FCC RF Test Report

APPLICANT	:	**Quectel Wireless Solutions Co., Ltd.**
EQUIPMENT	:	**5G Sub-6 GHz LGA Module**
BRAND NAME	:	**Quectel**
MODEL NAME	:	**RG500L-NA**
FCC ID	:	**XMR2023RG500LNA**
STANDARD	:	**47 CFR Part 2, 22, 24, 27**
CLASSIFICATION	:	**PCS Licensed Transmitter (PCB)**
TEST DATE(S)	:	**Feb. 02, 2023 ~ Apr. 04, 2023**

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED
Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG2D0201I	Rev. 01	Initial issue of report	Jun. 02, 2023

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
	§22.913(a)(5)	Effective Radiated Power (5G NR n5)	ERP < 7 Watt		
	§27.50(c)(10)	Effective Radiated Power (5G NR n12, n71)	ERP < 3 Watt		
	§24.232(c)	Equivalent Isotropic Radiated Power (5G NR n2, n25)	EIRP < 2Watt		
3.5	§24.232(d)	Peak-to-Average Ratio	<13 dB	PASS	-
3.6	§2.1049	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §22.917(a) §24.238(a) §27.53(g)	Conducted Band Edge Measurement (5G NR n5) (5G NR n2, n25) (5G NR n12, n71)	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §22.917(a) §24.238(a) §27.53(g)	Conducted Spurious Emission (5G NR n5) (5G NR n2, n25) (5G NR n12, n71)	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §22.355	Frequency Stability Temperature & Voltage	< 2.5 ppm for Part 22	PASS	-
	§24.235 §27.54		Within Authorized Band		
4.4	§2.1053 §22.917(a) §24.238(a) §27.53(g)	Radiated Spurious Emission (5G NR n5) (5G NR n2, n25) (5G NR n12, n71)	< 43+10$\log_{10}$(P[Watts])	PASS	Under limit 29.65 dB at 3726.00 MHz

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Applicant

Quectel Wireless Solutions Co., Ltd.
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

1.2 Manufacturer

Quectel Wireless Solutions Co., Ltd.
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	5G Sub-6 GHz LGA Module
Brand Name	Quectel
Model Name	RG500L-NA
FCC ID	XMR2023RG500LNA
IMEI Code	Conducted : 860815050004316 Radiation : 860815050004233
HW Version	R1.0
SW Version	RG500LNAAAR04A02E32_OCPU
EUT Stage	Identical Prototype

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n12 : 699 MHz ~ 716 MHz 5G NR n25 : 1850 MHz ~ 1915 MHz 5G NR n71: 663 MHz ~ 698 MHz
Rx Frequency	5G NR n2 : 1930 MHz ~ 1990 MHz 5G NR n5 : 869 MHz ~ 894 MHz 5G NR n12: 729 MHz ~ 746 MHz 5G NR n25 : 1930 MHz ~ 1995 MHz 5G NR n71: 617 MHz ~ 652 MHz
Bandwidth	n2, n5, n25, n71: 5MHz / 10MHz / 15MHz / 20MHz n12: 5MHz / 10MHz / 15MHz
SCS	15kHz
Antenna Gain	**<Ant. 1>:** n2: 0.73 dBi n5: 0.49 dBi n25: 0.73 dBi n71: -6.05 dBi **<Ant. 7>:** n2: 0.75 dBi n12: -8.65 dBi n25: 0.75 dBi n71: -9.34 dBi
Type of Modulation	CP-OFDM: QPSK / 16QAM / 64QAM / 256QAM DFT-s-OFDM: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM

Remark:

1. All the supported ENDC combinations are verified conducted power, only the ENDC combination with highest power are shown in the report.
2. 5G NR support SA mode and NSA mode. According to the maximum power between SA and NSA mode, SA covers NSA mode for (n2/n12/n25), NSA covers SA mode for (n5/n71).
3. The maximum ERP/EIRP is calculated from max output power and max antenna gain, only the maximum ERP/EIRP of Ant.1 for n2/n5/n/25/n71, and Ant.7 for n12 are shown in the report.
4. The device supports two PAs for 5G NR n2/n25/n71 (main PA with Ant.1 for SA mode, and other PA with Ant.7 for NSA mode), both the PA are full test.
5. The EN-DC mode combination could be referred to the product spec.

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Maximum Conducted Power and Emission Designator

5G NR n2		PI/2 BPSK/QPSK		16QAM / 64QAM / 256QAM	
BW (MHz)	Frequency Range (MHz)	Maximum Conducted power (W)	Emission Designator (99%OBW)	Maximum Conducted power (W)	Emission Designator (99%OBW)
5	1852.5 ~ 1907.5	0.2438	4M47G7D	0.1986	4M48W7D
10	1855.0 ~ 1905.0	0.2427	9M29G7D	0.1968	9M30W7D
15	1857.5 ~ 1902.5	0.2432	14M1G7D	0.1972	14M1W7D
20	1860.0 ~ 1900.0	0.2495	18M9G7D	0.1959	18M9W7D

5G NR n25		PI/2 BPSK/QPSK		16QAM / 64QAM / 256QAM	
BW (MHz)	Frequency Range (MHz)	Maximum Conducted power (W)	Emission Designator (99%OBW)	Maximum Conducted power (W)	Emission Designator (99%OBW)
5	1852.5 ~ 1912.5	0.2489	4M47G7D	0.1977	4M48W7D
10	1855.0 ~ 1910.0	0.2477	9M29G7D	0.1982	9M30W7D
15	1857.5 ~ 1907.5	0.2449	14M1G7D	0.1959	14M1W7D
20	1860.0 ~ 1905.0	0.2618	18M9G7D	0.1977	18M9W7D

5G NR n5		PI/2 BPSK/QPSK		16QAM / 64QAM / 256QAM	
BW (MHz)	Frequency Range (MHz)	Maximum Conducted power (W)	Emission Designator (99%OBW)	Maximum Conducted power (W)	Emission Designator (99%OBW)
5	826.5 ~ 846.5	0.2851	4M46G7D	0.2460	4M47W7D
10	829.0 ~ 844.0	0.2825	9M27G7D	0.2427	9M30W7D
15	831.5 ~ 841.5	0.2844	14M1G7D	0.2460	14M1W7D
20	834.0 ~ 839.0	0.2891	18M9G7D	0.2455	18M9W7D

5G NR n12		PI/2 BPSK/QPSK		16QAM / 64QAM / 256QAM	
BW (MHz)	Frequency Range (MHz)	Maximum Conducted power (W)	Emission Designator (99%OBW)	Maximum Conducted power (W)	Emission Designator (99%OBW)
5	701.5 ~ 713.5	0.2244	4M46G7D	0.1778	4M47W7D
10	704.0~ 711.0	0.2249	9M28G7D	0.1778	9M28W7D
15	706.5 ~ 708.5	0.2317	14M1G7D	0.1770	14M1W7D

5G NR n71		**PI/2 BPSK/QPSK**		**16QAM / 64QAM / 256QAM**	
BW (MHz)	**Frequency Range (MHz)**	**Maximum Conducted power (W)**	**Emission Designator (99%OBW)**	**Maximum Conducted power (W)**	**Emission Designator (99%OBW)**
5	665.5 ~ 695.5	0.2032	4M46G7D	0.1618	4M47W7D
10	668.0 ~ 693.0	0.2046	9M28G7D	0.1641	9M29W7D
15	670.5 ~ 690.5	0.2014	14M1G7D	0.1614	14M1W7D
20	673.0 ~ 688.0	0.2075	18M9G7D	0.1622	18M9W7D

Note:

1. 5G NR n25 overlaps the entire frequency range of 5G NR n2. Therefore, the test results provided in this report covers 5G NR n25 as well as 5G NR n2.
2. All modulations have been tested, only the worst test results of PSK & QAM are shown in the report.

1.7 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH04-KS TH01-KS	CN1257	314309

1.8 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH04-KS	AUDIX	E3	6.2009-8-24al

1.9 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2, 22, 24, 27
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items are performed according to KDB 971168 D01 Power Meas License Digital Systems v03r01 with maximum output power.

For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.

Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			

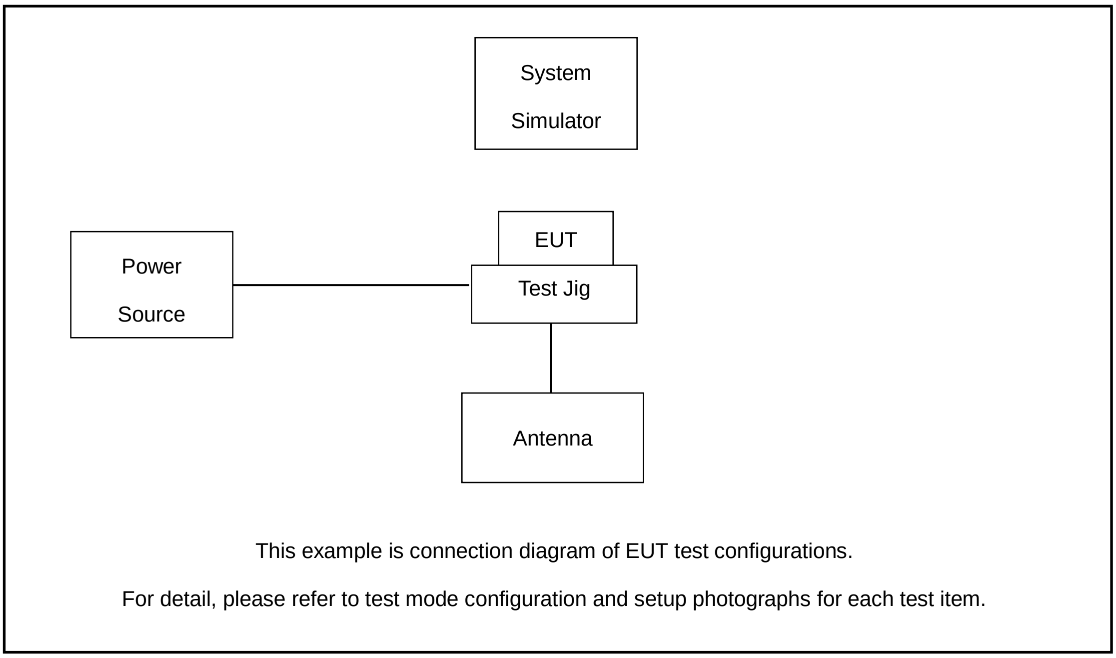
Test Items	5G NR	Bandwidth (MHz)					Modulation					RB #		Test Channel		
		5	10	15	20	25	PI/2 BPSK	QPSK	16QAM	64QAM	256QAM	1	Full	L	M	H
Max. Output Power	n2	v	v	v	v	-	v	v	v	v	v	v	v	v	v	v
	n5	v	v	v	v	-	v	v	v	v	v	v	v	v	v	v
	n12	v	v	v	-	-	v	v	v	v	v	v	v	v	v	v
	n25	v	v	v	v	-	v	v	v	v	v	v	v	v	v	v
	n71	v	v	v	v	-	v	v	v	v	v	v	v	v	v	v
Peak-to-Average Ratio	n5				v		v	v				v	v		v	
	n12			v	-	-	v	v				v	v		v	
	n25				v	-	v	v				v	v		v	
	n71				v	-	v	v				v	v		v	
26dB and 99% Bandwidth	n5	v	v	v	v			v	v	v	v		v		v	
	n12	v	v	v	-	-		v	v	v	v		v		v	
	n25	v	v	v	v	-		v	v	v	v		v		v	
	n71	v	v	v	v	-		v	v	v	v		v		v	
Conducted Band Edge	n5	v		v	v		v	v				v	v	v		v
	n12	v	v	v	-	-	v	v				v	v	v		v
	n25	v		v	v	-	v	v				v	v	v		v
	n71	v	v		v	-	v	v				v	v	v		v

Test Items	5G NR	Bandwidth (MHz)					Modulation					RB #		Test Channel		
		5	10	15	20	25	PI/2 BPSK	QPSK	16QAM	64QAM	256QAM	1	Full	L	M	H
Conducted Spurious Emission	n5	v		v	v		v	v				v		v	v	v
	n12	v	v	v	v	-	v	v				v		v	v	v
	n25	v		v	v	-	v	v				v		v	v	v
	n71	v	v		v	-	v	v				v		v	v	v
Frequency Stability	n5				v		-	v					v		v	
	n12			v	-	-	-	v					v		v	
	n25				v	-	-	v					v		v	
	n71				v	-	-	v					v		v	
E.R.P / E.I.R.P	n2	v	v	v	v	-	v	v	v	v	v	v	v	v	v	v
	n5	v	v	v	v	-	v	v	v	v	v	v	v	v	v	v
	n12	v	v	v	-	-	v	v	v	v	v	v	v	v	v	v
	n25	v	v	v	v	-	v	v	v	v	v	v	v	v	v	v
	n71	v	v	v	v	-	v	v	v	v	v	v	v	v	v	v
Radiated Spurious Emission	n5	Worst Case												v	v	v
	n12	Worst Case												v	v	v
	n25	Worst Case												v	v	v
	n71	Worst Case												v	v	v

Note

1. The mark “**v** “ means that this configuration is chosen for testing
2. The mark “-“ means that this bandwidth is not supported.
3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.
4. Frequency Stability：Normal Voltage = 3.8V；Low Voltage =3.3V.；High Voltage =4.3V

2.2 Connection Diagram of Test System



The EUT has been configuration operated in a manner tended to maximize its emission characteristics in a typical application.

2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	Power Supply	GWINSTEK	PSS-2002	N/A	N/A	Unshielded, 1.8 m
2.	Base Station	Anritsu	MT8820/8821	N/A	N/A	Unshielded, 1.8 m
3.	Adapter	N/A	N/A	N/A	N/A	N/A
4.	Test Jig	N/A	N/A	N/A	N/A	N/A
5.	Antenna	N/A	N/A	N/A	N/A	N/A

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 4.8 dB.

Example :

Offset(dB) = RF cable loss(dB).

= 4.8 (dB)

2.5 Frequency List of Low/Middle/High Channels

5G NR n2 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	372000	376000	380000
	Frequency	1860	1880	1900
15	Channel	371500	376000	380500
	Frequency	1857.5	1880	1902.5
10	Channel	371000	376000	381000
	Frequency	1855	1880	1905
5	Channel	370500	376000	381500
	Frequency	1852.5	1880	1907.5

5G NR n5 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	166800	167300	167800
	Frequency	834	836.5	839
15	Channel	166300	167300	168300
	Frequency	831.5	836.5	841.5
10	Channel	165800	167300	168800
	Frequency	829	836.5	844
5	Channel	165300	167300	169300
	Frequency	826.5	836.5	846.5

5G NR n12 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
15	Channel	141300	141500	141700
	Frequency	706.5	707.5	708.5
10	Channel	140800	141500	142200
	Frequency	704	707.5	711
5	Channel	140300	141500	142700
	Frequency	701.5	707.5	713.5

5G NR n25 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	372000	376500	381000
	Frequency	1860	1882.5	1905
15	Channel	371500	376500	381500
	Frequency	1857.5	1882.5	1907.5
10	Channel	371000	376500	382000
	Frequency	1855	1882.5	1910
5	Channel	370500	376500	382500
	Frequency	1852.5	1882.5	1912.5

5G NR n71 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	134600	136100	137600
	Frequency	673	680.5	688
15	Channel	134100	136100	138100
	Frequency	670.5	680.5	690.5
10	Channel	133600	136100	138600
	Frequency	668	680.5	693
5	Channel	133100	136100	139100
	Frequency	665.5	680.5	695.5

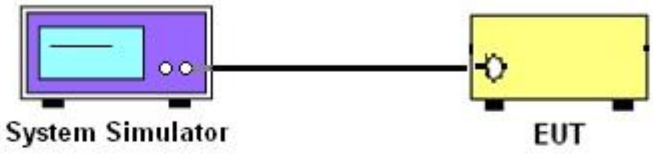
3 Conducted Test Items

3.1 Measuring Instruments

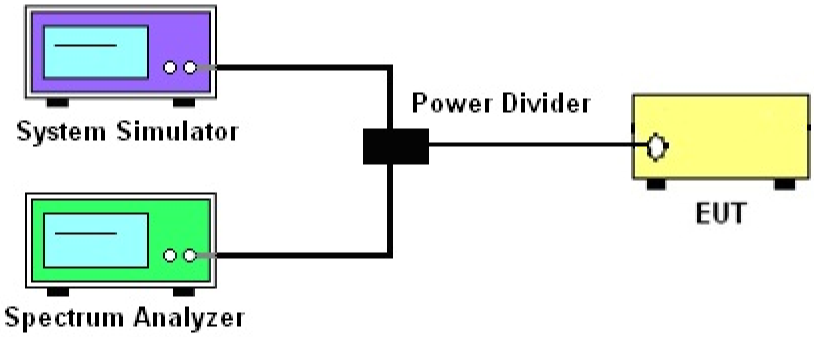
See list of measuring instruments of this test report.

3.2 Test Setup

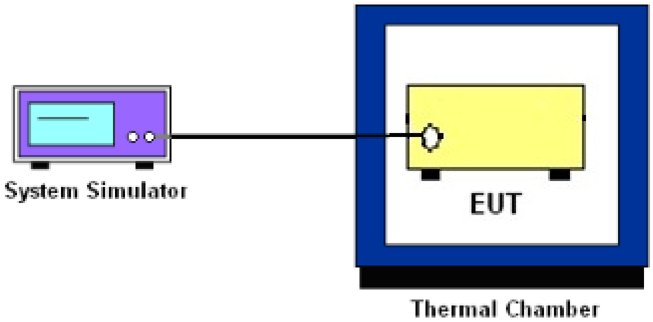
3.2.1 Conducted Output Power



3.2.2 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge and Conducted Spurious Emission



3.2.3 Frequency Stability



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power and ERP/EIRP

3.4.1 Description of the Conducted Output Power Measurement and ERP/EIRP Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for 5G NR n5.

The ERP of mobile transmitters must not exceed 3 Watts for 5G NR n12, n71.

The EIRP of mobile transmitters must not exceed 2 Watts for 5G NR n2, n25.

According to KDB 412172 D01 Power Approach,

EIRP = $P_T + G_T - L_C$, ERP = EIRP -2.15, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

3.5 Peak-to-Average Ratio

3.5.1 Description of the PAR Measurement

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.5.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2.3.4 (CCDF).
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.

3.6 Occupied Bandwidth

3.6.1 Description of Occupied Bandwidth Measurement

The 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 a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

3.6.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.4
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
4. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
5. Set the detection mode to peak, and the trace mode to max hold.
6. Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace. (this is the reference value)
7. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
8. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “–X dB down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

3.7 Conducted Band Edge

3.7.1 Description of Conducted Band Edge Measurement

22.917(a)

For operations in the 824 – 849 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(Watts) in a 100kHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

24.238 (a)

For operations in the 1850-1910 and 1930-1990 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(Watts) in a 1MHz bandwidth. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

27.53 (g)

For operations in the 600MHz band and 698 -746 MHz band, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(Watts) in a 100 kHz bandwidth. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

3.7.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured.
4. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
5. Beyond the 1 MHz band from the band edge, RBW=1MHz was used or a narrower RBW was used (generally limited to no less than 1% of the OBW) and the measured power was integrated over the full required measurement bandwidth.
6. Set spectrum analyzer with RMS detector.
7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
8. Checked that all the results comply with the emission limit line.
   Example:
   The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
   = P(W)- [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB) = -13dBm.
9. When using the integration method, the starting frequency of the integration shall be centered at one-half of the RBW away from the band edge.

3.8 Conducted Spurious Emission

3.8.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10^{th} harmonic.

3.8.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz.
7. Set spectrum analyzer with RMS detector.
8. Taking the record of maximum spurious emission.
9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
10. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.

3.9 Frequency Stability

3.9.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

3.9.2 Test Procedures for Temperature Variation

1. The testing follows ANSI C63.26 section 5.6.4
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.9.3 Test Procedures for Voltage Variation

1. The testing follows ANSI C63.26 section 5.6.5
2. The EUT was placed in a temperature chamber at 20±5°C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value for other than hand carried battery equipment.
4. For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
5. The variation in frequency was measured for the worst case.

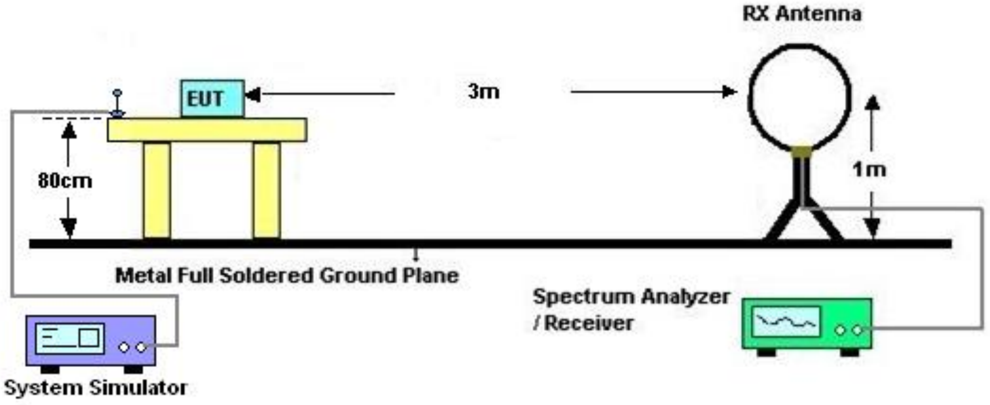
4 Radiated Test Items

4.1 Measuring Instruments

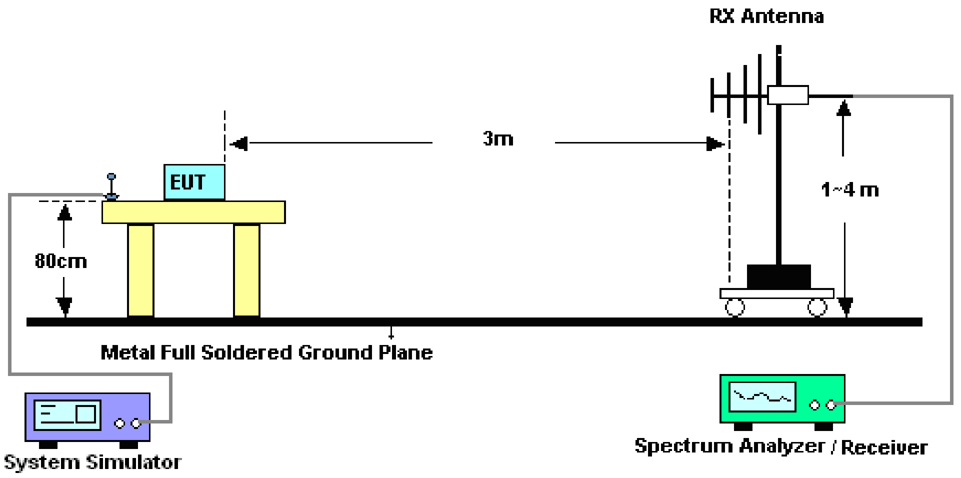
See list of measuring instruments of this test report.

4.2 Test Setup

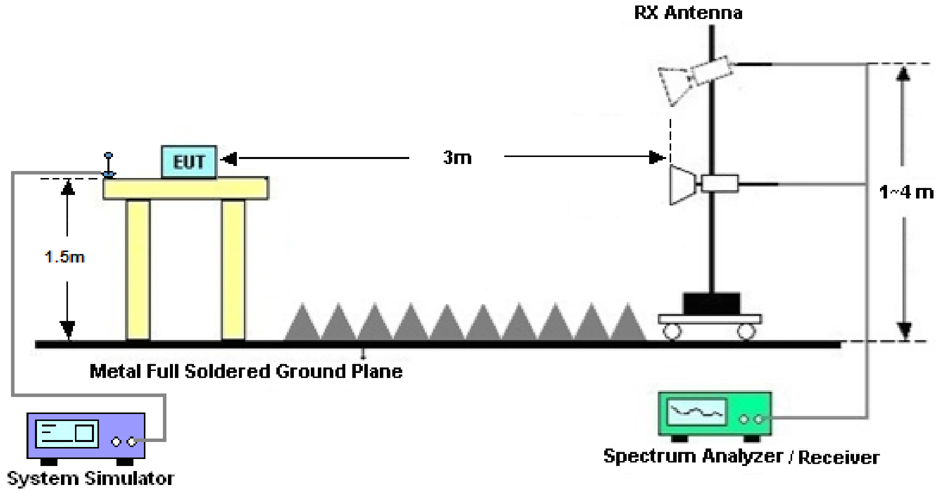
4.2.1 For radiated test below 30MHz



4.2.2 For radiated test from 30MHz to 1GHz



4.2.3 For radiated test above 1GHz



4.3 Test Result of Radiated Test

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

Please refer to Appendix B.

4.4 Radiated Spurious Emission

4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI C63.26. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
10. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 12, 2022	Feb. 02, 2023~ Apr. 04, 2023	Oct. 11, 2023	Conducted (TH01-KS)
Power divider	STI	STI08-0055	-	0.5~40GHz	NCR	Feb. 02, 2023~ Apr. 04, 2023	NCR	Conducted (TH01-KS)
Temperature& humidity chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jul. 15, 2022	Feb. 02, 2023~ Apr. 04, 2023	Jul. 14, 2023	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY57471079	10Hz-44G,MAX 30dB	Oct. 12, 2022	Mar. 20, 2023	Oct. 11, 2023	Radiation (03CH04-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 16, 2022	Mar. 20, 2023	Oct. 15, 2023	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	May 24, 2022	Mar. 20, 2023	May 23, 2023	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1284	1GHz~18GHz	Jan. 04, 2023	Mar. 20, 2023	Jan. 03, 2024	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 04, 2023	Mar. 20, 2023	Jan. 03, 2024	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Jan. 04, 2023	Mar. 20, 2023	Jan. 03, 2024	Radiation (03CH04-KS)
high gain Amplifier	EM	EM01G18GA	060840	1Ghz-18Ghz	Oct. 12, 2022	Mar. 20, 2023	Oct. 11, 2023	Radiation (03CH04-KS)
Amplifier	Agilent	8449B	3008A02370	1Ghz-18Ghz	Oct. 12, 2022	Mar. 20, 2023	Oct. 11, 2023	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 04, 2023	Mar. 20, 2023	Jan. 03, 2024	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Mar. 20, 2023	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Mar. 20, 2023	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Mar. 20, 2023	NCR	Radiation (03CH04-KS)

NCR: No Calibration Required.

6 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Power	±0.46 dB
Conducted Emissions	±0.48 dB
Occupied Channel Bandwidth	±0.1 %

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.3dB

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.8dB

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.8dB

----------- THE END -----------

Appendix A. Test Results of Conducted Test

Test Engineer :	Simle Wang	Temperature :	22~23℃
		Relative Humidity :	40~42%

Conducted Output Power(Average power and EIRP)

5G NR n2_Ant.1:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Gain	EIRP (W)		
Channel				372000	376000	380000		L	M	H
Frequency (MHz)				1860	1880	1900				
20	PI/2 BPSK	1	1	23.61	23.66	23.81	0.73	0.2716	0.2748	0.2844
20	QPSK	1	1	23.77	23.81	23.89	0.73	0.2818	0.2844	0.2897
20	QPSK	1	53	23.87	23.89	23.95	0.73	0.2884	0.2897	0.2938
20	QPSK	1	104	23.91	23.94	23.97	0.73	0.2911	0.2931	0.2951
20	QPSK	50	0	22.89	22.82	23.06	0.73	0.2301	0.2265	0.2393
20	QPSK	50	28	23.86	23.91	23.96	0.73	0.2877	0.2911	0.2944
20	QPSK	50	56	22.87	22.92	22.91	0.73	0.2291	0.2317	0.2312
20	QPSK	100	0	22.85	22.88	22.98	0.73	0.2280	0.2296	0.2350
20	16QAM	1	1	22.74	22.86	22.92	0.73	0.2223	0.2286	0.2317
20	64QAM	1	1	21.40	20.93	21.67	0.73	0.1633	0.1466	0.1738
20	256QAM	1	1	19.44	19.49	19.71	0.73	0.1040	0.1052	0.1107
Channel				371500	376000	380500	Gain	EIRP (W)		
Frequency (MHz)				1857.5	1880	1902.5				
15	PI/2 BPSK	1	1	23.62	23.70	23.75	0.73	0.2723	0.2773	0.2805
15	QPSK	1	1	23.76	23.83	23.86	0.73	0.2812	0.2858	0.2877
15	16QAM	1	1	22.87	22.88	22.95	0.73	0.2291	0.2296	0.2333
Channel				371000	376000	381000	Gain	EIRP (W)		
Frequency (MHz)				1855	1880	1905				
10	PI/2 BPSK	1	1	23.69	23.65	23.80	0.73	0.2767	0.2742	0.2838
10	QPSK	1	1	23.80	23.84	23.85	0.73	0.2838	0.2864	0.2871
10	16QAM	1	1	22.91	22.89	22.94	0.73	0.2312	0.2301	0.2328
Channel				370500	376000	381500	Gain	EIRP (W)		
Frequency (MHz)				1852.5	1880	1907.5				
5	PI/2 BPSK	1	1	23.71	23.77	23.79	0.73	0.2780	0.2818	0.2831
5	QPSK	1	1	23.87	23.85	23.81	0.73	0.2884	0.2871	0.2844
5	16QAM	1	1	22.98	22.90	22.90	0.73	0.2350	0.2307	0.2307

EN-DC_2A_n5A_Ant.1:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Gain	ERP (W)		
Channel				166800	167300	167800		L	M	H
Frequency (MHz)				834	836.5	839				
20	PI/2 BPSK	1	1	24.49	24.53	24.56	0.49	0.1919	0.1936	0.1950
20	QPSK	1	1	24.45	24.55	24.56	0.49	0.1901	0.1945	0.1950
20	QPSK	1	53	24.61	24.59	24.43	0.49	0.1972	0.1963	0.1892
20	QPSK	1	104	24.57	24.52	24.48	0.49	0.1954	0.1932	0.1914
20	QPSK	50	0	23.87	23.94	24.05	0.49	0.1663	0.1690	0.1734
20	QPSK	50	28	24.59	24.61	24.51	0.49	0.1963	0.1972	0.1928
20	QPSK	50	56	23.96	23.88	23.81	0.49	0.1698	0.1667	0.1641
20	QPSK	100	0	23.98	23.92	23.90	0.49	0.1706	0.1683	0.1675
20	16QAM	1	1	23.84	23.90	23.86	0.49	0.1652	0.1675	0.1660
20	64QAM	1	1	22.42	22.45	22.47	0.49	0.1191	0.1199	0.1205
20	256QAM	1	1	19.84	19.98	19.96	0.49	0.0658	0.0679	0.0676
Channel				166300	167300	168300	Gain	ERP (W)		
Frequency (MHz)				831.5	836.5	841.5				
15	PI/2 BPSK	1	1	24.37	24.37	24.40	0.49	0.1866	0.1866	0.1879
15	QPSK	1	1	24.31	24.54	24.44	0.49	0.1841	0.1941	0.1897
15	16QAM	1	1	23.68	23.91	23.81	0.49	0.1592	0.1679	0.1641
Channel				165800	167300	168800	Gain	ERP (W)		
Frequency (MHz)				829	836.5	844				
10	PI/2 BPSK	1	1	24.34	24.42	24.51	0.49	0.1854	0.1888	0.1928
10	QPSK	1	1	24.33	24.36	24.48	0.49	0.1849	0.1862	0.1914
10	16QAM	1	1	23.70	23.73	23.85	0.49	0.1600	0.1611	0.1656
Channel				165300	167300	169300	Gain	ERP (W)		
Frequency (MHz)				826.5	836.5	846.5				
5	PI/2 BPSK	1	1	24.47	24.49	24.55	0.49	0.1910	0.1919	0.1945
5	QPSK	1	1	24.54	24.53	24.51	0.49	0.1941	0.1936	0.1928
5	16QAM	1	1	23.91	23.90	23.88	0.49	0.1679	0.1675	0.1667

5G NR n12_Ant.7:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Gain	ERP (W)		
Channel				141300	141500	141700		L	M	H
Frequency (MHz)				706.5	707.5	708.5				
15	PI/2 BPSK	1	1	23.42	23.46	23.49	-8.65	0.0183	0.0185	0.0186
15	QPSK	1	1	23.47	23.53	23.51	-8.65	0.0185	0.0187	0.0187
15	QPSK	1	40	23.52	23.57	23.60	-8.65	0.0187	0.0189	0.0191
15	QPSK	1	77	23.65	23.63	23.61	-8.65	0.0193	0.0192	0.0191
15	QPSK	36	0	22.52	22.44	22.46	-8.65	0.0149	0.0146	0.0147
15	QPSK	36	22	23.55	23.58	23.56	-8.65	0.0188	0.0190	0.0189
15	QPSK	36	43	22.40	22.49	22.54	-8.65	0.0145	0.0148	0.0149
15	QPSK	75	0	22.47	22.45	22.50	-8.65	0.0147	0.0146	0.0148
15	16QAM	1	1	22.44	22.42	22.48	-8.65	0.0146	0.0145	0.0147
15	64QAM	1	1	21.06	21.21	21.26	-8.65	0.0106	0.0110	0.0111
15	256QAM	1	1	18.71	18.66	18.75	-8.65	0.0062	0.0061	0.0062
Channel				140800	141500	142200	Gain	ERP(W)		
Frequency (MHz)				704	707.5	711				
10	PI/2 BPSK	1	1	23.45	23.44	23.44	-8.65	0.0184	0.0184	0.0184
10	QPSK	1	1	23.52	23.51	23.49	-8.65	0.0187	0.0187	0.0186
10	16QAM	1	1	22.48	22.50	22.40	-8.65	0.0147	0.0148	0.0145
Channel				140300	141500	142700	Gain	ERP(W)		
Frequency (MHz)				701.5	707.5	713.5				
5	PI/2 BPSK	1	1	23.42	23.45	23.47	-8.65	0.0183	0.0184	0.0185
5	QPSK	1	1	23.40	23.51	23.49	-8.65	0.0182	0.0187	0.0186
5	16QAM	1	1	22.36	22.50	22.40	-8.65	0.0143	0.0148	0.0145

5G NR n25_Ant.1:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Gain	EIRP (W)		
Channel				372000	376500	381000	Gain	L	M	H
Frequency (MHz)				1860	1882.5	1905				
20	PI/2 BPSK	1	1	23.75	23.79	23.87	0.73	0.2805	0.2831	0.2884
20	QPSK	1	1	23.88	23.90	24.09	0.73	0.2891	0.2904	0.3034
20	QPSK	1	53	23.91	24.07	24.03	0.73	0.2911	0.3020	0.2992
20	QPSK	1	104	23.96	24.16	24.18	0.73	0.2944	0.3083	0.3097
20	QPSK	50	0	22.90	22.85	22.94	0.73	0.2307	0.2280	0.2328
20	QPSK	50	28	23.93	24.02	24.03	0.73	0.2924	0.2985	0.2992
20	QPSK	50	56	22.84	22.93	22.76	0.73	0.2275	0.2323	0.2234
20	QPSK	100	0	22.89	22.92	22.86	0.73	0.2301	0.2317	0.2286
20	16QAM	1	1	22.72	22.85	22.96	0.73	0.2213	0.2280	0.2339
20	64QAM	1	1	21.49	21.40	21.15	0.73	0.1667	0.1633	0.1542
20	256QAM	1	1	19.45	19.56	19.61	0.73	0.1042	0.1069	0.1081
Channel				371500	376500	381500	Gain	EIRP (W)		
Frequency (MHz)				1857.5	1882.5	1907.5				
15	PI/2 BPSK	1	1	23.67	23.64	23.77	0.73	0.2754	0.2735	0.2818
15	QPSK	1	1	23.81	23.75	23.89	0.73	0.2844	0.2805	0.2897
15	16QAM	1	1	22.68	22.73	22.92	0.73	0.2193	0.2218	0.2317
Channel				371000	376500	382000	Gain	EIRP (W)		
Frequency (MHz)				1855	1882.5	1910				
10	PI/2 BPSK	1	1	23.79	23.72	23.82	0.73	0.2831	0.2786	0.2851
10	QPSK	1	1	23.86	23.92	23.94	0.73	0.2877	0.2917	0.2931
10	16QAM	1	1	22.73	22.90	22.97	0.73	0.2218	0.2307	0.2344
Channel				370500	376500	382500	Gain	EIRP (W)		
Frequency (MHz)				1852.5	1882.5	1912.5				
5	PI/2 BPSK	1	1	23.80	23.82	23.84	0.73	0.2838	0.2851	0.2864
5	QPSK	1	1	23.91	23.96	23.93	0.73	0.2911	0.2944	0.2924
5	16QAM	1	1	22.78	22.94	22.96	0.73	0.2244	0.2328	0.2339

5G NR n71_Ant.1:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Gain	ERP (W)		
Channel				134600	136100	137600		L	M	H
Frequency (MHz)				673	680.5	688				
20	PI/2 BPSK	1	1	23.08	23.07	23.09	-6.05	0.0308	0.0307	0.0308
20	QPSK	1	1	23.17	22.96	22.98	-6.05	0.0314	0.0299	0.0301
20	QPSK	1	53	22.94	23.05	23.04	-6.05	0.0298	0.0305	0.0305
20	QPSK	1	104	22.87	23.08	23.17	-6.05	0.0293	0.0308	0.0314
20	QPSK	50	0	22.04	21.82	22.09	-6.05	0.0242	0.0230	0.0245
20	QPSK	50	28	23.10	23.05	23.04	-6.05	0.0309	0.0305	0.0305
20	QPSK	50	56	22.13	21.87	22.16	-6.05	0.0247	0.0233	0.0249
20	QPSK	100	0	22.08	21.82	22.14	-6.05	0.0244	0.0230	0.0248
20	16QAM	1	1	21.98	22.10	22.08	-6.05	0.0239	0.0245	0.0244
20	64QAM	1	1	20.46	20.41	20.44	-6.05	0.0168	0.0166	0.0167
20	256QAM	1	1	18.90	18.77	18.75	-6.05	0.0117	0.0114	0.0114
Channel				134100	136100	138100	Gain	ERP (W)		
Frequency (MHz)				670.5	680.5	690.5				
15	PI/2 BPSK	1	1	22.95	22.88	22.84	-6.05	0.0299	0.0294	0.0291
15	QPSK	1	1	23.04	22.79	22.98	-6.05	0.0305	0.0288	0.0301
15	16QAM	1	1	22.08	21.80	21.96	-6.05	0.0244	0.0229	0.0238
Channel				133600	136100	138600	Gain	ERP (W)		
Frequency (MHz)				668	680.5	693				
10	PI/2 BPSK	1	1	22.98	22.90	22.91	-6.05	0.0301	0.0295	0.0296
10	QPSK	1	1	23.11	22.84	22.87	-6.05	0.0310	0.0291	0.0293
10	16QAM	1	1	22.15	21.85	21.85	-6.05	0.0248	0.0232	0.0232
Channel				133100	136100	139100	Gain	ERP (W)		
Frequency (MHz)				665.5	680.5	695.5				
5	PI/2 BPSK	1	1	23.08	23.07	23.05	-6.05	0.0308	0.0307	0.0305
5	QPSK	1	1	23.05	22.96	22.98	-6.05	0.0305	0.0299	0.0301
5	16QAM	1	1	22.09	21.97	21.96	-6.05	0.0245	0.0238	0.0238

Software Version: 22.12.120701

FR1 N5

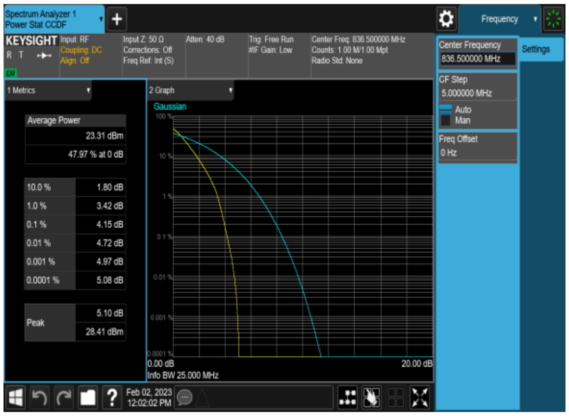
Frequency Stability

NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	Deviation (ppm)	Verdict	Environment
5	15	20	167300	836.5	DFT-s-OFDM QPSK	100@0	0.0061	**PASS**	NV
5	15	20	167300	836.5	DFT-s-OFDM QPSK	100@0	0.0048	**PASS**	LV
5	15	20	167300	836.5	DFT-s-OFDM QPSK	100@0	0.0064	**PASS**	HV
5	15	20	167300	836.5	DFT-s-OFDM QPSK	100@0	0.0036	**PASS**	-30℃
5	15	20	167300	836.5	DFT-s-OFDM QPSK	100@0	0.0030	**PASS**	-20℃
5	15	20	167300	836.5	DFT-s-OFDM QPSK	100@0	0.0042	**PASS**	-10℃
5	15	20	167300	836.5	DFT-s-OFDM QPSK	100@0	0.0055	**PASS**	0℃
5	15	20	167300	836.5	DFT-s-OFDM QPSK	100@0	0.0069	**PASS**	10℃
5	15	20	167300	836.5	DFT-s-OFDM QPSK	100@0	0.0064	**PASS**	20℃
5	15	20	167300	836.5	DFT-s-OFDM QPSK	100@0	0.0035	**PASS**	30℃
5	15	20	167300	836.5	DFT-s-OFDM QPSK	100@0	0.0029	**PASS**	40℃
5	15	20	167300	836.5	DFT-s-OFDM QPSK	100@0	0.0053	**PASS**	50℃

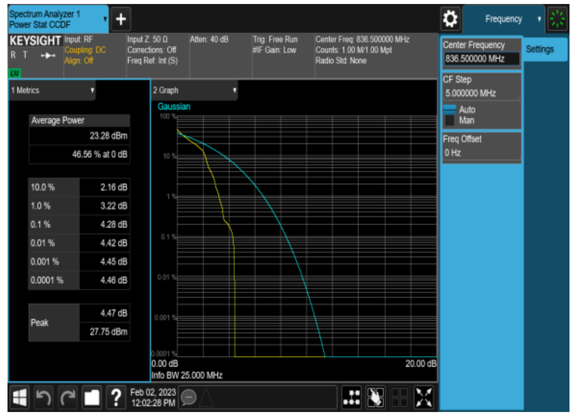
Peak to Average Ratio

NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	Result (dB)	Limit (dB)	Verdict
5	15	20	167300	836.5	DFT-s-OFDM PI/2 BPSK	100@0	4.15	13	**PASS**
5	15	20	167300	836.5	DFT-s-OFDM PI/2 BPSK	1@0	4.28	13	**PASS**
5	15	20	167300	836.5	DFT-s-OFDM QPSK	100@0	5.37	13	**PASS**
5	15	20	167300	836.5	DFT-s-OFDM QPSK	1@0	5.04	13	**PASS**

N5(20M)_DFT-s-OFDM_PI_2-BPSK_Outer_Full_Mid_CH



N5(20M)_DFT-s-OFDM_PI_2-BPSK_Edge_1RB_Left_Mid_CH



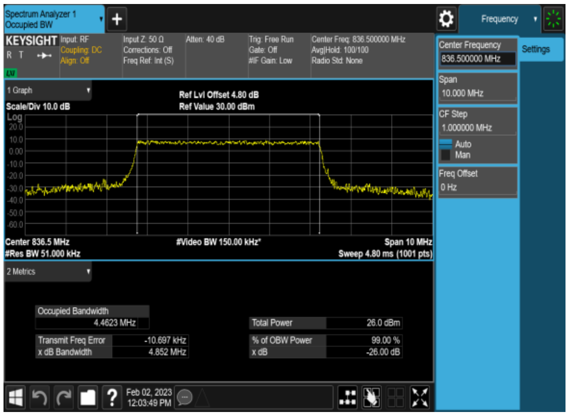
N5(20M)_DFT-s-OFDM_QPSK_Outer_Full_Mid_CH

N5(20M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Mid_CH

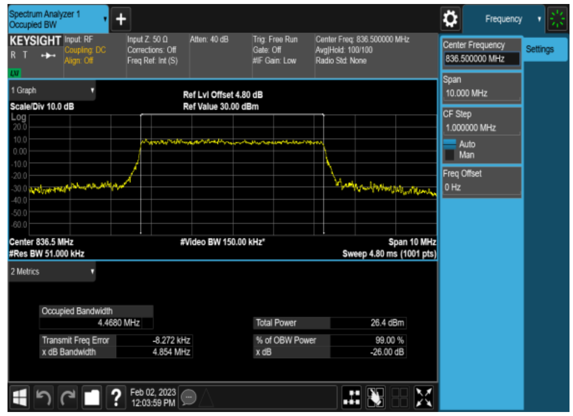
Occupied Bandwidth

NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	OBW (MHz)	26dB BW (MHz)
5	15	5	167300	836.5	CP-OFDM QPSK	25@0	4.4623	4.852
5	15	5	167300	836.5	CP-OFDM 16 QAM	25@0	4.468	4.854
5	15	5	167300	836.5	CP-OFDM 64 QAM	25@0	4.4641	4.82
5	15	5	167300	836.5	CP-OFDM 256 QAM	25@0	4.4585	4.766
5	15	10	167300	836.5	CP-OFDM QPSK	52@0	9.2692	9.753
5	15	10	167300	836.5	CP-OFDM 16 QAM	52@0	9.2613	9.788
5	15	10	167300	836.5	CP-OFDM 64 QAM	52@0	9.2708	9.716
5	15	10	167300	836.5	CP-OFDM 256 QAM	52@0	9.3026	9.859
5	15	15	167300	836.5	CP-OFDM QPSK	79@0	14.095	14.86
5	15	15	167300	836.5	CP-OFDM 16 QAM	79@0	14.104	14.7
5	15	15	167300	836.5	CP-OFDM 64 QAM	79@0	14.102	14.8
5	15	15	167300	836.5	CP-OFDM 256 QAM	79@0	14.086	14.71
5	15	20	167300	836.5	CP-OFDM QPSK	106@0	18.908	19.79
5	15	20	167300	836.5	CP-OFDM 16 QAM	106@0	18.877	19.76
5	15	20	167300	836.5	CP-OFDM 64 QAM	106@0	18.899	19.65
5	15	20	167300	836.5	CP-OFDM 256 QAM	106@0	18.906	19.79

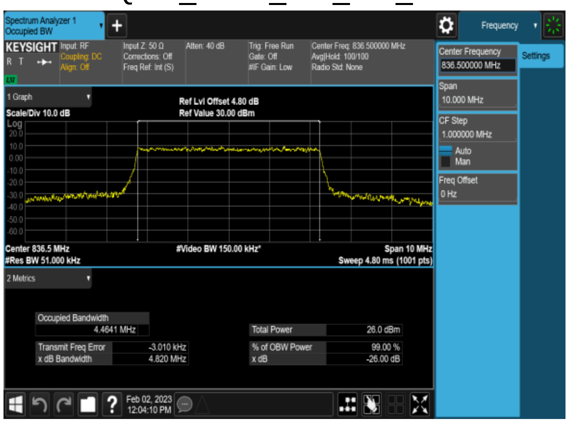
N5(5M)_CP-OFDM_QPSK_Outer_Full_Mid_CH



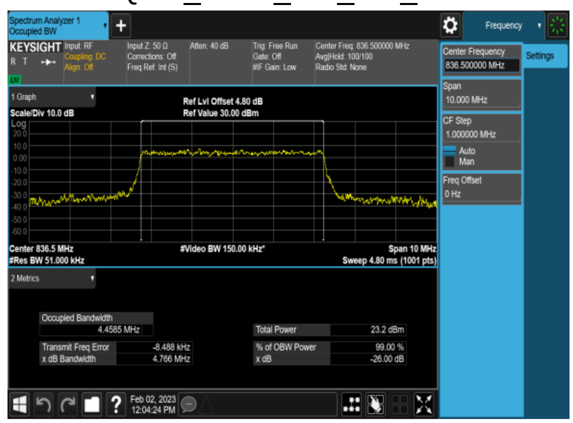
N5(5M)_CP-OFDM_16 QAM_Outer_Full_Mid_CH



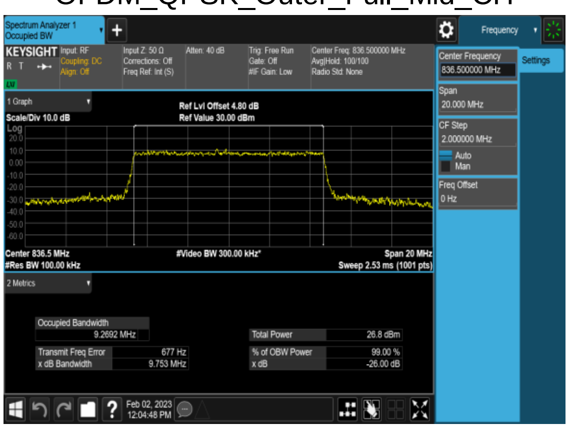
N5(5M)_CP-OFDM_64 QAM_Outer_Full_Mid_CH



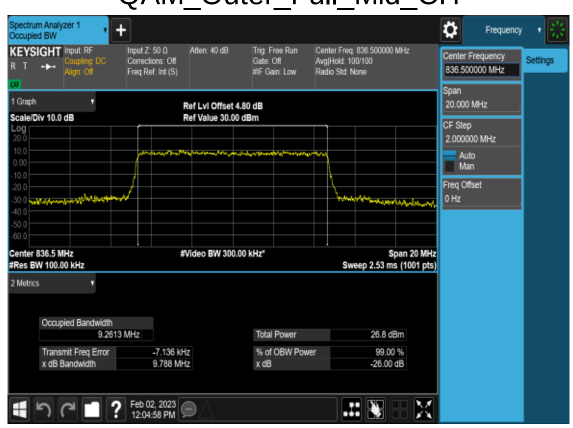
N5(5M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH



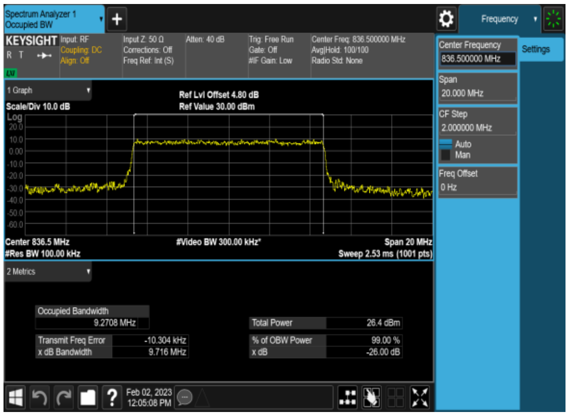
N5(10M)_CP-OFDM_QPSK_Outer_Full_Mid_CH



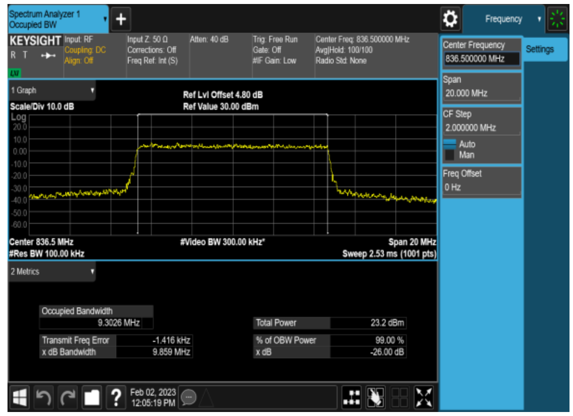
N5(10M)_CP-OFDM_16 QAM_Outer_Full_Mid_CH



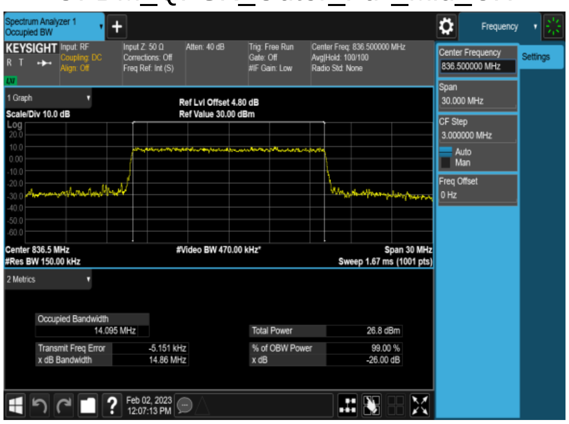
N5(10M)_CP-OFDM_64 QAM_Outer_Full_Mid_CH



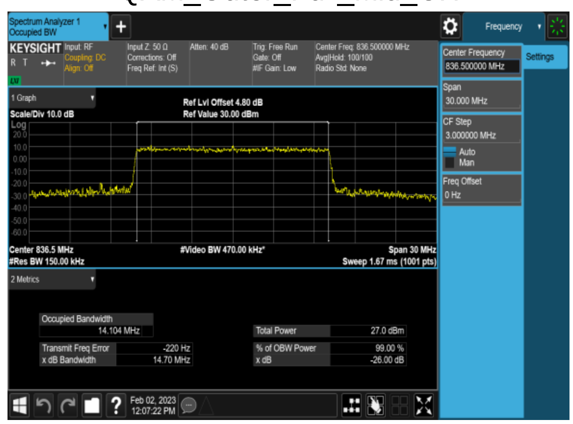
N5(10M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH



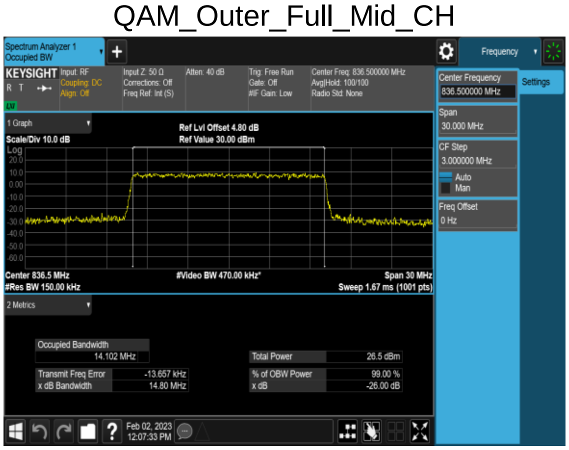
N5(15M)_CP-OFDM_QPSK_Outer_Full_Mid_CH



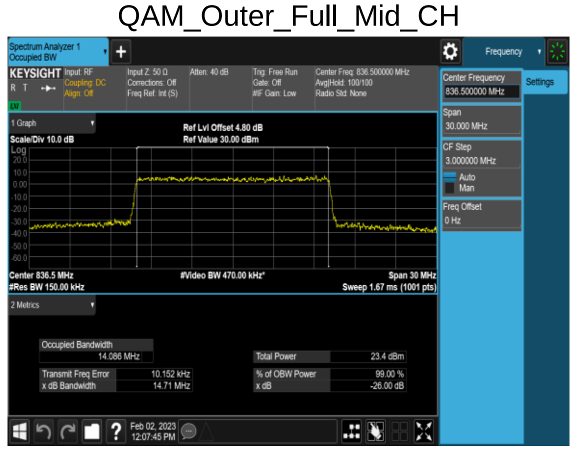
N5(15M)_CP-OFDM_16 QAM_Outer_Full_Mid_CH



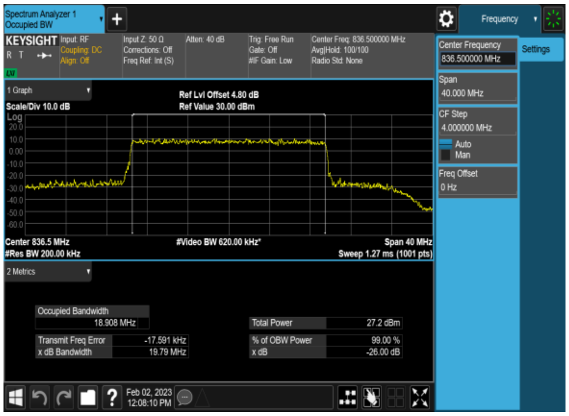
N5(15M)_CP-OFDM_64 QAM_Outer_Full_Mid_CH



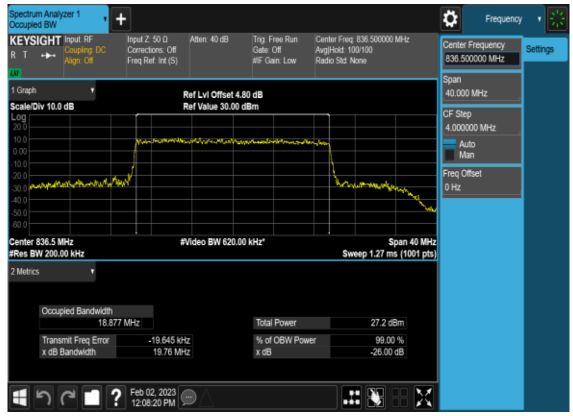
N5(15M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH



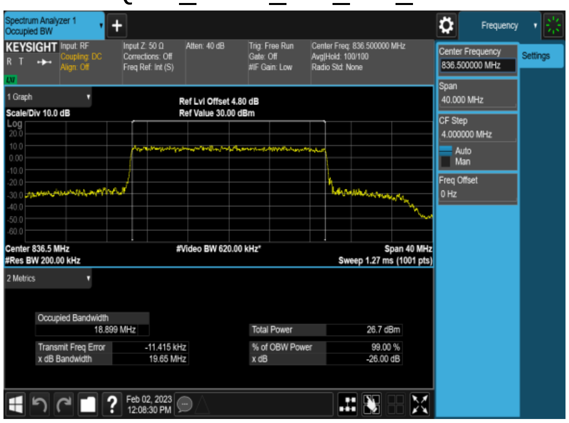
N5(20M)_CP-OFDM_QPSK_Outer_Full_Mid_CH



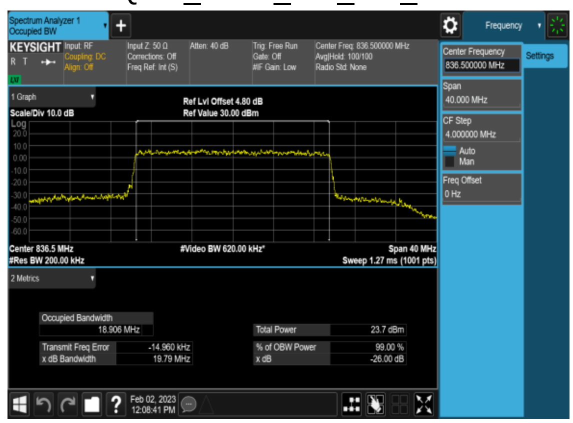
N5(20M)_CP-OFDM_16 QAM_Outer_Full_Mid_CH



N5(20M)_CP-OFDM_64 QAM_Outer_Full_Mid_CH



N5(20M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH



Conducted Spurious Emissions

NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	Result	Verdict
5	15	5	165300	826.5	DFT-s-OFDM BPSK	1@0	see graph	**---**
5	15	5	165300	826.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
5	15	5	165300	826.5	DFT-s-OFDM QPSK	1@0	see graph	**---**
5	15	5	165300	826.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
5	15	5	167300	836.5	DFT-s-OFDM BPSK	1@0	see graph	**---**
5	15	5	167300	836.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
5	15	5	167300	836.5	DFT-s-OFDM QPSK	1@0	see graph	**---**
5	15	5	167300	836.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
5	15	5	169300	846.5	DFT-s-OFDM BPSK	1@0	see graph	**---**
5	15	5	169300	846.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
5	15	5	169300	846.5	DFT-s-OFDM QPSK	1@0	see graph	**---**
5	15	5	169300	846.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
5	15	15	166300	831.5	DFT-s-OFDM BPSK	1@0	see graph	**---**
5	15	15	166300	831.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
5	15	15	166300	831.5	DFT-s-OFDM QPSK	1@0	see graph	**---**
5	15	15	166300	831.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
5	15	15	167300	836.5	DFT-s-OFDM BPSK	1@0	see graph	**---**
5	15	15	167300	836.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
5	15	15	167300	836.5	DFT-s-OFDM QPSK	1@0	see graph	**---**
5	15	15	167300	836.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
5	15	15	168300	841.5	DFT-s-OFDM BPSK	1@0	see graph	**---**
5	15	15	168300	841.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**

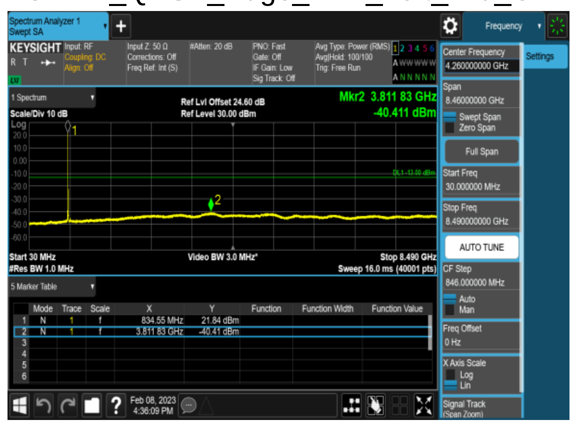
5	15	15	168300	841.5	DFT-s-OFDM QPSK	1@0	see graph	**---**
5	15	15	168300	841.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
5	15	20	166800	834.0	DFT-s-OFDM BPSK	1@0	see graph	**---**
5	15	20	166800	834.0	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
5	15	20	166800	834.0	DFT-s-OFDM QPSK	1@0	see graph	**---**
5	15	20	166800	834.0	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
5	15	20	167300	836.5	DFT-s-OFDM BPSK	1@0	see graph	**---**
5	15	20	167300	836.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
5	15	20	167300	836.5	DFT-s-OFDM QPSK	1@0	see graph	**---**
5	15	20	167300	836.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
5	15	20	167800	839.0	DFT-s-OFDM BPSK	1@0	see graph	**---**
5	15	20	167800	839.0	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
5	15	20	167800	839.0	DFT-s-OFDM QPSK	1@0	see graph	**---**
5	15	20	167800	839.0	DFT-s-OFDM QPSK	1@0	see graph	**PASS**

N5(5M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Low_CH

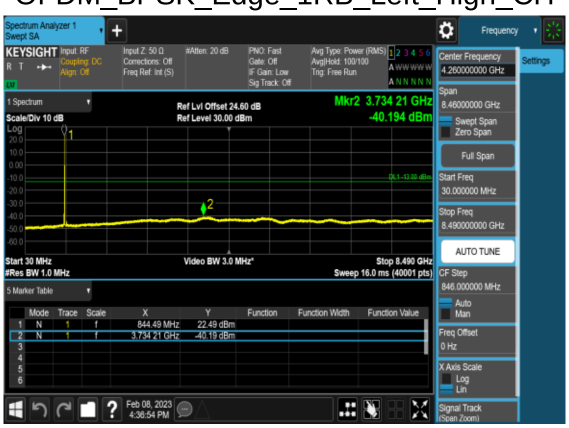
N5(5M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Low_CH

N5(5M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Mid_CH

N5(5M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Mid_CH



N5(5M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_High_CH



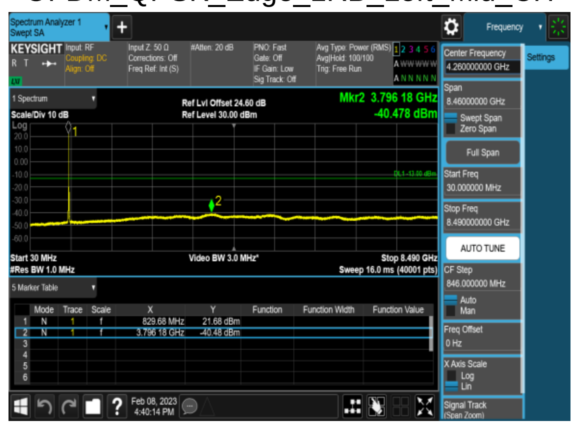
N5(5M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_High_CH

N5(15M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Low_CH

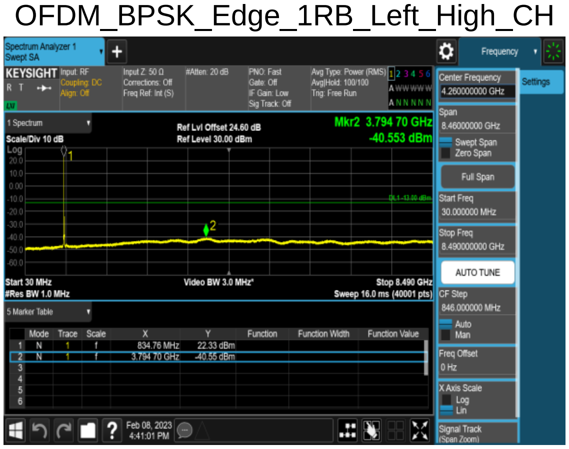
N5(15M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Low_CH

N5(15M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Mid_CH

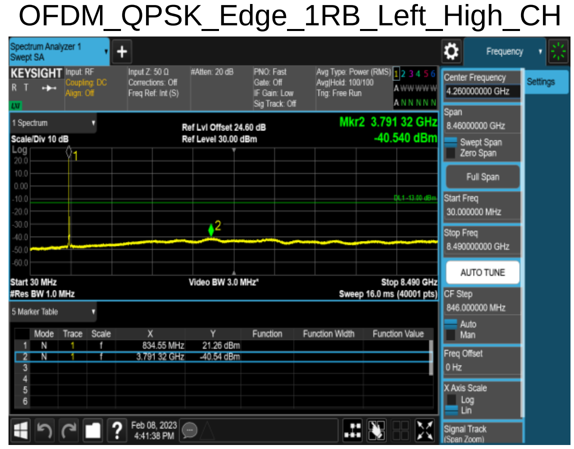
N5(15M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Mid_CH



N5(15M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_High_CH



N5(15M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_High_CH



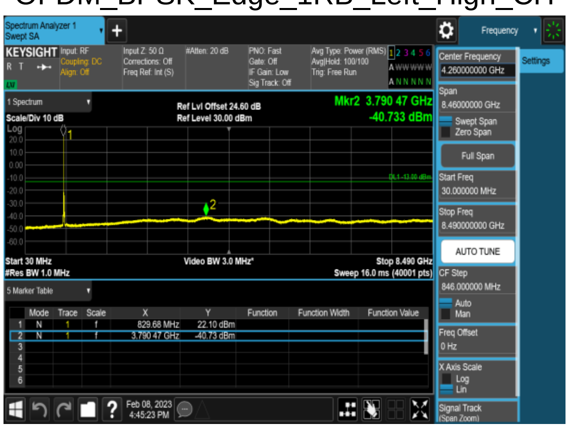
N5(20M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Low_CH

N5(20M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Low_CH

N5(20M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Mid_CH

N5(20M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Mid_CH

N5(20M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_High_CH



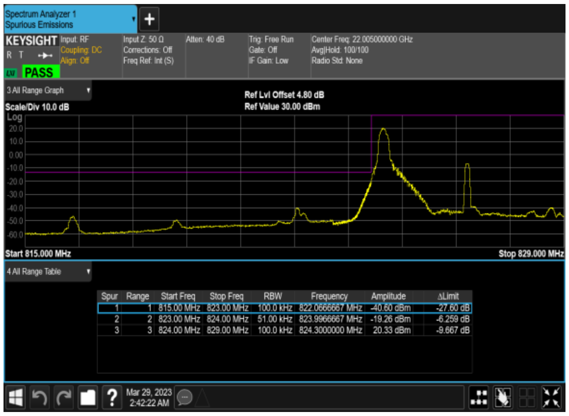
N5(20M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_High_CH

Conducted Band Edge

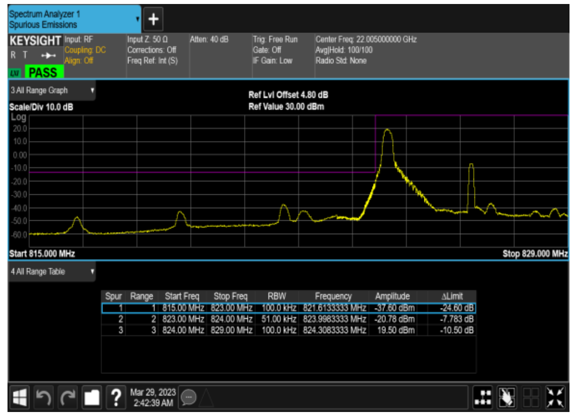
NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	Result	Verdict
5	15	5	165300	826.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
5	15	5	165300	826.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
5	15	5	165300	826.5	DFT-s-OFDM BPSK	25@0	see graph	**PASS**
5	15	5	165300	826.5	DFT-s-OFDM QPSK	25@0	see graph	**PASS**
5	15	5	169300	846.5	DFT-s-OFDM BPSK	1@24	see graph	**PASS**
5	15	5	169300	846.5	DFT-s-OFDM QPSK	1@24	see graph	**PASS**
5	15	5	169300	846.5	DFT-s-OFDM BPSK	25@0	see graph	**PASS**
5	15	5	169300	846.5	DFT-s-OFDM QPSK	25@0	see graph	**PASS**
5	15	15	166300	831.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
5	15	15	166300	831.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
5	15	15	166300	831.5	DFT-s-OFDM BPSK	75@0	see graph	**PASS**
5	15	15	166300	831.5	DFT-s-OFDM QPSK	75@0	see graph	**PASS**
5	15	15	168300	841.5	DFT-s-OFDM BPSK	1@78	see graph	**PASS**
5	15	15	168300	841.5	DFT-s-OFDM QPSK	1@78	see graph	**PASS**
5	15	15	168300	841.5	DFT-s-OFDM BPSK	75@0	see graph	**PASS**
5	15	15	168300	841.5	DFT-s-OFDM QPSK	75@0	see graph	**PASS**
5	15	20	166800	834.0	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
5	15	20	166800	834.0	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
5	15	20	166800	834.0	DFT-s-OFDM BPSK	100@0	see graph	**PASS**
5	15	20	166800	834.0	DFT-s-OFDM QPSK	100@0	see graph	**PASS**
5	15	20	167800	839.0	DFT-s-OFDM BPSK	1@105	see graph	**PASS**
5	15	20	167800	839.0	DFT-s-OFDM QPSK	1@105	see graph	**PASS**

5	15	20	167800	839.0	DFT-s-OFDM BPSK	100@0	see graph	**PASS**
5	15	20	167800	839.0	DFT-s-OFDM QPSK	100@0	see graph	**PASS**

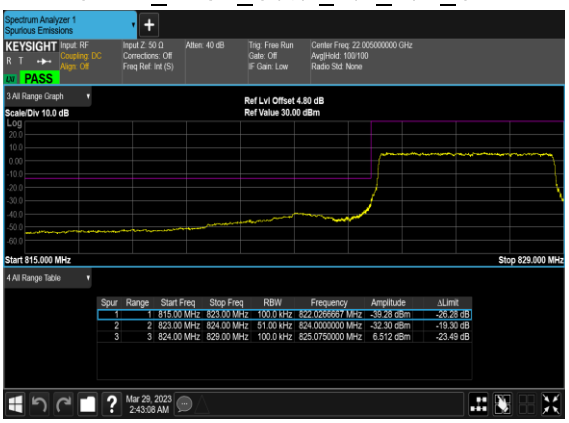
N5(5M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Low_CH



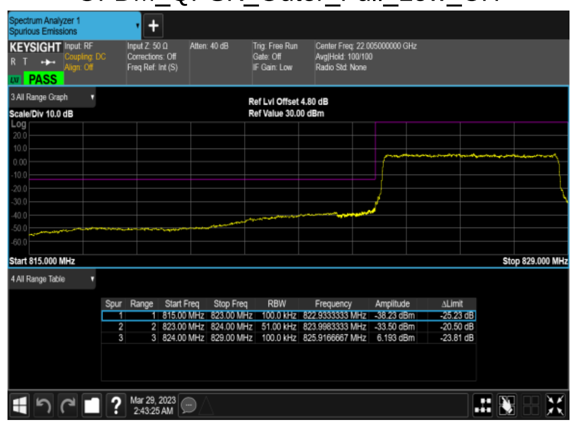
N5(5M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Low_CH



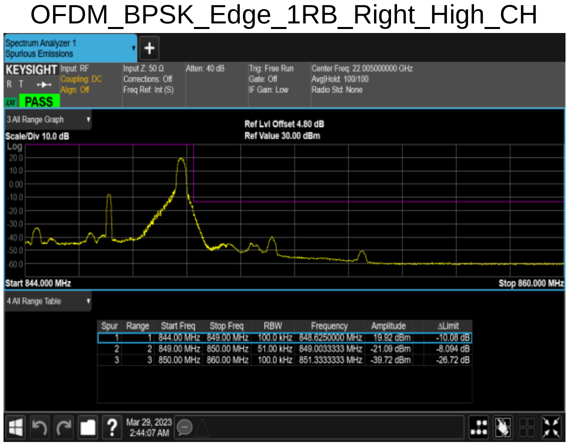
N5(5M)_DFT-s-OFDM_BPSK_Outer_Full_Low_CH



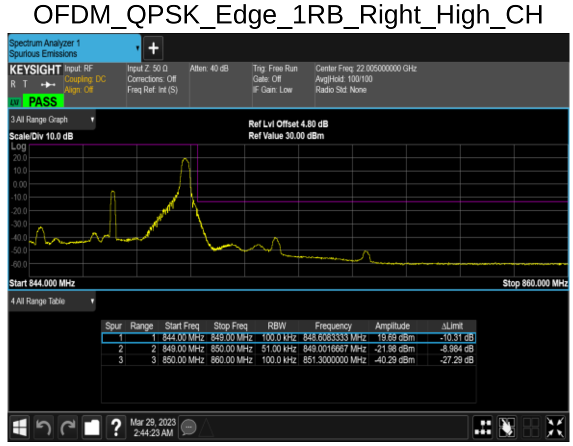
N5(5M)_DFT-s-OFDM_QPSK_Outer_Full_Low_CH



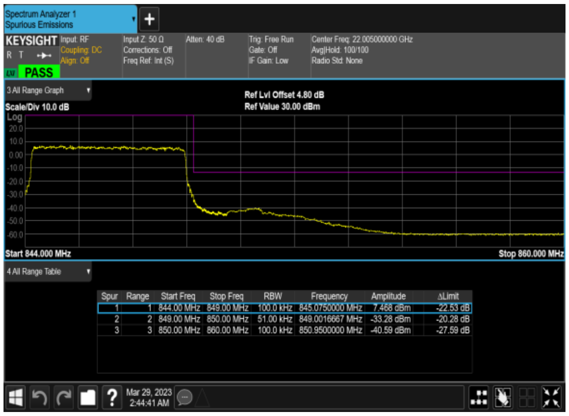
N5(5M)_DFT-s-OFDM_BPSK_Edge_1RB_Right_High_CH



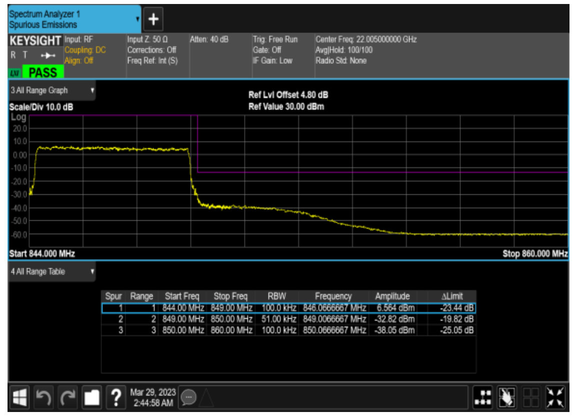
N5(5M)_DFT-s-OFDM_QPSK_Edge_1RB_Right_High_CH



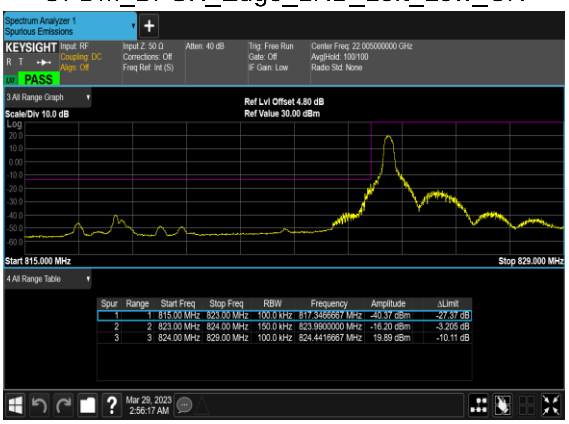
N5(5M)_DFT-s-OFDM_BPSK_Outer_Full_High_CH



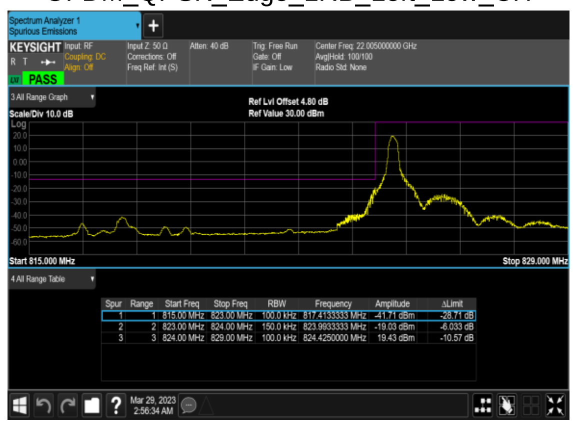
N5(5M)_DFT-s-OFDM_QPSK_Outer_Full_High_CH



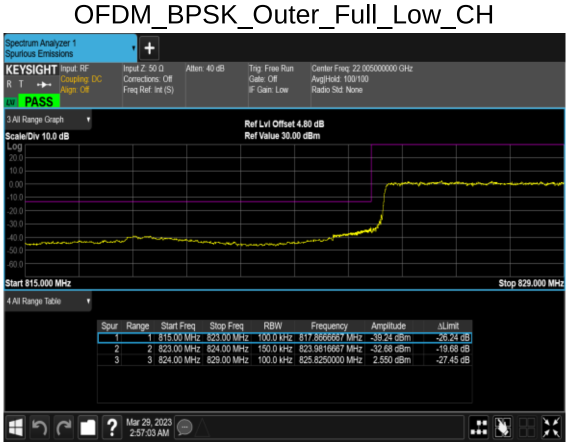
N5(15M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Low_CH



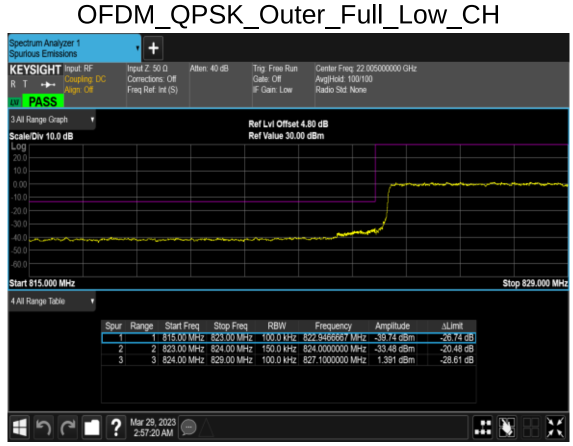
N5(15M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Low_CH



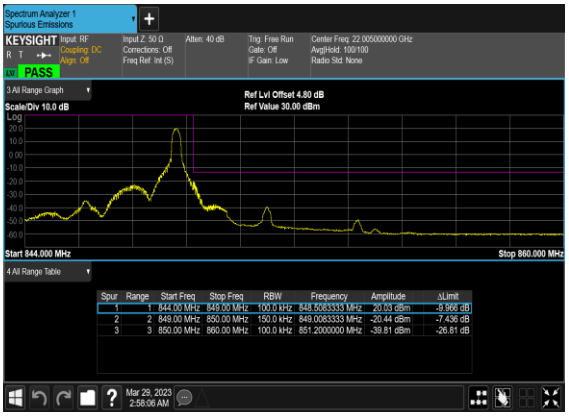
N5(15M)_DFT-s-OFDM_BPSK_Outer_Full_Low_CH



N5(15M)_DFT-s-OFDM_QPSK_Outer_Full_Low_CH

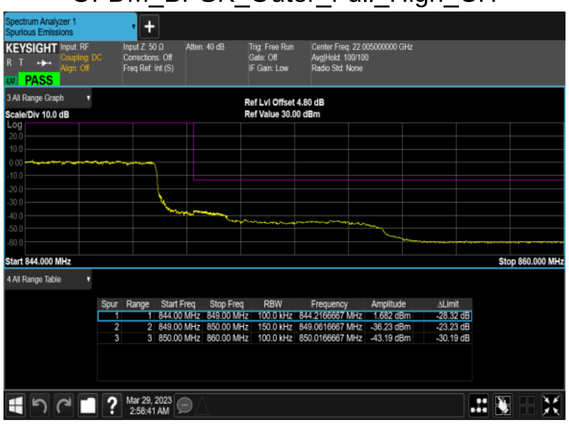


N5(15M)_DFT-s-OFDM_BPSK_Edge_1RB_Right_High_CH

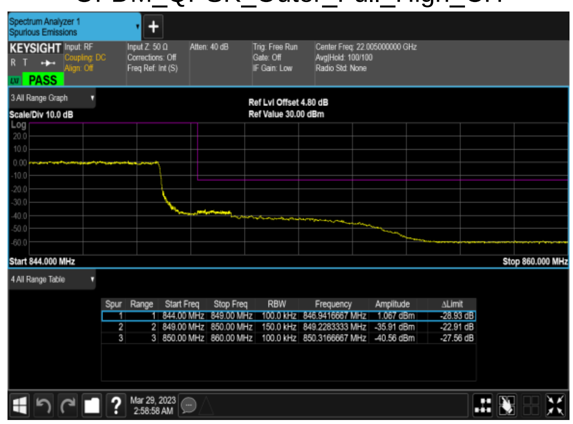


N5(15M)_DFT-s-OFDM_QPSK_Edge_1RB_Right_High_CH

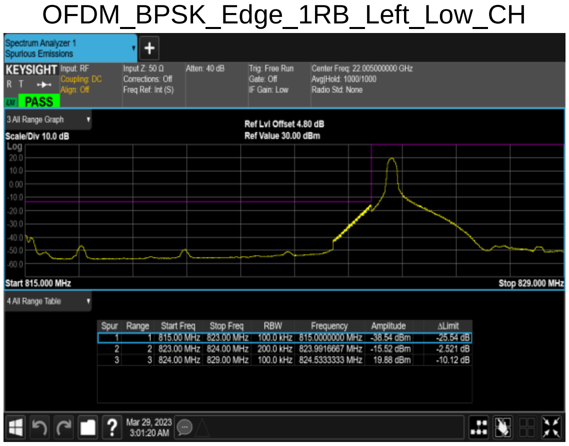
N5(15M)_DFT-s-OFDM_BPSK_Outer_Full_High_CH



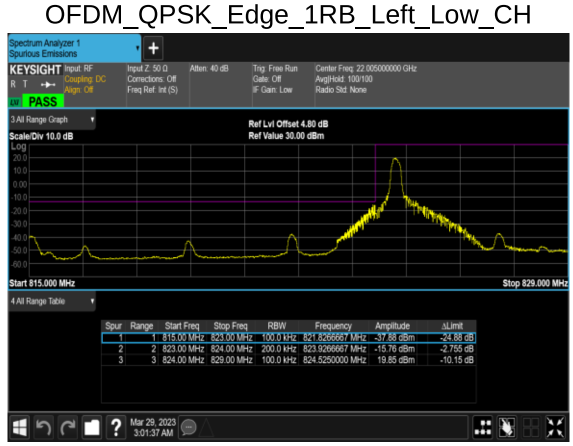
N5(15M)_DFT-s-OFDM_QPSK_Outer_Full_High_CH



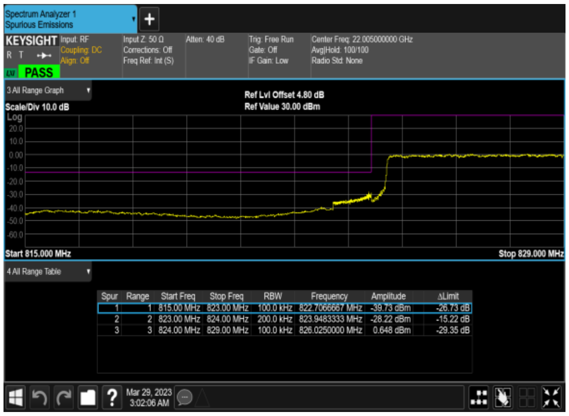
N5(20M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Low_CH



N5(20M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Low_CH

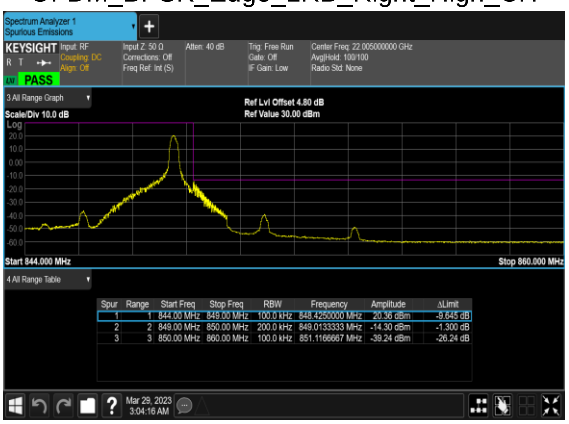


N5(20M)_DFT-s-OFDM_BPSK_Outer_Full_Low_CH

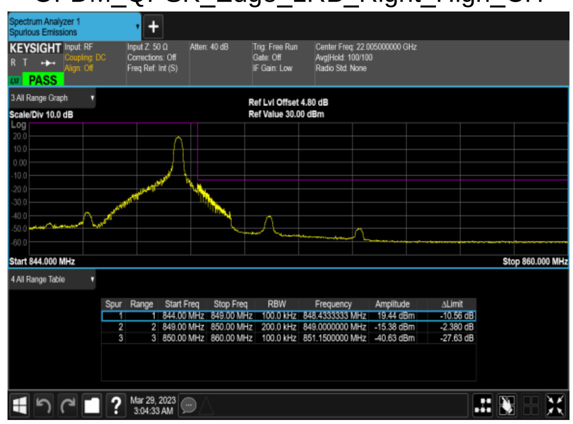


N5(20M)_DFT-s-OFDM_QPSK_Outer_Full_Low_CH

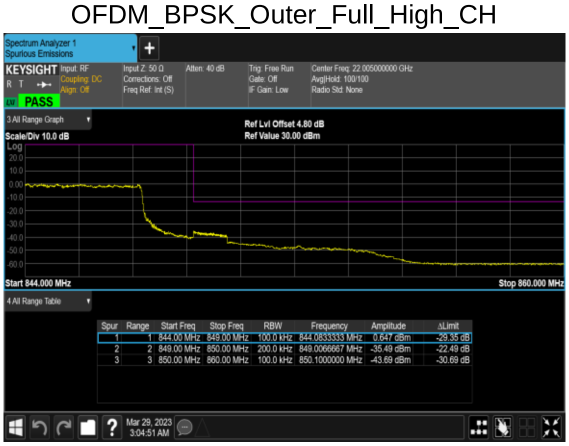
N5(20M)_DFT-s-OFDM_BPSK_Edge_1RB_Right_High_CH



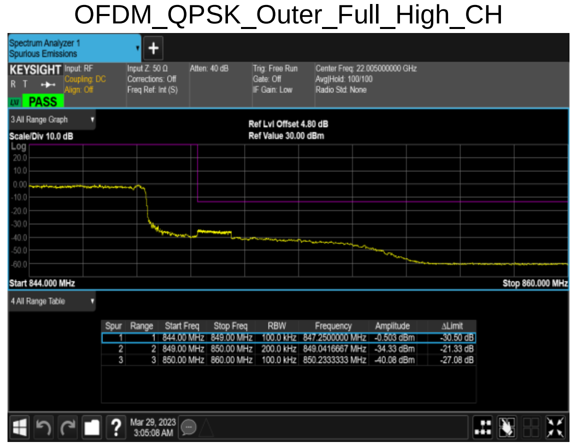
N5(20M)_DFT-s-OFDM_QPSK_Edge_1RB_Right_High_CH



N5(20M)_DFT-s-OFDM_BPSK_Outer_Full_High_CH



N5(20M)_DFT-s-OFDM_QPSK_Outer_Full_High_CH



Software Version: 23.02.011001

FR1 N12

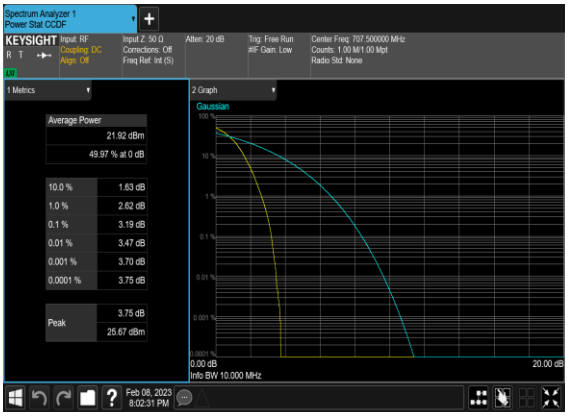
Frequency Stability

NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	Deviation (ppm)	Verdict	Environment
12	15	15	141500	707.5	DFT-s-OFDM QPSK	75@0	0.0000	**PASS**	NV
12	15	15	141500	707.5	DFT-s-OFDM QPSK	75@0	0.0007	**PASS**	LV
12	15	15	141500	707.5	DFT-s-OFDM QPSK	75@0	0.0006	**PASS**	HV
12	15	15	141500	707.5	DFT-s-OFDM QPSK	75@0	0.0049	**PASS**	-30℃
12	15	15	141500	707.5	DFT-s-OFDM QPSK	75@0	0.0007	**PASS**	-20℃
12	15	15	141500	707.5	DFT-s-OFDM QPSK	75@0	0.0023	**PASS**	-10℃
12	15	15	141500	707.5	DFT-s-OFDM QPSK	75@0	0.0011	**PASS**	0℃
12	15	15	141500	707.5	DFT-s-OFDM QPSK	75@0	0.0004	**PASS**	10℃
12	15	15	141500	707.5	DFT-s-OFDM QPSK	75@0	0.0000	**PASS**	20℃
12	15	15	141500	707.5	DFT-s-OFDM QPSK	75@0	0.0047	**PASS**	30℃
12	15	15	141500	707.5	DFT-s-OFDM QPSK	75@0	0.0048	**PASS**	40℃
12	15	15	141500	707.5	DFT-s-OFDM QPSK	75@0	0.0011	**PASS**	50℃

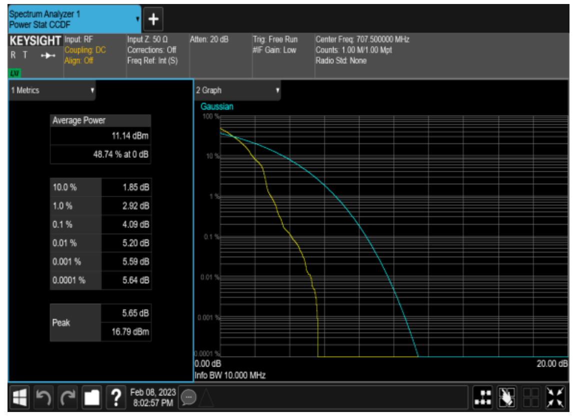
Peak to Average Ratio

NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	Result (dB)	Limit (dB)	Verdict
12	15	15	141500	707.5	DFT-s-OFDM PI/2 BPSK	75@0	3.19	13	**PASS**
12	15	15	141500	707.5	DFT-s-OFDM PI/2 BPSK	1@0	4.09	13	**PASS**
12	15	15	141500	707.5	DFT-s-OFDM QPSK	75@0	4.96	13	**PASS**
12	15	15	141500	707.5	DFT-s-OFDM QPSK	1@0	5.03	13	**PASS**

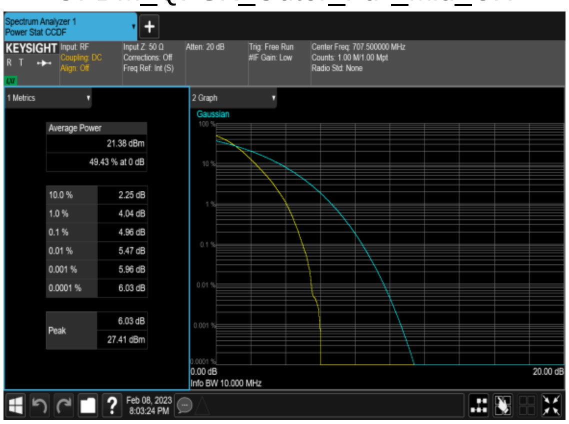
N12(15M)_DFT-s-OFDM_PI_2-BPSK_Outer_Full_Mid_CH



N12(15M)_DFT-s-OFDM_PI_2-BPSK_Edge_1RB_Left_Mid_CH



N12(15M)_DFT-s-OFDM_QPSK_Outer_Full_Mid_CH

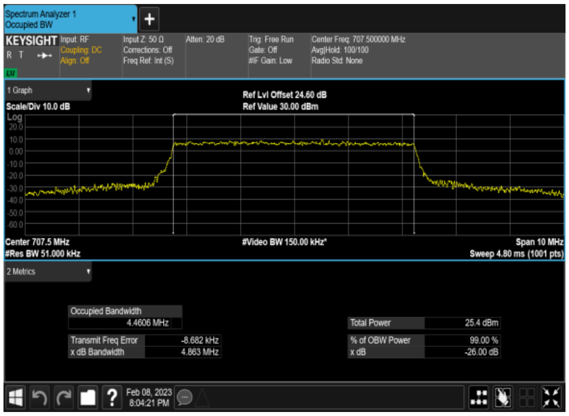


N12(15M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Mid_CH

Occupied Bandwidth

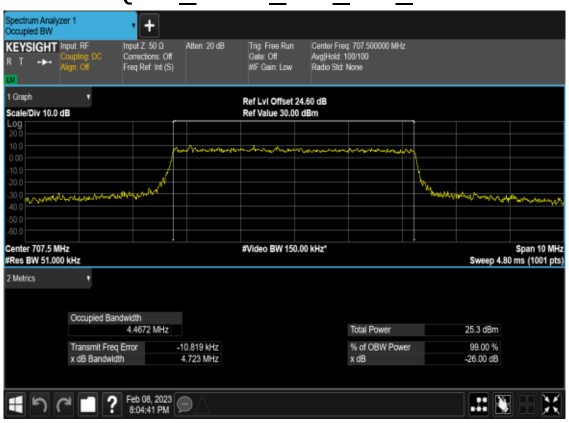
NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	OBW (MHz)	26dB BW (MHz)
12	15	5	141500	707.5	CP-OFDM QPSK	25@0	4.4606	4.863
12	15	5	141500	707.5	CP-OFDM 16 QAM	25@0	4.4671	4.805
12	15	5	141500	707.5	CP-OFDM 64 QAM	25@0	4.4672	4.723
12	15	5	141500	707.5	CP-OFDM 256 QAM	25@0	4.4539	4.819
12	15	10	141500	707.5	CP-OFDM QPSK	52@0	9.2782	9.895
12	15	10	141500	707.5	CP-OFDM 16 QAM	52@0	9.2776	9.802
12	15	10	141500	707.5	CP-OFDM 64 QAM	52@0	9.2532	9.798
12	15	10	141500	707.5	CP-OFDM 256 QAM	52@0	9.2527	9.803
12	15	15	141500	707.5	CP-OFDM QPSK	79@0	14.087	14.66
12	15	15	141500	707.5	CP-OFDM 16 QAM	79@0	14.078	14.71
12	15	15	141500	707.5	CP-OFDM 64 QAM	79@0	14.082	14.76
12	15	15	141500	707.5	CP-OFDM 256 QAM	79@0	14.056	14.68

N12(5M)_CP-OFDM_QPSK_Outer_Full_Mid_CH

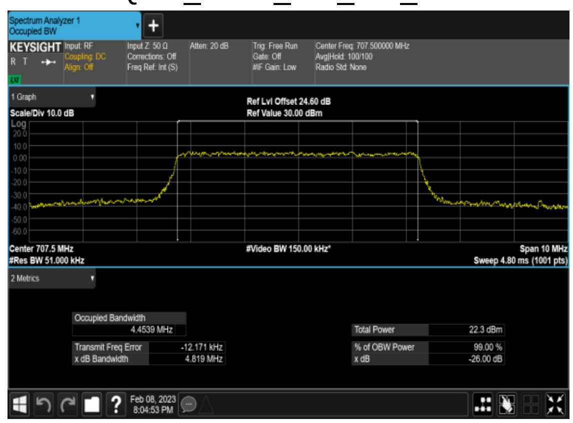


N12(5M)_CP-OFDM_16 QAM_Outer_Full_Mid_CH

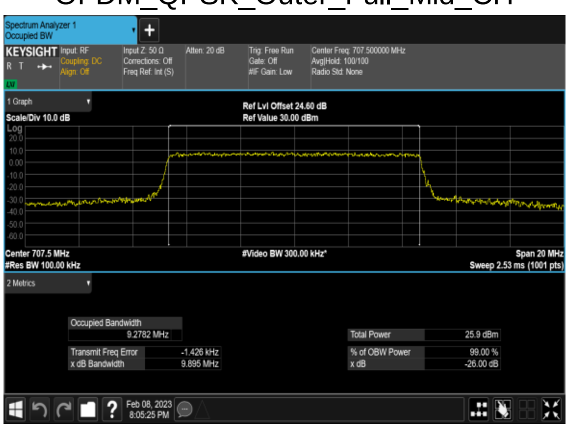
N12(5M)_CP-OFDM_64 QAM_Outer_Full_Mid_CH



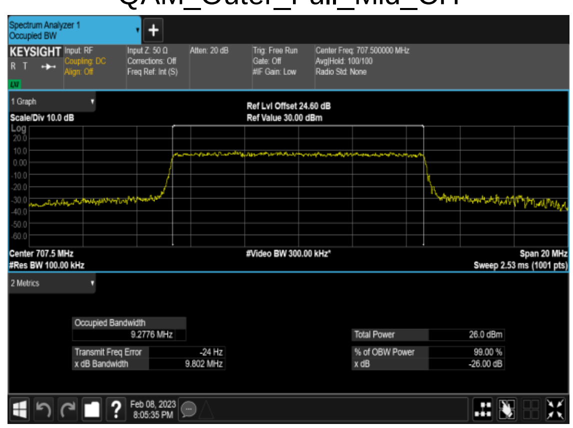
N12(5M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH



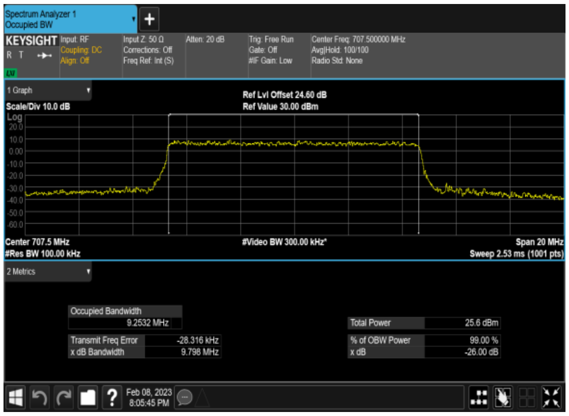
N12(10M)_CP-OFDM_QPSK_Outer_Full_Mid_CH



N12(10M)_CP-OFDM_16 QAM_Outer_Full_Mid_CH

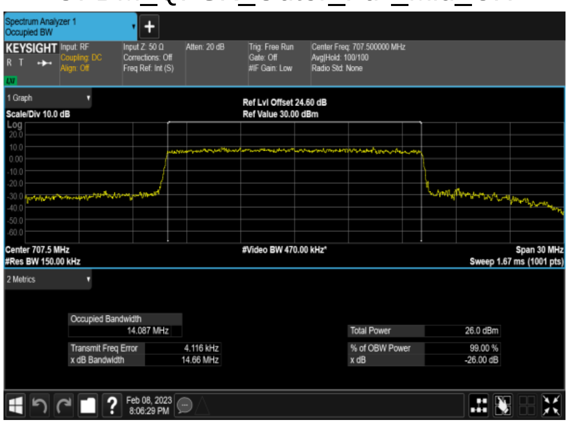


N12(10M)_CP-OFDM_64 QAM_Outer_Full_Mid_CH

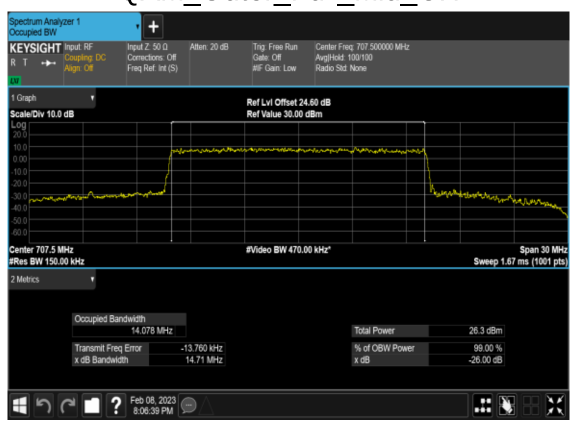


N12(10M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH

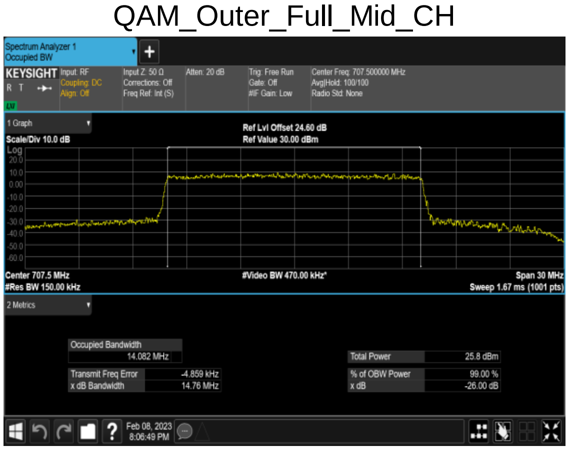
N12(15M)_CP-OFDM_QPSK_Outer_Full_Mid_CH



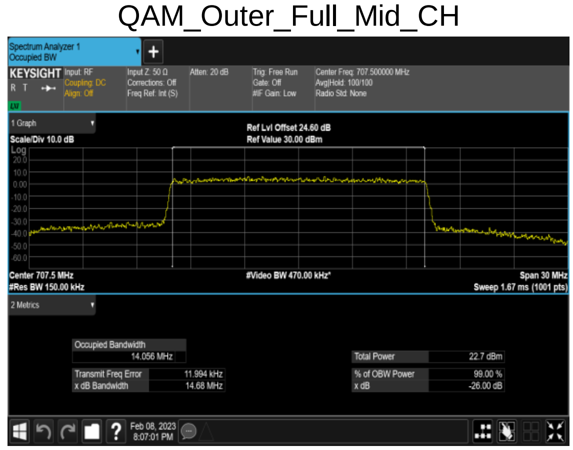
N12(15M)_CP-OFDM_16 QAM_Outer_Full_Mid_CH



N12(15M)_CP-OFDM_64 QAM_Outer_Full_Mid_CH



N12(15M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH



Conducted Spurious Emissions

NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	Result	Verdict
12	15	5	140300	701.5	DFT-s-OFDM BPSK	1@0	see graph	**---**
12	15	5	140300	701.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
12	15	5	140300	701.5	DFT-s-OFDM QPSK	1@0	see graph	**---**
12	15	5	140300	701.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
12	15	5	141500	707.5	DFT-s-OFDM BPSK	1@0	see graph	**---**
12	15	5	141500	707.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
12	15	5	141500	707.5	DFT-s-OFDM QPSK	1@0	see graph	**---**
12	15	5	141500	707.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
12	15	5	142700	713.5	DFT-s-OFDM BPSK	1@0	see graph	**---**
12	15	5	142700	713.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
12	15	5	142700	713.5	DFT-s-OFDM QPSK	1@0	see graph	**---**
12	15	5	142700	713.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
12	15	10	140800	704.0	DFT-s-OFDM BPSK	1@0	see graph	**---**
12	15	10	140800	704.0	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
12	15	10	140800	704.0	DFT-s-OFDM QPSK	1@0	see graph	**---**
12	15	10	140800	704.0	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
12	15	10	141500	707.5	DFT-s-OFDM BPSK	1@0	see graph	**---**
12	15	10	141500	707.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
12	15	10	141500	707.5	DFT-s-OFDM QPSK	1@0	see graph	**---**
12	15	10	141500	707.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
12	15	10	142200	711.0	DFT-s-OFDM BPSK	1@0	see graph	**---**
12	15	10	142200	711.0	DFT-s-OFDM BPSK	1@0	see graph	**PASS**

12	15	10	142200	711.0	DFT-s-OFDM QPSK	1@0	see graph	**---**
12	15	10	142200	711.0	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
12	15	15	141300	706.5	DFT-s-OFDM BPSK	1@0	see graph	**---**
12	15	15	141300	706.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
12	15	15	141300	706.5	DFT-s-OFDM QPSK	1@0	see graph	**---**
12	15	15	141300	706.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
12	15	15	141500	707.5	DFT-s-OFDM BPSK	1@0	see graph	**---**
12	15	15	141500	707.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
12	15	15	141500	707.5	DFT-s-OFDM QPSK	1@0	see graph	**---**
12	15	15	141500	707.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
12	15	15	141700	708.5	DFT-s-OFDM BPSK	1@0	see graph	**---**
12	15	15	141700	708.5	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
12	15	15	141700	708.5	DFT-s-OFDM QPSK	1@0	see graph	**---**
12	15	15	141700	708.5	DFT-s-OFDM QPSK	1@0	see graph	**PASS**