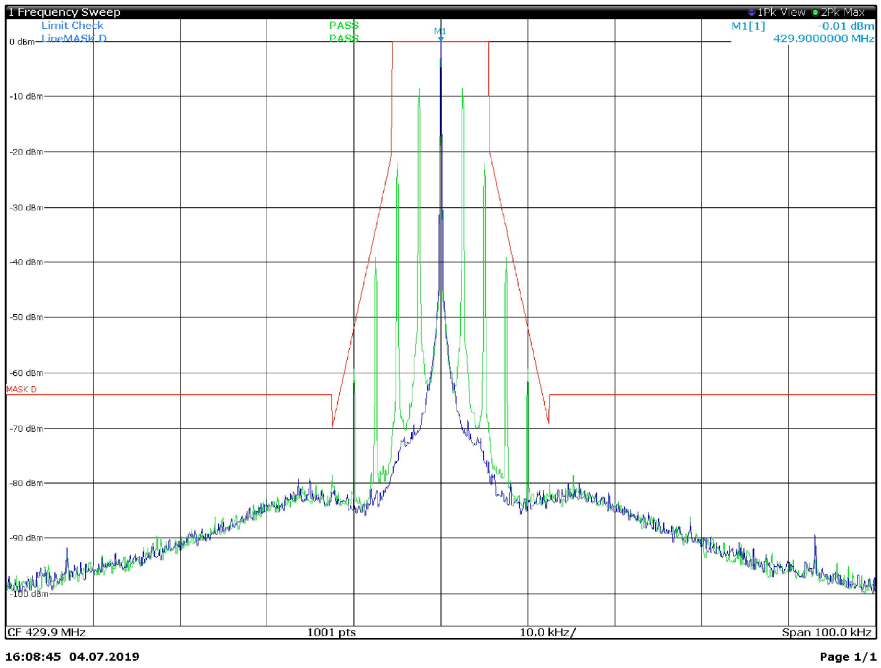
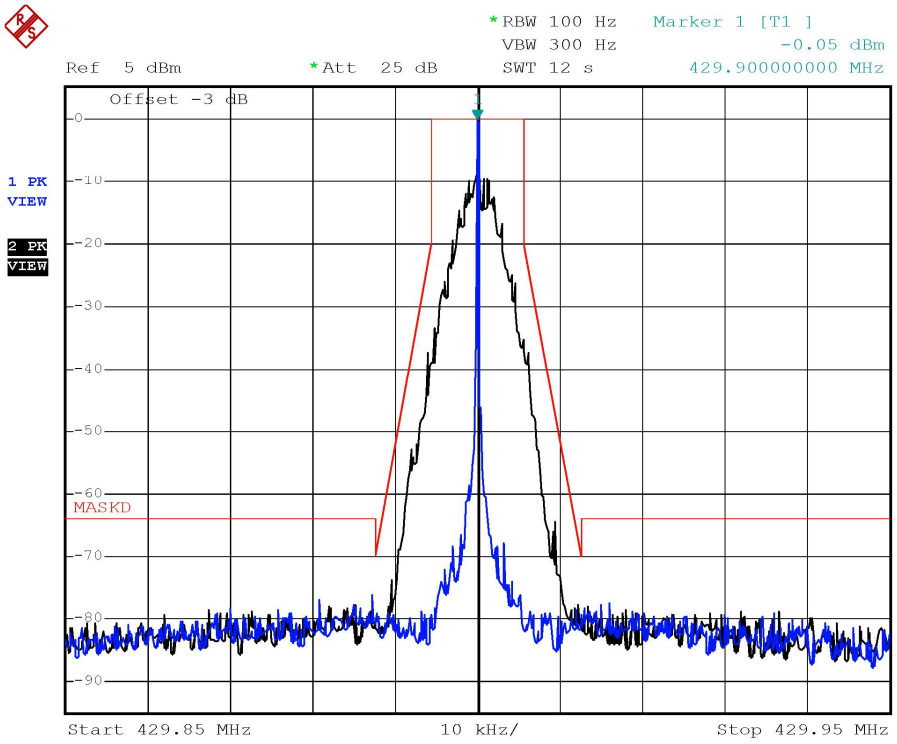
## Test data



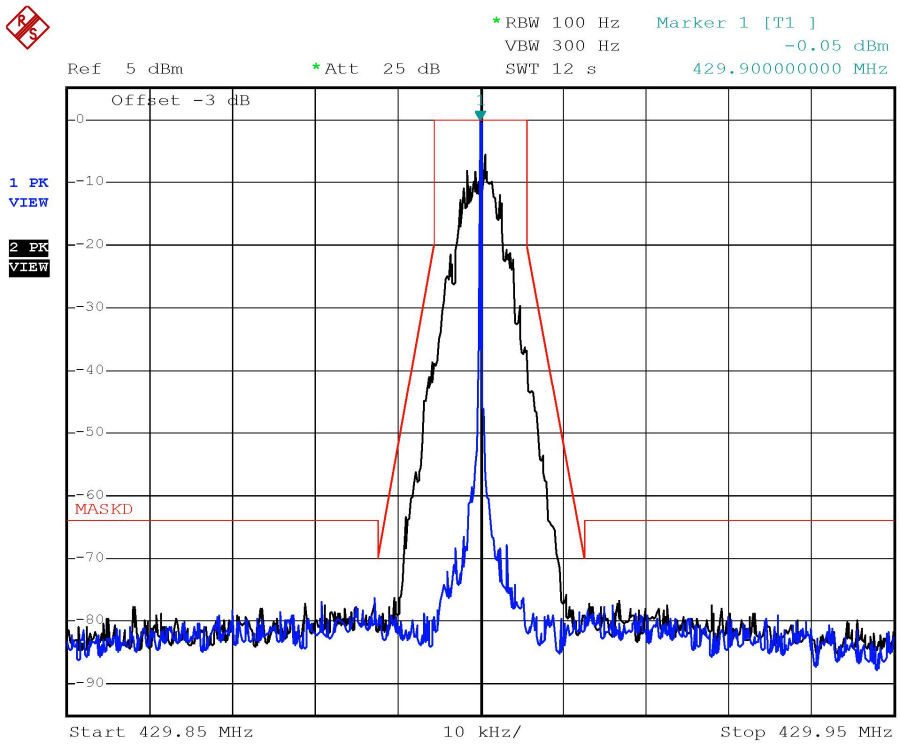

Frequency 429.9 MHz – FM modulation with 12.5 kHz channel bandwidth

## Test data



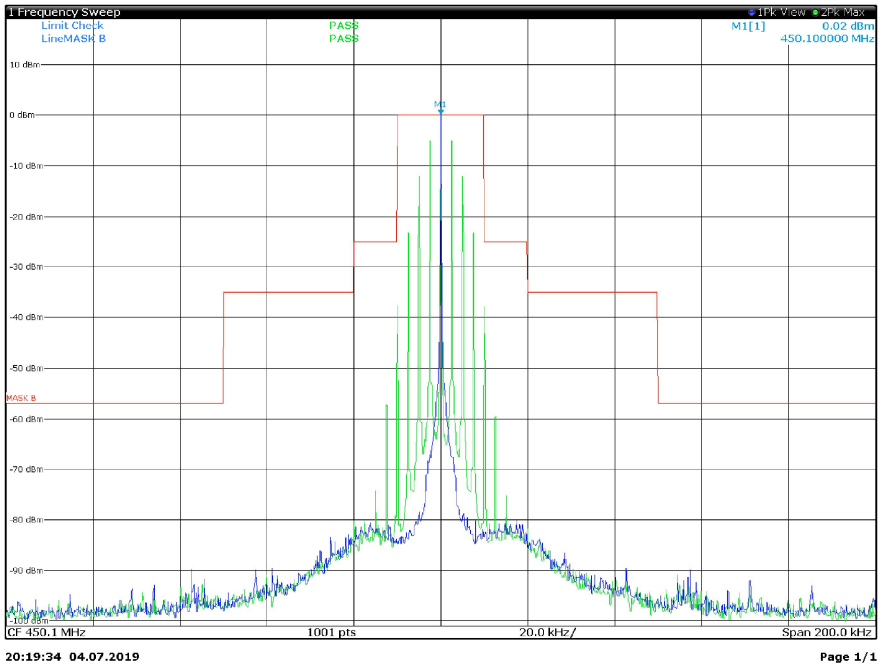

Frequency 429.9 MHz – 4FSK modulation with 12.5 kHz channel bandwidth

## Test data



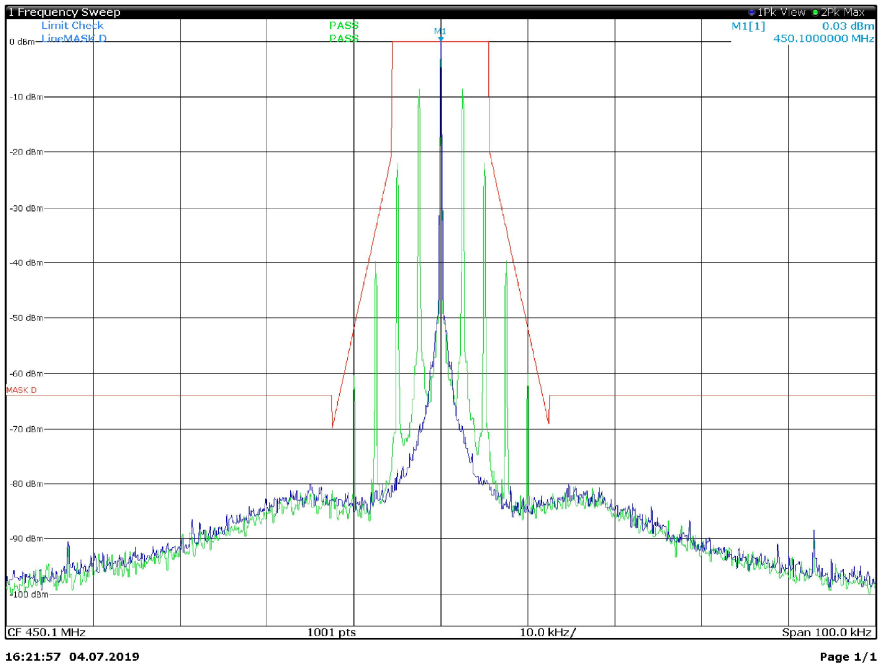

Frequency 429.9 MHz – C4FM modulation with 12.5 kHz channel bandwidth

## Test data



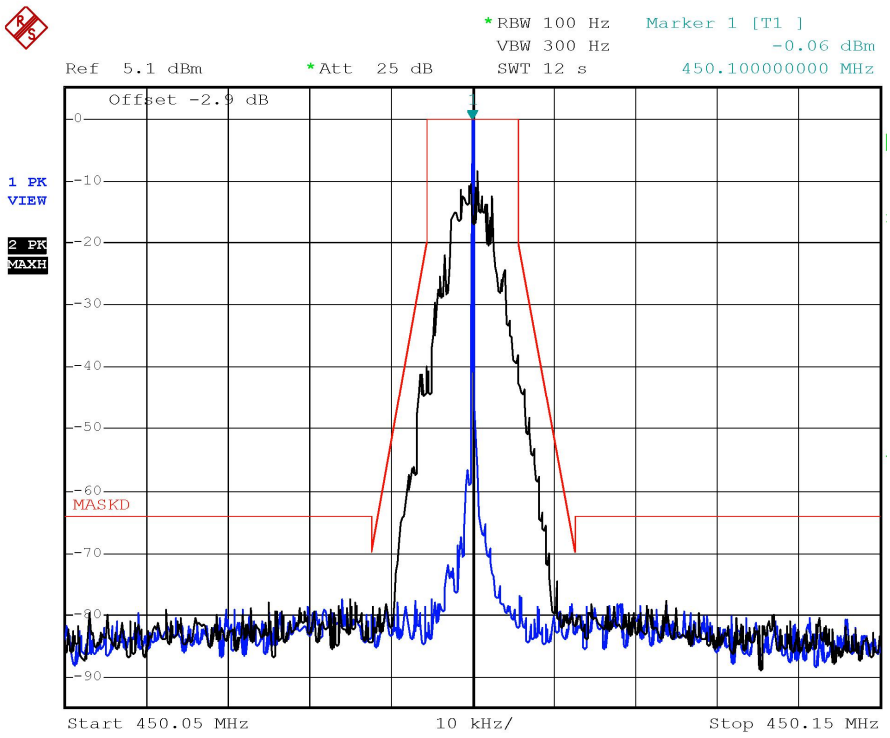

Frequency 450.1 MHz – FM modulation with 25 kHz channel bandwidth

## Test data



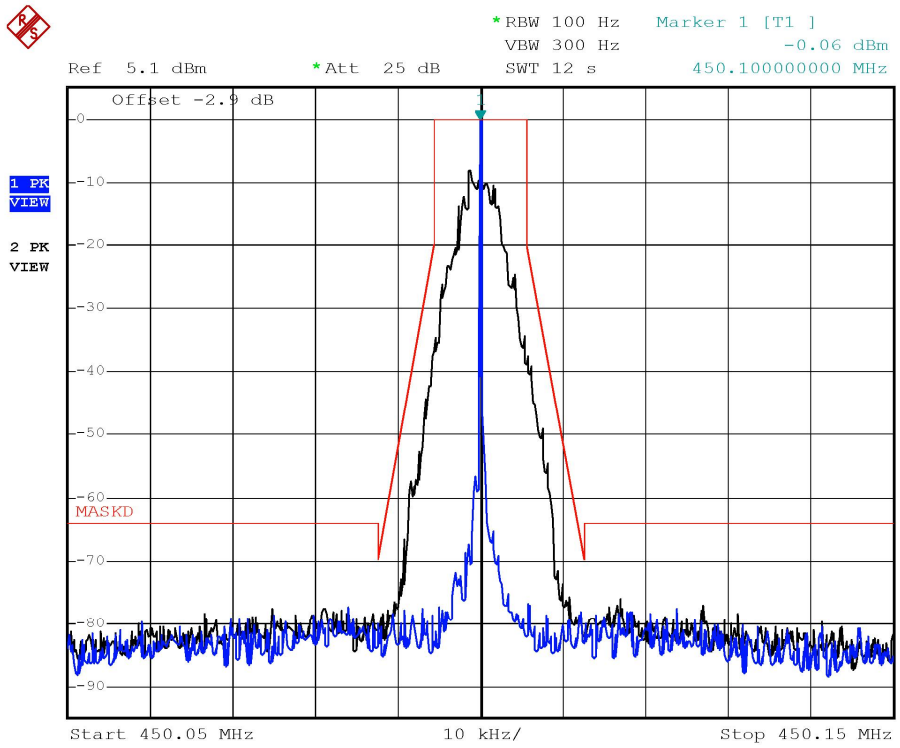

Frequency 450.1 MHz – FM modulation with 12.5 kHz channel bandwidth

## Test data



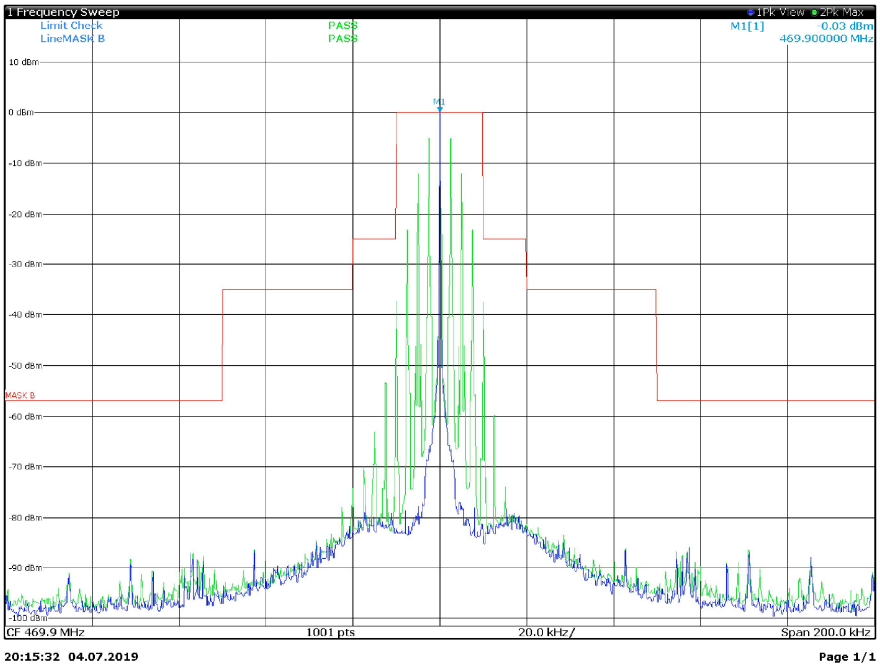

Frequency 450.1 MHz – 4FSK modulation with 12.5 kHz channel bandwidth

## Test data



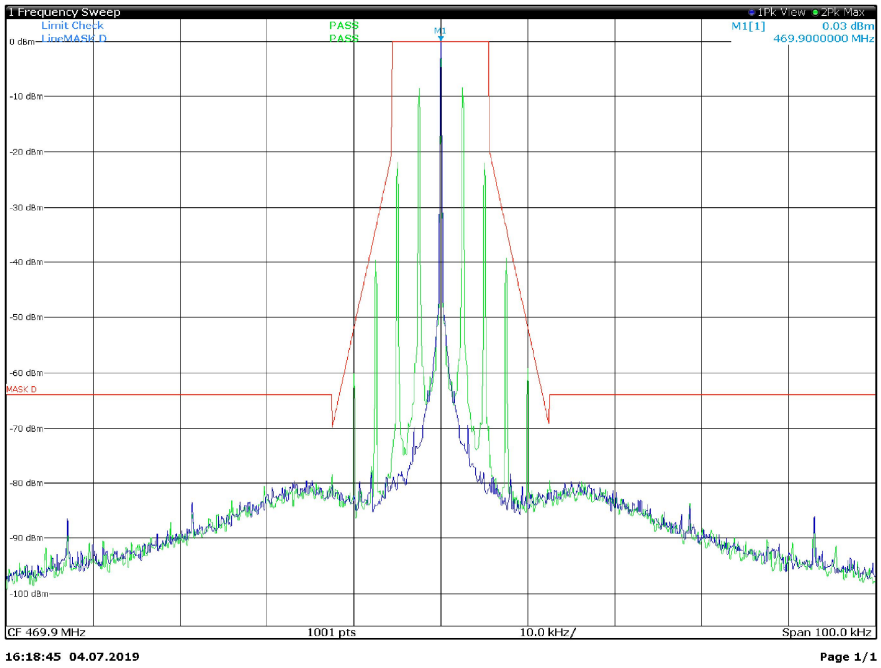

Frequency 450.1 MHz – C4FM modulation with 12.5 kHz channel bandwidth

## Test data



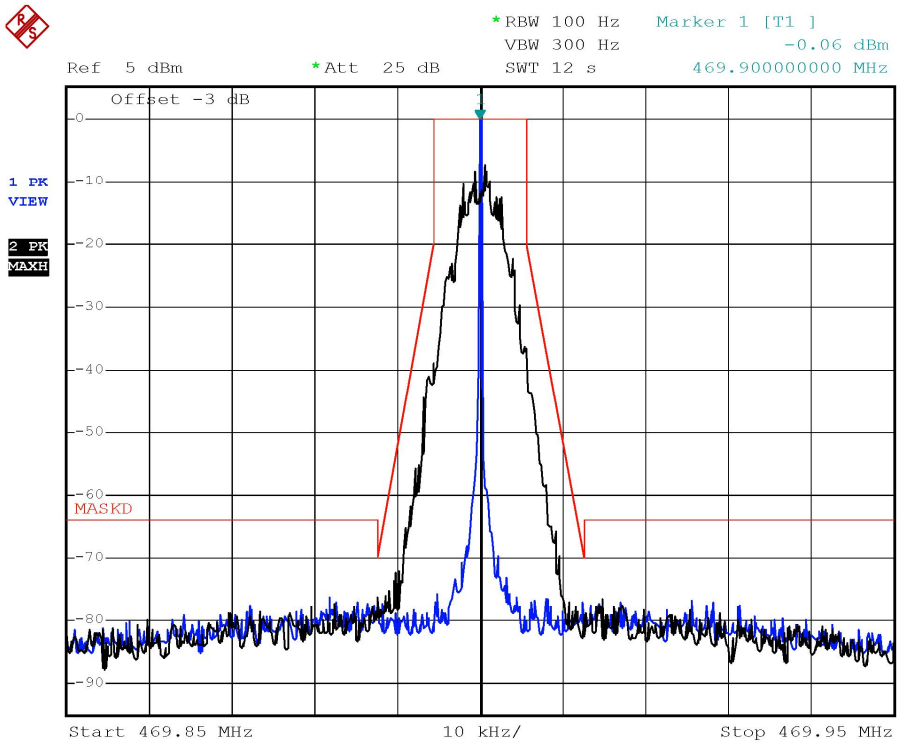

Frequency 469.9 MHz – FM modulation with 25 kHz channel bandwidth

## Test data



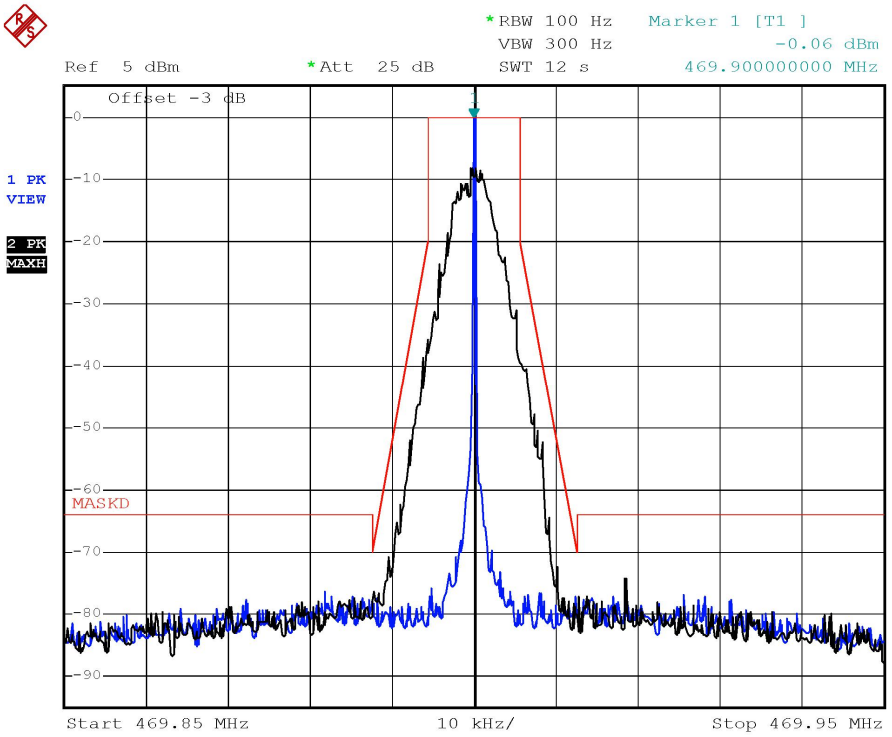

Frequency 469.9 MHz – FM modulation with 12.5 kHz channel bandwidth

## Test data




Frequency 469.9 MHz – 4FSK modulation with 12.5 kHz channel bandwidth

## Test data




Frequency 469.9 MHz – C4FM modulation with 12.5 kHz channel bandwidth

## Clause 90.210 and 22.359 Spurious emissions at antenna terminals

**§90.210 Emission masks.**

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (o) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere in this part, the table in this section specifies the emission masks for equipment operating under this part.

**APPLICABLE EMISSION MASKS**

| Frequency band (MHz) | Mask for equipment with audio low pass filter | Mask for equipment without audio low pass filter |
|---|---|---|
| Below 25[1] | A or B | A or C |
| 25-50 | B | C |
| 72-76 | B | C |
| 150-174[2] | B, D, or E | C, D or E |
| 150 paging only | B | C |
| 220-222 | F | F |
| 421-512[2 5] | B, D, or E | C, D, or E |
| 450 paging only | B | G |
| 806-809/851-854[6] | B | H |
| 809-824/854-869[35] | B, D | D, G. |
| 896-901/935-940 | I | J |
| 902-928 | K | K |
| 929-930 | B | G |
| 4940-4990 MHz | L or M | L or M |
| 5850-5925[4] | | |
| All other bands | B | C |

Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

Emission Mask D — 12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(5) On any frequency from the center of the authorized bandwidth $f_0$ to 5.625 kHz removed from $f_0$: Zero dB.

(6) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ($f_d$ in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(fd–2.88 kHz) dB.

(7) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ($f_d$ in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

(8) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

**§22.359 Emission limitations.**

The rules in this section govern the spectral characteristics of emissions in the Public Mobile Services, except for the Air-Ground Radiotelephone Service (see §22.861, instead) and the Cellular Radiotelephone Service (see §22.917, instead).

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 30 kHz or more. In the 60 kHz bands immediately outside and adjacent to the authorized frequency range or channel, a resolution bandwidth of at least one 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., 30 kHz or 1 percent of emission bandwidth, as specified). 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.

(c) Alternative out of band emission limit. Licensees in the Public Mobile Services may establish an alternative out of band emission limit to be used at specified frequencies (band edges) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

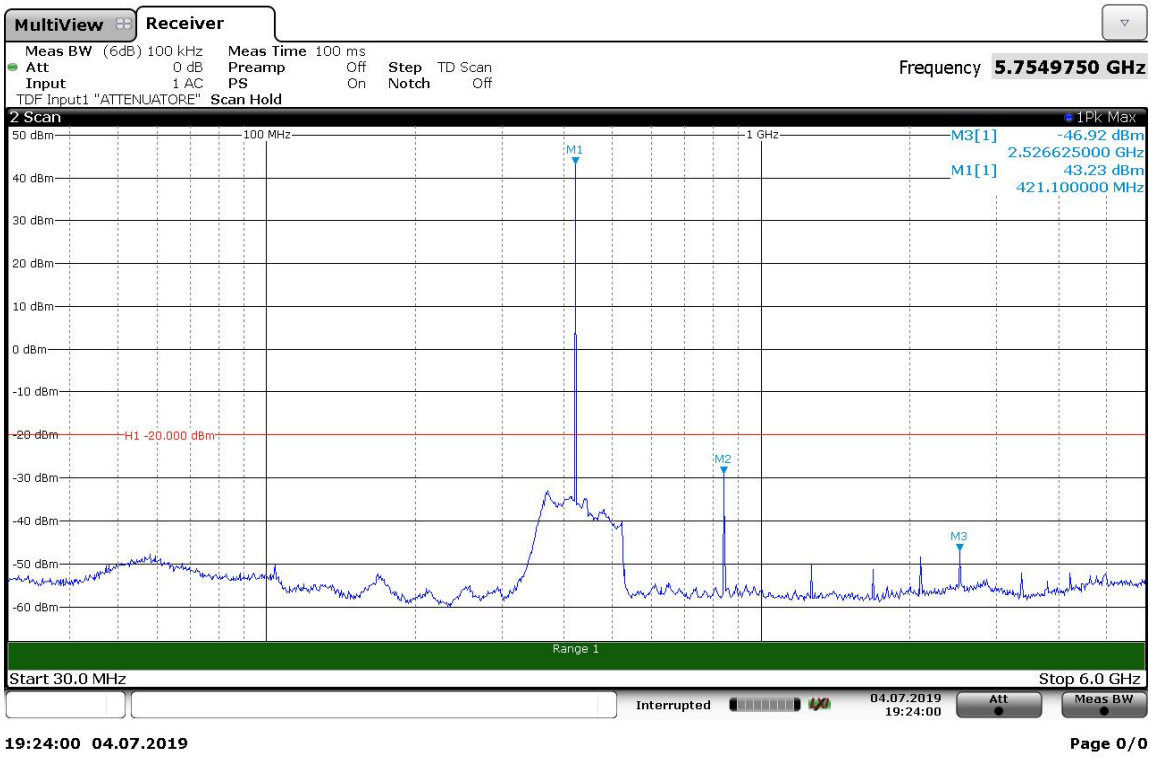
(d) Interference caused by out of band emissions. If any emission from a transmitter operating in any of the Public Mobile Services results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

**§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.

| |
| --- |
| Test date: 2019-07-04 |
| Test results: Pass |
| Modulation used: 16K0F3E, 11K0F3E, 7K60FXE, 8K0F1E |

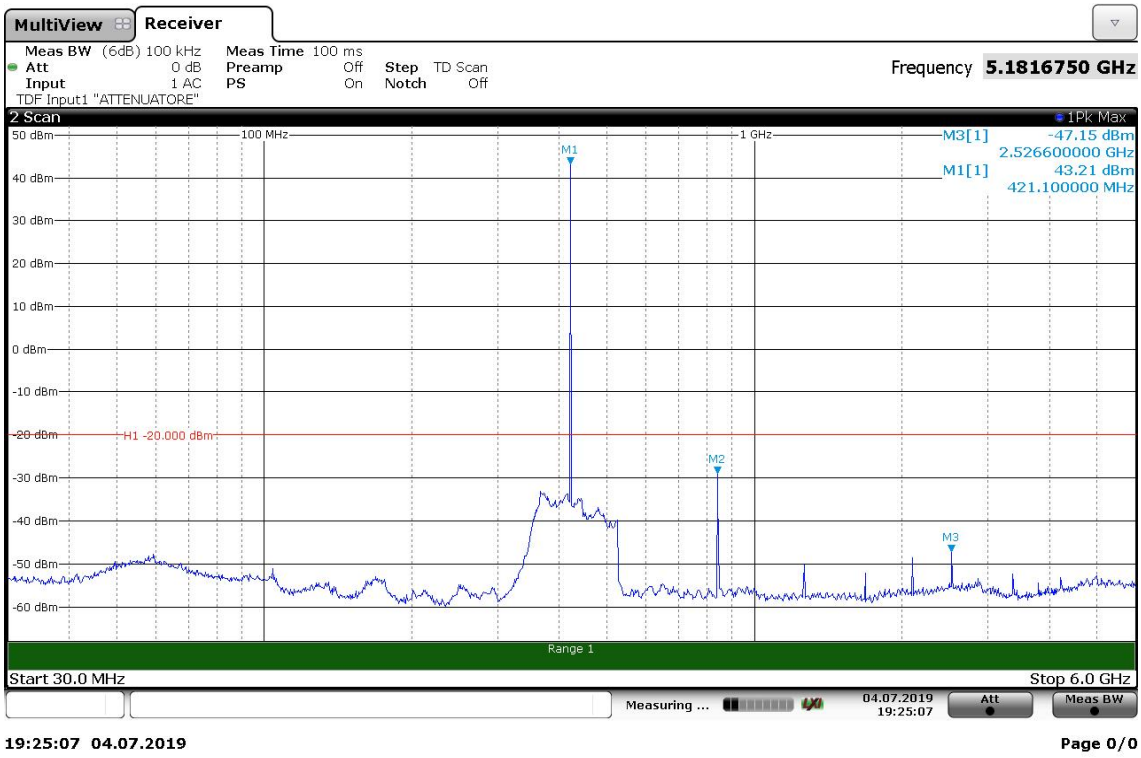
## Test data




Frequency 421.1 MHz – 25 kHz channel bandwidth FM modulation

Limit exceeds by the carrier

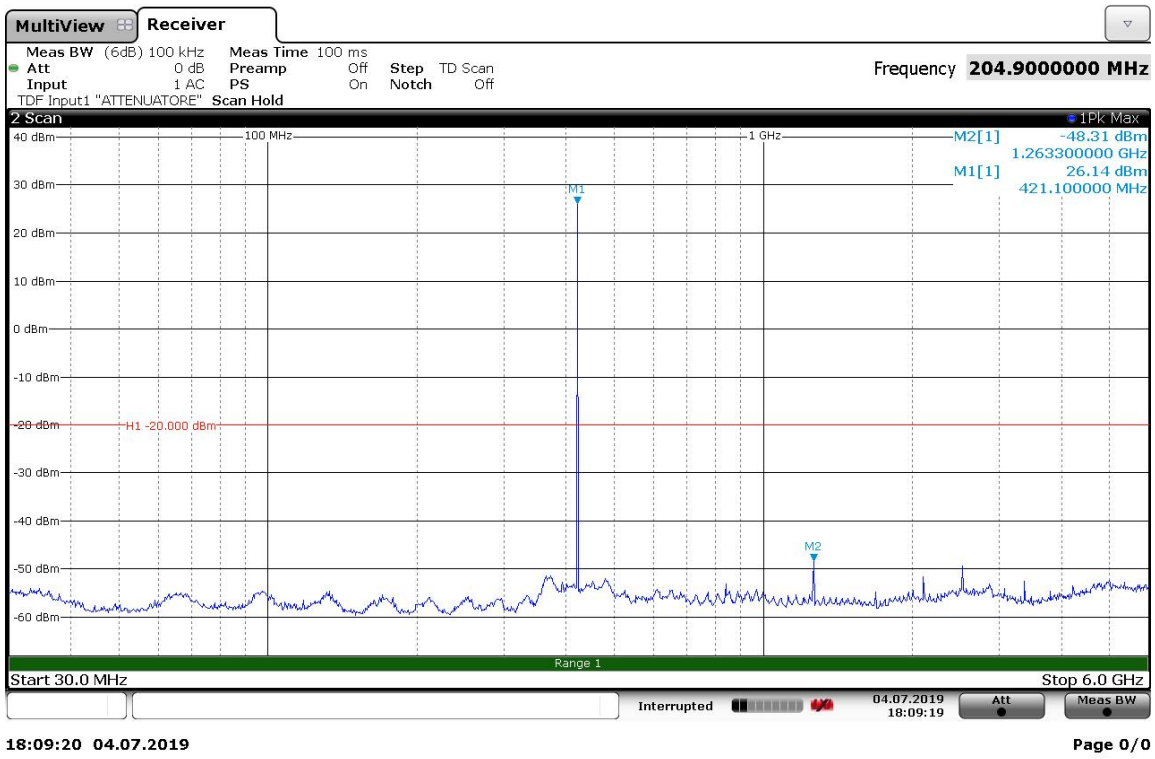
## Test data




Frequency 421.1 MHz – 12.5 kHz channel bandwidth FM modulation

Limit exceeds by the carrier

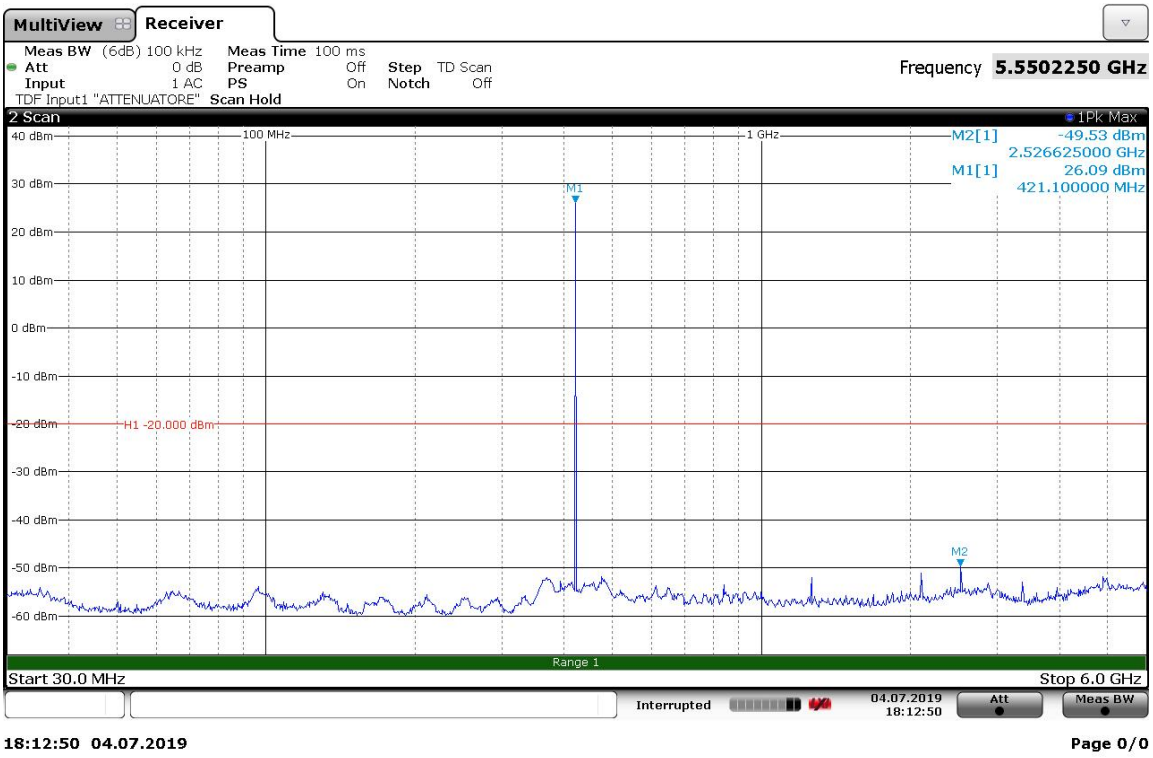
## Test data




Frequency 421.1 MHz – 12.5 kHz channel bandwidth 4FSK modulation

Limit exceeds by the carrier

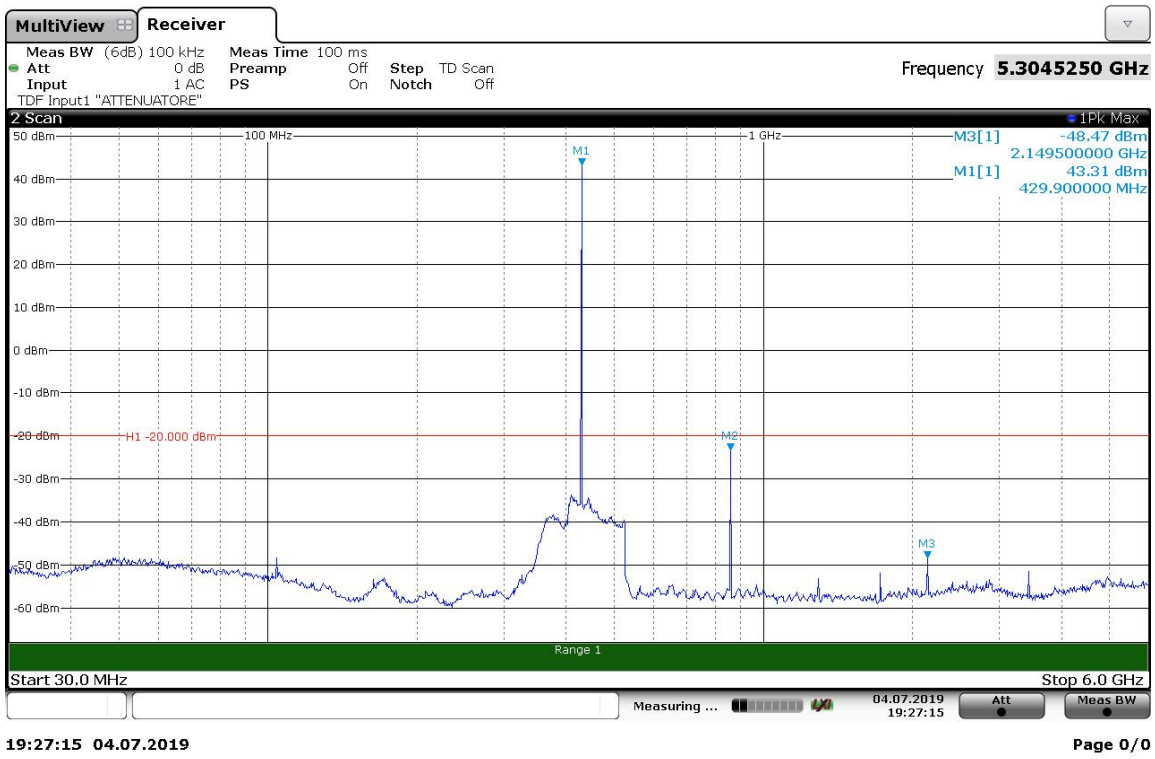
## Test data




Frequency 421.1 MHz – 12.5 kHz channel bandwidth C4FM modulation

Limit exceeds by the carrier

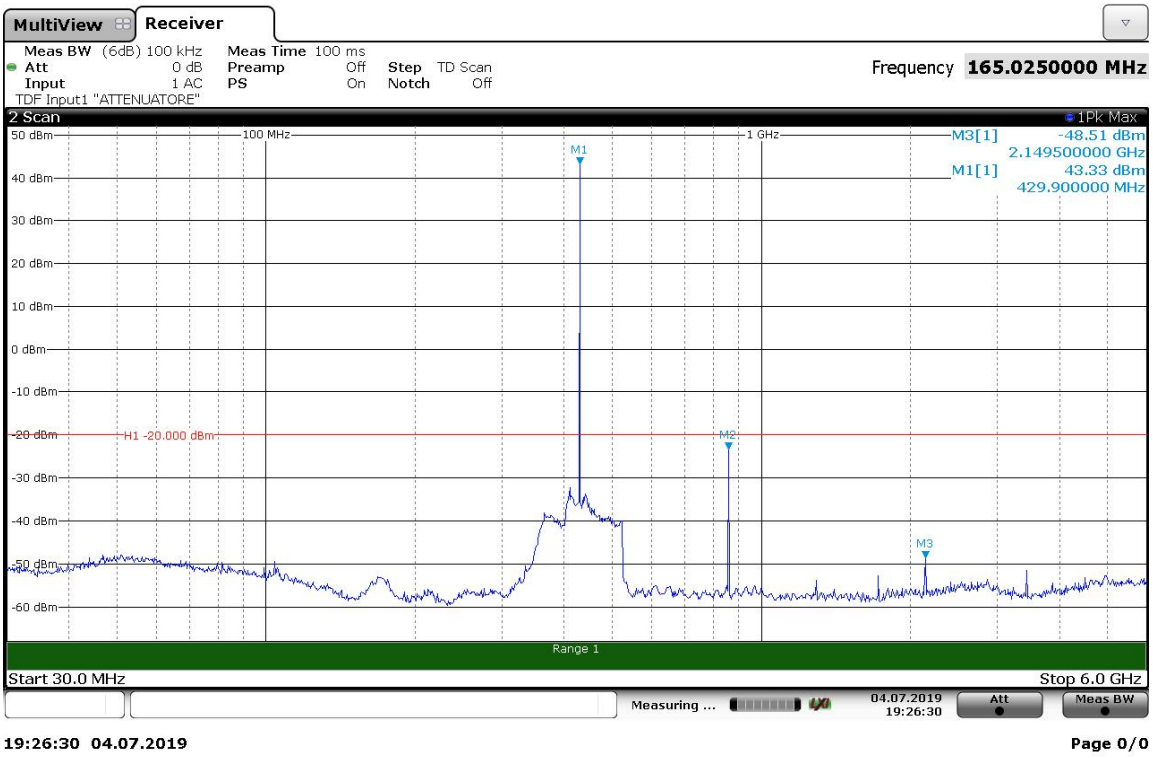
## Test data




Frequency 429.9 MHz – 25 kHz channel bandwidth FM modulation

Limit exceeds by the carrier

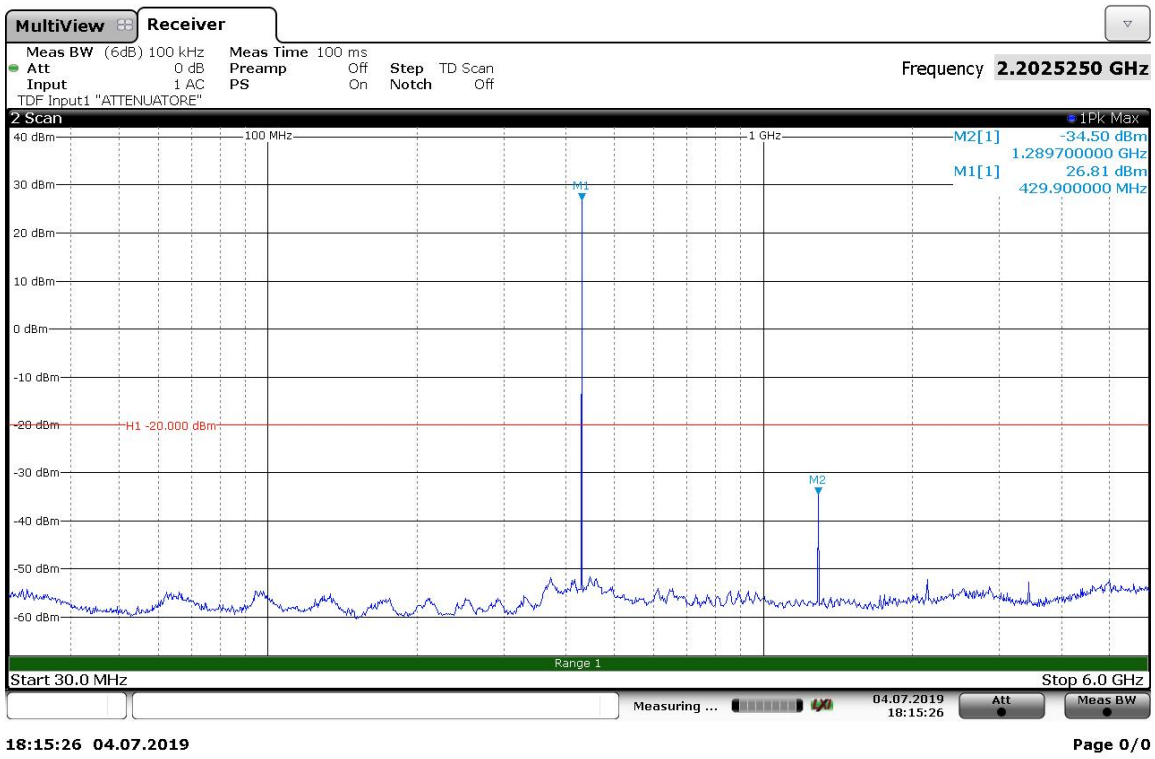
## Test data




Frequency 429.9 MHz – 12.5 kHz channel bandwidth FM modulation

Limit exceeds by the carrier

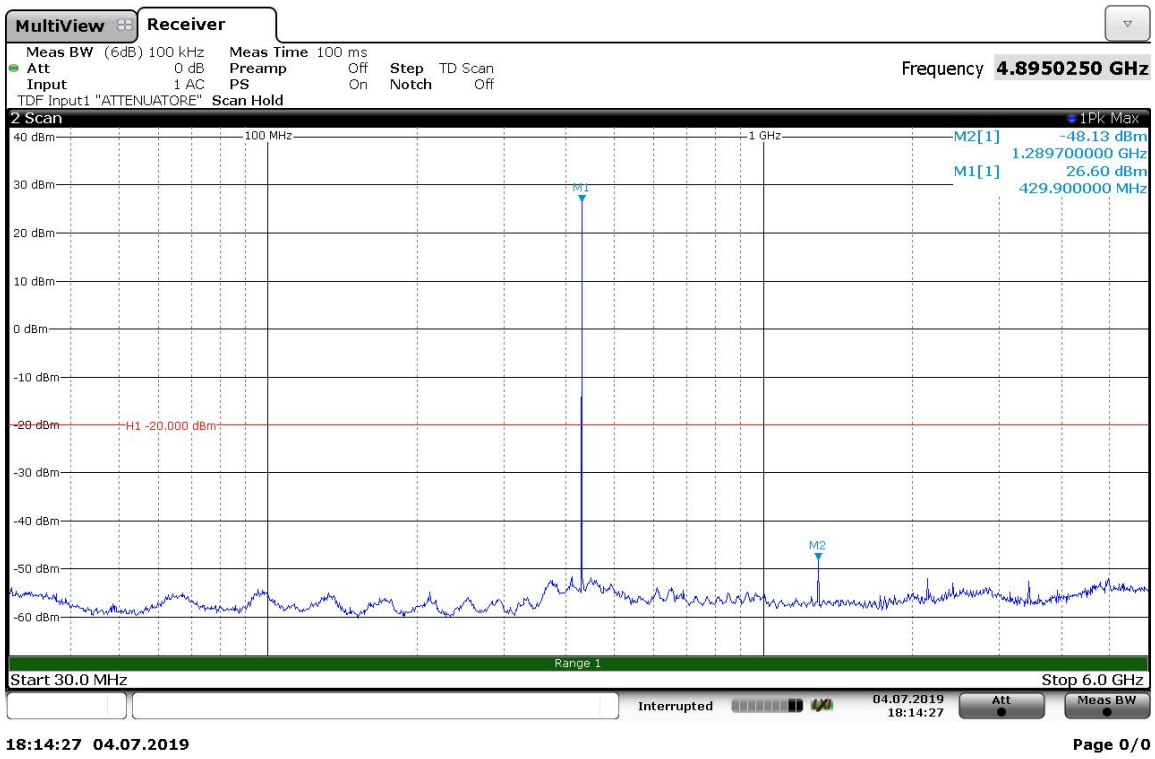
## Test data




Frequency 429.9 MHz – 12.5 kHz channel bandwidth 4FSK modulation

Limit exceeds by the carrier

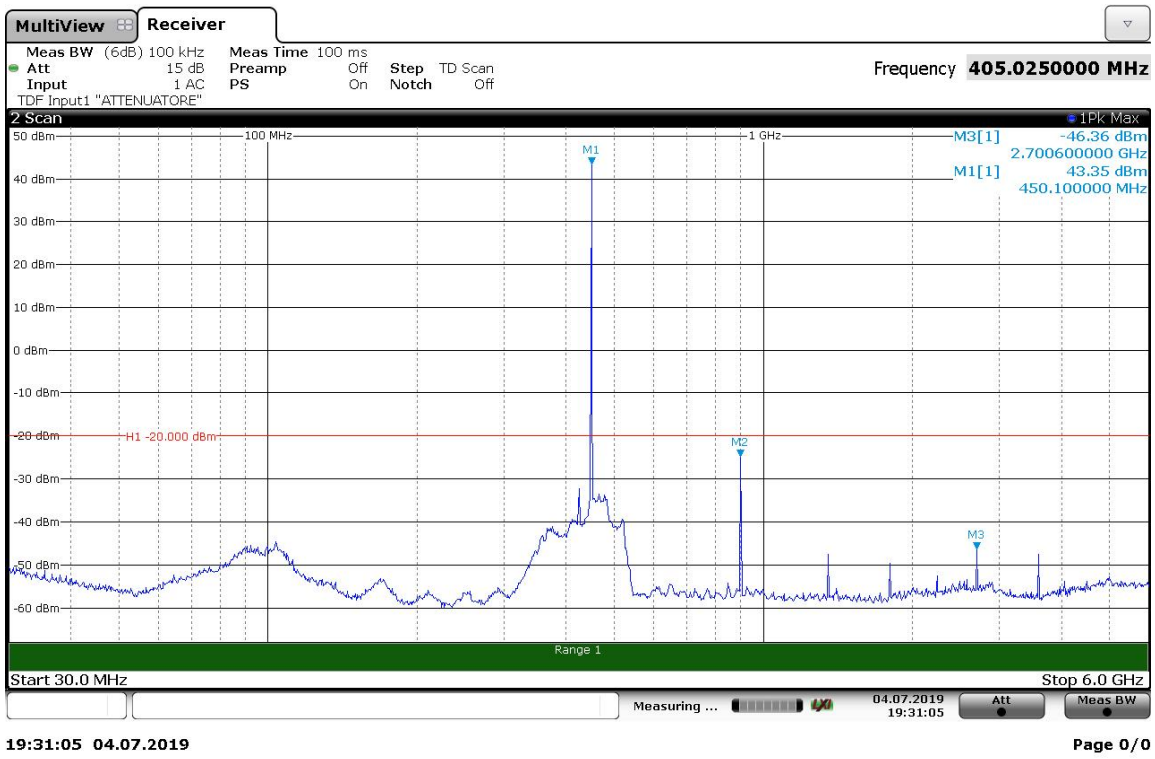
## Test data




Frequency 429.9 MHz – 12.5 kHz channel bandwidth C4FM modulation

Limit exceeds by the carrier

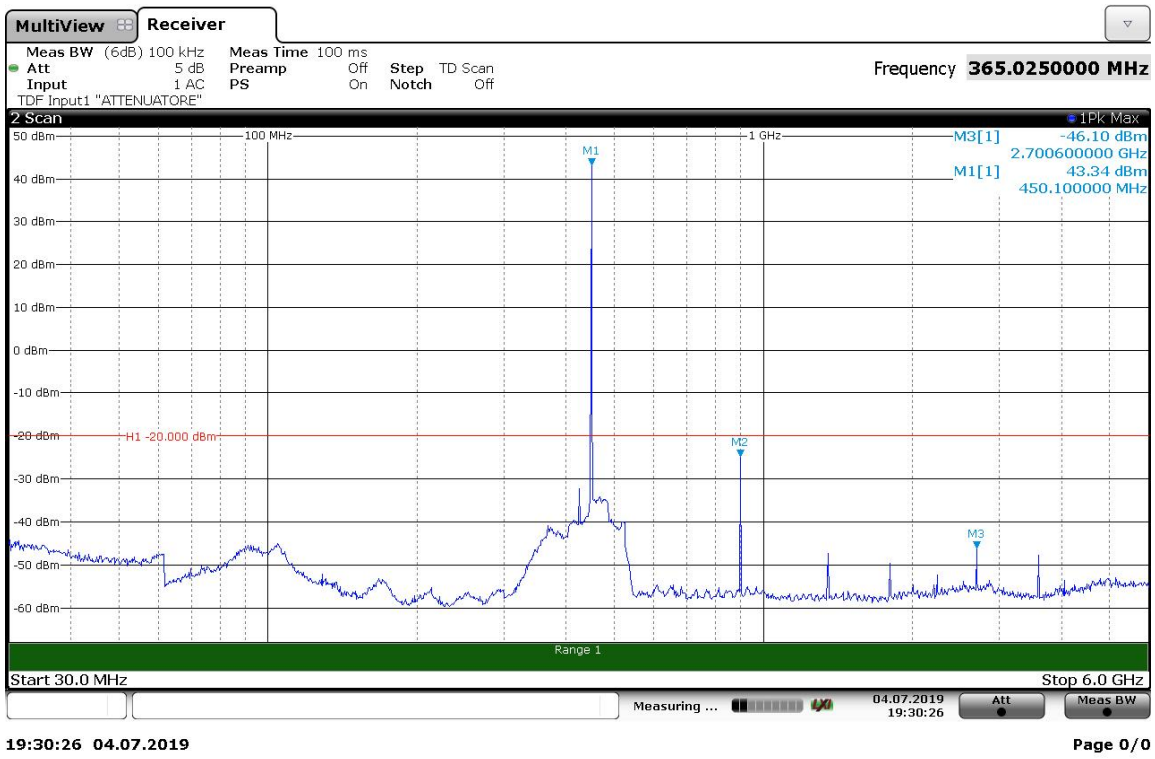
## Test data




Frequency 450.1 MHz – 25 kHz channel bandwidth FM modulation

Limit exceeds by the carrier

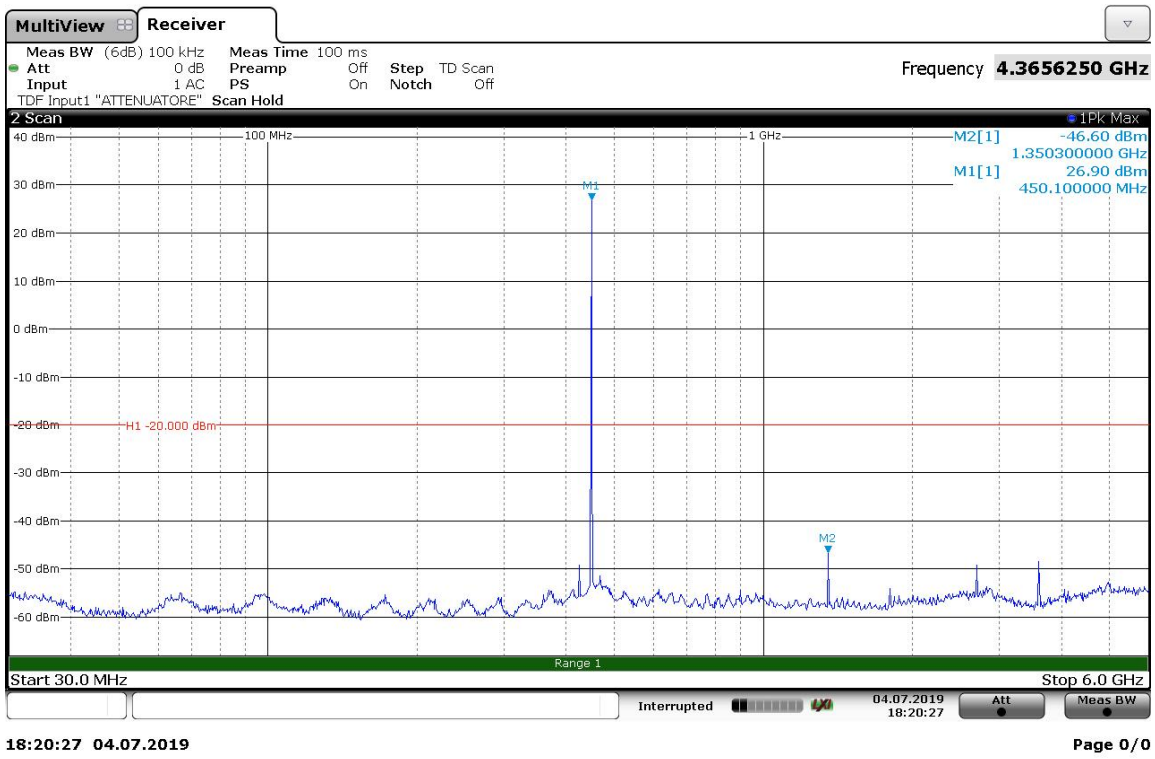
## Test data




Frequency 450.1 MHz – 12.5 kHz channel bandwidth FM modulation

Limit exceeds by the carrier

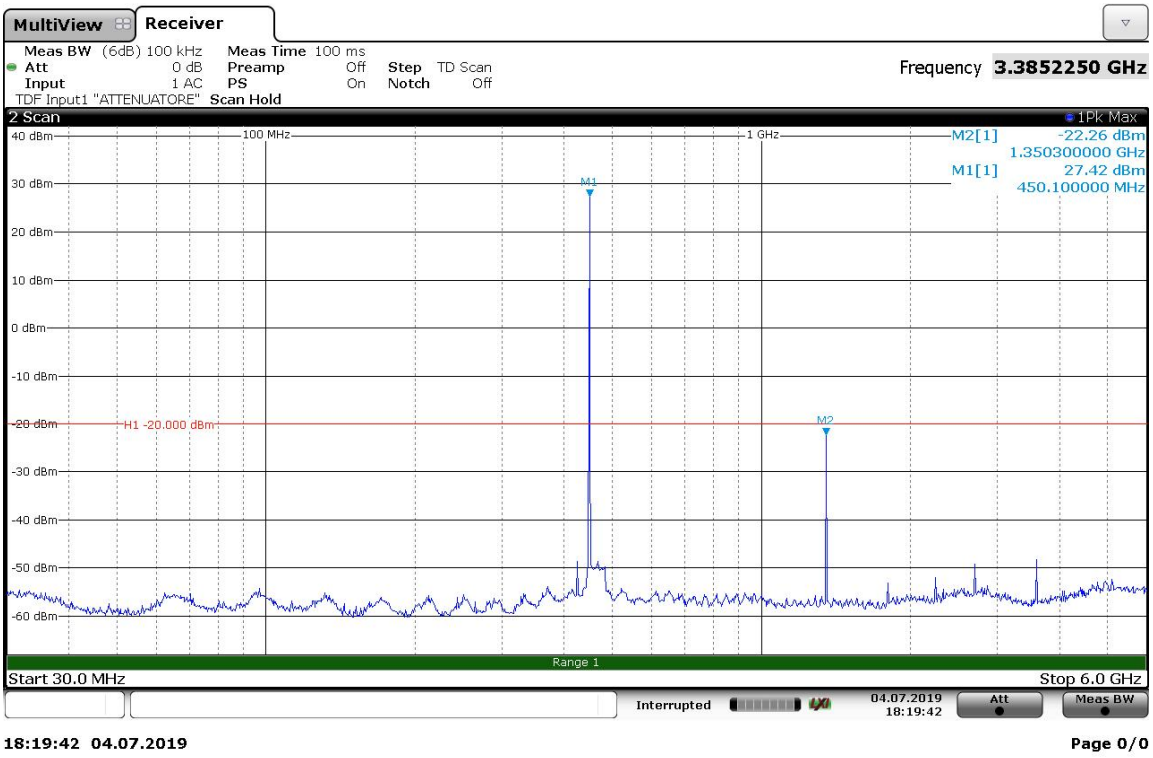
## Test data




Frequency 450.1 MHz – 12.5 kHz channel bandwidth 4FSK modulation

Limit exceeds by the carrier

## Test data




Frequency 450.1 MHz – 12.5 kHz channel bandwidth C4FM modulation

Limit exceeds by the carrier

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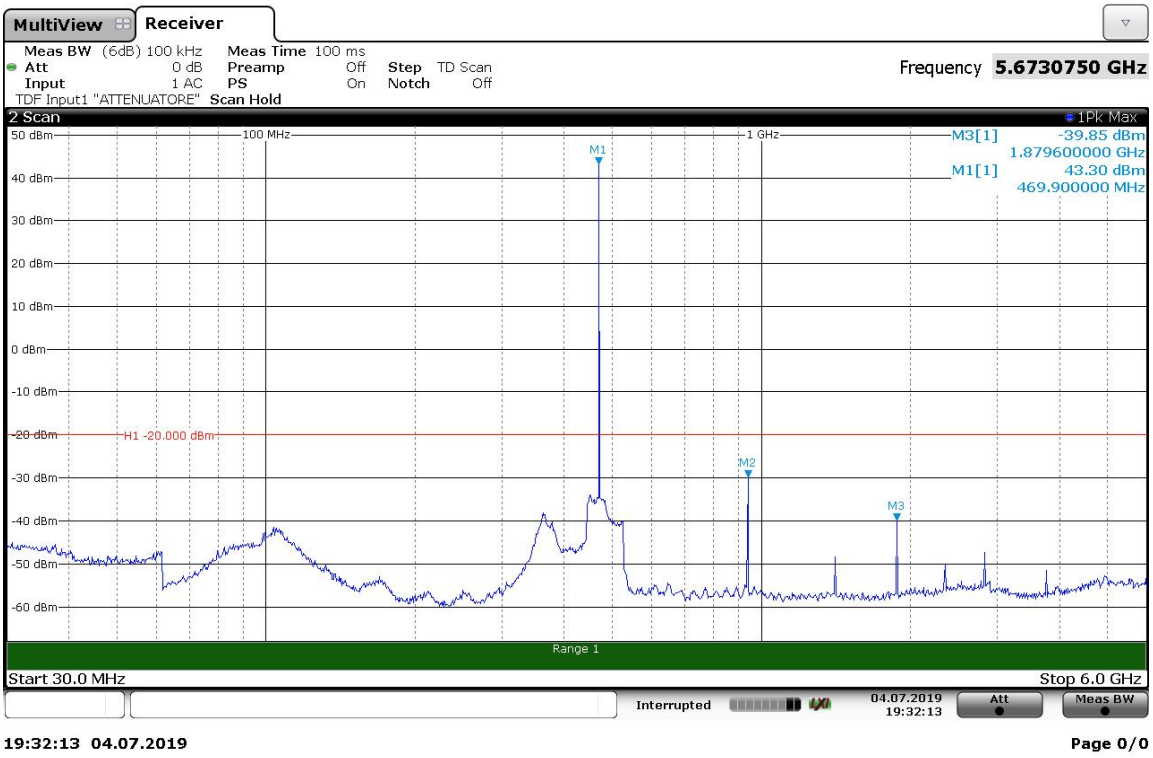


Frequency 469.9 MHz – 25 kHz channel bandwidth FM modulation

Limit exceeds by the carrier