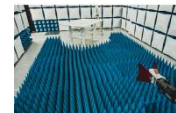




Element Materials Technology

(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:

12/20/2024 - 7/19/2025

Test Report Issue Date:

8/8/2025

Test Site/Location:

Element Materials Technology, Morgan Hill, CA, USA

Test Report Serial No.:

1C2503270037-04.BCG

FCC ID:

BCG-A3328

Applicant Name:

Apple Inc.

Application Type:

Certification

Model:

A3328, A3329

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-A3328	PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch
		Page 1 of 110

V2.2 09/07/2023

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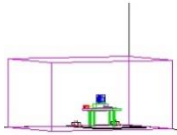
TABLE OF CONTENTS

1.0	INTRODUCTION	4
1.1	Scope	4
1.2	Element Materials Technology Test Location.....	4
1.3	Test Facility / Accreditations.....	4
2.0	PRODUCT INFORMATION.....	5
2.1	Equipment Description	5
2.2	Device Capabilities.....	5
2.3	Antenna Description	6
2.4	Test Support Equipment.....	6
2.5	Test Configuration	7
2.6	Software and Firmware	7
2.7	EMI Suppression Device(s)/Modifications	7
3.0	DESCRIPTION OF TESTS	8
3.1	Evaluation Procedure	8
3.2	Radiated Spurious Emissions	8
4.0	MEASUREMENT UNCERTAINTY	9
5.0	TEST EQUIPMENT CALIBRATION DATA	10
6.0	SAMPLE CALCULATIONS	11
7.0	TEST RESULTS	12
7.1	Summary	12
7.2	Occupied Bandwidth	13
7.3	Spurious and Harmonic Emissions at Antenna Terminal	37
7.4	Band Edge Emissions at Antenna Terminal	61
7.5	Radiated Power (EIRP).....	86
7.6	Radiated Spurious Emissions	92
7.7	Frequency Stability / Temperature Variation	105
8.0	CONCLUSION.....	110

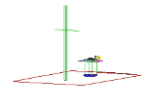
FCC ID: BCG-A3328		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 2 of 110

V2.2 09/07/2023

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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	4.5464	64.417	18.09	4M55G7W
		16QAM	2502.5 - 2567.5	4.5204	57.943	17.63	4M52D7W
	10 MHz	QPSK	2505 - 2565	9.0221	63.241	18.01	9M02G7W
		16QAM	2505 - 2565	5.0810	53.827	17.31	5M08D7W
	15 MHz	QPSK	2507.5 - 2562.5	13.5099	65.766	18.18	13M5G7W
		16QAM	2507.5 - 2562.5	5.3700	54.576	17.37	5M37D7W
LTE Band 41(PC3)	5 MHz	QPSK	2498.5 - 2687.5	4.5650	87.096	19.40	4M57G7W
		16QAM	2498.5 - 2687.5	4.5304	66.988	18.26	4M53D7W
	10 MHz	QPSK	2501 - 2685	9.0645	86.896	19.39	9M06G7W
		16QAM	2501 - 2685	5.0987	66.834	18.25	5M10D7W
	15 MHz	QPSK	2503.5 - 2682.5	13.5840	87.096	19.40	13M6G7W
		16QAM	2503.5 - 2682.5	5.4682	68.865	18.38	5M47D7W
	20 MHz	QPSK	2506 - 2680	18.0530	87.096	19.40	18M1G7W
		16QAM	2506 - 2680	5.8684	69.024	18.39	5M87D7W
NR Band n7	5 MHz	$\pi/2$ BPSK	2502.5 - 2567.5	4.4709	65.615	18.17	4M47G7W
		QPSK	2502.5 - 2567.5	4.4836	66.069	18.20	4M48G7W
		16QAM	2502.5 - 2567.5	4.4747	52.966	17.24	4M47D7W
		64QAM	2502.5 - 2567.5	4.4859	41.783	16.21	4M49D7W
	10MHz	$\pi/2$ BPSK	2505 - 2565	8.9800	65.615	18.17	8M98G7W
		QPSK	2505 - 2565	9.3309	66.069	18.20	9M33G7W
		16QAM	2505 - 2565	9.3149	52.119	17.17	9M31D7W
		64QAM	2505 - 2565	9.2659	41.495	16.18	9M27D7W
	15 MHz	$\pi/2$ BPSK	2507.5 - 2562.5	13.5000	65.464	18.16	13M5G7W
		QPSK	2507.5 - 2562.5	14.1370	66.069	18.20	14M1G7W
		16QAM	2507.5 - 2562.5	14.0830	53.456	17.28	14M1D7W
		64QAM	2507.5 - 2562.5	14.1970	42.364	16.27	14M2D7W
	20MHz	$\pi/2$ BPSK	2510 - 2560	17.9730	66.069	18.20	18M0G7W
		QPSK	2510 - 2560	18.8800	66.069	18.20	18M9G7W
		16QAM	2510 - 2560	18.9730	52.000	17.16	19M0D7W
		64QAM	2510 - 2560	18.9210	41.591	16.19	18M9D7W
NR Band n41 (PC3)	10 MHz	$\pi/2$ BPSK	2501 - 2685	8.5833	86.896	19.39	8M58G7W
		QPSK	2501 - 2685	8.5801	86.696	19.38	8M58G7W
		16QAM	2501 - 2685	8.5820	69.343	18.41	8M58D7W
		64QAM	2501 - 2685	8.6409	54.576	17.37	8M64D7W
	15 MHz	$\pi/2$ BPSK	2503.5 - 2682.5	12.9420	87.096	19.40	12M9G7W
		QPSK	2503.5 - 2682.5	13.6090	87.096	19.40	13M6G7W
		16QAM	2503.5 - 2682.5	13.5830	68.391	18.35	13M6D7W
		64QAM	2503.5 - 2682.5	13.6510	55.847	17.47	13M7D7W
	20 MHz	$\pi/2$ BPSK	2506 - 2680	17.9240	87.096	19.40	17M9G7W
		QPSK	2506 - 2680	18.2590	86.298	19.36	18M3G7W
		16QAM	2506 - 2680	18.3210	69.183	18.40	18M3D7W
		64QAM	2506 - 2680	18.2680	55.081	17.41	18M3D7W

EUT Overview

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 3 of 110

V2.2 09/07/2023

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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

- 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).

FCC ID: BCG-A3328		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 4 of 110

V2.2 09/07/2023

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Watch FCC ID:BCG-A3328**. 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.: L2F7HR6WJC, LDWD7GHHXW, MXT40JXY0C, FN6HFX0011W0000YCL, FN6HFX000390000YCL

2.2 Device Capabilities

This device contains the following capabilities:

Multi-band LTE, 5G NR (FR1), 802.11b/g/n WLAN, Bluetooth (1x, EDR, HDR4, HDR8, LE1M, LE2M), NFC.

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	LTE/FR1
	802.11b/g/n	BDR, EDR, HDR4/8, LE1/2M	Mid/High Band
Config 1	✓	✗	✓
Config 2	✗	✓	✓

Table 2-1. Simultaneous Transmission Configurations

✓ = Support; ✗ = Not Support

Note:

All the above simultaneous transmission configurations have been tested and the worst-case configuration was found to be Config 2.

FCC ID: BCG-A3328		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 5 of 110

V2.2 09/07/2023

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2.3 Antenna Description

Following antenna gains provided by manufacturer were used for testing.


Band	Antenna Gain [dBi]
	Antenna FCM
LTE Band 7	-7.0
NR Band n7	
LTE Band 41	-5.8
NR Band n41	

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:	N/A	S/N:	SAA24DEN24xP2444600777
	w/ Cradle	Model:	N/A	S/N:	SAA24FTN24xP1430200500
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:	P1 N24X B PF 029	S/N:	DLCH9T0001J0000UR6
5	DC Power Supply	Model:	KPS3010D	S/N:	N/A

Table 2-3. Test Support Equipment

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 6 of 110

V2.2 09/07/2023

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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 and above 18GHz 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)
Antenna	FCM	FCM
Channel	78	518600
Operating Frequency (MHz)	2480	2593
Mode/Modulation	GFSK ePA	QPSK/1RB/10MHz


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.

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch
		Page 7 of 110

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.

FCC ID: BCG-A3328		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 8 of 110


V2.2 09/07/2023

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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

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch
		Page 9 of 110

V2.2 09/07/2023

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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 has been internally verified/calibrated.

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 10 of 110

V2.2 09/07/2023

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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.

FCC ID: BCG-A3328		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 11 of 110

V2.2 09/07/2023

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7.0 TEST RESULTS

7.1 Summary


Company Name: Apple Inc.
 FCC ID: BCG-A3328
 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	2.1051, 27.53(m)	Undesirable emissions must meet the limits detailed in 27.53(m)	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	27.50(h)(2)	< 2 Watts max. ERP	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	2.1053, 27.53(m)	Undesirable emissions must meet the limits detailed in 27.53(m)	PASS	Section 7.6

Table 7-1. Summary of Test Results

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 spurious emissions, 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.

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 12 of 110

V2.2 09/07/2023

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

FCC ID: BCG-A3328		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 13 of 110

V2.2 09/07/2023

Test Setup

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

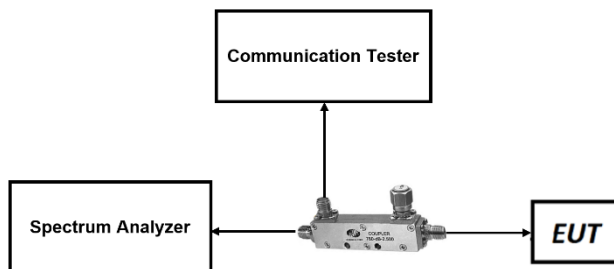


Figure 7-1. LTE Test Instrument & Measurement Setup

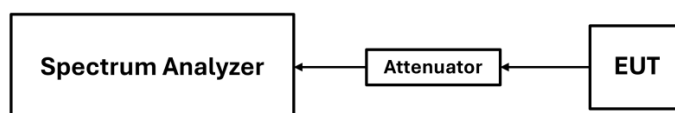



Figure 7-2. FR1 Test Instrument & Measurement Setup

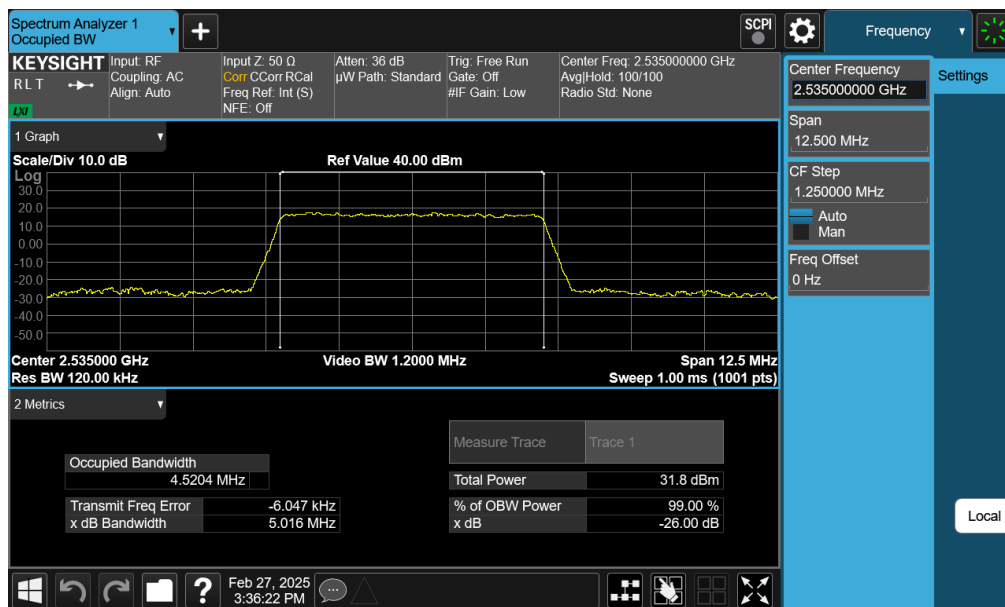
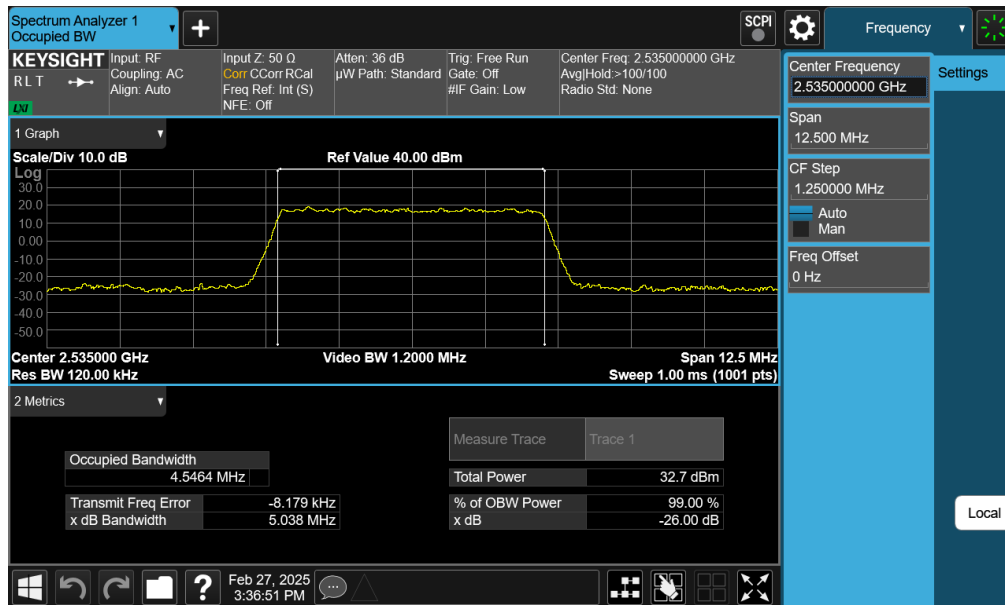
Test Notes


- 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.

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch
		Page 14 of 110

V2.2 09/07/2023

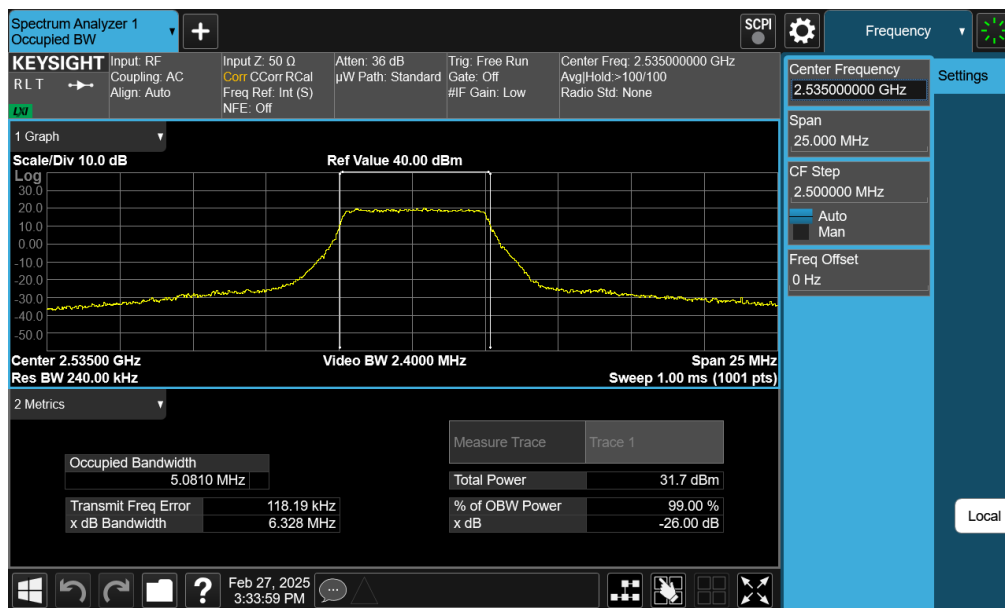
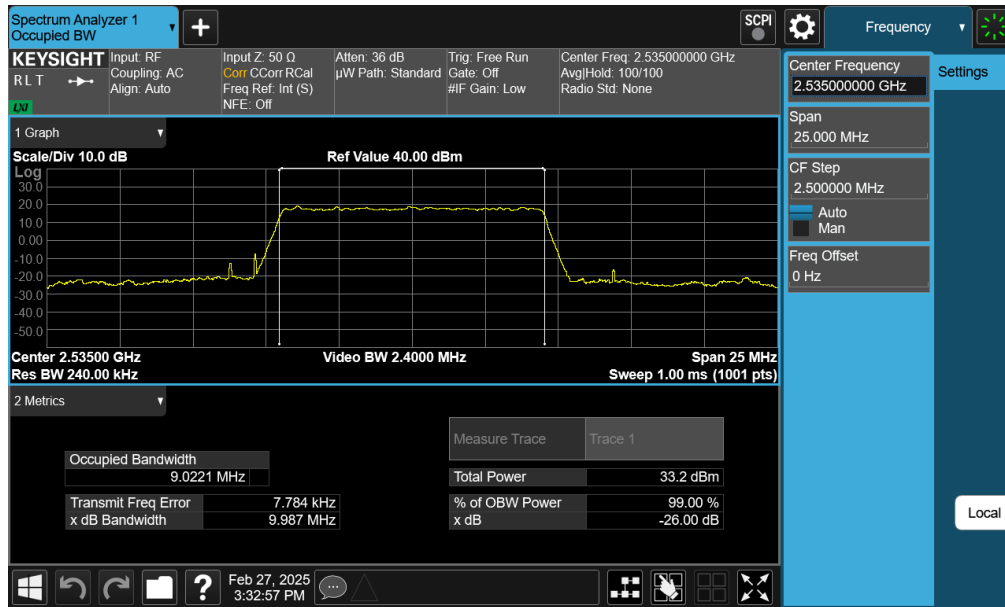
LTE Band 7



FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 15 of 110

V2.2 09/07/2023

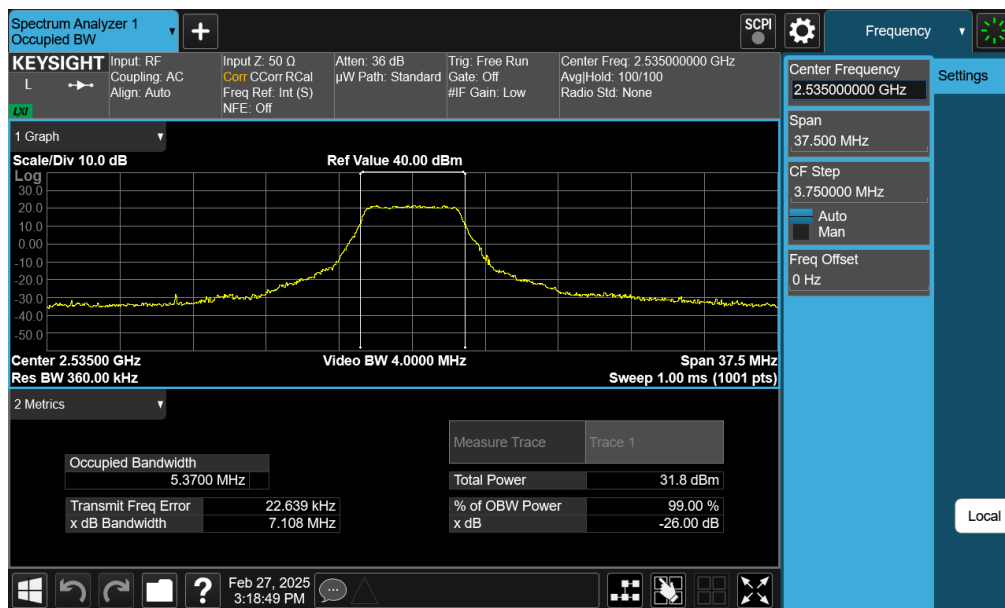
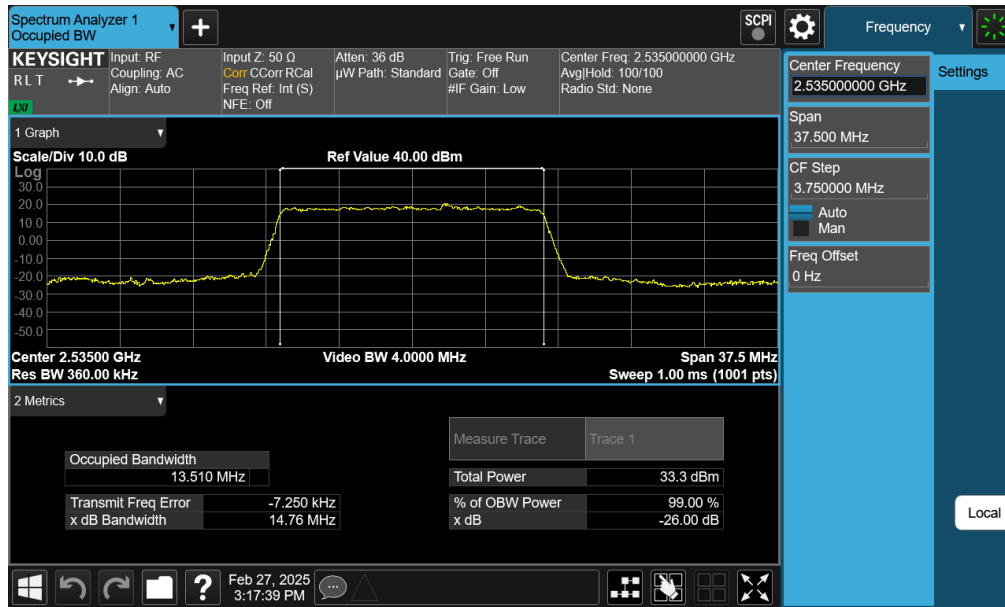
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Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 16 of 110

V2.2 09/07/2023

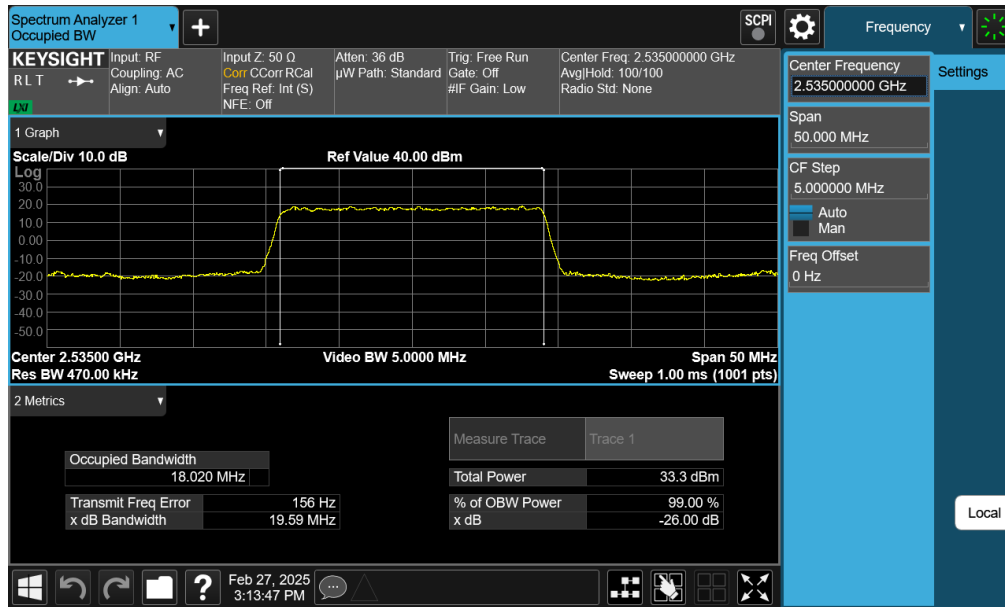
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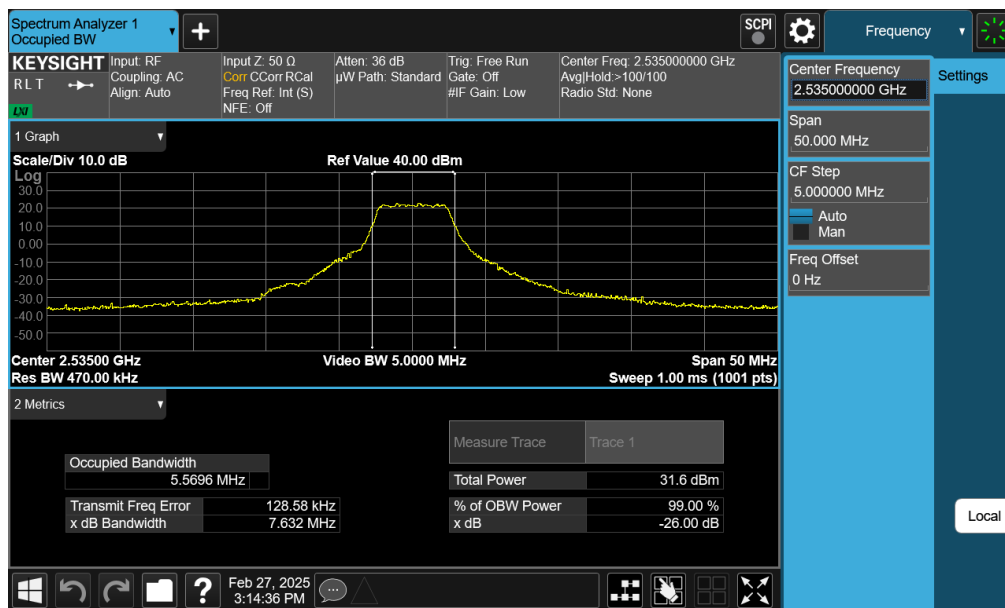
FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 17 of 110

V2.2 09/07/2023


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Plot 7-7. Occupied Bandwidth Plot (LTE Band 7 - 20MHz QPSK - Full RB)



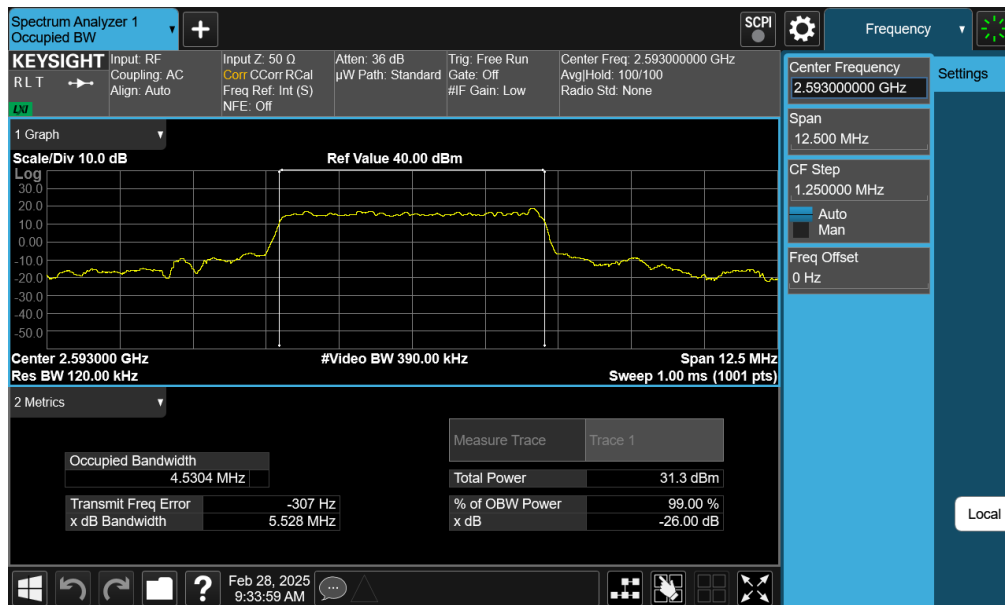
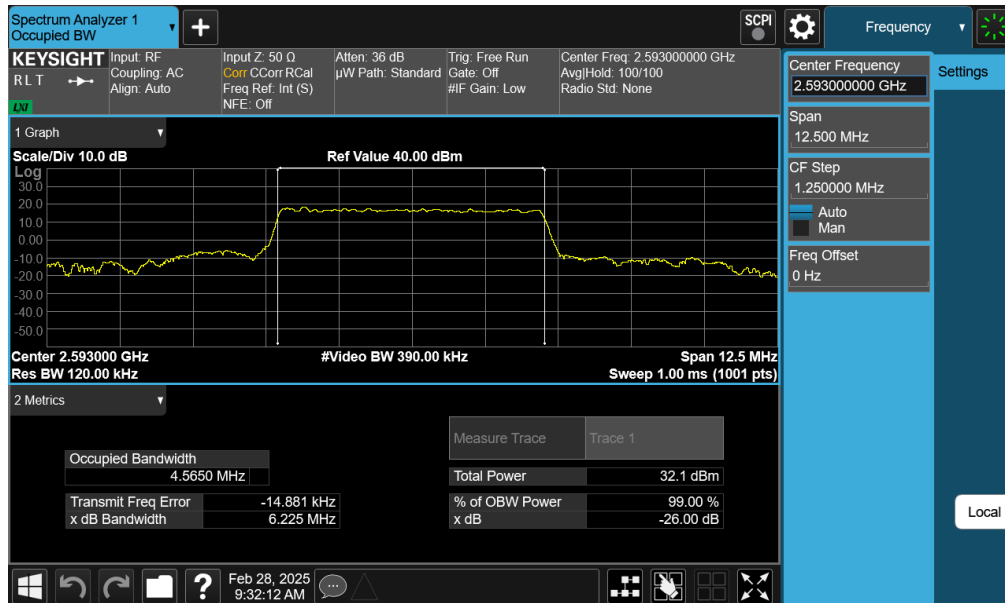
Plot 7-8. Occupied Bandwidth Plot (LTE Band 7 - 20MHz 16-QAM - Full RB)


FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 18 of 110

V2.2 09/07/2023

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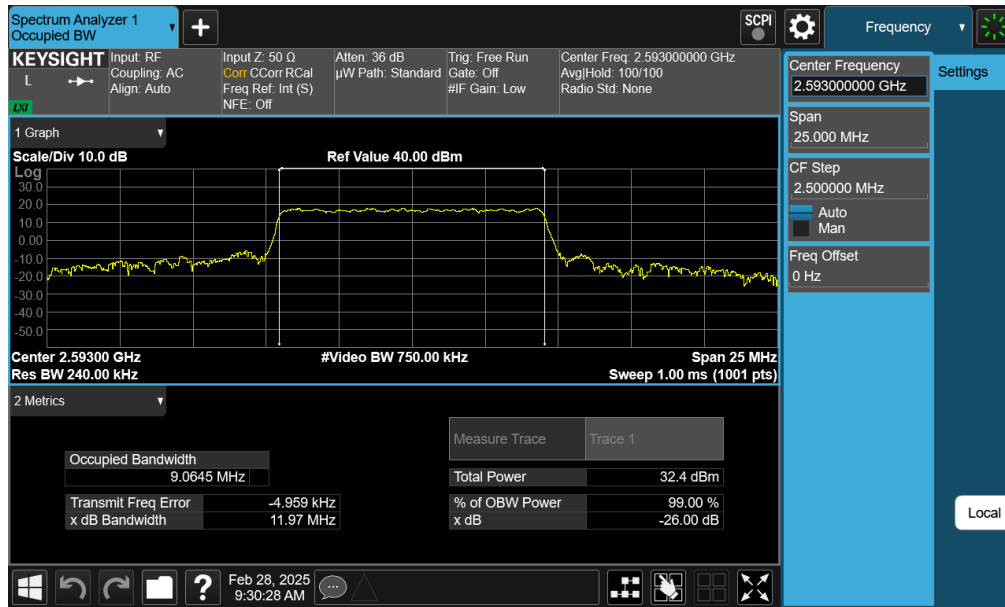
LTE Band 41




FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 19 of 110

V2.2 09/07/2023

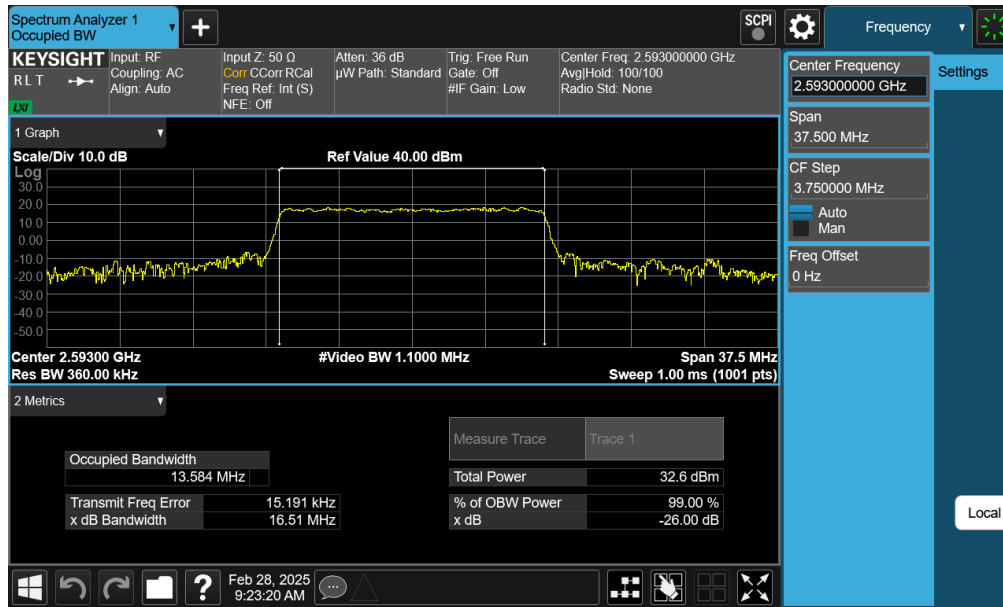
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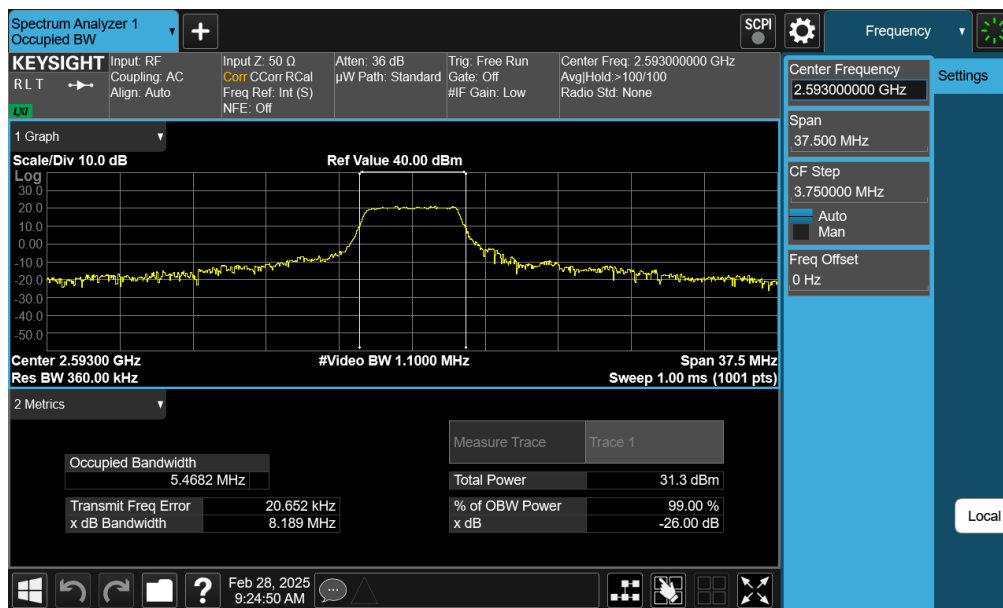
FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 20 of 110

V2.2 09/07/2023

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Plot 7-13. Occupied Bandwidth Plot (LTE Band 41 - 15MHz QPSK - Full RB)

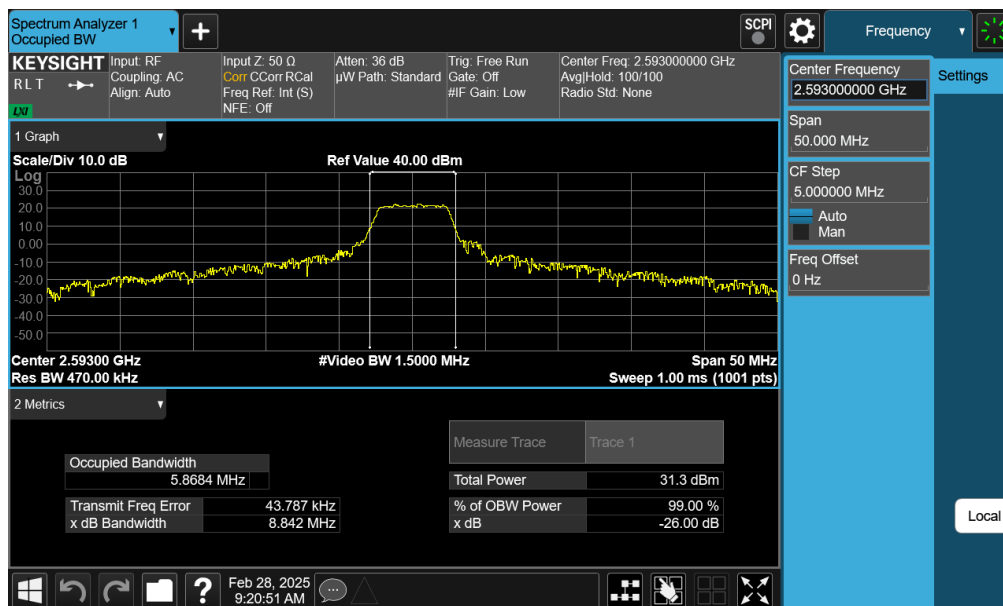
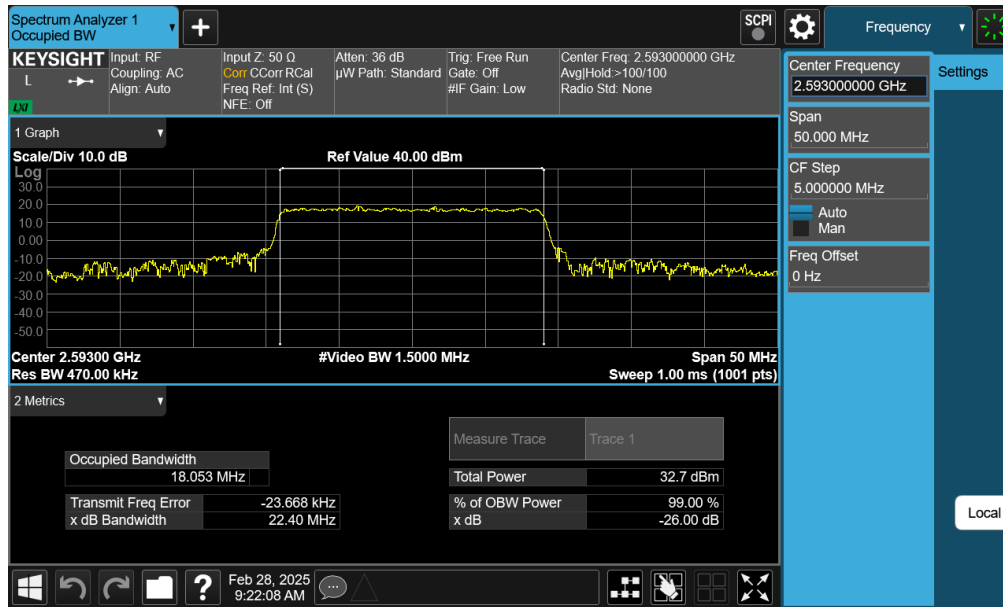


Plot 7-14. Occupied Bandwidth Plot (LTE Band 41 - 15MHz 16-QAM - Full RB)

FCC ID: BCG-A3328	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 21 of 110

V2.2 09/07/2023

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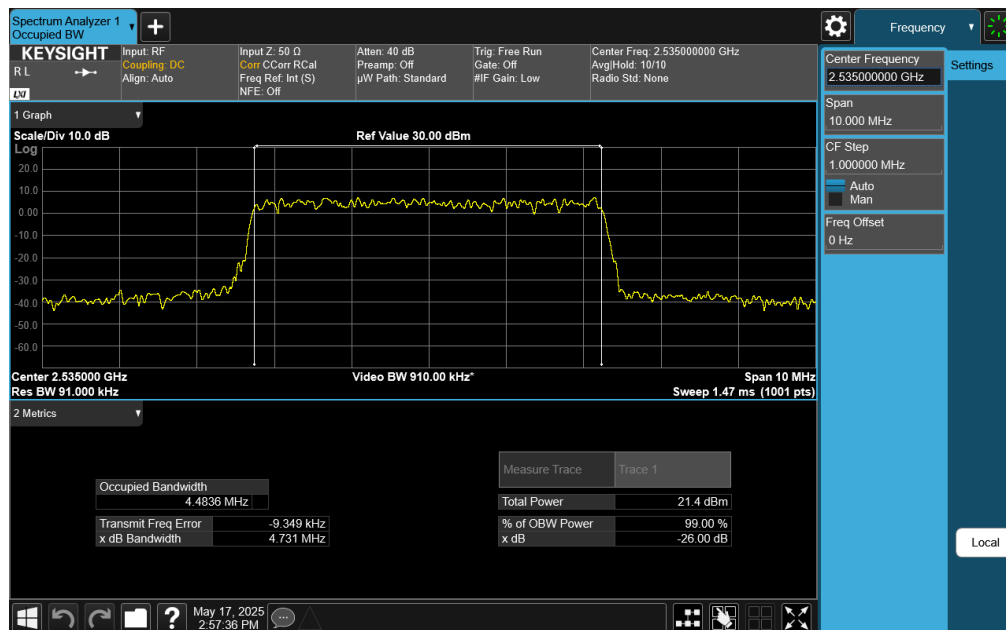
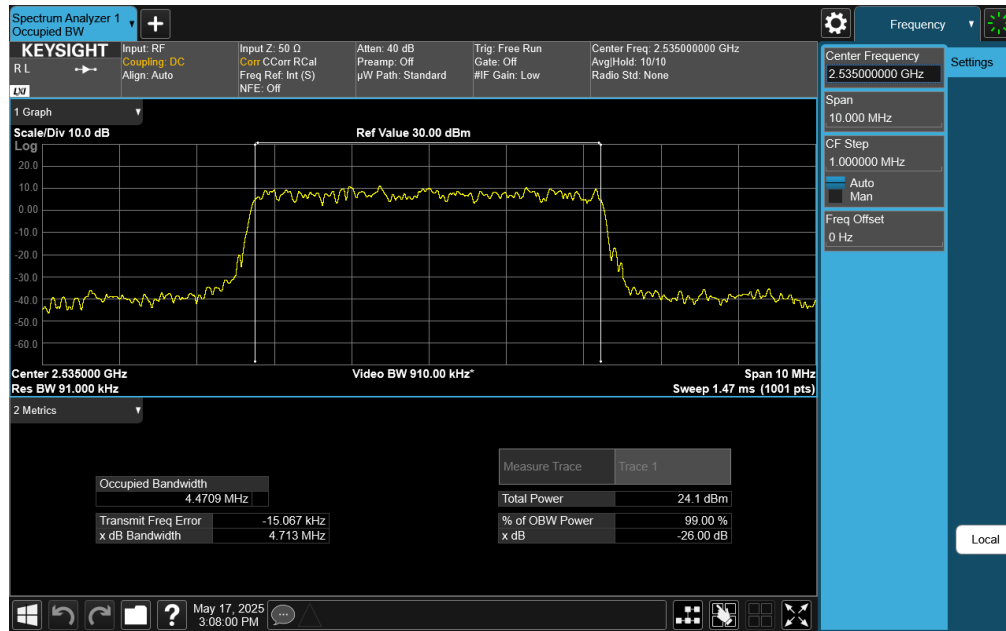



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Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 22 of 110

V2.2 09/07/2023

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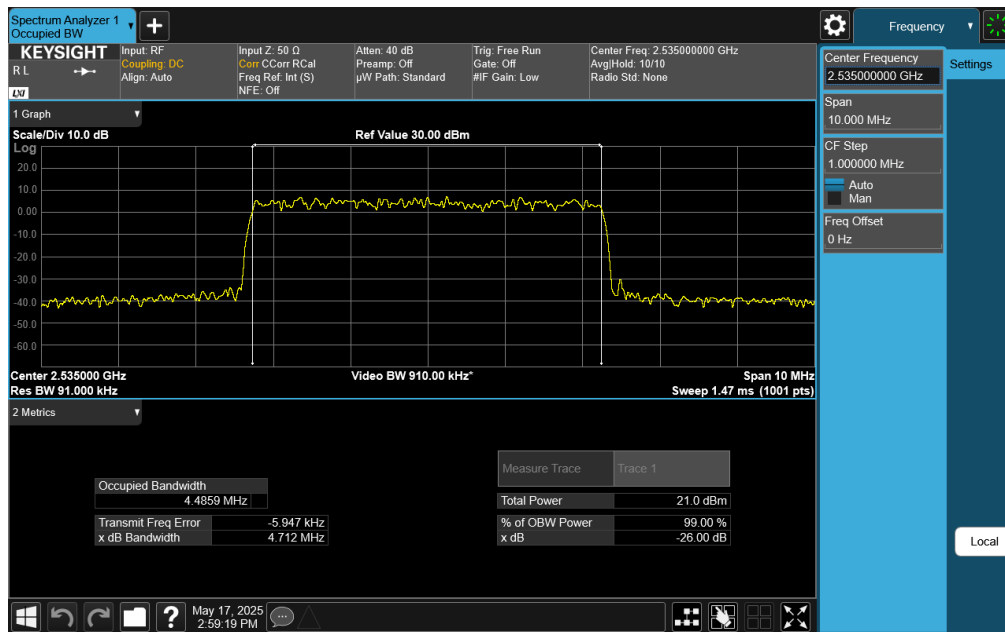
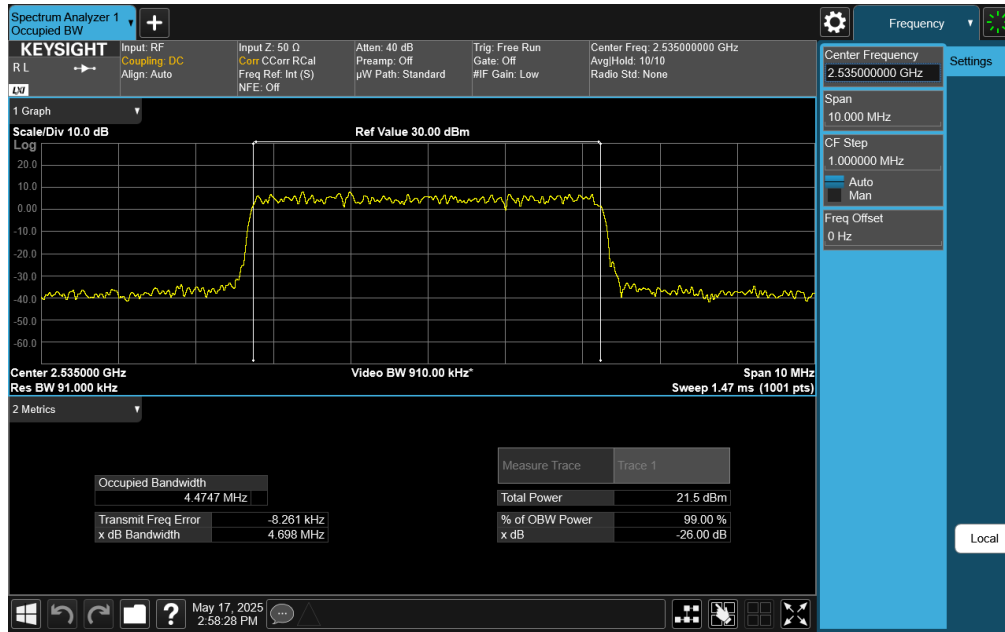
NR Band n7




FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 23 of 110

V2.2 09/07/2023

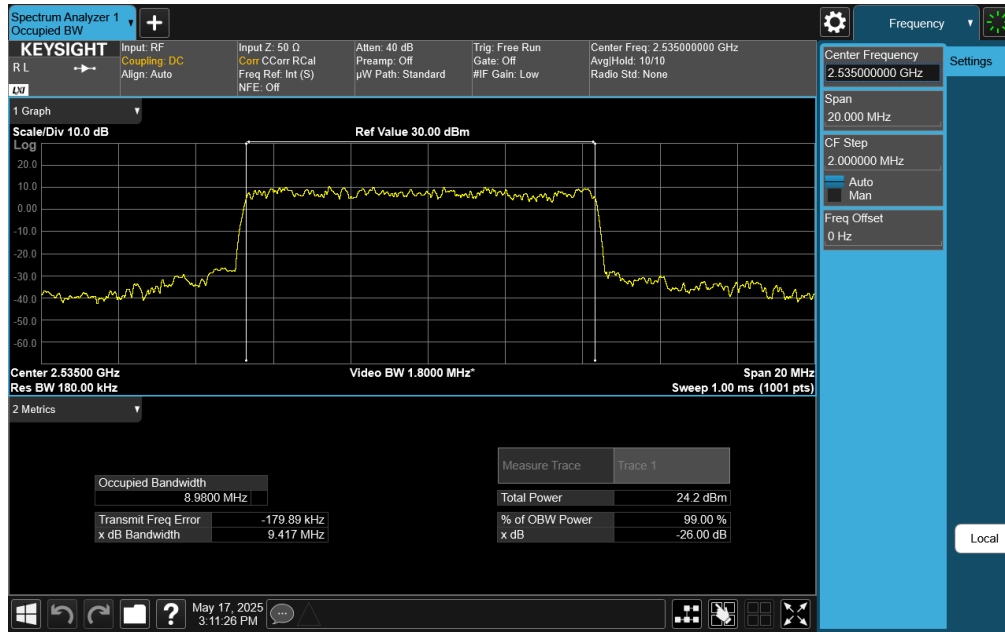
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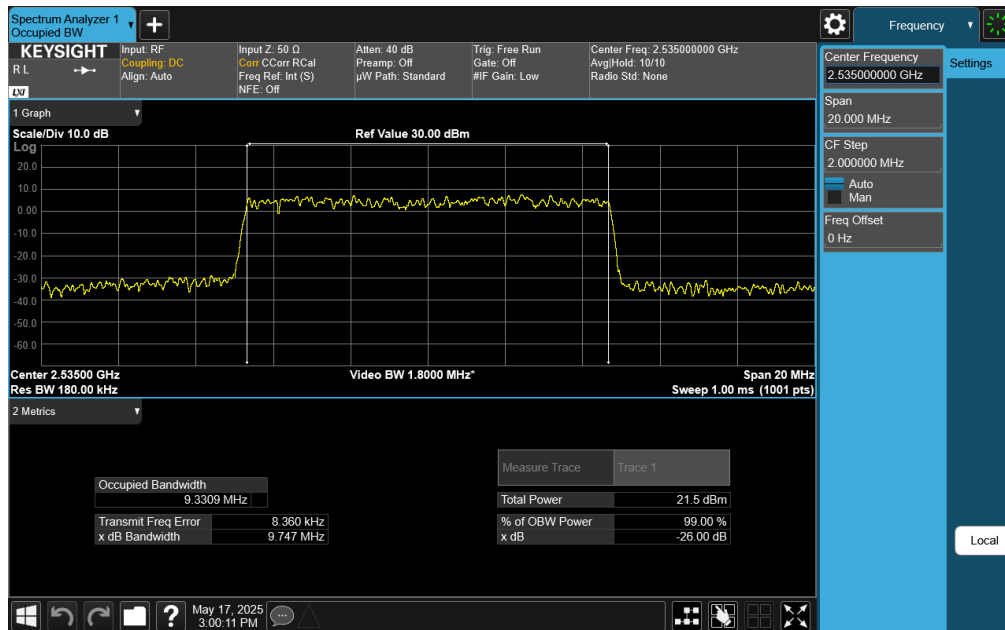
FCC ID: BCG-A3328		PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch		Page 24 of 110

V2.2 09/07/2023

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Plot 7-21. Occupied Bandwidth Plot (NR Band n7 - 10MHz DFT-s-OFDM $\pi/2$ BPSK - Full RB)

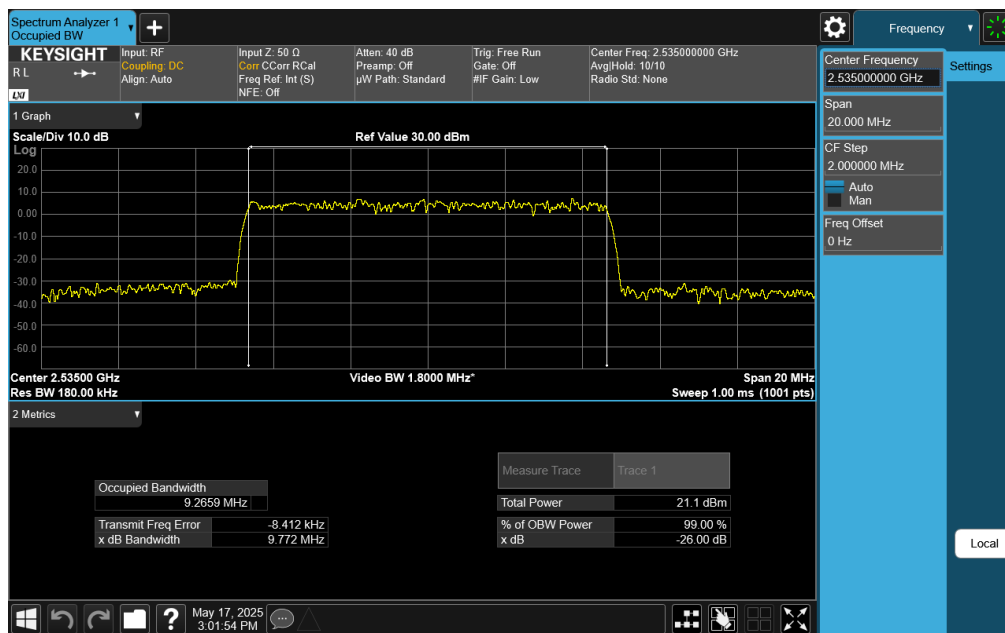
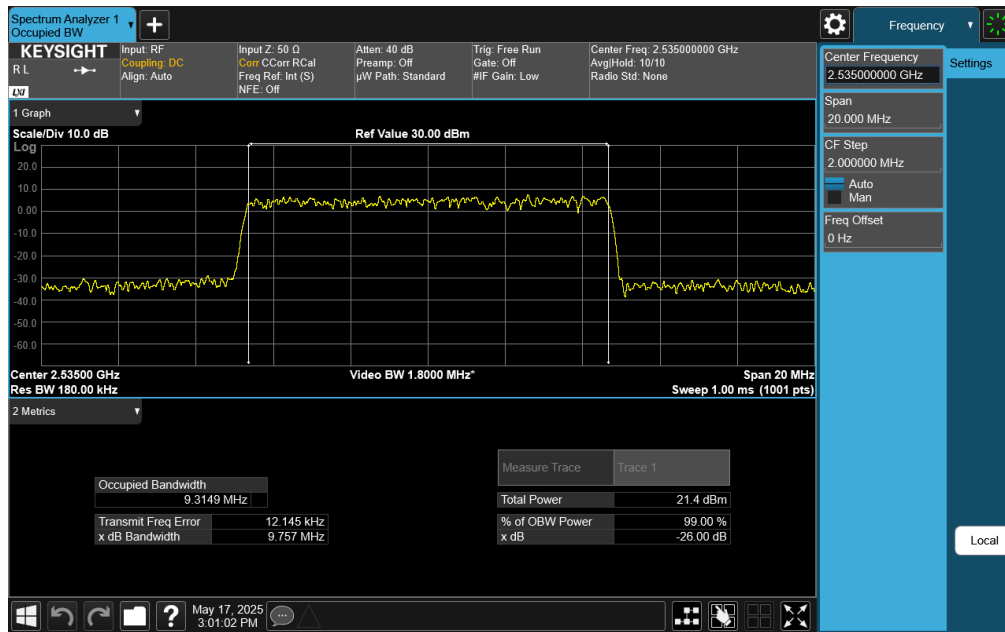



Plot 7-22. Occupied Bandwidth Plot (NR Band n7 - 10MHz CP-OFDM QPSK - Full RB)

FCC ID: BCG-A3328	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 25 of 110

V2.2 09/07/2023

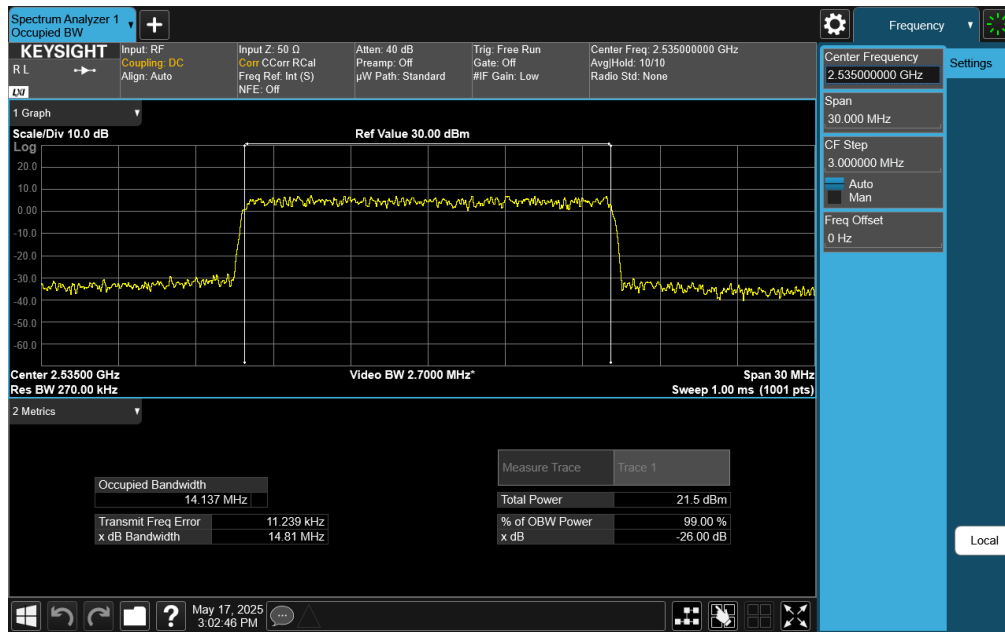
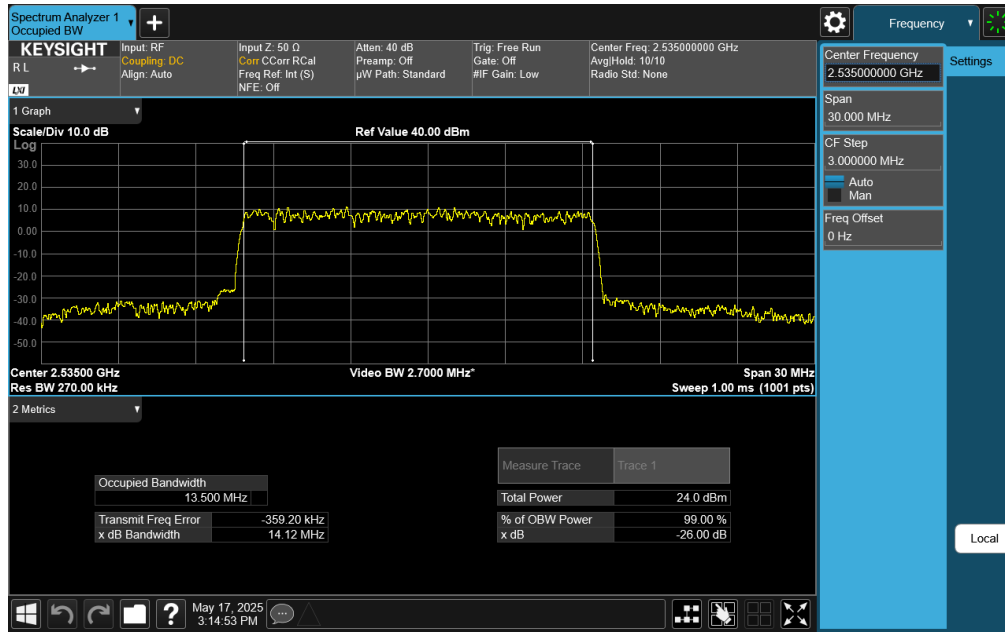
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FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 26 of 110

V2.2 09/07/2023

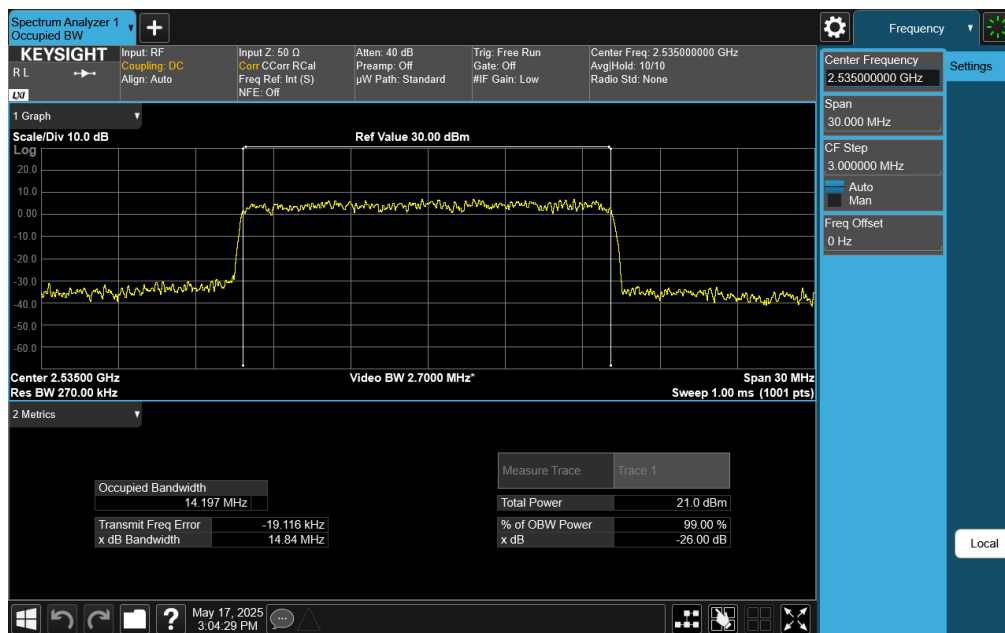
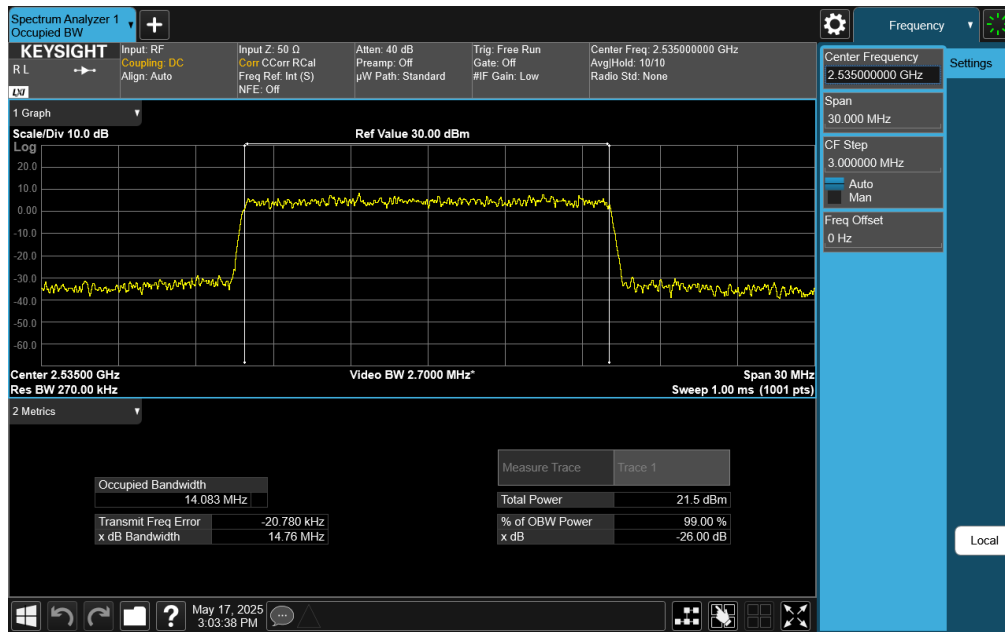
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FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 27 of 110

V2.2 09/07/2023

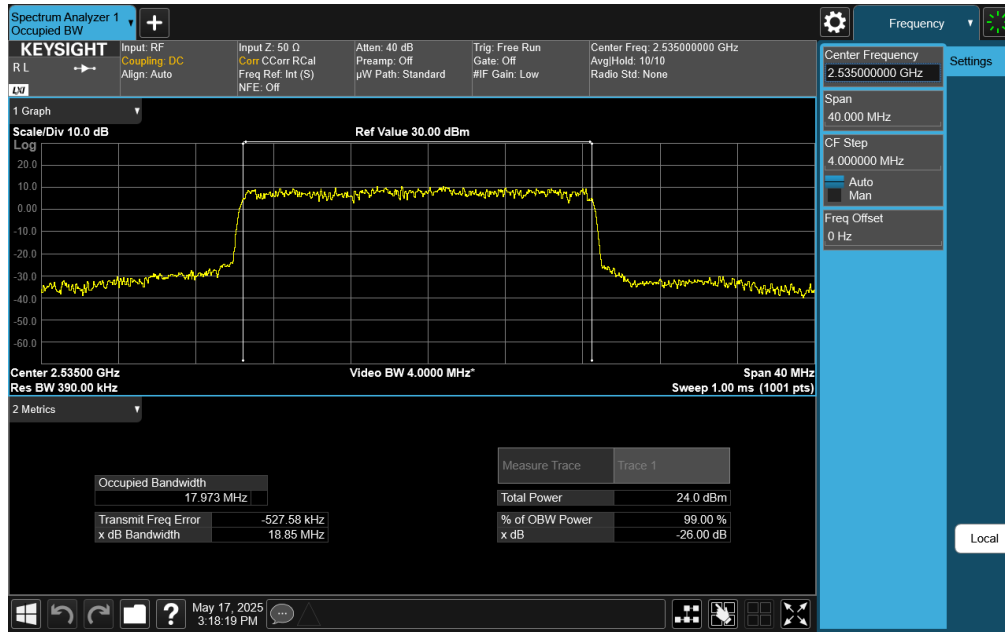
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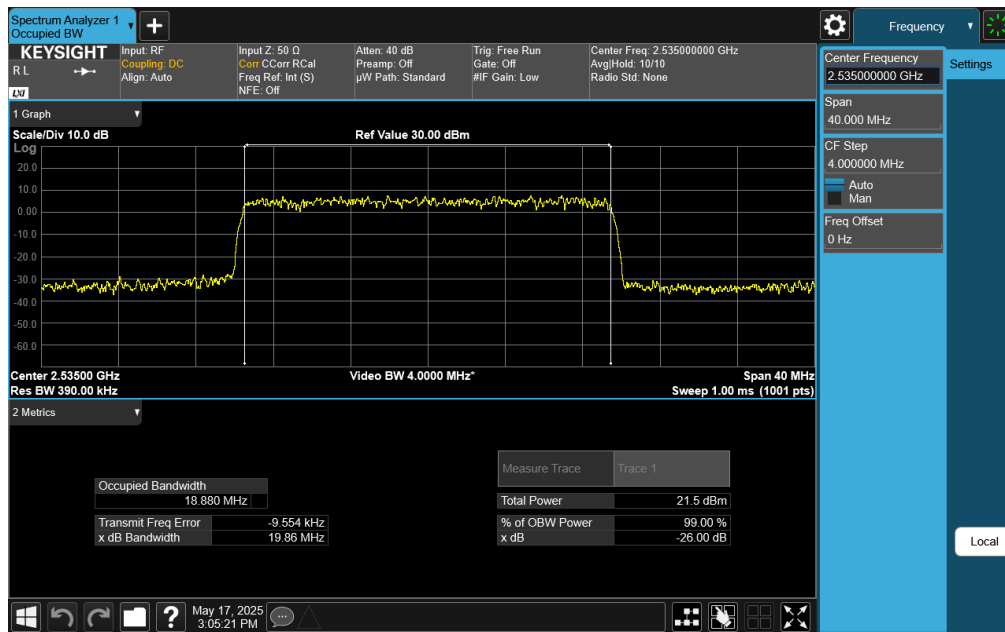
FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 28 of 110

V2.2 09/07/2023


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

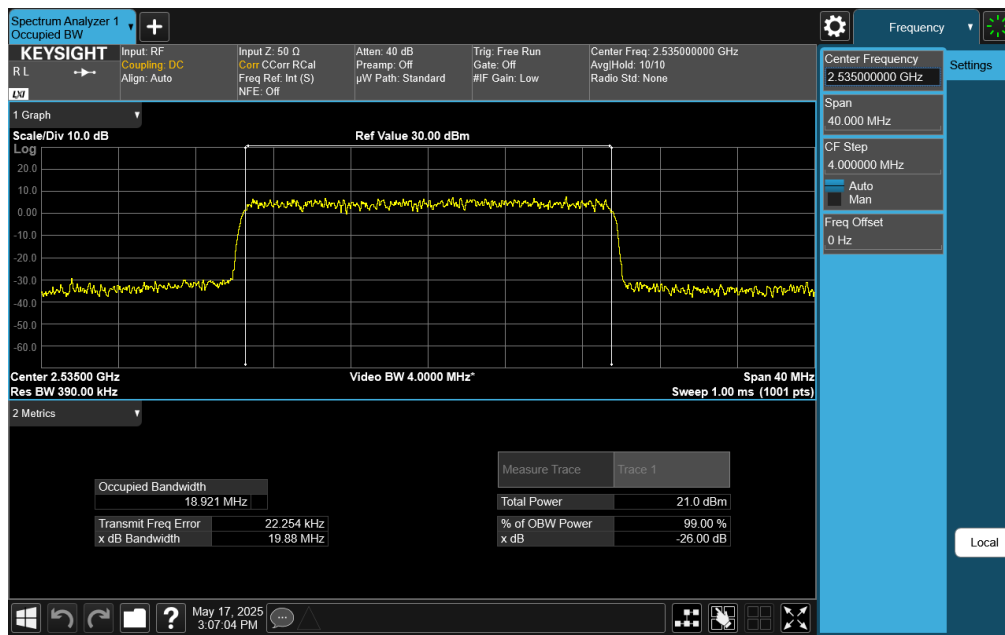
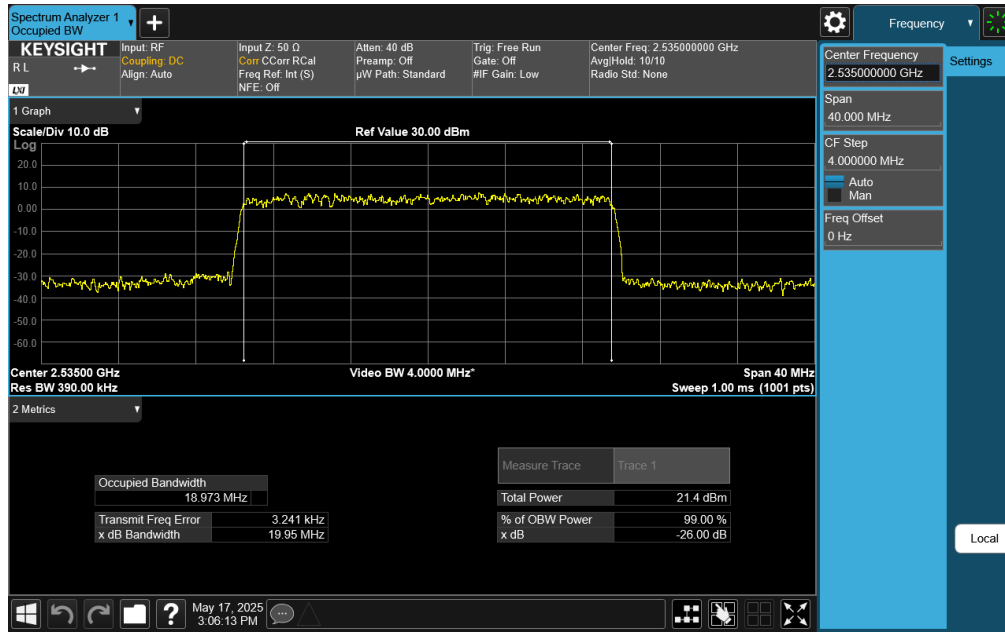


Plot 7-30. Occupied Bandwidth Plot (NR Band n7 - 20MHz CP-OFDM 16 QPSK - Full RB)

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 29 of 110

V2.2 09/07/2023

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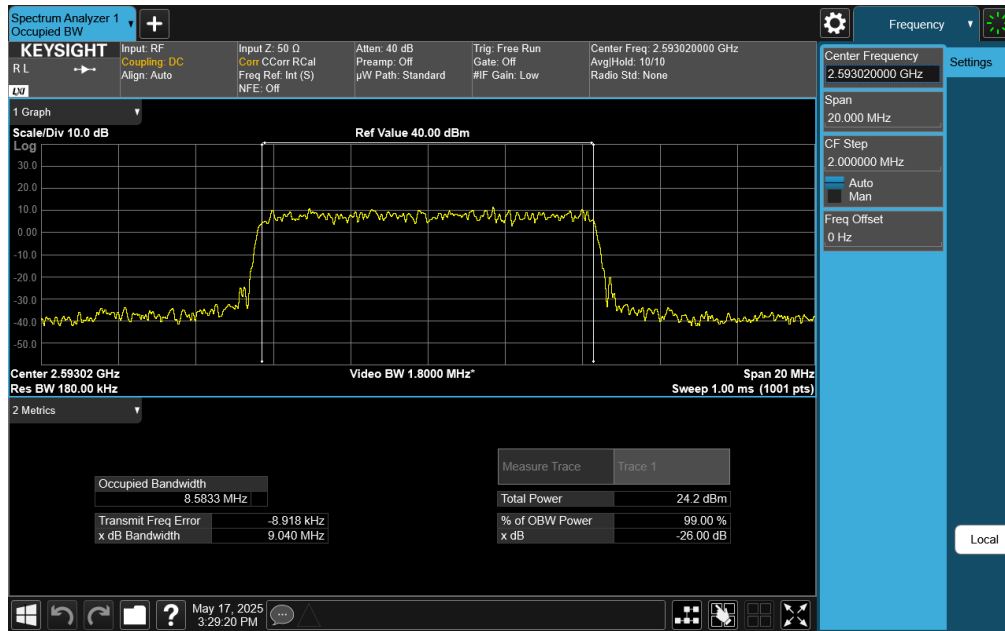


FCC ID: BCG-A3328	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 30 of 110

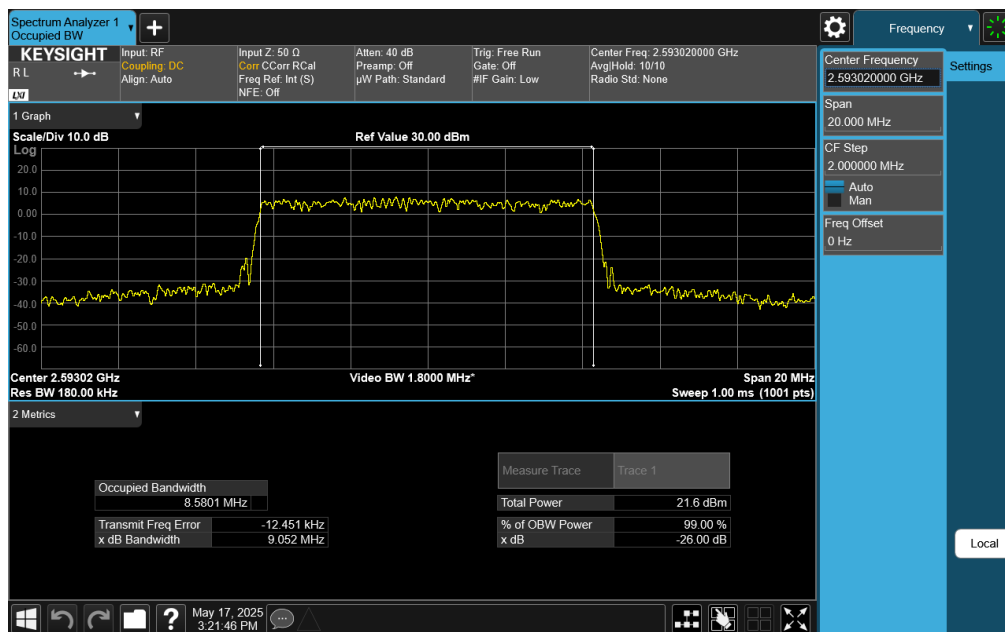
V2.2 09/07/2023

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NR Band n41



Plot 7-33. Occupied Bandwidth Plot (NR Band n41 - 10MHz DFT-s-OFDM $\pi/2$ BPSK - Full RB)

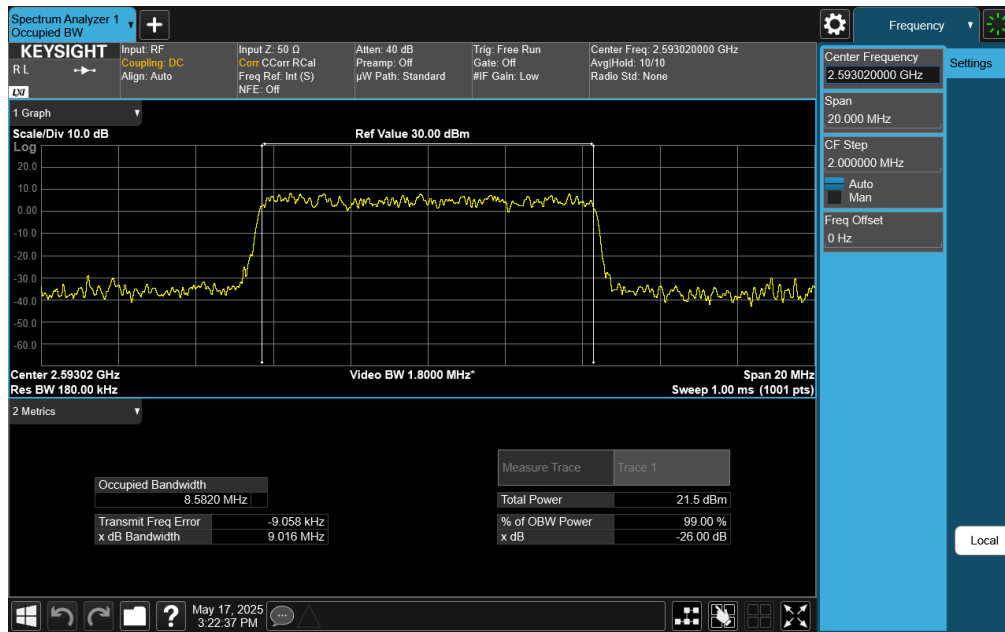


Plot 7-34. Occupied Bandwidth Plot (NR Band n41 - 10MHz CP-OFDM QPSK - Full RB)

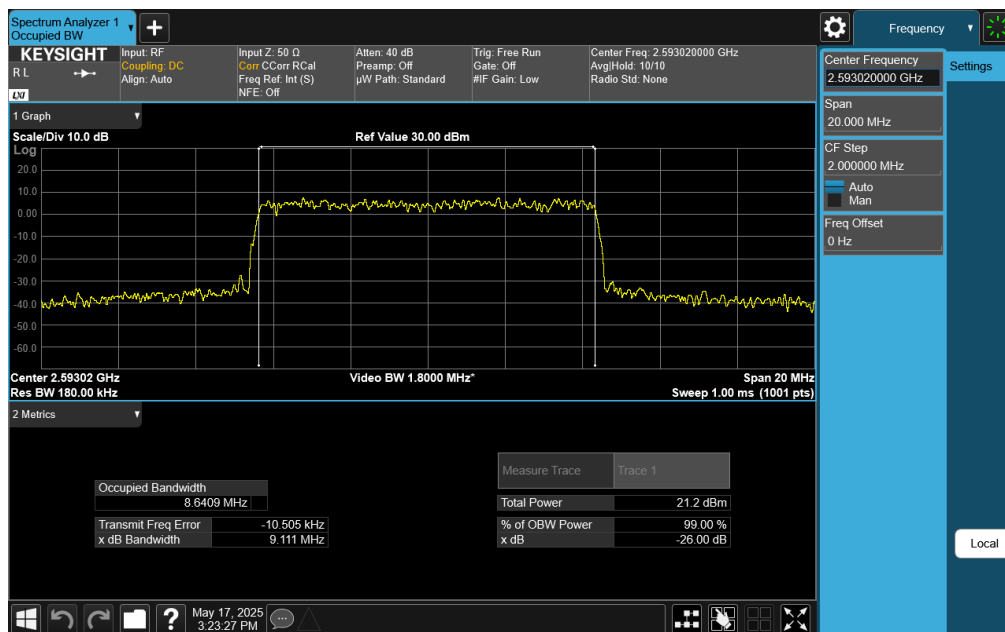
FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 31 of 110

V2.2 09/07/2023


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Plot 7-35. Occupied Bandwidth Plot (NR Band n41 - 10MHz CP-OFDM 16-QAM - Full RB)

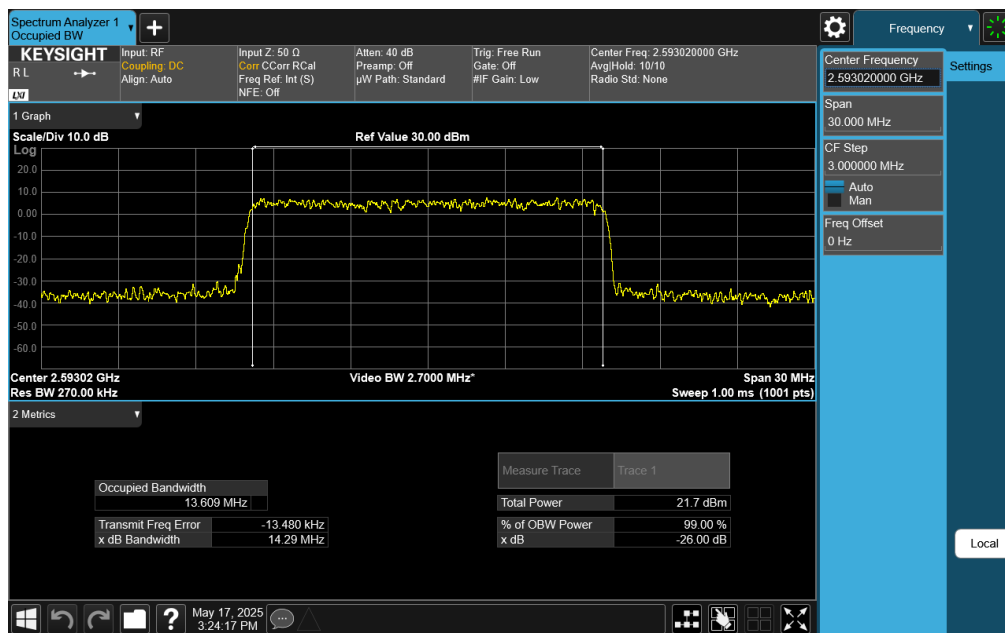
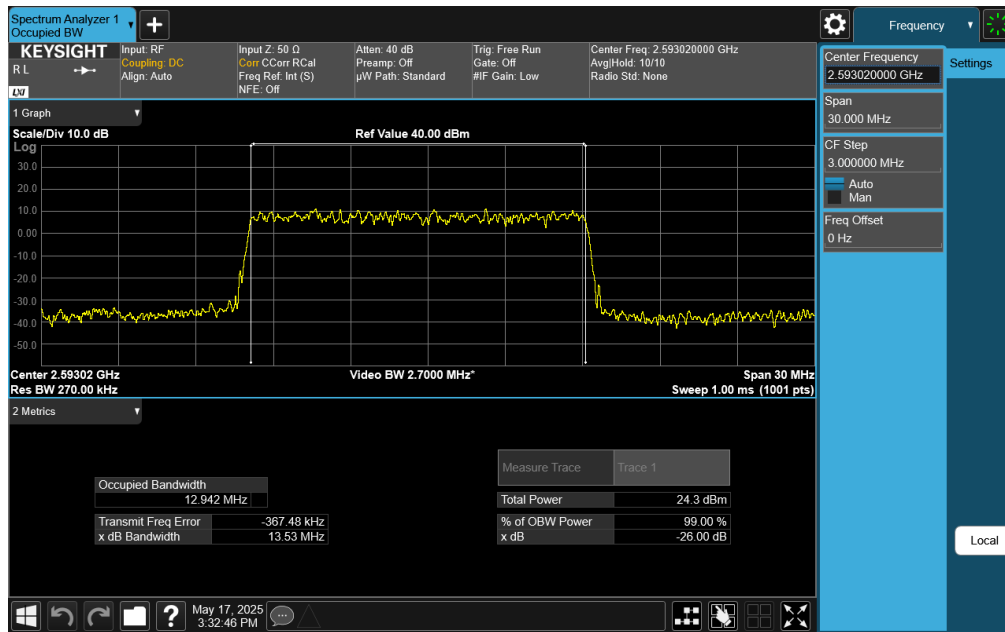



Plot 7-36. Occupied Bandwidth Plot (NR Band n41 - 10MHz CP-OFDM 64-QAM - Full RB)

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 32 of 110

V2.2 09/07/2023

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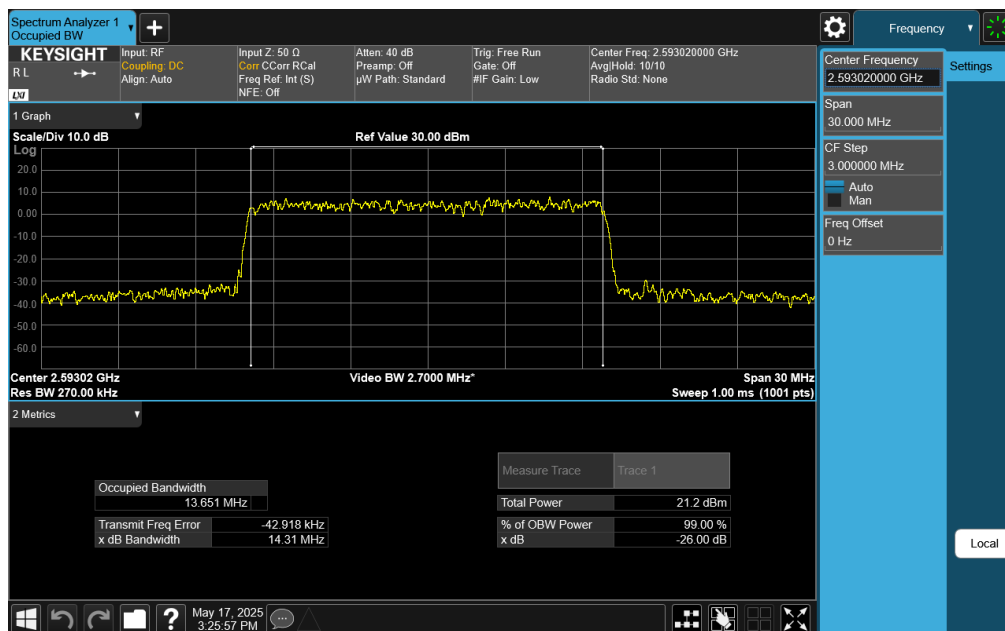
FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 33 of 110

V2.2 09/07/2023

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

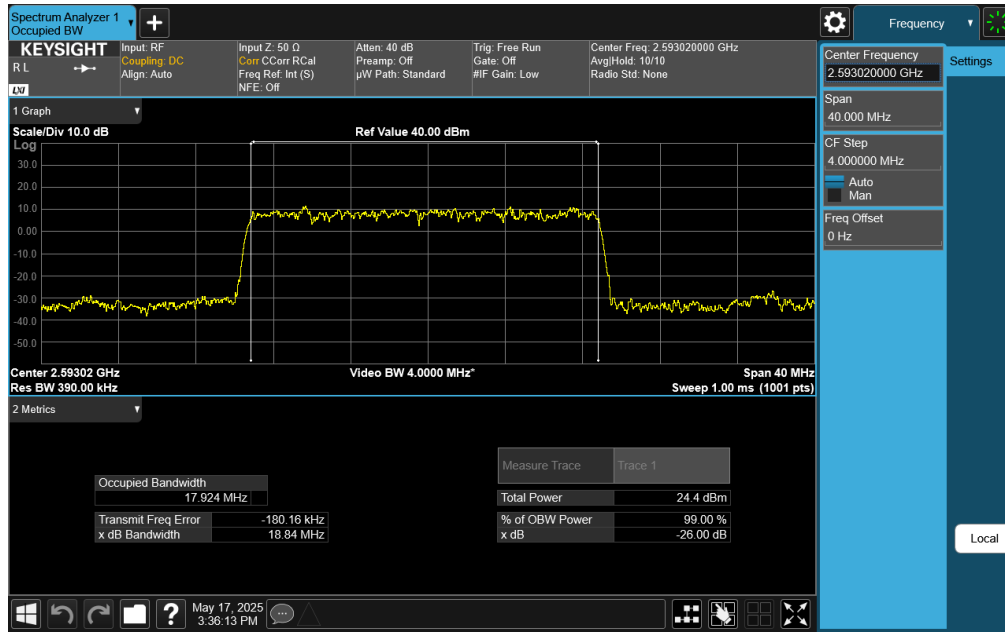


Plot 7-40. Occupied Bandwidth Plot (NR Band n41 - 15MHz CP-OFDM 64-QAM - Full RB)

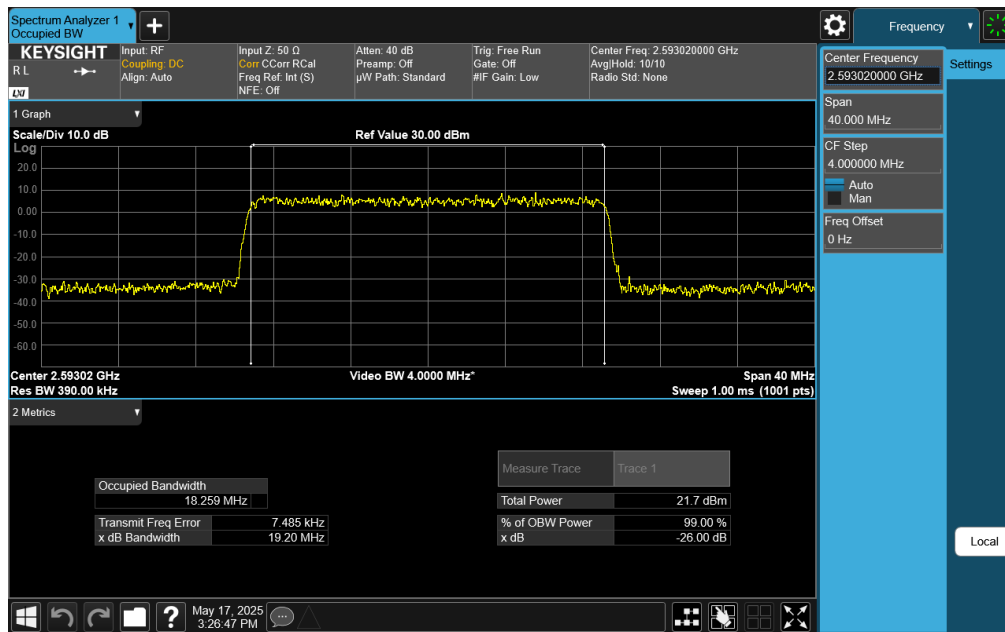
FCC ID: BCG-A3328	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 34 of 110

V2.2 09/07/2023


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Plot 7-41. Occupied Bandwidth Plot (NR Band n41 - 20MHz DFT-s-OFDM $\pi/2$ BPSK - Full RB)

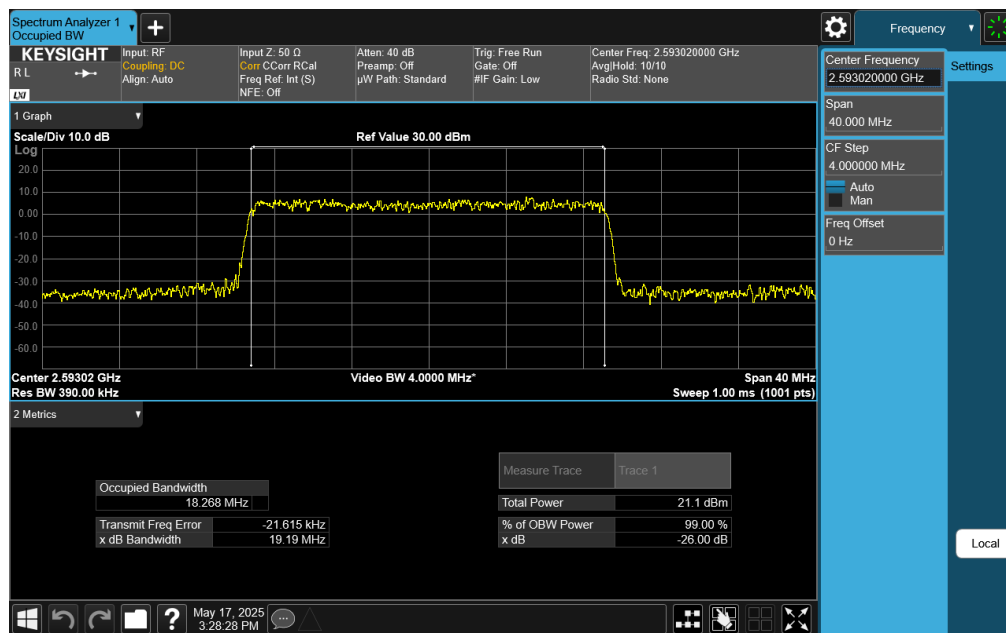
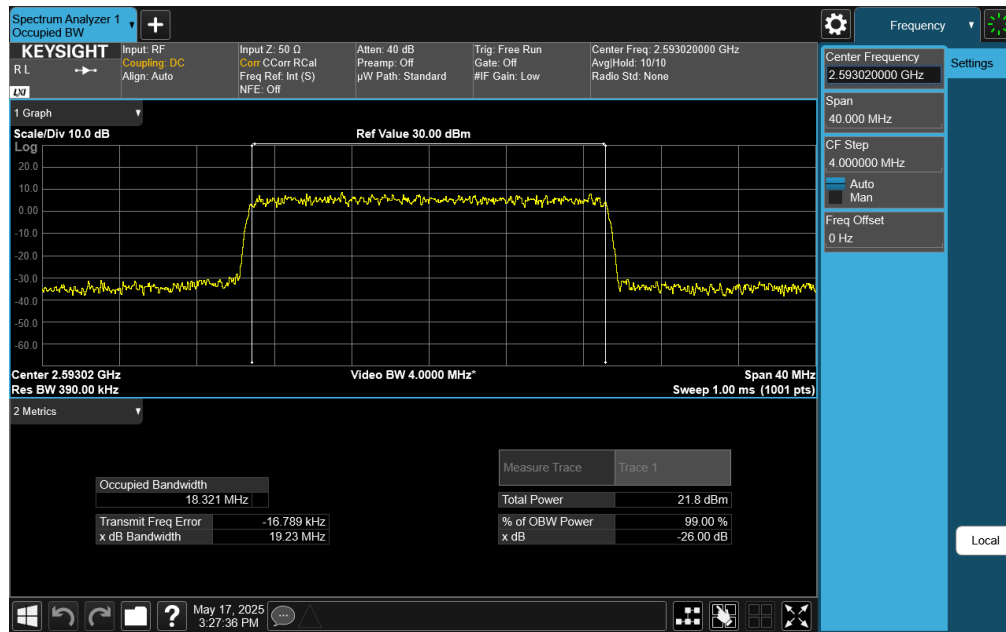



Plot 7-42. Occupied Bandwidth Plot (NR Band n41 - 20MHz CP-OFDM QPSK - Full RB)

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 35 of 110

V2.2 09/07/2023

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FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 36 of 110

V2.2 09/07/2023

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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, and NR FR1 Band n7, n41 the minimum permissible, 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.

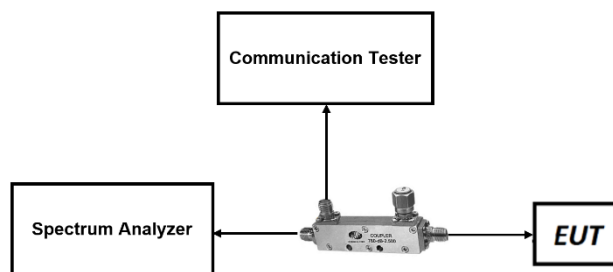


Figure 7-3. LTE Test Instrument & Measurement Setup

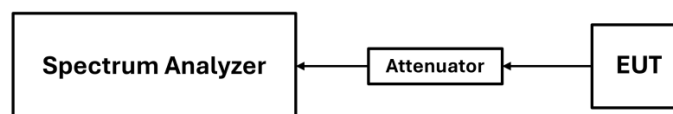




Figure 7-4. FR1 Test Instrument & Measurement Setup

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 37 of 110

V2.2 09/07/2023

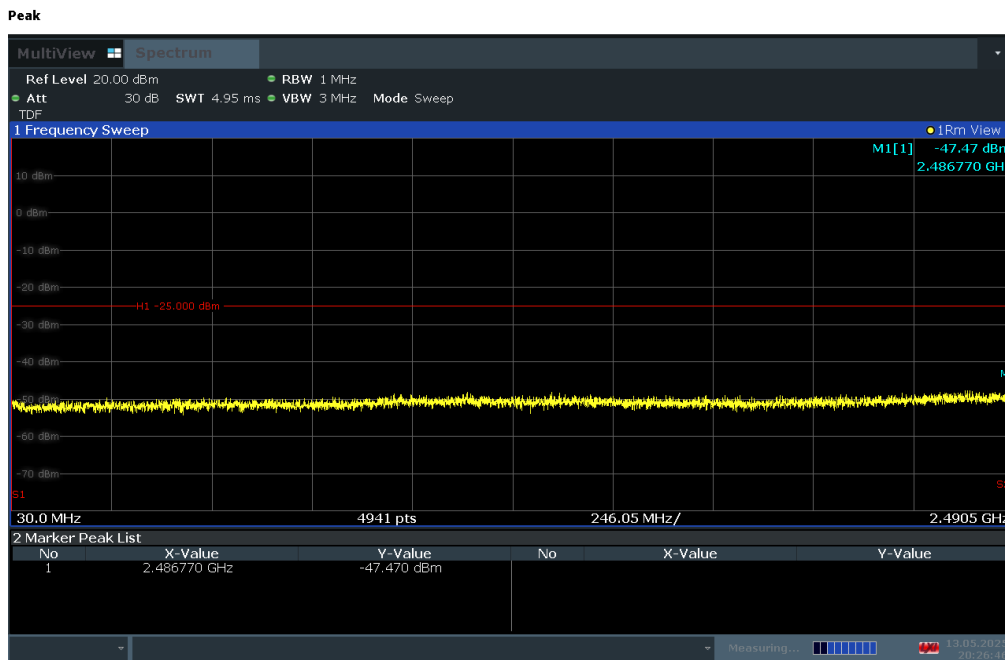
Test Notes

1. 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.
2. 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.

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 38 of 110

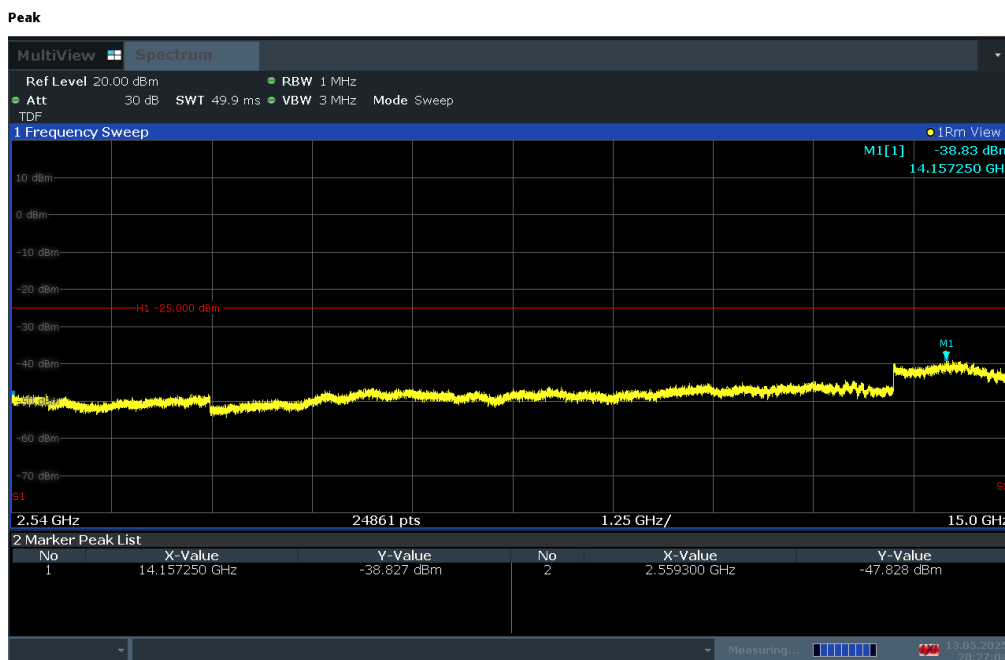
V2.2 09/07/2023

LTE Band 7




20:26:47 13.05.2025

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



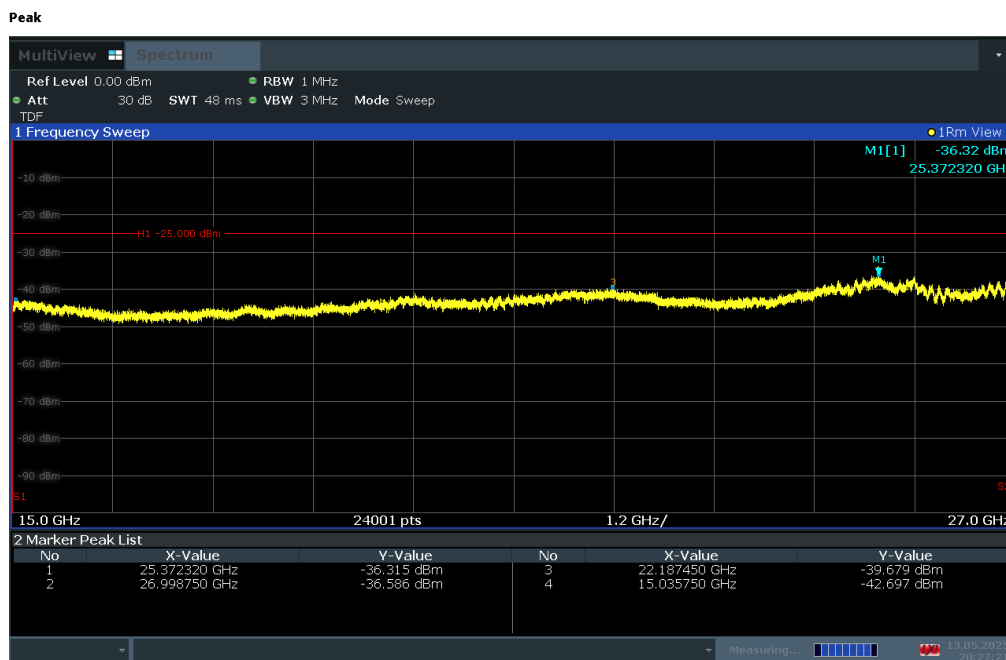
20:27:04 13.05.2025

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

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 39 of 110

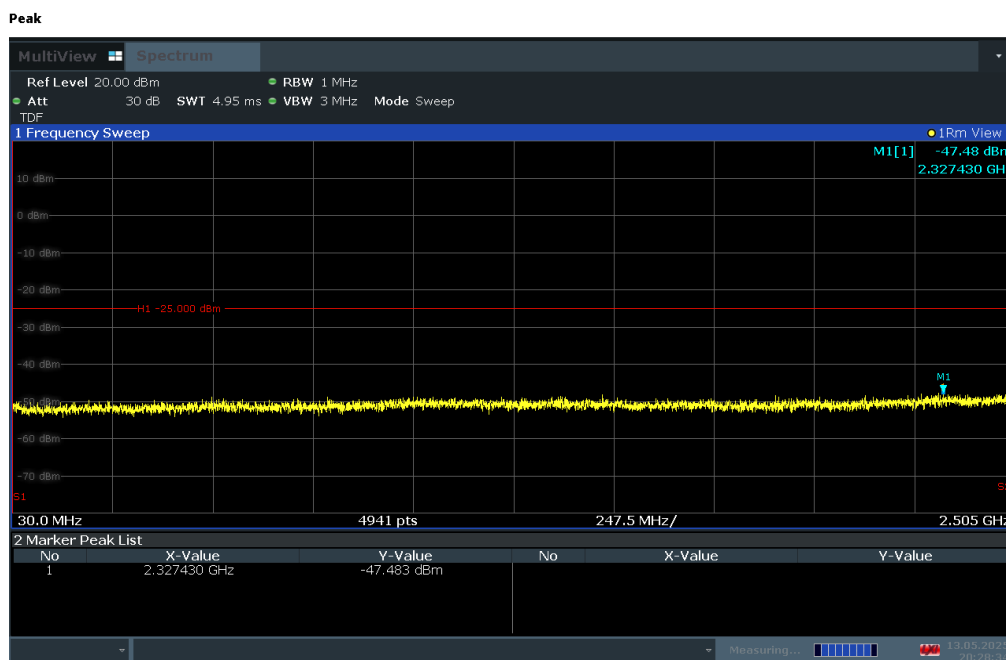
V2.2 09/07/2023

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20:27:21 13.05.2025

Plot 7-47. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 50 - Low Channel)



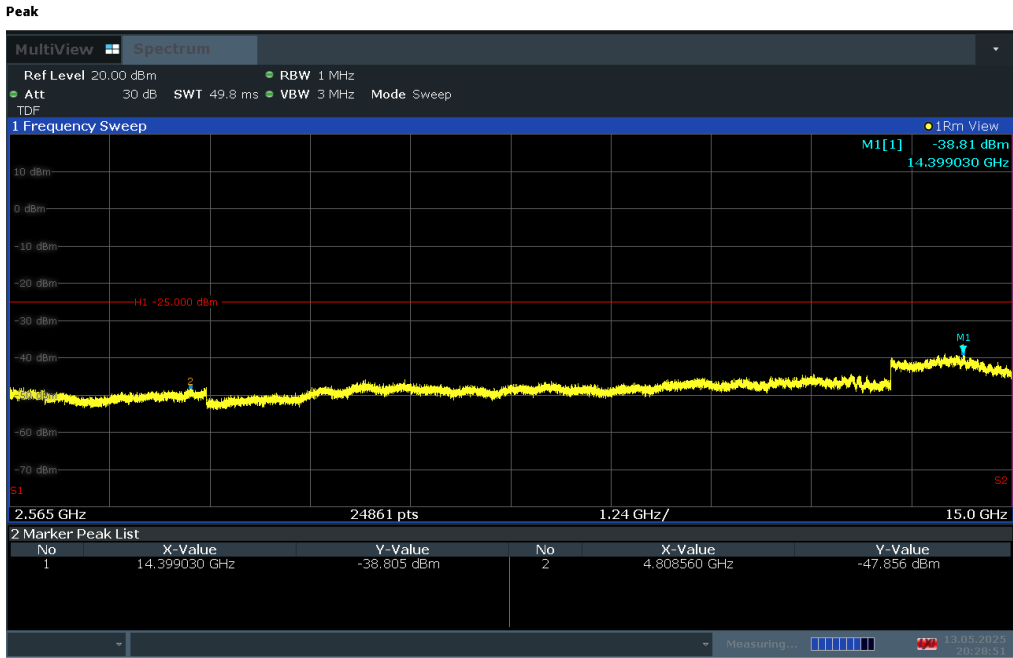
20:28:35 13.05.2025

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

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 40 of 110

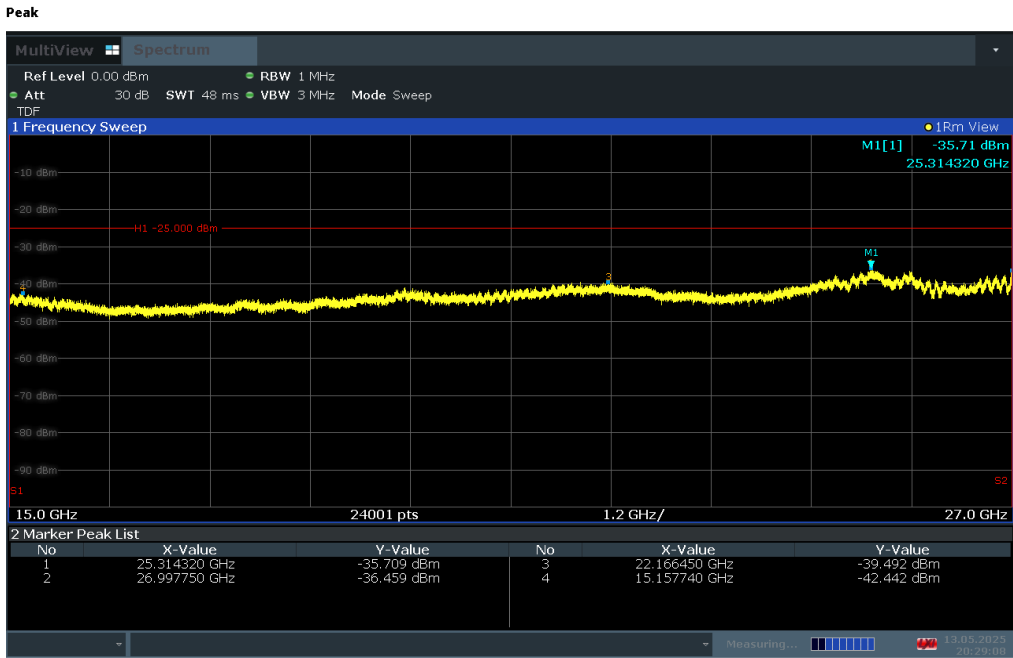
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20:28:52 13.05.2025

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



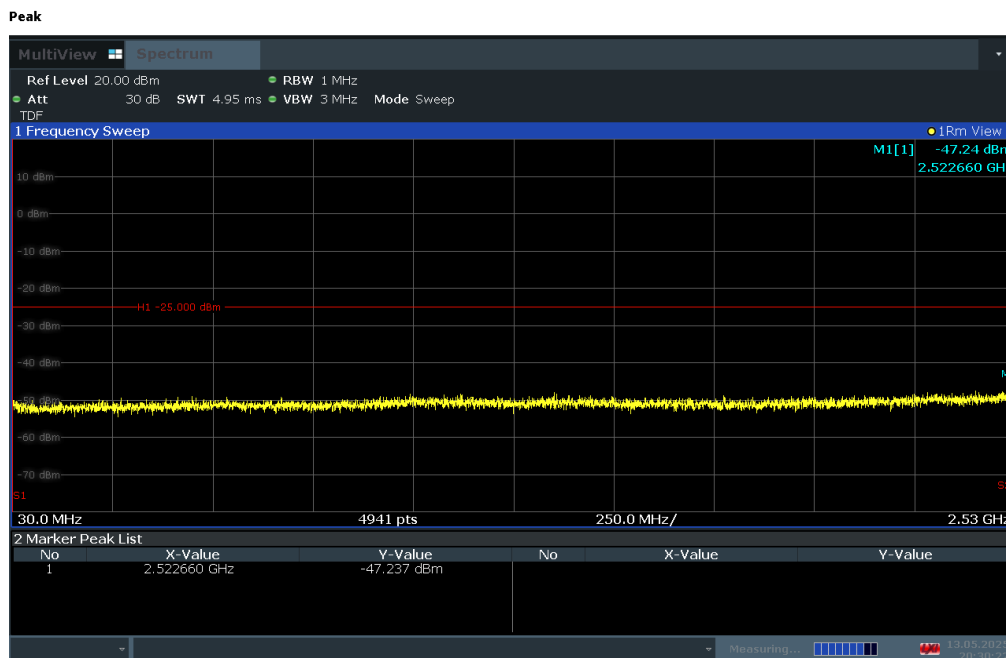
20:29:09 13.05.2025

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

FCC ID: BCG-A3328	element PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 41 of 110

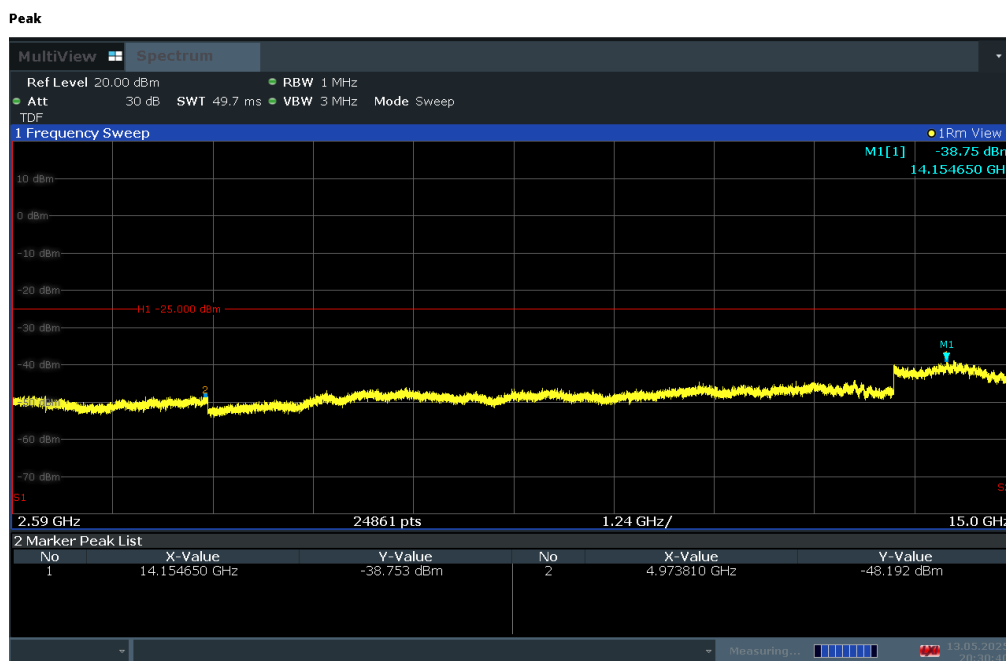
V2.2 09/07/2023

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20:30:23 13.05.2025

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



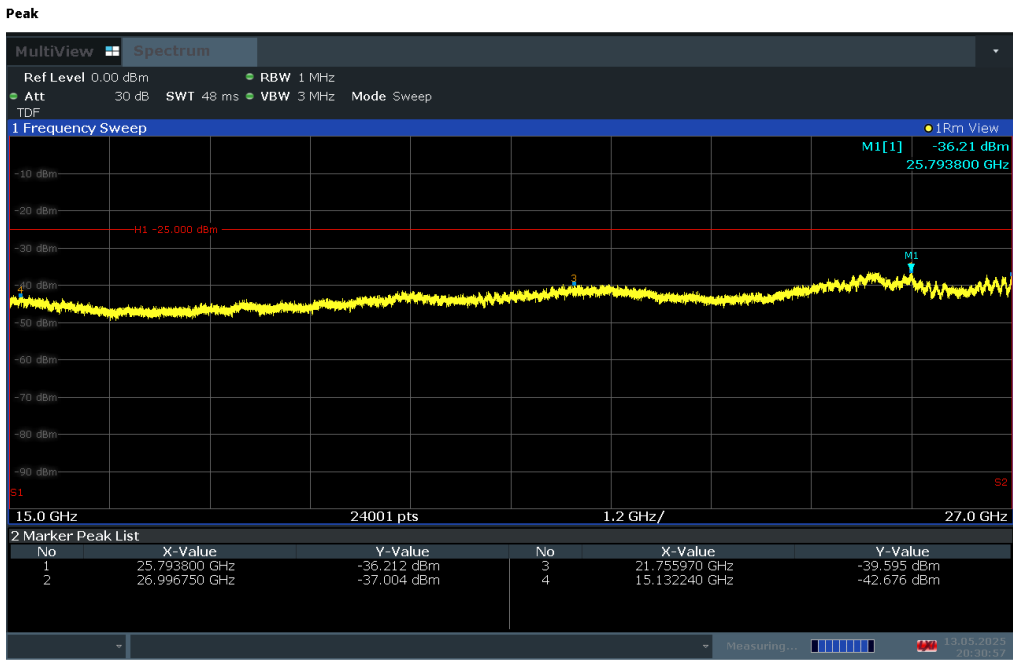
20:30:40 13.05.2025

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

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 42 of 110

V2.2 09/07/2023

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20:30:58 13.05.2025

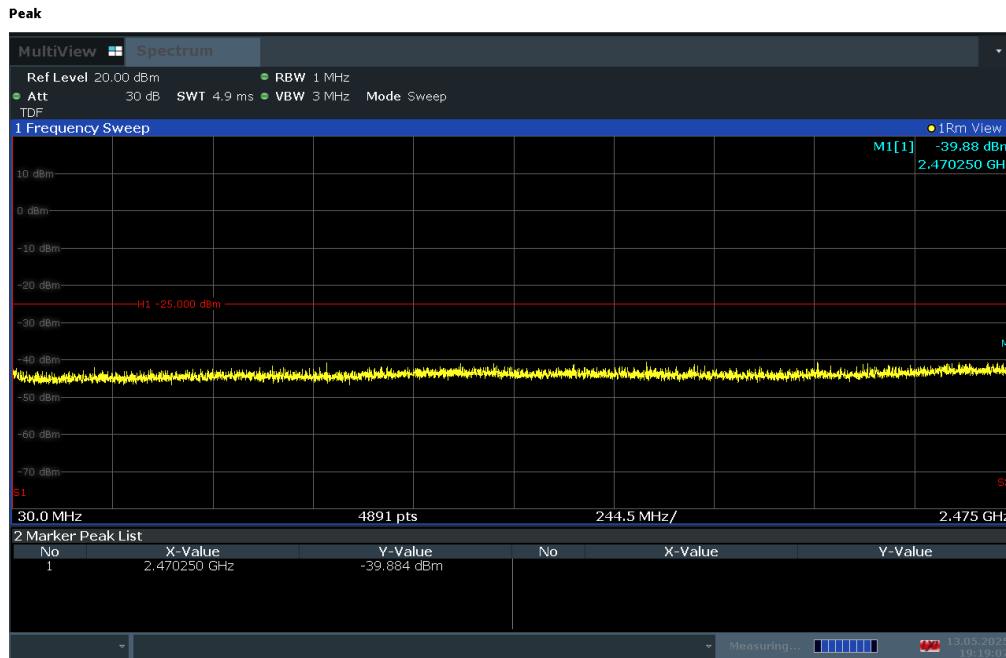
Plot 7-53. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 50 - High Channel)

FCC ID: BCG-A3328	element PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 43 of 110

V2.2 09/07/2023

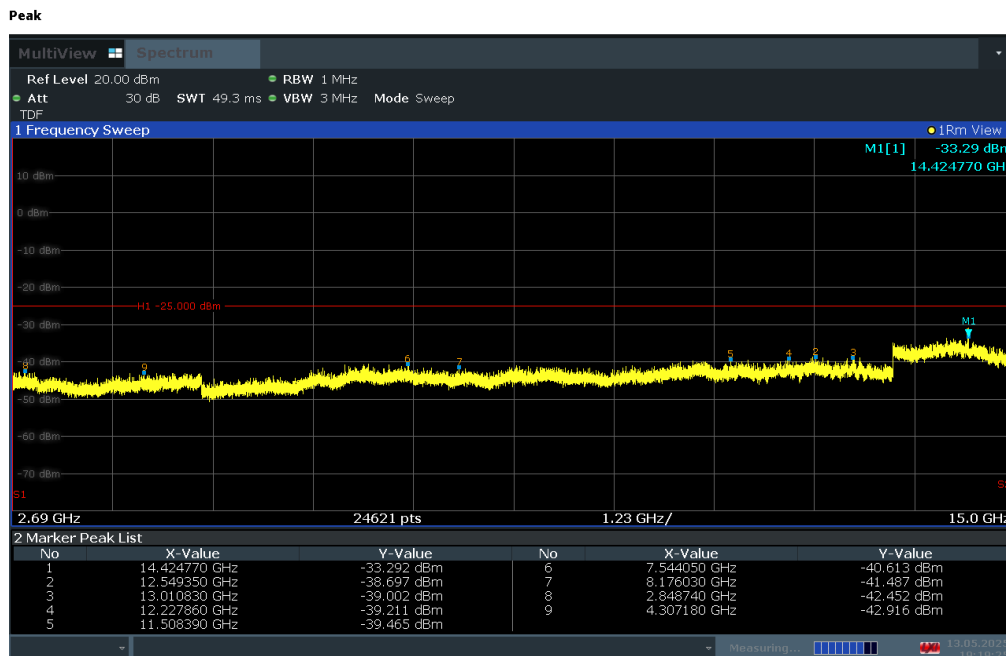
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LTE Band 41




19:19:08 13.05.2025

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



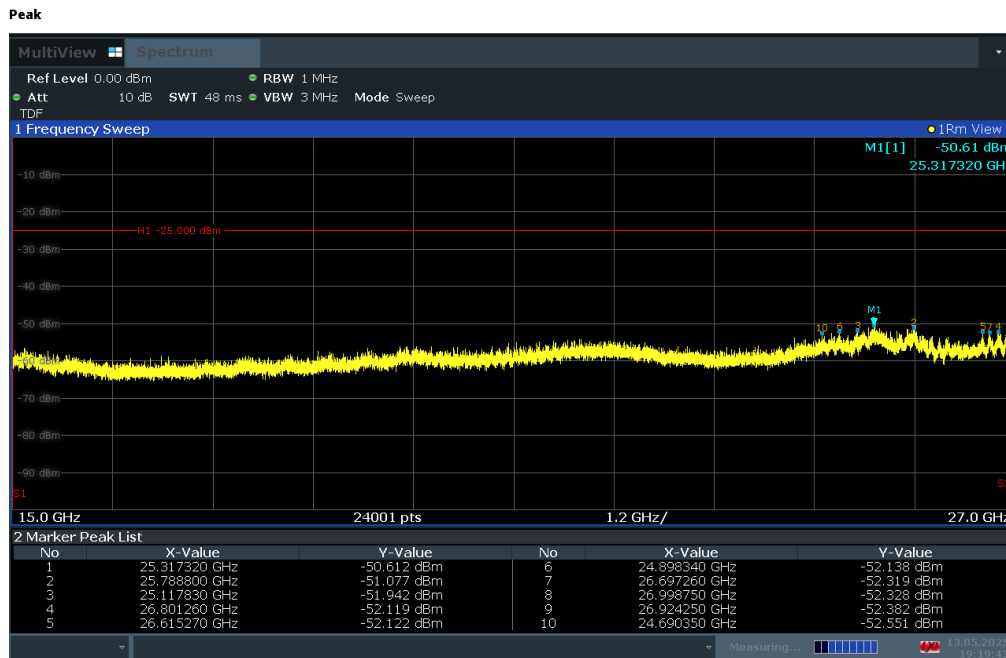
19:19:26 13.05.2025

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

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 44 of 110

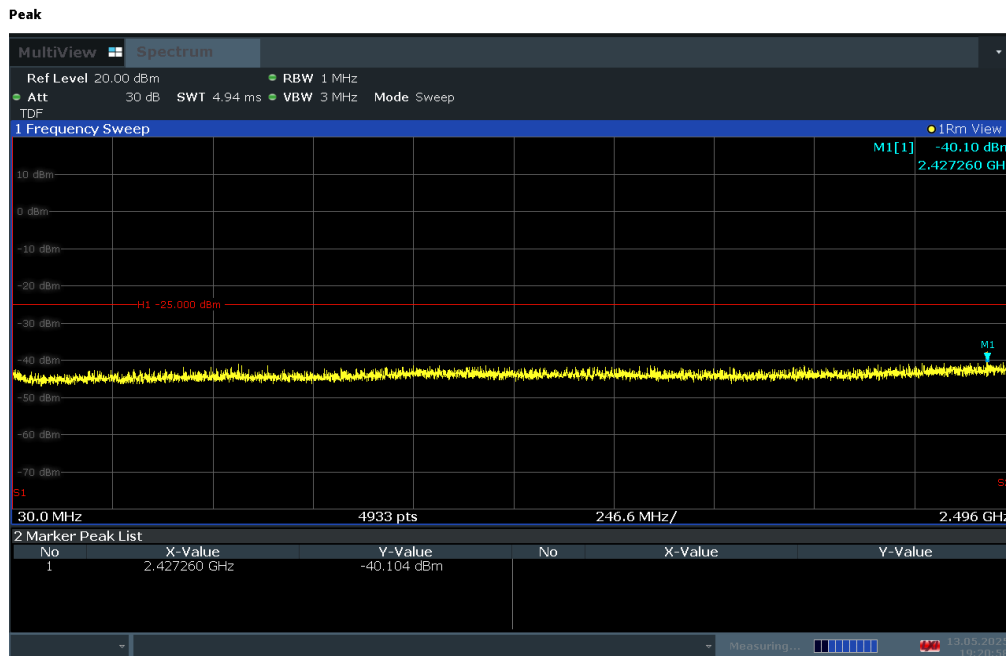
V2.2 09/07/2023

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19:19:43 13.05.2025

Plot 7-56. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 50 - Low Channel)



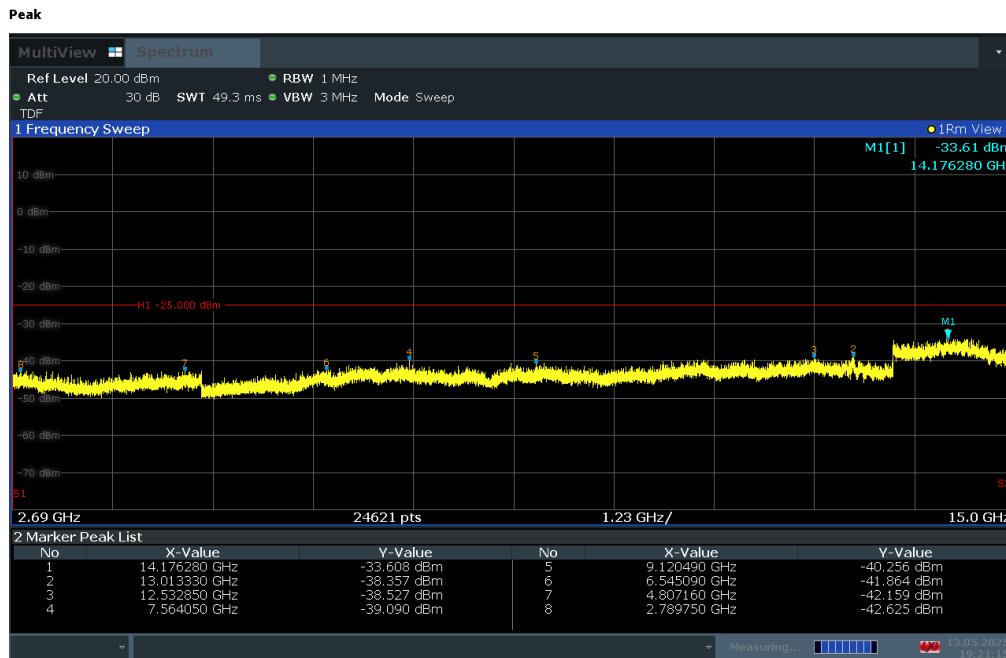
19:20:58 13.05.2025

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

FCC ID: BCG-A3328	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 45 of 110

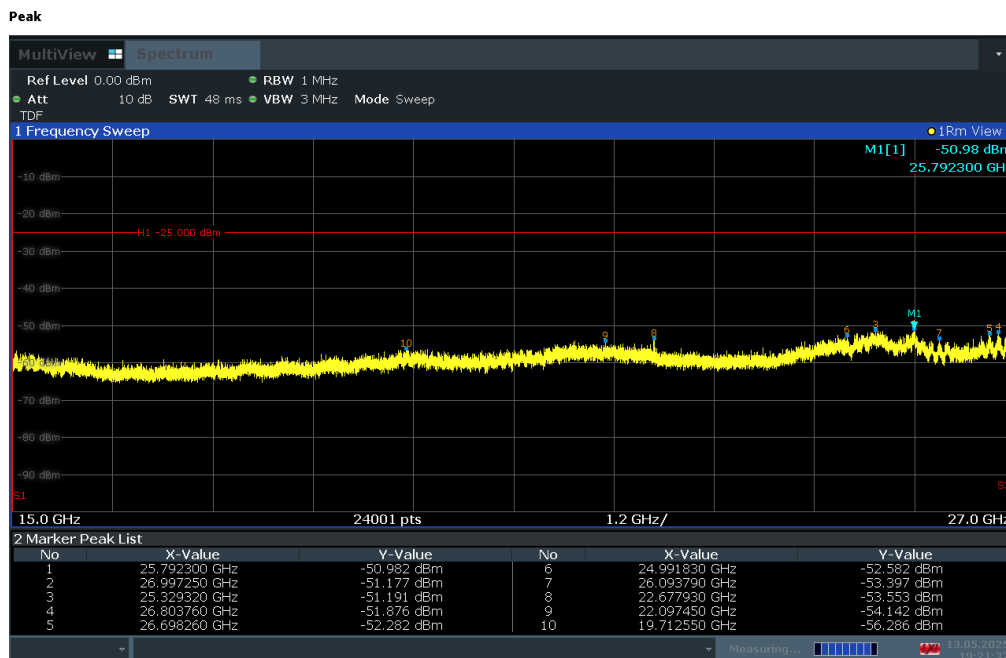
V2.2 09/07/2023

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19:21:15 13.05.2025

Plot 7-58. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 50 - Mid Channel)



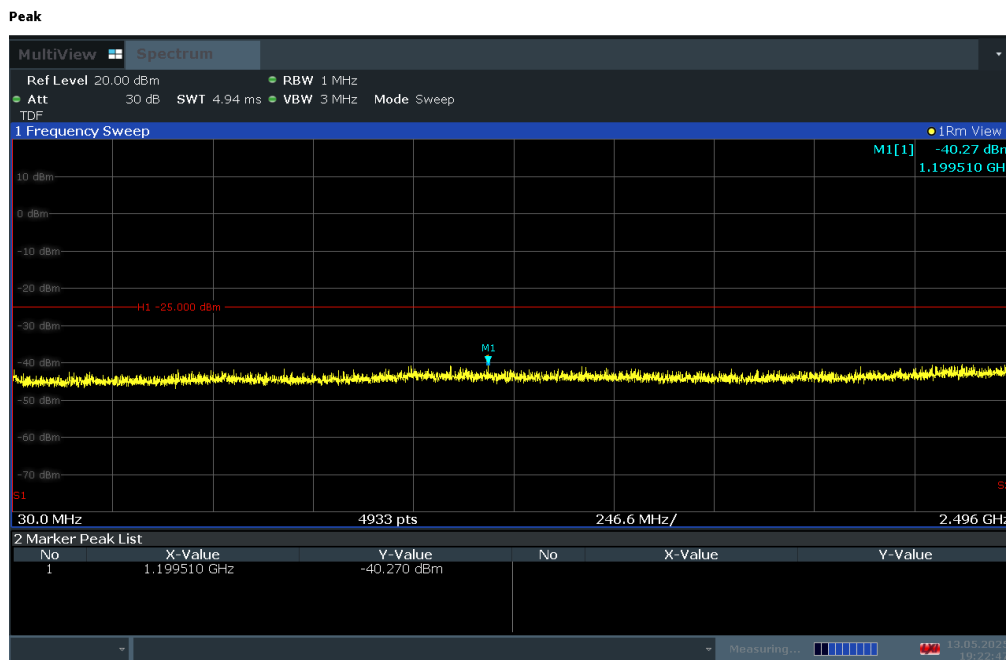
19:21:33 13.05.2025

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

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 46 of 110

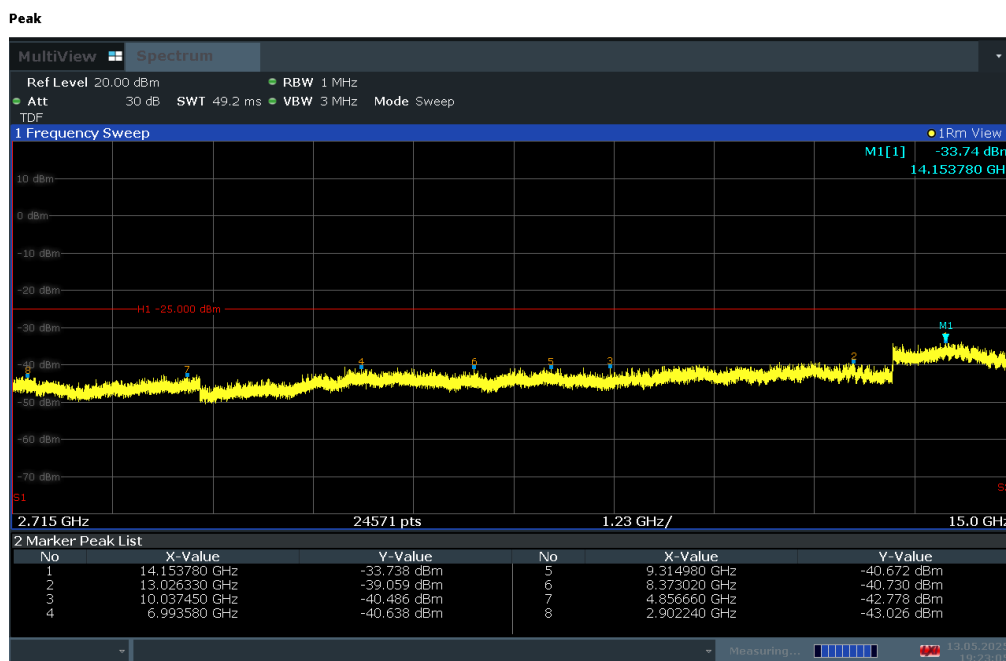
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19:22:48 13.05.2025

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



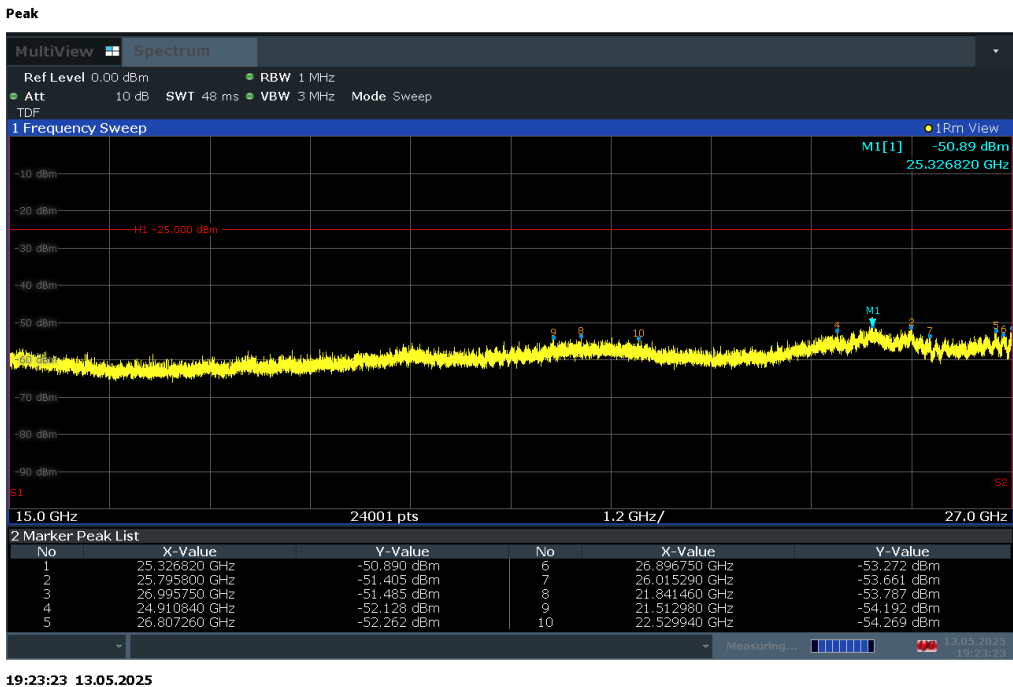
19:23:06 13.05.2025

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

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 47 of 110

V2.2 09/07/2023

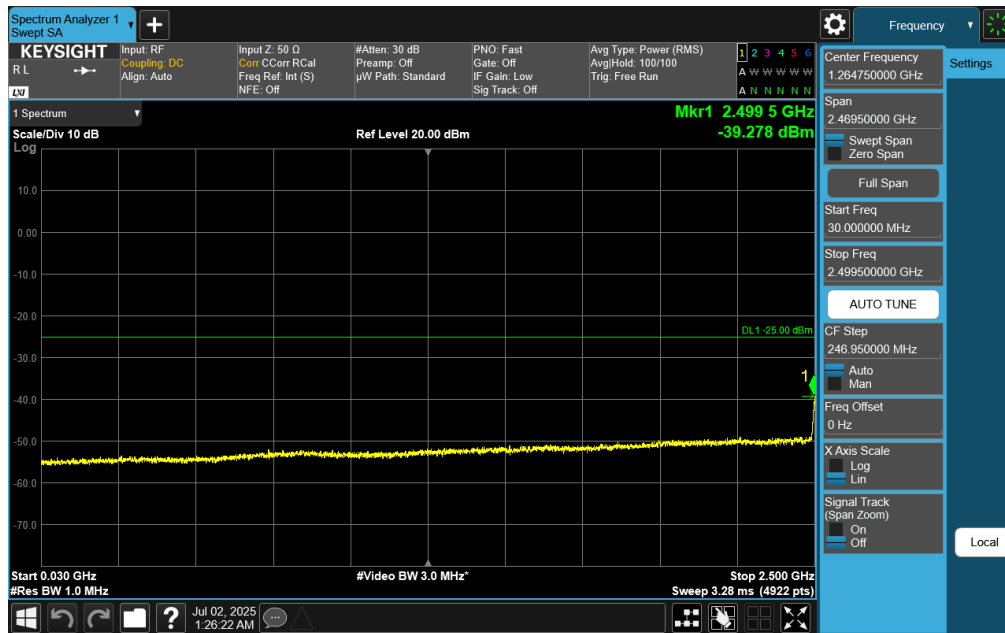
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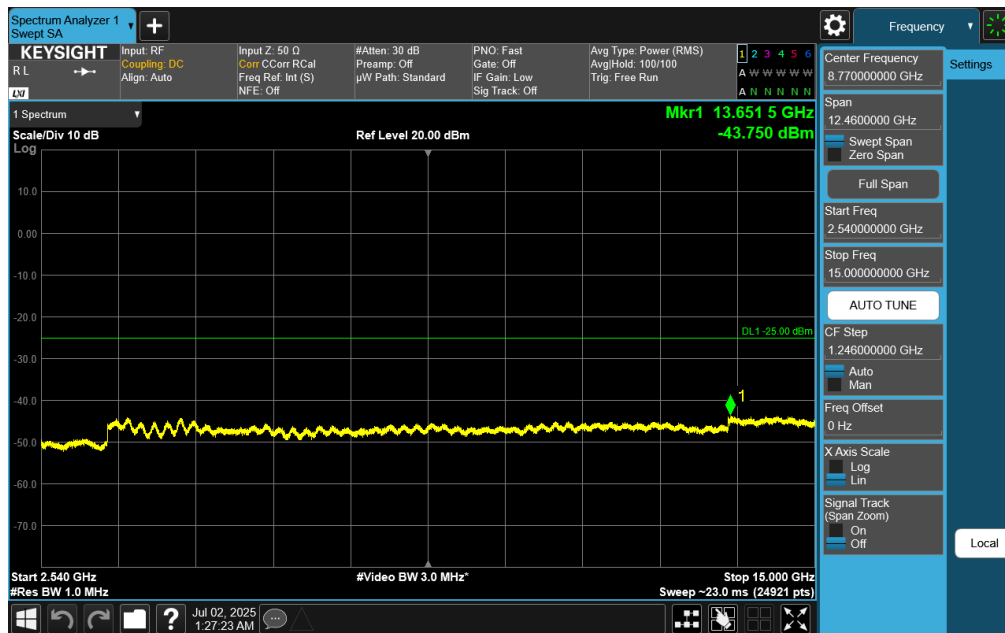
Plot 7-62. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 50 - High Channel)

FCC ID: BCG-A3328	element PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 48 of 110


NR Band n7



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

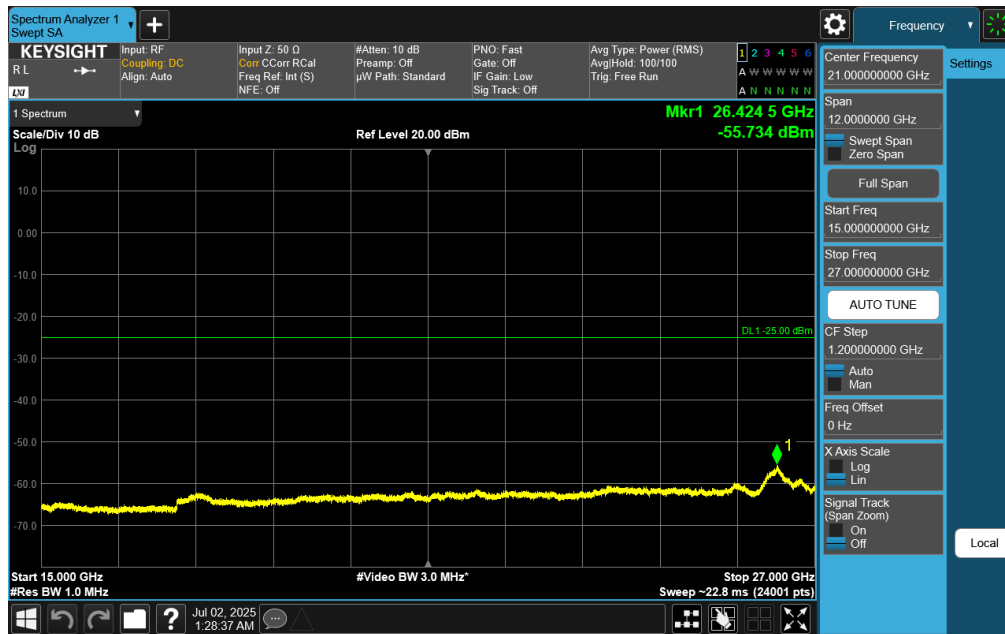


Plot 7-64. Conducted Spurious Plot (NR Band n7 - 20MHz QPSK - RB Size 1, RB Offset 50 - Low Channel)

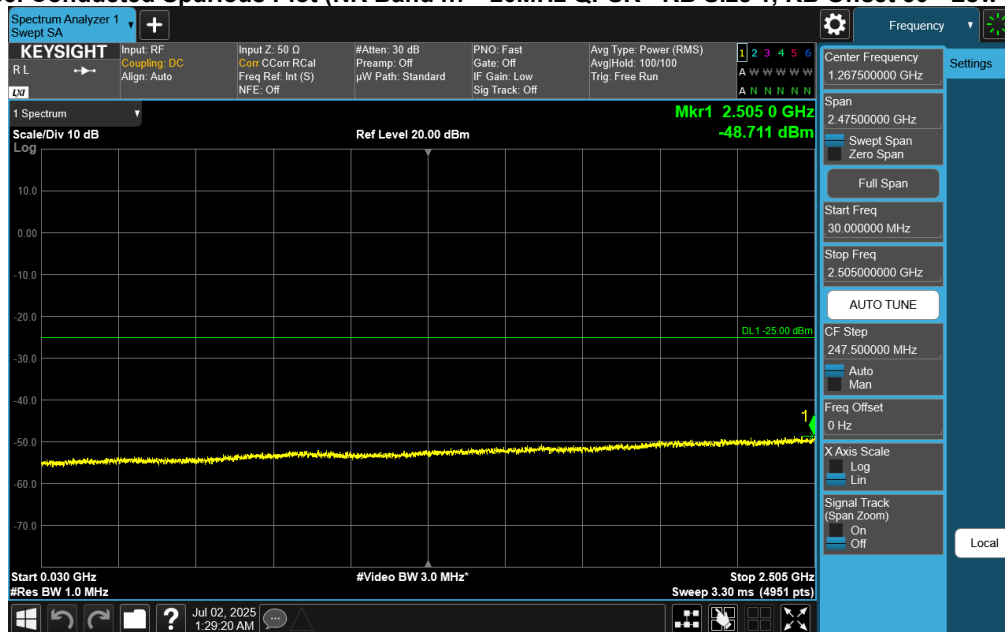
FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 49 of 110

V2.2 09/07/2023

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

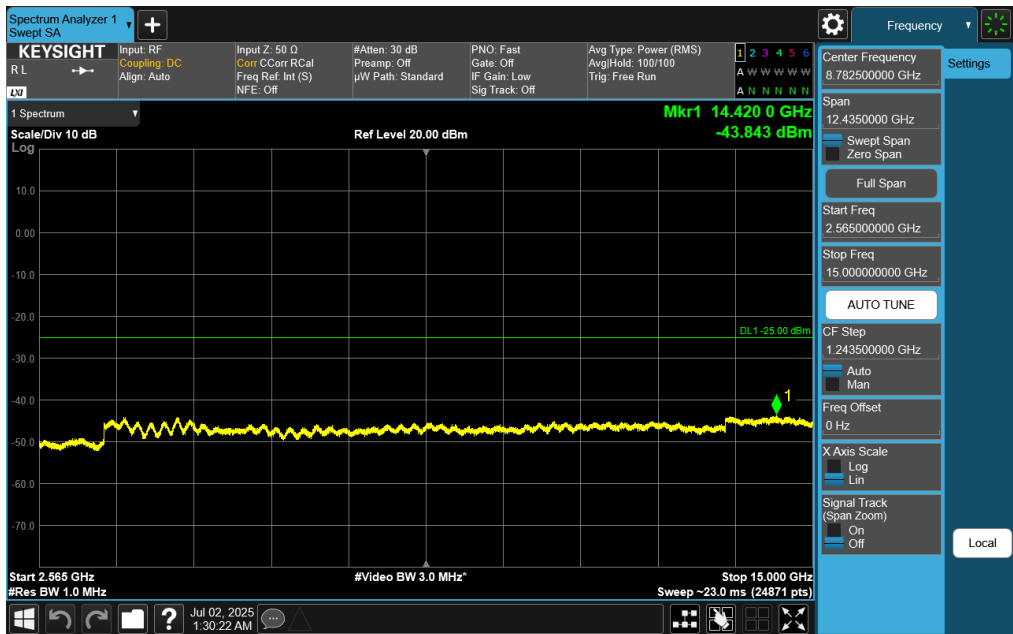


Plot 7-66. Conducted Spurious Plot (NR Band n7 - 20MHz QPSK - RB Size 1, RB Offset 50 - Mid Channel)

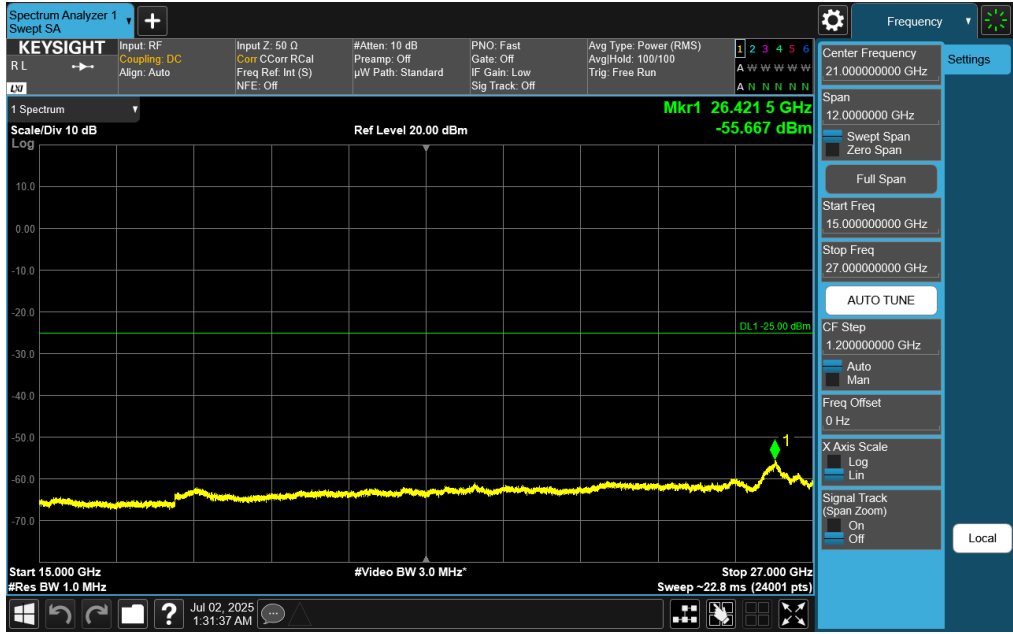
FCC ID: BCG-A3328	<p>element</p> <p>PART 27 MEASUREMENT REPORT</p>		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 50 of 110

V2.2 09/07/2023

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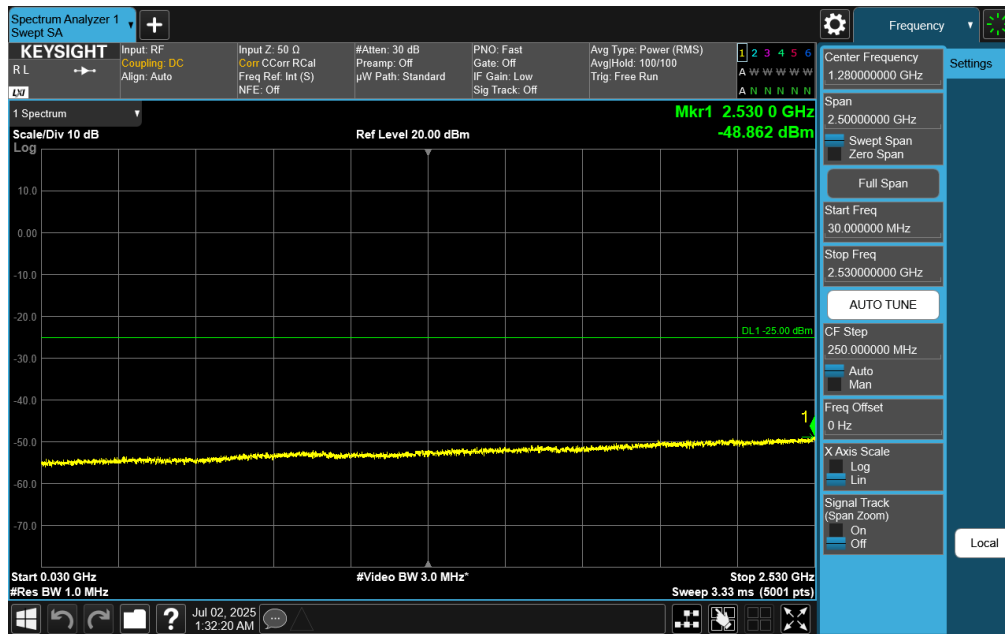


Plot 7-67. Conducted Spurious Plot (NR Band n7 - 20MHz QPSK - RB Size 1, RB Offset 50 - Mid Channel)

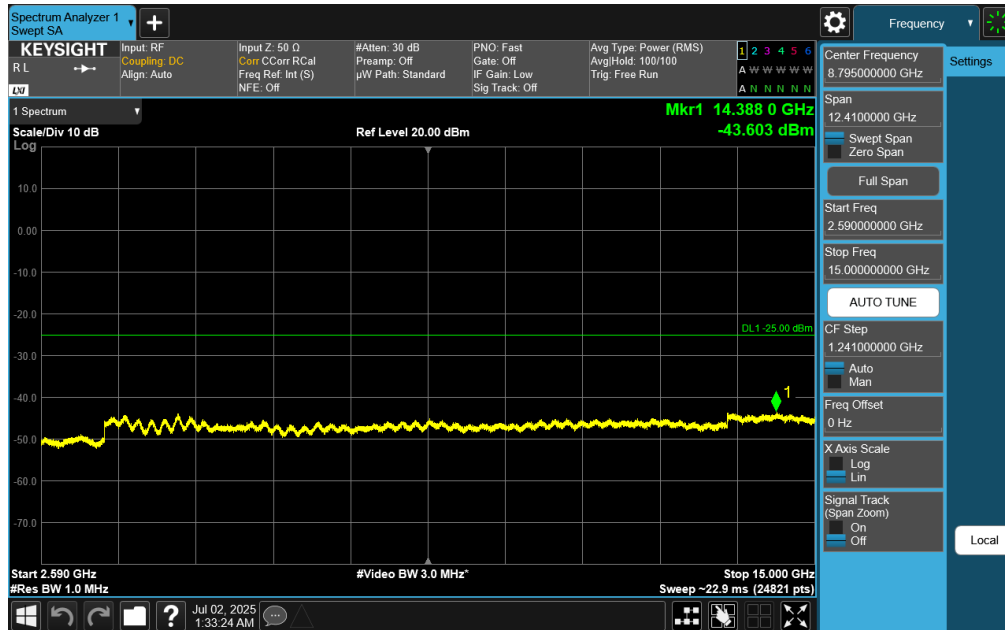


Plot 7-68. Conducted Spurious Plot (NR Band n7 - 20MHz QPSK - RB Size 1, RB Offset 50 - Mid Channel)


FCC ID: BCG-A3328	element PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 51 of 110



Plot 7-69. Conducted Spurious Plot (NR Band n7 - 20MHz QPSK - RB Size 1, RB Offset 50 - High Channel)

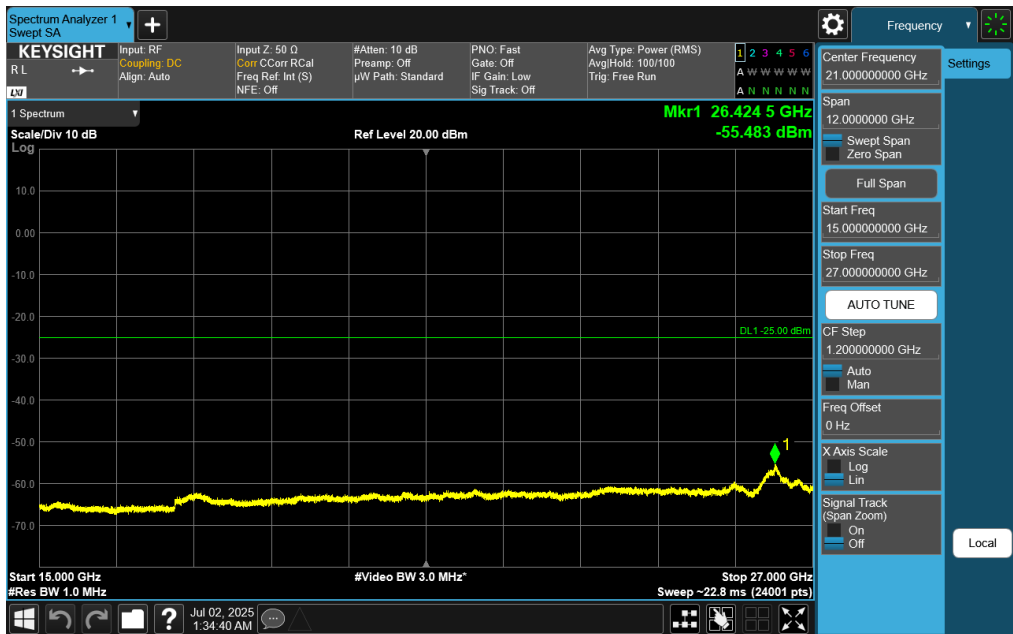


Plot 7-70. Conducted Spurious Plot (NR Band n7 - 20MHz QPSK - RB Size 1, RB Offset 50 - High Channel)

FCC ID: BCG-A3328	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 52 of 110

V2.2 09/07/2023

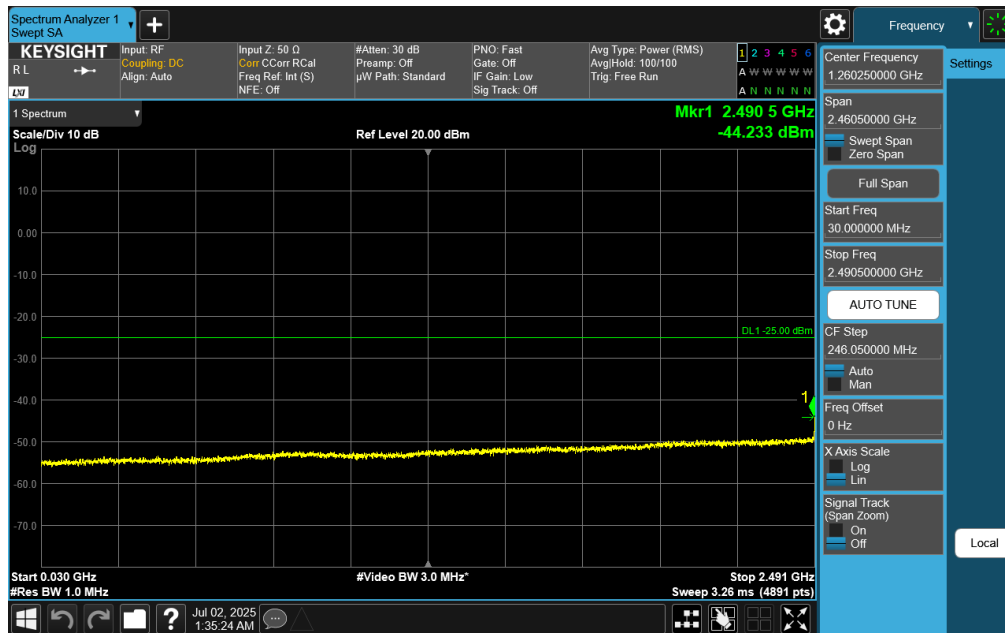
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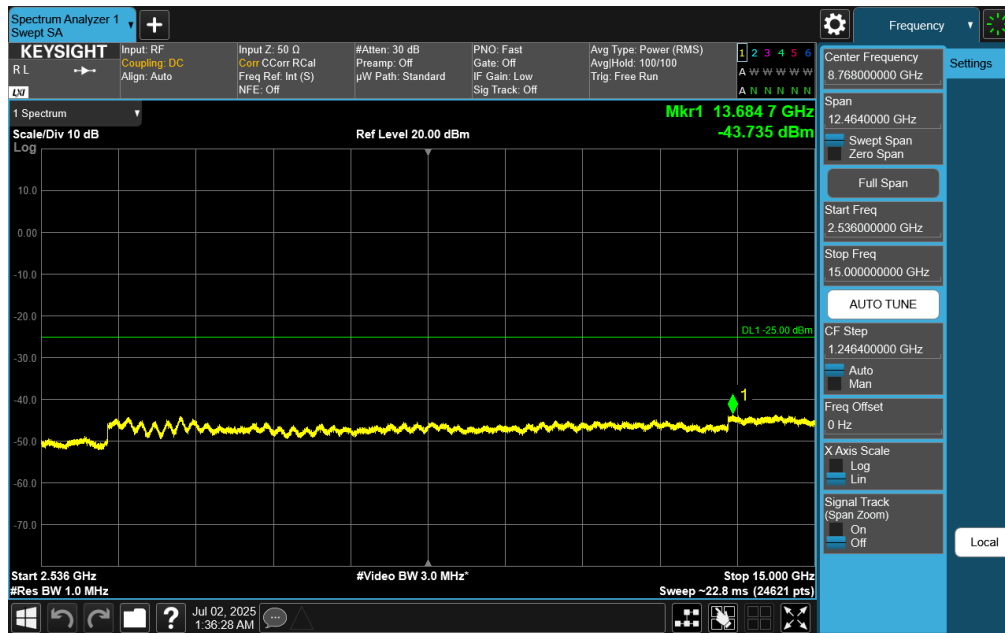
Plot 7-71. Conducted Spurious Plot (NR Band n7 - 20MHz QPSK - RB Size 1, RB Offset 50 - High Channel)

FCC ID: BCG-A3328	<div>element</div> <div>PART 27 MEASUREMENT REPORT</div>		Approved by: Technical Manager
Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 53 of 110


NR Band n41



Plot 7-72. Conducted Spurious Plot (NR Band n41 - 20MHz QPSK - RB Size 1, RB Offset 25 - Low Channel)



Plot 7-73. Conducted Spurious Plot (NR Band n41 - 20MHz QPSK - RB Size 1, RB Offset 25 - Low Channel)

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Test Report S/N: 1C2503270037-04.BCG	Test Dates: 12/20/2024 - 7/19/2025	EUT Type: Watch	Page 54 of 110

V2.2 09/07/2023

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