TEST REPORT: FCC RF Test Report AEHC

FCC id: VBNAEHC-01

Date:	Oulu 11 April 2025
Pages:	85
Appendices:	2

Equipment Under Test:	Airscale MAA 64T64R 192AE n41 320W 3.5GHz
Radio Access technology:	NR (TDD)
Type:	AEHC
Manufacturer:	Nokia Solutions and Networks Oy
Address:	Tapsitie 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 ICES-003 Issue7
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	11 April 2025	

Contents

1 Summary

FCC 47 CFR PART 2 & 27 sets out the requirements applicable to radio transmitters subject to this product.

The scope of testing in this effort is FCC radio certification of the AEHC adds 5G NR 15 MHz TDD Single and Multi Carrier in the 2.5G Band 41.

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

Table 1 Results – Summary

Test No.	Measurement	FCC Part	Page Number of this Report	Result
1	Transmitter Output Power	47 CFR 2.1046, 27.53	9	compliant
2	Modulation Characteristics	47 CFR 2.1047, 27.53	29	compliant
3	Occupied Bandwidth	47 CFR 2.1049, 27.53	30	compliant
4	Transmitter Unwanted Emissions (conducted)	47 CFR 2.1051, 27.53	34	compliant
5	Field Strength of Spurious Radiation	47 CFR 2.1053, 27.53, 15.109	42	compliant

Measurements guidance: FCC OET laboratory KDB: 662911 D01 Multiple Transmitter Output v01r02 and FCC KDB 971168 D01 Power Meas License Digital Systems v03r01: ANSI C63.26-2015.

Test Laboratory:

Nokia Solutions and Networks Oy

Tapsitie 4,

FI-90620, Oulu, Finland

Jarkko Kenttälä

OATS number: 661AI-1

Testing laboratory accreditation number: T297

1.1 Time Schedule

Table 2 Time Schedule

Test No.	1, 2, 3, 4	5
Start of Test:	25 Feb 2025	17 Feb 2025
End of Test:	07 Apr 2025	20 Feb 2025

1.2 Participants

Table 3 Participants

Name	Function	Signature
Kimmo Huuki	Tests no: 1,2,3,4 Setup of EUT	
Juho Purola	Test no 5, Setup of EUT	

2 Equipment Under Test

The EUT is AEHC AirScale MAA 64T64R 192AE n41 320W 2.5GHz.

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.

Table 4 Overview of EUT Configuration

Module Type	**Airscale MAA 64T64R 192AE n41 320W 2.5GHz**	
Radio Access Technology	NR	
Duplex mode	Time Division Duplex (TDD)	
Channel Bandwidth	Single carrier 15MHz (Configuration A), Dual carrier 10MHz+10MHz contiguous spectrum (Configuration B), Dual carrier 40MHz+40MHz non-contiguous spectrum (Configuration C), Dual carrier 100MHz+90MHz non-contiguous spectrum (Configuration D), Triple carrier (40MHz+15MHz) + gap 124MHz +15MHz non-contiguous spectrum (Configuration E) Triple carrier 15MHz+ gap 124MHz + (40MHz+15MHz) non-contiguous spectrum (Configuration F)	
Supply Voltage	48.0 V DC	
Single carrier		
Rated Output Power (Prat)	1.3W (31.1dBm) to 5W (37.0dBm) conducted / carrier	
Dual carrier		
Rated Output Power (Prat)	1.3W (31.1dBm) to 2.5W (34.0dBm) conducted / carrier	
Triple carrier		
Rated Output Power (Prat)	1.65W (32.1dBm) / carrier	
Downlink/Uplink ratio	6/3 to 8/1	
	RX	**TX**
Number of Antenna Ports	64 (ANT1 to ANT64)	64 (ANT1 to ANT64)
MiMo	Yes	Yes

The tests were performed with two EUT at the antenna ports from ANT1 to ANT64.

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

Table 5 Test configurations of EUT

Module Name	**Serial-No.**	**Module Type**	**Configuration**
AHEC	AH231900249	RRH	1,2,3,4
AHEC	AH231900224	RRH	5

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 3.1: 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.

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).

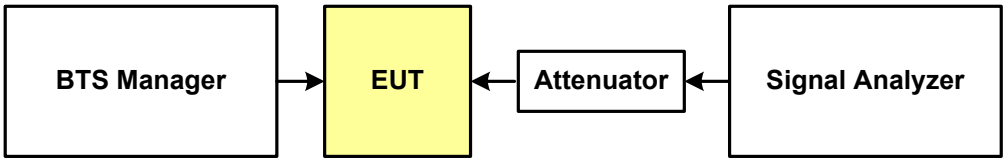


Figure 1 Test Configuration (single output)

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 65 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

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 with 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. Maximum values [dBm] are bolded in the output power tables. The AEHC antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the results) and antenna port 64 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.

Table 6 Temperature and humidity

Measured laboratory room temperature and humidity during tests				
Date	**Temperature Min-Max:**		**Humidity Min-Max:**	
25.02.2025 – 03.04.2025	26.3°C	33.5°C	6.2 RH%	25.5 RH%

Configuration A:

Table 7 Output power for TM1.1 15 MHz signal at bottom channel

Test Model 1.1 Modulation QPSK Channel Frequency 2503.5MHz		Test Model 1.1 Modulation QPSK Channel Frequency 2503.5MHz		Test Model 1.1 Modulation QPSK Channel Frequency 2503.5MHz		Test Model 1.1 Modulation QPSK Channel Frequency 2503.5MHz	
Port	[dBm]	Port	[dBm]	Port	[dBm]	Port	[dBm]
1	31.00	17	30.69	33	30.55	49	30.98
2	30.89	18	30.82	34	30.48	50	30.99
3	30.71	19	30.66	35	30.56	51	31.16
4	30.83	20	30.73	36	30.36	52	30.99
5	30.71	21	30.74	37	30.09	53	31.01
6	30.60	22	30.75	38	30.34	54	30.96
7	30.75	23	30.79	39	30.57	55	31.01
8	30.74	24	30.78	40	30.41	56	31.06
9	30.70	25	30.68	41	30.64	57	31.08
10	30.73	26	30.71	42	30.51	58	31.04
11	30.74	27	30.67	43	30.71	59	31.13
12	30.70	28	30.80	44	30.53	60	30.76
13	30.73	29	30.69	45	30.41	61	31.04
14	30.91	30	30.73	46	30.46	62	31.07
15	30.85	31	30.65	47	30.55	63	31.07
16	30.68	32	30.50	48	30.53	64	**31.17**
Total power	76.13 W						
	48.82 dBm						

Table 8 Output power for TM1.1 15 MHz signal at middle channel

Test Model 1.1 Modulation QPSK Channel Frequency 2592.99MHz		Test Model 1.1 Modulation QPSK Channel Frequency 2592.99MHz		Test Model 1.1 Modulation QPSK Channel Frequency 2592.99MHz		Test Model 1.1 Modulation QPSK Channel Frequency 2592.99MHz	
Port	[dBm]	Port	[dBm]	Port	[dBm]	Port	[dBm]
1	30.86	17	30.76	33	30.56	49	30.96
2	30.79	18	30.75	34	30.47	50	30.99
3	30.70	19	30.65	35	30.59	51	31.15
4	30.76	20	30.68	36	30.37	52	30.99
5	30.70	21	30.77	37	30.11	53	30.95
6	30.54	22	30.77	38	30.43	54	31.01
7	30.65	23	30.79	39	30.37	55	30.96
8	30.58	24	30.65	40	30.43	56	30.97
9	30.66	25	30.70	41	30.49	57	31.12
10	30.61	26	30.72	42	30.48	58	31.07
11	30.74	27	30.75	43	30.71	59	31.10
12	30.71	28	30.85	44	30.37	60	30.81
13	30.71	29	30.67	45	30.41	61	31.12
14	30.70	30	30.66	46	30.39	62	31.05
15	30.78	31	30.63	47	30.42	63	31.02
16	30.53	32	30.52	48	30.51	**64**	**31.21**
Total power	75.60 W						
	48.79 dBm						

Table 9 Output power for TM1.1 15 MHz signal at top channel

Test Model 1.1 Modulation QPSK Channel Frequency 2682.51MHz		Test Model 1.1 Modulation QPSK Channel Frequency 2682.51MHz		Test Model 1.1 Modulation QPSK Channel Frequency 2682.51MHz		Test Model 1.1 Modulation QPSK Channel Frequency 2682.51MHz	
Port	[dBm]	Port	[dBm]	Port	[dBm]	Port	[dBm]
1	30.81	17	30.58	33	30.55	49	30.87
2	30.70	18	30.57	34	30.46	50	30.97
3	30.62	19	30.59	35	30.65	51	31.23
4	30.63	20	30.53	36	30.29	52	31.09
5	30.55	21	30.67	37	30.22	53	31.05
6	30.38	22	30.68	38	30.51	54	30.94
7	30.57	23	30.59	39	30.65	55	31.06
8	30.49	24	30.62	40	30.52	56	31.00
9	30.69	25	30.56	41	30.58	57	31.03
10	30.58	26	30.61	42	30.47	58	31.00
11	30.64	27	30.59	43	30.74	59	31.05
12	30.70	28	30.73	44	30.36	60	30.78
13	30.65	29	30.64	45	30.40	61	31.09
14	30.68	30	30.61	46	30.54	62	31.00
15	30.78	31	30.61	47	30.57	63	31.05
16	30.54	32	30.50	48	30.59	**64**	**31.26**
Total power	75.15 W						
	48.76 dBm						

Table 10 Output power for TM3.2 15M Hz signal at bottom channel

Test Model 3.2 Modulation 16QAM Channel Frequency 2503.5MHz		Test Model 3.2 Modulation 16QAM Channel Frequency 2503.5MHz		Test Model 3.2 Modulation 16QAM Channel Frequency 2503.5MHz		Test Model 3.2 Modulation 16QAM Channel Frequency 2503.5MHz	
Port	[dBm]	Port	[dBm]	Port	[dBm]	Port	[dBm]
1	31.05	17	30.68	33	30.55	49	30.99
2	30.93	18	30.85	34	30.49	50	30.98
3	30.74	19	30.66	35	30.57	51	31.16
4	30.87	20	30.73	36	30.30	52	31.00
5	30.74	21	30.75	37	30.10	53	30.99
6	30.64	22	30.75	38	30.36	54	30.96
7	30.76	23	30.77	39	30.56	55	31.00
8	30.65	24	30.79	40	30.44	56	31.06
9	30.70	25	30.69	41	30.61	57	31.03
10	30.72	26	30.71	42	30.51	58	31.02
11	30.75	27	30.67	43	30.71	59	31.12
12	30.69	28	30.77	44	30.51	60	30.77
13	30.71	29	30.69	45	30.41	61	30.99
14	30.88	30	30.73	46	30.48	62	31.05
15	30.86	31	30.63	47	30.54	63	31.06
16	30.73	32	30.50	48	30.56	**64**	**31.17**
Total power	76.12 W						
	48.81 dBm						

Table 11 Output power for TM3.2 15 MHz signal at middle channel

Test Model 3.2 Modulation 16QAM Channel Frequency 2592.99MHz		Test Model 3.2 Modulation 16QAM Channel Frequency 2592.99MHz		Test Model 3.2 Modulation 16QAM Channel Frequency 2592.99MHz		Test Model 3.2 Modulation 16QAM Channel Frequency 2592.99MHz	
Port	[dBm]	Port	[dBm]	Port	[dBm]	Port	[dBm]
1	30.93	17	30.76	33	30.57	49	30.96
2	30.84	18	30.77	34	30.48	50	31.00
3	30.72	19	30.66	35	30.59	51	31.16
4	30.78	20	30.70	36	30.37	52	31.00
5	30.72	21	30.77	37	30.09	53	30.95
6	30.59	22	30.77	38	30.41	54	31.00
7	30.64	23	30.80	39	30.37	55	30.98
8	30.55	24	30.67	40	30.44	56	30.98
9	30.65	25	30.70	41	30.50	57	31.06
10	30.58	26	30.74	42	30.50	58	31.07
11	30.75	27	30.75	43	30.67	59	31.12
12	30.71	28	30.85	44	30.35	60	30.81
13	30.70	29	30.68	45	30.41	61	31.09
14	30.69	30	30.66	46	30.37	62	31.04
15	30.79	31	30.63	47	30.42	63	31.03
16	30.56	32	30.49	48	30.51	**64**	**31.21**
Total power	75.66 W						
	48.79 dBm						

Table 12 Output power for TM3.2 15 MHz signal at top channel

Test Model 3.2 Modulation 16QAM Channel Frequency 2682.51MHz		Test Model 3.2 Modulation 16QAM Channel Frequency 2682.51MHz		Test Model 3.2 Modulation 16QAM Channel Frequency 2682.51MHz		Test Model 3.2 Modulation 16QAM Channel Frequency 2682.51MHz	
Port	[dBm]	Port	[dBm]	Port	[dBm]	Port	[dBm]
1	30.84	17	30.60	33	30.56	49	30.89
2	30.74	18	30.58	34	30.47	50	30.99
3	30.65	19	30.61	35	30.69	51	31.22
4	30.66	20	30.54	36	30.30	52	31.09
5	30.58	21	30.67	37	30.24	53	31.05
6	30.42	22	30.68	38	30.53	54	31.01
7	30.59	23	30.61	39	30.66	55	31.07
8	30.48	24	30.63	40	30.53	56	31.02
9	30.69	25	30.56	41	30.58	57	30.98
10	30.59	26	30.59	42	30.50	58	31.03
11	30.65	27	30.60	43	30.73	59	31.05
12	30.73	28	30.74	44	30.37	60	30.79
13	30.66	29	30.65	45	30.45	61	31.07
14	30.67	30	30.56	46	30.54	62	30.99
15	30.82	31	30.61	47	30.58	63	31.06
16	30.55	32	30.58	48	30.59	**64**	**31.28**
Total power	75.35 W						
	48.77 dBm						

Table 13 Output power for TM3.1 15 MHz signal at bottom channel.

Test Model 3.1 Modulation 64QAM Channel Frequency 2503.5MHz		Test Model 3.1 Modulation 64QAM Channel Frequency 2503.5MHz		Test Model 3.1 Modulation 64QAM Channel Frequency 2503.5MHz		Test Model 3.1 Modulation 64QAM Channel Frequency 2503.5MHz	
Port	[dBm]	Port	[dBm]	Port	[dBm]	Port	[dBm]
1	30.99	17	30.64	33	30.48	49	30.98
2	30.89	18	30.80	34	30.44	50	30.97
3	30.70	19	30.61	35	30.52	51	31.15
4	30.84	20	30.68	36	30.30	52	30.99
5	30.68	21	30.65	37	30.02	53	31.00
6	30.57	22	30.72	38	30.31	54	30.95
7	30.71	23	30.76	39	30.56	55	31.01
8	30.54	24	30.76	40	30.41	56	31.08
9	30.65	25	30.64	41	30.63	57	31.05
10	30.67	26	30.64	42	30.50	58	31.02
11	30.71	27	30.63	43	30.67	59	31.12
12	30.66	28	30.71	44	30.61	60	30.76
13	30.68	29	30.64	45	30.36	61	30.95
14	30.85	30	30.66	46	30.45	62	31.02
15	30.82	31	30.54	47	30.53	63	31.03
16	30.66	32	30.47	48	30.54	64	**31.15**
Total power	75.55 W						
	48.78 dBm						

Table 14 Output power for TM3.1 15 MHz signal at middle channel

Test Model 3.1 Modulation 64QAM Channel Frequency 2592.99MHz		Test Model 3.1 Modulation 64QAM Channel Frequency 2592.99MHz		Test Model 3.1 Modulation 64QAM Channel Frequency 2592.99MHz		Test Model 3.1 Modulation 64QAM Channel Frequency 2592.99MHz	
Port	[dBm]	Port	[dBm]	Port	[dBm]	Port	[dBm]
1	30.88	17	30.71	33	30.52	49	30.95
2	30.80	18	30.75	34	30.46	50	30.97
3	30.68	19	30.63	35	30.54	51	31.14
4	30.74	20	30.65	36	30.33	52	30.97
5	30.67	21	30.72	37	30.08	53	30.92
6	30.54	22	30.71	38	30.41	54	30.99
7	30.61	23	30.78	39	30.34	55	30.98
8	30.42	24	30.65	40	30.43	56	30.98
9	30.61	25	30.67	41	30.48	57	31.07
10	30.58	26	30.68	42	30.48	58	31.05
11	30.70	27	30.71	43	30.63	59	31.10
12	30.67	28	30.79	44	30.53	60	30.80
13	30.66	29	30.60	45	30.39	61	31.02
14	30.65	30	30.61	46	30.37	62	30.98
15	30.75	31	30.56	47	30.40	63	30.98
16	30.51	32	30.46	48	30.46	**64**	**31.17**
Total power	75.10 W						
	48.76 dBm						

Table 15 Output power for TM3.1 15 MHz signal at top channel

Test Model 3.1 Modulation 64QAM Channel Frequency 2682.51MHz		Test Model 3.1 Modulation 64QAM Channel Frequency 2682.51MHz		Test Model 3.1 Modulation 64QAM Channel Frequency 2682.51MHz		Test Model 3.1 Modulation 64QAM Channel Frequency 2682.51MHz	
Port	[dBm]	Port	[dBm]	Port	[dBm]	Port	[dBm]
1	30.76	17	30.55	33	30.50	49	30.87
2	30.70	18	30.54	34	30.40	50	30.96
3	30.61	19	30.53	35	30.62	51	31.20
4	30.62	20	30.46	36	30.26	52	31.05
5	30.52	21	30.61	37	30.18	53	31.03
6	30.37	22	30.64	38	30.49	54	30.98
7	30.53	23	30.53	39	30.62	55	31.07
8	30.33	24	30.59	40	30.50	56	31.01
9	30.65	25	30.51	41	30.57	57	30.99
10	30.55	26	30.56	42	30.45	58	30.99
11	30.58	27	30.51	43	30.67	59	31.01
12	30.66	28	30.68	44	30.62	60	30.77
13	30.61	29	30.58	45	30.37	61	30.97
14	30.64	30	30.53	46	30.54	62	30.94
15	30.75	31	30.56	47	30.57	63	31.02
16	30.50	32	30.49	48	30.59	64	31.23
Total power	74.63 W						
	48.73 dBm						

Table 16 Output power for TM3.1A 15 MHz signal at bottom channel.

Test Model 3.1A Modulation 256QAM Channel Frequency 2503.5MHz		Test Model 3.1A Modulation 256QAM Channel Frequency 2503.5MHz		Test Model 3.1A Modulation 256QAM Channel Frequency 2503.5MHz		Test Model 3.1A Modulation 256QAM Channel Frequency 2503.5MHz	
Port	[dBm]	Port	[dBm]	Port	[dBm]	Port	[dBm]
1	30.95	17	30.64	33	30.53	49	30.99
2	30.85	18	30.78	34	30.46	50	30.98
3	30.69	19	30.59	35	30.54	**51**	**31.17**
4	30.80	20	30.67	36	30.30	52	31.00
5	30.67	21	30.68	37	30.03	53	30.98
6	30.60	22	30.71	38	30.35	54	30.94
7	30.64	23	30.72	39	30.54	55	31.00
8	30.52	24	30.73	40	30.42	56	31.06
9	30.66	25	30.64	41	30.61	57	31.04
10	30.68	26	30.69	42	30.52	58	31.00
11	30.70	27	30.63	43	30.66	59	31.12
12	30.65	28	30.74	44	30.49	60	30.75
13	30.67	29	30.65	45	30.42	61	30.97
14	30.86	30	30.69	46	30.47	62	30.99
15	30.77	31	30.61	47	30.53	63	31.04
16	30.66	32	30.47	48	30.56	64	31.14
Total power	75.51 W						
	48.78 dBm						

Table 17 Output power for TM3.1A 15 MHz signal at middle channel

Test Model 3.1A Modulation 256QAM Channel Frequency 2592.99MHz		Test Model 3.1A Modulation 256QAM Channel Frequency 2592.99MHz		Test Model 3.1A Modulation 256QAM Channel Frequency 2592.99MHz		Test Model 3.1A Modulation 256QAM Channel Frequency 2592.99MHz	
Port	[dBm]	Port	[dBm]	Port	[dBm]	Port	[dBm]
1	30.83	17	30.69	33	30.53	49	30.96
2	30.78	18	30.71	34	30.45	50	30.98
3	30.68	19	30.60	35	30.56	51	31.14
4	30.74	20	30.64	36	30.34	52	30.98
5	30.68	21	30.72	37	30.07	53	30.92
6	30.55	22	30.70	38	30.43	54	31.00
7	30.54	23	30.75	39	30.34	55	30.96
8	30.35	24	30.62	40	30.41	56	30.97
9	30.64	25	30.68	41	30.49	57	31.06
10	30.56	26	30.70	42	30.50	58	31.05
11	30.70	27	30.72	43	30.62	59	31.08
12	30.66	28	30.83	44	30.35	60	30.76
13	30.64	29	30.64	45	30.42	61	31.01
14	30.64	30	30.63	46	30.42	62	31.00
15	30.73	31	30.60	47	30.39	63	30.98
16	30.50	32	30.48	48	30.49	64	31.16
Total power	75.01 W						
	48.75 dBm						

Table 18 Output power for TM3.1A 15 MHz signal at top channel

Test Model 3.1A Modulation 256QAM Channel Frequency 2682.51MHz		Test Model 3.1A Modulation 256QAM Channel Frequency 2682.51MHz		Test Model 3.1A Modulation 256QAM Channel Frequency 2682.51MHz		Test Model 3.1A Modulation 256QAM Channel Frequency 2682.51MHz	
Port	[dBm]	Port	[dBm]	Port	[dBm]	Port	[dBm]
1	30.76	17	30.52	33	30.52	49	30.89
2	30.66	18	30.52	34	30.44	50	30.98
3	30.58	19	30.53	35	30.64	51	31.20
4	30.60	20	30.47	36	30.25	52	31.07
5	30.52	21	30.60	37	30.20	53	31.03
6	30.38	22	30.66	38	30.51	54	30.96
7	30.46	23	30.56	39	30.64	55	31.04
8	30.18	24	30.59	40	30.51	56	31.00
9	30.64	25	30.51	41	30.60	57	30.95
10	30.53	26	30.58	42	30.47	58	30.98
11	30.58	27	30.55	43	30.68	59	31.01
12	30.65	28	30.69	44	30.38	60	30.76
13	30.57	29	30.61	45	30.41	61	30.99
14	30.62	30	30.56	46	30.53	62	30.96
15	30.69	31	30.58	47	30.56	63	31.01
16	30.49	32	30.54	48	30.61	**64**	**31.20**
Total power	74.53 W						
	48.72 dBm						

Configuration B:

Table 19 Output power for 2x10 MHz carriers contiguous

Test Model 1.1 Modulation QPSK Channel Frequency 2501.01&2511MHz				Test Model 1.1 Modulation QPSK Channel Frequency 2588.01&2598MHz				Test Model 1.1 Modulation QPSK Channel Frequency 2675.01&2685MHz			
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
64	31.08	64	31.45	64	31.37	64	31.12	64	31.50	64	31.20
Test Model 3.2 Modulation 16QAM Channel Frequency 2501.01&2511MHz				Test Model 3.2 Modulation 16QAM Channel Frequency 2588.01&2598MHz				Test Model 3.2 Modulation 16QAM Channel Frequency 2675.01&2685MHz			
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
64	31.05	64	31.40	64	31.40	64	31.11	64	31.50	64	31.19
Test Model 3.1 Modulation 64QAM Channel Frequency 2501.01&2511MHz				Test Model 3.1 Modulation 64QAM Channel Frequency 2588.01&2598MHz				Test Model 3.1 Modulation 64QAM Channel Frequency 2675.01&2685MHz			
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
64	31.06	64	31.43	64	31.37	64	31.14	64	31.49	64	31.20
Test Model 3.1A Modulation 256QAM Channel Frequency 2501.01&2511MHz				Test Model 3.1A Modulation 256QAM Channel Frequency 2588.01&2598MHz				Test Model 3.1A Modulation 256QAM Channel Frequency 2675.01&2685MHz			
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
64	31.09	64	31.42	64	31.39	64	31.14	64	31.52	64	31.20

Configuration C:

Table 20 Output power for 40+40 MHz carriers non-contiguous

Test Model 1.1 Modulation QPSK Channel Frequency 2516.01&2670MHz			
Tx Port	(dBm)	Tx Port	(dBm)
64	34.44	64	34.18
Test Model 3.2 Modulation 16QAM Channel Frequency 2516.01&2670MHz			
Tx Port	(dBm)	Tx Port	(dBm)
64	34.39	64	34.09
Test Model 3.1 Modulation 64QAM Channel Frequency 2516.01&2670MHz			
Tx Port	(dBm)	Tx Port	(dBm)
64	34.41	64	34.10
Test Model 3.1A Modulation 256QAM Channel Frequency 2516.01&2670MHz			
Tx Port	(dBm)	Tx Port	(dBm)
64	34.43	64	34.11

Configuration D:

Table 21 Output power for 100+90 MHz carriers non-contiguous

Test Model 1.1 Modulation QPSK Channel Frequency 2546.01&2645.01MHz			
Tx Port	(dBm)	Tx Port	(dBm)
64	34.34	64	34.07
Test Model 3.2 Modulation 16QAM Channel Frequency 2546.01&2645.01MHz			
Tx Port	(dBm)	Tx Port	(dBm)
64	34.38	64	34.05
Test Model 3.1 Modulation 64QAM Channel Frequency 2546.01&2645.01MHz			
Tx Port	(dBm)	Tx Port	(dBm)
64	34.34	64	34.05
Test Model 3.1A Modulation 256QAM Channel Frequency 2546.01&2645.01MHz			
Tx Port	(dBm)	Tx Port	(dBm)
64	34.32	64	34.05

Configuration E:

Table 22 Output power for 40MHz+15MHz gap 124MHz + 15MHz non-contiguous

Test Model 1.1 Modulation QPSK Channel Frequency 2516.01&2543.49&2582.51MHz					
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
64	34.28	64	31.78	64	30.75
Test Model 3.2 Modulation 16QAM Channel Frequency 2516.01&2543.49&2582.51MHz					
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
64	34.26	64	31.78	64	30.76
Test Model 3.1 Modulation 64QAM Channel Frequency 2516.01&2543.49&2582.51MHz					
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
64	34.30	64	31.77	64	30.72
Test Model 3.1A Modulation 256QAM Channel Frequency 2516.01&2543.49&2582.51MHz					
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
64	34.30	64	31.78	64	30.74

Configuration F:

Table 23 Output power for 15MHz gap 124MHz + 15+40MHz non-contiguous

Test Model 1.1 Modulation QPSK Channel Frequency 2503.5&2642.49&2670MHz					
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
64	31.16	64	31.46	64	34.02
Test Model 3.2 Modulation 16QAM Channel Frequency 2503.5&2642.49&2670MHz					
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
64	31.20	64	31.52	64	34.08
Test Model 3.1 Modulation 64QAM Channel Frequency 2503.5&2642.49&2670MHz					
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
64	31.15	64	31.45	64	34.07
Test Model 3.1A Modulation 256QAM Channel Frequency 2503.5&2642.49&2670MHz					
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
64	31.14	64	31.48	64	34.06

Configuration A:

Table 24 Peak to average power (15 MHz channel bandwidth)

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 2503.5MHz		Channel Frequency 2503.5MHz		Channel Frequency 2503.5MHz		Channel Frequency 2503.5MHz	
Port	CCDF 0.1%	Port	CCDF 0.1%	Port	CCDF 0.1%	Port	CCDF 0.1%
64	7.4	64	7.38	64	7.44	64	7.40
Channel Frequency 2592.99MHz		Channel Frequency 2592.99MHz		Channel Frequency 2592.99MHz		Channel Frequency 2592.99MHz	
Port	CCDF 0.1%	Port	CCDF 0.1%	Port	CCDF 0.1%	Port	CCDF 0.1%
64	7.28	64	7.30	64	7.36	64	7.34
Channel Frequency 2682.51MHz		Channel Frequency 2682.51MHz		Channel Frequency 2682.51MHz		Channel Frequency 2682.51MHz	
Port	CCDF 0.1%	Port	CCDF 0.1%	Port	CCDF 0.1%	Port	CCDF 0.1%
64	7.4	64	7.36	64	7.42	64	7.40

Pak to Average Power was found to be compliant with the manufacturer's specifications and with all requirements of the of FCC rules.

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

Sample of digital modulation screenshots are on page 50, in I/Q constellation diagrams and tables, showing QPSK, 16QAM, 64QAM and 256QAM –modulation generation.

No further testing is required under this section in FCC rules.

4.3 Test No. 3: Occupied Bandwidth (§ 2.1049)

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 power 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 1-5% of bandwidth; see screenshots on page 54 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 1-5% of bandwidth; see screenshots strating on page 54 for details.

Table 25 Temperature and humidity during the tests

Measured laboratory room temperature and humidity during the tests				
Date	Temperature Min-Max:		Humidity Min-Max:	
14.3.2025 – 1.4.2025	23.6°C	29.2°C	6.6 RH%	25.5 RH%

Configuration A:

Table 25 Occupied Bandwidth (15 MHz channel bandwidth)

Test Model 1.1 Modulation QPSK Channel Frequency 2503.5MHz			Test Model 3.2 Modulation 16QAM Channel Frequency 2503.5MHz			Test Model 3.1 Modulation 64QAM Channel Frequency 2503.5MHz			Test Model 3.1A Modulation 256QAM Channel Frequency 2503.5MHz		
Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)
64	13.62	14.70	64	13.55	14.53	64	13.61	14.60	64	13.64	14.64
Test Model 1.1 Modulation QPSK Channel Frequency 2592.99MHz			Test Model 3.2 Modulation 16QAM Channel Frequency 2592.99MHz			Test Model 3.1 Modulation 64QAM Channel Frequency 2592.99MHz			Test Model 3.1A Modulation 256QAM Channel Frequency 2592.99MHz		
Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)
64	13.64	14.67	64	13.54	14.54	64	13.62	14.66	64	13.63	14.64
Test Model 1.1 Modulation QPSK Channel Frequency 2682.51MHz			Test Model 3.2 Modulation 16QAM Channel Frequency 2682.51MHz			Test Model 3.1 Modulation 64QAM Channel Frequency 2682.51MHz			Test Model 3.1A Modulation 256QAM Channel Frequency 2682.51MHz		
Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)
64	13.64	14.66	64	13.53	14.55	64	13.62	14.67	64	13.63	14.63

Configuration B:

Table 26 Occupied Bandwidth (2x10 MHz Channel bandwidth) contiguous

Test Model 1.1 Modulation QPSK Channel Frequency 2501.0/2511MHz			Test Model 3.2 Modulation 16QAM Channel Frequency 2501.01/2511MHz			Test Model 3.1 Modulation 64QAM Channel Frequency 2501.01/2511MHz			Test Model 3.1A Modulation 256QAM Channel Frequency 2501.01/2511MHz		
Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)
64	18.52	19.92	64	18.43	19.75	64	18.52	19.78	64	18.53	19.81
Test Model 1.1 Modulation QPSK Channel Frequency 2588.01/ 2598MHz			Test Model 3.2 Modulation 16QAM Channel Frequency 2588.01/ 2598MHz			Test Model 3.1 Modulation 64QAM Channel Frequency 2588.01/ 2598MHz			Test Model 3.1A Modulation 256QAM Channel Frequency 2588.01/ 2598MHz		
Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)
64	18.52	19.92	64	18.43	19.74	64	18.52	19.80	64	18.53	19..81
Test Model 1.1 Modulation QPSK Channel Frequency 2675.01/2685MHz			Test Model 3.2 Modulation 16QAM Channel Frequency 2675.01/2685MHz			Test Model 3.1 Modulation 64QAM Channel Frequency 2675.01/2685MHz			Test Model 3.1A Modulation 256QAM Channel Frequency 2675.01/2685MHz		
Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)
64	18.51	19.89	64	18.41	19.74	64	18.50	19.77	64	18.52	19.80

Configuration C

Table 27 Occupied Bandwidth (2x40 MHz Channel bandwidth) non contiguous

Test Model 1.1 Modulation QPSK Channel Frequency 2516.01			Test Model 3.2 Modulation 16QAM Channel Frequency 2516.01			Test Model 3.1 Modulation 64QAM Channel Frequency 2516.01			Test Model 3.1A Modulation 256QAM Channel Frequency 2516.01		
Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)
64	37.96	40.48	64	38.12	40.39	64	38.04	40.45	64	38.02	40.53
Test Model 1.1 Modulation QPSK Channel Frequency 2670MHz			Test Model 3.2 Modulation 16QAM Channel Frequency 2670MHz			Test Model 3.1 Modulation 64QAM Channel Frequency 2670MHz			Test Model 3.1A Modulation 256QAM Channel Frequency 2670MHz		
Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)	Port	99 % (MHz)	26dBm (MHz)
64	38.00	40.53	64	38.12	40.29	64	37.98	40.35	64	38.01	40.47

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: Transmitter Unwanted Emissions (§2.1051, §27.53)

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 64 TX antenna connectors, one antenna connector was measured individually and the individual limit lime was reduced by 10log(64). Limit line was calculated to show -31.06 dBm emission limit, according to FCC KDB 662911 D01 and ANSI C6326-2015 guidance.

The AEHC 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 64 was selected for the remaining testing based on ANSI C63.26-2015 clauses 5.2.5.3, 5.7.2i and 6.4.

4.4.1 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.

In the spurious emission measurements (except measurements at band edges) for single carrier operations, carriers in all bands with same channel bandwidth and modulation type were enabled simultaneously to maximize the port power.

The following tables summarize the worst case detected emission levels (see screenshots starting on page 56 for details). The external attenuation (connection loss of the set up) is already added in the results.

Table 28 Temperature and humidity during the tests

Measured laboratory room temperature and humidity during the tests				
Date	Temperature Min-Max:		Humidity Min-Max:	
10.3.2025 – 18.3.2024	23.8 °C	30.2°C	6.2 RH%	18.4 RH%

Configuration A Lower band edge:

Table 28 CH BW 15MHz, TM1.1 at port 64

Carrier Frequency: 2503.5MHz					
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Margin [dB]**	**Result**
QPSK-Modulation TX port 64					
2495 - 2496	2595.99	-34.02	-31.06	2.96	Pass
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			

Configuration A Upper band edge:

Table 29 CH BW 15MHz, TM1.1 at port 64

Carrier Frequency: 2682.51MHz					
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Margin [dB]**	**Result**
QPSK-Modulation TX port 64					
2690 - 2691	2690	-33.52	-31.06	2.46	Pass
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			

Configuration B Lower band edge:

Table 30 CH BW 2x10MHz, TM3.1 at port 64

Carrier Frequency: 2501.01/2511MHz					
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Margin [dB]**	**Result**
64QAM-Modulation TX port 64					
2495 – 2495.9	2495.89	-32.29	-31.06	1.23	Pass
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			

Configuration B Upper band edge:

Table 31 CH BW 2x10MHz, TM1.1 at port 64

Carrier Frequency: 2675.01/2685MHz					
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Margin [dB]**	**Result**
QPSK-Modulation TX port 64					
2690.1 - 2691	2690.1	-31.50	-31.06	0.44	Pass
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			

Configuration D Lower band edge:

Table 32 CH BW 100+90MHz, TM3.2 at port 64

Carrier Frequency: 2546.01/2645.01MHz					
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Margin [dB]**	**Result**
16QAM-Modulation TX port 64					
2495-2496	2496	-32.64	-31.06	1.58	Pass
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			

Configuration D Upper band edge:

Table 33 CH BW 100+90MHz, TM3.1 at port 64

Carrier Frequency: 2546.01/2645.01MHz					
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Margin [dB]**	**Result**
64QAM-Modulation TX port 64					
2690-2691	2690	-31.97	-31.06	0.91	Pass
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			

Configuration E: Lower band edge:

Table 34 (40 + 15)+15 MHz (non - contiguous), TM3.2 at port 64

Carrier Frequency: 2516.01/2543.49/ 2682.51MHz					
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Margin [dB]**	**Result**
16QAM-Modulation TX port 64					
2495-2496	2496	-31.54	-31.06	0.48	Pass
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			

Configuration E: Upper band edge

Table 35 (40 + 15)+15 MHz (non - contiguous), TM3.2 at port 64

Carrier Frequency: 2516.01/2543.49/2682.51MHz					
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Margin [dB]**	**Result**
16QAM-Modulation TX port 64					
2690-2691	2690	-33.00	-31.06	1.94	Pass
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			

Configuration F: Lower band edge:

Table 36 15+(15+40) MHz (non - contiguous), TM1.1 at port 64

Carrier Frequency: 2503.5/2642.49/2670MHz					
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Margin [dB]**	**Result**
QPSK-Modulation TX port 64					
2495-2496	2496	-31.90	-31.06	0.84	Pass
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			

Configuration F: Upper band edge

Table 37 15+(15+40) MHz (non - contiguous), TM3.2 at port 64

Carrier Frequency: 2503.5/2642.49/2670MHz					
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Limit [dBm]**	**Margin [dB]**	**Result**
16QAM-Modulation TX port 64					
2690-2691	2690	-31.83	-31.06	0.77	Pass
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			

Configuration A: Spurious emissions

Table 38 15 MHz, TM1.1 at port 64

Channel frequency [MHz]	**Frequency range start**	**Frequency range stop**	**Maximum Emission frequency [MHz]**	**Max emisson level [dBm]**	**Limit [dBm]**	**Margin [dB]**	**Compliance**
2592.99	0.009	27000	26363.08	-36.92	-31.06	5.86	Passed
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					

Configuration B: Spurious emissions

Table 39 2x10 MHz, TM3.2 at port 64

Channel frequency [MHz]	Frequency range start	Frequency range stop	Maximum Emission frequency [MHz]	Max emisson level [dBm]	Limit [dBm]	Margin [dB]	Compliance
2588.01/ 2598	0.009	27000	5915.80	-34.29	-31.06	3.23	Passed
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						

Configuration D: Spurious emissions

Table 40 100+90MHz, TM3.2 at port 64

Channel frequency [MHz]	Frequency range start	Frequency range stop	Maximum Emission frequency [MHz]	Max emisson level [dBm]	Limit [dBm]	Margin [dB]	Compliance
2546.01/ 2645.01	0.009	27000	2862.52	-34.78	-31.06	3.72	Passed
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						

Configuration E: Spurious emissions

Table 41 (40 + 15)+15 MHz (non - contiguous), TM1.1 at port 64

Channel frequency [MHz]	Frequency range start	Frequency range stop	Maximum Emission frequency [MHz]	Max emisson level [dBm]	Limit [dBm]	Margin [dB]	Compliance
2516.01/ 2543.49/ 2682.51	0.009	27000	2853.86	-34.81	-31.06	3.75	Passed
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						

Configuration F: Spurious emissions

Table 42 15+(15+40) MHz (non - contiguous), TM3.2 at port 64

Channel frequency [MHz]	Frequency range start	Frequency range stop	Maximum Emission frequency [MHz]	Max emisson level [dBm]	Limit [dBm]	Margin [dB]	Compliance
2503.5/ 2642.49/ 2670	0.009	27000	5914.91	-36.00	-31.06	4.94	Passed
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					

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

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.

4.5.1 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)

4.5.2 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 – 10th harmonic	54.0	54.0	1000	Average

Table 43 Radiated Emission Limits

4.5.1 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:	
17.02.2025 – 20.02.2025	21.3 °C	22.8 °C	8.6 RH%	14.0 RH%
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**		**Result**
30 - 26900	13452.550800	-42.01 dBm		compliant
Measurement Uncertainty:				±5.33 dB

Table 44 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.

5 Test Data and Screenshots

5.1 Part List of the RF Measurement Test Equipment

Table 55 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 FSW43	104599	12/2024	12/2025	1,2,3,4
2	Multimeter	Fluke 83	9922073A046	12/2024	12/2025	1,2,3,4
3	Network Analyzer	Rohde & Schwarz ZVL-13	101177	12/2024	12/2025	1,2,3,4
4	Vector Network Analyzer	Rohde&Schwarz, ZVA-40	100146	12/2024	12/2025	1,2,3,4
5	Calibration Unit	Rohde&Schwarz, ZV-Z54	100125	07/2024	07/2025	1,2,3,4
6	Humidity &temperature indicator	Vaisala HMP110	M2710515	07/2024	07/2025	1,2,3,4
7	Pressure, Humidity and Temperature Probe	Vaisala HMP3	W2512009	06/2024	06/2025	1,2,3,4
8	High Pass Filter	Lambda RHPF23G06G40	21052000014	cnn	-	4
9	TX SSU	Orbis 64x4 solid state Blocking Switch matrix	SSU-1939-3823	cnn	-	1,2,3,4
10	DC Power Supply	Elektro-Automatik PSI 8080-510	2057220001	cnn	-	1,2,3,4
11	Attenuator	SHX DTS100G-20dB-24G	14111101	cnn	-	4
12	EMI Test Receiver	R&S	103055	06/2024	06/2025	5
13	EMI Test Receiver	R&S	103455	11/2024	11/2025	5
14	Bilog Antenna	Schaffner Chase	2003	08/2024	08/2025	5
15	Horn Antenna	ETS-Lindgren	69381	08/2024	08/2025	5
16	Horn Antenna	ETS-Lindgren	206990	08/2024	08/2025	5
17	4-meter mast	Maturo	123/21250317	cnr	cnr	5
18	Mast Controller	Maturo	21250317	cnr	cnr	5
19	Humidity and temperature meter	Vaisala	T0841033	12/2024	12/2025	5
20	Combined Pressure,	Vaisala	R1250933	11/2024	11/2025	5

	Humidity and Temperature Transmitter					
21	Anechoic Chamber	Comtest	1711-200-216453	10/2022	10/2025	5
22	Band stop filter	Creowave Filters	2337001	cnr	cnr	5
23	High pass filter	Creowave Filters	2513001	cnr	cnr	5

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

Configuration A Transmitter Output power 15MHz BW

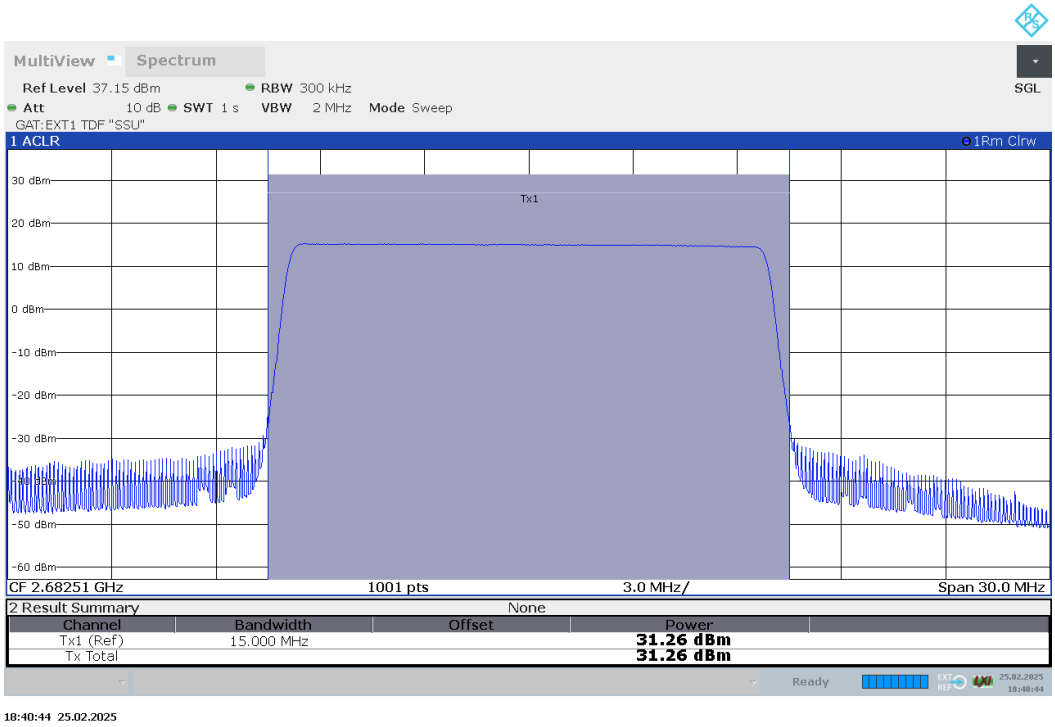


Figure 2 Test Model 1.1, Modulation QPSK, Channel Frequency 2682.51MHz, port 64

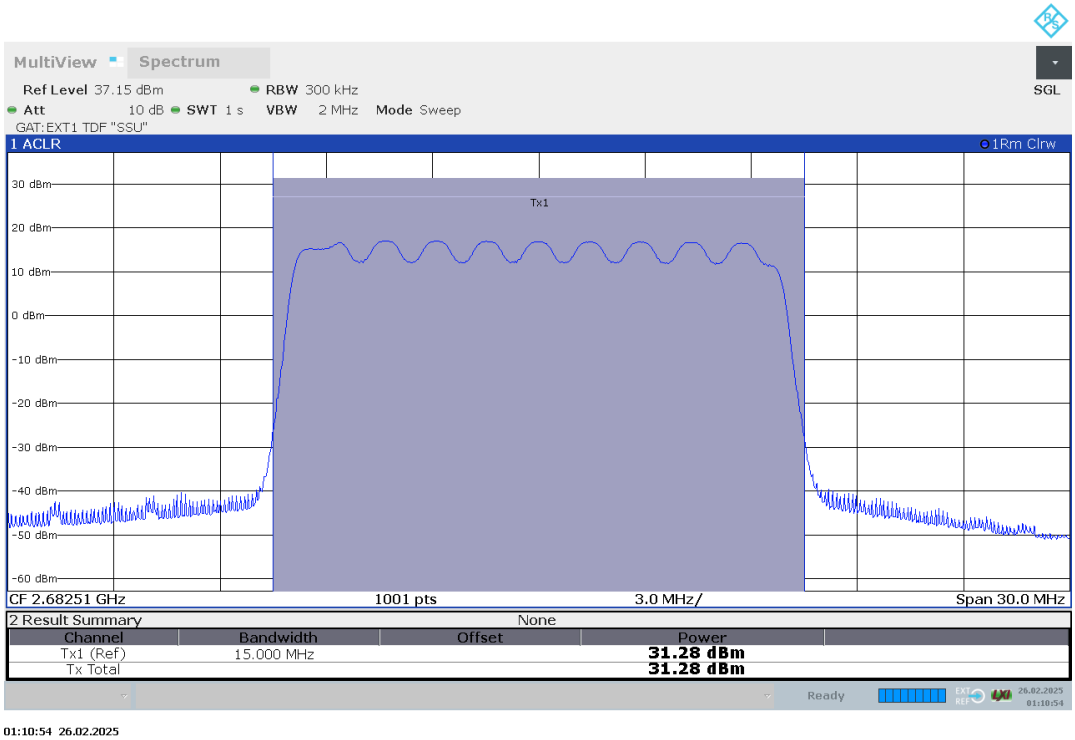


Figure 3 Test Model 3.2, Modulation 16QAM, Channel Frequency 2682.51MHz, port 64

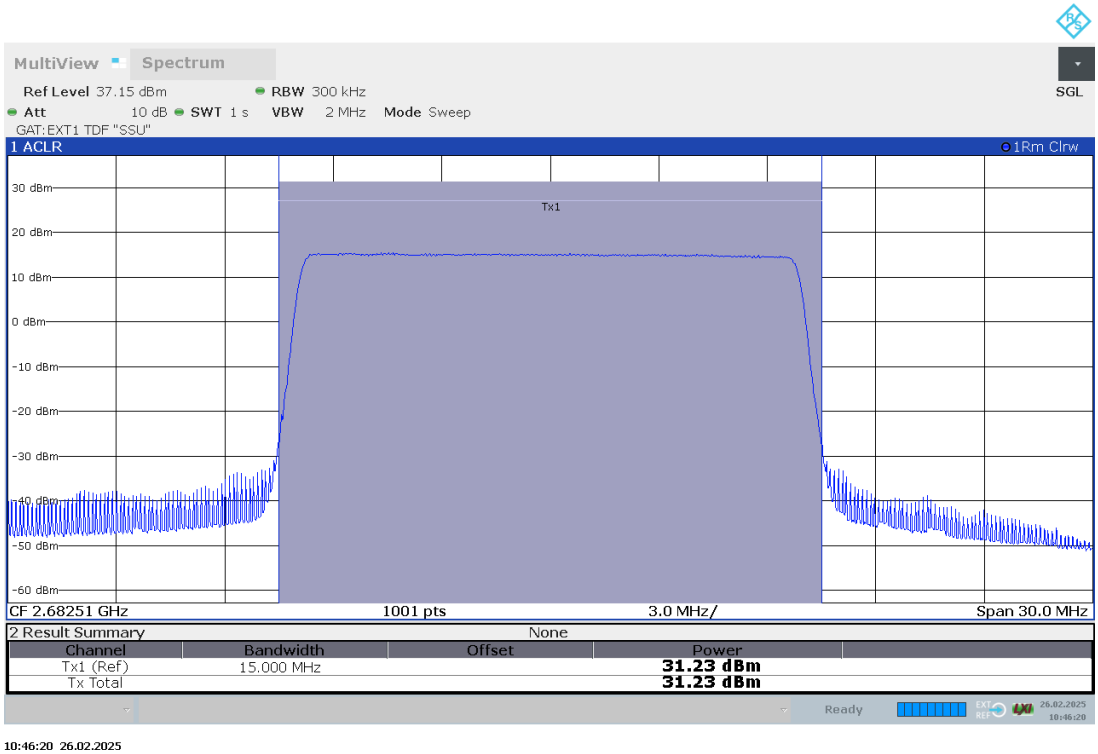


Figure 4 Test Model 3.1, Modulation 64QAM, Channel Frequency 2682.51MHz, port 64

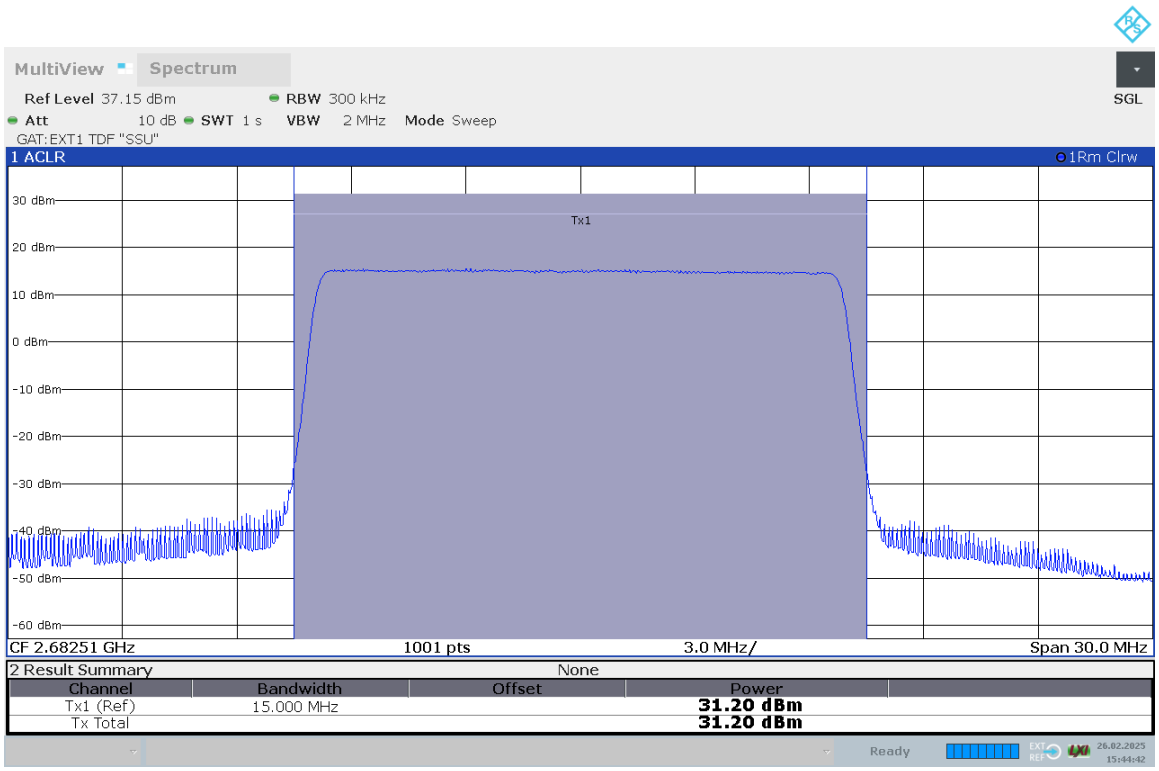


Figure 5 Test Model 3.1A, Modulation 256QAM, Channel Frequency 2682.51MHz, port 64

Configuration A: Peak-to-Average Power Ratio (PAPR) 15MHz BW

Figure 6 Test Model 1.1, Modulation QPSK, Channel Frequency 2503.5MHz, Port64

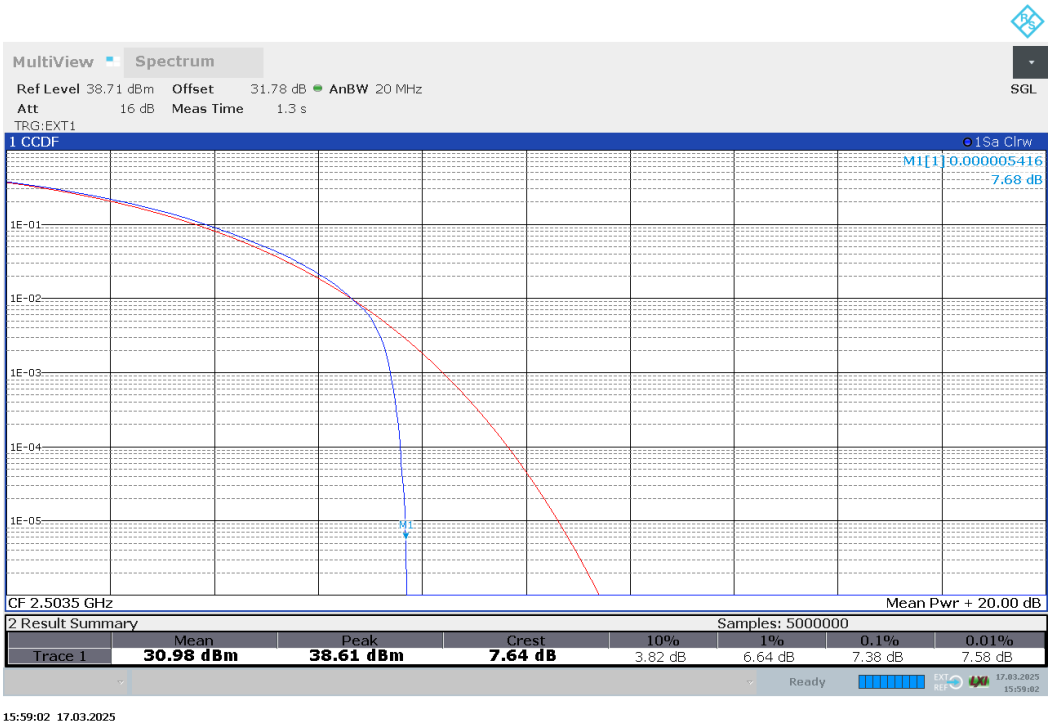


Figure 7 Test Model 3.2, Modulation 16QAM, Channel Frequency 2503.5MHz, Port64

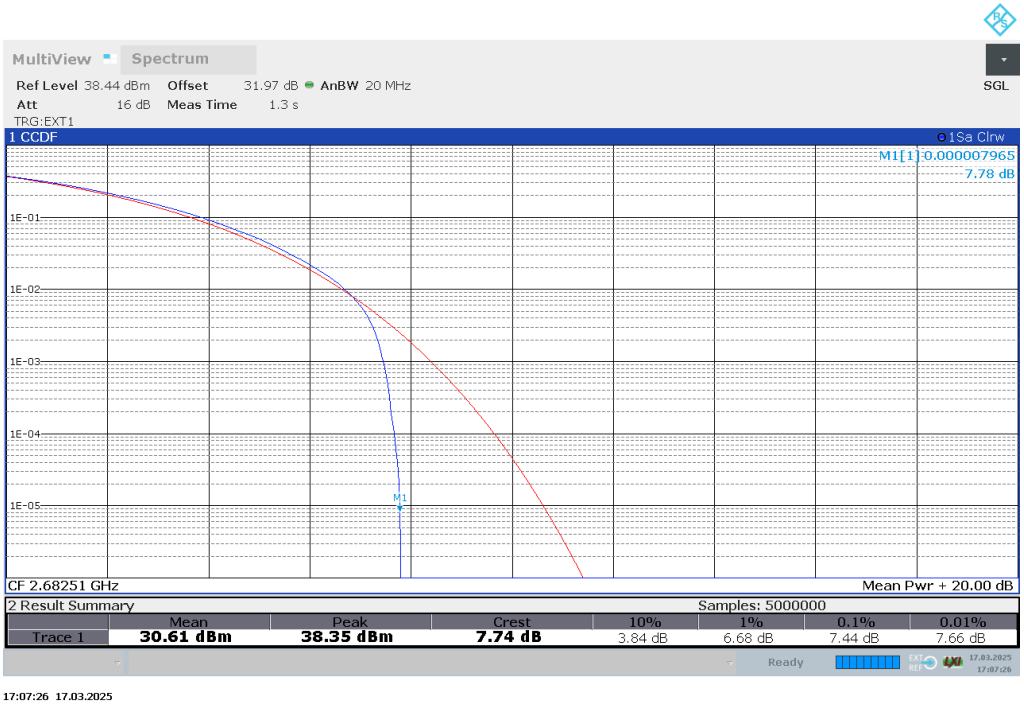


Figure 8 Test Model 3.1, Modulation 64QAM, Channel Frequency 2503.5MHz, Port64

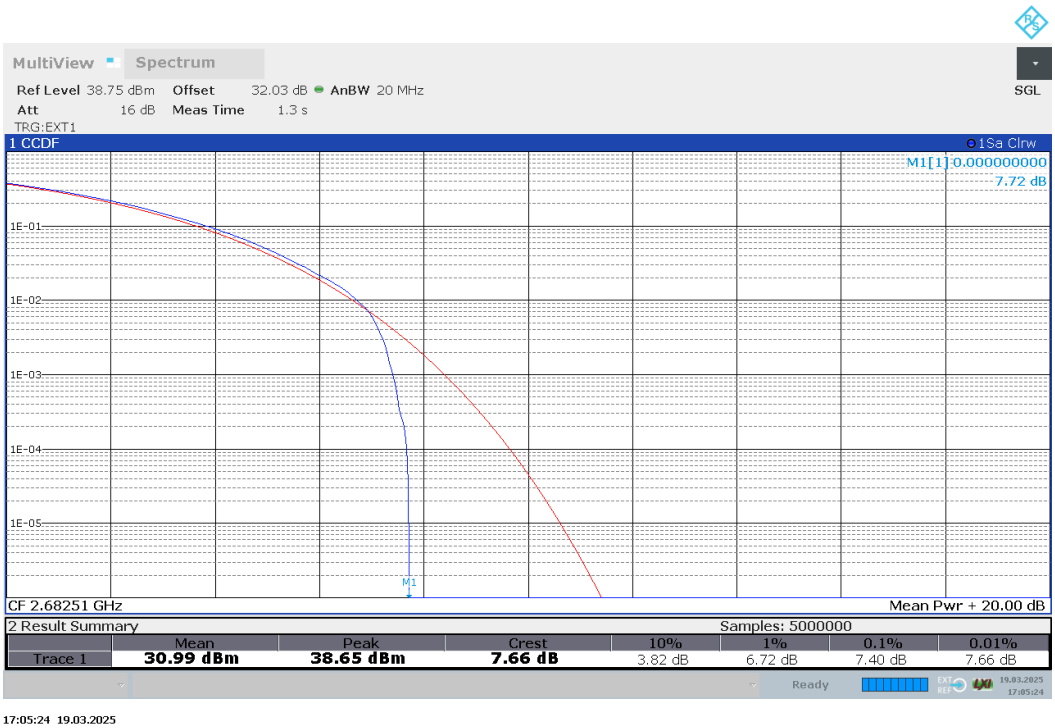


Figure 9 Test Model 3.1A, Modulation 256QAM, Channel Frequency2682.51MHz, Port64

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 54.

Screenshots from antenna port 64 below shows information about the modulations I/Q constellation form and modulation information table, displaying error to ideal modulation symbols.

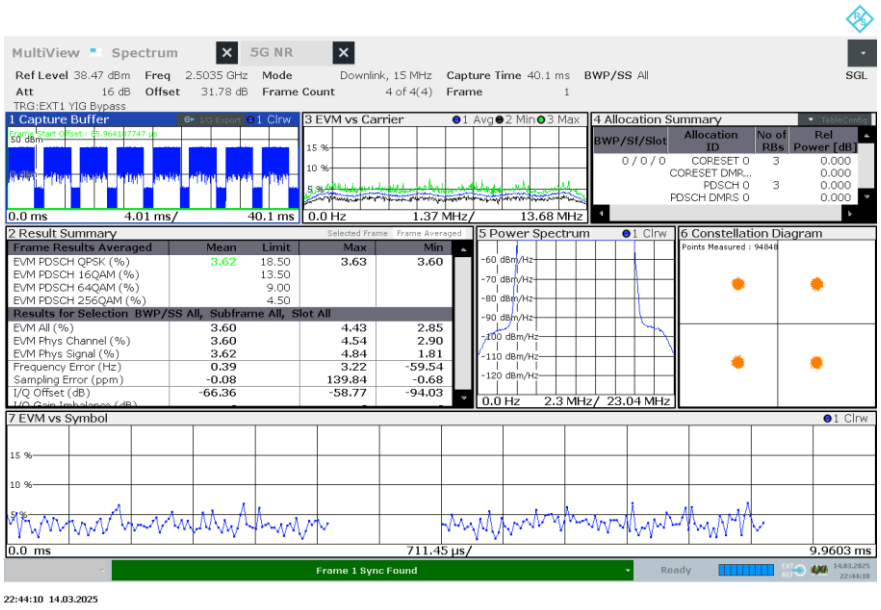


Figure 10 I/Q constellation diagram with capture buffer – QPSK (2503.5MHz) (15MHz Channel BW)

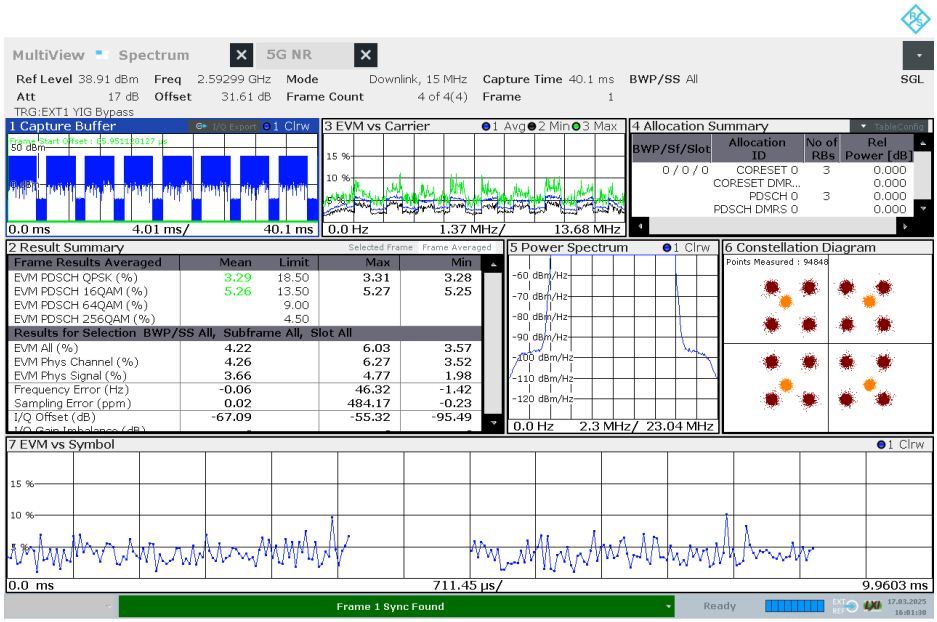


Figure 11 I/Q constellation diagram with capture buffer – 16QAM (2592.99MHz) (15MHz Channel BW)

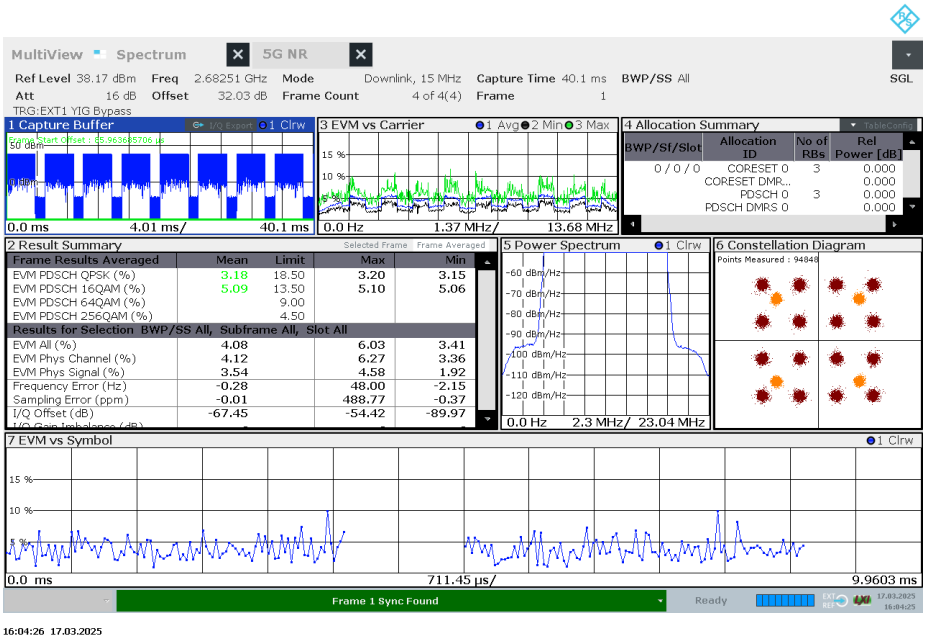


Figure 12 I/Q constellation diagram with capture buffer – 64QAM (2682.51MHz) (15MHz Channel BW)

Figure 13 I/Q constellation diagram with capture buffer – 256QAM (2592.99MHz) (15MHz Channel BW)

5.2.3 Test No. 3: Occupied Bandwidth

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

Configuration A: Occupied Bandwidth 99% 15MHz BW

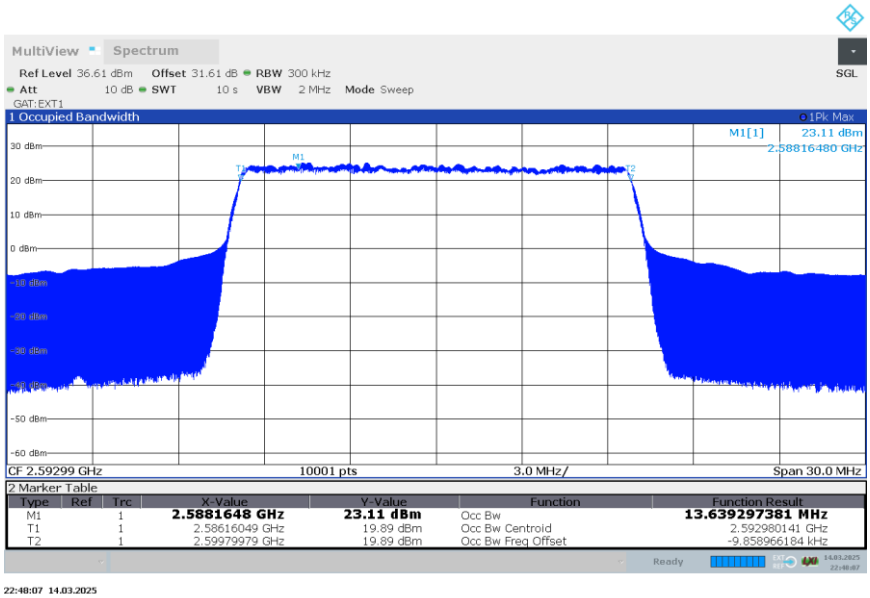


Figure 14 Test Model 1.1, Modulation QPSK, Channel Frequency 2592.99MHz, Port64

Configuration A: Occupied Bandwidth -26dBm 15MHz BW

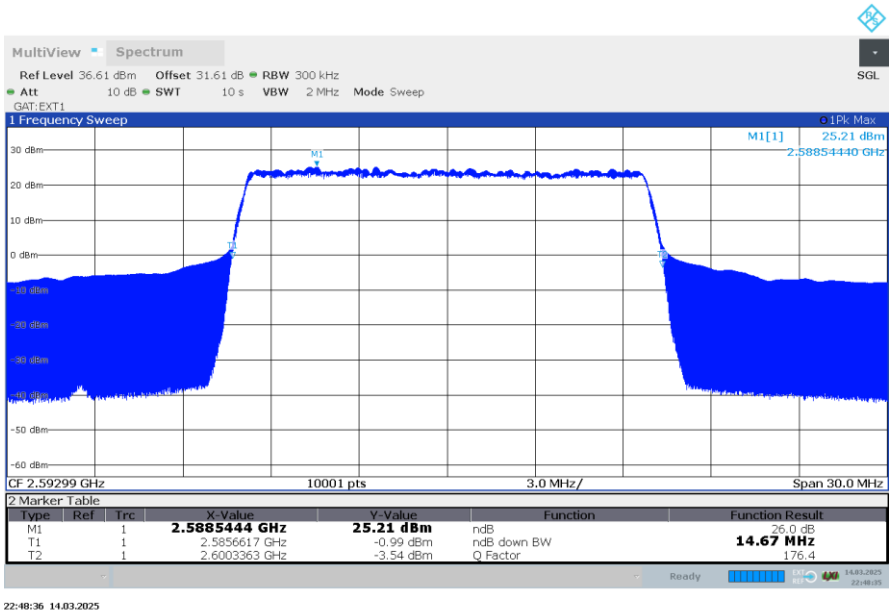
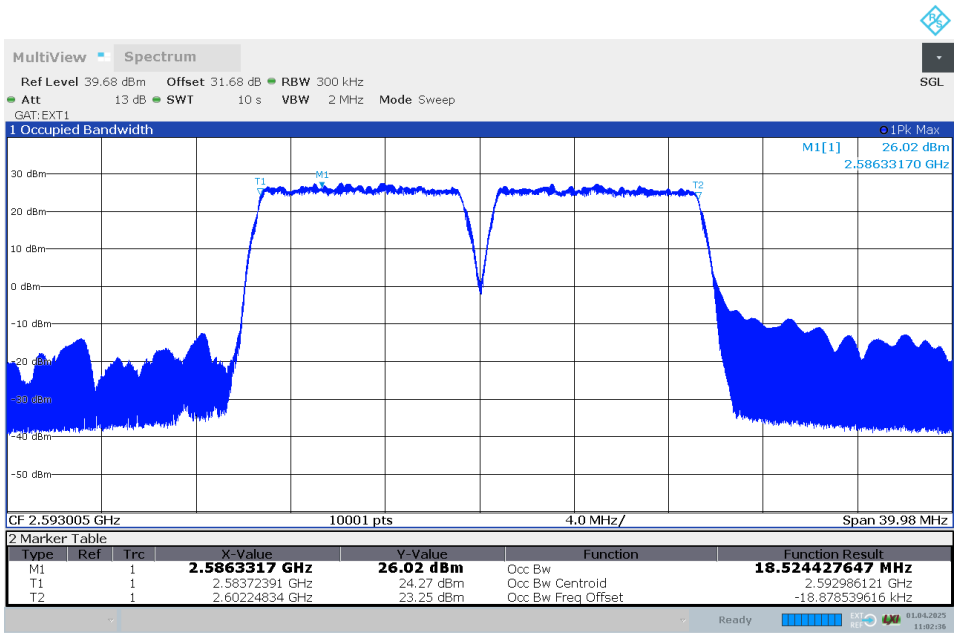


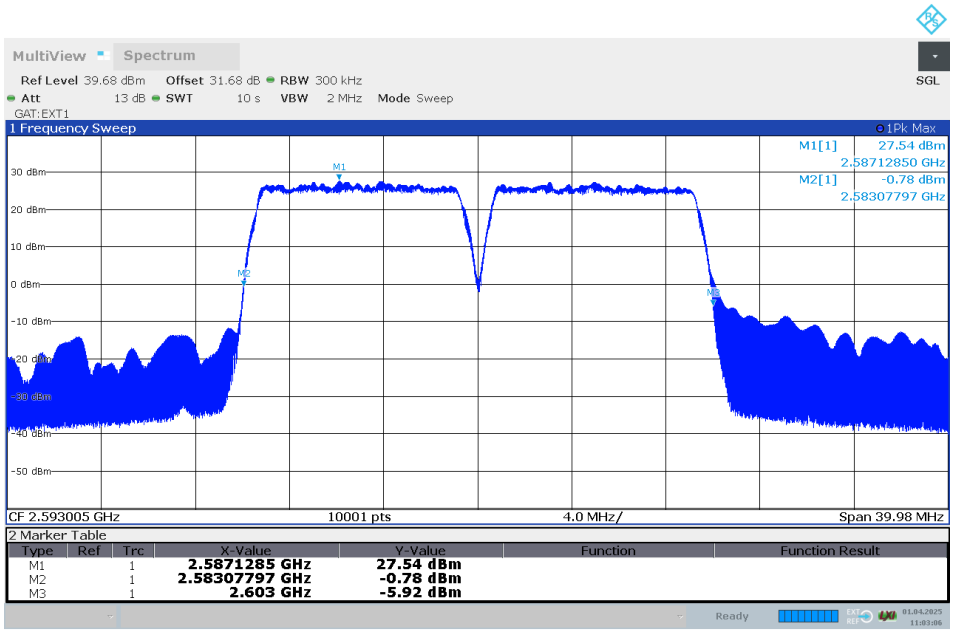
Figure 15 Test Model 1.1, Modulation QPSK, Channel Frequency 2592.99MHz, Port64

Configuration B: Occupied Bandwidth 99% 2x10MHz BW



11:02:37 01.04.2025

Configuration B: Occupied Bandwidth -26dBm 2x10MHz BW



11:03:06 01.04.2025

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

Configuration A Port 64:

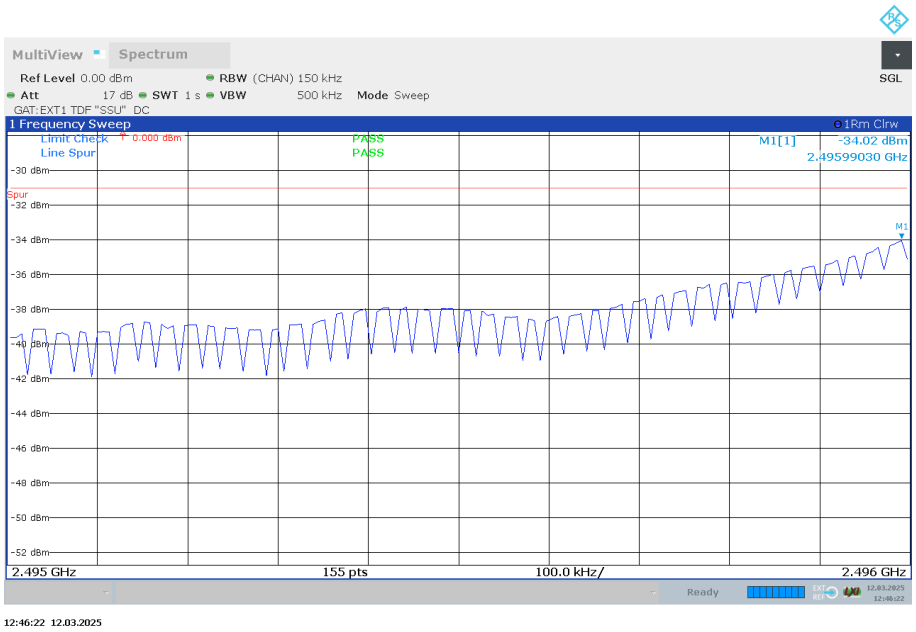


Figure 16 Spurious Emissions (Lower Band Edge 2495-2496MHz) – QPSK (2503.5 MHz) (15MHz Channel BW)

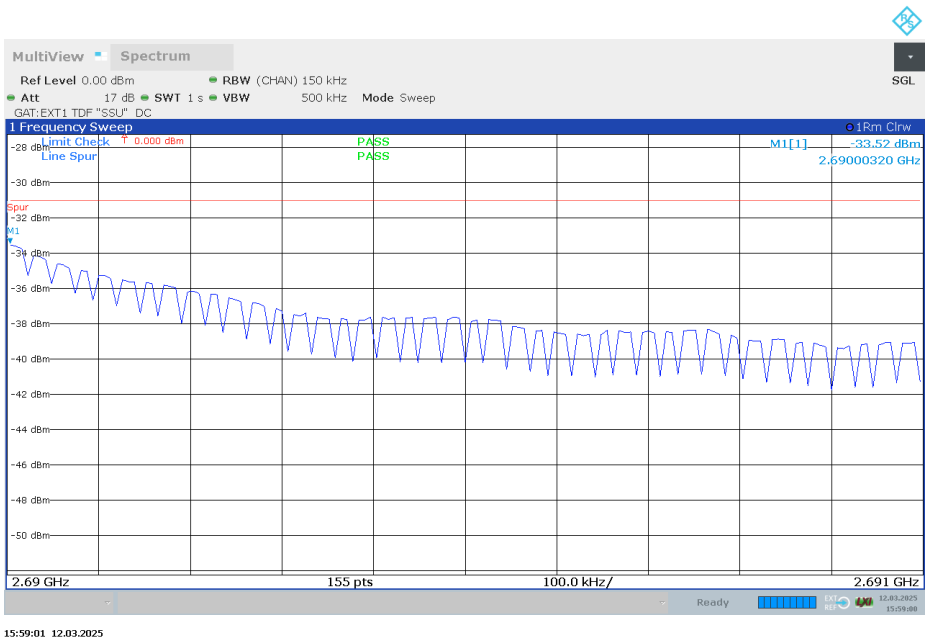
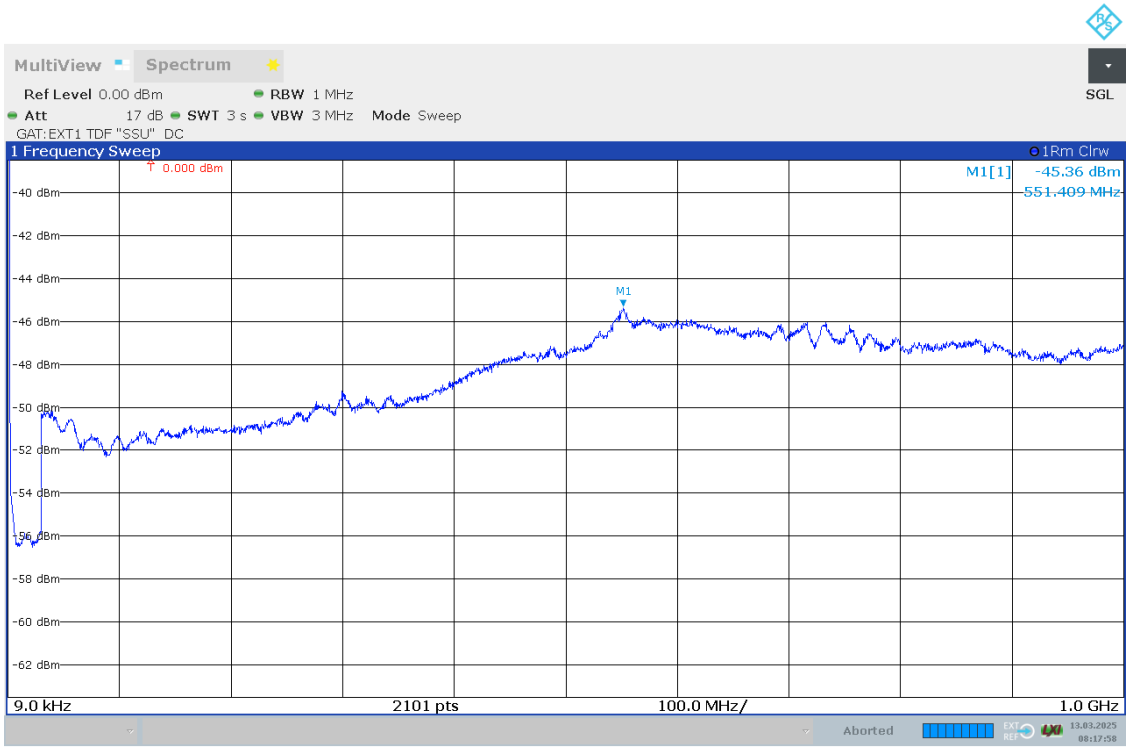
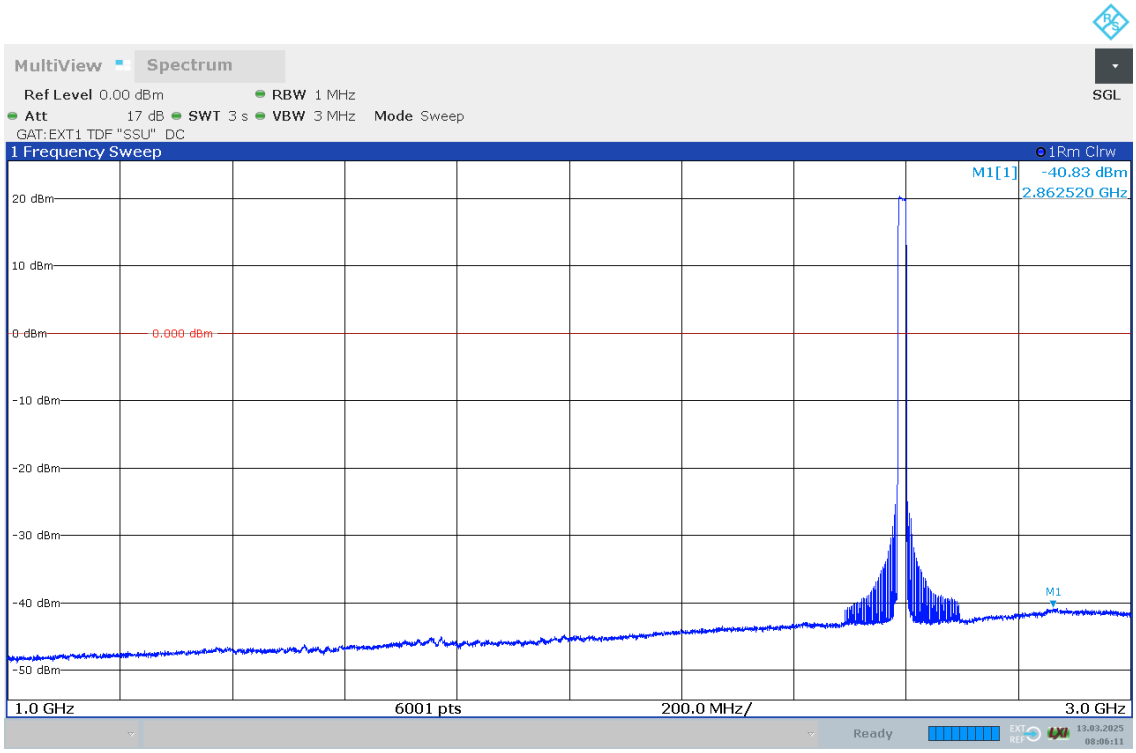


Figure 17 Spurious Emissions (Upper Band Edge 2690-2691MHz) – QPSK (2682.51 MHz) (15MHz Channel BW)



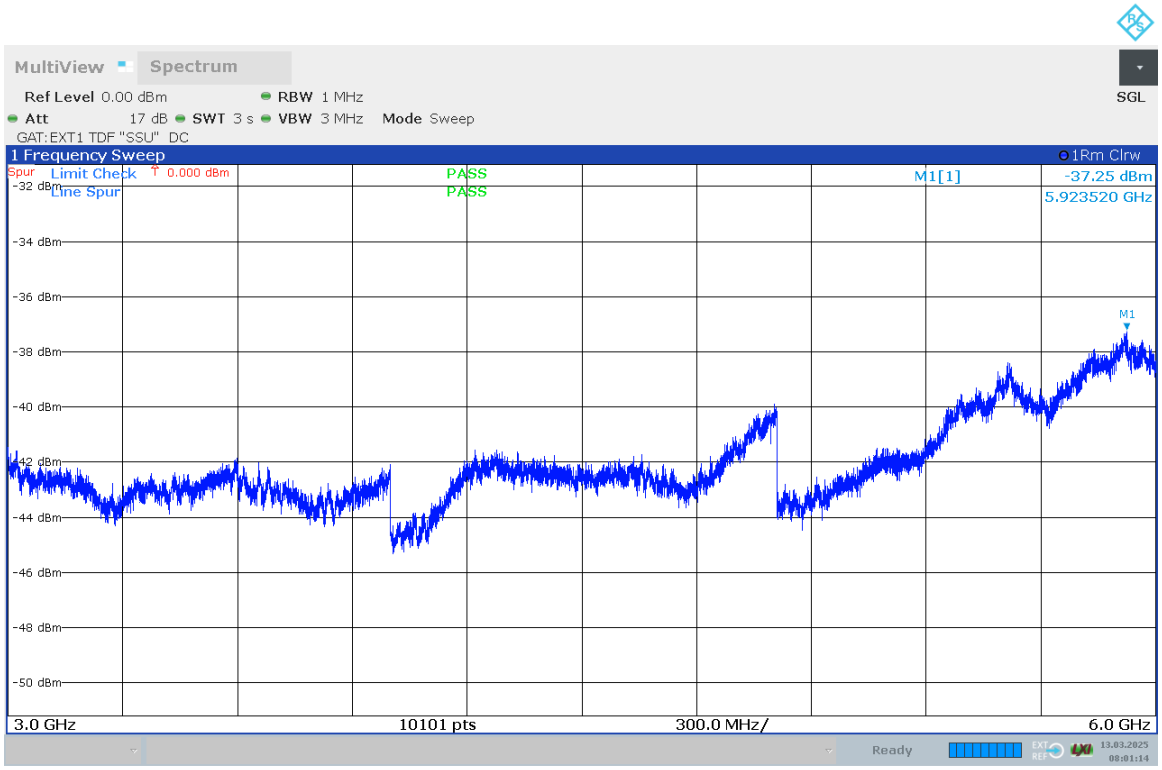
08:17:58 13.03.2025

Figure 18 Spurious Emissions (9kHz–1GHz) – QPSK (2592.99 MHz) (15MHz Channel BW)



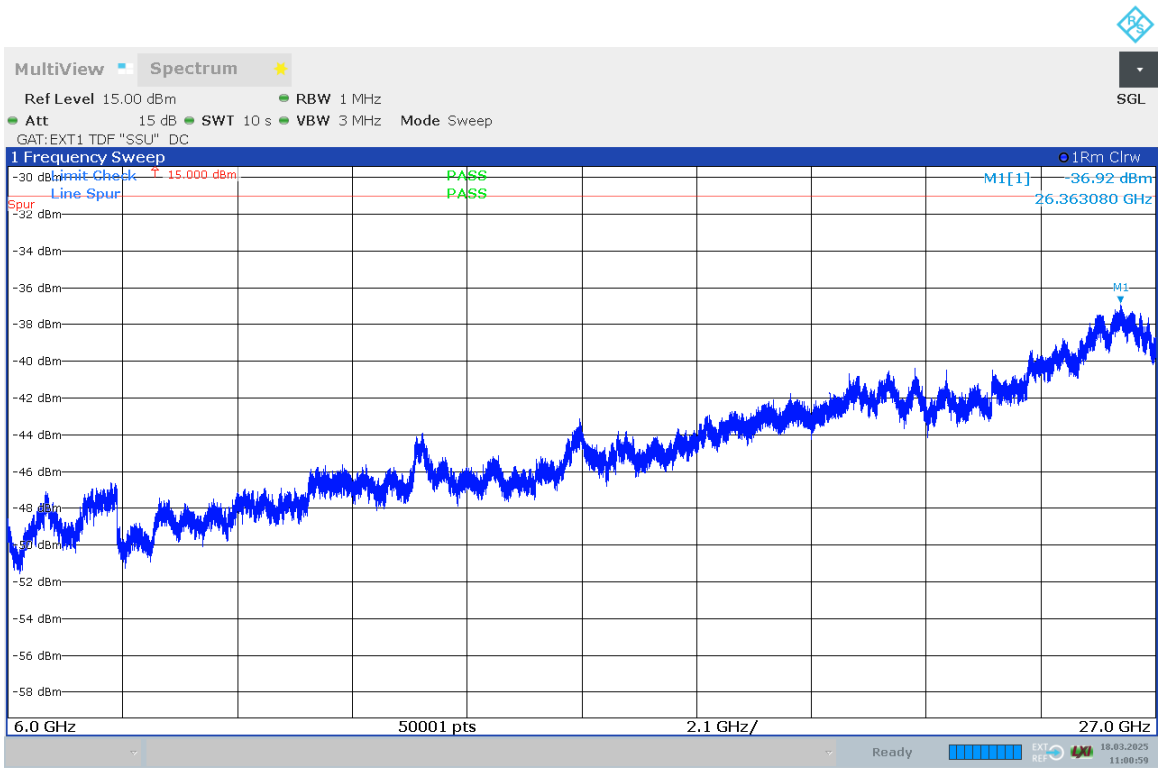
08:06:12 13.03.2025

Figure 19 Spurious Emissions (1GHz–3GHz) – QPSK (2592.99 MHz) (15MHz Channel BW)



08:01:15 13.03.2025

Figure 20 Spurious Emissions (3GHz–6GHz) – QPSK (2592.99 MHz) (15MHz Channel BW)



11:00:59 18.03.2025

Figure 21 Spurious Emissions (6GHz-27GHz) – QPSK (2592.99 MHz) (15MHz Channel BW)

Configuration B Port 64:

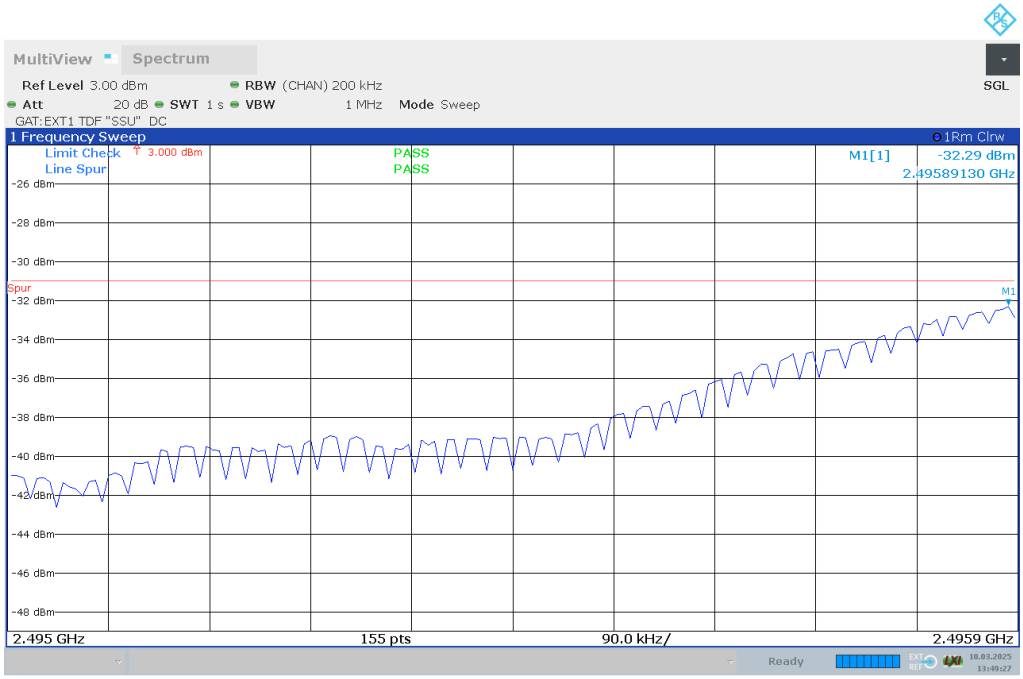


Figure 22 Spurious Emissions (Lower Band Edge 2495-2495.9 MHz) – QPSK (2501.01/2511 MHz) (2x10MHz Channel BW)

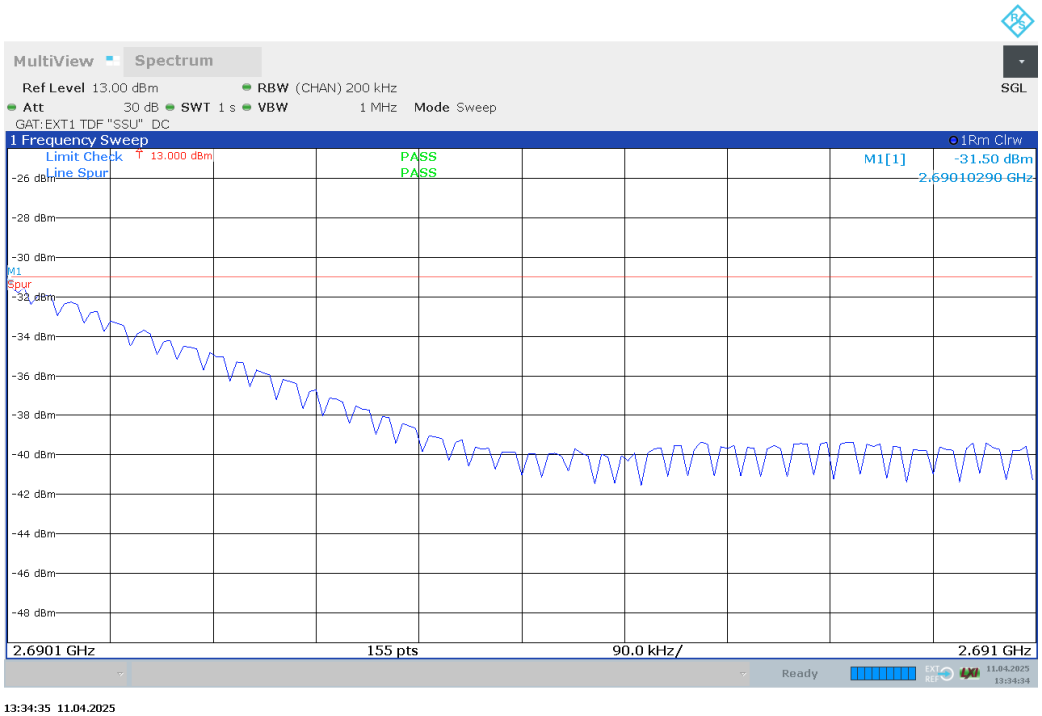
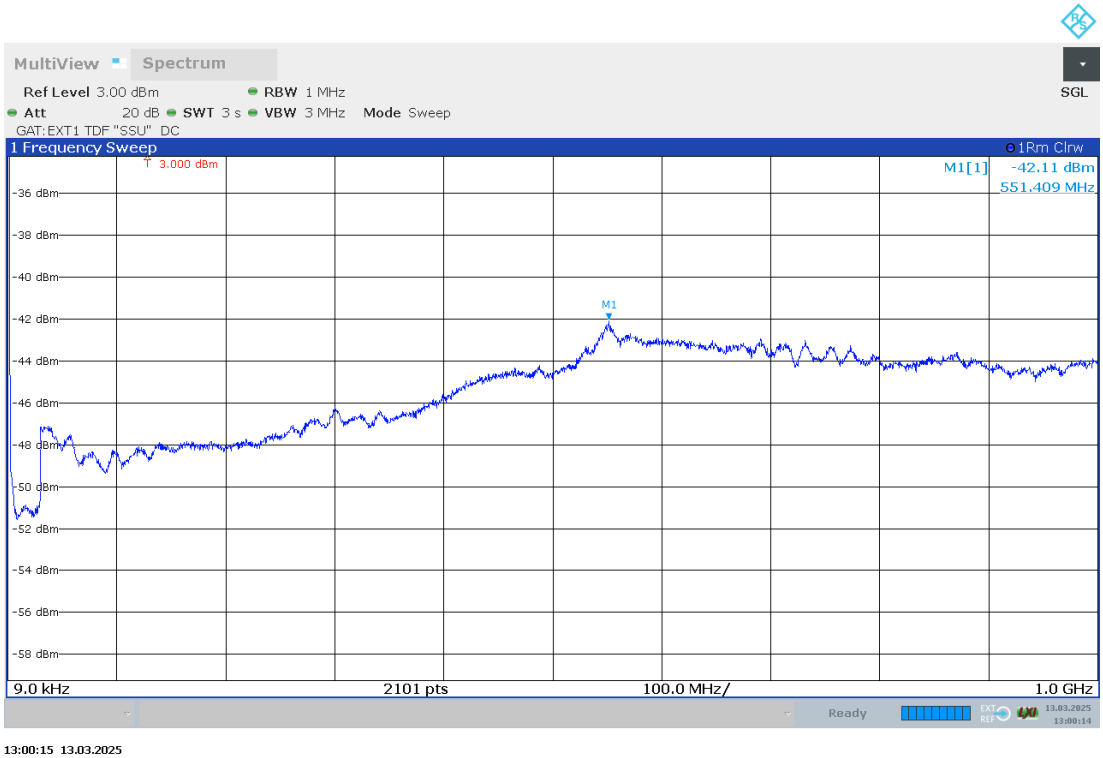
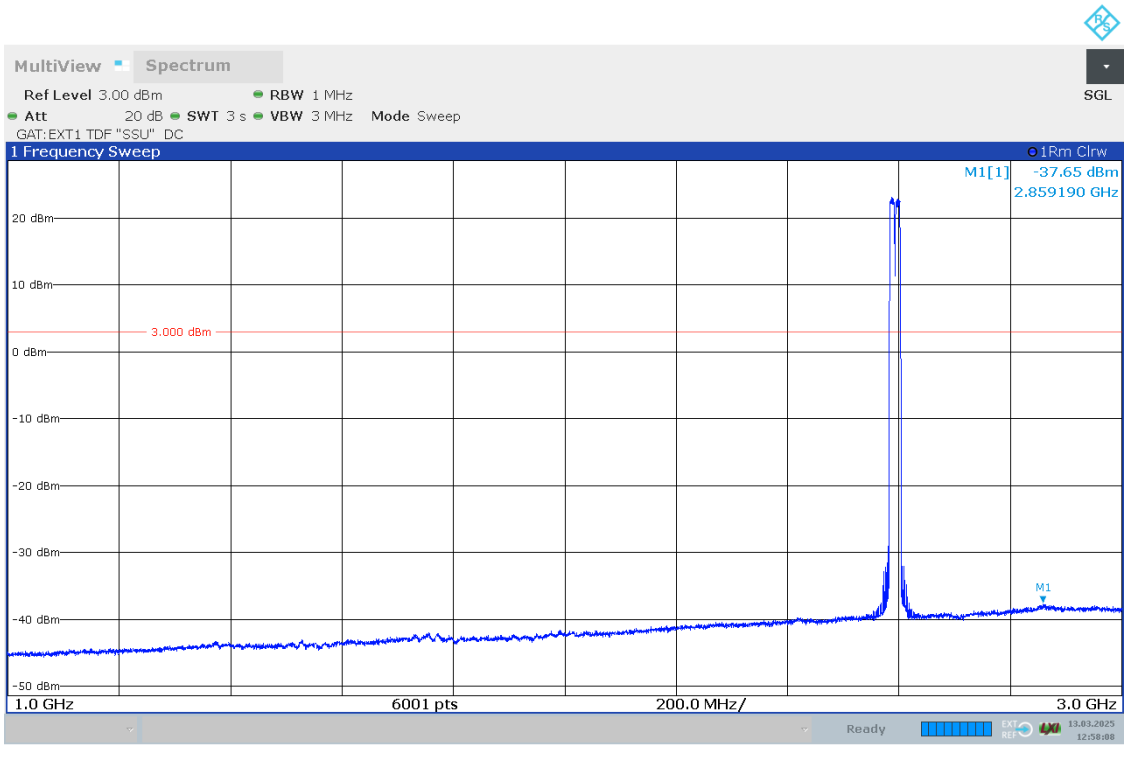


Figure 23 Spurious Emissions (Upper Band Edge 2690.1-2691MHz) – QPSK (2675.01/2685MHz) (2x10MHz Channel BW)



13:00:15 13.03.2025

Figure 24 Spurious Emissions (9kHz–1GHz) – 16QAM (2588.01/2598MHz) (2x10MHz Channel BW)



12:58:08 13.03.2025

Figure 25 Spurious Emissions (1GHz-3GHz) – 16QAM (2588.01/2598MHz) (2x10MHz Channel BW)

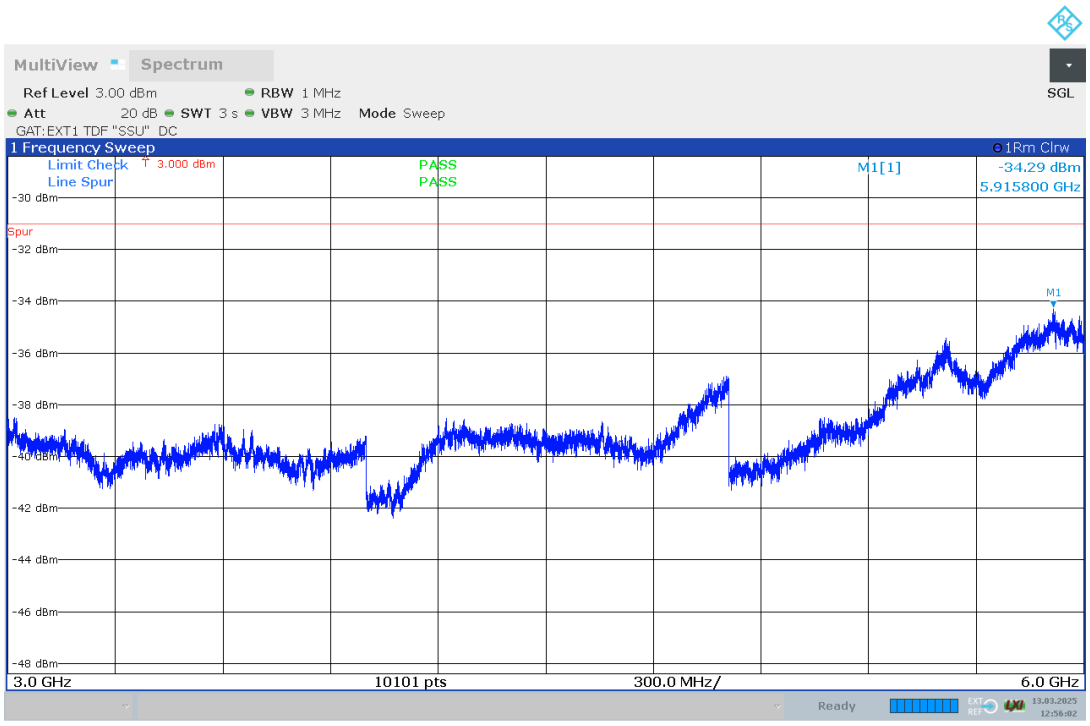


Figure 26 Spurious Emissions (3GHz-6GHz) – 16QAM (2588.01/2598MHz) (2x10MHz Channel BW)

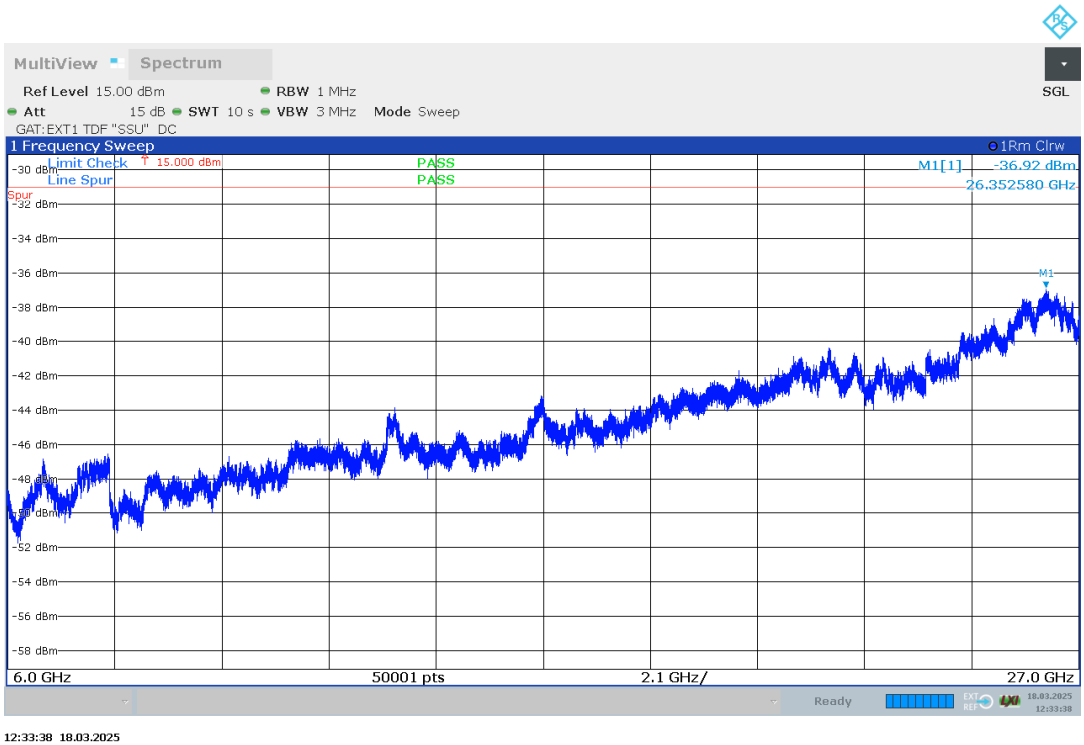


Figure 27 Spurious Emissions (6GHz-27GHz) – 16QAM (2588.01/2598MHz) (2x10MHz Channel BW)

Configuration D Port 64:

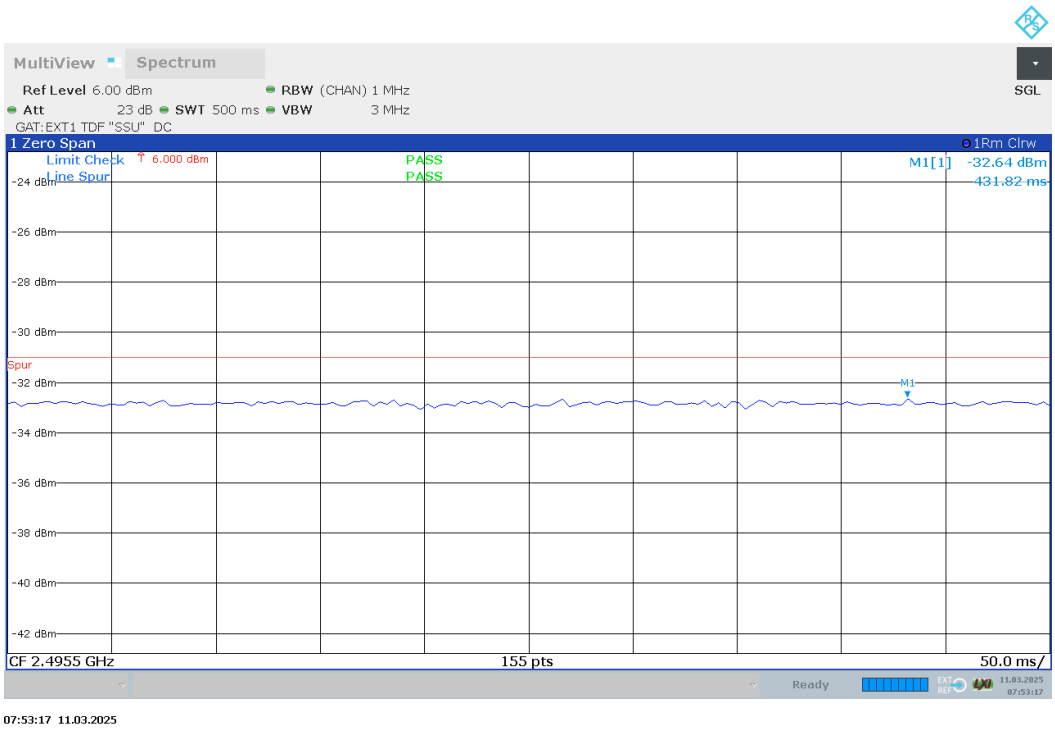
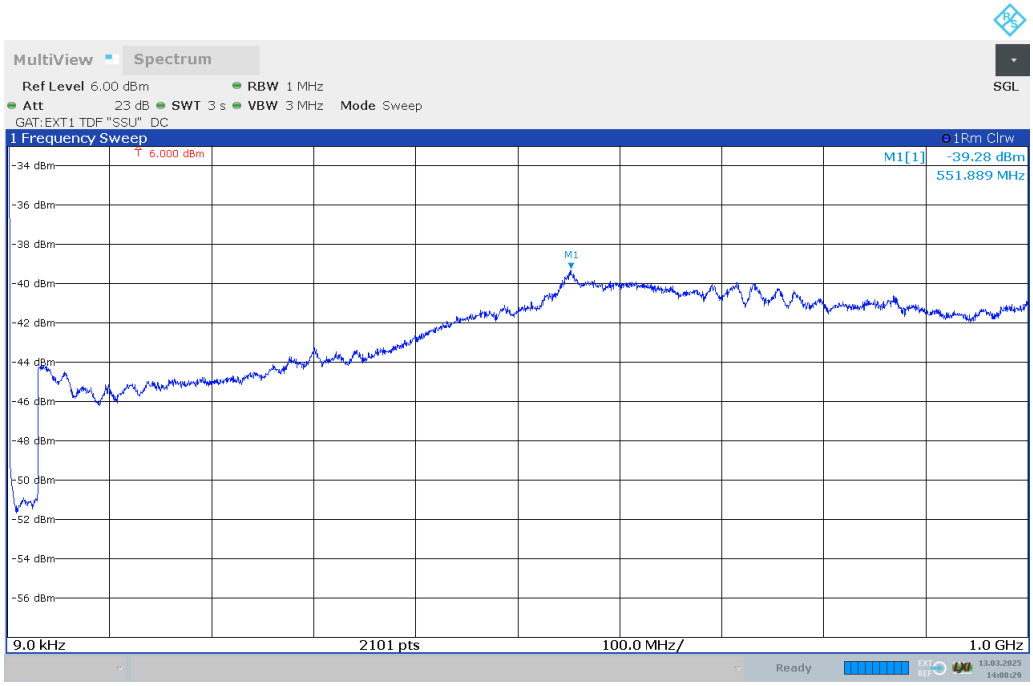


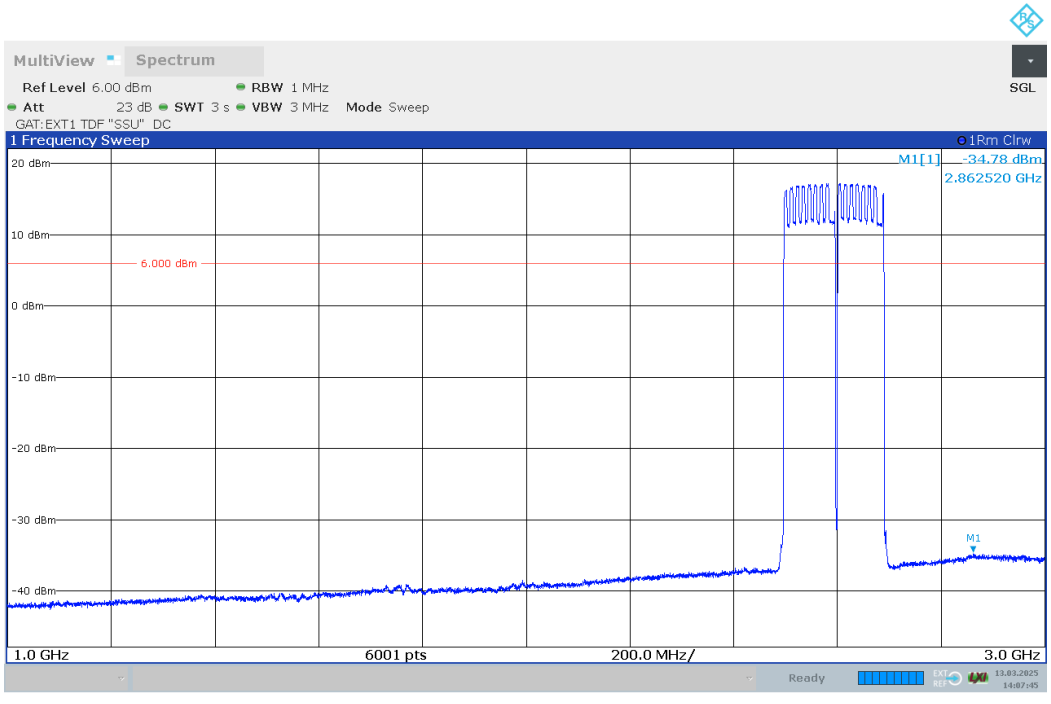
Figure 28 Spurious Emissions (Lower Band Edge 2495-2496MHz) – 16QAM (2546.01/2645.01MHz) (100MHz+90MHz Channel BW)

Figure 29 Spurious Emissions (Lower Band Edge 2690-2691MHz) – 64QAM (2546.01/2645.01MHz) (100MHz+90MHz Channel BW)



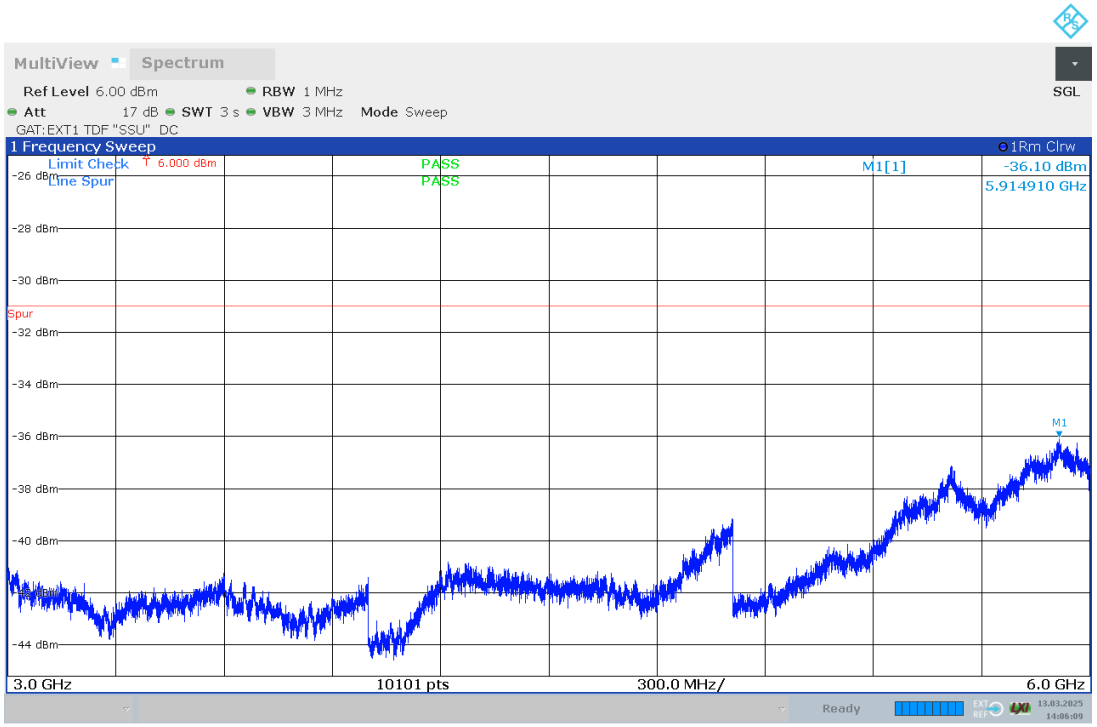
14:08:30 13.03.2025

Figure 30 Spurious Emissions (9kHz-1GHz) – 16QAM (2546.01/2645.01MHz) (100+90MHz Channel BW)



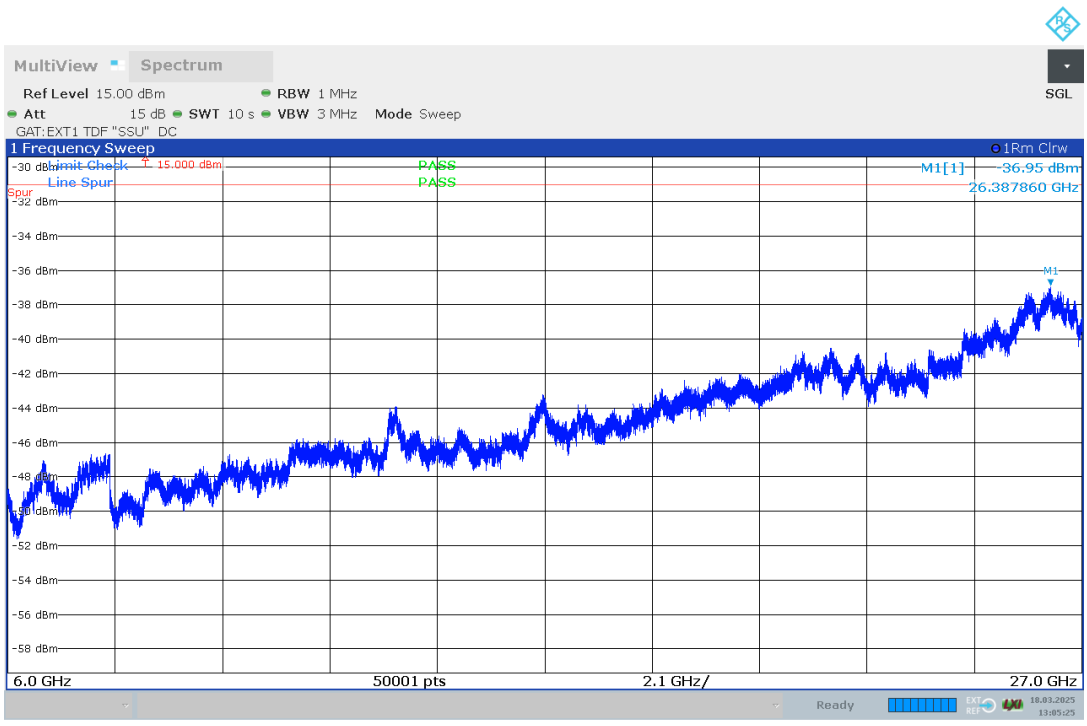
14:07:45 13.03.2025

Figure 31 Spurious Emissions (1GHz-3GHz) – 16QAM (2546.01/2645.01MHz) (100+90MHz Channel BW)



14:06:10 13.03.2025

Figure 32 Spurious Emissions (3GHz-6GHz) – 16QAM (2546.01/2645.01MHz) (100+90MHz Channel BW)



13:05:25 18.03.2025

Figure 33 Spurious Emissions (6GHz-27GHz) – 16QAM (2546.01/2645.01MHz) (100+90MHz Channel BW)

Configuration E Port 64:

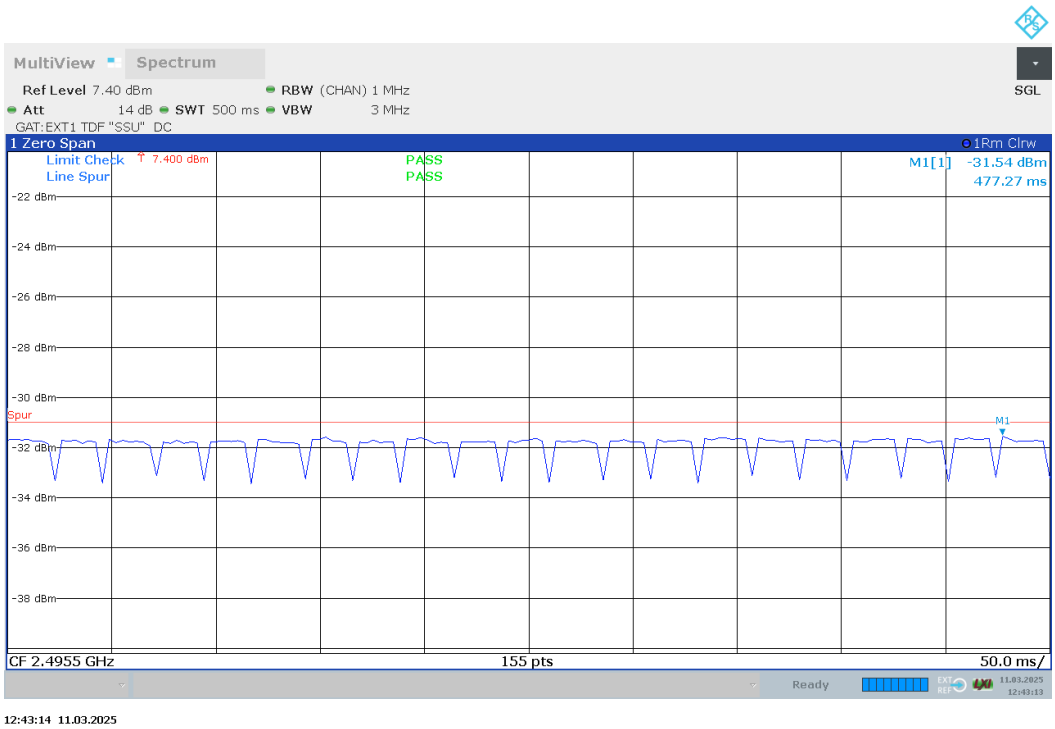


Figure 34 Spurious Emissions (Lower Band Edge 2495-2496 MHz) – 16QAM (2516.01/2543.49/2682.51MHz) (40+15MHz LE+15MHz UE Channel BW)

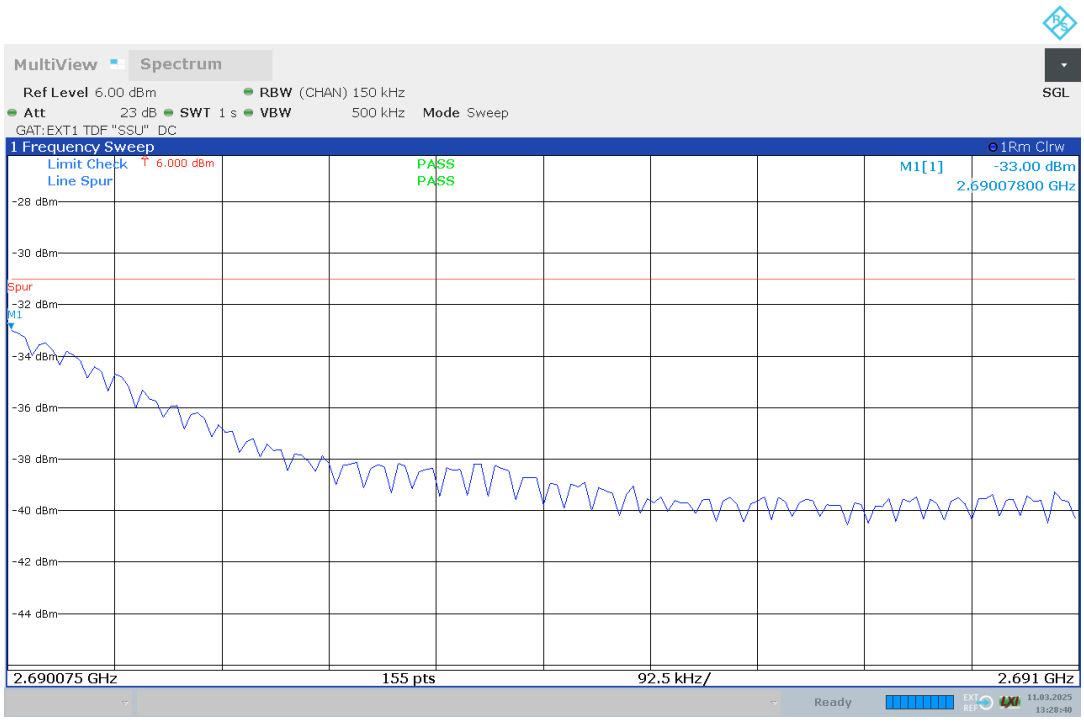


Figure 35 Spurious Emissions (Upper Band Edge 2690-2691 MHz) – 16QAM (2516.01/2543.49/2682.51MHz) (40+15MHz LE+15MHz UE Channel BW)

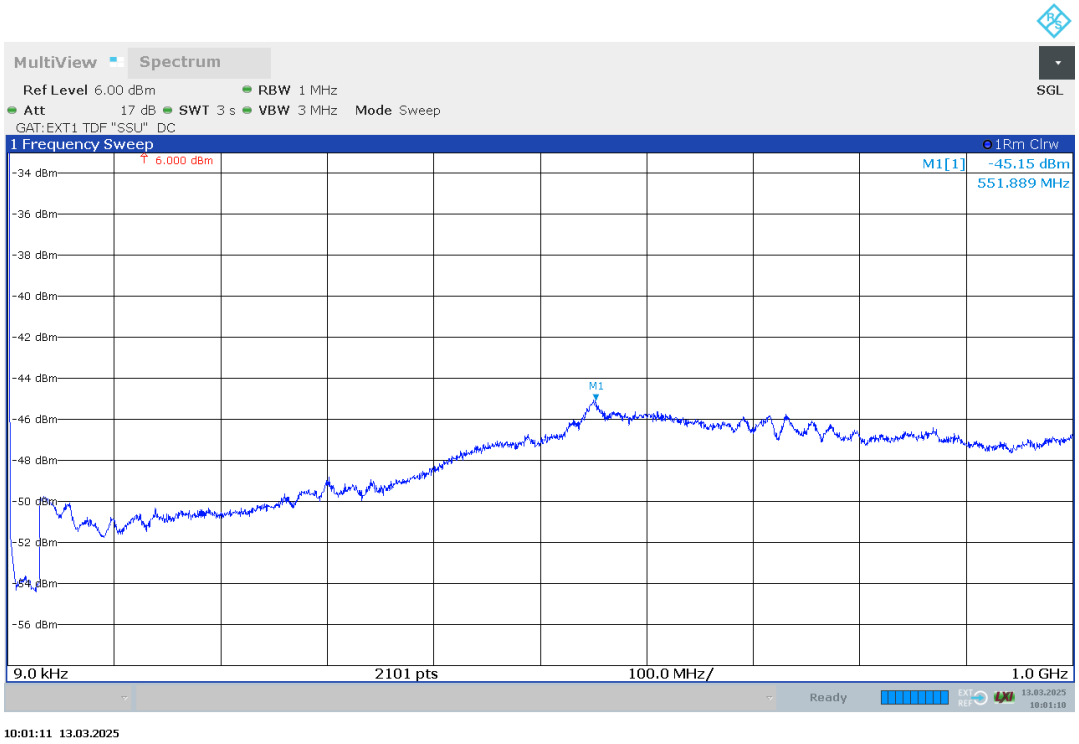


Figure 36 Spurious Emissions (9kHz-1GHz) – QPSK (2516.01/2543.49/2682.51MHz) (40+15MHz LE+15MHz UE Channel BW)

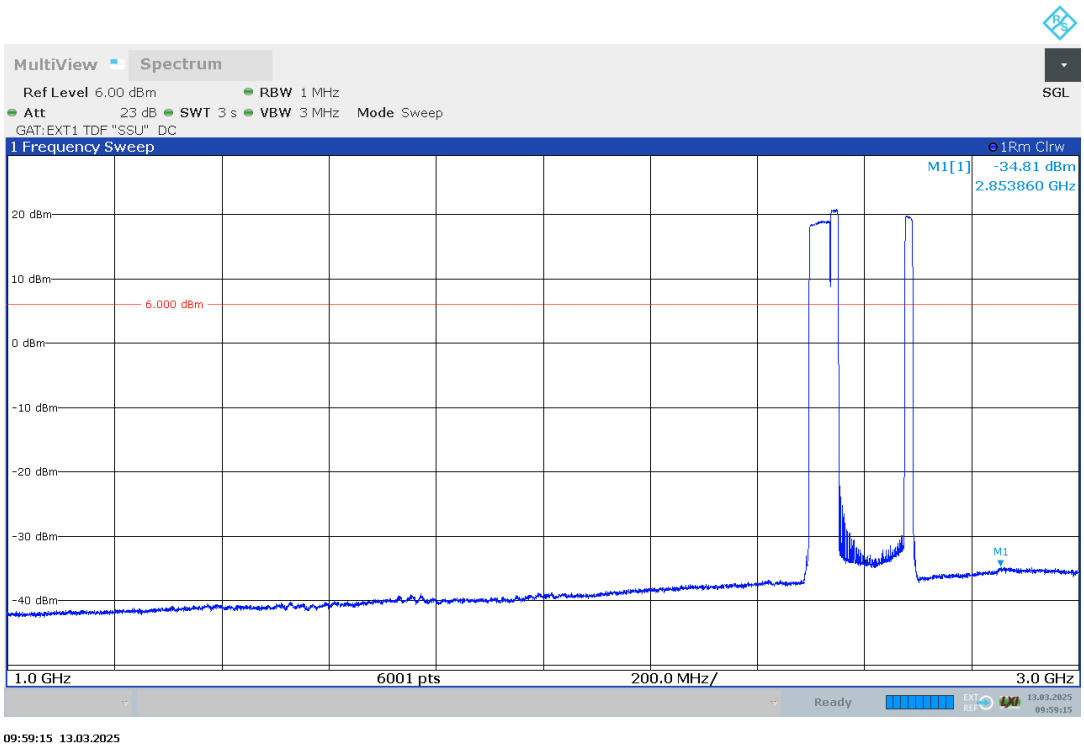
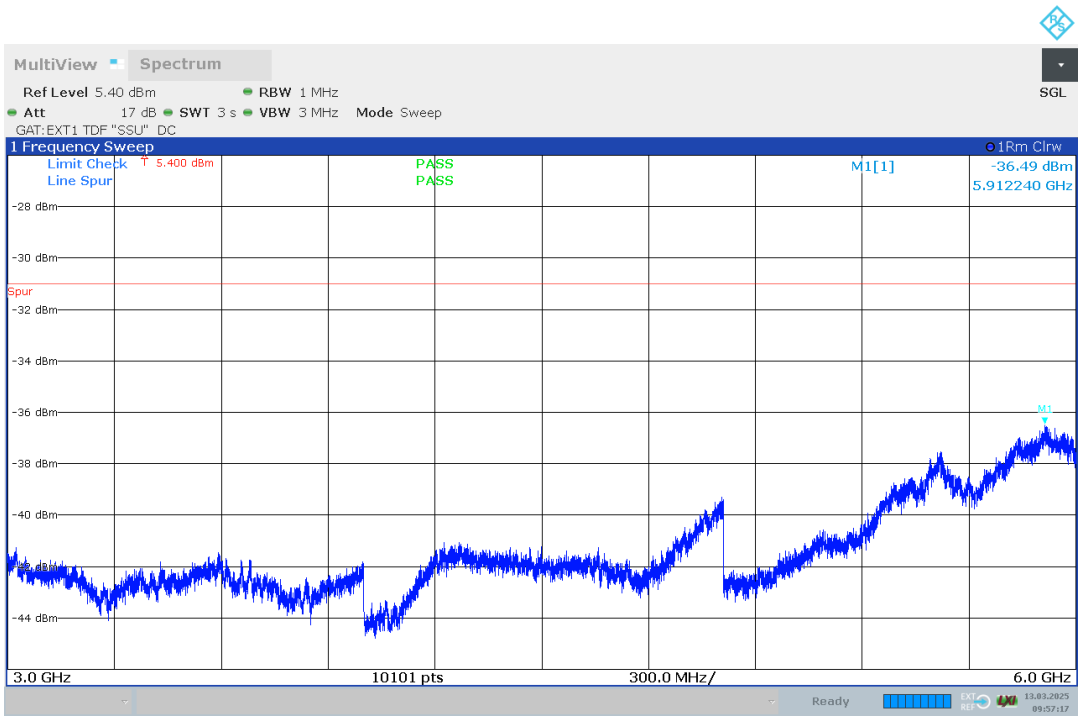
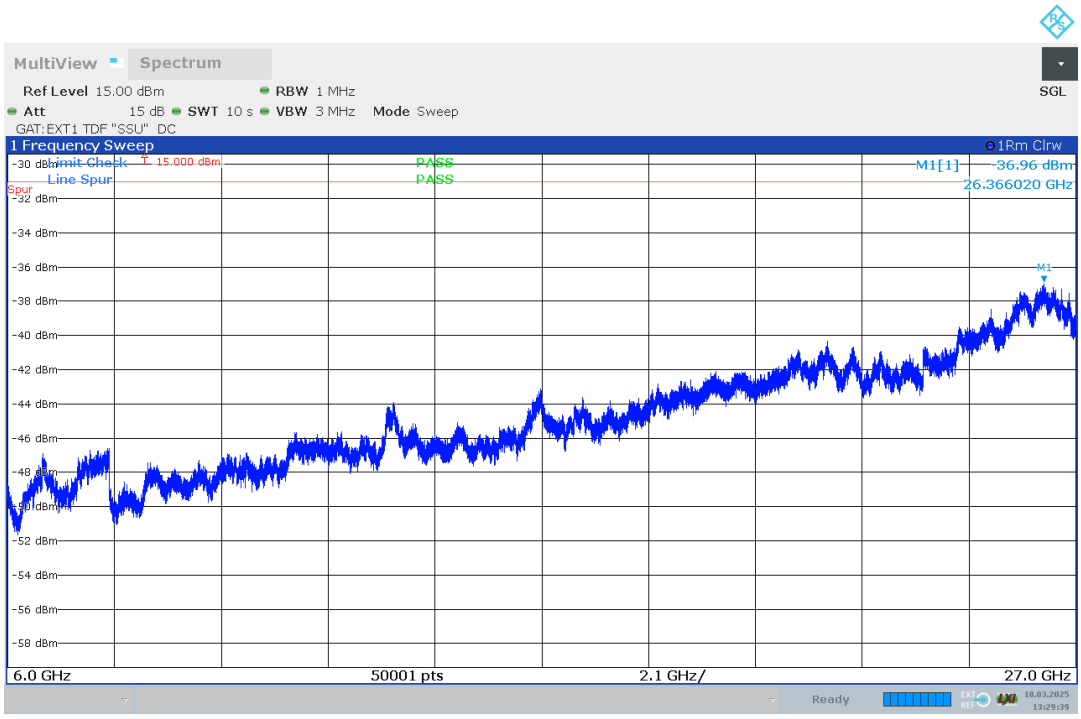


Figure 37 Spurious Emissions (1GHz-3GHz) – QPSK (2516.01/2543.49/2682.51MHz) (40+15MHz LE+15MHz UE Channel BW)



09:57:18 13.03.2025

Figure 38 Spurious Emissions (3GHz-6GHz) – QPSK (2516.01/2543.49/2682.51MHz) (40+15MHz LE+15MHz UE Channel BW)



13:29:40 18.03.2025

Figure 39 Spurious Emissions (6GHz-27GHz) – QPSK (2516.01/2543.49/2682.51MHz) (40+15MHz LE+15MHz UE Channel BW)

Configuration F Port 64:

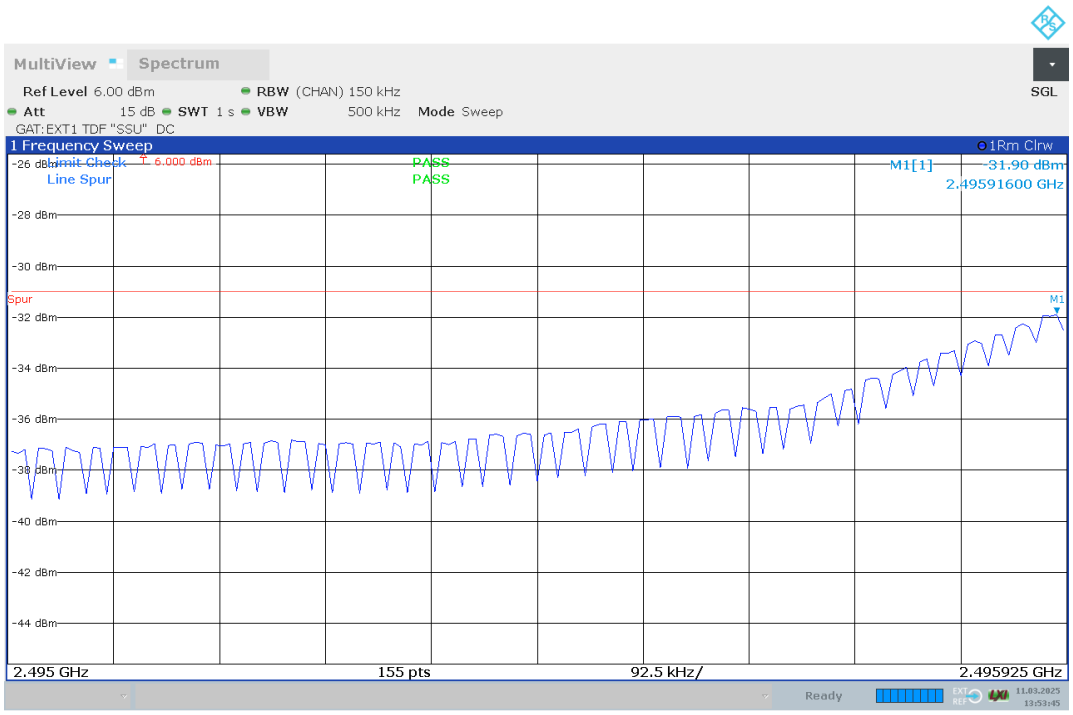


Figure 40 Spurious Emissions (Lower Band Edge 2495-2496 MHz) – QPSK (2503.5/2642.49/2670MHz) (15MHz LE+15+40MHz UE Channel BW)

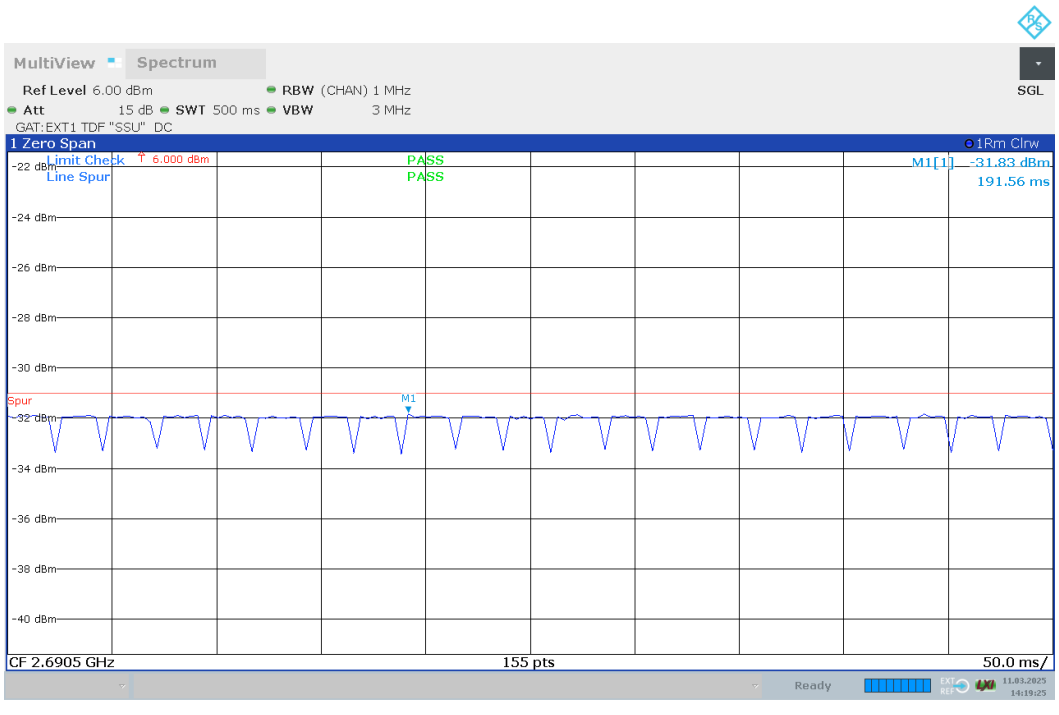
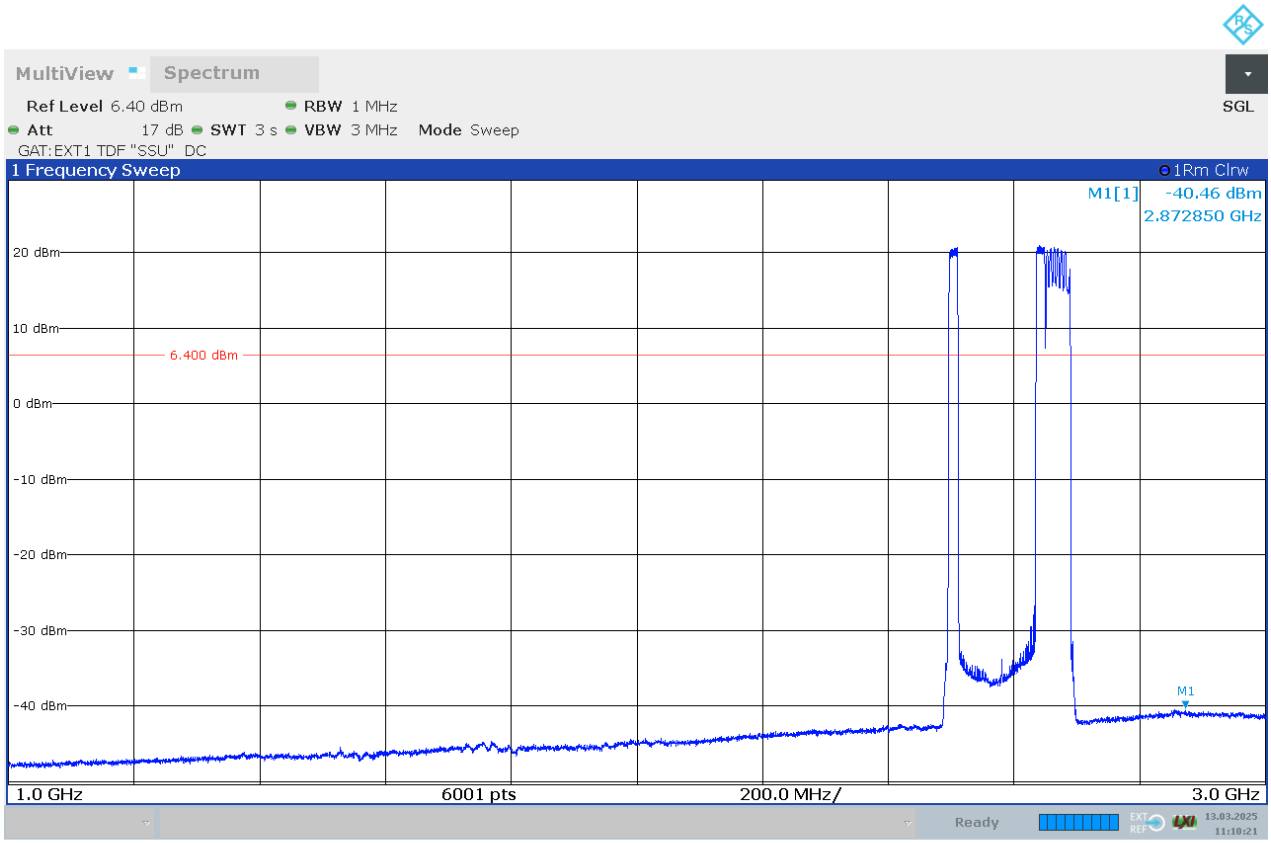
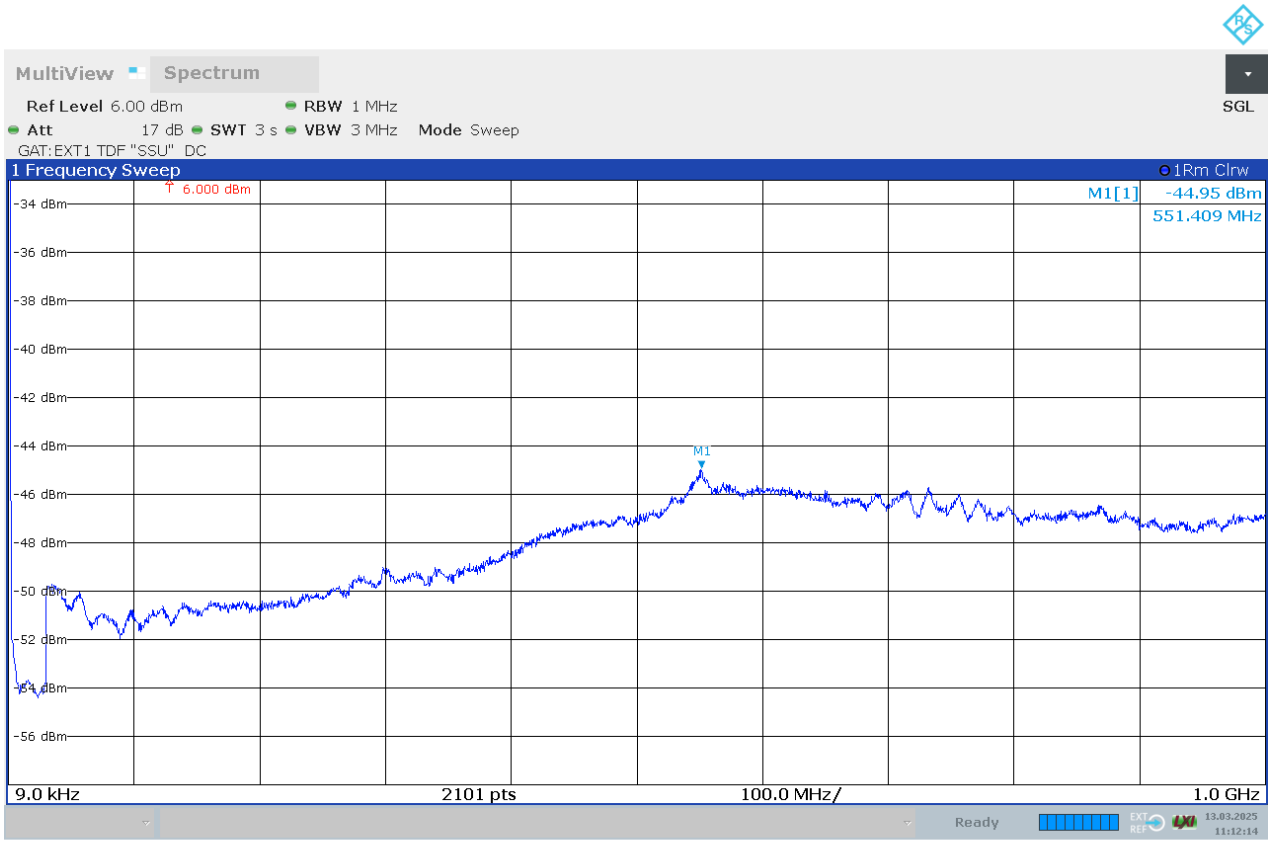


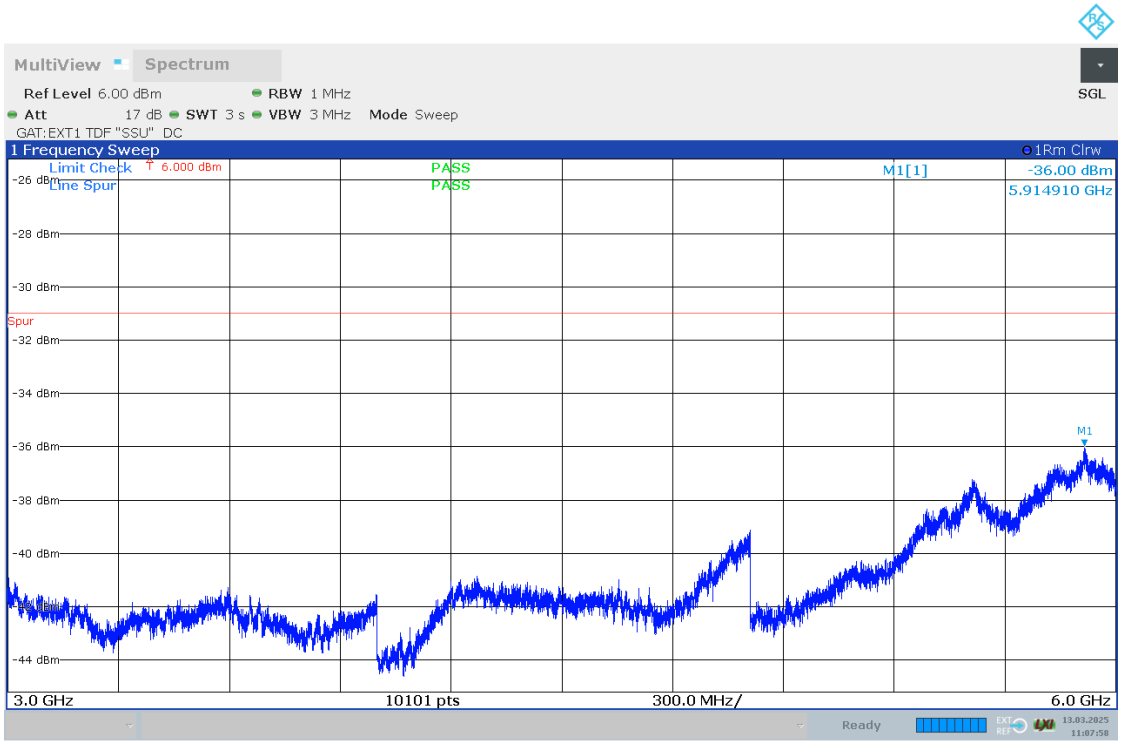
Figure 41 Spurious Emissions (Upper Band Edge 2690-2691 MHz) – 16QAM (2503.5/2642.49/2670MHz) (15MHz LE+15+40MHz UE Channel BW)



11:10:21 13.03.2025

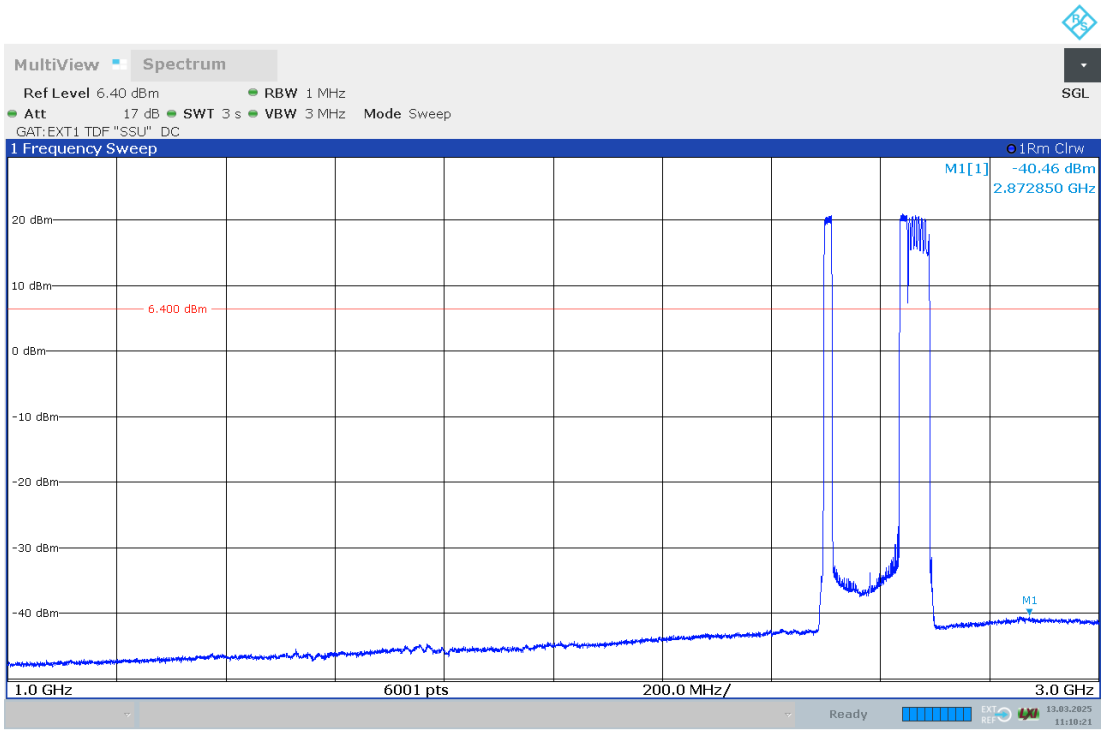


11:12:15 13.03.2025



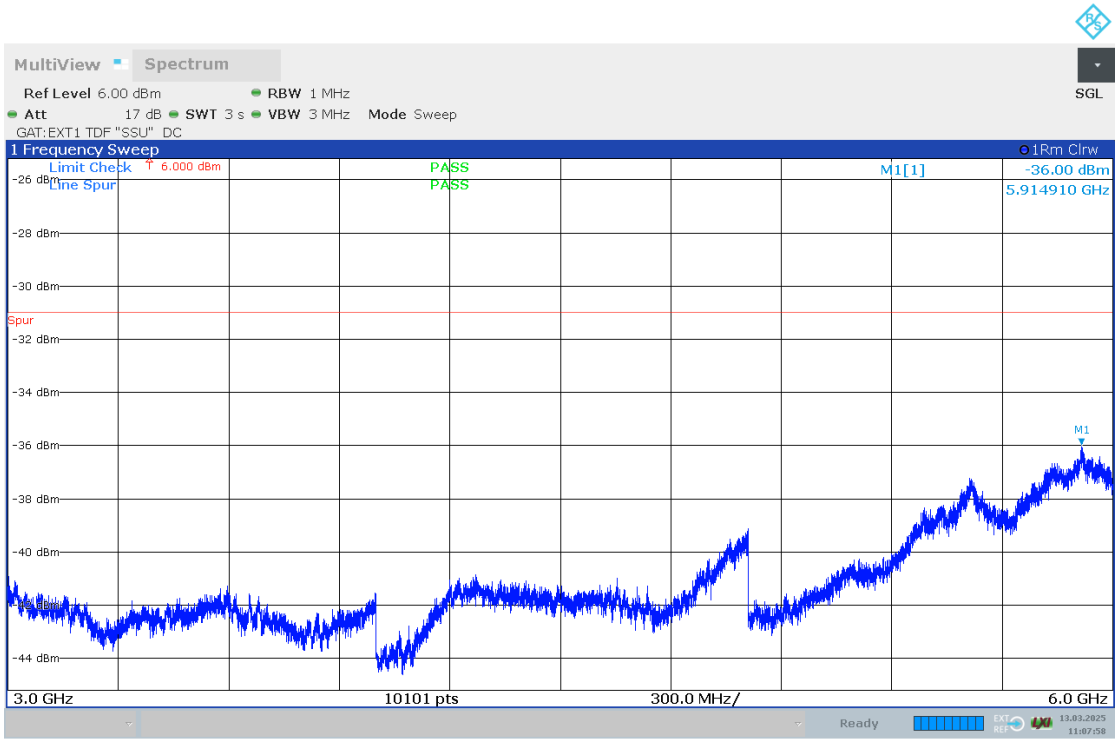
11:07:59 13.03.2025

Figure 42 Spurious Emissions (9kHz-1GHz) – QPSK (2503.5/2642.49/2670MHz) (15MHz LE+15+40MHz UE Channel BW)



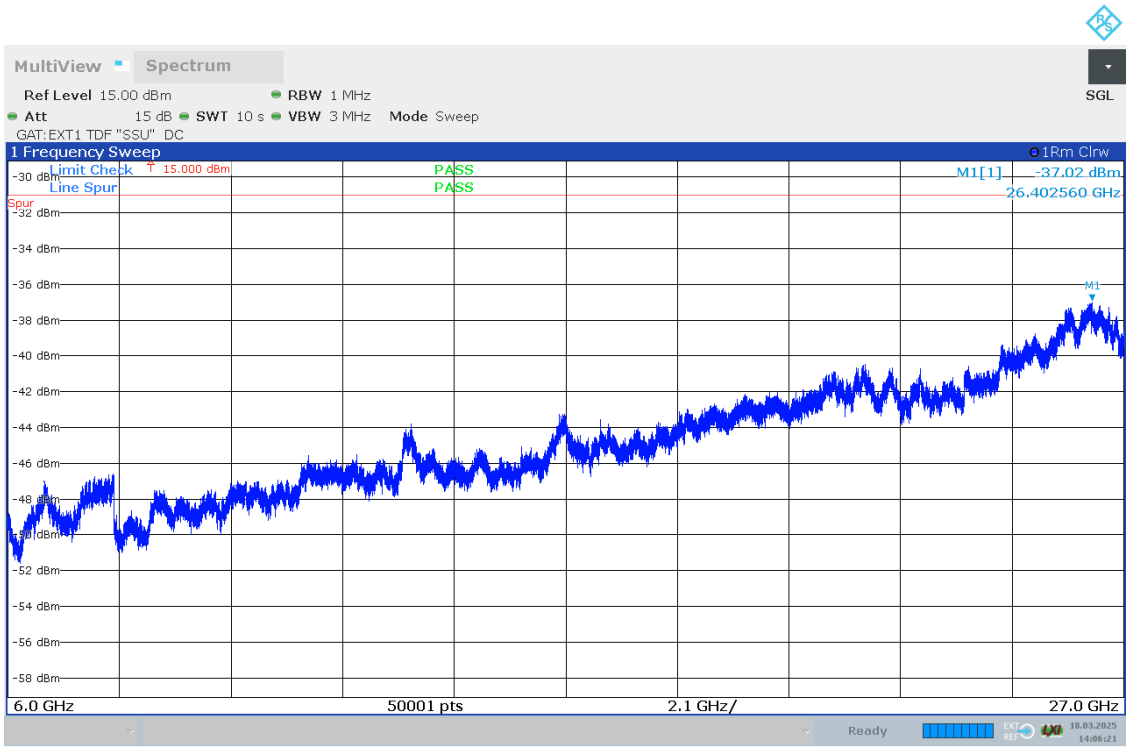
11:10:21 13.03.2025

Figure 43 Spurious Emissions (1GHz-3GHz) – QPSK (2503.5/2642.49/2670MHz) (15MHz LE+15+40MHz UE Channel BW)



11:07:59 13.03.2025

Figure 44 Spurious Emissions (3GHz-6GHz) – QPSK (2503.5/2642.49/2670MHz) (15MHz LE+15+40MHz UE Channel BW)



14:06:22 18.03.2025

Figure 45 Spurious Emissions (6GHz-27GHz) – QPSK (2503.5/2642.49/2670MHz) (15MHz LE+15+40MHz UE Channel BW)

5.2.5 Test No. 5 Field Strength of Spurious Radiation

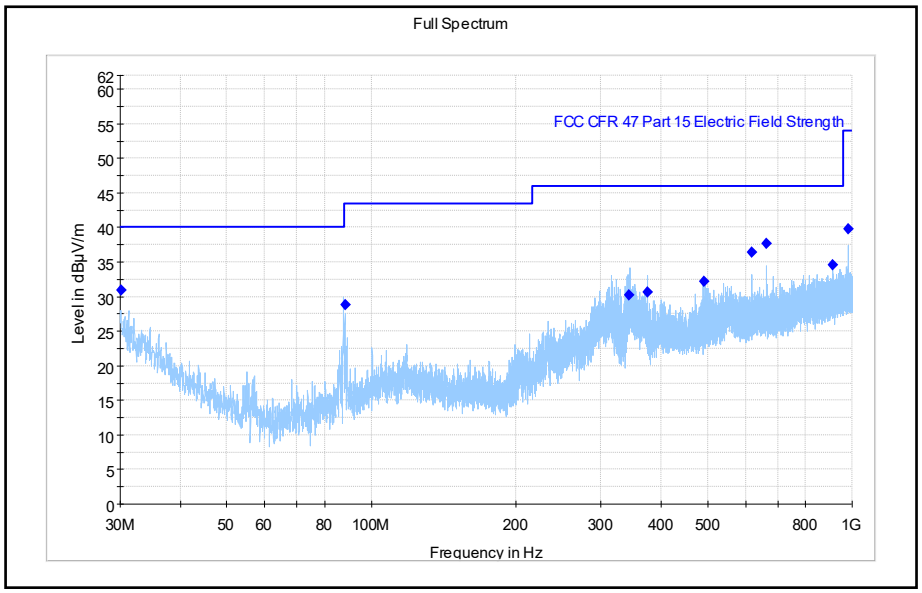


Figure 46 Field Strength of Spurious Radiation (30 MHz – 1 GHz) – QPSK (2516.01 / 2670 MHz) (40+40 MHz Channel BW)

Frequency (MHz)	QuasiPeak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarisation	Angle (°)
30.151000	30.89	40.00	9.11	121.0	V	94.0
88.107000	28.81	43.50	14.69	102.0	V	229.0
343.493000	30.16	46.00	15.84	100.0	H	324.0
375.026667	30.67	46.00	15.33	100.0	H	257.0
491.130333	32.16	46.00	13.84	102.0	V	-5.0
619.309667	36.47	46.00	9.53	100.0	V	221.0
663.541667	37.74	46.00	8.26	205.0	V	323.0
911.981000	34.62	46.00	11.38	111.0	V	22.0
983.027333	39.78	54.00	14.22	100.0	V	168.0

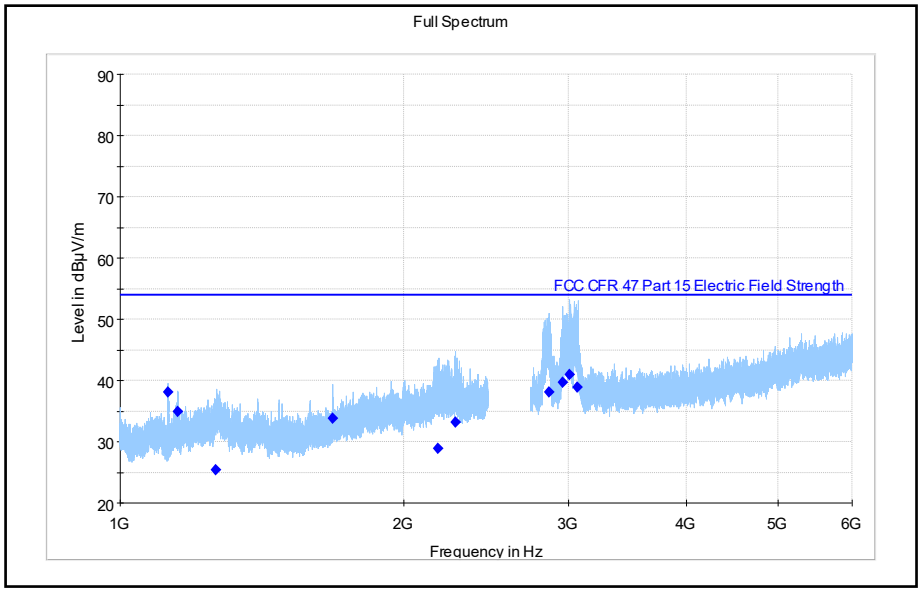


Figure 47 Field Strength of Spurious Radiation (1 GHz – 6 GHz) – QPSK (2516.01 / 2670 MHz) (40+40 MHz Channel BW)

Exclusion band FDL_low - ΔfOBUE < f < FDL_high +ΔfOBUE : 2486 MHz – 2700 MHz

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarisation	Angle (°)
1124.937267	38.08	54.00	15.92	205.0	V	178.0
1150.213133	34.95	54.00	19.05	107.0	V	65.0
1264.854433	25.47	54.00	28.53	107.0	V	296.0
1680.950033	33.80	54.00	20.20	131.0	V	298.0
2175.597867	28.81	54.00	25.19	104.0	H	1.0
2273.153567	33.22	54.00	20.78	105.0	V	-5.0
2856.511167	38.14	54.00	15.86	173.0	H	330.0
2957.168000	39.68	54.00	14.32	186.0	V	19.0
3004.736333	41.02	54.00	12.98	119.0	V	2.0
3065.263000	38.83	54.00	15.17	100.0	H	30.0

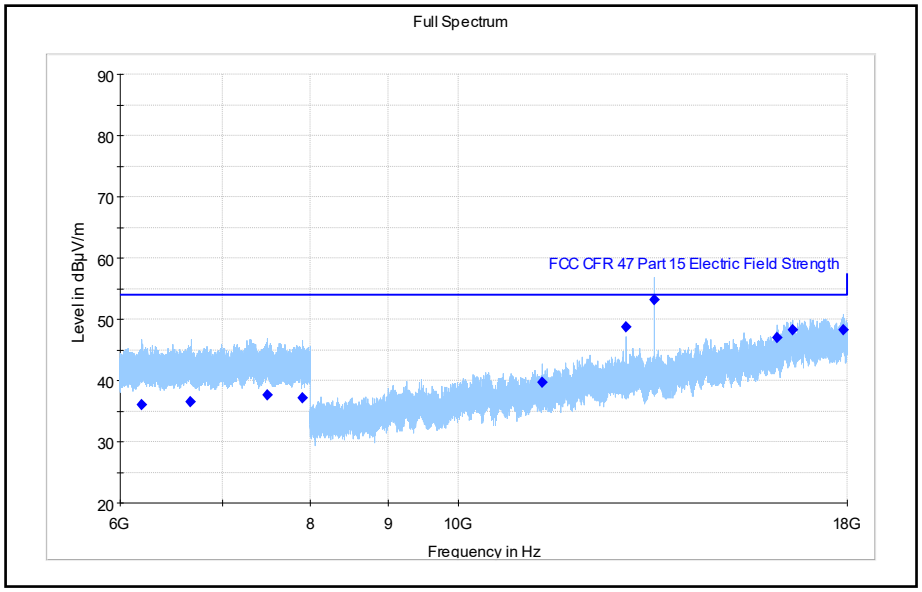


Figure 48 Field Strength of Spurious Radiation (6 GHz – 18 GHz) – QPSK (2516.01 / 2670 MHz) (40+40 MHz Channel BW)

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarisation	Angle (°)
6201.649333	36.07	54.00	17.93	334.0	H	171.0
6674.388000	36.46	54.00	17.54	200.0	H	81.0
7492.036834	37.54	54.00	16.46	224.0	H	252.0
7901.745500	37.18	54.00	16.82	215.0	V	185.0
11354.126320	39.75	54.00	14.25	127.0	H	222.0
12890.629280	48.66	54.00	5.34	107.0	V	333.0
13452.550800	53.22	54.00	0.78	200.0	V	26.0
16184.211332	46.93	54.00	7.07	100.0	V	186.0
16564.164948	48.21	54.00	5.79	124.0	V	247.0
17904.131560	48.28	54.00	5.72	111.0	V	236.0

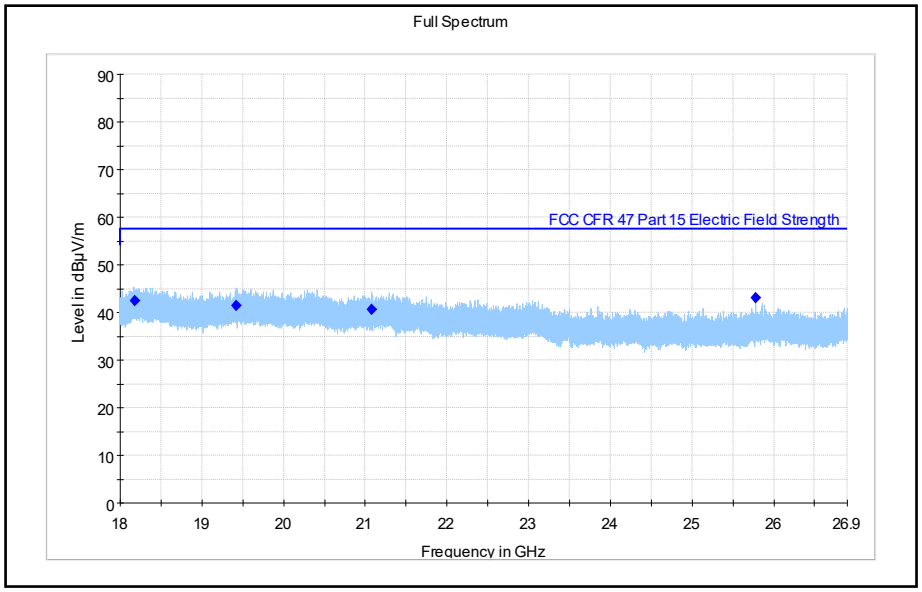


Figure 49 Field Strength of Spurious Radiation (18 GHz – 26.9 GHz) – QPSK (2516.01 / 2670 MHz) (40+40 MHz Channel BW)

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarisation	Angle (°)
18173.127532	42.53	57.50	14.97	113.0	H	9.0
19418.333068	41.45	57.50	16.05	124.0	V	15.0
21078.496628	40.66	57.50	16.84	143.0	H	130.0
25780.769388	43.06	57.50	14.44	132.0	H	318.0

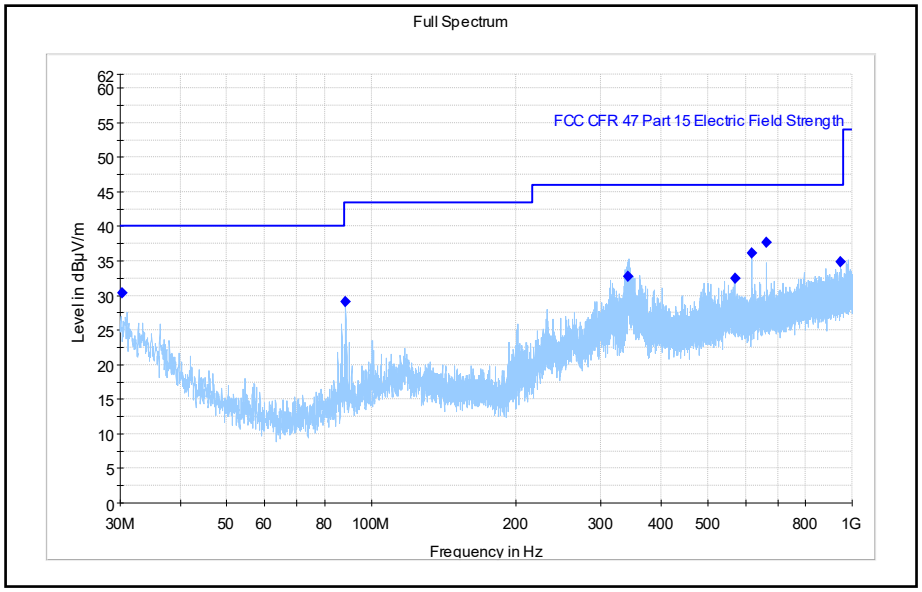


Figure 50 Field Strength of Spurious Radiation (30 MHz – 1 GHz) – QPSK (2546.01 / 2645.01 MHz) (100 + 90 MHz Channel BW)

Frequency (MHz)	QuasiPeak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarisation	Angle (°)
30.300000	30.39	40.00	9.61	333.0	H	58.0
88.059333	29.11	43.50	14.39	100.0	V	250.0
342.257667	32.80	46.00	13.20	100.0	H	335.0
569.795667	32.44	46.00	13.56	100.0	H	89.0
619.309667	36.18	46.00	9.82	100.0	V	221.0
663.541667	37.62	46.00	8.38	216.0	H	58.0
947.015000	34.88	46.00	11.12	161.0	H	247.0

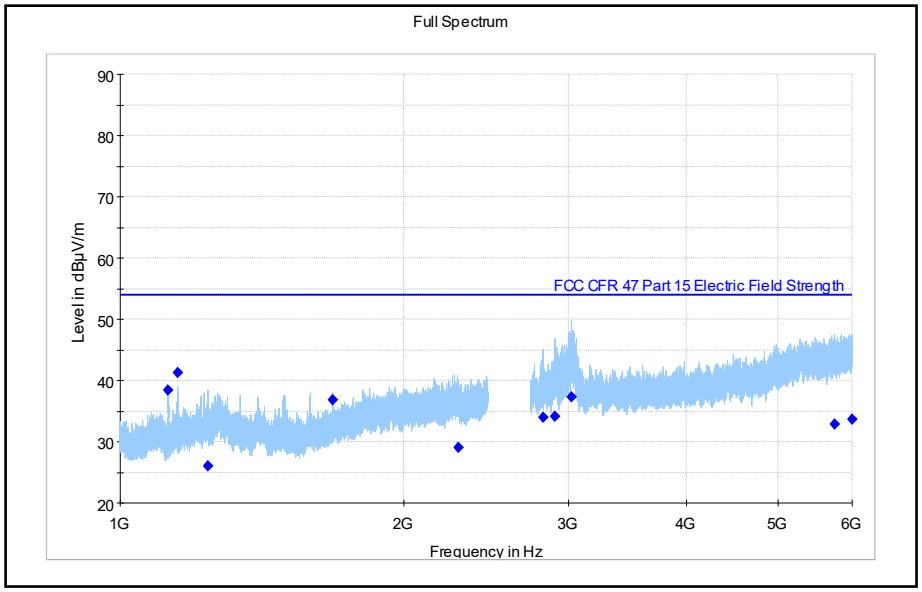


Figure 51 Field Strength of Spurious Radiation (1 GHz – 6 GHz) – QPSK (2546.01 / 2645.01 MHz) (100 + 90 MHz Channel BW)

Exclusion band FDL_low - ΔfOBUE < f < FDL_high +ΔfOBUE : 2486 MHz – 2700 MHz

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarisation	Angle (°)
1124.985733	38.42	54.00	15.58	203.0	V	177.0
1150.140566	41.20	54.00	12.80	161.0	H	312.0
1239.603867	26.04	54.00	27.96	242.0	H	322.0
1680.935100	36.78	54.00	17.22	149.0	V	330.0
2286.406500	28.97	54.00	25.03	253.0	V	1.0
2813.394833	33.96	54.00	20.04	228.0	V	32.0
2897.396500	34.09	54.00	19.91	299.0	V	331.0
3015.322833	37.38	54.00	16.62	109.0	H	303.0
5744.069500	32.90	54.00	21.10	307.0	V	2.0
5996.387260	33.69	54.00	20.31	332.0	V	340.0

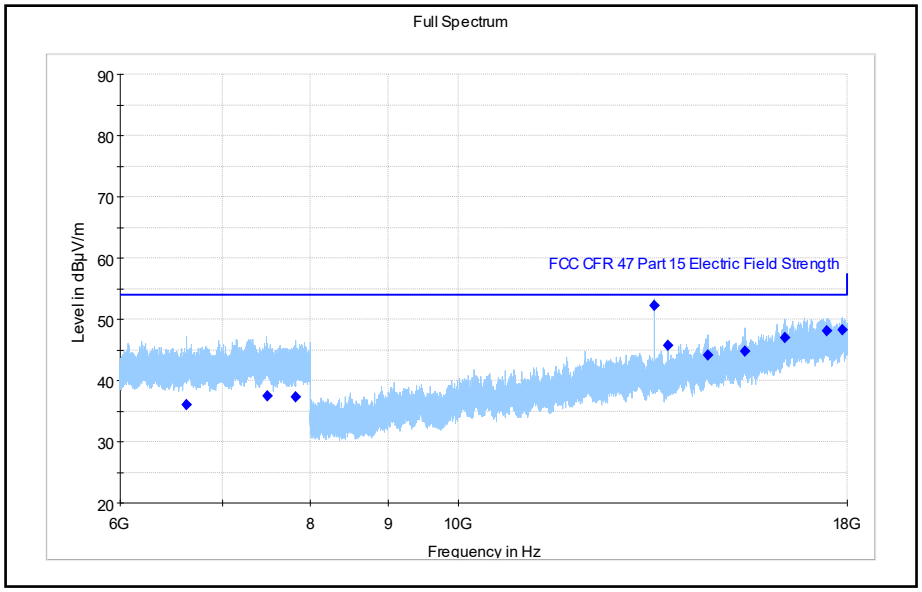


Figure 52 Field Strength of Spurious Radiation (6 GHz – 18 GHz) – QPSK (2546.01 / 2645.01 MHz) (100 + 90 MHz Channel BW)

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarisation	Angle (°)
6636.000000	36.11	54.00	17.89	140.0	H	55.0
7489.400000	37.49	54.00	16.51	195.0	H	78.0
7819.869166	37.37	54.00	16.63	206.0	H	330.0
13452.579360	52.19	54.00	1.81	100.0	V	6.0
13727.950788	45.67	54.00	8.33	154.0	V	307.0
14577.950692	44.16	54.00	9.84	171.0	H	330.0
15414.223412	44.80	54.00	9.20	127.0	H	204.0
16392.657640	47.01	54.00	6.99	232.0	V	329.0
17443.855640	48.03	54.00	5.97	189.0	H	255.0
17872.787252	48.30	54.00	5.70	232.0	H	298.0

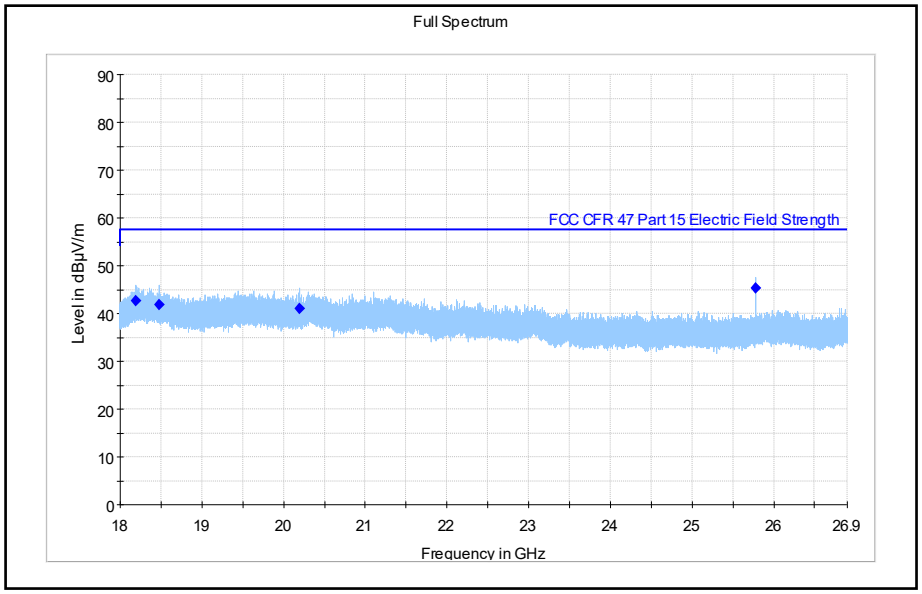


Figure 53 Field Strength of Spurious Radiation (18 GHz – 26.9 GHz) – QPSK (2546.01 / 2645.01 MHz) (100 + 90 MHz Channel BW)

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarisation	Angle (°)
18194.385252	42.66	57.50	14.84	151.0	H	304.0
18473.710000	41.93	57.50	15.57	100.0	H	130.0
20194.514360	41.05	57.50	16.45	100.0	H	214.0
25780.797400	45.26	57.50	12.24	100.0	H	315.0

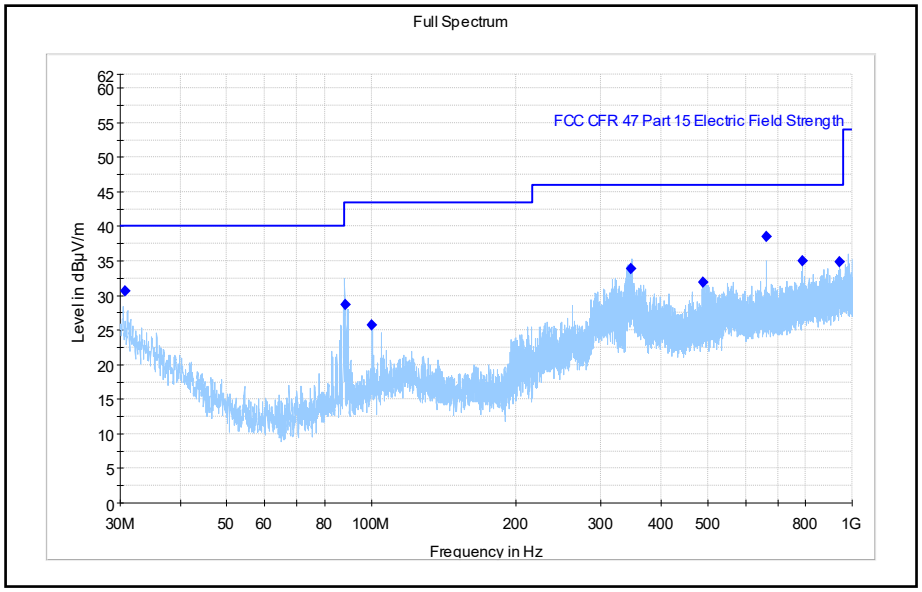


Figure 54 Field Strength of Spurious Radiation (30 MHz – 1 GHz) – QPSK (2503.5 / 2593.02 / 2682.51 MHz) (15 + 40 +15 MHz Channel BW)

Frequency (MHz)	QuasiPeak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarisation	Angle (°)
30.690000	30.67	40.00	9.33	100.0	V	95.0
88.241333	28.75	43.50	14.75	100.0	V	311.0
100.292667	25.69	43.50	17.81	102.0	V	293.0
346.588000	33.83	46.00	12.17	100.0	H	337.0
489.878667	31.93	46.00	14.07	102.0	V	-3.0
663.541667	38.58	46.00	7.42	112.0	H	157.0
787.482667	35.01	46.00	10.99	297.0	H	289.0
940.670000	34.88	46.00	11.12	185.0	V	297.0

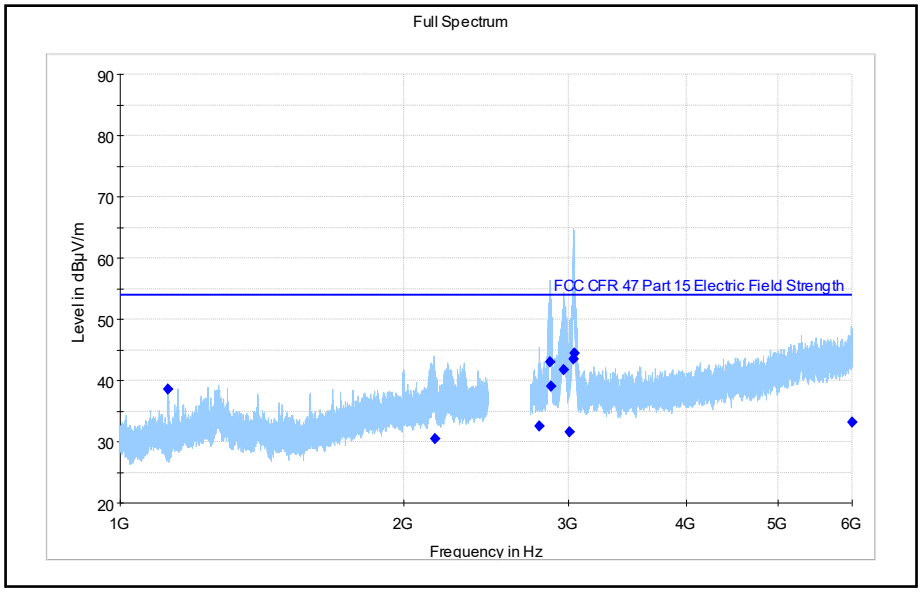


Figure 55 Field Strength of Spurious Radiation (1 GHz – 6 GHz) – QPSK (2503.5 / 2593.02 / 2682.51 MHz) (15 + 40 + 15 MHz Channel BW)

Exclusion band FDL_low - ΔfOBUE < f < FDL_high +ΔfOBUE : 2486 MHz – 2700 MHz

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarisation	Angle (°)
1124.981966	38.61	54.00	15.39	204.0	V	174.0
2160.052834	30.53	54.00	23.47	211.0	H	29.0
2790.182500	32.47	54.00	21.53	244.0	V	31.0
2865.226000	42.97	54.00	11.03	175.0	H	333.0
2871.299500	39.11	54.00	14.89	113.0	V	57.0
2960.604333	41.77	54.00	12.23	168.0	V	-1.0
3001.365000	31.65	54.00	22.35	141.0	H	2.0
3035.441500	43.53	54.00	10.47	194.0	H	0.0
3038.999667	44.46	54.00	9.54	197.0	H	-1.0
5993.178500	33.12	54.00	20.88	275.0	V	159.0

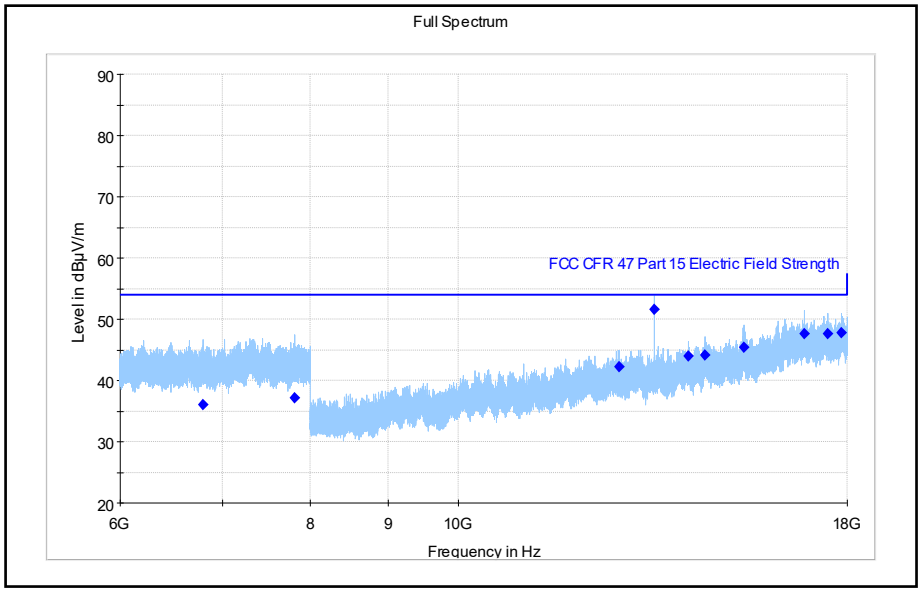


Figure 56 Field Strength of Spurious Radiation (6 GHz – 18 GHz) – QPSK (2503.5 / 2593.02 / 2682.51 MHz) (15 + 40 + 15 MHz Channel BW)

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarisation	Angle (°)
6796.138833	36.11	54.00	17.89	350.0	H	135.0
7809.803500	37.16	54.00	16.84	147.0	H	218.0
12755.134720	42.30	54.00	11.70	253.0	H	62.0
13452.534360	51.65	54.00	2.35	100.0	V	301.0
14157.374452	43.96	54.00	10.04	113.0	H	45.0
14524.030880	44.17	54.00	9.83	128.0	H	135.0
15391.420800	45.35	54.00	8.65	130.0	H	190.0
16868.131468	47.59	54.00	6.41	114.0	H	248.0
17482.661160	47.66	54.00	6.34	132.0	H	39.0
17830.679000	47.85	54.00	6.15	107.0	H	258.0

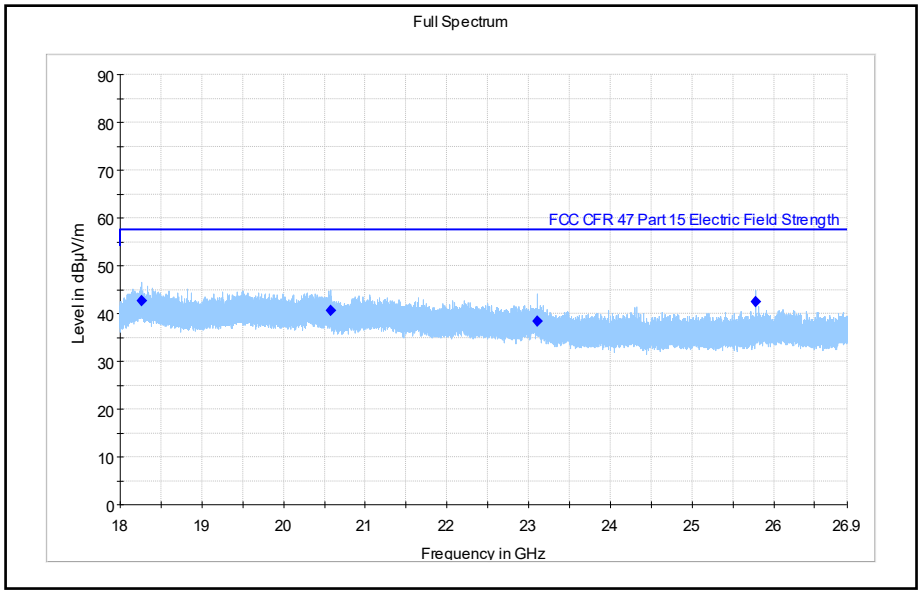


Figure 57 Field Strength of Spurious Radiation (18 GHz – 26.9 GHz) – QPSK (2503.5 / 2593.02 / 2682.51 MHz) (15 + 40 + 15 MHz Channel BW)

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarisation	Angle (°)
18258.860092	42.60	57.50	14.90	100.0	H	195.0
20578.300828	40.59	57.50	16.91	304.0	V	-3.0
23103.510932	38.42	57.50	19.08	100.0	H	135.0
25780.738948	42.42	57.50	15.08	100.0	H	310.0

Appendix A: AEHC 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 AEHC 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 24 dBi. The sixty-four AEHC 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 correlated output signals) from the results of power measurements (highest measured power for channel bandwidth). 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 AEHC antenna is installed directly into the unit. Calculations of worst-case EIRP for sixty-four port MIMO are as follows:

Parameter	NR 15 MHz Ch BW
Worst Case Power Output per Antenna Port	31.23 dBm
Number of Ant Ports per Polarization	32
Total Power per Polarization **10Log32 = + 15.05dB**	46.28 dBm
Cable Loss (site dependent) **= 0.0dB**	46.28 dBm
Maximum Antenna Beamforming Gain per Polarization	24.0 dBi
EIRP per Polarization	70.28 dBm
Number of Polarizations	2
EIRP Total = **Y1 ±45°and Y2 ±45°** **See Note 1**	70.28 dBm
Passing FCC EIRP Limit **See Note 2**	74.76 dBm

EIRP Calculation Summary for the 2.5G band

The worst case AEHC Band 41 64 port MIMO EIRP levels are less than the FCC EIRP Regulatory Limits.

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).
Note 2: 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 AEHC antenna has a horizontal beamwidth of 60 degrees for the 2496 to 2690MHz frequency range. Y was selected to be 6MHz.

Appendix B: AEHC Emission Designators

FCC Emission Designators for Band n41 (2496MHz to 2690MHz) Single Carrier	
Ch BW	5G-NR
	FCC
15MHz	14M70G7W
Note: FCC emission designator is based on 26dB emission bandwidth.	

FCC Emission Designators for Band n41 (2496MHz to 2690MHz) Multi Carrier	
Ch BW	5G-NR
	FCC
10+10MHz contiguous	19M92G7W
Note: FCC emission designator is based on 26dB emission bandwidth.	