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IC id: 661AI-AWMFIA01

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Equipment Under Test:	AirScale Base Transceiver Station Remote Radio Head 4T4R B25/n25, B66/n66 160W 1,9GHz/2,1GHz
Radio Access technology:	NR, E-UTRA and E-UTRA NB-IoT (FDD)
Type:	AWMFIA
Manufacturer:	Nokia Solutions and Networks Oy
Address:	Kaapelitie 4, FI-90620, Oulu, Finland

Task:	Conformance test according to the specifications mentioned below
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Test Specification(s):	FCC 47 CFR part 2 RSS-Gen FCC 47 CFR part 24 FCC 47 CFR part 27 RSS-133 RSS-139 SRSP-510 SRSP-513 SRSP-519
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Result:	The EUT complies with the requirements of the specification
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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

19 Mar 2024



Contents

1	Summary.....	5
1.1	Time Schedule	7
1.2	Participants	7
2	Equipment Under Test.....	8
2.1	Configuration of EUT	8
2.2	Operating Conditions	9
3	Test Configuration	11
3.1	Calibration of the Test Equipment	11
4	Test Results.....	12
4.1	Test No. 1: Transmitter Output Power (§ 2.1046, § 24.232, § 27.50, RSS-Gen, RSS-133, RSS-139, SRSP-510, SRSP-513, SRSP-519)	12
4.1.1	Limits.....	12
4.1.2	Test Procedure and Results.....	12
4.2	Test No. 2: Modulation Characteristics (§ 2.1047, RSS-Gen, RSS-133, RSS-139).....	38
4.3	Test No. 3: Occupied Bandwidth (§ 2.1049, § 2.201, § 24.238, § 27.53 RSS-Gen 6.7)	39
4.3.1	Limits.....	39
4.3.2	Test Procedure and Results.....	39
4.4	Test No. 4 Spurious Emissions at Antenna Terminals (§ 2.1051, § 2.1057, § 24.238, § 27.53) and Transmitter Unwanted Emission (RSS-Gen, RSS-133, RSS-139)	58
4.4.1	Limits.....	58
4.4.2	Test Procedure and Results.....	59
4.1	Test No. 5 Field Strength of Spurious Radiation (§ 2.1053, § 24.238, § 27.53, RSS-Gen 8.9, RSS-133 6.5 and RSS-139 5.6)	84
4.1.1	FCC Section 2.1053 and RSS-Gen Section 8.9 Field Strength of Spurious Emissions	84
4.1.2	Field Strength of Spurious Emissions - Limits.....	84
4.1.3	FCC 15.109 and ICES-003 Class B Radiated Emissions Limits:.....	85

4.1.4	RESULTS:.....	86
4.2	Test No. 6: Frequency Stability (§24.235, §27.54, §2.1055, RSS-139 section 5.4, RSS-133 section 6.3, RSS-Gen 6.11.).....	87
4.2.1	Purpose.....	87
4.2.2	Limits.....	87
4.2.3	Test Configuration	87
4.2.4	Test Procedure and Results.....	88
4.3	Test No. 7 Receiver Spurious Emissions (RSS-Gen)	93
4.3.1	Limits.....	93
4.3.2	Test Procedure and Results.....	93
4.4	Test No. 8 Conducted Emissions (§15.107, RSS-Gen 8.8 and ICES-003 3.2.1)	99
4.4.1	FCC §15.107, RSS-Gen and ICES-003 Class B AC Conducted Emissions Limits:.....	99
4.4.2	RESULTS:.....	99
4.5	Part List of the RF Measurement Test Equipment.....	101
4.6	Spectral Plots.....	103
4.6.1	Test No. 1: RF Output Power	103
4.6.2	Test No. 2: Modulation Characteristics.....	108
4.6.3	Test No. 3: Occupied Bandwidth.....	111
4.6.4	Test No. 4: Spurious Emissions at the Antenna Terminals.....	117
4.6.5	Test No. 5 Field Strength of Spurious Radiation.....	124
4.6.6	Test No. 7 Receiver Spurious Emissions	133
4.6.7	Test No. 8 AC Conducted Emissions	135
Appendix A: AWMFIA NR/E-UTRA Multicarrier Multiband configurations description ..		141
Appendix B: AWMFIA EIRP calculations		143
Appendix C: AWMFIA Emission Designators.....		145

1 Summary

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

Test No.	Measurement	FCC Rule	Page Number of this Report	Result
1	RF Output power Transmitter Output Power	§ 2.1046, § 24.232, § 27.50, RSS-133, 4.1, 6.4 RSS-139, 5.5 SRSP-510, 5.1.1 SRSP-513, 6.1.2, 6.1.3 SRSP-519, 6.1.2, 6.1.3	11	compliant
2	Modulation Characteristics	§ 2.1047, RSS-133, 6.2 RSS-139, 5.3 RSS-Gen.	40	compliant
3	Occupied Bandwidth	§ 2.1049, § 2.201, § 24.238, § 27.53, RSS-Gen, 6.7	41	compliant
4	Spurious Emissions at Antenna Terminals Transmitter Unwanted Emissions (conducted)	§ 2.1051, § 2.1057 § 24.238 § 27.53 RSS-133, 4.2, 6.5 RSS-139, 5.6 RSS-Gen, 6.13	61	compliant
5	Field Strength of Spurious Radiation	RSS-Gen 6.13 §24.238 §27.53 §15.109 ICES-003 3.2.2, class B	88	compliant
6	Frequency Stability	§24.235 §27.54 §2.1055 RSS-139 section 5.4 RSS-133 section 6.3 RSS-Gen 6.11.	91	compliant
7	Receiver Spurious Emissions (conducted)	RSS-Gen, 7.1, 7.4	97	compliant

8	AC PWR Line Conducted	§15.107 RSS-GEN 8.8 ICES-003 3.2.1, class B	102	compliant
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Table 1 Results – Summary

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

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

Test Laboratory:

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OATS number: 661AI-1

Testing laboratory accreditation number: T297

1.1 Time Schedule

Test No.	1, 2, 3, 4, 7	5,8	6
Start of Test:	30 Jan 2024	5 Feb 2024	13 Feb 2024
End of Test:	1 Mar 2024	8 Feb 2024	20 Feb 2024

1.2 Participants

Name	Function	Signature
Mika Kallankari	Tests no: 1,2,3,4 and 7 Setup of EUT	
Juha Orava	Tests no: 6 Setup of EUT	
Pekka Jaakkonen	Test no 5 and 8, Setup of EUT	

2 Equipment Under Test

The EUT is a AirScale Base Transceiver Station Remote Radio Head

The BTS performs the full RAN function of NR and E-UTRA system (New Radio).

2.1 Configuration of EUT

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

Module Type	Airscale BTS RRH 4T4R, B25/B66 40W per antenna 160W per radio
Radio Access Technology	NR, E-UTRA, E-UTRA NB-IoT (In-band, Guard Band, Standalone)
Duplex mode	Frequency Division Duplex (FDD)
Channel Bandwidth	E-UTRA Single carrier 15MHz (B25, B66) (Config. A), E-UTRA Single carrier 10MHz (B25, B66) (Config. B), E-UTRA Single carrier 5MHz (B25, B66) (Config. C), NR Single carrier 15MHz (B25, B66) (Config. D), NR Single carrier 5MHz (B25, B66) (Config. E), NR Single carrier 40MHz (B66) (Config. F), NB-IoT Guard band (NB-IoT GB) Single carrier 15MHz (B25, B66) (Config. G), NB-IoT Guard band (NB-IoT GB) Single carrier 10MHz (B25, B66) (Config. H), NB-IoT Standalone (NB-IoT SA) Single carrier 200kHz (B25, B66) (Config. I), E-UTRA Multicarrier 10MHz+10MHz Contiguous spectrum(B25, B66) (Config. J), E-UTRA Multicarrier 10MHz+10MHz Non-Contiguous spectrum(B25, B66) (Config. K), NR Multicarrier 10MHz+10MHz Contiguous spectrum(B25, B66) (Config. L), NR Multicarrier 10MHz+10MHz Non-Contiguous spectrum(B25, B66) (Config. M), NR Multicarrier 30MHz+35MHz Contiguous spectrum(B25) (Config. N), NR Multicarrier 30MHz+40MHz Contiguous spectrum(B66) (Config. O), AWS Multicarrier Multiband Test Configuration 1 (Config P), PCS Multicarrier Multiband Test Configuration 2 (Config Q), PCS Multicarrier Multiband Test Configuration 3 (Config R), AWS Multicarrier Multiband Test Configuration 4 (Config S), PCS Multicarrier Multiband Test Configuration 5 (Config T), AWS Multicarrier Multiband Test Configuration 6 (Config U), AWS+PCS Multicarrier Multiband Test Configuration 7 (Config V), AWS+PCS Multicarrier Multiband Test Configuration 8 (Config W) AWS+PCS Multicarrier Multiband Test Configuration 9 (Config Z)

	Detailed description of Multicarrier Multiband configurations (Config P, Q, R, S, T, U, V, W and Z) in Appendix A.	
Supply Voltage	48.0 V DC	
Single carrier		
Rated Output Power (Prat)	11W (40.4dBm) to 30W (44.8.0dBm) conducted / carrier	
Dual carrier		
Rated Output Power (Prat)	15W (41.8dBm) conducted / carrier	
Downlink/Uplink ratio		
	RX	TX
Number of Antenna Ports	4 (ANT1 to ANT4)	4 (ANT1 to ANT4)
MiMo	Yes	Yes

Table 2 Overview of EUT configuration

The tests were performed with three EUT at the antenna ports from ANT1 to ANT4. The used different EUT configurations are shown by the following table.

Module Name	Serial-No.	Module Type	Test No.
AWMFIA	YK234500086	RRH	1,2,3,4,7
AWMFIA	YK234500061	RRH	5,8
AWMFIA	YK234500061	RRH	6

Table 3 Configuration of EUT

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

2.2 Operating Conditions

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

The transmitter was set up according to 3GPP TS 38.141 NR Test Models (TM) and 3GPP TS 36.141 E-UTRA Test Models (TM) and NB-IoT Test Model (N-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

- TM 1.1 with N-TM: E-UTRA NB-IoT (In-band, Guard band) QPSK modulation testing
- N-TM: E-UTRA NB-IoT (Standalone) QPSK modulation testing

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

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

3 Test Configuration

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

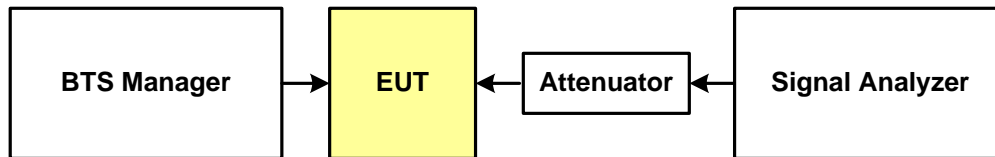


Figure 1 Test Configuration (single output)

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 104 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, § 24.232, § 27.50, RSS-Gen, RSS-133, RSS-139, SRSP-510, SRSP-513, SRSP-519)

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 B.

PCS FCC and ISSED EIRP limits: 1640W/MHz i.e. 62.15dBm/MHz or 3280W/MHz i.e. 65.16dBm/MHz (§ 24.232(a)(2), (b)(2), RSS-133 6.4/ SRSP-510 5.1.1)

AWS FCC EIRP limits: 1640W/MHz i.e. 62.15dBm/MHz or 3280W/MHz i.e. 65.16dBm/MHz (§ 27.50(d)(1), (d)(2))

AWS ISSED EIRP limits: 62.0dBm/MHz or 65.0dBm/MHz (RSS-139 5.5/ SRSP-513 6.1.2, 6.1.3/ SRSP-519 6.1.2, 6.1.3)

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

4.1.2 Test Procedure and Results

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

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

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

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

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

Average Power Spectral density was measured using FSW signal Analyzer.

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

Measured laboratory room temperature and humidity during the tests				
Date	Temperature Min-Max:		Humidity Min-Max:	
30.1.2024 – 19.02.2024	23.6 °C	25.8 °C	4.0 RH%	19.6 RH%

Config A:

Test Model 3.1A Modulation 256QAM TX port 1		Test Model 3.1A Modulation 256QAM TX port 2		Test Model 3.1A Modulation 256QAM TX port 3		Test Model 3.1A Modulation 256QAM TX port 4	
Channel Frequency (MHz)	(dBm)	Channel Frequency (MHz)	(dBm)	Channel Frequency (MHz)	(dBm)	Channel Frequency (MHz)	(dBm)
2117.5	44.59	2117.5	44.63	2117.5	44.73	2117.5	44.79
2155	44.72	2155	44.68	2155	44.70	2155	44.68
2192.5	44.65	2192.5	44.65	2192.5	44.61	2192.5	44.59
Total power	87.63 W		87.58 W		88.14 W		88.30 W
	49.43 dBm		49.42 dBm		49.45 dBm		49.46 dBm

Table 4 RF Power Output (15 MHz BW E-UTRA Band 66)

Config A:

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	44.92	4	44.82	4	44.98	4	44.82
Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	44.52	4	44.49	4	44.33	4	44.44
Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	44.93	4	44.90	4	44.79	4	44.91

Table 5 RF Power Output (Band 25 E-UTRA 15 MHz Channel BW All modulation types)

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	44.71	4	44.66	4	44.77	4	44.58
Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	44.67	4	44.60	4	44.71	4	44.52
Channel Frequency 2192.5MHz		Channel Frequency 2192.5MHz		Channel Frequency 2192.5MHz		Channel Frequency 2192.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	44.62	4	44.53	4	44.68	4	44.49

Table 6 RF Power Output (Band 66 E-UTRA 15 MHz Channel BW All modulation types)

Config B:

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 1935MHz		Channel Frequency 1935MHz		Channel Frequency 1935MHz		Channel Frequency 1935MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	43.61	4	43.53	4	43.51	4	43.52
Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	43.31	4	43.26	4	43.28	4	43.25
Channel Frequency 1990MHz		Channel Frequency 1990MHz		Channel Frequency 1990MHz		Channel Frequency 1990MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	43.59	4	43.54	4	43.69	4	43.65

Table 7 RF Power Output (Band 25 E-UTRA 10 MHz Channel BW All modulation types)

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 2115MHz		Channel Frequency 2115MHz		Channel Frequency 2115MHz		Channel Frequency 2115MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	43.56	4	43.44	4	43.42	4	43.39
Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	43.50	4	43.41	4	43.42	4	43.39
Channel Frequency 2195MHz		Channel Frequency 2195MHz		Channel Frequency 2195MHz		Channel Frequency 2195MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	43.40	4	43.35	4	43.28	4	43.26

Table 8 RF Power Output (Band 66 E-UTRA 10 MHz Channel BW All modulation types)

Config C:

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 1932.5MHz		Channel Frequency 1932.5MHz		Channel Frequency 1932.5MHz		Channel Frequency 1932.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	40.29	4	40.31	4	40.04	4	40.15
Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	40.17	4	40.18	4	40.18	4	40.09
Channel Frequency 1992.5MHz		Channel Frequency 1992.5MHz		Channel Frequency 1992.5MHz		Channel Frequency 1992.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	40.44	4	40.42	4	40.63	4	40.41

Table 9 RF Power Output (Band 25 E-UTRA 5 MHz Channel BW All modulation types)

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 2112.5MHz		Channel Frequency 2112.5MHz		Channel Frequency 2112.5MHz		Channel Frequency 2112.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	40.31	4	40.22	4	40.43	4	40.07
Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	40.37	4	40.27	4	40.54	4	40.26
Channel Frequency 2197.5MHz		Channel Frequency 2197.5MHz		Channel Frequency 2197.5MHz		Channel Frequency 2197.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	40.11	4	40.17	4	39.90	4	40.04

Table 10 RF Power Output (Band 66 E-UTRA 5 MHz Channel BW All modulation types)

Config D:

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	44.83	4	44.78	4	44.76	4	44.76
Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	44.46	4	44.44	4	44.39	4	44.41
Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	44.87	4	44.89	4	44.80	4	44.82

Table 11 RF Power Output (Band 25 NR 15 MHz Channel BW All modulation types)

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	44.74	4	44.66	4	44.57	4	44.55
Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	44.70	4	44.61	4	44.54	4	44.52
Channel Frequency 2192.5MHz		Channel Frequency 2192.5MHz		Channel Frequency 2192.5MHz		Channel Frequency 2192.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	44.60	4	44.55	4	44.51	4	44.48

Table 12 RF Power Output (Band 66 NR 15 MHz Channel BW All modulation types)

Config E:

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 1932.5MHz		Channel Frequency 1932.5MHz		Channel Frequency 1932.5MHz		Channel Frequency 1932.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	40.32	4	40.32	4	40.33	4	40.29
Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	40.19	4	40.21	4	40.23	4	40.18
Channel Frequency 1992.5MHz		Channel Frequency 1992.5MHz		Channel Frequency 1992.5MHz		Channel Frequency 1992.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	40.44	4	40.44	4	40.46	4	40.42

Table 13 RF Power Output (Band 25 NR 5 MHz Channel BW All modulation types)

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 2112.5MHz		Channel Frequency 2112.5MHz		Channel Frequency 2112.5MHz		Channel Frequency 2112.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	40.28	4	40.22	4	40.26	4	40.19
Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	40.33	4	40.31	4	40.32	4	40.27
Channel Frequency 2197.5MHz		Channel Frequency 2197.5MHz		Channel Frequency 2197.5MHz		Channel Frequency 2197.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	40.18	4	40.18	4	40.19	4	40.11

Table 14 RF Power Output (Band 66 NR 5 MHz Channel BW All modulation types)

Config G:

Test Model 1.1 Modulation QPSK		Test Model 1.1 Modulation QPSK	
Channel Frequency 1937.5MHz		Channel Frequency 2117.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)
4	45.21	4	45.13
Channel Frequency 1962.5MHz		Channel Frequency 2155MHz	
Tx Port	(dBm)	Tx Port	(dBm)
4	44.84	4	45.10
Channel Frequency 1987.5MHz		Channel Frequency 2192.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)
4	45.21	4	45.00

Table 15 RF Power Output (Bands 25 and 66 E-UTRA with Guard band NB-IoT15 MHz Channel BW)

Config H:

Test Model 1.1 Modulation QPSK		Test Model 1.1 Modulation QPSK	
Channel Frequency 1935MHz		Channel Frequency 2115MHz	
Tx Port	(dBm)	Tx Port	(dBm)
4	43.68	4	43.61
Channel Frequency 1962.5MHz		Channel Frequency 2155MHz	
Tx Port	(dBm)	Tx Port	(dBm)
4	43.33	4	43.58
Channel Frequency 1990MHz		Channel Frequency 2195MHz	
Tx Port	(dBm)	Tx Port	(dBm)
4	43.69	4	43.46

Table 16 RF Power Output (Bands 25 and 66 E-UTRA with Guard band NB-IoT10 MHz Channel BW)

Config I:

Test Model N-TM Modulation QPSK		Test Model N-TM Modulation QPSK	
Channel Frequency 1930.2MHz		Channel Frequency 2110.2MHz	
Tx Port	(dBm)	Tx Port	(dBm)
4	43.40	4	43.50
Channel Frequency 1962.5MHz		Channel Frequency 2155MHz	
Tx Port	(dBm)	Tx Port	(dBm)
4	43.45	4	43.65
Channel Frequency 1994.8MHz		Channel Frequency 2199.8MHz	
Tx Port	(dBm)	Tx Port	(dBm)
4	43.34	4	43.38

Table 17 RF Power Output (Bands 25 and 66 E-UTRA with Standalone NB-IoT 0.2 MHz Channel BW)

Config J:

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 1935/1945MHz		Channel Frequency 1935/1945MHz		Channel Frequency 1935/1945MHz		Channel Frequency 1935/1945MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.69/42.08	4	41.62/41.99	4	41.58/42.01	4	41.63/42.06
Channel Frequency 1980/1990MHz		Channel Frequency 1980/1990MHz		Channel Frequency 1980/1990MHz		Channel Frequency 1980/1990MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	42.15/41.78	4	42.01/41.75	4	42.03/41.68	4	42.03/41.76

Table 18 RF Power Output (B25 E-UTRA 10+10 MHz Contiguous spectrum Channel BW All modulation types)

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 2115/2125MHz		Channel Frequency 2115/2125MHz		Channel Frequency 2115/2125MHz		Channel Frequency 2115/2125MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.65/41.87	4	41.64/41.80	4	41.52/41.88	4	41.51/41.76
Channel Frequency 2185/2195MHz		Channel Frequency 2185/2195MHz		Channel Frequency 2185/2195MHz		Channel Frequency 2185/2195MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.78/41.56	4	41.66/41.52	4	41.68/41.50	4	41.69/41.48

Table 19 RF Power Output (B66 E-UTRA 10+10 MHz Contiguous spectrum Channel BW All modulation types)

Config K:

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 1935/1990MHz		Channel Frequency 1935/1990MHz		Channel Frequency 1935/1990MHz		Channel Frequency 1935/1990MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.74/41.82	4	41.67/41.71	4	41.81/41.71	4	41.67/41.73

Table 20 RF Power Output (B25 E-UTRA 10+10 MHz Non-contiguous spectrum Channel BW All modulation types)

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 2115/2170MHz		Channel Frequency 2115/2170MHz		Channel Frequency 2115/2170MHz		Channel Frequency 2115/2170MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.37/41.97	4	41.30/42.00	4	41.19/41.91	4	41.20/41.92
Channel Frequency 2130/2195MHz		Channel Frequency 2130/2195MHz		Channel Frequency 2130/2195MHz		Channel Frequency 2130/2195MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.63/41.70	4	41.65/41.65	4	41.58/41.70	4	41.54/41.58

Table 21 RF Power Output (B66 E-UTRA 10+10 MHz Contiguous spectrum Channel BW All modulation types)

Config L:

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 1935/1945MHz		Channel Frequency 1935/1945MHz		Channel Frequency 1935/1945MHz		Channel Frequency 1935/1945MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.67/42.08	4	41.64/42.05	4	41.67/42.09	4	41.63/42.03
Channel Frequency 1980/1990MHz		Channel Frequency 1980/1990MHz		Channel Frequency 1980/1990MHz		Channel Frequency 1980/1990MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	42.04/41.71	4	41.99/41.69	4	42.04/41.75	4	42.01/41.68

Table 22 RF Power Output (B25 NR 10+10 MHz Contiguous spectrum Channel BW All modulation types)

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 2115/2125MHz		Channel Frequency 2115/2125MHz		Channel Frequency 2115/2125MHz		Channel Frequency 2115/2125MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.42/41.72	4	41.38/41.69	4	41.40/41.71	4	41.37/41.64
Channel Frequency 2185/2195MHz		Channel Frequency 2185/2195MHz		Channel Frequency 2185/2195MHz		Channel Frequency 2185/2195MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.63/41.62	4	41.59/41.45	4	41.61/41.44	4	41.57/41.34

Table 23 RF Power Output (B66 NR 10+10 MHz Contiguous spectrum Channel BW All modulation types)

Config M:

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 1935/1990MHz		Channel Frequency 1935/1990MHz		Channel Frequency 1935/1990MHz		Channel Frequency 1935/1990MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.73/41.79	4	41.69/41.80	4	41.72/41.82	4	41.66/41.75

Table 24 RF Power Output (B25 NR 10+10 MHz Non-contiguous spectrum Channel BW All modulation types)

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 2115/2170MHz		Channel Frequency 2115/2170MHz		Channel Frequency 2115/2170MHz		Channel Frequency 2115/2170MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.25/41.96	4	41.21/41.89	4	41.23/41.95	4	41.17/41.84
Channel Frequency 2130/2195MHz		Channel Frequency 2130/2195MHz		Channel Frequency 2130/2195MHz		Channel Frequency 2130/2195MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.53/41.61	4	41.47/41.56	4	41.49/41.59	4	41.42/41.52

Table 25 RF Power Output (B66 NR 10+10 MHz Non-Contiguous spectrum Channel BW All modulation types)

Config N:

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 1945/1977.5MHz		Channel Frequency 1945/1977.5MHz		Channel Frequency 1945/1977.5MHz		Channel Frequency 1945/1977.5MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.93/41.87	4	41.89/41.87	4	41.85/41.79	4	41.82/41.85

Table 26 RF Power Output (B25 NR 30+35 MHz Contiguous spectrum Channel BW All modulation types)

Config O:

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 2125/2160MHz		Channel Frequency 2125/2160MHz		Channel Frequency 2125/2160MHz		Channel Frequency 2125/2160MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.67/42.04	4	41.59/41.97	4	41.52/41.92	4	41.48/41.91
Channel Frequency 2145/2180MHz		Channel Frequency 2145/2180MHz		Channel Frequency 2145/2180MHz		Channel Frequency 2145/2180MHz	
Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)	Tx Port	(dBm)
4	41.74/41.79	4	41.69/41.78	4	41.65/41.72	4	41.64/41.63

Table 27 RF Power Output (B66 NR 30+40 MHz Contiguous spectrum Channel BW All modulation types)

Config P:

Test Model 1.1 Modulation QPSK				
Channel Frequency				
1962.5 MHz 2112.5 MHz 2117.5 MHz 2197.5 MHz				
Tx Port	(dBm)	(dBm)	(dBm)	(dBm)
4	39.81	39.60	39.82	39.98
Test Model 3.1 Modulation 64QAM				
Channel Frequency				
1962.5 MHz 2112.5 MHz 2117.5 MHz 2197.5 MHz				
Tx Port	(dBm)	(dBm)	(dBm)	(dBm)
4	39.79	39.47	39.69	39.80
Test Model 3.2 Modulation 16QAM				
Channel Frequency				
1962.5 MHz 2112.5 MHz 2117.5 MHz 2197.5 MHz				
Tx Port	(dBm)	(dBm)	(dBm)	(dBm)
4	39.76	39.47	39.55	39.75
Test Model 3.1A Modulation 256QAM				
Channel Frequency				
1962.5 MHz 2112.5 MHz 2117.5 MHz 2197.5 MHz				
Tx Port	(dBm)	(dBm)	(dBm)	(dBm)
4	39.72	39.31	39.61	39.69

Table 28 RF Power Output (B25 1xNR 5MHz BW+B66 2x E-UTRA 5MHz BW +1x NR 5MHz BW)

Config Q:

Test Model 1.1 Modulation QPSK				
Channel Frequency				
1932.5 MHz 1937.5 MHz 1992.5 MHz 2155 MHz				
Tx Port	(dBm)	(dBm)	(dBm)	(dBm)
4	39.70	40.08	39.92	39.89
Test Model 3.1 Modulation 64QAM				
Channel Frequency				
1932.5 MHz 1937.5 MHz 1992.5 MHz 2155 MHz				
Tx Port	(dBm)	(dBm)	(dBm)	(dBm)
4	39.62	39.98	39.87	39.85
Test Model 3.2 Modulation 16QAM				
Channel Frequency				
1932.5 MHz 1937.5 MHz 1992.5 MHz 2155 MHz				
Tx Port	(dBm)	(dBm)	(dBm)	(dBm)
4	39.35	40.00	39.88	39.78
Test Model 3.1A Modulation 256QAM				
Channel Frequency				
1932.5 MHz 1937.5 MHz 1992.5 MHz 2155 MHz				
Tx Port	(dBm)	(dBm)	(dBm)	(dBm)
4	39.44	39.99	39.87	39.74

Table 29 RF Power Output (B25 2xE-UTRA 5MHz BW+1xNR 5MHzBW+ B66 1xNR 5MHz BW)

Config R:

Test Model 1.1 Modulation QPSK			
Channel Frequency			
1940 MHz 1967.5 MHz 2155 MHz			
Tx Port	(dBm)	(dBm)	(dBm)
4	41.22	41.37	41.11
Test Model 3.1 Modulation 64QAM			
Channel Frequency			
1940 MHz 1967.5 MHz 2155 MHz			
Tx Port	(dBm)	(dBm)	(dBm)
4	41.15	41.34	41.06
Test Model 3.2 Modulation 16QAM			
Channel Frequency			
1940 MHz 1967.5 MHz 2155 MHz			
Tx Port	(dBm)	(dBm)	(dBm)
4	41.15	41.34	40.97
Test Model 3.1A Modulation 256QAM			
Channel Frequency			
1940 MHz 1967.5 MHz 2155 MHz			
Tx Port	(dBm)	(dBm)	(dBm)
4	41.08	41.26	40.96

Table 30 RF Power Output (B25 1xE-UTRA 20MHz BW+1xNR 35MHzBW+ B66 1xE-UTRA 20MHz BW)

Config S:

Test Model 1.1 Modulation QPSK			
Channel Frequency			
	1962.5 MHz	2120 MHz	2150 MHz
Tx Port	(dBm)	(dBm)	(dBm)
4	40.82	40.93	41.11
Test Model 3.1 Modulation 64QAM			
Channel Frequency			
	1962.5 MHz	2120 MHz	2150 MHz
Tx Port	(dBm)	(dBm)	(dBm)
4	40.86	40.87	41.29
Test Model 3.2 Modulation 16QAM			
Channel Frequency			
	1962.5 MHz	2120 MHz	2150 MHz
Tx Port	(dBm)	(dBm)	(dBm)
4	41.03	40.56	41.20
Test Model 3.1A Modulation 256QAM			
Channel Frequency			
	1962.5 MHz	2120 MHz	2150 MHz
Tx Port	(dBm)	(dBm)	(dBm)
4	40.82	40.69	41.20

Table 31 RF Power Output (B25 1xE-UTRA 20MHz BW + B66 1xE-UTRA 20MHz BW + 1xNR 40MHz BW)

Config T:

Test Model 1.1 Modulation QPSK			
Channel Frequency			
	1950 MHz	1977.5 MHz	2155 MHz
Tx Port	(dBm)	(dBm)	(dBm)
4	41.35	41.29	41.12
Test Model 3.1 Modulation 64QAM			
Channel Frequency			
	1950 MHz	1977.5 MHz	2155 MHz
Tx Port	(dBm)	(dBm)	(dBm)
4	41.33	41.28	41.00
Test Model 3.2 Modulation 16QAM			
Channel Frequency			
	1950 MHz	1977.5 MHz	2155 MHz
Tx Port	(dBm)	(dBm)	(dBm)
4	41.17	41.18	41.27
Test Model 3.1A Modulation 256QAM			
Channel Frequency			
	1950 MHz	1977.5 MHz	2155 MHz
Tx Port	(dBm)	(dBm)	(dBm)
4	41.27	41.20	40.94

Table 32 RF Power Output (B25 1xE-UTRA 20MHz BW + 1xNR 35MHz BW+ B66 1xE-UTRA 20MHz BW)

Config U:

Test Model 1.1 Modulation QPSK			
Channel Frequency			
1962.5 MHz		2150 MHz	2180 MHz
Tx Port	(dBm)	(dBm)	(dBm)
4	40.87	41.18	41.10
Test Model 3.1 Modulation 64QAM			
Channel Frequency			
1962.5 MHz		2150 MHz	2180 MHz
Tx Port	(dBm)	(dBm)	(dBm)
4	40.85	41.07	41.00
Test Model 3.2 Modulation 16QAM			
Channel Frequency			
1962.5 MHz		2150 MHz	2180 MHz
Tx Port	(dBm)	(dBm)	(dBm)
4	40.81	40.74	40.98
Test Model 3.1A Modulation 256QAM			
Channel Frequency			
1962.5 MHz		2150 MHz	2180 MHz
Tx Port	(dBm)	(dBm)	(dBm)
4	40.82	40.95	40.96

Table 33 RF Power Output (B25 1xE-UTRA 20MHz BW+ B66 1xE-UTRA 20MHz BW+ 1x NR 40MHz 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 and ISSED RSS specifications.

Config A:

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	34.05	4	34.06	4	34.78	4	34.03
Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	33.55	4	33.54	4	34.41	4	33.49
Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	34.15	4	34.14	4	34.87	4	34.10

Table 34 Power Spectral Density (B25 E-UTRA 15 MHz Channel BW)

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	33.93	4	33.85	4	34.56	4	33.77
Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	33.74	4	33.65	4	34.51	4	33.60
Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	33.72	4	33.69	4	34.46	4	33.57

Table 35 Power Spectral Density (B66 E-UTRA 15 MHz Channel BW)

Config D:

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	33.82	4	33.81	4	35.26	4	33.75
Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	33.29	4	33.30	4	34.80	4	33.24
Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	33.89	4	33.88	4	35.30	4	33.82

Table 36 Power Spectral Density (B25 NR 15 MHz Channel BW)

Test Model 1.1 Modulation QPSK		Test Model 3.1 Modulation 64QAM		Test Model 3.2 Modulation 16QAM		Test Model 3.1a Modulation 256QAM	
Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	33.58	4	33.52	4	34.98	4	33.46
Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	33.42	4	33.34	4	34.85	4	33.30
Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	33.41	4	33.39	4	34.82	4	33.30

Table 37 Power Spectral Density (B66 NR 15 MHz Channel BW)

Config I:

Test Model N-TM Modulation QPSK		Test Model N-TM Modulation QPSK	
Channel Frequency 1930.2MHz		Channel Frequency 2110.2MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	43.48	4	43.60
Channel Frequency 1962.5MHz		Channel Frequency 2155MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	43.49	4	43.70
Channel Frequency 1994.8MHz		Channel Frequency 2199.8MHz	
Tx Port	dBm/MHz	Tx Port	dBm/MHz
4	43.47	4	43.45

Table 38 Power Spectral Density (B25 and B66 E_UTRA SA-IoT 0.2 MHz Channel BW)

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

Config A:

Test Model 1.1		Test Model 3.1		Test Model 3.2		Test Model 3.1a	
Modulation QPSK		Modulation 64QAM		Modulation 16QAM		Modulation 256QAM	
Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	7.48	4	7.05	4	7.05	4	7.52
Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	7.46	4	7.48	4	7.46	4	7.48
Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	7.52	4	7.05	4	7.48	4	7.52

Table 39 Peak to Average Power (B25 E-UTRA 15 MHz BW)

Test Model 1.1		Test Model 3.1		Test Model 3.2		Test Model 3.1a	
Modulation QPSK		Modulation 64QAM		Modulation 16QAM		Modulation 256QAM	
Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	7.52	4	7.52	4	7.05	4	7.54
Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	7.05	4	7.52	4	7.05	4	7.52
Channel Frequency 2192.5MHz		Channel Frequency 2192.5MHz		Channel Frequency 2192.5MHz		Channel Frequency 2192.5MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	7.52	4	7.54	4	7.52	4	7.54

Table 40 Peak to Average Power (B66 E-UTRA 15 MHz BW)

Config D:

Test Model 1.1		Test Model 3.1		Test Model 3.2		Test Model 3.1a	
Modulation QPSK		Modulation 64QAM		Modulation 16QAM		Modulation 256QAM	
Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz		Channel Frequency 1937.5MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	7.52	4	7.54	4	7.52	4	7.06
Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz		Channel Frequency 1962.5MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	7.05	4	7.05	4	7.05	4	7.52
Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz		Channel Frequency 1987.5MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	7.05	4	7.52	4	7.54	4	7.58

Table 41 Peak to Average Power (B25 NR 15 MHz BW)

Test Model 1.1		Test Model 3.1		Test Model 3.2		Test Model 3.1a	
Modulation QPSK		Modulation 64QAM		Modulation 16QAM		Modulation 256QAM	
Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz		Channel Frequency 2117.5MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	7.05	4	7.52	4	7.54	4	7.56
Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz		Channel Frequency 2155MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	7.54	4	7.54	4	7.52	4	7.56
Channel Frequency 2192.5MHz		Channel Frequency 2192.5MHz		Channel Frequency 2192.5MHz		Channel Frequency 2192.5MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	7.54	4	7.54	4	7.54	4	7.54

Table 42 Peak to Average Power (B66 NR 15 MHz BW)

Config I:

Test Model N-TM Modulation QPSK Channel Frequency 1930.2MHz		Test Model N-TM Modulation QPSK Channel Frequency 2110.2MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	6.08	4	6.09
Channel Frequency 1962.5MHz		Channel Frequency 2155MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	7.14	4	7.02
Channel Frequency 1994.8MHz		Channel Frequency 2199.8MHz	
Tx Port	CCDF 0.1%	Tx Port	CCDF 0.1%
4	6.94	4	6.76

Table 43 Peak to Average Power (B25 and B66 E-UTRa SA-IoT 0.2 MHz BW)

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

4.2 Test No. 2: Modulation Characteristics (§ 2.1047, RSS-Gen, RSS-133, RSS-139)

The occupied bandwidth was measured to be compliant with the manufacturer's specifications and with all requirements of the FCC rules and ISED RSS specifications, which represents the 99% power bandwidth (see the following section and screenshots on page 114).

No further testing is required under this section of the FCC rules and ISED RSS specifications. No measurements other than the occupied bandwidth are required. Sample of modulation screenshots are on page 108, 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, § 24.238, § 27.53 RSS-Gen 6.7)

4.3.1 Limits

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

FCC § 24.238(b) for PCS and § 27.53(h)(3) for AWS: 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.

RSS-Gen. 6.7: The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

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 3.9kHz-1MHz (1-5% of bandwidth; see screenshots on page 111 for details). The following tables summarize the results:

The Relative measurement procedure of OBW is measured as the width of the spectral envelope of the modulated signal, at an amplitude level reduced from a reference value by a specified ratio (or in decibels, a specified number of dB down from the reference value). The typical ratio for transmitters is -26 dB, corresponding to the 26 dB BW. The Relative measurement procedure emission is measured using a signal analyzer with Resolution Bandwidth set to 3.9kHz-1MHz (1-5% of bandwidth; see screenshots on page 115 for details).

Emission designator summary tables are 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:	
02.02.2024 – 16.02.2024	23.6 °C	25.9 °C	4.0 RH%	19.2 RH%

Config A:

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM																										
									Channel Frequency 1937.5MHz																										
Tx Port			99% (MHz)			26dB (MHz)																													
4			13.46			14.63																													
Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz																										
Tx Port			Value 99% (MHz)			Value 26dB (MHz)			Tx Port			99% (MHz)			26dB (MHz)																				
4			13.47			14.51			4			13.47			14.54			4			13.45			14.48			4			13.47			14.56		
									Channel Frequency 1987.5MHz																										
Tx Port			99% (MHz)			26dB (MHz)																													
4			13.45			14.56																													

Table 44 Occupied Bandwidth (Band 25 E-UTRA 15 MHz Channel bandwidth)

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
									Channel Frequency 2117.5MHz		
									Tx Port	99% (MHz)	26dB (MHz)
									1	13.46	14.45
Channel Frequency 2155MHz			Channel Frequency 2155MHz			Channel Frequency 2155MHz			Channel Frequency 2155MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
1	13.47	14.45	1	13.45	14.51	1	13.43	14.48	1	13.46	14.54
									Channel Frequency 2192.5MHz		
									Tx Port	99% (MHz)	26dB (MHz)
									1	13.47	14.56

Table 45 Occupied Bandwidth (Band 66 E-UTRA 15 MHz Channel bandwidth)

Config B:

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
									Channel Frequency 1935MHz		
Tx Port			99% (MHz)			26dB (MHz)					
4			8.98			9.69					
Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	8.97	9.73	4	8.98	9.71	4	8.98	9.69	4	8.97	9.67
									Channel Frequency 1990MHz		
Tx Port			99% (MHz)			26dB (MHz)					
4			8.98			9.69					

Table 46 Occupied Bandwidth (Band 25 E-UTRA 10 MHz Channel bandwidth)

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
									Channel Frequency 2115MHz		
									Tx Port	99% (MHz)	26dB (MHz)
									1	8.97	9.73
Channel Frequency 2155MHz			Channel Frequency 2155MHz			Channel Frequency 2155MHz			Channel Frequency 2155MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
1	8.97	9.71	1	8.96	9.67	1	8.97	9.71	1	8.96	9.69
									Channel Frequency 2195MHz		
									Tx Port	99% (MHz)	26dB (MHz)
									1	8.98	9.69

Table 47 Occupied Bandwidth (Band 66 E-UTRA 10 MHz Channel bandwidth)

Config C:

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
									Channel Frequency 1932.5MHz		
									Tx Port	99% (MHz)	26dB (MHz)
Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	4.49	4.88	4	4.50	4.87	4	4.46	4.87	4	4.49	4.87
									Channel Frequency 1992.5MHz		
									Tx Port	99% (MHz)	26dB (MHz)

Table 48 Occupied Bandwidth (Band 25 E-UTRA 5 MHz Channel bandwidth)

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
									Channel Frequency 2112.5MHz		
									Tx Port	99% (MHz)	26dB (MHz)
									1	4.50	4.84
Channel Frequency 2155MHz			Channel Frequency 2155MHz			Channel Frequency 2155MHz			Channel Frequency 2155MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
1	4.48	4.82	1	4.49	4.87	1	4.48	4.87	1	4.49	4.83
									Channel Frequency 2192.5MHz		
									Tx Port	99% (MHz)	26dB (MHz)
									1	4.50	4.88

Table 49 Occupied Bandwidth (Band 66 E-UTRA 5 MHz Channel bandwidth)

Config D:

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
									Channel Frequency 1937.5MHz		
									Tx Port	99% (MHz)	26dB (MHz)
									4	14.12	15.07
Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	14.12	15.02	4	14.12	15.02	4	14.16	15.04	4	14.16	15.02
									Channel Frequency 1987.5MHz		
									Tx Port	99% (MHz)	26dB (MHz)
									4	14.14	15.02

Table 50 Occupied Bandwidth (Band 25 NR 15 MHz Channel bandwidth)

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
									Channel Frequency 2117.5MHz		
									Tx Port	99% (MHz)	26dB (MHz)
									1	14.12	15.04
Channel Frequency 2155MHz			Channel Frequency 2155MHz			Channel Frequency 2155MHz			Channel Frequency 2155MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
1	14.13	15.04	1	14.11	15.02	1	14.18	14.96	1	14.12	15.07
									Channel Frequency 2192.5MHz		
									Tx Port	99% (MHz)	26dB (MHz)
									1	14.14	15.02

Table 51 Occupied Bandwidth (Band 66 NR 15 MHz Channel bandwidth)

Config E:

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
									Channel Frequency 1932.5MHz		
Tx Port			99% (MHz)			26dB (MHz)					
4			4.47			4.86					
Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz			Channel Frequency 1962.5MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	4.47	4.88	4	4.48	4.83	4	4.50	4.84	4	4.48	4.86
									Channel Frequency 1992.5MHz		
Tx Port			99% (MHz)			26dB (MHz)					
4			4.48			4.86					

Table 52 Occupied Bandwidth (Band 25 NR 5 MHz Channel bandwidth)

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
									Channel Frequency 2112.5MHz		
									Tx Port	99% (MHz)	26dB (MHz)
									1	4.48	4.83
Channel Frequency 2155MHz			Channel Frequency 2155MHz			Channel Frequency 2155MHz			Channel Frequency 2155MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
1	4.47	4.83	1	4.47	4.84	1	4.50	4.83	1	4.48	4.84
									Channel Frequency 2197.5MHz		
									Tx Port	99% (MHz)	26dB (MHz)
									1	4.48	4.83

Table 53 Occupied Bandwidth (Band 66 NR 5 MHz Channel bandwidth)

Config G:

Test Model TM1.1 Modulation QPSK			Test Model TM1.1 Modulation QPSK		
Channel Frequency 1937.5MHz			Channel Frequency 2117.5MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
1	13.74	14.63	4	13.74	14.74
Channel Frequency 1962.5MHz			Channel Frequency 2155MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
1	13.74	14.74	4	13.74	14.74
Channel Frequency 1987.5MHz			Channel Frequency 2192.5MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
1	13.74	14.74	4	13.74	14.69

Table 54 Occupied Bandwidth (Band 25 and Band 66 E-UTRA with Guard band IoT 15 MHz Channel bandwidth)

Config H:

Test Model TM1.1 Modulation QPSK			Test Model TM1.1 Modulation QPSK		
Channel Frequency 1935MHz			Channel Frequency 2115MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
1	9.21	9.83	4	9.20	9.87
Channel Frequency 1962.5MHz			Channel Frequency 2155MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
1	9.20	9.85	4	9.22	9.77
Channel Frequency 1990MHz			Channel Frequency 2195MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
1	9.20	9.91	4	9.20	9.83

Table 55 Occupied Bandwidth (Band 25 and Band 66 E-UTRA with Guard band IoT 10 MHz Channel bandwidth)

Config I:

Test Model N-TM Modulation QPSK			Test Model N-TM Modulation QPSK		
Channel Frequency 1930.2MHz			Channel Frequency 2110.2MHz		
Tx Port	99% (kHz)	26dB (kHz)	Tx Port	99% (kHz)	26dB (kHz)
1	187.52	255.74	4	187.50	270.93
Channel Frequency 1962.5MHz			Channel Frequency 2155MHz		
Tx Port	99% (kHz)	26dB (kHz)	Tx Port	99% (kHz)	26dB (kHz)
1	188.72	269.33	4	188.85	267.73
Channel Frequency 1994.8MHz			Channel Frequency 2199.2MHz		
Tx Port	99% (kHz)	26dB (kHz)	Tx Port	99% (kHz)	26dB (kHz)
1	187.49	271.33	4	189.62	252.55

Table 56 Occupied Bandwidth (Band 25 and Band 66 E-UTRA with Standalone IoT 0.2 MHz Channel bandwidth)

Config J:

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
Channel Frequency 1935MHz/1945MHz			Channel Frequency 1935MHz/1945MHz			Channel Frequency 1935MHz/1945MHz			Channel Frequency 1935MHz/1945MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	18.90	19.98	4	18.90	19.98	4	18.94	19.90	4	18.93	19.90
Channel Frequency 1980MHz/1990MHz			Channel Frequency 1980MHz/1990MHz			Channel Frequency 1980MHz/1990MHz			Channel Frequency 1980MHz/1990MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	18.90	19.94	4	18.90	19.94	4	18.89	19.86	4	18.92	19.86

Table 57 Occupied Bandwidth (Band 25 E-UTRA 10MHz+10MHz contiguous spectrum Channel bandwidth)

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
Channel Frequency 2115MHz/2125MHz			Channel Frequency 2115MHz/2125MHz			Channel Frequency 2115MHz/2125MHz			Channel Frequency 2115MHz/2125MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	18.92	19.98	4	18.90	19.94	4	18.87	19.94	4	18.93	20.02
Channel Frequency 2185MHz/2195MHz			Channel Frequency 2185MHz/2195MHz			Channel Frequency 2185MHz/2195MHz			Channel Frequency 2185MHz/2195MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	18.90	19.90	4	18.90	19.94	4	18.96	19.90	4	18.93	19.94

Table 58 Occupied Bandwidth (Band 66 E-UTRA 10MHz+10MHz contiguous spectrum Channel bandwidth)

Config K:

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
Channel Frequency 1935MHz/1990MHz			Channel Frequency 1935MHz/1990MHz			Channel Frequency 1935MHz/1990MHz			Channel Frequency 1935MHz/1990MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	8.97 / 8.97	9.75 / 9.71	4	8.99 / 8.98	9.65 / 9.69	4	8.97 / 8.96	9.71 / 9.65	4	8.98 / 8.97	9.65 / 9.65

Table 59 Occupied Bandwidth (Band 25 E-UTRA 10MHz+10MHz non-contiguous spectrum Channel bandwidth)

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
Channel Frequency 2115MHz/2170MHz			Channel Frequency 2115MHz/2170MHz			Channel Frequency 2115MHz/2170MHz			Channel Frequency 2115MHz/2170MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	8.97 / 8.97	9.75 / 9.67	4	8.97 / 8.97	9.69 / 9.67	4	8.97 / 8.98	9.73 / 9.67	4	8.98 / 8.97	9.69 / 9.65
Channel Frequency 2130MHz/2195MHz			Channel Frequency 2130MHz/2195MHz			Channel Frequency 2130MHz/2195MHz			Channel Frequency 2130MHz/2195MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	8.97 / 8.97	9.71 / 9.65	4	8.98 / 8.97	9.75 / 9.77	4	8.97 / 8.98	9.69 / 9.63	4	8.97 / 8.97	9.69 / 9.71

Table 60 Occupied Bandwidth (Band 66 E-UTRA 10MHz+10MHz non-contiguous spectrum Channel bandwidth)

Config L:

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
Channel Frequency 1935MHz/1945MHz			Channel Frequency 1935MHz/1945MHz			Channel Frequency 1935MHz/1945MHz			Channel Frequency 1935MHz/1945MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	19.24	20.30	4	19.23	20.26	4	19.11	20.18	4	19.22	20.26
Channel Frequency 1980MHz/1990MHz			Channel Frequency 1980MHz/1990MHz			Channel Frequency 1980MHz/1990MHz			Channel Frequency 1980MHz/1990MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	19.21	20.26	4	19.20	20.26	4	19.08	20.14	4	19.24	20.22

Table 61 Occupied Bandwidth (Band 25 NR 10MHz+10MHz contiguous spectrum Channel bandwidth)

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
Channel Frequency 2115MHz/2125MHz			Channel Frequency 2115MHz/2125MHz			Channel Frequency 2115MHz/2125MHz			Channel Frequency 2115MHz/2125MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	19.22	20.26	4	19.24	20.22	4	19.10	20.18	4	19.25	20.22
Channel Frequency 2185MHz/2195MHz			Channel Frequency 2185MHz/2195MHz			Channel Frequency 2185MHz/2195MHz			Channel Frequency 2185MHz/2195MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	19.22	20.22	4	19.23	20.22	4	19.11	20.22	4	19.26	20.22

Table 62 Occupied Bandwidth (Band 66 NR 10MHz+10MHz contiguous spectrum Channel bandwidth)

Config M:

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
Channel Frequency 1935MHz/1990MHz			Channel Frequency 1935MHz/1990MHz			Channel Frequency 1935MHz/1990MHz			Channel Frequency 1935MHz/1990MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	9.30 / 9.30	9.95 / 9.95	4	9.29 / 9.30	9.91 / 9.95	4	9.23 / 9.24	9.77 / 9.89	4	9.30 / 9.31	9.89 / 9.91

Table 63 Occupied Bandwidth (Band 25 NR 10MHz+10MHz non-contiguous spectrum Channel bandwidth)

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
Channel Frequency 2115MHz/2170MHz			Channel Frequency 2115MHz/2170MHz			Channel Frequency 2115MHz/2170MHz			Channel Frequency 2115MHz/2170MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	9.29 / 9.30	9.93 / 9.95	4	9.28 / 9.29	9.95 / 9.95	4	9.21 / 9.26	9.83 / 9.95	4	9.30 / 9.31	9.91 / 9.93
Channel Frequency 2130MHz/2195MHz			Channel Frequency 2130MHz/2195MHz			Channel Frequency 2130MHz/2195MHz			Channel Frequency 2130MHz/2195MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	9.29 / 9.30	9.95 / 9.95	4	9.30 / 9.29	9.91 / 9.97	4	9.24 / 9.25	9.89 / 9.87	4	9.31 / 9.30	9.97 / 9.95

Table 64 Occupied Bandwidth (Band 66 NR 10MHz+10MHz non-contiguous spectrum Channel bandwidth)

Config N:

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
Channel Frequency 1945MHz/1977.5MHz			Channel Frequency 1945MHz/1977.5MHz			Channel Frequency 1945MHz/1977.5MHz			Channel Frequency 1945MHz/1977.5MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	63.18	65.97	4	63.16	65.97	4	63.42	65.97	4	63.20	65.97

Table 65 Occupied Bandwidth (Band 25 NR 30MHz+35MHz Contiguous spectrum Channel bandwidth)

Config O:

Test Model 1.1 Modulation QPSK			Test Model 3.1 Modulation 64QAM			Test Model 3.2 Modulation 16QAM			Test Model 3.1a Modulation 256QAM		
Channel Frequency 2125MHz/2160MHz			Channel Frequency 2125MHz/2160MHz			Channel Frequency 2125MHz/2160MHz			Channel Frequency 2125MHz/2160MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	68.31	71.05	4	68.20	71.05	4	68.54	71.05	4	68.17	71.05
Channel Frequency 2145MHz/2180MHz			Channel Frequency 2145MHz/2180MHz			Channel Frequency 2145MHz/2180MHz			Channel Frequency 2145MHz/2180MHz		
Tx Port	99% (MHz)	26dB (MHz)	Tx Port	Value 99% (MHz)	Value 26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)	Tx Port	99% (MHz)	26dB (MHz)
4	68.31	71.05	4	68.22	71.05	4	68.49	71.05	4	68.26	71.05

Table 66 Occupied Bandwidth (Band 66 NR 30MHz+40MHz contiguous spectrum Channel bandwidth)

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

4.4 Test No. 4 Spurious Emissions at Antenna Terminals (§ 2.1051, § 2.1057, § 24.238, § 27.53) and Transmitter Unwanted Emission (RSS-Gen, RSS-133, RSS-139)

4.4.1 Limits

FCC §27.53(h)(1) for AWS and §24.238(a) for PCS. 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]: $30 + 10 \log_{10} P$ (conversion from W to dBm)

Attenuation required by FCC: $43 + 10 \log_{10} P$

Compliance limit = Maximum transmitter output power - Required attenuation
 $= 30 + 10 \log_{10} P - (43 + 10 \log_{10} P) = \underline{-13 \text{ dBm}}$

RSS-133, 6.51 for PCS. Equipment shall comply with the limits in (i) and (ii) below.

- i. In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} P$ (watts).
- ii. After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} P$ (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

RSS-139, 5.6 Table 6 for AWS. Offset from the edge of the frequency block or frequency block group over the 1MHz unwanted emission limit is -13dBm/MHz and below 1MHz limit is -13 dBm/MHz (1% of occupied bandwidth).

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

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

4.4.2 Test Procedure and Results

The tests were carried out in accordance with § 27.53§, 24.238, RSS-133, RSS-139, RSS-199. 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 and RSS-Gen 6.13.2, 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 117 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:	
19.02.2024 – 01.03 2024	23.7 °C	26.2 °C	9.5 RH%	20.8 RH%

Config A Lower band edge:

Carrier Frequency: 1937.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	1929.99	-25.87	compliant
64QAM-Modulation TX port 4			
	1930.00	-25.94	compliant
16QAM-Modulation TX port 4			
	1929.98	-26.18	compliant
256QAM-Modulation TX port 4			
	1930.00	-25.78	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 67 Spurious Emissions (Lower band edge) (Band 25 E-UTRA 15 MHz CH BW)

Carrier Frequency: 2117.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	2110.00	-27.05	compliant
64QAM-Modulation TX port 4			
	2109.98	-27.51	compliant
16QAM-Modulation TX port 4			
	2110.00	-27.57	compliant
256QAM-Modulation TX port 4			
	2109.99	-27.34	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 68 Spurious Emissions (Lower band edge) (Band 66 E-UTRA 15 MHz CH BW)

Config A Upper band edge:

Carrier Frequency: 1987.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	1995.03	-26.89	compliant
64QAM-Modulation TX port 4			
	1995.00	-26.87	compliant
16QAM-Modulation TX port 4			
	1995.00	-26.60	compliant
256QAM-Modulation TX port 4			
	1995.00	-26.86	compliant
		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, Measurement Uncertainty: 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 69 Spurious Emissions (Upper band edge) (Band 25 E-UTRA 15 MHz CH BW)

Carrier Frequency: 2192.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	2200.00	-26.62	compliant
64QAM-Modulation TX port 4			
	2200.00	-26.96	compliant
16QAM-Modulation TX port 4			
	2200.00	-26.82	compliant
256QAM-Modulation TX port 4			
	2200.00	-27.33	compliant
		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, Measurement Uncertainty: 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 70 Spurious Emissions (Upper band edge) (Band 66 E-UTRA 15 MHz CH BW)

Config A Spurious emissions:

Carrier Frequency: 1962.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9244.63	-26.81	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9247.40	-26.85	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9246.61	-26.74	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	9246.61	-26.74	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 71 Spurious Emissions (Band 25 E-UTRA 15 MHz Channel BW)

Carrier Frequency: 2155 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9247.40	-26.91	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9250.17	-27.00	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9247.01	-26.85	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	9253.74	-26.93	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 72 Spurious Emissions (Band 66 E-UTRA 15 MHz Channel BW)

Config D Lower band edge:

Carrier Frequency: 1937.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	1929.99	-20.39	compliant
64QAM-Modulation TX port 4			
	1930.00	-20.81	compliant
16QAM-Modulation TX port 4			
	1930.00	-20.67	compliant
256QAM-Modulation TX port 4			
	1930.00	-20.22	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 73 Spurious Emissions (Lower band edge) (Band 25 NR 15 MHz CH BW)

Carrier Frequency: 2117.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	2110.00	-20.68	compliant
64QAM-Modulation TX port 4			
	2110.00	-20.57	compliant
16QAM-Modulation TX port 4			
	2110.00	-21.50	compliant
256QAM-Modulation TX port 4			
	2110.00	-21.76	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 74 Spurious Emissions (Lower band edge) (Band66 NR 15 MHz CH BW)

Config D Upper band edge:

Carrier Frequency: 3960 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	1995.02	-20.76	compliant
64QAM-Modulation TX port 4			
	1995.01	-21.72	compliant
16QAM-Modulation TX port 4			
	1995.00	-20.34	compliant
256QAM-Modulation TX port 4			
	1995.01	-20.55	compliant
		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, Measurement Uncertainty: 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 75 Spurious Emissions (Upper band edge) (Band 25 NR 15MHz CH BW)

Carrier Frequency: 2192.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	2200.02	-22.98	compliant
64QAM-Modulation TX port 4			
	2200.00	-21.50	compliant
16QAM-Modulation TX port 4			
	2200.00	-20.09	compliant
256QAM-Modulation TX port 4			
	2200.00	-21.90	compliant
		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, Measurement Uncertainty: 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 76 Spurious Emissions (Upper band edge) (Band 66 NR 15MHz CH BW)

Config D Spurious emissions:

Carrier Frequency: 1962.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9247.80	-26.77	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9240.67	-26.84	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9245.03	-26.93	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	9247.40	-26.99	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 77 Spurious Emissions (Band 25 NR 15MHz Channel BW)

Carrier Frequency: 2155 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9243.84	-26.88	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9255.32	-26.83	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9248.99	-26.78	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	9250.97	-26.78	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 78 Spurious Emissions (Band 66 NR 15MHz Channel BW)

Config I Lower band edge:

Carrier Frequency: 1930.2 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	1929.99	-21.42	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 79 Spurious Emissions (Lower band edge) (B25 E-UTRA SA-IoT 0.2MHz CH BW)

Carrier Frequency: 2110.2 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	2109.88	-23.85	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 80 Spurious Emissions (Lower band edge) (B66 E-UTRA SA-IoT 0.2MHz CH BW)

Config I Upper band edge:

Carrier Frequency: 1994.8 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	1995.01	-20.15	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 81 Spurious Emissions (Upper band edge) (B25 E-UTRA SA-IoT 0.2MHz CH BW)

Carrier Frequency: 2199.8 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	2200.02	-19.24	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 82 Spurious Emissions (Upper band edge) (B66 E-UTRA SA-IoT 0.2MHz CH BW)

Config I Spurious emissions:

Carrier Frequency: 1962.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9245.82	-27.11	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 83 Spurious Emissions (B25 E-UTRA SA-IoT 0.2 MHz Channel BW)

Carrier Frequency: 2155 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9249.38	-27.04	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 84 Spurious Emissions (B66 E-UTRA SA-IoT 0.2 MHz Channel BW)

Config J Lower band edge:

Carrier Frequency: 1935/1945 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	1930.00	-21.33	compliant
64QAM-Modulation TX port 4			
	1929.99	-20.90	compliant
16QAM-Modulation TX port 4			
	1930.00	-21.20	compliant
256QAM-Modulation TX port 4			
	1930.00	-21.51	compliant
		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, Measurement Uncertainty: 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 85 Spurious Emissions (Lower band edge) (B25 E-UTRA 10MHz+10MHz CH BW)

Carrier Frequency: 2115/2125 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	2110.00	-20.75	compliant
64QAM-Modulation TX port 4			
	2109.98	-22.56	compliant
16QAM-Modulation TX port 4			
	2109.98	-22.98	compliant
256QAM-Modulation TX port 4			
	2110.00	-21.87	compliant
		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, Measurement Uncertainty: 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 86 Spurious Emissions (Lower band edge) (B66 E-UTRA 10MHz+10MHz CH BW)

Config J Upper band edge:

Carrier Frequency: 1980/1990 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	1995.00	-22.43	compliant
64QAM-Modulation TX port 4			
	1995.02	-22.35	compliant
16QAM-Modulation TX port 4			
	1995.00	-21.79	compliant
256QAM-Modulation TX port 4			
	1995.00	-21.67	compliant
		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, Measurement Uncertainty: 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 87 Spurious Emissions (Upper band edge) (B25 E-UTRA 10MHz+10MHz CH BW)

Carrier Frequency: 2185/2195 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	2200.00	-22.27	compliant
64QAM-Modulation TX port 4			
	2200.00	-21.50	compliant
16QAM-Modulation TX port 4			
	2200.01	-21.93	compliant
256QAM-Modulation TX port 4			
	2200.00	-21.96	compliant
		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, Measurement Uncertainty: 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 88 Spurious Emissions (Upper band edge) (B66 E-UTRA 10MHz+10MHz CH BW)

Config J Spurious emissions:

Carrier Frequency: 1957.5/1967.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9254.93	-26.94	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9243.84	-26.84	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9239.09	-26.77	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	9236.71	-26.87	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 89 Spurious Emissions (B25 E-UTRA 10MHz+10MHz Channel BW)

Carrier Frequency: 2150/2160 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9247.40	-26.86	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9246.21	-26.94	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9242.25	-26.63	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	9246.21	-26.66	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 90 Spurious Emissions (B66 E-UTRA 10MHz+10MHz Channel BW)

Config K Lower band edge:

Carrier Frequency: 1935 / 1990 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	1929.99	-19.97	compliant
64QAM-Modulation TX port 4			
	1930.00	-20.80	compliant
16QAM-Modulation TX port 4			
	1930.00	-20.13	compliant
256QAM-Modulation TX port 4			
	1930.00	-20.54	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 91 Spurious Emissions (Lower band edge) (Band 25 E-UTRA10+10 MHz CH BW)

Carrier Frequency: 2115 / 2170 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	2110.00	-20.32	compliant
64QAM-Modulation TX port 4			
	2109.99	-20.31	compliant
16QAM-Modulation TX port 4			
	2110.00	-20.62	compliant
256QAM-Modulation TX port 4			
	2110.00	-21.12	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 92 Spurious Emissions (Lower band edge) (Band 66 E-UTRA 10+10 MHz CH BW)

Config K Upper band edge:

Carrier Frequency: 1935 / 1990 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	1995.00	-20.91	compliant
64QAM-Modulation TX port 4			
	1995.00	-20.14	compliant
16QAM-Modulation TX port 4			
	1995.02	-21.43	compliant
256QAM-Modulation TX port 4			
	1995.00	-20.79	compliant
		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, Measurement Uncertainty: 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 93 Spurious Emissions (Upper band edge) (Band 25 E-UTRA 10+10 MHz CH BW)

Carrier Frequency: 2130 / 2195 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	2200.00	-20.61	compliant
64QAM-Modulation TX port 4			
	2200.00	-19.99	compliant
16QAM-Modulation TX port 4			
	2200.01	-20.29	compliant
256QAM-Modulation TX port 4			
	2200.00	-20.28	compliant
		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, Measurement Uncertainty: 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 94 Spurious Emissions (Upper band edge) (Band 66 E-UTRA 10+10 MHz CH BW)

Config K Spurious emissions:

Carrier Frequency: 1935 / 1990 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9250.97	-26.84	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9246.61	-26.94	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9253.34	-26.99	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	9245.03	-26.69	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 95 Spurious Emissions (Band 25 E-UTRA 10+10 MHz CH BW)

Carrier Frequency: 2117.5 / 2192.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9243.84	-26.86	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9247.01	-26.72	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9244.63	-26.81	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	94241.86	-26.75	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 96 Spurious Emissions (Band 66 E-UTRA 10+10 MHz CH BW)

Config N Lower band edge:

Carrier Frequency: 1945 / 1977.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port15			
	1929.5	-25.72	compliant
16QAM-Modulation TX port 15			
	1929.5	-25.93	compliant
64QAM-Modulation TX port 15			
	1929.5	-25.92	compliant
256QAM-Modulation TX port 15			
	1929.5	-26.03	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 97 Spurious Emissions (Lower band edge) (B25 NR 30+35 MHz CH BW)

Config N Upper band edge:

Carrier Frequency: 1945 / 1977.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	1995.5	-23.53	compliant
64QAM-Modulation TX port 4			
	1995.5	-24.06	compliant
16QAM-Modulation TX port 4			
	1995.5	-23.54	compliant
256QAM-Modulation TX port 4			
	1995.5	-23.98	compliant
		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, Measurement Uncertainty: 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 98 Spurious Emissions (Upper band edge) (B25 NR 30+35 MHz CH BW)

Config N Spurious emissions:

Carrier Frequency: 1945 / 1977.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9256.91	-27.00	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9250.57	-26.79	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9238.29	-26.84	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	9251.36	-26.59	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 99 Spurious Emissions (B25 NR 30+35 MHz Channel BW)

Config O Lower band edge:

Carrier Frequency: 2125 / 2160 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	2109.5	-27.32	compliant
64QAM-Modulation TX port 4			
	2109.5	-27.02	compliant
16QAM-Modulation TX port 4			
	2109.5	-27.17	compliant
256QAM-Modulation TX port 4			
	2109.5	-27.17	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 100 Spurious Emissions (Lower band edge) (B66 NR 30+40 MHz CH BW)

Config O Upper band edge:

Carrier Frequency: 2145 / 2180 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
	2200.5	-27.22	compliant
64QAM-Modulation TX port 4			
	2200.5	-27.21	compliant
16QAM-Modulation TX port 4			
	2200.5	-27.25	compliant
256QAM-Modulation TX port 4			
	2200.5	-27.28	compliant
		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f <3.6GHz: ±1.2dB, Measurement Uncertainty:3.6GHz ≤ f <8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 101 Spurious Emissions (Upper band edge) (B66 NR 30+40 MHz CH BW)

Config O Spurious emissions:

Carrier Frequency: 2135 / 2170 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9245.42	-26.92	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9249.78	-26.91	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9244.63	-26.70	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	9247.80	-26.80	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 102 Spurious Emissions (B66 NR 30+40 MHz Channel BW)

Config P Lower band edge B66:

Carrier Frequency: 2112.5 / 2117.5 / 2197.5 / 1962.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
2109-2110	2110.00	-21.17	compliant
64QAM-Modulation TX port 4			
2109-2110	2110.00	-20.47	compliant
16QAM-Modulation TX port 4			
2109-2110	2110.00	-21.24	compliant
256QAM-Modulation TX port 4			
2109-2110	2110.00	-20.19	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 103 Spurious Emissions (Lower band edge) (B66 2x E-UTRA 5MHz BW +1x NR 5MHz BW+ B25 1xNR 5MHz BW)

Config P Upper band edgeB66:

Carrier Frequency: 2112.5 / 2117.5 / 2197.5 / 1962.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
2200-2201	2200.00	-28.08	compliant
64QAM-Modulation TX port 4			
2200-2201	2200.00	-28.54	compliant
16QAM-Modulation TX port 4			
2200-2201	2200.00	-26.98	compliant
256QAM-Modulation TX port 4			
2200-2201	2200.00	-28.58	compliant
		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, Measurement Uncertainty: 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 104 Spurious Emissions (Upper band edge) (B66 2x E-UTRA 5MHz BW +1x NR 5MHz BW+ B25 1xNR 5MHz BW)

Config P Spurious emissions:

Carrier Frequency: 2112.5 / 2117.5 / 2197.5 / 1962.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	3735	-35.01	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	3735	-35.25	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	3735	-34.47	compliant
256QAM-Modulation TX port 4			
0.009 – 39800	3735	-34.25	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 105 Spurious Emissions (B66 2x E-UTRA 5MHz BW +1x NR 5MHz BW+ B25 1xNR 5MHz BW)

Config Q Lower band edge B25:

Carrier Frequency: 1932.5 / 1937.5 / 1992.5 / 2155 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
1929-1930	1930.00	-23.95	compliant
64QAM-Modulation TX port 4			
1929-1930	1930.00	-24.25	compliant
16QAM-Modulation TX port 4			
1929-1930	1930.00	-24.27	compliant
256QAM-Modulation TX port 4			
1929-1930	1930.00	-23.89	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 106 Spurious Emissions (Lower band edge) (B25 2x E-UTRA 5MHz BW +1x NR 5MHz BW+ B66 1xNR 5MHz BW)

Config Q Upper band edgeB25:

Carrier Frequency: 1932.5 / 1937.5 / 1992.5 / 2155 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
1995-1996	1995.00	-28.37	compliant
16QAM-Modulation TX port 4			
1995-1996	1995.00	-28.34	compliant
64QAM-Modulation TX port 4			
1995-1996	1995.00	-28.17	compliant
256QAM-Modulation TX port 4			
1995-1996	1995.00	-28.84	compliant
		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, Measurement Uncertainty: 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 107 Spurious Emissions (Upper band edge) (B25 2x E-UTRA 5MHz BW +1x NR 5MHz BW+ B66 1xNR 5MHz BW)

Config Q Spurious emissions:

Carrier Frequency: 1932.5 / 1937.5 / 1992.5 / 2155 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9240.67	-26.99	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9248.59	-26.77	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9252.95	-26.88	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	9251.36	-26.79	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 108 Spurious Emissions (B25 2x E-UTRA 5MHz BW +1x NR 5MHz BW+ B66 1xNR 5MHz BW)

Config R Lower band edge B25:

Carrier Frequency: 1940 / 1967.5 / 2155 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
1929-1930	1929.5	-25.96	compliant
64QAM-Modulation TX port 4			
1929-1930	1929.5	-25.73	compliant
16QAM-Modulation TX port 4			
1929-1930	1929.5	-25.88	compliant
256QAM-Modulation TX port 4			
1929-1930	1929.5	-25.91	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 109 Spurious Emissions (Lower band edge) (B25 1x E-UTRA 20MHz BW +1x NR 35MHz BW+ B66 1xNR 20MHz BW)

Config R Spurious emissions:

Carrier Frequency: 1940 / 1967.5 / 2155 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9246.61	-27.08	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9244.63	-27.05	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9248.99	-27.15	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	9242.25	-26.97	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 110 Spurious Emissions (B25 1x E-UTRA 20MHz BW +1x NR 35MHz BW+ B66 1xNR 20MHz BW)

Config S Lower band edge B66:

Carrier Frequency: 2120 / 2150 / 1962.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
2109-2110	2109.5	-27.65	compliant
64QAM-Modulation TX port 4			
2109-2110	2109.5	-27.77	compliant
16QAM-Modulation TX port 4			
2109-2110	2109.5	-27.83	compliant
256QAM-Modulation TX port 4			
2109-2110	2109.5	-27.71	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 111 Spurious Emissions (Lower band edge) (B66 1x E-UTRA 20MHz BW +1x NR 40MHz BW+ B25 1xE-UTRA 20MHz BW)

Config S Spurious emissions:

Carrier Frequency: 2120 / 2150 / 1962.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9251.36	-31.77	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9248.99	-31.83	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9243.44	-31.71	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	9242.65	-31.76	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 112 Spurious Emissions (B66 1x E-UTRA 20MHz BW +1x NR 40MHz BW+ B25 1xE-UTRA 20MHz BW)

Config T Upper band edge B25:

Carrier Frequency: 1950 / 1977.5 / 2155 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
1995-1996	1995.5	-24.60	compliant
64QAM-Modulation TX port 4			
1995-1996	1995.5	-24.61	compliant
16QAM-Modulation TX port 4			
1995-1996	1995.5	-24.33	compliant
256QAM-Modulation TX port 4			
1995-1996	1995.5	-24.84	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 113 Spurious Emissions (Lower band edge) (B25 1x E-UTRA 20MHz BW +1x NR 35MHz BW+ B66 1xE-UTRA 20MHz BW)

Config T Spurious emissions:

Carrier Frequency: 1950 / 1977.5 / 2155 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9242.65	-27.00	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9250.97	-26.99	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9248.59	-26.96	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	9237.50	-27.06	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 114 Spurious Emissions (B25 1x E-UTRA 20MHz BW +1x NR 35MHz BW+ B66 1xE-UTRA 20MHz BW)

Config U Upper band edge B66:

Carrier Frequency: 2150 / 2180 / 1962.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
2200-2201	2200.5	-26.14	compliant
64QAM-Modulation TX port 4			
2200-2201	2200.5	-26.57	compliant
16QAM-Modulation TX port 4			
2200-2201	2200.5	-27.61	compliant
256QAM-Modulation TX port 4			
2200-2201	2200.5	-27.61	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 115 Spurious Emissions (Lower band edge) (B66 1x E-UTRA 20MHz BW +1x NR 40MHz BW+ B25 1xE-UTRA 20MHz BW)

Config U Spurious emissions:

Carrier Frequency: 2150 / 2180 / 1962.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX port 4			
0.009 – 22000	9248.59	-31.63	compliant
64QAM-Modulation TX port 4			
0.009 – 22000	9254.13	-31.79	compliant
16QAM-Modulation TX port 4			
0.009 – 22000	9225.72	-31.81	compliant
256QAM-Modulation TX port 4			
0.009 – 22000	9238.69	-31.52	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 116 Spurious Emissions (B66 1x E-UTRA 20MHz BW +1x NR 40MHz BW+ B25 1xE-UTRA 20MHz BW)

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

4.1 Test No. 5 Field Strength of Spurious Radiation (§ 2.1053, § 24.238, § 27.53, RSS-Gen 8.9, RSS-133 6.5 and RSS-139 5.6)

4.1.1 FCC Section 2.1053 and RSS-Gen Section 8.9 Field Strength of Spurious Emissions

Field strength measurements of radiated spurious emissions were made in an FCC and IC 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) and IC (Filing number: 661AI).

The spectrum from 30 MHz to beyond the tenth harmonic of the carrier 2.2 GHz, (22 GHz), was searched for spurious radiation. Measurements were made using both horizontally and vertically polarized broadband antennas. Per FCC and IC 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 and RSS-Gen Section 8.9). For this case the evaluation of acceptable radiated field strength is as follows.

4.1.2 Field Strength of Spurious Emissions - Limits

FCC Sections 2.1053, 24.238 and 27.53 and IC Sections RSS-Gen 8.9, RSS-133 6.5 and RSS-139 5.6 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.

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

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

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 dB μ V/m at 3m and 85.75 dB μ V/m at 2m

The calculated emission levels were found by:

$$\text{Measured level (dB}\mu\text{V)} + \text{Cable Loss(dB)} + \text{Antenna Factor(dB)} = \text{Field Strength (dB}\mu\text{V/m)}$$

4.1.3 FCC 15.109 and ICES-003 Class B Radiated Emissions Limits:

Frequency (MHz)	Field Strength at 3m (dB μ V/m)	Field Strength at 3m (dB μ V/m)	RBW (KHz)	Detector
	FCC §15.109	ICES-003		
30 – 88	40.0	40.0	100	QP
88 – 216	43.5	43.5	100	QP
216 – 230	46.0	46.0	100	QP
230 – 960	46.0	47.0	100	QP
960 – 1000	54.0	54.0	100	QP
1000 – 5 th harmonic	54.0	54.0	1000	Average
1000 – 5 th harmonic	---	74.0	1000	Peak

Table 117 Radiated Emission Limits

4.1.4 RESULTS:

For compliance with 47CFR Part 2, 24 and 27 and RSS-Gen, RSS-133 and RSS 139, the field strength of any spurious radiation, measured at 3m, is required to be less than 82.23 dB μ V/meter (82.23 @ 3m). Over the out of band spectrum investigated from 30 MHz to beyond the tenth harmonic of the carrier (up to 22 GHz), no reportable spurious emissions were detected.

Measured laboratory room temperature and humidity during the tests				
Date	Temperature Min-Max:		Humidity Min-Max:	
05.02.2024 – 08.02.2024	22.8 °C	23.3 °C	4.0 RH%	12.7 RH%
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result	
30 - 22000	17833.538588	-35.44 dBm	compliant	
Measurement Uncertainty:			±5.16 dB	

Table 118 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 and ISED rules.

4.2 Test No. 6: Frequency Stability §24.235, §27.54, §2.1055, RSS-139 section 5.4, RSS-133 section 6.3, RSS-Gen 6.11.)

4.2.1 Purpose

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

4.2.2 Limits

Para. No. 27.54, 24.235, RSS-133 section 6.3 and RSS-139 section 5.4. (-30 °C to +50 °C) and supply voltage conditions according to § 2.1055 and RSS-Gen section 6.11.

4.2.3 Test Configuration

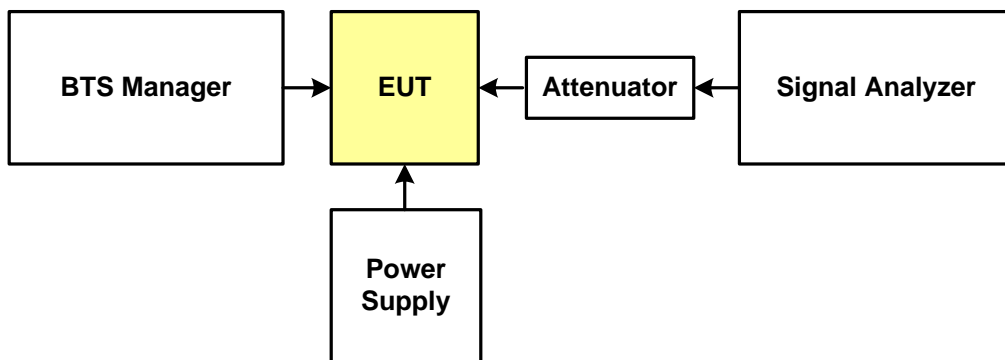


Figure 2 Test Configuration for frequency stability with voltage variation

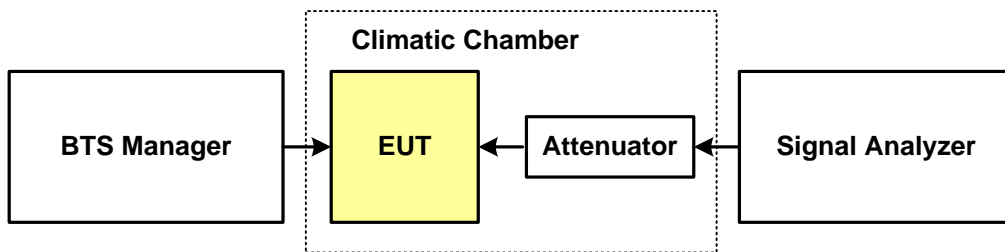


Figure 3 Test Configuration for frequency stability with temperature variation

A complete list of the measurement equipment is included on page 101 of this measurement report.

4.2.4 Test Procedure and Results

Measured laboratory room temperature and humidity during the tests				
Date	Temperature Min-Max:		Humidity Min-Max:	
13.02.2024 – 20.03 2024	23.7 °C	25.9 °C	4.0 RH%	17.2 RH%

Frequency Stability with Temperature Variation:

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

Config A:

Carrier Frequency: 3840.0 MHz						
Supply Voltage (DC) [V]	Ambient Temperature [°C]	Frequency Deviation		Manufacturer's Specification		Result
		[Hz]	[ppm]	[Hz]	[ppm]	
QPSK Modulation TX PORT 4						
-48.0	-30.0	5.00570	0.003	96	0.05	compliant
-48.0	-20.0	- 5.60710	-0.003	96	0.05	compliant
-48.0	-10.0	-6.39520	-0.003	96	0.05	compliant
-48.0	0.0	5.31275	0.003	96	0.05	compliant
-48.0	10.0	5.00108	0.003	96	0.05	compliant
-48.0	30.0	-4.42835	-0.002	96	0.05	compliant
-48.0	40.0	-5.65310	-0.003	96	0.05	compliant
-48.0	50.0	8.62223	0.004	96	0.05	compliant
16QAM Modulation TX port 4						
-48.0	-30.0	3.99648	0.002	96	0.05	compliant
-48.0	-20.0	6.0877	0.000	96	0.05	compliant
-48.0	-10.0	-3.29985	-0.002	96	0.05	compliant
-48.0	0.0	2.95932	0.002	96	0.05	compliant
-48.0	10.0	-3.85335	-0.002	96	0.05	compliant
-48.0	30.0	5.35905	0.003	96	0.05	compliant
-48.0	40.0	-6.87323	-0.004	96	0.05	compliant
-48.0	50.0	-8.01198	-0.004	96	0.05	compliant
64QAM Modulation TX port 4						
-48.0	-30.0	-7.15570	-0.004	96	0.05	compliant

-48.0	-20.0	-4.61582	-0.002	96	0.05	compliant
-48.0	-10.0	-6.28129	-0.003	96	0.05	compliant
-48.0	0.0	6.99062	0.004	96	0.05	compliant
-48.0	10.0	-3.44100	-0.002	96	0.05	compliant
-48.0	30.0	4.53504	0.002	96	0.05	compliant
-48.0	40.0	9.00814	0.005	96	0.05	compliant
-48.0	50.0	-7.69883	-0.004	96	0.05	compliant
256QAM Modulation TX port 4						
-48.0	-30.0	3.99648	0.002	96	0.05	compliant
-48.0	-20.0	-5.08274	-0.003	96	0.05	compliant
-48.0	-10.0	-4.77282	-0.002	96	0.05	compliant
-48.0	0.0	4.97571	0.003	96	0.05	compliant
-48.0	10.0	7.25357	0.004	96	0.05	compliant
-48.0	30.0	-3.50840	-0.002	96	0.05	compliant
-48.0	40.0	-5.57305	-0.003	96	0.05	compliant
-48.0	50.0	3.71215	0.002	96	0.05	compliant
Measurement Uncertainty:					±1.0 Hz	

Table 119 Frequency stability with temp. var. (B25 E-UTRA 15 MHz Channel BW)

Config E:

Carrier Frequency: 5840.0 MHz						
Supply Voltage (DC) [V]	Ambient Temperature [°C]	Frequency Deviation		Manufacturer's Specification		Result
		[Hz]	[ppm]	[Hz]	[ppm]	
QPSK Modulation TX port 4						
-48.0	-30.0	0.36021	0.000	96	0.05	compliant
-48.0	-20.0	0.37136	0.000	96	0.05	compliant
-48.0	-10.0	-0.31148	0.000	96	0.05	compliant
-48.0	0.0	-0.30384	0.000	96	0.05	compliant
-48.0	10.0	-0.66719	0.000	96	0.05	compliant
-48.0	30.0	-0.50486	0.000	96	0.05	compliant
-48.0	40.0	0.07373	0.000	96	0.05	compliant
-48.0	50.0	0.45602	0.000	96	0.05	compliant
16QAM Modulation ANT4						
-48.0	-30.0	-0.24206	0.000	96	0.05	compliant
-48.0	-20.0	-0.11288	0.000	96	0.05	compliant
-48.0	-10.0	-0.30620	0.000	96	0.05	compliant
-48.0	0.0	0.19872	0.000	96	0.05	compliant
-48.0	10.0	0.31418	0.000	96	0.05	compliant

-48.0	30.0	0.05449	0.000	96	0.05	compliant
-48.0	40.0	-0.02466	0.000	96	0.05	compliant
-48.0	50.0	-0.30824	0.000	96	0.05	compliant
64QAM Modulation ANT4						
-48.0	-30.0	0.09855	0.000	96	0.05	compliant
-48.0	-20.0	-0.06502	0.000	96	0.05	compliant
-48.0	-10.0	0.20503	0.000	96	0.05	compliant
-48.0	0.0	-0.04495	0.000	96	0.05	compliant
-48.0	10.0	0.16149	0.000	96	0.05	compliant
-48.0	30.0	0.25628	0.000	96	0.05	compliant
-48.0	40.0	0.39838	0.000	96	0.05	compliant
-48.0	50.0	0.16255	0.000	96	0.05	compliant
256QAM Modulation ANT4						
-48.0	-30.0	-0.78540	0.000	96	0.05	compliant
-48.0	-20.0	-0.58591	0.000	96	0.05	compliant
-48.0	-10.0	-0.41119	0.000	96	0.05	compliant
-48.0	0.0	0.32101	0.000	96	0.05	compliant
-48.0	10.0	-0.45463	0.000	96	0.05	compliant
-48.0	30.0	-0.17723	0.000	96	0.05	compliant
-48.0	40.0	-0.40662	0.000	96	0.05	compliant
-48.0	50.0	-0.08694	0.000	96	0.05	compliant
Measurement Uncertainty:					±1.0 Hz	

Table 120 Frequency stability with temp. var. (B66 NR 5 MHz Channel BW)

Frequency Stability with Voltage Variation:

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

Config A:

Carrier Frequency: 5840.0 MHz						
Supply Voltage (DC) [V]	Ambient Temperature [°C]	Frequency Deviation		Manufacturer's Specification		Result
		[Hz]	[ppm]	[Hz]	[ppm]	
QPSK Modulation TX port 4						
-40.8	20.0	-4.91408	-0.003	96	0.05	compliant
-48.0	20.0	3.47901	0.002	96	0.05	compliant

-55.2	20.0	-7.43992	-0.004	96	0.05	compliant
16QAM Modulation TX port 4						
-40.8	20.0	-5.57688	-0.003	96	0.05	compliant
-48.0	20.0	4.53462	0.002	96	0.05	compliant
-55.2	20.0	7.57975	0.004	96	0.05	compliant
64QAM Modulation TX port 4						
-40.8	20.0	6.47825	0.003	96	0.05	compliant
-48.0	20.0	3.25242	0.002	96	0.05	compliant
-55.2	20.0	4.39513	0.002	96	0.05	compliant
256QAM Modulation TX port 23						
-40.8	20.0	-5.2040	-0.003	96	0.05	compliant
-48.0	20.0	-4.85329	-0.003	96	0.05	compliant
-55.2	20.0	-2.73485	-0.001	96	0.05	compliant
Measurement Uncertainty:					±1.0 Hz	

Table 121 Frequency stability with voltage var. (B25 E-UTRA 15 MHz Channel BW)

Config E:

Carrier Frequency: 3840.0 MHz						
Supply Voltage (DC) [V]	Ambient Temperature [°C]	Frequency Deviation		Manufacturer's Specification		Result
		[Hz]	[ppm]	[Hz]	[ppm]	
QPSK Modulation TX port 4						
-40.8	20.0	-0.16116	00.000	96	0.05	compliant
-48.0	20.0	-0.63689	0.000	96	0.05	compliant
-55.2	20.0	-0.13675	0.000	96	0.05	compliant
16QAM Modulation TX port 4						
-40.8	20.0	0.07448	0.000	96	0.05	compliant
-48.0	20.0	0.00808	0.000	96	0.05	compliant
-55.2	20.0	0.56501	0.000	96	0.05	compliant
64QAM Modulation TX port 4						
-40.8	20.0	0.46587	0.000	96	0.05	compliant
-48.0	20.0	0.08938	0.000	96	0.05	compliant
-55.2	20.0	-0.11213	0.000	96	0.05	compliant
256QAM Modulation TX port 4						
-40.8	20.0	0.14988	0.000	96	0.05	compliant
-48.0	20.0	-0.17359	0.000	96	0.05	compliant
-55.2	20.0	0.68515	0.000	96	0.05	compliant
Measurement Uncertainty:					±1.0 Hz	

Table 122 Frequency stability with voltage var. (B66 NR 5MHz Channel BW)



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

4.3 Test No. 7 Receiver Spurious Emissions (RSS-Gen)

4.3.1 Limits

RSS-Gen para. no. 7.4: Receiver-spurious emissions at any discrete frequency shall not exceed 2 nanowatts in the band 30-1000 MHz nor 5 nW above 1000 MHz.

Limit conversion: 2nW = -57dBm and 5nW = -53dBm.

4.3.2 Test Procedure and Results

According to RSS-Gen. para. no. 7, all spurious emissions from 30 MHz to 11 GHz, up to at least 5x the highest tunable frequency were investigated.

For the frequency range from 30 MHz to 1 GHz, a 100 kHz resolution bandwidth with peak detector was used for the measurements. Above 1 GHz a resolution bandwidth of 1 MHz with average detector was used.

The following tables summarize the worst case detected emission levels (see screenshots on pages 133 for details).

Measured laboratory room temperature and humidity during the tests				
Date	Temperature Min-Max:		Humidity Min-Max:	
22.02.2024 – 28.02 2024	23.9 °C	26.2 °C	14.4 RH%	20.8 RH%

Config A:

RX Channel Frequency: 1882.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 – 1000	555.43	-61.64	compliant
1000 – 11000	4018.76	-58.58	compliant

Table 123 RX Spurious Emissions (B25 E-UTRA 15 MHz Channel BW)

RX Channel Frequency: 1745 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 – 1000	484.27	-60.44	compliant
1000 – 11000	10072.12	-58.20	compliant

Table 124 RX Spurious Emissions (B66 E-UTRA 15 MHz Channel BW)

Config D:

RX Channel Frequency: 1882.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 – 1000	485.33	-60.66	compliant
1000 – 11000	10300.32	-58.51	compliant

Table 125 RX Spurious Emissions (B25 NR 15 MHz Channel BW)

RX Channel Frequency: 1745 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 – 1000	882.99	-61.92	compliant
1000 – 11000	9007.38	-58.22	compliant

Table 126 RX Spurious Emissions (B66 NR 15 MHz Channel BW)

Config I:

RX Channel Frequency: 1882.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 – 1000	826.43	-61.61	compliant
1000 – 11000	10477.53	-58.38	compliant

Table 127 RX Spurious Emissions (B25 E-UTRA SA-IoT 0.2 MHz Channel BW)

RX Channel Frequency: 1745 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 – 1000	905.55	-61.14	compliant
1000 – 11000	9012.82	-58.31	compliant

Table 128 RX Spurious Emissions (B66 E-UTRA SA-IoT 0.2 MHz Channel BW)

Config J:

RX Channel Frequency: 1877.5 / 1887.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 – 1000	465.64	-61.83	compliant
1000 – 11000	9765.22	-58.24	compliant

Table 129 RX Spurious Emissions (B25 E-UTRA 10+10 MHz Channel BW)

RX Channel Frequency: 1750 / 1760 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 – 1000	556.97	-61.82	compliant
1000 – 11000	9504.85	-58.05	compliant

Table 130 RX Spurious Emissions (B66 E-UTRA 10+10 MHz Channel BW)

Config K:

RX Channel Frequency: 1855 / 1910 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 – 1000	807.12	-61.17	compliant
1000 – 11000	4009.36	-57.12	compliant

Table 131 RX Spurious Emissions (B25 E-UTRA 10+10 MHz Channel BW)

RX Channel Frequency: 1715 / 1775 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 – 1000	856.00	-61.56	compliant
1000 – 11000	10455.75	-57.89	compliant

Table 132 RX Spurious Emissions (B66 E-UTRA 10+10 MHz Channel BW)

Config N:

RX Channel Frequency: 1865 / 1897.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 – 1000	474.00	-61.25	compliant
1000 – 11000	10307.25	-58.64	compliant

Table 133 RX Spurious Emissions (B25 NR 30+35 MHz Channel BW)

Config O:

RX Channel Frequency: 1725 / 1760 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 – 1000	551.01	-62.00	compliant
1000 – 11000	10307.25	-58.34	compliant

Table 134 RX Spurious Emissions (B66 NR 30+40MHz Channel BW)

Config P:

RX Channel Frequency: 1712.5 / 1717.5 / 1777.5 / 1882.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 – 1000	719.93	-61.01	compliant
1000 – 11000	10311.21	-58.09	compliant

Table 135 RX Spurious Emissions (B66 2x E-UTRA 5MHz BW +1x NR 5MHz BW+ B25 1xNR 5MHz BW)

Config Q:

RX Channel Frequency: 1852.5 / 1857.5 / 1912.5 / 1745 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 – 1000	506.65	-61.90	compliant
1000 – 11000	9261.31	-57.61	compliant

Table 136 RX Spurious Emissions (B25 2x E-UTRA 5MHz BW +1x NR 5MHz BW+ B66 1xNR 5MHz BW)

Config R:

RX Channel Frequency: 1860 / 1887.5 / 1745 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 - 1000	471.11	-61.09	compliant
1000 - 11000	9667.21	-58.63	compliant

Table 137 RX Spurious Emissions (B25 1x E-UTRA 20MHz BW +1x NR 35MHz BW+ B66 1xNR 20MHz BW)

Config S:

RX Channel Frequency: 1720 / 1750 / 1882.5 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 - 1000	860.80	-61.12	compliant
1000 - 11000	10296.85	-58.44	compliant

Table 138 RX Spurious Emissions (B25 1x E-UTRA 20MHz BW +1x NR 35MHz BW+ B66 1xE-UTRA 20MHz BW)

Config T:

RX Channel Frequency: 1870 / 1897.5 / 1745 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 - 1000	748.74	-62.00	compliant
1000 - 11000	10450.80	-57.09	compliant

Table 139 RX Spurious Emissions (B25 1x E-UTRA 20MHz BW +1x NR 35MHz BW+ B66 1xE-UTRA 20MHz BW)

Config U:

RX Channel Frequency: 1730 /1760 / 1882.5MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
ANT4			
30 - 1000	550.63	-60.86	compliant
1000 - 11000	9273.19	-58.22	compliant

Table 140 RX Spurious Emissions (B66 1x E-UTRA 20MHz BW +1x NR 40MHz BW+ B25 1xE-UTRA 20MHz BW)



The receiver spurious emissions were found to be compliant with the manufacturer's specifications and with all requirements of the RSS specifications.

4.4 Test No. 8 Conducted Emissions (§15.107, RSS-Gen 8.8 and ICES-003 3.2.1)

The ITE or digital apparatus shall comply with the conducted emission limits at its AC mains power terminals. The product under test shall comply with both the quasi-peak and the average limits. Where the product under test is powered through an external device (for example, through an external power supply), the conducted emission limits apply at the AC mains power terminals of the external device, while this is powering the product under test: FCC §15.107. RSS-Gen Section 8.8 and ICES-003 Section 3.2.1

4.4.1 FCC §15.107, RSS-Gen and ICES-003 Class B AC Conducted Emissions Limits:

Frequency (MHz)	Class B Quasi-peak (dBµV)	Class B Average (dBµV)
0.15 – 0.5	66 to 56	56 to 46
0.5 – 5	56	46
5 – 30	60	50

Table 141 Conducted Emission Limits

4.4.2 RESULTS:

For compliance with 47CFR Part 15, RSS-Gen and ICES-003, the conducted emission of any spurious radiation.

Measured laboratory room temperature and humidity during the tests				
Date	Temperature Min-Max:		Humidity Min-Max:	
8 Feb 2024	23.3 °C	23.3 °C	4.5 RH%	4.5 RH%
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBµV]	Result	
0.15 – 30	0.150	60.41 (Average)	compliant	
0.15 – 30	0.150	53.97 (Quasi-peak)	Compliant	
Measurement Uncertainty:			±5.16 dB	

Table 142 Conducted Emission Result



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

Test Data and Screenshots

4.5 Part List of the RF Measurement Test Equipment

No.	Test Equipment	Manufacturer & Type	Serial Number	Calibration date	Calibration due	Test No.
1	Signal Analyzer	Rohde & Schwarz: FSW-43	104597	12/2023	12/2024	1, 2, 3, 4, 7
2	Signal Analyzer	Rohde & Schwarz: FSW-43	104600	07/2023	07/2024	6
3	Vector Network Analyzer	Rohde & Schwarz: ZVA40	100146	12/2023	12/2024	1, 2, 3, 4, 7
4	Vector Network Analyzer	Rohde & Schwarz: ZVL13	101177	12/2023	12/2024	6
5	Calibration Unit	Rohde & Schwarz: ZV-Z54	100125	11/2023	11/2024	1, 2, 3, 4, 7
6	Calibration Unit	Hewlett Packard 85032B	2919A04843	07/2023	07/2024	6
7	Frequency Standard	Symmetricom 8040C	16173011501 1	07/2023	07/2024	1, 2, 3, 4, 6, 7
8	Multimeter	Fluke 83	DM8750386	12/2023	12/2024	1, 2, 3, 4, 6, 7
9	Humidity and Temperature Indicator	Vaisala: HMT 131	E6316020	12/2023	12/2024	1, 2, 3, 4, 6, 7
10	DC Power Supply	Elektro-AutomatikGmbH & Co:PS 9080-510 3U19 3HE 15000W	2457570001	cnn	-	1, 2, 3, 4, 7
11	DC Power Supply	SG180X188D-1AAA	1245A00011	cnn	-	6
12	DC Power Supply	Toellner TOE887	160142	cnn	-	6
13	Attenuator	Weinschel 66-30-33	BN0228	cnn	-	1, 2, 3,
14	Attenuator	SHX DTS100G-20dB-24G	14111101	cnn	-	4,7
15	High Pass Filter	RF-Lambda RHPF23G06G40	21052000014	cnn	-	4
16	Attenuator	API Weinschel 254-30-33	UH351	cnn	-	6
17	Temperature chamber	Weiss WTS 3-600/70/5	58226142630 010	12/2023	12/2024	6
18	EMI Test Receiver	Rohde & Schwarz: ESW44	103055	12/2023	12/2024	5
19	Horn Antenna	ETS-Lindgren ETS3117	00227737	04/2023	04/2024	5
20	Bilog Antenna	Schaffner Chase CBL6112B	2003	08/2023	08/2024	5
21	Horn Antenna	ETS-Lindgren 3116C-PA	206990	07/2023	07/2024	5
22	Amplifier	Miteq AFSX4	1829263	cnn	-	5

23	Mast Controller	Maturo NCD/281	21250317	cnn	-	5
24	4-meter mast	Maturo TAM4.0-E	123/21250317	cnn	-	5
25	Anechoic chamber	Comtest Nokia 3m Chamber	Nokia 3m Chamber	10/2022	10/2025	5, 8
26	Humidity and temperature meter	Vaisala HMP113	T0841033	12/2023	12/2024	5, 8
27	EMI Test Receiver	Rohde & Schwarz: ESR3	102906	07/2023	07/2024	8
28	Artificial Mains Network 4x200A	Rohde & Schwarz: ESH-2-Z5	100023	07/2023	07/2024	8

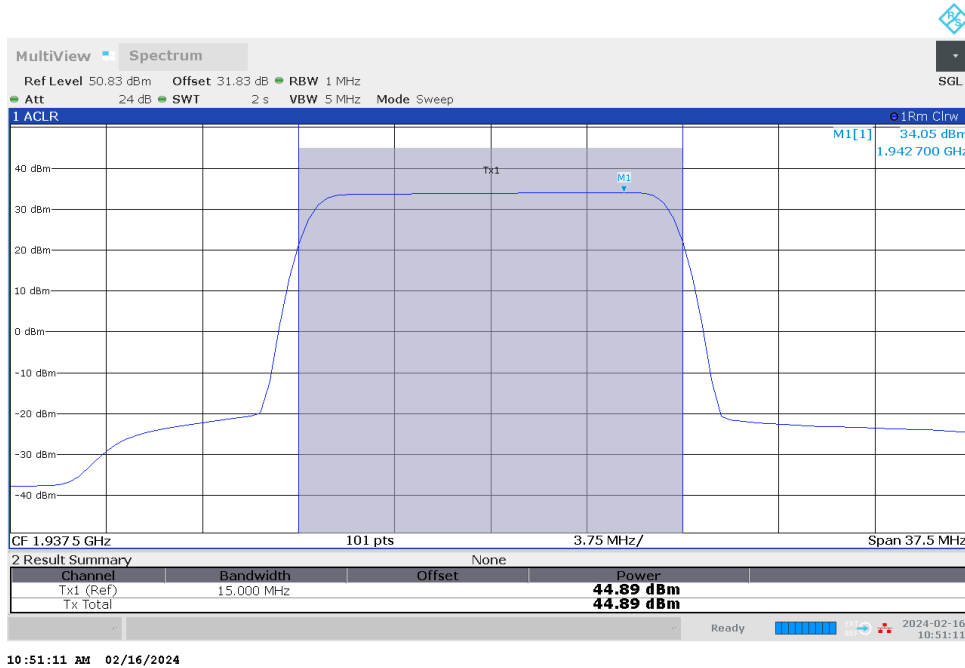
Table 143 Part List of the RF Measurement Test Equipment

4.6 Spectral Plots

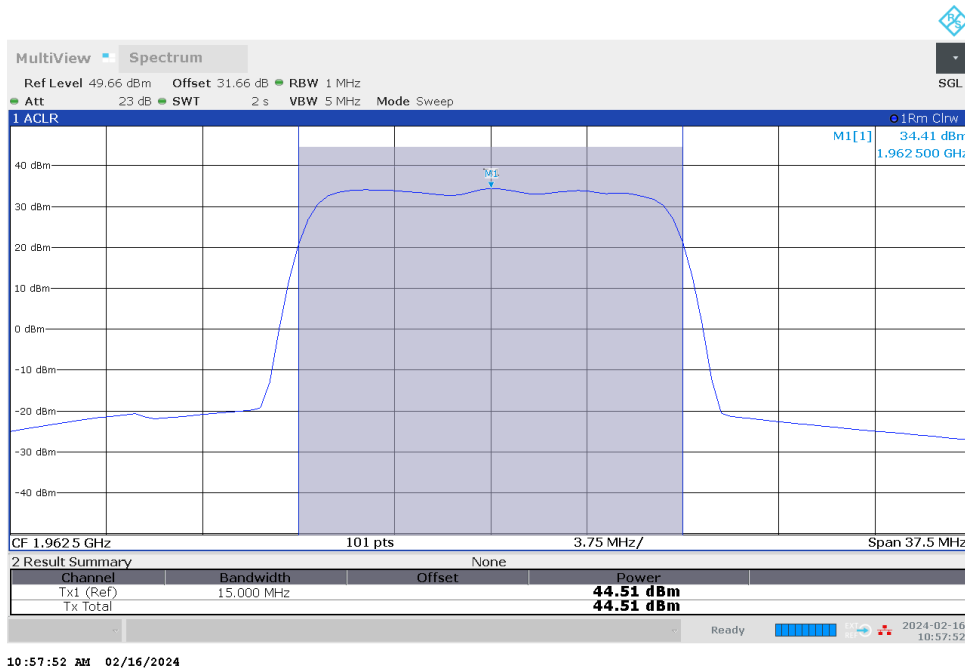
NOTE: Only a sample of the spectral plots are used and visible in this report. All measured test results and data are saved in Oulu located server.

4.6.1 Test No. 1: RF Output Power

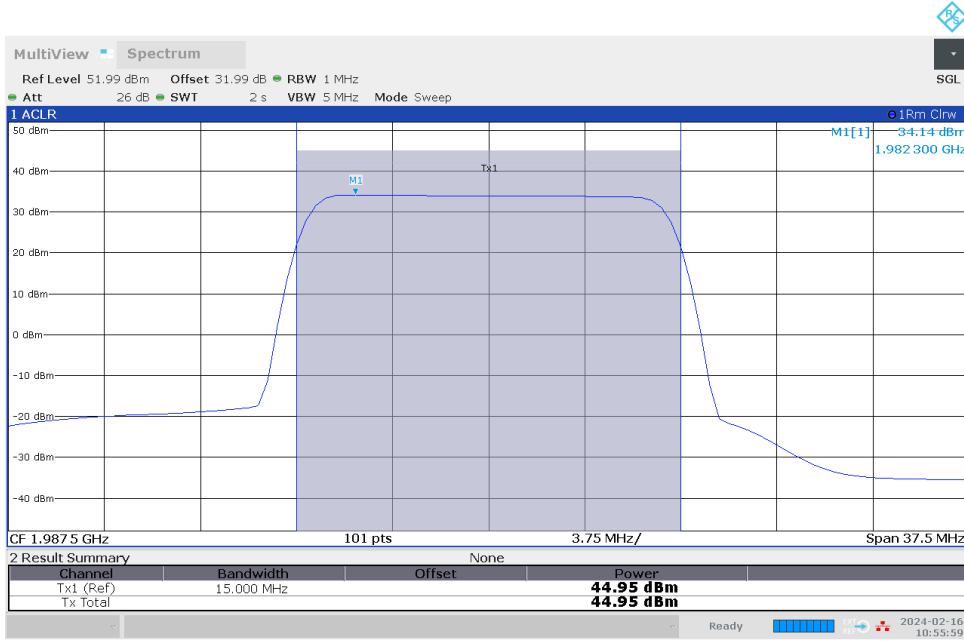
Power spectral density E-UTRA 15MHz BW



Test Model 1.1, Modulation QPSK, Channel Frequency 1937.5MHz, Tx port 4

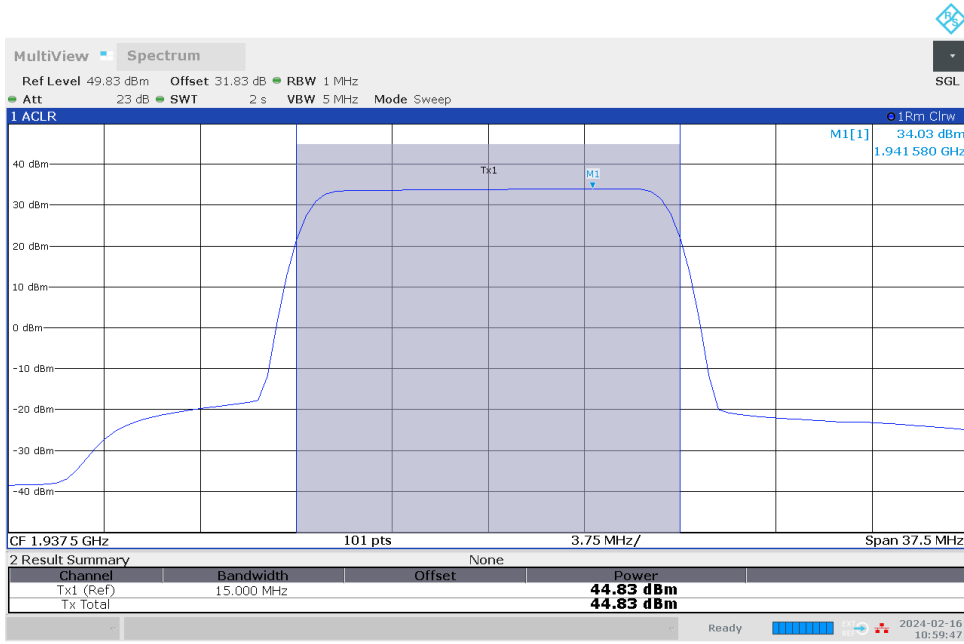


Test Model 3.2, Modulation 16QAM, Channel Frequency 1962.5MHz, Tx port 4



10:55:59 AM 02/16/2024

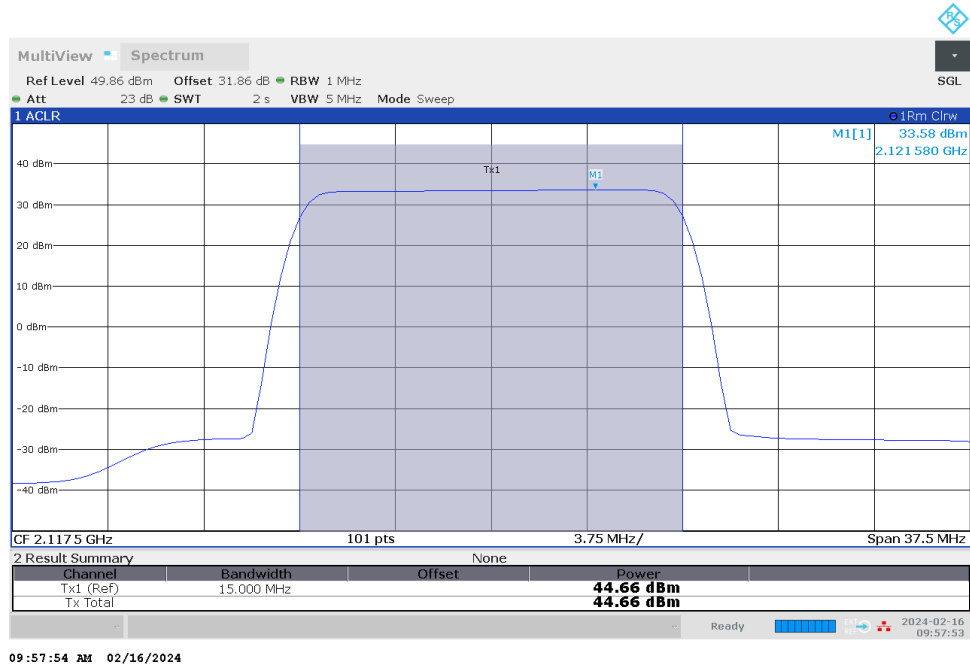
Test Model 3.1, Modulation 64QAM, Channel Frequency 1987.5MHz, Tx port 4



10:59:48 AM 02/16/2024

Test Model 3.1a, Modulation 256QAM, Channel Frequency 1937.5MHz, Tx port 4

Power spectral density NR 15MHz BW



Test Model 1.1, Modulation QPSK, Channel Frequency 2117.5MHz, Tx port 4

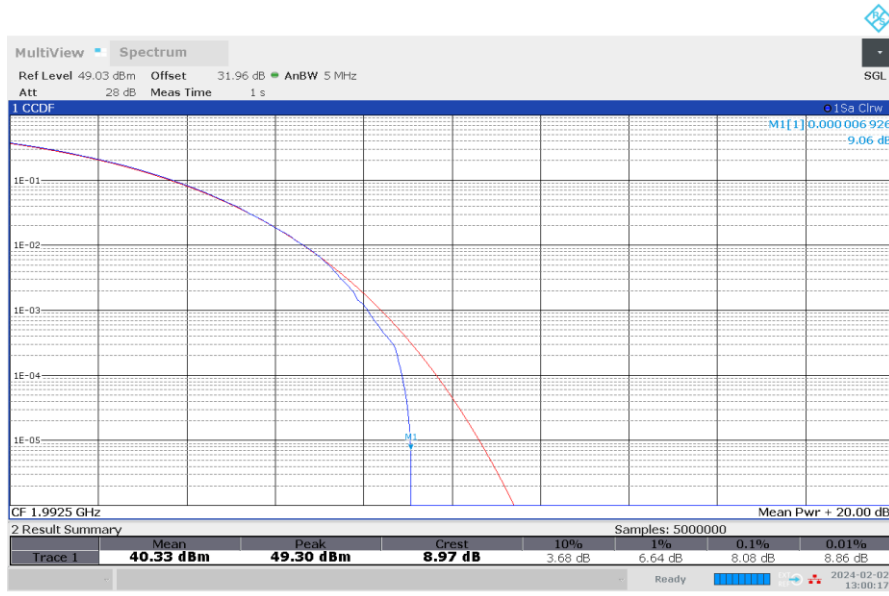
Peak-to-Average Power Ratio (PAPR) E-UTRA 15MHz BW



09:19:44 AM 02/02/2024

Test Model 1.1, Modulation QPSK, Channel Frequency 1962.5MHz, Tx Port4

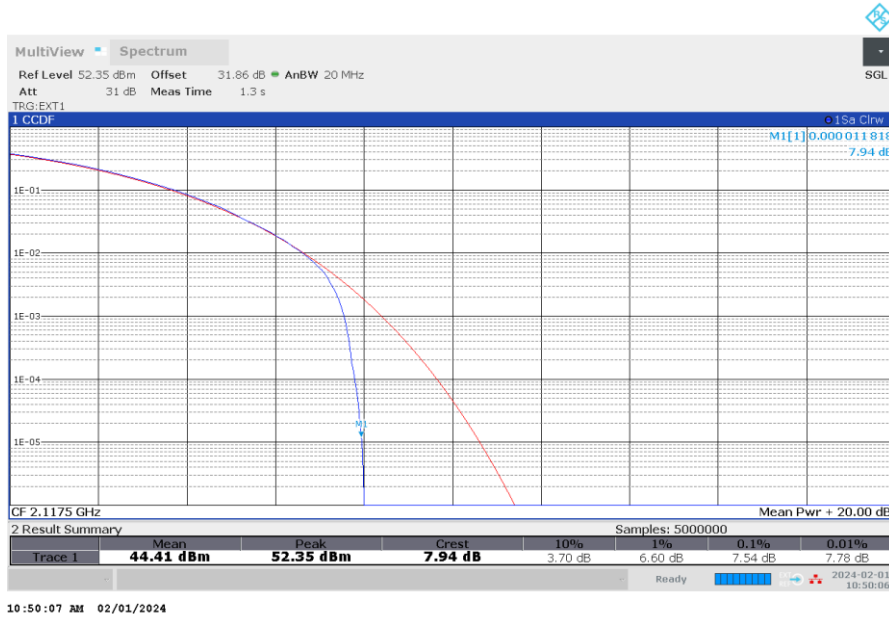
Peak-to-Average Power Ratio (PAPR) E-UTRA 5MHz BW



01:00:17 PM 02/02/2024

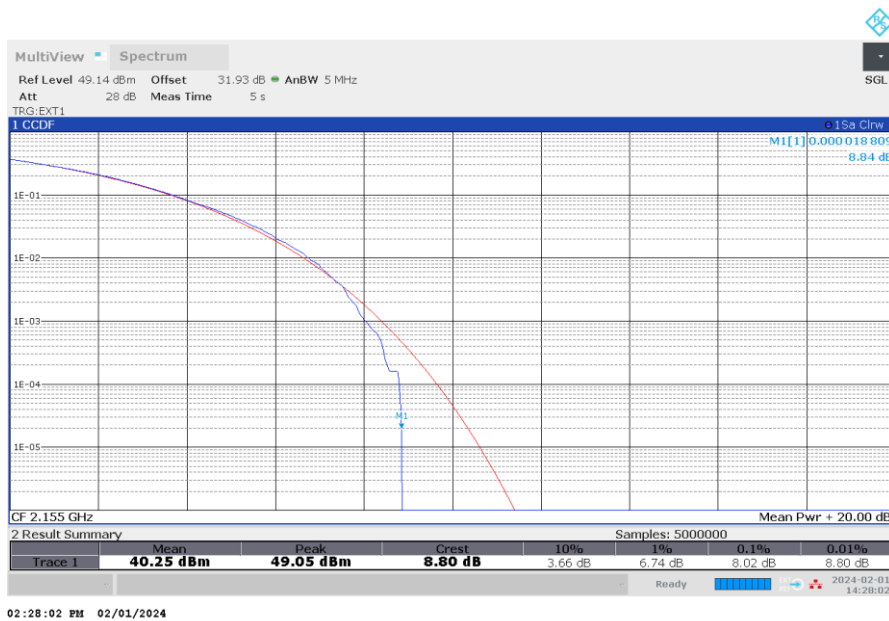
Test Model 3.2, Modulation 16QAM, Channel Frequency 1992.5MHz, Tx Port4

Peak-to-Average Power Ratio (PAPR) NR 15MHz BW



Test Model 3.1, Modulation 64QAM, Channel Frequency 2117.5MHz, Tx Port4

Peak-to-Average Power Ratio (PAPR) NR 5MHz BW

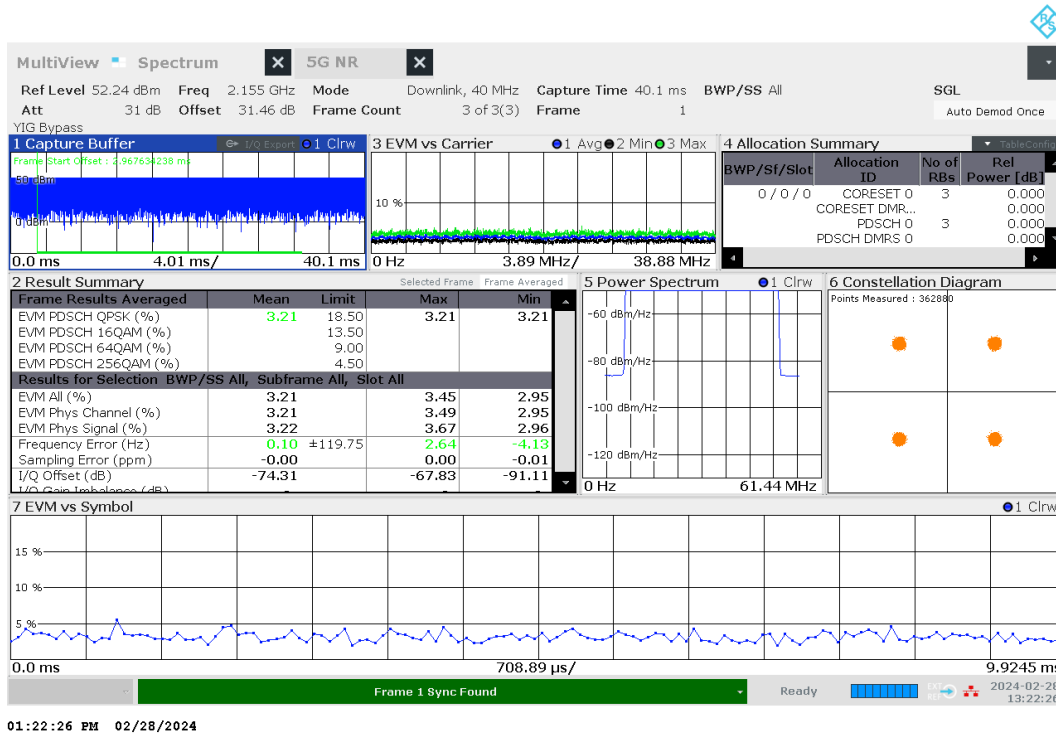


Test Model 3.1a, Modulation 256QAM, Channel Frequency 2155MHz, Tx Port4

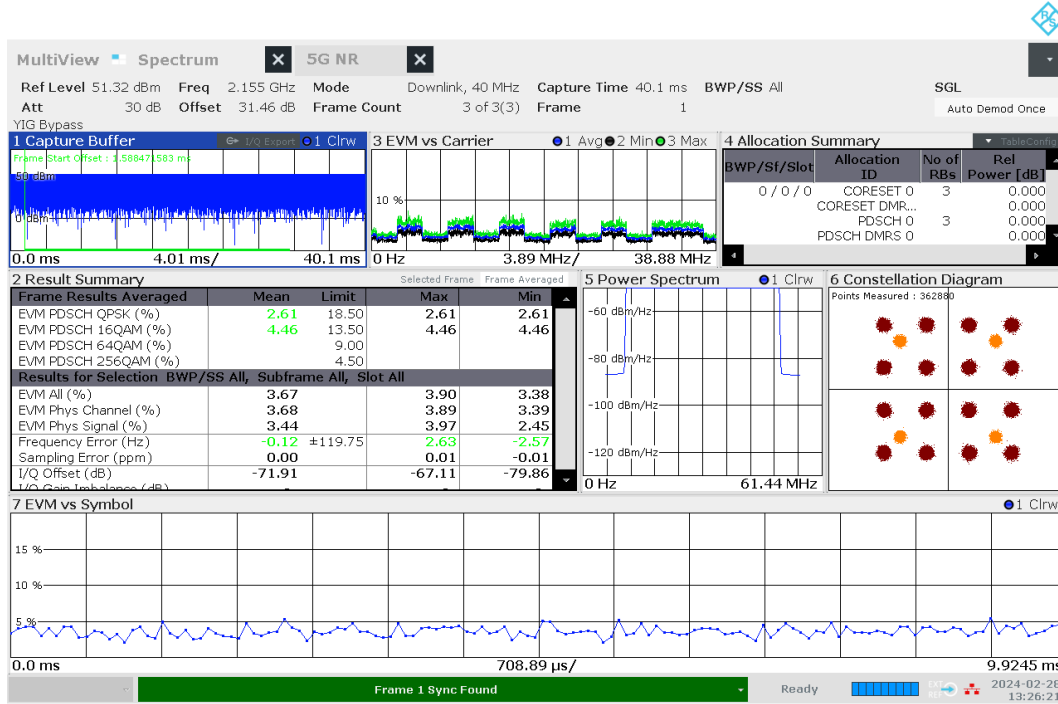
4.6.2 Test No. 2: Modulation Characteristics

No additional measurements are required for the modulation characteristics. Please refer to test no. 3, occupied bandwidth on page 39.

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

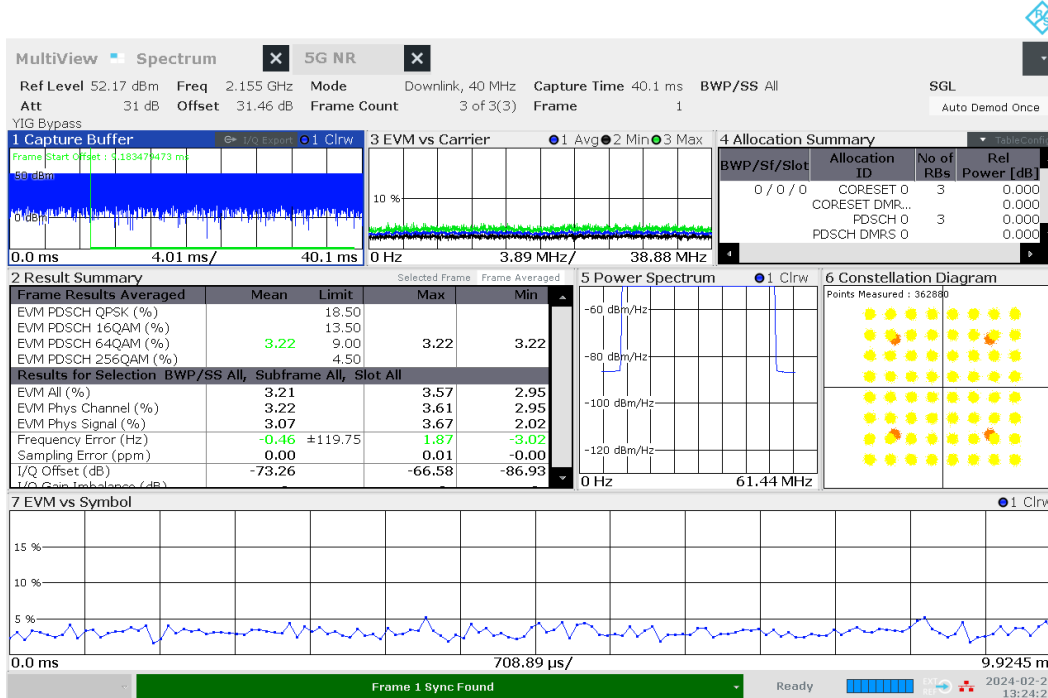


I/Q constellation diagram with capture buffer – QPSK (2155MHz) (NR 40MHz Channel BW)



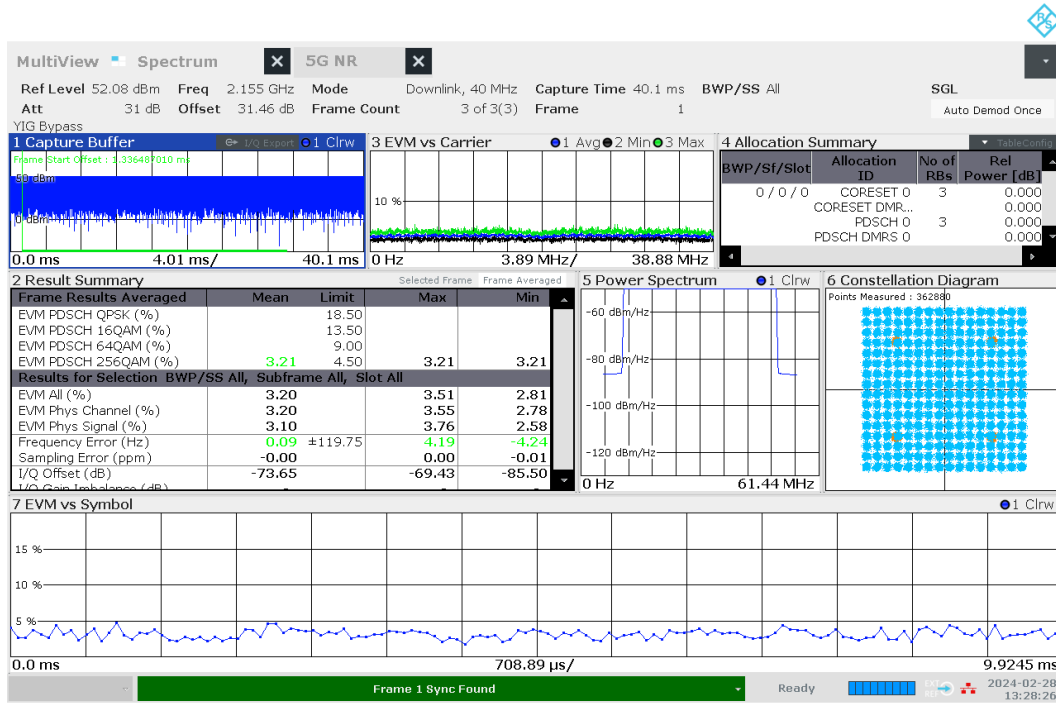
01:26:21 PM 02/28/2024

I/Q constellation diagram with capture buffer – 16QAM (2155 MHz) (NR 40MHz Channel BW)



01:24:23 PM 02/28/2024

I/Q constellation diagram with capture buffer – 64QAM (2155 MHz) (NR 40MHz Channel BW)



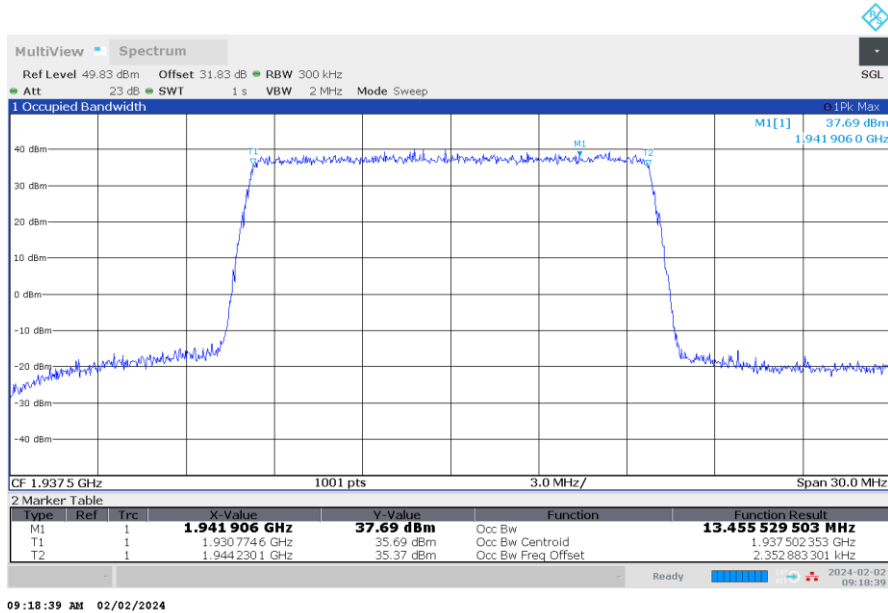
I/Q constellation table with I/Q error -256QAM (2155 MHz) (NR 40MHz Channel BW)

4.6.3 Test No. 3: Occupied Bandwidth

The value 'Occ Bw' is the measured occupied bandwidth.

Occupied Bandwidth 99% plots

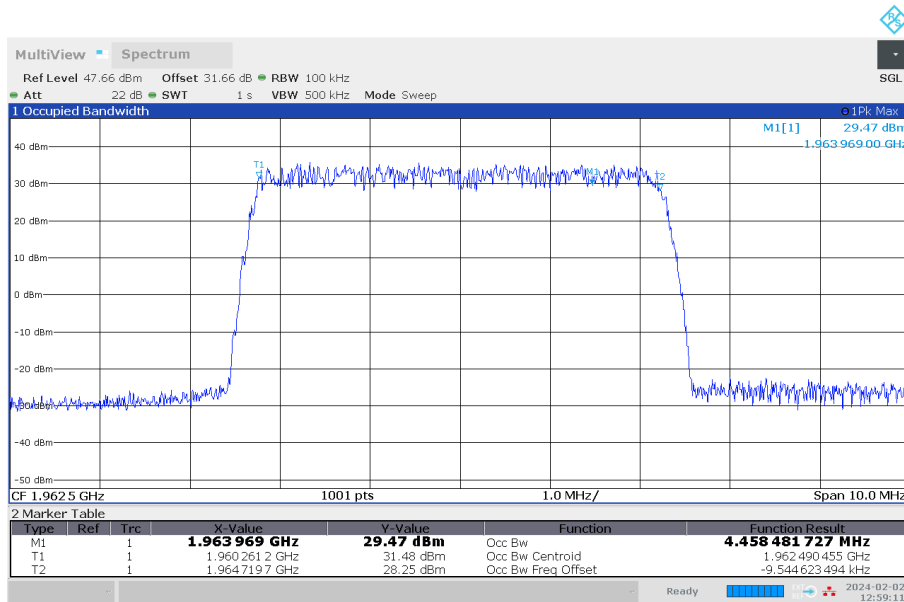
Occupied Bandwidth E-UTRA15MHz BW



09:18:39 AM 02/02/2024

Test Model 1.1, Modulation QPSK, Channel Frequency 1937.5MHz, Tx Port4

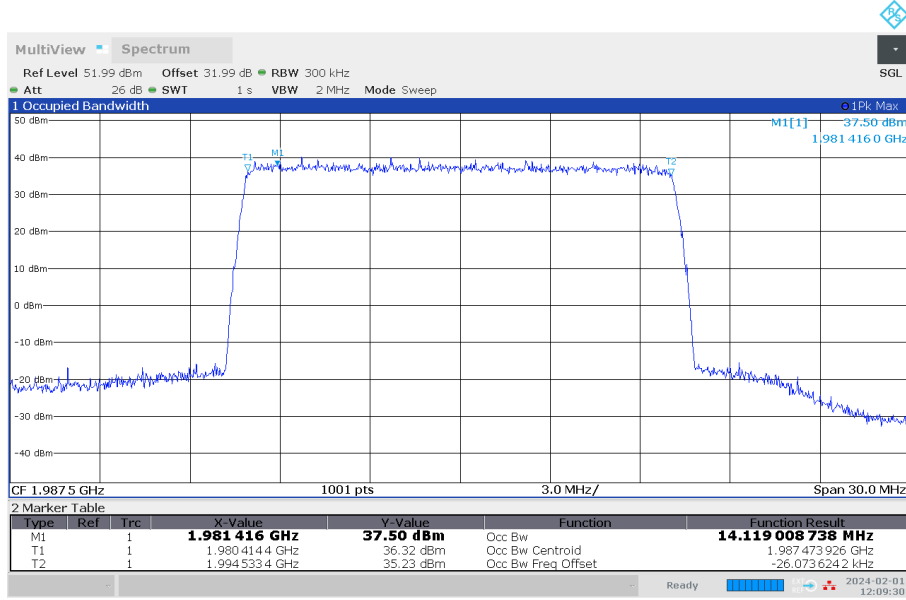
Occupied Bandwidth E-UTRA 5MHz BW



12:59:11 PM 02/02/2024

Test Model 3.2, Modulation 16QAM, Channel Frequency 1962.5MHz, Tx Port4

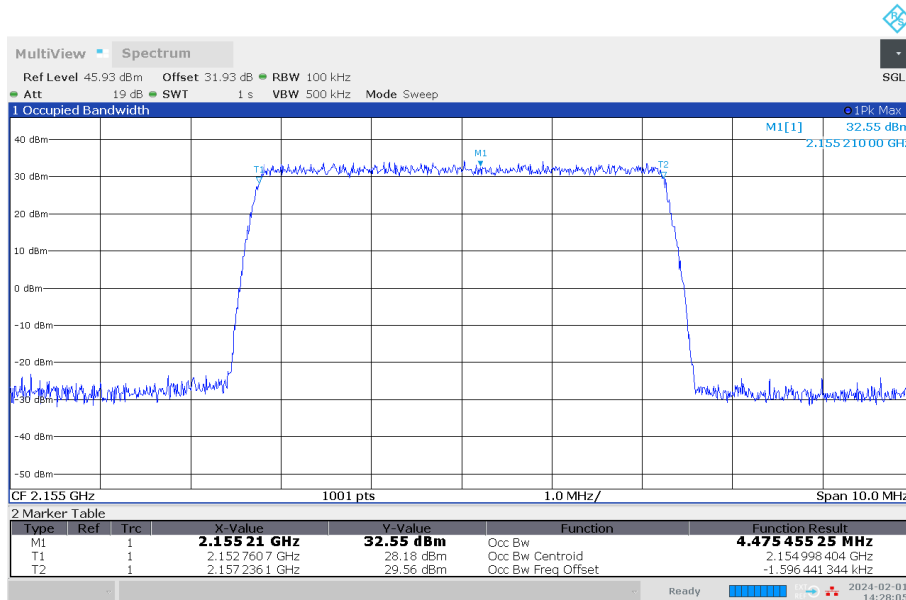
Occupied Bandwidth NR 15MHz BW



12:09:31 PM 02/01/2024

Test Model 3.1, Modulation 64QAM, Channel Frequency 1987.5MHz, Tx Port4

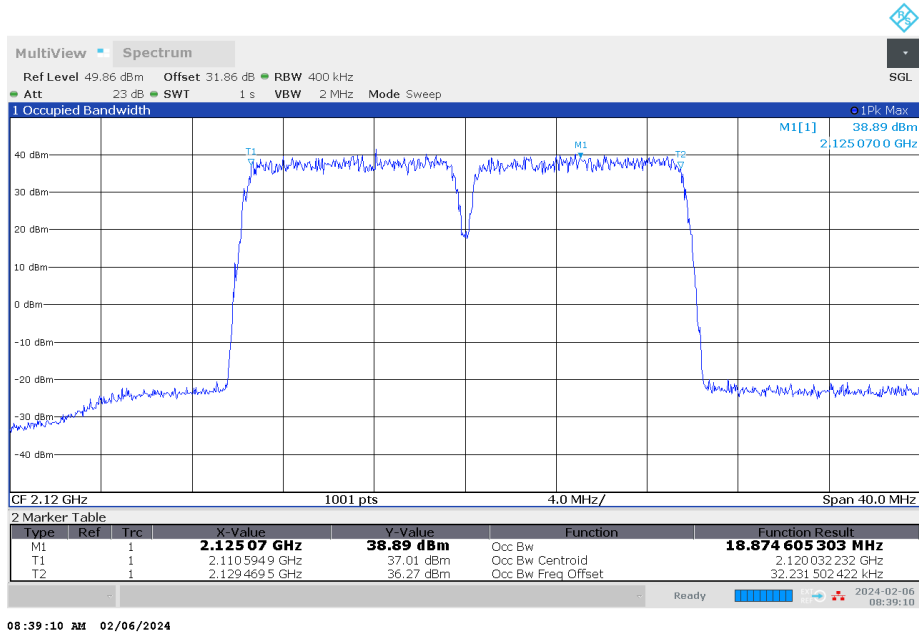
Occupied Bandwidth NR 5MHz BW



02:28:05 PM 02/01/2024

Test Model 3.1a, Modulation 256QAM, Channel Frequency 2155MHz, Tx Port4

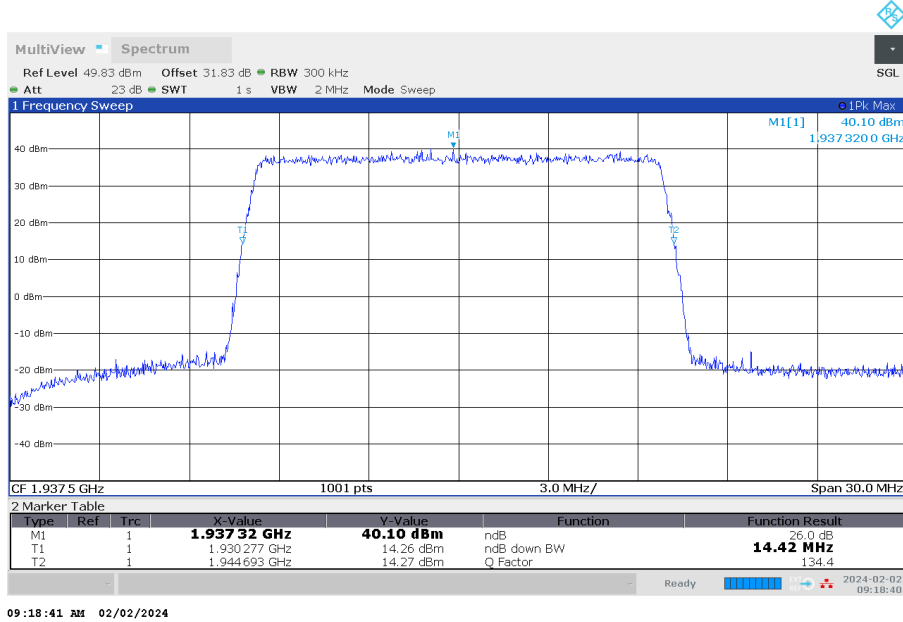
Occupied Bandwidth E-UTRA 10+10MHz BW



Test Model 3.2, Modulation 16QAM, Channel Frequency 2115/2125MHz, TxPort4

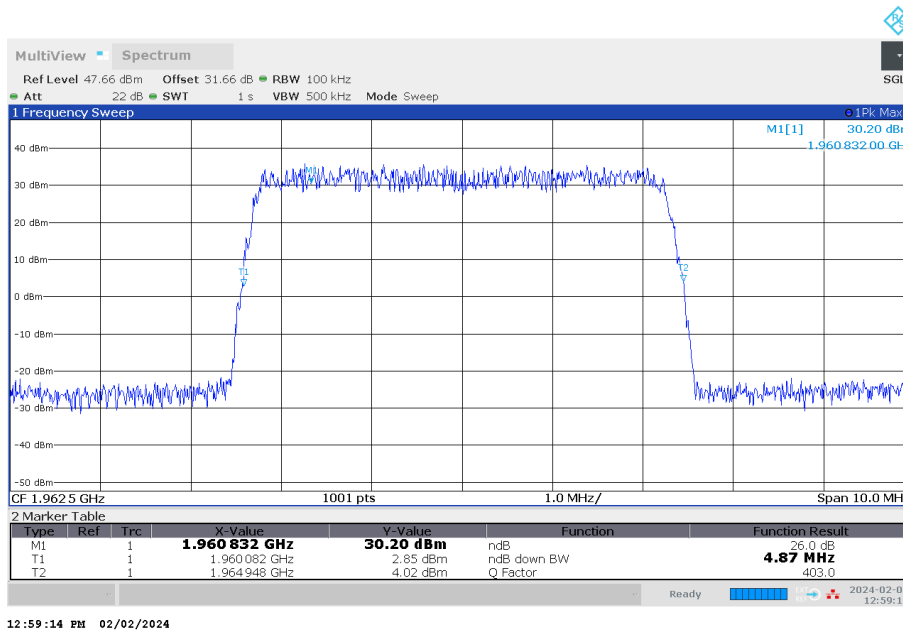
Occupied Bandwidth -26dB plots

Occupied Bandwidth E-UTRA 15MHz BW



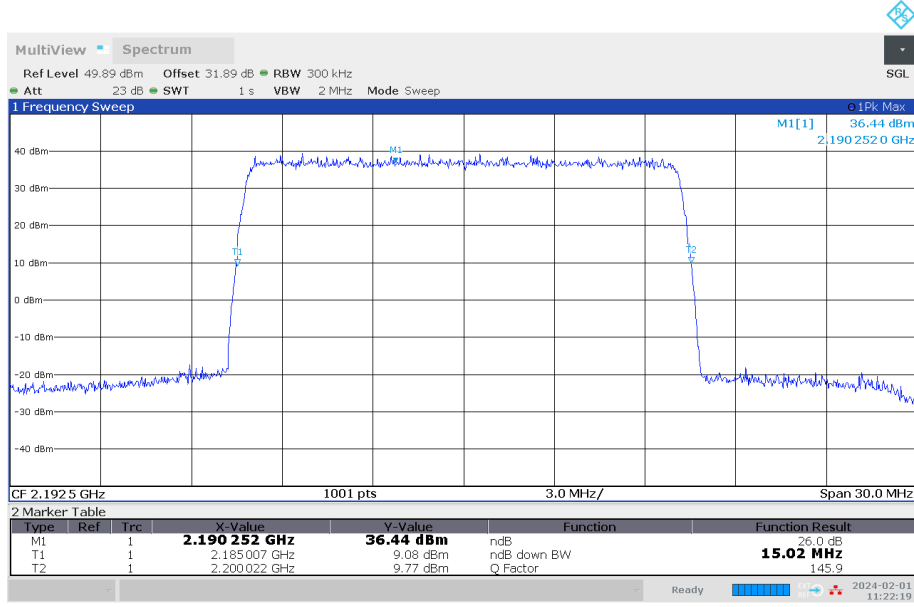
Test Model 1.1, Modulation QPSK, Channel Frequency 1937.5MHz, Tx Port4

Occupied Bandwidth E-UTRA 5MHz BW



Test Model 3.2, Modulation 16QAM, Channel Frequency 1962.5MHz, Tx Port4

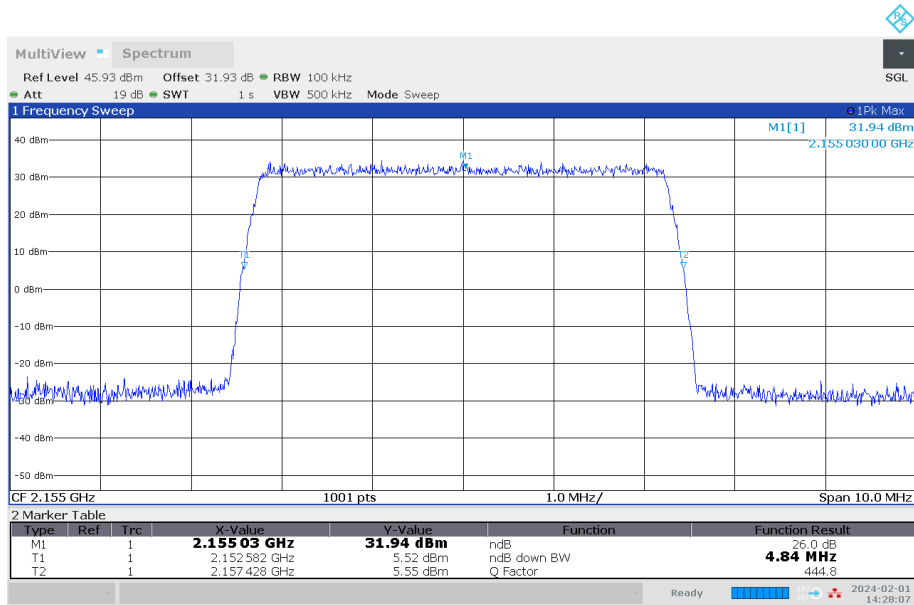
Occupied Bandwidth NR 15MHz BW



11:22:19 AM 02/01/2024

Test Model 3.1, Modulation 64QAM, Channel Frequency 2192.5MHz, Tx Port4

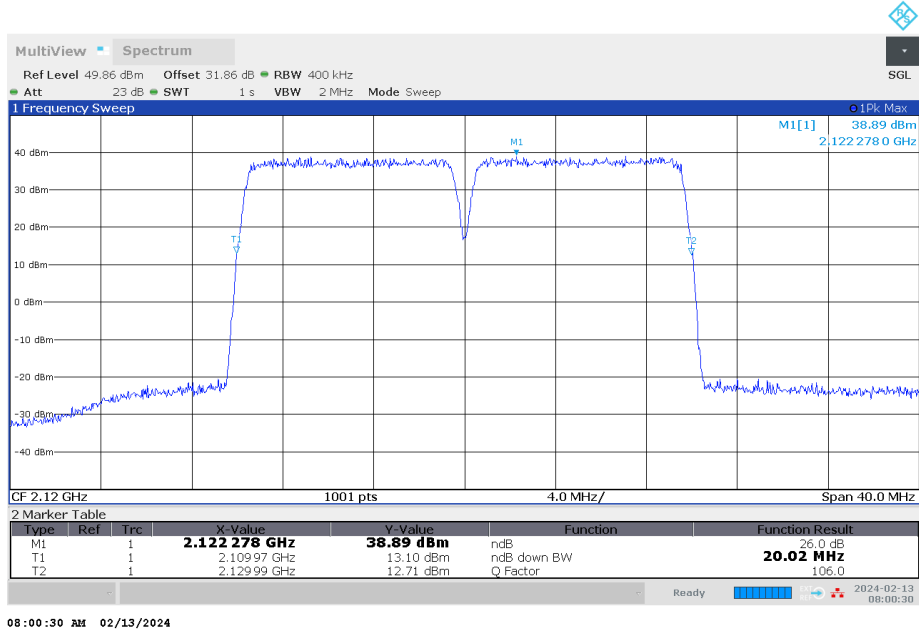
Occupied Bandwidth NR 5MHz BW



02:28:07 PM 02/01/2024

Test Model 3.1a, Modulation 256QAM, Channel Frequency 2155MHz, Tx Port4

Occupied Bandwidth E-UTRA 10+10MHz BW



Test Model 3.2, Modulation 16QAM, Channel Frequency 2115/2125MHz, TxPort4

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

Config A TX port 4:

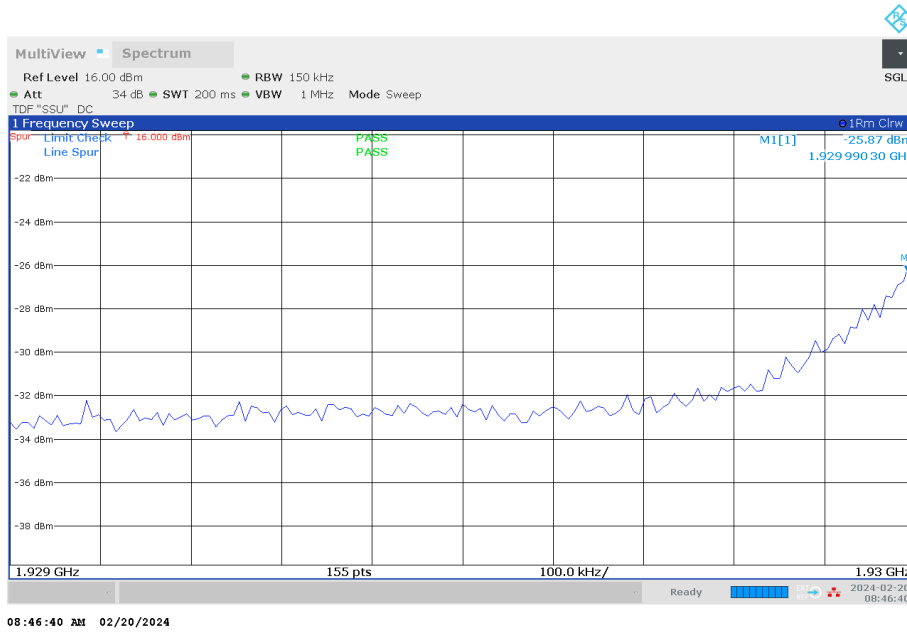


Figure 4 Spurious Emissions (Lower Band Edge) – QPSK (1937.5 MHz) (15MHz Channel BW)

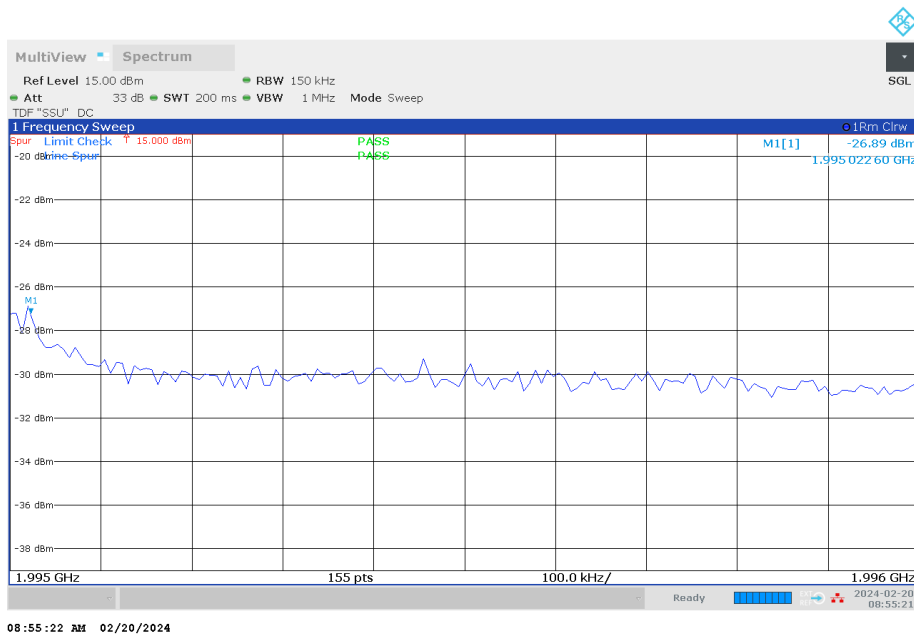


Figure 5 Spurious Emissions (Upper Band Edge) – QPSK (1987.5 MHz) (15 MHz Channel BW)

Config A TX port 4:

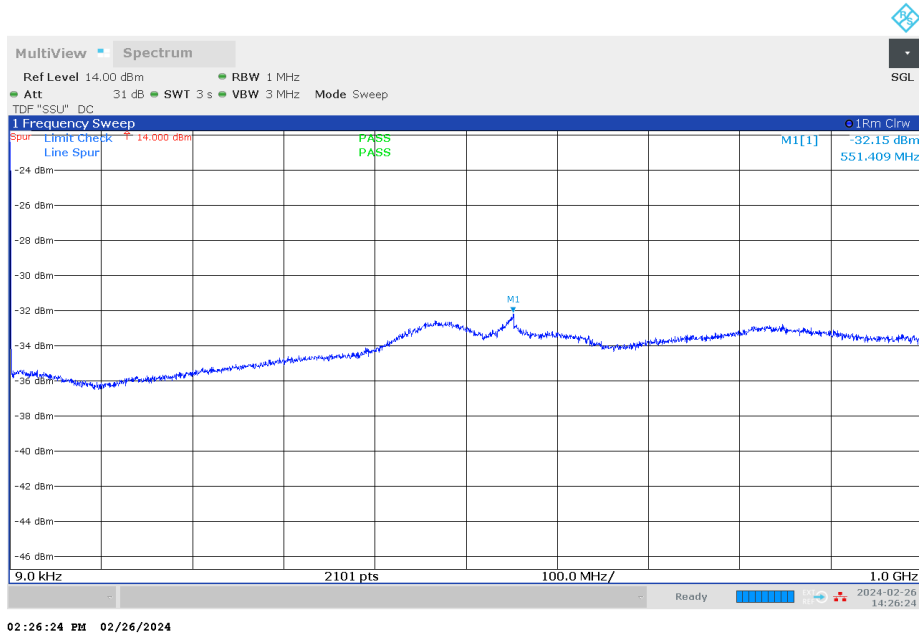


Figure 6 Spurious Emissions (9kHz – 1GHz) - QPSK (1962.5 MHz) (15MHz Channel BW)

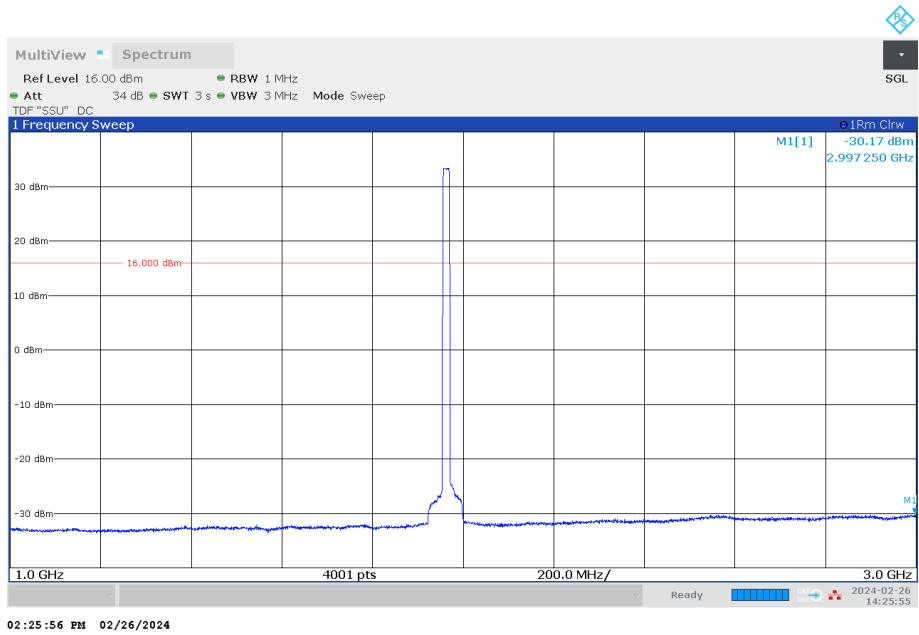
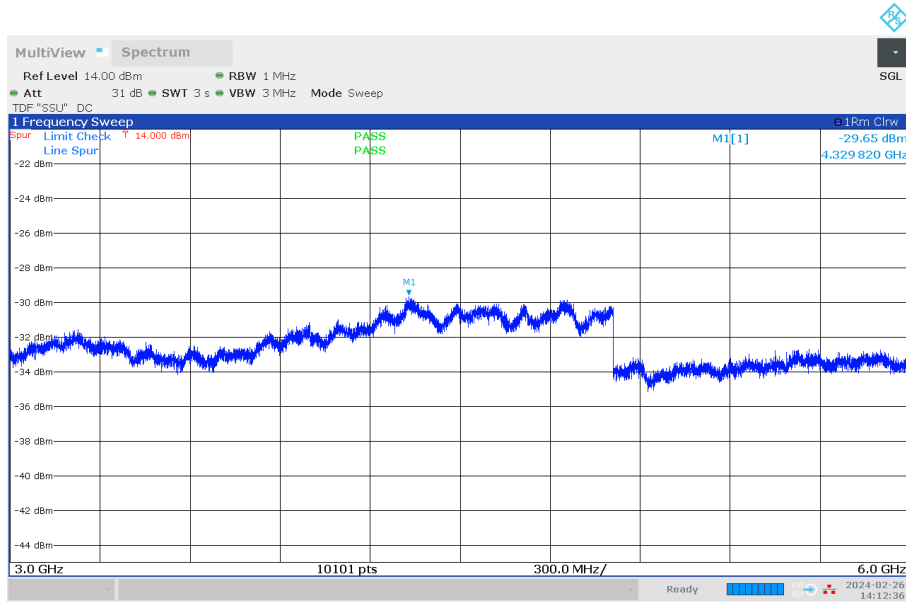
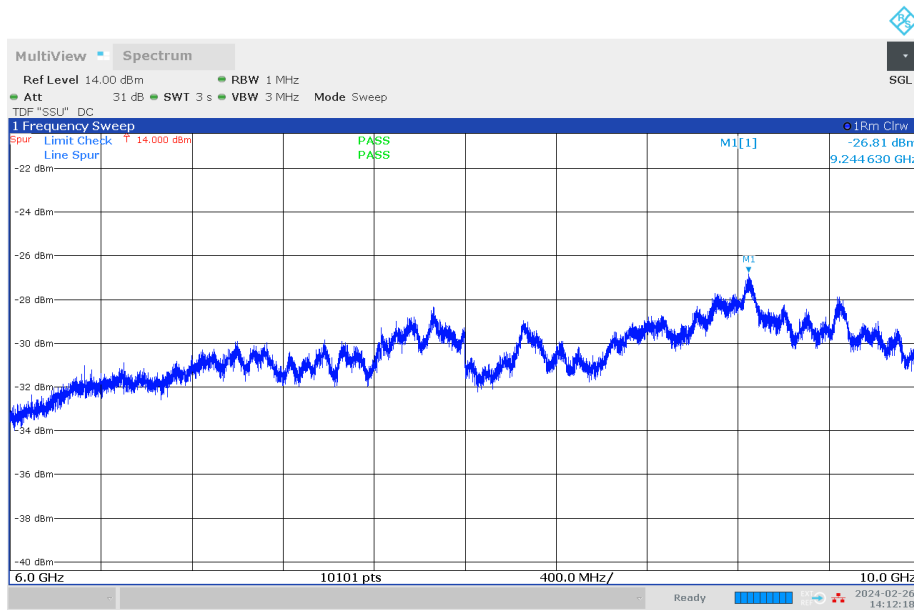


Figure 7 Spurious Emissions (1GHz – 3GHz) – QPSK (1962.5MHz) (15MHz Channel BW)



02:12:36 PM 02/26/2024

Figure 8 Spurious Emissions (3GHz – 6GHz) – QPSK (1962.5 MHz) (15MHz Channel BW)



02:12:19 PM 02/26/2024

Figure 9 Spurious Emissions (6GHz – 10GHz) – QPSK (1962.5 MHz) (15MHz Channel BW)

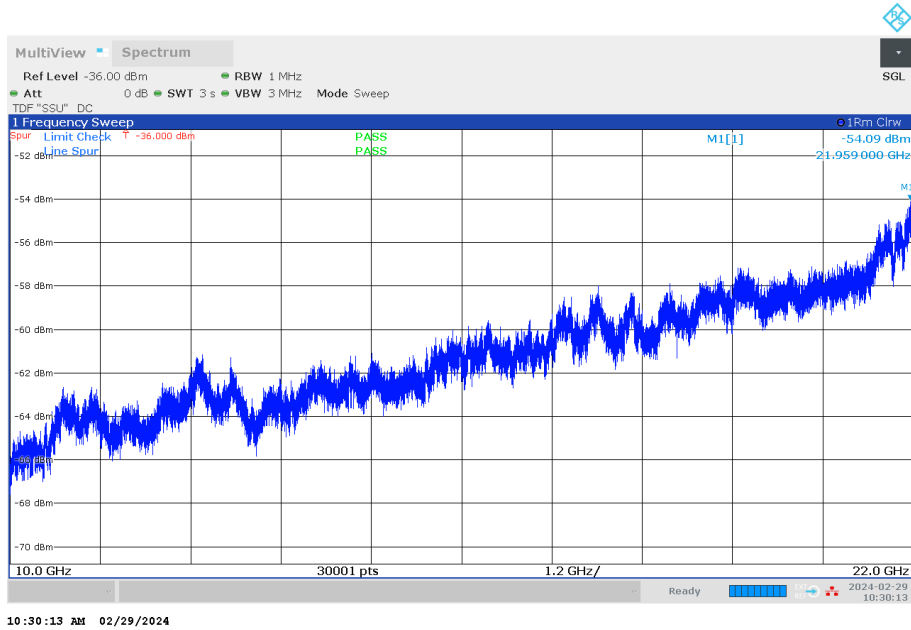


Figure 10 Spurious Emissions (10GHz – 22GHz) – QPSK (1962.5 MHz) (15MHz Channel BW)

Config J TX port 4:

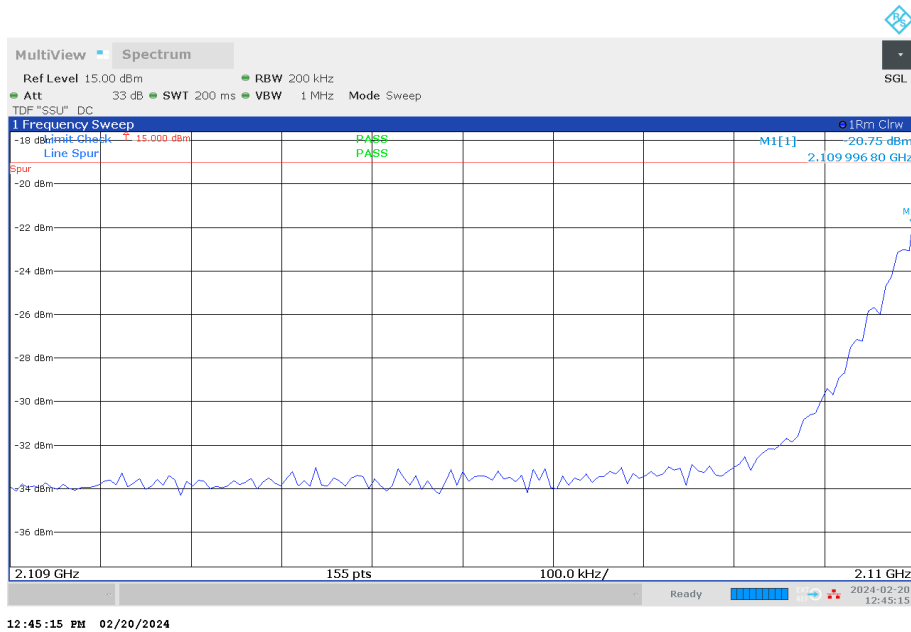
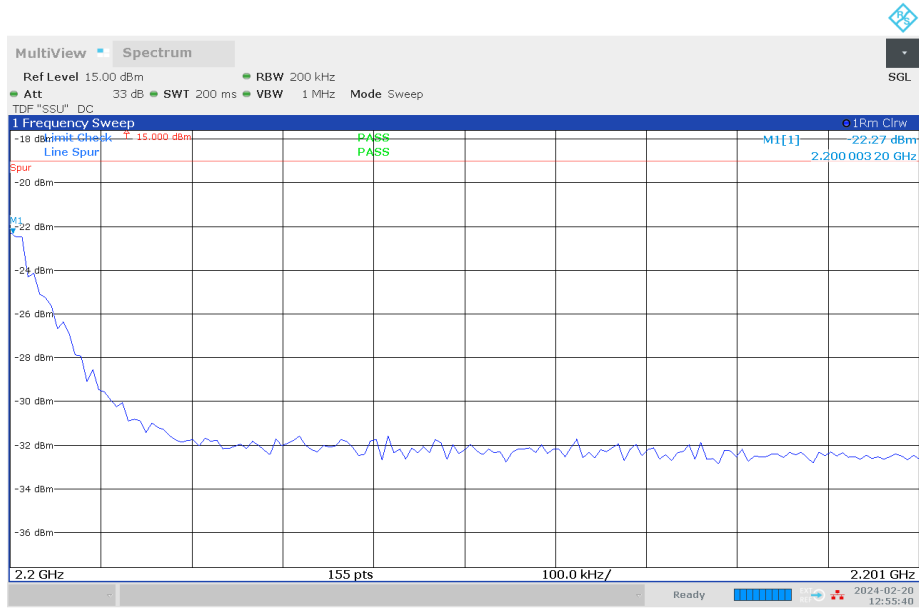


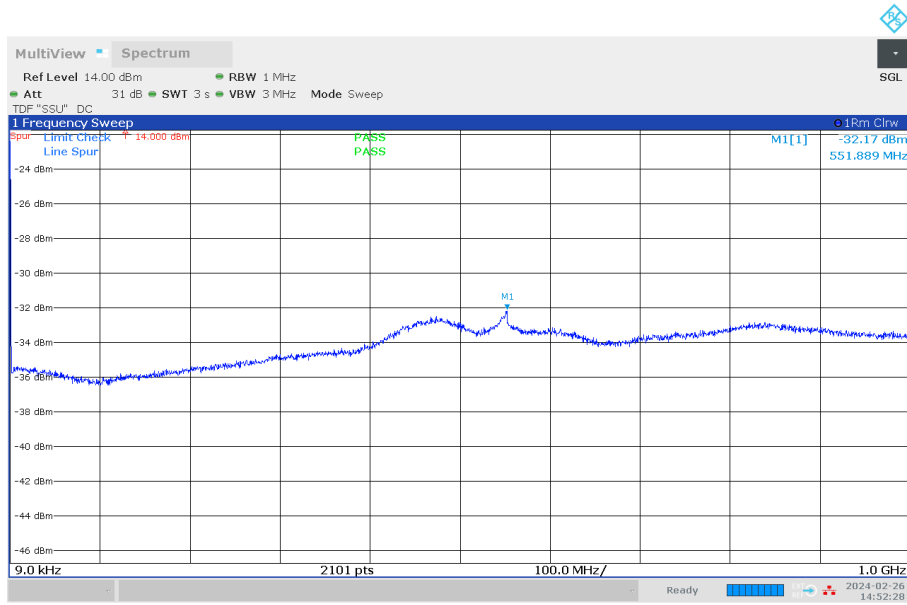
Figure 11 Spurious Emissions (Lower Band Edge) – QPSK (2115 / 2125 MHz) (10 +10MHz Channel BW)



12:55:40 PM 02/20/2024

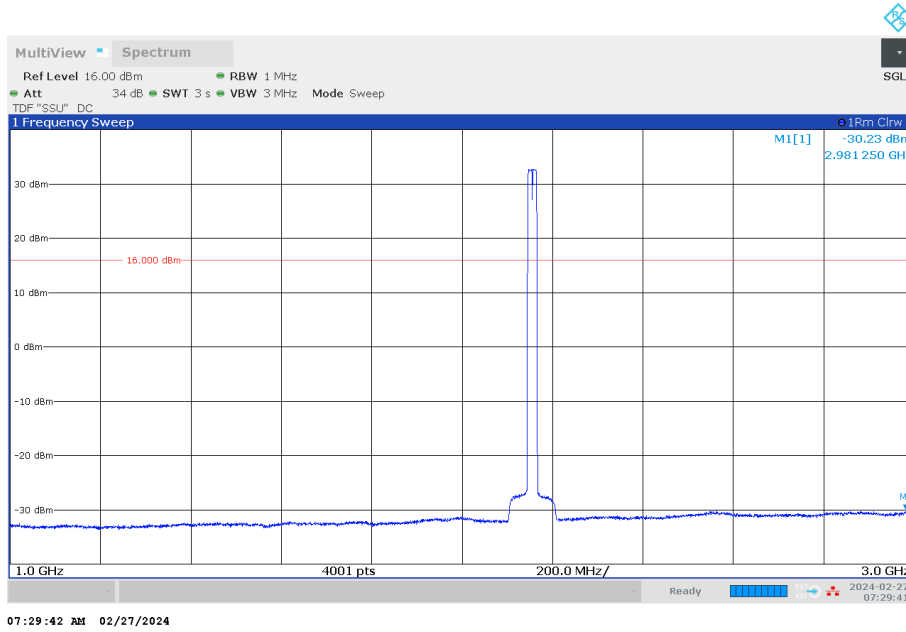
Figure 12 Spurious Emissions (Upper Band Edge) – QPSK (2185 / 2195 MHz) (10 +10MHz Channel BW)

Config J TX port 4:



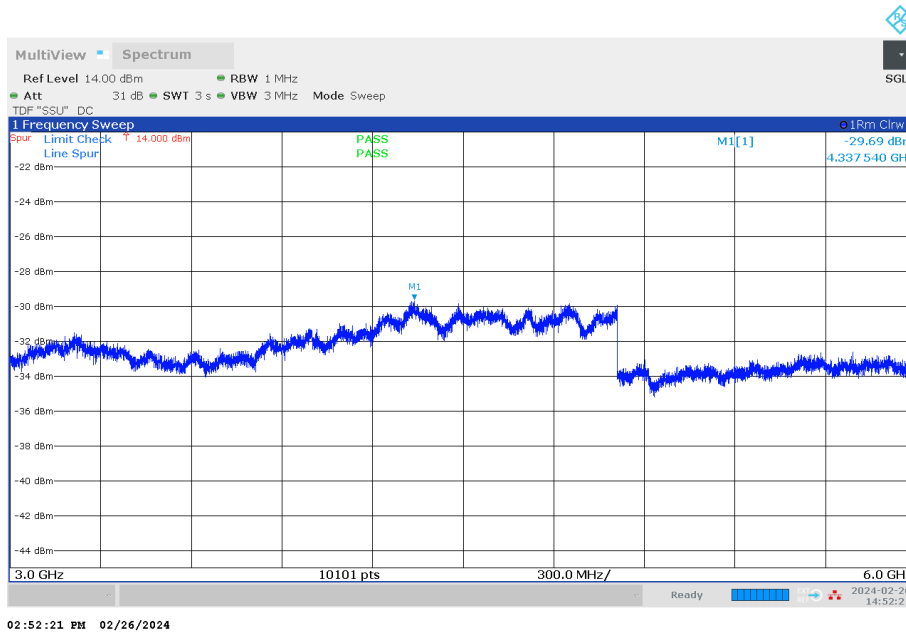
02:52:28 PM 02/26/2024

Figure 13 Spurious Emissions (9kHz – 1GHz) - QPSK (2150 / 2160 MHz) (10+10MHz Channel BW)



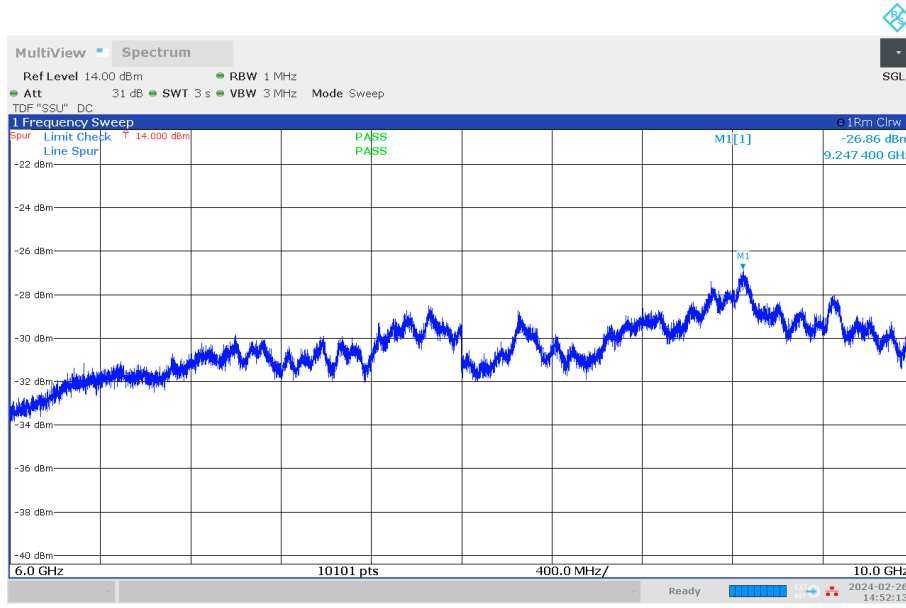
07:29:42 AM 02/27/2024

Figure 14 Spurious Emissions (1GHz – 3GHz) – QPSK (2150 / 2160 MHz) (10+10MHz Channel BW)



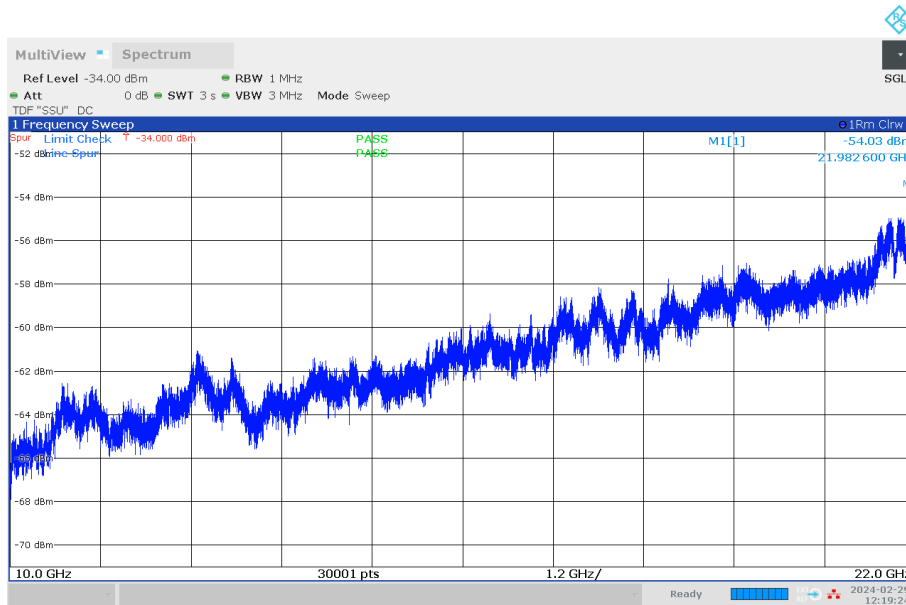
02:52:21 PM 02/26/2024

Figure 15 Spurious Emissions (3GHz – 6GHz) – QPSK (2150 / 2160 MHz) (10+10MHz Channel BW)



02:52:14 PM 02/26/2024

Figure 16 Spurious Emissions (6GHz – 10GHz) – QPSK (2150 / 2160 MHz) (10+10MHz Channel BW)



12:19:25 PM 02/29/2024

Figure 17 Spurious Emissions (10GHz – 22GHz) – QPSK (2150 / 2160 MHz) (10+10MHz Channel BW)

4.6.5 Test No. 5 Field Strength of Spurious Radiation

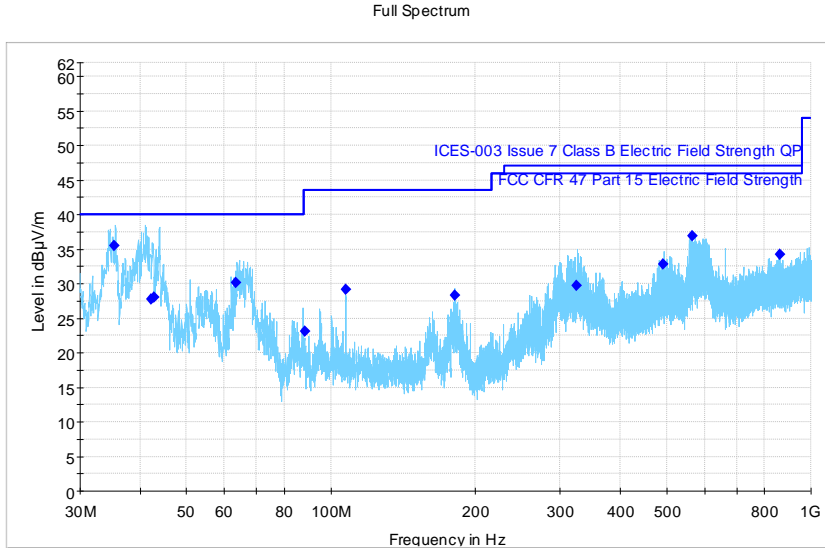


Figure 18 Field Strength of Spurious Radiation (30 MHz – 1 GHz) – QPSK (1940 / 1985 / 2120 / 2190 MHz) (20+20+20+20 MHz Channel BW)

Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
35.381333	35.46	40.00	4.54	100.0	V	156.0
42.195667	27.72	40.00	12.28	100.0	V	151.0
42.703333	28.00	40.00	12.00	110.0	V	62.0
63.230333	30.20	40.00	9.80	201.0	V	105.0
88.086333	23.05	43.50	20.45	216.0	H	74.0
107.378333	29.15	43.50	14.35	102.0	V	81.0
180.904333	28.32	43.50	15.18	207.0	H	202.0
325.065667	29.76	46.00	16.24	238.0	H	218.0
492.392667	32.86	46.00	13.14	102.0	V	164.0
566.331333	36.87	46.00	9.13	106.0	V	267.0
859.352000	34.21	46.00	11.79	160.0	H	300.0

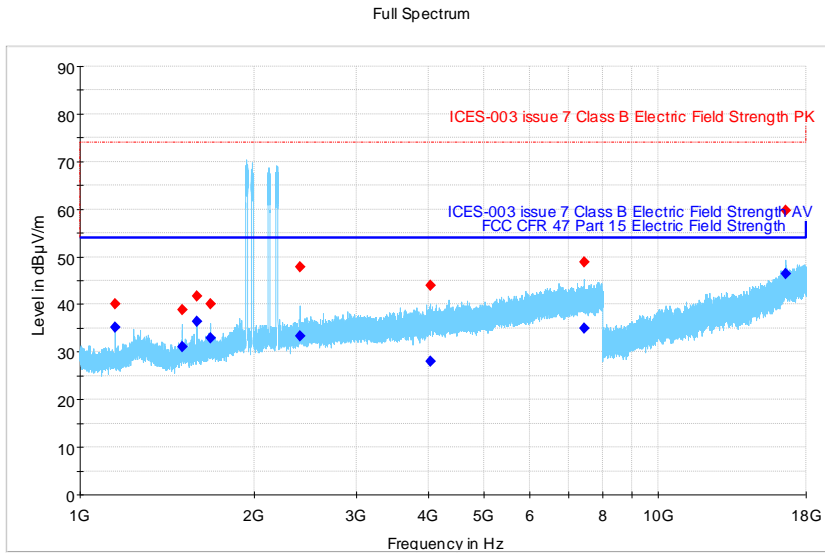


Figure 19 Field Strength of Spurious Radiation (1 GHz – 18 GHz) – QPSK (1940 / 1985 / 2120 / 2190 MHz) (20+20+20+20 MHz Channel BW)

Final_Result

Frequency (MHz)	Average (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
1150.103833	35.16	---	54.00	18.84	138.0	H	331.0
1150.103833	---	40.18	74.00	33.82	138.0	H	331.0
1503.910667	31.16	---	54.00	22.84	100.0	H	302.0
1503.910667	---	38.93	74.00	35.07	100.0	H	302.0
1592.461500	36.33	---	54.00	17.67	301.0	H	287.0
1592.461500	---	41.63	74.00	32.37	301.0	H	287.0
1680.859000	32.87	---	54.00	21.13	168.0	H	165.0
1680.859000	---	40.10	74.00	33.90	168.0	H	165.0
2399.903333	33.29	---	54.00	20.71	114.0	H	1.0
2399.903333	---	47.86	74.00	26.14	114.0	H	1.0
4030.967166	28.08	---	54.00	25.92	219.0	V	171.0
4030.967166	---	43.92	74.00	30.08	219.0	V	171.0
7447.470333	34.99	---	54.00	19.01	293.0	H	241.0
7447.470333	---	48.79	74.00	25.21	293.0	H	241.0
16582.265492	46.43	---	54.00	7.57	118.0	V	292.0
16582.265492	---	59.73	74.00	14.27	118.0	V	292.0



Figure 20 Field Strength of Spurious Radiation (18 GHz – 22 GHz) – QPSK (1940 / 1985 / 2120 / 2190 MHz) (20+20+20+20 MHz Channel BW)

Final_Result

Frequency (MHz)	Average (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
18111.899880	39.72	---	57.50	17.78	123.0	H	15.0
18111.899880	---	53.30	77.50	24.20	123.0	H	15.0
21160.566108	40.44	---	57.50	17.06	104.0	H	65.0
21160.566108	---	53.97	77.50	23.53	104.0	H	65.0

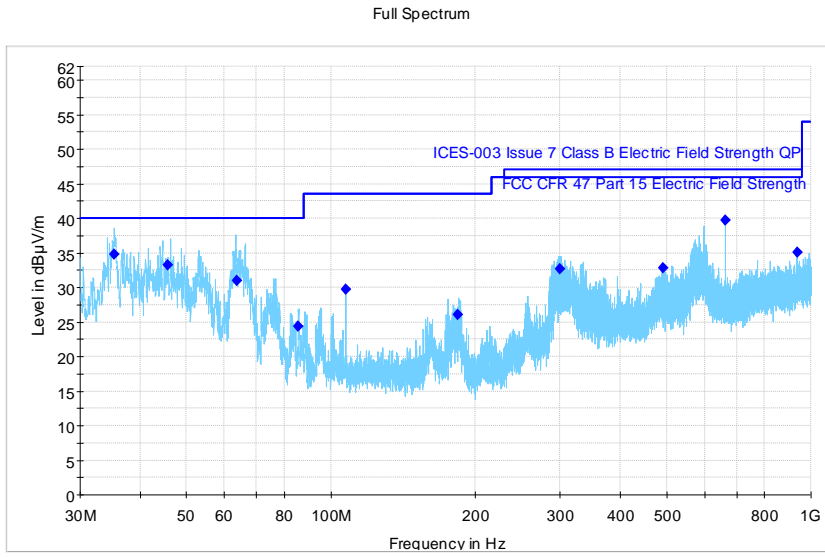


Figure 21 Field Strength of Spurious Radiation (30 MHz – 1 GHz) – QPSK (1950 / 2130 / 2180 MHz) (40+40+40 MHz Channel BW)

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
35.335000	34.86	40.00	5.14	100.0	V	81.0
45.638333	33.31	40.00	6.69	100.0	V	124.0
63.748667	31.03	40.00	8.97	190.0	V	269.0
85.523333	24.36	40.00	15.64	203.0	H	62.0
107.403667	29.77	43.50	13.73	107.0	V	20.0
183.914333	26.03	43.50	17.47	120.0	H	319.0
299.917000	32.74	46.00	13.26	102.0	H	235.0
491.667667	32.90	46.00	13.10	100.0	V	162.0
663.541667	39.72	46.00	6.28	102.0	V	93.0
938.284000	35.12	46.00	10.88	181.0	V	130.0

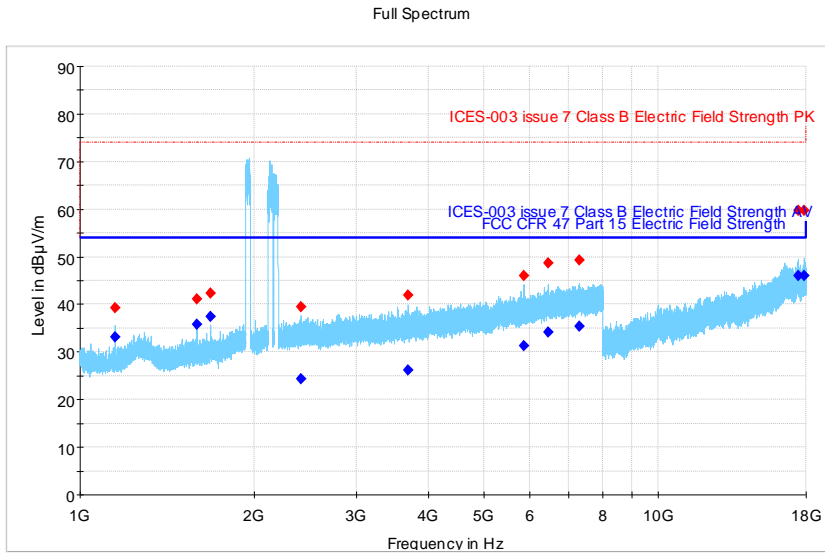


Figure 22 Field Strength of Spurious Radiation (1 GHz – 18 GHz) – QPSK (1950 / 2130 / 2180 MHz) (40+40+40 MHz Channel BW)

Final_Result

Frequency (MHz)	Average (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
1150.084667	33.17	---	54.00	20.83	174.0	H	31.0
1150.084667	---	39.30	74.00	34.70	174.0	H	31.0
1592.501833	35.72	---	54.00	18.28	298.0	H	300.0
1592.501833	---	41.20	74.00	32.80	298.0	H	300.0
1680.957500	37.33	---	54.00	16.67	350.0	V	131.0
1680.957500	---	42.44	74.00	31.56	350.0	V	131.0
2407.576833	24.27	---	54.00	29.73	193.0	H	154.0
2407.576833	---	39.38	74.00	34.62	193.0	H	154.0
3695.842834	26.17	---	54.00	27.83	114.0	H	179.0
3695.842834	---	41.85	74.00	32.15	114.0	H	179.0
5848.266166	31.34	---	54.00	22.66	229.0	H	160.0
5848.266166	---	45.98	74.00	28.02	229.0	H	160.0
6434.711500	34.10	---	54.00	19.90	198.0	H	334.0
6434.711500	---	48.66	74.00	25.34	198.0	H	334.0
7285.875166	35.40	---	54.00	18.60	100.0	H	34.0
7285.875166	---	49.24	74.00	24.76	100.0	H	34.0
17418.668520	46.08	---	54.00	7.92	210.0	V	88.0
17418.668520	---	59.77	74.00	14.23	210.0	V	88.0
17833.538588	45.93	---	54.00	8.07	123.0	V	84.0
17833.538588	---	59.79	74.00	14.21	123.0	V	84.0

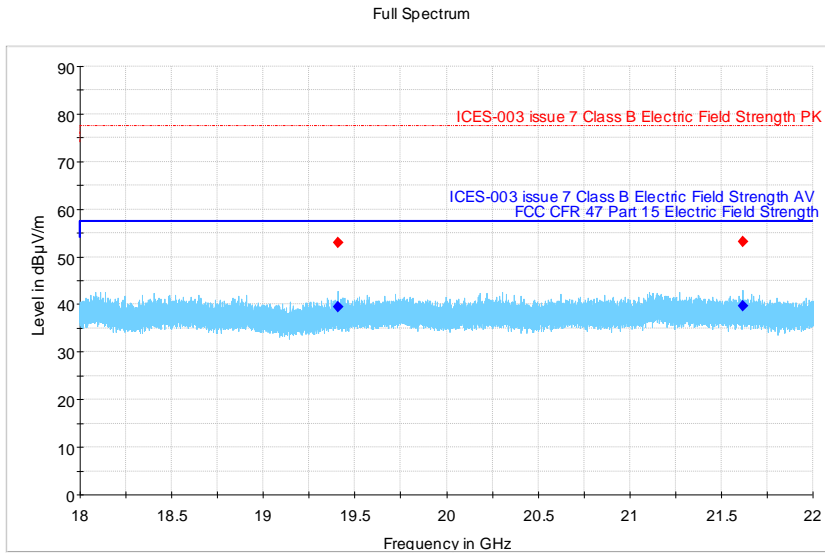


Figure 23 Field Strength of Spurious Radiation (18 GHz – 22 GHz) – QPSK (1950 / 2130 / 2180 MHz) (40+40+40 MHz Channel BW)

Final_Result

Frequency (MHz)	Average (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
19405.320948	---	53.01	77.50	24.49	224.0	V	45.0
19405.320948	39.55	---	57.50	17.95	224.0	V	45.0
21615.714720	39.71	---	57.50	17.79	115.0	V	78.0
21615.714720	---	53.26	77.50	24.24	115.0	V	78.0

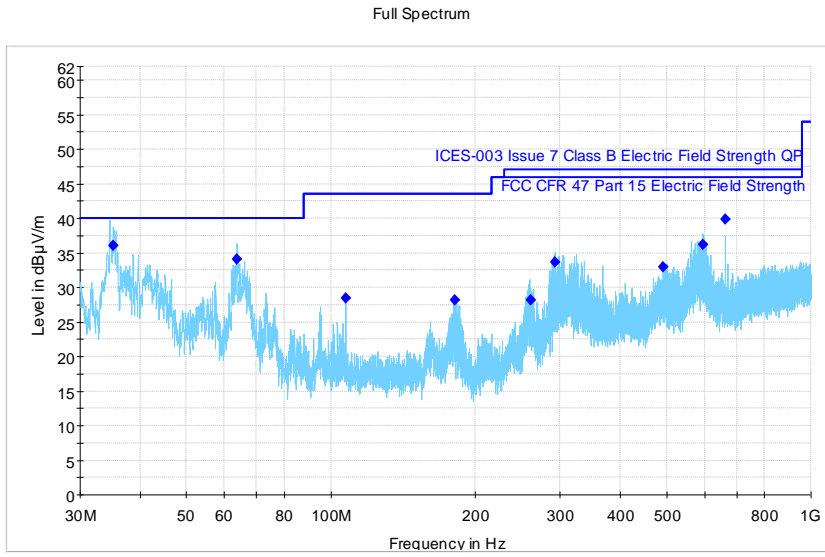


Figure 24 Field Strength of Spurious Radiation (30 MHz – 1 GHz) – QPSK (1950 / 1990 / 2115 / 2180 MHz) (40+10+10 + 40 MHz Channel BW)

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
35.163667	36.12	40.00	3.88	102.0	V	22.0
63.666000	34.10	40.00	5.90	210.0	V	89.0
107.373667	28.48	43.50	15.02	107.0	V	159.0
180.708333	28.13	43.50	15.37	194.0	H	202.0
260.596000	28.24	46.00	17.76	104.0	H	18.0
292.572333	33.69	46.00	12.31	100.0	H	233.0
491.265333	32.91	46.00	13.09	100.0	V	164.0
595.889333	36.27	46.00	9.73	100.0	V	265.0
663.541667	39.90	46.00	6.10	100.0	V	92.0

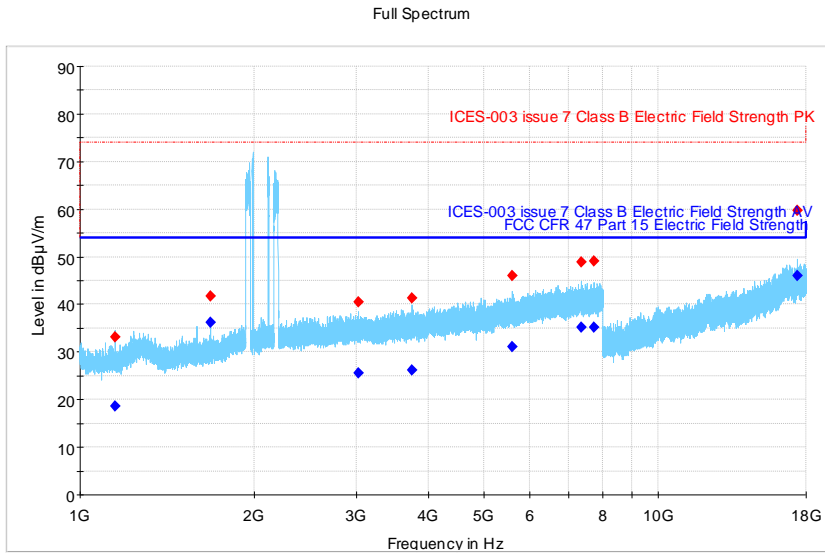


Figure 25 Field Strength of Spurious Radiation (1 GHz – 18 GHz) – QPSK (1950 / 1990 / 2115 / 2180 MHz) (40+10+10 + 40 MHz Channel BW)

Final_Result

Frequency (MHz)	Average (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
1151.300333	---	33.16	74.00	40.84	250.0	H	239.0
1151.300333	18.56	---	54.00	35.44	250.0	H	239.0
1681.001833	---	41.66	74.00	32.34	160.0	V	270.0
1681.001833	36.25	---	54.00	17.75	160.0	V	270.0
3031.890833	25.49	---	54.00	28.51	314.0	V	10.0
3031.890833	---	40.49	74.00	33.51	314.0	V	10.0
3751.085167	26.23	---	54.00	27.77	119.0	V	345.0
3751.085167	---	41.32	74.00	32.68	119.0	V	345.0
5581.113166	---	46.04	74.00	27.96	189.0	V	154.0
5581.113166	31.06	---	54.00	22.94	189.0	V	154.0
7351.985333	35.12	---	54.00	18.88	113.0	H	1.0
7351.985333	---	48.79	74.00	25.21	113.0	H	1.0
7747.686000	---	49.19	74.00	24.81	103.0	H	321.0
7747.686000	35.18	---	54.00	18.82	103.0	H	321.0
17404.018680	46.00	---	54.00	8.00	111.0	V	330.0
17404.018680	---	59.65	74.00	14.35	111.0	V	330.0

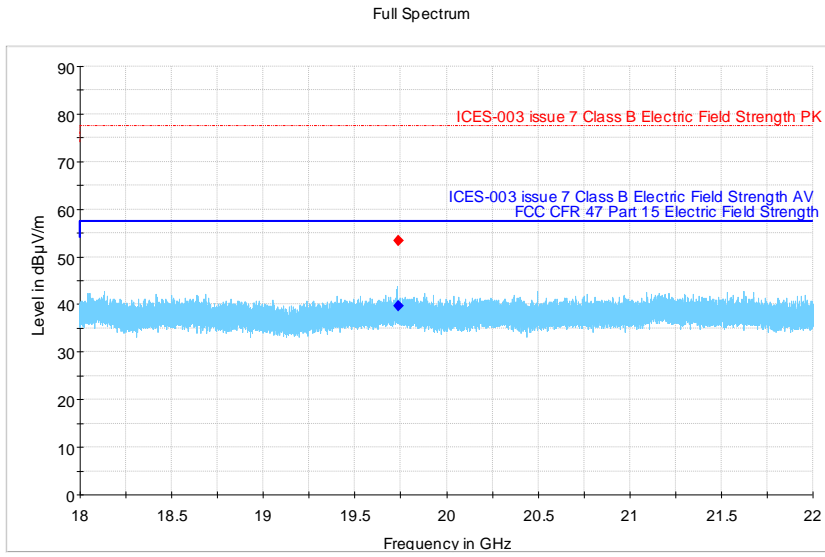


Figure 26 Field Strength of Spurious Radiation (18 GHz – 22 GHz) – QPSK (1950 / 1990 / 2115 / 2180 MHz) (40+10+10 + 40 MHz Channel BW)

Final_Result

Frequency (MHz)	Average (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
19734.585000	---	53.46	77.50	24.04	329.0	V	151.0
19734.585000	39.64	---	57.50	17.86	329.0	V	151.0

4.6.6 Test No. 7 Receiver Spurious Emissions

Config J TX port 4:

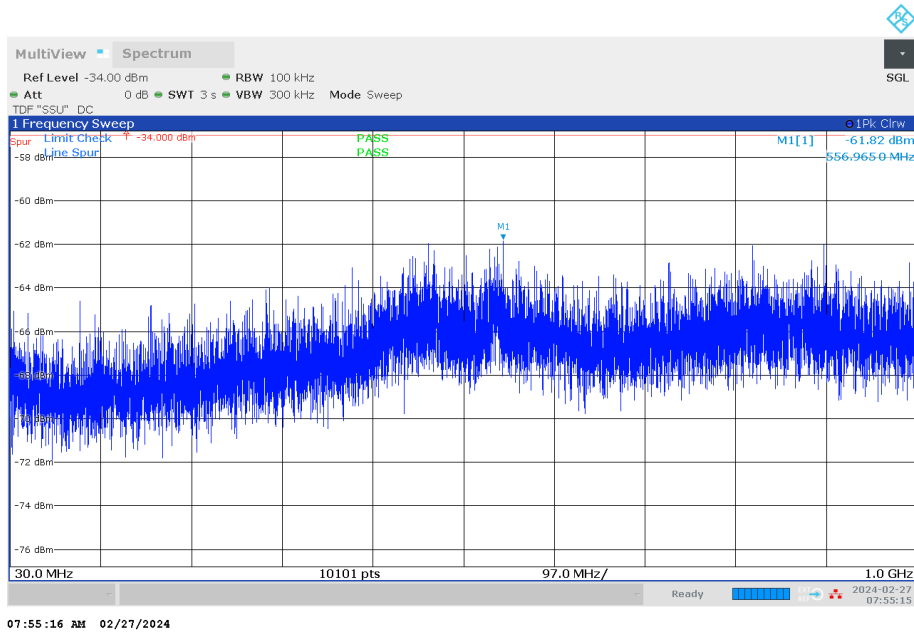


Figure 27 Receiver Spurious Emissions (30MHz – 1GHz) – QPSK (2150 / 2160 MHz) (10+10MHz Channel BW)

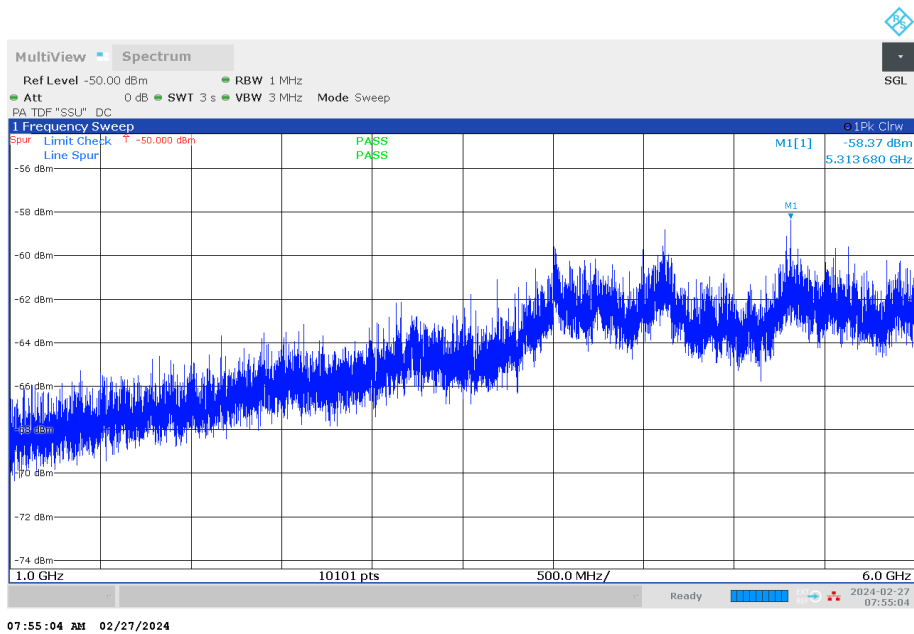


Figure 28 Receiver Spurious Emissions (1GHz – 6GHz) – QPSK (2150 / 2160 MHz) (10+10MHz Channel BW)

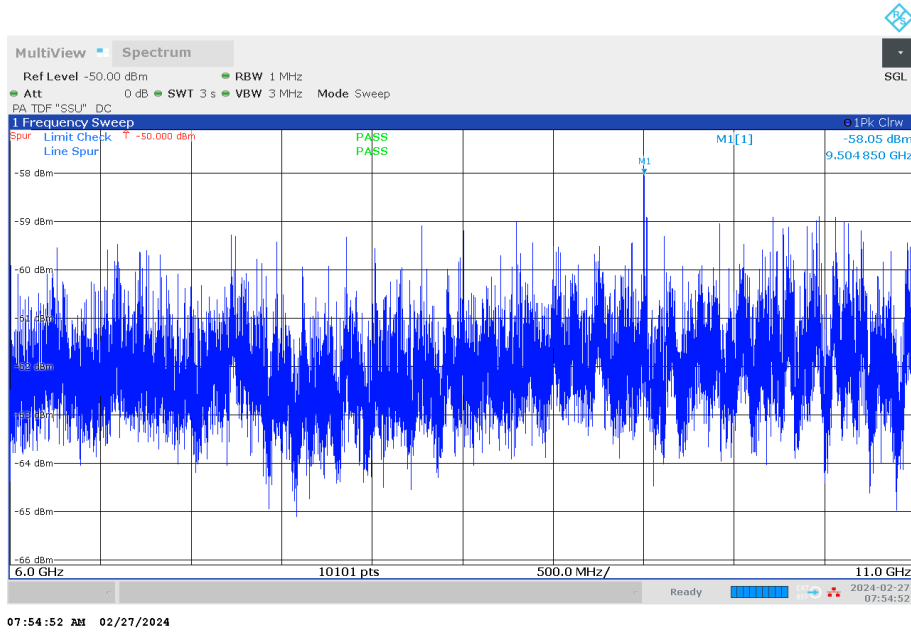


Figure 29 Receiver Spurious Emissions (6GHz – 11GHz) – QPSK (2150 / 2160 MHz) (10+10MHz Channel BW)

4.6.7 Test No. 8 AC Conducted Emissions

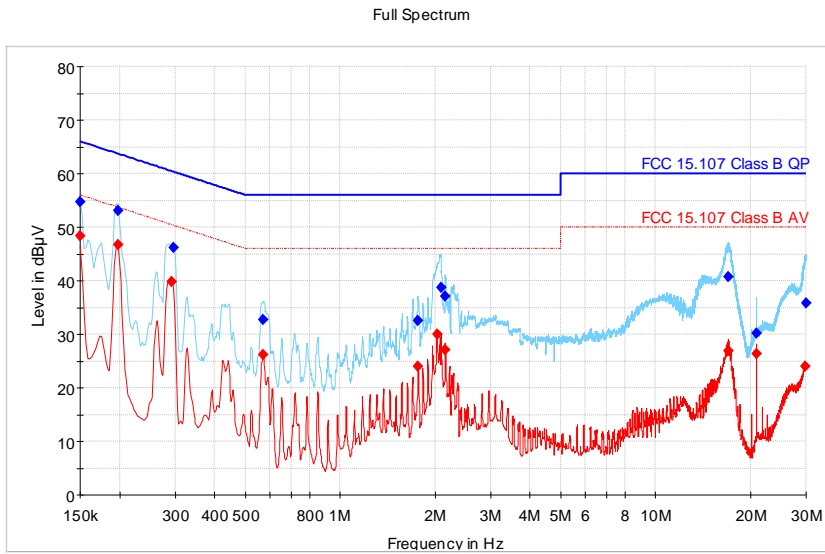


Figure 30 AC Conducted Emissions L1-line (150 kHz – 30 MHz) – QPSK (1940 / 1985 / 2120 / 2190 MHz) (20+20+20+20 MHz Channel BW)

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.150000	---	48.29	56.00	7.71	L1
0.150000	54.70	---	66.00	11.30	L1
0.197250	---	46.75	53.73	6.98	L1
0.197250	53.14	---	63.73	10.58	L1
0.291750	---	39.89	50.47	10.58	L1
0.296250	46.22	---	60.35	14.13	L1
0.570750	---	26.15	46.00	19.85	L1
0.570750	32.73	---	56.00	23.27	L1
1.765500	32.55	---	56.00	23.45	L1
1.765500	---	24.03	46.00	21.97	L1
2.026500	---	29.92	46.00	16.08	L1
2.085000	38.65	---	56.00	17.35	L1
2.157000	37.11	---	56.00	18.89	L1
2.159250	---	27.05	46.00	18.95	L1
17.047500	---	26.82	50.00	23.18	L1
17.049750	40.64	---	60.00	19.36	L1
20.942250	30.26	---	60.00	29.74	L1
20.942250	---	26.45	50.00	23.55	L1
29.791500	---	23.91	50.00	26.09	L1
29.989500	35.84	---	60.00	24.16	L1

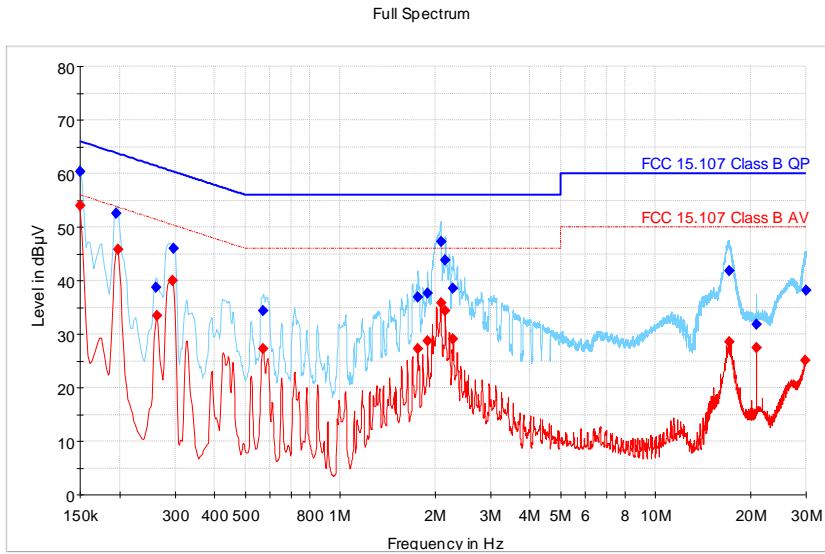


Figure 31 AC Conducted Emissions N-line (150 kHz – 30 MHz) – QPSK (1940 / 1985 / 2120 / 2190 MHz) (20+20+20+20 MHz Channel BW)

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.150000	---	53.97	56.00	2.03	N
0.150000	60.41	---	66.00	5.59	N
0.195000	52.57	---	63.82	11.25	N
0.197250	---	45.73	53.73	7.99	N
0.260250	38.68	---	61.42	22.75	N
0.262500	---	33.47	51.35	17.89	N
0.294000	---	39.92	50.41	10.49	N
0.296250	46.07	---	60.35	14.28	N
0.570750	---	27.30	46.00	18.70	N
0.570750	34.32	---	56.00	21.68	N
1.763250	---	27.22	46.00	18.78	N
1.763250	36.90	---	56.00	19.11	N
1.893750	37.67	---	56.00	18.33	N
1.893750	---	28.69	46.00	17.31	N
2.085000	47.24	---	56.00	8.76	N
2.089500	---	35.88	46.00	10.12	N
2.154750	43.77	---	56.00	12.23	N
2.154750	---	34.29	46.00	11.71	N
2.280750	38.57	---	56.00	17.43	N
2.285250	---	29.15	46.00	16.85	N
17.092500	41.89	---	60.00	18.11	N
17.092500	---	28.55	50.00	21.45	N
20.942250	---	27.37	50.00	22.63	N
20.944500	31.74	---	60.00	28.26	N
29.863500	---	25.06	50.00	24.94	N
29.904000	38.24	---	60.00	21.76	N

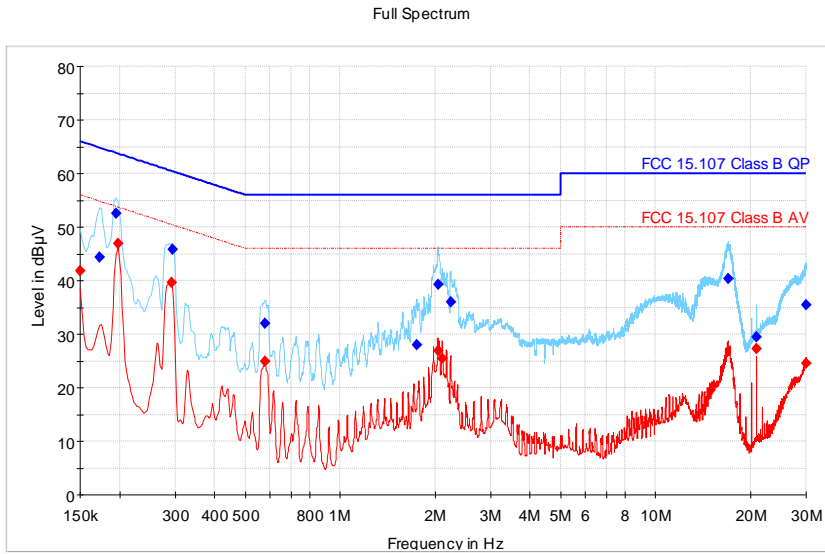


Figure 32 AC Conducted Emissions L1-line (150 kHz – 30 MHz) – QPSK (1950 / 2130 / 2180 MHz) (40+40+40 MHz Channel BW)

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.150000	---	41.86	56.00	14.14	L1
0.172500	44.37	---	64.84	20.47	L1
0.195000	52.51	---	63.82	11.31	L1
0.197250	---	46.82	53.73	6.91	L1
0.291750	---	39.70	50.47	10.78	L1
0.294000	45.89	---	60.41	14.52	L1
0.577500	---	24.83	46.00	21.17	L1
0.579750	32.00	---	56.00	24.00	L1
1.749750	28.02	---	56.00	27.98	L1
2.042250	---	26.87	46.00	19.13	L1
2.046750	39.36	---	56.00	16.64	L1
2.107500	---	25.38	46.00	20.62	L1
2.240250	36.07	---	56.00	19.93	L1
16.955250	40.39	---	60.00	19.61	L1
20.933250	29.50	---	60.00	30.50	L1
20.935500	---	27.28	50.00	22.72	L1
29.915250	35.38	---	60.00	24.62	L1
29.926500	---	24.51	50.00	25.49	L1

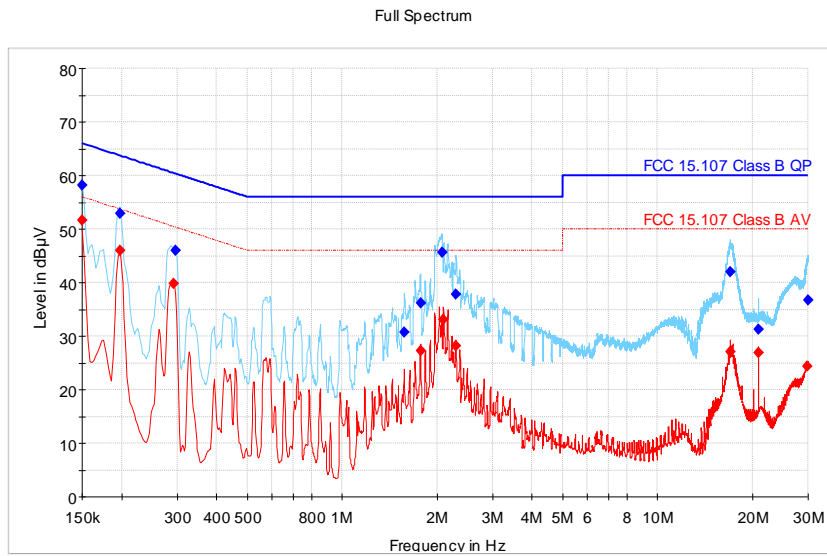


Figure 33 AC Conducted Emissions N-line (150 kHz – 30 MHz) – QPSK (1950 / 2130 / 2180 MHz) (40+40+40 MHz Channel BW)

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.150000	---	51.56	56.00	4.44	N
0.150000	58.16	---	66.00	7.84	N
0.197250	---	45.92	53.73	7.80	N
0.197250	52.97	---	63.73	10.76	N
0.291750	---	39.77	50.47	10.70	N
0.296250	46.07	---	60.35	14.28	N
1.576500	30.74	---	56.00	25.26	N
1.770000	---	27.36	46.00	18.64	N
1.772250	36.24	---	56.00	19.76	N
2.069250	45.55	---	56.00	10.45	N
2.098500	---	33.15	46.00	12.85	N
2.294250	---	28.13	46.00	17.87	N
2.298750	37.76	---	56.00	18.24	N
17.020500	---	27.06	50.00	22.94	N
17.047500	42.06	---	60.00	17.94	N
20.935500	---	26.91	50.00	23.09	N
20.937750	31.30	---	60.00	28.70	N
29.755500	---	24.39	50.00	25.61	N
29.996250	36.66	---	60.00	23.34	N

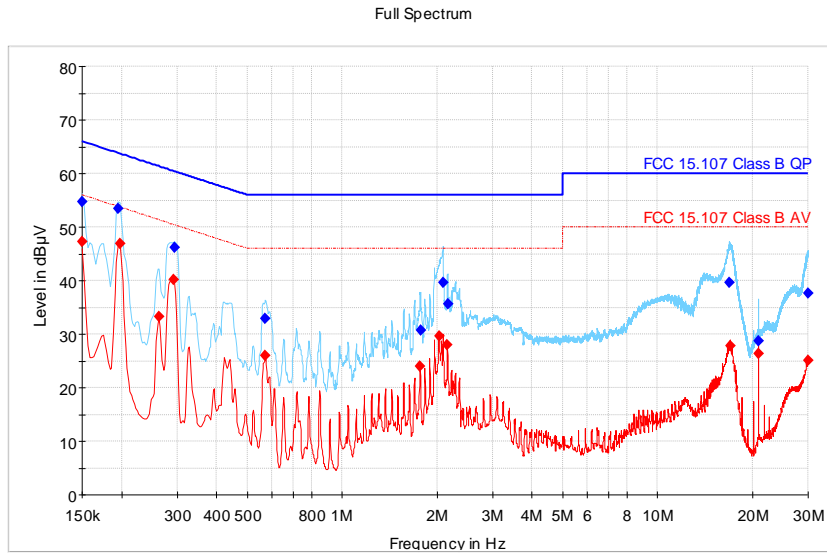


Figure 34 AC Conducted Emissions L1-line (150 kHz – 30 MHz) – QPSK (1950 / 1990 / 2115 / 2180 MHz) (40+10+10 + 40 MHz Channel BW)

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.150000	---	47.19	56.00	8.81	L1
0.150000	54.64	---	66.00	11.36	L1
0.195000	53.39	---	63.82	10.43	L1
0.197250	---	47.00	53.73	6.73	L1
0.262500	---	33.29	51.35	18.06	L1
0.291750	---	40.09	50.47	10.38	L1
0.294000	46.23	---	60.41	14.18	L1
0.570750	32.85	---	56.00	23.15	L1
0.570750	---	25.93	46.00	20.07	L1
1.765500	---	24.03	46.00	21.97	L1
1.770000	30.80	---	56.00	25.20	L1
2.026500	---	29.65	46.00	16.35	L1
2.087250	39.68	---	56.00	16.32	L1
2.157000	---	27.98	46.00	18.02	L1
2.161500	35.67	---	56.00	20.33	L1
16.908000	39.63	---	60.00	20.37	L1
16.968750	---	27.73	50.00	22.27	L1
20.937750	28.72	---	60.00	31.28	L1
20.940000	---	26.39	50.00	23.61	L1
29.949000	37.63	---	60.00	22.37	L1
29.958000	---	25.16	50.00	24.84	L1

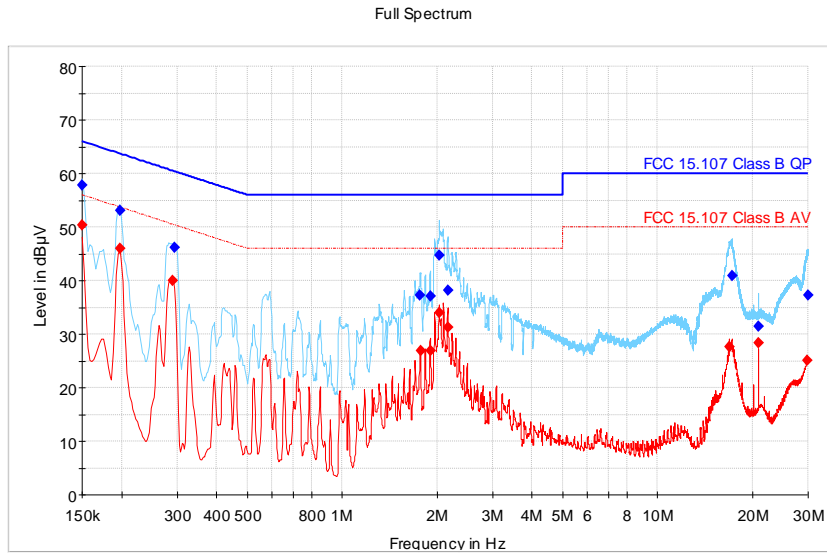


Figure 35 AC Conducted Emissions N-line (150 kHz – 30 MHz) – QPSK (1950 / 1990 / 2115 / 2180 MHz) (40+10+10 + 40 MHz Channel BW)

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.150000	---	50.28	56.00	5.72	N
0.150000	57.73	---	66.00	8.27	N
0.197250	---	45.97	53.73	7.75	N
0.197250	53.03	---	63.73	10.70	N
0.289500	---	39.94	50.54	10.59	N
0.294000	46.23	---	60.41	14.18	N
1.767750	37.21	---	56.00	18.79	N
1.770000	---	26.93	46.00	19.07	N
1.900500	37.14	---	56.00	18.86	N
1.900500	---	26.82	46.00	19.18	N
2.031000	---	34.02	46.00	11.98	N
2.033250	44.76	---	56.00	11.24	N
2.163750	---	31.25	46.00	14.75	N
2.170500	38.13	---	56.00	17.87	N
16.912500	---	27.68	50.00	22.32	N
17.205000	40.98	---	60.00	19.02	N
20.940000	31.39	---	60.00	28.61	N
20.940000	---	28.28	50.00	21.72	N
29.834250	---	25.05	50.00	24.95	N
29.982750	37.22	---	60.00	22.78	N

Appendix A: AWMFIA NR/E-UTRA Multicarrier Multiband configurations description

The antenna port power is enabled at maximum (40 watts) for all multicarrier multi-band testing. QPSK modulation type is used for this testing.

- *Multicarrier test cases have been developed as shown below:*
- *AWS Multicarrier Multiband Test Configuration 1 (Config P): In the AWS band Two E-UTRA 5MHz and one NR 5MHz carriers using two E-UTRA carriers (with minimum spacing between carrier frequencies) at the lower band edge (2112.5 & 2117MHz) and One NR 5MHz carrier with maximum spacing between the other two carrier frequencies (2197.5MHz) at the upper band edge. In the PCS band single NR 5MHz carrier at the middle channel (1962.5. The smallest channel bandwidth is selected to maximize carrier power spectral density. The carriers are operated at maximum power (~10W/PCS carrier, 10W/AWS carriers) with a total port power of 40 watts (10W for PCS band carrier + 30W for AWS band carriers).*
- *PCS Multicarrier Multiband Test Configuration 2 (Config Q): In the PCS band two E-UTRA 5MHz carriers (with minimum spacing between carrier frequencies) at the lower band edge (1932.5 & 1937.5MHz) and One NR 5MHz carrier with maximum spacing between the other two carrier frequencies (1992.5MHz) at the upper band edge In the AWS band single NR 5MHz carrier at the middle channel (2155.0 MHz). The smallest channel bandwidth is selected to maximize carrier power spectral density (~10W/PCS carriers, 10W/AWS carrier) with a total port power of 40 watts (30W for PCS band carriers + 10W for AWS band carrier).*
- *PCS Multicarrier Multiband Test Configuration 3 (Config R): In the PCS band one E-UTRA 20MHz and one NR 35 MHz carriers (with minimum spacing between carrier frequencies) at the upper band edge (1940.0 & 1967.5MHz). In the AWS band single E-UTRA 20MHz carrier at the middle channel (2155.0MHz). The largest channel bandwidth is selected to maximize carrier OBW. The carriers are operated at maximum power (~13.3W/PCS carriers, 13.3W/AWS carrier) with a total port power of 40 watts (26.6W for PCS band carriers + 13.3W for AWS band carrier).*
- *AWS Multicarrier Multiband Test Configuration 4 (Config S): In the AWS band One E-UTRA 20MHz and one NR 40MHz carriers (with minimum spacing between carrier frequencies) at the lower band edge (2120 & 2150MHz) In the PCS band single E-UTRA 20MHz carrier at the middle channel (1962.5MHz). The largest channel bandwidth was selected to maximize carrier OBW. The carriers are operated at maximum power (~13.3W/AWS carrier, 13.3W/PCS carrier) with a total port power of 40 watts (13.3W for PCS band carrier + 26.6W for AWS band carriers)*
- *PCS Multicarrier Multiband Test Configuration 5 (Config T): In the PCS band one E-UTRA 20MHz and one NR 35MHz carriers (with minimum spacing between carrier frequencies) at*

the upper band edge (1950.0 & 1977.5MHz). In the AWS band single E-UTRA 20MHz carrier at the middle channel (2155MHz). The largest channel bandwidth is selected to maximize carrier OBW. The carriers are operated at maximum power (~13.3W/PCS carrier, 13.3W/AWS carrier) with a total port power of 40 watts (26.6W for PCS band carriers + 13.3W for AWS band carrier).

- **AWS Multicarrier Multiband Test Configuration 6 (Config U):** In the AWS band one E-UTRA 20MHz and one NR 40MHz carriers (with minimum spacing between carrier frequencies) at the upper band edge (2150.0 & 2180.0MHz). In the PCS band single E-UTRA 20MHz carrier at the middle channel (1962.5MHz). The largest channel bandwidth is selected to maximize carrier OBW. The carriers are operated at maximum power (~13.3W/AWS carrier, 13.3W/PCS carrier) with a total port power of 40 watts (13.3W for PCS band carrier + 26.6W for AWS band carriers).
- **AWS and PCS Multicarrier Multiband Test Configuration 7 (Config V):** In the PCS band two E-UTRA 20MHz carriers (with maximum spacing between carrier frequencies) at the upper and lower band edges (1940.0 & 1985MHz). In the AWS band two E-UTRA 20MHz carrier (with maximum spacing between carrier frequencies) at the upper and lower band edges (2120MHz and 2190). The largest channel bandwidth is selected to maximize carrier OBW. The carriers are operated at maximum power (~10W/PCS carrier, 10W/AWS carrier) with a total port power of 40 watts (20W for PCS band carriers + 20W for AWS band carrier).
- **AWS and PCS Multicarrier Multiband Test Configuration 8 (Config W):** In the PCS band one NR 40MHz carrier at the lower band edge (1950MHz). In the AWS band two NR 40MHz carriers (with maximum spacing between carrier frequencies) at the upper and lower band edges (2130MHz and 2180MHz). The largest channel bandwidth is selected to maximize carrier OBW. The carriers are operated at maximum power (20W/PCS carrier, 10W/AWS carrier) with a total port power of 40 watts (20W for PCS band carriers + 20W for AWS band carrier).
- **AWS and PCS Multicarrier Test Configuration 9 (Config X):** In the PCS band one E-UTRA 10MHz and one NR 40MHz carriers (with maximum spacing between carrier frequencies) at the upper and lower band edges (1950MHz and 1990MHz). In the AWS band one E-UTRA 10MHz and one NR 40MHz carriers (with maximum spacing between carrier frequencies) at the upper and lower band edges (2115MHz and 2180MHz). The largest channel bandwidth is selected to maximize carrier OBW. The carriers are operated at maximum power (10W/PCS carrier, 10W/AWS carrier) with a total port power of 40 watts (20W for PCS band carriers + 20W for AWS band carrier).

Appendix B: AWMFIA EIRP calculations

EIRP Calculations for Four Port MIMO Operations for Band 25 Single Carriers

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

The base station antenna is selected by the customer. This EIRP calculation is based upon Nokia antenna assembly model “AAFC”. The maximum Band 25 gain (12.5dBi) for this antenna was used for the EIRP calculation. This antenna assembly has a pair of $\pm 45^\circ$ cross-polarized radiators used for Band 25. Four AWMFIA transmitter outputs are connected to the antenna assembly RF inputs.

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

Parameter	NB-IoT SA	E-UTRA 15 MHz Ch BW	NR 15 MHz Ch BW
Worst Case PSD/Antenna Port	43.49 dBm/MHz	34.87 dBm/MHz	35.30 dBm/MHz
Number of Ant Ports per Polarization	2	2	2
Total PSD per Polarization 10Log 2 = + 3dB	46.49 dBm/MHz	37.87 dBm/MHz	38.30 dBm/MHz
Cable Loss (site dependent) = 0 dB	46.49 dBm/MHz	37.87 dBm/MHz	38.30 dBm/MHz
Dir Gain = Max Ant Gain (G_{Ant}) See Note 1	12.5 dBi	12.5 dBi	12.5 dBi
EIRP per Polarization	58.99 dBm/MHz	50.37 dBm/MHz	50.80 dBm/MHz
Number of Polarizations	2	2	2
EIRP Total = +45° and -45° See Note 2	58.99 dBm/MHz	50.37 dBm/MHz	50.80 dBm/MHz
Passing FCC & ISED EIRP Limit	62.15 & 65.16 dBm/MHz	62.15 & 65.16 dBm/MHz	62.15 & 65.16 dBm/MHz

Note 1: The directional gain is equal to antenna gain since the transmit signals are completely uncorrelated. See ANSI C63.26 sections 6.4.5.2.3b) and 6.4.5.3.1b) for guidance.

Note 2: The EIRP per antenna polarity is required to be below the regulatory limit as described in ANSI C63.26-2015 section 6.4.6.3 b)2) and KDB 662911 D02v01 page 3 example (2) since the two transmitter outputs to each antenna are 90 degree-phase shifted relative to each other (cross-polarized radiators).

EIRP Calculation Summary

The worst case AWMFIA Band 25 four port MIMO EIRP levels using antenna assembly model “AAFC” are less than the FCC and ISED (65.16 dBm/MHz and 62.15 dBm/MHz) EIRP Regulatory Limits.

EIRP Calculations for Four Port MIMO Operations for Band 66 Single Carriers

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

The base station antenna is selected by the customer. This EIRP calculation is based upon Nokia antenna assembly model “AAFC”. The maximum Band 66 gain (12.5dBi) for this antenna was used for the EIRP calculation. This antenna assembly has a pair of $\pm 45^\circ$ cross-polarized radiators used for Band 66. Four AWMFIA transmitter outputs are connected to the antenna assembly RF inputs.

Equivalent Isotropically Radiated Power (EIRP) is calculated for four port MIMO (as specified in ANSI C63.26-2015 section 6.4 for uncorrelated output signals) from the results of power measurements (highest measured PSD for each channel bandwidth type). The maximum antenna gain was used for this calculation. The cable loss between the antenna and transmitter is site dependent. The cable loss 0 dB was used in this calculation since AAFC can be installed directly into the AWMFIA. EIRP was calculated as described in SRSP 513 clause 6.1.2 and SRSP 519 clause 6.1.2 “EIRP for non-AAS uncorrelated transmission”. Calculations of worst-case EIRP for four port MIMO are as follows:

Parameter	NB-IoT SA	E-UTRA 15 MHz Ch BW	NR 15 MHz Ch BW
Worst Case PSD/Antenna Port	43.70 dBm/MHz	34.56 dBm/MHz	34.98 dBm/MHz
Number of Ant Ports per Polarization	2	2	2
Total PSD per Polarization 10Log 2 = + 3dB	46.70 dBm/MHz	37.56 dBm/MHz	37.98 dBm/MHz
Cable Loss (site dependent) = 0 dB	46.70 dBm/MHz	37.56 dBm/MHz	37.98 dBm/MHz
Dir Gain = Max Ant Gain (G_{Ant}) See Note 1	12.5 dBi	12.5 dBi	12.5 dBi
EIRP per Polarization	59.20 dBm/MHz	50.06 dBm/MHz	50.48 dBm/MHz
Number of Polarizations	2	2	2
EIRP Total = +45° and -45° See Note 2	59.20 dBm/MHz	50.06 dBm/MHz	50.48 dBm/MHz
Passing FCC EIRP Limit	62.15 & 65.16 dBm/MHz	62.15 & 65.16 dBm/MHz	62.15 & 65.16 dBm/MHz
Passing ISED EIRP Limit	62.0 & 65.0 dBm/MHz	62.0 & 65.0 dBm/MHz	62.0 & 65.0 dBm/MHz

Note 1: The directional gain is equal to antenna gain since the transmit signals are completely uncorrelated. See ANSI C63.26 sections 6.4.5.2.3b) and 6.4.5.3.1b) for guidance.

Note 2: The EIRP per antenna polarity is required to be below the regulatory limit as described in ANSI C63.26-2015 section 6.4.6.3 b)2) and KDB 662911 D02v01 page 3 example (2) since the two transmitter outputs to each antenna are 90 degree-phase shifted relative to each other (cross-polarized radiators).

EIRP Calculation Summary

The worst case AWMFIA Band 66 four port MIMO EIRP levels using antenna assembly model “AAFC” are less than the FCC (65.16 dBm/MHz and 62.15 dBm/MHz) and ISED (65 dBm/MHz and 62 dBm/MHz) EIRP Regulatory Limits.

Appendix C: AWMFIA Emission Designators

FCC and ISED Emission Designators for Band 25/n25 (1930MHz to 1995MHz) Single Carrier		
Ch BW	4G-LTE	
	FCC	ISED
5MHz	4M88F9W	4M50F9W
10MHz	9M73F9W	8M98F9W
15MHz	14M6F9W	13M5F9W
Ch BW	5G-NR	
	FCC	ISED
5MHz	4M88G7W	4M50G7W
15MHz	15M1G7W	14M2G7W

Note: FCC emission designators are based on 26dB emission bandwidth. ISED emission designators are based on 99% emission bandwidth.

FCC and ISED Emission Designators for Band 66/n66 (2110MHz to 2200MHz) Single Carrier		
Ch BW	4G-LTE	
	FCC	ISED
5MHz	4M88F9W	4M50F9W
10MHz	9M73F9W	8M98F9W
15MHz	14M6F9W	13M5F9W
Ch BW	5G-NR	
	FCC	ISED
5MHz	4M84G7W	4M50G7W
15MHz	15M1G7W	14M2G7W

Note: FCC emission designators are based on 26dB emission bandwidth. ISED emission designators are based on 99% emission bandwidth.

FCC and ISED Emission Designators for Band 25 (1930MHz to 1995MHz) NB-IoT Guard Band		
Ch BW	4G-LTE	
	FCC	ISED
10MHz	9M91F9W	9M21F9W
15MHz	14M7F9W	13M7F9W

Note: FCC emission designators are based on 26dB emission bandwidth. ISED emission designators are based on 99% emission bandwidth.

FCC and ISED Emission Designators for Band 66 (2110MHz to 2200MHz) NB-IoT Guard Band		
Ch BW	4G-LTE	
	FCC	ISED
10MHz	9M87F9W	9M22F9W
15MHz	14M7F9W	13M7F9W

Note: FCC emission designators are based on 26dB emission bandwidth. ISED emission designators are based on 99% emission bandwidth.

FCC and ISED Emission Designators for Band 25 (1930MHz to 1995MHz) NB-IoT Stand Alone		
Ch BW	4G-LTE	
	FCC	ISED
200kHz	271KG7D	189KG7D

Note: FCC emission designators are based on 26dB emission bandwidth. ISED emission designators are based on 99% emission bandwidth.

FCC and ISED Emission Designators for Band 66 (2110MHz to 2200MHz) NB-IoT Stand Alone		
Ch BW	4G-LTE	
	FCC	ISED
200kHz	271KG7D	190KG7D

Note: FCC emission designators are based on 26dB emission bandwidth. ISED emission designators are based on 99% emission bandwidth.

FCC and ISED Emission Designators for Band 25/n25 (1930MHz to 1995MHz) Multi Carrier		
Ch BW	4G-LTE	
	FCC	ISED
10+10MHz contiguous	20M0F9W	18M9F9W
10+10MHz non-contiguous	9M75F9W / 9M71F9W	8M99F9W / 8M98F9W
Ch BW	5G-NR	
	FCC	ISED
10+10MHz contiguous	20M3G7W	19M2G7W
10+10MHz non-contiguous	9M95G7W / 9M95G7W	9M30G7W / 9M31G7W
30+35MHz contiguous	66M0G7W	63M4G7W

Note: FCC emission designators are based on 26dB emission bandwidth. ISED emission designators are based on 99% emission bandwidth.

FCC and ISED Emission Designators for Band 66/n66 (2110MHz to 2200MHz) Multi Carrier		
Ch BW	4G-LTE	
	FCC	ISED
10+10MHz contiguous	20M0F9W	19M0F9W
10+10MHz non-contiguous	9M75F9W / 9M77F9W	8M98F9W / 8M98F9W
Ch BW	5G-NR	
	FCC	ISED
10+10MHz contiguous	20M3G7W	19M3G7W
10+10MHz non-contiguous	9M97G7W / 9M97G7W	9M31G7W / 9M31G7W
30+40MHz contiguous	71M1G7W	68M5G7W

Note: FCC emission designators are based on 26dB emission bandwidth. ISED emission designators are based on 99% emission bandwidth.