RF MEASUREMENT REPORT

FCC ID:	XMR2023RG520NNA
Applicant:	Quectel Wireless Solutions Co., Ltd
Product:	5G Sub-6 GHz LGA Module
Model No.:	RG520N-NA
Brand Name:	Quectel
FCC Rule Part(s):	Part 2, 27
Result:	Complies
Received Date:	2024-01-23
Test Date:	2024-01-23 ~ 2024-02-28

Reviewed By: Sunny Sun

Approved By: Robin Wu

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

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 (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2401RSU047-U1	V01	Initial Report	2024-03-18	Valid

Note: This report is prepared for FCC Class II permissive supplement to FCC ID: XMR2023RG520NNA enable LTE band 42/43 via SW.

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1. General Information

1.1. Applicant

Quectel Wireless Solutions Co., Ltd

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

1.2. Manufacturer

Quectel Wireless Solutions Co., Ltd

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

1.3. Testing Facility

☒	**Test Site – MRT Suzhou Laboratory**				
	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				
	Laboratory Accreditations				
	A2LA: 3628.01		CNAS: L10551		
	FCC: CN1166		ISED: CN0001		
	VCCI:	☐R-20025	☐G-20034	☐C-20020	☐T-20020
		☐R-20141	☐G-20134	☐C-20103	☐T-20104
☐	**Test Site – MRT Shenzhen Laboratory**				
	Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China				
	Laboratory Accreditations				
	A2LA: 3628.02		CNAS: L10551		
	FCC: CN1284		ISED: CN0105		
☐	**Test Site – MRT Taiwan Laboratory**				
	Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)				
	Laboratory Accreditations				
	TAF: 3261				
	FCC: 291082, TW3261		ISED: TW3261		

1.4. Product Information

Product Name	5G Sub-6 GHz LGA Module
Model No.	RG520N-NA
Brand Name	Quectel
IMEI	Conducted Measurement 1: 863109050294995 Conducted Measurement 2: 863109050298111 Conducted Measurement 3: 863109050295893 Radiated Measurement: 863109050298590
3GPP Specification	LTE Band 2/4/5/7/12/13/14/17/25/26/29/30/38/41/42/43/46/48/66/71 NR SA/NSA Band n2/5/7/12/13/14/25/26/29/30/38/41/48/66/70/71/77/78
Temperature Operating Range	-30 ~ 75 °C
Power Supply Rating	3.3 ~ 4.4Vdc, typical 3.8Vdc
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 Test

E-UTRA Specification	
TDD T_X & R_X Frequency Range	Band 42: 3450 ~ 3550 MHz; Band 43: 3700 ~ 3800 MHz
Intra-Band	CA_42C, CA_43C
Modulation	UL up to 256QAM, DL up to 256QAM

1.6. Description of Available Antennas

Technology	Frequency Range (MHz)	Antenna Type	MaxPeak Gain (dBi)
LTE Band 42	3450 ~ 3550	Dipole	0.58
LTE Band 43	3700 ~ 3800		0.58

Note 1: All antenna information (Antenna type and Peak Gain) is provided by the manufacturer.

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

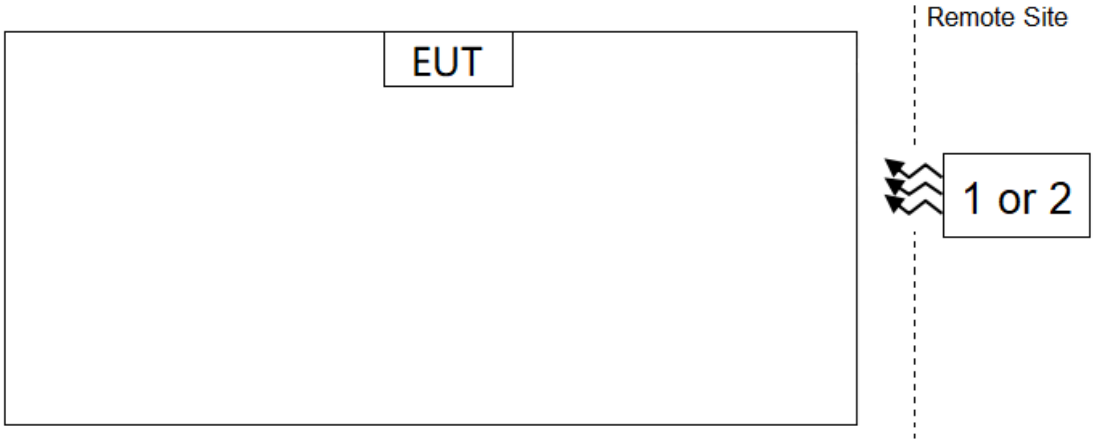
1.7. Test Methodology

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

2. Test Configuration

2.1. Test System Connection Diagram



Product		Manufacturer	Model No.
1	Wideband Radio Communication Tester	R&S	CMW 500
2	Radio Communication Analyzer	Anritsu	MT8821C

2.2. Test Environment Condition

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

3. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2024-09-17	WZ-AC2
Horn Antenna	ETS	3117	MRTSUE06257	1 year	2024-09-23	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2024-11-04	WZ-AC2
Preamplifier	EMCI	EMC184045SE	MRTSUE06640	1 year	2025-01-11	WZ-AC2
Preamplifier	EMCI	EMC051845SE	MRTSUE06987	1 year	2024-09-07	WZ-AC2
Active Loop Antenna	Schwarzbeck	FMZB 1519-60 D	MRTSUE07076	1 year	2024-12-04	WZ-AC2
Passive Magentic TX Loop Antenna	Schwarzbeck	Cable loop EN 303417	MRTSUE07087	N/A	N/A	WZ-AC2
Test loop antenna	MRT	d-2m	MRTSUE11131	N/A	N/A	WZ-AC2
TRILOG Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2024-05-15	WZ-AC2
EMI Test Receiver	Agilent	N9038A	MRTSUE06125	1 year	2024-05-23	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2024-10-11	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
Thermohygrometer	testo	608-H1	MRTSUE11038	1 year	2024-10-25	WZ-AC2
Thermohygrometer	testo	608-H1	MRTSUE11263	1 year	2024-11-07	WZ-AC2
Temperature Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2024-09-27	WZ-TR3
Vibration Test System	DongLing	ES-1-150	MRTSUE06206	1 year	2024-07-02	WZ-TR3
Thermohygrometer	testo	608-H1	MRTSUE11268	1 year	2024-12-14	WZ-TR3
USB Power Sensor	Agilent	U2021XA	MRTSUE06030	1 year	2024-09-27	WZ-SR6
Thermohygrometer	testo	608-H1	MRTSUE06362	1 year	2024-02-14	WZ-SR6
				1 year	2025-02-04	
Shielding Room	HUAMING	WZ-SR6	MRTSUE06443	N/A	N/A	WZ-SR6
Signal Analyzer	Keysight	N9020B	MRTSUE06583	1 year	2024-09-27	WZ-SR6
Signal Analyzer	Keysight	N9010B	MRTSUE06457	1 year	2024-05-23	WZ-SR6
Radio Communication Analyzer	Anritsu	MT8821C	MRTSUE06960	1 year	2024-07-06	WZ-SR6
Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2024-05-23	SIP-SR1
Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2024-06-29	SIP-SR1
Communication Tester	R&S	CMW500	MRTSUE06243	1 year	2024-09-27	SIP-SR1
Communication Tester	R&S	CMW500	MRTSUE06881	1 year	2024-05-23	SIP-SR1
Directional Coupler	MVE	MVE4912-10	MRTSUE07051	1 year	2024-08-23	WZ
Attenuator	MVE	MVE2365	MRTSUE07070	1 year	2024-11-27	WZ
Attenuator	MVE	MVE2365	MRTSUE07071	1 year	2024-11-27	WZ

Directional Coupler	MVE	MVE4816-10	MRTSUE11117	1 year	2024-08-24	SIP
Attenuator	MVE	MVE2213	MRTSUE11111	1 year	2024-08-02	SIP

Software	Version	Function
EMI V3	V3.0.0	EMI Test Software
Controller_MF 7802	1.02	RE Antenna & Turntable
UCTS	V 6.23.217.99	license 3G & 4G & 5G
Agilent Power Analyzer/Agilent Power Panel	VR03.09.00	Power

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: 2.61dB Coplanar: 9kHz~30MHz: 2.62dB Horizontal: 30MHz~200MHz: 3.79dB 200MHz~1GHz: 3.91dB 1GHz~40GHz: 4.99dB Vertical: 30MHz~200MHz: 4.06dB 200MHz~1GHz: 5.21dB 1GHz~40GHz: 4.90dB
Conducted Spurious Emissions
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.47dB
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 Part Section(s)	Test Description	Test Condition	Test Result
2.1049	Occupied Bandwidth	Conducted	Pass
27.54	Frequency Stability		Pass
27.50(k)(3) (j)(3)	Equivalent Isotropically Radiated Power		Pass
27.50(k)(4) (j)(4)	Peak to Average Ratio		Pass
27.53(n)(2) (l)(2)	Band Edge		Pass
27.53(n)(2) (l)(2)	Spurious Emission		
27.53(n)(2) (l)(2)	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, Peak to Average Ratio, Channel Band Edge, Conducted Spurious Emission, Radiated Spurious Emission were presented the worst-case in the test report.
3) For radiated emission tests, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst-case emissions.
4) For Conducted Spurious Emission of CA, the highest BW and lowest BW combinations were tested. Combination pairs of the same BW are considered generally equivalent. The RB combinations were selected such that the signal is active closest to the band limit, as this is the worst case.

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.

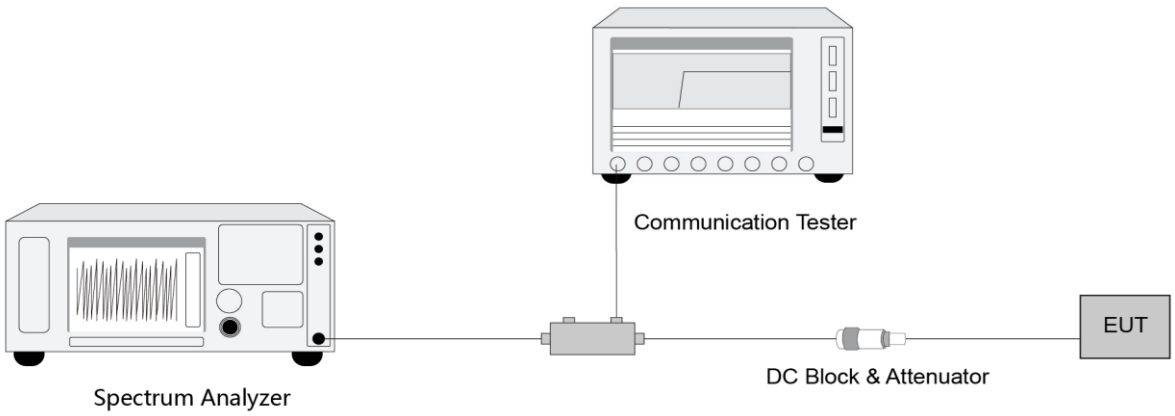
5.2.2. Test Procedure

ANSI C63.26-2015 - Section 5.4.4

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 Procedure

ANSI C63.26-2015 - Section 5.6.3

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:

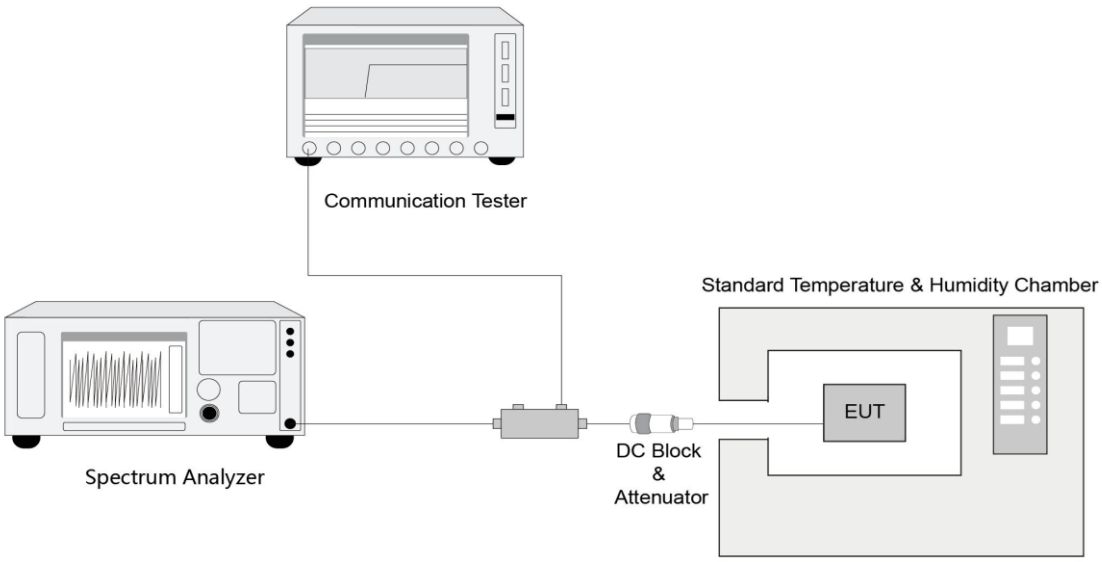
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain 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 EIRP of mobile transmitters must not exceed 1 watt.

5.4.2. Test Procedure

ANSI C63.26-2015 - Section 5.2.4.2 & 5.2.4.3.4

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.

EIRP & 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 = $P_{Meas} + G_T$

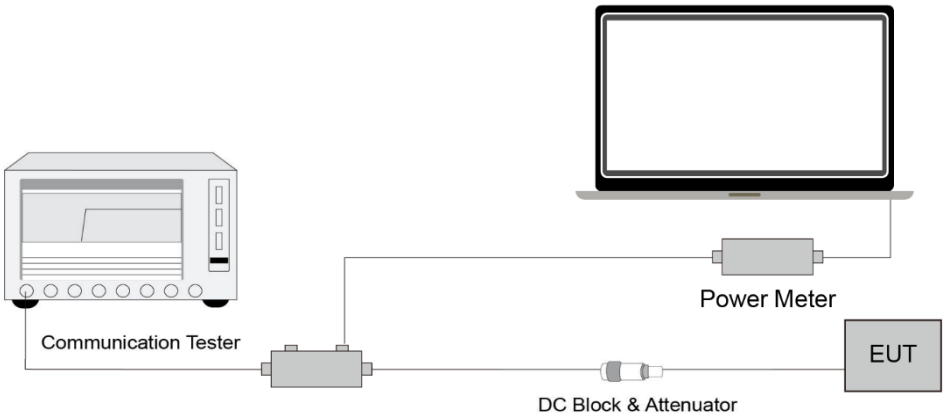
where

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

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

In addition, 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.

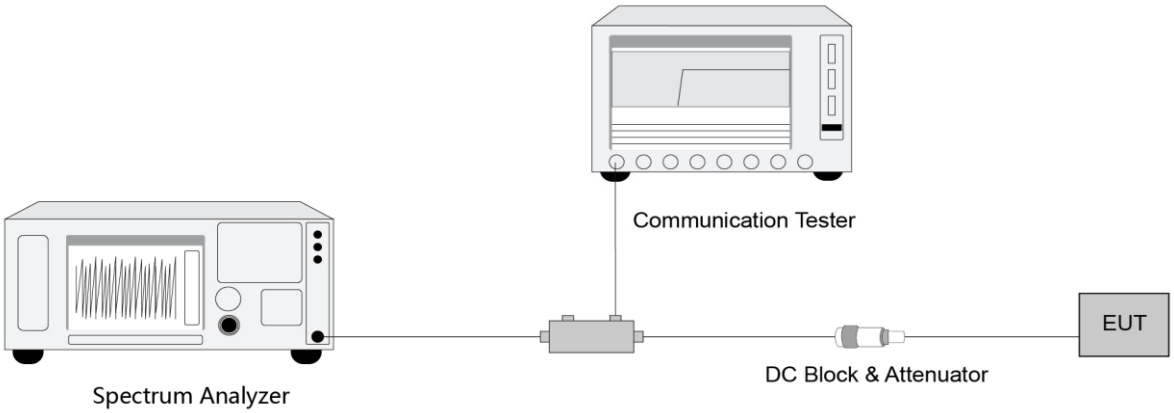
5.5.2. Test Procedure

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 Measurement

5.6.1. Test Limit

27.53 (l)(2)

For mobile operations in the 3700–3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz. Compliance with this paragraph (l)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

27.53 (n)(2)

For mobile operations in the 3450–3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz. Compliance with this paragraph (n)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

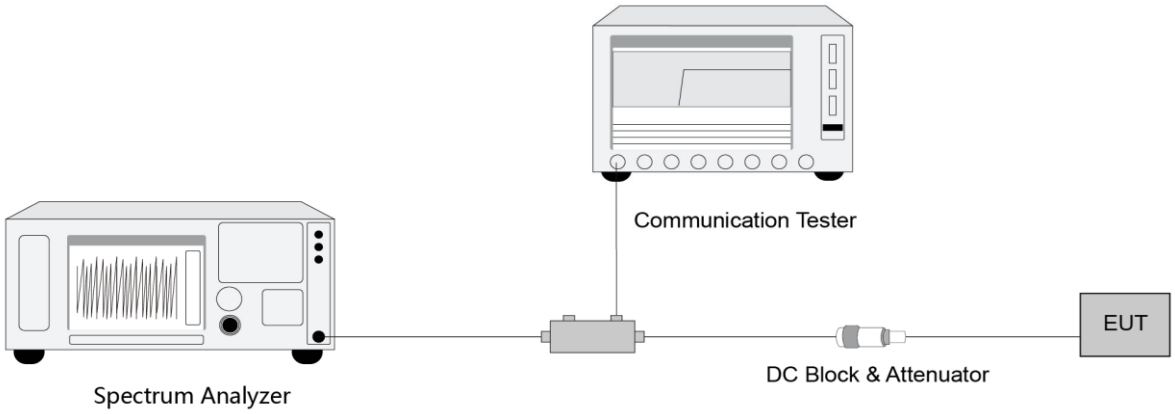
5.6.2. Test Procedure

ANSI C63.26-2015 - Section 5.7

5.6.3. Test Setting

1. Set the analyzer frequency to low or high channel
2. RBW ≥ The nominal RBW shall be in the range of 1% of the anticipated OBW (in the 1MHz band immediately outside and adjacent to the band edge). For improvement of the accuracy in the measurement of the average power of a noise-like emission, a RBW narrower than the specified reference bandwidth can be used (generally limited to no less than 1% of the OBW), provided that a subsequent integration is performed over the full required measurement bandwidth. This integration should be performed using the spectrum analyzer's band power functions.
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.

5.6.4. Test Setup



5.6.5. Test Result

Refer to Appendix A.5

5.7. Conducted Spurious Emissions Measurement

5.7.1. Test Limit

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

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

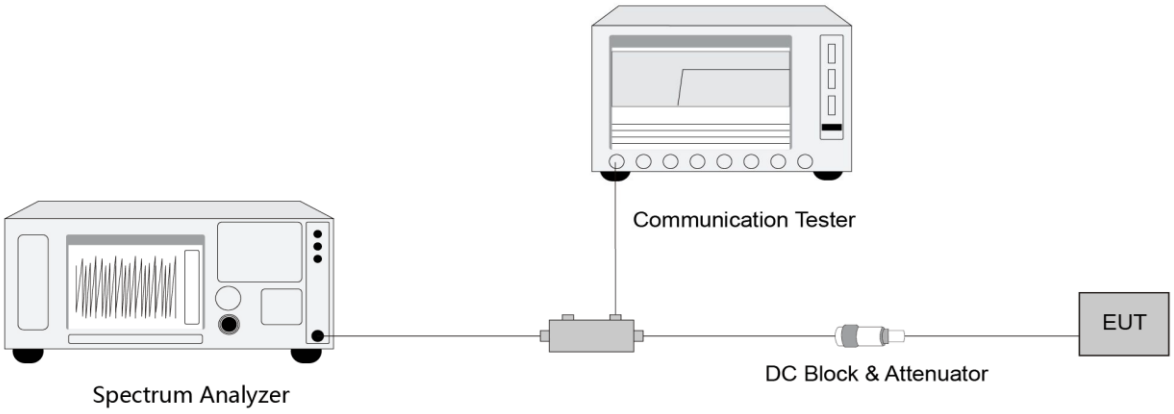
5.7.2. Test Procedure

ANSI C63.26-2015 - Section 5.7

5.7.3. Test Setting

1. Set the analyzer frequency to low, mid, 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 Spurious Emissions Measurement

5.8.1. Test Limit

The power of any emission outside of theauthorized operating frequency ranges must be attenuated below the transmitting power (P) by a factorof at least 43 + 10 log(P) dB. The emission limit equal to -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

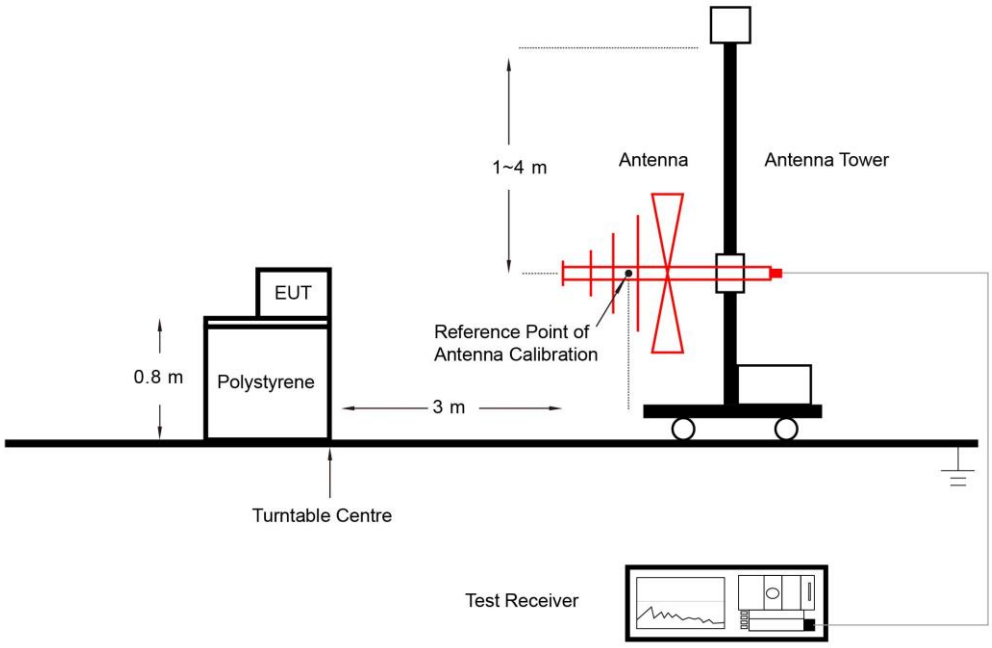
ANSI C63.26-2015 - Section 5.2.7 & 5.5.3

5.8.3. Test Setting

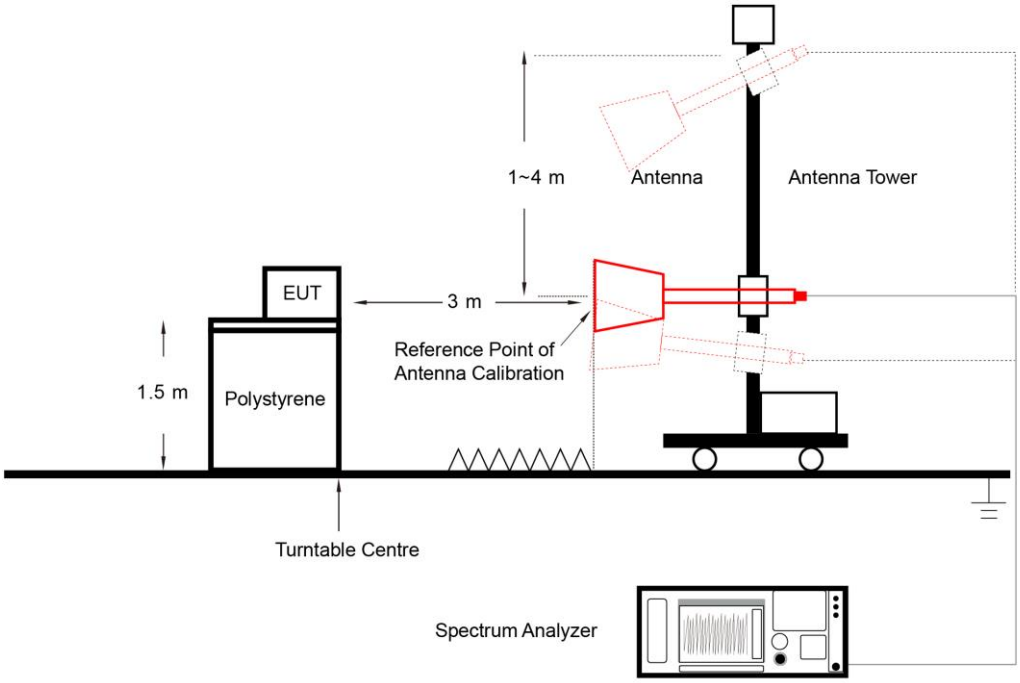
1. RBW = 100KHz or 1MHz
2. VBW ≥ 3*RBW
3. Sweep time ≥ 10 × (number of points in sweep) × (transmission symbol period)
4. Detector = Peak
5. Trace mode = max hold
6. The trace was allowed to stabilize

5.8.4. Test Setup

<u>Below 1GHz Test Setup</u>:



Above 1GHz Test Setup:



5.8.5. Test Result

Refer to Appendix A.7.

Appendix A - Test Result

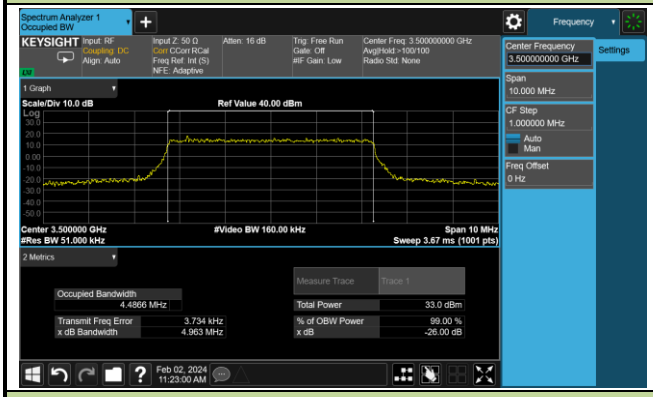
A.1 Occupied Bandwidth Test Result

Test Site	WZ-SR6	Test Engineer	Lucas Wang
Test Date	2024-02-02	Test Band	LTE Band 42_HPUE

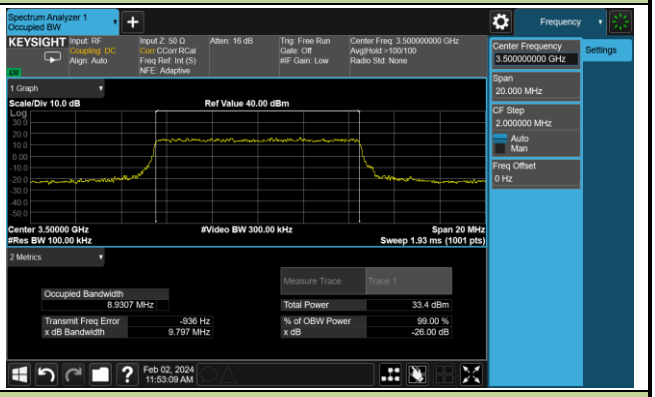
Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK		
3500.0	5	4.4866
	10	8.9307
	15	13.447
	20	17.862
16QAM		
3500.0	5	4.4960
	10	8.9418
	15	13.433
	20	17.898
64QAM		
3500.0	5	4.4860
	10	8.9658
	15	13.443
	20	17.861
256QAM		
3500.0	5	4.4810
	10	8.9695
	15	13.408
	20	17.868

99% Bandwidth - QPSK

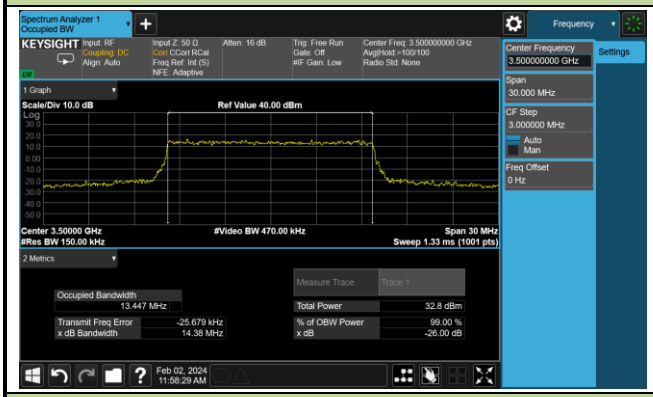
5MHz Channel Bandwidth



10MHz Channel Bandwidth



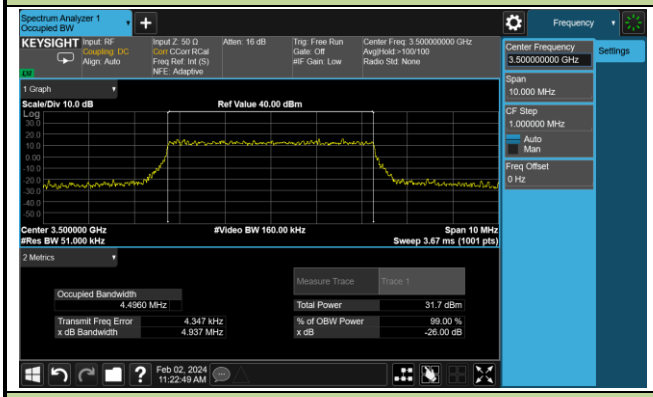
15MHz Channel Bandwidth



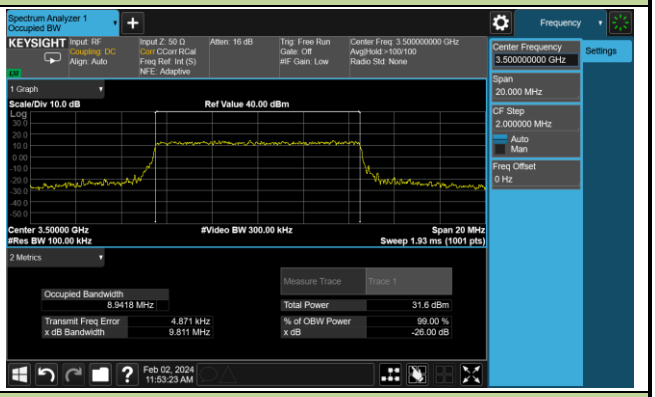
20MHz Channel Bandwidth

99% Bandwidth - 16QAM

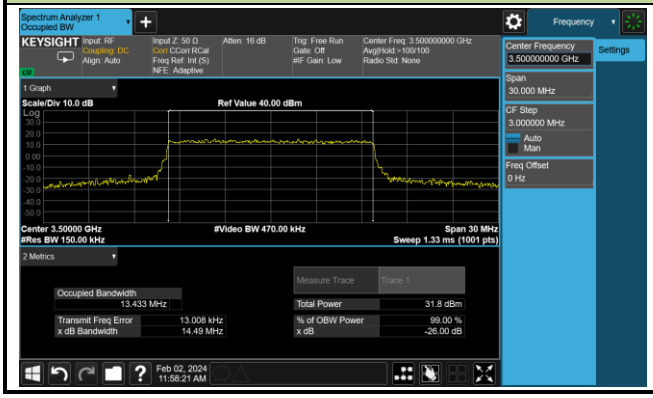
5MHz Channel Bandwidth



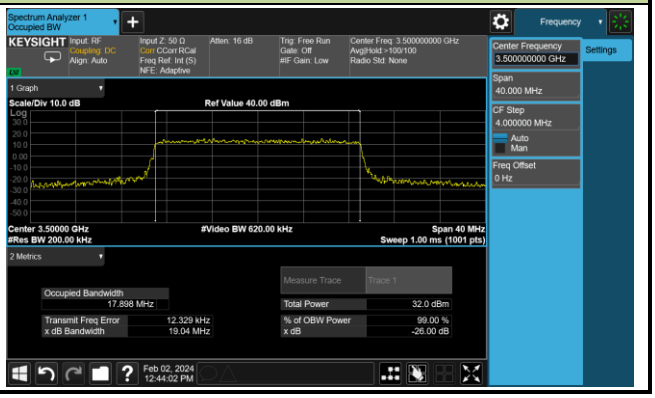
10MHz Channel Bandwidth



15MHz Channel Bandwidth

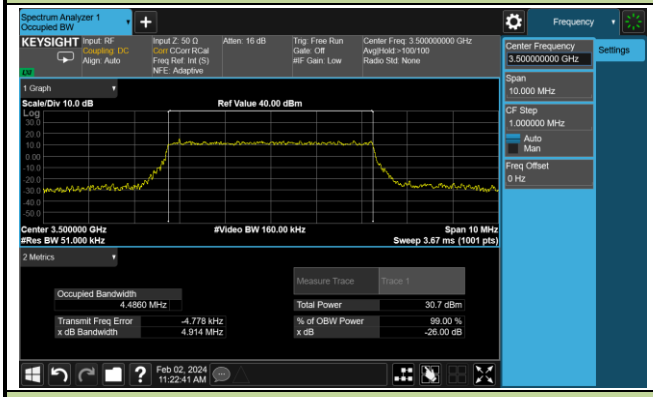


20MHz Channel Bandwidth

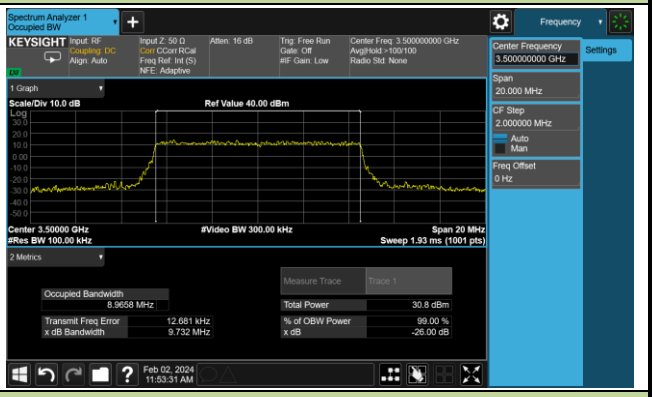


99% Bandwidth - 64QAM

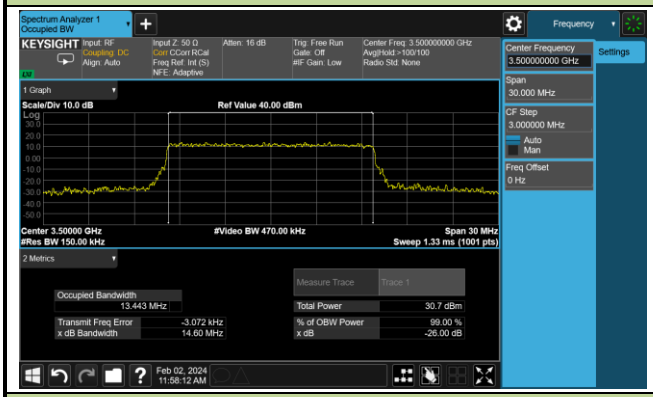
5MHz Channel Bandwidth



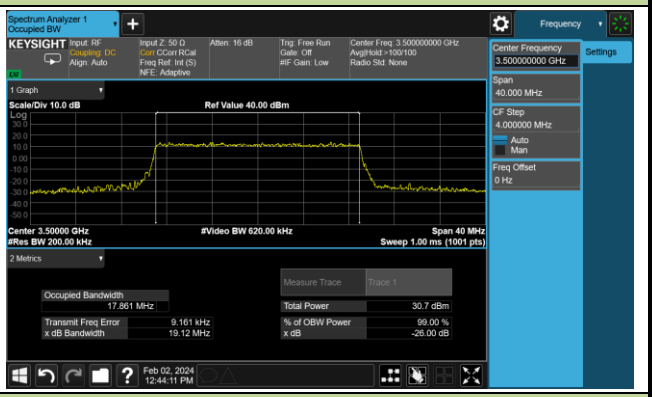
10MHz Channel Bandwidth



15MHz Channel Bandwidth

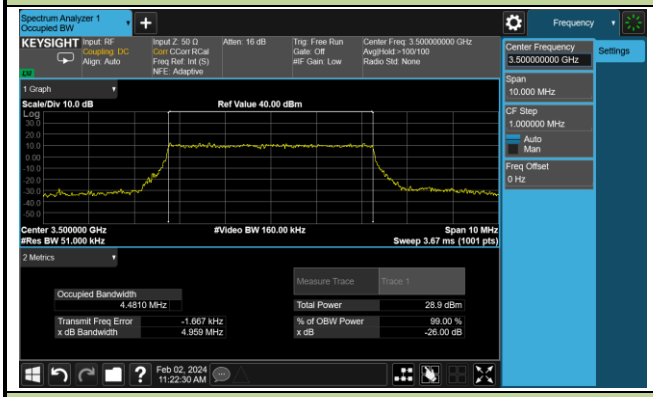


20MHz Channel Bandwidth



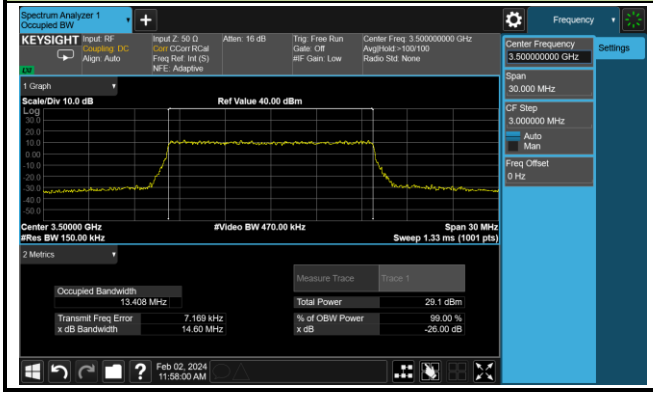
99% Bandwidth - 256QAM

5MHz Channel Bandwidth

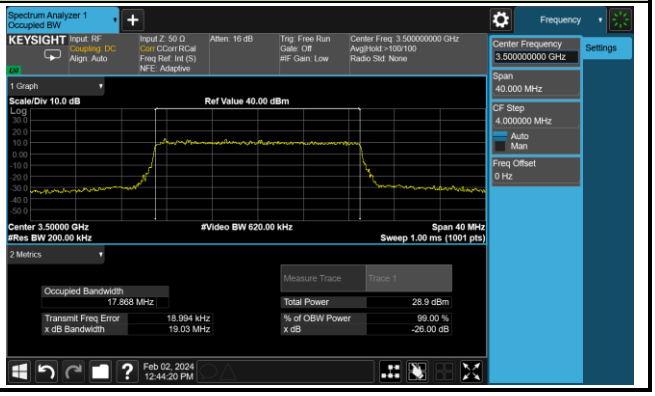


10MHz Channel Bandwidth

15MHz Channel Bandwidth



20MHz Channel Bandwidth

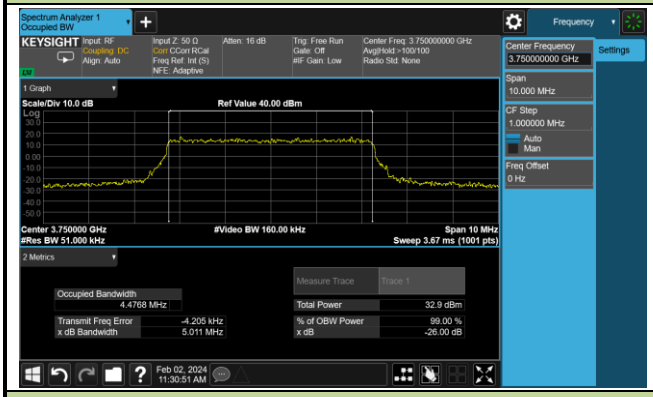


Test Site	WZ-SR6	Test Engineer	Lucas Wang
Test Date	2024-02-02	Test Band	LTE Band 43_HPUE

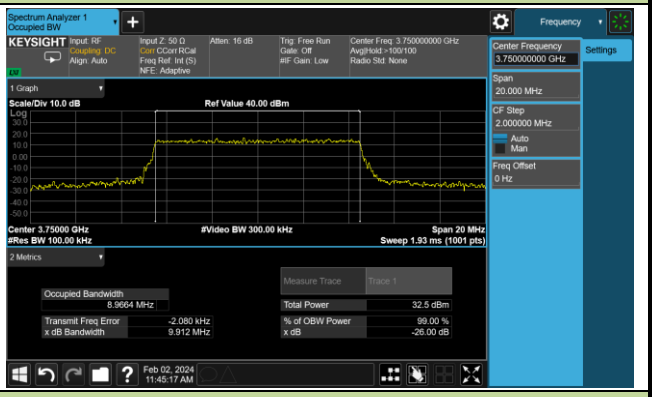
Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK		
3750.0	5	4.4768
	10	8.9664
	15	13.409
	20	17.881
16QAM		
3750.0	5	4.4685
	10	8.9441
	15	13.411
	20	17.876
64QAM		
3750.0	5	4.4814
	10	8.9492
	15	13.416
	20	17.859
256QAM		
3750.0	5	4.4824
	10	8.9579
	15	13.451
	20	17.787

99% Bandwidth - QPSK

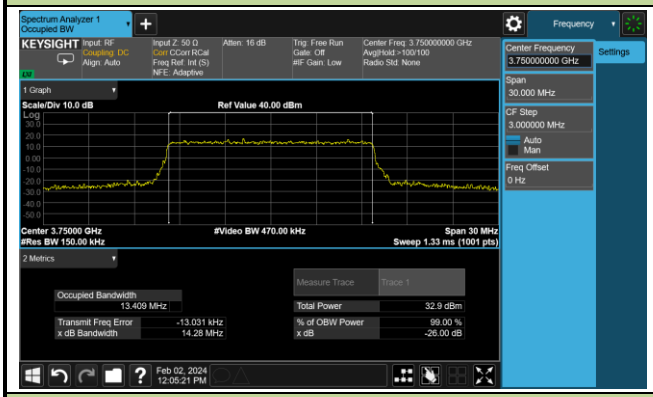
5MHz Channel Bandwidth



10MHz Channel Bandwidth



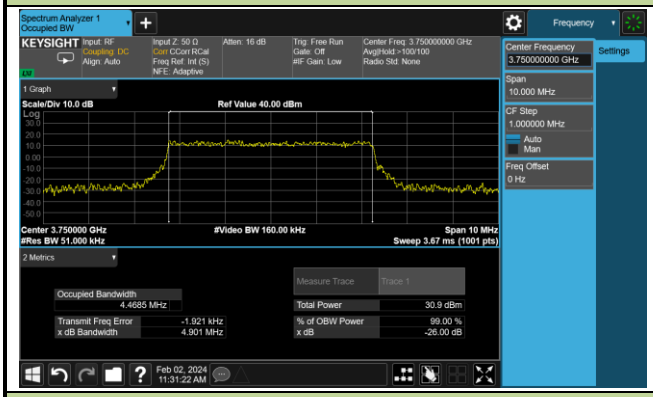
15MHz Channel Bandwidth



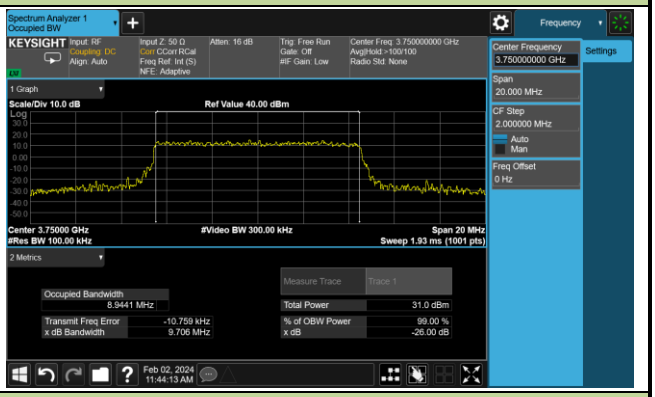
20MHz Channel Bandwidth

99% Bandwidth - 16QAM

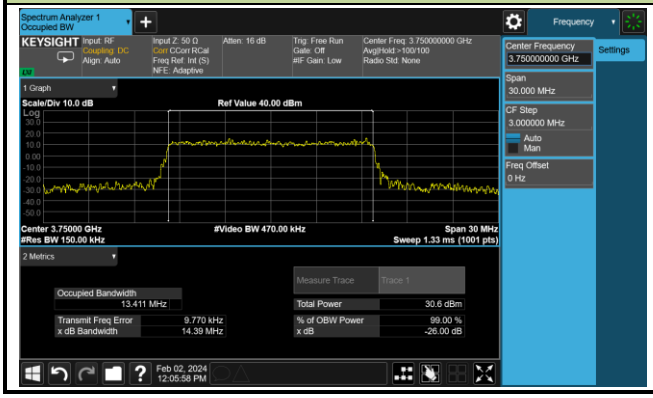
5MHz Channel Bandwidth



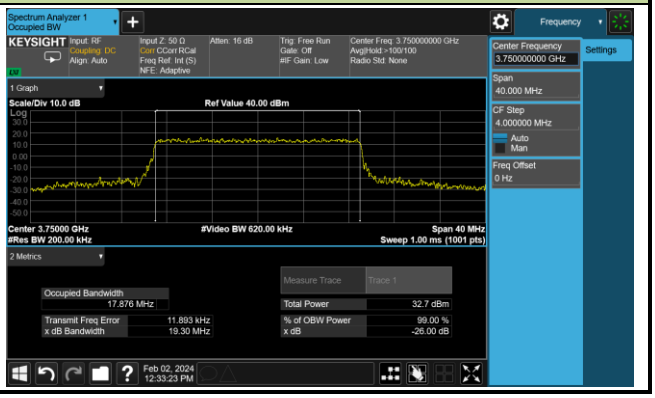
10MHz Channel Bandwidth



15MHz Channel Bandwidth

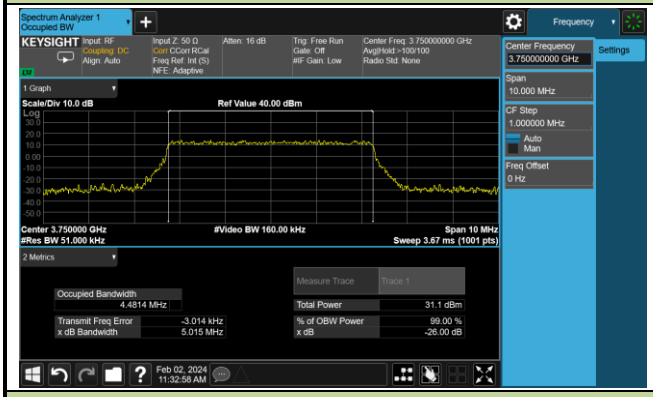


20MHz Channel Bandwidth

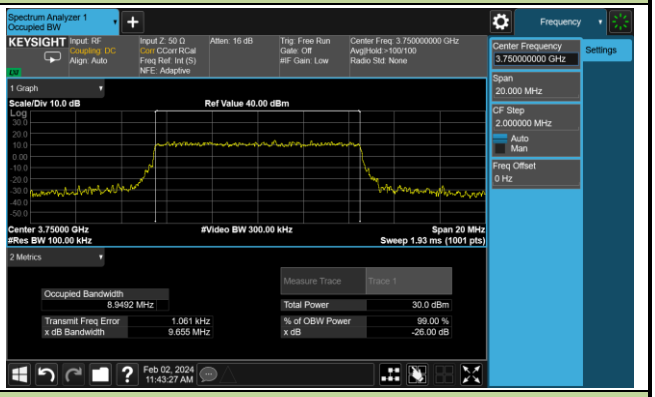


99% Bandwidth - 64QAM

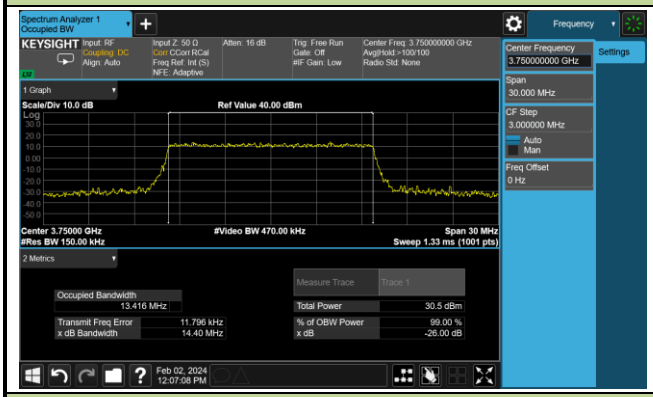
5MHz Channel Bandwidth



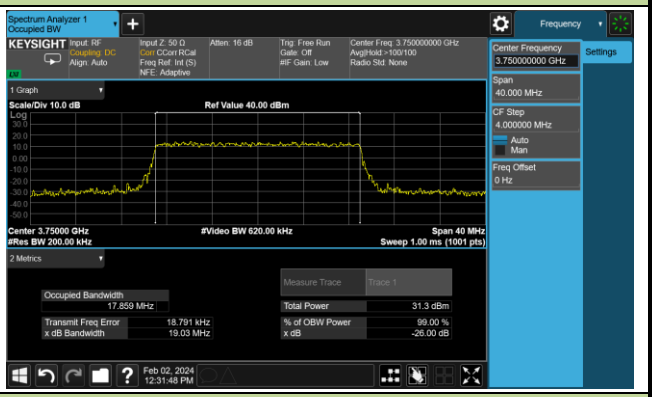
10MHz Channel Bandwidth



15MHz Channel Bandwidth

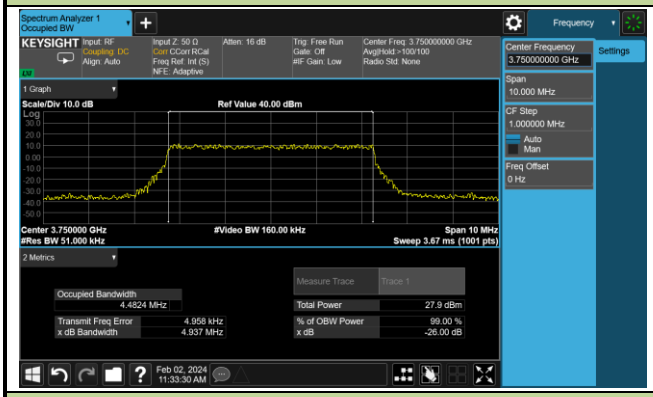


20MHz Channel Bandwidth

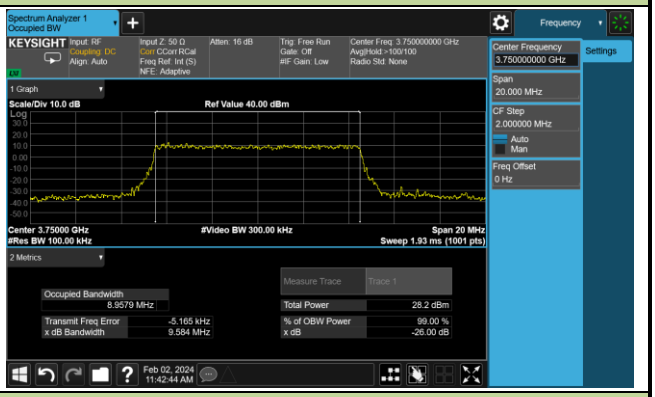


99% Bandwidth - 256QAM

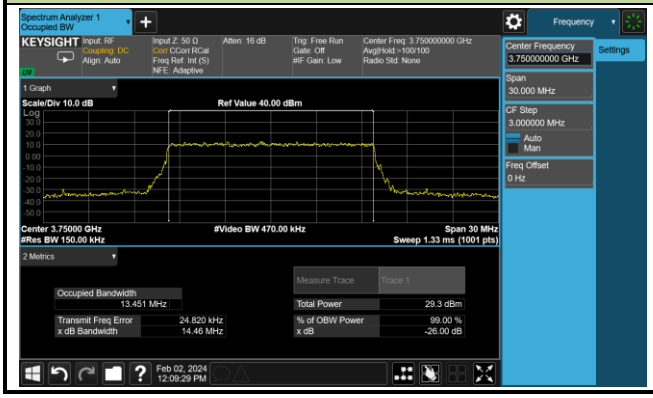
5MHz Channel Bandwidth



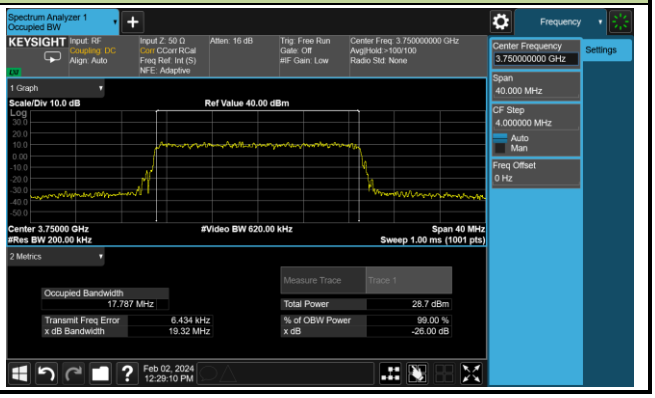
10MHz Channel Bandwidth



15MHz Channel Bandwidth



20MHz Channel Bandwidth

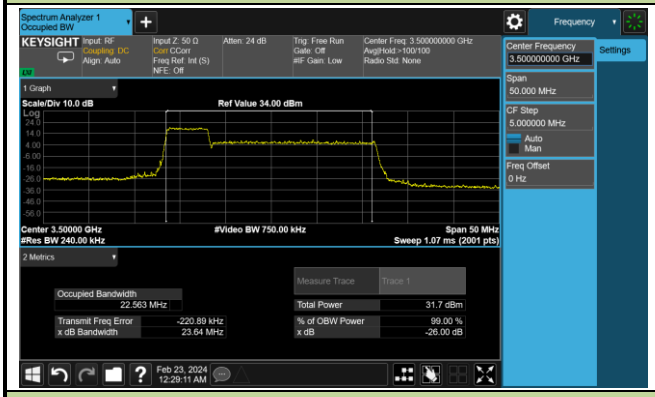


Test Site	SIP-SR1	Test Engineer	Candy Luo
Test Date	2024-02-23	Test Band	Intra-Band CA_42C

Modulation	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK	3490.8+3502.5	5+20	22.563
	3497.5+3509.2	20+5	22.721
	3490.6+3505.5	10+20	27.416
	3460.0+3474.4	20+10	27.619
	3490.3+3507.4	15+20	32.262
	3492.6+3509.7	20+15	32.388
	3490.1+3509.9	20+20	37.269
16QAM	3490.8+3502.5	5+20	22.484
	3497.5+3509.2	20+5	22.716
	3490.6+3505.5	10+20	27.351
	3460.0+3474.4	20+10	27.616
	3490.3+3507.4	15+20	32.296
	3492.6+3509.7	20+15	32.375
	3490.1+3509.9	20+20	37.134
64QAM	3490.8+3502.5	5+20	22.481
	3497.5+3509.2	20+5	22.782
	3490.6+3505.5	10+20	27.476
	3460.0+3474.4	20+10	27.608
	3490.3+3507.4	15+20	32.298
	3492.6+3509.7	20+15	32.438
	3490.1+3509.9	20+20	37.263
256QAM	3490.8+3502.5	5+20	22.514
	3497.5+3509.2	20+5	22.745
	3490.6+3505.5	10+20	27.375
	3460.0+3474.4	20+10	27.564
	3490.3+3507.4	15+20	32.254
	3492.6+3509.7	20+15	32.418
	3490.1+3509.9	20+20	37.185

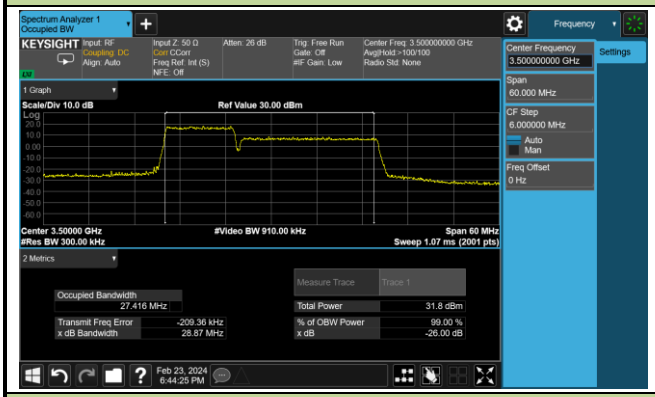
99% Bandwidth - QPSK

5+20MHz Channel Bandwidth



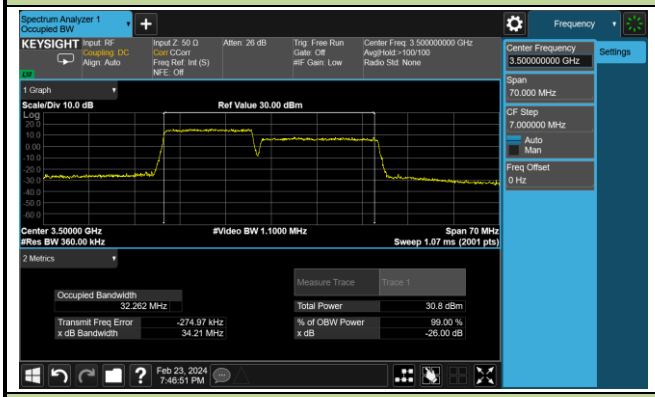
20+5MHz Channel Bandwidth

10+20MHz Channel Bandwidth



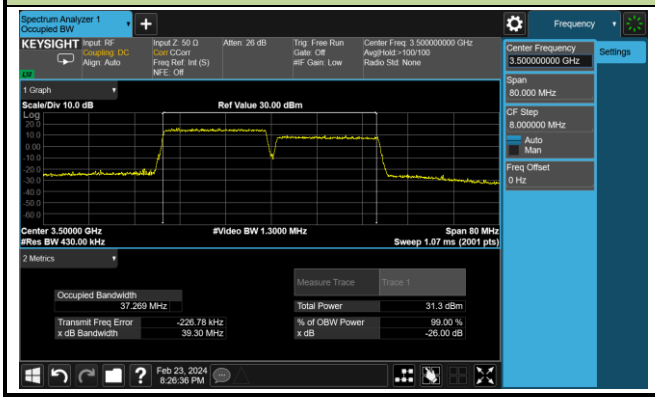
20+10MHz Channel Bandwidth

15+20MHz Channel Bandwidth



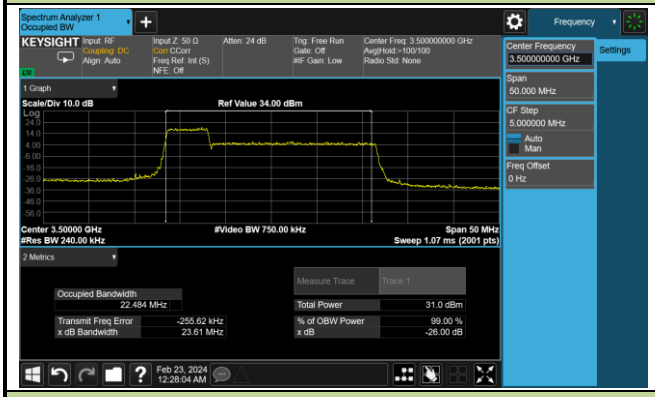
20+15MHz Channel Bandwidth

20+20MHz Channel Bandwidth



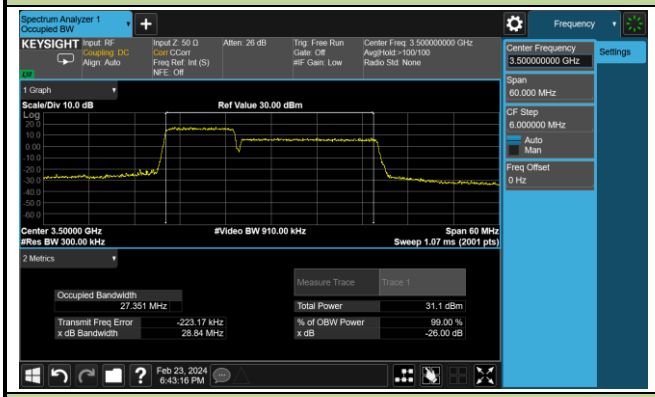
99% Bandwidth - 16QAM

5+20MHz Channel Bandwidth



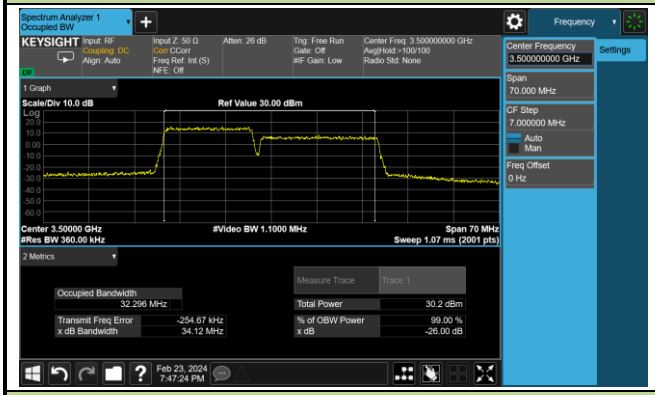
20+5MHz Channel Bandwidth

10+20MHz Channel Bandwidth

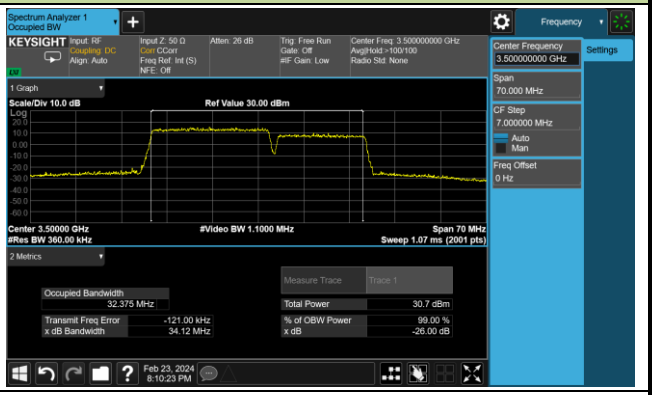


20+10MHz Channel Bandwidth

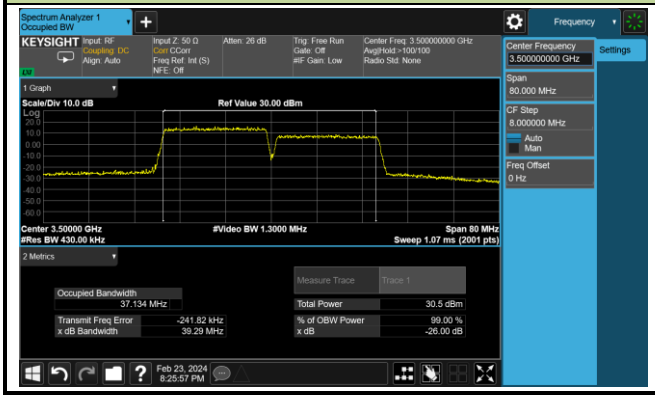
15+20MHz Channel Bandwidth



20+15MHz Channel Bandwidth

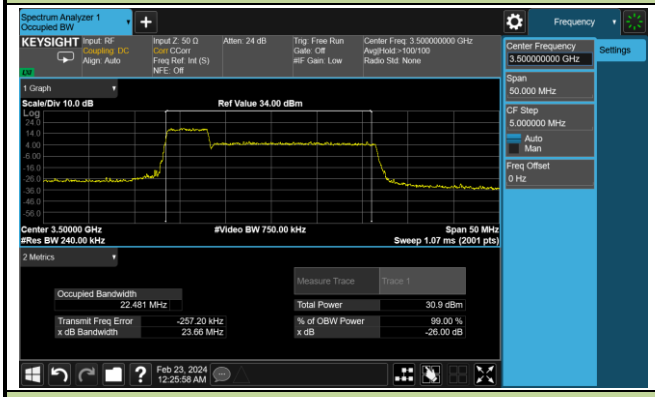


20+20MHz Channel Bandwidth

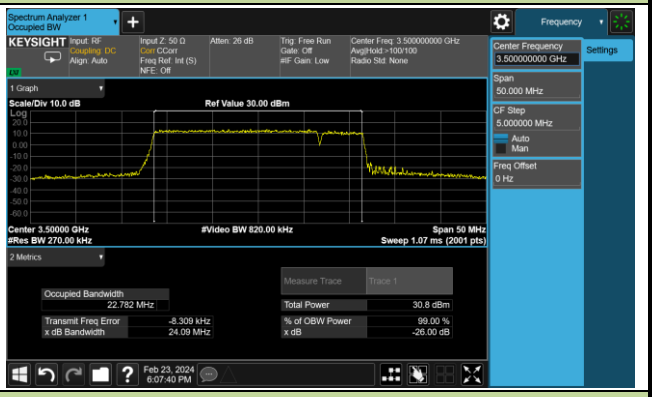


99% Bandwidth - 64QAM

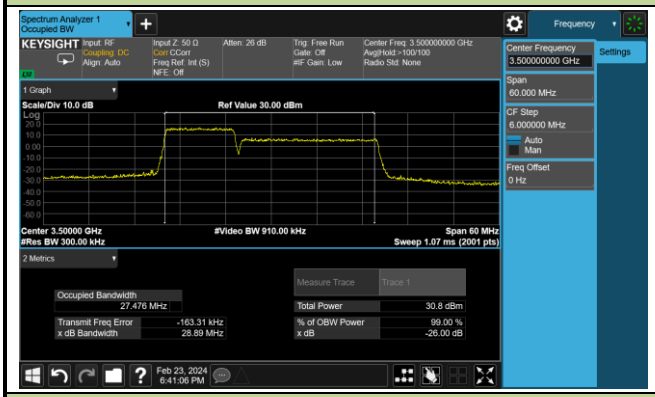
5+20MHz Channel Bandwidth



20+5MHz Channel Bandwidth

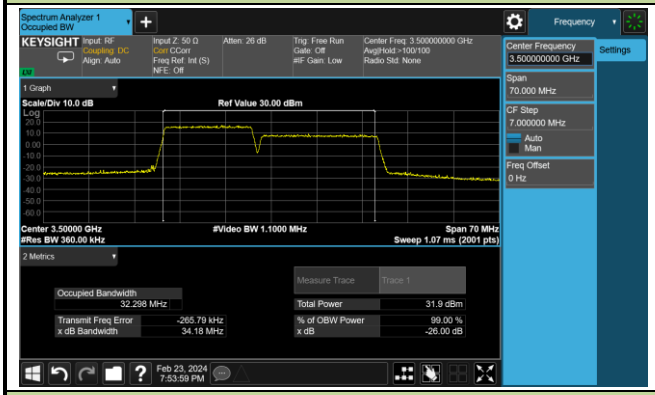


10+20MHz Channel Bandwidth

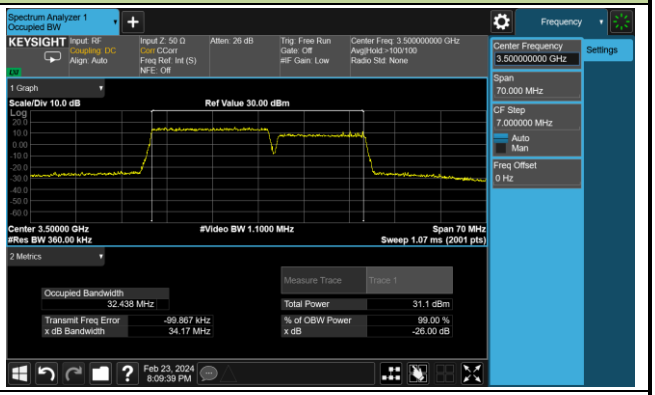


20+10MHz Channel Bandwidth

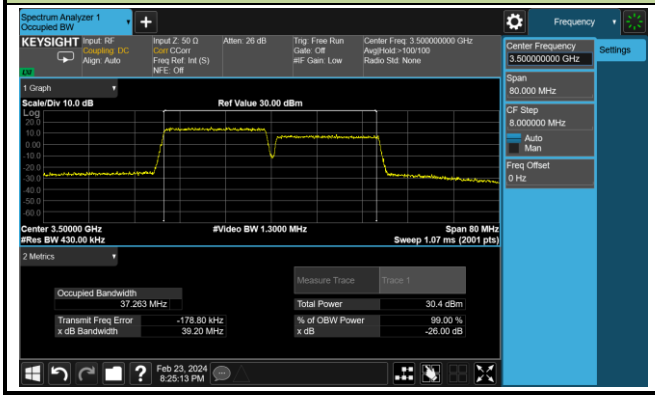
15+20MHz Channel Bandwidth



20+15MHz Channel Bandwidth

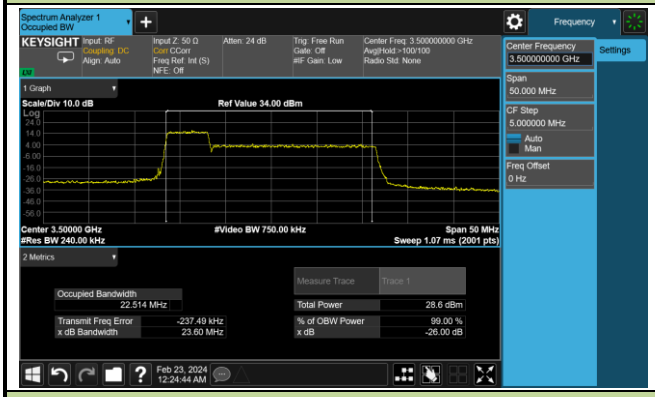


20+20MHz Channel Bandwidth



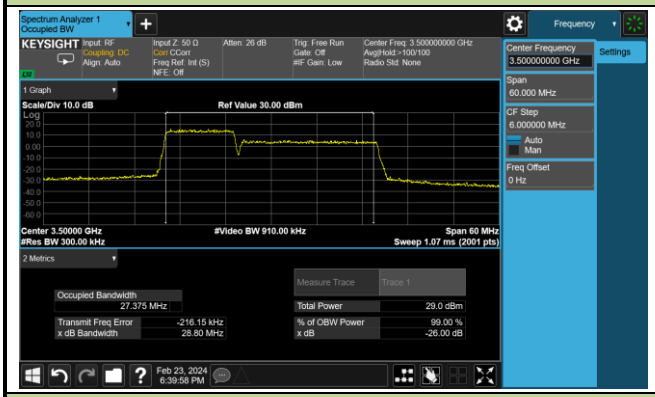
99% Bandwidth - 256QAM

5+20MHz Channel Bandwidth



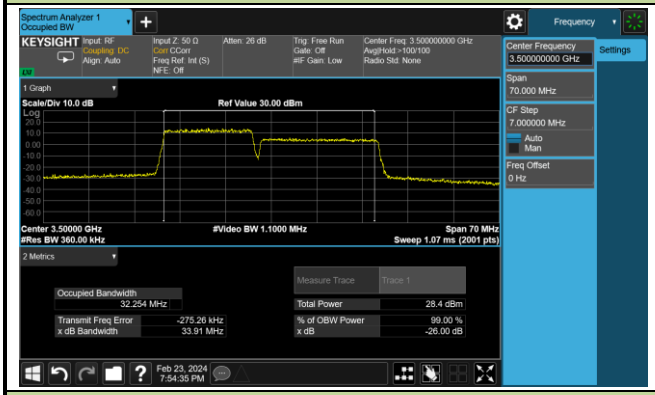
20+5MHz Channel Bandwidth

10+20MHz Channel Bandwidth

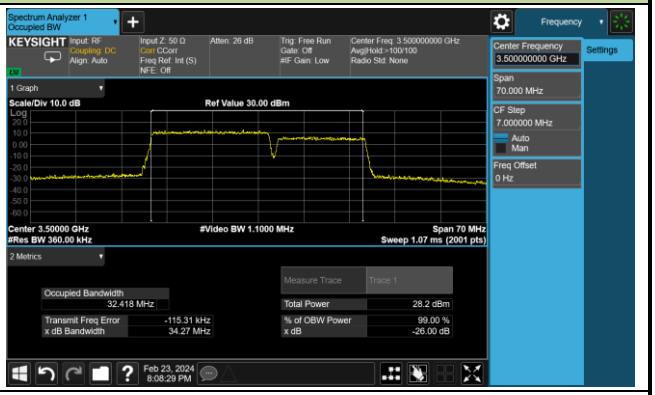


20+10MHz Channel Bandwidth

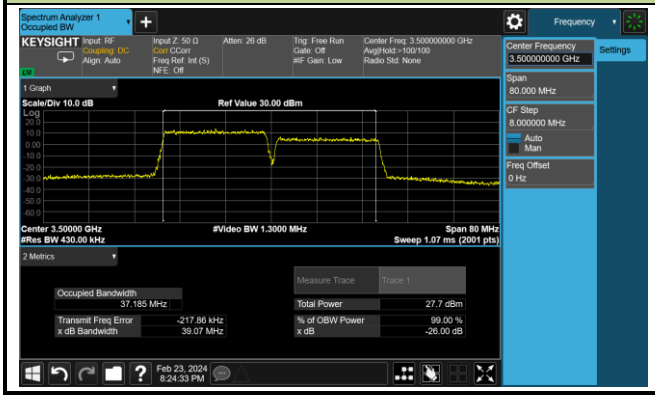
15+20MHz Channel Bandwidth



20+15MHz Channel Bandwidth



20+20MHz Channel Bandwidth



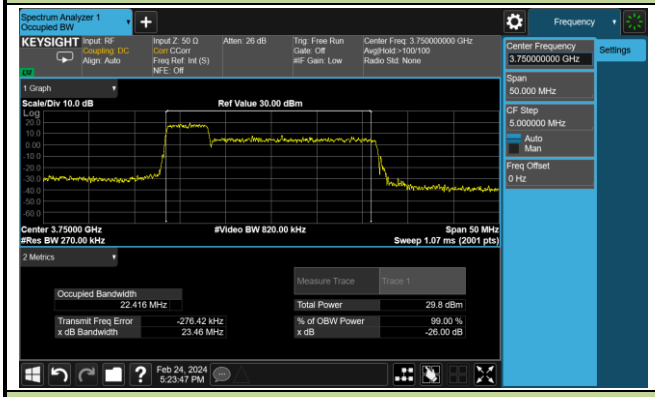
Test Site	SIP-SR1	Test Engineer	Candy Luo
Test Date	2024-02-23 ~ 2024-02-26	Test Band	Intra-Band CA_43C

Modulation	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK	3740.8+3752.5	5+20	22.416
	3742.9+3754.9	10+15	22.844
	3740.6+3755.0	10+20	27.374
	3745.1+3757.1	15+10	23.004
	3742.5+3757.5	15+15	28.188
	3740.3+3757.4	15+20	32.286
	3747.5+3759.2	20+5	22.723
	3745.1+3759.5	20+10	27.604
	3742.6+3759.7	20+15	32.412
	3740.1+3759.9	20+20	37.175
16QAM	3740.8+3752.5	5+20	22.506
	3742.9+3754.9	10+15	22.910
	3740.6+3755.0	10+20	27.407
	3745.1+3757.1	15+10	22.932
	3742.5+3757.5	15+15	28.053
	3740.3+3757.4	15+20	32.316
	3747.5+3759.2	20+5	22.720
	3745.1+3759.5	20+10	27.542
	3742.6+3759.7	20+15	32.426
	3740.1+3759.9	20+20	37.166
64QAM	3740.8+3752.5	5+20	22.432
	3742.9+3754.9	10+15	22.972
	3740.6+3755.0	10+20	27.381
	3745.1+3757.1	15+10	22.927
	3742.5+3757.5	15+15	28.096
	3740.3+3757.4	15+20	32.341
	3747.5+3759.2	20+5	22.742
	3745.1+3759.5	20+10	27.557
	3742.6+3759.7	20+15	32.418
	3740.1+3759.9	20+20	37.271

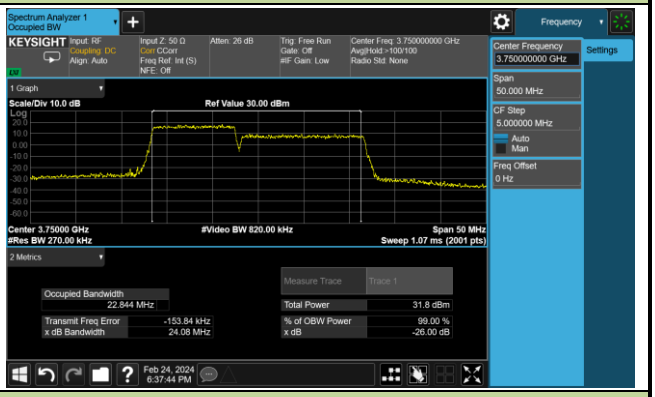
Modulation	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
256QAM	3740.8+3752.5	5+20	22.463
	3742.9+3754.9	10+15	22.832
	3740.6+3755.0	10+20	27.349
	3745.1+3757.1	15+10	22.980
	3742.5+3757.5	15+15	28.138
	3740.3+3757.4	15+20	32.361
	3747.5+3759.2	20+5	22.708
	3745.1+3759.5	20+10	27.588
	3742.6+3759.7	20+15	32.374
	3740.1+3759.9	20+20	37.188

99% Bandwidth - QPSK

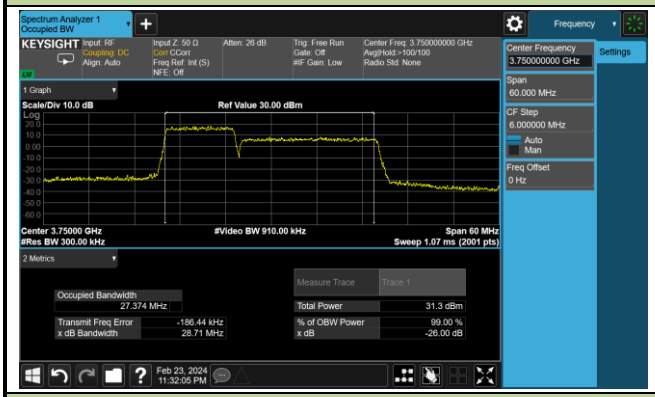
5+20MHz Channel Bandwidth



10+15MHz Channel Bandwidth

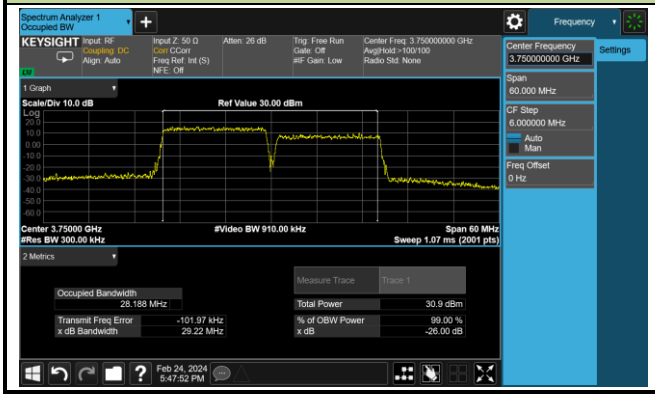


10+20MHz Channel Bandwidth

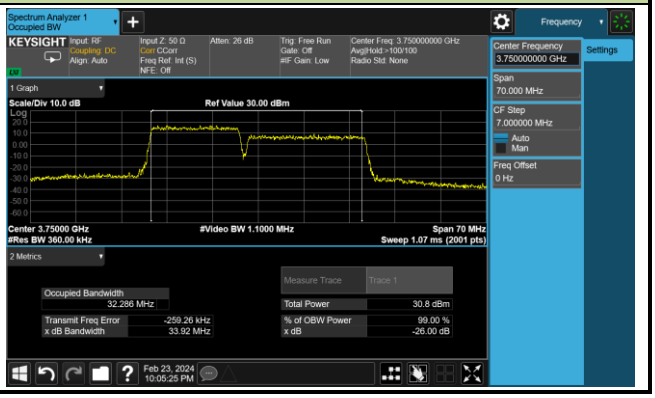


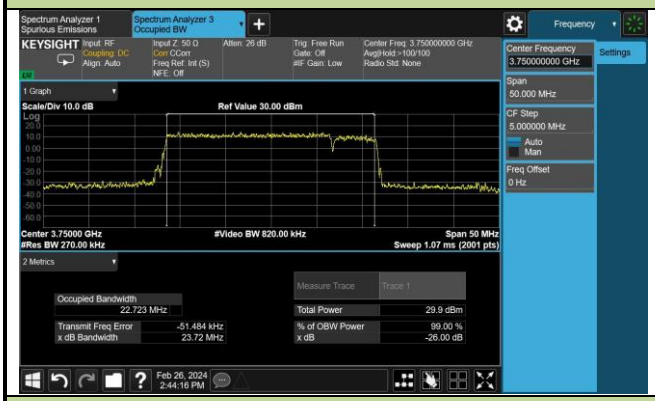
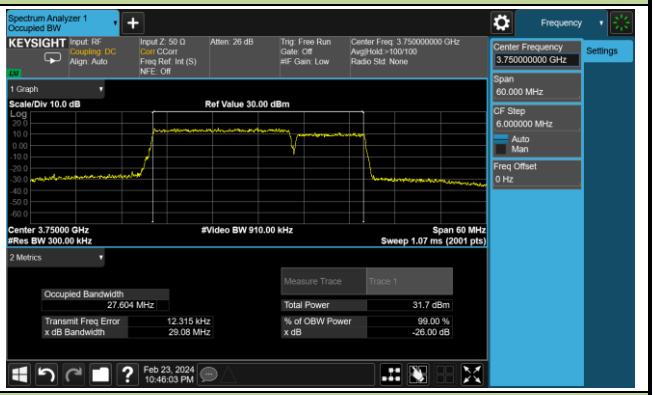
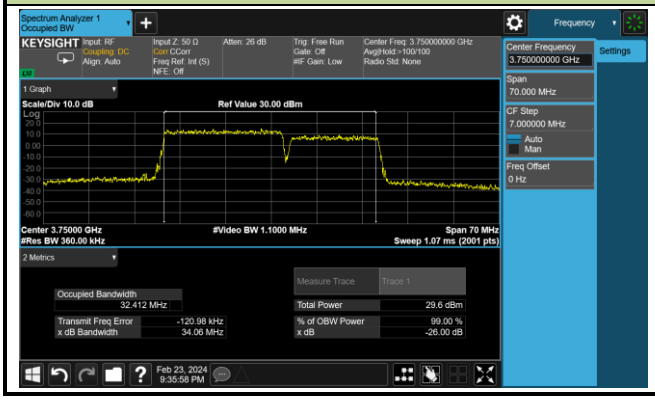
15+10MHz Channel Bandwidth

15+15MHz Channel Bandwidth



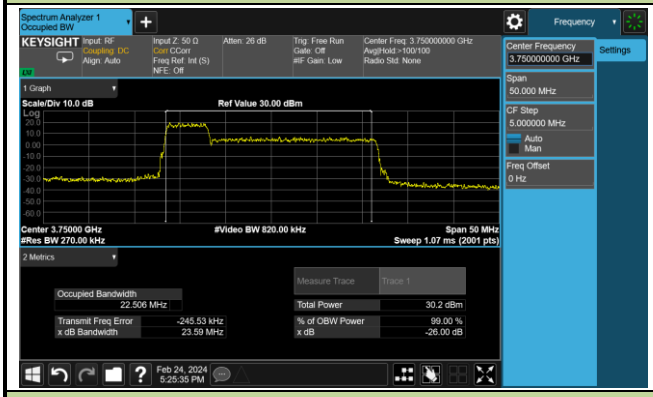
15+20MHz Channel Bandwidth



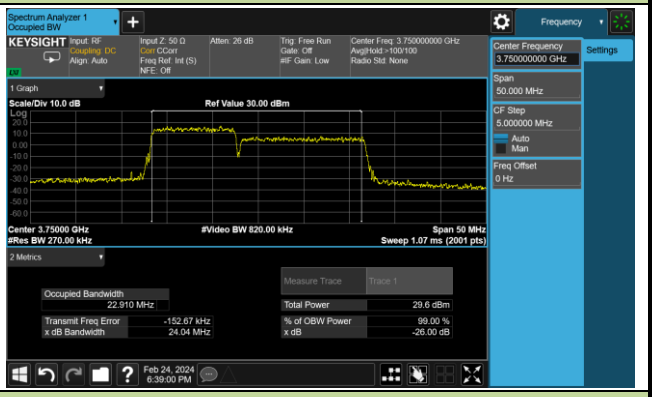
20+5MHz Channel Bandwidth	20+10MHz Channel Bandwidth
	
20+15MHz Channel Bandwidth	**20+20MHz Channel Bandwidth**
	

99% Bandwidth - 16QAM

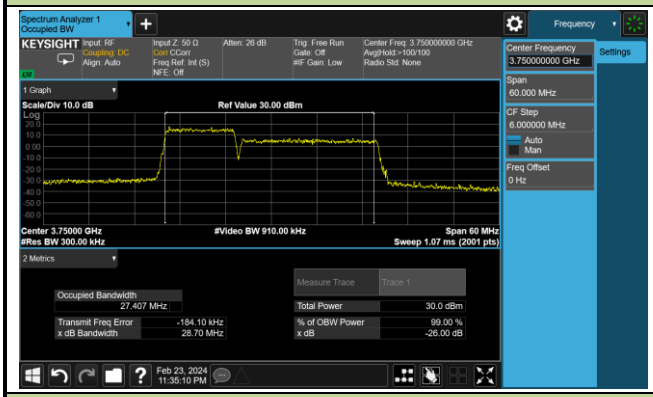
5+20MHz Channel Bandwidth



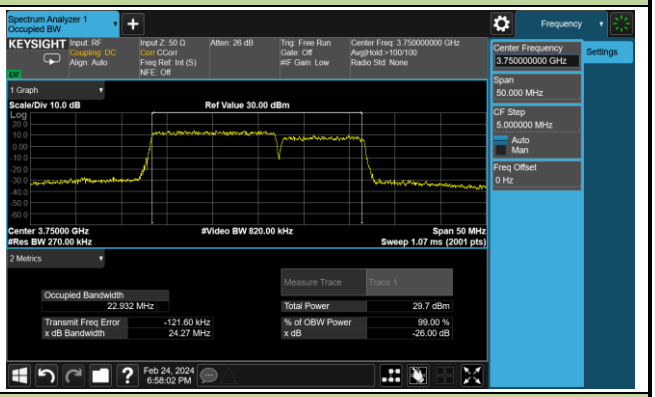
10+15MHz Channel Bandwidth



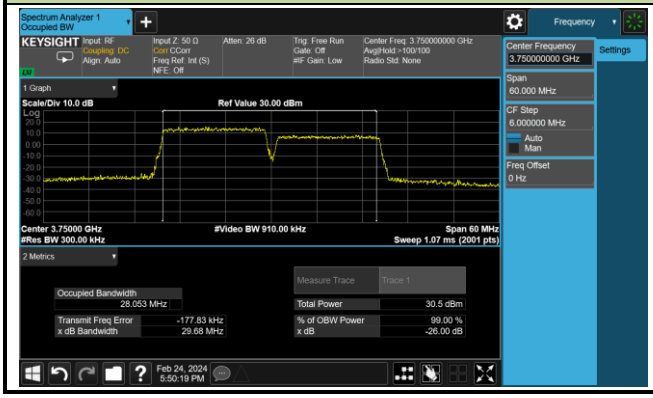
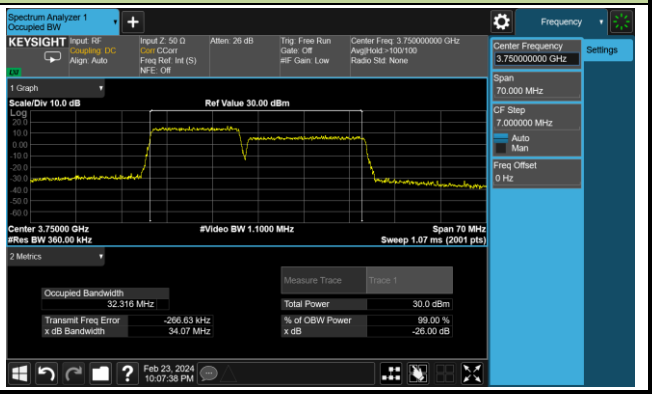
10+20MHz Channel Bandwidth



15+10MHz Channel Bandwidth



15+15MHz Channel Bandwidth



15+20MHz Channel Bandwidth