RF MEASUREMENT REPORT

FCC ID:	2AD8UAWHQN01
Applicant:	Nokia Solutions and Networks, OY
Product:	AirScale Micro RRH
Model No.:	AWHQN
Brand Name:	Nokia
FCC Rule(s):	Part 2, 27 (O)
Result:	Complies
Received Date:	2023-08-31
Test Date:	2023-09-01 ~ 2023-10-07

Reviewed By: Sunny Sun

Approved By: Robin Wu

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.

Revision History

Report No.	Version	Description	Issue Date	Note
2308RSU090-U1	V01	Initial Report	2023-09-22	Invalid
2308RSU090-U1	V02	Update the output power value of 10MHz	2023-10-07	Valid

Note: This report is prepared for FCC Class II permissive supplement to FCC ID: 2AD8UAWHQN01, added some bandwidths test data.

CONTENTS

1. General Information

1.1. Applicant

Nokia Solutions and Networks, OY

2000 W. Lucent Lane, Naperville, Illinois, United States, 60563

1.2. Manufacturer

Nokia Solutions and Networks, OY

2000 W. Lucent Lane, Naperville, Illinois, United States, 60563

1.3. Testing Facility

<table>
<tr><td>☒</td><td colspan="5">Test Site - MRT Suzhou Laboratory</td></tr>
<tr><td rowspan="5"></td><td colspan="5">Laboratory Location (Suzhou - Wuzhong)
D8 Building, No.2 Tian’edang Rd., Wuzhong Economic Development Zone, Suzhou, China
Laboratory Location (Suzhou - SIP)
4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China</td></tr>
<tr><td colspan="5">Laboratory Accreditations</td></tr>
<tr><td colspan="3">A2LA: 3628.01</td><td colspan="2">CNAS: L10551</td></tr>
<tr><td colspan="3">FCC: CN1166</td><td colspan="2">ISED: CN0001</td></tr>
<tr><td>VCCI:</td><td>☐R-20025</td><td>☐G-20034</td><td>☐C-20020</td><td>☐T-20020</td></tr>
<tr><td></td><td>☐R-20141</td><td>☐G-20134</td><td>☐C-20103</td><td>☐T-20104</td></tr>
<tr><td>☐</td><td colspan="5">Test Site - MRT Shenzhen Laboratory</td></tr>
<tr><td rowspan="4"></td><td colspan="5">Laboratory Location (Shenzhen)
1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China</td></tr>
<tr><td colspan="5">Laboratory Accreditations</td></tr>
<tr><td colspan="3">A2LA: 3628.02</td><td colspan="2">CNAS: L10551</td></tr>
<tr><td colspan="3">FCC: CN1284</td><td colspan="2">ISED: CN0105</td></tr>
<tr><td>☐</td><td colspan="5">Test Site - MRT Taiwan Laboratory</td></tr>
<tr><td rowspan="4"></td><td colspan="5">Laboratory Location (Taiwan)
No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)</td></tr>
<tr><td colspan="5">Laboratory Accreditations</td></tr>
<tr><td colspan="5">TAF: 3261</td></tr>
<tr><td colspan="3">FCC: 291082, TW3261</td><td colspan="2">ISED: TW3261</td></tr>
</table>

1.4. Product Information

Product Name	AirScale Micro RRH
Model Number	AWHQN
Brand Name	Nokia
Serial Number	EB2144R0553
Software Version	5G23A
Operating Band	5G NR: n77
Temperature Operating Range	-40 ~ +55°C
Power Supply Rating	40.5 ~ 57Vdc
Accessories	
Adapter	Model: APAH PSU Input: 100-240V ~ 50/60Hz, 7A MAX. Output: 54V⎓9.3A MAX.
Remark: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Radio Specification under Testing

Operating Band Specification	
Single Band	5G NR n77
T_X Frequency Range	3700 ~ 3980 MHz
R_X Frequency Range	3700 ~ 3980 MHz
Bandwidth	10/20/30/50/60/70/90MHz 10+GAP260+10MHz, 100+GAP80+100MHz
iBW	280MHz
Modulation	QPSK, 16QAM, 64QAM, 256QAM
Max EIRP Power	10 MHz: 63.83 dBm, 20 MHz: 63.58 dBm, 30 MHz: 63.69 dBm; 50 MHz: 63.65 dBm, 60 MHz: 63.57 dBm, 70 MHz: 63.59 dBm; 90 MHz: 63.73 dBm, 10+GAP260+10MHz 63.55 dBm; 100+GAP80+100MHz 63.83 dBm.

1.6. Description of Available Antennas

Band Support	Antenna Type	Model	Antenna Gain
n77	Directional Antenna	P567454	14.5 dBi

Note 1: The transmit signals are completely uncorrelated with each other, directional gain = G_{ANT} dBi, G_{ANT} is the antenna gain in dBi.

Note 2: The representative antennas used to calculate the ERP (EIRP).

1.7. Test Methodology

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

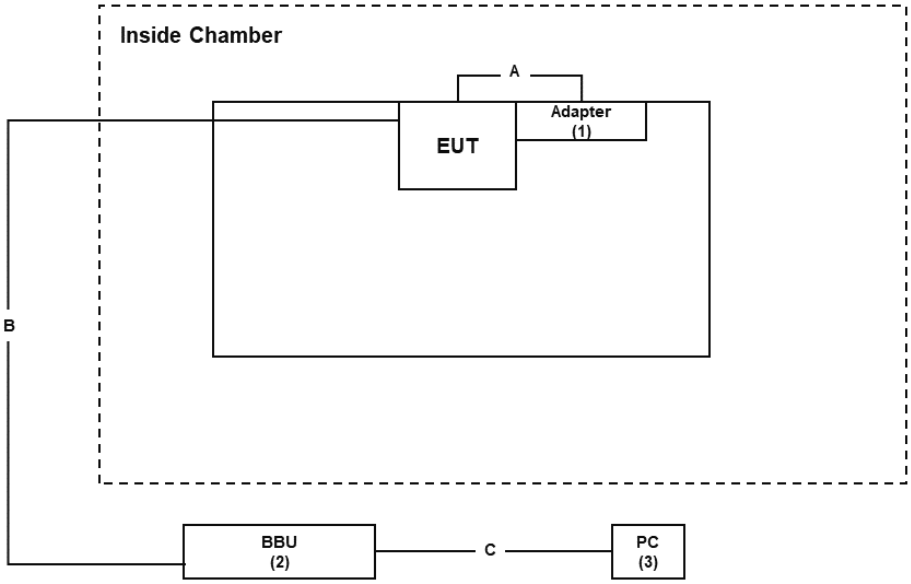
- ANSI C63.26:2015
- FCC CFR 47 Part 2, Part 27
- FCC KDB 971168 D01 v03r01: Power Meas License Digital Systems
- FCC KDB 971168 D02 v02r01: Misc Rev Approv License Devices
- FCC KDB 412172 D01 v01r01: Determining ERP and EIRP
- FCC KDB 662911 D01 v02r01: Multiple Transmitter Output

2. Test Configuration

2.1. Test Mode

Test Item	Channel Bandwidth	Modulation
Occupied bandwidth	10/20/30/50/60/70/90MHz 10+GAP260+10MHz 100+GAP80+100MHz	QPSK, 16QAM, 64QAM, 256QAM
Equivalent Isotropically Radiated Power		QPSK, 16QAM, 64QAM, 256QAM
Band Edge unwanted Emissions		16QAM
Out-of-frequency band unwanted emissions		16QAM
Peak to Average Ratio	10/20/30/50/60/70/90MHz	QPSK, 16QAM, 64QAM, 256QAM
Frequency Stability	10MHz	16QAM
Radiated Transmitter Spurious Emissions	10MHz	16QAM

2.2. Test System Connection Diagram



No.	Cable Type	Cable Spec.	Length
A	Power cable	Non-Shielding	1.0m
B	Optical fiber cable	Non-Shielding	>10.0m
C	LAN cable	Non-Shielding	2.0m
No.	Product	Manufacturer	Model No.
1	AC/DC Power supply	Nokia	APAH PSU
2	BBU	Nokia	ASIB+ABIO
3	Personal Computer	HP	TPN-C141

2.3. Test Environment Condition

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

3. Measuring Instrument

Instrument Name	Manufacturer	Model No.	Asset No.	Cali. Interval	Cal. Due Date	Test Site
Temperature Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2023-10-08	WZ-TR3
Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2024-05-31	WZ-TR3
Thermohygrometer	testo	608-H1	MRTSUE06362	1 year	2024-02-14	WZ-SR6
Shielding Room	HUAMING	WZ-SR6	MRTSUE06443	N/A	N/A	WZ-SR6
Signal Analyzer	Keysight	N9020B	MRTSUE06583	1 year	2023-10-08 2024-09-28	WZ-SR6
Attenuator	SHX	WDTS100-40dB-6G-B	MRTSUE06685	1 year	2024-03-01	WZ
Attenuator	SHX	WDTS100-40dB-6G-B	MRTSUE06689	1 year	2024-03-01	WZ
Attenuator	SHX	WDTS100-40dB-6G-B	MRTSUE06690	1 year	2024-03-01	WZ
Attenuator	SHX	WDTS100-40dB-6G-B	MRTSUE06691	1 year	2024-03-01	WZ
Attenuator	SHX	SMA10-20dB-18G	MRTSUE06697	1 year	2024-03-01	WZ
Attenuator	SHX	DTS 100G-6dB-19G-A	MRTSUE06964	1 year	2024-03-01	WZ
TRILOG Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2024-05-15	WZ-AC2
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2023-09-29	WZ-AC2
EMI Test Receiver	Agilent	N9038A	MRTSUE06125	1 year	2024-05-23	WZ-AC2
Thermohygrometer	Mingle	ETH529	MRTSUE06170	1 year	2023-11-27	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2023-10-13	WZ-AC2
Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2024-05-07	WZ-AC2
Anechoic Chamber	RIKEN	WZ-AC2	MRTSUE06213	1 year	2024-04-20	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2023-11-05	WZ-AC2
Preamplifier	EMCI	EMC184045SE	MRTSUE06640	1 year	2024-01-12	WZ-AC2
Preamplifier	EMCI	EMC051845SE	MRTSUE06987	1 year	2023-09-08 2024-09-07	WZ-AC2
Thermohygrometer	testo	608-H1	MRTSUE11038	1 year	2023-11-01	WZ-AC2

Software	Version	Function
EMI Software	V3.0.0	EMI Test Software
Controller_MF 7802	1.02	RE Antenna & turntable

4. Decision Rules and Measurement Uncertainty

4.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

4.2. 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.

Radiated Spurious Emissions
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Coaxial: 9kHz~30MHz: 2.59dB Coplanar: 9kHz~30MHz: 2.60dB Horizontal: 30MHz~200MHz: 3.85dB 200MHz~1GHz: 4.36dB 1GHz~40GHz: 4.98dB Vertical: 30MHz~200MHz: 4.06dB 200MHz~1GHz: 5.28dB 1GHz~40GHz: 4.91dB
Conducted Spurious Emissions
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.468dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.66dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 69.28KHz
Frequency Stability
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 8.04Hz

5. Test Result

5.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
2.1049	Occupied Bandwidth	Conducted	Pass
2.1055; 27.54	Frequency Stability		Pass
2.1046; 27.50(j)(2)	Equivalent Isotropically Radiated Power		Pass
2.1046; 27.50(j)(4)	Peak to Average Ratio		Pass
2.1051; 27.53(l)(1)	Band Edge unwanted Emissions		Pass
2.1051; 27.53(l)(1)	Out-of-frequency Band unwanted Emissions		Pass
2.1051; 27.53(l)(1)	Radiated Transmitter Spurious Emissions	Radiated	Pass

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) All supported modulation types were evaluated. The worst-case emission of modulation was selected. Therefore, the Frequency Stability, Unwanted Emissions and Radiated Spurious Emission were presented the worst-case in the test report.

5.2. Occupied Bandwidth Measurement

5.2.1. 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.

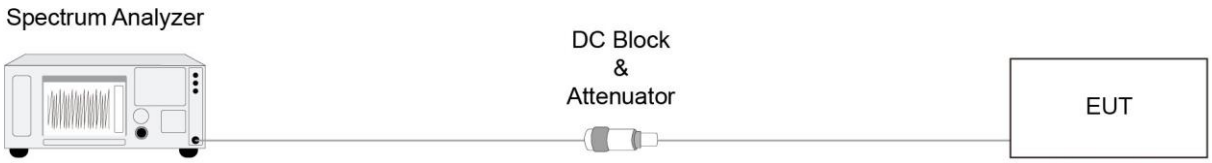
5.2.2. Test Procedure

ANSI C63.26-2015 - Section 5.4

5.2.3. 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 ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize
8. Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

5.2.4. Test Setup



5.2.5. Test Result

Refer to Appendix A.1.

5.3. Frequency Stability Measurement

5.3.1. Test Limit

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

5.3.2. Test Procedures Used

ANSI C63.26-2015 - Section 5.4 & 5.6

5.3.3. Test Setting

1. Use the occupied bandwidth function of the instrument and record the low edge for low channel occupancy bandwidth and the high edge for high channel occupancy bandwidth.
2. Change the temperature of equipment and repeat Steps 1.
3. Change the Voltage of equipment and repeat Steps 1.
4. Use the frequency error function of the instrument and record the frequency error.
5. Change the temperature of equipment and repeat Steps 4.
6. Change the Voltage of equipment and repeat Steps 4.

Frequency Stability Under Temperature Variations:

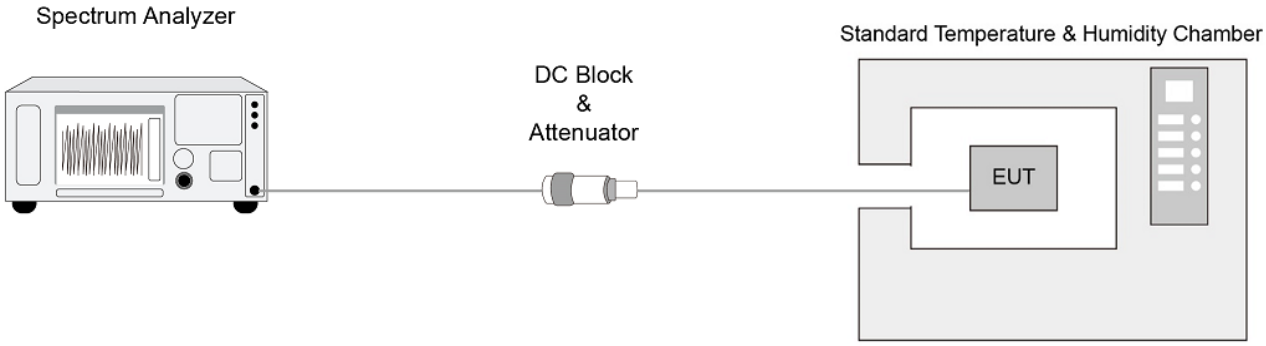
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain 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 (±15%) and endpoint, recordthe maximum frequency change.

5.3.4. Test Setup



5.3.5. Test Result

Refer to Appendix A.2.

5.4. Equivalent Isotropically Radiated Power Measurement

5.4.1. 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.

5.4.2. Test Procedure

ANSI C63.26-2015 - Section 5.2

5.4.3. 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 Density Measurement

1. Set span to 2 × to 3 × the OBW;
2. Set RBW = 1% to 5% of the OBW;
3. Set VBW ≥ 3 × RBW;
4. Set number of measurement points in sweep ≥ 2 × span / RBW;
5. Sweep time set to auto;
6. Detector = power averaging (rms);
7. If the EUT can be configured to transmit continuously, then set the trigger to free run;
8. If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep.
9. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over multiple symbols, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.
10. Compute power by integrating the spectrum across the specified bandwidth of the signal using the instrument's band or channel power measurement function with band/channel limits set equal to the specified bandwidth band edges. If the instrument does not have a band or channel power function, sum

the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire specified bandwidth of the spectrum.

ERP & EIRP Measurement

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation (1) as follows:

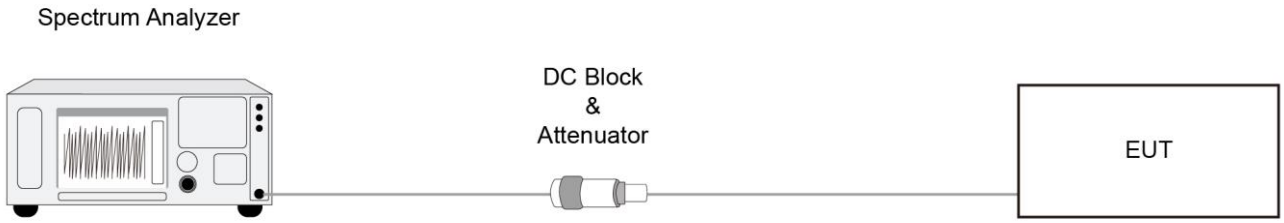
ERP or EIRP = P_{Meas} + G_T

where

ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g., dBm or dBW)

P_{Meas} measured transmitter output power or PSD, in dBm or dBW
G_T gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

5.4.4. Test Setup



5.4.5. Test Result

Refer to Appendix A.3.

5.5. Peak to Average Ratio Measurement

5.5.1. Test Limit

The peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

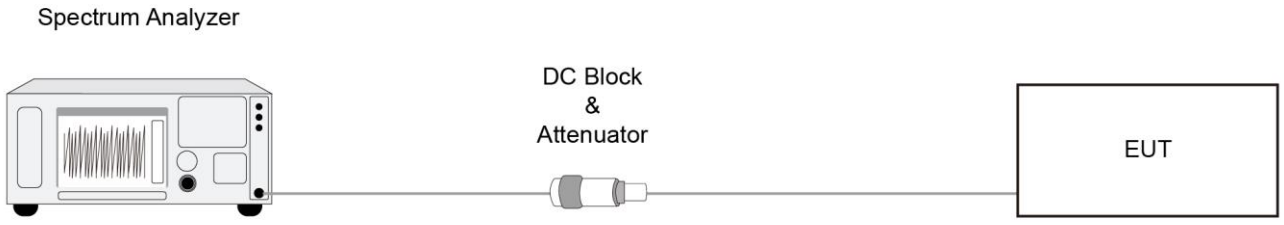
5.5.2. Test Procedure

ANSI C63.26-2015 - Section 5.2.3.4 (CCDF).

5.5.3. Test Setting

1. Set the resolution / measurement bandwidth ≥ signal's occupied bandwidth
2. Set the number of counts to a value that stabilizes the measured CCDF curve
3. Record the maximum PARR level associated with a probability of 0.1%

5.5.4. Test Setup



5.5.5.Test Result

Refer to Appendix A.4.

5.6. Band Edge unwanted Emissions Measurement

5.6.1. Test Limit

The first 1.0 MHz band immediately outside and adjacent to each of the sub-bands, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p (watts)

Note: This device can be impelement MIMO function, so the limit os spurious emissions needs to be reduced 10*log($Numbers_{Ant}$) according to FCC KDB 662911 D01 guidance.

The limit is adjusted to -13dBm - 10*log(4) = -19.02dBm

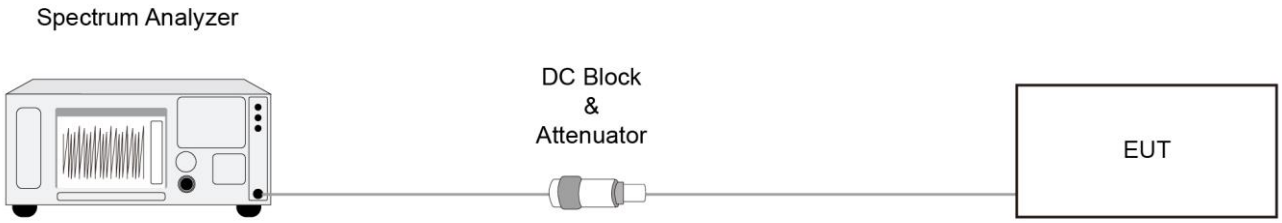
5.6.2. Test Procedure

ANSI C63.26-2015 - Section 5.7

5.6.3. Test Setting

1. Set the analyzer frequency to Bottom or Top channel.
2. RBW = The nominal RBW shall be in the range of 1% of the anticipated OBW;
3. VBW ≥ 3*RBW
4. Sweep time = auto
5. Detector = power averaging (rms)
6. Set sweep trigger to “free run”
7. User gate triggered such that the analyzer only sweeps when the device is transmitting at full power
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.
9. Used power integration when using a measurement bandwidth smaller than the specified bandwidth.

5.6.4. Test Setup



5.6.5. Test Result

Refer to Appendix A.5.

5.7. Out-of-frequency Band Unwanted Emissions Measurement

5.7.1. Test Limit

The first 1.0 MHz band immediately outside and adjacent to each of the sub-bands, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p (watts)

Note: This device can be impelement MIMO function, so the limit os spurious emissions needs to be reduced 10*log($Numbers_{Ant}$) according to FCC KDB 662911 D01 guidance.

The limit is adjusted to -13dBm - 10*log(4) = -19.02dBm

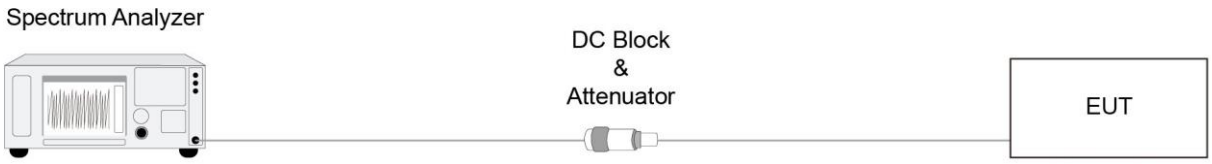
5.7.2. Test Procedure

ANSI C63.26-2015 - Section 5.7

5.7.3. Test Setting

1. Set the analyzer frequency to low or high channel.
2. RBW = 1MHz
3. VBW ≥ 3*RBW
4. Sweep time = auto
5. Detector = power averaging (rms)
6. Set sweep trigger to “free run.”
7. User gate triggered such that the analyzer only sweeps when the device is transmitting at full power.
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

5.7.4. Test Setup



5.7.5. Test Result

Refer to Appendix A.6.

5.8. Radiated Transmitter Spurious Emissions Measurement

5.8.1. Test Limit

The unwanted emissions shall not exceed -13dBm.

E (dBμV/m) = EIRP (dBm) - 20 log D + 104.8; where D is the measurement distance in meters. The emission limit equal to 82.3dBμV/m.

5.8.2. Test Procedure

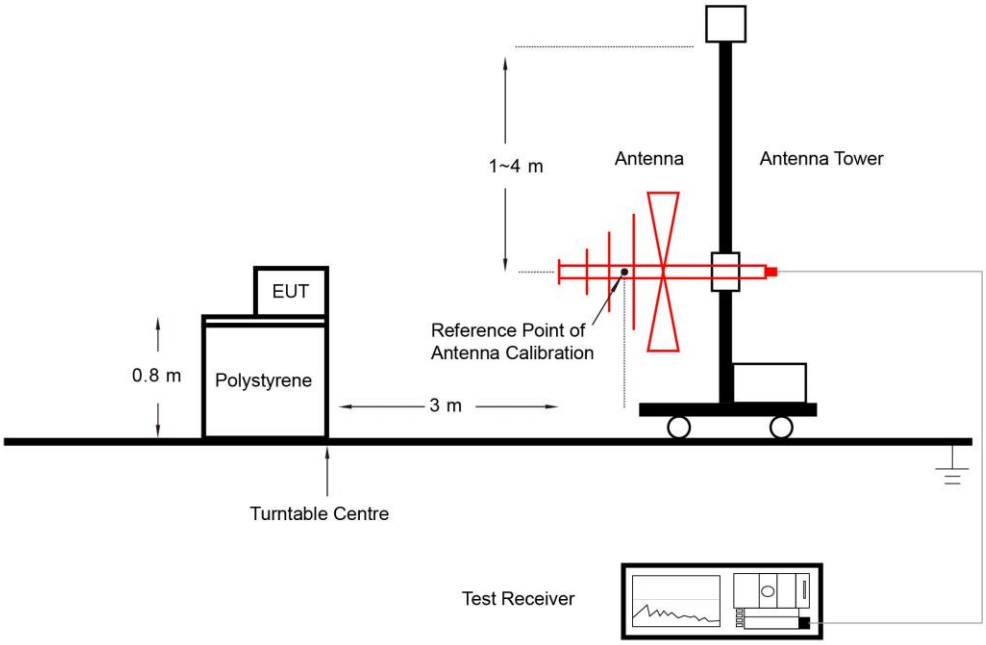
ANSI C63.26-2015 - Section 5.2.7 & 5.5

5.8.3. Test Setting

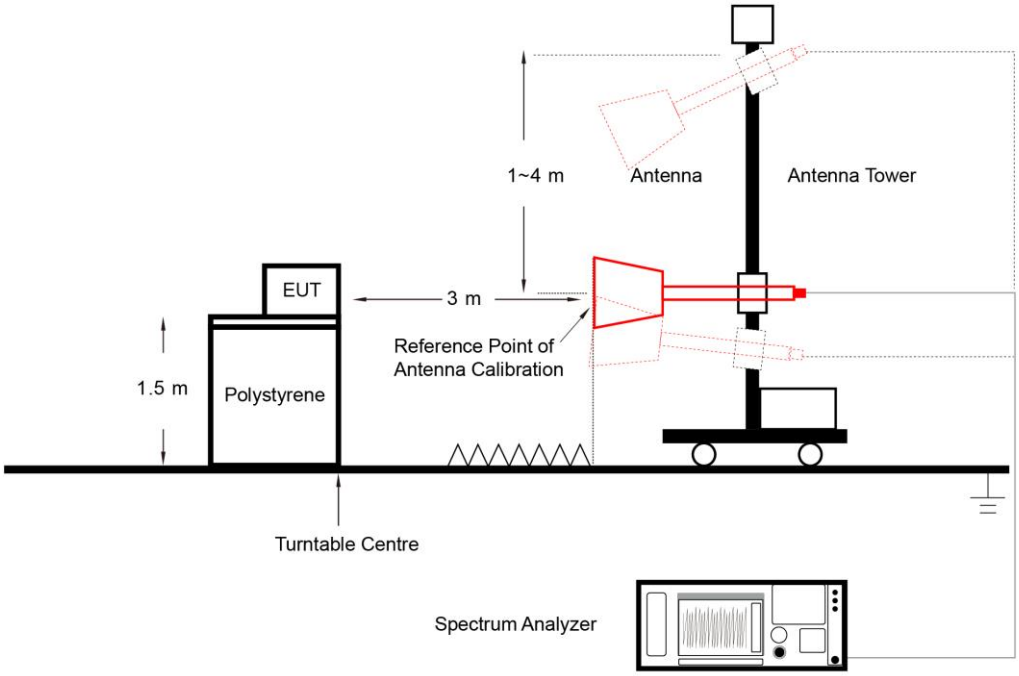
1. RBW = 100kHz or 1MHz
2. VBW≥ 3*RBW
3. Sweep time ≥ 10 × (number of points in sweep) × (transmission symbol period)
4. Detector = Peak
5. Trace mode = max hold
6. The trace was allowed to stabilize

5.8.4. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



5.8.5. Test Result

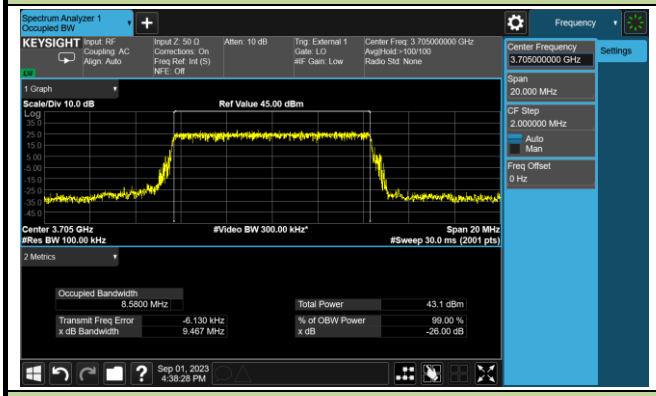
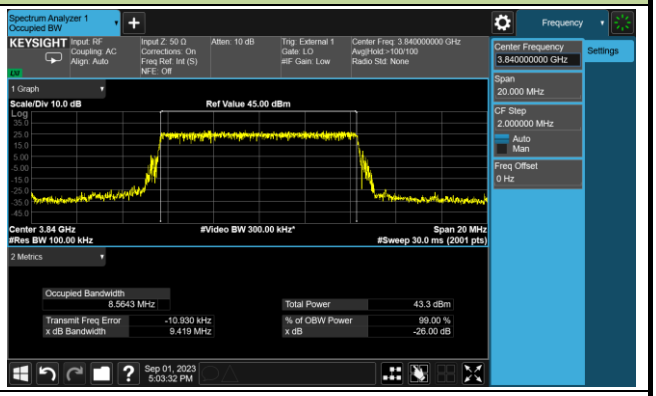
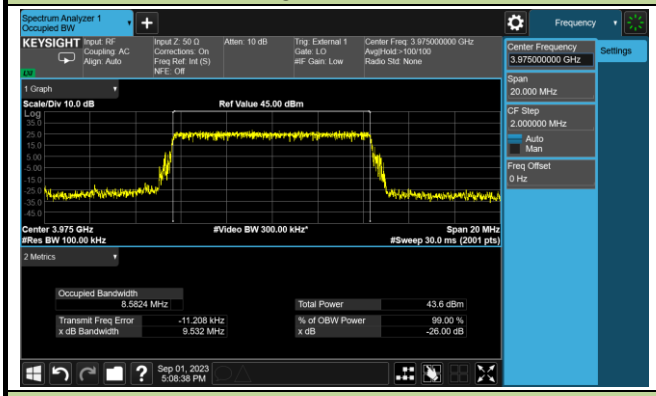
Refer to Appendix A.7.

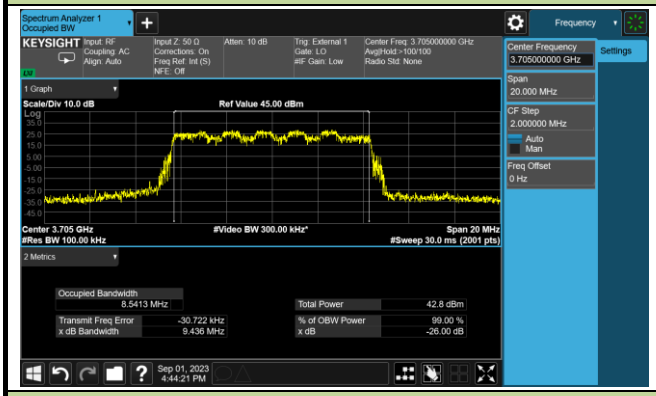
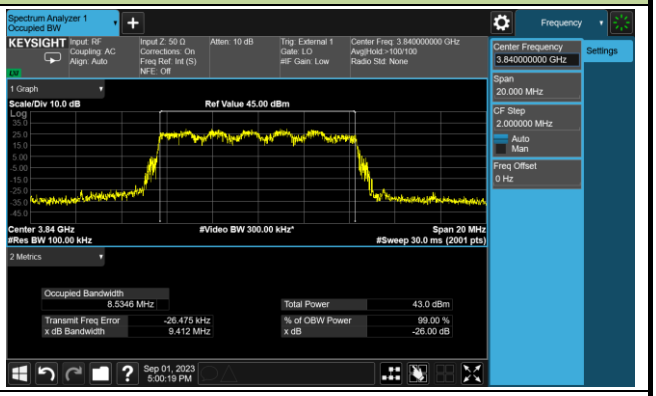
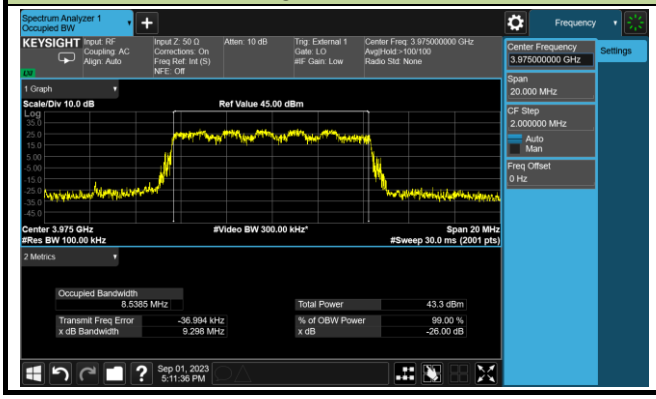
Appendix A - Test Result

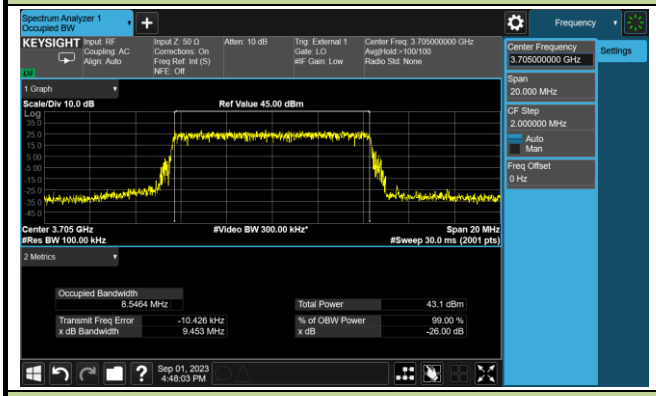
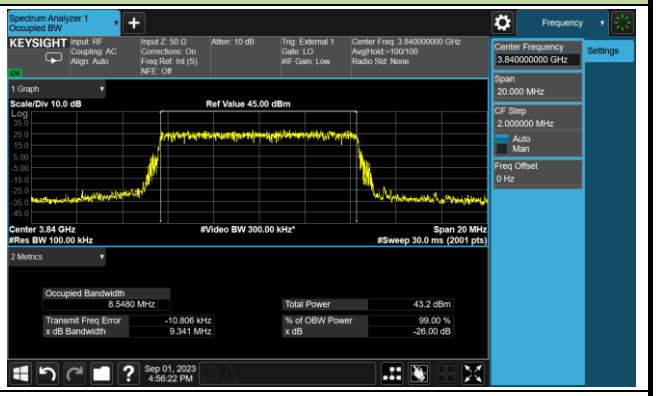
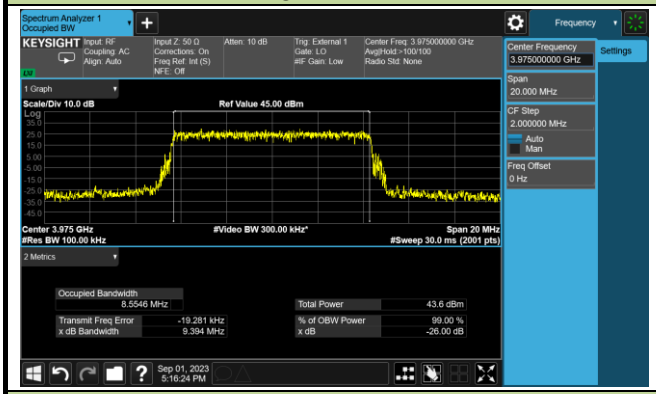
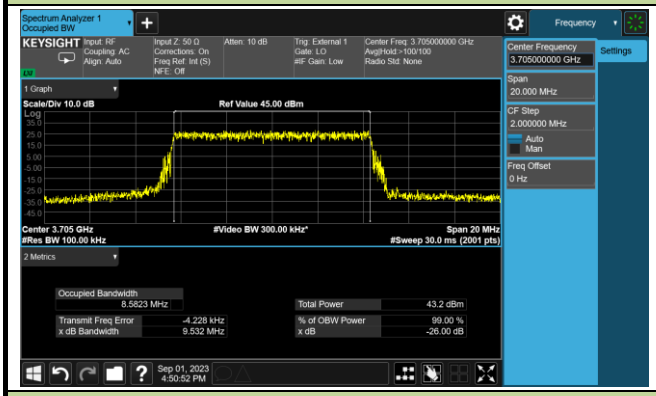
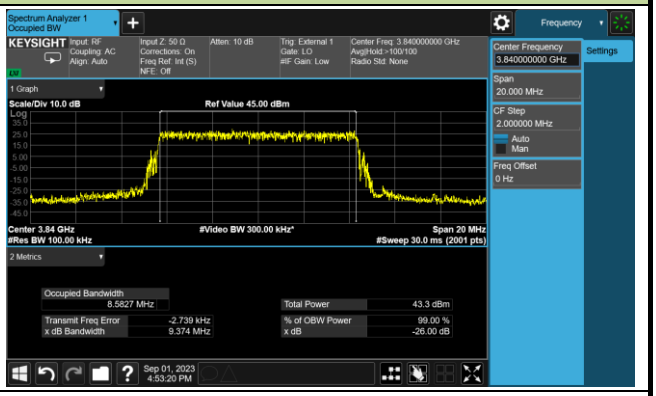
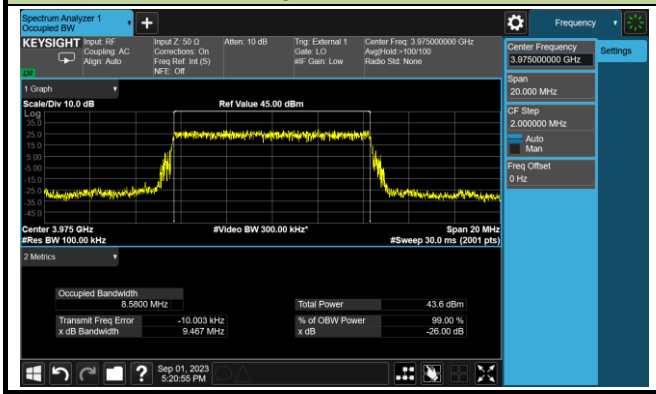
A.1 Occupied Bandwidth Test Result

Test Site	WZ-SR6	Test Engineer	Larry Yan
Test Date	2023-09-01	Test Band	n77_10MHz

Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK		
3705.00	10	8.5800
3840.00	10	8.5643
3975.00	10	8.5824
16QAM		
3705.00	10	8.5413
3840.00	10	8.5346
3975.00	10	8.5385
64QAM		
3705.00	10	8.5464
3840.00	10	8.5480
3975.00	10	8.5546
256QAM		
3705.00	10	8.5823
3840.00	10	8.5827
3975.00	10	8.5800

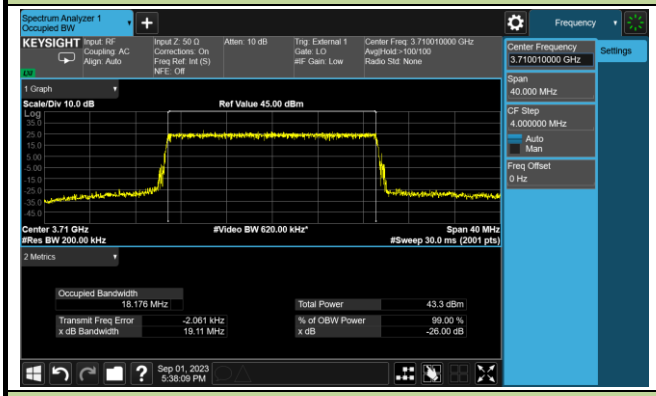
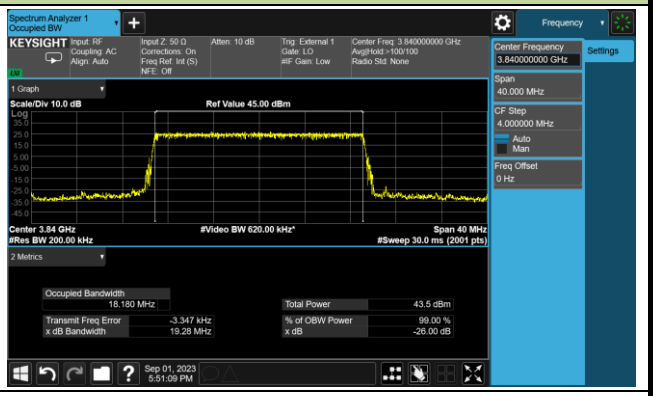
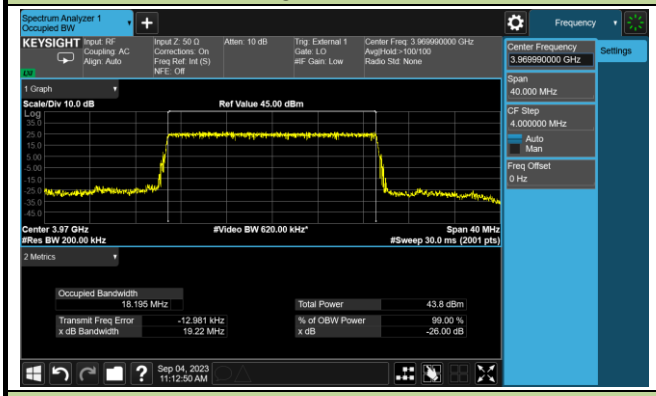
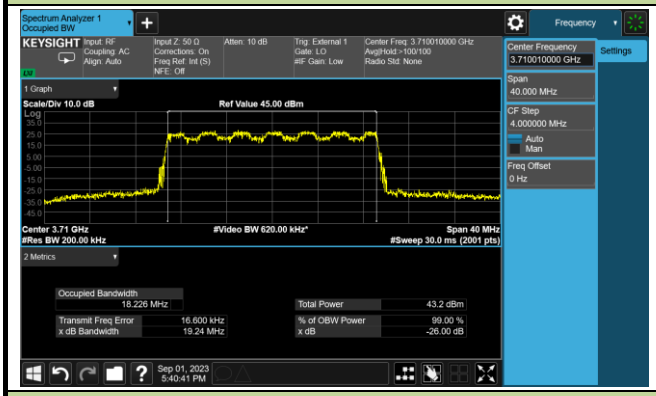
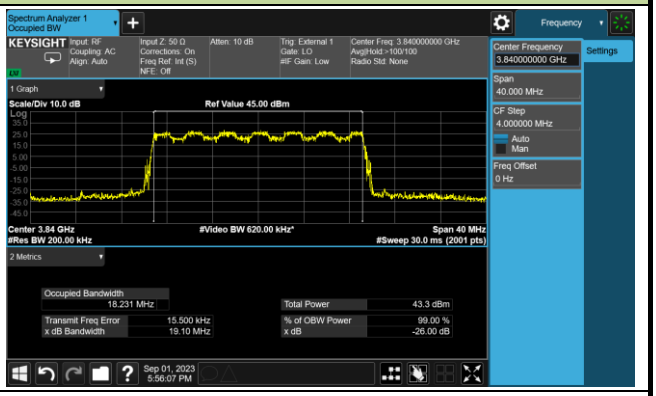
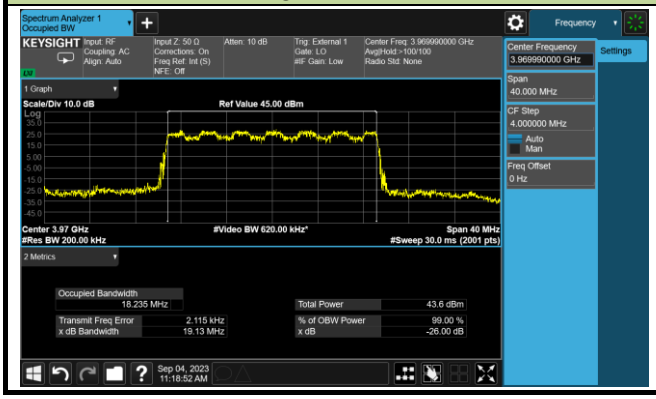
10MHz Channel Bandwidth - QPSK	
Low Channel	Middle Channel
	
High Channel	
	

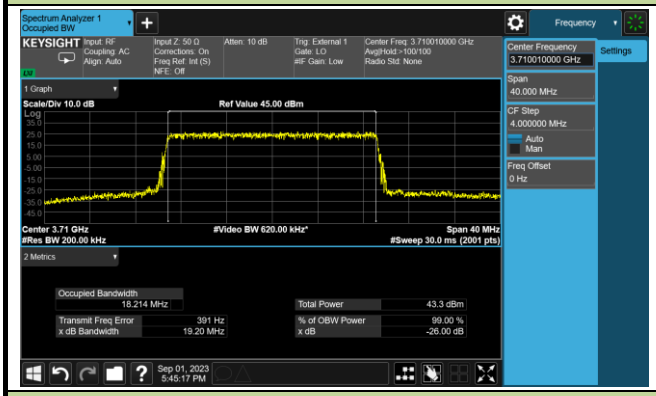
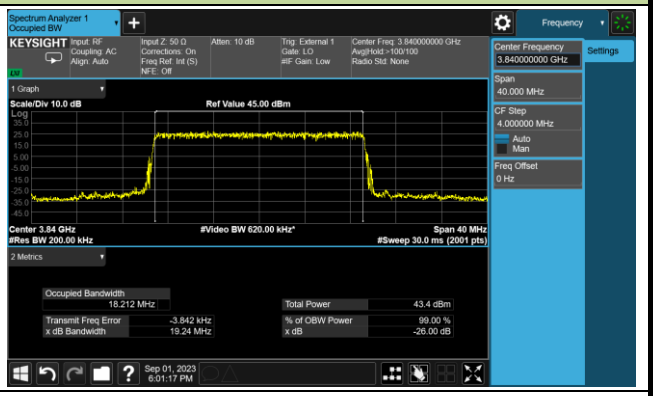
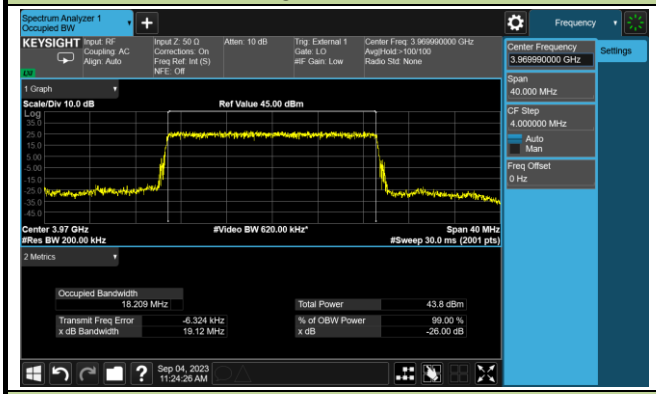
10MHz Channel Bandwidth - 16QAM	
Low Channel	Middle Channel
	
High Channel	
	

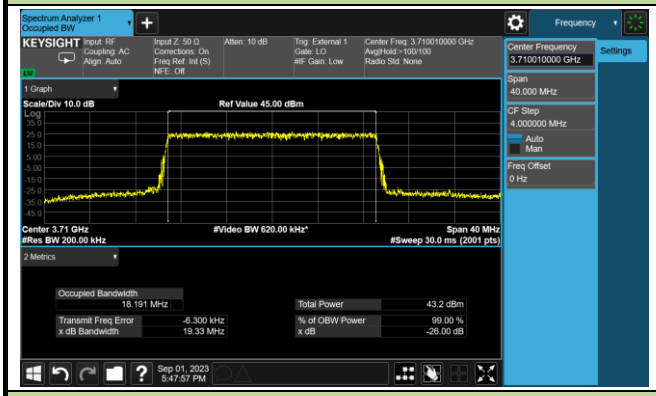
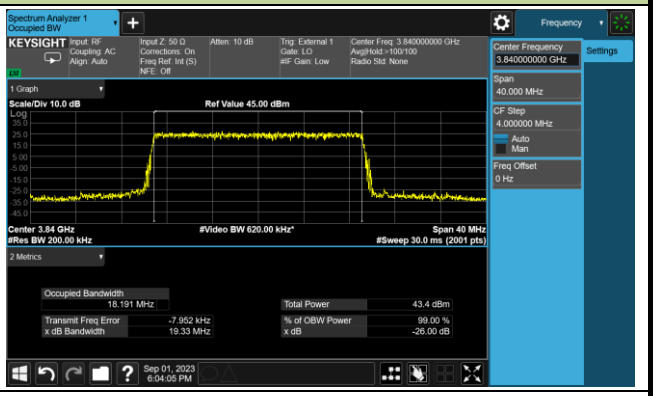
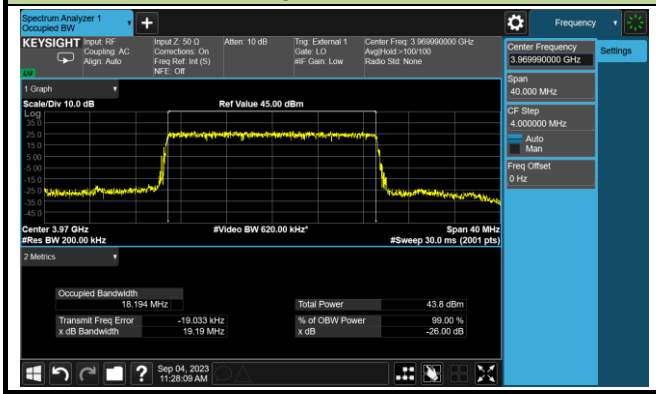
10MHz Channel Bandwidth - 64QAM	
Low Channel	Middle Channel
	
High Channel	
	
10MHz Channel Bandwidth - 256QAM	
Low Channel	Middle Channel
	
High Channel	
	

Test Site	WZ-SR6	Test Engineer	Larry Yan
Test Date	2023-09-01 ~ 2023-09-04	Test Band	n77_20MHz

Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK		
3710.01	20	18.176
3840.00	20	18.180
3969.99	20	18.195
16QAM		
3710.01	20	18.226
3840.00	20	18.231
3969.99	20	18.235
64QAM		
3710.01	20	18.214
3840.00	20	18.212
3969.99	20	18.209
256QAM		
3710.01	20	18.191
3840.00	20	18.191
3969.99	20	18.194

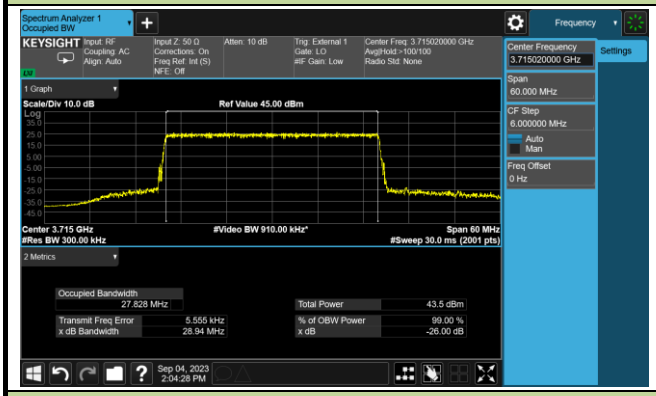
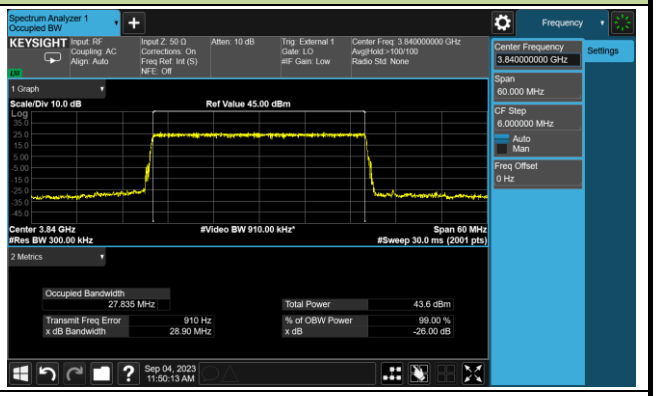
20MHz Channel Bandwidth - QPSK	
Low Channel	Middle Channel
	
High Channel	
	
20MHz Channel Bandwidth - 16QAM	
Low Channel	Middle Channel
	
High Channel	
	

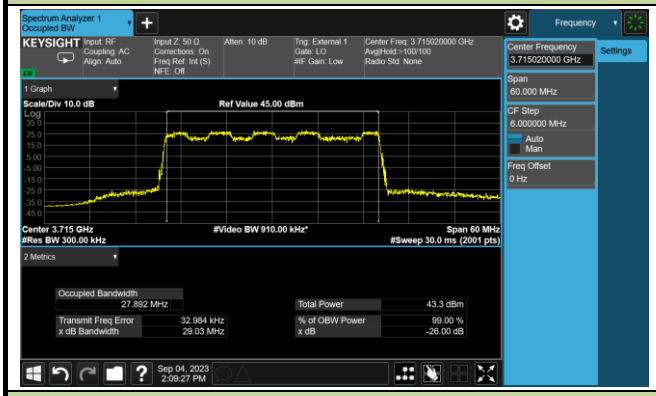
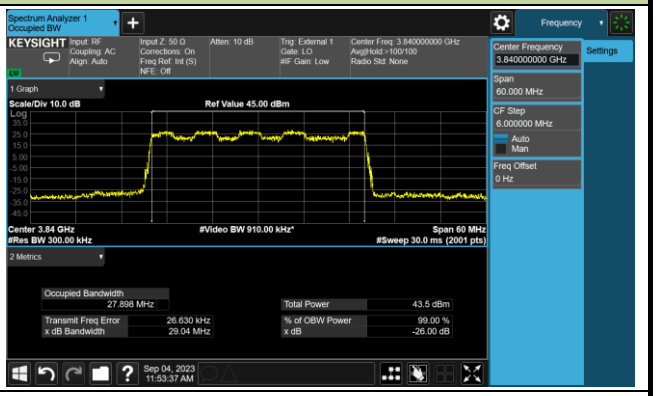
20MHz Channel Bandwidth - 64QAM	
Low Channel	Middle Channel
	
High Channel	
	

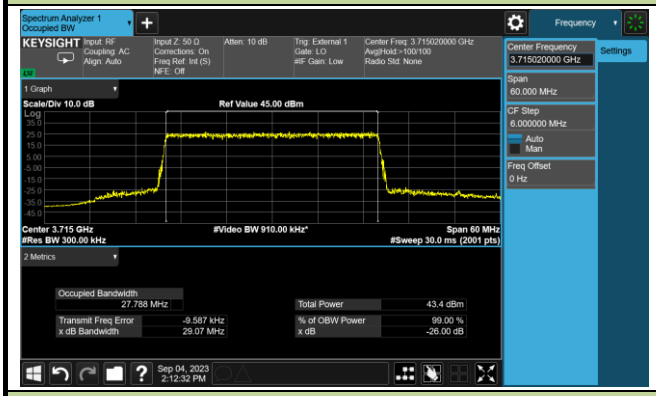
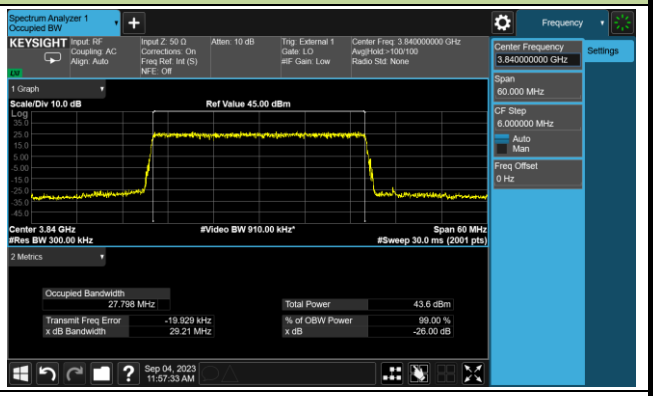
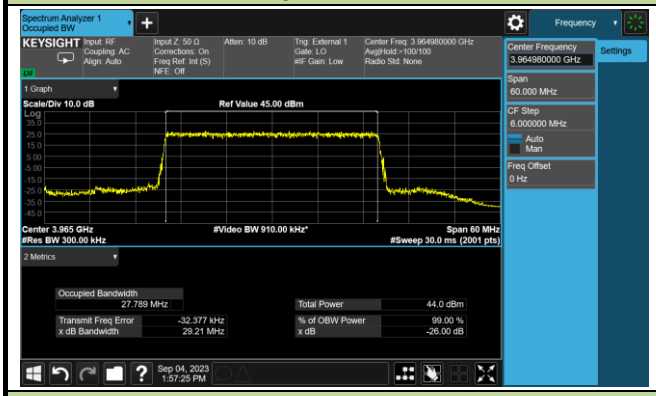
20MHz Channel Bandwidth - 256QAM	
Low Channel	Middle Channel
	
High Channel	
	

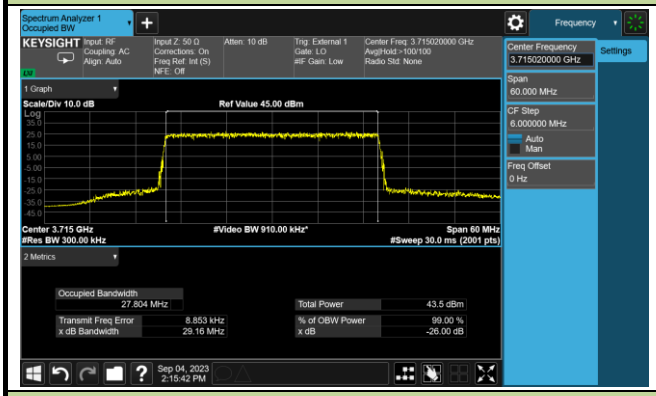
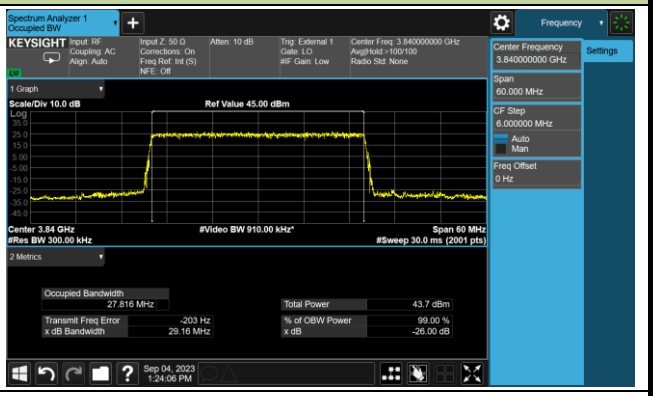
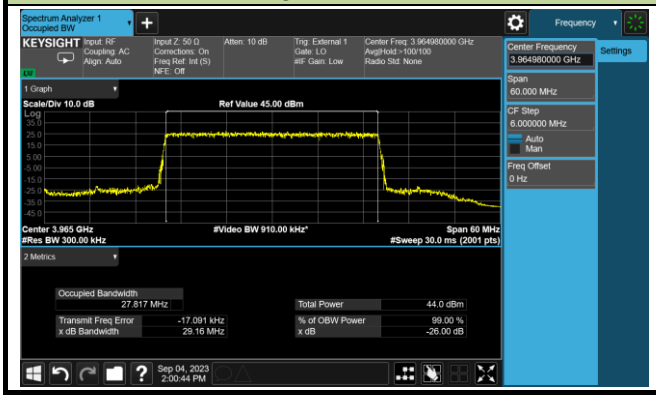
Test Site	WZ-SR6	Test Engineer	Larry Yan
Test Date	2023-09-04	Test Band	n77_30MHz

Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK		
3715.02	30	27.828
3840.00	30	27.835
3964.98	30	27.821
16QAM		
3715.02	30	27.892
3840.00	30	27.898
3964.98	30	27.890
64QAM		
3715.02	30	27.788
3840.00	30	27.798
3964.98	30	27.789
256QAM		
3715.02	30	27.804
3840.00	30	27.816
3964.98	30	27.817

30MHz Channel Bandwidth - QPSK	
Low Channel	Middle Channel
	
High Channel	
	

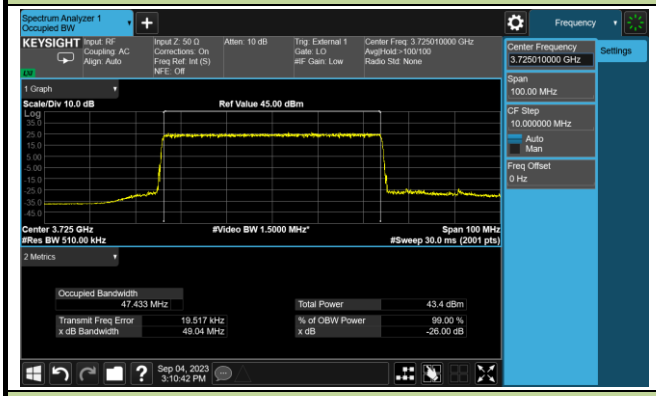
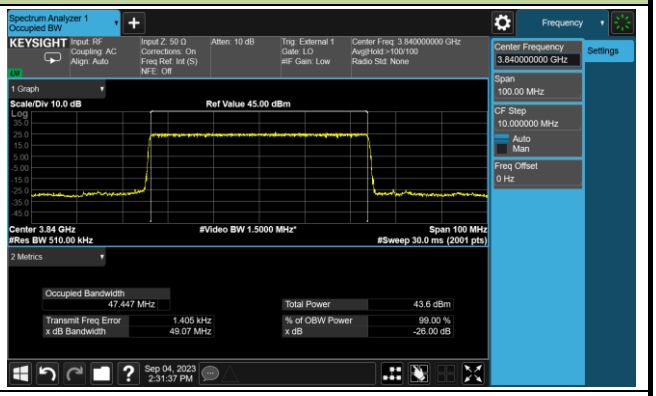
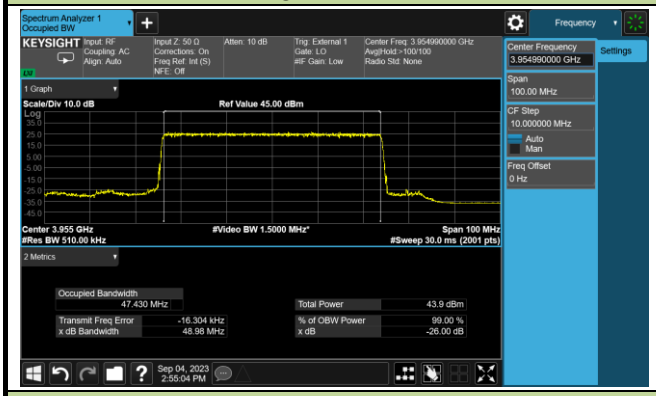
30MHz Channel Bandwidth - 16QAM	
Low Channel	Middle Channel
	
High Channel	
	

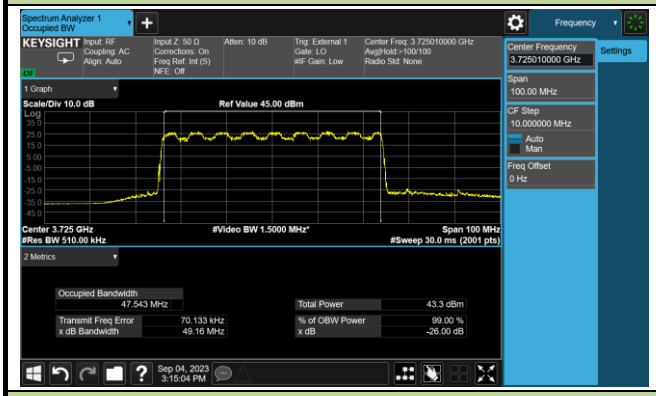
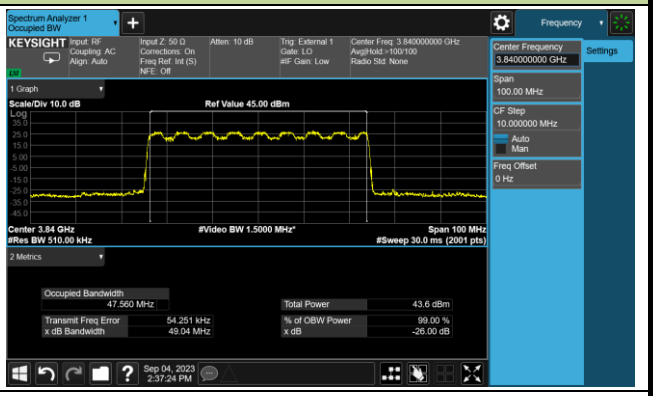
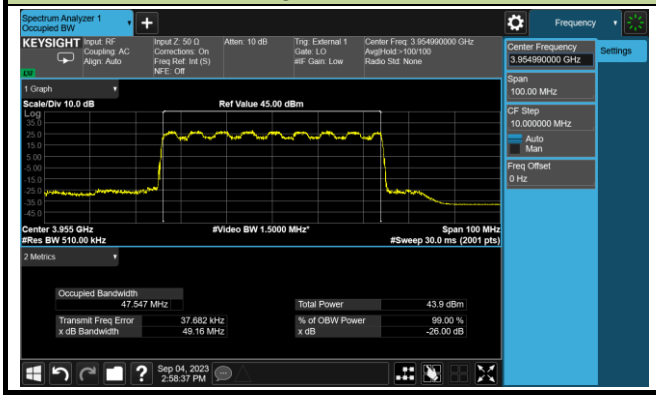
30MHz Channel Bandwidth - 64QAM	
Low Channel	Middle Channel
	
High Channel	
	

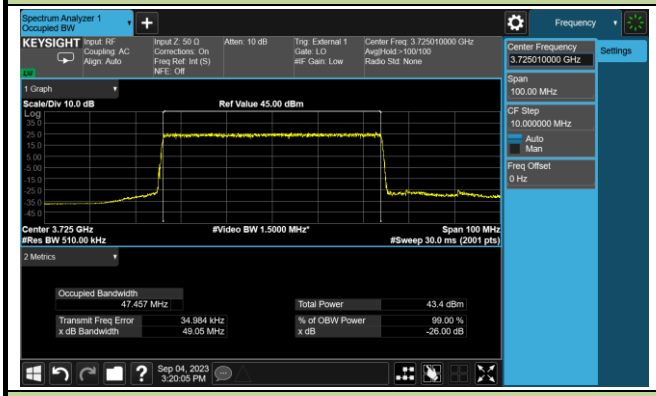
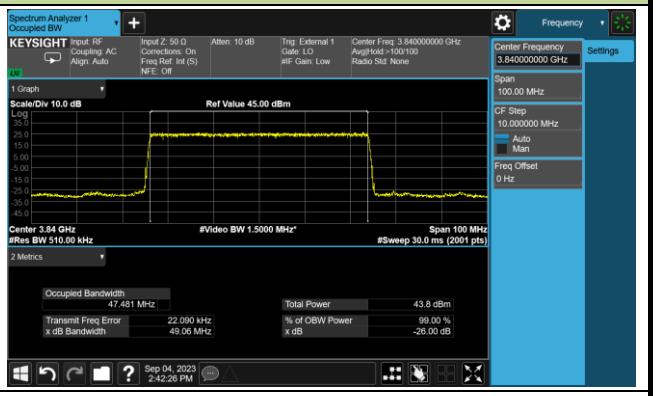
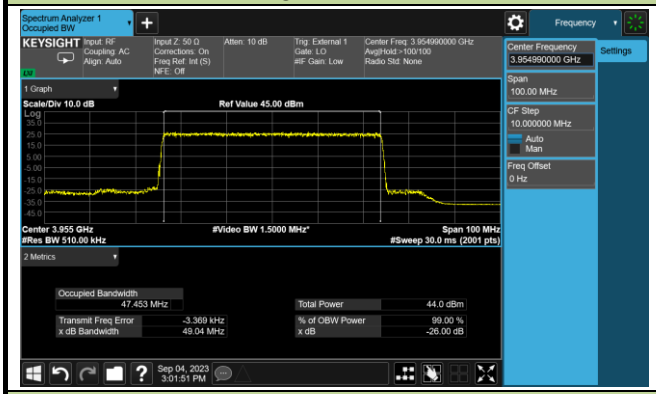
30MHz Channel Bandwidth - 256QAM	
Low Channel	Middle Channel
	
High Channel	
	

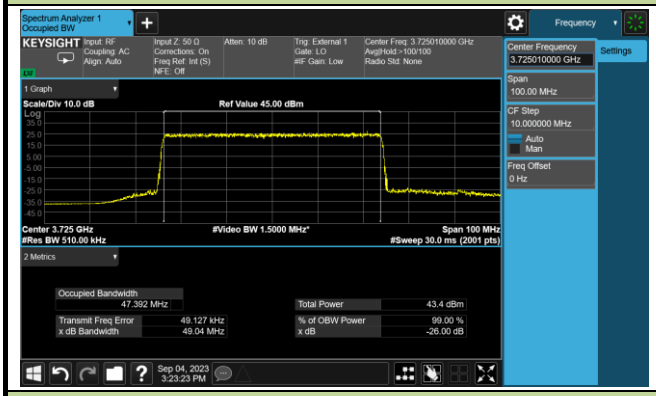
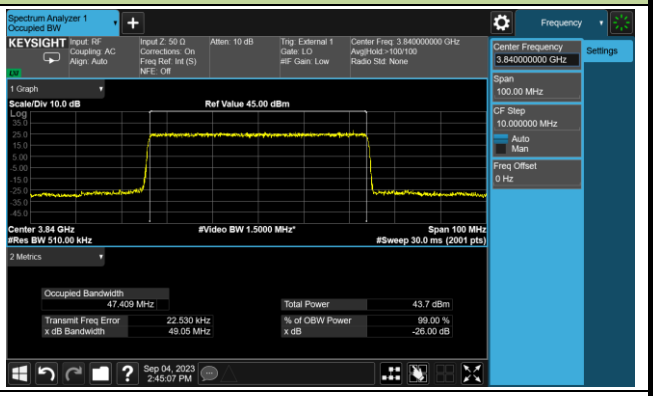
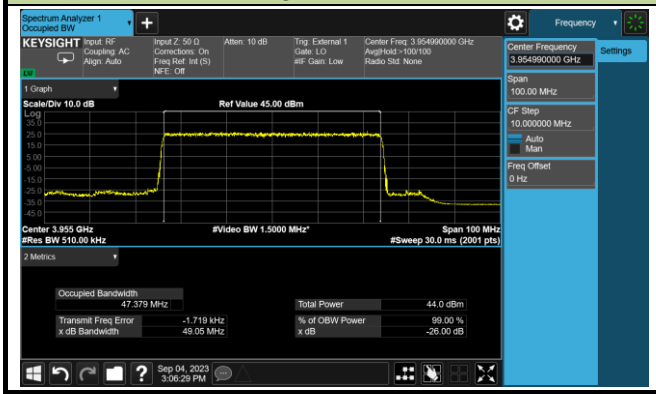
Test Site	WZ-SR6	Test Engineer	Larry Yan
Test Date	2023-09-04	Test Band	n77_50MHz

Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK		
3725.01	50	47.433
3840.00	50	47.447
3954.99	50	47.430
16QAM		
3725.01	50	47.543
3840.00	50	47.560
3954.99	50	47.547
64QAM		
3725.01	50	47.457
3840.00	50	47.481
3954.99	50	47.453
256QAM		
3725.01	50	47.392
3840.00	50	47.409
3954.99	50	47.379

50MHz Channel Bandwidth - QPSK	
Low Channel	Middle Channel
	
High Channel	
	

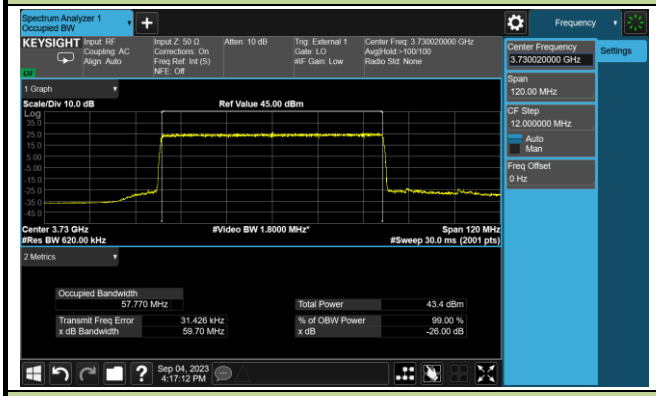
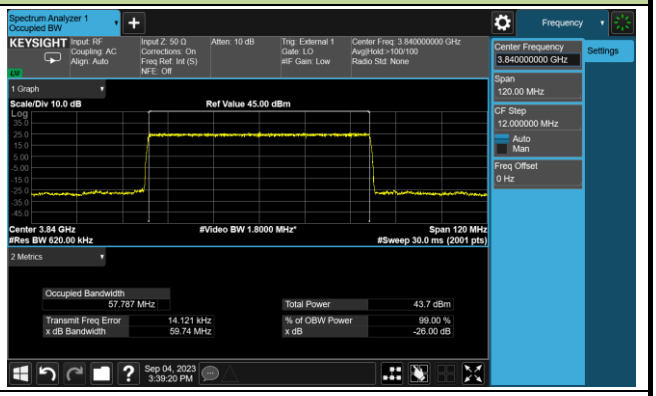
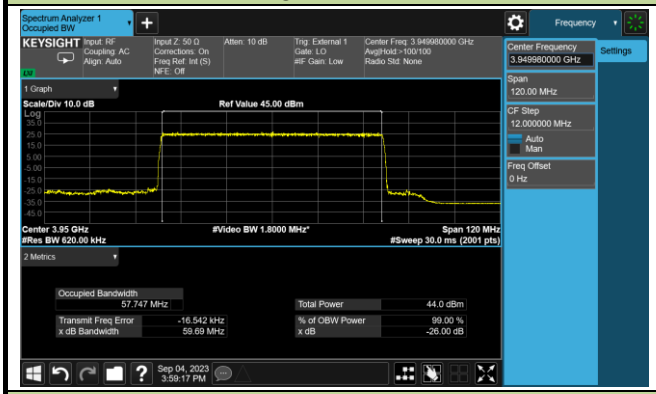
50MHz Channel Bandwidth - 16QAM	
Low Channel	Middle Channel
	
High Channel	
	

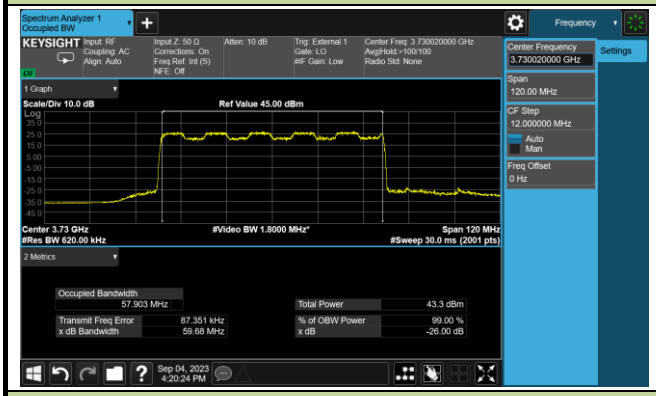
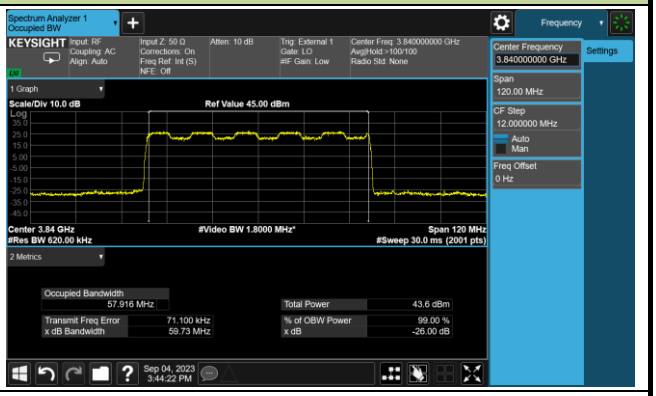
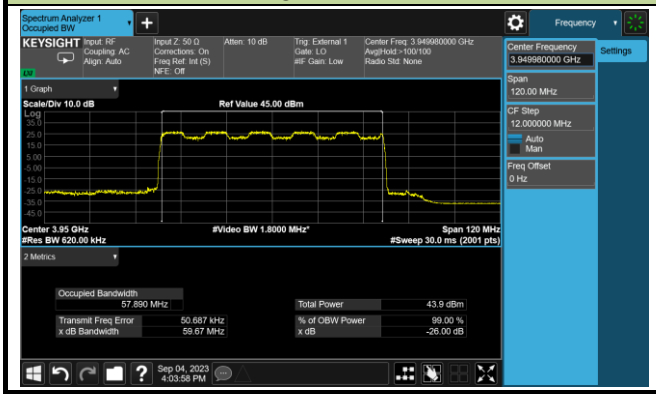
50MHz Channel Bandwidth - 64QAM	
Low Channel	Middle Channel
	
High Channel	
	

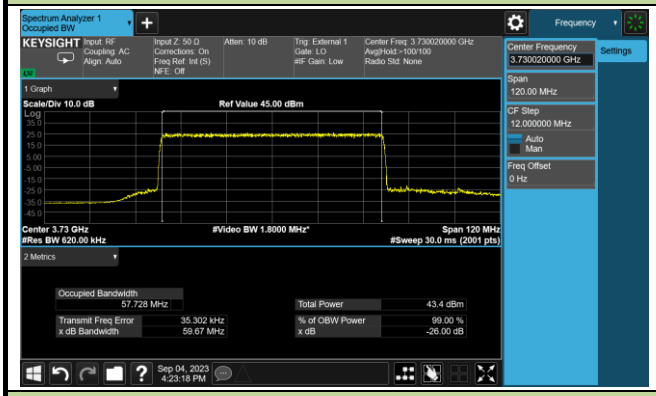
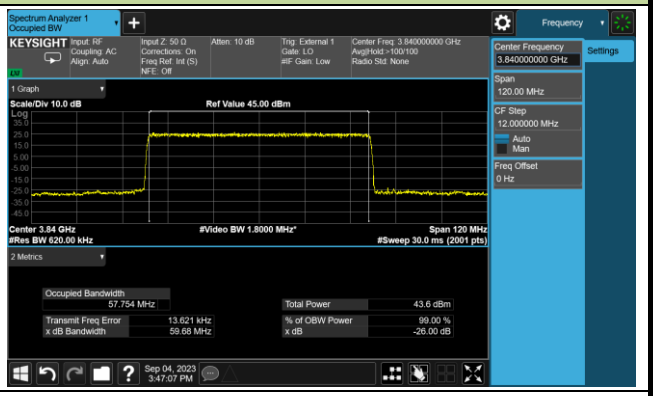
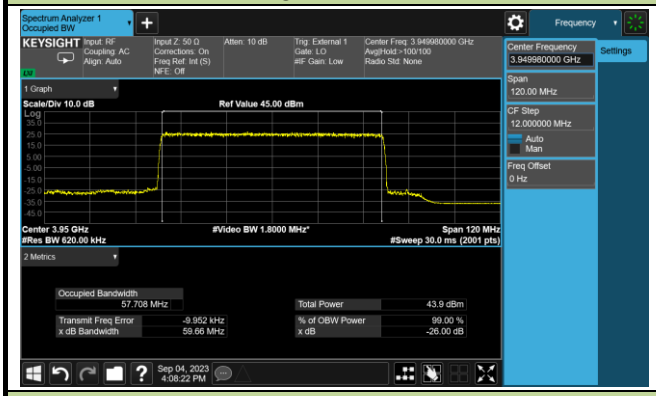
50MHz Channel Bandwidth - 256QAM	
Low Channel	Middle Channel
	
High Channel	
	

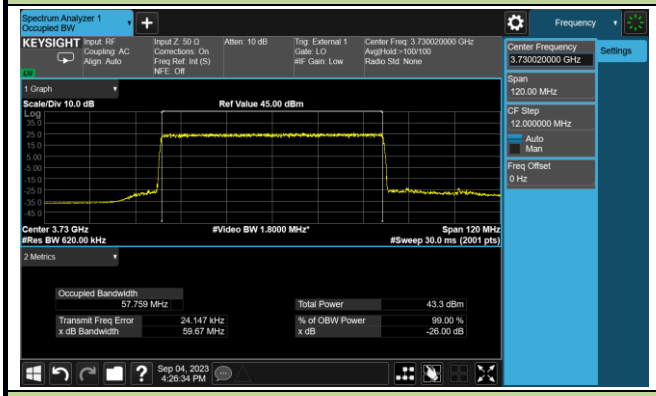
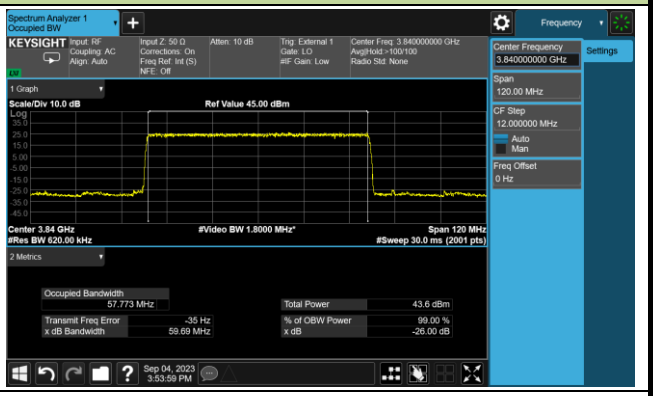
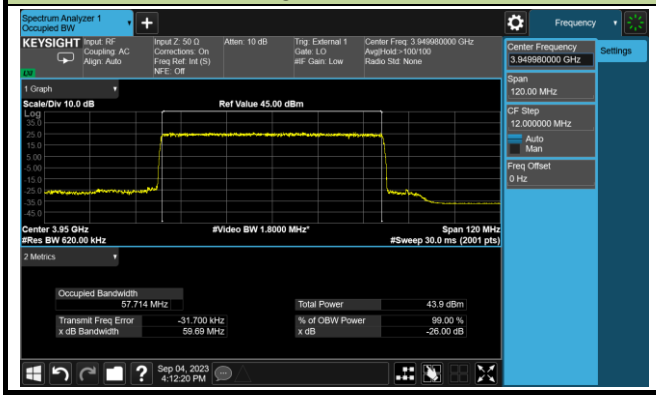
Test Site	WZ-SR6	Test Engineer	Larry Yan
Test Date	2023-09-04	Test Band	n77_60MHz

Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK		
3730.02	60	57.770
3840.00	60	57.787
3949.98	60	57.747
16QAM		
3730.02	60	57.903
3840.00	60	57.916
3949.98	60	57.890
64QAM		
3730.02	60	57.728
3840.00	60	57.754
3949.98	60	57.708
256QAM		
3730.02	60	57.759
3840.00	60	57.773
3949.98	60	57.714

60MHz Channel Bandwidth - QPSK	
Low Channel	Middle Channel
	
High Channel	
	

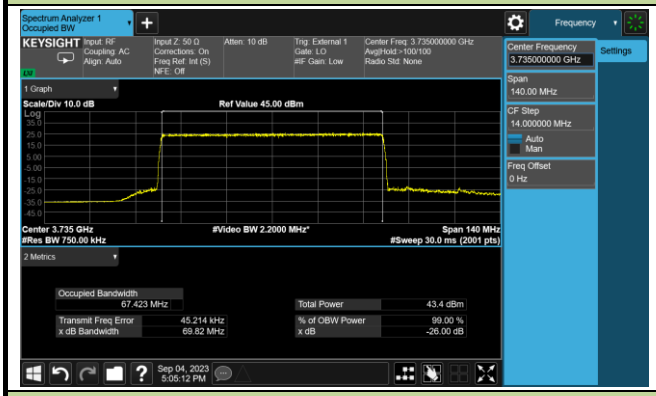
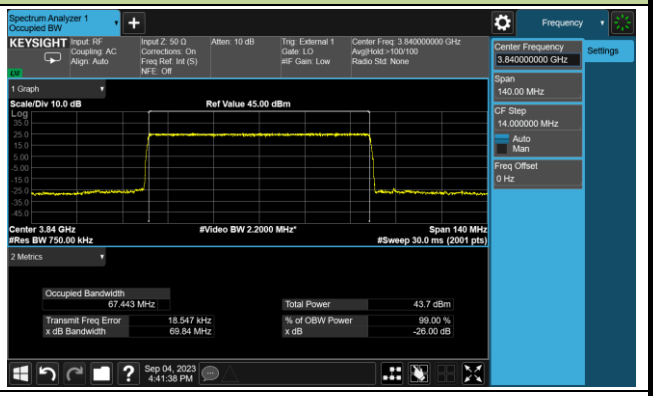
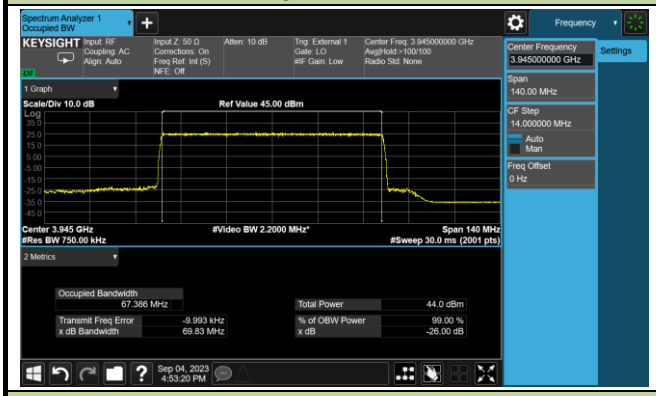
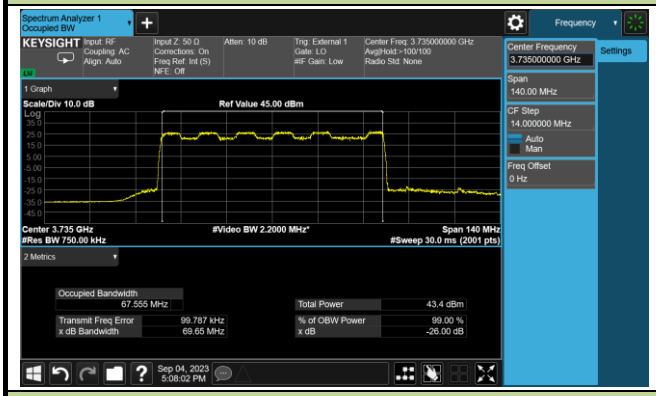
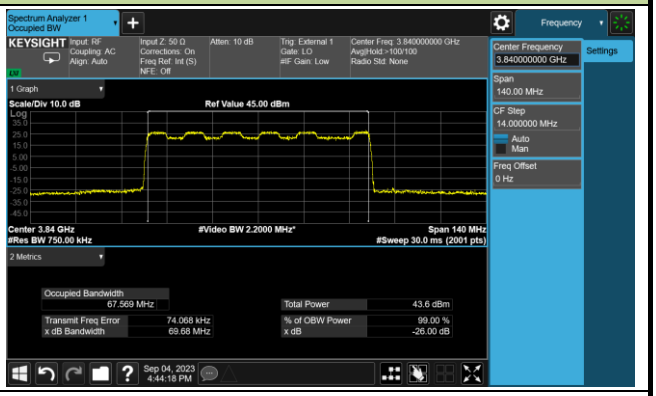
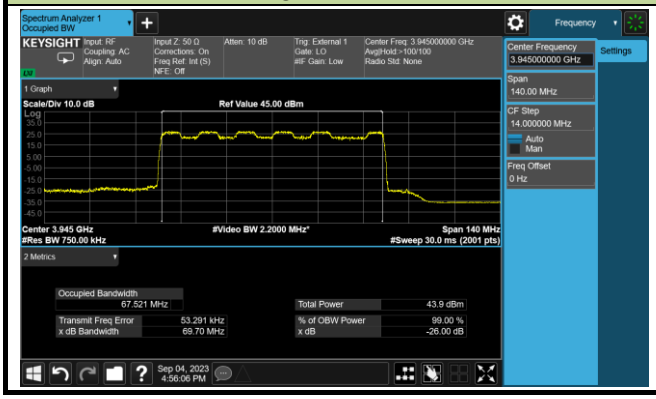
60MHz Channel Bandwidth - 16QAM	
Low Channel	Middle Channel
	
High Channel	
	

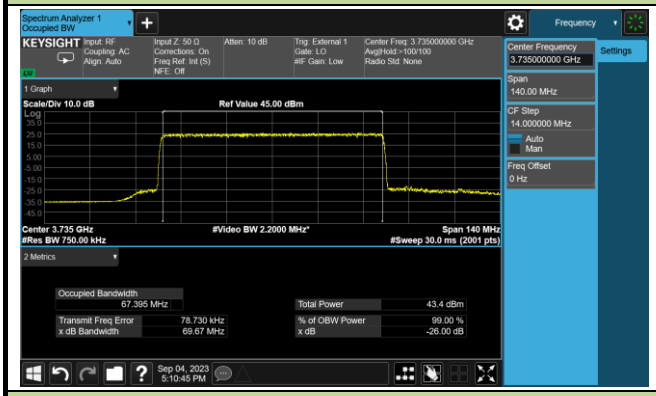
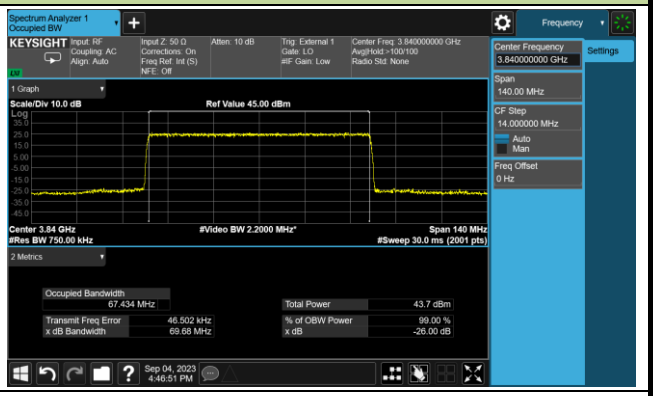
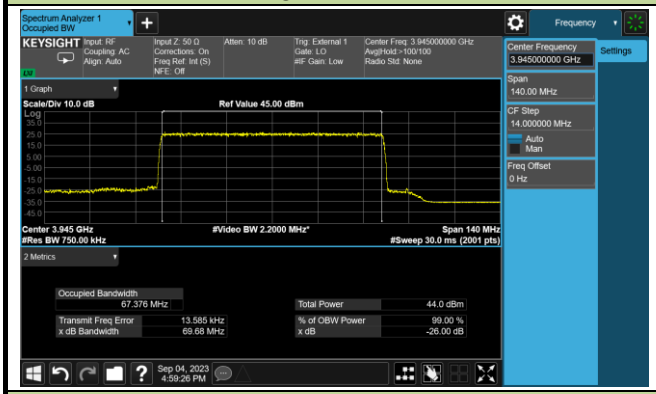
60MHz Channel Bandwidth - 64QAM	
Low Channel	Middle Channel
	
High Channel	
	

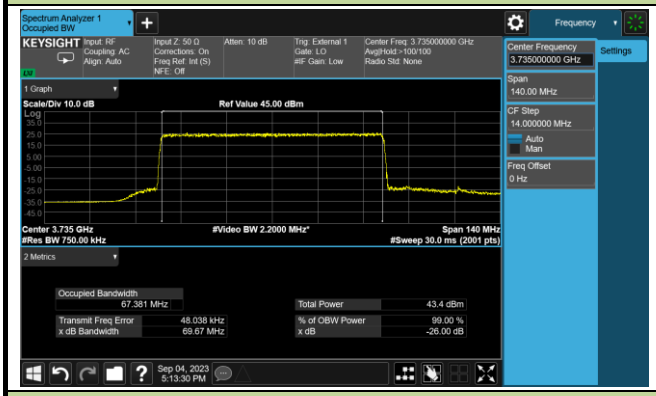
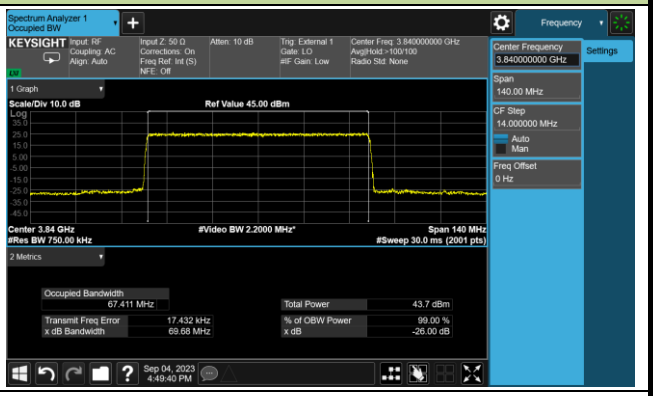
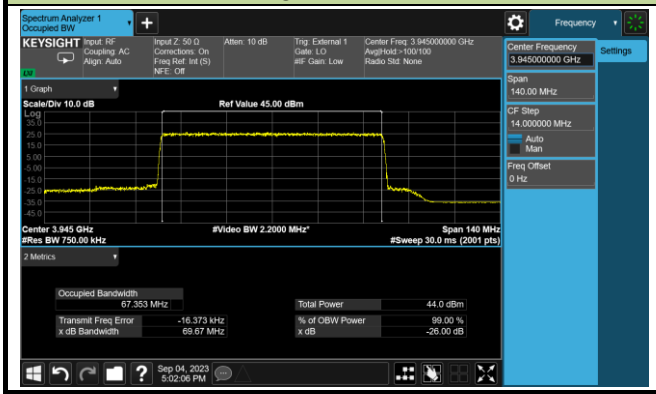
60MHz Channel Bandwidth - 256QAM	
Low Channel	Middle Channel
	
High Channel	
	

Test Site	WZ-SR6	Test Engineer	Larry Yan
Test Date	2023-09-04	Test Band	n77_70MHz

Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK		
3735.00	70	67.423
3840.00	70	67.443
3945.00	70	67.386
16QAM		
3735.00	70	67.555
3840.00	70	67.569
3945.00	70	67.521
64QAM		
3735.00	70	67.395
3840.00	70	67.434
3945.00	70	67.376
256QAM		
3735.00	70	67.381
3840.00	70	67.411
3945.00	70	67.353

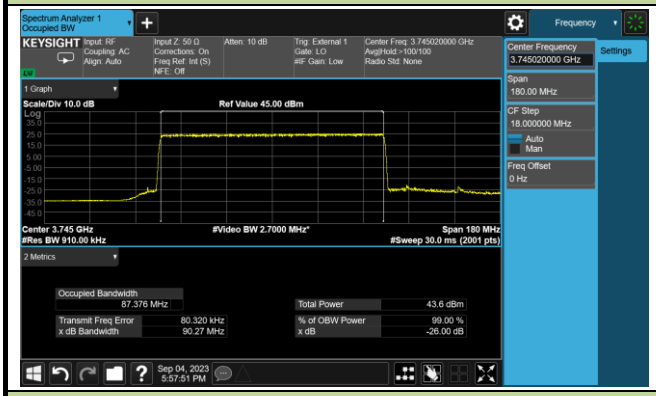
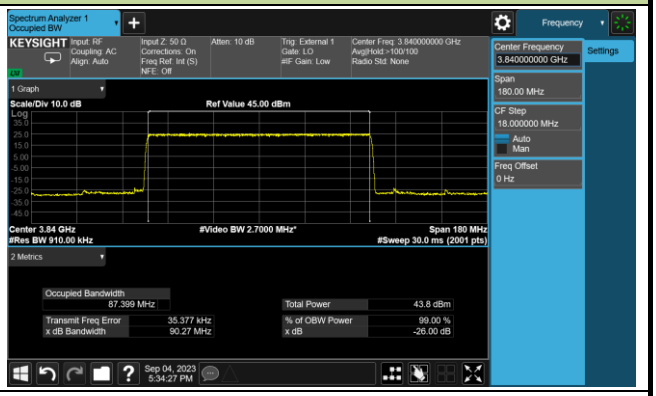
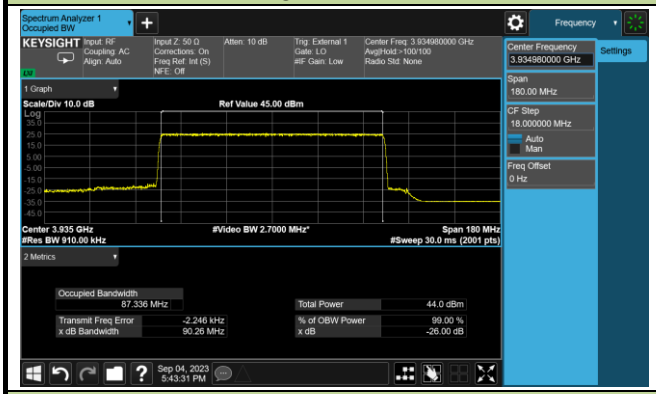
70MHz Channel Bandwidth - QPSK	
Low Channel	Middle Channel
	
High Channel	
	
70MHz Channel Bandwidth - 16QAM	
Low Channel	Middle Channel
	
High Channel	
	

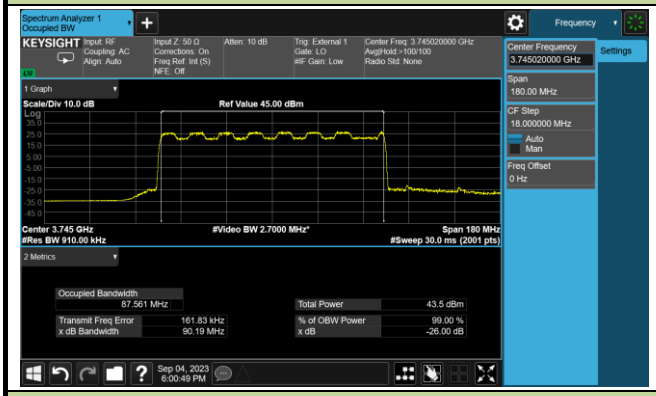
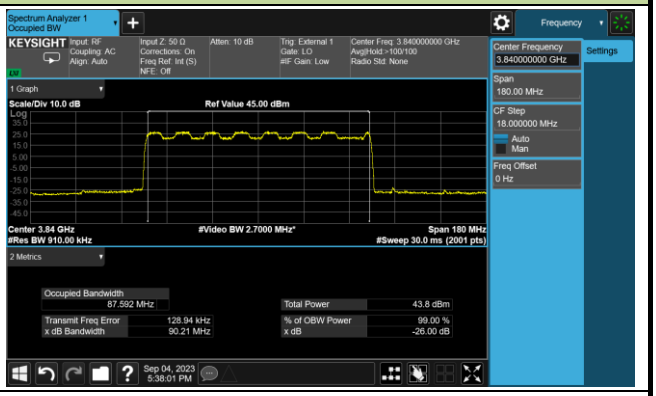
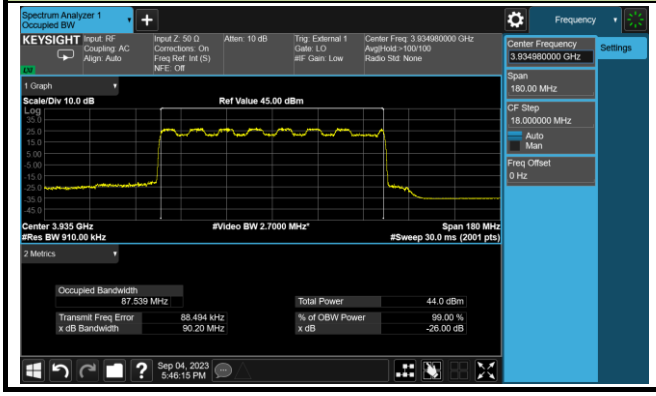
70MHz Channel Bandwidth - 64QAM	
Low Channel	Middle Channel
	
High Channel	
	

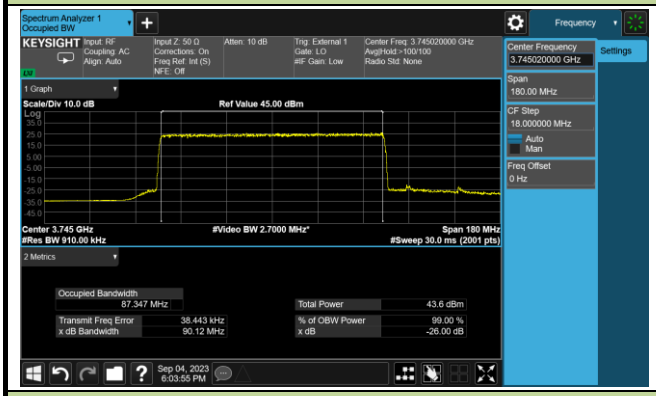
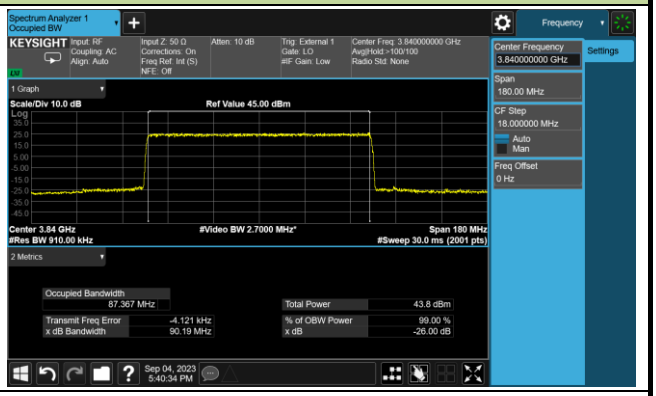
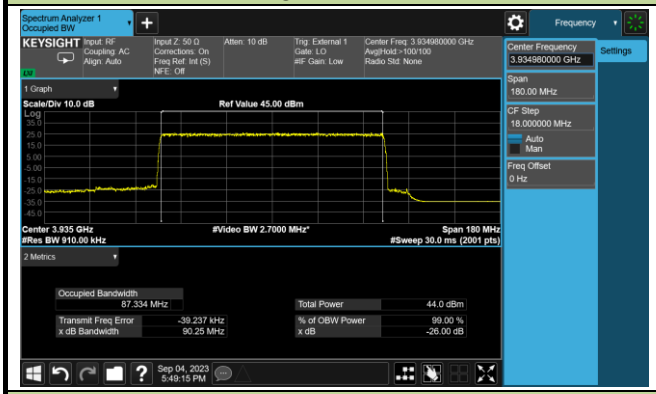
70MHz Channel Bandwidth - 256QAM	
Low Channel	Middle Channel
	
High Channel	
	

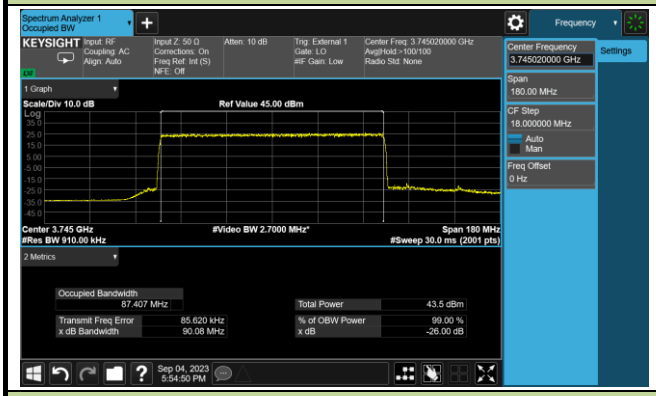
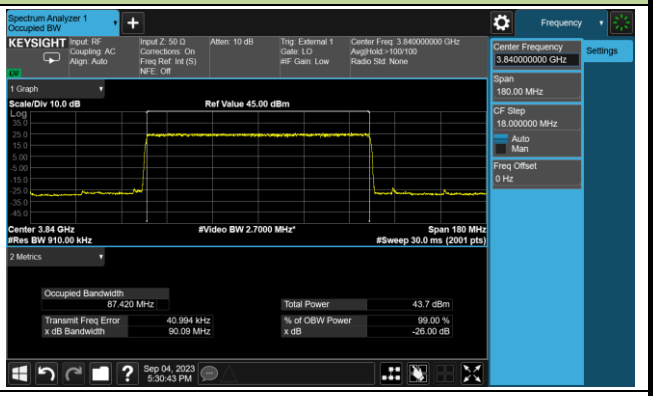
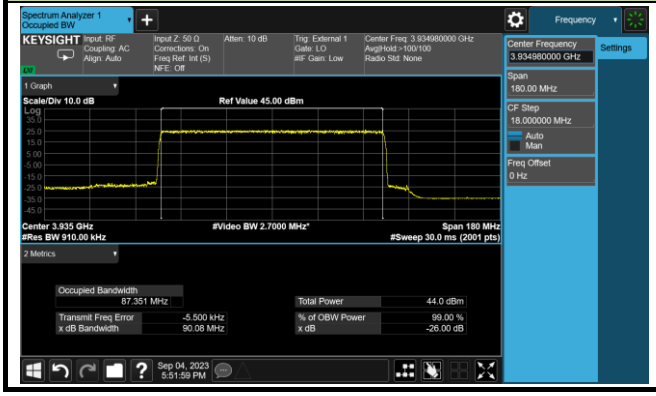
Test Site	WZ-SR6	Test Engineer	Larry Yan
Test Date	2023-09-04	Test Band	n77_90MHz

Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK		
3745.02	90	87.376
3840.00	90	87.399
3934.98	90	87.336
16QAM		
3745.02	90	87.561
3840.00	90	87.592
3934.98	90	87.539
64QAM		
3745.02	90	87.347
3840.00	90	87.367
3934.98	90	87.334
256QAM		
3745.02	90	87.407
3840.00	90	87.420
3934.98	90	87.351

90MHz Channel Bandwidth - QPSK	
Low Channel	Middle Channel
	
High Channel	
	

90MHz Channel Bandwidth - 16QAM	
Low Channel	Middle Channel
	
High Channel	
	

90MHz Channel Bandwidth - 64QAM	
Low Channel	Middle Channel
	
High Channel	
	

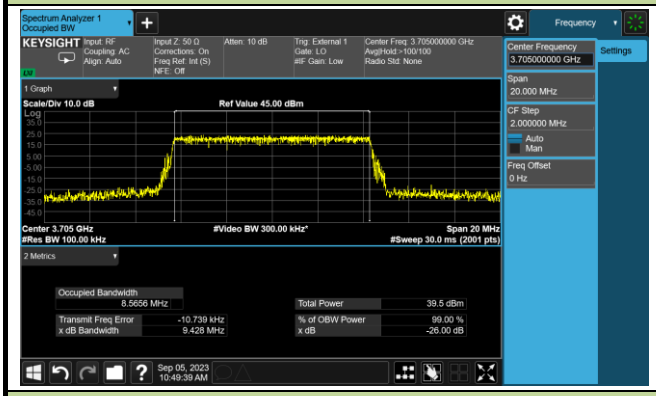
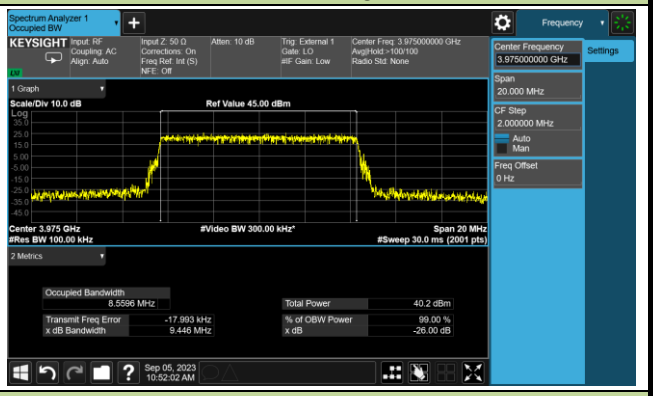
90MHz Channel Bandwidth - 256QAM	
Low Channel	Middle Channel
	
High Channel	
	

Test Site	WZ-SR6	Test Engineer	Larry Yan
Test Date	2023-09-05	Test Band	n77_10+GAP260+10MHz

Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK		
3705.00+3975.00	10+GAP260+10	17.1252
16QAM		
3705.00+3975.00	10+GAP260+10	17.0423
64QAM		
3705.00+3975.00	10+GAP260+10	17.1198
256QAM		
3705.00+3975.00	10+GAP260+10	17.1199

10+GAP260+10 MHz Channel Bandwidth

QPSK

Carrier Left	Carrier Right
	

16QAM

Carrier Left	Carrier Right