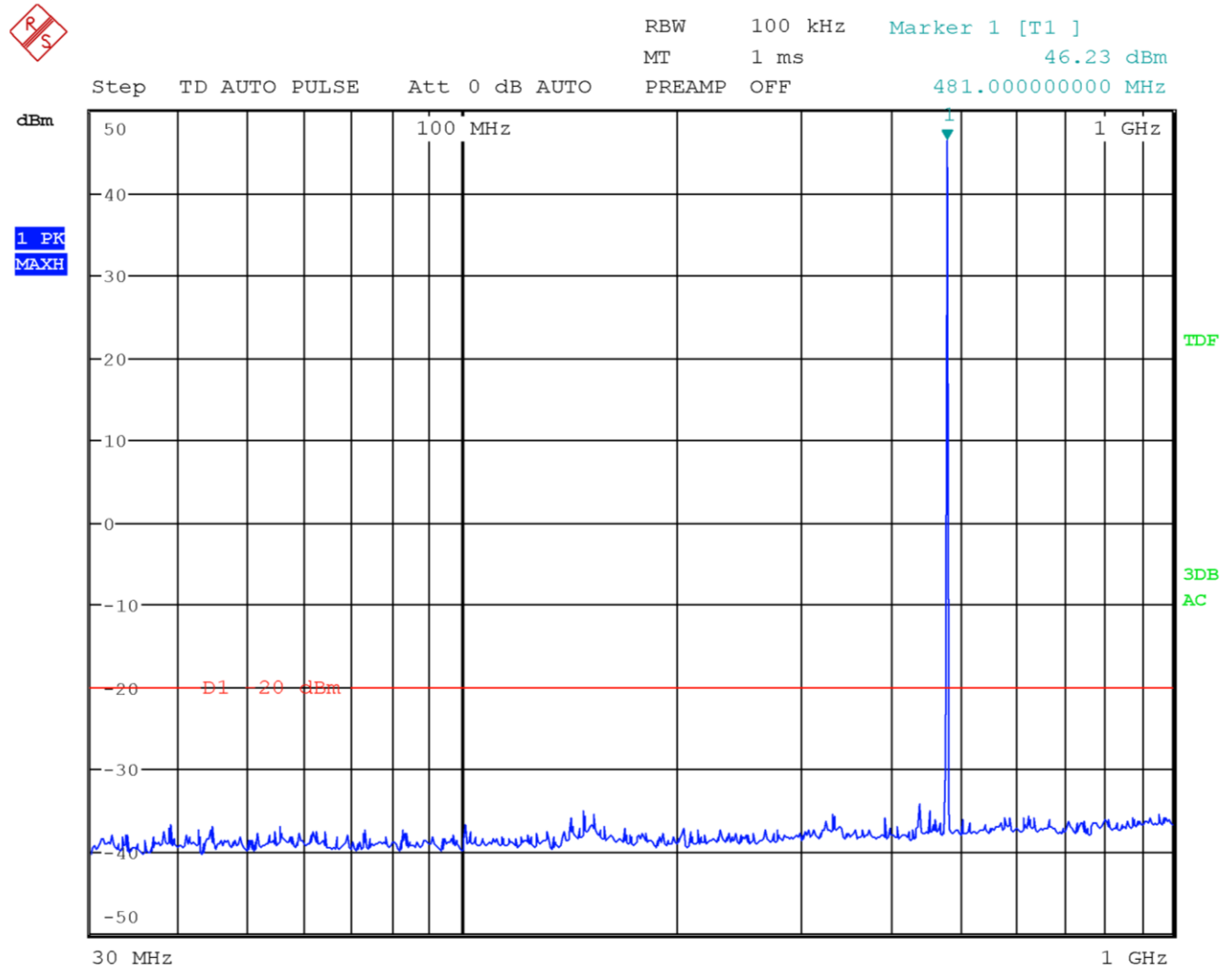


Test data, continued



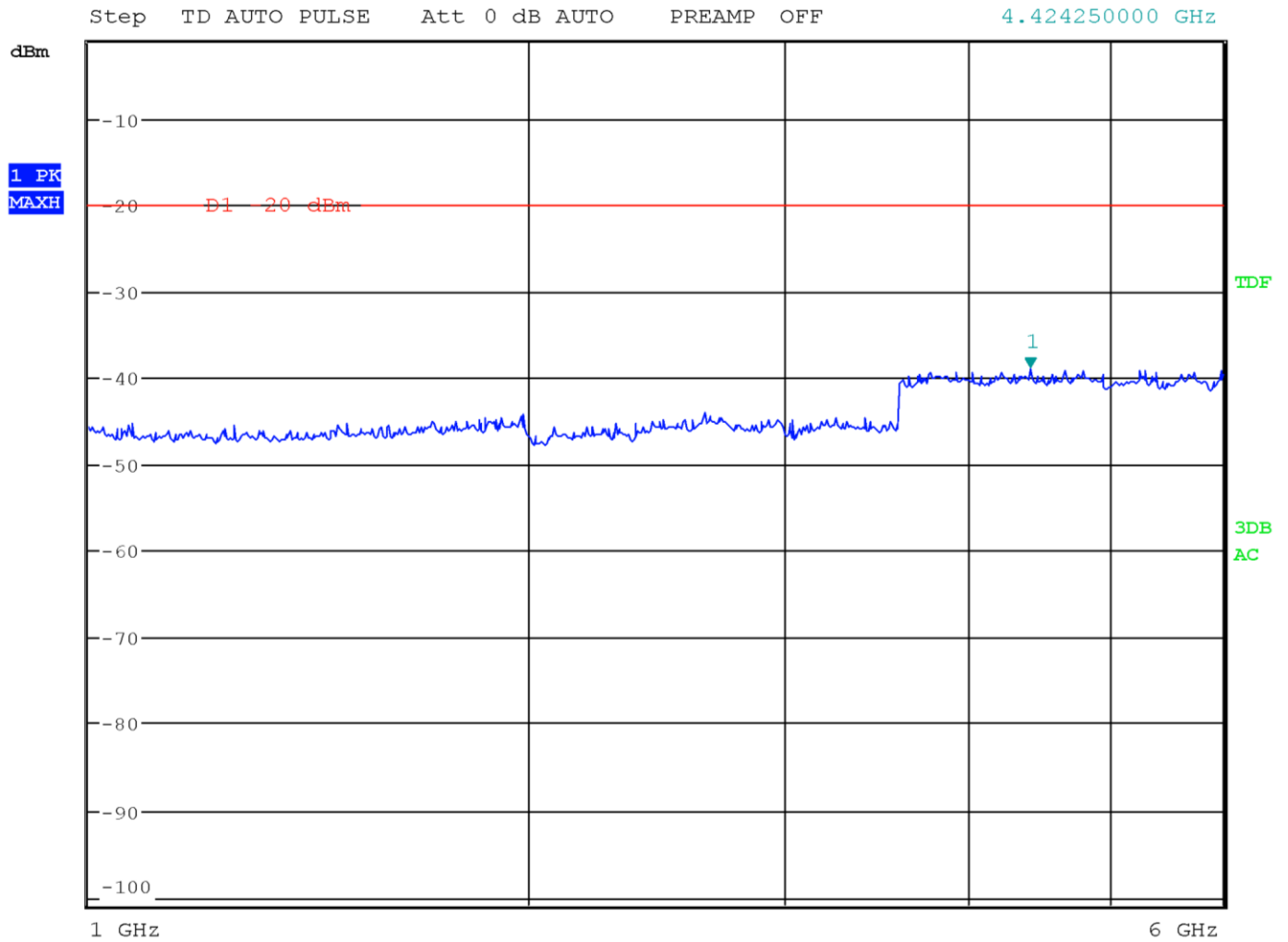
Conducted spurious emissions with modulation DMR 4FSK at 481.0 MHz (30 MHz to 1 GHz)

Limit exceeded by the carrier

Test data, continued

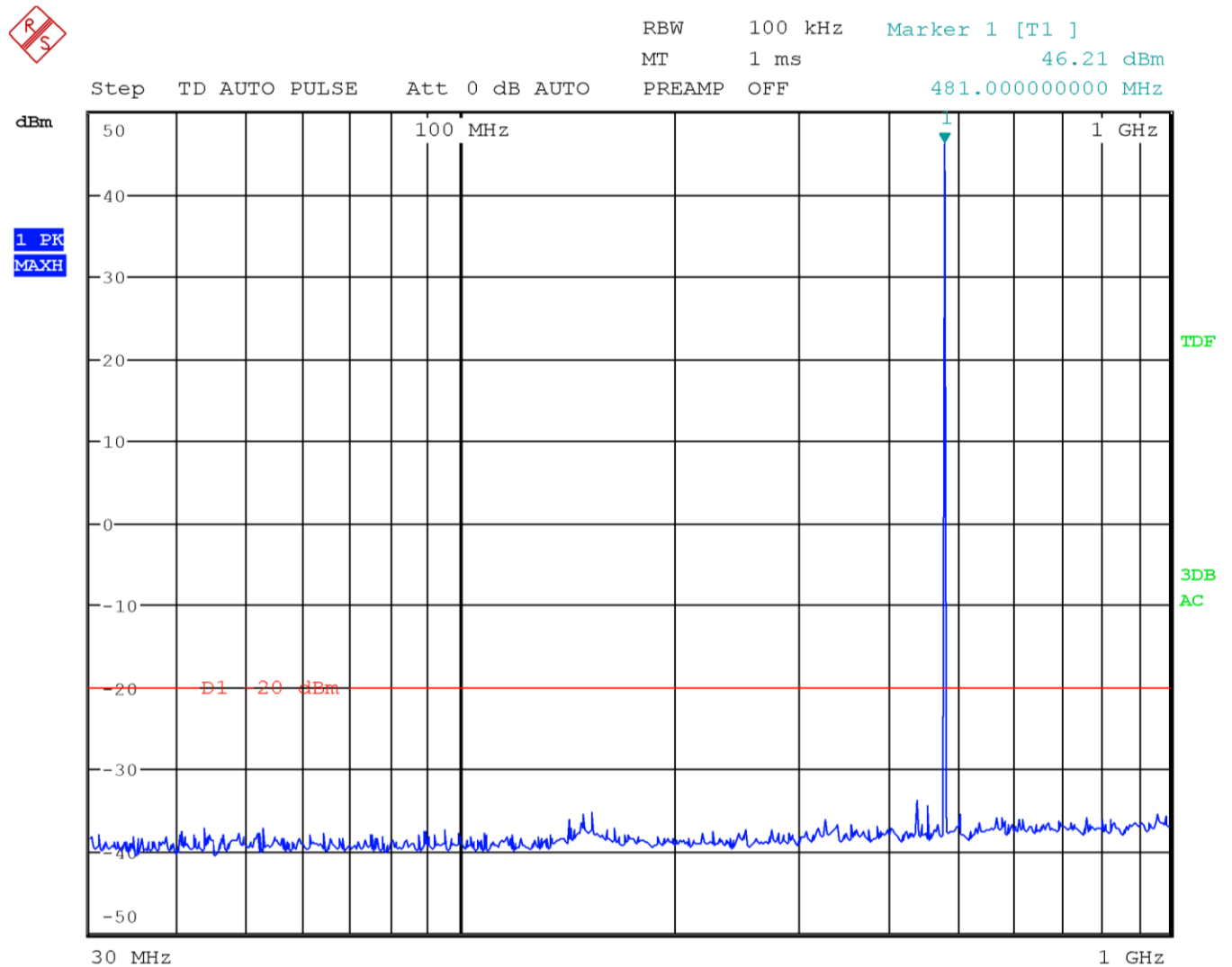


RBW 1 MHz Marker 1 [T1]  
MT 1 ms -39.02 dBm  
PREAMP OFF 4.424250000 GHz



Conducted spurious emissions with modulation DMR 4FSK at 481.0 MHz (1 to 6 GHz)

Test data, continued



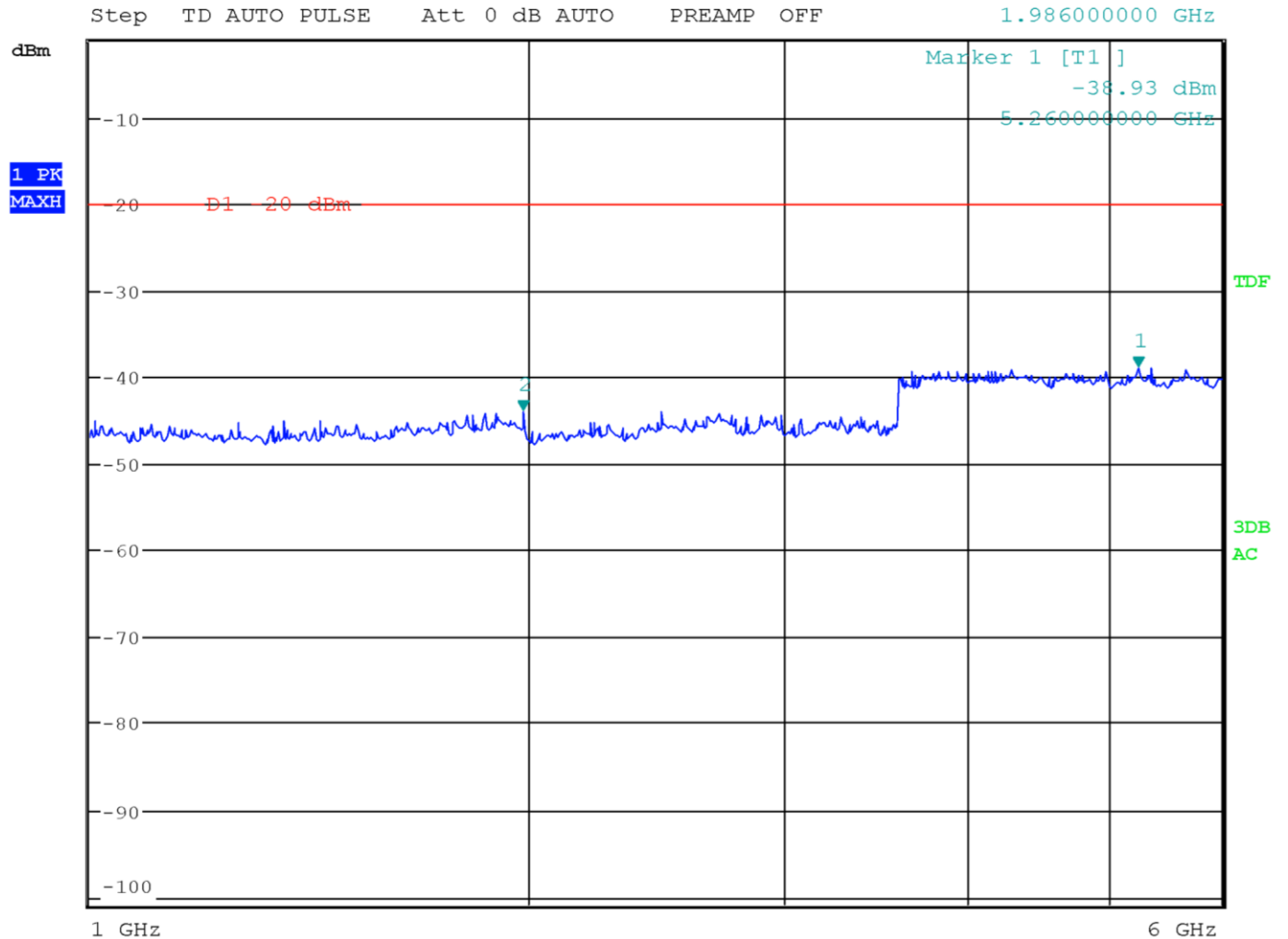
Conducted spurious emissions with modulation P25 C4FM at 481.0 MHz (30 MHz to 1 GHz)

Limit exceeded by the carrier

Test data, continued

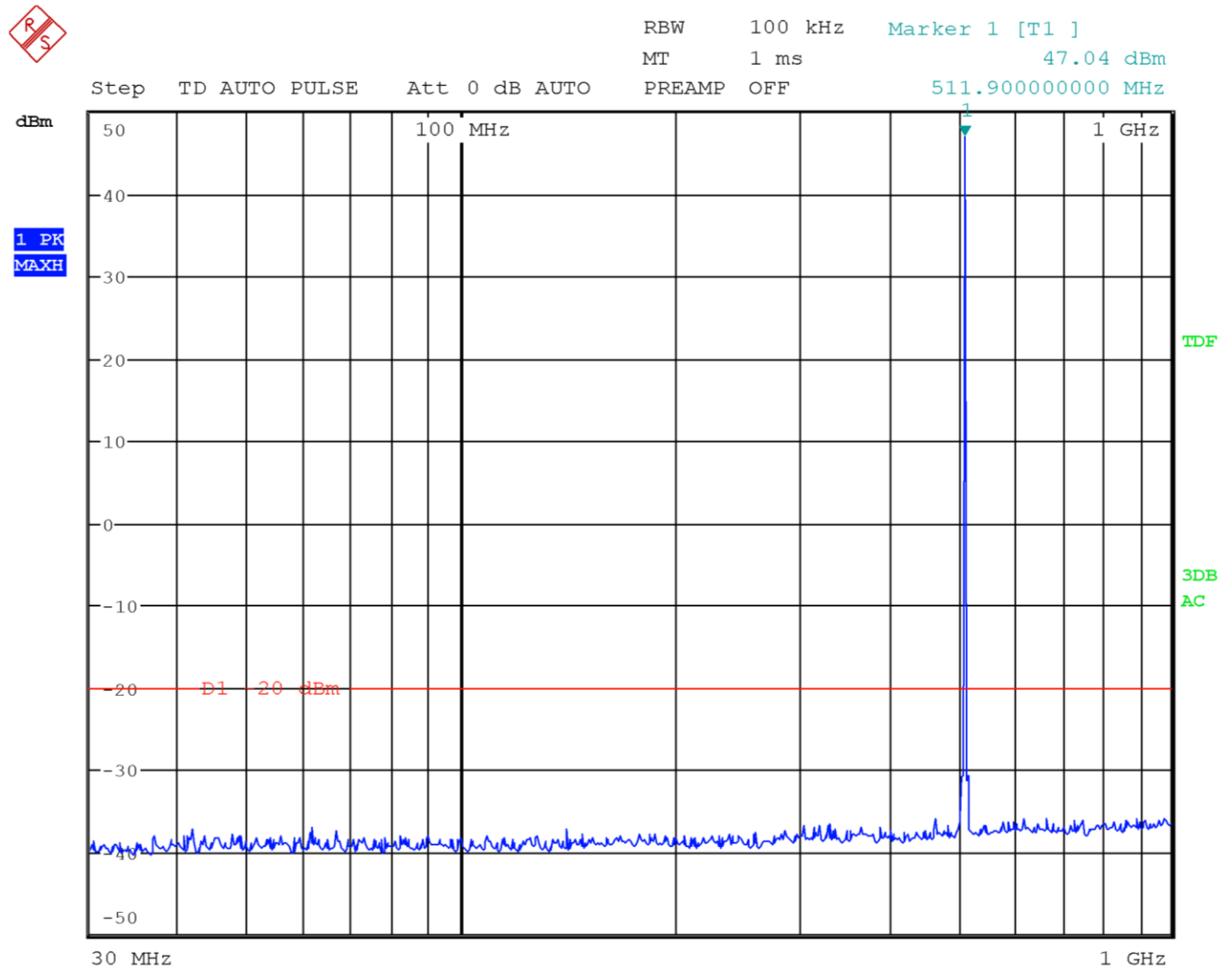


RBW 1 MHz Marker 2 [T1 ]  
MT 1 ms -44.01 dBm  
PREAMP OFF 1.986000000 GHz



Conducted spurious emissions with modulation P25 C4FM at 481.0 MHz (1 to 6 GHz)

Test data, continued



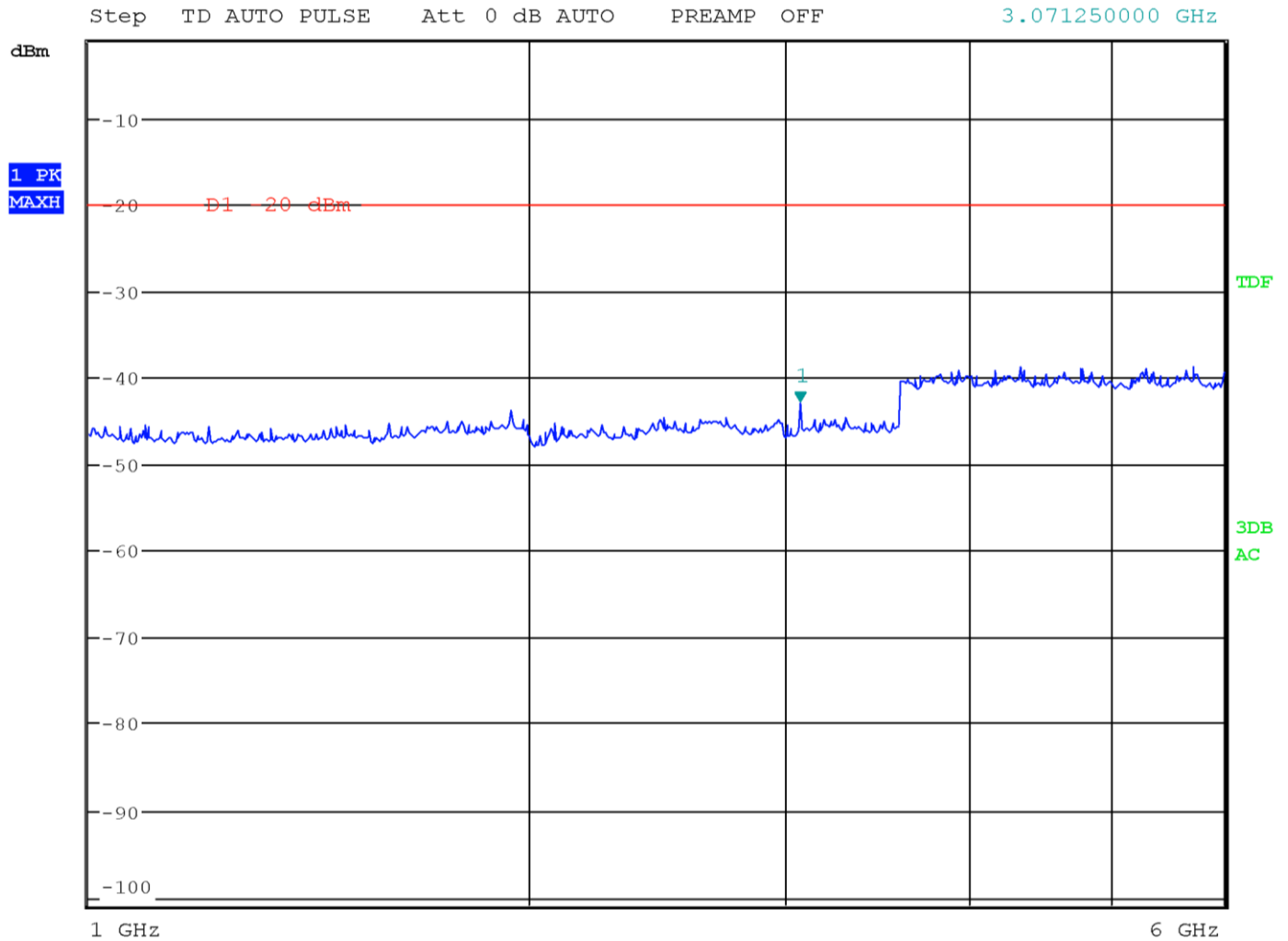
Conducted spurious emissions with modulation FM 12.5 kHz at 511.9 MHz (30 MHz to 1 GHz)

Limit exceeded by the carrier

Test data, continued

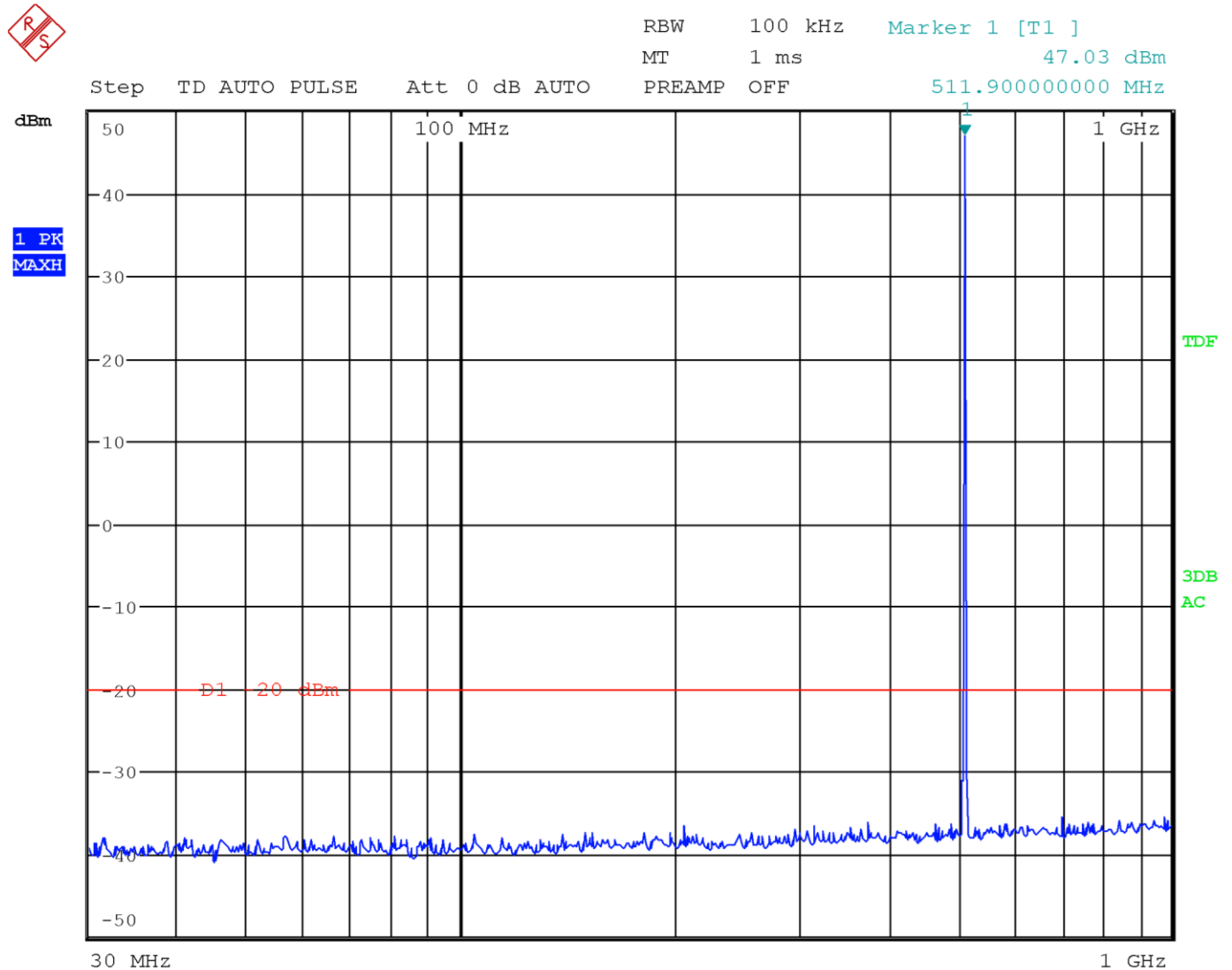


RBW 1 MHz Marker 1 [T1 ]  
MT 1 ms -43.01 dBm  
PREAMP OFF 3.071250000 GHz



Conducted spurious emissions with modulation FM 12.5 kHz at 511.9 MHz (1 to 6 GHz)

Test data, continued



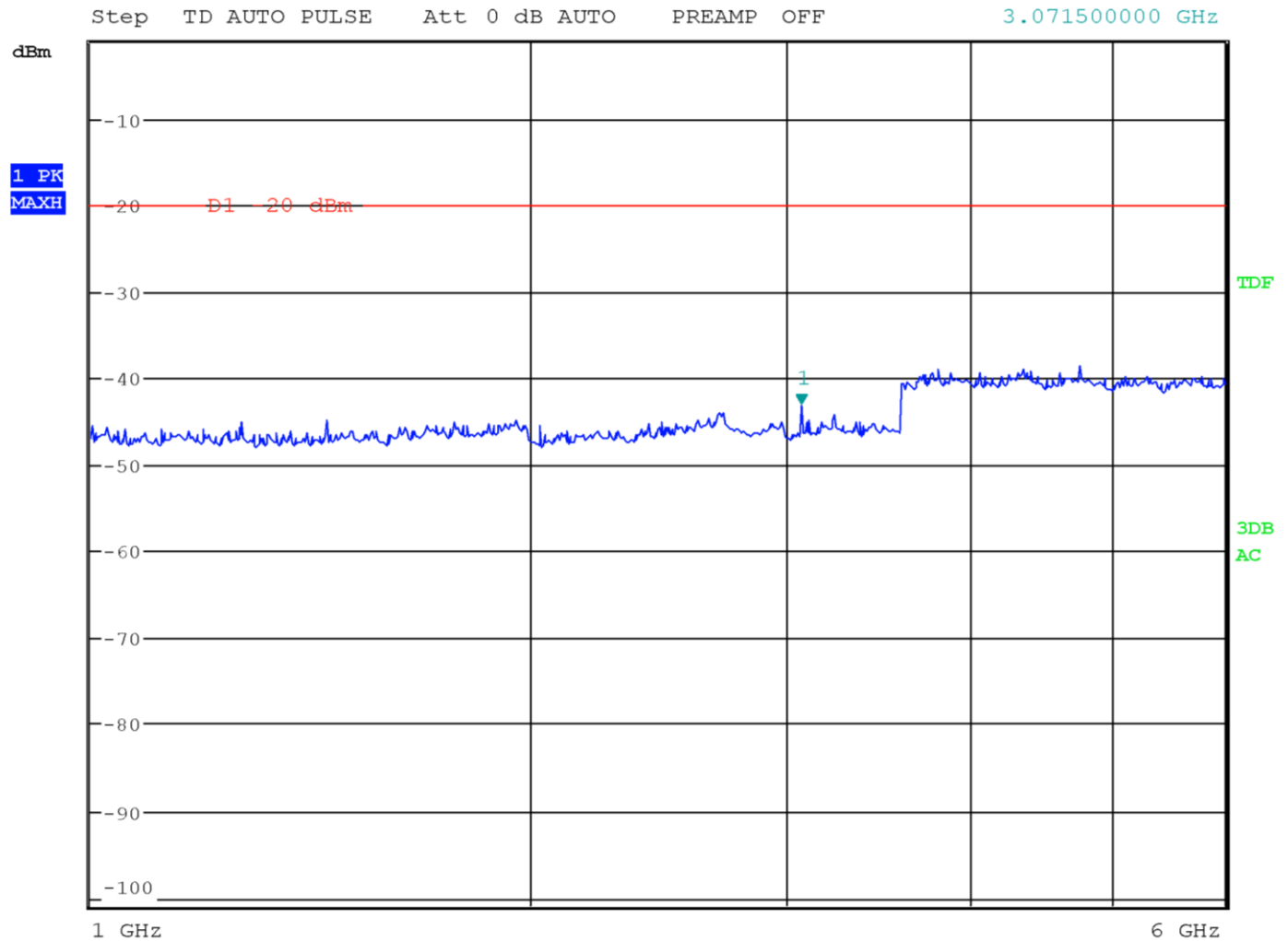
Conducted spurious emissions with modulation FM 25 kHz at 511.9 MHz (30 MHz to 1 GHz)

Limit exceeded by the carrier

Test data, continued

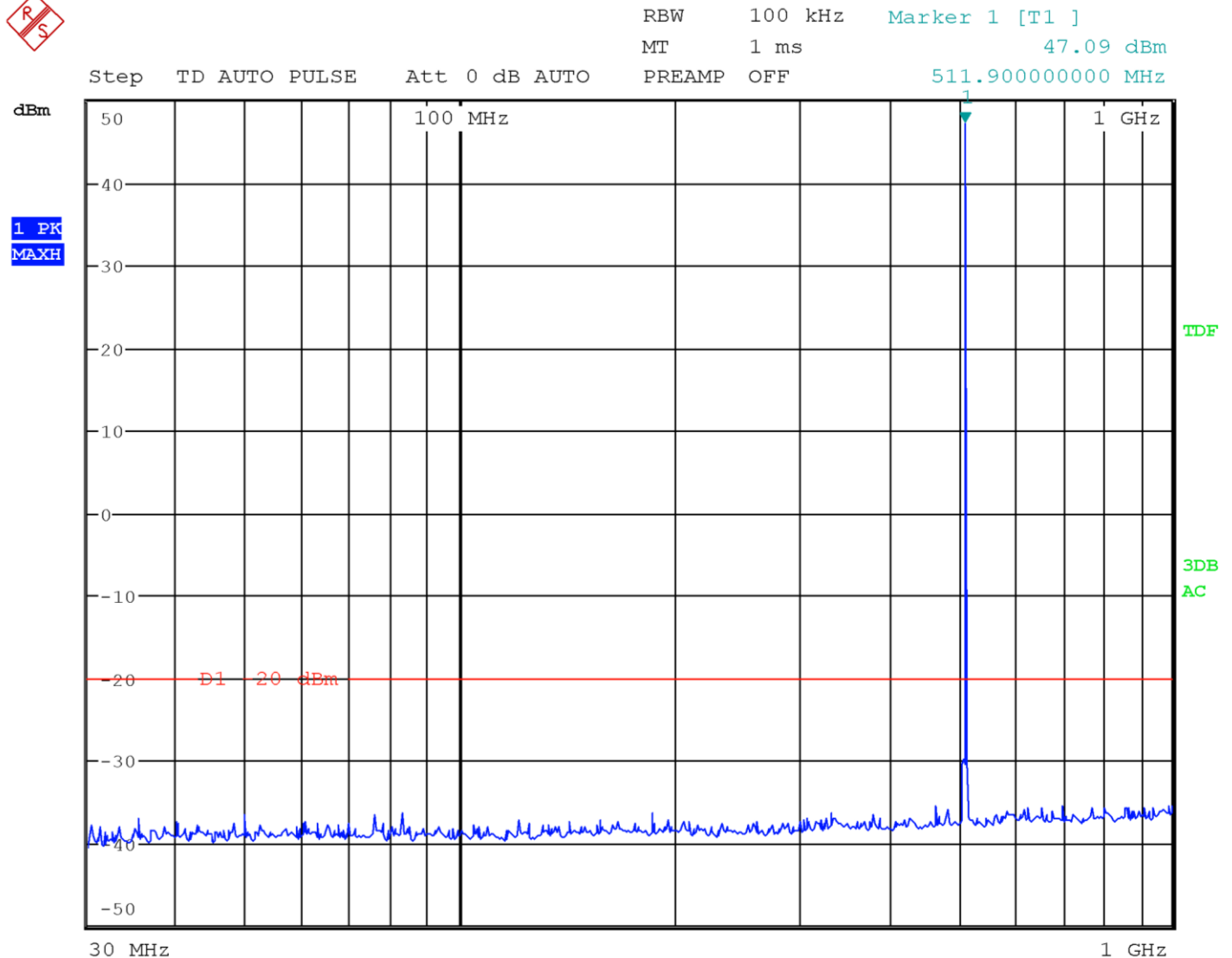


RBW 1 MHz Marker 1 [T1]  
 MT 1 ms -43.19 dBm  
 PREAMP OFF 3.071500000 GHz



Conducted spurious emissions with modulation FM 25 kHz at 511.9 MHz (1 to 6 GHz)

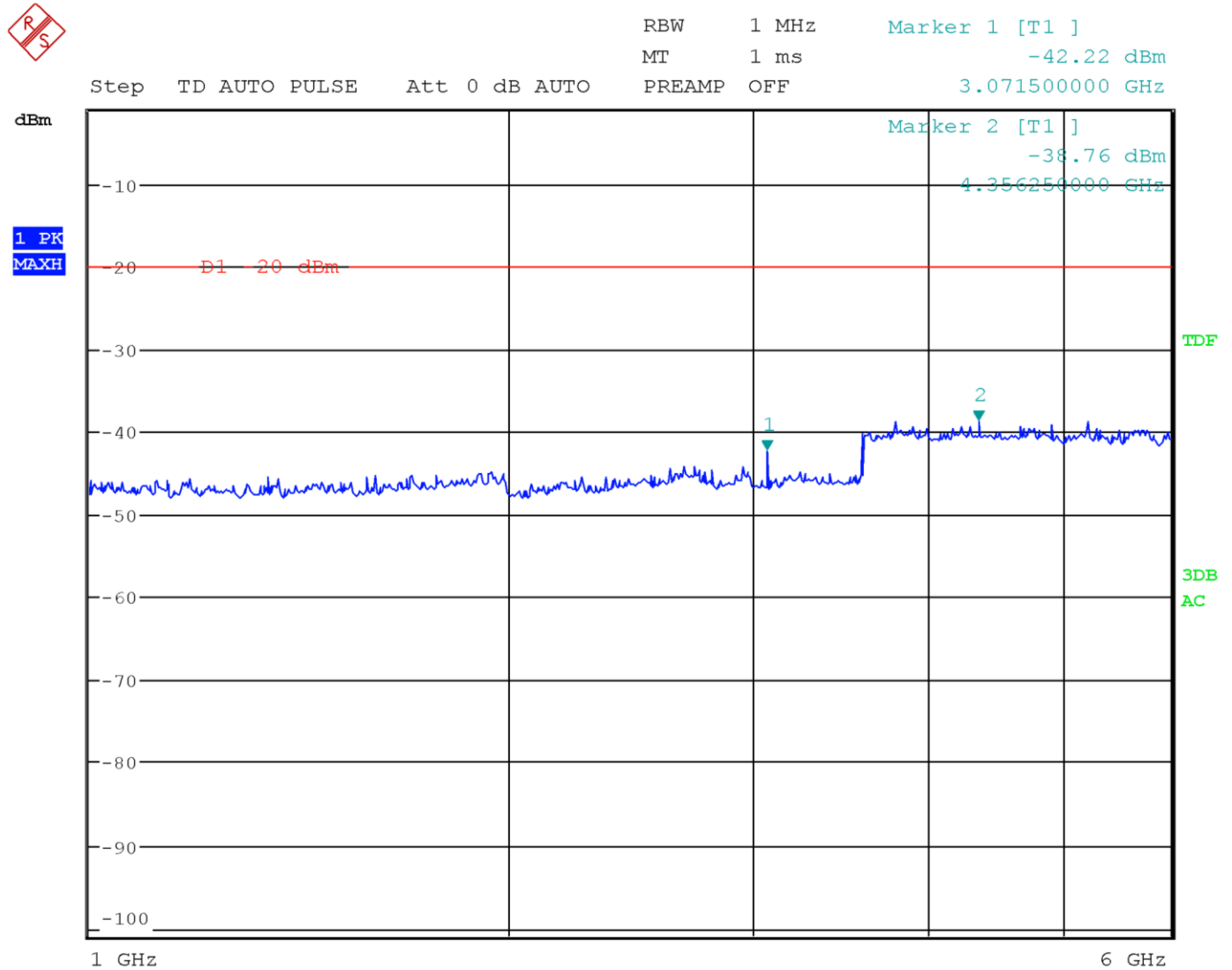
Test data, continued



Conducted spurious emissions with modulation DMR 4FSK at 511.9 MHz (30 MHz to 1 GHz)

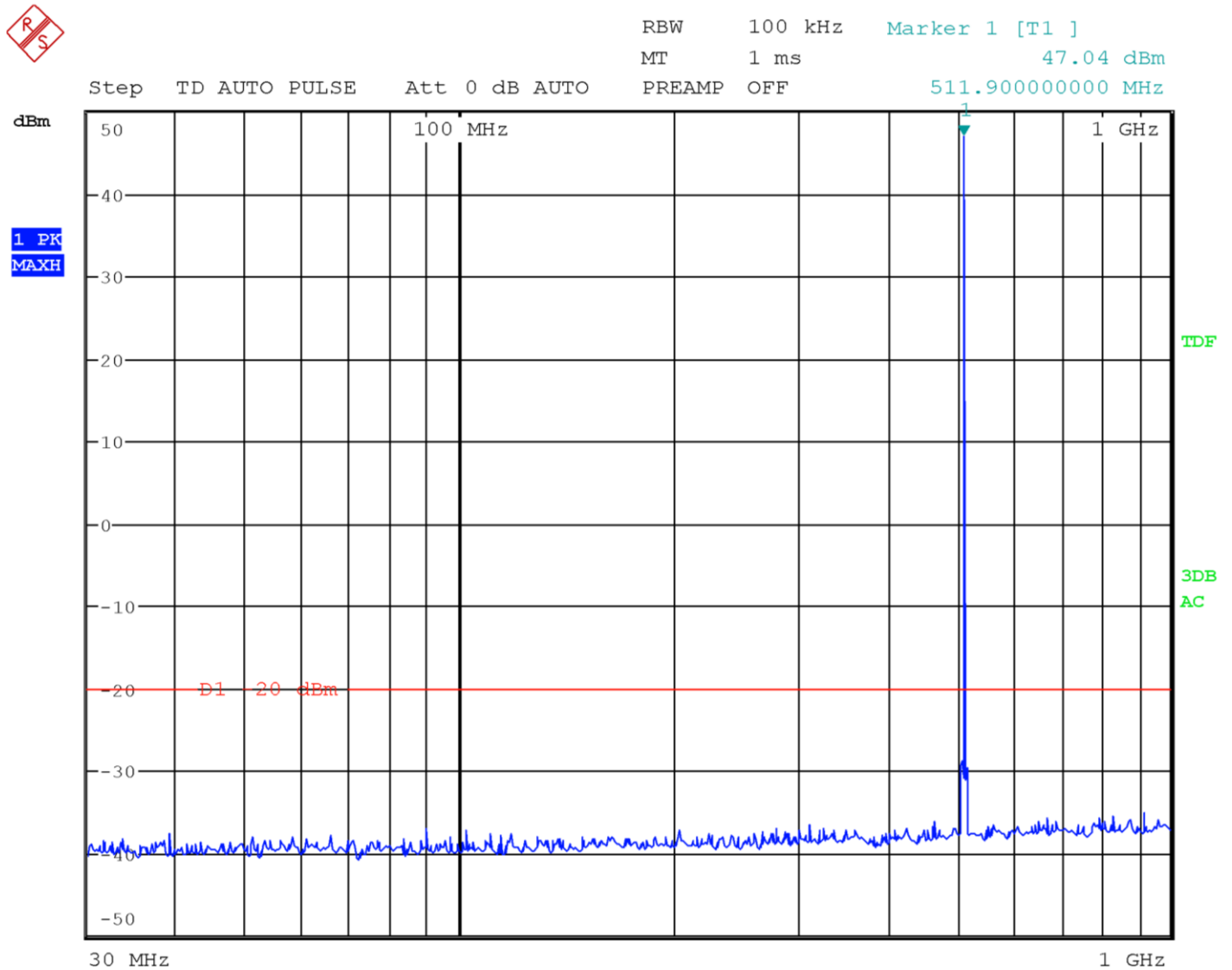
Limit exceeded by the carrier

Test data, continued



Conducted spurious emissions with modulation DMR 4FSK at 511.9 MHz (1 to 6 GHz)

Test data, continued



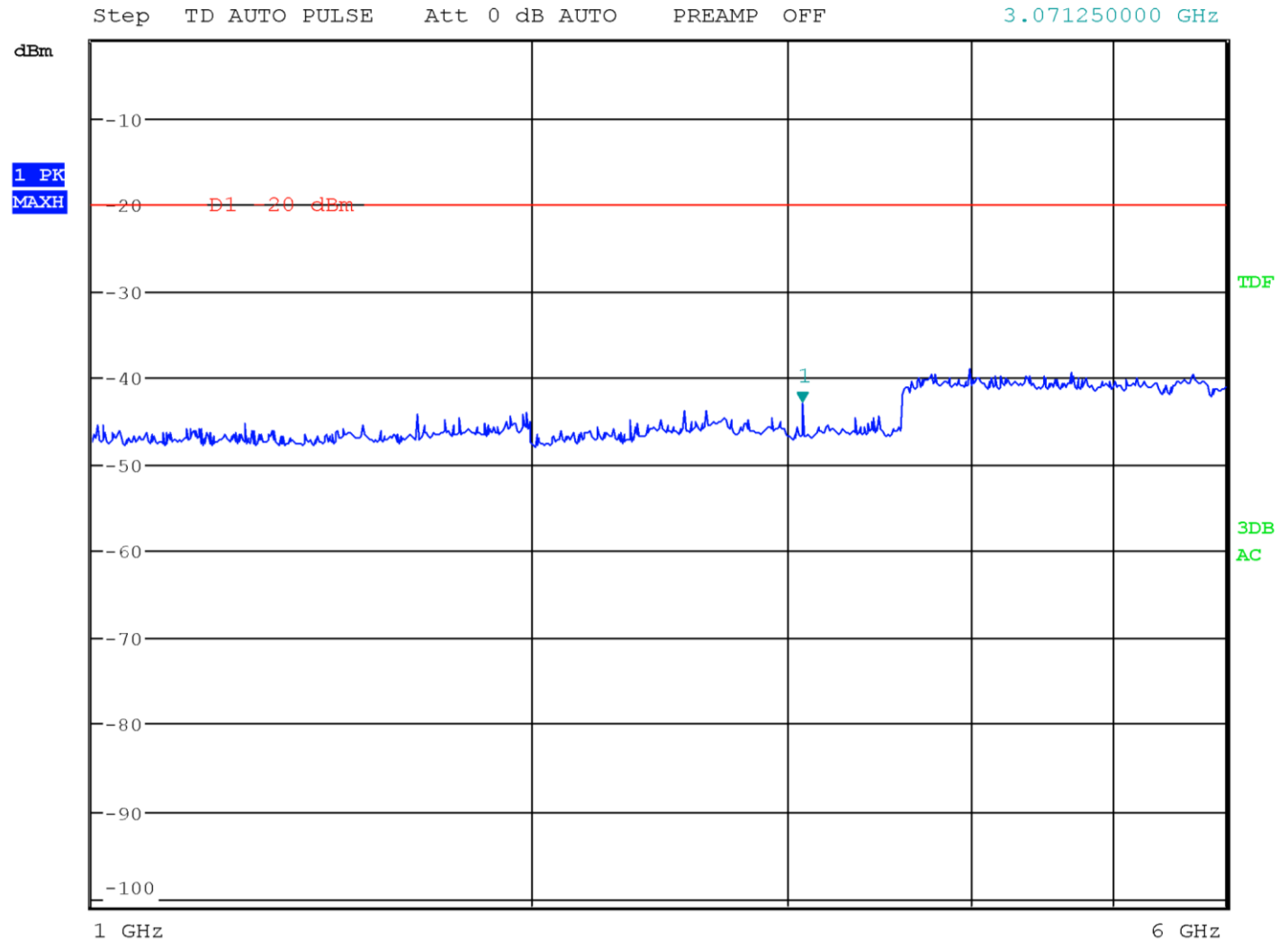
Conducted spurious emissions with modulation P25 C4FM at 511.9 MHz (30 MHz to 1 GHz)

Limit exceeded by the carrier

Test data, continued

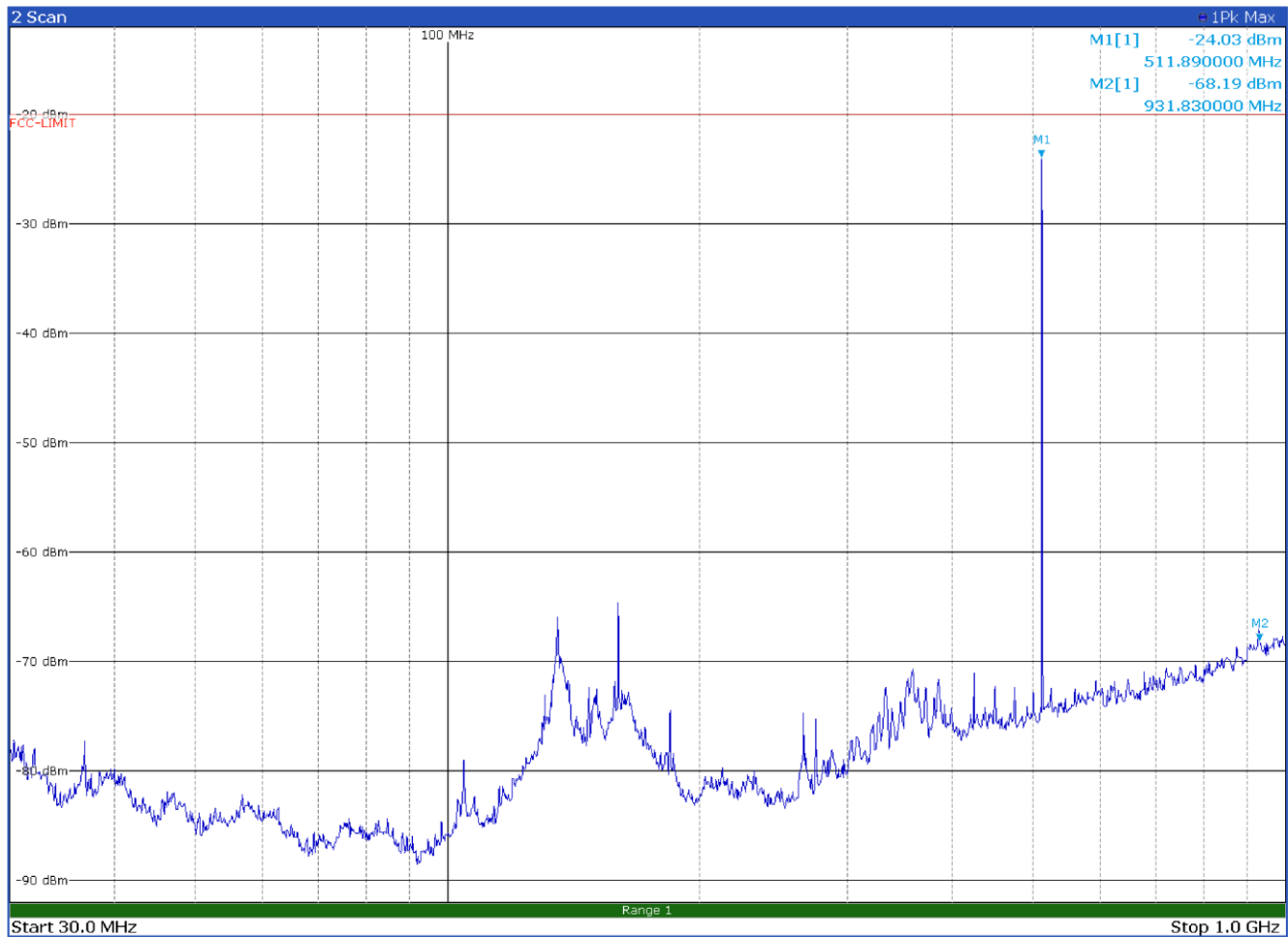


RBW 1 MHz Marker 1 [T1]  
MT 1 ms -42.86 dBm  
PREAMP OFF 3.071250000 GHz



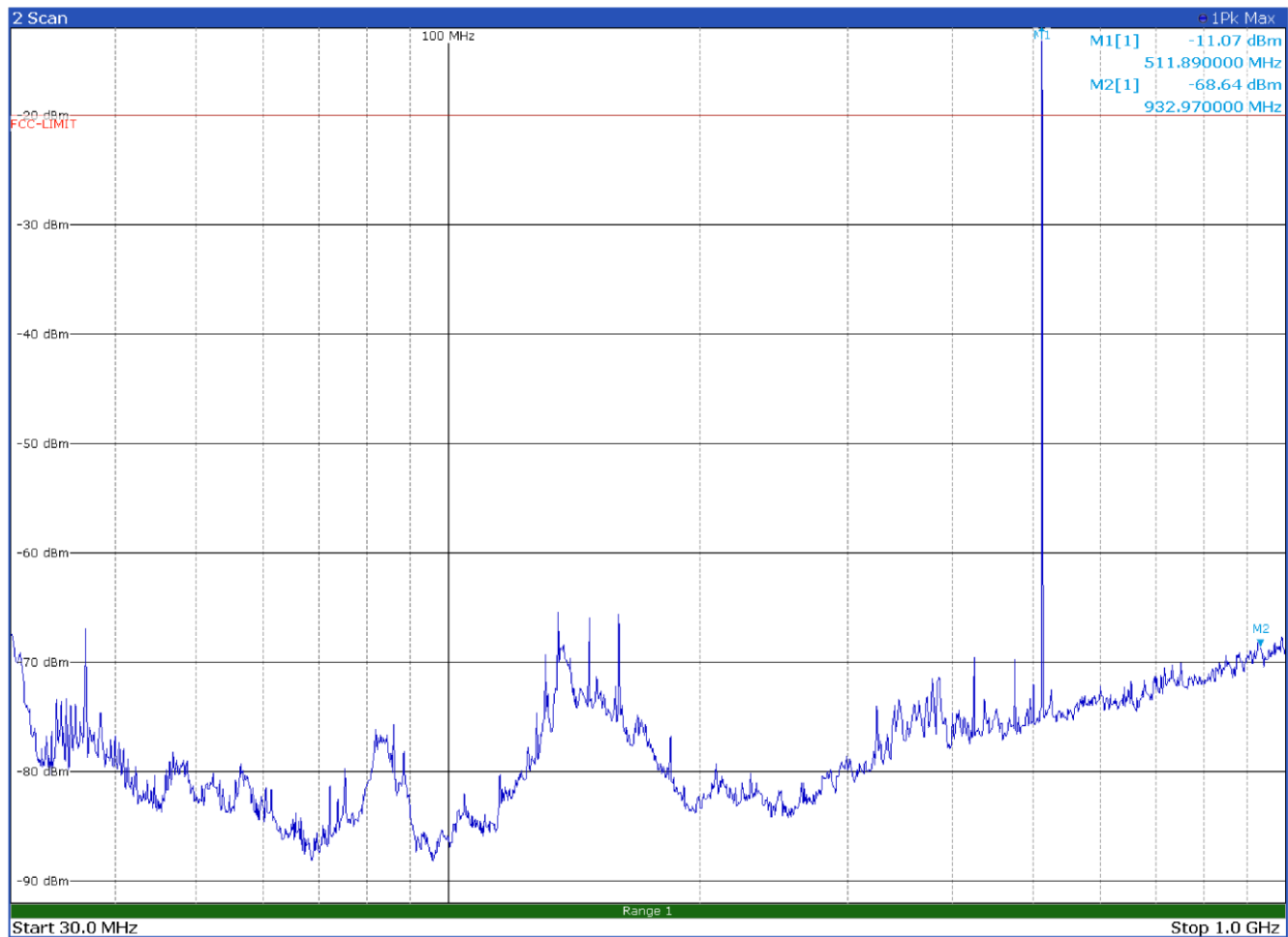
Conducted spurious emissions with modulation P25 C4FM at 511.9 MHz (1 to 6 GHz)

Test data, continued



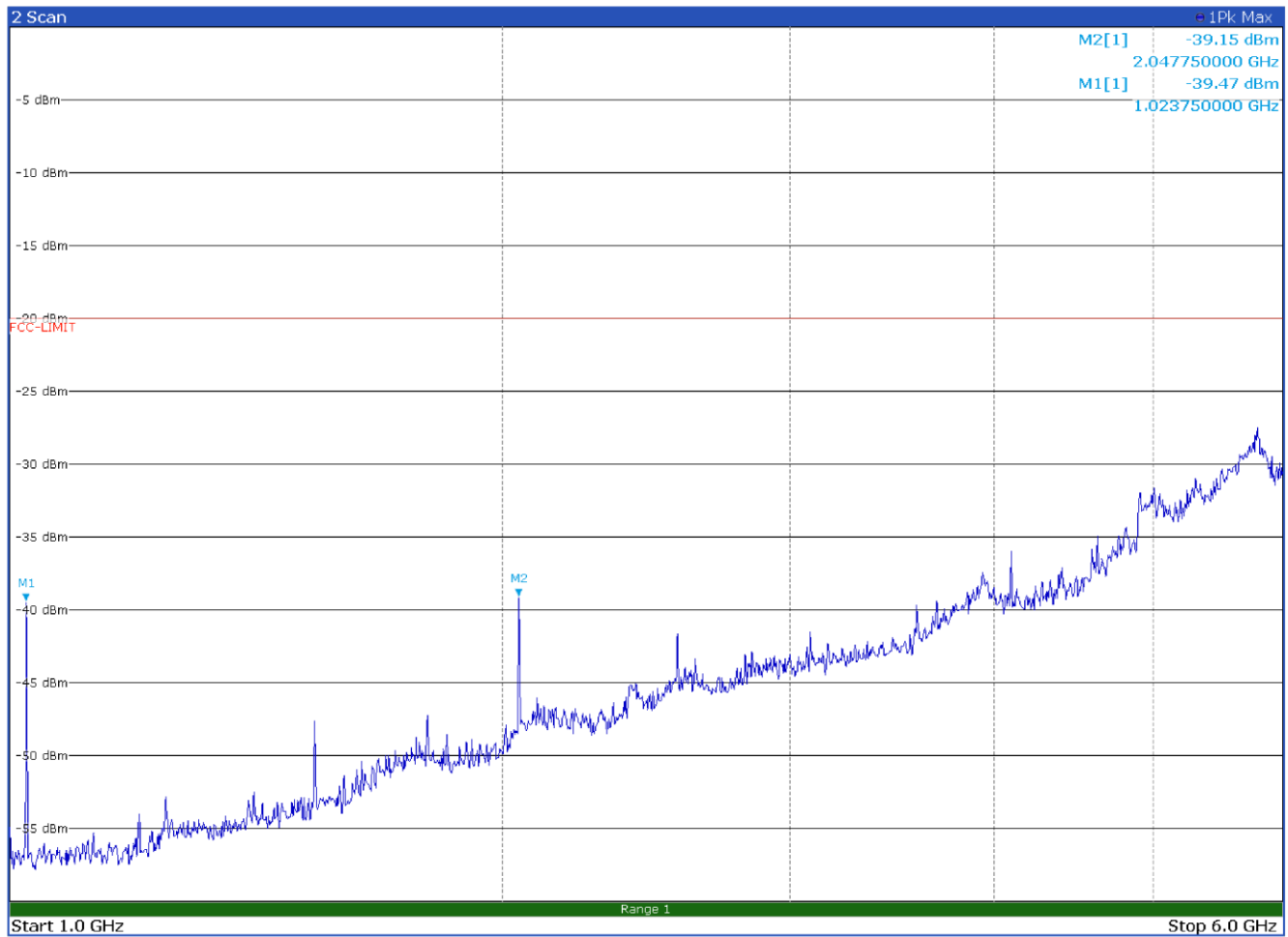
Radiated spurious emissions with modulation FM 12.5 kHz at 511.9 MHz – Antenna in horizontal polarization  
(worst frequency case from conducted emissions)

Test data, continued



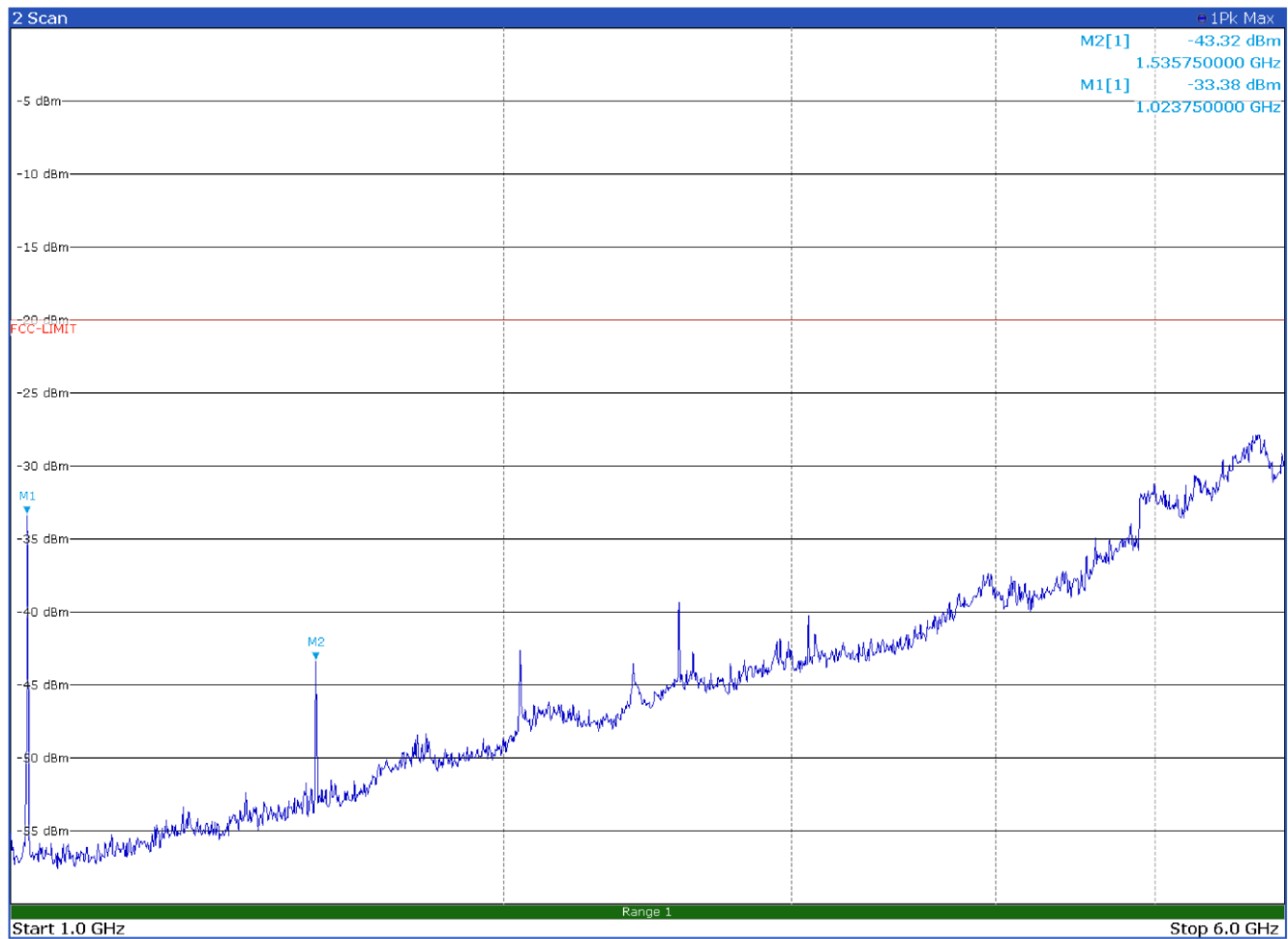
Radiated spurious emissions with modulation FM 12.5 kHz at 511.9 MHz – Antenna in vertical polarization  
(worst frequency case from conducted emissions)

Limit exceeded by the carrier



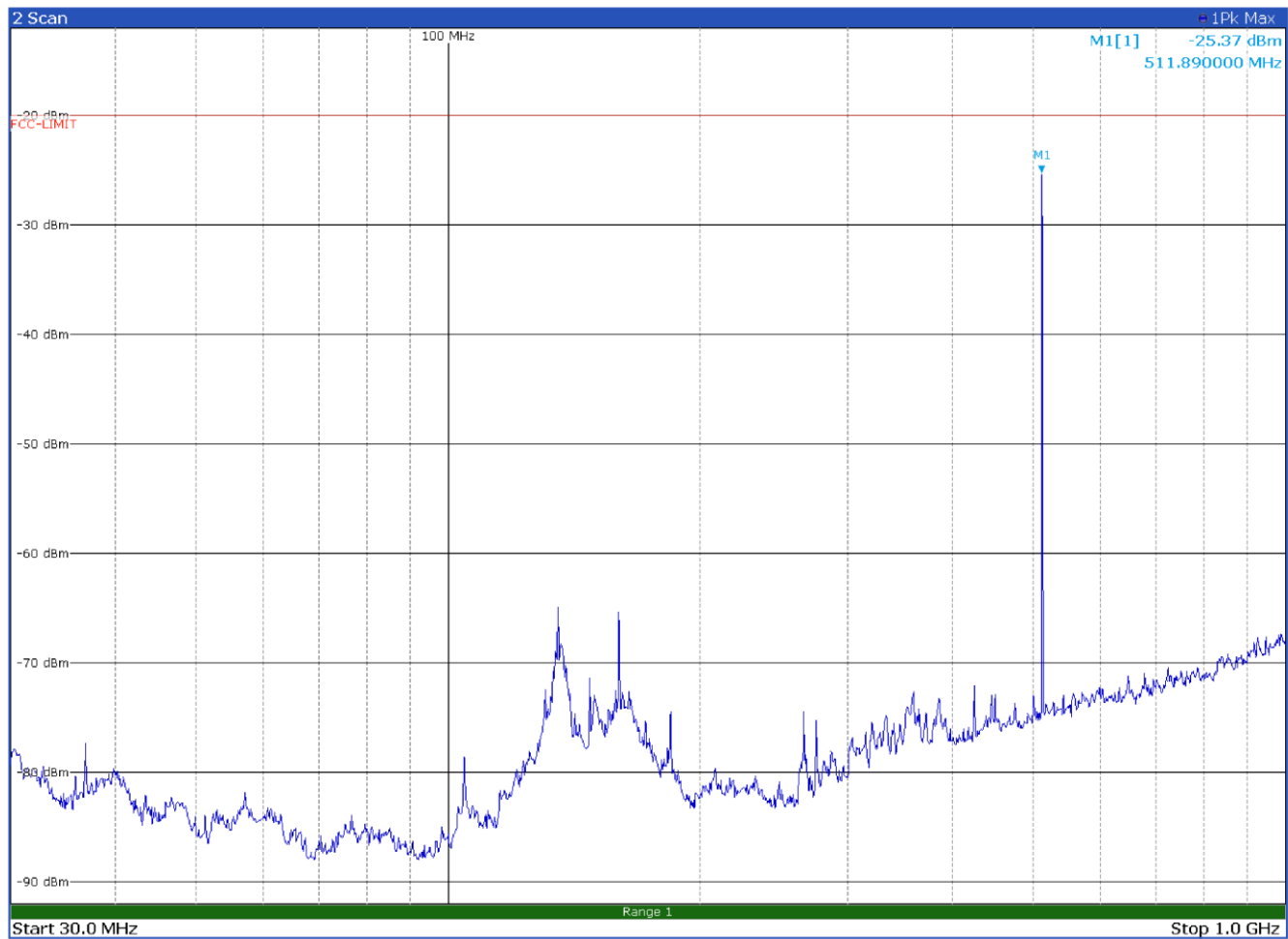
Radiated spurious emissions with modulation FM 12.5 kHz at 511.9 MHz – Antenna in horizontal polarization  
(worst frequency case from conducted emissions)

Test data, continued



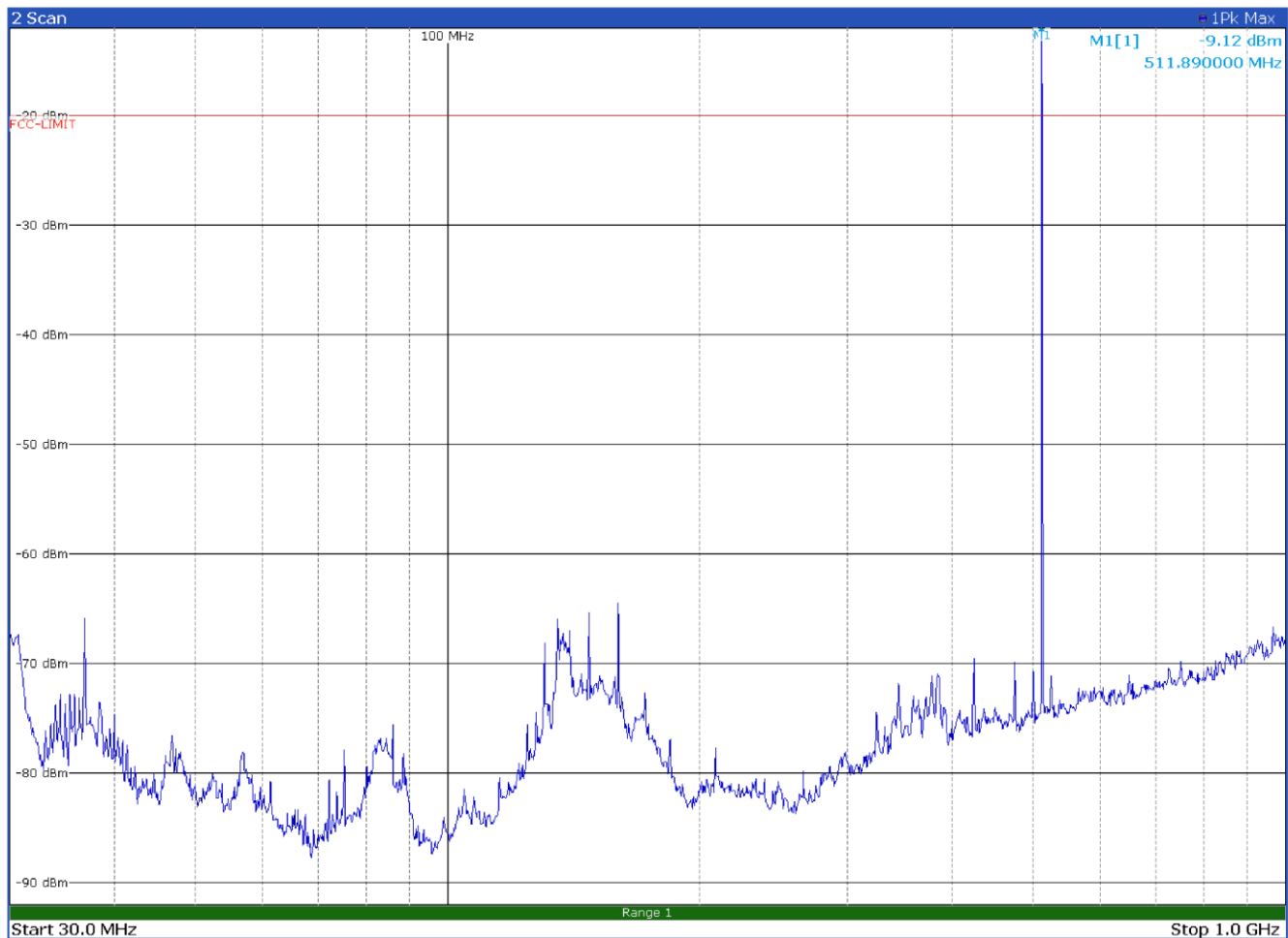
Radiated spurious emissions with modulation FM 12.5 kHz at 511.9 MHz – Antenna in vertical polarization  
(worst frequency case from conducted emissions)

Test data, continued



Radiated spurious emissions with modulation FM 25.0 kHz at 511.9 MHz – Antenna in horizontal polarization  
(worst frequency case from conducted emissions)

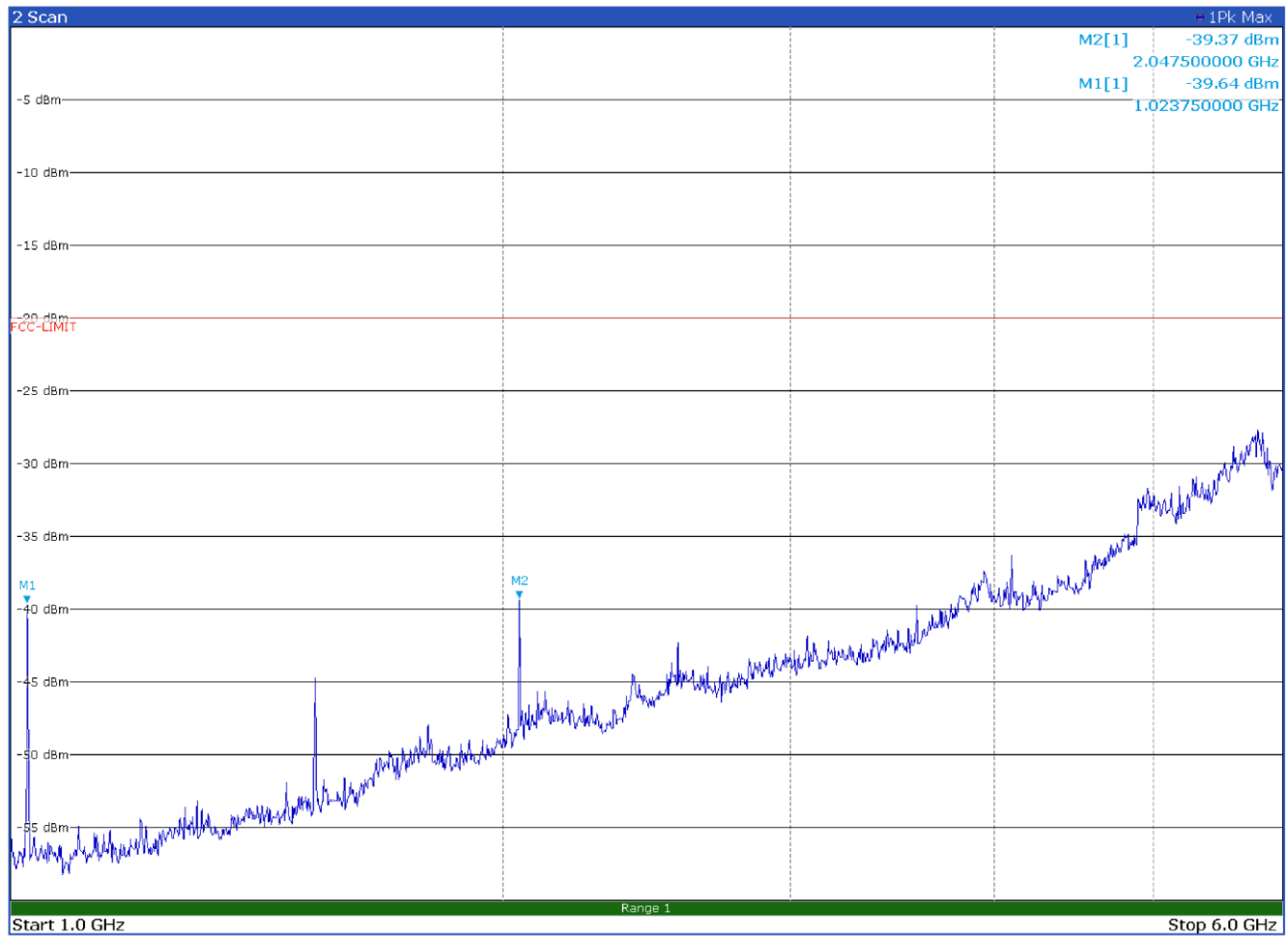
## Test data, continued



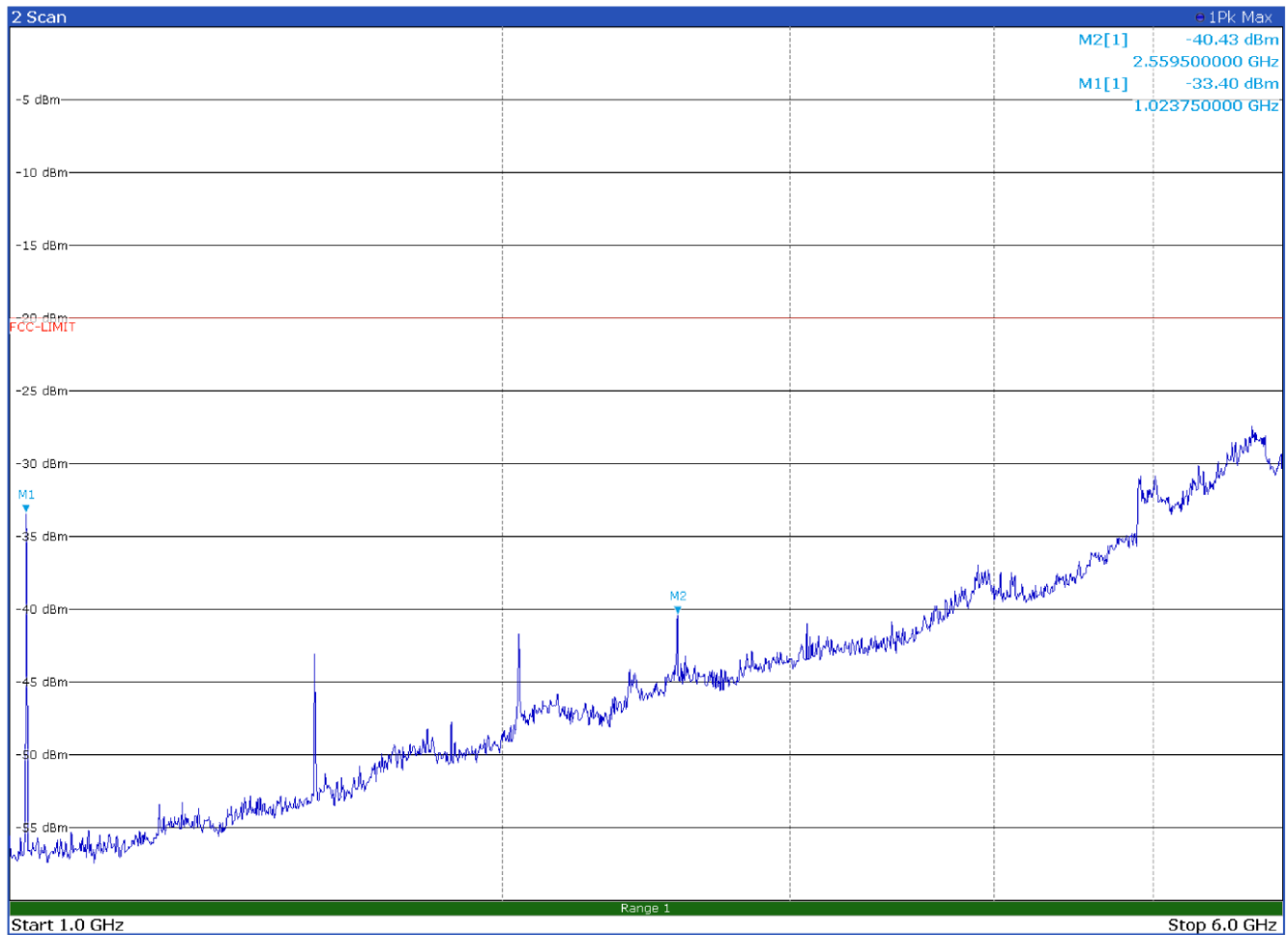
Radiated spurious emissions with modulation FM 25.0 kHz at 511.9 MHz – Antenna in vertical polarization  
(worst frequency case from conducted emissions)

Limit exceeded by the carrier

Test data, continued

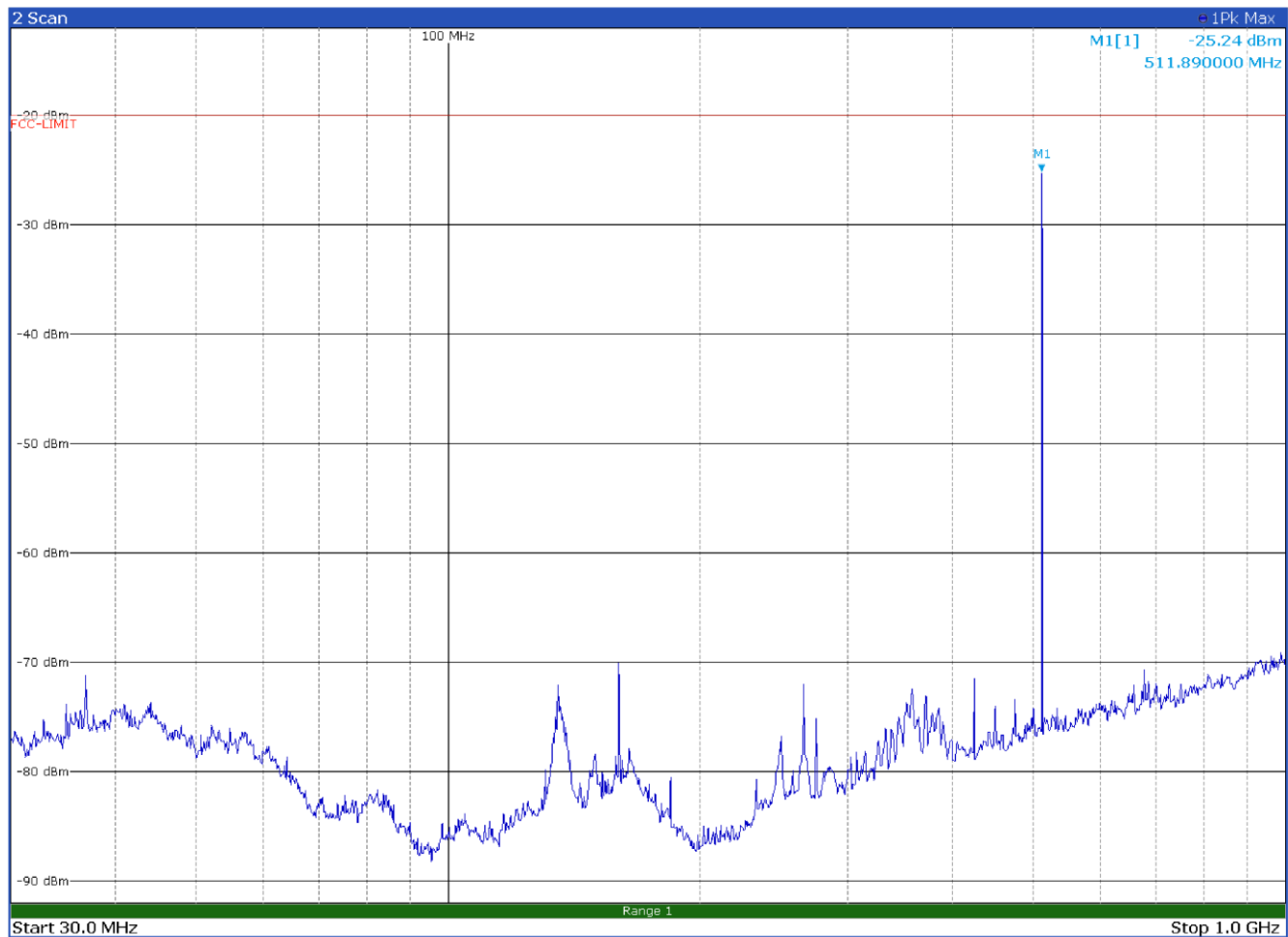


Radiated spurious emissions with modulation FM 25.0 kHz at 511.9 MHz – Antenna in horizontal polarization  
(worst frequency case from conducted emissions)



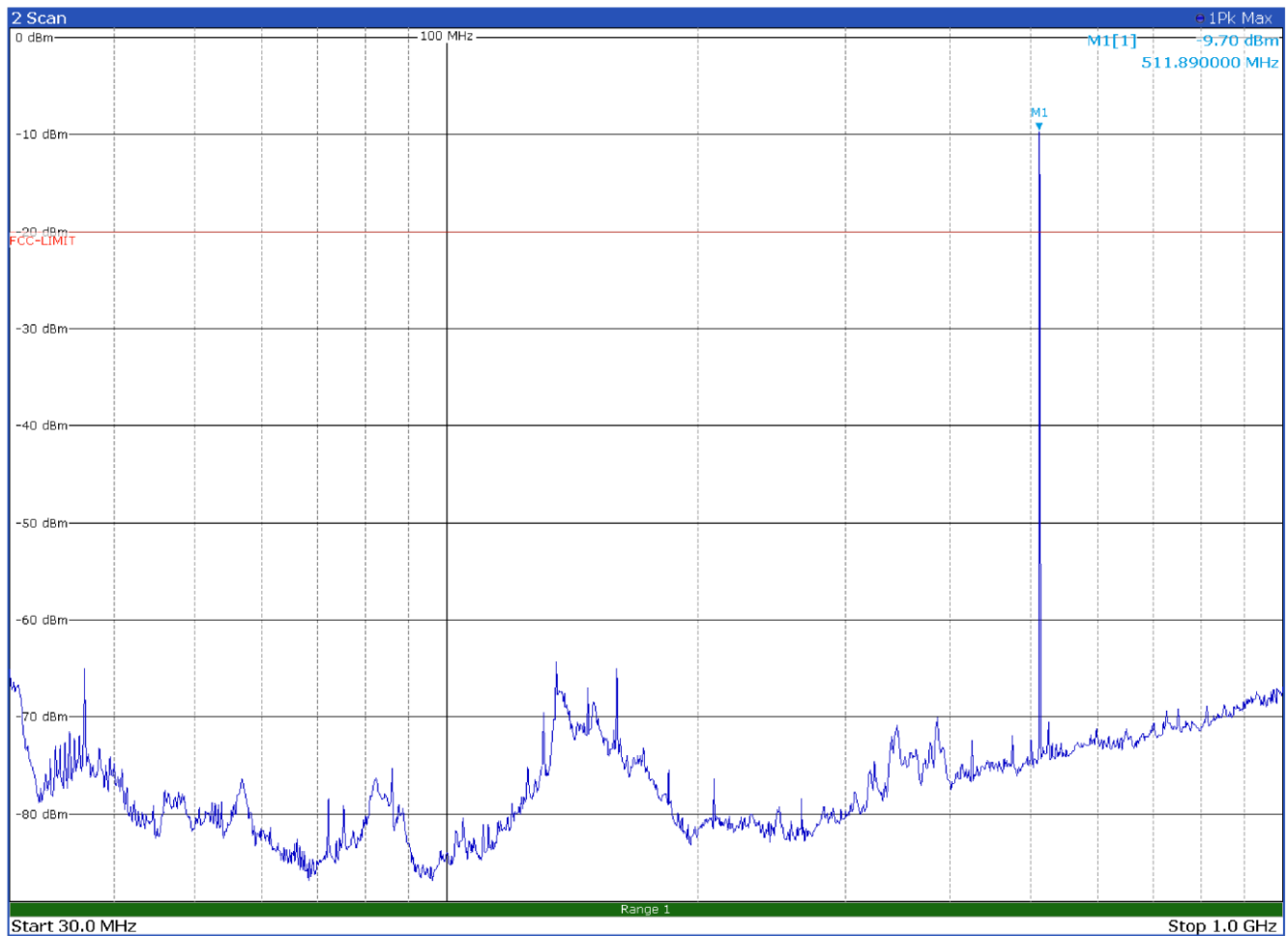
Radiated spurious emissions with modulation FM 25.0 kHz at 511.9 MHz – Antenna in vertical polarization  
(worst frequency case from conducted emissions)

Test data, continued



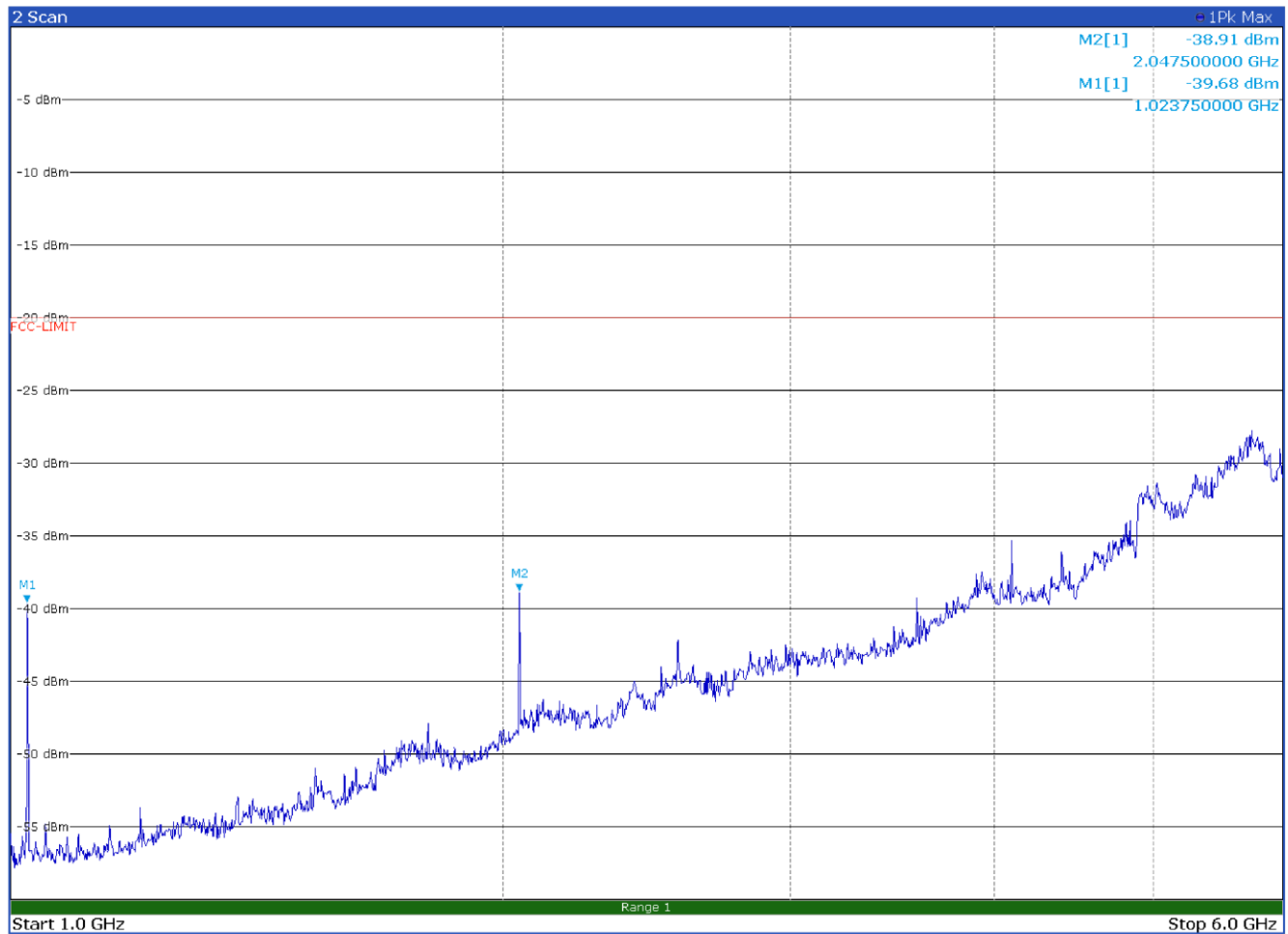
Radiated spurious emissions with modulation DMR 4FSK at 511.9 MHz – Antenna in horizontal polarization  
(worst frequency case from conducted emissions)

Test data, continued



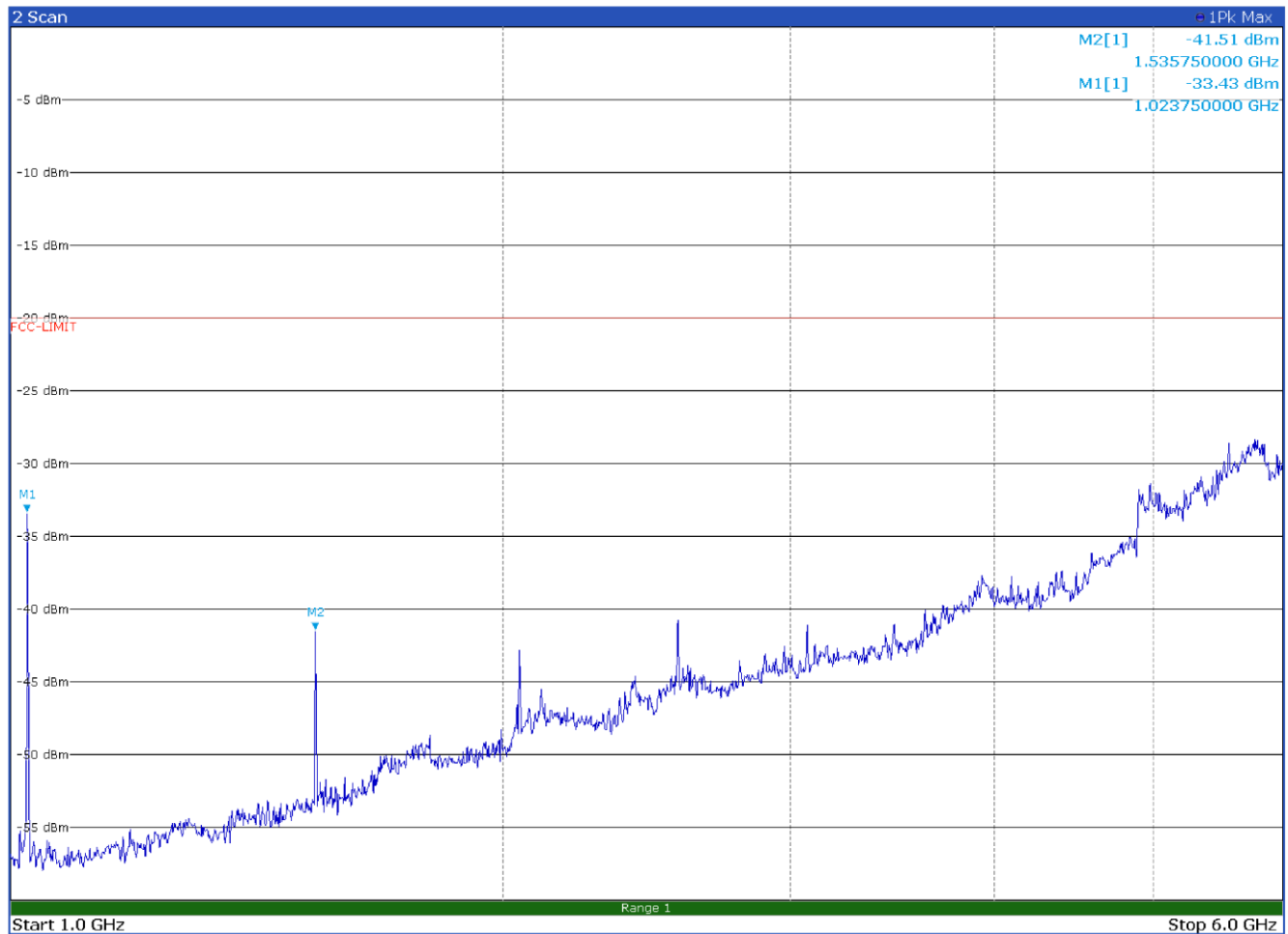
Radiated spurious emissions with modulation DMR 4FSK at 511.9 MHz – Antenna in vertical polarization  
(worst frequency case from conducted emissions)

Limit exceeded by the carrier



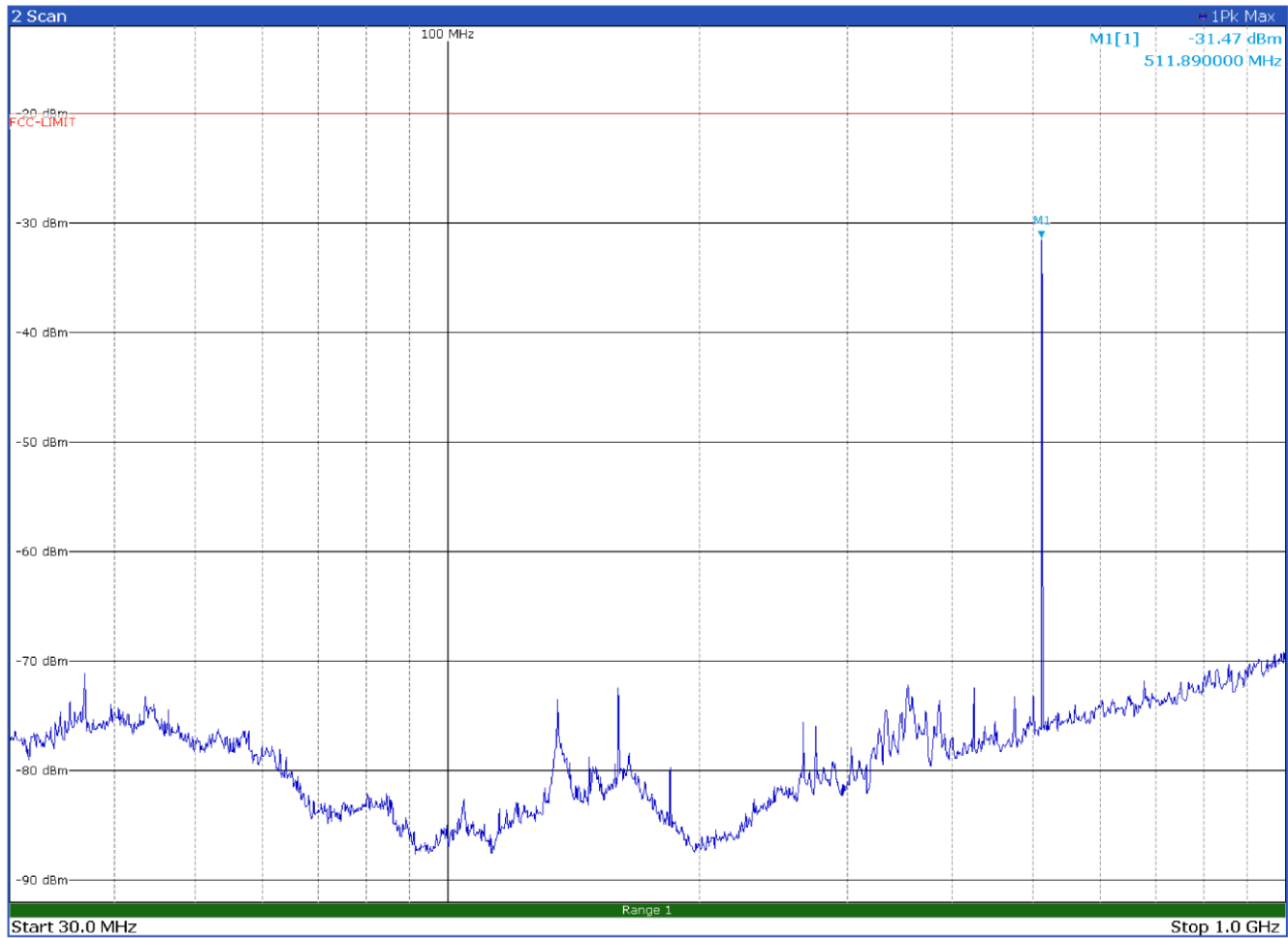
Radiated spurious emissions with modulation DMR 4FSK at 511.9 MHz – Antenna in horizontal polarization  
(worst frequency case from conducted emissions)

Test data, continued



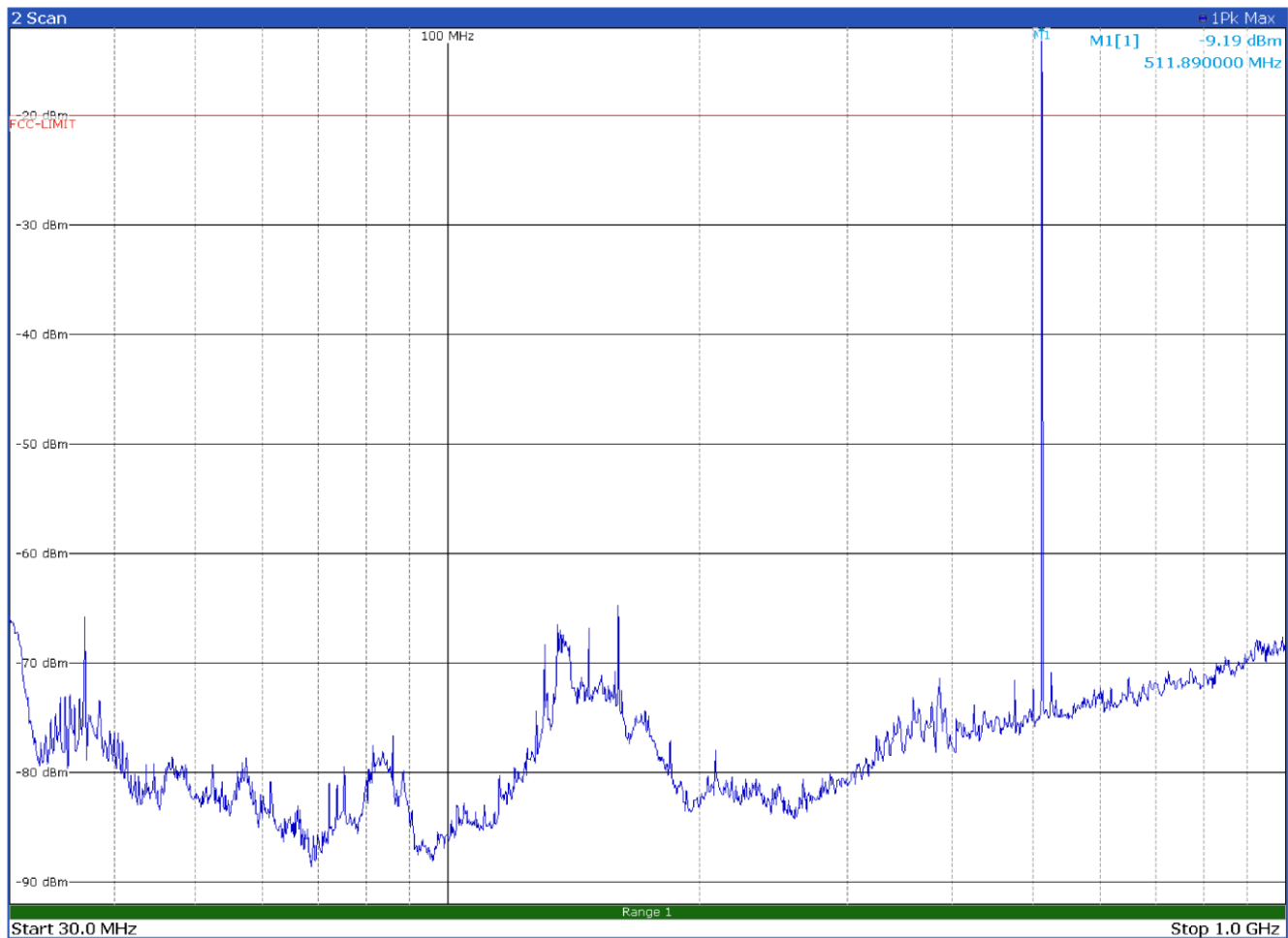
Radiated spurious emissions with modulation DMR 4FSK at 511.9 MHz – Antenna in vertical polarization  
(worst frequency case from conducted emissions)

Test data, continued



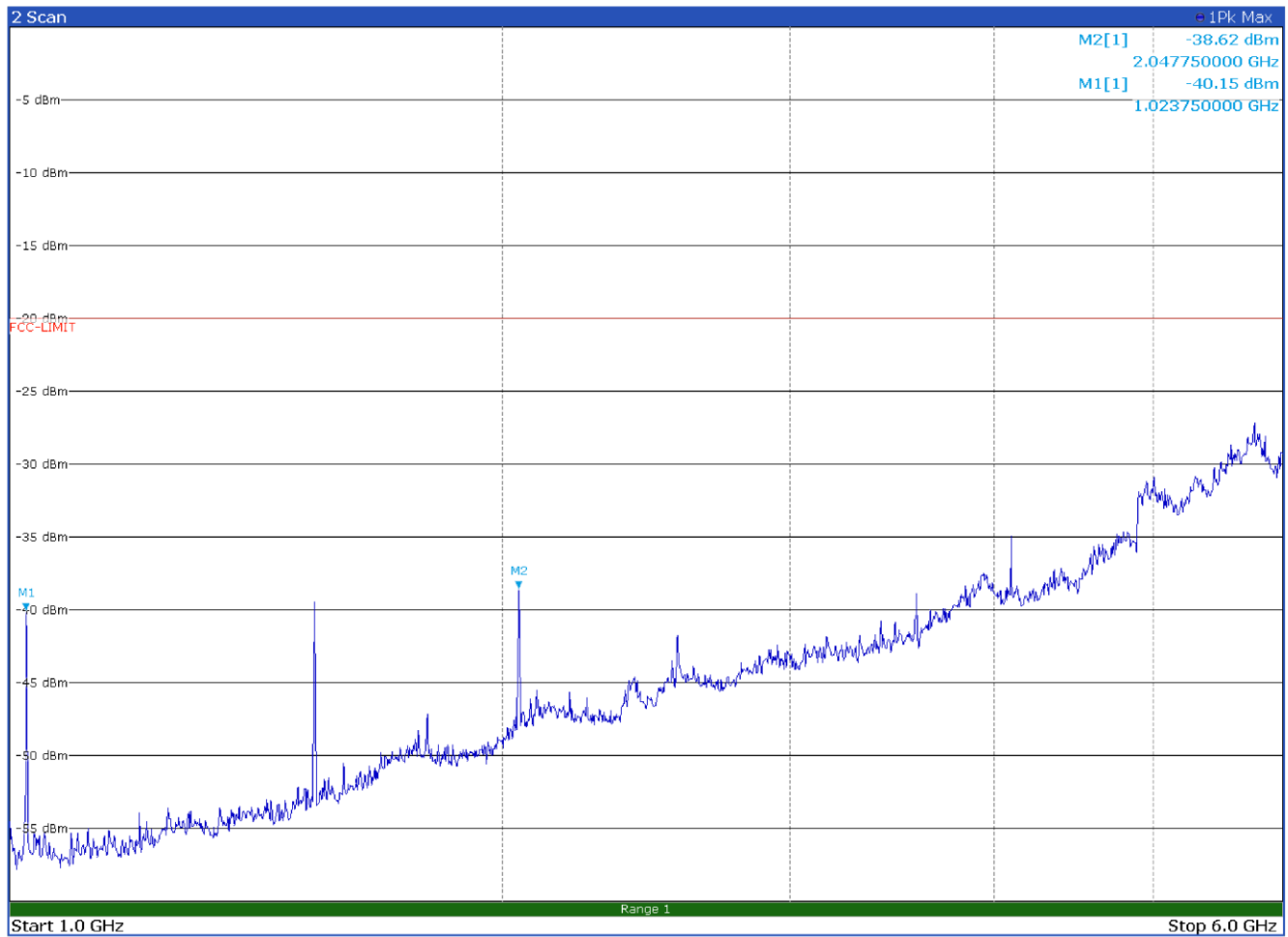
Radiated spurious emissions with modulation P25 C4FM at 511.9 MHz – Antenna in horizontal polarization  
(worst frequency case from conducted emissions)

Test data, continued



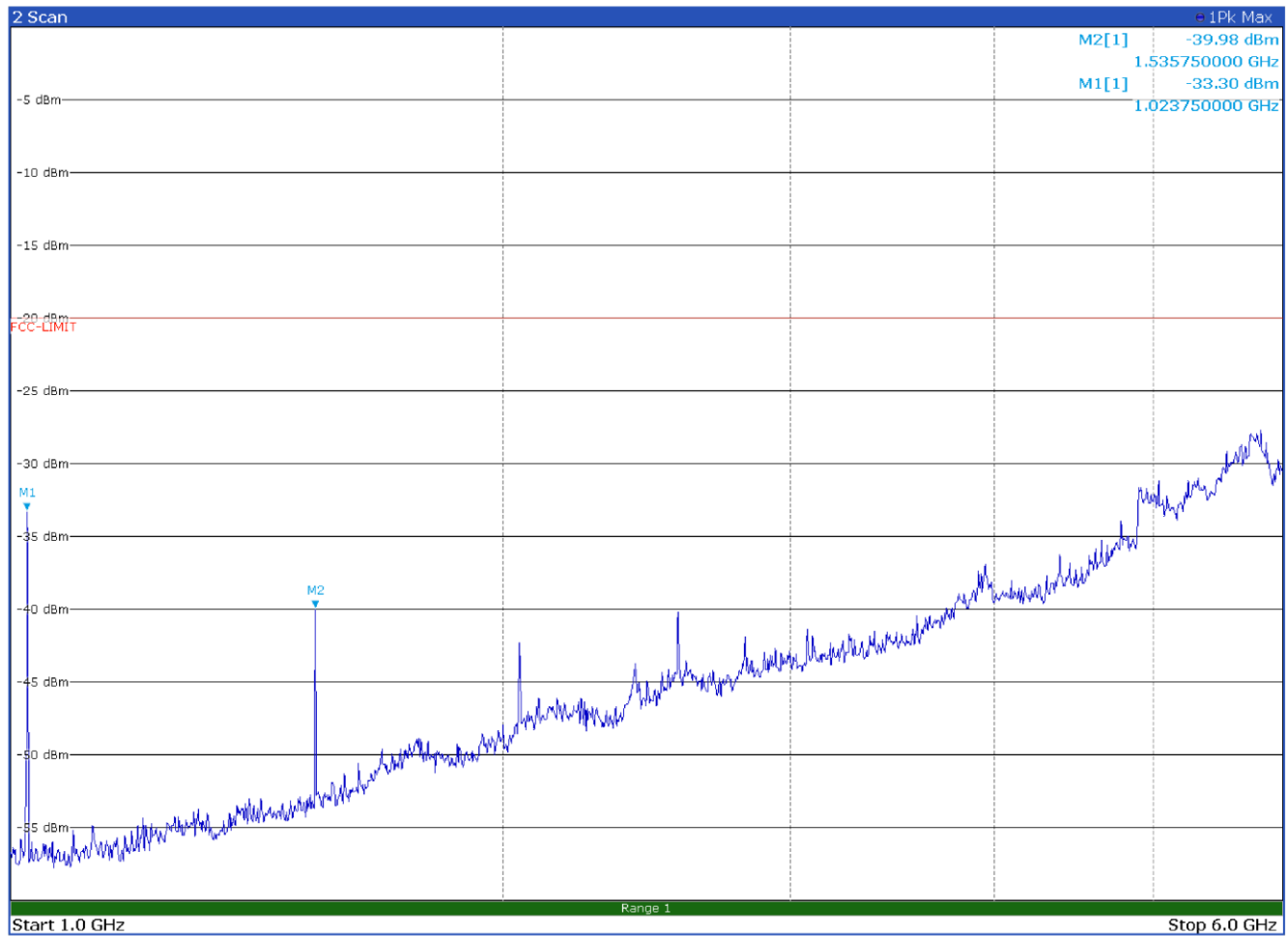
Radiated spurious emissions with modulation P25 C4FM at 511.9 MHz – Antenna in vertical polarization  
(worst frequency case from conducted emissions)

Limit exceeded by the carrier



Radiated spurious emissions with modulation P25 C4FM at 511.9 MHz – Antenna in horizontal polarization  
(worst frequency case from conducted emissions)

Test data, continued, continue



Radiated spurious emissions with modulation P25 C4FM at 511.9 MHz – Antenna in vertical polarization  
(worst frequency case from conducted emissions)

## 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 <sup>1,2</sup>                                                       | Maximum frequency difference <sup>3</sup> | 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: <sup>1</sup> $t_{on}$  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.

<sup>2</sup>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.

<sup>3</sup>Difference between the actual transmitter frequency and the assigned transmitter frequency.

<sup>4</sup>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 | O. Frau        |
| Test date | April 02, 2024 |

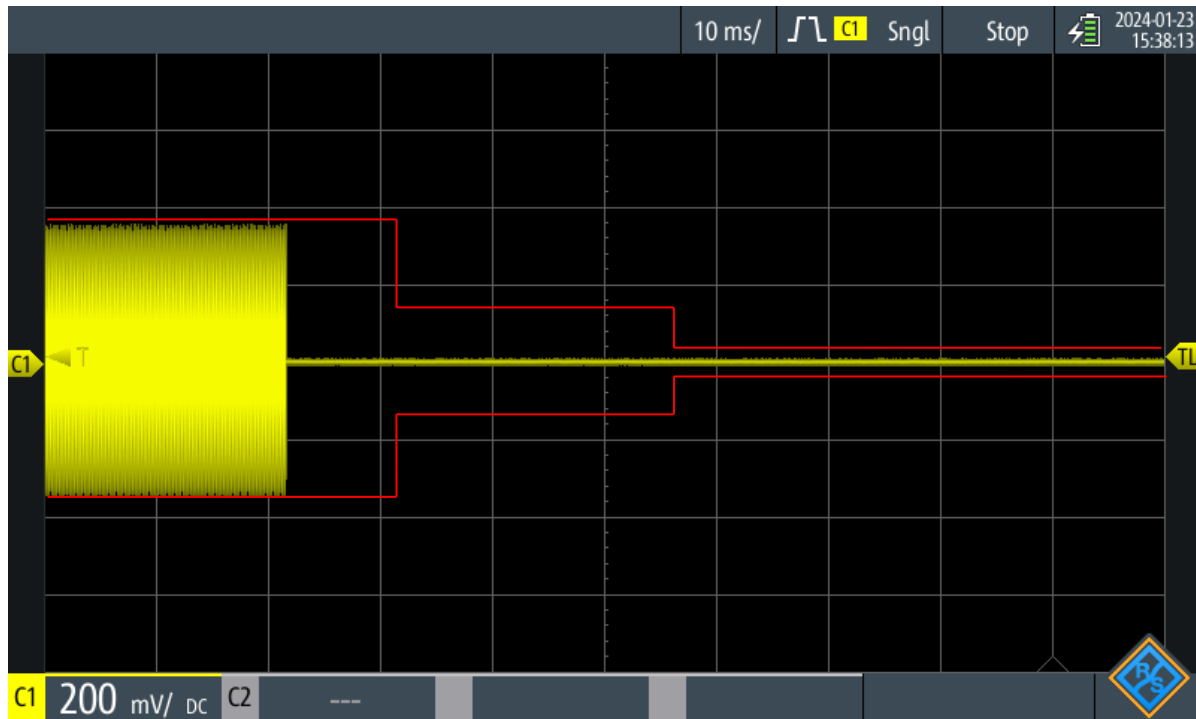
### 7.6.3 Observations, settings and special notes

None

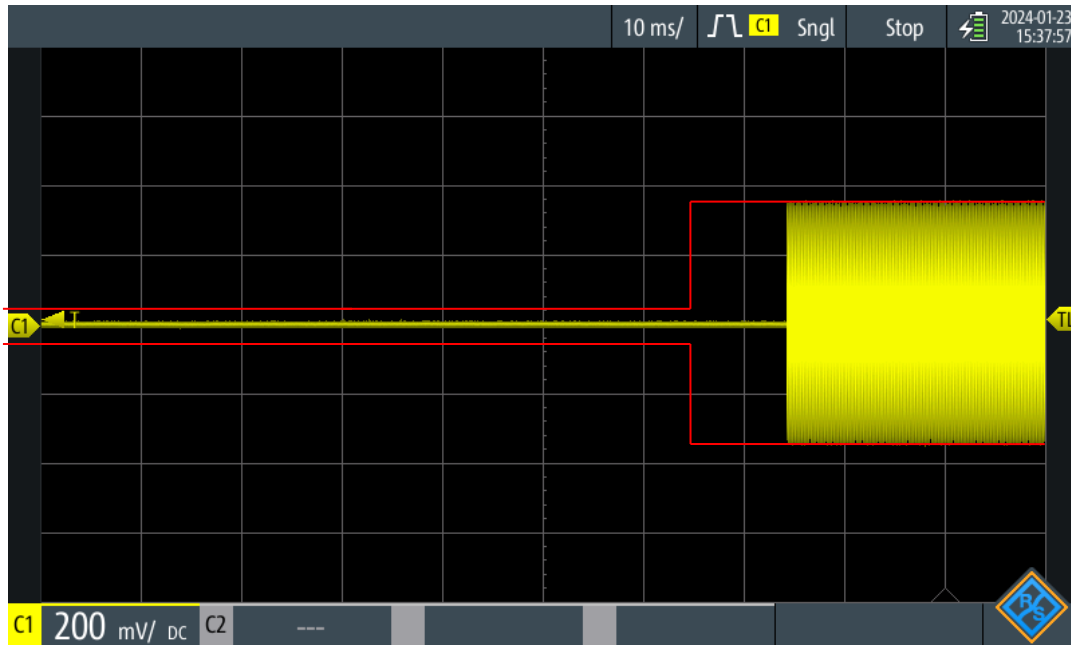
### 7.6.4 Test equipment list

| 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 | 2024-01   | 2027-01   |
| Oscilloscope               | Yokogawa        | DL1540           | 25WY1600L   | 2024-03   | 2025-03   |
| Cable set                  | Rosenberger     | ST.ALO-02        | 1.650       | 2023-10   | 2024-10   |

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

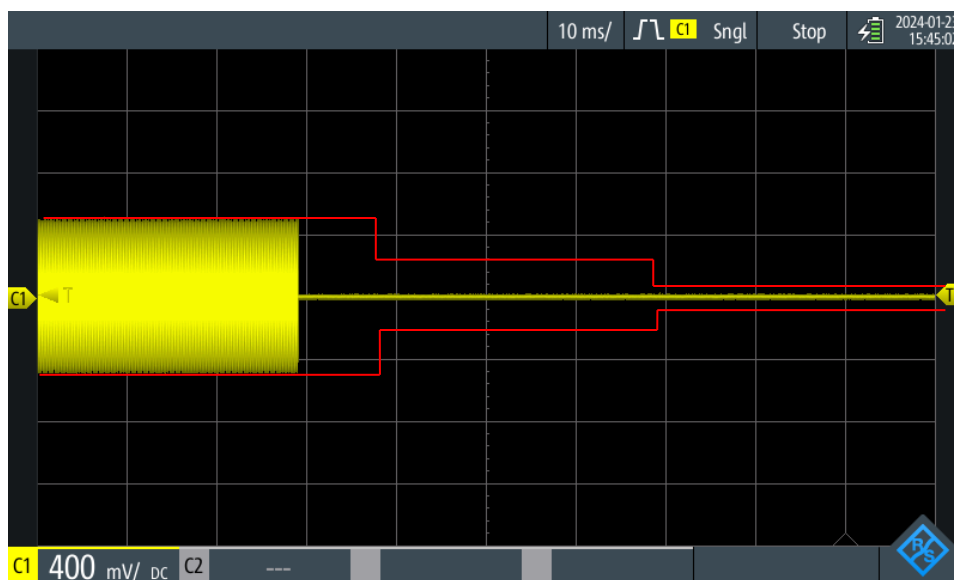


Transient Frequency behavior with modulation FM 12.5 kHz, switch ON

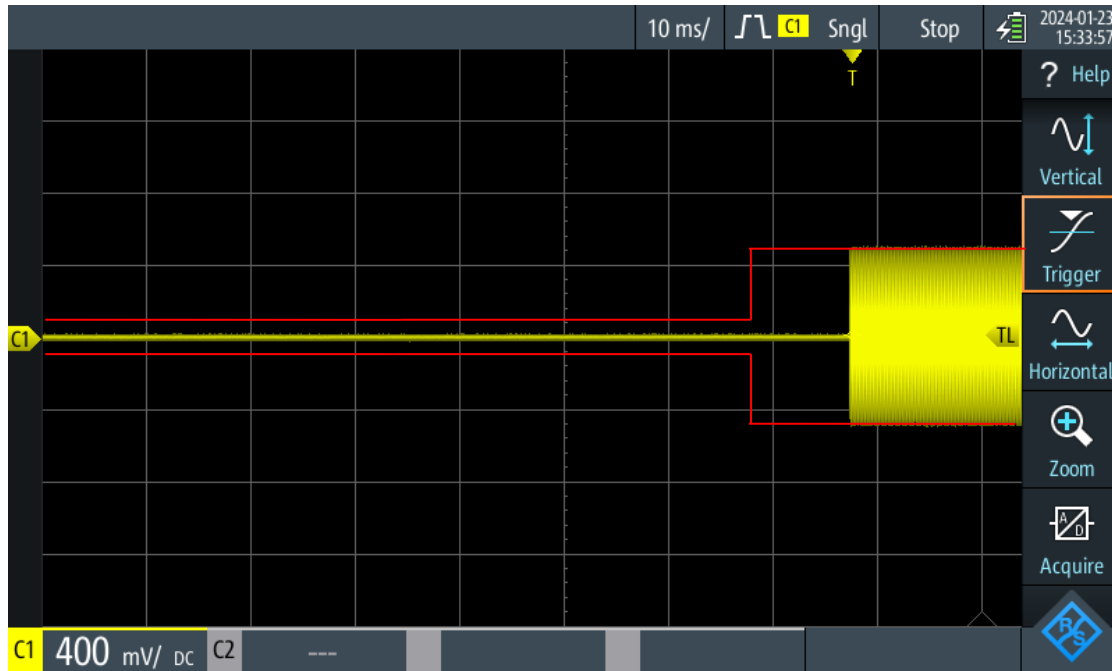


Transient Frequency behavior with modulation FM 12.5 kHz, switch OFF

Test data, continued



Transient Frequency behavior with modulation FM 25 kHz, switch ON



Transient Frequency behavior with modulation FM 25 kHz, 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 <sup>1</sup>   | ±5 ppm <sup>2</sup>                       | ±5 ppm <sup>2</sup>                          |

Notes: <sup>1</sup>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.

<sup>2</sup>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    | Test date | April 02, 2024 |
| Tested by | O. Frau |           |                |

### 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

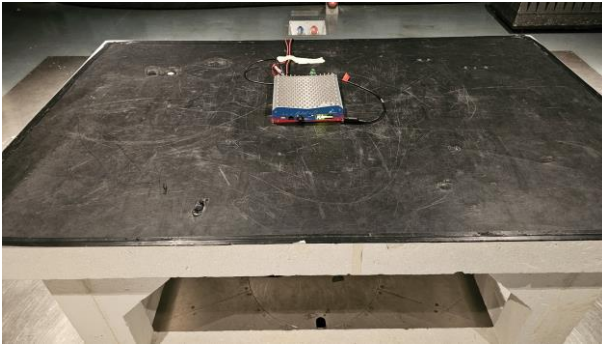
## 7.7.5 Test data

Table 7.7-3: Transmitter frequency stability results

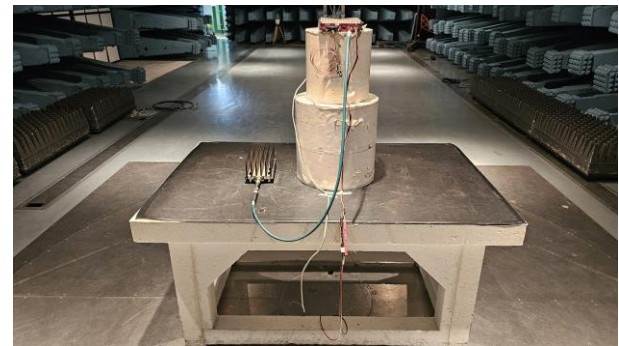
| Test conditions | Frequency, Hz | Drift, Hz | Drift, ppm | Limit ±ppm | Margin, ±ppm |
|-----------------|---------------|-----------|------------|------------|--------------|
| +50 °C, Nominal | 480999792.0   | -8.0      | -0.017     | 2.5        | -2.52        |
| +40 °C, Nominal | 480999793.8   | -6.2      | -0.013     | 2.5        | -2.51        |
| +30 °C, Nominal | 480999796.1   | -3.9      | -0.008     | 2.5        | -2.51        |
| +20 °C, +15 %   | 480999799.9   | -0.1      | 0.000      | 2.5        | -2.50        |
| +20 °C, Nominal | 480999800.0   | Reference | Reference  | Reference  | Reference    |
| +20 °C, -15 %   | 480999799.8   | -0.2      | 0.000      | 2.5        | -2.50        |
| +10 °C, Nominal | 480999797.5   | -2.5      | -0.005     | 2.5        | -2.51        |
| 0 °C, Nominal   | 480999796.1   | -3.9      | -0.008     | 2.5        | -2.51        |
| -10 °C, Nominal | 480999792.9   | -7.1      | -0.015     | 2.5        | -2.51        |
| -20 °C, Nominal | 480999792.1   | -7.9      | -0.016     | 2.5        | -2.52        |
| -30 °C, Nominal | 480999791.1   | -8.9      | -0.019     | 2.5        | -2.52        |

## Section 8 Photos

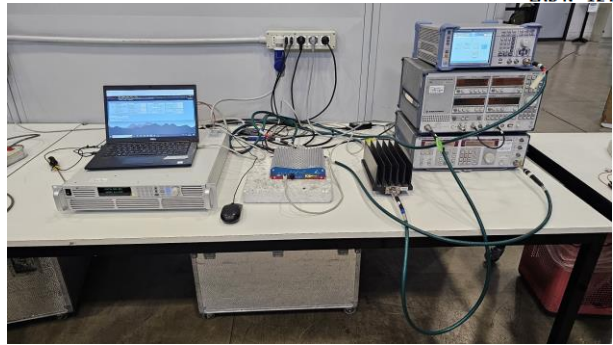
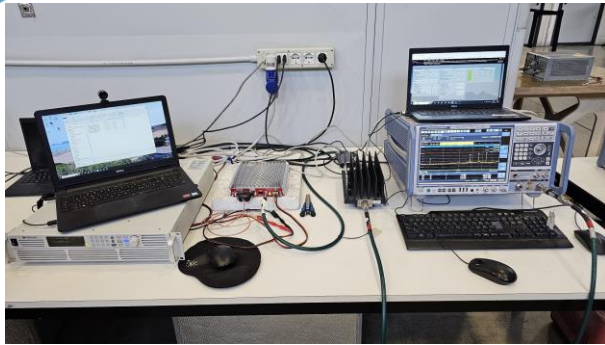
### 8.1 Photos of the test set-up



Set-up photo for radiated tests below 1 GHz photo



Set-up photo for radiated tests above 1 GHz photo

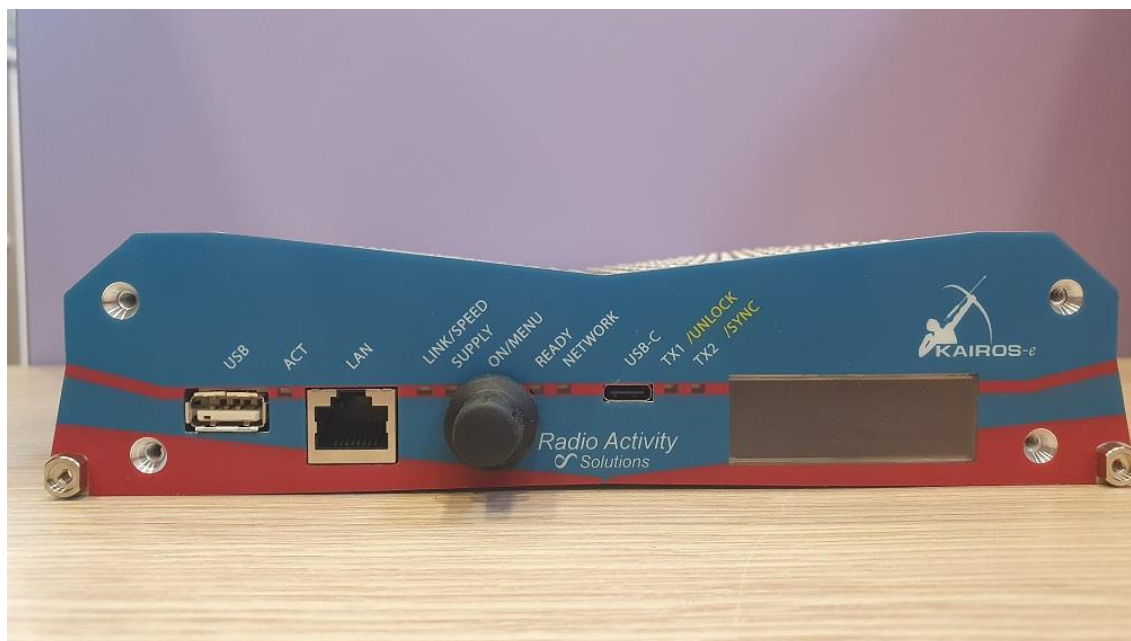


Set-up photo for antenna port tests



Set-up photo for frequency error tests

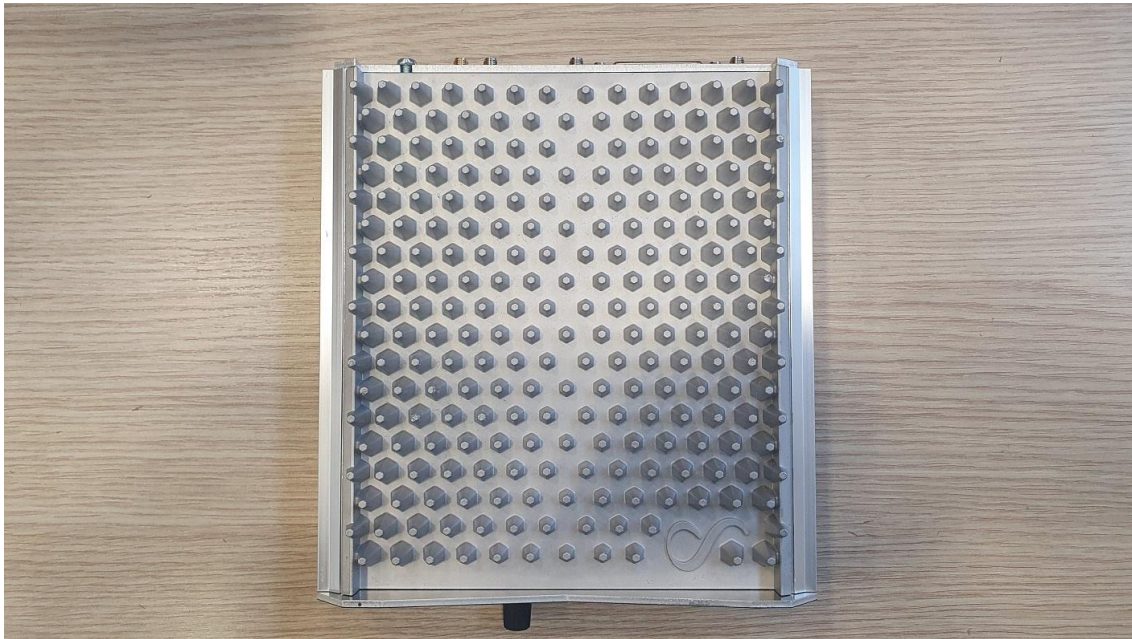
## 8.2 Photos of the EUT



Front side photo



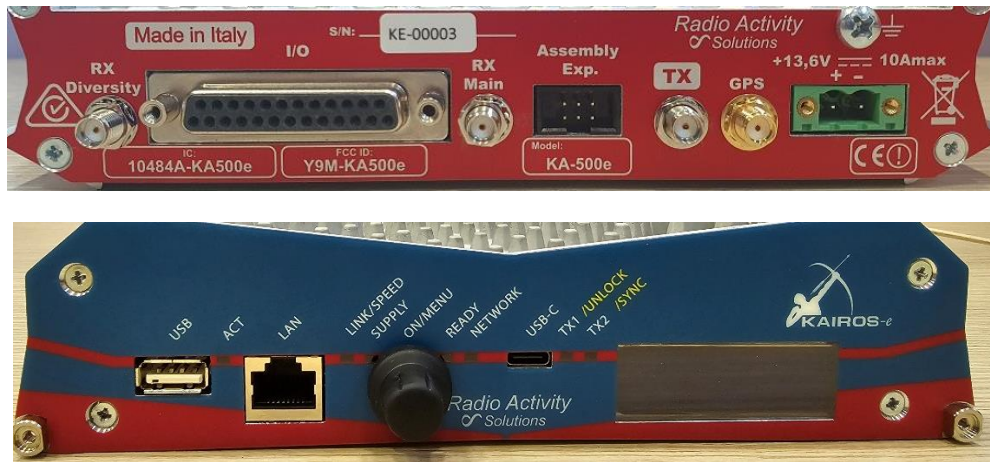
Rear side photo



Top side photo



Bottom side photo



Copy of marking plate

End of the test report