meters above the roadway surface bed. To operate above 8 and up to 15 meters the EIRP shall be reduced by 20*log(H_t/8), where H_t is the height of the RSU transmit antenna above the roadway surface bed.		

Table 2. RSU EIRP Limits

8.1.2 Test summary

Verdict	Pass		
Tested by	O. Frau	Test date	May 8, 2025

8.1.3 Observations, settings and special notes

Spectrum analyzer settings:

Detector mode	Average
Resolution bandwidth	≥ OBW
Video bandwidth	≥ RBW
Measurement mode	Power emission
Trace mode	Peak
Measurement time	Auto
Note	The EUT only supports 10 MHz and 20 MHz channels. 30 MHz channels are not supported by the product. All five supported frequency ranges (three for 10 MHz and two for 20 MHz channels), as per §95.3204 and KDB Publication 511808, Table 1 (page 4/11), were assessed.

8.1.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767

Notes: NCR - no calibration required, VOU - verify on use

8.1.5 Test data

OBW, MHz	Antenna port	Frequency, MHz	Peak RF output power, dBm	Max Gain, dBi	Sum, dBm eirp	MIMO, dBm eirp	Limit, dBm eirp
10	1	5900.0	22.5	7.0	29.5	32.6	33.0
	2	5900.0	22.6	7.0	29.6		33.0
	1	5910.0	23.0	7.0	30.0	32.9	33.0
	2	5910.0	22.7	7.0	29.7		33.0
	1	5920.0	22.4	7.0	29.4	32.3	33.0
	2	5920.0	22.2	7.0	29.2		33.0

OBW, MHz	Antenna port	Frequency, MHz	Peak RF output power, dBm	Max Gain, dBi	Sum, dBm eirp	MIMO, dBm eirp	Limit, dBm eirp
20	1	5905.0	20.3	7.0	27.3	30.3	33.0
	2	5905.0	20.3	7.0	27.3		33.0
	1	5915.0	20.0	7.0	27.0	30.0	33.0
	2	5915.0	20.0	7.0	27.0		33.0

Example of MIMO calculations (@ 5900 MHz, OBW 10 MHz):

Antenna port 1: 29.5 dBm eirp → 891 mW eirp
Antenna port 2: 29.6 dBm eirp → 912 mW eirp
Sum = 1803 mW eirp → 32.6 dBm eirp

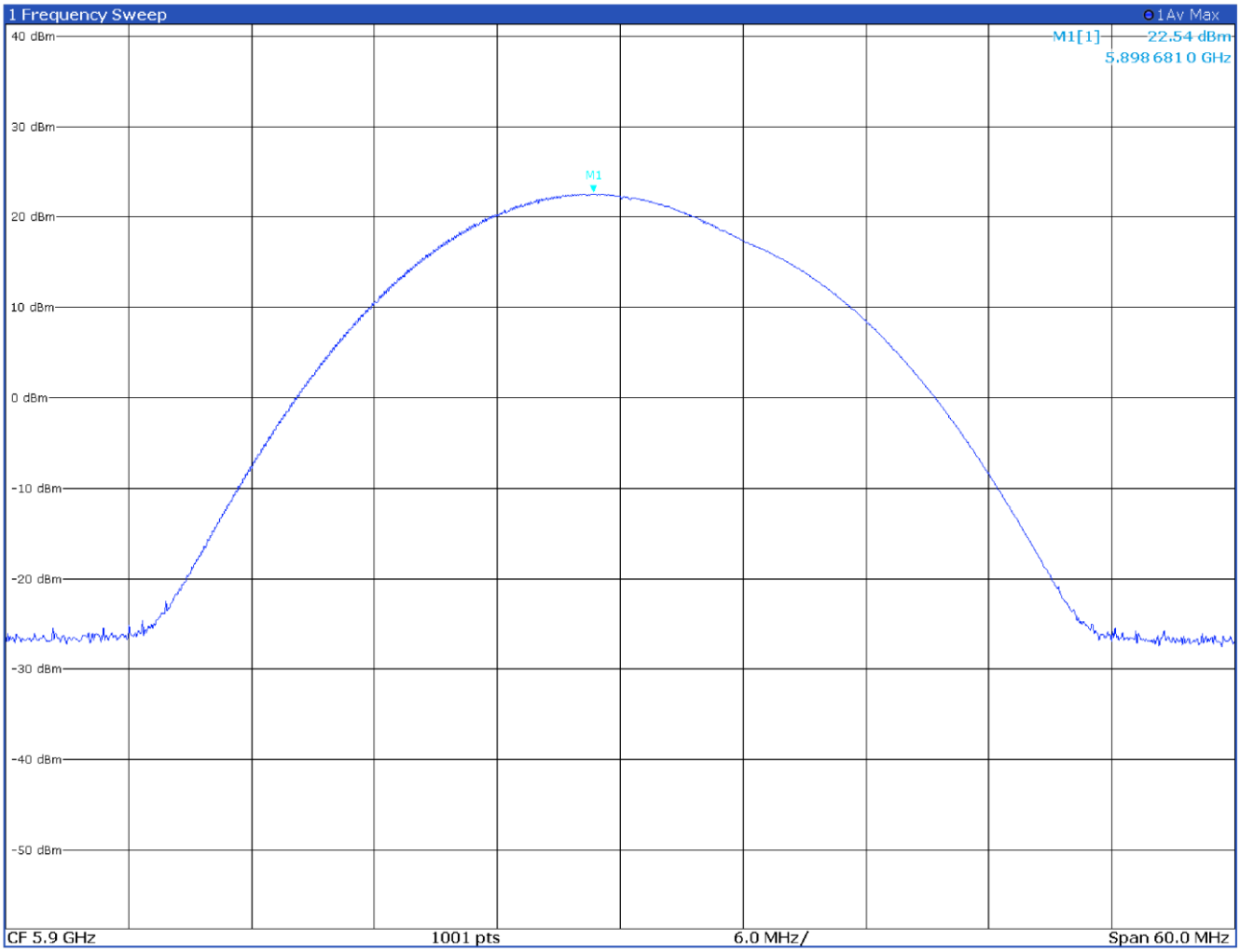


Figure 8.1-1: *5900 MHz, OBW 10 MHz, Antenna port 1*

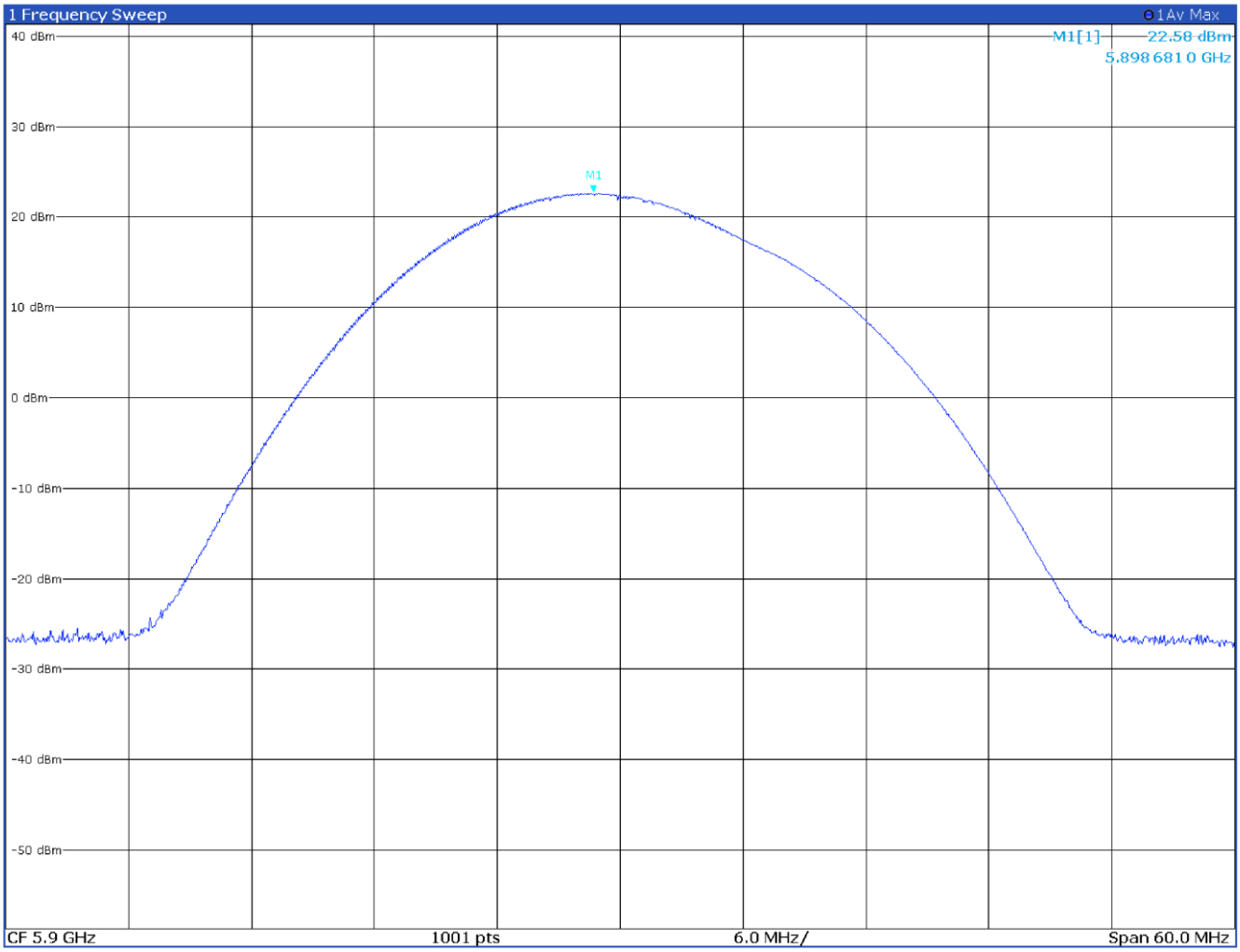


Figure 8.1-2: *5900 MHz, OBW 10 MHz, Antenna port 2*

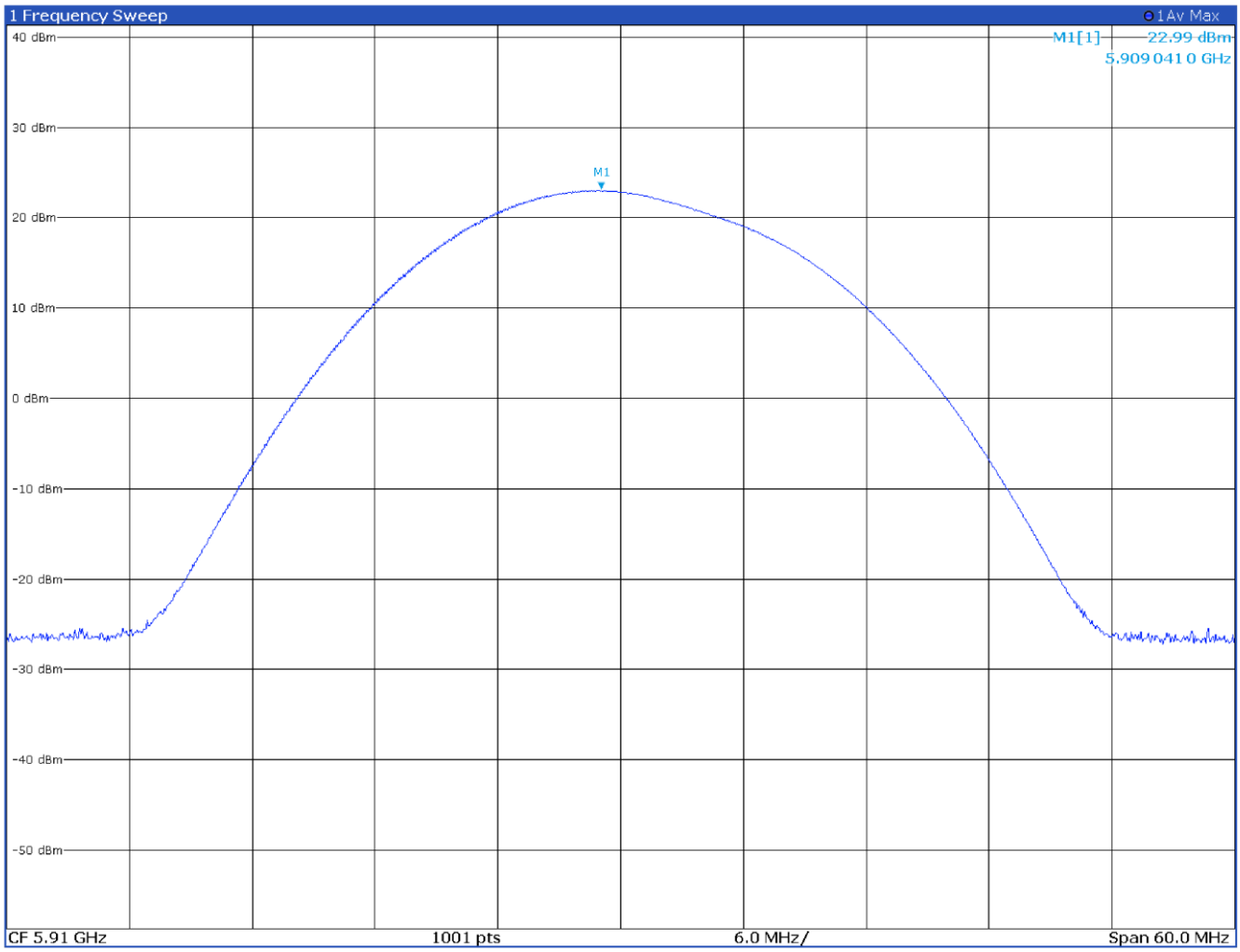


Figure 8.1-3: *5910 MHz, OBW 10 MHz, Antenna port 1*

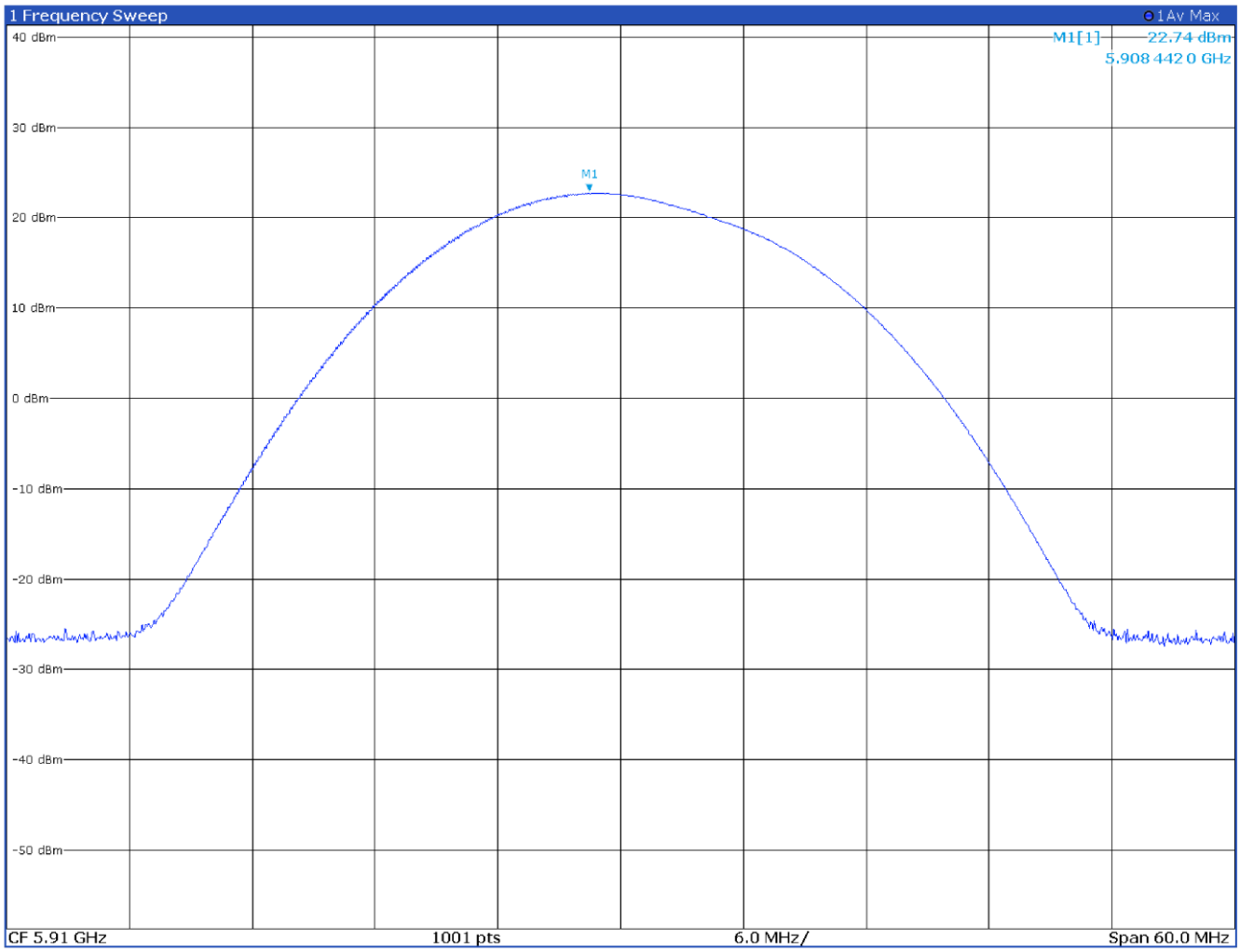


Figure 8.1-4: *5910 MHz, OBW 10 MHz, Antenna port 2*

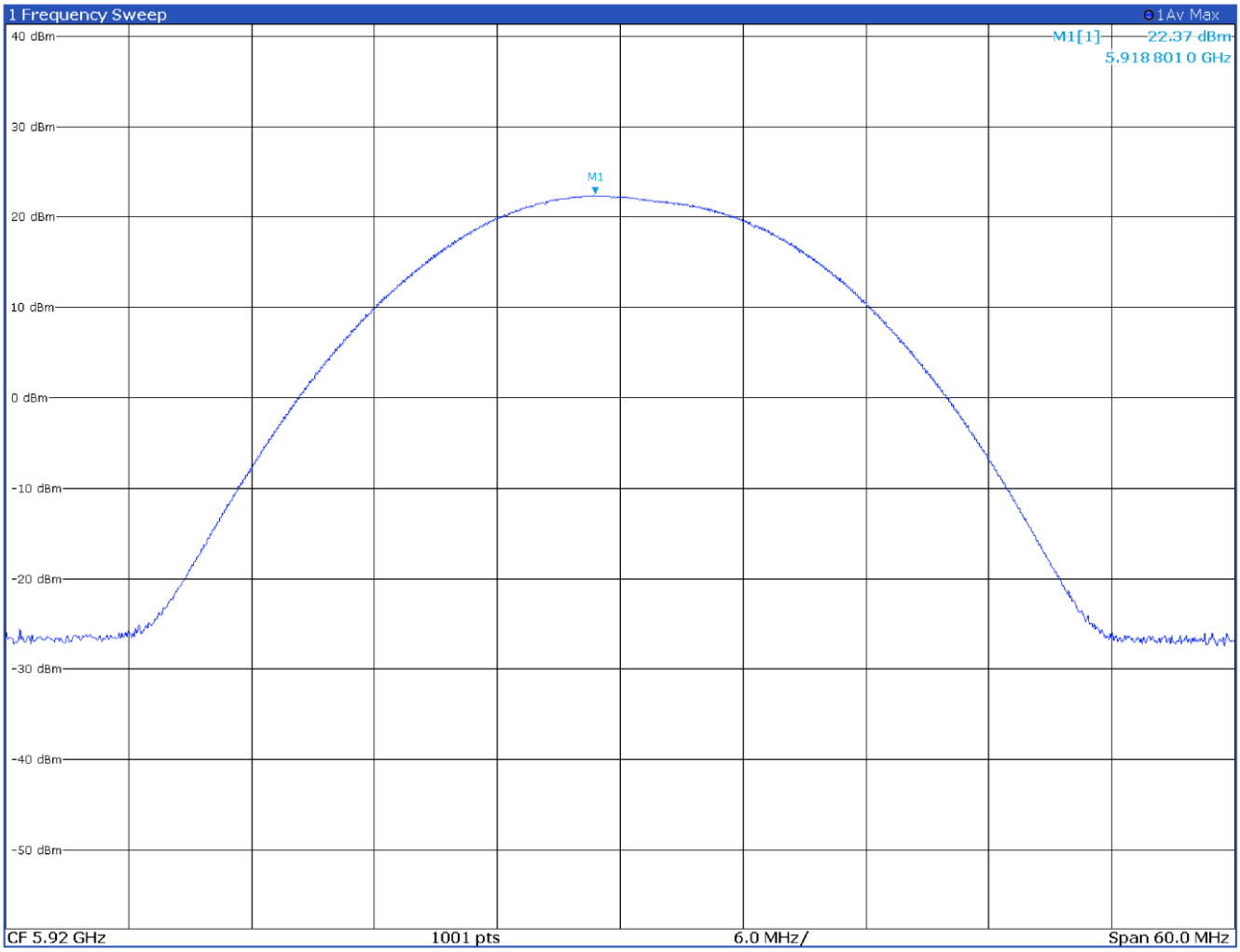


Figure 8.1-5: *5920 MHz, OBW 10 MHz, Antenna port 1*

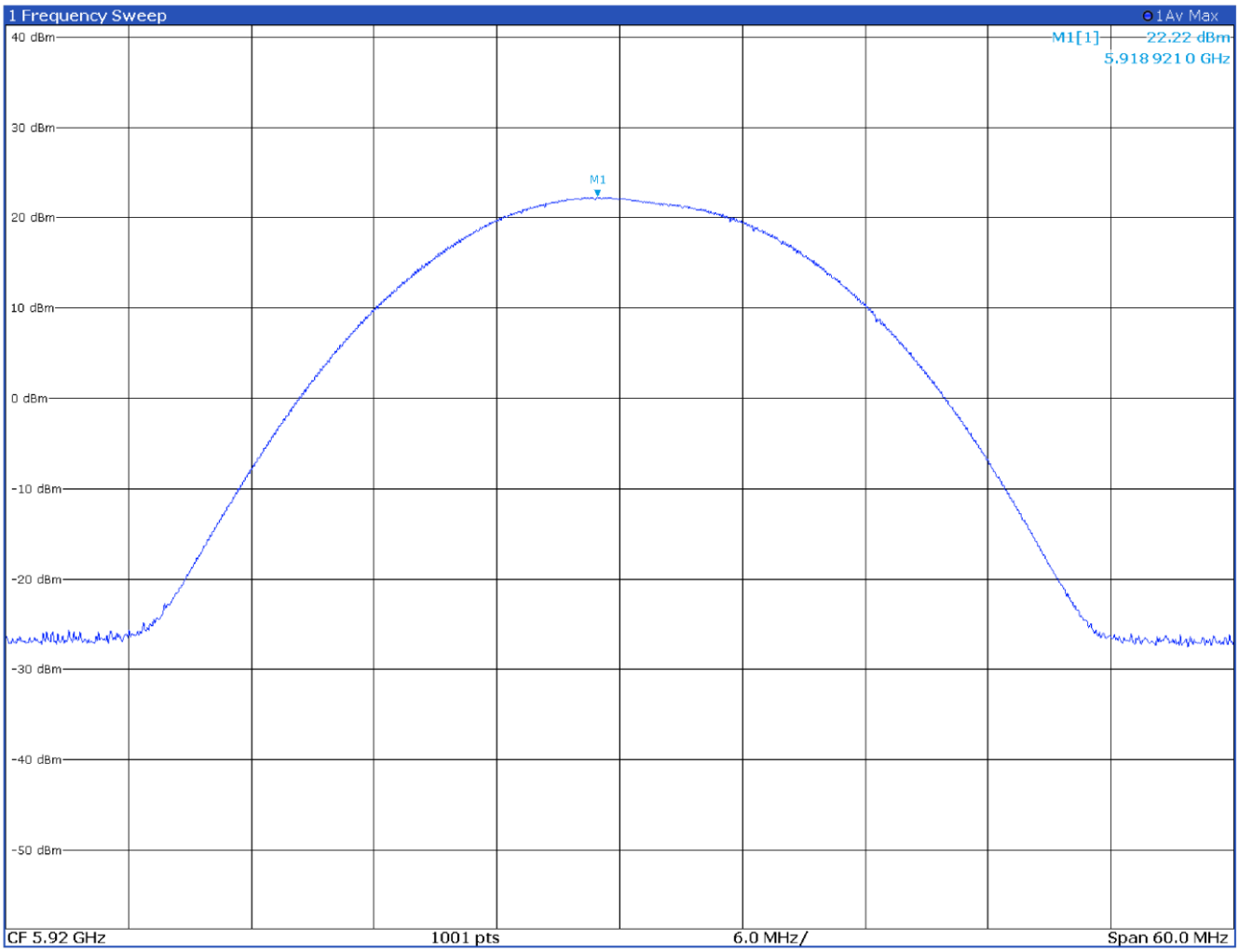


Figure 8.1-6: *5920 MHz, OBW 10 MHz, Antenna port 2*

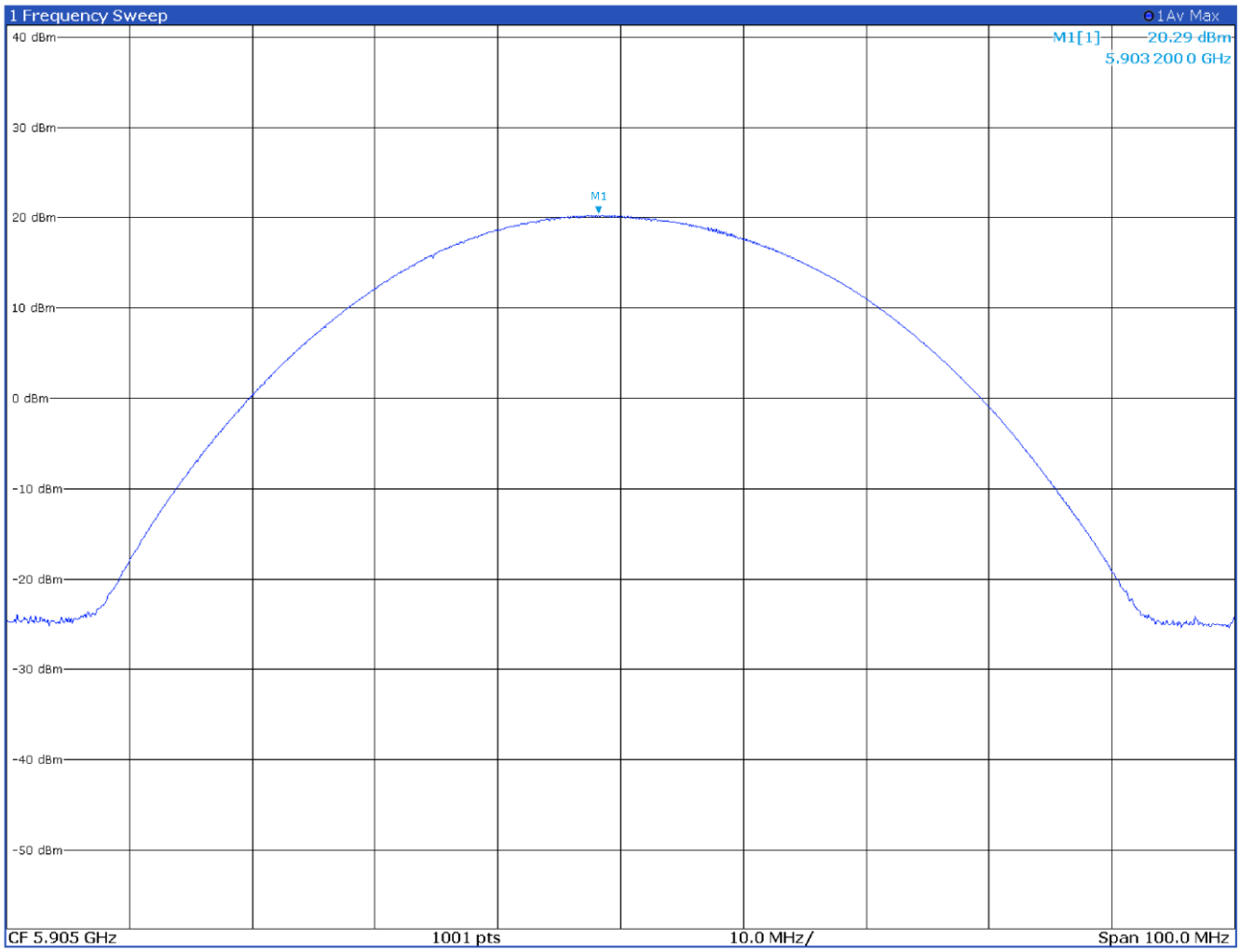


Figure 8.1-7: *5905 MHz, OBW 20 MHz, Antenna port 1*

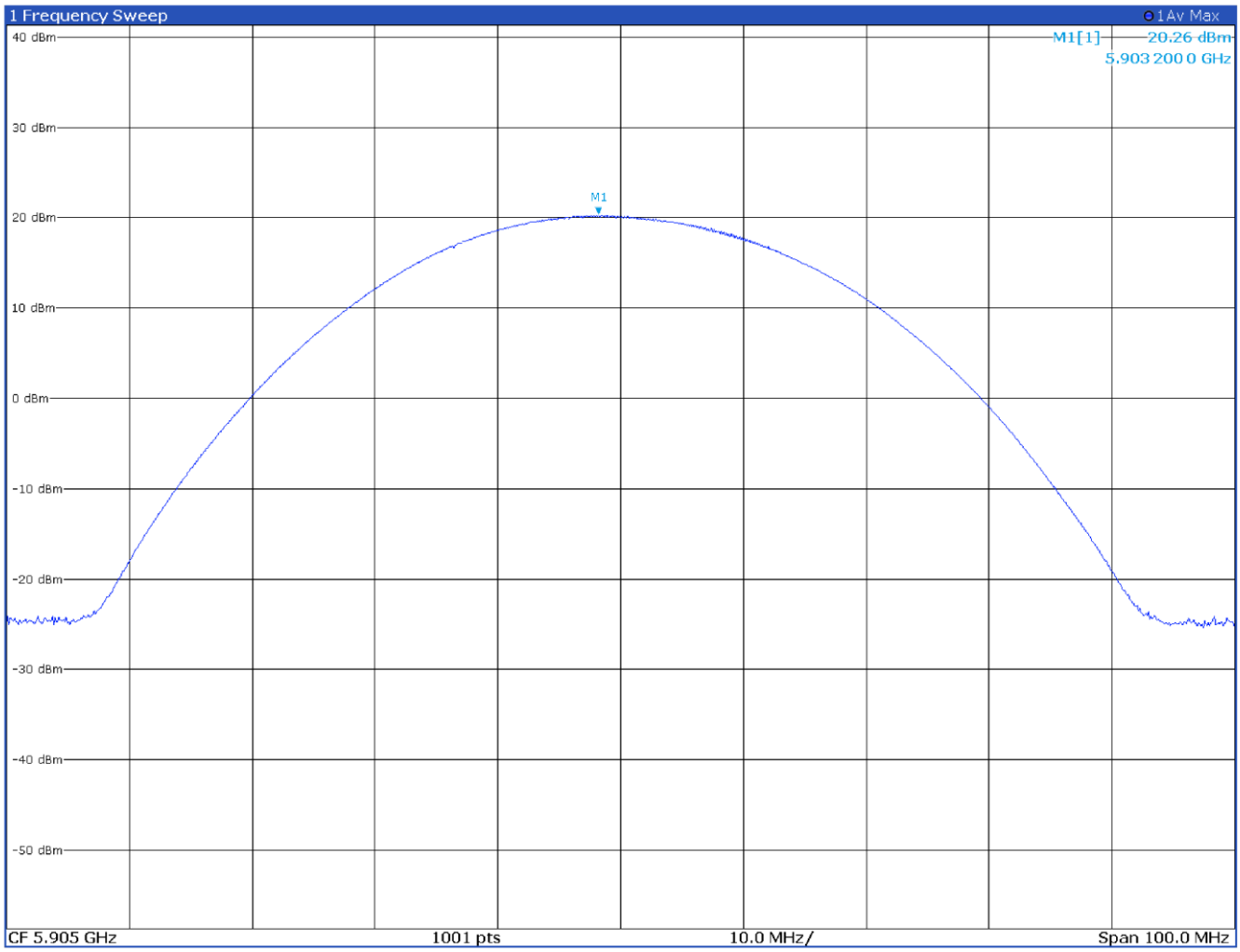


Figure 8.1-8: *5905 MHz, OBW 20 MHz, Antenna port 2*

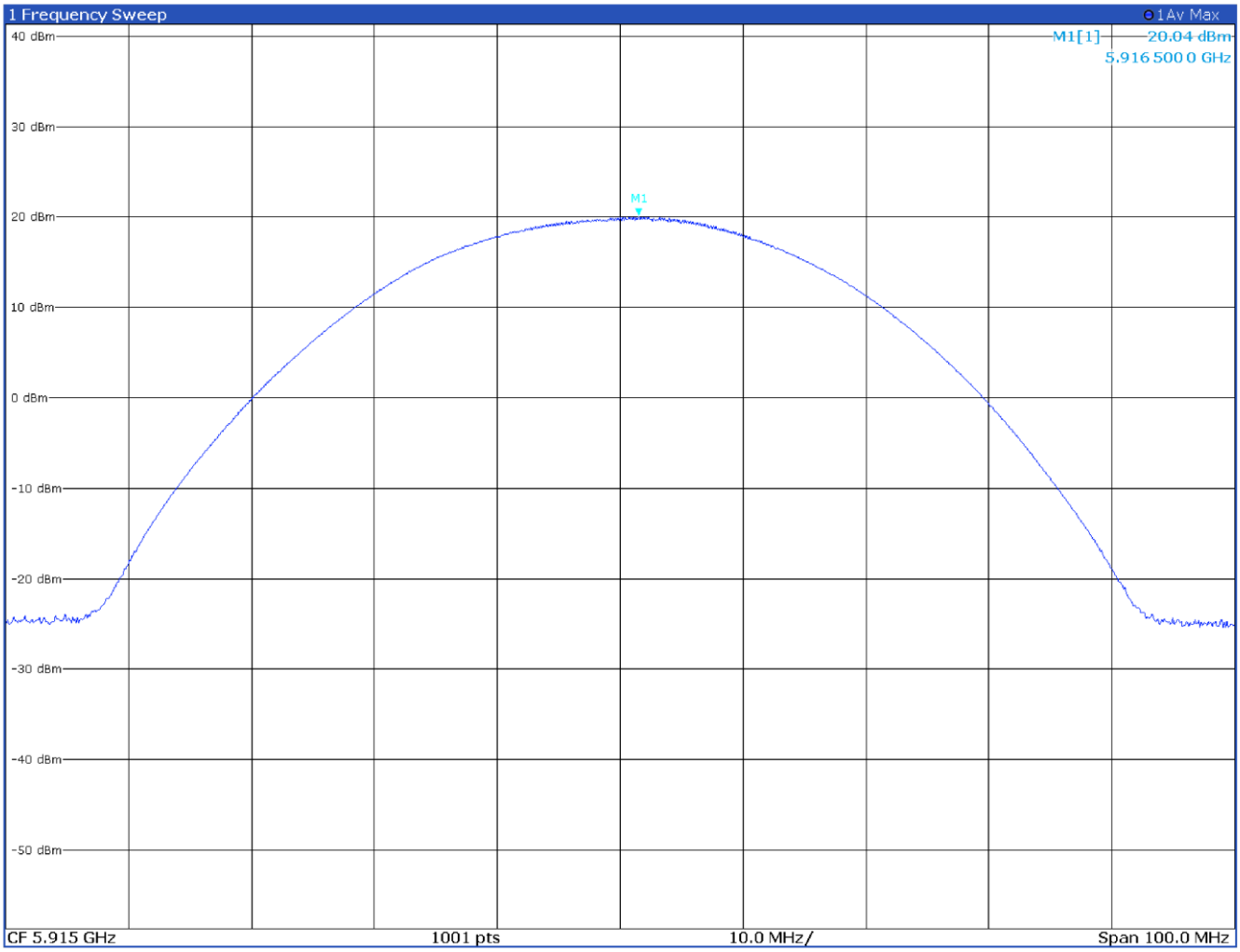


Figure 8.1-9: *5915 MHz, OBW 20 MHz, Antenna port 1*

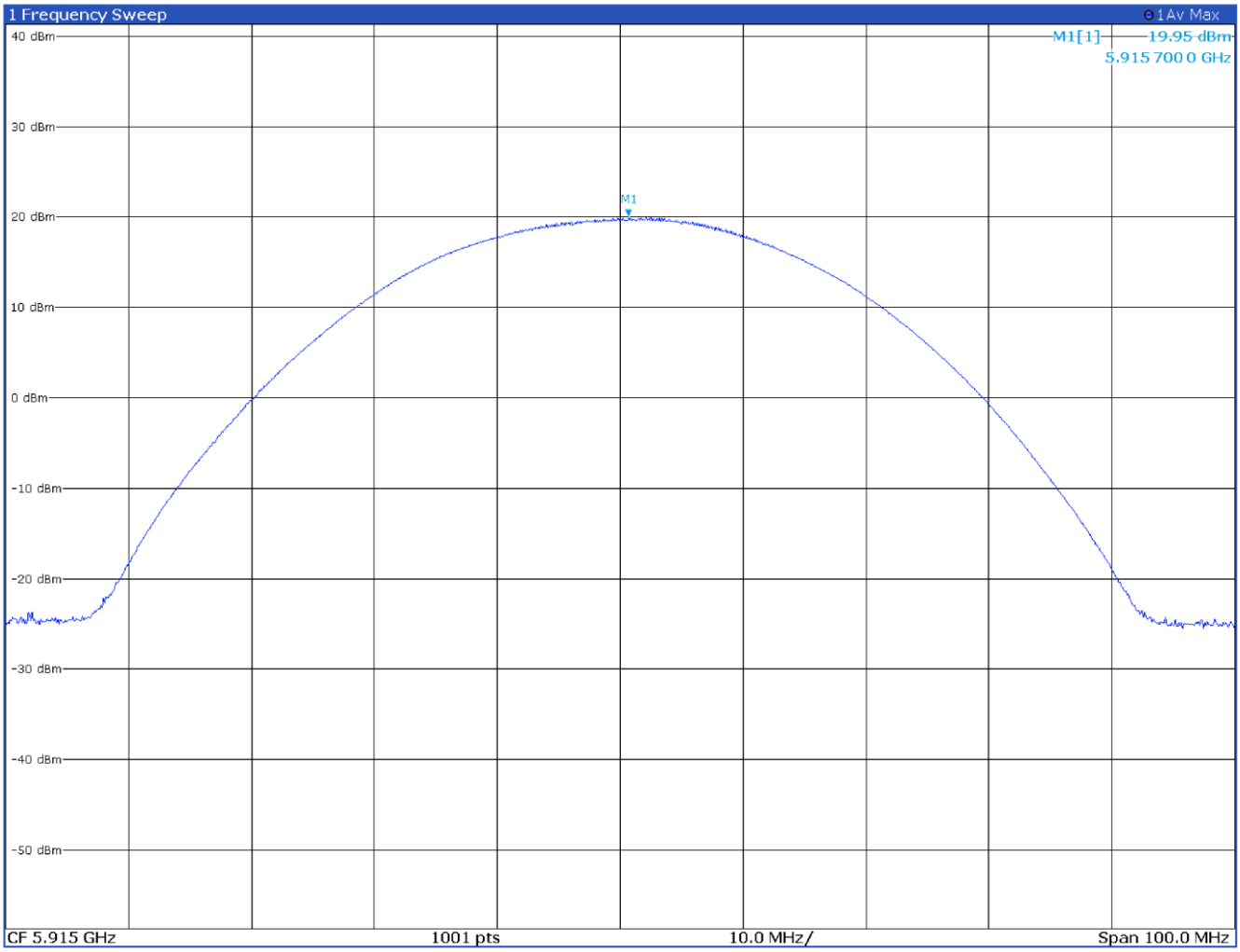


Figure 8.1-10: *5915 MHz, OBW 20 MHz, Antenna port 2*

8.2 Occupied Bandwidth

8.2.1 References, definitions and limits

KDB 511808 D01 C-V2X v02

3.1 Occupied bandwidth:

Measure the 26 dB and 99% power bandwidth following procedures in ANSI C63.26-2015 section 5.4.

8.2.2 Test summary

Verdict	Pass		
Tested by	O. Frau	Test date	May 8, 2025

8.2.3 Observations, settings and special notes

Spectrum analyzer settings 99%:

Resolution bandwidth	of 1 % to 5 % of the OBW
Video bandwidth	≥3 × RBW
Frequency span	of 1.5 to 5 times the OBW
Detector mode	Peak
Trace mode	Max Hold

Spectrum analyzer settings 26 dB:

Resolution bandwidth	1 % OBW
Video bandwidth	≥ RBW
Frequency span	of 1.5 to 5 times the OBW
Detector mode	Peak
Trace mode	Max Hold

8.2.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767

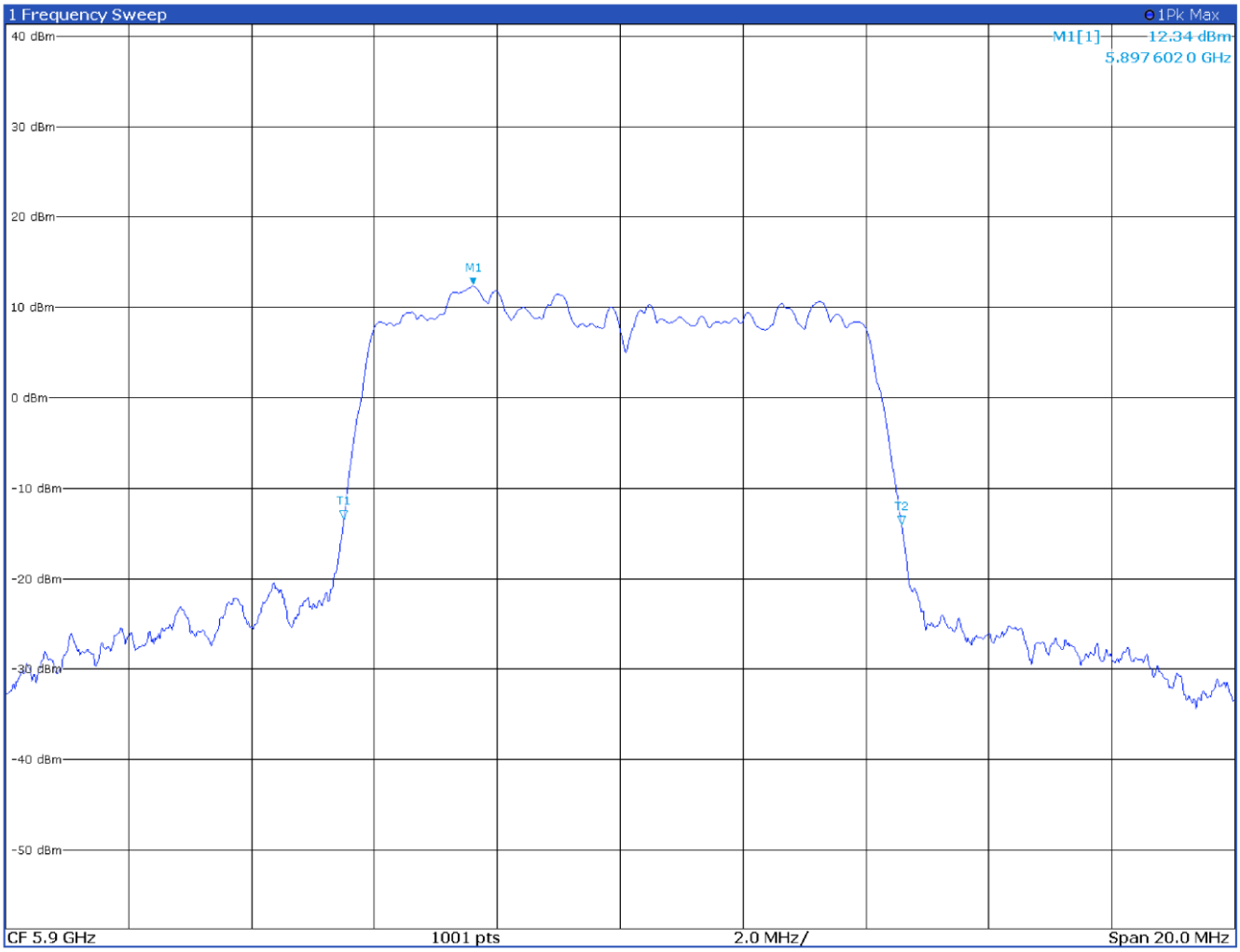
Notes: NCR - no calibration required, VOU - verify on use

8.2.5 Test data

Table 8.2-1: *Occupied bandwidth results*

OBW, MHz	Antenna port	Frequency, MHz	99% OBW, MHz	26 dB BW, MHz
10	1	5900.0	8.21	9.07
	2	5900.0	8.21	9.07
	1	5910.0	8.21	9.11
	2	5910.0	8.20	9.09
	1	5920.0	8.24	9.09
	2	5920.0	8.24	9.07

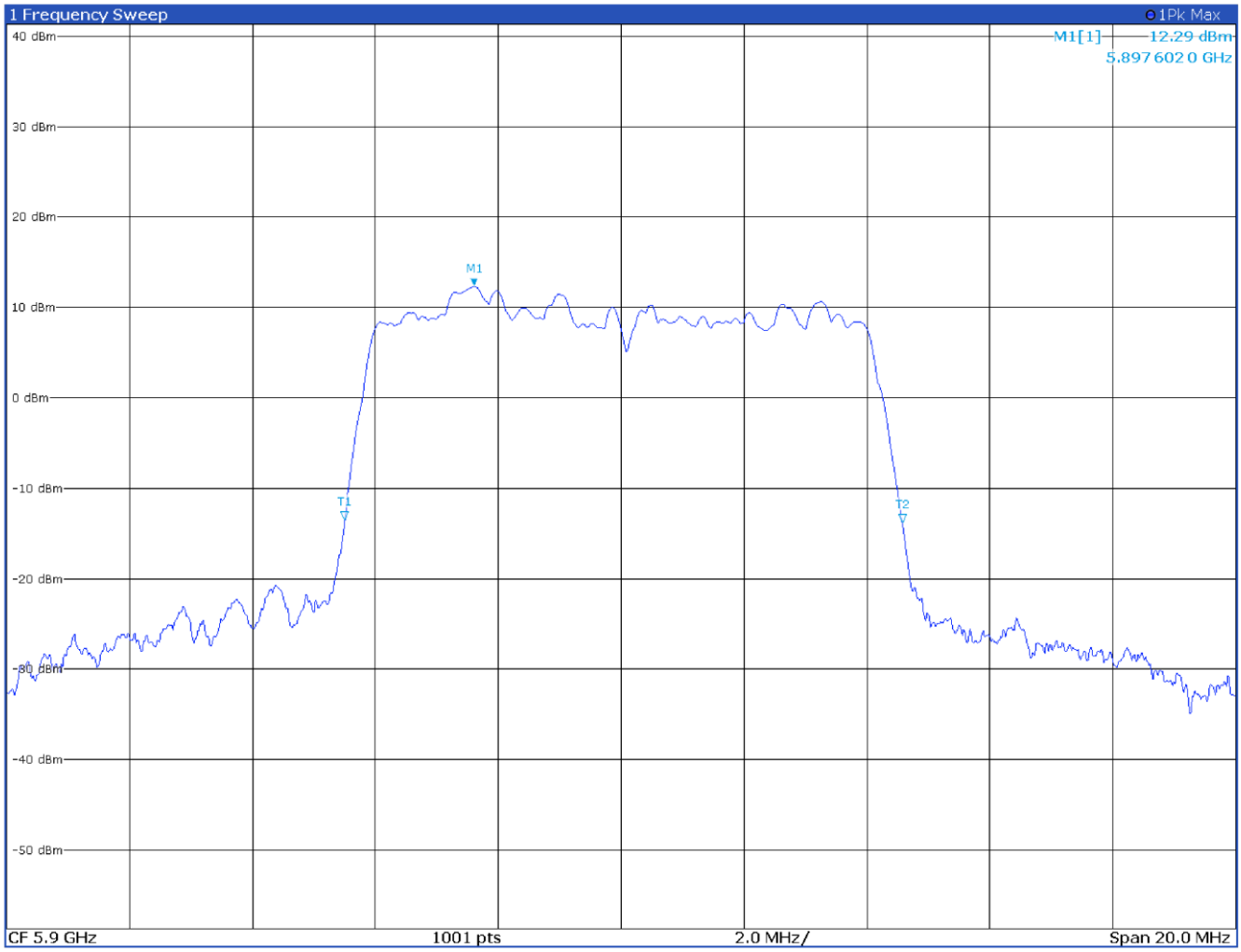
OBW, MHz	Antenna port	Frequency, MHz	99% OBW, MHz	26 dB BW, MHz
20	1	5905.0	16.67	19.98
	2	5905.0	16.66	19.88
	1	5915.0	16.58	19.78
	2	5915.0	16.58	19.78



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.897 602 GHz**	**12.34 dBm**	ndB	26.0 dB
T1		1	5.895 504 GHz	-13.44 dBm	ndB down BW	**9.071 MHz**
T2		1	5.904 575 GHz	-14.00 dBm	Q Factor	650.2

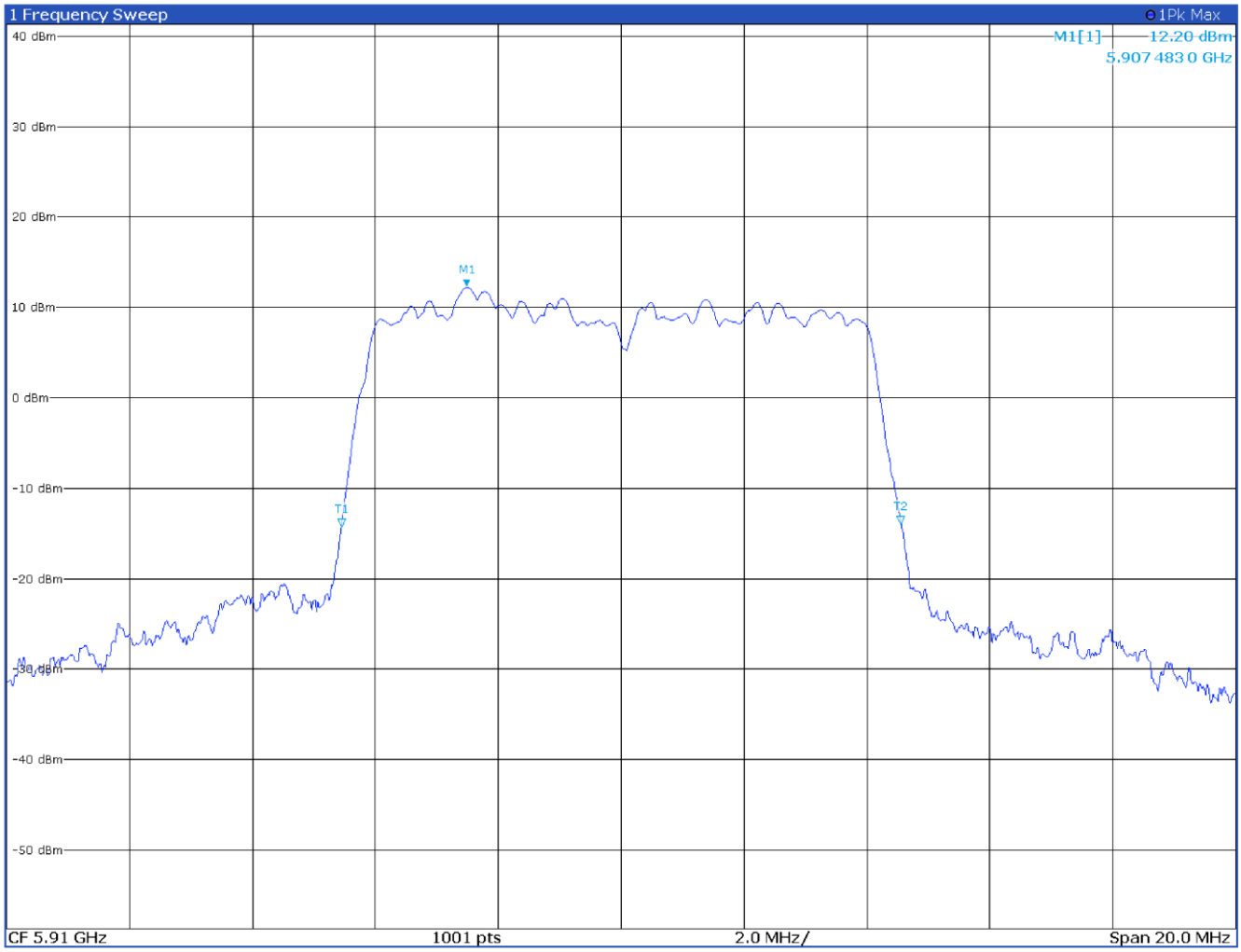
Figure 8.2-1: *26 dB occupied bandwidth, 5900 MHz, antenna port 1*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.897 602 GHz**	**12.29 dBm**	ndB	26.0 dB
T1		1	5.895 504 GHz	-13.50 dBm	ndB down BW	**9.071 MHz**
T2		1	5.904 575 GHz	-13.86 dBm	Q Factor	650.2

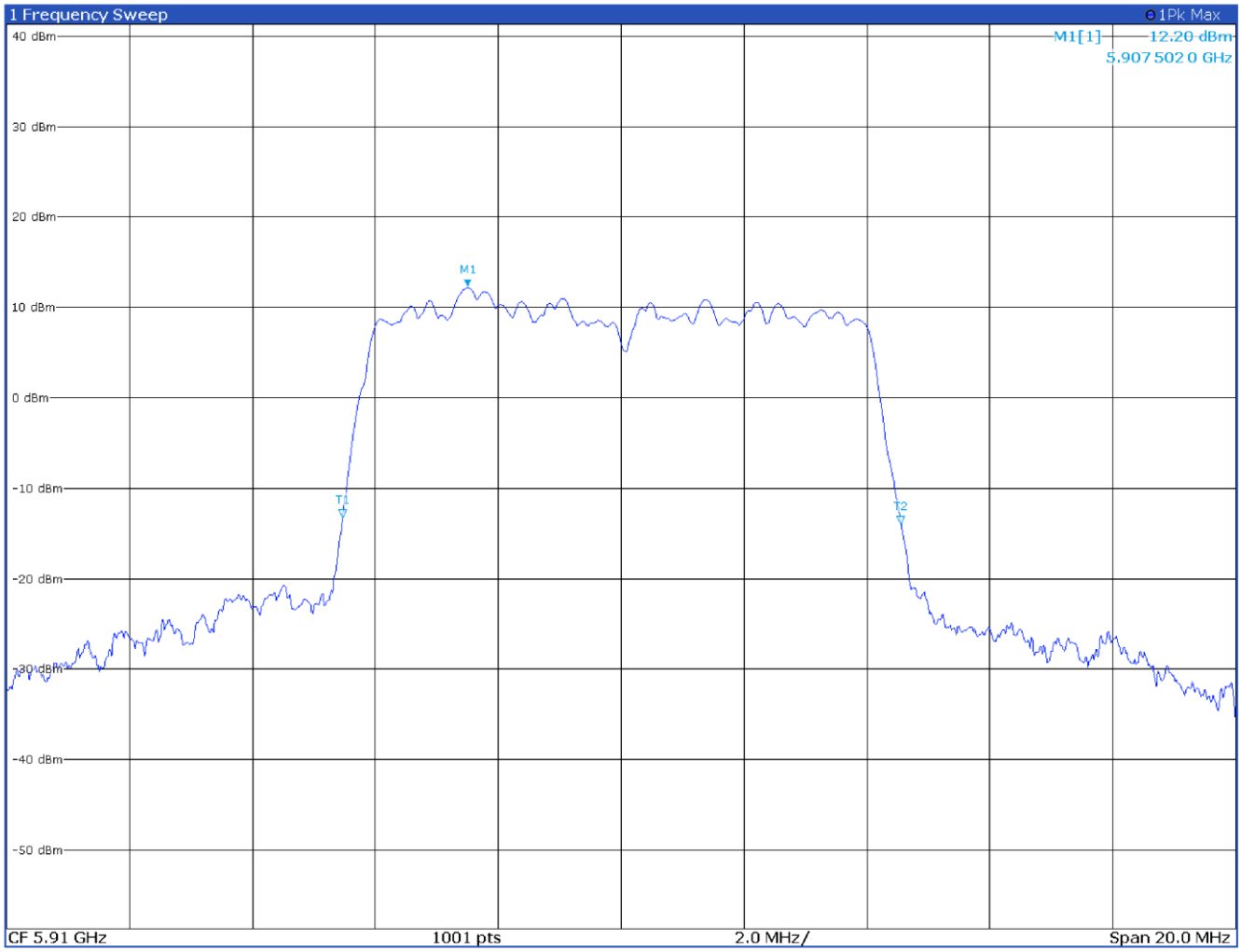
Figure 8.2-2: *26 dB occupied bandwidth, 5900 MHz, antenna port 2*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.907 483 GHz**	**12.20 dBm**	ndB	26.0 dB
T1		1	5.905 445 GHz	-14.34 dBm	ndB down BW	**9.111 MHz**
T2		1	5.914 555 GHz	-13.98 dBm	Q Factor	648.4

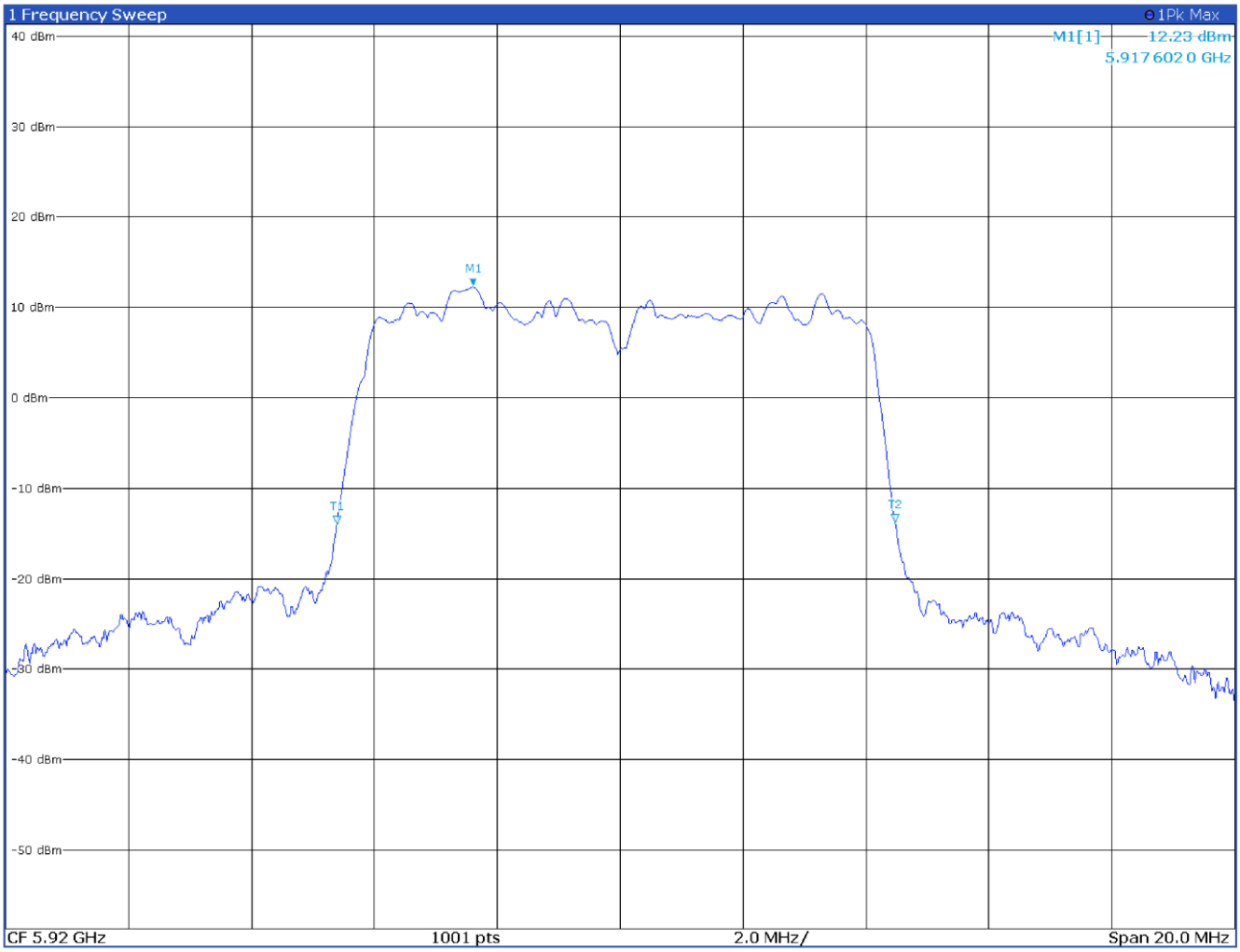
Figure 8.2-3: *26 dB occupied bandwidth, 5910 MHz, antenna port 1*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.907 502 GHz**	**12.20 dBm**	ndB	26.0 dB
T1		1	5.905 465 GHz	-13.30 dBm	ndB down BW	**9.091 MHz**
T2		1	5.914 555 GHz	-13.97 dBm	Q Factor	649.8

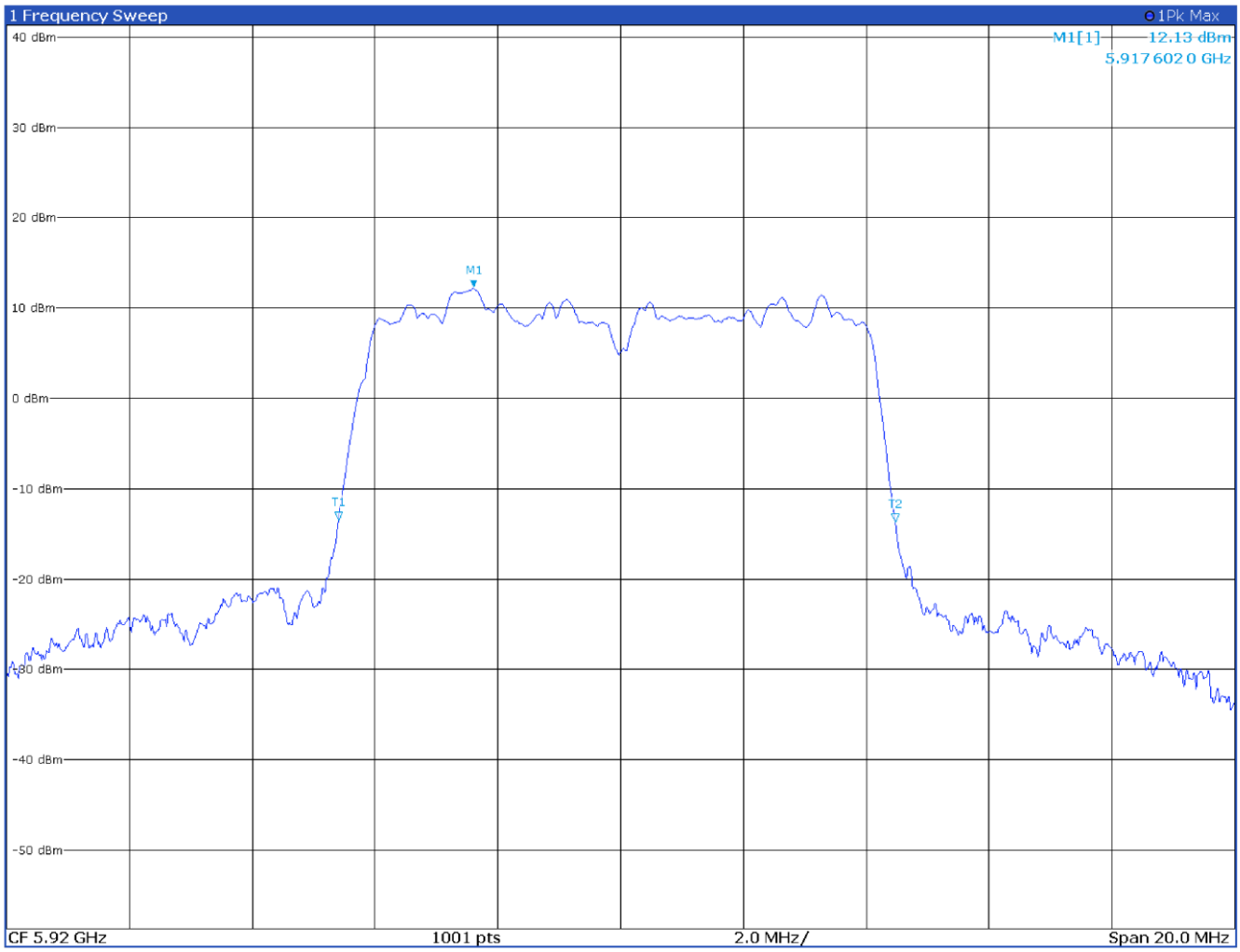
Figure 8.2-4: *26 dB occupied bandwidth, 5910 MHz, antenna port 2*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.917 602 GHz**	**12.23 dBm**	ndB	26.0 dB
T1		1	5.915 385 GHz	-14.01 dBm	ndB down BW	**9.091 MHz**
T2		1	5.924 476 GHz	-13.85 dBm	Q Factor	650.9

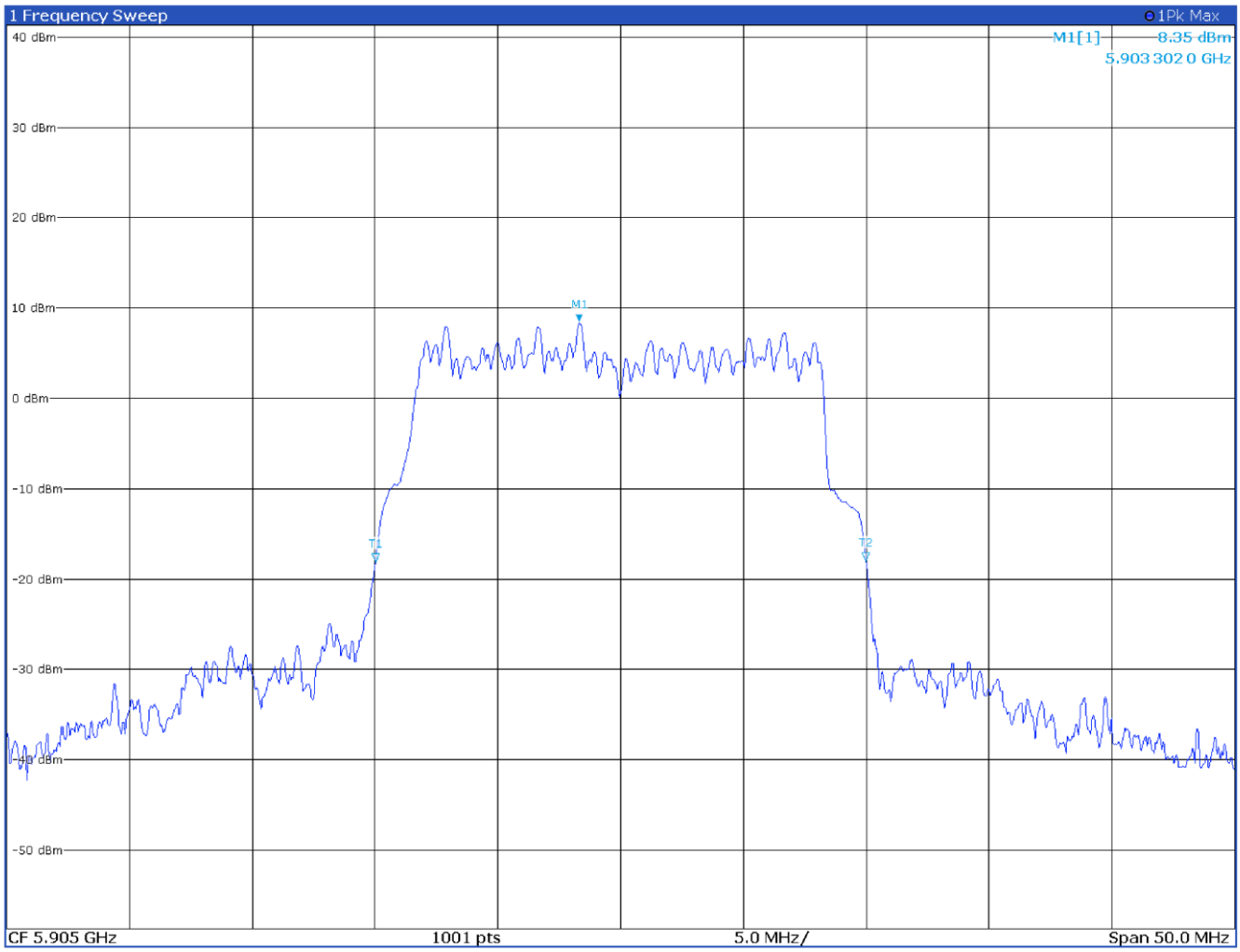
Figure 8.2-5: *26 dB occupied bandwidth, 5920 MHz, antenna port 1*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.917 602 GHz**	**12.13 dBm**	ndB	26.0 dB
T1		1	5.915 405 GHz	-13.49 dBm	ndB down BW	**9.071 MHz**
T2		1	5.924 476 GHz	-13.76 dBm	Q Factor	652.4

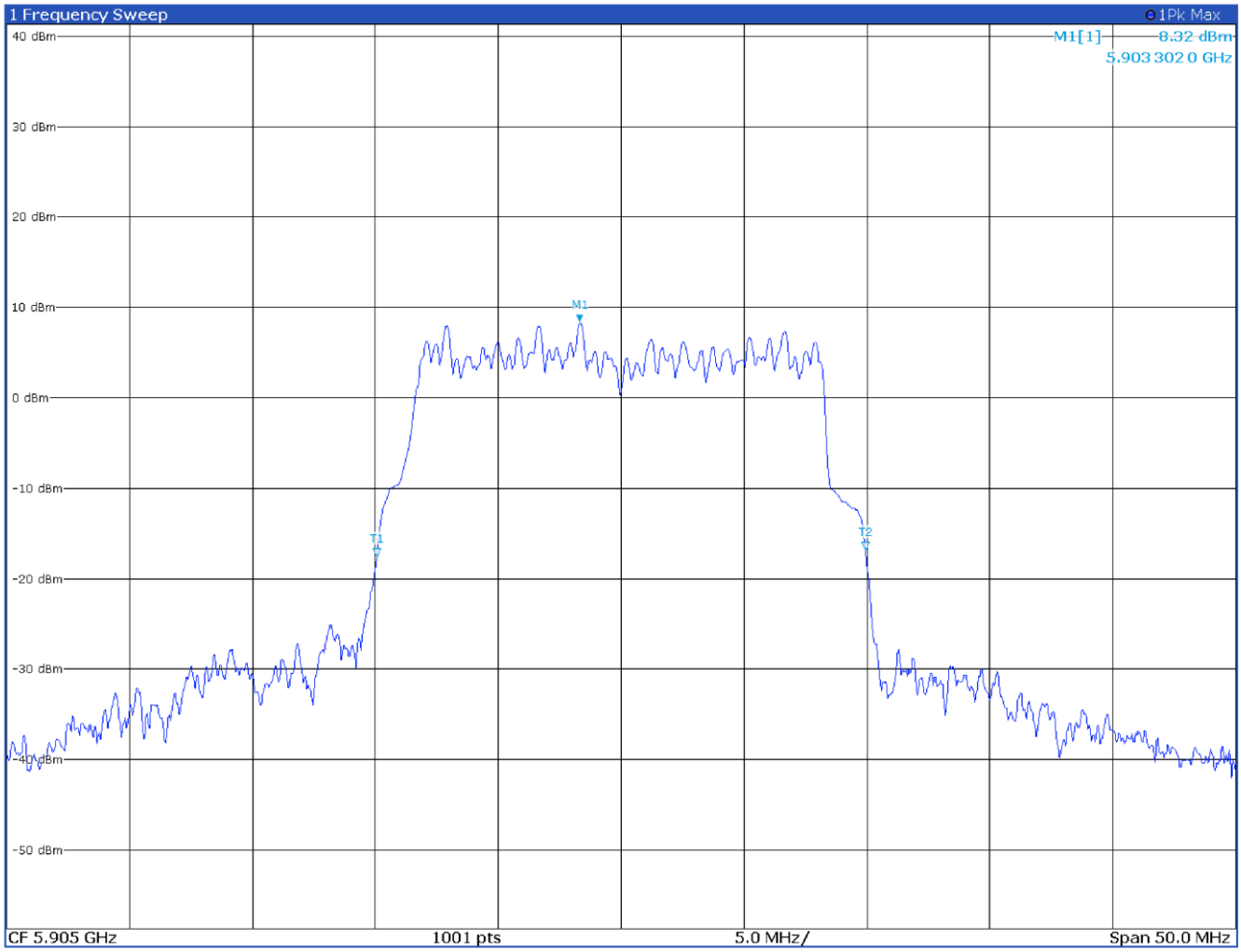
Figure 8.2-6: *26 dB occupied bandwidth, 5920 MHz, antenna port 2*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.903 302 GHz**	**8.35 dBm**	ndB	26.0 dB
T1		1	5.89501 GHz	-18.15 dBm	ndB down BW	**19.98 MHz**
T2		1	5.91499 GHz	-18.01 dBm	Q Factor	295.5

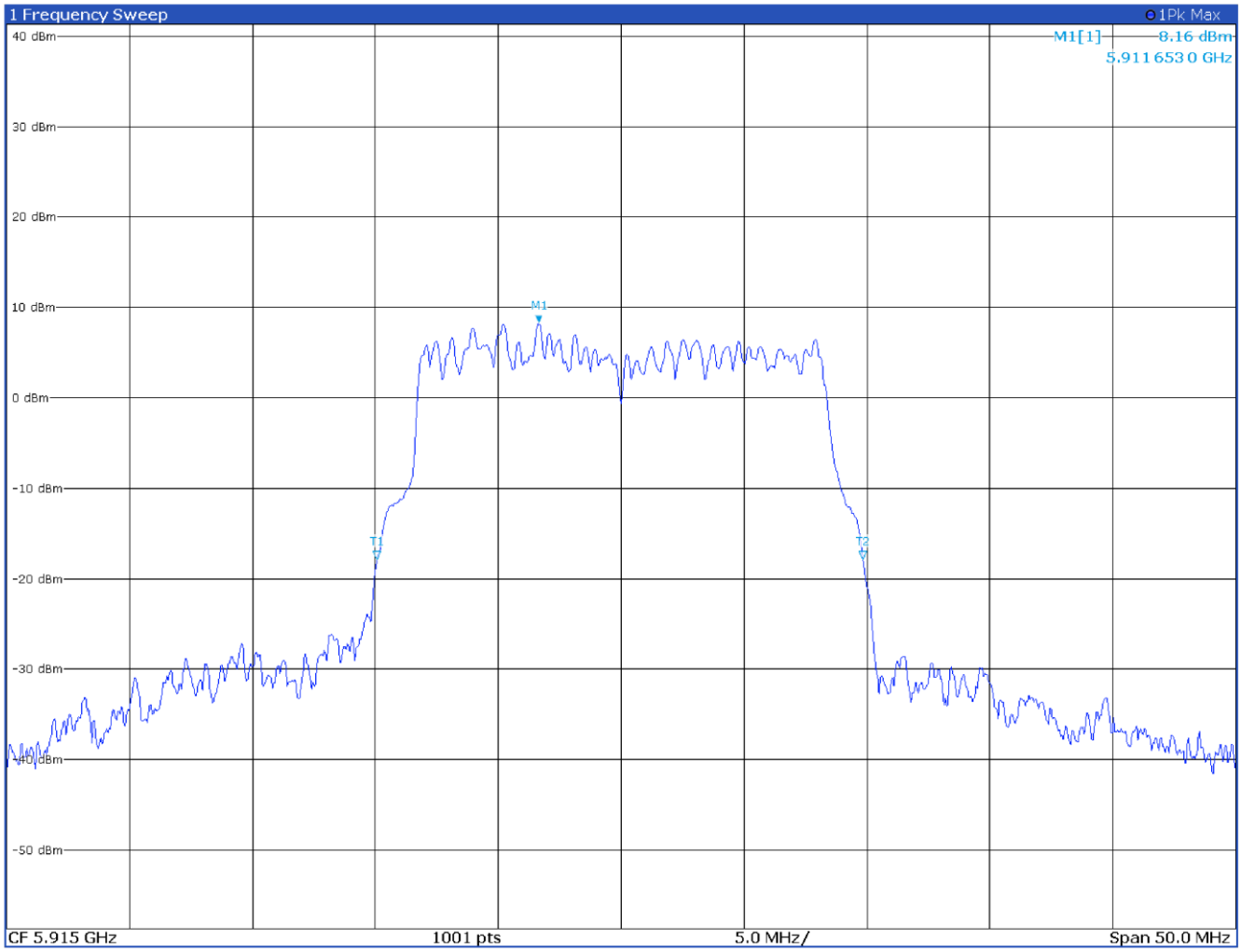
Figure 8.2-7: *26 dB occupied bandwidth, 5905 MHz, antenna port 1*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.903 302 GHz**	**8.32 dBm**	ndB	26.0 dB
T1		1	5.89506 GHz	-17.61 dBm	ndB down BW	**19.88 MHz**
T2		1	5.91494 GHz	-16.84 dBm	Q Factor	296.9

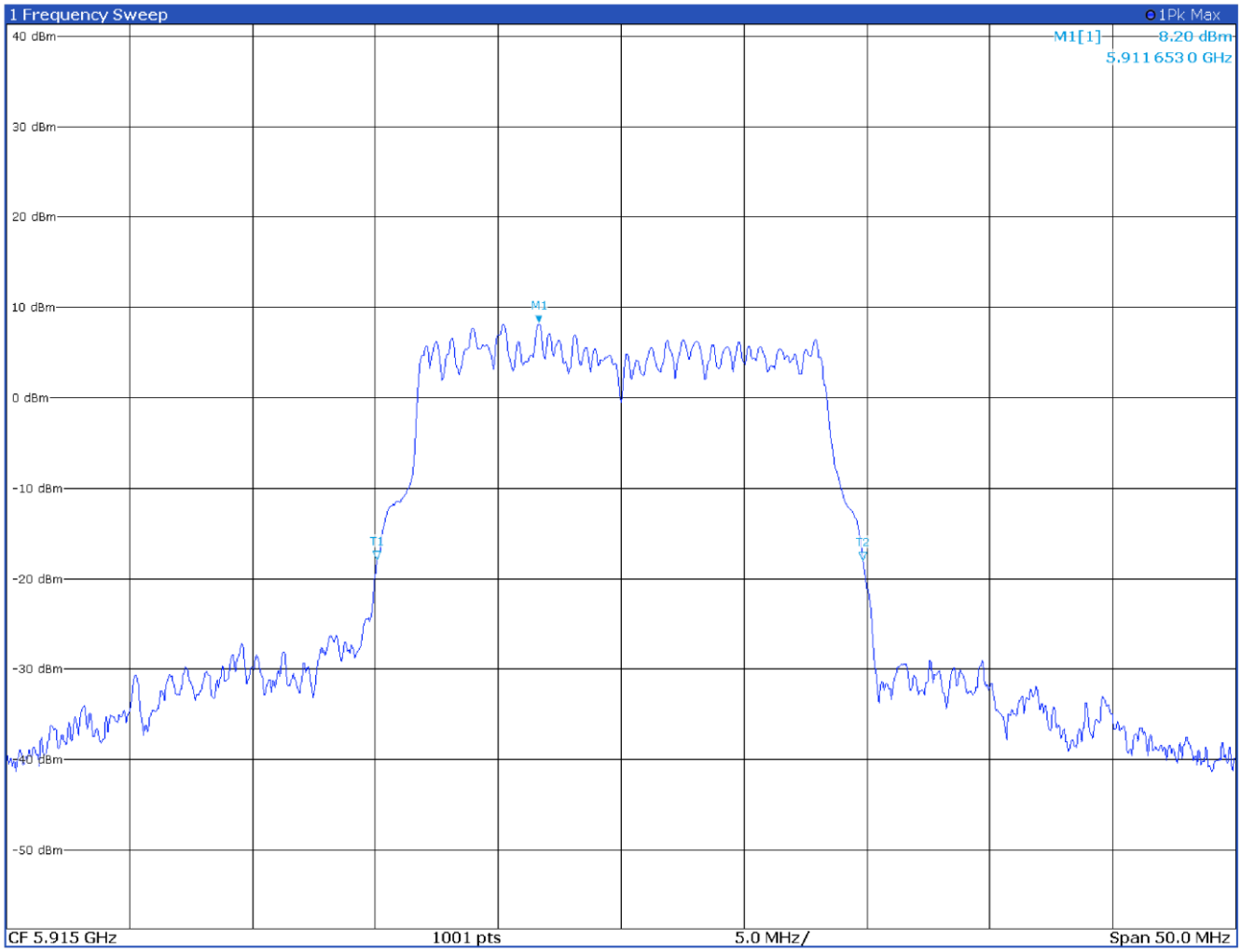
Figure 8.2-8: *26 dB occupied bandwidth, 5905 MHz, antenna port 2*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.911 653 GHz**	**8.16 dBm**	ndB	26.0 dB
T1		1	5.905 06 GHz	-17.95 dBm	ndB down BW	**19.78 MHz**
T2		1	5.924 84 GHz	-17.94 dBm	Q Factor	298.9

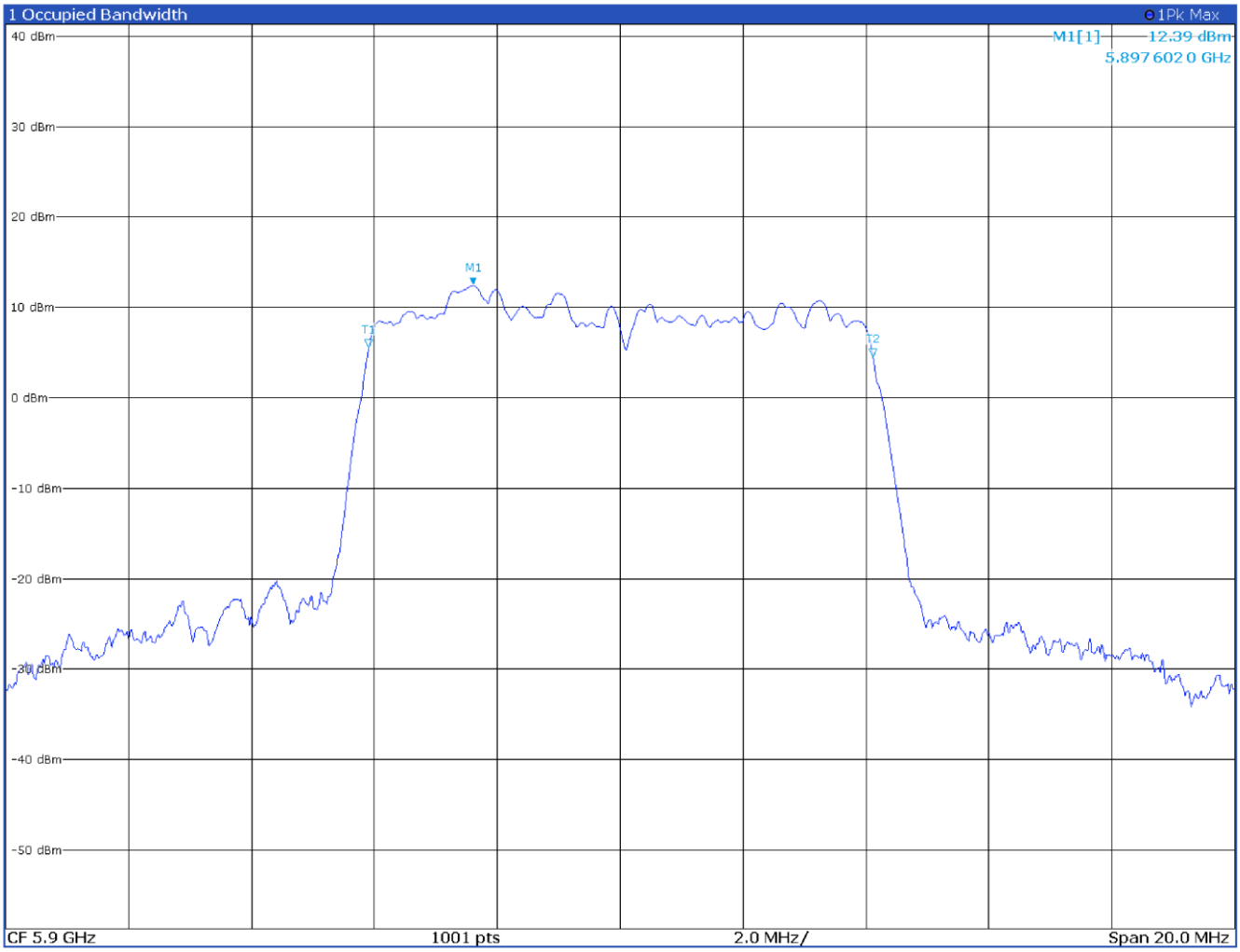
Figure 8.2-9: *26 dB occupied bandwidth, 5915 MHz, antenna port 1*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.911 653 GHz**	**8.20 dBm**	ndB	26.0 dB
T1		1	5.905 06 GHz	-17.92 dBm	ndB down BW	**19.78 MHz**
T2		1	5.924 84 GHz	-17.99 dBm	Q Factor	298.9

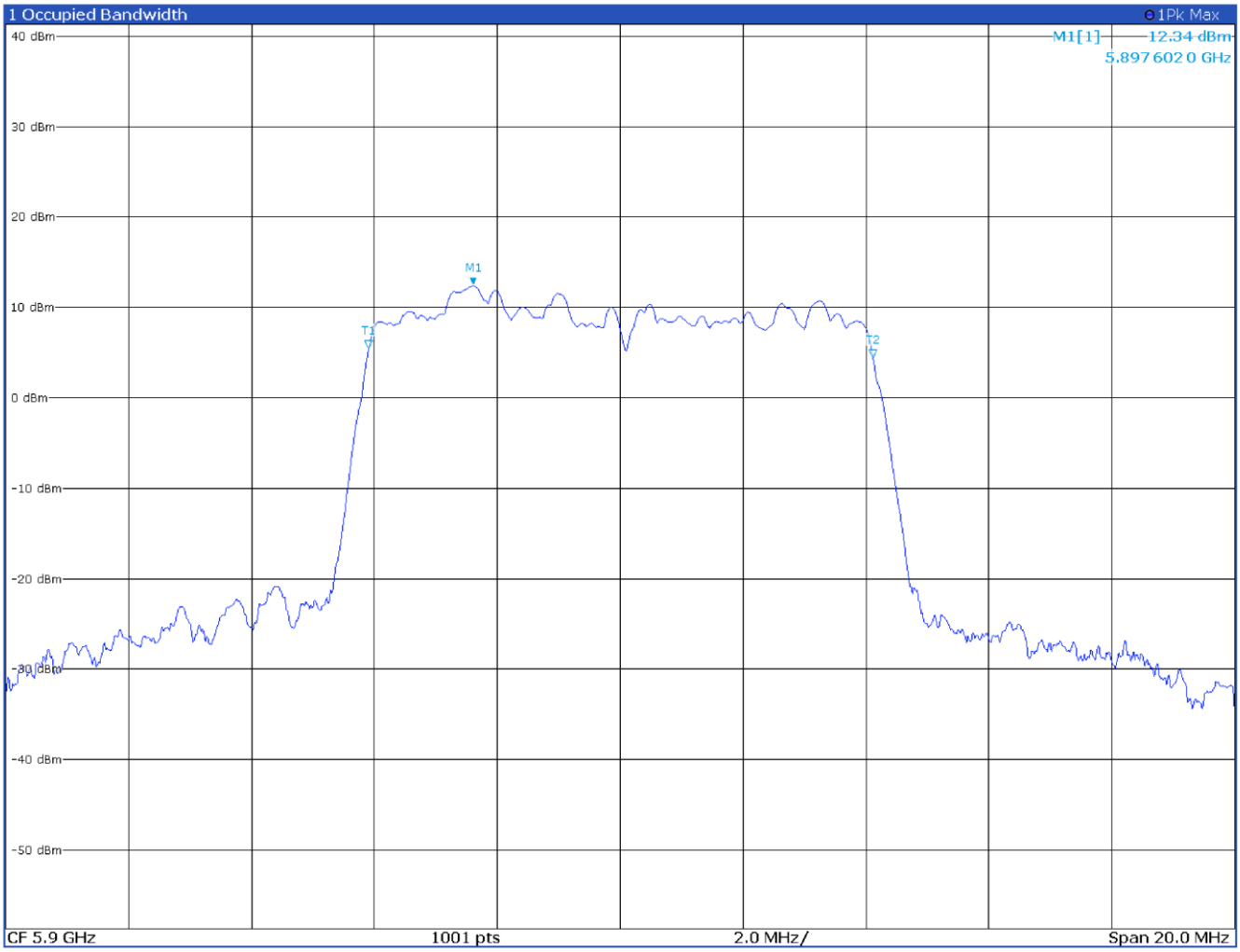
Figure 8.2-10: *26 dB occupied bandwidth, 5915 MHz, antenna port 2*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.897 602 GHz**	**12.39 dBm**	Occ Bw	**8.211 823 235 MHz**
T1		1	5.895 899 8 GHz	5.51 dBm	Occ Bw Centroid	5.900 005 667 GHz
T2		1	5.904 111 6 GHz	4.47 dBm	Occ Bw Freq Offset	5.666 521 803 kHz

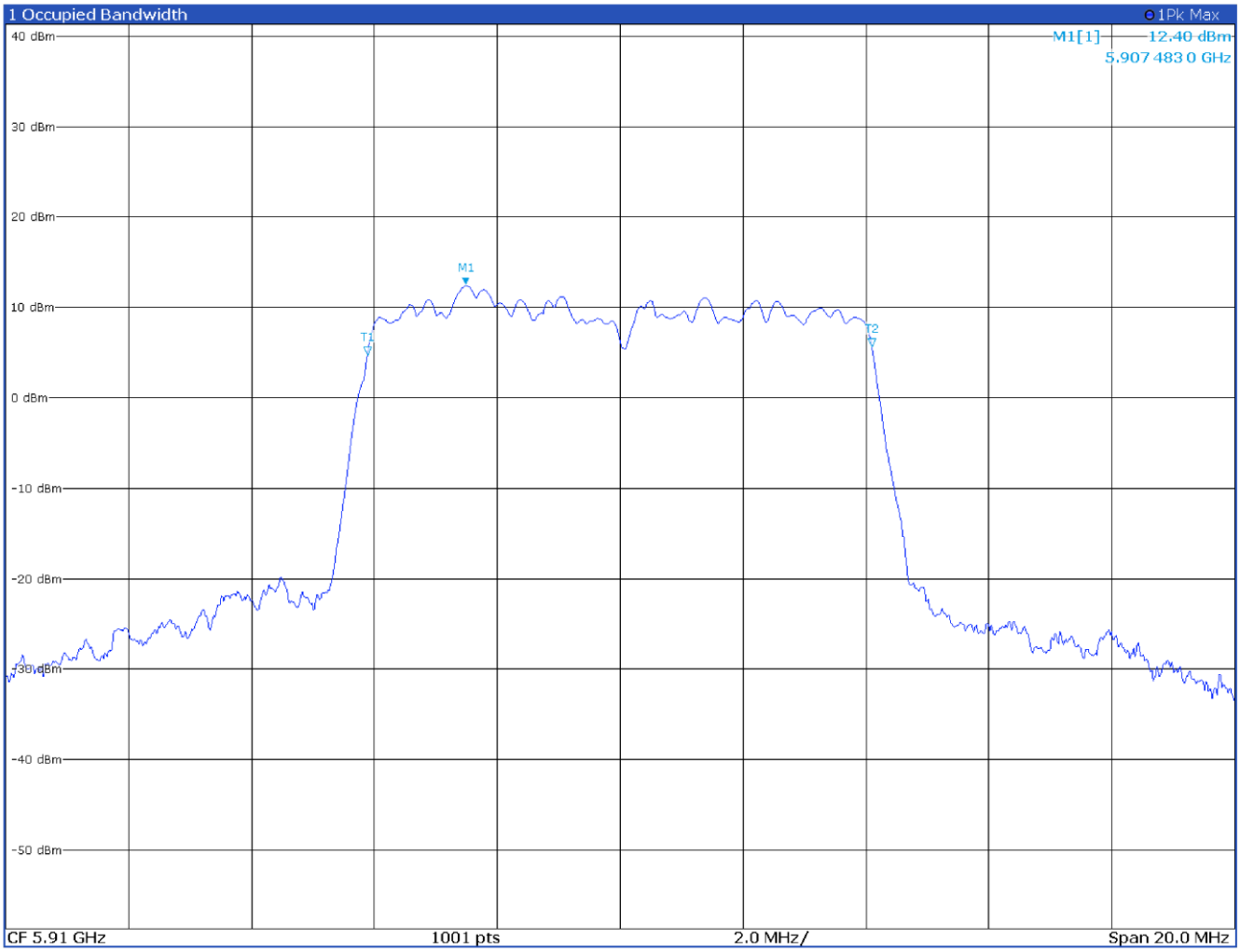
Figure 8.2-11: *99% occupied bandwidth, 5900 MHz, antenna port 1*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.897 602 GHz**	**12.34 dBm**	Occ Bw	**8.210 699 965 MHz**
T1		1	5.895 900 5 GHz	5.38 dBm	Occ Bw Centroid	5.900 005 87 GHz
T2		1	5.904 111 2 GHz	4.39 dBm	Occ Bw Freq Offset	5.869 549 877 kHz

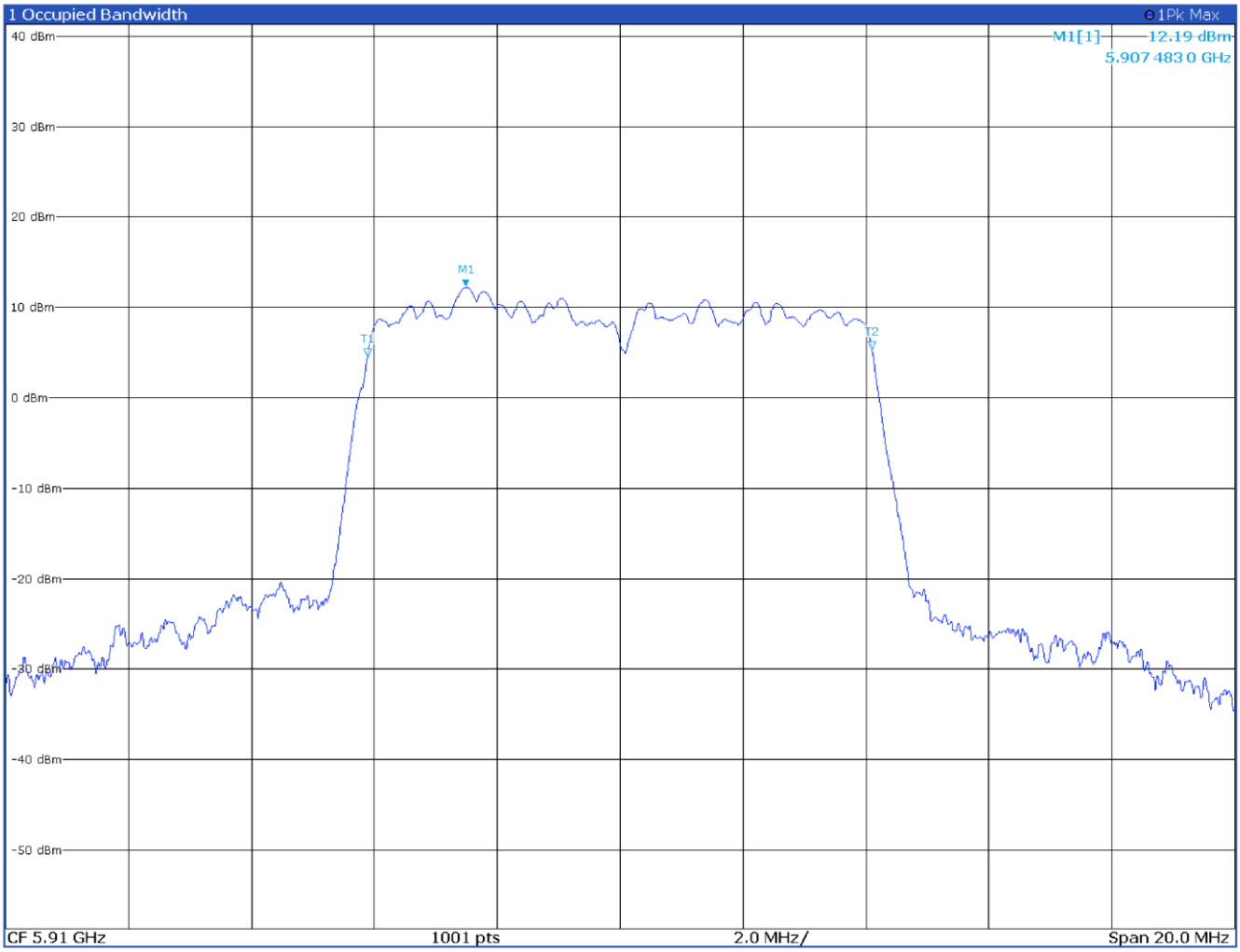
Figure 8.2-12: *99% occupied bandwidth, 5900 MHz, antenna port 2*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.907 483 GHz**	**12.40 dBm**	Occ Bw	**8.207 152 144 MHz**
T1		1	5.905 884 6 GHz	4.73 dBm	Occ Bw Centroid	5.909 988 211 GHz
T2		1	5.914 091 8 GHz	5.57 dBm	Occ Bw Freq Offset	-11.789 270 786 kHz

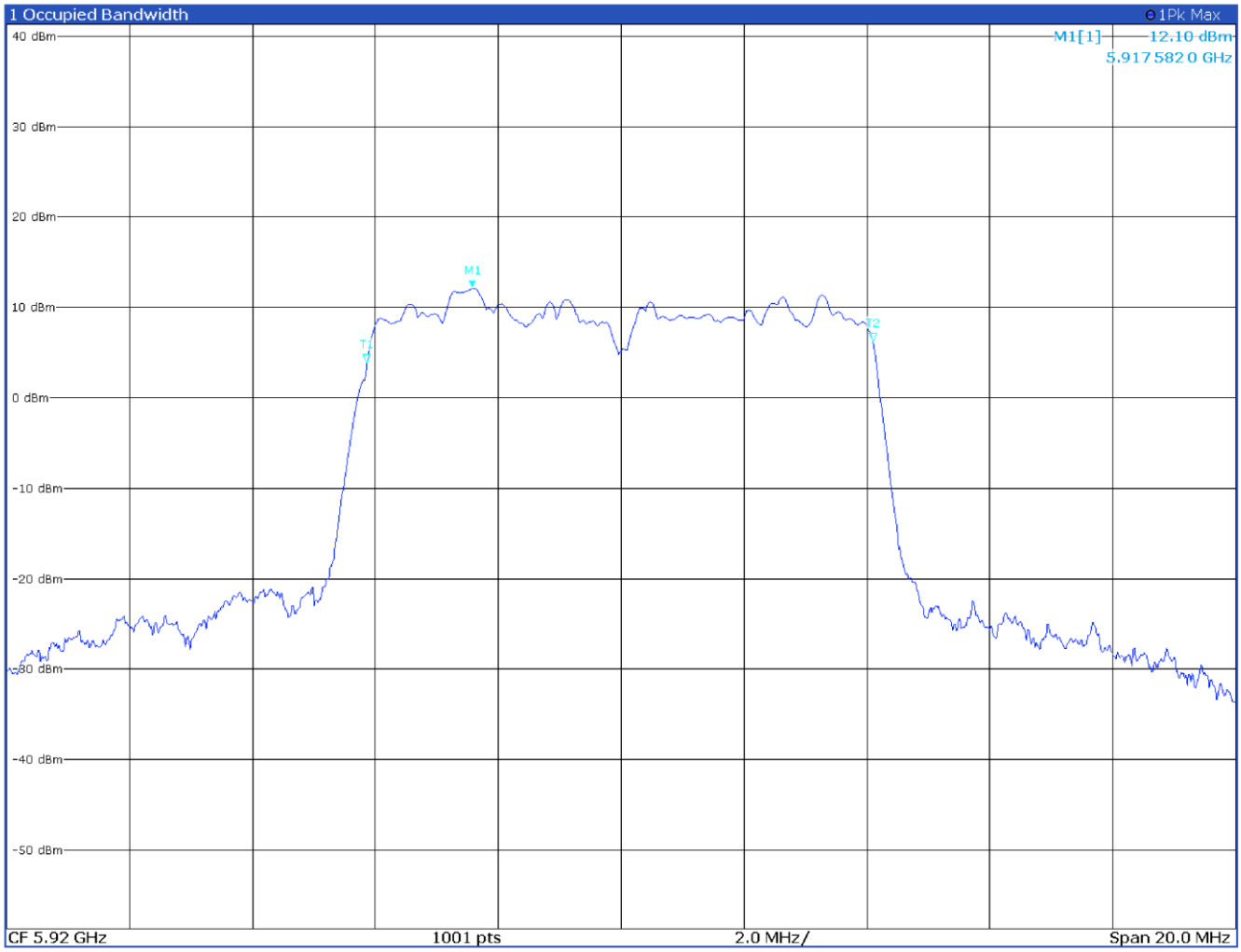
Figure 8.2-13: *99% occupied bandwidth, 5910 MHz, antenna port 1*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.907 483 GHz**	**12.19 dBm**	Occ Bw	**8.203 489 634 MHz**
T1		1	5.905 887 GHz	4.51 dBm	Occ Bw Centroid	5.909 988 724 GHz
T2		1	5.914 090 5 GHz	5.32 dBm	Occ Bw Freq Offset	-11.276 277 417 kHz

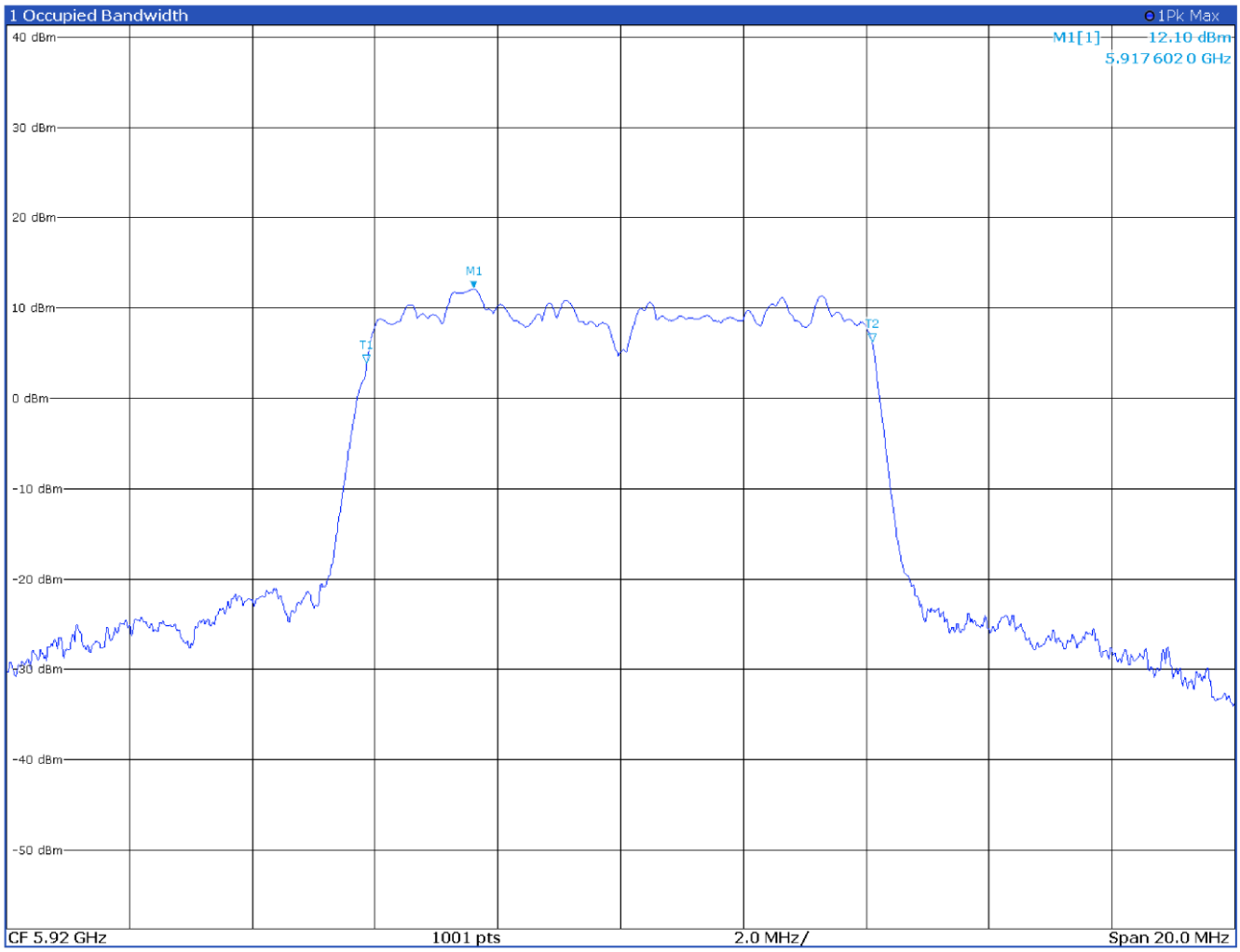
Figure 8.2-14: *99% occupied bandwidth, 5910 MHz, antenna port 2*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.917 582 GHz**	**12.10 dBm**	Occ Bw	**8.238 292 958 MHz**
T1		1	5.915 863 6 GHz	3.90 dBm	Occ Bw Centroid	5.919 982 716 GHz
T2		1	5.924 101 9 GHz	6.24 dBm	Occ Bw Freq Offset	-17.283 698 979 kHz

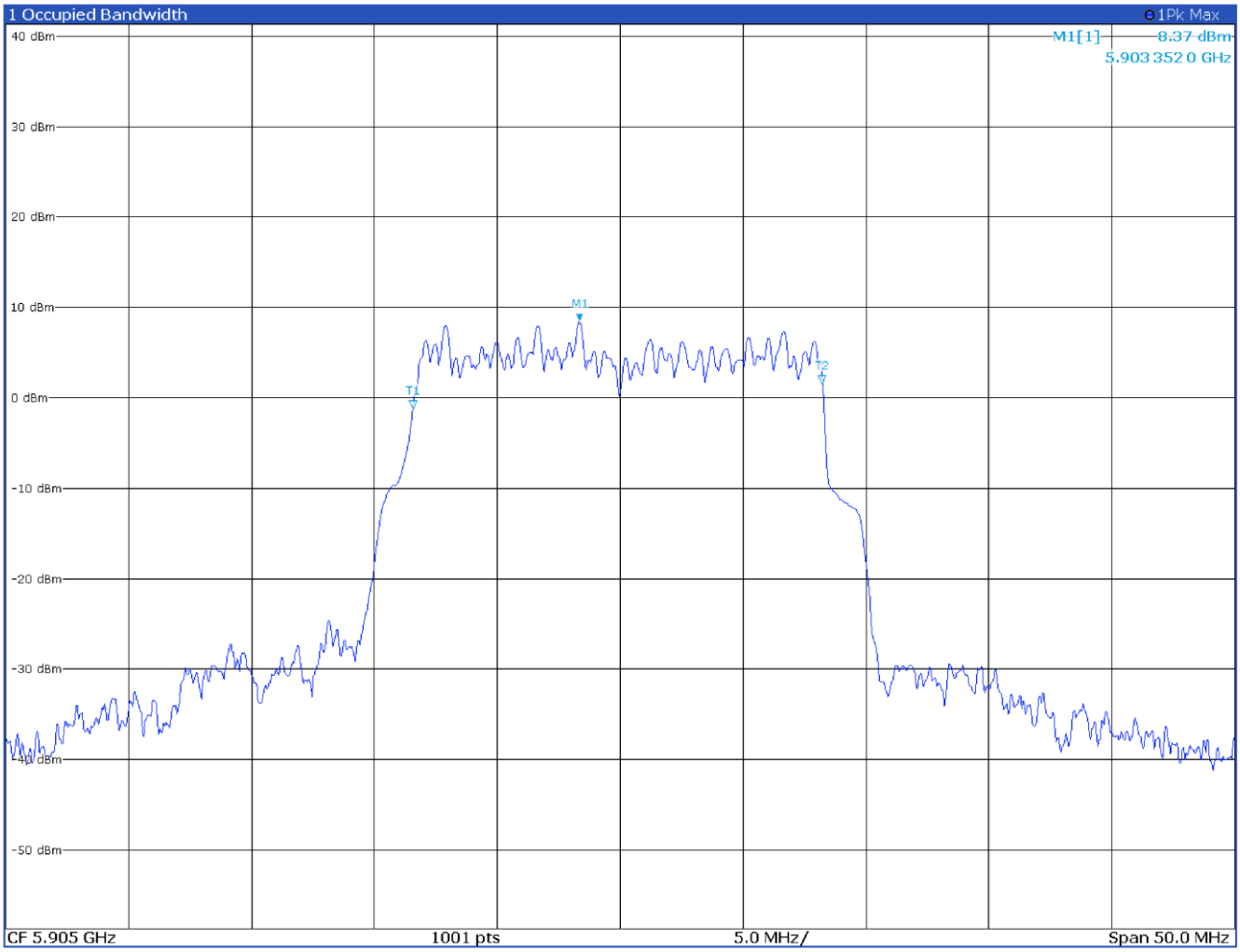
Figure 8.2-15: *99% occupied bandwidth, 5920 MHz, antenna port 1*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.917 602 GHz**	**12.10 dBm**	Occ Bw	**8.237 934 217 MHz**
T1		1	5.915 863 9 GHz	3.89 dBm	Occ Bw Centroid	5.919 982 829 GHz
T2		1	5.924 101 8 GHz	6.25 dBm	Occ Bw Freq Offset	-17.171 153 677 kHz

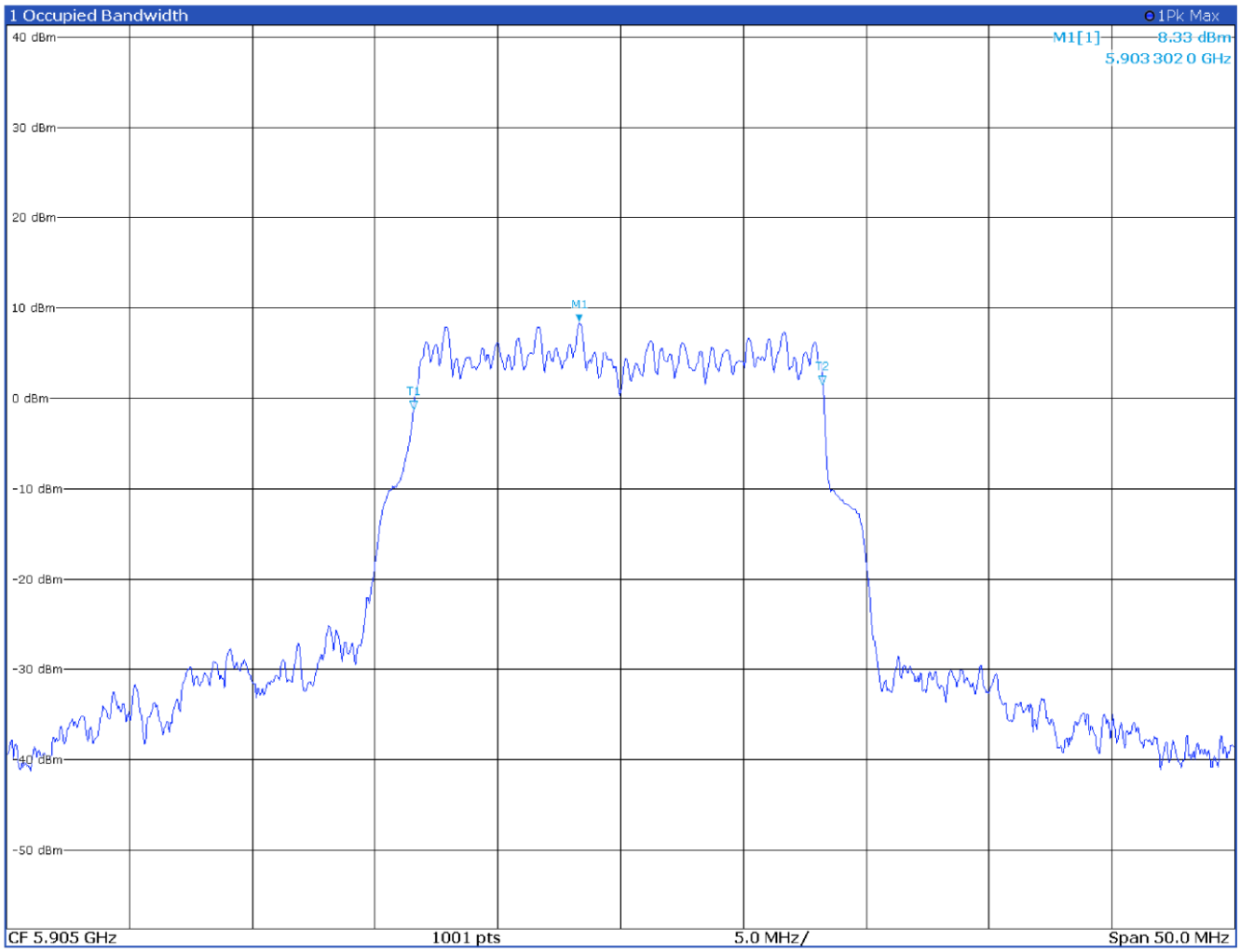
Figure 8.2-16: *99% occupied bandwidth, 5920 MHz, antenna port 2*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.903 352 GHz**	**8.37 dBm**	Occ Bw	**16.665 775 172 MHz**
T1		1	5.896 555 6 GHz	-1.22 dBm	Occ Bw Centroid	5.904 888 466 GHz
T2		1	5.913 221 4 GHz	1.54 dBm	Occ Bw Freq Offset	-111.533 774 277 kHz

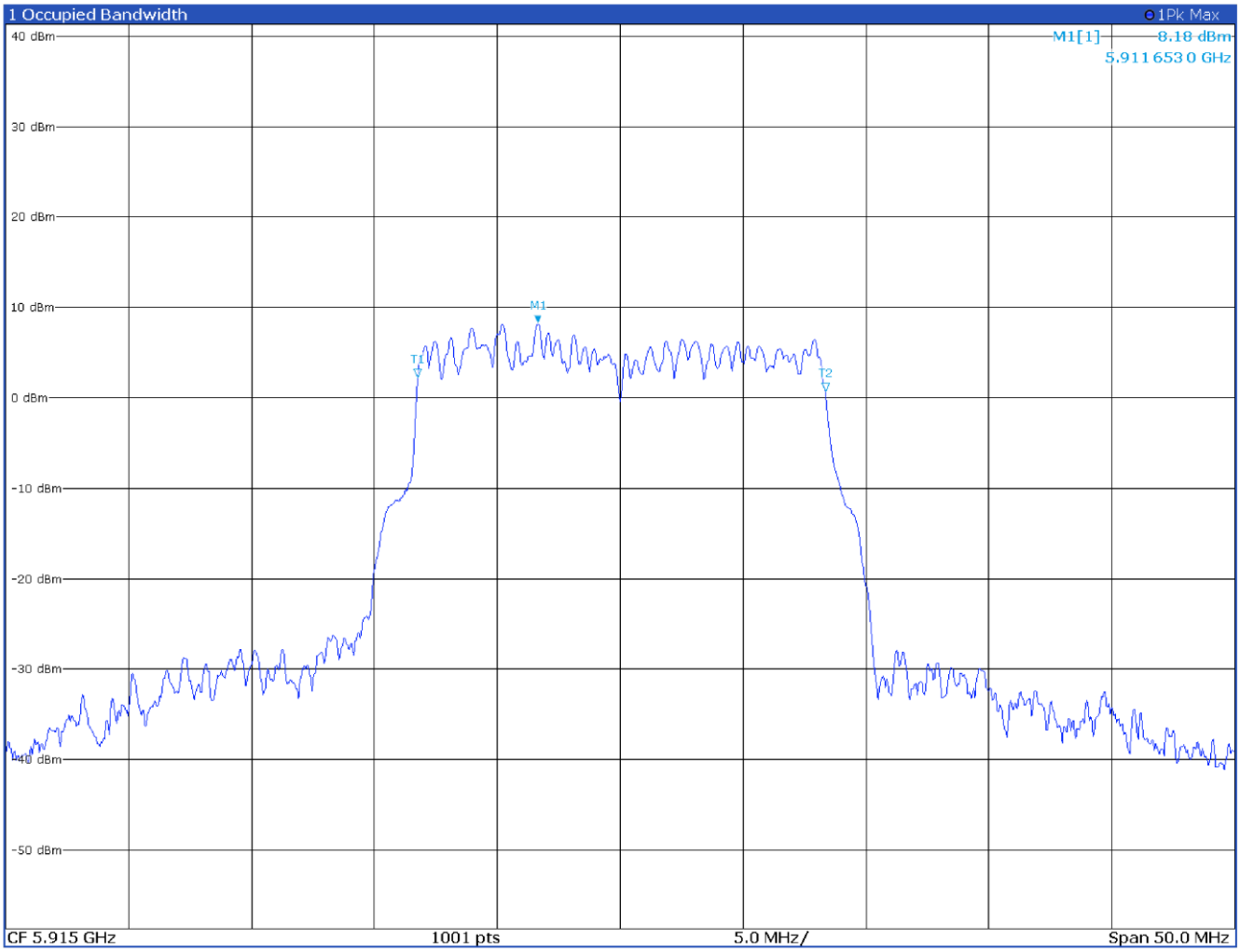
Figure 8.2-17: *99% occupied bandwidth, 5905 MHz, antenna port 1*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.903 302 GHz**	**8.33 dBm**	Occ Bw	**16.664 732 176 MHz**
T1		1	5.896 556 GHz	-1.21 dBm	Occ Bw Centroid	5.904 888 384 GHz
T2		1	5.913 220 8 GHz	1.52 dBm	Occ Bw Freq Offset	-111.615 722 2 kHz

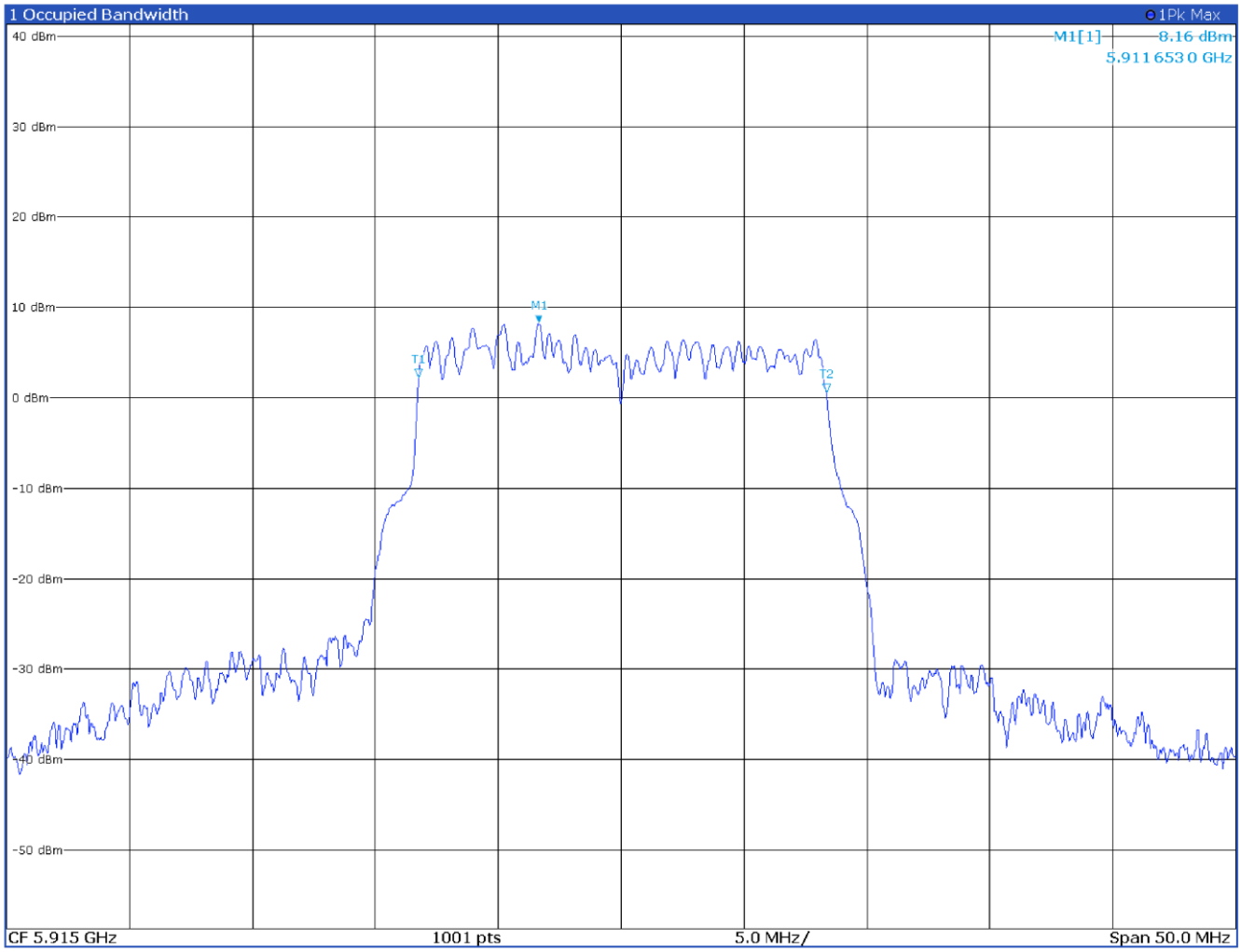
Figure 8.2-18: *99% occupied bandwidth, 5905 MHz, antenna port 2*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.911 653 GHz**	**8.18 dBm**	Occ Bw	**16.584 765 358 MHz**
T1		1	5.906 759 3 GHz	2.21 dBm	Occ Bw Centroid	5.915 051 696 GHz
T2		1	5.923 344 1 GHz	0.75 dBm	Occ Bw Freq Offset	51.695 945 019 kHz

Figure 8.2-19: *99% occupied bandwidth, 5915 MHz, antenna port 1*



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.911 653 GHz**	**8.16 dBm**	Occ Bw	**16.584 885 971 MHz**
T1		1	5.906 761 2 GHz	2.22 dBm	Occ Bw Centroid	5.915 053 63 GHz
T2		1	5.923 346 1 GHz	0.62 dBm	Occ Bw Freq Offset	53.629 873 196 kHz

Figure 8.2-20: *99% occupied bandwidth, 5915 MHz, antenna port 2*

8.3 Out-Of-Band Emissions

8.3.1 References, definitions and limits

KDB 511808 D01 C-V2X v02

3.3 Out-of-Band Emissions (OOBE)

RSUs and OBUs must comply with the following guidelines:

a) Conducted limits measured at the antenna input must not exceed:

1. -16 dBm/100 kHz within ± 1 megahertz of the band edges.
2. -13 dBm/MHz within ± 1 megahertz to ± 5 megahertz of the band edges.
3. -16 dBm/MHz within ± 5 megahertz to ± 30 megahertz of the band edges and
4. -28 dBm/MHz beyond 30 megahertz from the band edges.

b) Compliance can be verified using an RMS average detector.

c) The general test methods of ANSI C63.26, section 5.7.3 and 5.7.4 shall be used.

d) There is no requirement as to how the plots are to be formatted or displayed, as long as all applicable data is presented.

e) For example, if the lab possesses a spectrum analyzer capable of performing segmented measurements with control of RBW, VBW, sweep time, number of points, detector type, etc., per segment, then all the segments from 1. – 4. in a) above, may appear on one single plot as shown in Figure 3.

f) When using the emission mask for plots or segments, ensure that the spectrum analyzer's automatic measurement feature is enabled to clearly display the "pass" or "fail" result on the plot as shown in Figure 3.

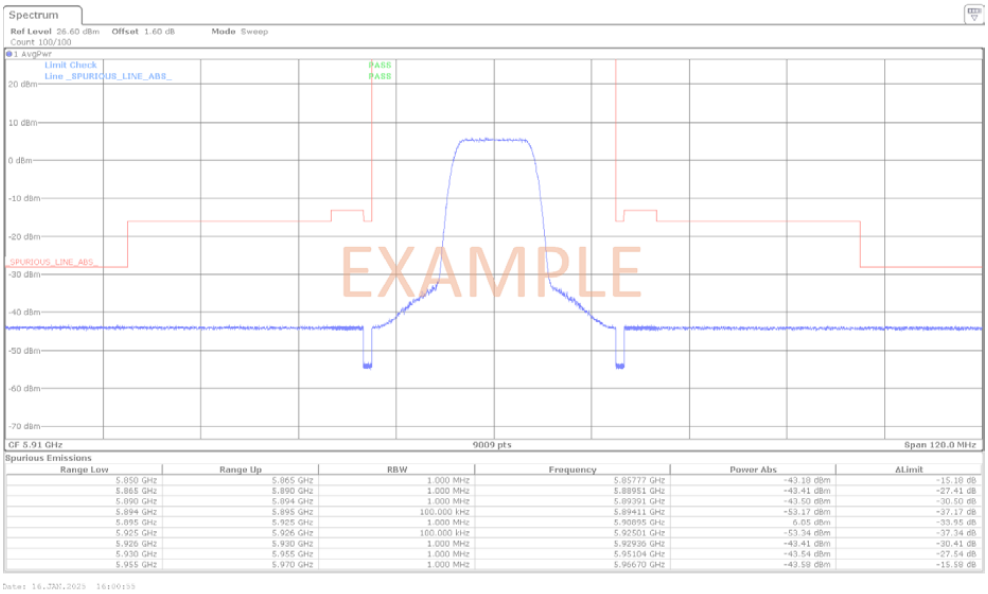


Figure 3. Example of C-V2X OOBE limits plot

g) If this method is used, then the report shall also include an example table from one channel displaying the RBW, VBW, sweep time, number of points, detector, etc. for each range in the emission mask.

Sweep List

	Range 1	Range 2	Range 3	Range 4	Range 5	Range 6	Range 7	Range 8	Range 9
Range Start	5.85 GHz	5.865 GHz	5.89 GHz	5.894 GHz	5.895 GHz	5.925 GHz	5.926 GHz	5.93 GHz	5.955 GHz
Range Stop	5.865 GHz	5.89 GHz	5.894 GHz	5.895 GHz	5.925 GHz	5.926 GHz	5.93 GHz	5.955 GHz	5.97 GHz
Filter Type	Gaussian	Gaussian	Gaussian	Gaussian	Gaussian	Gaussian	Gaussian	Gaussian	Gaussian
RBW	1 MHz	1 MHz	1 MHz	100 kHz	1 MHz	100 kHz	1 MHz	1 MHz	1 MHz
VBW	3 MHz	3 MHz	3 MHz	300 kHz	3 MHz	300 kHz	3 MHz	3 MHz	3 MHz
Sweep Time Mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto
Sweep Time	1.01 ms	1.01 ms	1.01 ms	1.01 ms	1.01 ms	1.01 ms	1.01 ms	1.01 ms	1.01 ms
Detector	RMS	RMS	RMS	RMS	RMS	RMS	RMS	RMS	RMS
Ref. Level	26.6 dBm	26.6 dBm	26.6 dBm	26.6 dBm	26.6 dBm	26.6 dBm	26.6 dBm	26.6 dBm	26.6 dBm
RF Att. Mode	Manual	Manual	Manual	Manual	Manual	Manual	Manual	Manual	Manual
RF Attenuator	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB
Preamp	Off	Off	Off	Off	Off	Off	Off	Off	Off
Sweep Points	1001	1001	1001	1001	1001	1001	1001	1001	1001
Stop After Sweep	Off	Off	Off	Off	Off	Off	Off	Off	Off
Transducer	None	None	None	None	None	None	None	None	None
Limit Check	Absolute	Absolute	Absolute	Absolute	Absolute	Absolute	Absolute	Absolute	Absolute
Abs Limit Start	-28 dBm	-16 dBm	-13 dBm	-16 dBm	40 dBm	-16 dBm	-13 dBm	-16 dBm	-28 dBm
Abs Limit Stop	-28 dBm	-16 dBm	-13 dBm	-16 dBm	40 dBm	-16 dBm	-13 dBm	-16 dBm	-28 dBm

EXAMPLE

Figure 4. Example table of Spectrum Analyzer settings

h) If individual segments are measured, and the pertinent information, RBW, VBW, sweep time, number of points, etc. are displayed on the plot, then there is no need to add an additional sweep list table.

i) For devices with MIMO capabilities, follow the procedures specified in KDB Publication 662911 for summing emissions or adjusting emission levels measured on individual outputs by 10 log (NANT), where NANT is the number of outputs.

j) Testing shall be performed on all potential channel bandwidths and all potential power outputs which the RSU or OBU is capable of transmitting. If the RSU or OBU is capable of carrier aggregation (e.g., transmit a 10 MHz and 20 MHz channel simultaneously) then these combinations shall also be investigated. Care shall be taken to evaluate the impact of intermodulation while additional carriers are active and multiple configurations are possible (e.g., varying resource block configurations for 4G LTE).

k) Measurements shall be performed up to 40 GHz.

l) In addition to conducted measurements, the RSU or OBU shall also be tested for cabinet radiation with the antenna output terminated into a load.

8.3.2 Test summary

Verdict	Pass		
Tested by	O. Frau	Test date	May 9, 2025

8.3.3 Observations, settings and special notes

Spectrum analyser settings:

Resolution bandwidth:	Reference bandwidth in the applicable rule section for the supported frequency band
Video bandwidth:	VBW ≥ 3 × RBW
Detector mode:	RMS
Trace mode:	Average

An example of the sweep table is provided at the end of the section, see Figure 8.3-11; here below two examples of the calculations of the masks:

BW 10 MHz (Figure 8.3-1)

- Center frequency: 5900 MHz
- In band lower frequency: 5895 MHz
- In band upper frequency: 5905 MHz

So, according to

1. -16 dBm/100 kHz within ± 1 megahertz of the band edges.
2. -13 dBm/MHz within ± 1 megahertz to ± 5 megahertz of the band edges.
3. -16 dBm/MHz within ± 5 megahertz to ± 30 megahertz of the band edges and
4. -28 dBm/MHz beyond 30 megahertz from the band edges.

The results shown on the table ("Range Low" and "Range Up" columns) are:

1. -16 dBm/100 kHz limit: -6 to -5 MHz → 5894 to 5895 MHz, and +5 to +6 MHz → 5905 to 5906 MHz
2. -13 dBm/MHz limit: -10 to -6 MHz → 5890 to 5894 MHz, and +6 to +10 MHz → 5906 to 5910 MHz
3. -16 dBm/MHz limit: -35 to -10 MHz → 5865 to 5890 MHz, and +10 to +35 MHz → 5910 to 5935 MHz
4. -28 dBm/MHz limit: -40 to -35 MHz → 5855 to 5865 MHz, and +35 to +40 MHz → 5935 to 5945 MHz

BW 20 MHz (Figure 8.3-7:)

- Center frequency: 5905 MHz
- In band lower frequency: 5895 MHz
- In band upper frequency: 5915 MHz

So, according to

5. -16 dBm/100 kHz within ± 1 megahertz of the band edges.
6. -13 dBm/MHz within ± 1 megahertz to ± 5 megahertz of the band edges.
7. -16 dBm/MHz within ± 5 megahertz to ± 30 megahertz of the band edges and
8. -28 dBm/MHz beyond 30 megahertz from the band edges.

The results shown on the table ("Range Low" and "Range Up" columns) are:

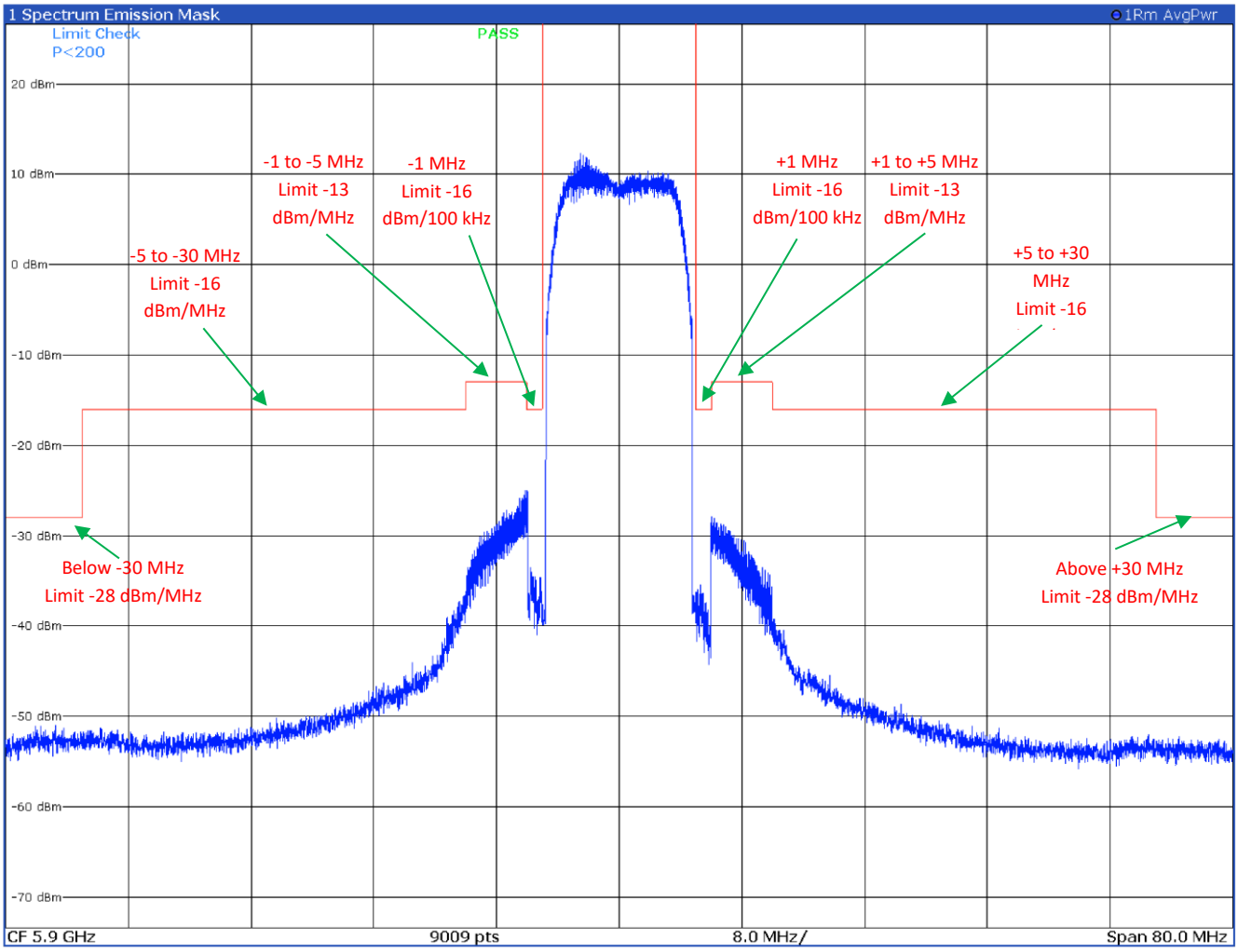
5. -16 dBm/100 kHz limit: -11 to -10 MHz → 5894 to 5895 MHz, and +10 to +11 MHz → 5915 to 5916 MHz
6. -13 dBm/MHz limit: -15 to -11 MHz → 5890 to 5894 MHz, and +11 to +15 MHz → 5916 to 5920 MHz
7. -16 dBm/MHz limit: -40 to -15 MHz → 5865 to 5890 MHz, and +15 to +40 MHz → 5920 to 5945 MHz
8. -28 dBm/MHz limit: -50 to -40 MHz → 5855 to 5865 MHz, and +40 to +50 MHz → 5945 to 5955 MHz

8.3.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767

Notes: NCR - no calibration required, VOU - verify on use

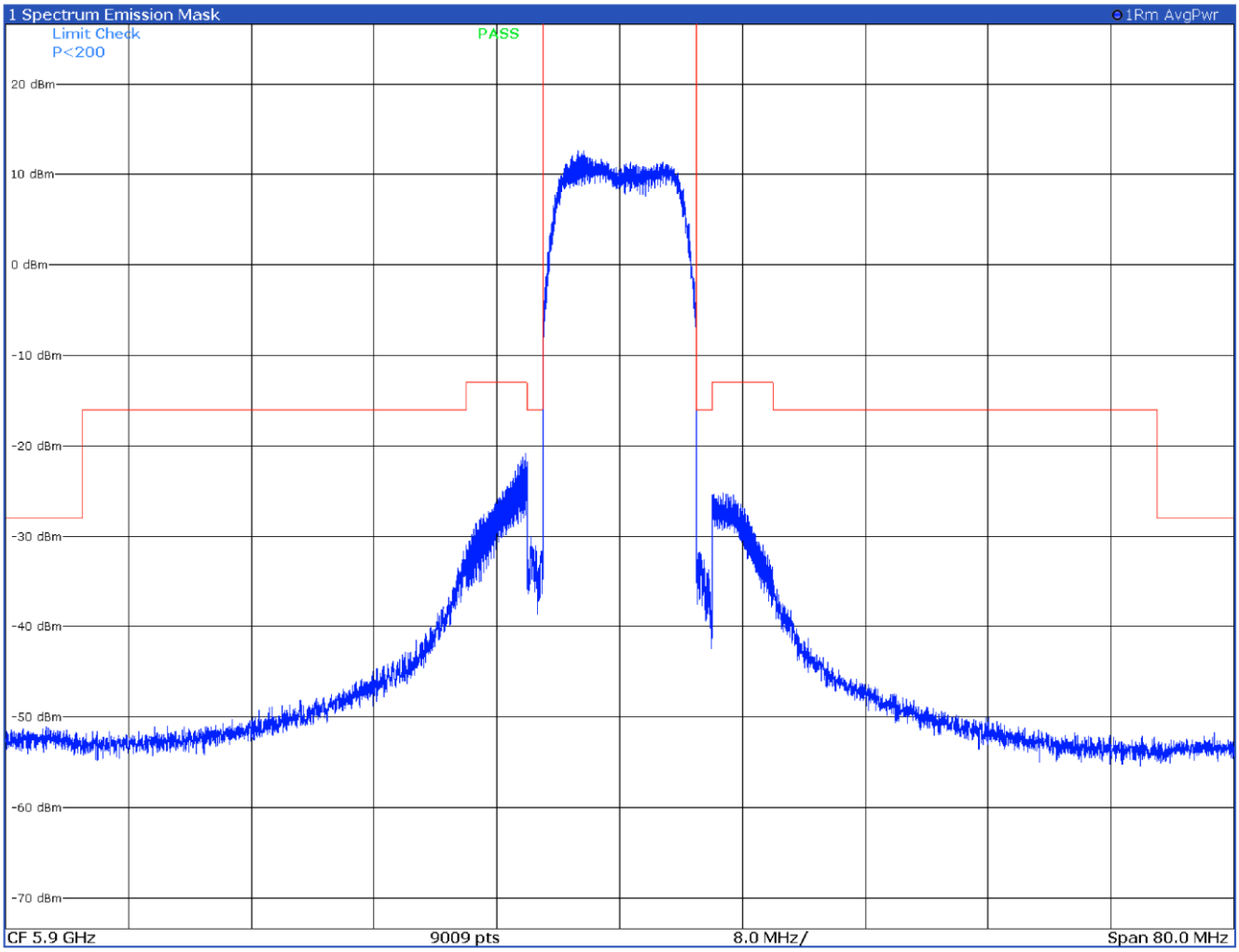
8.3.5 Test data



2 Result Summary

Sub Block A	Center 5.90 GHz		Tx Power 14.89 dBm Tx Bandwidth 3.840 MHz		RBW 1.000 MHz	None
Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-40.000 MHz	-35.000 MHz	1.000 MHz	**5.863 23 GHz**	**-50.98 dBm**	**-65.87 dB**	**-22.98 dB**
-35.000 MHz	-10.000 MHz	1.000 MHz	**5.889 93 GHz**	**-36.53 dBm**	**-51.42 dB**	**-20.53 dB**
-10.000 MHz	-6.000 MHz	1.000 MHz	**5.893 99 GHz**	**-24.99 dBm**	**-39.88 dB**	**-11.99 dB**
-6.000 MHz	-5.000 MHz	100.000 kHz	**5.894 02 GHz**	**-25.13 dBm**	**-40.02 dB**	**-9.13 dB**
5.000 MHz	6.000 MHz	100.000 kHz	**5.906 00 GHz**	**-28.28 dBm**	**-43.17 dB**	**-12.28 dB**
6.000 MHz	10.000 MHz	1.000 MHz	**5.906 02 GHz**	**-27.88 dBm**	**-42.77 dB**	**-14.88 dB**
10.000 MHz	35.000 MHz	1.000 MHz	**5.910 13 GHz**	**-39.20 dBm**	**-54.10 dB**	**-23.20 dB**
35.000 MHz	40.000 MHz	1.000 MHz	**5.936 49 GHz**	**-52.16 dBm**	**-67.05 dB**	**-24.16 dB**

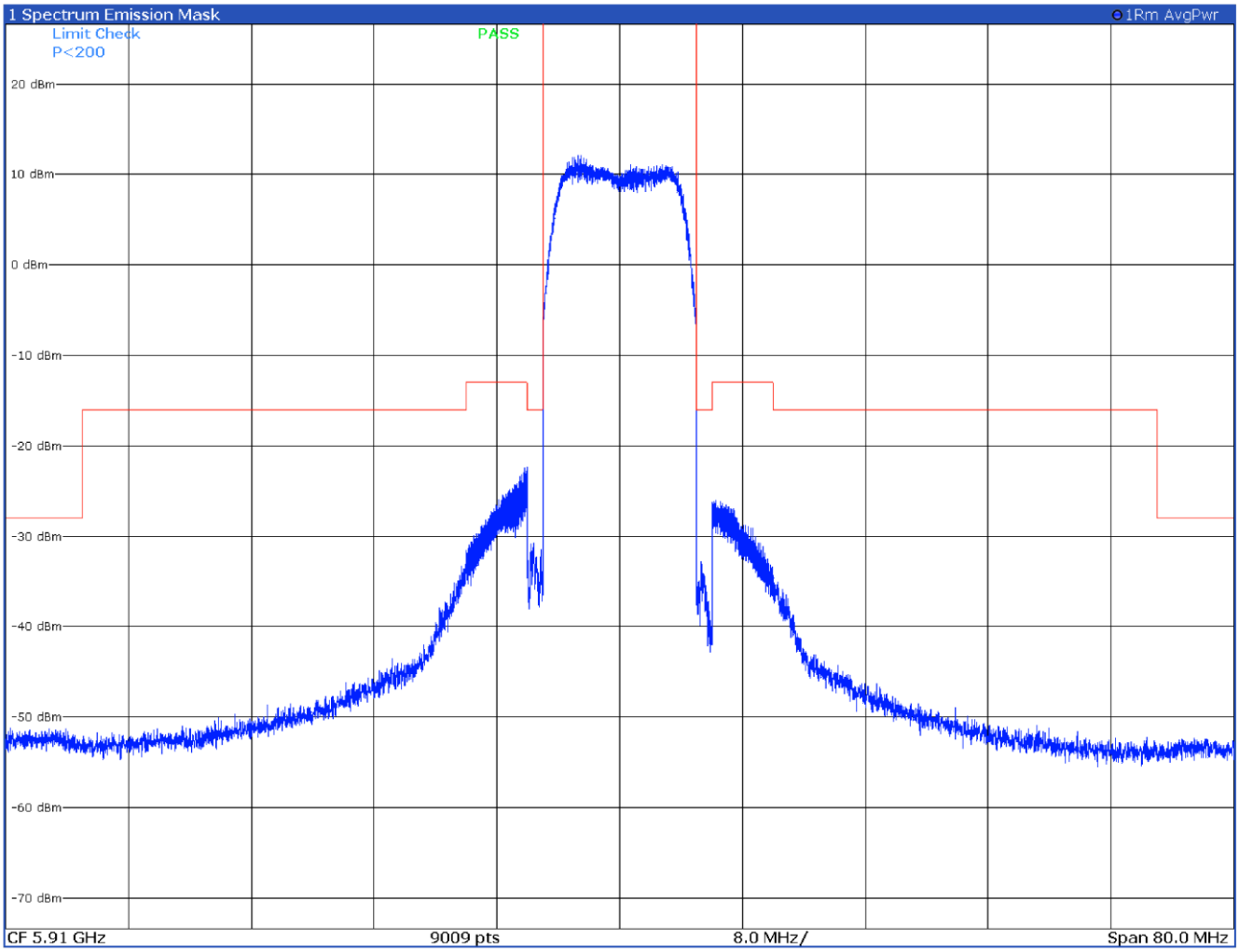
Figure 8.3-1: *Emissions mask, 5900 MHz, 10 MHz OBW, Antenna port 1*



2 Result Summary

Sub Block A	Center 5.90 GHz		Tx Power 15.94 dBm Tx Bandwidth 3.840 MHz		RBW 1.000 MHz	None
Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-40.000 MHz	-35.000 MHz	1.000 MHz	**5.862 78 GHz**	**-51.16 dBm**	**-67.10 dB**	**-23.16 dB**
-35.000 MHz	-10.000 MHz	1.000 MHz	**5.889 74 GHz**	**-32.59 dBm**	**-48.52 dB**	**-16.31 dB**
-10.000 MHz	-6.000 MHz	1.000 MHz	**5.893 86 GHz**	**-21.08 dBm**	**-37.01 dB**	**-7.70 dB**
-6.000 MHz	-5.000 MHz	100.000 kHz	**5.894 20 GHz**	**-30.17 dBm**	**-46.10 dB**	**-14.04 dB**
5.000 MHz	6.000 MHz	100.000 kHz	**5.905 26 GHz**	**-31.69 dBm**	**-47.63 dB**	**-15.69 dB**
6.000 MHz	10.000 MHz	1.000 MHz	**5.906 75 GHz**	**-25.19 dBm**	**-41.12 dB**	**-12.19 dB**
10.000 MHz	35.000 MHz	1.000 MHz	**5.910 06 GHz**	**-35.44 dBm**	**-51.38 dB**	**-19.44 dB**
35.000 MHz	40.000 MHz	1.000 MHz	**5.938 73 GHz**	**-51.63 dBm**	**-67.56 dB**	**-23.63 dB**

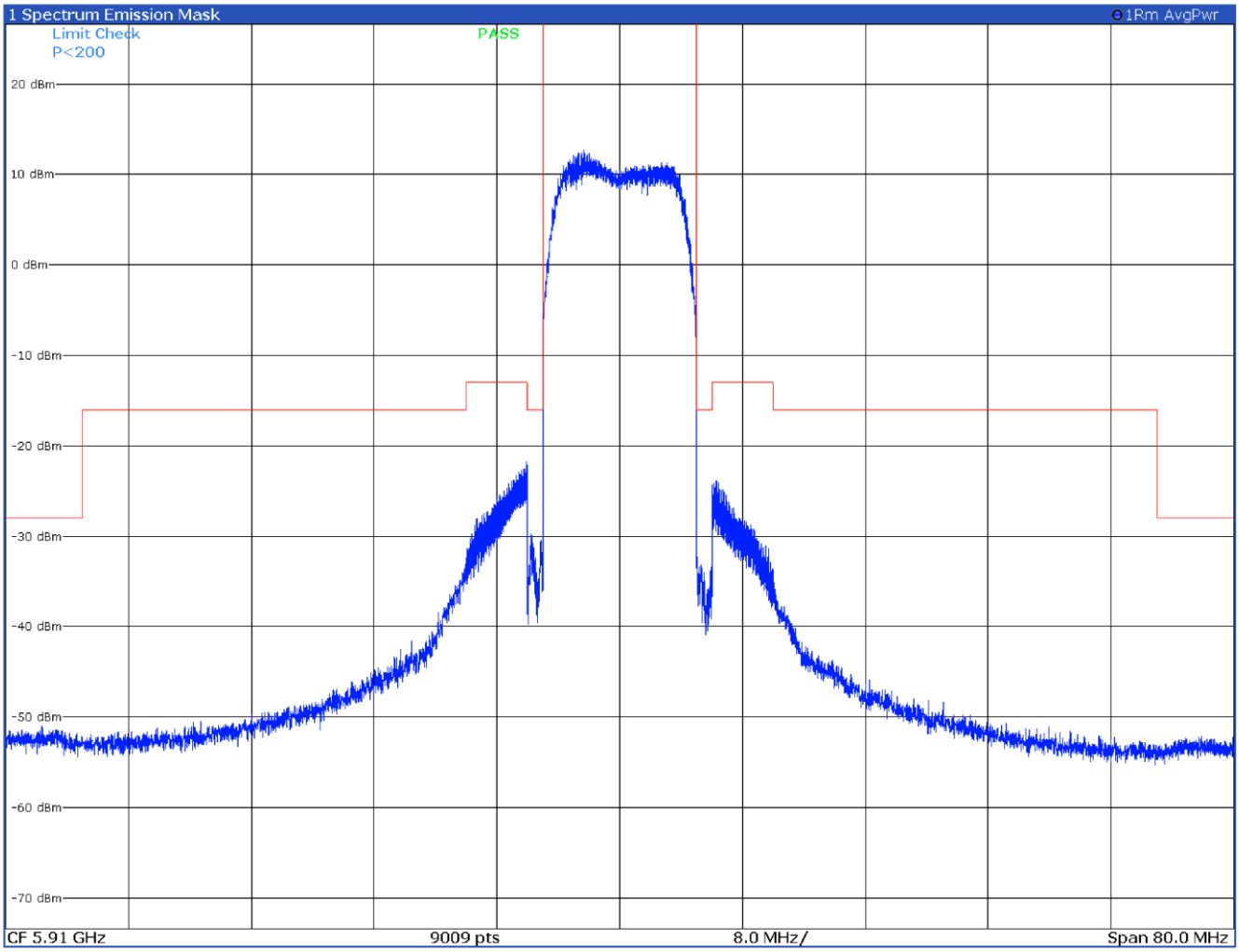
Figure 8.3-2: *Emissions mask, 5900 MHz, 10 MHz OBW, Antenna port 2*



2 Result Summary

Sub Block A	Center 5.91 GHz		Tx Power 15.63 dBm Tx Bandwidth 3.840 MHz		RBW 1.000 MHz	None
Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-40.000 MHz	-35.000 MHz	1.000 MHz	**5.870 29 GHz**	**-51.18 dBm**	**-66.82 dB**	**-23.18 dB**
-35.000 MHz	-10.000 MHz	1.000 MHz	**5.899 98 GHz**	**-32.87 dBm**	**-48.50 dB**	**-16.87 dB**
-10.000 MHz	-6.000 MHz	1.000 MHz	**5.903 96 GHz**	**-22.29 dBm**	**-37.92 dB**	**-9.29 dB**
-6.000 MHz	-5.000 MHz	100.000 kHz	**5.904 38 GHz**	**-30.70 dBm**	**-46.33 dB**	**-14.70 dB**
5.000 MHz	6.000 MHz	100.000 kHz	**5.915 31 GHz**	**-32.72 dBm**	**-48.35 dB**	**-16.72 dB**
6.000 MHz	10.000 MHz	1.000 MHz	**5.916 25 GHz**	**-26.04 dBm**	**-41.68 dB**	**-13.04 dB**
10.000 MHz	35.000 MHz	1.000 MHz	**5.920 01 GHz**	**-34.50 dBm**	**-50.13 dB**	**-18.50 dB**
35.000 MHz	40.000 MHz	1.000 MHz	**5.947 43 GHz**	**-52.30 dBm**	**-67.93 dB**	**-24.30 dB**

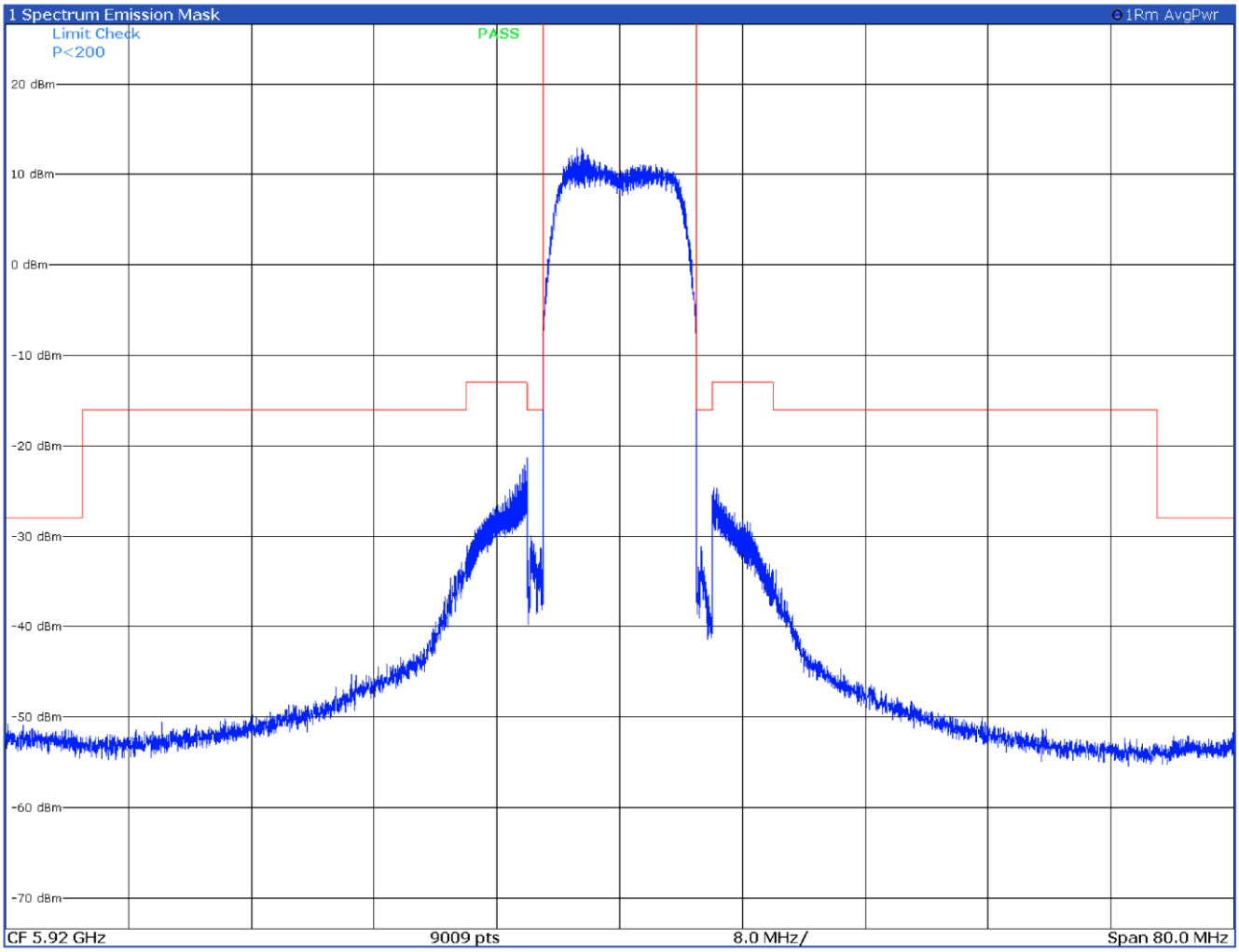
Figure 8.3-3: *Emissions mask, 5910 MHz, 10 MHz OBW, Antenna port 1*



2 Result Summary

Sub Block A	Center 5.91 GHz		Tx Power 15.93 dBm Tx Bandwidth 3.840 MHz		RBW 1.000 MHz	None
Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-40.000 MHz	-35.000 MHz	1.000 MHz	**5.872 35 GHz**	**-50.98 dBm**	**-66.91 dB**	**-22.98 dB**
-35.000 MHz	-10.000 MHz	1.000 MHz	**5.899 98 GHz**	**-32.36 dBm**	**-48.29 dB**	**-16.36 dB**
-10.000 MHz	-6.000 MHz	1.000 MHz	**5.903 92 GHz**	**-21.73 dBm**	**-37.66 dB**	**-8.73 dB**
-6.000 MHz	-5.000 MHz	100.000 kHz	**5.904 21 GHz**	**-29.69 dBm**	**-45.62 dB**	**-13.69 dB**
5.000 MHz	6.000 MHz	100.000 kHz	**5.915 02 GHz**	**-31.59 dBm**	**-47.52 dB**	**-15.59 dB**
6.000 MHz	10.000 MHz	1.000 MHz	**5.916 29 GHz**	**-23.81 dBm**	**-39.74 dB**	**-10.81 dB**
10.000 MHz	35.000 MHz	1.000 MHz	**5.920 02 GHz**	**-34.01 dBm**	**-49.95 dB**	**-18.01 dB**
35.000 MHz	40.000 MHz	1.000 MHz	**5.947 89 GHz**	**-52.11 dBm**	**-68.05 dB**	**-24.11 dB**

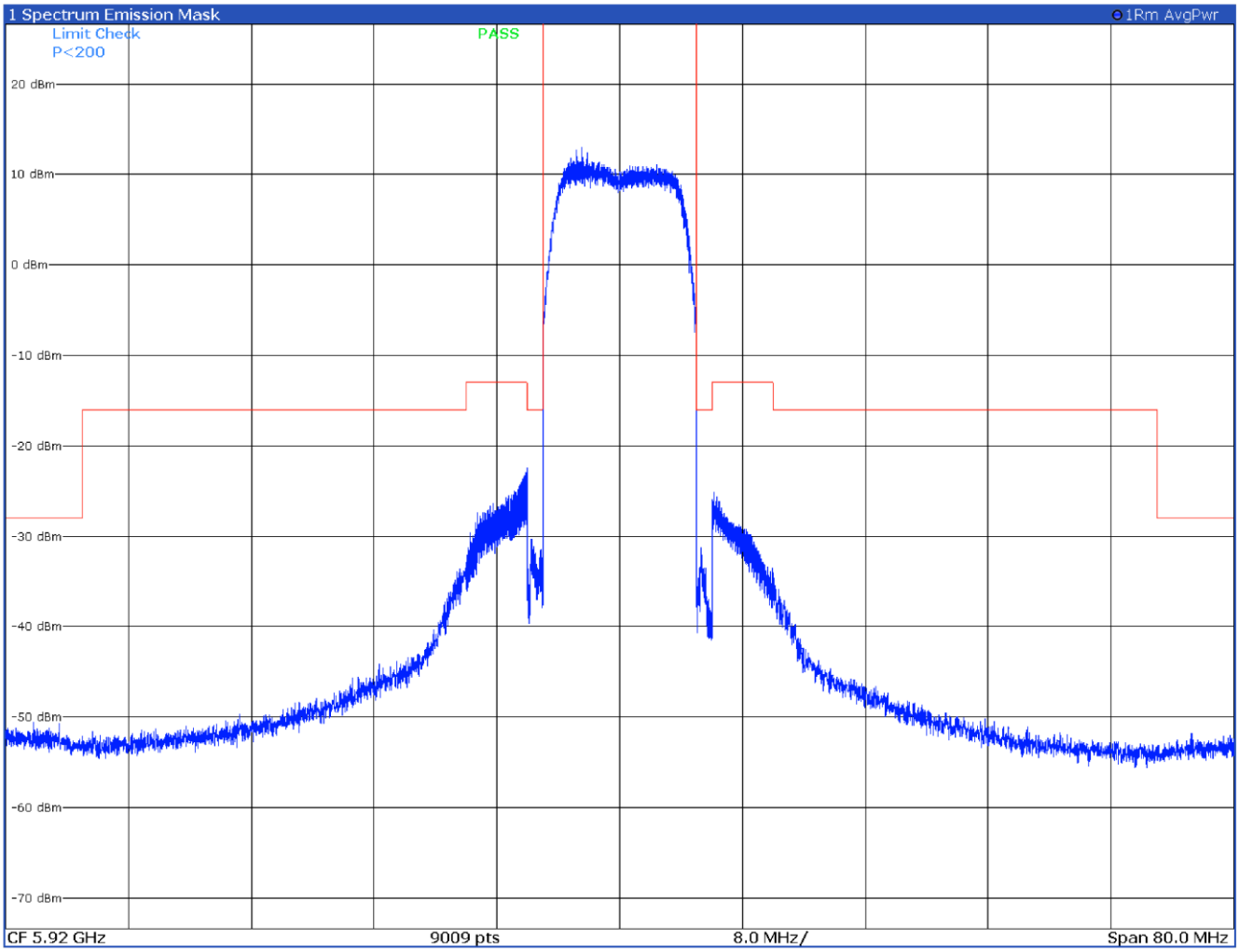
Figure 8.3-4: *Emissions mask, 5910 MHz, 10 MHz OBW, Antenna port 2*



2 Result Summary

Sub Block A	Center 5.92 GHz		Tx Power 15.75 dBm Tx Bandwidth 3.840 MHz		RBW 1.000 MHz	None
Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-40.000 MHz	-35.000 MHz	1.000 MHz	**5.880 13 GHz**	**-50.79 dBm**	**-66.55 dB**	**-22.79 dB**
-35.000 MHz	-10.000 MHz	1.000 MHz	**5.909 93 GHz**	**-32.76 dBm**	**-48.51 dB**	**-16.76 dB**
-10.000 MHz	-6.000 MHz	1.000 MHz	**5.913 98 GHz**	**-21.33 dBm**	**-37.09 dB**	**-8.33 dB**
-6.000 MHz	-5.000 MHz	100.000 kHz	**5.914 22 GHz**	**-29.87 dBm**	**-45.63 dB**	**-13.87 dB**
5.000 MHz	6.000 MHz	100.000 kHz	**5.925 33 GHz**	**-31.13 dBm**	**-46.89 dB**	**-15.13 dB**
6.000 MHz	10.000 MHz	1.000 MHz	**5.926 14 GHz**	**-24.54 dBm**	**-40.29 dB**	**-11.54 dB**
10.000 MHz	35.000 MHz	1.000 MHz	**5.930 18 GHz**	**-33.67 dBm**	**-49.42 dB**	**-17.67 dB**
35.000 MHz	40.000 MHz	1.000 MHz	**5.959 93 GHz**	**-51.71 dBm**	**-67.46 dB**	**-23.71 dB**

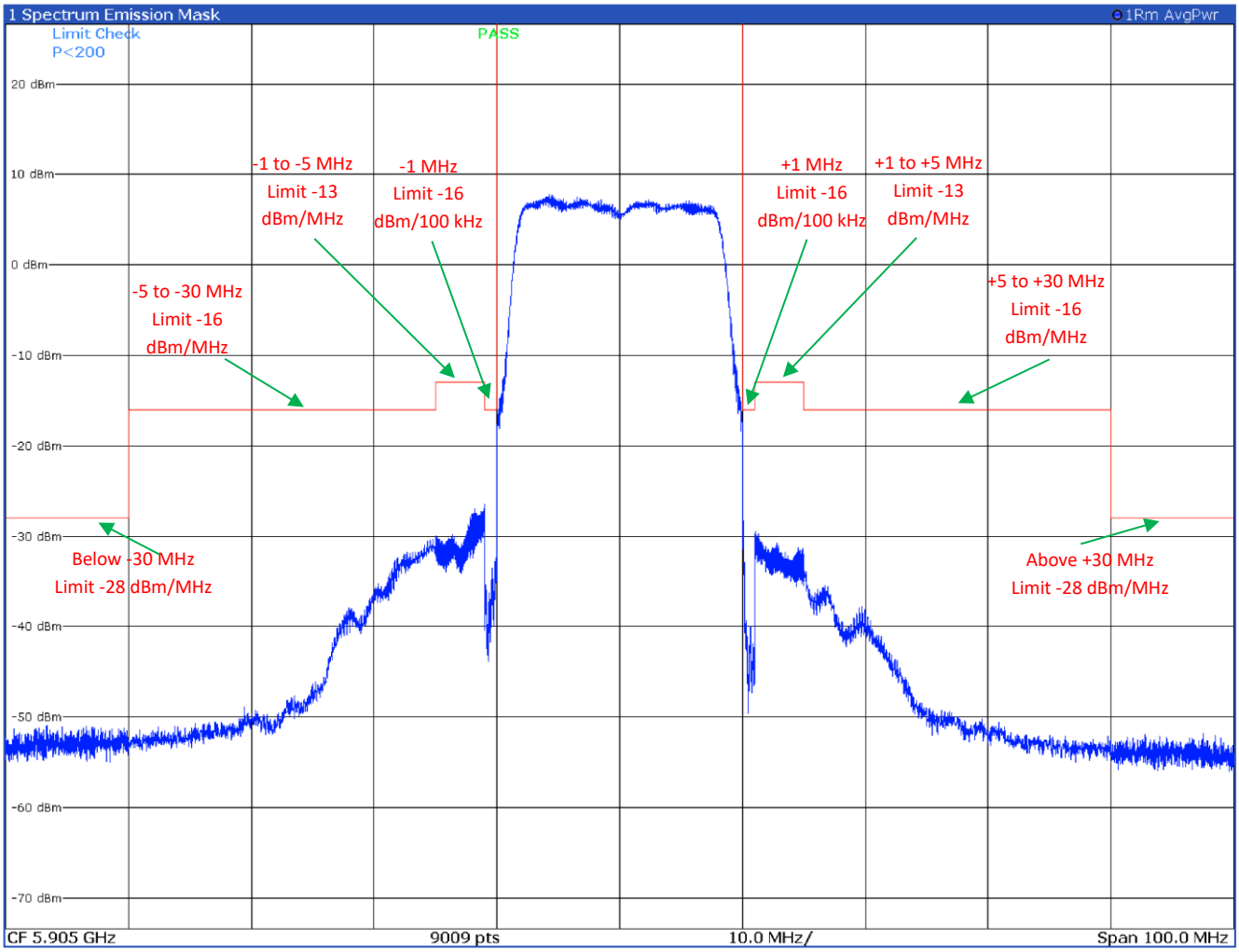
Figure 8.3-5: *Emissions mask, 5920 MHz, 10 MHz OBW, Antenna port 1*



2 Result Summary

Sub Block A	Center 5.92 GHz		Tx Power 15.67 dBm Tx Bandwidth 3.840 MHz		RBW 1.000 MHz	None
Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-40.000 MHz	-35.000 MHz	1.000 MHz	**5.881 83 GHz**	**-50.56 dBm**	**-66.23 dB**	**-22.56 dB**
-35.000 MHz	-10.000 MHz	1.000 MHz	**5.909 96 GHz**	**-33.44 dBm**	**-49.11 dB**	**-17.44 dB**
-10.000 MHz	-6.000 MHz	1.000 MHz	**5.913 98 GHz**	**-22.41 dBm**	**-38.08 dB**	**-9.41 dB**
-6.000 MHz	-5.000 MHz	100.000 kHz	**5.914 25 GHz**	**-30.28 dBm**	**-45.95 dB**	**-14.28 dB**
5.000 MHz	6.000 MHz	100.000 kHz	**5.925 31 GHz**	**-31.24 dBm**	**-46.91 dB**	**-15.24 dB**
6.000 MHz	10.000 MHz	1.000 MHz	**5.926 15 GHz**	**-25.10 dBm**	**-40.77 dB**	**-12.10 dB**
10.000 MHz	35.000 MHz	1.000 MHz	**5.930 06 GHz**	**-34.55 dBm**	**-50.22 dB**	**-18.55 dB**
35.000 MHz	40.000 MHz	1.000 MHz	**5.957 26 GHz**	**-51.73 dBm**	**-67.40 dB**	**-23.73 dB**

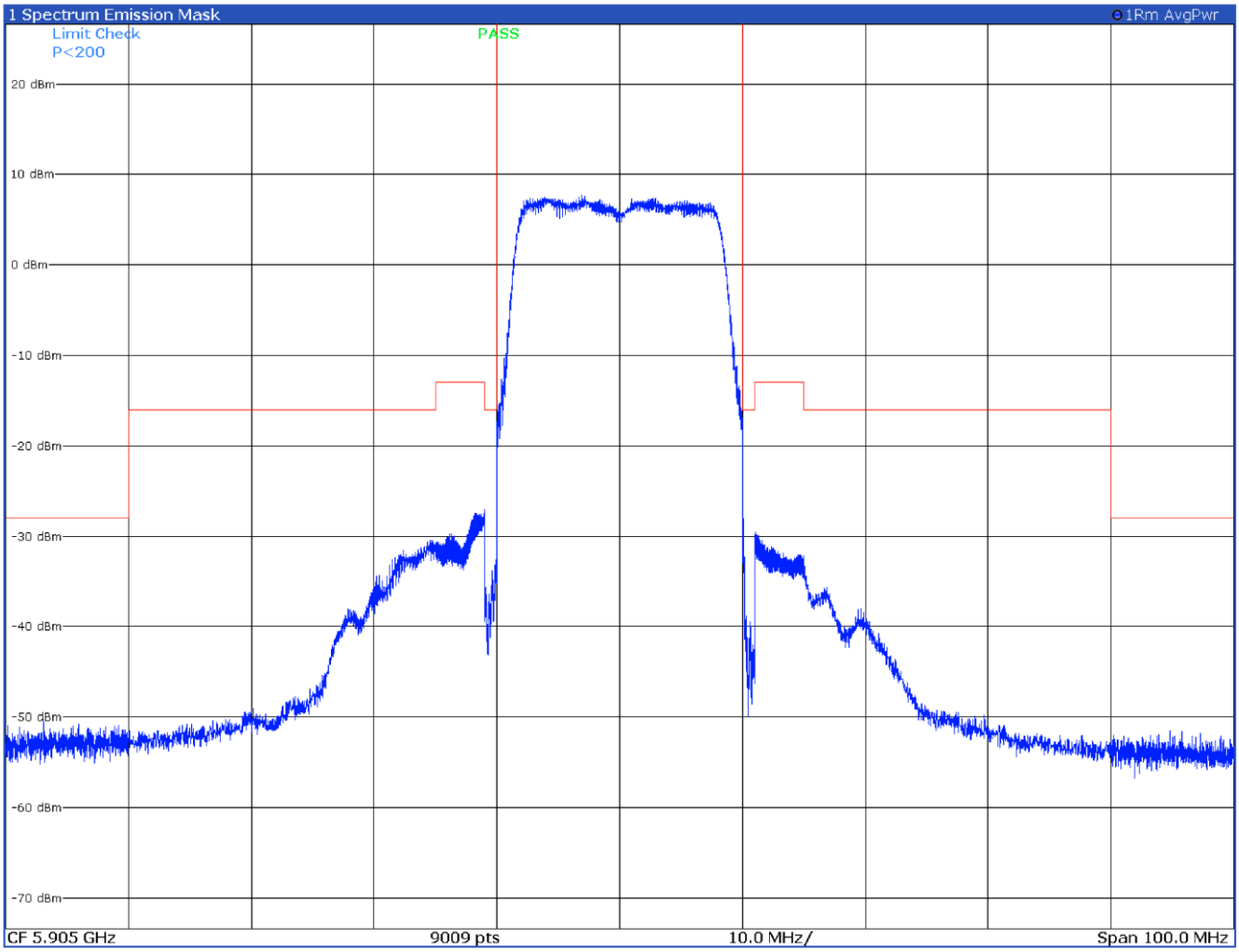
Figure 8.3-6: *Emissions mask, 5920 MHz, 10 MHz OBW, Antenna port 2*



2 Result Summary

Sub Block A	Center 5.91 GHz		Tx Power 11.73 dBm Tx Bandwidth 3.840 MHz		RBW 1.000 MHz	None
Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-50.000 MHz	-40.000 MHz	1.000 MHz	**5.858 35 GHz**	**-50.88 dBm**	**-62.61 dB**	**-22.80 dB**
-40.000 MHz	-15.000 MHz	1.000 MHz	**5.889 76 GHz**	**-30.31 dBm**	**-42.04 dB**	**-14.22 dB**
-15.000 MHz	-11.000 MHz	1.000 MHz	**5.893 98 GHz**	**-26.46 dBm**	**-38.19 dB**	**-13.68 dB**
-11.000 MHz	-10.000 MHz	100.000 kHz	**5.894 99 GHz**	**-29.67 dBm**	**-41.40 dB**	**-13.57 dB**
10.000 MHz	11.000 MHz	100.000 kHz	**5.915 06 GHz**	**-28.23 dBm**	**-39.96 dB**	**-12.11 dB**
11.000 MHz	15.000 MHz	1.000 MHz	**5.916 05 GHz**	**-29.43 dBm**	**-41.16 dB**	**-16.43 dB**
15.000 MHz	40.000 MHz	1.000 MHz	**5.920 19 GHz**	**-33.85 dBm**	**-45.58 dB**	**-17.85 dB**
40.000 MHz	50.000 MHz	1.000 MHz	**5.952 52 GHz**	**-51.78 dBm**	**-63.51 dB**	**-23.78 dB**

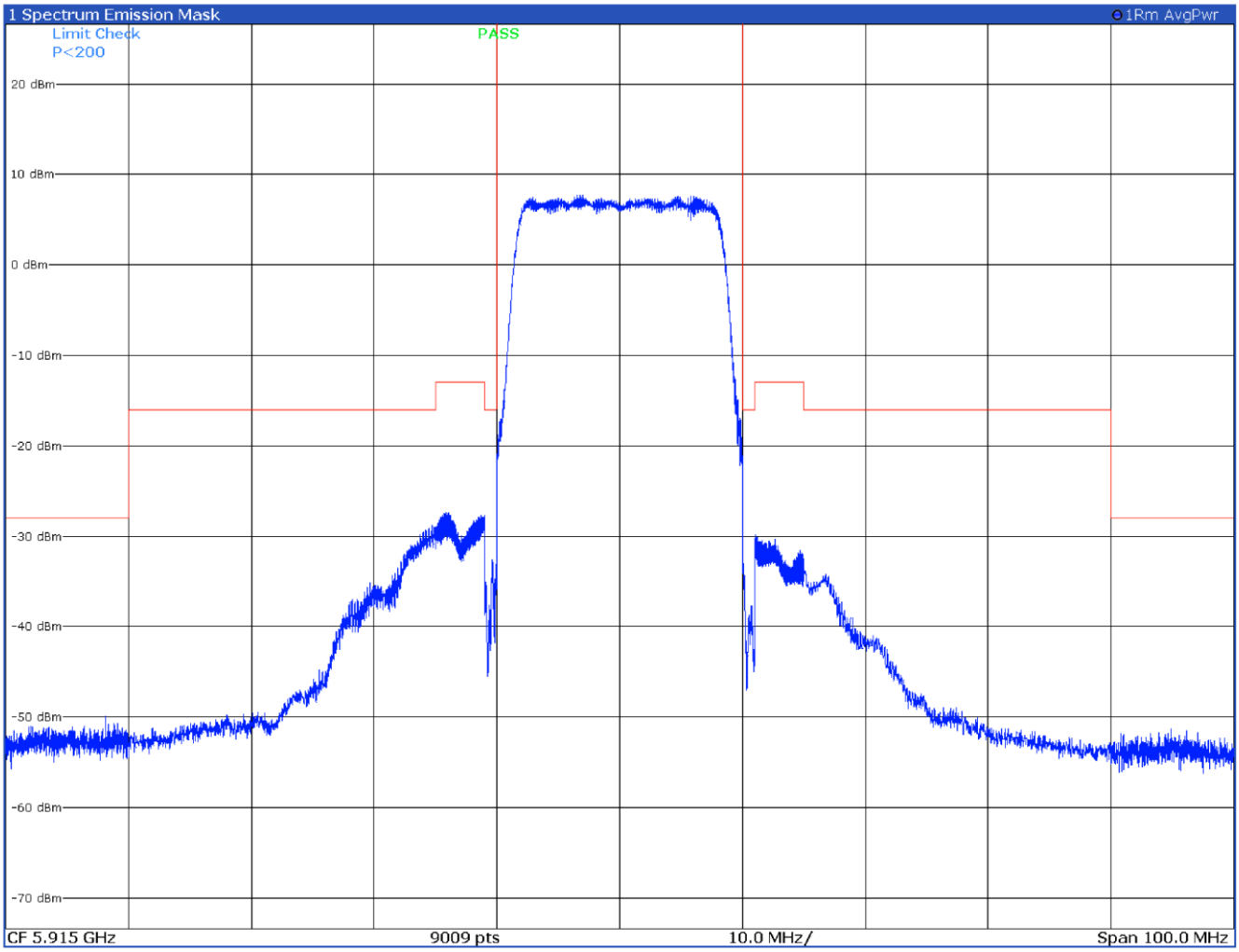
Figure 8.3-7: *Emissions mask, 5905 MHz, 20 MHz OBW, Antenna port 1*



2 Result Summary

Sub Block A	Center 5.91 GHz		Tx Power 11.73 dBm Tx Bandwidth 3.840 MHz		RBW 1.000 MHz	None
Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-50.000 MHz	-40.000 MHz	1.000 MHz	**5.858 06 GHz**	**-50.00 dBm**	**-61.73 dB**	**-22.37 dB**
-40.000 MHz	-15.000 MHz	1.000 MHz	**5.889 59 GHz**	**-30.45 dBm**	**-42.18 dB**	**-14.28 dB**
-15.000 MHz	-11.000 MHz	1.000 MHz	**5.893 99 GHz**	**-27.00 dBm**	**-38.73 dB**	**-14.31 dB**
-11.000 MHz	-10.000 MHz	100.000 kHz	**5.895 00 GHz**	**-30.04 dBm**	**-41.77 dB**	**-14.17 dB**
10.000 MHz	11.000 MHz	100.000 kHz	**5.915 04 GHz**	**-27.79 dBm**	**-39.52 dB**	**-11.71 dB**
11.000 MHz	15.000 MHz	1.000 MHz	**5.916 07 GHz**	**-29.51 dBm**	**-41.23 dB**	**-16.51 dB**
15.000 MHz	40.000 MHz	1.000 MHz	**5.920 09 GHz**	**-33.26 dBm**	**-44.99 dB**	**-17.26 dB**
40.000 MHz	50.000 MHz	1.000 MHz	**5.949 80 GHz**	**-51.50 dBm**	**-63.23 dB**	**-23.50 dB**

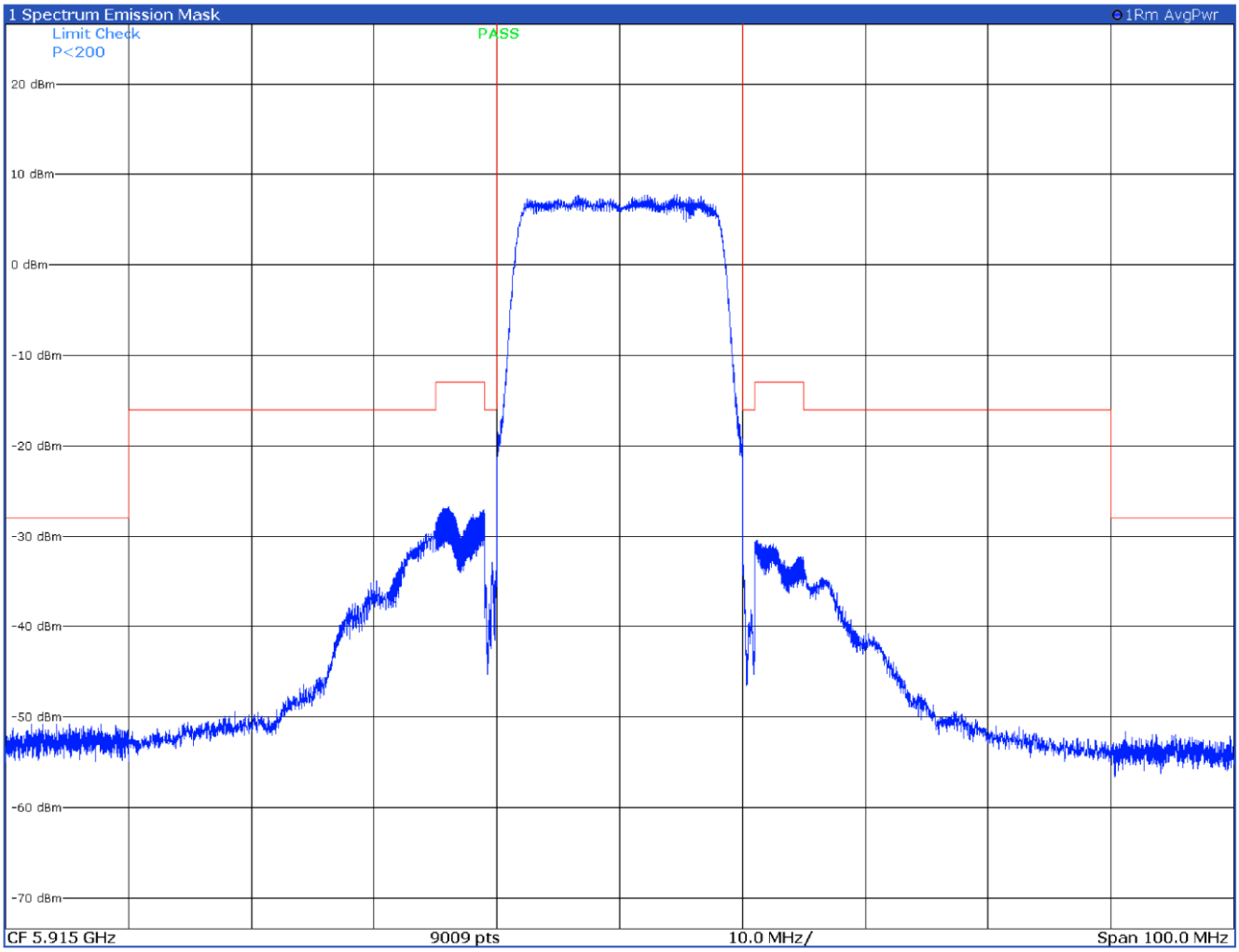
Figure 8.3-8: *Emissions mask, 5905 MHz, 20 MHz OBW, Antenna port 2*



2 Result Summary

Sub Block A	Center 5.92 GHz		Tx Power 12.23 dBm Tx Bandwidth 3.840 MHz		RBW 1.000 MHz	None
Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-50.000 MHz	-40.000 MHz	1.000 MHz	**5.874 14 GHz**	**-50.69 dBm**	**-62.92 dB**	**-22.36 dB**
-40.000 MHz	-15.000 MHz	1.000 MHz	**5.899 74 GHz**	**-28.79 dBm**	**-41.03 dB**	**-12.54 dB**
-15.000 MHz	-11.000 MHz	1.000 MHz	**5.903 69 GHz**	**-27.63 dBm**	**-39.86 dB**	**-14.24 dB**
-11.000 MHz	-10.000 MHz	100.000 kHz	**5.904 63 GHz**	**-32.51 dBm**	**-44.74 dB**	**-16.33 dB**
10.000 MHz	11.000 MHz	100.000 kHz	**5.925 03 GHz**	**-32.99 dBm**	**-45.23 dB**	**-16.68 dB**
11.000 MHz	15.000 MHz	1.000 MHz	**5.926 07 GHz**	**-29.74 dBm**	**-41.98 dB**	**-16.74 dB**
15.000 MHz	40.000 MHz	1.000 MHz	**5.930 01 GHz**	**-33.69 dBm**	**-45.93 dB**	**-17.69 dB**
40.000 MHz	50.000 MHz	1.000 MHz	**5.959 87 GHz**	**-51.26 dBm**	**-63.49 dB**	**-23.26 dB**

Figure 8.3-9: *Emissions mask, 5915 MHz, 20 MHz OBW, Antenna port 1*



2 Result Summary

Sub Block A	Center 5.92 GHz		Tx Power 12.13 dBm Tx Bandwidth 3.840 MHz		RBW 1.000 MHz	None
Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-50.000 MHz	-40.000 MHz	1.000 MHz	**5.867 13 GHz**	**-50.78 dBm**	**-62.91 dB**	**-22.56 dB**
-40.000 MHz	-15.000 MHz	1.000 MHz	**5.899 96 GHz**	**-29.37 dBm**	**-41.50 dB**	**-13.05 dB**
-15.000 MHz	-11.000 MHz	1.000 MHz	**5.901 10 GHz**	**-26.70 dBm**	**-38.83 dB**	**-13.41 dB**
-11.000 MHz	-10.000 MHz	100.000 kHz	**5.904 61 GHz**	**-32.97 dBm**	**-45.10 dB**	**-16.95 dB**
10.000 MHz	11.000 MHz	100.000 kHz	**5.925 05 GHz**	**-33.16 dBm**	**-45.29 dB**	**-16.91 dB**
11.000 MHz	15.000 MHz	1.000 MHz	**5.926 21 GHz**	**-30.39 dBm**	**-42.52 dB**	**-17.39 dB**
15.000 MHz	40.000 MHz	1.000 MHz	**5.930 01 GHz**	**-33.04 dBm**	**-45.17 dB**	**-17.04 dB**
40.000 MHz	50.000 MHz	1.000 MHz	**5.956 20 GHz**	**-51.58 dBm**	**-63.71 dB**	**-23.58 dB**

Figure 8.3-10: *Emissions mask, 5915 MHz, 20 MHz OBW, Antenna port 2*

	Range 1	Range 2	Range 3	Range 4	Range 5	Range 6	Range 7	Range 8	Range 9
Range Start	-50 MHz	-45 MHz	-20 MHz	-16 MHz	-15 MHz	15 MHz	16 MHz	20 MHz	45 MHz
Range Stop	-45 MHz	-20 MHz	-16 MHz	-15 MHz	15 MHz	16 MHz	20 MHz	45 MHz	50 MHz
Fast SEM	Off	Off	Off	Off	Off	Off	Off	Off	Off
Filter Type	Normal(3dB)	Normal(3dB)	Normal(3dB)	Normal(3dB)	Normal(3dB)	Normal(3dB)	Normal(3dB)	Normal(3dB)	Normal(3dB)
RBW	1 MHz	1 MHz	1 MHz	100 kHz	1 MHz	100 kHz	1 MHz	1 MHz	1 MHz
VBW	3 MHz	3 MHz	3 MHz	300 kHz	3 MHz	300 kHz	3 MHz	3 MHz	3 MHz
Sweep Time Mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto
Sweep Time	1.01 ms	1.01 ms	1.01 ms	1.01 ms	1.01 ms	1.01 ms	1.01 ms	1.01 ms	1.01 ms
Ref Level	26.6 dBm	26.6 dBm	26.6 dBm	26.6 dBm	26.6 dBm	26.6 dBm	26.6 dBm	26.6 dBm	26.6 dBm
RF Att Mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto
RF Attenuation	6 dB	6 dB	6 dB	6 dB	6 dB	6 dB	6 dB	6 dB	6 dB
Preamp	Off	Off	Off	Off	Off	Off	Off	Off	Off
Transducer	None	None	None	None	None	None	None	None	None
Multi Limit Calc	NONE	NONE	NONE	NONE	NONE	SUM	SUM	SUM	SUM
Min Sweep Points	1 001	1 001	1 001	1 001	1 001	1 001	1 001	1 001	1 001
Limit Check 1	Absolute	Absolute	Absolute	Absolute	Absolute	Absolute	Absolute	Absolute	Absolute
Abs Limit Start 1	-28 dBm	-16 dBm	-13 dBm	-16 dBm	40 dBm	-16 dBm	-13 dBm	-16 dBm	-28 dBm
Abs Limit Stop 1	-28 dBm	-16 dBm	-13 dBm	-16 dBm	40 dBm	-16 dBm	-13 dBm	-16 dBm	-28 dBm

Figure 8.3-11: *Example of the sweep table*

8.4 Spurious Emissions at Antenna Terminal

8.4.1 References, definitions and limits

§ 2.1051 Measurements required: Spurious emissions at antenna terminals.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

8.4.2 Test summary

Verdict	Pass		
Tested by	O. Frau	Test date	May 12, 2025

8.4.3 Observations, settings and special notes

The spectrum was searched from 30 MHz to 40 GHz.
Limit line was adjusted for MIMO operation by 3 dB*: −28 dBm – 3 dB = −31 dBm
*MIMO correction factor for 2 antenna ports: $10 \times \text{Log}_{10}(2) = 3.01$ dB

Spectrum analyser settings:

Resolution bandwidth:	Reference bandwidth in the applicable rule section for the supported frequency band
Video bandwidth:	VBW ≥ 3 × RBW
Detector mode:	RMS
Trace mode:	Max Hold

8.4.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767

Notes: NCR - no calibration required, VOU - verify on use

8.4.5 Test data

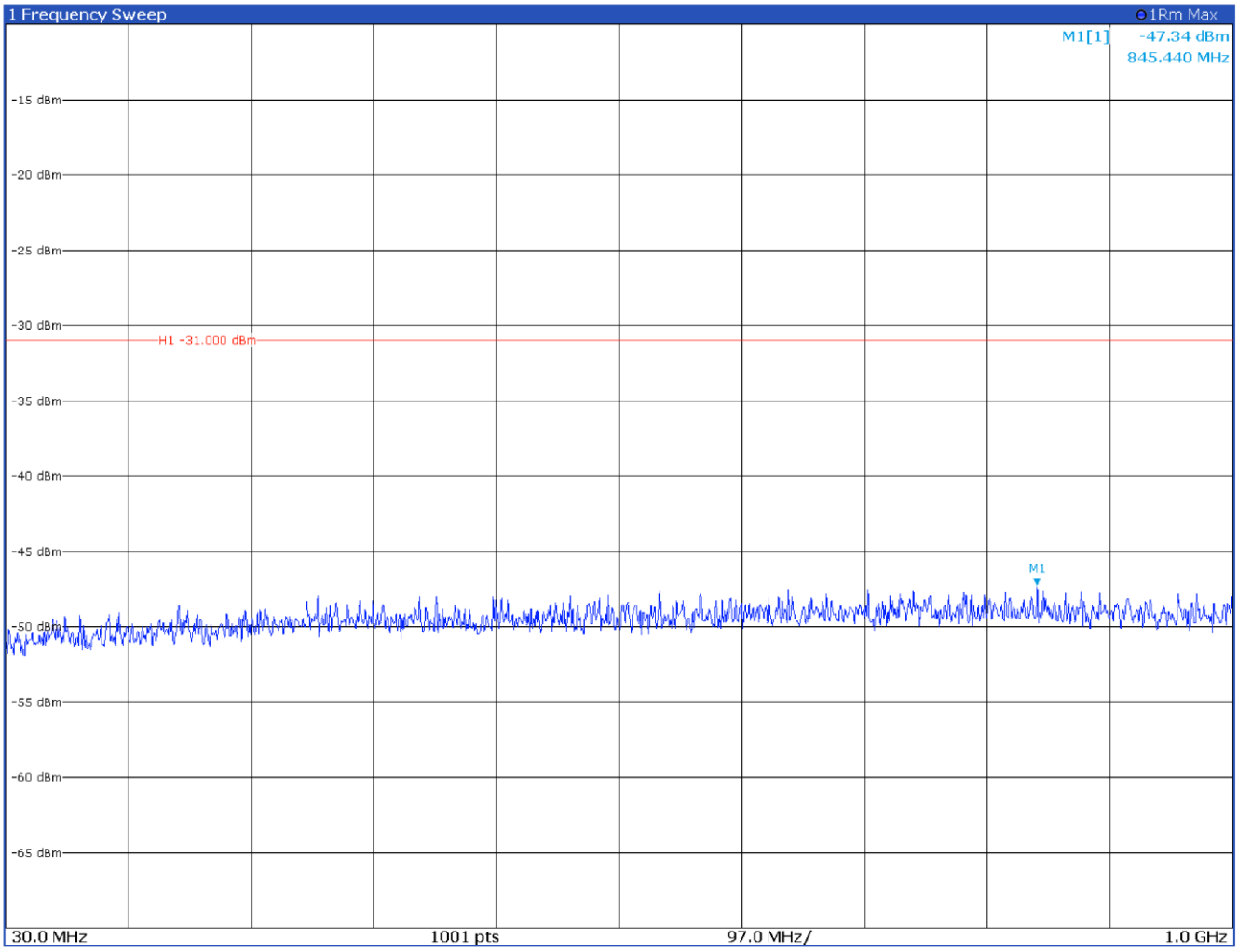


Figure 8.4-1: *Conducted spurious emissions 30 to 1000 MHz, 5900 MHz, 10 MHz OBW, Antenna port 1*

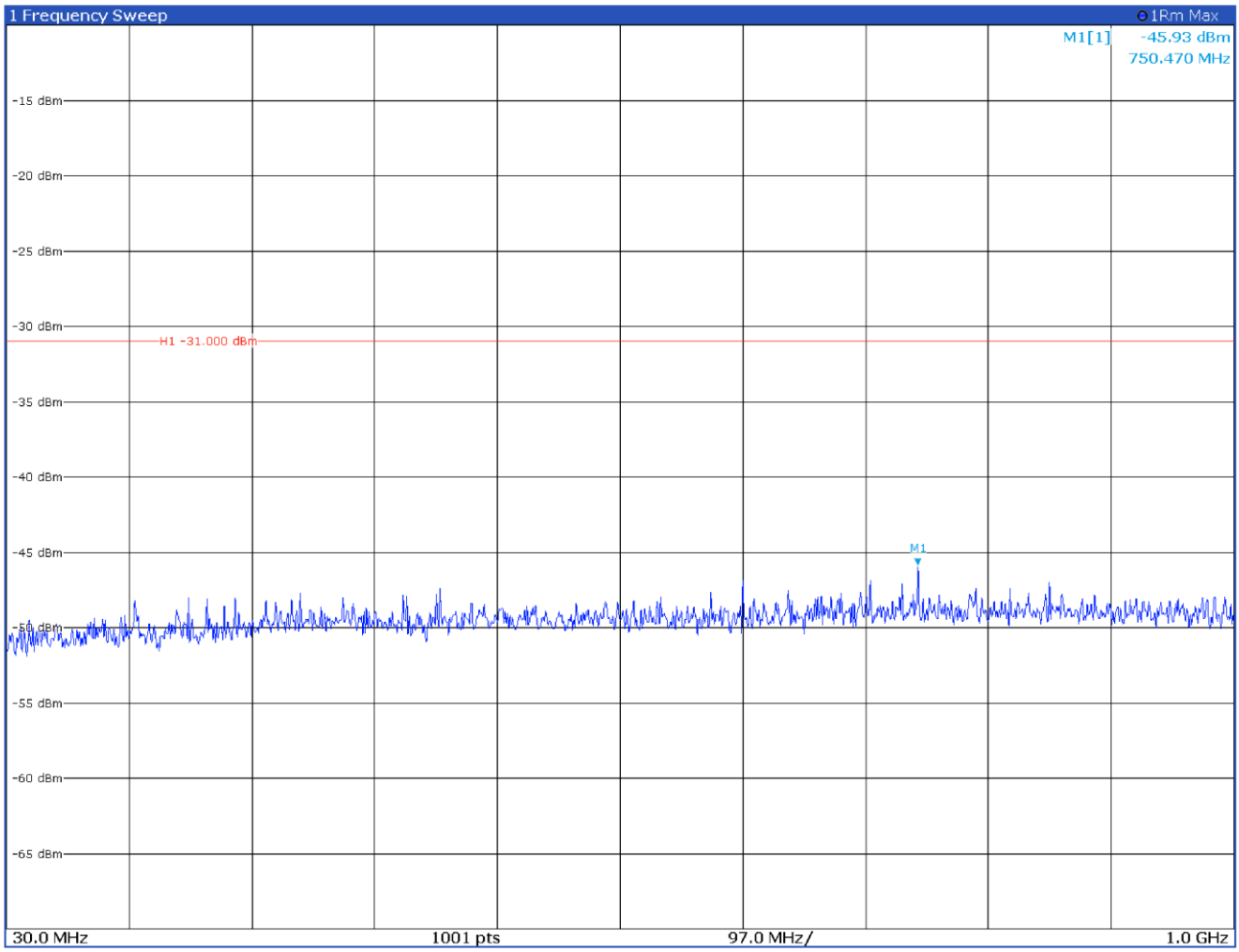
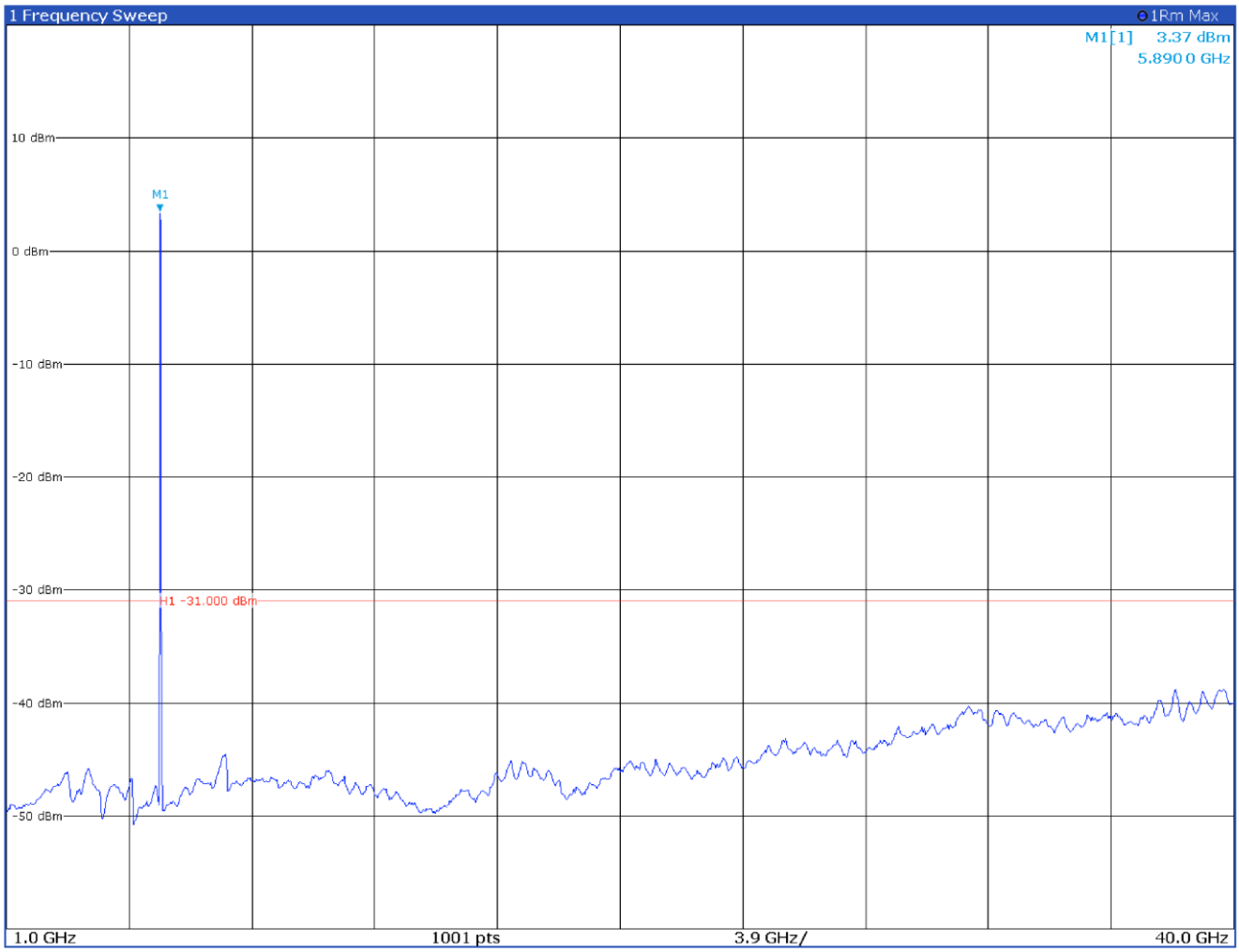
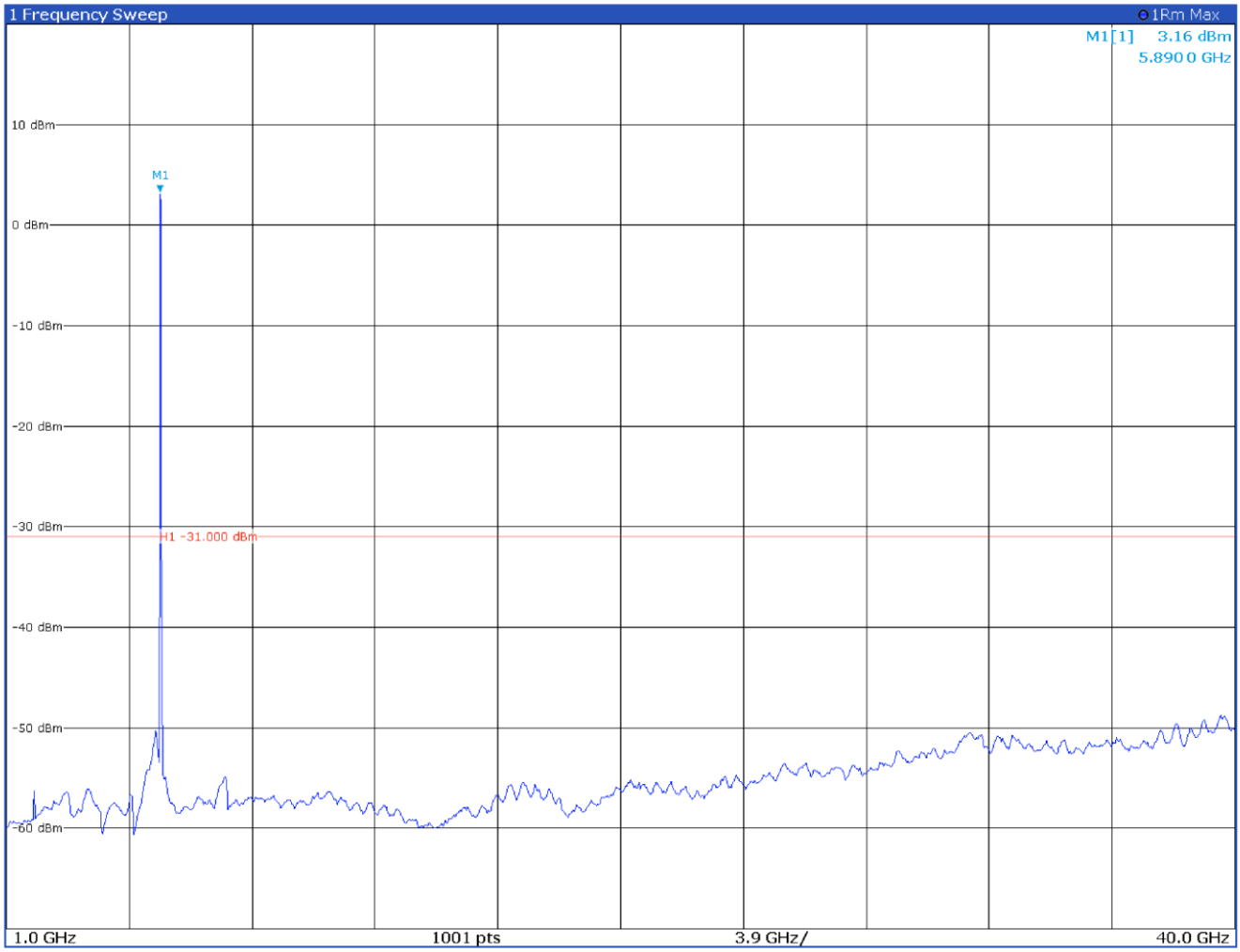


Figure 8.4-2: *Conducted spurious emissions 30 to 1000 MHz, 5900 MHz, 10 MHz OBW, Antenna port 2*



Limit exceeded by the carrier

Figure 8.4-3: *Conducted spurious emissions 1 to 40 GHz, 5900 MHz, 10 MHz OBW, Antenna port 1*



Limit exceeded by the carrier

Figure 8.4-4: *Conducted spurious emissions 1 to 40 GHz, 5900 MHz, 10 MHz OBW, Antenna port 2*

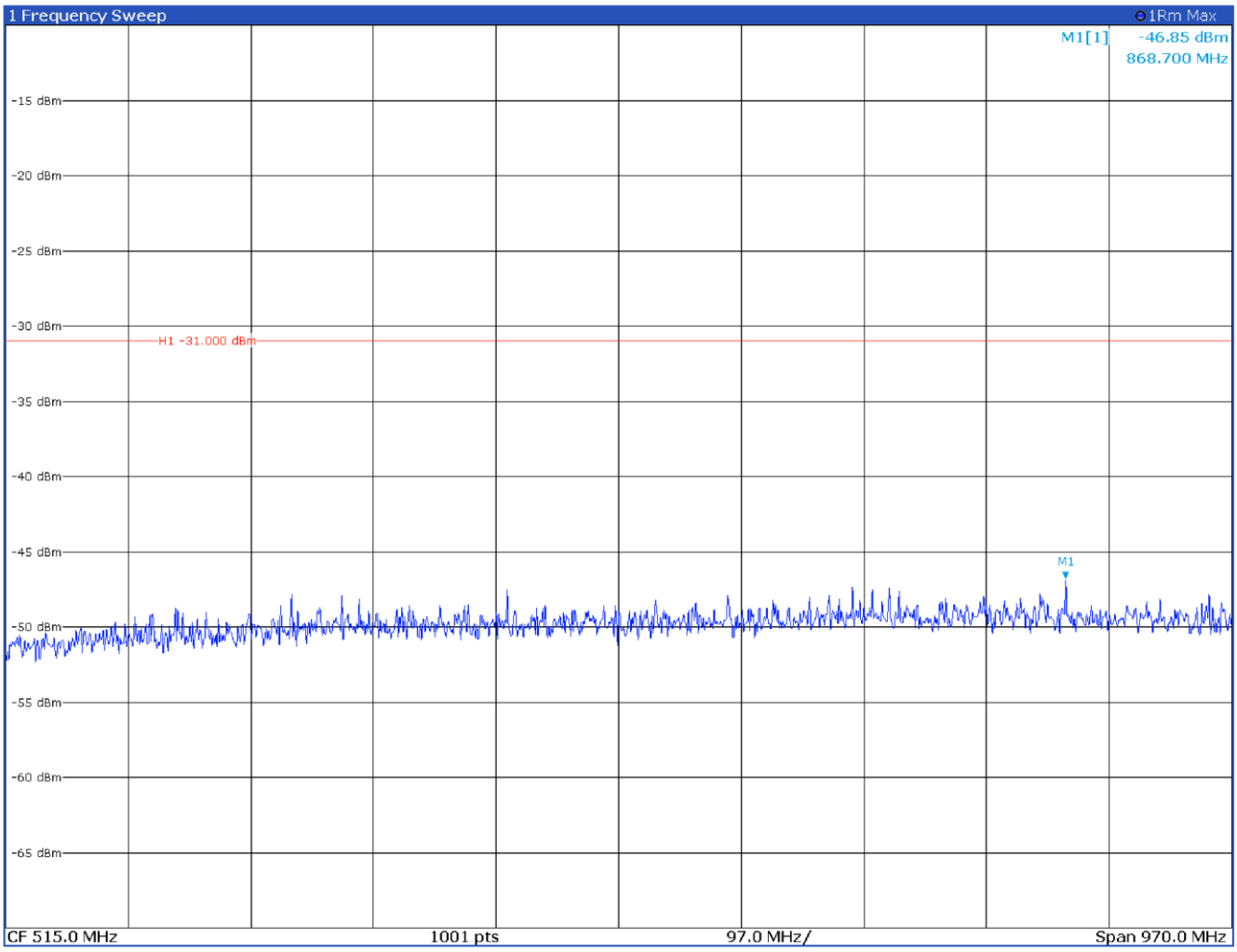


Figure 8.4-5: *Conducted spurious emissions 30 to 1000 MHz, 5910 MHz, 10 MHz OBW, Antenna port 1*

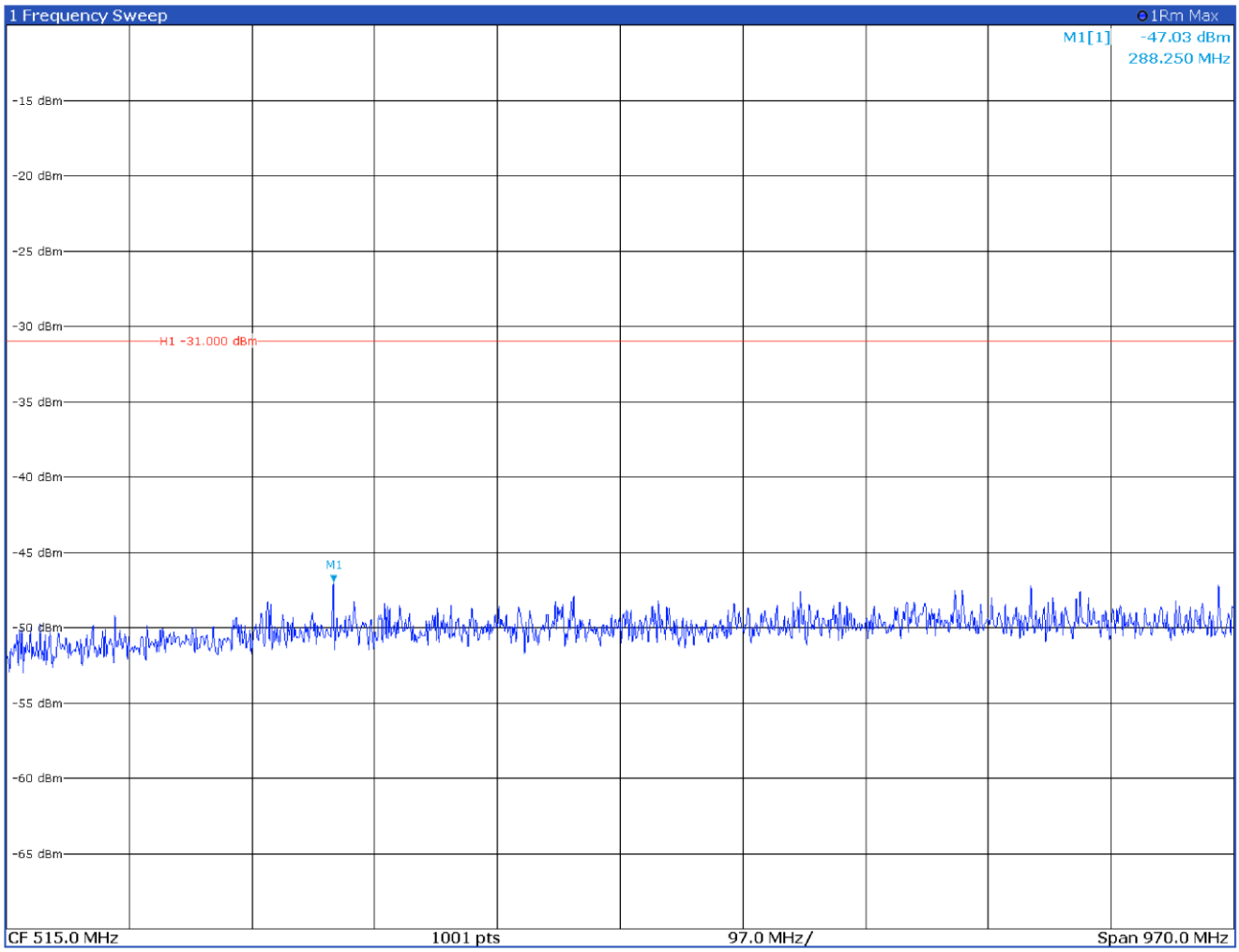
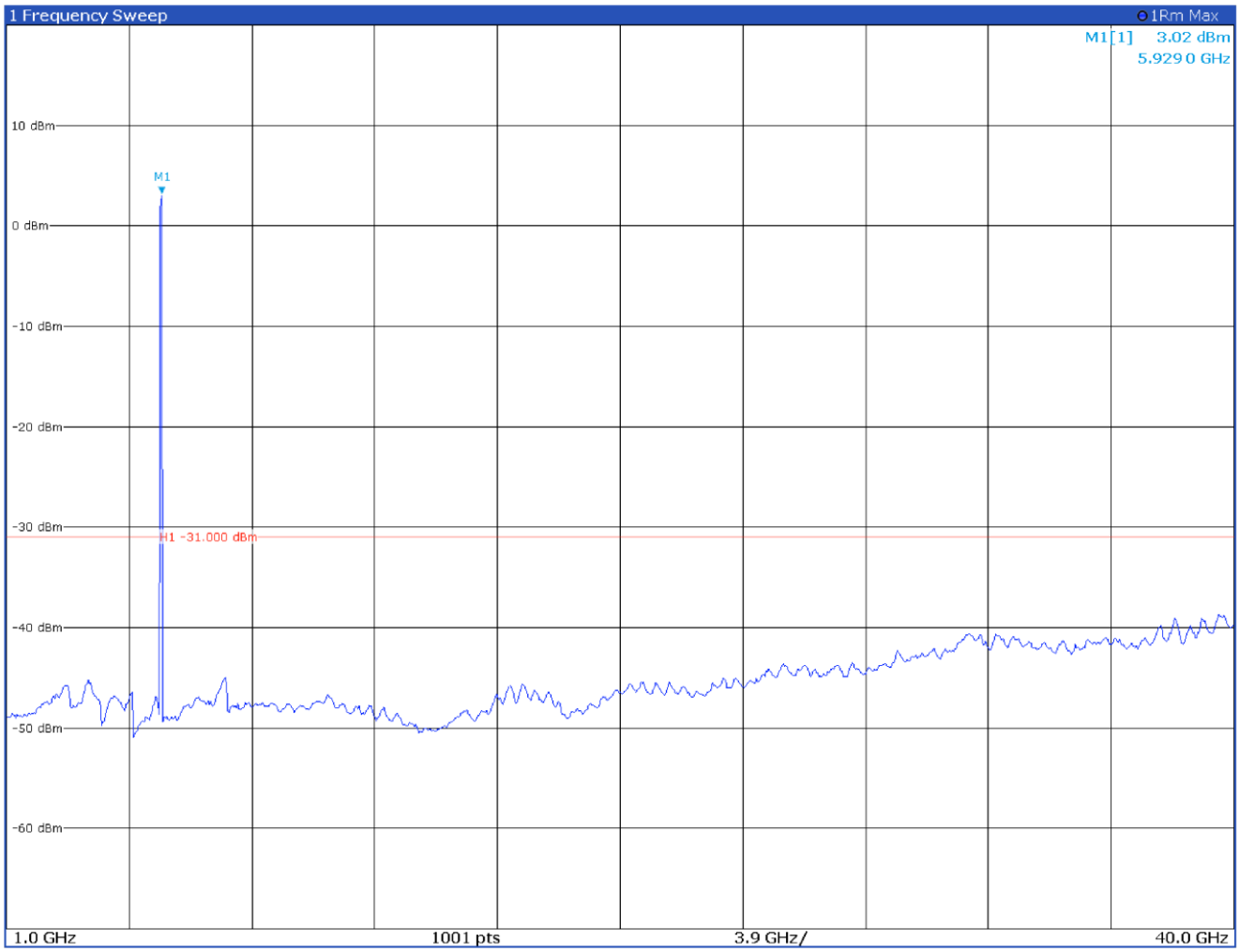
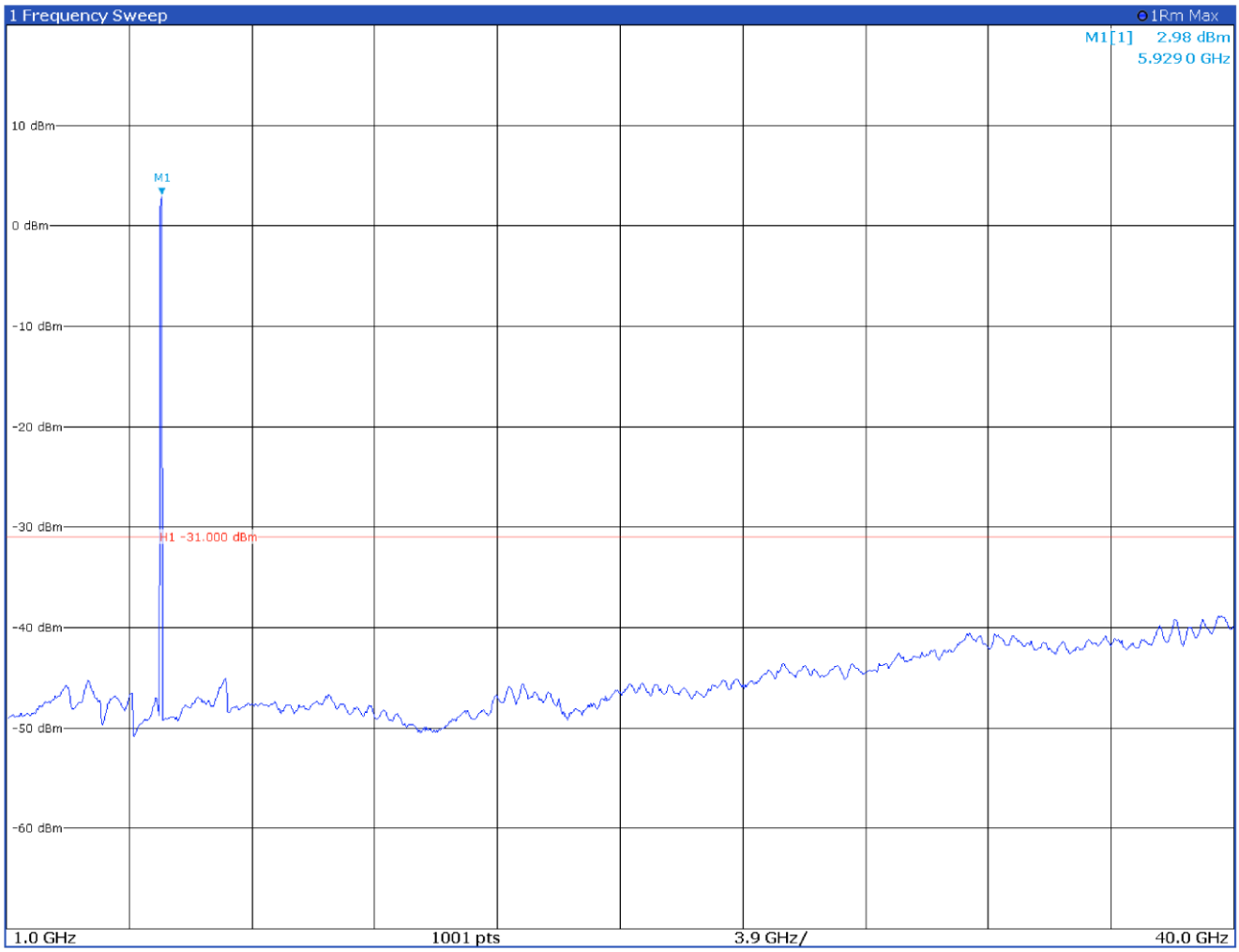


Figure 8.4-6: *Conducted spurious emissions 30 to 1000 MHz, 5910 MHz, 10 MHz OBW, Antenna port 2*



Limit exceeded by the carrier

Figure 8.4-7: *Conducted spurious emissions 1 to 40 GHz, 5910 MHz, 10 MHz OBW, Antenna port 1*



Limit exceeded by the carrier

Figure 8.4-8: *Conducted spurious emissions 1 to 40 GHz, 5910 MHz, 10 MHz OBW, Antenna port 2*

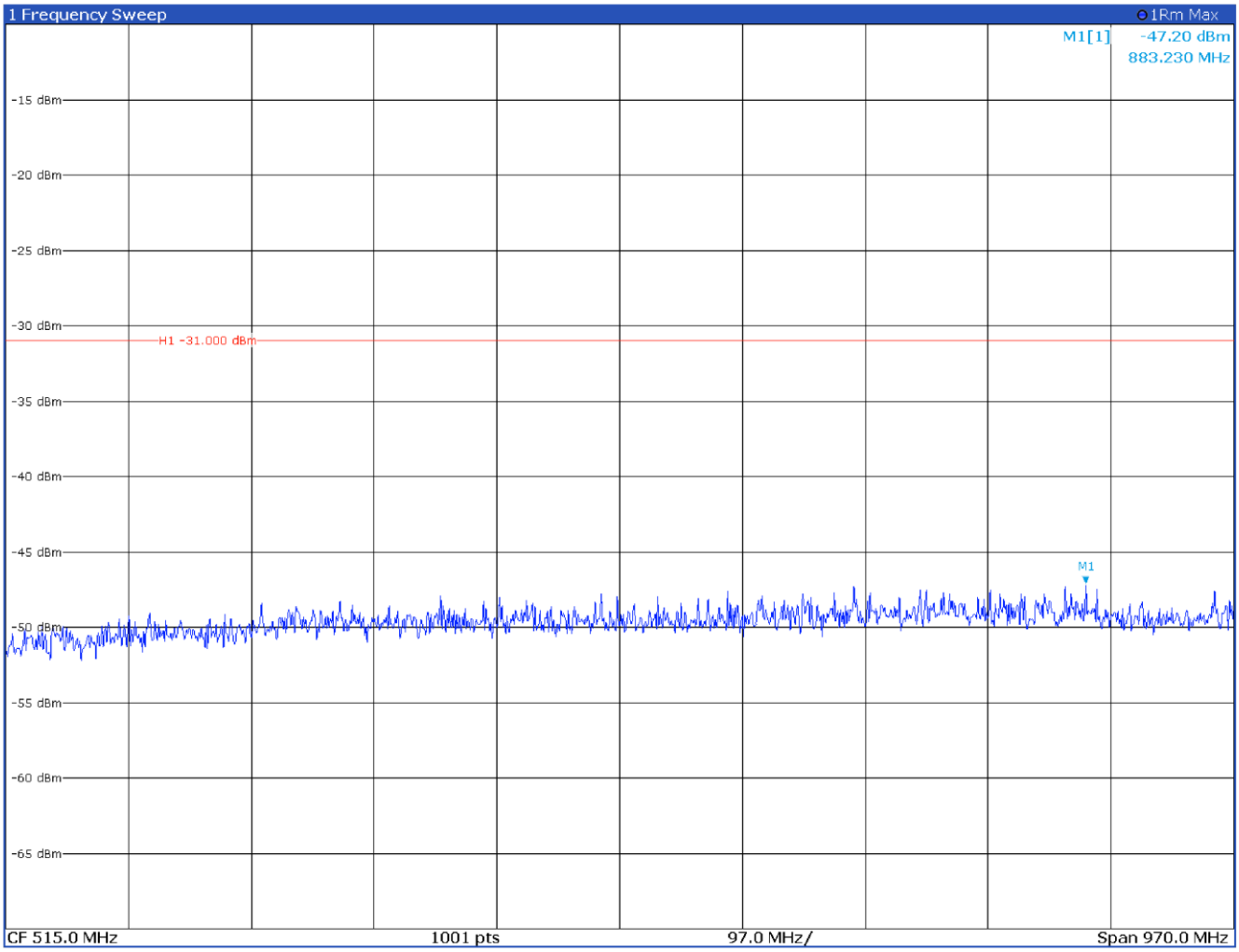


Figure 8.4-9: *Conducted spurious emissions 30 to 1000 MHz, 5920 MHz, 10 MHz OBW, Antenna port 1*

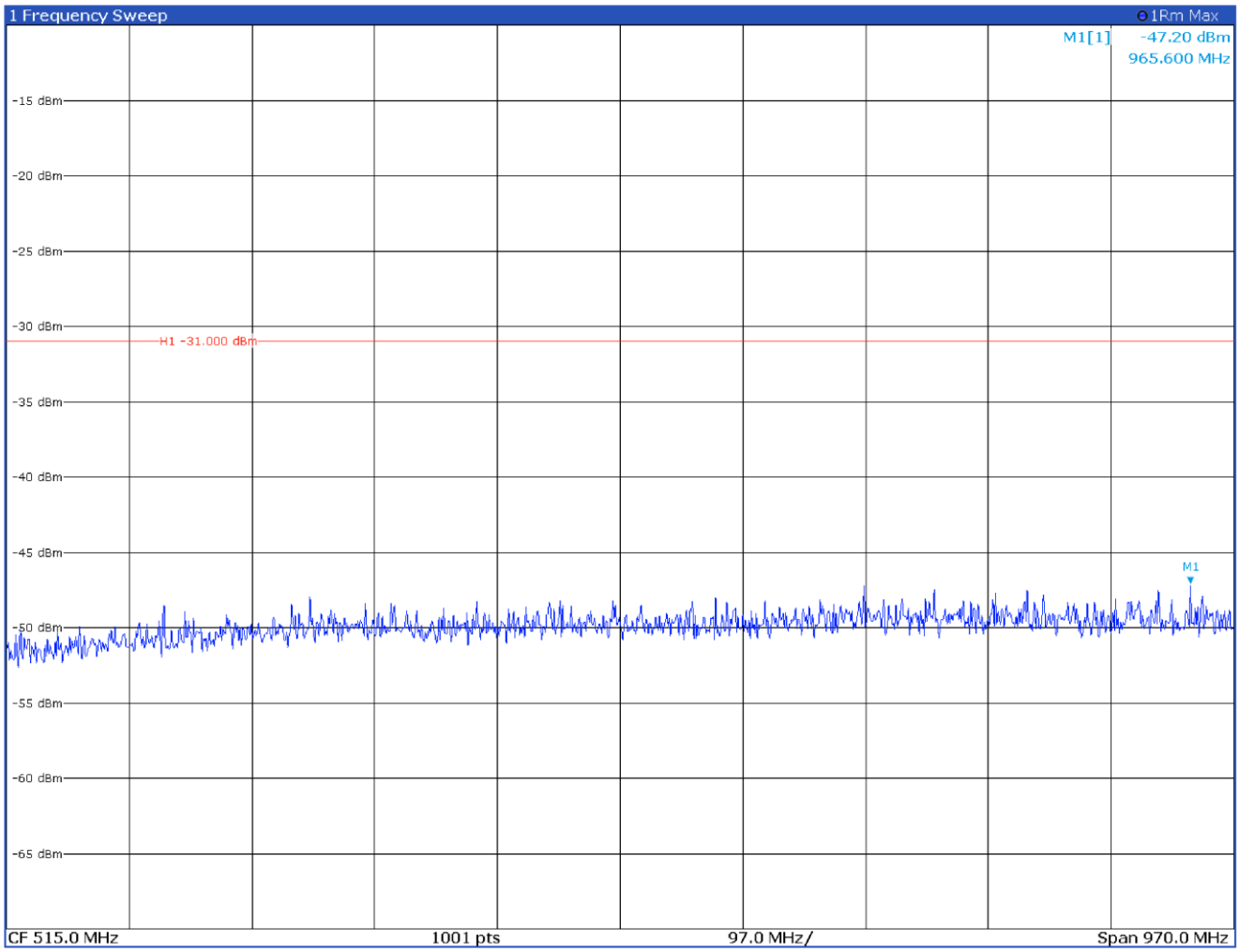
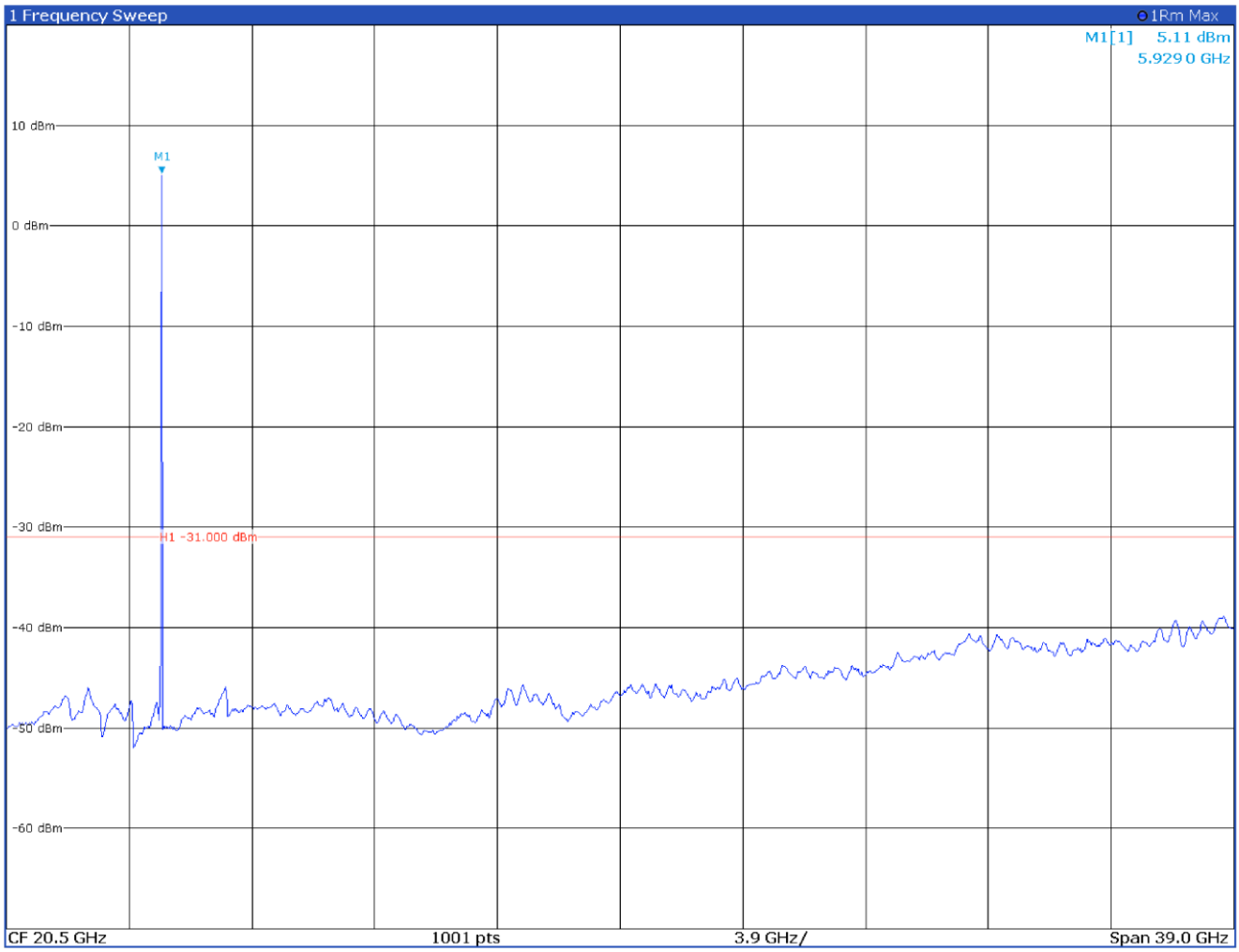
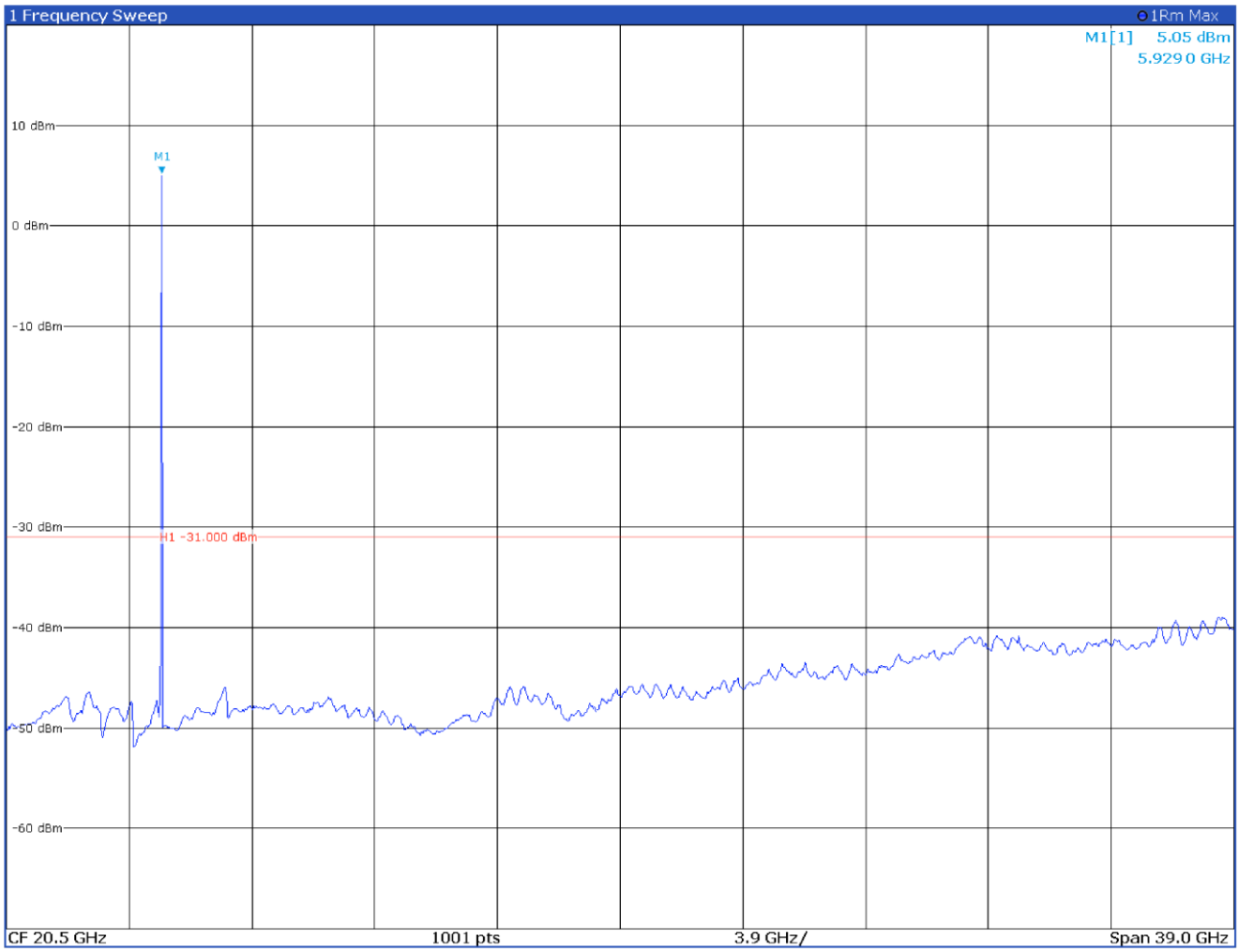


Figure 8.4-10: *Conducted spurious emissions 30 to 1000 MHz, 5920 MHz, 10 MHz OBW, Antenna port 2*



Limit exceeded by the carrier

Figure 8.4-11: *Conducted spurious emissions 1 to 40 GHz, 5920 MHz, 10 MHz OBW, Antenna port 1*



Limit exceeded by the carrier

Figure 8.4-12: *Conducted spurious emissions 1 to 40 GHz, 5920 MHz, 10 MHz OBW, Antenna port 2*

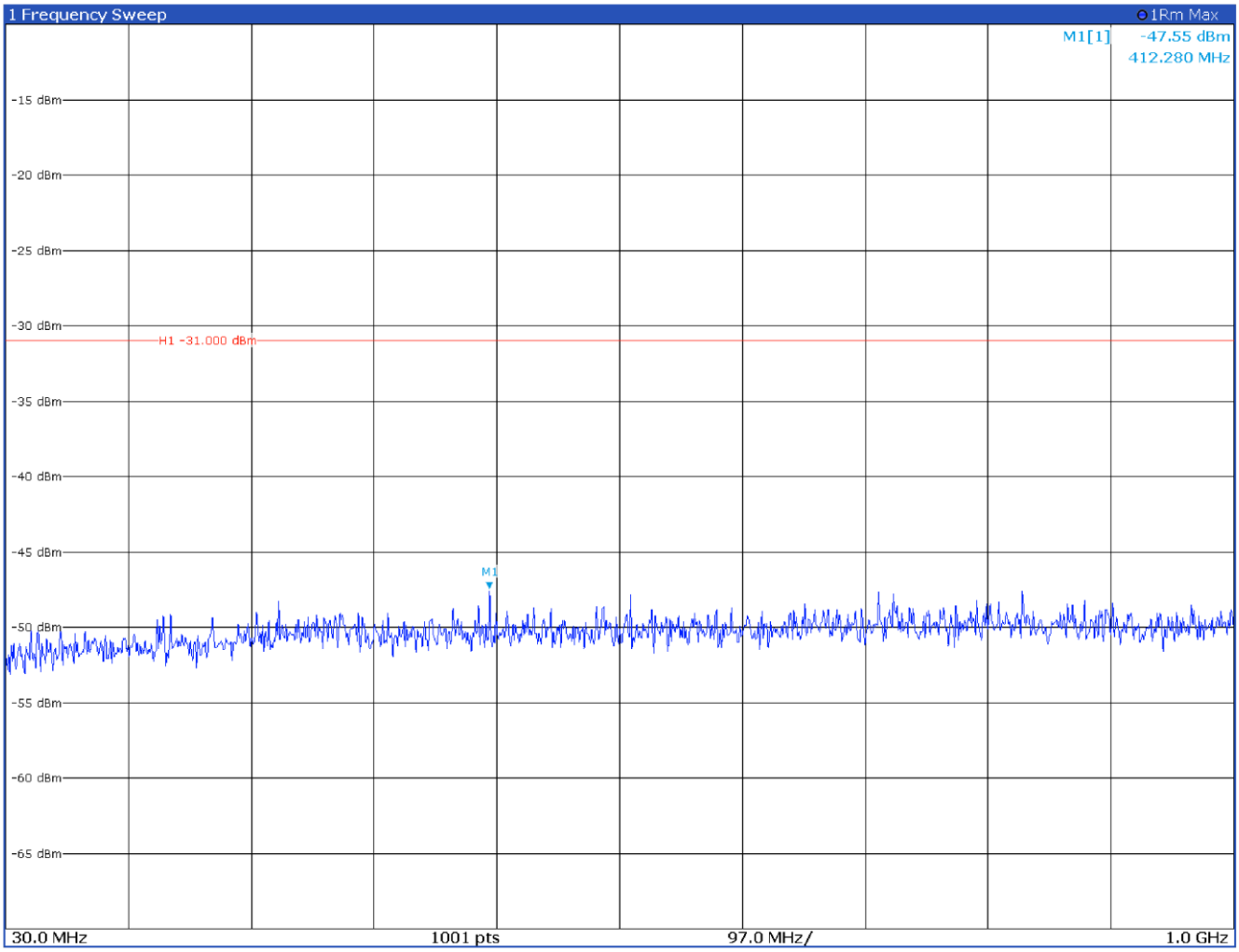


Figure 8.4-13: *Conducted spurious emissions 30 to 1000 MHz, 5905 MHz, 20 MHz OBW, Antenna port 1*