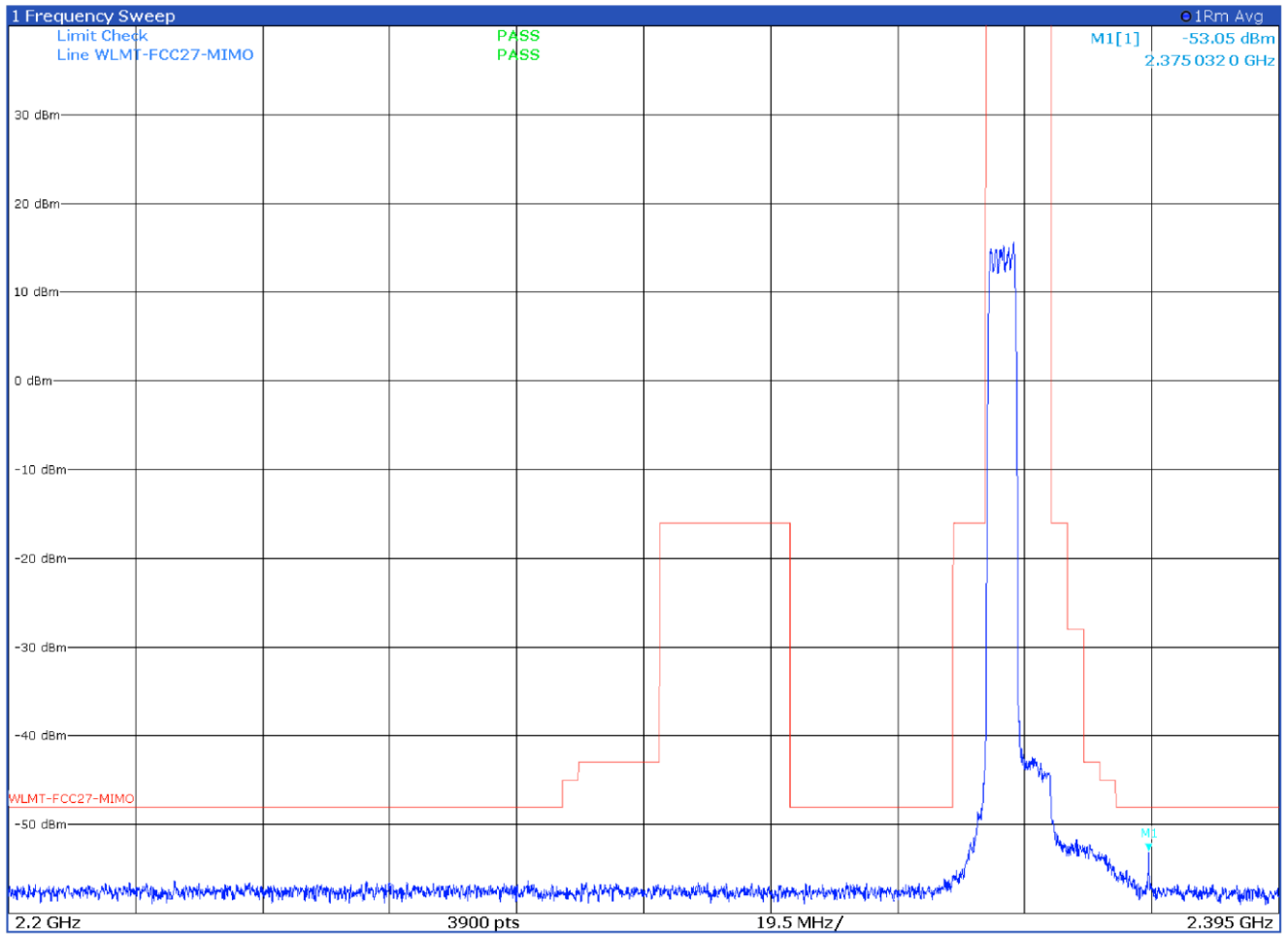


Test data, continued



**Figure 8.5-12:** Antenna port 2 single carrier lower block edge with input signal at AGC threshold +3 dB

## 8.6 Spurious emissions conducted measurements

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### 8.6.1 References, definitions and limits

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#### **FCC §27.53(a):**

- (a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power  $P$  (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:
  - (1) For base and fixed stations' operations in the 2305-2320 MHz band and the 2345-2360 MHz band:
    - (i) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than  $75 + 10 \log(P)$  dB on all frequencies between 2320 and 2345 MHz;
    - (ii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2300 and 2305 MHz,  $70 + 10 \log(P)$  dB on all frequencies between 2287.5 and 2300 MHz,  $72 + 10 \log(P)$  dB on all frequencies between 2285 and 2287.5 MHz, and  $75 + 10 \log(P)$  dB below 2285 MHz;
    - (iii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2360 and 2362.5 MHz,  $55 + 10 \log(P)$  dB on all frequencies between 2362.5 and 2365 MHz,  $70 + 10 \log(P)$  dB on all frequencies between 2365 and 2367.5 MHz,  $72 + 10 \log(P)$  dB on all frequencies between 2367.5 and 2370 MHz, and  $75 + 10 \log(P)$  dB above 2370 MHz.
  - (2) For fixed customer premises equipment (CPE) stations operating in the 2305-2320 MHz band and the 2345-2360 MHz band transmitting with more than 2 watts per 5 megahertz average EIRP:
    - (i) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than  $75 + 10 \log(P)$  dB on all frequencies between 2320 and 2345 MHz;
    - (ii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2300 and 2305 MHz,  $70 + 10 \log(P)$  dB on all frequencies between 2287.5 and 2300 MHz,  $72 + 10 \log(P)$  dB on all frequencies between 2285 and 2287.5 MHz, and  $75 + 10 \log(P)$  dB below 2285 MHz;
    - (iii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2360 and 2362.5 MHz,  $55 + 10 \log(P)$  dB on all frequencies between 2362.5 and 2365 MHz,  $70 + 10 \log(P)$  dB on all frequencies between 2365 and 2367.5 MHz,  $72 + 10 \log(P)$  dB on all frequencies between 2367.5 and 2370 MHz, and  $75 + 10 \log(P)$  dB above 2370 MHz.
  - (3) For fixed CPE stations operating in the 2305-2320 MHz and 2345-2360 MHz bands transmitting with 2 watts per 5 megahertz average EIRP or less:
    - (i) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than  $55 + 10 \log(P)$  dB on all frequencies between 2320 and 2324 MHz and between 2341 and 2345 MHz, not less than  $61 + 10 \log(P)$  dB on all frequencies between 2324 and 2328 MHz and between 2337 and 2341 MHz, and not less than  $67 + 10 \log(P)$  dB on all frequencies between 2328 and 2337 MHz;
    - (ii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2300 and 2305 MHz,  $55 + 10 \log(P)$  dB on all frequencies between 2296 and 2300 MHz,  $61 + 10 \log(P)$  dB on all frequencies between 2292 and 2296 MHz,  $67 + 10 \log(P)$  dB on all frequencies between 2288 and 2292 MHz, and  $70 + 10 \log(P)$  dB below 2288 MHz;
    - (iii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log(P)$  dB above 2365 MHz.
  - (4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:
    - (i) By a factor of not less than:  $43 + 10 \log(P)$  dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than  $55 + 10 \log(P)$  dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than  $61 + 10 \log(P)$  dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than  $67 + 10 \log(P)$  dB on all frequencies between 2328 and 2337 MHz;
    - (ii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2300 and 2305 MHz,  $55 + 10 \log(P)$  dB on all frequencies between 2296 and 2300 MHz,  $61 + 10 \log(P)$  dB on all frequencies between 2292 and 2296 MHz,  $67 + 10 \log(P)$  dB on all frequencies between 2288 and 2292 MHz, and  $70 + 10 \log(P)$  dB below 2288 MHz;
    - (iii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log(P)$  dB above 2365 MHz.
  - (5) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 1 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

References, definitions and limits, continued

- (6) [Reserved]
- (7) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power;
- (8) Waiver requests of any of the out-of-band emission limits in paragraphs (a)(1) through (a)(7) of this section shall be entertained only if interference protection equivalent to that afforded by the limits is shown;
- (9) [Reserved]
- (10) The out-of-band emissions limits in paragraphs (a)(1) through (a)(3) of this section may be modified by the private contractual agreement of all affected licensees, who must maintain a copy of the agreement in their station files and disclose it to prospective assignees, transferees, or spectrum lessees and, upon request, to the Commission.

**RSS-131, Clause 5.2**

Industrial zone enhancers

Industrial Zone Enhancers, including DASs, shall employ a gain control feature and shall comply with all the requirements in the RSS which applies to the equipment with which the zone enhancer is to be used. In addition, the equipment shall comply with the requirements specified in this section.

**RSS-195, Clause 5.6.1**

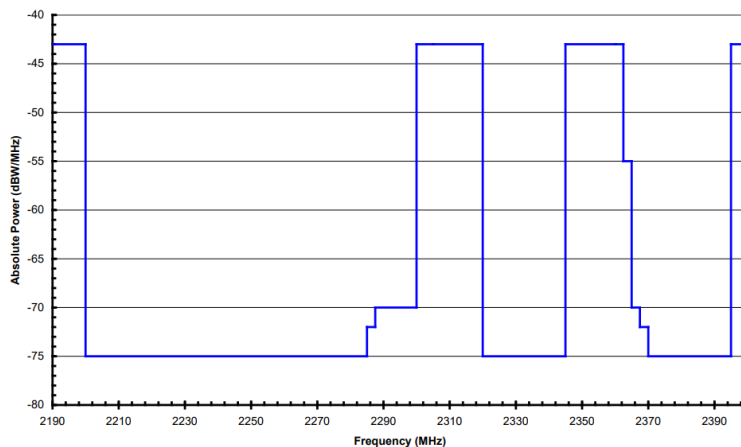
The power of any emission outside the frequency range(s) in which the equipment operates shall be attenuated below the transmitter power, P(dBW), by the amount indicated in Table 1 and graphically represented in Figure 1, where p is the transmitter output power measured in watts.

**Table 1 — Unwanted Emissions for Base Station, Fixed Station and High-Power Fixed Subscriber Equipment**

Frequency (MHz)	Attenuation (dB)
<2200	43 + 10 log <sub>10</sub> (p)
2200 - 2285	75 + 10 log <sub>10</sub> (p)
2285 - 2287.5	72 + 10 log <sub>10</sub> (p)
2287.5 - 2300	70 + 10 log <sub>10</sub> (p)
2300 - 2305	43 + 10 log <sub>10</sub> (p)
2305 - 2320	43 + 10 log <sub>10</sub> (p) <sup>Note</sup>
2320 - 2345	75 + 10 log <sub>10</sub> (p)
2345 - 2360	43 + 10 log <sub>10</sub> (p) <sup>Note</sup>
2360 - 2362.5	43 + 10 log <sub>10</sub> (p)
2362.5 - 2365	55 + 10 log <sub>10</sub> (p)
2365 - 2367.5	70 + 10 log <sub>10</sub> (p)
2367.5 - 2370	72 + 10 log <sub>10</sub> (p)
2370 - 2395	75 + 10 log <sub>10</sub> (p)
>2395	43 + 10 log <sub>10</sub> (p)

Note: Measured at the edges of the highest and lowest frequency range(s) in which the equipment is designed to operate. See Section 5.2 for the permitted frequency ranges for the various equipment types.

**Figure 1: Unwanted Emissions for Base Station, Fixed Station and High-Power Fixed Subscriber Equipment**





8.6.2 Test summary

Verdict	Pass		
Tested by	P. Barbieri	Test date	February 3, 2022

8.6.3 Observations, settings and special notes

The spectrum was searched from 9 kHz to the 10<sup>th</sup> 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<sub>10</sub> (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 × Log<sub>10</sub>(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	2352.5 MHz
High channel	2357.5 MHz

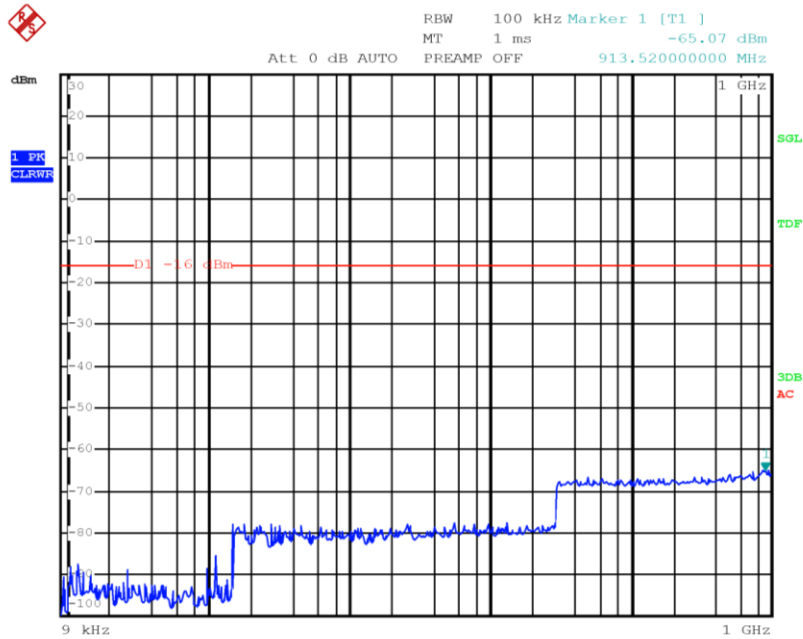
8.6.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767
EMI Receiver	Rohde & Schwarz	ESU8	100202
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263254
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263397

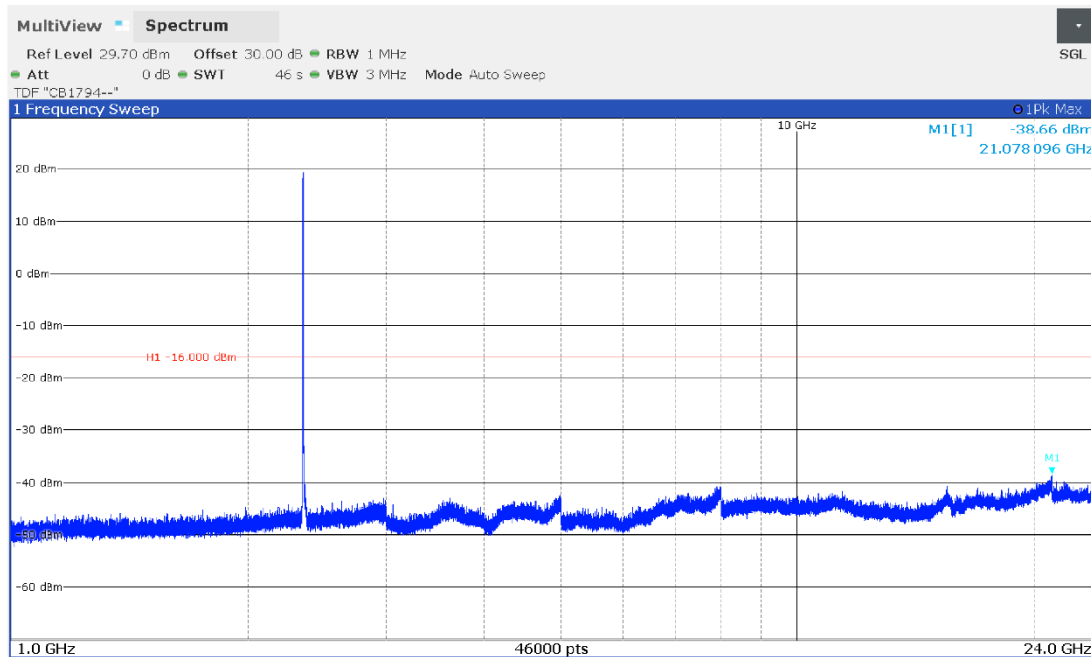
Notes:            NCR - no calibration required, VOU - verify on use

2021-09

8.6.5 Test data



**Figure 8.6-1:** Conducted spurious emissions of low channel, antenna port 1 – Range 9 kHz to 1000 MHz



**Figure 8.6-2:** Conducted spurious emissions of low channel, antenna port 1 – Range 1000 MHz to 10th harmonic

Test data, continued

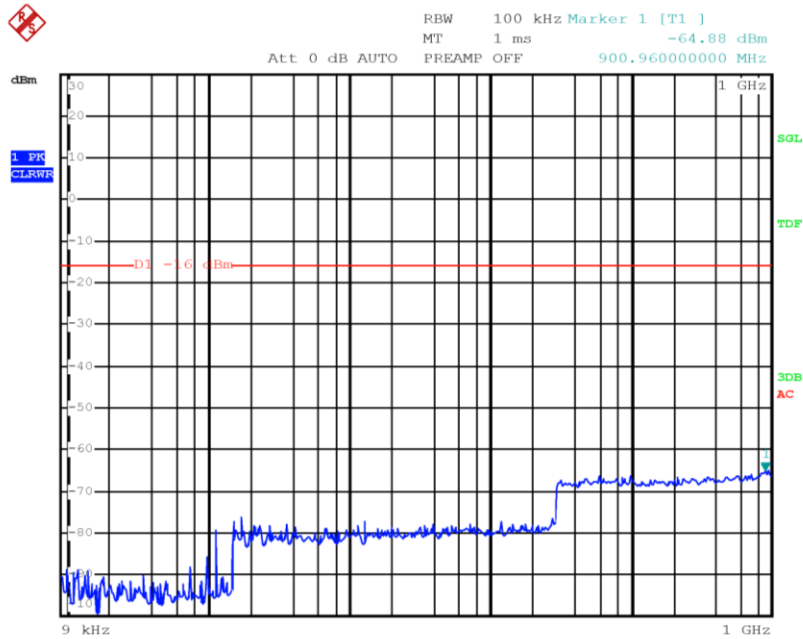


Figure 8.6-3: Conducted spurious emissions of high channel, antenna port 1 – Range 9 kHz to 1000 MHz

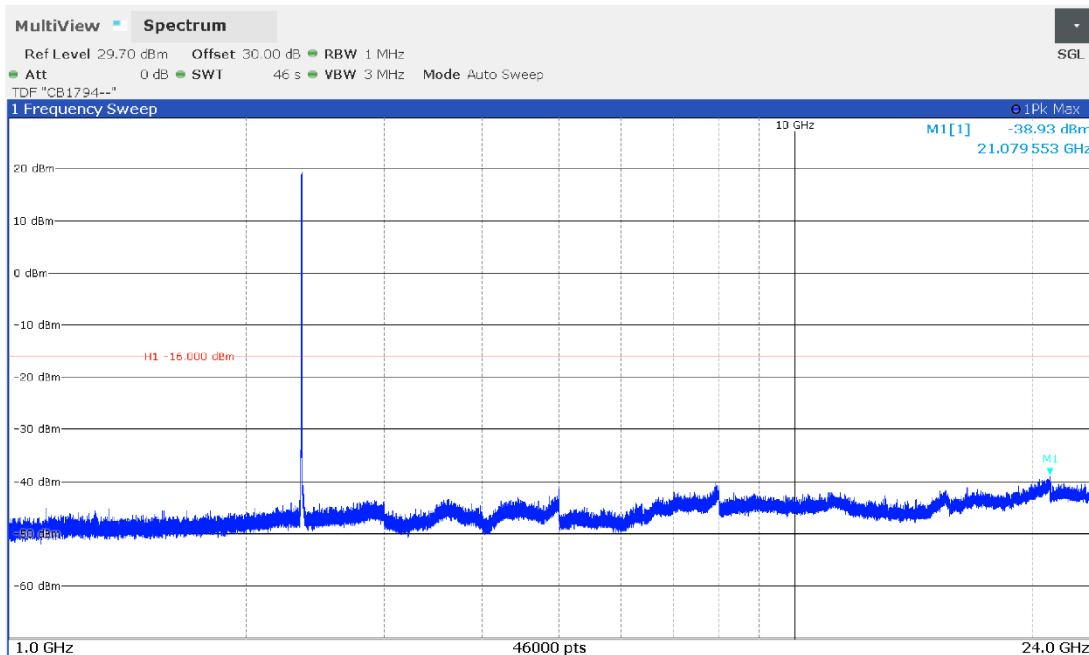
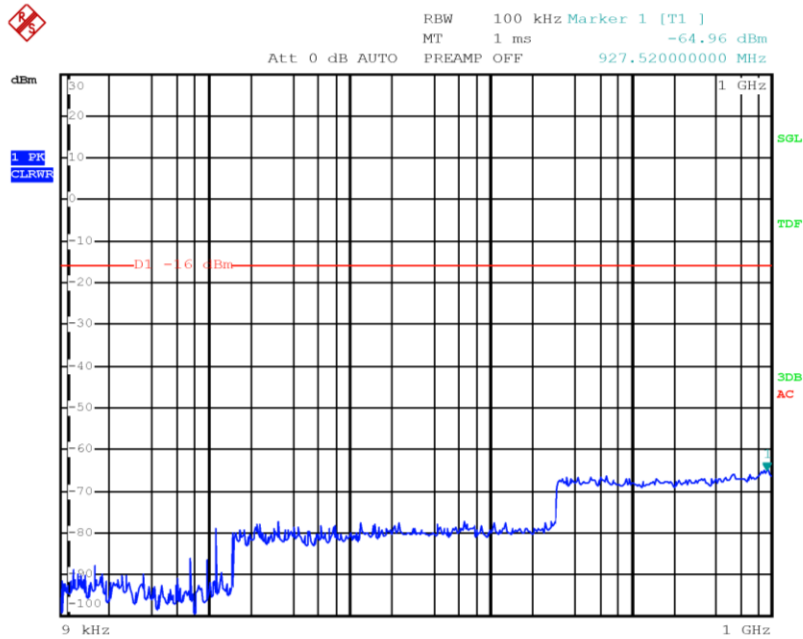
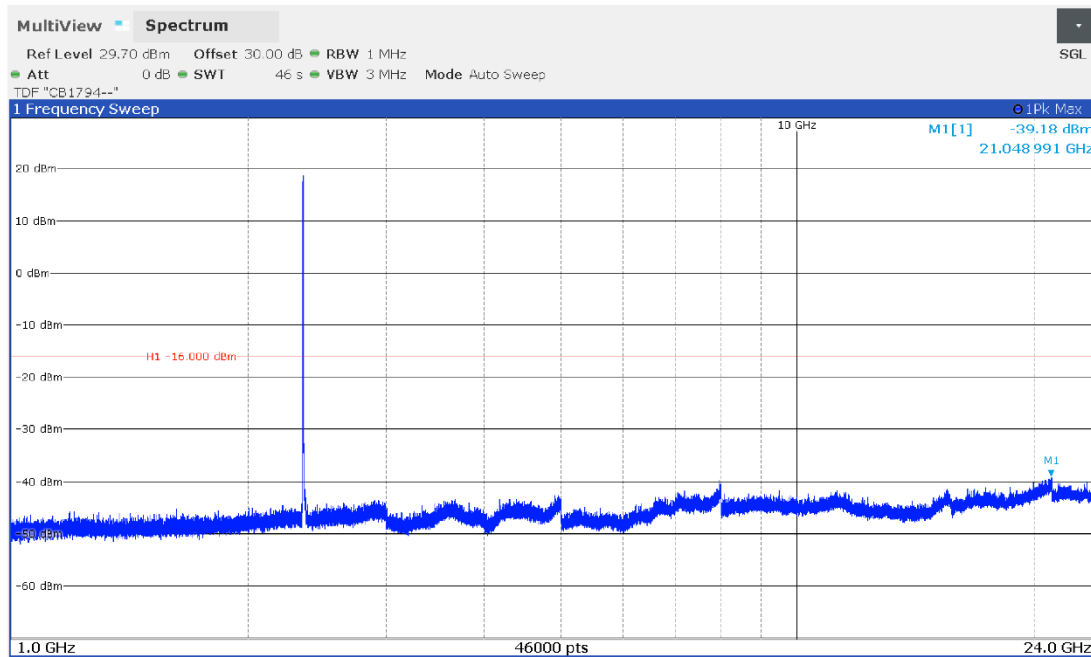


Figure 8.6-4: Conducted spurious emissions of high channel, antenna port 1 – Range 1000 MHz to 10th harmonic

8.6.1 Test data



**Figure 8.6-5:** Conducted spurious emissions of low channel, antenna port 2 – Range 9 kHz to 1000 MHz



**Figure 8.6-6:** Conducted spurious emissions of low channel, antenna port 2 – Range 1000 MHz to 10th harmonic

Test data, continued

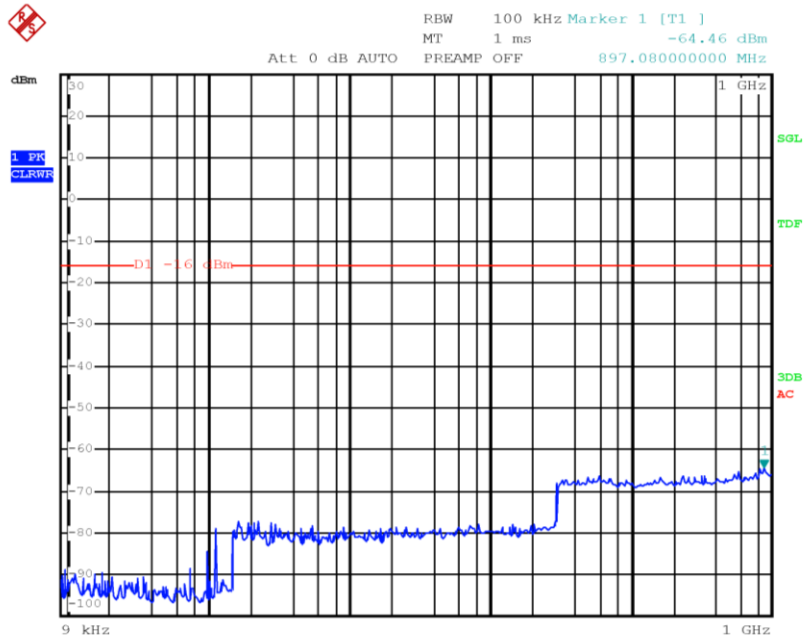


Figure 8.6-7: Conducted spurious emissions of high channel, antenna port 2 – Range 9 kHz to 1000 MHz

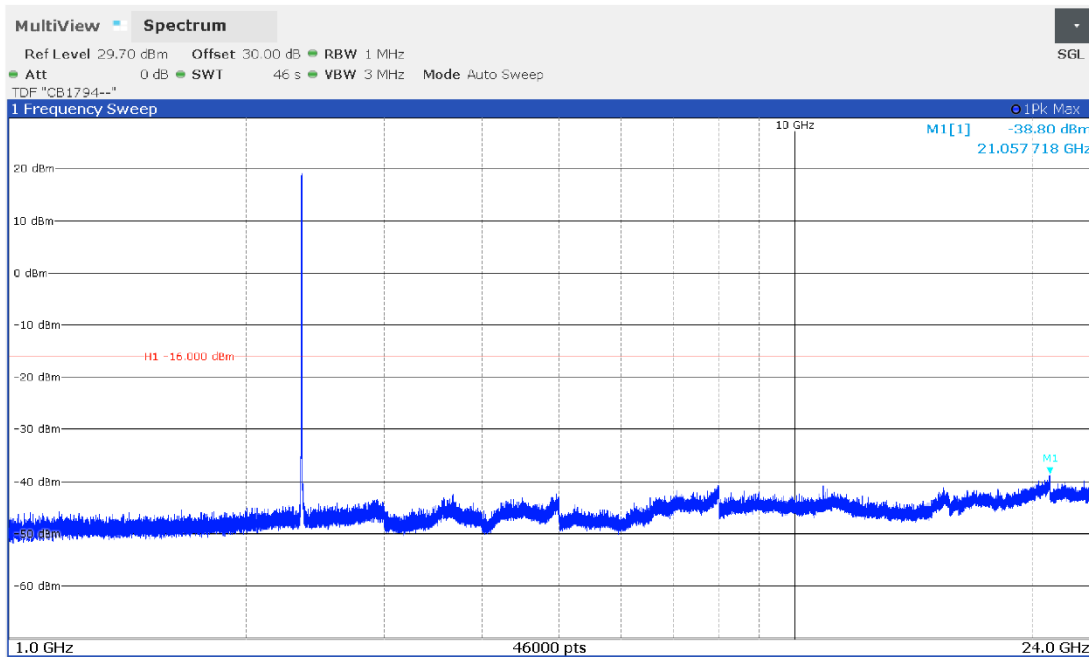


Figure 8.6-8: Conducted spurious emissions of high channel, antenna port 2 – Range 1000 MHz to 10th harmonic



## 8.7 Spurious emissions radiated measurements

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### 8.7.1 References, definitions and limits

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#### **FCC §27.53(a):**

- (a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:
  - (1) For base and fixed stations' operations in the 2305-2320 MHz band and the 2345-2360 MHz band:
    - (i) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than  $75 + 10 \log(P)$  dB on all frequencies between 2320 and 2345 MHz;
    - (ii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2300 and 2305 MHz,  $70 + 10 \log(P)$  dB on all frequencies between 2287.5 and 2300 MHz,  $72 + 10 \log(P)$  dB on all frequencies between 2285 and 2287.5 MHz, and  $75 + 10 \log(P)$  dB below 2285 MHz;
    - (iii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2360 and 2362.5 MHz,  $55 + 10 \log(P)$  dB on all frequencies between 2362.5 and 2365 MHz,  $70 + 10 \log(P)$  dB on all frequencies between 2365 and 2367.5 MHz,  $72 + 10 \log(P)$  dB on all frequencies between 2367.5 and 2370 MHz, and  $75 + 10 \log(P)$  dB above 2370 MHz.
  - (2) For fixed customer premises equipment (CPE) stations operating in the 2305-2320 MHz band and the 2345-2360 MHz band transmitting with more than 2 watts per 5 megahertz average EIRP:
    - (i) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than  $75 + 10 \log(P)$  dB on all frequencies between 2320 and 2345 MHz;
    - (ii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2300 and 2305 MHz,  $70 + 10 \log(P)$  dB on all frequencies between 2287.5 and 2300 MHz,  $72 + 10 \log(P)$  dB on all frequencies between 2285 and 2287.5 MHz, and  $75 + 10 \log(P)$  dB below 2285 MHz;
    - (iii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2360 and 2362.5 MHz,  $55 + 10 \log(P)$  dB on all frequencies between 2362.5 and 2365 MHz,  $70 + 10 \log(P)$  dB on all frequencies between 2365 and 2367.5 MHz,  $72 + 10 \log(P)$  dB on all frequencies between 2367.5 and 2370 MHz, and  $75 + 10 \log(P)$  dB above 2370 MHz.
  - (3) For fixed CPE stations operating in the 2305-2320 MHz and 2345-2360 MHz bands transmitting with 2 watts per 5 megahertz average EIRP or less:
    - (i) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than  $55 + 10 \log(P)$  dB on all frequencies between 2320 and 2324 MHz and between 2341 and 2345 MHz, not less than  $61 + 10 \log(P)$  dB on all frequencies between 2324 and 2328 MHz and between 2337 and 2341 MHz, and not less than  $67 + 10 \log(P)$  dB on all frequencies between 2328 and 2337 MHz;
    - (ii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2300 and 2305 MHz,  $55 + 10 \log(P)$  dB on all frequencies between 2296 and 2300 MHz,  $61 + 10 \log(P)$  dB on all frequencies between 2292 and 2296 MHz,  $67 + 10 \log(P)$  dB on all frequencies between 2288 and 2292 MHz, and  $70 + 10 \log(P)$  dB below 2288 MHz;
    - (iii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log(P)$  dB above 2365 MHz.
  - (4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:
    - (i) By a factor of not less than:  $43 + 10 \log(P)$  dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than  $55 + 10 \log(P)$  dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than  $61 + 10 \log(P)$  dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than  $67 + 10 \log(P)$  dB on all frequencies between 2328 and 2337 MHz;
    - (ii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2300 and 2305 MHz,  $55 + 10 \log(P)$  dB on all frequencies between 2296 and 2300 MHz,  $61 + 10 \log(P)$  dB on all frequencies between 2292 and 2296 MHz,  $67 + 10 \log(P)$  dB on all frequencies between 2288 and 2292 MHz, and  $70 + 10 \log(P)$  dB below 2288 MHz;
    - (iii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log(P)$  dB above 2365 MHz.
  - (5) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 1 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

References, definitions and limits, continued

- (6) [Reserved]
- (7) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power;
- (8) Waiver requests of any of the out-of-band emission limits in paragraphs (a)(1) through (a)(7) of this section shall be entertained only if interference protection equivalent to that afforded by the limits is shown;
- (9) [Reserved]
- (10) The out-of-band emissions limits in paragraphs (a)(1) through (a)(3) of this section may be modified by the private contractual agreement of all affected licensees, who must maintain a copy of the agreement in their station files and disclose it to prospective assignees, transferees, or spectrum lessees and, upon request, to the Commission.

**RSS-131, Clause 5.2**

Industrial zone enhancers

Industrial Zone Enhancers, including DASs, shall employ a gain control feature and shall comply with all the requirements in the RSS which applies to the equipment with which the zone enhancer is to be used. In addition, the equipment shall comply with the requirements specified in this section.

**RSS-195, Clause 5.6.1**

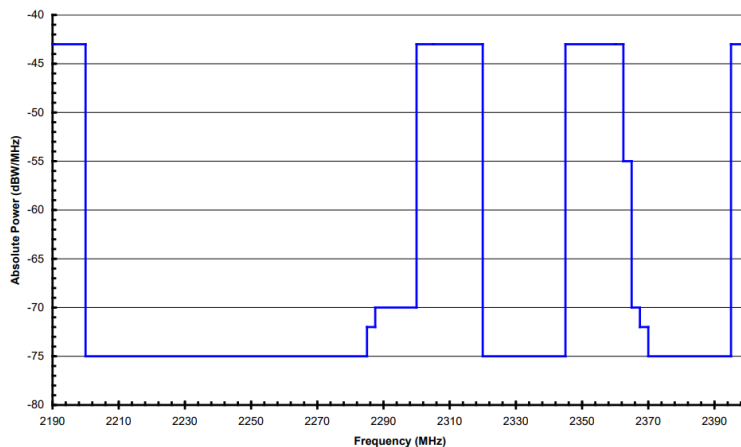
The power of any emission outside the frequency range(s) in which the equipment operates shall be attenuated below the transmitter power, P(dBW), by the amount indicated in Table 1 and graphically represented in Figure 1, where p is the transmitter output power measured in watts.

**Table 1 — Unwanted Emissions for Base Station, Fixed Station and High-Power Fixed Subscriber Equipment**

Frequency (MHz)	Attenuation (dB)
<2200	$43 + 10 \log_{10}(p)$
2200 - 2285	$75 + 10 \log_{10}(p)$
2285 - 2287.5	$72 + 10 \log_{10}(p)$
2287.5 - 2300	$70 + 10 \log_{10}(p)$
2300 - 2305	$43 + 10 \log_{10}(p)$
2305 - 2320	$43 + 10 \log_{10}(p)$ <sup>Note</sup>
2320 - 2345	$75 + 10 \log_{10}(p)$
2345 - 2360	$43 + 10 \log_{10}(p)$ <sup>Note</sup>
2360 - 2362.5	$43 + 10 \log_{10}(p)$
2362.5 - 2365	$55 + 10 \log_{10}(p)$
2365 - 2367.5	$70 + 10 \log_{10}(p)$
2367.5 - 2370	$72 + 10 \log_{10}(p)$
2370 - 2395	$75 + 10 \log_{10}(p)$
>2395	$43 + 10 \log_{10}(p)$

Note: Measured at the edges of the highest and lowest frequency range(s) in which the equipment is designed to operate. See Section 5.2 for the permitted frequency ranges for the various equipment types.

**Figure 1: Unwanted Emissions for Base Station, Fixed Station and High-Power Fixed Subscriber Equipment**



### 8.7.2 Test summary

Verdict	Pass		
Tested by	P. Barbieri	Test date	February 3, 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 $\geq 3 \times$ RBW
Detector mode:	Peak
Trace mode:	Max Hold

Input signal frequency

Low channel	2182.5 MHz
Middle channel	2190.0 MHz
High channel	2197.5 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

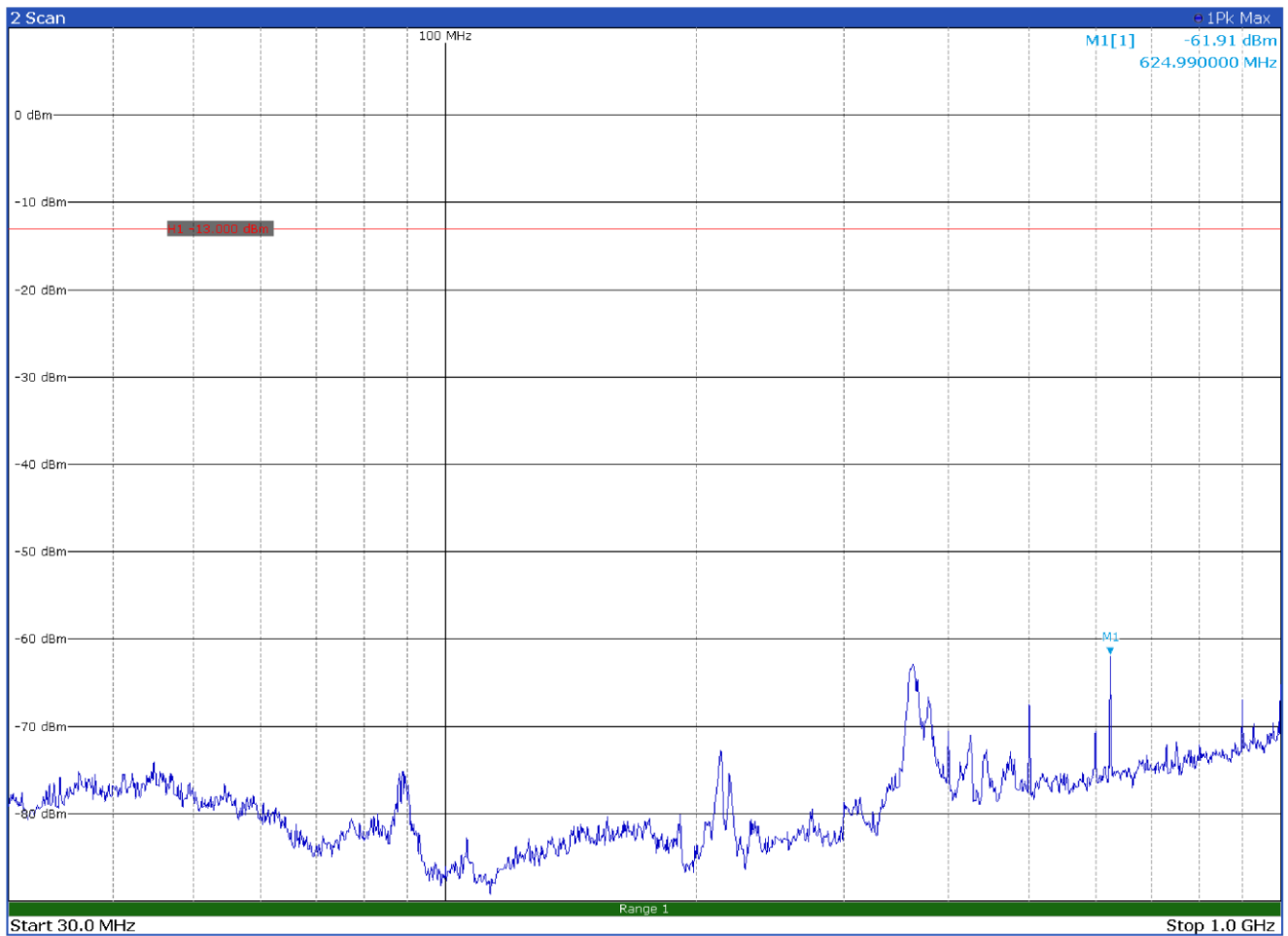
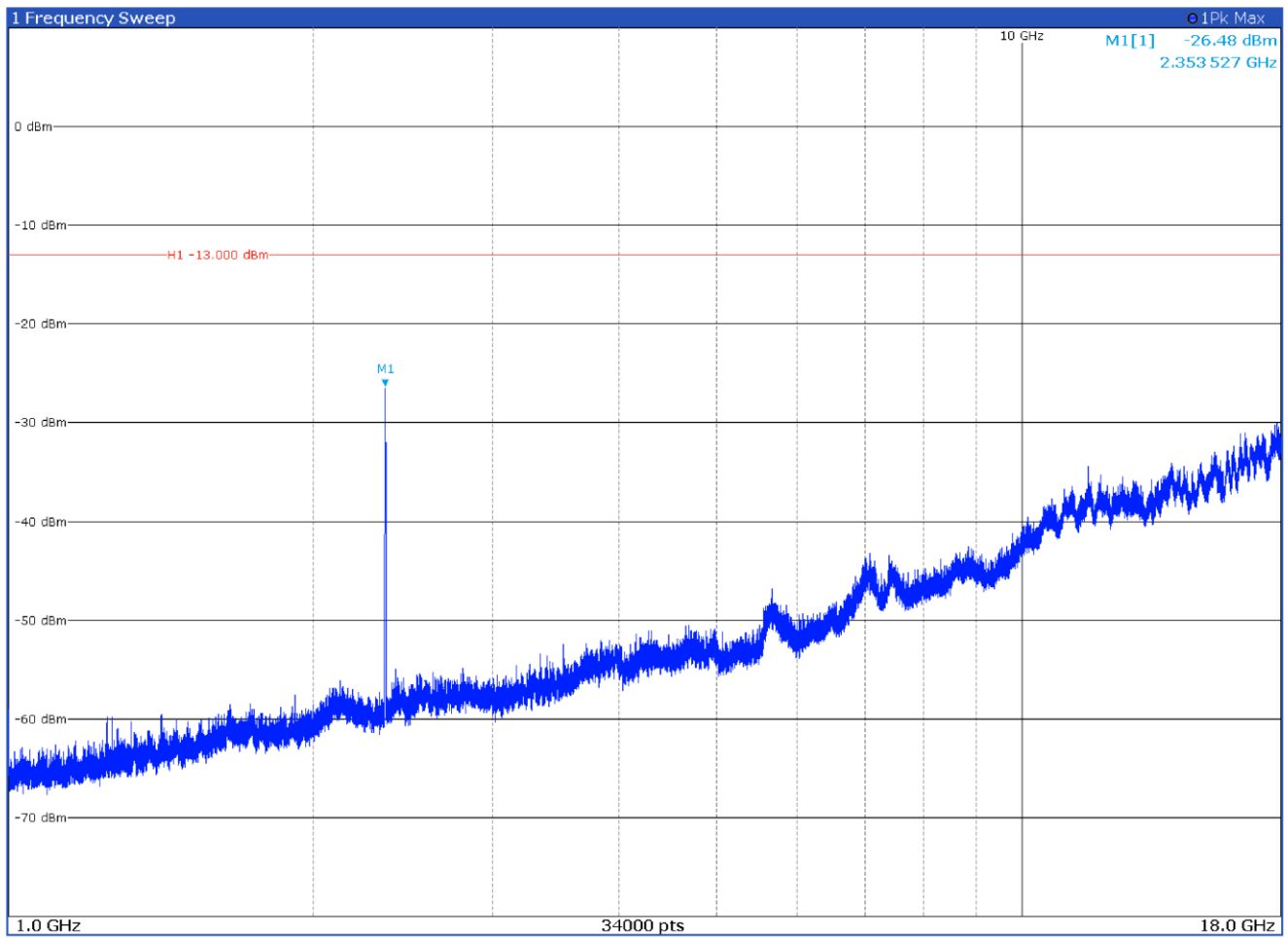


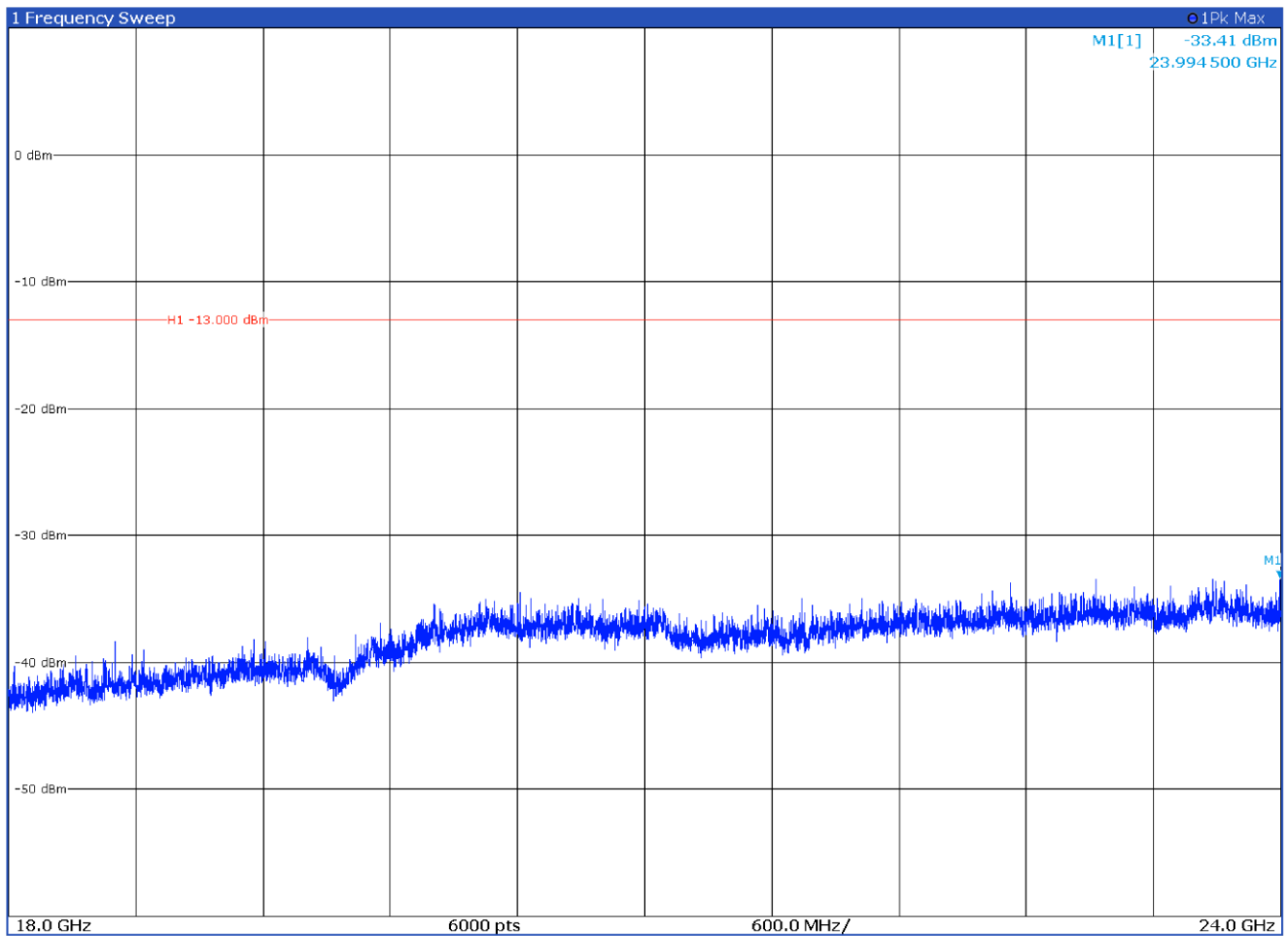
Figure 8.7-1: Radiated spurious emissions below 1 GHz, low channel with antenna in horizontal polarization

Test data, continued



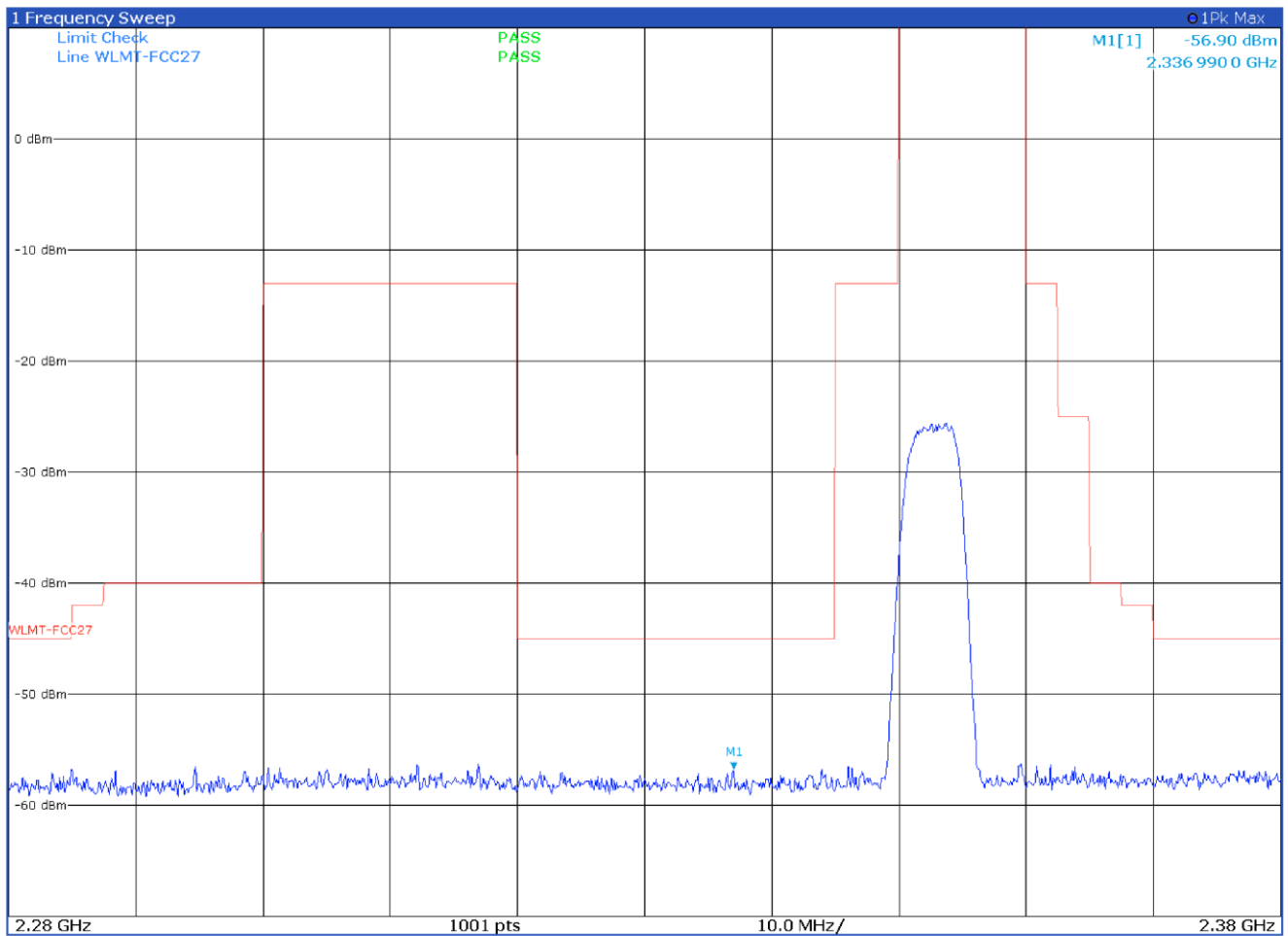
**Figure 8.7-2:** Radiated spurious emissions from 1 GHz to 18 GHz, low channel with antenna in horizontal polarization

Test data, continued



**Figure 8.7-3:** Radiated spurious emissions from 18 GHz to 10th harmonic, low channel with antenna in horizontal polarization

Test data, continued



**Figure 8.7-4:** Radiated spurious emissions from 2280 MHz to 2380 MHz, low channel with antenna in horizontal polarization

Test data, continued

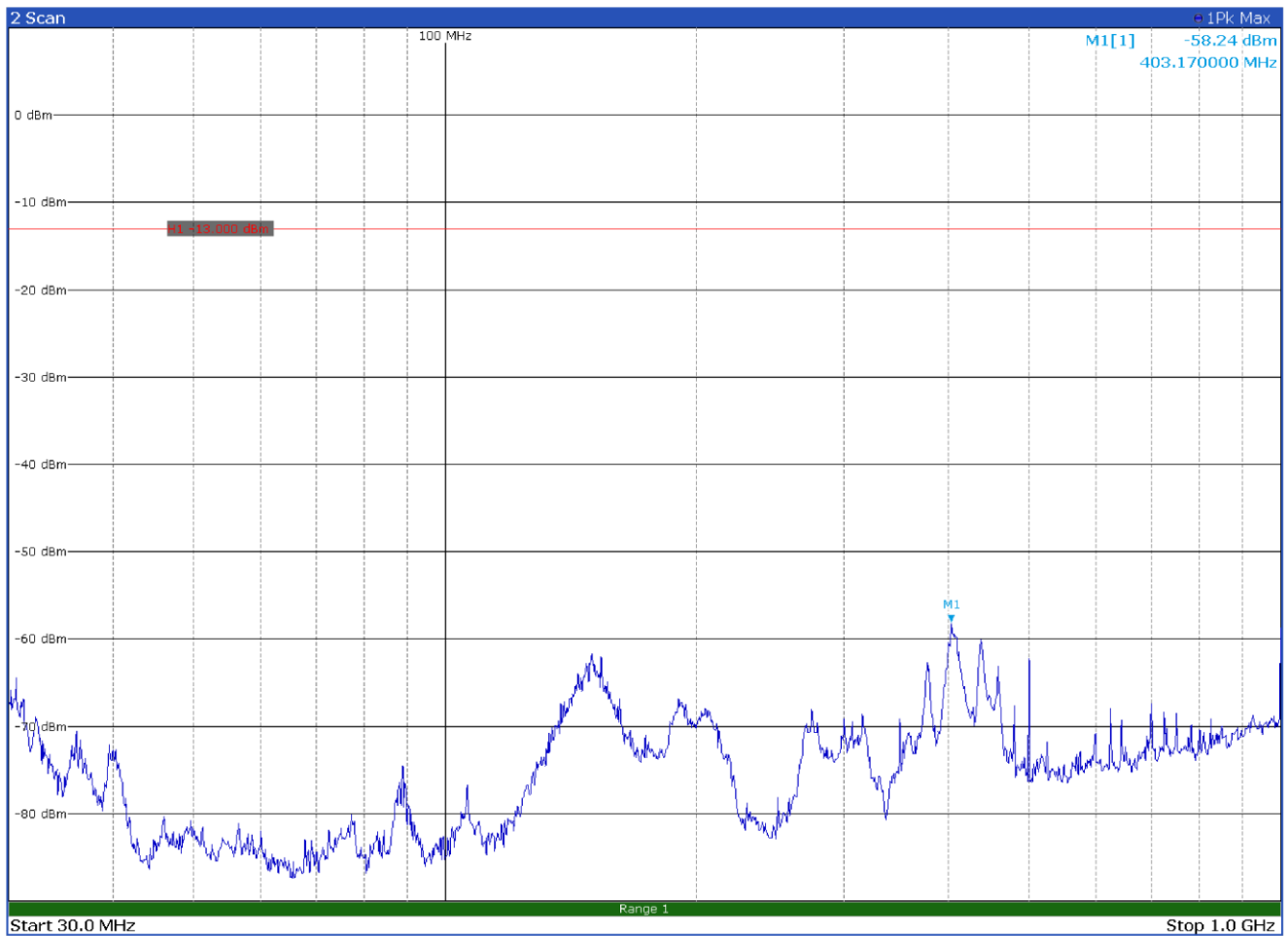
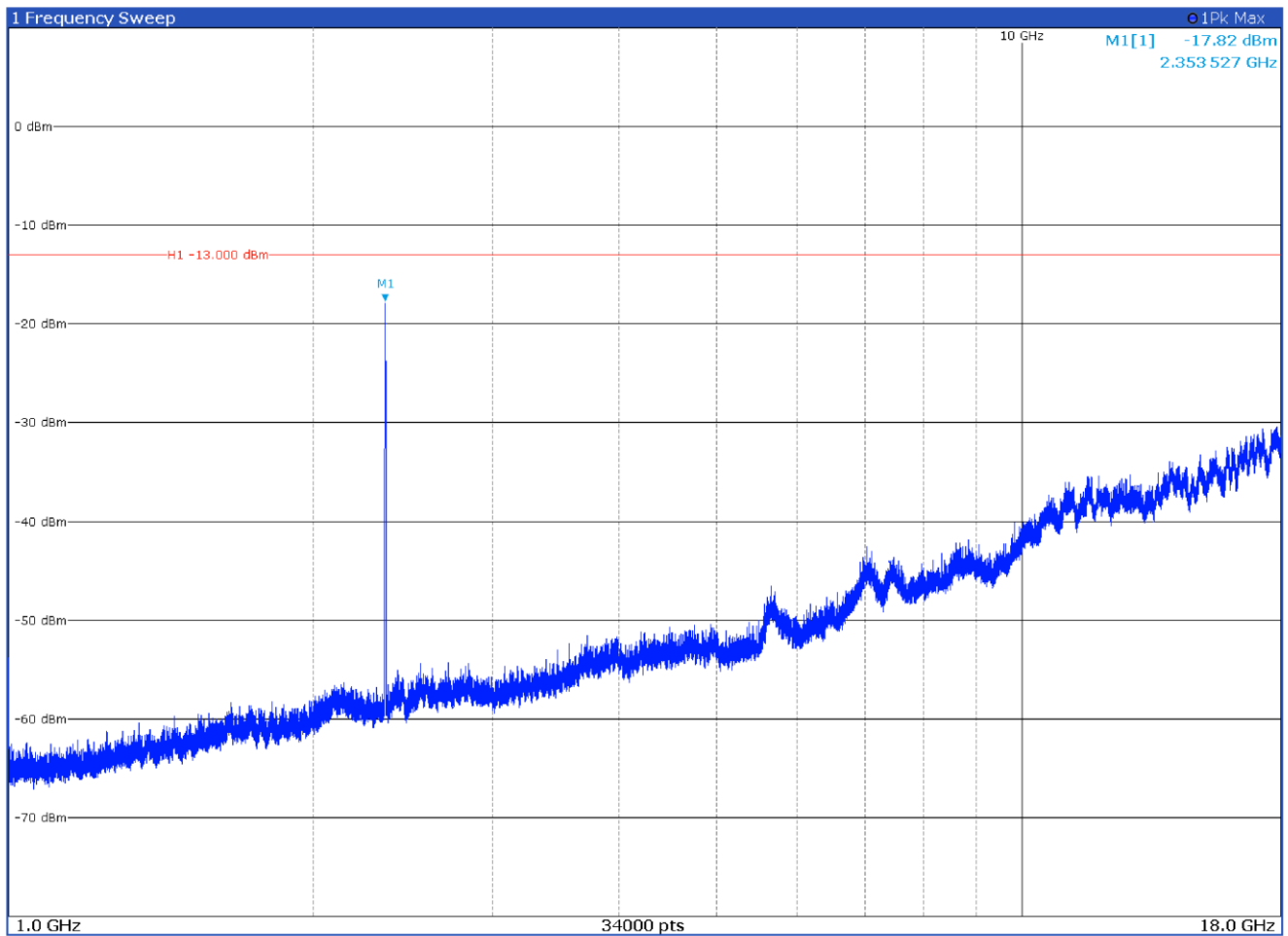


Figure 8.7-5: Radiated spurious emissions below 1 GHz, low channel with antenna in vertical polarization

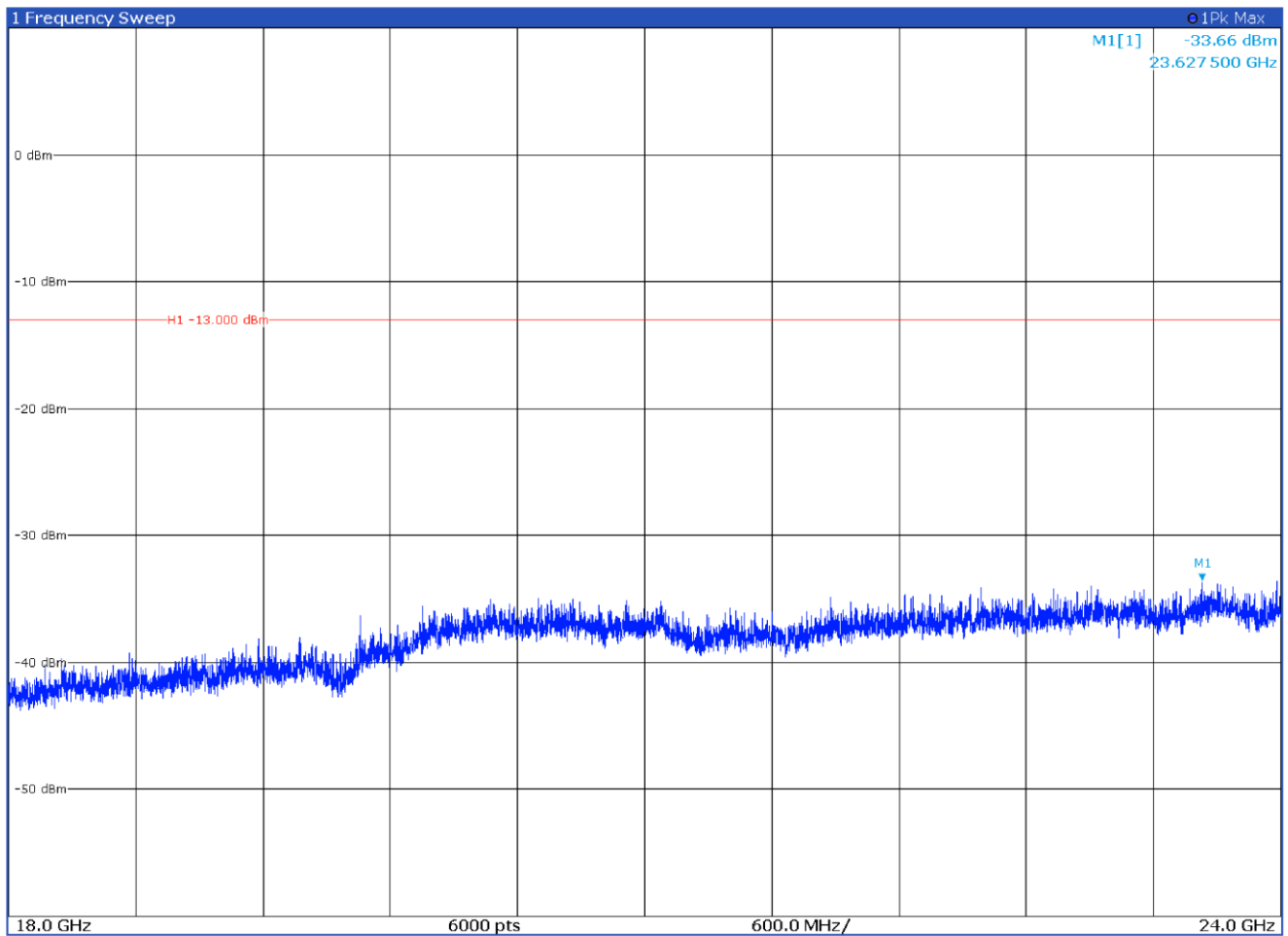


Test data, continued



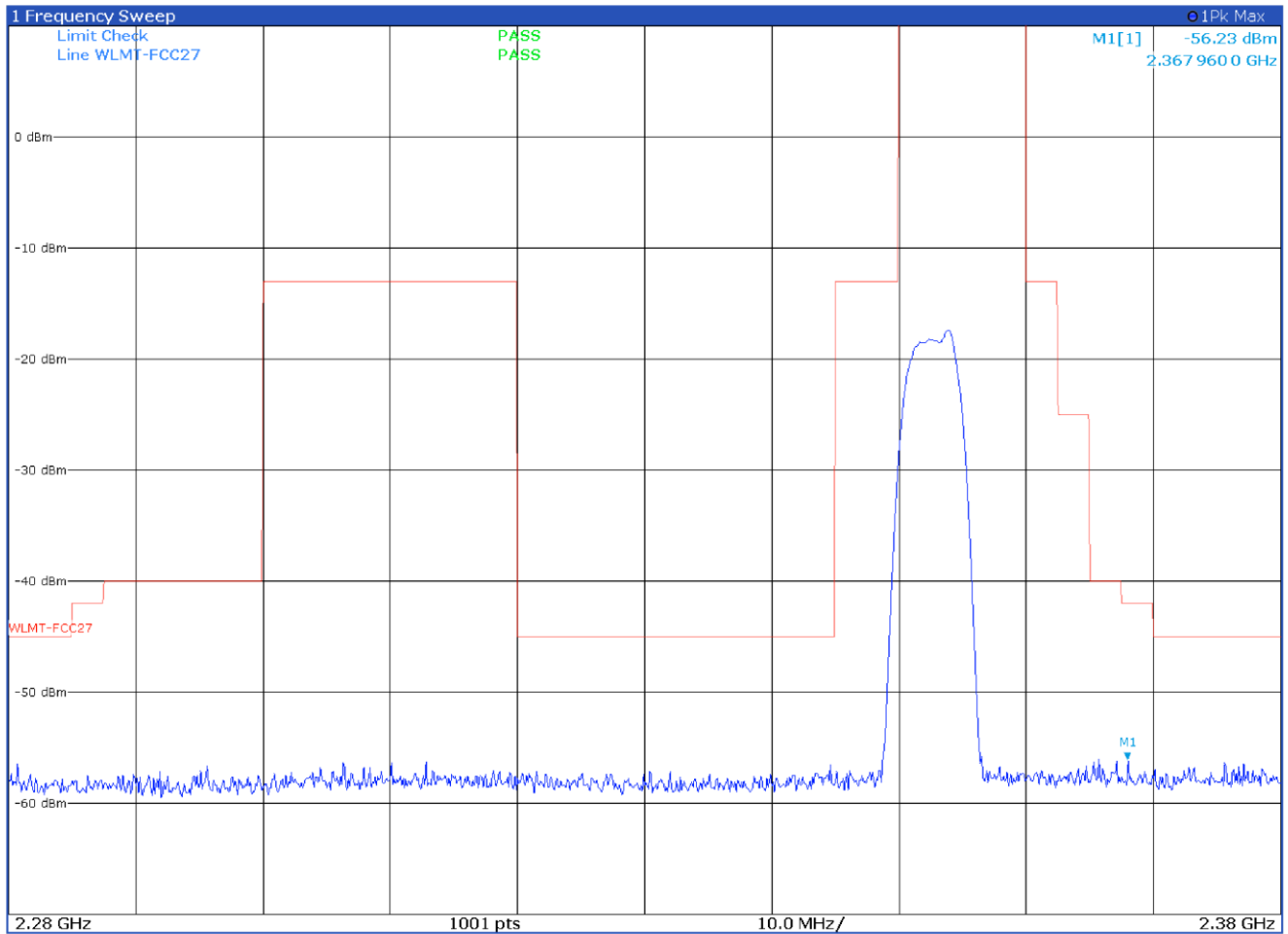
**Figure 8.7-6:** Radiated spurious emissions from 1 GHz to 18 GHz, low channel with antenna in vertical polarization

Test data, continued



**Figure 8.7-7:** Radiated spurious emissions from 18 GHz to 10th harmonic, low channel with antenna in vertical polarization

Test data, continued



**Figure 8.7-8:** Radiated spurious emissions from 2280 MHz to 2380 MHz, low channel with antenna in vertical polarization

Test data, continued

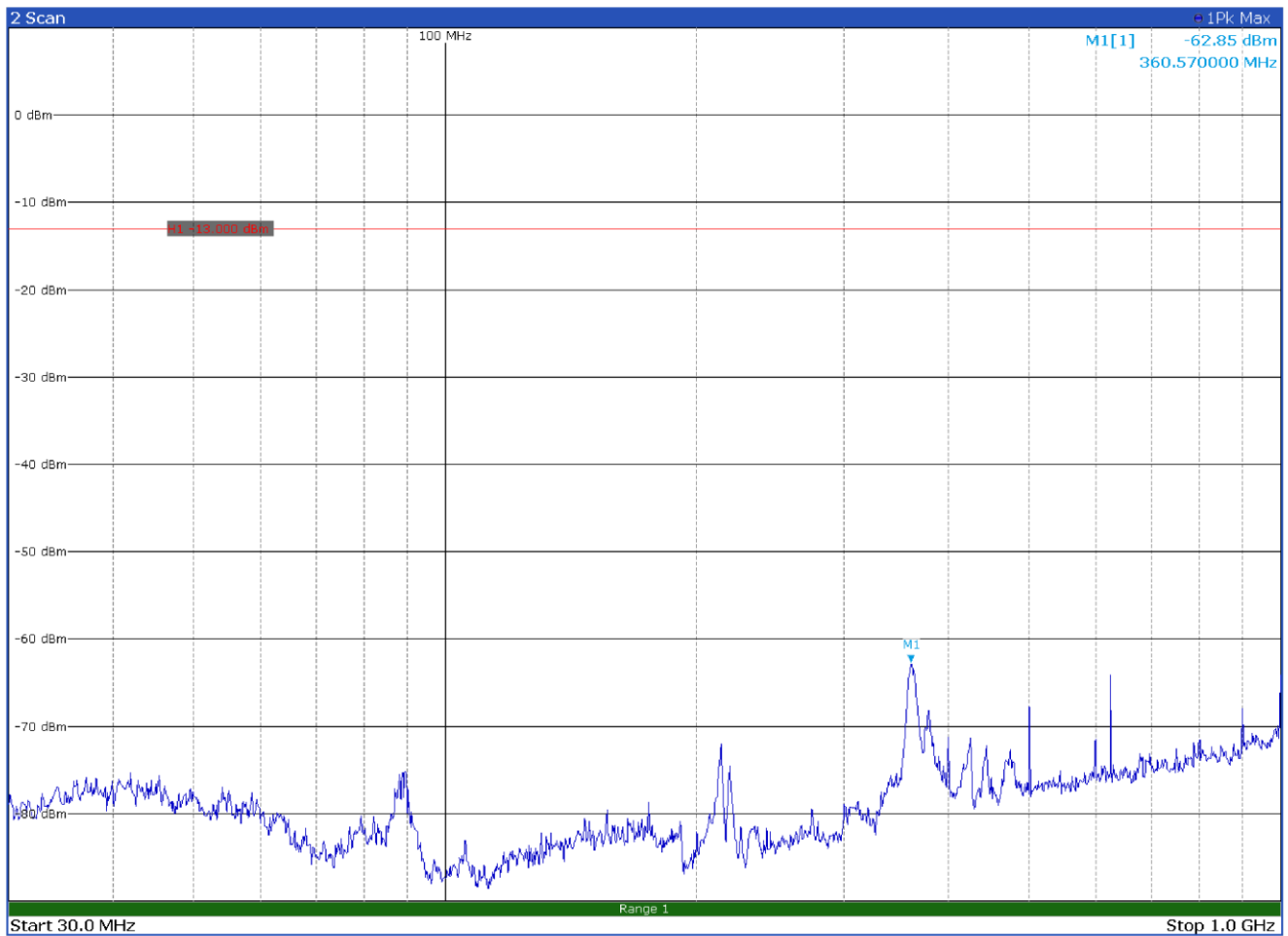


Figure 8.7-9: Radiated spurious emissions below 1 GHz, high channel with antenna in horizontal polarization

Test data, continued

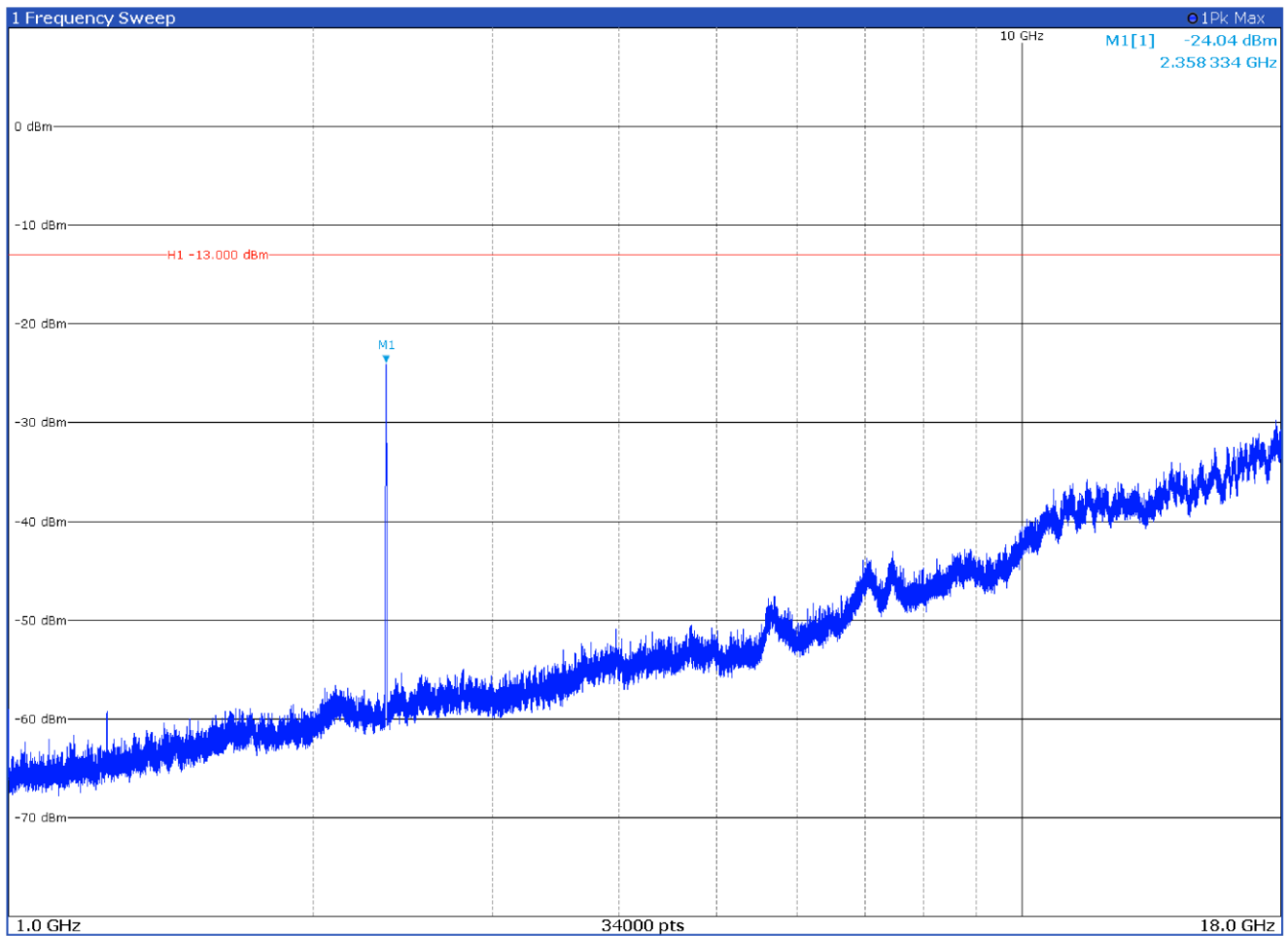
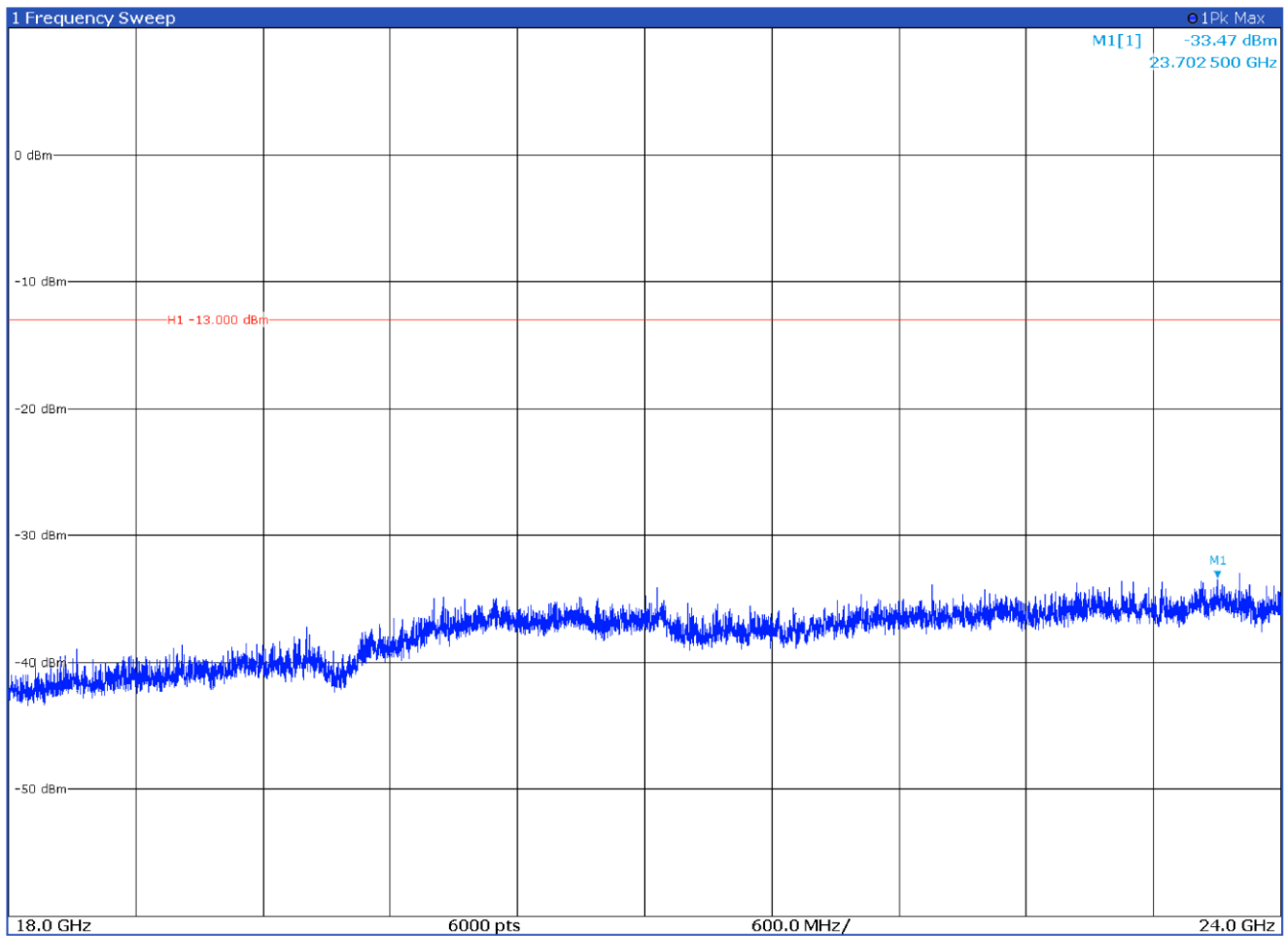


Figure 8.7-10: Radiated spurious emissions from 1 GHz to 18 GHz, high channel with antenna in horizontal polarization

Test data, continued



**Figure 8.7-11:** Radiated spurious emissions from 18 GHz to 10th harmonic, high channel with antenna in horizontal polarization

Test data, continued

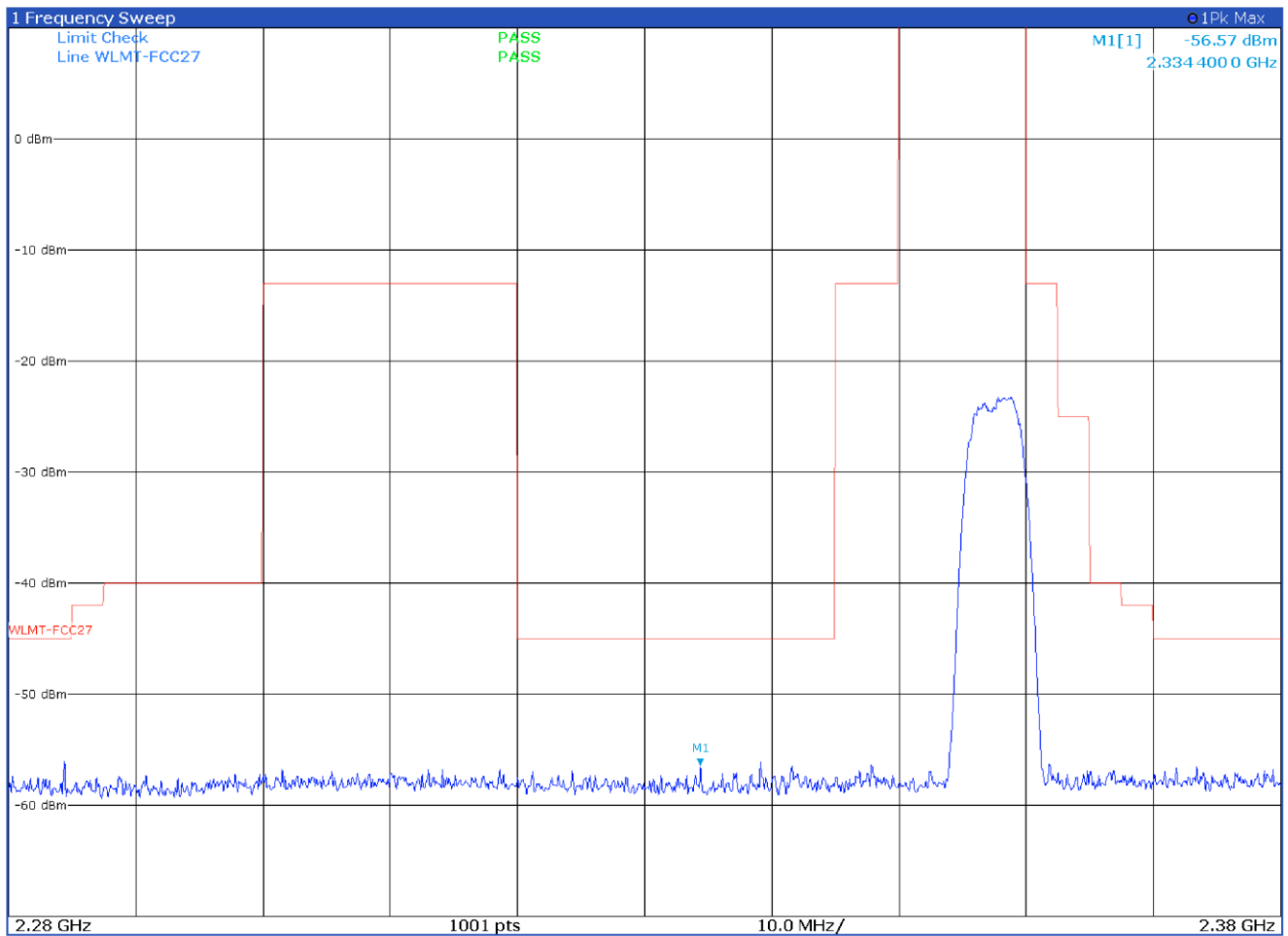


Figure 8.7-12: Radiated spurious emissions from 2280 MHz to 2380 MHz, high channel with antenna in horizontal polarization

Test data, continued

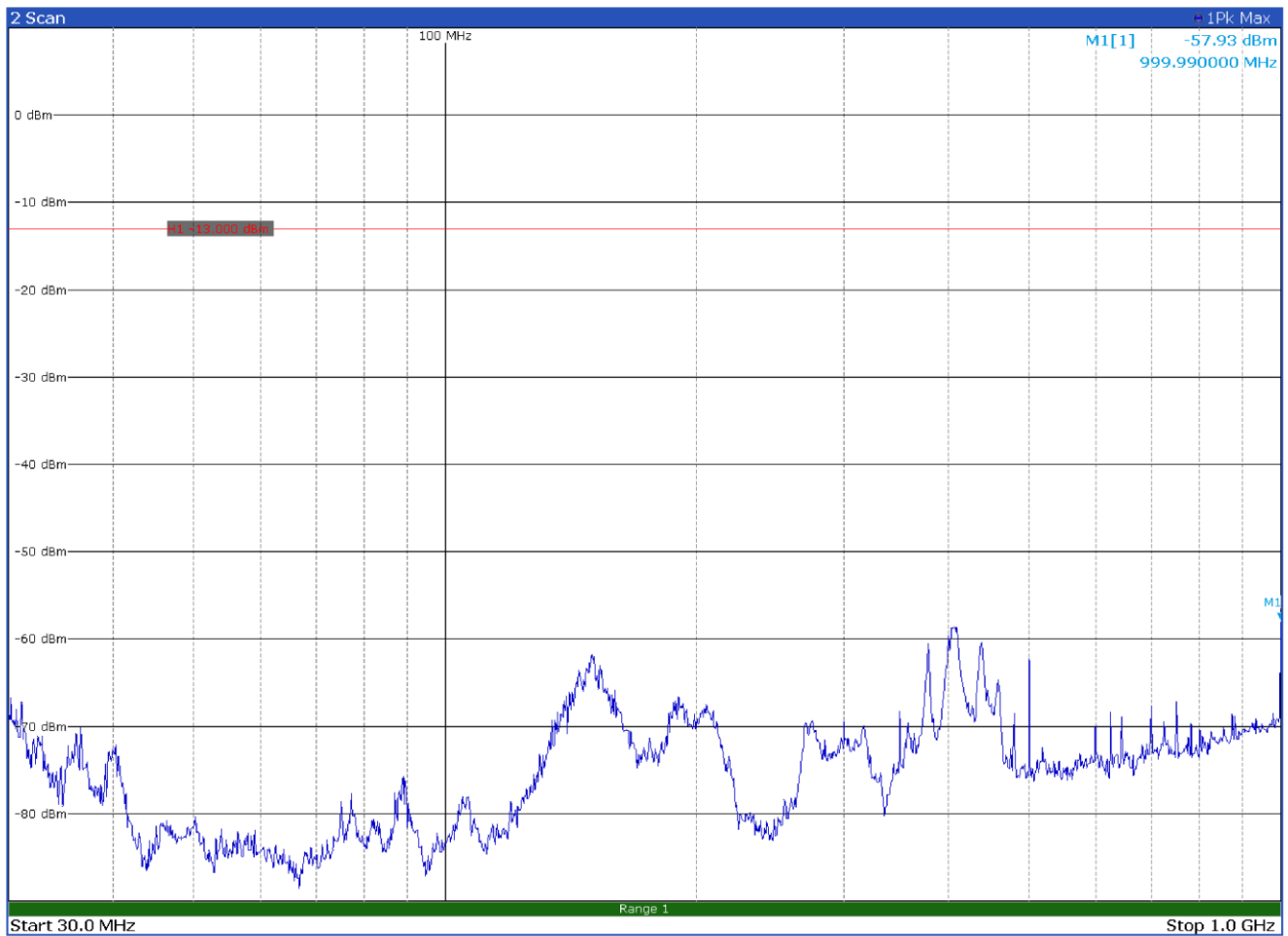


Figure 8.7-13: Radiated spurious emissions below 1 GHz, high channel with antenna in vertical polarization



Test data, continued

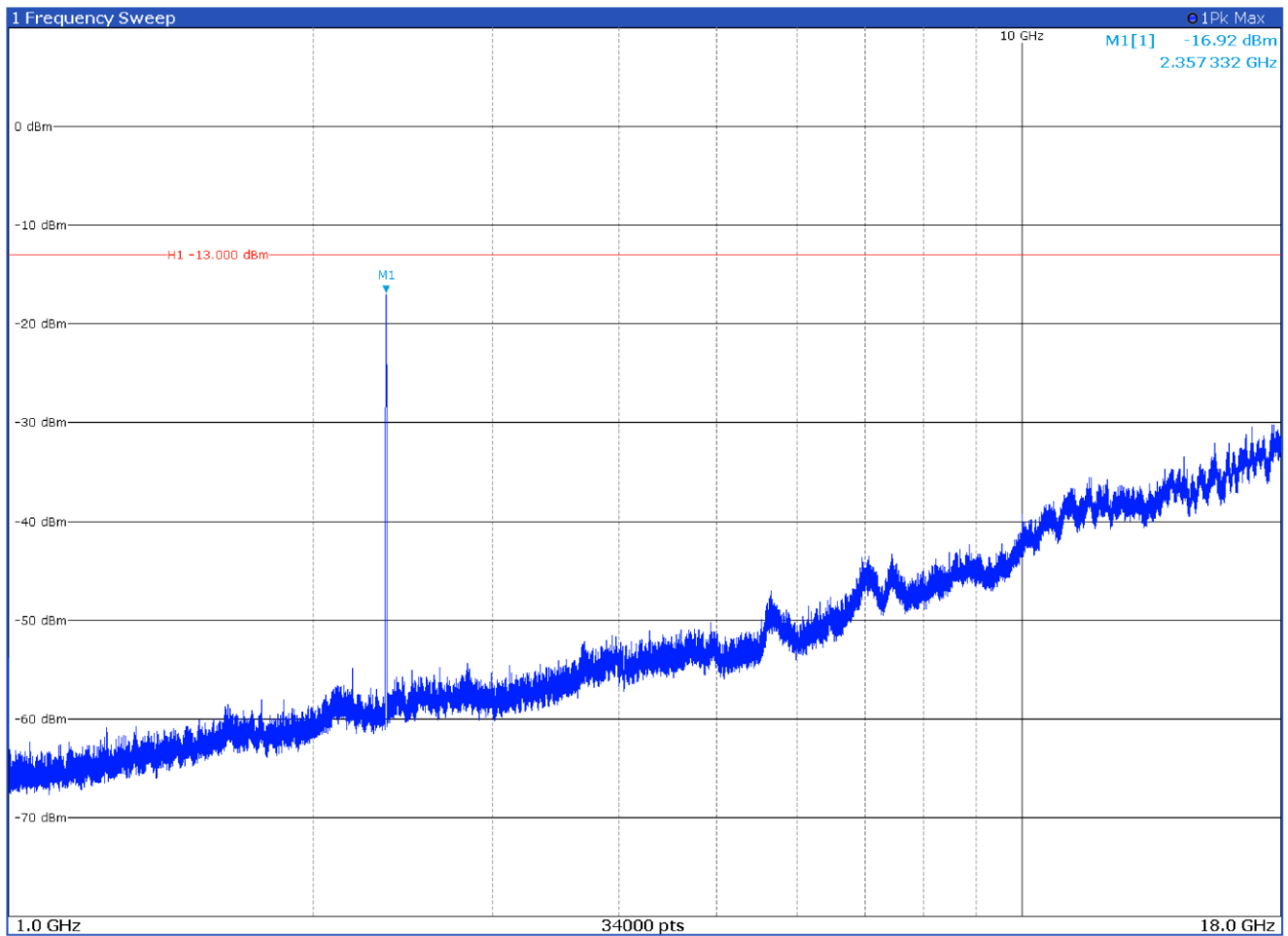
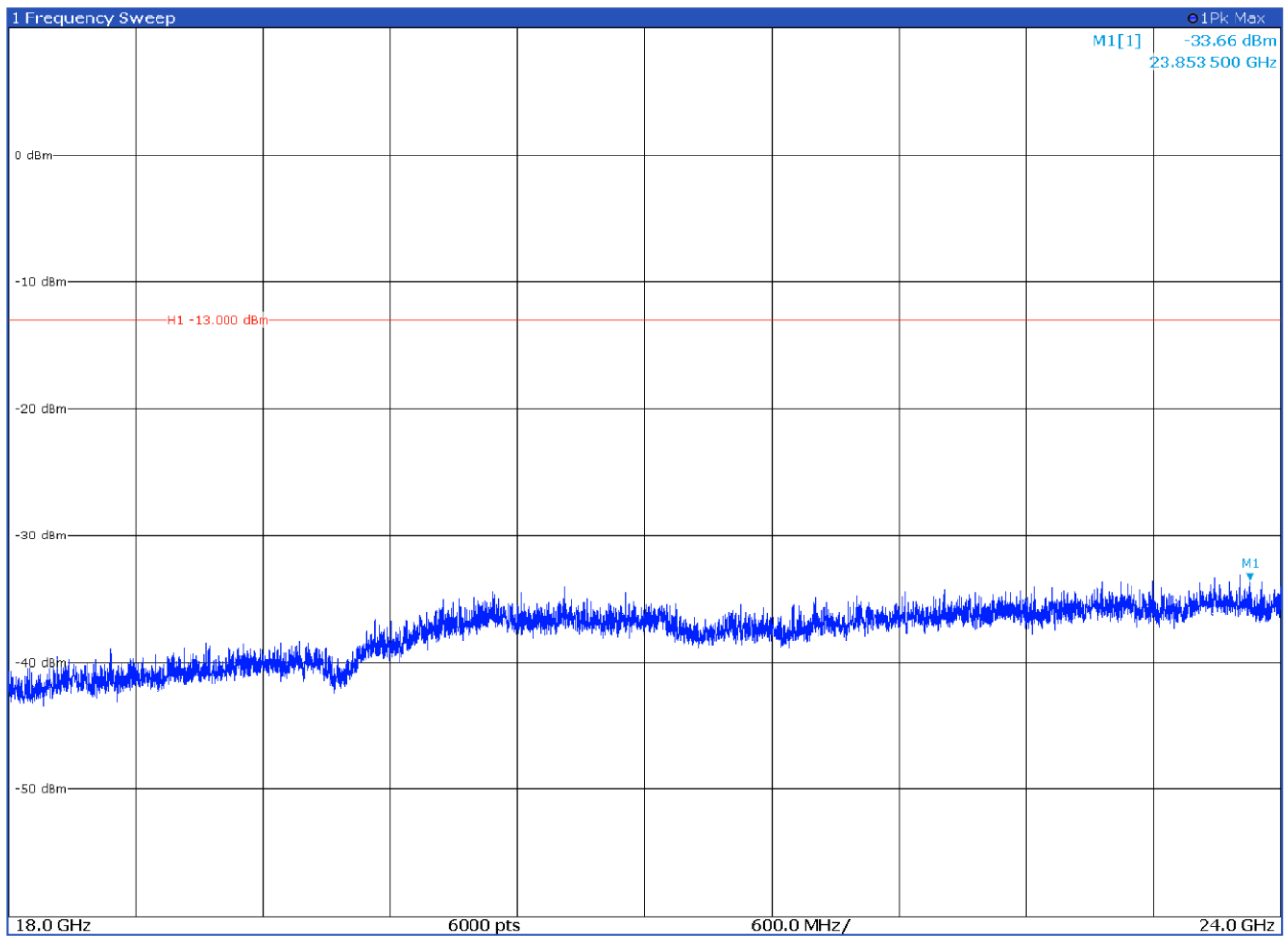


Figure 8.7-14: Radiated spurious emissions from 1 GHz to 18 GHz, high channel with antenna in vertical polarization

Test data, continued



**Figure 8.7-15:** Radiated spurious emissions from 18 GHz to 10th harmonic, high channel with antenna in vertical polarization

Test data, continued

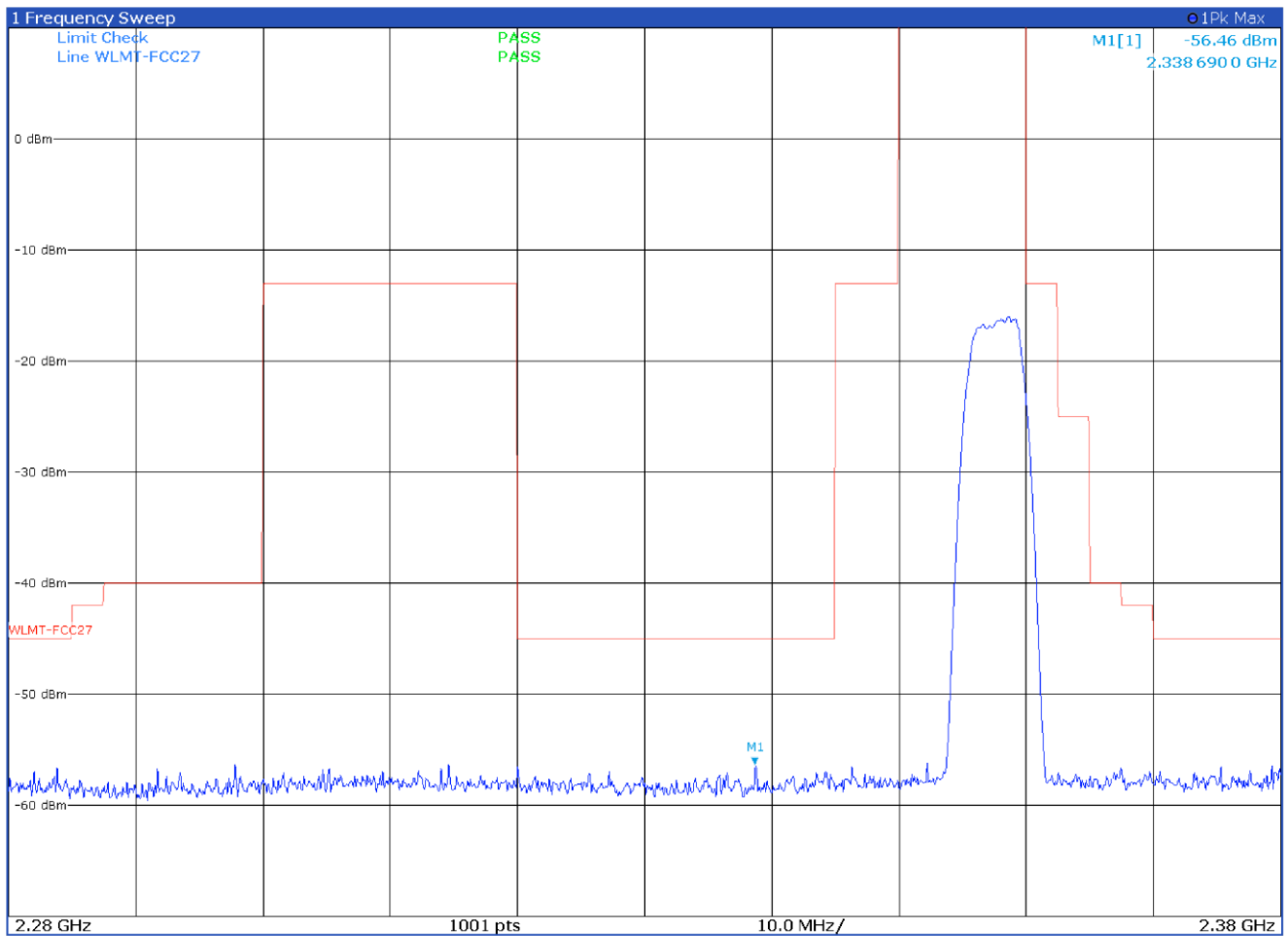


Figure 8.7-16: Radiated spurious emissions from 2280 MHz to 2380 MHz, high channel with antenna in vertical polarization



## 8.8 Frequency stability measurements

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### 8.8.1 References, definitions and limits

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#### **FCC §27.54**

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

#### **RSS-131, Clause 5.2.4**

Industrial zone enhancers shall comply with the frequency stability given in the RSS that applies to the equipment with which the zone enhancer is to be used. In cases where the frequency stability limit is not given in the applicable RSS, the equipment shall comply with a frequency stability of  $\pm 1.5$  ppm.

For zone enhancers with no input signal processing capability, the frequency stability measurement in this section is not required.

#### **RSS-195, Clause 5.4**

The applicant shall ensure frequency stability by showing that the occupied bandwidth is maintained within the range of the operating frequency blocks when testing under the temperature and supply voltage variations specified for the frequency stability measurement in RSS-Gen.

#### **RSS-Gen, Clause 6.11**

##### Transmitter frequency stability

Frequency stability is a measure of frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at an appropriate reference temperature and the rated supply voltage.

When the measurement method of transmitter frequency stability is not stated in the applicable RSS or reference standards, the following conditions apply:

- a. The reference temperature for radio transmitters is  $+20^{\circ}\text{C}$  ( $+68^{\circ}\text{F}$ ).
- b. A hand-held device that is only capable of operating using internal batteries shall be tested at the battery's nominal voltage, and again at the battery's operating end-point voltage, which shall be specified by the equipment manufacturer. For this test, either a battery or an external power supply can be used.
- c. The operating carrier frequency shall be set up in accordance with the manufacturer's published operation and instruction manual prior to the commencement of these tests. No adjustment of any frequency-determining circuit element shall be made subsequent to this initial set-up.

With the transmitter installed in an environmental test chamber, the unmodulated carrier frequency and frequency stability shall be measured under the conditions specified below for licensed and licence-exempt devices, unless specified otherwise in the applicable RSS. A sufficient stabilization period at each temperature shall be used prior to each frequency measurement.

For licensed devices, the following measurement conditions apply:

- a. at the temperatures of  $-30^{\circ}\text{C}$  ( $-22^{\circ}\text{F}$ ),  $+20^{\circ}\text{C}$  ( $+68^{\circ}\text{F}$ ) and  $+50^{\circ}\text{C}$  ( $+122^{\circ}\text{F}$ ), and at the manufacturer's rated supply voltage
- b. at the temperature of  $+20^{\circ}\text{C}$  ( $+68^{\circ}\text{F}$ ) and at  $\pm 15\%$  of the manufacturer's rated supply voltage

### 8.8.2 Test summary

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

### 8.8.3 Observations, settings and special notes

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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	2354999572.5	16.6	0.00705	1.5	1.49
+40 °C, Nominal	2354999571.5	15.6	0.00662	1.5	1.49
+30 °C, Nominal	2354999566.1	10.2	0.00433	1.5	1.50
+20 °C, -15% voltage	2354999555.7	-0.2	-0.00008	1.5	1.50
+20 °C, Nominal	2354999555.9	Reference	Reference	Reference	Reference
+20 °C, +15% voltage	2354999558.8	2.9	0.00123	1.5	1.50
+10 °C, Nominal	2354999537.6	-18.3	-0.00777	1.5	1.49
0 °C, Nominal	2354999526.7	-29.2	-0.01240	1.5	1.49
-10 °C, Nominal	2354999503.3	-52.6	-0.02234	1.5	1.48
-20 °C, Nominal	2354999499.1	-56.8	-0.02412	1.5	1.48
-30 °C, Nominal	2354999434.3	-121.6	-0.05163	1.5	1.45

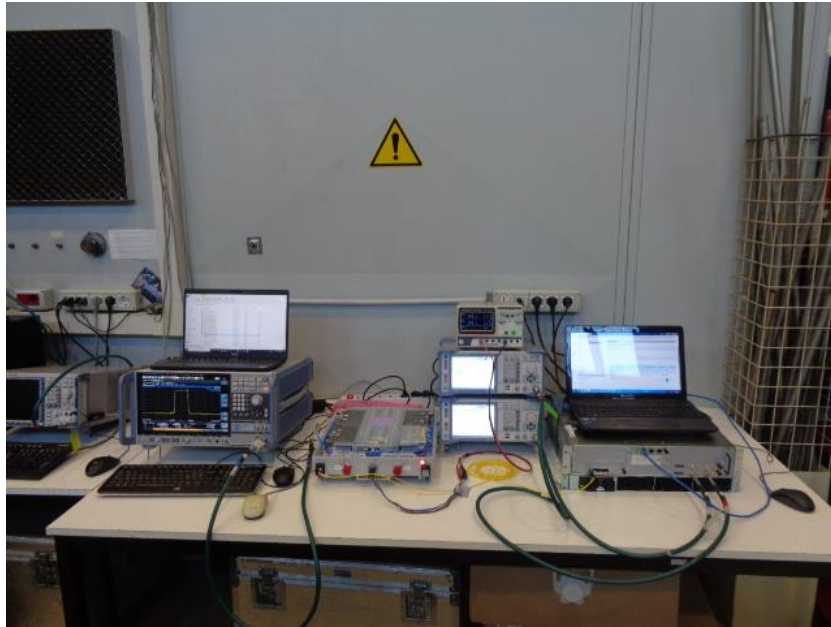
**Table 8.8-2: Transmitter frequency stability results for antenna port 2**

Test conditions	Frequency, Hz	Drift, Hz	Drift, ppm	Limit ±ppm	Margin, ±ppm
+50 °C, Nominal	2354999572.3	16.9	0.00718	1.5	1.49
+40 °C, Nominal	2354999571.1	15.7	0.00667	1.5	1.49
+30 °C, Nominal	2354999566.9	11.5	0.00488	1.5	1.50
+20 °C, -15% voltage	2354999555.5	0.1	0.00004	1.5	1.50
+20 °C, Nominal	2354999555.4	Reference	Reference	Reference	Reference
+20 °C, +15% voltage	2354999558.3	2.9	0.00123	1.5	1.50
+10 °C, Nominal	2354999537.1	-18.3	-0.00777	1.5	1.49
0 °C, Nominal	2354999526.5	-28.9	-0.01227	1.5	1.49
-10 °C, Nominal	2354999503.5	-51.9	-0.02204	1.5	1.48
-20 °C, Nominal	2354999498.7	-56.7	-0.02408	1.5	1.48
-30 °C, Nominal	2354999433.9	-121.5	-0.05159	1.5	1.45

## Section 9 EUT photos

### 9.1 Set-up photos

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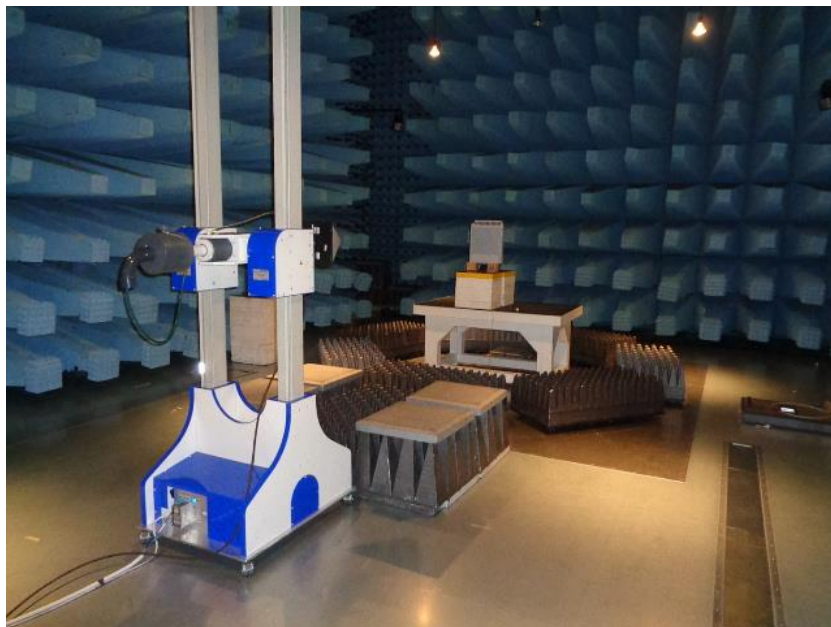
**Figure 9.1-1:** Antenna port testing set-up



**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



TOP View



BOTTOM View

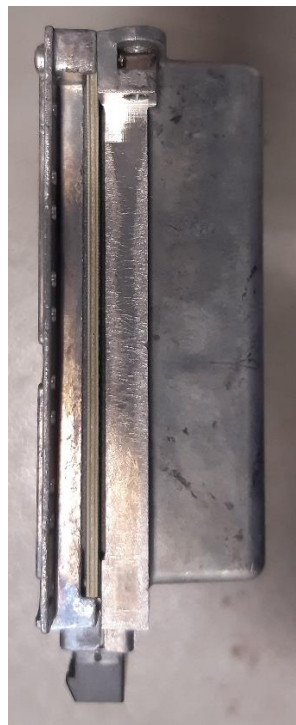
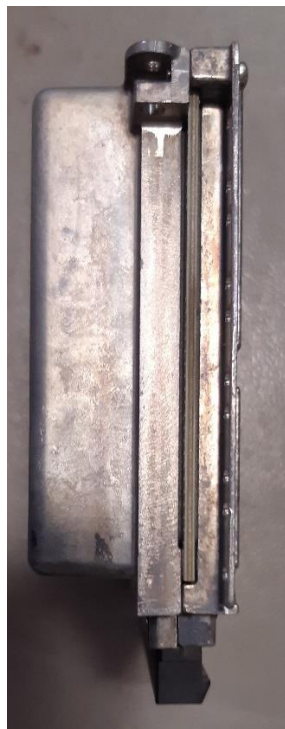




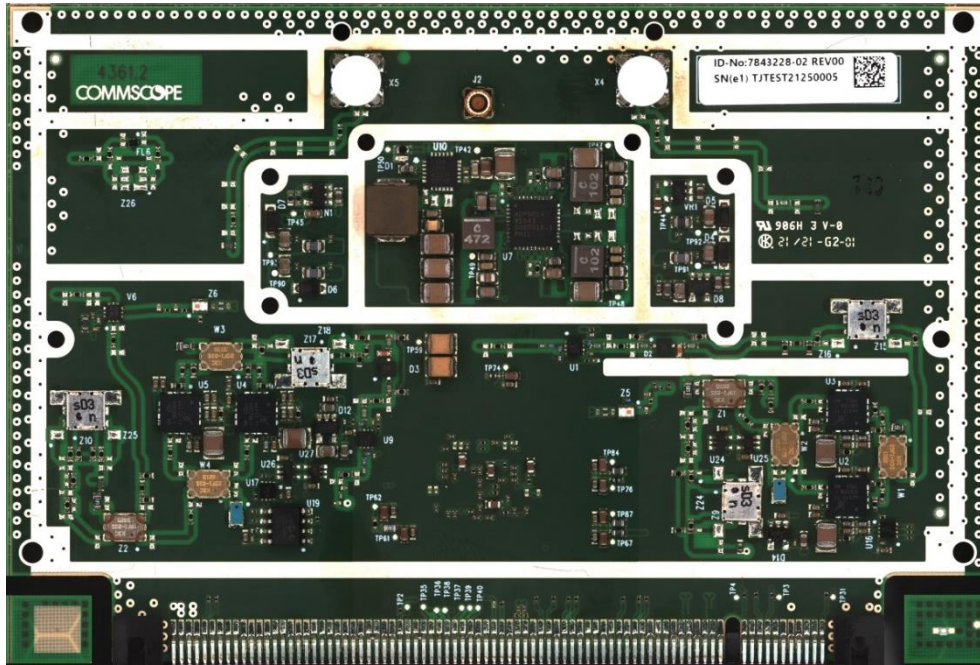
Connector side view



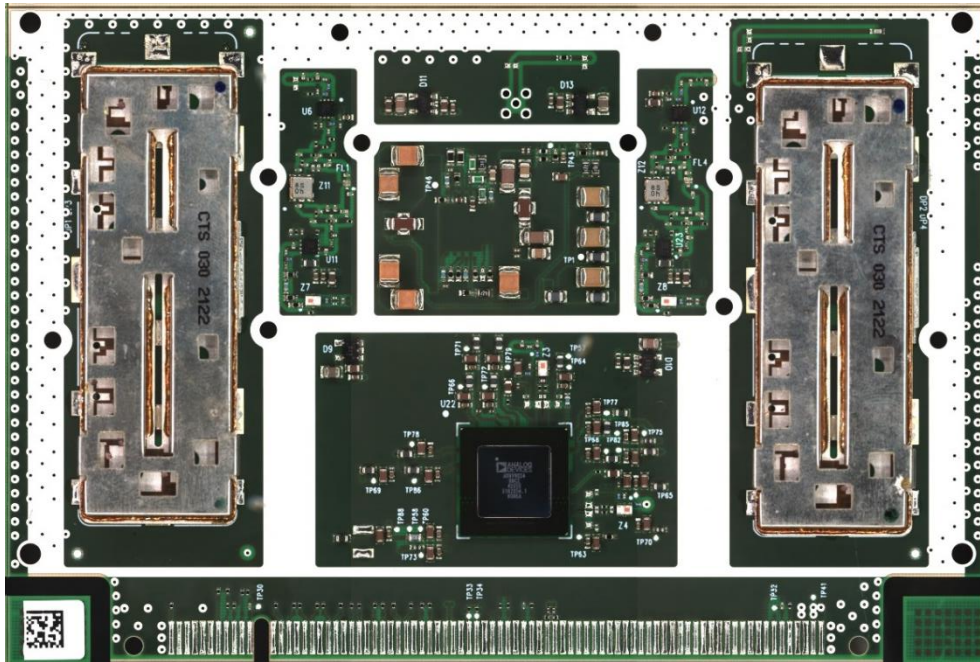
Rear side View



Left and Right side view



TOP View



BOTTOM View

End of the test report