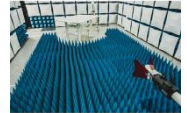




Element Materials Technology

(formerly PCTEST)
18855 Adams Court, Morgan Hill, CA 95037 USA
Tel. 408.538.5600
<http://www.element.com>



PART 27 MEASUREMENT REPORT

Applicant Name:

Apple Inc.
One Apple Park Way
Cupertino, CA 95014
United States

Date of Testing:

01/17/2025 - 07/31/2025

Test Report Issue Date:

8/3/2025

Test Site/Location:

Element Materials Technology, Morgan Hill, CA, USA

Test Report Serial No.:

1C2503270029-06.BCG

FCC ID:

BCG-A3281

Applicant Name:

Apple Inc.

Application Type:

Certification

Model:

A3281, A3282

EUT Type:

Watch

FCC Classification:

PCS Licensed Transmitter Worn on Body (PCT)

FCC Rule Part:

27

Test Procedure(s):

ANSI C63.26-2015, TIA-603-E-2016, KDB 971168 D01
v03r01

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 §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RJ Ortanez
Executive Vice President




FCC ID: BCG-A3281	PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2503270029-06.BCG	Test Dates: 01/17/2025 - 07/31/2025	EUT Type: Watch
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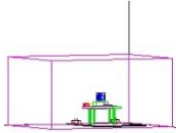
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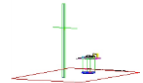
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PART 27 MEASUREMENT REPORT



Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	OBW [MHz]	EIRP		Emission Designator
					Max. Power [mW]	Max. Power [dBm]	
LTE Band 7	5 MHz	QPSK	2502.5 - 2567.5	4.5472	218.776	23.40	4M55G7W
		16QAM	2502.5 - 2567.5	4.5211	178.649	22.52	4M52D7W
	10 MHz	QPSK	2505 - 2565	9.0219	225.944	23.54	9M02G7W
		16QAM	2505 - 2565	5.1034	178.238	22.51	5M10D7W
	15 MHz	QPSK	2507.5 - 2562.5	13.5220	226.464	23.55	13M5G7W
		16QAM	2507.5 - 2562.5	5.3740	175.792	22.45	5M37D7W
	20 MHz	QPSK	2510 - 2560	18.0170	223.872	23.50	18M0G7W
		16QAM	2510 - 2560	5.5725	180.717	22.57	5M57D7W
LTE Band 41(PC3)	5 MHz	QPSK	2498.5 - 2687.5	4.5418	212.814	23.28	4M54G7W
		16QAM	2498.5 - 2687.5	4.5222	169.824	22.30	4M52D7W
	10 MHz	QPSK	2501 - 2685	9.0654	212.814	23.28	9M07G7W
		16QAM	2501 - 2685	5.0814	167.109	22.23	5M08D7W
	15 MHz	QPSK	2503.5 - 2682.5	13.5760	212.814	23.28	13M6G7W
		16QAM	2503.5 - 2682.5	5.3876	170.608	22.32	5M39D7W
	20 MHz	QPSK	2506 - 2680	18.0670	212.814	23.28	18M1G7W
		16QAM	2506 - 2680	5.7439	169.044	22.28	5M74D7W
NR Band n7	5MHz	TT/2 BPSK	2502.5 - 2567.5	4.4787	222.331	23.47	4M48G7W
		QPSK	2502.5 - 2567.5	4.4780	226.464	23.55	4M48G7W
		16QAM	2502.5 - 2567.5	4.4754	179.061	22.53	4M48D7W
		64QAM	2502.5 - 2567.5	4.4892	141.906	21.52	4M49D7W
	10MHz	TT/2 BPSK	2505 - 2565	8.9691	226.464	23.55	8M97G7W
		QPSK	2505 - 2565	9.2706	225.424	23.53	9M27G7W
		16QAM	2505 - 2565	9.2985	179.887	22.55	9M30D7W
		64QAM	2505 - 2565	8.9160	142.561	21.54	8M92D7W
	15 MHz	TT/2 BPSK	2507.5 - 2562.5	13.4380	226.464	23.55	13M4G7W
		QPSK	2507.5 - 2562.5	14.1110	224.905	23.52	14M1G7W
		16QAM	2507.5 - 2562.5	14.1070	178.649	22.52	14M1D7W
		64QAM	2507.5 - 2562.5	13.4030	138.676	21.42	13M4D7W
	20MHz	TT/2 BPSK	2510 - 2560	17.9390	226.464	23.55	17M9G7W
		QPSK	2510 - 2560	19.0530	225.944	23.54	19M1G7W
		16QAM	2510 - 2560	18.9030	175.792	22.45	18M9D7W
		64QAM	2510 - 2560	19.0690	141.254	21.50	19M1D7W
NR Band n41 (PC3)	10MHz	TT/2 BPSK	2501 - 2685	8.5722	211.836	23.26	8M57G7W
		QPSK	2501 - 2685	8.5556	212.814	23.28	8M56G7W
		16QAM	2501 - 2685	8.6107	164.816	22.17	8M61D7W
		64QAM	2501 - 2685	8.6196	132.434	21.22	8M62D7W
	15 MHz	TT/2 BPSK	2503.5 - 2682.5	12.8830	212.814	23.28	12M9G7W
		QPSK	2503.5 - 2682.5	13.6210	210.863	23.24	13M6G7W
		16QAM	2503.5 - 2682.5	13.6230	172.584	22.37	13M6D7W
		64QAM	2503.5 - 2682.5	13.5710	135.519	21.32	13M6D7W
	20MHz	TT/2 BPSK	2506 - 2680	17.9380	209.894	23.22	17M9G7W
		QPSK	2506 - 2680	18.2290	212.814	23.28	18M2G7W
		16QAM	2506 - 2680	18.2150	167.494	22.24	18M2D7W
		64QAM	2506 - 2680	18.2930	133.660	21.26	18M3D7W

EUT Overview

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.


1.2 Element Materials Technology Test Location

These measurement tests were conducted at the Element Materials Technology facility located at 18855 Adams Court, Morgan Hill, CA 95037. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014 and KDB 414788 D01 v01r01.

1.3 Test Facility / Accreditations

Measurements were performed at Element Materials Technology located in Morgan Hill, CA 95037, U.S.A.

- Element Materials Technology is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.02 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- Element Washington DC LLC TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- Element Materials Technology facility is a registered (22831) test laboratory with the site description on file with ISED.
- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Agreements (MRAs).

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Watch FCC ID:BCG-A3281**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 27.

Test Device Serial No.: FN6HG1000GN0000VL1, FN6HG1000DF0000VL1, W7Y9YP320W, YMHWMV7H7D, T262Q5T4CQ

2.2 Device Capabilities

This device contains the following capabilities:


Multi-band LTE, 5G NR (FR1), 802.11b/g/n WLAN, 802.11a/n UNII, 802.15.4ab-NB, Bluetooth (1x, EDR, HDR4, HDR8, LE1M, LE2M), NFC, UWB, 60.5GHz Transmitter, Mobile Satellite Service (MSS).

This device supports simultaneous transmission operations, which allows for multiple transmitters to transmit simultaneously on the same antenna. The table below shows all configurations possible.

Simultaneous Tx Config	Antenna FCM					
	WLAN	Bluetooth	802.15.4ab - NB	LTE/FR1	UNII	UWB
	802.11b/g/n	BDR, EDR, HDR4/8, LE1/2M	O-QPSK	Mid/High Band	802.11a/n	Ch.5/Ch.9
Config 1	✓	✗	✗	✓	✗	✓
Config 2	✗	✓	✗	✓	✗	✓
Config 3	✗	✓	✓	✓	✗	✗
Config 4	✓	✗	✓	✓	✗	✗
Config 5	✗	✓	✗	✓	✓	✗
Config 6	✗	✓	✗	✓	✗	✓
Config 7	✓	✗	✗	✓	✗	✗
Config 8	✓	✗	✓	✗	✗	✗
Config 9	✓	✗	✗	✗	✗	✓
Config 10	✗	✓	✗	✗	✓	✗
Config 11	✗	✓	✗	✓	✗	✗
Config 12	✗	✓	✓	✗	✗	✗
Config 13	✗	✓	✗	✗	✗	✓
Config 14	✗	✗	✓	✓	✗	✗
Config 15	✗	✗	✗	✓	✓	✗
Config 16	✗	✗	✗	✓	✗	✓

Table 2-1. Simultaneous Transmission Configurations

✓ = Support; ✗ = Not Support

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2.3 Antenna Description

Following antenna gains provided by manufacturer were used for testing.


Frequency [MHz]	Antenna Gain [dBi]
	Antenna FCM
LTE Band 41	-1.92
NR Band n41	-1.92
LTE Band 7	-1.65
NR Band n7	-1.65

Table 2-2. Highest Antenna Gain

2.4 Test Support Equipment

1	Apple Macbook	Model:	A1398	S/N:	FVFDHG8TP3XY
	w/AC/DC Adapter	Model:	A1435	S/N:	N/A
2	Apple USB-C cable	Model:	N/A	S/N:	N/A
	w/ Charging Dock	Model:	A2921	S/N:	DQ8137601MY08V22F
	w/ Cradle	Model:	N/A	S/N:	CYV142700BEE1EN01MP1P
3	Apple Magnetic Charger	Model:	A2515	S/N:	DLC313306ZQ1NR1A7
	Apple Magnetic Charger	Model:	A2879	S/N:	DLCH5T0012A00000WB
4	Pathfinder Davenport	Model:	920-15901-01	S/N:	DLCH640006H0000QA0
	SiP Socket	Model:	P2 N230 PF 238	S/N:	DLCHB60007Q0000Q45
5	DC Power Supply	Model:	KPS3010D	S/N:	N/A

Table 2-3. Test Support Equipment

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2.5 Test Configuration

The EUT was tested per the guidance of ANSI C63.26 2015, TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

The worst case configuration was investigated for the various types of wristbands, metal and non-metal wristbands. The EUT was also investigated with and without wireless charger. The worst case configuration found was used for all testing.

For emissions from 1GHz – 18GHz, low, mid, and high channels were tested with highest power and worst case configuration. The emissions below 1GHz were tested with the highest transmitting power and the worst case channel.

The EUT was manipulated through three orthogonal planes of X-orientation (flatbed), Y-orientation (landscape), and Z-orientation (portrait) during the testing. Only the worst case emissions were reported in this test report.

All possible simultaneous transmission configurations have been investigated and the worst case config has been reported.

This device only supports 27RBs or less for LTE 16-QAM uplink.

Description	Bluetooth	FR1 (Band n41)	UNII
Antenna	FCM	FCM	FCM
Channel	78	518598	36
Operating Frequency (MHz)	2480	2592.99	5180
Mode/Modulation	GFSK ePA	QPSK/1RB/10MHz	802.11n


Table 2-4. Worst Case Simultaneous Transmission Configuration

2.6 Software and Firmware

The test was conducted with firmware version watchOS 26 installed on the EUT.

2.7 EMI Suppression Device(s)/Modifications

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

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the documents titled “American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services” (ANSI C63.26-2015 and TIA-603-E-2016) and “Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems” (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

Deviation from Measurement Procedure.....None

3.2 Radiated Spurious Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

For radiated spurious emissions measurements and calculations, conversion method is used per the formulas in KDB 971168 Section 5.8.4. Field Strength (EIRP) is calculated using the following formulas:

$$E_{[dB\mu V/m]} = \text{Measured amplitude level}_{[dBm]} + 107 + \text{Cable Loss}_{[dB]} + \text{Antenna Factor}_{[dB/m]}$$


And

$$\text{EIRP}_{[dBm]} = E_{[dB\mu V/m]} + 20\log D - 104.8; \text{ where } D \text{ is the measurement distance in meters.}$$

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014.

Per KDB 414788 D01 v01r01, radiated emission test sites other than open-field test sites (e.g., shielded anechoic chambers), may be employed for emission measurements below 30MHz if characterized so that the measurements correspond to those obtained at an open-field test site. To determine test site equivalency, a reference sample transmitting at 149kHz was measured on an open field test site (asphalt with no ground plane) and then measured in the 3m semi-anechoic chamber. A calibrated 60cm loop antenna was used while the reference device was rotated through the X, Y and Z axis in order to capture the worst case level. A maximum deviation of 2.77dB at 149kHz was measured when comparing the 3 meter semi-anechoic chamber to the open field site.

Radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI C63.26-2015 and TIA-603-E-2016.


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4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.23-2012. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (\pm dB)
Conducted Bench Top Measurements	2.07
Radiated Disturbance (<30MHz)	4.12
Radiated Disturbance (30MHz-1GHz)	4.85
Radiated Disturbance (1-18GHz)	5.08
Radiated Disturbance (>18GHz)	5.22

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5.0 TEST EQUIPMENT CALIBRATION DATA


Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent Technologies	N9030A	3Hz-26.5GHz PXA Signal Analyzer	10/31/2024	Annual	10/31/2025	MY55330128
ATM	180-442-KF	20dB Nominal Gain Horn Antenna	3/24/2025	Annual	3/24/2026	T058601-02
ESPEC	SU-241	Tabletop Temperature Chamber	10/24/2024	Annual	10/24/2025	92009574
ETS-Lindgren	3117	Double Ridged Guide Antenna (1-18 GHz)	9/25/2024	Annual	9/25/2025	240109
Fairview Microwave	FMCA1975-36	30MHz-40GHz Conducted Cable *	6/17/2025	Annual	6/17/2026	-
Fairview Microwave	M2CP1122-10	30MHz-40GHz Conducted Coupler *	6/17/2025	Annual	6/17/2026	1946
Keysight Technology	N9040B	UXA Signal Analyzer	6/9/2025	Annual	6/9/2026	MY57212015
MCL	BW-K10-2W44+	Attenuator *	6/17/2025	Annual	6/17/2026	-
Rohde & Schwarz	ESW44	EMI Test Receiver	10/17/2024	Annual	10/17/2025	101668
Rohde & Schwarz	FSV40	Signal Analyzer (10Hz-40GHz)	5/20/2025	Annual	5/20/2026	101619
Rohde & Schwarz	FSW67	Signal and Spectrum Analyzer (2Hz-67GHz)	1/7/2025	Annual	1/7/2026	101366
Rohde & Schwarz	TS-PR18	Pre-Amplifier (1GHz - 18GHz)	8/14/2024	Annual	8/14/2025	101648
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	12/10/2024	Annual	12/10/2025	161616
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	3/4/2025	Annual	3/4/2026	164715
Rohde & Schwarz	HFH2-Z2	Loop Antenna	5/12/2025	Annual	5/12/2026	100546
Rohde & Schwarz	HFH2-Z2	Loop Antenna	6/26/2025	Annual	6/26/2026	100519
Rohde & Schwarz	TS-PR1840	Pre-Amplifier (18GHz - 40GHz)	6/3/2025	Annual	6/3/2026	100052
Rohde & Schwarz	TS-PR8	Pre-Amplifier (30MHz - 8GHz)	11/15/2024	Annual	11/15/2025	102326
Schwarzbeck	VULB 9162	Bilog Antenna (30MHz - 6GHz)	9/18/2024	Annual	9/18/2025	358

Table 5-1. Test Equipment

Notes:

- For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
- * denotes passive equipment that have been internally verified/calibrated.

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6.0 SAMPLE CALCULATIONS

Emission Designator

$\pi/2$ BPSK / QPSK Modulation

Emission Designator = 8M62G7W

BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

W = Combination of Any

QAM Modulation

Emission Designator = 8M45D7W

BW = 8.45 MHz

D = Amplitude/Angle Modulated


7 = Quantized/Digital Info

W = Combination of Any

Spurious Radiated Emission

Example: Spurious emission at 3700.40 MHz

The receive spectrum analyzer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 3700.40 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.50 dBm so this harmonic was 25.50 dBm $- (-24.80) = 50.3$ dBc.

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7.0 TEST RESULTS

7.1 Summary

Company Name: Apple Inc.
 FCC ID: BCG-A3281
 FCC Classification: PCS Licensed Transmitter Worn on Body (PCT)
 Mode(s): LTE/NR

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Occupied Bandwidth	2.1049	N/A	N/A	Section 7.2
	Conducted Band Edge / Spurious Emissions (LTE Band 7)	2.1051, 27.53(m)	Undesirable emissions must meet the limits detailed in 27.53(m)	PASS	Sections 7.3, 7.4
	Conducted Band Edge / Spurious Emissions (LTE Band 41)			PASS	Sections 7.3, 7.4
	Conducted Band Edge / Spurious Emissions (NR Band n41)			PASS	Sections 7.3, 7.4
	Transmitter Conducted Output Power	2.1046	N/A	N/A	See RF Exposure Report
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 7)	27.50(h)(2)	< 2 Watts max. EIRP	PASS	Section 7.5
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 41)			PASS	Section 7.5
	Effective Radiated Power / Equivalent Isotropic Radiated Power (NR Band n41)			PASS	Section 7.5
	Frequency Stability	2.1055, 27.54	Fundamental emissions stay within authorized frequency block over the temperature and voltage range as tested	PASS	Section 7.7
RADIATED	Radiated Spurious Emissions (LTE Band 7)	2.1053, 27.53(m)	Undesirable emissions must meet the limits detailed in 27.53(m)	PASS	Section 7.6
	Radiated Spurious Emissions (LTE Band 41)			PASS	Section 7.6
	Radiated Spurious Emissions (NR Band n41)			PASS	Section 7.6


Table 7-1. Summary of Test Results

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Notes:

1. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2. The analyzer plots were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
3. All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
4. All conducted emissions measurements are performed with automated test software to capture the corresponding plots necessary to show compliance. The measurement software utilized was Element EMC Software Tool v1.1.
5. For radiated emissions measurements, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is Element "Chamber Automation," Version 3.4.2.

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7.2 Occupied Bandwidth

\$2.1049

Test Overview


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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 4.2

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

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Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

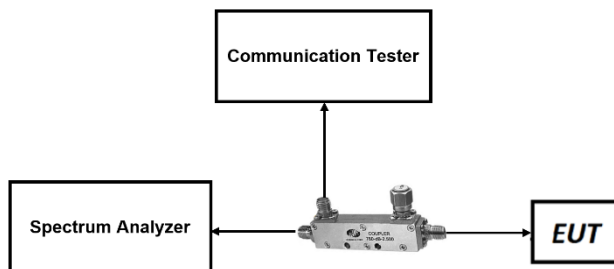


Figure 7-1. LTE Test Instrument & Measurement Setup

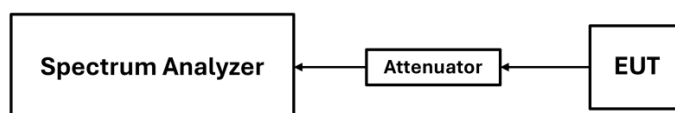



Figure 7-2. FR1 Test Instrument & Measurement Setup

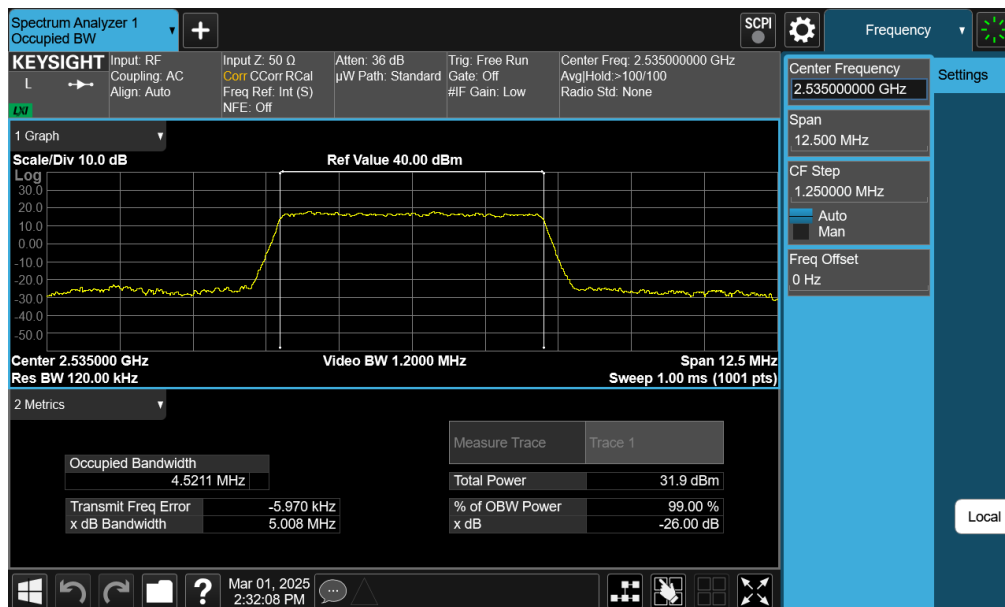
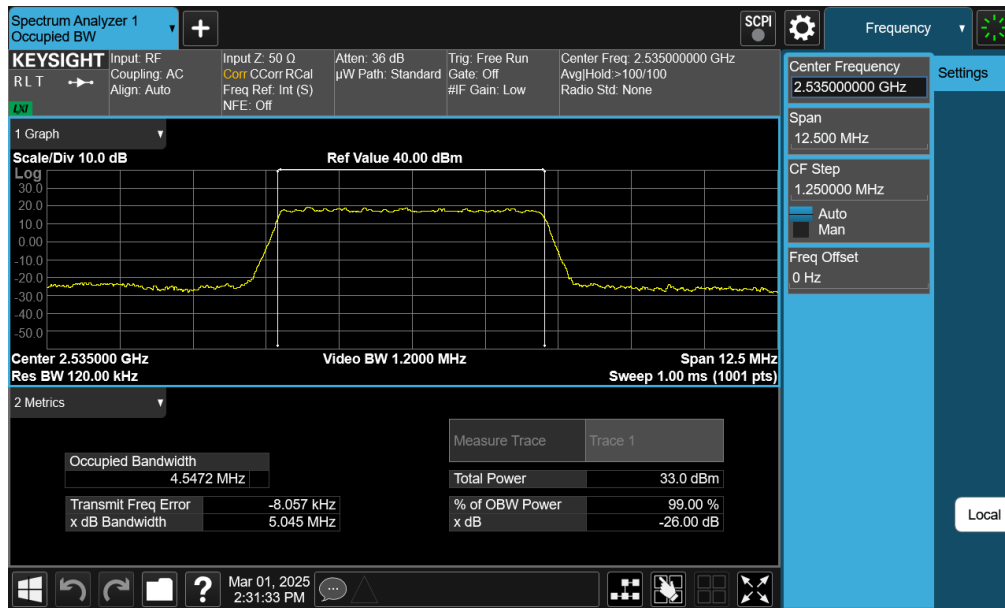
Test Notes


1. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

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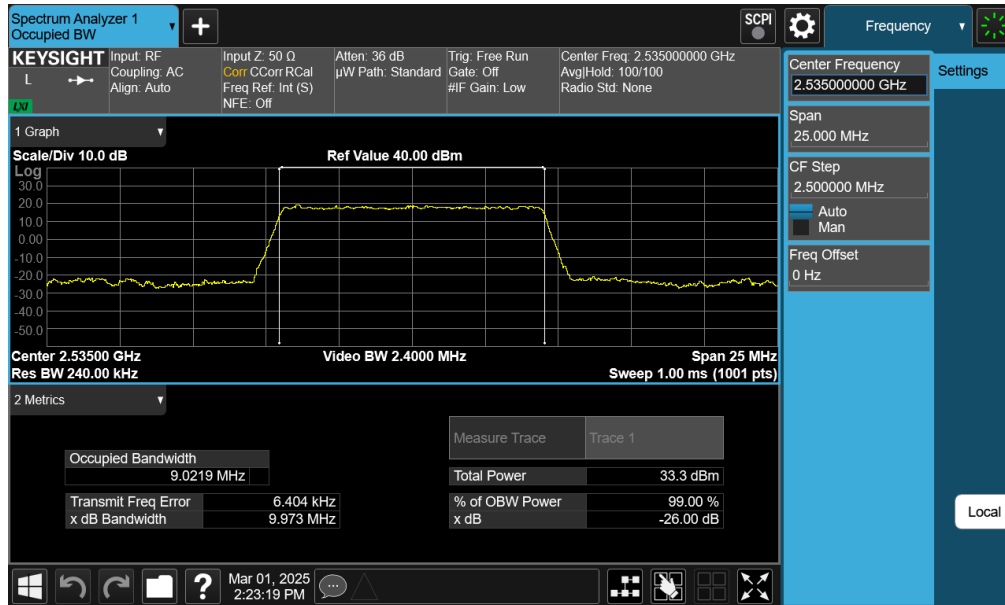
LTE Band 7



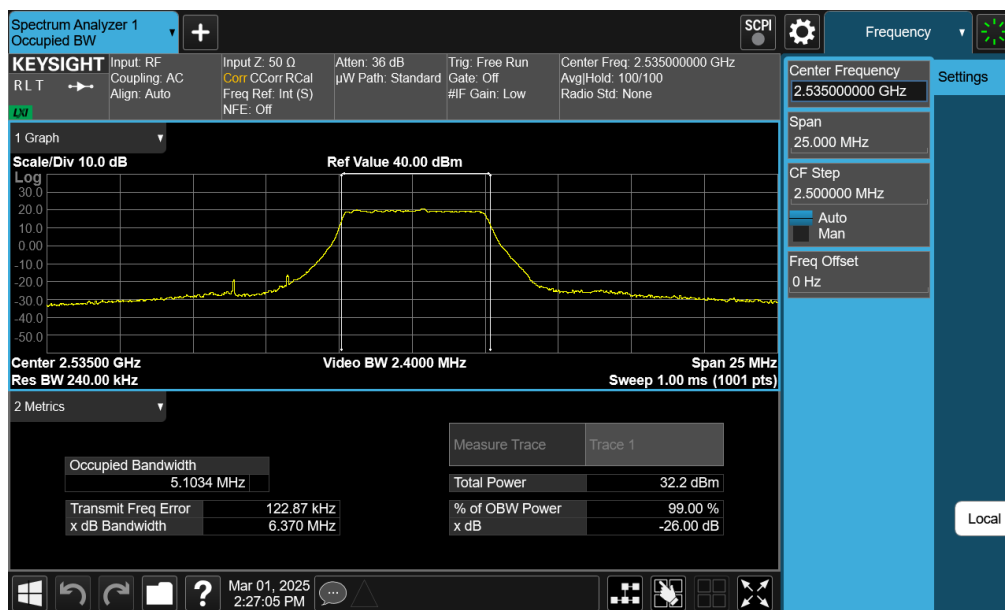
FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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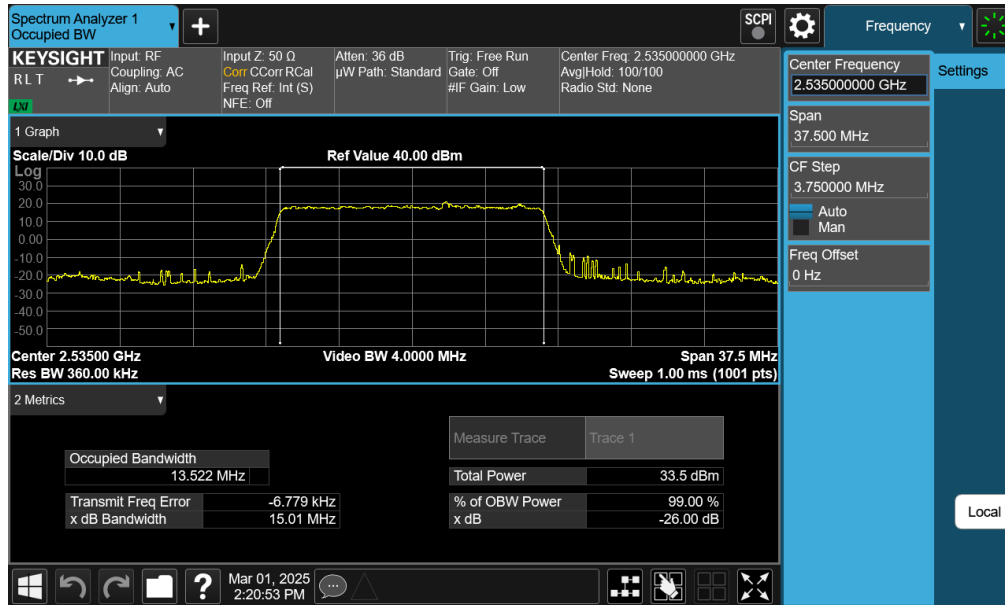


Plot 7-3. Occupied Bandwidth Plot (LTE Band 7 - 10MHz QPSK - Full RB)

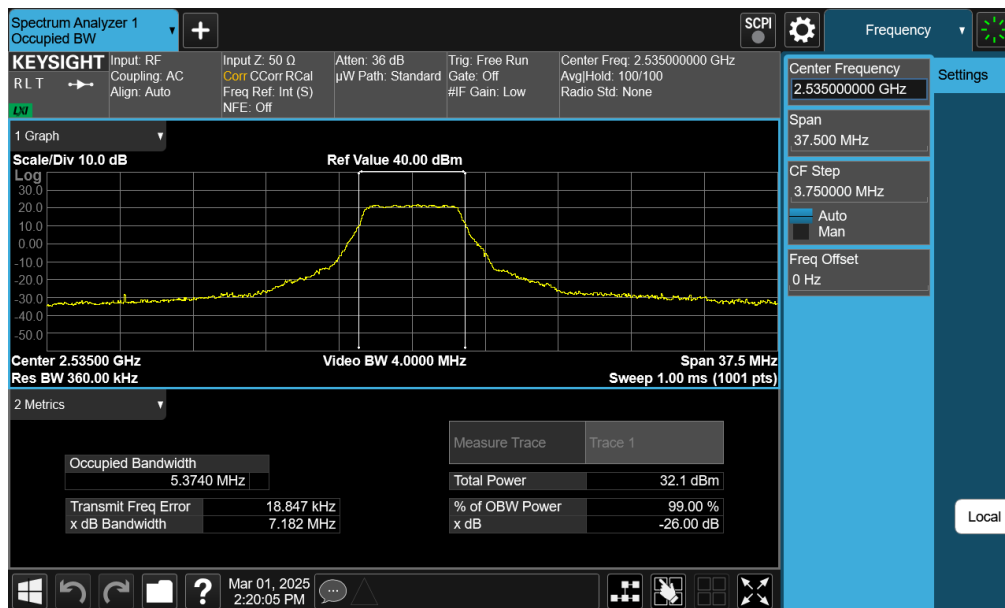


Plot 7-4. Occupied Bandwidth Plot (LTE Band 7 - 10MHz 16-QAM - Full RB)

FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-5. Occupied Bandwidth Plot (LTE Band 7 - 15MHz QPSK - Full RB)

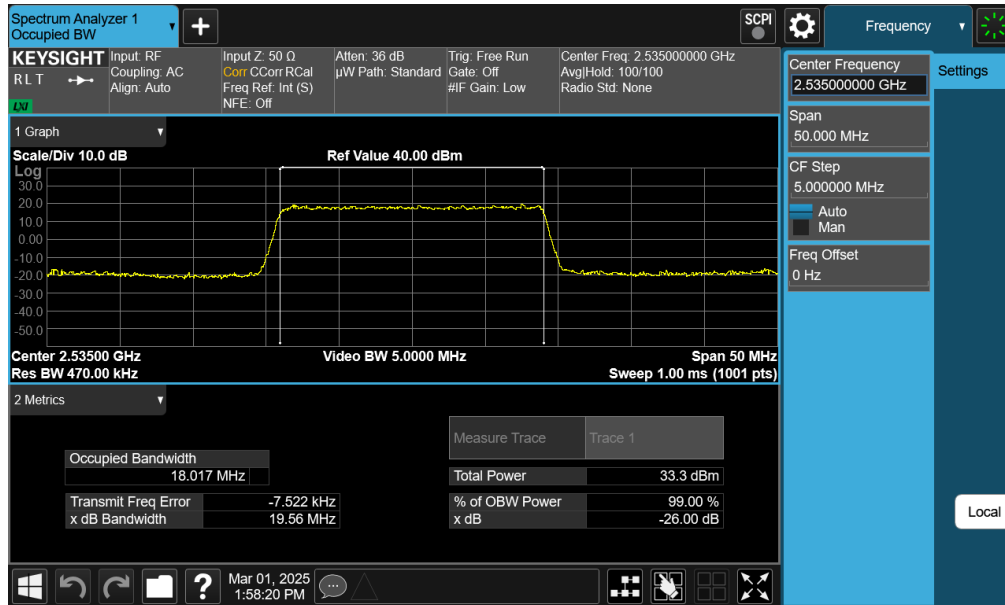


Plot 7-6. Occupied Bandwidth Plot (LTE Band 7 - 15MHz 16-QAM - Full RB)

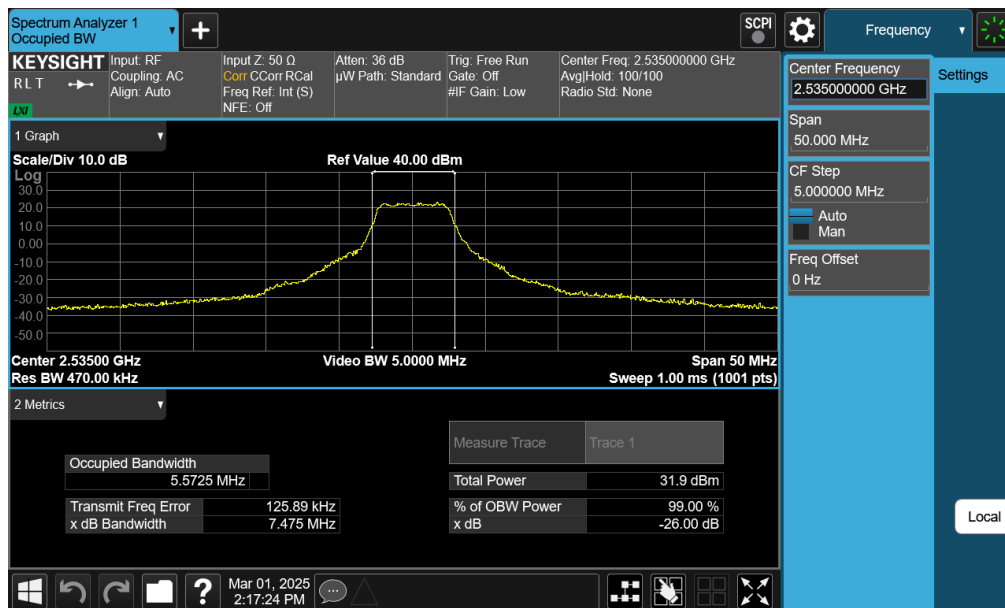
FCC ID: BCG-A3281	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-7. Occupied Bandwidth Plot (LTE Band 7 - 20MHz QPSK - Full RB)



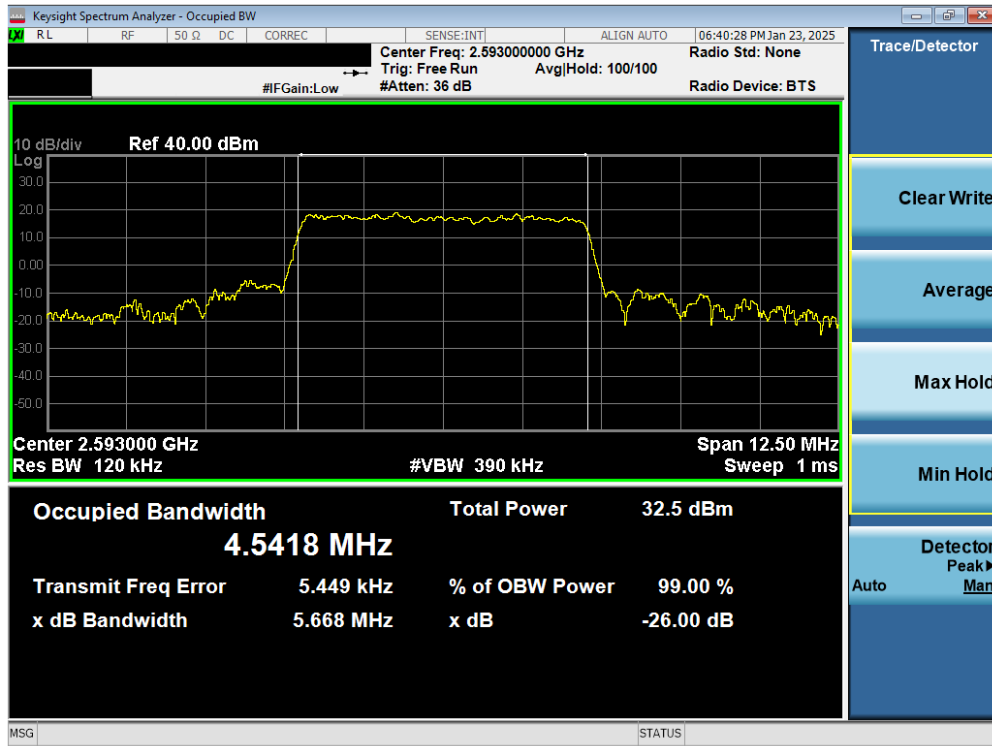
Plot 7-8. Occupied Bandwidth Plot (LTE Band 7 - 20MHz 16-QAM - Full RB)

FCC ID: BCG-A3281	<p>element</p> <p>PART 27 MEASUREMENT REPORT</p>		Approved by: Technical Manager
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LTE Band 41



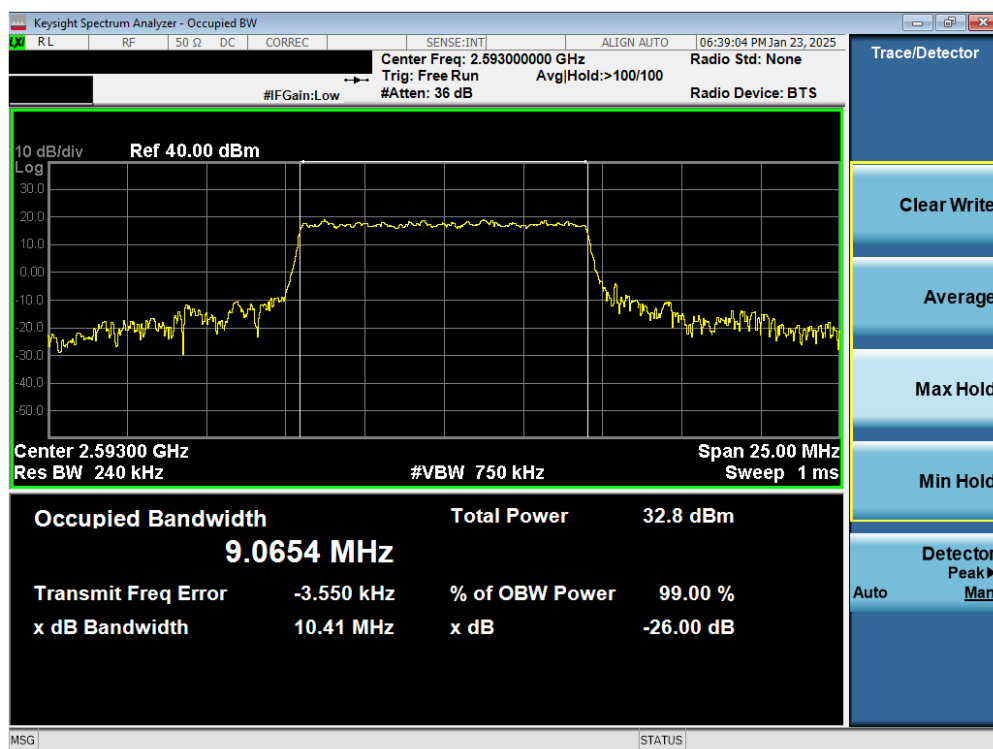
Plot 7-9. Occupied Bandwidth Plot (LTE Band 41 - 5MHz QPSK - Full RB)



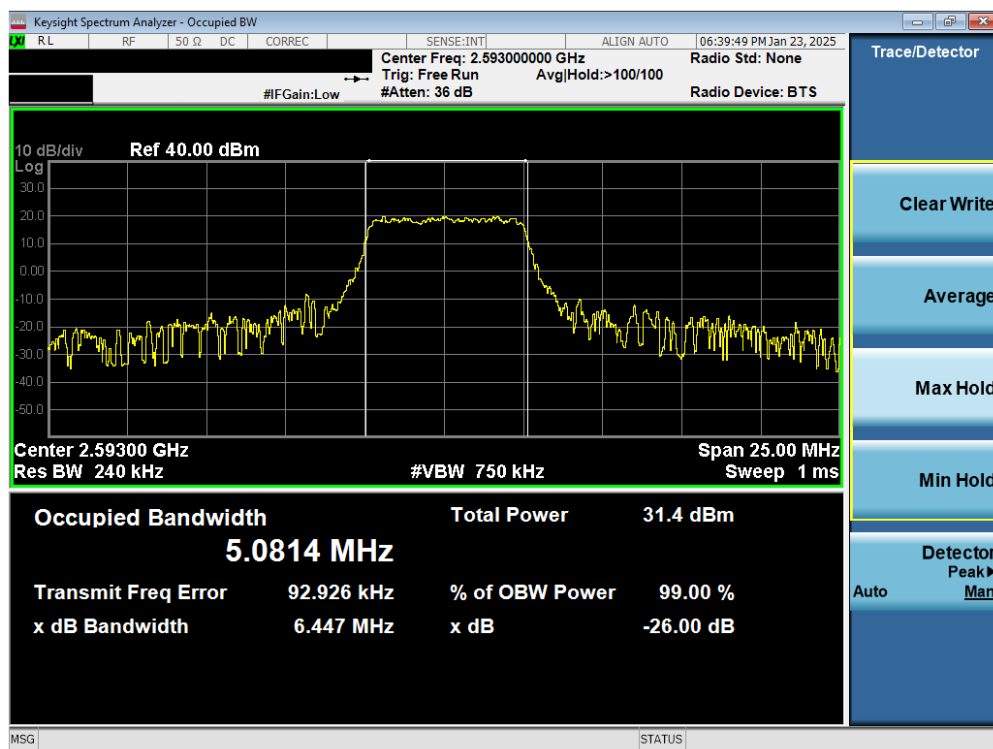
Plot 7-10. Occupied Bandwidth Plot (LTE Band 41 - 5MHz 16-QAM - Full RB)

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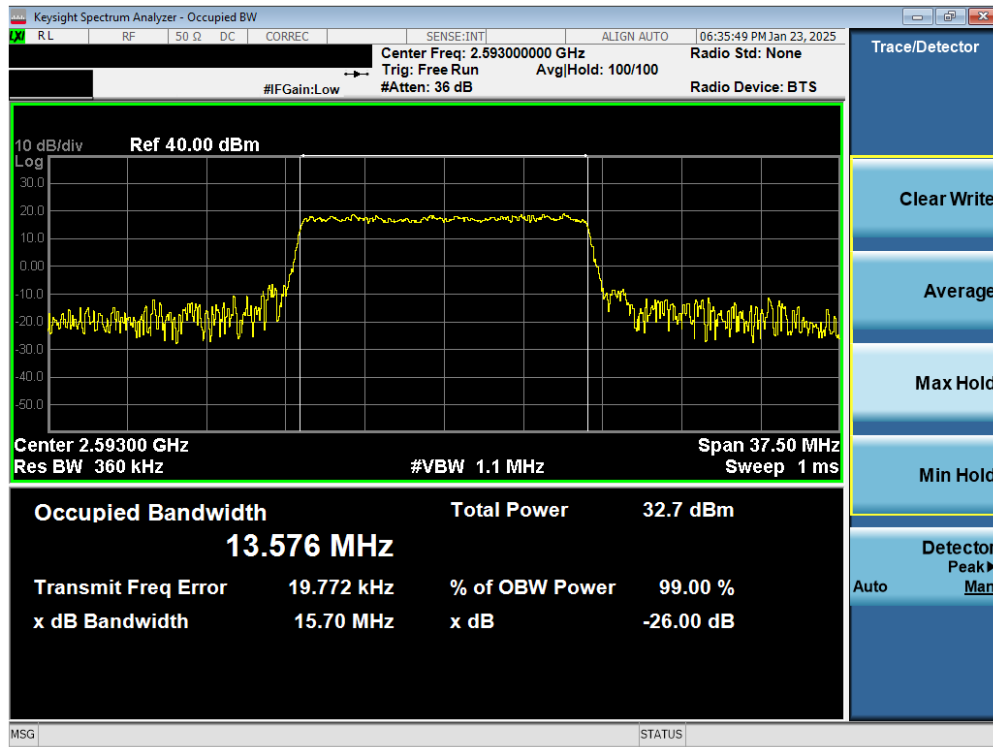
Plot 7-11. Occupied Bandwidth Plot (LTE Band 41 - 10MHz QPSK - Full RB)



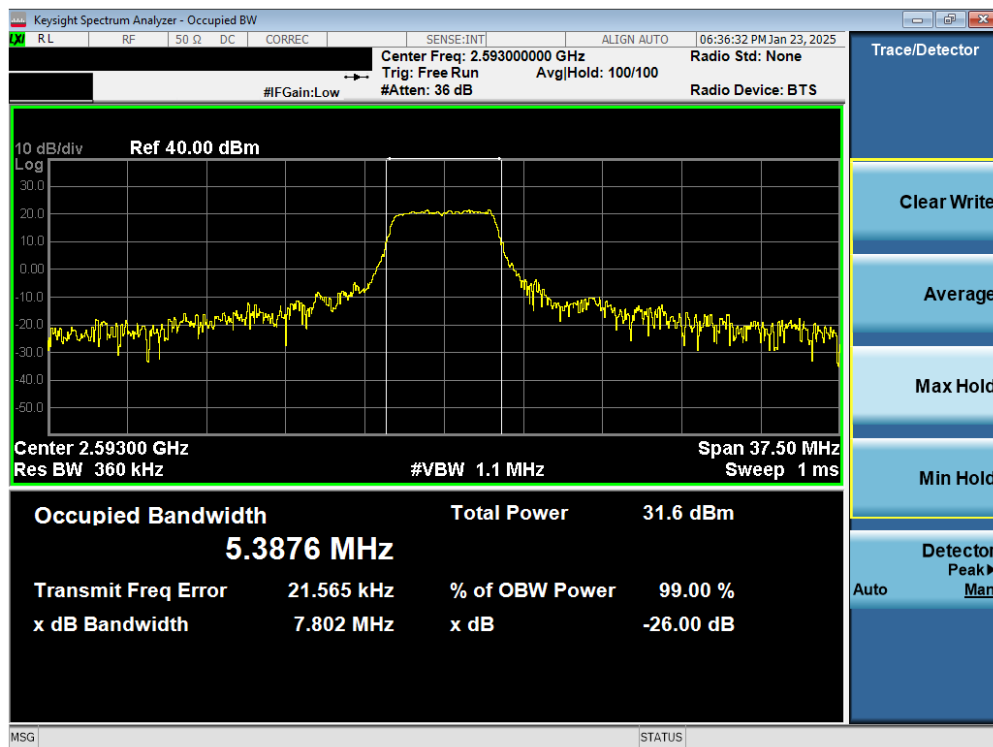
Plot 7-12. Occupied Bandwidth Plot (LTE Band 41 - 10MHz 16-QAM - Full RB)

FCC ID: BCG-A3281	element	PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
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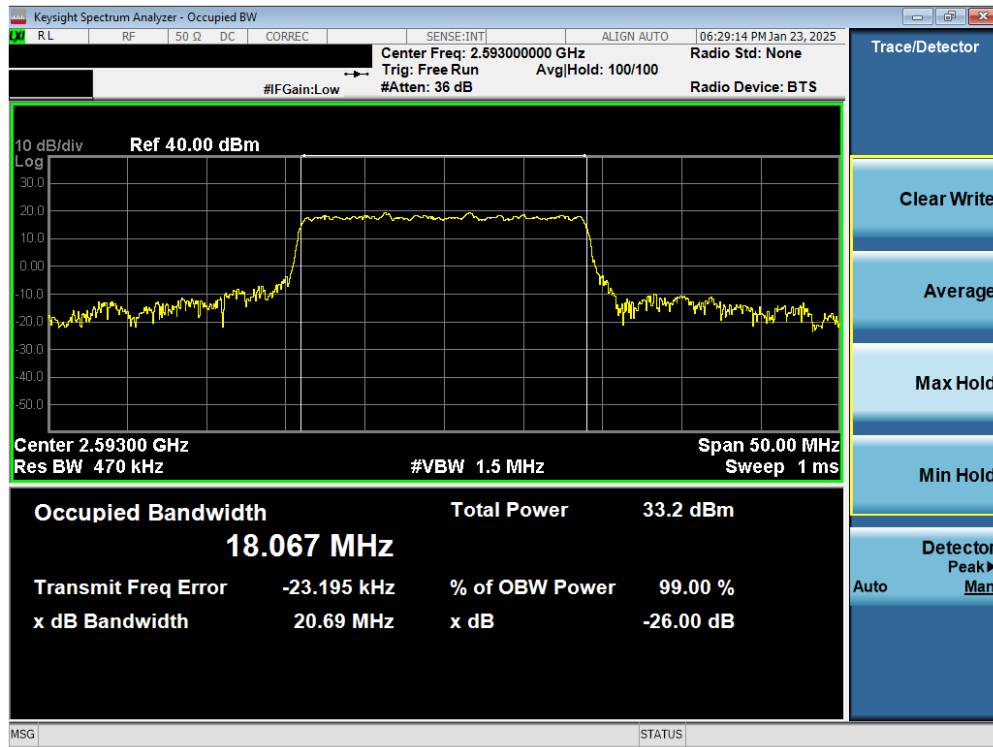
Plot 7-13. Occupied Bandwidth Plot (LTE Band 41 - 15MHz QPSK - Full RB)



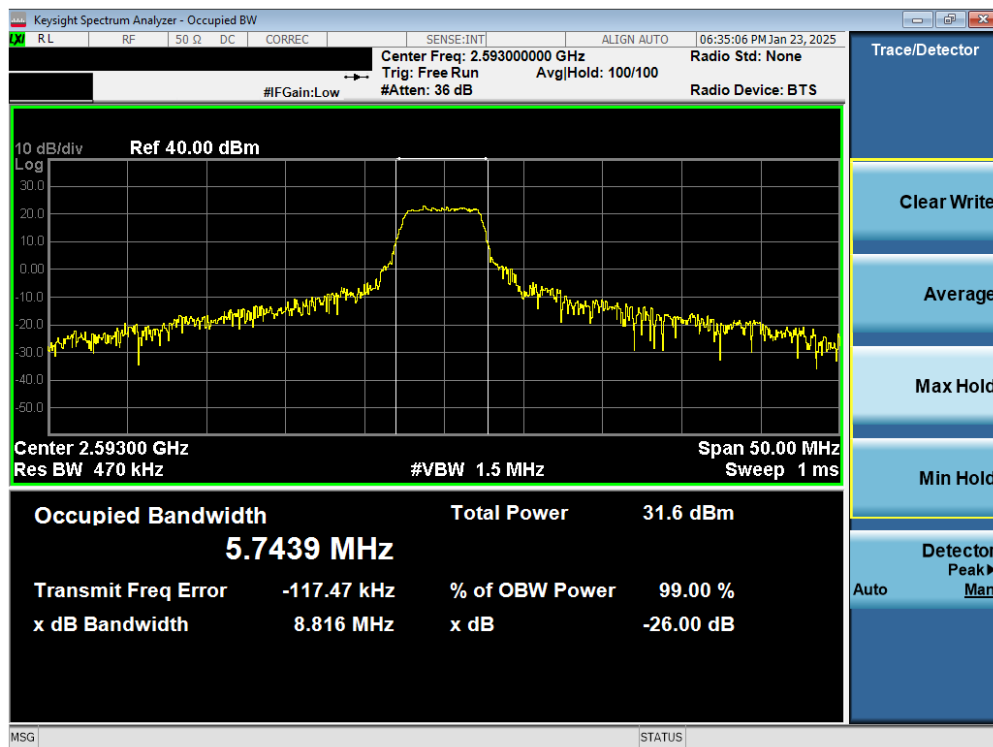
Plot 7-14. Occupied Bandwidth Plot (LTE Band 41 - 15MHz 16-QAM - Full RB)

FCC ID: BCG-A3281	element	PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-15. Occupied Bandwidth Plot (LTE Band 41 - 20MHz QPSK - Full RB)

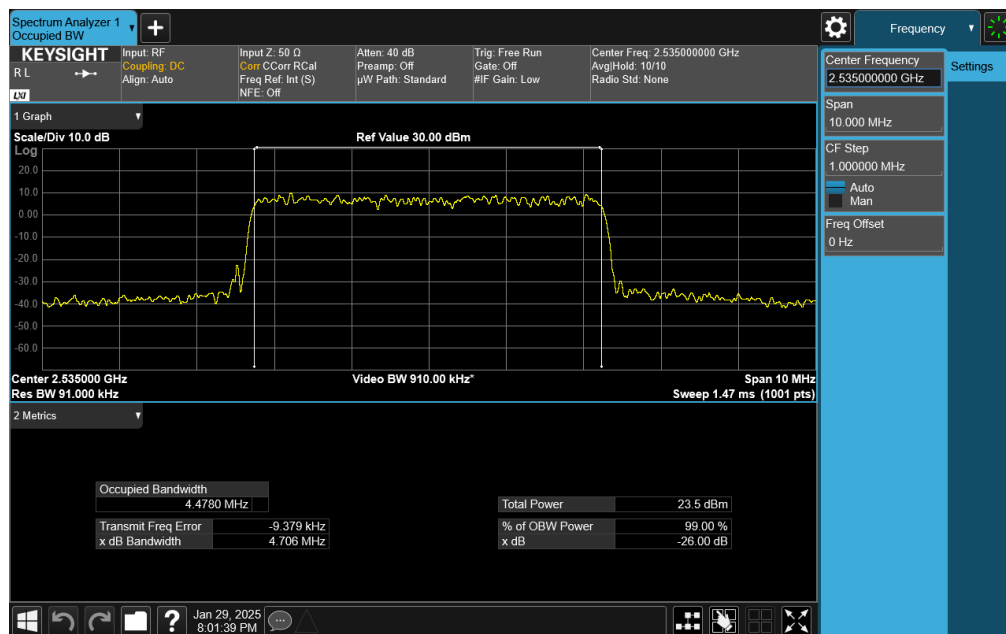
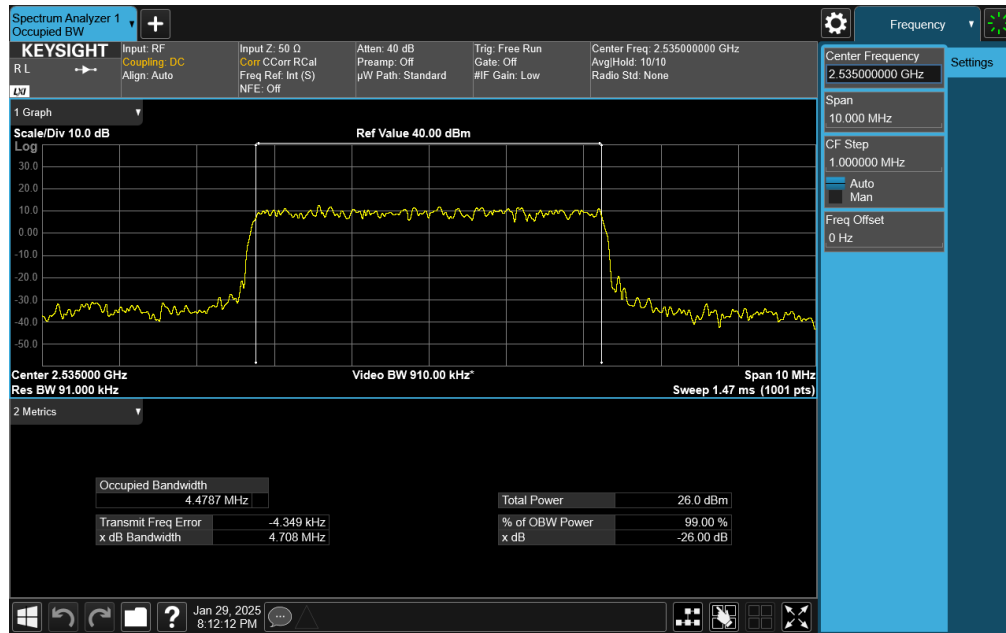


Plot 7-16. Occupied Bandwidth Plot (LTE Band 41 - 20MHz 16-QAM - Full RB)

FCC ID: BCG-A3281	element	PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
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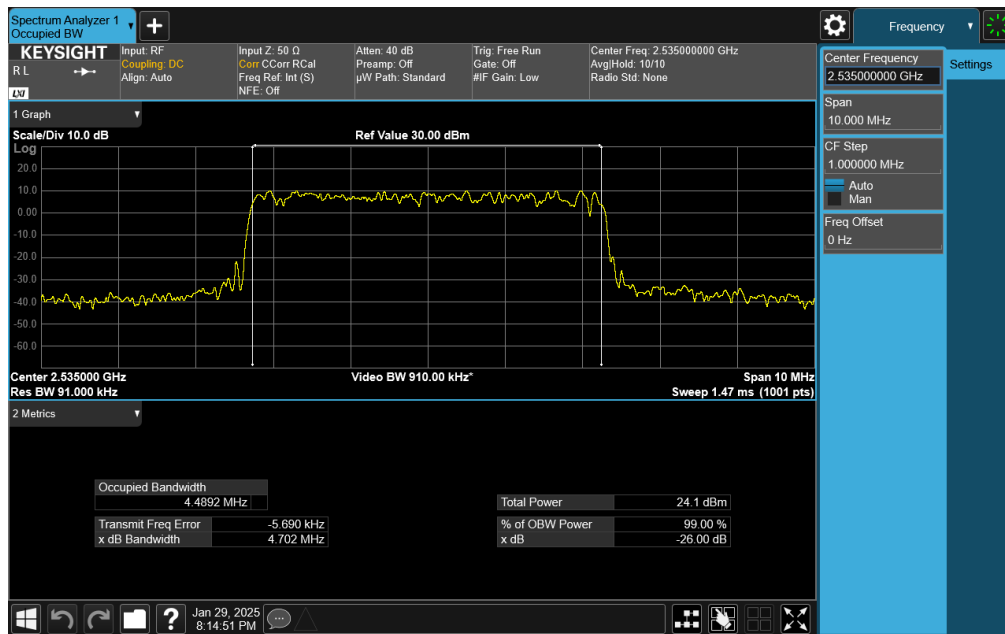
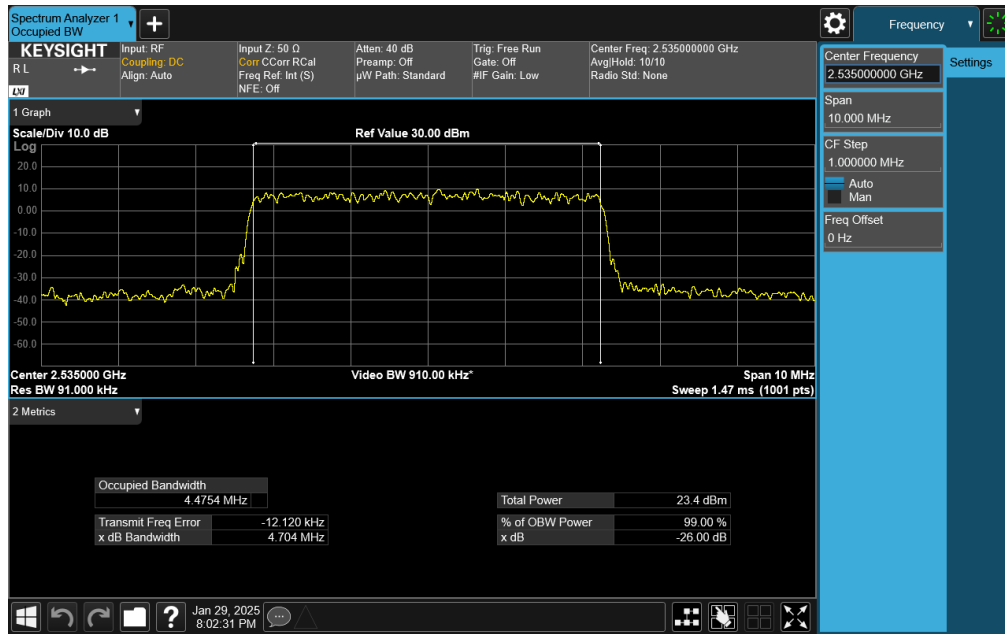
NR Band n7




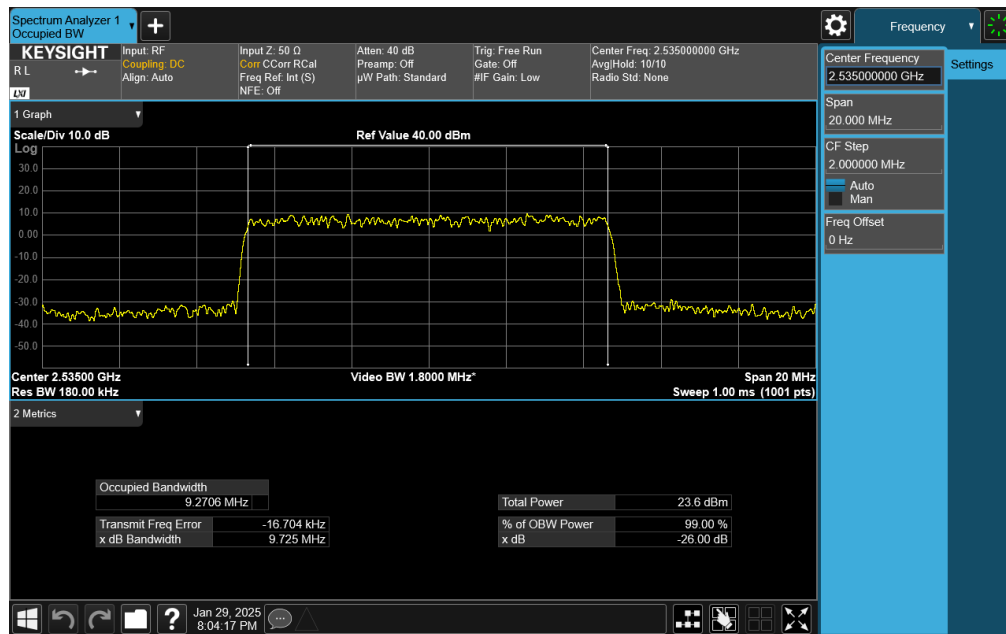
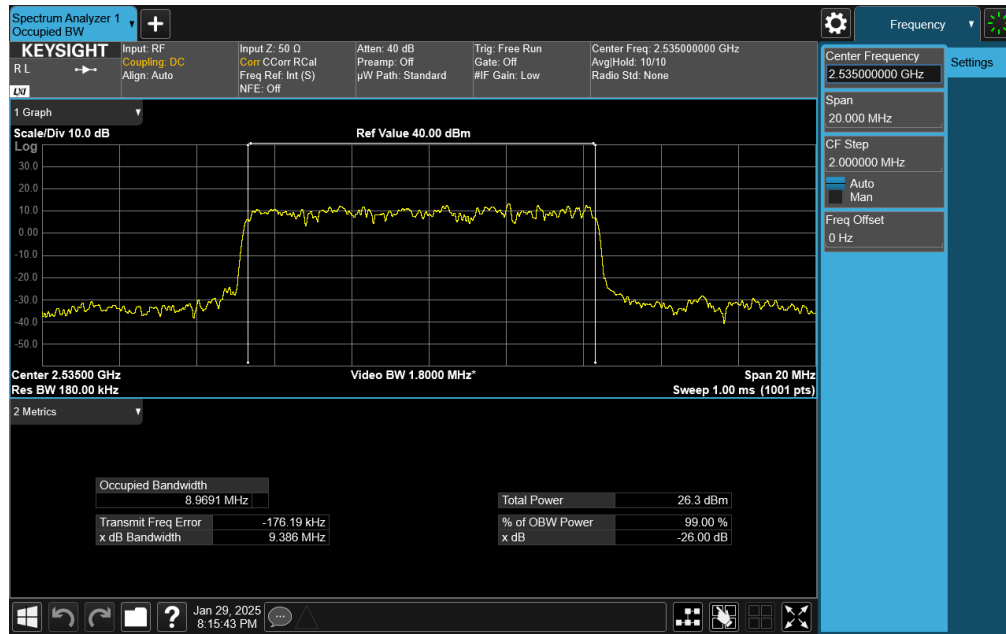
FCC ID: BCG-A3281	element	PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
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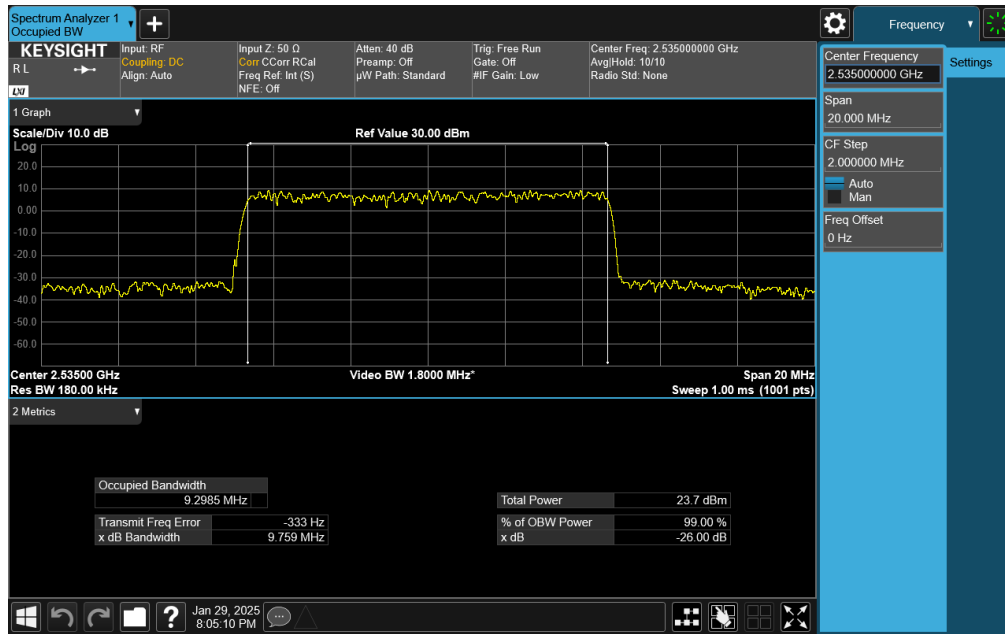
FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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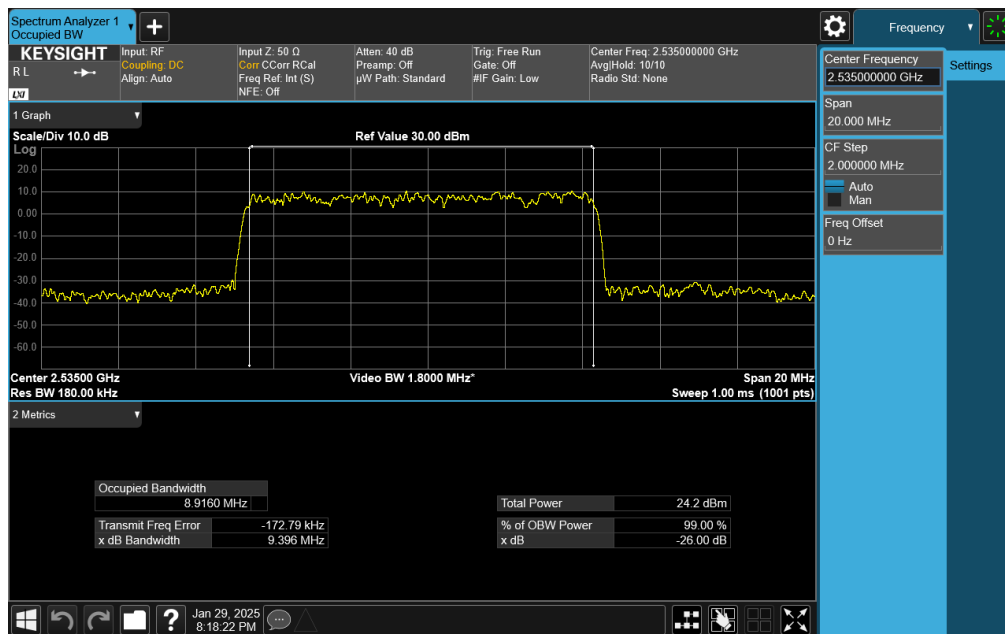
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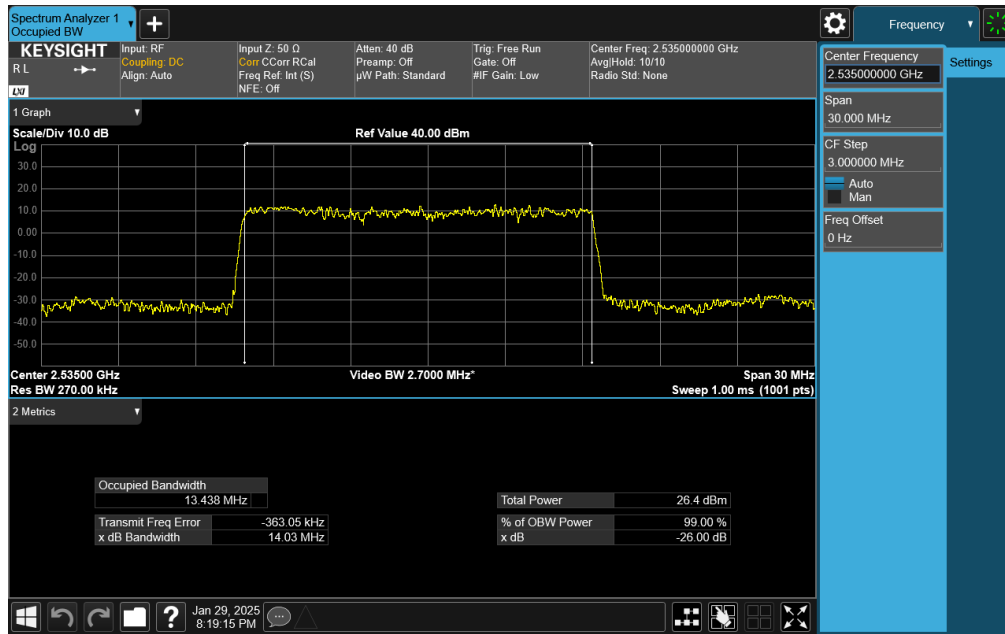


Plot 7-23. Occupied Bandwidth Plot (NR Band n7 - CP-OFDM 10MHz 16-QAM - Full RB)

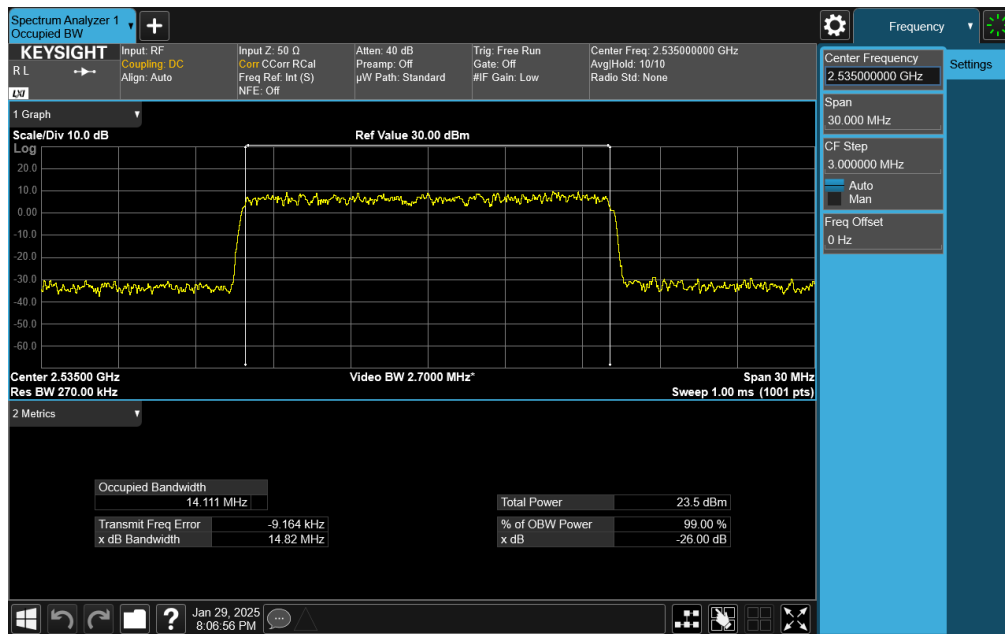


Plot 7-24. Occupied Bandwidth Plot (NR Band n7 - CP-OFDM 10MHz 64-QAM - Full RB)


FCC ID: BCG-A3281	<p>element</p> <p>PART 27 MEASUREMENT REPORT</p>		Approved by: Technical Manager
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Plot 7-25. Occupied Bandwidth Plot (NR Band n7 - 15MHz DFT-s-OFDM $\pi/2$ BPSK - Full RB)

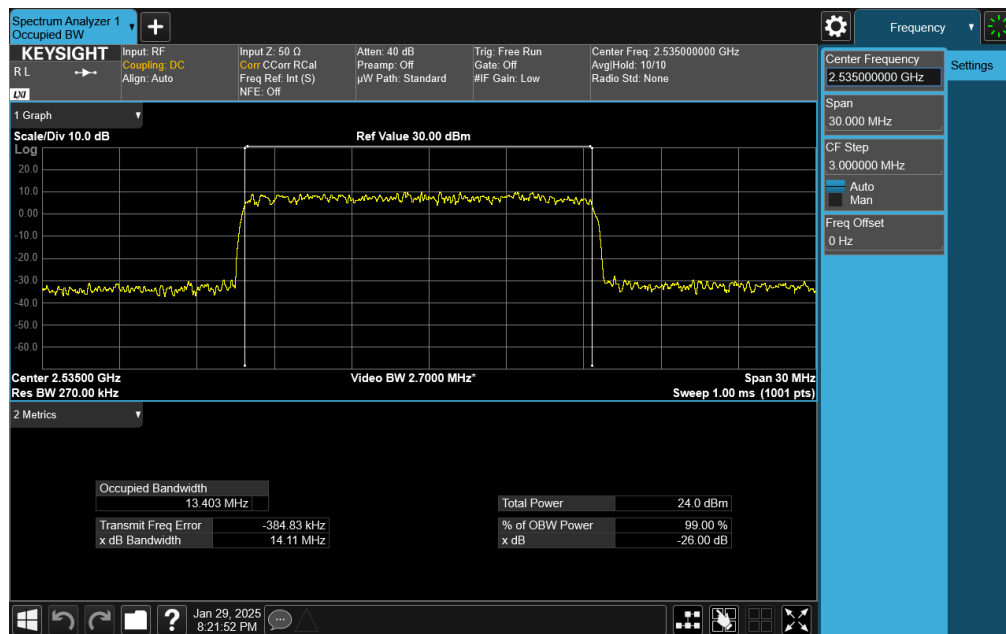
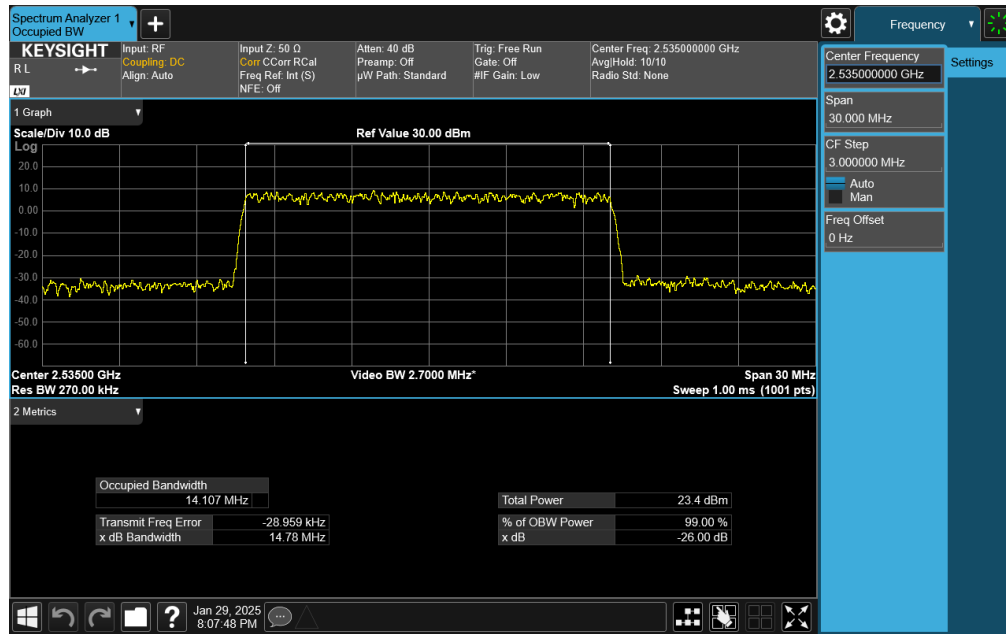



Plot 7-26. Occupied Bandwidth Plot (NR Band n7 - CP-OFDM 15MHz QPSK - Full RB)

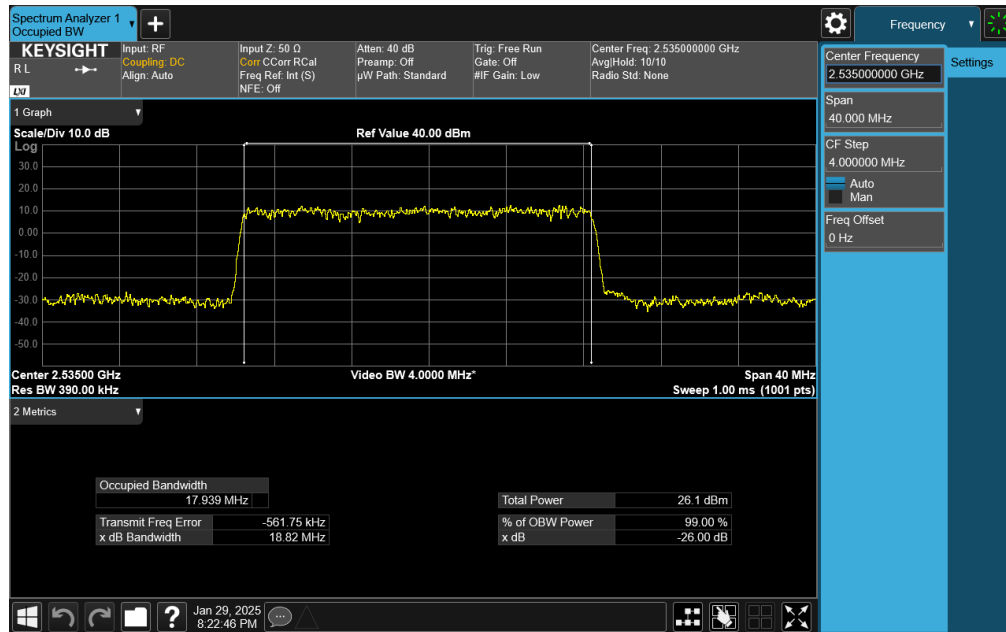
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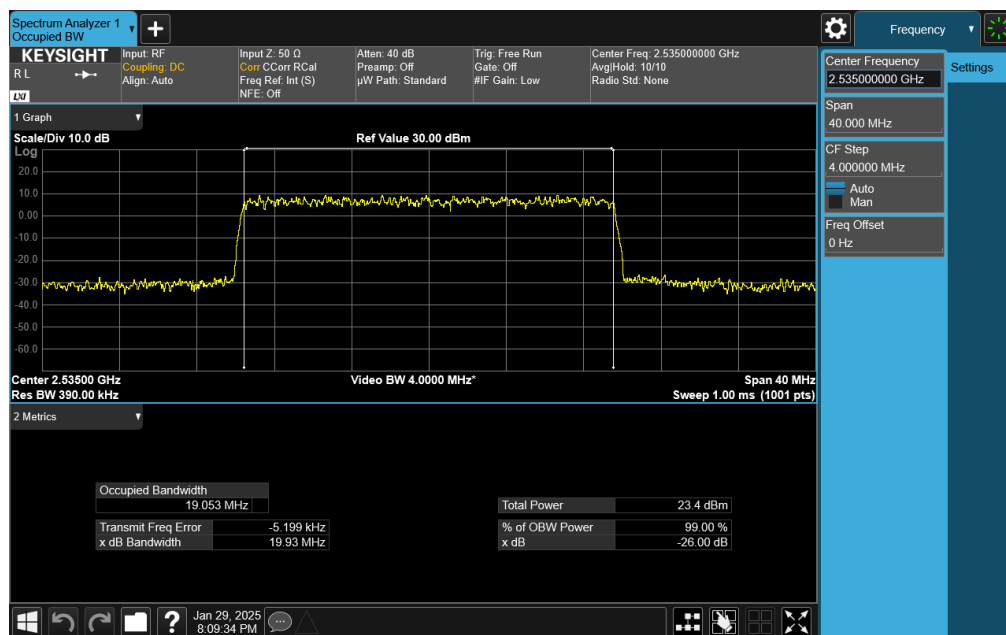
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Plot 7-29. Occupied Bandwidth Plot (NR Band n7 - 20MHz DFT-s-OFDM $\pi/2$ BPSK - Full RB)

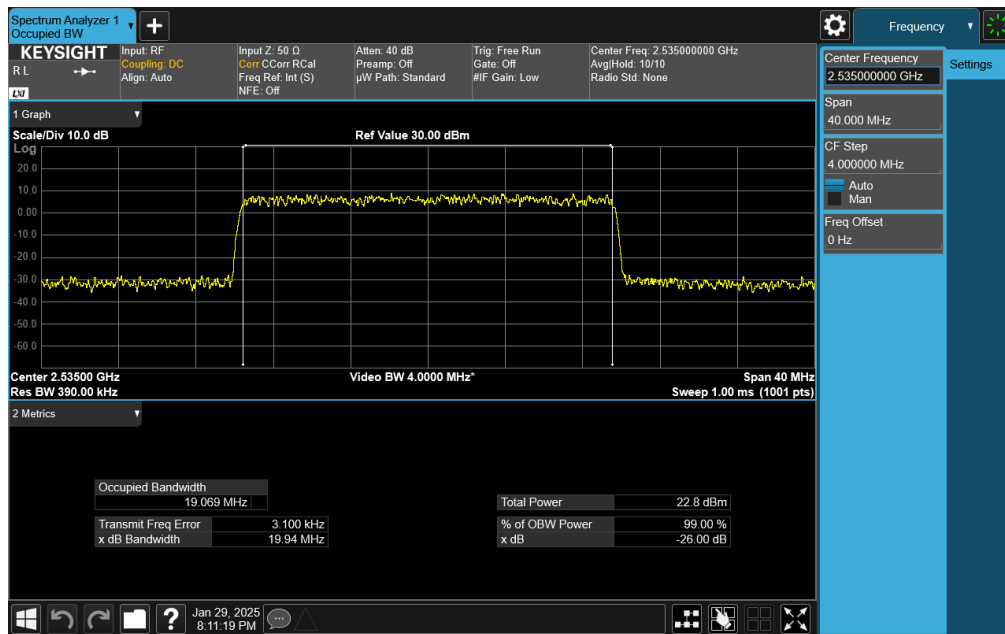
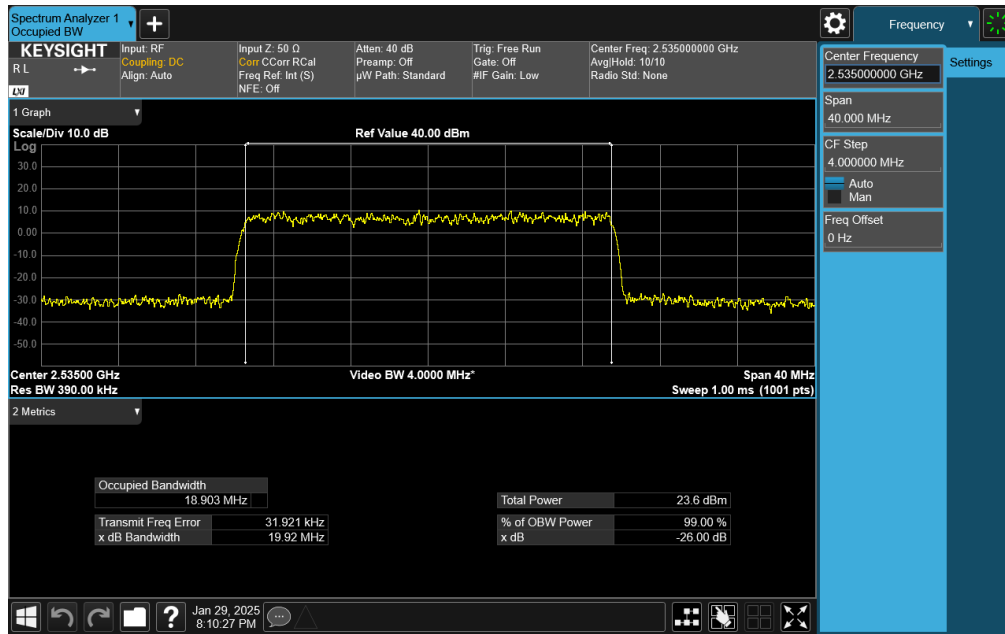


Plot 7-30. Occupied Bandwidth Plot (NR Band n7 - CP-OFDM 20MHz QPSK - Full RB)

FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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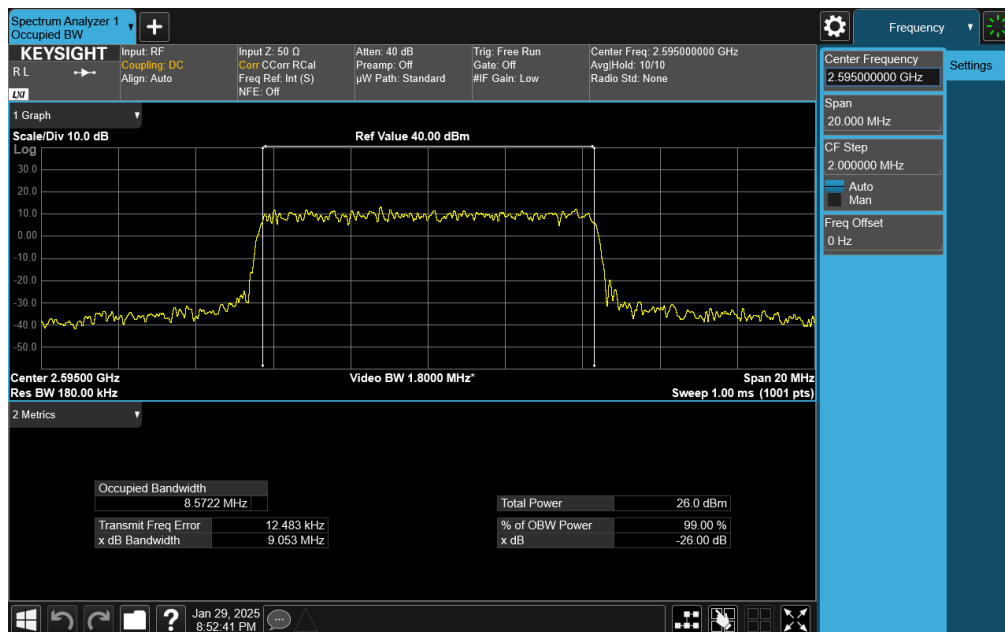
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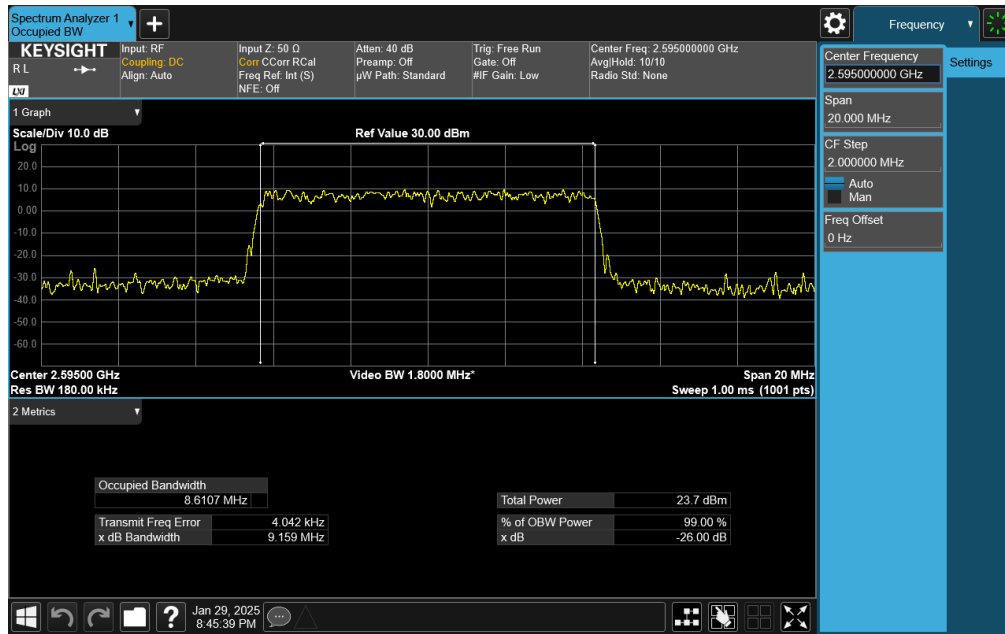
NR Band n41



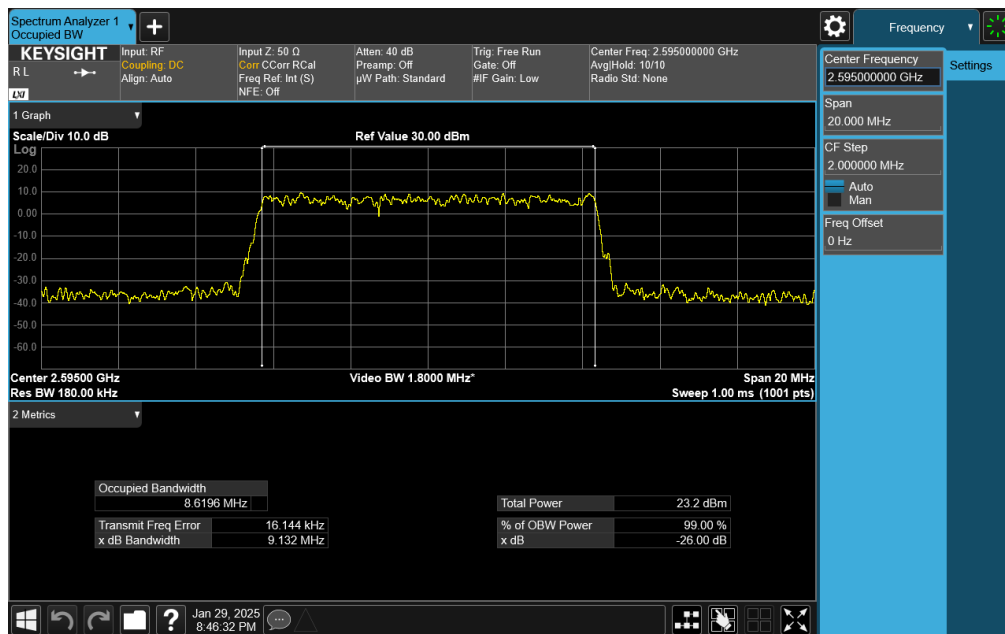
FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-35. Occupied Bandwidth Plot (NR Band n41 - CP-OFDM 10MHz 16-QAM - Full RB)

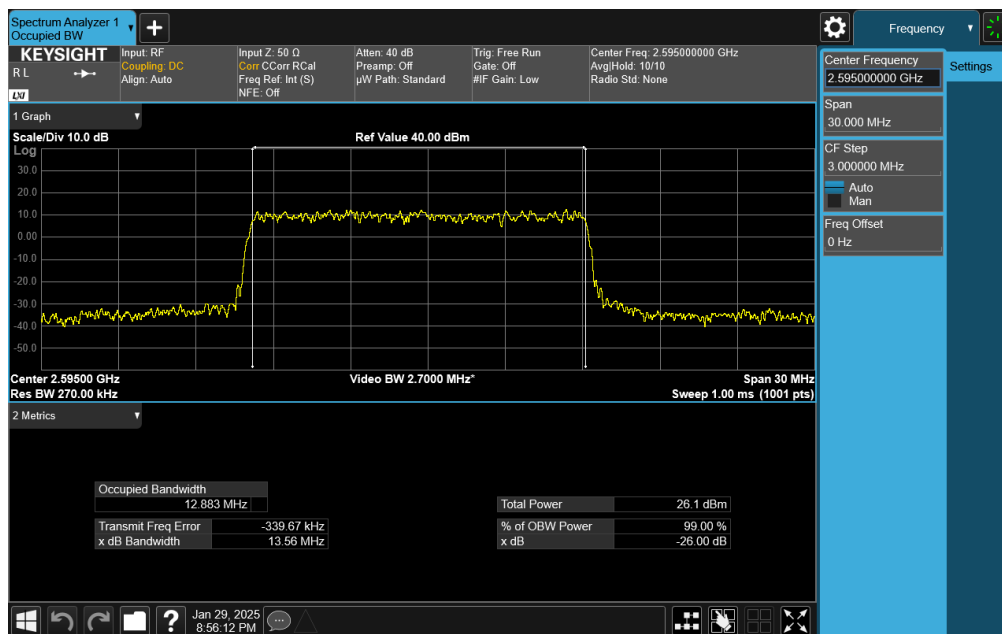


Plot 7-36. Occupied Bandwidth Plot (NR Band n41 - CP-OFDM 10MHz 64-QAM - Full RB)

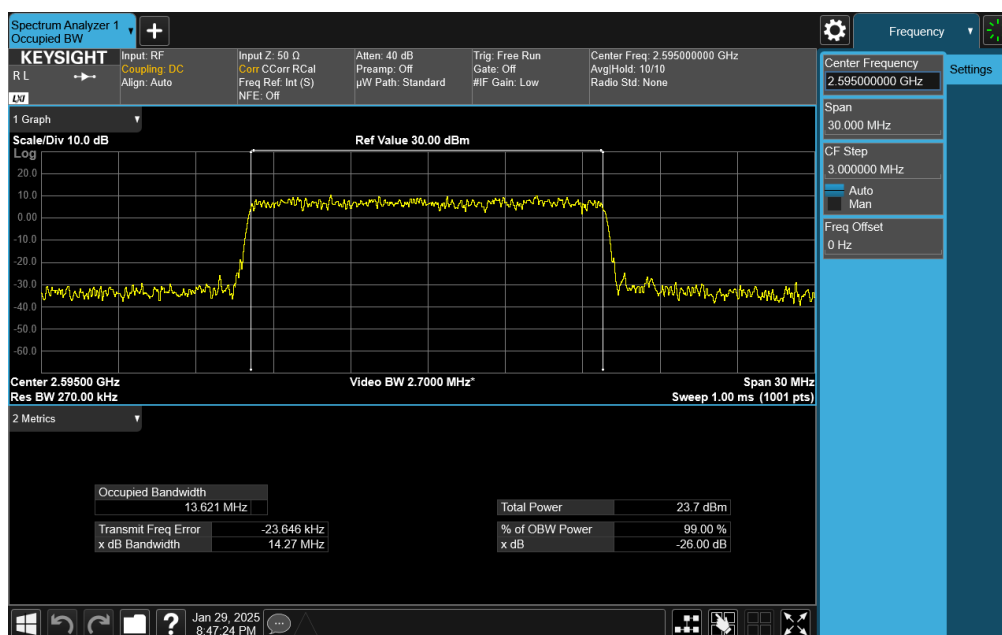
FCC ID: BCG-A3281	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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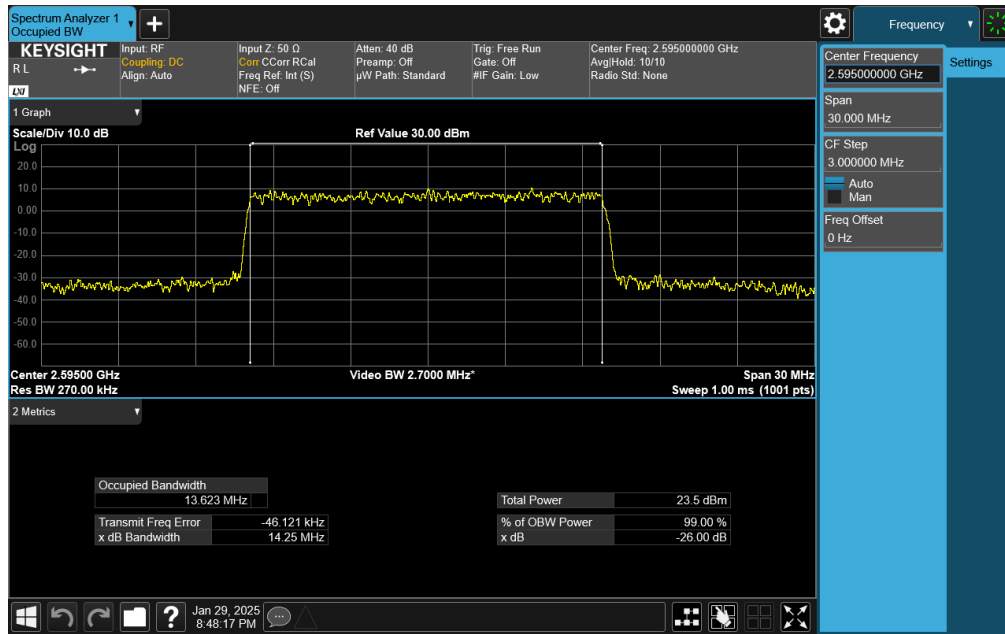


Plot 7-37. Occupied Bandwidth Plot (NR Band n41 - 15MHz DFT-s-OFDM $\pi/2$ BPSK - Full RB)

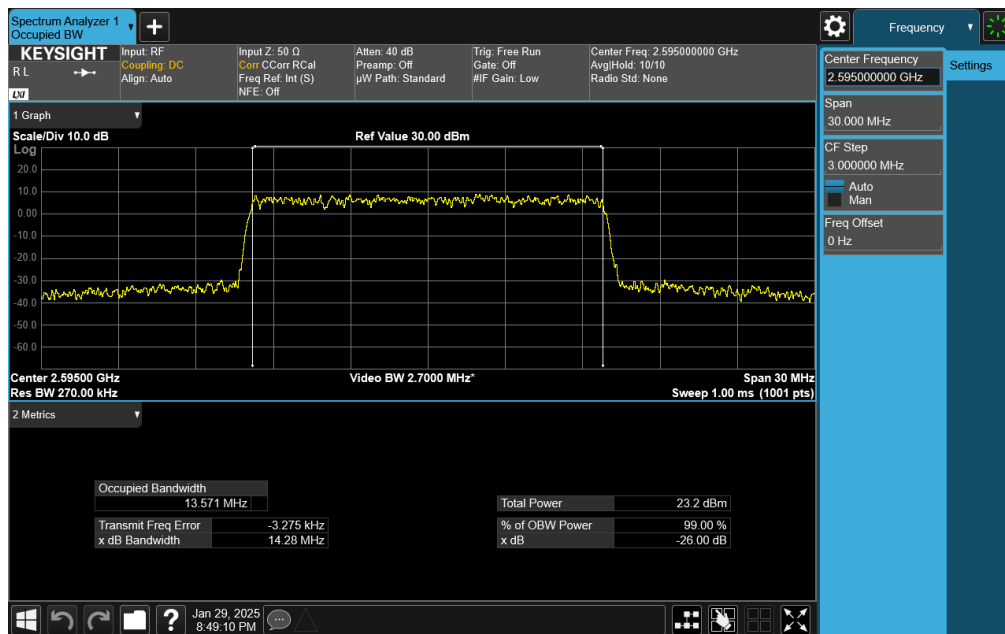


Plot 7-38. Occupied Bandwidth Plot (NR Band n41 - CP-OFDM 15MHz QPSK - Full RB)

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Plot 7-39. Occupied Bandwidth Plot (NR Band n41 - CP-OFDM 15MHz 16-QAM - Full RB)

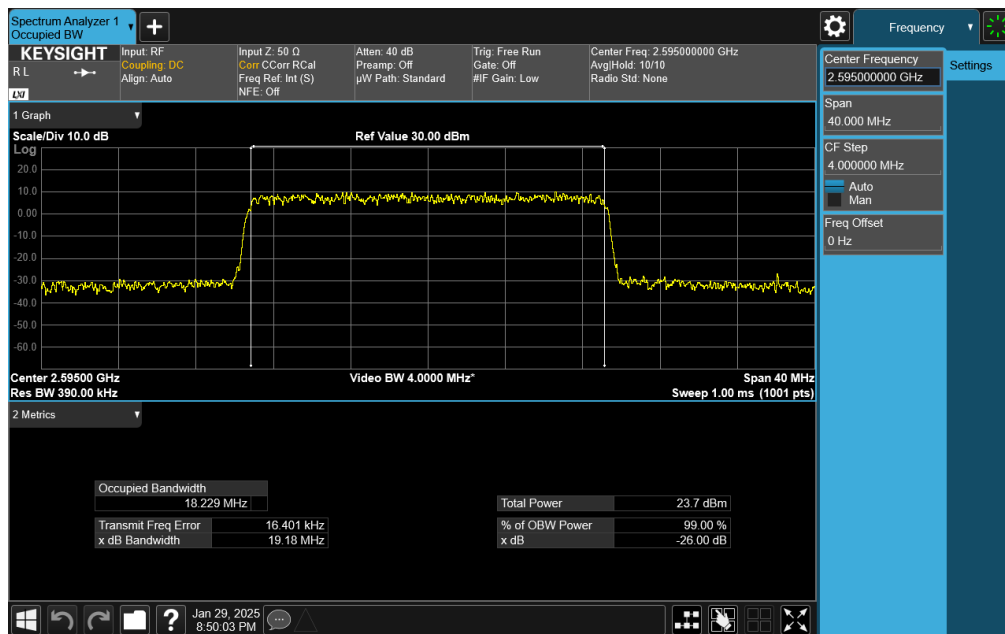
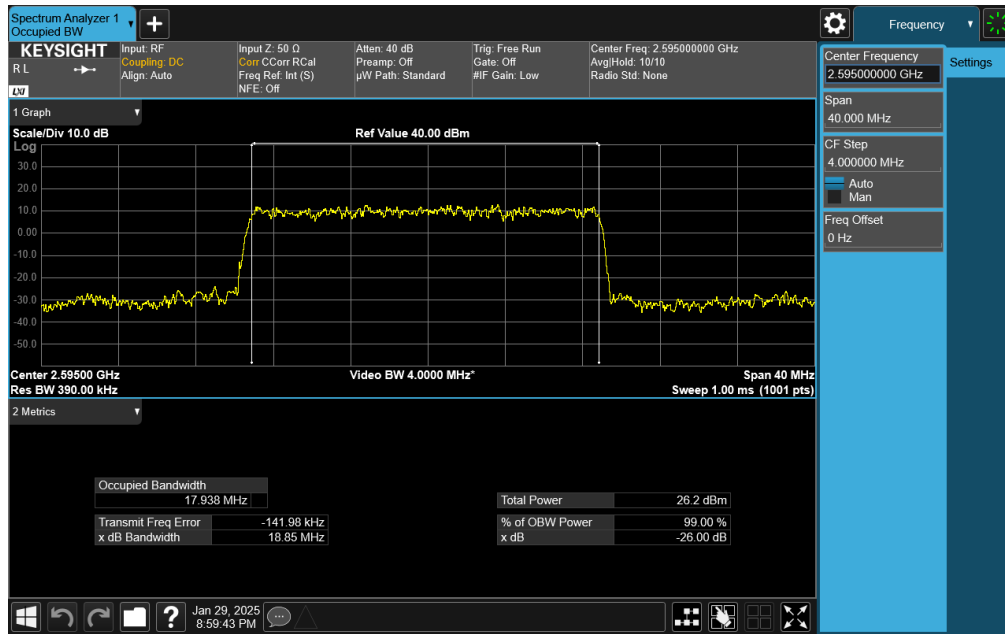


Plot 7-40. Occupied Bandwidth Plot (NR Band n41 - CP-OFDM 15MHz 64-QAM - Full RB)

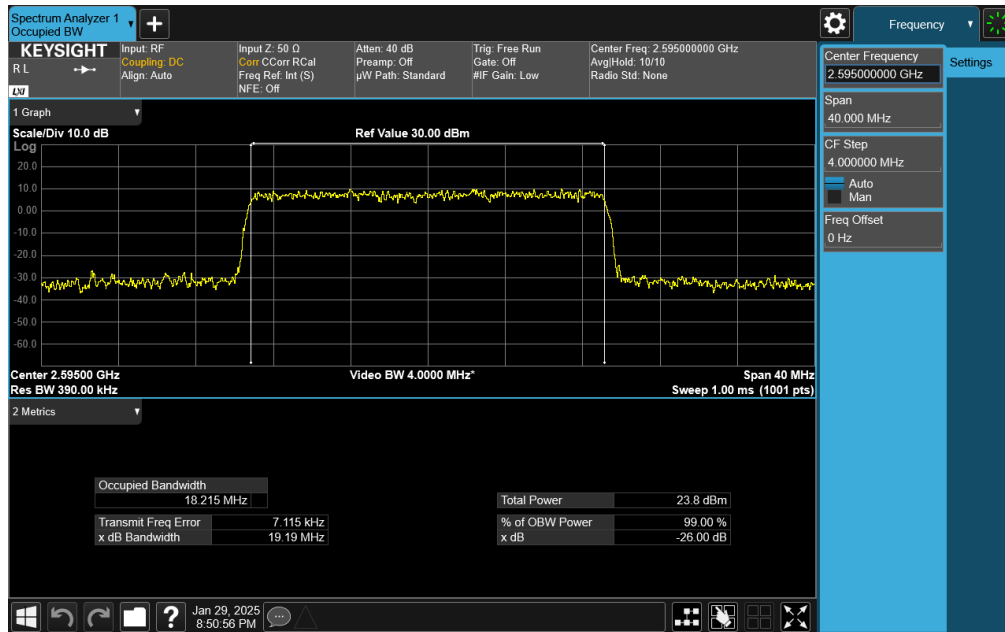
FCC ID: BCG-A3281	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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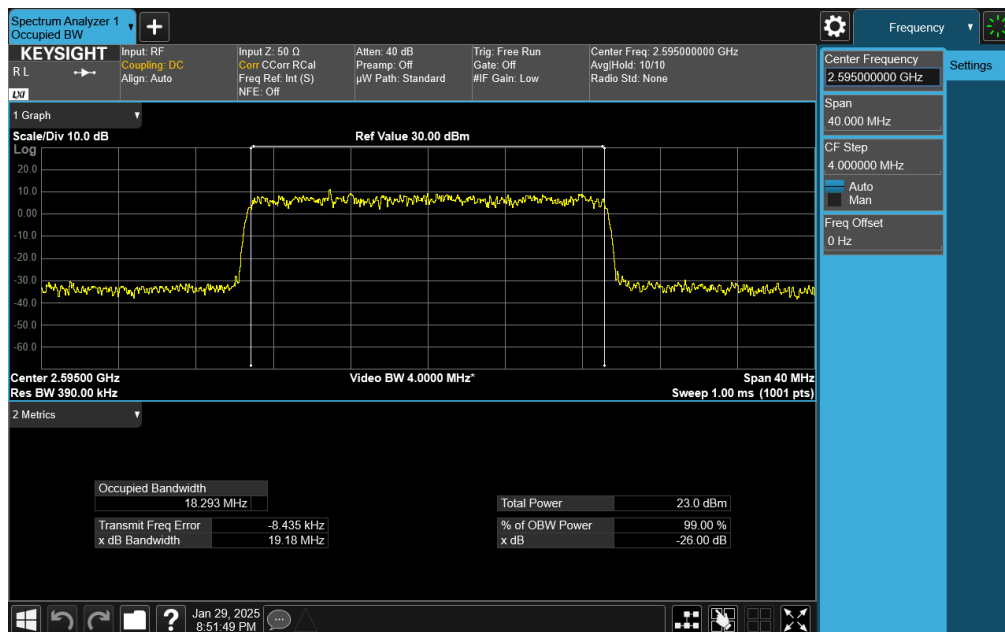
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Plot 7-43. Occupied Bandwidth Plot (NR Band n41 - CP-OFDM 20MHz 16-QAM - Full RB)



Plot 7-44. Occupied Bandwidth Plot (NR Band n41 - CP-OFDM 20MHz 64-QAM - Full RB)

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7.3 Spurious and Harmonic Emissions at Antenna Terminal

§2.1051, §27.53(a), §27.53(m)

Test Overview

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 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.

For LTE Bands 7, 41, NR FR1 Band n7 and n41 the minimum permissible attenuation level of any spurious emission is $55 + 10\log_{10}(P_{\text{Watts}})$.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 10GHz (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

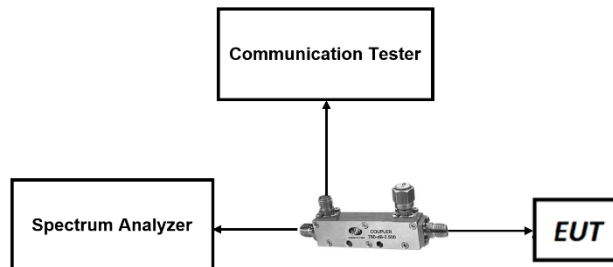


Figure 7-3. LTE Test Instrument & Measurement Setup

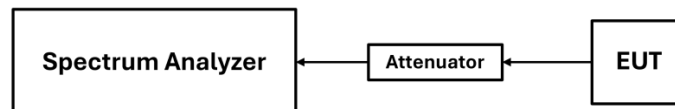




Figure 7-4. FR1 Test Instrument & Measurement Setup

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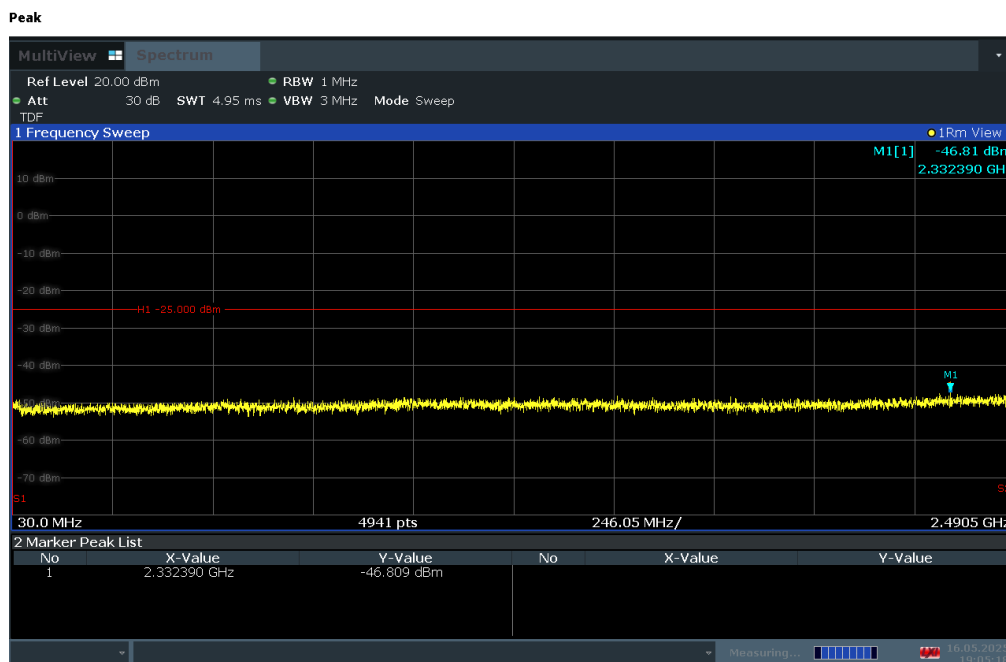
Test Notes

2. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. 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 emission are attenuated at least 26 dB below the transmitter power.
3. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

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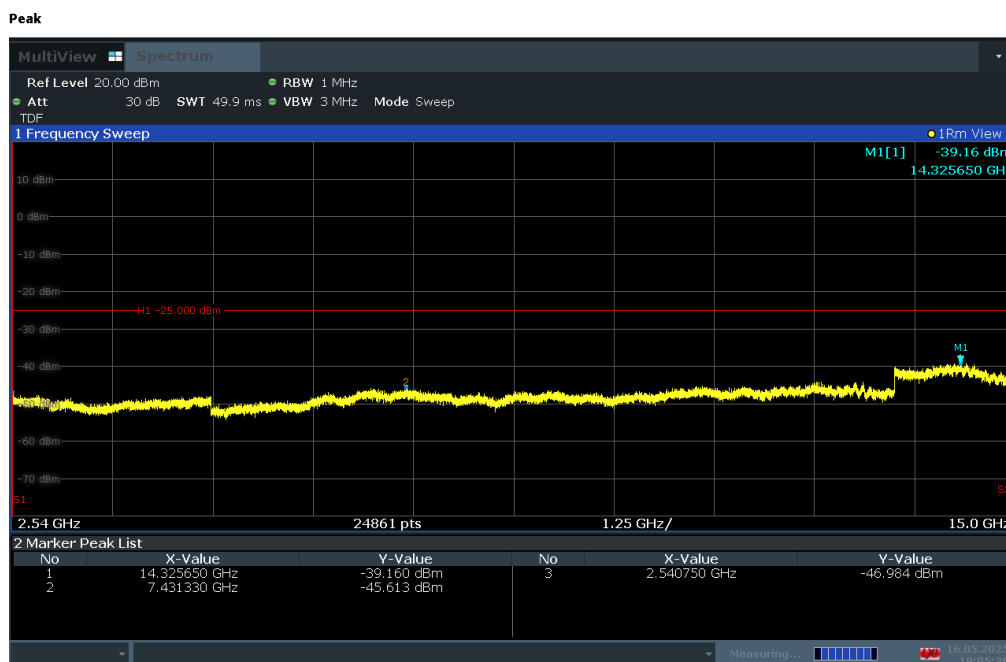
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LTE Band 7




19:05:19 16.05.2025

Plot 7-45. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 50 - Low Channel)



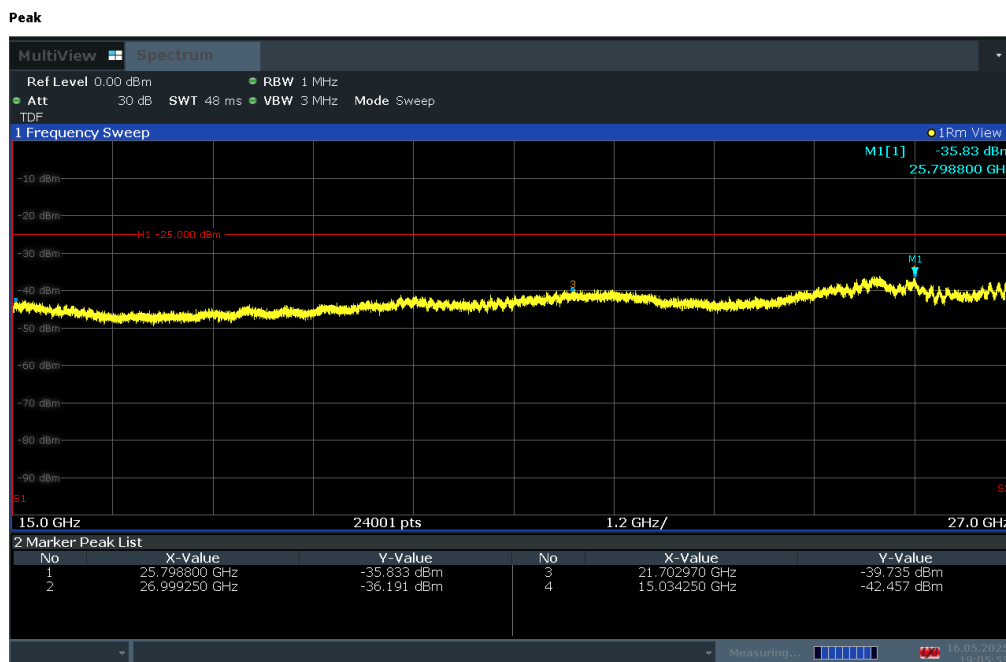
19:05:36 16.05.2025

Plot 7-46. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 50 - Low Channel)

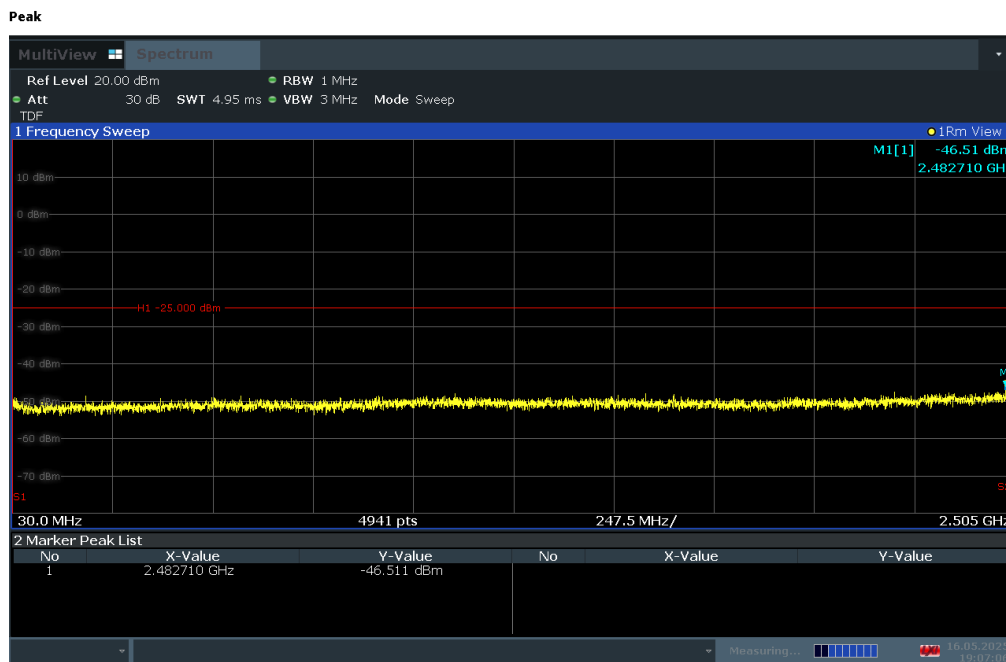
FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-47. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 50 - Low Channel)

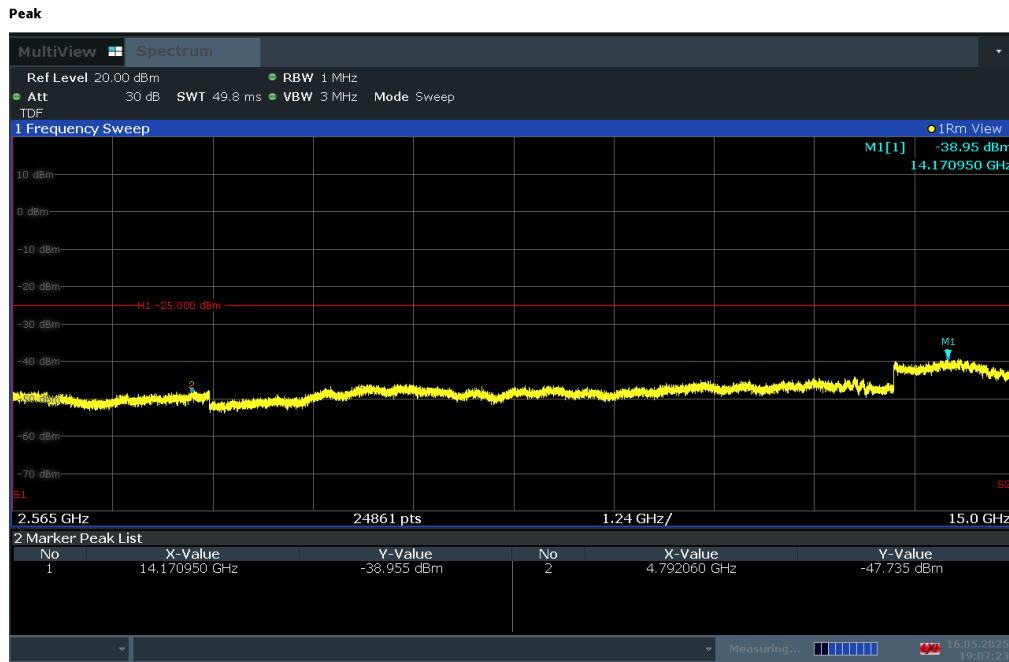


Plot 7-48. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 50 - Mid Channel)

FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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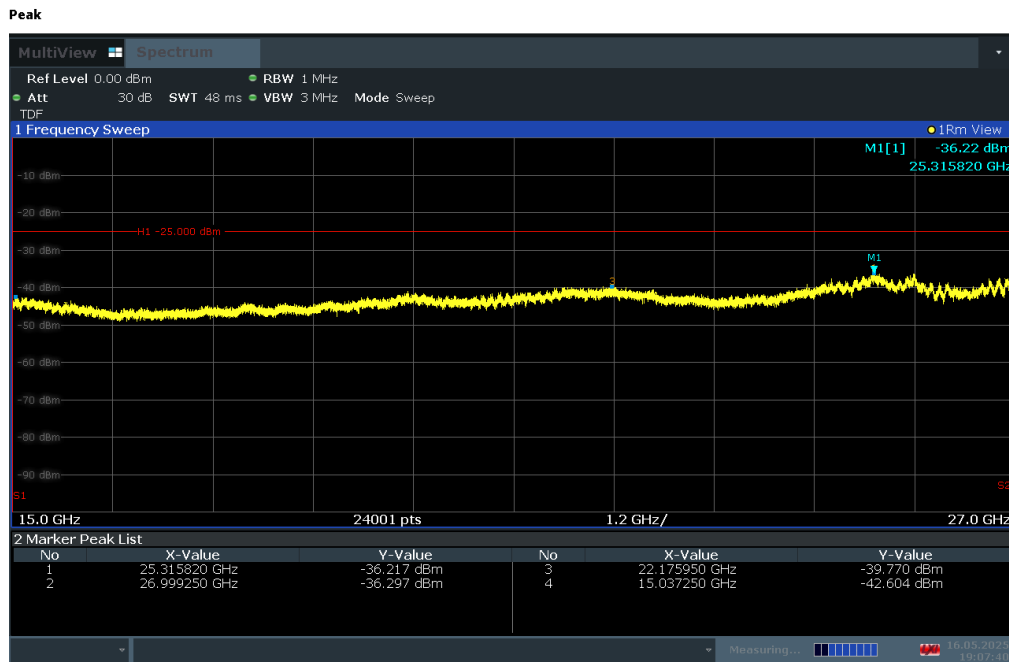
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19:07:23 16.05.2025

Plot 7-49. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 50 - Mid Channel)



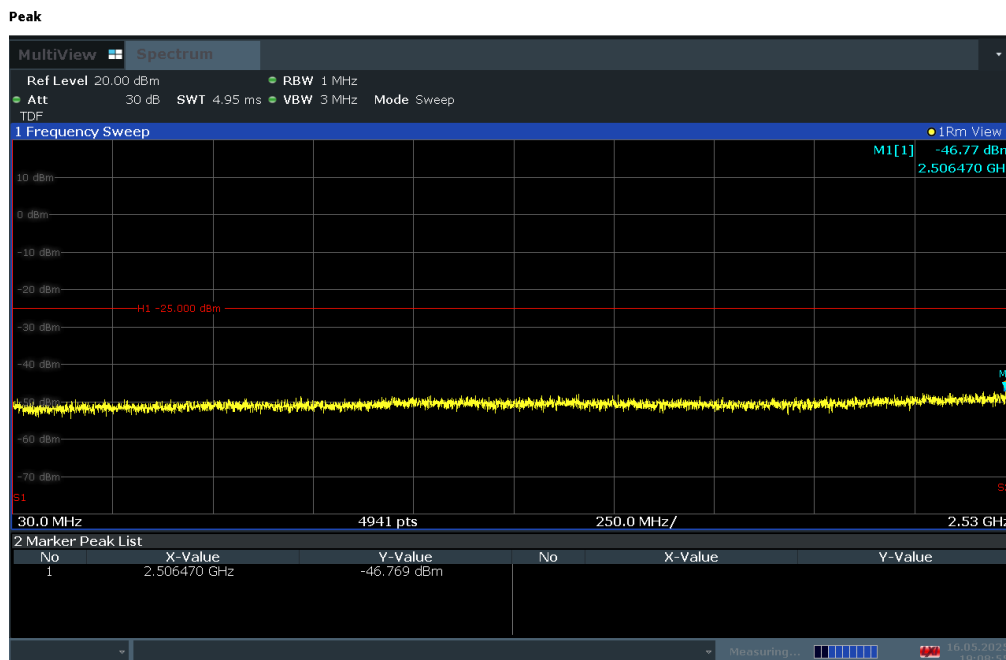
19:07:41 16.05.2025

Plot 7-50. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 50 - Mid Channel)

FCC ID: BCG-A3281	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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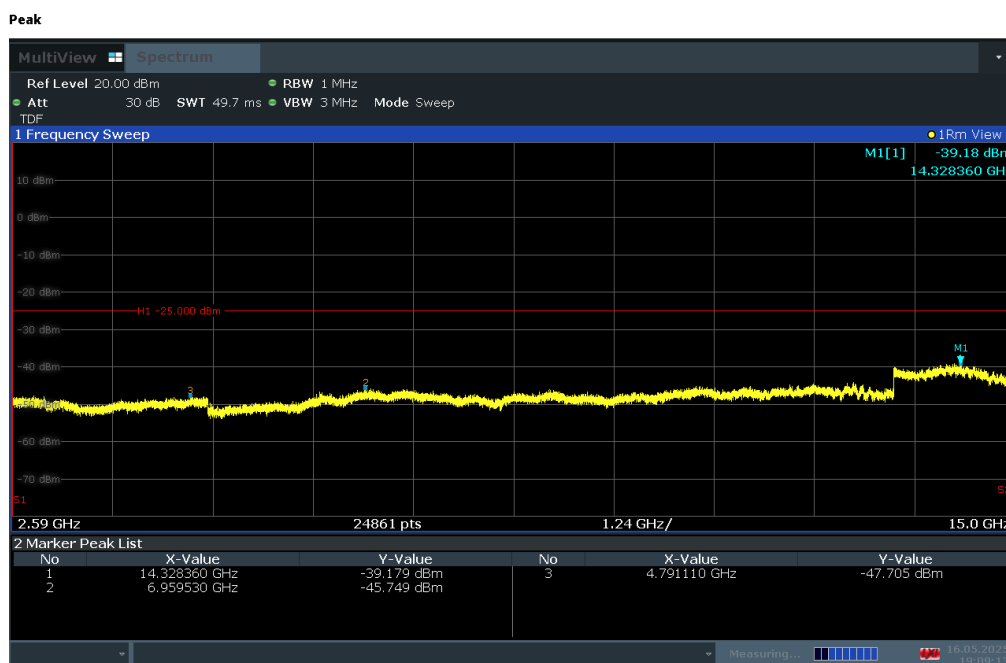
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19:08:56 16.05.2025

Plot 7-51. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 50 - High Channel)



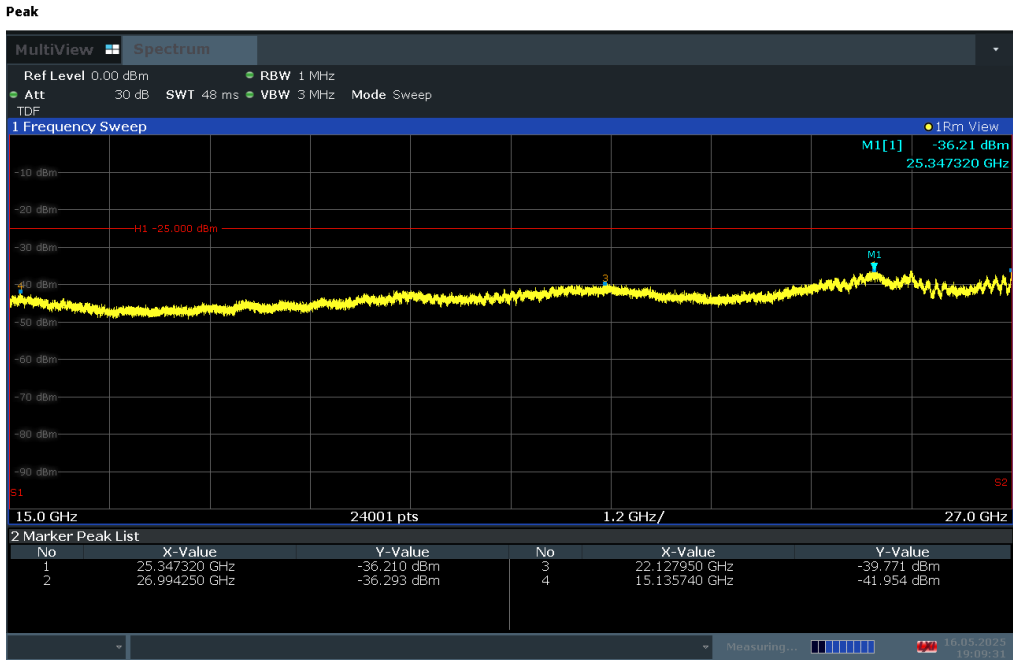
19:09:13 16.05.2025

Plot 7-52. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 50 - High Channel)

FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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19:09:31 16.05.2025

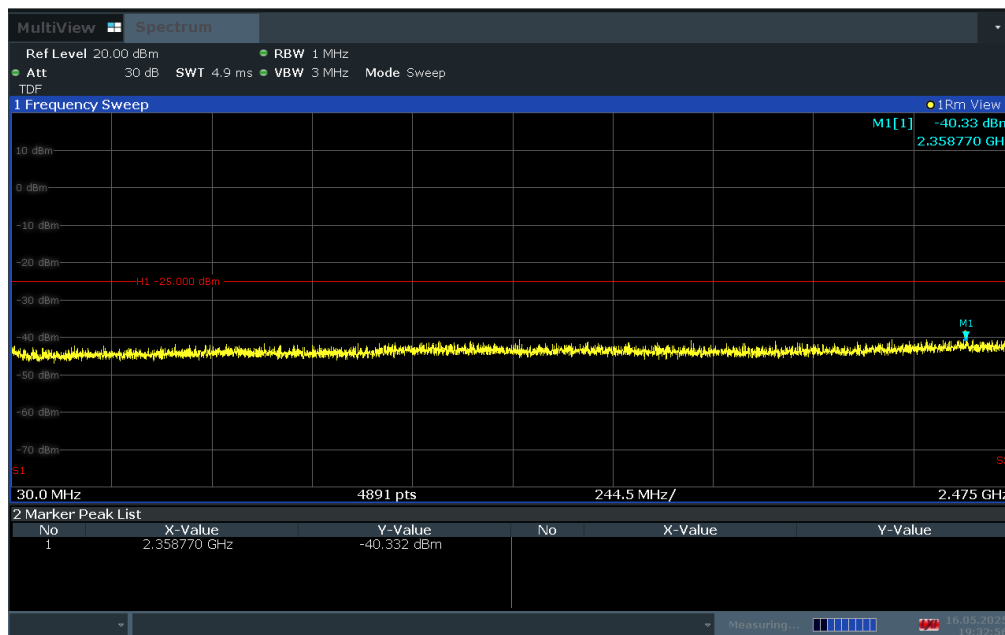
Plot 7-53. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 50 - High Channel)

FCC ID: BCG-A3281	element PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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LTE Band 41

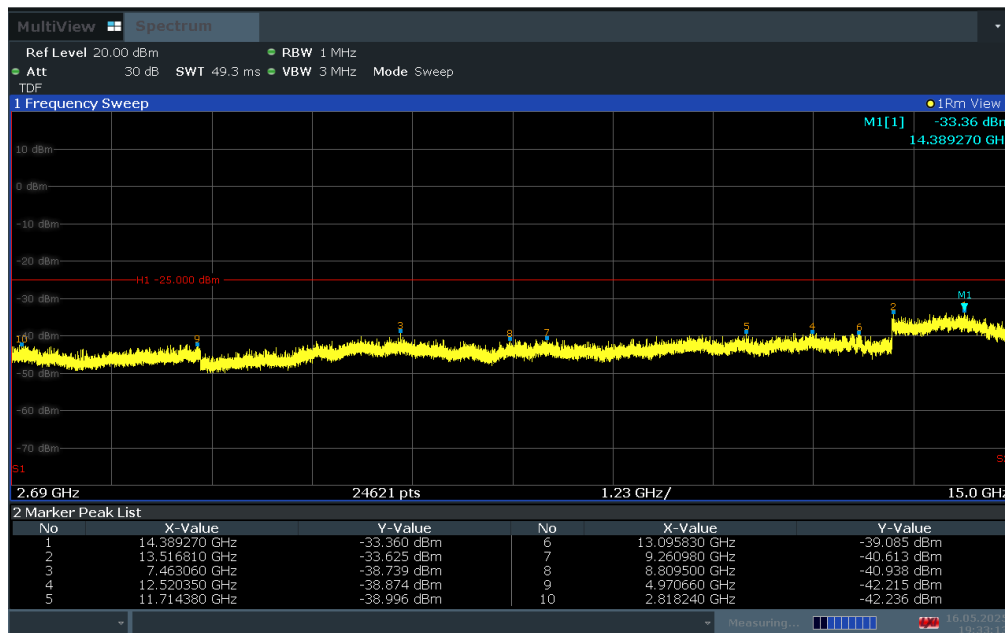
Peak



19:32:57 16.05.2025


Plot 7-54. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 50 - Low Channel)

Peak



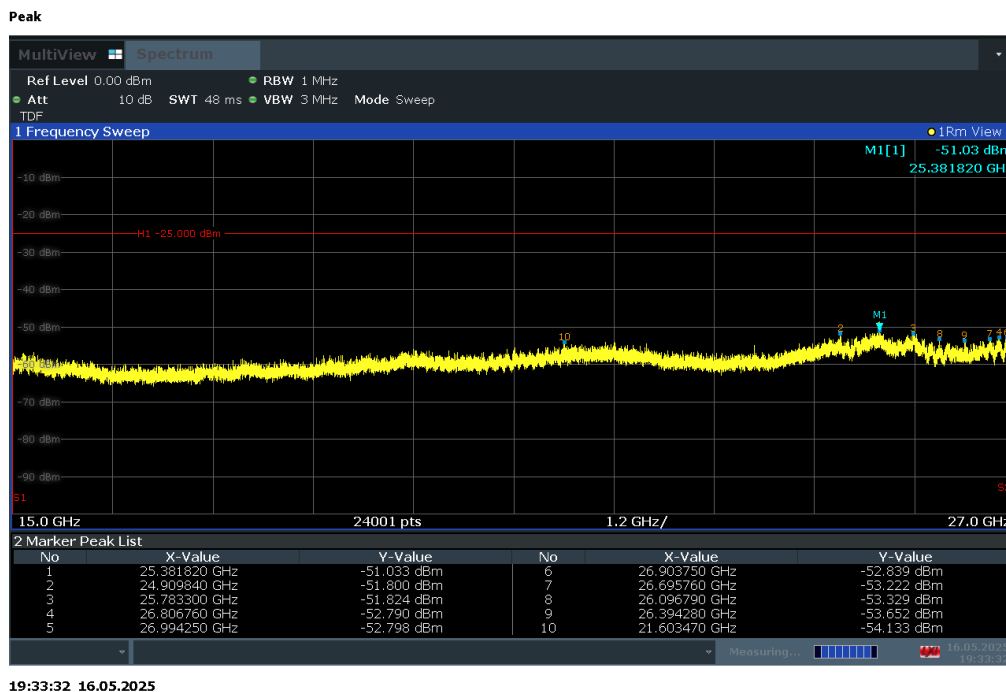
19:33:14 16.05.2025

Plot 7-55. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 50 - Low Channel)

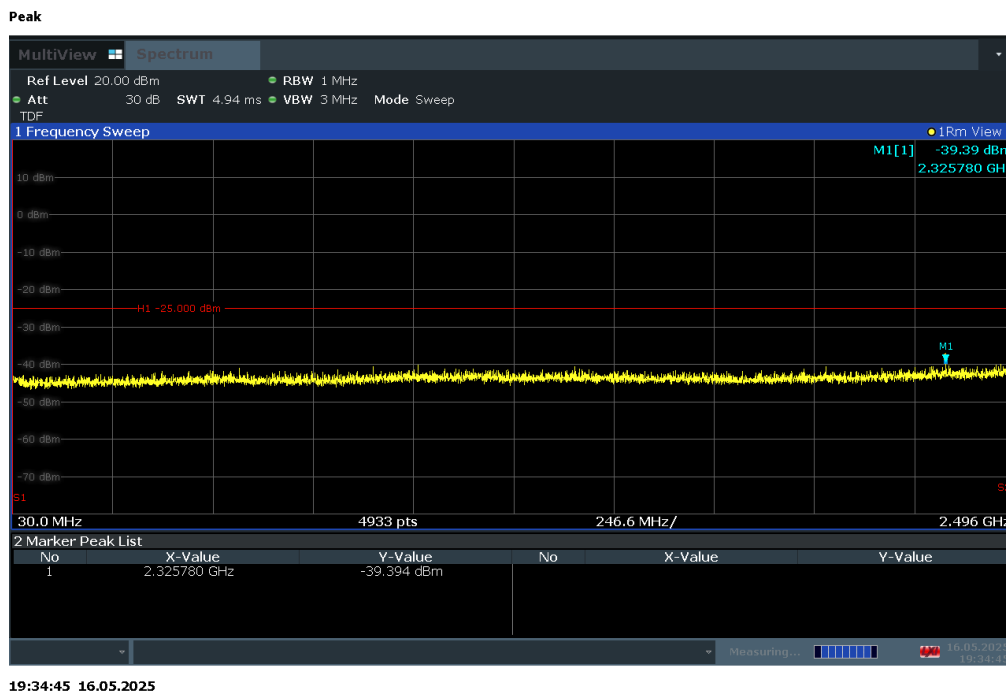
FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-56. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 50 - Low Channel)

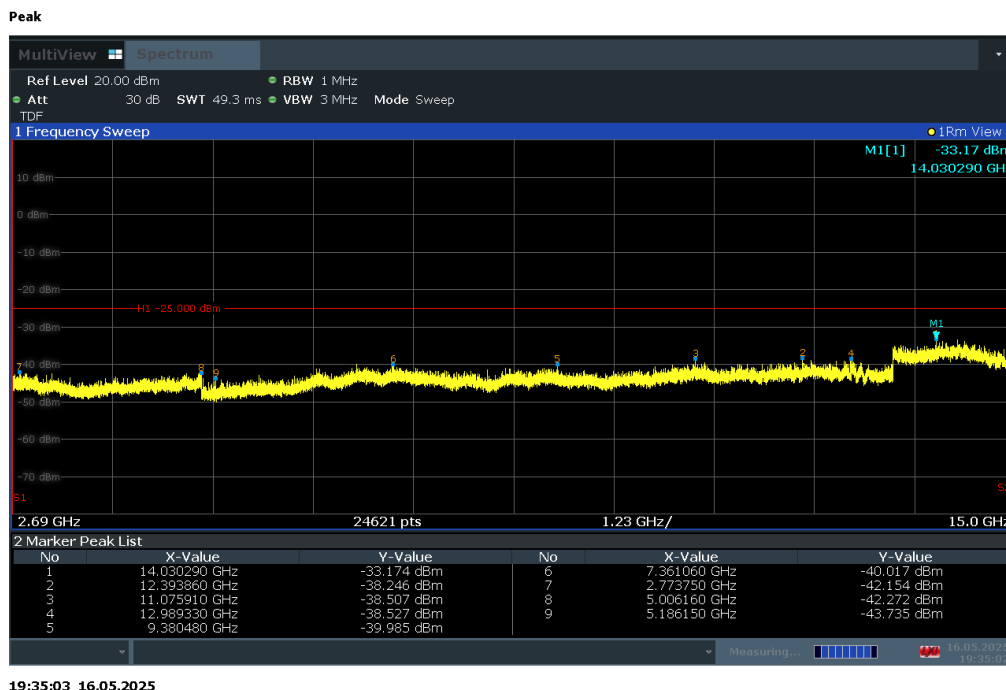


Plot 7-57. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 50 - Mid Channel)

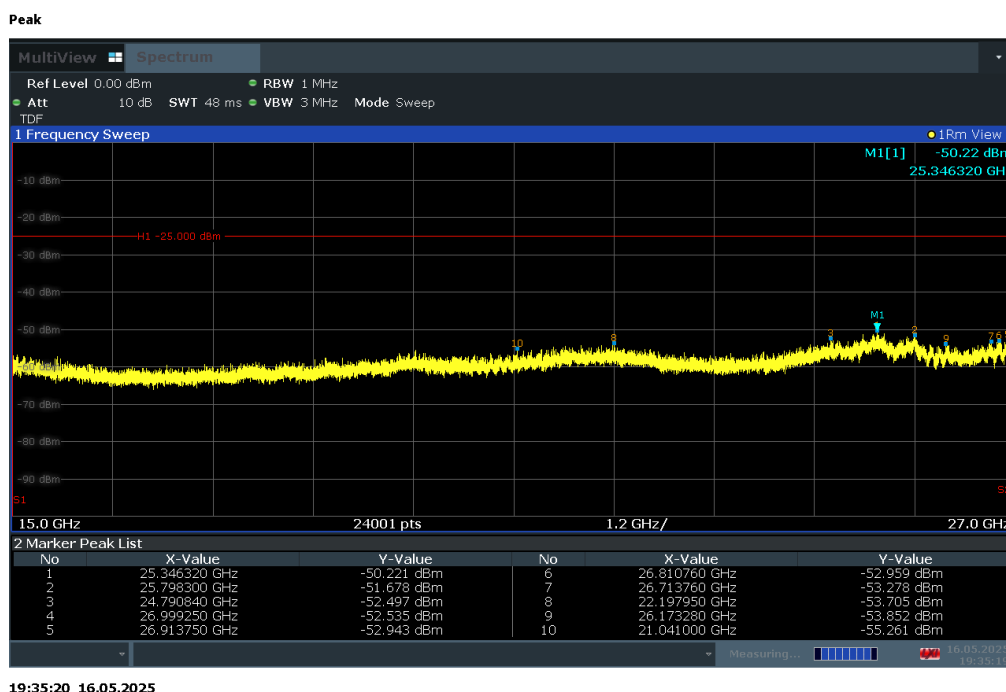
FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-58. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 50 - Mid Channel)

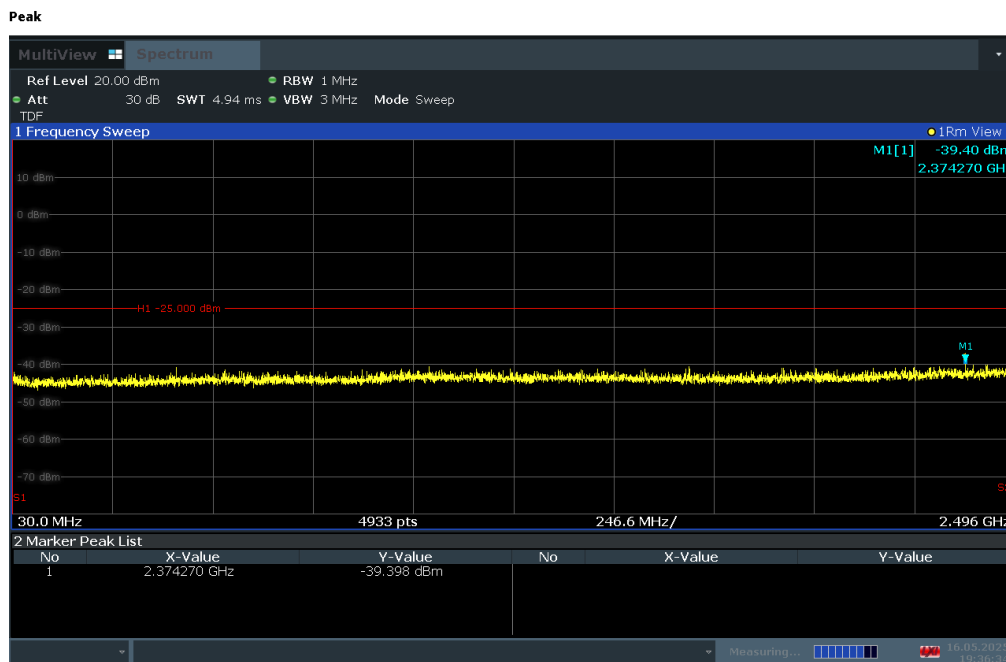


Plot 7-59. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 50 - Mid Channel)

FCC ID: BCG-A3281	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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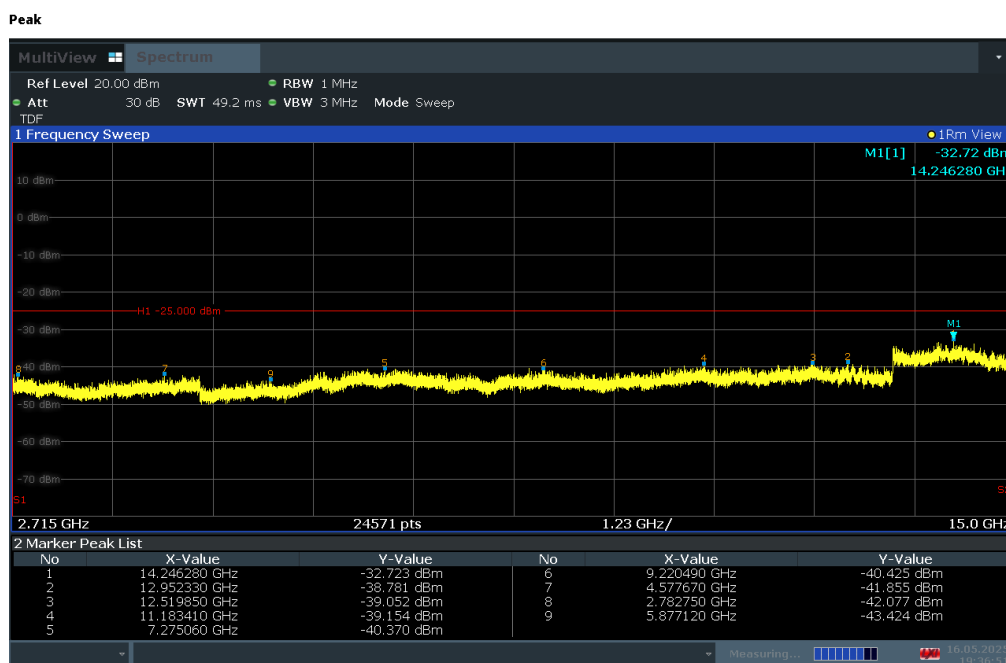
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19:36:35 16.05.2025

Plot 7-60. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 50 - High Channel)



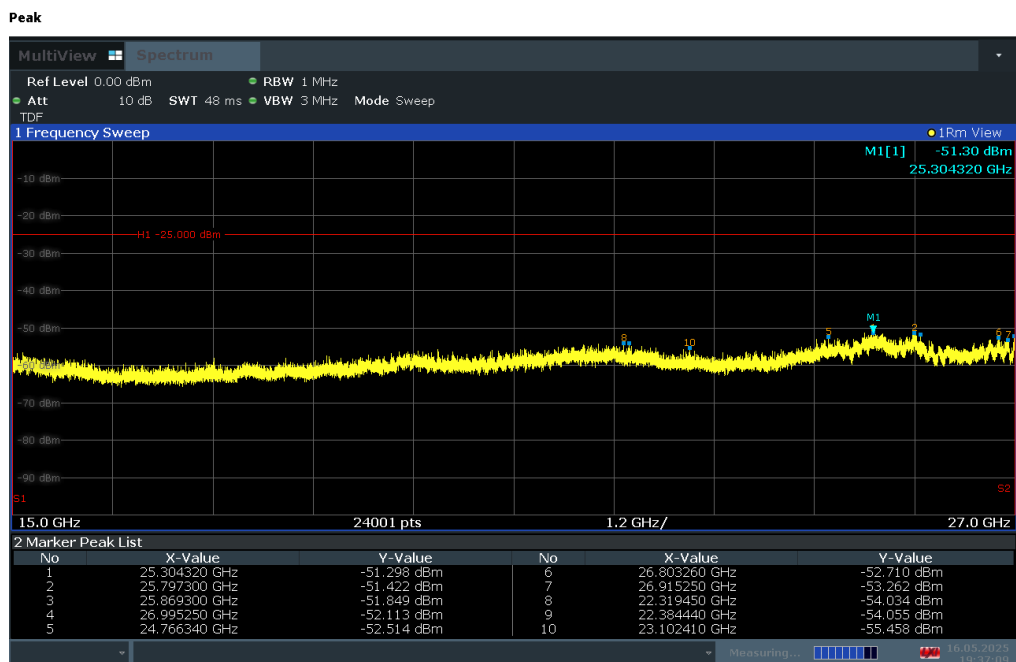
19:36:52 16.05.2025

Plot 7-61. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 50 - High Channel)

FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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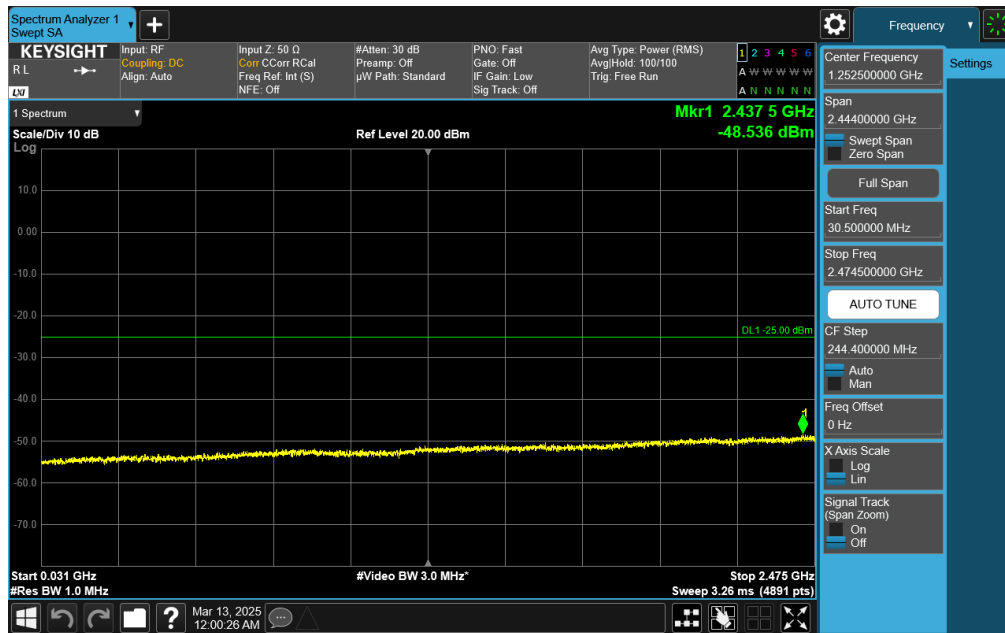
19:37:10 16.05.2025

Plot 7-62. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 50 - High Channel)

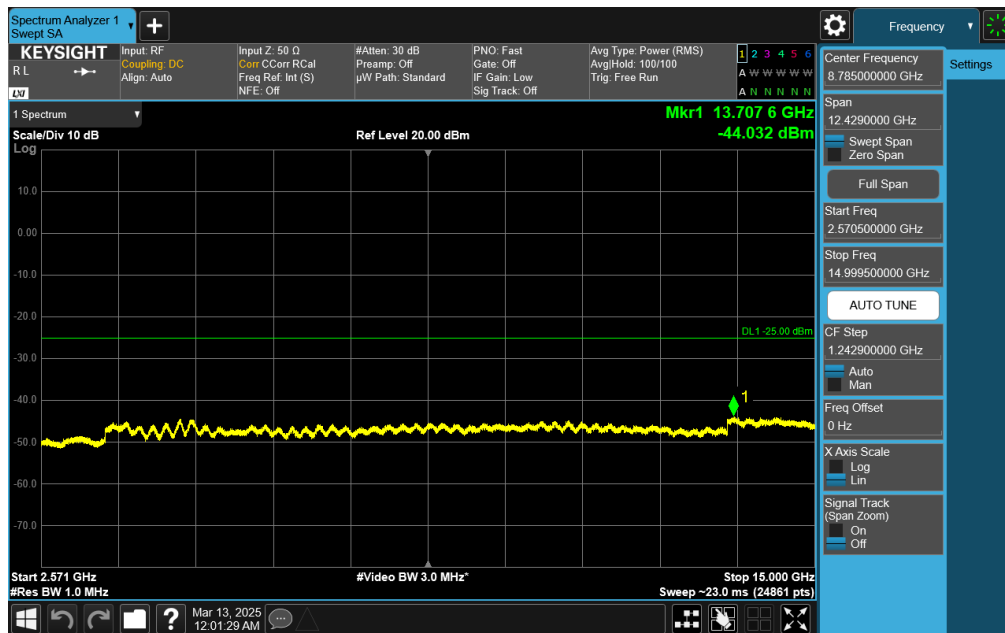
FCC ID: BCG-A3281	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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NR Band n7



Plot 7-63. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Low Channel)

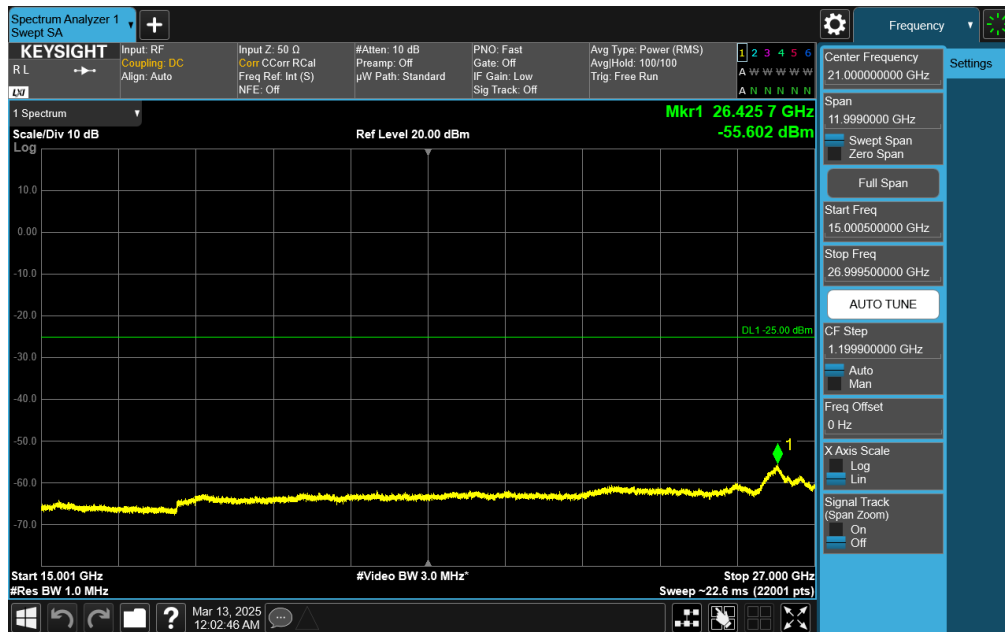


Plot 7-64. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Low Channel)

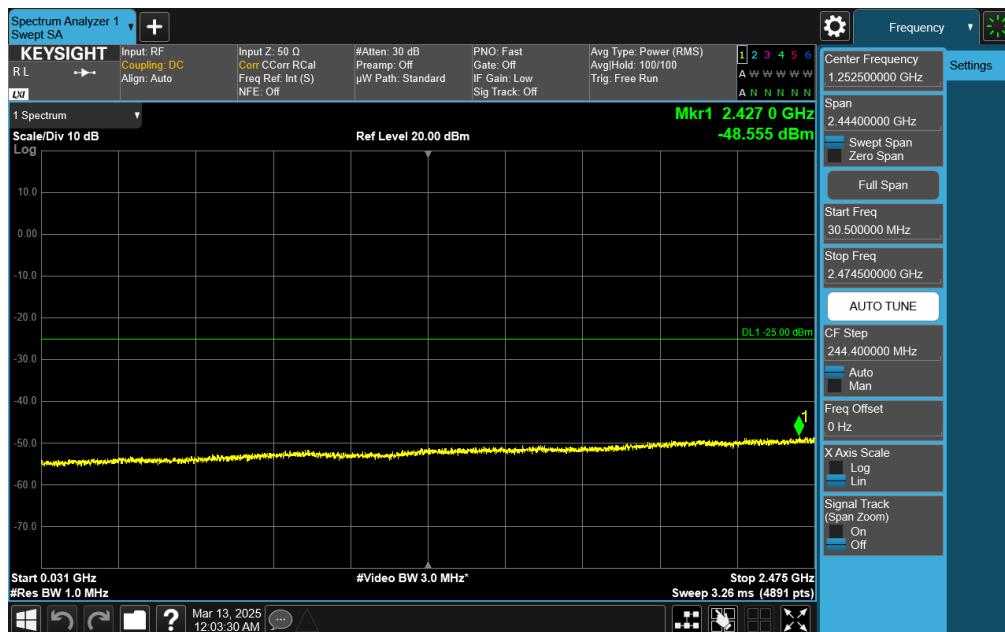
FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270029-06.BCG	Test Dates: 01/17/2025 - 07/31/2025	EUT Type: Watch	Page 50 of 112

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Plot 7-65. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Low Channel)

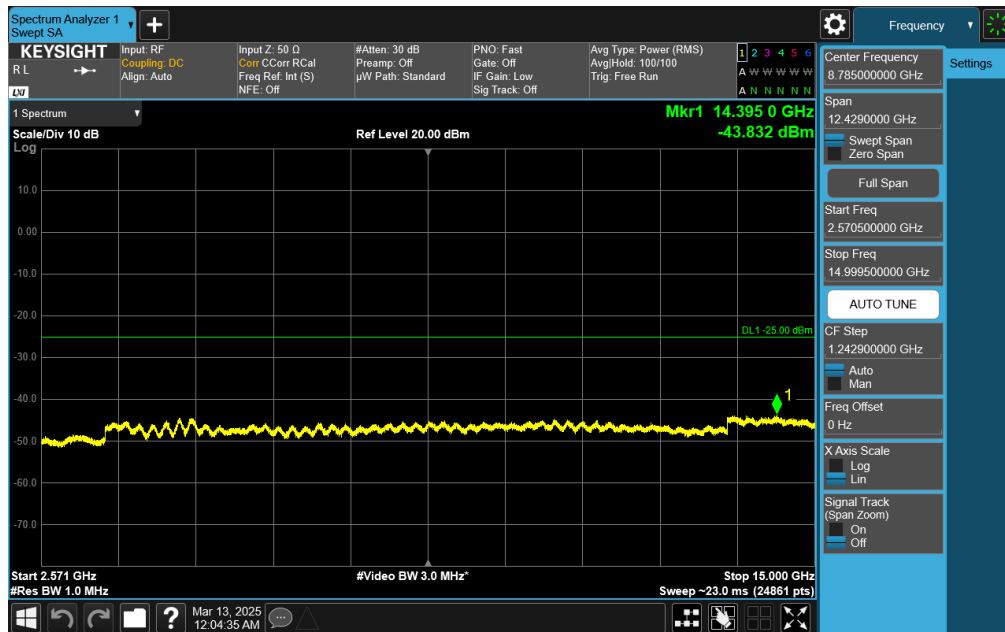


Plot 7-66. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Mid Channel)

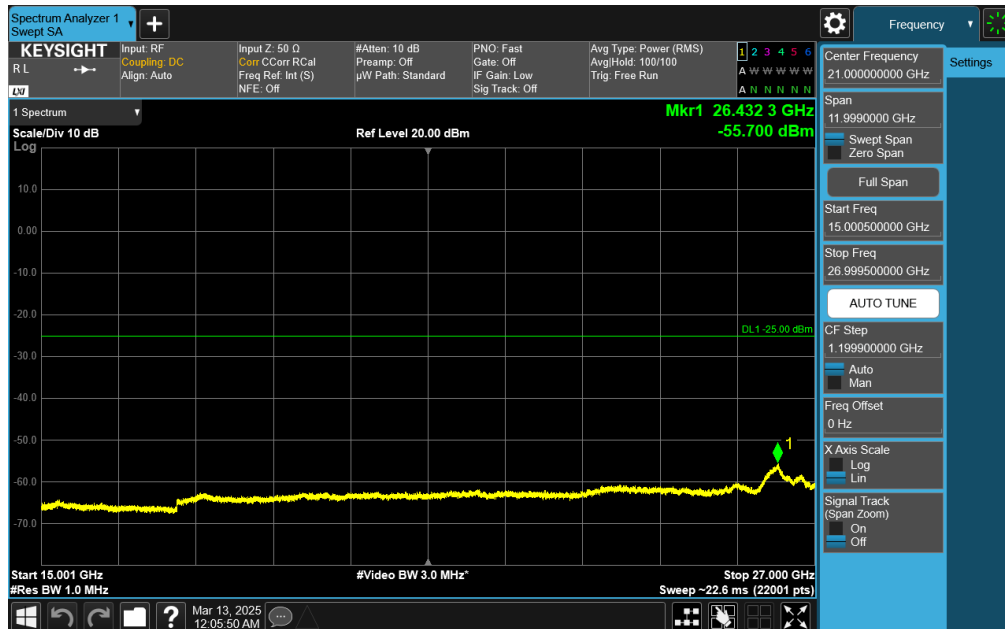
FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-67. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Mid Channel)

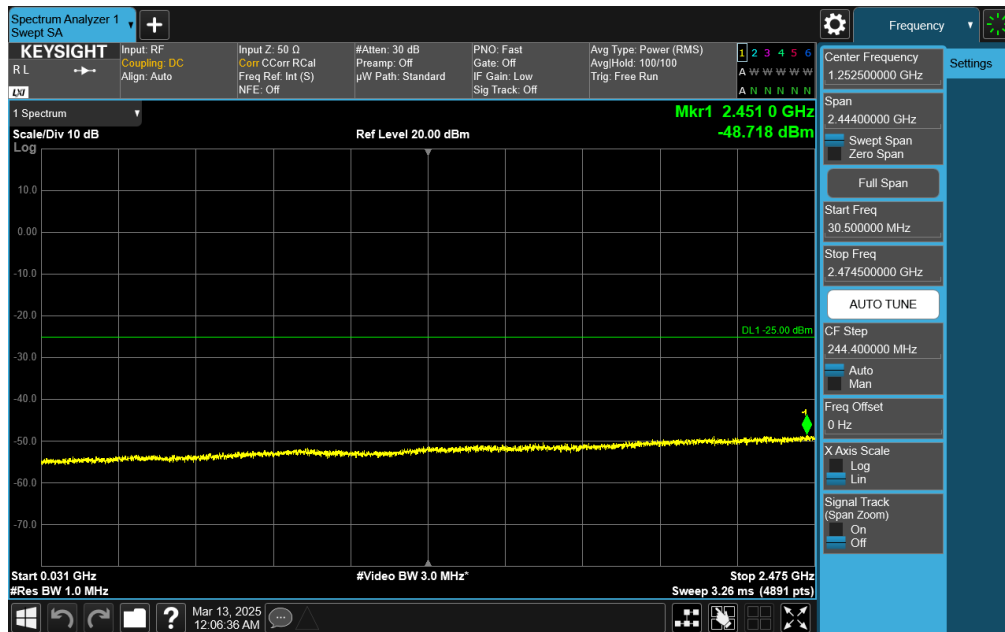


Plot 7-68. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Mid Channel)

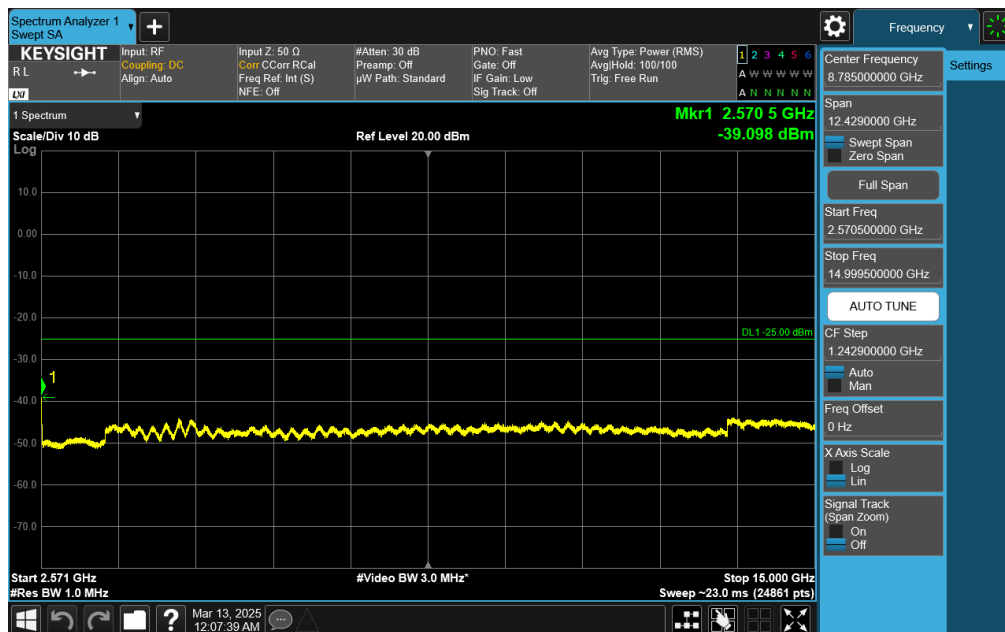
FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-69. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - High Channel)

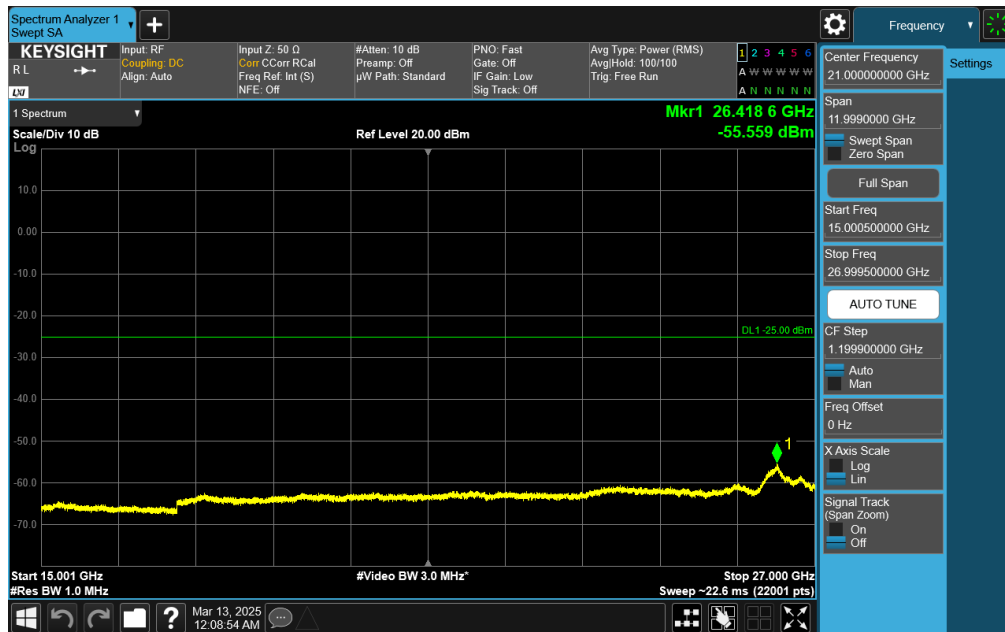


Plot 7-70. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - High Channel)

FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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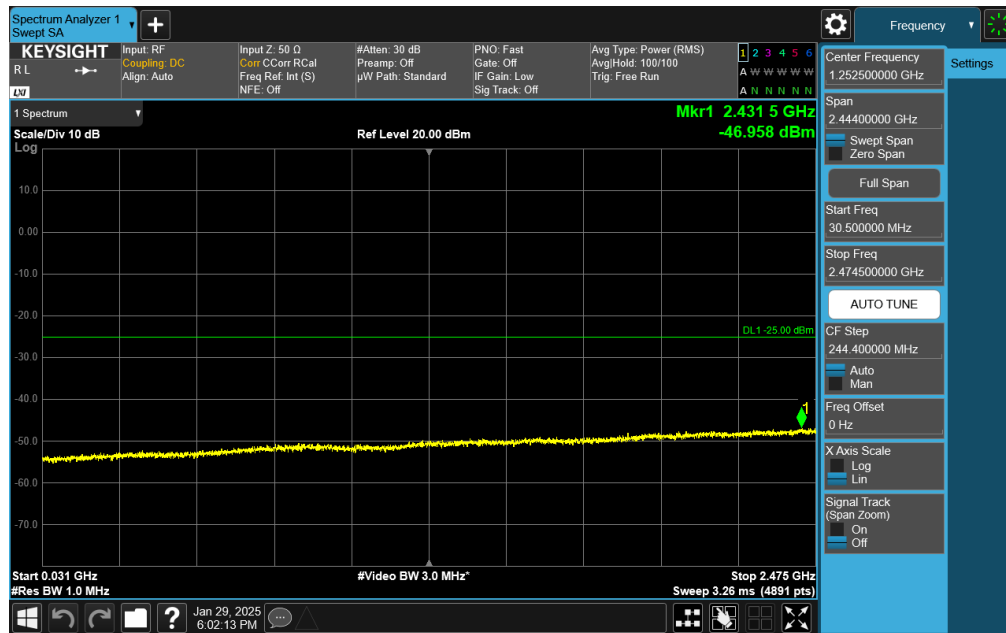


Plot 7-71. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - High Channel)

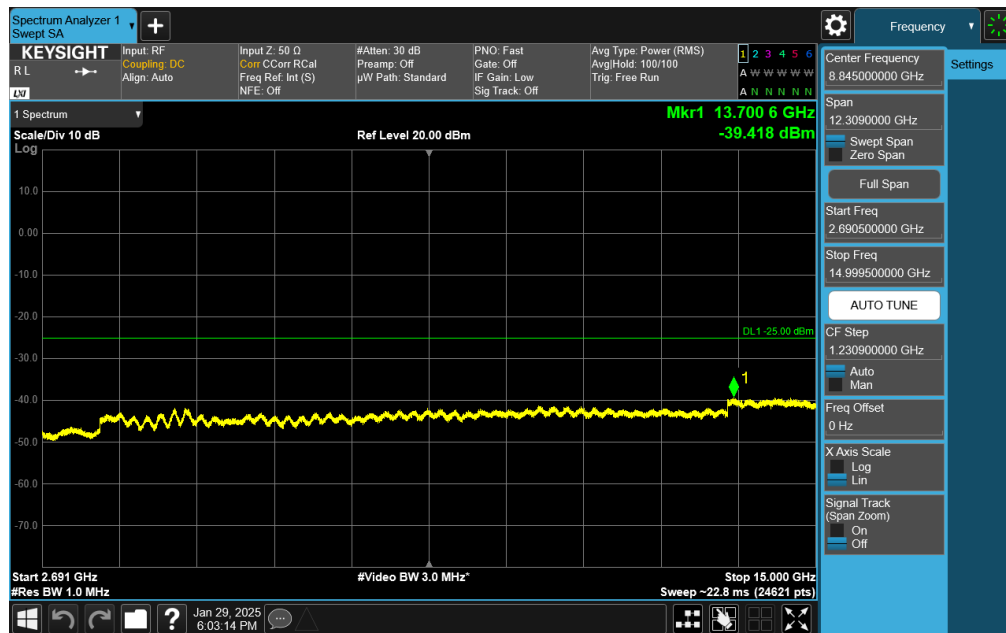
FCC ID: BCG-A3281	element PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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NR Band n41



Plot 7-72. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Low Channel)

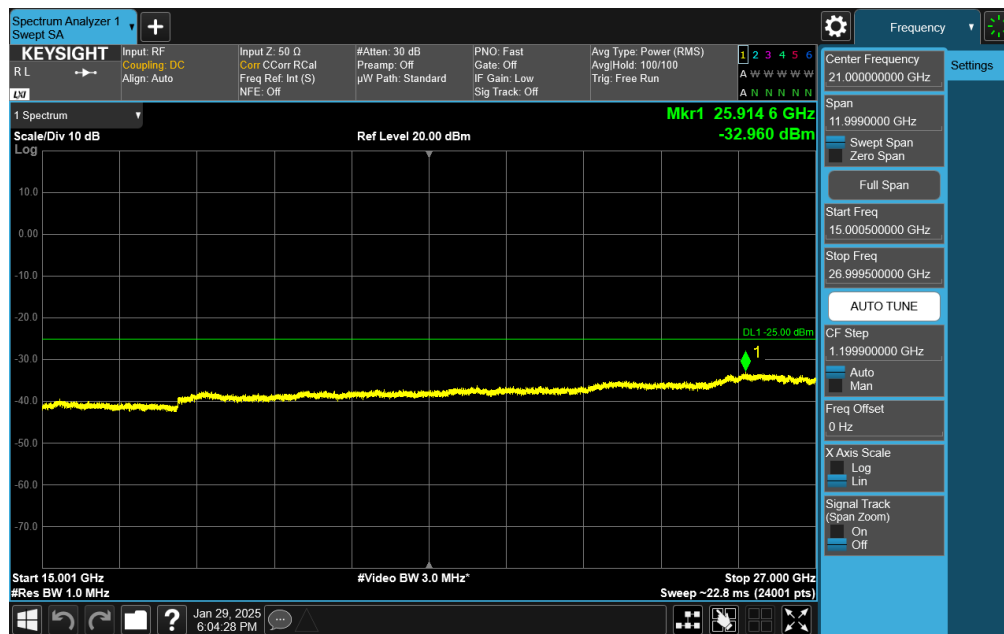


Plot 7-73. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Low Channel)

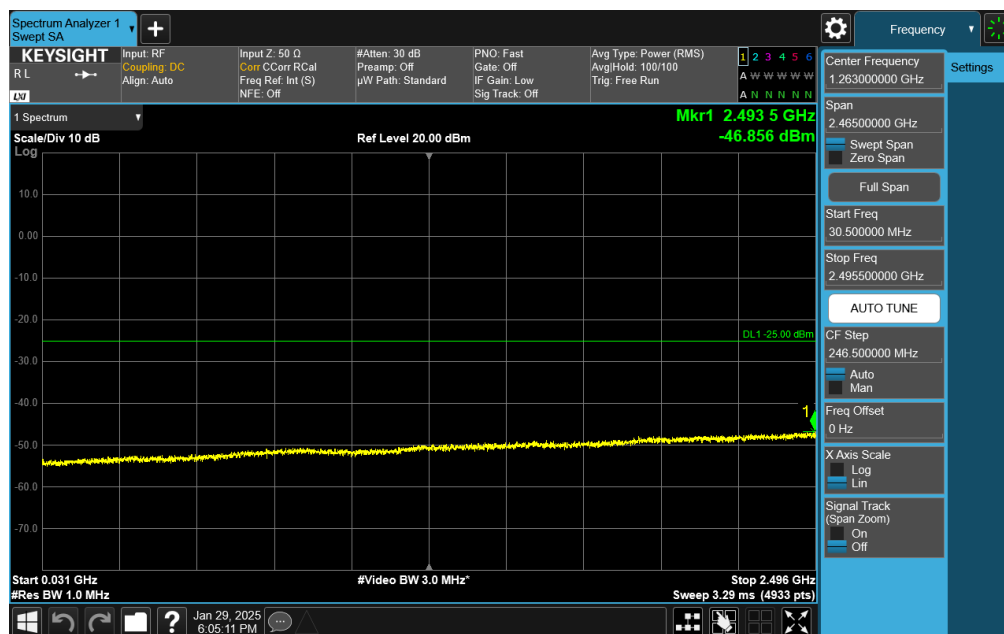
FCC ID: BCG-A3281	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-74. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Low Channel)

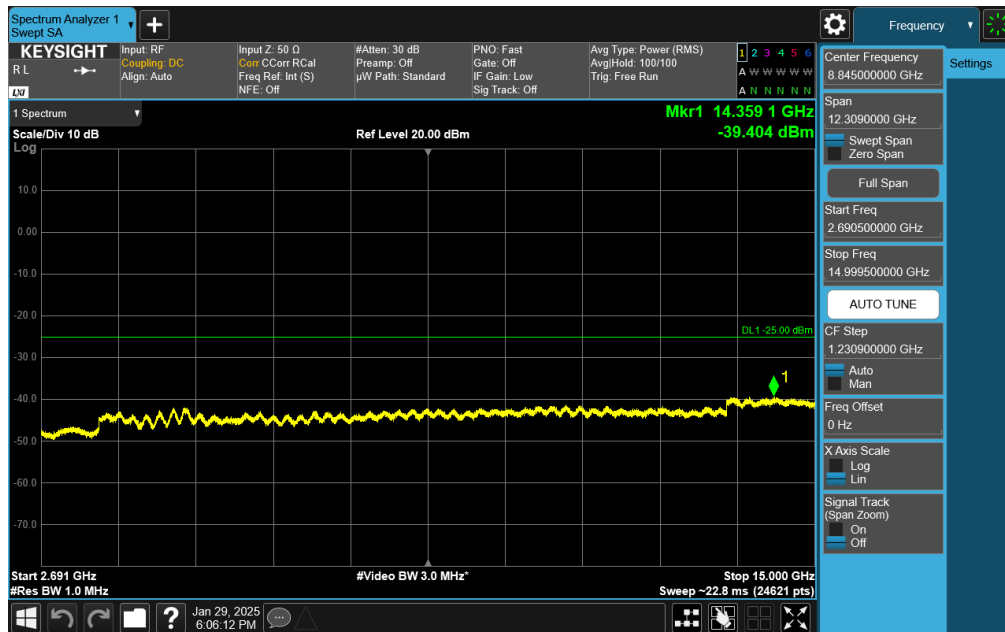


Plot 7-75. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Mid Channel)

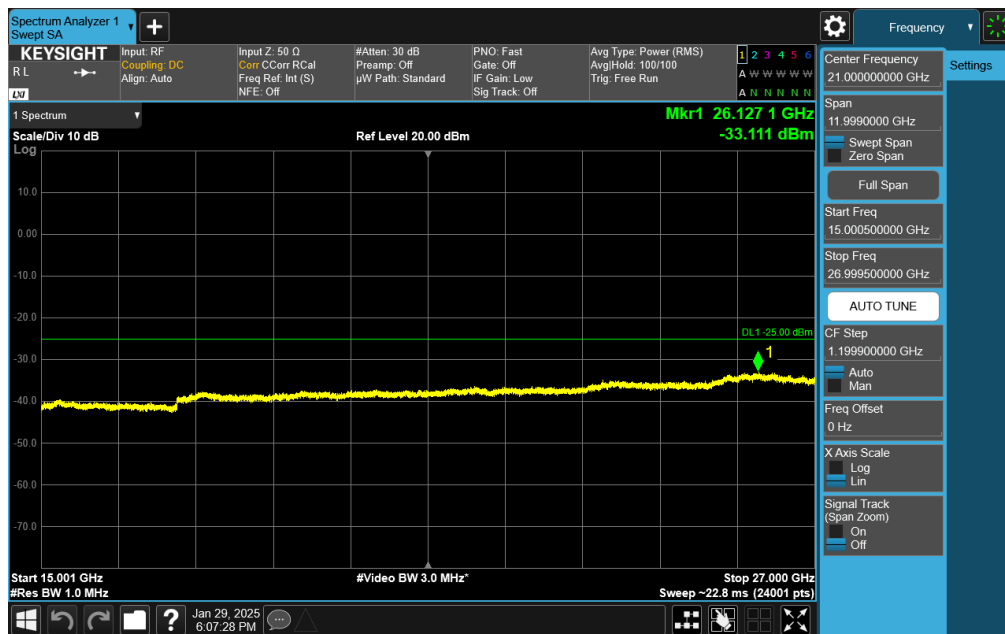
FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270029-06.BCG	Test Dates: 01/17/2025 - 07/31/2025	EUT Type: Watch	Page 56 of 112

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Plot 7-76. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Mid Channel)

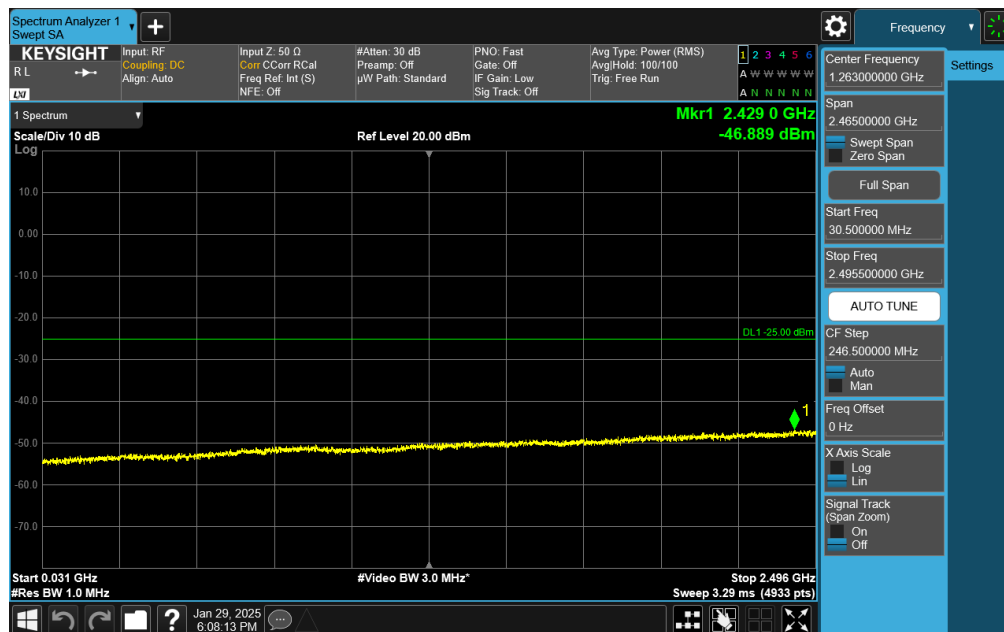


Plot 7-77. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Mid Channel)

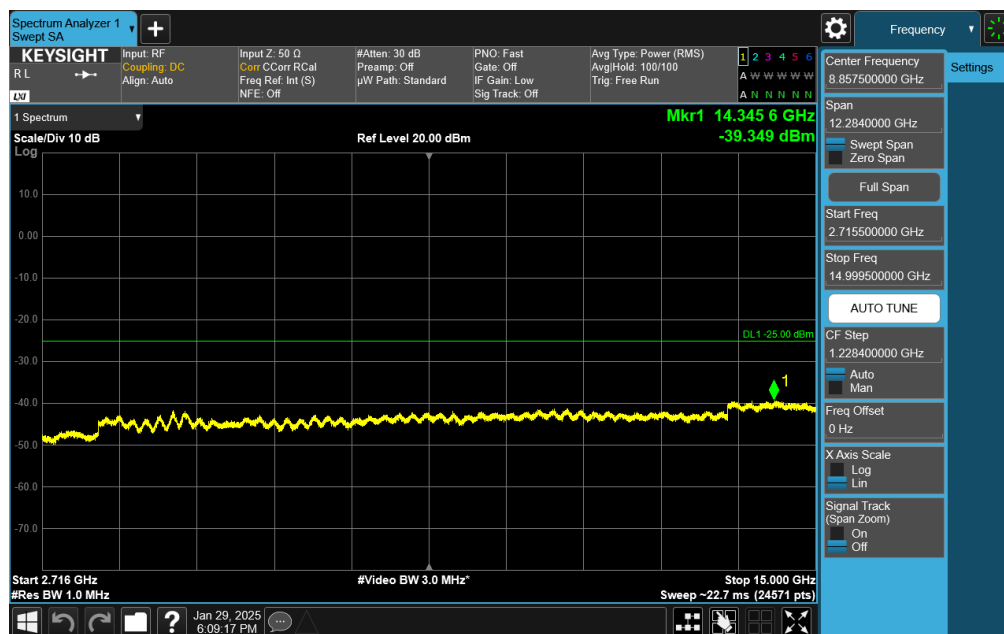
FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270029-06.BCG	Test Dates: 01/17/2025 - 07/31/2025	EUT Type: Watch	Page 57 of 112

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Plot 7-78. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - High Channel)

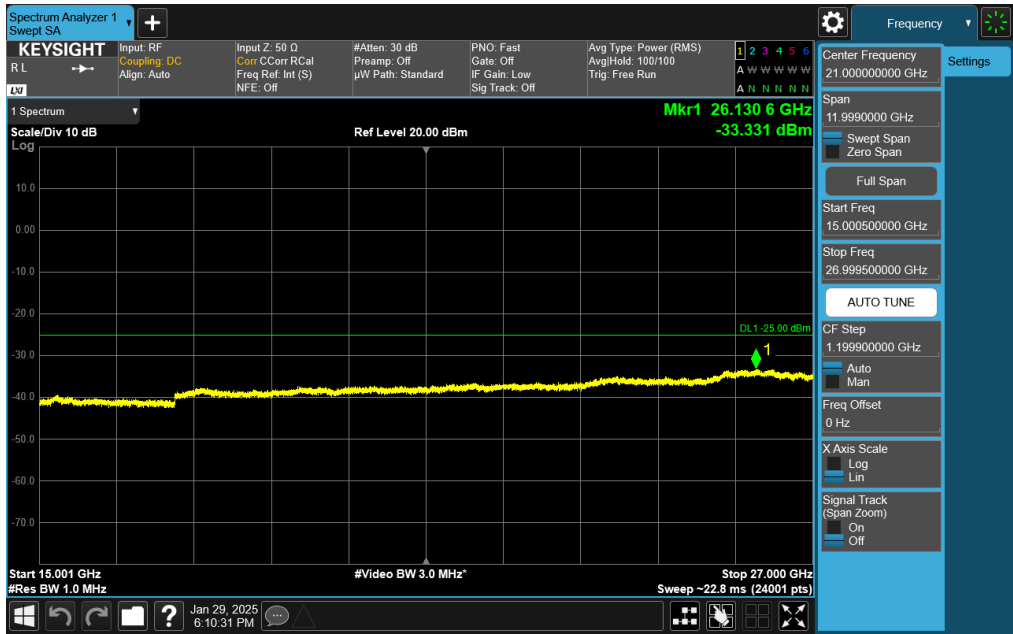


Plot 7-79. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - High Channel)


FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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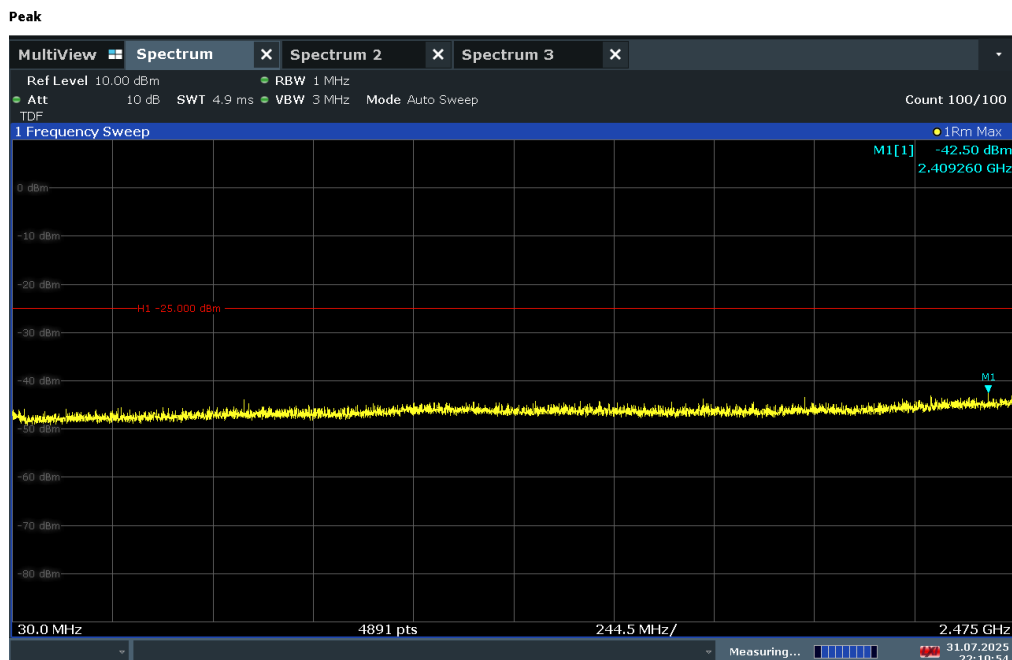
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Plot 7-80. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - High Channel)

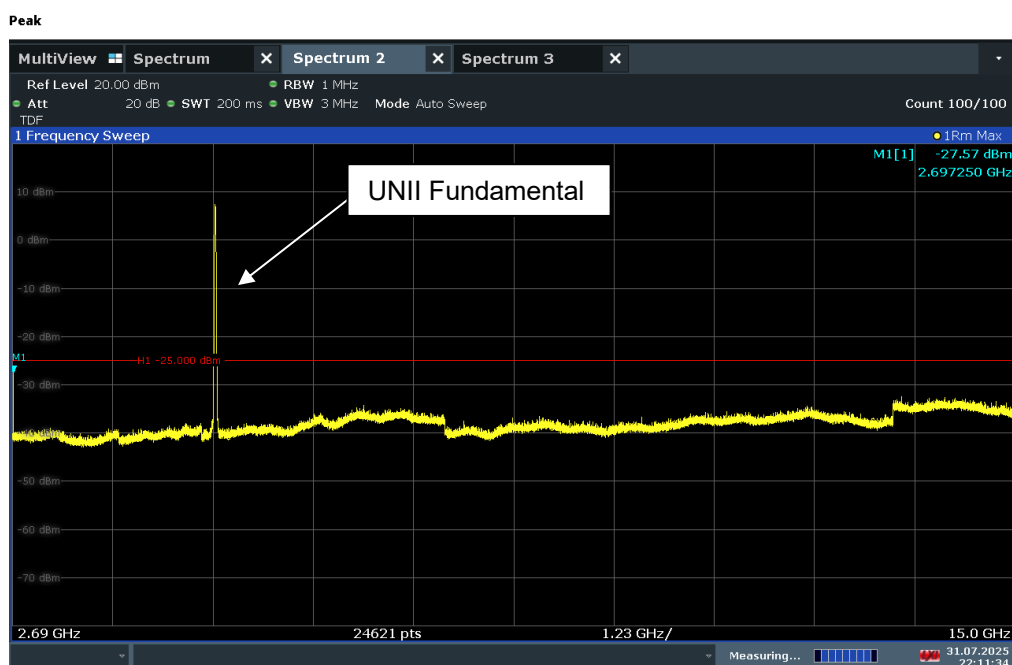
FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270029-06.BCG	Test Dates: 01/17/2025 - 07/31/2025	EUT Type: Watch	Page 59 of 112

Simultaneous Tx Conducted Spurious Emissions Measurements




22:10:54 31.07.2025

Plot 7-81. Simultaneous Tx Conducted Spurious Plot (NR Band n41 + BT + UNII)



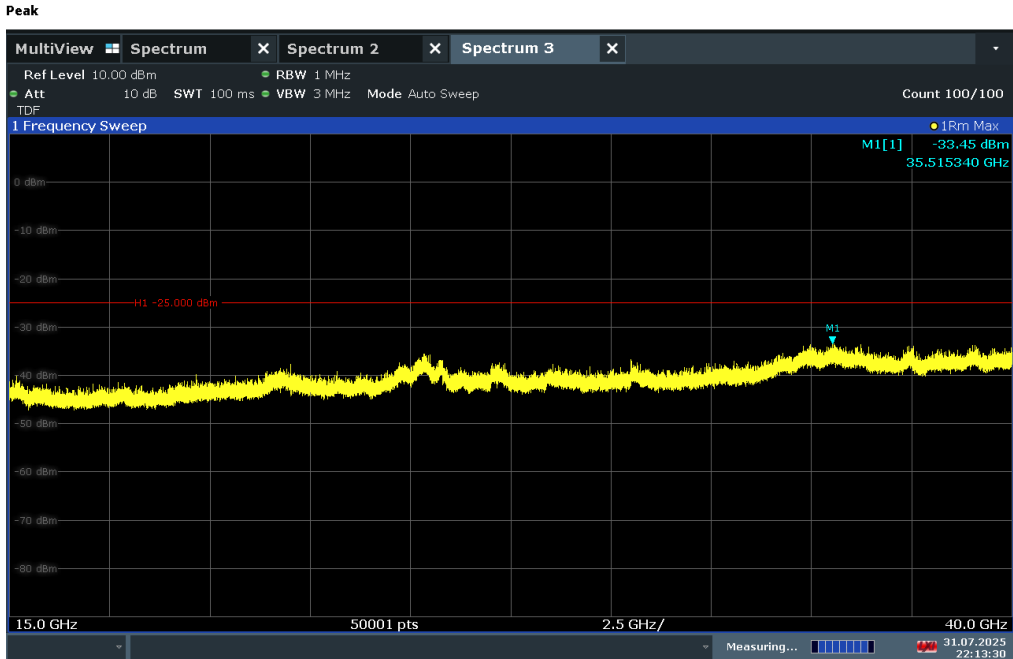
22:11:35 31.07.2025

Plot 7-82. Simultaneous Tx Conducted Spurious Plot (NR Band n41 + BT + UNII)

FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270029-06.BCG	Test Dates: 01/17/2025 - 07/31/2025	EUT Type: Watch	Page 60 of 112


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22:13:30 31.07.2025

Plot 7-83. Simultaneous Tx Conducted Spurious Plot (NR Band n41 + BT + UNII)

FCC ID: BCG-A3281	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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