TEST REPORT: FCC RF Test Report AQQQA

FCC ID: VBNAQQQA-01

Date:	Oulu 30 Sep 2024
Pages:	79
Appendices:	3

Equipment Under Test:	Airscale Base Transceiver Station Radio Unit 64T64R 3.45G and 3.7G bands
Radio Access technology:	NR (TDD)
Type:	AQQQA
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 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 Squad Group Lead, Type Approval Nokia Networks	30 Sep 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.

The scope of testing in this effort is FCC radio certification of the AQQQA adds 5G NR 10 MHz TDD Single Carrier operations in the 3.45G and Multicarrier Multiband operations with 3.45G Band 2cc + 3.7G Band 1cc.

Test No.	Measurement	FCC Rule	Page Number of this Report	Result
1	RF Power Output	§ 2.1046, § 27.50,	10	compliant
2	Modulation Characteristics	§ 2.1047,	16	compliant
3	Occupied Bandwidth	§ 2.1049, § 2.201, § 27.53,	17	compliant
4	Spurious Emissions at Antenna Terminals	§ 2.1051, § 2.1057 § 27.53	19	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 v02r01, 971168 D03 IM Emission Repeater Amp v01, 971168 D01 Power Meas License Digital Systems v03r01 and 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,
Start of Test:	03 Sep 2024
End of Test:	12 Sep 2024

1.2 Participants

Name	Function	Signature
RF Test person (Nokia) Timo Lindvall	Tests no: 1,2,3, 4 Setup of EUT	

2 Equipment Under Test

The EUT is a AirScale Dual Band MAA (Massive Adaptive Antenna) 64T64R Radio Unit (RU) variant AQQQA.

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 Dual Band MAA 64T64R Radio Unit, 3.45G and 3.7G bands, 480W (including both bands)**
Radio Access Technology	NR
Duplex mode	Time Division Duplex (TDD)
Channel Bandwidth	NR Single carrier 10MHz (3.45G band) (**Config. A**), Multicarrier Multiband TC 1 (**Config. B**), Multicarrier Multiband TC 2 (**Config. C**), Multicarrier Multiband TC 3 (**Config. D**), Multicarrier Multiband TC 4 (**Config. E**), Multicarrier Multiband TC 5 (**Config. F**), Multicarrier Multiband TC 6 (**Config. G**), Multicarrier Multiband TC 7 (**Config. H**) Detailed description of Multicarrier Multiband configurations (Config B, C, D, E, F, G and H) in Appendix A.
Supply Voltage	48.0 V DC
Frequency Range	3.45G Band: 3450 – 3550 MHz 3.7G Band: 3700 – 3980 MHz
Rated Output Power (Prat)	**3.45G Band**: Maximum RF output power **200W** (3.125W/TRX x 64TRXs) **3.7G Band**: Maximum RF output power **320W** (5W/TRX x 64TRXs) **AQQQA** (including both bands): **Maximum RF output power 480W** (7.5W/TRX x 64TRXs) **The 3.45G Band** single carrier channel bandwidth maximum RF output power per TRX: **NR 10MHz**: 1.25W / 31.0dBm per TRX for single carrier only, (0.78W / 28.9dBm per carrier for multicarrier) **NR 20MHz**: 2.5W / 34.0dBm per TRX for single carrier only, (1.56W / 31.9dBm per carrier for multicarrier) **NR 30MHz**: 2.5W / 34.0dBm per TRX **NR 40MHz**: 3.125W / 35.0dBm per TRX **The 3.7G Band** single carrier channel bandwidth maximum RF output power per TRX:

	NR 20MHz: 2.5W / 34.0dBm per TRX **NR 40MHz**: 5W / 37.0dBm per TRX **NR 60MHz**: 5W / 37.0dBm per TRX **NR 80MHz**: 5W / 37.0dBm per TRX **NR 100MHz**: 5W / 37.0dBm per TRX	
Downlink/Uplink ratio	7:2	
	RX	**TX**
Number of Antenna Ports	64	64
MiMo	Yes	Yes

Table 2 Overview of EUT configuration

The tests were performed with one EUT at the TAB port 57.

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

Module Name	**Serial-No.**	**Module Type**	**Test No.**
AQQQA	BL2318G601N	64T64R RU	1,2,3,4
BTS Software version			
SBTS24R3_ENB_0000_000386_000000			

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 38.141-1 NR Test Models (TM) for all tests:

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

NR Test Models TM1.1, TM3.2, TM3.1 and TM3.1A have Downlink/Uplink ratio 7:2.

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.

3 Test Configuration

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

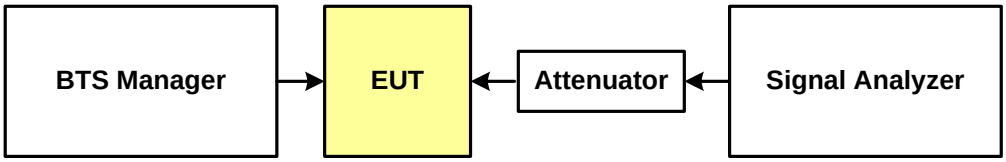


Figure 1 Test Configuration (single output)

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 36 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: RF Power Output (§ 2.1046, § 27.50)

4.1.1 Limits

EIRP limits are calculated and found in Appendix B.

3.45G Band EIRP limits: 3280W/MHz i.e. 65.16dBm/MHz or 1640W/MHz i.e. 62.15dBm/MHz. (§ 27.50(k)(1), (2))

Peak to average power (PAPR) limit is 13dBm (0.1% of time). (§ 27.50(k)(4), ANSI C63.26 5.2.3.4)

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.)

The tests were performed at the TAB port 57.

The testing was performed on the same version of hardware (AQQQA) as the original certification test. The AQQQA antenna ports are essentially electrically identical (the RF power output variation between TAB ports is small as shown in the original certification testing) and TAB port 57 was selected at random to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraph 5.7.2i.

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 tables 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:	
03.09.2024 – 10.09.2024	24.9 °C	27.0 °C	32.4 RH%	53.0 RH%

Config A:

Test Model 1.1 Modulation QPSK		Test Model 3.2 Modulation 16QAM		Test Model 3.1 Modulation 64QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 3455.01MHz		Channel Frequency 3455.01MHz		Channel Frequency 3455.01MHz		Channel Frequency 3455.01MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
57	30.55	57	30.50	57	30.51	57	30.52
Channel Frequency 3500.01MHz		Channel Frequency 3500.01MHz		Channel Frequency 3500.01MHz		Channel Frequency 3500.01MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
57	30.50	57	30.47	57	30.43	57	30.45
Channel Frequency 3544.995MHz		Channel Frequency 3544.995MHz		Channel Frequency 3544.995MHz		Channel Frequency 3544.995MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
57	30.53	57	30.50	57	30.45	57	30.48

Table 4 RF Power Output (3.45G Band NR 10 MHz Channel BW)

Config B:

Test Model 1.1 Modulation QPSK			
Channel Frequency			
	3455.01 MHz	3465.00 MHz	3960.00MHz
Tx Port	(dBm)	(dBm)	(dBm)
57	28.31	28.81	36.56

Table 5 RF Power Output (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config C:

Test Model 1.1 Modulation QPSK			
	Channel Frequency		
	3534.99 MHz	3544.995 MHz	3720.00MHz
Tx Port	(dBm)	(dBm)	(dBm)
57	28.59	28.28	36.39

Table 6 RF Power Output (Multicarrier Multiband TC2: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config D:

Test Model 1.1 Modulation QPSK			
	Channel Frequency		
	3455.01 MHz	3544.995 MHz	3720.00MHz
Tx Port	(dBm)	(dBm)	(dBm)
57	28.24	28.43	36.41

Table 7 RF Power Output (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config E:

Test Model 1.1 Modulation QPSK			
	Channel Frequency		
	3460.02 MHz	3480.00 MHz	3960.00MHz
Tx Port	(dBm)	(dBm)	(dBm)
57	31.49	31.62	35.97

Table 8 RF Power Output (Multicarrier Multiband TC4: 3.45G Band 2xNR 20MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config F:

Test Model 1.1 Modulation QPSK			
Channel Frequency			
	3519.99 MHz	3540.00 MHz	3720.00MHz
Tx Port	(dBm)	(dBm)	(dBm)
57	31.66	31.36	35.77

Table 9 RF Power Output (Multicarrier Multiband TC5: 3.45G Band 2xNR 20MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config G:

Test Model 1.1 Modulation QPSK			
Channel Frequency			
	3460.02 MHz	3540.00 MHz	3960.00MHz
Tx Port	(dBm)	(dBm)	(dBm)
57	31.40	31.48	35.96

Table 10 RF Power Output (Multicarrier Multiband TC6: 3.45G Band 2xNR 20MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config H:

Test Model 1.1 Modulation QPSK			
Channel Frequency			
	3470.01 MHz	3529.98 MHz	3930.00MHz
Tx Port	(dBm)	(dBm)	(dBm)
57	31.55	31.67	35.83

Table 11 RF Power Output (Multicarrier Multiband TC7: 3.45G Band 2xNR 40MHz + 3.7G Band 1xNR 100MHz Channel BW)

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 Modulation QPSK		Test Model 3.2 Modulation 16QAM		Test Model 3.1 Modulation 64QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 3455.01MHz		Channel Frequency 3455.01MHz		Channel Frequency 3455.01MHz		Channel Frequency 3455.01MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
57	21.62	57	22.39	57	21.60	57	21.60
Channel Frequency 3500.01MHz		Channel Frequency 3500.01MHz		Channel Frequency 3500.01MHz		Channel Frequency 3500.01MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
57	21.57	57	22.23	57	21.42	57	21.42
Channel Frequency 3544.995MHz		Channel Frequency 3544.995MHz		Channel Frequency 3544.995MHz		Channel Frequency 3544.995MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
57	21.61	57	22.31	57	21.57	57	21.58

Table 12 Power Spectral Density (3.45G Band NR 10 MHz Channel BW)

The base station power spectral density was found to be compliant with the manufacturer's specifications and with the 3280 W/MHz (65.16 dBm/MHz) FCC regulatory limit.

The AQQQA 5G NR 10MHz channel bandwidth carrier power level using sixty-four port MIMO operation need to be reduced to meet 1640 W/MHz (62.15 dBm/MHz) FCC regulatory limit. See details in Appendix B.

Config A:

Test Model 1.1 Modulation QPSK		Test Model 3.2 Modulation 16QAM		Test Model 3.1 Modulation 64QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 3455.01MHz		Channel Frequency 3455.01MHz		Channel Frequency 3455.01MHz		Channel Frequency 3455.01MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
57	8.64	57	8.34	57	8.50	57	8.60
Channel Frequency 3500.01MHz		Channel Frequency 3500.01MHz		Channel Frequency 3500.01MHz		Channel Frequency 3500.01MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
57	8.64	57	8.32	57	8.56	57	8.58
Channel Frequency 3544.995MHz		Channel Frequency 3544.995MHz		Channel Frequency 3544.995MHz		Channel Frequency 3544.995MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
57	8.58	57	8.36	57	8.52	57	8.70

Table 13 Peak to Average Power (3.45G Band NR 10 MHz Channel 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 45).

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 page43, 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

FCC § 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(n)(1) for 3.45G Band: 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 (1-5% of bandwidth; see screenshots on page 45 for details).

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 (1-5% of bandwidth; see screenshots on page 47 for details).

Emission designator summary table is found in Appendix C.

The following tables summarize the results:

Measured laboratory room temperature and humidity during the tests				
Date	Temperature Min-Max:		Humidity Min-Max:	
04.09.2024	25.4 °C	26.8 °C	41.7 RH%	53.0 RH%

Config A:

Test Model 1.1 Modulation QPSK			Test Model 3.2 Modulation 16QAM			Test Model 3.1 Modulation 64QAM			Test Model 3.1a Modulation 256QAM		
Channel Frequency 3455.01MHz			Channel Frequency 3455.01MHz			Channel Frequency 3455.01MHz			Channel Frequency 3455.01MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
57	8.68	9.74	57	8.63	9.60	57	8.66	9.67	57	8.65	9.68
Channel Frequency 3500.01MHz			Channel Frequency 3500.01MHz			Channel Frequency 3500.01MHz			Channel Frequency 3500.01MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
57	8.67	9.69	57	8.63	9.58	57	8.68	9.68	57	8.65	9.67
Channel Frequency 3544.995MHz			Channel Frequency 3544.995MHz			Channel Frequency 3544.995MHz			Channel Frequency 3544.995MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
57	8.67	9.68	57	8.62	9.56	57	8.68	9.71	57	8.65	9.67

Table 14 Occupied Bandwidth (3.45G Band NR 10 MHz Channel BW)

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

Per section FCC §27.53(n)(1) for 3.45G Band, the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm/MHz. Additionally for base station operations in the 3450-3550 MHz band, the conducted power of any emission below 3440 MHz or above 3560 MHz shall not exceed −25 dBm/MHz, and the conducted power of emissions below 3430 MHz or above 3570 MHz shall not exceed −40 dBm/MHz.

Per section FCC §27.53(l)(1) for 3.7G Band, the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm/MHz.

For MiMo output from 64 TX antenna connectors, one antenna connector was measured individually, and the individual limit line was reduced by 10log(64) according to FCC KDB 662911 D01 and ANSI C63.26-2015 guidance.

Limit line was calculated to show:

-31.1 dBm (-13 dBm – 10*log(64)) for the 3440-3450 MHz & 3550-3560 MHz ranges (and additionally for 3680-3700 MHz & 3980-4000 MHz with the Multicarrier Multiband Test Cases),

-43.1 dBm (-25 dBm – 10*log(64)) for the 3430-3440 MHz & 3560-3570 MHz ranges,

-58.1 dBm (-40 dBm – 10*log(64)) for the below 3430 MHz & above 3570 MHz ranges.

4.4.2 Test Configurations

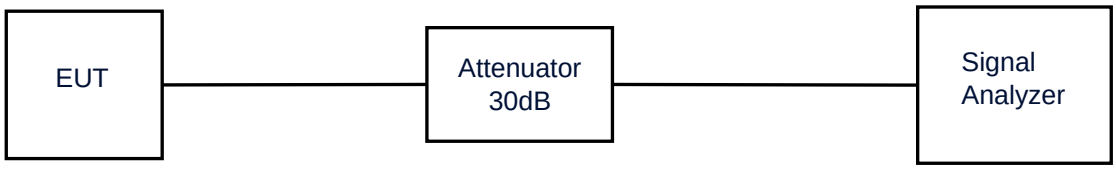


Figure 2 Band Edge Spurious Emission test configuration

The test configuration shown in Figure 2 was used for Band Edge measurements for 3430-3450MHz, 3550-3570MHz, 3680-3700MHz & 3980-4000MHz. Additionally, it was used for Spurious Emissions 3400-3600MHz (3.45G Single carrier operation) & 3400-4030MHz (Multicarrier Multiband operation) to show emissions and carriers in carrier bands.

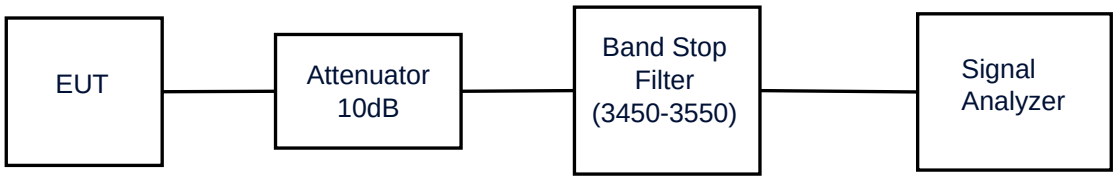


Figure 3 Spurious Emission 3.45G Single carrier operation test configuration

The test configuration shown in Figure 3 was used for Spurious emission measurements for 9kHz-3430MHz & 3570-6000MHz (3.45G Band Single carrier operation).

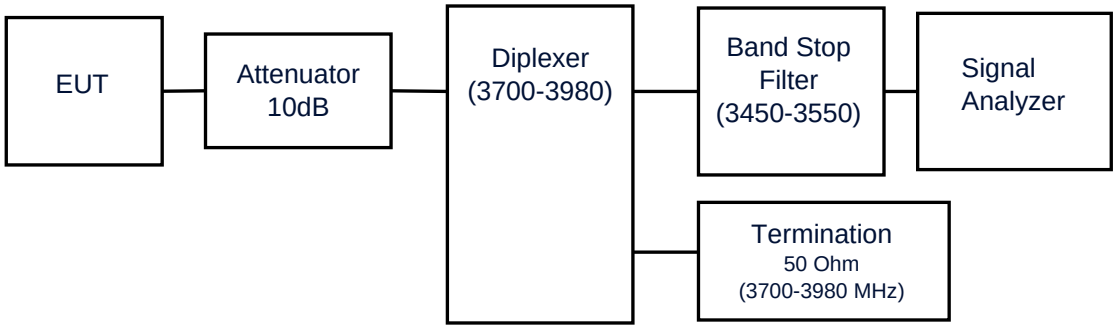


Figure 4 Spurious Emission Multicarrier Multiband operation test configuration

The test configuration shown in Figure 4 was used for Spurious emission measurements for 9kHz-3430MHz, 3570-3680MHz & 4000-6000MHz (Multicarrier Multiband operation).

Figure 5 Spurious Emission 6-40GHz test configuration

The test configuration shown in Figure 5 was used for Spurious emission measurements for 6-40GHz.

A complete list of the measurement equipment is included on page 36 of this measurement report.

4.4.3 Test Procedure and Results

The tests were performed at the TAB port 57.

The testing was performed on the same version of hardware (AQQQA) as the original certification test. The AQQQA antenna ports are essentially electrically identical (the RF power output variation between TAB ports is small as shown in the original certification testing) and TAB port 57 was selected at random to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraph 5.7.2i.

Only the QPSK modulation was required to be tested due to OBW variation is small between modulation types. (See ANSI C63.26. clause 5.7.2e)

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.

FCC § 27.53(n)(1) for 3.45G Band: In the 1 MHz frequency bands immediately outside and adjacent to the carrier frequency block the resolution bandwidth is lowered to 1% of the 26 dB occupied bandwidth of the transmitted carrier but limited to a maximum of 200kHz.

FCC § 27.53(l)(1) for 3.7G Band: In the 1 MHz frequency bands immediately outside and adjacent to the carrier frequency block the resolution bandwidth is lowered to 1% of the 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 49 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:	
06.09.2024 – 12.09 2024	24.9 °C	27.1 °C	32.4 RH%	51.7 RH%

Config A Lower band edge:

Carrier Frequency: 3455.01 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3449 – 3450	3450.0	-38.18	-31.1	compliant
3448 – 3449	3448.5	-37.10	-31.1	compliant
3440 – 3448	3447.9	-36.82	-31.1	compliant
3430 - 3440	3439.9	-47.30	-43.1	compliant
3100 - 3430	3421.6	-78.76	-58.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 15 Spurious Emissions (Lower band edge) (3.45G Band NR 10 MHz Channel BW)

Config A Upper band edge:

Carrier Frequency: 3544.995 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3550 – 3551	3550.0	-37.51	-31.1	compliant
3551 – 3552	3551.5	-35.26	-31.1	compliant
3552 – 3560	3552.0	-36.35	-31.1	compliant
3560 - 3570	3560.2	-47.85	-43.1	compliant
3570 - 4030	3573.9	-78.99	-58.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 16 Spurious Emissions (Upper band edge) (3.45G Band NR 10 MHz Channel BW)

Config A Spurious emissions:

Carrier Frequency: 3500.01 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
0.009 – 3430	984.6	-75.67	-58.1	compliant
3570 – 6000	4829.3	-77.14	-58.1	compliant
3400 – 3600	3449.5	-40.72	-31.1	compliant
6000 – 13000	12512.7	-70.94	-58.1	compliant
13000 - 40000	39673.1	-71.18	-58.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 17 Spurious Emissions (3.45G Band NR 10 MHz Channel BW)

Config B Lower band edge (3.45G Band):

Carrier Frequency: 3455.01/ 3465.00 / 3960.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3449 – 3450	3450.0	-34.90	-31.1	compliant
3448 – 3449	3448.5	-36.95	-31.1	compliant
3440 – 3448	3447.6	-37.06	-31.1	compliant
3430 – 3440	3439.9	-45.35	-43.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 18 Spurious Emissions (Lower band edge) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config B Upper band edge (3.7G Band):

Carrier Frequency: 3455.01/ 3465.00 / 3960.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3980 – 3981	3980.5	-32.93	-31.1	compliant
3981 – 3982	3981.5	-33.29	-31.1	compliant
3982 – 4000	3982.1	-31.92	-31.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 19 Spurious Emissions (Upper band edge) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config B Spurious emissions:

Carrier Frequency: 3455.01/ 3465.00 / 3960.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
0.009 – 3400	996.8	-75.00	-58.1	compliant
3100 – 3430	3426.2	-71.66	-58.1	compliant
3400 – 4030	3859.5	-34.87	-31.1	compliant
3570 – 3680	3674.5	-72.15	-58.1	compliant
4000 – 4200	4005.3	-66.16	-58.1	compliant
4030 – 6000	4454.9	-70.03	-58.1	compliant
6000 – 13000	12468.9	-70.83	-58.1	compliant
13000 - 40000	39667.2	-71.2	-58.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 20 Spurious Emissions (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config C Upper band edge (3.45G Band):

Carrier Frequency: 3534.99/ 3544.995 / 3720.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3550 – 3551	3550.0	-35.39	-31.1	compliant
3551 – 3552	3551.5	-37.28	-31.1	compliant
3552 – 3560	3552.0	-36.27	-31.1	compliant
3560 - 3570	3560.2	-45.13	-43.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 21 Spurious Emissions (Upper band edge) (Multicarrier Multiband TC2: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config C Lower band edge (3.7G Band):

Carrier Frequency: 3534.99/ 3544.995 / 3720.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3699 – 3700	3699.5	-35.26	-31.1	compliant
3698 – 3699	3698.5	-35.79	-31.1	compliant
3680 - 3698	3697.9	-34.47	-31.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 22 Spurious Emissions (Lower band edge) (Multicarrier Multiband TC2: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config C Spurious emissions:

Carrier Frequency: 3534.99/ 3544.995 / 3720.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
0.009 – 3400	995.5	-74.95	-58.1	compliant
3100 – 3430	3423.9	-77.61	-58.1	compliant
3400 – 4030	3860.1	-33.41	-31.1	compliant
3570 – 3680	3674.8	-69.22	-58.1	compliant
4000 – 4200	4006.9	-69.64	-58.1	compliant
4030 – 6000	4864.1	-75.96	-58.1	compliant
6000 – 13000	12473.1	-70.87	-58.1	compliant
13000 - 40000	39667.1	-71.34	-58.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 23 Spurious Emissions (Multicarrier Multiband TC2: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config D Lower band edge (3.45G Band):

Carrier Frequency: 3455.01/ 3544.995 / 3720.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3449 – 3450	3450.0	-40.22	-31.1	compliant
3448 – 3449	3448.5	-37.59	-31.1	compliant
3440 – 3448	3447.9	-37.61	-31.1	compliant
3430 – 3440	3440.0	-45.52	-43.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 24 Spurious Emissions (Lower band edge) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config D Upper band edge (3.45G Band):

Carrier Frequency: 3455.01/ 3544.995 / 3720.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3550 – 3551	3550.0	-39.49	-31.1	compliant
3551 – 3552	3551.5	-36.92	-31.1	compliant
3552 – 3560	3552.0	-36.62	-31.1	compliant
3560 - 3570	3560.0	-45.70	-43.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 25 Spurious Emissions (Upper band edge) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config D Lower band edge (3.7G Band):

Carrier Frequency: 3455.01/ 3544.995 / 3720.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3699 – 3700	3699.5	-35.24	-31.1	compliant
3698 – 3699	3698.5	-35.59	-31.1	compliant
3680 - 3698	3697.9	-34.77	-31.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 26 Spurious Emissions (Lower band edge) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config D Spurious emissions:

Carrier Frequency: 3455.01/ 3544.995 / 3720.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
0.009 – 3400	1000.2	-74.79	-58.1	compliant
3100 – 3430	3425.9	-76.28	-58.1	compliant
3400 – 4030	3859.8	-33.5	-31.1	compliant
3570 – 3680	3675.2	-68.99	-58.1	compliant
4000 – 4200	4006.9	-69.67	-58.1	compliant
4030 – 6000	4978.1	-76.11	-58.1	compliant
6000 – 13000	12472.8	-70.96	-58.1	compliant
13000 - 40000	39671.7	-71.27	-58.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 27 Spurious Emissions (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config E Lower band edge (3.45G Band):

Carrier Frequency: 3460.02/ 3480.00 / 3960.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3449 – 3450	3449.4	-36.24	-31.1	compliant
3448 – 3449	3448.5	-34.92	-31.1	compliant
3440 – 3448	3447.9	-33.53	-31.1	compliant
3430 – 3440	3440.0	-43.99	-43.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 28 Spurious Emissions (Lower band edge) (Multicarrier Multiband TC4: 3.45G Band 2xNR 20MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config E Upper band edge (3.7G Band):

Carrier Frequency: 3460.02/ 3480.00 / 3960.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3980 – 3981	3980.5	-33.49	-31.1	compliant
3981 – 3982	3981.5	-33.96	-31.1	compliant
3982 – 4000	3982.1	-33.00	-31.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 29 Spurious Emissions (Upper band edge) (Multicarrier Multiband TC4: 3.45G Band 2xNR 20MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config E Spurious emissions:

Carrier Frequency: 3460.02/ 3480.00 / 3960.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
0.009 – 3400	1000.2	-75.02	-58.1	compliant
3100 – 3430	3425.9	-73.35	-58.1	compliant
3400 – 4030	3860.4	-34.47	-31.1	compliant
3570 – 3680	3675.2	-72.11	-58.1	compliant
4000 – 4200	4003.0	-65.08	-58.1	compliant
4030 – 6000	4439.8	-66.32	-58.1	compliant
6000 – 13000	12468.6	-70.84	-58.1	compliant
13000 - 40000	39670.4	-71.32	-58.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 30 Spurious Emissions (Multicarrier Multiband TC4: 3.45G Band 2xNR 20MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config F Upper band edge (3.45G Band):

Carrier Frequency: 3519.99/ 3540.00 / 3720.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3550 – 3551	3550.3	-36.17	-31.1	compliant
3551 – 3552	3551.5	-35.07	-31.1	compliant
3552 – 3560	3552.0	-34.61	-31.1	compliant
3560 - 3570	3560.1	-44.59	-43.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 31 Spurious Emissions (Upper band edge) (Multicarrier Multiband TC5: 3.45G Band 2xNR 20MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config F Lower band edge (3.7G Band):

Carrier Frequency: 3519.99/ 3540.00 / 3720.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3699 – 3700	3699.5	-35.78	-31.1	compliant
3698 – 3699	3698.5	-36.29	-31.1	compliant
3680 - 3698	3697.9	-35.51	-31.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 32 Spurious Emissions (Lower band edge) (Multicarrier Multiband TC5: 3.45G Band 2xNR 20MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config F Spurious emissions:

Carrier Frequency: 3519.99/ 3540.00 / 3720.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
0.009 – 3400	1000.5	-74.74	-58.1	compliant
3100 – 3430	3425.0	-76.92	-58.1	compliant
3400 – 4030	3860.4	-34.55	-31.1	compliant
3570 – 3680	3675.5	-69.54	-58.1	compliant
4000 – 4200	4006.9	-69.60	-58.1	compliant
4030 – 6000	4983.0	-76.05	-58.1	compliant
6000 – 13000	12324.4	-70.98	-58.1	compliant
13000 - 40000	39673.5	-71.14	-58.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 33 Spurious Emissions (Multicarrier Multiband TC5: 3.45G Band 2xNR 20MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config G Lower band edge (3.45G Band):

Carrier Frequency: 3460.02/ 3540.00 / 3960.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3449 – 3450	3450.0	-35.52	-31.1	compliant
3448 – 3449	3448.5	-35.59	-31.1	compliant
3440 – 3448	3447.9	-35.15	-31.1	compliant
3430 – 3440	3439.8	-44.94	-43.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 34 Spurious Emissions (Lower band edge) (Multicarrier Multiband TC6: 3.45G Band 2xNR 20MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config G Upper band edge (3.45G Band):

Carrier Frequency: 3460.02/ 3540.00 / 3960.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3550 – 3551	3550.0	-32.96	-31.1	compliant
3551 – 3552	3551.5	-35.55	-31.1	compliant
3552 – 3560	3552.0	-34.75	-31.1	compliant
3560 - 3570	3560.2	-45.61	-43.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 35 Spurious Emissions (Upper band edge) (Multicarrier Multiband TC6: 3.45G Band 2xNR 20MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config G Upper band edge (3.7G Band):

Carrier Frequency: 3460.02/ 3540.00 / 3960.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3980 – 3981	3980.5	-33.53	-31.1	compliant
3981 – 3982	3981.5	-34.02	-31.1	compliant
3982 – 4000	3982.0	-32.39	-31.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 36 Spurious Emissions (Upper band edge) (Multicarrier Multiband TC6: 3.45G Band 2xNR 20MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config G Spurious emissions:

Carrier Frequency: 3460.02/ 3540.00 / 3960.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
0.009 – 3400	1000.2	-75.01	-58.1	compliant
3100 – 3430	3427.9	-74.70	-58.1	compliant
3400 – 4030	3860.4	-34.47	-31.1	compliant
3570 – 3680	3675.3	-71.99	-58.1	compliant
4000 – 4200	4003.0	-65.64	-58.1	compliant
4030 – 6000	4463.5	-69.23	-58.1	compliant
6000 – 13000	12476.3	-70.98	-58.1	compliant
13000 - 40000	39656.9	-71.22	-58.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 37 Spurious Emissions (Multicarrier Multiband TC6: 3.45G Band 2xNR 20MHz + 3.7G Band 1xNR 40MHz Channel BW)

Config H Lower band edge (3.45G Band):

Carrier Frequency: 3470.01/ 3529.98 / 3930.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3449 – 3450	3450.0	-37.09	-31.1	compliant
3448 – 3449	3448.5	-35.79	-31.1	compliant
3440 – 3448	3447.9	-36.00	-31.1	compliant
3430 – 3440	3439.9	-44.70	-43.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 38 Spurious Emissions (Lower band edge) (Multicarrier Multiband TC7: 3.45G Band 2xNR 40MHz + 3.7G Band 1xNR 100MHz Channel BW)

Config H Upper band edge (3.45G Band):

Carrier Frequency: 3470.01/ 3529.98 / 3930.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3550 – 3551	3550.0	-38.24	-31.1	compliant
3551 – 3552	3551.5	-36.29	-31.1	compliant
3552 – 3560	3552.0	-35.74	-31.1	compliant
3560 - 3570	3560.0	-45.50	-43.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 39 Spurious Emissions (Upper band edge) (Multicarrier Multiband TC7: 3.45G Band 2xNR 40MHz + 3.7G Band 1xNR 100MHz Channel BW)

Config H Upper band edge (3.7G Band):

Carrier Frequency: 3470.01/ 3529.98 / 3930.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
3980 – 3981	3980.5	-35.48	-31.1	compliant
3981 – 3982	3981.5	-35.98	-31.1	compliant
3982 – 4000	3983.1	-35.40	-31.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 40 Spurious Emissions (Upper band edge) (Multicarrier Multiband TC7: 3.45G Band 2xNR 40MHz + 3.7G Band 1xNR 100MHz Channel BW)

Config H Spurious emissions:

Carrier Frequency: 3470.01/ 3529.98 / 3930.00 MHz				
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Result**
QPSK-Modulation TX port 57				
0.009 – 3400	1000.2	-74.93	-58.1	compliant
3100 – 3430	3425.2	-72.16	-58.1	compliant
3400 – 4030	3860.4	-35.20	-31.1	compliant
3570 – 3680	3674.8	-71.62	-58.1	compliant
4000 – 4200	4004.6	-65.60	-58.1	compliant
4030 – 6000	4415.7	-71.77	-58.1	compliant
6000 – 13000	12424.5	-70.95	-58.1	compliant
13000 - 40000	39670.4	-71.13	-58.1	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, 3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB		

Table 41 Spurious Emissions (Multicarrier Multiband TC7: 3.45G Band 2xNR 40MHz + 3.7G Band 1xNR 100MHz 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.

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 & Spectrum Analyser	Rohde & Schwarz, FSW-43	104001	08.08.2024	07.08.2025	1, 2, 3, 4
2	Vector Network Analyzer	Rohde&Schwarz, ZVL-13	101177	11.12.2023	10.12.2024	4
3	Vector Network Analyzer	Rohde&Schwarz, ZVA-40	100146	29.12.2023	28.12.2024	1, 2, 3, 4
4	Calibration Unit	Rohde&Schwarz, ZV-Z54	100125	03.07.2024	02.07.2025	1, 2, 3, 4
5	Rubidium Frequency Standard	Symmetricom, 8040C	161730115011	02.08.2024	01.08.2025	1, 2, 3, 4
6	DC-power supply	Elektro-Automatik, PSI 8080-510	1331460001	cnn	-	1, 2, 3, 4
7	Attenuator	API Weinschel, 254-30-33	UH352	cnn	-	1, 2, 3, 4
8	Attenuator	Weinshel, 66-10-33	CE6853	cnn	-	4
9	Band Stop Filter	Creowave, CW-BSF-3450-3550-E5-M2	2370001	cnn	-	4
10	Diplexer	Creowave, CW-DPF-3700-3980-E2-M2	1959001	cnn	-	4
11	Termination	RD Microwaves, TA-A75NM-B	2230	cnn	-	4
12	Attenuator	Signal Solutions, SSN-FA20K-40MF-10A	1	cnn	-	4
13	High Pass Filter	RF-Lambda, RHPF23G06G40	21052000014	cnn	-	4
14	Multimeter	Fluke, 83	65870302	13.12.2023	12.12.2024	1, 2, 3, 4
15	Humidity & Temperature Probe	Vaisala, HMP110	S0840831	24.12.2023	24.12.2024	1, 2, 3, 4

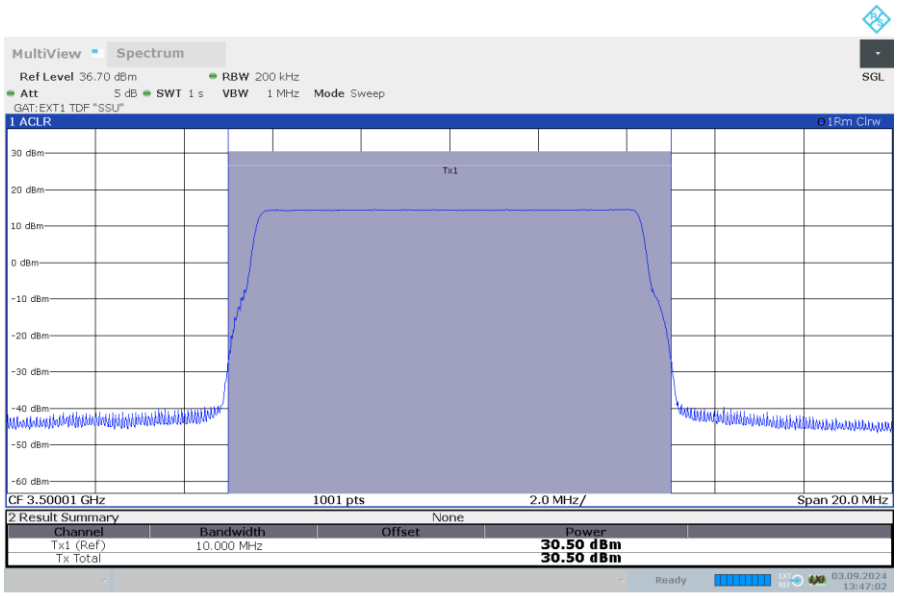
Table 424 Part List of the RF Measurement Test Equipment

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.

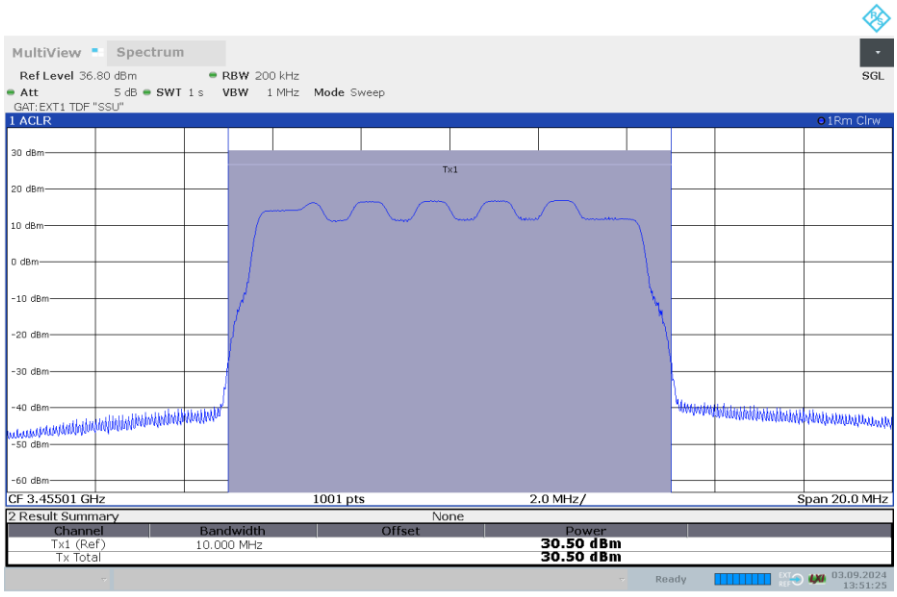
5.2.1 Test No. 1: RF Output Power

RF Power Output NR 10MHz BW (3.45G Band)



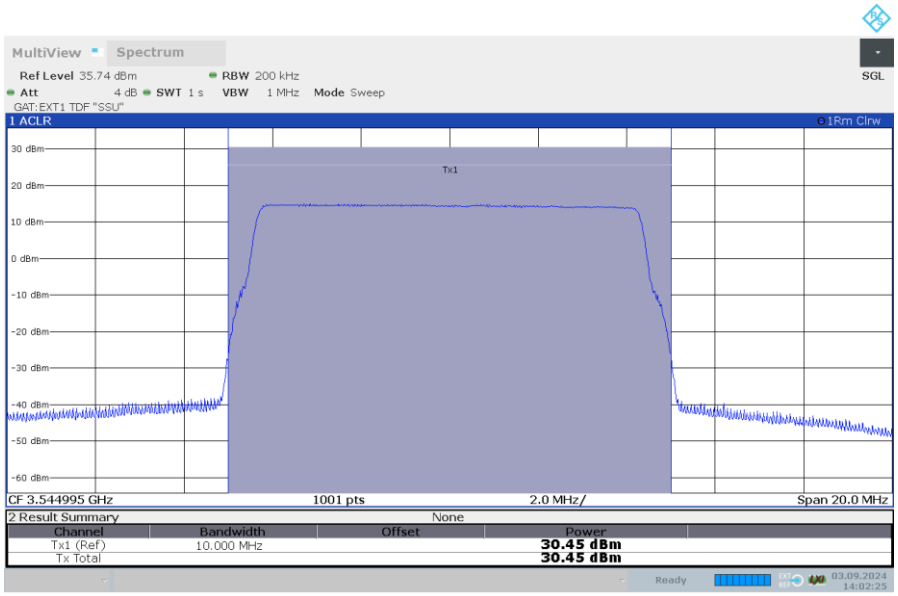
13:47:02 03.09.2024

Test Model 1.1, Modulation QPSK, Channel Frequency 3500.01MHz, TX port 57



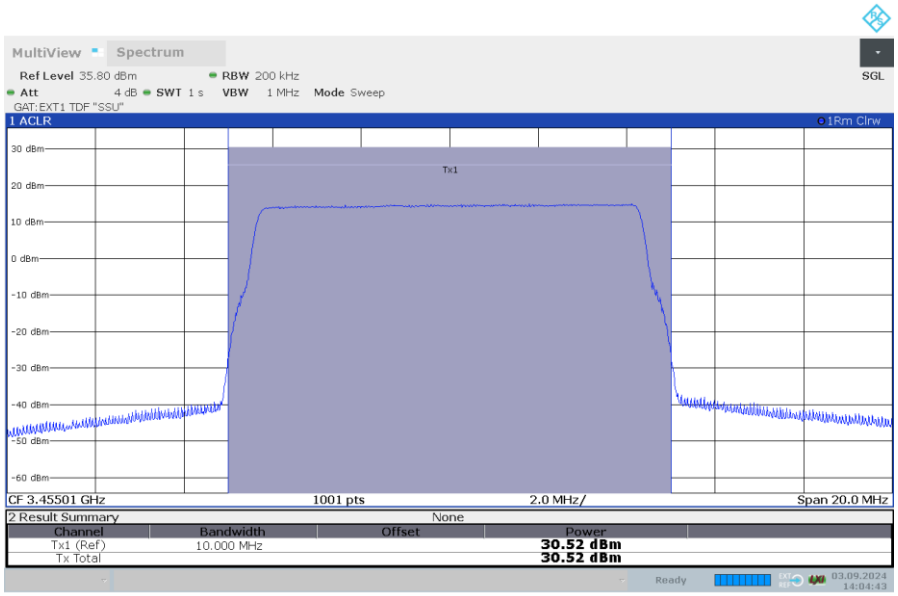
13:51:26 03.09.2024

Test Model 3.2, Modulation 16QAM, Channel Frequency 3455.01MHz, TX port 57



14:02:26 03.09.2024

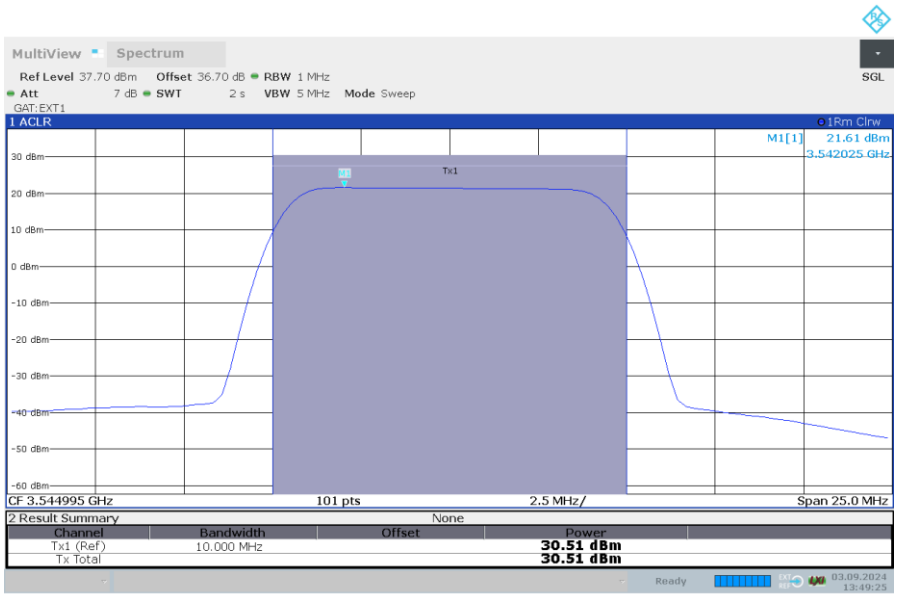
Test Model 3.1, Modulation 64QAM, Channel Frequency 3544.995MHz, TX port 57



14:04:44 03.09.2024

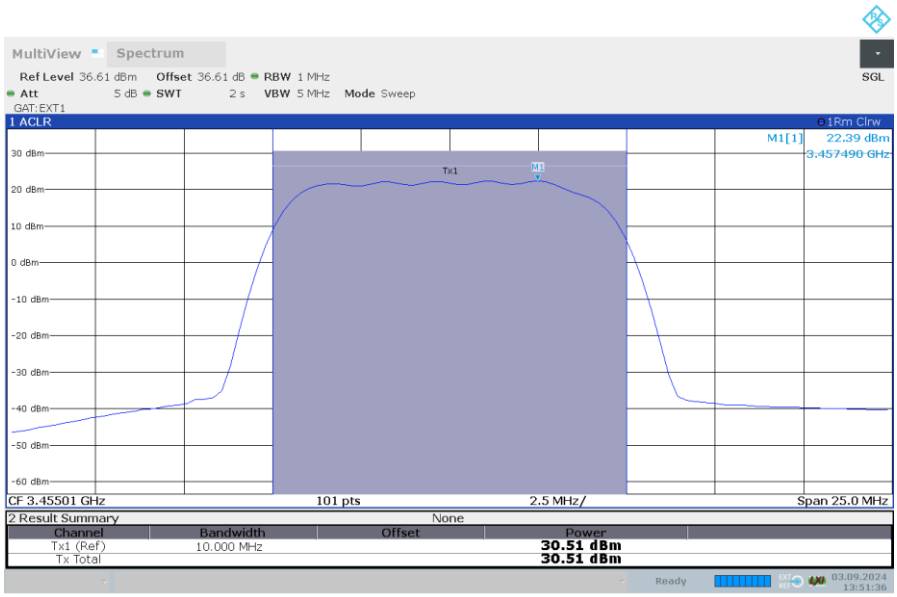
Test Model 3.1a, Modulation 256QAM, Channel Frequency 3455.01MHz, TX port 57

Power spectral density NR 10MHz BW (3.45G Band)



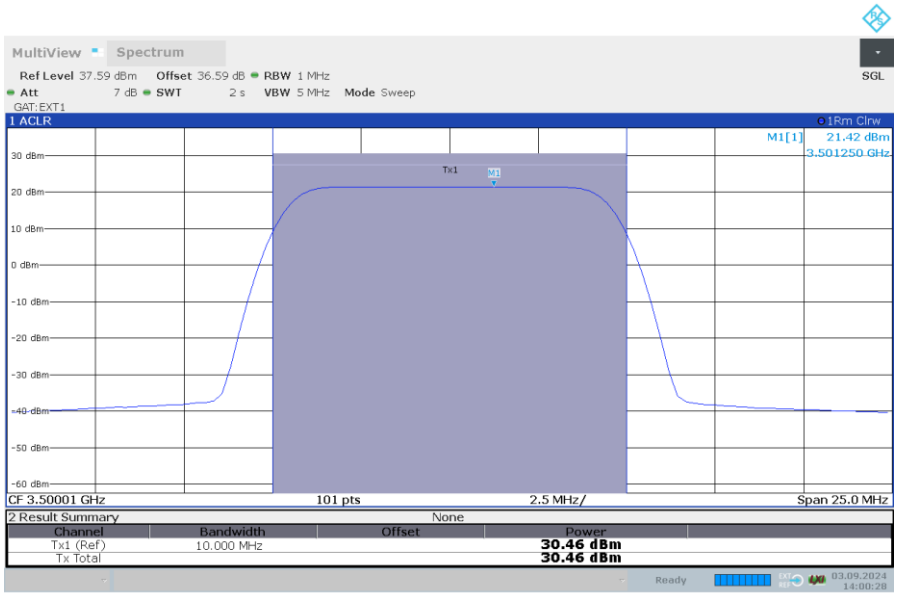
13:49:25 03.09.2024

Test Model 1.1, Modulation QPSK, Channel Frequency 3544.995MHz, TX port 57



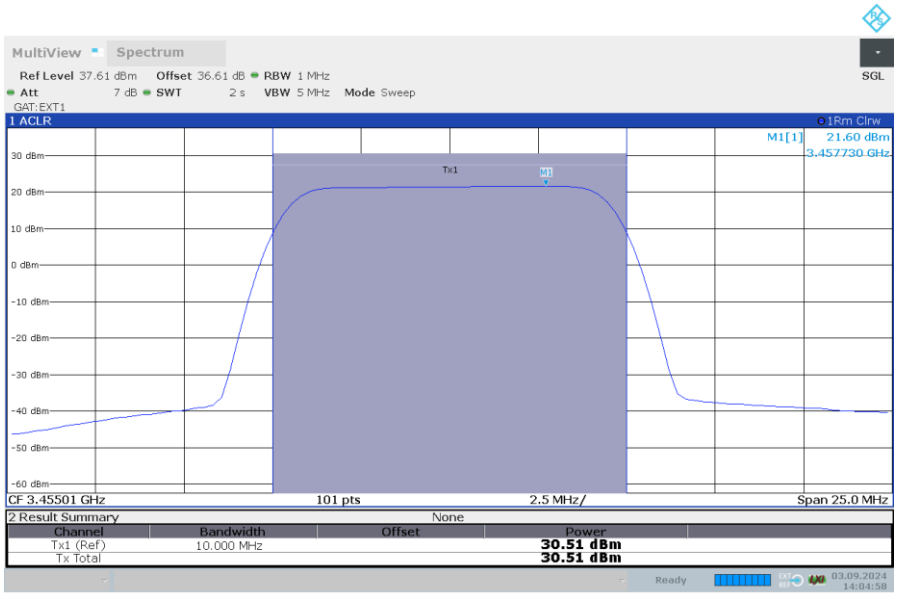
13:51:36 03.09.2024

Test Model 3.2, Modulation 16QAM, Channel Frequency 3455.01MHz, TX port 57



14:00:29 03.09.2024

Test Model 3.1, Modulation 64QAM, Channel Frequency 3500.01MHz, TX port 57



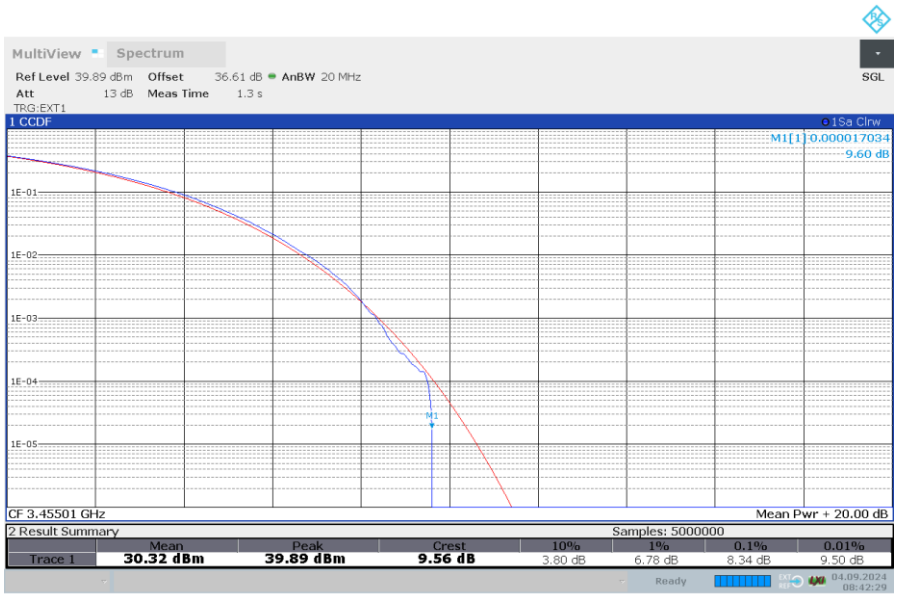
14:04:59 03.09.2024

Test Model 3.1a, Modulation 256QAM, Channel Frequency 3455.01MHz, TX port 57

Peak-to-Average Power Ratio (PAPR) NR 10MHz BW (3.45G Band)

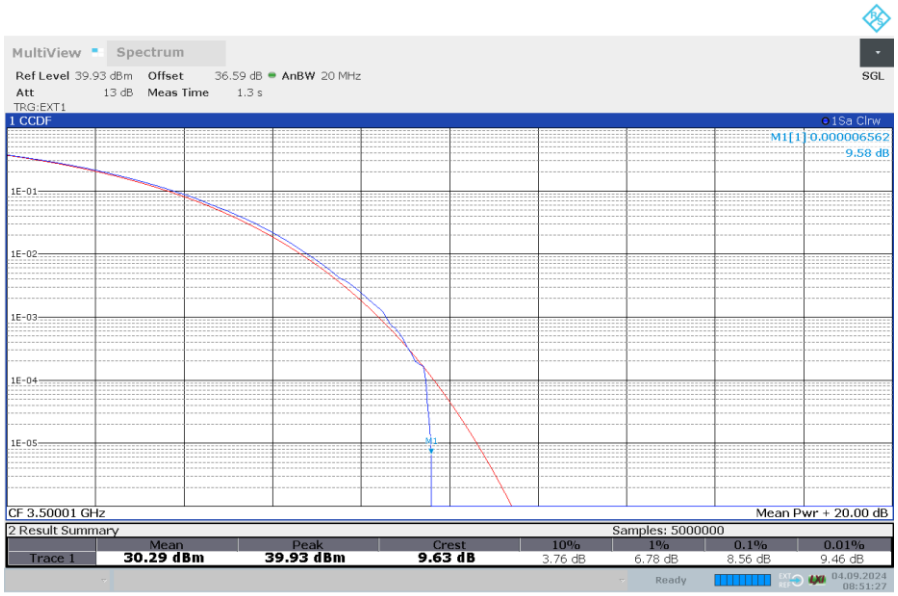
08:38:02 04.09.2024

Test Model 1.1, Modulation QPSK, Channel Frequency 3500.01MHz, TX port 57



08:42:29 04.09.2024

Test Model 3.2, Modulation 16QAM, Channel Frequency 3455.01MHz, TX port 57



08:51:27 04.09.2024

Test Model 3.1, Modulation 64QAM, Channel Frequency 3500.01MHz, TX port 57

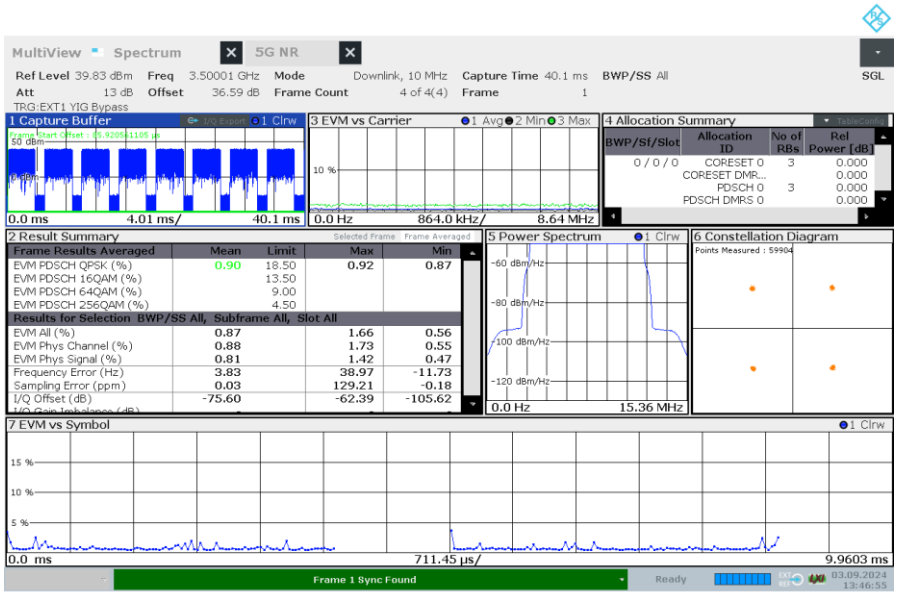
09:00:20 04.09.2024

Test Model 3.1a, Modulation 256QAM, Channel Frequency 3544.995MHz, TX port 57

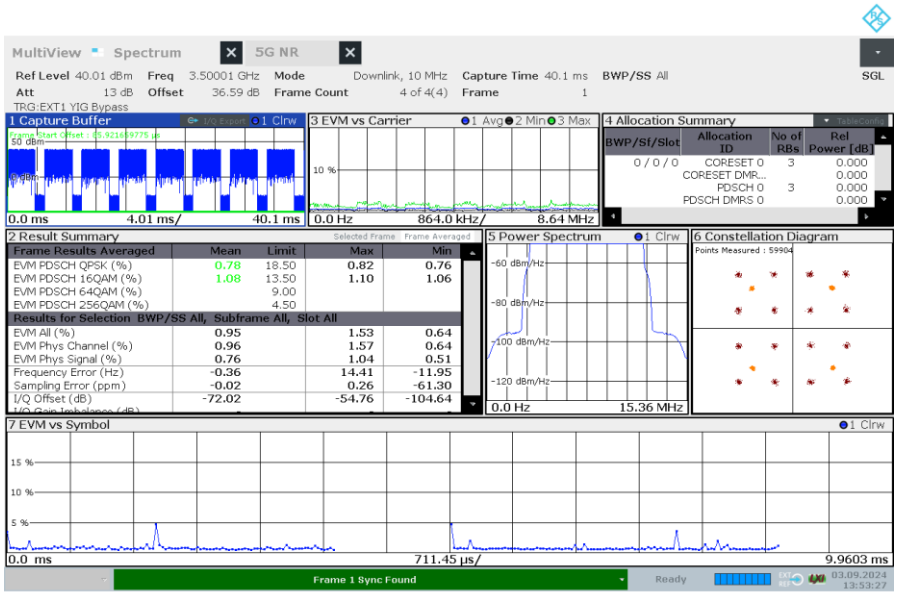
5.2.2 Test No. 2: Modulation Characteristics

No additional measurements are required for the modulation characteristics. Please refer to test no. 3, occupied bandwidth on page17.

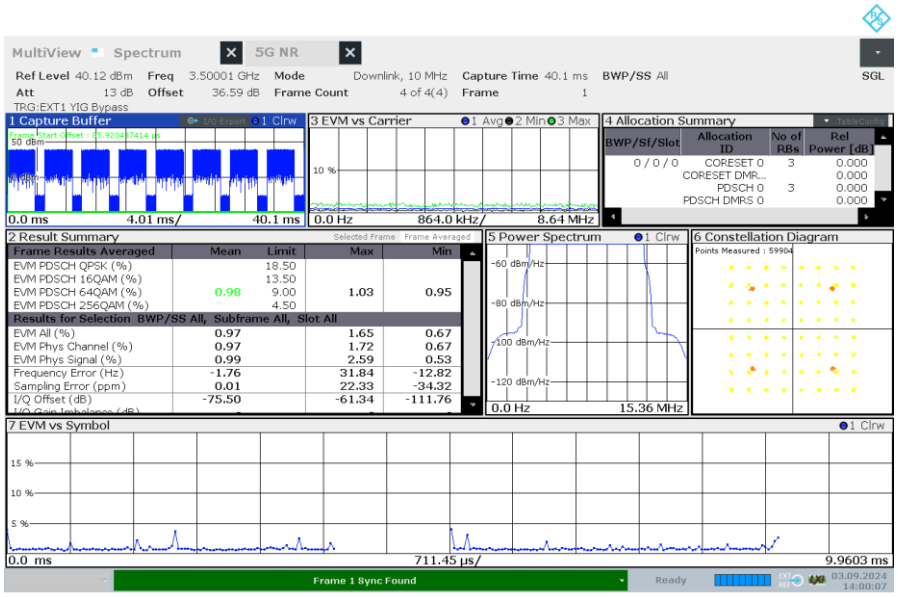
Screenshots below shows information about the modulations I/Q constellation form and modulation information table, displaying error to ideal modulation symbols.



I/Q constellation diagram with capture buffer – QPSK (3500.01MHz) (NR 10MHz Channel BW)

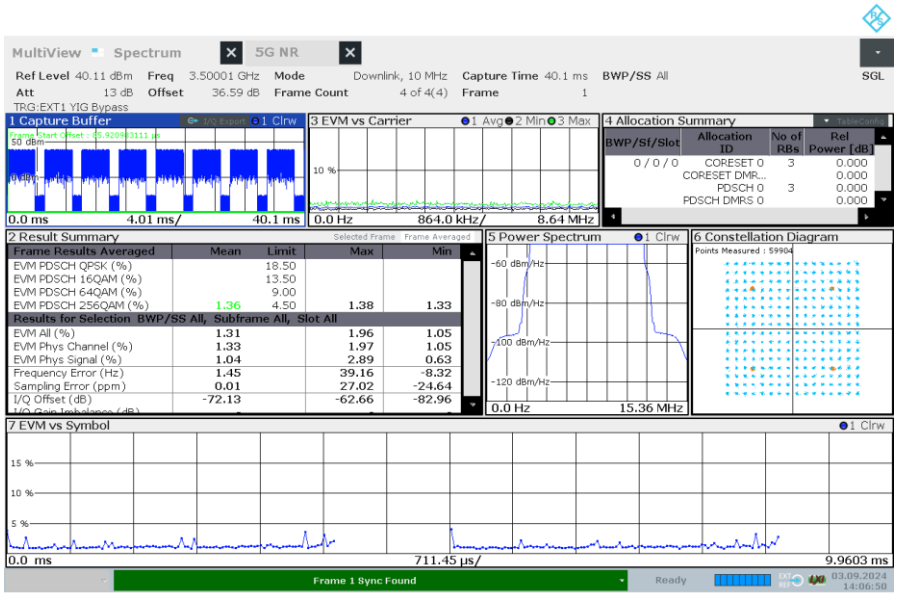


I/Q constellation diagram with capture buffer – 16QAM (3500.01MHz) (NR 10MHz Channel BW)



14:00:08 03.09.2024

I/Q constellation diagram with capture buffer – 64QAM (3500.01MHz) (NR 10MHz Channel BW)



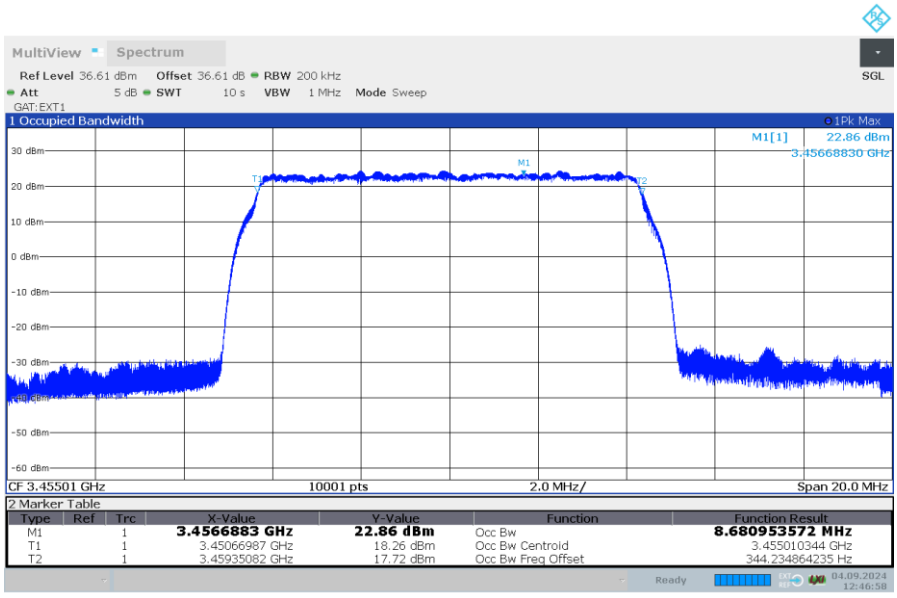
14:06:51 03.09.2024

I/Q constellation table with I/Q error –256QAM (3500.01MHz) (NR 10MHz Channel BW)

5.2.3 Test No. 3: Occupied Bandwidth

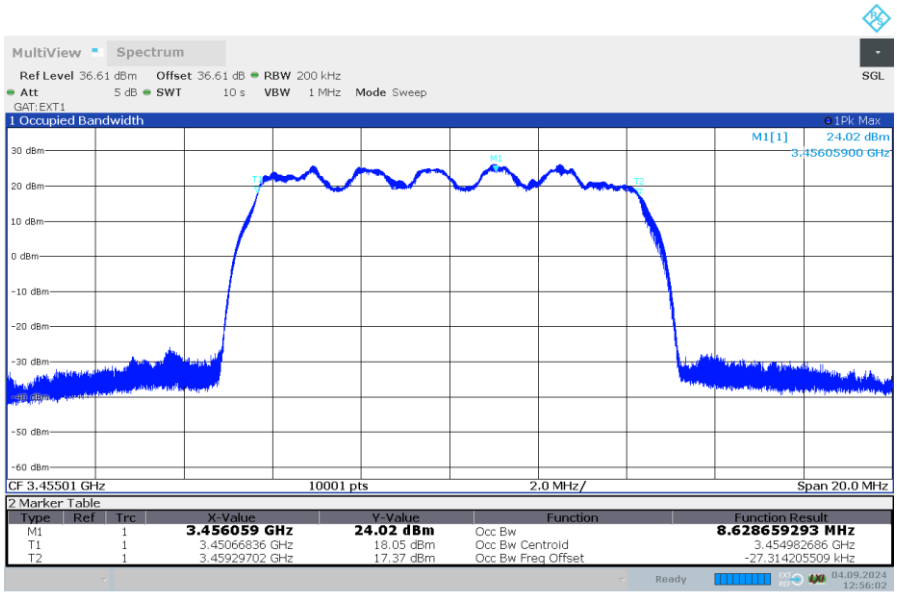
5.2.3.1 Occupied Bandwidth 99% plots

Occupied Bandwidth NR 10MHz BW (3.45G Band)



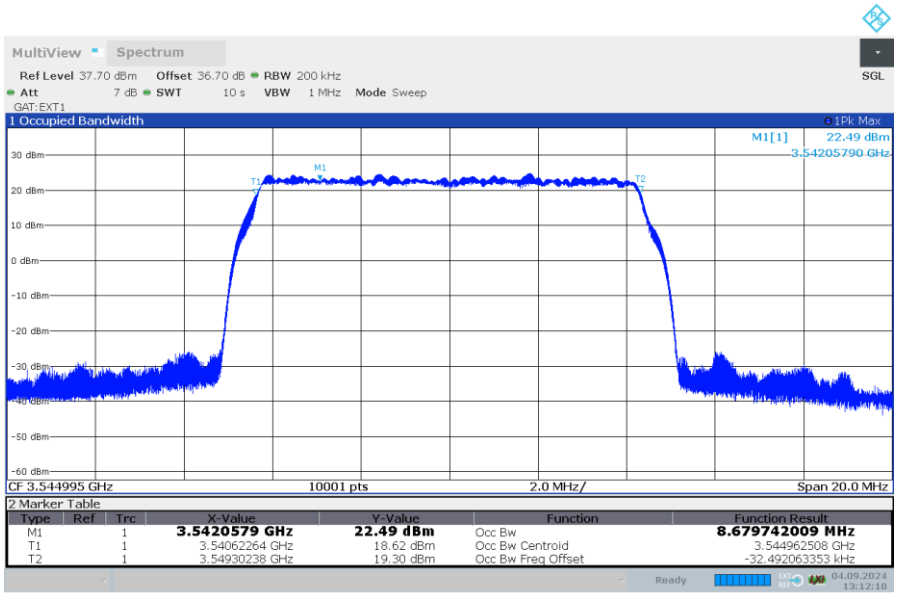
12:46:59 04.09.2024

Test Model 1.1, Modulation QPSK, Channel Frequency 3455.01MHz, TX port 57



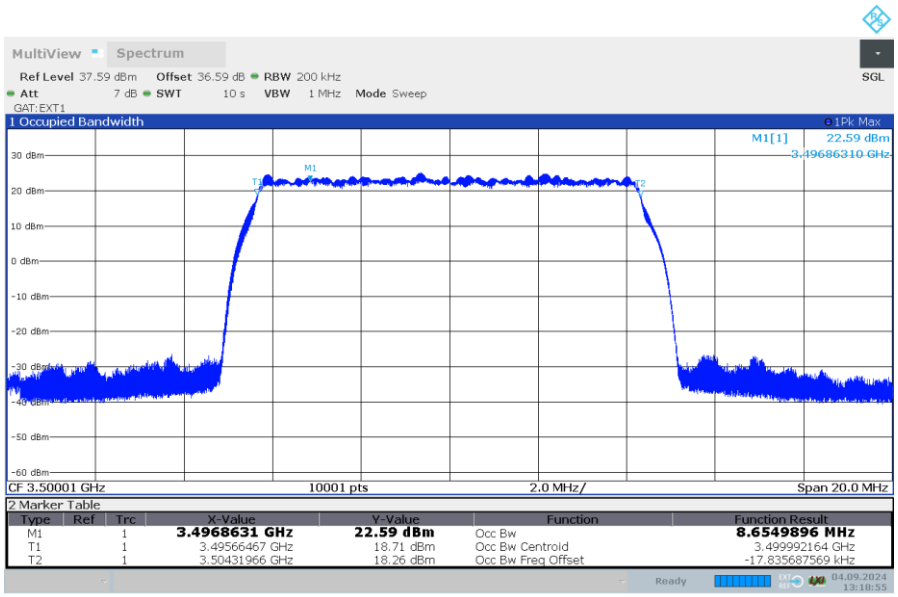
12:56:02 04.09.2024

Test Model 3.2, Modulation 16QAM, Channel Frequency 3455.01MHz, TX port 57



13:12:10 04.09.2024

Test Model 3.1, Modulation 64QAM, Channel Frequency 3544.995MHz, TX port 57

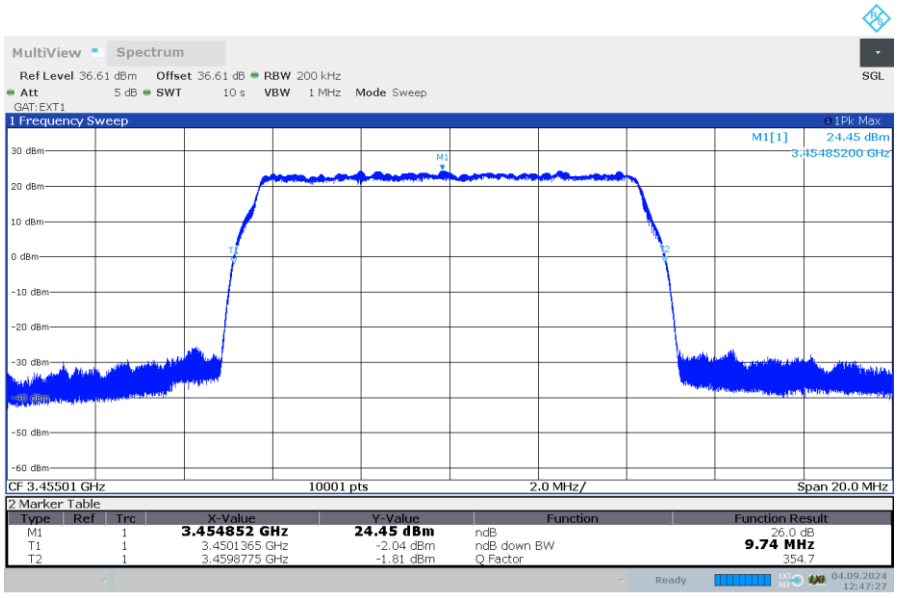


13:18:55 04.09.2024

Test Model 3.1a, Modulation 256QAM, Channel Frequency 3500.01MHz, TX port 57

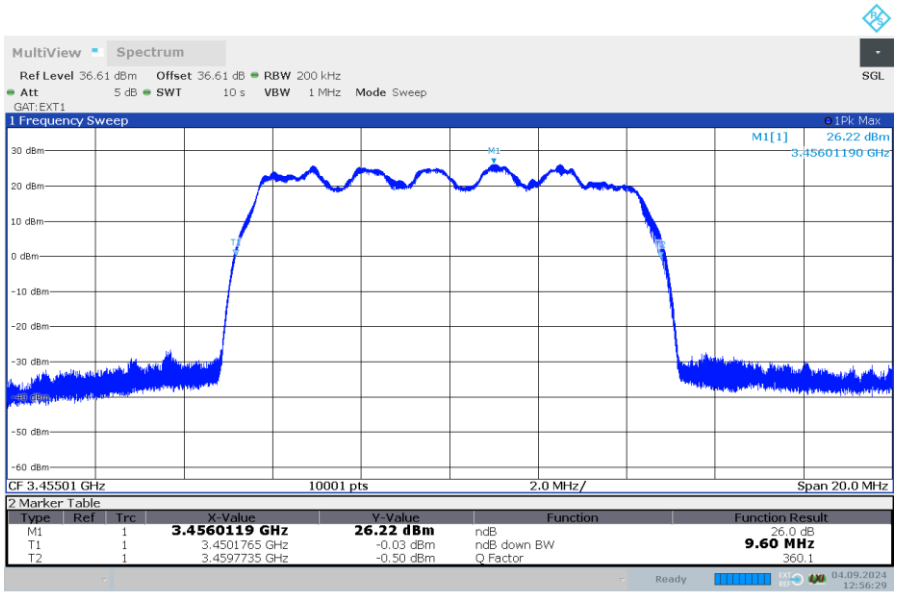
5.2.3.2 Occupied Bandwidth -26dB plots

Occupied Bandwidth NR 10MHz BW (3.45G Band)



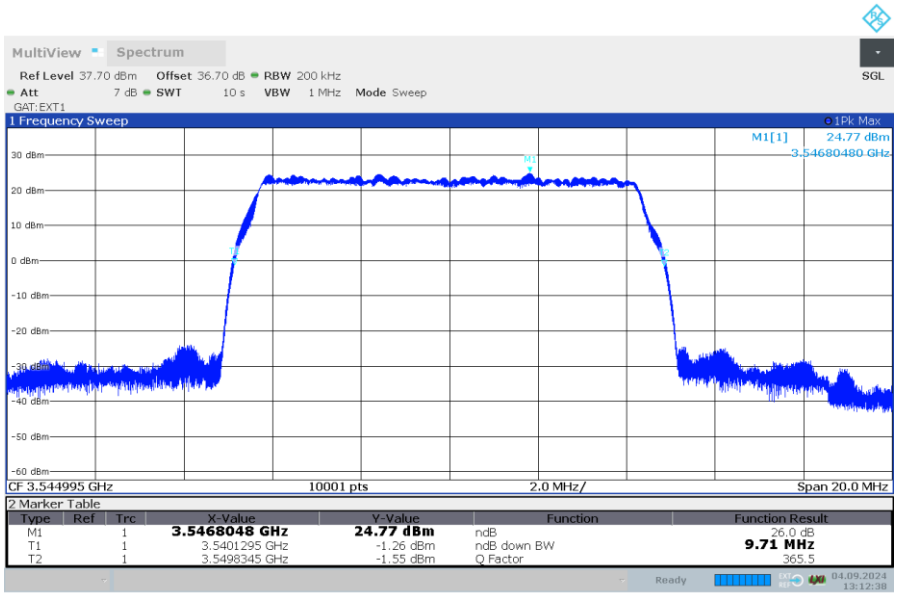
12:47:27 04.09.2024

Test Model 1.1, Modulation QPSK, Channel Frequency 3455.01MHz, TX port 57



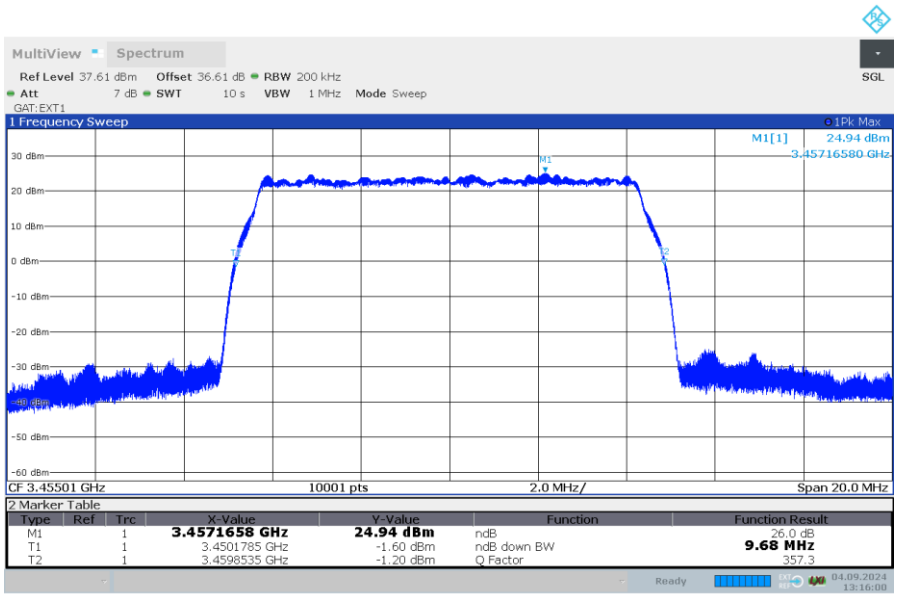
12:56:30 04.09.2024

Test Model 3.2, Modulation 16QAM, Channel Frequency 3455.01MHz, TX port 57



13:12:38 04.09.2024

Test Model 3.1, Modulation 64QAM, Channel Frequency 3544.995MHz, TX port 57

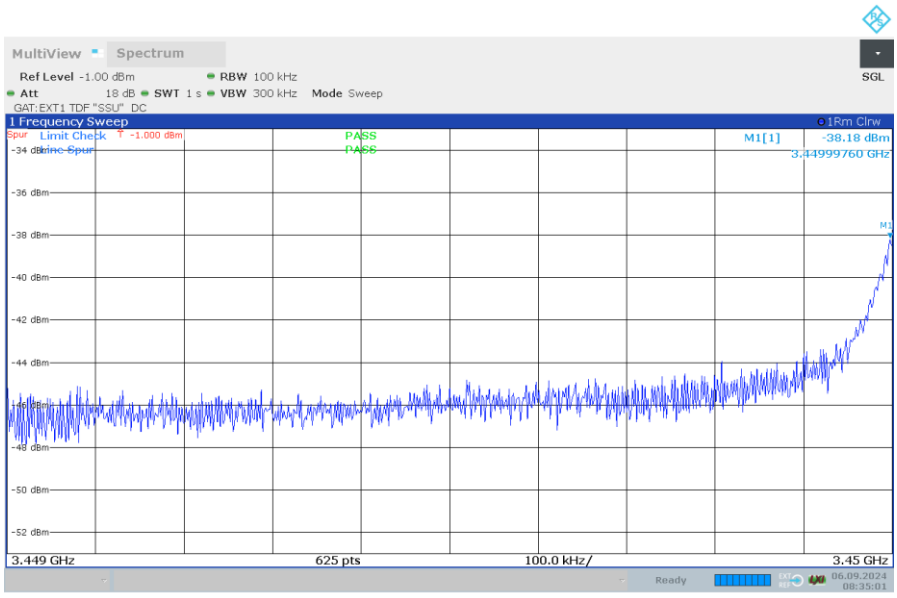


13:16:01 04.09.2024

Test Model 3.1a, Modulation 256QAM, Channel Frequency 3455.01MHz, TX port 57

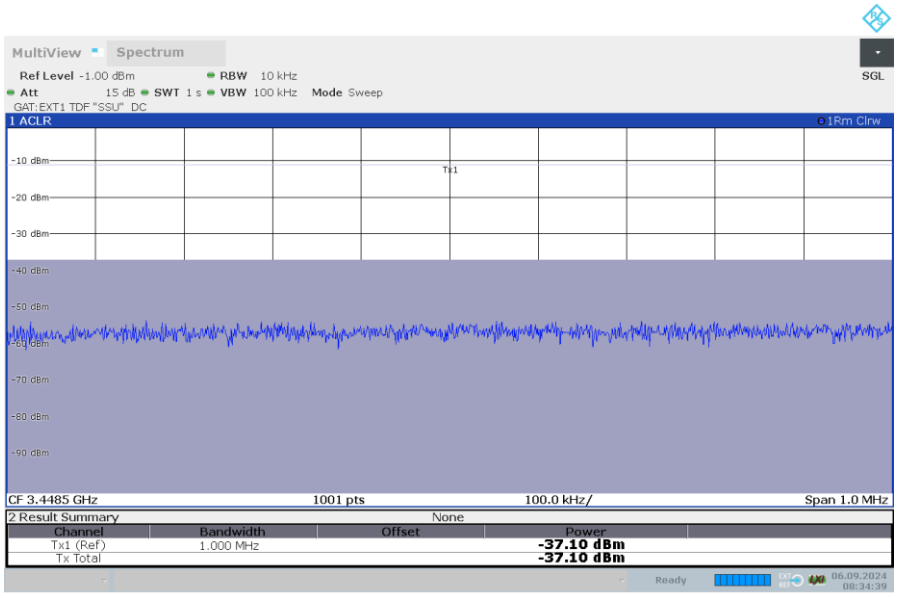
5.2.4 Test No. 4: Spurious Emissions at the Antenna Terminals

Config A TX port 57:



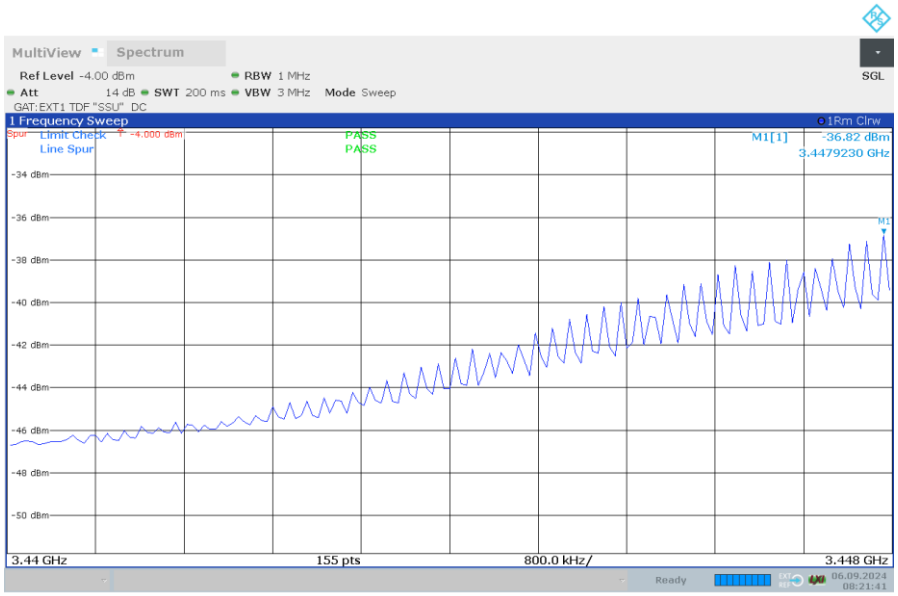
08:35:02 06.09.2024

Spurious Emissions (Lower Band Edge 3449-3450MHz) – QPSK (3455.01MHz) (10MHz Channel BW)



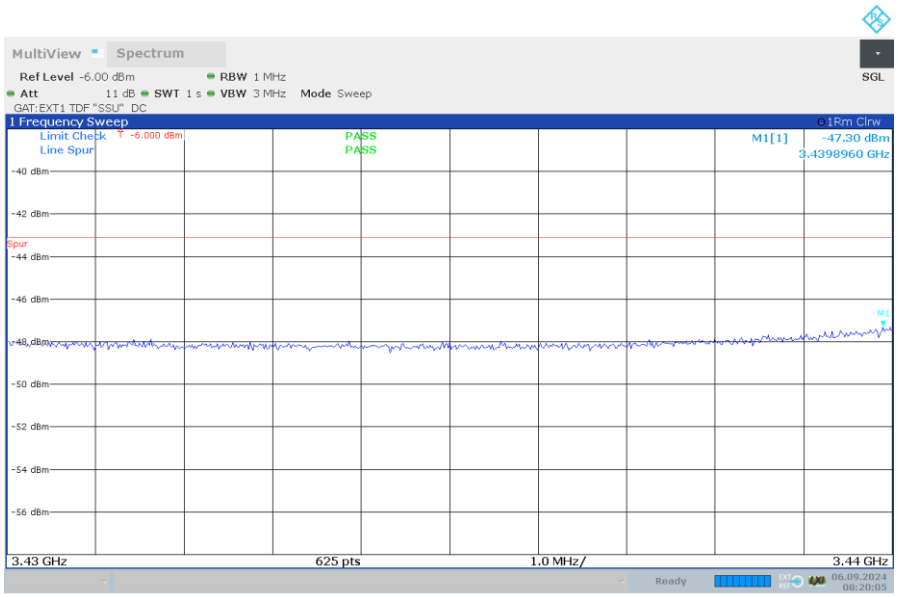
08:34:40 06.09.2024

Spurious Emissions (Lower Band Edge 3448-3449MHz) – QPSK (3455.01MHz) (10MHz Channel BW)



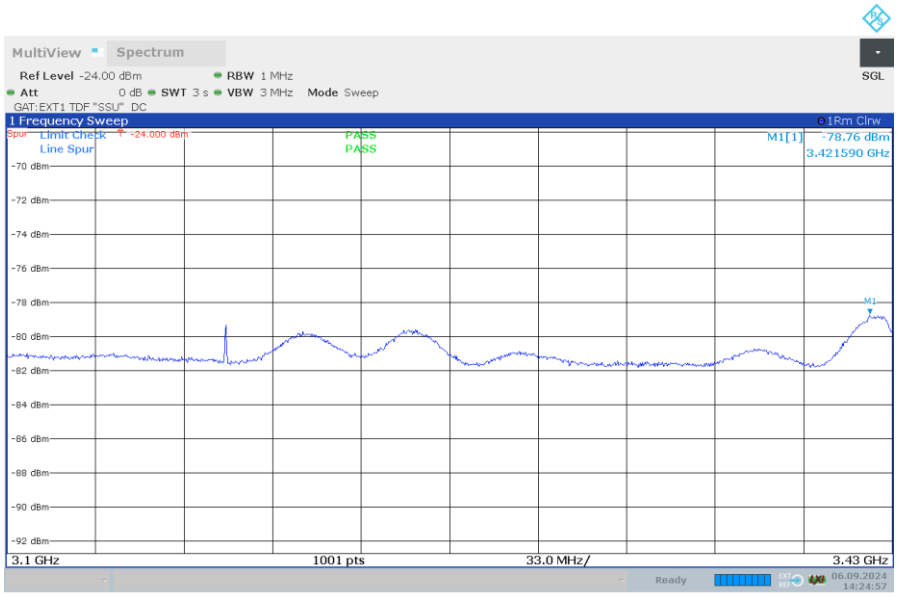
08:21:42 06.09.2024

Spurious Emissions (Lower Band Edge 3440-3448MHz) – QPSK (3455.01MHz) (10MHz Channel BW)

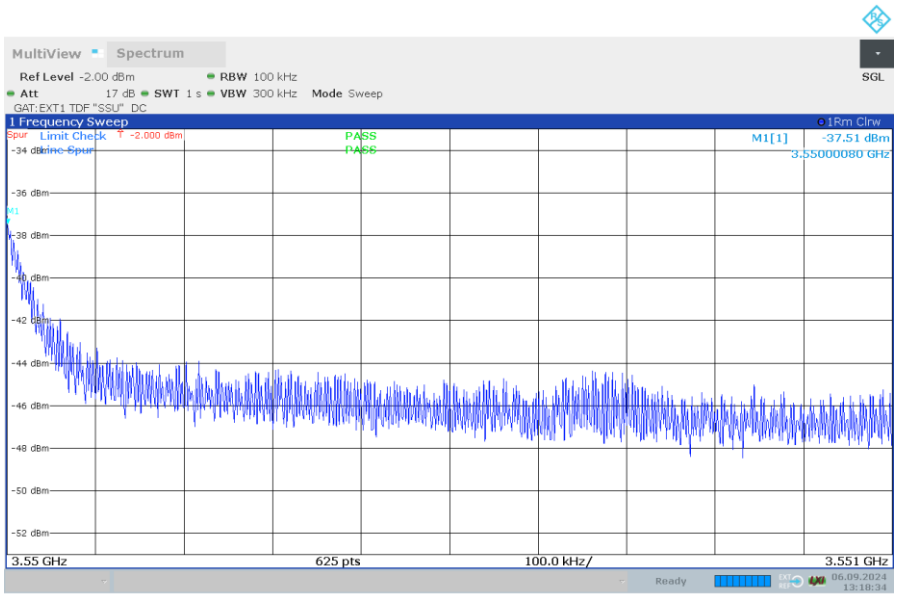


08:20:05 06.09.2024

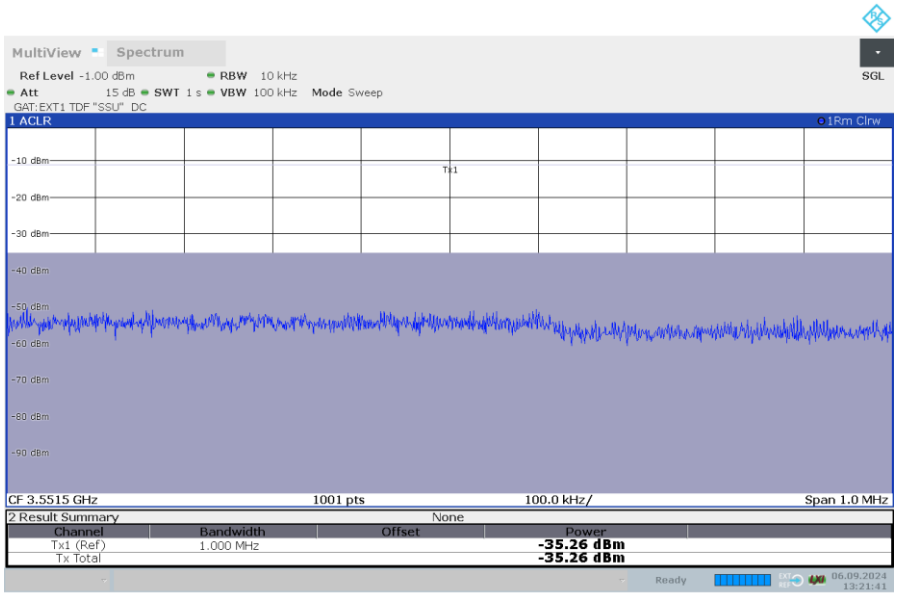
Spurious Emissions (Lower Band Edge 3430-3440MHz) – QPSK (3455.01MHz) (10MHz Channel BW)



Spurious Emissions (Lower Band Edge 3100-3430MHz) – QPSK (3455.01MHz) (10MHz Channel BW)

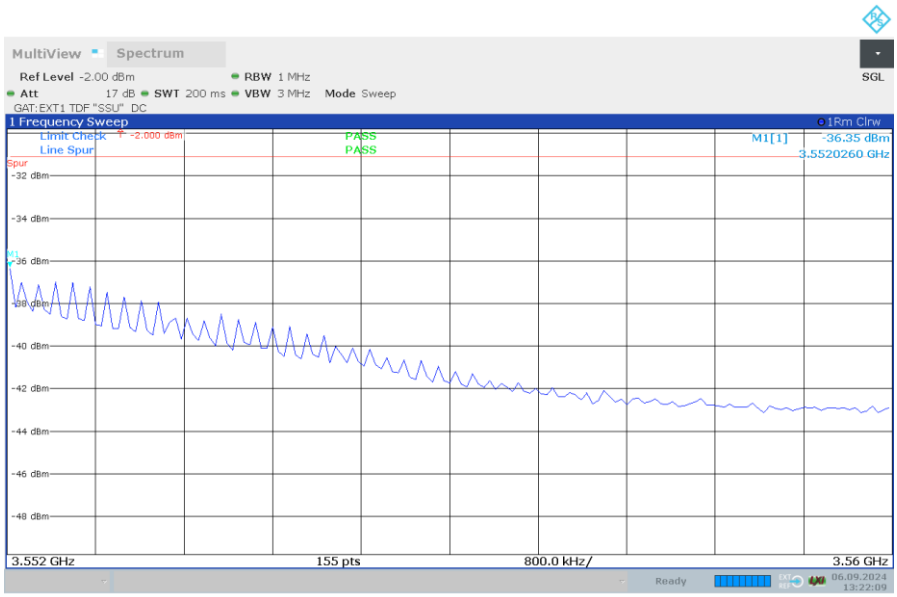


Spurious Emissions (Upper Band Edge 3550-3551MHz) – QPSK (3544.995MHz) (10MHz Channel BW)



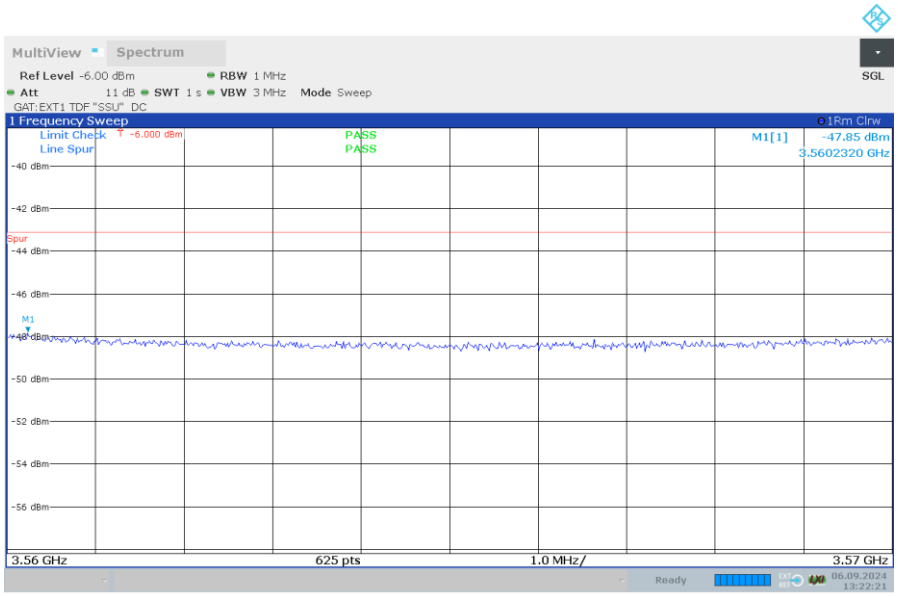
13:21:41 06.09.2024

Spurious Emissions (Upper Band Edge 3551-3552MHz) – QPSK (3544.995MHz) (10MHz Channel BW)



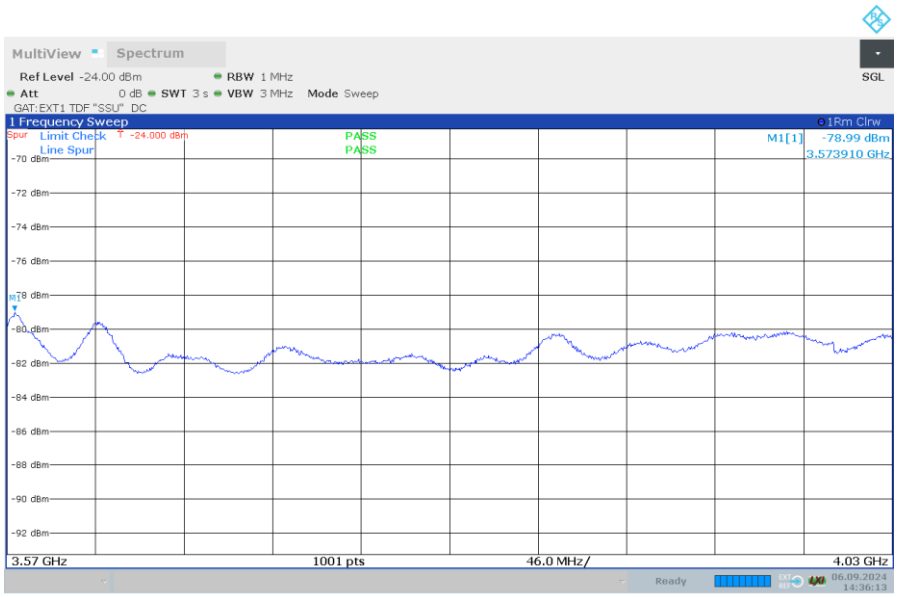
13:22:09 06.09.2024

Spurious Emissions (Upper Band Edge 3552-3560MHz) – QPSK (3544.995MHz) (10MHz Channel BW)



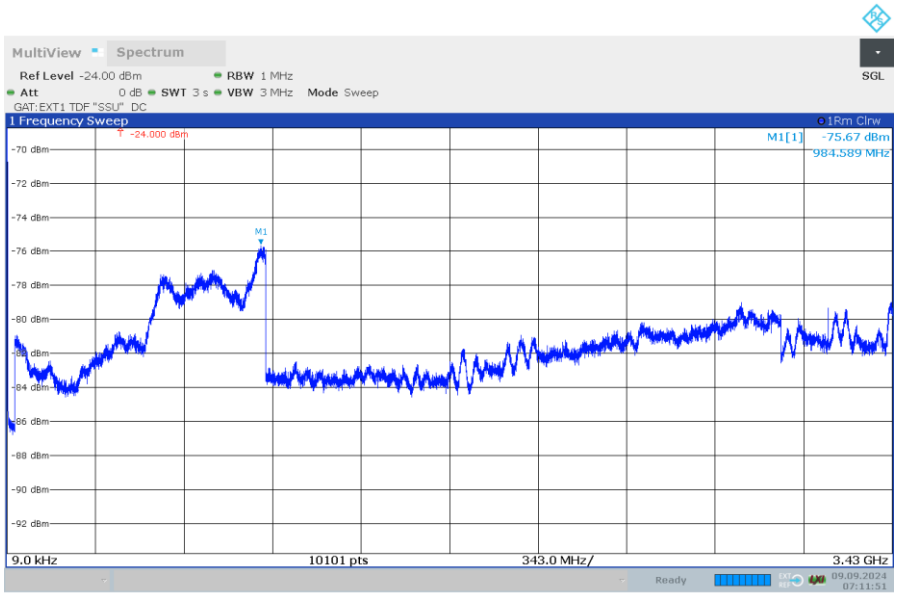
13:22:22 06.09.2024

Spurious Emissions (Upper Band Edge 3560-3570MHz) – QPSK (3544.995MHz) (10MHz Channel BW)

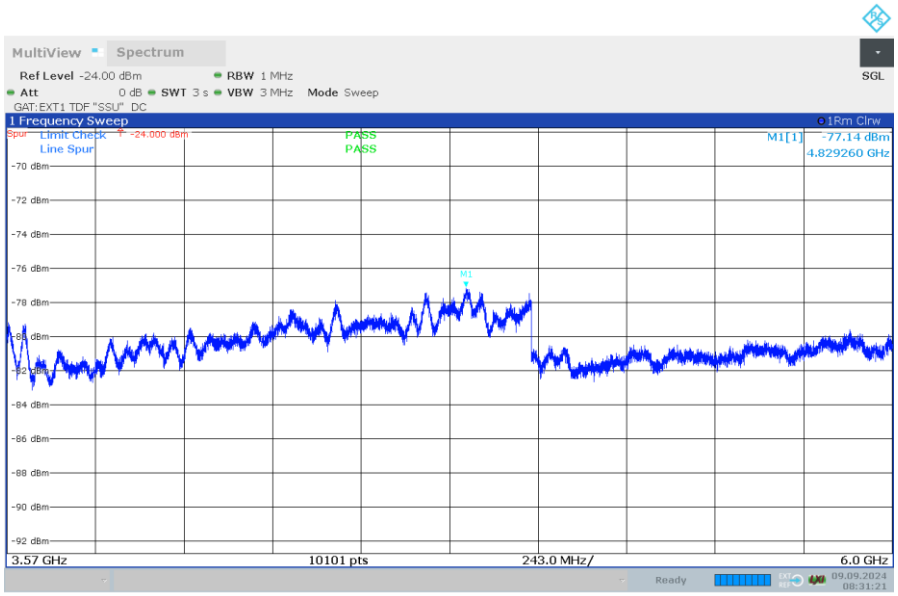


14:36:13 06.09.2024

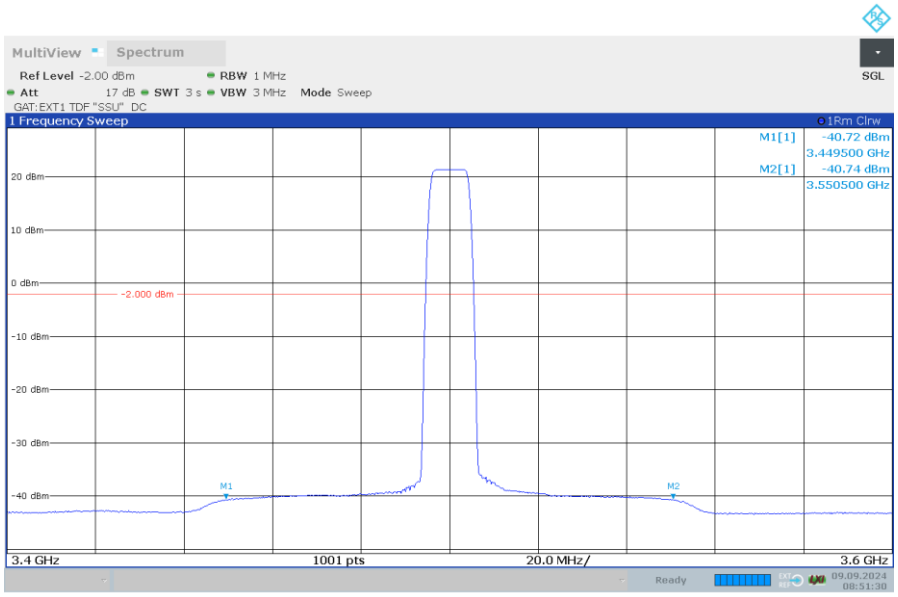
Spurious Emissions (Upper Band Edge 3570-4030MHz) – QPSK (3544.995MHz) (10MHz Channel BW)



Spurious Emissions (9kHz – 3430MHz) - QPSK (3500.01MHz) (10MHz Channel BW)

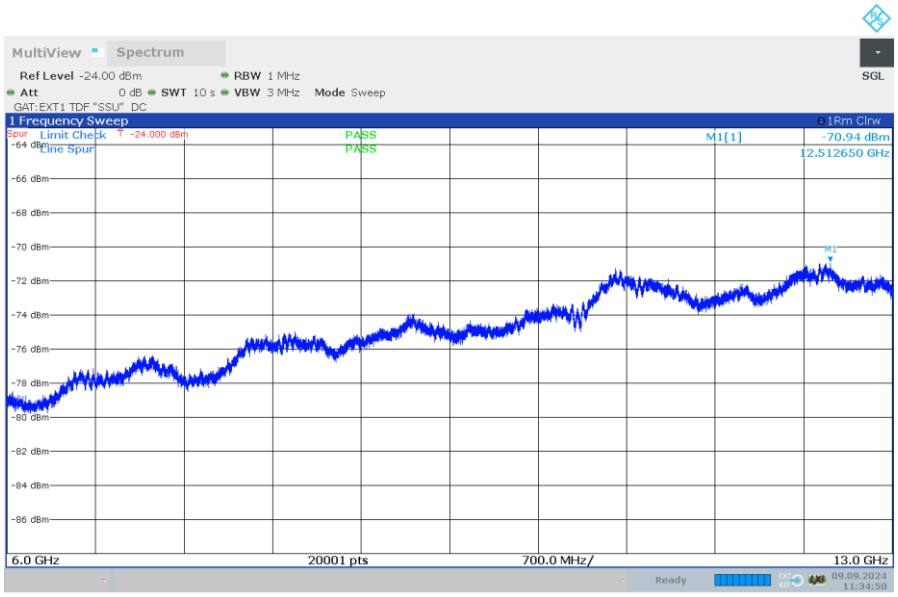


Spurious Emissions (3570MHz – 6000MHz) - QPSK (3500.01MHz) (10MHz Channel BW)



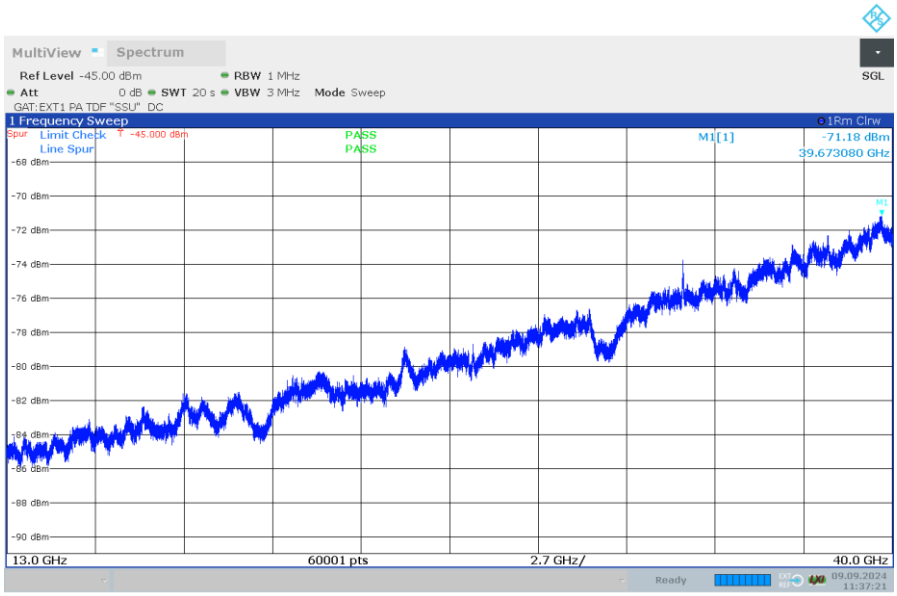
08:51:31 09.09.2024

Spurious Emissions (3400MHz – 3600MHz) - QPSK (3500.01MHz) (10MHz Channel BW)



11:34:51 09.09.2024

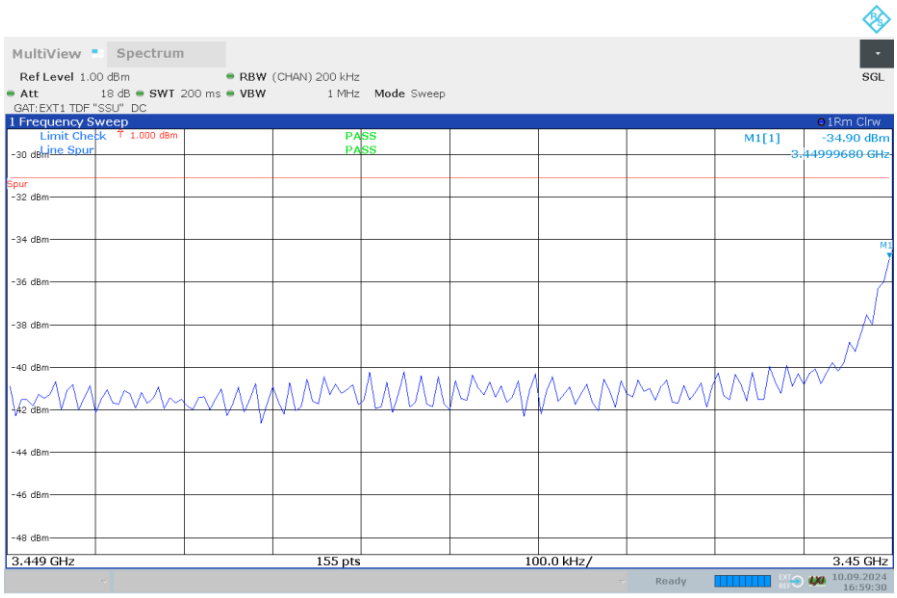
Spurious Emissions (6GHz – 13GHz) - QPSK (3500.01MHz) (10MHz Channel BW)



11:37:21 09.09.2024

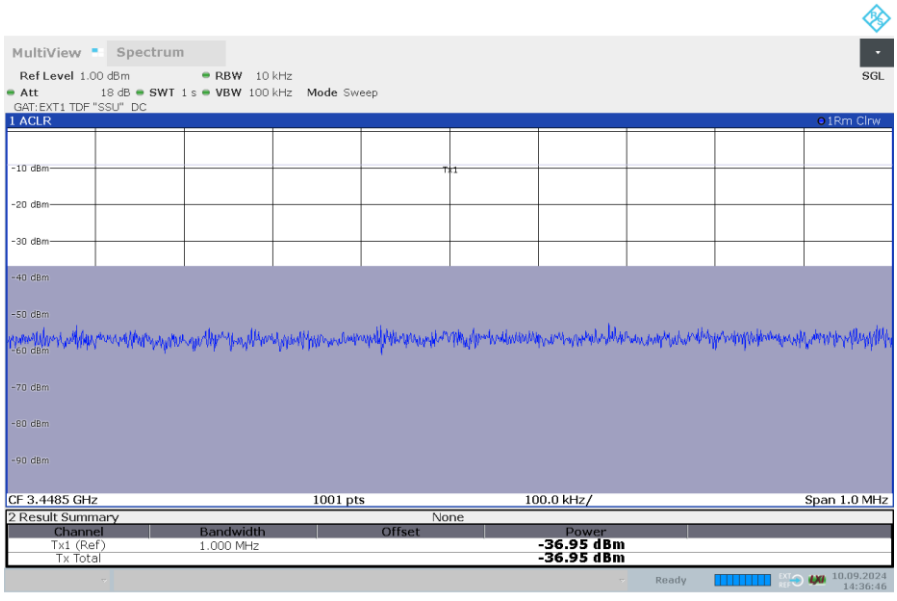
Spurious Emissions (13GHz – 40GHz) - QPSK (3500.01MHz) (10MHz Channel BW)

Config B TX port 57:



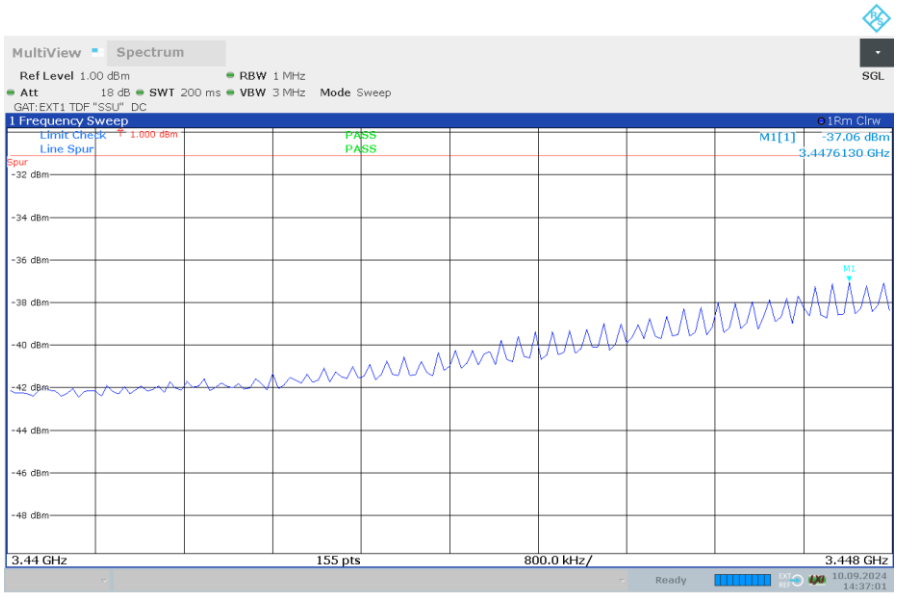
16:59:31 10.09.2024

Spurious Emissions (Lower Band Edge 3449-3450MHz) – QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



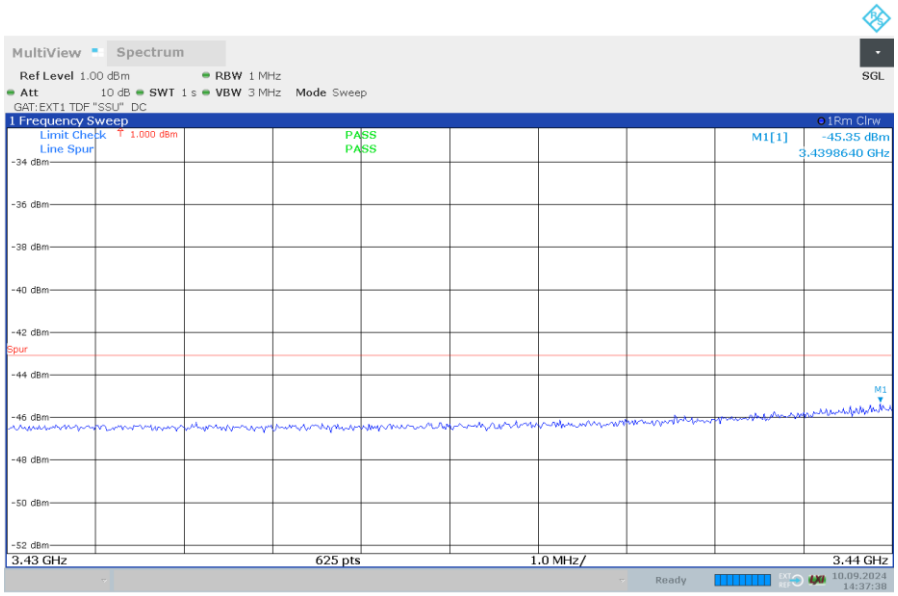
14:36:47 10.09.2024

Spurious Emissions (Lower Band Edge 3448-3449MHz) – QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



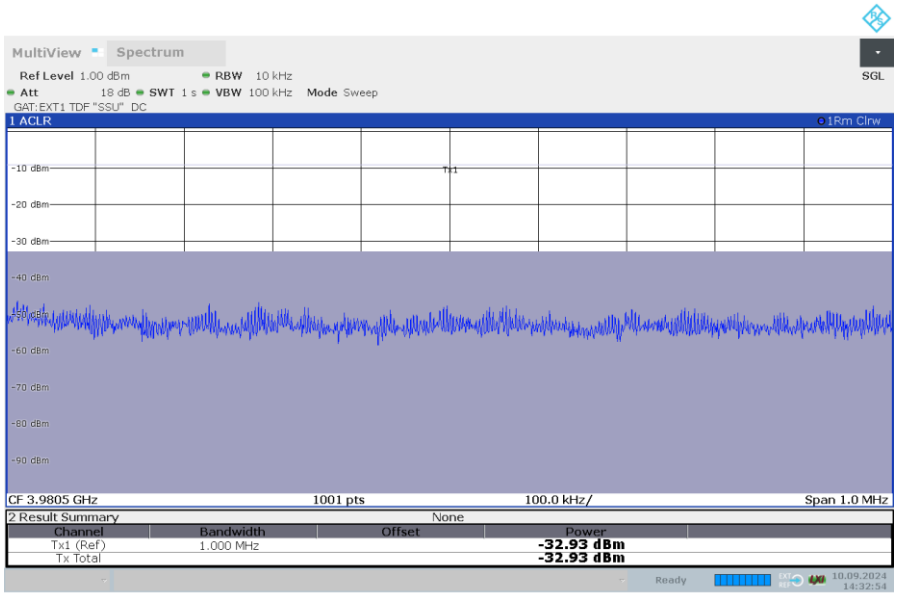
14:37:02 10.09.2024

Spurious Emissions (Lower Band Edge 3440-3448MHz) – QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



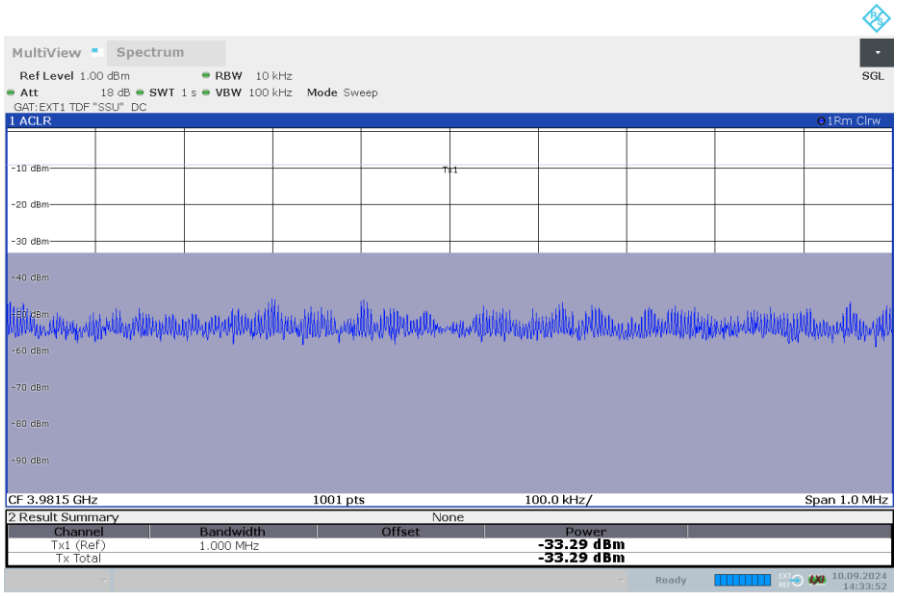
14:37:38 10.09.2024

Spurious Emissions (Lower Band Edge 3430-3440MHz) – QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



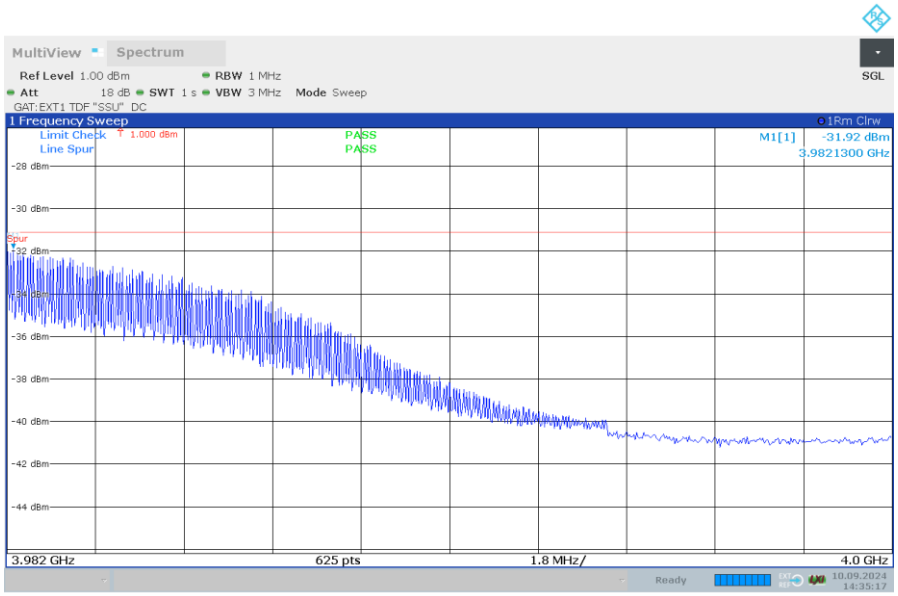
14:32:55 10.09.2024

Spurious Emissions (Upper Band Edge 3980-3981MHz) – QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



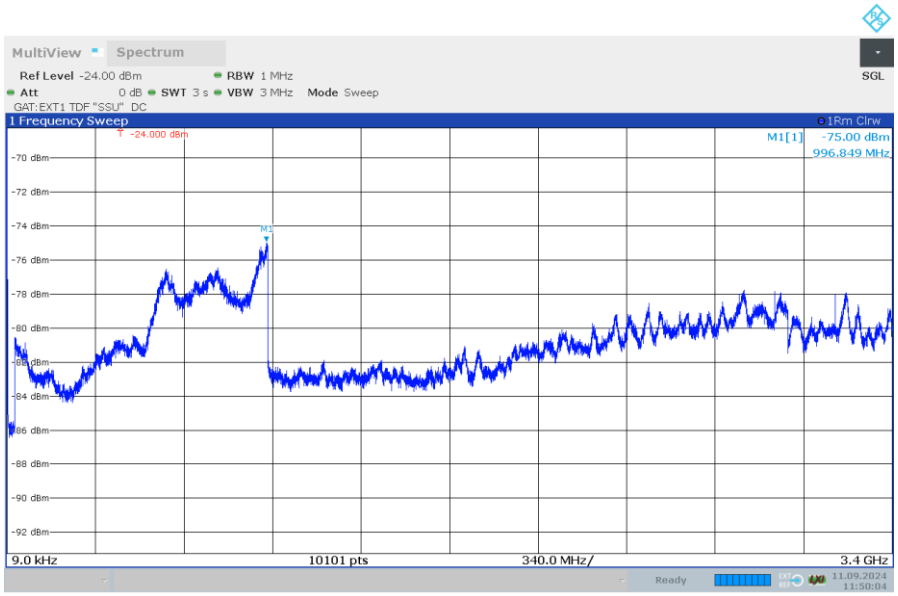
14:33:52 10.09.2024

Spurious Emissions (Upper Band Edge 3981-3982MHz) – QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



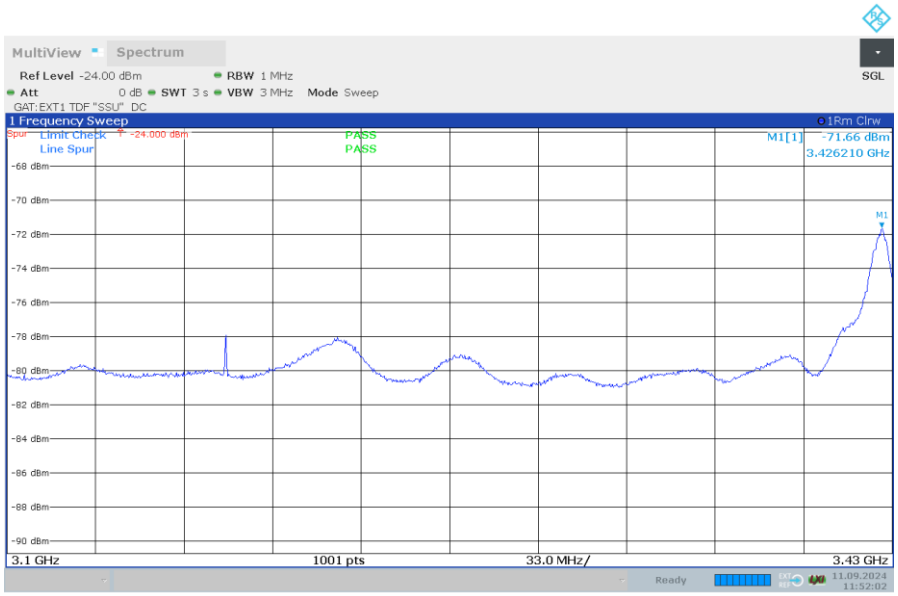
14:35:17 10.09.2024

Spurious Emissions (Upper Band Edge 3982-4000MHz) – QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



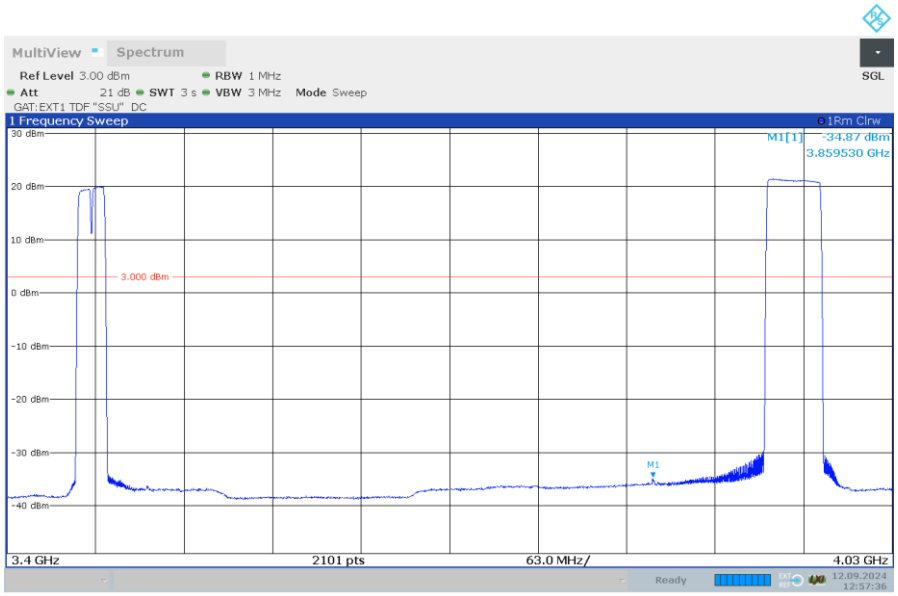
11:50:05 11.09.2024

Spurious Emissions (9kHz – 3400MHz) - QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



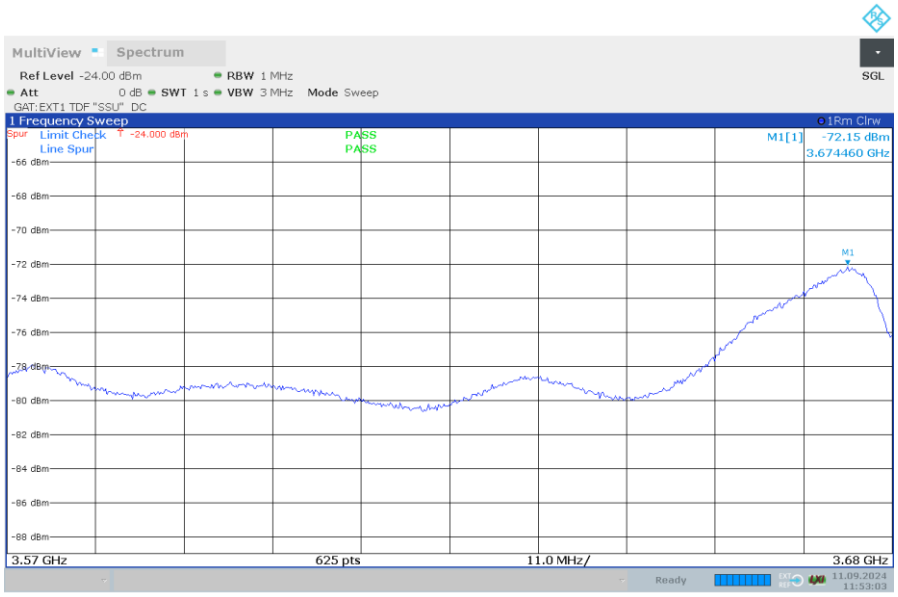
11:52:02 11.09.2024

Spurious Emissions (3100MHz – 3430MHz) - QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



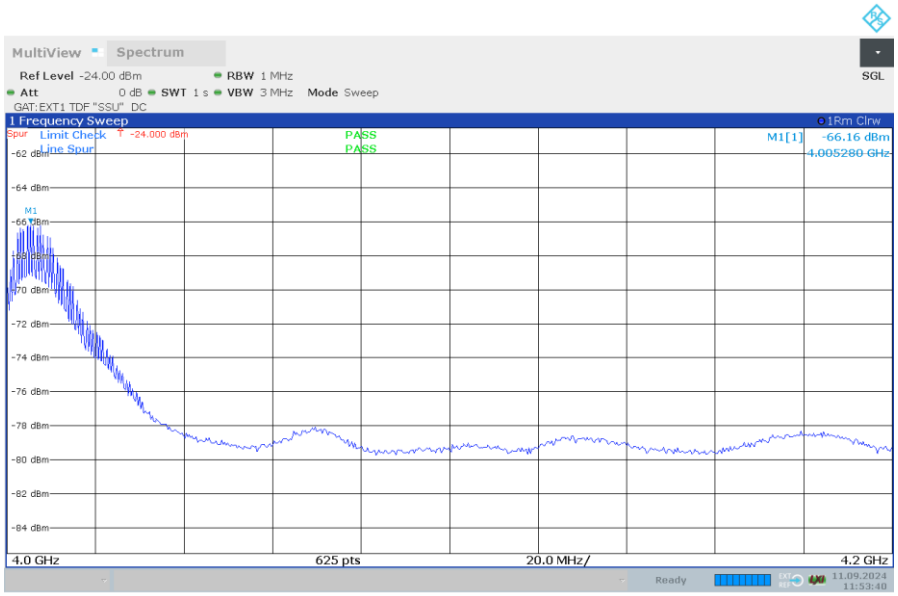
12:57:36 12.09.2024

Spurious Emissions (3400MHz – 4030MHz) - QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



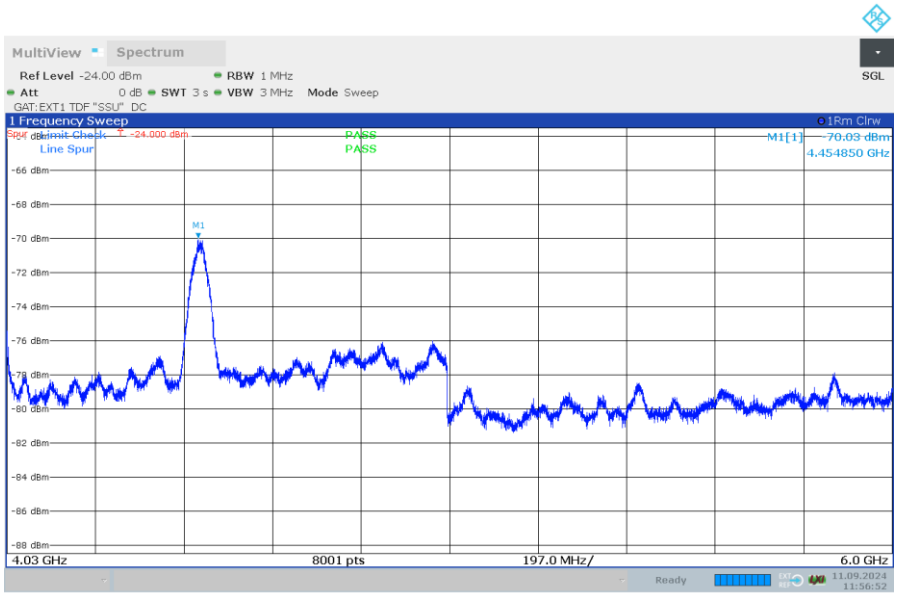
11:53:03 11.09.2024

Spurious Emissions (3570MHz – 3680MHz) - QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



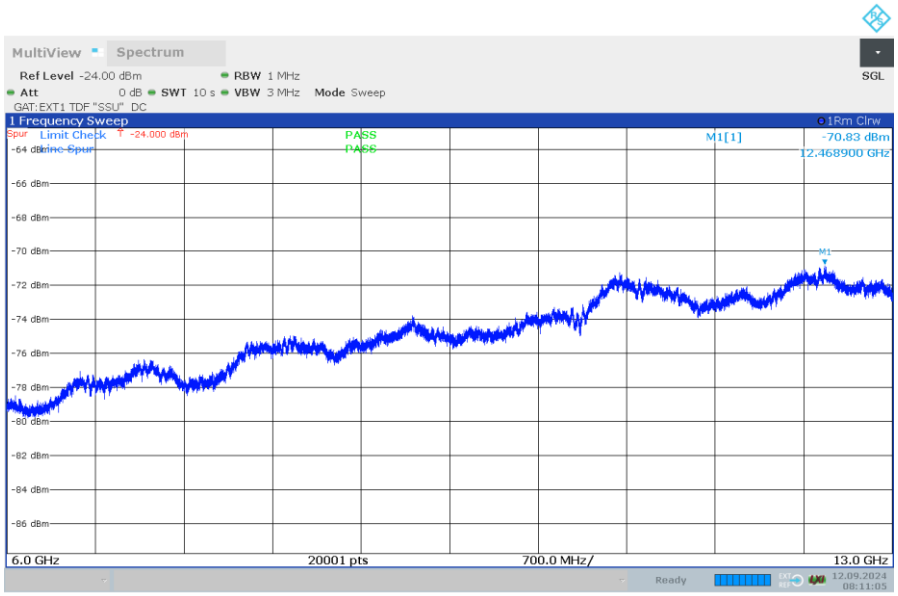
11:53:40 11.09.2024

Spurious Emissions (4000MHz – 4200MHz) - QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



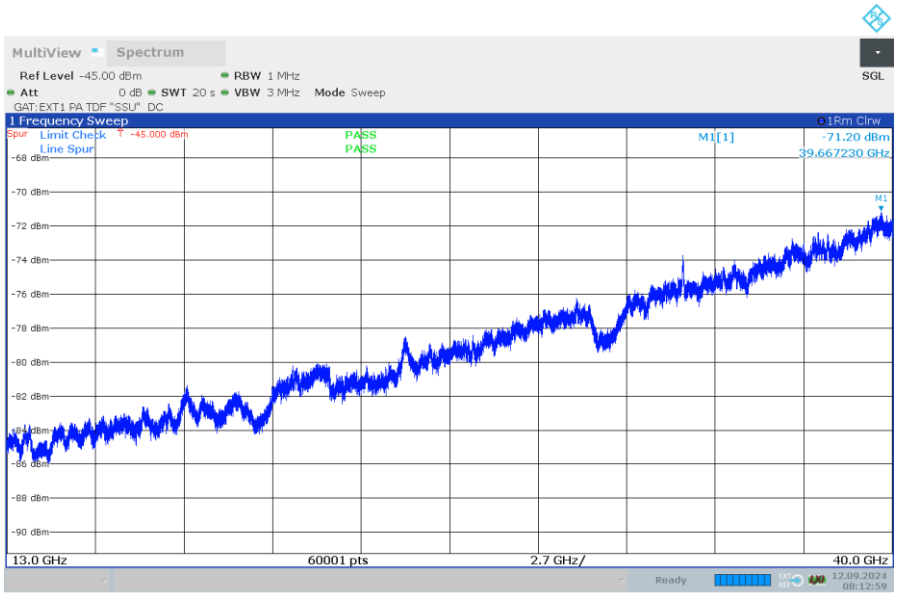
11:56:53 11.09.2024

Spurious Emissions (4030MHz – 6000MHz) - QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



08:11:06 12.09.2024

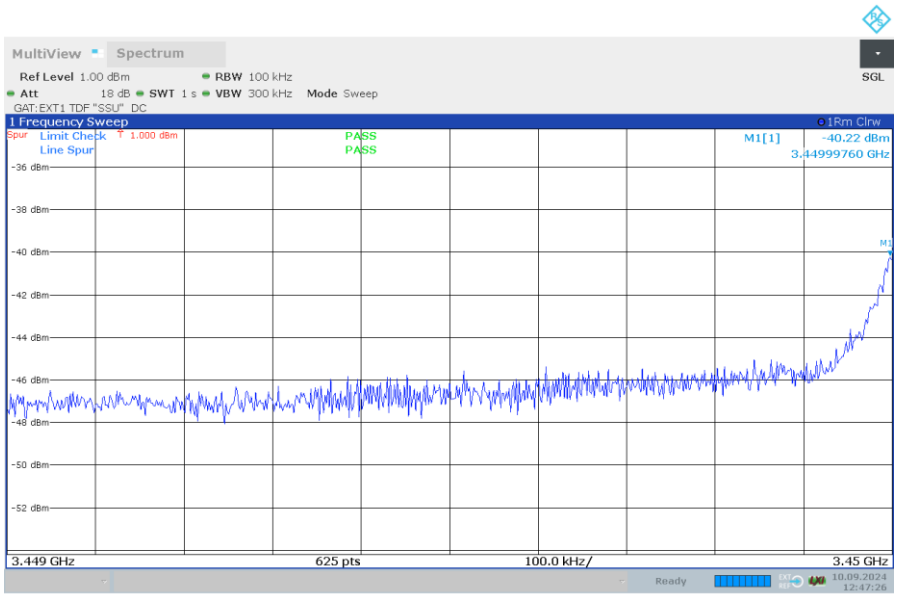
Spurious Emissions (6GHz – 13GHz) - QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



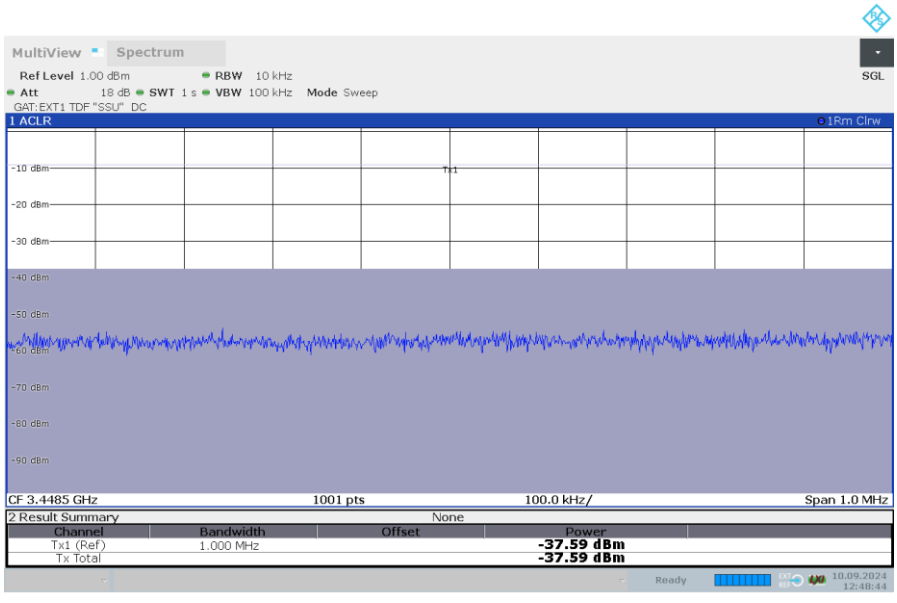
08:12:59 12.09.2024

Spurious Emissions (13GHz – 40GHz) - QPSK (3455.01 / 3465.00 / 3960.00 MHz) (Multicarrier Multiband TC1: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

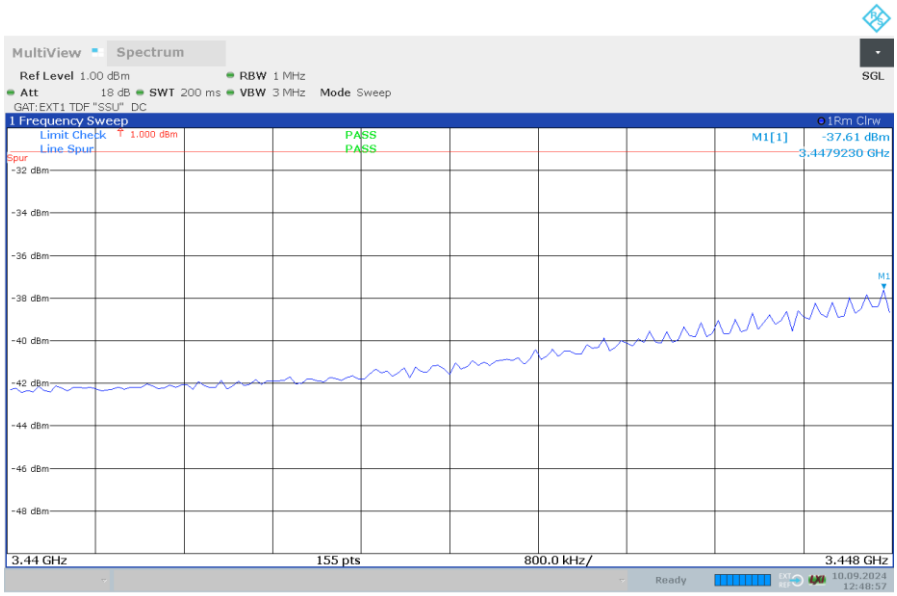
Config D TX port 57:



Spurious Emissions (Lower Band Edge 3449-3450MHz) – QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

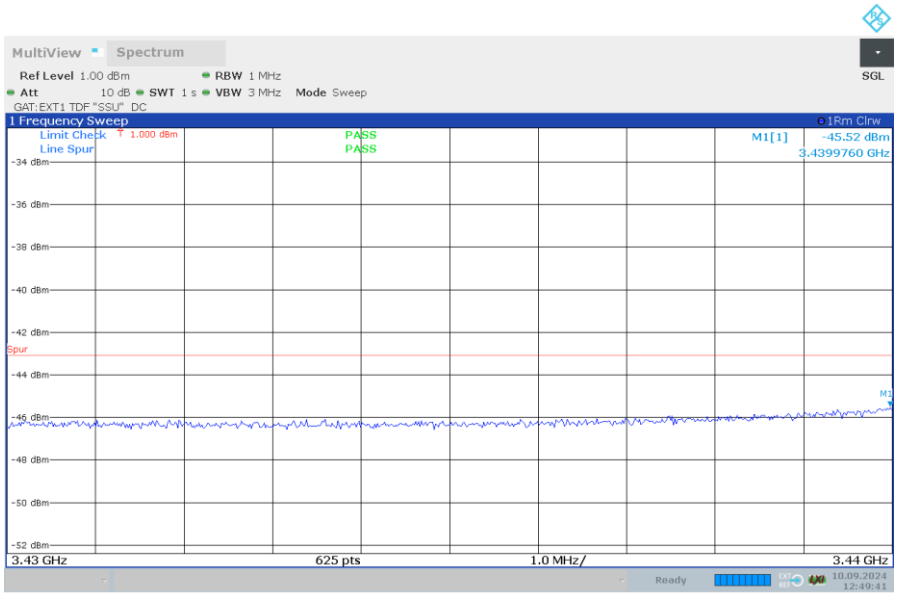


Spurious Emissions (Lower Band Edge 3448-3449MHz) – QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



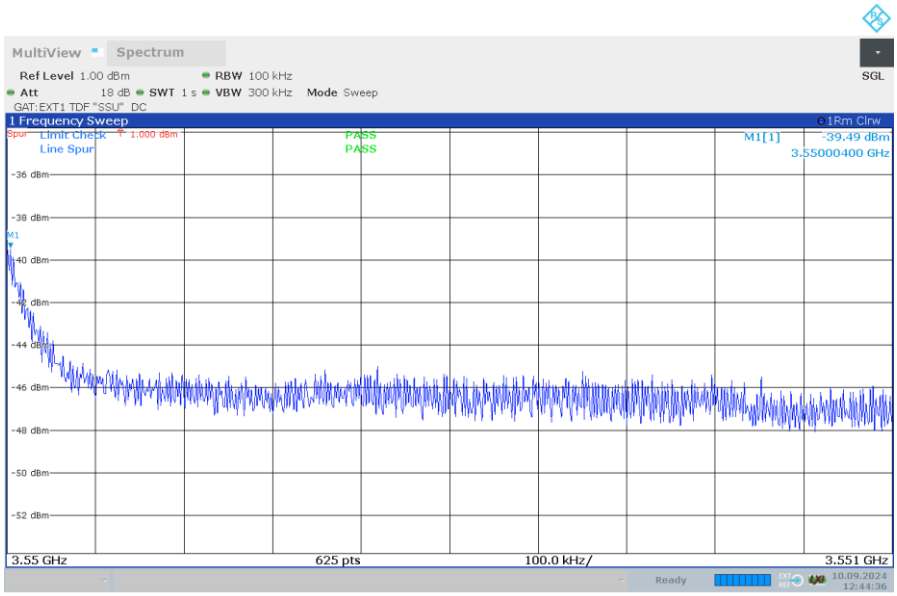
12:48:57 10.09.2024

Spurious Emissions (Lower Band Edge 3440-3448MHz) – QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

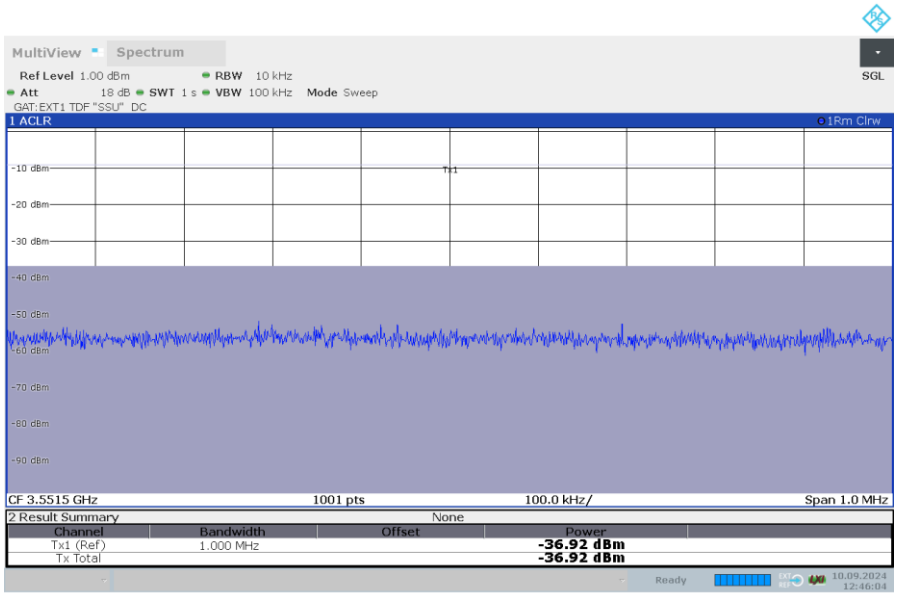


12:49:42 10.09.2024

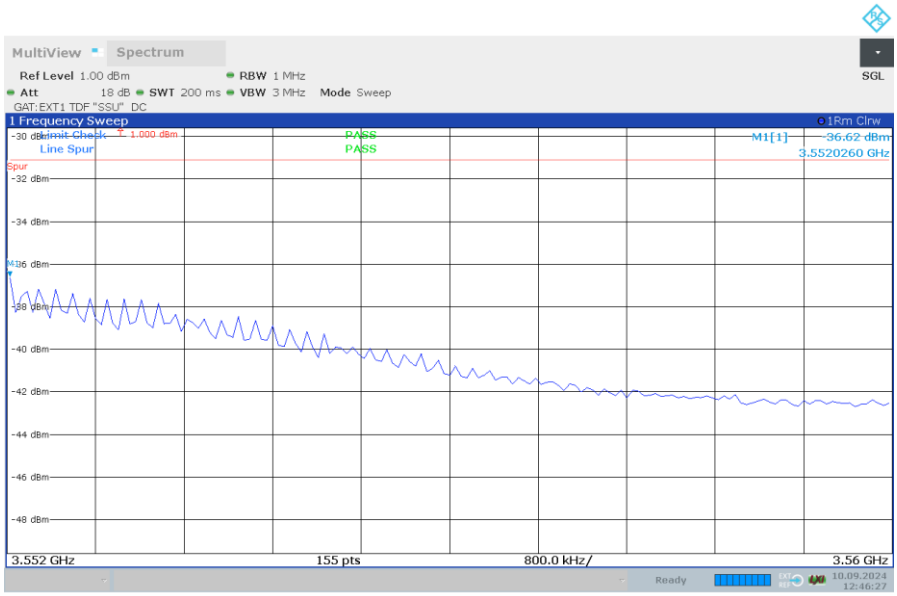
Spurious Emissions (Lower Band Edge 3430-3440MHz) – QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



Spurious Emissions (Upper Band Edge 3550-3551MHz) – QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

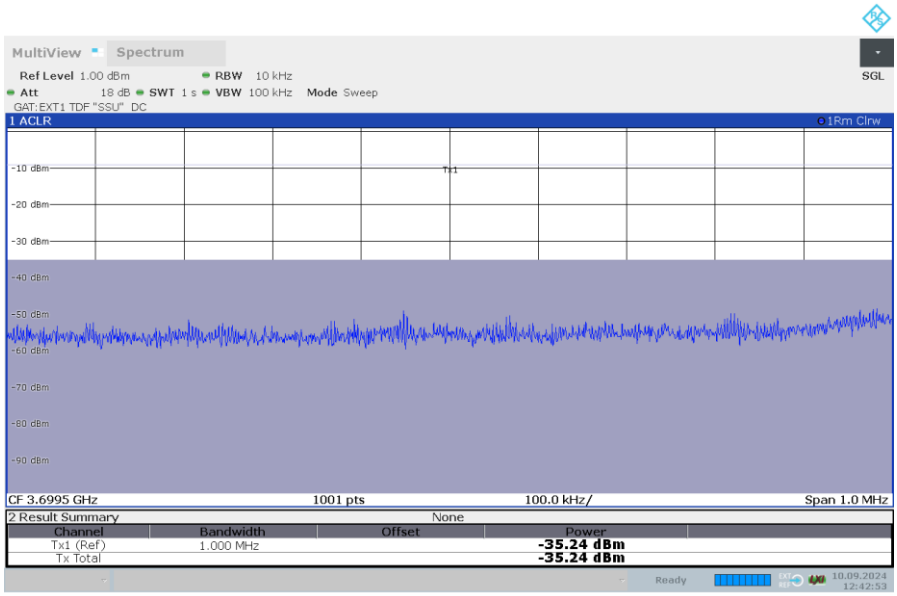


Spurious Emissions (Upper Band Edge 3551-3552MHz) – QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



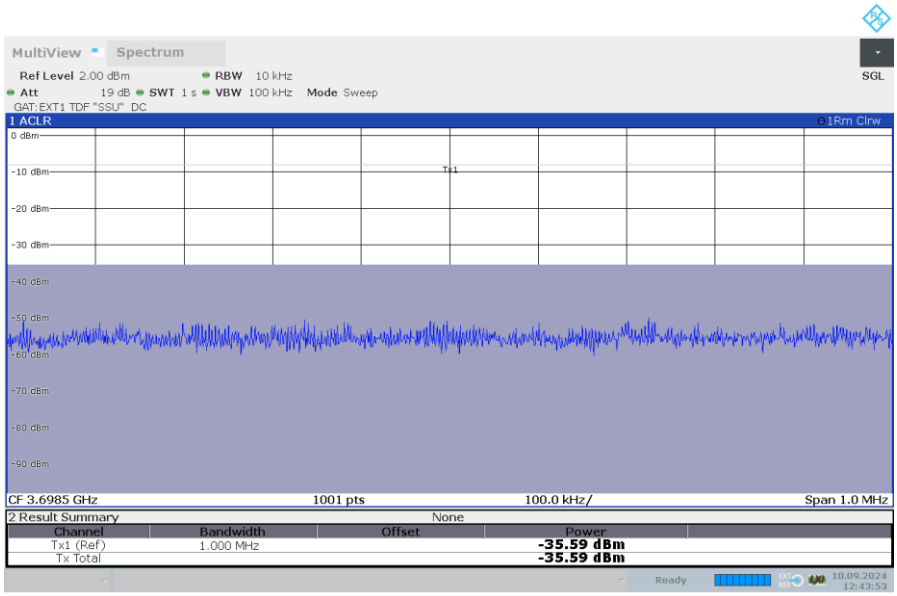
Spurious Emissions (Upper Band Edge 3552-3560MHz) – QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

Spurious Emissions (Upper Band Edge 3560-3570MHz) – QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



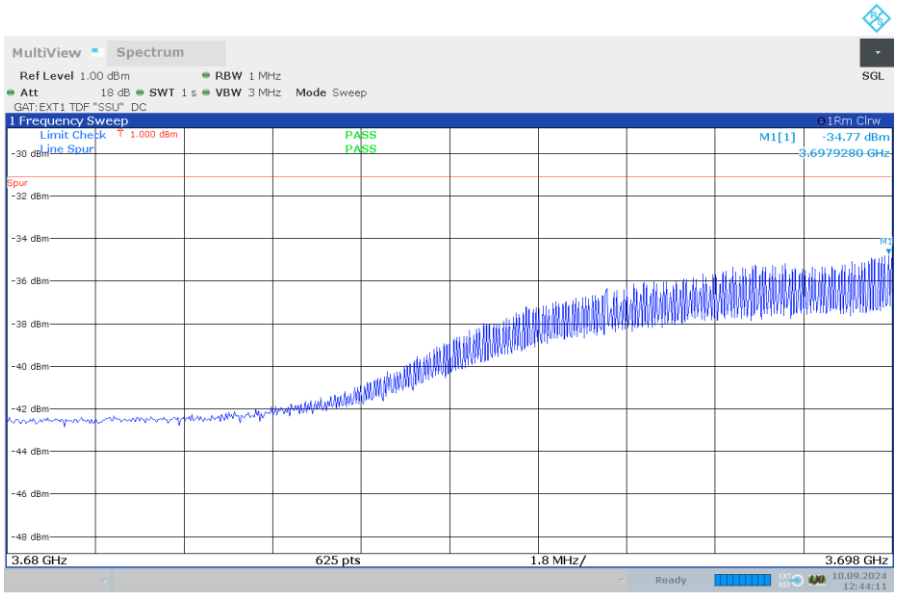
12:42:53 10.09.2024

Spurious Emissions (Lower Band Edge 3699-3700MHz) – QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



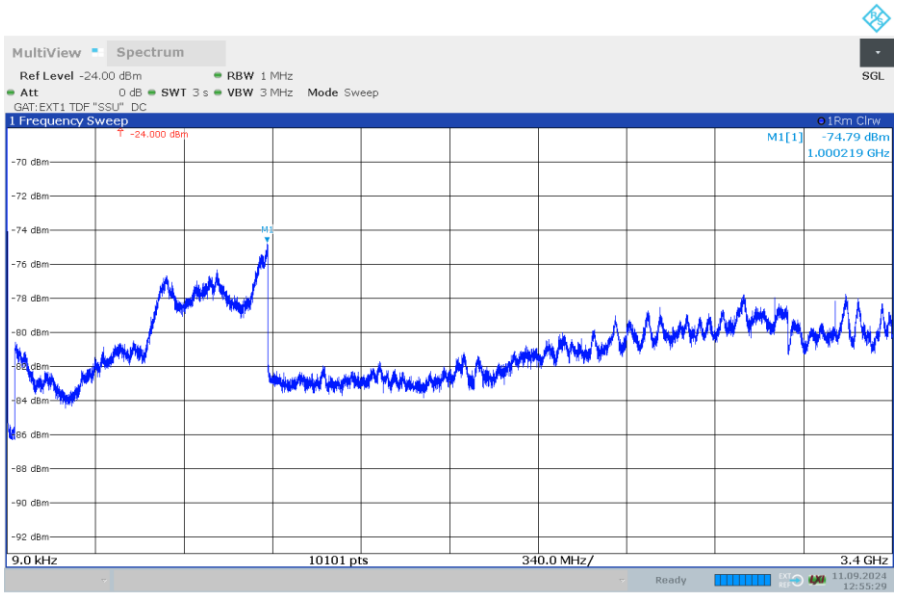
12:43:54 10.09.2024

Spurious Emissions (Lower Band Edge 3698-3699MHz) – QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



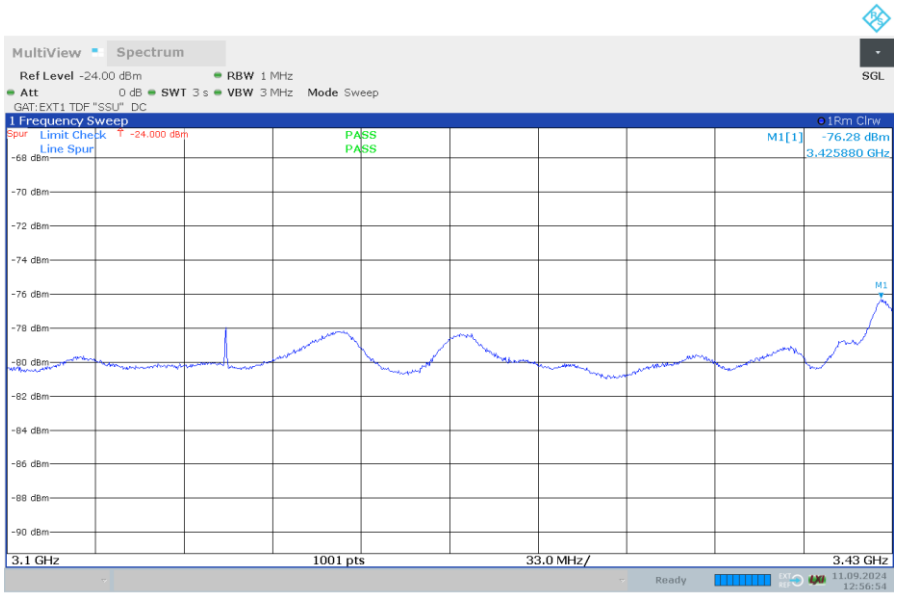
12:44:11 10.09.2024

Spurious Emissions (Lower Band Edge 3680-3698MHz) – QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

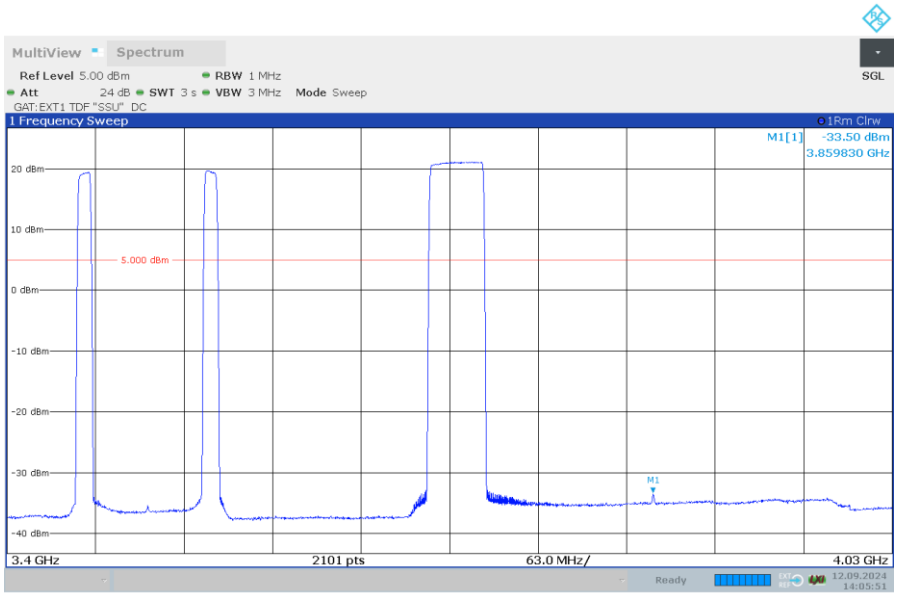


12:55:30 11.09.2024

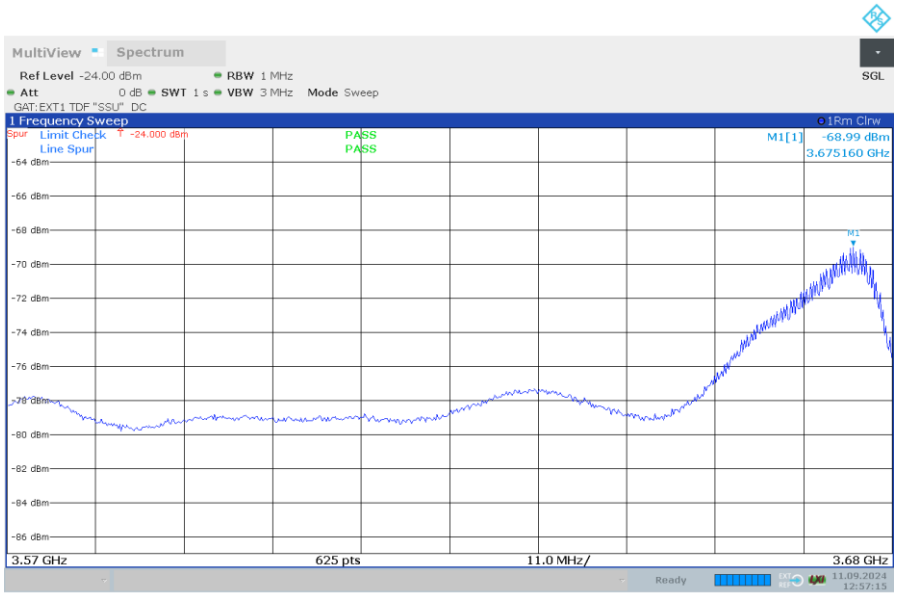
Spurious Emissions (9kHz – 3400MHz) - QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



Spurious Emissions (3100MHz – 3430MHz) - QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

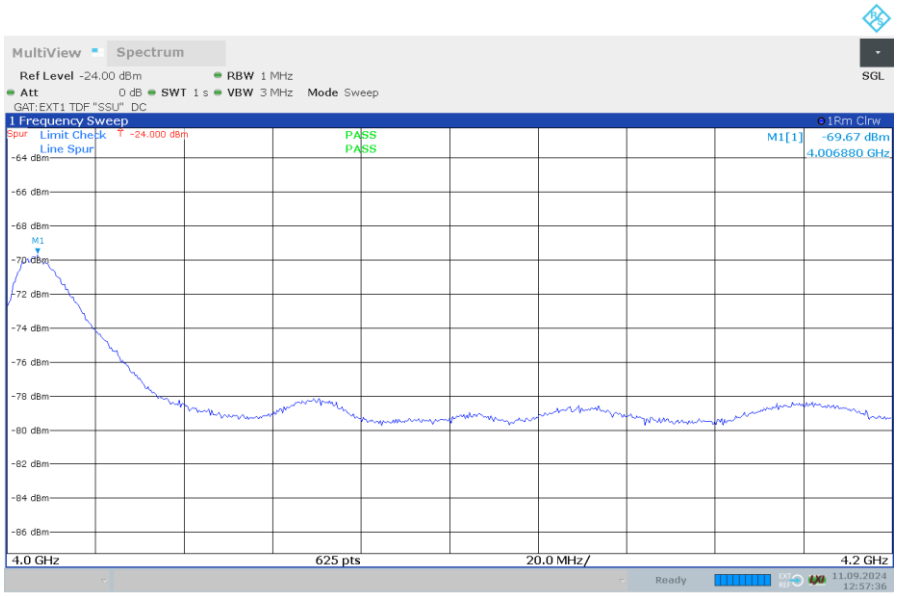


Spurious Emissions (3400MHz – 4030MHz) - QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



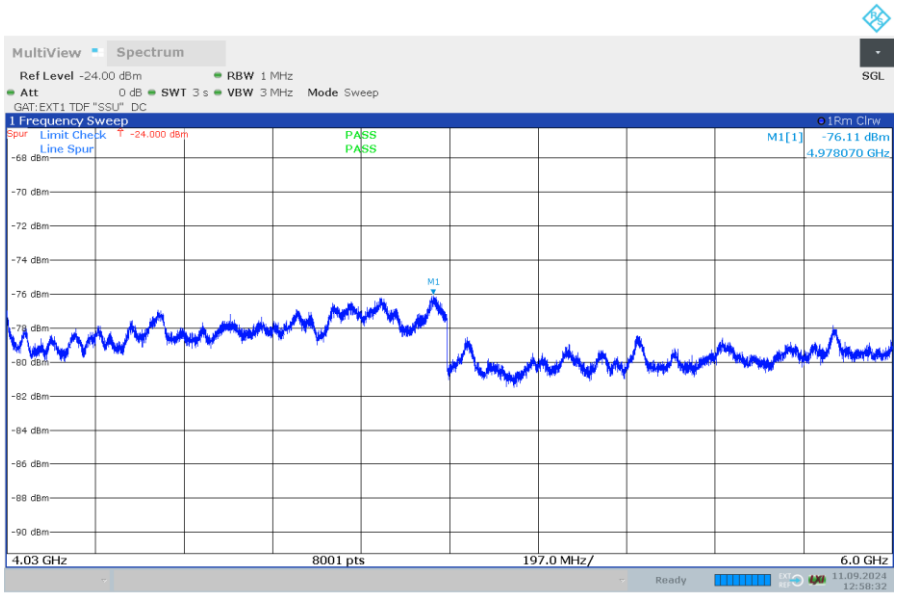
12:57:16 11.09.2024

Spurious Emissions (3570MHz – 3680MHz) - QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



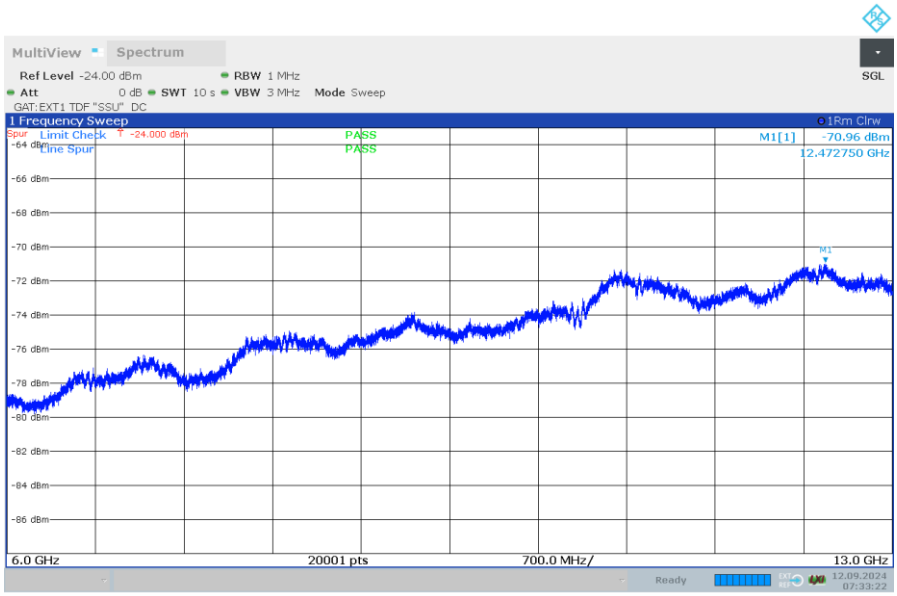
12:57:37 11.09.2024

Spurious Emissions (4000MHz – 4200MHz) - QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



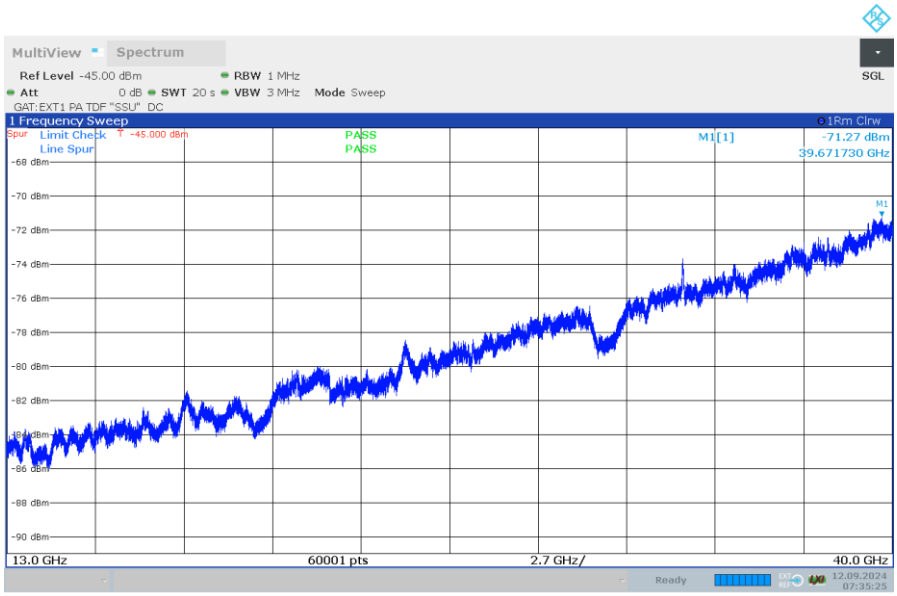
12:58:33 11.09.2024

Spurious Emissions (4030MHz – 6000MHz) - QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



07:33:23 12.09.2024

Spurious Emissions (6GHz – 13GHz) - QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)



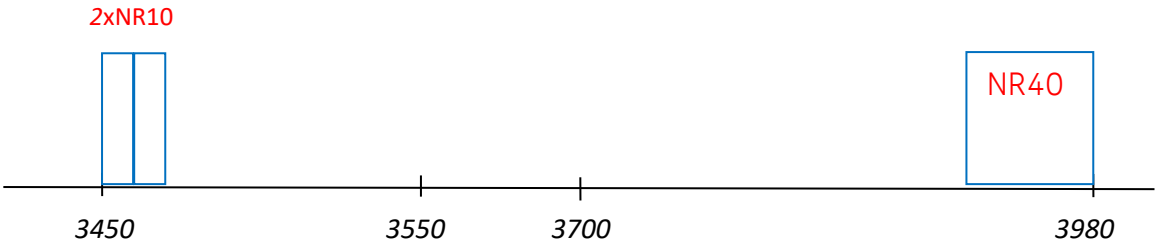
07:35:25 12.09.2024

Spurious Emissions (13GHz – 40GHz) - QPSK (3455.01 / 3544.995 / 3720.00 MHz) (Multicarrier Multiband TC3: 3.45G Band 2xNR 10MHz + 3.7G Band 1xNR 40MHz Channel BW)

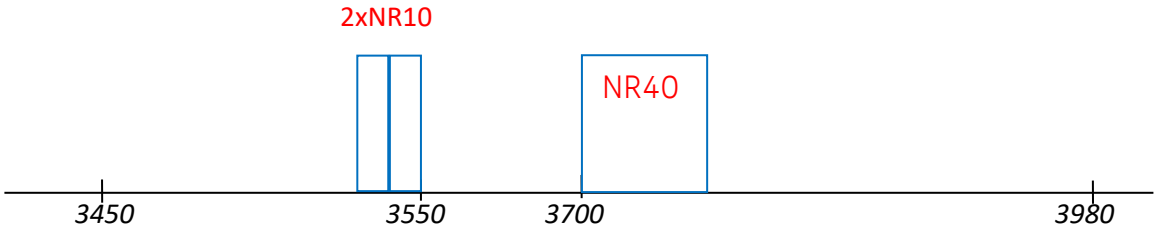
Appendix A: AQQQA Multicarrier Multiband configurations

The TRX output power is enabled at maximum available carrier power for all multicarrier on 3.45G Band testing. The QPSK modulation type is used for all carriers.
Multicarrier multiband operations test cases have been developed as shown below (3.45G Band 2cc + 3.7G Band 1cc, any channel bandwidth combination):

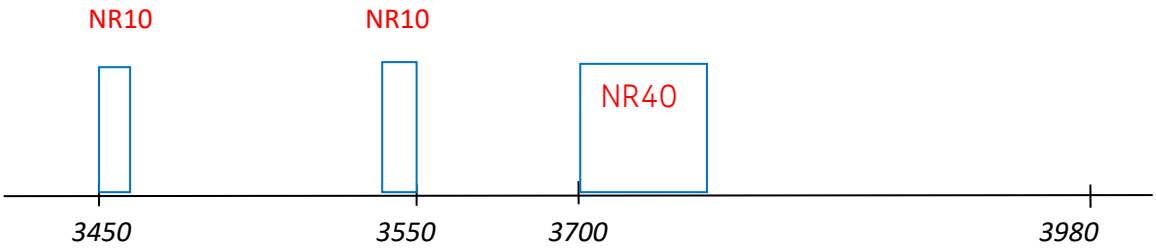
Multicarrier Multiband Test Case 1 ***(Config B)****:* In 3.45G Band - Two contiguous NR10 carriers with minimum spacing between carrier frequencies at the lower band edge (3455.01 & 3465.00MHz). In 3.7G Band - One NR40 carrier at maximum carrier power (and Band power) at the upper band edge (3960.00MHz). The smallest channel bandwidth in 3.45G band is selected to maximize carrier power spectral density. The carriers are operated at maximum power (0.78W/NR10 carrier) and (5W/NR40 carrier) with a radio power of 420 watts.



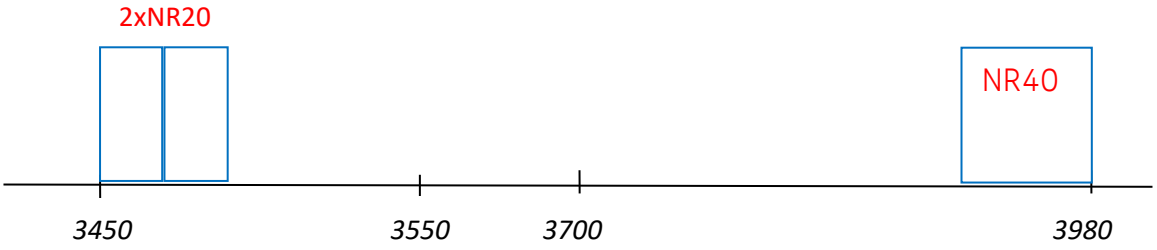
Multicarrier Multiband Test Case 2 ***(Config C)****:* In 3.45G Band - Two contiguous NR10 carriers with minimum spacing between carrier frequencies at the upper band edge (3544.995 & 3534.99MHz). In 3.7G Band - One NR40 carrier at maximum carrier power (and Band power) at the lower band edge (3720.00MHz). The smallest channel bandwidth in 3.45G band is selected to maximize carrier power spectral density. The carriers are operated at maximum power (0.78W/NR10 carrier) and (5W/NR40 carrier) with a radio power of 420 watts.



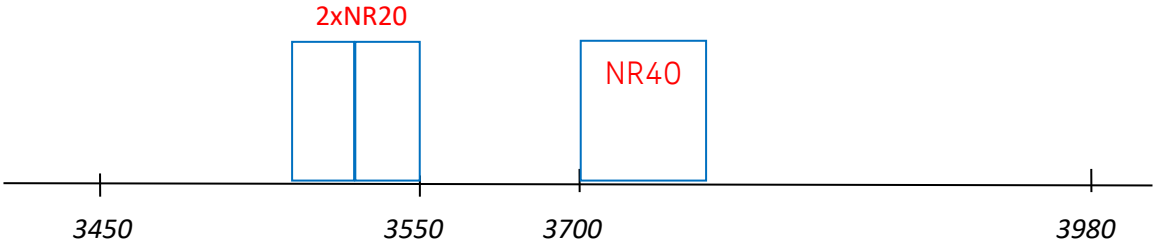
Multicarrier Multiband Test Case 3 ***(Config D)****:* In 3.45G Band - Two non-contiguous NR10 carriers with maximum spacing between carrier frequencies at the lower/upper band edge (3455.01 & 3544.995MHz). In 3.7G Band - One NR40 carrier at maximum carrier power (and Band power) at the lower band edge (3720.00MHz). The smallest channel bandwidth in 3.45G band is selected to maximize carrier power spectral density. The carriers are operated at maximum power (0.78W/NR10 carrier) and (5W/NR40 carrier) with a radio power of 420 watts.



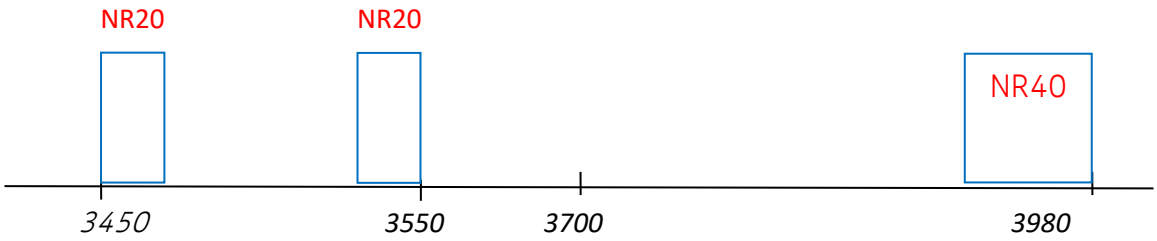
Multicarrier Multiband Test Case 4 ***(Config E)****:* In 3.45G Band - Two contiguous NR20 carriers with minimum spacing between carrier frequencies at the lower band edge (3460.02 & 3480.00MHz). In 3.7G Band - One NR40 carrier at the upper band edge (3960.00MHz). The 20MHz channel bandwidth in 3.45G Band is selected to maximize port and band power. The carriers are operated at maximum power (1.56W/NR20 carrier) and (4.375W/NR40 carrier) with a maximum radio power of 480 watts.



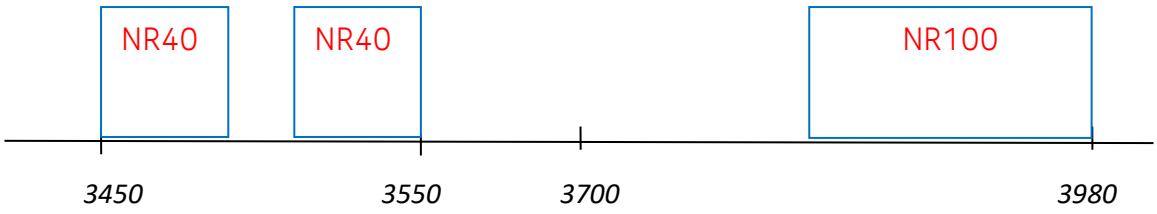
Multicarrier Multiband Test Case 5 ***(Config F)****:* In 3.45G Band - Two contiguous NR20 carriers with minimum spacing between carrier frequencies at the upper band edge (3540.00 & 3519.99MHz). In 3.7G Band - One NR40 carrier at the lower band edge (3720.00MHz). The 20MHz channel bandwidth in 3.45G Band is selected to maximize port and band power. The carriers are operated at maximum power (1.56W/NR20 carrier) and (4.375W/NR40 carrier) with a maximum radio power of 480 watts.



Multicarrier Multiband Test Case 6 ***(Config G)***: In 3.45G Band - Two non-contiguous NR20 carriers with maximum spacing between carrier frequencies at the lower/upper band edge (3460.02 & 3540.00MHz). In 3.7G Band - One NR40 carrier at the upper band edge (3960.00MHz). The 20MHz channel bandwidth in 3.45G Band is selected to maximize port and band power. The carriers are operated at maximum power (1.56W/NR20 carrier) and (4.375W/NR40 carrier) with a maximum radio power of 480 watts.



Multicarrier Multiband Test Case 7 ***(Config H)***: In 3.45G Band - Two non-contiguous NR40 carriers with maximum spacing between carrier frequencies at the lower/upper band edge (3470.01 & 3529.98MHz). In 3.7G Band - One NR100 carrier at the upper band edge (3930.00MHz). The 40MHz channel bandwidth in 3.45G Band and 100MHz channel bandwidth in 3.7G Band are selected to maximize OBW, iBW, port and band power. The carriers are operated at maximum power (1.56W/NR40 carrier) and (4.375W/NR100 carrier) with a maximum radio power of 480 watts.



Appendix B: AQQQA 3.45G EIRP calculations

5G NR EIRP Calculations for Sixty-Four Port MIMO Operations

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.

The AQQQA antenna assembly has an array of 4 rows and 8 columns of (±45°) cross-polarized (orthogonal) radiators. This antenna assembly has a maximum beamforming gain of 25.5 dBi. The sixty-four AQQQA transmitter outputs are connected to the antenna array (thirty-two are connected to +45° radiators/antennas and thirty-two are connected to -45° radiators/antennas).

Equivalent Isotropically Radiated Power (EIRP) is calculated (as specified in ANSI C63.26-2015 section 6.4 for a correlated output signals) from the results of power measurements (highest measured PSD for each channel bandwidth type). The maximum antenna assembly beamforming gain was used for this calculation. Calculations of worst-case EIRP for sixty-four port MIMO are as follows:

Parameter	NR 10 MHz Ch BW
Worst Case PSD/Antenna Port	22.4 dBm/MHz
Cable Loss	0 dB
Number of Ant Ports per Polarization	32
Total PSD per Polarization 10Log 32 = + 15.1dB	37.5 dBm/MHz
Maximum Antenna Beamforming Gain per Polarization	25.5 dBi
EIRP per Polarization	63.0 dBm/MHz
Number of Polarizations	2
EIRP Total = +45°and -45° (See Note 1)	63.0 dBm/MHz
Passing FCC EIRP Limit	65.16 dBm/MHz

Note 1: The EIRP per antenna polarization 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).

EIRP Calculation Summary for the 3.45G band

(1) The worst case AQQQA sixty-four port MIMO EIRP levels for 5G NR channel bandwidth 10MHz are less than the 3280W/MHz (65.16 dBm/MHz) FCC regulatory limit.

(2) The worst case AQQQA sixty-four port MIMO EIRP levels for 5G NR channel bandwidth 10MHz exceed the 1640W/MHz (62.15 dBm/MHz) FCC regulatory limit by 0.85 dB (63.0 dBm/MHz – 62.15 dBm/MHz). The AQQQA 5G NR 10MHz channel bandwidth carrier power level using sixty-four port MIMO operation need to be reduced to meet 1640 W/MHz (62.15 dBm/MHz) FCC regulatory limit.

Appendix C: AQQQA 3.45G Emission Designators

FCC 5G Emission Designators for 3.45G Band (3450MHz to 3550MHz)					
Ch BW	**Radio Channel**	**5G-NR: QPSK**	**5G-NR: 16QAM**	**5G-NR: 64QAM**	**5G-NR: 256QAM**
10MHz	Low	9M74G7W	9M60G7W	9M67G7W	9M68G7W
	Mid	9M69G7W	9M58G7W	9M68G7W	9M67G7W
	High	9M68G7W	9M56G7W	9M71G7W	9M67G7W
Note: FCC emission designators are based on 26dB emission bandwidth.					