

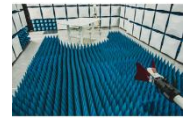


## Element Washington DC LLC

18855 Adams Court, Morgan Hill, CA 95037 USA

Tel. 410.290.6652 / Fax 410.290.6654

<http://www.element.com>



### DATA REFERENCE REPORT PART 27

**Applicant Name:**

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

**Date of Testing:**

5/30/2022 - 9/16/2022

**Test Site/Location:**

Element Washington DC LLC. Morgan Hill, CA, USA

**Test Report Serial No.:**

1C2205090029-03.BCG

**FCC ID:**

BCGA2437

**APPLICANT:**

Apple Inc.

**Reference Model:**

A2764

**Variant Model:**

A2437(A2766)

**EUT Type:**

Tablet Device

**FCC Classification:**

PCS Licensed Transmitter (PCB)

**FCC Rule Part:**

27

**Test Procedure(s):**

ANSI C63.26-2015, ANSI/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




<b>FCC ID:</b> BCGA2437	<b>PART 27 DATA REFERENCE REPORT</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2205090029-03.BCG	<b>Test Dates:</b> 5/30/2022 - 9/16/2022	<b>EUT Type:</b> Tablet Device
		Page 1 of 7

V2.1 11/9/2021

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element Washington DC LLC. If you have any questions about this or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact [ct.info@element.com](mailto:ct.info@element.com).

## TABLE OF CONTENTS

1.0	INTRODUCTION .....	3
1.1	Scope .....	3
1.2	Element Washington DC LLC Test Location .....	3
1.3	Test Facility / Accreditations.....	3
2.0	PRODUCT INFORMATION.....	4
2.1	Equipment Description .....	4
2.2	Device Capabilities.....	4
2.3	Antenna Description .....	5
3.0	CONCLUSION .....	6
4.0	APPENDIX A: REFERENCE MODEL TEST REPORT.....	7

<b>FCC ID:</b> BCGA2437	 <b>PART 27 DATA REFERENCE REPORT</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2205090029-03.BCG	<b>Test Dates:</b> 5/30/2022 - 9/16/2022	<b>EUT Type:</b> Tablet Device
		Page 2 of 7

V2.1 11/9/2021

## 1.0 INTRODUCTION

### 1.1 Scope

Per manufacturer declaration, there are two tablet device models, A2764 and A2437(A2766), with high degree of similarity, reference model FCC ID: BCGA2764 and variant model **FCC ID: BCGA2437**. The reference models support mmWave operations, while the variant models have the mmWave components/antennas removed. Both models share the same material, form factor, circuit design, and components, including antennas and their locations. The reference and variant models use the same power tables and have same tune-up tolerances.

Per FCC approved Data Referencing Test Plan, testing was done fully on the reference model FCC ID: BCGA2764, while conducted and radiated spot-check verification has been performed on variant model **FCC ID: BCGA2437**. Spot-check measurements were conducted, all measurements were investigated and found to be within acceptable tolerance.

Equipment Class	Reference Model FCC ID	Reference Report	Report Title
PCB	BCGA2764	1C2205090028-03.BCG	RF Part 27a Test Report

Table 1-1. Reference Model Details

Spot-check verification are not applicable to this test report; therefore, all data for variant model **FCC ID: BCGA2437** can be fully referenced from the reference model.

Reference model FCC ID: BCGA2764 test report has been included in Appendix A


### 1.2 Element Washington DC LLC Test Location

These measurement tests were conducted at the Element 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 located in Morgan Hill, CA 95037, U.S.A.**

- Element Washington DC LLC 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 ISSED Standards (RSS).
- Element Washington DC LLC facility is a registered (22831) test laboratory with the site description on file with ISSED.

FCC ID: BCGA2437	 <b>PART 27 DATA REFERENCE REPORT</b>	Approved by: Technical Manager
Test Report S/N: 1C2205090029-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device
		Page 3 of 7

V2.1 11/9/2021

## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Tablet Device FCC ID: BCGA2437**. 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.

### 2.2 Device Capabilities

This device contains the following capabilities:

850/1700/1900 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR (FR1), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, 802.11a/ax WIFI 6E, Bluetooth (1x, EDR, LE1M, LE2M, HDR4, HDR8), NB UNII (1x, HDR4, HDR8), WPT

This device supports BT Beamforming

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.

Antenna	Simultaneous Tx Config	WiFi 2.4GHz	Bluetooth	NB UNII	WiFi 5GHz	WiFi 6GHz	LTE / FR1 NR
		802.11 b/g/n/ax	BDR, EDR, HDR4/8, LE1/2M	BDR, HDR4/8	802.11 a/n/ac/ax	802.11 a/ax	Ultra High Band
2a	Config 1	✓	✗	✗	✗	✗	✓
2a	Config 2	✗	✓	✗	✗	✗	✓
4a	Config 3	✓	✗	✓	✗	✗	✗
4a	Config 4	✗	✓	✗	✓	✗	✗


**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 and reported in RF Bluetooth and RF Part 96 test reports.

Wi-Fi 2.4GHz and Bluetooth 2.4 GHz can transmit simultaneously on separate antennas. Specific 2.4 GHz Wi-Fi antenna that can only transmit simultaneously with 2.4 GHz Bluetooth antenna is listed in the SAR test report. For BT (2.4 GHz) in connected mode and Wi-Fi (2.4 GHz) – Wi-Fi max power will not exceed minimum of (13.5dBm, SAR max cap, Reg max cap) power. For BT (2.4 GHz) in disconnected mode and Wi-Fi (2.4 GHz) – BT will be using iPA only and Wi-Fi max power will not exceed minimum of (SAR max cap, Reg max cap) power.

FCC ID: BCGA2437	 <b>PART 27 DATA REFERENCE REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090029-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 4 of 7


V2.1 11/9/2021

## 2.3 Antenna Description

Following antenna gains provided by manufacturer were used for testing.

Band	Antenna Gain [dBi]			
	Antenna 1	Antenna 2B	Antenna 3	Antenna 4B
LTE Band 12/17	-2.1		-1.5	
NR Band 12				
LTE Band 13	-3.1		-2.9	
LTE Band 4/66	1.8	-1.1	1.7	-4.4
NR Band 66				
LTE Band 71	0.3		-1.5	
NR Band 71				
NR Band 70	0.2	-1.1	1.7	-4.7
WCDMA1700	1.8	-1.1	1.7	-4.4


Table 2-2. Highest Antenna Gain

FCC ID: BCGA2437	 <b>PART 27 DATA REFERENCE REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090029-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 5 of 7

V2.1 11/9/2021

### 3.0 CONCLUSION

The spot-check data measured for variant model **FCC ID: BCGA2437** is in tolerance with reference model FCC ID: BCGA2764 per FCC Approved Data Referencing Test Plan.


<b>FCC ID:</b> BCGA2437	 <b>PART 27 DATA REFERENCE REPORT</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2205090029-03.BCG	<b>Test Dates:</b> 5/30/2022 - 9/16/2022	<b>EUT Type:</b> Tablet Device
		Page 6 of 7

V2.1 11/9/2021

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element Washington DC LLC. If you have any questions about this or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact [ct.info@element.com](mailto:ct.info@element.com).

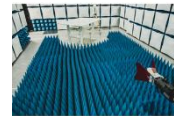
## 4.0 APPENDIX A: REFERENCE MODEL TEST REPORT

Attached is the test report (1C2205090028-03.BCG) from reference model FCC ID: BCGA2764, which includes referenced data results.

<b>FCC ID:</b> BCGA2437	 <b>PART 27 DATA REFERENCE REPORT</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2205090029-03.BCG	<b>Test Dates:</b> 5/30/2022 - 9/16/2022	<b>EUT Type:</b> Tablet Device
		Page 7 of 7

V2.1 11/9/2021

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element Washington DC LLC. If you have any questions about this or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact [ct.info@element.com](mailto:ct.info@element.com).



## PART 27 MEASUREMENT REPORT

**Applicant Name:**

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

**Date of Testing:**

5/30/2022 - 9/16/2022

**Test Site/Location:**

Element Washington DC LLC. Morgan Hill, CA, USA

**Test Report Serial No.:**

1C2205090028-03.BCG

**FCC ID:**

BCGA2764

**APPLICANT:**

Apple Inc.

**Application Type:**

Certification

**Model:**

A2764

**EUT Type:**

Tablet Device

**FCC Classification:**

PCS Licensed Transmitter (PCB)

**FCC Rule Part:**

27

**Test Procedure(s):**

ANSI C63.26-2015, ANSI/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




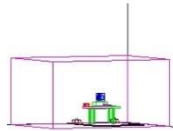
FCC ID: BCGA2764	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 1 of 334



## T A B L E O F C O N T E N T S

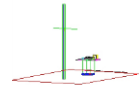
1.0	INTRODUCTION .....	7
1.1	Scope .....	7
1.2	Element Washington DC LLC Test Location .....	7
1.3	Test Facility / Accreditations.....	7
2.0	PRODUCT INFORMATION.....	8
2.1	Equipment Description .....	8
2.2	Device Capabilities.....	8
2.3	Antenna Description .....	9
2.4	Test Support Equipment.....	9
2.5	Test Configuration .....	10
2.6	Software and Firmware .....	10
2.7	EMI Suppression Device(s)/Modifications .....	10
3.0	DESCRIPTION OF TESTS .....	11
3.1	Evaluation Procedure .....	11
3.2	Radiated Spurious Emissions .....	11
4.0	MEASUREMENT UNCERTAINTY .....	12
5.0	TEST EQUIPMENT CALIBRATION DATA .....	13
6.0	SAMPLE CALCULATIONS .....	14
7.0	TEST RESULTS.....	15
7.1	Summary.....	15
7.2	Occupied Bandwidth .....	17
7.3	Spurious and Harmonic Emissions at Antenna Terminal .....	92
7.4	Band Edge Emissions at Antenna Terminal .....	136
7.5	Peak-Average Ratio .....	203
7.6	Radiated Power (ERP/EIRP).....	252
7.7	Radiated Spurious Emissions .....	286
7.8	Frequency Stability / Temperature Variation .....	324
8.0	CONCLUSION.....	334

<b>FCC ID:</b> BCGA2764		<b>PART 27 MEASUREMENT REPORT</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2205090028-03.BCG	<b>Test Dates:</b> 5/30/2022 - 9/16/2022	<b>EUT Type:</b> Tablet Device	Page 2 of 334




# MEASUREMENT REPORT

## FCC Part 27




Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	OBW [MHz]	PAR at 0.1% [dB]	ERP		EIRP		Emission Designator
						Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	
LTE Band 71	5 MHz	QPSK	665.5 - 695.5	4.5381	4.82	0.160	22.05	0.263	24.20	4M54G7W
		16QAM	665.5 - 695.5	4.5379	5.88	0.132	21.22	0.217	23.37	4M54D7W
		64QAM	665.5 - 695.5	4.5389	6.54	0.110	20.40	0.180	22.55	4M54D7W
		256QAM	665.5 - 695.5	4.5413	6.68	0.063	17.99	0.103	20.14	4M54D7W
	10 MHz	QPSK	668.0 - 693.0	9.0412	4.87	0.160	22.05	0.263	24.20	9M04G7W
		16QAM	668.0 - 693.0	9.0236	5.90	0.137	21.37	0.225	23.52	9M02D7W
		64QAM	668.0 - 693.0	9.0189	6.45	0.116	20.63	0.190	22.78	9M02D7W
		256QAM	668.0 - 693.0	8.9998	6.66	0.064	18.05	0.105	20.20	9M00D7W
	15 MHz	QPSK	670.5 - 690.5	13.5093	4.86	0.160	22.05	0.263	24.20	13M6G7W
		16QAM	670.5 - 690.5	13.4964	5.83	0.137	21.37	0.225	23.52	13M5D7W
		64QAM	670.5 - 690.5	13.5382	6.41	0.109	20.38	0.179	22.53	13M5D7W
		256QAM	670.5 - 690.5	13.5329	6.63	0.063	17.96	0.103	20.11	13M5D7W
	20 MHz	QPSK	673.0 - 688.0	18.0368	4.72	0.160	22.05	0.263	24.20	18M0G7W
		16QAM	673.0 - 688.0	17.9799	5.76	0.139	21.44	0.229	23.59	18M0D7W
		64QAM	673.0 - 688.0	17.9650	6.37	0.115	20.61	0.189	22.76	18M0D7W
		256QAM	673.0 - 688.0	17.9369	6.58	0.063	17.97	0.103	20.12	17M9D7W
LTE Band 12	1.4 MHz	QPSK	699.7 - 715.3	1.1094	5.01	0.160	22.05	0.263	24.20	1M11G7W
		16QAM	699.7 - 715.3	1.1165	5.90	0.126	21.01	0.207	23.16	1M12D7W
		64QAM	699.7 - 715.3	1.1121	6.50	0.104	20.15	0.170	22.30	1M11D7W
		256QAM	699.7 - 715.3	1.1027	7.51	0.059	17.69	0.096	19.84	1M10D7W
	3 MHz	QPSK	700.5 - 714.5	2.7200	4.65	0.160	22.05	0.263	24.20	2M72G7W
		16QAM	700.5 - 714.5	2.7255	5.75	0.131	21.17	0.215	23.32	2M73D7W
		64QAM	700.5 - 714.5	2.7216	6.52	0.107	20.30	0.176	22.45	2M72D7W
		256QAM	700.5 - 714.5	2.7114	6.77	0.060	17.79	0.099	19.94	2M71D7W
	5 MHz	QPSK	701.5 - 713.5	4.5549	4.81	0.160	22.05	0.263	24.20	4M55G7W
		16QAM	701.5 - 713.5	4.5254	5.91	0.125	20.98	0.206	23.13	4M53D7W
		64QAM	701.5 - 713.5	4.5390	6.56	0.101	20.05	0.166	22.20	4M54D7W
		256QAM	701.5 - 713.5	4.5410	7.69	0.059	17.72	0.097	19.87	4M54D7W
	10 MHz	QPSK	704.0 - 711.0	9.0056	4.86	0.160	22.05	0.263	24.20	9M01G7W
		16QAM	704.0 - 711.0	9.0150	5.84	0.135	21.31	0.222	23.46	9M02D7W
		64QAM	704.0 - 711.0	9.0021	6.47	0.115	20.60	0.188	22.75	9M00D7W
		256QAM	704.0 - 711.0	9.0075	7.61	0.060	17.77	0.098	19.92	9M01D7W
LTE Band 17	5 MHz	QPSK	706.5 - 713.5	4.5549	4.84	0.160	22.05	0.263	24.20	4M55G7W
		16QAM	706.5 - 713.5	4.5254	5.87	0.132	21.19	0.216	23.34	4M53D7W
		64QAM	706.5 - 713.5	4.5390	6.48	0.114	20.55	0.186	22.70	4M54D7W
		256QAM	706.5 - 713.5	4.5410	6.74	0.062	17.89	0.101	20.04	4M54D7W
	10 MHz	QPSK	709.0 - 711.0	9.0056	4.96	0.160	22.05	0.263	24.20	9M01G7W
		16QAM	709.0 - 711.0	9.0150	5.88	0.134	21.26	0.219	23.41	9M02D7W
		64QAM	709.0 - 711.0	9.0021	6.45	0.107	20.30	0.176	22.45	9M00D7W
		256QAM	709.0 - 711.0	9.0075	6.72	0.061	17.87	0.100	20.02	9M01D7W
LTE Band 13	5 MHz	QPSK	779.5 - 784.5	4.5436	4.72	0.116	20.65	0.191	22.80	4M54G7W
		16QAM	779.5 - 784.5	4.5410	5.80	0.091	19.61	0.150	21.76	4M54D7W
		64QAM	779.5 - 784.5	4.5315	6.43	0.073	18.64	0.120	20.79	4M53D7W
		256QAM	779.5 - 784.5	4.5411	7.54	0.046	16.61	0.075	18.76	4M54D7W
	10 MHz	QPSK	782.0	9.0300	4.92	0.116	20.65	0.191	22.80	9M03G7W
		16QAM	782.0	9.0242	5.89	0.095	19.76	0.155	21.91	9M02D7W
		64QAM	782.0	9.0241	6.50	0.070	18.46	0.115	20.61	9M02D7W
		256QAM	782.0	9.0275	7.58	0.046	16.62	0.075	18.77	9M03D7W

Overview Table (<1GHz Band)

FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 3 of 334


Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	OBW [MHz]	ERP		EIRP		Emission Designator
					Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	
NR Band n71	5 MHz	$\pi/2$ BPSK	665.5 - 695.5	4.5925	0.152	21.83	0.250	23.98	4M59G7W
		QPSK	665.5 - 695.5	4.5219	0.149	21.74	0.245	23.89	4M52G7W
		16QAM	665.5 - 695.5	4.5581	0.133	21.24	0.218	23.39	4M56D7W
		64QAM	665.5 - 695.5	4.5294	0.087	19.40	0.143	21.55	4M53D7W
		256QAM	665.5 - 695.5	4.5421	0.054	17.30	0.088	19.45	4M54D7W
	10 MHz	$\pi/2$ BPSK	668.0 - 693.0	9.0406	0.160	22.03	0.262	24.18	9M04G7W
		QPSK	668.0 - 693.0	9.3608	0.151	21.78	0.247	23.93	9M36G7W
		16QAM	668.0 - 693.0	9.3863	0.130	21.14	0.213	23.29	9M39D7W
		64QAM	668.0 - 693.0	9.3772	0.088	19.43	0.144	21.58	9M38D7W
		256QAM	668.0 - 693.0	9.3371	0.052	17.17	0.086	19.32	9M34D7W
	15 MHz	$\pi/2$ BPSK	670.5 - 690.5	13.4787	0.154	21.88	0.253	24.03	13M5G7W
		QPSK	670.5 - 690.5	14.1775	0.150	21.77	0.246	23.92	14M2G7W
		16QAM	670.5 - 690.5	14.2130	0.135	21.29	0.221	23.44	14M2D7W
		64QAM	670.5 - 690.5	14.1771	0.096	19.84	0.158	21.99	14M2D7W
		256QAM	670.5 - 690.5	14.1808	0.055	17.37	0.089	19.52	14M2D7W
	20 MHz	$\pi/2$ BPSK	673.0 - 688.0	17.9897	0.157	21.96	0.257	24.11	18M0G7W
		QPSK	673.0 - 688.0	18.9991	0.150	21.76	0.246	23.91	19M0G7W
		16QAM	673.0 - 688.0	18.9844	0.126	21.00	0.207	23.15	19M0D7W
		64QAM	673.0 - 688.0	18.9658	0.094	19.74	0.154	21.89	19M0D7W
		256QAM	673.0 - 688.0	19.0077	0.075	18.74	0.123	20.89	19M0D7W
NR Band n12	5 MHz	$\pi/2$ BPSK	701.5 - 713.5	4.5606	0.150	21.75	0.246	23.90	4M56G7W
		QPSK	701.5 - 713.5	4.5231	0.151	21.80	0.248	23.95	4M52G7W
		16QAM	701.5 - 713.5	4.5249	0.117	20.67	0.191	22.82	4M52D7W
		64QAM	701.5 - 713.5	4.5175	0.084	19.24	0.138	21.39	4M52D7W
		256QAM	701.5 - 713.5	4.5567	0.051	17.07	0.084	19.22	4M56D7W
	10 MHz	$\pi/2$ BPSK	704.0 - 711.0	9.0044	0.146	21.64	0.240	23.79	9M00G7W
		QPSK	704.0 - 711.0	9.3623	0.139	21.42	0.228	23.57	9M36G7W
		16QAM	704.0 - 711.0	9.3620	0.123	20.90	0.202	23.05	9M36D7W
		64QAM	704.0 - 711.0	9.3283	0.085	19.31	0.140	21.46	9M33D7W
		256QAM	704.0 - 711.0	9.3293	0.050	17.00	0.082	19.15	9M33D7W
	15 MHz	$\pi/2$ BPSK	706.5 - 708.5	13.4988	0.142	21.52	0.233	23.67	13M5G7W
		QPSK	706.5 - 708.5	14.1637	0.149	21.72	0.244	23.87	14M2G7W
		16QAM	706.5 - 708.5	14.1936	0.123	20.89	0.201	23.04	14M2D7W
		64QAM	706.5 - 708.5	14.1427	0.085	19.29	0.139	21.44	14M1D7W
		256QAM	706.5 - 708.5	14.1404	0.055	17.39	0.090	19.54	14M1D7W

Overview Table (<1GHz Band)

FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 4 of 334


Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	OBW [MHz]	PAR at 0.1% [dB]	EIRP		Emission Designator
						Max. Power [W]	Max. Power [dBm]	
WCDMA1700	5 MHz	Spread Spectrum	1712.4 - 1752.6	4.1515	2.88	0.490	26.90	4M15F9W
LTE Band 4	1.4 MHz	QPSK	1710.7 - 1754.3	1.1092	4.91	0.562	27.50	1M11G7W
		16QAM	1710.7 - 1754.3	1.1059	5.72	0.453	26.56	1M11D7W
		64QAM	1710.7 - 1754.3	1.1091	6.51	0.362	25.59	1M11D7W
		256QAM	1710.7 - 1754.3	1.1060	7.33	0.191	22.81	1M11D7W
	3 MHz	QPSK	1711.5 - 1753.5	2.7296	4.59	0.562	27.50	2M73G7W
		16QAM	1711.5 - 1753.5	2.7245	5.68	0.466	26.68	2M72D7W
		64QAM	1711.5 - 1753.5	2.7205	6.49	0.389	25.90	2M72D7W
		256QAM	1711.5 - 1753.5	2.7192	6.73	0.194	22.87	2M72D7W
	5 MHz	QPSK	1712.5 - 1752.5	4.5393	4.80	0.562	27.50	4M54G7W
		16QAM	1712.5 - 1752.5	4.5499	5.83	0.462	26.65	4M55D7W
		64QAM	1712.5 - 1752.5	4.5342	6.46	0.399	26.01	4M53D7W
		256QAM	1712.5 - 1752.5	4.5505	6.67	0.194	22.88	4M55D7W
	10MHz	QPSK	1715.0 - 1750.0	9.0551	4.88	0.562	27.50	9M06G7W
		16QAM	1715.0 - 1750.0	9.0599	5.83	0.462	26.65	9M06D7W
		64QAM	1715.0 - 1750.0	9.0378	6.59	0.394	25.96	9M04D7W
		256QAM	1715.0 - 1750.0	9.0525	6.68	0.195	22.89	9M05D7W
	15 MHz	QPSK	1717.5 - 1747.5	13.5670	4.89	0.562	27.50	13M6G7W
		16QAM	1717.5 - 1747.5	13.5225	5.86	0.457	26.60	13M5D7W
		64QAM	1717.5 - 1747.5	13.5086	6.42	0.374	25.73	13M5D7W
		256QAM	1717.5 - 1747.5	13.5390	6.64	0.191	22.80	13M5D7W
	20 MHz	QPSK	1720.0 - 1745.0	18.0427	4.75	0.562	27.50	18M0G7W
		16QAM	1720.0 - 1745.0	18.0752	5.79	0.468	26.70	18M1D7W
		64QAM	1720.0 - 1745.0	18.0320	6.40	0.387	25.88	18M0D7W
		256QAM	1720.0 - 1745.0	17.9999	6.63	0.190	22.79	18M0D7W
LTE Band 66	1.4 MHz	QPSK	1710.7 - 1779.3	1.1092	5.66	0.562	27.50	1M11G7W
		16QAM	1710.7 - 1779.3	1.1059	6.54	0.476	26.78	1M11D7W
		64QAM	1710.7 - 1779.3	1.1091	7.01	0.378	25.78	1M11D7W
		256QAM	1710.7 - 1779.3	1.1060	7.66	0.184	22.65	1M11D7W
	3 MHz	QPSK	1711.5 - 1778.5	2.7296	5.53	0.562	27.50	2M73G7W
		16QAM	1711.5 - 1778.5	2.7245	6.52	0.467	26.69	2M72D7W
		64QAM	1711.5 - 1778.5	2.7205	6.95	0.378	25.78	2M72D7W
		256QAM	1711.5 - 1778.5	2.7192	7.77	0.197	22.94	2M72D7W
	5 MHz	QPSK	1712.5 - 1777.5	4.5393	5.65	0.562	27.50	4M54G7W
		16QAM	1712.5 - 1777.5	4.5499	6.51	0.469	26.71	4M55D7W
		64QAM	1712.5 - 1777.5	4.5342	6.94	0.374	25.73	4M53D7W
		256QAM	1712.5 - 1777.5	4.5505	8.01	0.185	22.67	4M55D7W
	10 MHz	QPSK	1715.0 - 1775.0	9.0551	5.64	0.562	27.50	9M06G7W
		16QAM	1715.0 - 1775.0	9.0599	6.49	0.476	26.78	9M06D7W
		64QAM	1715.0 - 1775.0	9.0378	6.96	0.382	25.82	9M04D7W
		256QAM	1715.0 - 1775.0	9.0525	8.02	0.182	22.60	9M05D7W
	15 MHz	QPSK	1717.5 - 1772.5	13.5670	5.80	0.562	27.50	13M6G7W
		16QAM	1717.5 - 1772.5	13.5225	6.56	0.459	26.62	13M5D7W
		64QAM	1717.5 - 1772.5	13.5086	6.86	0.385	25.86	13M5D7W
		256QAM	1717.5 - 1772.5	13.5390	6.92	0.231	23.64	13M5D7W
	20 MHz	QPSK	1720.0 - 1770.0	18.0427	5.63	0.562	27.50	18M0G7W
		16QAM	1720.0 - 1770.0	18.0752	6.57	0.478	26.79	18M1D7W
		64QAM	1720.0 - 1770.0	18.0320	7.01	0.388	25.89	18M0D7W
		256QAM	1720.0 - 1770.0	17.9999	7.96	0.187	22.71	18M0D7W

Overview Table (>1GHz Bands)

FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 5 of 334

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	OBW [MHz]	PAR at 0.1% [dB]	EIRP		Emission Designator
						Max. Power [W]	Max. Power [dBm]	
NR Band n66	5 MHz	$\pi/2$ BPSK	1712.5 - 1777.5	4.5970	4.88	0.532	27.26	4M60G7W
		QPSK	1712.5 - 1777.5	4.5359	5.82	0.498	26.97	4M54G7W
		16QAM	1712.5 - 1777.5	4.5465	6.52	0.407	26.10	4M55D7W
		64QAM	1712.5 - 1777.5	4.5206	6.80	0.282	24.50	4M52D7W
		256QAM	1712.5 - 1777.5	4.5500	7.05	0.179	22.54	4M55D7W
	10 MHz	$\pi/2$ BPSK	1715.0 - 1775.0	9.0706	4.70	0.514	27.11	9M07G7W
		QPSK	1715.0 - 1775.0	9.3766	5.66	0.498	26.97	9M38G7W
		16QAM	1715.0 - 1775.0	9.3879	6.78	0.413	26.16	9M39D7W
		64QAM	1715.0 - 1775.0	9.3938	7.00	0.289	24.61	9M39D7W
		256QAM	1715.0 - 1775.0	9.3728	6.64	0.173	22.37	9M37D7W
	15 MHz	$\pi/2$ BPSK	1717.5 - 1772.5	13.5213	4.87	0.528	27.22	13M5G7W
		QPSK	1717.5 - 1772.5	14.2213	5.84	0.542	27.34	14M2G7W
		16QAM	1717.5 - 1772.5	14.2226	6.68	0.430	26.33	14M2D7W
		64QAM	1717.5 - 1772.5	14.2416	6.82	0.309	24.90	14M2D7W
		256QAM	1717.5 - 1772.5	14.2399	7.04	0.175	22.44	14M2D7W
	20 MHz	$\pi/2$ BPSK	1720.0 - 1770.0	18.0473	4.48	0.539	27.32	18M0G7W
		QPSK	1720.0 - 1770.0	19.0345	5.68	0.509	27.07	19M0G7W
		16QAM	1720.0 - 1770.0	19.0555	6.64	0.420	26.23	19M1D7W
		64QAM	1720.0 - 1770.0	19.1511	6.91	0.299	24.76	19M2D7W
		256QAM	1720.0 - 1770.0	19.0518	6.75	0.186	22.70	19M1D7W
	30 MHz	$\pi/2$ BPSK	1725.0 - 1765.0	28.7879	4.63	0.514	27.11	28M8G7W
		QPSK	1725.0 - 1765.0	28.7652	5.93	0.518	27.15	28M8G7W
		16QAM	1725.0 - 1765.0	28.7866	6.42	0.443	26.46	28M8D7W
		64QAM	1725.0 - 1765.0	28.8188	6.79	0.307	24.87	28M8D7W
		256QAM	1725.0 - 1765.0	28.7062	6.79	0.193	22.86	28M7D7W
	40 MHz	$\pi/2$ BPSK	1730.0 - 1760.0	38.9313	4.88	0.537	27.30	38M9G7W
		QPSK	1730.0 - 1760.0	38.8607	5.79	0.522	27.18	38M9G7W
		16QAM	1730.0 - 1760.0	38.9696	6.46	0.432	26.35	39M0D7W
		64QAM	1730.0 - 1760.0	38.8949	6.78	0.306	24.86	38M9D7W
		256QAM	1730.0 - 1760.0	39.0227	6.78	0.194	22.88	39M0D7W
NR Band n70	5 MHz	$\pi/2$ BPSK	1697.5 - 1707.5	4.6270	4.07	0.490	26.90	4M63G7W
		QPSK	1697.5 - 1707.5	4.5617	5.37	0.478	26.79	4M56G7W
		16QAM	1697.5 - 1707.5	4.5803	6.23	0.422	26.25	4M58D7W
		64QAM	1697.5 - 1707.5	4.5841	6.49	0.293	24.67	4M58D7W
		256QAM	1697.5 - 1707.5	4.5380	6.42	0.195	22.89	4M54D7W
	10 MHz	$\pi/2$ BPSK	1700.0 - 1705.0	9.0606	4.14	0.490	26.90	9M06G7W
		QPSK	1700.0 - 1705.0	9.3844	5.50	0.489	26.89	9M38G7W
		16QAM	1700.0 - 1705.0	9.3796	6.35	0.484	26.85	9M38D7W
		64QAM	1700.0 - 1705.0	9.3863	6.58	0.292	24.65	9M39D7W
		256QAM	1700.0 - 1705.0	9.3448	6.63	0.188	22.73	9M34D7W
	15 MHz	$\pi/2$ BPSK	1702.5	13.5380	4.17	0.451	26.54	13M5G7W
		QPSK	1702.5	14.2240	5.42	0.445	26.48	14M2G7W
		16QAM	1702.5	14.2420	6.40	0.366	25.63	14M2D7W
		64QAM	1702.5	14.2310	6.55	0.253	24.02	14M2D7W
		256QAM	1702.5	14.1720	6.67	0.146	21.65	14M2D7W

Overview Table (>1GHz Bands)

FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 6 of 334

## 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 Washington DC LLC Test Location

These measurement tests were conducted at the Element 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 located in Morgan Hill, CA 95037, U.S.A.

- Element Washington DC LLC 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 Washington DC LLC facility is a registered (22831) test laboratory with the site description on file with ISED.

FCC ID: BCGA2764		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 7 of 334

## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Tablet Device FCC ID: BCGA2764**. 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.:** DLX2184009B1M9L1M, KRRF2YPXDHM, H4QHXRFX21

### 2.2 Device Capabilities

This device contains the following capabilities:

850/1700/1900 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR (FR1, FR2), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, 802.11a/ax WIFI 6E, Bluetooth (1x, EDR, LE1M, LE2M, HDR4, HDR8), NB UNII (1x, HDR4, HDR8), WPT

This device supports BT Beamforming

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.

Antenna	Simultaneous Tx Config	WiFi 2.4GHz	Bluetooth	NB UNII	WiFi 5GHz	WiFi 6GHz	LTE / FR1 NR
		802.11 b/g/n/ax	BDR, EDR, HDR4/8, LE1/2M	BDR, HDR4/8	802.11 a/n/ac/ax	802.11 a/ax	Ultra High Band
2a	Config 1	✓	✗	✗	✗	✗	✓
2a	Config 2	✗	✓	✗	✗	✗	✓
4a	Config 3	✓	✗	✓	✗	✗	✗
4a	Config 4	✗	✓	✗	✓	✗	✗


**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 and reported in RF Bluetooth and RF Part 96 test reports.

Wi-Fi 2.4GHz and Bluetooth 2.4 GHz can transmit simultaneously on separate antennas. Specific 2.4 GHz Wi-Fi antenna that can only transmit simultaneously with 2.4 GHz Bluetooth antenna is listed in the SAR test report. For BT (2.4 GHz) in connected mode and Wi-Fi (2.4 GHz) – Wi-Fi max power will not exceed minimum of (13.5dBm, SAR max cap, Reg max cap) power. For BT (2.4 GHz) in disconnected mode and Wi-Fi (2.4 GHz) – BT will be using iPA only and Wi-Fi max power will not exceed minimum of (SAR max cap, Reg max cap) power.

<b>FCC ID:</b> BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2205090028-03.BCG	<b>Test Dates:</b> 5/30/2022 - 9/16/2022	<b>EUT Type:</b> Tablet Device	Page 8 of 334

## 2.3 Antenna Description

Following antenna gains provided by manufacturer were used for testing.


Band	Antenna Gain [dBi]			
	Antenna 1	Antenna 2B	Antenna 3	Antenna 4B
LTE Band 12/17	-2.1		-1.5	
NR Band 12				
LTE Band 13	-3.1		-2.9	
LTE Band 4/66	1.8	-1.1	1.7	-4.4
NR Band 66				
LTE Band 71	0.3		-1.5	
NR Band 71				
NR Band 70	0.2	-1.1	1.7	-4.7
WCDMA1700	1.8	-1.1	1.7	-4.4

Table 2-2. Highest Antenna Gain

## 2.4 Test Support Equipment

1	Apple MacBook Pro	Model: A2141	S/N: C02DV7VKMD6T
	w/AC/DC Adapter	Model: A2166	S/N: N/A
2	Apple USB-C Cable	Model: Spartan	S/N: 000MKTR02U
3	USB-C Cable	Model: A246	S/N: N/A
	w/ AC Adapter	Model: A2305	S/N: N/A
4	Apple Pencil	Model: N/A	S/N: GQXGSXBJKM9
5	DC Power Supply	Model: KPS3010D	S/N: N/A

Table 2-3. Test Support Equipment

FCC ID: BCGA2764		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 9 of 334



## 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.

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.

## 2.6 Software and Firmware

The test was conducted with firmware version 20A8359 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.

<b>FCC ID:</b> BCGA2764		<b>PART 27 MEASUREMENT REPORT</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2205090028-03.BCG	<b>Test Dates:</b> 5/30/2022 - 9/16/2022	<b>EUT Type:</b> Tablet Device	Page 10 of 334

## 3.0 DESCRIPTION OF TESTS

### 3.1 Evaluation Procedure

The measurement procedures described in the document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI C63.26-2015/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.

### 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:

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


And

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

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: BCGA2764		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 11 of 334

## 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	1.77
Radiated Disturbance (<30MHz)	4.38
Radiated Disturbance (30MHz-1GHz)	4.75
Radiated Disturbance (1-18GHz)	5.20
Radiated Disturbance (>18GHz)	4.79

FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device
		Page 12 of 334

## 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-44GHz PXA Signal Analyzer	6/10/2022	Annual	6/10/2023	MY49430244
Agilent Technologies	N9020A	MXA Signal Analyzer	4/26/2022	Annual	4/26/2023	MY56470202
ATM	180-442A-KF	20dB Nominal Gain Horn Antenna	1/19/2022	Annual	1/19/2023	T058701-02
ETS-Lindgren	3142E	Biconilog Antenna (26-6000MHz)	10/21/2021	Annual	10/21/2022	208204
ETS-Lindgren	3117	Double Ridged Guide Horn Antenna (1-18GHz)	10/25/2021	Annual	10/25/2022	227597
ETS-Lindgren	SU-241	Table Top Temperature Chamber	10/6/2021	Annual	10/6/2022	92009574
Keysight Technology	N9040B	UXA Signal Analyzer	2/8/2022	Annual	2/8/2023	MY57212015
Rohde & Schwarz	TS-PR8	Pre-Amplifier (30MHz-6GHz)	1/6/2022	Annual	1/6/2023	102328
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	10/11/2021	Annual	10/11/2022	161616
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	11/4/2021	Annual	11/4/2022	151888
Rohde & Schwarz	ESW26	EMI Test Receiver	5/19/2022	Annual	5/19/2023	101299
Rohde & Schwarz	ESW44	EMI Test Receiver	12/2/2021	Annual	12/2/2022	101570
Rohde & Schwarz	FSV40	Signal Analyzer (10Hz-40GHz)	3/4/2022	Annual	3/4/2023	101619
Rohde & Schwarz	FSVA3044	Signal Analyzer (up to 44 GHz)	5/12/2022	Annual	5/12/2023	101098
Rohde & Schwarz	HFH2-Z2	Loop Antenna	4/3/2022	Annual	4/3/2023	100546
Rohde & Schwarz	TC-TA18	Cross-Polarized Antenna 400MHz-18GHz	1/25/2022	Annual	1/25/2023	101063
Rohde & Schwarz	TS-PR18	Pre-Amplifier (1GHz-18GHz)	1/6/2022	Annual	1/6/2023	101639
Rohde & Schwarz	TS-PR1840	Pre-Amplifier (18GHz-40GHz)	4/18/2022	Annual	4/18/2023	100050

**Table 5-1. Test Equipment**

### Notes:

1. 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.

FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 13 of 334

## 6.0 SAMPLE CALCULATIONS

### Emission Designator

#### WCDMA Emission Designator

**Emission Designator = 4M16F9W**

WCDMA BW = 4.16 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

#### $\pi/2$ 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**

LTE BW = 8.45 MHz

D = Amplitude/Angle Modulated


7 = Quantized/Digital Info

W = Combination of Any

### Spurious Radiated Emission

#### **Example: Middle Channel LTE Mode 2<sup>nd</sup> Harmonic (1564 MHz)**

The average 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 1564 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm - (-24.80).

FCC ID: BCGA2764		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 14 of 334


## 7.0 TEST RESULTS

### 7.1 Summary

Company Name: Apple Inc.  
 FCC ID: BCGA2764  
 FCC Classification: PCS Licensed Transmitter (PCB)  
 Mode(s): WCDMA/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	-13 dBm at Band Edge and for all out-of-band emissions	PASS	Sections 7.3, 7.4
	Conducted Band Edge / Spurious Emissions (LTE B13)	2.1051, 27.53	-13 dBm at Band Edge and for all out-of-band emissions < -70 dBW/MHz (for wideband signals) < -80 dBW (for discrete emissions less than 700Hz BW) For all emissions in the band 1559 - 1610 MHz.	PASS	Sections 7.3, 7.4
	Peak-Average Ratio	27.50(d)(5)	< 13 dB	PASS	Section 7.5
	Transmitter Conducted Output Power	2.1046	N/A	N/A	See RF Exposure Report
	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
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 71)	27.50(b)(10)	< 3 Watts max. ERP	PASS	Section 7.6
	Effective Radiated Power / Equivalent Isotropic Radiated Power (NR Band n71)			PASS	Section 7.6
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 12/17)			PASS	Section 7.6
	Effective Radiated Power / Equivalent Isotropic Radiated Power (NR Band 12)			PASS	Section 7.6
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 13)	27.50(c)(10)	< 3 Watts max. ERP	PASS	Section 7.6
	Equivalent Isotropic Radiated Power (WCDMA)	27.50(d)(4)	< 1 Watts max. EIRP	PASS	Section 7.6
	Equivalent Isotropic Radiated Power (NR Band n66)			PASS	Section 7.6
	Equivalent Isotropic Radiated Power (LTE Band 4/66)			PASS	Section 7.6
	Equivalent Isotropic Radiated Power (NR Band n70)			PASS	Section 7.6
RADIATED	Radiated Spurious Emissions (LTE Band 13)	2.1053, 27.53(f)	-13 dBm for all out-of-band emissions < -70 dBW/MHz (for wideband signals) < -80 dBW (for discrete emissions less than 700Hz BW) For all emissions in the band 1559 - 1610 MHz	PASS	Section 7.7
	Radiated Spurious Emissions	2.1053, 27.53	-13 dBm for all out-of-band emissions	PASS	Section 7.7

Table 7-1. Summary of Test Results

FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 15 of 334

**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 is Element EMC Software Tool v1.1.

<b>FCC ID:</b> BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2205090028-03.BCG	<b>Test Dates:</b> 5/30/2022 - 9/16/2022	<b>EUT Type:</b> Tablet Device	Page 16 of 334

## 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. All ports were tested and only the worst case data were reported.

#### 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

#### Test Setup

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

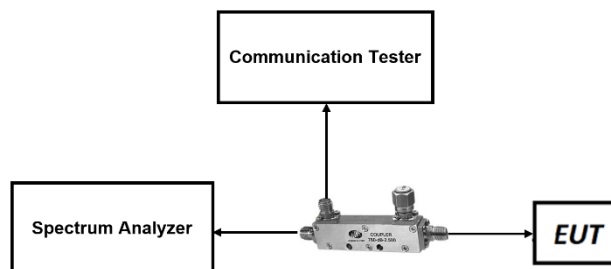



Figure 7-1. Test Instrument & Measurement Setup

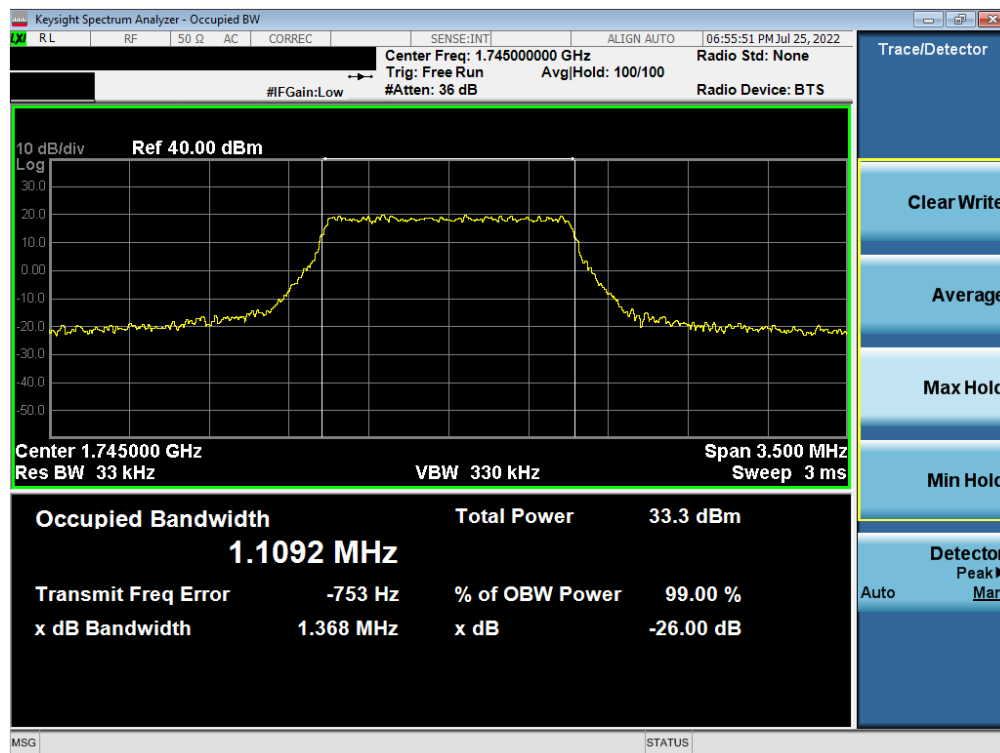
#### Test Notes

None.

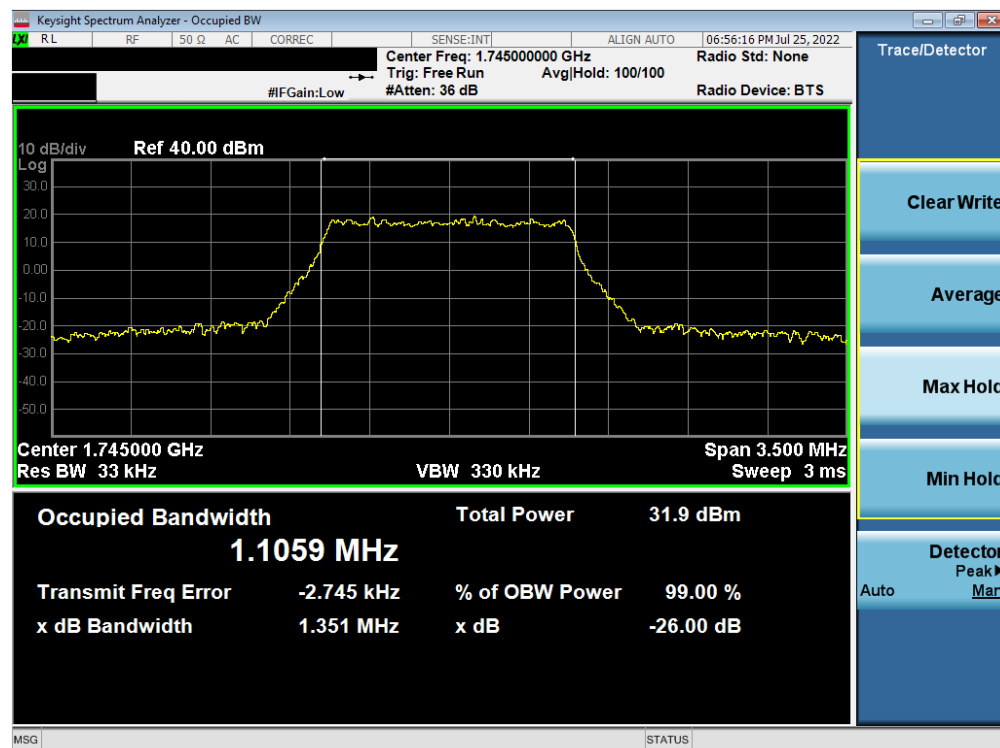
FCC ID: BCGA2764		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 17 of 334




## LTE Band 66/4

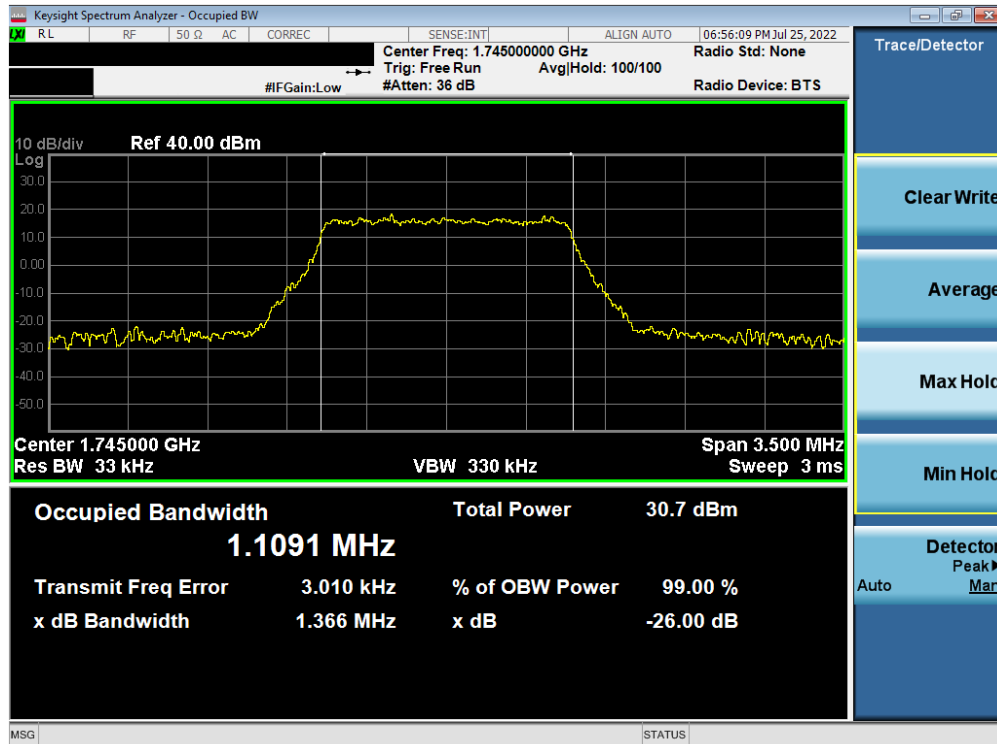


Plot 7-1. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz QPSK - Full RB)

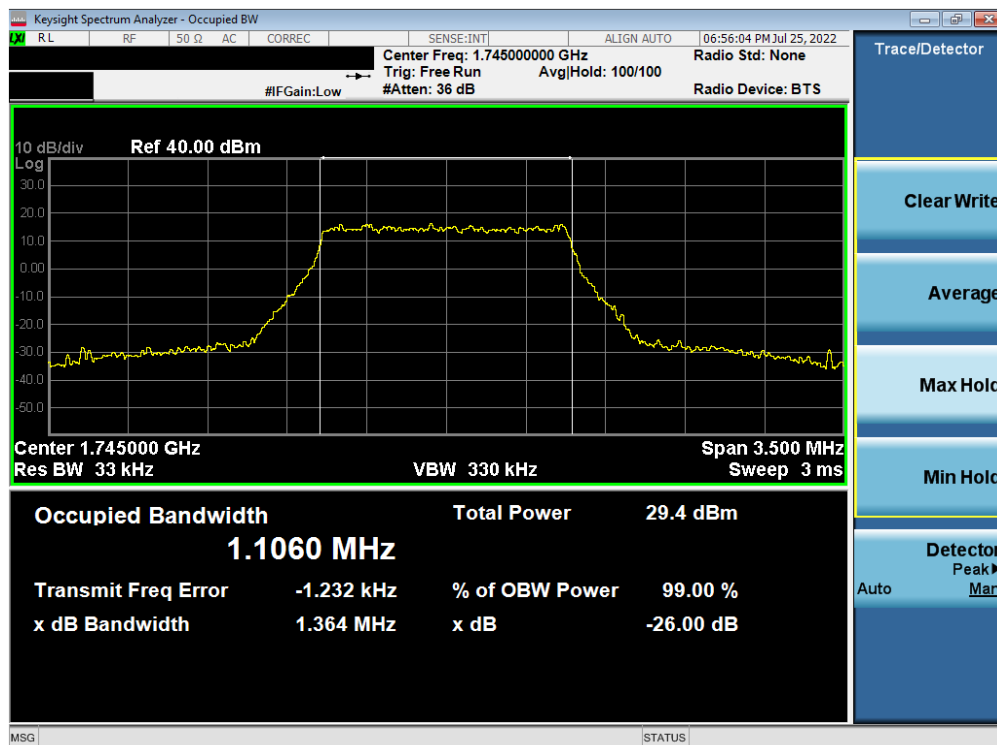


Plot 7-2. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz 16-QAM - Full RB)

FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 18 of 334



Plot 7-3. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz 64-QAM - Full RB)

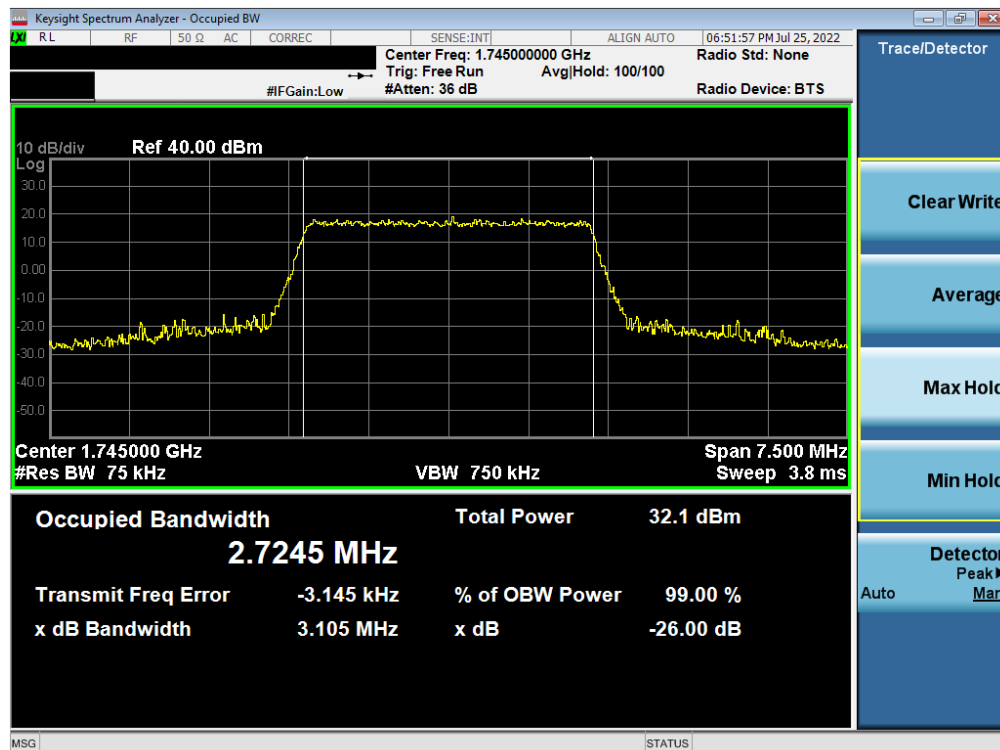


Plot 7-4. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz 256-QAM - Full RB)


FCC ID: BCGA2764	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 19 of 334

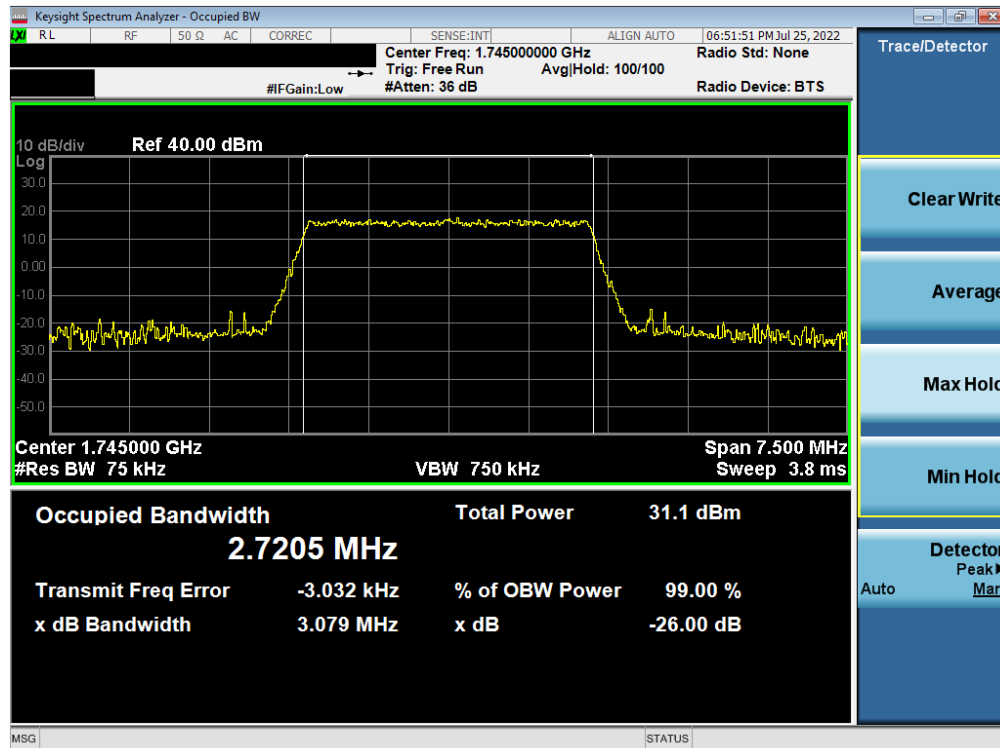


Plot 7-5. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz QPSK - Full RB)

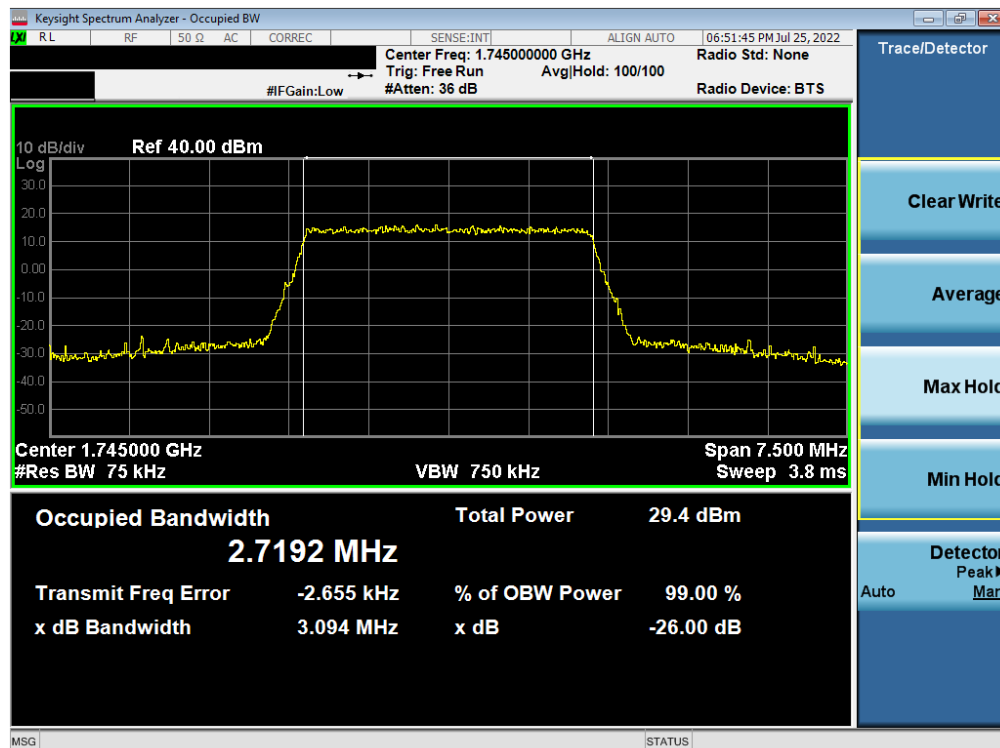


Plot 7-6. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz 16-QAM - Full RB)


FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 20 of 334

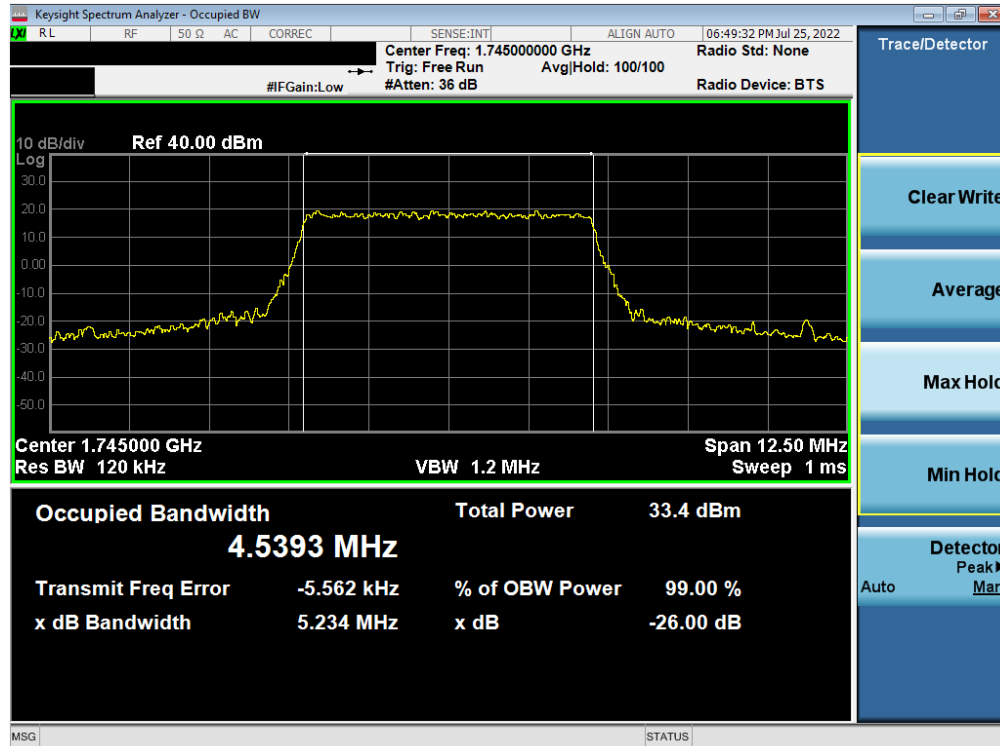


Plot 7-7. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz 64-QAM - Full RB)

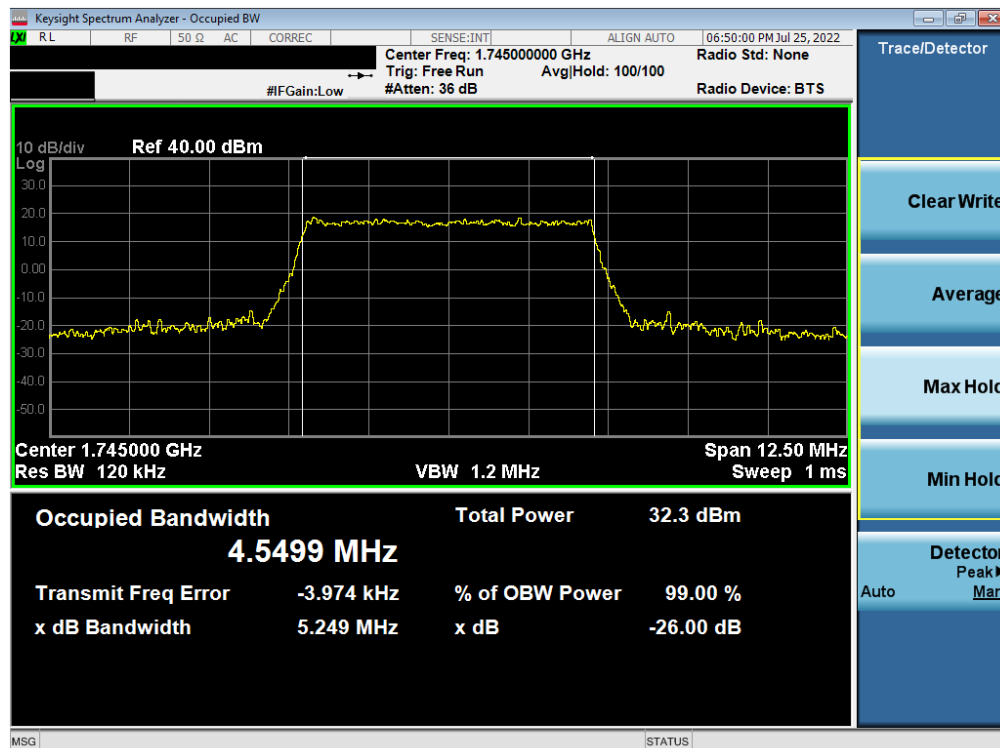


Plot 7-8. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz 256-QAM - Full RB)


FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 21 of 334

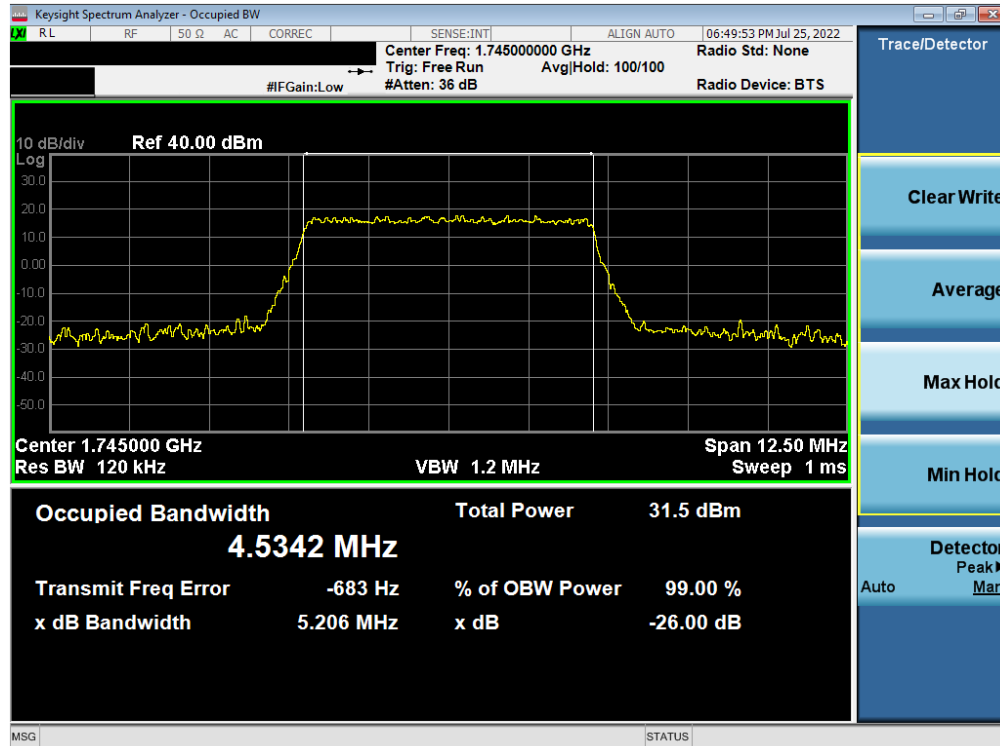


Plot 7-9. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz QPSK - Full RB)

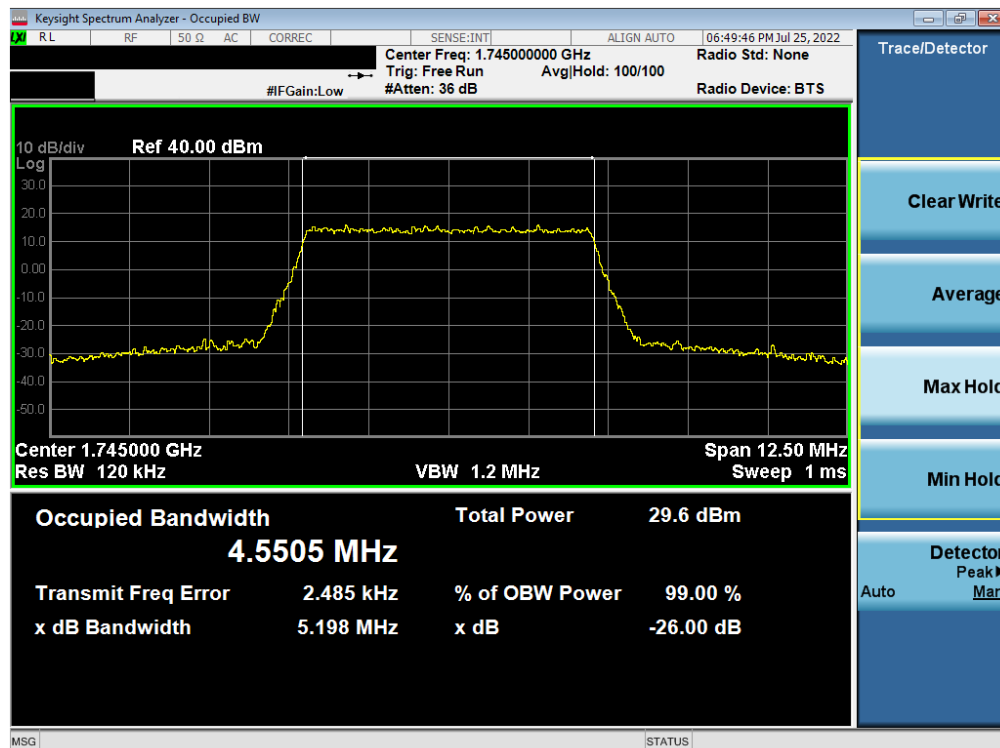


Plot 7-10. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz 16-QAM - Full RB)


FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 22 of 334

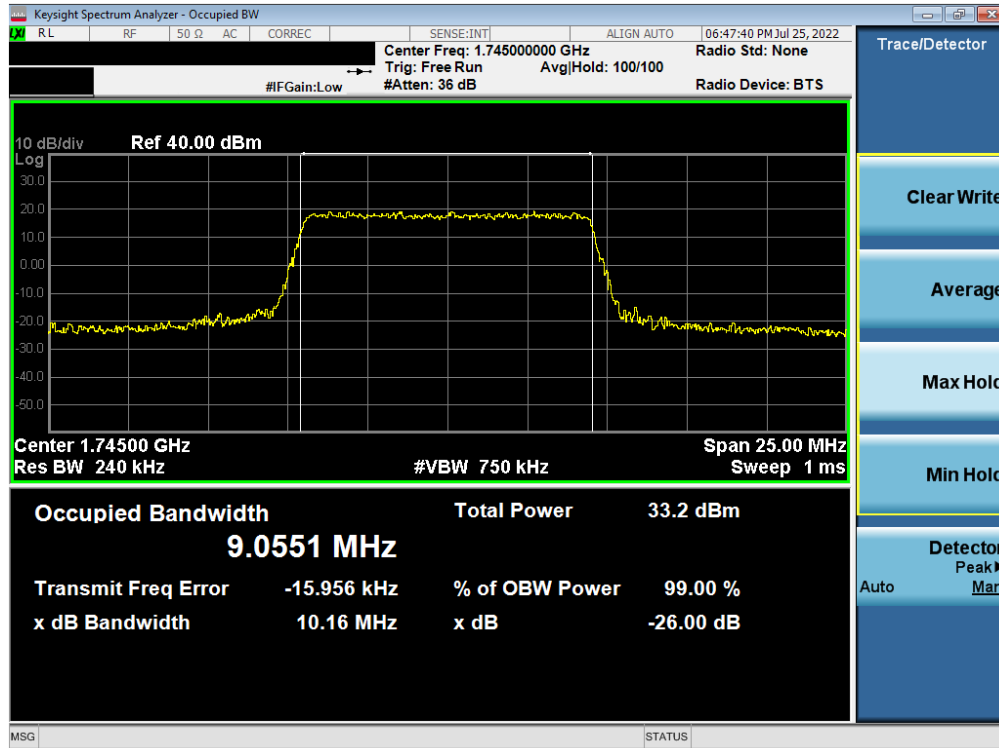


Plot 7-11. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz 64-QAM - Full RB)

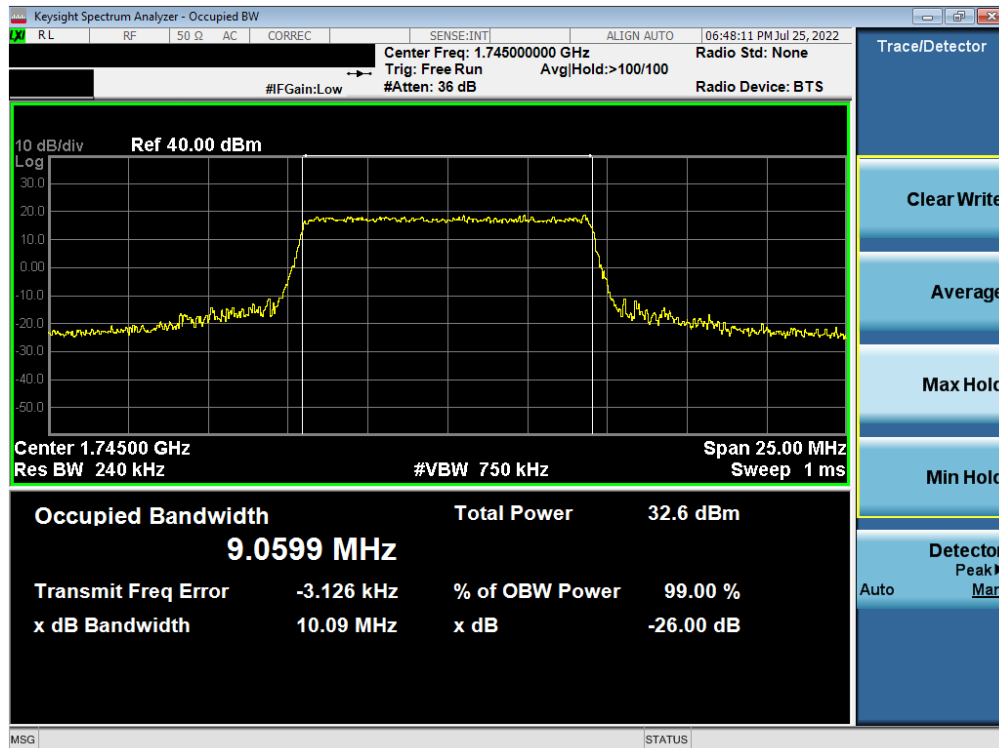


Plot 7-12. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz 256-QAM - Full RB)


FCC ID: BCGA2764		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 23 of 334

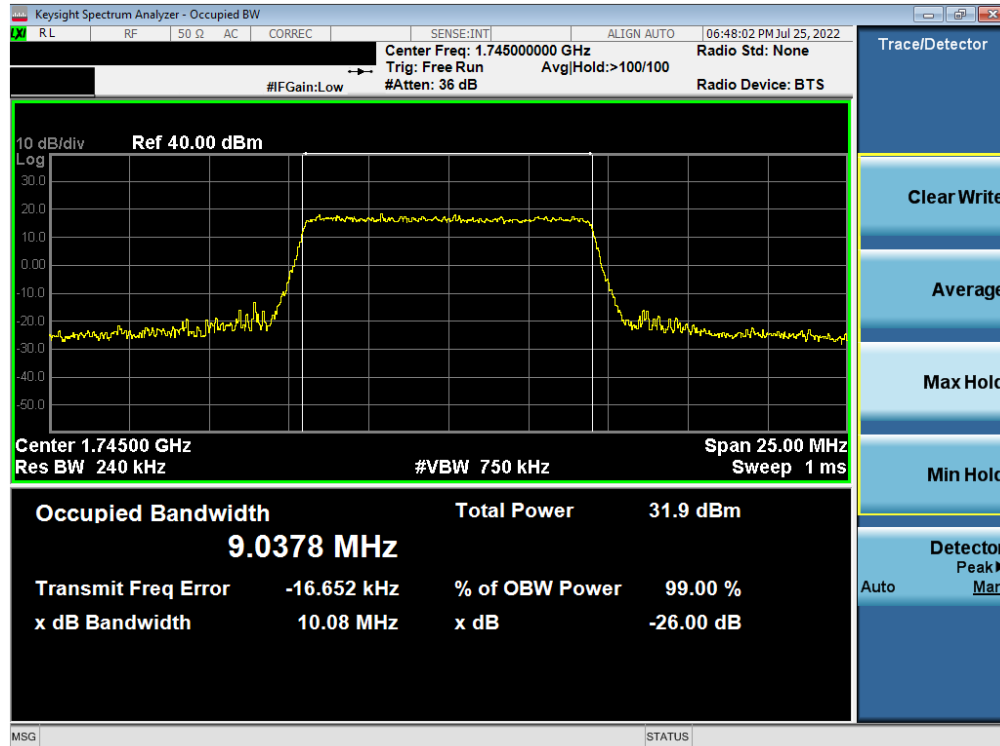


Plot 7-13. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz QPSK - Full RB)

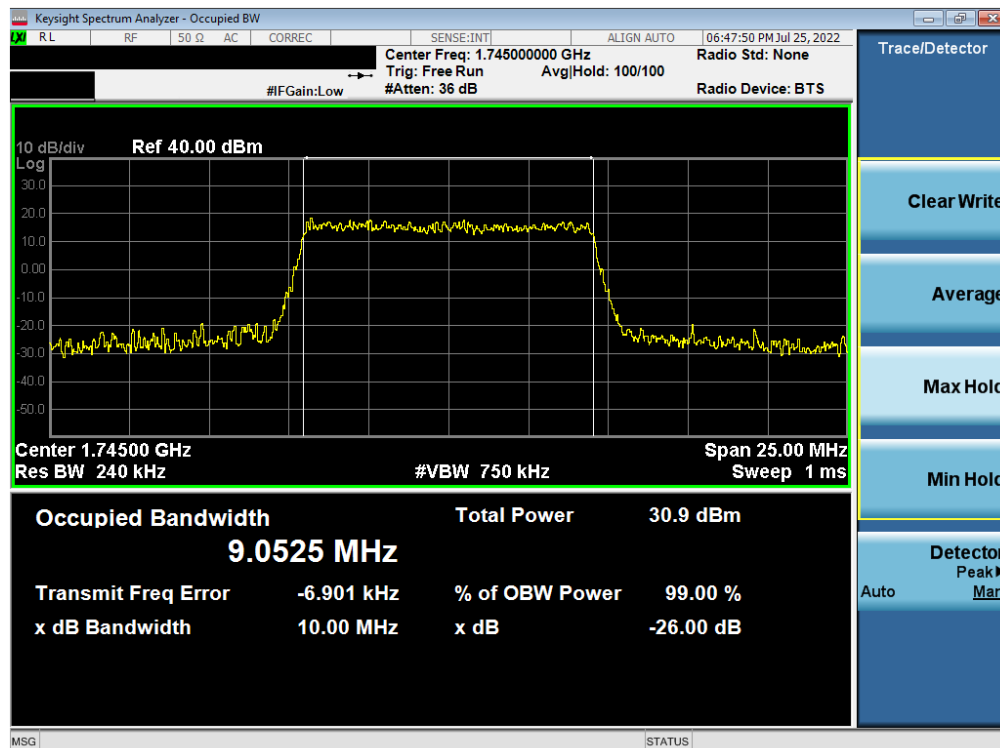


Plot 7-14. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz 16-QAM - Full RB)


FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 24 of 334



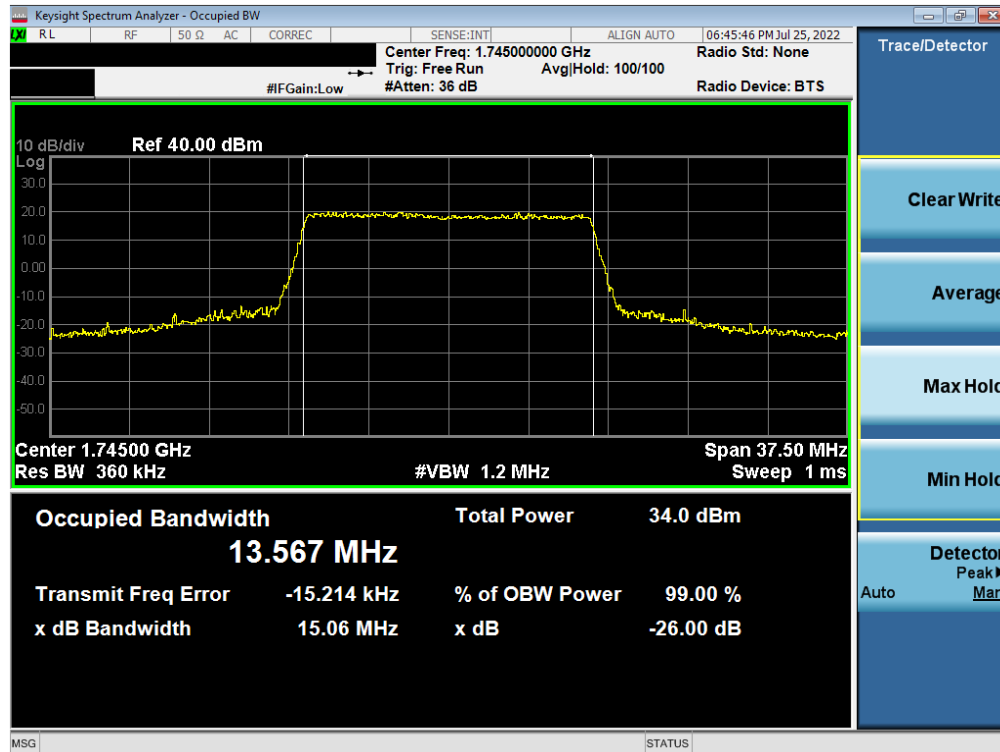
Plot 7-15. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz 64-QAM - Full RB)



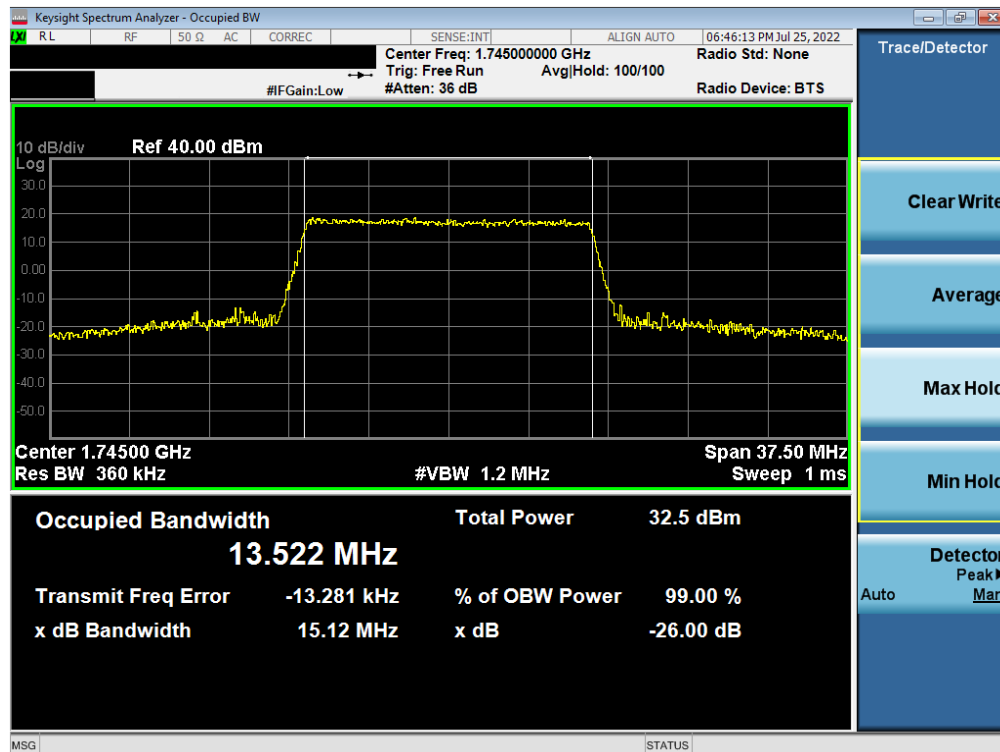
Plot 7-16. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz 256-QAM - Full RB)

FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 25 of 334



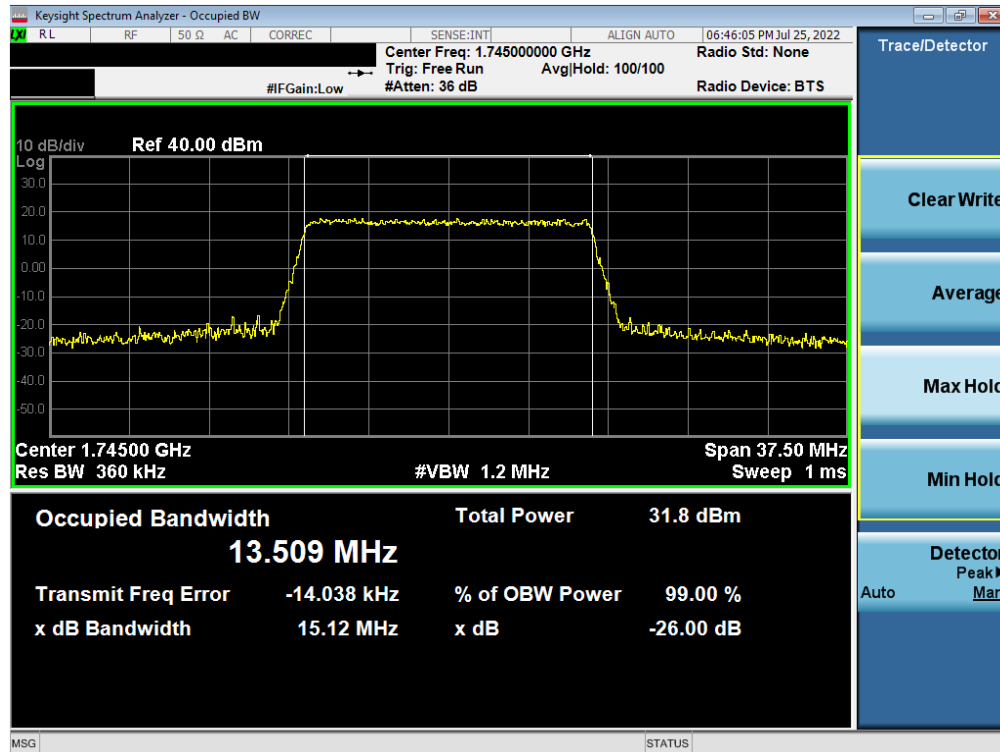


Plot 7-17. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz QPSK - Full RB)

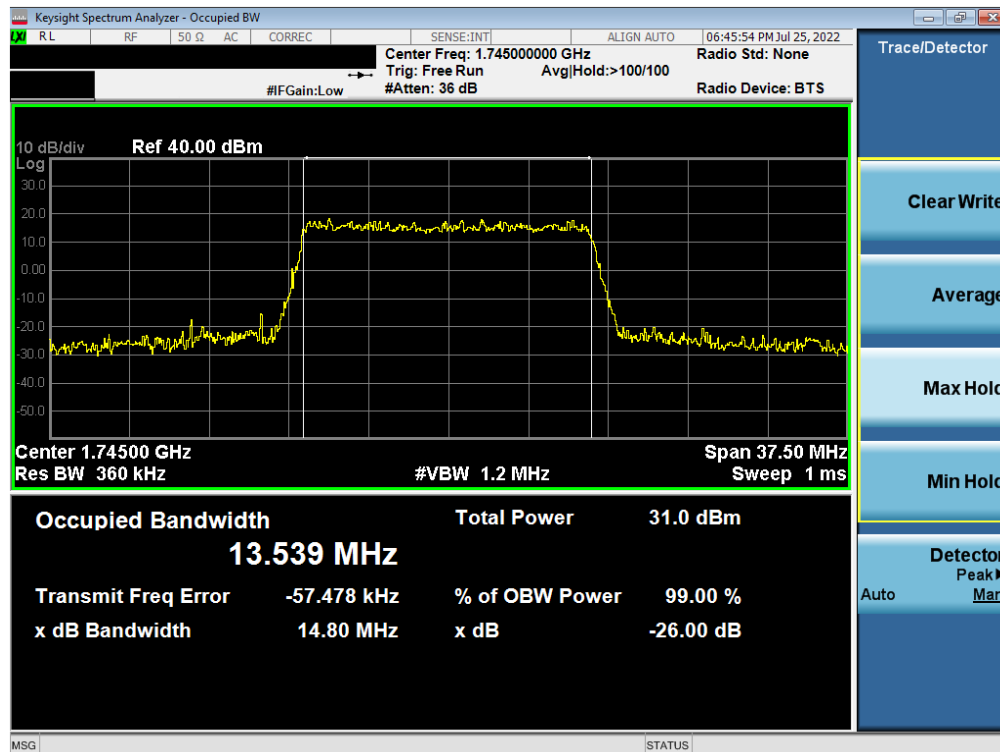


Plot 7-18. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz 16-QAM - Full RB)


FCC ID: BCGA2764	<p>element PART 27 MEASUREMENT REPORT</p>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 26 of 334

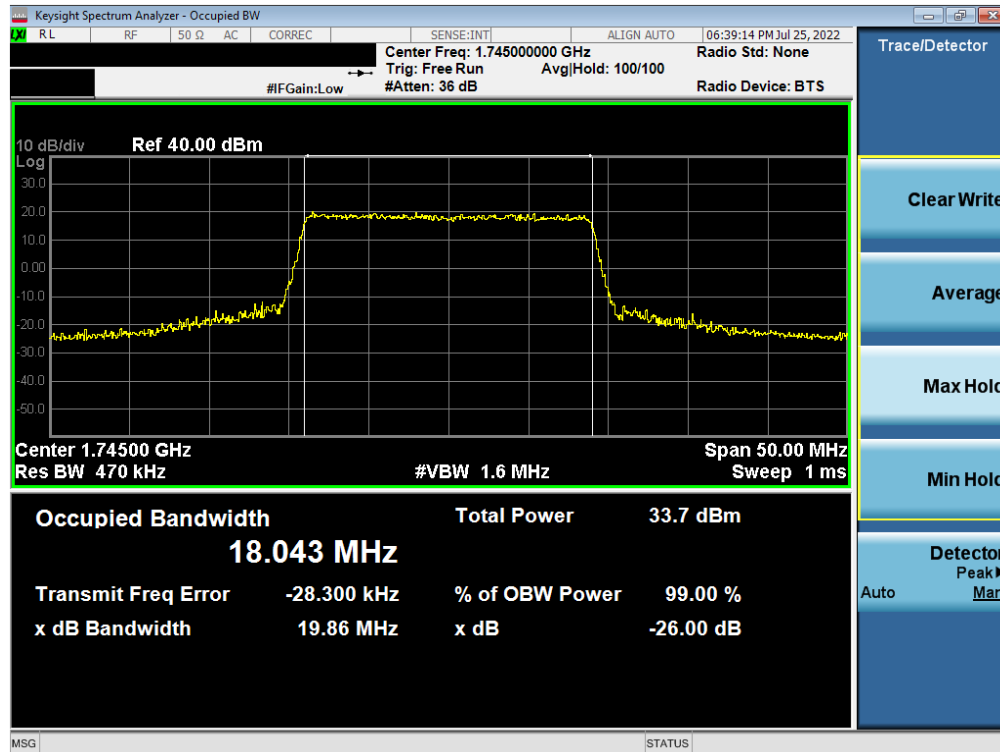


Plot 7-19. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz 64-QAM - Full RB)

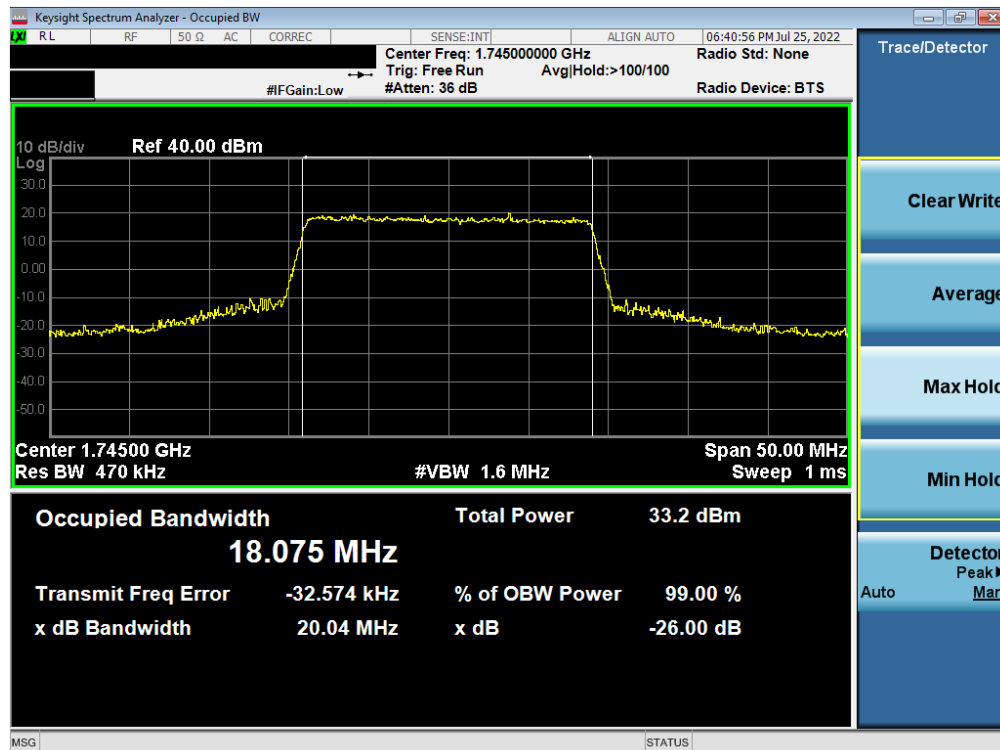


Plot 7-20. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz 256-QAM - Full RB)


FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 27 of 334

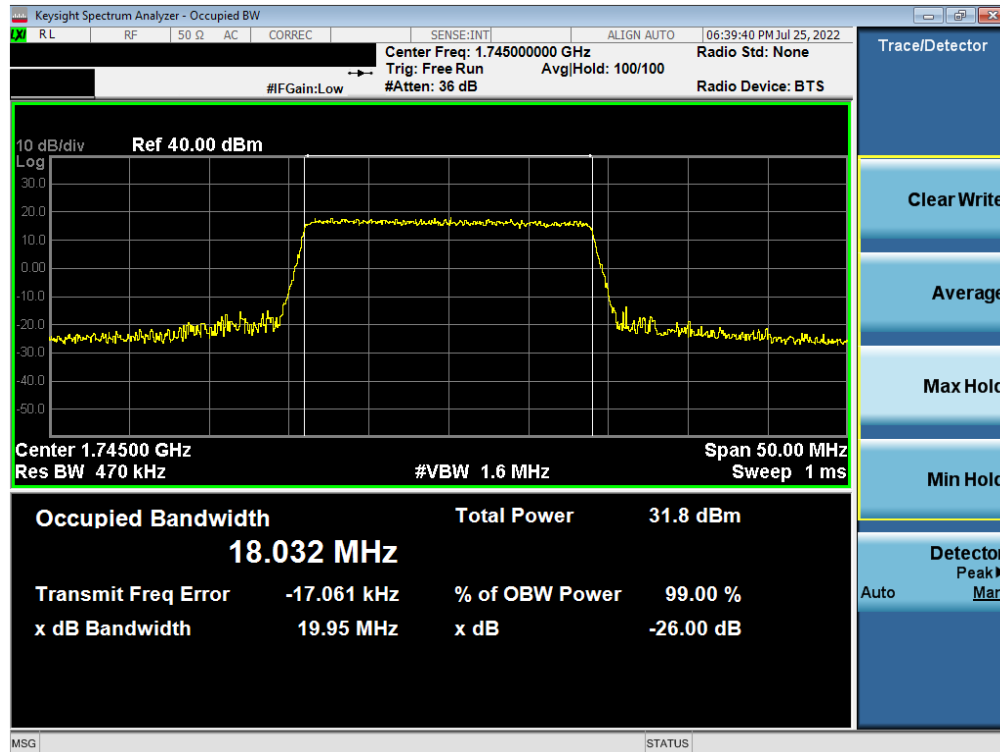


Plot 7-21. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz QPSK - Full RB)

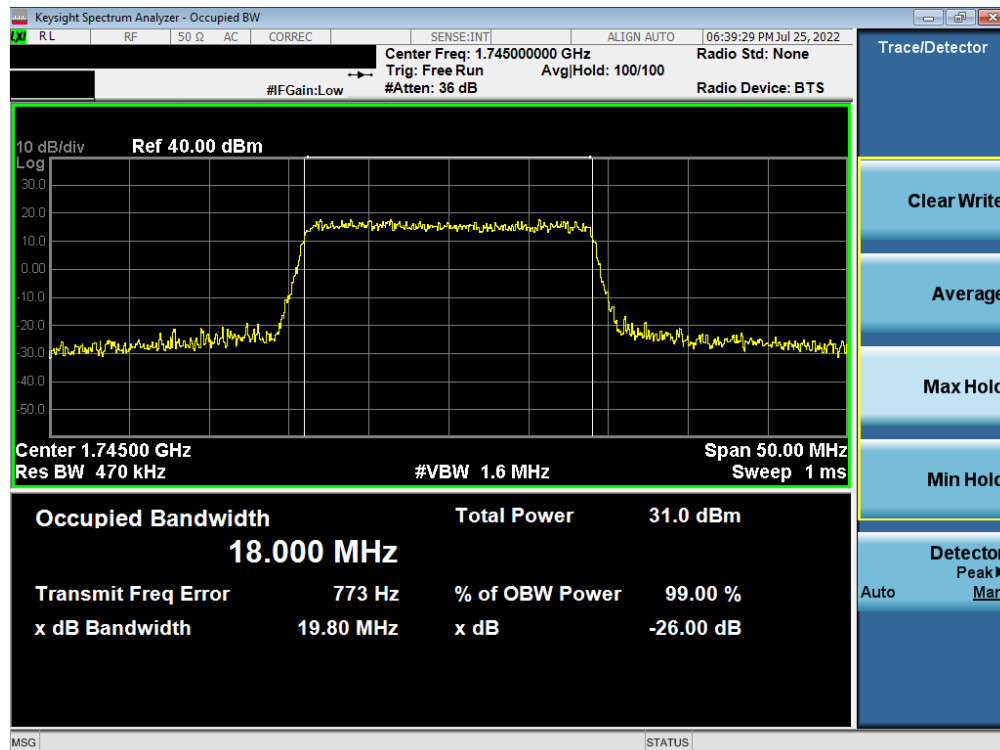


Plot 7-22. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz 16-QAM - Full RB)


FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 28 of 334



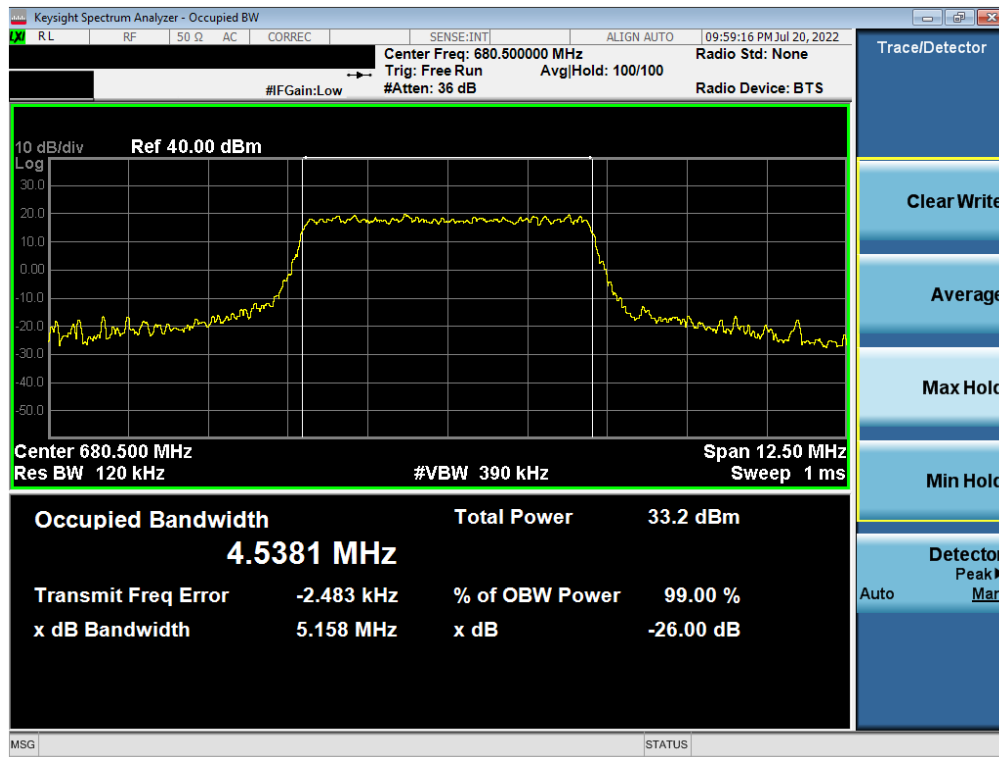
Plot 7-23. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz 64-QAM - Full RB)



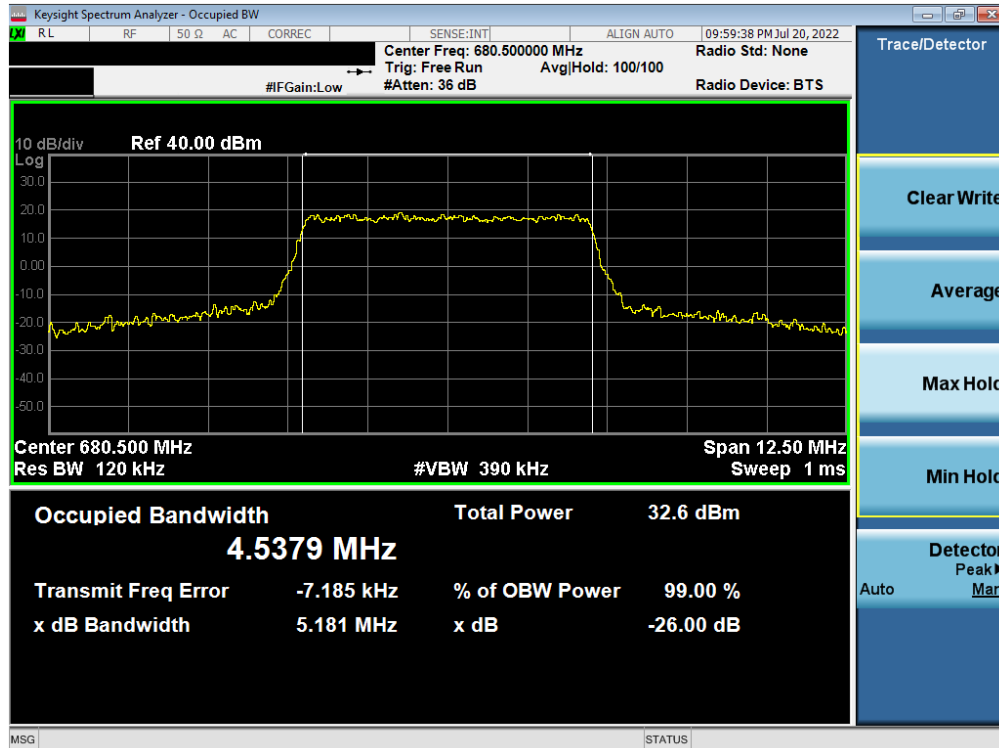
Plot 7-24. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz 256-QAM - Full RB)

FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 29 of 334

## LTE Band 71

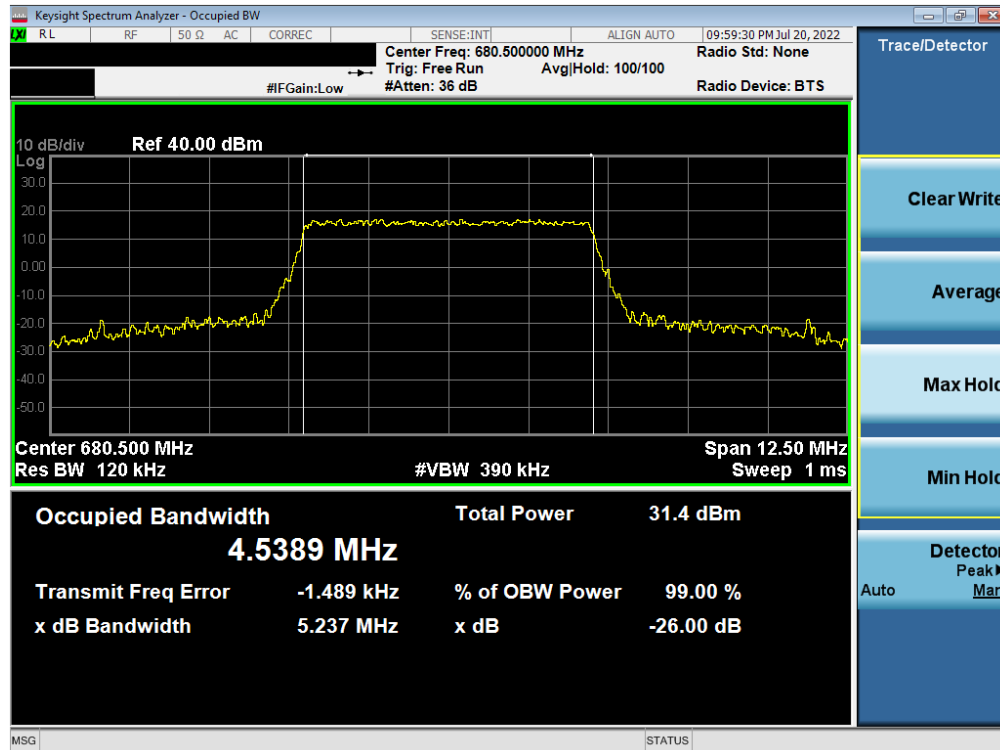


Plot 7-25. Occupied Bandwidth Plot (LTE Band 71 - 5MHz QPSK - Full RB)

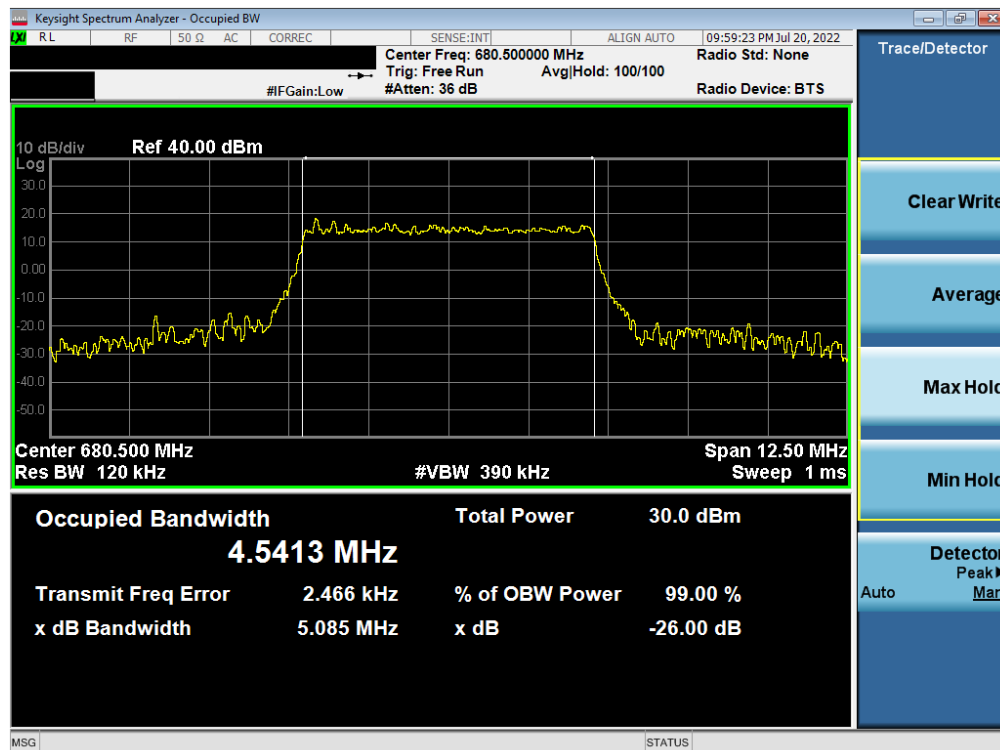


Plot 7-26. Occupied Bandwidth Plot (LTE Band 71 - 5MHz 16-QAM - Full RB)


FCC ID: BCGA2764	PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device
		Page 30 of 334

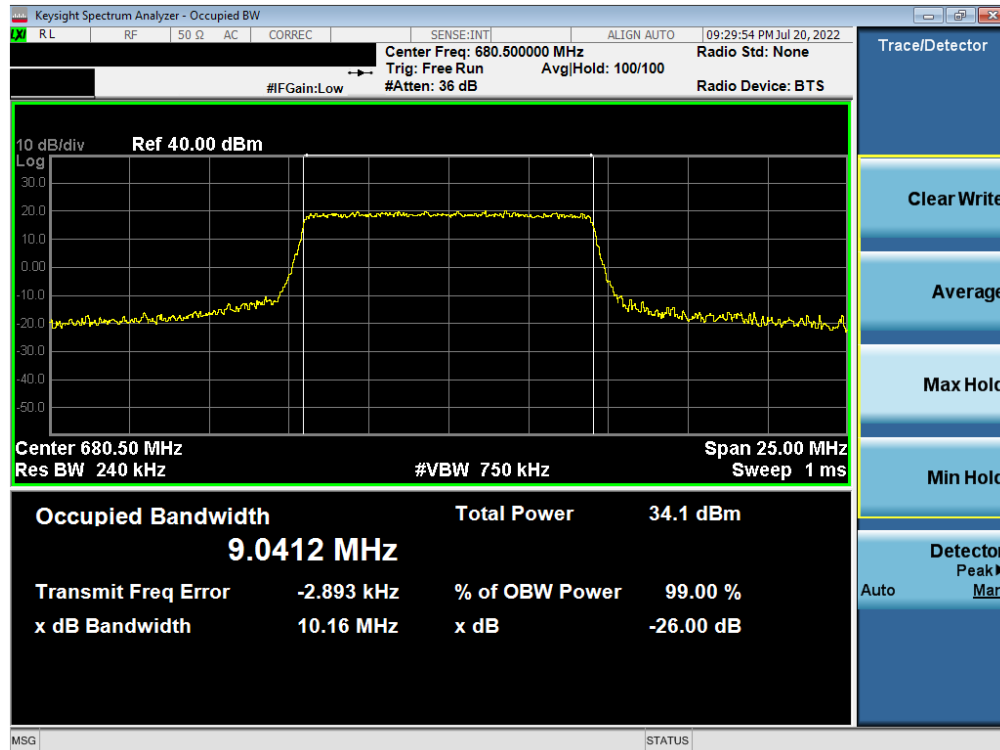


Plot 7-27. Occupied Bandwidth Plot (LTE Band 71 - 5MHz 64-QAM - Full RB)

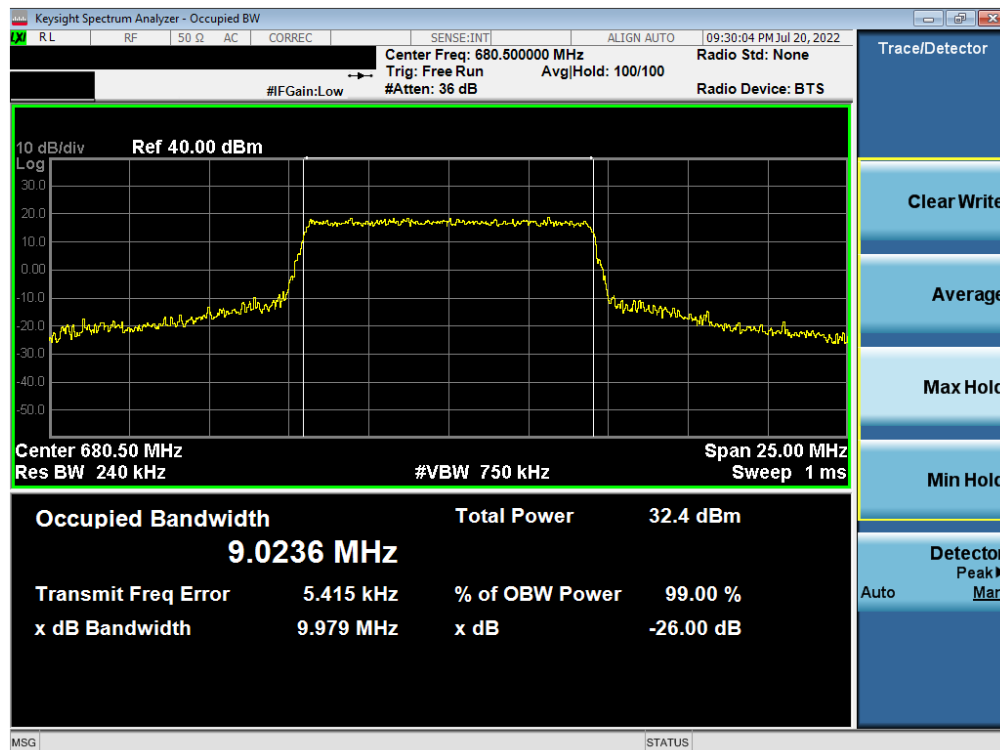


Plot 7-28. Occupied Bandwidth Plot (LTE Band 71 - 5MHz 256-QAM - Full RB)

FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 31 of 334

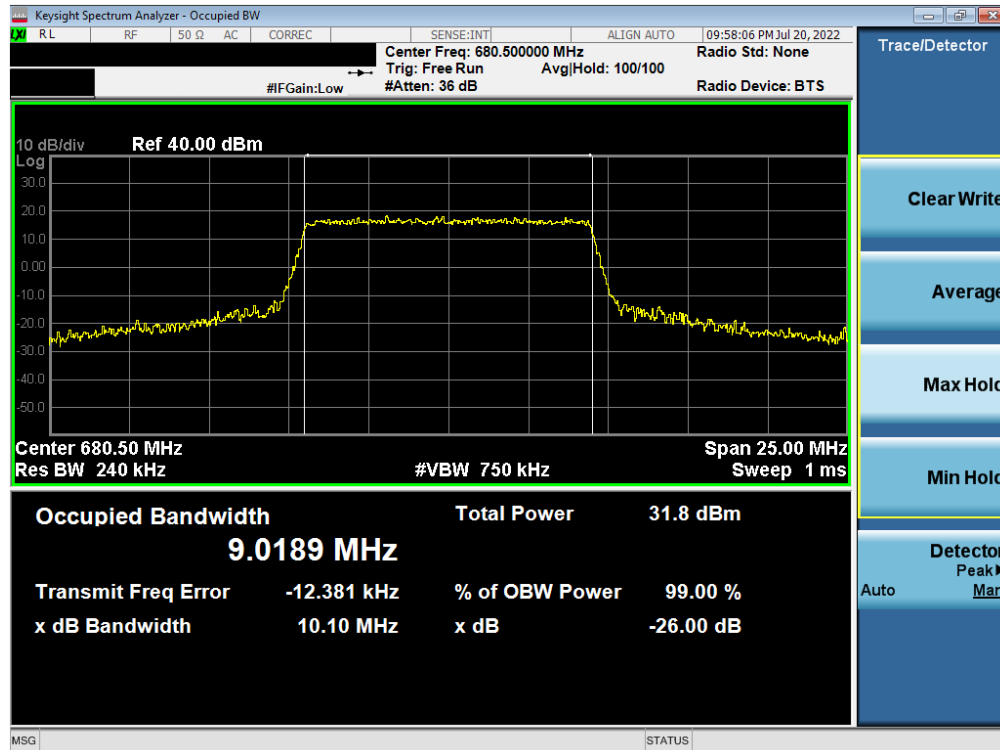


Plot 7-29. Occupied Bandwidth Plot (LTE Band 71 - 10MHz QPSK - Full RB)

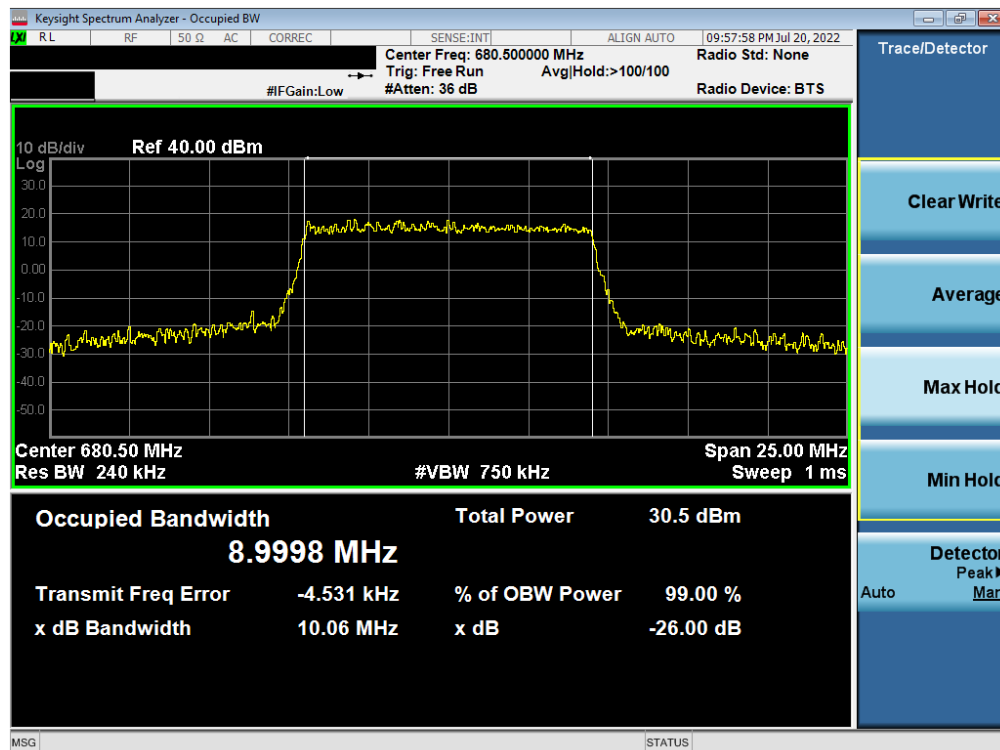


Plot 7-30. Occupied Bandwidth Plot (LTE Band 71 - 10MHz 16-QAM - Full RB)

FCC ID: BCGA2764	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 32 of 334



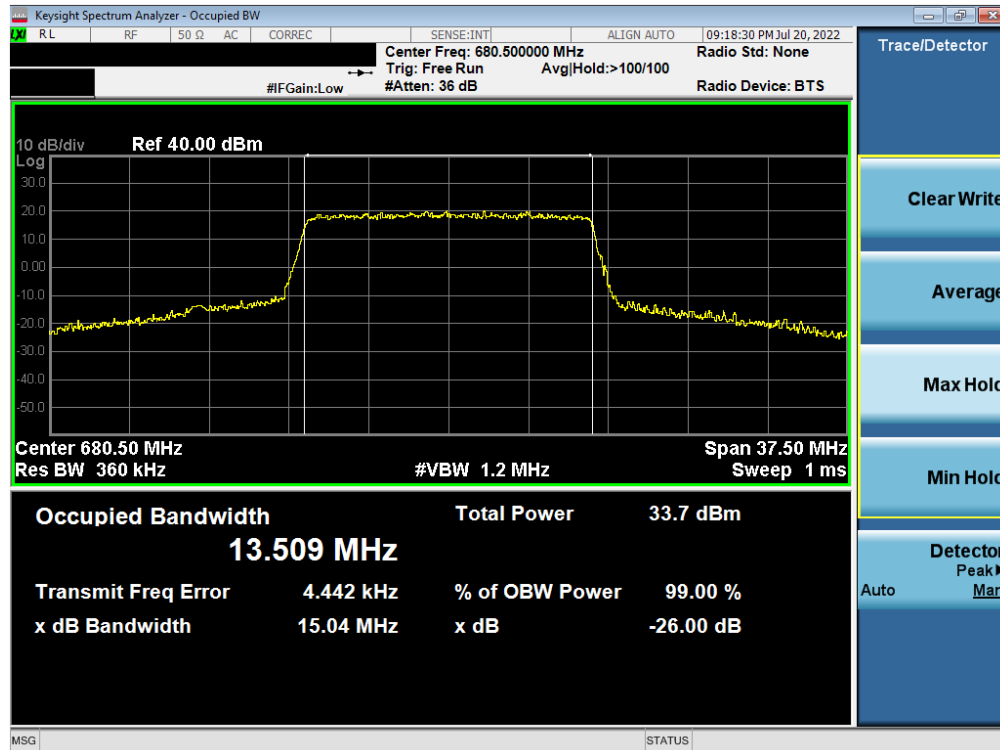
Plot 7-31. Occupied Bandwidth Plot (LTE Band 71 - 10MHz 64-QAM - Full RB)



Plot 7-32. Occupied Bandwidth Plot (LTE Band 71 - 10MHz 256-QAM - Full RB)

FCC ID: BCGA2764	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 33 of 334




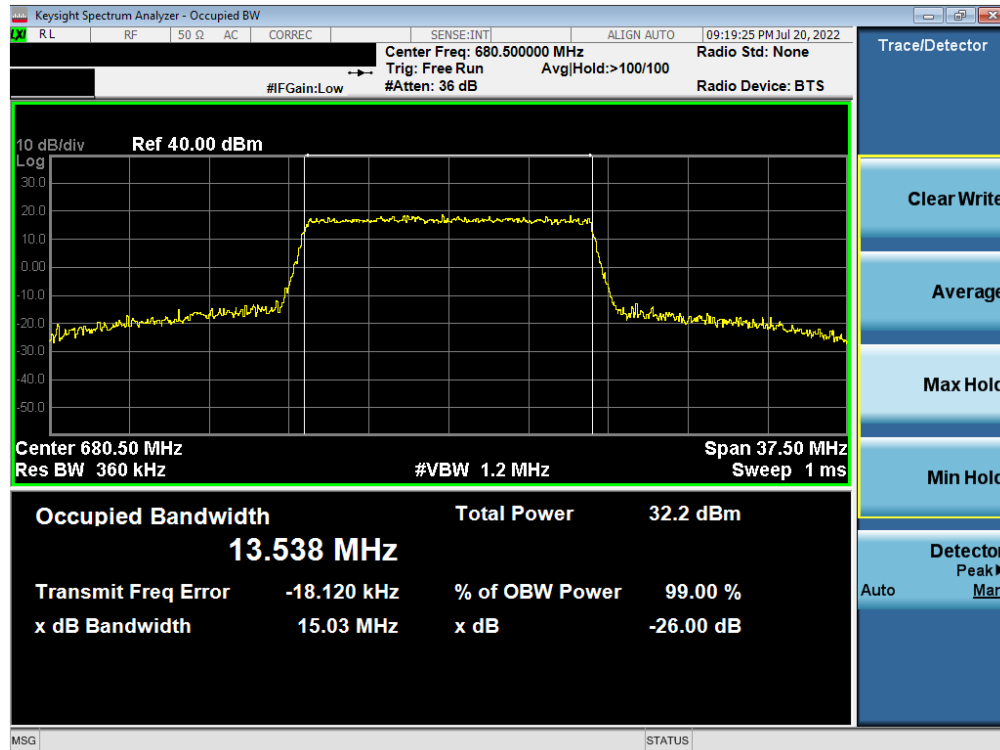


Plot 7-33. Occupied Bandwidth Plot (LTE Band 71 - 15MHz QPSK - Full RB)

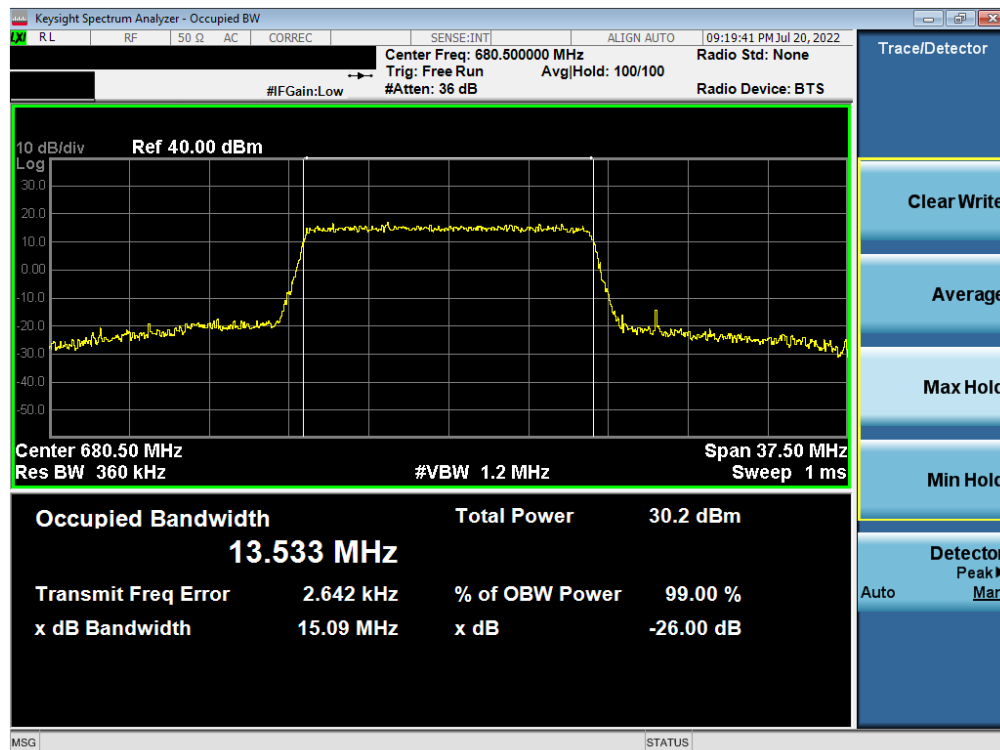


Plot 7-34. Occupied Bandwidth Plot (LTE Band 71 - 15MHz 16-QAM - Full RB)

FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 34 of 334

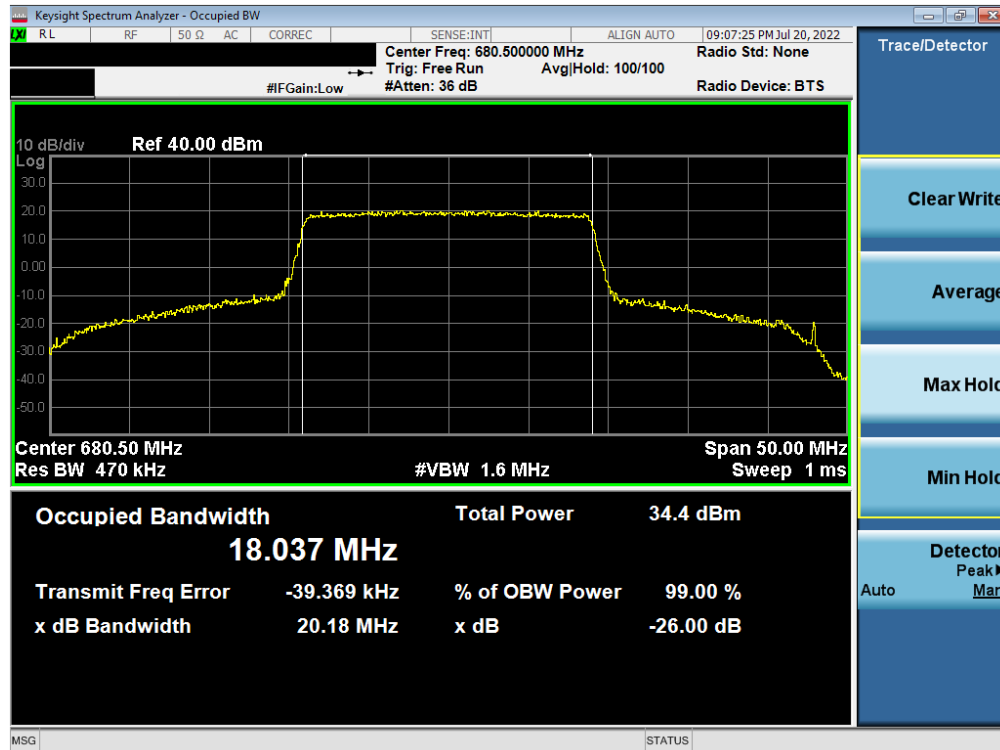


Plot 7-35. Occupied Bandwidth Plot (LTE Band 71 - 15MHz 64-QAM - Full RB)



Plot 7-36. Occupied Bandwidth Plot (LTE Band 71 - 15MHz 256-QAM - Full RB)

FCC ID: BCGA2764	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 35 of 334



Plot 7-37. Occupied Bandwidth Plot (LTE Band 71 - 20MHz QPSK - Full RB)

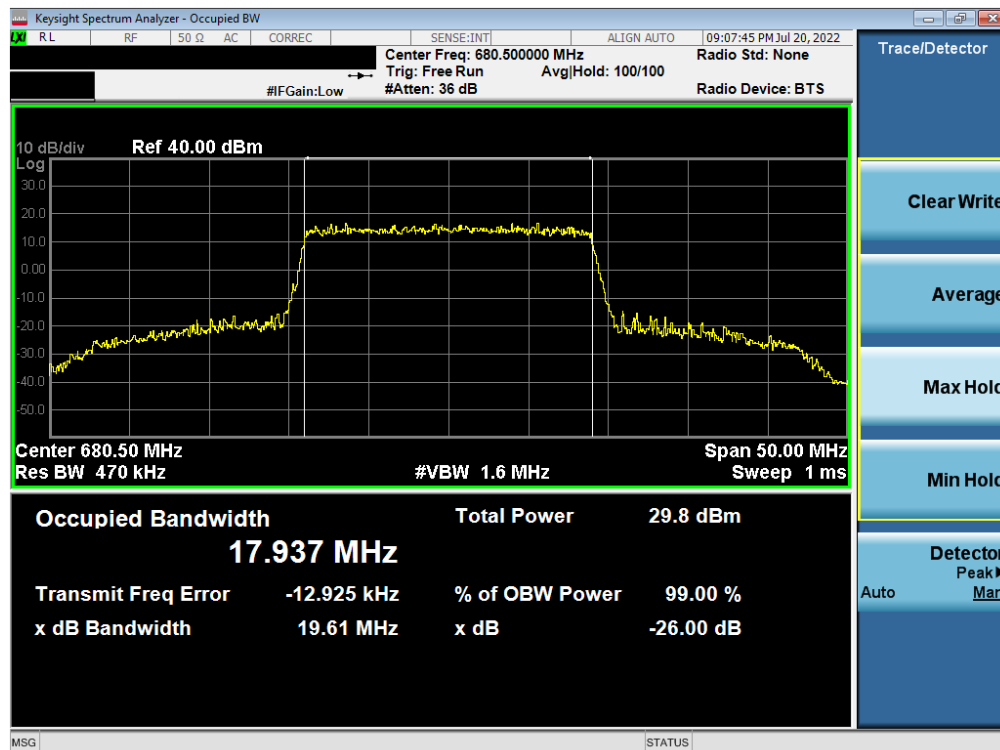


Plot 7-38. Occupied Bandwidth Plot (LTE Band 71 - 20MHz 16-QAM - Full RB)


FCC ID: BCGA2764	element	PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 36 of 334



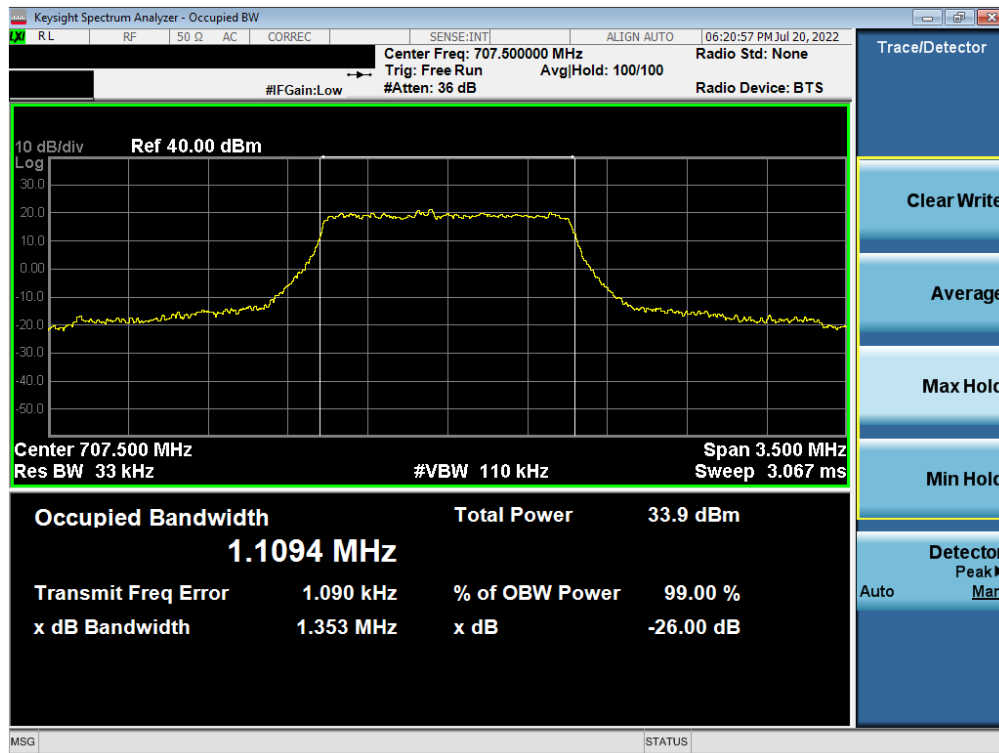
Plot 7-39. Occupied Bandwidth Plot (LTE Band 71 - 20MHz 64-QAM - Full RB)



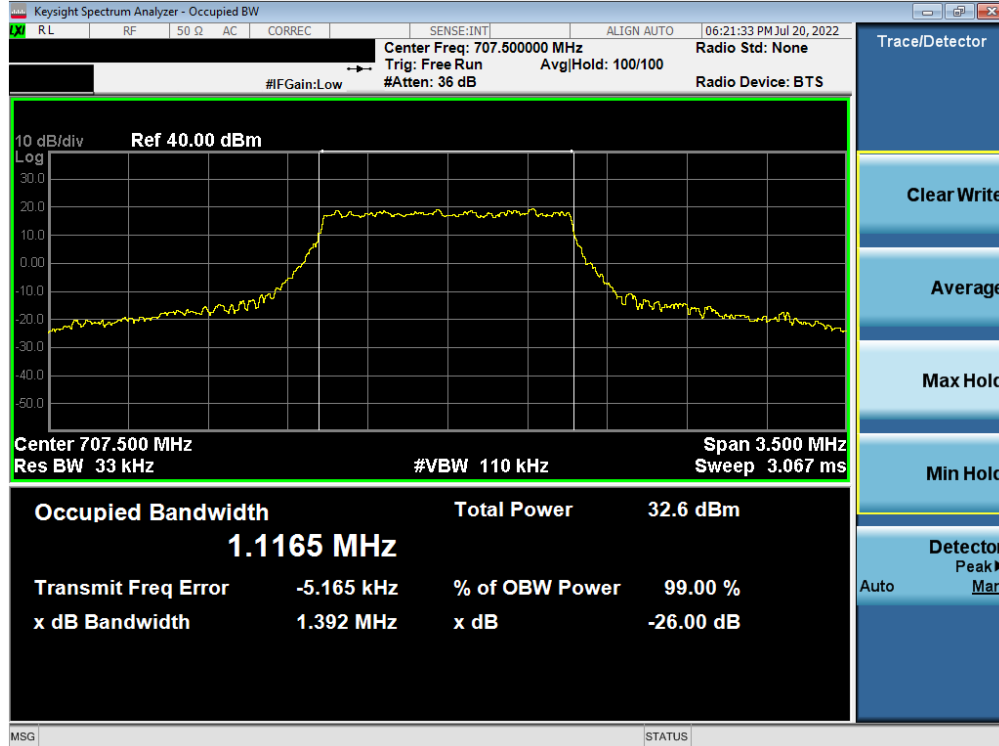
Plot 7-40. Occupied Bandwidth Plot (LTE Band 71 - 20MHz 256-QAM - Full RB)

FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 37 of 334


## LTE Band 12/17

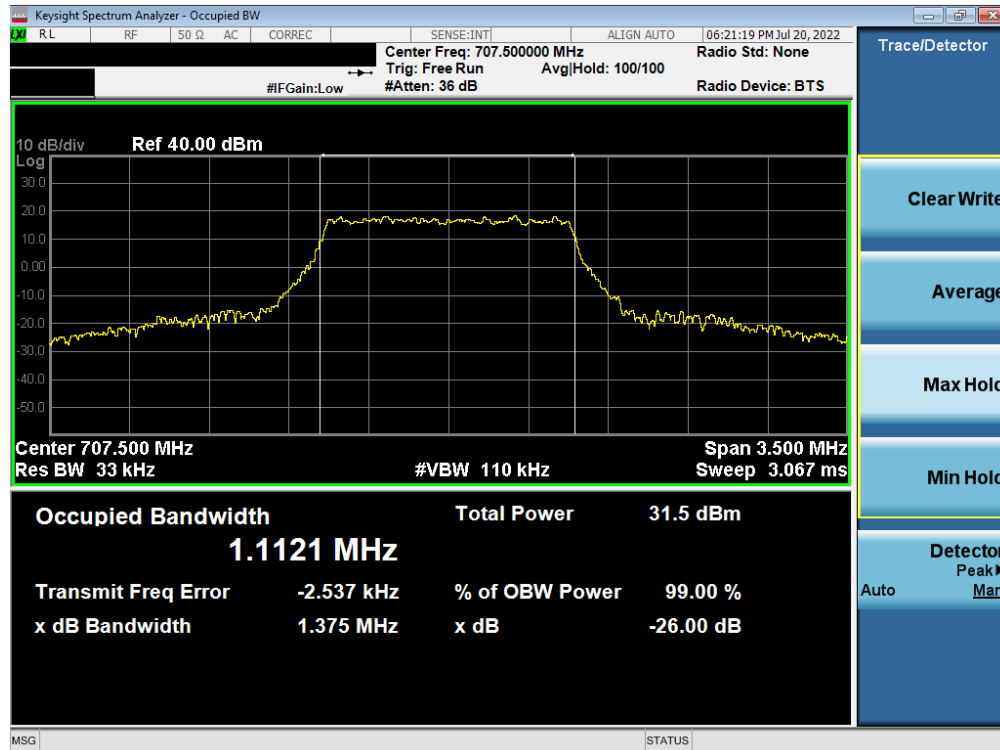


Plot 7-41. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz QPSK - Full RB)

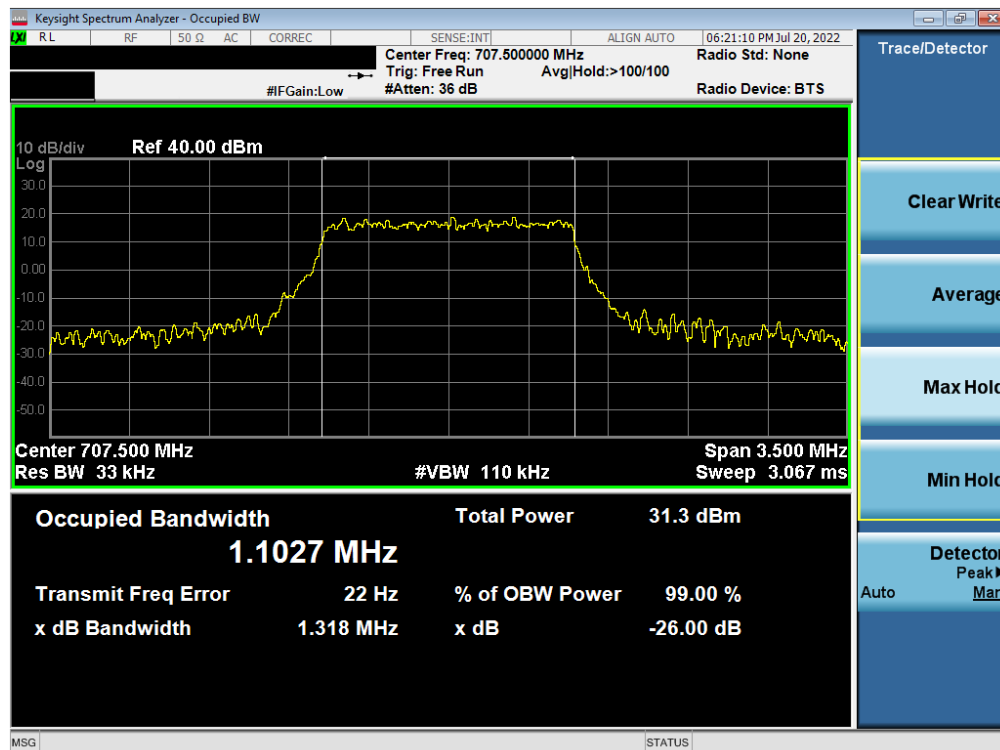


Plot 7-42. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz 16-QAM - Full RB)


FCC ID: BCGA2764		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 38 of 334

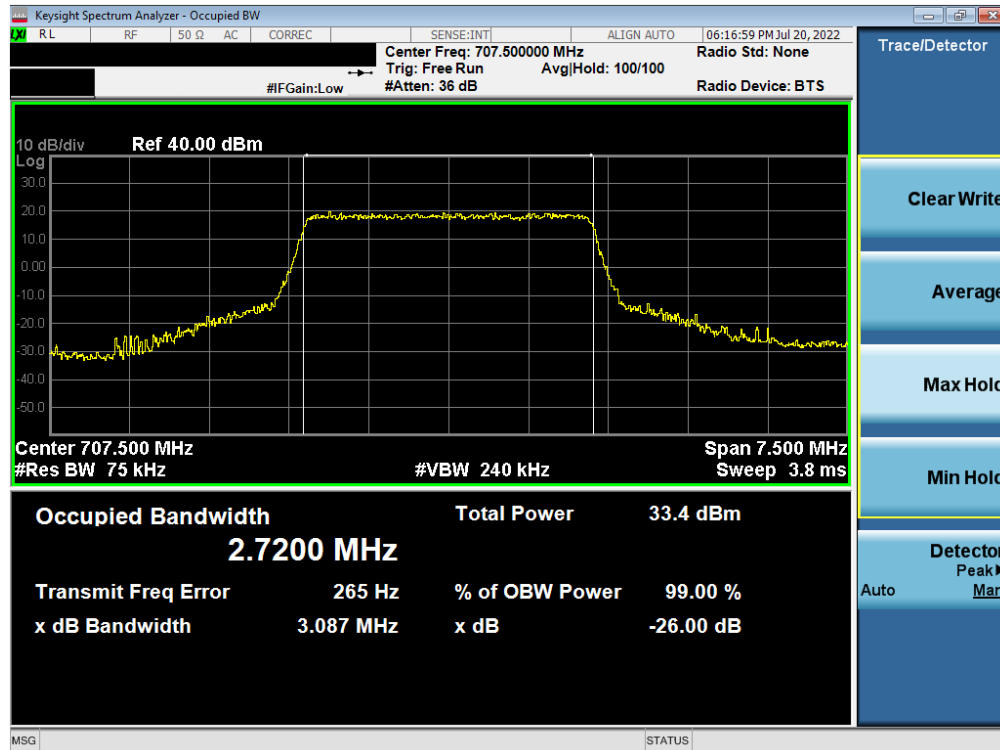


Plot 7-43. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz 64-QAM - Full RB)

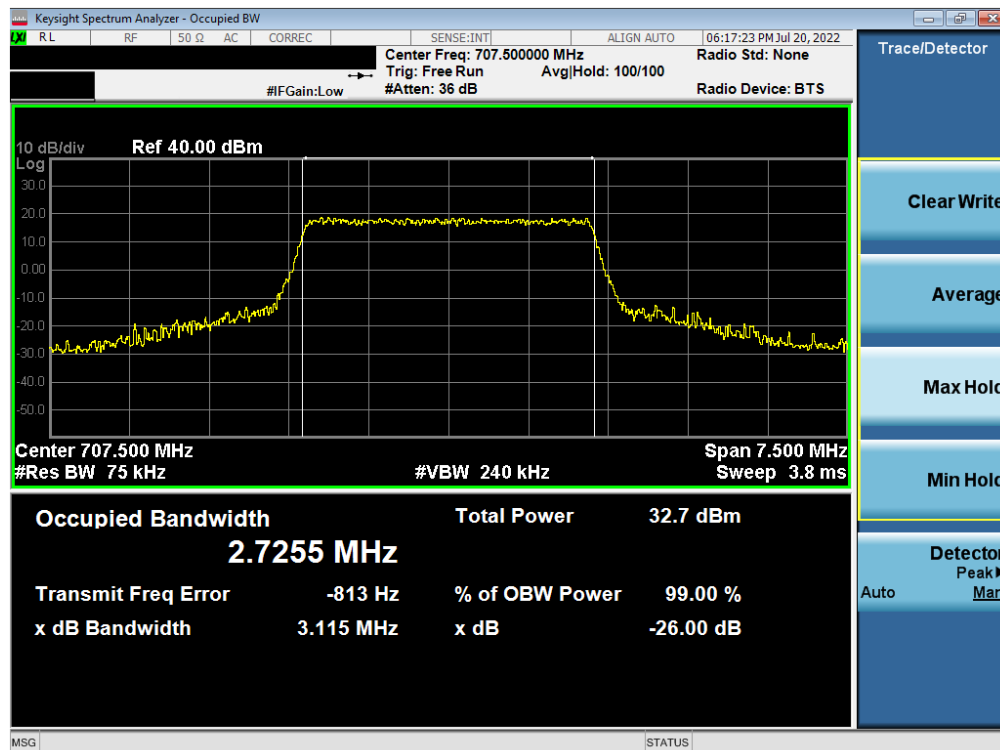


Plot 7-44. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz 256-QAM - Full RB)

FCC ID: BCGA2764		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 39 of 334

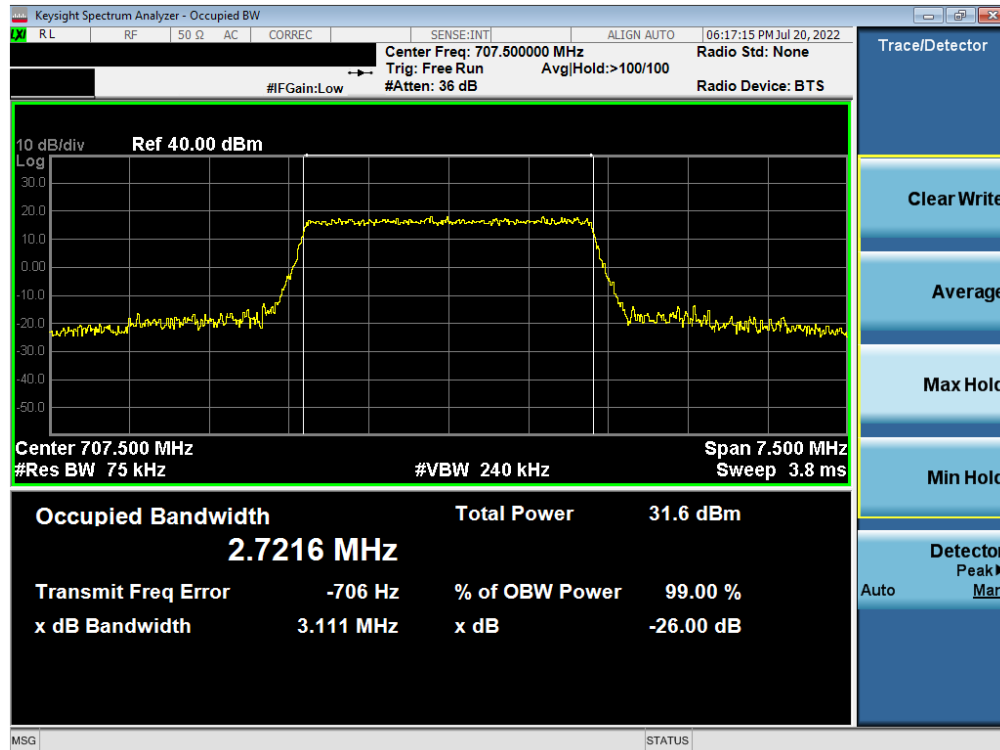


Plot 7-45. Occupied Bandwidth Plot (LTE Band 12 - 3MHz QPSK - Full RB)

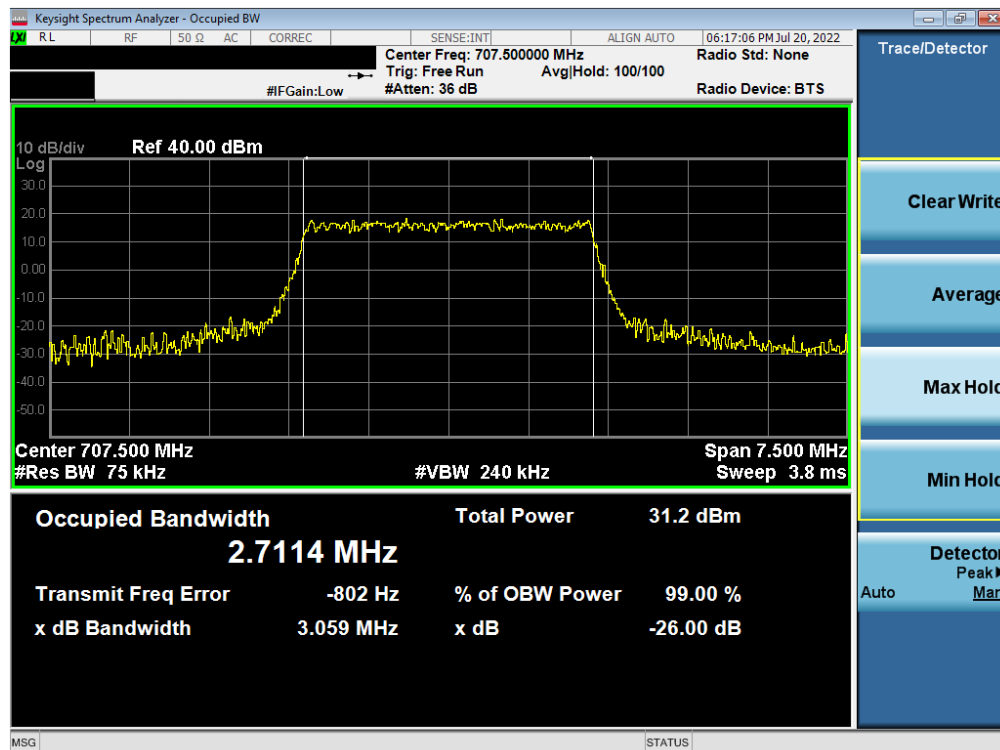


Plot 7-46. Occupied Bandwidth Plot (LTE Band 12 - 3MHz 16-QAM - Full RB)


FCC ID: BCGA2764	element	PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 40 of 334



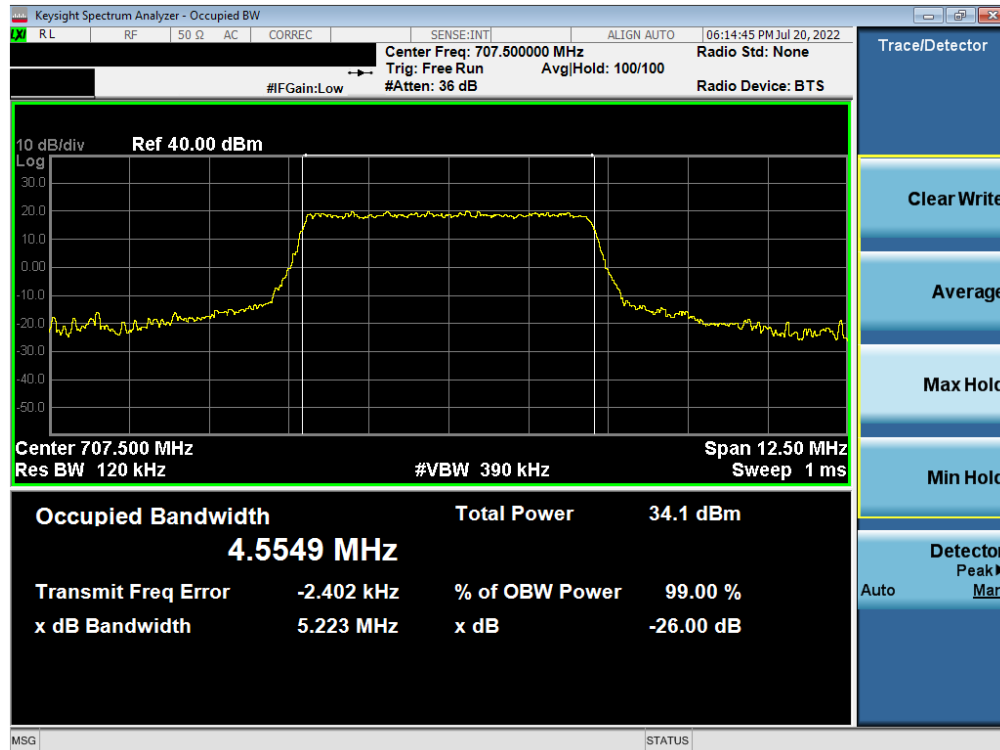
Plot 7-47. Occupied Bandwidth Plot (LTE Band 12 - 3MHz 64-QAM - Full RB)



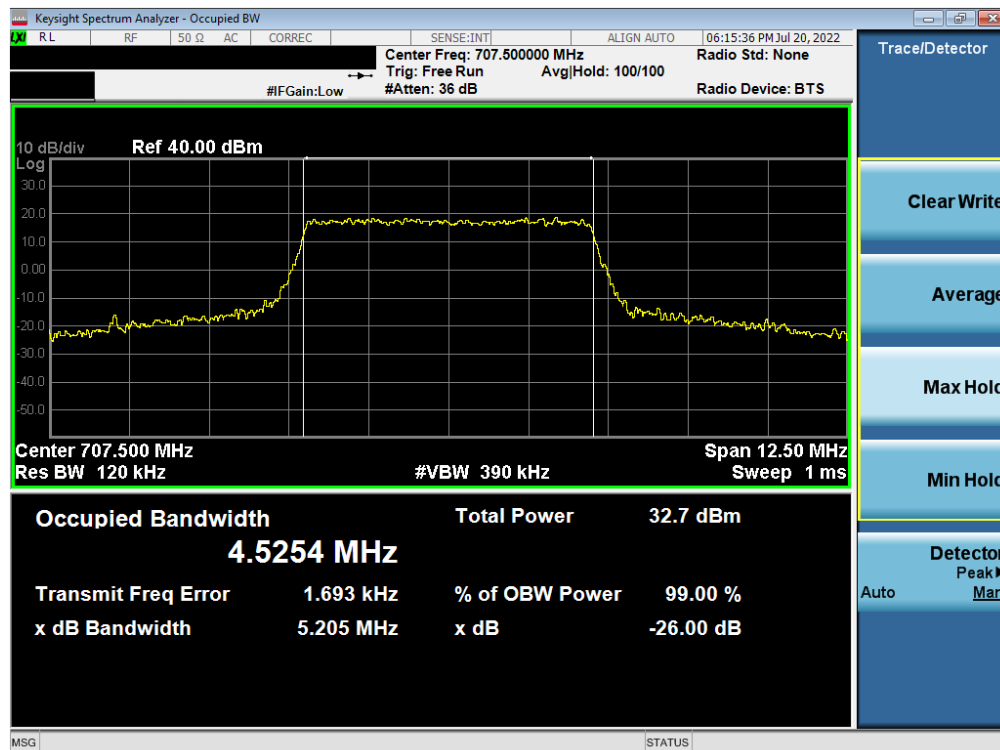
Plot 7-48. Occupied Bandwidth Plot (LTE Band 12 - 3MHz 256-QAM - Full RB)

FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 41 of 334




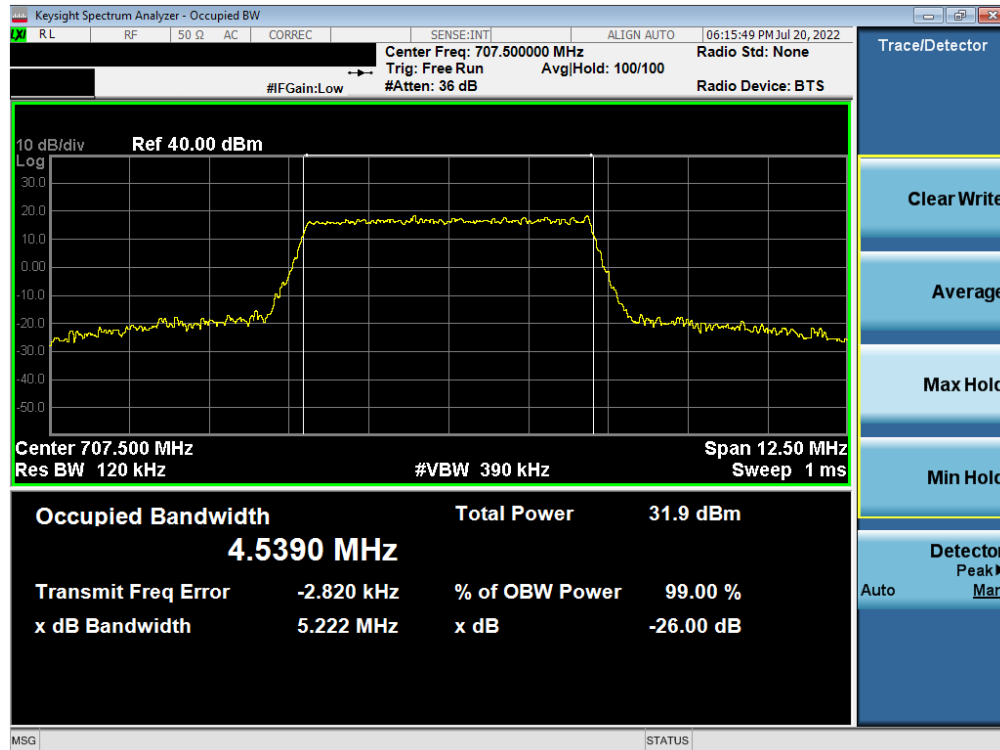


Plot 7-49. Occupied Bandwidth Plot (LTE Band 12/17 - 5MHz QPSK - Full RB)

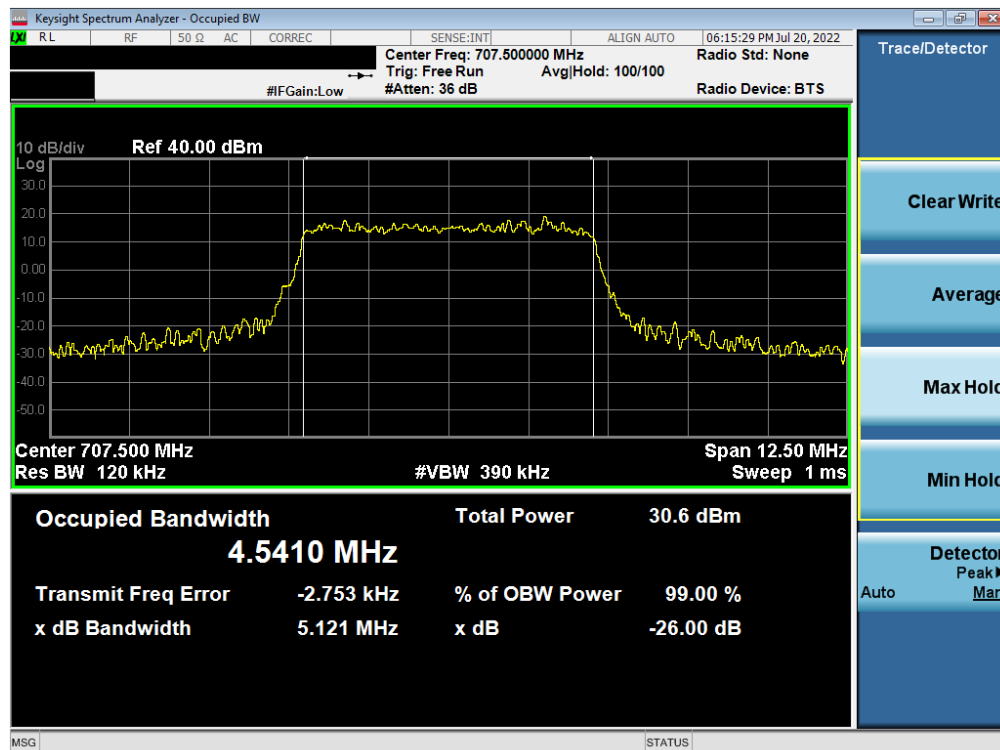


Plot 7-50. Occupied Bandwidth Plot (LTE Band 12/17 - 5MHz 16-QAM - Full RB)


FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 42 of 334

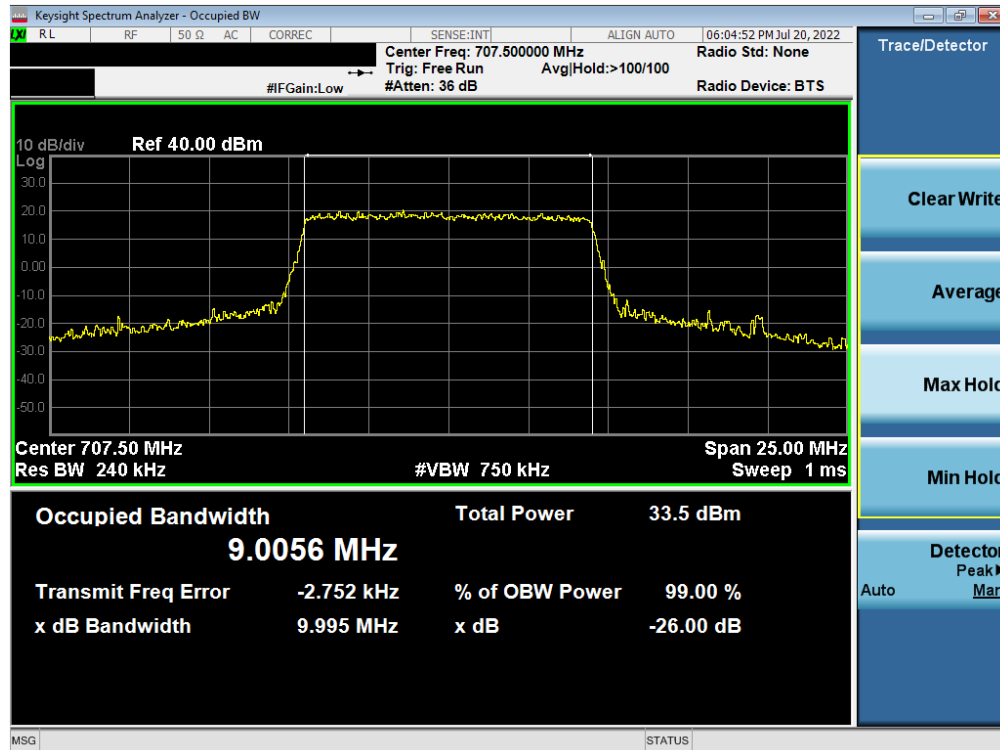


Plot 7-51. Occupied Bandwidth Plot (LTE Band 12/17 - 5MHz 64-QAM - Full RB)



Plot 7-52. Occupied Bandwidth Plot (LTE Band 12/17 - 5MHz 256-QAM - Full RB)

FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 43 of 334

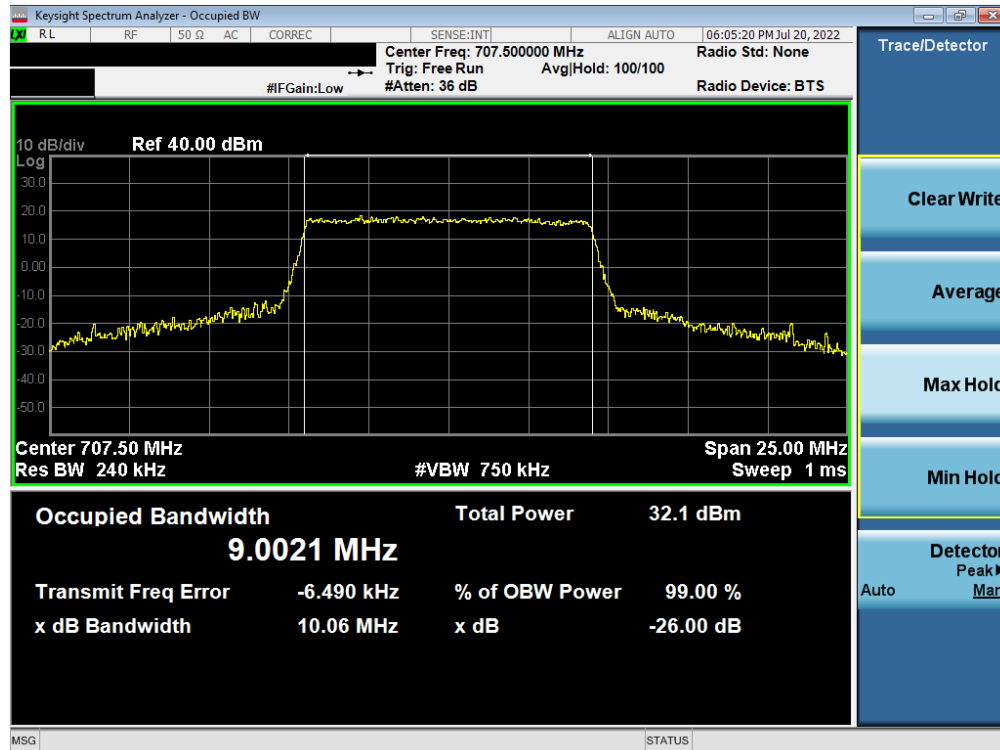


Plot 7-53. Occupied Bandwidth Plot (LTE Band 12/17 - 10MHz QPSK - Full RB)

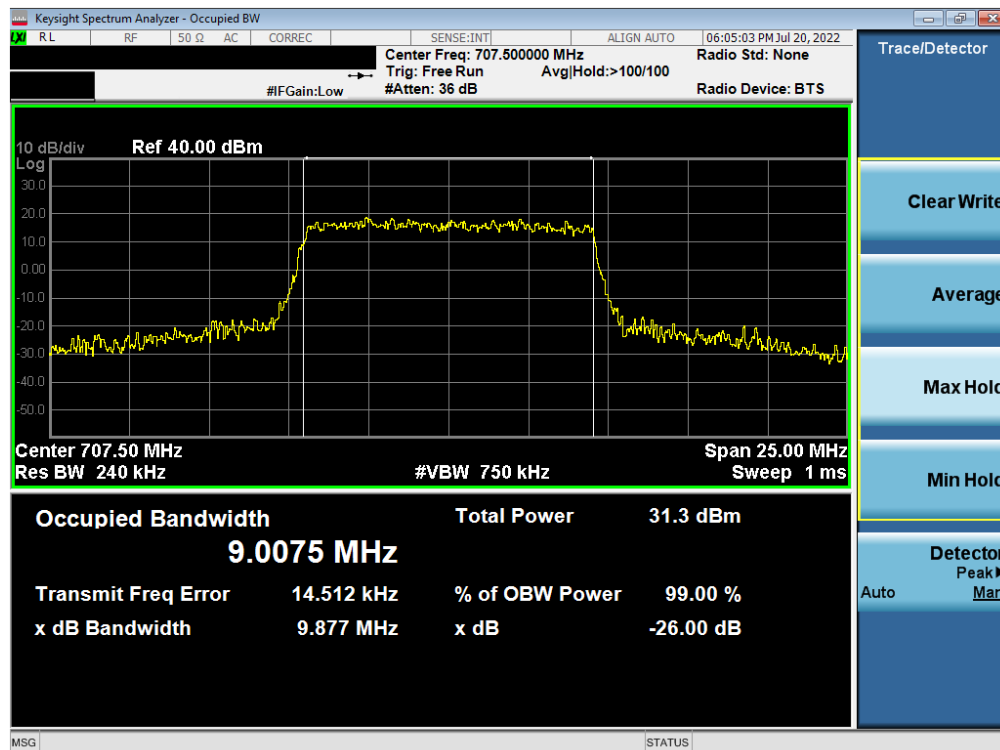


Plot 7-54. Occupied Bandwidth Plot (LTE Band 12/17 - 10MHz 16-QAM - Full RB)

FCC ID: BCGA2764	element	PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 44 of 334



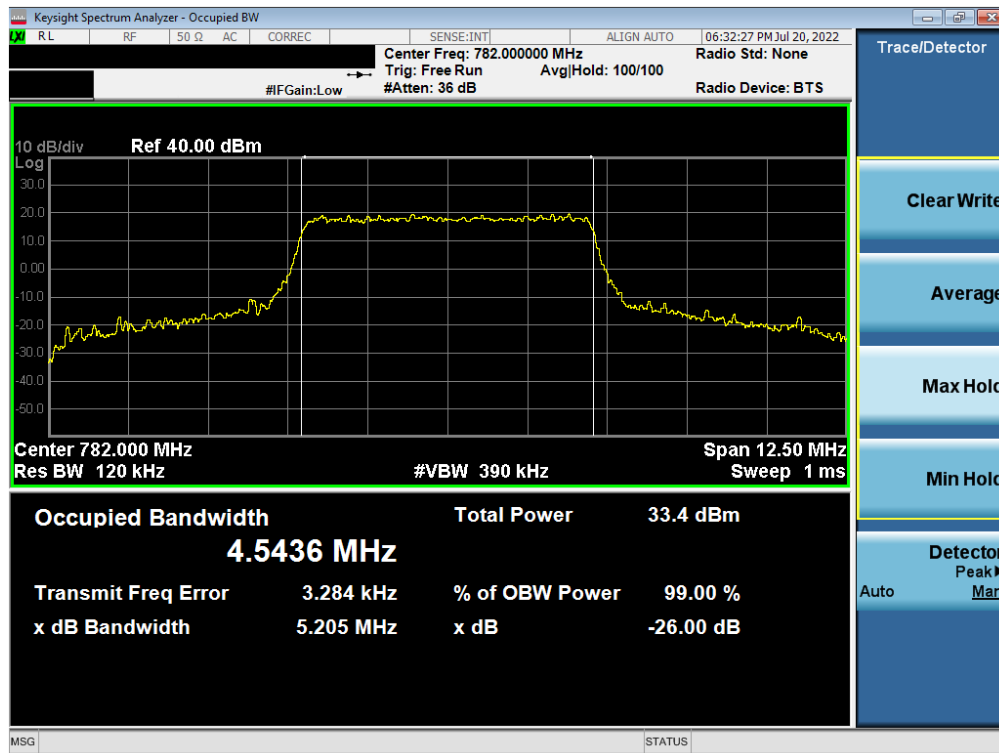
Plot 7-55. Occupied Bandwidth Plot (LTE Band 12/17 - 10MHz 64-QAM - Full RB)



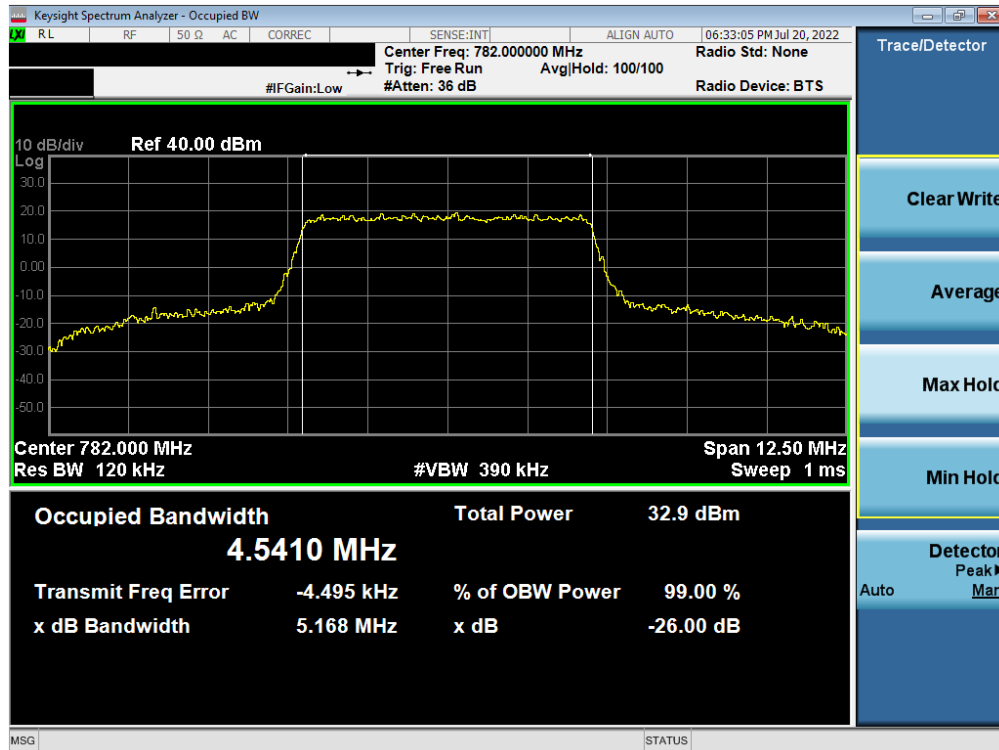
Plot 7-56. Occupied Bandwidth Plot (LTE Band 12/17 - 10MHz 256-QAM - Full RB)

FCC ID: BCGA2764	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 45 of 334


## LTE Band 13

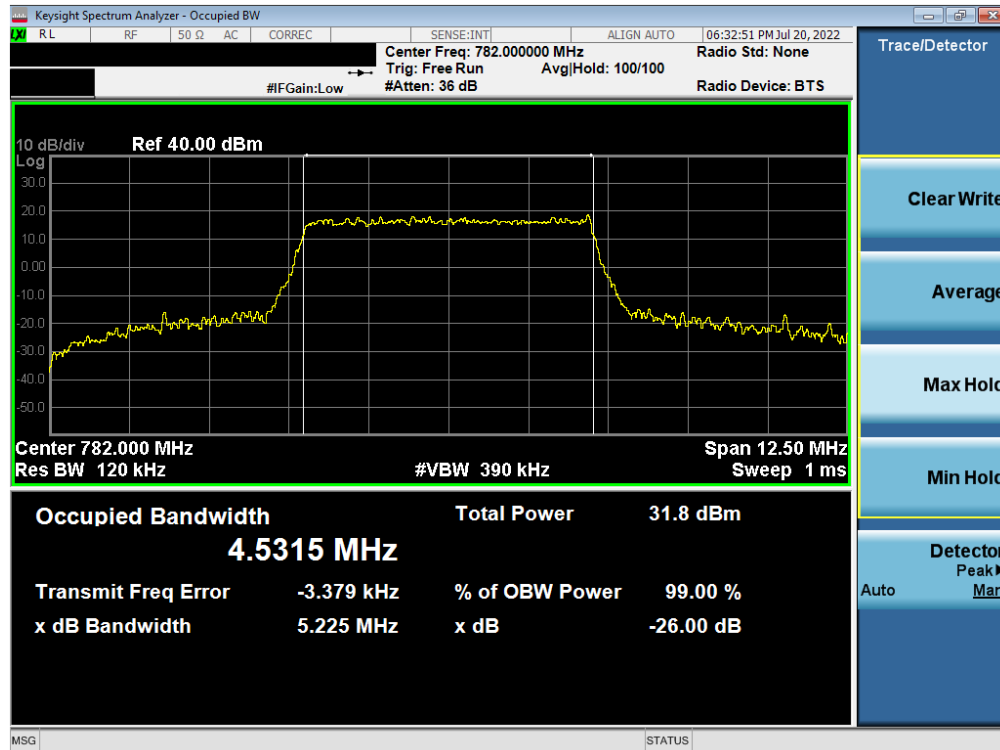


Plot 7-57. Occupied Bandwidth Plot (LTE Band 13 - 5MHz QPSK - Full RB)

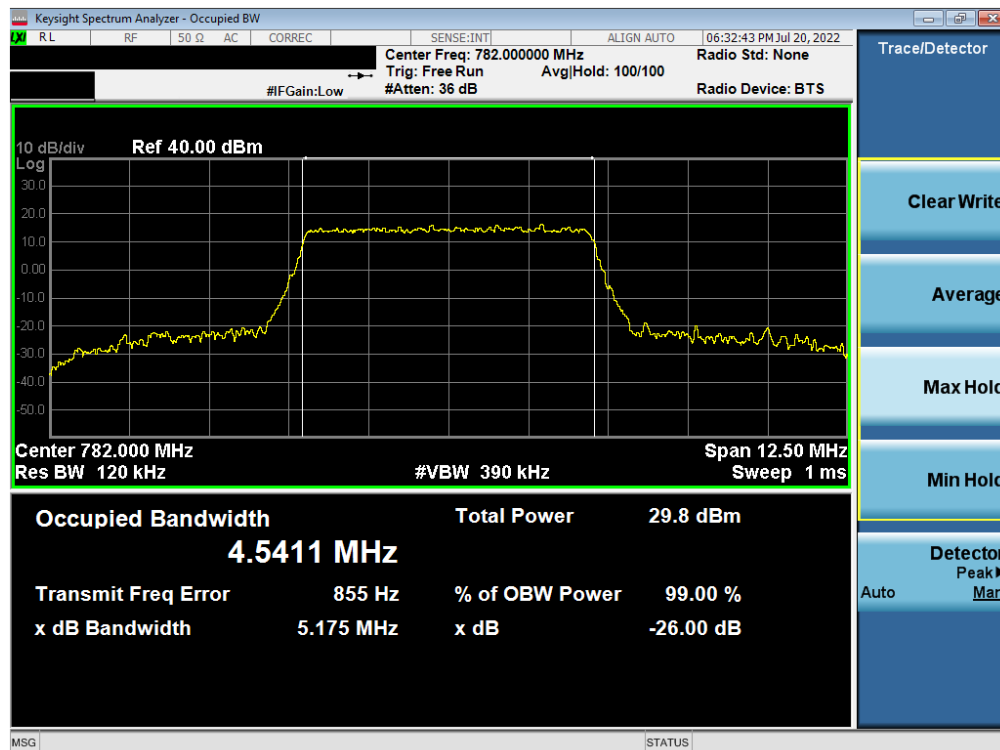


Plot 7-58. Occupied Bandwidth Plot (LTE Band 13 - 5MHz 16-QAM - Full RB)


FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 46 of 334

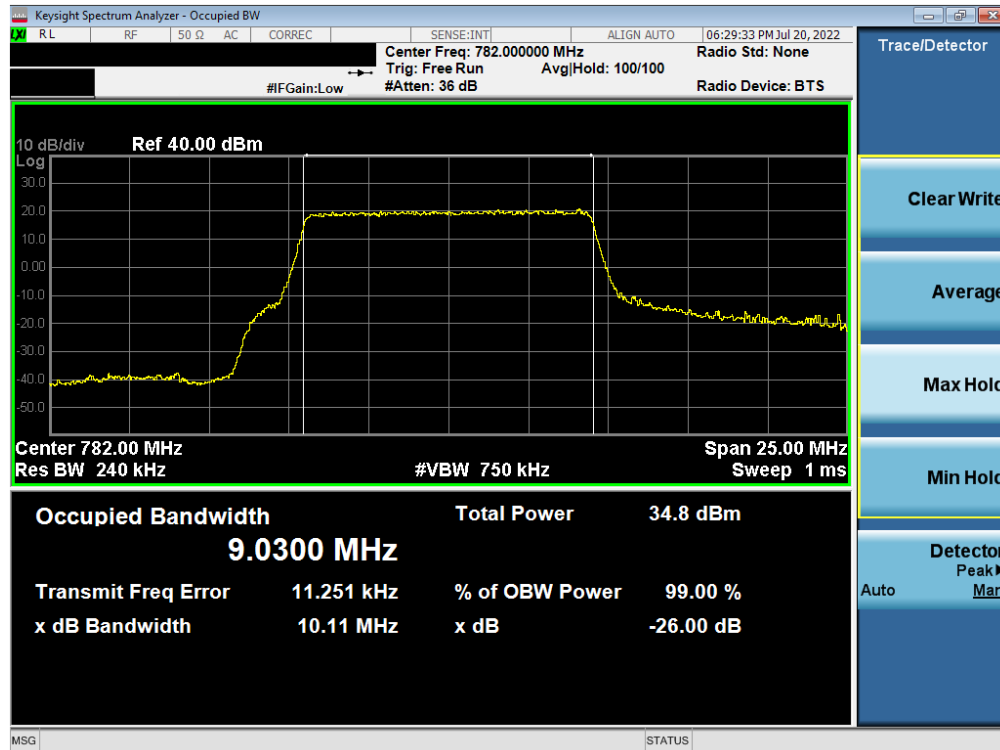


Plot 7-59. Occupied Bandwidth Plot (LTE Band 13 - 5MHz 64-QAM - Full RB)

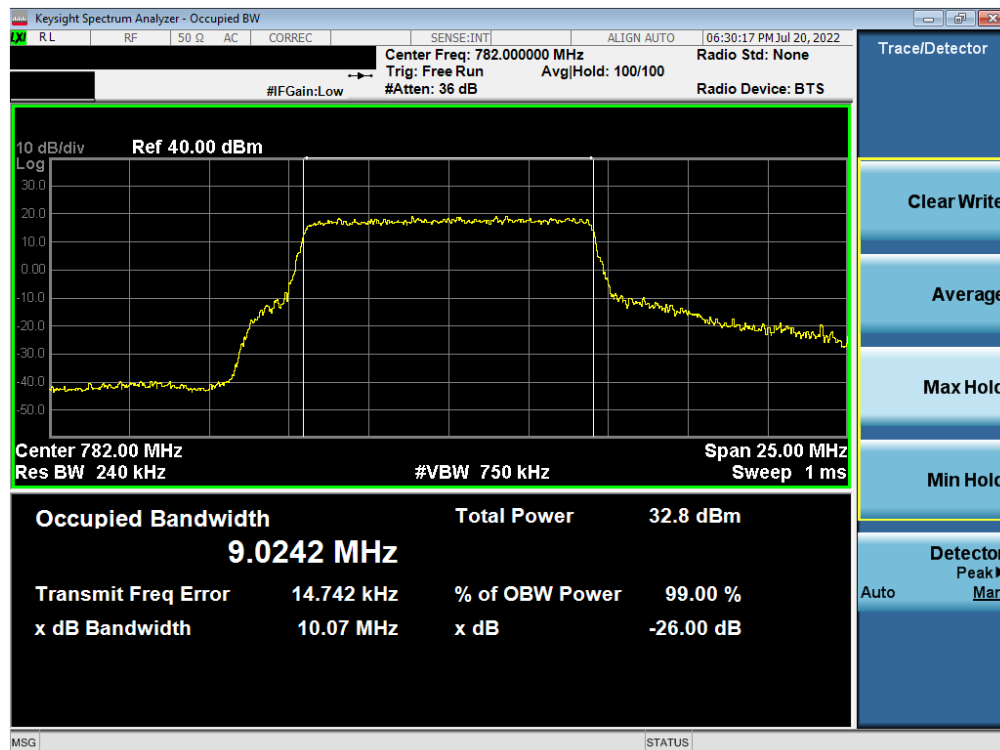


Plot 7-60. Occupied Bandwidth Plot (LTE Band 13 - 5MHz 256-QAM - Full RB)


FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 47 of 334

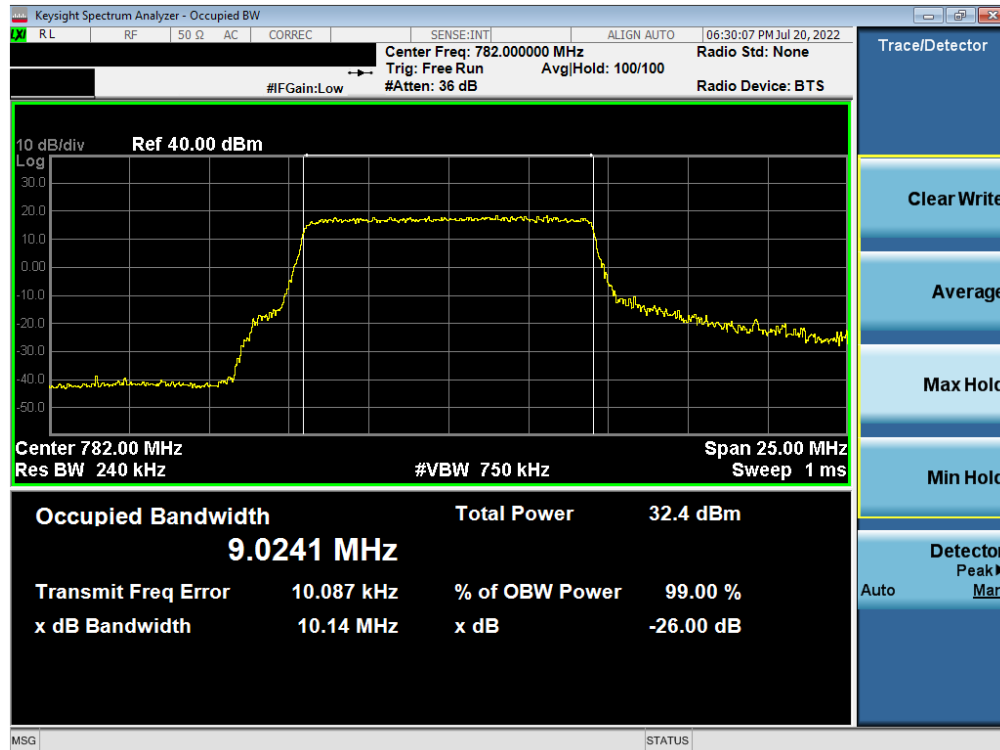


Plot 7-61. Occupied Bandwidth Plot (LTE Band 13 - 10MHz QPSK - Full RB)

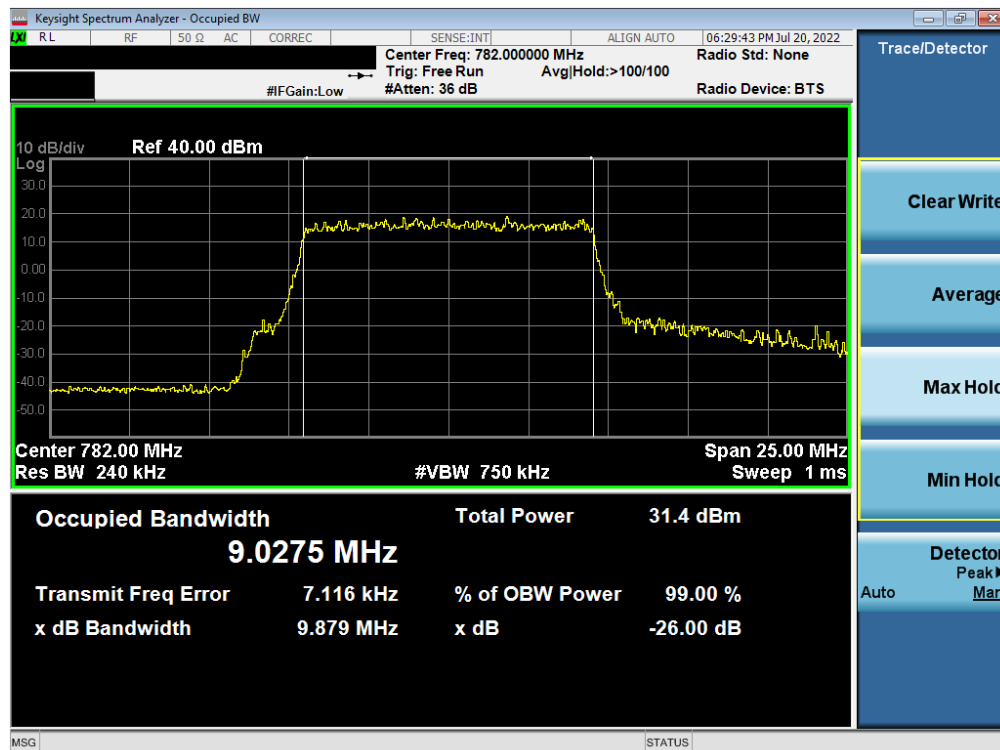


Plot 7-62. Occupied Bandwidth Plot (LTE Band 13 - 10MHz 16-QAM - Full RB)


FCC ID: BCGA2764		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 48 of 334



Plot 7-63. Occupied Bandwidth Plot (LTE Band 13 - 10MHz 64-QAM - Full RB)

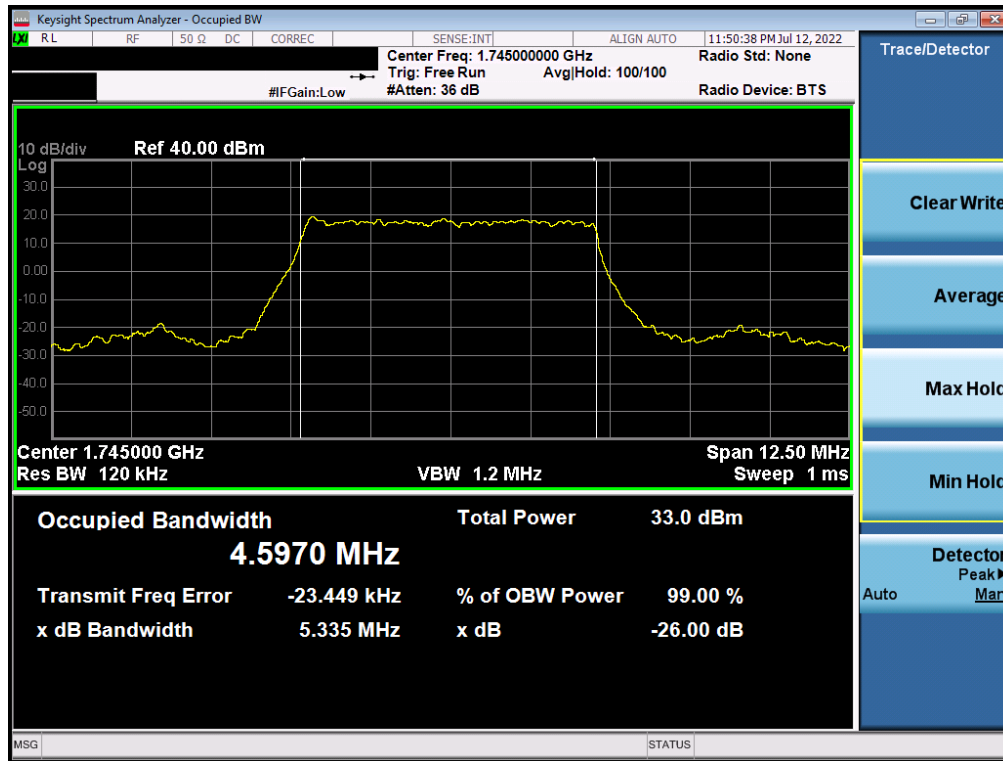


Plot 7-64. Occupied Bandwidth Plot (LTE Band 13 - 10MHz 256-QAM - Full RB)

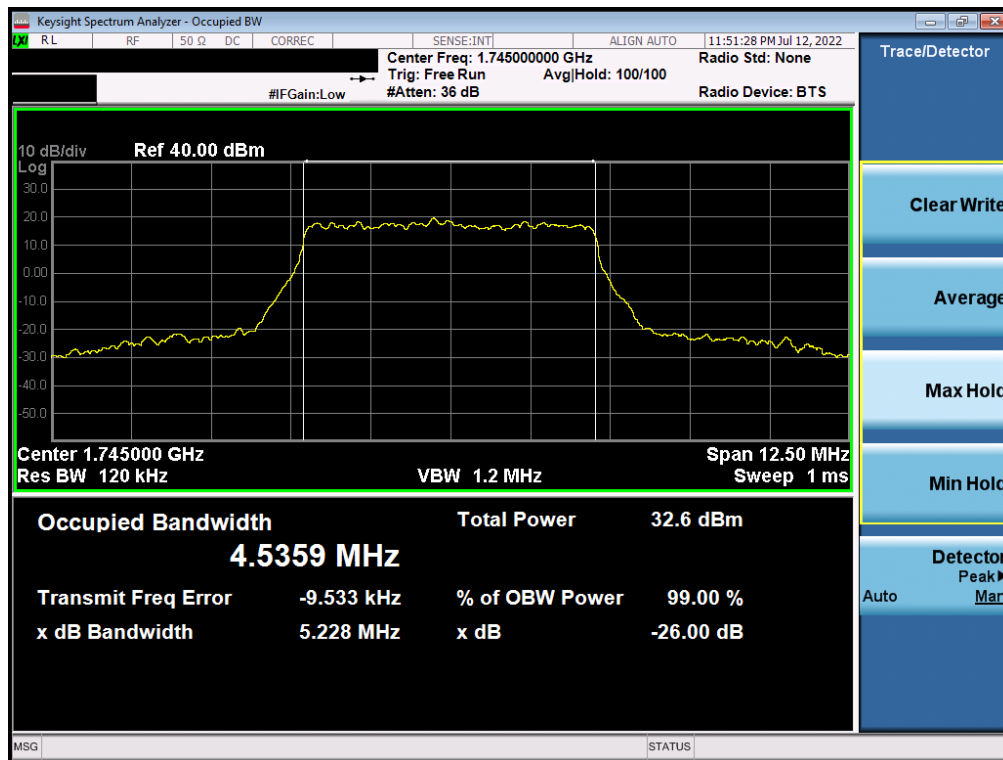
FCC ID: BCGA2764		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 49 of 334




## NR Band n66

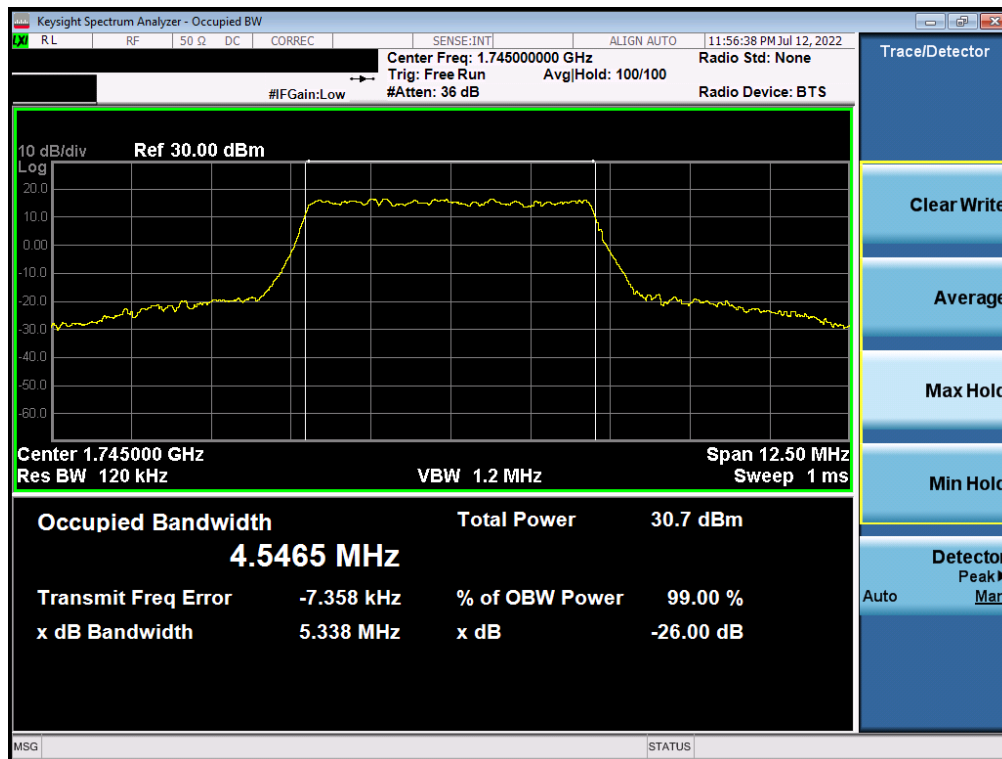


Plot 7-65. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz DFT-s-OFDM  $\pi/2$  BPSK - Full RB)

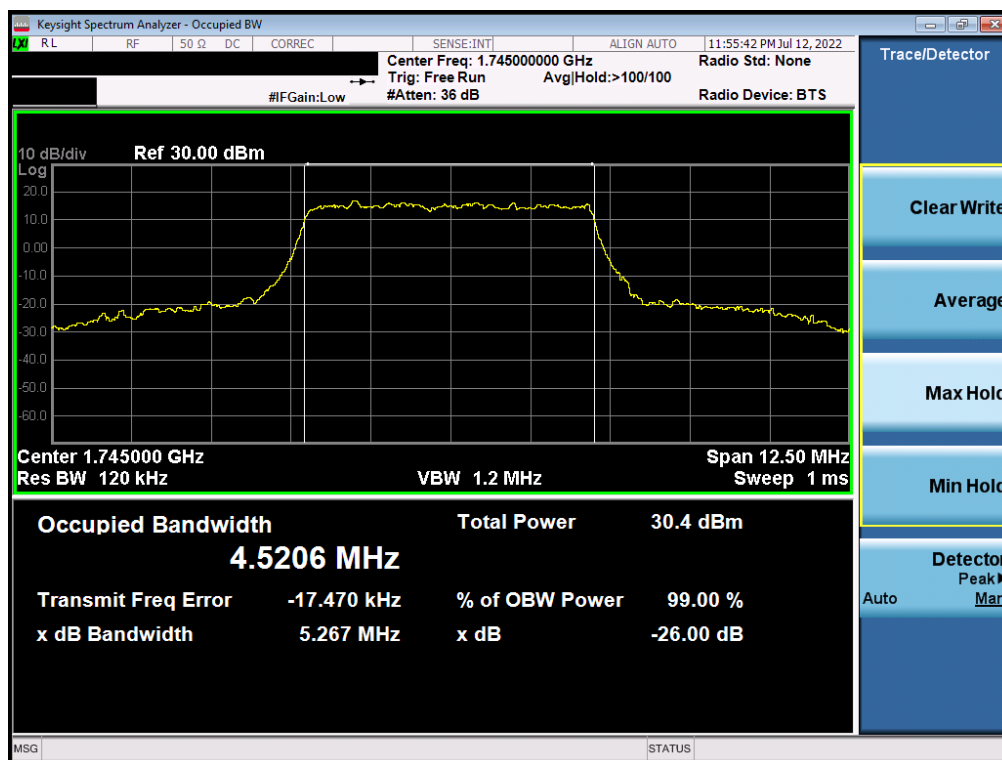


Plot 7-66. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz DFT-s-OFDM QPSK - Full RB)

FCC ID: BCGA2764		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 50 of 334

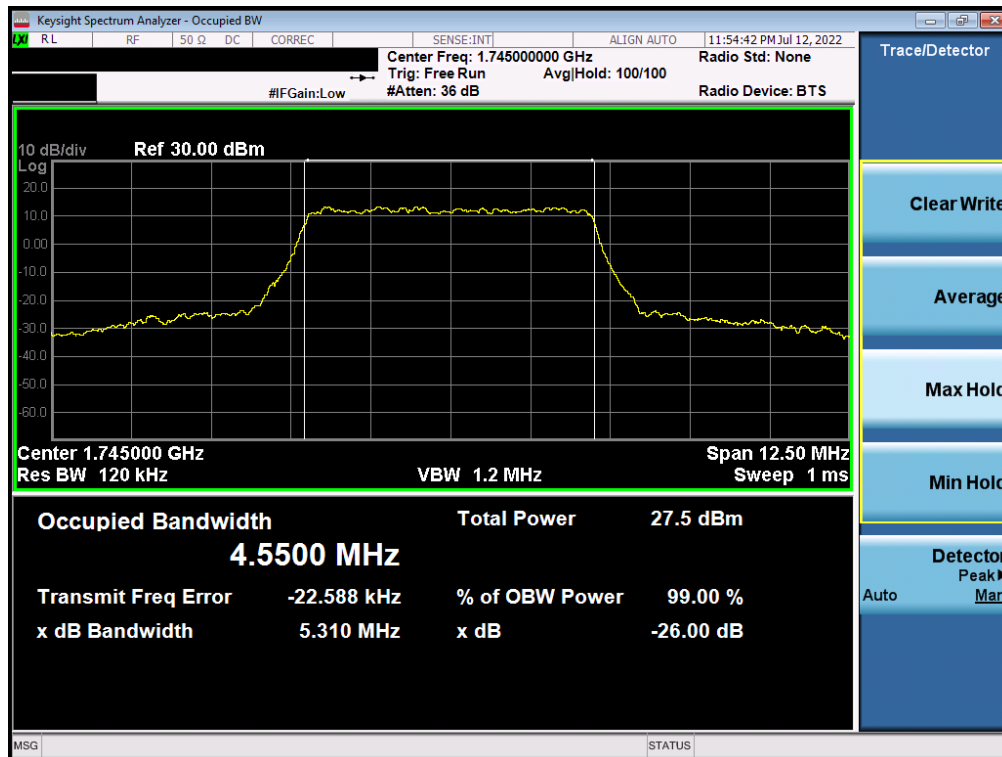


Plot 7-67. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM 16QAM - Full RB)

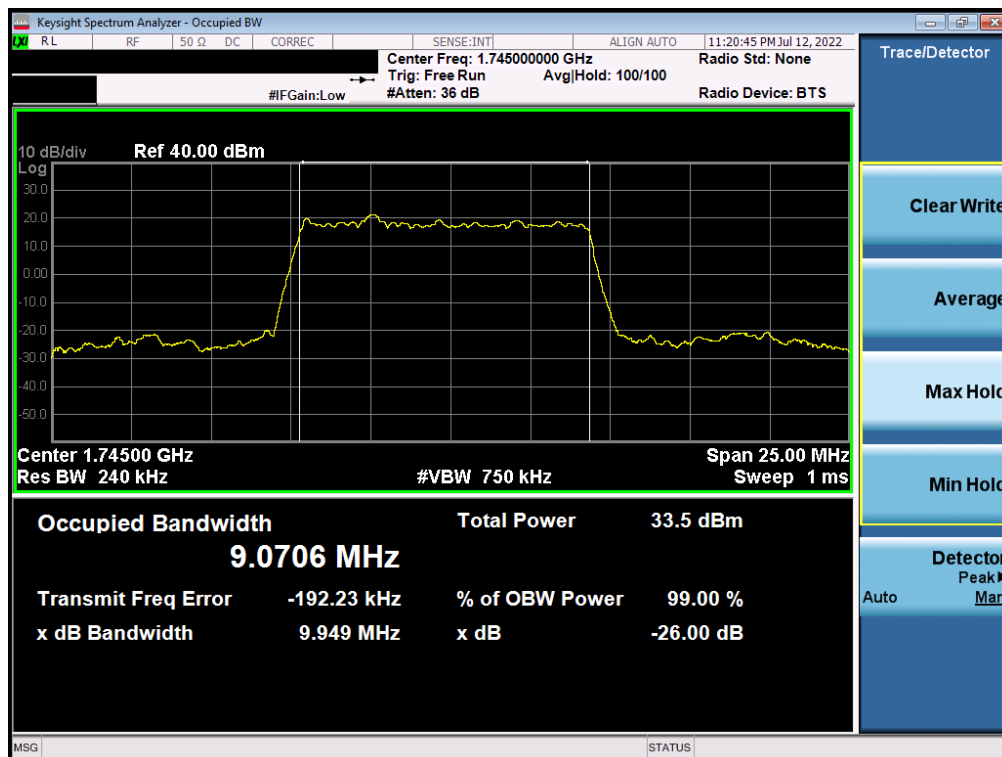


Plot 7-68. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM 64QAM - Full RB)


FCC ID: BCGA2764	element	PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 51 of 334

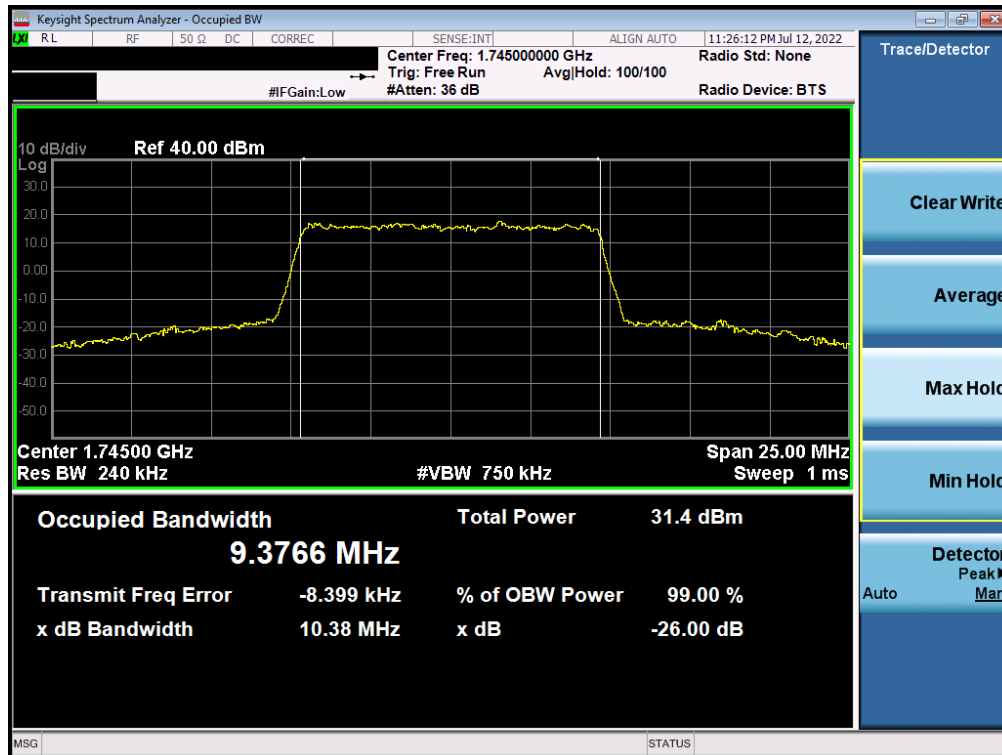


Plot 7-69. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM 256QAM - Full RB)

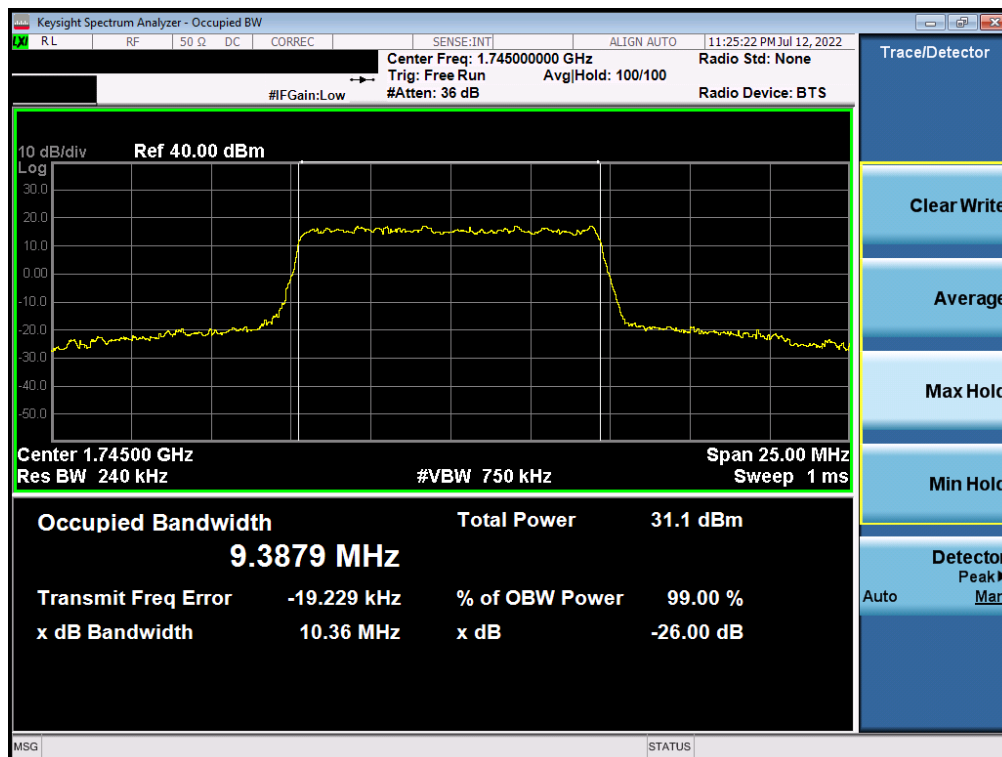


Plot 7-70. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz DFT-s-OFDM  $\pi/2$  BPSK - Full RB)


FCC ID: BCGA2764		PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 52 of 334



Plot 7-71. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM QPSK - Full RB)

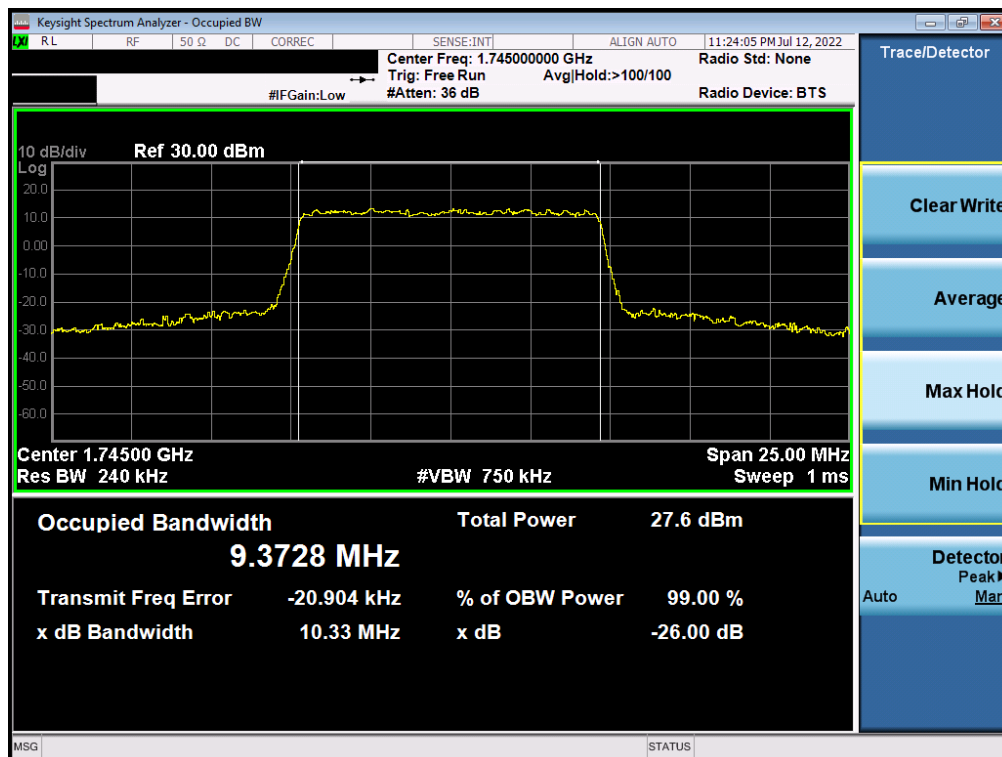


Plot 7-72. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM 16QAM - Full RB)

FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 53 of 334

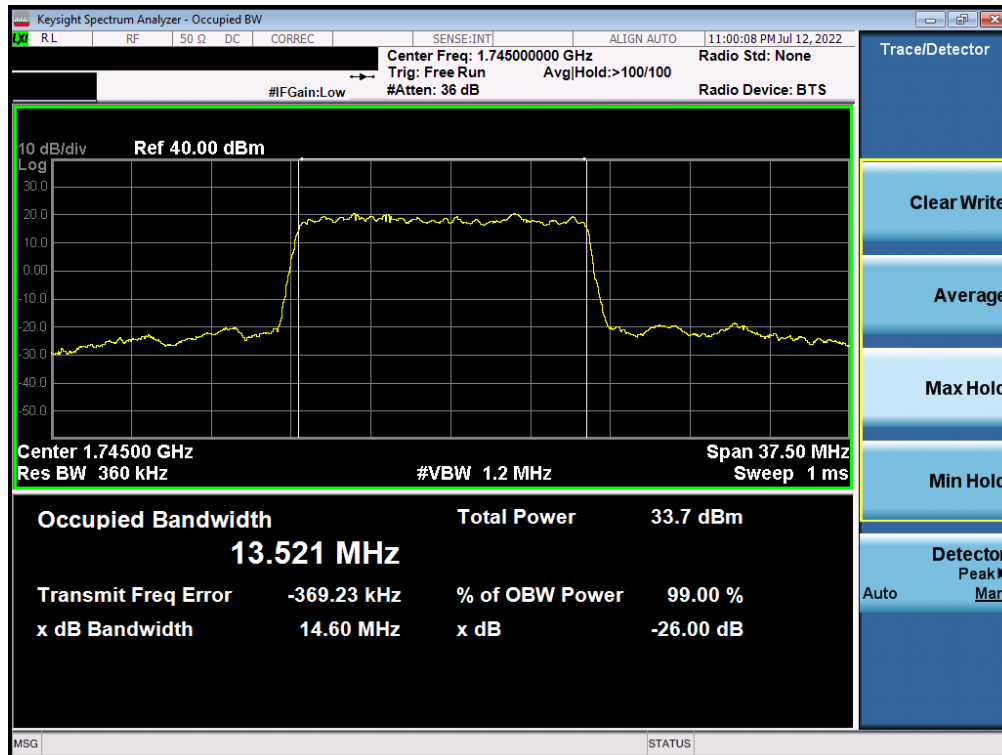


Plot 7-73. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM 64QAM - Full RB)

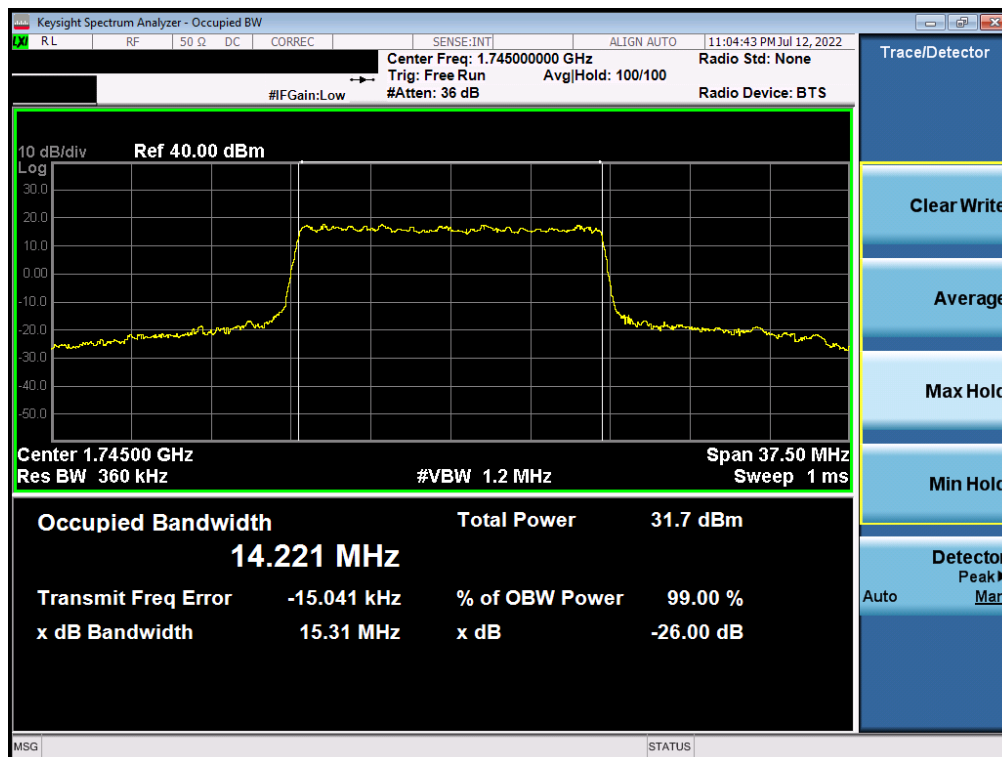


Plot 7-74. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM 256QAM - Full RB)


FCC ID: BCGA2764	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 54 of 334

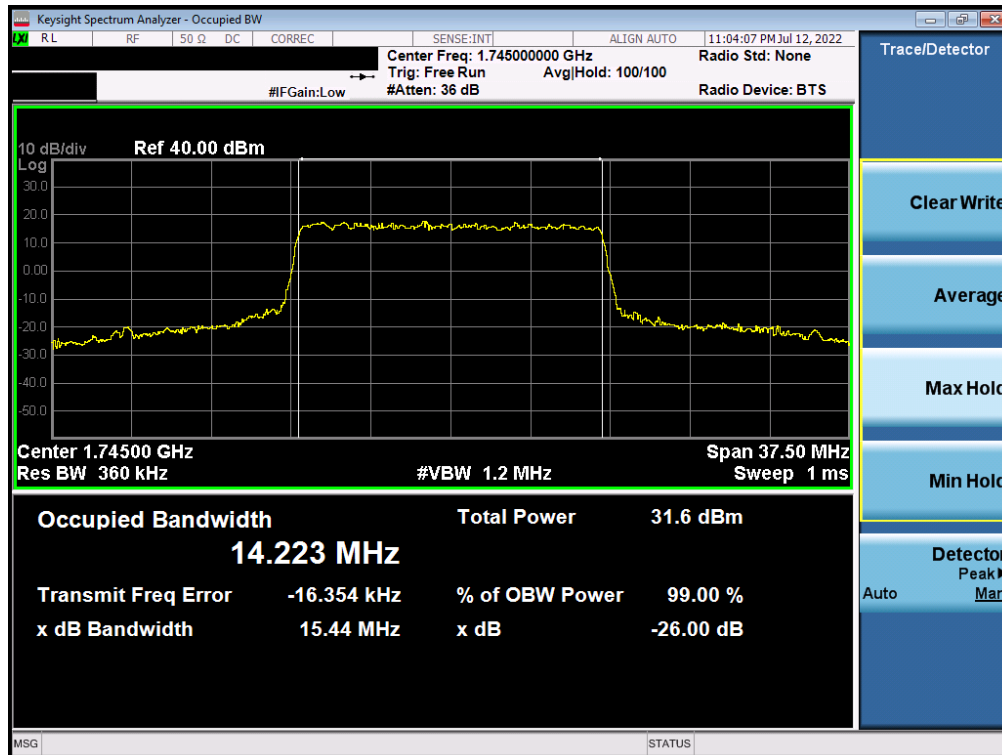


Plot 7-75. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz DFT-s-OFDM  $\pi/2$  BPSK - Full RB)

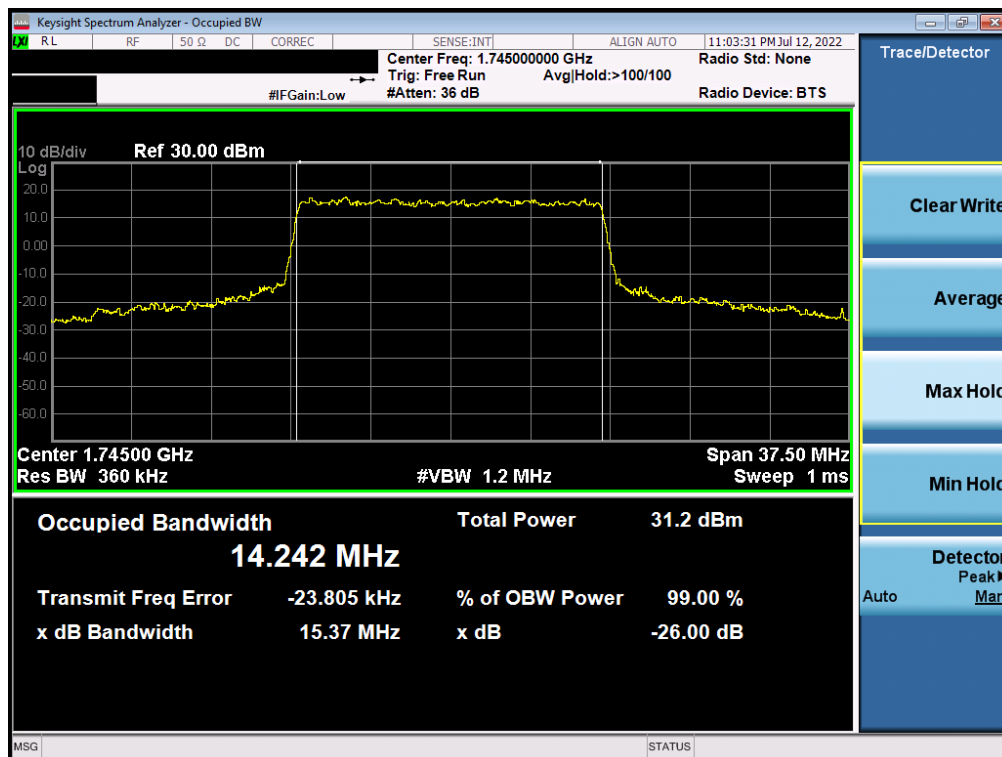


Plot 7-76. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM QPSK - Full RB)

FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 55 of 334



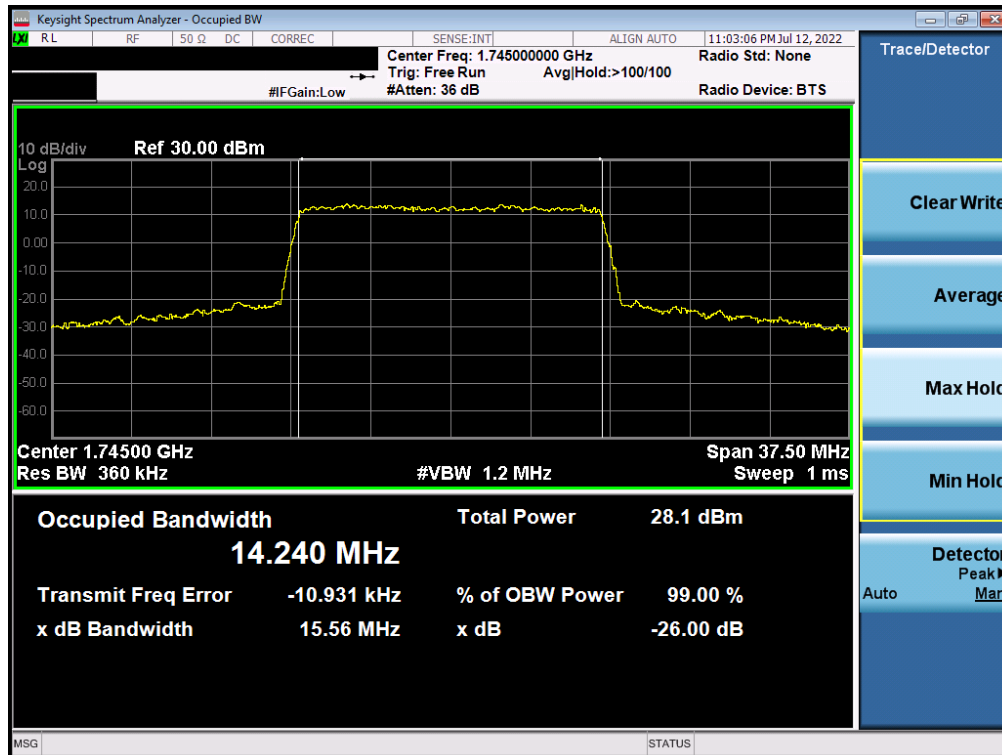
Plot 7-77. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM 16QAM - Full RB)



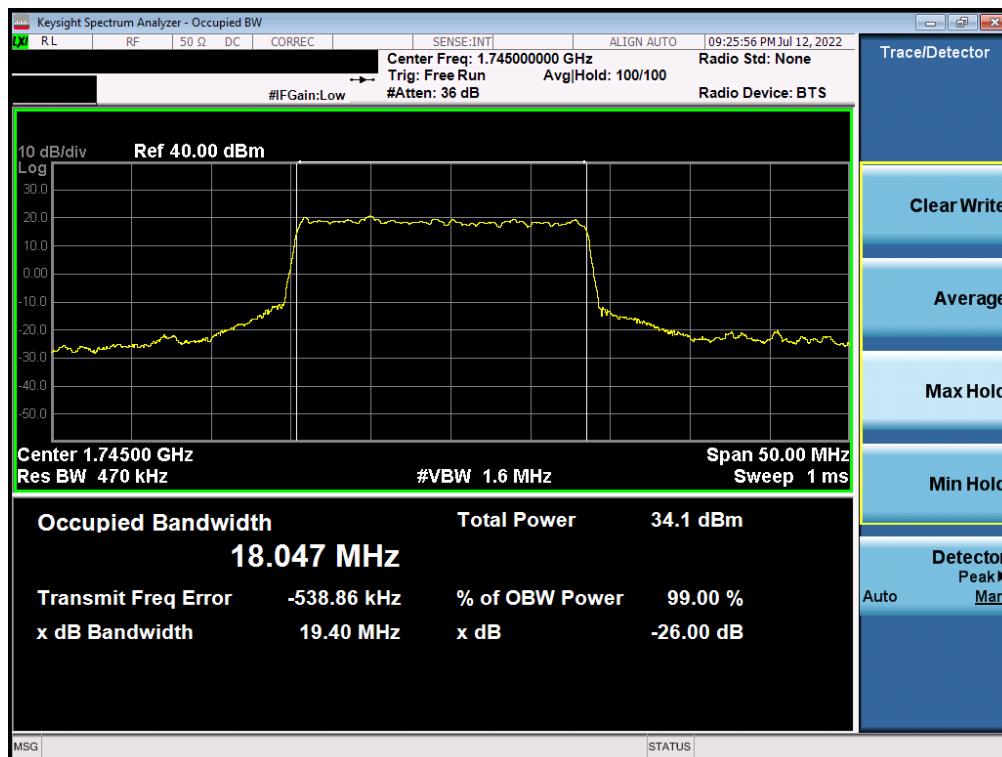
Plot 7-78. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM 64QAM - Full RB)

FCC ID: BCGA2764	<p>element</p> <p>PART 27 MEASUREMENT REPORT</p>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 56 of 334






Plot 7-79. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM 256QAM - Full RB)



Plot 7-80. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz DFT-s-OFDM  $\pi/2$  BPSK - Full RB)

FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 57 of 334



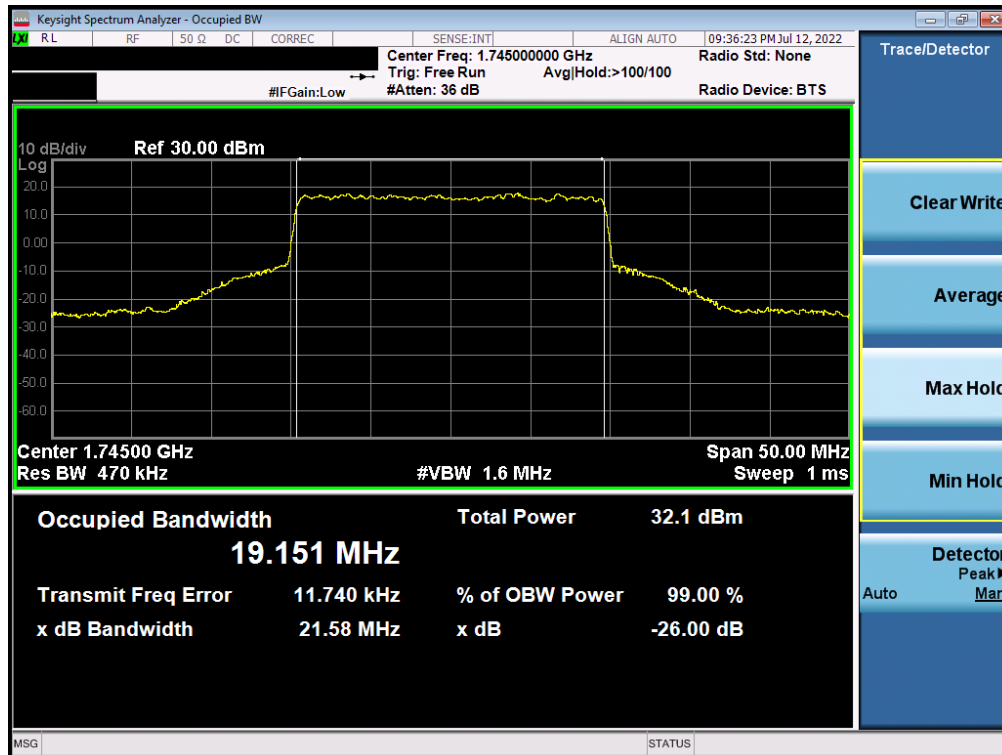


Plot 7-81. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM QPSK - Full RB)

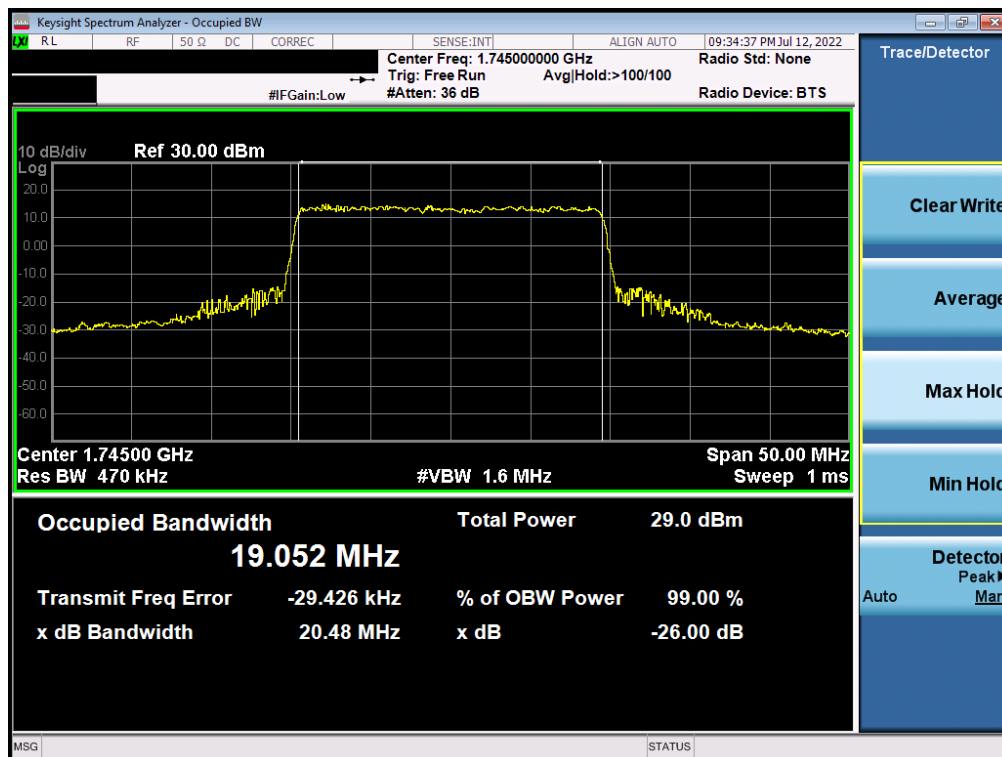


Plot 7-82. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM 16QAM - Full RB)

FCC ID: BCGA2764	element	PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 58 of 334

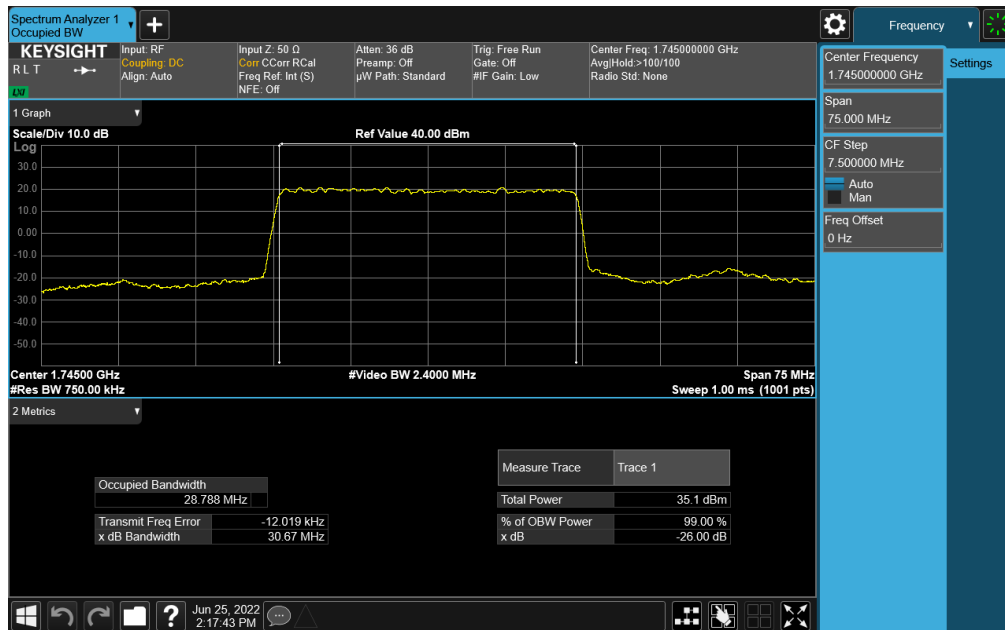


Plot 7-83. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM 64QAM - Full RB)



Plot 7-84. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM 256QAM - Full RB)

FCC ID: BCGA2764	<p>element</p> <p>PART 27 MEASUREMENT REPORT</p>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 59 of 334

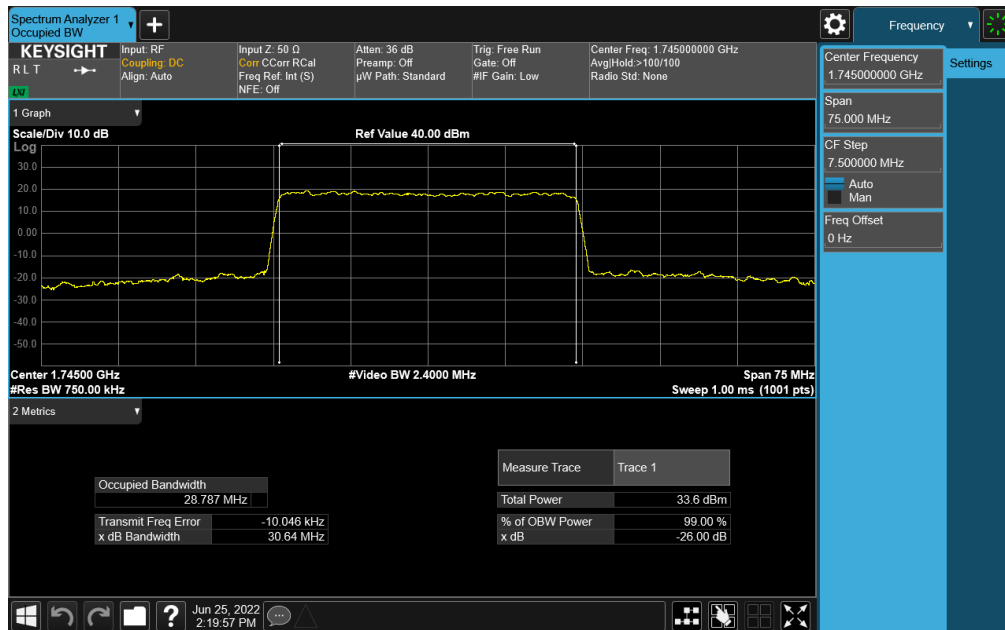


Plot 7-85. Occupied Bandwidth Plot (NR Band n66 - 30.0MHz DFT-s-OFDM  $\pi/2$  BPSK - Full RB)

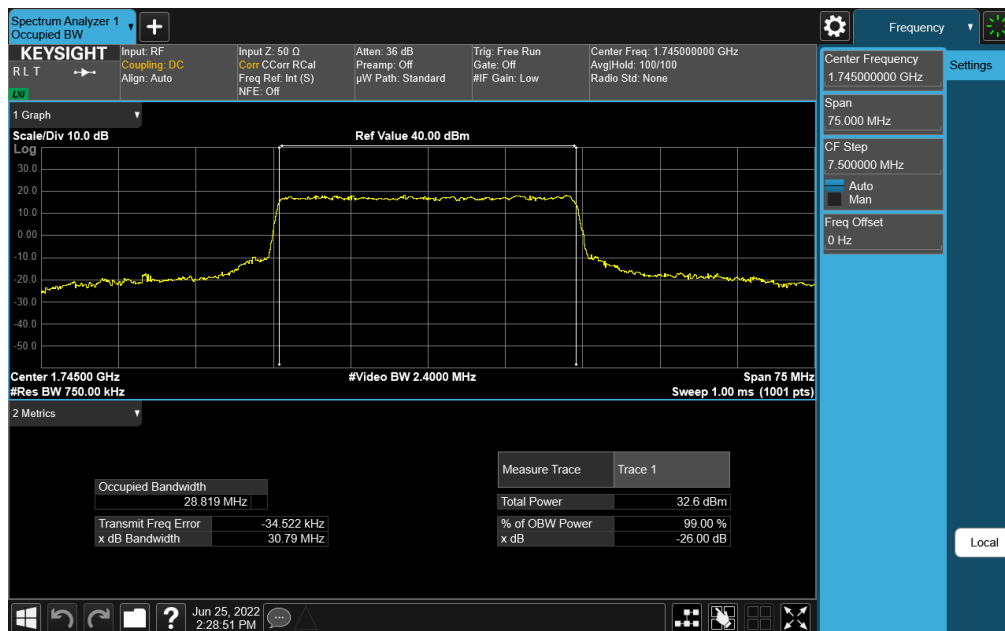


Plot 7-86. Occupied Bandwidth Plot (NR Band n66 - 30.0MHz DFT-s-OFDM QPSK - Full RB)


FCC ID: BCGA2764	element	PART 27 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 60 of 334

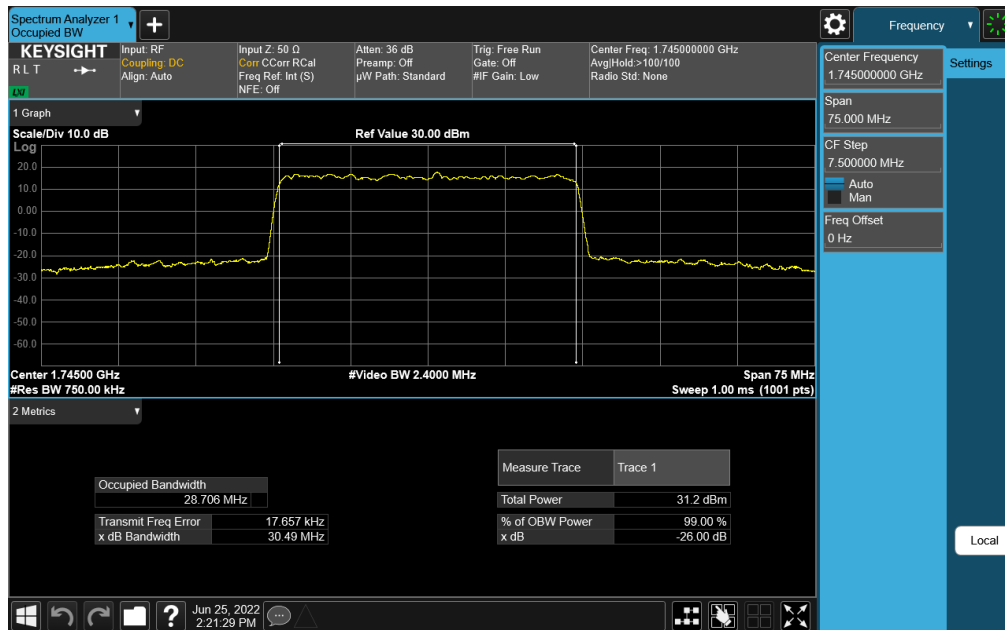



Plot 7-87. Occupied Bandwidth Plot (NR Band n66 - 30.0MHz DFT-s-OFDM 16QAM - Full RB)



Plot 7-88. Occupied Bandwidth Plot (NR Band n66 - 30.0MHz CP-OFDM 64QAM - Full RB)

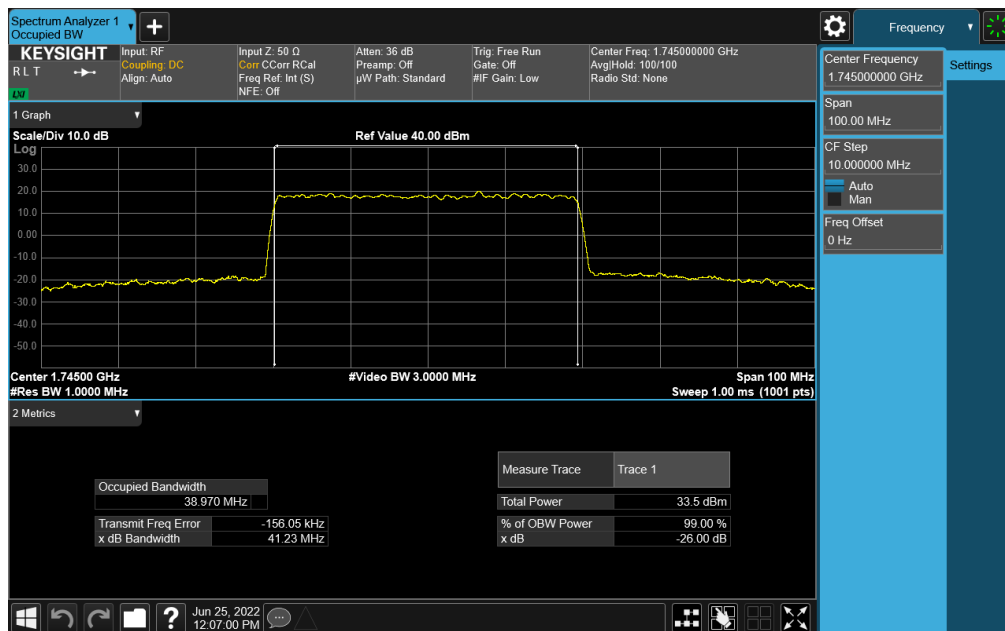
FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 61 of 334



FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 62 of 334

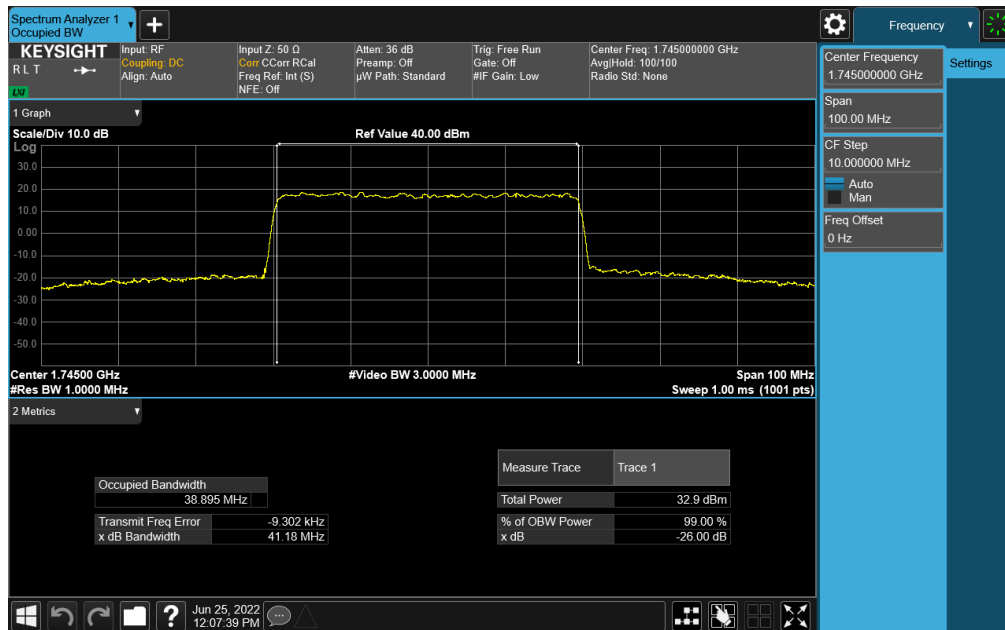


Plot 7-91. Occupied Bandwidth Plot (NR Band n66 - 40.0MHz CP-OFDM QPSK - Full RB)



Plot 7-92. Occupied Bandwidth Plot (NR Band n66 - 40.0MHz DFT-s-OFDM 16QAM - Full RB)

FCC ID: BCGA2764	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 63 of 334



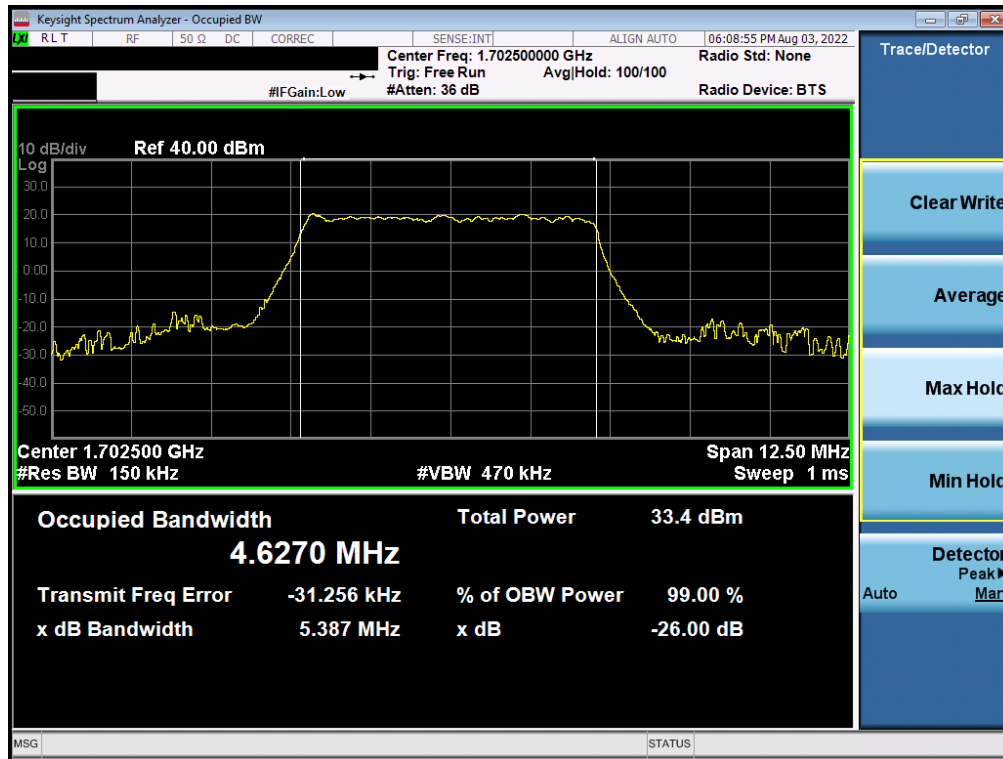
Plot 7-93. Occupied Bandwidth Plot (NR Band n66 - 40.0MHz DFT-s-OFDM 64QAM - Full RB)



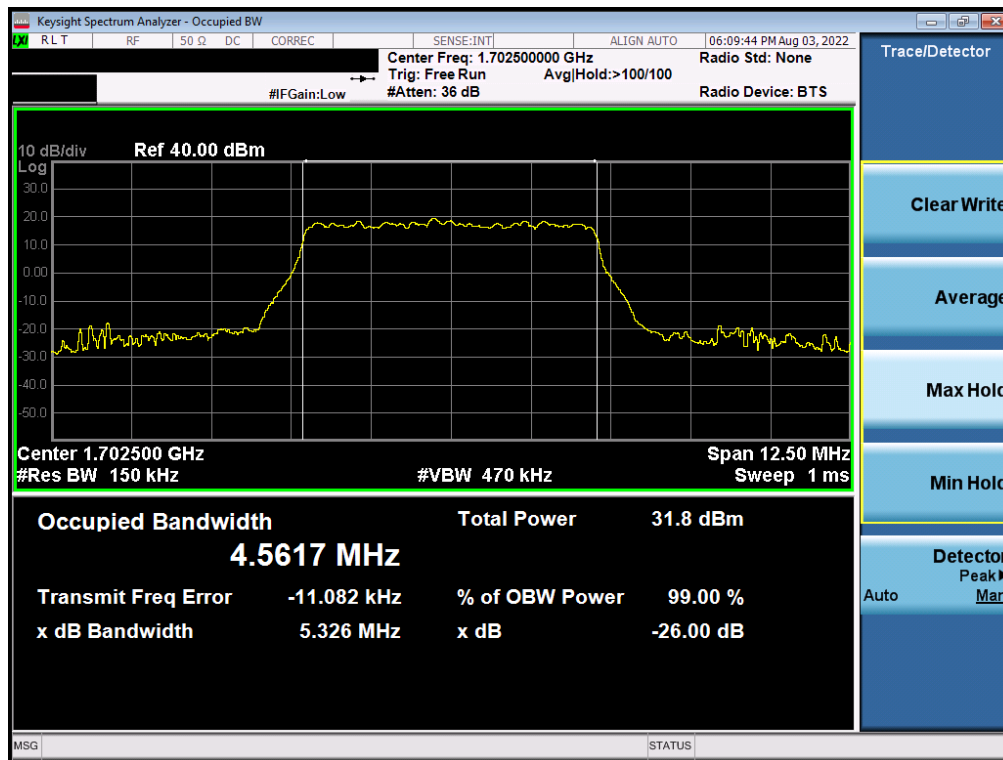
Plot 7-94. Occupied Bandwidth Plot (NR Band n66 - 40.0MHz DFT-s-OFDM 256QAM - Full RB)

FCC ID: BCGA2764	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 64 of 334


## NR Band n70



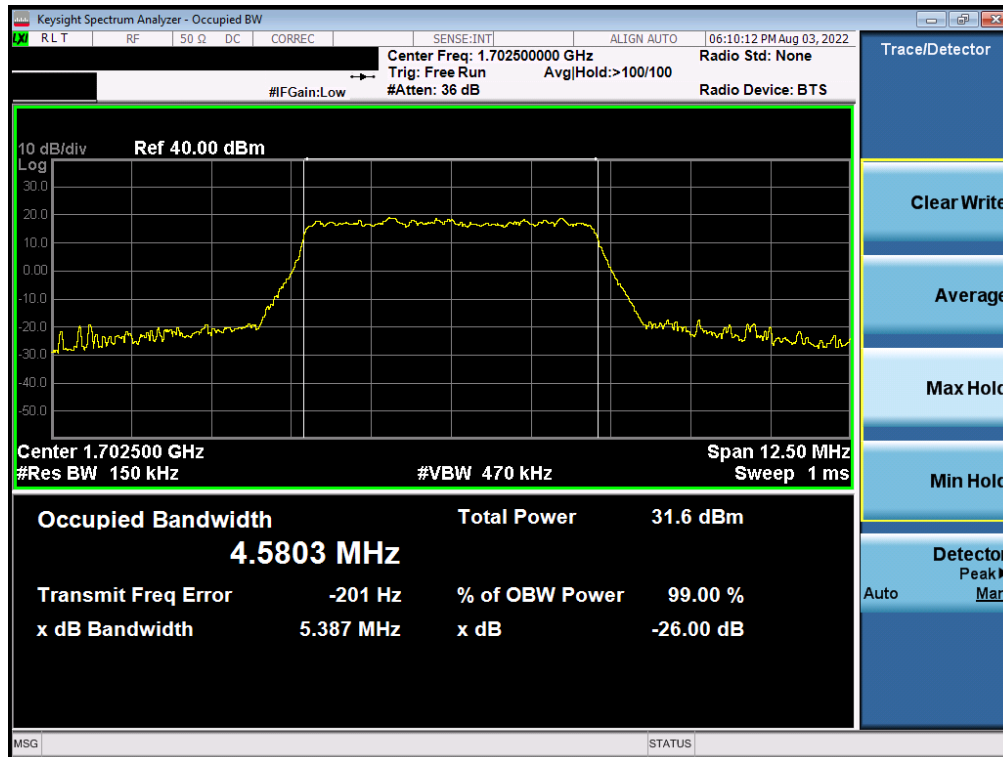
Plot 7-95. Occupied Bandwidth Plot (NR Band n70 - 5.0MHz DFT-s-OFDM  $\pi/2$  BPSK - Full RB)



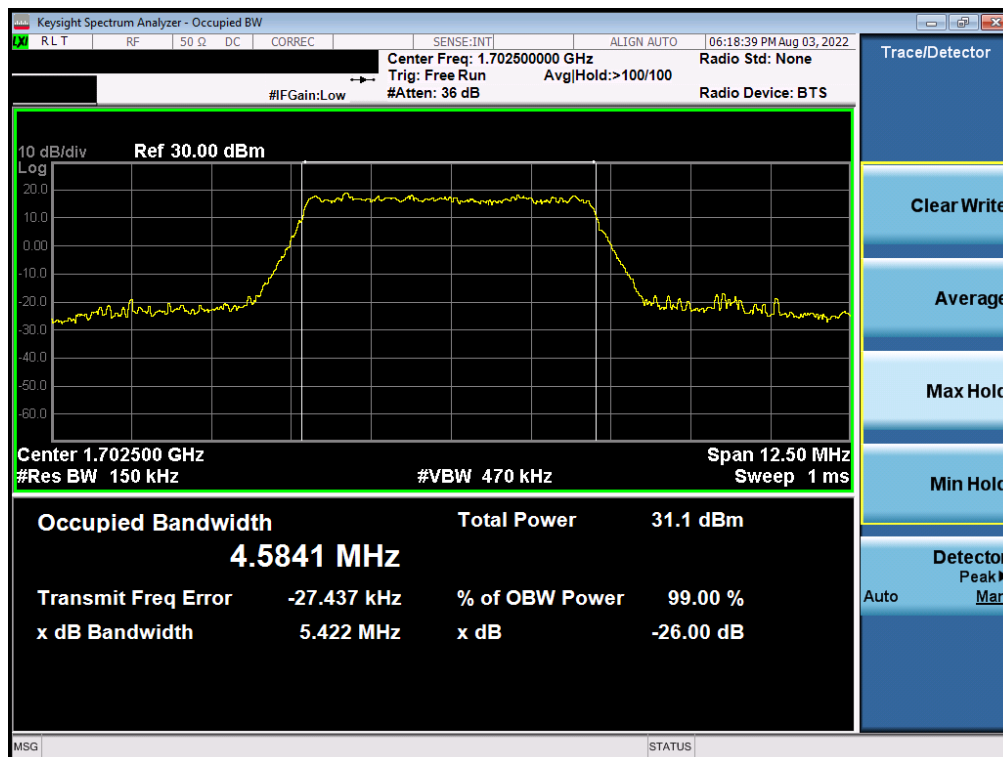
Plot 7-96. Occupied Bandwidth Plot (NR Band n70 - 5.0MHz DFT-s-OFDM QPSK - Full RB)

FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 65 of 334






Plot 7-97. Occupied Bandwidth Plot (NR Band n70 - 5.0MHz DFT-s-OFDM 16QAM - Full RB)

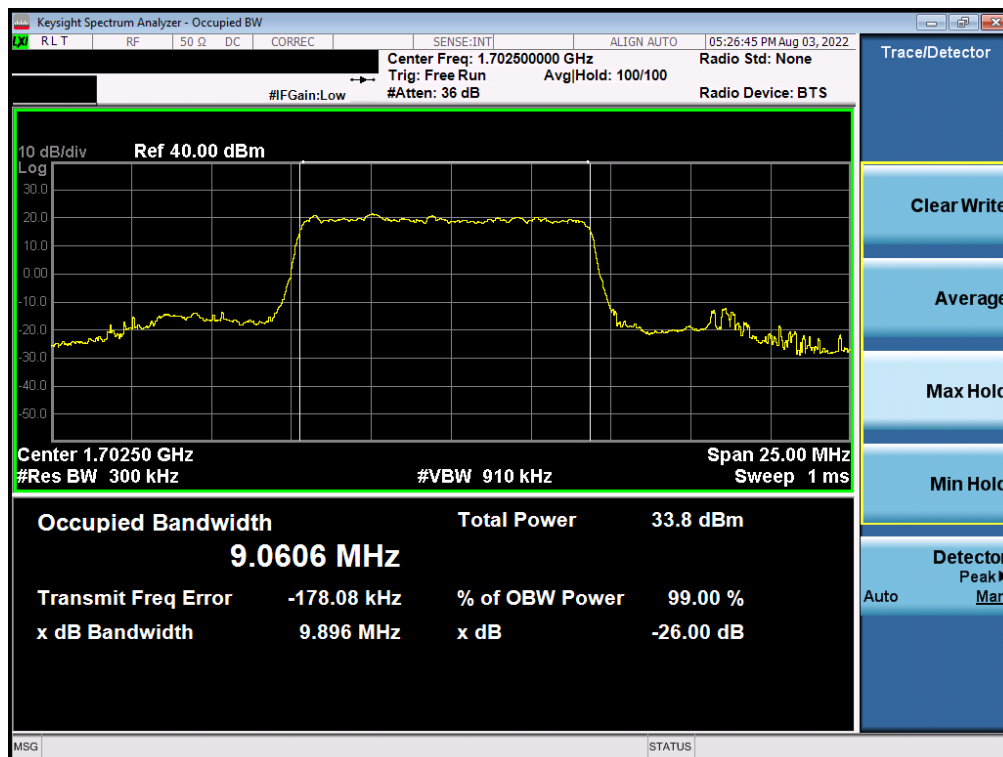


Plot 7-98. Occupied Bandwidth Plot (NR Band n70 - 5.0MHz CP-OFDM 64QAM - Full RB)

FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 66 of 334

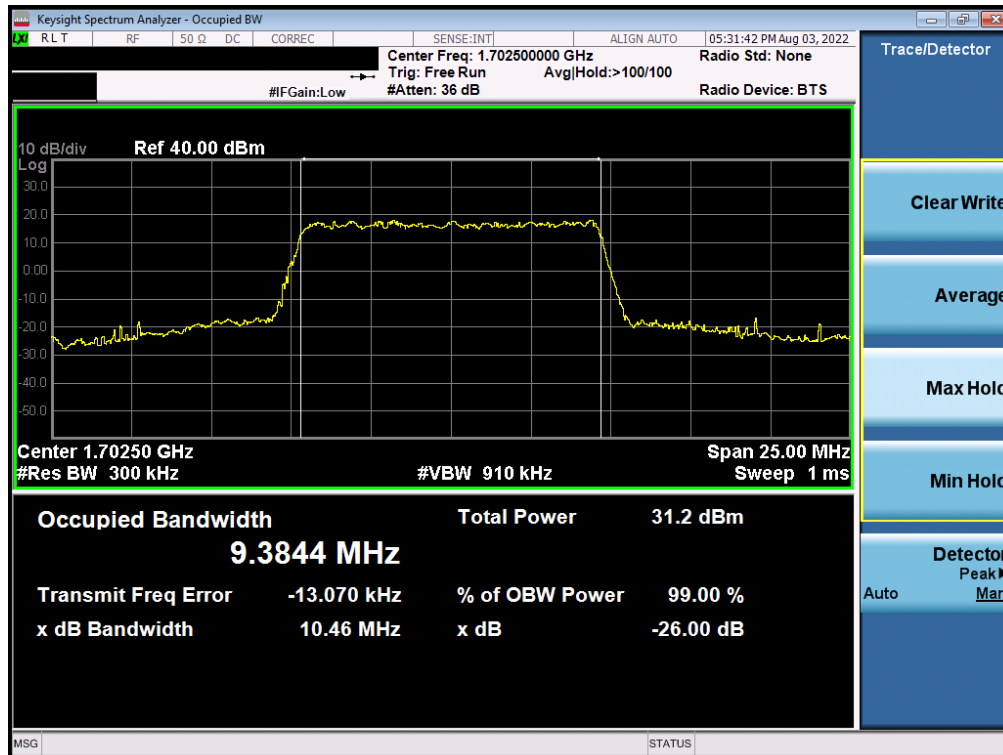


Plot 7-99. Occupied Bandwidth Plot (NR Band n70 - 5.0MHz CP-OFDM 256QAM - Full RB)

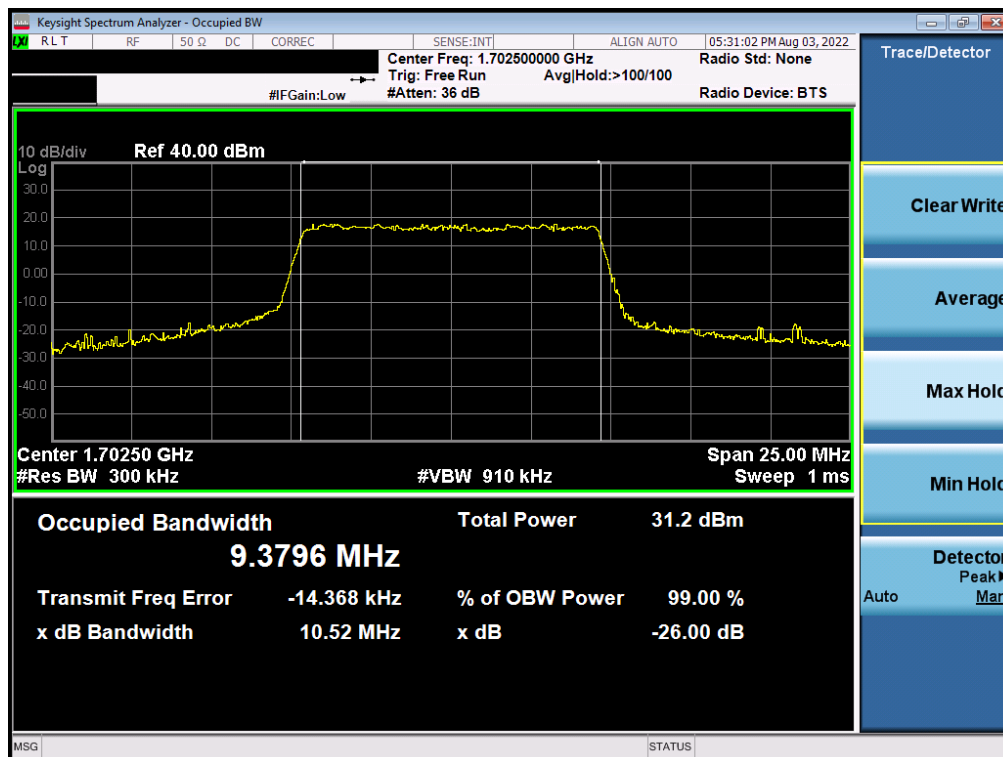


Plot 7-100. Occupied Bandwidth Plot (NR Band n70 - 10.0MHz DFT-s-OFDM  $\pi/2$  BPSK - Full RB)


FCC ID: BCGA2764	<p>element</p> <p>PART 27 MEASUREMENT REPORT</p>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 67 of 334

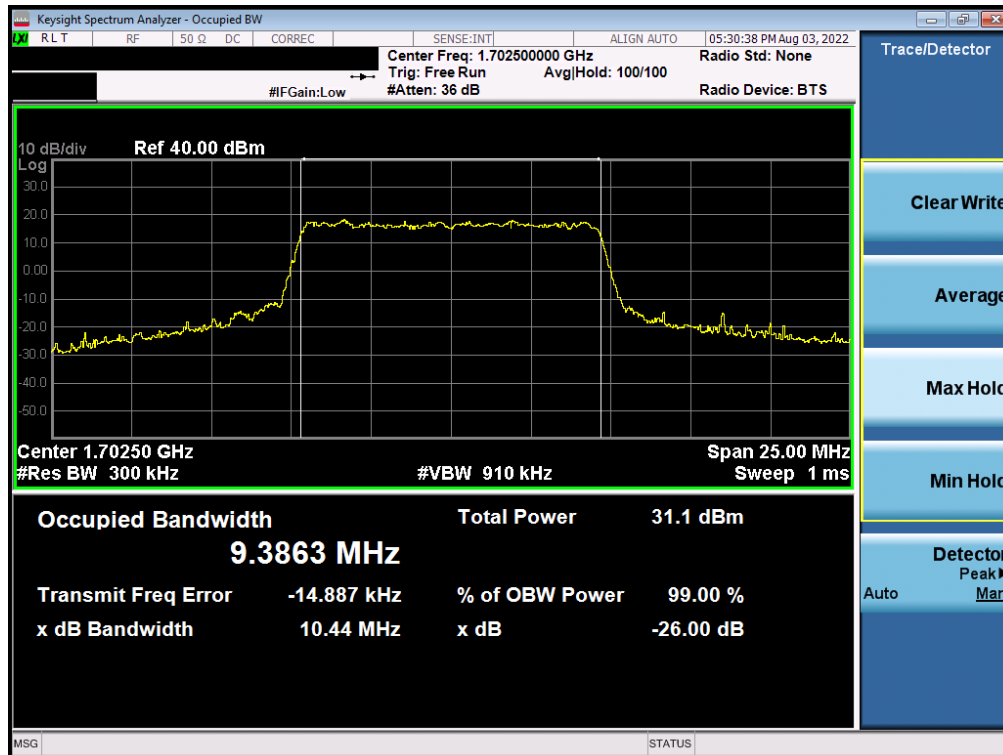


Plot 7-101. Occupied Bandwidth Plot (NR Band n70 - 10.0MHz CP-OFDM QPSK - Full RB)

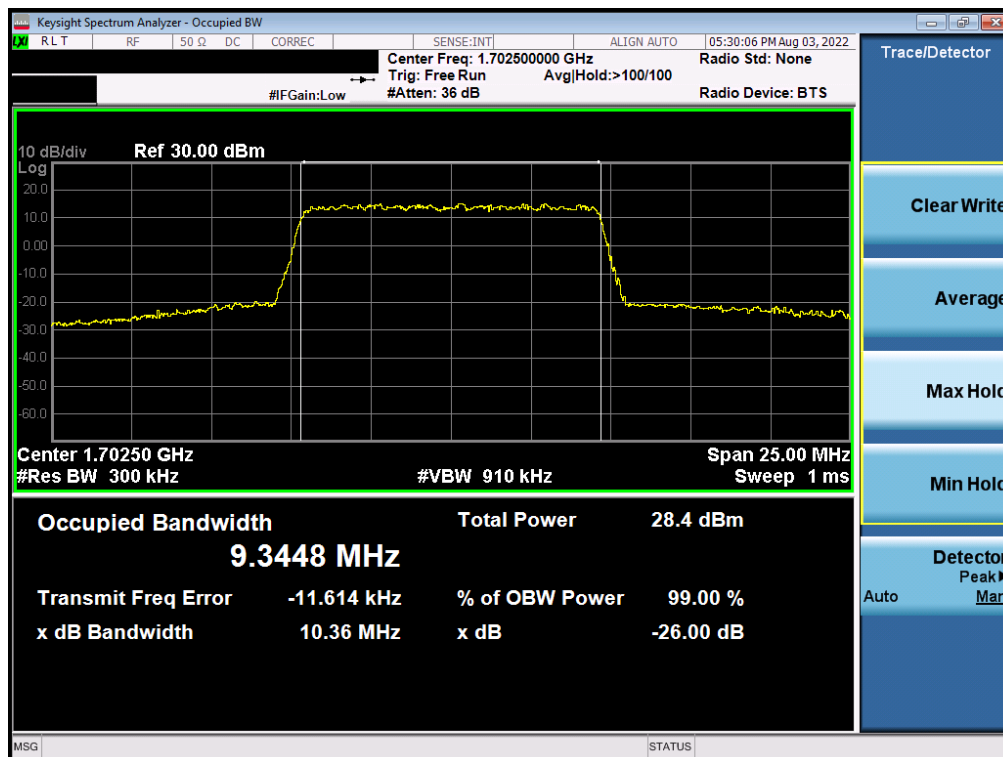


Plot 7-102. Occupied Bandwidth Plot (NR Band n70 - 10.0MHz CP-OFDM 16QAM - Full RB)


FCC ID: BCGA2764	 <b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 68 of 334

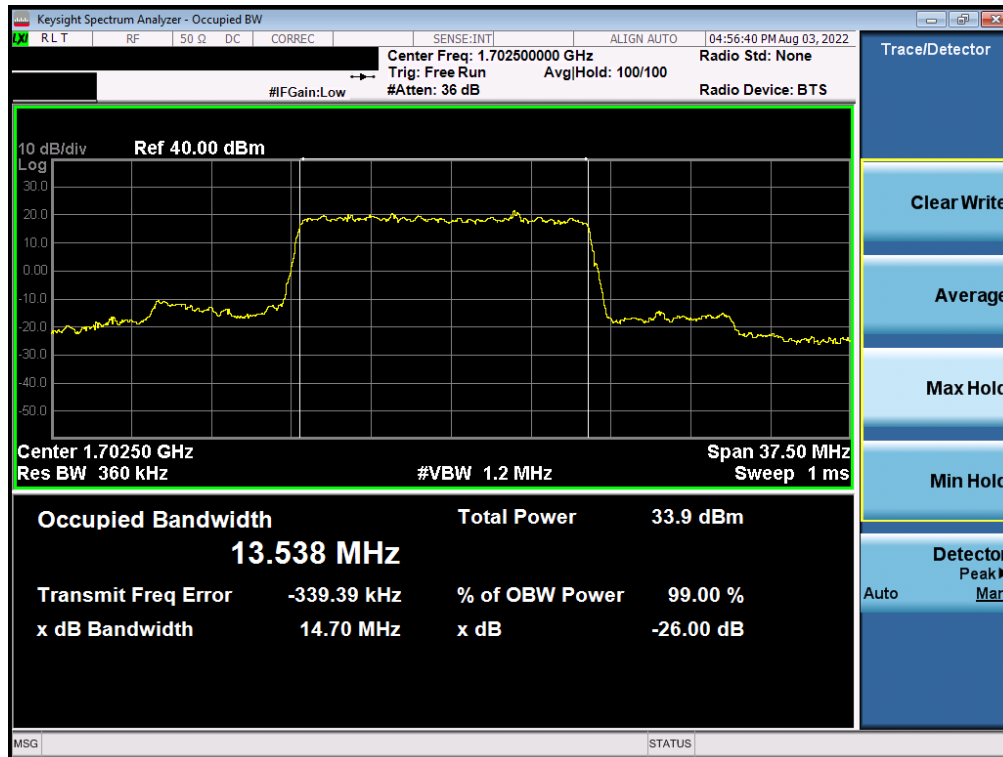


Plot 7-103. Occupied Bandwidth Plot (NR Band n70 - 10.0MHz CP-OFDM 64QAM - Full RB)

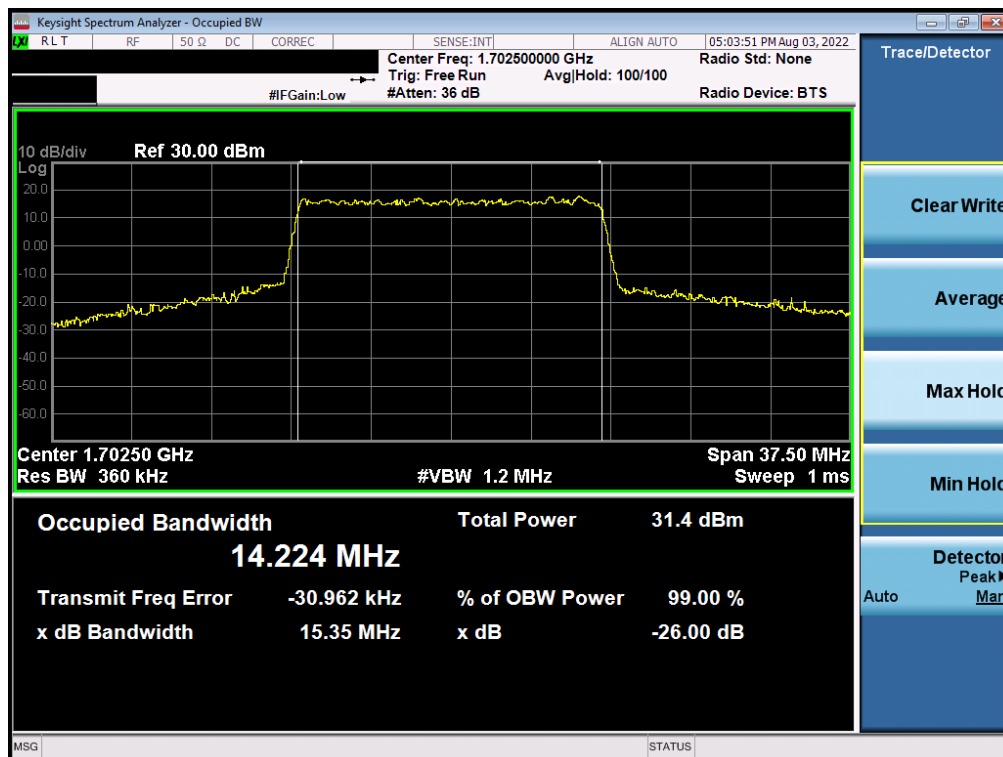


Plot 7-104. Occupied Bandwidth Plot (NR Band n70 - 10.0MHz CP-OFDM 256QAM - Full RB)


FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 69 of 334

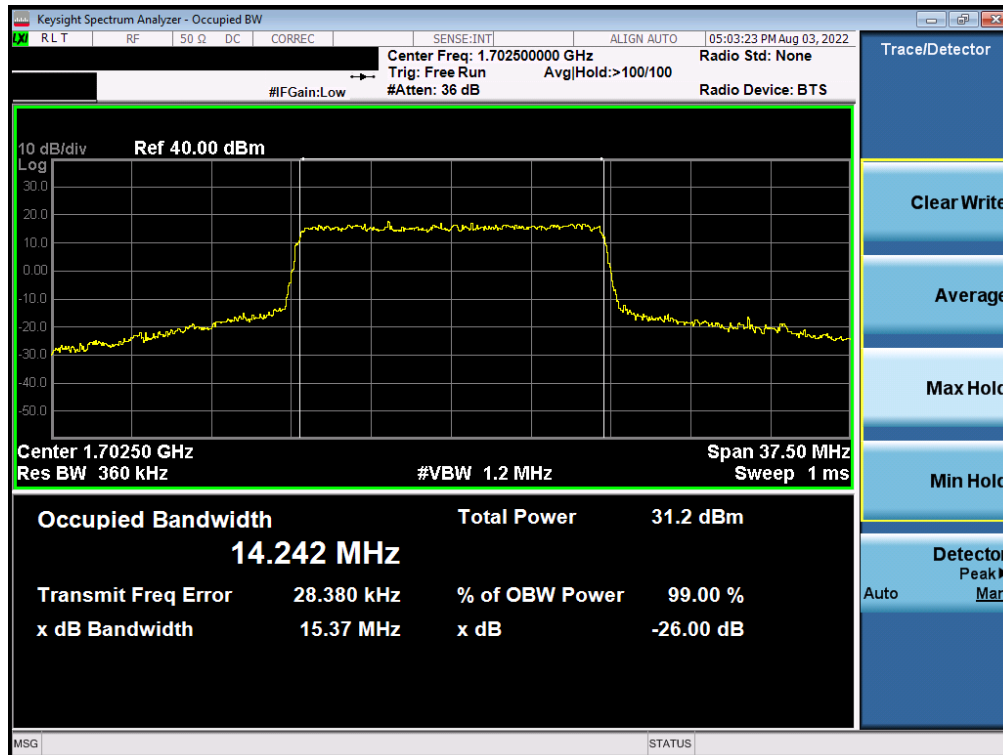


Plot 7-105. Occupied Bandwidth Plot (NR Band n70 - 15.0MHz DFT-s-OFDM  $\pi/2$  BPSK - Full RB)

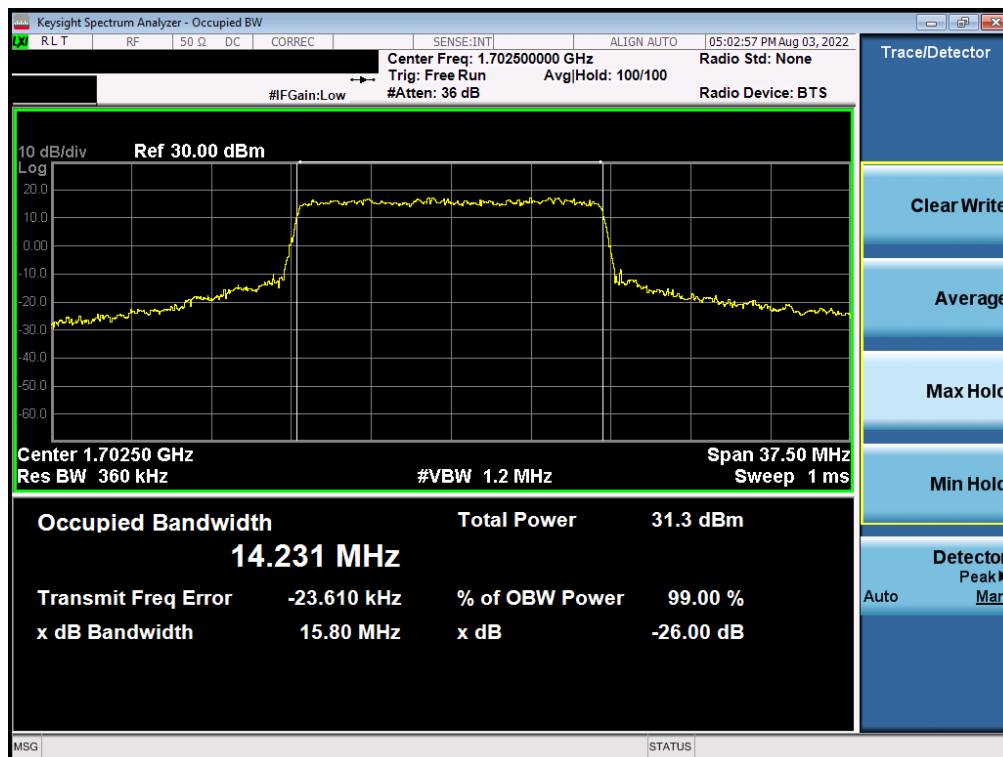


Plot 7-106. Occupied Bandwidth Plot (NR Band n70 - 15.0MHz CP-OFDM QPSK - Full RB)

FCC ID: BCGA2764	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 70 of 334



Plot 7-107. Occupied Bandwidth Plot (NR Band n70 - 15.0MHz CP-OFDM 16QAM - Full RB)



Plot 7-108. Occupied Bandwidth Plot (NR Band n70 - 15.0MHz CP-OFDM 64QAM - Full RB)

FCC ID: BCGA2764	<p>element</p> <p>PART 27 MEASUREMENT REPORT</p>		Approved by: Technical Manager
Test Report S/N: 1C2205090028-03.BCG	Test Dates: 5/30/2022 - 9/16/2022	EUT Type: Tablet Device	Page 71 of 334