# TEST REPORT

## No. 24T04Z102605-003

**for**

**Baicells Technologies Co., Ltd.**

**Product Name: NeutrinoE224**

**Model Name: pBS42020**

**FCC ID: 2AG32PBS42020**

**with**

**Hardware Version: B01**

**Software Version: BaiBS_QAFA_2.17.5.7.1**

**Issued Date: 2024-11-26**

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

**Test Laboratory:**

**CTTL-Telecommunication Technology Labs, CAICT**

No.52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

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Email: cttl_terminals@caict.ac.cn, website: www.caict.ac.cn

# REPORT HISTORY

| Report Number | Revision | Description | Issue Date |
|---|---|---|---|
| 24T04Z102605-003 | Rev.0 | 1st edition | 2024-11-26 |

Note: the latest revision of the test report supersedes all previous version.

# CONTENTS

# 1. Test Laboratory

## 1.1. Introduction & Accreditation

**Telecommunication Technology Labs, CAICT** is an ISO/IEC 17025:2017 accredited test laboratory under American Association for Laboratory Accreditation (A2LA) with lab code 7049.01, and is also an FCC accredited test laboratory (CN1349), and ISED accredited test laboratory (CAB identifier:CN0066). The detail accreditation scope can be found on A2LA website.

## 1.2. Testing Location

Location 1: CTTL (huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China100191

Location 2: CTTL (BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology Development Area, Beijing, P. R. China 100176

## 1.3. Project date

Testing Start Date: 2024-11-12

Testing End Date: 2024-11-25

## 1.4. Signature

**Dong Yuan**

**(Prepared this test report)**

**Zhou Yu**

**(Reviewed this test report)**

**Zhao Hui Lin**

**(Approved this test report)**

# 2. Client Information

## 2.1. Applicant Information

| | |
|---|---|
| Company Name: | Baicells Technologies Co., Ltd. |
| Address: | 9-10F, 1stBldg., No.81 Beiqing Road, Haidian District, Beijing, China |
| City: | Beijing |
| Country: | China |
| Contact | Back Huang |
| Telephone: | 010-62607100 |
| **Email** | contact@baicells.com |

## 2.2. Manufacturer Information

| | |
|---|---|
| Company Name: | Baicells Technologies Co., Ltd. |
| Address: | 9-10F, 1stBldg., No.81 Beiqing Road, Haidian District, Beijing, China |
| City: | Beijing |
| Country: | China |
| Contact | Back Huang |
| Telephone: | 010-62607100 |
| Email | contact@baicells.com |

# 3. Equipment Under Test (EUT)

## 3.1. About EUT

| | |
|---|---|
| Description | NeutrinoE224 |
| Model Name | pBS42020 |
| Antenna Gain | 5dBi |
| Supported Channel bandwidth | LTE: 5/10/15/20 MHz |
| Output Power(*) | EIRP maximum 29dBm |
| Number of Antenna ports | 2 |
| Frequency range(*) | Band7 2620MHz-2690MHz |
| Type of modulation | QPSK, 16QAM, 64QAM |
| Extreme Temperature | -5°C to +45°C |
| Normal Voltage | 12V DC |

(*): Declared by applicant.

## 3.2. Internal Identification of EUT used during the test

| EUT ID* | IMEI | HW Version | SW Version | Date of receipt |
|---|---|---|---|---|
| UT01a | 120200061024ABB0003 | B01 | BaiBS_QAFA_2.17.5.7.1 | 2024-11-11 |
| UT02a | 120200061024ABB0005 | B01 | BaiBS_QAFA_2.17.5.7.1 | 2024-11-11 |

*EUT ID: is used to identify the test sample in the lab internally.

Note: UT02a was for radiated test, and UT01a was for conducted test.

## 3.3. Internal Identification of AE used during the test

| AE ID* | Description |
|---|---|
| AE1, AE2 | Charger |

AE1, AE2

| | |
|---|---|
| Model | S24B72-120A200-0K |
| Manufacturer | Shenzhen Gongjin Electronics Co.,Ltd |

*AE ID: is used to identify the test sample in the lab internally.

## 3.4. General Description

The Equipment Under Test (EUT) pBS42020 is a LTE indoor base station which provides communication connections to 2620-2690 MHz network. The EUT operates from a 12V DC supply.

The EUT includes 2 TX/RX ports. It can operate in LTE single RAT mode. It can be configured to transmit in MIMO mode which was used for measurements as the worst configuration. The complete testing was performed with the EUT transmitting at rated maximum RF power unless otherwise stated.

A full technical description can be found in the Manufacturer's documentation.

## 3.5. Configuration Description

The following settings were used to represent all traffic scenarios. The output power was measured on the bottom, middle and top channel of all applicable antenna ports. By measuring the output power of QPSK, 16QAM and 64QAM for LTE on one of the antenna ports, it was determined that QPSK was the worst-case modulation scheme and was used for all testing.
Complete testing was carried out on the worst-case antenna port which was established as being the highest output power from the applicable measured ports on worst case modulation scheme. This antenna port was Port 1 for LTE mode.

The settings below were used for all measurements unless otherwise noted:
LTE

| Configuration | Carrier | Carrier Bandwidth | Carrier Frequency Configuration (MHz) | | |
|---|---|---|---|---|---|
| | | | Bottom | Middle | Top |
| LTE-MIMO-1C | 1LTE | 5MHz | 2622.5 | 2655.0 | 2687.5 |
| LTE-MIMO-1C | 1LTE | 10MHz | 2625.0 | 2655.0 | 2685.0 |
| LTE-MIMO-1C | 1LTE | 15MHz | 2627.5 | 2655.0 | 2682.5 |
| LTE-MIMO-1C | 1LTE | 20MHz | 2630.0 | 2655.0 | 2680.0 |

# 4. Reference Documents

## 4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

| Reference | Title | Version |
|---|---|---|
| FCC Part 27 | MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES | 10-1-23 Edition |
| FCC Part 2 | FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS | 10-1-23 Edition |
| ANSI 63.26 | American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services | 2015 |
| ANSI/TIA-603-E | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards | 2016 |
| KDB 971168 D01 | MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS | v03r01 |
| KDB 662911 D01 | Emissions Testing of Transmitters with Multiple Outputs in the Same Band | v02r01 |

## 5. Laboratory Environment

**Control room / conducted chamber** did not exceed following limits along the testing:

| | |
|---|---|
| Temperature | Min. = 15 ˚C, Max. = 35 ˚C |
| Relative humidity | Min. =20 %, Max. = 80 % |
| Shielding effectiveness | > 110 dB |
| Electrical insulation | >2 MΩ |
| Ground system resistance | < 0.5 Ω |

**Anechoic chamber** did not exceed following limits along the testing:

| | |
|---|---|
| Temperature | Min. = 15 ˚C, Max. = 30 ˚C |
| Relative humidity | Min. = 35 %, Max. = 60 % |
| Shielding effectiveness | > 110 dB |
| Electrical insulation | >2 MΩ |
| Ground system resistance | < 0.5 Ω |
| Normalised site attenuation (NSA) | <±3.9 dB, 3 m distance |
| Site voltage standing-wave ratio ($S_{VSWR}$) | < 5 dB, from 1GHz to 18GHz |

## 6. Summary of Test Results

| Items | Test Name | Clause in ISED rules | Verdict |
|---|---|---|---|
| 1 | Transmitter Output Power / PAPR | 27.50(h), 2.1046 | Pass |
| 2 | Occupied Bandwidth | 27.53 (m), 2.1049 | Pass |
| 3 | Transmitter unwanted emissions at Band Edge | 27.53 (m), 2.1051 | Pass |
| 4 | Transmitter unwanted emissions - Conducted Spurious Emission | 27.53 (m), 2.1051 | Pass |
| 5 | Radiated Spurious Emission | 27.53 (m) | Pass |
| 6 | Frequency Stability | 2.1055 | Pass |

## 7. Test Equipment Utilized

| Description | Type | Series Number | Manufacture | Cal Due Date | Calibration Interval |
|---|---|---|---|---|---|
| Spectrum Analyzer | FSV30 | 101525 | R&S | 2025-01-18 | 1 year |
| Antenna | VULB9163 | 9163-482 | Schwarzbeck | 2025-05-19 | 1 year |
| Antenna | 9117 | 167 | Schwarzbeck | 2026-10-15 | 3 years |
| Antenna | LB-7180-NF | J203001300005 | A-INFO | 2025-05-16 | 1 year |
| Antenna | 3115 | 00146404 | ETS-Lindgren | 2025-05-16 | 1 year |
| Signal generator | SMF100A | 101295 | R&S | 2025-02-04 | 1 year |
| Spectrum Analyzer | FSW | 104038 | R&S | 2025-07-02 | 1 year |
| DC Power Supply | PCR2000M | PJ000583 | Kikusui | 2025-5-13 | 1 year |
| 10dB Attenuator | 4A-10dB | 64671 | INMET | - | - |
| Climate Chamber | GPS-4 | 0010-003512 | Espec | 2025-3-18 | 1 year |

| Test Item | Test Software | Software Vendor |
|---|---|---|
| Emission Limit | ELEKTRA 5.00.2 | R&S |

## 8. Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

| Test Discipline | Measurement Uncertainty |
|---|---|
| Conducted Maximum Peak Output Power | 0.5dB |
| Occupied Bandwidth | 1.1Hz |
| Conducted Unwanted Emissions | 2.3dB |
| Frequency Stability | $<\pm 1 \times 10^{-7}$ |
| Radiated Spurious Emissions | <1GHz 2.21dB, k=2<br>>1GHz 3.10dB, k=2 |

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.

# ANNEX A: Measurement Results

## A.1 Maximum Output Power

### A.1.1 Reference

FCC CFR 47 Part 2, Clause 2.1046
FCC CFR 47 Part 27, Clause 27.50(h)

### A.1.2 Method of Measurements

During the process of testing, the EUT was configured to transmit on maximum power and proper modulation. The transmitter power shall be measured in terms of a root-mean-square (RMS) average value. In case of the EUT was configured to MIMO mode, since the EUT transmits on all antennas simultaneously in the same frequency range, using the Measure-and-Sum approach, the output power at all antennas were tested, and the total output power were then summed mathematically in linear power units according to FCC KDB 662911 D01.

A peak to average ratio measurement is performed at the conducted ports of the EUT for single carrier for single RAT mode. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) was used and 0.1% probability value recorded.

### A.1.3 Limit

EIRP Power: 33dBW + 10lg(X/Y)dBW
where X is the actual channel width in MHz and Y is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is in the LBS and UBS following transition.

### A.1.4 Measurement result

Configuration LTE-MIMO-1C

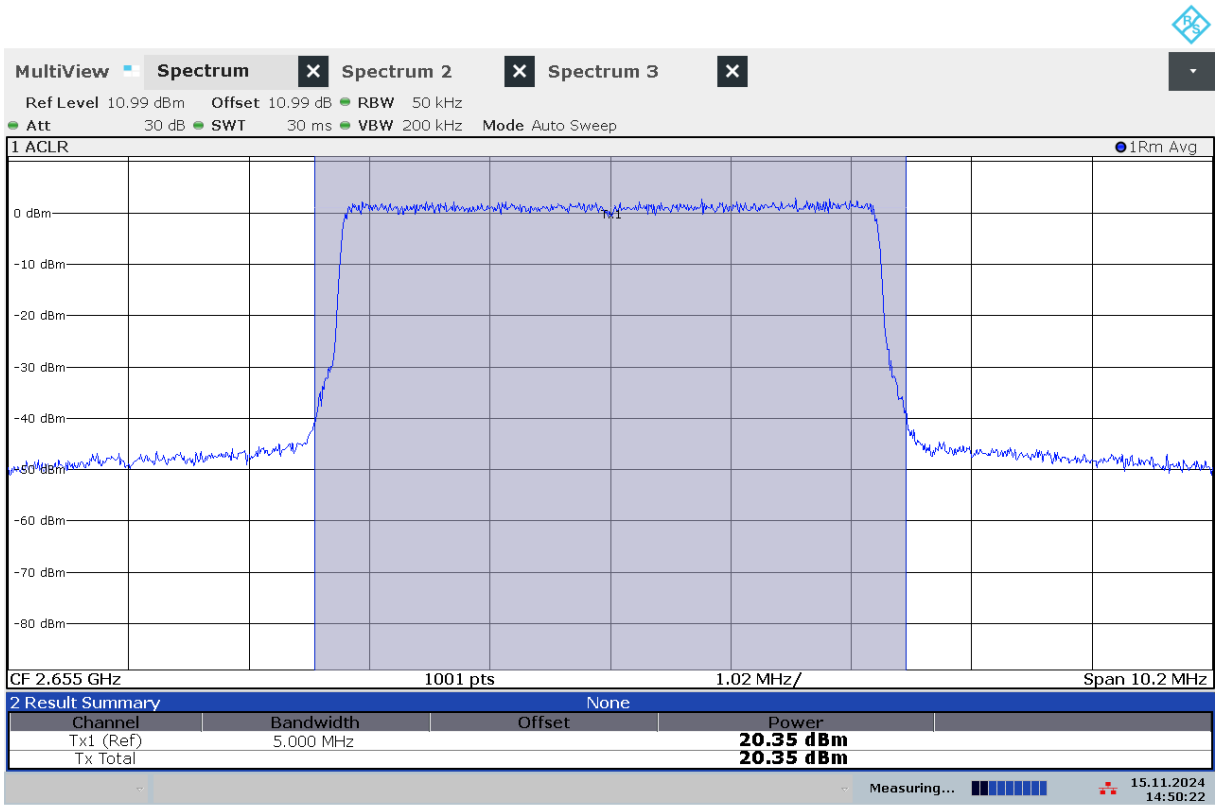
| Port | Modulation/ Carrier Bandwidth (MHz) | Output Power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Channel position B | | | Channel position M | | | Channel position T | | |
| | | POWER (dBm) | POWER (dBm/MHz) | PAR (dB) | POWER (dBm) | POWER (dBm/MHz) | PAR (dB) | POWER (dBm) | POWER (dBm/MHz) | PAR (dB) |
| 1 | QPSK/5 Conducted power | 21.52 | - | 7.62 | 21.53 | - | 7.74 | 21.49 | - | 7.84 |
| 2 | QPSK/5 Conducted power | 20.87 | - | 7.68 | 20.35 | - | 7.86 | 20.85 | - | 7.81 |
| Total calculated radiated EIRP Power | | 29.22 | - | - | 28.99 | - | - | 29.19 | - | - |
| 1 | QPSK/10.0 Conducted power | 21.07 | - | 7.79 | 21.03 | - | 7.84 | 20.61 | - | 7.73 |
| 2 | QPSK/10.0 Conducted power | 20.59 | - | 7.77 | 20.46 | - | 7.86 | 21.08 | - | 7.74 |
| Total calculated radiated EIRP Power | | 28.85 | - | - | 28.76 | - | - | 28.86 | - | - |
| 1 | QPSK/15.0 Conducted power | 21.10 | - | 7.78 | 20.89 | - | 7.74 | 21.07 | - | 7.65 |
| 2 | QPSK/15.0 Conducted power | 20.95 | - | 7.64 | 21.06 | - | 7.71 | 20.86 | - | 7.78 |
| Total calculated radiated EIRP Power | | 29.04 | - | - | 28.99 | - | - | 28.98 | - | - |
| 1 | QPSK/20.0 Conducted power | 20.93 | - | 7.75 | 20.47 | - | 7.72 | 20.51 | - | 7.74 |
| 2 | QPSK/20.0 Conducted power | 20.48 | - | 7.79 | 20.81 | - | 7.72 | 20.89 | - | 7.72 |
| Total calculated radiated EIRP Power | | 28.72 | - | - | 28.65 | - | - | 28.71 | - | - |

| Port | Modulation/ Carrier Bandwidth (MHz) | Output Power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Channel position B | | | Channel position M | | | Channel position T | | |
| | | POWER (dBm) | POWER (dBm/MHz) | PAR (dB) | POWER (dBm) | POWER (dBm/MHz) | PAR (dB) | POWER (dBm) | POWER (dBm/MHz) | PAR (dB) |
| 1 | 16QAM/5 Conducted power | 20.53 | - | 7.82 | 20.47 | - | 7.79 | 20.41 | - | 7.81 |
| 2 | 16QAM/5 Conducted power | 20.99 | - | 7.78 | 21.21 | - | 7.81 | 20.74 | - | 7.80 |
| Total calculated radiated EIRP Power | | 28.78 | - | - | 28.87 | - | - | 28.59 | - | - |
| 1 | 16QAM/10.0 Conducted power | 20.75 | - | 7.76 | 20.66 | - | 7.88 | 20.72 | - | 7.73 |
| 2 | 16QAM/10.0 Conducted power | 20.54 | - | 7.75 | 20.53 | - | 7.74 | 20.67 | - | 7.78 |
| Total calculated radiated EIRP Power | | 28.66 | - | - | 28.61 | - | - | 28.71 | - | - |
| 1 | 16QAM/15.0 | 20.48 | - | 7.78 | 20.67 | - | 7.81 | 20.71 | - | 7.77 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Conducted power | | | | | | | | | |
| 2 | 16QAM/15.0 Conducted power | 20.69 | - | 7.73 | 20.72 | - | 7.75 | 20.87 | - | 7.78 |
| Total calculated radiated EIRP Power | | 28.60 | - | - | 28.71 | - | - | 28.80 | - | - |
| 1 | 16QAM/20.0 Conducted power | 20.76 | - | 7.74 | 20.69 | - | 7.72 | 20.71 | - | 7.73 |
| 2 | 16QAM/20.0 Conducted power | 20.87 | - | 7.77 | 20.78 | - | 7.66 | 20.89 | - | 7.77 |
| Total calculated radiated EIRP Power | | 28.83 | - | - | 28.75 | - | - | 28.81 | - | - |

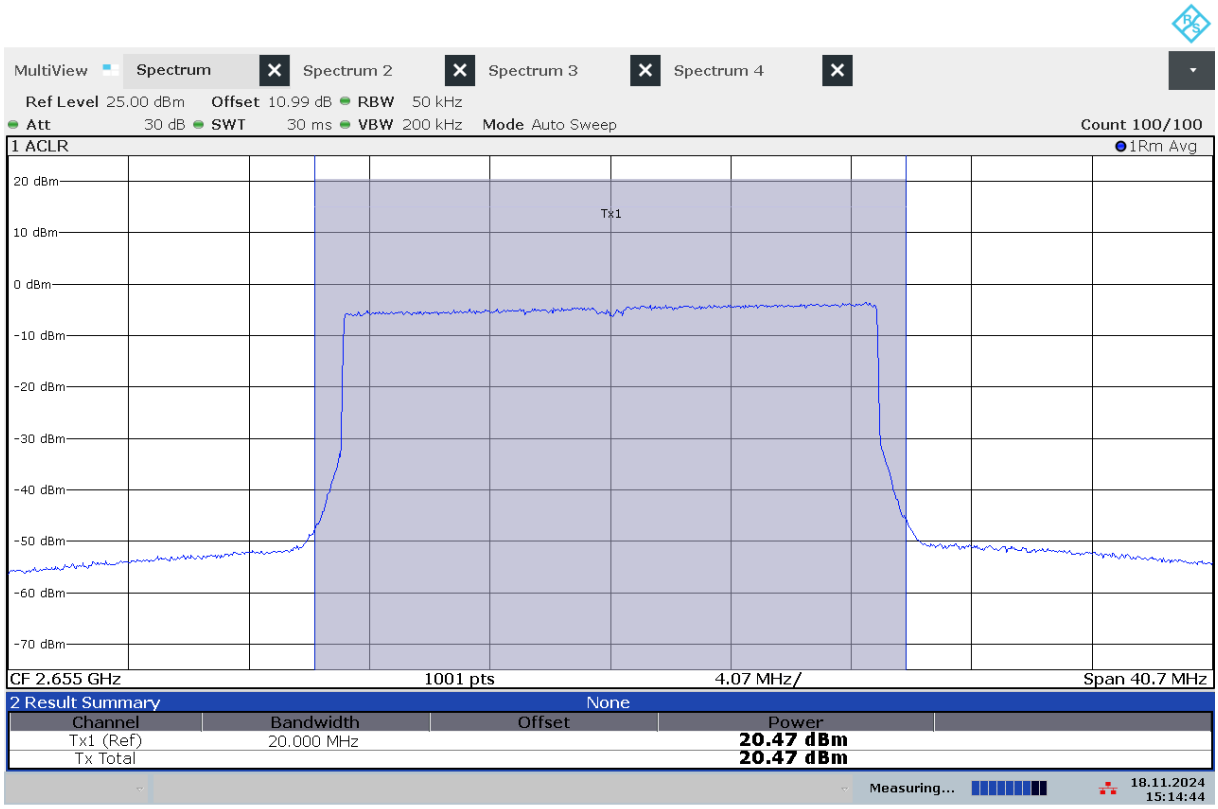
| Port | Modulation/ Carrier Bandwidth (MHz) | Output Power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Channel position B | | | Channel position M | | | Channel position T | | |
| | | POWER (dBm) | POWER (dBm/MHz) | PAR (dB) | POWER (dBm) | POWER (dBm/MHz) | PAR (dB) | POWER (dBm) | POWER (dBm/MHz) | PAR (dB) |
| 1 | 64QAM/5 Conducted power | 20.98 | - | 7.68 | 20.85 | - | 7.82 | 20.98 | - | 7.71 |
| 2 | 64QAM/5 Conducted power | 21.02 | - | 7.72 | 21.13 | - | 7.86 | 21.11 | - | 7.68 |
| Total calculated radiated EIRP Power | | 29.01 | - | - | 29.00 | - | - | 29.06 | - | - |
| 1 | 64QAM/10.0 Conducted power | 21.12 | - | 7.86 | 21.02 | - | 7.65 | 21.03 | - | 7.72 |
| 2 | 64QAM/10.0 Conducted power | 20.85 | - | 7.64 | 21.08 | - | 7.71 | 21.11 | - | 7.74 |
| Total calculated radiated EIRP Power | | 29.00 | - | - | 29.06 | - | - | 29.08 | - | - |
| 1 | 64QAM/15.0 Conducted power | 20.96 | - | 7.86 | 20.41 | - | 7.70 | 20.64 | - | 7.72 |
| 2 | 64QAM/15.0 Conducted power | 20.56 | - | 7.71 | 20.86 | - | 7.68 | 20.76 | - | 7.68 |
| Total calculated radiated EIRP Power | | 28.77 | - | - | 28.65 | - | - | 28.71 | - | - |
| 1 | 64QAM/20.0 Conducted power | 20.96 | - | 7.69 | 20.93 | - | 7.64 | 20.97 | - | 7.86 |
| 2 | 64QAM/20.0 Conducted power | 20.98 | - | 7.63 | 20.91 | - | 7.68 | 20.98 | - | 7.73 |
| Total calculated radiated EIRP Power | | 28.98 | - | - | 28.93 | - | - | 28.99 | - | - |

Port 2, Configuration LTE-MIMO-1C 5 MHz QPSK, Channel Position M




14:50:23 15.11.2024

Port 1, Configuration LTE-MIMO-1C 20 MHz QPSK, Channel Position M




15:14:45 18.11.2024

Port 2, Configuration LTE-MIMO-1C 5 MHz QPSK, Channel Position M

## A.2 Occupied Bandwidth

### A.2.1 Reference

FCC CFR 47 Part 2, Clause 2.1049
FCC CFR 47 Part 27, Clause 27.53 (m)

### A.2.2Method of Measurements

The EUT was set to transmit at maximum power. Using the Occupied Bandwidth measurement function in the spectrum analyzer, the occupied bandwidth was measured in accordance with ANSI 63.26.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

### A.2.3 Measurement result

Configuration LTE-MIMO-1C
-26dBc Occupied Bandwidth

| Port | Modulation/ Bandwidth | Occupied Bandwidth (MHz) | | |
|---|---|---|---|---|
| | | Channel Position B | Channel Position M | Channel Position T |
| 1 | QPSK/5 MHz | 4.80 | 4.82 | 4.87 |
| 1 | QPSK/10 MHz | 9.72 | 9.72 | 9.72 |
| 1 | QPSK/15 MHz | 14.41 | 14.31 | 14.40 |
| 1 | QPSK/20 MHz | 18.88 | 18.94 | 18.90 |

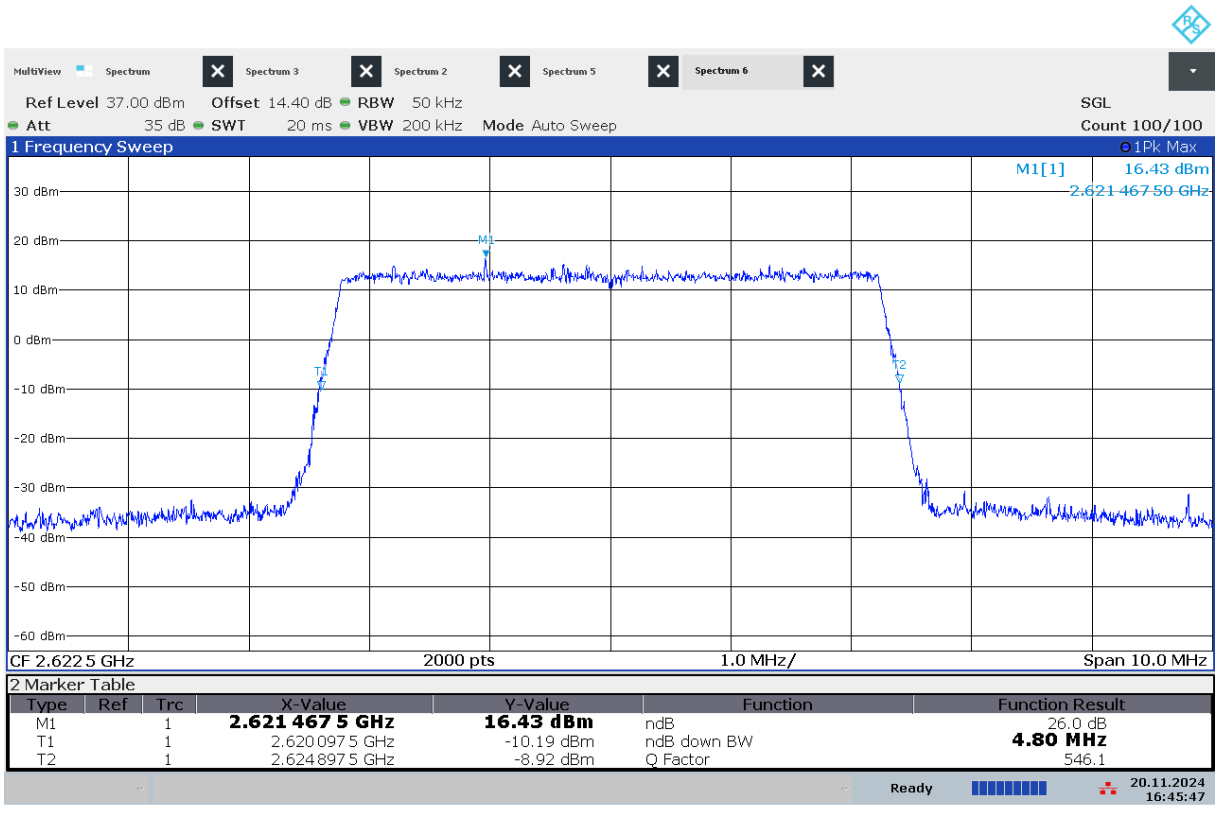
| Port | Modulation/ Bandwidth | Occupied Bandwidth (MHz) | | |
|---|---|---|---|---|
| | | Channel Position B | Channel Position M | Channel Position T |
| 1 | 16QAM/5 MHz | - | 4.74 | - |
| 1 | 64QAM/5 MHz | - | 4.80 | - |

99% Occupied Bandwidth

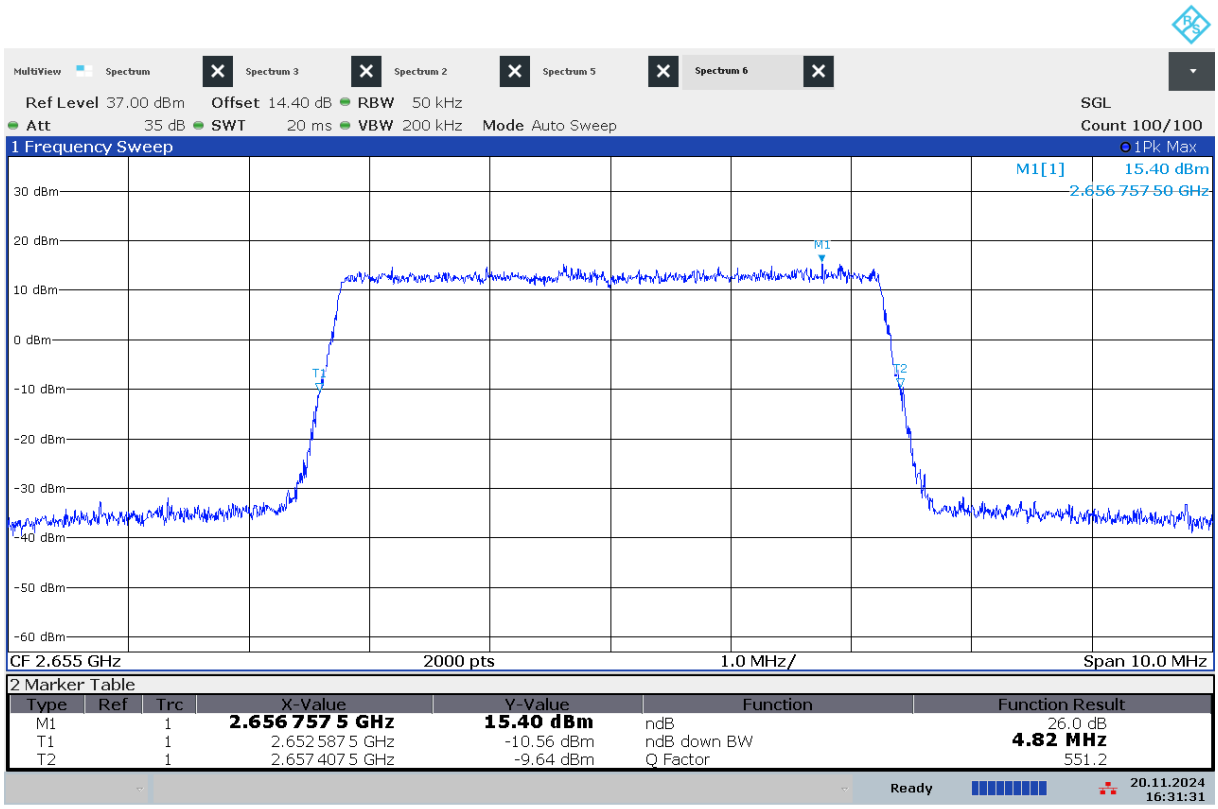
| Port | Modulation/ Bandwidth | Occupied Bandwidth (MHz) | | |
|---|---|---|---|---|
| | | Channel Position B | Channel Position M | Channel Position T |
| 1 | QPSK/5 MHz | - | 4.47 | - |
| 1 | 16QAM /5 MHz | - | 4.46 | - |
| 1 | QPSK/20 MHz | - | 17.86 | - |
| 1 | 16QAM/20 MHz | - | 17.86 | - |

-26dBc Occupied Bandwidth

Port 1, QPSK 5M, Channel position B

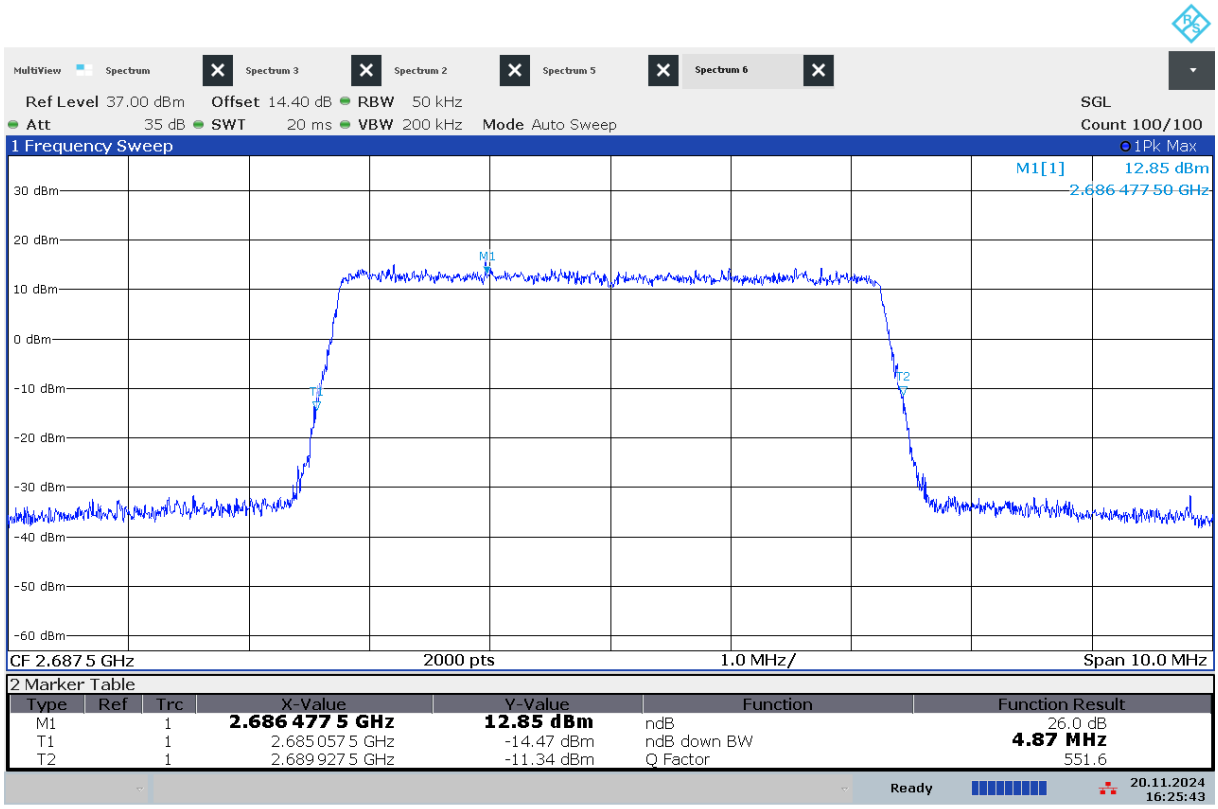


Port 1, QPSK 5M, Channel position M



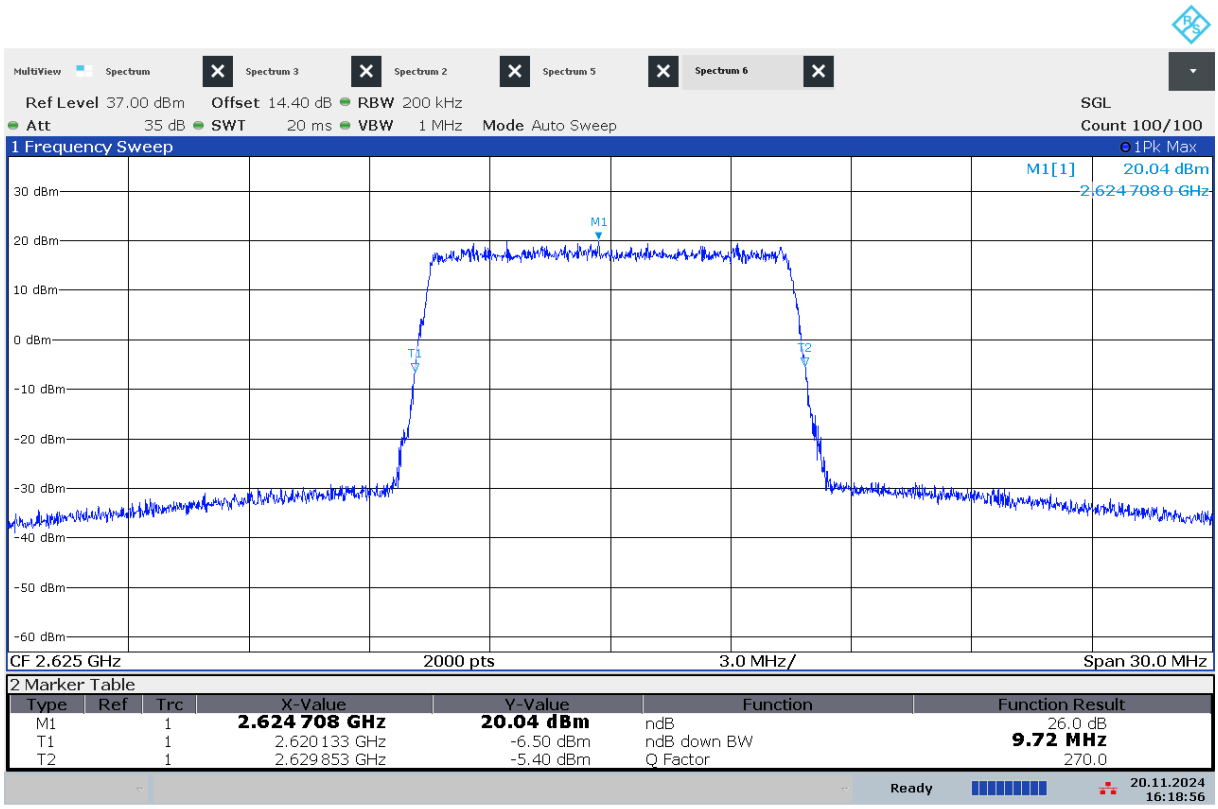

16:31:31 20.11.2024

Port 1, QPSK 5M, Channel position T



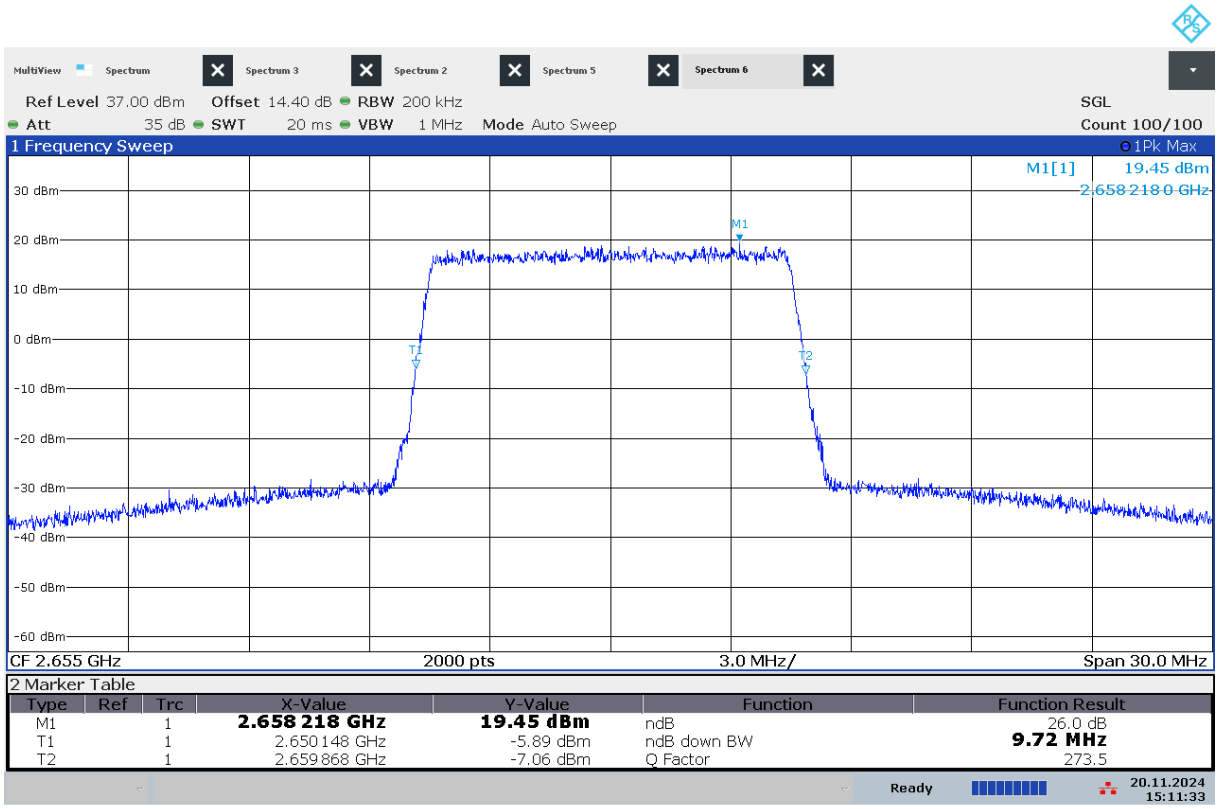

16:25:43 20.11.2024

Port 1, QPSK 10M, Channel position B




16:18:56 20.11.2024

Port 1, QPSK 10M, Channel position M

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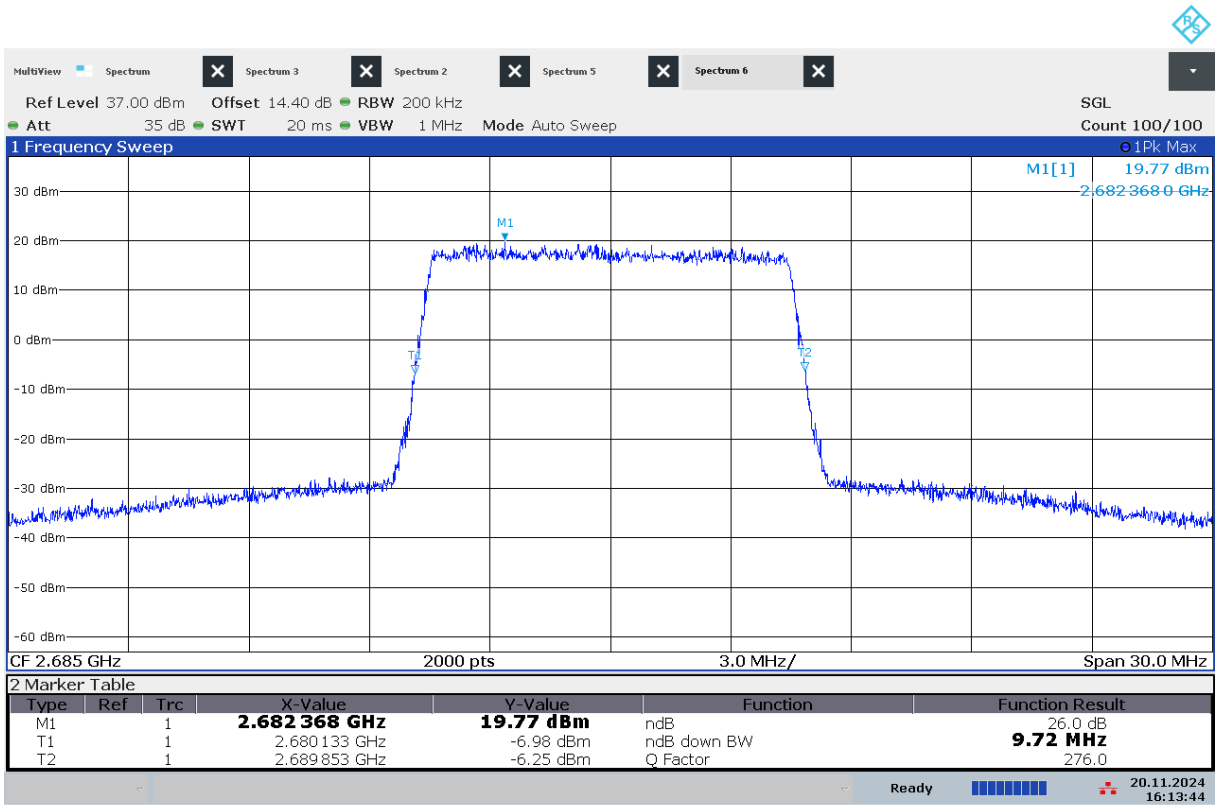
Port 1, QPSK 10M, Channel position T

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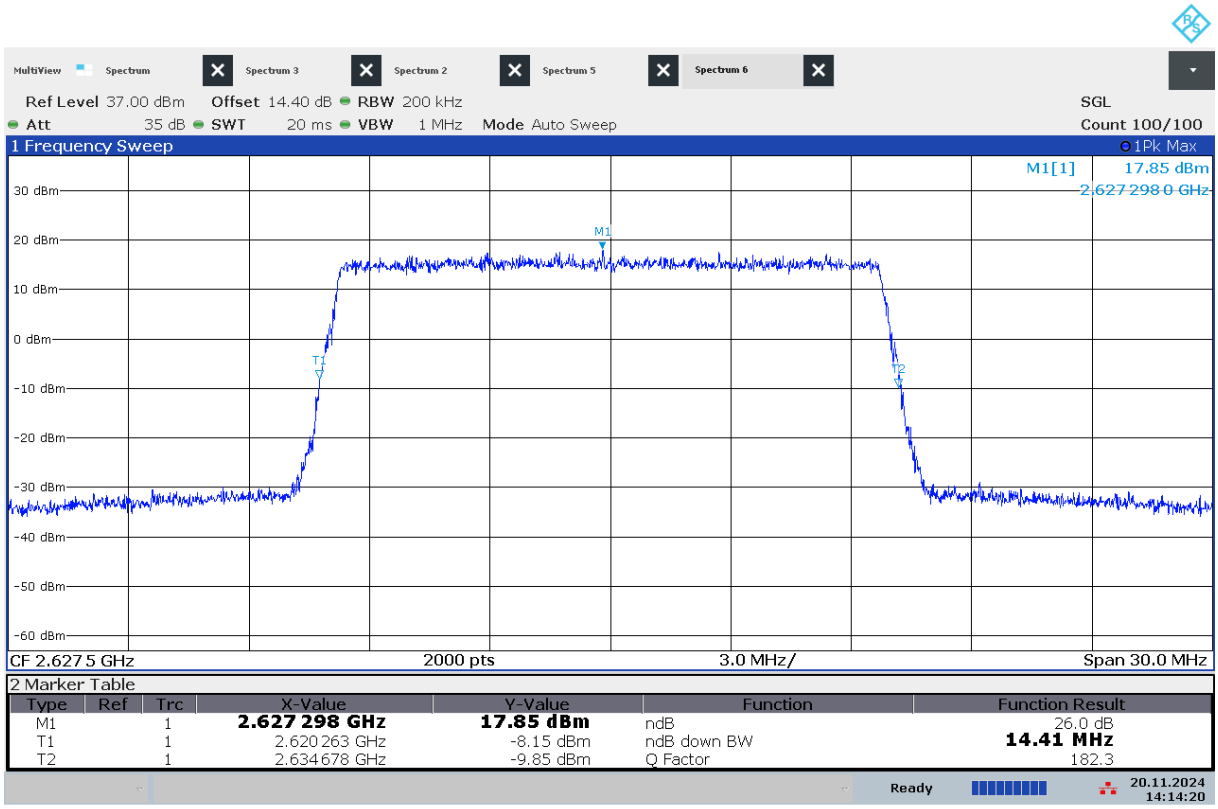
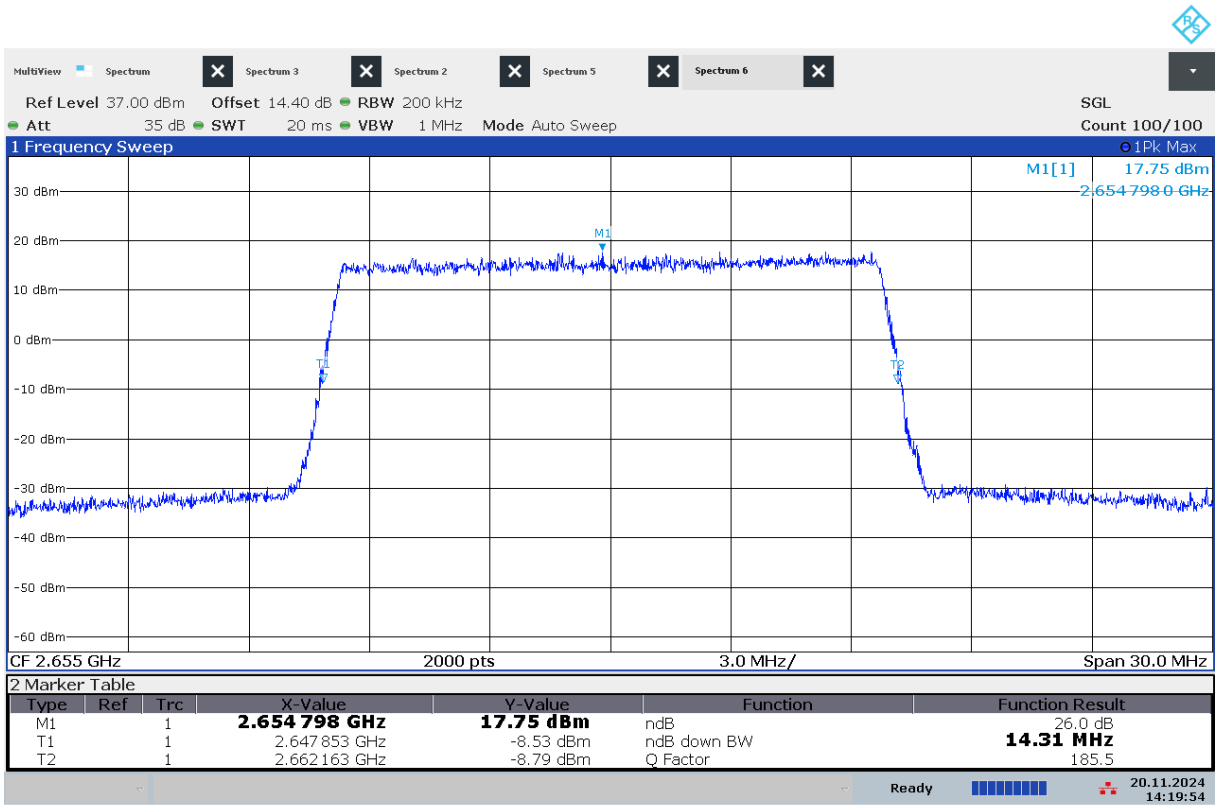
Port 1, QPSK 15M, Channel position B




14:14:20 20.11.2024

Port 1, QPSK 15M, Channel position M

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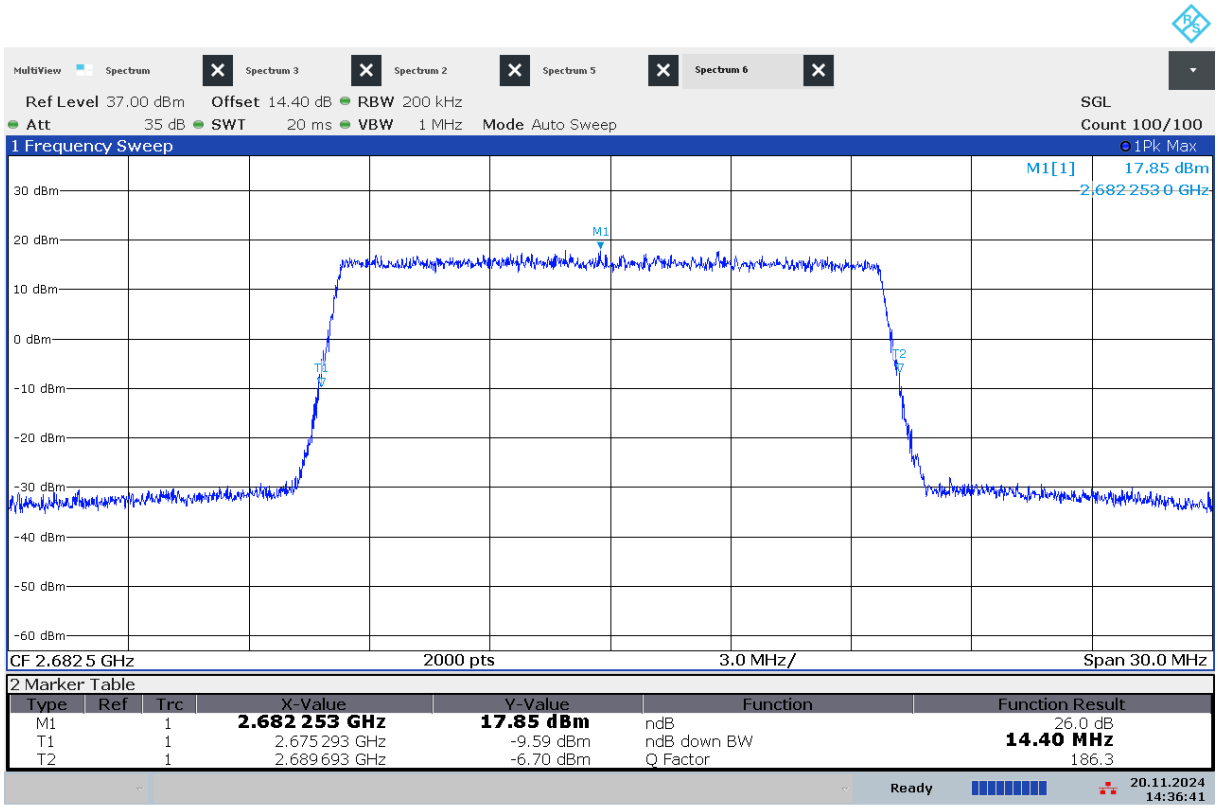
Port 1, QPSK 15M, Channel position T

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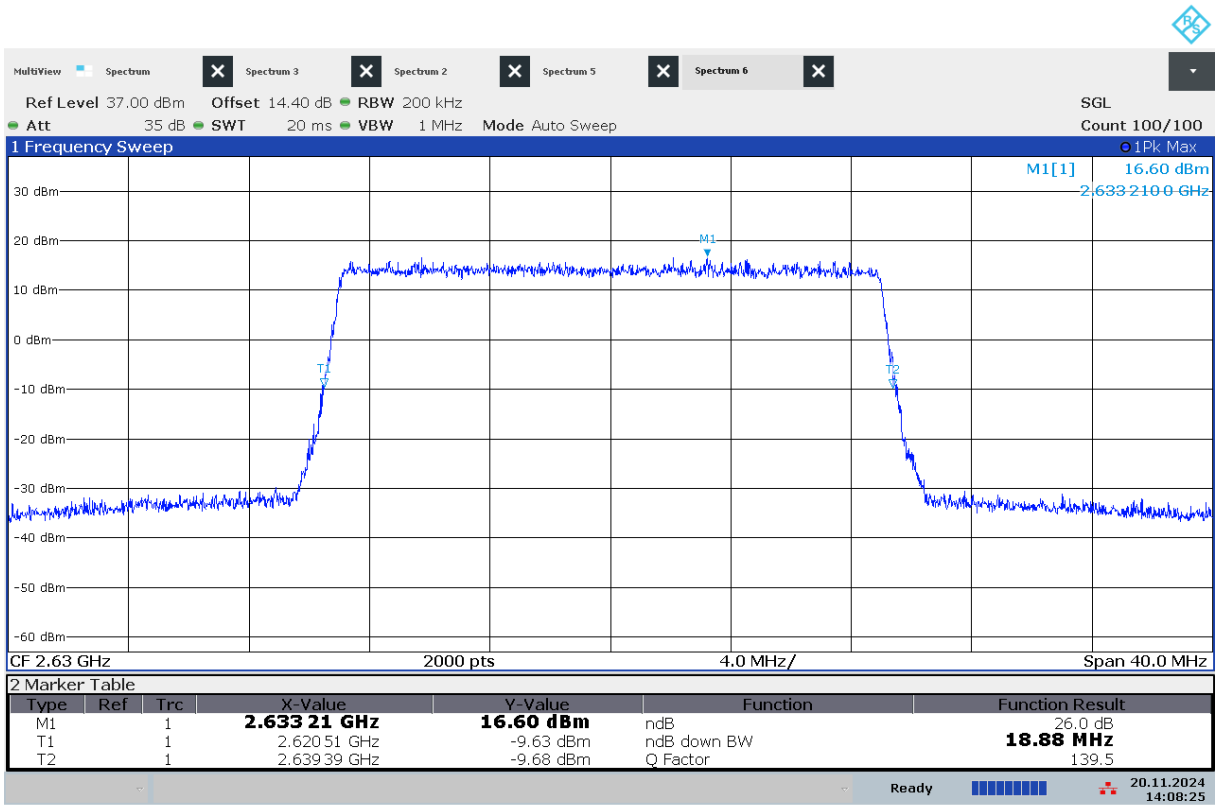
Port 1, QPSK 20M, Channel position B

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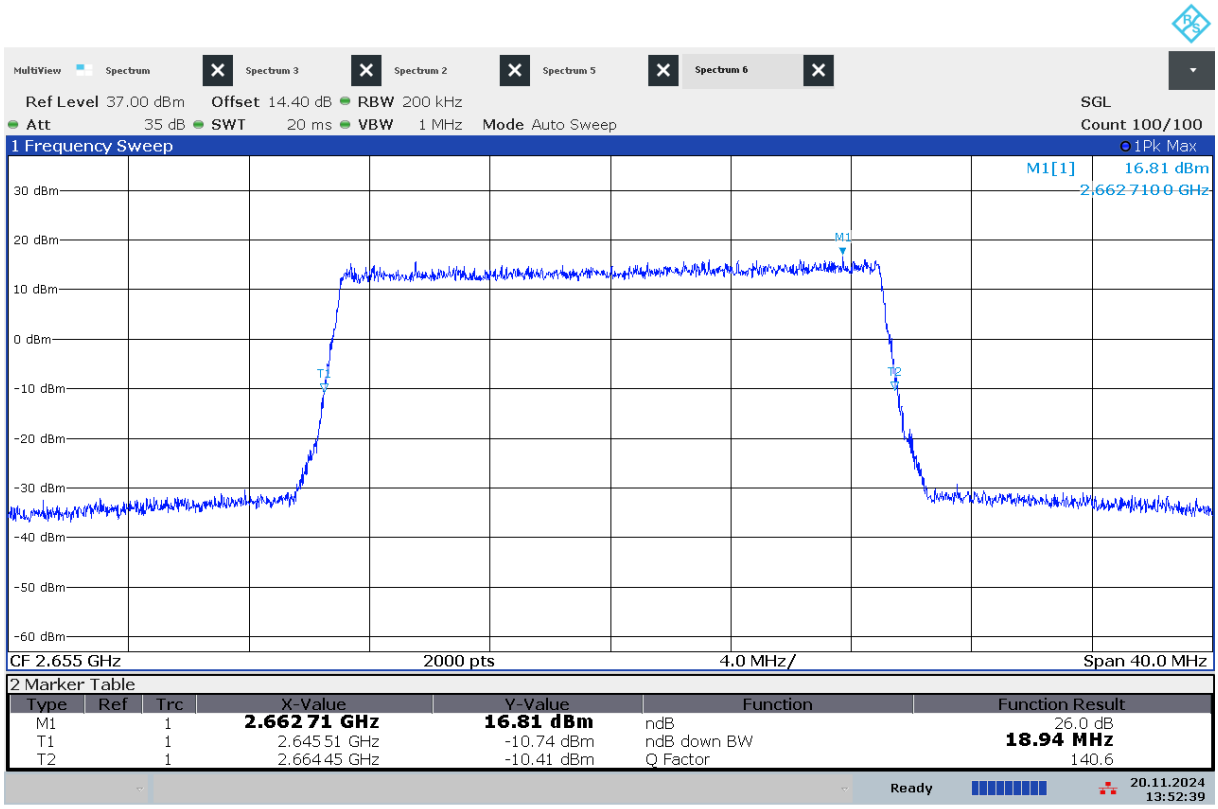
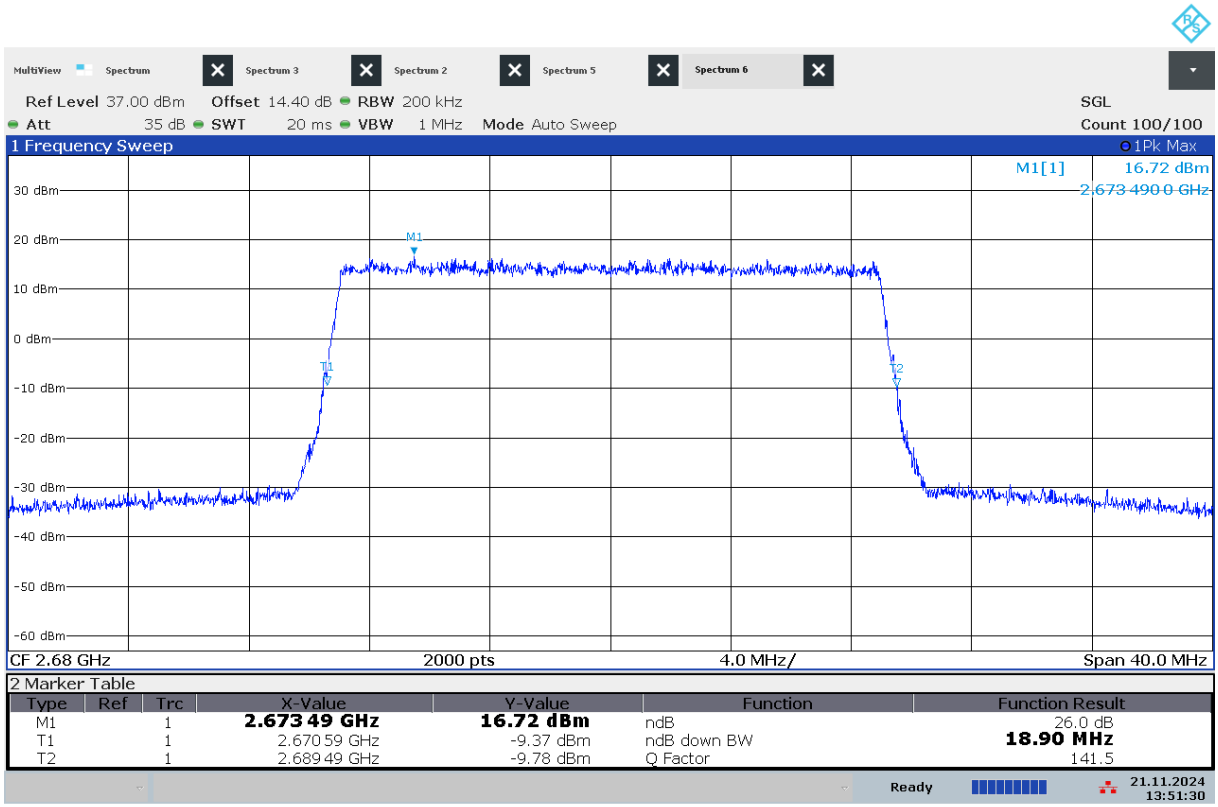
Port 1, QPSK 20.0M, Channel position M



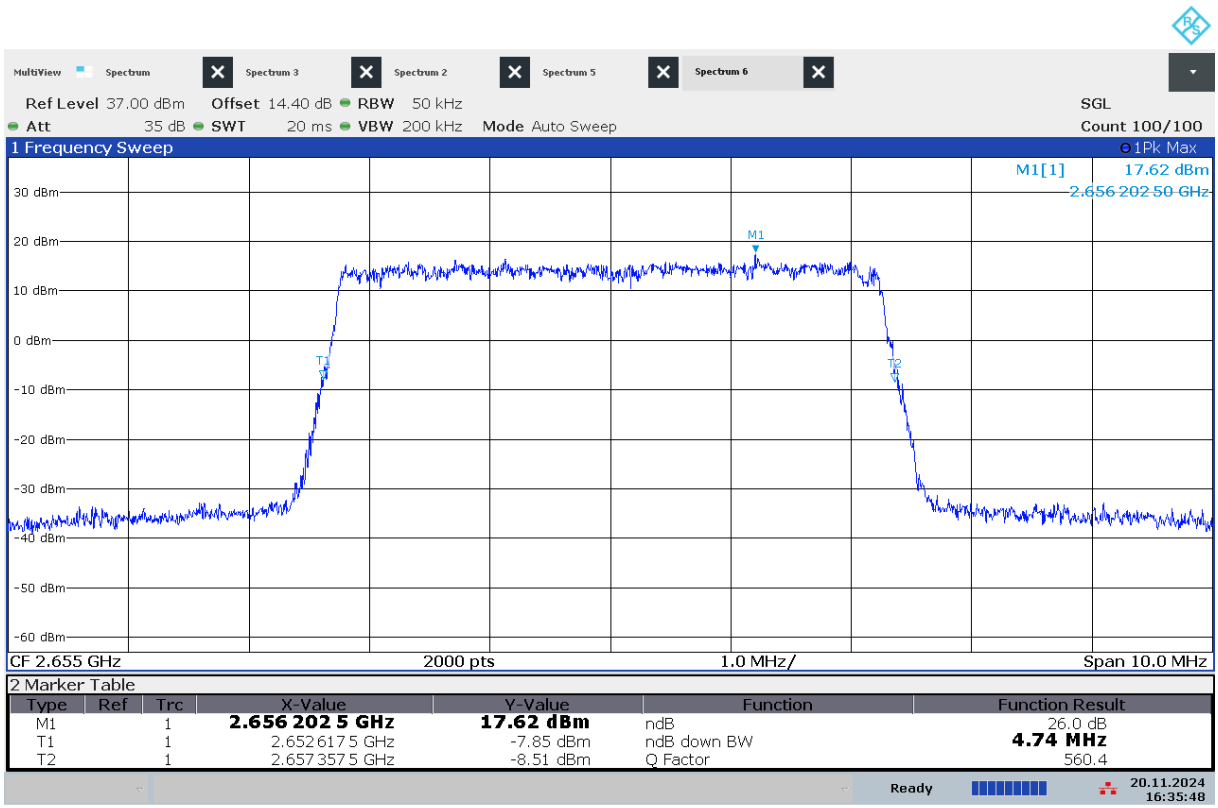

13:52:39 20.11.2024

Port 1, QPSK 20M, Channel position T



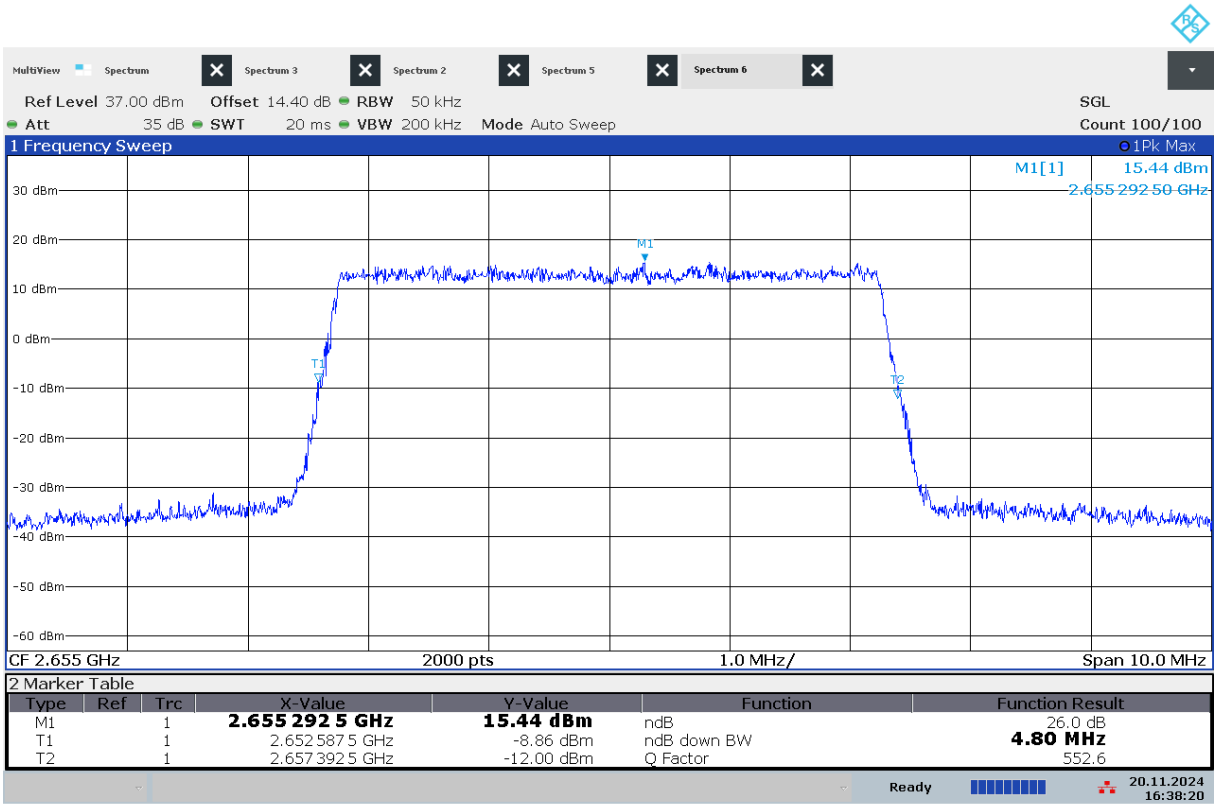

13:51:31 21.11.2024

Port 1, 16QAM 5M, Channel position M




16:35:49 20.11.2024

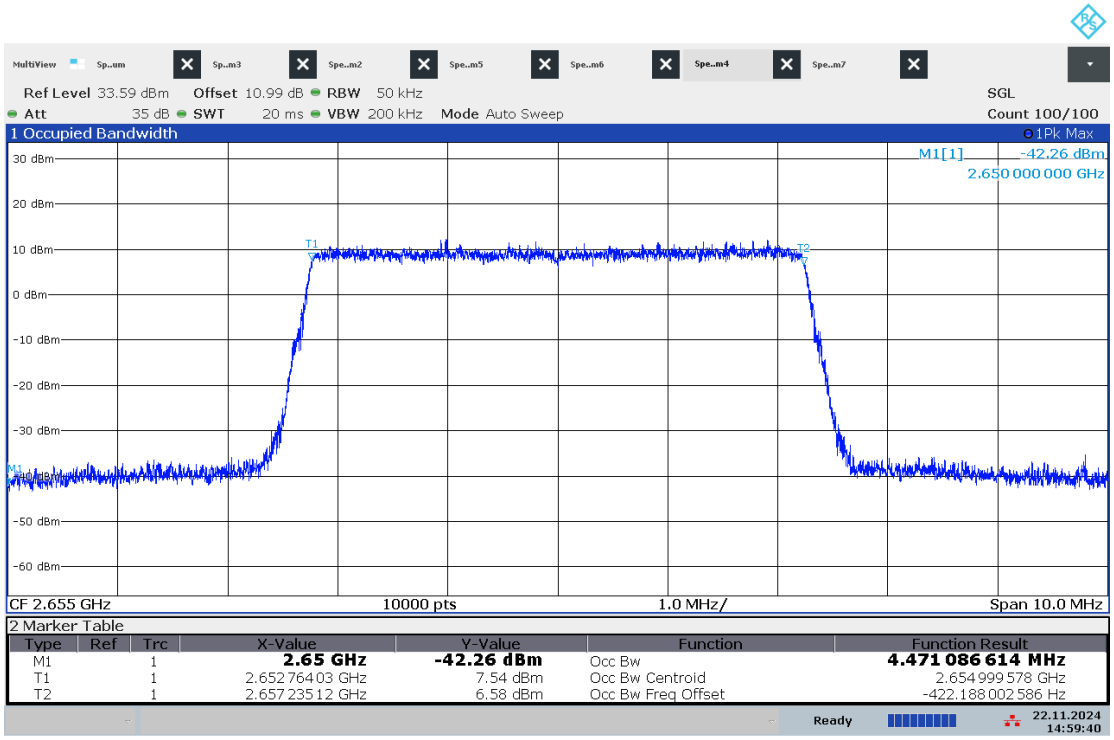
Port 1, 64QAM 5M, Channel position M




16:38:20 20.11.2024

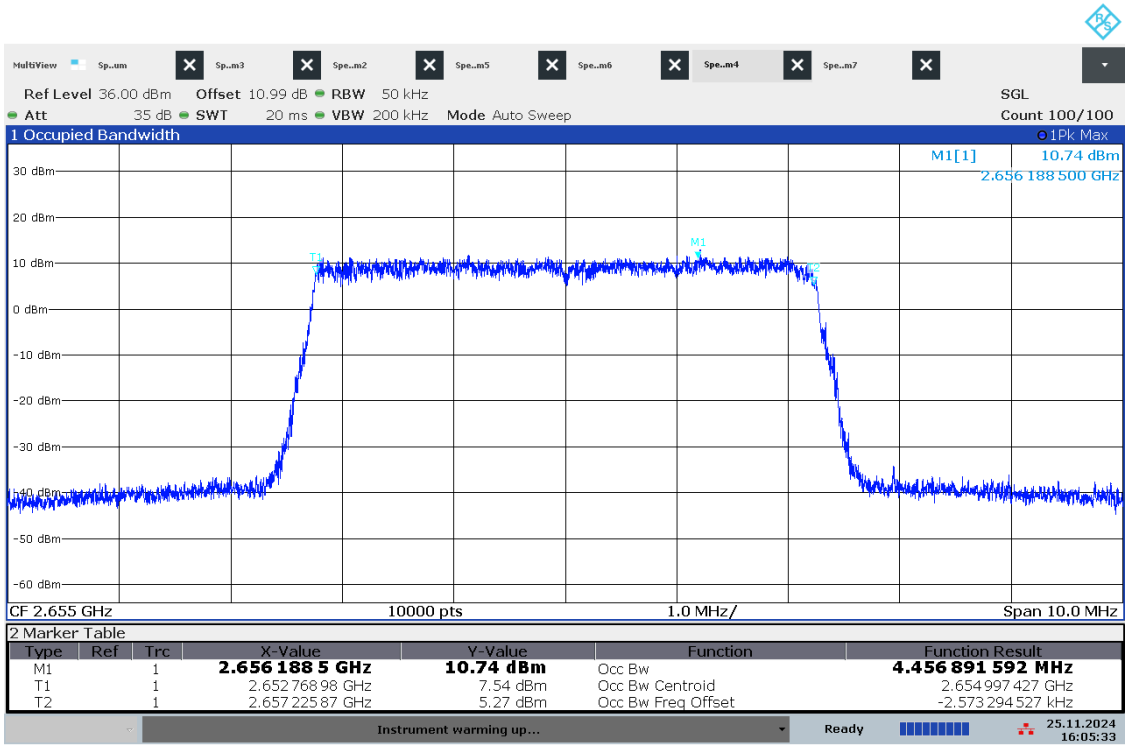
99% Occupied Bandwidth

Port 1, QPSK 5M, Channel position M, 99%BW



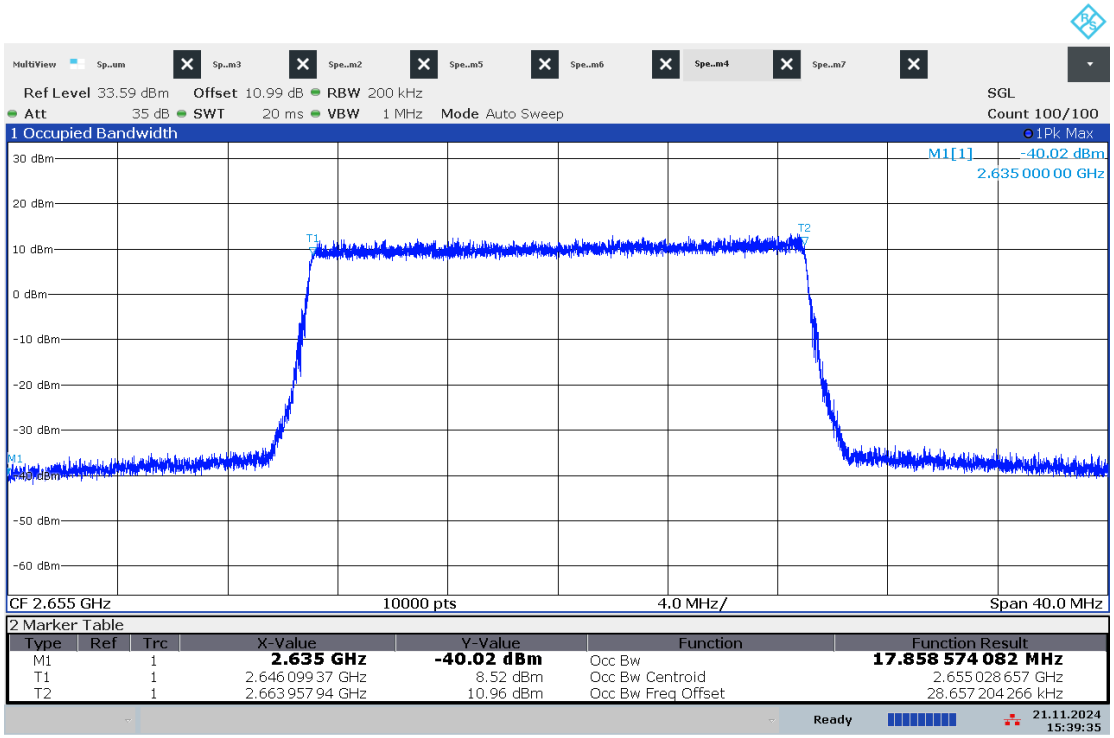

14:59:40 22.11.2024

Port 1, 16QAM 5M, Channel position M, 99%BW



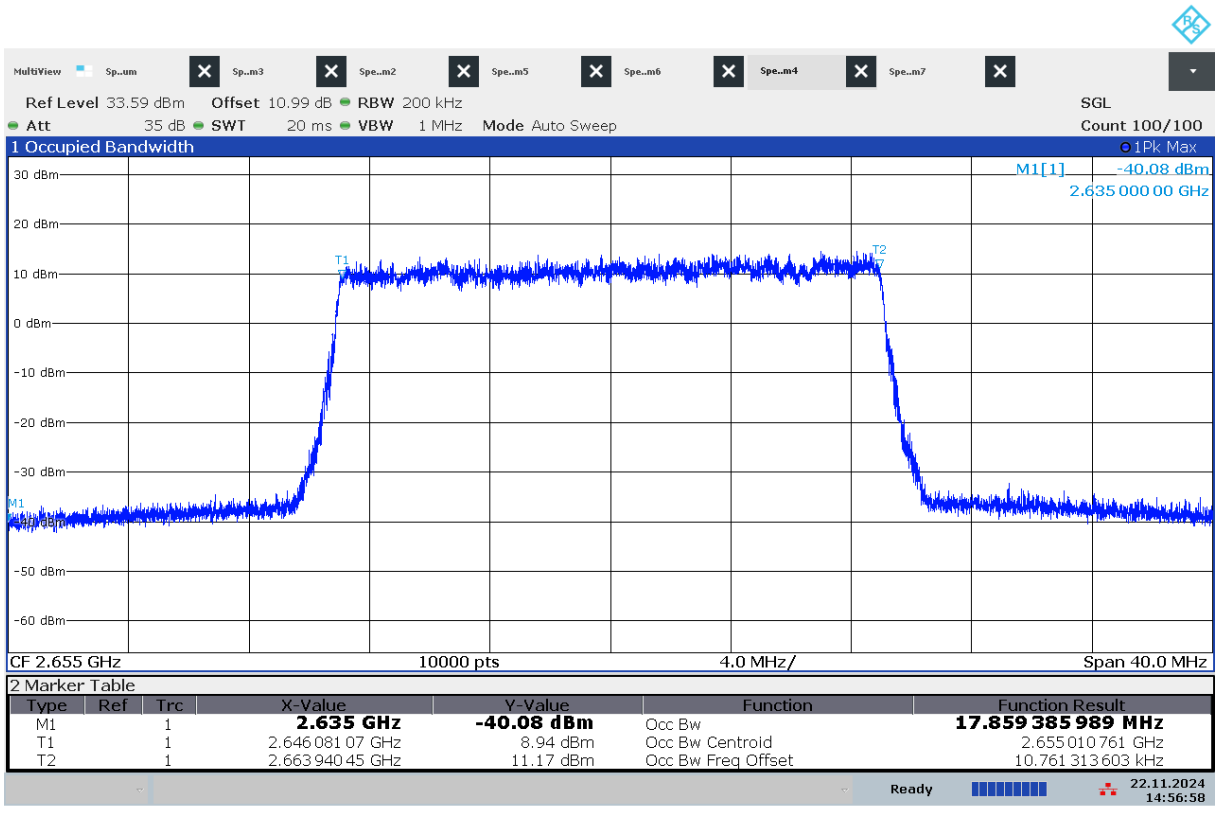

16:05:34 25.11.2024

Port 1, QPSK 20M, Channel position M, 99%BW




15:39:36 21.11.2024

Port 1, 16QAM 20M, Channel position M, 99%BW




14:56:58 22.11.2024

## A.3 Transmitter unwanted emissions at Band Edge

### A.3.1 Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 27, Clause 27.53(m)

### A.3.2 Method of measurement

For MIMO mode configurations, the limit was adjusted with a correction of -3.01dB [10Log2] by using the Measure and Add 10Log(N) dB technique according to FCC KDB 662911 D01 Multiple Transmitter Output accounting for simultaneous transmission from antenna ports. Then the limit was adjusted to -16.01dBm.

In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed and a RBW of 1MHz for measurements of emissions > 1MHz away from the band edges.

The limit was adjusted with -13.01dB [10Log(50/1000)] to compensate for the reduced measurement bandwidth 50KHz for emission more than 1MHz away from the LTE 5MHz band edges. For MIMO mode, the limit of -29.02dBm was used for emission more than 1MHz away from the LTE 5MHz band edges.
The limit was adjusted with -10dB [10Log(100/1000)] to compensate for the reduced measurement bandwidth 100KHz for emission more than 1MHz away from the LTE 10MHz band edges. For MIMO mode, the limit of -26.01dBm was used for emission more than 1MHz away from the LTE 10MHz band edges.
The limit was adjusted with -6.99dB [10Log(200/1000)] to compensate for the reduced measurement bandwidth 200KHz for emission more than 1MHz away from the LTE 15MHz and 20MHz band edges. For MIMO mode, the limit of -23dBm was used for emission more than 1MHz away from the LTE 15MHz and 20MHz band edges.

Spectrum analyzer detector was set as RMS.

### A.3.3 Measurement limit

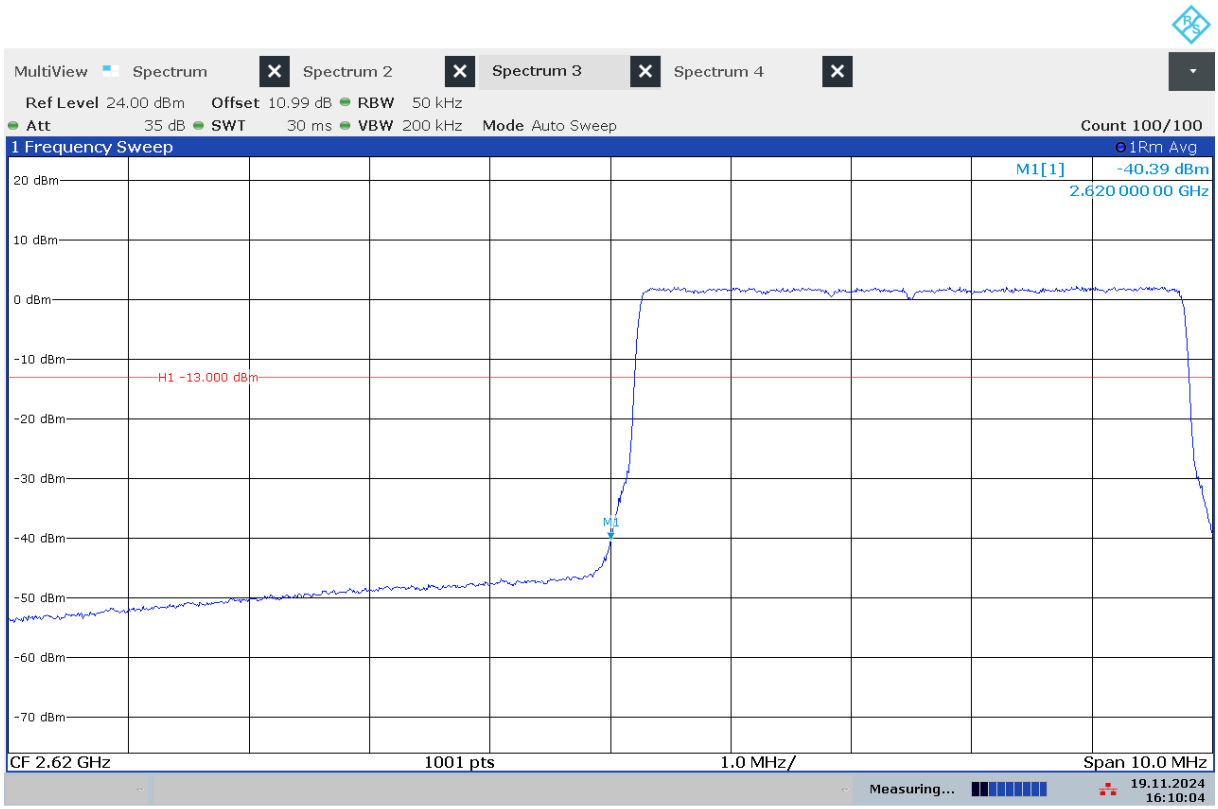
The power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts not less than 43 + 10 log (P) dB.

**A.3.4 Measurement result**

Configuration LTE-MIMO-1C, QPSK

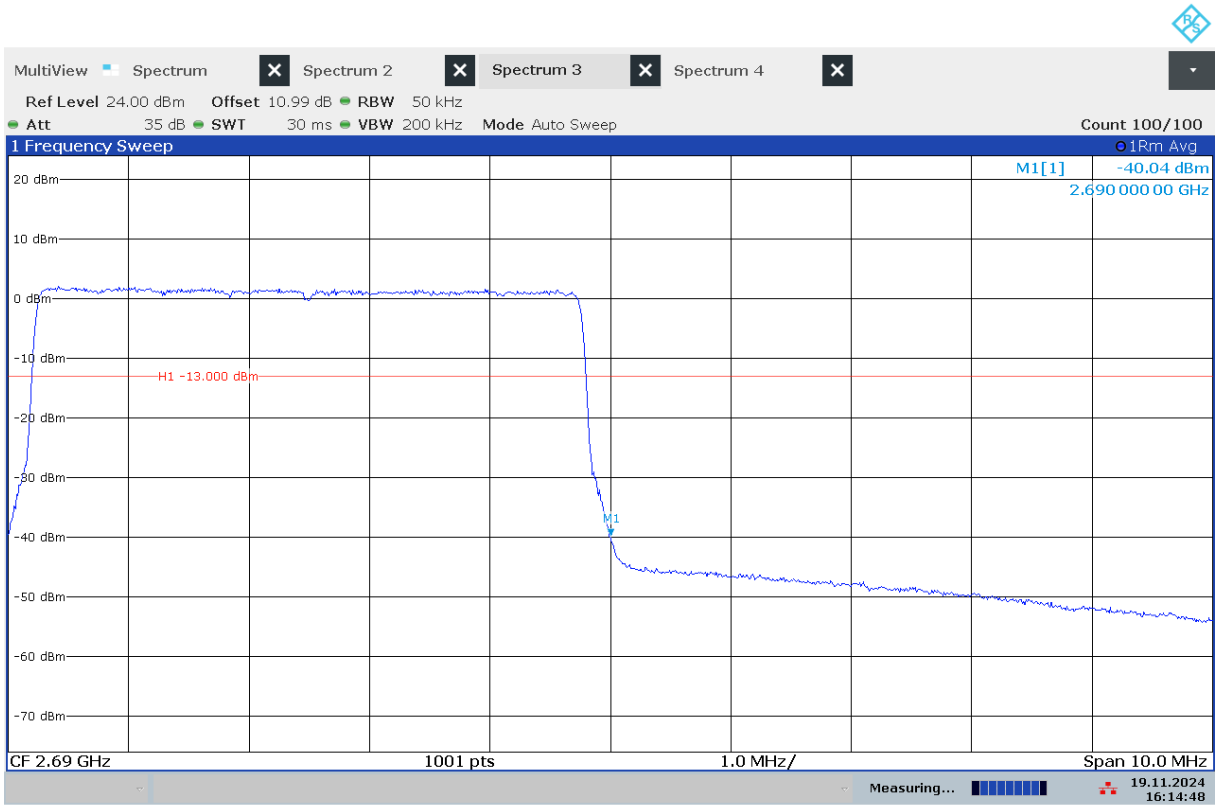
| Band Edge Frequency | Channel Bandwidth | RBW | Limit(dBm) |
|---|---|---|---|
| 2620/2690 | 5 | 50KHz | -16.01/-29.02 |
| 2620/2690 | 10 | 100KHz | -16.01/-26.01 |
| 2620/2690 | 15 | 200KHz | -16.01/-23 |
| 2620/2690 | 20 | 200KHz | -16.01/-23 |

Port 1, Channel Position B, 5 MHz



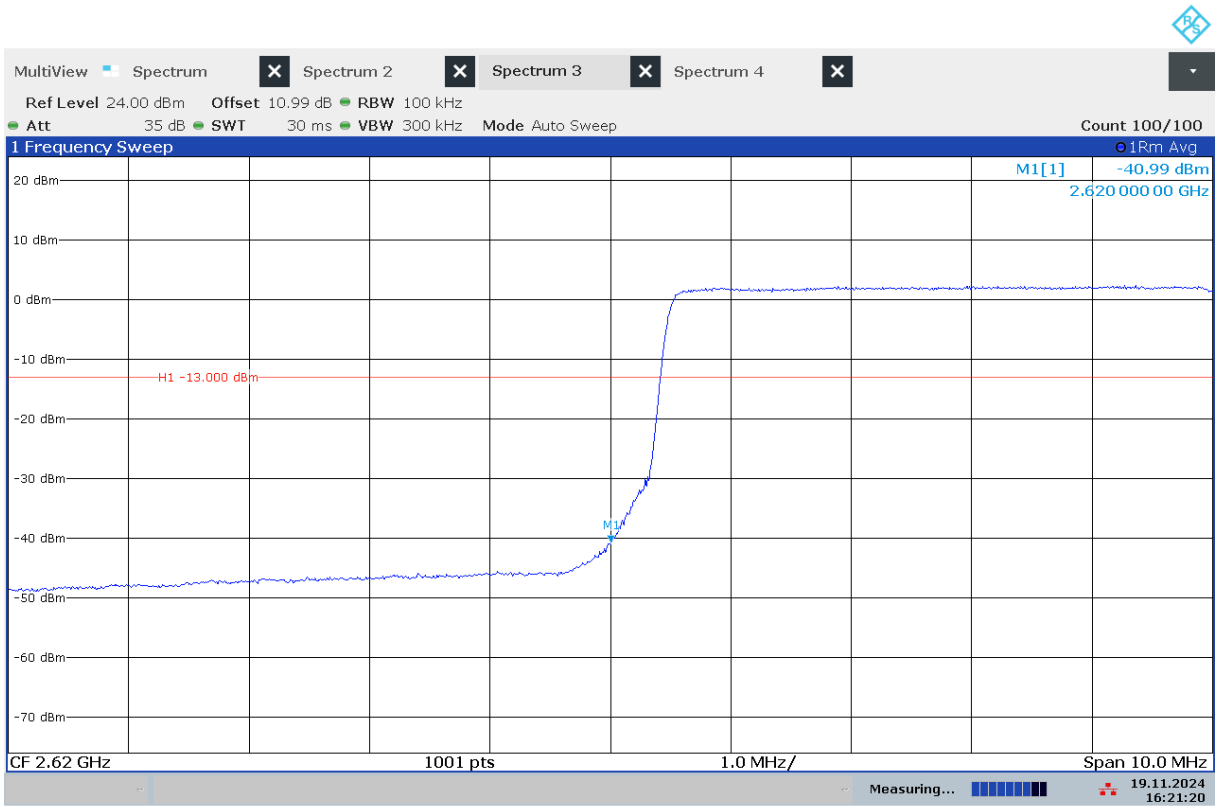

16:10:05 19.11.2024

Port 1, Channel Position T, 5 MHz



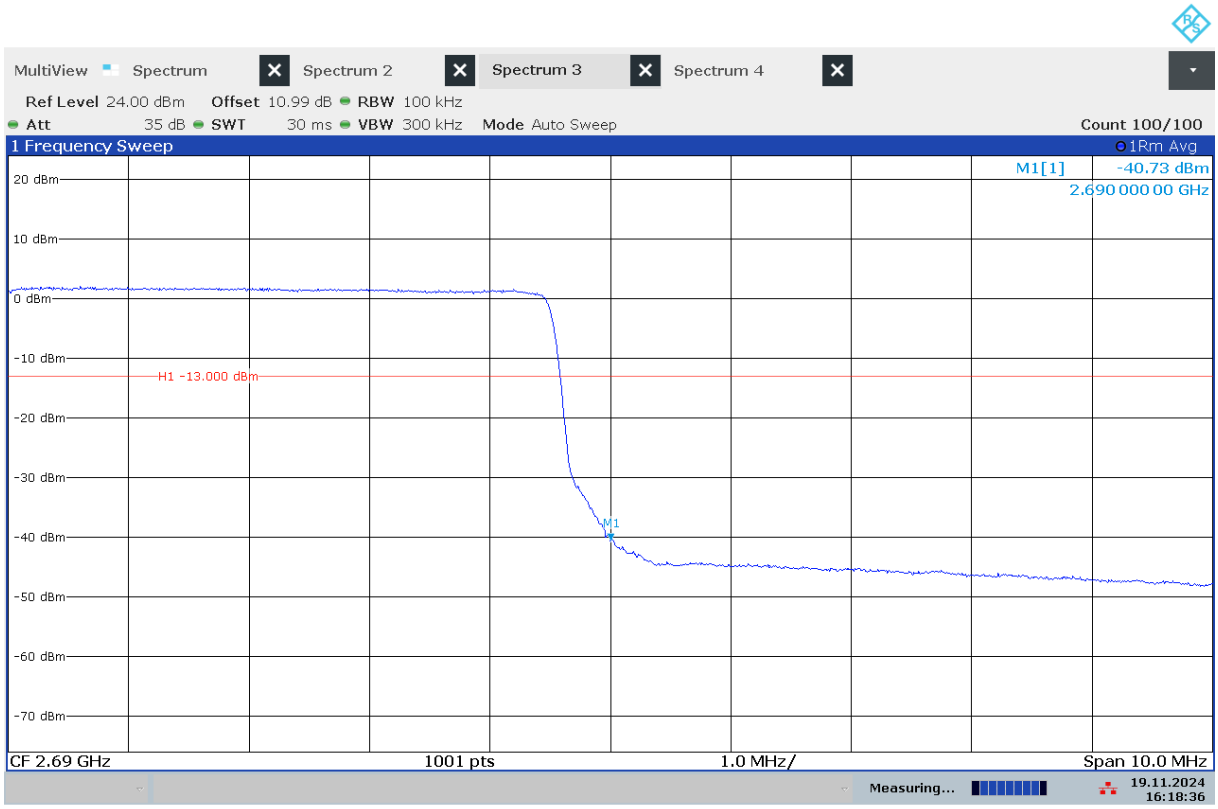

16:14:49 19.11.2024

Port 1, Channel Position B, 10 MHz



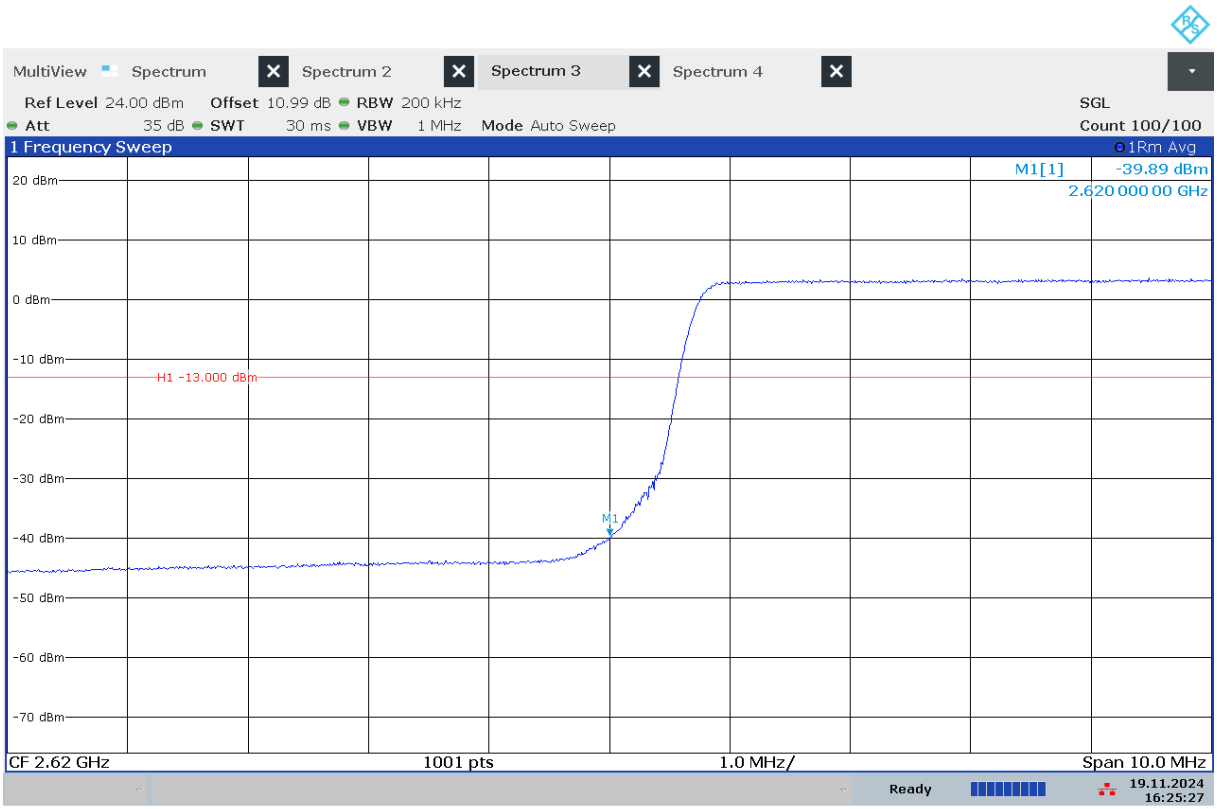

16:21:21 19.11.2024

Port 1, Channel Position T, 10 MHz



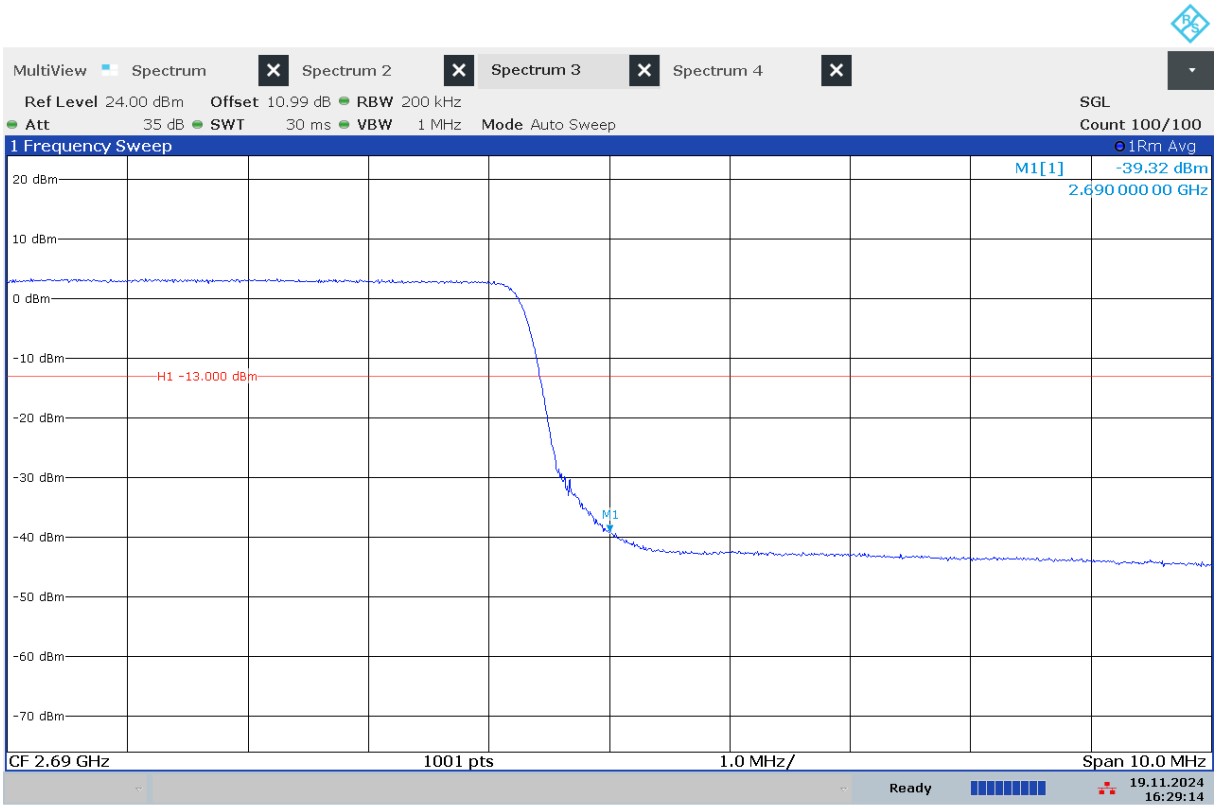

16:18:37 19.11.2024

Port 1, Channel Position B, 15 MHz



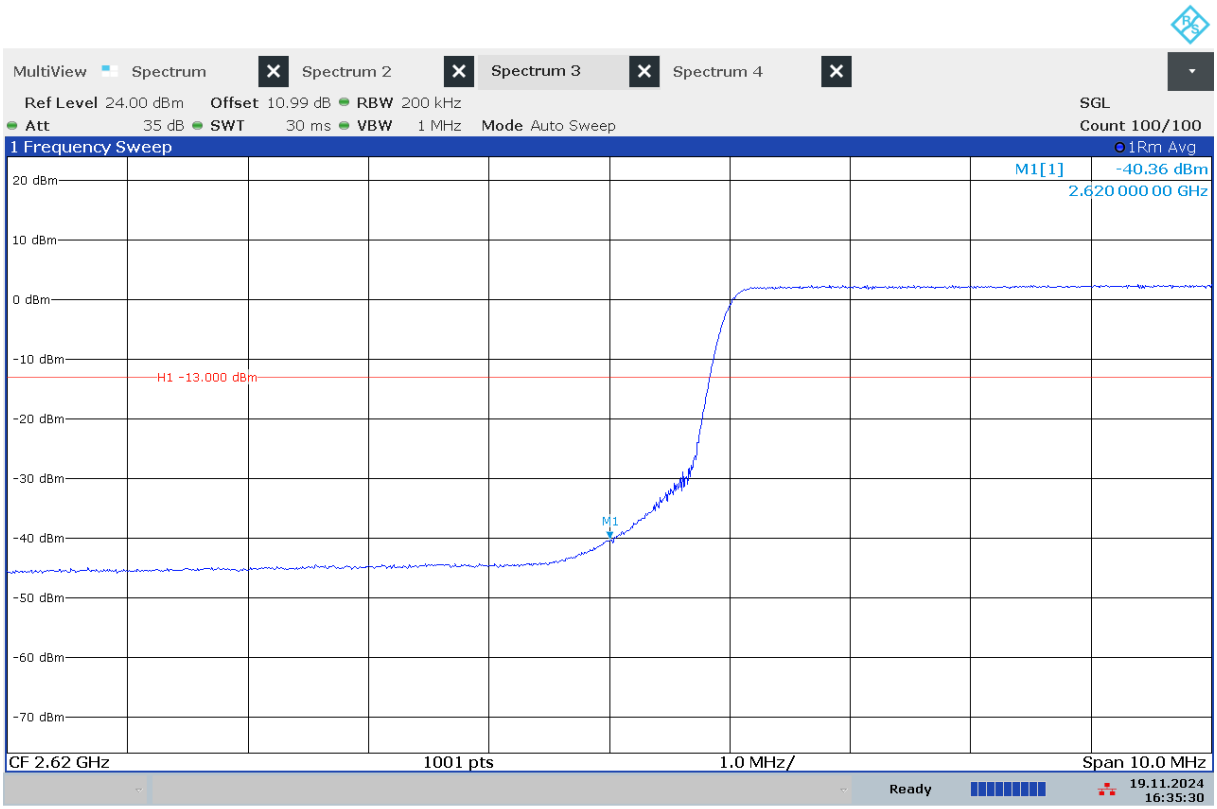

16:25:28 19.11.2024

Port 1, Channel Position T, 15 MHz



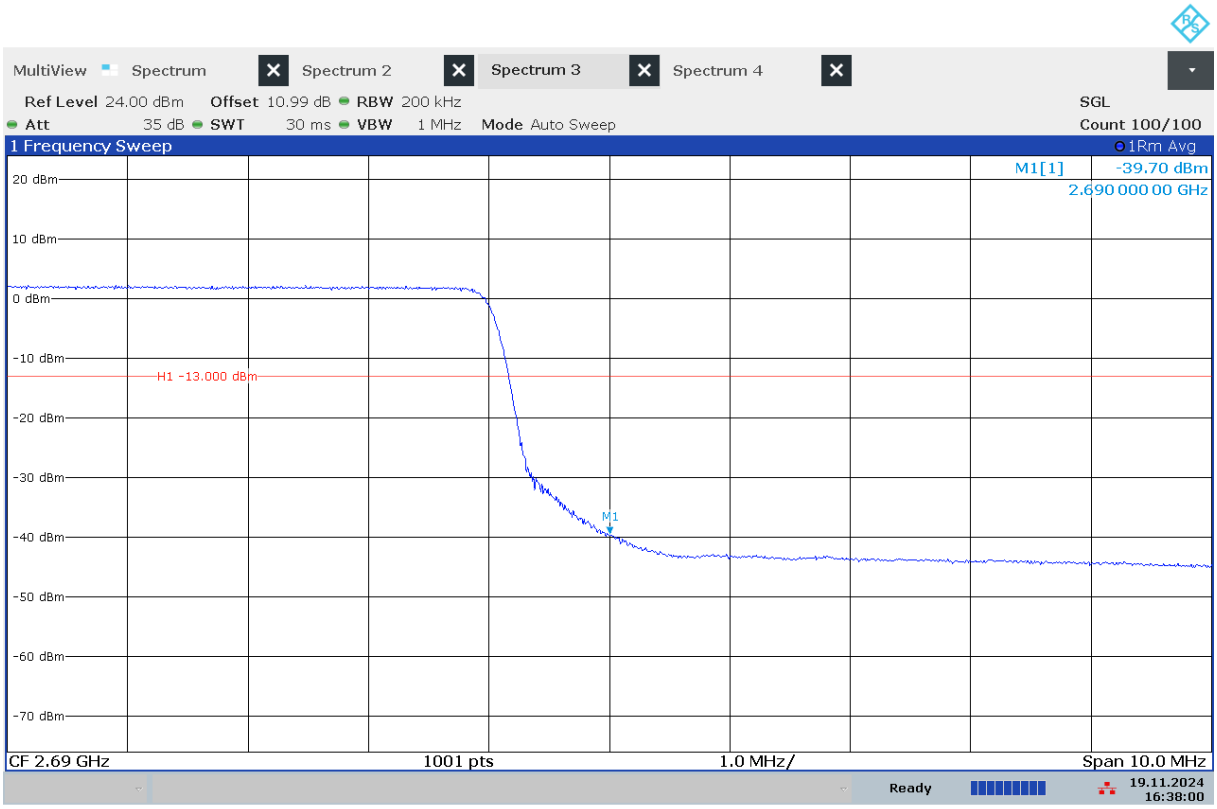

16:29:14 19.11.2024

Port 1, Channel Position B, 20 MHz




16:35:31 19.11.2024

Port 1, Channel Position T, 20 MHz




16:38:00 19.11.2024

## A.4 Transmitter unwanted emissions - Conducted Spurious Emission

### A.4.1 Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 27, Clause 27.53(m)

### A.4.2 Method of measurement

For MIMO mode configurations, the limit was adjusted with a correction of -3.01dB [10Log2] by using the Measure and Add 10Log(N) dB technique according to FCC KDB 662911 D01 Multiple Transmitter Output accounting for simultaneous transmission from antenna ports.

The spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using an attenuator and the frequency spectrum was investigated from 3kHz to 27GHz.

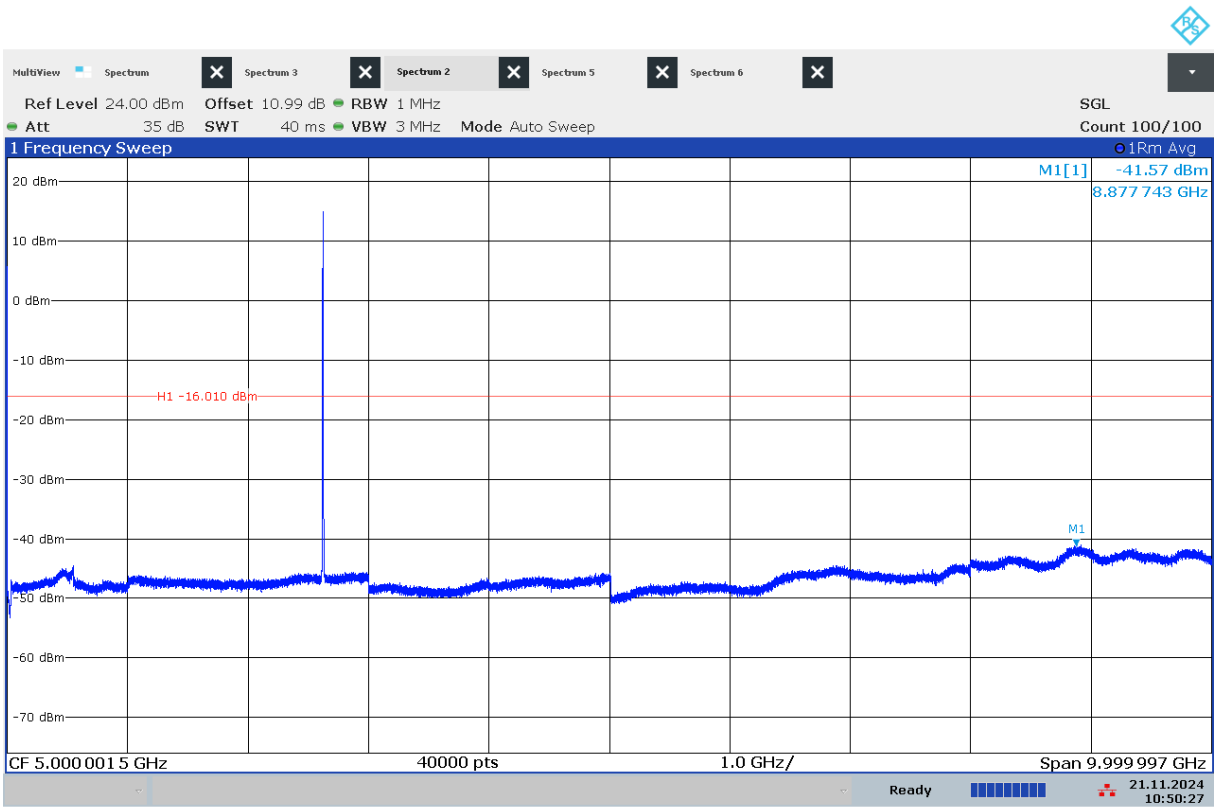
Spectrum analyzer detector was set as RMS.

### A.4.3 Measurement limit

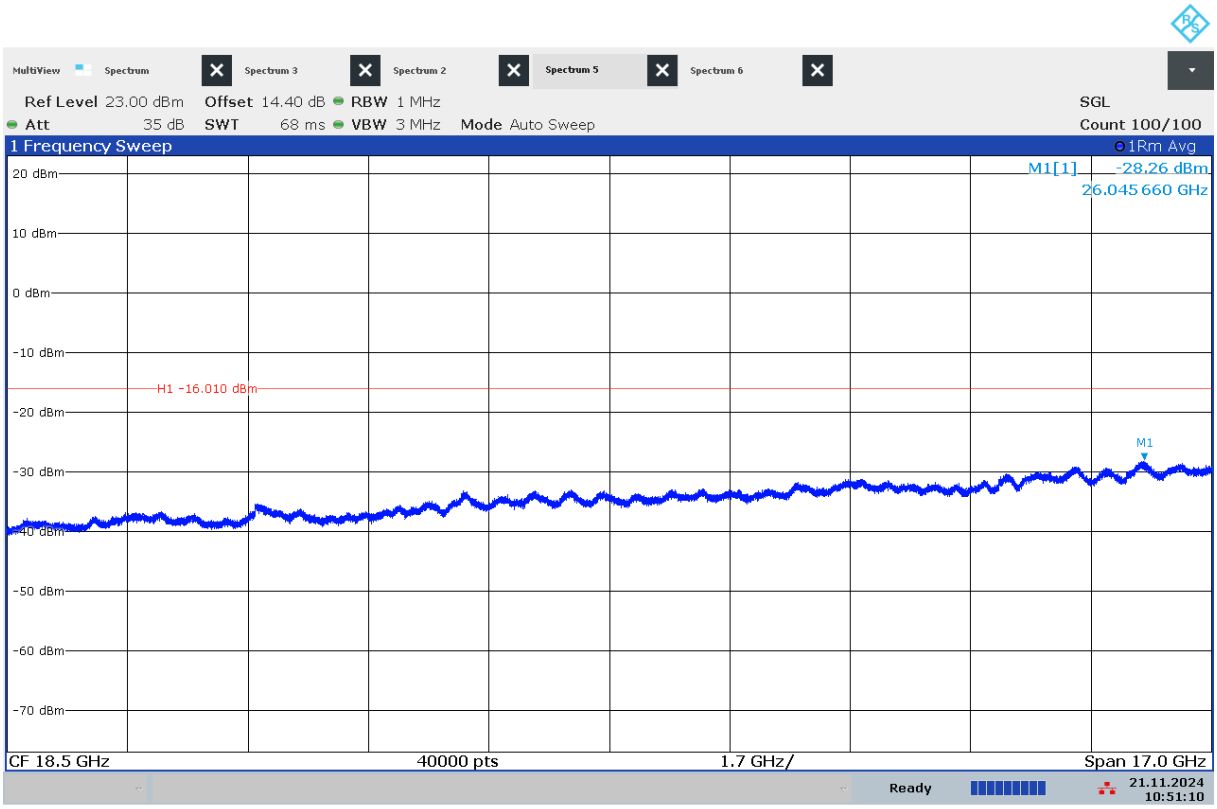
The power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts not less than 43 + 10 log (P) dB.

### A.4.4 Measurement results

Configuration LTE-MIMO-1C 5M, QPSK
Port 1, QPSK 5M, Channel Position B

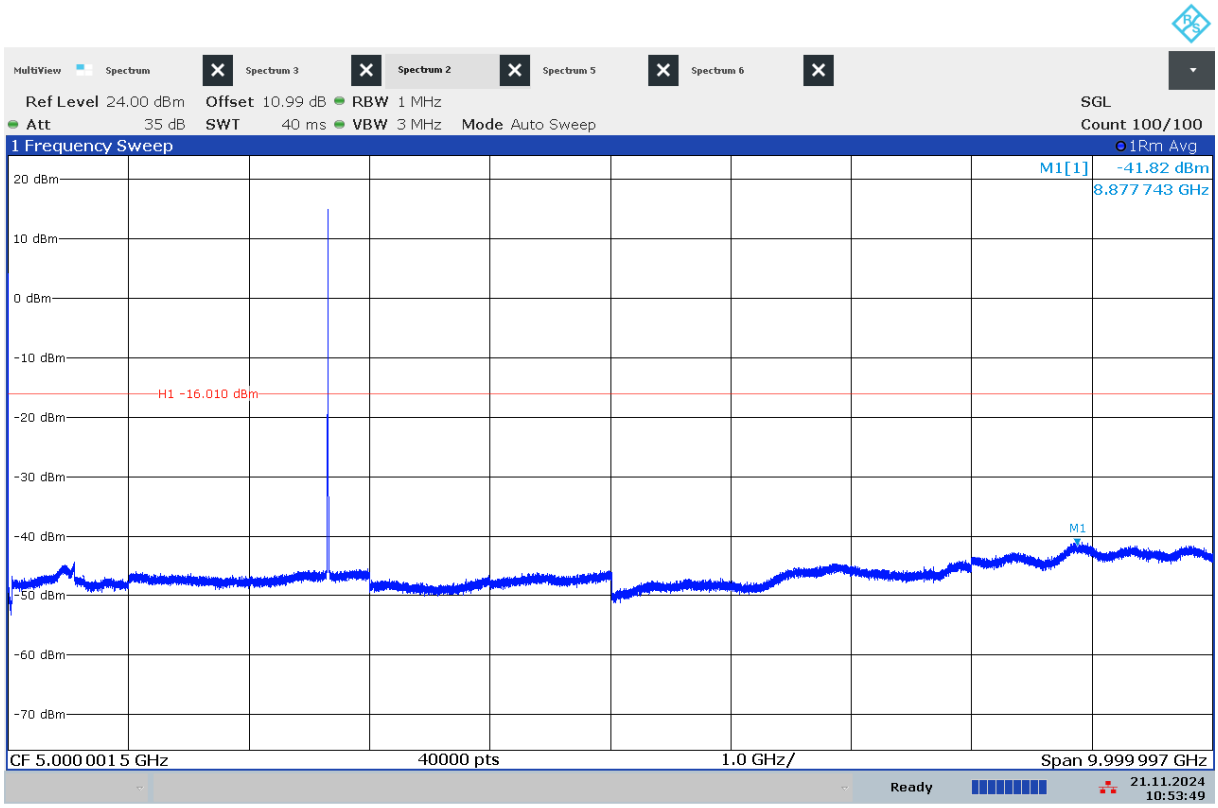



10:50:27 21.11.2024

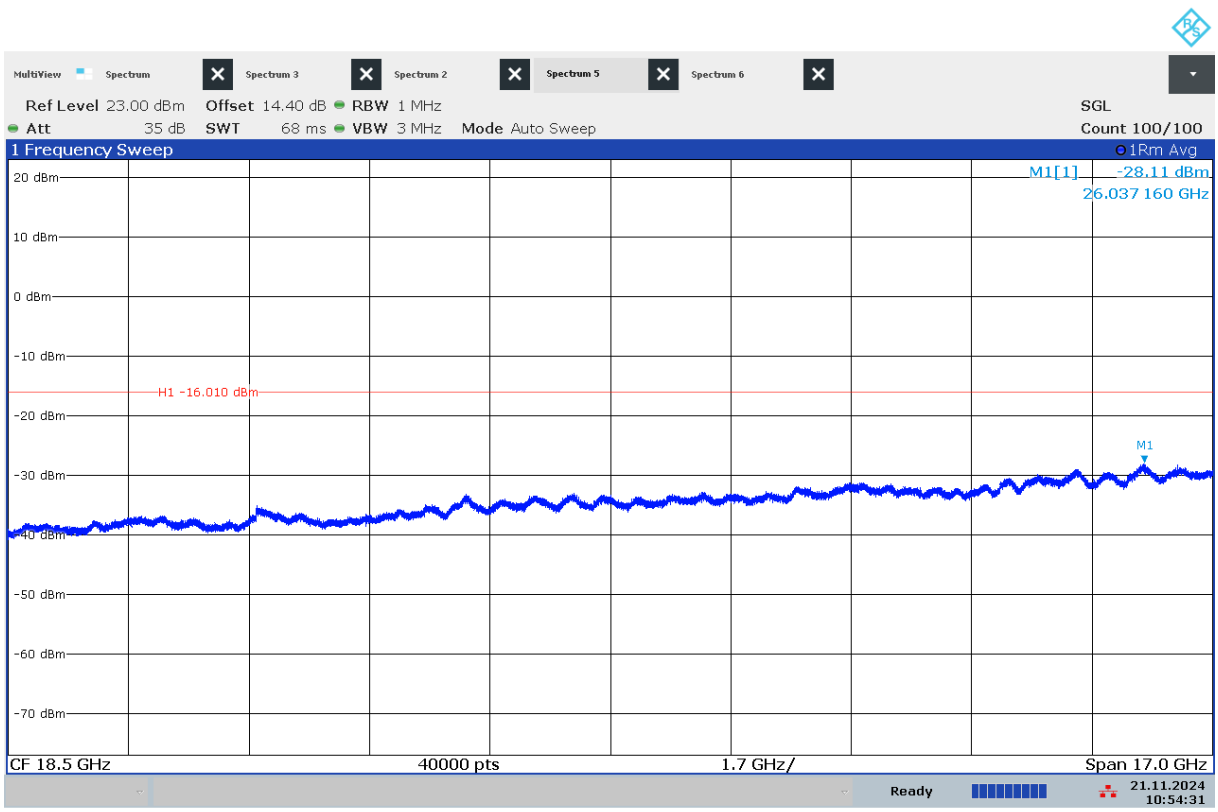



10:51:10 21.11.2024

Port 1, QPSK 5M, Channel Position M

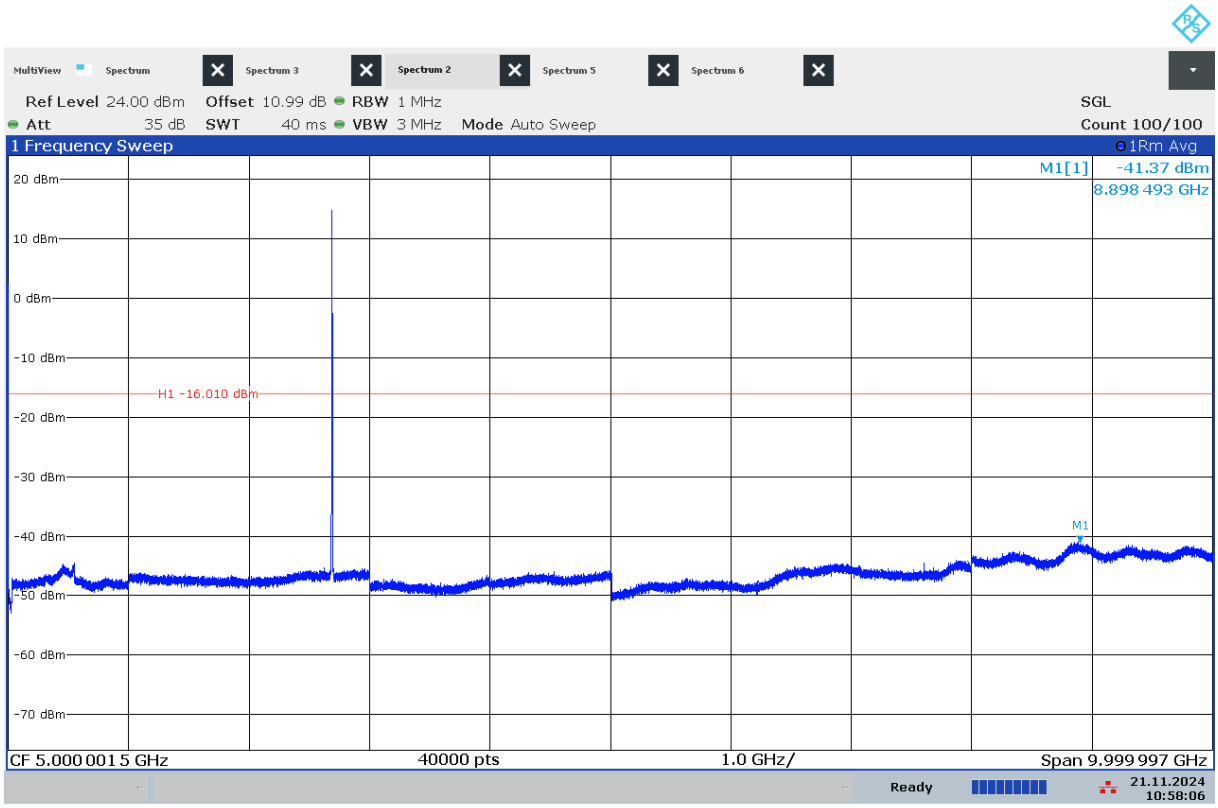



10:53:50 21.11.2024

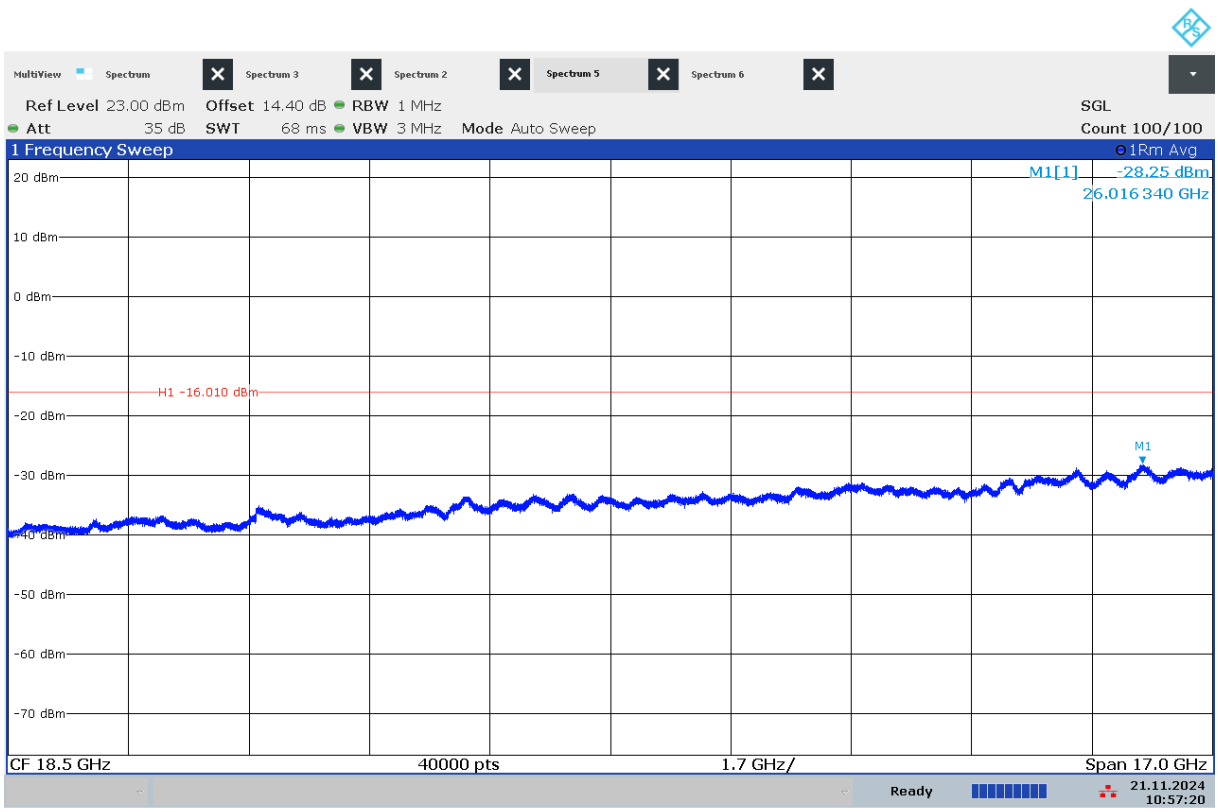



10:54:31 21.11.2024

Port 1, QPSK 5M, Channel Position T

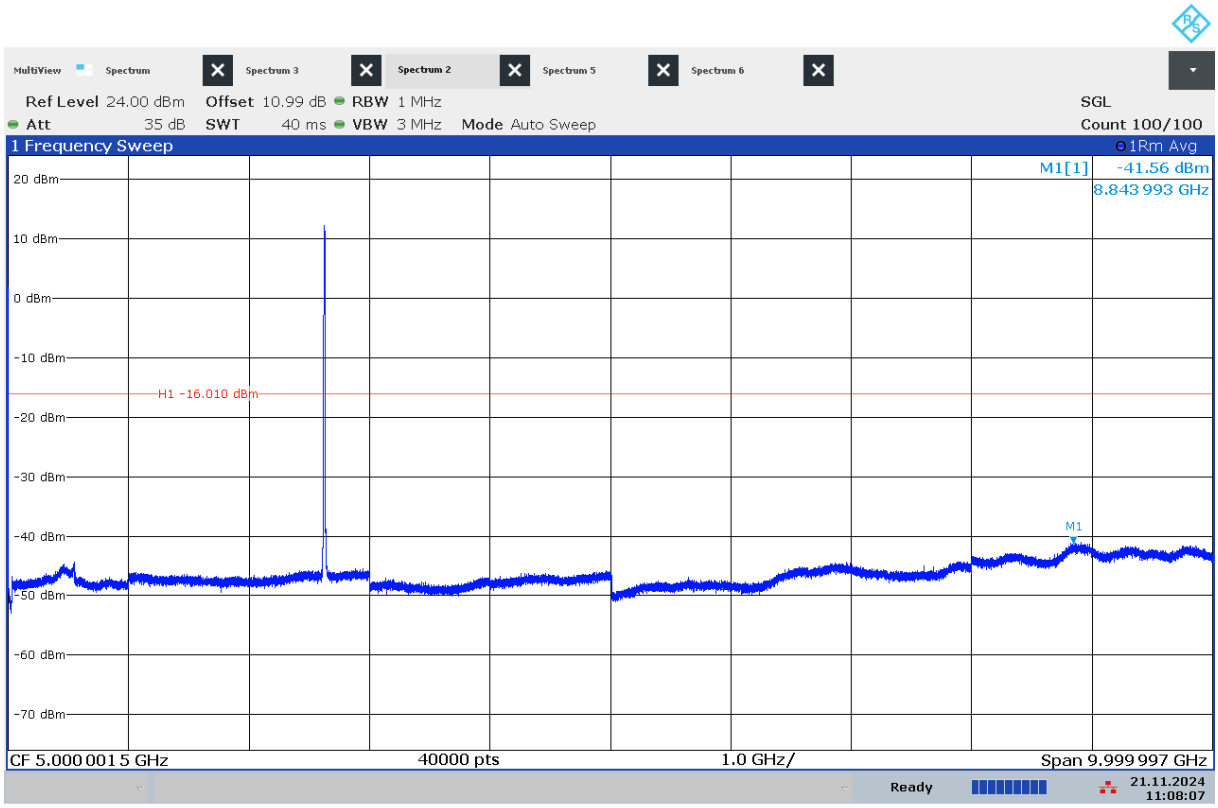



10:58:07 21.11.2024

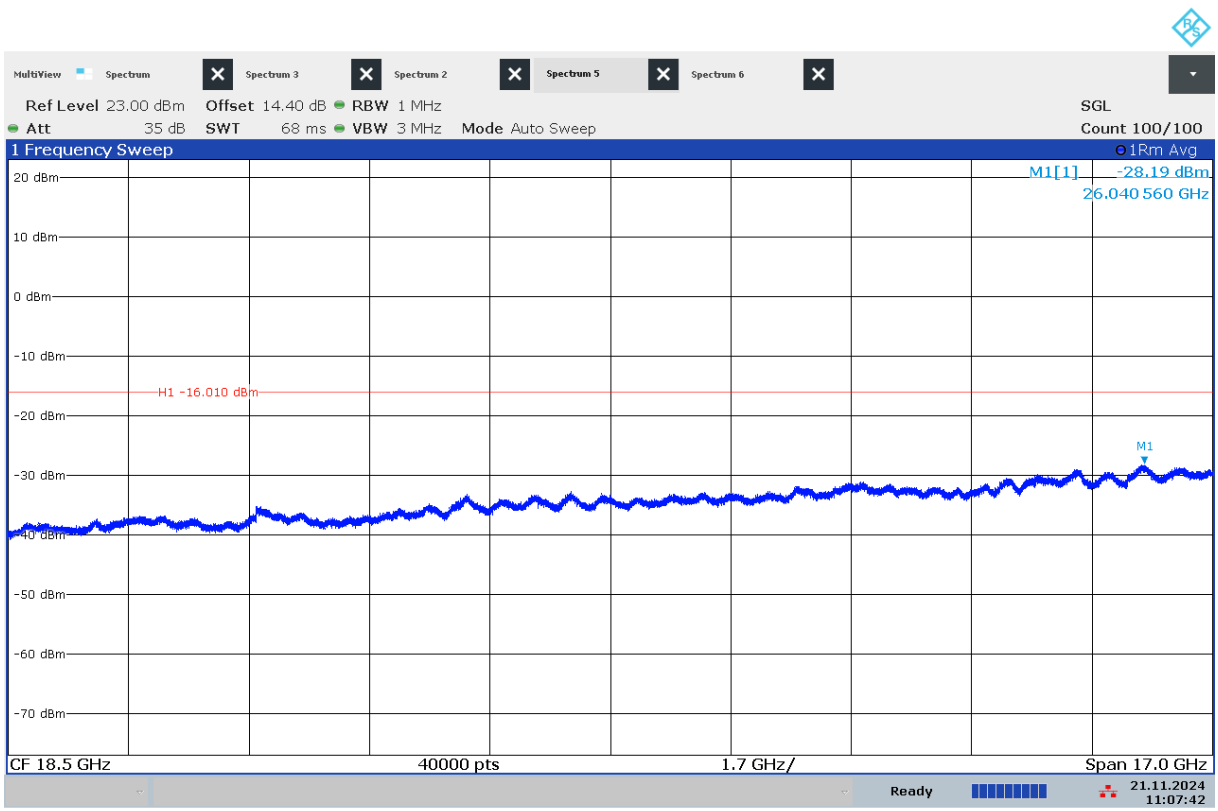



10:57:20 21.11.2024

Port 1, QPSK 10M, Channel Position B

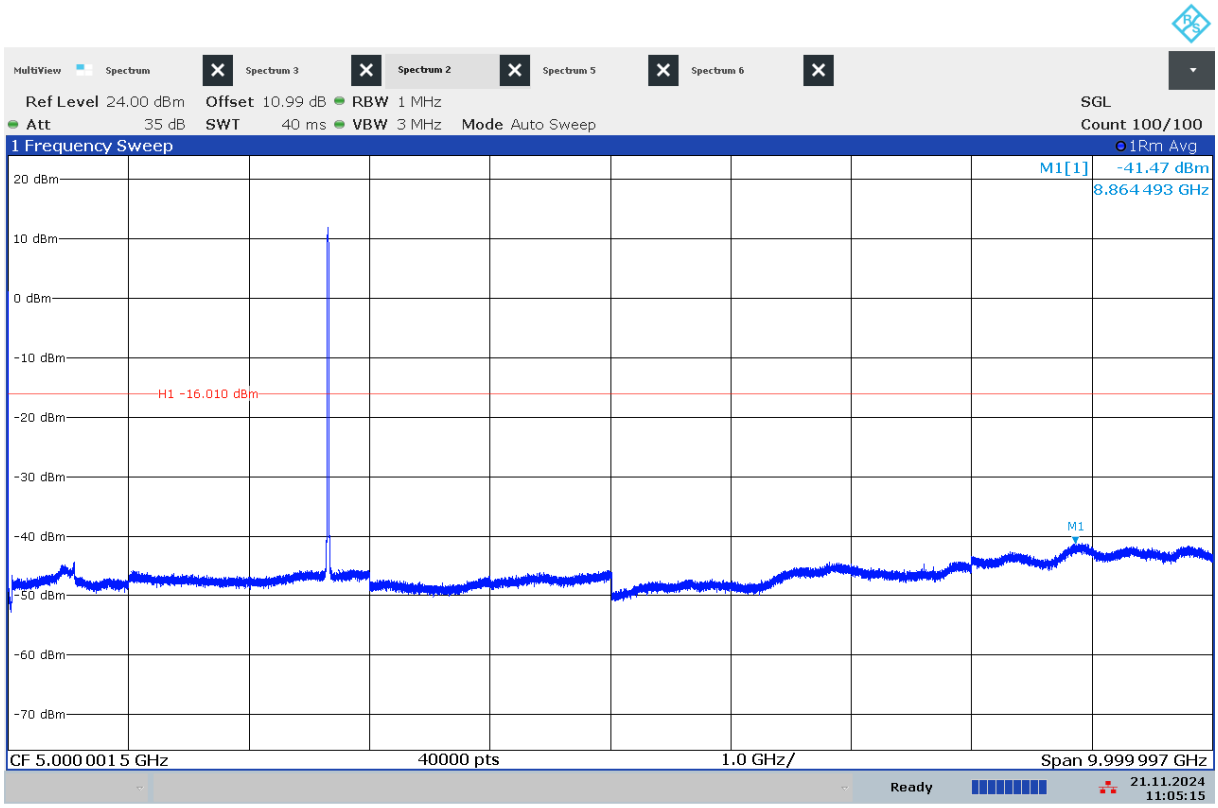



11:08:08 21.11.2024

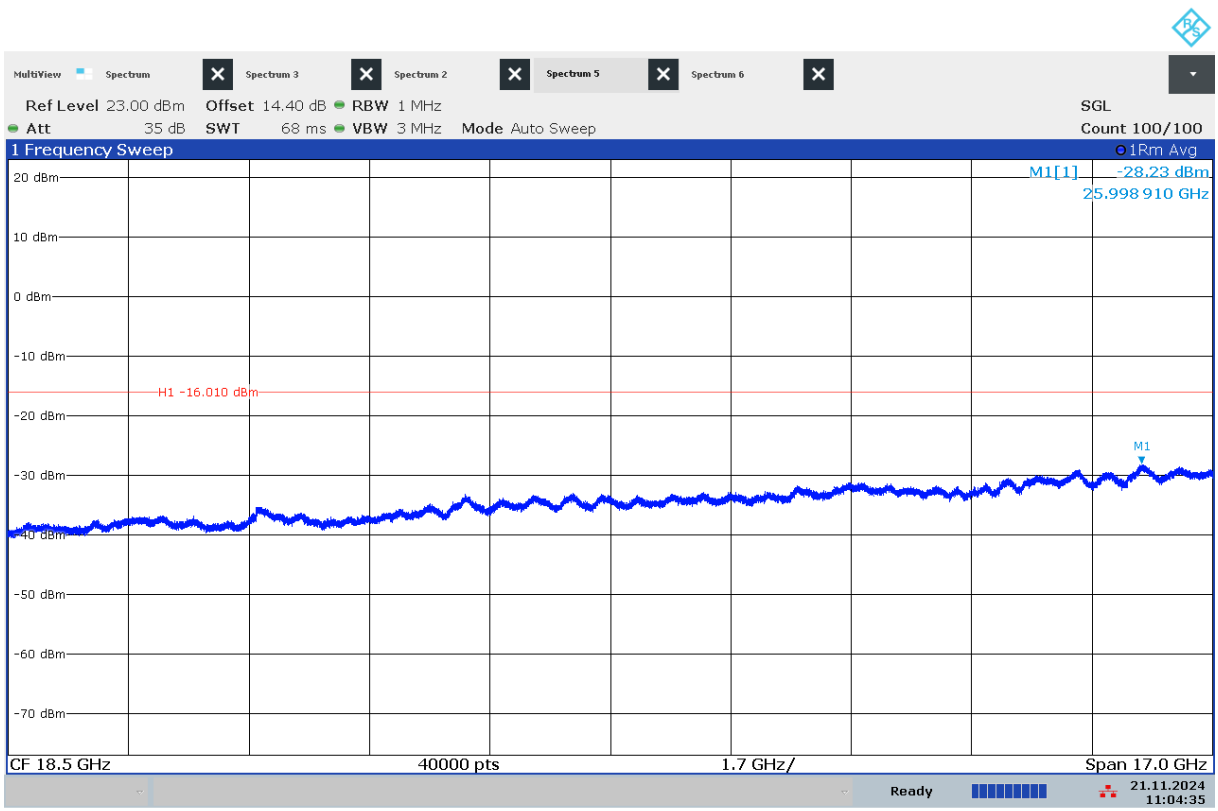



11:07:42 21.11.2024

Port 1, QPSK 10M, Channel Position M

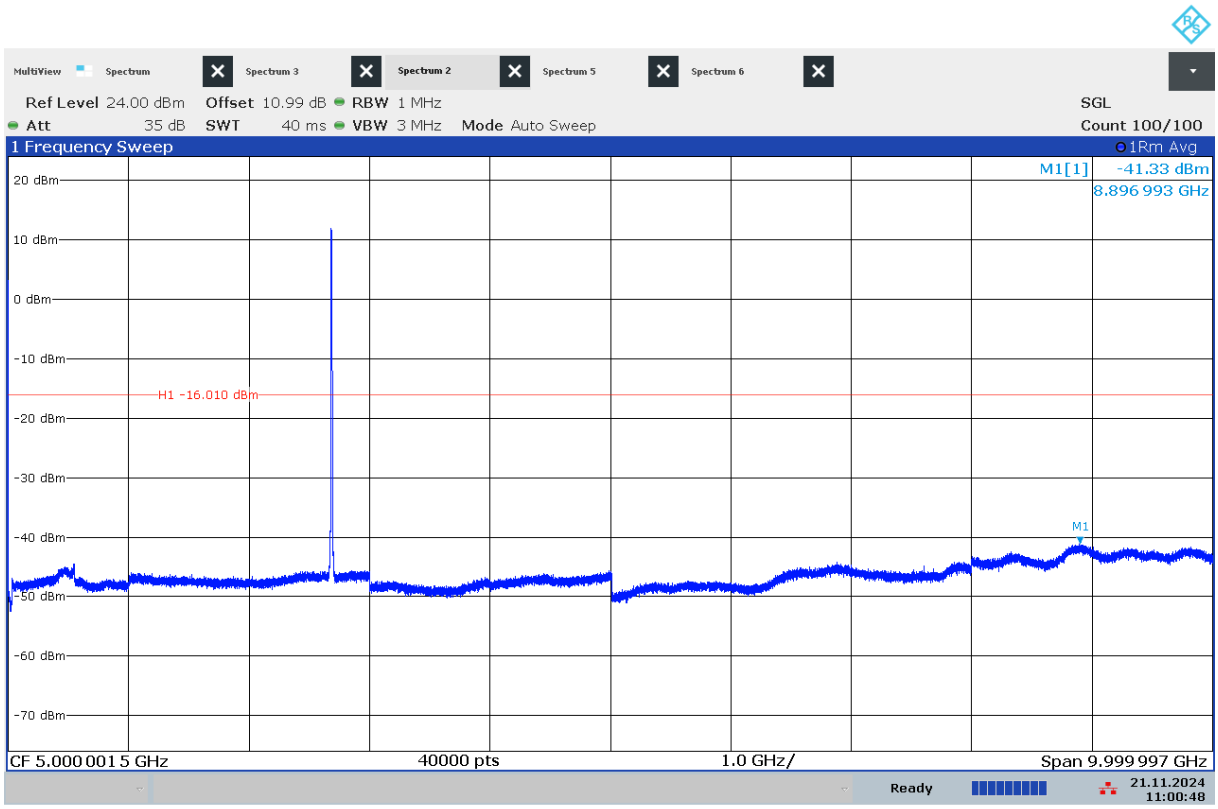



11:05:15 21.11.2024

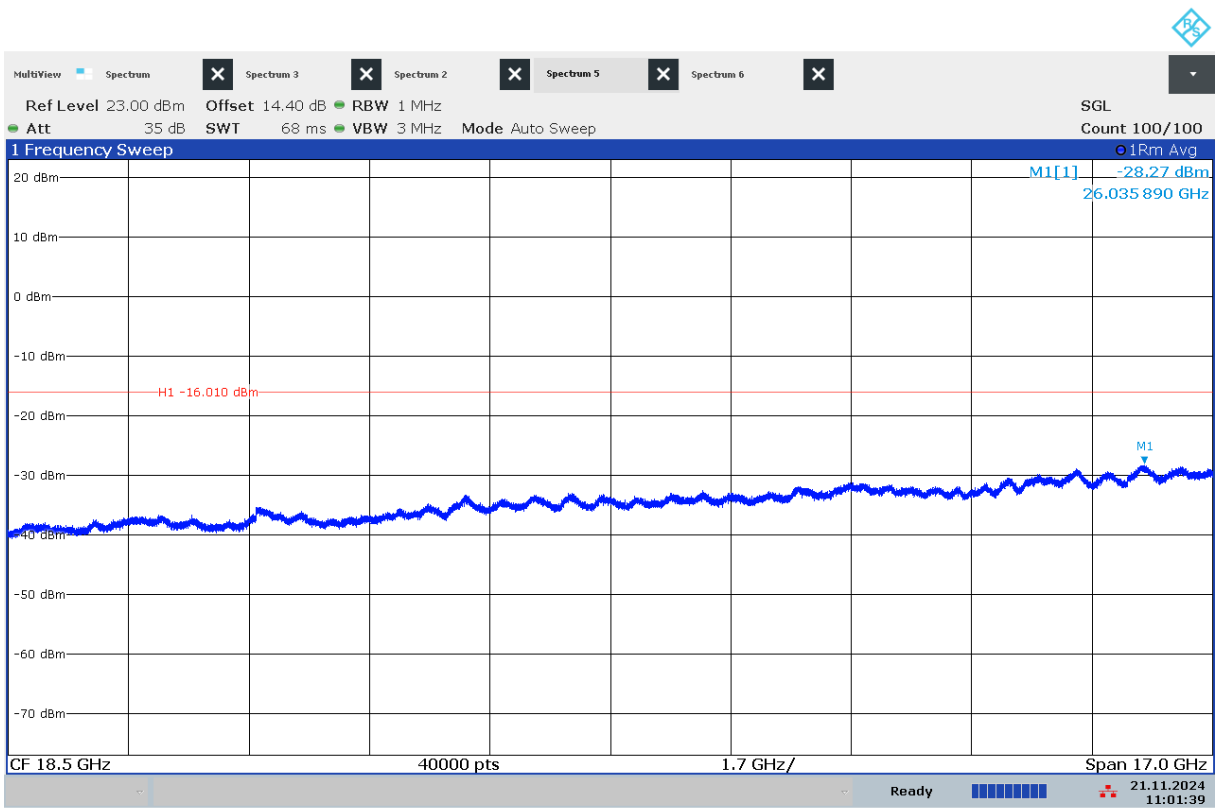



11:04:36 21.11.2024

Port 1, QPSK 10M, Channel Position T

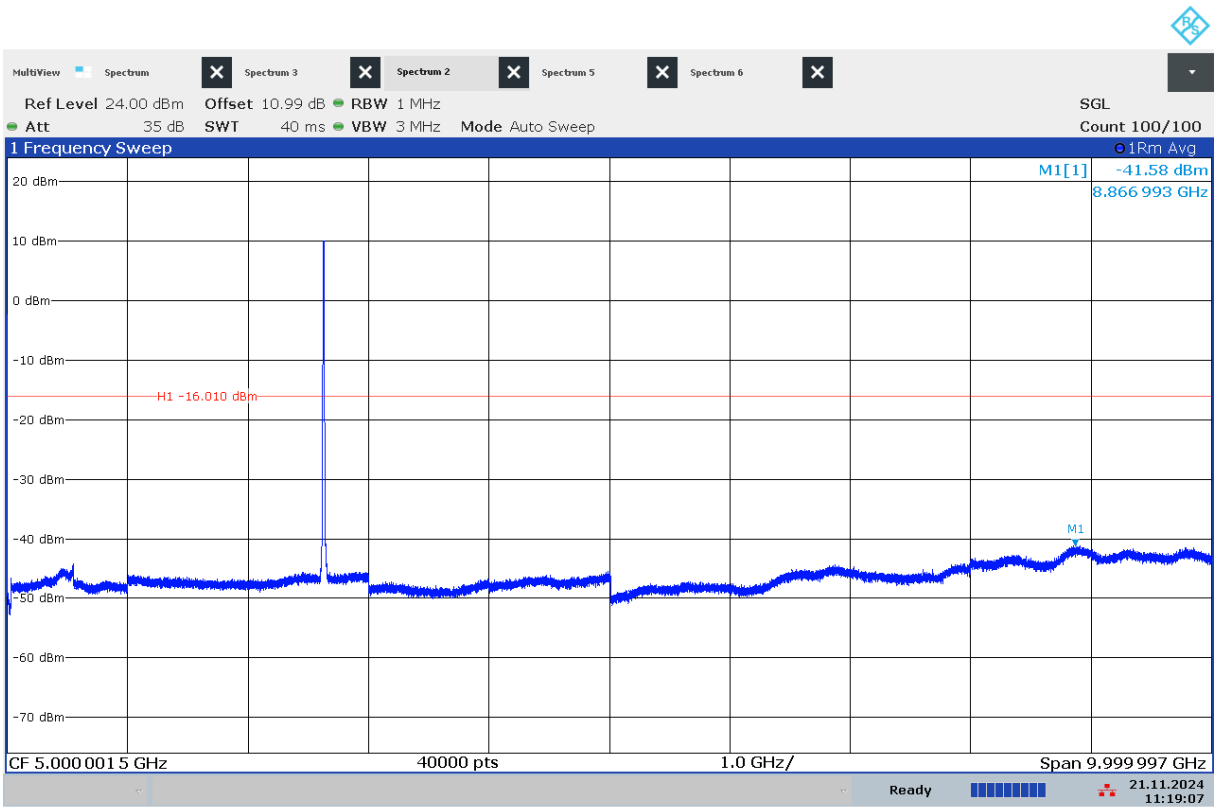



11:00:48 21.11.2024

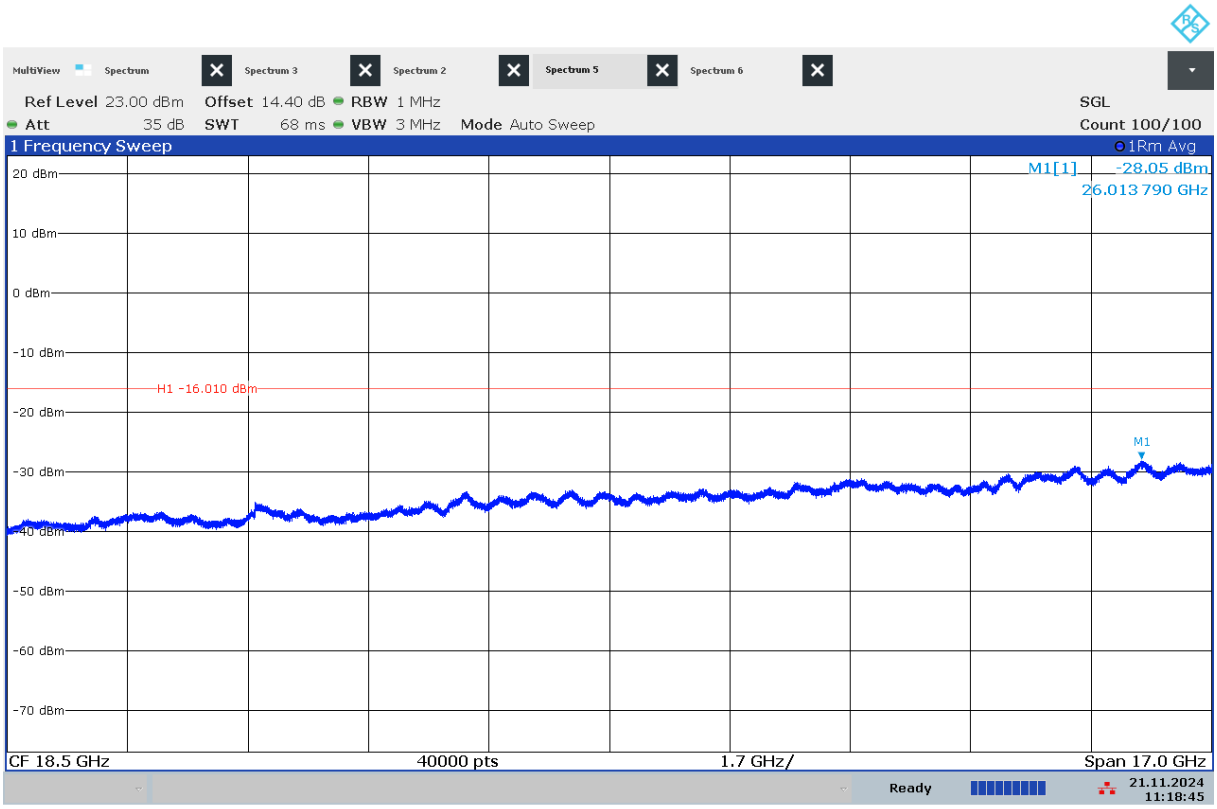



11:01:39 21.11.2024

Port 1, QPSK 15M, Channel Position B

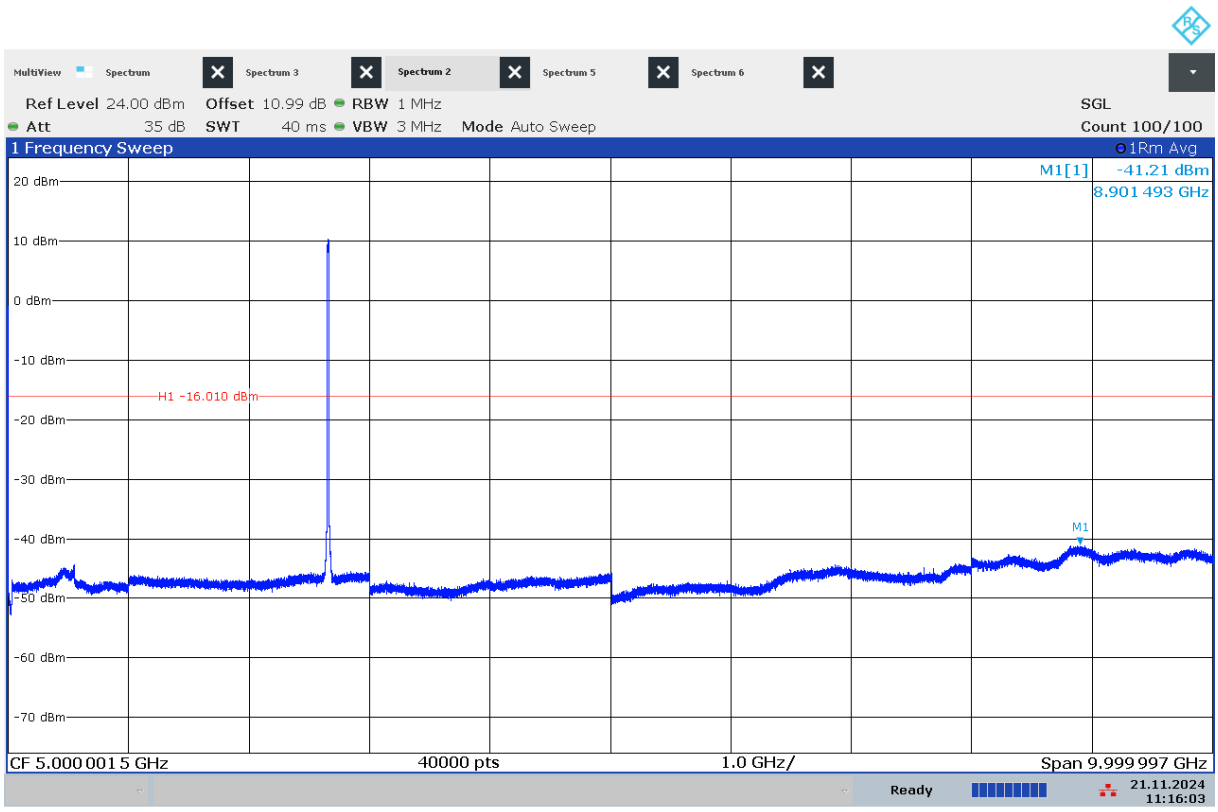



11:19:08 21.11.2024

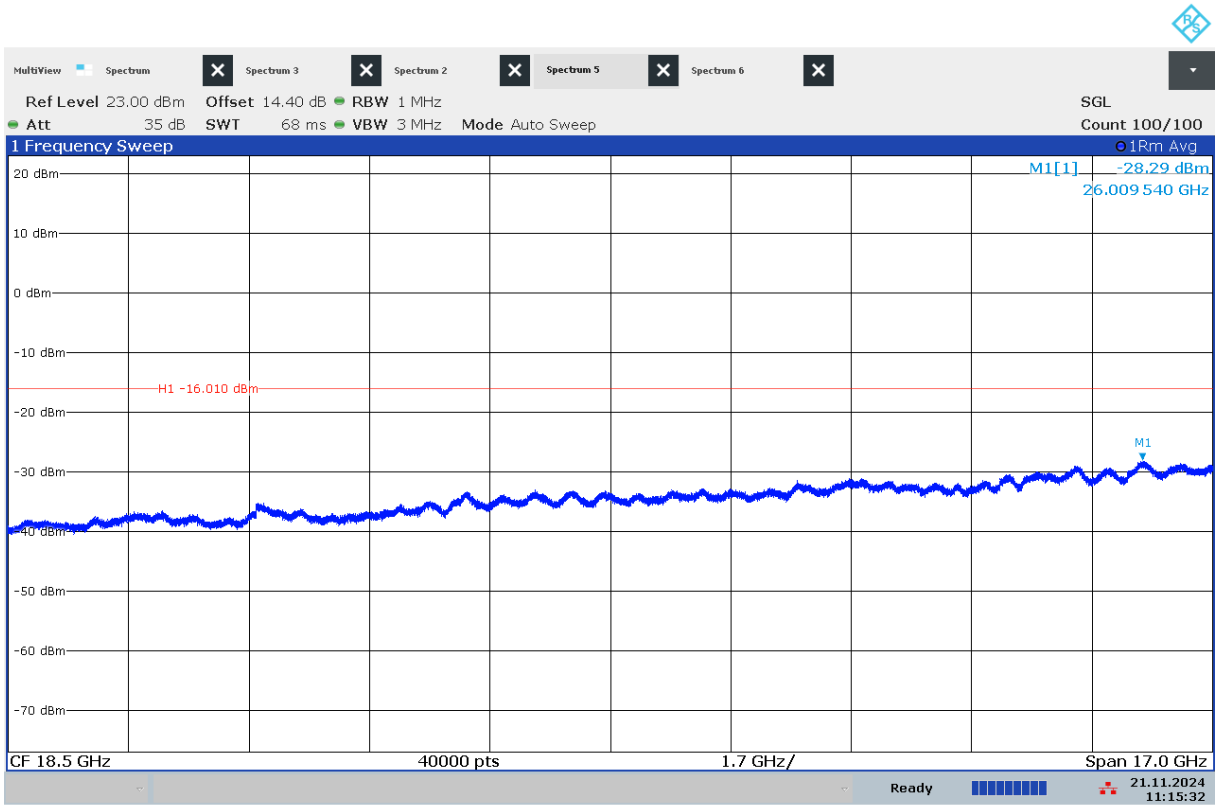



11:18:46 21.11.2024

Port 1, QPSK 15M, Channel Position M

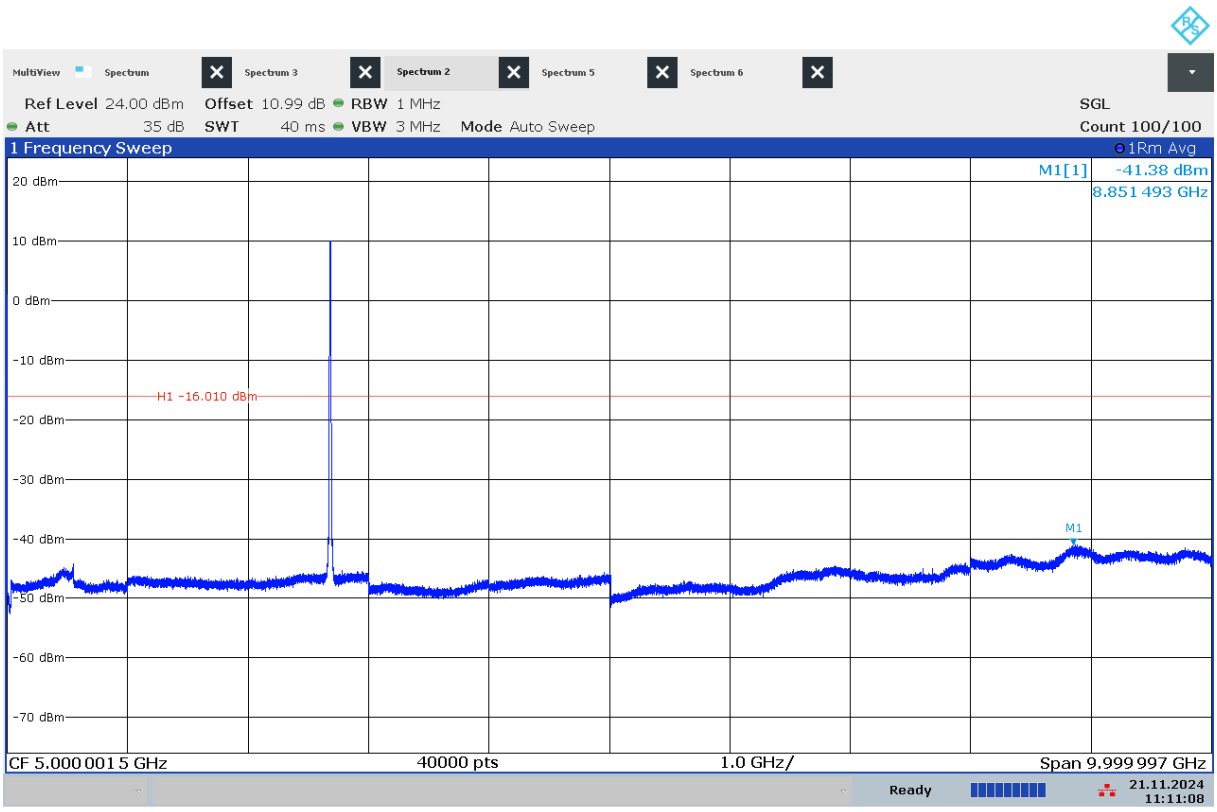



11:16:03 21.11.2024

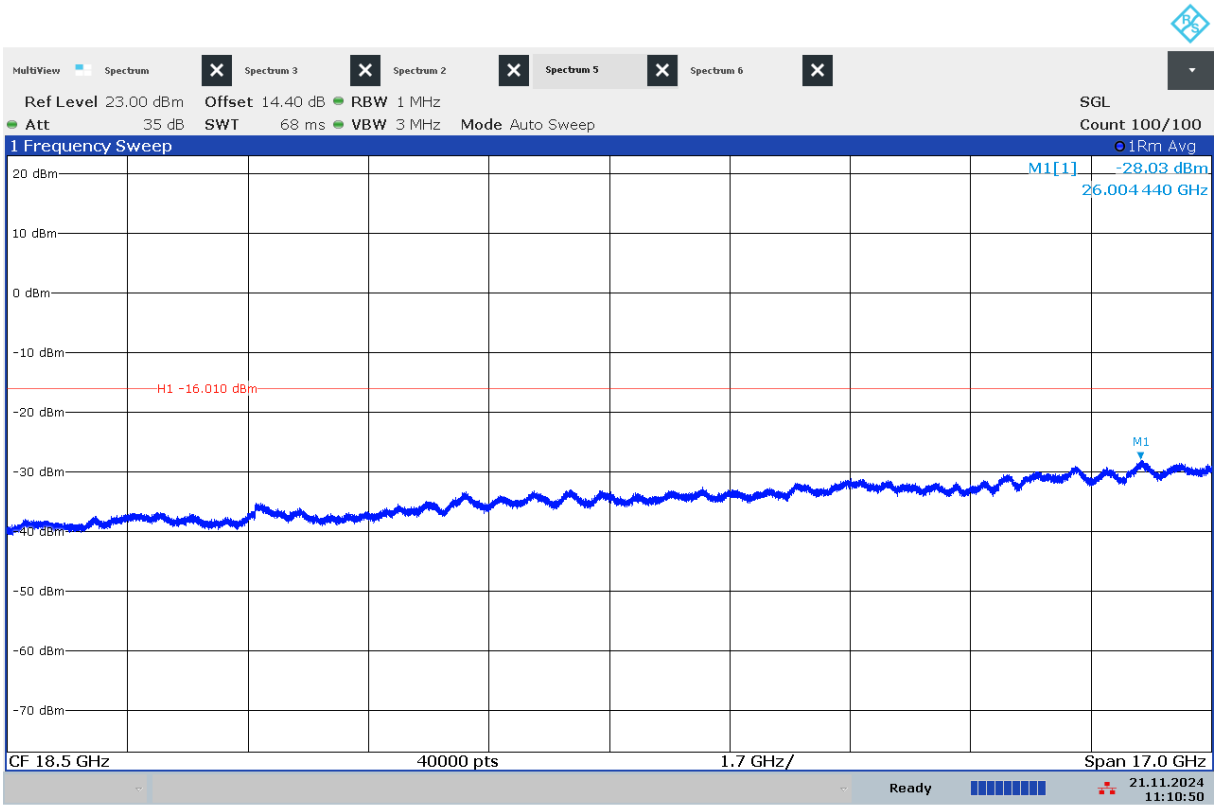



11:15:32 21.11.2024

Port 1, QPSK 15M, Channel Position T

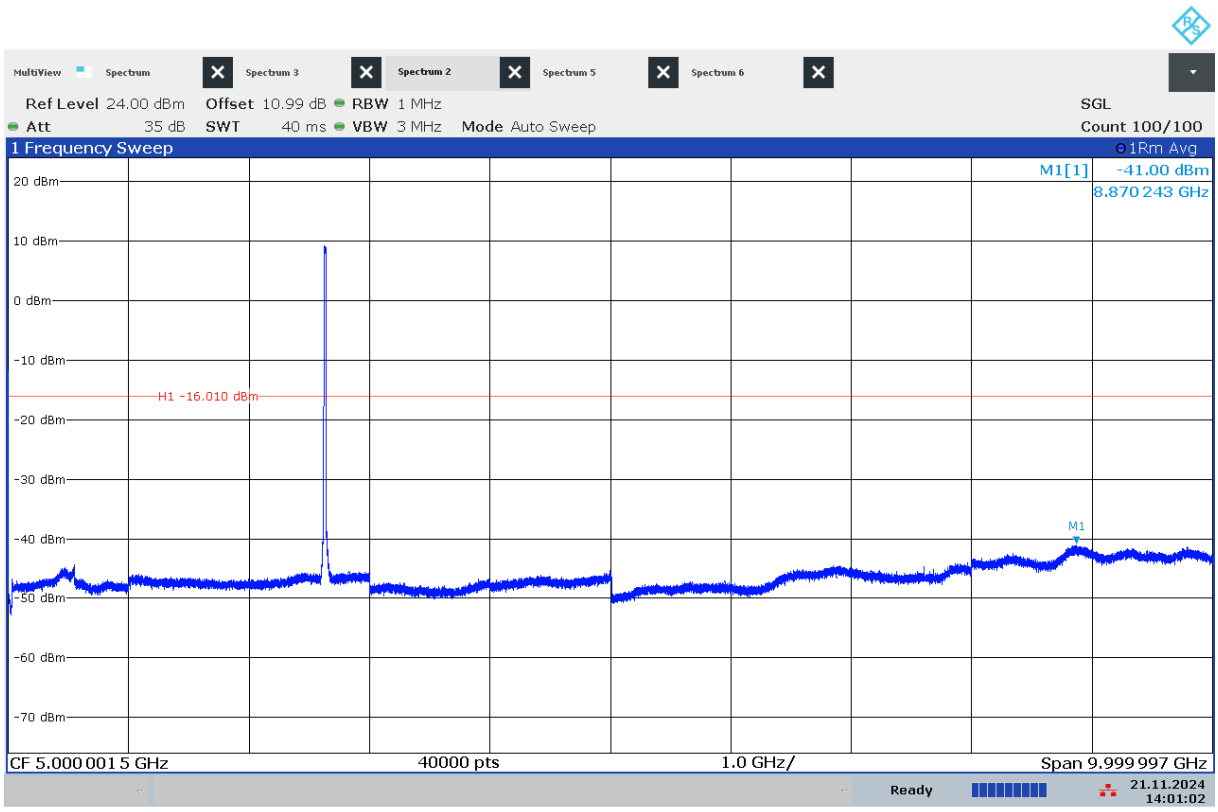



11:11:08 21.11.2024

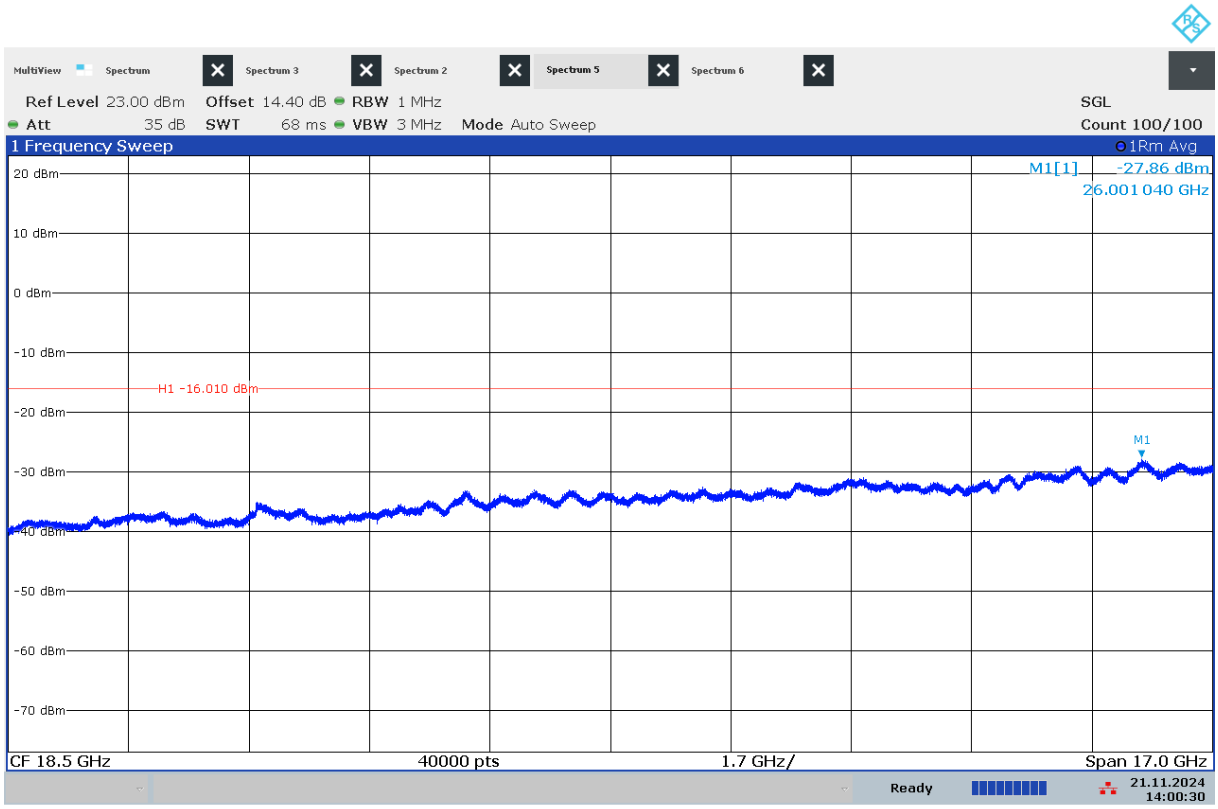



11:10:50 21.11.2024

Port 1, QPSK 20M, Channel Position B

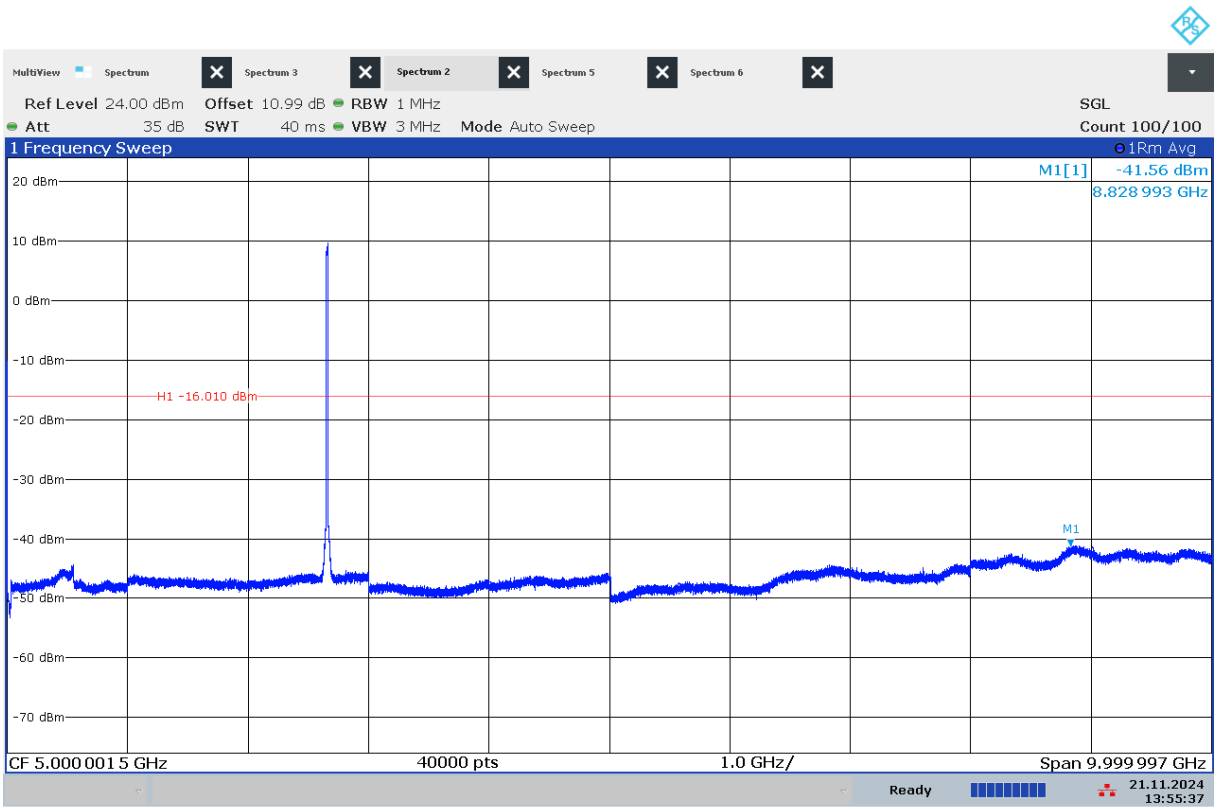



14:01:03 21.11.2024

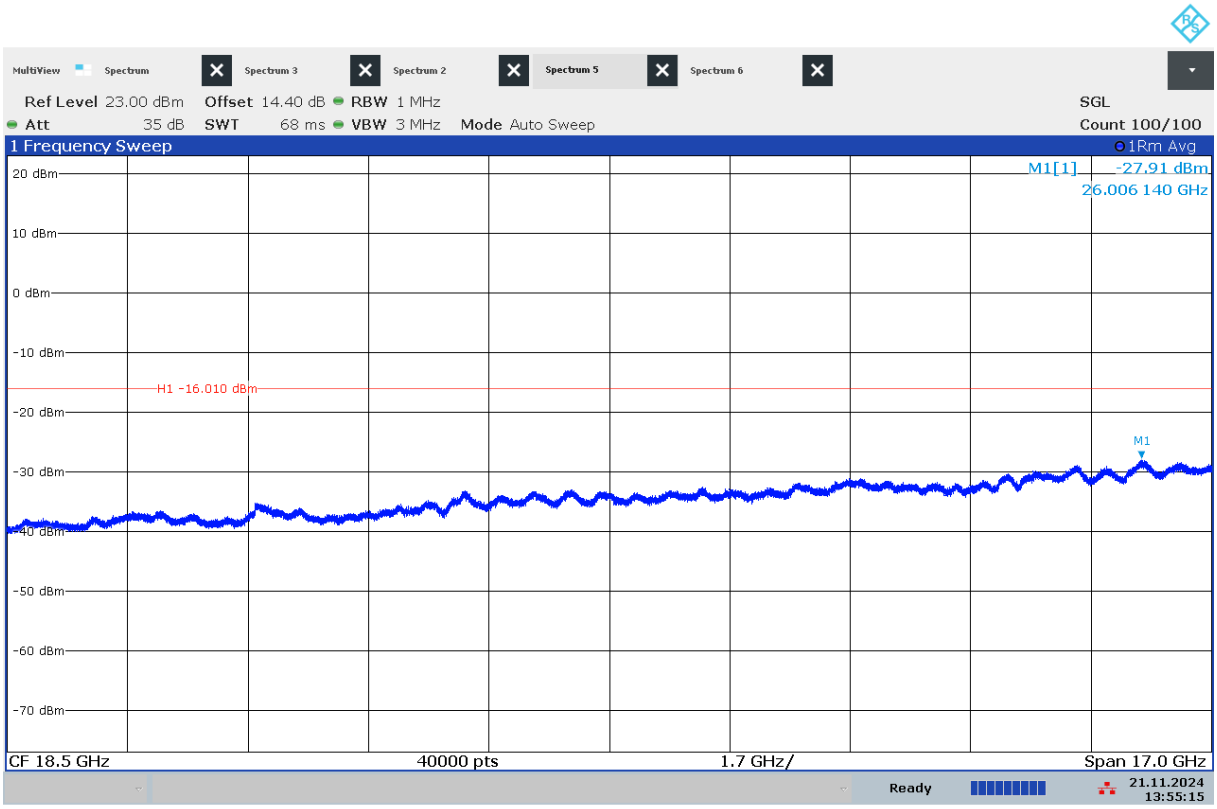



14:00:30 21.11.2024

Port 1, QPSK 20M, Channel Position M

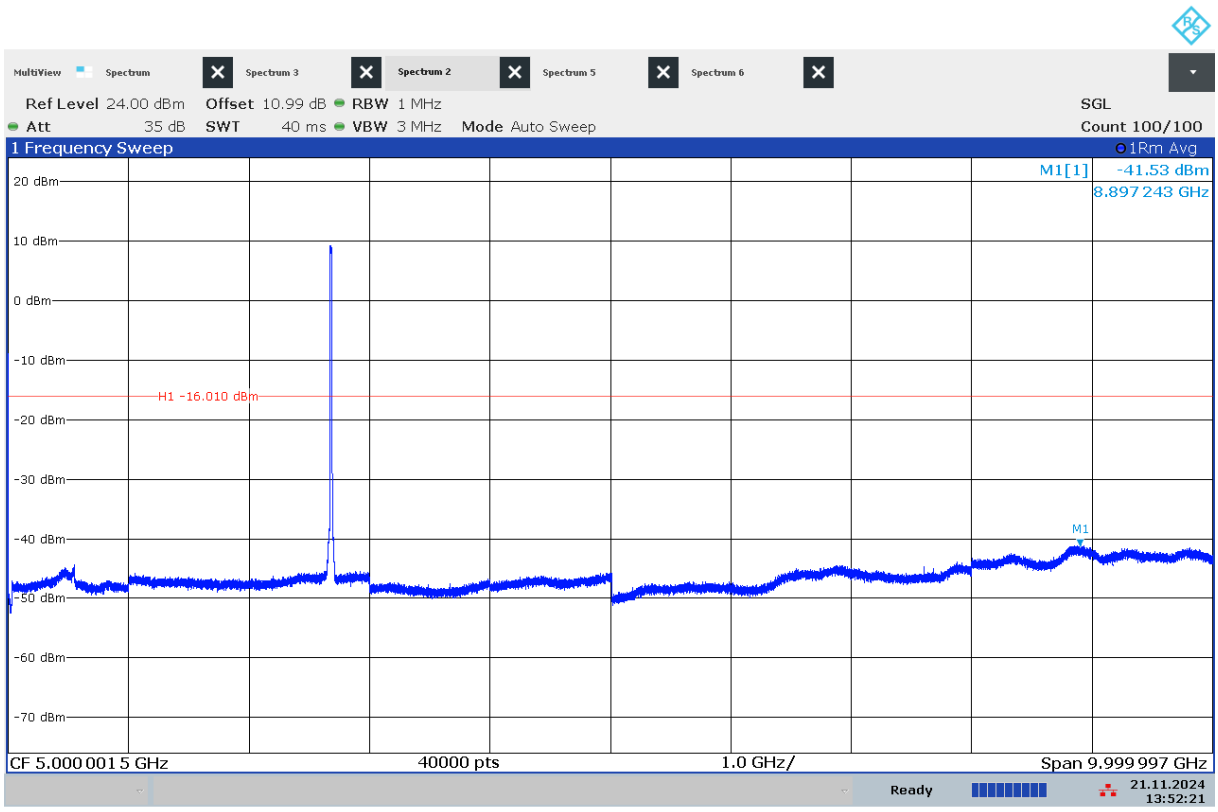



13:55:38 21.11.2024

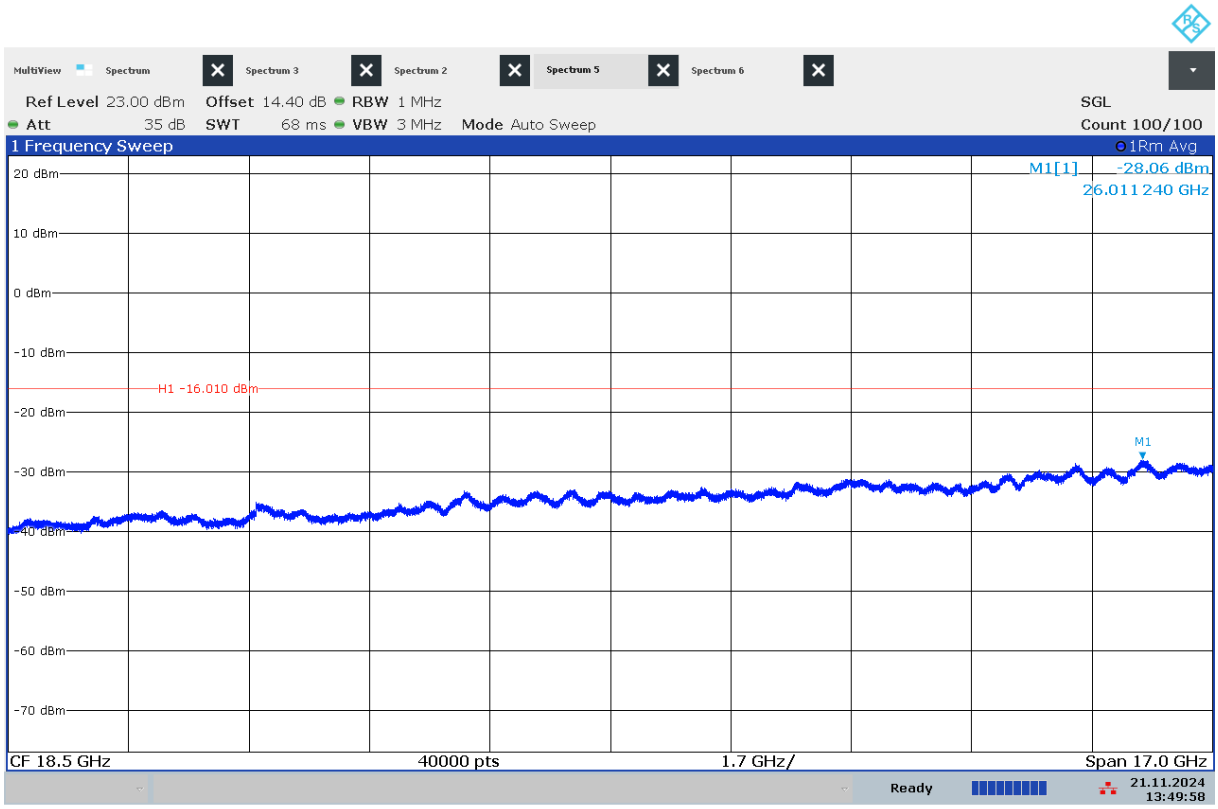



13:55:15 21.11.2024

Port 1, QPSK 20M, Channel Position T




13:52:21 21.11.2024




13:49:58 21.11.2024

## A.5 Radiated Spurious Emission

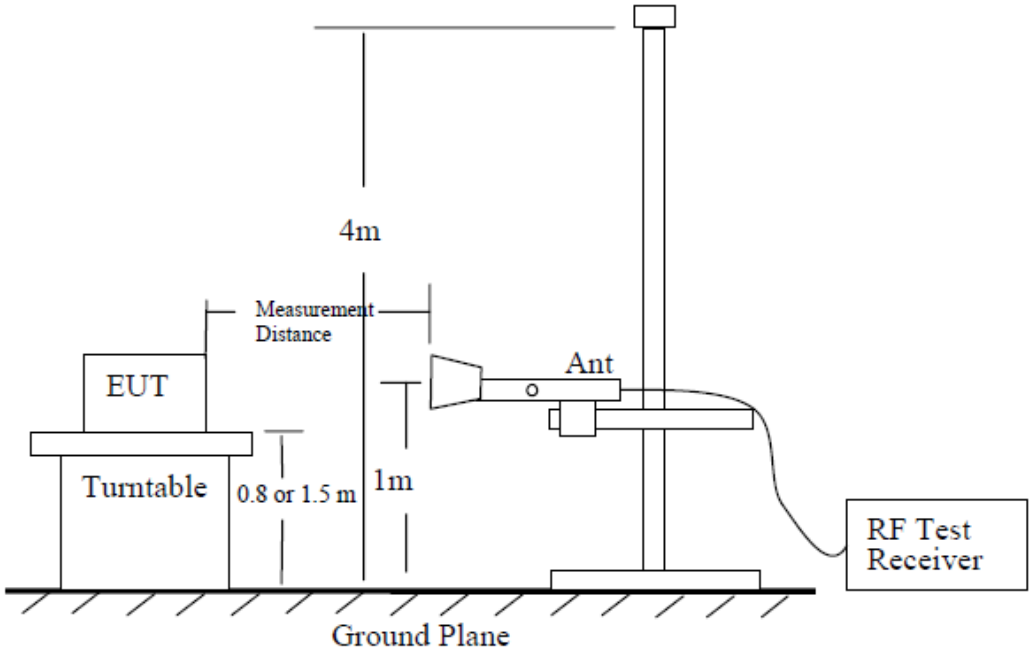
### A.5.1 Measurement procedures

The measurements procedures in C63.26 are used.

The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Band 7.

**The procedure of radiated spurious emissions is as follows:**

Using the test configuration as follow, measure the radiated emissions directly from the EUT and convert the measured field strength or received power to ERP or EIRP, as required, for comparison to the applicable limits.




The emission characteristics of the EUT can be identified from the pre-scan measurement information.

Exploratory radiated measurements (pre-scans) may be performed to determine the general EUT radiated emissions characteristics and, when necessary, the EUT-to-measurement antenna orientation that produces the maximum emission amplitude. Pre-scans shall only be used to determine the emission frequencies (i.e., not amplitude levels). The information garnered from a pre-scan can then be used to perform final compliance measurements using either the substitution or direct field strength method.

For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 80 cm above the reference ground plane. Radiated measurements shall be made with the measurement antenna positioned in both horizontal and vertical polarization. The measurement antenna shall be varied from 1 m to 4 m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level (i.e., field strength or received power). When orienting the measurement antenna in vertical polarization, the minimum height of the lowest

element of the antenna shall clear the site reference ground plane by at least 25 cm.

The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.

For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table or support at a nominal height of 1.5 m above the ground plane. When maximizing the emissions from the EUT for measurement, the EUT and its transmitting antenna(s) shall be rotated through 360°. For each mode of operation to be tested, the frequency spectrum (based on findings from exploratory measurements) shall be monitored.
Final measurements shall be performed for the worst case combination(s) of variable technical parameters that result in the maximum measured emission amplitude, record the frequency and amplitude of the highest fundamental emission (if applicable), and the frequency and amplitude data for the six highest-amplitude spurious emissions.

**A.5.2 Measurement Limit**

**FDD Band 7**: 27.53(m) (2) specifies " For digital base stations, the attenuation shall be not less than 43 + 10 log (P) dB, unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS No. 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. ".

**A.5.3 Measurement Results**

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Band 7. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the LTE Band 7 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this. The range of evaluated frequency is from 30MHz to 26GHz.

**Test note**

1. The EUT is operating at its maximum duty cycle and its maximum power control level.
2. Investigation has been done on all modes and modulations/data rates. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.
3. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept.

**Measurement Results:**

**LTE-MIMO-1C**

**LTE Band 7, 5 MHz, QPSK, Channel 20775**

| Frequency (MHz) | $P_{Mea}$ (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 5244.50 | -39.16 | 7.00 | 10.24 | -35.92 | -13.00 | 22.92 | H |
| 7864.50 | -40.05 | 8.38 | 12.49 | -35.94 | -13.00 | 22.94 | V |
| 10488.50 | -39.16 | 9.67 | 13.10 | -35.73 | -13.00 | 22.73 | V |
| 13110.00 | -49.00 | 10.89 | 13.65 | -46.24 | -13.00 | 33.24 | H |
| 15735.00 | -41.50 | 11.63 | 13.70 | -39.43 | -13.00 | 26.43 | H |
| 17066.00 | -45.42 | 12.57 | 13.95 | -44.04 | -13.00 | 31.04 | H |

**LTE Band 7, 5 MHz, QPSK, Channel 21100**

| Frequency (MHz) | $P_{Mea}$ (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 5308.50 | -30.82 | 6.99 | 10.33 | -27.48 | -13.00 | 14.48 | V |
| 7965.00 | -44.48 | 8.36 | 12.57 | -40.27 | -13.00 | 27.27 | H |
| 10621.00 | -42.31 | 9.29 | 13.12 | -38.48 | -13.00 | 25.48 | V |
| 13283.00 | -47.67 | 10.57 | 13.90 | -44.34 | -13.00 | 31.34 | V |
| 15930.50 | -44.35 | 11.68 | 13.70 | -42.33 | -13.00 | 29.33 | H |
| 17275.50 | -45.36 | 12.37 | 14.41 | -43.32 | -13.00 | 30.32 | H |

**LTE Band 7, 5 MHz, QPSK, Channel 21425**

| Frequency (MHz) | $P_{Mea}$ (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 5375.00 | -28.73 | 6.88 | 10.43 | -25.18 | -13.00 | 12.18 | H |
| 8061.00 | -40.84 | 8.32 | 12.65 | -36.51 | -13.00 | 23.51 | V |
| 10750.00 | -36.03 | 9.43 | 13.15 | -32.31 | -13.00 | 19.31 | V |
| 13436.50 | -47.34 | 10.60 | 14.11 | -43.83 | -13.00 | 30.83 | H |
| 16125.00 | -41.33 | 11.82 | 13.68 | -39.47 | -13.00 | 26.47 | H |
| 17476.50 | -44.67 | 12.67 | 14.85 | -42.49 | -13.00 | 29.49 | V |

Sample：5375.00 MHz

Power (EIRP) = $P_{Mea}$ + $P_{pl}$ + $G_a$

Power (-25.18dBm) = $P_{Mea}$ (-28.73dBm)+ $P_{pl}$ (6.88 dB)+ Ga(10.43dBi)

Note: The measurement results showed here are worst cases

## A.6 Frequency Stability

### A.6.1 Reference

FCC CFR 47 Part 2, Clause 2.1055
FCC CFR 47 Part 27, Clause 27.54

### A.6.2 Method of measurement

Temperature Variation

The EUT was tested over the temperature range -30°C to +50°C in 10°C steps with -12VDC Power Supply. At each temperature step, the Base Station was configured to transmit a [RAT]* at maximum power on the middle channel of the operating band. After achieving thermal balance, the averages of 200 transmission bursts were measured and the result recorded.

Voltage Variation

The EUT was tested at the supplied voltages varied from 85 to 115 percent of the nominal value of 12VDC. At +20°C, the Base Station was configured to transmit a [RAT]* at maximum power on the middle channel of the operating band. The average of 200 transmission bursts was measured and the result recorded.

[RAT]*:
LTE – QPSK modulation

### A.6.3 Measurement limit

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

**A.6.4 Measurement results**

Configuration LTE-MIMO-1C, 5MHz, QPSK

Frequency Error – Temperature Variation

| Supply Voltage DC(V) | Temperature(°C) | Frequency Stability (Hz) |
|---|---|---|
| | | Channel position M |
| 12 | -30 | -1.27 |
| | -20 | -1.24 |
| | -10 | 1.68 |
| | 0 | -1.35 |
| | 10 | 1.35 |
| | 20 | 1.25 |
| | 30 | 1.01 |
| | 40 | -1.04 |
| | 50 | -1.72 |

Frequency Error – Voltage Variation

| Supply Voltage DC(V) | Frequency Stability (Hz) |
|---|---|
| | Channel position M |
| 10.2 | 0.38 |
| 13.8 | 0.55 |

## ANNEX B: Accreditation Certificate

Accredited Laboratory

A2LA has accredited

TELECOMMUNICATION TECHNOLOGY LABS, CAICT

Beijing, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 23rd day of July 2024.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 7049.01
Valid to July 31, 2026

*For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.*

*****END OF REPORT*****