# TEST REPORT NO: FCC_RF_Test_Report_AWHHJ-TYPEAPPR-1682788340-1453

# FCC ID: VBNAWHHJ-01

| | |
|---|---|
| Date: | Oulu 3. Jul 2024 |
| Pages: | 91 |
| Appendices: | 2 |

| | |
|---|---|
| Equipment Under Test: | AirScale Base Transceiver Station Remote Radio Head 4T4R n41 160W 2,5GHz |
| Radio Access technology: | NR (TDD) |
| Type: | AWHHJ |
| Manufacturer: | Nokia Solutions and Networks Oy |
| Address: | Kaapelitie 4, FI-90620, Oulu, Finland |

| | |
|---|---|
| Task: | Conformance test according to the specifications mentioned below |
| Test Specification(s): | FCC 47 CFR part 2<br>FCC 47 CFR part 27 |
| Result: | The EUT complies with the requirements of the specification |

The results relate only to the items tested as described in this test report.

| **Approved by:** | **Date** | **Signature** |
|---|---|---|
| Jarkko Kenttälä<br>Squad Group Lead, Type Approval<br>Nokia Networks | 3 JuL 2024 | |

# Contents

# 1 Summary

The following tests were performed according to the FCC rules in order to verify the compliance of the EUT with the FCC requirements:

| Test No. | Measurement | FCC Rule | Page Number of this Report | Result |
|---|---|---|---|---|
| 1 | RF Output power | § 2.1046,<br>§ 27.50, | 9 | compliant |
| 2 | Modulation Characteristics | § 2.1047, | 21 | compliant |
| 3 | Occupied Bandwidth | § 2.1049, § 2.201,<br>§ 27.53, | 22 | compliant |
| 4 | Spurious Emissions at Antenna Terminals | § 2.1051, § 2.1057<br>§ 27.53 | 36 | compliant |
| 5 | Field Strength of Spurious Radiation | §27.53<br>§15.109 | 47 | compliant |
| 6 | Frequency Stability | §27.54<br>§2.1055 | 50 | compliant |

Table 1 Results – Summary

In accordance with the FCC Rule §15.3 (z) the equipment was tested with the limits that are valid for an *unintentional radiator*.

Measurements guidance: FCC OET laboratory KDB: 662911 D01 Multiple Transmitter Output v01r02, 971168 D03 IM Emission Repeater Amp v01 and FCC KDB 971168 D01 Power Meas License Digital Systems v03r01: ANSI C63.26-2015.

Test Laboratory:

Nokia Solutions and Networks Oy

Kaapelitie 4,

FI-90620, Oulu, Finland

Jarkko Kenttälä

FCC Reg. No: 261413

Testing laboratory accreditation number: T297

## 1.1 Time Schedule

| Test No. | 1, 2, 3, 4 | 5 | 6 |
|---|---|---|---|
| Start of Test: | 02 May 2024 | 30 May 2024 | 03 May 2024 |
| End of Test: | 07 Jun 2024 | 13 Jun 2024 | 08 May 2024 |

## 1.2 Participants

| Name | Function | Signature |
|---|---|---|
| Mika Kallankari | Tests no: 1,2,3 and 4<br>Setup of EUT |  |
| Juha Orava | Tests no: 6 Setup of EUT |  |
| Onyumbe Olamba N´Djeka | Test no 5 Setup of EUT |  |

# 2 Equipment Under Test

The EUT is a AirScale Base Transceiver Station Remote Radio Head

The BTS performs the full RAN function of NR system (New Radio).

## 2.1 Configuration of EUT

The used different EUT configurations are shown by the following table.

| **Module Type** | **Airscale BTS RRH 4T4R, B41 40W per antenna 160W per radio** | |
|---|---|---|
| **Radio Access Technology** | NR | |
| **Duplex mode** | Time Division Duplex (TDD) | |
| **Channel Bandwidth** | NR Single carrier 10MHz (n41) (Config. A),<br>NR Single carrier 20MHz (n41) (Config. B),<br>NR Single carrier 30MHz (n41) (Config. C),<br>NR Single carrier 40MHz (n41) (Config. D),<br>NR Single carrier 50MHz (n41) (Config. E),<br>NR Single carrier 60MHz (n41) (Config. F),<br>NR Single carrier 70MHz (n41) (Config. G),<br>NR Single carrier 80MHz (n41) (Config. H),<br>NR Single carrier 90MHz (n41) (Config. I),<br>NR Single carrier 100MHz (n41) (Config. J),<br>NR Multicarrier 10 MHz+10MHz contuquous spectrum (Config K),<br>NR Multicarrier 10 MHz+10MHz non-contuquous spectrum (Config L),<br>NR Multicarrier 100 MHz+90MHz contuquous spectrum (Config M),<br>NR Multicarrier 10 MHz+10MHz+10MHz non-contuquous spectrum (Config N), | |
| **Supply Voltage** | 48.0 V DC | |
| **Single carrier** | | |
| **Rated Output Power (Prat)** | 11W (40.4dBm) to 40W (46.0dBm) conducted / carrier | |
| **Dual carrier** | | |
| **Rated Output Power (Prat)** | 20W (43.0dBm) conducted / carrier | |
| **Downlink/Uplink ratio** | 3:6 | |
| | **RX** | **TX** |
| **Number of Antenna Ports** | 4 (ANT1 to ANT4) | 4 (ANT1 to ANT4) |
| **MiMo** | Yes | Yes |

Table 2 Overview of EUT configuration

The tests were performed with two EUT at the antenna ports from ANT1 to ANT4.

The used different EUT configurations are shown by the following table.

| Module Name | Serial-No. | Module Type | Test No. |
|---|---|---|---|
| AWHHJ | EB2352R0726 | RRH | 1,2,3,4 |
| AWHHJ | EB2352R0734 | RRH | 5,6 |

Table 3 Configuration of EUT

For a functional description of the modules, please refer to the appropriate related parts and exhibit sections of this certification application.

## 2.2 Operating Conditions

The EUT supports QPSK, 16QAM, 64QAM and 256QAM modulation. If not stated otherwise, the following standard setup procedure for the EUT was used:

The transmitter was set up according to 3GPP TS 38.141 NR Test Models (TM) for all tests:

- TM 1.1: All QPSK modulation testing
- TM 3.1: All 64QAM modulation testing
- TM 3.1A All 256QAM modulation testing
- TM 3.2: All 16QAM modulation testing

During the measurements, one carrier channel was tested at a time. The carrier was set to the maximum power level to ensure the maximum emission amplitudes during all measurements.

During the tests, the AirScale BTS is transmitting a pseudo random bit pattern on the data channels. This ensures that the measurements of the emission characteristics of the transmitter are pursuant to § 2.1049.

Test models TM1.1, TM3.1, TM3.1A and TM3.2, have uplink/Downlink ratio 3:6.

# 3 Test Configuration

If not stated otherwise, the following measurement configuration was used to perform all measurements (see figure below).

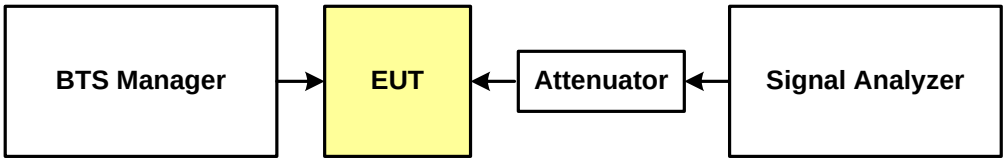



Figure 1 Test Configuration (single output)

The RF output of the transceiver (cell) under test is connected to a signal analyzer via a high power attenuator to protect the input of the signal analyzer from high RF power levels. A description of the analyzer settings is given in each of the sections describing the measurements. The other transceivers are terminated.

A complete list of the measurement equipment is included on page 57 of this measurement report.

## 3.1 Calibration of the Test Equipment

All relevant test equipment has a valid calibration from an external calibration laboratory. Additionally, the signal analyzer has a built-in self-calibration procedure. This calibration procedure was activated prior to the measurements so that the analyzer is deemed accurate. High quality cables were used to connect the measurement equipment to the EUT. The actual loss of the attenuator and the cables was measured with a high precision network analyzer and taken into account for all measurements.

# 4 Test Results

## 4.1 Test No. 1: Transmitter Output Power (§ 2.1046, § 27.50,)

### 4.1.1 Limits

The maximum output power of the equipment measured in terms of average values shall comply with the Total power limit:

EIRP limits are calculated and found in Appendix A.

BRS FCC EIRP limits: 33dBW + 10 log(X/Y) dBW + 10 log(360/beamwidth) dBW, where X is the channel width in MHz and Y is 5.5 or 6MHz. (§ 27.50(h)(ii)).

Peak to average power (PAPR) limit is 13dBm.

### 4.1.2 Test Procedure and Results

Detachable Antenna: The maximum output power at the antenna terminals was measured using a signal analyzer.

The RF power was measured with a frequency sweep across the carrier. The carrier power was calculated from the signal analyzer by integration over the result. The base station maximum output power was measured with signal analyzer with offset adjust in testcase. (Offset is measured connection loss of the test set up.)

For the MiMo output, RF power output was measured from each antenna port individually and the results summed mathematically in accordance to FCC KDB 662911 D01 and ANSI C63.26 -guidance.

All Tx ports were tested in Config A and one Tx port was selected for the remaining testing. The AWHHJ antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the results) and antenna port 4 was selected for the remaining testing based on ANSI C63.26-2015 clauses 5.2.5.3, 5.7.2i and 6.4.

Peak to average power (PAPR) was examined using CCDF method and 0.1% value recorded in dB to the tables below.

Average Power Spectral density was measured using FSW signal Analyzer.

The following table shows the measured output powers at the antenna connector.

| Measured laboratory room temperature and humidity during the tests | | | | |
|---|---|---|---|---|
| Date | Temperature Min-Max: | | Humidity Min-Max: | |
| 02.05.2024 – 04.06.2024 | 23.9 °C | 26.8 °C | 7.0 RH% | 49.5 RH% |

## Config A:

| | Channel Frequency (MHz) | Antenna Port1 Power (dBm) | Antenna Port2 Power (dBm) | Antenna Port3 Power (dBm) | Antenna Port4 Power (dBm) |
|---|---|---|---|---|---|
| Test Model 1 Modulation QPSK | 2501.01 | 45,55 | 45.52 | 45.21 | 45.35 |
| Test Model 3.1 Modulation 64QAM | 2501.01 | 45.45 | 45.41 | 45.12 | 45.22 |
| Test Model 3.2 Modulation 16QAM | 2501.01 | 45.42 | 45.47 | 45.12 | 45.24 |
| Test Model 3.1A Modulation 256QAM | 2501.01 | 45.55 | 45.48 | 45.15 | 45.23 |
| Test Model 1 Modulation QPSK | 2592.99 | 45.49 | 45.67 | 45.58 | 45.72 |
| Test Model 3.1 Modulation 64QAM | 2592.99 | 45.43 | 45.64 | 45.53 | 45.61 |
| Test Model 3.2 Modulation 16QAM | 2592.99 | 45.45 | 45.66 | 45.55 | 45.61 |
| Test Model 3.1A Modulation 256QAM | 2592.99 | 45.48 | 45.67 | 45.56 | 45.64 |
| Test Model 1 Modulation QPSK | 2685 | 45.23 | 45.02 | 45.47 | 45.34 |
| Test Model 3.1 Modulation 64QAM | 2685 | 45.22 | 45.01 | 45.40 | 45.35 |
| Test Model 3.2 Modulation 16QAM | 2685 | 45.25 | 45.04 | 45.41 | 45.34 |

| | | | | | |
|---|---|---|---|---|---|
| Test Model 3.1A Modulation 256QAM | 2685 | 45.25 | 45.05 | 45.42 | 45.34 |
| Total power | (W) | 416.01 | 415.27 | 414.19 | **418.1** |

Table 4 RF Power Output (10 MHz BW NR Band 41)

## Config A:

| Test Model 1.1 Modulation QPSK | | Test Model 3.1 Modulation 64QAM | | Test Model 3.2 Modulation 16QAM | | Test Model 3.1a Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2501.01MHz | | Channel Frequency 2501.01MHz | | Channel Frequency 2501.01MHz | | Channel Frequency 2501.01MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.69 | 4 | 45.62 | 4 | 45.59 | 4 | 45.62 |
| Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.95 | 4 | 45.86 | 4 | 45.85 | 4 | 45.86 |
| Channel Frequency 2685MHz | | Channel Frequency 2685MHz | | Channel Frequency 2685MHz | | Channel Frequency 2685MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.51 | 4 | 45.44 | 4 | 45.44 | 4 | 45.43 |

Table 5 RF Power Output (Band 41 NR 10 MHz Channel BW All modulation types)

## Config B:

| Test Model 1.1 Modulation QPSK | | Test Model 3.1 Modulation 64QAM | | Test Model 3.2 Modulation 16QAM | | Test Model 3.1a Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2505.99MHz | | Channel Frequency 2505.99MHz | | Channel Frequency 2505.99MHz | | Channel Frequency 2505.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.72 | 4 | 45.62 | 4 | 45.63 | 4 | 45.57 |
| Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.92 | 4 | 45.89 | 4 | 45.89 | 4 | 45.83 |
| Channel Frequency 2675.01MHz | | Channel Frequency 2675.01MHz | | Channel Frequency 2675.01MHz | | Channel Frequency 2675.01MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.64 | 4 | 45.65 | 4 | 45.64 | 4 | 45.59 |

Table 6 RF Power Output (Band 41 NR 20 MHz Channel BW All modulation types)

## Config C:

| Test Model 1.1 Modulation QPSK | | Test Model 3.1 Modulation 64QAM | | Test Model 3.2 Modulation 16QAM | | Test Model 3.1a Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2511MHz | | Channel Frequency 2511MHz | | Channel Frequency 2511MHz | | Channel Frequency 2511MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.83 | 4 | 45.78 | 4 | 45.69 | 4 | 45.72 |
| Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 46.01 | 4 | 45.97 | 4 | 45.91 | 4 | 45.93 |
| Channel Frequency 2675.01MHz | | Channel Frequency 2675.01MHz | | Channel Frequency 2675.01MHz | | Channel Frequency 2675.01MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.68 | 4 | 45.66 | 4 | 45.58 | 4 | 45.60 |

Table 7 RF Power Output (Band 41 NR 30 MHz Channel BW All modulation types)

## Config D:

| Test Model 1.1 Modulation QPSK | | Test Model 3.1 Modulation 64QAM | | Test Model 3.2 Modulation 16QAM | | Test Model 3.1a Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2516.01MHz | | Channel Frequency 2516.01MHz | | Channel Frequency 2516.01MHz | | Channel Frequency 2516.01MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.81 | 4 | 45.77 | 4 | 45.73 | 4 | 45.74 |
| Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 46.01 | 4 | 45.96 | 4 | 45.93 | 4 | 45.94 |
| Channel Frequency 2670MHz | | Channel Frequency 2670MHz | | Channel Frequency 2670MHz | | Channel Frequency 2670MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.60 | 4 | 45.57 | 4 | 45.56 | 4 | 45.56 |

Table 8 RF Power Output (Band 41 NR 40 MHz Channel BW All modulation types)

## Config E:

| Test Model 1.1 Modulation QPSK | | Test Model 3.1 Modulation 64QAM | | Test Model 3.2 Modulation 16QAM | | Test Model 3.1a Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2520.99MHz | | Channel Frequency 2520.99MHz | | Channel Frequency 2520.99MHz | | Channel Frequency 2520.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.72 | 4 | 45.71 | 4 | 45.63 | 4 | 45.66 |
| Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.81 | 4 | 45.77 | 4 | 45.72 | 4 | 45.74 |
| Channel Frequency 2664.99MHz | | Channel Frequency 2664.99MHz | | Channel Frequency 2664.99MHz | | Channel Frequency 2664.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.58 | 4 | 45.51 | 4 | 45.51 | 4 | 45.54 |

Table 9 RF Power Output (Band 41 NR 50 MHz Channel BW All modulation types)

## Config F:

| Test Model 1.1 Modulation QPSK | | Test Model 3.1 Modulation 64QAM | | Test Model 3.2 Modulation 16QAM | | Test Model 3.1a Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2526MHz | | Channel Frequency 2526MHz | | Channel Frequency 2526MHz | | Channel Frequency 2526MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.76 | 4 | 45.69 | 4 | 45.60 | 4 | 45.62 |
| Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.79 | 4 | 45.72 | 4 | 45.69 | 4 | 45.66 |
| Channel Frequency 2660.01MHz | | Channel Frequency 2660.01MHz | | Channel Frequency 2660.01MHz | | Channel Frequency 2660.01MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.57 | 4 | 45.52 | 4 | 45.49 | 4 | 45.46 |

Table 10 RF Power Output (Band 41 NR 60 MHz Channel BW All modulation types)

## Config G:

| Test Model 1.1 Modulation QPSK | | Test Model 3.1 Modulation 64QAM | | Test Model 3.2 Modulation 16QAM | | Test Model 3.1a Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2531.01MHz | | Channel Frequency 2531.01MHz | | Channel Frequency 2531.01MHz | | Channel Frequency 2531.01MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.70 | 4 | 45.67 | 4 | 45.64 | 4 | 45.62 |
| Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.67 | 4 | 45.66 | 4 | 45.66 | 4 | 45.63 |
| Channel Frequency 2655MHz | | Channel Frequency 2655MHz | | Channel Frequency 2655MHz | | Channel Frequency 2655MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.52 | 4 | 45.47 | 4 | 45.47 | 4 | 45.45 |

Table 11 RF Power Output (Band 41 NR 70 MHz Channel BW All modulation types)

## Config H:

| Test Model 1.1 Modulation QPSK | | Test Model 3.1 Modulation 64QAM | | Test Model 3.2 Modulation 16QAM | | Test Model 3.1a Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2535.99MHz | | Channel Frequency 2535.99MHz | | Channel Frequency 2535.99MHz | | Channel Frequency 2535.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.74 | 4 | 45.66 | 4 | 45.62 | 4 | 45.54 |
| Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.76 | 4 | 45.70 | 4 | 45.66 | 4 | 45.63 |
| Channel Frequency 2649.99MHz | | Channel Frequency 2649.99MHz | | Channel Frequency 2649.99MHz | | Channel Frequency 2649.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.57 | 4 | 45.50 | 4 | 45.47 | 4 | 45.44 |

Table 12 RF Power Output (Band 41 NR 80 MHz Channel BW All modulation types)

## Config I:

| Test Model 1.1 Modulation QPSK | | Test Model 3.1 Modulation 64QAM | | Test Model 3.2 Modulation 16QAM | | Test Model 3.1a Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2541MHz | | Channel Frequency 2541MHz | | Channel Frequency 2541MHz | | Channel Frequency 2541MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.77 | 4 | 45.66 | 4 | 45.58 | 4 | 45.60 |
| Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.79 | 4 | 45.72 | 4 | 45.65 | 4 | 45.66 |
| Channel Frequency 2645.01MHz | | Channel Frequency 2645.01MHz | | Channel Frequency 2645.01MHz | | Channel Frequency 2645.01MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.65 | 4 | 45.62 | 4 | 45.56 | 4 | 45.57 |

Table 13 RF Power Output (Band 41 NR 90 MHz Channel BW All modulation types)

## Config J:

| Test Model 1.1 Modulation QPSK | | Test Model 3.1 Modulation 64QAM | | Test Model 3.2 Modulation 16QAM | | Test Model 3.1a Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2546.01MHz | | Channel Frequency 2546.01MHz | | Channel Frequency 2546.01MHz | | Channel Frequency 2546.01MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.71 | 4 | 45.66 | 4 | 45.65 | 4 | 45.60 |
| Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.67 | 4 | 45.60 | 4 | 45.66 | 4 | 45.59 |
| Channel Frequency 2640MHz | | Channel Frequency 2640MHz | | Channel Frequency 2640MHz | | Channel Frequency 2640MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 45.71 | 4 | 45.64 | 4 | 45.65 | 4 | 45.59 |

Table 14 RF Power Output (Band 41 NR 100 MHz Channel BW All modulation types)

## Config K:

| Test Model 1.1 Modulation QPSK | | Test Model 3.1 Modulation 64QAM | | Test Model 3.2 Modulation 16QAM | | Test Model 3.1a Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2501.01/2511MHz | | Channel Frequency 2501.01/2511MHz | | Channel Frequency 2501.01/2511MHz | | Channel Frequency 2501.01/2511MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 42.55/42.75 | 4 | 42.44/42.73 | 4 | 42.40/42.66 | 4 | 42.40/42.62 |
| Channel Frequency 2588.01/2598MHz | | Channel Frequency 2588.01/2598MHz | | Channel Frequency 2588.01/2598MHz | | Channel Frequency 2588.01/2598MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 42.93/42.82 | 4 | 42.86/42.78 | 4 | 42.83/42.74 | 4 | 42.83/42.69 |
| Channel Frequency 2675.01/2685MHz | | Channel Frequency 2675.01/2685MHz | | Channel Frequency 2675.01/2685MHz | | Channel Frequency 2675.01/2685MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 42.67/42.50 | 4 | 42.62/42.48 | 4 | 42.61/42.45 | 4 | 42.60/42.38 |

Table 15 RF Power Output (Band 41 NR 10+10 MHz Contiquous spectrum Channel BW All modulation types)

## Config L:

| Test Model 1.1 Modulation QPSK | | Test Model 3.1 Modulation 64QAM | | Test Model 3.2 Modulation 16QAM | | Test Model 3.1a Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2501.01/2685MHz | | Channel Frequency 2501.01/2685MHz | | Channel Frequency 2501.01/2685MHz | | Channel Frequency 2501.01/2685MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 41.87/42.44 | 4 | 41.79/42.34 | 4 | 41.76/42.37 | 4 | 41.74/42.32 |

Table 16 RF Power Output (Band 41 E-UTRA 10+10 MHz Non-contiquous spectrum Channel BW All modulation types)

## Config M:

| Test Model 1.1 Modulation QPSK | | Test Model 3.1 Modulation 64QAM | | Test Model 3.2 Modulation 16QAM | | Test Model 3.1a Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2546.01/2640.99MHz | | Channel Frequency 2546.01/2640.99MHz | | Channel Frequency 2546.01/2640.99MHz | | Channel Frequency 2546.01/2640.99MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 42.04/42.39 | 4 | 42.04/42.39 | 4 | 41.97/42.28 | 4 | 41.95/42.33 |
| Channel Frequency 2548.01/2643MHz | | Channel Frequency 2548.01/2643MHz | | Channel Frequency 2548.01/2643MHz | | Channel Frequency 2548.01/2643MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 42.07/42.41 | 4 | 42.03/42.38 | 4 | 42.01/42.30 | 4 | 41.96/42.31 |
| Channel Frequency 2550/2645.01MHz | | Channel Frequency 2550/2645.01MHz | | Channel Frequency 2550/2645.01MHz | | Channel Frequency 2550/2645.01MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 41.97/42.35 | 4 | 41.94/42.24 | 4 | 41.96/42.23 | 4 | 41.88/42.20 |

Table 17 RF Power Output (B41 NR 100+90 MHz Contiquous spectrum Channel BW All modulation types)

## Config N:

| Test Model 1.1 Modulation QPSK | | Test Model 3.1 Modulation 64QAM | | Test Model 3.2 Modulation 16QAM | | Test Model 3.1a Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2501.01/2511/ 2685MHz | | Channel Frequency 2501.01/2511/ 2685MHz | | Channel Frequency 2501.01/2511/ 2685MHz | | Channel Frequency 2501.01/2511/ 2685MHz | |
| Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) | Tx Port | (dBm) |
| 4 | 40.09/40.33/ 40.65 | 4 | 40.03/40.31/ 40.60 | 4 | 40.03/40.27/ 40.62 | 4 | 40.03/40.22/ 40.60 |

Table 18 RF Power Output (B41 NR 10+10+10 MHz Contiquous/Non Contiguous spectrum Channel BW All modulation types)

The base station maximum output power was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

**Config A:**

| Test Model 1.1<br>Modulation QPSK | | Test Model 3.1<br>Modulation 64QAM | | Test Model 3.2<br>Modulation 16QAM | | Test Model 3.1a<br>Modulation 256QAM | |
|---|---|---|---|---|---|---|---|
| Channel Frequency 2501.01MHz | | Channel Frequency 2501.01MHz | | Channel Frequency 2501.01MHz | | Channel Frequency 2501.01MHz | |
| Tx Port | dBm/MHz | Tx Port | dBm/MHz | Tx Port | dBm/MHz | Tx Port | dBm/MHz |
| 4 | 36.56 | 4 | 36.48 | 4 | 37.26 | 4 | 36.46 |
| Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | |
| Tx Port | dBm/MHz | Tx Port | dBm/MHz | Tx Port | dBm/MHz | Tx Port | dBm/MHz |
| 4 | 36.76 | 4 | 36.74 | 4 | 37.52 | 4 | 36.76 |
| Channel Frequency 2685MHz | | Channel Frequency 2685MHz | | Channel Frequency 2685MHz | | Channel Frequency 2685MHz | |
| Tx Port | dBm/MHz | Tx Port | dBm/MHz | Tx Port | dBm/MHz | Tx Port | dBm/MHz |
| 4 | 36.61 | 4 | 36.55 | 4 | 37.32 | 4 | 36.56 |

Table 19 Power Spectral Density (B41 NR 10 MHz Channel BW)

The base station power spectral density was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

**Config A:**

| Test Model 1.1<br>Modulation QPSK<br>Channel Frequency 2501.01MHz | | Test Model 3.1<br>Modulation 64QAM<br>Channel Frequency 2501.01MHz | | Test Model 3.2<br>Modulation 16QAM<br>Channel Frequency 2501.01MHz | | Test Model 3.1a<br>Modulation 256QAM<br>Channel Frequency 2501.01MHz | |
|---|---|---|---|---|---|---|---|
| Tx Port | CCDF 0.1% | Tx Port | CCDF 0.1% | Tx Port | CCDF 0.1% | Tx Port | CCDF 0.1% |
| 4 | 8.00 | 4 | 8.02 | 4 | 7.98 | 4 | 8.06 |
| Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | | Channel Frequency 2592.99MHz | |
| Tx Port | CCDF 0.1% | Tx Port | CCDF 0.1% | Tx Port | CCDF 0.1% | Tx Port | CCDF 0.1% |
| 4 | 8.00 | 4 | 8.06 | 4 | 8.00 | 4 | 8.06 |
| Channel Frequency 2685MHz | | Channel Frequency 2685MHz | | Channel Frequency 2685MHz | | Channel Frequency 2685MHz | |
| Tx Port | CCDF 0.1% | Tx Port | CCDF 0.1% | Tx Port | CCDF 0.1% | Tx Port | CCDF 0.1% |
| 4 | 8.02 | 4 | 8.04 | 4 | 7.98 | 4 | 8.04 |

Table 20 Peak to Average Power (B41 NR 10 MHz BW)

The base station peak to average power was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

## 4.2 Test No. 2: Modulation Characteristics (§ 2.1047)

The occupied bandwidth was measured to be compliant with the manufacturer's specifications and with all requirements of the FCC rules, which represents the 99% power bandwidth (see the following section and screenshots on page 62).

No further testing is required under this section of the FCC rules. No measurements other than the occupied bandwidth are required. Sample of modulation screenshots are on page 60, in I/Q constellation diagrams and tables, showing QPSK, 16QAM, 64QAM and 256QAM –modulation generation.

## 4.3 Test No. 3: Occupied Bandwidth (§ 2.1049, § 2.201, § 27.53)

### 4.3.1 Limits

Para. No. 2.1049. The 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0.5% of the emitted power.

FCC § 27.53(m)(6) for BRS: 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.

### 4.3.2 Test Procedure and Results

The 99% occupied bandwidth of the carrier emission is measured using a signal analyzer with Resolution Bandwidth set to 200kHz-2MHz (1-5% of bandwidth; see screenshots on page 64 for details). The following tables summarize the results:

The Relative measurement procedure of OBW is measured as the width of the spectral envelope of the modulated signal, at an amplitude level reduced from a reference value by a specified ratio (or in decibels, a specified number of dB down from the reference value). The typical ratio for transmitters is −26 dB, corresponding to the 26 dB BW. The Relative measurement procedure emission is measured using a signal analyzer with Resolution Bandwidth set to 200kHz-2MHz (1-5% of bandwidth; see screenshots on page 67 for details).

Emission designator summary tables are found in Appendix B.

The following tables summarize the results:

| **Measured laboratory room temperature and humidity during the tests** | | | | |
|---|---|---|---|---|
| Date | Temperature Min-Max: | | Humidity Min-Max: | |
| 03.05.2024 – 04.06.2024 | 24.0 °C | 26.8 °C | 7.0 RH% | 49.5 RH% |

**Config A:**

| Test Model 1.1 Modulation QPSK | | | Test Model 3.1 Modulation 64QAM | | | Test Model 3.2 Modulation 16QAM | | | Test Model 3.1a Modulation 256QAM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Channel Frequency 2501.01MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 4 | 8.66 | 9.75 |
| Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 4 | 8.70 | 9.71 | 4 | 8.65 | 9.71 | 4 | 8.63 | 9.69 | 4 | 8.68 | 9.75 |
| | | | | | | | | | Channel Frequency 2685MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 4 | 8.66 | 9.69 |

Table 21 Occupied Bandwidth (Band 41 NR 10 MHz Channel bandwidth)

**Config B:**

| Test Model 1.1 Modulation QPSK | | | Test Model 3.1 Modulation 64QAM | | | Test Model 3.2 Modulation 16QAM | | | Test Model 3.1a Modulation 256QAM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Channel Frequency 2505.99MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 1 | 18.37 | 19.98 |
| Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 1 | 18.37 | 19.98 | 1 | 18.41 | 20.06 | 1 | 18.47 | 19.98 | 1 | 18.38 | 19.90 |
| | | | | | | | | | Channel Frequency 2679.99MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 1 | 18.36 | 19.90 |

Table 22 Occupied Bandwidth (Band 41 NR 20 MHz Channel bandwidth)

## Config C:

| Test Model 1.1 Modulation QPSK | | | Test Model 3.1 Modulation 64QAM | | | Test Model 3.2 Modulation 16QAM | | | Test Model 3.1a Modulation 256QAM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Channel Frequency 2511MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 4 | 27.90 | 29.79 |
| Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 4 | 27.95 | 29.70 | 4 | 27.95 | 29.79 | 4 | 28.02 | 29.79 | 4 | 27.92 | 29.85 |
| | | | | | | | | | Channel Frequency 2675.01MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 4 | 27.87 | 29.73 |

Table 23 Occupied Bandwidth (Band 41 NR 30 MHz Channel bandwidth)

**Config D:**

| Test Model 1.1 Modulation QPSK | | | Test Model 3.1 Modulation 64QAM | | | Test Model 3.2 Modulation 16QAM | | | Test Model 3.1a Modulation 256QAM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Channel Frequency 2516.01MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 1 | 38.00 | 40.60 |
| Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 1 | 38.07 | 40.76 | 1 | 38.09 | 40.60 | 1 | 38.15 | 40.52 | 1 | 38.06 | 40.68 |
| | | | | | | | | | Channel Frequency 2570MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 1 | 38.01 | 40.68 |

Table 24 Occupied Bandwidth (Band 41 NR 40 MHz Channel bandwidth)

## Config E:

| Test Model 1.1 Modulation QPSK | | | Test Model 3.1 Modulation 64QAM | | | Test Model 3.2 Modulation 16QAM | | | Test Model 3.1a Modulation 256QAM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Channel Frequency 2520.99MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 4 | 47.68 | 50.55 |
| Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 4 | 47.55 | 50.55 | 4 | 47.57 | 50.35 | 4 | 47.75 | 50.55 | 4 | 47.71 | 50.55 |
| | | | | | | | | | Channel Frequency 2664.99MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 4 | 47.69 | 50.35 |

Table 25 Occupied Bandwidth (Band 41 NR 50 MHz Channel bandwidth)

## Config F:

| Test Model 1.1 Modulation QPSK | | | Test Model 3.1 Modulation 64QAM | | | Test Model 3.2 Modulation 16QAM | | | Test Model 3.1a Modulation 256QAM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Channel Frequency 2526MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 1 | 57.81 | 60.66 |
| Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 1 | 57.89 | 60.66 | 1 | 57.88 | 60.66 | 1 | 57.94 | 60.66 | 1 | 57.86 | 60.66 |
| | | | | | | | | | Channel Frequency 2660.01MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 1 | 57.81 | 60.54 |

Table 26 Occupied Bandwidth (Band 41 NR 60 MHz Channel bandwidth)

## Config G:

| Test Model 1.1 Modulation QPSK | | | Test Model 3.1 Modulation 64QAM | | | Test Model 3.2 Modulation 16QAM | | | Test Model 3.1a Modulation 256QAM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Channel Frequency 2531.01MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 4 | 67.42 | 70.35 |
| Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 4 | 67.40 | 70.49 | 4 | 67.49 | 70.49 | 4 | 67.55 | 70.49 | 4 | 67.46 | 70.21 |
| | | | | | | | | | Channel Frequency 2655MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 4 | 67.41 | 70.35 |

Table 27 Occupied Bandwidth (Band 41 NR 70 MHz Channel bandwidth)

## Config H:

| Test Model 1.1<br>Modulation QPSK | | | Test Model 3.1<br>Modulation 64QAM | | | Test Model 3.2<br>Modulation 16QAM | | | Test Model 3.1a<br>Modulation 256QAM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Channel Frequency<br>2535.99MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 1 | 77.78 | 82.48 |
| Channel Frequency<br>2592.99MHz | | | Channel Frequency<br>2592.99MHz | | | Channel Frequency<br>2592.99MHz | | | Channel Frequency<br>2592.99MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 1 | 77.74 | 82.48 | 1 | 77.87 | 82.48 | 1 | 78.12 | 82.64 | 1 | 77.84 | 82.48 |
| | | | | | | | | | Channel Frequency<br>2649.99MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 1 | 77.77 | 82.64 |

Table 28 Occupied Bandwidth (Band 41 NR 80 MHz Channel bandwidth)

## Config I:

| Test Model 1.1 Modulation QPSK | | | Test Model 3.1 Modulation 64QAM | | | Test Model 3.2 Modulation 16QAM | | | Test Model 3.1a Modulation 256QAM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Channel Frequency 2541MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 4 | 87.58 | 92.79 |
| Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 4 | 87.73 | 92.43 | 4 | 87.77 | 92.79 | 4 | 88.07 | 92.61 | 4 | 87.64 | 92.79 |
| | | | | | | | | | Channel Frequency 2645.01MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 4 | 87.58 | 92.61 |

Table 29 Occupied Bandwidth (Band 41 NR 90 MHz Channel bandwidth)

## Config J:

| Test Model 1.1 Modulation QPSK | | | Test Model 3.1 Modulation 64QAM | | | Test Model 3.2 Modulation 16QAM | | | Test Model 3.1a Modulation 256QAM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Channel Frequency 2546.01MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 1 | 97.51 | 102.70 |
| Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | | Channel Frequency 2592.99MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 1 | 97.66 | 102.70 | 1 | 97.66 | 102.70 | 1 | 97.52 | 102.50 | 1 | 97.58 | 102.70 |
| | | | | | | | | | Channel Frequency 2640MHz | | |
| | | | | | | | | | Tx Port | 99% (MHz) | 26dB (MHz) |
| | | | | | | | | | 1 | 97.49 | 102.70 |

Table 30 Occupied Bandwidth (Band 41 NR 100 MHz Channel bandwidth)

## Config K:

| Test Model 1.1 Modulation QPSK | | | Test Model 3.1 Modulation 64QAM | | | Test Model 3.2 Modulation 16QAM | | | Test Model 3.1a Modulation 256QAM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Channel Frequency 2501.01MHz/2511MHz | | | Channel Frequency 2501.01MHz/2511MHz | | | Channel Frequency 2501.01MHz/2511MHz | | | Channel Frequency 2501.01MHz/2511MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 4 | 18.53 | 19.93 | 4 | 18.53 | 19.85 | 4 | 18.44 | 19.84 | 4 | 18.55 | 19.88 |
| Channel Frequency 2588.01MHz/2598MHz | | | Channel Frequency 2588.01MHz/2598MHz | | | Channel Frequency 2588.01MHz/2598MHz | | | Channel Frequency 2588.01MHz/2598MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 4 | 18.54 | 19.94 | 4 | 18.52 | 19.87 | 4 | 18.45 | 19.84 | 4 | 18.56 | 19.89 |
| Channel Frequency 2675.01MHz/2685MHz | | | Channel Frequency 2675.01MHz/2685MHz | | | Channel Frequency 2675.01MHz/2685MHz | | | Channel Frequency 2675.01MHz/2685MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 4 | 18.52 | 19.91 | 4 | 18.51 | 19.85 | 4 | 18.45 | 19.84 | 4 | 18.55 | 19.90 |

Table 31 Occupied Bandwidth (Band 41 E-UTRA 10MHz+10MHz contiquous spectrum Channel bandwidth)

## Config L:

| Test Model 1.1 Modulation QPSK | | | Test Model 3.1 Modulation 64QAM | | | Test Model 3.2 Modulation 16QAM | | | Test Model 3.1a Modulation 256QAM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Channel Frequency 2501.01MHz/2685MHz | | | Channel Frequency 2501.01MHz/2685MHz | | | Channel Frequency 2501.01MHz/2685MHz | | | Channel Frequency 2501.01MHz/2685MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 4 | 8.68/ 8.67 | 9.77/ 9.75 | 4 | 8.67/ 8.70 | 9.69/ 9.71 | 4 | 8.63/ 8.59 | 9.67/ 9.65 | 4 | 8.67/ 8.70 | 9.69/ 9.77 |

Table 32 Occupied Bandwidth (Band 41 NR 10MHz+10MHz non-contiquous spectrum Channel bandwidth)

**Config M:**

| Test Model 1.1 Modulation QPSK | | | Test Model 3.1 Modulation 64QAM | | | Test Model 3.2 Modulation 16QAM | | | Test Model 3.1a Modulation 256QAM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Channel Frequency 2546.01MHz/ 2640.99MHz | | | Channel Frequency 2546.01MHz/ 2640.99MHz | | | Channel Frequency 2546.01MHz/ 2640.99MHz | | | Channel Frequency 2546.01MHz/ 2640.99MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 4 | 186.47 | 195.10 | 4 | 186.42 | 194.72 | 4 | 187.24 | 194.72 | 4 | 186.45 | 195.10 |
| Channel Frequency 2548.01MHz/2643MHz | | | Channel Frequency 2548.01MHz/2643MHz | | | Channel Frequency 2548.01MHz/2643MHz | | | Channel Frequency 2548.01MHz/2643MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 4 | 186.49 | 195.12 | 4 | 186.41 | 194.74 | 4 | 187.27 | 194.74 | 4 | 186.47 | 195.12 |
| Channel Frequency 2550MHz/2645.01MHz | | | Channel Frequency 2550MHz/2645.01MHz | | | Channel Frequency 2550MHz/2645.01MHz | | | Channel Frequency 2550MHz/2645.01MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 4 | 186.46 | 194.76 | 4 | 186.31 | 194.72 | 4 | 187.18 | 194.87 | 4 | 186.36 | 194.87 |

Table 33 Occupied Bandwidth (Band 41 NR 100MHz+90MHz contiquous spectrum Channel bandwidth)

**Config N:**

| Test Model 1.1 Modulation QPSK | | | Test Model 3.1 Modulation 64QAM | | | Test Model 3.2 Modulation 16QAM | | | Test Model 3.1a Modulation 256QAM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Channel Frequency 2501.01MHz/2511MHz/ 2685MHz | | | Channel Frequency 2501.01MHz/2511MHz/ 2685MHz | | | Channel Frequency 2501.01MHz/2511MHz/ 2685MHz | | | Channel Frequency 2501.01MHz/2511MHz/ 2685MHz | | |
| Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | Value 99% (MHz) | Value 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) | Tx Port | 99% (MHz) | 26dB (MHz) |
| 4 | 18.53 / 8.66 | 19.93 / 9.71 | 4 | 18.53 / 8.67 | 19.85 / 9.75 | 4 | 18.43 / 8.61 | 19.84 / 9.65 | 4 | 18.55 / 8.69 | 19.88 / 9.75 |

Table 34 Occupied Bandwidth (Band 41 NR 10MHz+10MHz+10MHz contiquous /non-contiquous spectrum Channel bandwidth)

The occupied bandwidth was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

## 4.4 Test No. 4 Spurious Emissions at Antenna Terminals (§ 2.1051, § 2.1057, § 27.53)

### 4.4.1 Limits

FCC §27.53(m)(2) for BRS. The power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts.

The attenuation shall be not less than 43 + 10 log (P) dB (P = transmitter power in Watts).

The compliance limit was calculated in the following way:

Maximum transmitter output power [W]: P

Maximum transmitter output power [dBm]: 30 + 10 log10 P (conversion from W to dBm)

Attenuation required by FCC: 43 + 10 log10 P

Compliance limit = Maximum transmitter output power - Required attenuation

= 30 + 10 log10 P - (43 + 10 log10 P) = -13 dBm

For MiMo output from 4 TX antenna connectors, one antenna connector was measured individually and the individual limit lime was reduced by 10log(4). Limit line was calculated to show -19 dBm emission limit, according to FCC KDB 662911 D01 and ANSI C6326-2015 guidance.

The AWHHJ antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the results of Test No.1) and antenna port 4 was selected for the remaining testing based on ANSI C63.26-2015 clauses 5.2.5.3, 5.7.2i and 6.4.

### 4.4.2 Test Procedure and Results

The tests were carried out in accordance with § 27.53. For all frequency ranges except two (immediately below and above the carrier frequency block) a 1 MHz resolution bandwidth was used for the measurements.

In the 1 MHz frequency bands immediately outside and adjacent to the carrier frequency block the resolution bandwidth is lowered to 1% of the 99%/ 26 dB occupied bandwidth of the transmitted carrier.

According to § 2.1057, all emissions including the fundamental frequency from the lowest radio frequency generated in the equipment, without going below 9 kHz, up to the 10th harmonic were investigated.

The following tables summarize the worst case detected emission levels (see screenshots on page 70 for details). The external attenuation (cable loss of the set up) is already added in the results.

| Measured laboratory room temperature and humidity during the tests | | | | |
|---|---|---|---|---|
| Date | Temperature Min-Max: | | Humidity Min-Max: | |
| 23.05.2024 – 07.06 2024 | 24.1 °C | 26.9 °C | 17.5 RH% | 49.5 RH% |

## Config A Lower band edge:

| Carrier Frequency: 2501.01 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| | 2496.00 | -26.46 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| | 2496.00 | -26.63 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| | 2496.00 | -27.09 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| | 2496.00 | -27.28 | compliant |
| Measurement Uncertainty: | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 35 Spurious Emissions (Lower band edge) (Band 41 NR 10 MHz CH BW)

## Config A Upper band edge:

| Carrier Frequency: 2685.0 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| | 2690.00 | -24.61 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| | 2690.00 | -25.30 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| | 2690.00 | -26.36 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| | 2690.00 | -25.27 | compliant |
| | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>Measurement Uncertainty:3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 36 Spurious Emissions (Upper band edge) (Band 41 NR 10 MHz CH BW)

## Config A Spurious emissions:

| Carrier Frequency: 2592.99 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9201.07 | -26.94 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9199.88 | -26.91 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9212.55 | -26.91 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9185.23 | -26.93 | compliant |
| Measurement Uncertainty: | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 37 Spurious Emissions (Band 41 NR 10 MHz Channel BW)

## Config J Lower band edge:

| Carrier Frequency: 2546.01 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| | 2495.50 | -25.11 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| | 2495.50 | -25.16 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| | 2495.50 | -24.95 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| | 2495.50 | -25.25 | compliant |
| Measurement Uncertainty: | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 38 Spurious Emissions (Lower band edge) (Band 41 NR 100 MHz CH BW)

## Config J Upper band edge:

| Carrier Frequency: 2640.0 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| | 2690.50 | -24.03 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| | 2690.50 | -24.32 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| | 2690.50 | -24.32 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| | 2690.50 | -24.17 | compliant |
| | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>Measurement Uncertainty:3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 39 Spurious Emissions (Upper band edge) (Band 41 NR 100MHz CH BW)

## Config J Spurious emissions:

| Carrier Frequency: 2592.99 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9201.86 | -26.72 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9212.55 | -26.81 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9206.61 | -26.89 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9210.57 | -26.88 | compliant |
| Measurement Uncertainty: | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 40 Spurious Emissions (Band 41 NR 100MHz Channel BW)

## Config K Lower band edge:

| Carrier Frequency: 2501.01/2511 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| | 2496.00 | -21.43 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| | 2496.00 | -21.36 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| | 2496.00 | -21.67 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| | 2496.00 | -21.73 | compliant |
| | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>Measurement Uncertainty:3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 41 Spurious Emissions (Lower band edge) (B41 E-UTRA 10MHz+10MHz CH BW)

## Config K Upper band edge:

| Carrier Frequency: 2675.01/2685 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| | 2690.00 | -20.27 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| | 2690.01 | -21.04 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| | 2690.01 | -21.64 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| | 2690.01 | -20.42 | compliant |
| | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>Measurement Uncertainty:3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 42 Spurious Emissions (Upper band edge) (B41 NR 10MHz+10MHz CH BW)

## Config K Spurious emissions:

| Carrier Frequency: 2588.01/2598 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9196.32 | -26.83 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9201.86 | -26.93 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9201.47 | -26.92 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9197.51 | -26.59 | compliant |
| Measurement Uncertainty: | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 43 Spurious Emissions (B41 NR 10MHz+10MHz Channel BW)

## Config L Lower band edge:

| Carrier Frequency: 2501.01 / 2685 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| | 2496.00 | -28.71 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| | 2496.00 | -29.22 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| | 2496.00 | -29.18 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| | 2496.00 | -29.30 | compliant |
| Measurement Uncertainty: | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 44 Spurious Emissions (Lower band edge) (Band 41 NR 10+10 MHz CH BW)

## Config L Upper band edge:

| Carrier Frequency: 2501.01 / 2685 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| | 2690.00 | -27.46 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| | 2690.00 | -27.80 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| | 2690.00 | -28.24 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| | 2690.00 | -27.46 | compliant |
| | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>Measurement Uncertainty:3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 45 Spurious Emissions (Upper band edge) (Band 41 NR 10+10 MHz CH BW)

## Config L Spurious emissions:

| Carrier Frequency: 2501.01 / 2685 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9220.87 | -26.99 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9207.01 | -26.88 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9199.09 | -26.73 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9214.14 | -26.91 | compliant |
| Measurement Uncertainty: | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 46 Spurious Emissions (Band 41 NR 10+10 MHz CH BW)

## Config M Lower band edge:

| Carrier Frequency: 2546.01 / 2640.99 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| | 2495.00 | -21.90 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| | 2495.00 | -21.90 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| | 2495.00 | -21.95 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| | 2495.00 | -21.77 | compliant |
| Measurement Uncertainty: | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 47 Spurious Emissions (Lower band edge) (B41 NR 100+90 MHz CH BW)

## Config M Upper band edge:

| Carrier Frequency: 2550 / 2645.01 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| | 2691.00 | -19.52 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| | 2691.00 | -19.51 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| | 2691.00 | -19.62 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| | 2691.00 | -19.45 | compliant |
| | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>Measurement Uncertainty:3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 48 Spurious Emissions (Upper band edge) (B41 NR 100+90 MHz CH BW)

## Config M Spurious emissions:

| Carrier Frequency: 2548.01 / 2643 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9207.01 | -26.92 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9197.90 | -26.75 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9200.67 | -26.72 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9193.15 | -26.99 | compliant |
| Measurement Uncertainty: | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 49 Spurious Emissions (B41 NR 100+90 MHz Channel BW)

## Config N Lower band edge:

| Carrier Frequency: 2501.01 / 2511 / 2685 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| | 2496.00 | -23.22 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| | 2496.00 | -23.38 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| | 2496.00 | -23.30 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| | 2496.00 | -23.99 | compliant |
| Measurement Uncertainty: | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 50 Spurious Emissions (Lower band edge) (B41 NR 10+10+10 MHz CH BW)

## Config N Upper band edge:

| Carrier Frequency: 2501.01 / 2511 / 2685 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| | 2690.00 | -29.01 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| | 2690.00 | -28.96 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| | 2690.00 | -30.48 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| | 2690.00 | -29.48 | compliant |
| | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>Measurement Uncertainty:3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 51 Spurious Emissions (Upper band edge) (B41 NR 10+10+10 MHz CH BW)

## Config N Spurious emissions:

| Carrier Frequency: 2501.01 / 2511 / 2685 MHz | | | |
|---|---|---|---|
| **Frequency Range [MHz]** | **Emission Frequency [MHz]** | **Maximum Emission Level [dBm]** | **Result** |
| QPSK-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9191.57 | -26.85 | compliant |
| 64QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9224.04 | -26.83 | compliant |
| 16QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9221.66 | -26.90 | compliant |
| 256QAM-Modulation TX port 4 | | | |
| 0.009 – 27000 | 9194.34 | -26.83 | compliant |
| Measurement Uncertainty: | | f < 1.0GHz: ±1.1dB,<br>1.0GHz ≤ f <3.6GHz: ±1.2dB,<br>3.6GHz ≤ f <8.0GHz: ±1.6dB,<br>8.0GHz ≤ f: ±1.9dB | |

Table 52 Spurious Emissions (B41 NR 10+10+10 MHz Channel BW)

The measured conducted emission levels were found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

## 4.1 Test No. 5 Field Strength of Spurious Radiation (§ 2.1053, § 27.53)

### 4.1.1 FCC Section 2.1053 Field Strength of Spurious Emissions

Field strength measurements of radiated spurious emissions were made in an FCC registered 3m Semi-Anechoic Chamber which is maintained by Nokia in Oulu, Finland. A complete description and full measurement data for the site is on file with the FCC (Site Registration Number: 261413).

The spectrum from 30 MHz to beyond the tenth harmonic of the carrier 2.69 GHz, (26.9 GHz), was searched for spurious radiation. Measurements were made using both horizontally and vertically polarized broadband antennas. Per FCC regulations, the comparison of out of band spurious emissions directly to the limit is appropriately made using the substitution method. However, when the emissions are more than 20 dB below the specification limit, the use of field strength measurements for compliance determination is acceptable and those emissions are considered not reportable (FCC Section 2.1053). For this case the evaluation of acceptable radiated field strength is as follows.

### 4.1.2 Field Strength of Spurious Emissions - Limits

FCC Sections 2.1053 and 27.53 contain the requirements for the levels of spurious radiation as a function of the level of the unmodulated carrier. The reference level for the unmodulated carrier is calculated as the field produced by an ideal dipole excited by the transmitter output power according to the following relation taken from Reference Data for Radio Engineers, page 676, 4th edition, IT&T Corp.

$$E = [(30*P)^{1/2}]/R$$

$$20 \log (E*10^{6}) - (43 + 10 \log P) = 82.23 \text{ dB}\mu\text{V/meter}$$

Where:

E = Field Intensity in Volts/meter P = Transmitted Power in Watts

R = Measurement distance in meters = 3 m

The Part 27 Limit is 82.23 dBµV/m at 3m and 85.75 dBuV/m at 2m

The calculated emission levels were found by:

Measured level (dBμV) + Cable Loss(dB)+Antenna Factor(dB) = Field Strength (dBμV/m)

### 4.1.3 FCC 15.109 Class B Radiated Emissions Limits:

| Frequency (MHz) | Field Strengh at 3m (dBμV/m) FCC §15.109 | ield Strengh at 3m (dBμV/m) ICES-003 | RBW (KHz) | Detector |
|---|---|---|---|---|
| 30 – 88 | 40.0 | 40.0 | 100 | QP |
| 88 – 216 | 43.5 | 43.5 | 100 | QP |
| 216 – 960 | 46.0 | 46.0 | 100 | QP |
| 960 – 1000 | 54.0 | 54.0 | 100 | QP |
| 1000 – 10$^{th}$ harmonic | 54.0 | 54.0 | 1000 | Average |

Table 53 Radiated Emission Limits

### 4.1.4 RESULTS:

For compliance with 47CFR Part 2and 27, the field strength of any spurious radiation, measured at 3m, is required to be less than 82.23 dBµV/meter (82.23 @ 3m). Over the out of band spectrum investigated from 30 MHz to beyond the tenth harmonic of the carrier (up to 26.9 GHz), no reportable spurious emissions were detected.

| Measured laboratory room temperature and humidity during the tests | | | | |
|---|---|---|---|---|
| Date | Temperature Min-Max: | | Humidity Min-Max: | |
| 30.05.2024 – 13.06.2024 | 23.7 °C | 28.5 °C | 30.3 RH% | 45.0 RH% |

| Frequency Range [MHz] | Emission Frequency [MHz] | Maximum Emission Level [dBm] | Result |
|---|---|---|---|
| 30 - 26900 | 13452.433280 | -33.19 dBm | compliant |
| Measurement Uncertainty: | | | ±5.33 dB |

Table 54 Field Strength of Spurious Radiation

The measured emission levels were found to be compliant with the manufacturer's specifications and with all requirements of the FCC.

## 4.2 Test No. 6: Frequency Stability §27.54, §2.1055.)

### 4.2.1 Purpose

Frequency stability measurements were performed to verify that the frequency deviation of the emission stays within the licensee's frequency block under extreme temperature.

### 4.2.2 Limits

Para. No. 27.54. (-30 °C to +50 °C) and supply voltage conditions according to § 2.1055.

### 4.2.3 Test Configuration

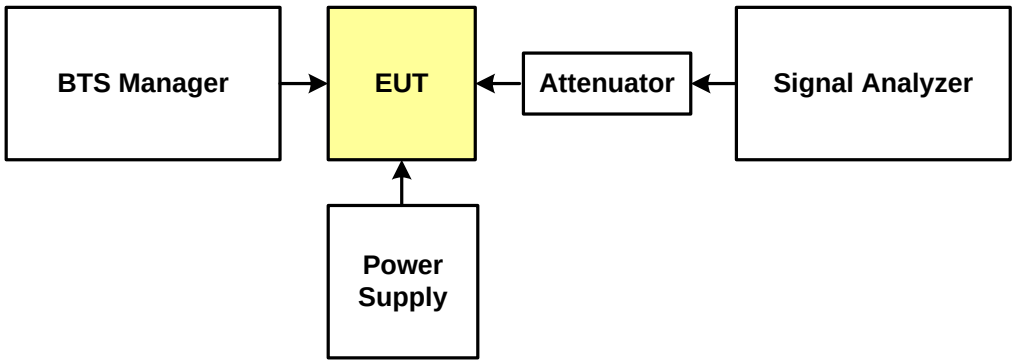



Figure 2 Test Configuration for frequency stability with voltage variation

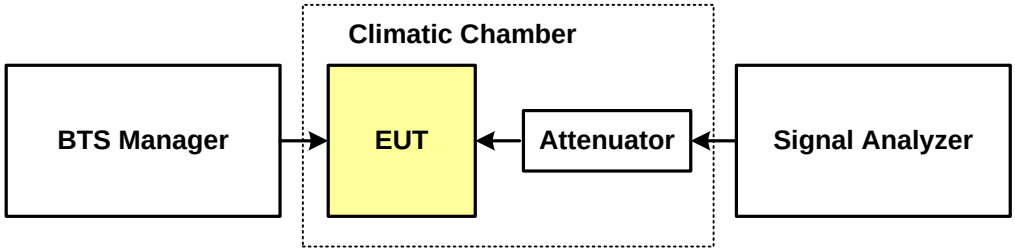



Figure 3 Test Configuration for frequency stability with temperature variation

A complete list of the measurement equipment is included on page 56 of this measurement report.

## 4.2.4 Test Procedure and Results

| Measured laboratory room temperature and humidity during the tests | | | | |
|---|---|---|---|---|
| Date | Temperature Min-Max: | | Humidity Min-Max: | |
| 03.05.2024 – 08.05 2024 | 24.0 °C | 25.5 °C | 7.9 RH% | 24.8 RH% |

**Frequency Stability with Temperature Variation:**

The supply voltage of the EUT was set to the nominal value and the temperature of the environmental chamber was varied in 10degree steps from -30 degrees Celsius to +50 degrees Celsius. The EUT was allowed to stabilize 60 min. at each temperature and the frequency error was measured.

**Config A:**

| Carrier Frequency: 2592.99 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Supply Voltage (DC) [V] | Ambient Temperature [°C] | Frequency Deviation | | Manufacturer's Specification | | Result |
| | | [Hz] | [ppm] | [Hz] | [ppm] | |
| QPSK Modulation TX PORT 4 | | | | | | |
| -48.0 | -30.0 | 0.90589 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | -20.0 | -1.71376 | -0.001 | 124 | 0.05 | compliant |
| -48.0 | -10.0 | 1.38659 | 0.001 | 124 | 0.05 | compliant |
| -48.0 | 0.0 | 0.95459 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 10.0 | -1.47120 | -0.001 | 124 | 0.05 | compliant |
| -48.0 | 30.0 | 2.04247 | 0.001 | 124 | 0.05 | compliant |
| -48.0 | 40.0 | -1.18193 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 50.0 | -0.32093 | 0.000 | 124 | 0.05 | compliant |
| 16QAM Modulation TX port 4 | | | | | | |
| -48.0 | -30.0 | 1.25314 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | -20.0 | -1.05906 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | -10.0 | 0.72346 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 0.0 | -0.99079 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 10.0 | 1.15372 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 30.0 | 0.41829 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 40.0 | -1.37449 | -0.001 | 124 | 0.05 | compliant |
| -48.0 | 50.0 | -0.77812 | 0.000 | 124 | 0.05 | compliant |
| 64QAM Modulation TX port 4 | | | | | | |
| -48.0 | -30.0 | -0.03234 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | -20.0 | 0.77114 | 0.000 | 124 | 0.05 | compliant |

| | | | | | | |
|---|---|---|---|---|---|---|
| -48.0 | -10.0 | -0.10008 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 0.0 | -1.49690 | -0.001 | 124 | 0.05 | compliant |
| -48.0 | 10.0 | 0.22381 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 30.0 | -0.68349 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 40.0 | 1.14698 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 50.0 | 0.17657 | 0.000 | 124 | 0.05 | compliant |
| 256QAM Modulation TX port 4 | | | | | | |
| -48.0 | -30.0 | 0.02040 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | -20.0 | -1.75734 | -0.001 | 124 | 0.05 | compliant |
| -48.0 | -10.0 | -2.37290 | -0.001 | 124 | 0.05 | compliant |
| -48.0 | 0.0 | 0.88526 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 10.0 | -0.04945 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 30.0 | 0.29711 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 40.0 | -0.61255 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 50.0 | 0.08524 | 0.000 | 124 | 0.05 | compliant |
| Measurement Uncertainty: | | | | | ±1.0 Hz | |

Table 55 Frequency stability with temp. var. (B41 NR 10 MHz Channel BW)

## Config J:

| Carrier Frequency: 2592.99 MHz | | | | | | |
|---|---|---|---|---|---|---|
| **Supply Voltage (DC) [V]** | **Ambient Temperature [°C]** | **Frequency Deviation** | | **Manufacturer's Specification** | | **Result** |
| | | **[Hz]** | **[ppm]** | **[Hz]** | **[ppm]** | |
| QPSK Modulation TX port 4 | | | | | | |
| -48.0 | -30.0 | 0.86899 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | -20.0 | -1.07457 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | -10.0 | -0.53730 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 0.0 | 0.84707 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 10.0 | 1.02369 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 30.0 | -0.76362 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 40.0 | -1.40603 | -0.001 | 124 | 0.05 | compliant |
| -48.0 | 50.0 | 3.71942 | -0.001 | 124 | 0.05 | compliant |
| 16QAM Modulation ANT4 | | | | | | |
| -48.0 | -30.0 | -0.66190 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | -20.0 | 0.70151 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | -10.0 | 0.18913 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 0.0 | -0.60252 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 10.0 | 0.23626 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 30.0 | -1.00418 | 0.000 | 124 | 0.05 | compliant |

| | | | | | | |
|---|---|---|---|---|---|---|
| -48.0 | 40.0 | 0.88455 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 50.0 | -1.43625 | -0.001 | 124 | 0.05 | compliant |
| 64QAM Modulation ANT4 | | | | | | |
| -48.0 | -30.0 | 1.92360 | 0.001 | 124 | 0.05 | compliant |
| -48.0 | -20.0 | 1.54669 | 0.001 | 124 | 0.05 | compliant |
| -48.0 | -10.0 | 1.56519 | 0.001 | 124 | 0.05 | compliant |
| -48.0 | 0.0 | 0.00613 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 10.0 | 0.21359 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 30.0 | 0.15690 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 40.0 | -0.55302 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 50.0 | 2.16455 | 0.001 | 124 | 0.05 | compliant |
| 256QAM Modulation ANT4 | | | | | | |
| -48.0 | -30.0 | 2.69279 | 0.001 | 124 | 0.05 | compliant |
| -48.0 | -20.0 | -0.00287 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | -10.0 | -1.23371 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 0.0 | -1.36818 | -0.001 | 124 | 0.05 | compliant |
| -48.0 | 10.0 | 1.90655 | 0.001 | 124 | 0.05 | compliant |
| -48.0 | 30.0 | 0.65890 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 40.0 | -0.38545 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 50.0 | -0.07412 | 0.000 | 124 | 0.05 | compliant |
| Measurement Uncertainty: | | | | | ±1.0 Hz | |

Table 56 Frequency stability with temp. var. (B41 NR 100 MHz Channel BW)

## Frequency Stability with Voltage Variation:

The EUT was placed in a climatic chamber and allowed to stabilize at +20 degrees Celsius for at least 60 minutes. With the supply voltage of the EUT set to 85% of the nominal value, the frequency error was measure. This procedure was repeated at 100% and 115% of the nominal supply voltage value.

## Config A:

| Carrier Frequency: 2592.99 MHz | | | | | | |
|---|---|---|---|---|---|---|
| **Supply Voltage (DC) [V]** | **Ambient Temperature [°C]** | **Frequency Deviation** | | **Manufacturer's Specification** | | **Result** |
| | | **[Hz]** | **[ppm]** | **[Hz]** | **[ppm]** | |
| QPSK Modulation TX port 4 | | | | | | |
| -40.8 | 20.0 | 0.01505 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 20.0 | -0.01726 | 0.000 | 124 | 0.05 | compliant |
| -55.2 | 20.0 | 0.43616 | 0.000 | 124 | 0.05 | compliant |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16QAM Modulation TX port 4 | | | | | | |
| -40.8 | 20.0 | -1.46101 | -0.001 | 124 | 0.05 | compliant |
| -48.0 | 20.0 | 1.17610 | 0.000 | 124 | 0.05 | compliant |
| -55.2 | 20.0 | -1.16976 | 0.000 | 124 | 0.05 | compliant |
| 64QAM Modulation TX port 4 | | | | | | |
| -40.8 | 20.0 | -0.44235 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 20.0 | 0.50510 | 0.000 | 124 | 0.05 | compliant |
| -55.2 | 20.0 | -0.79943 | 0.000 | 124 | 0.05 | compliant |
| 256QAM Modulation TX port 4 | | | | | | |
| -40.8 | 20.0 | -0.13204 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 20.0 | 0.11736 | 0.000 | 124 | 0.05 | compliant |
| -55.2 | 20.0 | -3.42639 | -0.001 | 124 | 0.05 | compliant |
| Measurement Uncertainty: | | | | | ±1.0 Hz | |

Table 57 Frequency stability with voltage var. (B41 NR 10 MHz Channel BW)

## Config J:

| Carrier Frequency: 2592.99 MHz | | | | | | |
|---|---|---|---|---|---|---|
| **Supply Voltage (DC) [V]** | **Ambient Temperature [°C]** | **Frequency Deviation** | | **Manufacturer's Specification** | | **Result** |
| | | **[Hz]** | **[ppm]** | **[Hz]** | **[ppm]** | |
| QPSK Modulation TX port 4 | | | | | | |
| -40.8 | 20.0 | -0.63903 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 20.0 | -0.14671 | 0.000 | 124 | 0.05 | compliant |
| -55.2 | 20.0 | 0.72849 | 0.000 | 124 | 0.05 | compliant |
| 16QAM Modulation TX port 4 | | | | | | |
| -40.8 | 20.0 | -0.13913 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 20.0 | -1.43465 | 0.000 | 124 | 0.05 | compliant |
| -55.2 | 20.0 | 2.29564 | 0.001 | 124 | 0.05 | compliant |
| 64QAM Modulation TX port 4 | | | | | | |
| -40.8 | 20.0 | -0.24183 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 20.0 | -0.34013 | 0.000 | 124 | 0.05 | compliant |
| -55.2 | 20.0 | -0.71669 | 0.000 | 124 | 0.05 | compliant |
| 256QAM Modulation TX port 4 | | | | | | |
| -40.8 | 20.0 | 0.17831 | 0.000 | 124 | 0.05 | compliant |
| -48.0 | 20.0 | -0.21260 | 0.000 | 124 | 0.05 | compliant |
| -55.2 | 20.0 | 0.45724 | 0.000 | 124 | 0.05 | compliant |
| Measurement Uncertainty: | | | | | ±1.0 Hz | |

Table 58 Frequency stability with voltage var. (B41 NR 100MHz Channel BW)

The measured frequency stability was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

# 5 Test Data and Screenshots

## 5.1 Part List of the RF Measurement Test Equipment

| No. | Test Equipment | Manufacturer & Type | Serial Number | Calibration date | Calibration due | Test No. |
|---|---|---|---|---|---|---|
| 1 | Signal Analyzer | Rohde & Schwarz: FSW-43 | 104597 | 12/2023 | 12/2024 | 1, 2, 3, 4 |
| 2 | Signal Analyzer | Rohde & Schwarz: FSW-43 | 104600 | 07/2023 | 07/2024 | 6 |
| 3 | Vector Network Analyzer | Rohde & Schwarz: ZVA40 | 100146 | 12/2023 | 12/2024 | 1, 2, 3, 4 |
| 4 | Vector Network Analyzer | Rohde & Schwarz: ZVL13 | 101177 | 12/2023 | 12/2024 | 6 |
| 5 | Calibration Unit | Rohde & Schwarz: ZV-Z54 | 100125 | 11/2023 | 11/2024 | 1, 2, 3, 4 |
| 6 | Calibration Unit | Hewlett Packard 85032B | 2919A04843 | 07/2023 | 07/2024 | 6 |
| 7 | Frequency Standard | Symmetricom 8040C | 135230101015 | 08/2023 | 08/2024 | 1, 2, 3, 4, |
| 8 | Frequency Standard | Symmetricom 8040C | 161730115011 | 07/2023 | 07/2024 | 6 |
| 9 | Multimeter | Fluke 83 | DM8750386 | 12/2023 | 12/2024 | 1, 2, 3, 4, 6, |
| 10 | Humidity and Temperature Indicator | Vaisala: HMT 131 | E6316020 | 12/2023 | 12/2024 | 1, 2, 3, 4, 6 |
| 11 | DC Power Supply | Elektro-AutomatikGmbH & Co:PS 9080-510 3U19 3HE 15000W | 1331460001 | cnn | - | 1, 2, 3, 4, |
| 12 | DC Power Supply | SG180X188D-1AAA | 1245A00011 | cnn | - | 6 |
| 13 | DC Power Supply | Toellner TOE887 | 160142 | cnn | - | 6 |
| 14 | Attenuator | Weinschel 66-30-33 | BN0228 | cnn | - | 1, 2, 3, |
| 15 | Attenuator | SHX DTS100G-20dB-24G | 14111101 | cnn | - | 4 |
| 16 | High Pass Filter | RF-Lambda RHPF23G06G40 | 21052000014 | cnn | - | 4 |
| 17 | Attenuator | API Weinschel 254-30-33 | UH351 | cnn | - | 6 |
| 18 | Temperature chamber | Weiss WTS 3-600/70/5 | 58226142630010 | 12/2023 | 12/2024 | 6 |
| 19 | EMI Test Receiver | Rohde & Schwarz: ESW44 | 103055 | 12/2023 | 12/2024 | 5 |
| 20 | Horn Antenna | ETS-Lindgren ETS3117 | 00227737 | 04/2023 | 04/2024 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 21 | Bilog Antenna | Schaffner Chase CBL6112B | 2003 | 08/2023 | 08/2024 | 5 |
| 22 | Horn Antenna | ETS-Lindgren 3116C-PA | 206990 | 07/2023 | 07/2024 | 5 |
| 23 | Amplifier | Miteq AFSX4 | 1829263 | cnn | - | 5 |
| 24 | Mast Controller | Maturo NCD/281 | 21250317 | cnn | - | 5 |
| 25 | 4-meter mast | Maturo TAM4.0-E | 123/21250317 | cnn | - | 5 |
| 26 | Anechoic chamber | Comtest Nokia 3m Chamber | Nokia 3m Chamber | 10/2022 | 10/2025 | 5 |
| 27 | Humidity and temperature meter | Vaisala HMP113 | T0841033 | 12/2023 | 12/2024 | 5 |

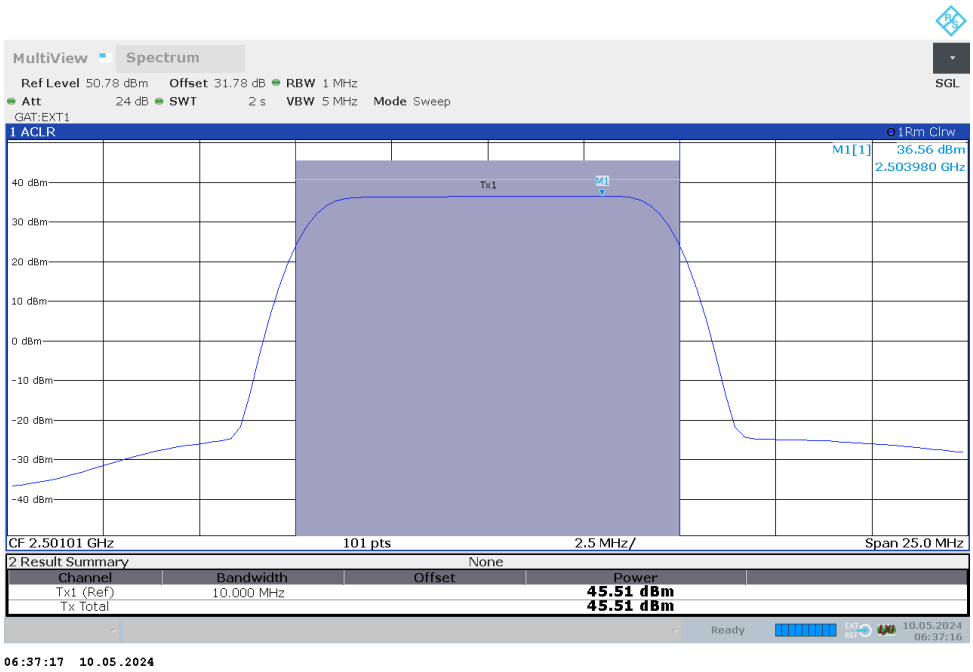
Table 59 Part List of the RF Measurement Test Equipment

## 5.2 Spectral Plots

NOTE: Only a sample of the spectral plots are used and visible in this report. All measured test results and data are saved in Oulu located server.

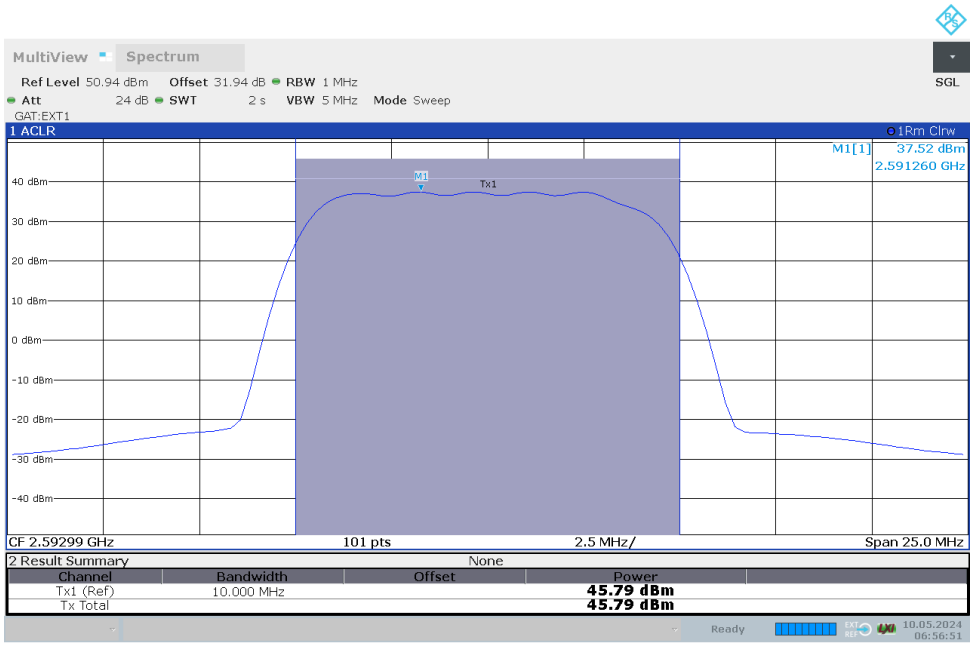
### 5.2.1 Test No. 1: RF Output Power

**Power spectral density NR 10MHz BW**



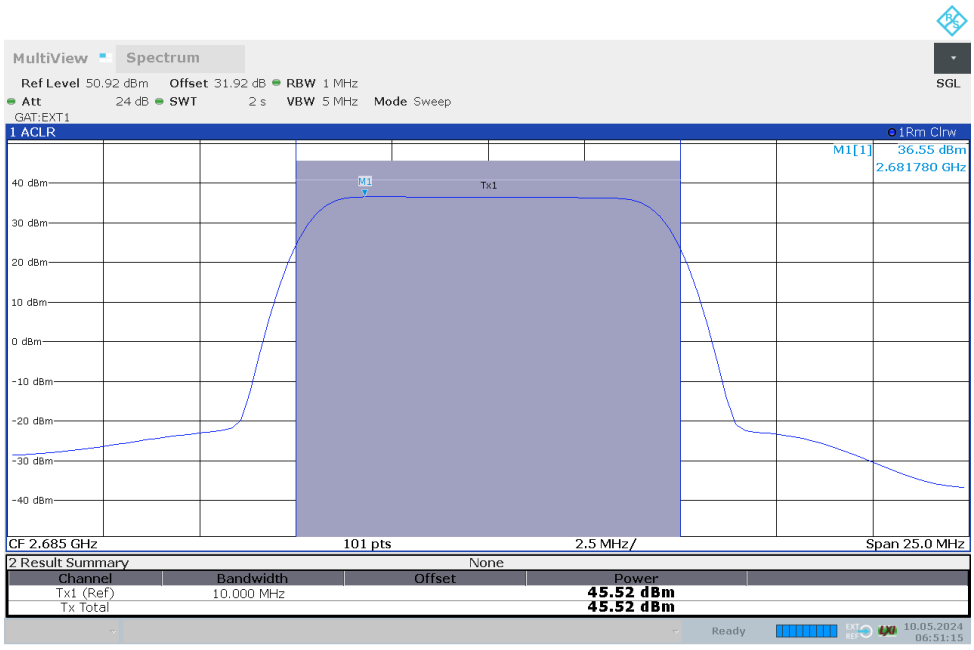

06:37:17 10.05.2024

Test Model 1.1, Modulation QPSK, Channel Frequency 2501.01MHz, Tx port 4



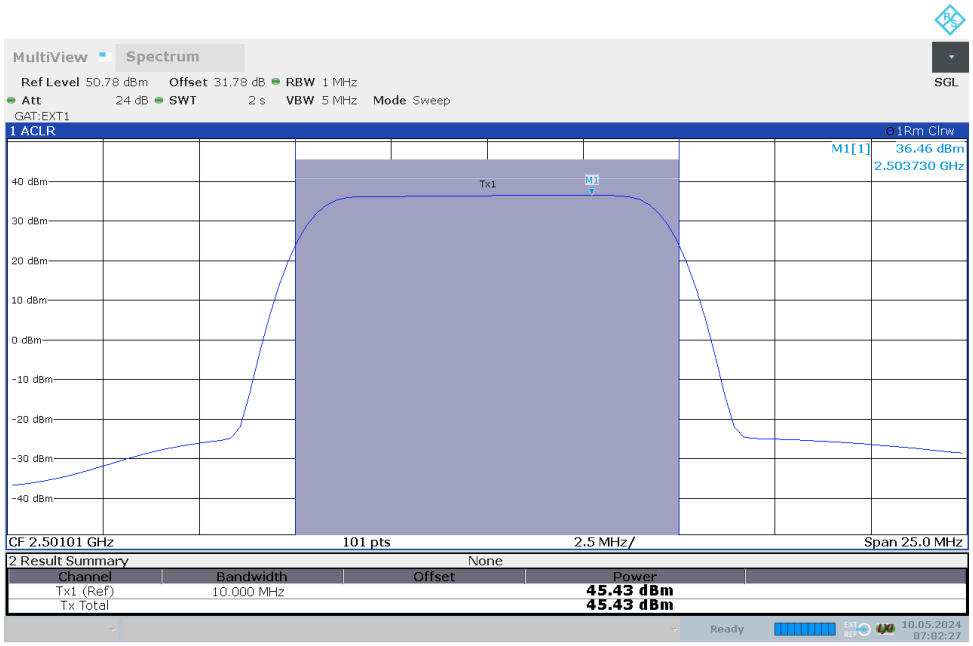

06:56:52 10.05.2024

Test Model 3.2, Modulation 16QAM, Channel Frequency 2592.99MHz, Tx port 4




06:51:16 10.05.2024

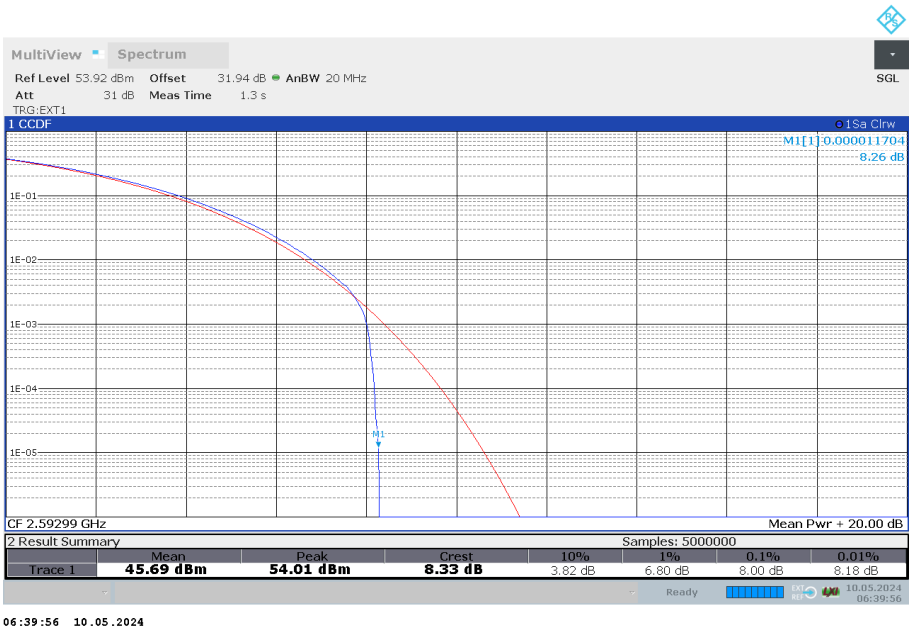
Test Model 3.1, Modulation 64QAM, Channel Frequency 2685MHz, Tx port 4




07:02:28 10.05.2024

Test Model 3.1a, Modulation 256QAM, Channel Frequency 2501.01MHz, Tx port 4

## Peak-to-Average Power Ratio (PAPR) NR 10MHz BW

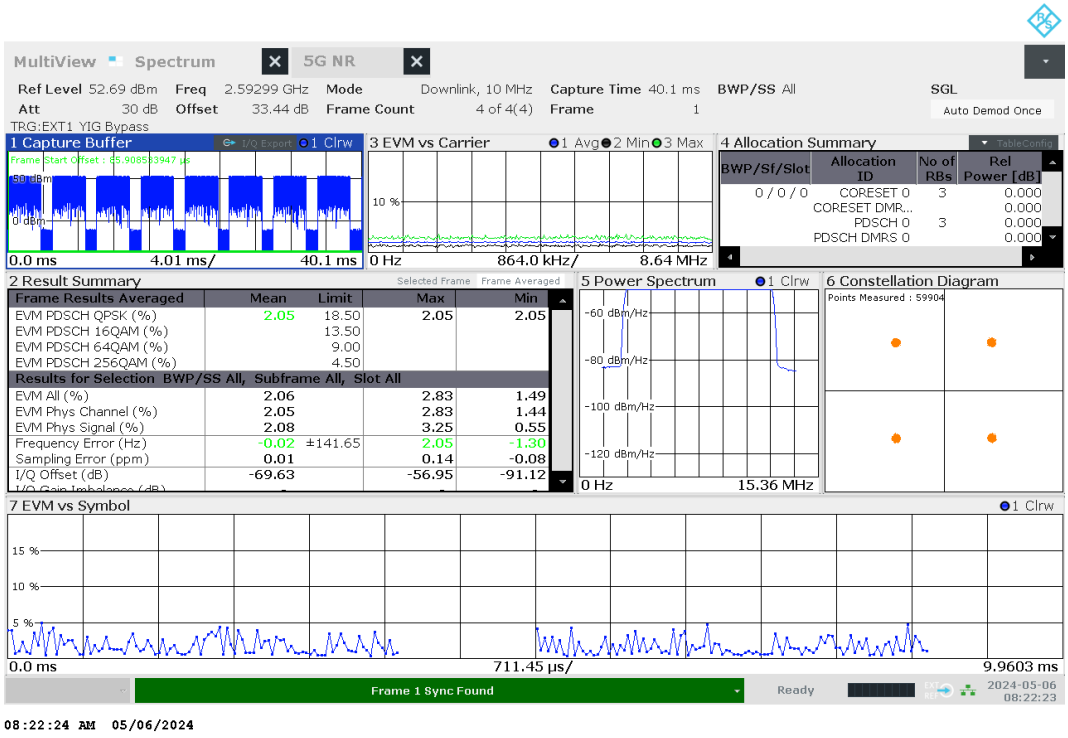



Test Model 1.1, Modulation QPSK, Channel Frequency 2592.99MHz, Tx Port4

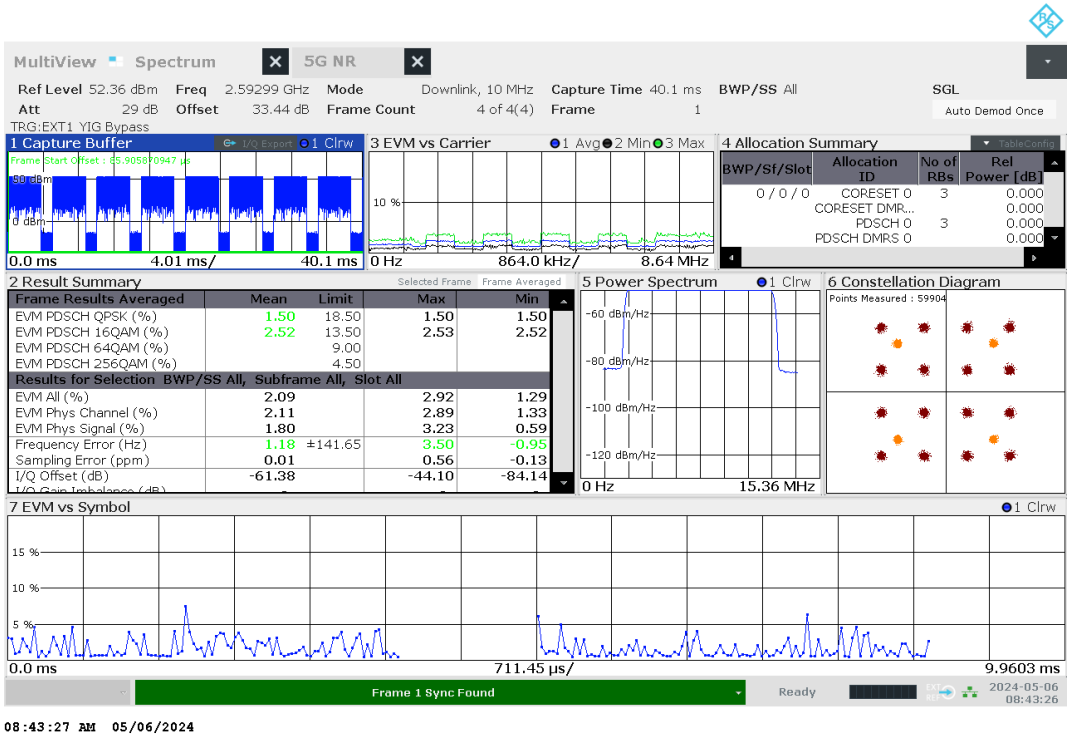
### 5.2.2 Test No. 2: Modulation Characteristics

No additional measurements are required for the modulation characteristics. Please refer to test no. 3, occupied bandwidth on page 22.

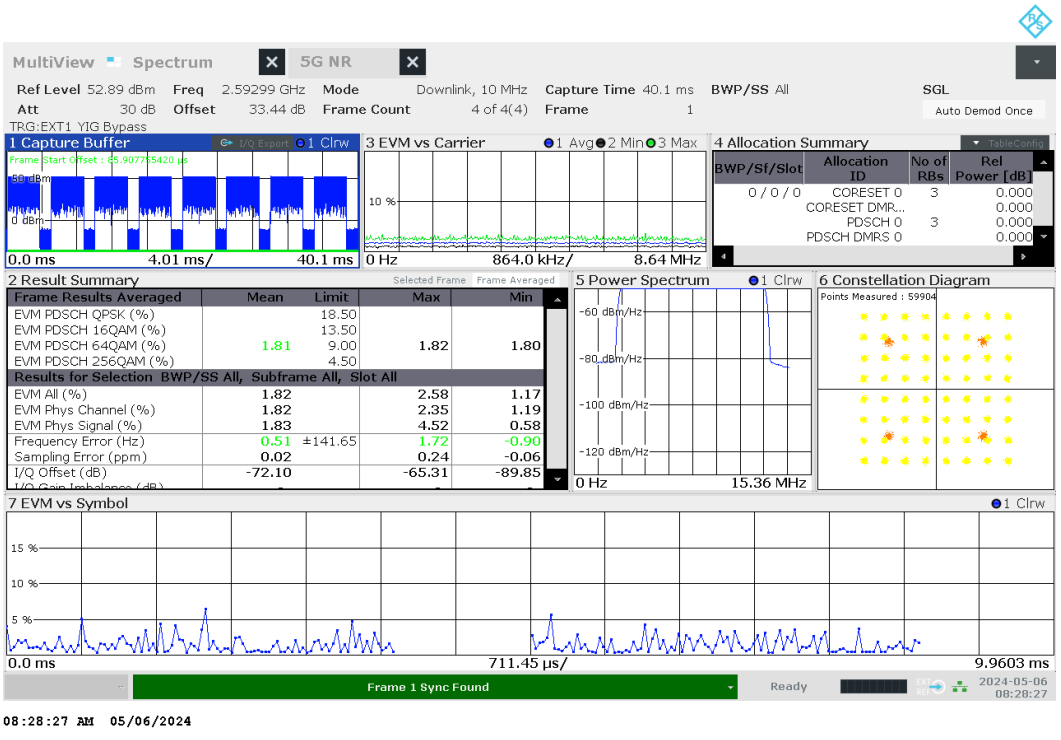
Screenshots below shows information about the modulations I/Q constellation form and modulation information table, displaying error to ideal modulation symbols.



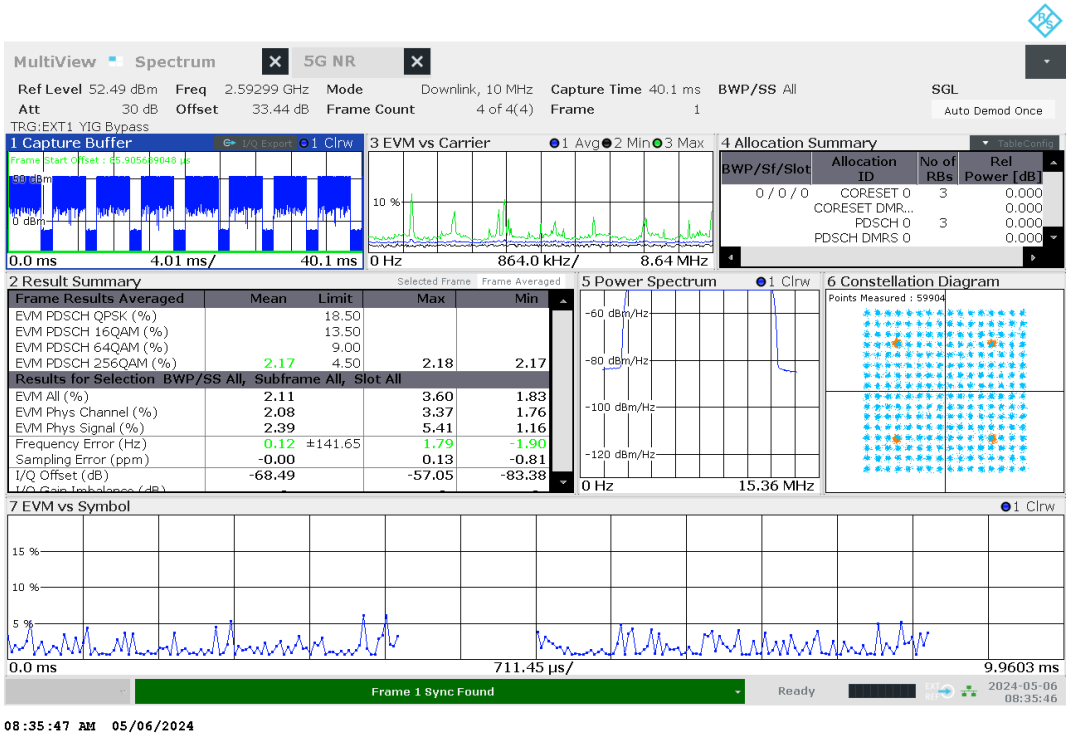

I/Q constellation diagram with capture buffer – QPSK (2592.99MHz) (NR 10MHz Channel BW)




I/Q constellation diagram with capture buffer – 16QAM (2592.99 MHz) (NR 10MHz Channel BW)




I/Q constellation diagram with capture buffer – 64QAM (2592.99 MHz) (NR 10MHz Channel BW)



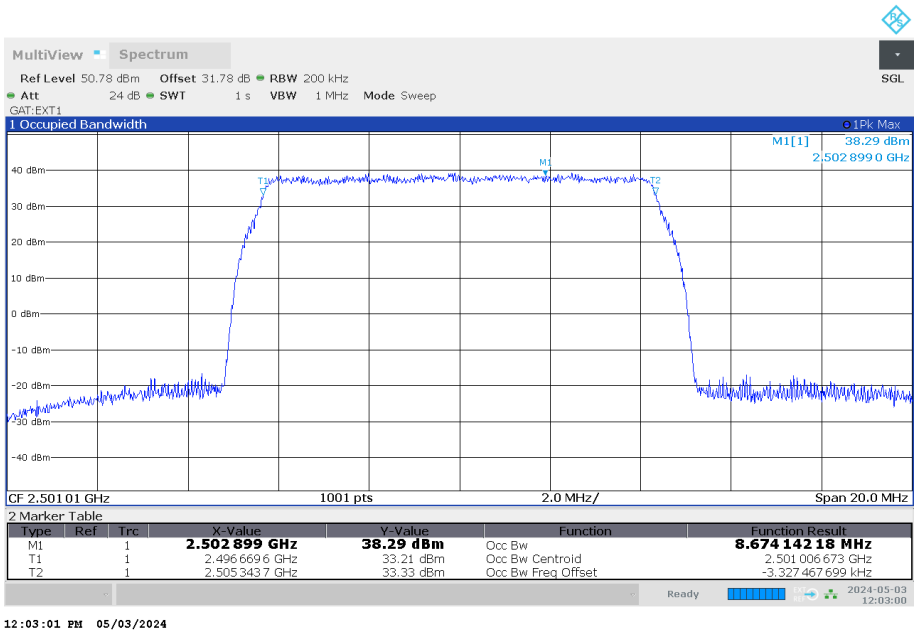

I/Q constellation table with I/Q error –256QAM (2592.99 MHz) (NR 10MHz Channel BW)

## 5.2.3 Test No. 3: Occupied Bandwidth

The value ‘Occ Bw’ is the measured occupied bandwidth.

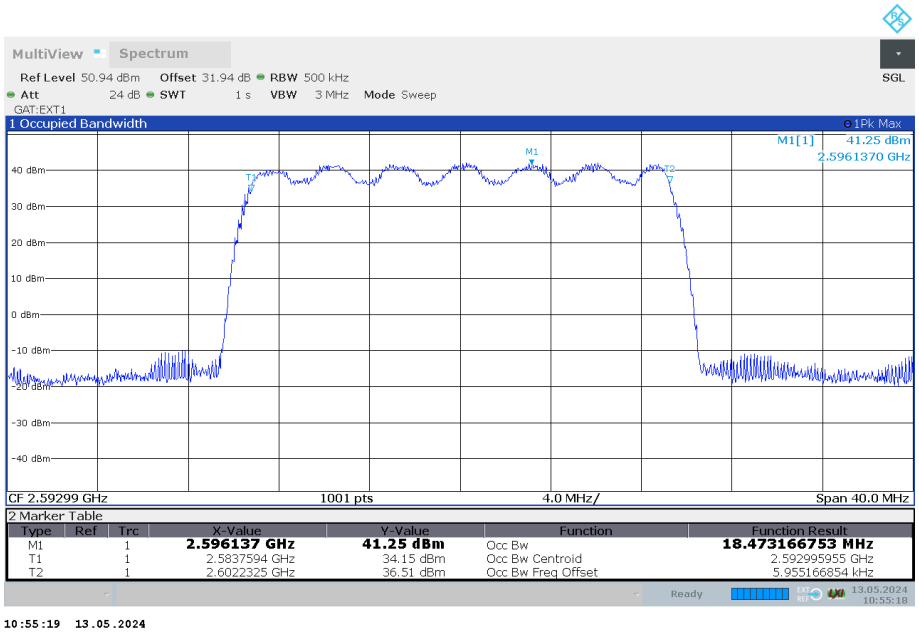
**Occupied Bandwidth 99% plots**

**Occupied Bandwidth NR10MHz BW**



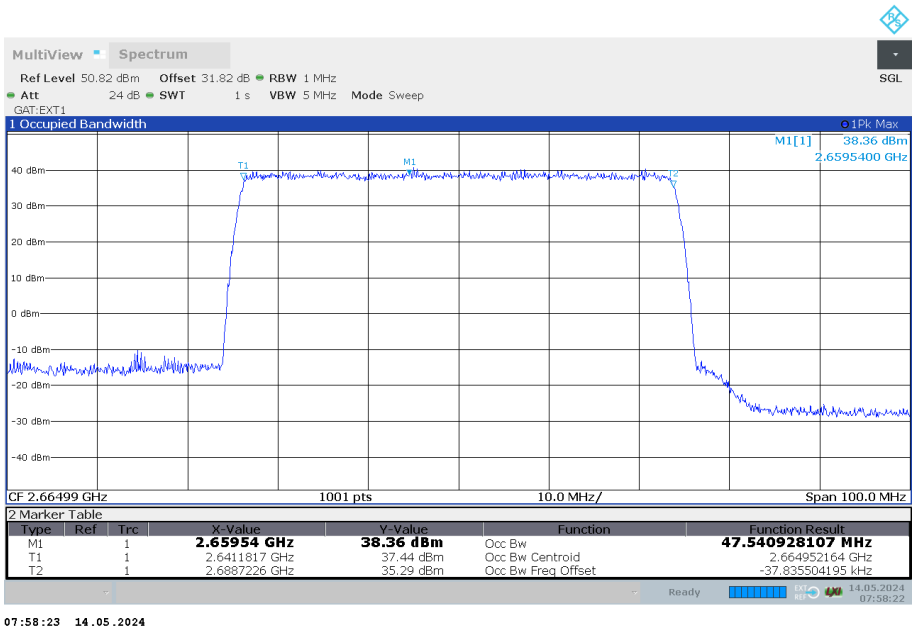

Test Model 1.1, Modulation QPSK, Channel Frequency 2501.01MHz, Tx Port4

**Occupied Bandwidth NR 20MHz BW**



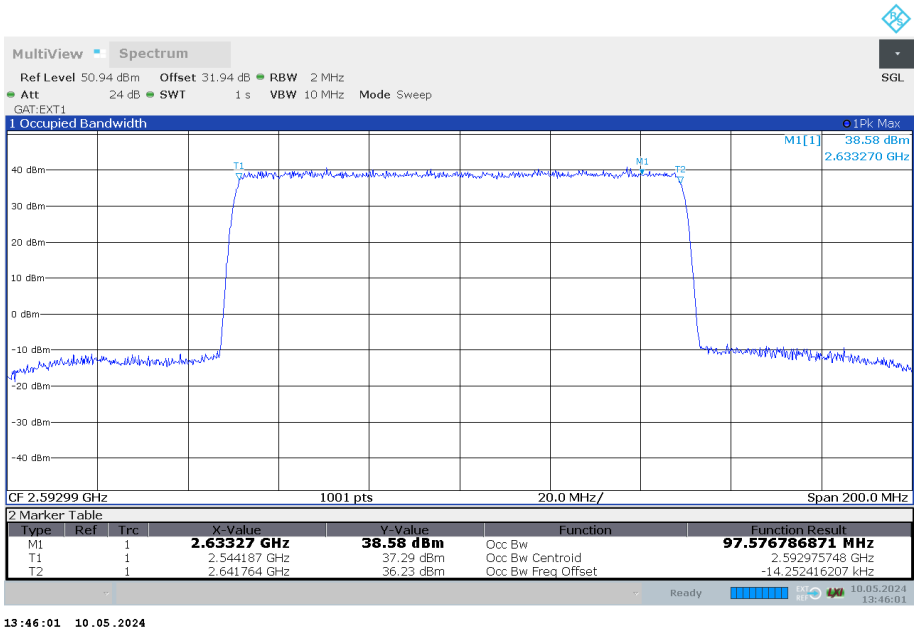

Test Model 3.2, Modulation 16QAM, Channel Frequency 2592.99MHz, Tx Port4

## Occupied Bandwidth NR 50MHz BW



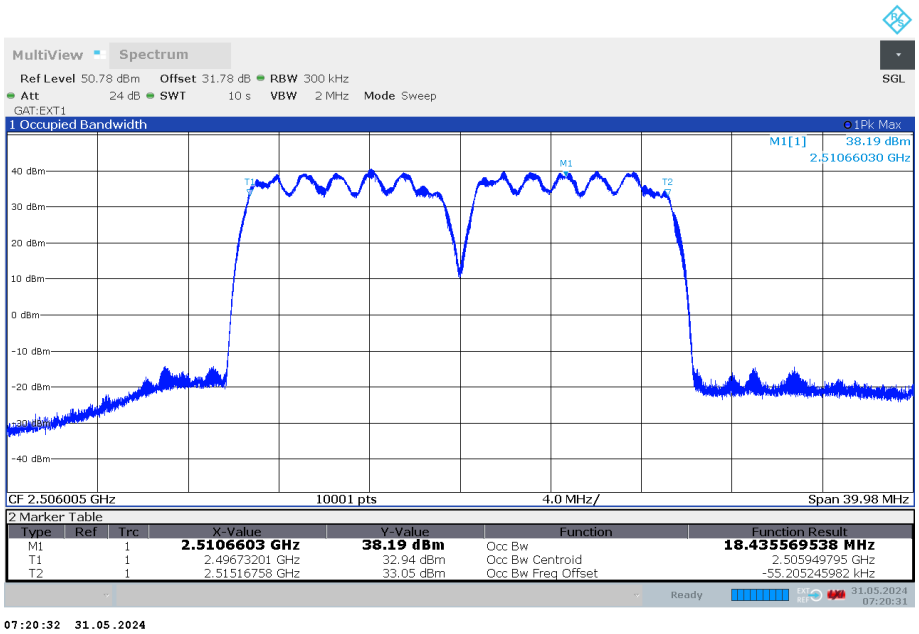

Test Model 3.1, Modulation 64QAM, Channel Frequency 2664.99MHz, Tx Port4

## Occupied Bandwidth NR 100MHz BW




Test Model 3.1a, Modulation 256QAM, Channel Frequency 2592.99MHz, Tx Port4

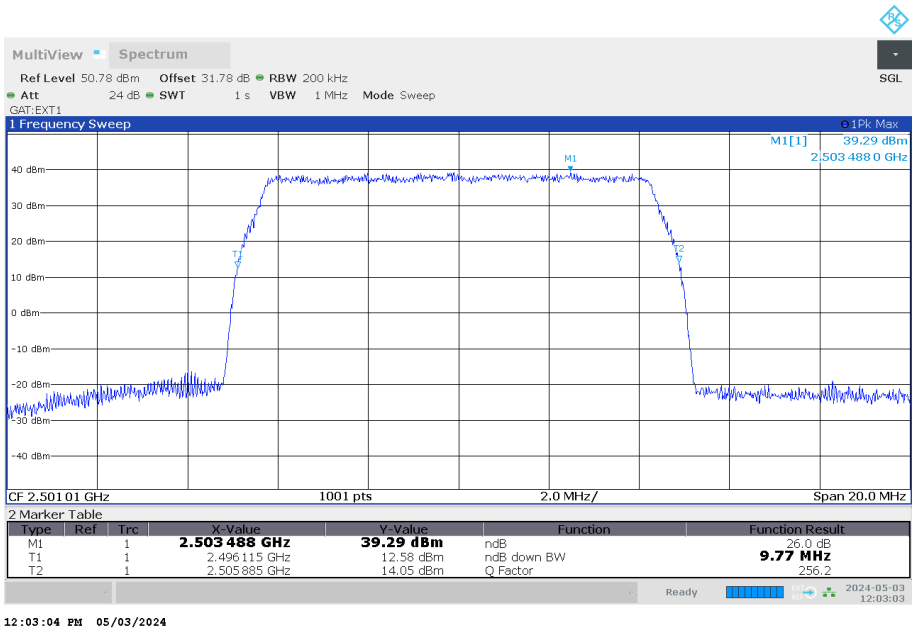
## Occupied Bandwidth NR 10+10MHz BW




Test Model 3.2, Modulation 16QAM, Channel Frequency 2501.01/2511MHz, TxPort4

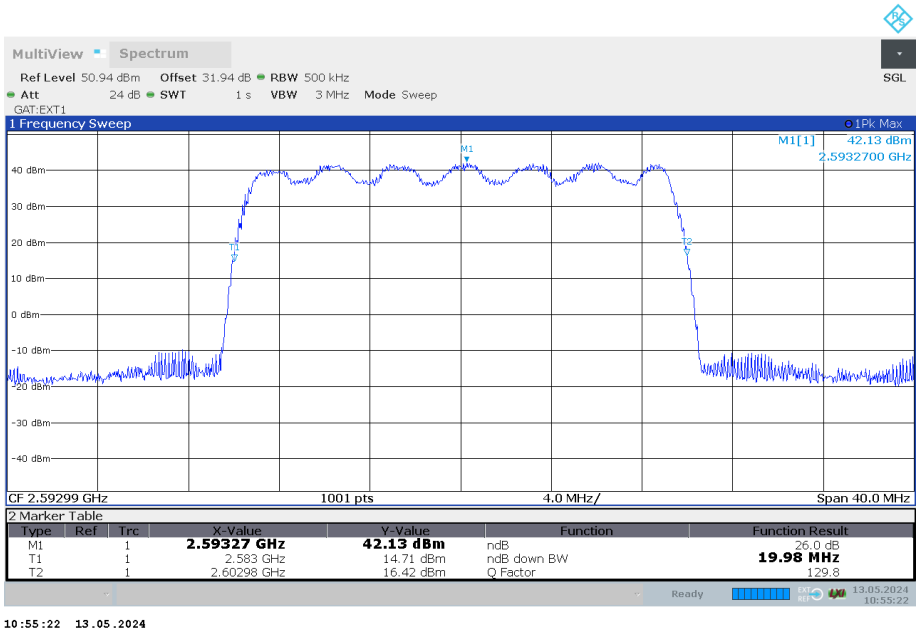
## Occupied Bandwidth -26dB plots

## Occupied Bandwidth NR 10MHz BW



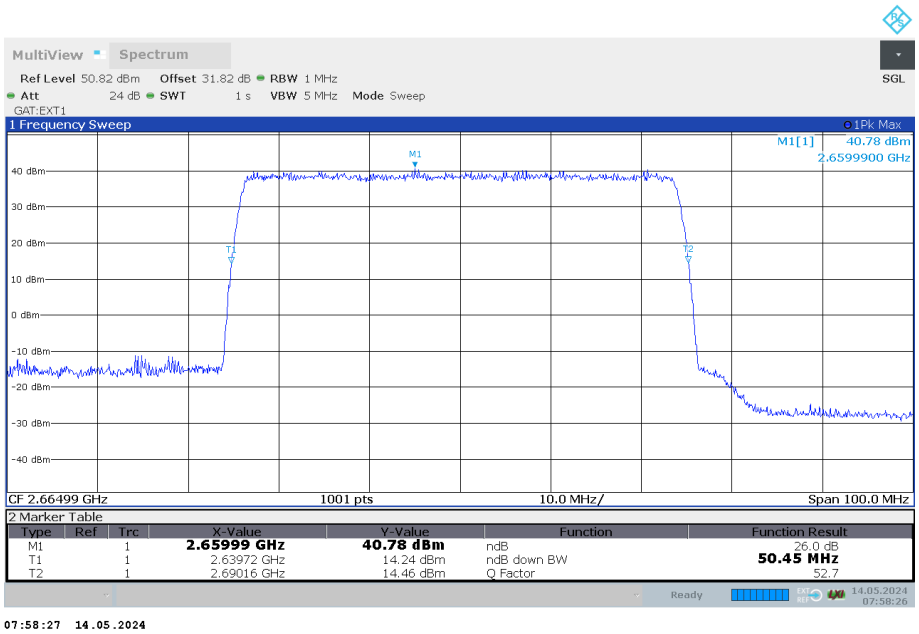

Test Model 1.1, Modulation QPSK, Channel Frequency 2501.01MHz, Tx Port4

## Occupied Bandwidth NR 20MHz BW



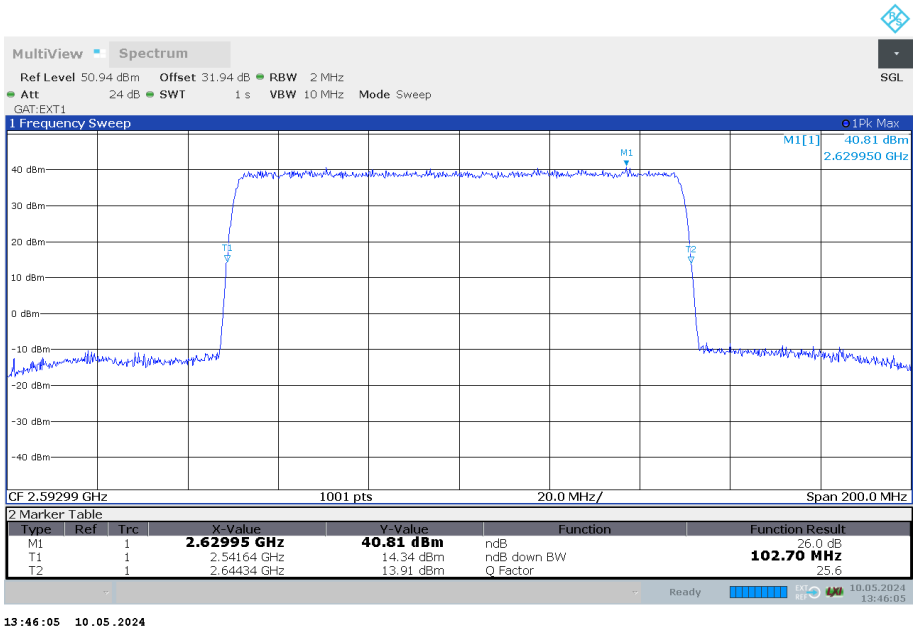

Test Model 3.2, Modulation 16QAM, Channel Frequency 2592.99MHz, Tx Port4

## Occupied Bandwidth NR 50MHz BW



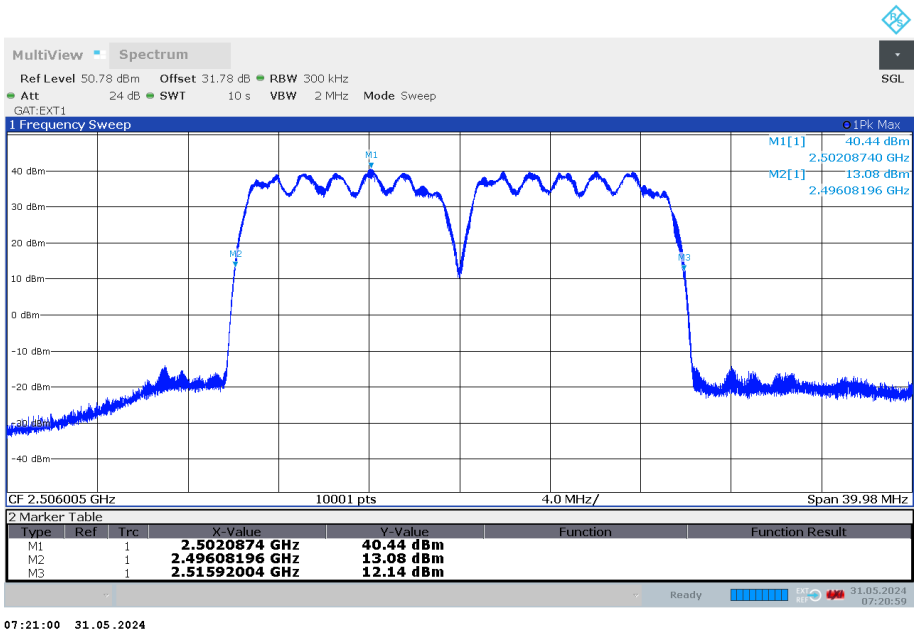

Test Model 3.1, Modulation 64QAM, Channel Frequency 2664.99MHz, Tx Port4

## Occupied Bandwidth NR 100MHz BW




Test Model 3.1a, Modulation 256QAM, Channel Frequency 2592.99MHz, Tx Port4

## Occupied Bandwidth E-UTRA 10+10MHz BW




07:21:00 31.05.2024

Test Model 3.2, Modulation 16QAM, Channel Frequency 2501.01/2511MHz, TxPort4

## 5.2.4 Test No. 4: Spurious Emissions at the Antenna Terminals

**Config A TX port 4:**

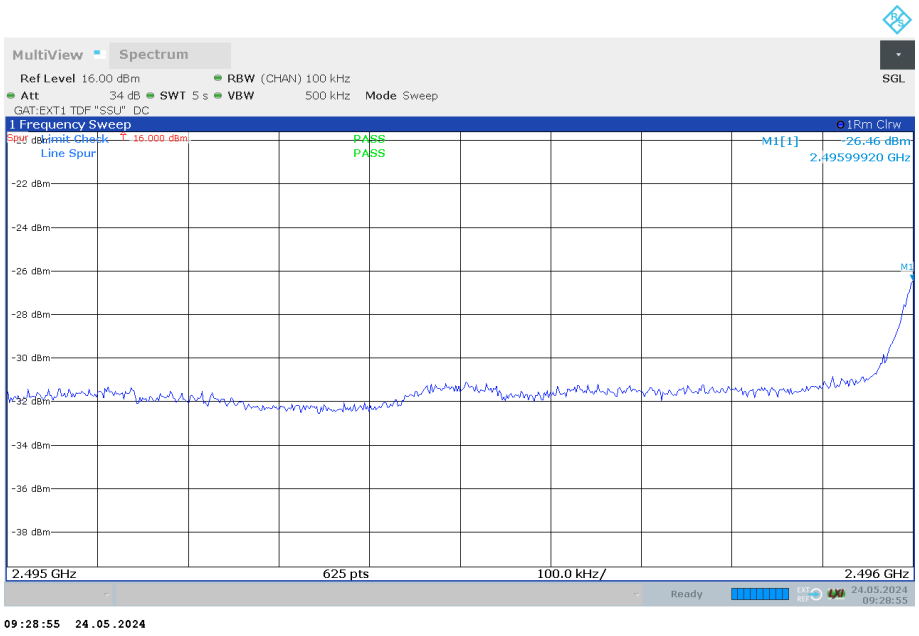



Figure 4 Spurious Emissions (Lower Band Edge) – QPSK (2501.01 MHz) (10MHz Channel BW)

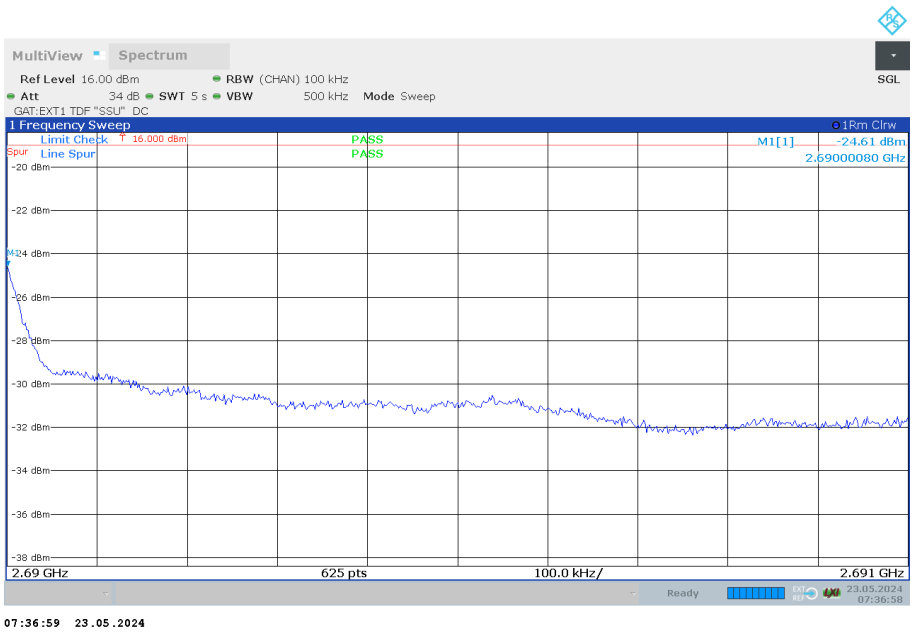



Figure 5 Spurious Emissions (Upper Band Edge) – QPSK (2685 MHz) (10 MHz Channel BW)

## Config A TX port 4:

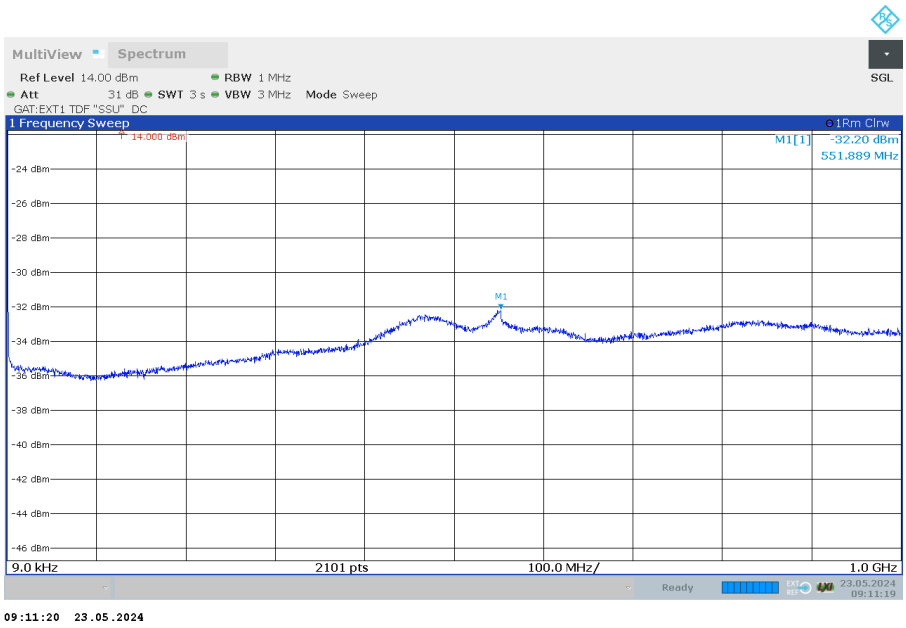



Figure 6 Spurious Emissions (9kHz – 1GHz) - QPSK (2592.99 MHz) (10MHz Channel BW)

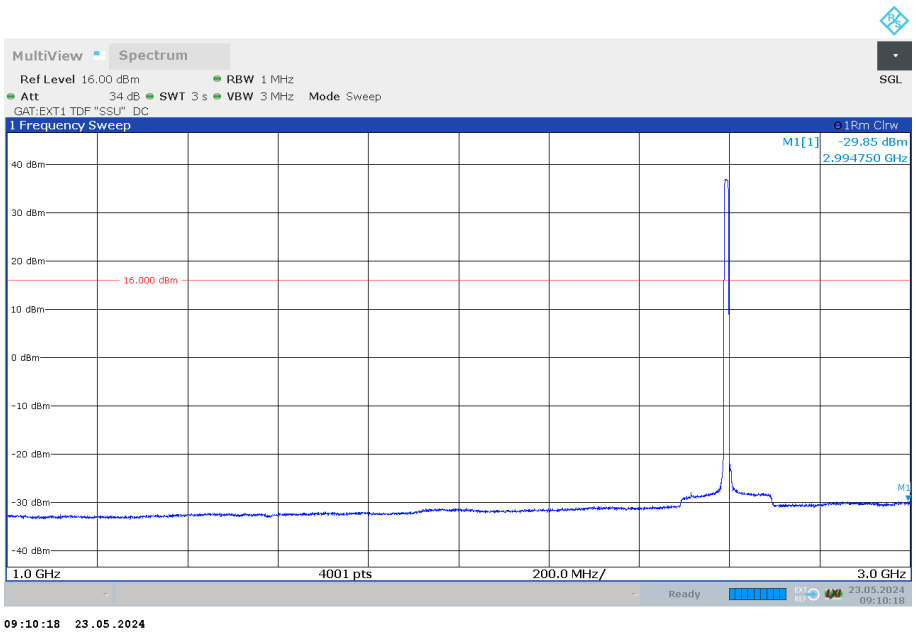



Figure 7 Spurious Emissions (1GHz – 3GHz) – QPSK (2592.99 MHz) (10MHz Channel BW)

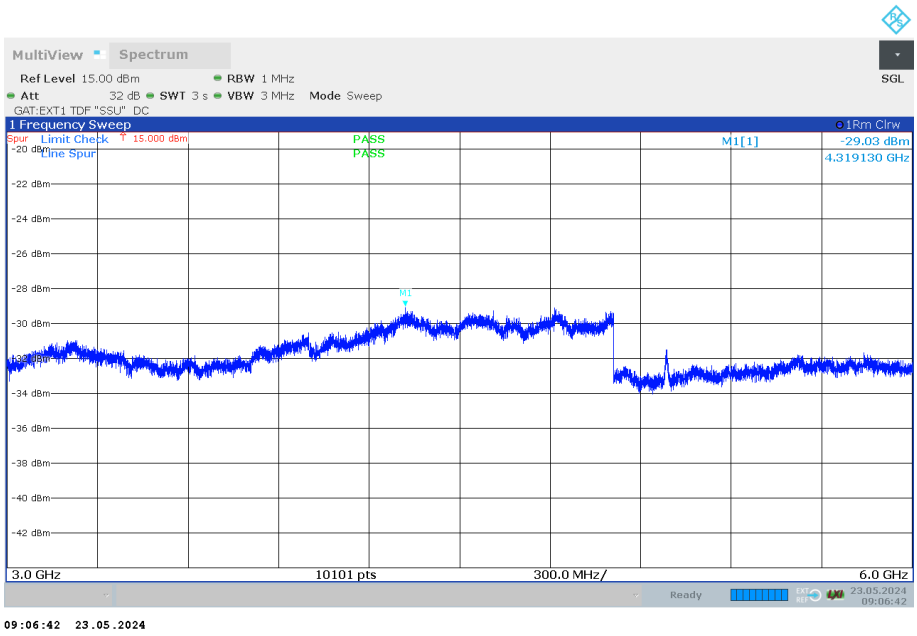



Figure 8 Spurious Emissions (3GHz – 6GHz) – QPSK (2592.99 MHz) (10MHz Channel BW)

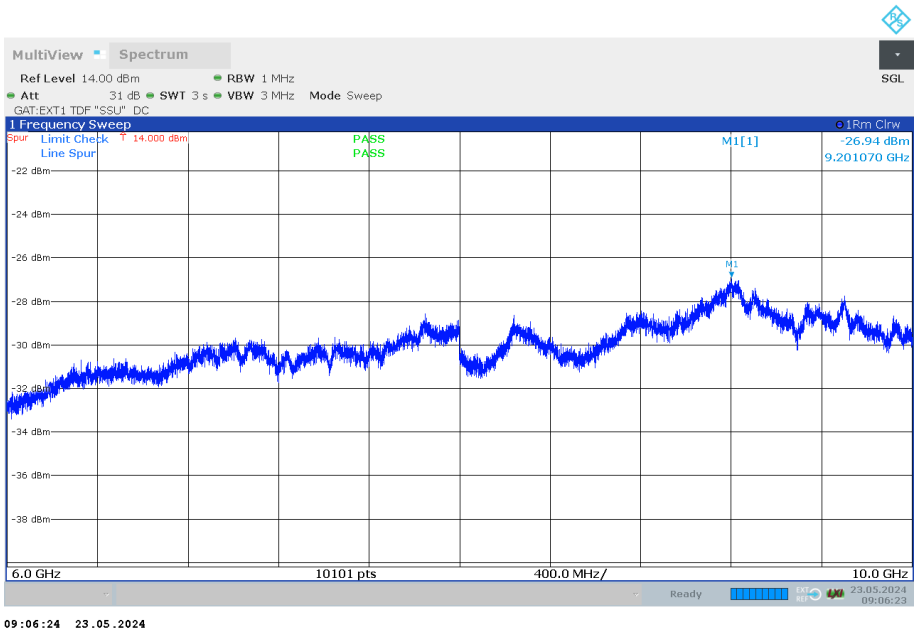



Figure 9 Spurious Emissions (6GHz – 10GHz) – QPSK (2592.99 MHz) (10MHz Channel BW)

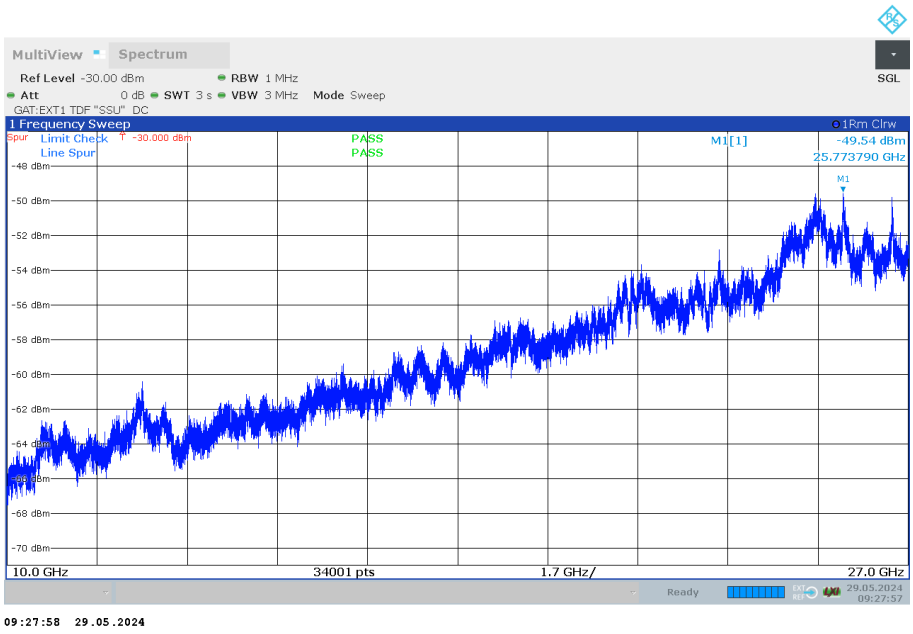



Figure 10 Spurious Emissions (10GHz – 27GHz) – QPSK (2592.99 MHz) (10MHz Channel BW)

## Config J TX port 4:


Figure 11 Spurious Emissions (Lower Band Edge) – QPSK (2546.01 MHz) (100MHz Channel BW)

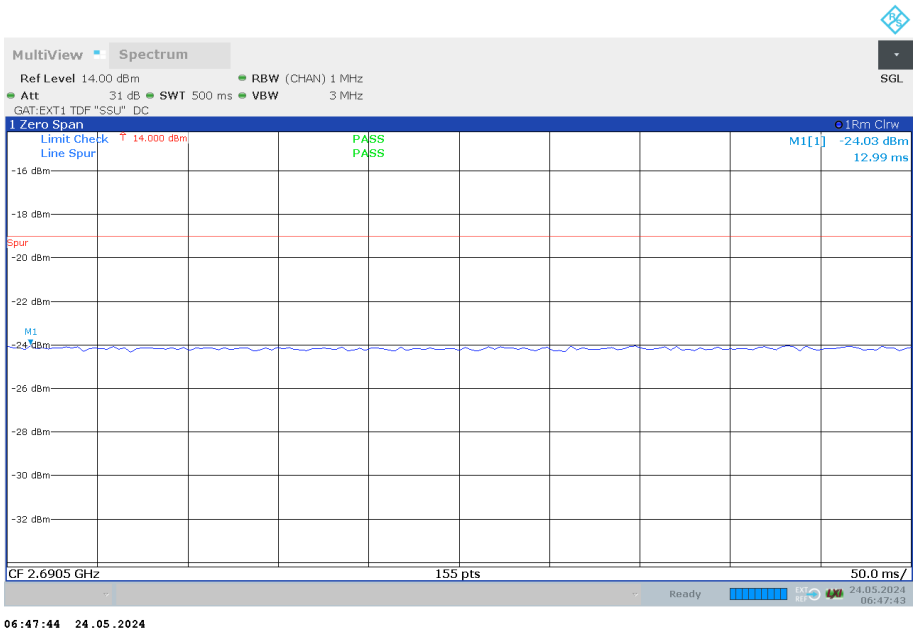



Figure 12 Spurious Emissions (Upper Band Edge) – QPSK (2640 MHz) (100MHz Channel BW)

## Config J TX port 4:

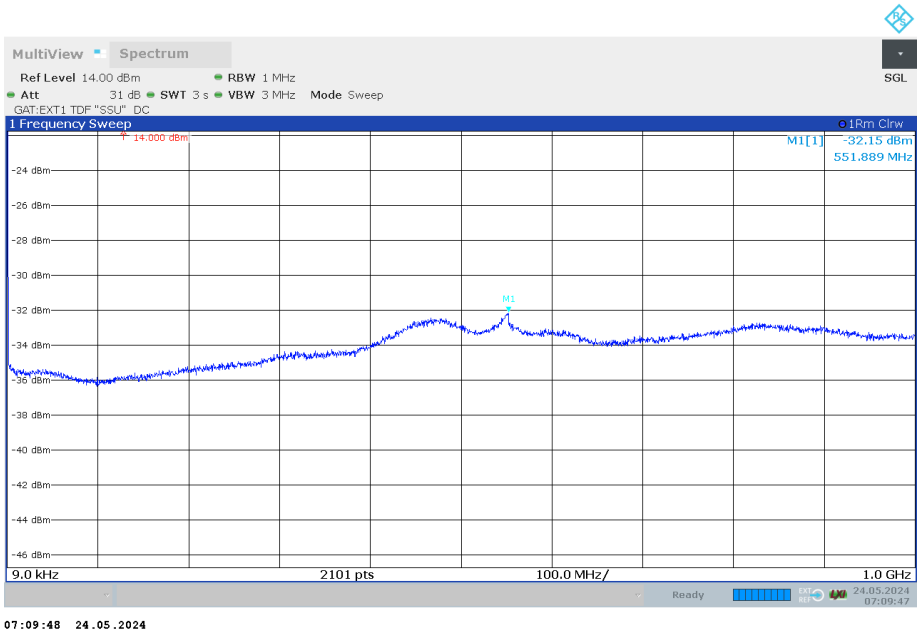



Figure 13 Spurious Emissions (9kHz – 1GHz) - QPSK (2592.99 MHz) (100MHz Channel BW)

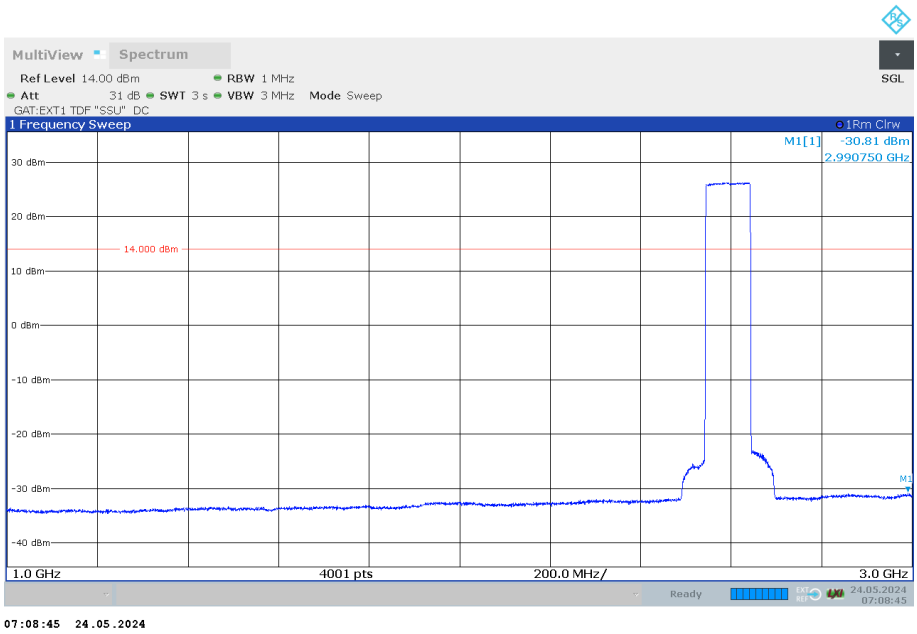



Figure 14 Spurious Emissions (1GHz – 3GHz) – QPSK (2592.99 MHz) (100MHz Channel BW)

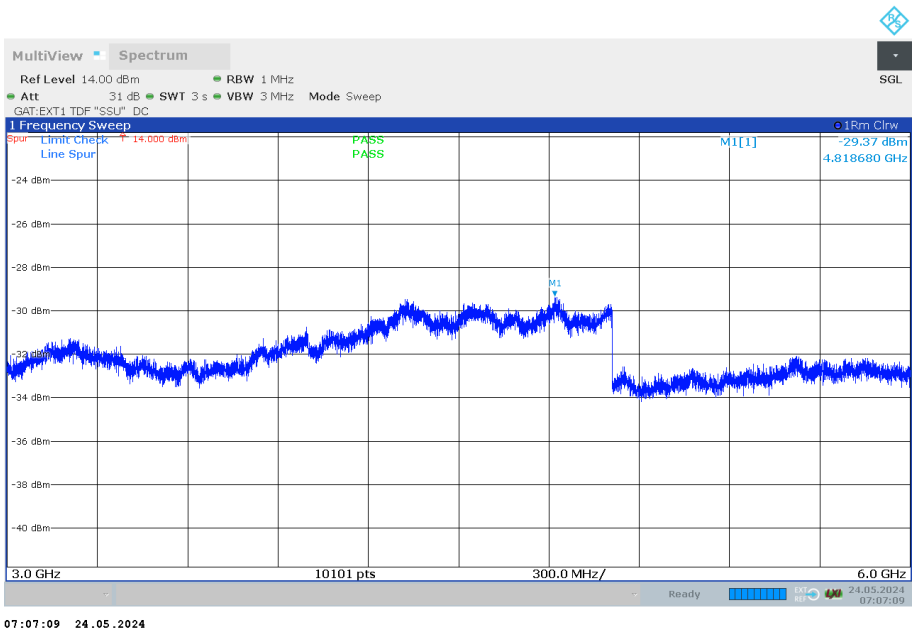



Figure 15 Spurious Emissions (3GHz – 6GHz) – QPSK (2592.99 MHz) (100MHz Channel BW)

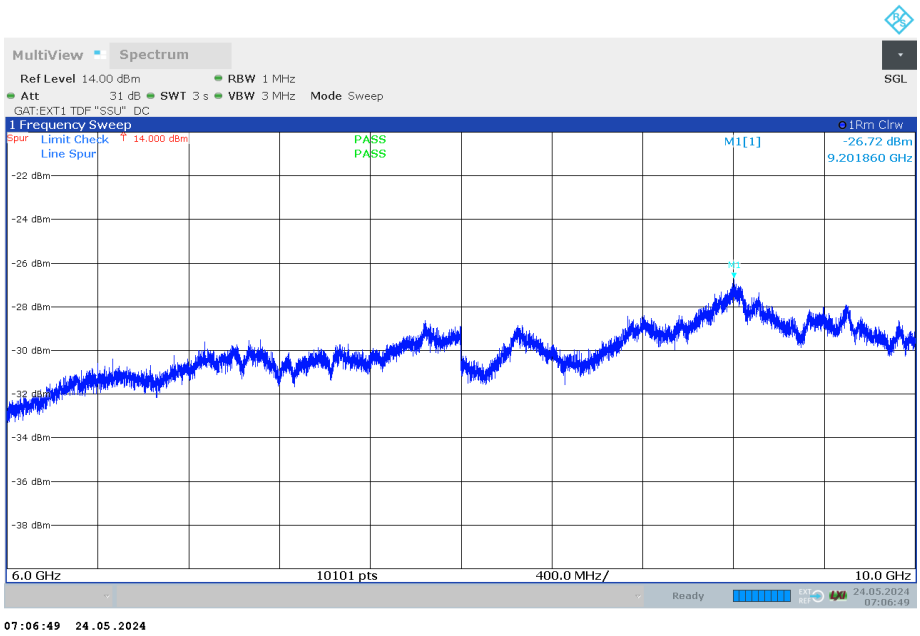



Figure 16 Spurious Emissions (6GHz – 10GHz) – QPSK (2592.99 MHz) (100MHz Channel BW)

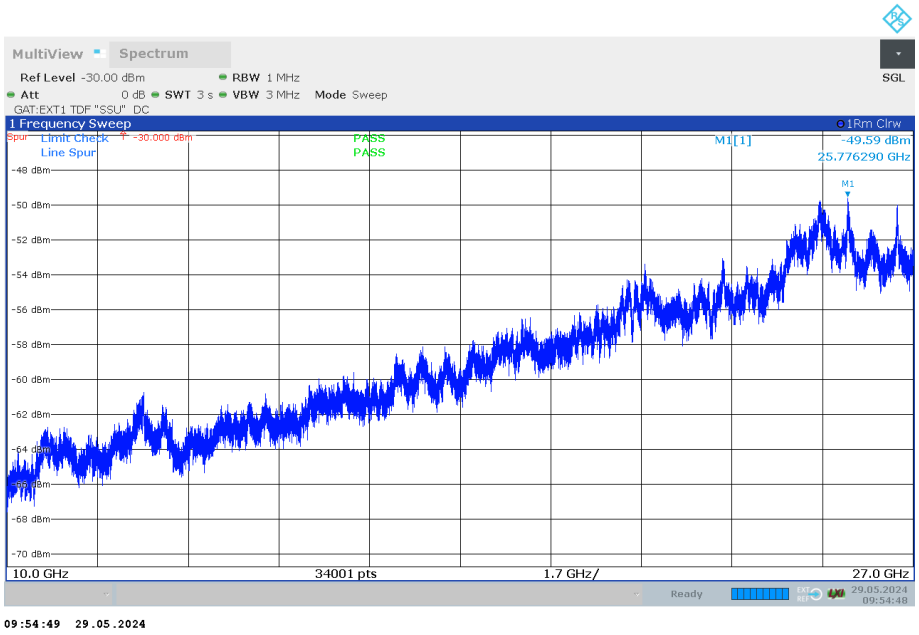



Figure 17 Spurious Emissions (10GHz – 27GHz) – QPSK (2592.99 MHz) (100MHz Channel BW)

## 5.2.5 Test No. 5 Field Strength of Spurious Radiation

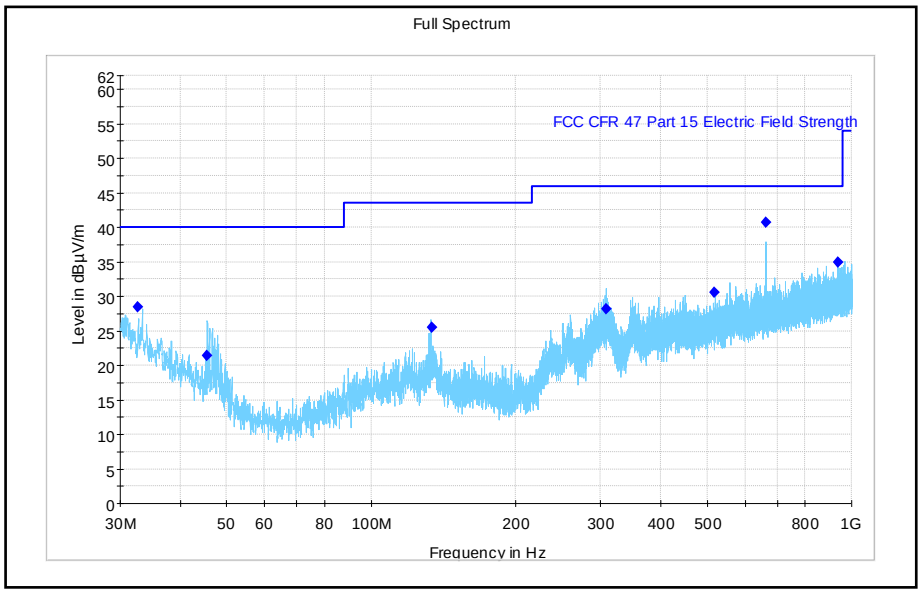



Figure 18 Field Strength of Spurious Radiation (30 MHz – 1 GHz) – QPSK (2501.01 / 2506.02 / 2685 MHz) (10+10+10 MHz Channel BW)

## Final_Result

| Frequency (MHz) | QuasiPeak Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Polarisation | Angle (°) |
|---|---|---|---|---|---|---|
| 32.672667 | 28.46 | 40.00 | 11.54 | 102.0 | V | 109.0 |
| 45.492333 | 21.39 | 40.00 | 18.61 | 102.0 | V | 252.0 |
| 133.413333 | 25.50 | 43.50 | 18.00 | 100.0 | V | 119.0 |
| 308.613333 | 28.17 | 46.00 | 17.83 | 106.0 | H | 1.0 |
| 518.347000 | 30.61 | 46.00 | 15.39 | 220.0 | H | 167.0 |
| 663.541667 | 40.72 | 46.00 | 5.28 | 119.0 | V | -5.0 |
| 935.688333 | 34.88 | 46.00 | 11.12 | 144.0 | V | 274.0 |

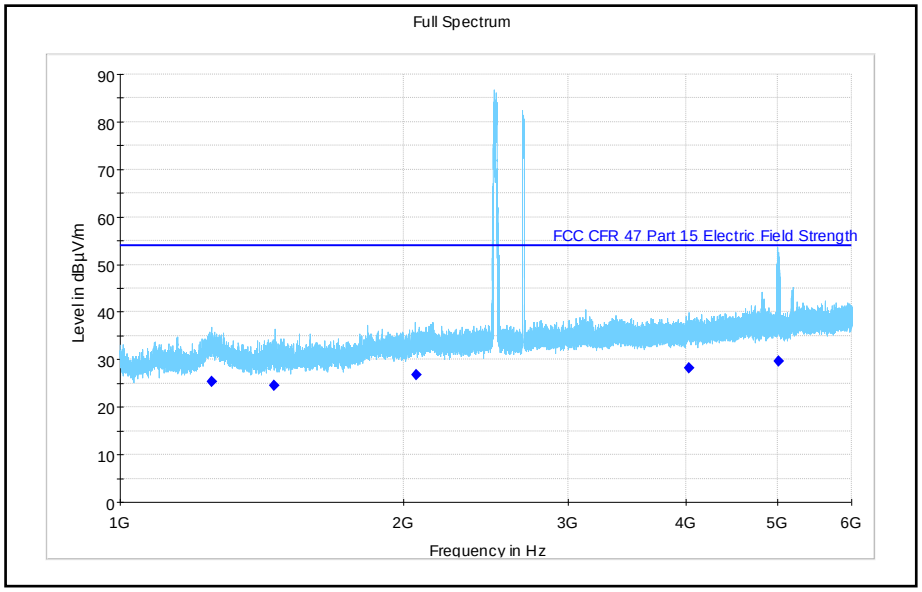



Figure 19 Field Strength of Spurious Radiation (1 GHz – 6 GHz) – QPSK (2501.01 / 2511 / 2685 MHz) (10+10+10 MHz Channel BW)

## Final_Result

| Frequency (MHz) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Polarisation | Angle (°) |
|---|---|---|---|---|---|---|
| 1252.016834 | 25.45 | 54.00 | 28.55 | 107.0 | V | -1.0 |
| 1456.183333 | 24.60 | 54.00 | 29.40 | 138.0 | H | 330.0 |
| 2063.644333 | 26.82 | 54.00 | 27.18 | 100.0 | V | 334.0 |
| 4032.215667 | 28.15 | 54.00 | 25.85 | 109.0 | V | 165.0 |
| 5013.280167 | 29.59 | 54.00 | 24.41 | 348.0 | H | 30.0 |

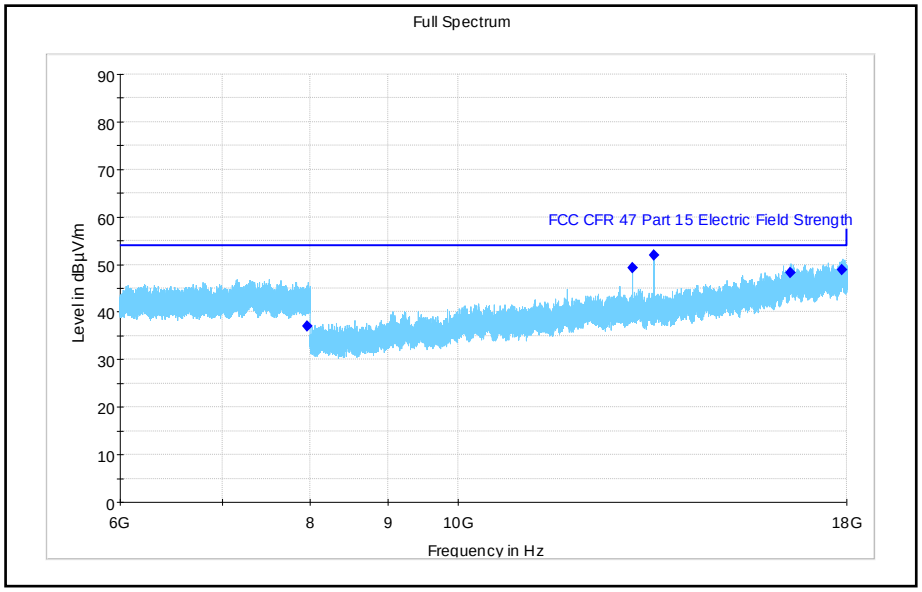



Figure 20 Field Strength of Spurious Radiation (6 GHz – 18 GHz) – QPSK (2501.01 / 2511 / 2685 MHz) (10+10+10 MHz Channel BW)

## Final_Result

| Frequency (MHz) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Polarisation | Angle (°) |
|---|---|---|---|---|---|---|
| 7962.889500 | 37.12 | 54.00 | 16.88 | 107.0 | V | 279.0 |
| 13025.274920 | 49.21 | 54.00 | 4.79 | 224.0 | V | 333.0 |
| 13452.515132 | 52.04 | 54.00 | 1.96 | 267.0 | V | 2.0 |
| 16536.705468 | 48.37 | 54.00 | 5.63 | 145.0 | V | 20.0 |
| 17859.848348 | 48.92 | 54.00 | 5.08 | 233.0 | H | 135.0 |

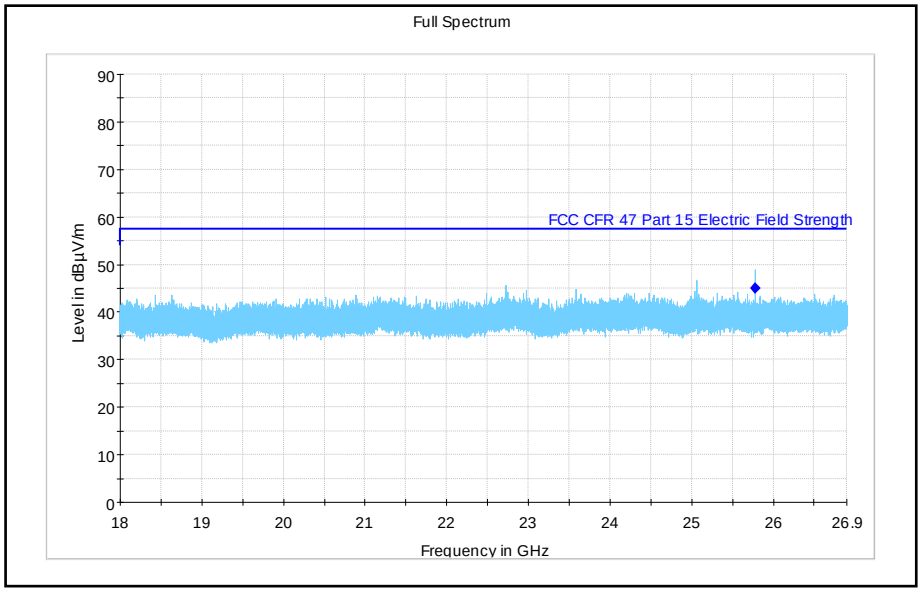



Figure 21 Field Strength of Spurious Radiation (18 GHz – 26.9 GHz) – QPSK (2501.01 / 2511 / 2685 MHz) (10+10+10 MHz Channel BW)

## Final_Result

| Frequency (MHz) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Polarisation | Angle (°) |
|---|---|---|---|---|---|---|
| 25781.264880 | 44.96 | 57.50 | 12.54 | 185.0 | H | 328.0 |

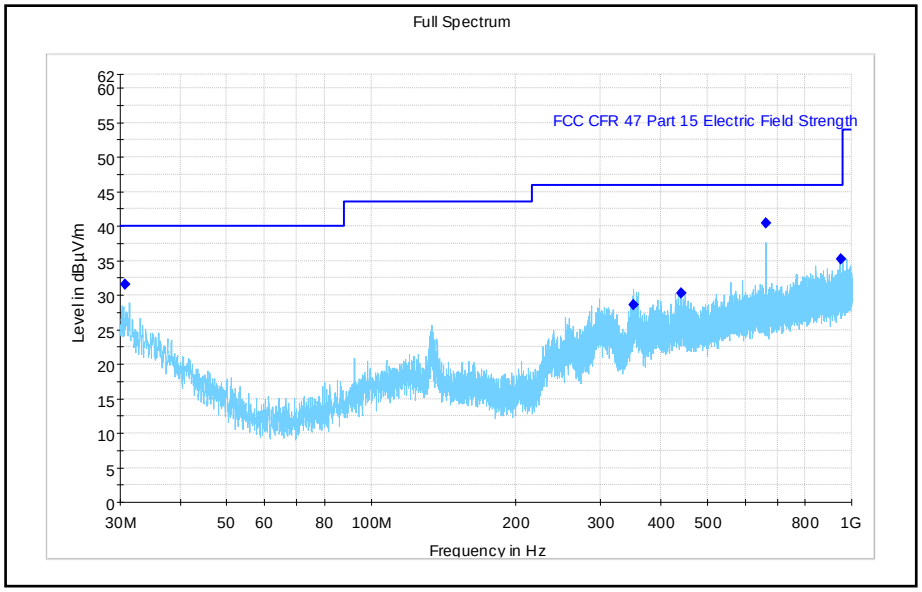



Figure 22 Field Strength of Spurious Radiation (30 MHz – 1 GHz) – QPSK (2501.01 / 2685 MHz) (10+10 MHz Channel BW)

## Final_Result

| Frequency (MHz) | QuasiPeak Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Polarisation | Angle (°) |
|---|---|---|---|---|---|---|
| 30.730333 | 31.57 | 40.00 | 8.43 | 100.0 | V | 297.0 |
| 351.162667 | 28.67 | 46.00 | 17.33 | 102.0 | H | 218.0 |
| 442.739000 | 30.28 | 46.00 | 15.72 | 107.0 | V | 282.0 |
| 663.541667 | 40.43 | 46.00 | 5.57 | 122.0 | V | -5.0 |
| 948.007333 | 35.23 | 46.00 | 10.77 | 200.0 | H | 163.0 |

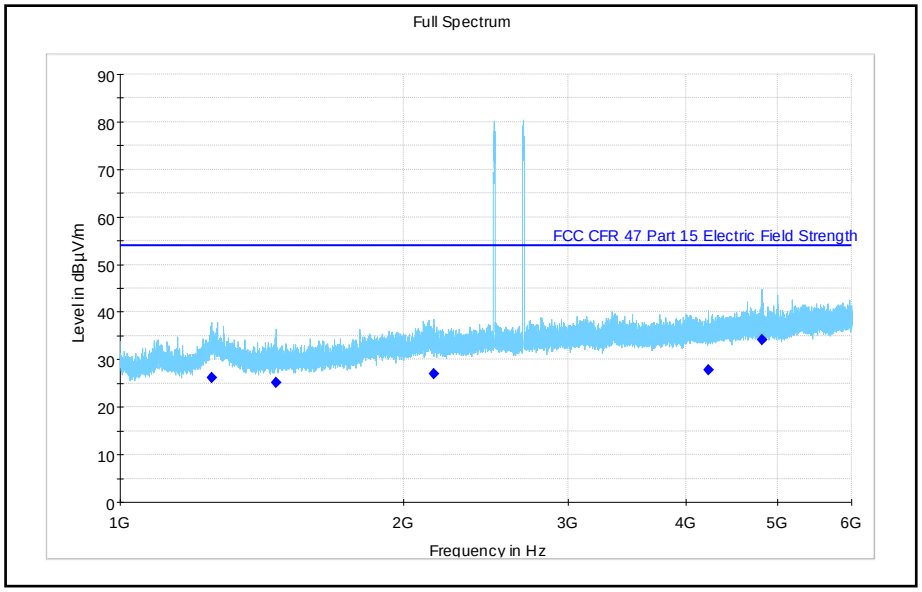



Figure 23 Field Strength of Spurious Radiation (1 GHz – 6 GHz) – QPSK (2501.01 / 2685 MHz) (10+10 MHz Channel BW)

## Final_Result

| Frequency (MHz) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Polarisation | Angle (°) |
|---|---|---|---|---|---|---|
| 1251.535834 | 26.13 | 54.00 | 27.87 | 169.0 | V | 248.0 |
| 1465.299833 | 25.12 | 54.00 | 28.88 | 148.0 | H | 330.0 |
| 2157.372333 | 27.01 | 54.00 | 26.99 | 100.0 | V | 1.0 |
| 4224.918834 | 27.72 | 54.00 | 26.28 | 100.0 | V | 285.0 |
| 4816.300833 | 34.10 | 54.00 | 19.90 | 110.0 | V | 156.0 |

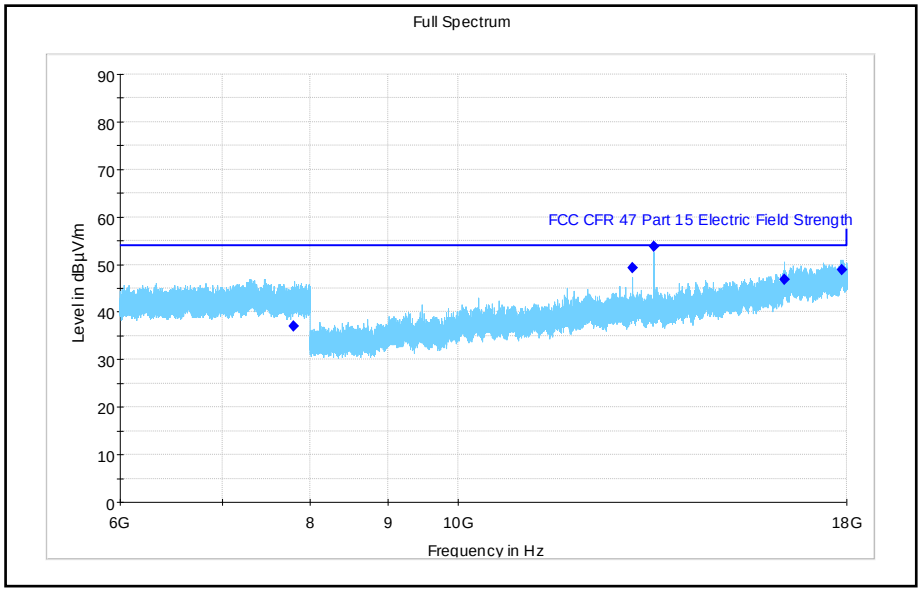



Figure 24 Field Strength of Spurious Radiation (6 GHz – 18 GHz) – QPSK (2501.01 / 2685 MHz) (10+10 MHz Channel BW)

## Final_Result

| Frequency (MHz) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Polarisation | Angle (°) |
|---|---|---|---|---|---|---|
| 7802.559833 | 36.99 | 54.00 | 17.01 | 165.0 | V | 0.0 |
| 13025.273720 | 49.37 | 54.00 | 4.63 | 177.0 | V | 339.0 |
| 13452.476720 | 53.70 | 54.00 | 0.30 | 155.0 | V | 330.0 |
| 16386.869760 | 46.87 | 54.00 | 7.13 | 153.0 | V | 311.0 |
| 17856.261400 | 48.82 | 54.00 | 5.18 | 129.0 | V | -2.0 |

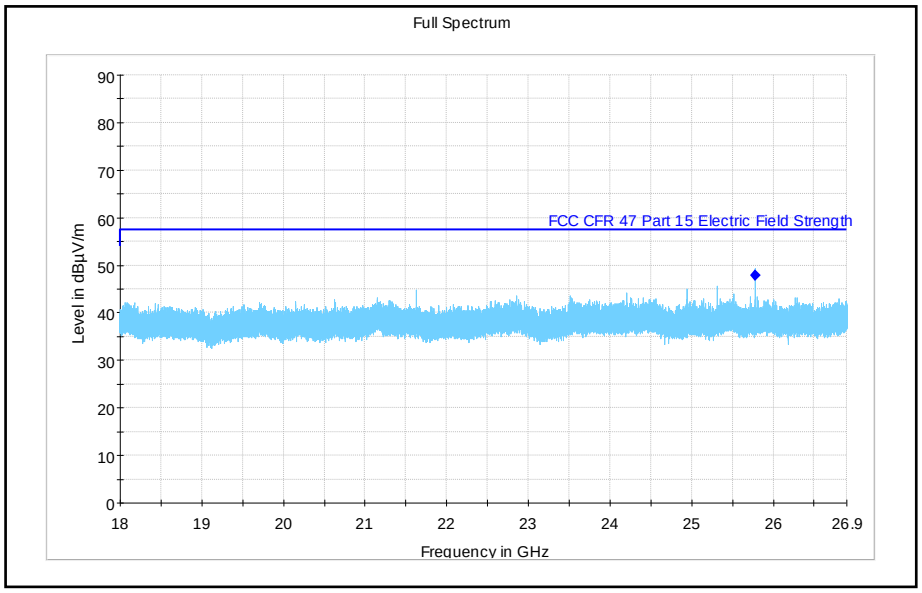



Figure 25 Field Strength of Spurious Radiation (18 GHz – 26.9 GHz) – QPSK (2501.01 / 2685 MHz) (10+10 MHz Channel BW)

## Final_Result

| Frequency (MHz) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Polarisation | Angle (°) |
|---|---|---|---|---|---|---|
| 25781.244948 | 47.82 | 57.50 | 9.68 | 131.0 | V | 15.0 |

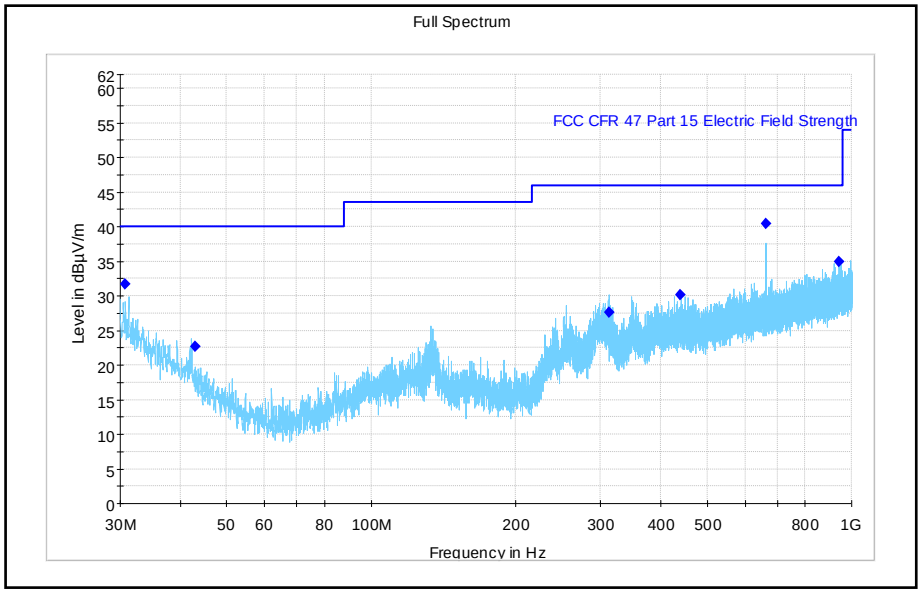



Figure 26 Field Strength of Spurious Radiation (30 MHz – 1 GHz) – QPSK (2546.01 / 2644.98 MHz) (100+90 MHz Channel BW)

## Final_Result

| Frequency (MHz) | QuasiPeak Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Polarisation | Angle (°) |
|---|---|---|---|---|---|---|
| 30.751000 | 31.75 | 40.00 | 8.25 | 100.0 | V | 295.0 |
| 43.059667 | 22.73 | 40.00 | 17.27 | 102.0 | V | 10.0 |
| 312.717667 | 27.59 | 46.00 | 18.41 | 103.0 | H | 229.0 |
| 440.460333 | 30.18 | 46.00 | 15.82 | 103.0 | V | 302.0 |
| 663.539333 | 40.40 | 46.00 | 5.60 | 113.0 | V | -5.0 |
| 941.315000 | 34.94 | 46.00 | 11.06 | 148.0 | V | 244.0 |

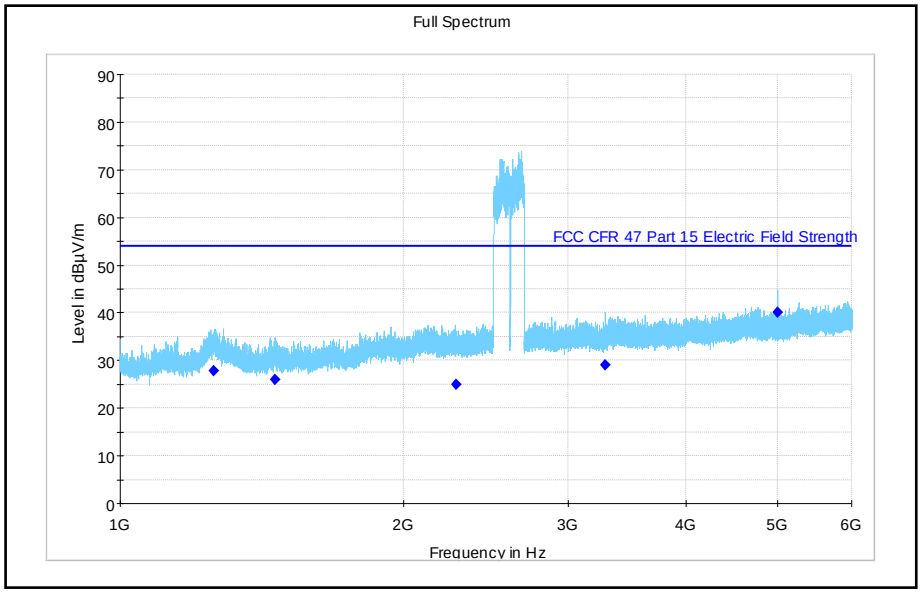



Figure 27 Field Strength of Spurious Radiation (1 GHz – 6 GHz) – QPSK (2546.01 / 2644.98 MHz) (100+90 MHz Channel BW)

## Final_Result

| Frequency (MHz) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Polarisation | Angle (°) |
|---|---|---|---|---|---|---|
| 1258.836000 | 27.83 | 54.00 | 26.17 | 104.0 | V | 297.0 |
| 1462.356833 | 26.03 | 54.00 | 27.97 | 147.0 | H | 328.0 |
| 2275.216667 | 24.97 | 54.00 | 29.03 | 312.0 | V | 345.0 |
| 3284.655000 | 28.96 | 54.00 | 25.04 | 290.0 | V | 330.0 |
| 5000.047333 | 40.11 | 54.00 | 13.89 | 103.0 | V | 270.0 |
| 6722.364000 | 34.22 | 54.00 | 19.78 | 157.0 | V | 302.0 |
| 7665.548333 | 35.03 | 54.00 | 18.97 | 100.0 | V | 150.0 |
| 13452.426200 | 55.90 | 54.00 | -1.90 | 214.0 | V | 32.0 |
| 17369.298640 | 45.90 | 54.00 | 8.10 | 102.0 | V | 236.0 |

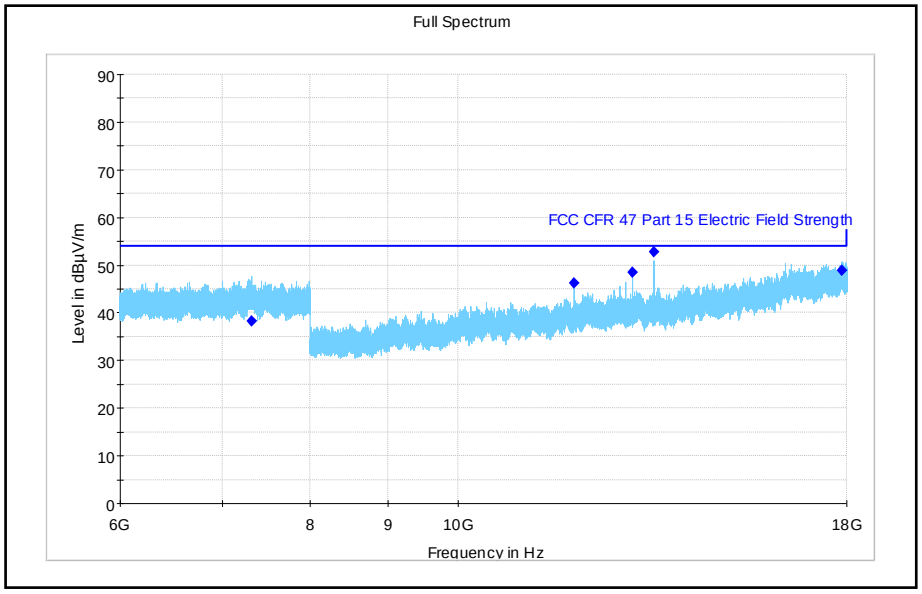



Figure 28 Field Strength of Spurious Radiation (6 GHz – 18 GHz) – QPSK (2546.01 / 2644.98 MHz) (100+90 MHz Channel BW)

## Final_Result

| Frequency (MHz) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Polarisation | Angle (°) |
|---|---|---|---|---|---|---|
| 7316.235500 | 38.17 | 54.00 | 15.83 | 304.0 | V | 342.0 |
| 11919.366388 | 46.27 | 54.00 | 7.73 | 194.0 | V | 0.0 |
| 13025.275880 | 48.38 | 54.00 | 5.62 | 137.0 | V | 26.0 |
| 13452.486240 | 52.79 | 54.00 | 1.21 | 250.0 | V | 15.0 |
| 17871.278600 | 48.90 | 54.00 | 5.10 | 283.0 | V | 135.0 |

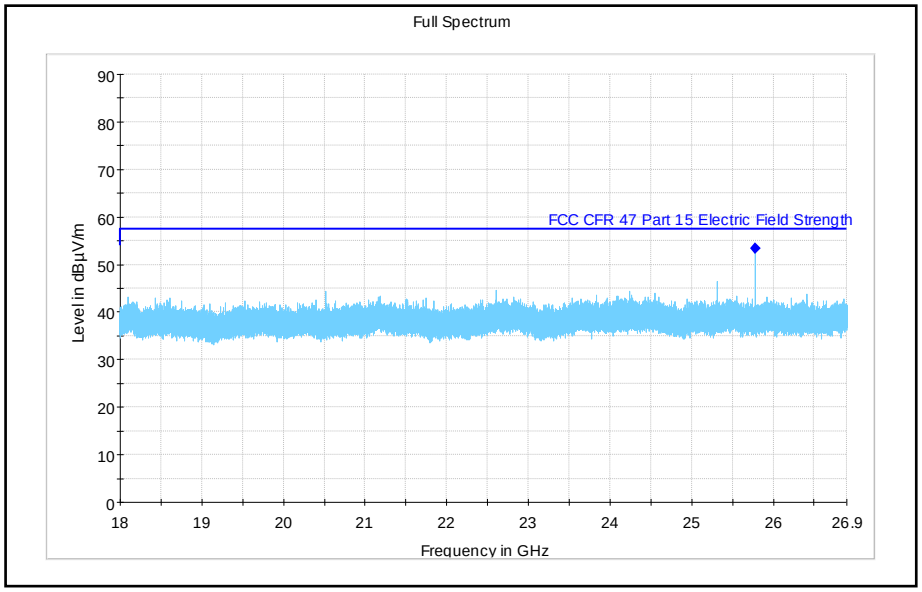



Figure 29 Field Strength of Spurious Radiation (18 GHz – 26.9 GHz) – QPSK (2546.01 / 2644.98 MHz) (100+90 MHz Channel BW)

## Final_Result

| Frequency (MHz) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Polarisation | Angle (°) |
|---|---|---|---|---|---|---|
| 25781.245308 | 53.44 | 57.50 | 4.06 | 131.0 | V | 323.0 |

# Appendix A: AWHHJ EIRP calculations

### EIRP Calculations for Four Port MIMO Operations for Band 41 Single Carriers

EIRP calculations are needed at each transmitter location to optimize base station operational performance while meeting regulatory requirements. Each cell site installation needs to consider the power measurements in the radio certification report as well as site specific regulatory requirements (such as antenna height, population density, etc.), site installation parameters (line loss between antenna and radio, antenna parameters, etc.) and base station operational parameters (MIMO operational setup, carrier power level, channel bandwidth, modulation type, etc.) to optimize performance. Transmitter output power may be reduced (from maximum) by base station setup parameters. Base station antennas are selected by the customer.

The base station antenna is selected by the customer. This EIRP calculation is based upon Nokia antenna assembly model "AAHM". The maximum Band 41 gain (12.0dBi) for this antenna was used for the EIRP calculation. This antenna assembly has a pair of ±45° cross-polarized radiators used for Band 41. Four AWHHJ transmitter outputs are connected to the antenna assembly RF inputs.

Equivalent Isotropically Radiated Power (EIRP) is calculated (as specified in ANSI C63.26-2015 section 6.4 for uncorrelated output signals) from the results of power measurements (highest measured power for each channel bandwidth type). The maximum antenna gain was used for this calculation. The cable loss between the antenna and transmitter is site dependent. The cable loss 0 dB was used in this calculation since AAHM can be installed directly into the AWHHJ. Calculations of worst-case EIRP for four port MIMO are as follows:

| Parameter | NR 10 MHz Ch BW | NR 20 MHz Ch BW | NR 30 MHz Ch BW | NR 40 MHz Ch BW | NR 50 MHz Ch BW |
|---|---|---|---|---|---|
| **Worst Case Power Output per Antenna Port** | 45.95 dBm | 45.92 dBm | 46.01 dBm | 46.01 dBm | 45.81 dBm |
| **Number of Ant Ports per Polarization** | 2 | 2 | 2 | 2 | 2 |
| **Total Power per Polarization 10Log 2 = + 3dB** | 48.95 dBm | 48.92 dBm | 49.01 dBm | 49.01 dBm | 48.81 dBm |
| **Cable Loss (site dependent) = 0.0dB** | 48.95 dBm | 48.92 dBm | 49.01 dBm | 49.01 dBm | 48.81 dBm |
| **Dir Gain = Max Ant Gain ($G_{Ant}$) See Note 1** | 12.0 dBi | 12.0 dBi | 12.0 dBi | 12.0 dBi | 12.0 dBi |
| **EIRP per Polarization** | 60.95 dBm | 60.92 dBm | 61.01 dBm | 61.01 dBm | 60.81 dBm |
| **Number of Polarizations** | 2 | 2 | 2 | 2 | 2 |
| **EIRP Total = Y1 ±45°and Y2 ±45° See Note 2** | 60.95 dBm | 60.92 dBm | 61.01 dBm | 61.01 dBm | 60.81 dBm |
| **Passing FCC EIRP Limit See Note 3** | 72.65 dBm | 75.66 dBm | 77.42 dBm | 78.67 dBm | 79.64 dBm |

| Parameter | NR 60 MHz Ch BW | NR 70 MHz Ch BW | NR 80 MHz Ch BW | NR 90 MHz Ch BW | NR 100 MHz Ch BW |
|---|---|---|---|---|---|
| **Worst Case Power Output per Antenna Port** | 45.79 dBm | 45.70 dBm | 45.76 dBm | 45.79 dBm | 45.71 dBm |
| **Number of Ant Ports per Polarization** | 2 | 2 | 2 | 2 | 2 |
| **Total Power per Polarization 10Log 2 = + 3dB** | 48.79 dBm | 48.70 dBm | 48.76 dBm | 48.79 dBm | 48.71 dBm |
| **Cable Loss (site dependent) = 0.0dB** | 48.79 dBm | 48.70 dBm | 48.76 dBm | 48.79 dBm | 48.71 dBm |
| **Dir Gain = Max Ant Gain ($G_{Ant}$) See Note 1** | 12.0 dBi | 12.0 dBi | 12.0 dBi | 12.0 dBi | 12.0 dBi |
| **EIRP per Polarization** | 60.79 dBm | 60.70 dBm | 60.76 dBm | 60.79 dBm | 60.71 dBm |
| **Number of Polarizations** | 2 | 2 | 2 | 2 | 2 |
| **EIRP Total = Y1 ±45°and Y2 ±45° See Note 2** | 60.79 dBm | 60.70 dBm | 60.76 dBm | 60.79 dBm | 60.71 dBm |
| **Passing FCC EIRP Limit See Note 3** | 80.43 dBm | 81.10 dBm | 81.68 dBm | 82.19 dBm | 82.65 dBm |

Note 1: The directional gain is equal to antenna gain since the transmit signals are completely uncorrelated. See ANSI C63.26 sections 6.4.5.2.3b) and 6.4.5.3.1b) for guidance.
Note 2: The EIRP per antenna polarity is required to be below the regulatory limit as described in ANSI C63.26-2015 section 6.4.6.3 b)2) and KDB 662911 D02v01 page 3 example (2) since the two transmitter outputs to each antenna are 90 degree-phase shifted relative to each other (cross-polarized radiators).
Note 3: The EIRP limit is defined by FCC part 27.50(h)(ii) as 33dBW+ 10Log(X/Y) dBW + 10 log(360/beamwidth) dBW where X is the channel width in MHz and Y is 5.5 or 6MHz. The Nokia AAHM antenna has a horizontal beamwidth of 65 degrees for the 2490 to 2690MHz frequency range. Y was selected to be 6MHz.

## EIRP Calculation Summary

The worst case AWHHJ Band 41 four port MIMO EIRP levels using antenna assembly model “AAHM” are less than the FCC EIRP Regulatory Limits.

# Appendix B: AWHHJ Emission Designators

| FCC Emission Designators for Band 41/n41 (2496MHz to 2690MHz) Single Carrier | |
|---|---|
| **Ch BW** | **5G-NR** |
| | **FCC** |
| 10MHz | 9M75G7W |
| 20MHz | 20M1G7W |
| 30MHz | 29M9G7W |
| 40MHz | 40M8G7W |
| 50MHz | 50M6G7W |
| 60MHz | 60M7G7W |
| 70MHz | 70M5G7W |
| 80MHz | 82M6G7W |
| 90MHz | 92M8G7W |
| 100MHz | 103MG7W |
| Note: FCC emission designators are based on 26dB emission bandwidth. | |

| FCC Emission Designators for Band 41/n41 (2496MHz to 2690MHz) Multi Carrier | |
|---|---|
| **Ch BW** | **5G-NR** |
| | **FCC** |
| 10+10MHz contiguous | 19M9G7W |
| 10+10MHz non-contiguous | 9M77G7W/9M75G7W |
| 100+90MHz contiguous | 195MG7W |
| 10+10 contiquous+10MHz non contiguous | 19M9G7W/9M71G7W |
| Note: FCC emission designators are based on 26dB emission bandwidth. | |