

# MEASUREMENT REPORT

## FCC PART 27 Subpart O

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**FCC ID:** 2AD8UAWHQT01  
**Application:** Nokia Solutions and Networks, OY  
**Application Type:** Certification  
**Product:** AirScale Indoor Radio 4G+5G ASiR-pRRH  
**Model No.:** AWHQT  
**Brand Name:** Nokia  
**FCC Rule Part(s):** Part 27 Subpart O  
**Test Procedure(s):** ANSI C63.26: 2015  
**Test Date:** July 13 ~ August 02, 2021

Reviewed By:

*Paddy Chen*

Paddy Chen

Approved By:

*Chenz Ker*

Chenz Ker



Testing Laboratory  
3261

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.26-2015. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Taiwan) Co., Ltd.

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## Revision History

Report No.	Version	Description	Issue Date	Note
2107TW0005-U1	Rev. 01	Initial Report	09-07-2021	Valid

Note: Here is only the different antenna between FCC ID “2AD8UAWHQS01 & “2AD8UAWHQT01”, and the other circuits are the same. This report reused the conducted measurements results of FCC ID “2AD8UAWHQS01”.

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## General Information

<b>Applicant:</b>	Nokia Solutions and Networks, OY
<b>Applicant Address:</b>	2000 W. Lucent Lane, Naperville, Illinois, United States, 60563
<b>Manufacturer:</b>	Nokia Solutions and Networks, OY
<b>Manufacturer Address:</b>	2000 W. Lucent Lane, Naperville, Illinois, United States, 60563
<b>Test Site:</b>	MRT Technology (Taiwan) Co., Ltd
<b>Test Site Address:</b>	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)

### Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Fuxing Rd., Taoyuan, Taiwan ( R.O.C )

- MRT facility is a FCC registered (Reg. No. 153292) test facility with the site description report on file and is designated by the FCC as an Accredited Test Film.
- MRT facility is an IC registered (MRT Reg. No. 21723-1) test laboratory with the site description on file at Industry Canada.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (TAF) under the American Association for Laboratory Accreditation Program (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC, Industry Taiwan, EU and TELEC Rules.

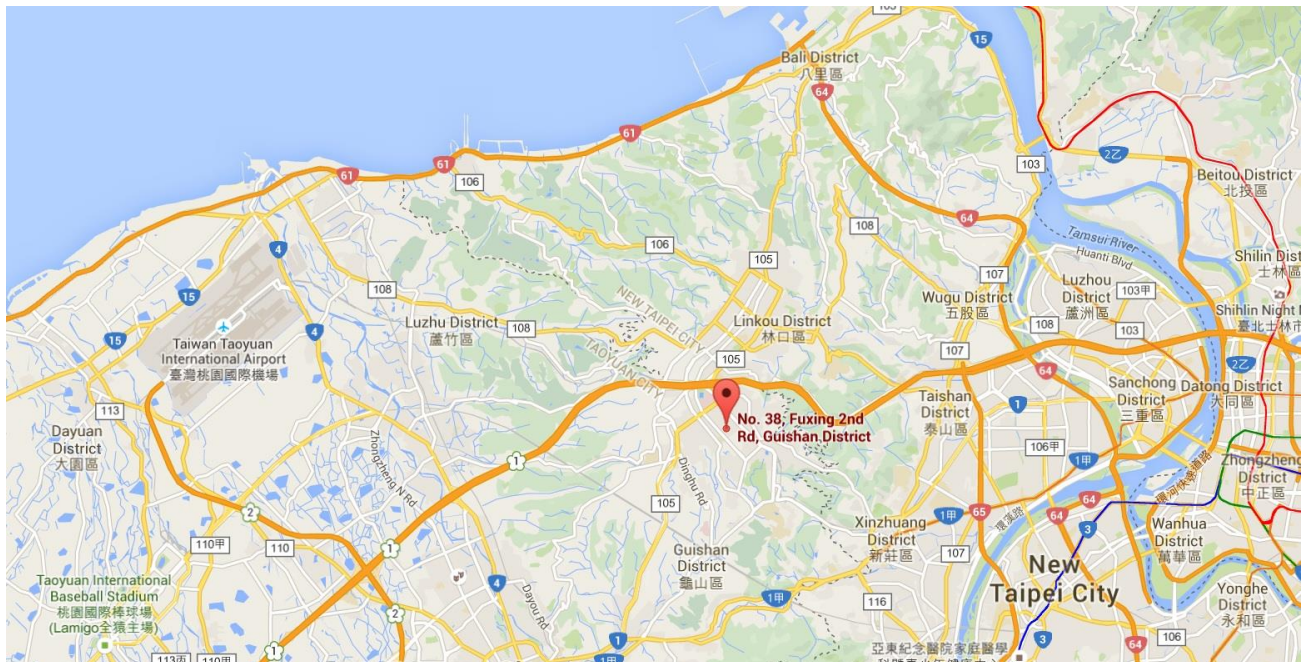
## 1. INTRODUCTION

### 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.


### 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



## 2. PRODUCT INFORMATION

### 2.1. Equipment Description

Product Name	AirScale Indoor Radio 4G+5G ASiR-pRRH
Model No.	AWHQT
Brand Name	Nokia
Operating Band (s)	5G NR: n77
Power Supply Rating:	PoE (43 ~ 57Vdc)
Emission Designator	Refer to Section 2.3
Antenna Specification	Refer to Section 2.4
Accessories	
AC to DC Adapter	Model: GA150SD2-5602679 Input: 100-240V ~ 50/60Hz, 2.5A Output: 56V  2.679A, 150.0W

### 2.2. Radio Specification under Test

LTE Band Specification	
Single Band	5G NR n77
T <sub>x</sub> Frequency Range	3700 ~ 3980 MHz
R <sub>x</sub> Frequency Range	3700 ~ 3980 MHz
Modulation	QPSK, 16QAM, 64QAM, 256QAM
Max EIRP Power	20 MHz: 35.12 dBm; 40 MHz: 35.14dBm; 60 MHz: 35.18dBm 80 MHz: 35.12dBm; 100 MHz: 35.08dBm 20+20 MHz: 35.13dBm; 100+100 MHz: 35.07dBm

### 2.3. Emission Designator

n77 (3700~3980MHz)		QPSK			16QAM		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	Designator	Tolerance (ppm)	Max Power (W)
20	3710 ~ 3970	18M4G7D	-	3.2509	18M3W7D	-	3.1989
40	3720 ~ 3960	37M9G7D	-	3.2509	38M0W7D	-	3.2659
60	3730 ~ 3950	58M0G7D	-	3.2734	57M8W7D	-	3.2359
80	3740 ~ 3940	77M5G7D	-	3.2434	77M6W7D	-	3.2063
100	3750 ~ 3930	97M5G7D	-	3.1696	97M4W7D	-	3.2211
20+20	3720 ~ 3960	38M2G7D	-	3.2211	38M2W7D	-	3.2584
100+100	3800 ~ 3880	195M7G7D	-	3.1623	196M2W7D	-	3.1405
n77 (3700~3980MHz)		64QAM			256QAM		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	Designator	Tolerance (ppm)	Max Power (W)
20	3710 ~ 3970	18M2W7D	-	3.2285	18M2W7D	-	3.1842
40	3720 ~ 3960	37M9W7D	-	3.2063	37M9W7D	-	3.2359
60	3730 ~ 3950	57M8W7D	-	3.2961	57M8W7D	-	3.2063
80	3740 ~ 3940	77M3W7D	-	3.2509	77M3W7D	-	3.2434
100	3750 ~ 3930	97M3W7D	-	3.1046	97M1W7D	-	3.1189
20+20	3720 ~ 3960	38M0W7D	-	3.1915	38M0W7D	-	3.2584
100+100	3800 ~ 3880	196M5W7D	-	3.0974	196M1W7D	-	3.2137



## 2.4. Description of Available Antennas

Band Support	Antenna Type	Nokia Code	Antenna Gain
n77	Flat Ceiling Antenna (External)	A0012103290003 A0012103290006	5dBi
Remark: 1. The transmit signals are completely uncorrelated with each other, directional gain = $G_{ANT}$ dBi, $G_{ANT}$ is the antenna gain in dBi; 2. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.			

## 2.5. Test Mode

Test Item	Channel Bandwidth	Modulation
Equivalent Isotropically Radiated Power	20MHz, 40MHz	QPSK, 16QAM, 64QAM, 256QAM
Emission Bandwidth	60MHz, 80MHz, 100MHz	
Conducted Spurious Emissions	20+20 MHz, 100+100MHz	QPSK
Band Edge Measurements		QPSK
Radiated Spurious Emissions	20MHz	QPSK
Peak to Average Ratio	20MHz, 40MHz 60MHz, 80MHz, 100MHz	QPSK
Frequency Stability	100MHz	QPSK
Remark: 1. This report has assessed the typical multi-carrier mode (symmetry mode).		

## 2.6. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

## 2.7. Labeling Requirements

Per 2.1074; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase.

However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device.

## 2.8. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20% ~ 75%RH

### 3. TEST EQUIPMENT CALIBRATION DATE

#### Radiated Emissions Test Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2021/10/05
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	MRTTWA00002	1 year	2022/05/06
Broadband Hornantenna	SCHWARZBECK	BBHA 9120D	MRTTWA00003	1 year	2022/04/21
Breitband Hornantenna	SCHWARZBECK	BBHA 9170	MRTTWA00004	1 year	2022/04/28
Broadband Preamplifier	SCHWARZBECK	BBV 9718	MRTTWA00005	1 year	2022/04/21
Broadband Amplifier	SCHWARZBECK	BBV 9721	MRTTWA00006	1 year	2022/04/26
Signal Analyzer	R&S	FSV40	MRTTWA00007	1 year	2022/03/23
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2022/03/24
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2021/10/14
EXA Signal Analyzer	KEYSIGHT	N9010B	MRTTWA00074	1 year	2022/07/13
Antenna Cable	HUBERSUHNER	SF106	MRTTWE00010	1 year	2022/06/15
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00032	1 year	2022/05/26
Cable	Rosnol	K1K50-UP026 4-K1K50-4M	MRTTWE00012	1 year	2022/06/20

#### Conducted Test Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
X-Series USB Peak and Average Power Sensor	KEYSIGHT	U2021XA	MRTTWA00014	1 year	2022/04/23
X-Series USB Peak and Average Power Sensor	KEYSIGHT	U2021XA	MRTTWA00015	1 year	2022/03/25
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2022/10/01
EXA Signal Analyzer	KEYSIGHT	N9010B	MRTTWA00074	1 year	2022/07/10
Signal Analyzer	R&S	FSV40	MRTTWA00007	1 year	2022/03/23
DC Power Supply	GWINSTEK	SPS-606	MRTTWA00034	Check by TRUE RMS MULTIMETER	
TRUE RMS MULTIMETER	FLUKE	117	MRTTWA00022	1 year	2022/05/05
Temperature & Humidity Chamber	TEN BILLION	TTH-B3UP	MRTTWA00036	1 year	2021/11/06
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00033	1 year	2022/03/08

Software	Version	Function
EMI Software	V3	EMI Test Software

#### 4. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

<b>Radiated Emission Measurement</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): 9kHz~30MHz: $\pm 3.92\text{dB}$ 30MHz~1GHz: $\pm 4.25\text{dB}$ 1GHz~18GHz: $\pm 4.40\text{dB}$ 18GHz~40GHz: $\pm 4.45\text{dB}$
<b>Spurious Emissions, Conducted</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): $\pm 2.65\text{ dB}$
<b>Output Power</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): $\pm 0.84\text{dB}$
<b>Frequency Error</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): $\pm 78.4\text{Hz}$
<b>Occupied Bandwidth</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): 3.3%

## 5. TEST RESULT

### 5.1. Summary

FCC Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1046; 27.50(j)(2)	Equivalent Isotropically Radiated Power	Refer to Section 5.2	Conducted	Pass	Section 5.2
2.1055; 27.54	Frequency Stability	Refer to Section 5.3		Pass	Section 5.3
2.1049	Emission Bandwidth	Refer to Section 5.4		Pass	Section 5.4
2.1046; 27.50(j)(4)	Peak to Average Ratio	Refer to Section 5.5		Pass	Section 5.6
27.53(l)(1)	Transmitter unwanted emissions (Band Edge)	Refer to Section 5.6		Pass	Section 5.5
2.1051; 27.53(l)(1)	Out-of-frequency Band unwanted Emissions	Refer to Section 5.7	Conducted & Radiated	Pass	Section 5.7

**Notes:**

- 1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 2) The Occupied Bandwidth, Frequency Stability and Conducted & Radiated Spurious Emission were presented the worst test data of modulation & antenna port in the test report.

## **5.2. Equivalent Isotropically Radiated Power Measurement**

### **5.2.1. Test Limit**

The Radiated Equivalent Isotropically Power shall be according to the specific rule Part 27.50(j)(2) that are limited to EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

### **5.2.2. Test Procedures Used**

ANSI C63.26-2015 - Section 5.2.4.2 & 5.2.5.5

### **5.2.3. Test Setting**

#### **Average Power Measurement**

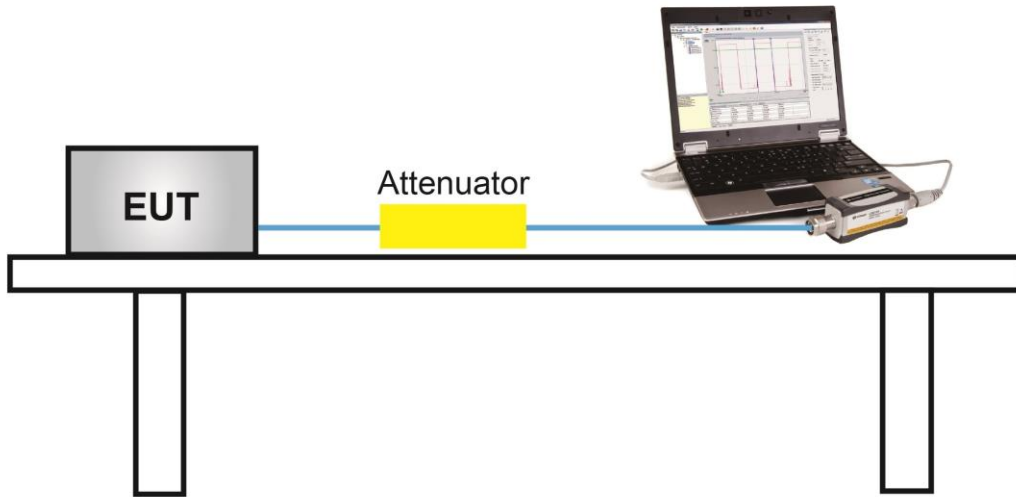
Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

#### **Average Power Spectral Density Measurement**

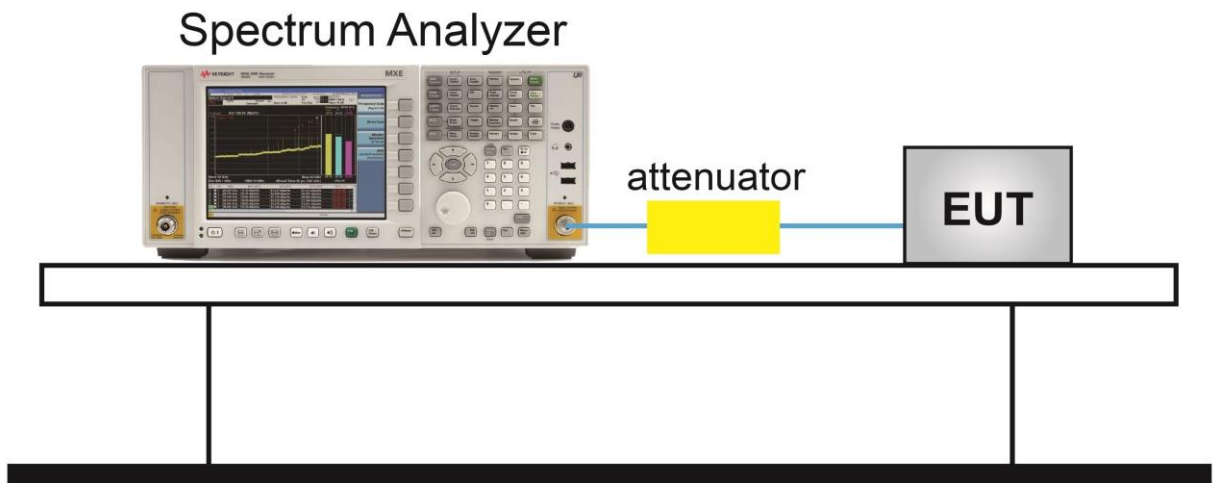
1. Span to  $2 \times$  to  $3 \times$  the OBW
2. RBW  $\geq 1\%$  to  $5\%$  of the OBW
3. VBW  $\geq 3 \times$  RBW
4. Sweep time  $\geq 10 \times$  (number of points in sweep)  $\times$  (transmission symbol period)
5. Detector = power averaging (rms)
6. Set sweep trigger to "free run"
7. If the EUT can be configured to transmit continuously, then set the trigger to free run
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple.
9. The trace was allowed to stabilize
10. Compute the power by integrating the spectrum across the OBW of the signal using the Instrument's band power measurement function, with the band/channel limits set equal to the OBW band edges.
11. EIRP = Output Power Level of S.G - T<sub>x</sub> Cable Loss + Antenna Gain of Substitution Antenna.

### 5.2.4. Test Setup

#### Conducted Output Power



#### Conducted Power Density



### 5.2.5. Test Result

Test Engineer	Peter Xu	Test Site	SR2
Test Date	2021/07/13 ~ 2021/07/16	Test Configuration	n77 (Single Carrier)
Test Item	EIRP Density		

Frequency (MHz)	Channel BW (MHz)	Output Power Density (dBm/MHz)				Total Power Density (dBm/MHz)	EIRP Density (dBm/MHz)	Limit (dBm /MHz)
		Ant 1	Ant 2	Ant 3	Ant 4			
QPSK								
3710.01	20	14.23	13.97	13.99	13.74	20.01	25.01	< 62.15
3840.00	20	14.18	14.01	14.01	13.99	20.07	25.07	< 62.15
3969.99	20	14.12	14.04	13.62	14.11	20.00	25.00	< 62.15
3720.00	40	10.81	10.65	11.13	10.98	16.92	21.92	< 62.15
3840.00	40	10.85	10.73	10.62	10.69	16.74	21.74	< 62.15
3960.00	40	10.67	10.77	10.36	10.56	16.61	21.61	< 62.15
3730.02	60	8.53	8.44	8.79	8.53	14.60	19.60	< 62.15
3840.00	60	8.52	8.44	8.46	8.31	14.45	19.45	< 62.15
3949.98	60	8.62	8.53	8.07	8.38	14.43	19.43	< 62.15
3740.01	80	7.69	7.67	7.73	7.76	13.73	18.73	< 62.15
3840.00	80	7.44	7.34	7.03	7.15	13.26	18.26	< 62.15
3939.99	80	7.58	7.85	7.19	7.38	13.53	18.53	< 62.15
3750.00	100	6.52	6.54	6.83	6.68	12.66	17.66	< 62.15
3840.00	100	6.32	6.35	6.20	6.28	12.31	17.31	< 62.15
3930.00	100	6.78	6.85	6.17	6.38	12.57	17.57	< 62.15



Frequency (MHz)	Channel BW (MHz)	Output Power Density (dBm/MHz)				Total Power Density (dBm/MHz)	EIRP Density (dBm/MHz)	Limit (dBm /MHz)
		Ant 1	Ant 2	Ant 3	Ant 4			
<b>16QAM</b>								
3710.01	20	13.25	13.07	13.26	12.87	19.14	24.14	< 62.15
3840.00	20	13.16	13.27	13.30	13.26	19.27	24.27	< 62.15
3969.99	20	13.46	13.32	13.04	13.34	19.31	24.31	< 62.15
3720.00	40	10.46	10.26	10.73	10.43	16.49	21.49	< 62.15
3840.00	40	10.49	10.49	10.35	10.34	16.44	21.44	< 62.15
3960.00	40	10.76	10.64	10.18	10.42	16.53	21.53	< 62.15
3730.02	60	8.71	8.53	8.80	8.69	14.70	19.70	< 62.15
3840.00	60	8.74	8.58	8.59	8.46	14.61	19.61	< 62.15
3949.98	60	8.76	8.99	8.70	8.63	14.79	19.79	< 62.15
3740.01	80	7.50	7.35	7.43	7.36	13.43	18.43	< 62.15
3840.00	80	7.51	7.37	7.58	7.57	13.53	18.53	< 62.15
3939.99	80	7.19	7.41	7.11	7.31	13.28	18.28	< 62.15
3750.00	100	6.58	6.43	6.79	6.49	12.60	17.60	< 62.15
3840.00	100	6.26	6.19	6.29	6.00	12.21	17.21	< 62.15
3930.00	100	6.54	6.51	5.72	6.27	12.29	17.29	< 62.15
<b>64QAM</b>								
3710.01	20	11.52	11.40	11.53	11.24	17.44	22.44	< 62.15
3840.00	20	11.77	11.62	11.67	11.64	17.70	22.70	< 62.15
3969.99	20	11.35	11.40	11.13	11.47	17.36	22.36	< 62.15
3720.00	40	8.64	8.40	8.91	8.56	14.65	19.65	< 62.15
3840.00	40	8.53	8.50	8.42	8.43	14.49	19.49	< 62.15
3960.00	40	8.41	8.59	8.20	8.51	14.45	19.45	< 62.15
3730.02	60	7.00	6.96	7.28	7.07	13.10	18.10	< 62.15
3840.00	60	6.96	6.96	6.68	6.93	12.90	17.90	< 62.15
3949.98	60	6.93	6.99	6.87	6.88	12.94	17.94	< 62.15
3740.01	80	5.59	5.64	5.78	5.74	11.71	16.71	< 62.15
3840.00	80	5.45	5.31	5.29	5.05	11.30	16.30	< 62.15
3939.99	80	5.58	5.80	5.66	5.42	11.64	16.64	< 62.15
3750.00	100	4.89	4.51	4.31	4.48	10.57	15.57	< 62.15
3840.00	100	4.43	4.47	4.61	4.17	10.44	15.44	< 62.15
3930.00	100	4.70	4.60	4.52	4.22	10.53	15.53	< 62.15

Frequency (MHz)	Channel BW (MHz)	Output Power Density (dBm/MHz)				Total Power Density (dBm/MHz)	EIRP Density (dBm/MHz)	Limit (dBm /MHz)
		Ant 1	Ant 2	Ant 3	Ant 4			
256QAM								
3710.01	20	11.80	11.55	11.48	11.47	17.60	22.60	< 62.15
3840.00	20	11.90	11.64	11.63	11.64	17.72	22.72	< 62.15
3969.99	20	11.55	11.60	11.21	11.73	17.55	22.55	< 62.15
3720.00	40	8.54	8.20	8.79	8.44	14.52	19.52	< 62.15
3840.00	40	8.57	8.27	8.40	8.36	14.42	19.42	< 62.15
3960.00	40	8.65	8.50	8.15	8.45	14.46	19.46	< 62.15
3730.02	60	7.06	6.92	7.14	6.98	13.05	18.05	< 62.15
3840.00	60	6.99	6.77	6.76	6.57	12.80	17.80	< 62.15
3949.98	60	6.79	6.98	6.56	6.68	12.78	17.78	< 62.15
3740.01	80	5.68	5.72	5.78	5.61	11.72	16.72	< 62.15
3840.00	80	5.82	5.74	5.65	5.29	11.65	16.65	< 62.15
3939.99	80	5.96	6.33	5.90	6.01	12.07	17.07	< 62.15
3750.00	100	4.71	4.80	4.75	4.89	10.81	15.81	< 62.15
3840.00	100	4.21	4.27	4.22	3.89	10.17	15.17	< 62.15
3930.00	100	4.46	4.66	4.50	4.48	10.55	15.55	< 62.15
Note 1: Total Power Density(dBm/MHz) = $10 \cdot \log \{ 10^{\lfloor \text{ANT 1 Power (dBm/MHz) / 10} \rfloor} + 10^{\lfloor \text{ANT 2 Power (dBm/MHz) / 10} \rfloor} + 10^{\lfloor \text{ANT 3 Power (dBm/MHz) / 10} \rfloor} + 10^{\lfloor \text{ANT 4 Power (dBm/MHz) / 10} \rfloor} \}$ (dBm/MHz). Note 2: EIRP Density (dBm/MHz) = Total Power Density (dBm/MHz) + Antenna Gain (dBi).								

Test Engineer	Peter Xu	Test Site	SR2
Test Date	2021/07/13 ~ 2021/07/16	Test Configuration	n77 (Single Carrier)
Test Item	EIRP (Reported only)		

Frequency (MHz)	Channel BW (MHz)	Output Power (dBm)				Total Power (dBm)	EIRP (dBm)
		Ant 1	Ant 2	Ant 3	Ant 4		
QPSK							
3710.01	20	24.03	23.84	23.93	23.89	29.94	34.94
3840.00	20	24.18	24.05	24.12	24.05	30.12	35.12
3969.99	20	23.84	23.88	23.77	23.79	29.84	34.84
3720.00	40	24.18	23.97	24.23	24.01	30.12	35.12
3840.00	40	24.10	23.95	24.01	24.11	30.06	35.06
3960.00	40	24.12	24.13	23.99	23.98	30.08	35.08
3730.02	60	24.16	24.10	24.17	24.08	30.15	35.15
3840.00	60	24.09	23.78	23.98	23.88	29.95	34.95
3949.98	60	24.08	24.12	23.75	24.01	30.01	35.01
3740.01	80	24.20	24.01	24.22	23.91	30.11	35.11
3840.00	80	23.90	24.02	23.90	23.89	29.95	34.95
3939.99	80	24.08	24.12	23.86	24.00	30.04	35.04
3750.00	100	24.08	23.96	24.08	23.84	30.01	35.01
3840.00	100	24.01	23.96	23.85	23.79	29.92	34.92
3930.00	100	24.02	24.01	23.84	23.79	29.94	34.94

Frequency (MHz)	Channel BW (MHz)	Output Power (dBm)				Total Power (dBm)	EIRP (dBm)
		Ant 1	Ant 2	Ant 3	Ant 4		
<b>16QAM</b>							
3710.01	20	24.04	23.95	23.91	23.78	29.94	34.94
3840.00	20	24.11	23.96	24.07	23.97	30.05	35.05
3969.99	20	23.93	23.96	23.68	23.93	29.90	34.90
3720.00	40	24.17	24.01	24.15	24.16	30.14	35.14
3840.00	40	24.16	23.98	24.07	24.12	30.10	35.10
3960.00	40	24.19	24.12	23.89	23.98	30.07	35.07
3730.02	60	24.12	24.18	24.08	23.93	30.10	35.10
3840.00	60	24.21	23.99	24.11	23.89	30.07	35.07
3949.98	60	24.16	24.01	23.91	23.93	30.02	35.02
3740.01	80	24.08	24.07	24.12	23.90	30.06	35.06
3840.00	80	23.83	23.88	23.85	23.79	29.86	34.86
3939.99	80	24.01	24.03	23.87	23.98	29.99	34.99
3750.00	100	24.09	24.15	24.06	23.94	30.08	35.08
3840.00	100	24.10	23.99	23.97	23.81	29.99	34.99
3930.00	100	23.99	23.84	23.96	23.81	29.92	34.92
<b>64QAM</b>							
3710.01	20	24.09	23.87	23.98	23.89	29.98	34.98
3840.00	20	24.17	24.04	24.08	23.97	30.09	35.09
3969.99	20	23.97	23.96	23.78	24.01	29.95	34.95
3720.00	40	24.15	23.96	24.12	23.93	30.06	35.06
3840.00	40	24.06	23.84	24.06	23.87	29.98	34.98
3960.00	40	24.02	24.08	23.80	23.97	29.99	34.99
3730.02	60	24.32	23.99	24.28	24.02	30.18	35.18
3840.00	60	24.16	23.71	23.95	23.84	29.94	34.94
3949.98	60	24.10	24.13	23.90	23.87	30.02	35.02
3740.01	80	24.13	24.07	24.22	23.96	30.12	35.12
3840.00	80	23.95	23.89	23.91	23.81	29.91	34.91
3939.99	80	24.12	24.03	23.85	23.86	29.99	34.99
3750.00	100	23.99	23.80	24.02	23.79	29.92	34.92
3840.00	100	23.91	23.88	23.91	23.85	29.91	34.91
3930.00	100	23.97	23.88	23.90	23.75	29.90	34.90

Frequency (MHz)	Channel BW (MHz)	Output Power (dBm)				Total Power (dBm)	EIRP (dBm)
		Ant 1	Ant 2	Ant 3	Ant 4		
256QAM							
3710.01	20	24.12	23.96	23.86	23.84	29.97	34.97
3840.00	20	24.11	23.88	23.98	24.06	30.03	35.03
3969.99	20	23.78	23.86	23.96	23.82	29.88	34.88
3720.00	40	24.13	24.01	24.12	23.95	30.07	35.07
3840.00	40	24.16	23.98	24.09	24.08	30.10	35.10
3960.00	40	24.11	24.19	23.89	23.96	30.06	35.06
3730.02	60	24.14	23.94	24.11	23.98	30.06	35.06
3840.00	60	24.06	23.85	23.95	23.76	29.93	34.93
3949.98	60	24.10	24.10	23.65	23.95	29.97	34.97
3740.01	80	24.23	24.03	24.16	23.95	30.11	35.11
3840.00	80	24.05	23.86	24.00	23.76	29.94	34.94
3939.99	80	24.07	24.11	23.91	23.86	30.01	35.01
3750.00	100	23.92	23.94	24.02	23.81	29.94	34.94
3840.00	100	23.97	23.79	23.86	23.88	29.90	34.90
3930.00	100	23.89	23.81	23.94	23.87	29.90	34.90
Note 1: Total Power (dBm) = $10 \cdot \log \{ 10^{\text{ANT 1 Power (dBm)} / 10} + 10^{\text{ANT 2 Power (dBm)} / 10} + 10^{\text{ANT 3 Power (dBm)} / 10} + 10^{\text{ANT 4 Power (dBm)} / 10} \}$ (dBm). Note 2: EIRP (dBm) = Total Power (dBm) + Antenna Gain (dBi).							

Test Engineer	Peter Xu	Test Site	SR2
Test Date	2021/07/13 ~ 2021/07/18	Test Configuration	n77 (Multi Carrier)
Test Item	EIRP Density		

Frequency (MHz)	Channel BW (MHz)	Output Power Density (dBm/MHz)				Total Power Density (dBm/MHz)	EIRP Density (dBm/MHz)	Limit (dBm /MHz)
		Ant 1	Ant 2	Ant 3	Ant 4			
<b>QPSK</b>								
3710+3730	20+20	10.81	10.69	11.33	11.02	16.99	21.99	< 62.15
3830+3850	20+20	11.01	10.90	10.80	10.42	16.81	21.81	< 62.15
3950+3970	20+20	10.88	11.02	10.73	10.60	16.83	21.83	< 62.15
3750+3850	100+100	3.11	3.08	3.17	3.14	9.15	14.15	< 62.15
3790+3890	100+100	3.12	2.83	2.82	2.99	8.96	13.96	< 62.15
3830+3930	100+100	3.12	2.85	2.83	3.01	8.97	13.97	< 62.15
<b>16QAM</b>								
3710+3730	20+20	10.44	10.04	10.69	10.09	16.34	21.34	< 62.15
3830+3850	20+20	10.46	10.28	10.25	10.27	16.34	21.34	< 62.15
3950+3970	20+20	10.40	10.41	10.15	10.17	16.30	21.30	< 62.15
3750+3850	100+100	2.85	2.88	2.95	2.84	8.90	13.90	< 62.15
3790+3890	100+100	2.83	2.81	2.72	2.52	8.74	13.74	< 62.15
3830+3930	100+100	2.94	2.69	2.88	2.71	8.83	13.83	< 62.15
<b>64QAM</b>								
3710+3730	20+20	8.55	8.30	8.99	8.72	14.67	19.67	< 62.15
3830+3850	20+20	8.60	8.66	8.85	8.55	14.69	19.69	< 62.15
3950+3970	20+20	8.37	8.43	8.28	8.51	14.42	19.42	< 62.15
3750+3850	100+100	1.12	1.16	1.25	1.39	7.25	12.25	< 62.15
3790+3890	100+100	1.26	0.99	0.80	0.87	7.00	12.00	< 62.15
3830+3930	100+100	0.95	0.87	0.85	0.89	6.91	11.91	< 62.15

256QAM								
3710+3730	20+20	8.75	8.36	8.95	8.72	14.72	19.72	< 62.15
3830+3850	20+20	8.77	8.58	8.43	8.47	14.59	19.59	< 62.15
3950+3970	20+20	8.61	8.58	8.47	8.70	14.61	19.61	< 62.15
3750+3850	100+100	1.09	1.04	1.02	1.03	7.07	12.07	< 62.15
3790+3890	100+100	1.17	1.01	1.08	1.05	7.10	12.10	< 62.15
3830+3930	100+100	1.11	1.17	1.03	1.15	7.14	12.14	< 62.15
Note 1: Total Power Density(dBm/MHz) = $10 \cdot \log \{ 10^{\text{ANT 1 Power (dBm/MHz) / 10}} + 10^{\text{ANT 2 Power (dBm/MHz) / 10}} + 10^{\text{ANT 3 Power (dBm/MHz) / 10}} + 10^{\text{ANT 4 Power (dBm/MHz) / 10}} \}$ (dBm/MHz). Note 2: EIRP Density (dBm/MHz) = Total Power Density (dBm/MHz) + Antenna Gain (dBi).								

Test Engineer	Peter Xu	Test Site	SR2
Test Date	2021/07/13 ~ 2021/07/20	Test Configuration	n77 (Multi Carrier)
Test Item	EIRP (Reported only)		

Frequency (MHz)	Channel BW (MHz)	Output Power (dBm)				Total Power (dBm)	EIRP (dBm)
		Ant 1	Ant 2	Ant 3	Ant 4		
<b>QPSK</b>							
3710+3730	20+20	24.05	23.98	24.12	23.98	30.05	35.05
3830+3850	20+20	24.12	24.01	24.10	24.01	30.08	35.08
3950+3970	20+20	24.22	23.99	23.85	24.06	30.05	35.05
3750+3850	100+100	24.11	23.90	24.05	23.85	30.00	35.00
3790+3890	100+100	23.96	23.79	23.89	23.69	29.85	34.85
3830+3930	100+100	23.89	23.82	23.91	23.89	29.90	34.90
<b>16QAM</b>							
3710+3730	20+20	24.12	23.96	24.13	23.97	30.07	35.07
3830+3850	20+20	24.14	24.03	24.10	24.12	30.12	35.12
3950+3970	20+20	24.11	24.18	24.06	24.10	30.13	35.13
3750+3850	100+100	23.96	23.73	23.89	23.81	29.87	34.87
3790+3890	100+100	24.03	23.74	23.84	23.78	29.87	34.87
3830+3930	100+100	23.98	23.95	23.91	23.96	29.97	34.97
<b>64QAM</b>							
3710+3730	20+20	23.95	23.87	24.13	23.94	29.99	34.99
3830+3850	20+20	24.13	23.89	24.01	24.00	30.03	35.03
3950+3970	20+20	24.06	23.99	23.93	24.11	30.04	35.04
3750+3850	100+100	23.93	23.84	23.99	23.80	29.91	34.91
3790+3890	100+100	24.02	23.76	23.86	23.79	29.88	34.88
3830+3930	100+100	23.98	23.86	23.86	23.83	29.90	34.90
<b>256QAM</b>							
3710+3730	20+20	24.04	23.78	24.18	23.85	29.99	34.99
3830+3850	20+20	24.08	23.85	24.07	23.98	30.02	35.02
3950+3970	20+20	24.21	24.11	23.92	24.18	30.13	35.13
3750+3850	100+100	24.11	23.86	24.01	23.91	29.99	34.99
3790+3890	100+100	24.06	23.97	23.98	23.86	29.99	34.99
3830+3930	100+100	24.15	23.98	24.04	24.02	30.07	35.07
Note 1: Total Power (dBm) = $10 \cdot \log \{ 10^{\text{ANT 1 Power (dBm)} / 10} + 10^{\text{ANT 2 Power (dBm)} / 10} + 10^{\text{ANT 3 Power (dBm)} / 10} + 10^{\text{ANT 4 Power (dBm)} / 10} \}$ (dBm). Note 2: EIRP (dBm) = Total Power (dBm) + Antenna Gain (dBi).							



### **5.3. Frequency Stability Measurement**

#### **5.3.1. Test Limit**

N/A

#### **5.3.2. Test Procedures Used**

ANSI C63.26-2015 - Section 5.6

#### **5.3.3. Test Setting**

##### **Frequency Stability Under Temperature Variations:**

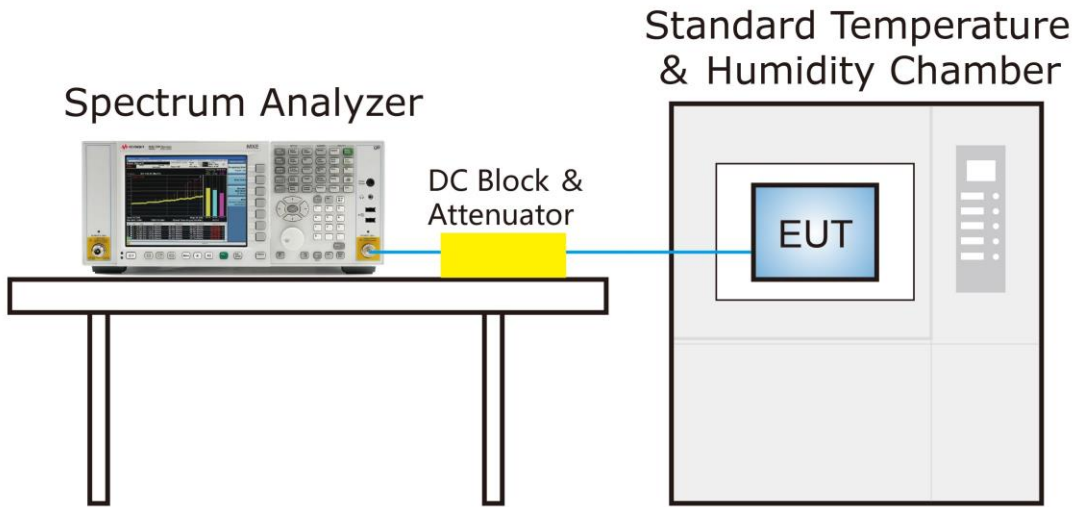
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

##### **Frequency Stability Under Voltage Variations:**

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ( $\pm 15\%$ ) and endpoint, record the maximum frequency change.

### 5.3.4. Test Setup



### 5.3.5. Test Result

Test Engineer	Peter Xu	Test Site	SR3
Test Date	2021/07/20		
Test Configuration	n77, 100MHz Bandwidth, Middle Channel		

Voltage	Temp(°C)	Frequency Tolerance(ppm)
AC 120V	- 30	-0.0290
	- 20	-0.0291
	- 10	-0.0294
	0	-0.0294
	+ 10	-0.0285
	+ 20	-0.0295
	+ 30	-0.0294
	+ 40	-0.0293
	+ 50	-0.0292
AC 138V	+ 20	-0.0293
AC 102V	+ 20	-0.0293

## 5.4. Emission Bandwidth Measurement

### 5.4.1. Test Limit

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

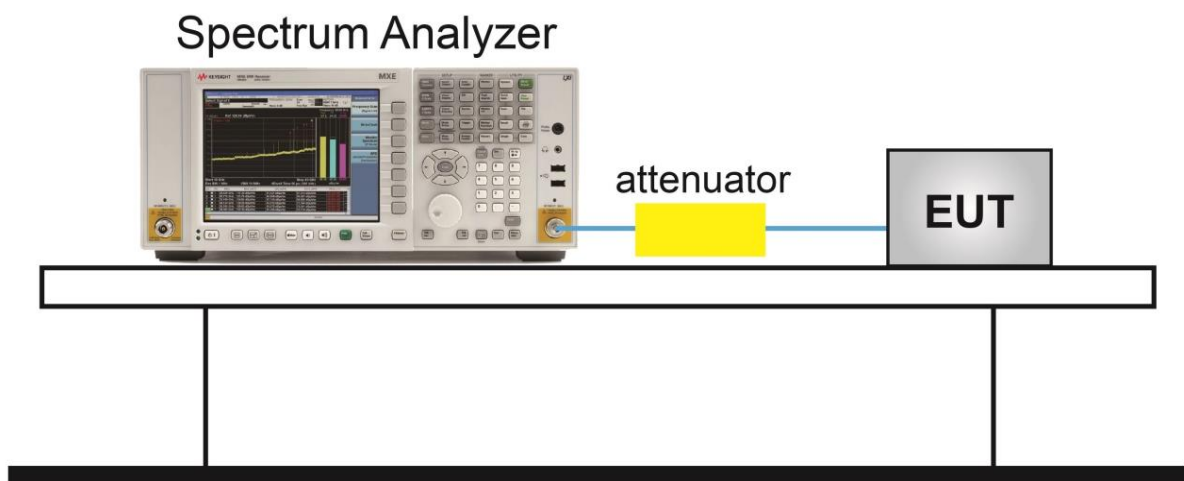
### 5.4.2. Test Procedure

ANSI C63.26-2015 - Section 5.4.4

### 5.4.3. Test Setting

1. Set center frequency to the nominal EUT channel center frequency;
2. RBW = The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW;
3. VBW  $\geq 3 \times$  RBW;
4. Detector = Peak;
5. Trace mode = max hold;
6. Sweep = auto couple;
7. Allow the trace to stabilize;
8. Use the 99% OBW function to record the OBW measurement result.

### 5.4.4. Test Setup



**5.4.5. Test Result**

Test Engineer	Peter Xu	Test Site	SR2
Test Date	2021/07/14 ~ 2021/07/20	Test Configuration	n77 (Single Carrier)

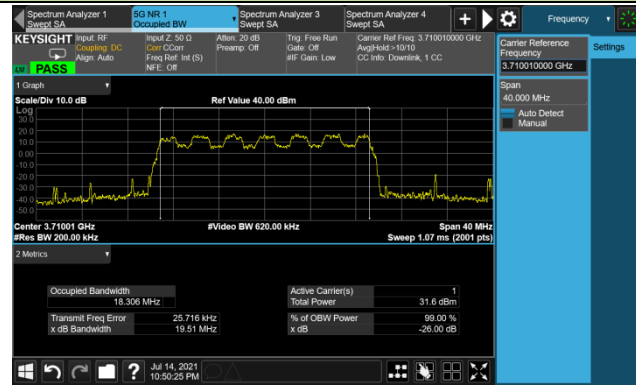
Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
<b>QPSK</b>					
3710.01	20	18.31	3740.01	80	77.35
3840.00	20	18.36	3840.00	80	77.52
3969.99	20	18.30	3939.99	80	77.48
3720.00	40	37.91	3750.00	100	97.34
3840.00	40	37.89	3840.00	100	97.49
3960.00	40	37.87	3930.00	100	97.45
3730.02	60	57.82	--		
3840.00	60	58.00			
3949.98	60	57.81			
<b>16QAM</b>					
3710.01	20	18.27	3740.01	80	77.57
3840.00	20	18.31	3840.00	80	77.61
3969.99	20	18.27	3939.99	80	77.35
3720.00	40	37.89	3750.00	100	97.42
3840.00	40	37.90	3840.00	100	97.25
3960.00	40	37.99	3930.00	100	97.36
3730.02	60	57.83	--		
3840.00	60	57.79			
3949.98	60	57.83			
<b>64QAM</b>					
3710.01	20	18.17	3740.01	80	77.27
3840.00	20	18.18	3840.00	80	77.16
3969.99	20	18.24	3939.99	80	77.21
3720.00	40	37.80	3750.00	100	97.34
3840.00	40	37.85	3840.00	100	97.26
3960.00	40	37.80	3930.00	100	97.12
3730.02	60	57.72	--		
3840.00	60	57.79			
3949.98	60	57.58			



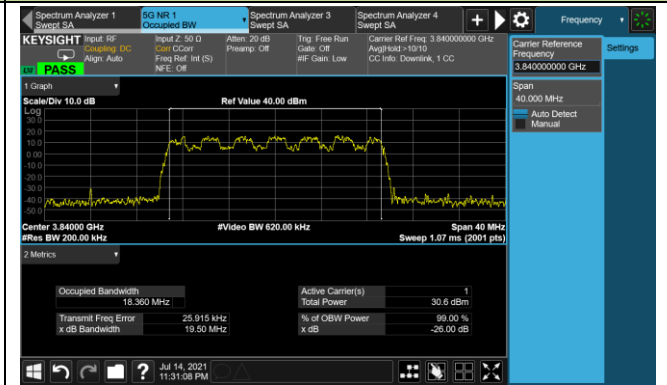
256QAM					
3710.01	20	18.24	3740.01	80	77.28
3840.00	20	18.20	3840.00	80	77.22
3969.99	20	18.15	3939.99	80	77.08
3720.00	40	37.89	3750.00	100	97.02
3840.00	40	37.82	3840.00	100	97.13
3960.00	40	37.82	3930.00	100	97.08
3730.02	60	57.72	--		
3840.00	60	57.78			
3949.98	60	57.42			

### 20MHz Channel Bandwidth - QPSK

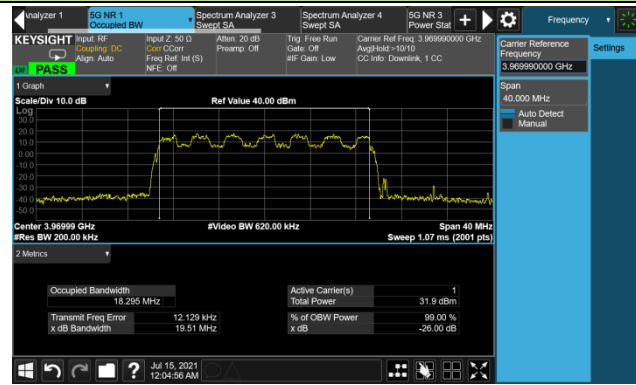
#### 3710.01 MHz



#### 3840.00 MHz

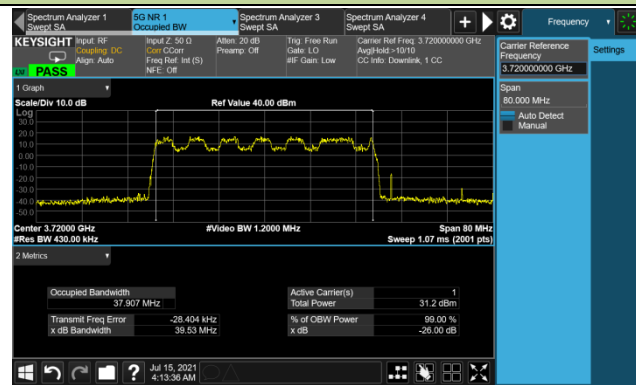


#### 3969.99 MHz

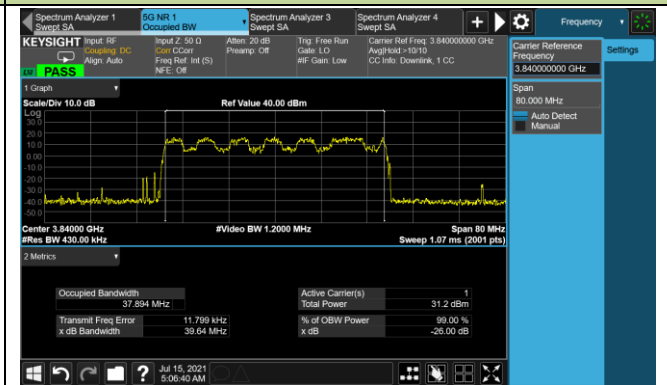


### 40MHz Channel Bandwidth - QPSK

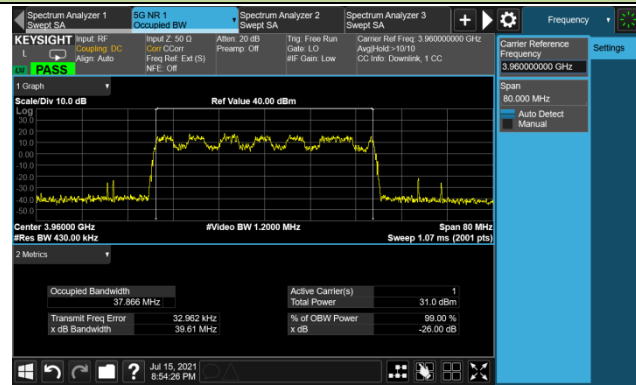
#### 3720.00 MHz



#### 3840.00 MHz

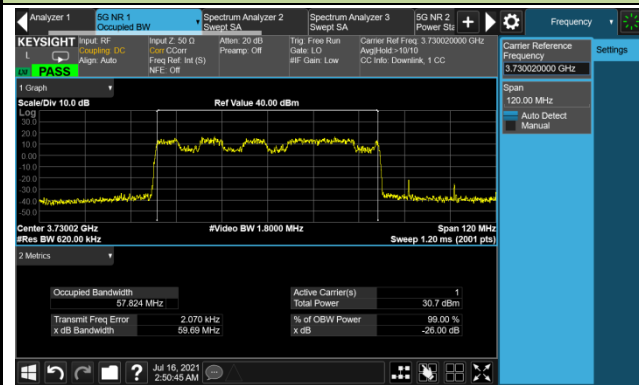


#### 3960.00 MHz

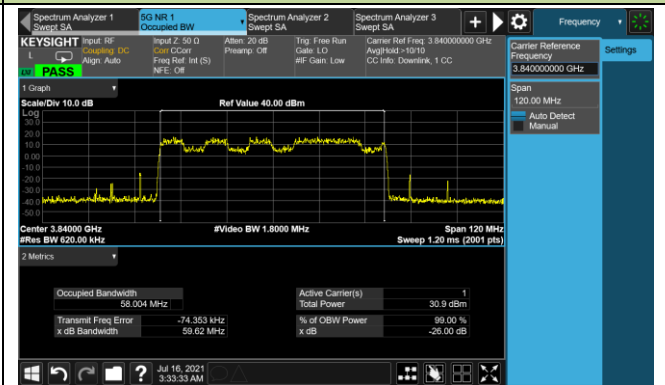


### 60MHz Channel Bandwidth - QPSK

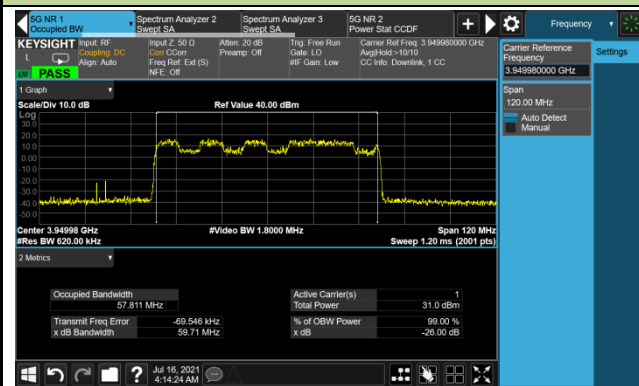
#### 3730.02 MHz



#### 3840.00 MHz

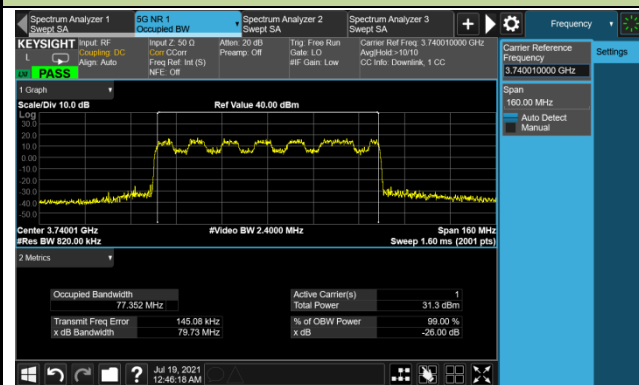


#### 3949.98MHz

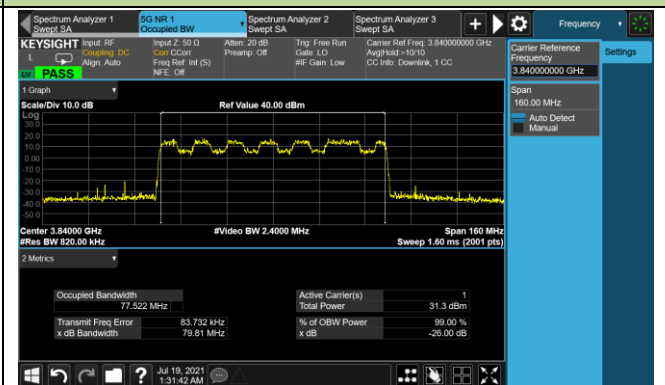


### 80MHz Channel Bandwidth - QPSK

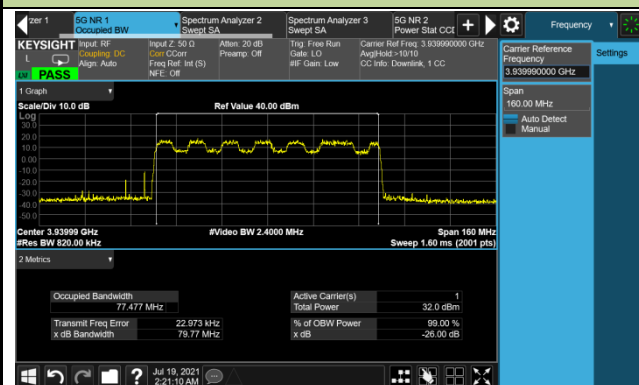
#### 3740.01MHz



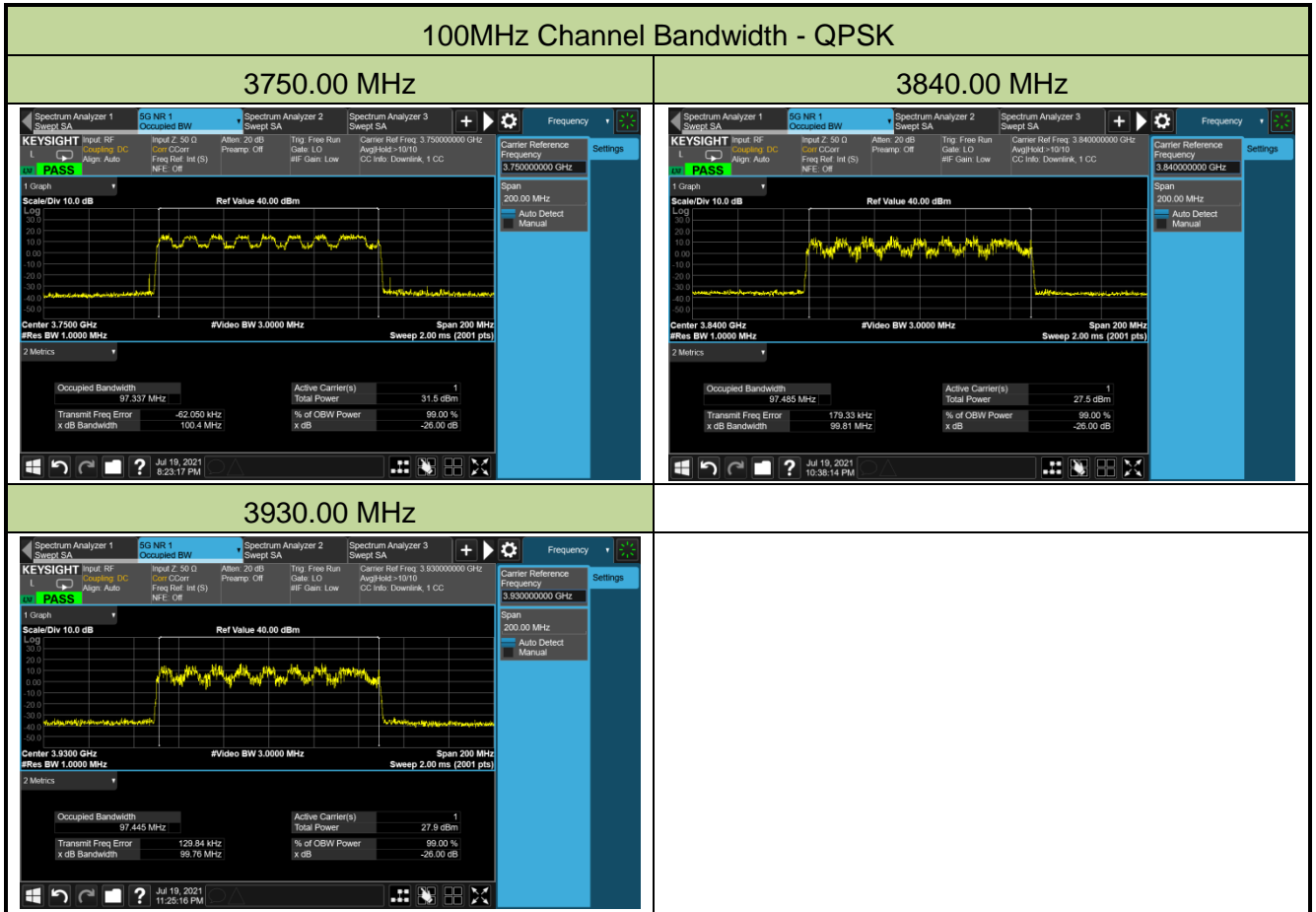
#### 3840.00 MHz



#### 3939.99MHz

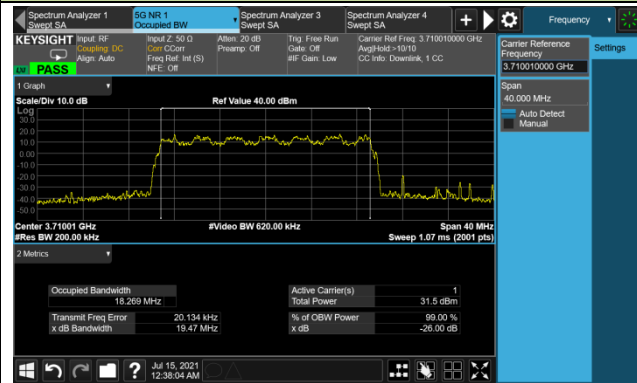




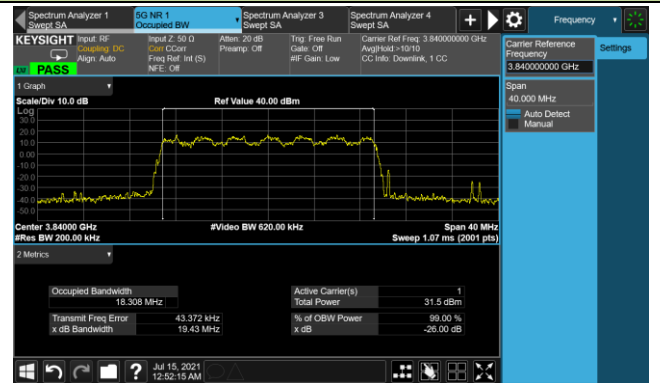


## 20MHz Channel Bandwidth - 16QAM

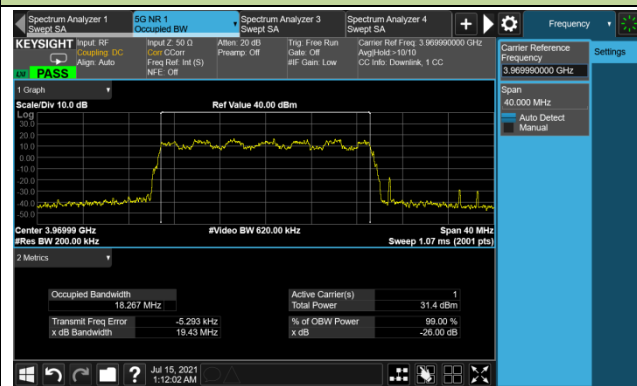
3710.01 MHz



3840.00 MHz

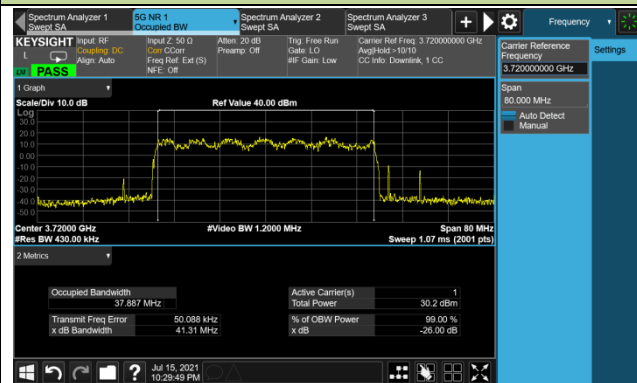


3969.99 MHz

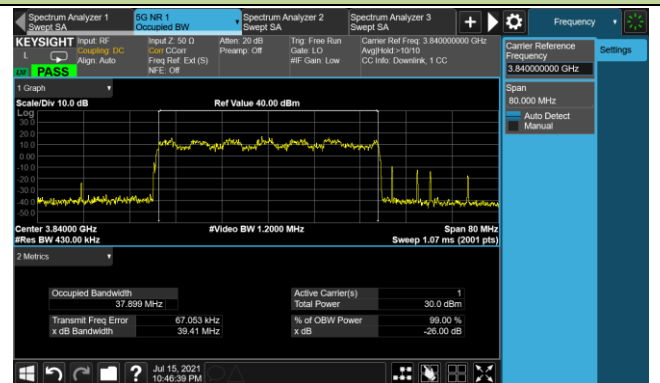


## 40MHz Channel Bandwidth - 16QAM

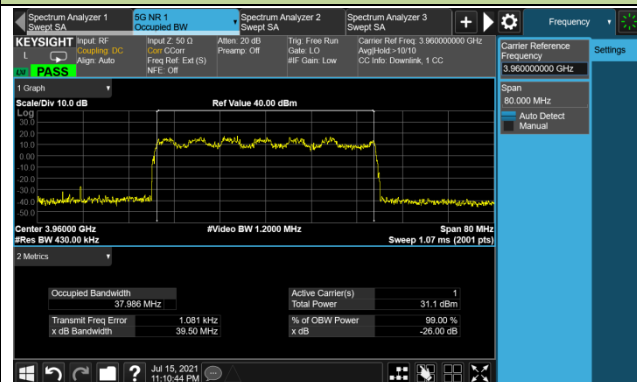
3720.00 MHz



3840.00 MHz

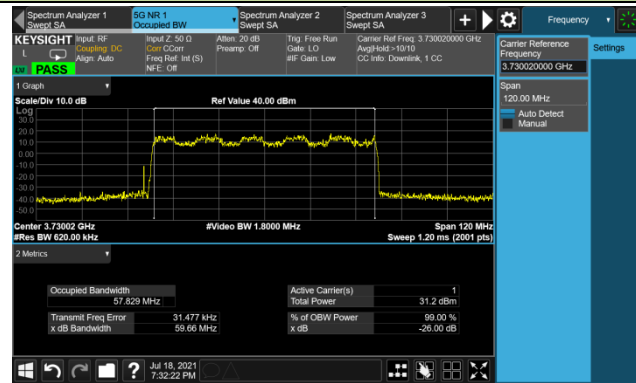


3960.00 MHz

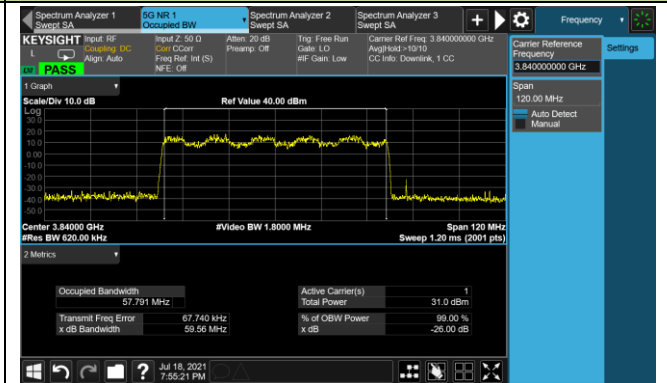


### 60MHz Channel Bandwidth - 16QAM

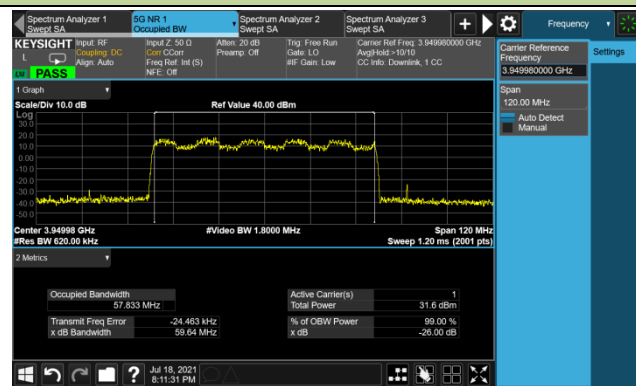
3730.02 MHz



3840.00 MHz

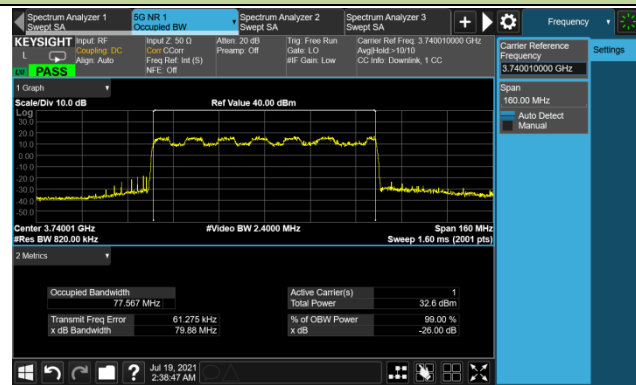


3949.98 MHz

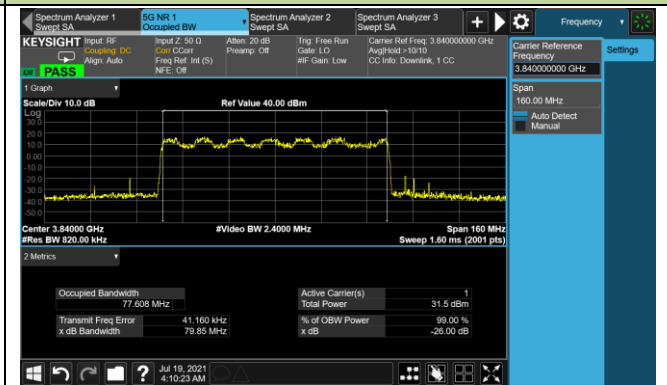


### 80MHz Channel Bandwidth - 16QAM

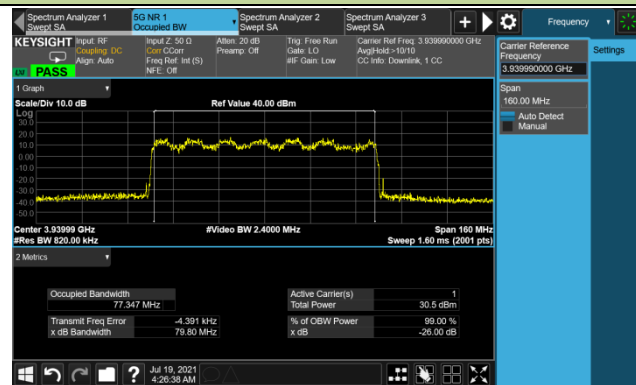
3740.01 MHz



3840.00 MHz

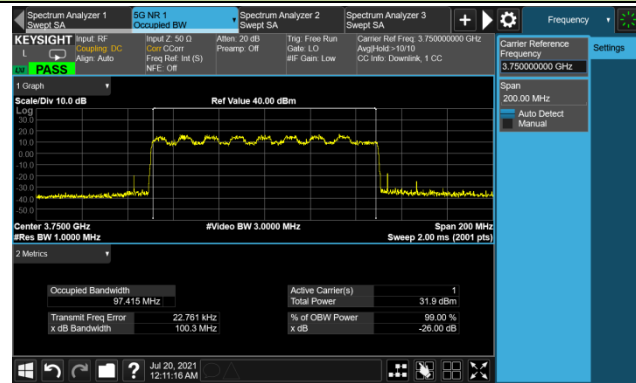


3939.99 MHz

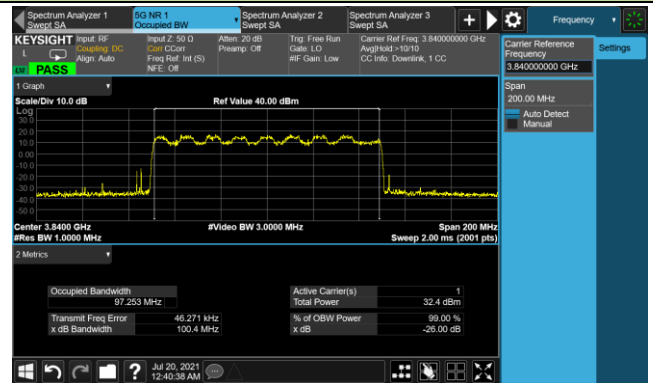


### 100MHz Channel Bandwidth - 16QAM

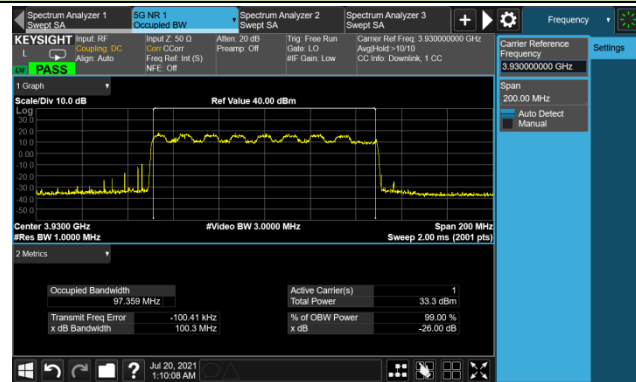
#### 3750.00 MHz



#### 3840.00 MHz

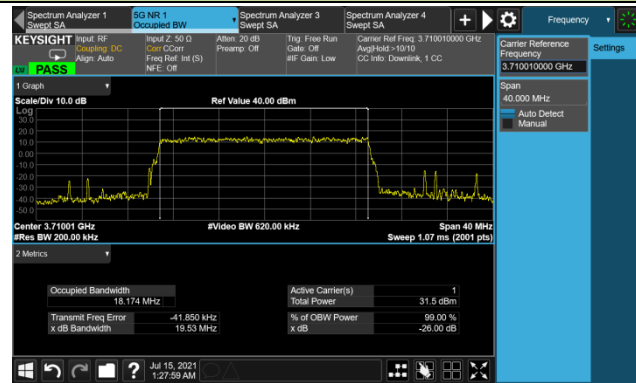


#### 3930.00 MHz

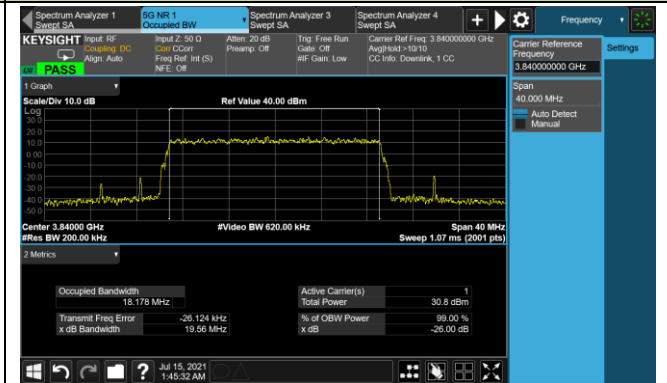


### 20MHz Channel Bandwidth - 64QAM

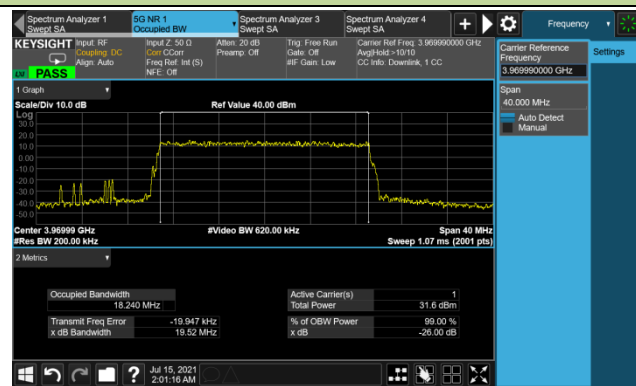
#### 3710.01 MHz



#### 3840.00 MHz

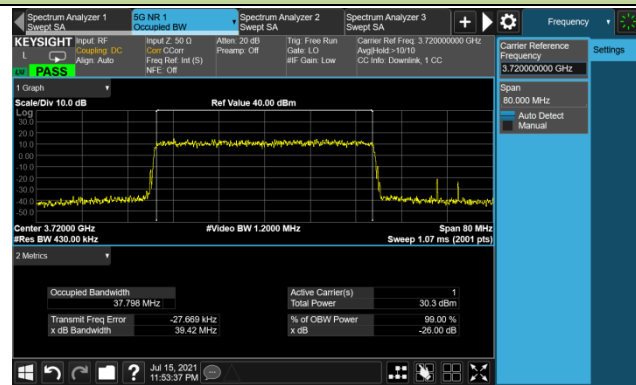


#### 3969.99 MHz

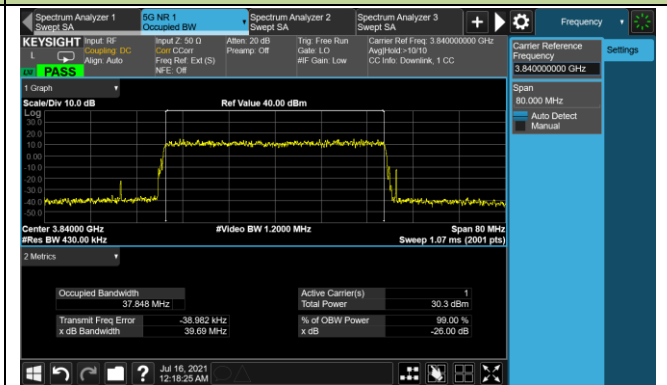


### 40MHz Channel Bandwidth - 64QAM

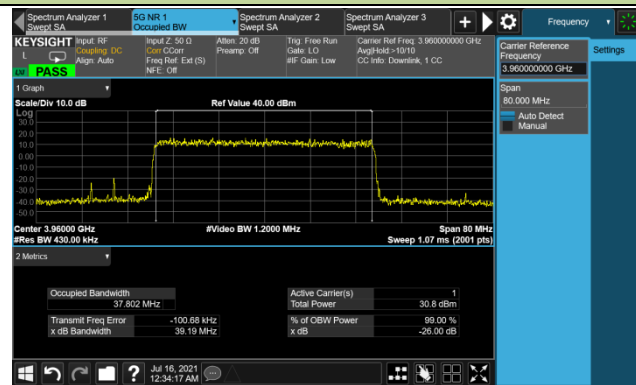
#### 3720.00 MHz



#### 3840.00 MHz

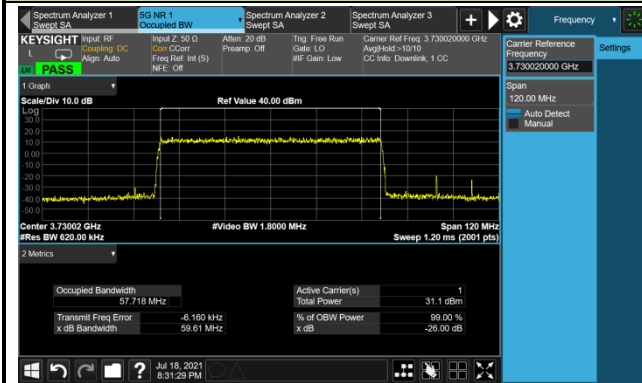


#### 3960.00 MHz

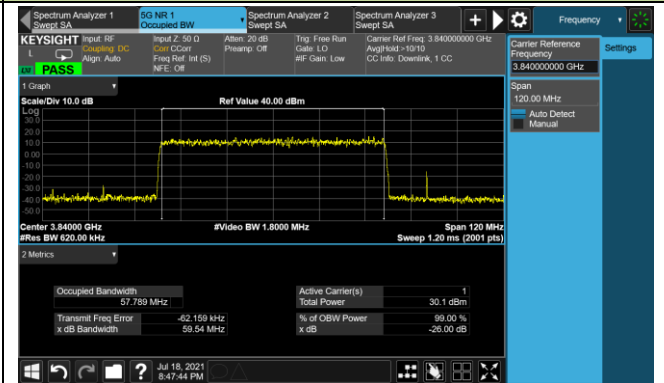


## 60MHz Channel Bandwidth - 64QAM

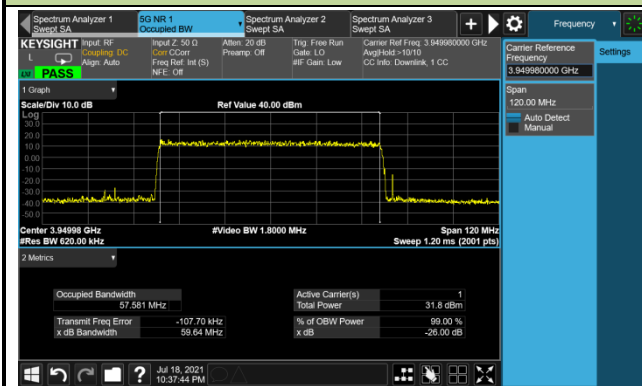
### 3730.02 MHz



### 3840.00 MHz

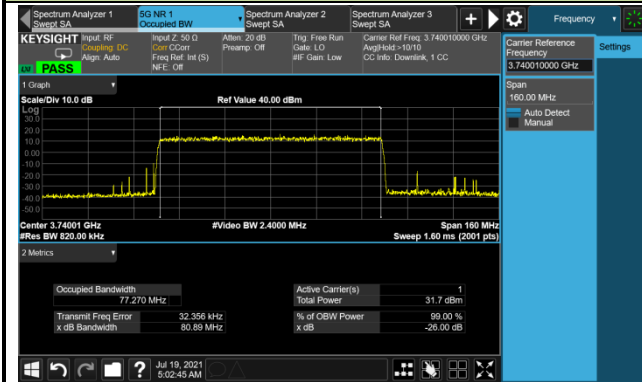


### 3949.98 MHz

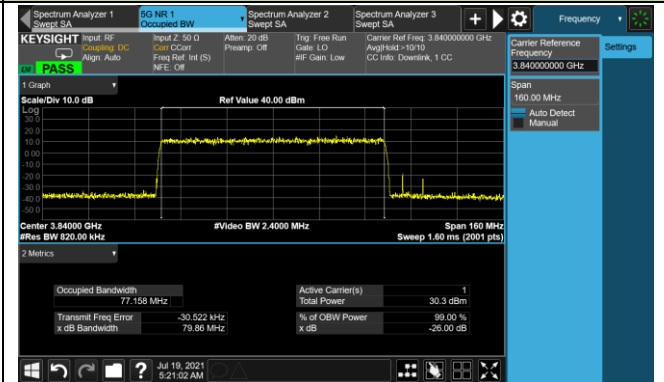


## 80MHz Channel Bandwidth - 64QAM

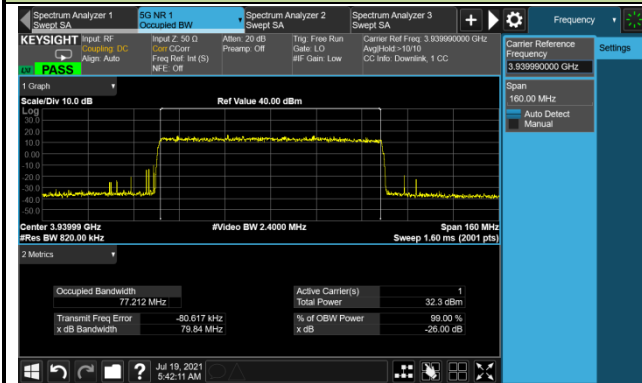
### 3740.01 MHz



### 3840.00 MHz

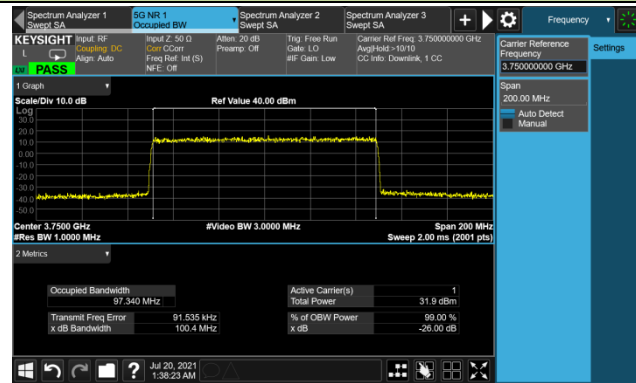


### 3939.99 MHz

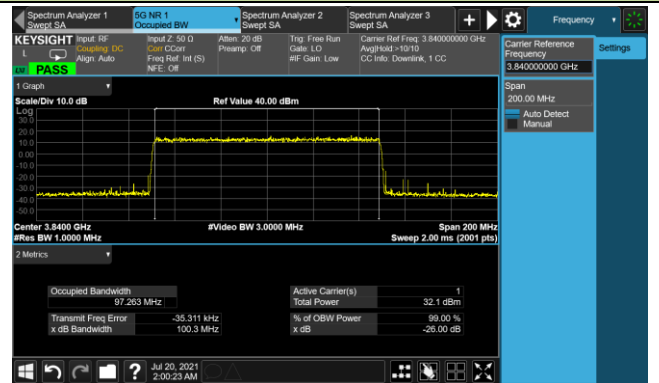


### 100MHz Channel Bandwidth - 64QAM

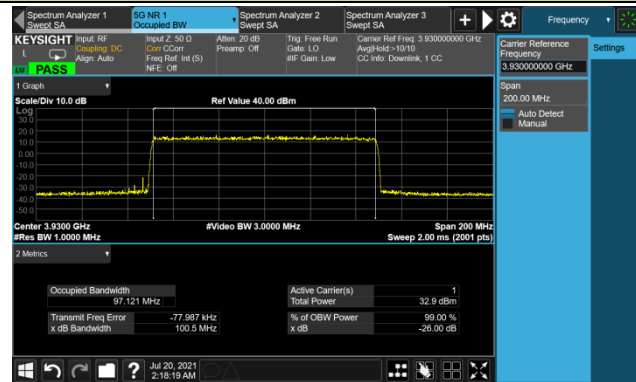
#### 3750.00 MHz



#### 3840.00 MHz



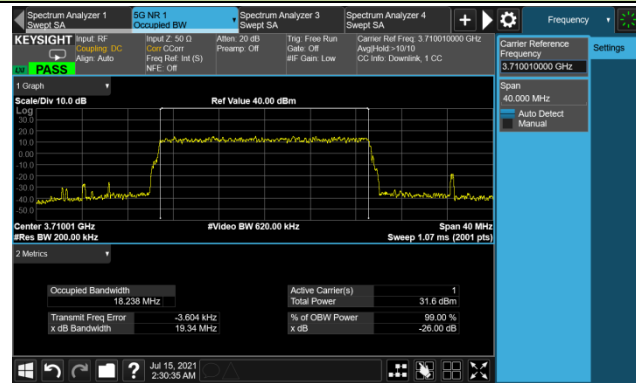
#### 3930.00 MHz



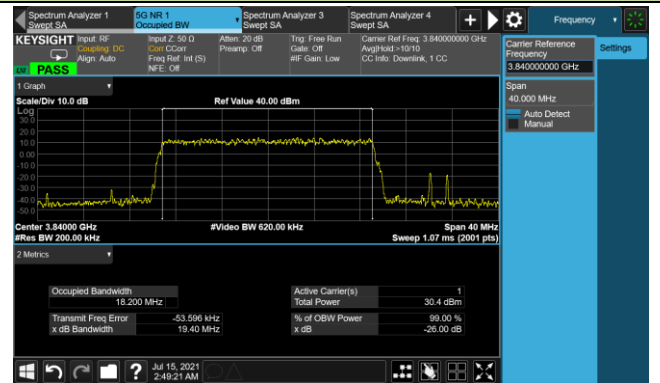


## 20MHz Channel Bandwidth - 2565QAM

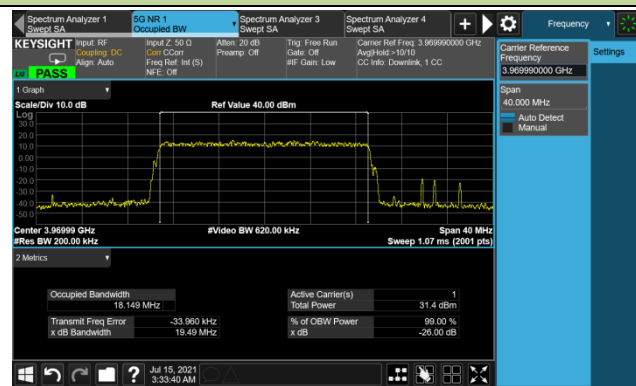
## 3710.01 MHz



## 3840.00 MHz

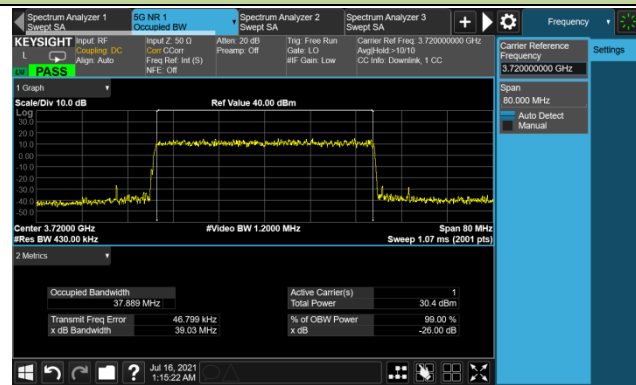


## 3969.99 MHz

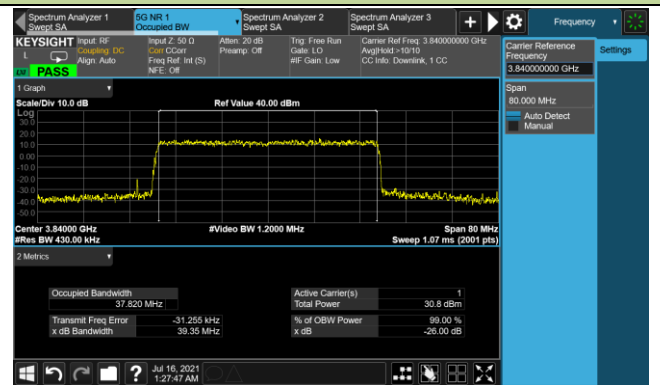


## 40MHz Channel Bandwidth - 256QAM

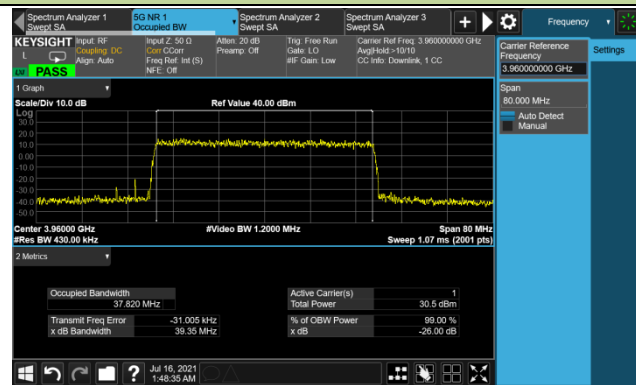
## 3720.00 MHz



## 3840.00 MHz



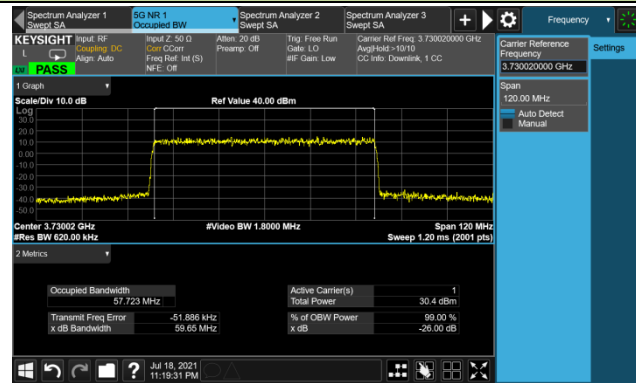
## 3960.00 MHz



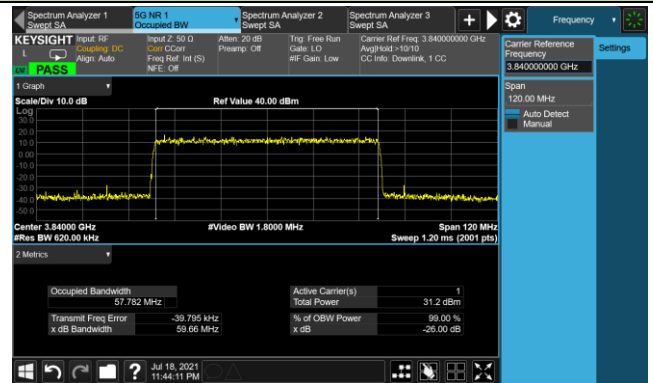


### 60MHz Channel Bandwidth - 256QAM

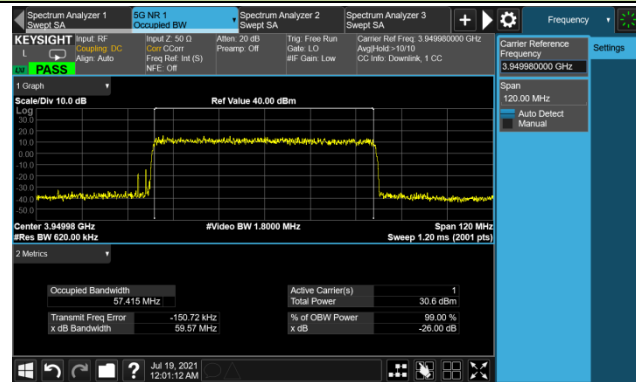
3730.02 MHz



3840.00 MHz

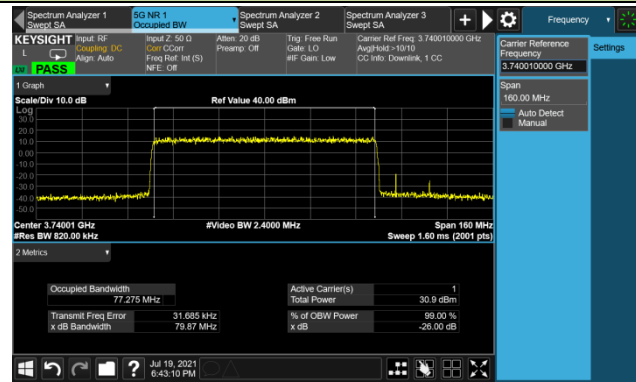


3949.98 MHz

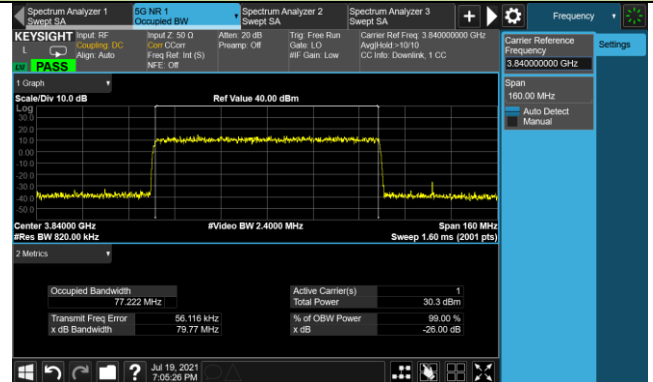


### 80MHz Channel Bandwidth - 256QAM

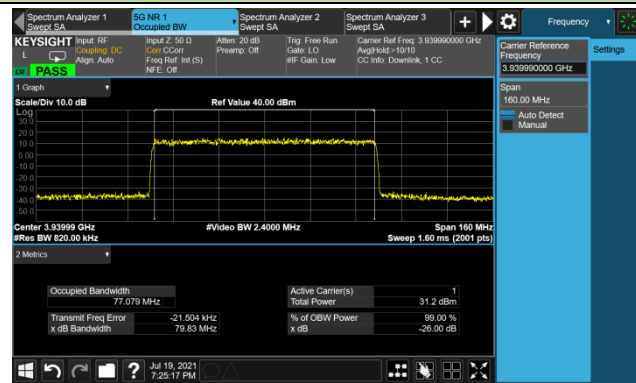
3740.01 MHz



3840.00 MHz

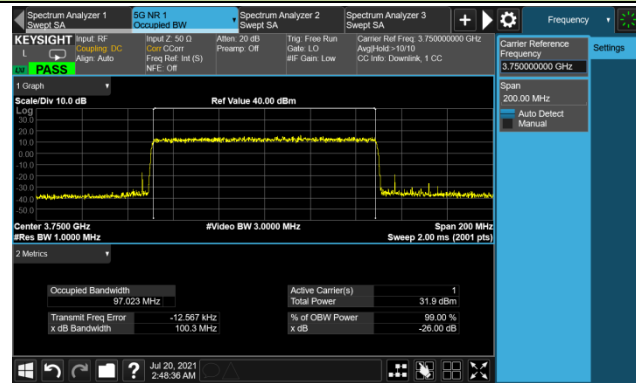


3939.99 MHz

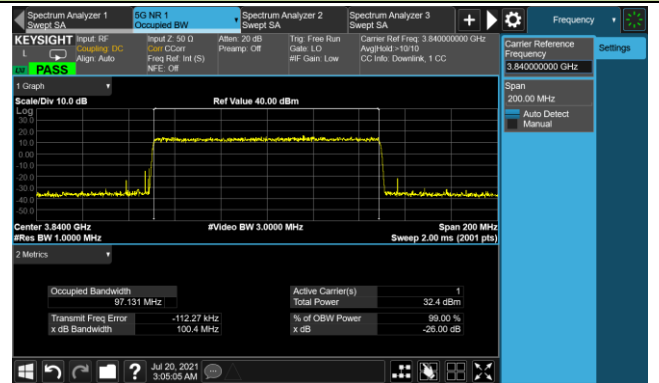


### 100MHz Channel Bandwidth - 256QAM

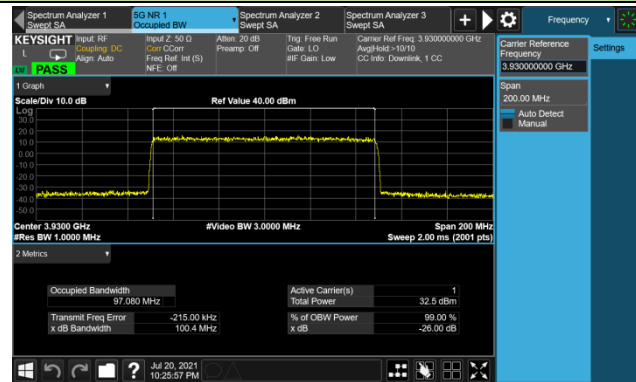
#### 3750.00 MHz



#### 3840.00 MHz



#### 3930.00 MHz

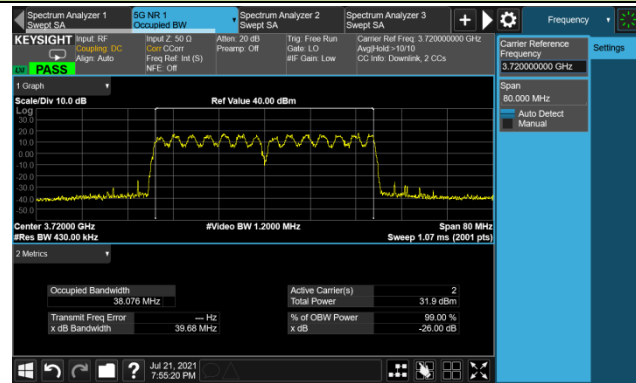


Test Engineer	Peter Xu	Test Site	SR2
Test Date	2021/07/21	Test Configuration	n77 (Multi Carrier)

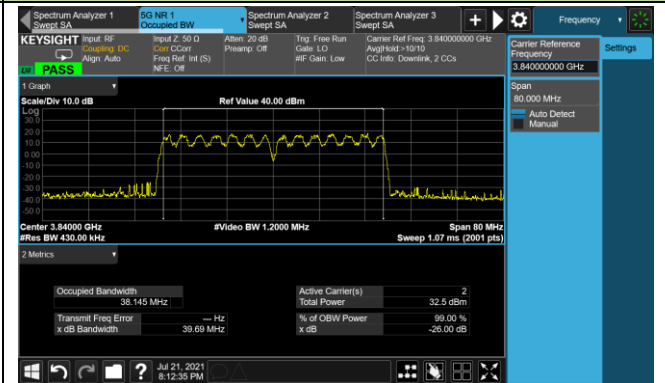
Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
<b>QPSK</b>					
3710+3730	20+20	38.08	3750+3850	100+100	195.69
3830+3850	20+20	38.15	3790+3890	100+100	195.20
3950+3970	20+20	38.07	3830+3930	100+100	194.58
<b>16QAM</b>					
3710+3730	20+20	38.03	3750+3850	100+100	195.99
3830+3850	20+20	38.15	3790+3890	100+100	196.18
3950+3970	20+20	38.11	3830+3930	100+100	195.73
<b>64QAM</b>					
3710+3730	20+20	37.93	3750+3850	100+100	196.31
3830+3850	20+20	37.92	3790+3890	100+100	196.23
3950+3970	20+20	38.00	3830+3930	100+100	196.50
<b>256QAM</b>					
3710+3730	20+20	37.89	3750+3850	100+100	195.97
3830+3850	20+20	38.03	3790+3890	100+100	196.11
3950+3970	20+20	38.03	3830+3930	100+100	195.84

## 20+20 MHz Channel Bandwidth - QPSK

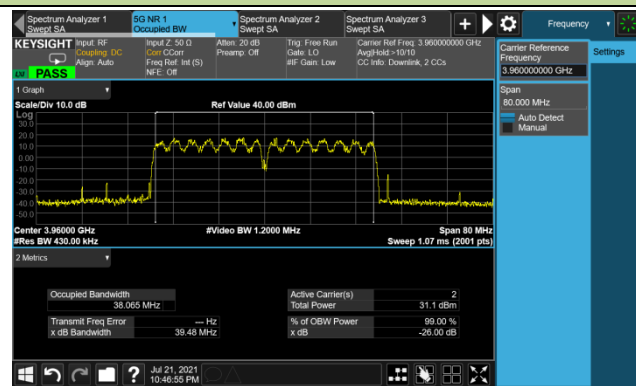
## 3710+3730 MHz



## 3830+3850 MHz

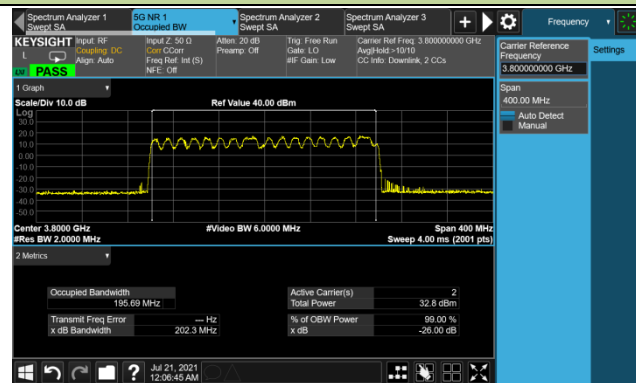


## 3950+3970 MHz

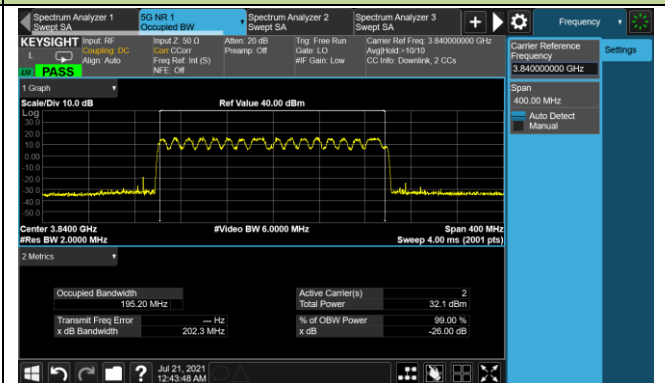


## 100+100 MHz Channel Bandwidth - QPSK

## 3750+3850 MHz



## 3790+3890 MHz



## 3983+3930 MHz

