

RF MEASUREMENT REPORT

FCC ID: XMR2023RG520FNA
Applicant: Quectel Wireless Solutions Co., Ltd
Product: 5G Sub-6 GHz LGA Module
Model No.: RG520F-NA
Brand Name: Quectel
FCC Rule Part(s): Part 2, 27
Test Procedure(s): ANSI C63.26: 2015
Result: Complies
Received Date: 2023-05-11
Test Date: 2023-05-12 ~ 2023-06-05

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.

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
2305RSU024-U12	Rev. 01	Initial Report	2023-07-01	Valid

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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

<input checked="" type="checkbox"/>	<p>Test Site - MRT Suzhou Laboratory</p> <hr/> <p>Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian’edang Rd., Wuzhong Economic Development Zone, Suzhou, China</p> <p>Laboratory Location (Suzhou - SIP) 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China</p> <hr/> <p>Laboratory Accreditations</p> <table data-bbox="263 1205 1054 1243"> <tr> <td>A2LA: 3628.01</td> <td>CNAS: L10551</td> </tr> </table> <table data-bbox="263 1263 1054 1301"> <tr> <td>FCC: CN1166</td> <td>ISED: CN0001</td> </tr> </table> <p>VCCI: R-20025, G-20034, C-20020, T-20020</p>	A2LA: 3628.01	CNAS: L10551	FCC: CN1166	ISED: CN0001
A2LA: 3628.01	CNAS: L10551				
FCC: CN1166	ISED: CN0001				
<input type="checkbox"/>	<p>Test Site - MRT Shenzhen Laboratory</p> <hr/> <p>Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China</p> <hr/> <p>Laboratory Accreditations</p> <table data-bbox="263 1574 1054 1612"> <tr> <td>A2LA: 3628.02</td> <td>CNAS: L10551</td> </tr> </table> <table data-bbox="263 1632 1054 1671"> <tr> <td>FCC: CN1284</td> <td>ISED: CN0105</td> </tr> </table>	A2LA: 3628.02	CNAS: L10551	FCC: CN1284	ISED: CN0105
A2LA: 3628.02	CNAS: L10551				
FCC: CN1284	ISED: CN0105				
<input type="checkbox"/>	<p>Test Site - MRT Taiwan Laboratory</p> <hr/> <p>Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)</p> <hr/> <p>Laboratory Accreditations</p> <p>TAF: L3261-190725</p> <table data-bbox="263 1937 1054 1975"> <tr> <td>FCC: 291082, TW3261</td> <td>ISED: TW3261</td> </tr> </table>	FCC: 291082, TW3261	ISED: TW3261		
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1.4. Product Information

Product Name	5G Sub-6 GHz LGA Module
Model No.	RG520F-NA
Brand Name	Quectel
IMEI	Conducted Measurement 1: 864766050012138 Conducted Measurement 2: 864766050012534 Radiated Measurement 1: 864766050012070 Radiated Measurement 2: 864766050012716
E-UTRA Band	Band 2, 4, 5, 7, 12, 13, 14, 17, 25, 26, 30, 38, 41, 42, 43, 48, 66, 71
5G NR Band	n2, n5, n7, n12, n13, n14, n25, n26, n30, n38, n41, n48, n66, n71, n77, n78
5G NR NSA Band	n2, n5, n7, n12, n13, n14, n25, n26, n30, n38, n41, n48, n66, n71, n77, n78
Operating Temperature	-30 ~ 75 °C
Power Type	3.3 ~ 4.4Vdc, typical 3.8Vdc
Remark: The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.	

1.5. Radio Specification under Test

E-UTRA Specification	
TDD Tx & Rx 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
Remark: For other features of this EUT, test report will be issued separately.	

1.6. Description of Available Antennas

Technology	Frequency Range (MHz)	Antenna Type	MaxPeak Gain (dBi)
LTE Band 2	1850 ~ 1910	Dipole	1.37
LTE Band 4	1710 ~ 1755		1.37
LTE Band 5	824 ~ 849		1.18
LTE Band 7	2500 ~ 2570		2.07
LTE Band 12	699 ~ 716		1.18
LTE Band 13	777 ~ 787		1.18
LTE Band 14	788 ~ 798		1.18
LTE Band 17	704~ 716		1.18
LTE Band 25	1850 ~ 1915		1.37
LTE Band 26	814~849		1.18
LTE Band 30	2305 ~ 2315		1.11
LTE Band 38	2570 ~ 2620		2.07
LTE Band 41	2496 ~ 2690		2.07
LTE Band 42	3450 ~ 3550		0.58
LTE Band 43	3700 ~ 3800		0.58
LTE Band 48	3550 ~ 3700		0.58
LTE Band 66	1710 ~ 1780		1.37
LTE Band 71	663 ~ 698		1.18

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

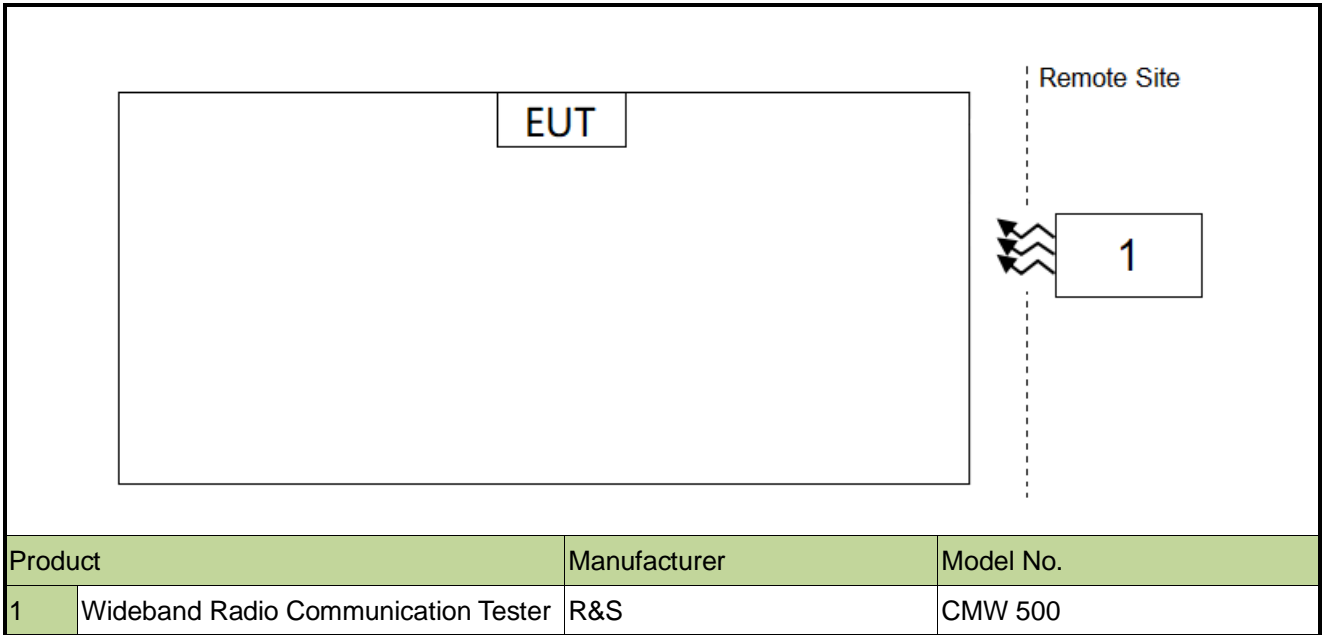
1.7. Test Methodology

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



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
Signal Analyzer	Keysight	N9010B	MRTSUE07028	1 year	2023-11-25	SIP-SR1
Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2024-05-23	SIP-SR1
Signal Analyzer	Keysight	N9010B	MRTSUE06603	1 year	2023-10-25	SIP-SR1
Signal Analyzer	Keysight	N9020B	MRTSUE06604	1 year	2023-11-07	SIP-SR1
Communication Tester	R&S	CMU 200	MRTSUE06009	1 year	2023-08-23	SIP-SR1
Communication Tester	R&S	CMW500	MRTSUE06243	1 year	2023-10-08	SIP-SR1
Signal Generator	Keysight	E8257D	MRTSUE06453	1 year	2024-05-23	SIP-SR1
Thermohygrometer	testo	622	MRTSUE06629	1 year	2024-01-03	SIP-SR1
5G Wireless Test Platform	Keysight	E7515B	MRTSUE06903	1 year	2023-10-25	SIP-SR1
Signal Generator	Keysight	E8257D	MRTSUE06904	1 year	2023-10-25	SIP-SR1
DC POWER MODULE	Keysight	N6743B	MRTSUE06905	N/A	N/A	SIP-SR1
DC POWER MODULE	Keysight	N6743B	MRTSUE06906	N/A	N/A	SIP-SR1
Low-Profile Modular Power System Mainframe	Keysight	N6700C	MRTSUE06907	N/A	N/A	SIP-SR1
FR1 Switching Unit	Keysight	C8880A	MRTSUE06908	N/A	N/A	SIP-SR1
Signal Analyzer	Keysight	N9021B	MRTSUE06915	1 year	2023-12-28	SIP-SR1
Temperature Chamber	BAOYT	BYG-80CL	MRTSUE06932	1 year	2024-02-12	SIP-SR1
Shielding Room	MIX-BEP	SIP-SR1	MRTSUE06948	N/A	N/A	SIP-SR1
Millimeter-Wave Transceiver for 5G	Keysight	M1740A	MRTSUE06954	3 years	2024-06-02	SIP-SR1
Millimeter-Wave Transceiver for 5G	Keysight	M1740A	MRTSUE06955	3 years	2024-06-02	SIP-SR1
5G Wireless Test Platform	Keysight	E7515B	MRTSUE06956	1 year	2024-05-23	SIP-SR1
Common Interface Unit	Keysight	E7770A	MRTSUE06957	N/A	N/A	SIP-SR1
USB Power Sensor	Keysight	U8488A	MRTSUE06958	1 year	2026-07-08	SIP-SR1
Directional Coupler	ar	DC7200A	MRTSUE06147	N/A	N/A	SIP
Directional Coupler	ar	DC6080A	MRTSUE06148	N/A	N/A	SIP-SR1
Directional Coupler	narda	4226-10	MRTSUE06564	1 year	2023-10-10	SIP-SR1
Directional Coupler	PULSAR	CS10-23-436/20	MRTSUE06846	1 year	2024-06-01	SIP-SR1
Directional Coupler	PULSAR	CS10-23-436/20	MRTSUE06848	1 year	2024-06-01	SIP-SR1
Attenuator	MVE	MVE2213	MRTSUE11055	1 year	2024-06-08	SIP-SR1
Attenuator	MVE	MVE2213	MRTSUE11056	1 year	2024-06-08	SIP-SR1
Attenuator	MVE	MVE2213	MRTSUE11057	1 year	2024-06-08	SIP-SR1
Attenuator	MVE	MVE2213	MRTSUE11058	1 year	2024-06-08	SIP-SR1
Attenuator	MVE	MVE2213	MRTSUE11059	1 year	2024-06-08	SIP-SR1

Attenuator	MVE	MVE2213	MRTSUE11060	1 year	2024-06-08	SIP-SR1
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Software	Version	Function
EMI Software	V3.0.0	EMI Test Software

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% ($U=2Uc(y)$): Horizontal: 9kHz ~ 300MHz: 5.04dB 300MHz ~ 1GHz: 4.95dB 1GHz ~ 40GHz: 6.40dB Vertical: 9kHz ~ 300MHz: 5.24dB 300MHz ~ 1GHz: 6.03dB 1GHz ~ 40GHz: 6.40dB
Conducted Spurious Emissions
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 1.13dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.28%
Frequency Stability
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 76.2Hz

5. Test Result

5.1. Summary

FCC Part Section(s)	Test Description	Test Condition	Test Result
2.1049	Occupied Bandwidth	Conducted	Pass
2.1055, 27.54	Frequency Stability		Pass
27.50(j)(3), (k)(3)	Equivalent Isotropic Radiated Power		Pass
27.50(j)(4), (k)(4)	Peak to Average Ratio		Pass
2.1051, 27.53 (l) (n)	Band Edge		Pass
2.1051, 27.53 (l) (n)	Spurious Emission		
2.1051, 27.53 (l) (n)	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, Channel Band Edge, Conducted Spurious Emission, Radiated Spurious Emission (include the Intr-Band CA Mode) 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.

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.

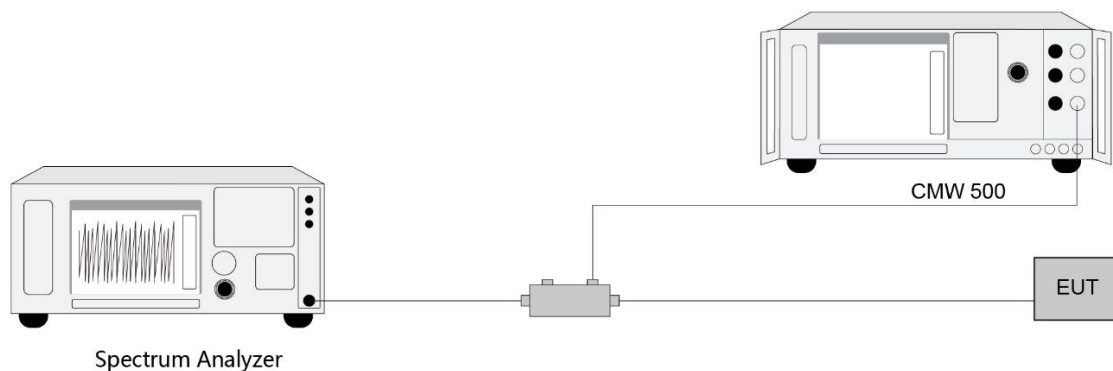
5.2.2. Test Procedure

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 $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize
8. Use the 99% 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 measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency.

5.3.2. Test Procedure

ANSI C63.26-2015 - Section 5.6

5.3.3. Test Setting

Frequency Stability Under Temperature Variations:

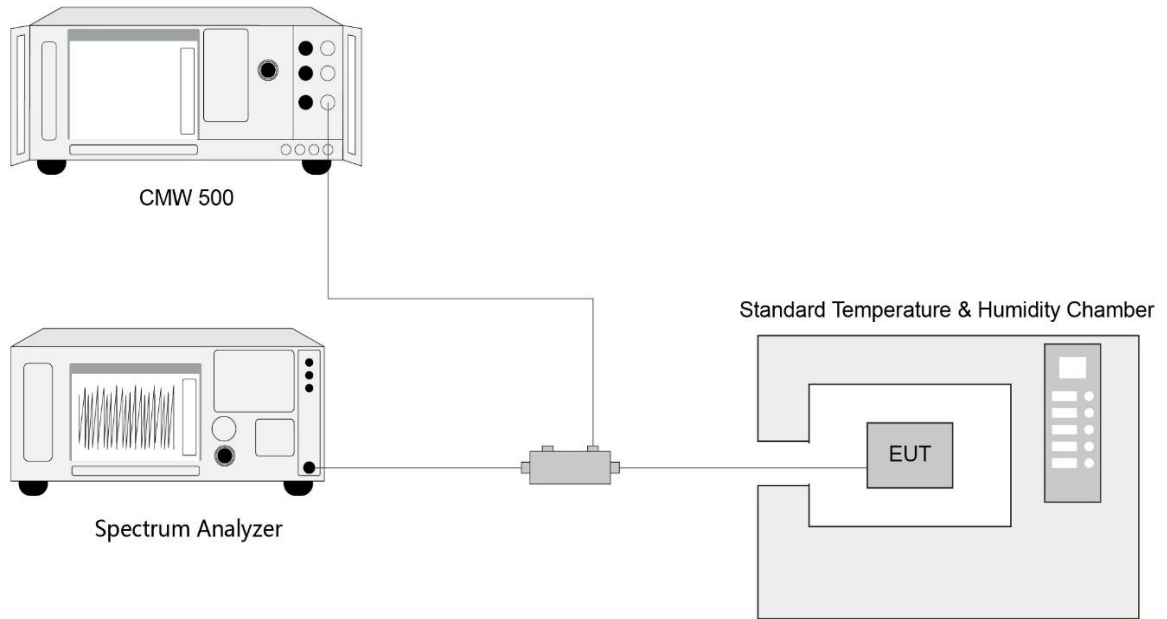
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain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

Frequency Stability Under Voltage Variations:

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

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

5.3.4. Test Setup



5.3.5. Test Result

Refer to Appendix A.2.

5.4. Equivalent Isotropically Radiated Power Measurement

5.4.1. Test Limit

Band 42:

Mobile devices are limited to 1Watt (30 dBm) EIRP. Mobile devices operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

Band 43:

Mobile and portable stations are limited to 1 Watt EIRP. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

5.4.2. Test Procedure

ANSI C63.26-2015 - Section 5.2

5.4.3. Test Setting

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.

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

$$\text{ERP or EIRP} = P_{\text{Meas}} + G_{\text{T}}$$

where

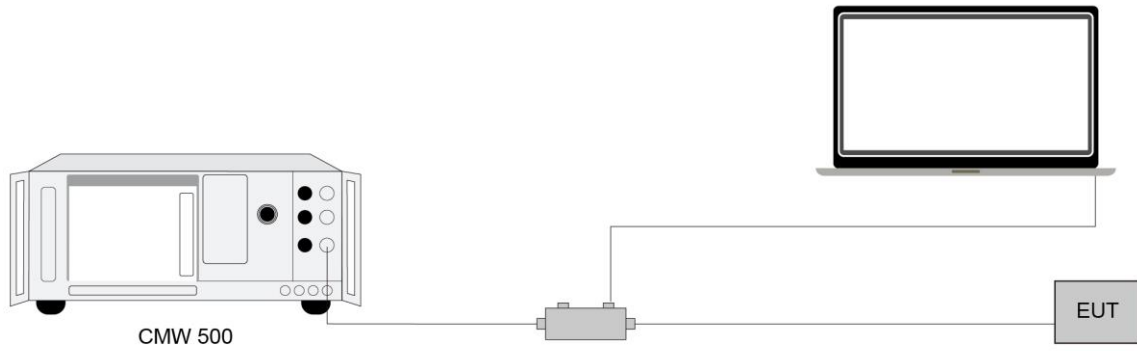
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas} , e.g., dBm or dBW)

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)

$$\text{ERP} = \text{EIRP} - 2.15$$

5.4.4. Test Setup



5.4.5. Test Result

Refer to Appendix A.3.

5.5. Band Edge Measurement

5.5.1. 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.

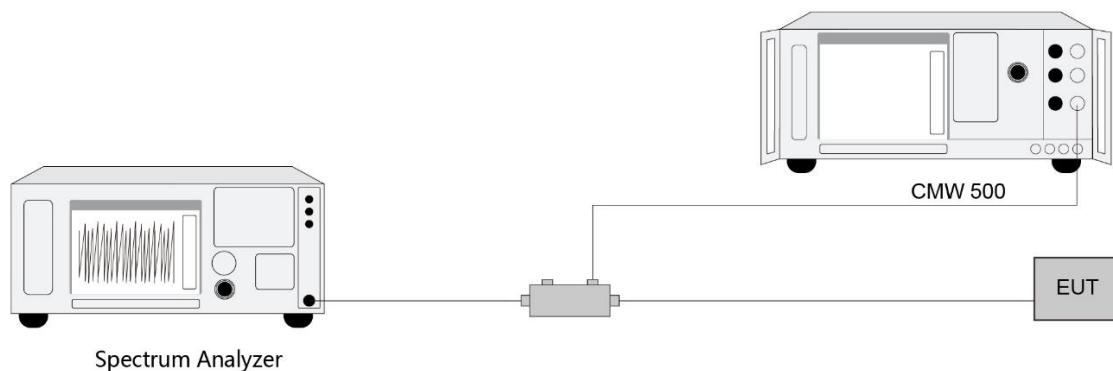
5.5.2. Test Procedure

ANSI C63.26-2015 - Section 5.7

5.5.3. Test Setting

1. Set the analyzer frequency to low or high channel
2. $RBW \geq$ 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. $VBW \geq 3 \cdot RBW$
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.

5.5.4. Test Setup



5.5.5. Test Result

Refer to Appendix A.4.

5.6. Peak to Average Ratio Measurement

5.6.1. 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.

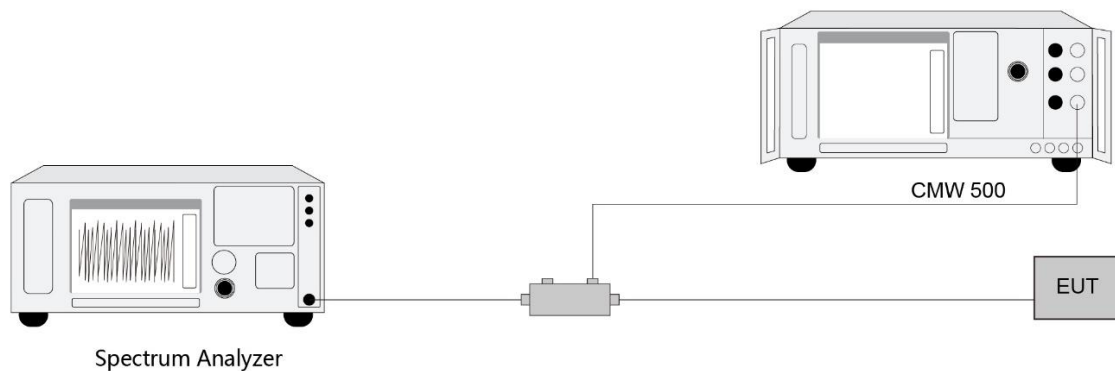
5.6.2. Test Procedure

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

5.6.3. Test Setting

1. Set the resolution / measurement bandwidth \geq 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%

5.6.4. 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.

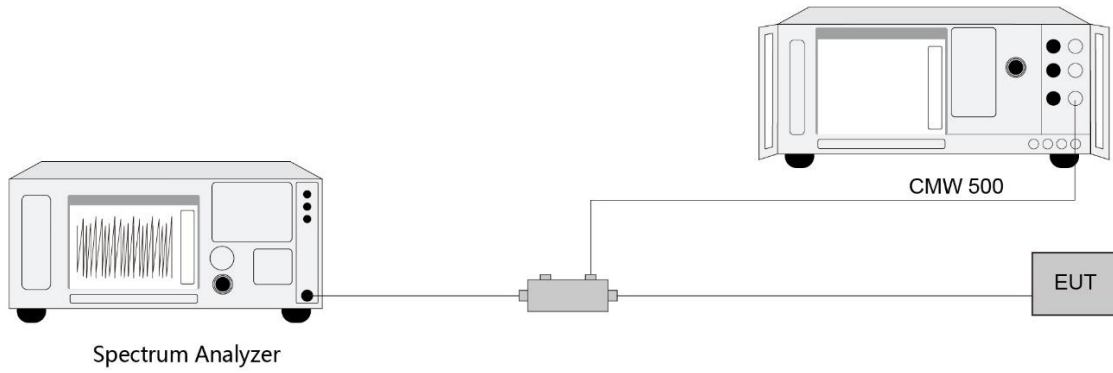
5.7.2. Test Procedure

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 $\geq 3 \cdot$ 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 the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13dBm.

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

5.8.2. Test Procedure

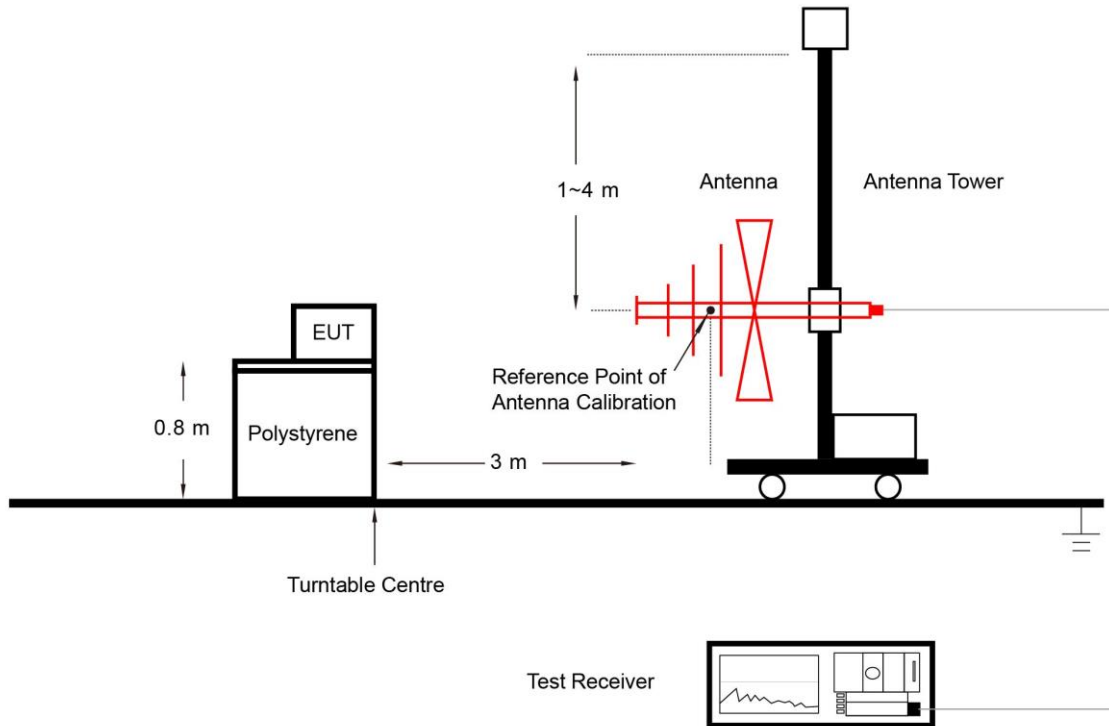
ANSI C63.26-2015 - Section 5.2.7 & 5.5

5.8.3. Test Setting

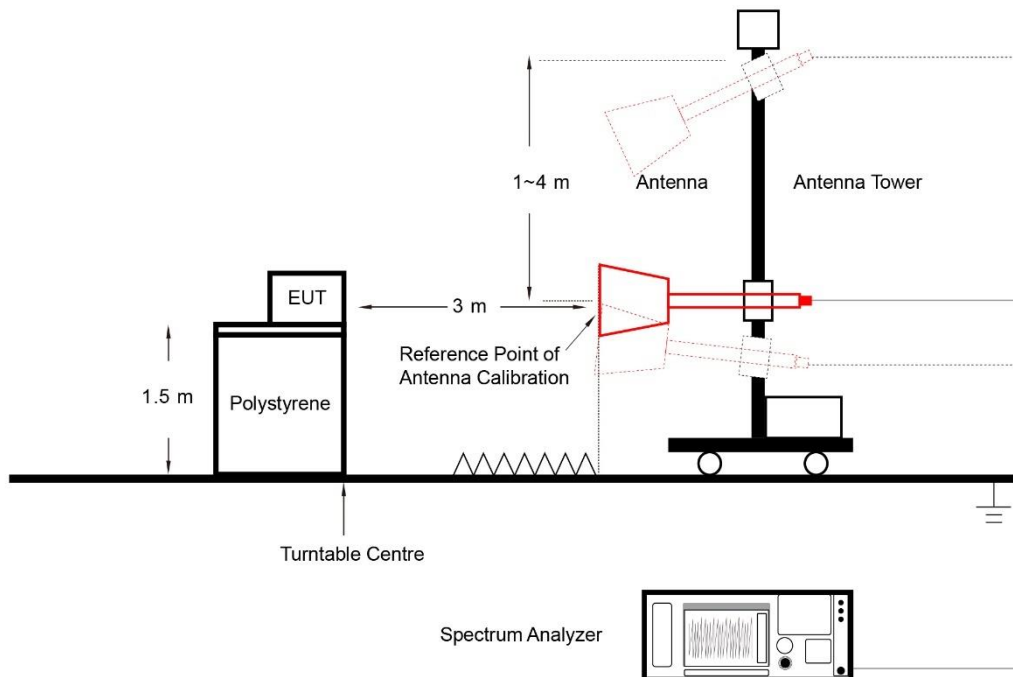
1. RBW = 1MHz
2. VBW \geq 3*RBW
3. Sweep time \geq 10 \times (number of points in sweep) \times (transmission symbol period)
4. Detector = Peak
5. Trace mode = max hold
6. The trace was allowed to stabilize

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

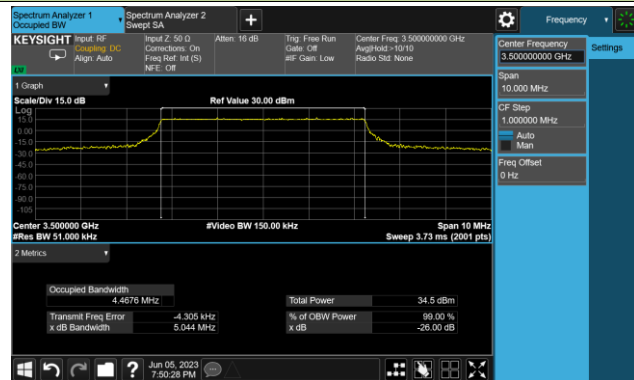
A.1 Occupied Bandwidth Test Result

Test Site	SIP-SR1	Test Engineer	Sunshine Wan
Test Date	2023/06/01 ~ 2023/06/05	Test Band	LTE Band 42_HPUE

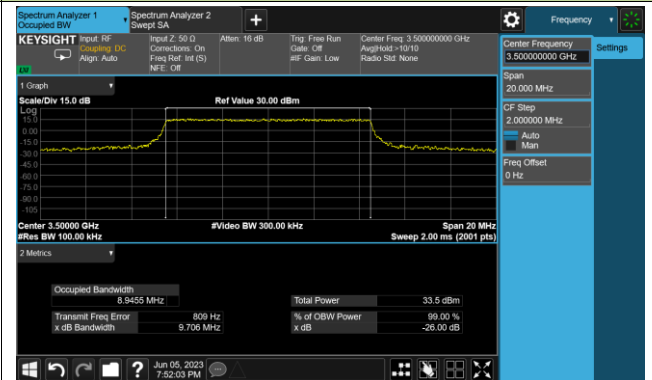
Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK		
3500.0	5	4.47
	10	8.95
	15	13.40
	20	17.88
16QAM		
3500.0	5	4.48
	10	8.95
	15	13.40
	20	17.87
64QAM		
3500.0	5	4.46
	10	8.94
	15	13.42
	20	17.88
256QAM		
3500.0	5	4.48
	10	8.95
	15	13.43
	20	17.86

99% Bandwidth - QPSK

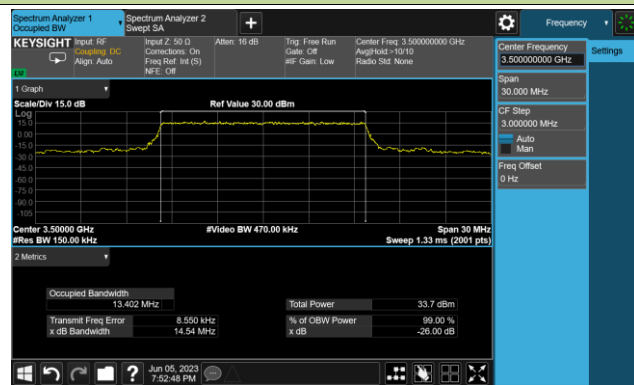
5MHz Channel Bandwidth



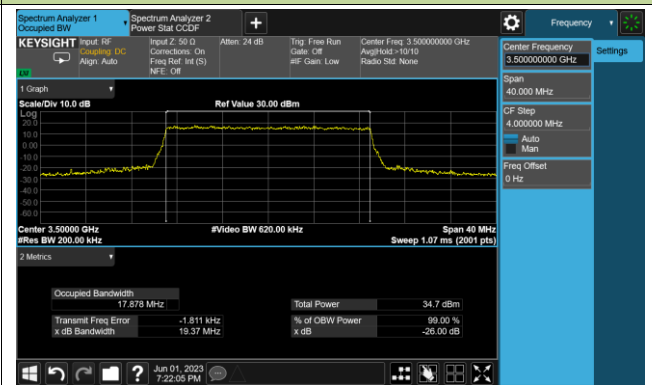
10MHz Channel Bandwidth



15MHz Channel Bandwidth

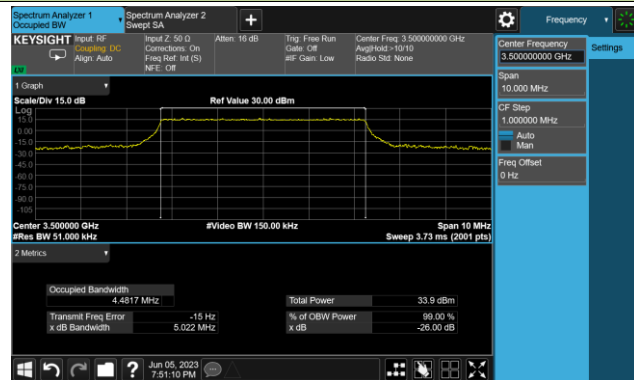


20MHz Channel Bandwidth

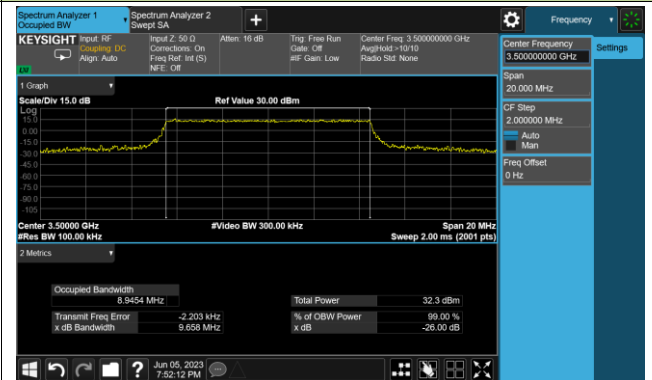


99% Bandwidth - 16QAM

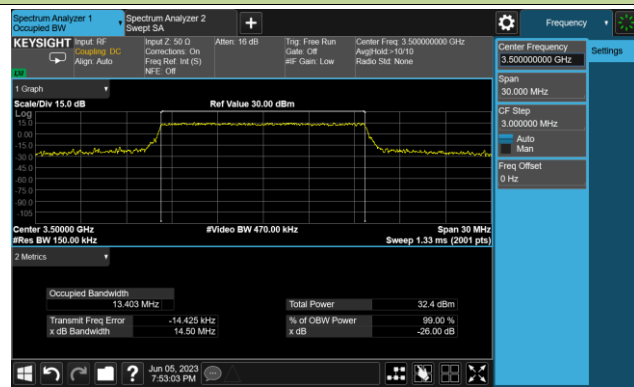
5MHz Channel Bandwidth



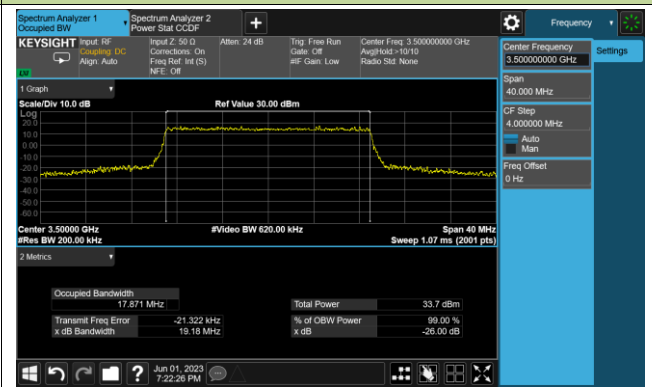
10MHz Channel Bandwidth



15MHz Channel Bandwidth

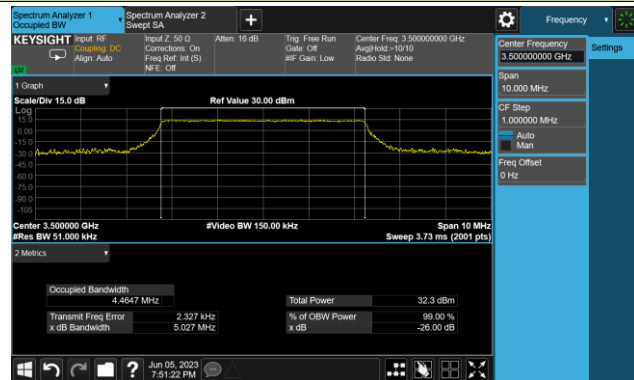


20MHz Channel Bandwidth

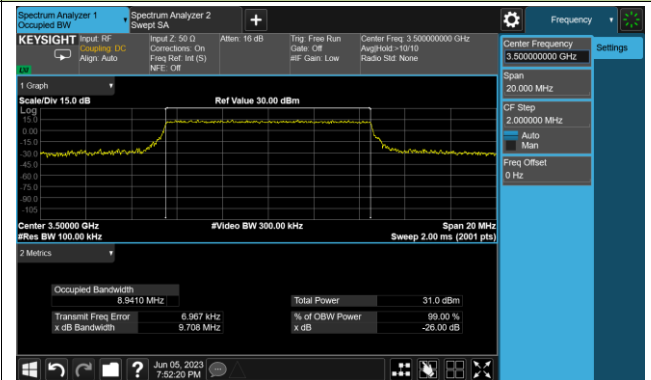


99% Bandwidth - 64QAM

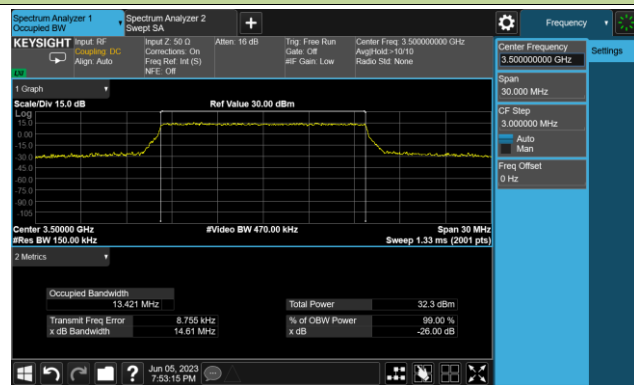
5MHz Channel Bandwidth



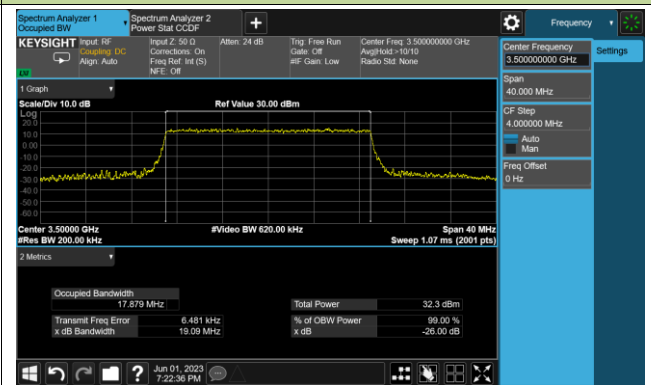
10MHz Channel Bandwidth



15MHz Channel Bandwidth

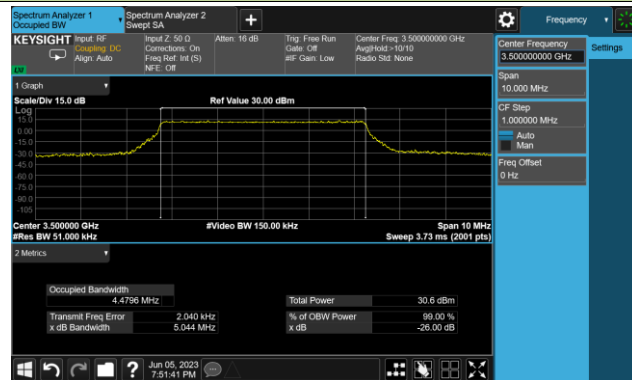


20MHz Channel Bandwidth

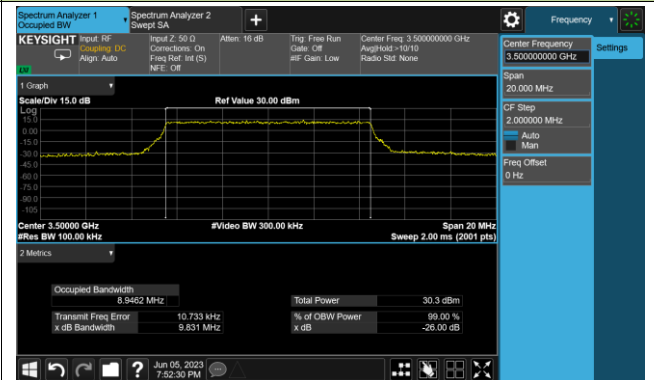


99% Bandwidth - 256QAM

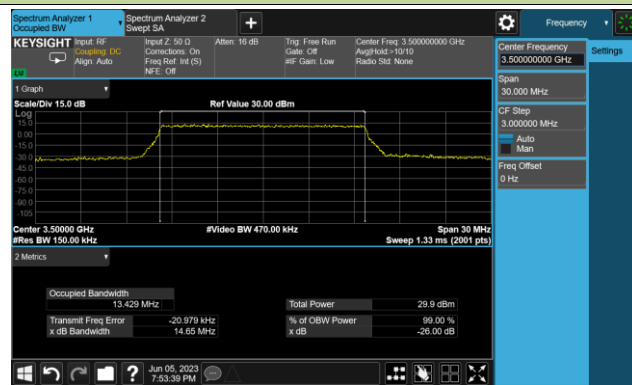
5MHz Channel Bandwidth



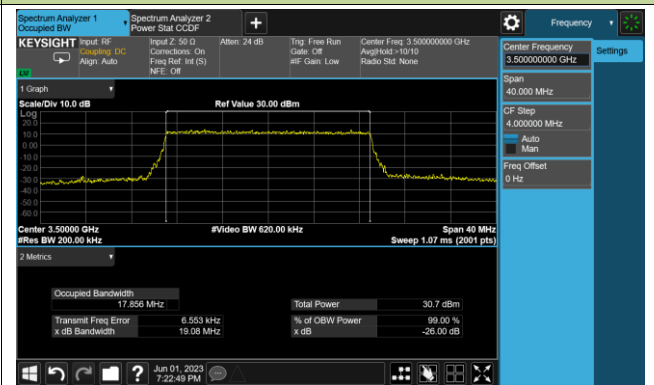
10MHz Channel Bandwidth



15MHz Channel Bandwidth



20MHz Channel Bandwidth

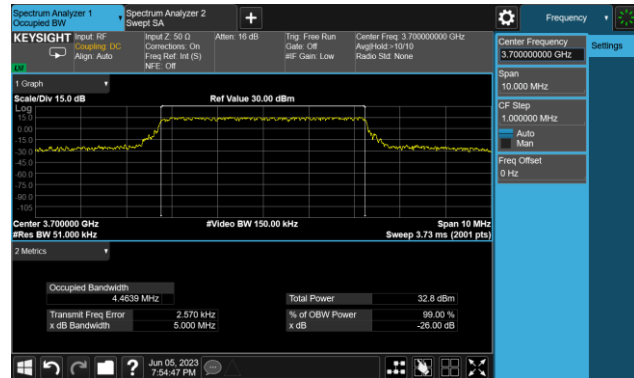


Test Site	SIP-SR1	Test Engineer	Sunshine Wan
Test Date	2023/06/01 ~ 2023/06/05	Test Band	LTE Band 43_HPUE

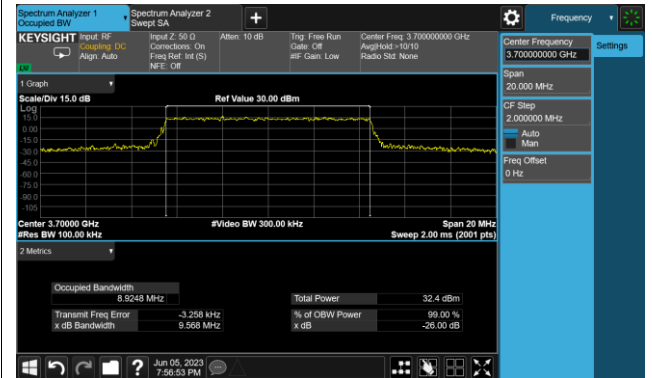
Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK		
3750.0	5	4.46
	10	8.92
	15	13.44
	20	17.85
16QAM		
3750.0	5	4.45
	10	8.96
	15	13.41
	20	17.88
64QAM		
3750.0	5	4.48
	10	8.95
	15	13.40
	20	17.87
256QAM		
3750.0	5	4.46
	10	8.95
	15	13.41
	20	17.87

99% Bandwidth - QPSK

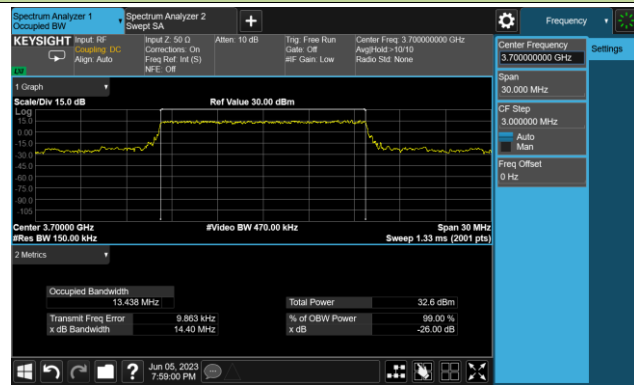
5MHz Channel Bandwidth



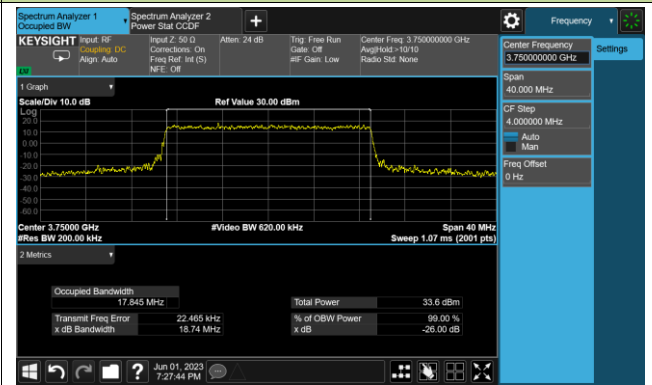
10MHz Channel Bandwidth



15MHz Channel Bandwidth

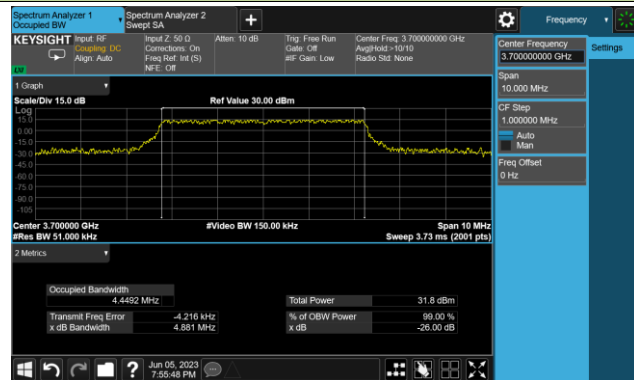


20MHz Channel Bandwidth

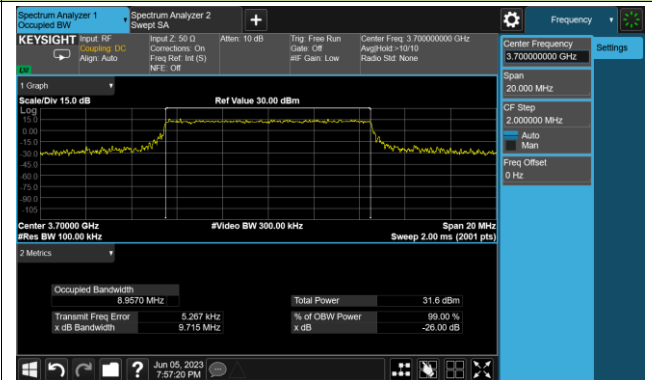


99% Bandwidth - 16QAM

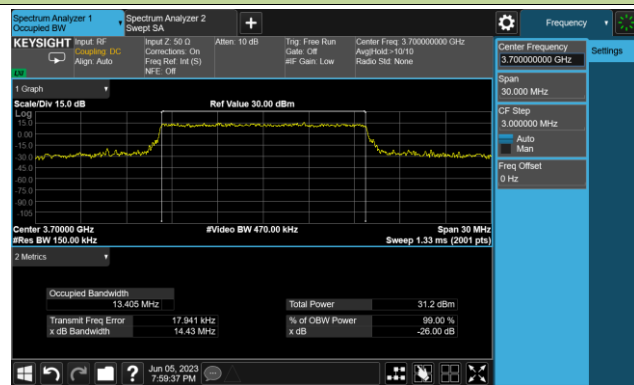
5MHz Channel Bandwidth



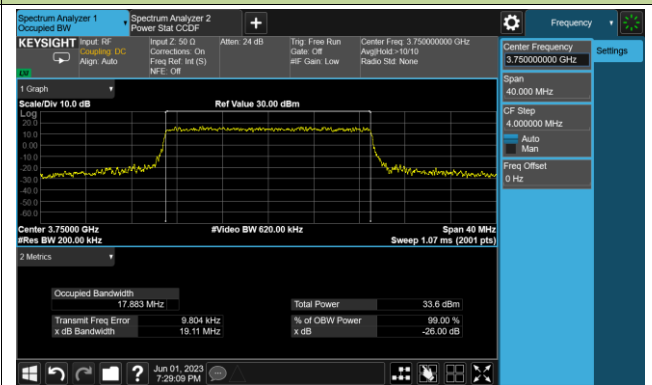
10MHz Channel Bandwidth



15MHz Channel Bandwidth

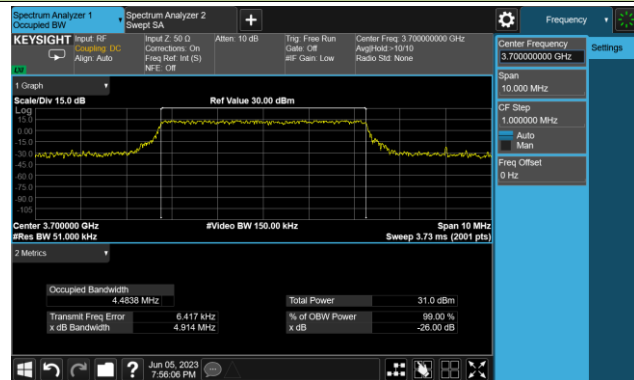


20MHz Channel Bandwidth

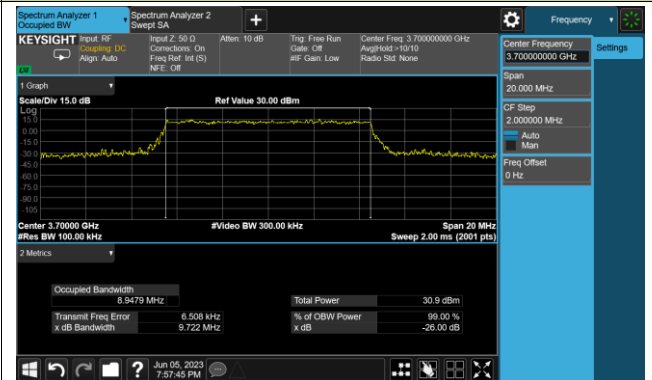


99% Bandwidth - 64QAM

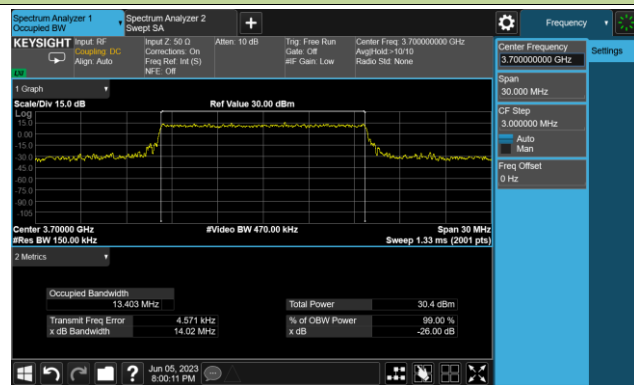
5MHz Channel Bandwidth



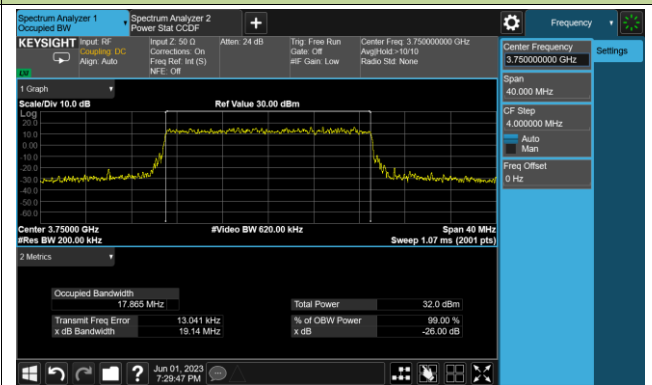
10MHz Channel Bandwidth



15MHz Channel Bandwidth

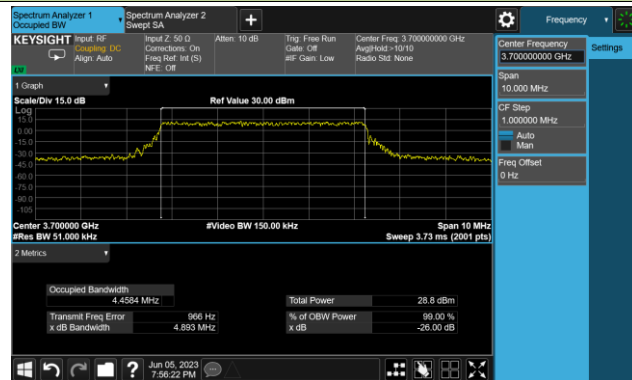


20MHz Channel Bandwidth

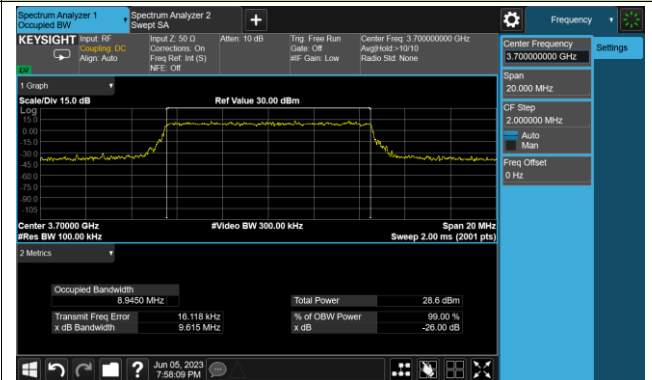


99% Bandwidth - 256QAM

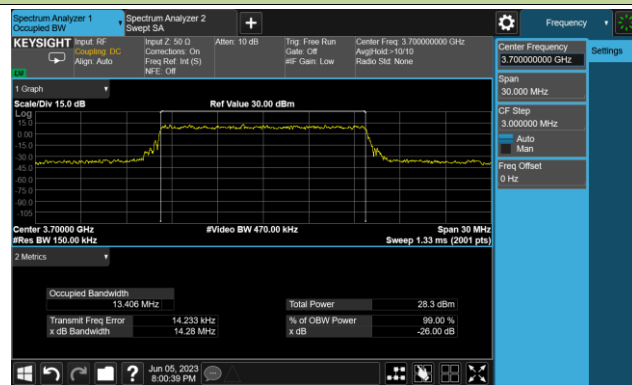
5MHz Channel Bandwidth



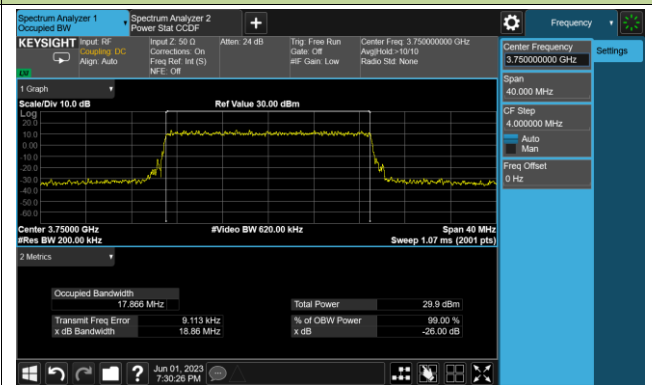
10MHz Channel Bandwidth



15MHz Channel Bandwidth



20MHz Channel Bandwidth

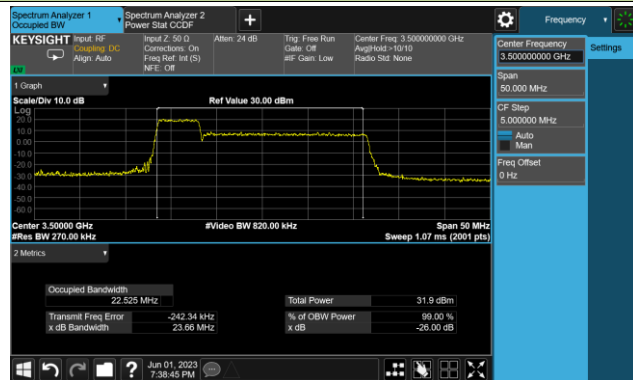


Test Site	SIP-SR1	Test Engineer	Sunshine Wan
Test Date	2023/06/01	Test Band	Intra-Band CA_42C

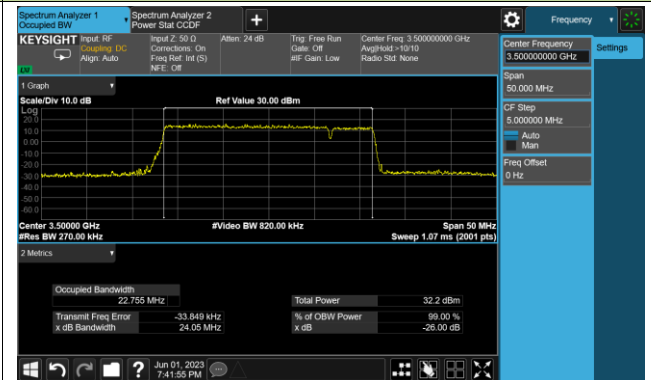
Modulation	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK	3490.8+3502.5	5+20	22.53
	3497.5+3509.2	20+5	22.76
	3490.6+3505.5	10+20	27.36
	3460.0+3474.4	20+10	27.58
	3490.3+3507.4	15+20	32.37
	3492.6+3509.7	20+15	32.36
	3490.1+3509.9	20+20	37.16
16QAM	3490.8+3502.5	5+20	22.51
	3497.5+3509.2	20+5	22.76
	3490.6+3505.5	10+20	27.29
	3460.0+3474.4	20+10	27.55
	3490.3+3507.4	15+20	32.27
	3492.6+3509.7	20+15	3.36
	3490.1+3509.9	20+20	37.26
64QAM	3490.8+3502.5	5+20	22.48
	3497.5+3509.2	20+5	22.75
	3490.6+3505.5	10+20	27.30
	3460.0+3474.4	20+10	27.55
	3490.3+3507.4	15+20	32.21
	3492.6+3509.7	20+15	32.33
	3490.1+3509.9	20+20	37.14
256QAM	3490.8+3502.5	5+20	22.49
	3497.5+3509.2	20+5	22.79
	3490.6+3505.5	10+20	27.32
	3460.0+3474.4	20+10	27.57
	3490.3+3507.4	15+20	32.32
	3492.6+3509.7	20+15	32.36
	3490.1+3509.9	20+20	37.22

99% Bandwidth - QPSK

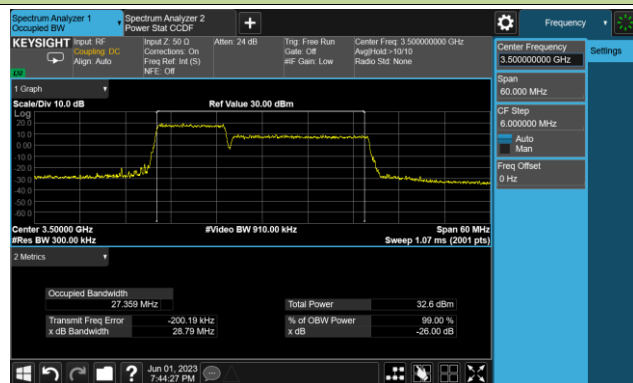
5+20MHz Channel Bandwidth



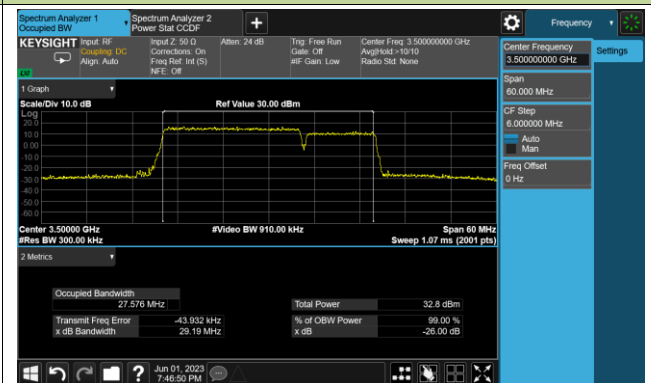
20+5MHz Channel Bandwidth



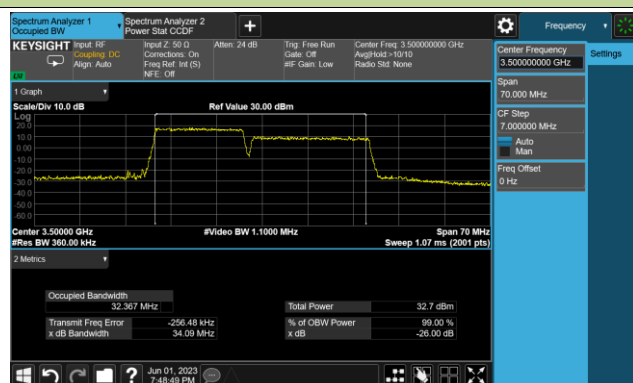
10+20MHz Channel Bandwidth



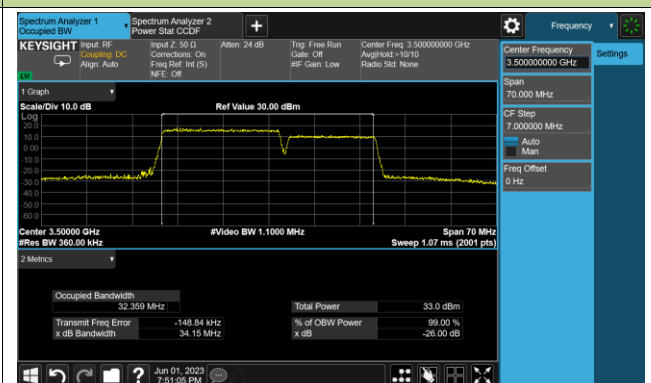
20+10MHz Channel Bandwidth



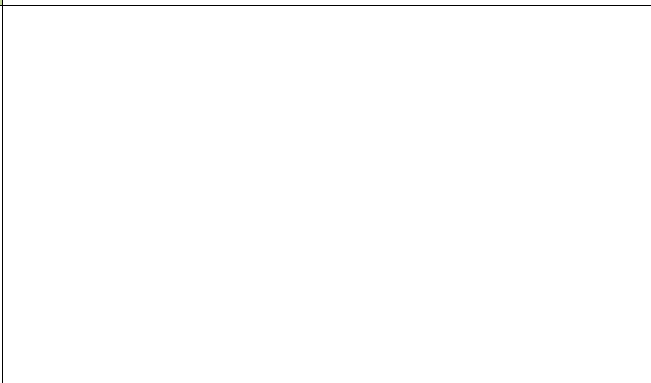
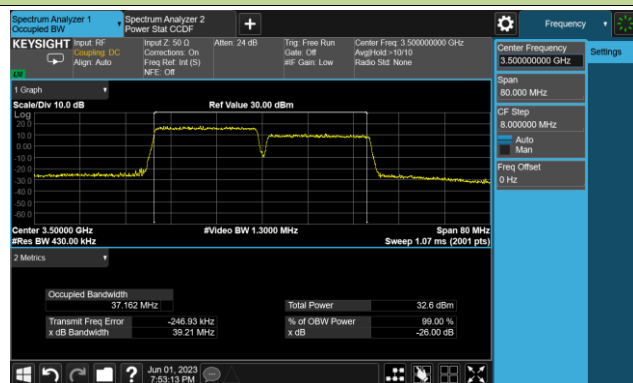
15+20MHz Channel Bandwidth



20+15MHz Channel Bandwidth

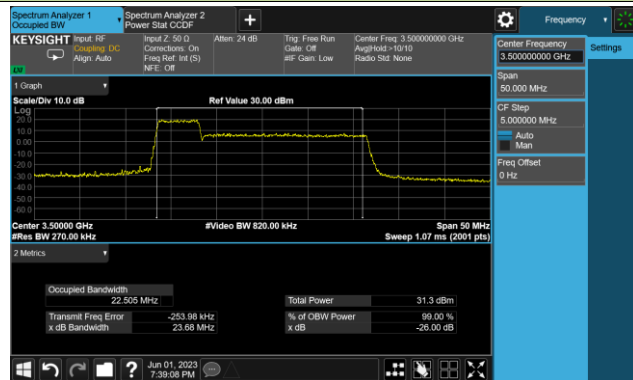


20+20MHz Channel Bandwidth

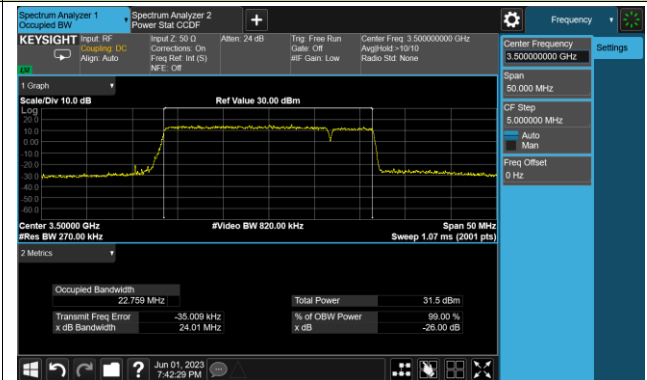


99% Bandwidth - 16QAM

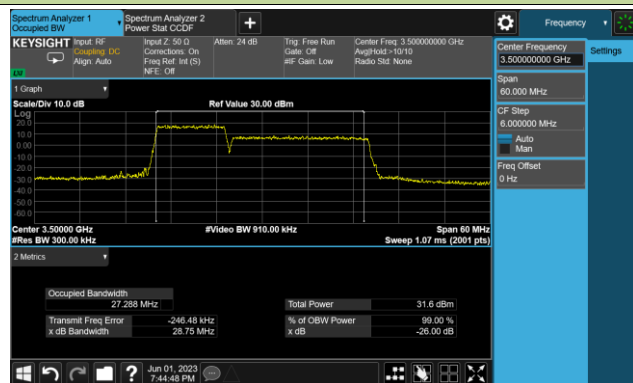
5+20MHz Channel Bandwidth



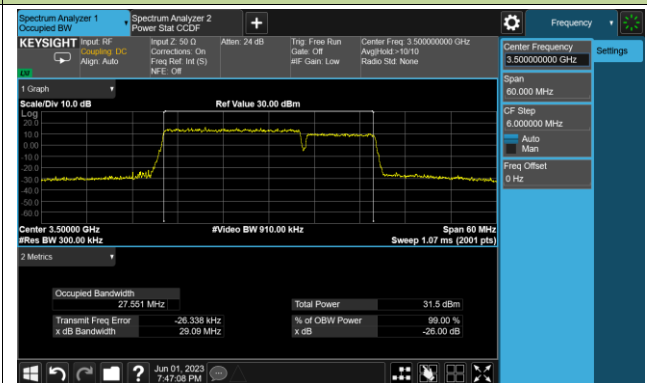
20+5MHz Channel Bandwidth



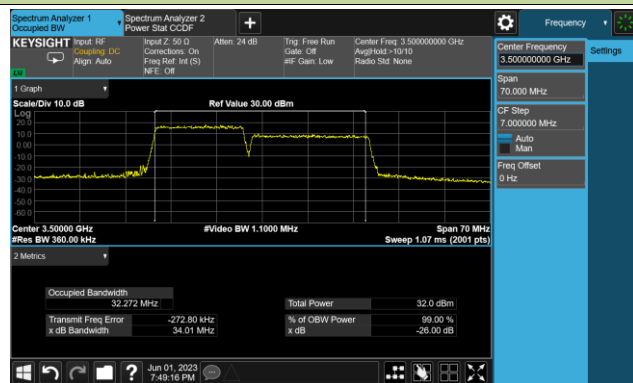
10+20MHz Channel Bandwidth



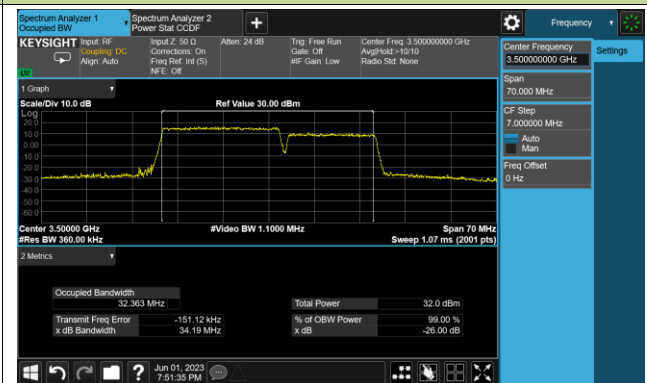
20+10MHz Channel Bandwidth



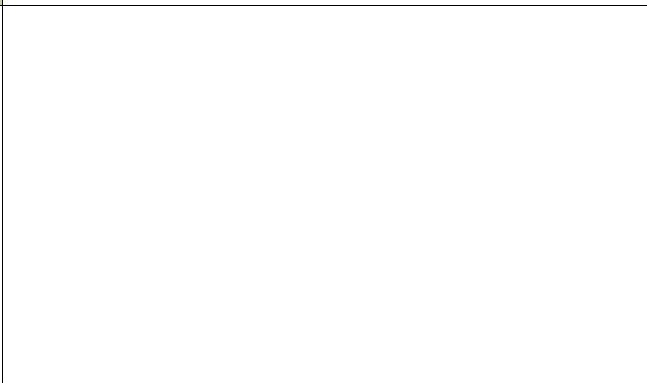
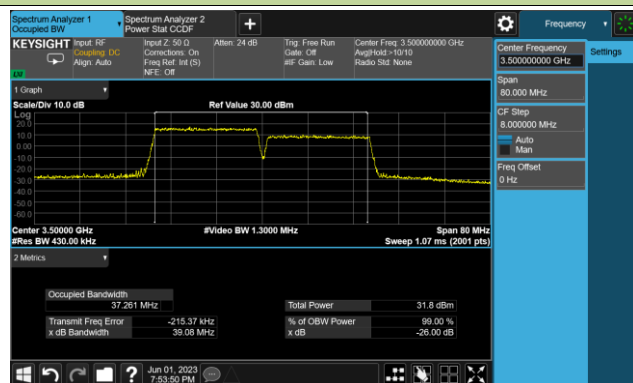
15+20MHz Channel Bandwidth



20+15MHz Channel Bandwidth

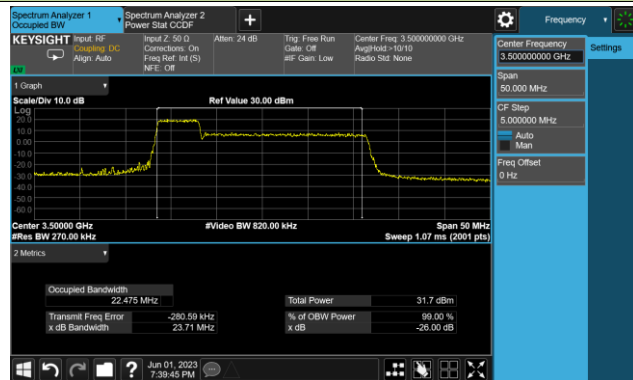


20+20MHz Channel Bandwidth

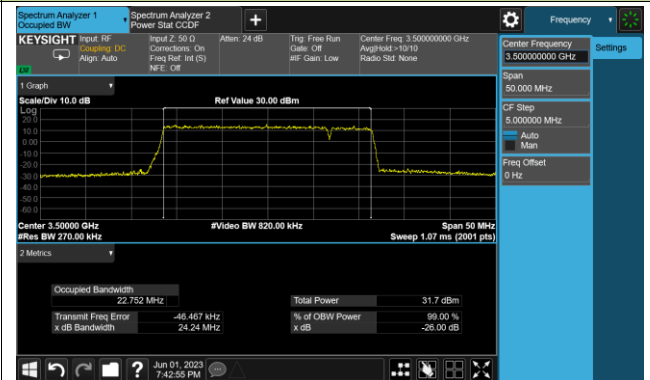


99% Bandwidth - 64QAM

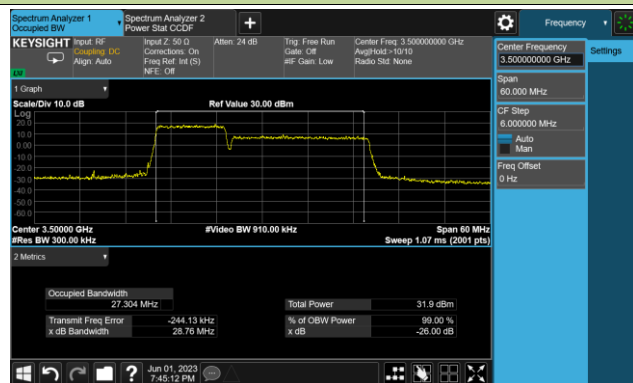
5+20MHz Channel Bandwidth



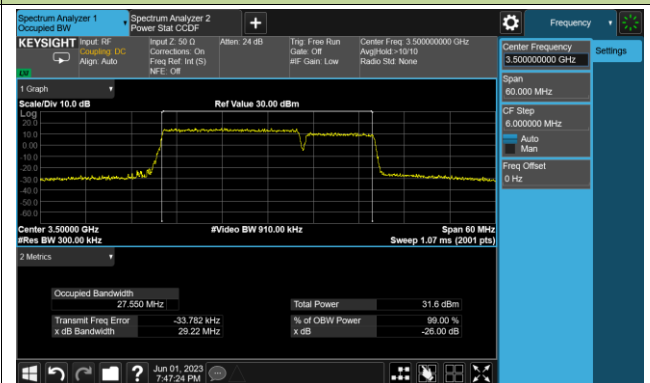
20+5MHz Channel Bandwidth



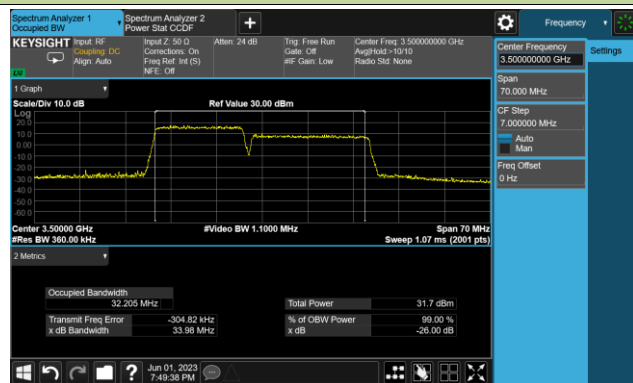
10+20MHz Channel Bandwidth



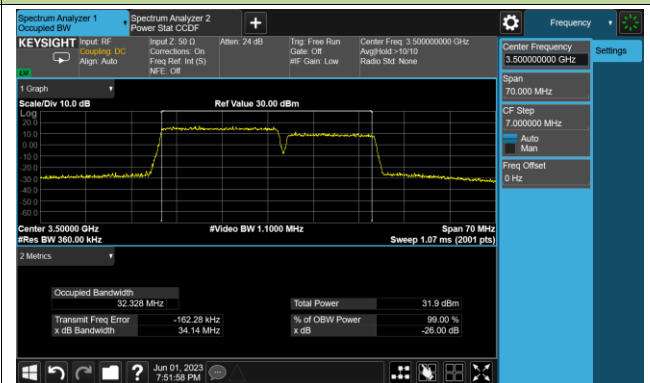
20+10MHz Channel Bandwidth



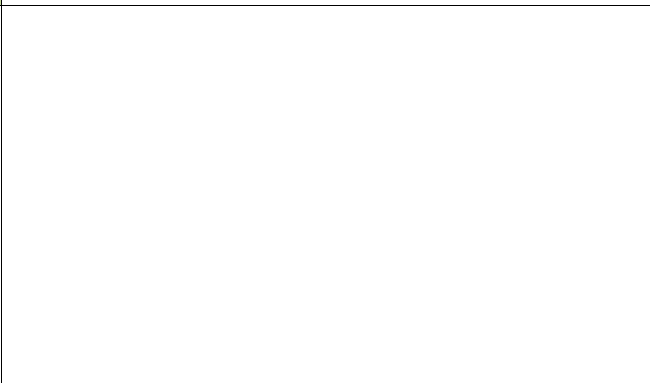
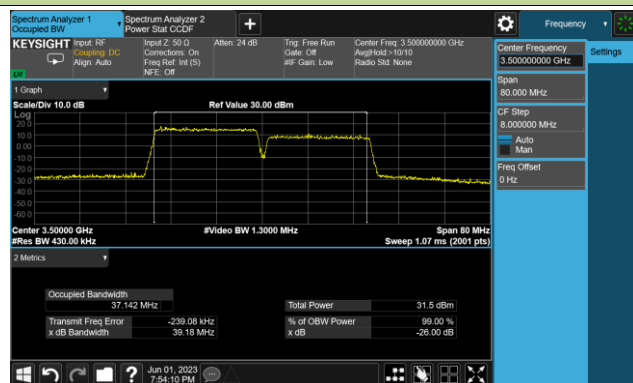
15+20MHz Channel Bandwidth



20+15MHz Channel Bandwidth

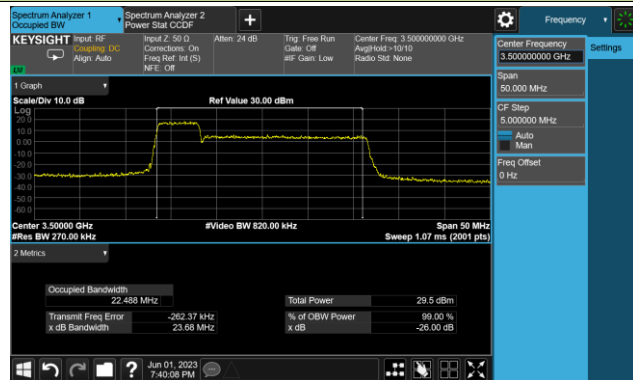


20+20MHz Channel Bandwidth

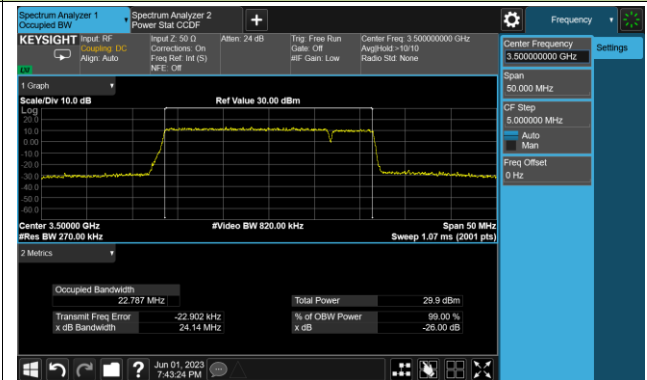


99% Bandwidth - 256QAM

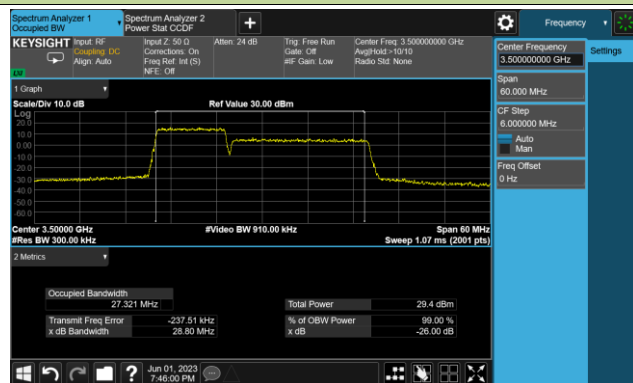
5+20MHz Channel Bandwidth



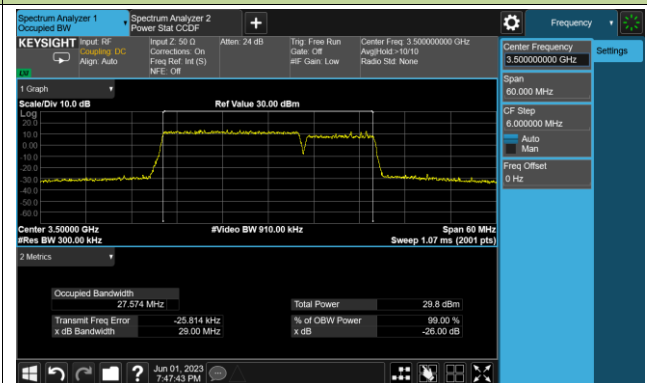
20+5MHz Channel Bandwidth



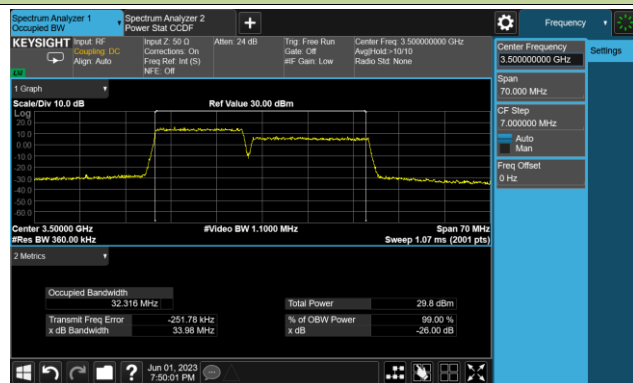
10+20MHz Channel Bandwidth



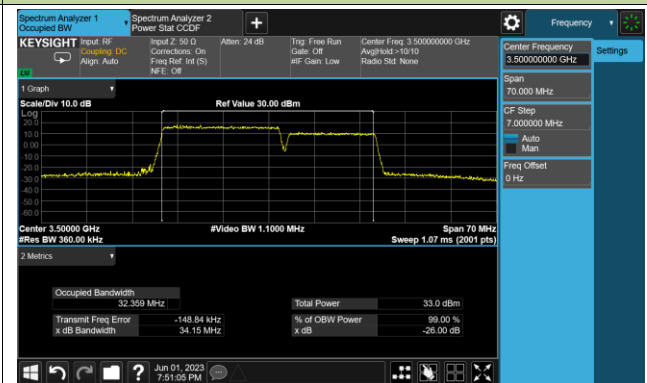
20+10MHz Channel Bandwidth



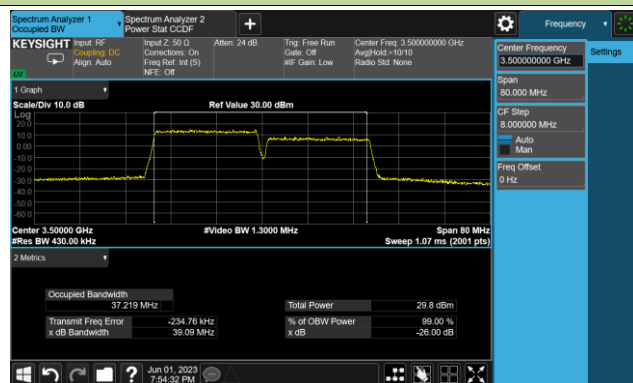
15+20MHz Channel Bandwidth



20+15MHz Channel Bandwidth



20+20MHz Channel Bandwidth



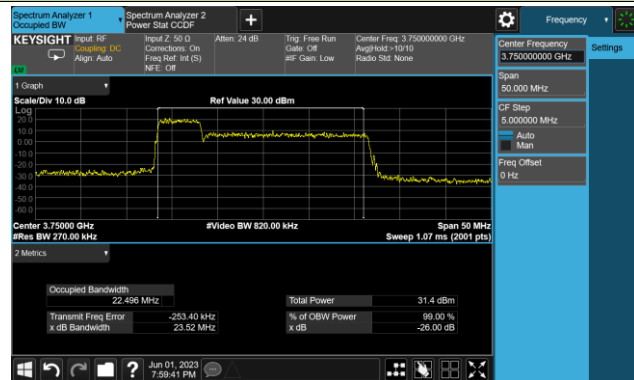
Test Site	SIP-SR1	Test Engineer	Sunshine Wan
Test Date	2023/06/01	Test Band	Intra-Band CA_43C

Modulation	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK	3740.8+3752.5	5+20	22.50
	3742.9+3754.9	10+15	22.86
	3740.6+3755.0	10+20	27.33
	3745.1+3757.1	15+10	22.87
	3742.5+3757.5	15+15	28.09
	3740.3+3757.4	15+20	32.33
	3747.5+3759.2	20+5	22.82
	3745.1+3759.5	20+10	27.65
	3742.6+3759.7	20+15	32.37
	3740.1+3759.9	20+20	37.17
16QAM	3740.8+3752.5	5+20	22.55
	3742.9+3754.9	10+15	23.01
	3740.6+3755.0	10+20	27.31
	3745.1+3757.1	15+10	22.90
	3742.5+3757.5	15+15	27.96
	3740.3+3757.4	15+20	32.37
	3747.5+3759.2	20+5	22.75
	3745.1+3759.5	20+10	27.49
	3742.6+3759.7	20+15	32.43
	3740.1+3759.9	20+20	37.09
64QAM	3740.8+3752.5	5+20	22.43
	3742.9+3754.9	10+15	22.81
	3740.6+3755.0	10+20	27.33
	3745.1+3757.1	15+10	22.94
	3742.5+3757.5	15+15	28.09
	3740.3+3757.4	15+20	32.26
	3747.5+3759.2	20+5	22.73
	3745.1+3759.5	20+10	27.57
	3742.6+3759.7	20+15	32.47
	3740.1+3759.9	20+20	37.10

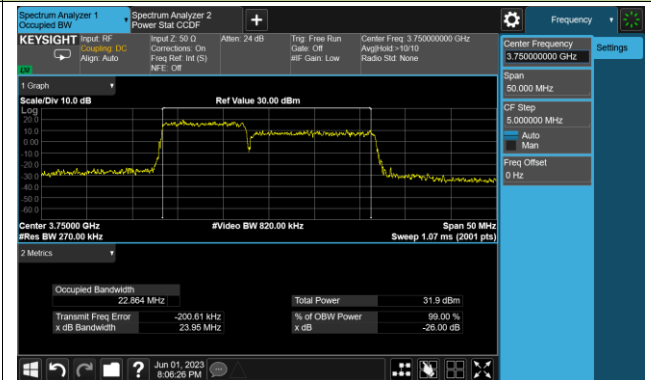
Modulation	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
256QAM	3740.8+3752.5	5+20	22.57
	3742.9+3754.9	10+15	22.86
	3740.6+3755.0	10+20	27.50
	3745.1+3757.1	15+10	22.87
	3742.5+3757.5	15+15	28.01
	3740.3+3757.4	15+20	32.35
	3747.5+3759.2	20+5	22.72
	3745.1+3759.5	20+10	27.59
	3742.6+3759.7	20+15	32.36
	3740.1+3759.9	20+20	37.28

99% Bandwidth - QPSK

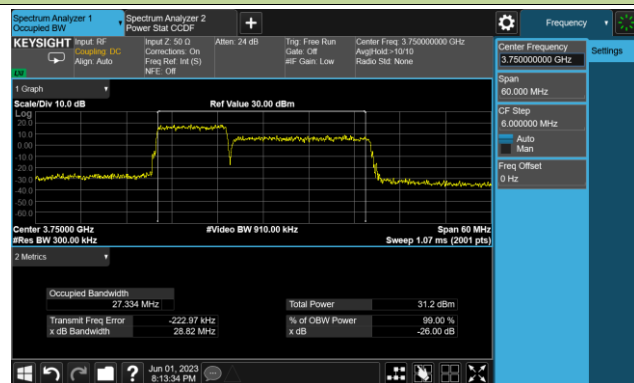
5+20MHz Channel Bandwidth



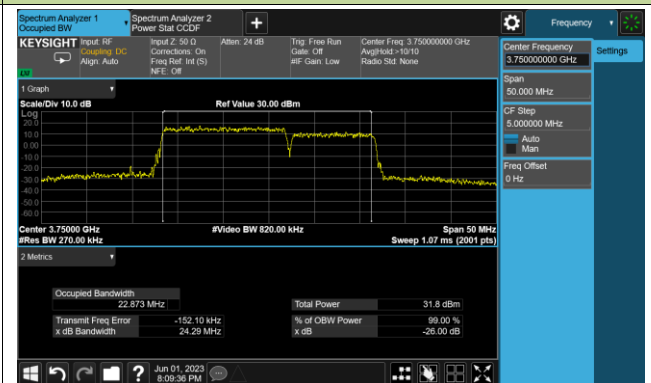
10+15MHz Channel Bandwidth



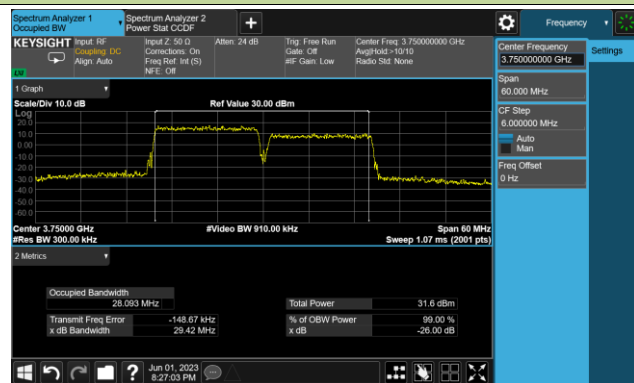
10+20MHz Channel Bandwidth



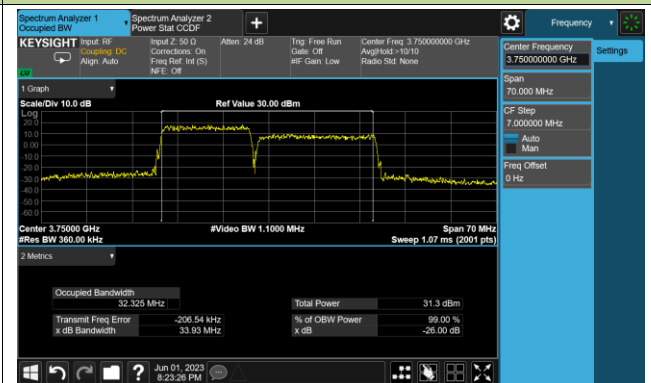
15+10MHz Channel Bandwidth

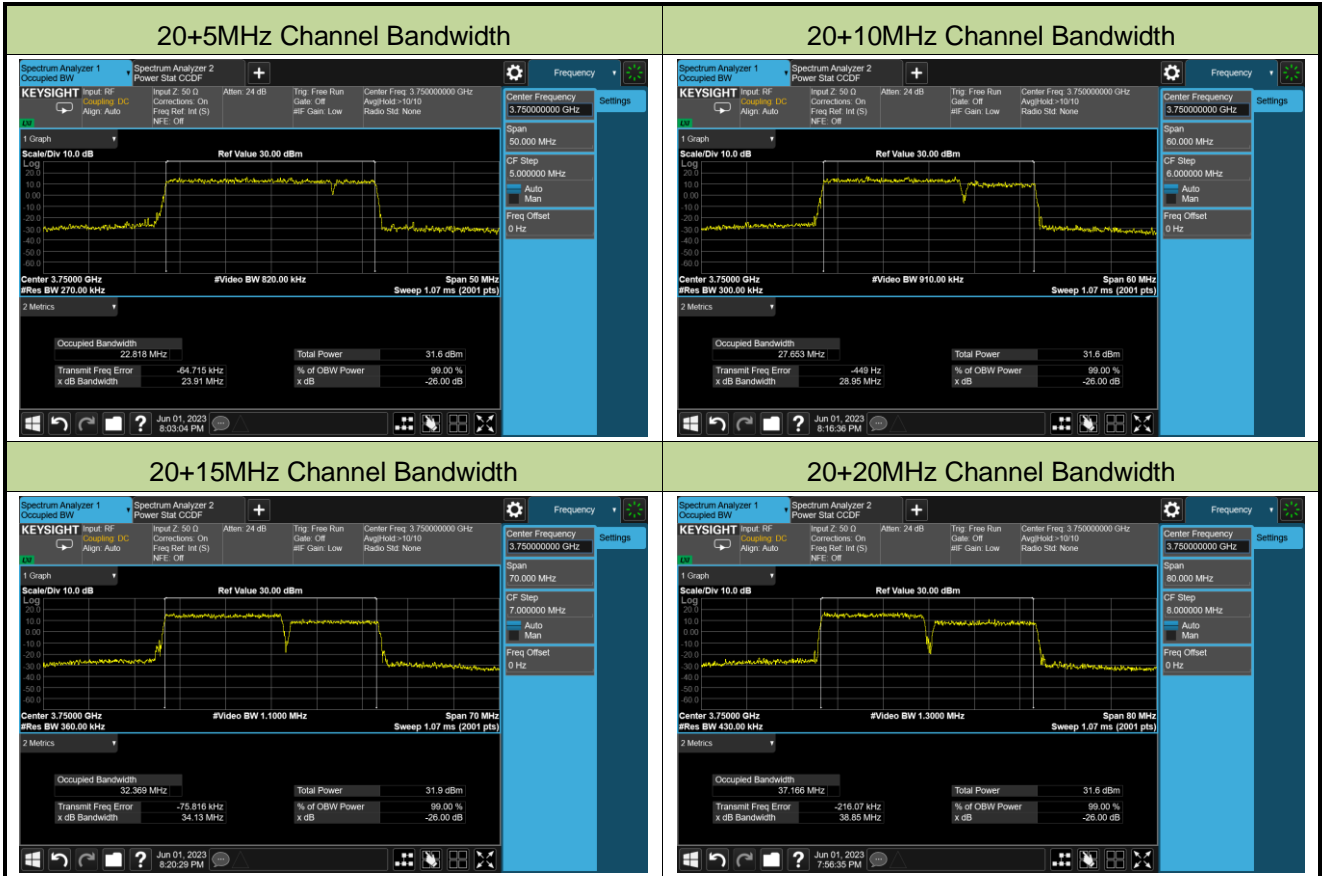


15+15MHz Channel Bandwidth



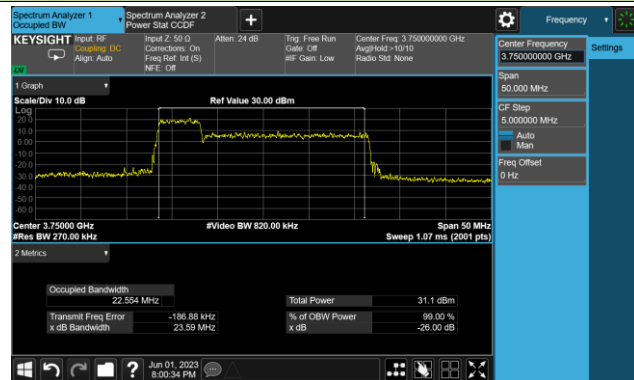
15+20MHz Channel Bandwidth



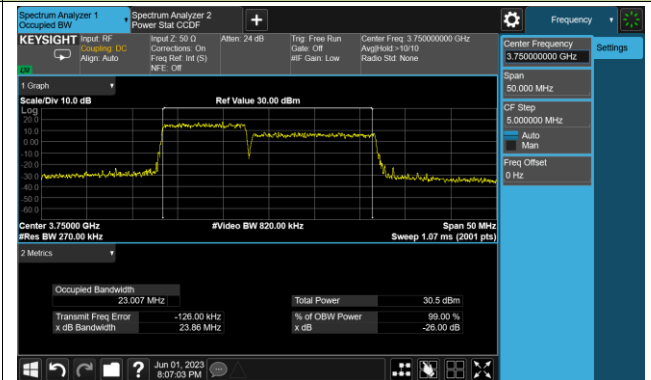


99% Bandwidth - 16QAM

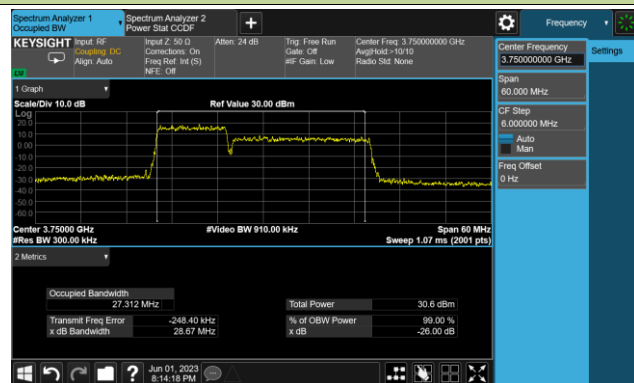
5+20MHz Channel Bandwidth



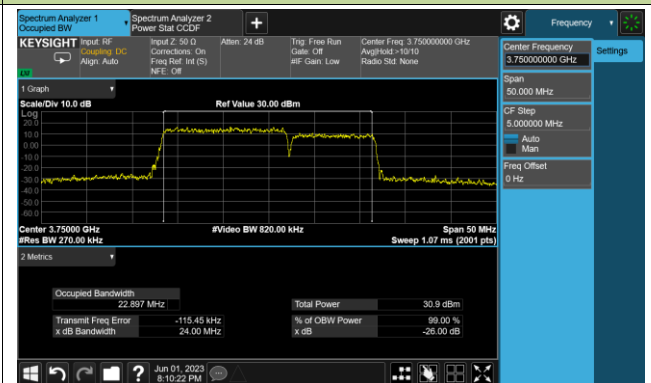
10+15MHz Channel Bandwidth



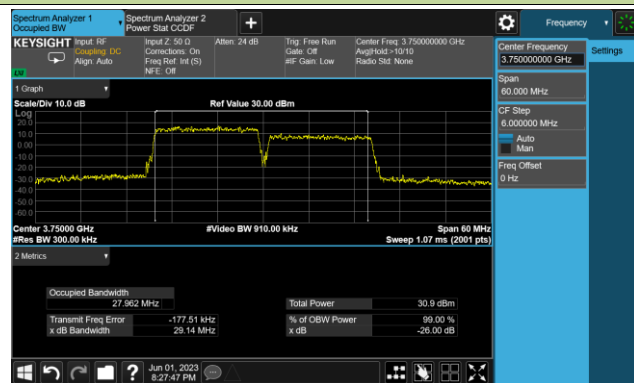
10+20MHz Channel Bandwidth



15+10MHz Channel Bandwidth



15+15MHz Channel Bandwidth



15+20MHz Channel Bandwidth

