TEST REPORT

No. I22Z62158-WMD02

for

Baicells Technologies Co., Ltd.

Product Name: 5G NR Base Station

Model Name: BSC7048A243

FCC ID: 2AG32BSC7048A243

with

Hardware Version: Ver.A

Software Version: BaiBBU_QSS_1.1.7

Issued Date: 2022-11-24

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S.Government.

Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I22Z62158-WMD02	Rev.0	1st edition	2022-11-16
I22Z62158-WMD02	Rev.1	Model name and FCC id modified	2022-11-21
I22Z62158-WMD02	Rev.2	Editorial modification in report history	2022-11-24

Note: the latest revision of the test report supersedes all previous version.

CONTENTS

1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0 and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (CN0066). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

Location 1: CTTL (huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191

Location 2: CTTL (BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology Development Area, Beijing 100176, P. R. China

1.3. Testing Environment

Normal Temperature: 15-35℃

Relative Humidity: 20-75%

1.4. Project Data

Testing Start Date: 2022-10-28

Testing End Date: 2022-11-16

1.5. Signature

Dong Yuan

(Prepared this test report)

Zhou Yu

(Reviewed this test report)

Zhao Hui Lin

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Baicells Technologies Co., Ltd.
Address:	9-10F, 1stBldg., No.81 Beiqing Road, Haidian District, Beijing, China
City:	Beijing
Postal Code:	100094
Country:	China
Telephone:	010-62607100
Fax:	010-62607100

2.2. Manufacturer Information

Company Name:	Baicells Technologies Co., Ltd.
Address:	9-10F, 1stBldg., No.81 Beiqing Road, Haidian District, Beijing, China
City:	Beijing
Postal Code:	100094
Country:	China
Telephone:	010-62607100
Fax:	010-62607100

3. Equipment Under Test (EUT)

3.1. About EUT

Description	5G NR base station
Model Name	BSC7048A243
CBSD Category	Category B
Antenna Gain	13dBi
Supported Channel bandwidth	NR:10/20/30/40 MHz
Output Power(*)	EIRP maximum 37dBm/MHz
Number of Antenna ports	2
Frequency range(*)	n48 3550MHz-3700MHz
Type of modulation	QPSK, 64QAM, 256QAM
Extreme Temperature(*)	-40/+50℃
Normal Voltage	48V DC

(*): Declared by applicant.

3.2. General Description

The Equipment Under Test (EUT) BSC7048A243 is a 5G NR base station which provides communication connections to 3550-3700 MHz network. The EUT operates from a 48V DC supply.

The EUT includes 2 TX/RX ports. It can operate in NR single RAT mode. It can be configured to transmit in MIMO mode which was used for measurements as the worst configuration. The complete testing was performed with the EUT transmitting at rated maximum RF power unless otherwise stated.

A full technical description can be found in the Manufacturer's documentation.

3.3. Configuration Description

The following settings were used to represent all traffic scenarios. The output power was measured on the bottom, middle and top channel of both applicable antenna ports. By measuring the output power of QPSK, 64QAM and 256QAM for NR on both of the antenna ports, it was determined that QPSK was the worst case modulation scheme and was used for all testing.

Complete testing was carried out on the worst case antenna port which was established as being the highest output power from the applicable measured ports on worst case modulation scheme. This antenna port was Port 0 for NR single RAT mode.

The settings below were used for all measurements unless otherwise noted:

Carrier Bandwidth	Carrier Frequency Configuration (MHz)		
	Bottom	Middle	Top
10MHz	3555	3624.99	3694.98
20MHz	3560.01	3624.99	3690
30MHz	3565.02	3624.99	3684.99
40MHz	3570	3624.99	3679.98

4. Reference Documents

4.1. Documents supplied by applicant

EUT parameters are supplied by the customer, which are the bases of testing. CAICT is not responsible for the accuracy of customer supplied technical information that may affect the test results (for example, antenna gain and loss of customer supplied cable).

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 96	CITIZENS BROADBAND RADIO SERVICE	10-1-21 Edition
FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	10-1-21 Edition
ANSI 63.26	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	2015
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
KDB 971168 D01	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS	v03r01
KDB 662911 D01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band	v02r01
KDB 940660 D01	CERTIFICATION AND TEST PROCEDURES FOR CITIZENS BROADBAND RADIO SERVICE DEVICES AUTHORIZED UNDER PART 96	v03

5. Laboratory Environment

Control room / conducted chamber did not exceed following limits along the testing:

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. =20 %, Max. = 80 %
Shielding effectiveness	> 110 dB
Electrical insulation	>2 MΩ
Ground system resistance	< 0.5 Ω

Semi-anechoic chamber(10 meters×6.7 meters×6.15 meters) did not exceed following limits along the testing:

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	>2 MΩ
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	<±3.5 dB, 3 m distance
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

6. Summary Of Test Result

Items	Test Name	Clause in FCC rules	Verdict
1	Maximum Output Power and PAPR	96.41(b) (g), 2.1046	Pass
2	Occupied Bandwidth	96.41(e), 2.1049	Pass
3	Transmitter unwanted emissions at Band Edge	96.41(e), 2.1051	Pass
4	Transmitter unwanted emissions - Conducted Spurious Emission	96.41(e), 2.1051	Pass
5	Radiated Spurious Emission	96.41(e)	Pass
6	Frequency Stability	2.1055	Pass

7. Test Equipment Utilized

NO.	Description	TYPE	series number	MANUFACTURE	CAL DUE DATE
1	AC Power Supply	PCR2000M	PJ000583	Kikusui	2023-05-13
2	20dB Attenuator	CA010-6-20-S-17	202104020008	HBTEtech	-
3	40dB Attenuator	66-40-33	CJ9452	Weinschel	-
4	Spectrum Analyzer	N9030B	MY57142378	Keysight	2023-03-01
5	Climate Chamber	SH-641	92009050	Espec	2023-12-21
6	Test Receiver	ESU26	100376	R&S	2023-09-22
7	Test Receiver	ESW44	103015	R&S	2023-02-23
8	Antenna	VULB 9163	01177	SCHWARZBECK	2023-08-03
9	Antenna	3117	00119024	ETS	2023-06-07
10	Antenna	LB-180400-25-C-KF	J211060826	A-INFO	2023-02-27

8. MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Discipline	Measurement Uncertainty
Conducted Maximum Peak Output Power	0.5dB
Occupied Bandwidth	1.1Hz
Conducted Spurious Emissions	2.3dB
Band Edge	2.3dB
Radiated Spurious Emissions	5.4dB
Frequency Stability	$<\pm 1 \times 10^{-7}$

Annex A: Measurement Results

A.1 Maximum Output Power and Peak to Average Power Ratio

A.1.1 Reference

FCC CFR 47 Part 96, Clause 96.41(b), 96.41(g)
FCC CFR 47 Part 2, Clause 2.1046

A.1.2 Method of Measurements

During the process of testing, the EUT was configured to transmit on maximum power and proper modulation. The transmitter power shall be measured in terms of a root-mean-square (RMS) average value. In case of the EUT was configured to MIMO mode, since the EUT transmits on all antennas simultaneously in the same frequency range, using the Measure-and-Sum approach, spectra are measured at each output of the EUT at the required resolution bandwidth. The individual spectra are then summed mathematically in linear power units according to FCC KDB 662911 D01.

A peak to average ratio measurement is performed at the conducted ports of the EUT for single carrier for single RAT mode. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) was used and 0.1% probability value recorded.

The antenna gain is declared as 13dBi, therefore the EIRP is calculated as the sum of the power over 2 ports plus the antenna gain.

A.1.3 Limit

Maximum EIRP: ≤47dBm/10MHz
Maximum PSD: ≤37dBm/MHz
PAPR: ≤13dB

A.1.4 Measurement result

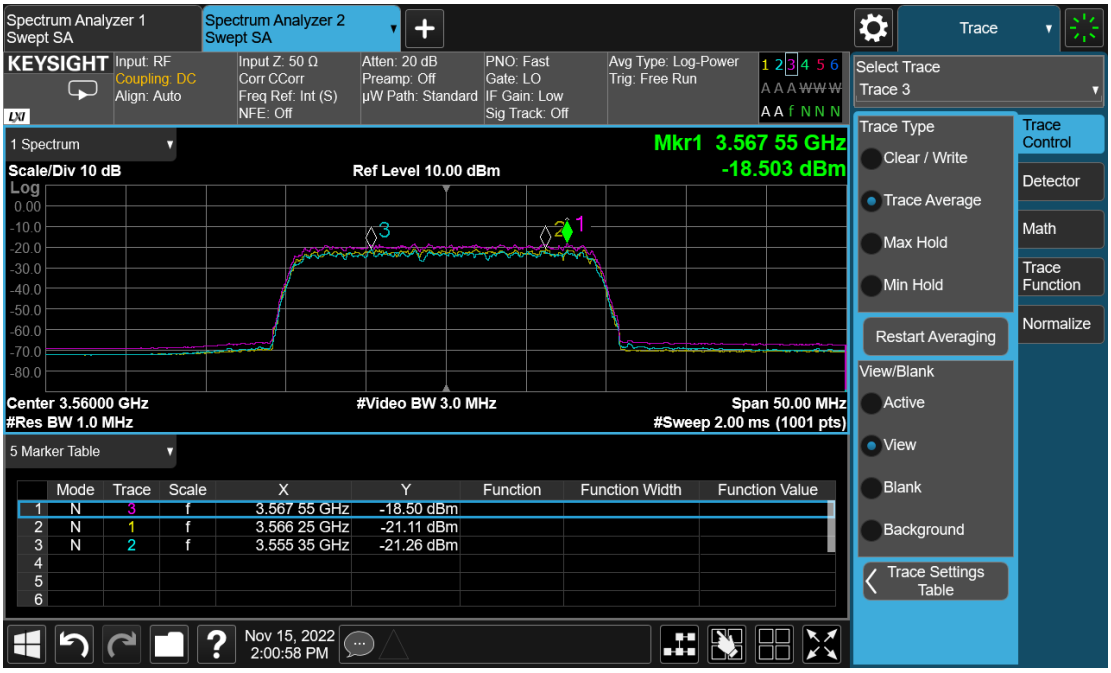
Port	BW (MHz)	Channel position	Modulation	PAPR (dB)	Conducted PSD (dBm/MHz)	Total Max EIRP (dBm/MHz)
0	10	Bottom	QPSK	9.28	23.81	36.81
1	10	Bottom	QPSK	9.24		
0	10	Bottom	64QAM	9.63	23.22	36.22
1	10	Bottom	64QAM	9.68		
0	10	Bottom	256QAM	9.82	23.14	36.14
1	10	Bottom	256QAM	9.90		
0	10	Middle	QPSK	9.31	23.93	36.93
1	10	Middle	QPSK	9.55		
0	10	Middle	64QAM	9.70	23.91	36.91
1	10	Middle	64QAM	9.75		
0	10	Middle	256QAM	9.98	23.82	36.82
1	10	Middle	256QAM	9.90		
0	10	Top	QPSK	9.51	23.51	36.51
1	10	Top	QPSK	9.44		
0	10	Top	64QAM	9.66	23.38	36.38
1	10	Top	64QAM	9.79		
0	10	Top	256QAM	9.94	23.32	36.32
1	10	Top	256QAM	9.81		
0	20	Bottom	QPSK	9.55	23.63	36.63
1	20	Bottom	QPSK	9.66		
0	20	Bottom	64QAM	9.78	23.48	36.48
1	20	Bottom	64QAM	9.85		
0	20	Bottom	256QAM	9.89	23.51	36.51
1	20	Bottom	256QAM	9.96		
0	20	Middle	QPSK	9.27	23.59	36.59
1	20	Middle	QPSK	9.22		
0	20	Middle	64QAM	9.58	23.61	36.61
1	20	Middle	64QAM	9.78		
0	20	Middle	256QAM	9.76	23.55	36.55
1	20	Middle	256QAM	9.95		
0	20	Top	QPSK	9.37	23.26	36.26
1	20	Top	QPSK	9.46		
0	20	Top	64QAM	9.59	23.63	36.63
1	20	Top	64QAM	9.56		
0	20	Top	256QAM	9.73	23.47	36.47
1	20	Top	256QAM	9.77		

0	30	Bottom	QPSK	9.46	23.60	36.60
1	30	Bottom	QPSK	9.33		
0	30	Bottom	64QAM	9.86	22.74	35.74
1	30	Bottom	64QAM	9.74		
0	30	Bottom	256QAM	9.94	23.38	36.38
1	30	Bottom	256QAM	9.82		
0	30	Middle	QPSK	9.38	23.49	36.49
1	30	Middle	QPSK	9.54		
0	30	Middle	64QAM	9.15	23.36	36.36
1	30	Middle	64QAM	9.49		
0	30	Middle	256QAM	9.66	23.52	36.52
1	30	Middle	256QAM	9.78		
0	30	Top	QPSK	9.39	23.64	36.64
1	30	Top	QPSK	9.62		
0	30	Top	64QAM	9.56	23.04	36.04
1	30	Top	64QAM	9.75		
0	30	Top	256QAM	9.62	23.68	36.68
1	30	Top	256QAM	9.87		
0	40	Bottom	QPSK	9.21	22.91	35.91
1	40	Bottom	QPSK	9.46		
0	40	Bottom	64QAM	9.56	23.23	36.23
1	40	Bottom	64QAM	9.51		
0	40	Bottom	256QAM	9.93	22.92	35.92
1	40	Bottom	256QAM	9.60		
0	40	Middle	QPSK	9.16	23.79	36.79
1	40	Middle	QPSK	9.61		
0	40	Middle	64QAM	9.59	23.67	36.67
1	40	Middle	64QAM	9.62		
0	40	Middle	256QAM	9.72	23.87	36.87
1	40	Middle	256QAM	9.96		
0	40	Top	QPSK	9.35	23.45	36.45
1	40	Top	QPSK	9.56		
0	40	Top	64QAM	9.60	23.13	36.13
1	40	Top	64QAM	9.75		
0	40	Top	256QAM	9.78	23.32	36.32
1	40	Top	256QAM	9.90		

Port	BW (MHz)	Channel position	Modulation	Conducted Power(dBm/10MHz)	Total Max EIRP(dBm/10MHz)	Conducted Total Power(dBm)	Total EIRP (dBm)
0	10	Bottom	QPSK	33.75	46.75	33.75	46.75
1	10	Bottom	QPSK				
0	10	Bottom	64QAM	33.57	46.57	33.57	46.57
1	10	Bottom	64QAM				
0	10	Bottom	256QAM	33.31	46.31	33.31	46.31
1	10	Bottom	256QAM				
0	10	Middle	QPSK	33.92	46.92	33.92	46.92
1	10	Middle	QPSK				
0	10	Middle	64QAM	33.85	46.85	33.85	46.85
1	10	Middle	64QAM				
0	10	Middle	256QAM	33.77	46.77	33.77	46.77
1	10	Middle	256QAM				
0	10	Top	QPSK	33.15	46.15	33.15	46.15
1	10	Top	QPSK				
0	10	Top	64QAM	32.86	45.86	32.86	45.86
1	10	Top	64QAM				
0	10	Top	256QAM	32.81	45.81	32.81	45.81
1	10	Top	256QAM				
0	20	Bottom	QPSK	32.16	45.16	34.86	47.86
1	20	Bottom	QPSK				
0	20	Bottom	64QAM	33.91	46.91	36.69	49.69
1	20	Bottom	64QAM				
0	20	Bottom	256QAM	33.69	46.69	36.33	49.33
1	20	Bottom	256QAM				
0	20	Middle	QPSK	32.31	45.31	35.05	48.05
1	20	Middle	QPSK				
0	20	Middle	64QAM	33.65	46.65	36.38	49.38
1	20	Middle	64QAM				
0	20	Middle	256QAM	33.70	46.70	36.40	49.40
1	20	Middle	256QAM				
0	20	Top	QPSK	33.88	46.88	36.69	49.69
1	20	Top	QPSK				
0	20	Top	64QAM	33.84	46.84	36.56	49.56
1	20	Top	64QAM				
0	20	Top	256QAM	33.56	46.56	36.19	49.19
1	20	Top	256QAM				

0	30	Bottom	QPSK	33.79	46.79	38.39	51.39
1	30	Bottom	QPSK				
0	30	Bottom	64QAM	33.90	46.90	38.41	51.41
1	30	Bottom	64QAM				
0	30	Bottom	256QAM	33.77	46.77	38.31	51.31
1	30	Bottom	256QAM				
0	30	Middle	QPSK	32.11	45.11	36.61	49.61
1	30	Middle	QPSK				
0	30	Middle	64QAM	31.92	44.92	36.56	49.56
1	30	Middle	64QAM				
0	30	Middle	256QAM	32.08	45.08	36.59	49.59
1	30	Middle	256QAM				
0	30	Top	QPSK	32.18	45.18	36.76	49.76
1	30	Top	QPSK				
0	30	Top	64QAM	32.07	45.07	36.57	49.57
1	30	Top	64QAM				
0	30	Top	256QAM	32.06	45.06	36.62	49.62
1	30	Top	256QAM				
0	40	Bottom	QPSK	33.76	46.76	39.68	52.68
1	40	Bottom	QPSK				
0	40	Bottom	64QAM	33.82	46.82	39.75	52.75
1	40	Bottom	64QAM				
0	40	Bottom	256QAM	33.84	46.84	39.67	52.67
1	40	Bottom	256QAM				
0	40	Middle	QPSK	32.36	45.36	38.28	51.28
1	40	Middle	QPSK				
0	40	Middle	64QAM	32.33	45.33	38.17	51.17
1	40	Middle	64QAM				
0	40	Middle	256QAM	32.22	45.22	38.02	51.02
1	40	Middle	256QAM				
0	40	Top	QPSK	33.74	46.74	39.63	52.63
1	40	Top	QPSK				
0	40	Top	64QAM	33.86	46.86	39.66	52.66
1	40	Top	64QAM				
0	40	Top	256QAM	33.90	46.90	39.85	52.85
1	40	Top	256QAM				

Port 0 and 1, 20MHz, bottom channel, QPSK, conducted PSD(dbm/MHz)



Port 0 and 1, 20MHz, bottom channel, QPSK, conducted Power(dbm/10MHz)

A.2 Occupied Bandwidth

A.2.1 Reference

FCC CFR 47 Part 96, Clause 96.41(e)
FCC CFR 47 Part 2, Clause 2.1049

A.2.2 Method of Measurements

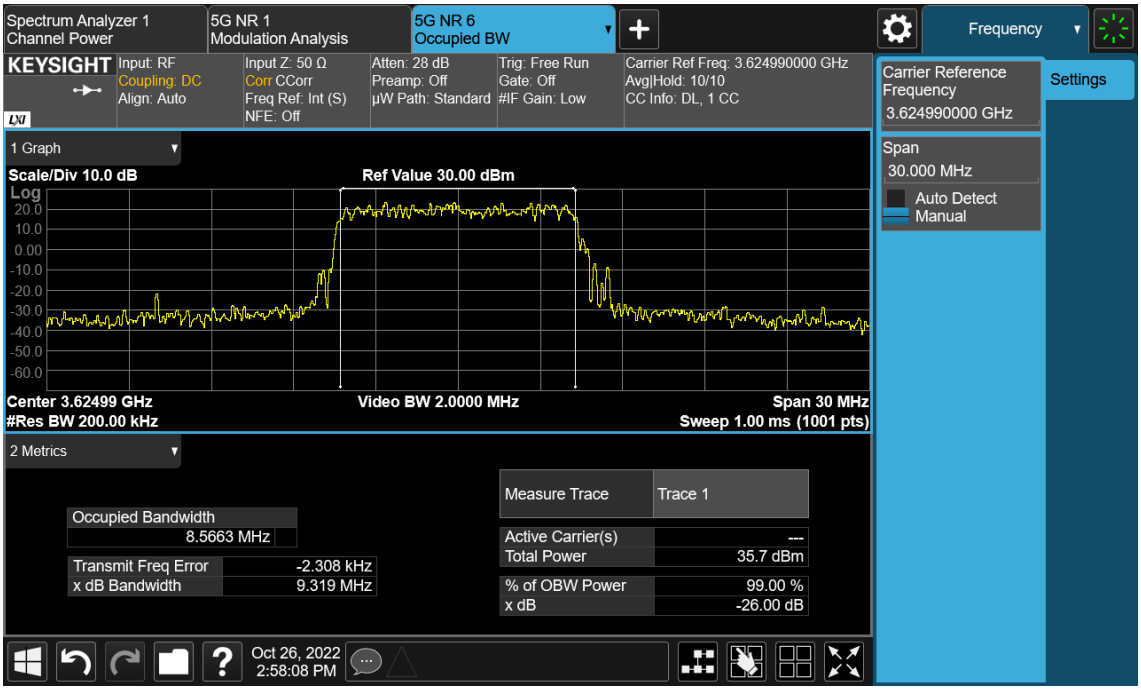
The EUT was set to transmit at maximum power and testing was carried out on bottom, middle and top channels. Using the Occupied Bandwidth measurement function in the spectrum analyzer, the 26dB bandwidth was measured in accordance with ANSI 63.26.

The measurement method is from ANSI 63.26:
a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).
b) The nominal IF filter bandwidth (3 dB 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.
c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.
d) Set the detection mode to peak, and the trace mode to max hold.
e) Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

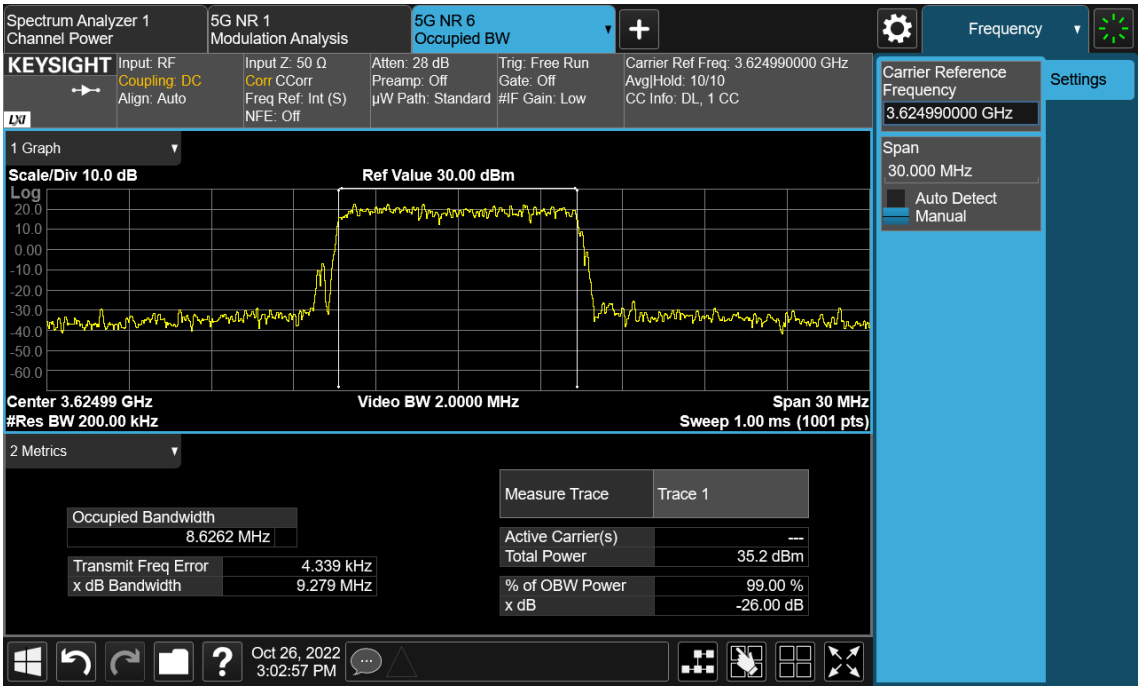
A.2.3 Measurement result

Port	Channel Position	BW(MHz)	Occupied Bandwidth (MHz)			Emission Bandwidth (MHz)		
			QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
0	Middle	10	8.566	8.626	8.571	9.319	9.279	9.141
		20	18.185	18.285	18.240	19.500	19.730	19.730
		30	27.817	27.846	27.905	29.570	29.310	29.340
		40	37.964	37.935	37.935	39.950	39.800	39.920

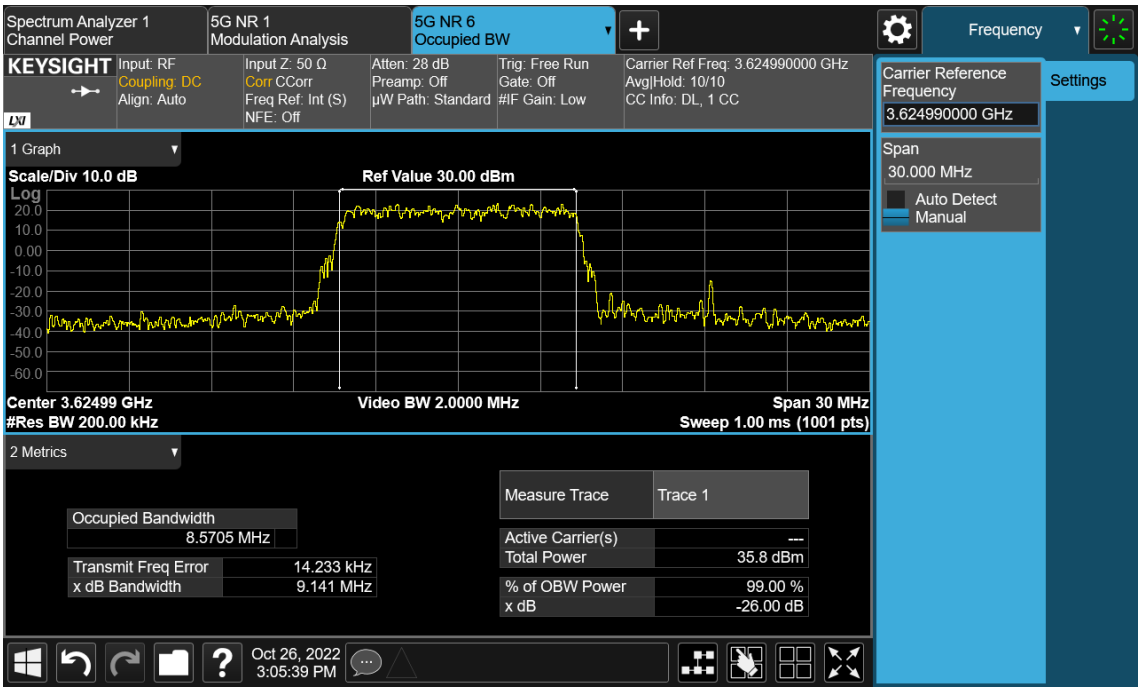
10MHz QPSK



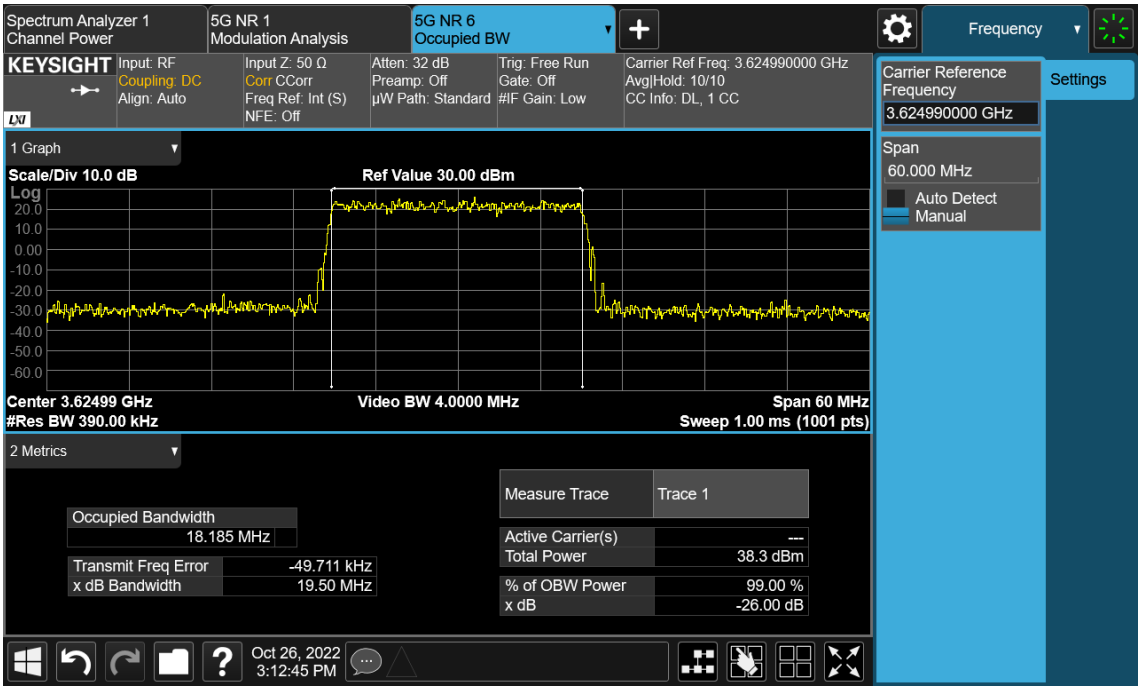
10MHz 64QAM



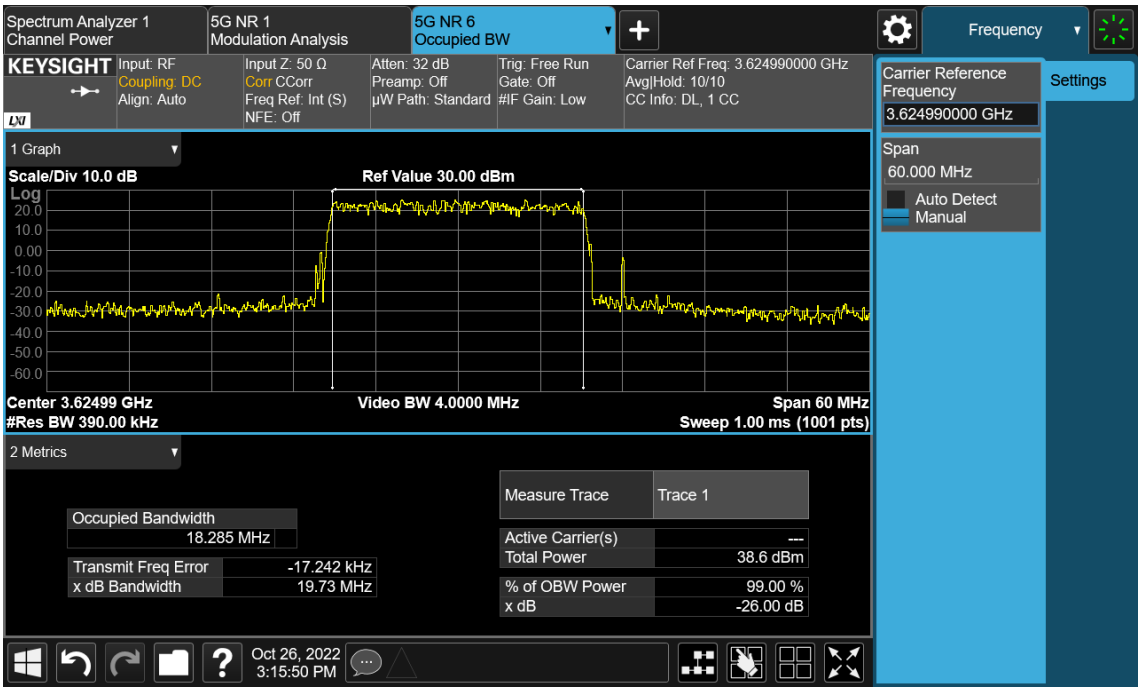
10MHz 256QAM



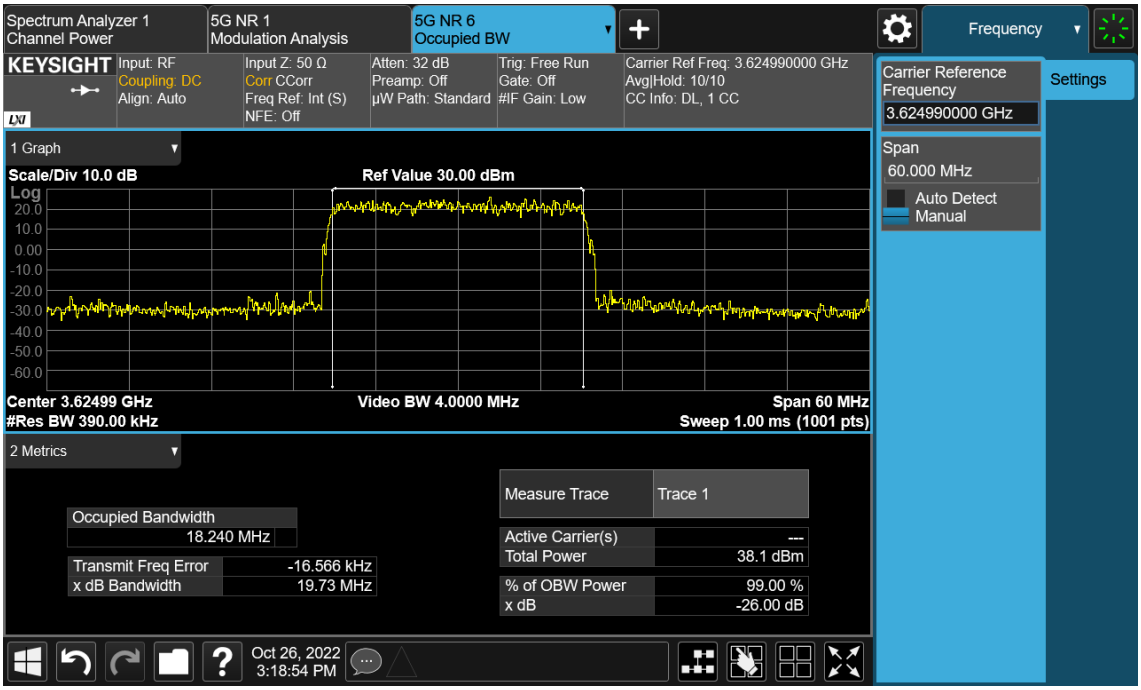
20MHz QPSK



20MHz 64QAM

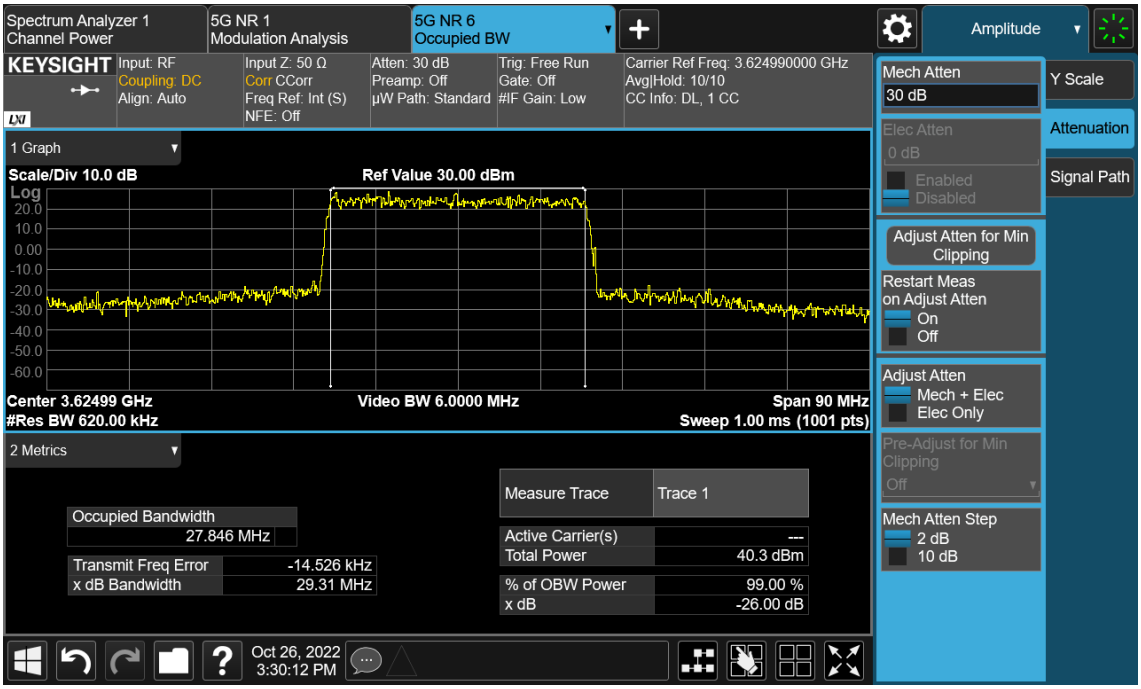


20MHz 256QAM

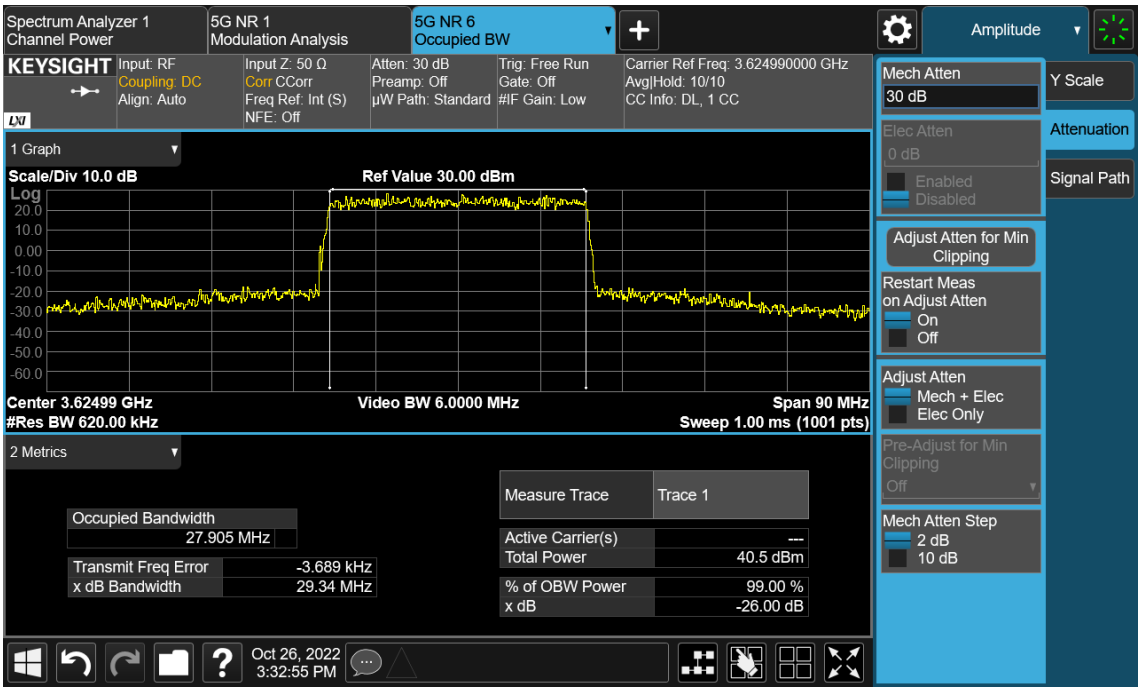


30MHz QPSK

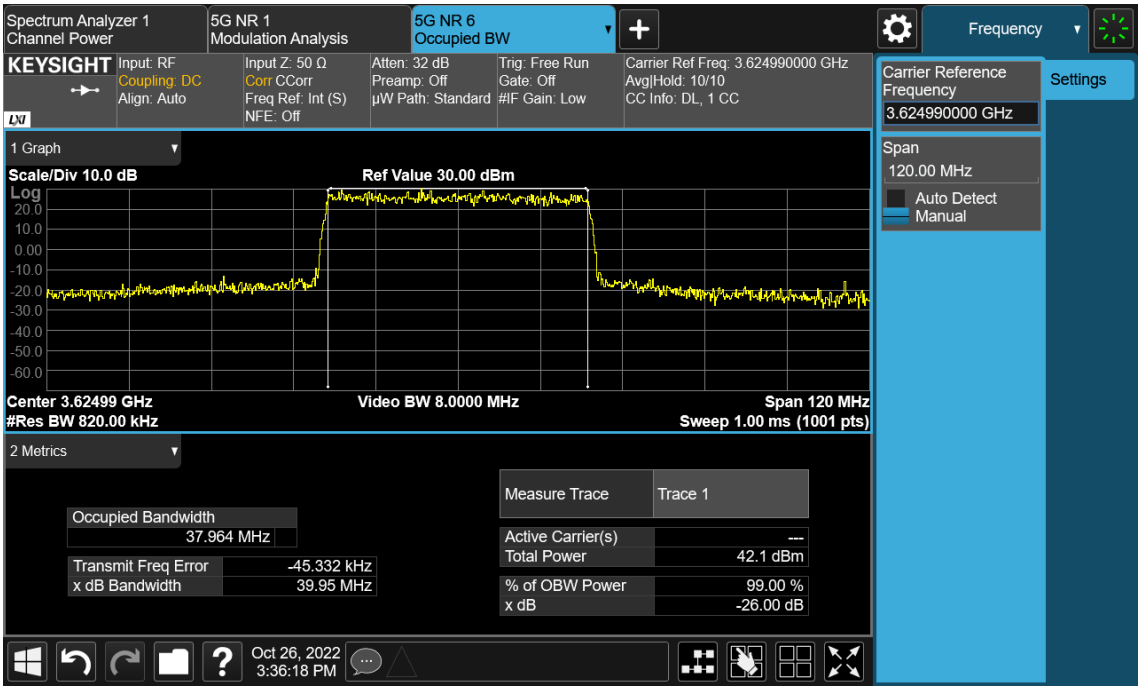
30MHz 64QAM



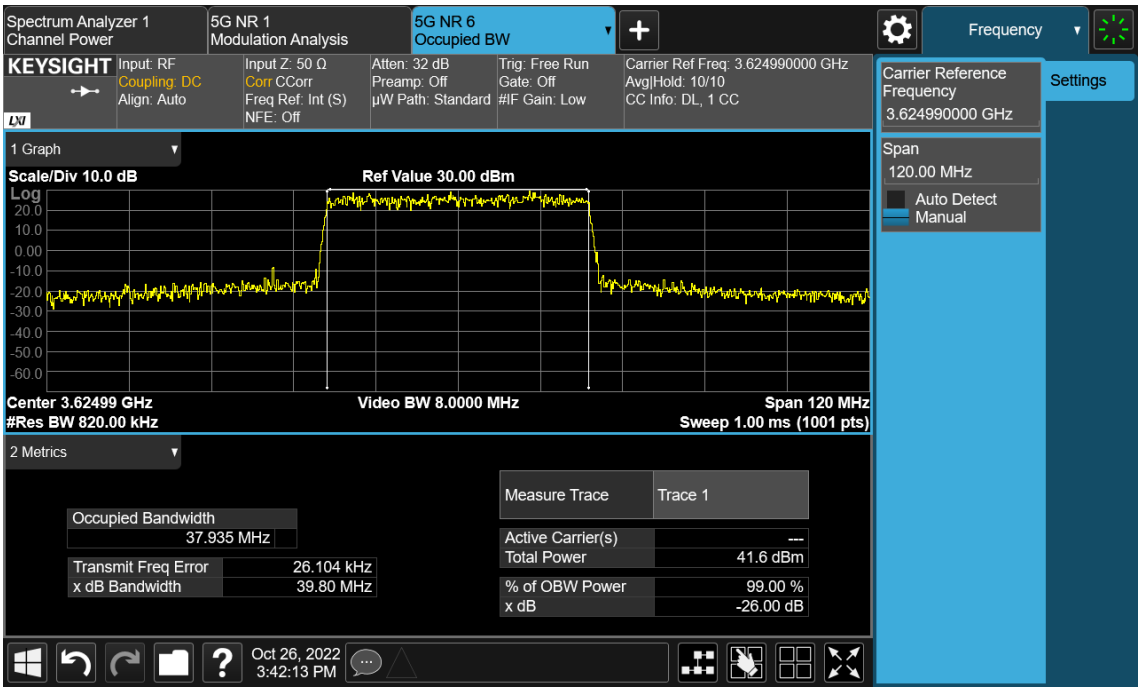
30MHz 256QAM



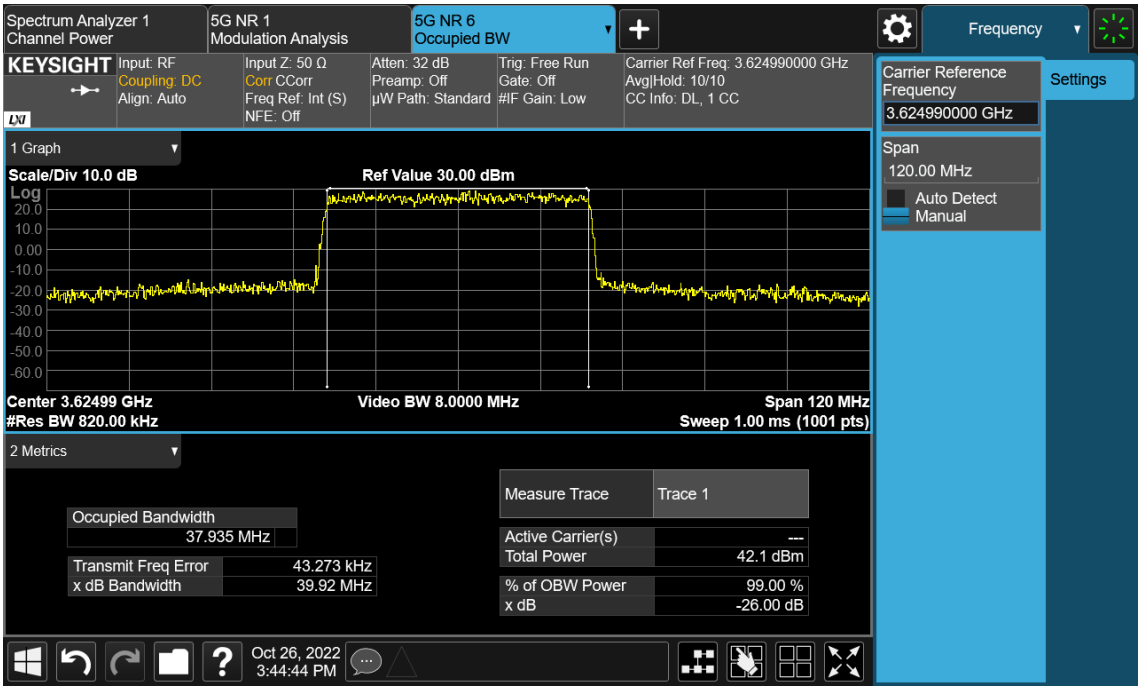
40MHz QPSK



40MHz 64QAM



40MHz 256QAM



A.3 Transmitter unwanted emissions at Band Edge

A.3.1 Reference

FCC CFR 47 Part 96, Clause 96.41(e)
FCC CFR 47 Part 2, Clause 2.1051

A.3.2 Method of measurement

For channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside the fundamental emission bandwidth shall not exceed -13dBm/MHz within 0–10 megahertz above the upper SAS-assigned channel edge and within 0–10megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed -25 dBm/MHz. The conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

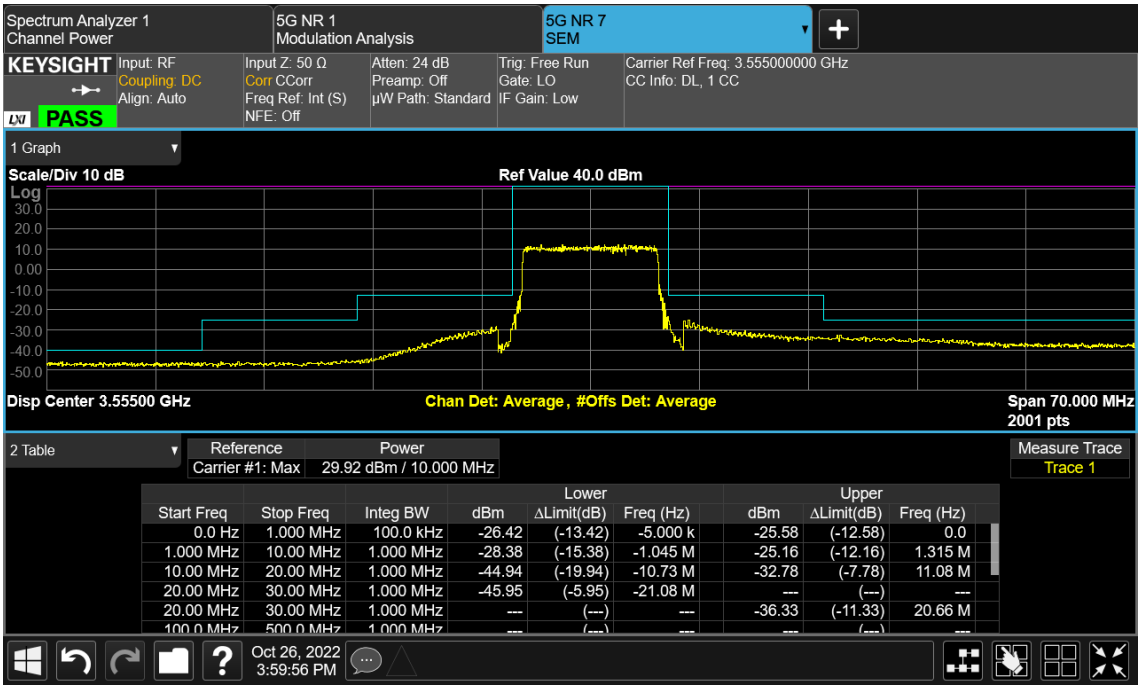
In the 1 megahertz bands immediately outside and adjacent to the licensee's authorized frequency channel, a resolution bandwidth of no less than one percent of the fundamental emission bandwidth may be employed.

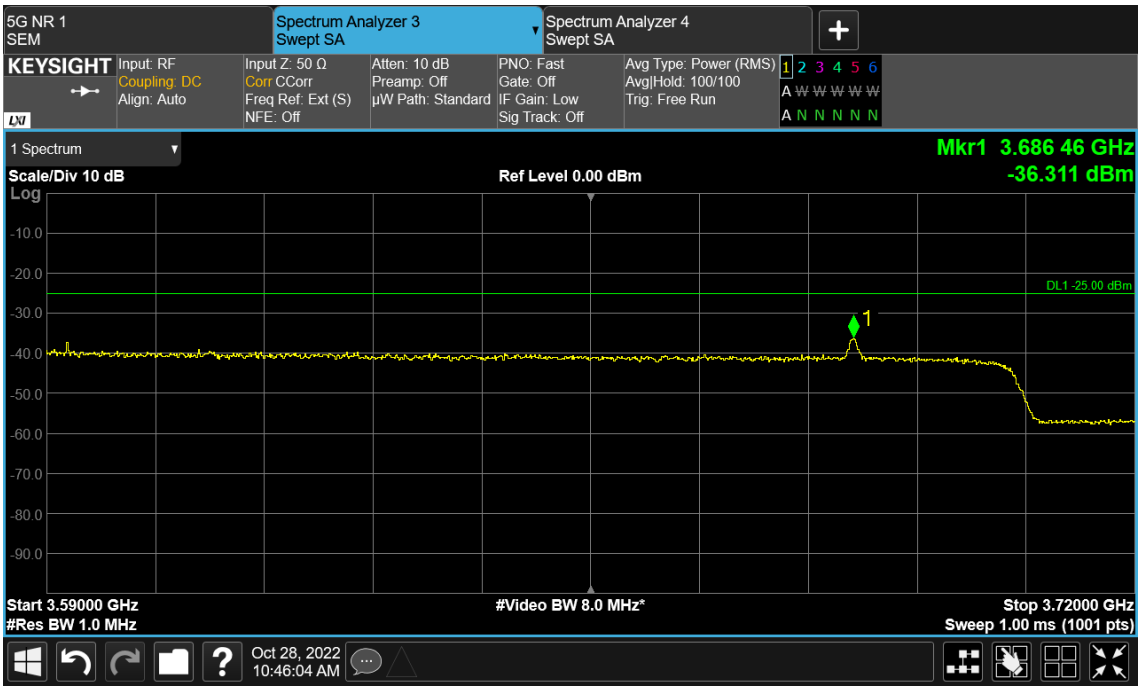
A.3.3 Measurement limit

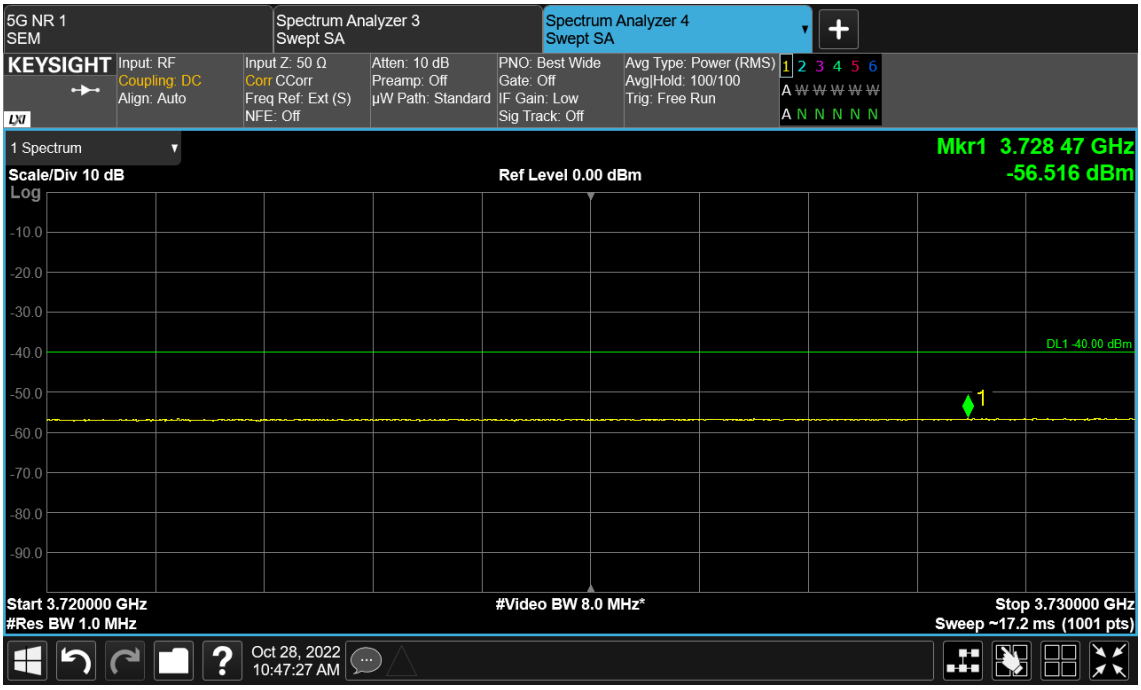
0-10MHz from channel edge: ≤-13dBm/MHz
>10MHz from channel edge: ≤-25dBm/MHz
3530MHz-3540MHz and 3710MHz-3720MHz: ≤-25dBm/MHz
below 3530 MHz and above 3720 MHz: ≤-40dBm/MHz

A.3.4 Measurement result

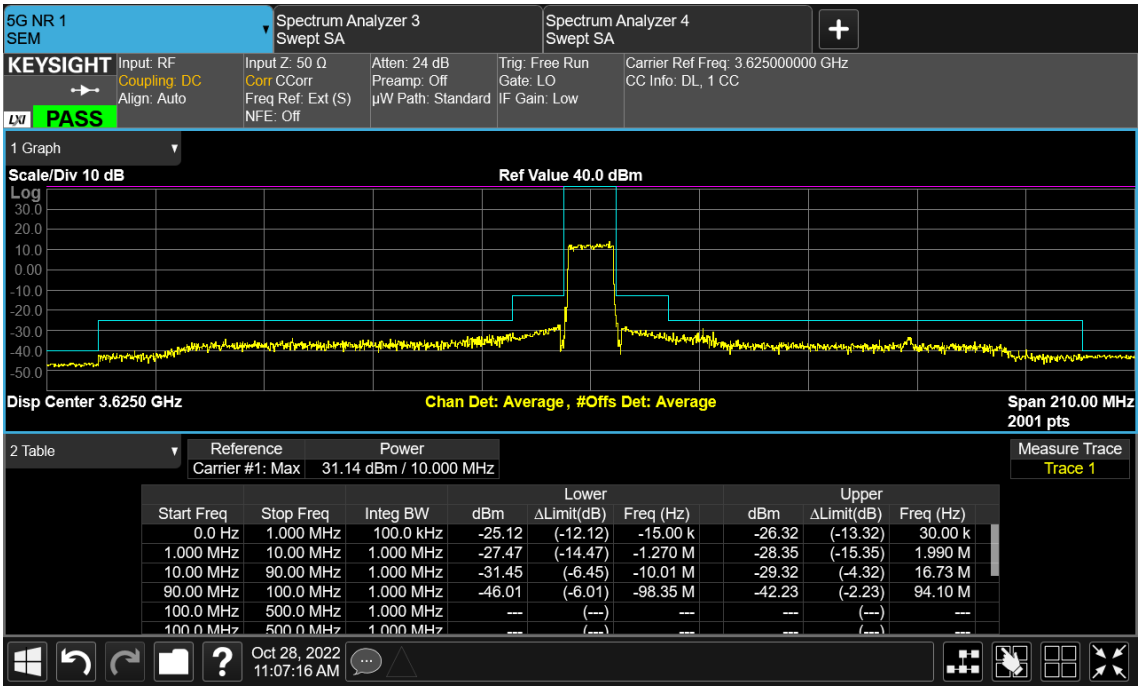
Port0, QPSK, Bottom Channel, 10MHz



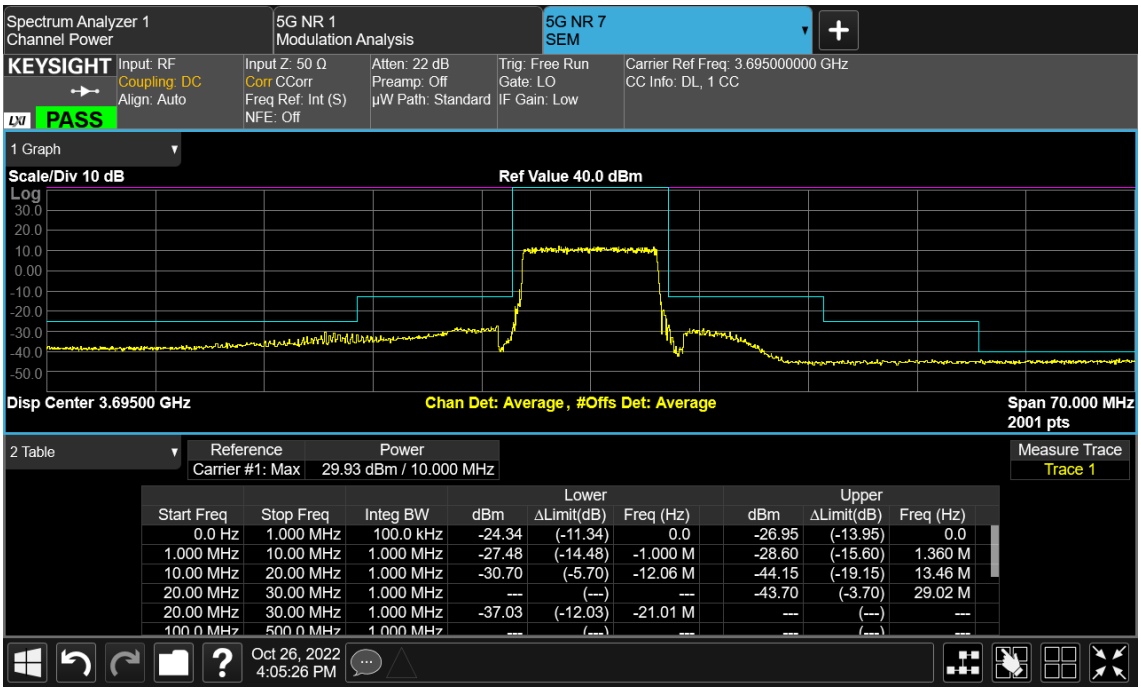


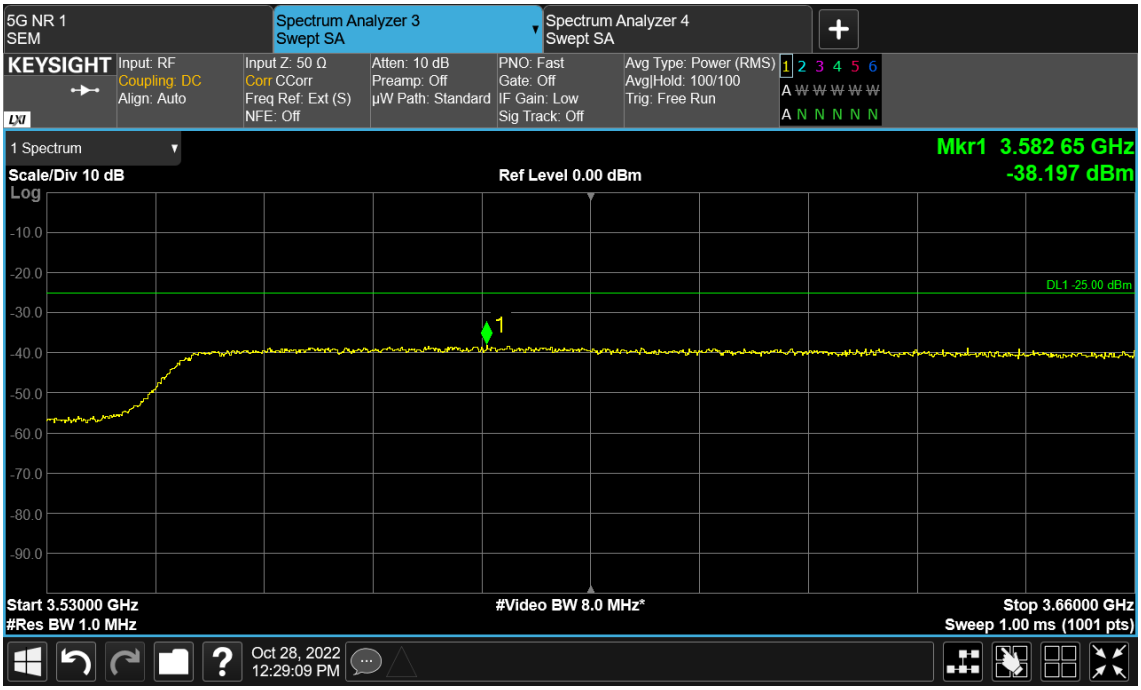


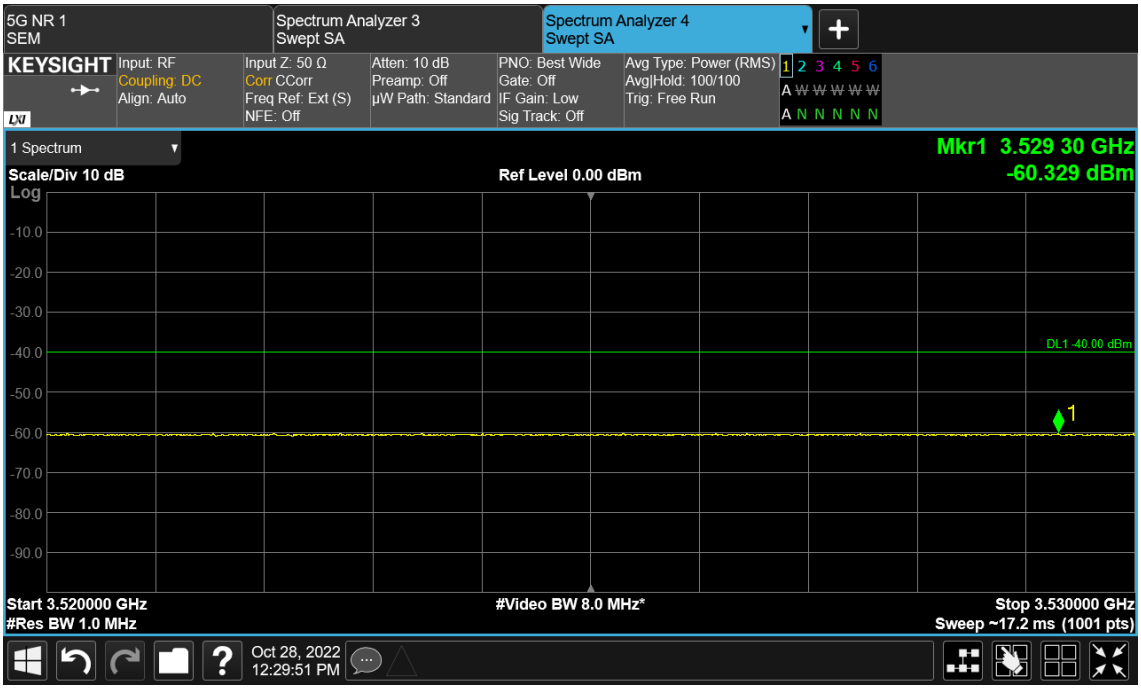
Port0, QPSK, Mid Channel, 10MHz



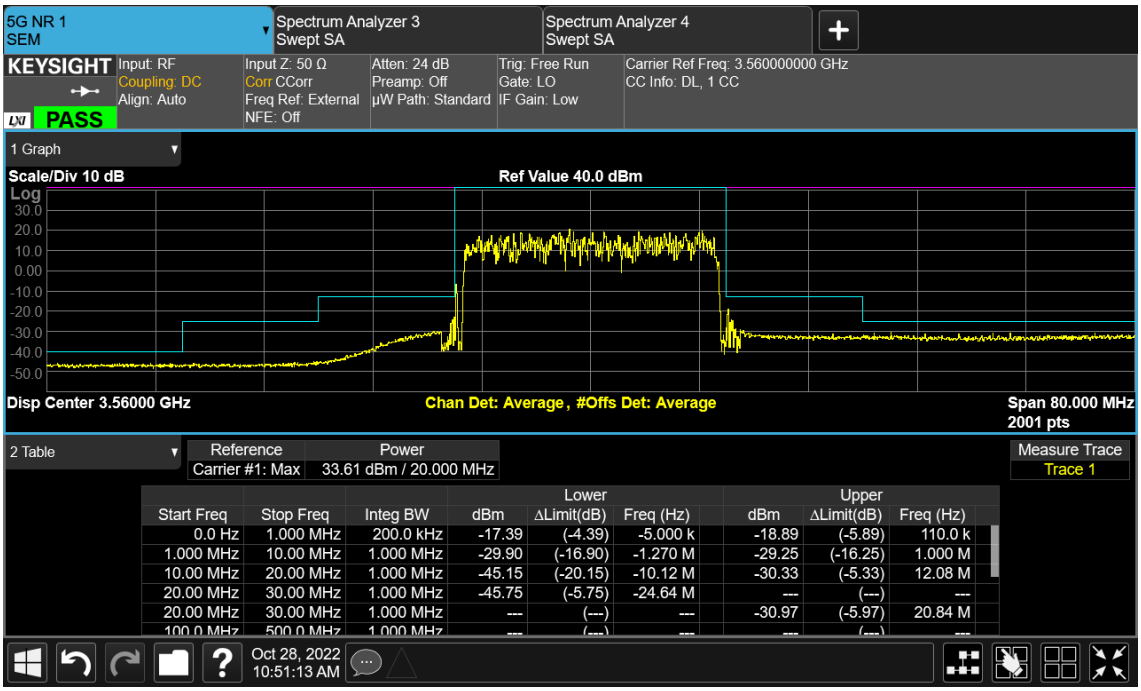
Port0, QPSK, Top Channel, 10MHz

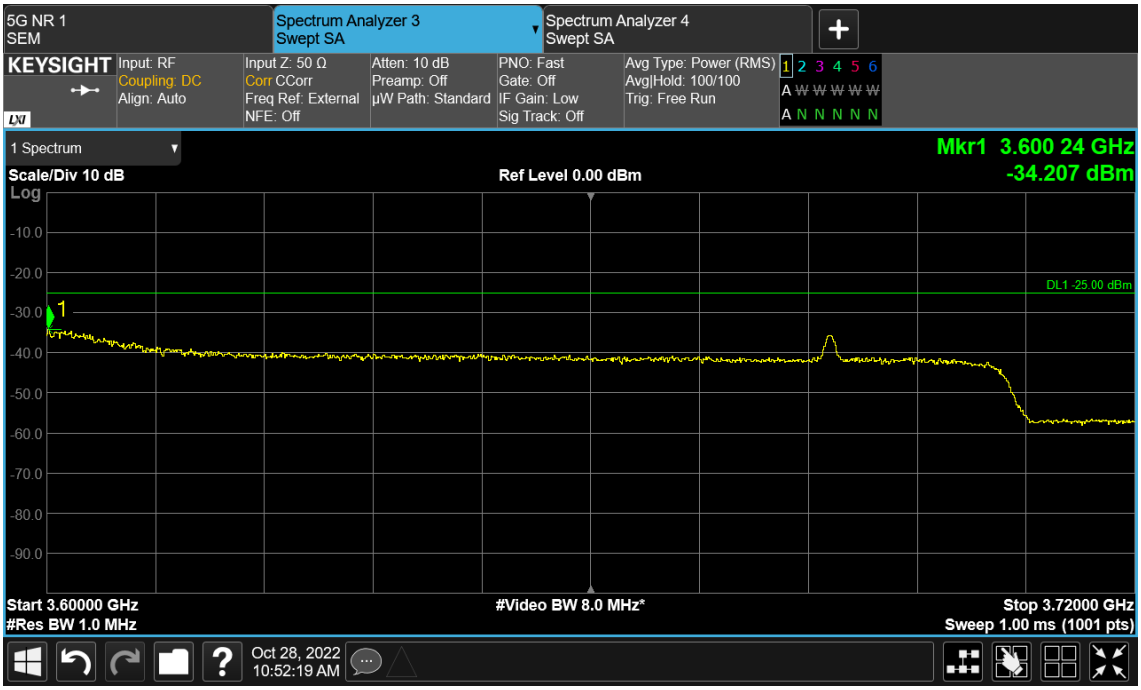


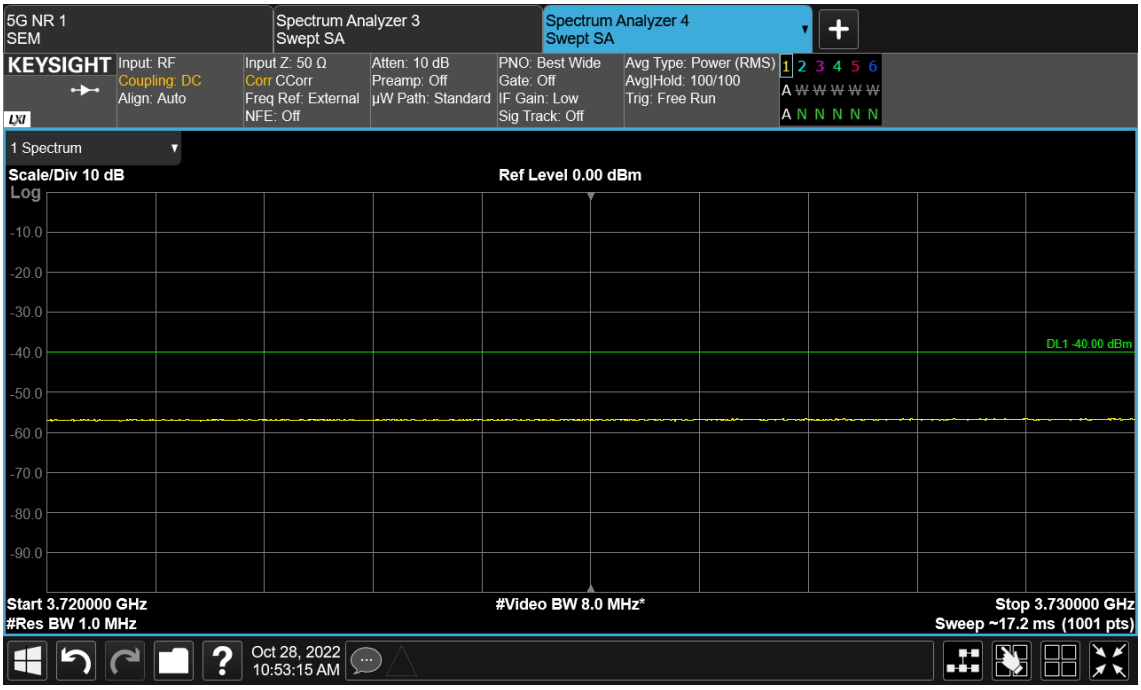




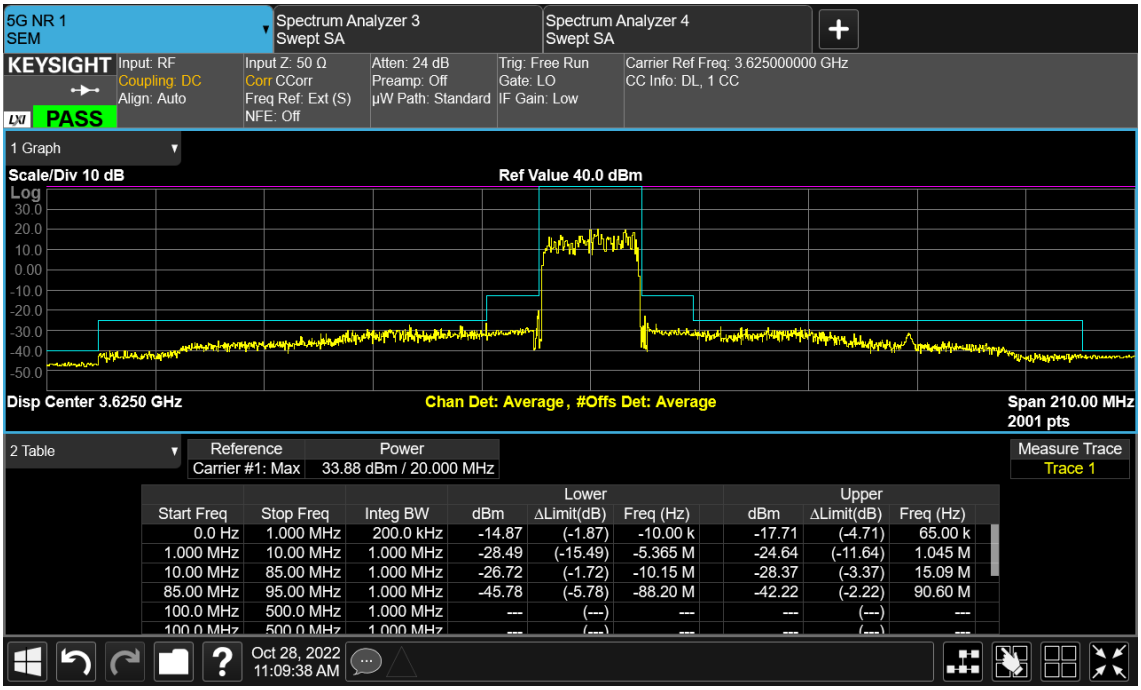
Port0, QPSK, Bottom Channel, 20MHz



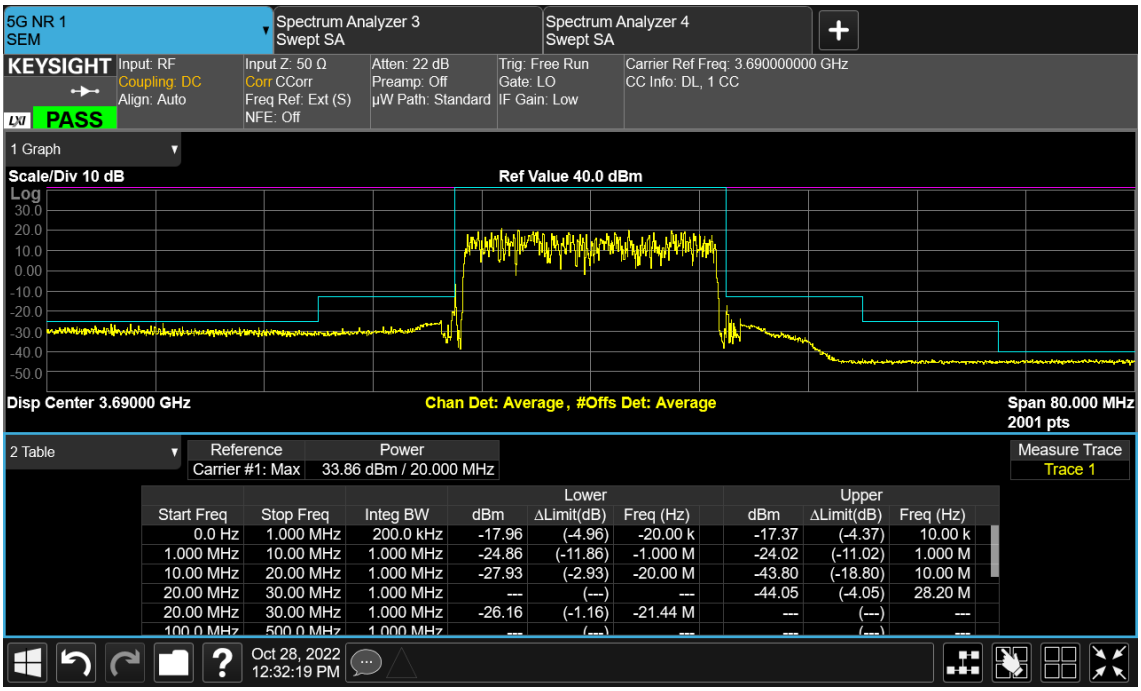


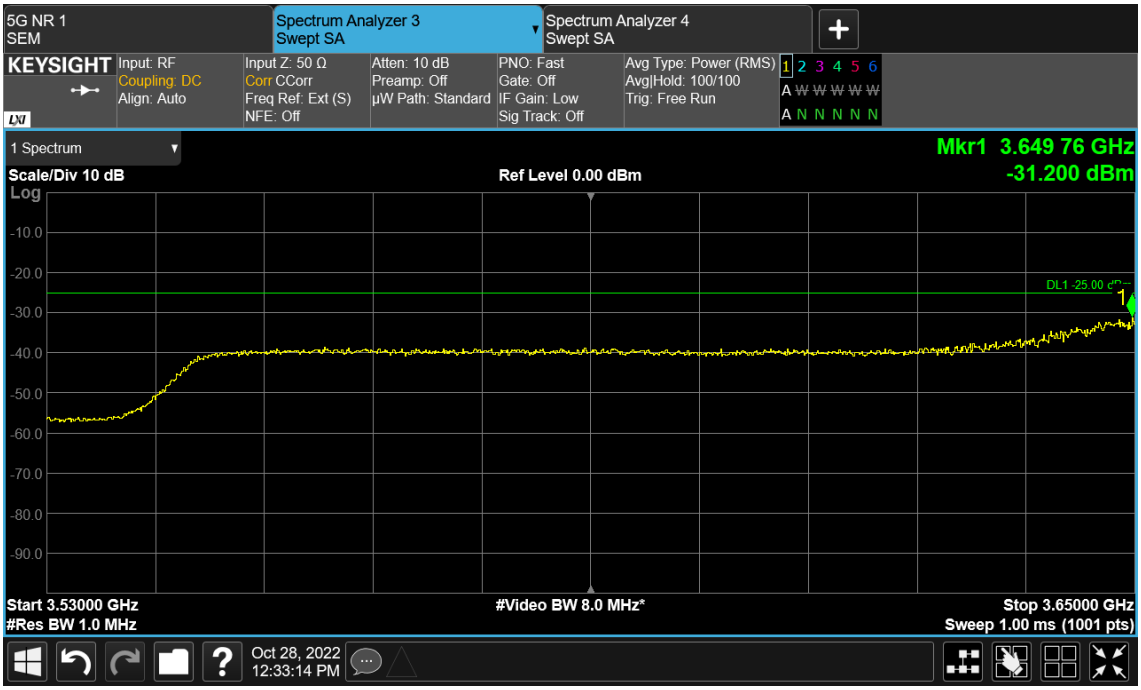


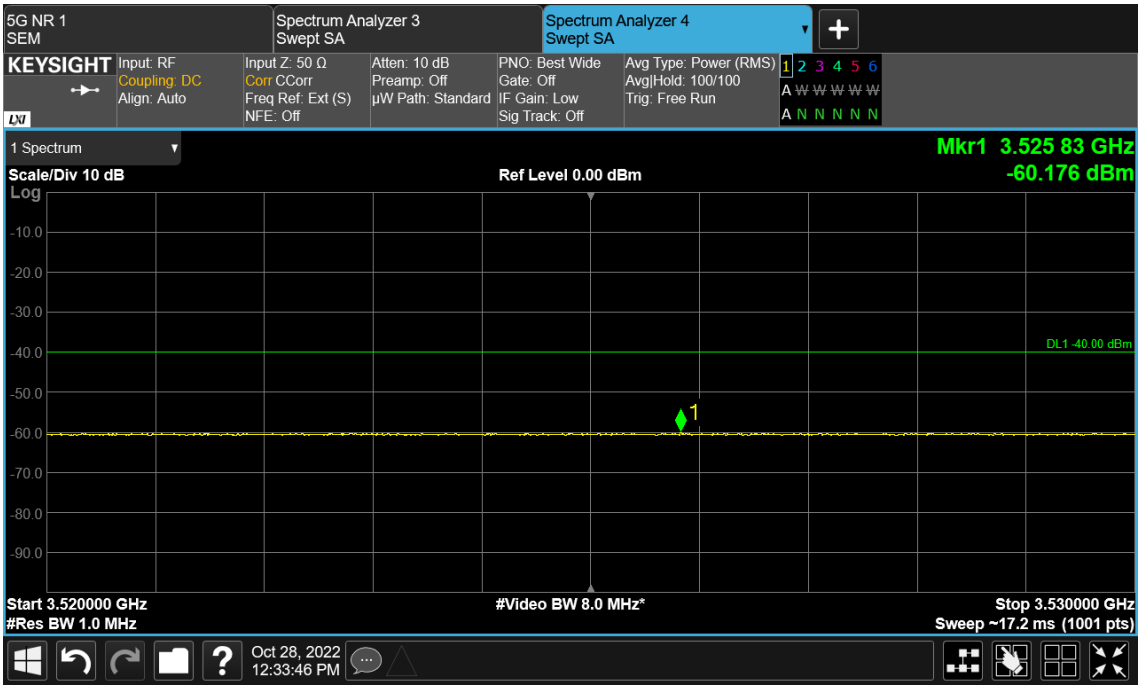
Port0, QPSK, Mid Channel, 20MHz



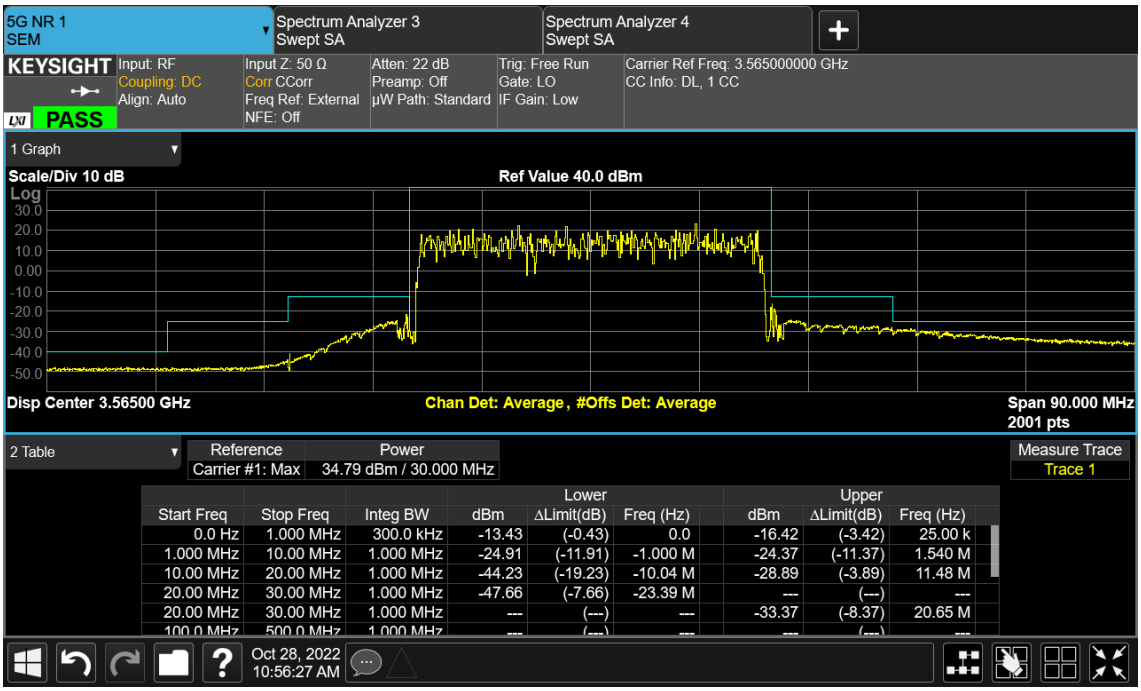
Port0, QPSK, Top Channel, 20MHz

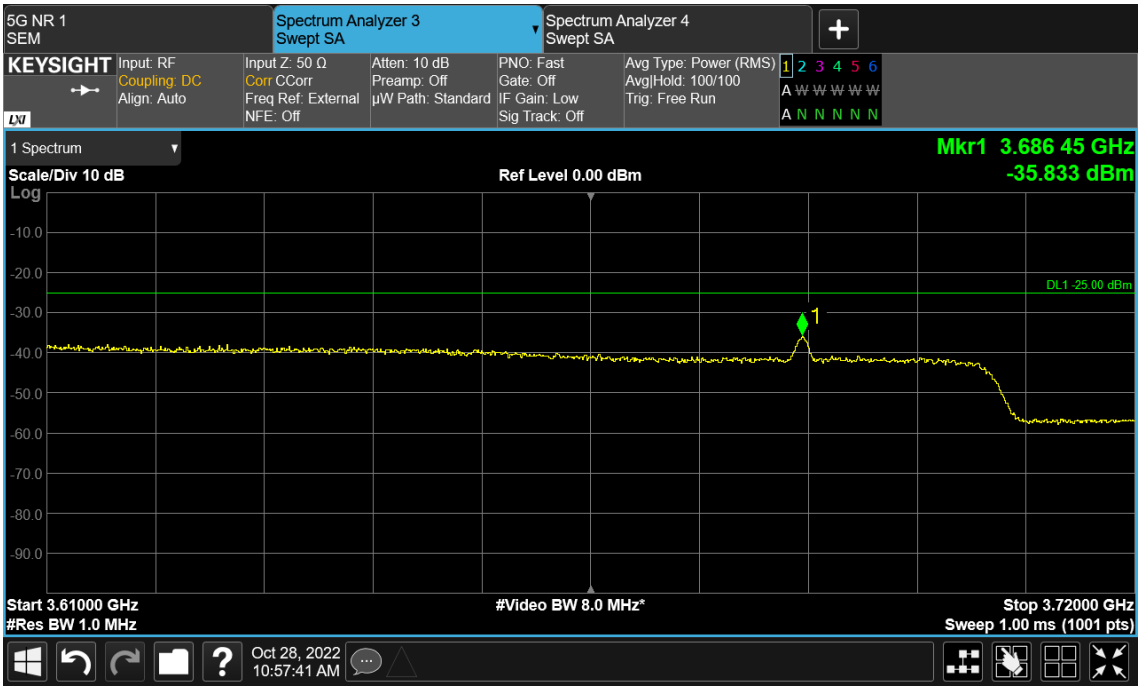


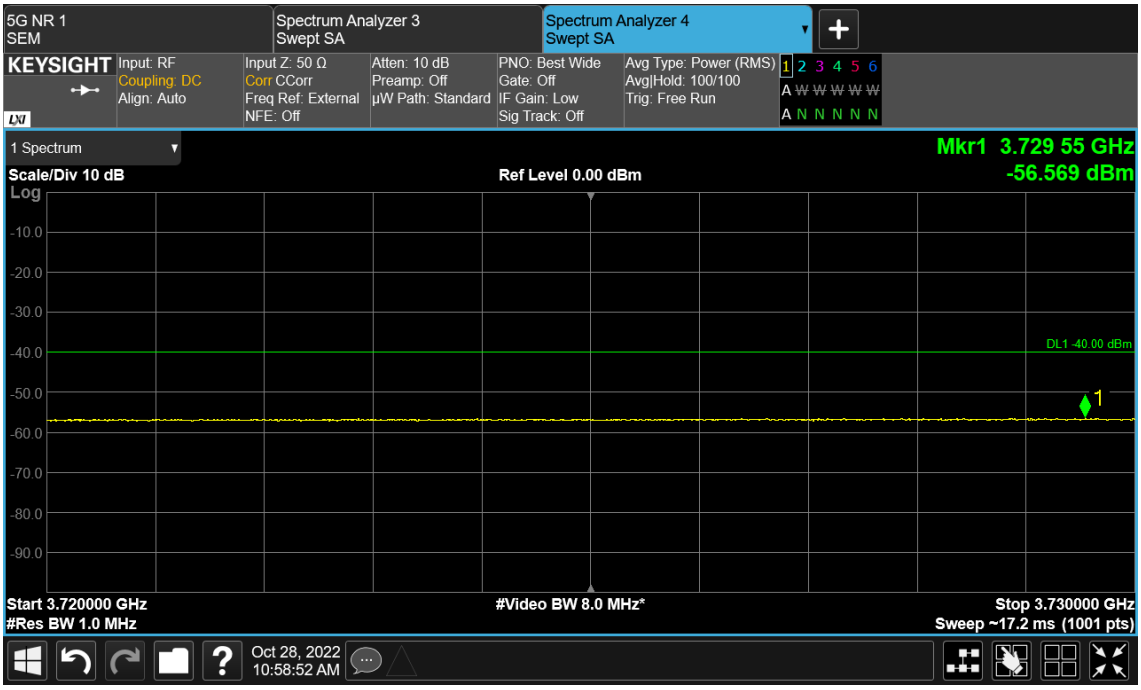




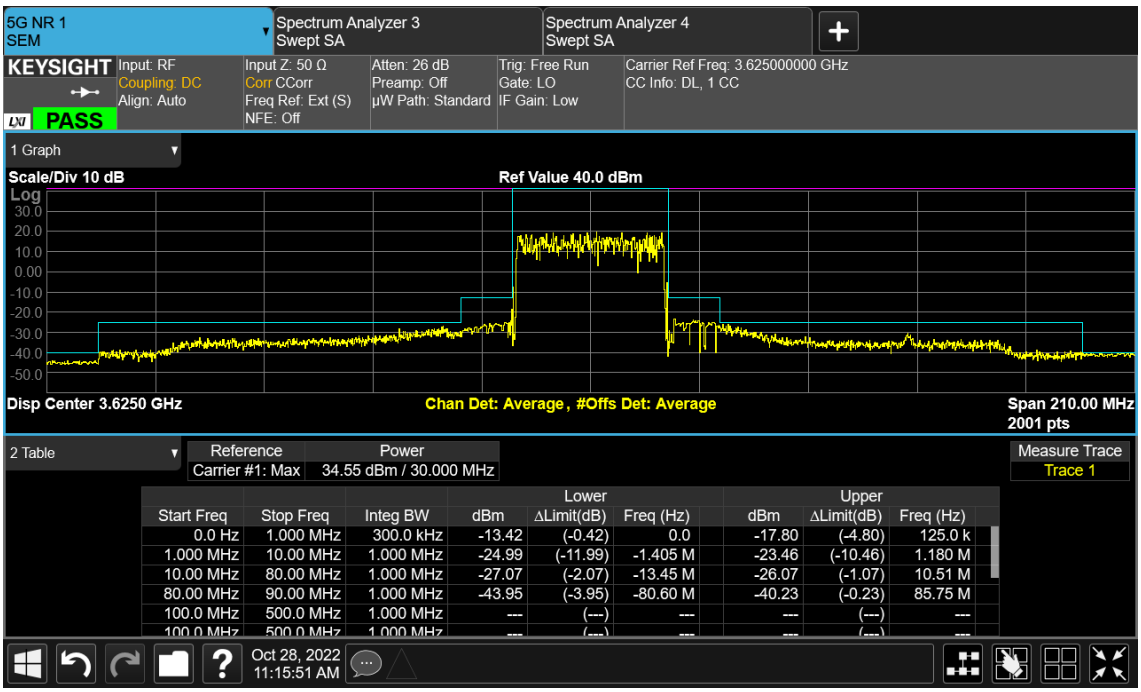
Port0, QPSK, Bottom Channel, 30MHz



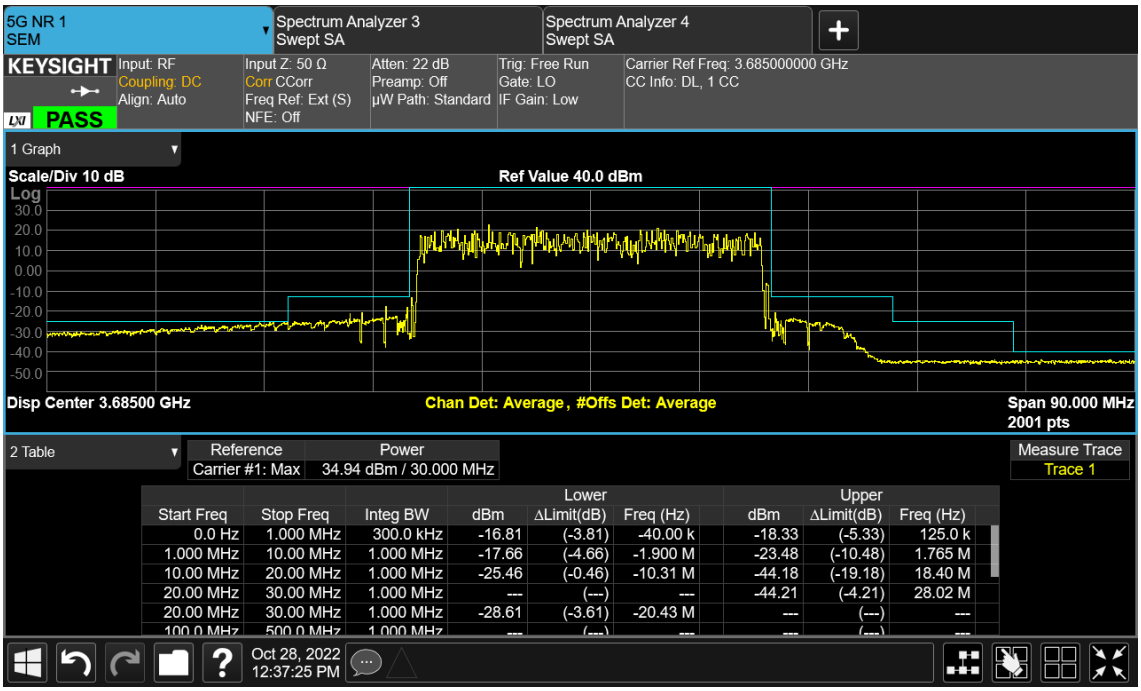


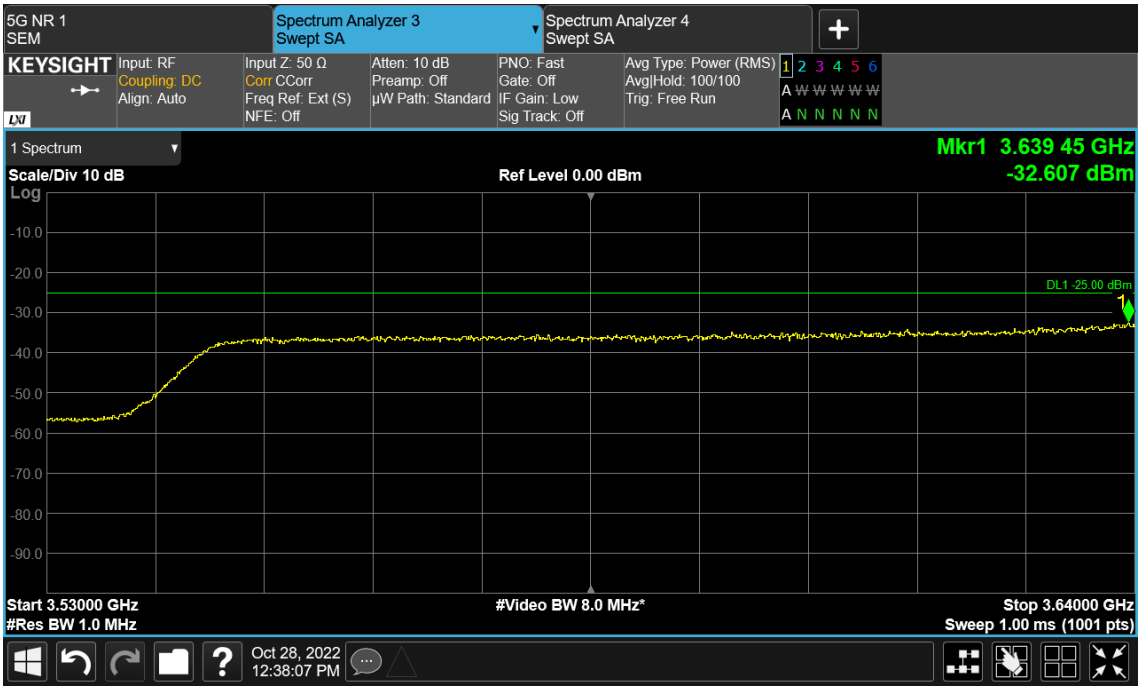


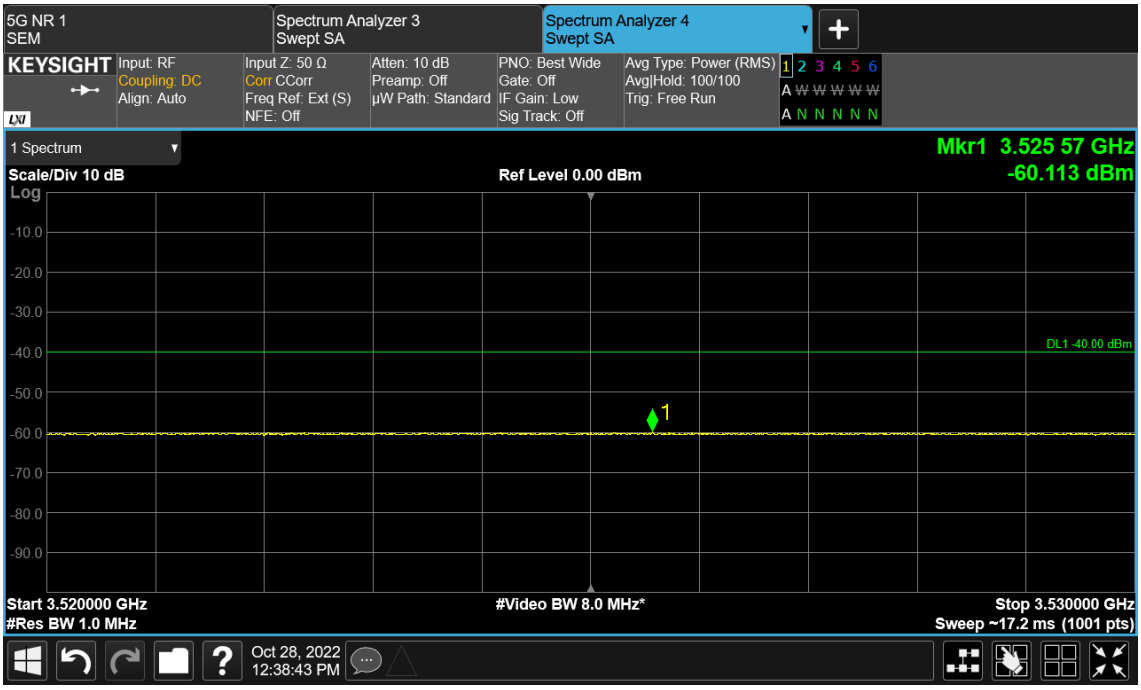
Port0, QPSK, Mid Channel, 30MHz



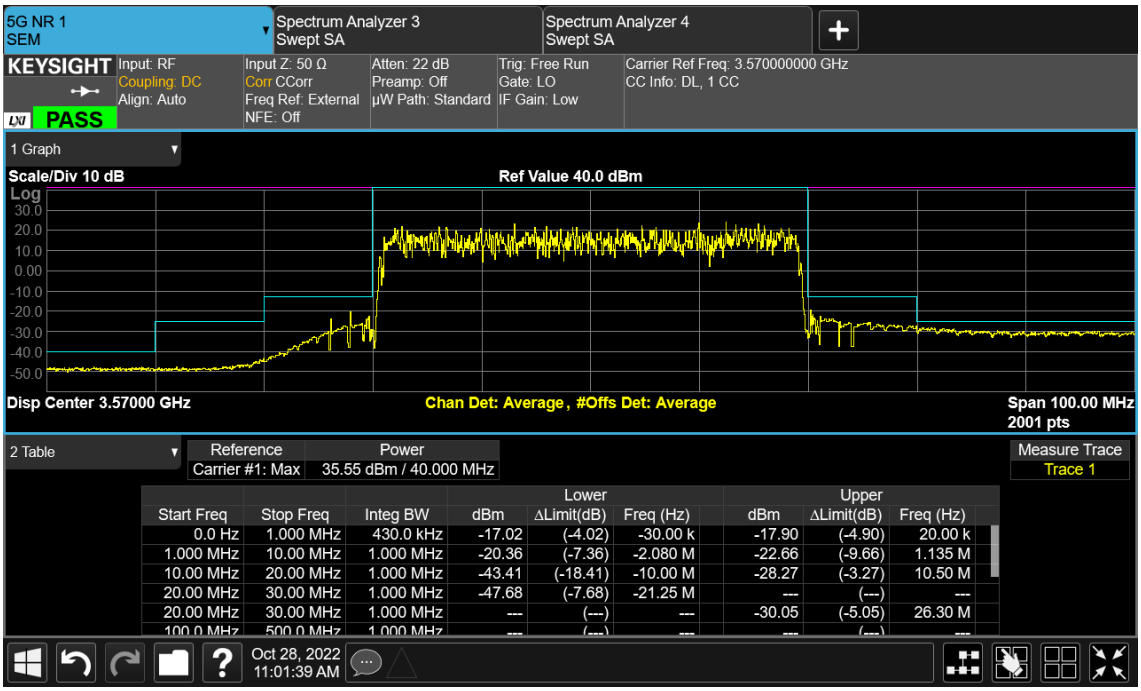
Port0, QPSK, Top Channel, 30MHz

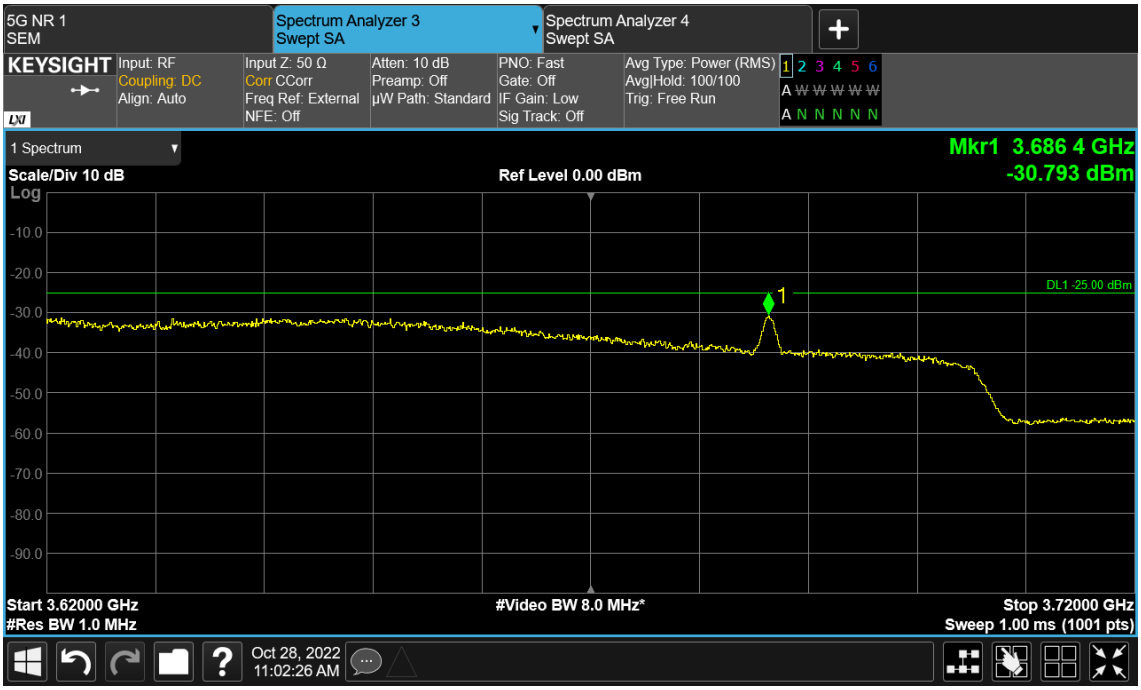


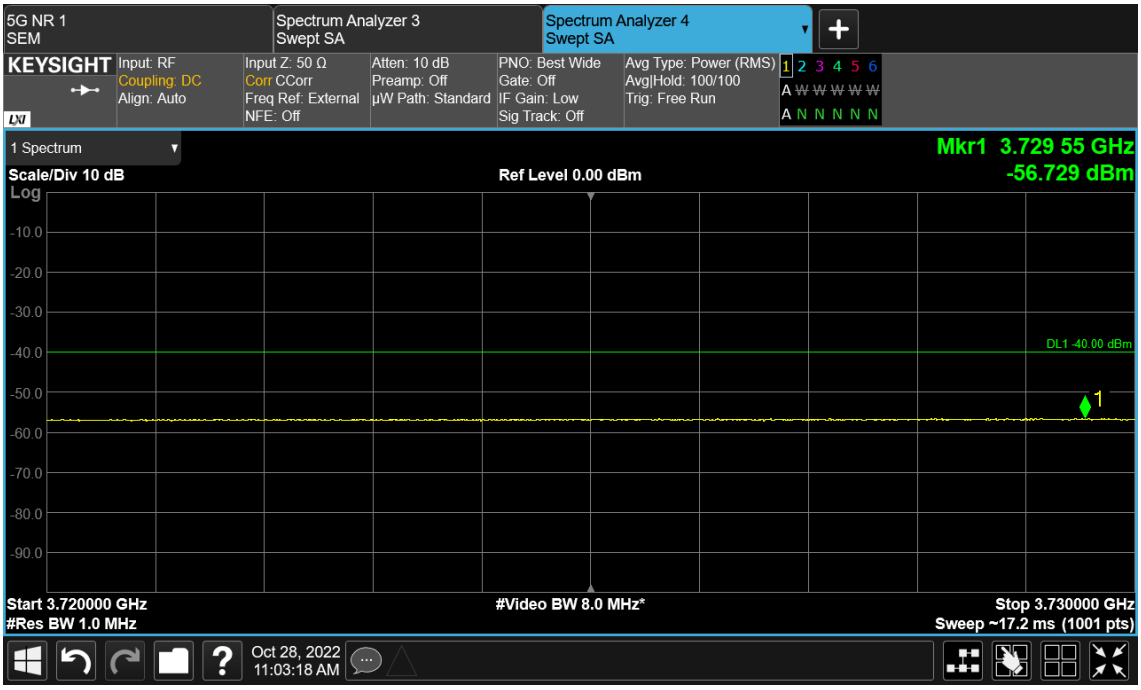




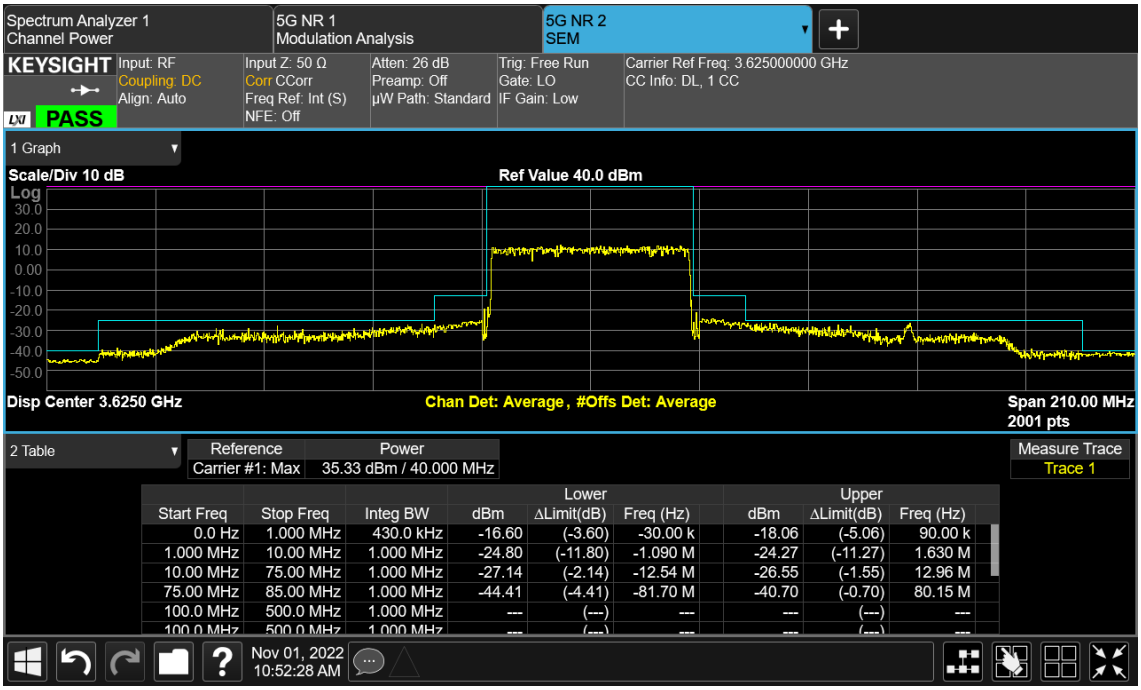
Port0, QPSK, Bottom Channel, 40MHz







Port0, QPSK, Mid Channel, 40MHz



Port0, QPSK, Top Channel, 40MHz