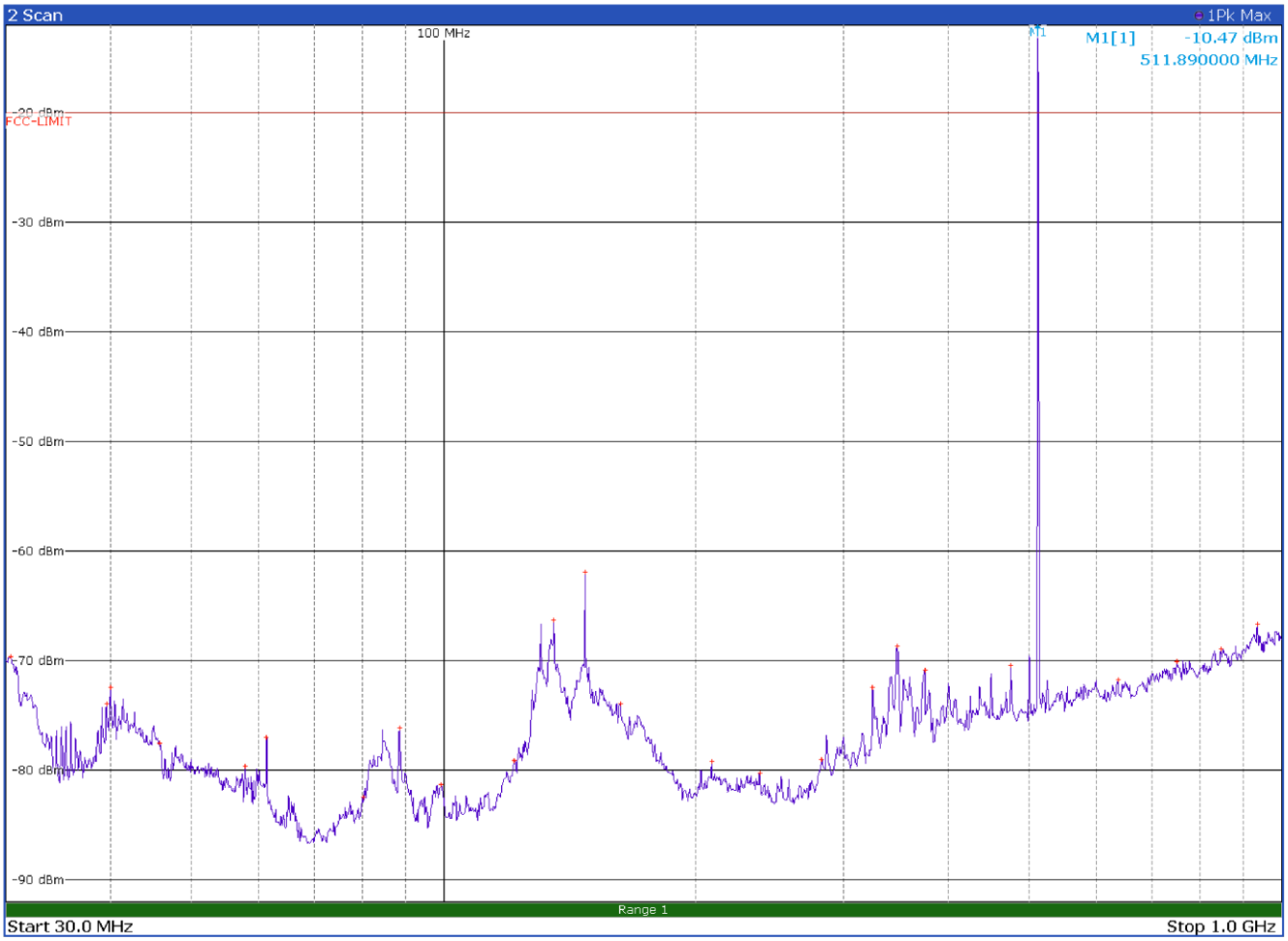
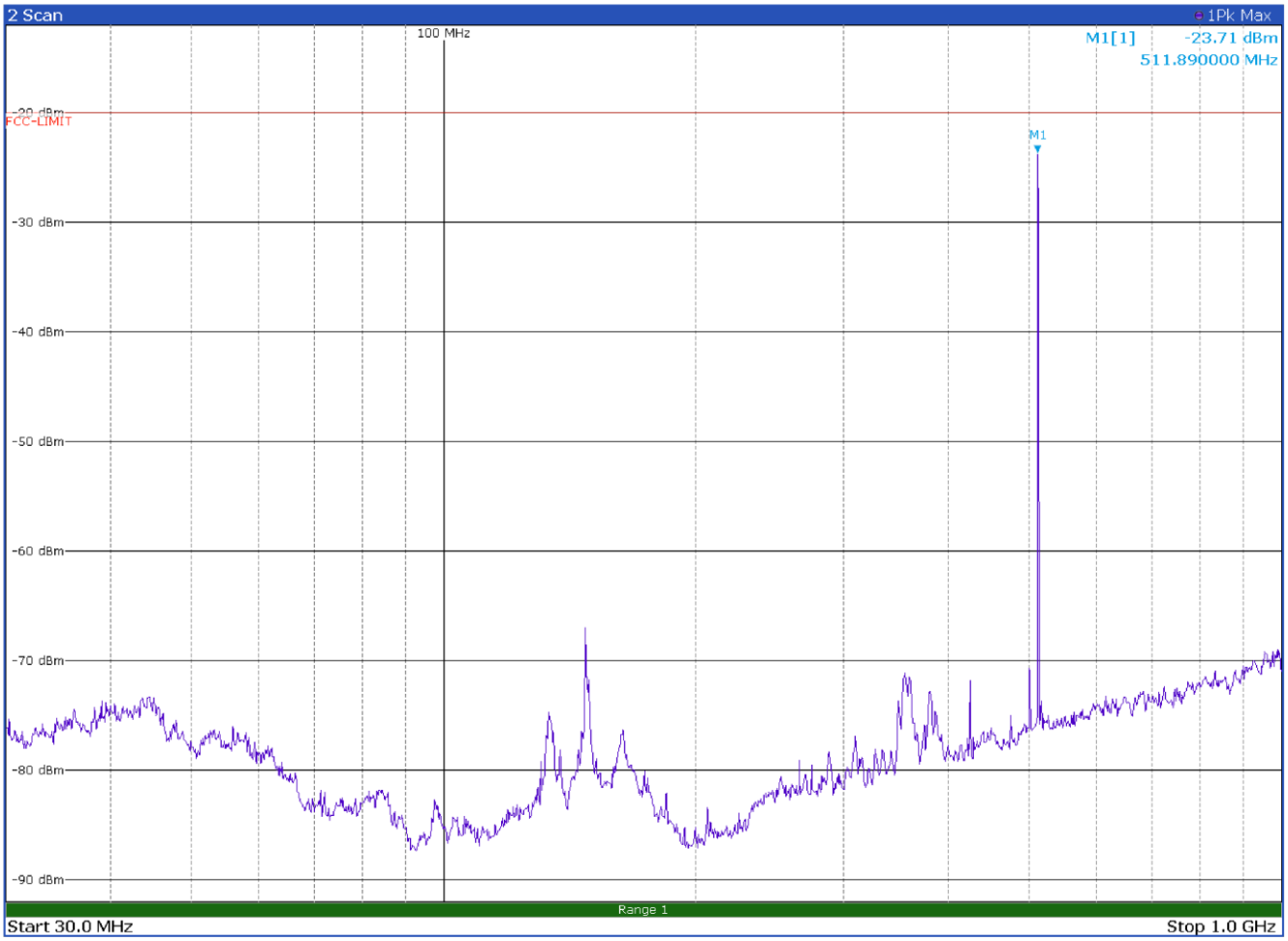
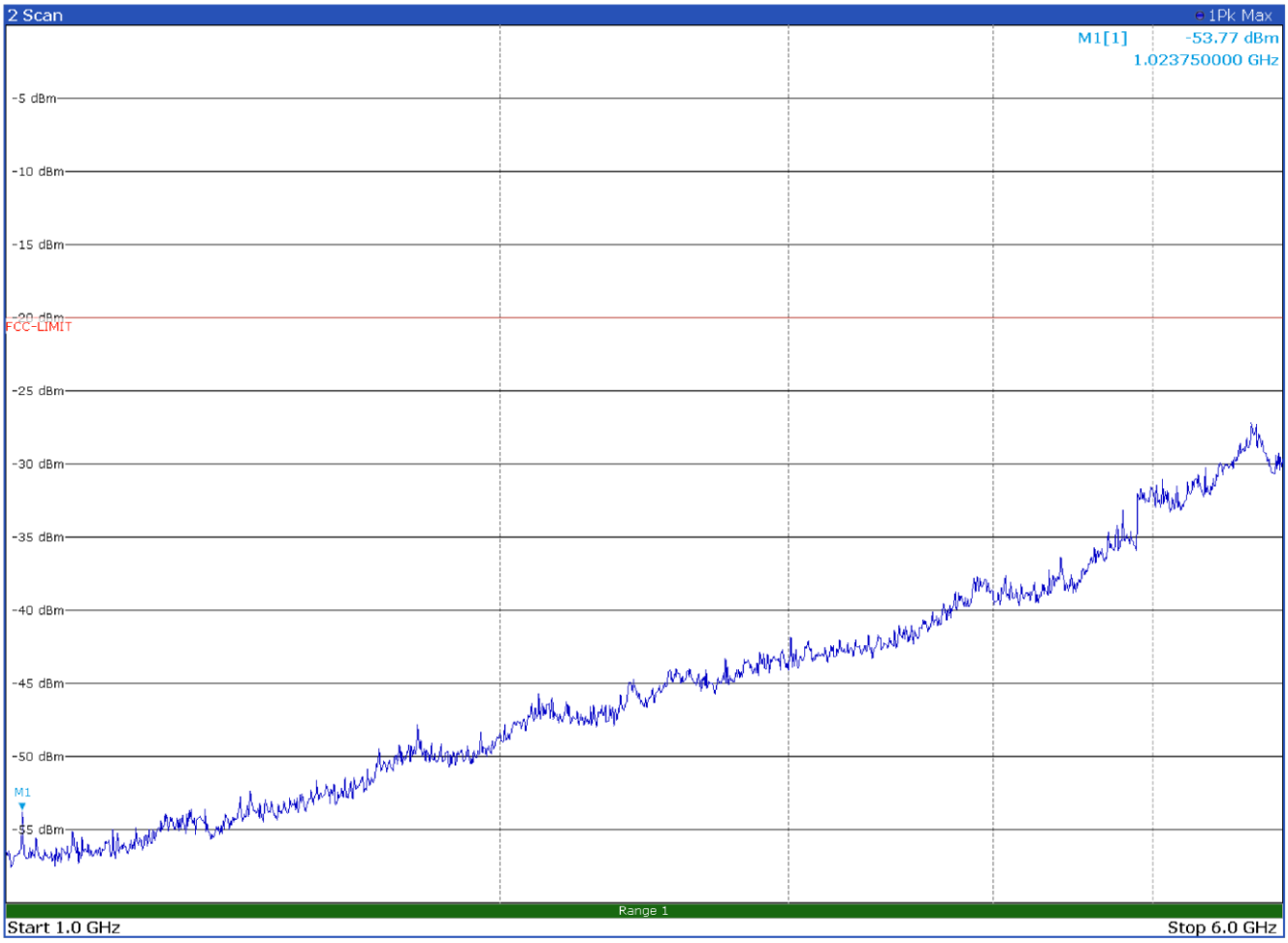


11:14:12 AM 01/05/2024 **Page 1/1**

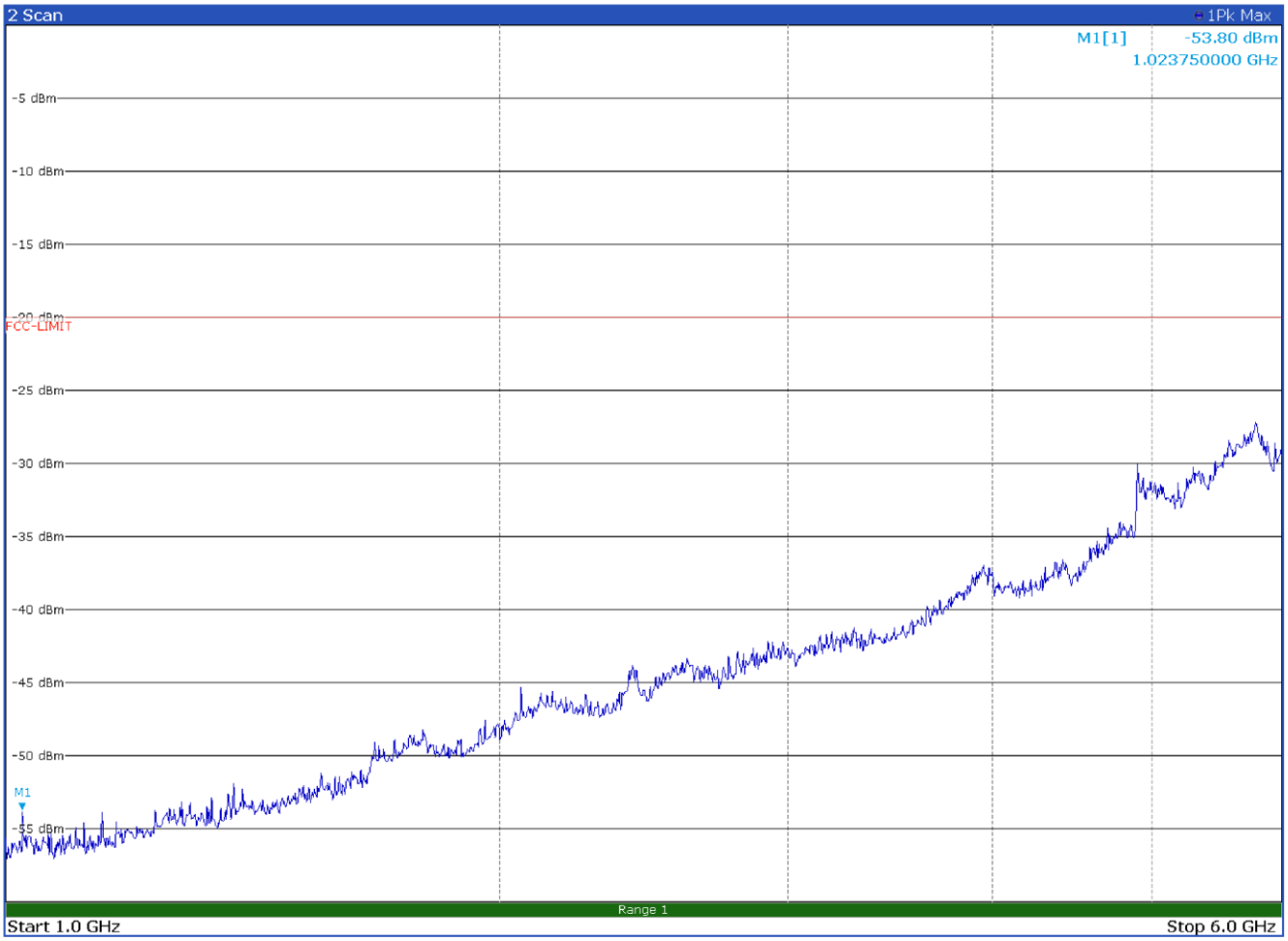
Radiated spurious emissions with modulation CST 4FSK at 511.9 MHz – Antenna in vertical polarization



Radiated spurious emissions with modulation CST 4FSK at 511.9 MHz – Antenna in horizontall polarization



Radiated spurious emissions with modulation CST 4FSK at 511.9 MHz – Antenna in horizontall polarization

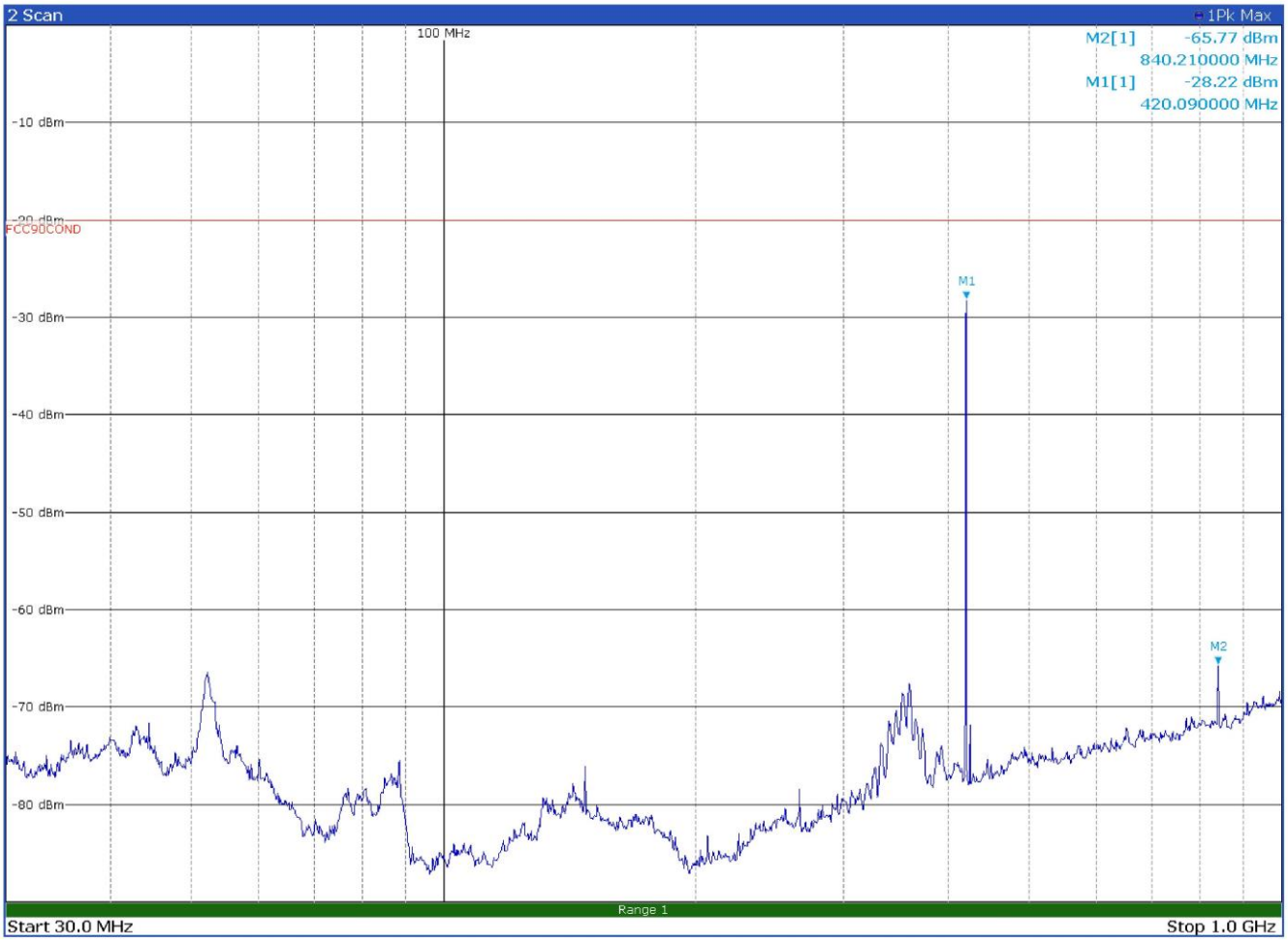


02:57:35 PM 01/05/2024 **Page 1/1**

Radiated spurious emissions with modulation CST 4FSK at 511.9 MHz – Antenna in vertical polarization

Test data, continued

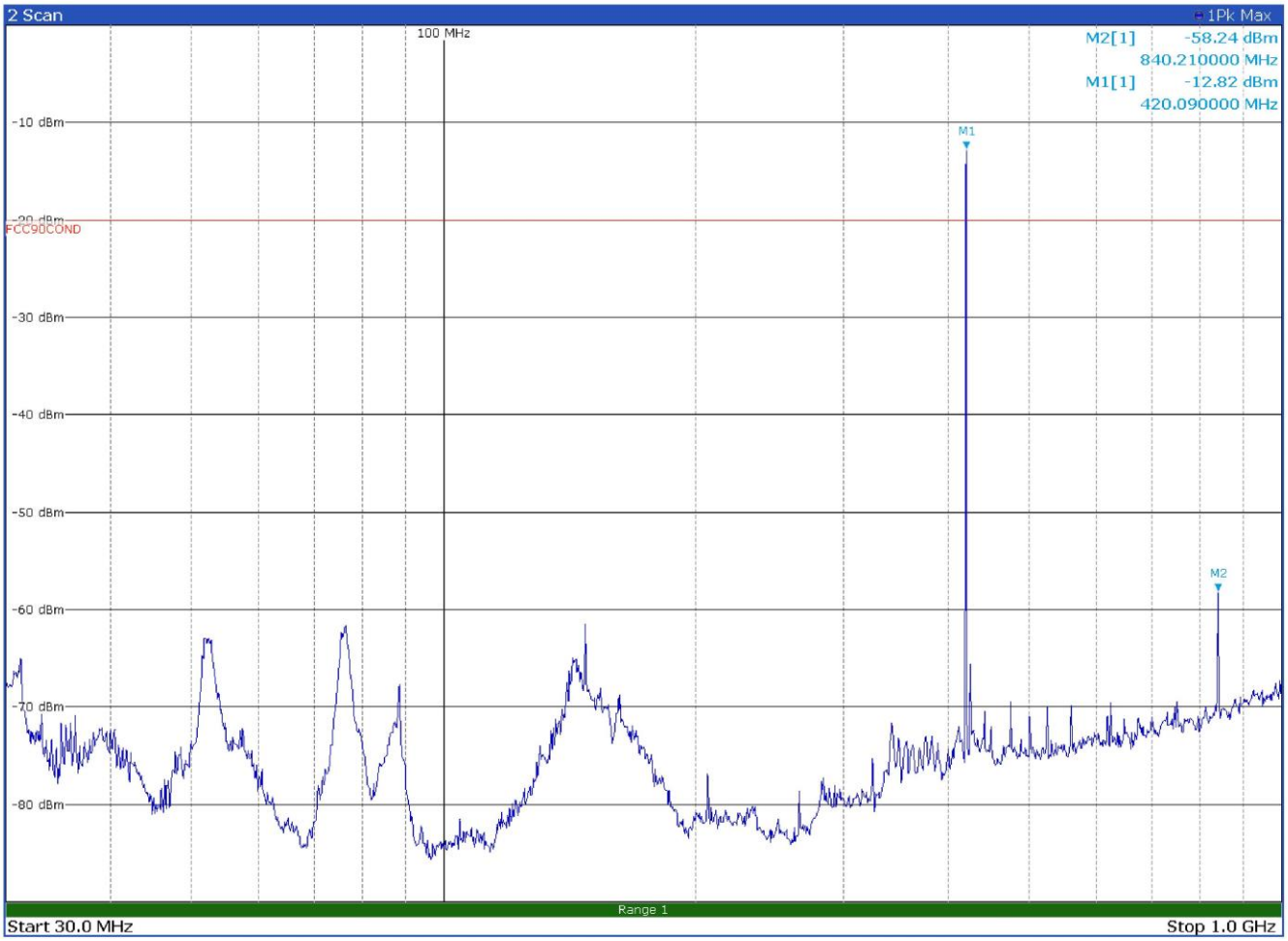
Test data, continued



Radiated spurious emissions with modulation P25 C4FM at 420.1 MHz – Antenna in horizontal polarization

Limit exceeded by the carrier

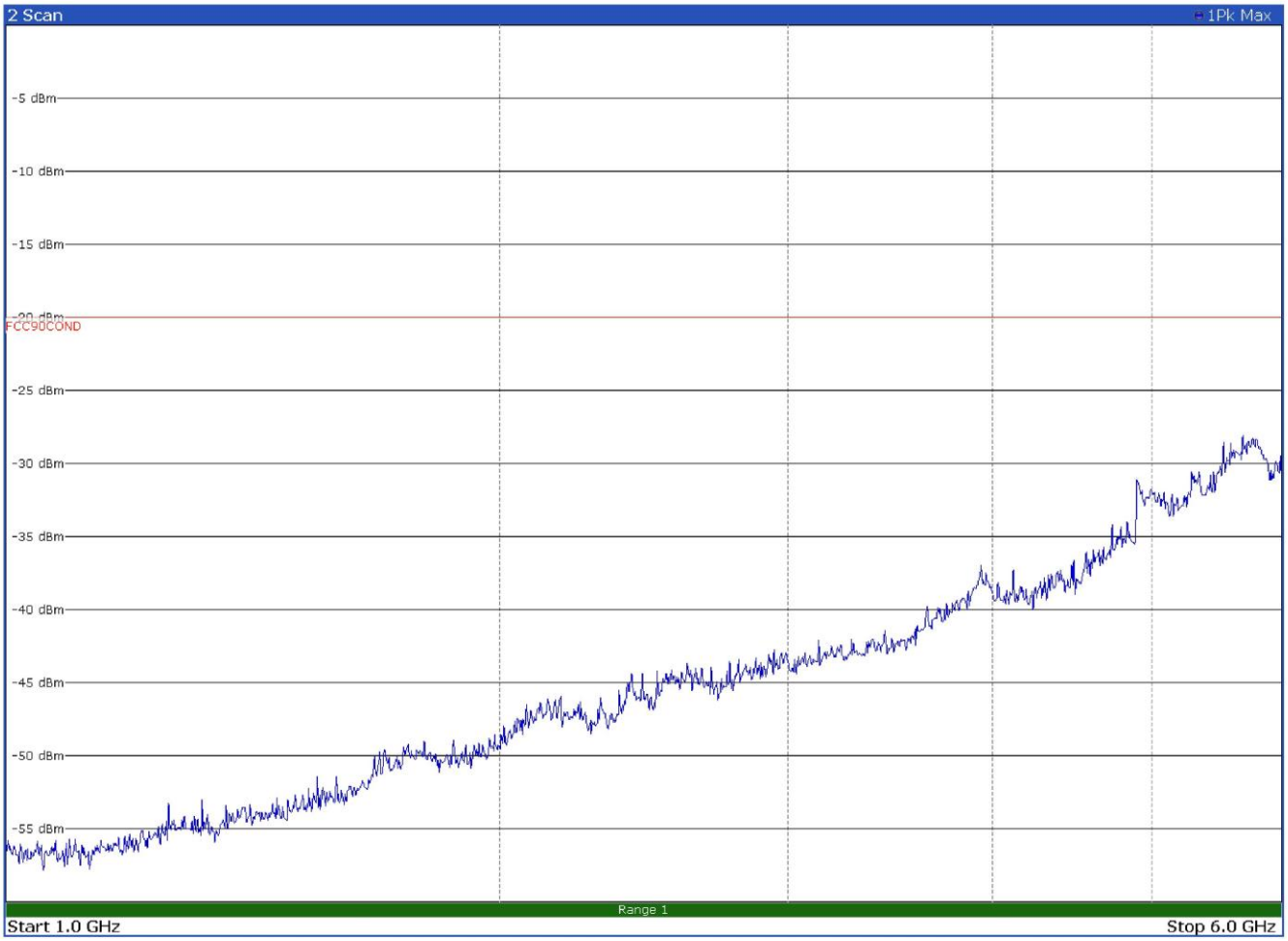
Test data, continued



Radiated spurious emissions with modulation P25 C4FM at 420.1 MHz – Antenna in vertical polarization

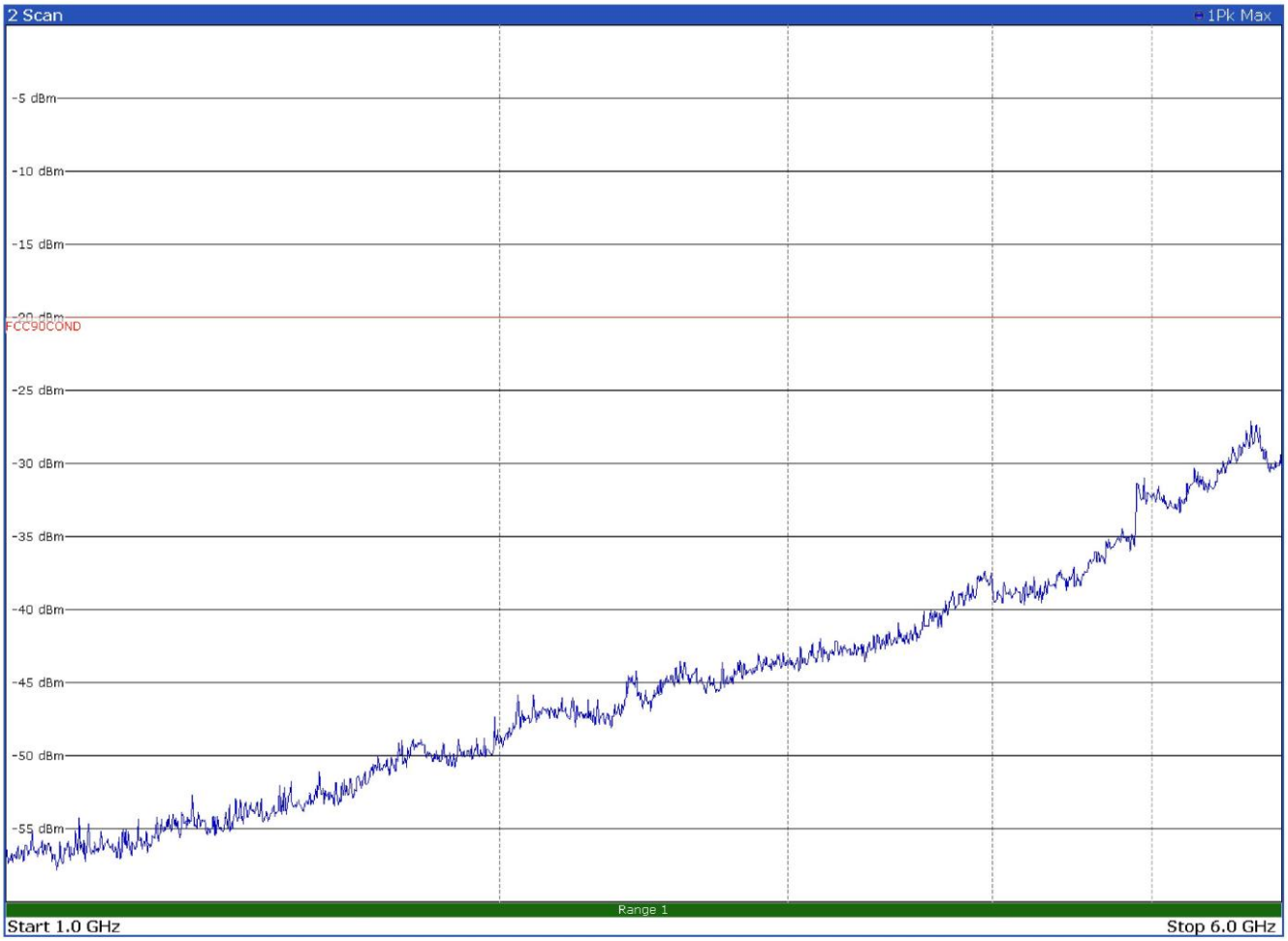
Limit exceeded by the carrier

Test data, continued



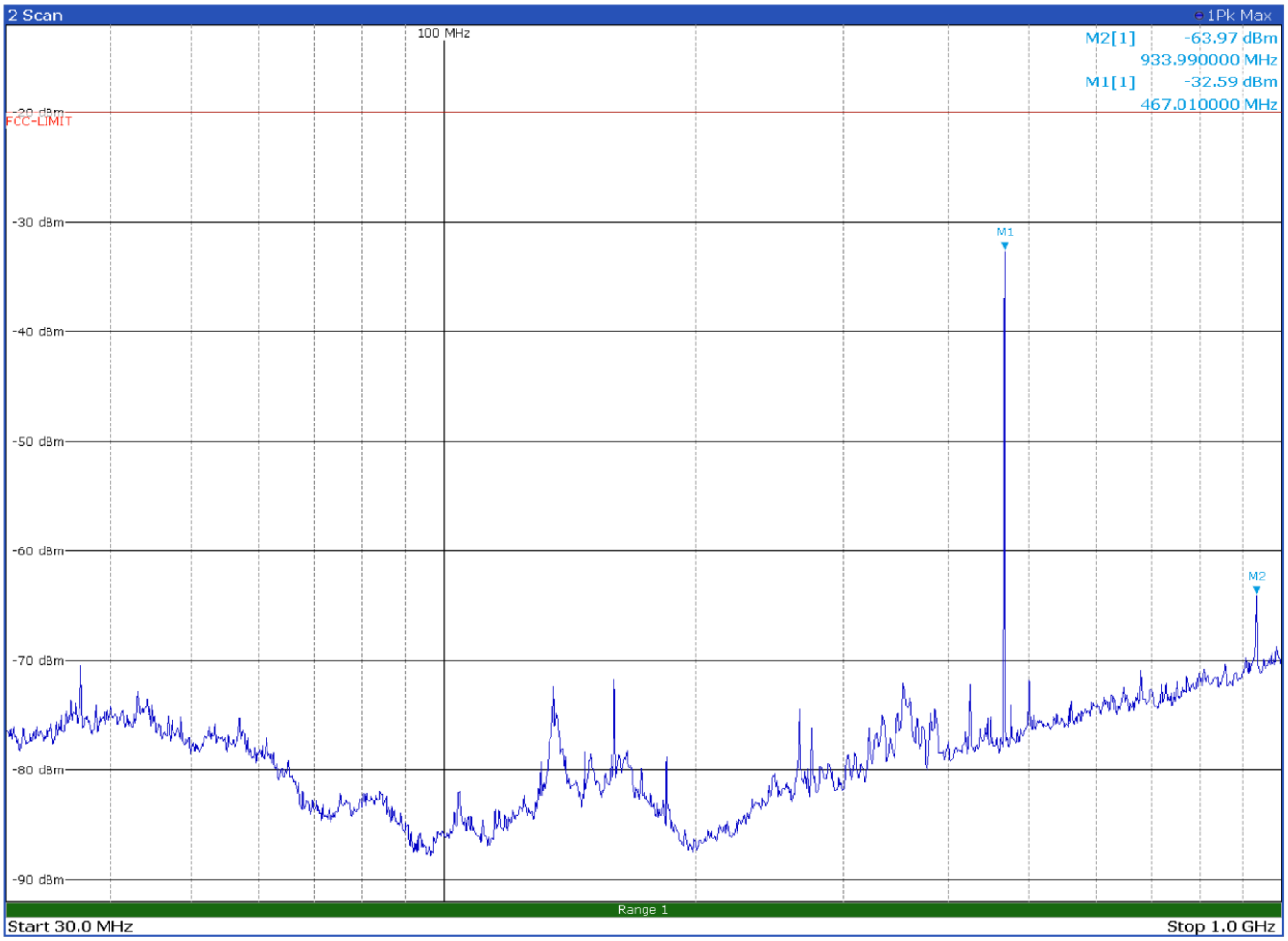
Radiated spurious emissions with modulation P25 C4FM at 420.1 MHz – Antenna in horizontal polarization

Test data, continued



Radiated spurious emissions with modulation P25 C4FM at 420.1 MHz – Antenna in vertical polarization

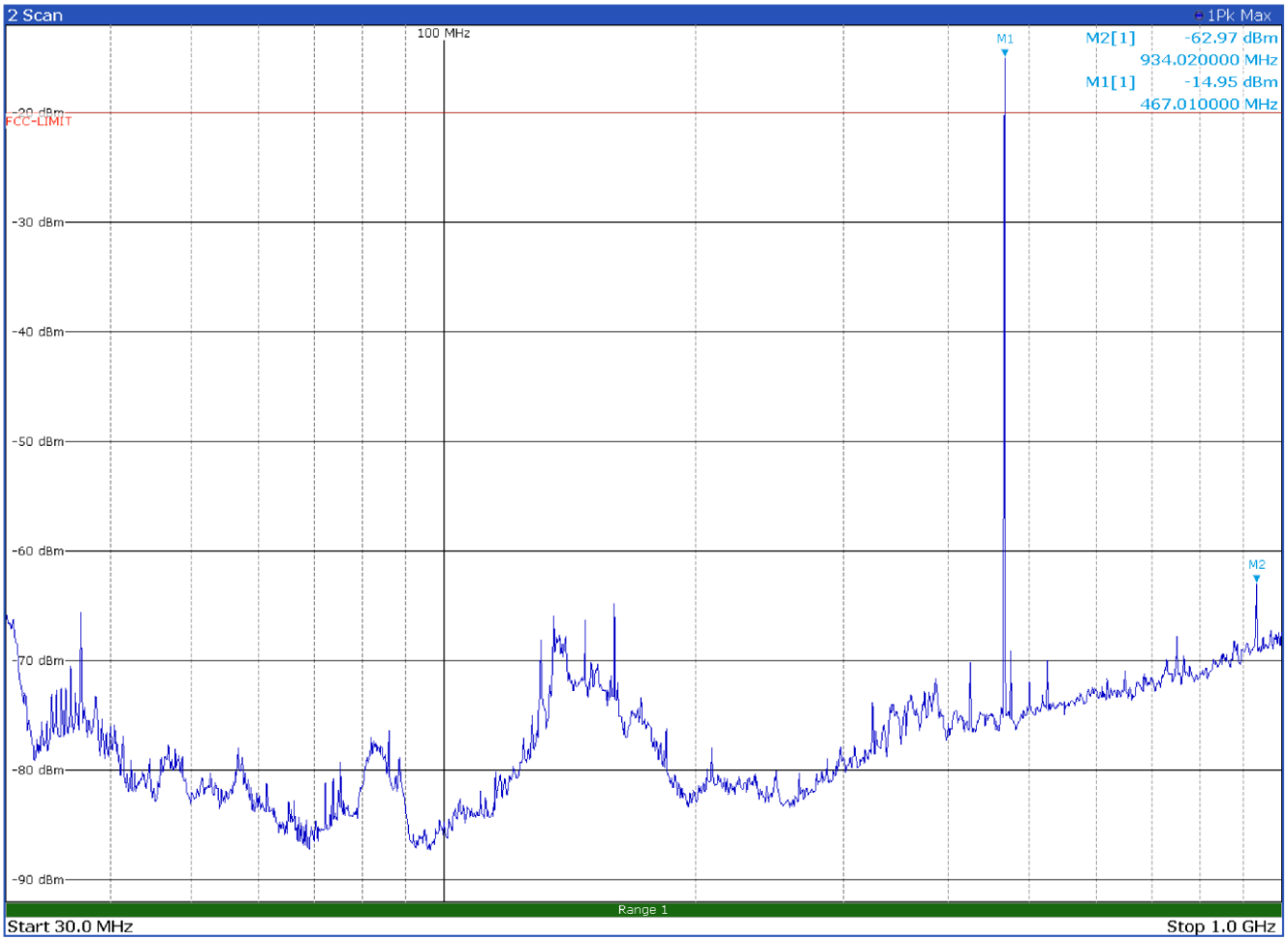
Test data, continued



Radiated spurious emissions with modulation P25 C4FM at 467 MHz – Antenna in horizontal polarization

Limit exceeded by the carrier

Test data, continued



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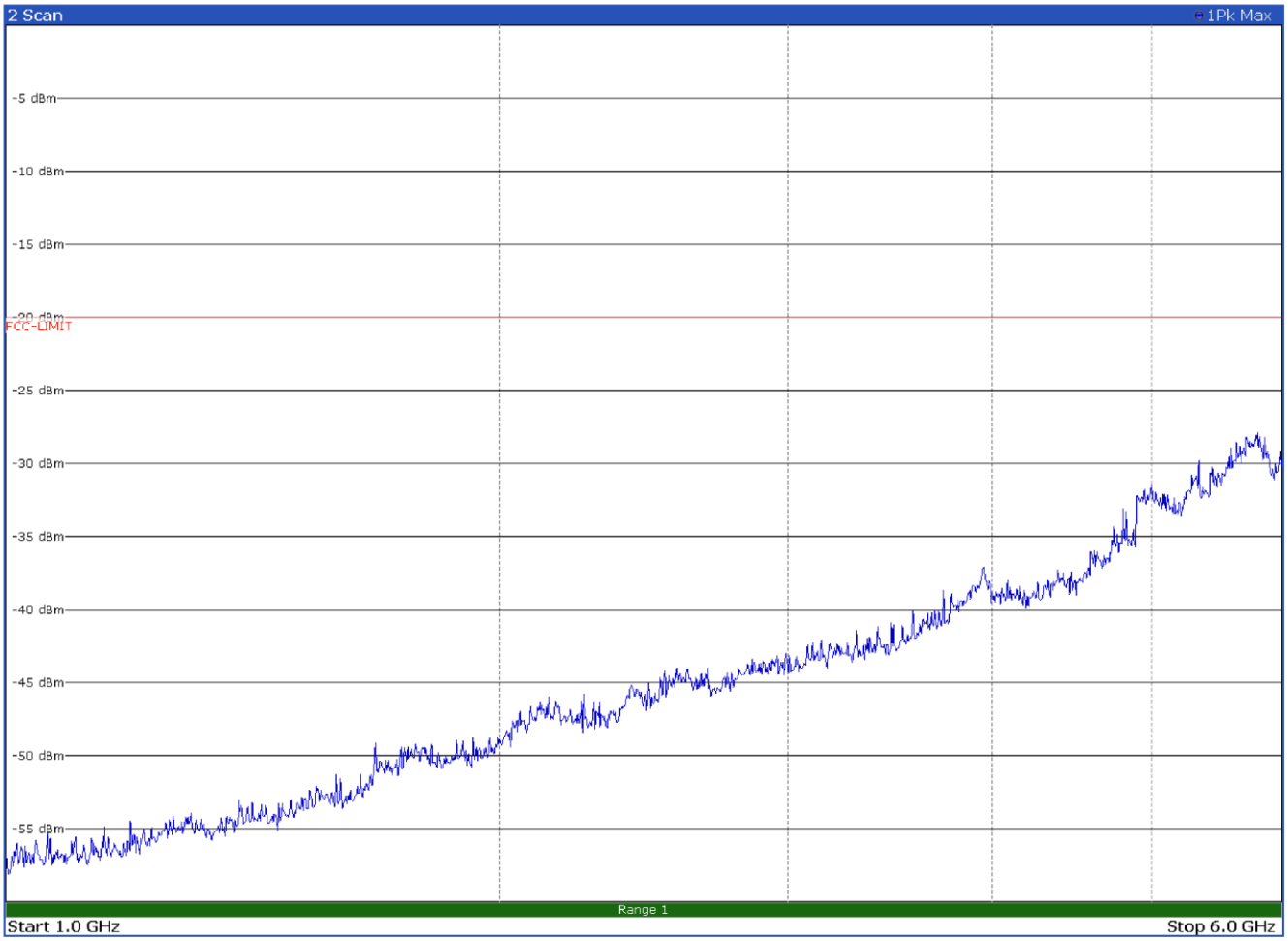
Radiated spurious emissions with modulation P25 C4FM at 467 MHz – Antenna in vertical polarization

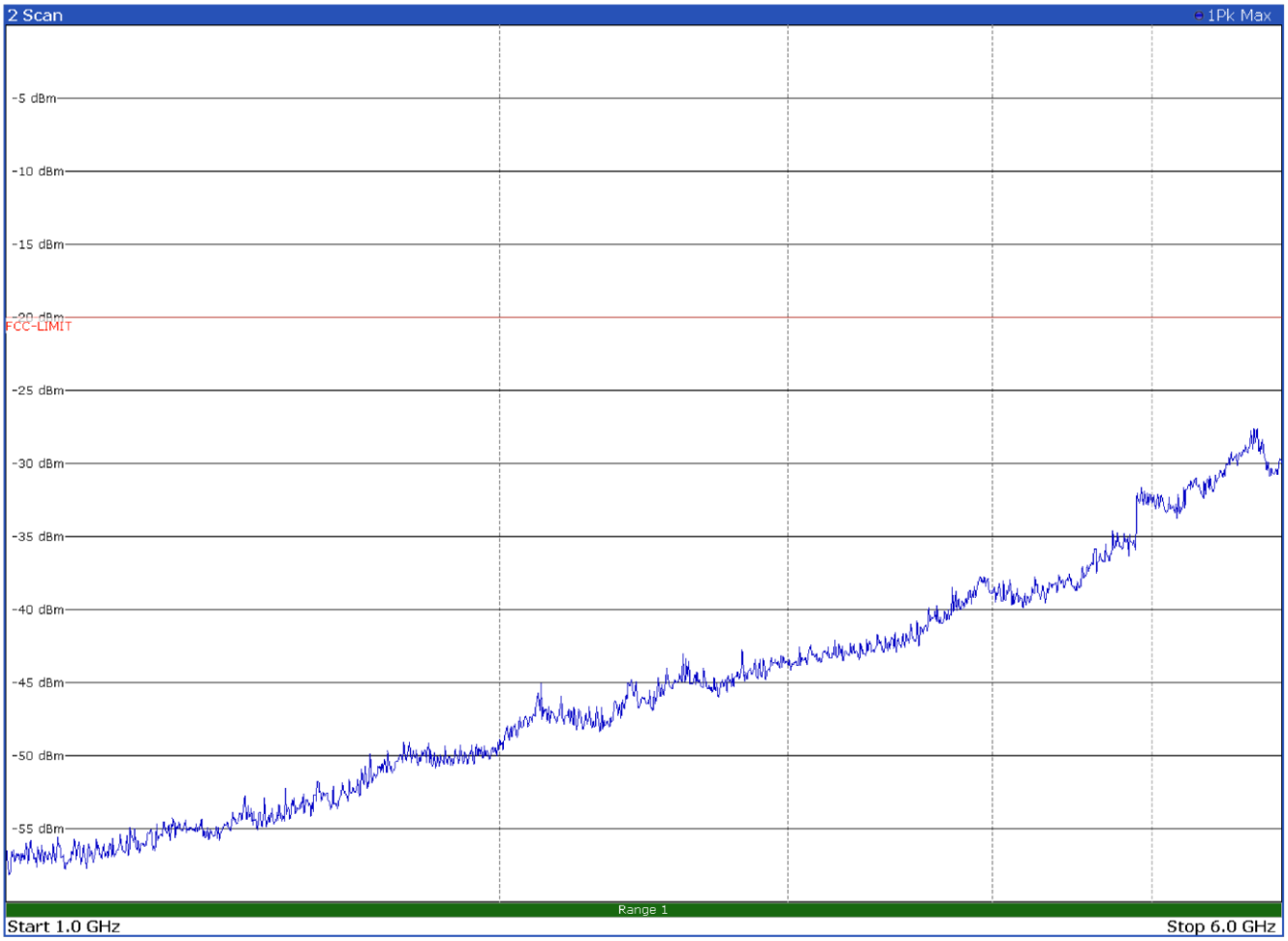
Limit exceeded by the carrier

Test data, continued



Radiated spurious emissions with modulation P25 C4FM at 467 MHz – Antenna in horizontal polarization

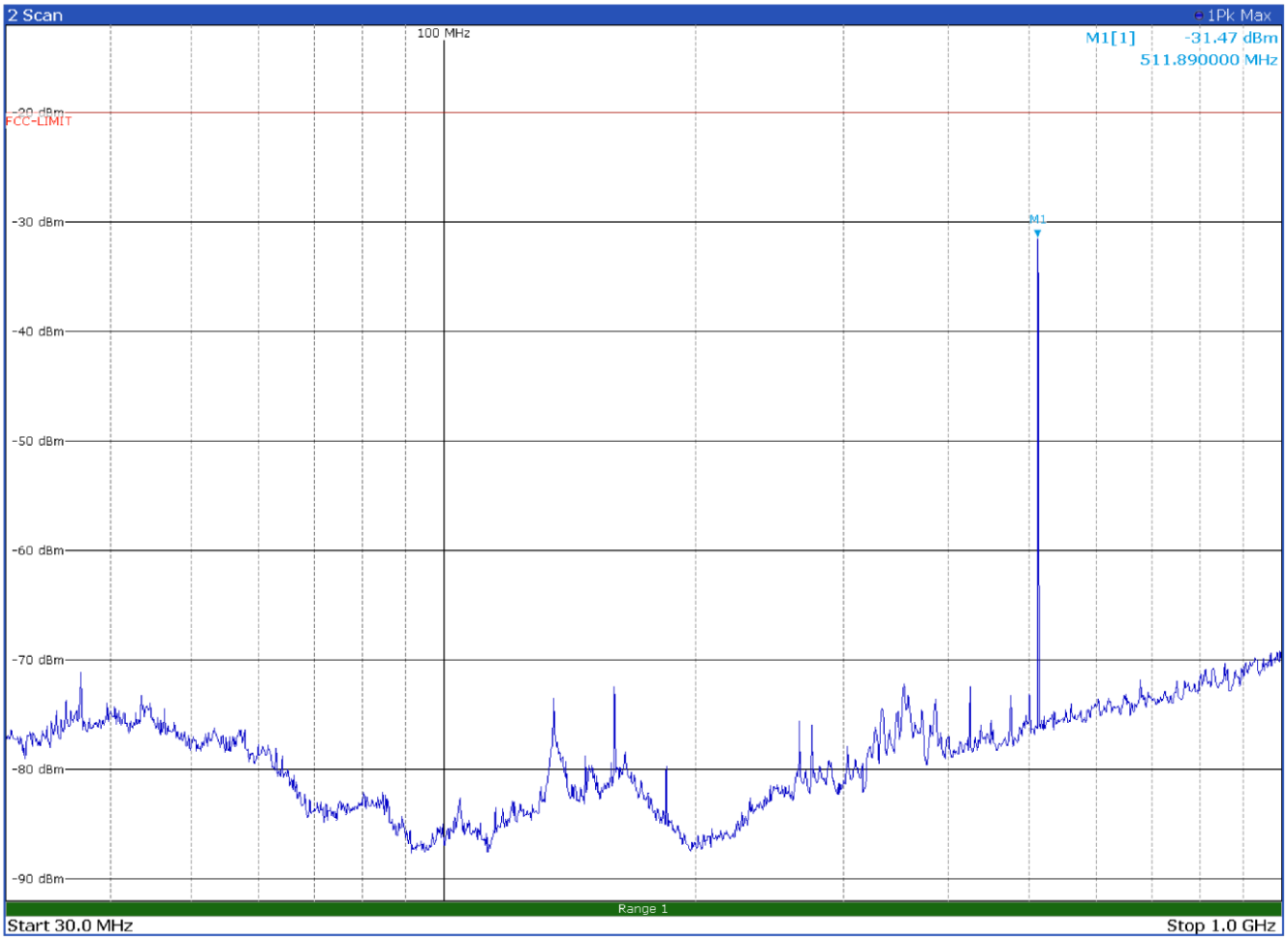
Test data, continued



Radiated spurious emissions with modulation P25 C4FM at 467 MHz – Antenna in vertical polarization

Test data, continued

Test data, continued



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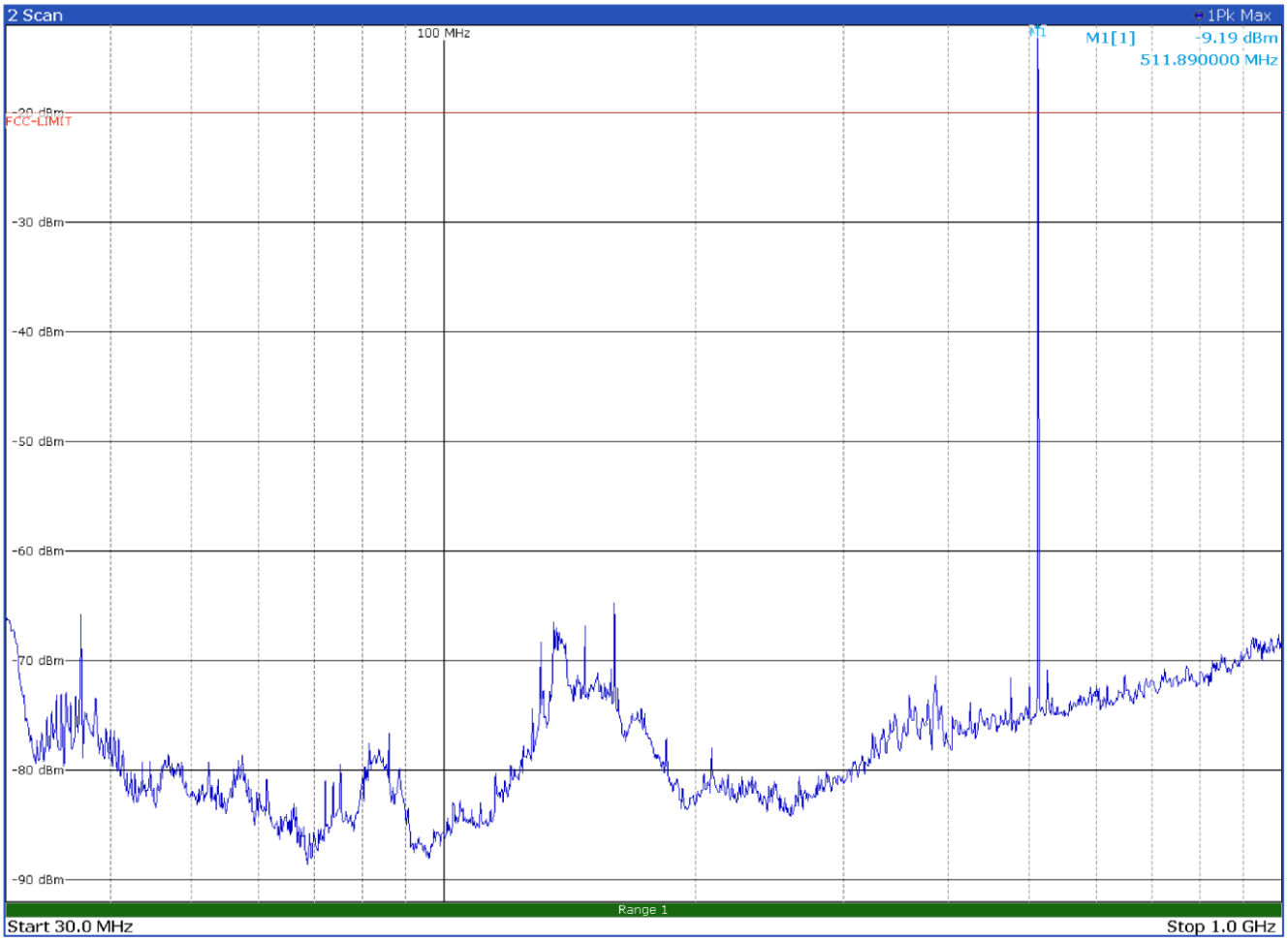
Radiated spurious emissions with modulation P25 C4FM at 511.9 MHz – Antenna in horizontal polarization

Limit exceeded by the carrier

Test data, continued

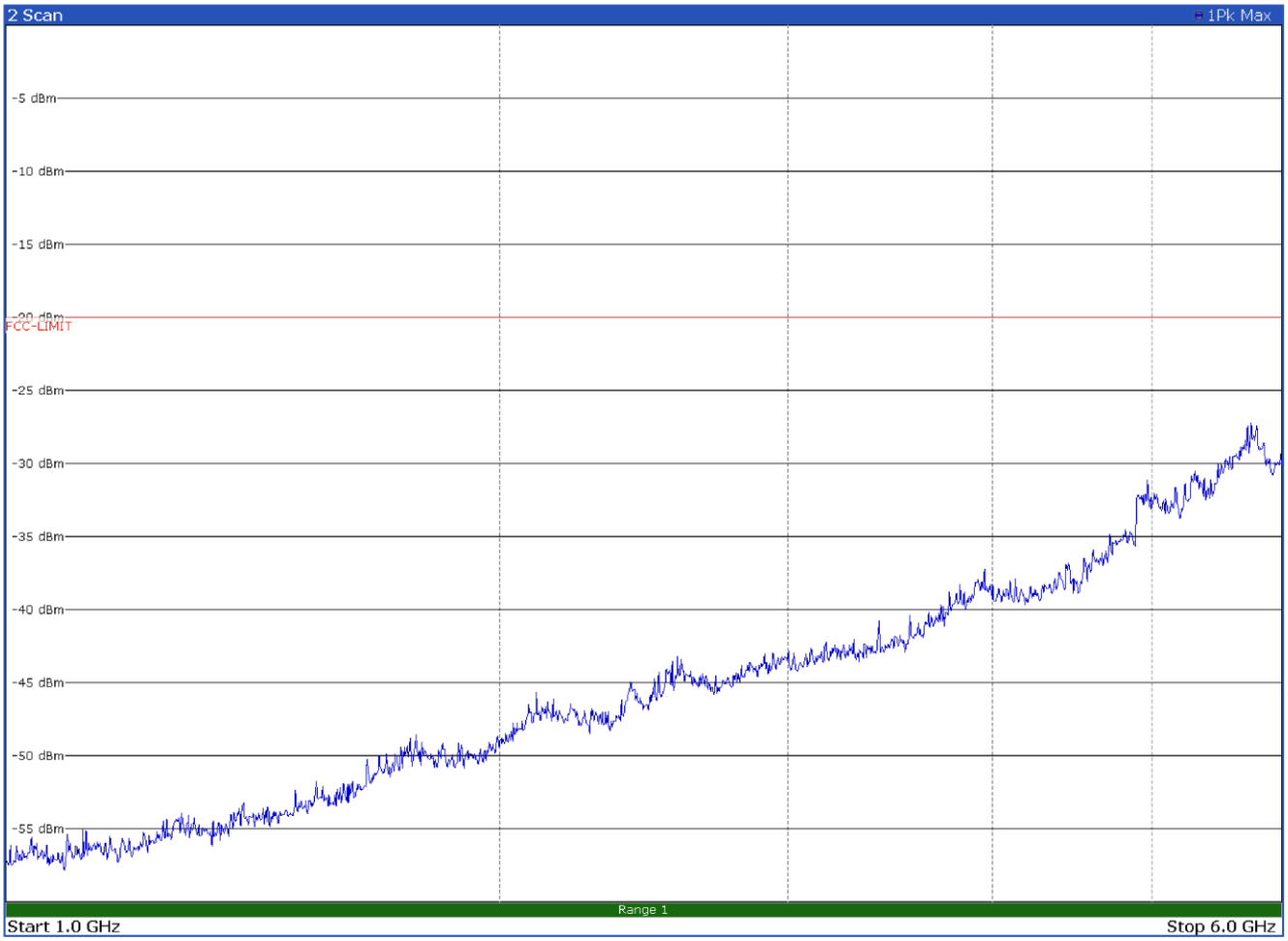


05:21:13 PM 01/04/2024 **Page 1/1**

Radiated spurious emissions with modulation P25 C4FM at 511.9 MHz – Antenna in vertical polarization

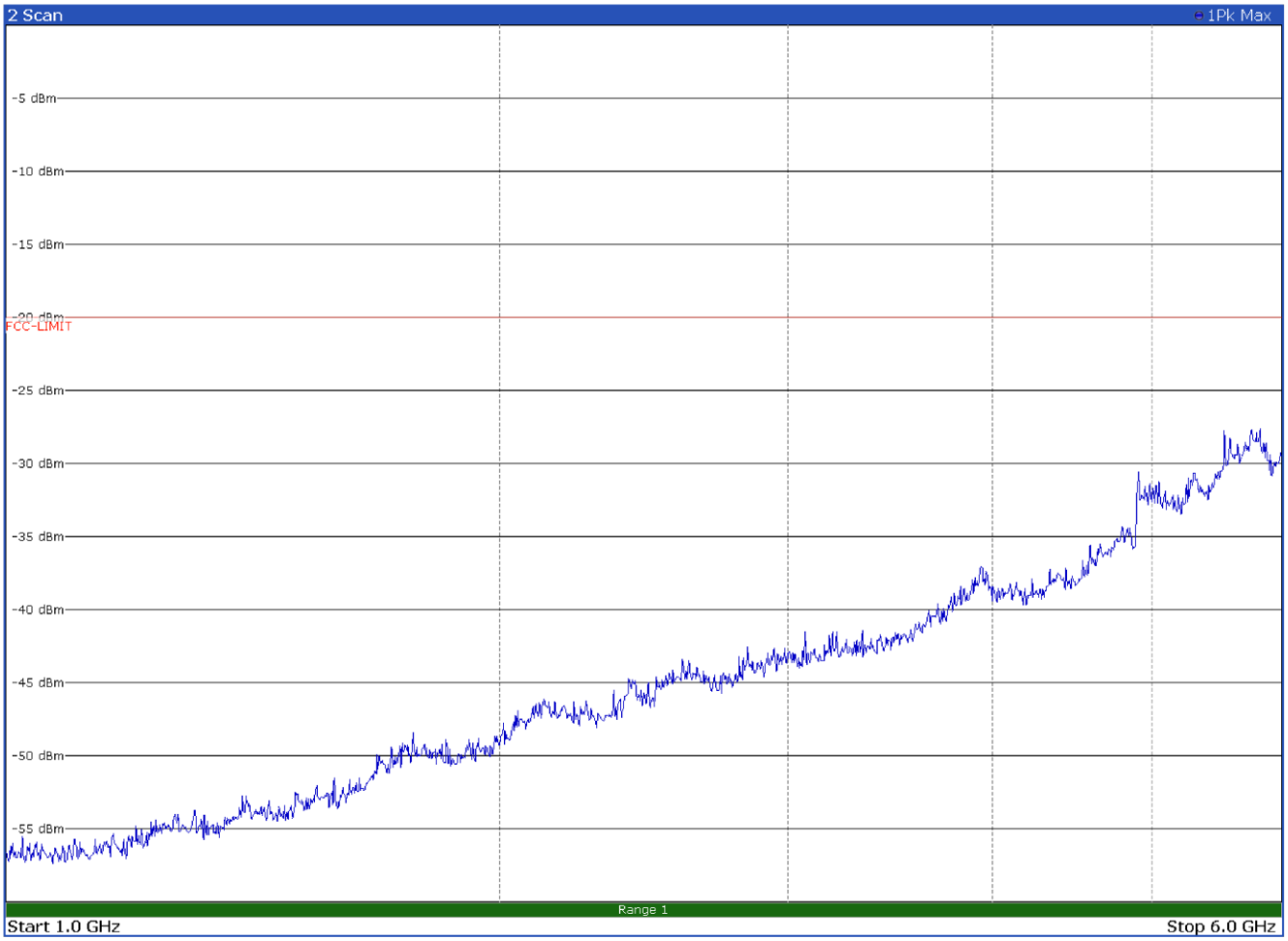
Limit exceeded by the carrier

Test data, continued



Radiated spurious emissions with modulation P25 C4FM at 511.9 MHz – Antenna in horizontal polarization

Test data, continued, continue



Radiated spurious emissions with modulation P25 C4FM at 511.9 MHz – Antenna in vertical polarization

7.6 Transient frequency behavior

7.6.1 References, definitions and limits

FCC §90.214:

Transmitters designed to operate in the 421–512 MHz frequency band must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

Table 7.6-1: Transient frequency behavior

Time intervals[1,2]	Maximum frequency difference[3]	Transient duration limit
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels		
t_1[4]	±25.0 kHz	10.0 ms
t_2	±12.5 kHz	25.0 ms
t_3[4]	±25.0 kHz	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels		
t_1[4]	±12.5 kHz	10.0 ms
t_2	±6.25 kHz	25.0 ms
t_3[4]	±12.5 kHz	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels		
t_1[4]	±6.25 kHz	10.0 ms
t_2	±3.125 kHz	25.0 ms
t_3[4]	±6.25 kHz	10.0 ms

Notes: [1]t_{on} is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.
t_1 is the time period immediately following t_{on}.
t_2 is the time period immediately following t_1.
t_3 is the time period from the instant when the transmitter is turned off until t_{off}.
t_{off} is the instant when the 1 kHz test signal starts to rise.
[2]During the time from the end of t_2 to the beginning of t_3, the frequency difference must not exceed the limits specified in §90.213.
[3]Difference between the actual transmitter frequency and the assigned transmitter frequency.
[4]If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

7.6.2 Test summary

Verdict	Pass		
Tested by	D. Guarnone	Test date	January 23, 2024

7.6.3 Observations, settings and special notes

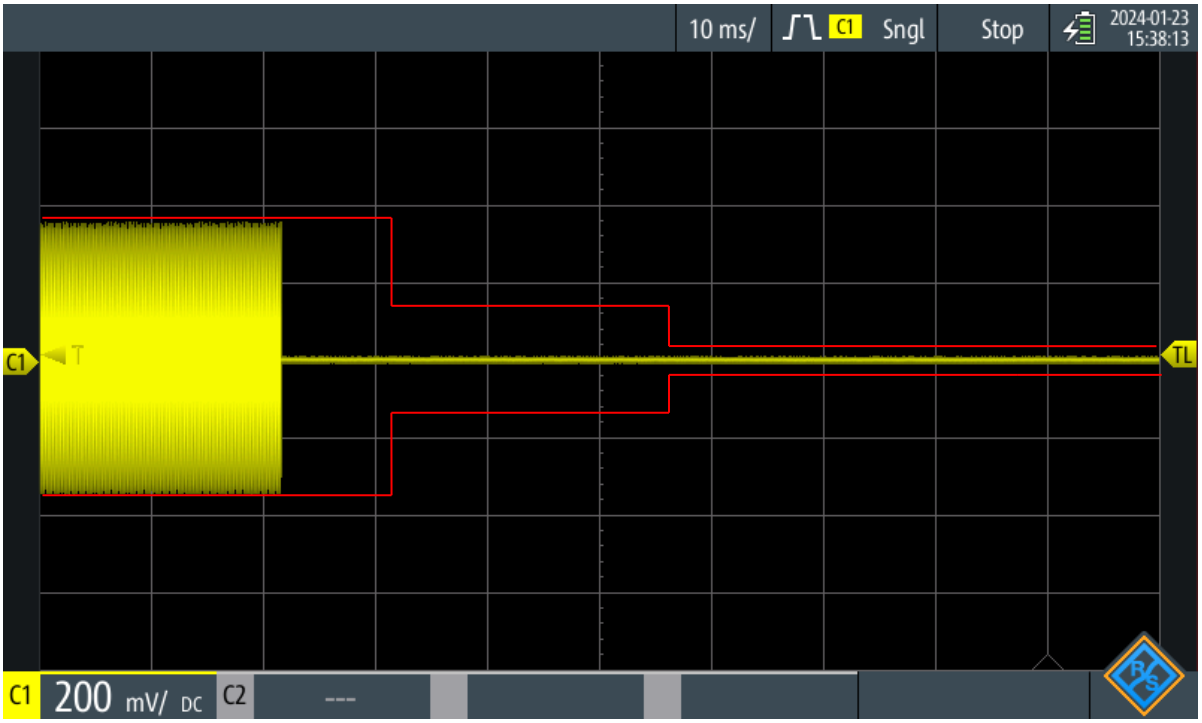
None

7.6.4 Test equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI receiver	Rohde & Schwarz	ESW44	101620	2023-08	2024-08
Shielded room	Siemens	10m control room	1947	NCR	NCR
Radio communication tester	Rohde & Schwarz	CMT	883 152/001	2021-01	2024-01
Oscilloscope	Yokogawa	DL1540	25WY1600L	2023-03	2024-03

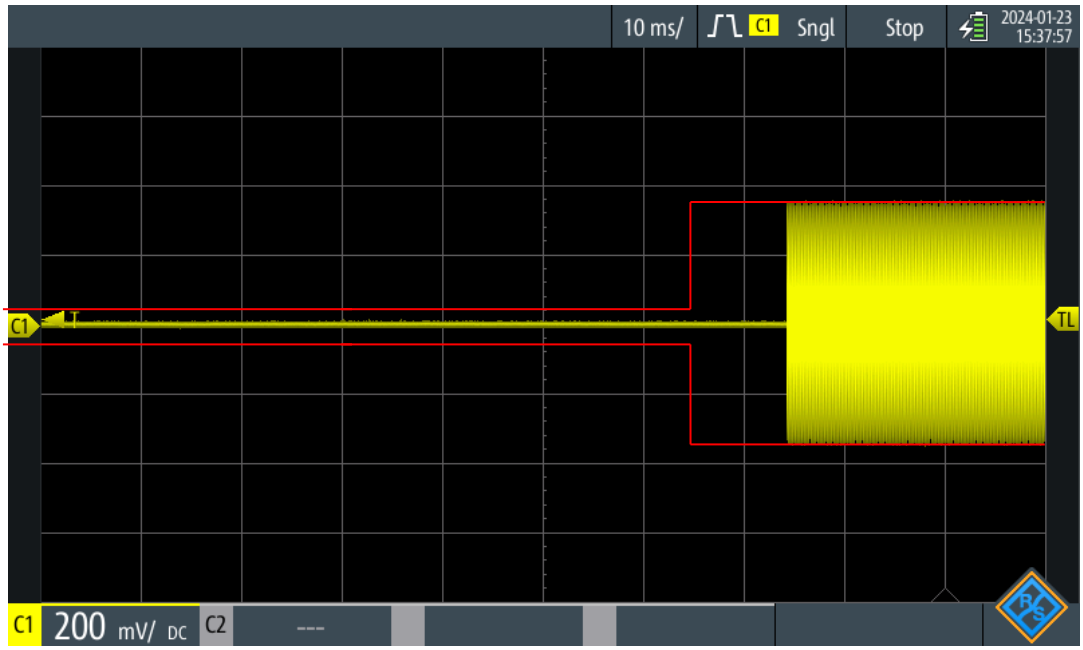
Note: NCR - no calibration required, VOU - verify on use

7.6.5 Test data



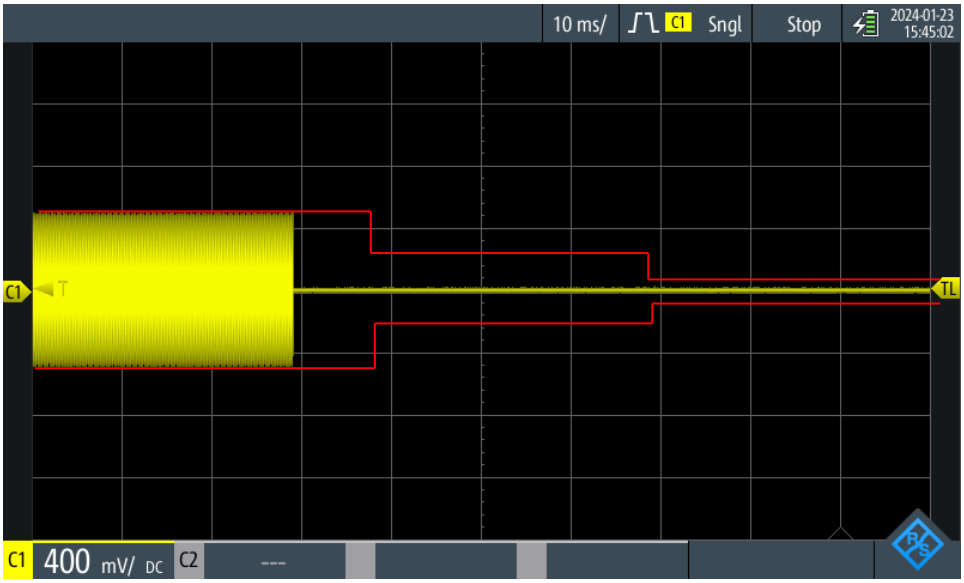
Transient Frequency behavior with modulation FM 12.5 kHz at 467 MHz, switch ON

Test data, continued



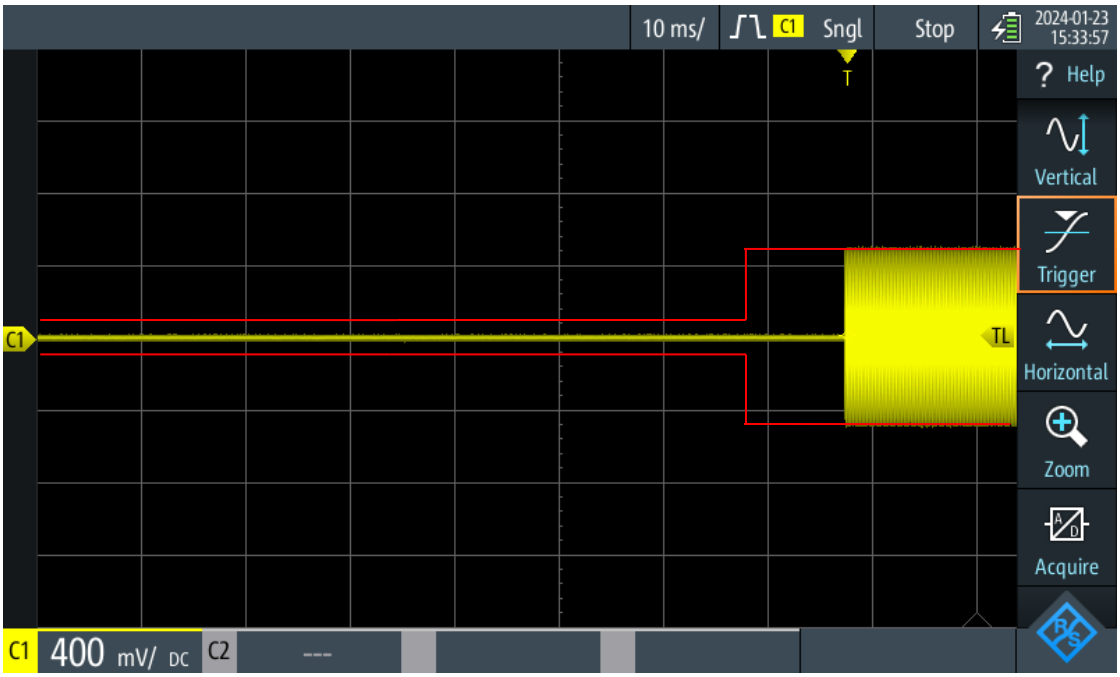
Transient Frequency behavior with modulation FM 12.5 kHz at 467 MHz, switch OFF

Test data, continued



Transient Frequency behavior with modulation FM 25 kHz at 467 MHz, switch ON

Test data, continued



Transient Frequency behavior with modulation FM 25 kHz at 467 MHz, switch OFF

7.7 Transmitter frequency stability

7.7.1 References, definitions and limits

FCC §22.355:

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C–1 of this section.

Table 7.7-1: Table C–1—Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile >3 watts (ppm)	Mobile ≤3 watts (ppm)
20 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/a

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.

Table 7.7-2: Minimum frequency stability

Frequency range (MHz)	Fixed and base stations	Mobile stations over 2 watts output power	Mobile stations 2 watts or less output power
421–512	±2.5 ppm[1]	±5 ppm[2]	±5 ppm[2]

Notes: [1]In the 421–512 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 1.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 0.5 ppm.

[2]In the 421–512 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.

7.7.2 Test summary

Verdict	Pass		
Tested by	D. Guarnone	Test date	January 23, 2024

7.7.3 Observations, settings and special notes

Test was performed on supply voltage variations as per client rated, no frequency deviation was observed.

7.7.4 Test equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI Receiver	Rohde & Schwarz	ESU8	100202	2023-09	2024-09
Climatic chamber	espec	ARS-1100	4100000067	2023-12	2024-12

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

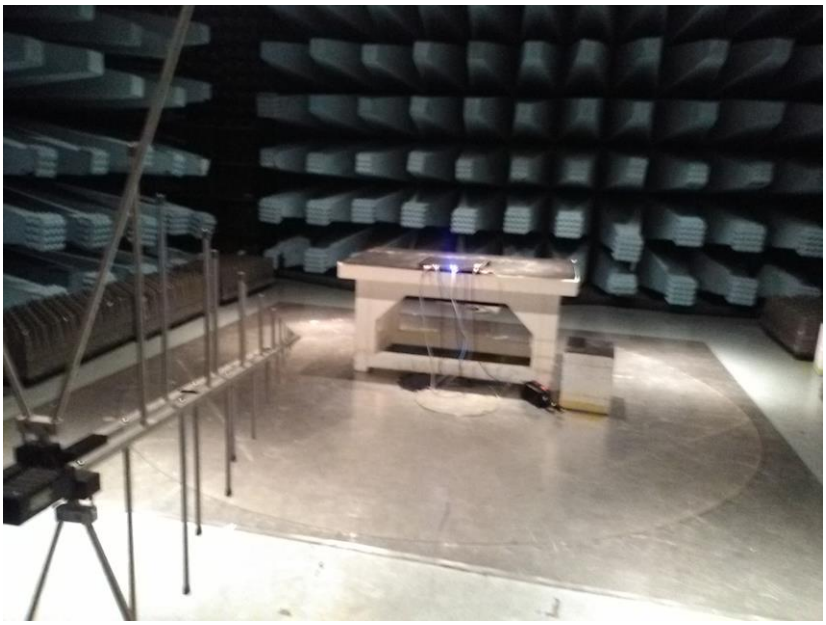
7.7.5 Test data

Table 7.7-3: Transmitter frequency stability results

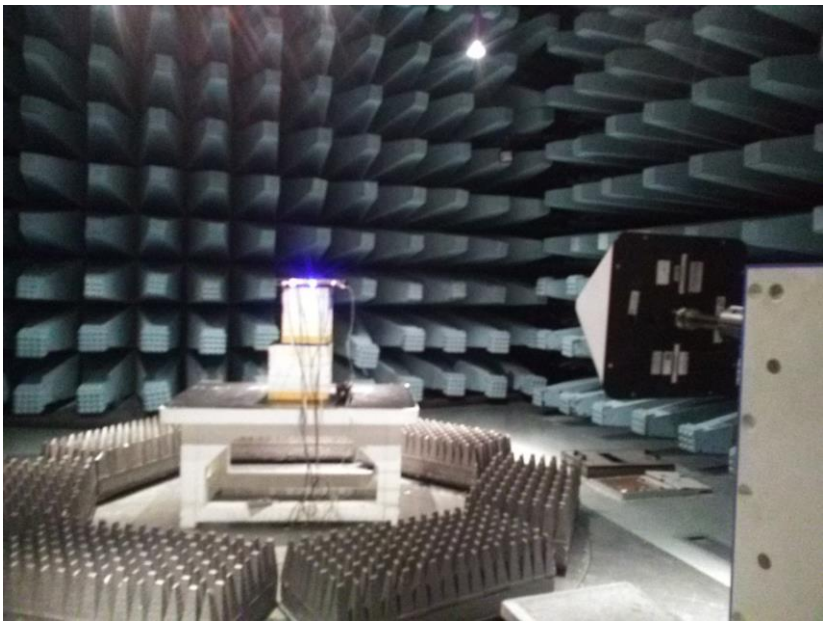
Test conditions	Frequency, Hz	Drift, Hz	Drift, ppm	Limit ±ppm	Margin, ±ppm
+50 °C, Nominal	46700012.5	1.8	0.004	2.5	-2.50
+40 °C, Nominal	46700012.2	1.5	0.003	2.5	-2.50
+30 °C, Nominal	46700013.2	2.5	0.006	2.5	-2.49
+20 °C, +15 %	46700012.1	1.4	0.003	2.5	-2.50
+20 °C, Nominal	46700010.7	Reference	Reference	Reference	Reference
+20 °C, -15 %	46700012.5	1.8	0.004	2.5	-2.50
+10 °C, Nominal	46700011.2	0.5	0.001	2.5	-2.50
0 °C, Nominal	46700012.3	1.6	0.004	2.5	-2.50
−10 °C, Nominal	46700013.1	2.4	0.005	2.5	-2.49
−20 °C, Nominal	46700013.2	2.5	0.006	2.5	-2.49
−30 °C, Nominal	46700012.2	1.5	0.003	2.5	-2.50

Section 8 Photos

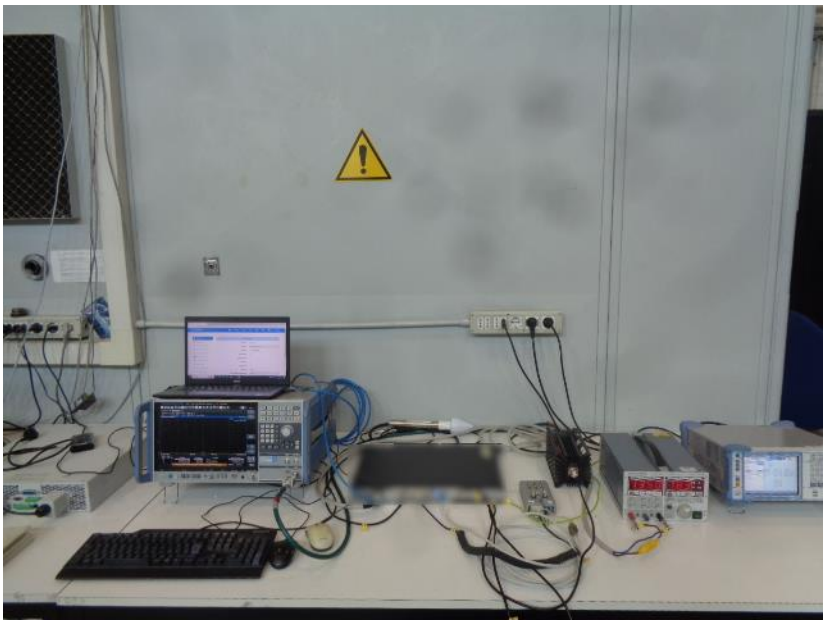
8.1 Photos of the test set-up



Set-up photo for radiated tests below 1 GHz photo



Set-up photo for radiated tests above 1 GHz photo



Set-up photo for antenna port tests

Set-up photo for frequency error tests

8.2 EUT label

Copy of marking plate

[End of the test report]