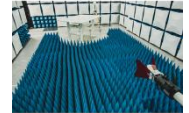




# Element Materials Technology

(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:**

4/2/2025 - 7/31/2025

**Test Report Issue Date:**

8/7/2025

**Test Site/Location:**

Element Materials Technology, Morgan Hill, CA, USA

**Test Report Serial No.:**

1C2503270032-04.BCG

**FCC ID:**

**BCG-A3335**

**Applicant Name:**

**Apple Inc.**

**Application Type:**

Certification

**Model:**

A3335, A3452

**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




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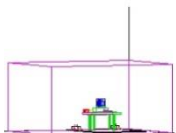
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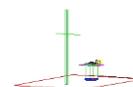
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## PART 27 MEASUREMENT REPORT



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	4.5320	77.625	18.90	4M53G7W
		16QAM	2502.5 - 2567.5	4.5075	61.376	17.88	4M51D7W
	10 MHz	QPSK	2505 - 2565	9.0324	76.560	18.84	9M03G7W
		16QAM	2505 - 2565	5.0535	60.117	17.79	5M05D7W
	15 MHz	QPSK	2507.5 - 2562.5	13.5275	77.625	18.90	13M5G7W
		16QAM	2507.5 - 2562.5	5.4106	61.094	17.86	5M41D7W
LTE Band 41(PC3)	5 MHz	QPSK	2510 - 2560	17.9985	77.625	18.90	18M0G7W
		16QAM	2510 - 2560	5.5717	61.094	17.86	5M57D7W
	10 MHz	QPSK	2498.5 - 2687.5	4.5616	75.858	18.80	4M56G7W
		16QAM	2498.5 - 2687.5	4.5284	60.256	17.80	4M53D7W
	15 MHz	QPSK	2501 - 2685	9.0652	74.131	18.70	9M07G7W
		16QAM	2501 - 2685	5.0923	58.076	17.64	5M09D7W
	20 MHz	QPSK	2503.5 - 2682.5	13.6087	75.858	18.80	13M6G7W
		16QAM	2503.5 - 2682.5	5.4753	60.534	17.82	5M48D7W
	20 MHz	QPSK	2506 - 2680	18.0512	75.858	18.80	18M1G7W
		16QAM	2506 - 2680	5.8575	60.256	17.80	5M86D7W

### EUT Overview


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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	OBW [MHz]	EIRP		Emission Designator
					Max. Power [mW]	Max. Power [dBm]	
NR Band n7	5 MHz	TT/2 BPSK	2502.5 - 2567.5	4.4819	77.625	18.90	4M48G7W
		QPSK	2502.5 - 2567.5	4.4850	77.090	18.87	4M49G7W
		16QAM	2502.5 - 2567.5	4.4797	61.376	17.88	4M48D7W
		64QAM	2502.5 - 2567.5	4.4597	48.978	16.90	4M46D7W
	10 MHz	TT/2 BPSK	2505 - 2565	8.8718	77.625	18.90	8M87G7W
		QPSK	2505 - 2565	9.3291	77.625	18.90	9M33G7W
		16QAM	2505 - 2565	9.3263	61.660	17.90	9M33D7W
		64QAM	2505 - 2565	9.3179	48.865	16.89	9M32D7W
	15 MHz	TT/2 BPSK	2507.5 - 2562.5	13.4250	77.268	18.88	13M4G7W
		QPSK	2507.5 - 2562.5	14.1410	77.625	18.90	14M1G7W
		16QAM	2507.5 - 2562.5	14.1200	62.517	17.96	14M1D7W
		64QAM	2507.5 - 2562.5	14.1920	50.003	16.99	14M2D7W
	20 MHz	TT/2 BPSK	2510 - 2560	17.9390	77.625	18.90	17M9G7W
		QPSK	2510 - 2560	18.9460	76.736	18.85	18M9G7W
		16QAM	2510 - 2560	18.9370	60.395	17.81	18M9D7W
		64QAM	2510 - 2560	19.0250	48.865	16.89	19M0D7W
NR Band n41 (PC3)	10 MHz	TT/2 BPSK	2501 - 2685	8.5529	75.858	18.80	8M55G7W
		QPSK	2501 - 2685	8.6168	73.961	18.69	8M62G7W
		16QAM	2501 - 2685	8.5900	58.479	17.67	8M59D7W
		64QAM	2501 - 2685	8.6264	47.753	16.79	8M63D7W
	15 MHz	TT/2 BPSK	2503.5 - 2682.5	12.9210	75.858	18.80	12M9G7W
		QPSK	2503.5 - 2682.5	13.6120	75.858	18.80	13M6G7W
		16QAM	2503.5 - 2682.5	13.5450	59.704	17.76	13M5D7W
		64QAM	2503.5 - 2682.5	13.5670	48.417	16.85	13M6D7W
	20 MHz	TT/2 BPSK	2506 - 2680	17.8630	74.989	18.75	17M9G7W
		QPSK	2506 - 2680	18.2460	74.817	18.74	18M2G7W
		16QAM	2506 - 2680	18.2880	59.704	17.76	18M3D7W
		64QAM	2506 - 2680	18.2460	46.881	16.71	18M2D7W

### 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 ISCED Standards (RSS).
- Element Materials Technology facility is a registered (22831) test laboratory with the site description on file with ISCED.
- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISCED 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-A3335**. 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.:** MC7DP4YMHF, PTQKY2MRPK, MW77GPK6KL, DLCHFZ000GE0000Q4C

### 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.

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
	802.11 b/g/n	BDR, EDR, HDR4/8, LE1/2M	O-QPSK	Mid/High Band	802.11 a/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

#### **Note:**

All the above simultaneous transmission configurations have been tested and the worst case configuration was found to be Config 5.

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## 2.3 Antenna Description

Following antenna gains provided by manufacturer were used for testing.


Band	Antenna Gain [dBi]
	FCM
LTE Band 7	-6.3
NR Band n7	
LTE Band 41	-6.4
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:	A3276	S/N:	DQ84112013F08V22Z
	w/ Cradle	Model:	N/A	S/N:	CYV4023011Y23SE01MP1F
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:	DLCH64000270000QA0
	SiP Socket	Model:	P1 N22X S PF 159	S/N:	DLCH8J000H50000WXE
5	DC Power Supply	Model:	SPS3010	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 all combinations of the two materials, aluminum, and titanium, and 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.

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

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

Description	Bluetooth	LTE (Band 41)	UNII
Antenna	FCM	FCM	FCM
Channel	78	40620	36
Operating Frequency (MHz)	2480	2593	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  $U_{\text{CISPR}}$  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-A3335  
 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 7.6
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 41)			PASS	Section 7.6
	Effective Radiated Power / Equivalent Isotropic Radiated Power (NR Band n41)			PASS	Section 7.6
	Frequency Stability	2.1055, 27.54	Fundamental emissions stay within authorized frequency block over the temperature and voltage range as tested	PASS	Section 7.8
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 7.7
	Radiated Spurious Emissions (LTE Band 41)			PASS	Section 7.7
	Radiated Spurious Emissions (NR Band n41)			PASS	Section 7.7

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 EMC Software Tool v1.1.
5. For radiated emission, 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

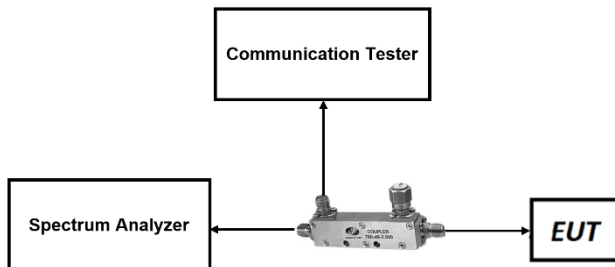
1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW  $\geq 3 \times$  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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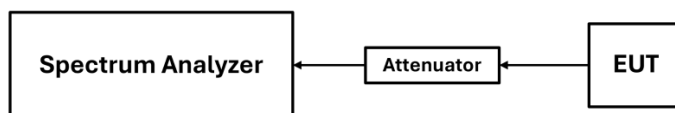
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## Test Setup

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

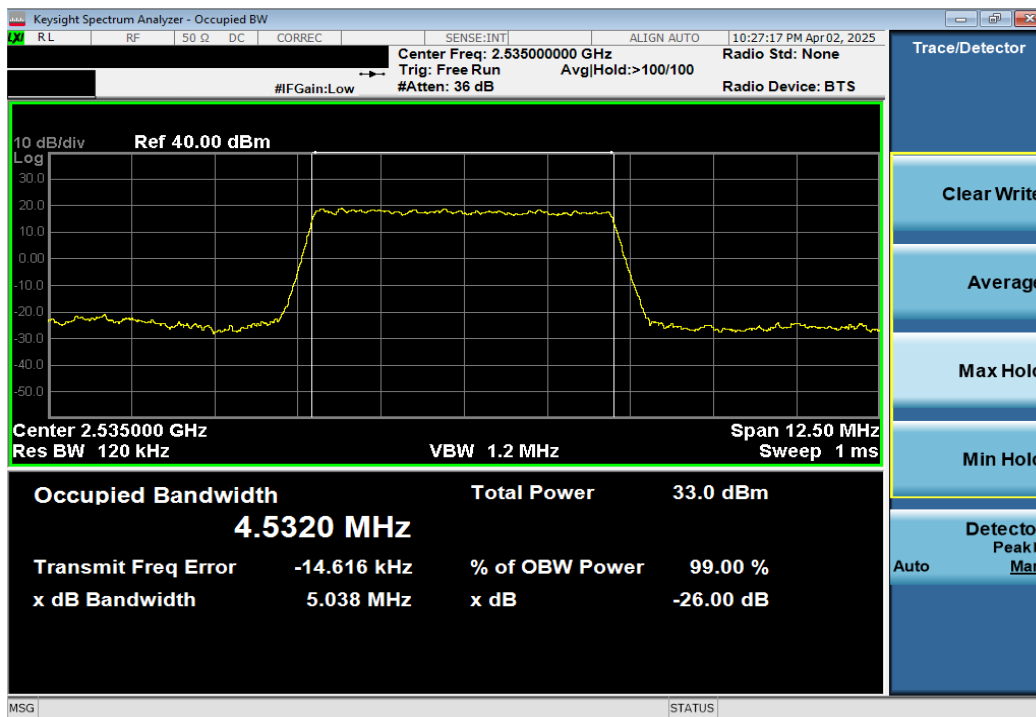
1. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

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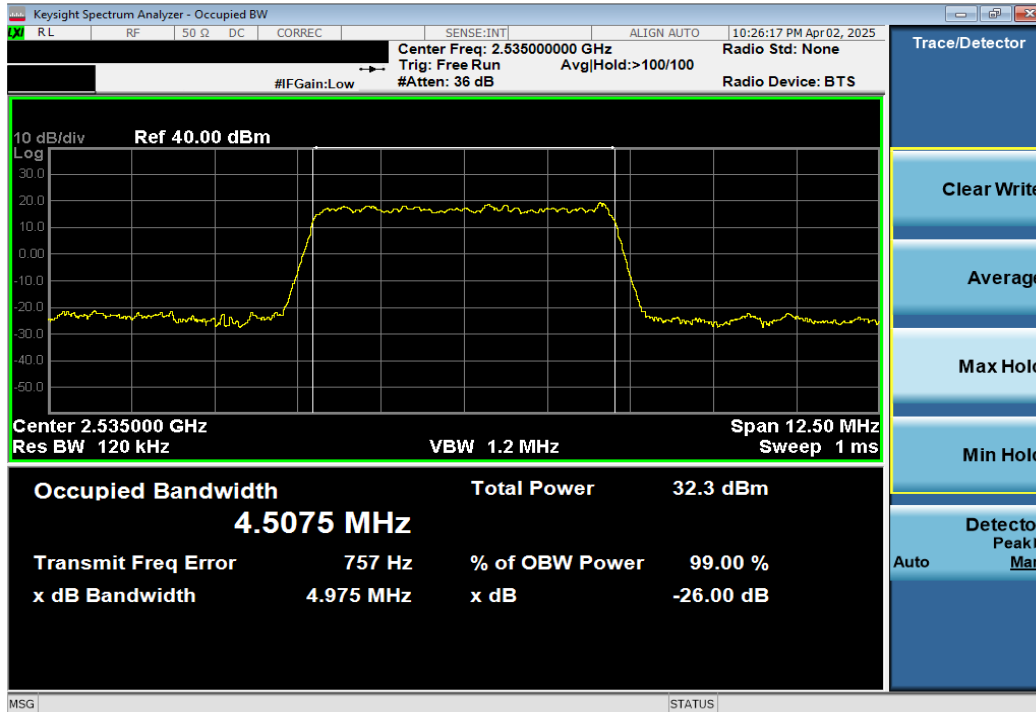
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## LTE Band 7



Plot 7-1. Occupied Bandwidth Plot (LTE Band 7 - 5MHz QPSK - Full RB)

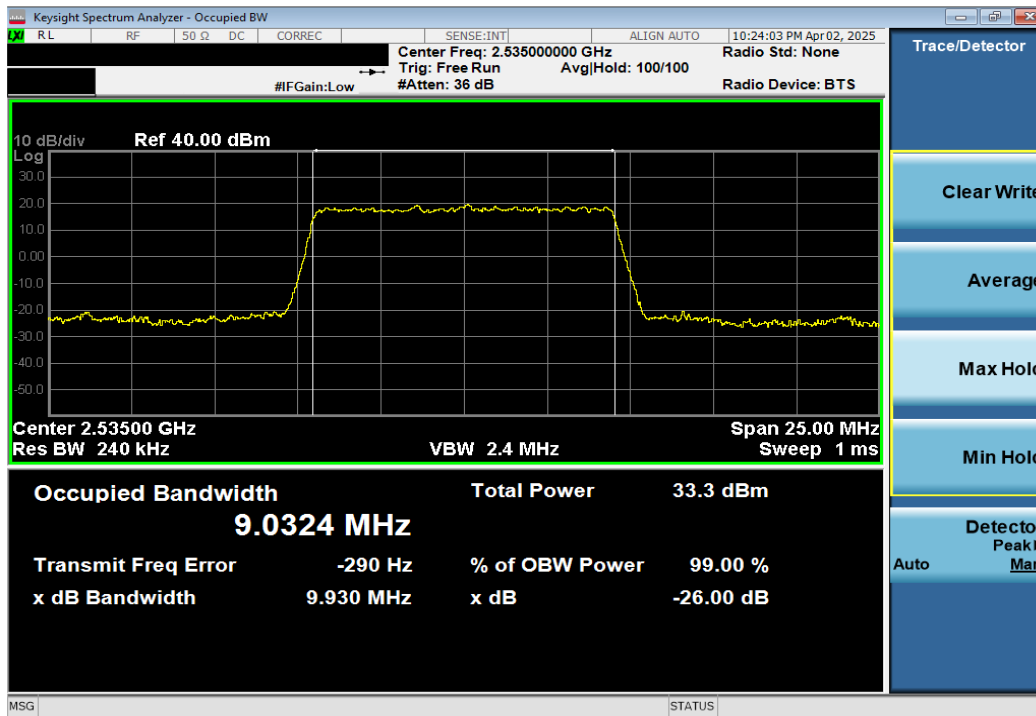


Plot 7-2. Occupied Bandwidth Plot (LTE Band 7 - 5MHz 16-QAM - Full RB)

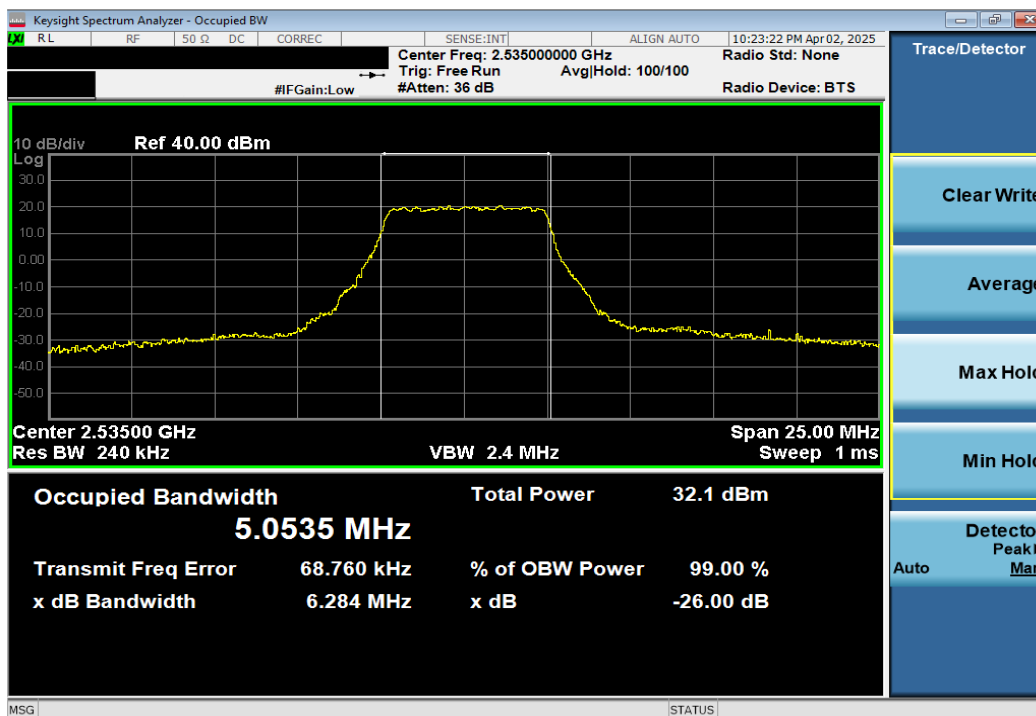
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Plot 7-3. Occupied Bandwidth Plot (LTE Band 7 - 10MHz QPSK - Full RB)

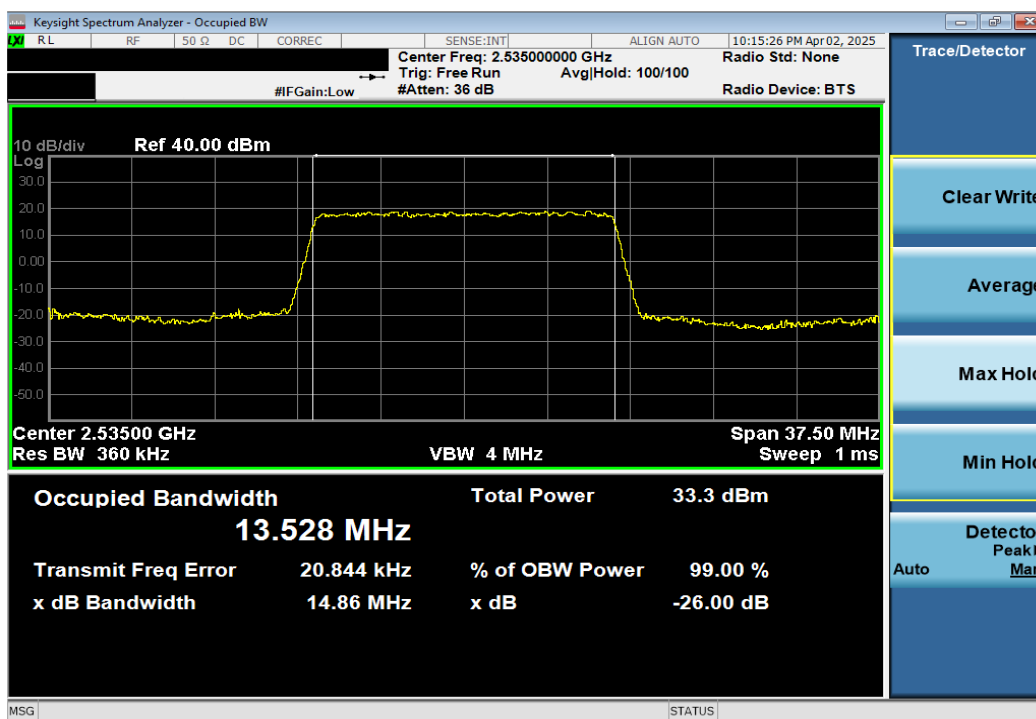


Plot 7-4. Occupied Bandwidth Plot (LTE Band 7 - 10MHz 16-QAM - Full RB)

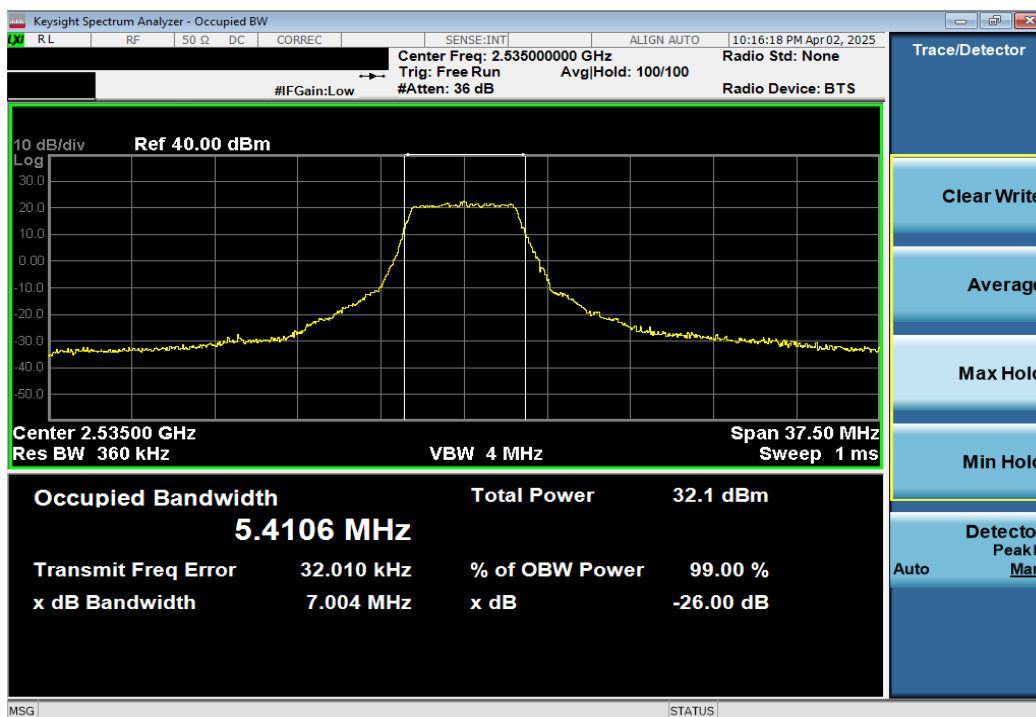
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Plot 7-5. Occupied Bandwidth Plot (LTE Band 7 - 15MHz QPSK - Full RB)

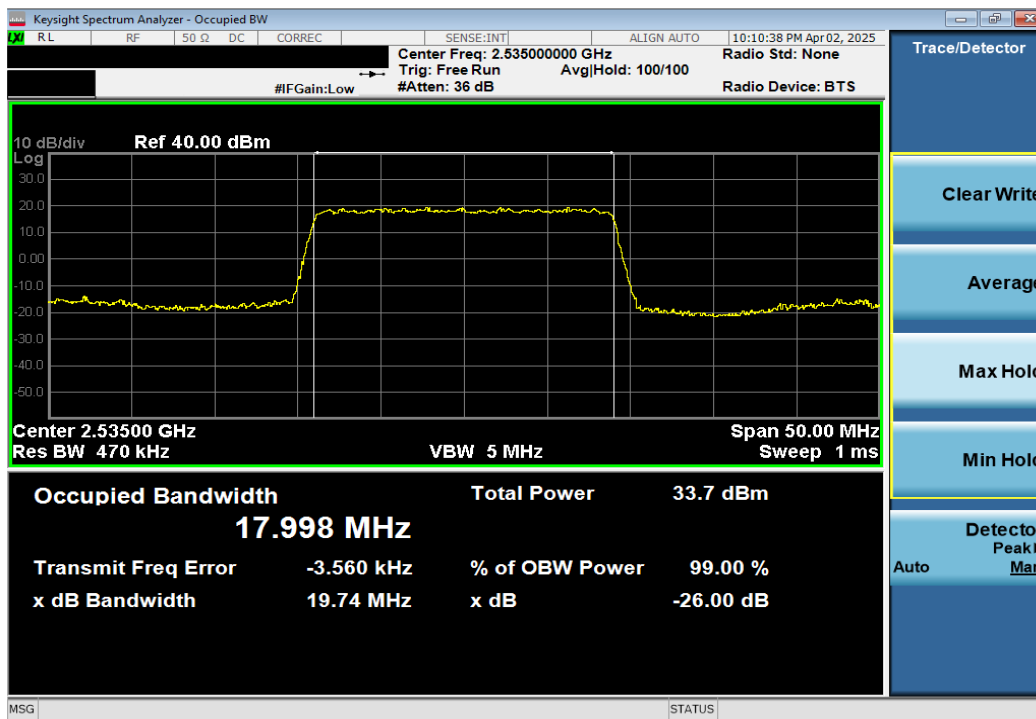


Plot 7-6. Occupied Bandwidth Plot (LTE Band 7 - 15MHz 16-QAM - Full RB)

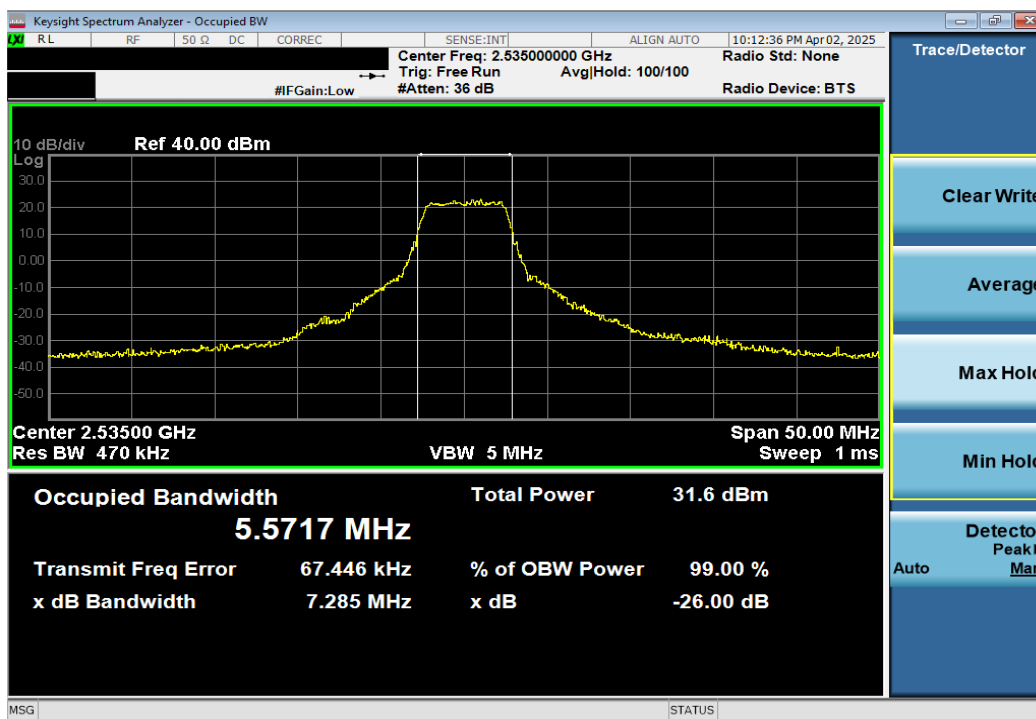
FCC ID: BCG-A3335	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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Plot 7-7. Occupied Bandwidth Plot (LTE Band 7 - 20MHz QPSK - Full RB)



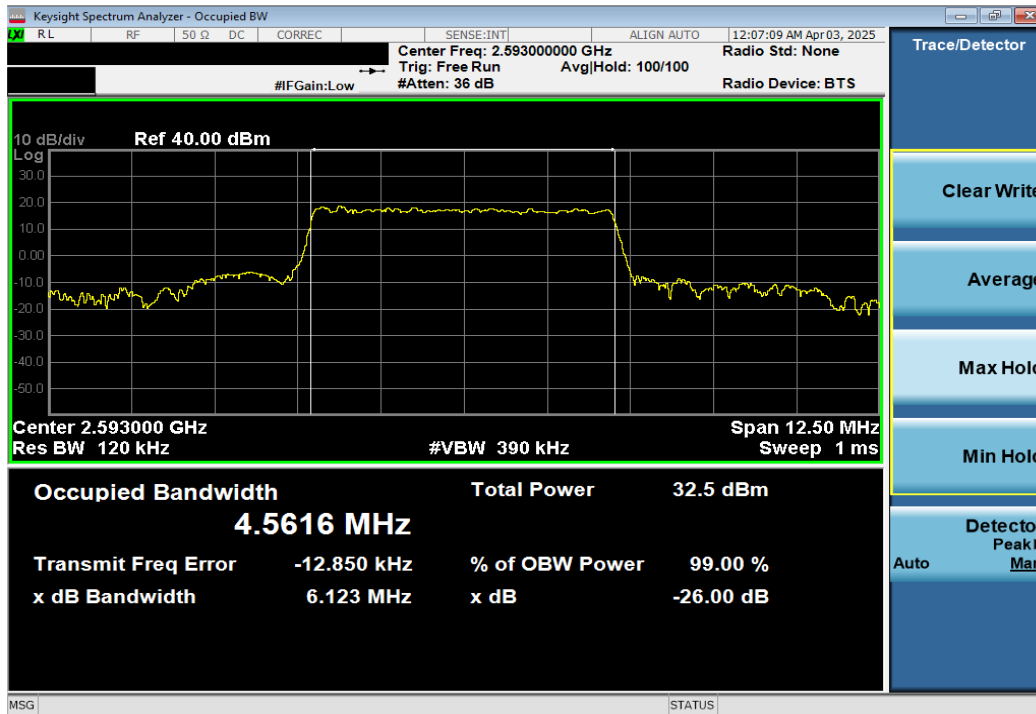
Plot 7-8. Occupied Bandwidth Plot (LTE Band 7 - 20MHz 16-QAM - Full RB)

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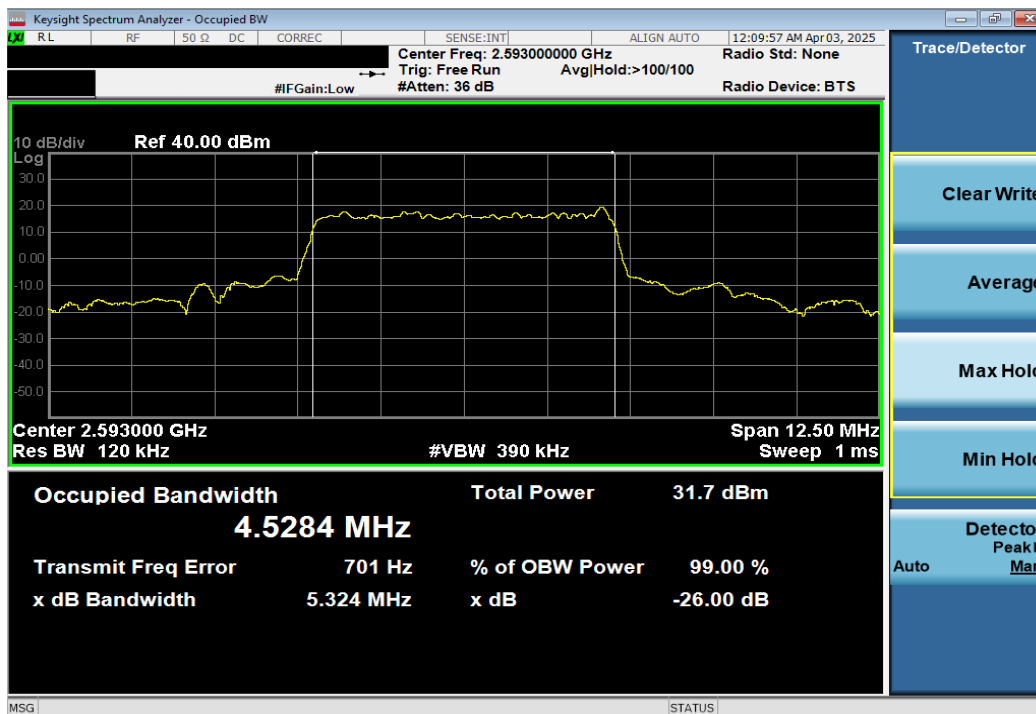
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## LTE Band 41



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

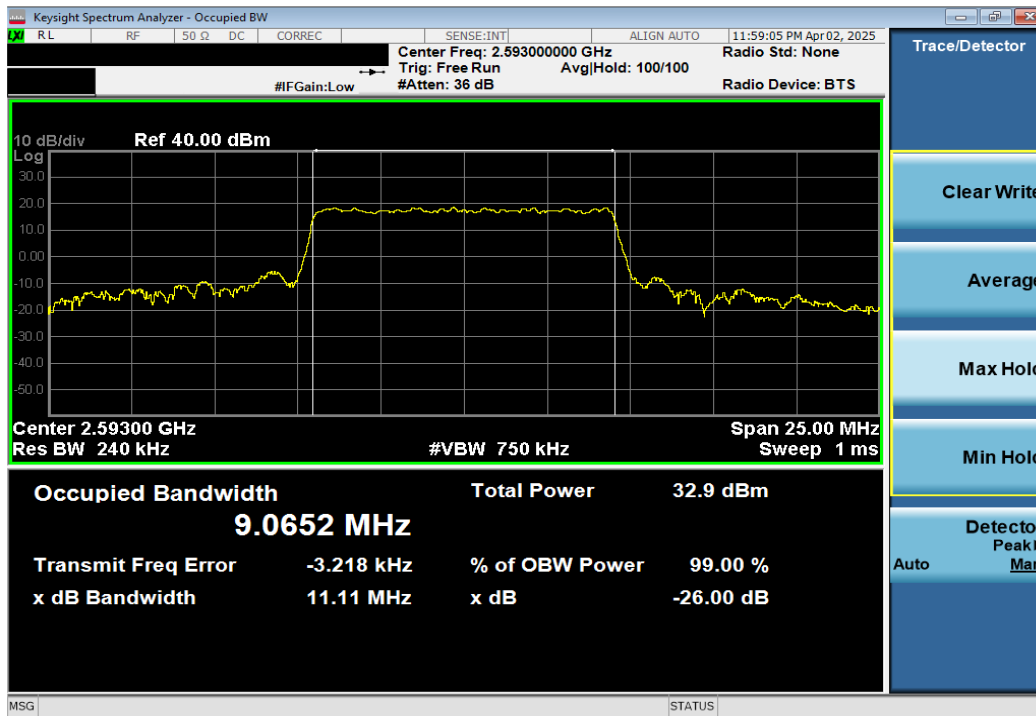


Plot 7-10. Occupied Bandwidth Plot (LTE Band 41 - 5MHz 16-QAM - Full RB)

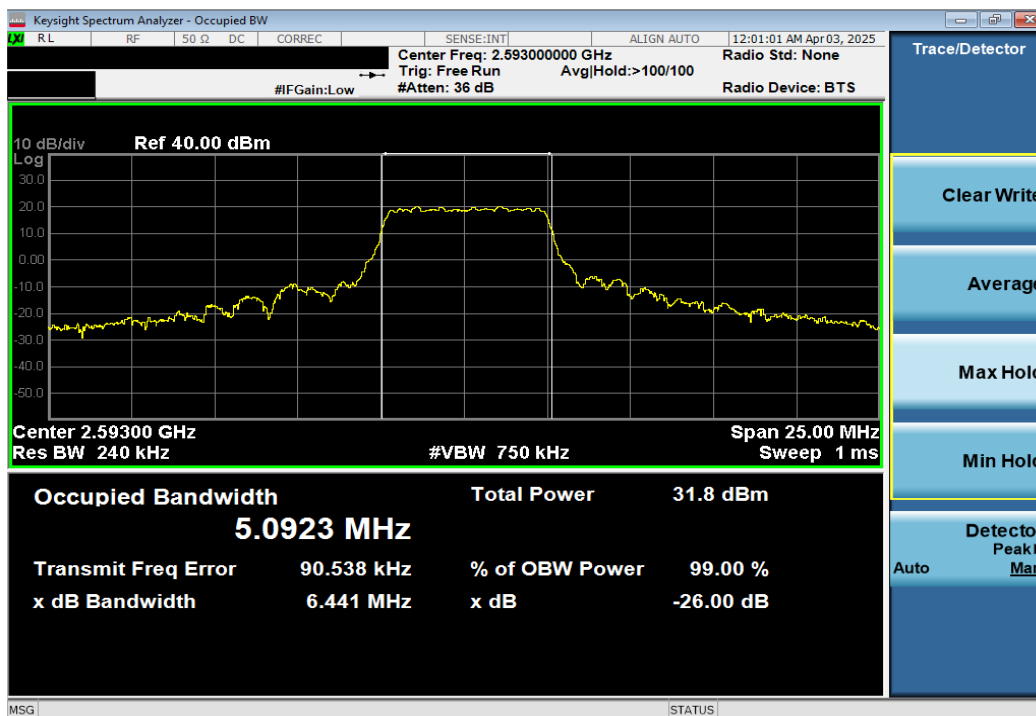
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Plot 7-11. Occupied Bandwidth Plot (LTE Band 41 - 10MHz QPSK - Full RB)

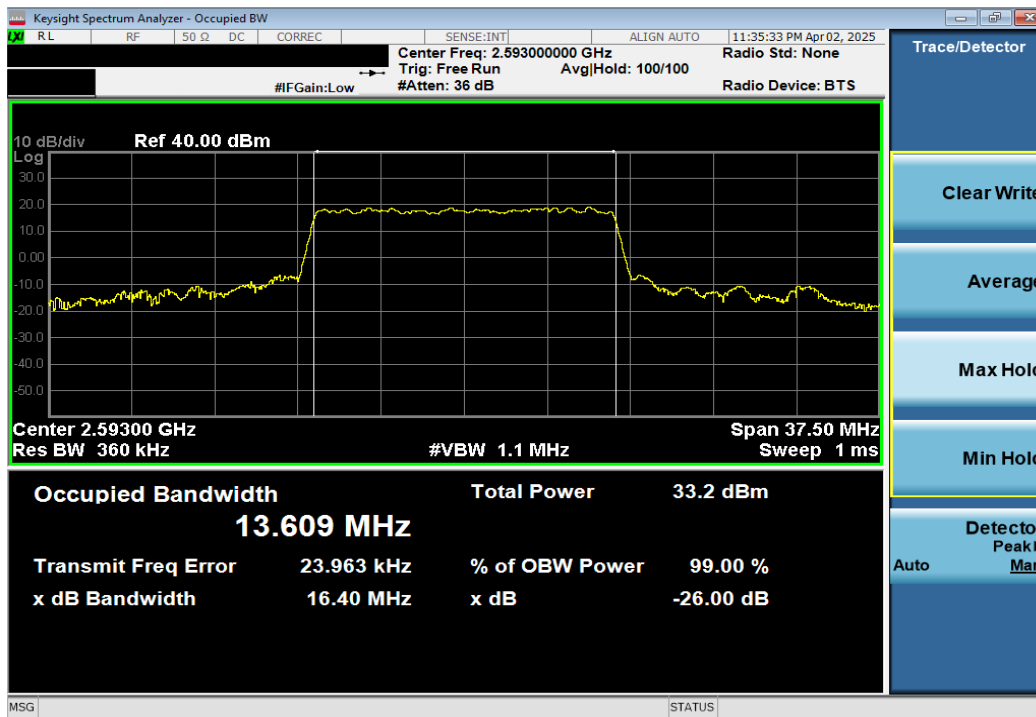


Plot 7-12. Occupied Bandwidth Plot (LTE Band 41 - 10MHz 16-QAM - Full RB)

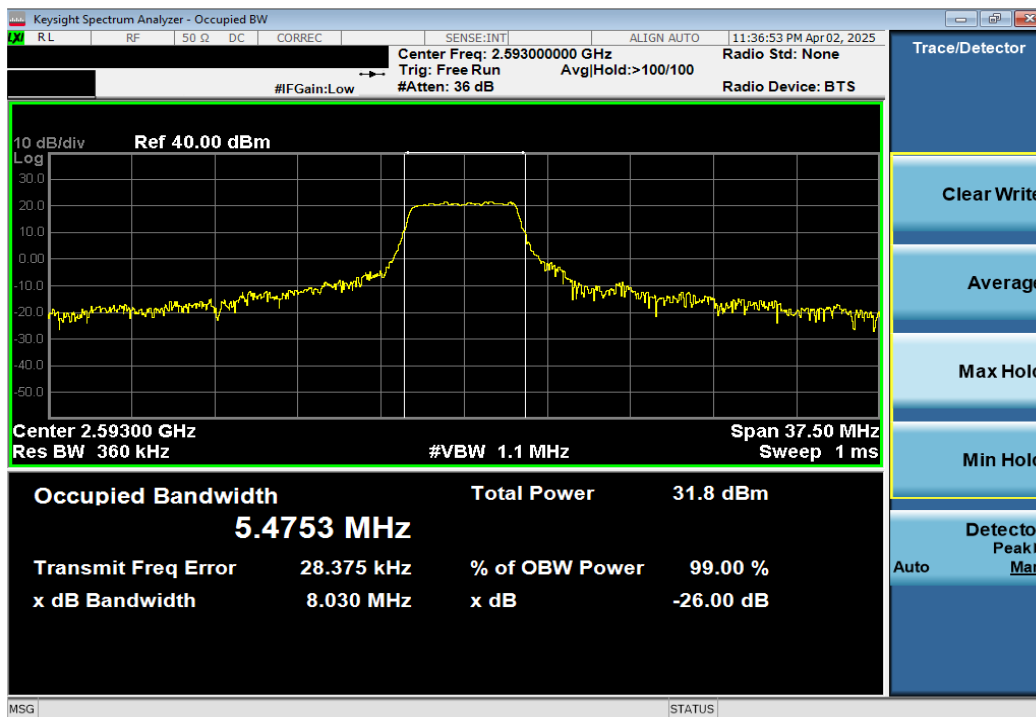
FCC ID: BCG-A3335	<p>element</p> <p>PART 27 MEASUREMENT REPORT</p>		Approved by: Technical Manager
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Plot 7-13. Occupied Bandwidth Plot (LTE Band 41 - 15MHz QPSK - Full RB)

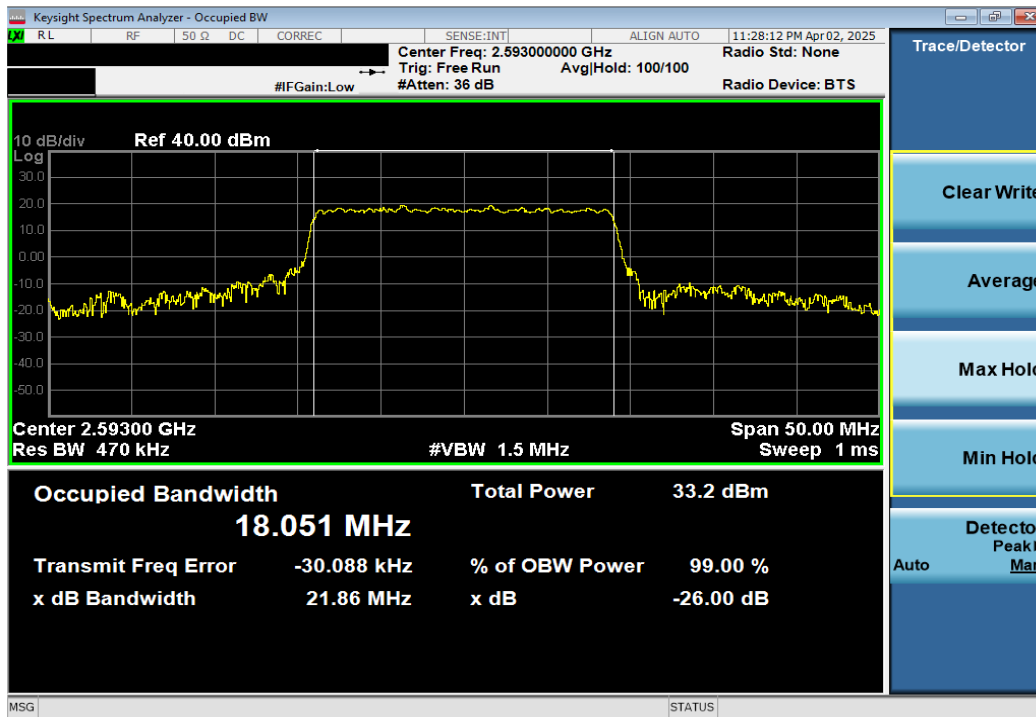


Plot 7-14. Occupied Bandwidth Plot (LTE Band 41 - 15MHz 16-QAM - Full RB)

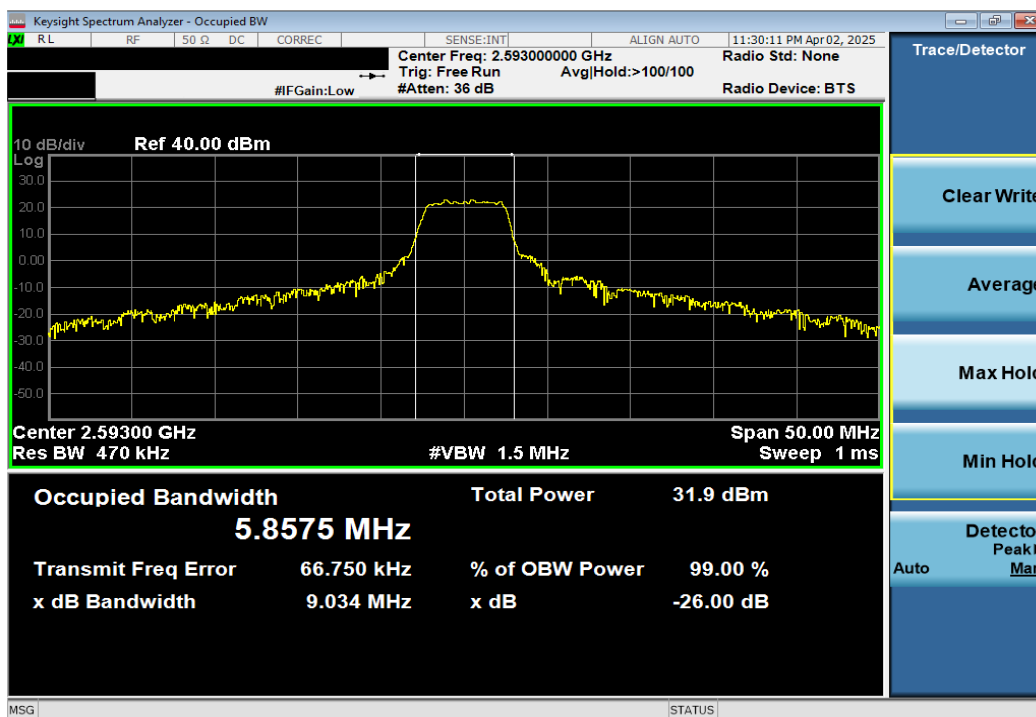
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Plot 7-15. Occupied Bandwidth Plot (LTE Band 41 - 20MHz QPSK - Full RB)



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

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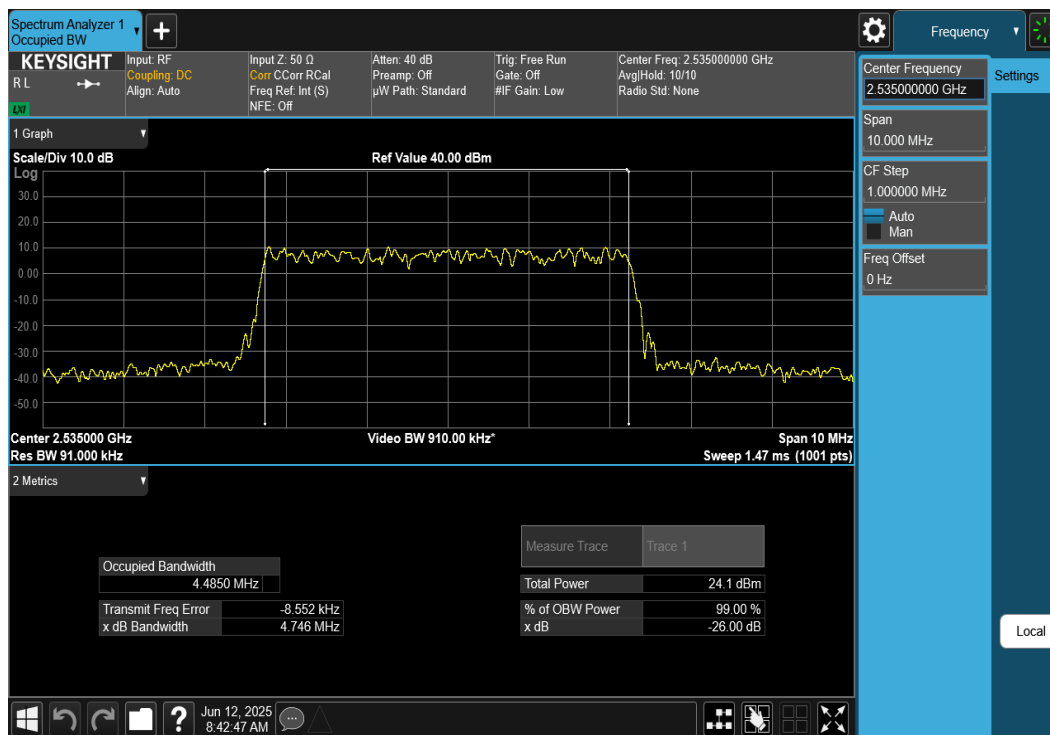
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## NR Band n7



Plot 7-17. Occupied Bandwidth Plot (NR Band n7 - 5MHz DFT-s-OFDM  $\pi/2$  BPSK - Full RB)

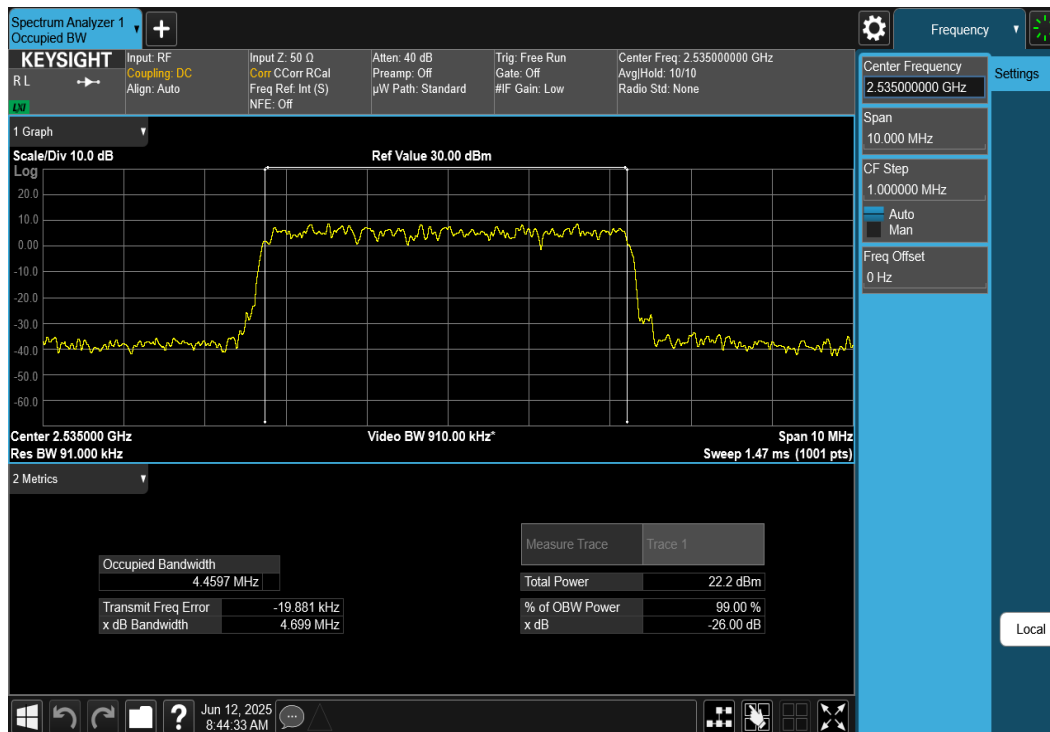
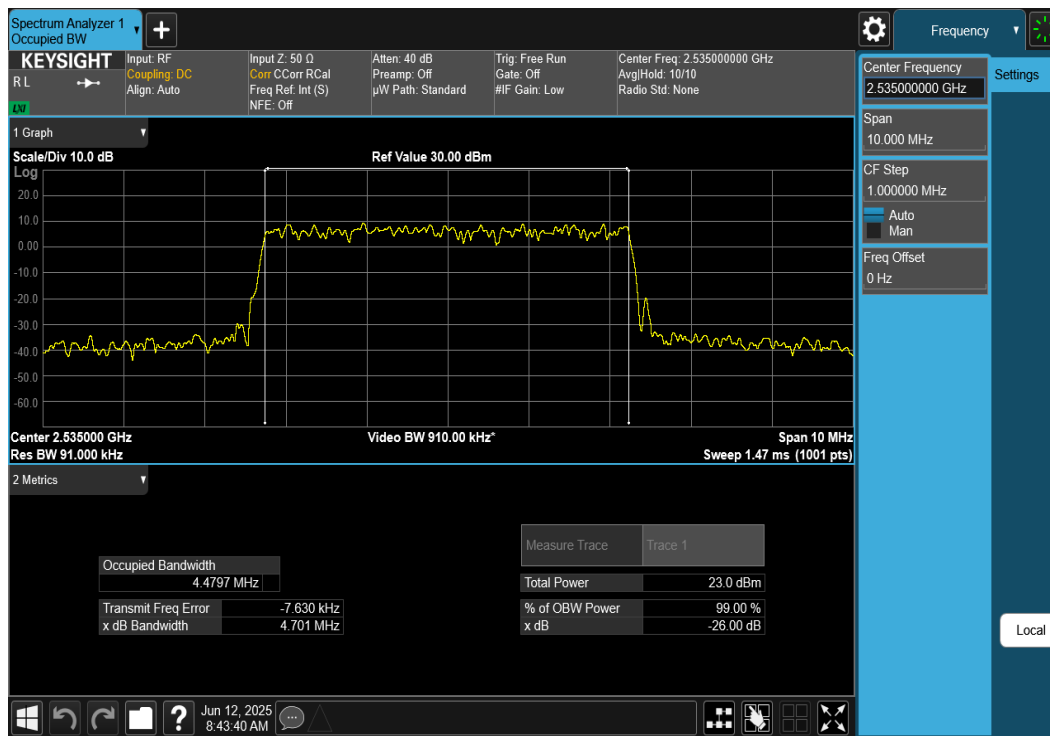



Plot 7-18. Occupied Bandwidth Plot (NR Band n7 - 5MHz DFT-s-OFDM QPSK - Full RB)

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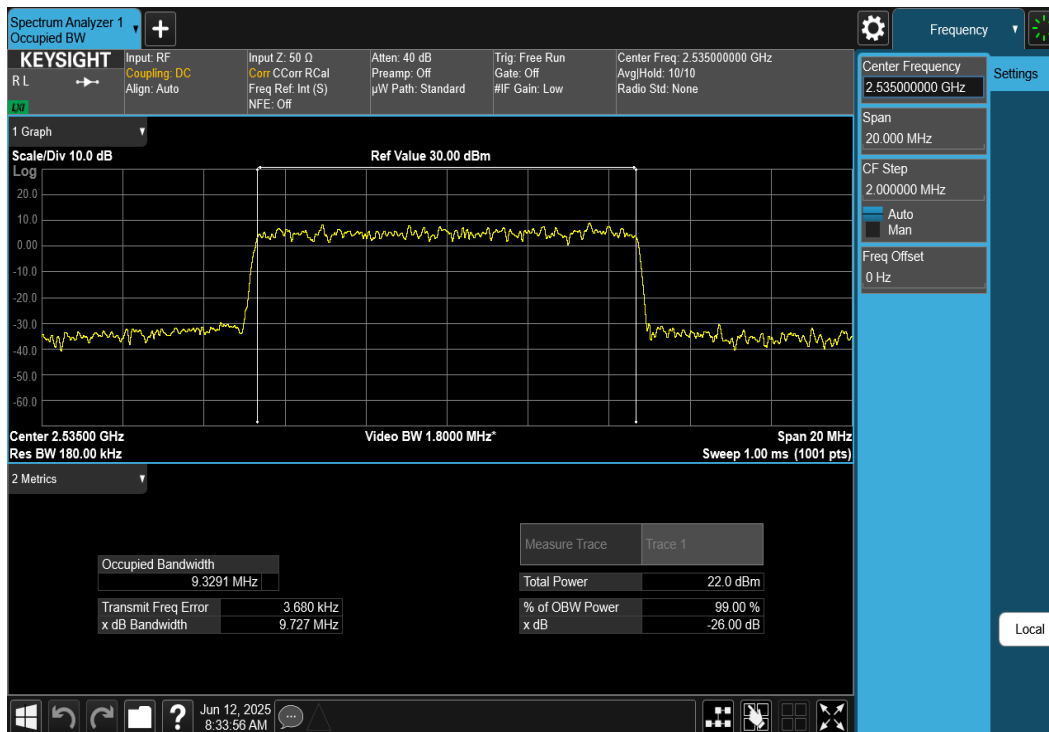
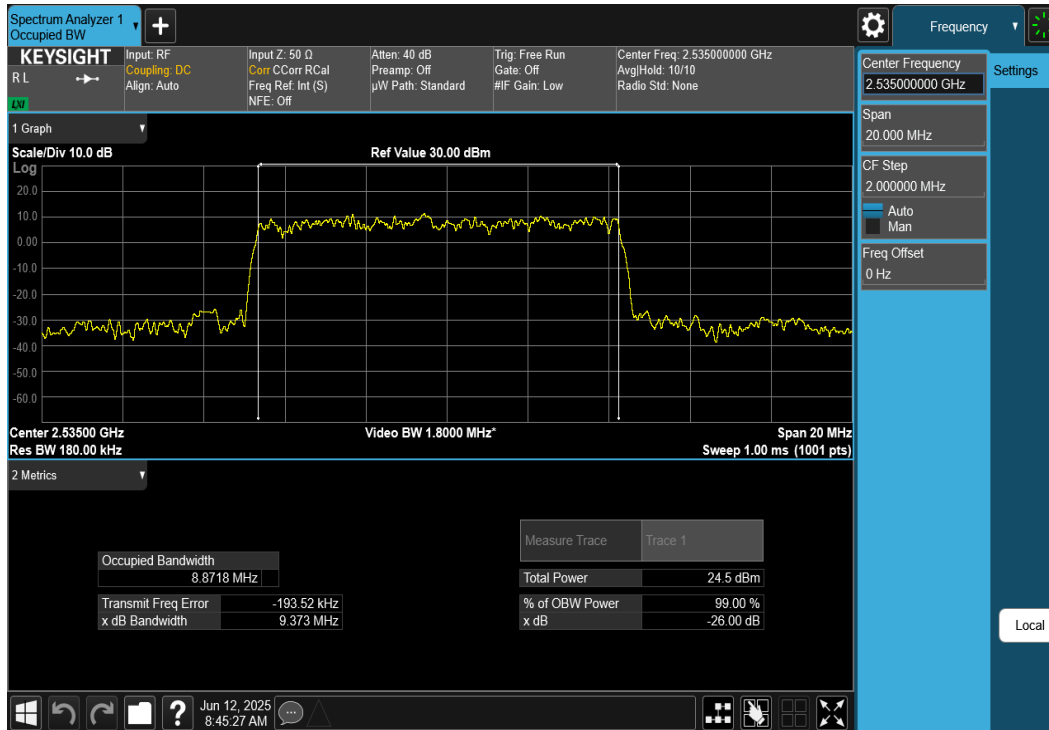
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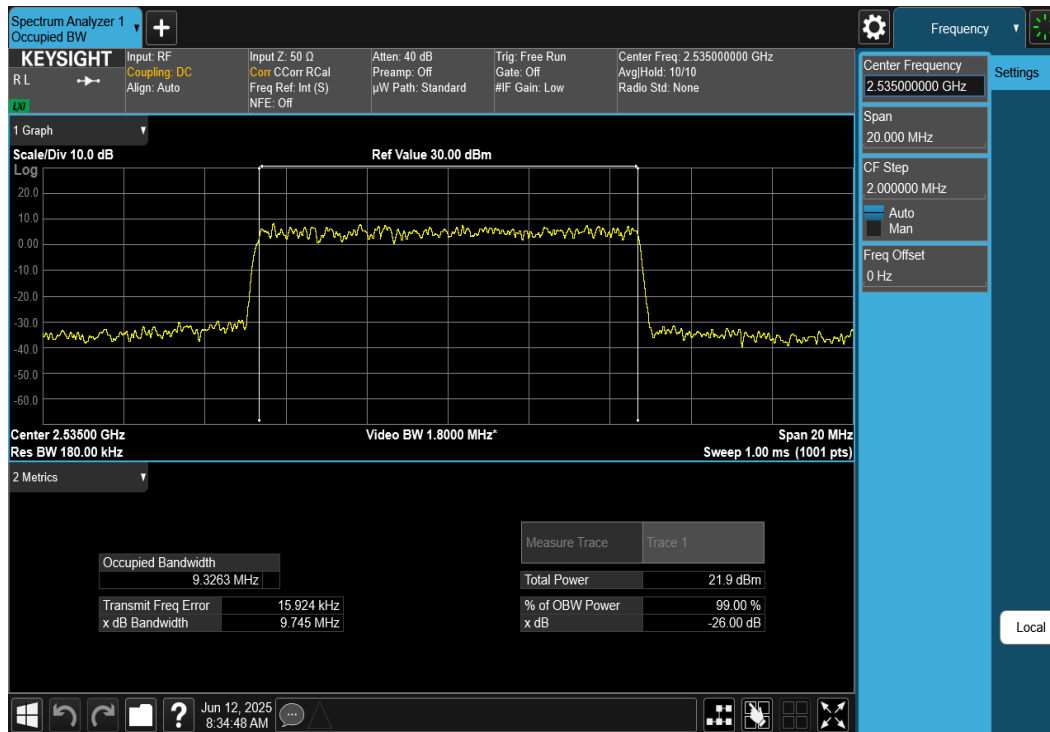
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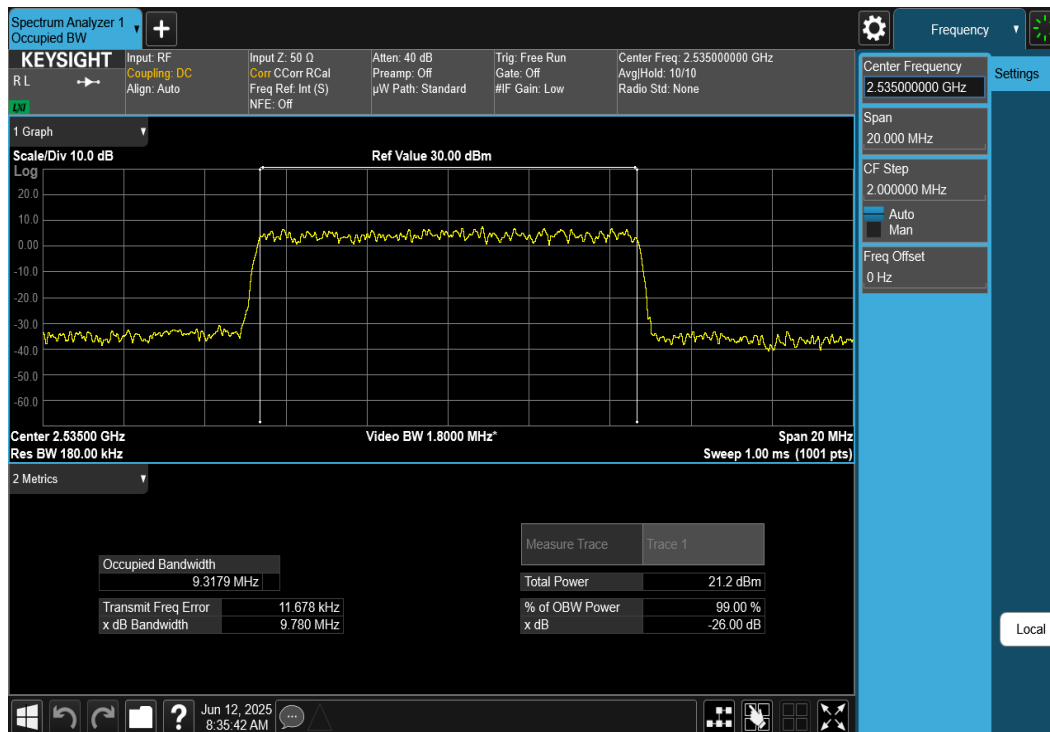
FCC ID: BCG-A3335	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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Plot 7-23. Occupied Bandwidth Plot (NR Band n7 - 10MHz CP-OFDM 16-QAM - Full RB)

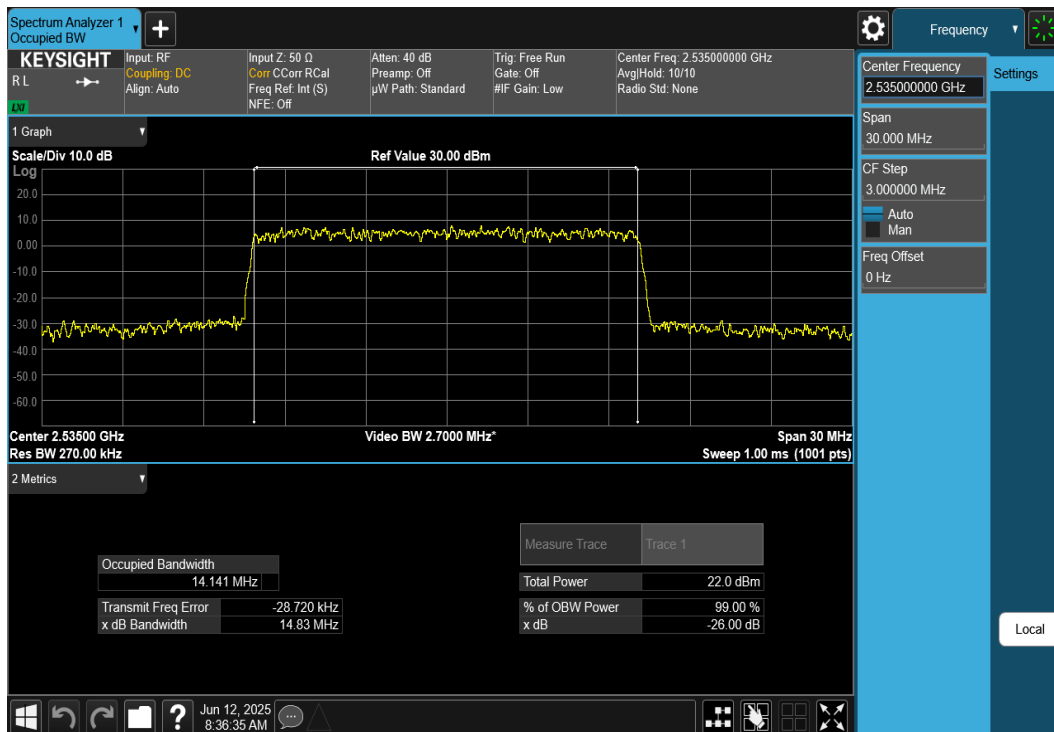
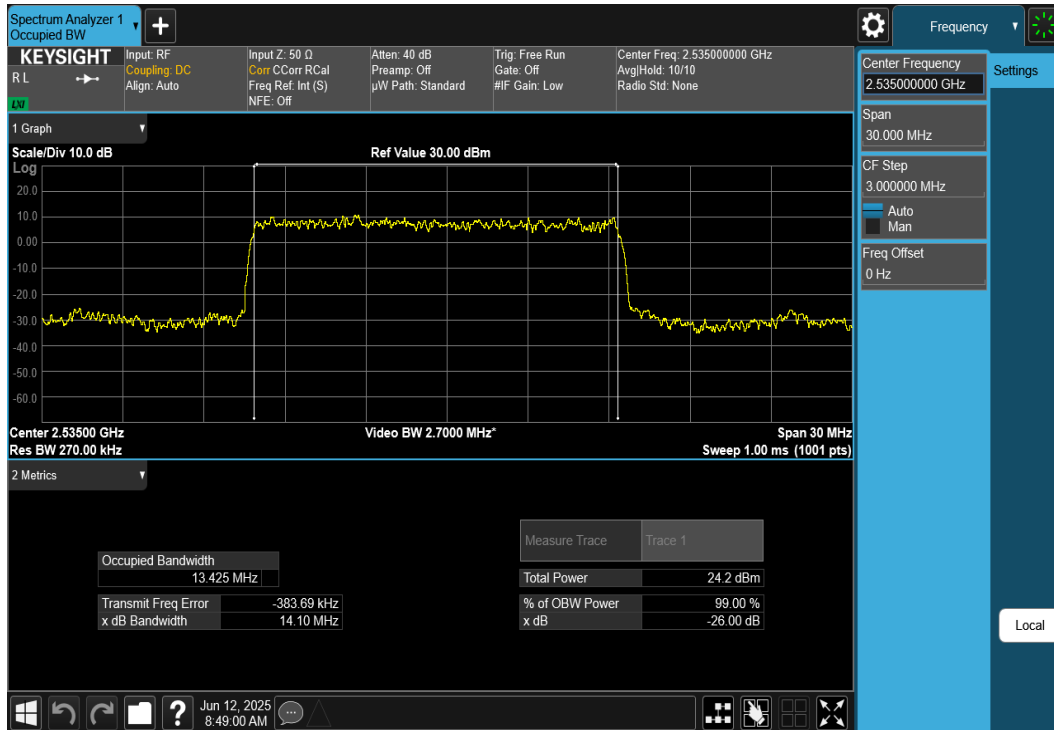



Plot 7-24. Occupied Bandwidth Plot (NR Band n7 - 10MHz CP-OFDM 64-QAM - Full RB)

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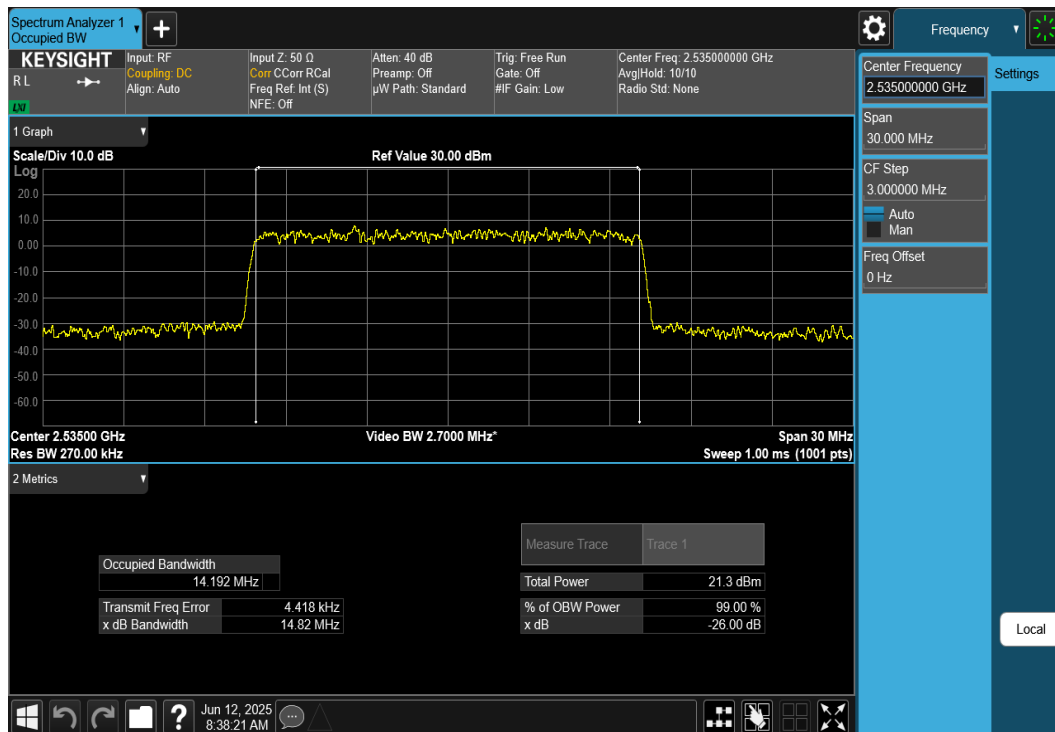
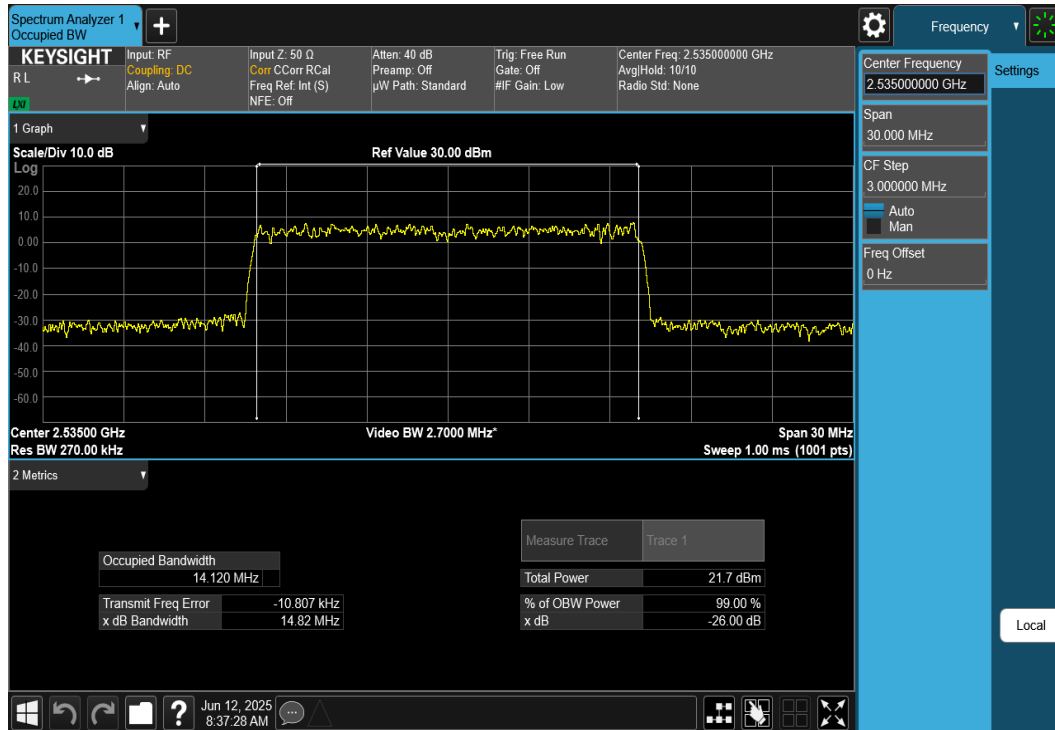
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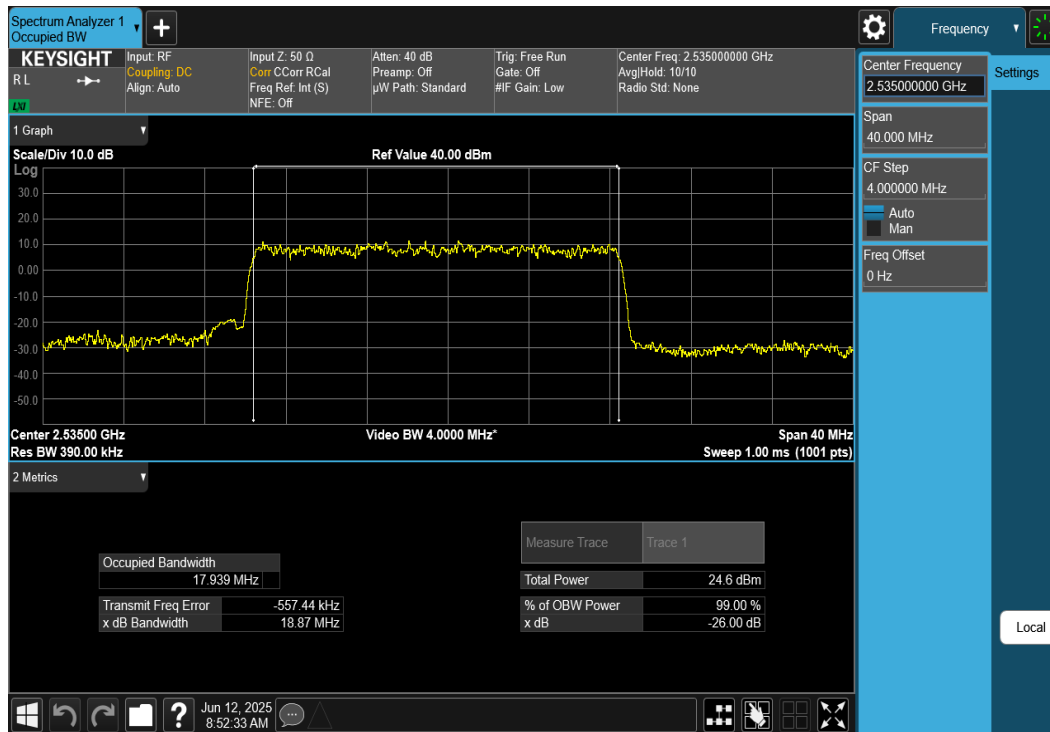
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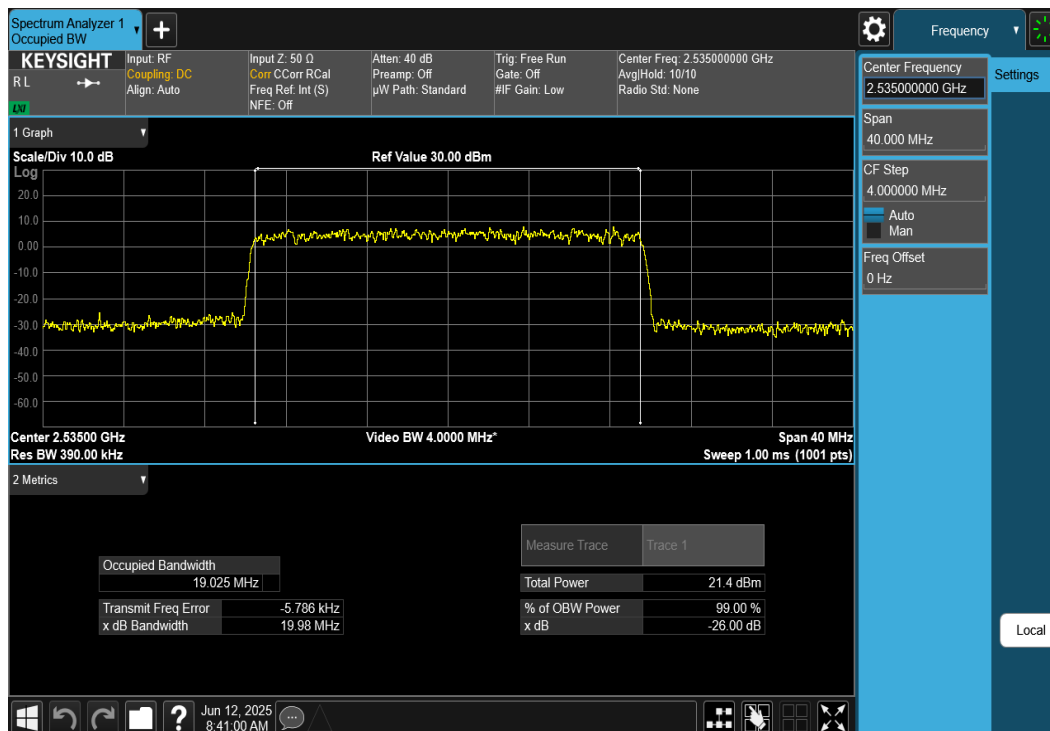
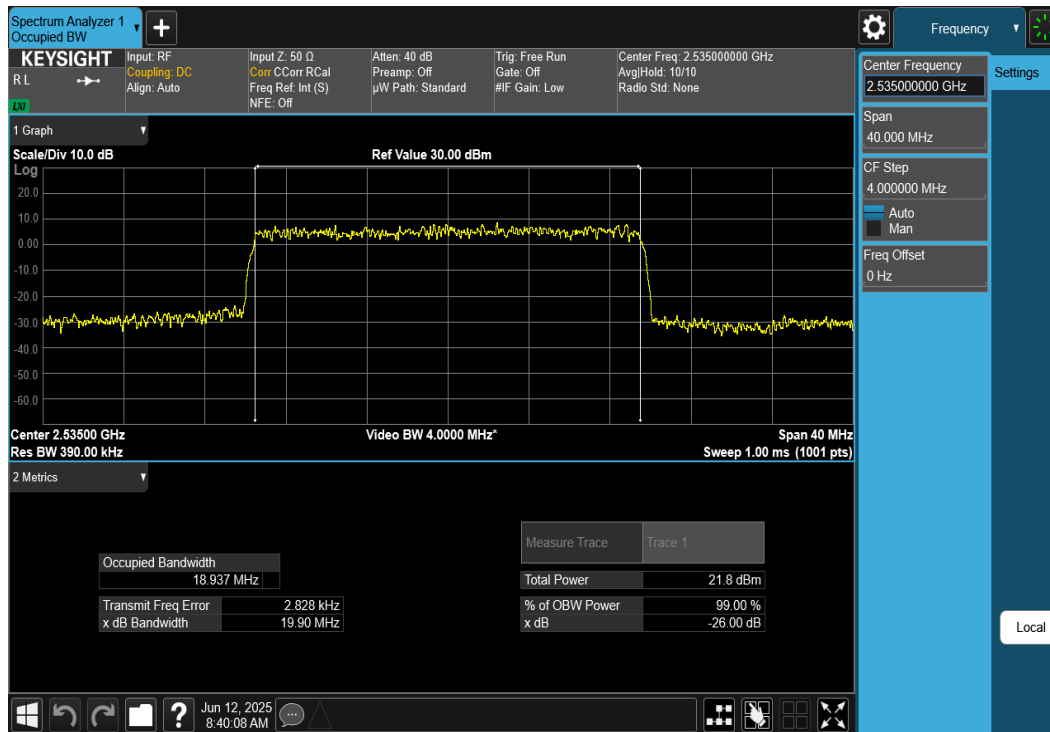
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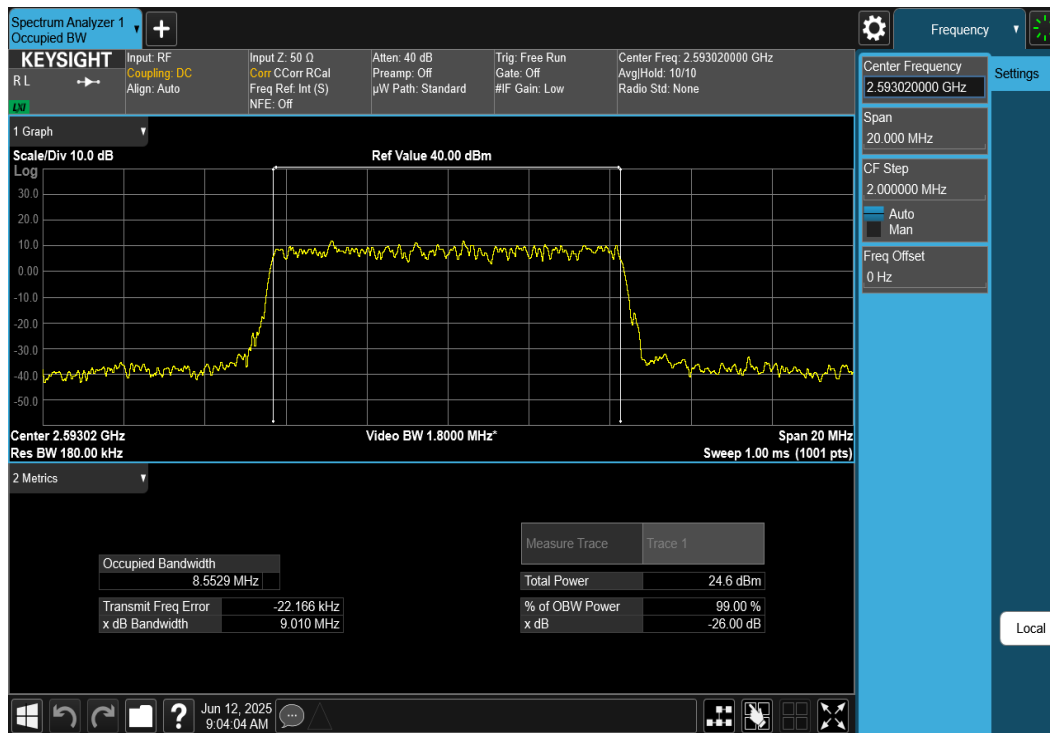
FCC ID: BCG-A3335	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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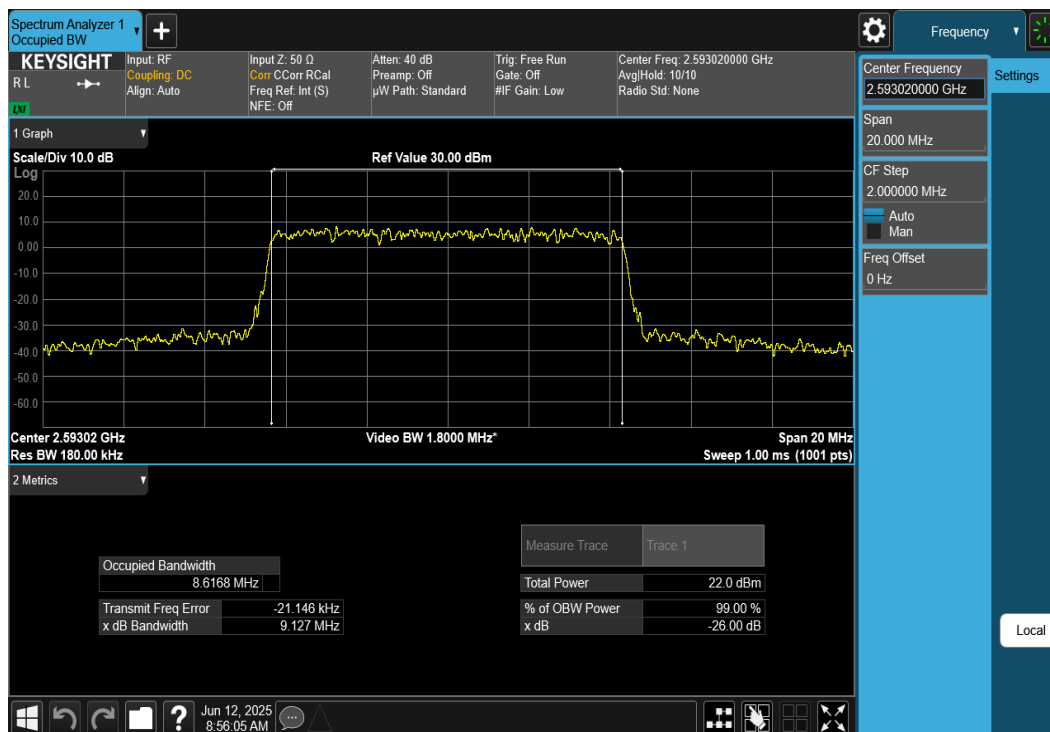
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## NR Band n41



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

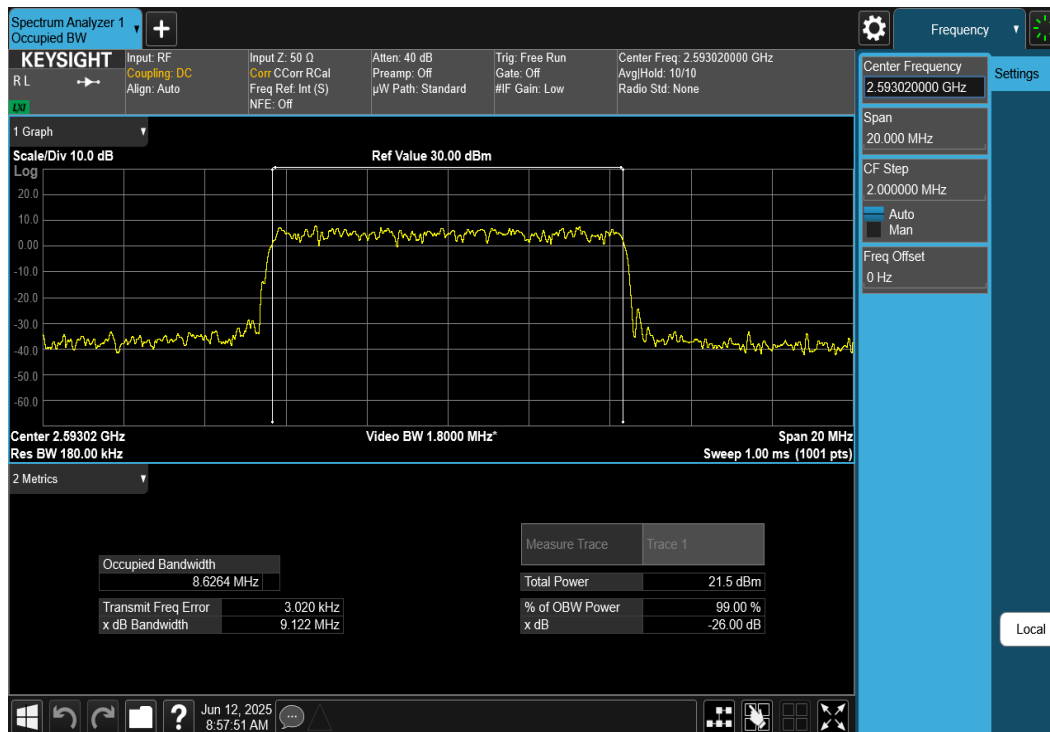
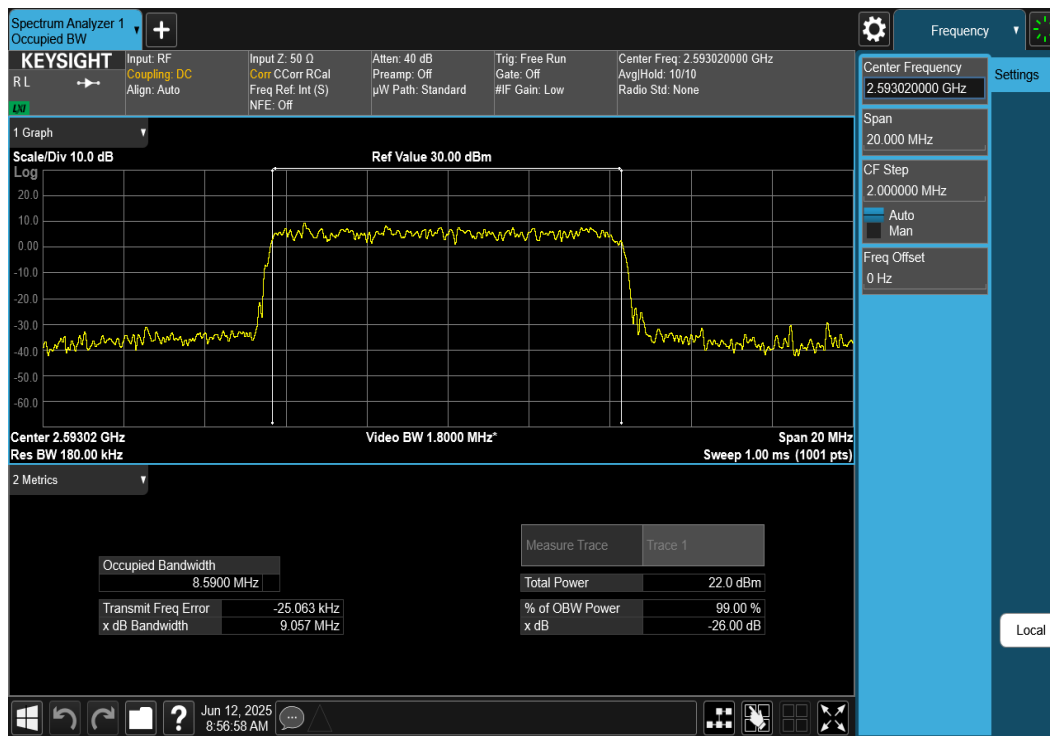


Plot 7-34. Occupied Bandwidth Plot (NR Band n41 - 10MHz CP-OFDM QPSK - Full RB)

FCC ID: BCG-A3335	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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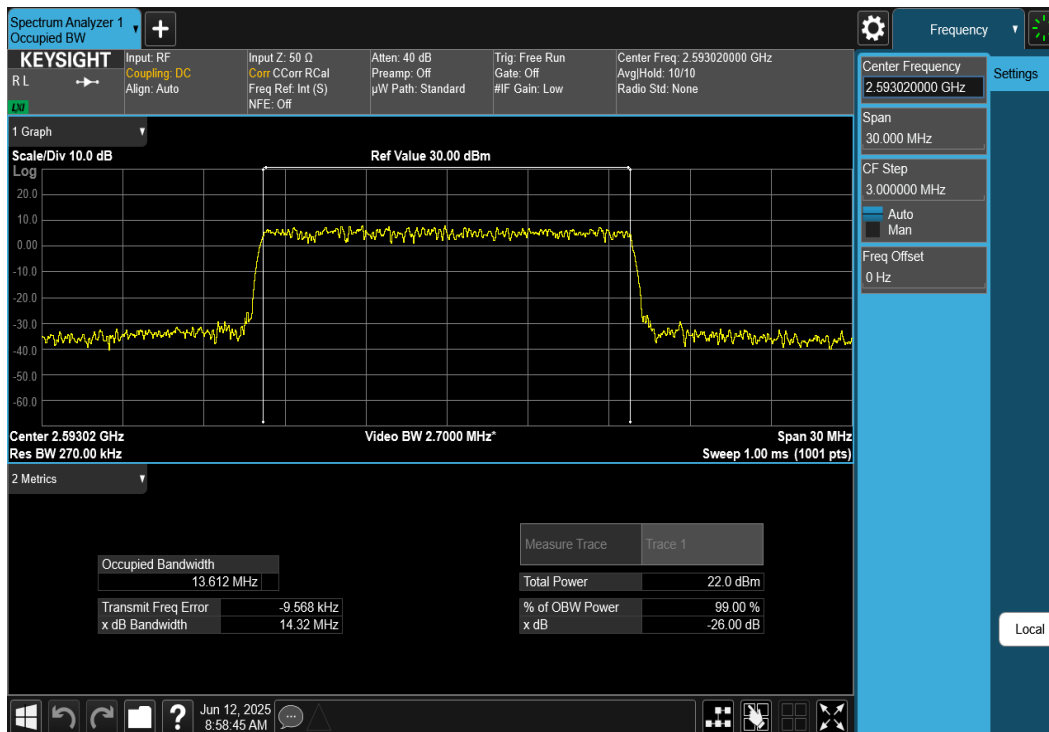
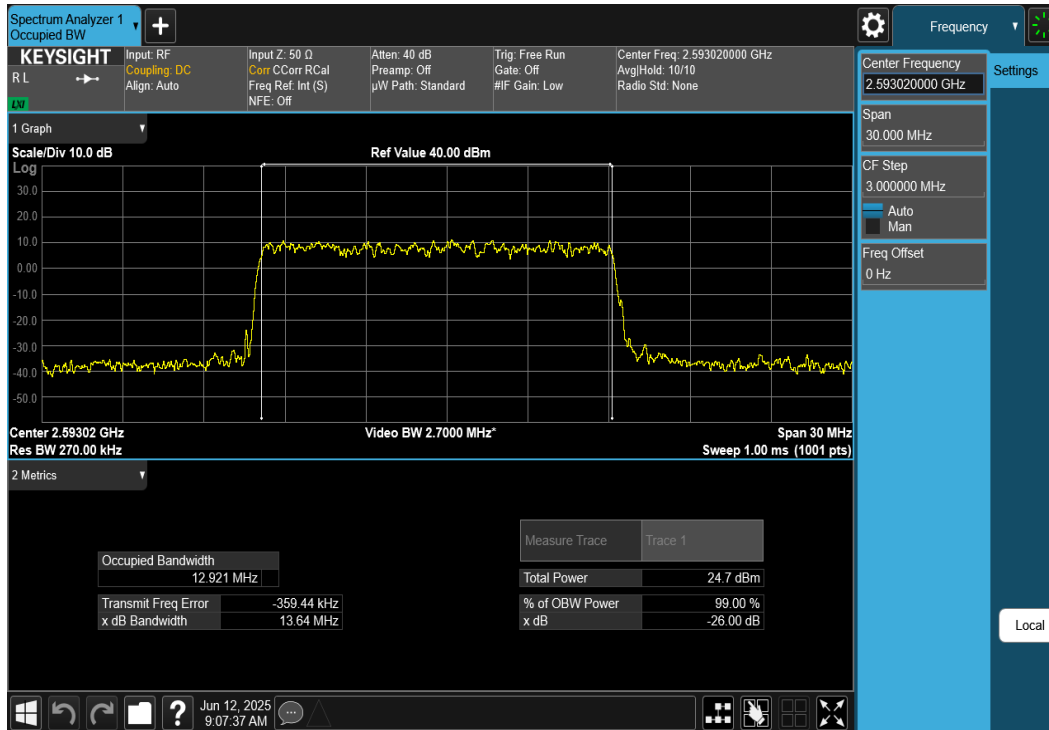
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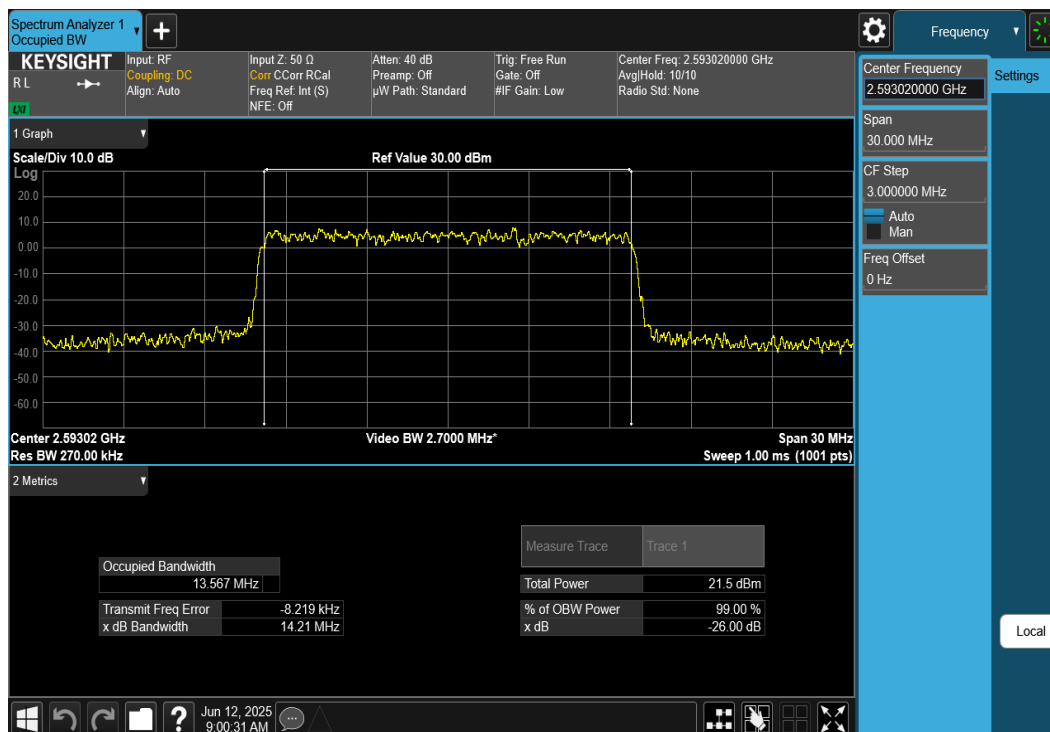
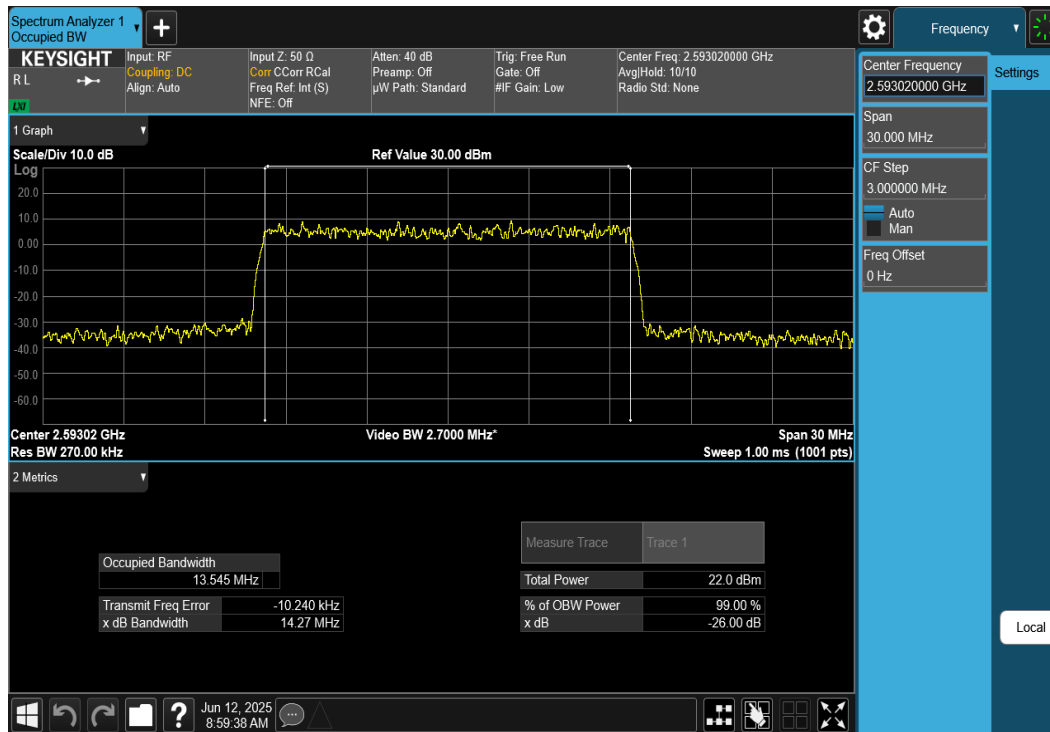
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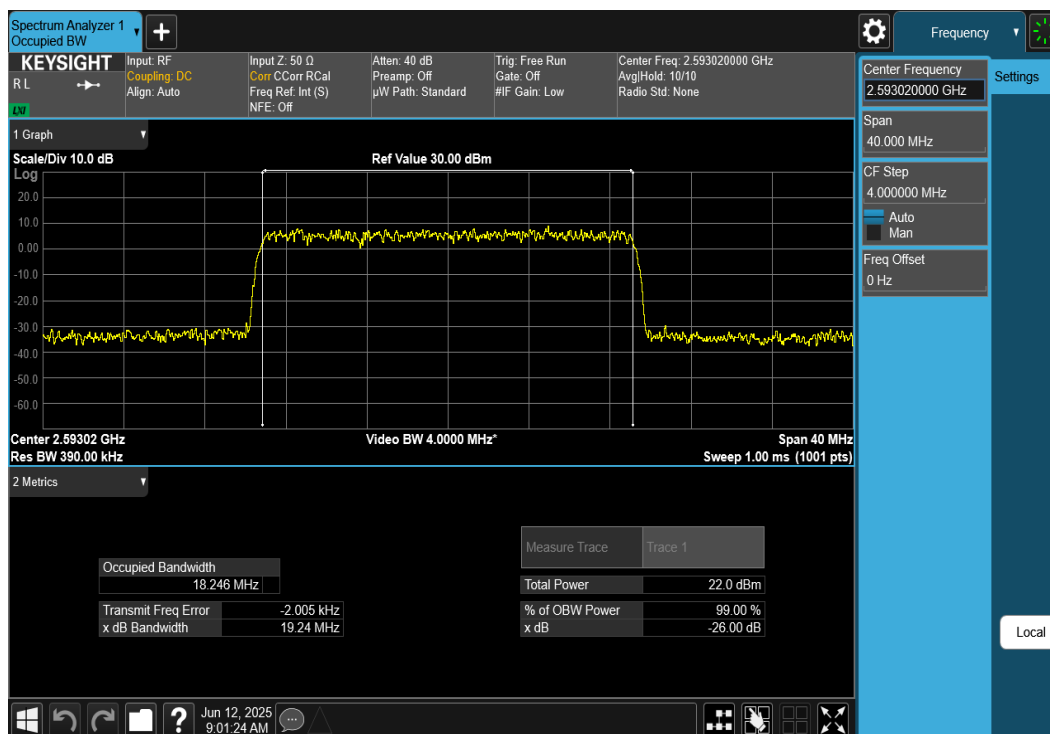
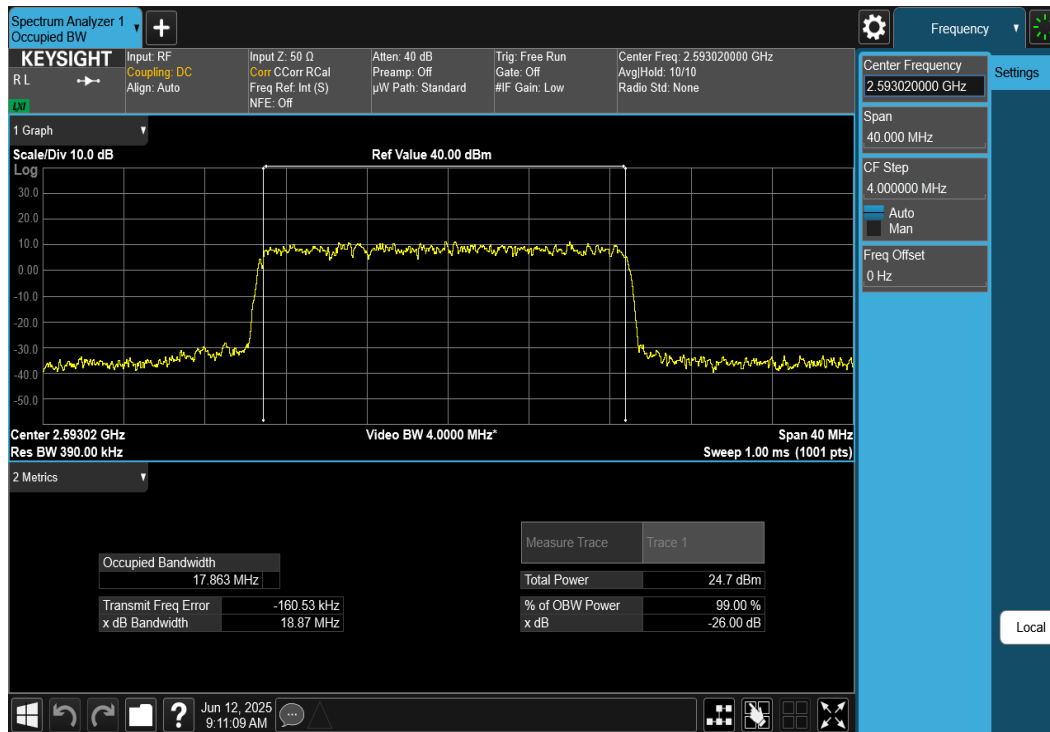
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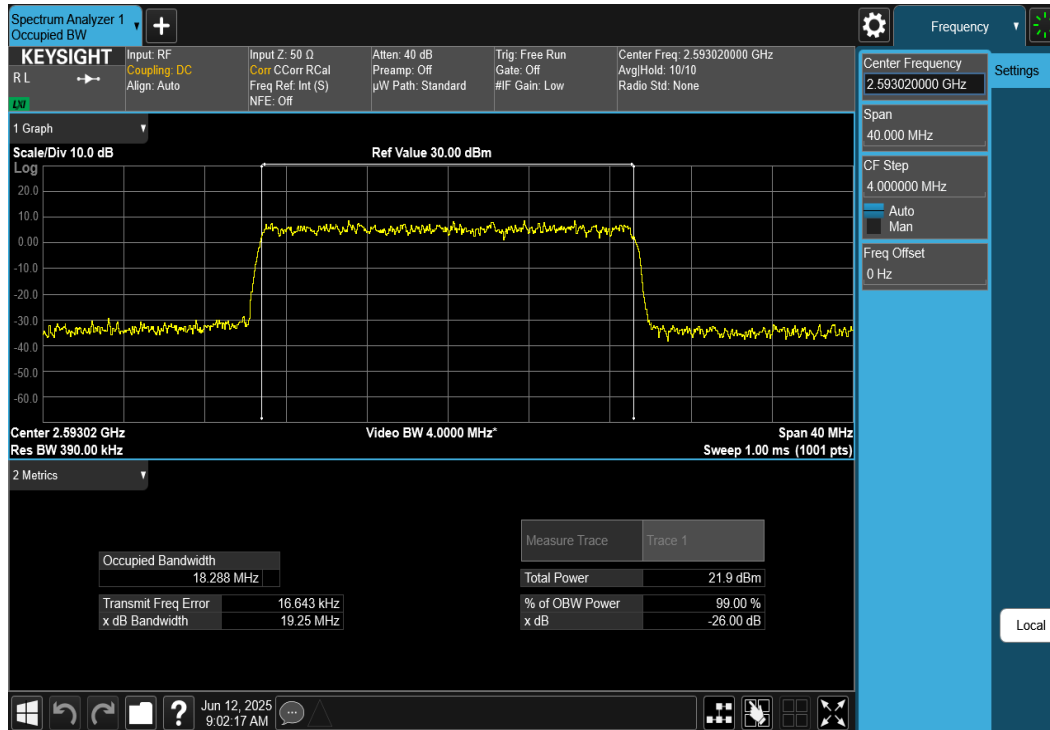
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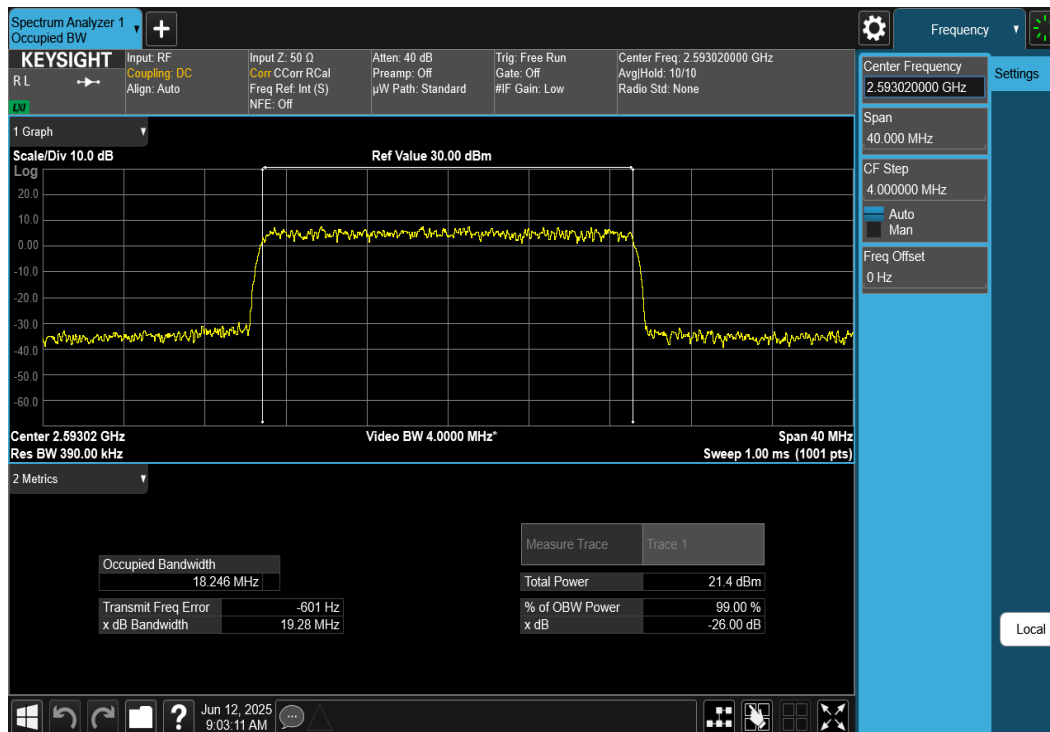
FCC ID: BCG-A3335	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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Plot 7-43. Occupied Bandwidth Plot (NR Band n41 - 20MHz CP-OFDM 16-QAM - Full RB)



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

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## 7.3 Spurious and Harmonic Emissions at Antenna Terminal

§2.1051, §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 10<sup>th</sup> 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 Band n7, n41 the minimum permissible attenuation level of any spurious emission is  $55 + 10\log_{10}(P_{\text{Watts}})$ .***

### Test Procedure Used

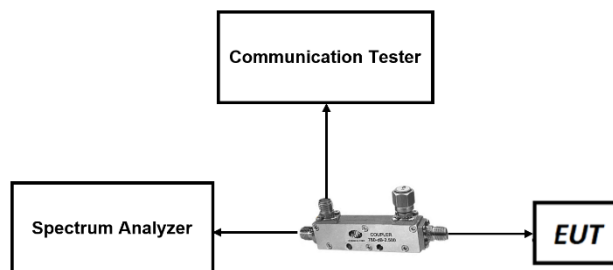
KDB 971168 D01 v03r01 – Section 6.0

### Test Settings

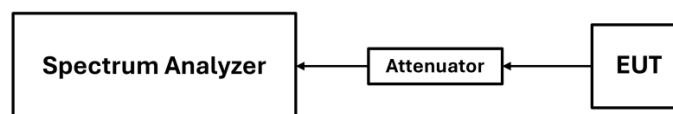
1. Start frequency was set to 30MHz and stop frequency was set to 10GHz (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see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

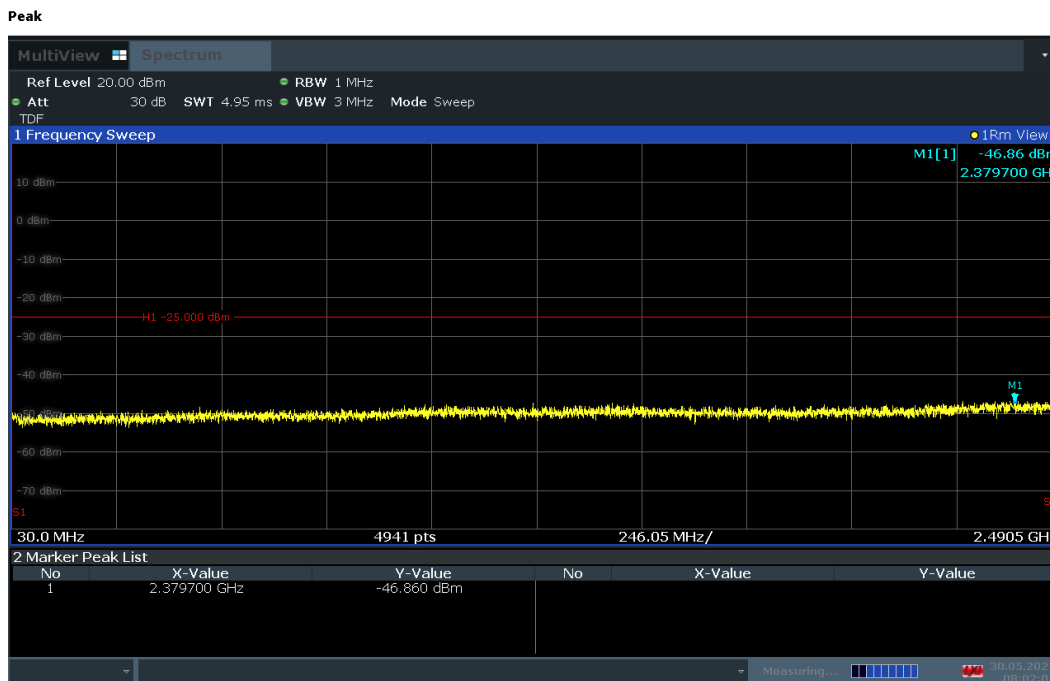
1. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent 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.

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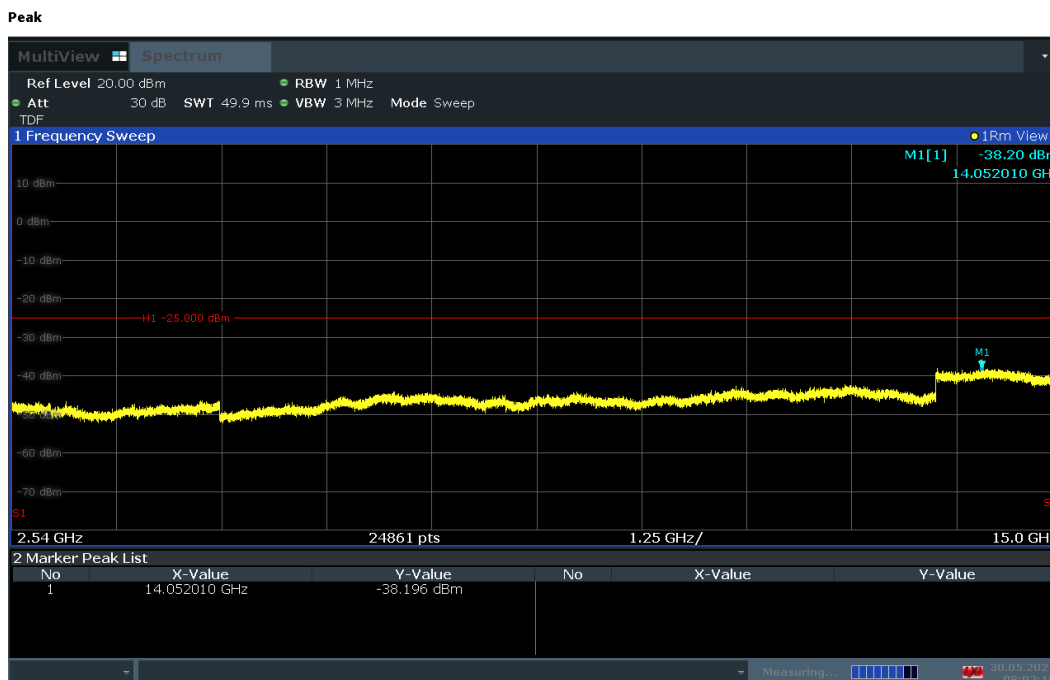


## LTE Band 7




08:02:01 30.05.2025

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



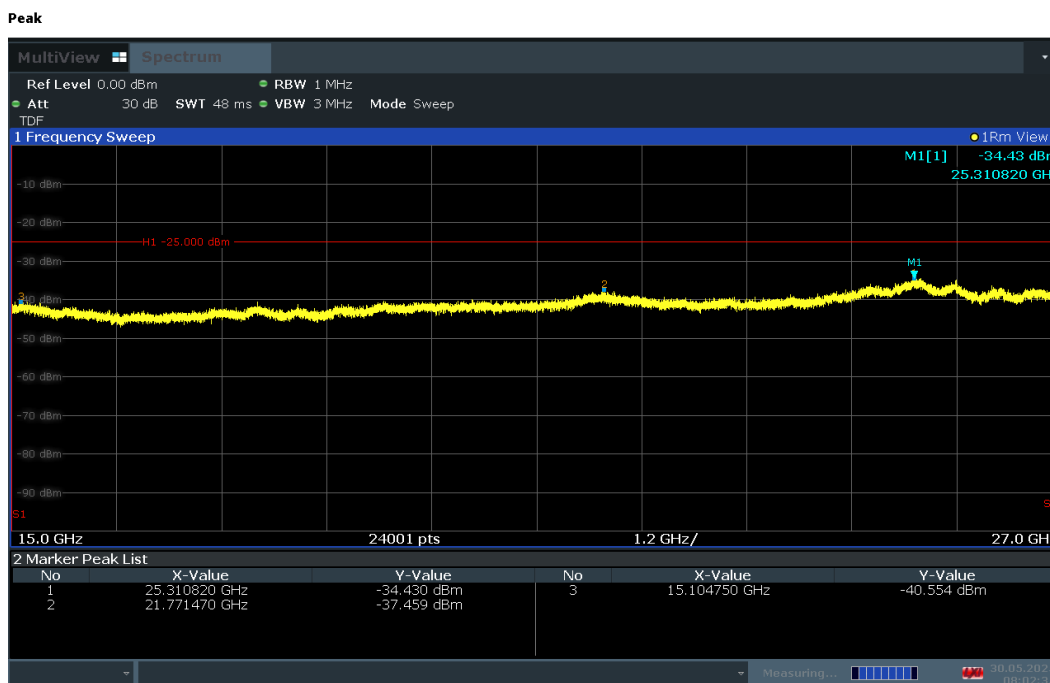
08:02:18 30.05.2025

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

FCC ID: BCG-A3335	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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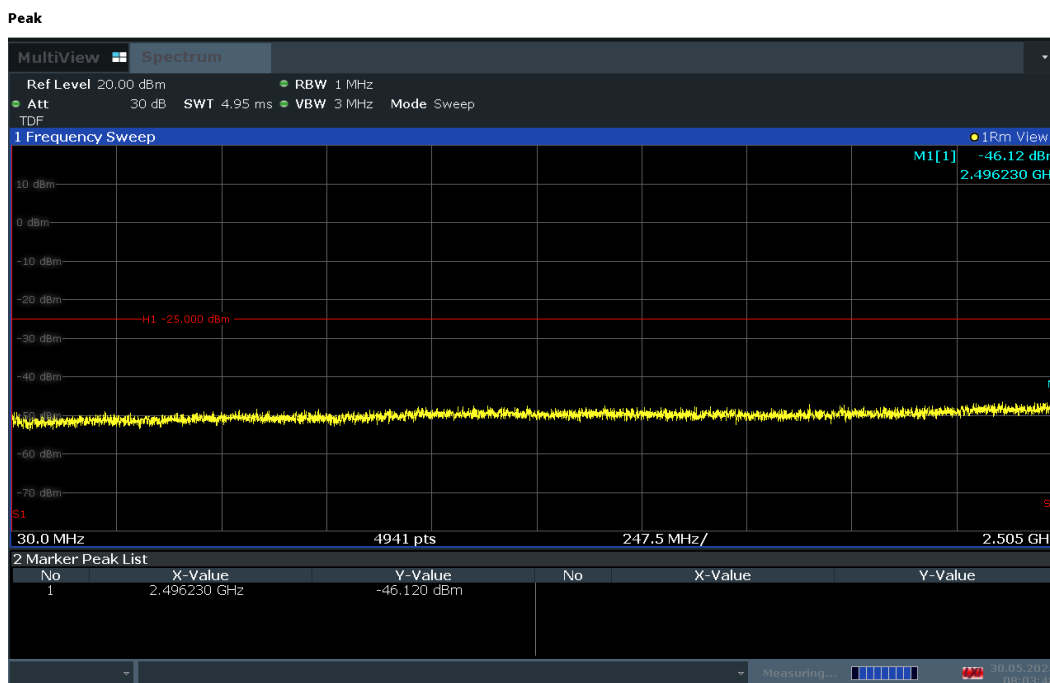
V2.2 09/07/2023

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08:02:36 30.05.2025

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



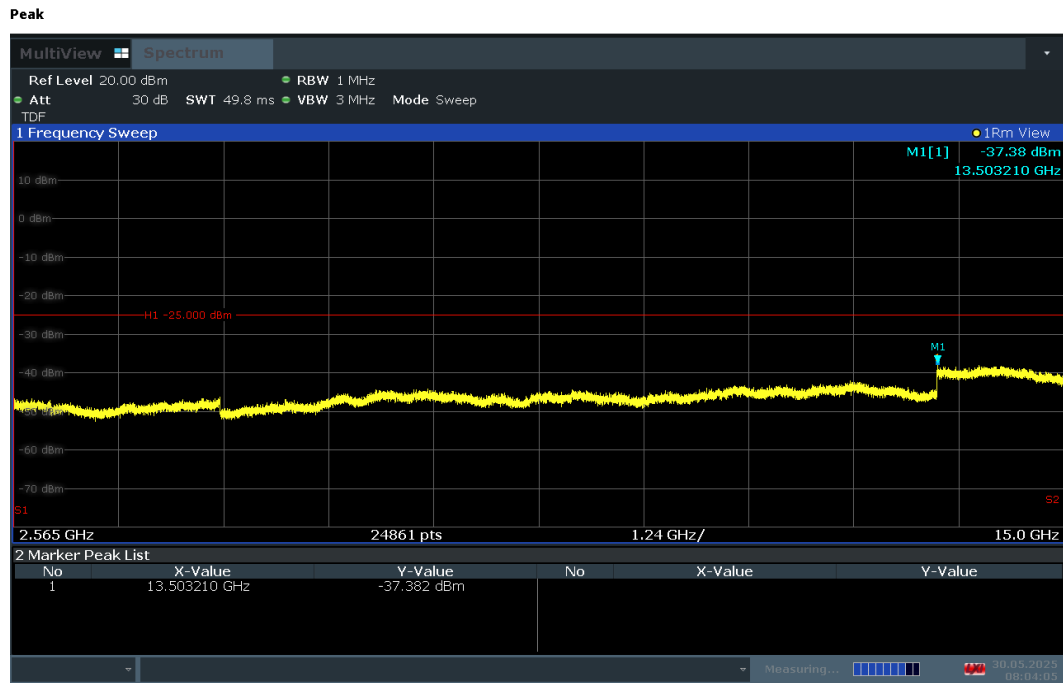
08:03:49 30.05.2025

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

FCC ID: BCG-A3335	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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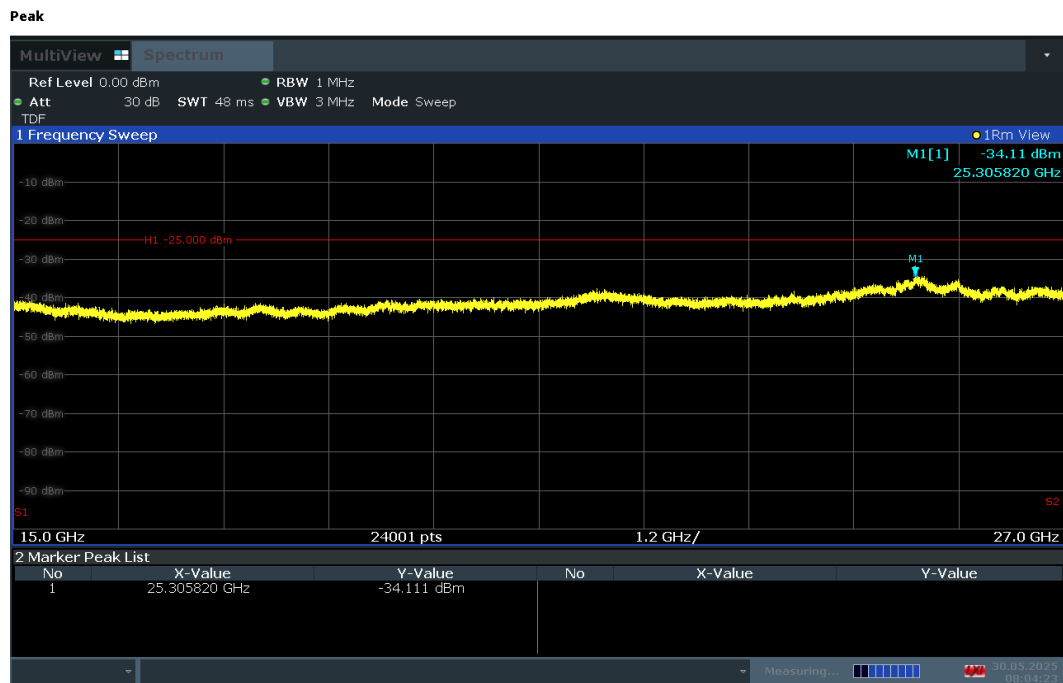
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08:04:06 30.05.2025

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



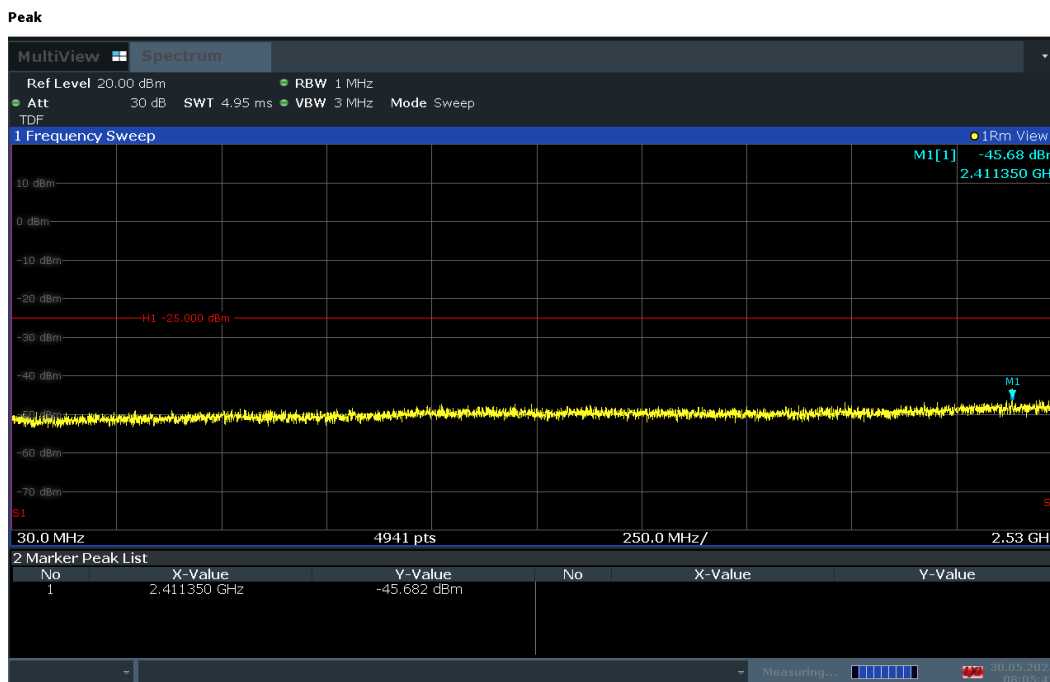
08:04:23 30.05.2025

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

FCC ID: BCG-A3335	element PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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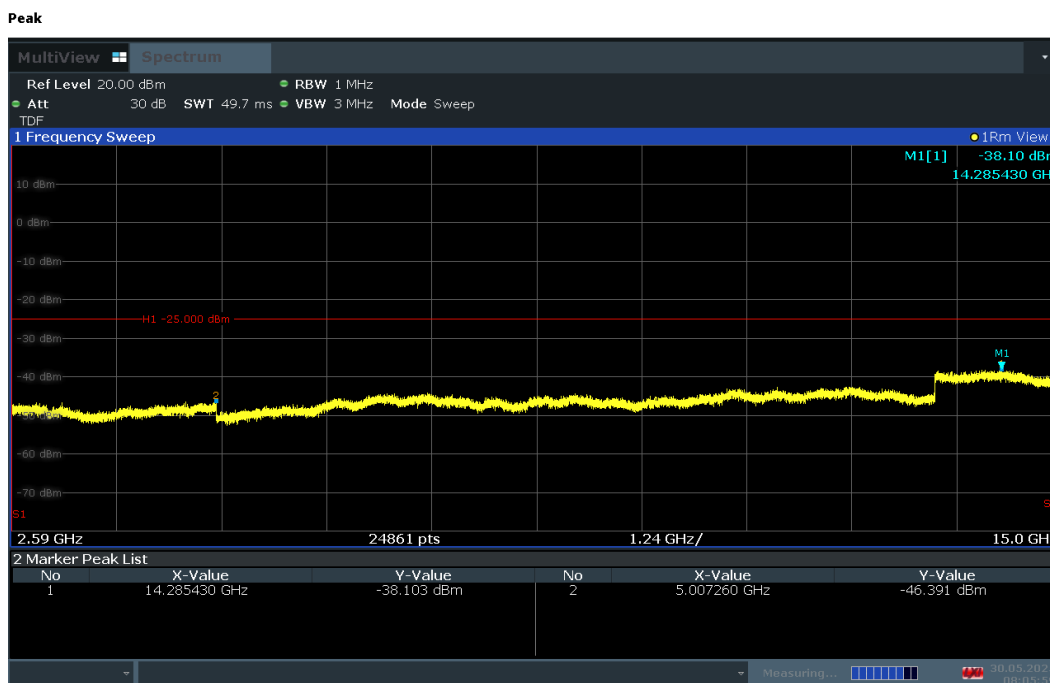
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08:05:42 30.05.2025

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



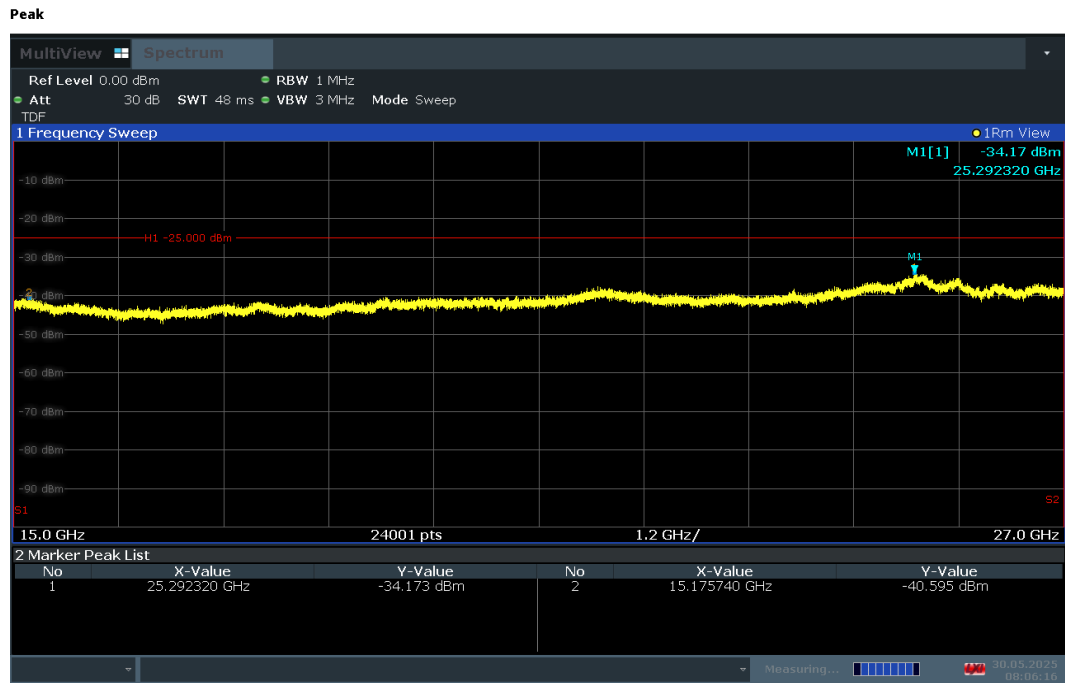
08:05:59 30.05.2025

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

FCC ID: BCG-A3335	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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08:06:17 30.05.2025

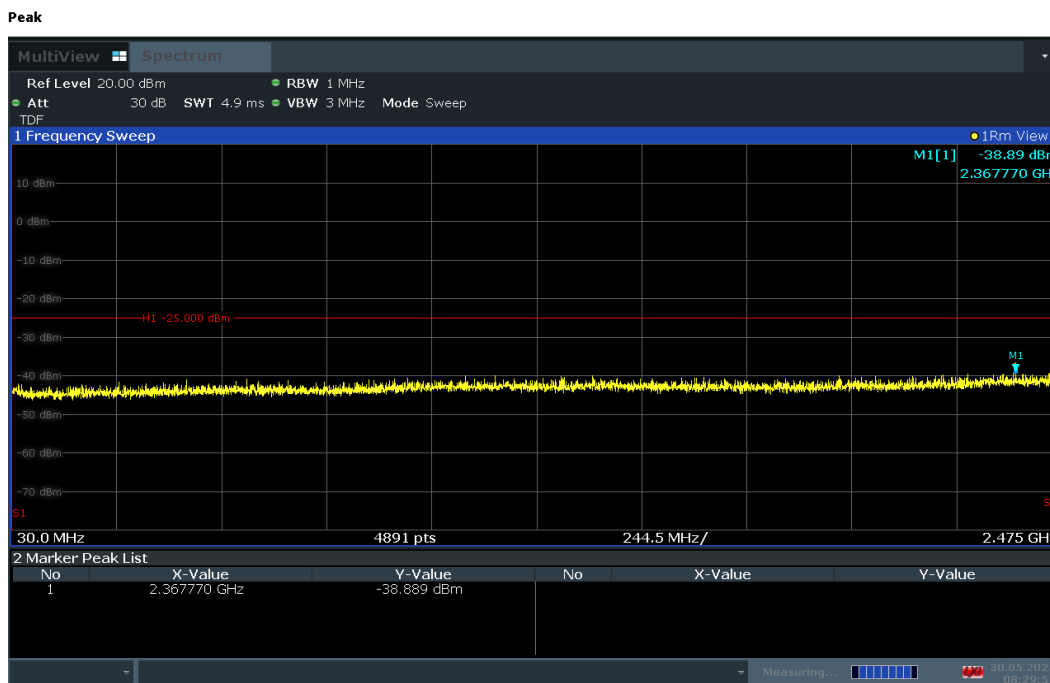
Plot 7-53. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 50 - High Channel)

FCC ID: BCG-A3335	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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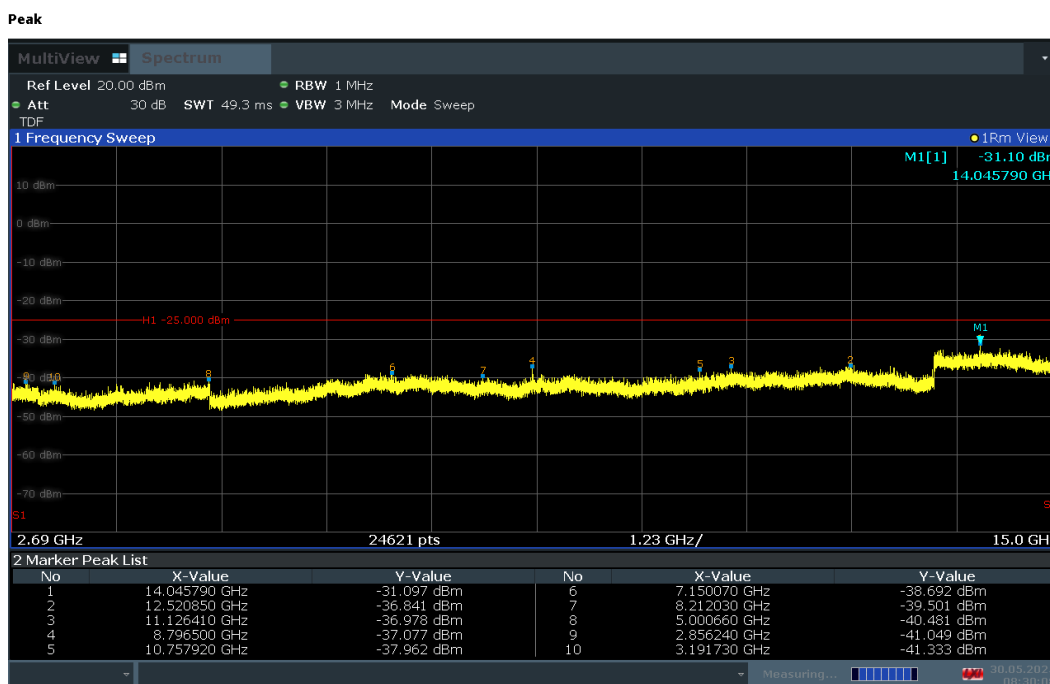
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## LTE Band 41




08:29:51 30.05.2025

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



08:30:09 30.05.2025

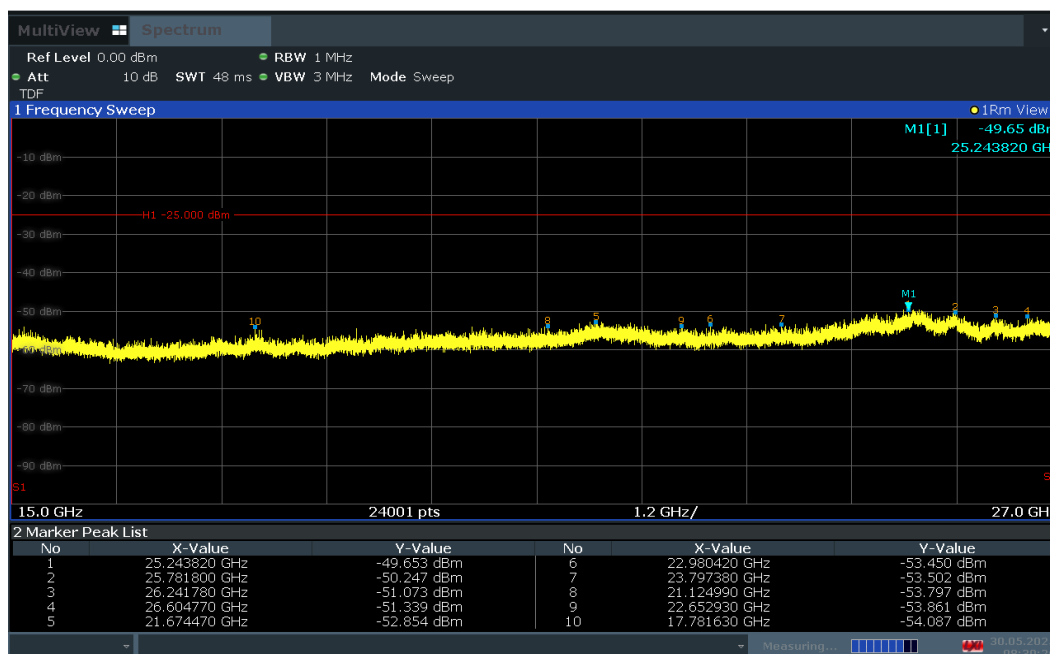
Plot 7-55. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 50 - Low Channel)

FCC ID: BCG-A3335	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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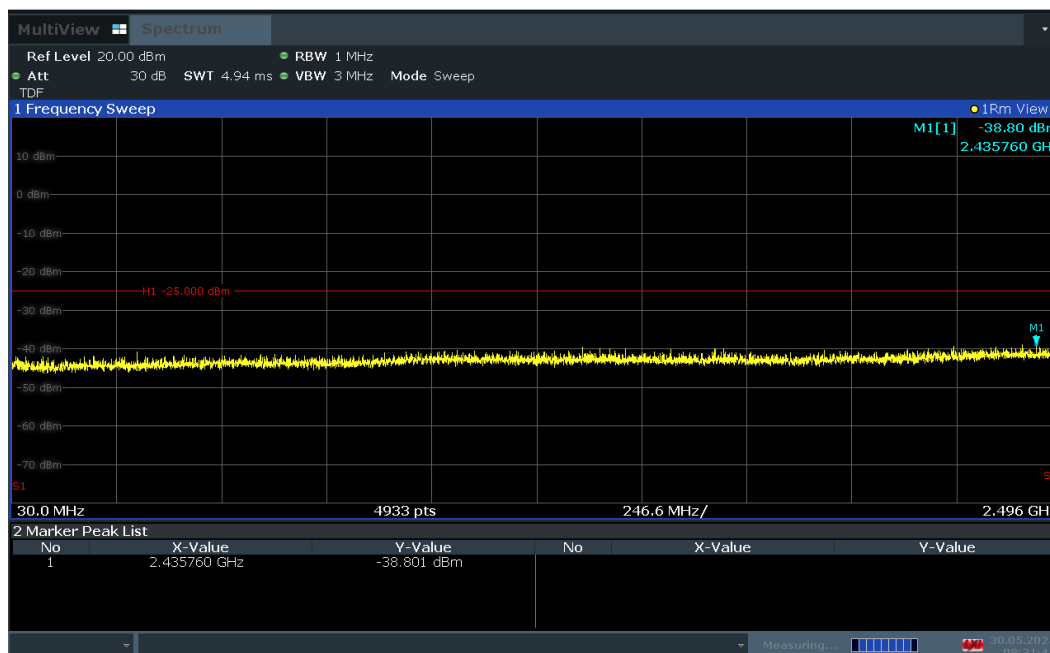
Peak



08:30:26 30.05.2025


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

Peak



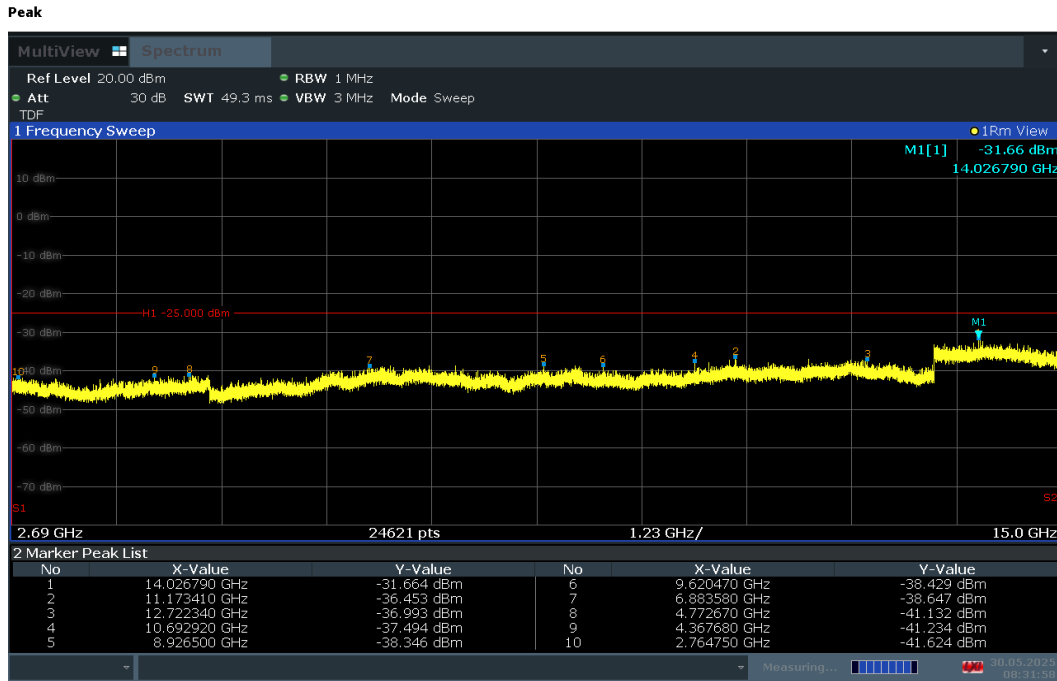
08:31:42 30.05.2025

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

FCC ID: BCG-A3335	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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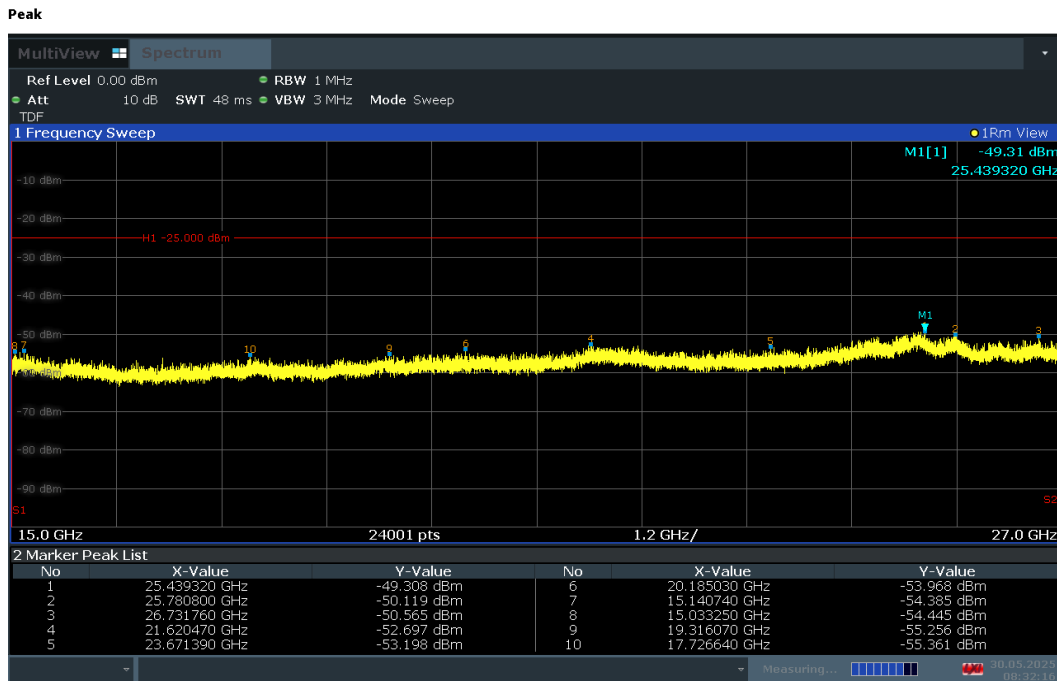
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08:31:59 30.05.2025

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



08:32:17 30.05.2025

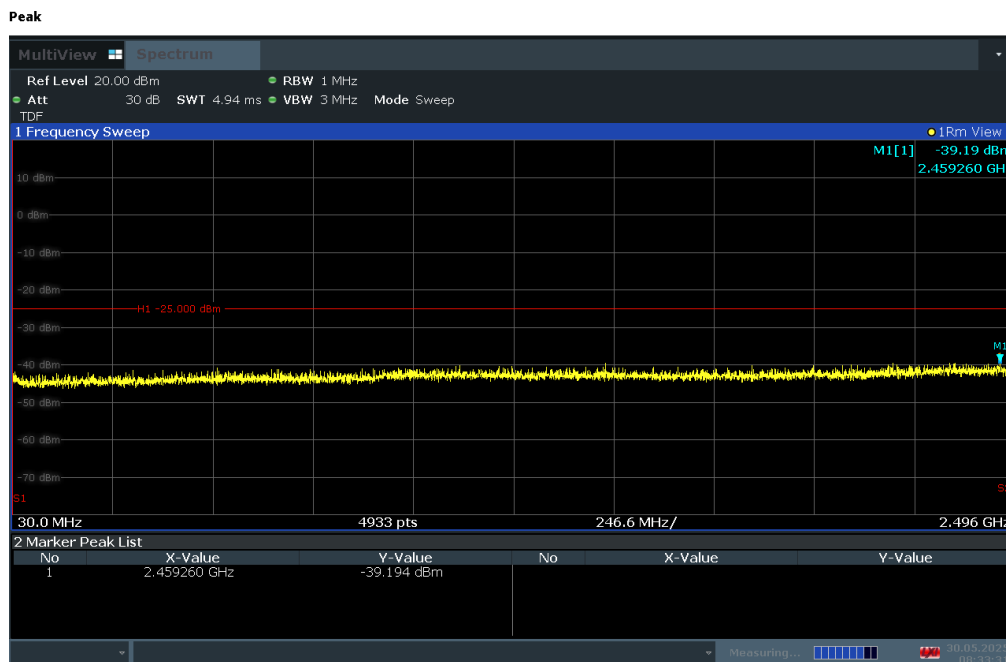
Plot 7-59. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 50 - Mid Channel)

FCC ID: BCG-A3335	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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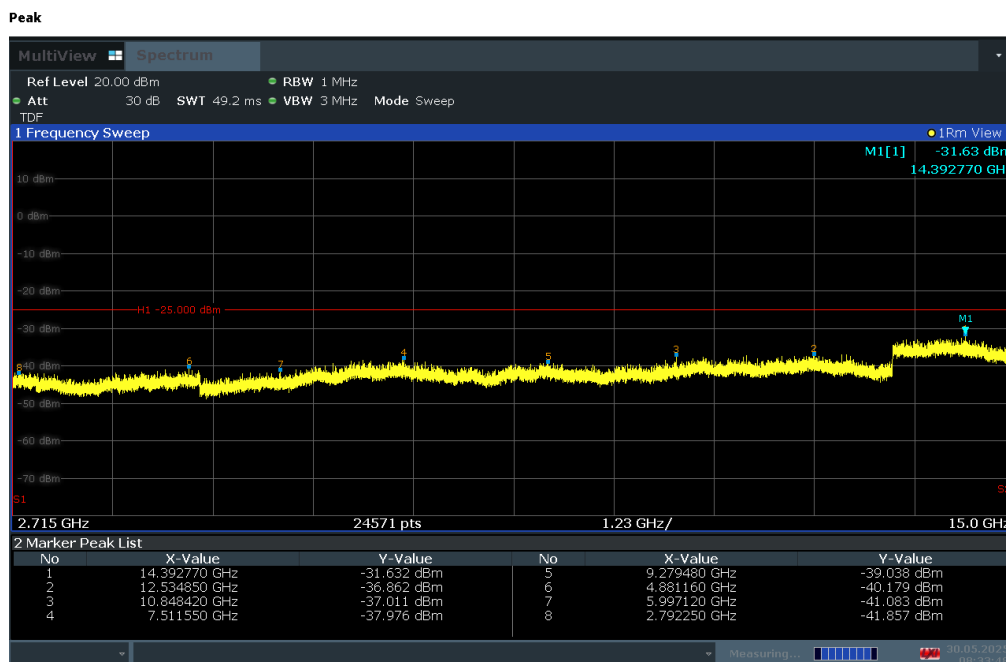
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08:33:31 30.05.2025

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



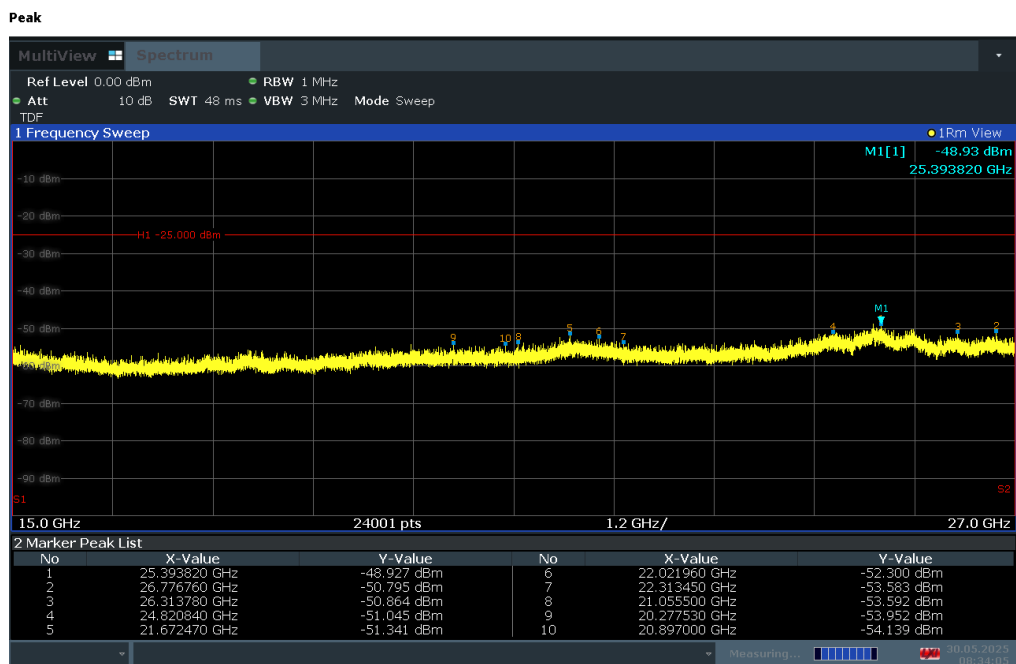
08:33:49 30.05.2025

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

FCC ID: BCG-A3335	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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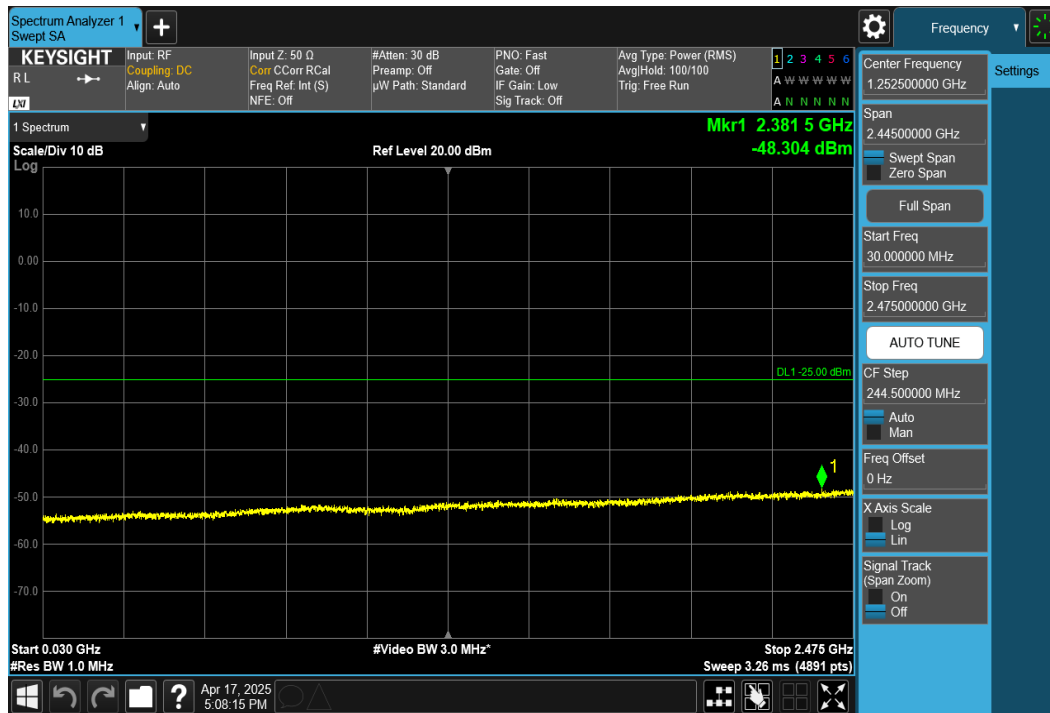
08:34:06 30.05.2025

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

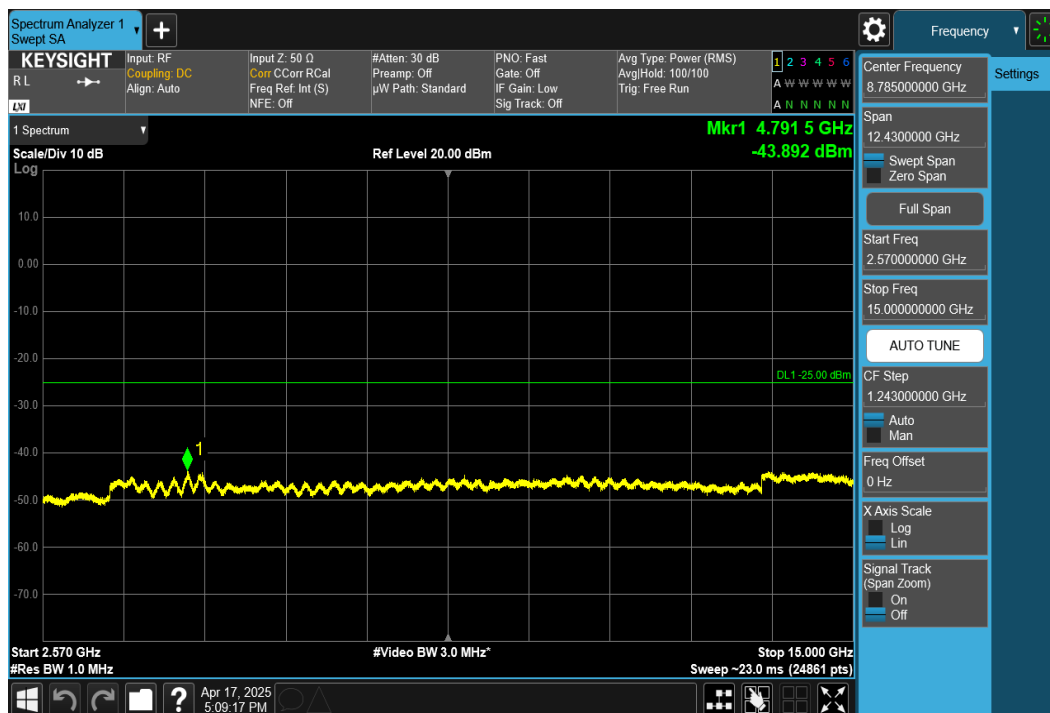
FCC ID: BCG-A3335	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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## NR Band n7



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

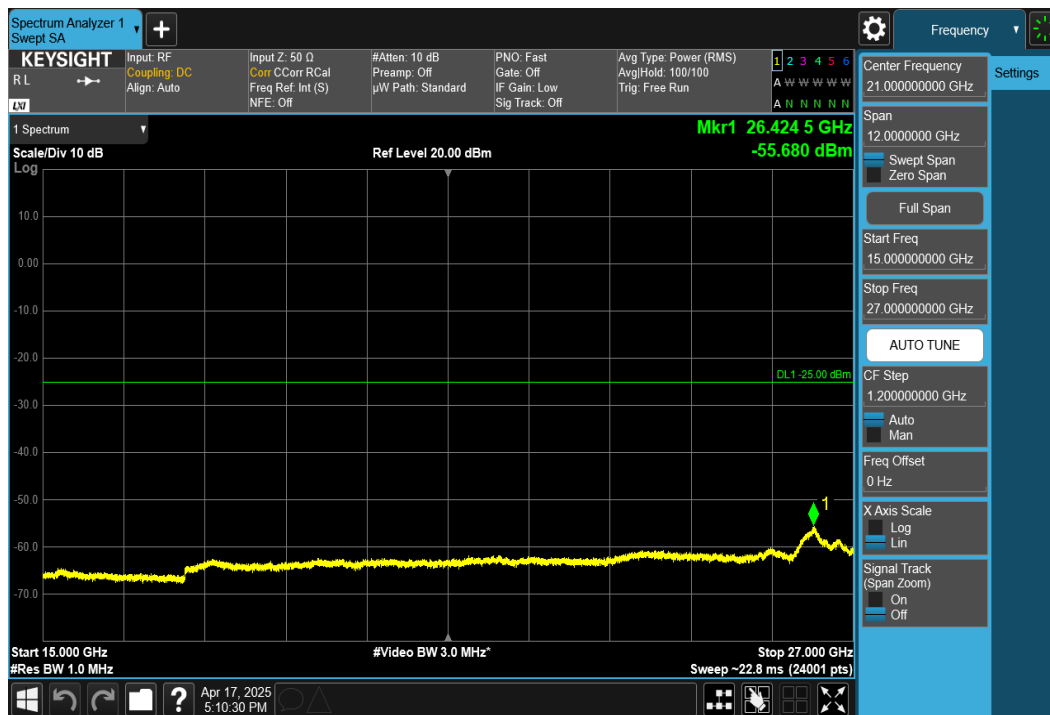


Plot 7-64. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Low Channel)

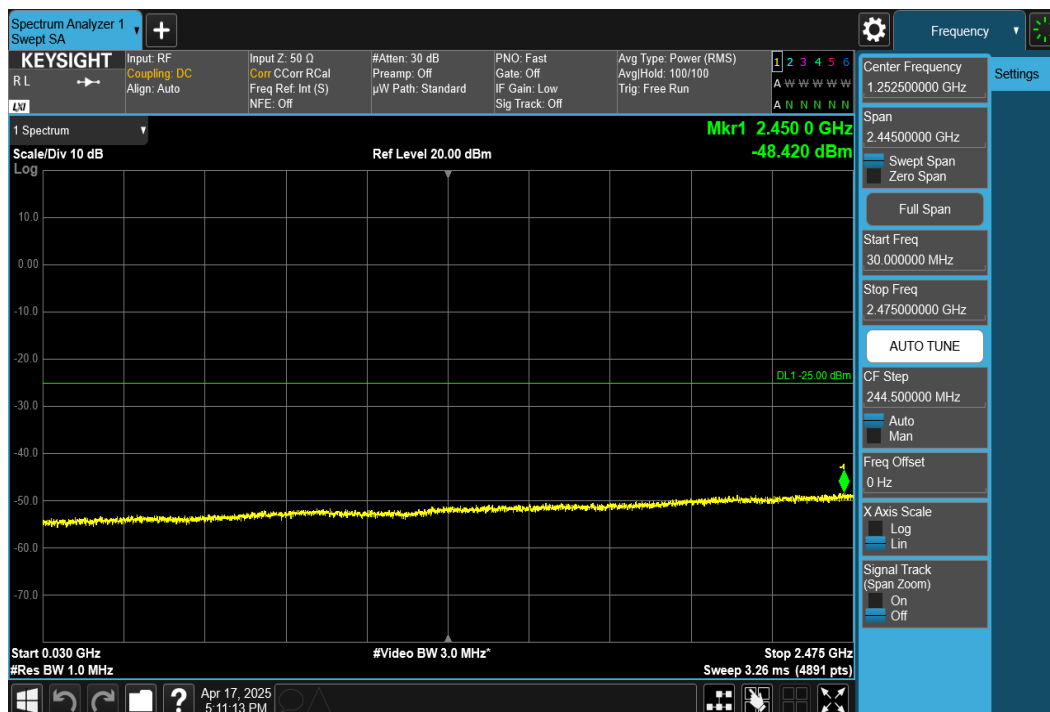
FCC ID: BCG-A3335	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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Plot 7-65. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Low Channel)

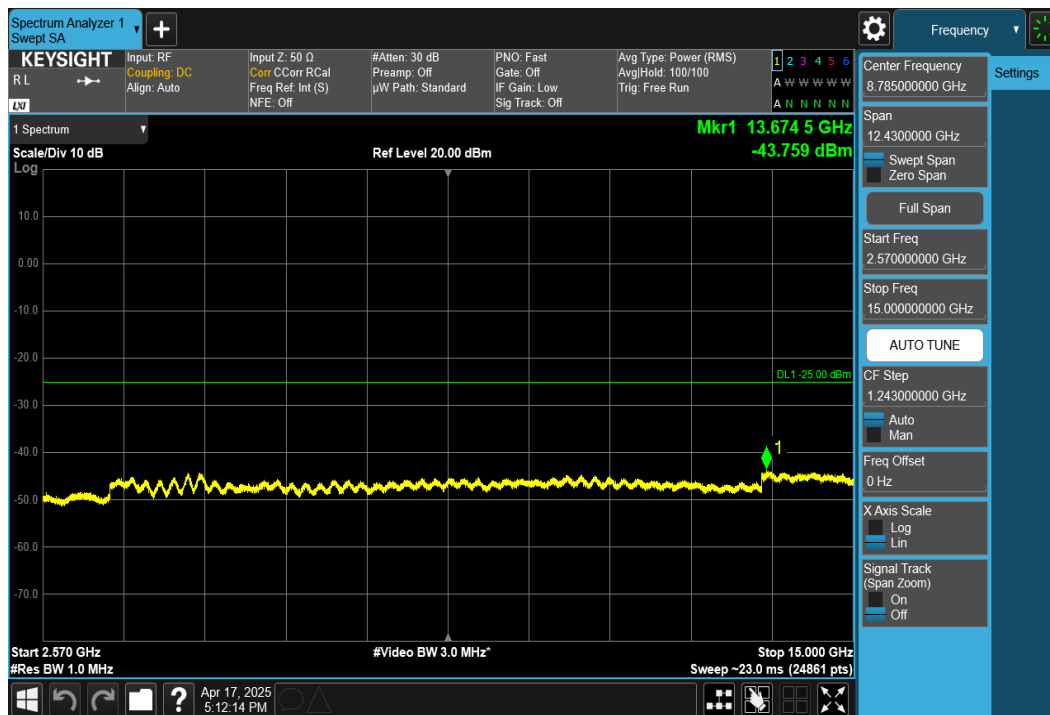


Plot 7-66. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Mid Channel)

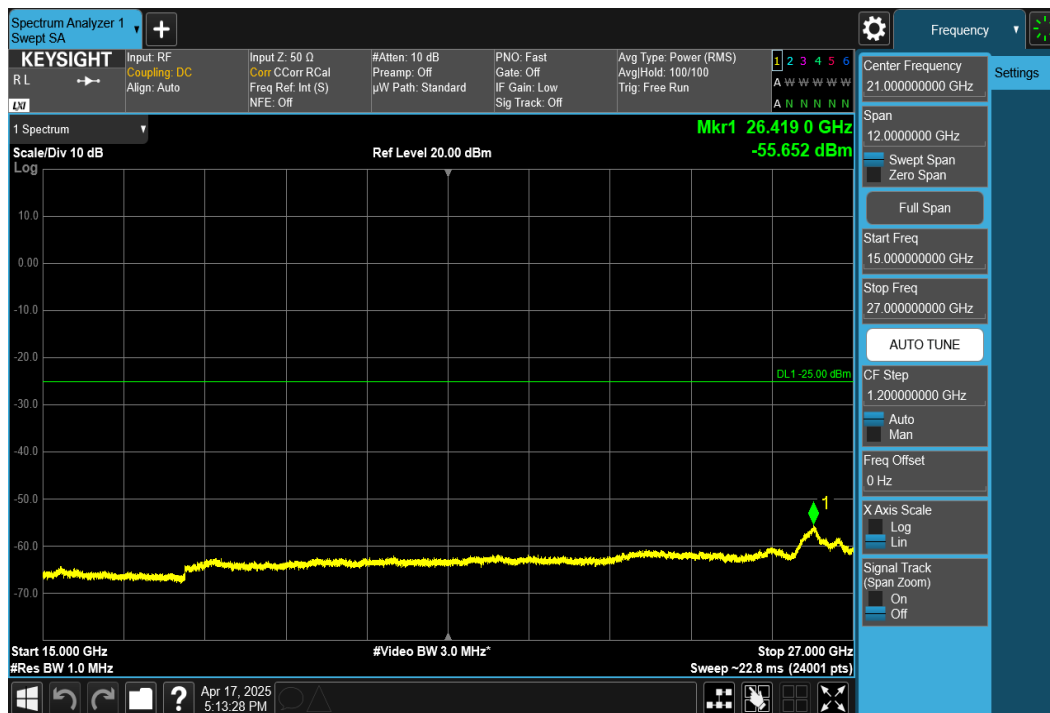
FCC ID: BCG-A3335	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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Plot 7-67. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Mid Channel)

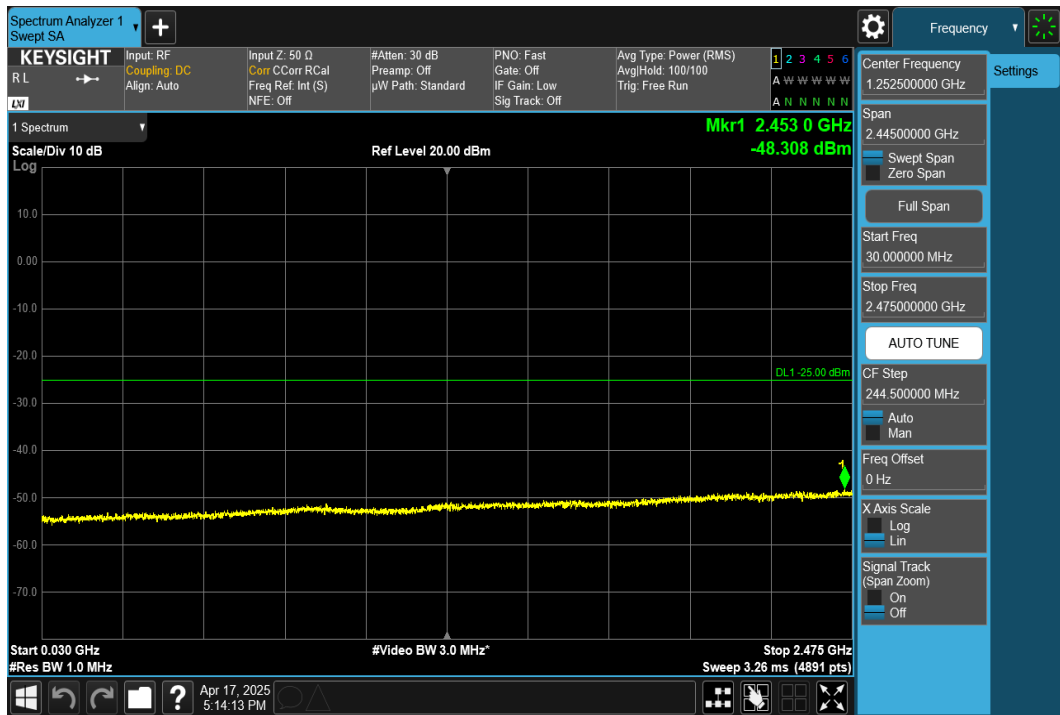


Plot 7-68. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - Mid Channel)

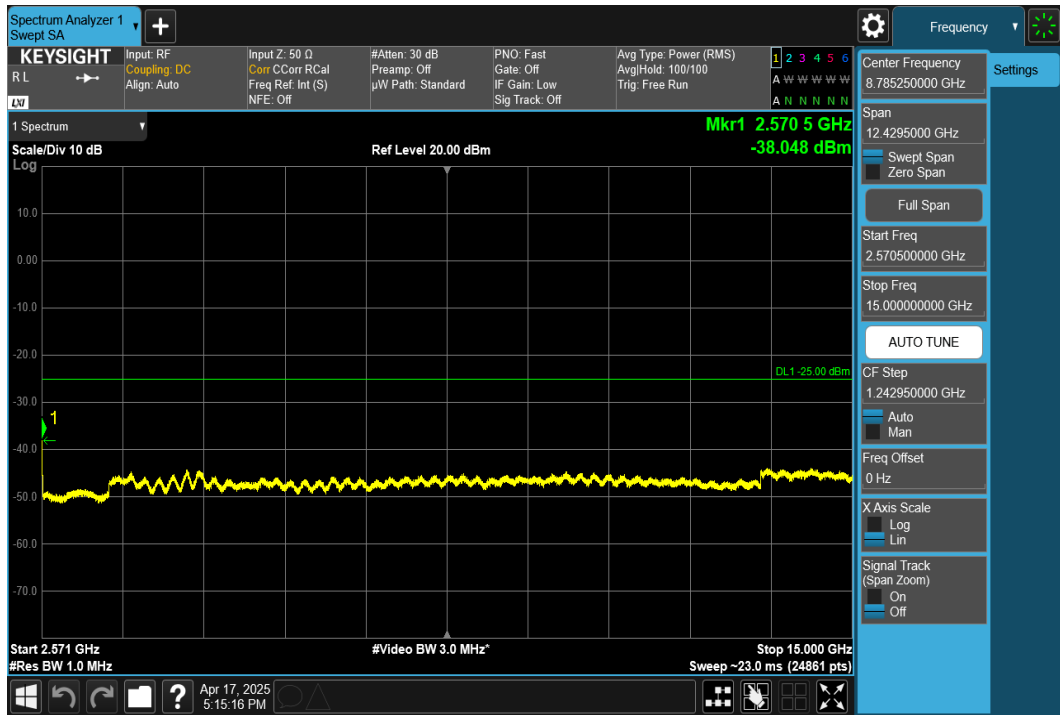
FCC ID: BCG-A3335	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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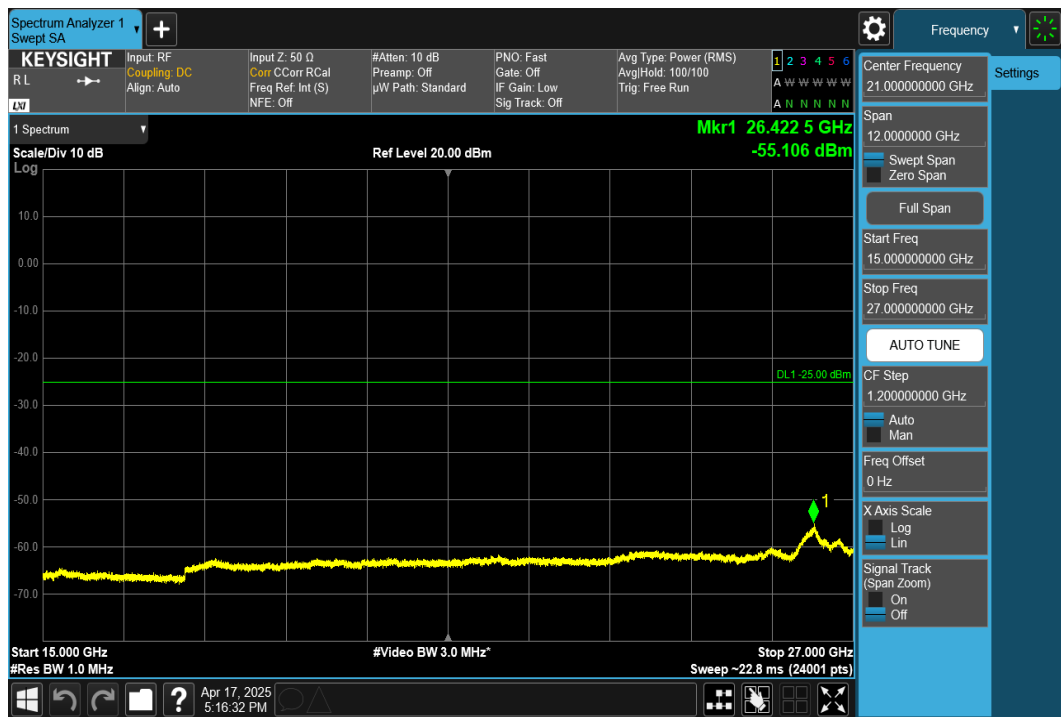


Plot 7-69. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - High Channel)



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

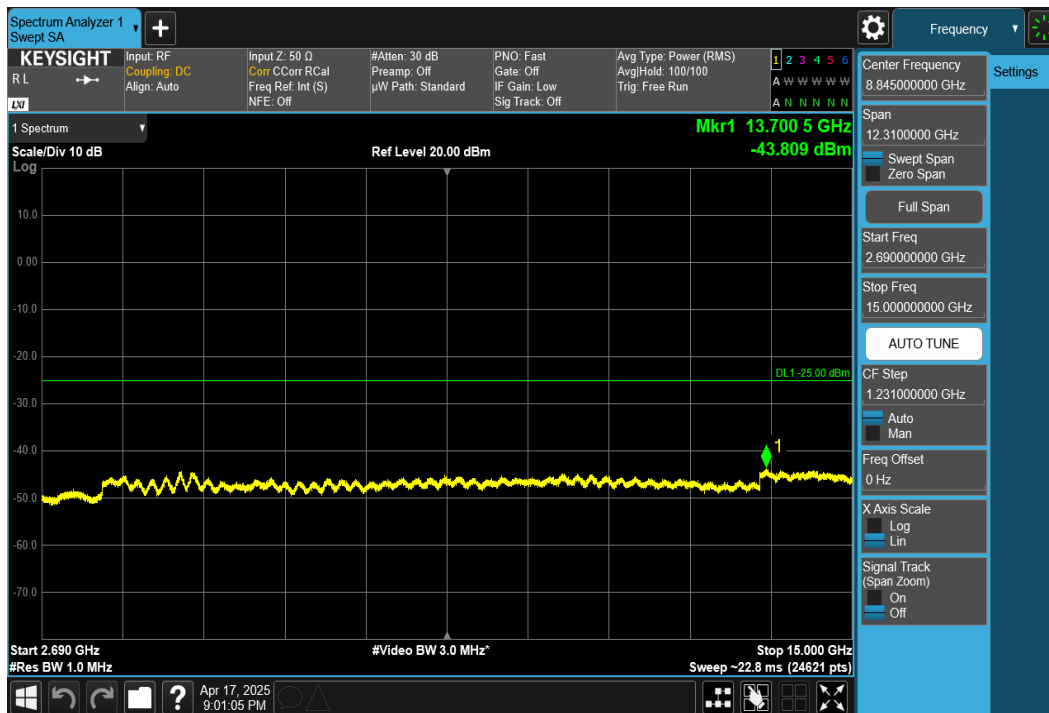
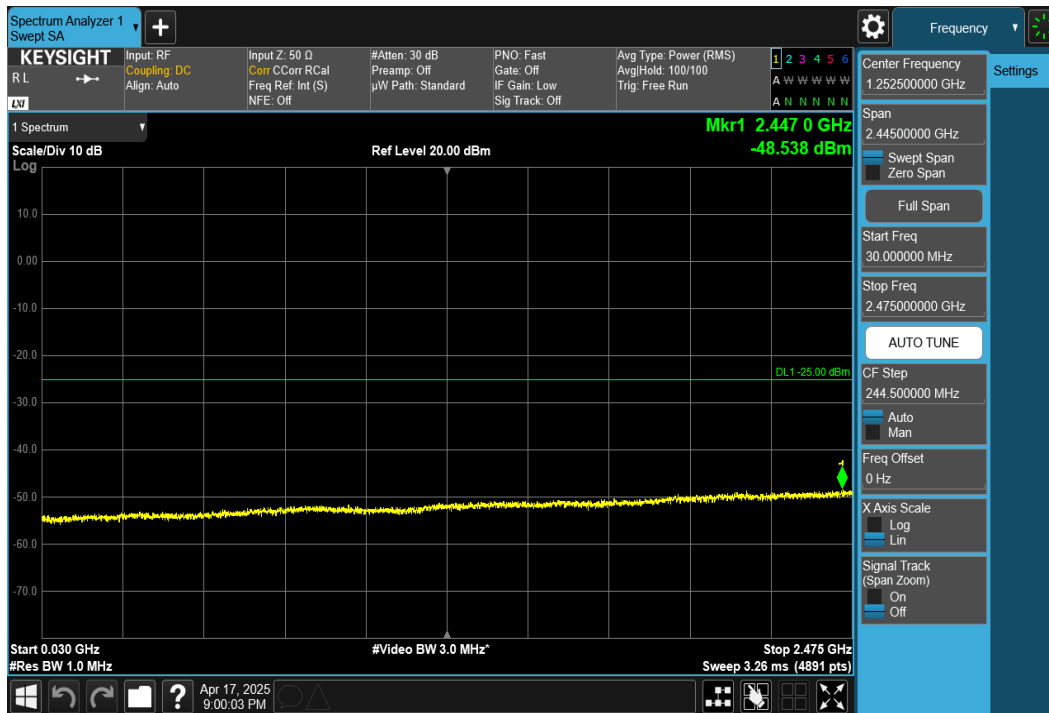
FCC ID: BCG-A3335	element PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-71. Conducted Spurious Plot (NR Band n7 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 50 - High Channel)

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## NR Band n41

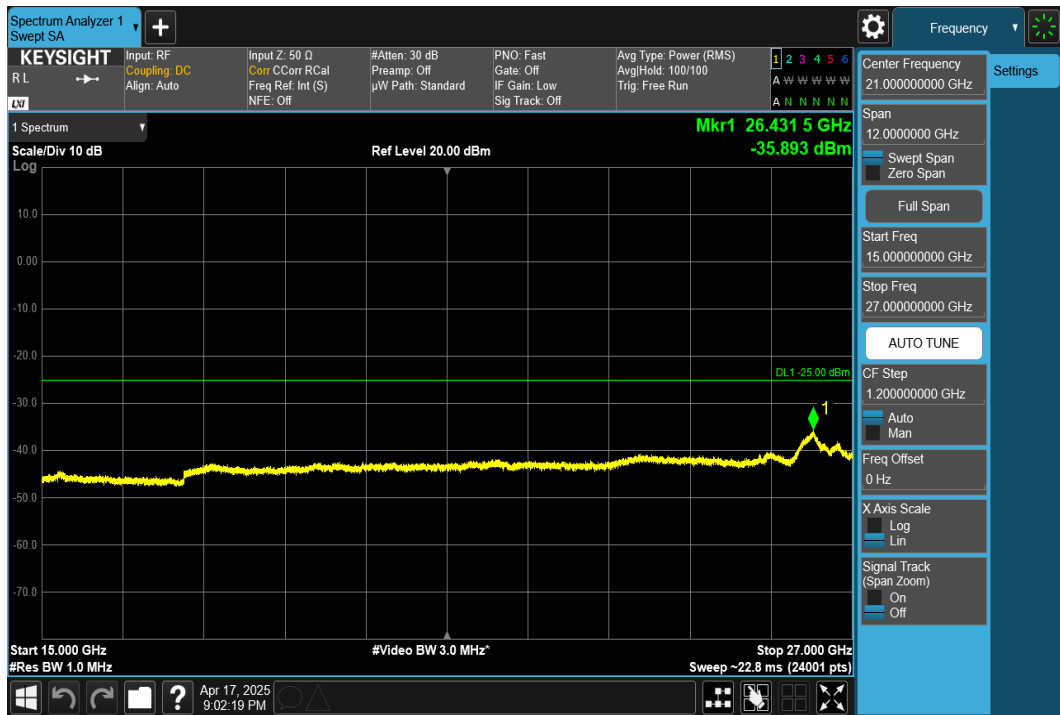


FCC ID: BCG-A3335	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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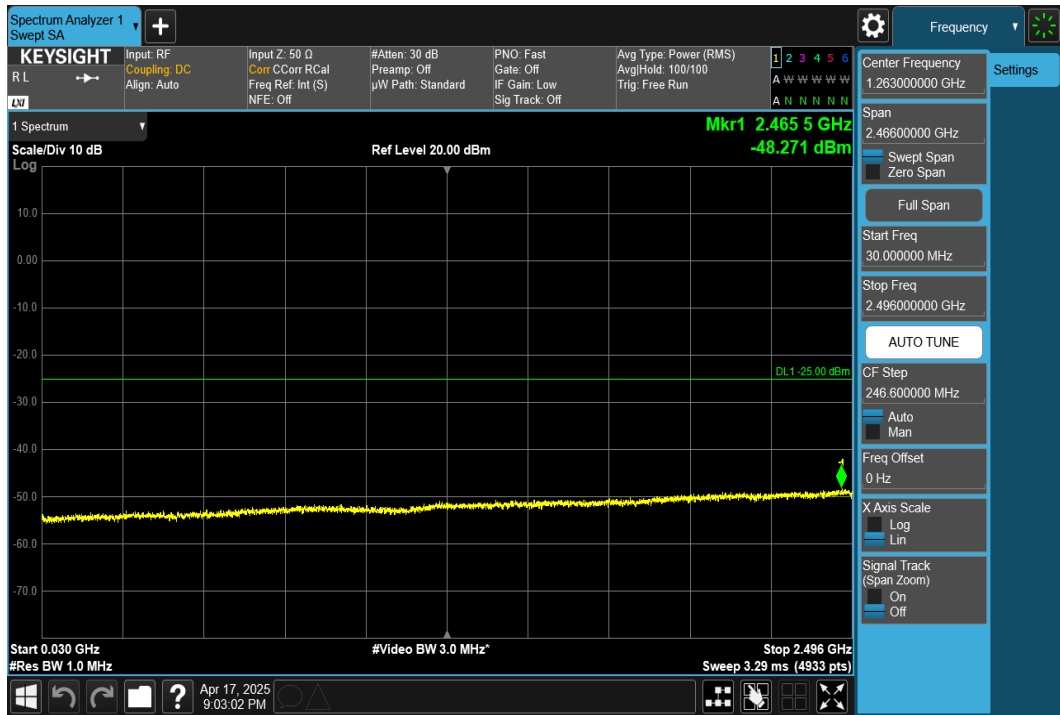
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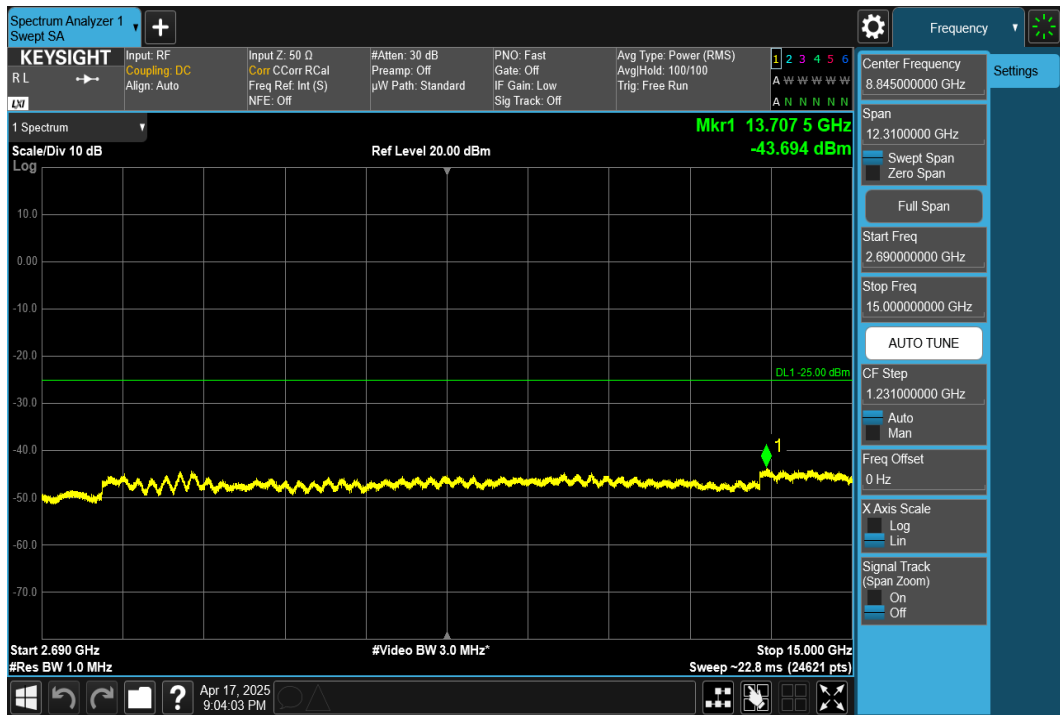


Plot 7-74. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 25 - Low Channel)

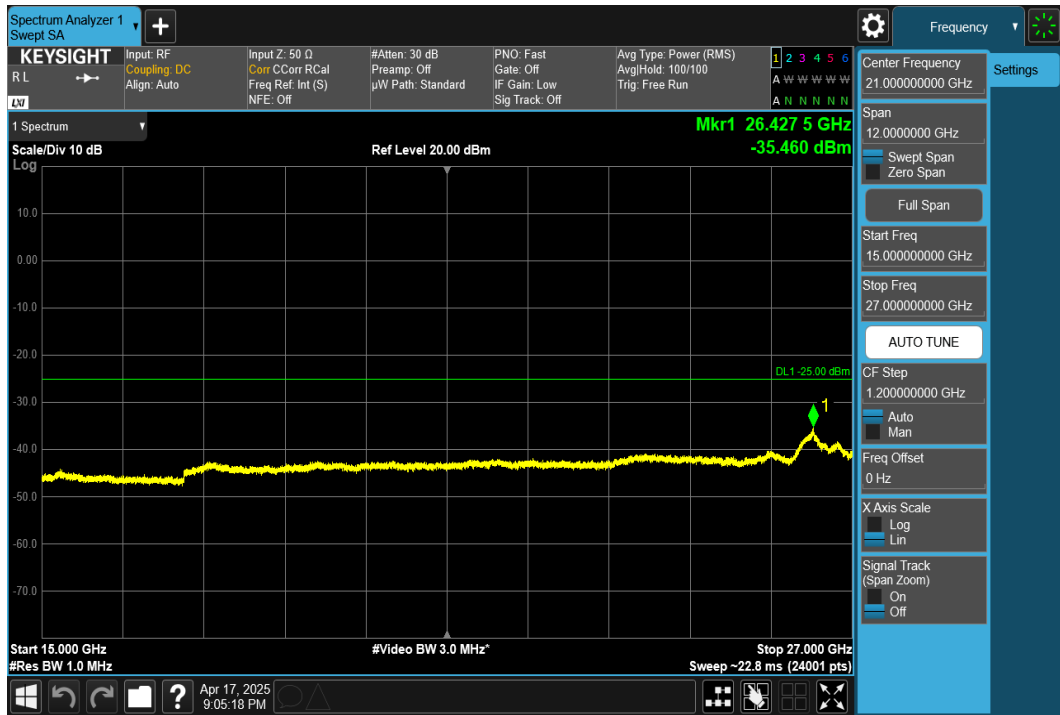


Plot 7-75. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 25 - Mid Channel)

FCC ID: BCG-A3335	element PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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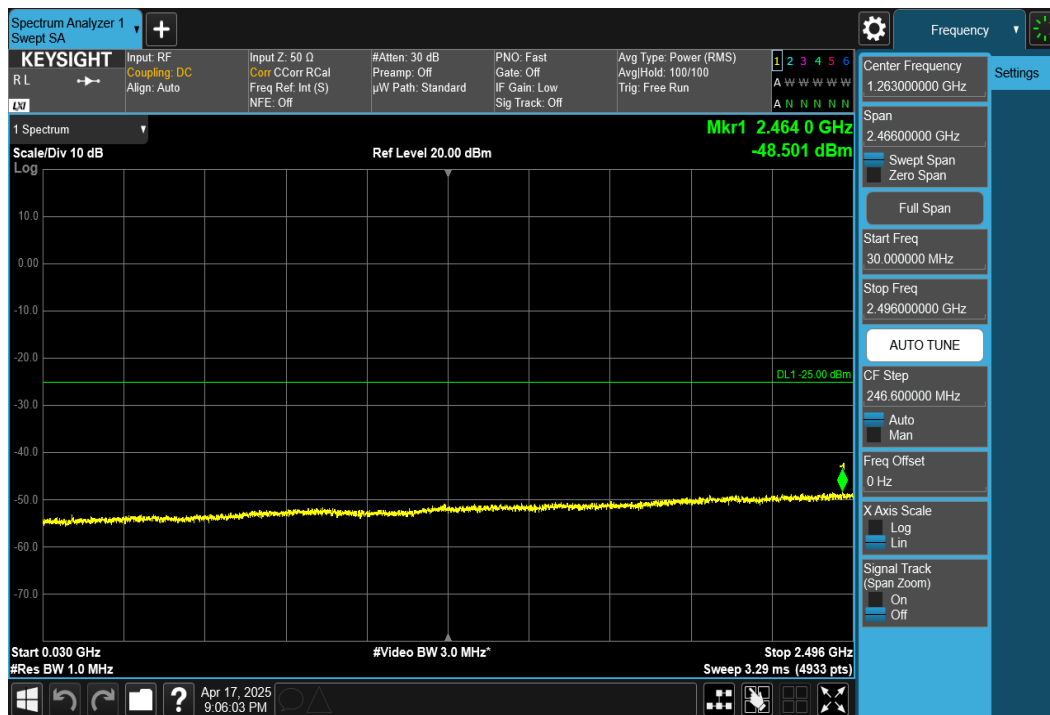


Plot 7-76. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 25 - Mid Channel)

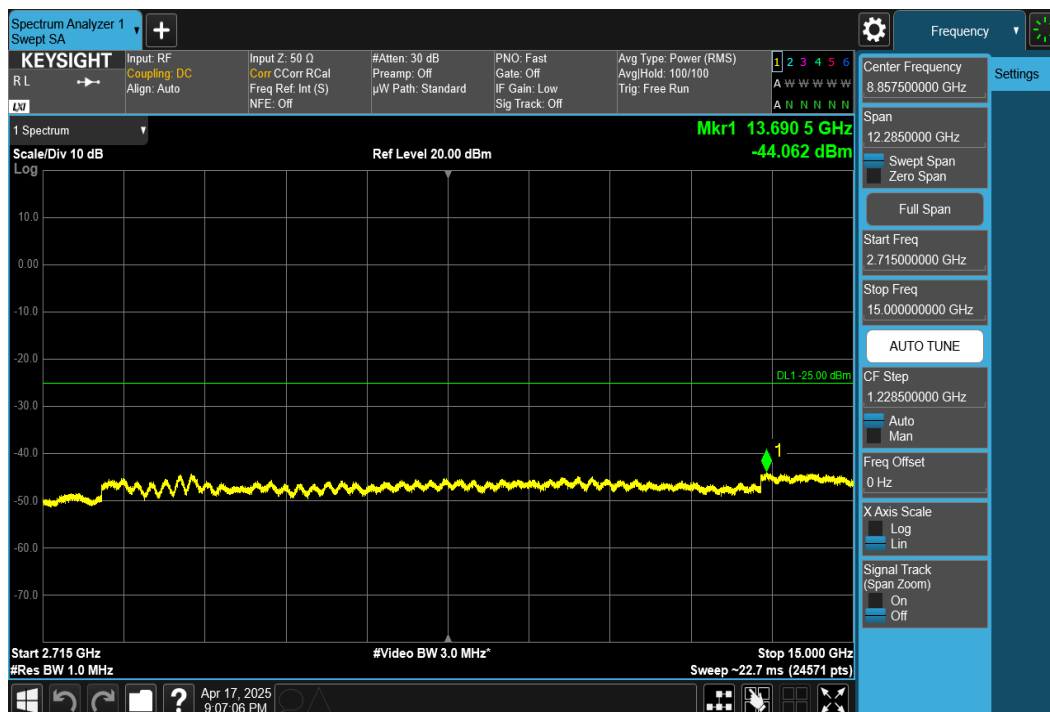


Plot 7-77. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 25 - Mid Channel)

FCC ID: BCG-A3335	element PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-78. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 25 - High Channel)

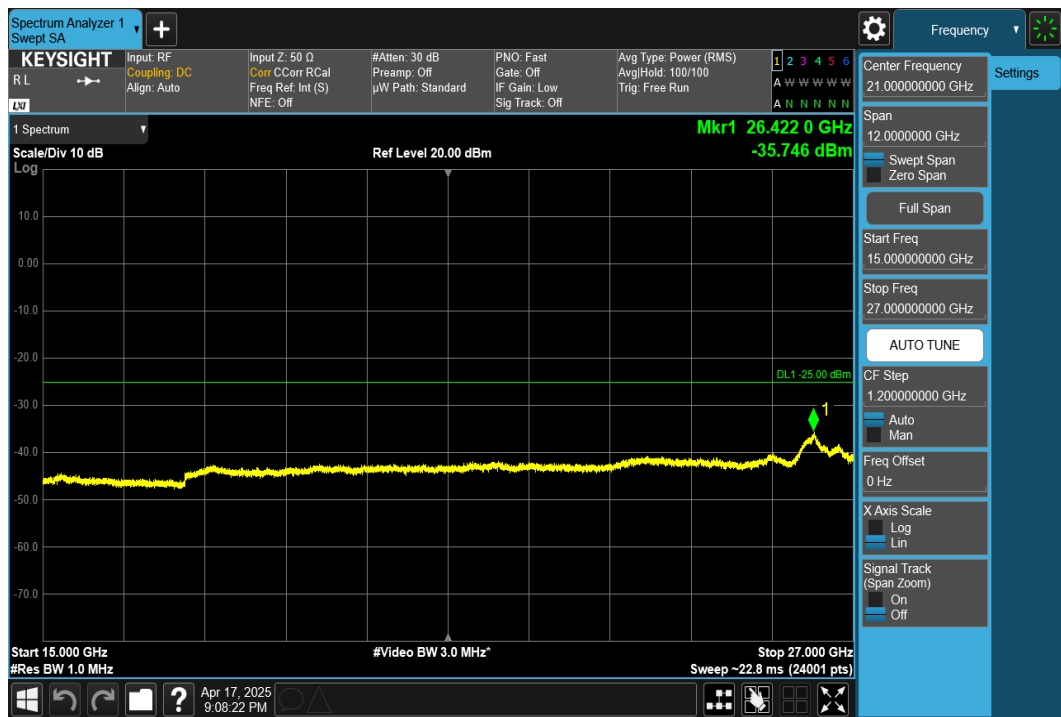


Plot 7-79. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 25 - High Channel)

FCC ID: BCG-A3335	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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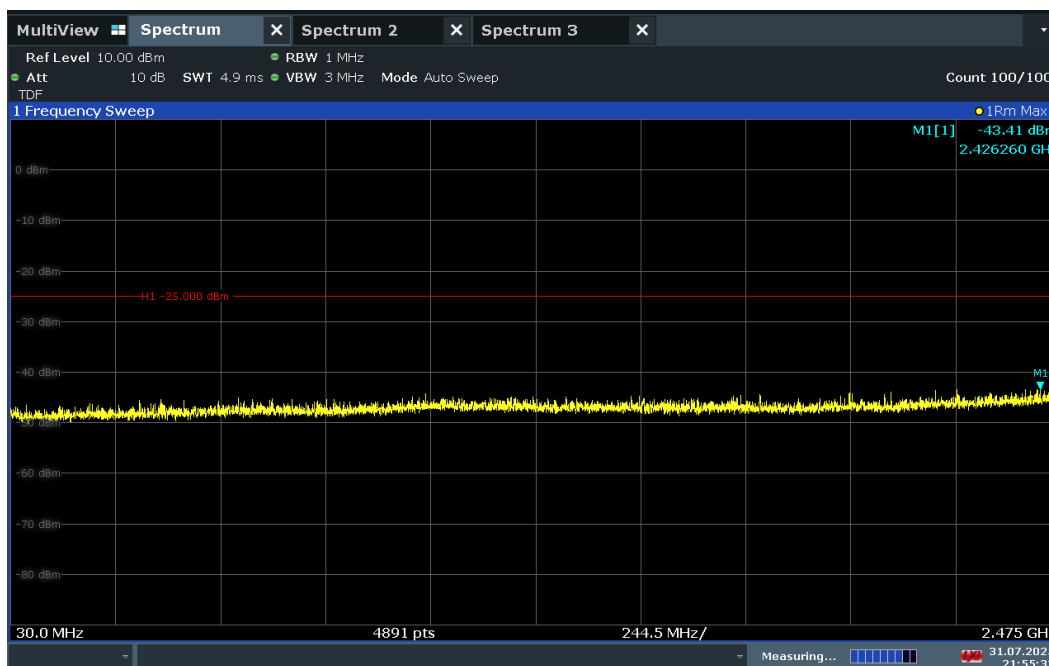
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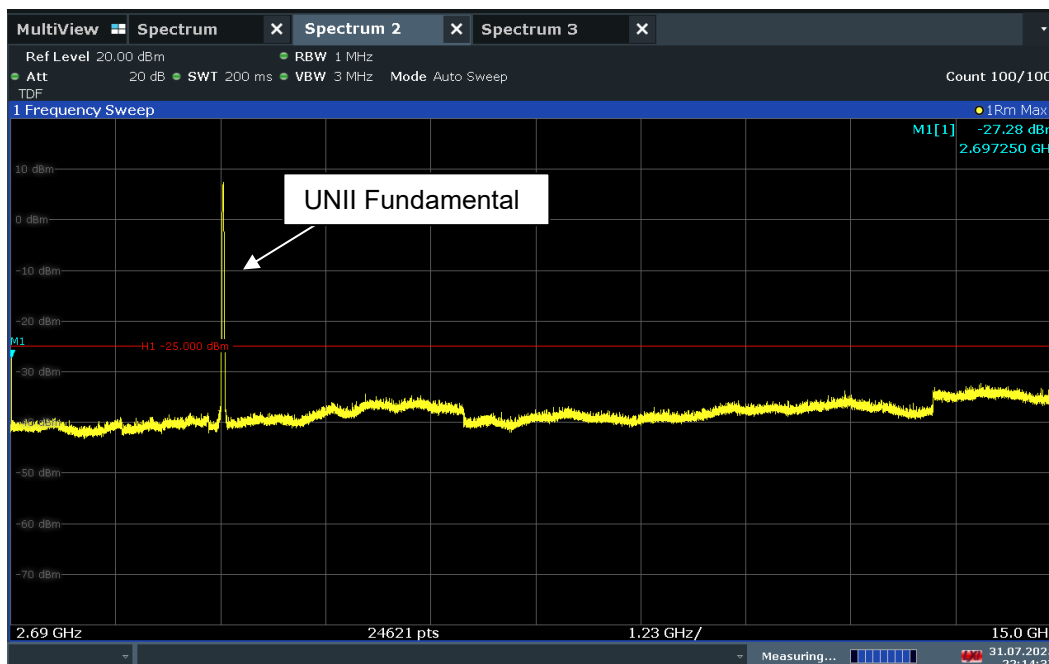
Plot 7-80. Conducted Spurious Plot (NR Band n41 - 20MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 25 - High Channel)

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## Simultaneous Tx Conducted Spurious Emissions Measurements



Plot 7-81. Simultaneous Tx Conducted Spurious Plot (LTE Band 41 + BT + UNII)

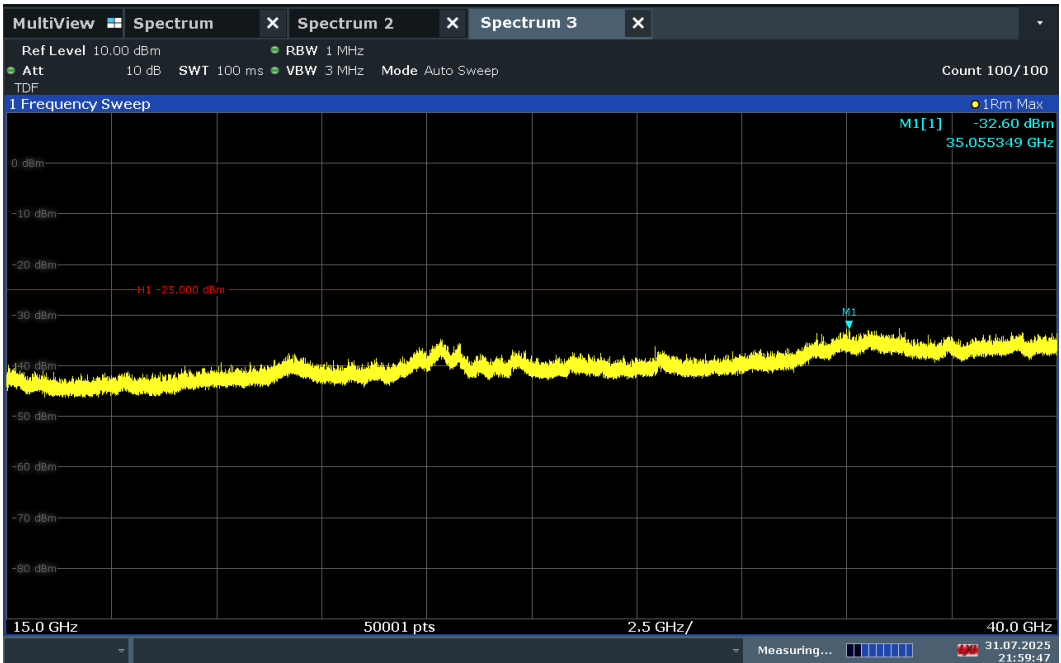


Plot 7-82. Simultaneous Tx Conducted Spurious Plot (LTE Band 41 + BT + UNII)


FCC ID: BCG-A3335	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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Plot 7-83. Simultaneous Tx Conducted Spurious Plot (LTE Band 41 + BT + UNII)

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## 7.4 Band Edge Emissions at Antenna Terminal

\$2.1051, \$27.53(m)

### Test Overview

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 n41 the minimum permissible attenuation level is noted in the Test Notes on the following page.***

### Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

### Test Settings

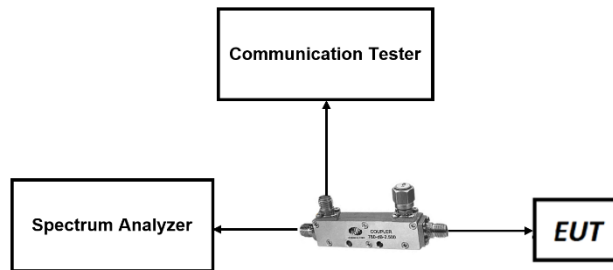
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW  $\geq$  1% of the emission bandwidth
4. VBW  $\geq$  3 x RBW
5. Detector = RMS
6. Number of sweep points  $\geq$  2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

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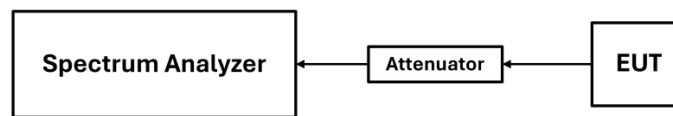
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## Test Setup

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




**Figure 7-5. LTE Test Instrument & Measurement Setup**



**Figure 7-6. FR1 Test Instrument & Measurement Setup**

## Test Notes

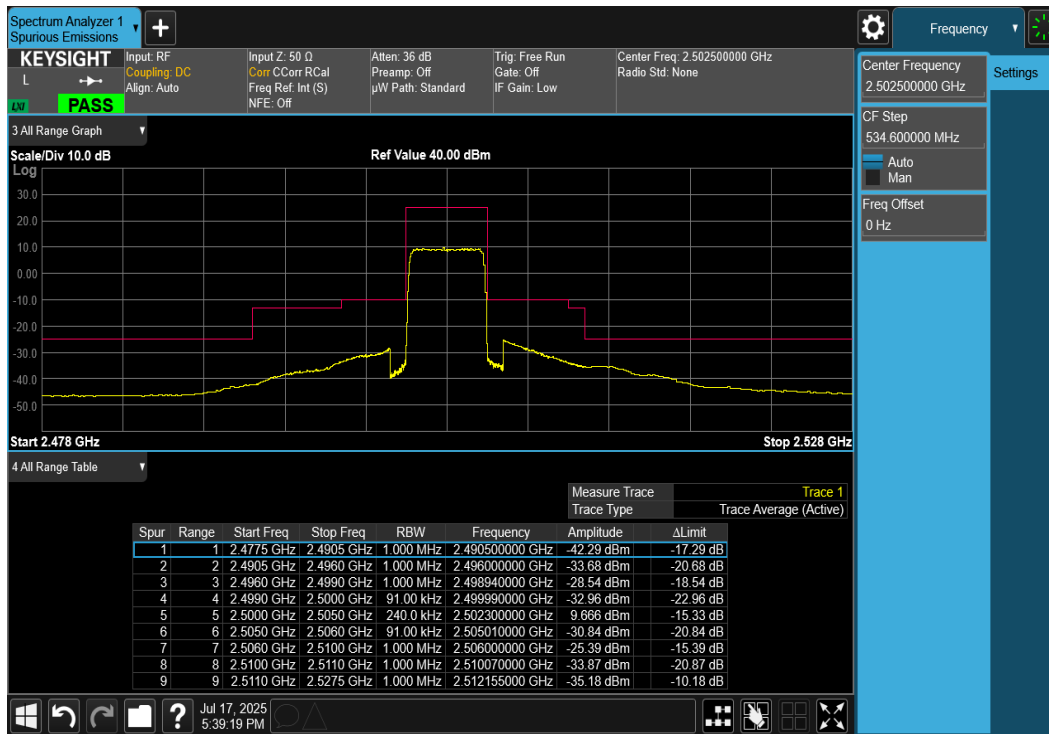
1. Per 27.53(h), in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission 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. Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less than  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz.
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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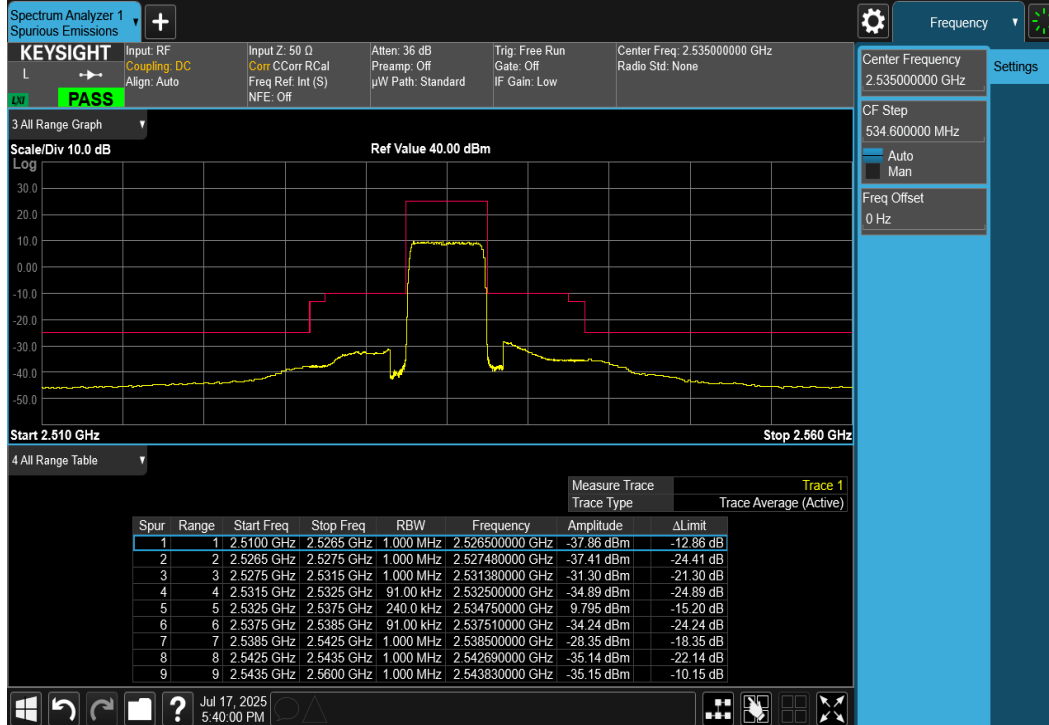
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## LTE Band 7



Plot 7-84. Lower Band Edge Plot (LTE Band 7 - 5MHz QPSK – Full RB)



Plot 7-85. Mid Band Edge Plot (LTE Band 7 - 5MHz QPSK – Full RB)

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