Test data, continued

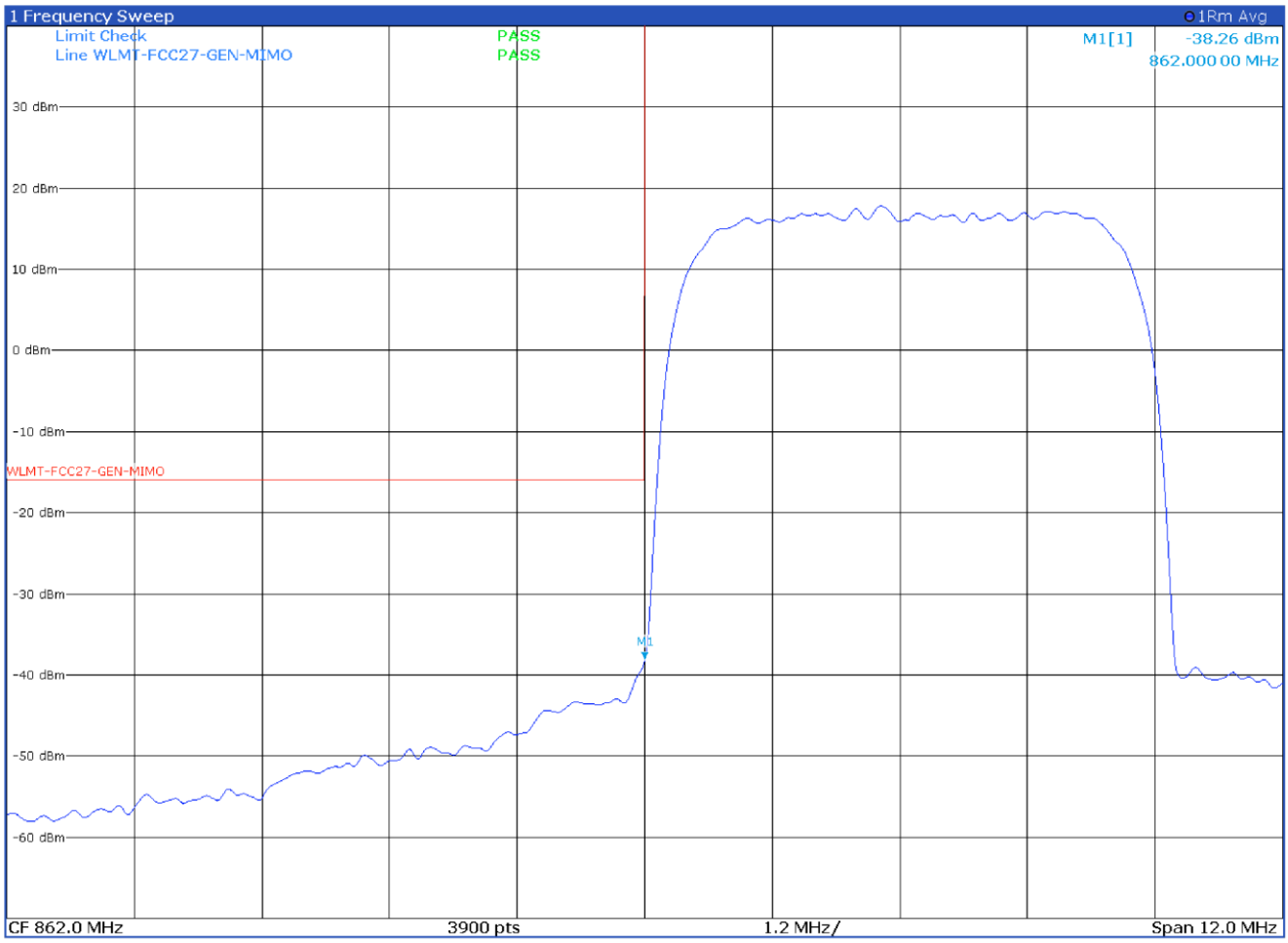


Figure 8.5-11: *Antenna port 1 single carrier lower block edge with input signal at AGC threshold*

Test data, continued

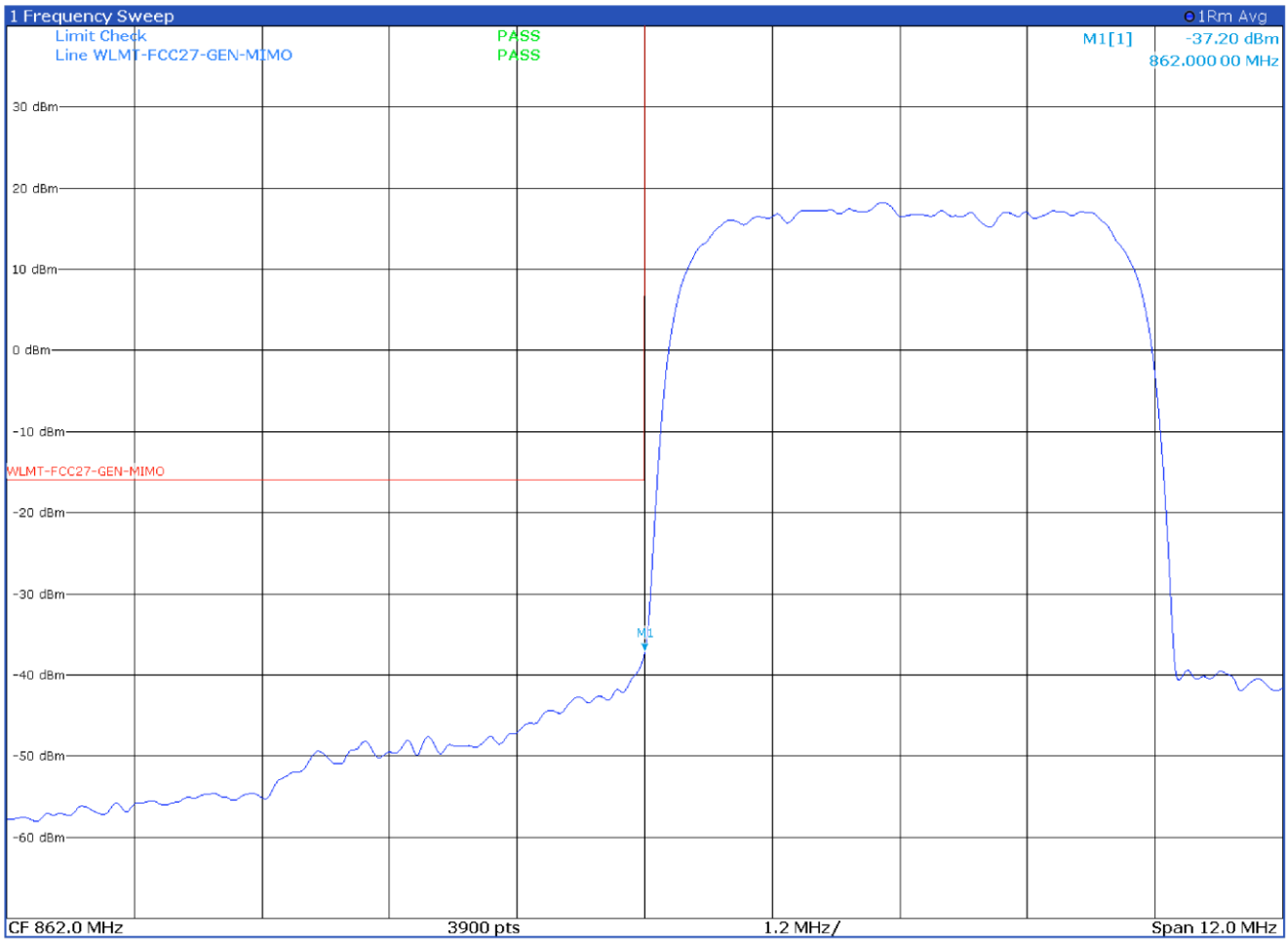


Figure 8.5-12: *Antenna port 1 single carrier lower block edge with input signal at AGC threshold +3 dB*

Test data, continued

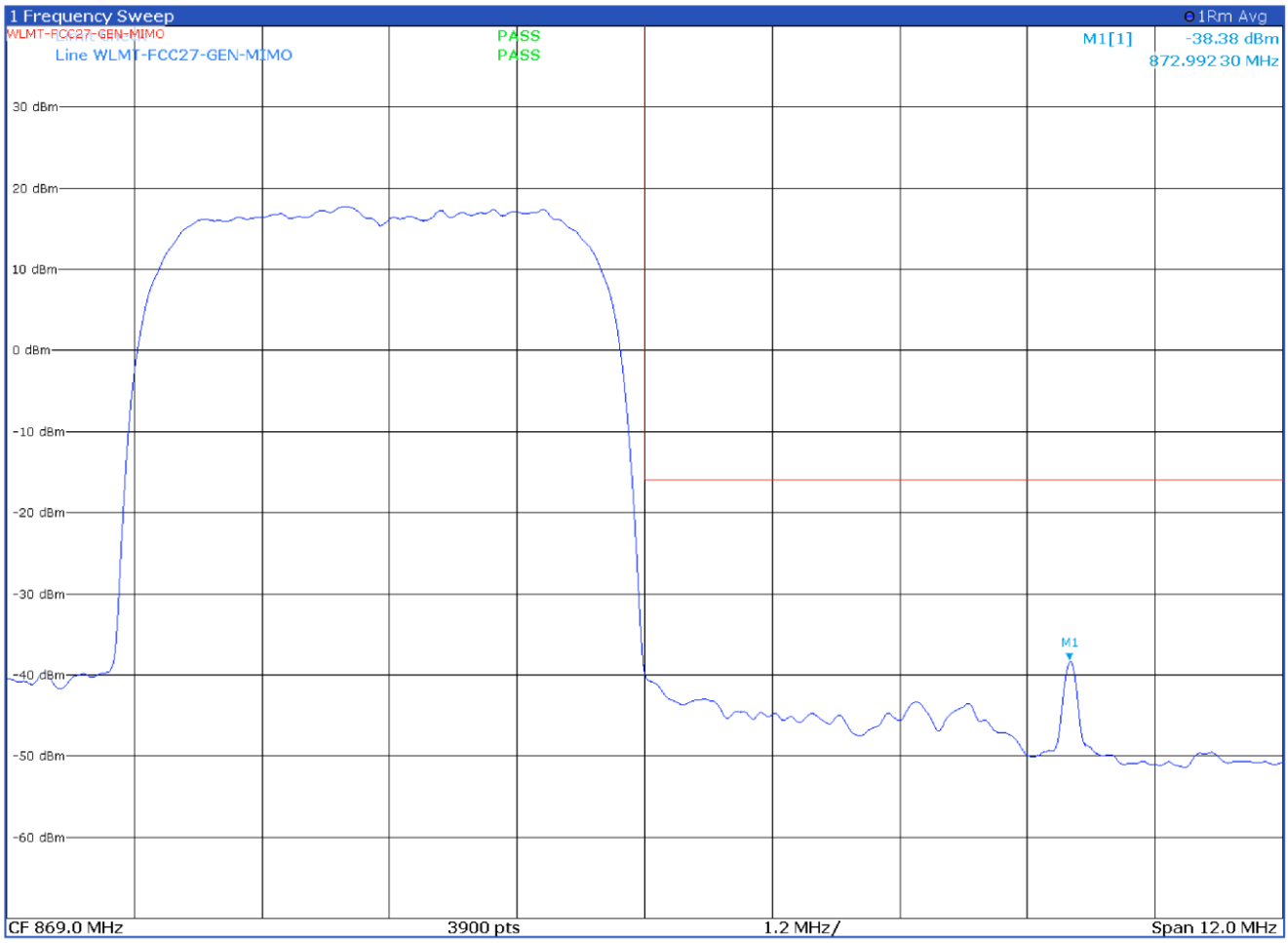


Figure 8.5-13: *Antenna port 2 single carrier upper block edge with input signal at AGC threshold*

Test data, continued

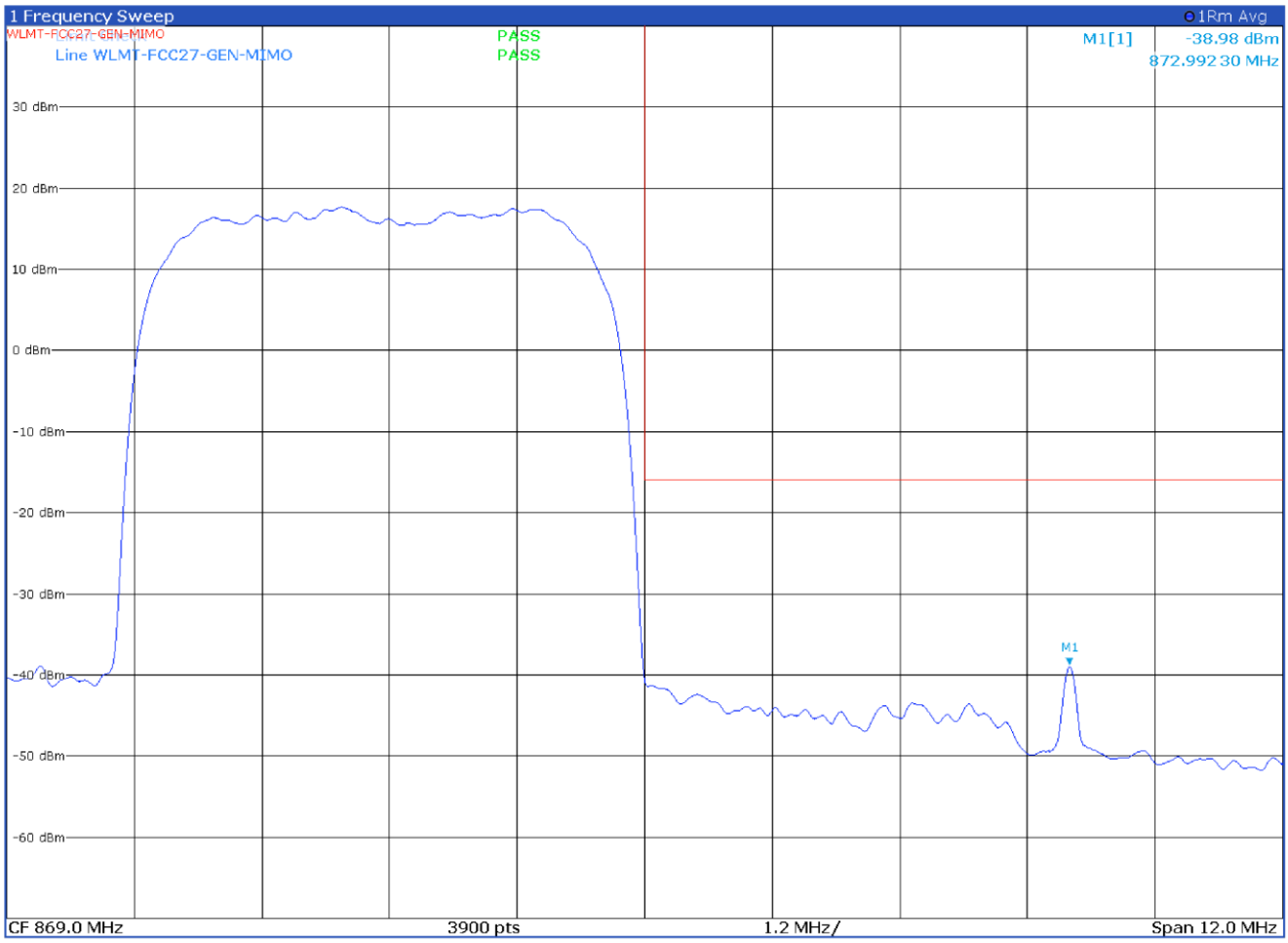


Figure 8.5-14: *Antenna port 2 single carrier upper block edge with input signal at AGC threshold +3 dB*

Test data, continued

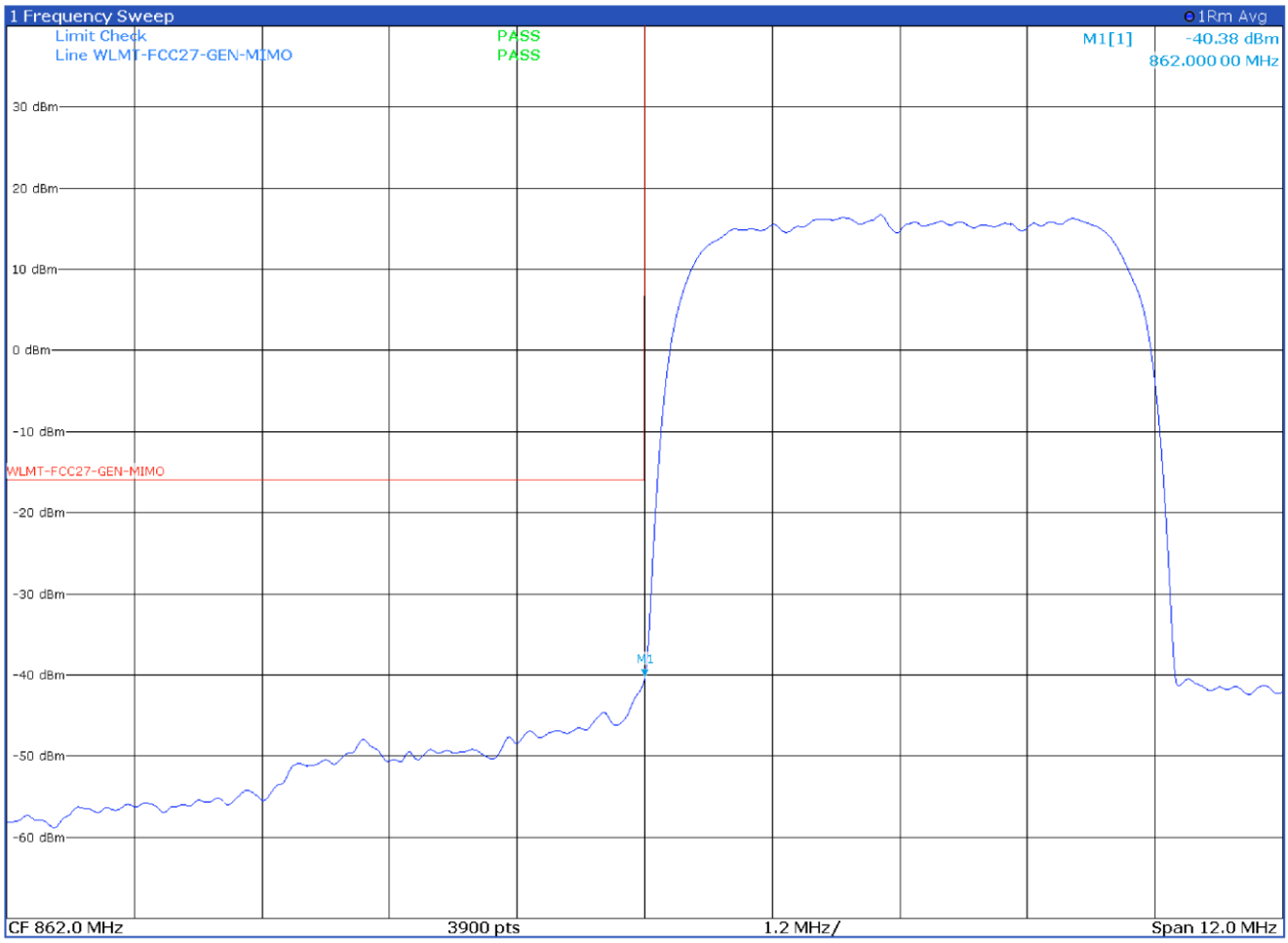


Figure 8.5-15: *Antenna port 2 single carrier lower block edge with input signal at AGC threshold*

Test data, continued

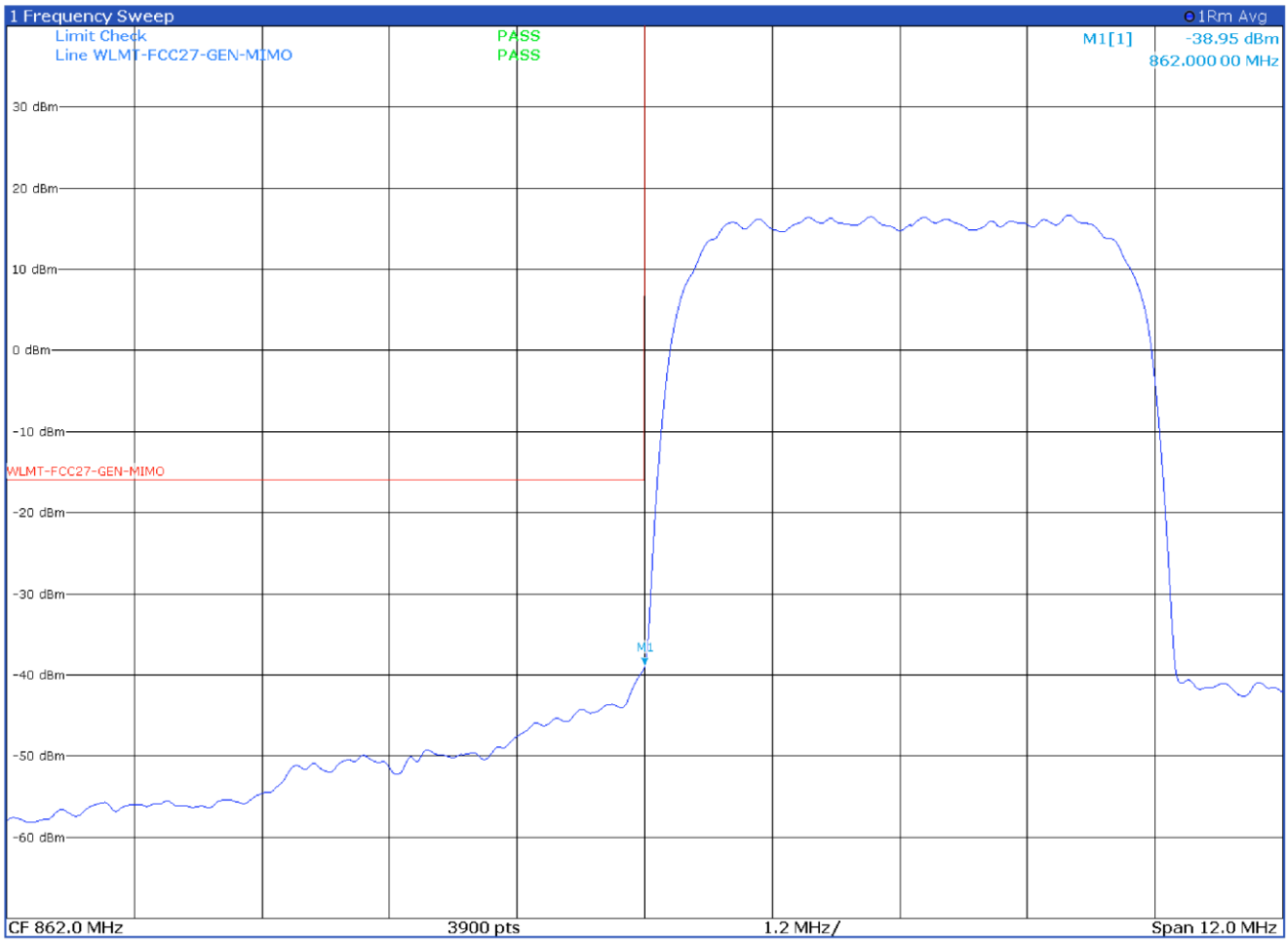


Figure 8.5-16: *Antenna port 2 single carrier lower block edge with input signal at AGC threshold +3 dB*

8.6 Spurious emissions conducted measurements

8.6.1 References, definitions and limits

FCC §90.210(g)(2)
On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

8.6.2 Test summary

Verdict	Pass		
Tested by	P. Barbieri	Test date	January 28, 2022

8.6.3 Observations, settings and special notes

The spectrum was searched from 9 kHz to the 10th harmonic.
All measurements were performed using peak detector according to note 4 of 935210 D05 Indus Booster Basic Meas v01r04 paragraph 3.6.3.
Limit line (43 + 10 $\log_{10}$ (P) or −13 dBm) was adjusted for MIMO operation by 3 dB*: −13 dBm – 3 dB = −16 dBm
*MIMO correction factor for 2 antenna ports: 10 × $\text{Log}_{10}(2)$ = 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:	Peak
Trace mode:	Max Hold

Input signal frequency

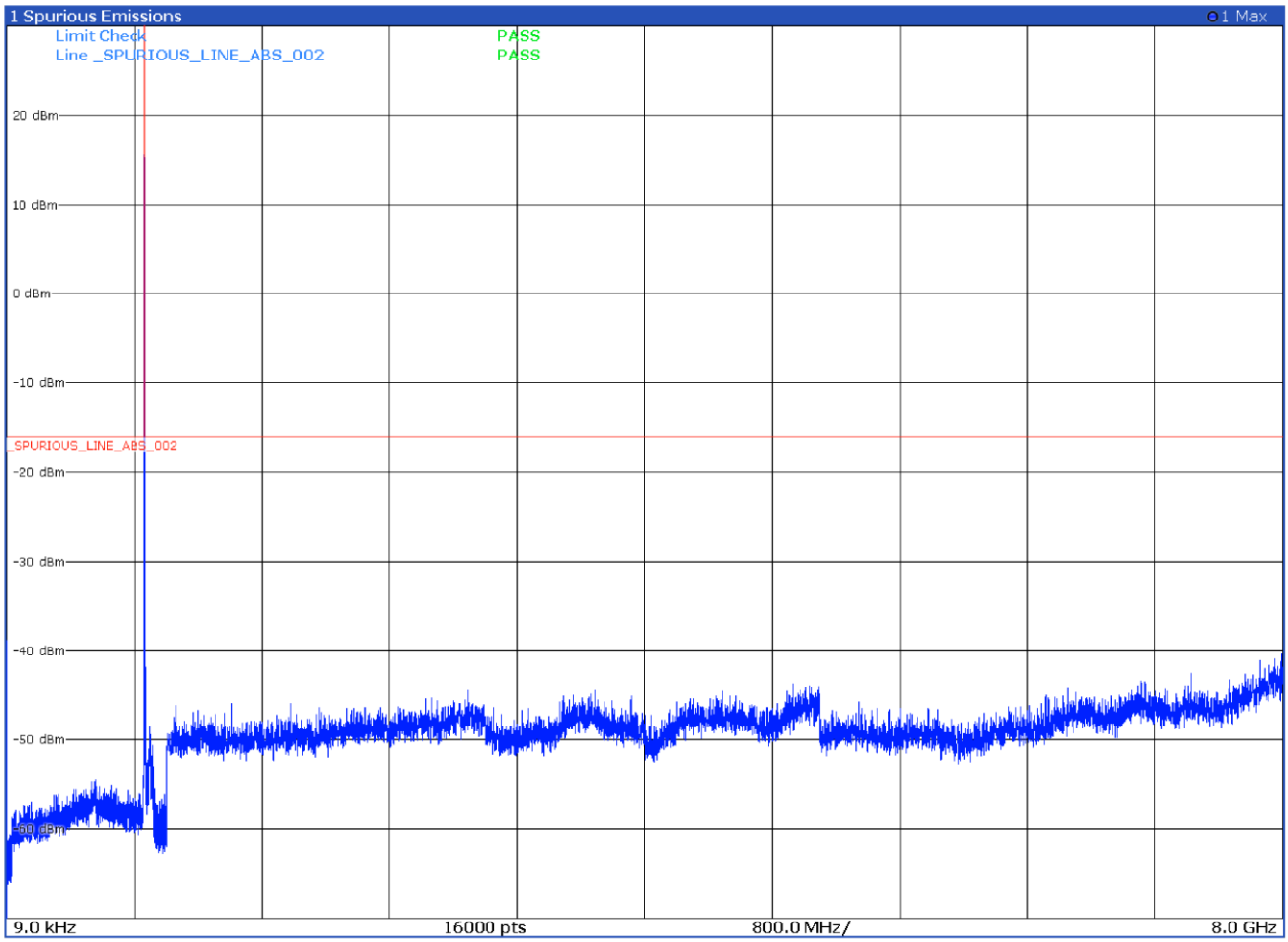
Low channel	864.5 MHz
High channel	866.5 MHz

8.6.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263254
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263397

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

8.6.5 Test data

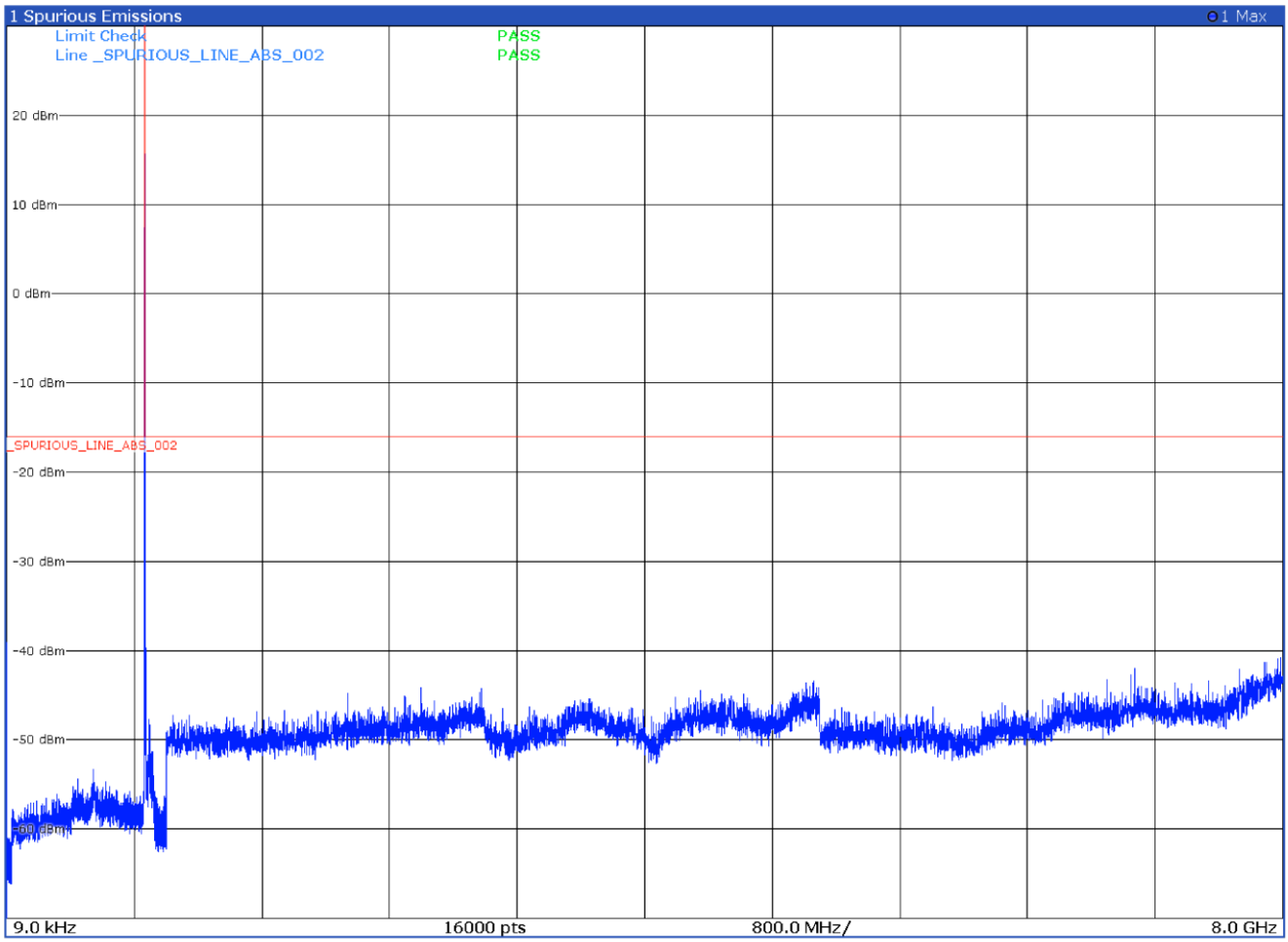


2 Result Summary

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 kHz	150.000 kHz	1.000 kHz	**9.070 50 kHz**	**-65.82 dBm**	**-49.82 dB**
150.000 kHz	30.000 MHz	10.000 kHz	**702.225 00 kHz**	**-38.83 dBm**	**-22.83 dB**
30.000 MHz	862.000 MHz	100.000 kHz	**861.792 00 MHz**	**-44.23 dBm**	**-28.23 dB**
862.000 MHz	869.000 MHz	100.000 kHz	**864.224 25 MHz**	**15.55 dBm**	**-34.45 dB**
869.000 MHz	1.000 GHz	100.000 kHz	**872.962 75 MHz**	**-41.89 dBm**	**-25.89 dB**
1.000 GHz	8.000 GHz	1.000 MHz	**7.995 19 GHz**	**-40.39 dBm**	**-24.39 dB**

Figure 8.6-1: *Conducted spurious emissions of low channel, antenna port 1*

Test data, continued

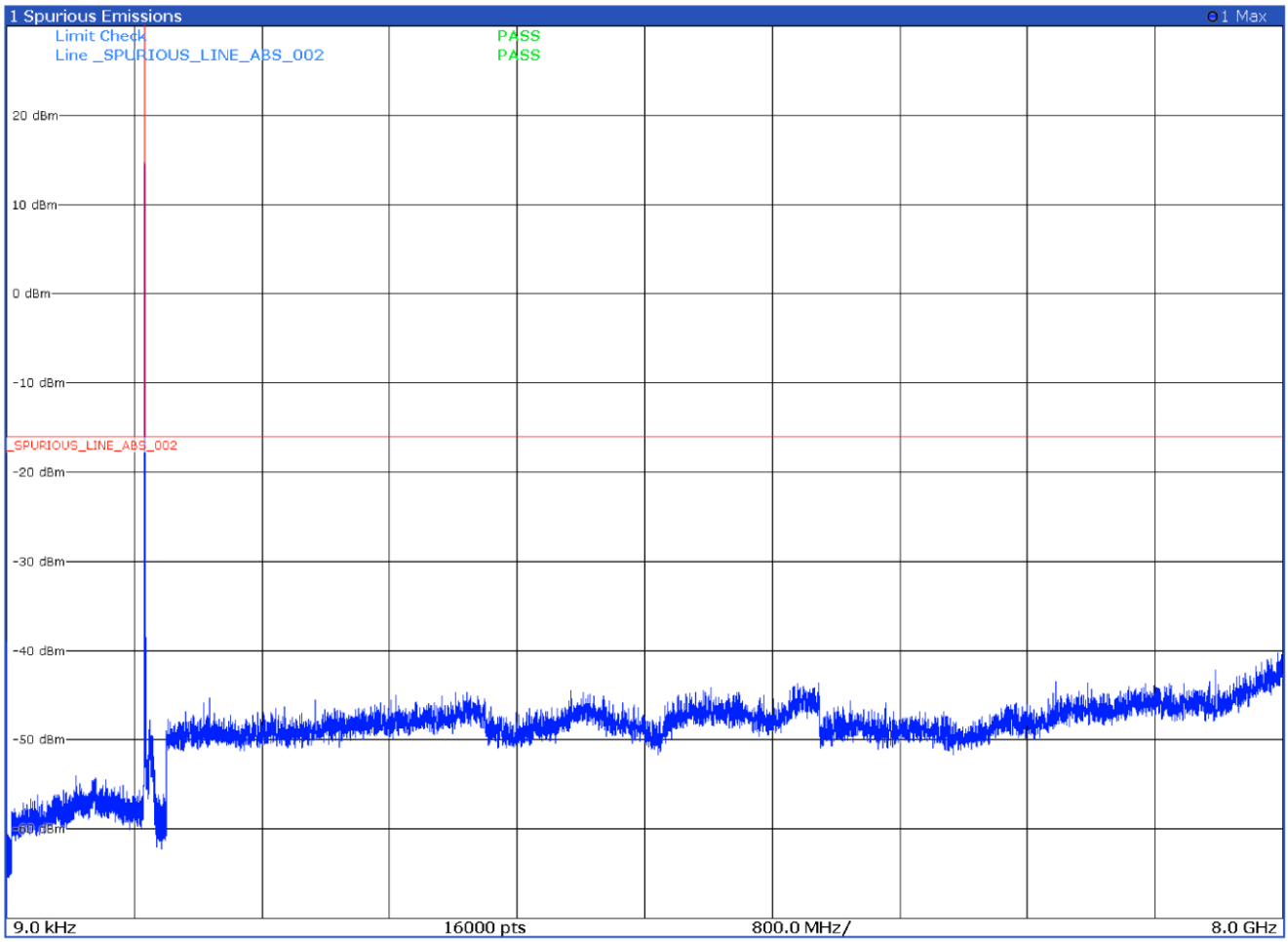


2 Result Summary

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 kHz	150.000 kHz	1.000 kHz	**13.018 50 kHz**	**-66.25 dBm**	**-50.25 dB**
150.000 kHz	30.000 MHz	10.000 kHz	**702.225 00 kHz**	**-39.04 dBm**	**-23.04 dB**
30.000 MHz	862.000 MHz	100.000 kHz	**861.792 00 MHz**	**-44.95 dBm**	**-28.95 dB**
862.000 MHz	869.000 MHz	100.000 kHz	**866.222 75 MHz**	**15.62 dBm**	**-34.38 dB**
869.000 MHz	1.000 GHz	100.000 kHz	**872.962 75 MHz**	**-39.77 dBm**	**-23.77 dB**
1.000 GHz	8.000 GHz	1.000 MHz	**7.985 56 GHz**	**-40.85 dBm**	**-24.85 dB**

Figure 8.6-2: *Conducted spurious emissions of high channel, antenna port 1*

8.6.1 Test data

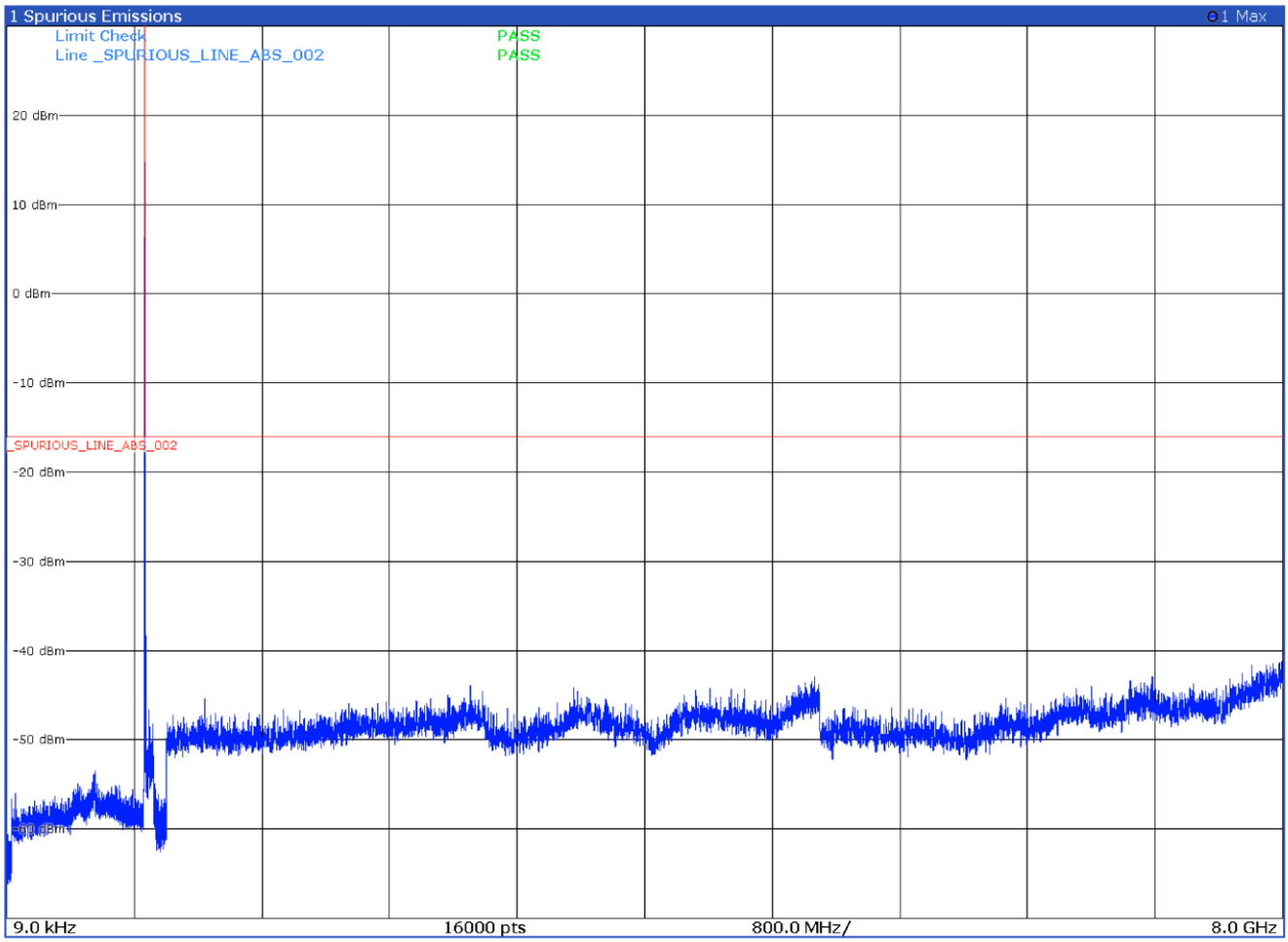


2 Result Summary

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 kHz	150.000 kHz	1.000 kHz	**17.953 50 kHz**	**-66.03 dBm**	**-50.03 dB**
150.000 kHz	30.000 MHz	10.000 kHz	**702.225 00 kHz**	**-39.12 dBm**	**-23.12 dB**
30.000 MHz	862.000 MHz	100.000 kHz	**861.792 00 MHz**	**-42.90 dBm**	**-26.90 dB**
862.000 MHz	869.000 MHz	100.000 kHz	**864.217 25 MHz**	**14.75 dBm**	**-35.25 dB**
869.000 MHz	1.000 GHz	100.000 kHz	**873.028 25 MHz**	**-38.54 dBm**	**-22.54 dB**
1.000 GHz	8.000 GHz	1.000 MHz	**7.967 19 GHz**	**-40.22 dBm**	**-24.22 dB**

Figure 8.6-3: *Conducted spurious emissions of low channel, antenna port 2*

Test data, continued



2 Result Summary

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 kHz	150.000 kHz	1.000 kHz	**16.120 50 kHz**	**-66.90 dBm**	**-50.90 dB**
150.000 kHz	30.000 MHz	10.000 kHz	**702.225 00 kHz**	**-38.95 dBm**	**-22.95 dB**
30.000 MHz	862.000 MHz	100.000 kHz	**861.792 00 MHz**	**-44.54 dBm**	**-28.54 dB**
862.000 MHz	869.000 MHz	100.000 kHz	**866.222 75 MHz**	**14.67 dBm**	**-35.33 dB**
869.000 MHz	1.000 GHz	100.000 kHz	**873.028 25 MHz**	**-38.28 dBm**	**-22.28 dB**
1.000 GHz	8.000 GHz	1.000 MHz	**7.993 44 GHz**	**-41.18 dBm**	**-25.18 dB**

Figure 8.6-4: *Conducted spurious emissions of high channel, antenna port 2*

8.7 Spurious emissions radiated measurements

8.7.1 References, definitions and limits

FCC §90.210(g)(2)
On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

8.7.2 Test summary

Verdict	Pass		
Tested by	P. Barbieri	Test date	January 28, 2022

8.7.3 Observations, settings and special notes

The spectrum was searched from 30 MHz to the 10th harmonic.
All measurements were performed using peak detector according to note 4 of 935210 D05 Indus Booster Basic Meas v01r04 paragraph 3.6.3.
Testing was performed with RF ports terminated with 50 Ohm load.
In the graphics below, no radiated spurious emission found and the limit is exceeded only by the carrier.

Spectrum analyser settings:

Resolution bandwidth:	100 kHz and 1 MHz
Video bandwidth:	VBW ≥ 3 × RBW
Detector mode:	Peak
Trace mode:	Max Hold

Input signal frequency

Low channel	864.5 MHz
High channel	866.5 MHz

8.7.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767
EMI Receiver	Rohde & Schwarz	ESW44	101620
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263254
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263397
Antenna Trilog 25MHz - 8GHz	Schwarzbeck Mess-Elektronik	VULB9162	9162-025
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STLP 9148-152
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40
Broadband Amplifier	Schwarzbeck Mess-Elektronik	BBV9718C	00121
Broadband Bench Top Amplifier	Sage	STB-1834034030-KFKF-L1	18490-01
Controller	Maturo	FCU3.0	10041
Tilt antenna mast	Maturo	TAM4.0-E	10042
Turntable	Maturo	TT4.0-5T	2.527
Semi-anechoic chamber	Nemko S.p.a.	10m semi-anechoic chamber	530

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

8.7.5 Test data

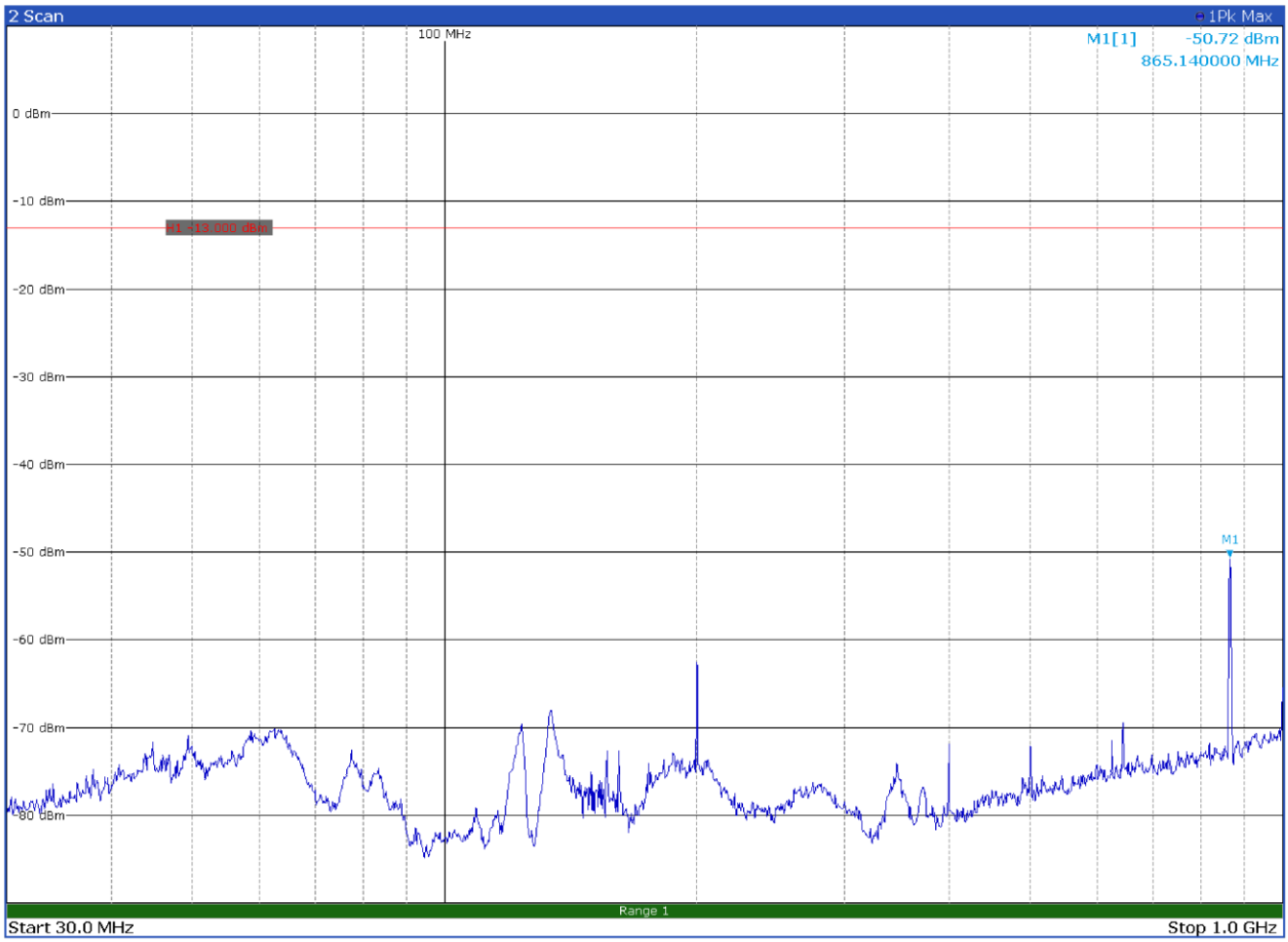


Figure 8.7-1: *Radiated spurious emissions below 1 GHz, low channel with antenna in horizontal polarization*

Test data, continued

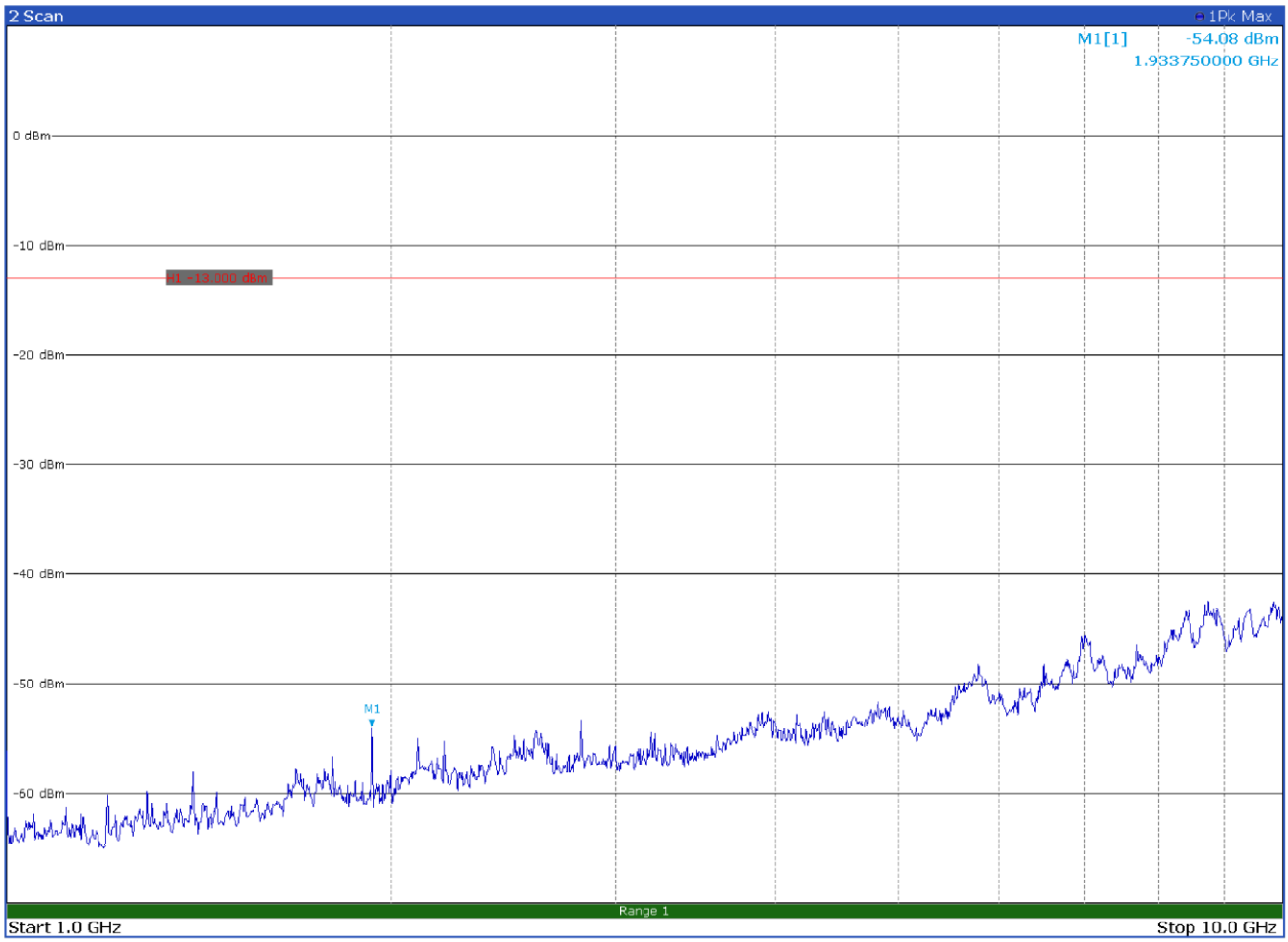


Figure 8.7-2: *Radiated spurious emissions from 1 GHz to 10 GHz, low channel with antenna in horizontal polarization*

Test data, continued

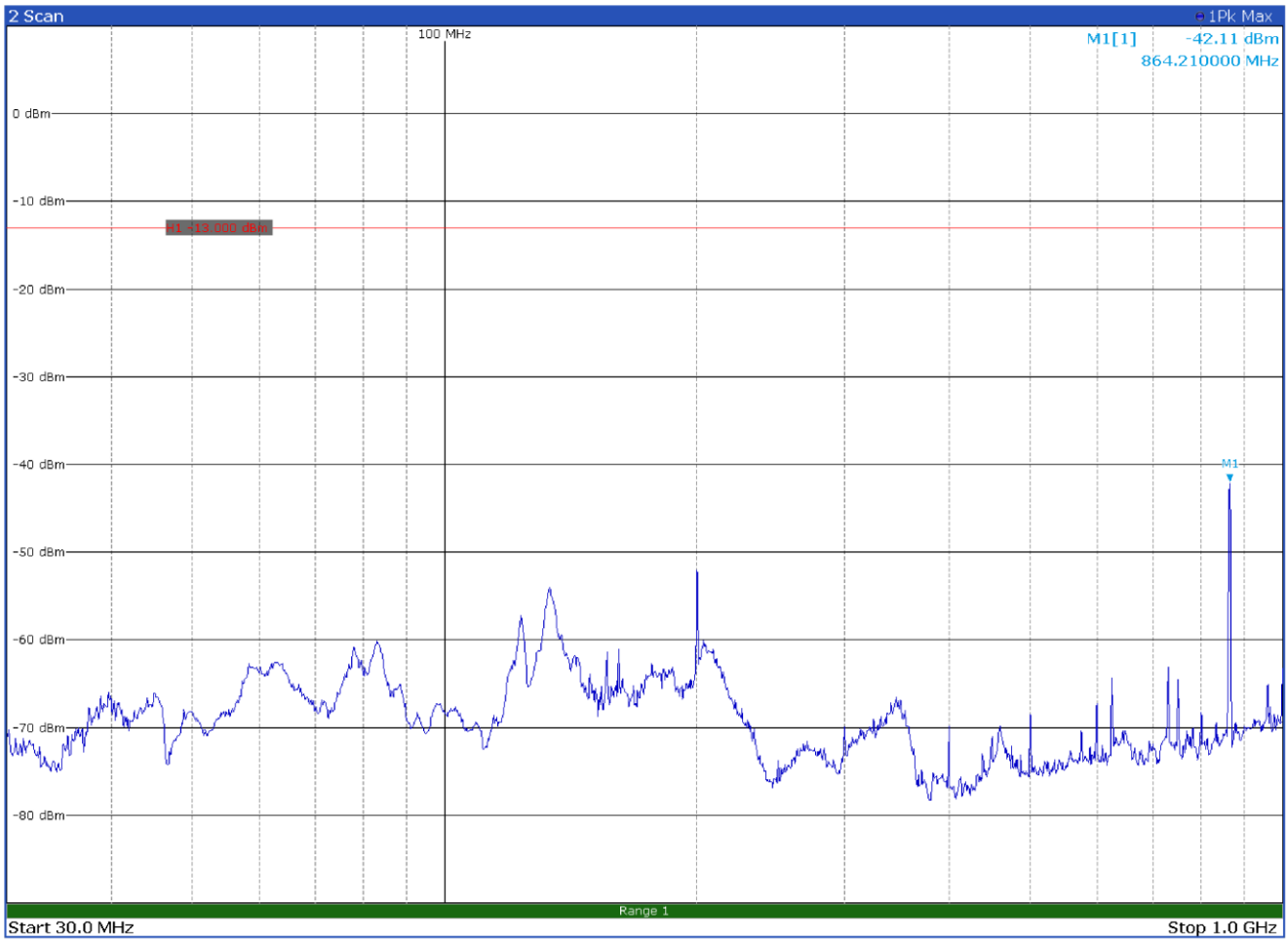


Figure 8.7-3: *Radiated spurious emissions below 1 GHz, low channel with antenna in vertical polarization*

Test data, continued

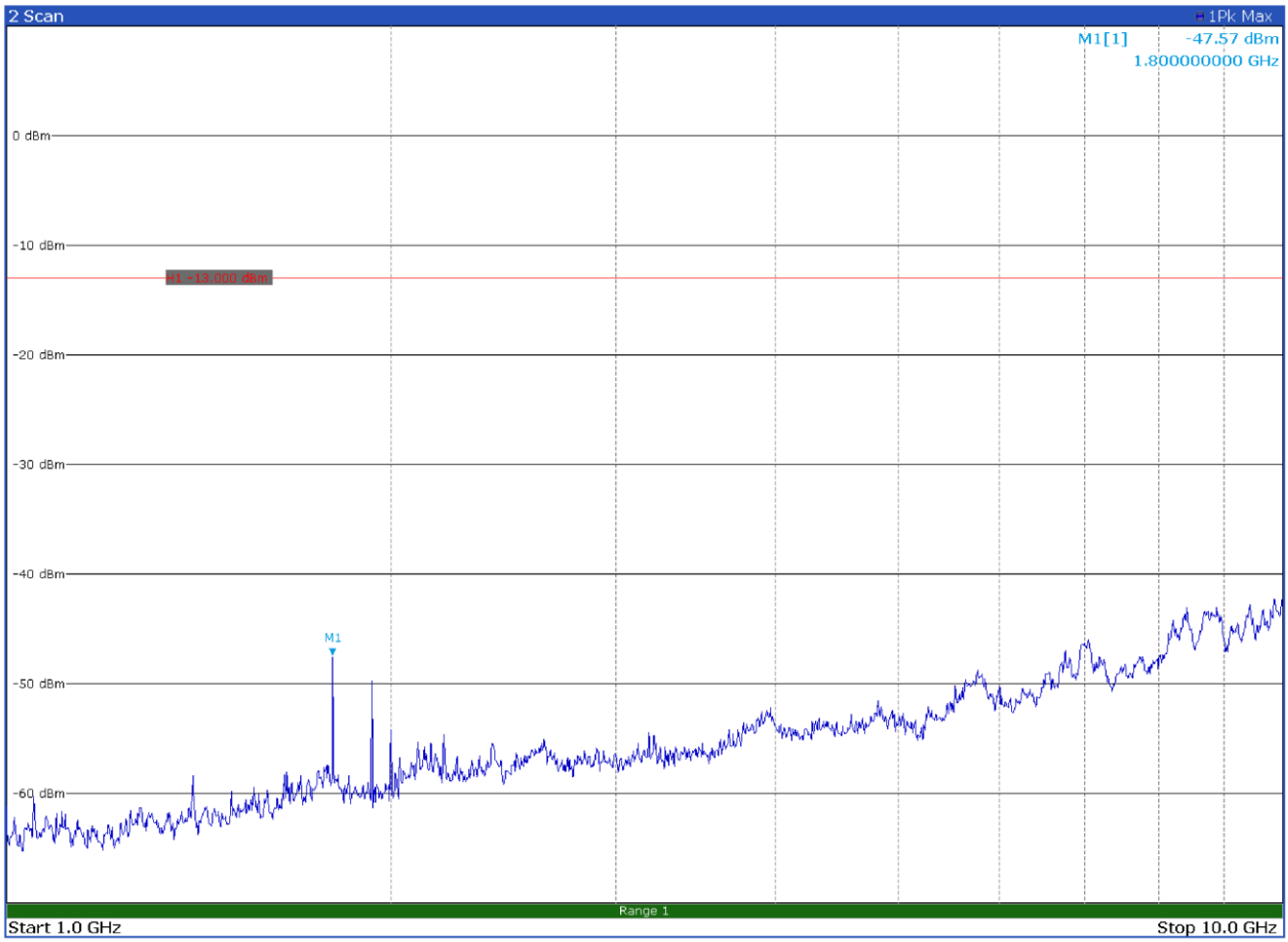


Figure 8.7-4: *Radiated spurious emissions from 1 GHz to 10 GHz, low channel with antenna in vertical polarization*

Test data, continued

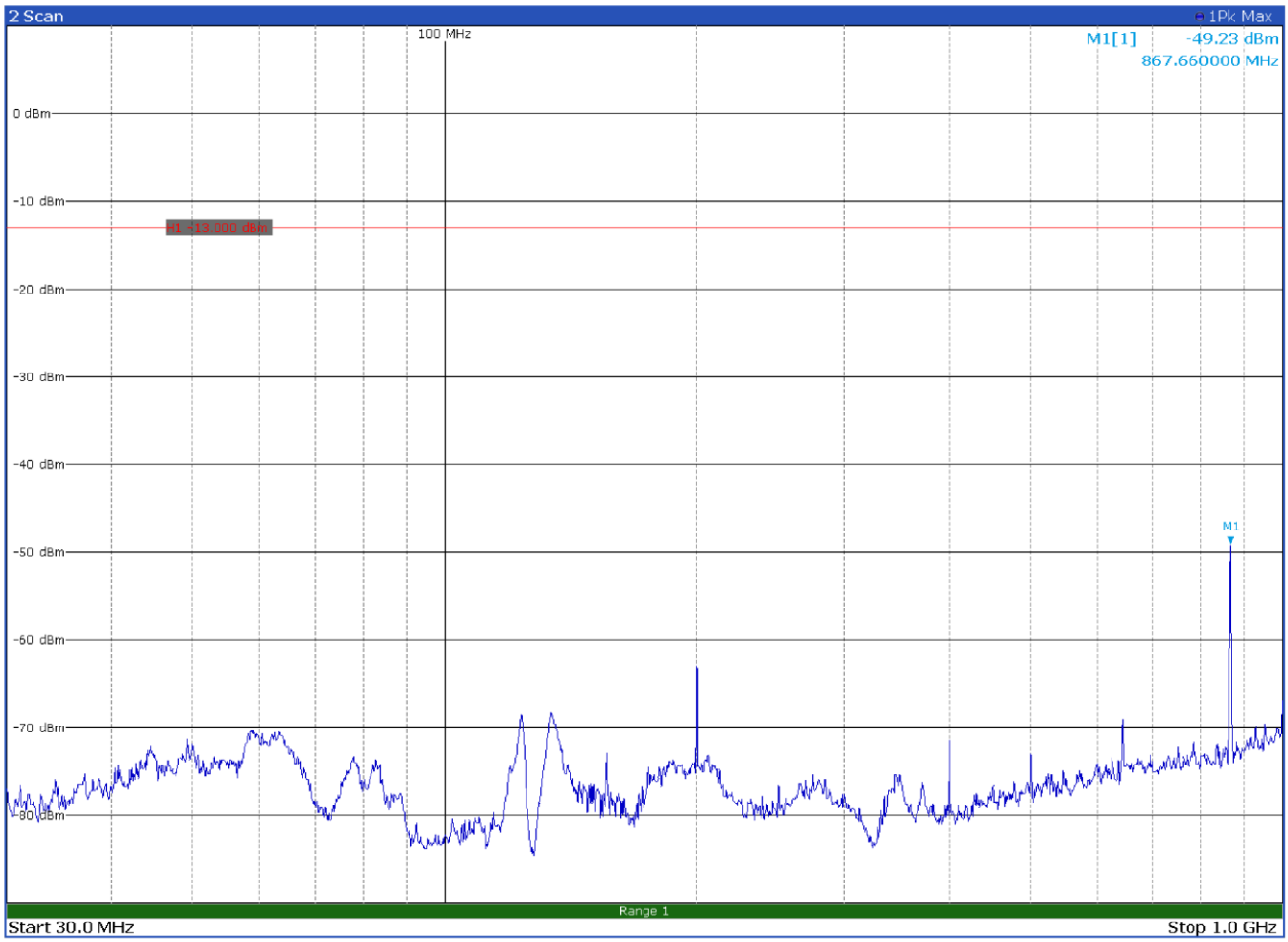


Figure 8.7-5: *Radiated spurious emissions below 1 GHz, high channel with antenna in horizontal polarization*

Test data, continued

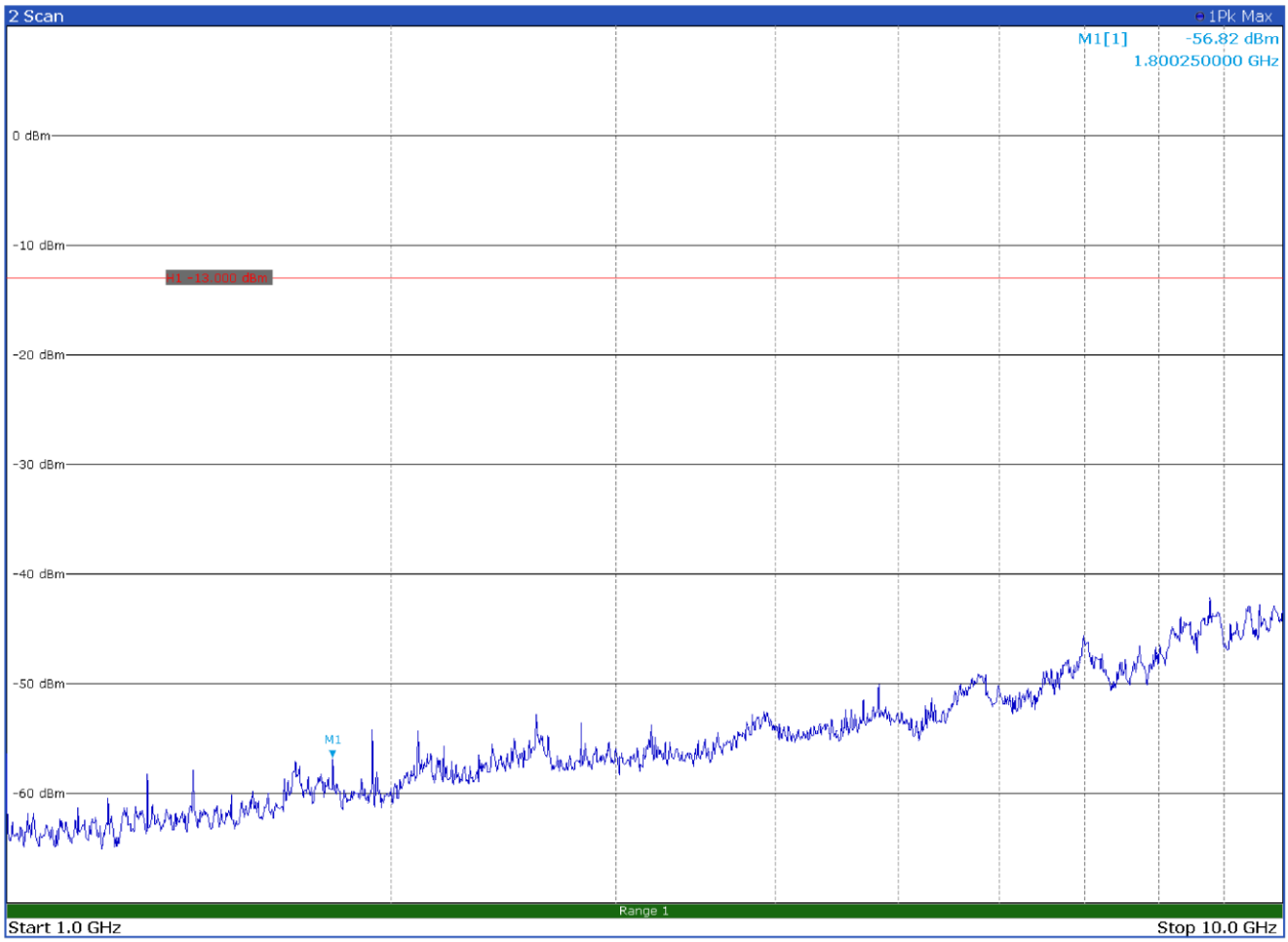


Figure 8.7-6: *Radiated spurious emissions from 1 GHz to 10 GHz, high channel with antenna in horizontal polarization*

Test data, continued

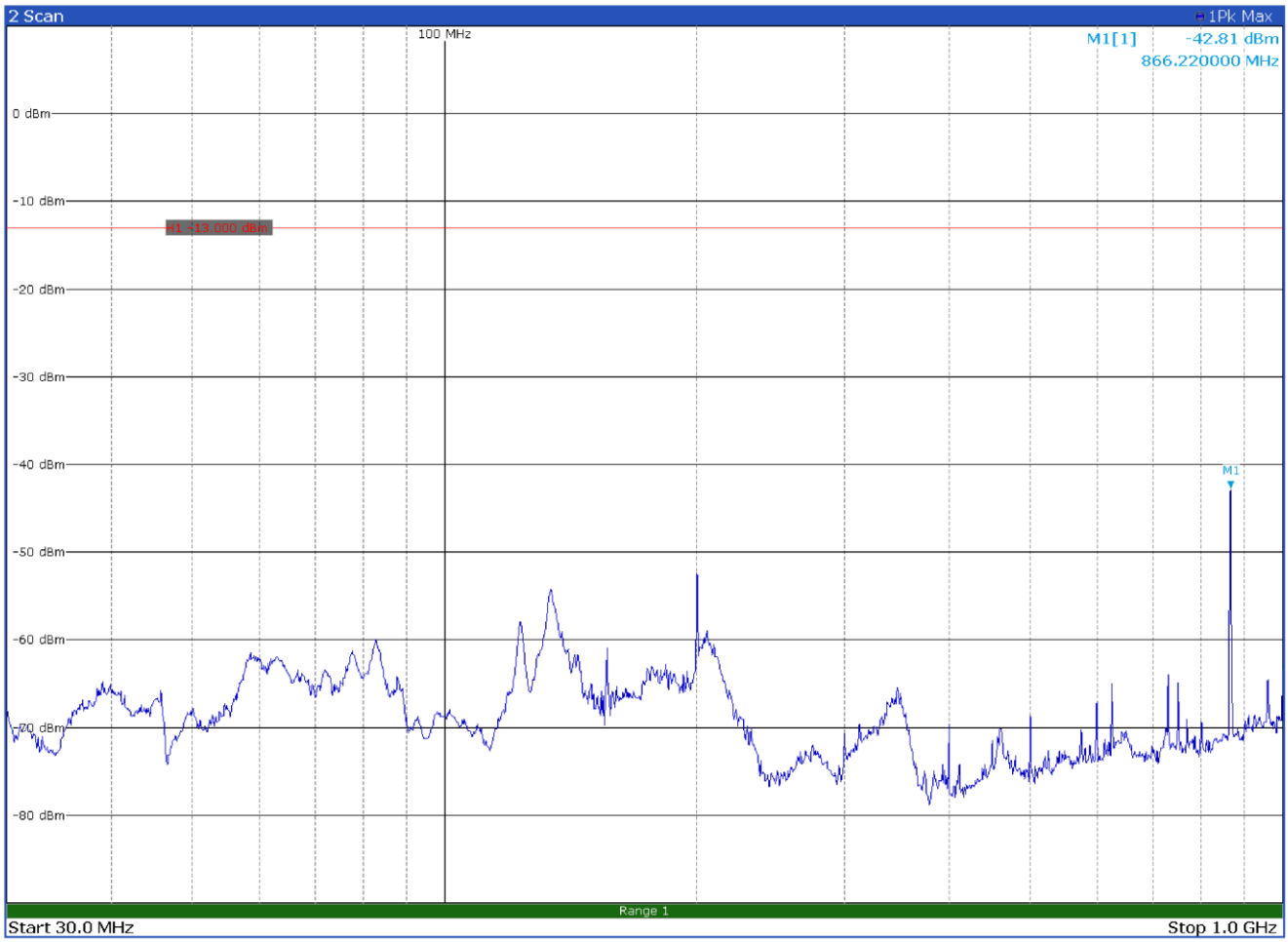


Figure 8.7-7: *Radiated spurious emissions below 1 GHz, high channel with antenna in vertical polarization*

Test data, continued

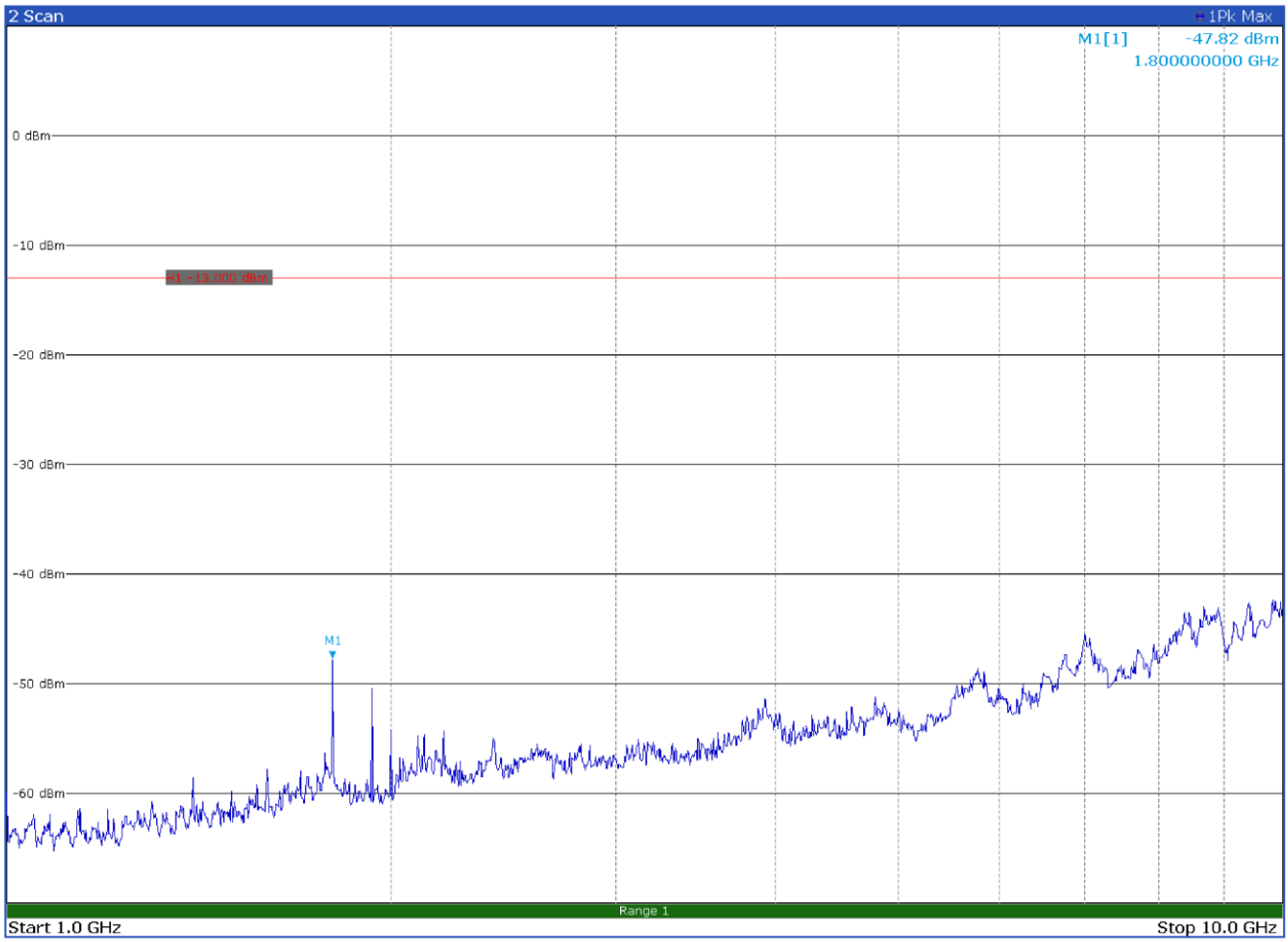


Figure 8.7-8: *Radiated spurious emissions from 1 GHz to 10 GHz, high channel with antenna in vertical polarization*

8.8 Frequency stability measurements

8.8.1 References, definitions and limits

FCC § 90.213(a)

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

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

8.8.2 Test summary

Verdict	Pass		
Tested by	P. Barbieri	Test date	February 8, 2022

8.8.3 Observations, settings and special notes

Testing was performed per ANSI C63.26 Paragraphs 5.6.3, 5.6.4 and 5.6.5 methods.

8.8.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
EMI Receiver	Rohde & Schwarz	ESU8	100202
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263254
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263397
Climatic Chamber	MSL	EC500DA	15022

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

8.8.5 Test data

Table 8.8-1: *Transmitter frequency stability results for antenna port 1*

Test conditions	Frequency, Hz	Drift, Hz	Drift, ppm	Limit ±ppm	Margin, ±ppm
+50 °C, Nominal	865499816.0	20.4	0.02357	1.5	1.48
+40 °C, Nominal	865499812.9	17.3	0.01999	1.5	1.48
+30 °C, Nominal	865499808.7	13.1	0.01514	1.5	1.48
+20 °C, -15% voltage	865499797.9	2.3	0.00266	1.5	1.50
+20 °C, Nominal	865499795.6	Reference	Reference	Reference	Reference
+20 °C, +15% voltage	865499793.1	-2.5	-0.00289	1.5	1.50
+10 °C, Nominal	865499775.3	-20.3	-0.02345	1.5	1.48
0 °C, Nominal	865499763.0	-32.6	-0.03767	1.5	1.46
−10 °C, Nominal	865499740.2	-55.4	-0.06401	1.5	1.44
−20 °C, Nominal	865499733.5	-62.1	-0.07175	1.5	1.43
−30 °C, Nominal	865499664.7	-130.9	-0.15124	1.5	1.35

Table 8.8-2: *Transmitter frequency stability results for antenna port 2*

Test conditions	Frequency, Hz	Drift, Hz	Drift, ppm	Limit ±ppm	Margin, ±ppm
+50 °C, Nominal	865499816.4	20.6	0.02380	1.5	1.48
+40 °C, Nominal	865499813.3	17.5	0.02022	1.5	1.48
+30 °C, Nominal	865499808.9	13.1	0.01514	1.5	1.48
+20 °C, -15% voltage	865499798.3	2.5	0.00289	1.5	1.50
+20 °C, Nominal	865499795.8	Reference	Reference	Reference	Reference
+20 °C, +15% voltage	865499792.5	-3.3	-0.00381	1.5	1.50
+10 °C, Nominal	865499775.4	-20.4	-0.02357	1.5	1.48
0 °C, Nominal	865499763.2	-32.6	-0.03767	1.5	1.46
−10 °C, Nominal	865499741.1	-54.7	-0.06320	1.5	1.44
−20 °C, Nominal	865499732.3	-63.5	-0.07337	1.5	1.43
−30 °C, Nominal	865499666.4	-129.4	-0.14951	1.5	1.35

Section 9 EUT photos

9.1 Set-up photos

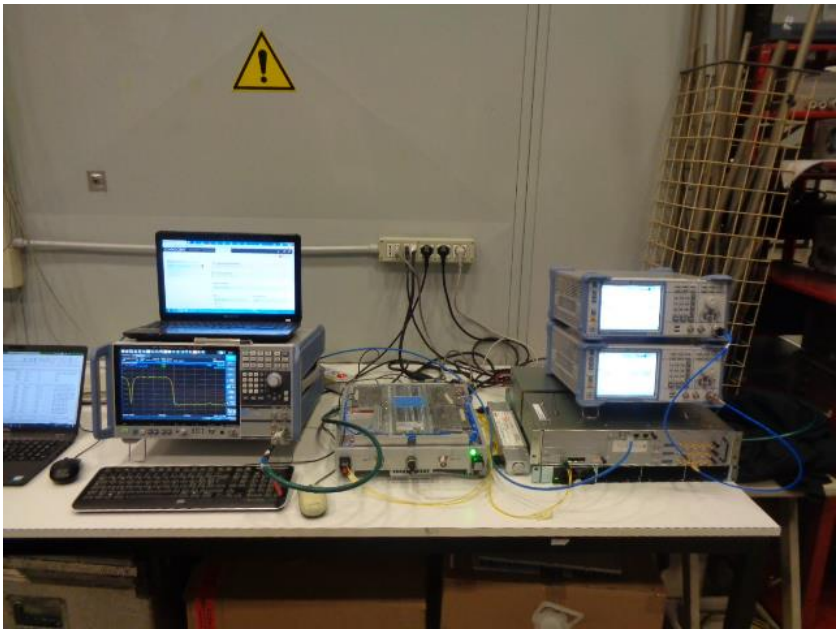


Figure 9.1-1: *Antenna port testing set-up*

Figure 9.1-2: *Antenna port testing set-up in climatic chamber*

Figure 9.1-3: *Radiated emissions set-up for frequencies below 1 GHz*

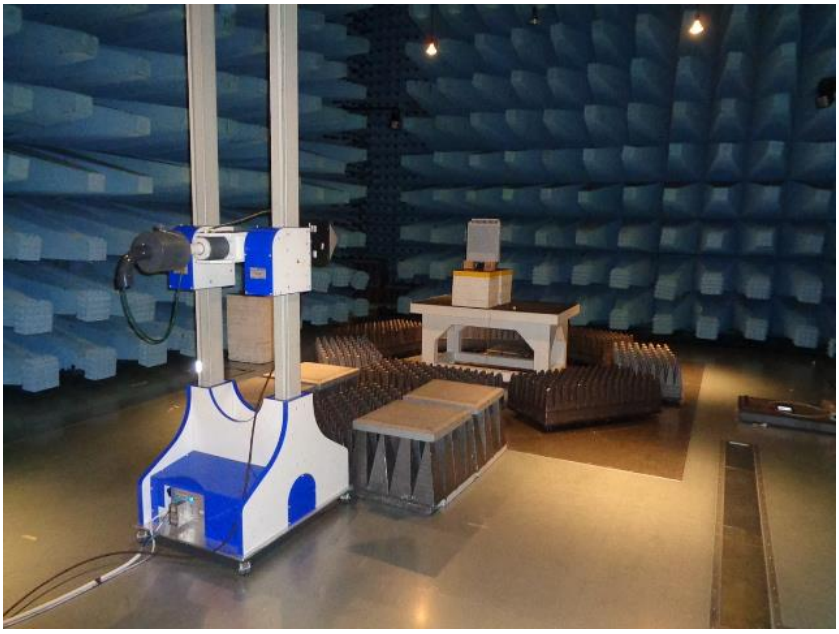


Figure 9.1-4: *Radiated emissions set-up for frequencies above 1 GHz*

9.2 External photos

Figure 9.2-1: *EUT photo*

End of the test report