

TEST REPORT

 CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Report No.: CTK-2024-03370 Page (1) / (274) Pages	
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1. Applicant

- Name : SAMSUNG Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea
- Date of Receipt : 2024-11-05

2. Manufacturer

- Name : SAMSUNG Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea

3. Use of Report : For FCC Certification

4. Test Sample / Model: RRU (RF4486) / RF4486-25A

5. Date of Test : 2024-11-07 to 2024-12-07

6. Test Standard(method) used : FCC 47 CFR Part 24, ANSI C63.10-2015

7. Testing Environment: refer to 6 page

8. Test Results : Compliance

9. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

(Address : 5, Dongbu-ro 221beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea)

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This report cannot be reproduced or copied without the written consent of CTK.

Approval	Tested by  Bong-jun Jang: (Signature)	Technical Manager  Young-taek Lee: (Signature)
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Remark. This report is not related to KOLAS accreditation and relevant regulation.

2024-12-11

CTK Co., Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2024-12-11	Issued (CTK-2024-03370)	all

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 CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Report No.: CTK-2024-03370 Page (4) / (274) Pages	
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1. General Product Description

1.1 Applicant Information

Company	SAMSUNG Electronics Co., Ltd.
Contact Point	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea
Contact Person	Name : Jongin Kim E-mail : jered.kim@samsung.com Tel : +82-31-279-3096

1.2 Product Information

FCC ID	A3LRF4486-25A			
Product Description	RRU (RF4486)			
Basic model	RF4486-25A			
Power Source	-48 Vdc			
Device Capabilities	LTE, 5G NR			
Duplex Mode	FDD			
FCC Classification	PCS Licensed Transmitter			
Operating Frequency	Band	Tx(Downlink)	Rx(Uplink)	
	LTE Band 25	1930 MHz to 1995 MHz	1850 MHz to 1915 MHz	
	5G NR n25			
Spectrum Operation	Contiguous, Non-Contiguous			
Multiple Carrier Supported	Maximum 3 Carrier			
Channel Bandwidth	LTE Band 25	Single carrier	5, 10, 15, 20 MHz	
		Multi carrier	5 MHz + 5 MHz, 10 MHz + 20 MHz	
	5G NR n25	Single carrier	5, 10, 15, 20 MHz	
	Multi-RAT 5G NR + LTE	LTE 5 MHz + NR 5 MHz LTE 5 MHz + LTE 10MHz + NR 10 MHz		
Antenna information	Type	☐ Internal antenna ☒ External antenna		
	Number of ports	4 TX / 4 RX ports		
RF Output Power	LTE Band 25	Single carrier	BW 5 MHz : 40 W/path (Total 4 path: 160 W) BW 10 MHz : 80 W/path (Total 4 path: 320 W) BW 15 MHz : 80 W/path (Total 4 path: 320 W) BW 20 MHz : 80 W/path (Total 4 path: 320 W)	
		Multi carrier	Contiguous	BW 5 MHz + 5 MHz : 80 W/path (Total 4 path: 320 W) BW 10 MHz + 20 MHz : 80 W/path (Total 4 path: 320 W)
			Non-Contiguous	BW 5 MHz + 5 MHz : 60 W/path (Total 4 path: 240 W) BW 10 MHz + 20 MHz : 80 W/path (Total 4 path: 320 W)
	5G NR n25	Single carrier	BW 5 MHz : 40 W/path (Total 4 path: 160 W) BW 10 MHz : 80 W/path (Total 4 path: 320 W) BW 15 MHz : 80 W/path (Total 4 path: 320 W) BW 20 MHz : 80 W/path (Total 4 path: 320 W)	
	Multi-RAT 5G NR + LTE	Contiguous	BW LTE 5 MHz + NR 5 MHz : 80 W/path (Total 4 path: 320 W) BW LTE 5 MHz + LTE 10 MHz + NR 10 MHz : 80 W/path (Total 4 path: 320 W)	
		Non-Contiguous	BW LTE 5 MHz + NR 5 MHz : 60 W/path (Total 4 path: 240 W) BW LTE 5 MHz + LTE 10 MHz + NR 10 MHz : 80 W/path (Total 4 path: 320 W)	
Type of Modulation	QPSK, 16QAM, 64QAM, 256QAM			

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Notebook Computer	Samsung Electronics Co., Ltd.	NT550P5C-S66S	JATQ91ID500157W
AC/DC Adapter	Chicony Power Technology	CPA09-004A	AD-6019B
Notebook Computer	Samsung Electronics Co., Ltd.	NT-RC510-S55S	ZZQN93MB100069V
AC/DC Adapter	Chicony Power Technology	CPA09-004A	AD-6019R
Notebook Computer	HP	HP ProBook 455G7	5CD0234DX4
AC/DC Adapter	HP	TPN-CA16	L25298-002

2. Accreditations

2.1 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	CN : 8737A CAB ID : KR0025
KOREA	NRRA	KR0025

2.2 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

3. Test Specifications

3.1 Standards

Section in FCC	Requirement(s)	Status (Note 1)	Test Condition
2.1046	Conducted Average Output Power	C	Conducted
2.1049	Occupied bandwidth	C	
2.1046, 24.232	Equivalent Isotropic Radiated Power (Power Spectral Density)	C	
2.1046, 24.232	Peak-to-average power ratio	C	
2.1051, 24.238	Band Edge Emissions at Antenna Terminal	C	
2.1051, 24.238	Spurious and Harmonic Emissions at Antenna Terminal	C	
2.1053, 24.238	Radiated unwanted emission	C	Radiated
2.1055, 24.235	Frequency Stability	C	Conducted
<u>Note 1:</u> C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable			
<u>Note 2:</u> The data in this test report are traceable to the national or international standards.			
<u>Note 3:</u> The sample was tested according to the following specification: FCC 47 CFR Part 24, ANSI C63.10 2015			
<u>Note 4:</u> The tests were performed according to the method of measurements prescribed in KDB No.662911, No.971168, ANSI C63.10-2015			

3.2 Testing Environment

Test Item		Test Date	Temperature (℃)	Relative Humidity (%)
Conducted Average Output Power		2024-11-07 ~ 2024-12-04	23~25	48~66
Occupied bandwidth		2024-11-07 ~ 2024-12-04	23~25	48~66
Equivalent Isotropic Radiated Power (Power Spectral Density)		2024-11-07 ~ 2024-12-04	23~25	48~66
Peak-to-average power ratio		2024-11-07 ~ 2024-12-04	23~25	48~66
Band Edge Emissions at Antenna Terminal		2024-11-07 ~ 2024-12-05	23~25	48~50
Spurious and Harmonic Emissions at Antenna Terminal		2024-11-07 ~ 2024-12-05	23~25	47~54
Radiated unwanted emission	1) 30 MHz to 1 GHz	2024-11-30	20	55
	2) 1 GHz to 18 GHz	2024-11-28 ~	22~23	50~51
	3) 18 GHz to 27GHz	2024-11-29		
Frequency Stability		2024-12-07	-30~50	-

3.3 Mode of operation during the test

The EUT is operated in a manner representative of the typical of the equipments. During at testing, system components were manipulated within the confines of typical usage to maximize each emission. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.

Operating Frequency		
LTE Band 25	TX (Downlink)	1 930 MHz to 1 995 MHz
5G NR n25	RX (Uplink)	1 850 MHz to 1 915 MHz

Description Test Modes					
RF Bandwidth positions			Carrier Configuration		
			1 st Carrier	2 nd Carrier	3 rd Carrier
LTE 1C 5 MHz	-	lowest	1 932.5 MHz		
		Middle	1 962.5 MHz		
		highest	1 992.5 MHz		
LTE 1C 10 MHz	-	lowest	1 935 MHz		
		Middle	1 962.5 MHz		
		highest	1 990 MHz		
LTE 1C 15 MHz	-	lowest	1 937.5 MHz		
		Middle	1 962.5 MHz		
		highest	1 987.5 MHz		
LTE 1C 20 MHz	-	lowest	1 940 MHz		
		Middle	1 962.5 MHz		
		highest	1 985 MHz		
LTE 2C 5 MHz + 5 MHz	Contiguous	lowest	1 932.5 MHz	1 937.5 MHz	
		Middle	1 960 MHz	1 965 MHz	
		highest	1 987.5 MHz	1 992.5 MHz	
	Non-Contiguous	lowest	1 932.5 MHz	1 977.5 MHz	
		Middle	1 940 MHz	1 985 MHz	
		highest	1 947.5 MHz	1 992.5 MHz	
LTE 2C 10 MHz + 20 MHz	Contiguous	lowest	1 935 MHz	1 950 MHz	
		Middle	1 952.5 MHz	1 967.5 MHz	
		highest	1 970 MHz	1 985 MHz	
	Non-Contiguous	lowest	1 935 MHz	1 970 MHz	
		Middle	1 942.5 MHz	1 977.5 MHz	
		highest	1 950 MHz	1 985 MHz	

Description Test Modes						
RF Bandwidth positions			Carrier Configuration			
			1 st Carrier	2 nd Carrier	3 rd Carrier	
NR 1C 5 MHz	-	lowest	1 932.5 MHz			
		Middle	1 962.5 MHz			
		highest	1 992.5 MHz			
NR 1C 10 MHz	-	lowest	1 935 MHz			
		Middle	1 962.5 MHz			
		highest	1 990 MHz			
NR 1C 15 MHz	-	lowest	1 937.5 MHz			
		Middle	1 962.5 MHz			
		highest	1 987.5 MHz			
NR 1C 20 MHz	-	lowest	1 940 MHz			
		Middle	1 962.5 MHz			
		highest	1 985 MHz			
LTE 1C 5 MHz + NR 1C 5 MHz	Contiguous	lowest	1 932.5 MHz	1 937.5 MHz		
		Middle	1 960 MHz	1 965 MHz		
		highest	1 987.5 MHz	1 992.5 MHz		
	Non-Contiguous	lowest	1 932.5 MHz	1 977.5 MHz		
		Middle	1 940 MHz	1 985 MHz		
		highest	1 947.5 MHz	1 992.5 MHz		
LTE 2C 5 MHz + 10 MHz + NR 1C 10 MHz	Contiguous	lowest	1 932.5 MHz	1 940 MHz	1 950 MHz	
		Middle	1 952.5 MHz	1 960 MHz	1 970 MHz	
		highest	1 972.5 MHz	1 980 MHz	1 990 MHz	
	Non-Contiguous	lowest	1 932.5 MHz	1 940 MHz	1 975 MHz	
		Middle	1 940 MHz	1 947.5 MHz	1 982.5 MHz	
		highest	1 947.5 MHz	1 955 MHz	1 990 MHz	

EUT Test Overview					
Mode	Operating Frequency	Total Power		Emission Designator	Modulation
		*Max Power (W)	Max Power (dBm)		
LTE 1C 5 MHz	Tx(Downlink) 1930 MHz to 1995 MHz & Rx(Uplink) 1850 MHz to 1915 MHz	151.14	51.79	4M51G7D	QPSK
		146.34	51.65	4M49W7D	16QAM
		148.63	51.72	4M51W7D	64QAM
		149.14	51.74	4M51W7D	256QAM
LTE 1C 10 MHz		320.17	55.05	9M04G7D	QPSK
		317.17	55.01	9M02W7D	16QAM
		318.43	55.03	9M04W7D	64QAM
		322.44	55.08	9M01W7D	256QAM
LTE 1C 15 MHz		325.82	55.13	13M5G7D	QPSK
		324.37	55.11	13M6W7D	16QAM
		325.67	55.13	13M5W7D	64QAM
		323.49	55.10	13M5W7D	256QAM
LTE 1C 20 MHz		310.11	54.92	18M0G7D	QPSK
		291.33	54.64	18M0W7D	16QAM
		306.72	54.87	18M0W7D	64QAM
		309.89	54.91	18M0W7D	256QAM
LTE 2C 5 MHz + 5 MHz		296.77	54.72	9M50G7D	QPSK
		296.24	54.72	9M44W7D	16QAM
		296.60	54.72	9M47W7D	64QAM
		305.97	54.86	9M47W7D	256QAM
LTE 2C 10 MHz + 20 MHz		302.97	54.81	28M5G7D	QPSK
		298.98	54.76	28M5W7D	16QAM
		301.58	54.79	28M5W7D	64QAM
		302.45	54.81	28M5W7D	256QAM
NR 1C 5 MHz		154.38	51.89	4M53G7D	QPSK
		151.92	51.82	4M50W7D	16QAM
		150.43	51.77	4M51W7D	64QAM
		144.83	51.61	4M51W7D	256QAM
NR 1C 10 MHz		306.88	54.87	9M33G7D	QPSK
		307.95	54.88	9M34W7D	16QAM
		309.90	54.91	9M34W7D	64QAM
		306.83	54.87	9M35W7D	256QAM
NR 1C 15 MHz		319.32	55.04	14M2G7D	QPSK
		328.83	55.17	14M2W7D	16QAM
		327.11	55.15	14M2W7D	64QAM
		328.68	55.17	14M2W7D	256QAM
NR 1C 20 MHz		322.77	55.09	19M0G7D	QPSK
		319.15	55.04	19M0W7D	16QAM
		318.02	55.02	19M0W7D	64QAM
		317.86	55.02	19M0W7D	256QAM
LTE 1C 5 MHz + NR 1C 5 MHz		276.97	54.42	9M48G7D	QPSK
		278.25	54.44	9M46W7D	16QAM
		268.91	54.30	9M48W7D	64QAM
		277.78	54.44	9M48W7D	256QAM
LTE 2C 5 MHz + 10 MHz + NR 1C 10 MHz		275.07	54.39	24M3G7D	QPSK
		275.22	54.40	24M3W7D	16QAM
		275.53	54.40	24M3W7D	64QAM
		275.69	54.40	24M4W7D	256QAM

* The Max Power(W) values shown in the table above are the sum of the output power of all antenna ports MIMO.

3.4 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.
 Coverage factor $k = 2$, Confidence levels of 95 %

Description	Uncertainty
Conducted Power Measurement and EIRP	1.5 dB (C.L. : Approx. 95%, $k = 2$)
Occupied bandwidth	0.1 MHz (C.L. : Approx. 95%, $k = 2$)
Peak-to-average power ratio	1.0 dB (C.L. : Approx. 95%, $k = 2$)
Band Edge Emissions at Antenna Terminal	3.0 dB (C.L. : Approx. 95%, $k = 2$)
Spurious and Harmonic Emissions at Antenna Terminal	3.0 dB (C.L. : Approx. 95%, $k = 2$)
Radiated Emissions ($f \leq 1$ GHz)	3.88 dB (C.L. : Approx. 95%, $k = 2$)
Radiated Emissions ($f > 1$ GHz)	4.50 dB (C.L. : Approx. 95%, $k = 2$)
Frequency Stability	0.1 kHz (C.L. : Approx. 95%, $k = 2$)

3.5 Test Software

Conducted Test	Ics Pro Ver. 7.0.3
Radiated Test	EP5RE Ver. 6.0.1.0, ES10 Ver. 10.001

4. Technical Characteristic Test

4.1 Occupied Bandwidth

Test Overview :

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

Test Procedures :

ANSI C63.26-2015 – Section 5.4.3
 KDB 971168 D01 v03r01 – Section 4.2

Test Settings :

Center frequency = the highest, middle and the lowest channels

- | | |
|--------------------------------------|----------------------------|
| a) RBW = 1 ~ 5 % of the expected OBW | b) VBW $\geq 3 \times$ RBW |
| c) Detector = peak | d) Trace mode = Max hold |
| e) Sweep = auto couple | |
| f) Allow trace to fully stabilize | |

Test Notes :

1. All modes of operation were investigated and the worst case configuration results are reported in this section.
2. The port with widest bandwidth i.e. worst case port per modulation has been highlighted in the following occupied bandwidth tables.

Limit :

N/A

All modes of operation were investigated and the worst case configuration results are reported in this section.

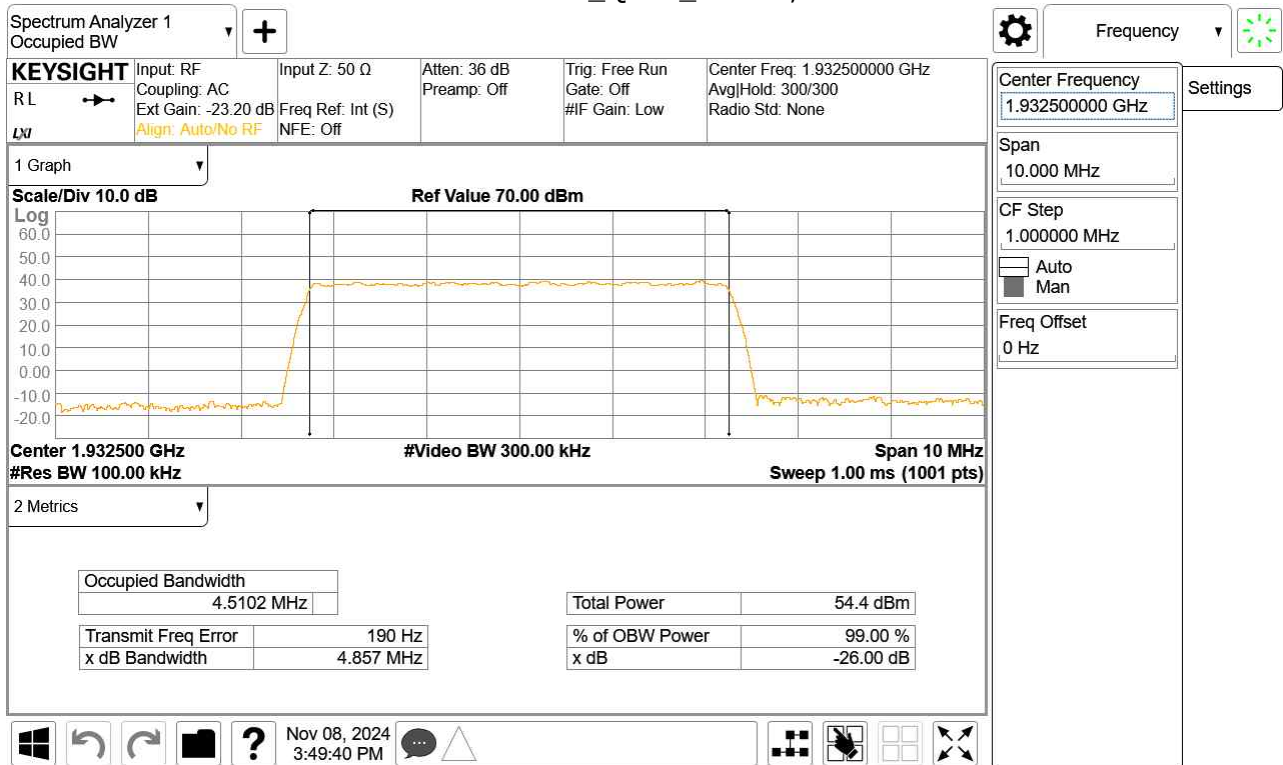
Test Data :

Test mode : LTE 1C 5 MHz

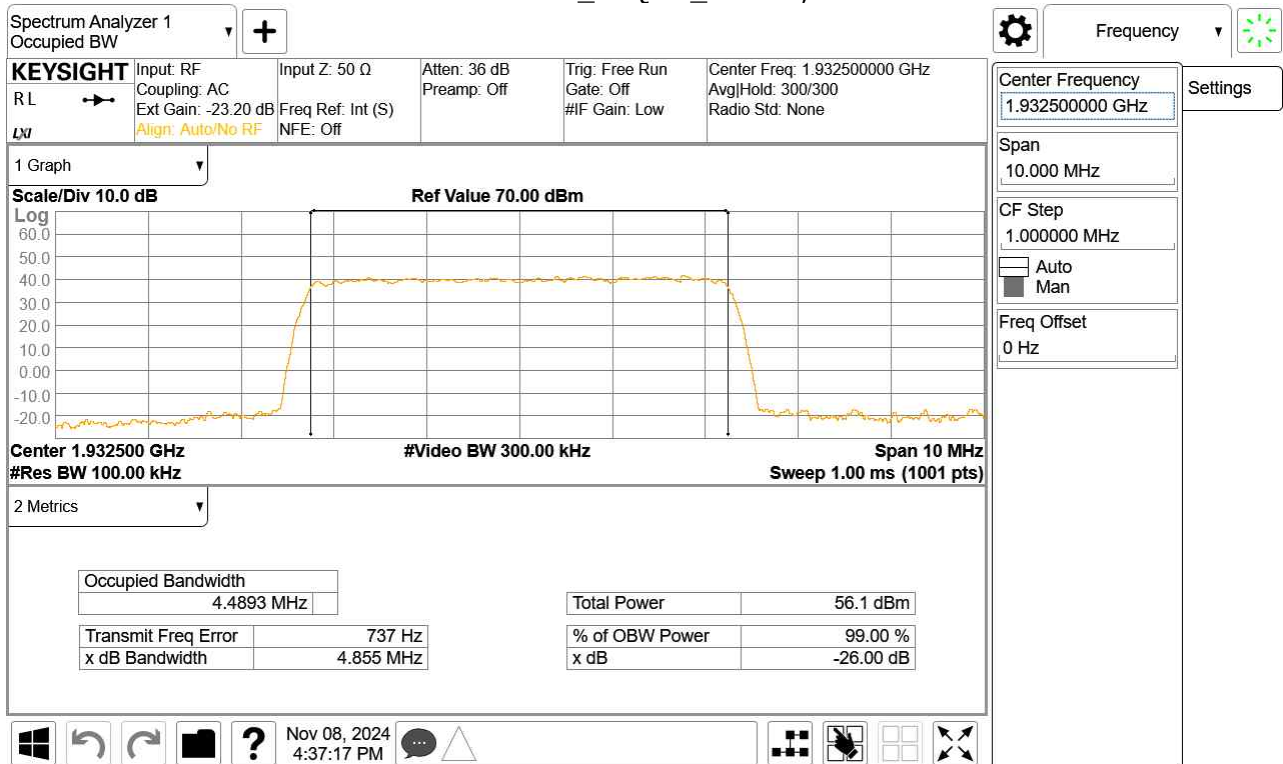
Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	4.51	4.49	4.51	4.51
	2	4.51	4.49	4.50	4.51
	3	4.51	4.49	4.51	4.51
	4	4.51	4.49	4.50	4.50
Middle	1	4.51	4.49	4.50	4.51
	2	4.51	4.49	4.51	4.51
	3	4.51	4.49	4.51	4.51
	4	4.51	4.49	4.50	4.51
highest	1	4.51	4.49	4.51	4.51
	2	4.51	4.49	4.51	4.51
	3	4.51	4.49	4.50	4.51
	4	4.51	4.49	4.51	4.51

See next pages for actual measured spectrum plots.

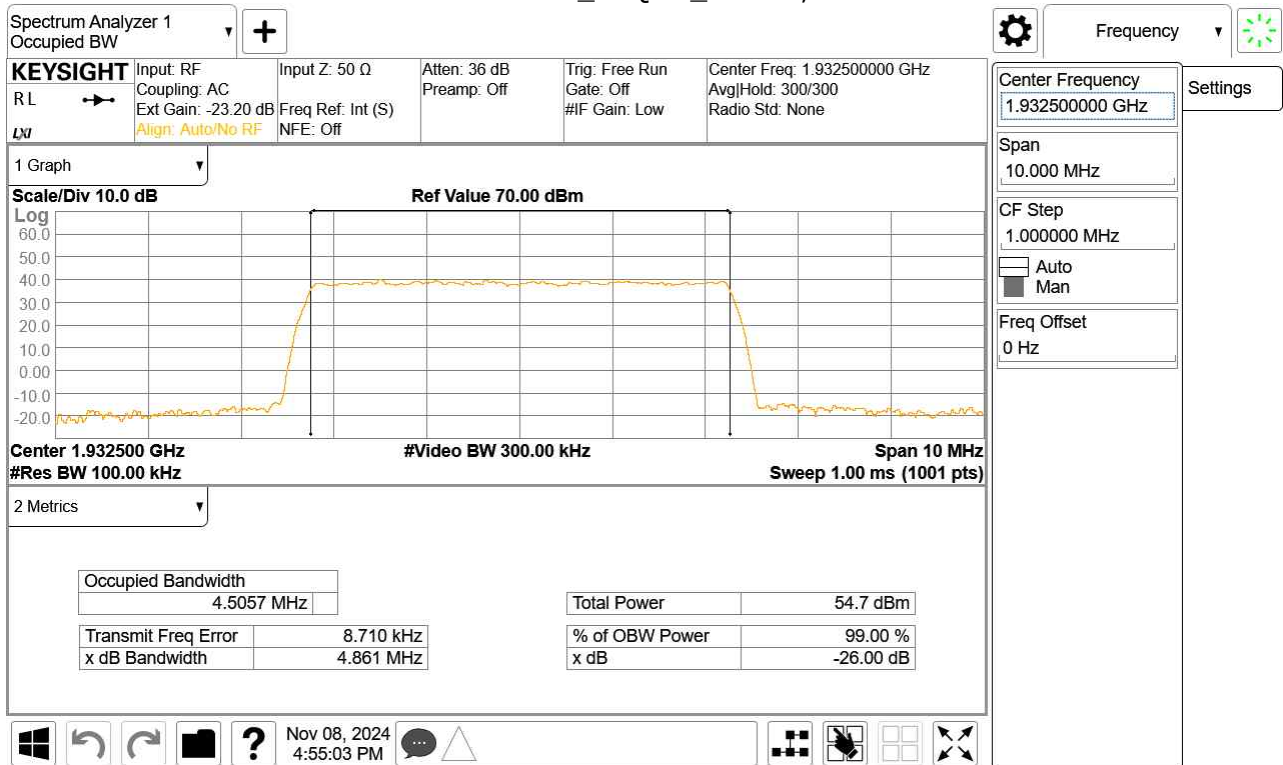
LTE 1C 5 MHz_QPSK_Lowest, Port 1



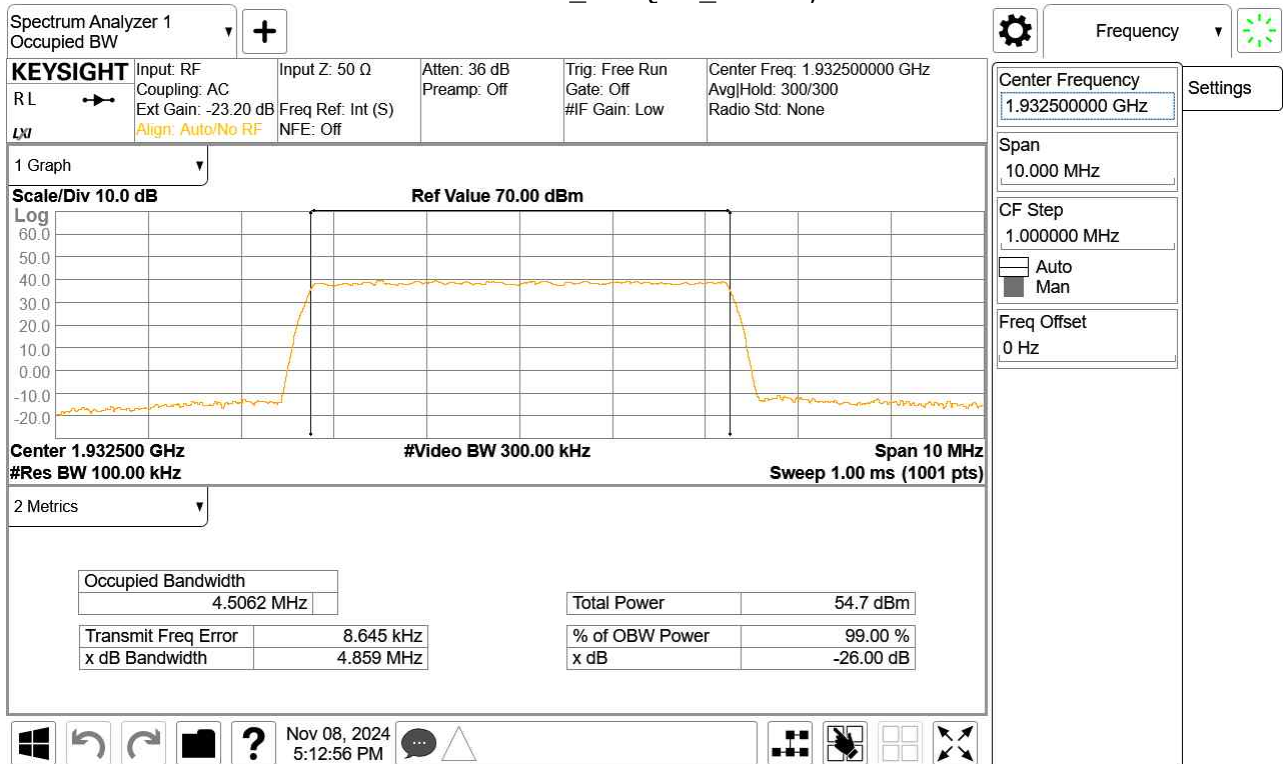
LTE 1C 5 MHz_16QAM_Lowest, Port 1



LTE 1C 5 MHz_64QAM_Lowest, Port 1



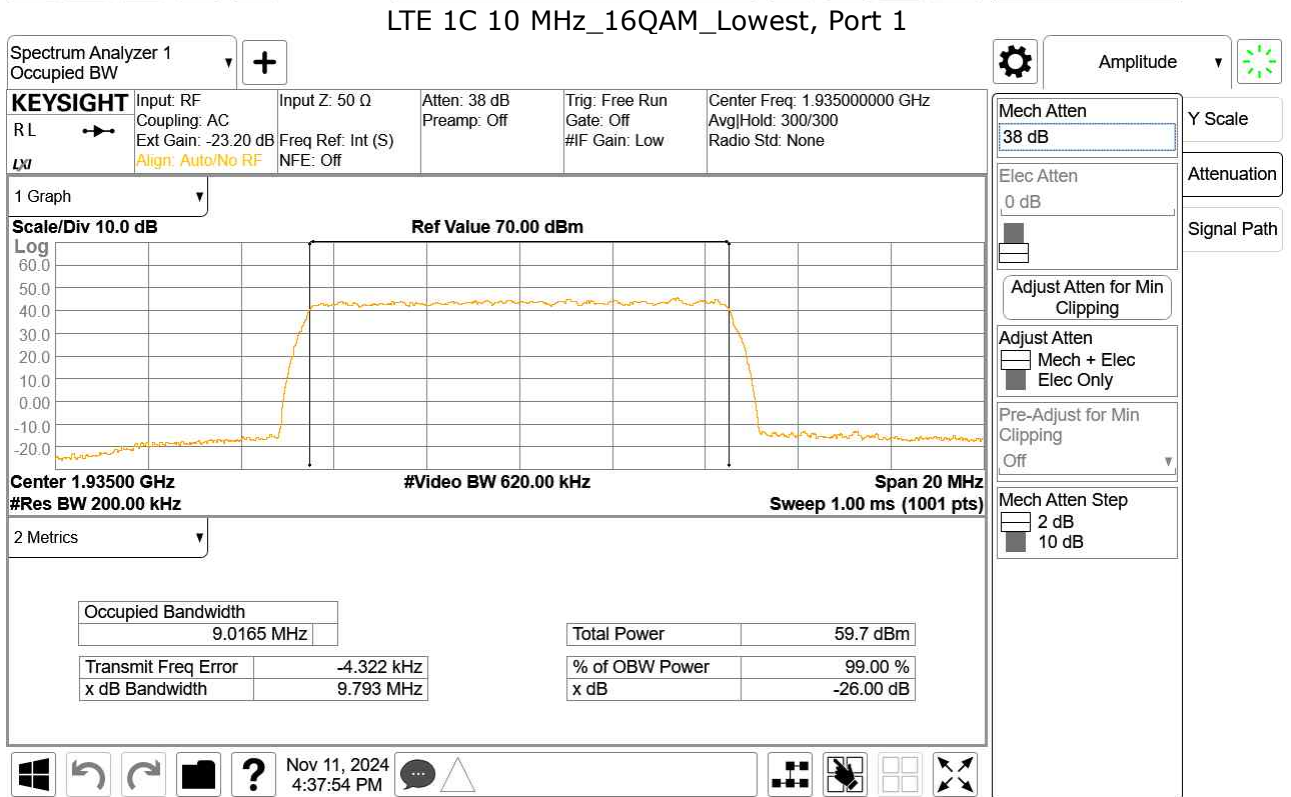
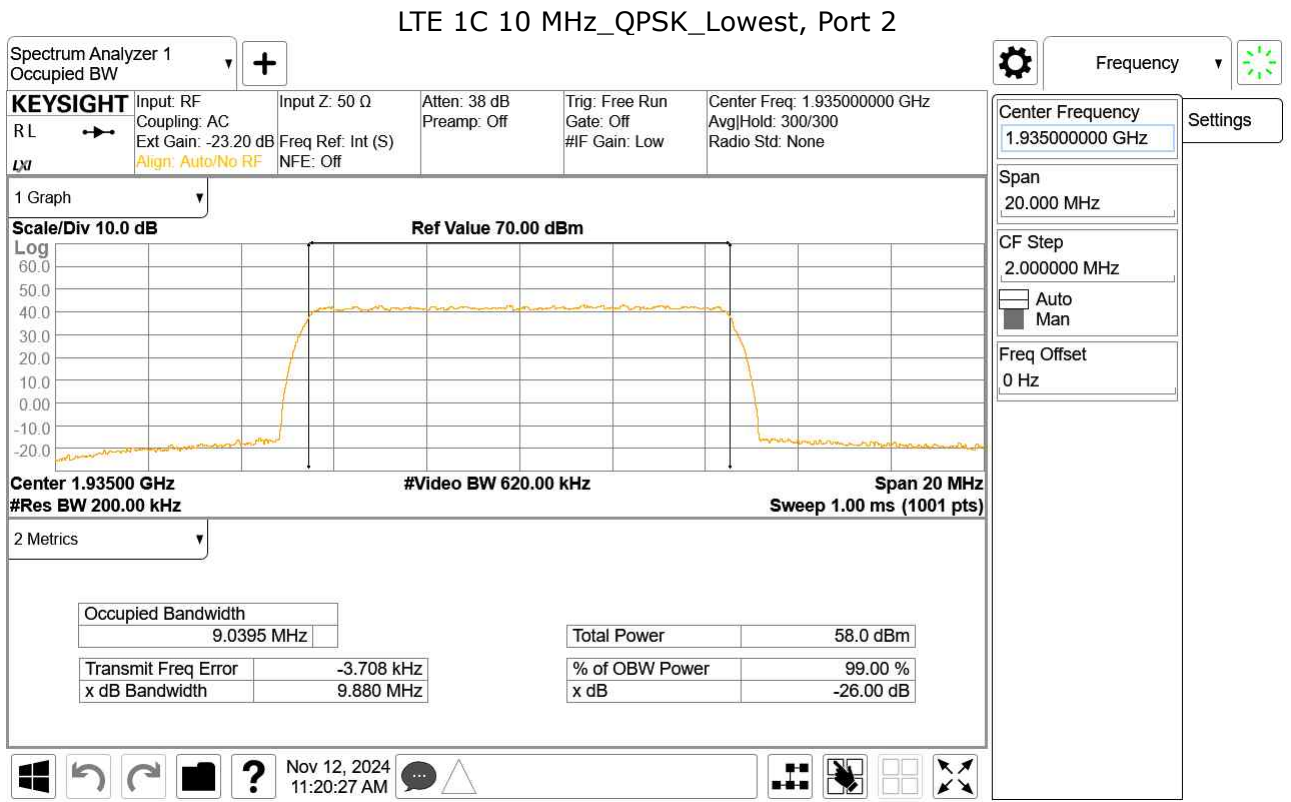
LTE 1C 5 MHz_256QAM_Lowest, Port 1



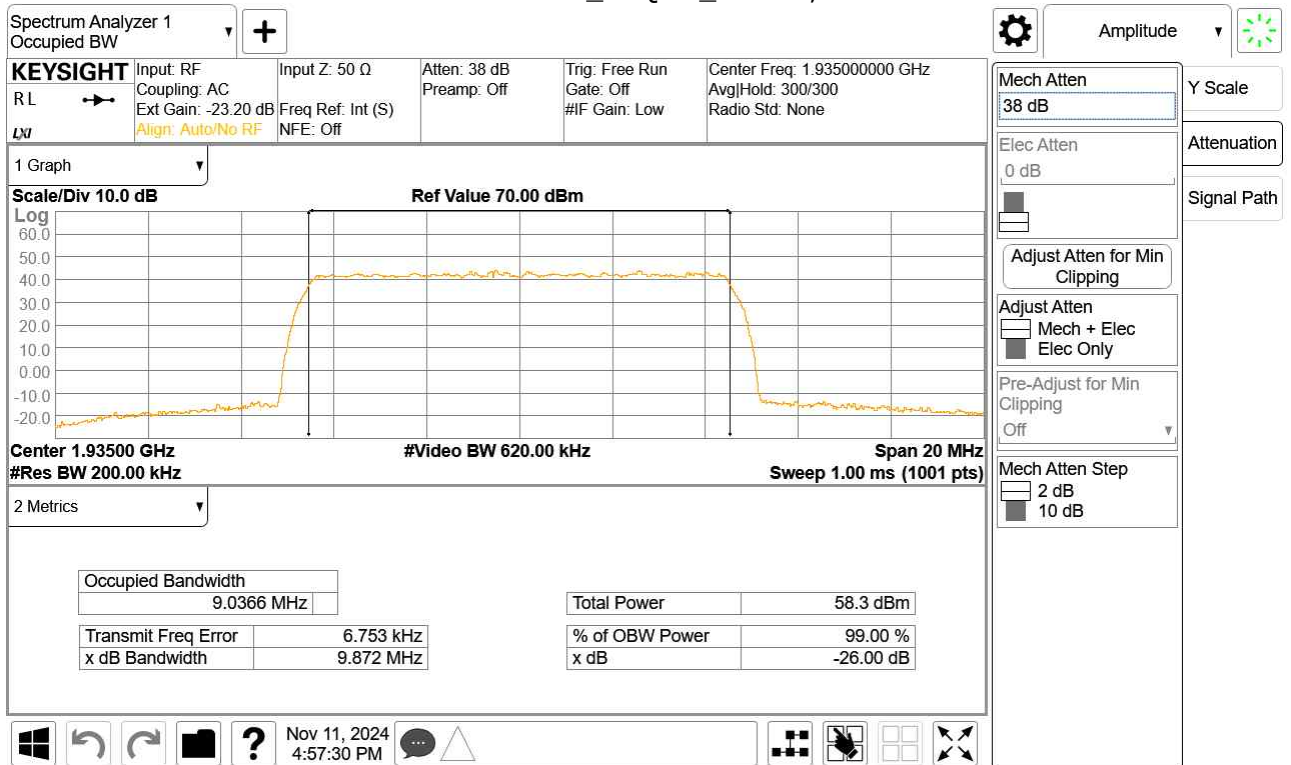
Test mode : LTE 1C 10 MHz

Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	9.03	9.02	9.03	9.01
	2	9.04	9.02	9.04	9.01
	3	9.03	9.02	9.03	9.01
	4	9.03	9.02	9.03	9.00
Middle	1	9.03	9.02	9.04	9.01
	2	9.04	9.02	9.04	9.01
	3	9.04	9.02	9.04	9.01
	4	9.04	9.02	9.03	9.01
highest	1	9.04	9.02	9.03	9.01
	2	9.02	9.02	9.03	9.01
	3	9.03	9.02	9.03	9.00
	4	9.03	9.02	9.03	9.00

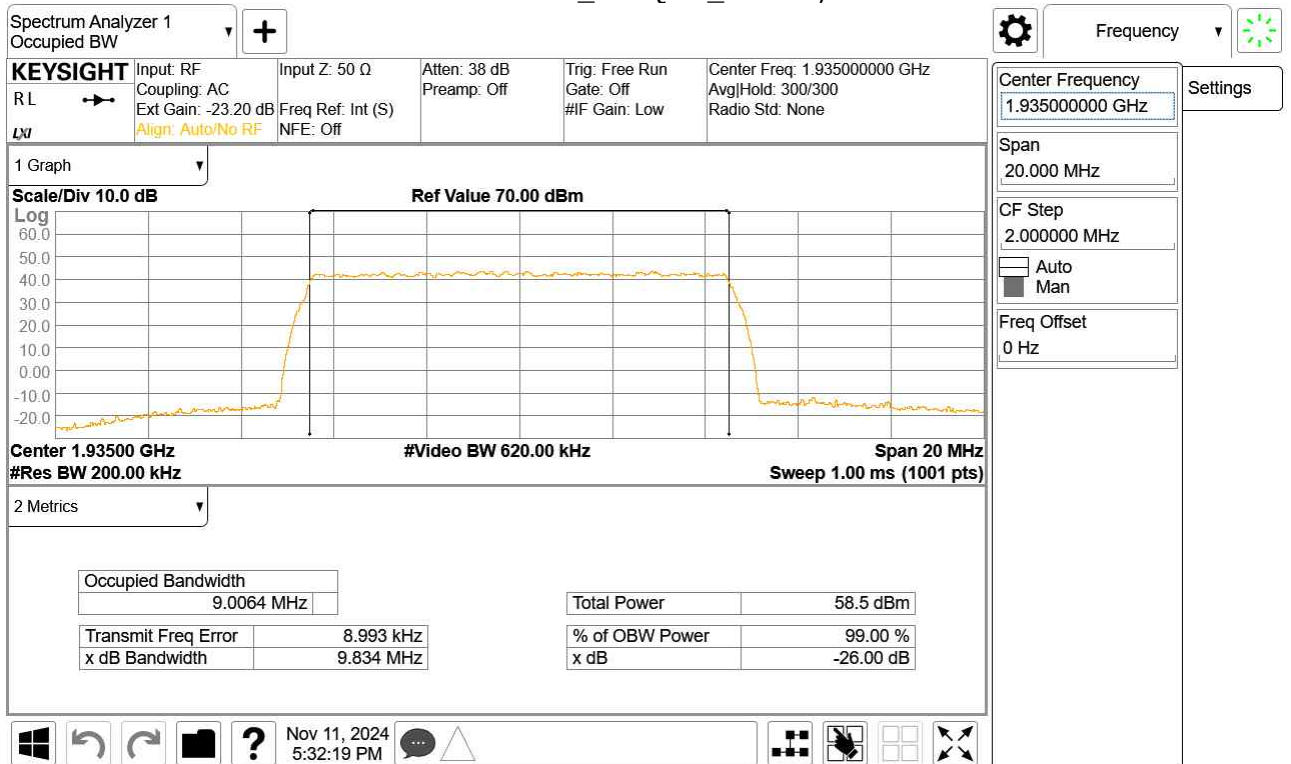
See next pages for actual measured spectrum plots.



LTE 1C 10 MHz_64QAM_Lowest, Port 2



LTE 1C 10 MHz_256QAM_Lowest, Port 1

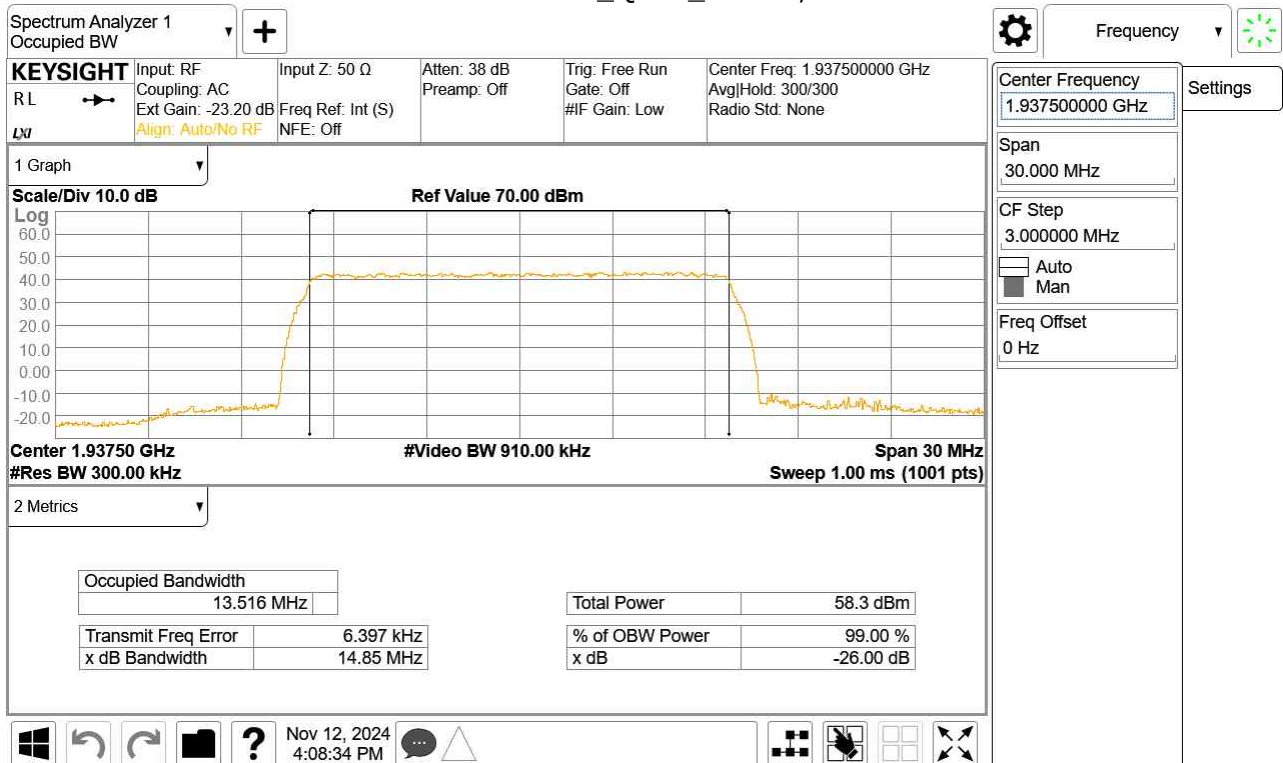


Test mode : LTE 1C 15 MHz

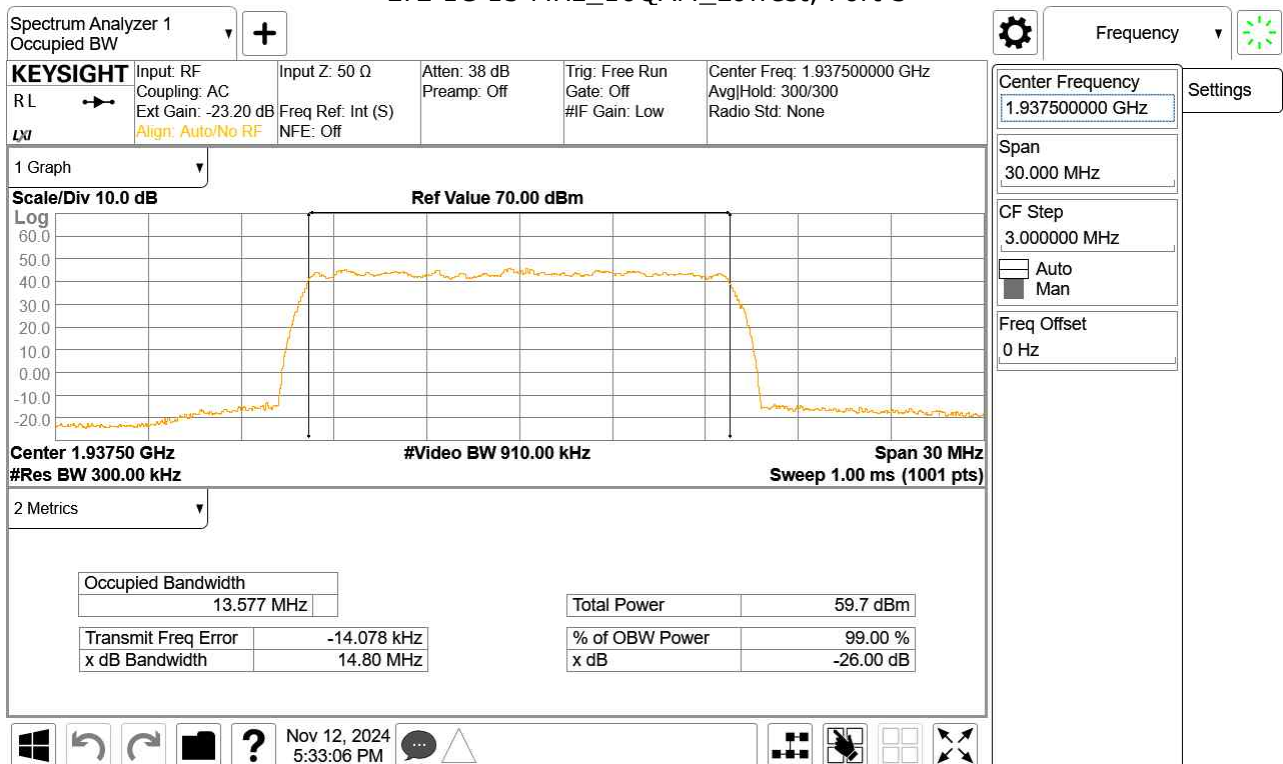
Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	13.51	13.57	13.50	13.52
	2	13.52	13.57	13.51	13.53
	3	13.51	13.58	13.50	13.54
	4	13.51	13.58	13.51	13.54
Middle	1	13.52	13.58	13.51	13.53
	2	13.52	13.58	13.51	13.53
	3	13.52	13.58	13.51	13.52
	4	13.52	13.57	13.52	13.54
highest	1	13.52	13.57	13.51	13.52
	2	13.53	13.57	13.52	13.54
	3	13.52	13.56	13.51	13.51
	4	13.52	13.56	13.51	13.54

See next pages for actual measured spectrum plots.

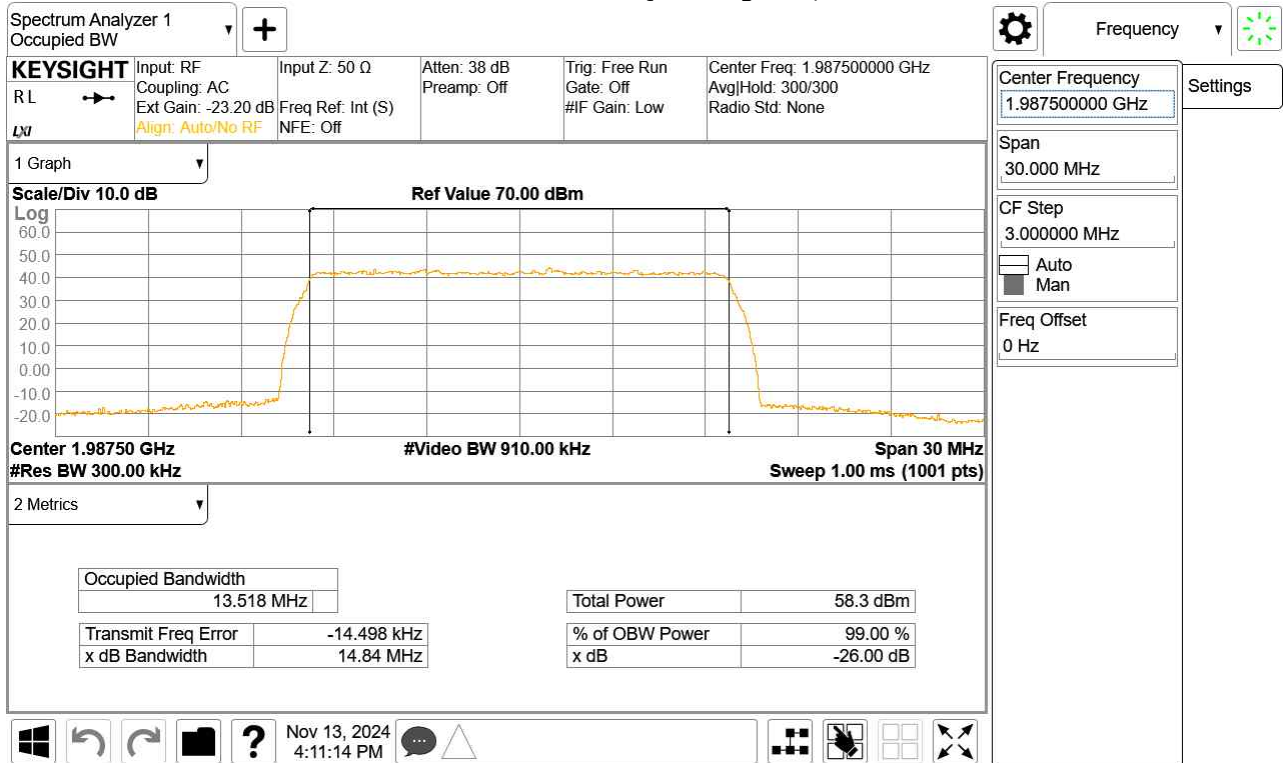
LTE 1C 15 MHz_QPSK_Lowest, Port 2



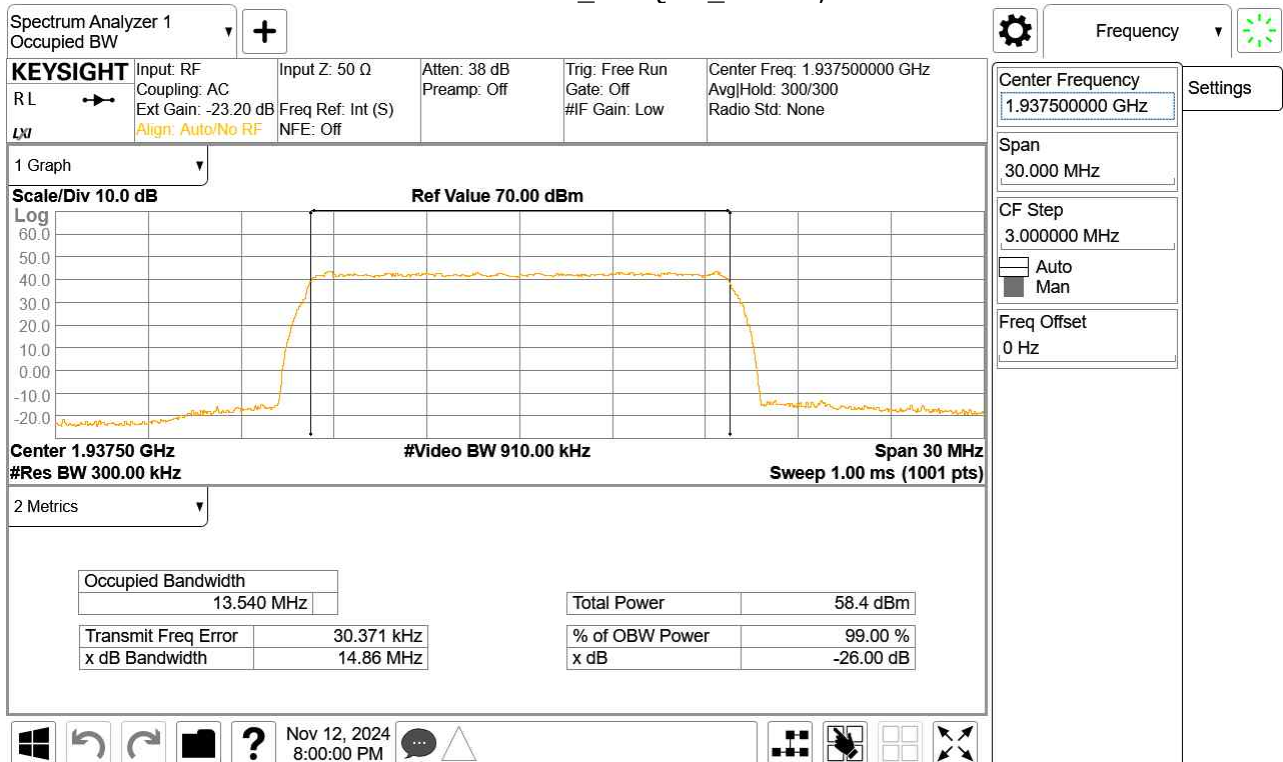
LTE 1C 15 MHz_16QAM_Lowest, Port 3



LTE 1C 15 MHz_64QAM_Highest, Port 2



LTE 1C 15 MHz_256QAM_Lowest, Port 3

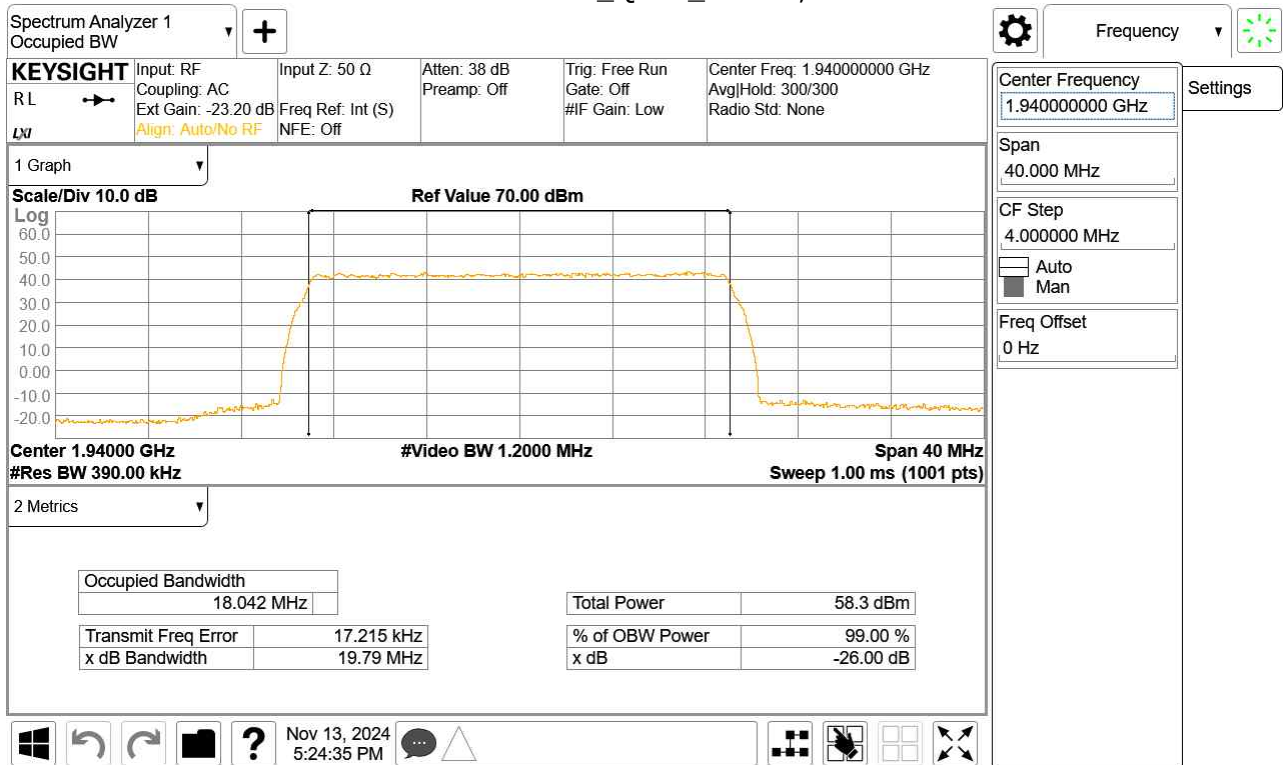


Test mode : LTE 1C 20 MHz

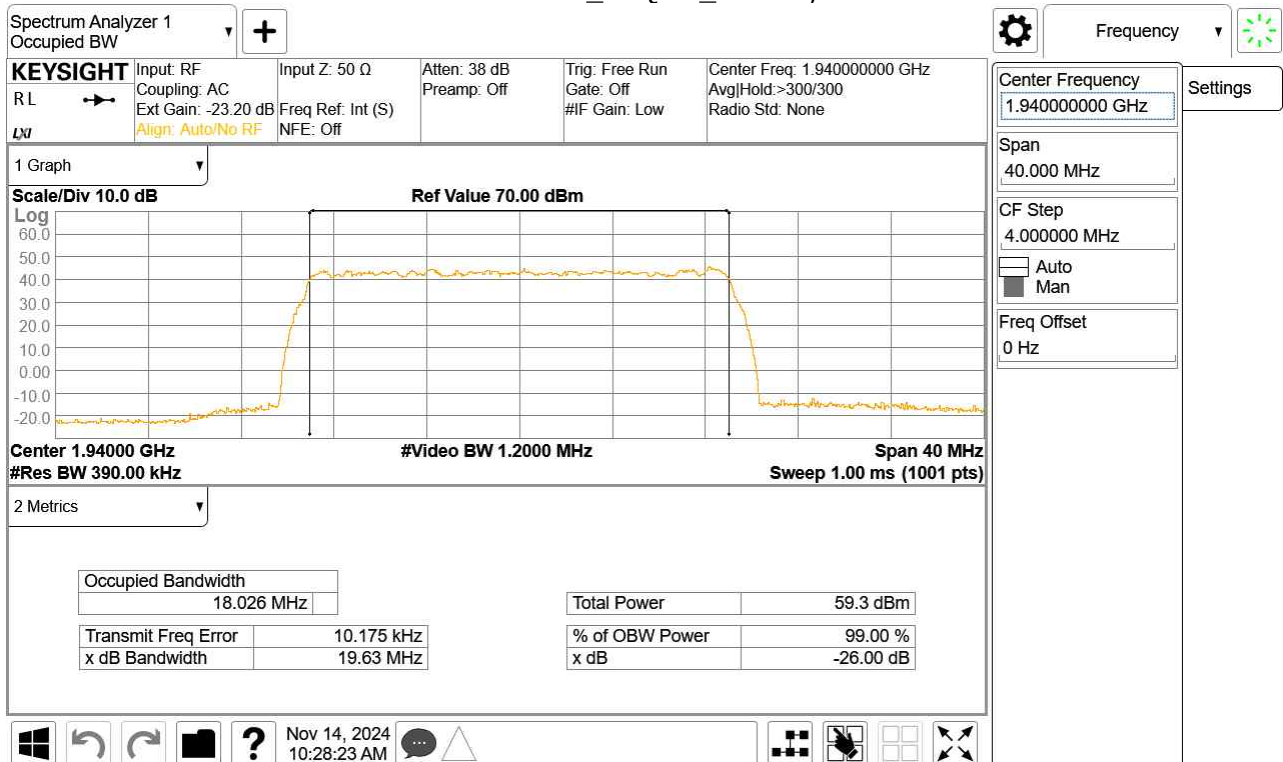
Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	18.02	18.01	17.99	17.99
	2	18.02	18.01	18.03	17.99
	3	18.04	18.03	18.02	17.99
	4	18.03	18.01	18.01	17.96
Middle	1	18.03	18.02	18.02	17.99
	2	18.03	18.02	18.02	17.98
	3	18.04	18.03	18.02	17.98
	4	18.03	18.03	18.04	17.99
highest	1	18.04	18.01	18.02	17.99
	2	18.04	18.03	18.02	17.98
	3	18.04	18.03	18.03	17.99
	4	18.04	18.03	18.02	17.99

See next pages for actual measured spectrum plots.

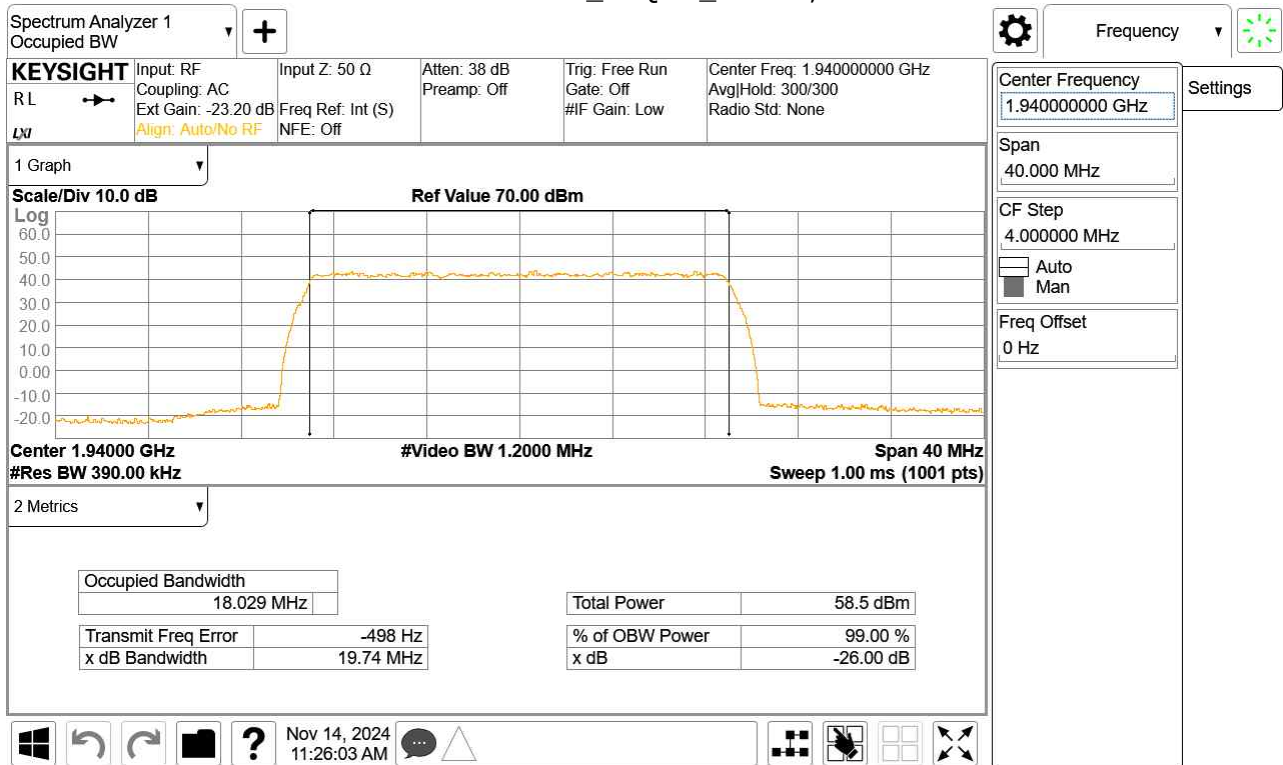
LTE 1C 20 MHz_QPSK_Lowest, Port 3



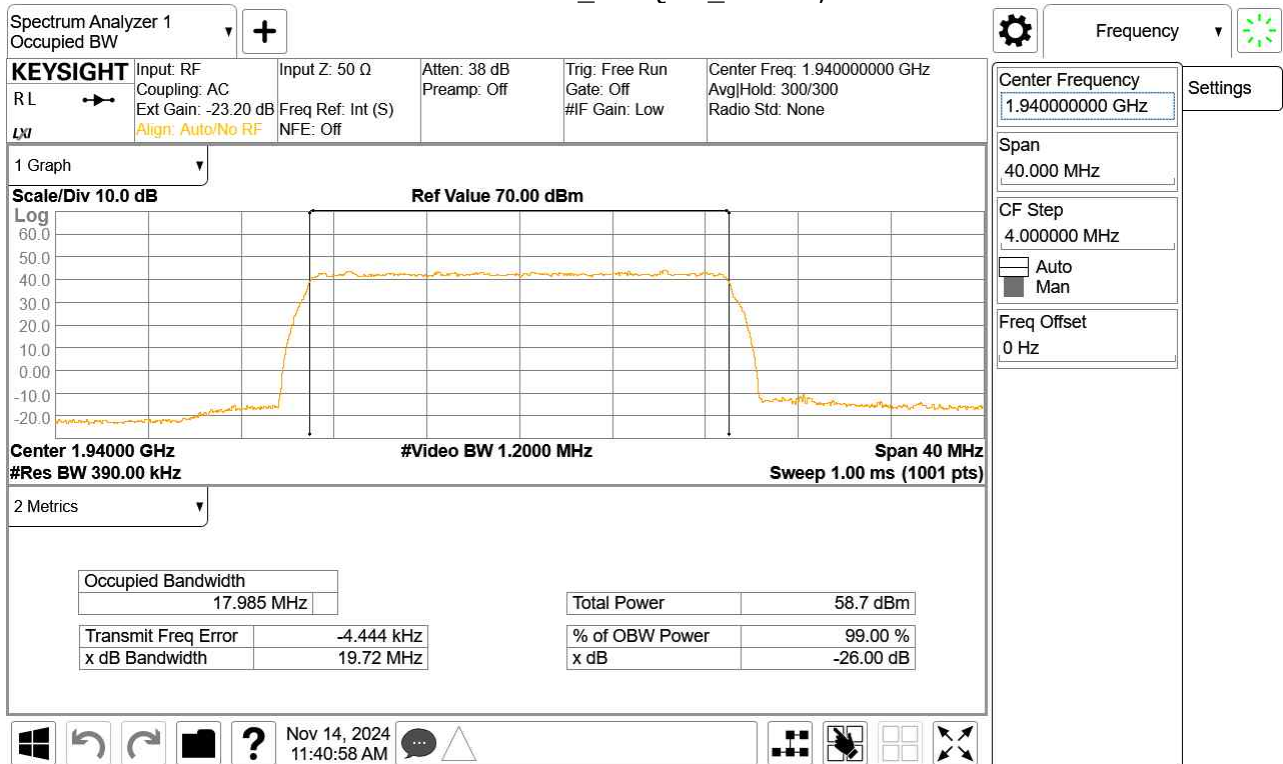
LTE 1C 20 MHz_16QAM_Lowest, Port 3



LTE 1C 20 MHz_64QAM_Lowest, Port 2



LTE 1C 20 MHz_256QAM_Lowest, Port 1

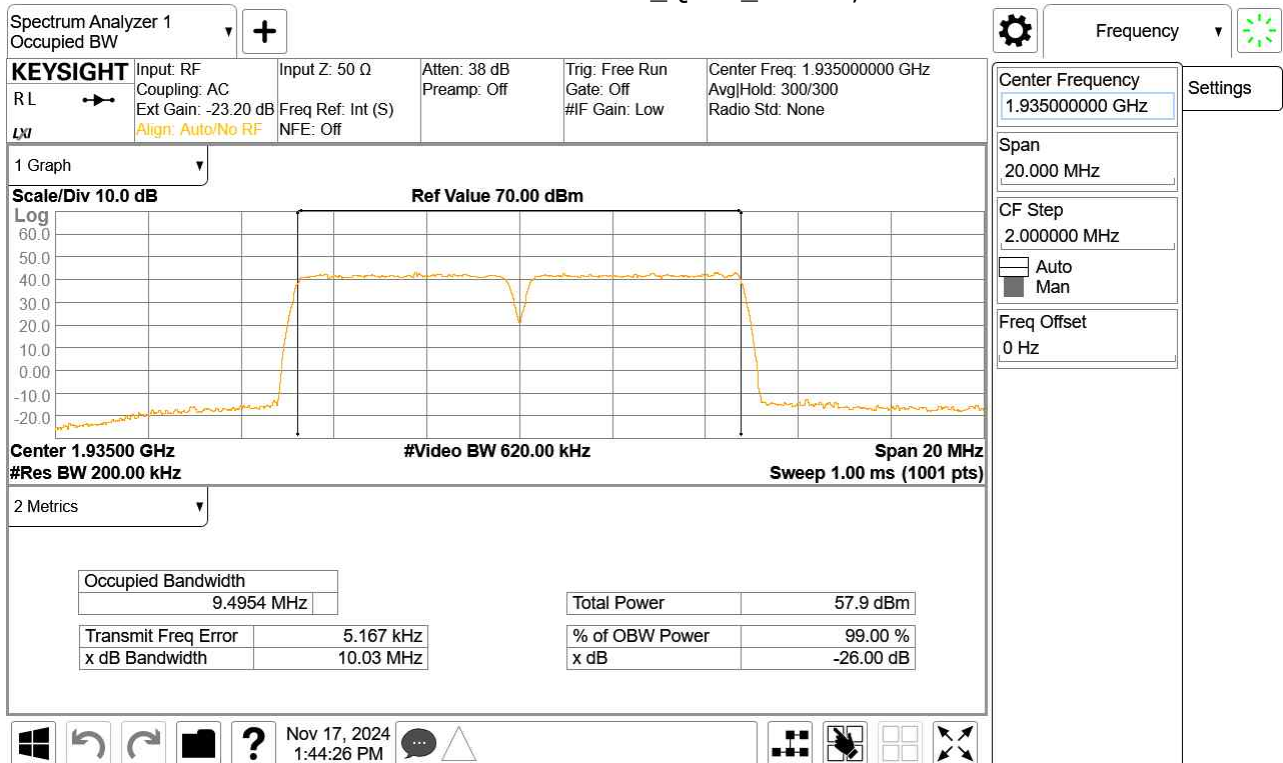


Test mode : LTE 2C 5 MHz + 5 MHz

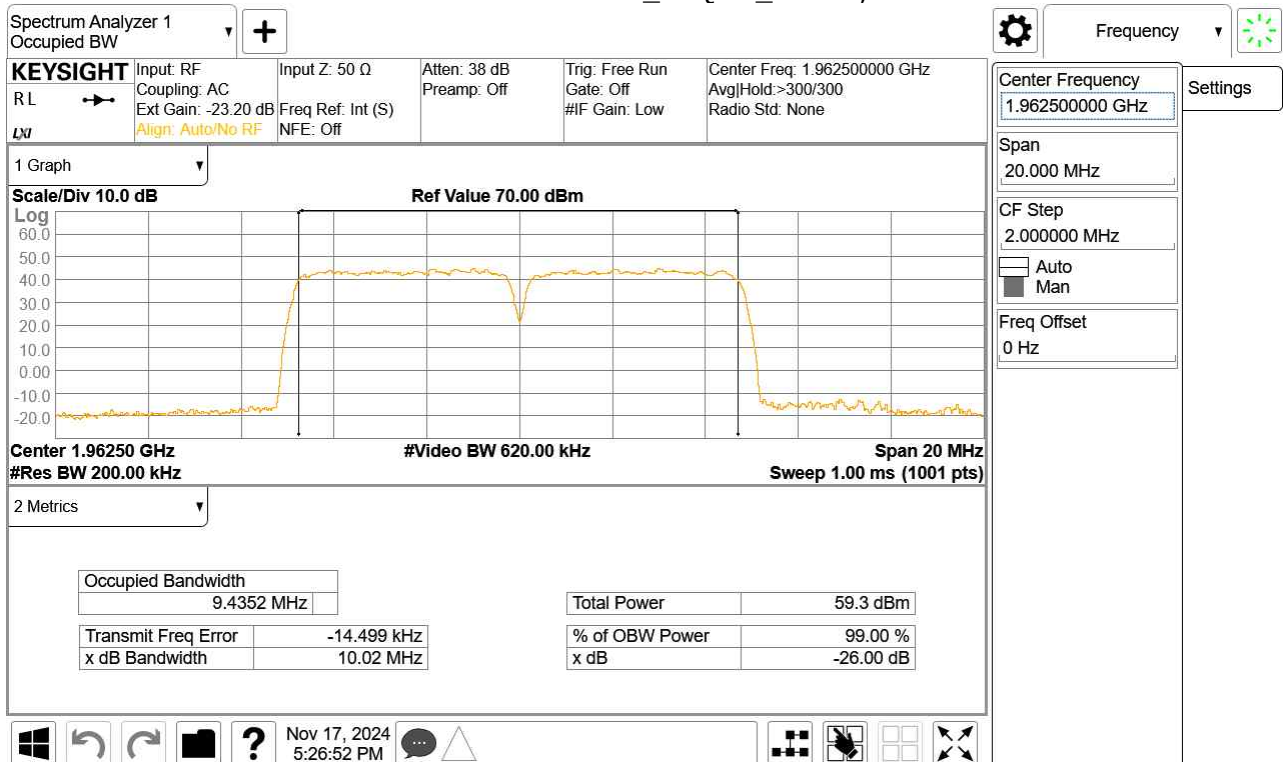
Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	9.50	9.43	9.46	9.46
	2	9.50	9.43	9.47	9.46
	3	9.50	9.43	9.47	9.47
	4	9.50	9.43	9.47	9.47
Middle	1	9.50	9.43	9.46	9.47
	2	9.50	9.43	9.47	9.47
	3	9.49	9.44	9.47	9.47
	4	9.50	9.44	9.47	9.47
highest	1	9.50	9.43	9.47	9.47
	2	9.50	9.43	9.47	9.47
	3	9.50	9.43	9.47	9.47
	4	9.50	9.44	9.47	9.47

See next pages for actual measured spectrum plots.

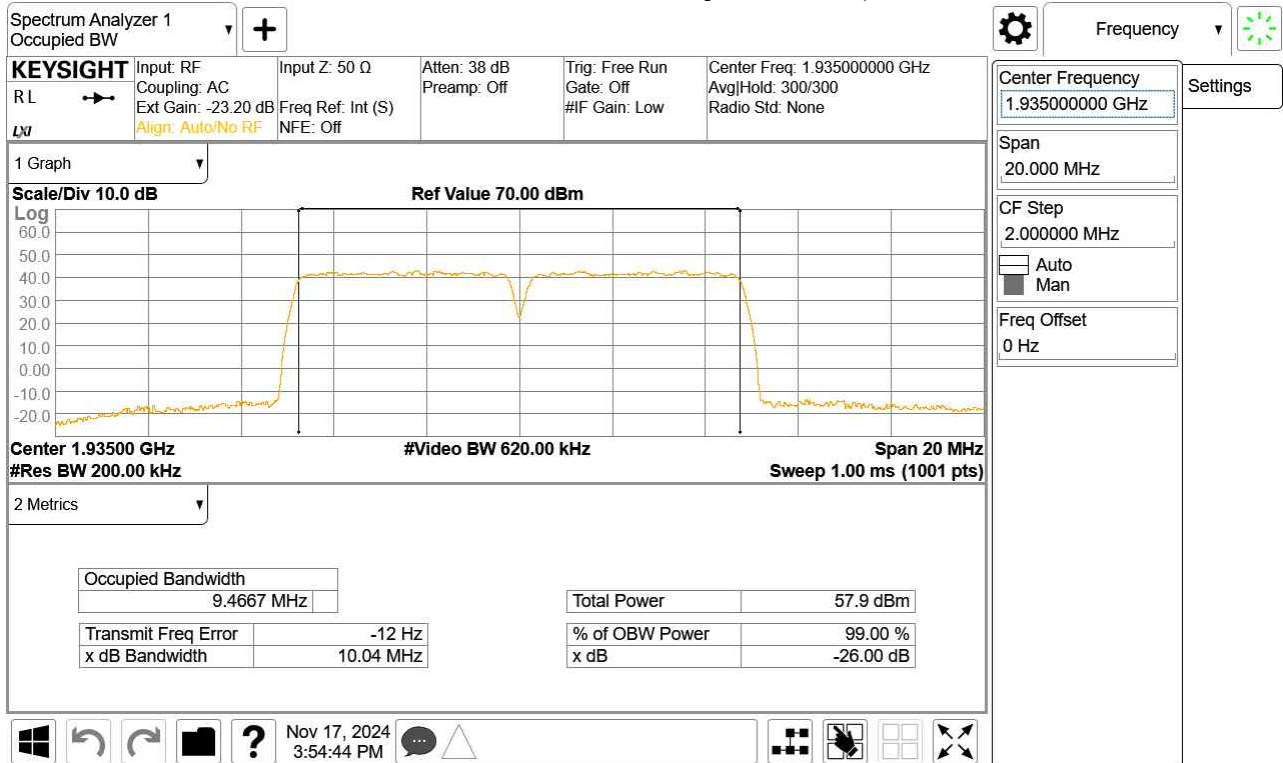
LTE 2C 5 MHz + 5 MHz_QPSK_Lowest, Port 1



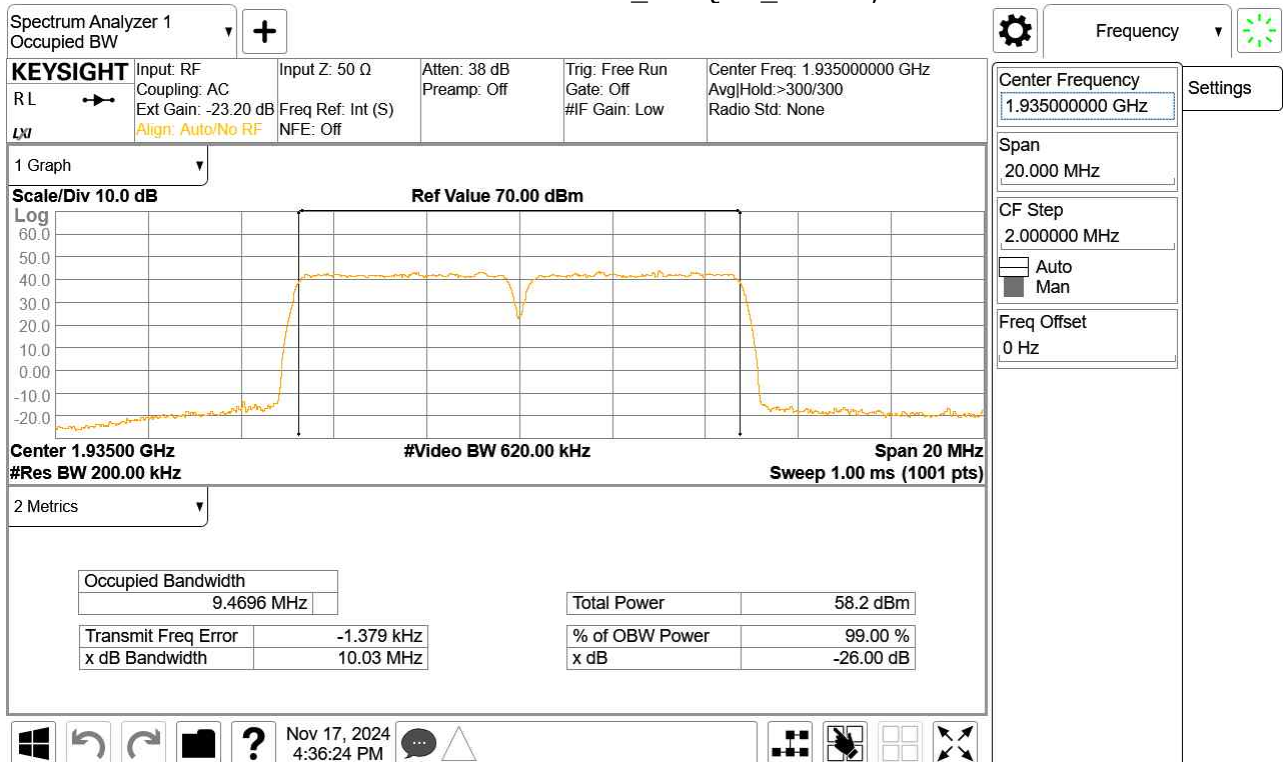
LTE 2C 5 MHz + 5 MHz_16QAM_Middle, Port 3



LTE 2C 5 MHz + 5 MHz_64QAM_Lowest, Port 2



LTE 2C 5 MHz + 5 MHz_256QAM_Lowest, Port 4

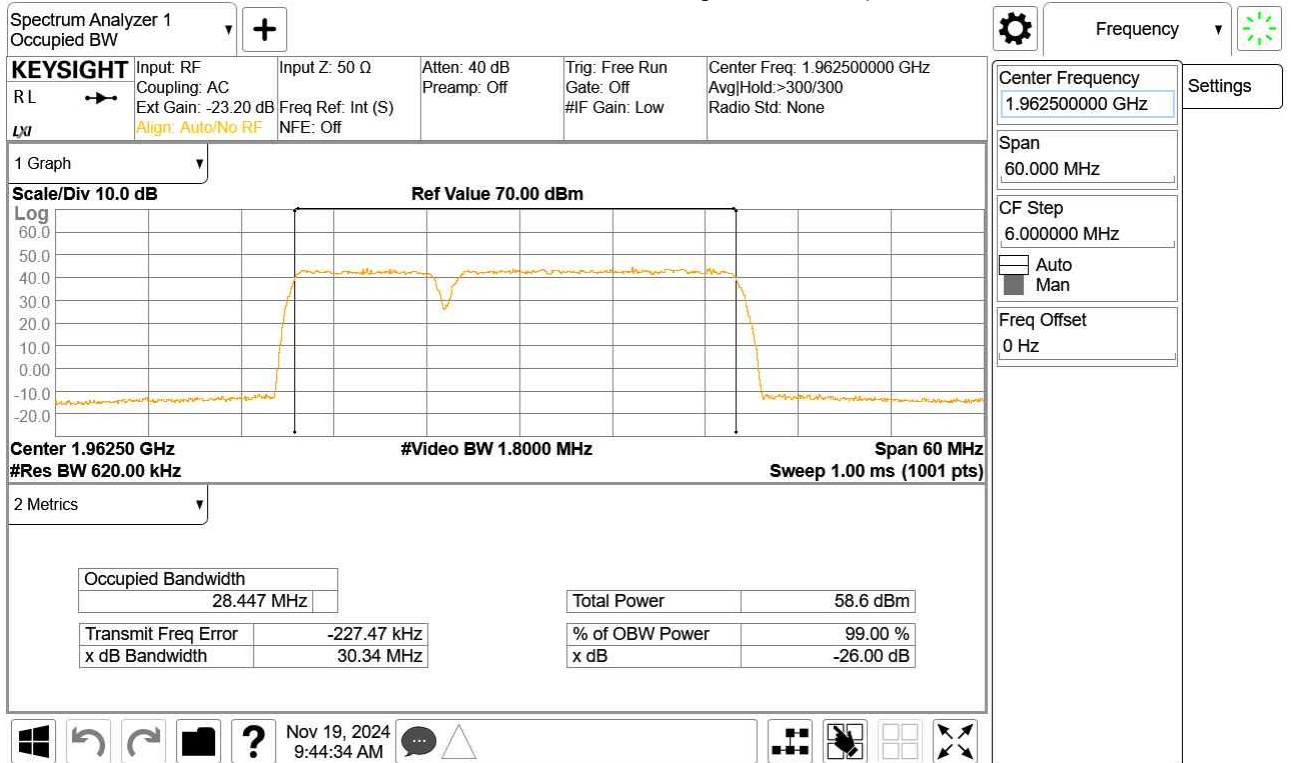


Test mode : LTE 2C 10 MHz + 20 MHz

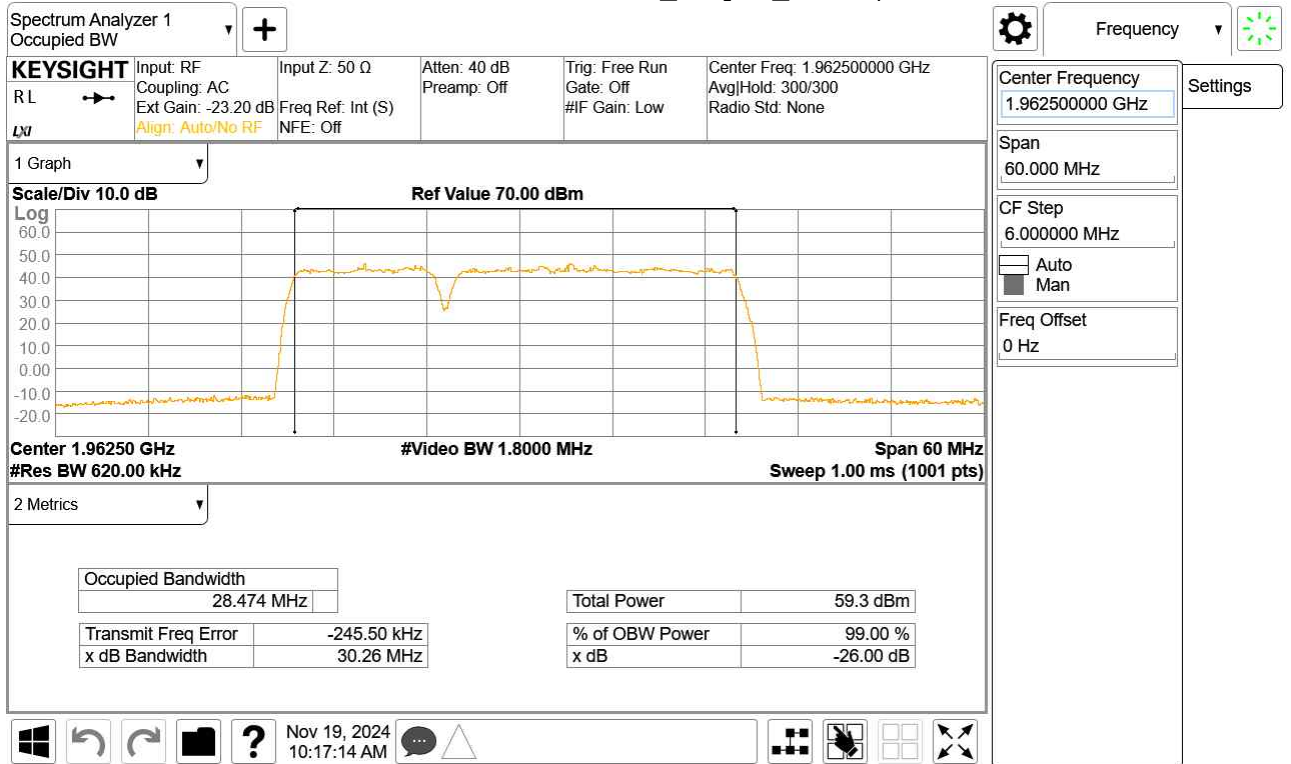
Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	28.43	28.46	28.43	28.45
	2	28.42	28.46	28.42	28.47
	3	28.44	28.46	28.42	28.47
	4	28.44	28.44	28.42	28.51
Middle	1	28.45	28.44	28.46	28.52
	2	28.45	28.44	28.44	28.49
	3	28.40	28.45	28.46	28.49
	4	28.42	28.47	28.45	28.47
highest	1	28.44	28.45	28.44	28.46
	2	28.44	28.46	28.45	28.49
	3	28.44	28.47	28.46	28.48
	4	28.45	28.43	28.44	28.46

See next pages for actual measured spectrum plots.

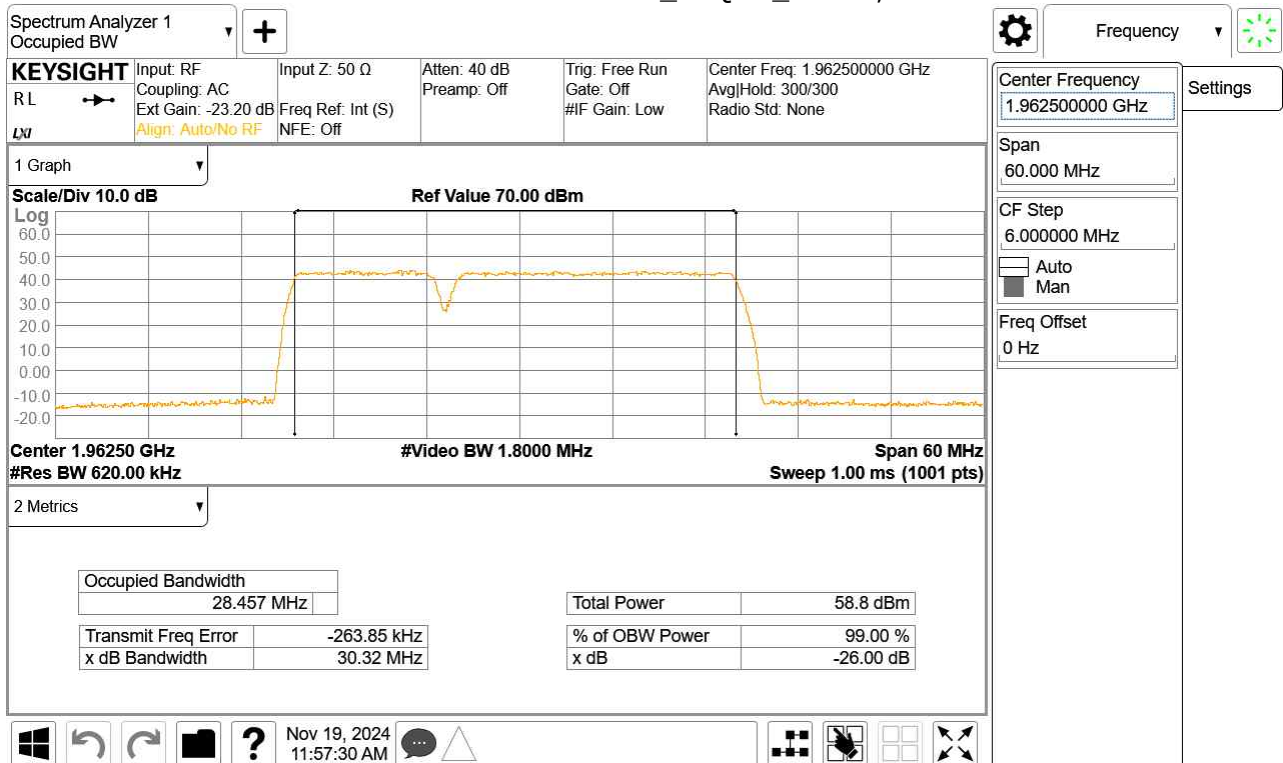
LTE 2C 10 MHz + 20 MHz_QPSK_Middle, Port 1



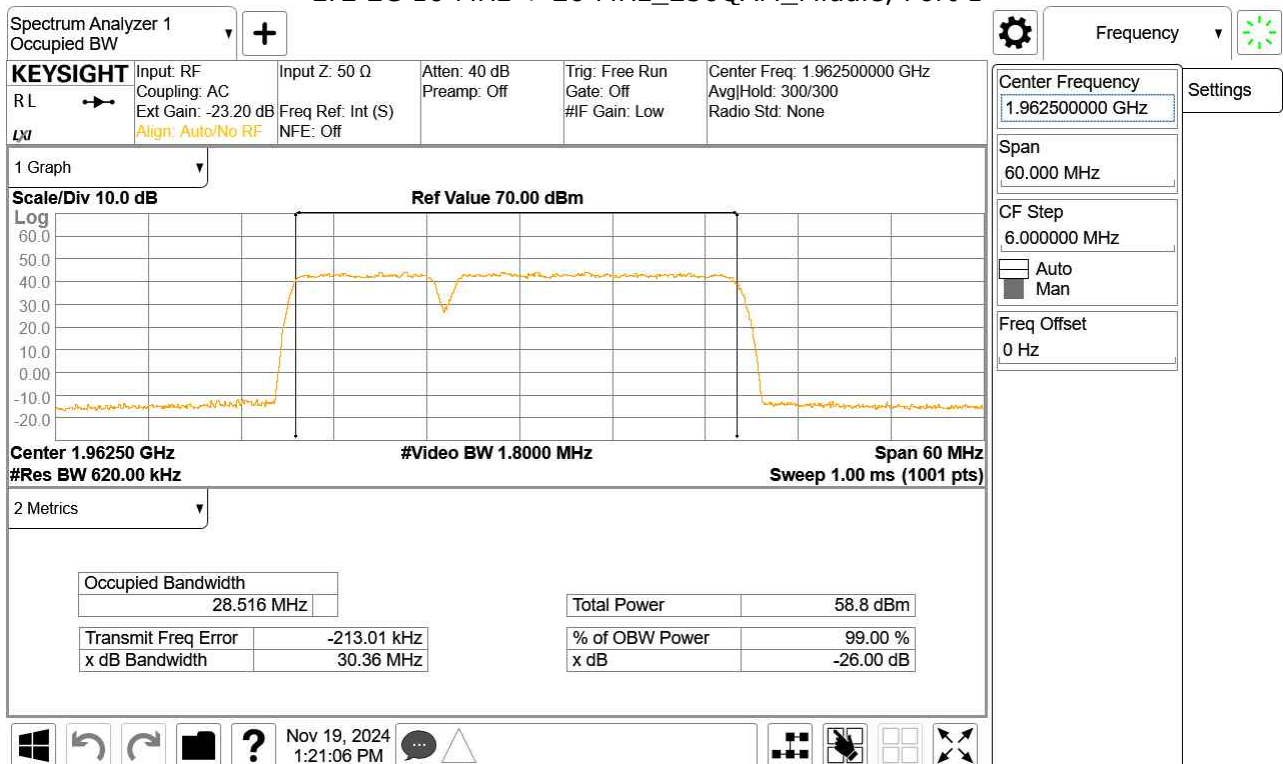
LTE 2C 10 MHz + 20 MHz_16QAM_Middle, Port 4



LTE 2C 10 MHz + 20 MHz_64QAM_Middle, Port 1



LTE 2C 10 MHz + 20 MHz_256QAM_Middle, Port 1

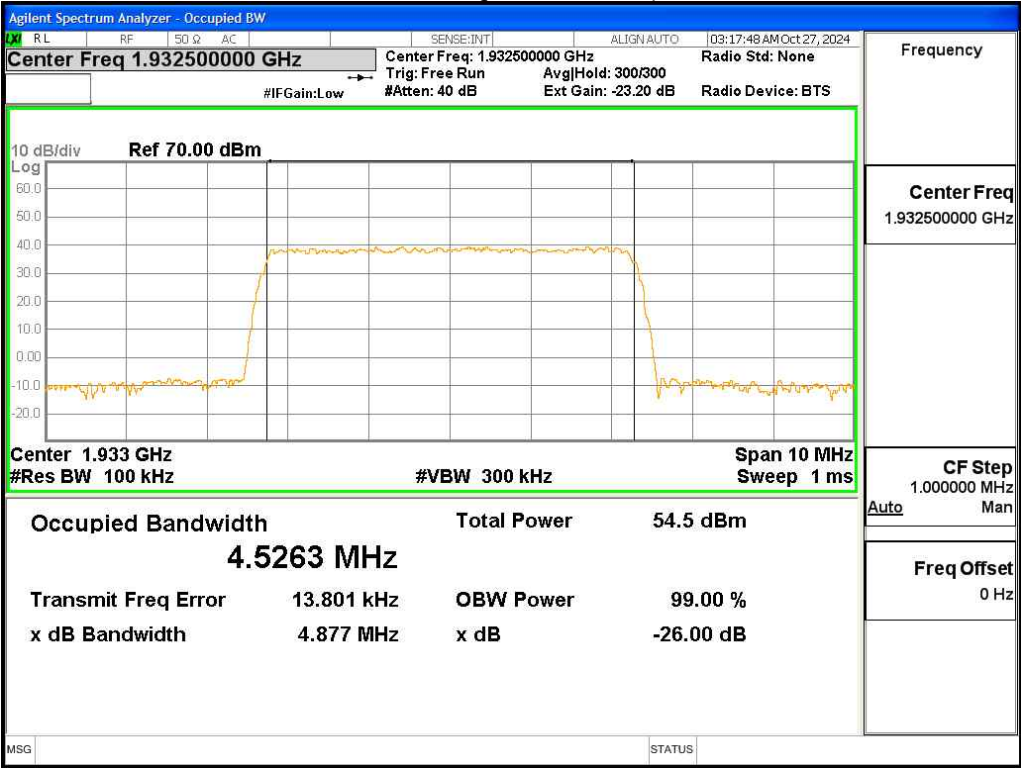


Test mode : NR 1C 5 MHz

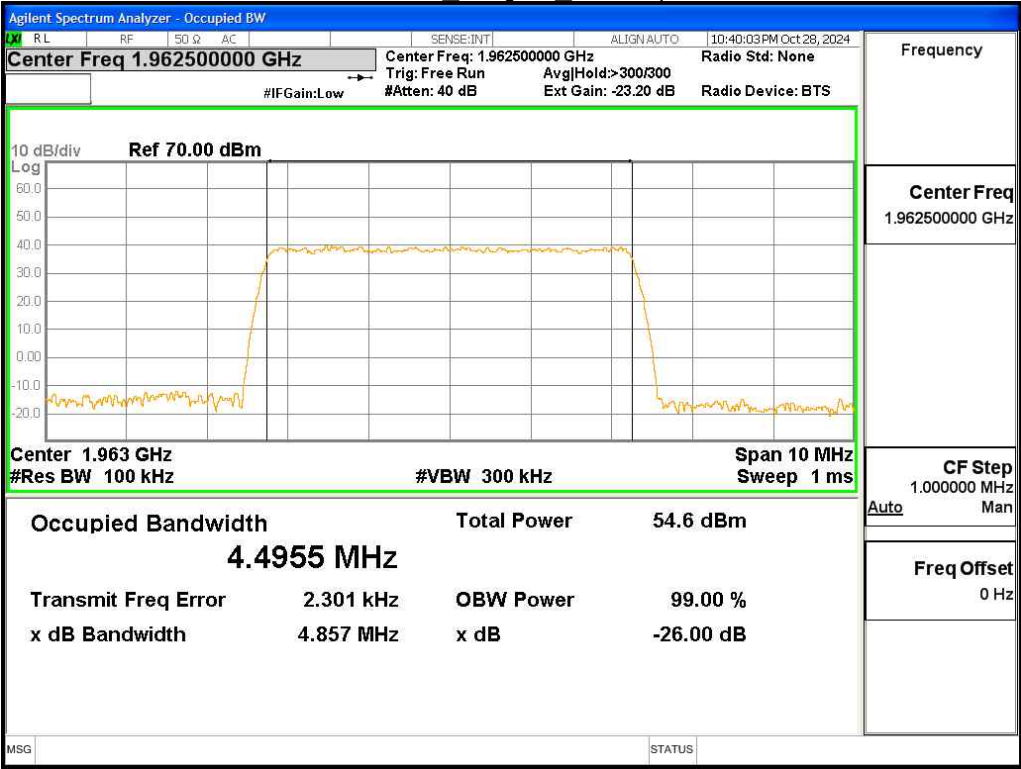
Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	4.52	4.49	4.50	4.50
	2	4.53	4.49	4.50	4.50
	3	4.53	4.49	4.50	4.50
	4	4.52	4.49	4.49	4.50
Middle	1	4.50	4.50	4.50	4.50
	2	4.50	4.50	4.50	4.50
	3	4.49	4.49	4.51	4.50
	4	4.50	4.50	4.51	4.49
highest	1	4.50	4.49	4.50	4.50
	2	4.49	4.50	4.49	4.51
	3	4.50	4.49	4.50	4.50
	4	4.50	4.49	4.51	4.51

See next pages for actual measured spectrum plots.

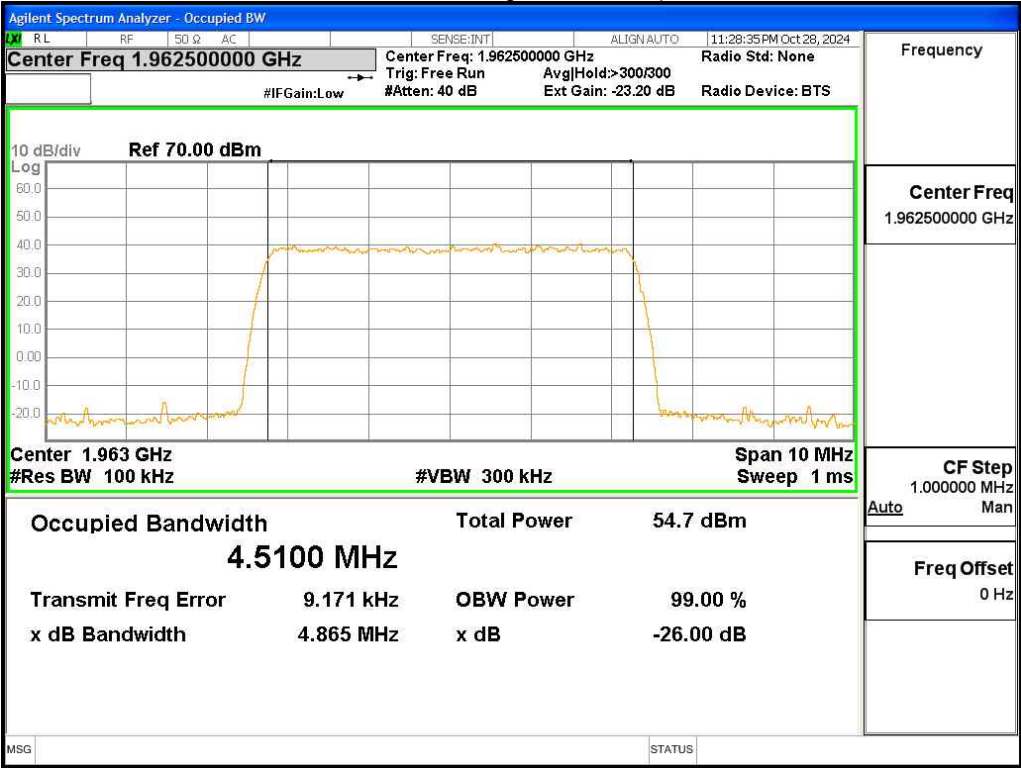
NR 1C 5 MHz_QPSK_Lowest, Port 2



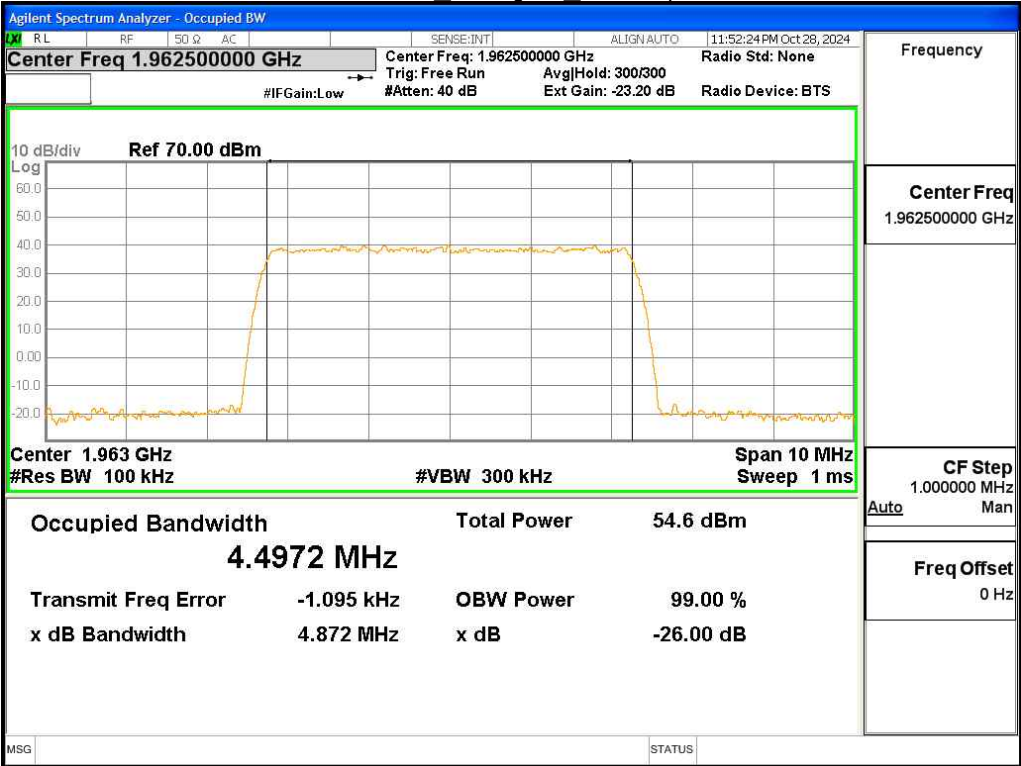
NR 1C 5 MHz_16QAM_Middle, Port 1



NR 1C 5 MHz_64QAM_Middle, Port 3



NR 1C 5 MHz_256QAM_Middle, Port 2

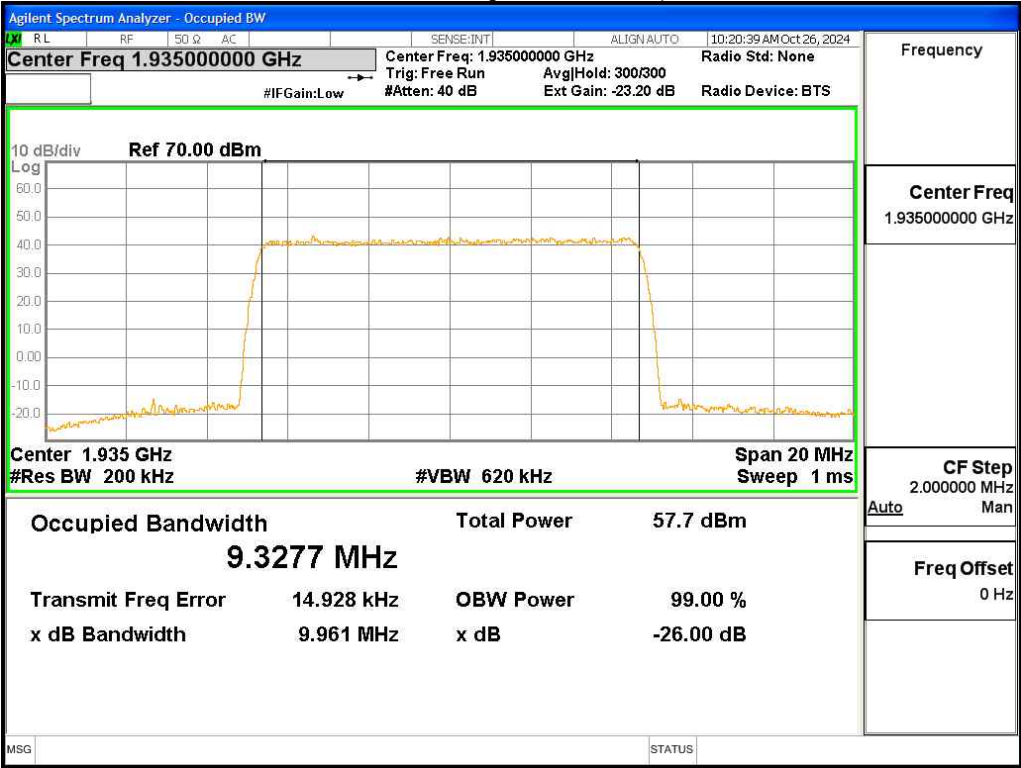


Test mode : NR 1C 10 MHz

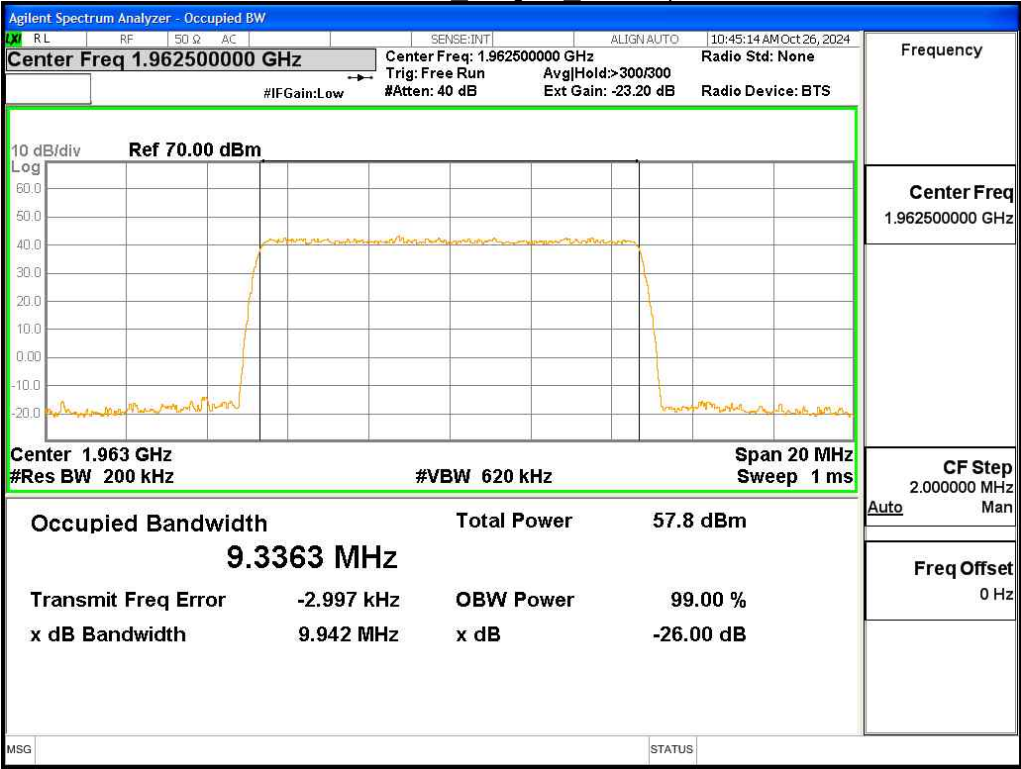
Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	9.32	9.31	9.32	9.32
	2	9.33	9.32	9.32	9.35
	3	9.33	9.32	9.31	9.33
	4	9.31	9.30	9.31	9.34
Middle	1	9.32	9.34	9.34	9.33
	2	9.31	9.33	9.32	9.35
	3	9.31	9.32	9.33	9.34
	4	9.32	9.32	9.32	9.33
highest	1	9.31	9.31	9.33	9.34
	2	9.32	9.30	9.32	9.33
	3	9.31	9.30	9.34	9.32
	4	9.31	9.30	9.33	9.33

See next pages for actual measured spectrum plots.

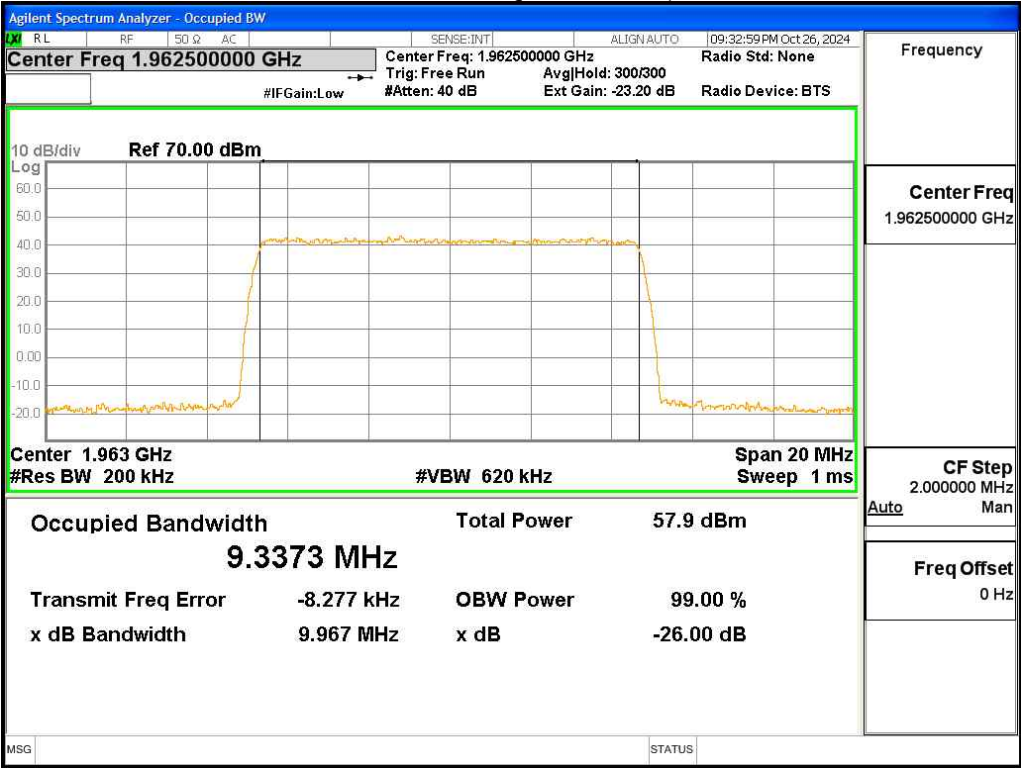
NR 1C 10 MHz_QPSK_Lowest, Port 2



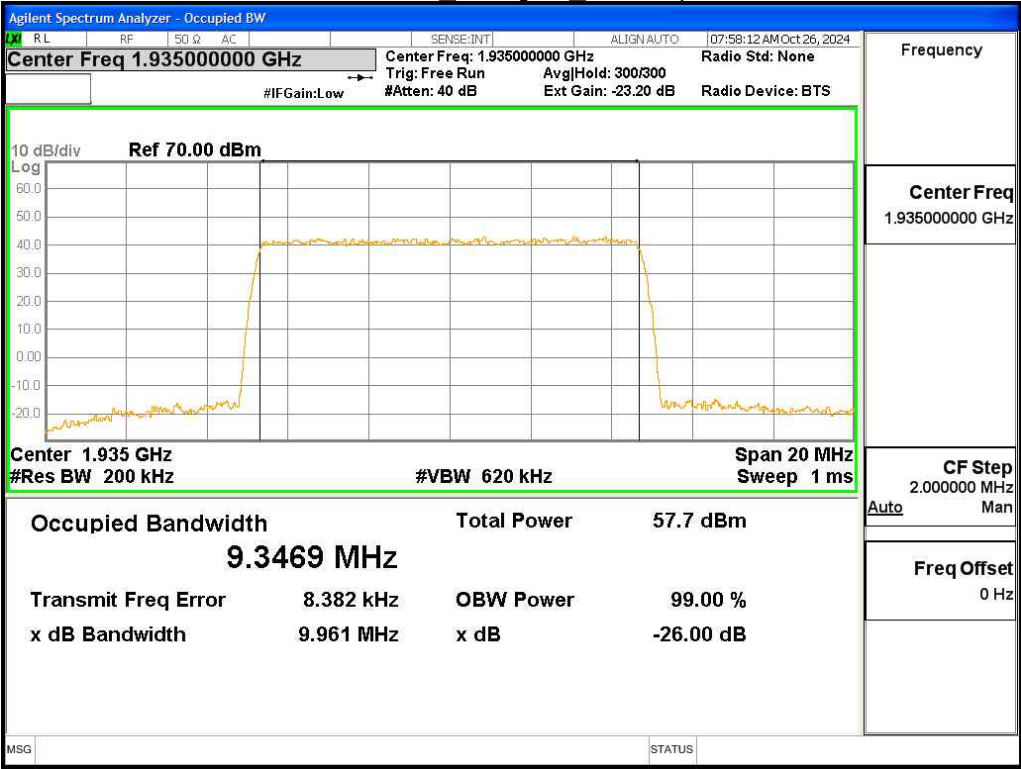
NR 1C 10 MHz_16QAM_Middle, Port 1



NR 1C 10 MHz_64QAM_Middle, Port 1



NR 1C 10 MHz_256QAM_Lowest, Port 2

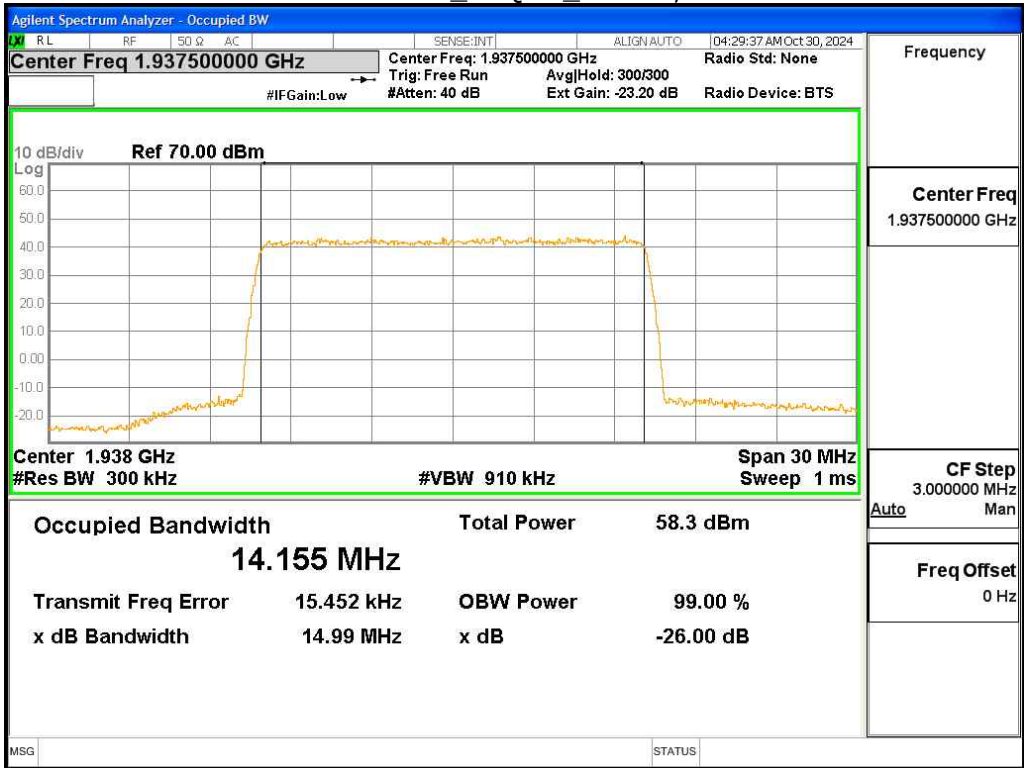


Test mode : NR 1C 15 MHz

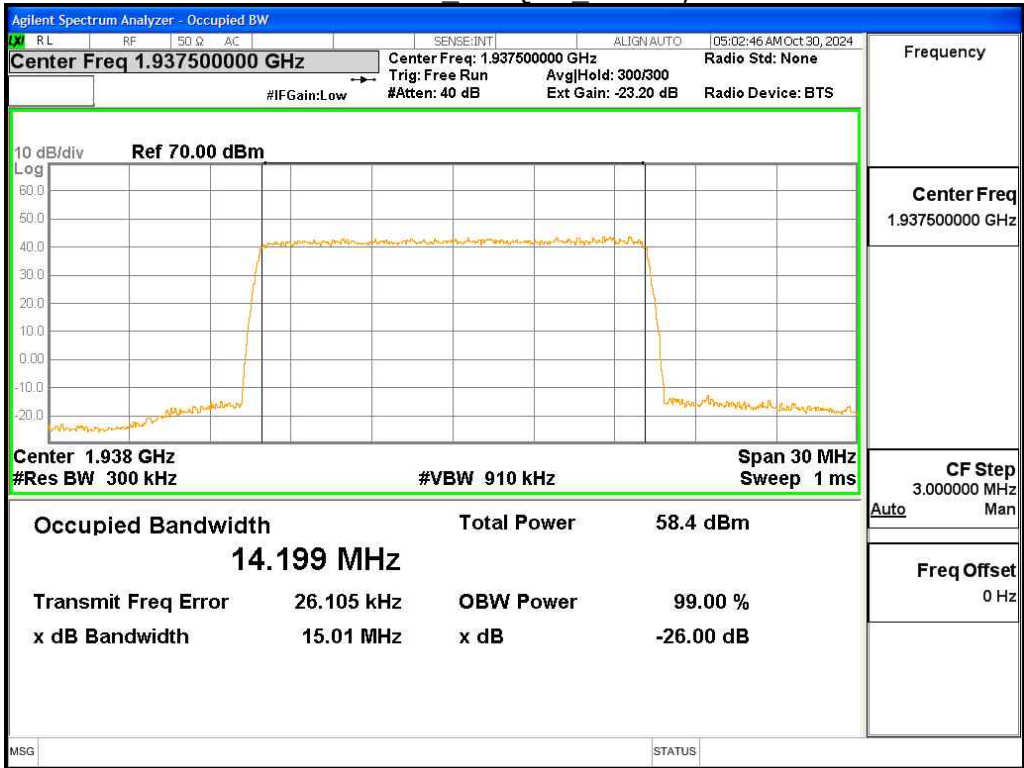
Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	14.15	14.15	14.16	14.19
	2	14.16	14.16	14.16	14.14
	3	14.15	14.15	14.15	14.17
	4	14.16	14.15	14.14	14.20
Middle	1	14.20	14.16	14.18	14.19
	2	14.18	14.14	14.14	14.19
	3	14.15	14.16	14.16	14.19
	4	14.19	14.16	14.16	14.20
highest	1	14.18	14.16	14.17	14.19
	2	14.17	14.15	14.15	14.17
	3	14.19	14.16	14.16	14.17
	4	14.15	14.16	14.14	14.15

See next pages for actual measured spectrum plots.

NR 1C 15 MHz_64QAM_Lowest, Port 1



NR 1C 15 MHz_256QAM_Lowest, Port 4

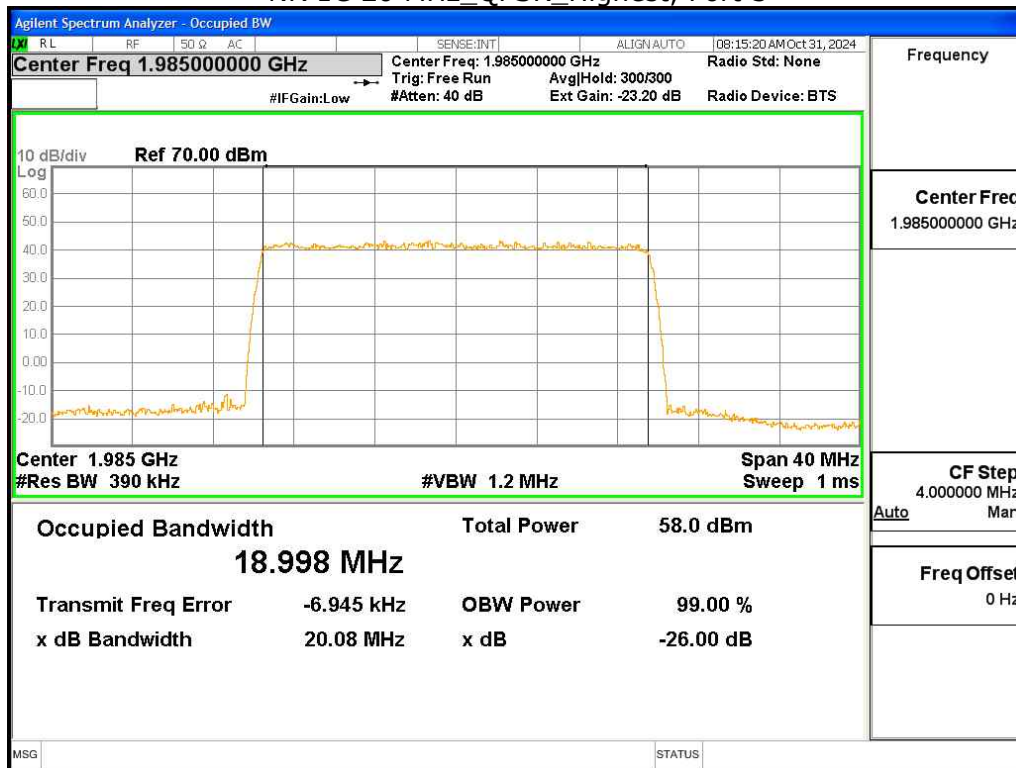


Test mode : NR 1C 20 MHz

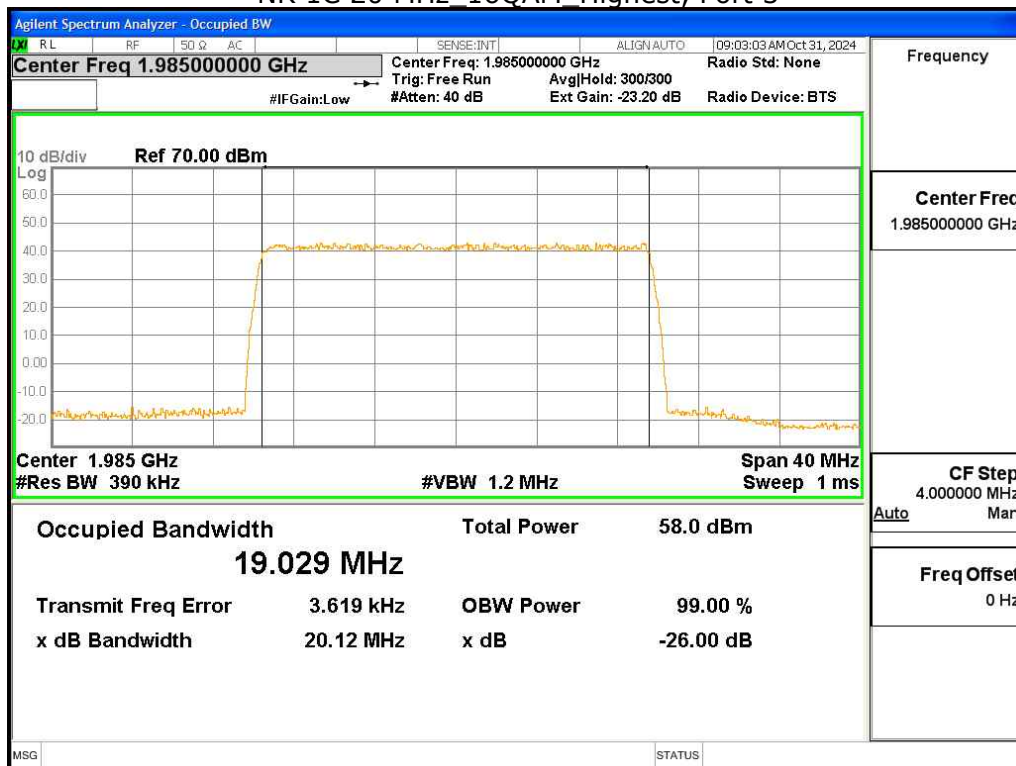
Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	18.96	19.00	19.00	18.98
	2	18.96	18.98	18.99	19.01
	3	18.97	18.97	18.97	18.99
	4	18.94	18.99	18.99	18.97
Middle	1	18.97	18.98	18.99	19.02
	2	18.95	18.98	19.00	19.01
	3	18.98	19.02	18.99	19.00
	4	18.98	19.00	19.00	18.98
highest	1	18.95	19.00	19.01	18.99
	2	18.94	18.99	19.00	19.00
	3	19.00	19.03	19.00	18.99
	4	18.95	18.97	18.97	18.99

See next pages for actual measured spectrum plots.

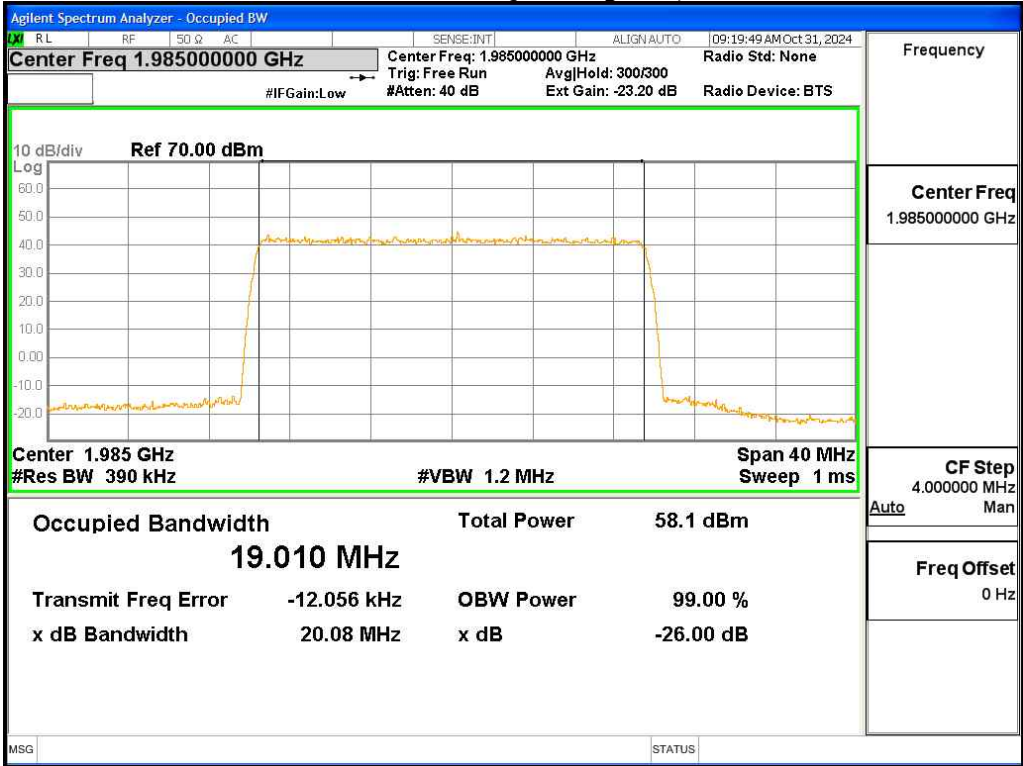
NR 1C 20 MHz_QPSK_Highest, Port 3



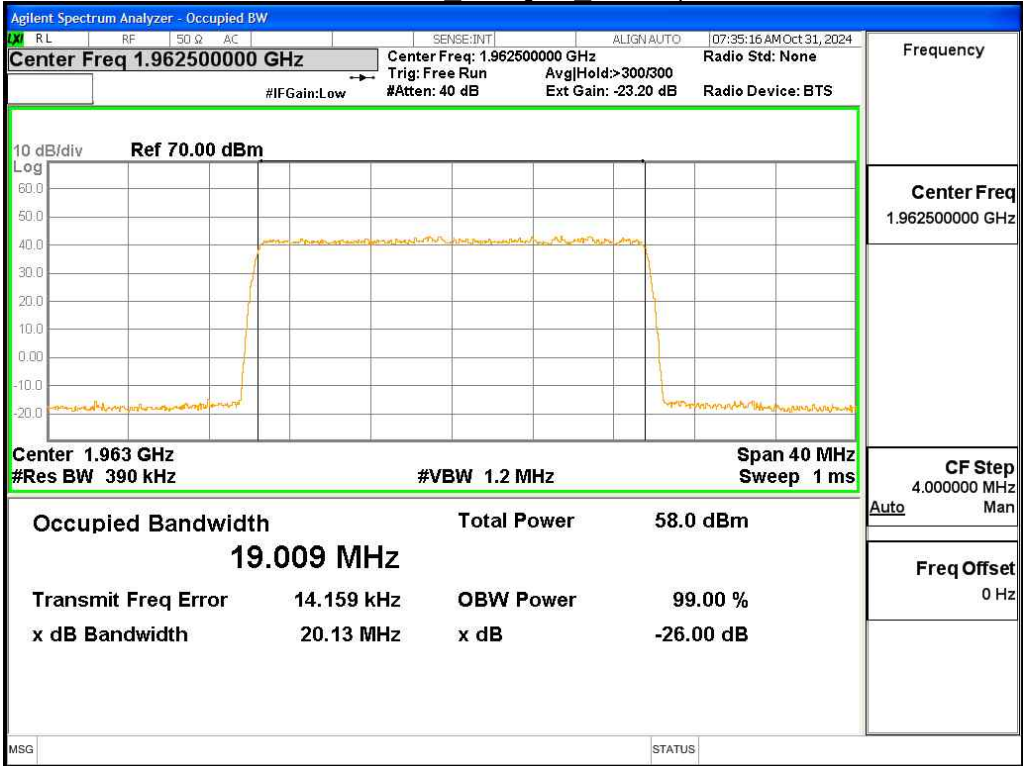
NR 1C 20 MHz_16QAM_Highest, Port 3



NR 1C 20 MHz_64QAM_Highest, Port 1



NR 1C 20 MHz_256QAM_Middle, Port 2

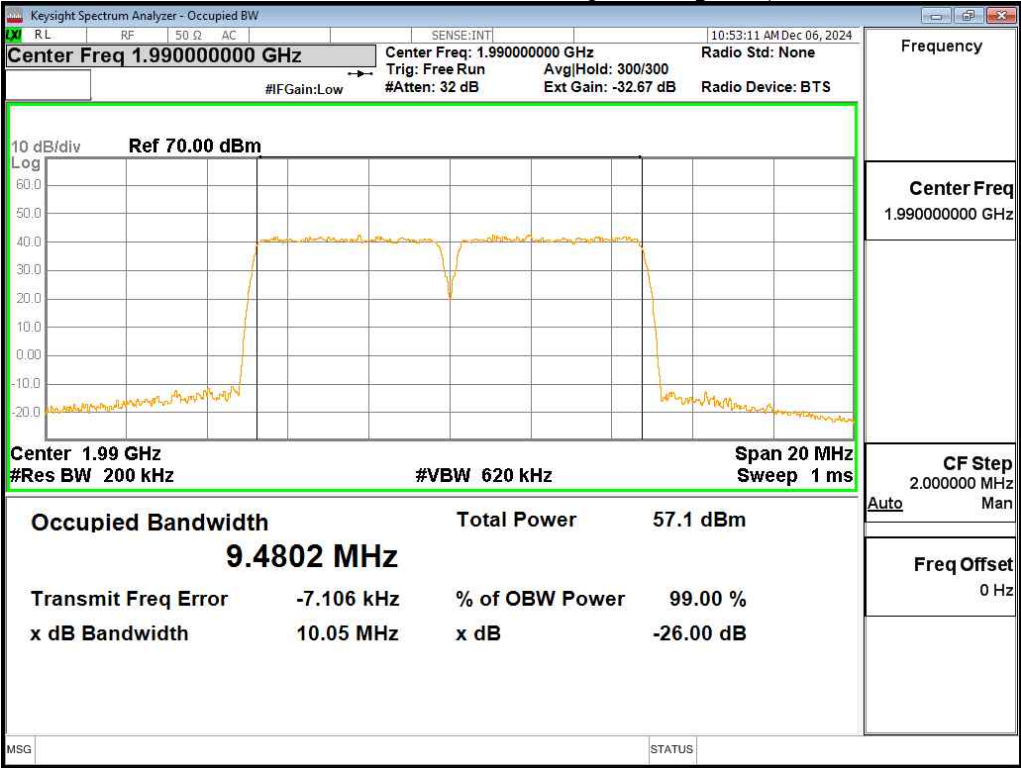


Test mode : LTE 1C 5 MHz + NR 1C 5 MHz

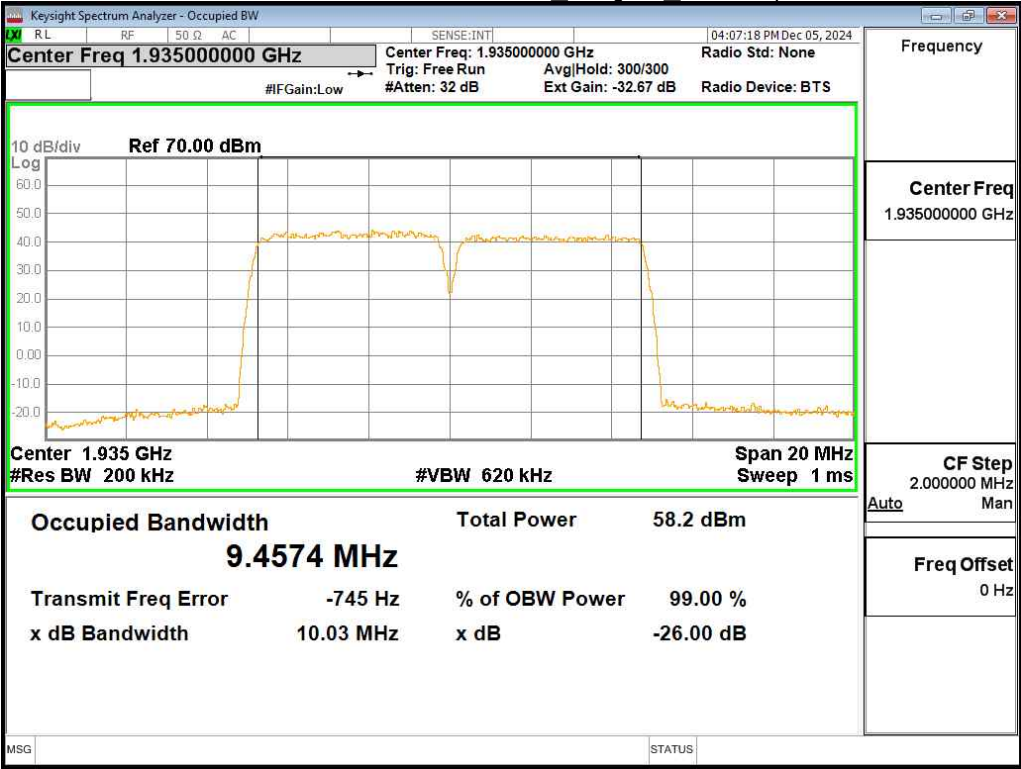
Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	9.47	9.45	9.46	9.46
	2	9.46	9.46	9.47	9.46
	3	9.46	9.46	9.47	9.46
	4	9.47	9.45	9.46	9.47
Middle	1	9.47	9.45	9.47	9.48
	2	9.47	9.46	9.46	9.47
	3	9.47	9.46	9.48	9.47
	4	9.48	9.45	9.48	9.46
highest	1	9.47	9.45	9.46	9.47
	2	9.47	9.46	9.45	9.47
	3	9.48	9.46	9.47	9.47
	4	9.47	9.45	9.46	9.47

See next pages for actual measured spectrum plots.

LTE 1C 5 MHz + NR 1C 5 MHz_QPSK_Highest, Port 3



LTE 1C 5 MHz + NR 1C 5 MHz_16QAM_Lowest, Port 2

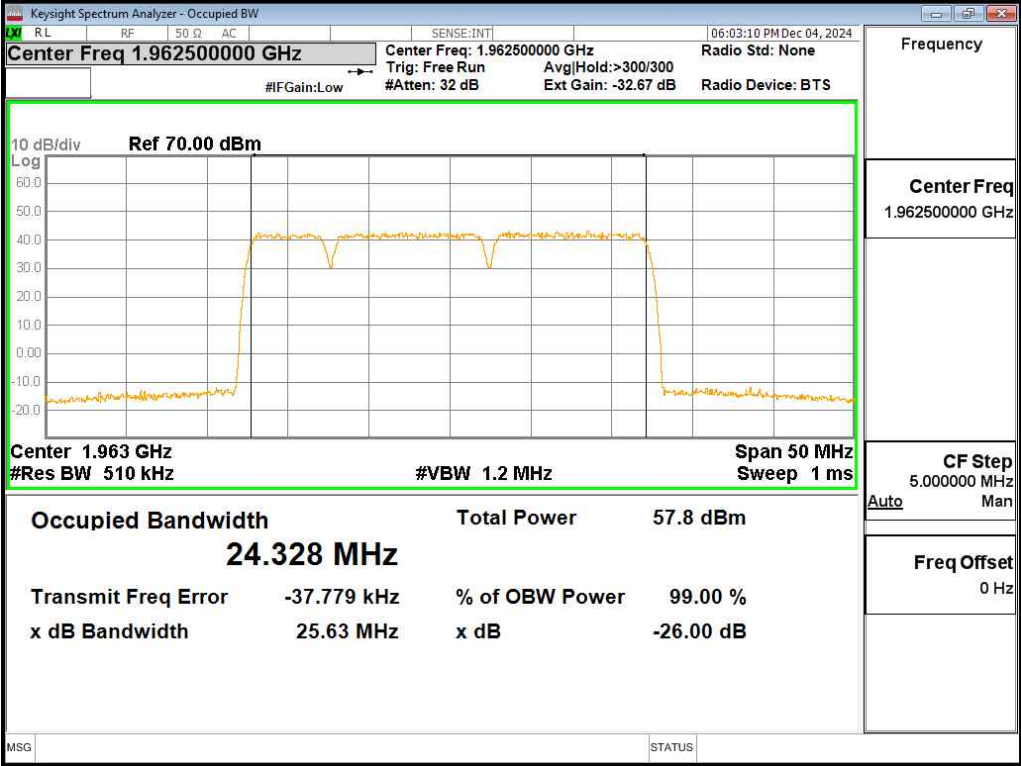


Test mode : LTE 2C 5 MHz + 10 MHz + NR 1C 10 MHz

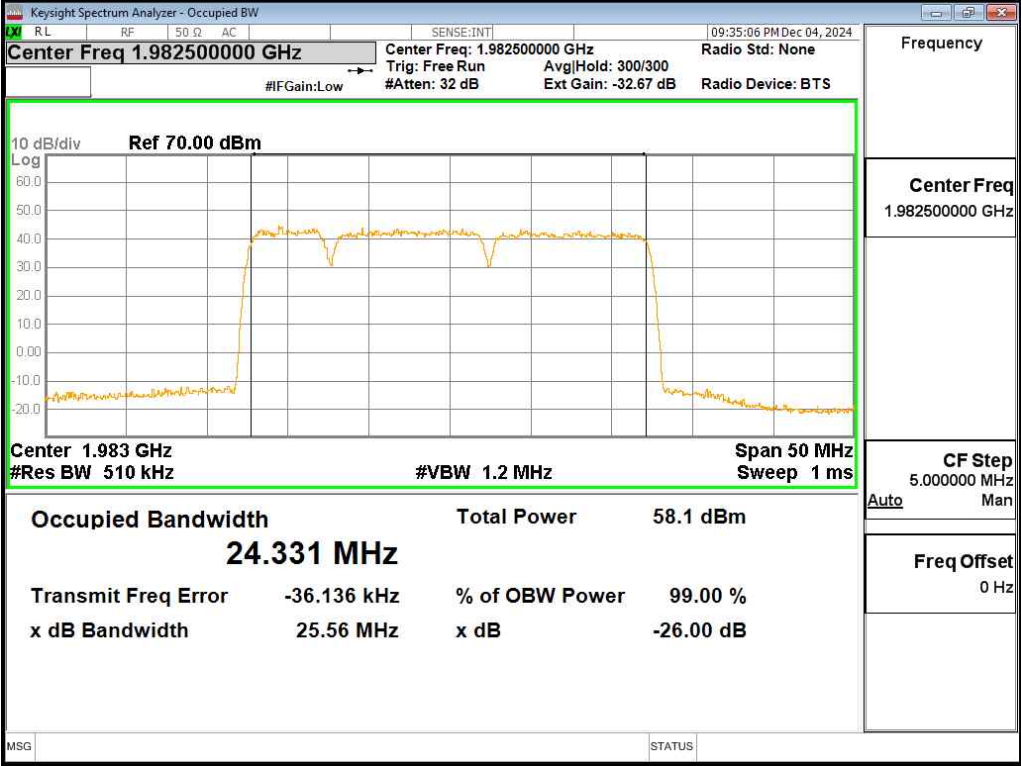
Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	24.30	24.28	24.30	24.31
	2	24.31	24.32	24.27	24.31
	3	24.30	24.29	24.31	24.29
	4	24.31	24.32	24.30	24.29
Middle	1	24.33	24.31	24.33	24.34
	2	24.30	24.29	24.30	24.35
	3	24.30	24.32	24.31	24.32
	4	24.32	24.31	24.31	24.31
highest	1	24.29	24.31	24.28	24.33
	2	24.31	24.33	24.31	24.33
	3	24.31	24.30	24.29	24.33
	4	24.32	24.28	24.28	24.32

See next pages for actual measured spectrum plots.

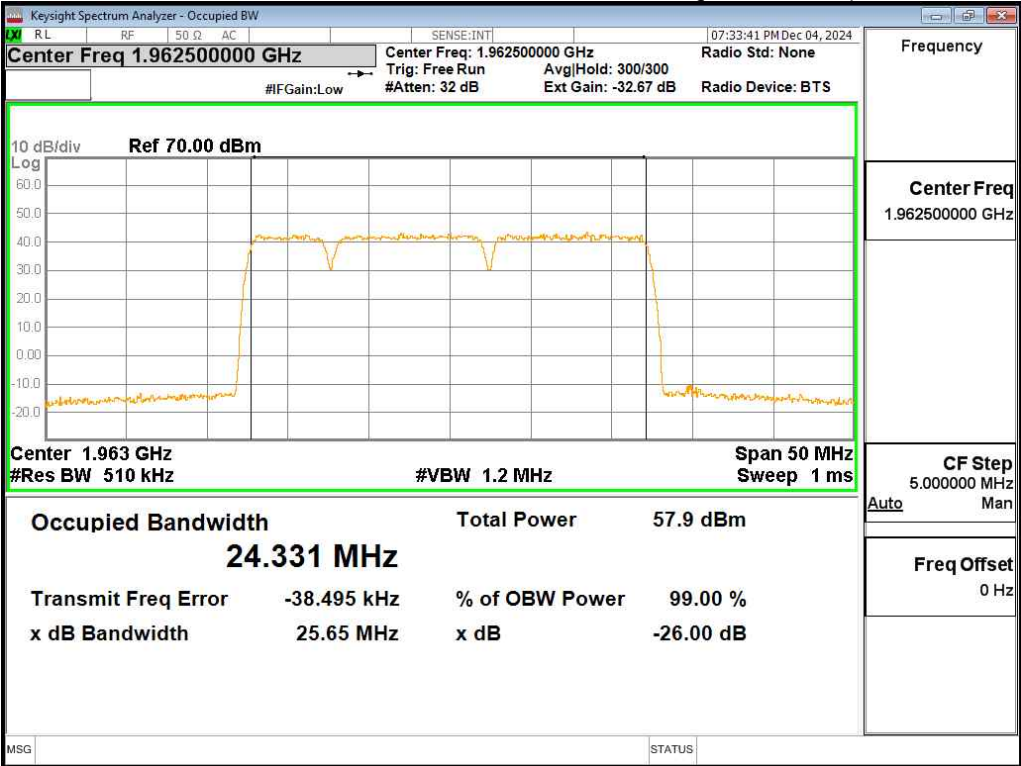
LTE 2C 5 MHz + 10 MHz + NR 1C 10 MHz_QPSK_Middle, Port 1



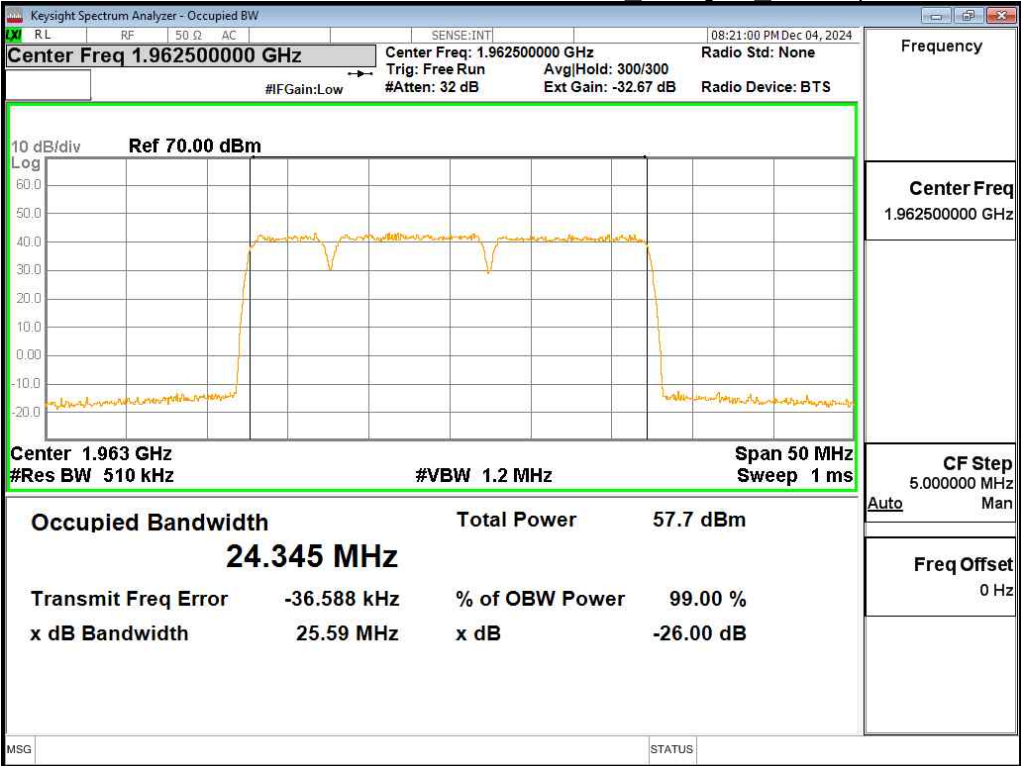
LTE 2C 5 MHz + 10 MHz + NR 1C 10 MHz_16QAM_Highest, Port 2



LTE 2C 5 MHz + 10 MHz + NR 1C 10 MHz_64QAM_Middle, Port 1



LTE 2C 5 MHz + 10 MHz + NR 1C 10 MHz_256QAM_Middle, Port 2



4.2 Conducted Average Output Power

Test Procedures :

KDB 971168 D01 v03r01 – Section 5
 KDB 662911 D01 v02r01 – Section E)
 ANSI C63.26-2015 – Section 5.2.4.4.1

Test Settings :

Conducted power measurements are performed using the "channel power mode" function of the signal analyzer.

Center frequency = the highest, middle and the lowest channels

- | | |
|--|---|
| a) RBW = 1 ~ 5 % of the expected OBW | b) VBW $\geq 3 \times$ RBW |
| c) span ≥ 2 to $3 \times$ RBW | d) Sweep time = auto couple |
| e) Detector = power averaging (rms). | f) Trace mode = trace average |
| g) Allow trace to fully stabilize | h) Sweep point $\geq 2 \times$ span / RBW |
| h) Use peak marker function to determine the peak amplitude level. | |

Test Notes :

- The port with highest power i.e. worst case port per modulation has been highlighted in the following power tables.
- MIMO calculations are done considering output channel power for all ports and respective are calculated.
- Consider the following factors for MIMO Output Power:
 - Conducted power for each port is measured in dBm.
 - Powers are summed up in linear using the measure-and-sum technique defined in KDB 662911 D01 v02r01-Section D.
 - Conducted power per port dBm is converted to a linear value mW. A summation of linear powers for all ports gives us the total MIMO conducted power in mW.
 We convert this back to logarithmic scale dBm.

Limit :

N/A

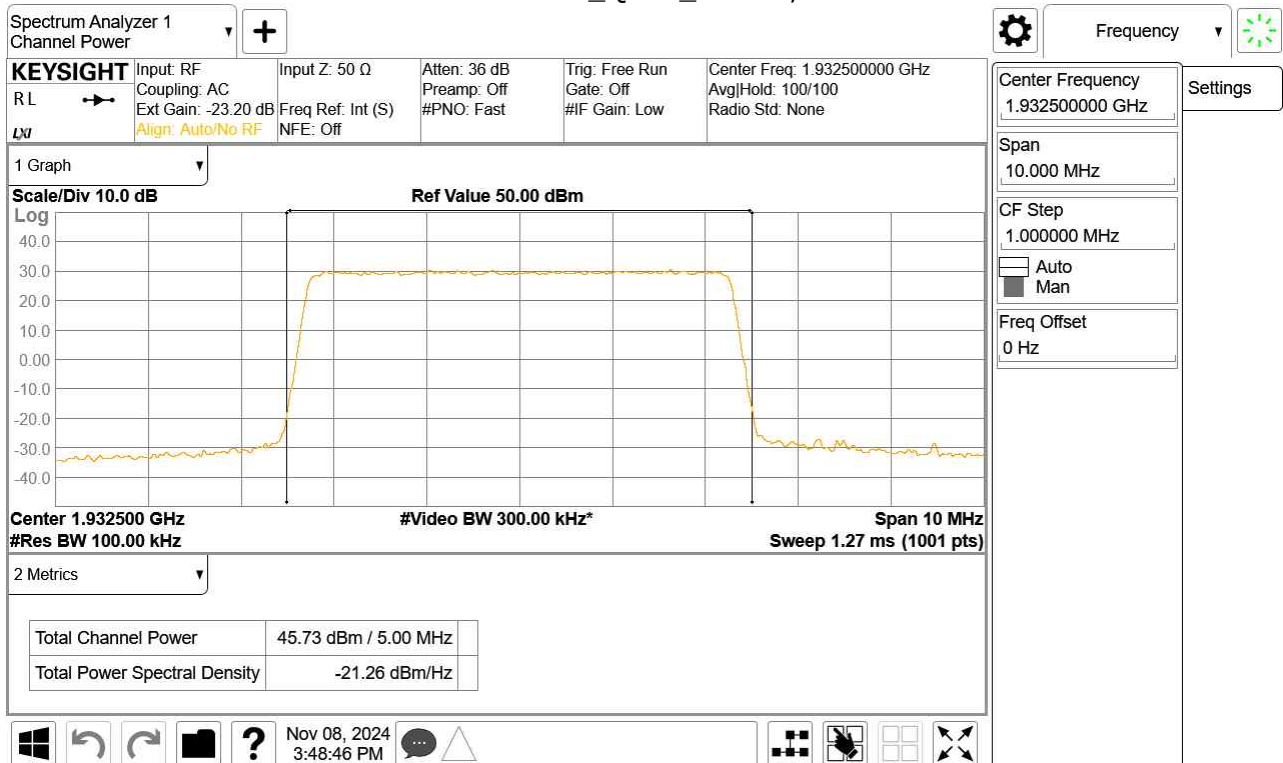
Test Data :

Test mode : LTE 1C 5 MHz

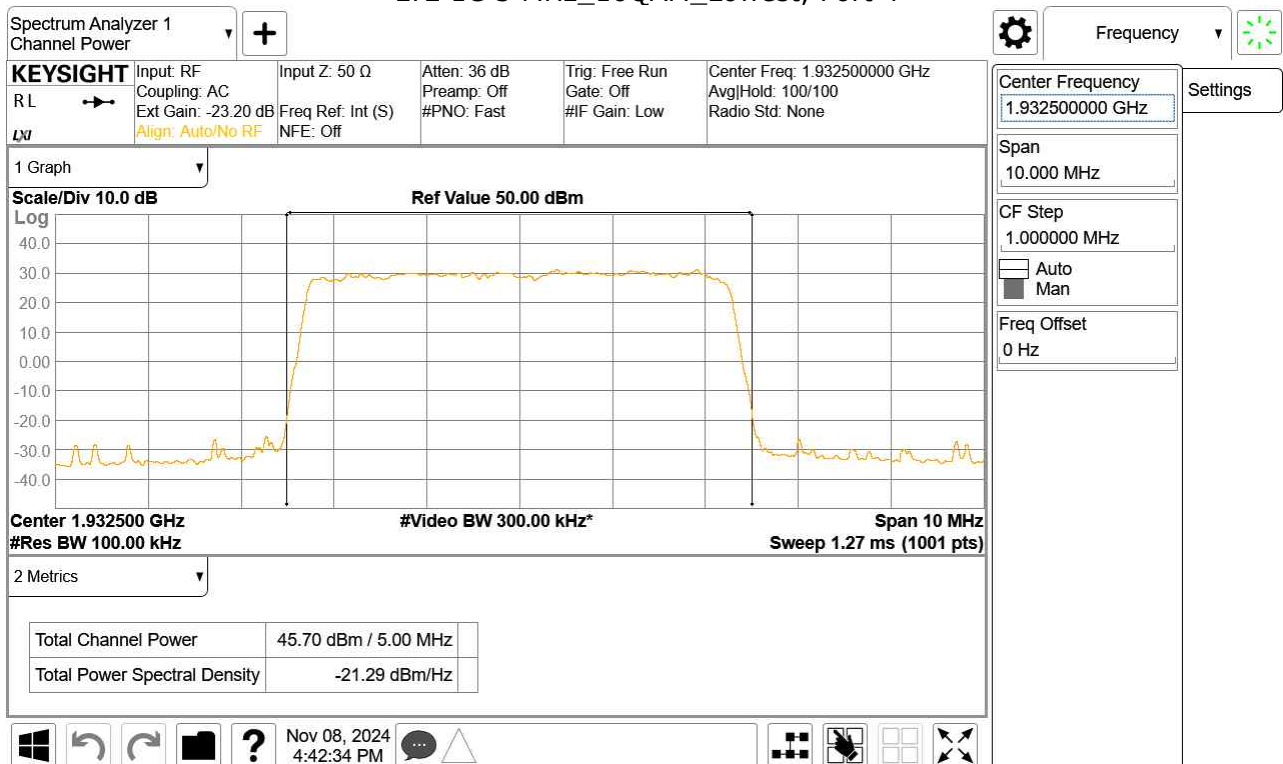
Channel	Port	Conducted Average Output Power (dBm)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	45.73	45.61	45.74	45.76
	2	45.48	45.53	45.60	45.63
	3	45.66	45.69	45.74	45.69
	4	45.68	45.70	45.72	45.78
Total MIMO Conducted Power(mW)		146525.09	146340.38	148627.42	149142.19
Total MIMO Conducted Power (dBm)		51.66	51.65	51.72	51.74
Middle	1	45.73	45.61	45.74	45.76
	2	45.48	45.53	45.60	45.63
	3	45.66	45.69	45.74	45.69
	4	45.68	45.70	45.72	45.78
Total MIMO Conducted Power(mW)		151140.5	145073.9	143621.1	146263.7
Total MIMO Conducted Power (dBm)		51.79	51.62	51.57	51.65
Highest	1	45.73	45.61	45.74	45.76
	2	45.48	45.53	45.60	45.63
	3	45.66	45.69	45.74	45.69
	4	45.68	45.70	45.72	45.78
Total MIMO Conducted Power(mW)		145359.4	140906.2	146024.7	145350.2
Total MIMO Conducted Power (dBm)		51.62	51.49	51.64	51.62

See next pages for actual measured spectrum plots.

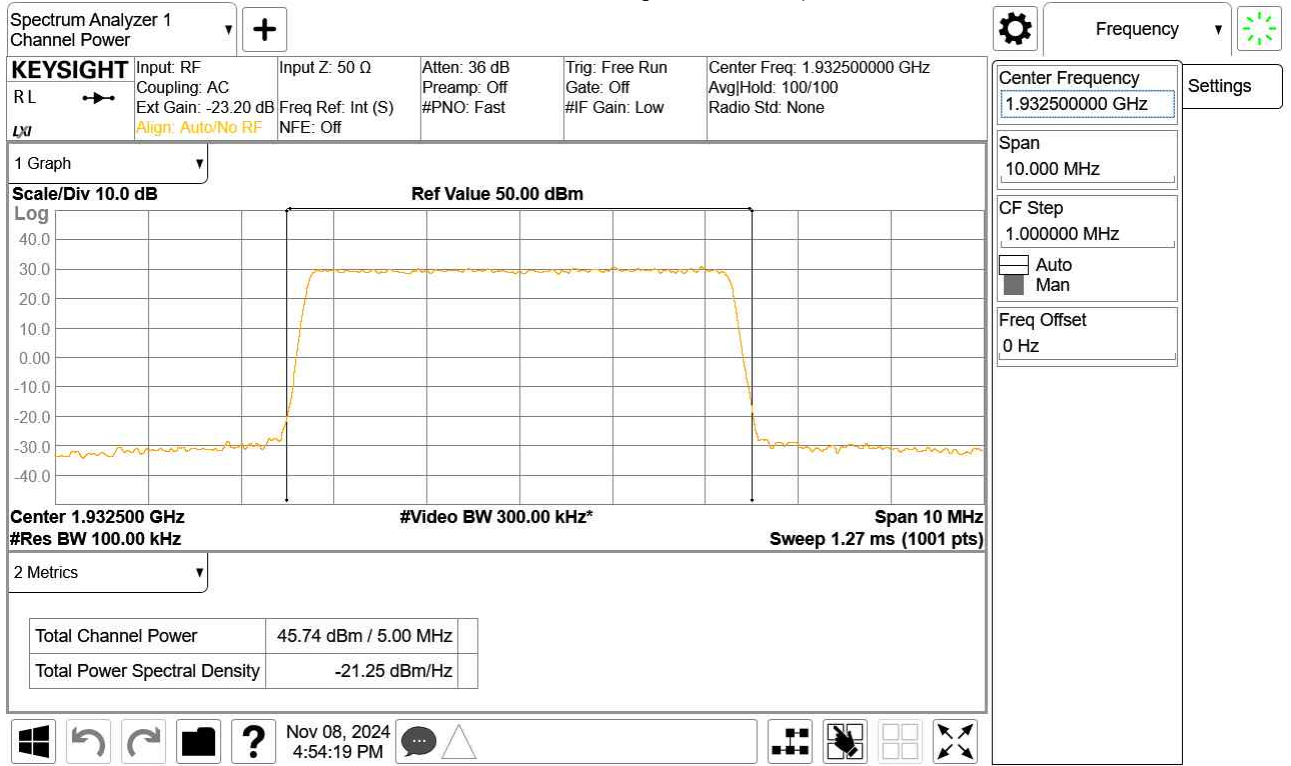
LTE 1C 5 MHz_QPSK_Lowest, Port 1



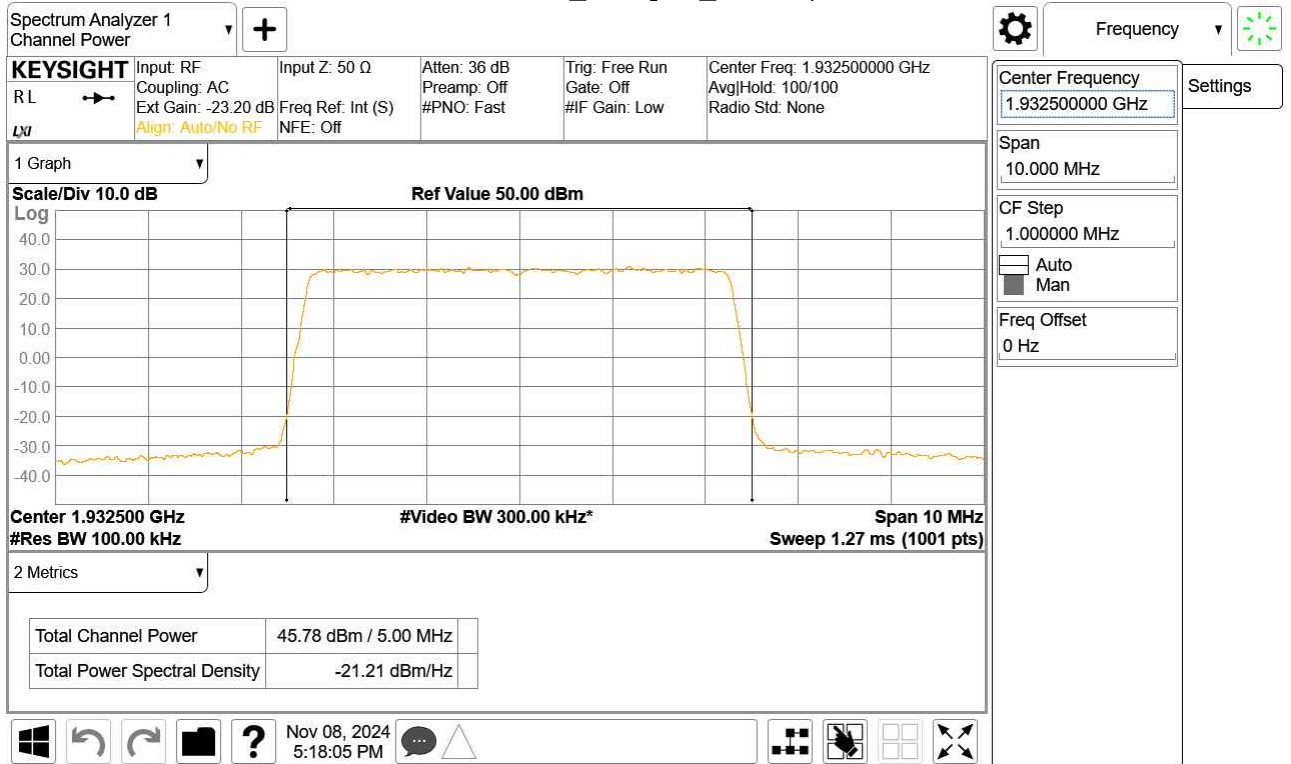
LTE 1C 5 MHz_16QAM_Lowest, Port 4



LTE 1C 5 MHz_64QAM_Lowest, Port 1



LTE 1C 5 MHz_256QAM_Lowest, Port 4

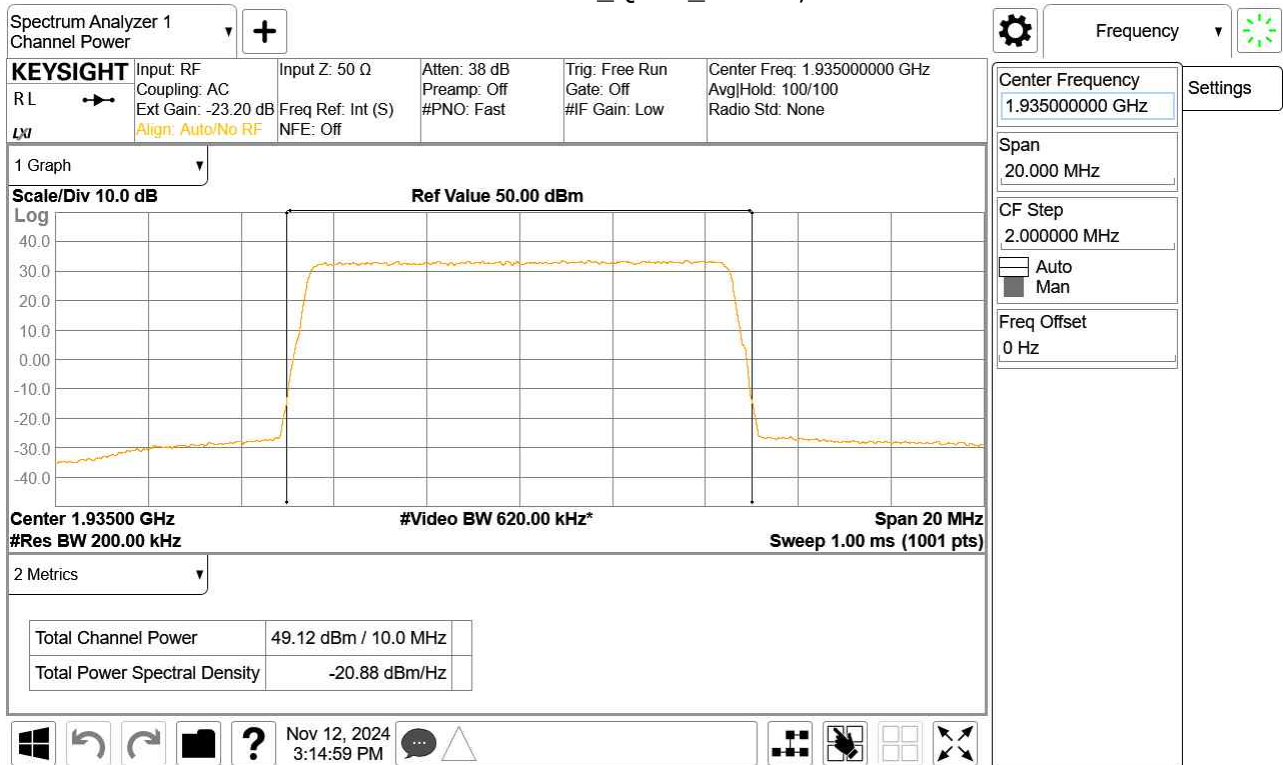


Test mode : LTE 1C 10 MHz

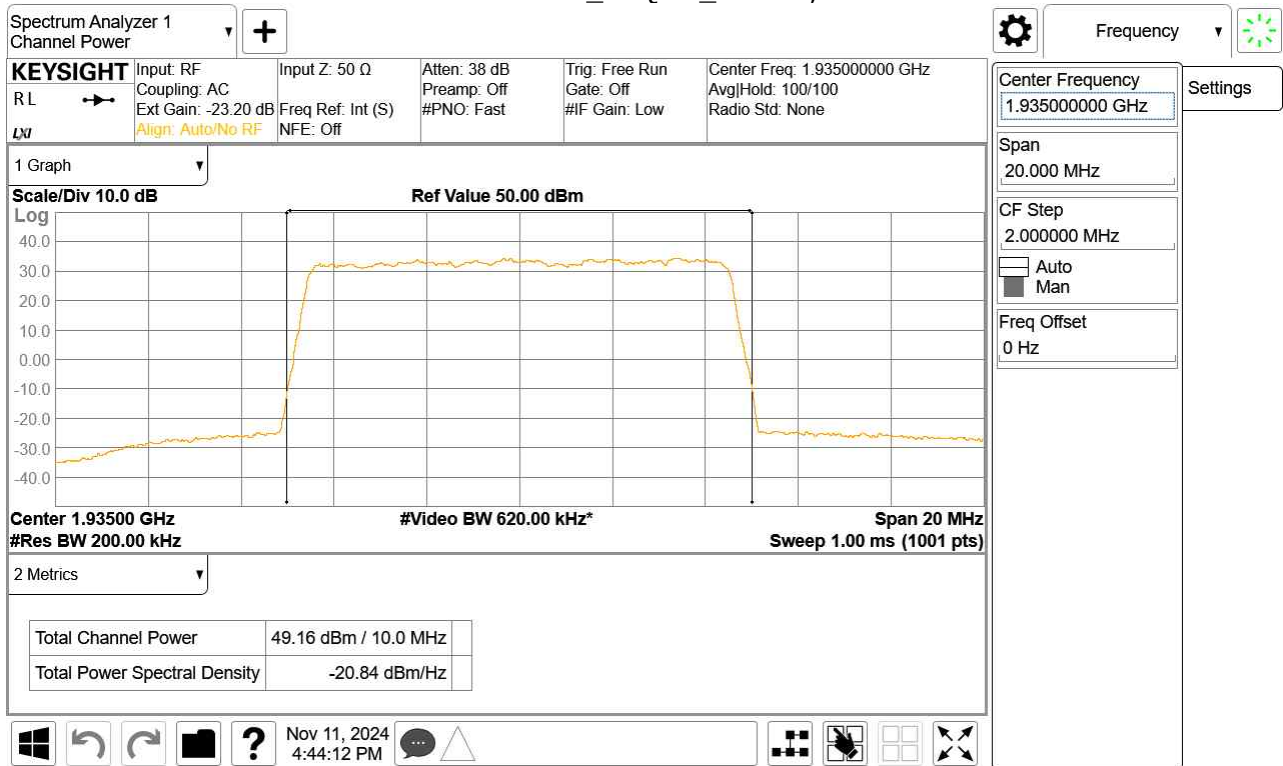
Channel	Port	Conducted Average Output Power (dBm)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	49.11	49.09	49.13	49.17
	2	48.81	48.81	48.85	48.92
	3	48.87	48.90	48.90	48.99
	4	49.12	49.16	49.15	49.17
Total MIMO Conducted Power(mW)		316251.64	317167.26	318431.60	322440.73
Total MIMO Conducted Power (dBm)		55.00	55.01	55.03	55.08
Middle	1	49.11	49.05	49.10	49.08
	2	48.91	48.77	48.76	48.75
	3	49.01	48.86	48.92	48.90
	4	49.10	48.99	49.04	49.05
Total MIMO Conducted Power(mW)		320173.1	311851.3	314596.2	313876.3
Total MIMO Conducted Power (dBm)		55.05	54.94	54.98	54.97
Highest	1	49.12	49.13	49.16	49.18
	2	48.84	48.78	48.81	48.82
	3	48.89	48.87	48.89	48.91
	4	49.03	48.96	49.00	49.04
Total MIMO Conducted Power(mW)		315647.5	313150.6	315325.4	316973.6
Total MIMO Conducted Power (dBm)		54.99	54.96	54.99	55.01

See next pages for actual measured spectrum plots.

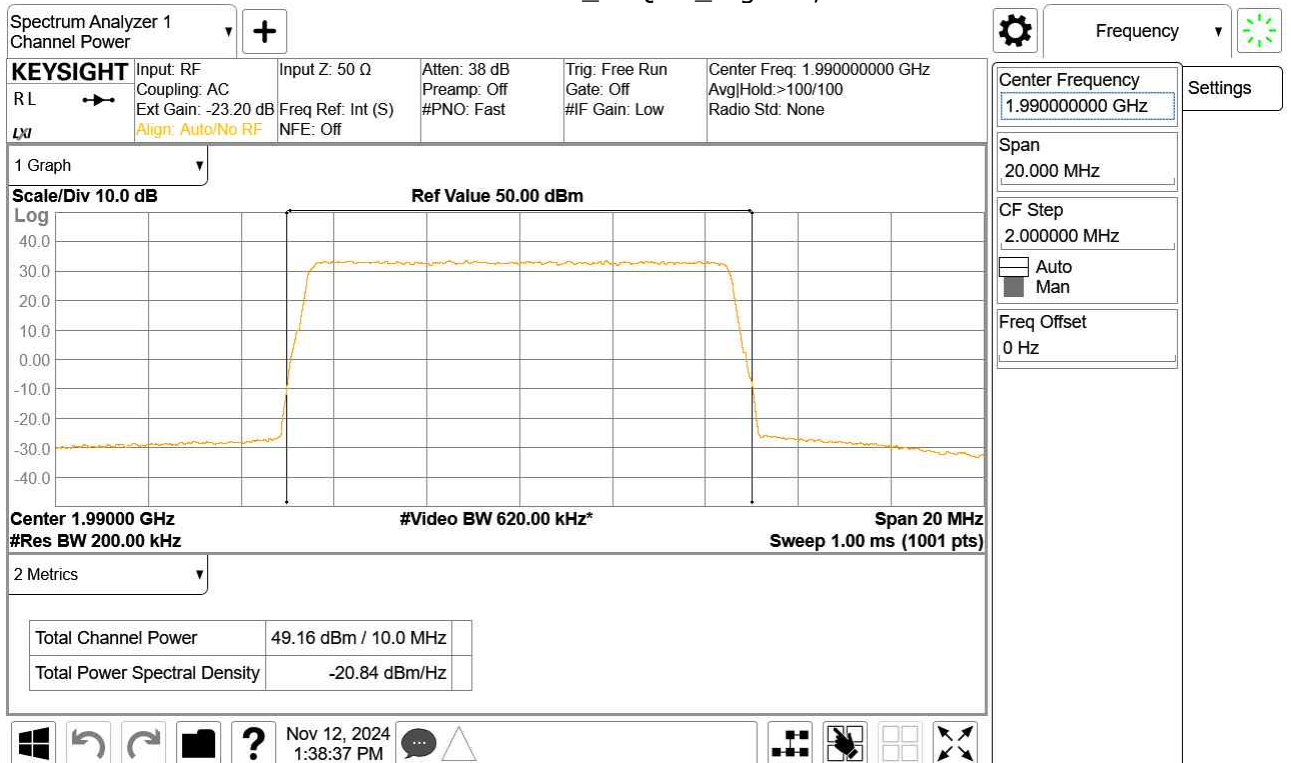
LTE 1C 10 MHz_QPSK_Lowest, Port 4



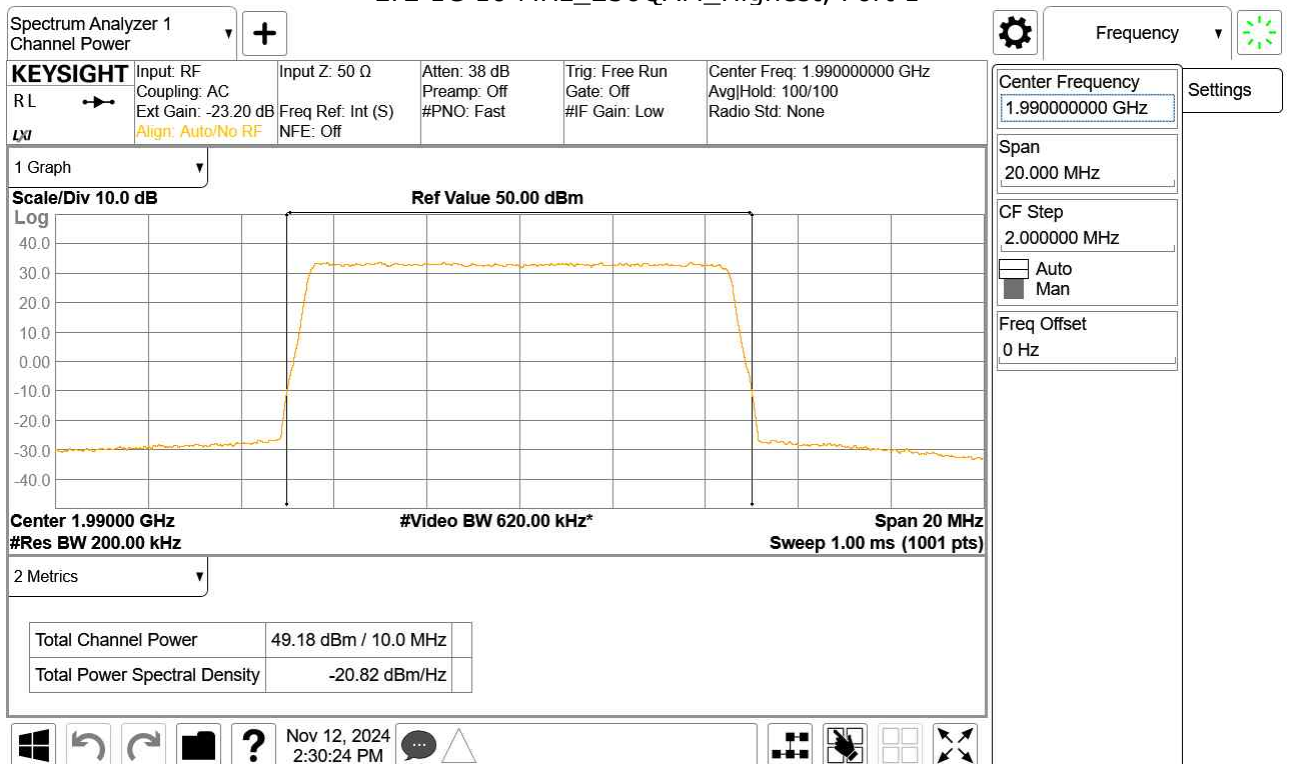
LTE 1C 10 MHz_16QAM_Lowest, Port 4



LTE 1C 10 MHz_64QAM_Highest, Port 1



LTE 1C 10 MHz_256QAM_Highest, Port 1

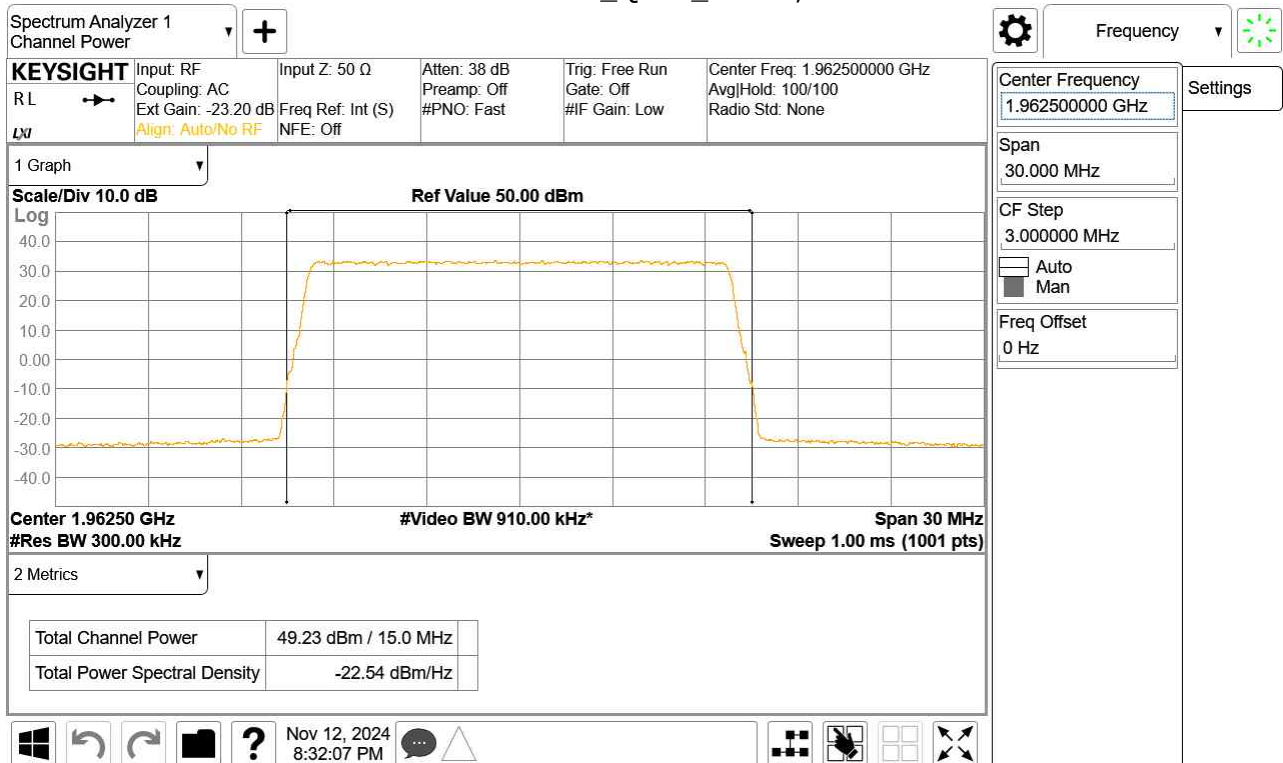


Test mode : LTE 1C 15 MHz

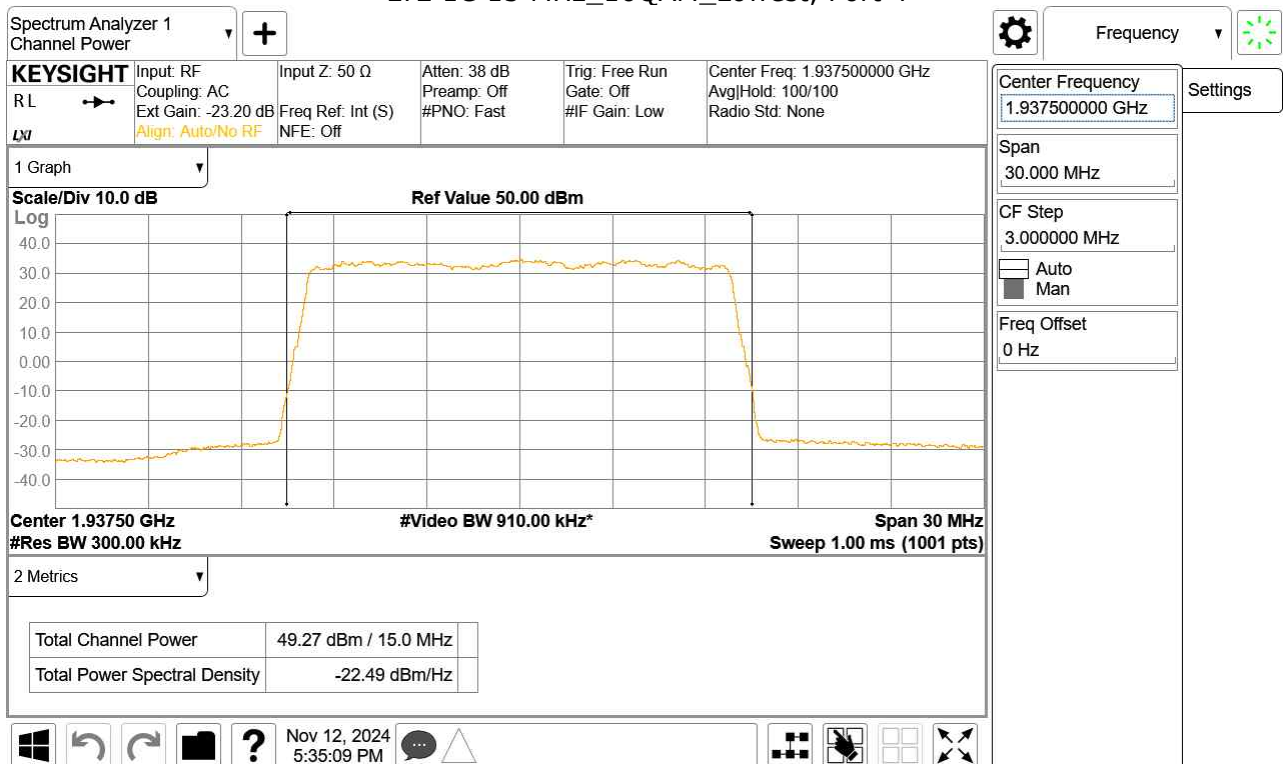
Channel	Port	Conducted Average Output Power (dBm)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	49.16	49.16	49.22	49.25
	2	48.86	48.89	48.96	48.90
	3	48.94	49.03	48.98	48.93
	4	49.18	49.27	49.26	49.22
Total MIMO Conducted Power(mW)		320464.04	324371.30	325666.22	323487.31
Total MIMO Conducted Power (dBm)		55.06	55.11	55.13	55.10
Middle	1	49.19	49.06	49.14	49.15
	2	48.92	48.85	48.86	48.88
	3	49.09	48.91	49.01	48.99
	4	49.23	49.05	49.07	49.08
Total MIMO Conducted Power(mW)		325817.1	315430.3	319287.6	319652
Total MIMO Conducted Power (dBm)		55.13	54.99	55.04	55.05
Highest	1	49.20	49.03	49.13	49.20
	2	48.85	48.75	48.84	48.87
	3	48.92	48.89	48.91	48.90
	4	49.04	48.94	49.02	49.00
Total MIMO Conducted Power(mW)		318063.3	310762	316009.3	317324.3
Total MIMO Conducted Power (dBm)		55.03	54.92	55.00	55.02

See next pages for actual measured spectrum plots.

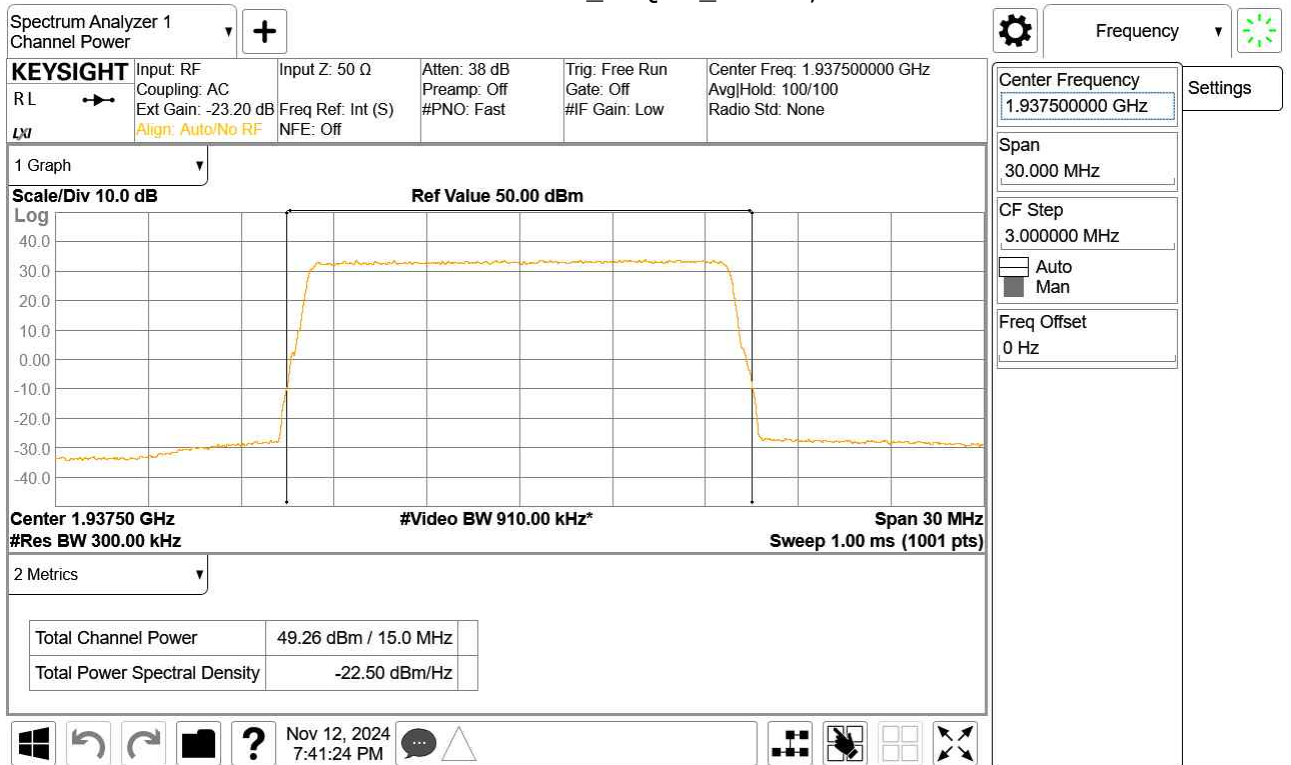
LTE 1C 15 MHz_QPSK_Middle, Port 4



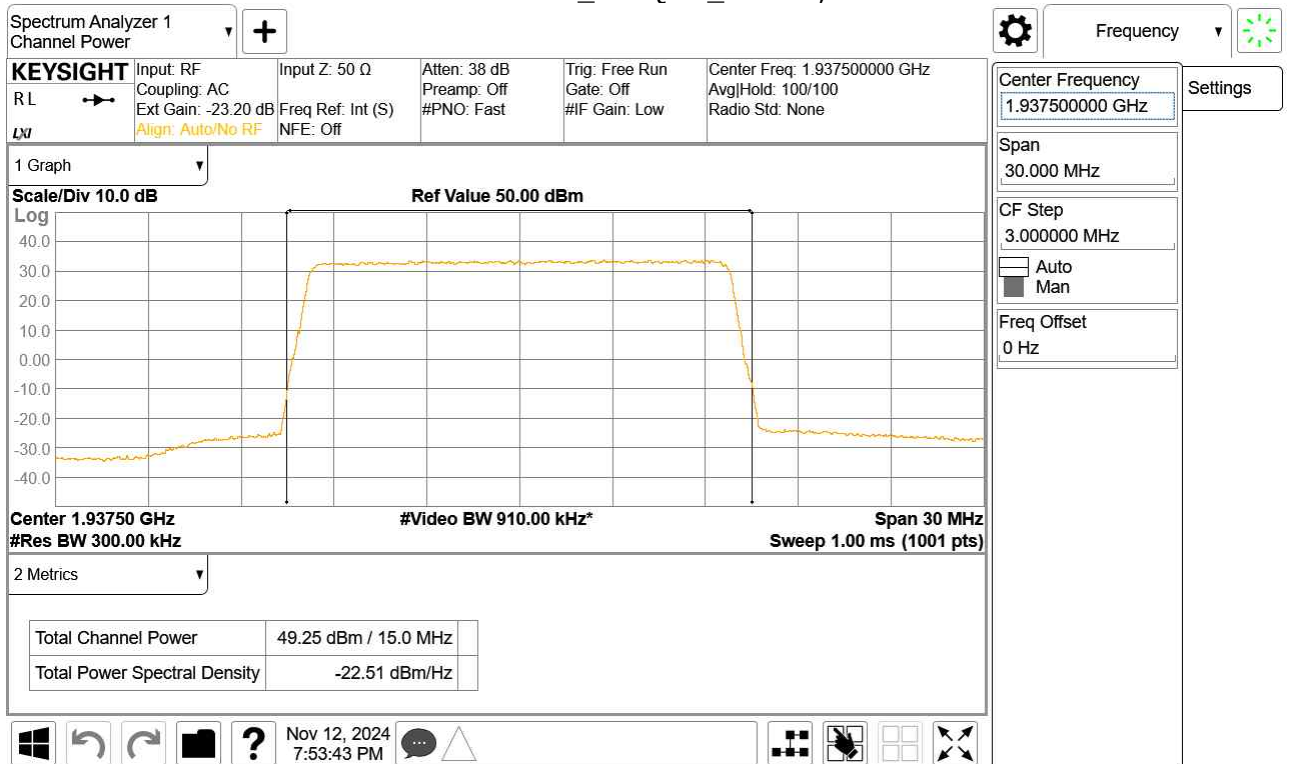
LTE 1C 15 MHz_16QAM_Lowest, Port 4



LTE 1C 15 MHz_64QAM_Lowest, Port 4



LTE 1C 15 MHz_256QAM_Lowest, Port 1

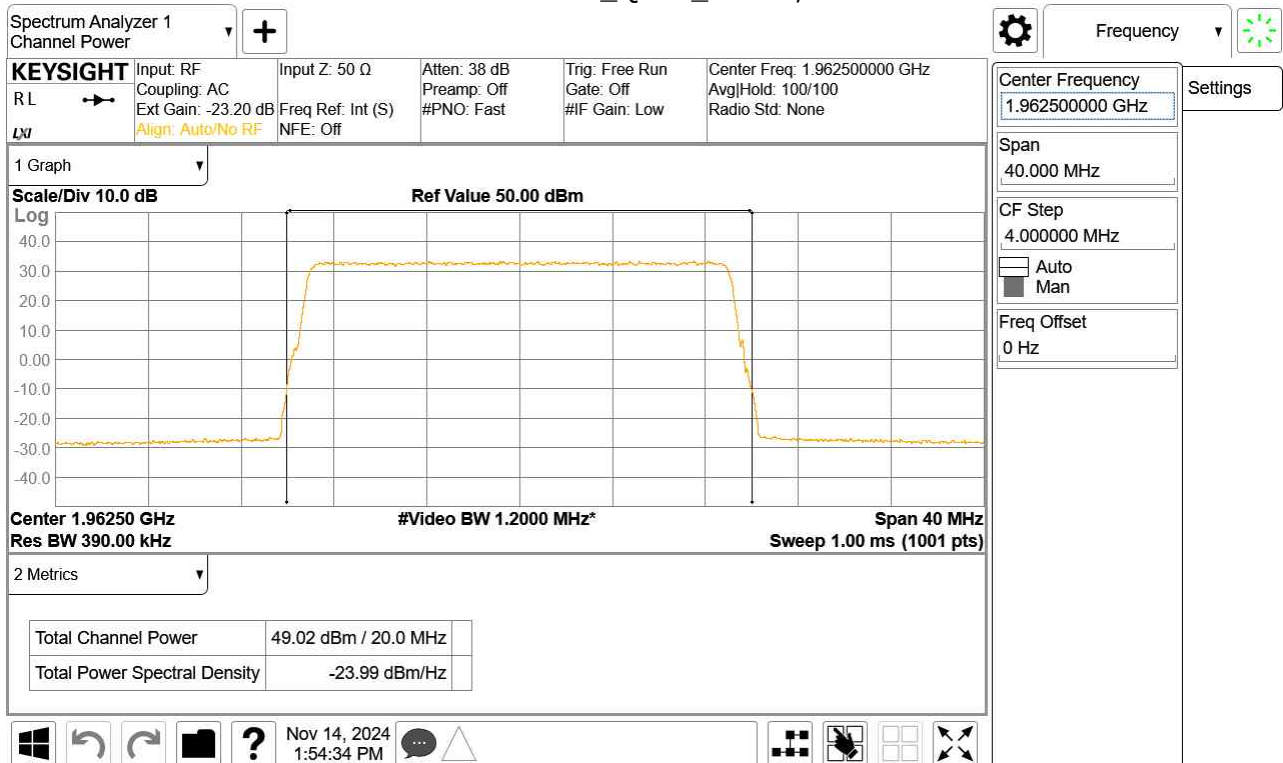


Test mode : LTE 1C 20 MHz

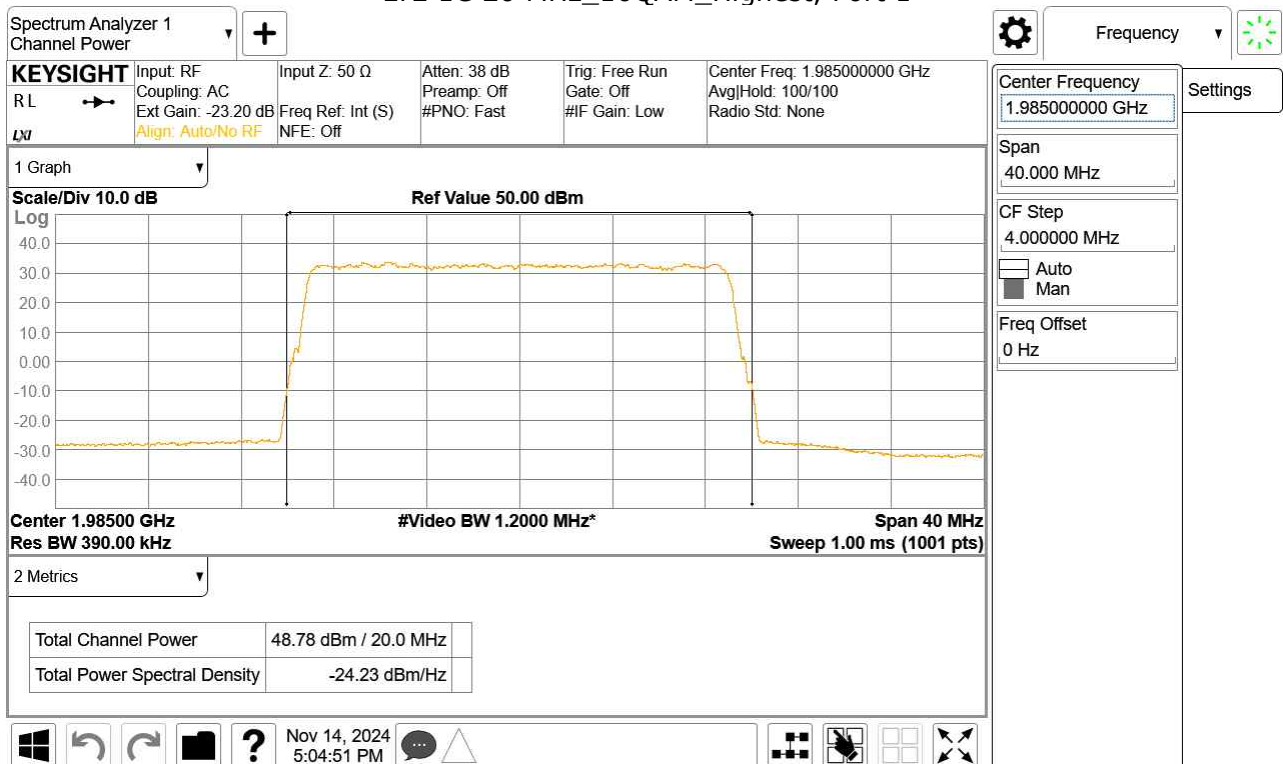
Channel	Port	Conducted Average Output Power (dBm)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	48.96	48.72	48.97	48.97
	2	48.71	48.44	48.69	48.72
	3	48.78	48.48	48.75	48.85
	4	49.01	48.69	48.97	49.02
Total MIMO Conducted Power(mW)		308131.65	288726.27	306721.97	309894.83
Total MIMO Conducted Power (dBm)		54.89	54.60	54.87	54.91
Middle	1	49.02	48.74	48.97	48.80
	2	48.68	48.51	48.68	48.47
	3	48.87	48.61	48.76	48.64
	4	49.00	48.63	48.84	48.68
Total MIMO Conducted Power(mW)		310113.1	291331.1	304398.4	293069.3
Total MIMO Conducted Power (dBm)		54.92	54.64	54.83	54.67
Highest	1	48.81	48.78	48.72	48.83
	2	48.41	48.44	48.38	48.47
	3	48.56	48.54	48.40	48.63
	4	48.57	48.55	48.51	48.59
Total MIMO Conducted Power(mW)		289099.5	288396.4	283479.3	291913.5
Total MIMO Conducted Power (dBm)		54.61	54.60	54.53	54.65

See next pages for actual measured spectrum plots.

LTE 1C 20 MHz_QPSK_Middle, Port 1



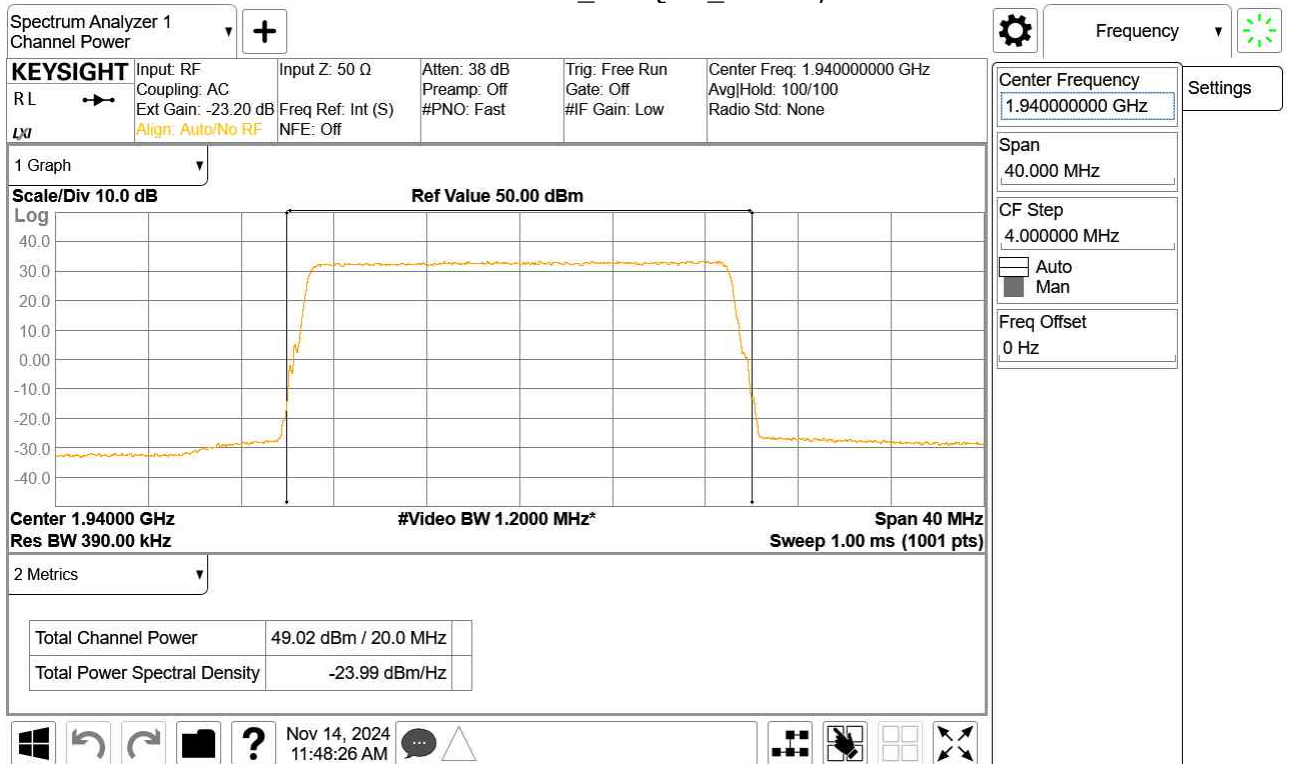
LTE 1C 20 MHz_16QAM_Highest, Port 1



LTE 1C 20 MHz_64QAM_Lowest, Port 1



LTE 1C 20 MHz_256QAM_Lowest, Port 4



Test mode : LTE 2C 5 MHz + 5 MHz

Channel	Port	Conducted Average Output Power (dBm)			
		QPSK	16QAM	64QAM	256QAM
lowest	1	48.75	48.79	48.77	48.84
	2	48.49	48.59	48.51	48.60
	3	48.62	48.64	48.61	48.64
	4	48.79	48.76	48.79	48.76
Total MIMO Conducted Power(mW)		294082.45	296236.47	294587.22	297279.45
Total MIMO Conducted Power (dBm)		54.68	54.72	54.69	54.73
Middle	1	48.86	48.72	48.86	48.98
	2	48.59	48.51	48.59	48.70
	3	48.67	48.58	48.67	48.82
	4	48.69	48.60	48.68	48.84
Total MIMO Conducted Power(mW)		296771.3	289985.3	296601.2	305966.4
Total MIMO Conducted Power (dBm)		54.72	54.62	54.72	54.86
Highest	1	48.83	48.85	48.84	48.87
	2	48.54	48.54	48.59	48.52
	3	48.70	48.61	48.67	48.63
	4	48.70	48.59	48.68	48.63
Total MIMO Conducted Power(mW)		296095.3	293073.4	296247.8	294103.2
Total MIMO Conducted Power (dBm)		54.71	54.67	54.72	54.68

See next pages for actual measured spectrum plots.