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PART 27 MEASUREMENT REPORT

Applicant Name:
Samsung Electronics Co., Ltd.
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Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

Date of Testing:
9/21/2023 - 10/23/2023
Test Report Issue Date:
11/7/2023
Test Site/Location:
Element lab., Columbia, MD, USA
Test Report Serial No.:
1M2309070100-05.A3L

FCC ID:	A3LSMA156U
Applicant Name:	Samsung Electronics Co., Ltd.

Application Type:	Certification
Model:	SM-A156U
Additional Model(s):	SM-A15U1/DS, SM-S156V
EUT Type:	Portable Handset
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part:	27
Test Procedure(s):	ANSI C63.26-2015, KDB 648474 D03 v01r04

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: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 1 of 146

TABLE OF CONTENTS

1.0	INTRODUCTION	7
1.1	Scope	7
1.2	Element 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	Test Configuration	8
2.4	Software and Firmware	8
2.5	EMI Suppression Device(s)/Modifications	8
3.0	DESCRIPTION OF TESTS	9
3.1	Evaluation Procedure	9
3.2	Radiated Power and Radiated Spurious Emissions	9
4.0	MEASUREMENT UNCERTAINTY	10
5.0	TEST EQUIPMENT CALIBRATION DATA	11
6.0	SAMPLE CALCULATIONS	12
7.0	TEST RESULTS	13
7.1	Summary.....	13
7.2	Conducted Output Power Data	14
7.3	Occupied Bandwidth	20
7.4	Spurious and Harmonic Emissions at Antenna Terminal	59
7.5	Band Edge Emissions at Antenna Terminal	82
7.6	Peak-Average Ratio	99
7.7	Radiated Power (EIRP).....	106
7.8	Radiated Spurious Emissions Measurements.....	113
7.9	Frequency Stability / Temperature Variation	143
8.0	CONCLUSION.....	146

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 2 of 146

PART 27 MEASUREMENT REPORT

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
NR Band n77 PC2 (3700 - 3980MHz)	100 MHz	$\pi/2$ BPSK	3750.0 - 3930.0	0.351	25.45	96M7G7D
		QPSK	3750.0 - 3930.0	0.373	25.71	97M7G7D
		16QAM	3750.0 - 3930.0	0.279	24.46	97M9W7D
	90 MHz	$\pi/2$ BPSK	3745.0 - 3935.0	0.360	25.56	87M0G7D
		QPSK	3745.0 - 3935.0	0.379	25.79	87M9G7D
		16QAM	3745.0 - 3935.0	0.281	24.48	87M7W7D
	80 MHz	$\pi/2$ BPSK	3740.0 - 3940.0	0.355	25.50	77M4G7D
		QPSK	3740.0 - 3940.0	0.378	25.77	77M7G7D
		16QAM	3740.0 - 3940.0	0.284	24.53	77M5W7D
	70 MHz	$\pi/2$ BPSK	3735.0 - 3945.0	0.357	25.53	64M9G7D
		QPSK	3735.0 - 3945.0	0.383	25.83	67M7G7D
		16QAM	3735.0 - 3945.0	0.277	24.43	67M6W7D
	60 MHz	$\pi/2$ BPSK	3730.0 - 3950.0	0.348	25.42	58M0G7D
		QPSK	3730.0 - 3950.0	0.371	25.69	58M1G7D
		16QAM	3730.0 - 3950.0	0.277	24.42	58M0W7D
	50 MHz	$\pi/2$ BPSK	3725.0 - 3955.0	0.369	25.67	45M9G7D
		QPSK	3725.0 - 3955.0	0.376	25.75	47M6G7D
		16QAM	3725.0 - 3955.0	0.293	24.66	47M6W7D
	40 MHz	$\pi/2$ BPSK	3720.0 - 3960.0	0.362	25.58	35M9G7D
		QPSK	3720.0 - 3960.0	0.376	25.75	38M1G7D
		16QAM	3720.0 - 3960.0	0.288	24.59	37M9W7D
	30 MHz	$\pi/2$ BPSK	3715.0 - 3965.0	0.371	25.69	27M0G7D
		QPSK	3715.0 - 3965.0	0.385	25.85	28M0G7D
		16QAM	3715.0 - 3965.0	0.287	24.58	28M0W7D
	25 MHz	$\pi/2$ BPSK	3712.5 - 3967.5	0.349	25.43	23M0G7D
		QPSK	3712.5 - 3967.5	0.376	25.75	23M2G7D
		16QAM	3712.5 - 3967.5	0.278	24.44	23M3W7D
	20 MHz	$\pi/2$ BPSK	3710.0 - 3970.0	0.359	25.55	18M0G7D
		QPSK	3710.0 - 3970.0	0.379	25.78	18M3G7D
		16QAM	3710.0 - 3970.0	0.287	24.58	18M3W7D
	15 MHz	$\pi/2$ BPSK	3707.5 - 3972.5	0.352	25.46	12M9G7D
		QPSK	3707.5 - 3972.5	0.375	25.74	13M7G7D
		16QAM	3707.5 - 3972.5	0.286	24.56	13M7W7D
	10 MHz	$\pi/2$ BPSK	3705.0 - 3975.0	0.352	25.47	8M59G7D
		QPSK	3705.0 - 3975.0	0.376	25.75	8M62G7D
		16QAM	3705.0 - 3975.0	0.280	24.47	8M62W7D

EUT Overview – Ant1

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 3 of 146

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
NR Band n77 PC2 (3450 - 3550MHz)	100 MHz	$\pi/2$ BPSK	3500.0	0.354	25.48	96M5G7D
		QPSK	3500.0	0.347	25.40	97M7G7D
		16QAM	3500.0	0.325	25.12	98M0W7D
	90 MHz	$\pi/2$ BPSK	3495.0 - 3505.0	0.359	25.55	87M0G7D
		QPSK	3495.0 - 3505.0	0.353	25.47	87M7G7D
		16QAM	3495.0 - 3505.0	0.331	25.19	87M7W7D
	80 MHz	$\pi/2$ BPSK	3490.0 - 3510.0	0.356	25.51	77M3G7D
		QPSK	3490.0 - 3510.0	0.349	25.42	77M5G7D
		16QAM	3490.0 - 3510.0	0.325	25.12	77M8W7D
	70 MHz	$\pi/2$ BPSK	3485.0 - 3515.0	0.348	25.41	64M3G7D
		QPSK	3485.0 - 3515.0	0.342	25.34	67M9G7D
		16QAM	3485.0 - 3515.0	0.322	25.07	67M6W7D
	60 MHz	$\pi/2$ BPSK	3480.0 - 3520.0	0.348	25.41	57M9G7D
		QPSK	3480.0 - 3520.0	0.342	25.34	58M3G7D
		16QAM	3480.0 - 3520.0	0.318	25.02	58M1W7D
	50 MHz	$\pi/2$ BPSK	3475.0 - 3525.0	0.339	25.30	46M0G7D
		QPSK	3475.0 - 3525.0	0.334	25.23	47M7G7D
		16QAM	3475.0 - 3525.0	0.310	24.91	47M8W7D
	40 MHz	$\pi/2$ BPSK	3470.0 - 3530.0	0.348	25.41	35M9G7D
		QPSK	3470.0 - 3530.0	0.342	25.34	37M9G7D
		16QAM	3470.0 - 3530.0	0.317	25.01	37M9W7D
	30 MHz	$\pi/2$ BPSK	3465.0 - 3535.0	0.358	25.54	27M1G7D
		QPSK	3465.0 - 3535.0	0.356	25.51	27M9G7D
		16QAM	3465.0 - 3535.0	0.328	25.15	27M9W7D
	25 MHz	$\pi/2$ BPSK	3462.5 - 3537.5	0.351	25.45	23M0G7D
		QPSK	3462.5 - 3537.5	0.341	25.32	23M2G7D
		16QAM	3462.5 - 3537.5	0.317	25.01	23M3W7D
	20 MHz	$\pi/2$ BPSK	3460.0 - 3540.0	0.358	25.53	18M0G7D
		QPSK	3460.0 - 3540.0	0.356	25.51	18M3G7D
		16QAM	3460.0 - 3540.0	0.313	24.95	18M4W7D
	15 MHz	$\pi/2$ BPSK	3457.5 - 3542.5	0.358	25.53	13M0G7D
		QPSK	3457.5 - 3542.5	0.348	25.41	13M6G7D
		16QAM	3457.5 - 3542.5	0.324	25.10	13M7W7D
	10 MHz	$\pi/2$ BPSK	3455.0 - 3545.0	0.359	25.55	8M66G7D
		QPSK	3455.0 - 3545.0	0.357	25.52	8M65G7D
		16QAM	3455.0 - 3545.0	0.321	25.06	8M62W7D

EUT Overview – Ant1

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 4 of 146

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
NR Band n78	100 MHz	$\pi/2$ BPSK	3500.0 - 3600.0	0.269	24.30	97M0G7D
		QPSK	3500.0 - 3600.0	0.262	24.18	99M5G7D
		16QAM	3500.0 - 3600.0	0.247	23.93	99M2W7D
	90 MHz	$\pi/2$ BPSK	3495.0 - 3605.0	0.268	24.27	87M0G7D
		QPSK	3495.0 - 3605.0	0.261	24.17	87M9G7D
		16QAM	3495.0 - 3605.0	0.249	23.95	87M7W7D
	80 MHz	$\pi/2$ BPSK	3490.0 - 3610.0	0.269	24.29	77M5G7D
		QPSK	3490.0 - 3610.0	0.263	24.19	77M5G7D
		16QAM	3490.0 - 3610.0	0.248	23.94	78M0W7D
	70 MHz	$\pi/2$ BPSK	3485.0 - 3615.0	0.266	24.24	64M5G7D
		QPSK	3485.0 - 3615.0	0.257	24.09	67M8G7D
		16QAM	3485.0 - 3615.0	0.246	23.90	67M6W7D
	60 MHz	$\pi/2$ BPSK	3480.0 - 3620.0	0.274	24.38	58M1G7D
		QPSK	3480.0 - 3620.0	0.267	24.26	57M9G7D
		16QAM	3480.0 - 3620.0	0.256	24.07	57M8W7D
	50 MHz	$\pi/2$ BPSK	3475.0 - 3625.0	0.267	24.26	45M9G7D
		QPSK	3475.0 - 3625.0	0.259	24.12	47M7G7D
		16QAM	3475.0 - 3625.0	0.251	23.99	47M5W7D
	40 MHz	$\pi/2$ BPSK	3470.0 - 3630.0	0.281	24.48	36M0G7D
		QPSK	3470.0 - 3630.0	0.269	24.29	38M1G7D
		16QAM	3470.0 - 3630.0	0.257	24.10	38M1W7D
	30 MHz	$\pi/2$ BPSK	3465.0 - 3635.0	0.273	24.35	26M9G7D
		QPSK	3465.0 - 3635.0	0.265	24.23	27M9G7D
		16QAM	3465.0 - 3635.0	0.254	24.04	27M9W7D
	25 MHz	$\pi/2$ BPSK	3462.5 - 3637.5	0.284	24.53	22M9G7D
		QPSK	3462.5 - 3637.5	0.276	24.41	23M2G7D
		16QAM	3462.5 - 3637.5	0.264	24.21	23M2W7D
	20 MHz	$\pi/2$ BPSK	3460.0 - 3640.0	0.276	24.40	18M0G7D
		QPSK	3460.0 - 3640.0	0.273	24.35	18M2G7D
		16QAM	3460.0 - 3640.0	0.266	24.24	18M3W7D
	15 MHz	$\pi/2$ BPSK	3457.5 - 3642.5	0.271	24.33	12M9G7D
		QPSK	3457.5 - 3642.5	0.265	24.22	13M6G7D
		16QAM	3457.5 - 3642.5	0.250	23.97	13M6W7D
	10 MHz	$\pi/2$ BPSK	3455.0 - 3645.0	0.271	24.32	8M68G7D
		QPSK	3455.0 - 3645.0	0.264	24.21	8M67G7D
		16QAM	3455.0 - 3645.0	0.246	23.91	8M61W7D

EUT Overview – Ant1

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP	
				Max. Power [W]	Max. Power [dBm]
NR Band n77 PC2 (3450 - 3550MHz)	100 MHz	$\pi/2$ BPSK	3500.0	0.021	13.29
		QPSK	3500.0	0.021	13.17
		16QAM	3500.0	0.016	12.02
NR Band n77 PC2 (3700 - 3980MHz)	100 MHz	$\pi/2$ BPSK	3750.0 - 3930.0	0.031	14.93
		QPSK	3750.0 - 3930.0	0.031	14.97
		16QAM	3750.0 - 3930.0	0.024	13.85

EUT Overview – Ant2

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 5 of 146

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP	
				Max. Power [W]	Max. Power [dBm]
NR Band n77 PC2 (3450 - 3550MHz)	100 MHz	$\pi/2$ BPSK	3500.0	0.006	7.54
		QPSK	3500.0	0.006	7.53
		16QAM	3500.0	0.004	6.28
NR Band n77 PC2 (3700 - 3980MHz)	100 MHz	$\pi/2$ BPSK	3750.0 - 3930.0	0.006	7.68
		QPSK	3750.0 - 3930.0	0.006	7.76
		16QAM	3750.0 - 3930.0	0.005	6.63

EUT Overview – Ant3

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP	
				Max. Power [W]	Max. Power [dBm]
NR Band n77 PC2 (3450 - 3550MHz)	100 MHz	$\pi/2$ BPSK	3500.0	0.007	8.24
		QPSK	3500.0	0.007	8.23
		16QAM	3500.0	0.005	7.24
NR Band n77 PC2 (3700 - 3980MHz)	100 MHz	$\pi/2$ BPSK	3750.0 - 3930.0	0.011	10.24
		QPSK	3750.0 - 3930.0	0.011	10.26
		16QAM	3750.0 - 3930.0	0.008	9.12

EUT Overview – Ant4

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 6 of 146

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 Test Location

These measurement tests were conducted at the Element laboratory located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at Element lab located in Columbia, MD 21046, 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 2041.01 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 (2451B) test laboratory with the site description on file with ISED.
- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreement.

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 7 of 146

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMA156U**. 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.: 0679M, 0674M, 0520M, 0499M, 0504M, 0712M, 0705M

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR (FR1), 802.11b/g/n WLAN, 802.11a/n/ac UNII (5GHz), Bluetooth (1x, EDR, LE), NFC

2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.26-2015. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) Model: EP-P2400 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

2.4 Software and Firmware

Testing was performed on device(s) using software/firmware version 0 installed on the EUT.

2.5 EMI Suppression Device(s)/Modifications

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

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 8 of 146

3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the “American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services” (ANSI C63.26-2015) were used in the measurement of the EUT.

Deviation from Measurement Procedure.....None

3.2 Radiated Power and 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 power measurements, substitution method is used per the guidance of ANSI C63.26-2015. For emissions below 1GHz, a half-wave dipole is substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_d [dBm] = P_g [dBm] - \text{cable loss} [dB] + \text{antenna gain} [dBd/dBi];$$

where P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_g [dBm] - \text{cable loss} [dB]$.

For radiated spurious emissions measurements, the field strength conversion method is used per the formulas in Section 5.2.7 of ANSI C63.26-2015. 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. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01 v01r01.

Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI C63.26-2015.

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 9 of 146

4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (\pm dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 10 of 146

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
-	AP1-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP1-002
-	ETS-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-001
-	ETS-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-002
-	MD 1M 18-40	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	MD 1M 18-40
-	WL40-1	Conducted Cable Set (40GHz)	1/12/2023	Annual	1/12/2024	WL40-1
-	WL25-1	Conducted Cable Set (25GHz)	1/12/2023	Annual	1/12/2024	WL25-1
Anritsu	MA24406A	Microwave Peak Power Sensor	9/7/2023	Annual	9/7/2024	11240
Emco	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2024	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	7/5/2022	Biennial	7/5/2024	9203-2178
Pastermack	MNLC-2	Line Conducted Emission Cable (NM)	1/11/2023	Annual	1/11/2024	NMLC-2
ETS-Lindgren	3816/2NM	Line Impedance Stabilization Network	8/11/2022	Biennial	8/11/2024	114451
ETS Lindgren	3116C	1-18 GHz DRG Horn Antenna	2/27/2023	Biennial	2/27/2024	00218893
ETS Lindgren	3115	Double Ridged Guide Horn	4/12/2022	Biennial	4/12/2024	82333
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	4/13/2022	Biennial	4/13/2025	121034
Keysight Technologies	N9020A	MXA Signal Analyzer	3/15/2023	Annual	3/15/2024	MY54500644
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	3/15/2023	Annual	3/15/2024	MY52350166
Keysight Technologies	N9030A	PXA Signal Analyzer	1/31/2023	Annual	1/31/2024	MY55410501
Keysight Technologies	N9030B	PXA Signal Analyzer, Multi-touch	9/7/2023	Annual	9/7/2024	MY57141001
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	9/25/2023	Annual	9/25/2024	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/11/2023	Annual	9/11/2024	100348
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	3/1/2023	Annual	3/1/2024	101716
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	1/13/2023	Annual	1/13/2024	103200
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	2/21/2023	Biennial	2/21/2025	A051107
Sunol	JB6	LB6 Antenna	3/2/2023	Biennial	3/2/2025	A082816

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.
2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 11 of 146

6.0 SAMPLE CALCULATIONS

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

Spurious Radiated Emission

Example: Spurious emission at 3700.40 MHz

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

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 12 of 146

7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.
 FCC ID: A3LSMA156U
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): NR

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Transmitter Conducted Output Power	2.1046(a), 2.1046(c)	N/A	PASS	Section 7.2
	Occupied Bandwidth	2.1049(h)	N/A	PASS	Section 7.3
	Conducted Band Edge / Spurious Emissions (NR Band n77/78)	2.1051, 27.53(l), 27.53(n)	≤ 13 dBm / MHz	PASS	Sections 7.4, 7.5
	Peak-to-Average Ratio (NR Band n77/78)	27.50(j)(4), 27.50(k)(4)	≤ 13 dB	PASS	Section 7.6
	Frequency Stability	2.1055, 27.54	Fundamental emissions stay within authorized frequency block.	PASS	Section 7.9
RADIATED	Effective Radiated Power / Equivalent Isotropic Radiated Power (NR Band n77/78)	27.50(j)(3), 27.50(k)(3)	≤ 1 Watt EIRP	PASS	Section 7.7
	Radiated Spurious Emissions (NR Band n77/78)	2.1053, 27.53(l), 27.53(n)	≤ 13 dBm / MHz	PASS	Section 7.8

* The only transmitter output conducted powers included in this report are those where the Pmax value, per the tune-up document, is higher than any of the DSI power levels. For the remaining conducted power measurements, see the **RF Exposure Report**.

Table 7-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- 4) All conducted emissions measurements are performed with automated test software to capture the corresponding plots necessary to show compliance. The measurement software utilized is EMC Software Tool v1.2.2.

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 13 of 146

7.2 Conducted Output Power Data

Test Overview

All emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

Test Procedure Used

ANSI C63.26-2015 – Section 5.2

Test Settings

1. Span = 2 x OBW to 3 x OBW
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.

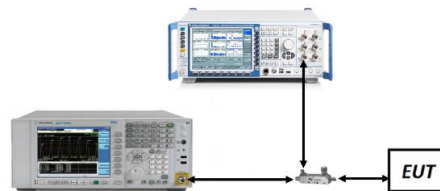


Figure 7-1. Test Instrument & Measurement Setup

Test Notes

1. Conducted power measurements were evaluated using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device.
2. All other conducted power measurements are contained in the RF exposure report for this filing.
3. Conducted power was found to reduce for the higher order QAM modulations when compared to 16QAM. Due to this trend, only the worst-case QAM (16QAM) powers are included in this section.

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 14 of 146

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	650000	3750.00	1 / 271	26.63
		656000	3840.00	1 / 136	26.59
		662000	3930.00	1 / 271	26.67
	QPSK	650000	3750.00	1 / 271	26.60
		656000	3840.00	1 / 136	26.61
		662000	3930.00	1 / 271	26.68
16-QAM	662000	3930.00	1 / 271	25.80	
90 MHz	π/2 BPSK	649668	3745.02	1 / 243	26.61
		656000	3840.00	1 / 1	26.55
		662332	3934.98	1 / 122	26.78
	QPSK	649668	3745.02	1 / 243	26.63
		656000	3840.00	1 / 1	26.63
		662332	3934.98	1 / 122	26.76
16-QAM	662332	3934.98	1 / 122	25.82	
80 MHz	π/2 BPSK	649334	3740.01	1 / 215	26.61
		656000	3840.00	1 / 1	26.60
		662666	3939.99	1 / 215	26.72
	QPSK	649334	3740.01	1 / 215	26.64
		656000	3840.00	1 / 1	26.59
		662666	3939.99	1 / 215	26.74
16-QAM	662666	3939.99	1 / 215	25.87	
70 MHz	π/2 BPSK	649000	3735.00	1 / 187	26.51
		656000	3840.00	1 / 94	26.52
		663000	3945.00	1 / 94	26.75
	QPSK	649000	3735.00	1 / 187	26.50
		656000	3840.00	1 / 94	26.77
		663000	3945.00	1 / 94	26.80
16-QAM	663000	3945.00	1 / 94	25.77	
60 MHz	π/2 BPSK	648668	3730.02	1 / 160	26.42
		656000	3840.00	1 / 1	26.72
		663332	3949.98	1 / 81	26.64
	QPSK	648668	3730.02	1 / 160	26.41
		656000	3840.00	1 / 1	26.43
		663332	3949.98	1 / 81	26.66
16-QAM	663332	3949.98	1 / 81	25.76	
50 MHz	π/2 BPSK	648334	3725.01	1 / 131	26.30
		656000	3840.00	1 / 1	26.48
		663666	3954.99	1 / 66	26.89
	QPSK	648334	3725.01	1 / 131	26.29
		656000	3840.00	1 / 1	26.47
		663666	3954.99	1 / 66	26.72
16-QAM	663666	3954.99	1 / 66	26.00	
40 MHz	π/2 BPSK	648000	3720.00	1 / 104	26.20
		656000	3840.00	1 / 1	26.47
		664000	3960.00	1 / 53	26.80
	QPSK	648000	3720.00	1 / 104	26.19
		656000	3840.00	1 / 1	26.50
		664000	3960.00	1 / 53	26.72
16-QAM	664000	3960.00	1 / 53	25.93	
30 MHz	π/2 BPSK	647668	3715.02	1 / 76	25.96
		656000	3840.00	1 / 1	26.46
		664332	3964.98	1 / 39	26.91
	QPSK	647668	3715.02	1 / 76	26.02
		656000	3840.00	1 / 1	26.46
		664332	3964.98	1 / 39	26.82
16-QAM	664332	3964.98	1 / 39	25.92	
25 MHz	π/2 BPSK	647500	3712.50	1 / 63	26.02
		656000	3840.00	1 / 32	26.49
		664500	3967.50	1 / 63	26.65
	QPSK	647500	3712.50	1 / 63	26.00
		656000	3840.00	1 / 32	26.61
		664500	3967.50	1 / 63	26.72
16-QAM	664500	3967.50	1 / 63	25.78	
20 MHz	π/2 BPSK	647334	3710.01	1 / 25	25.97
		656000	3840.00	1 / 1	26.45
		664666	3969.99	1 / 49	26.77
	QPSK	647334	3710.01	1 / 25	26.23
		656000	3840.00	1 / 1	26.43
		664666	3969.99	1 / 49	26.75
16-QAM	664666	3969.99	1 / 49	25.92	
15 MHz	π/2 BPSK	647168	3707.52	1 / 36	25.75
		656000	3840.00	1 / 19	26.55
		664832	3972.48	1 / 19	26.68
	QPSK	647168	3707.52	1 / 36	25.72
		656000	3840.00	1 / 19	26.69
		664832	3972.48	1 / 19	26.71
16-QAM	664832	3972.48	1 / 19	25.90	
10 MHz	π/2 BPSK	647000	3705.00	1 / 22	25.63
		656000	3840.00	1 / 1	26.44
		664332	3975.00	1 / 22	26.69
	QPSK	647000	3705.00	1 / 22	25.69
		656000	3840.00	1 / 1	26.43
		664332	3975.00	1 / 22	26.72
16-QAM	664332	3975.00	1 / 22	25.81	

Table 7-2. Conducted Power Measurement (NR n77 C-Band) – Ant1

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 15 of 146



Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]		
100 MHz	π/2 BPSK	633334	3500.01	1 / 271	26.56		
		633334	3500.01	1 / 271	26.58		
		633334	3500.01	1 / 271	25.73		
90 MHz	π/2 BPSK	633000	3495.00	1 / 243	26.30		
		633334	3500.01	1 / 243	26.45		
		633666	3504.99	1 / 243	26.63		
	QPSK	633000	3495.00	1 / 243	26.35		
		633334	3500.01	1 / 243	26.46		
		633666	3504.99	1 / 243	26.65		
	16-QAM	633666	3504.99	1 / 243	25.80		
		80 MHz	π/2 BPSK	632668	3490.02	1 / 215	26.25
				633334	3500.01	1 / 215	26.43
634000	3510.00			1 / 215	26.59		
QPSK	632668		3490.02	1 / 215	26.28		
	633334		3500.01	1 / 215	26.42		
	634000		3510.00	1 / 215	26.60		
16-QAM	634000	3510.00	1 / 215	25.73			
	70 MHz	π/2 BPSK	632334	3485.01	1 / 1	26.12	
			633334	3500.01	1 / 187	26.29	
634332			3514.98	1 / 187	26.49		
QPSK		632334	3485.01	1 / 1	26.14		
		633334	3500.01	1 / 187	26.30		
		634332	3514.98	1 / 187	26.52		
16-QAM	634332	3514.98	1 / 187	25.68			
	60 MHz	π/2 BPSK	632000	3480.00	1 / 1	25.99	
			633334	3500.01	1 / 160	26.18	
634666			3519.99	1 / 160	26.49		
QPSK		632000	3480.00	1 / 1	26.01		
		633334	3500.01	1 / 160	26.19		
		634666	3519.99	1 / 160	26.52		
16-QAM	634666	3519.99	1 / 160	25.63			
	50 MHz	π/2 BPSK	631668	3475.02	1 / 1	26.01	
			633334	3500.01	1 / 131	26.15	
635000			3525.00	1 / 131	26.38		
QPSK		631668	3475.02	1 / 1	26.05		
		633334	3500.01	1 / 131	26.11		
		635000	3525.00	1 / 131	26.41		
16-QAM	635000	3525.00	1 / 131	25.52			
	40 MHz	π/2 BPSK	631334	3470.01	1 / 1	26.05	
			633334	3500.01	1 / 104	26.06	
635332			3529.98	1 / 104	26.49		
QPSK		631334	3470.01	1 / 1	26.04		
		633334	3500.01	1 / 104	26.12		
		635332	3529.98	1 / 104	26.52		
16-QAM	635332	3529.98	1 / 104	25.62			
	30 MHz	π/2 BPSK	631000	3465.00	1 / 1	26.08	
			633334	3500.01	1 / 76	25.99	
635666			3534.99	1 / 76	26.62		
QPSK		631000	3465.00	1 / 1	26.04		
		633334	3500.01	1 / 76	26.06		
		635666	3534.99	1 / 76	26.69		
16-QAM	635666	3534.99	1 / 76	25.76			
	25 MHz	π/2 BPSK	630834	3462.51	1 / 32	26.05	
			633334	3500.01	1 / 63	26.00	
635832			3537.48	1 / 63	26.53		
QPSK		630834	3462.51	1 / 32	26.45		
		633334	3500.01	1 / 63	25.98		
		635832	3537.48	1 / 63	26.50		
16-QAM	635832	3537.48	1 / 63	25.62			
	20 MHz	π/2 BPSK	630668	3460.02	1 / 1	26.16	
			633334	3500.01	1 / 25	25.98	
636000			3540.00	1 / 25	26.61		
QPSK		630668	3460.02	1 / 1	26.16		
		633334	3500.01	1 / 25	26.25		
		636000	3540.00	1 / 25	26.69		
16-QAM	636000	3540.00	1 / 25	25.56			
	15 MHz	π/2 BPSK	630500	3457.50	1 / 1	26.12	
			633334	3500.01	1 / 36	25.93	
636166			3542.49	1 / 36	26.61		
QPSK		630500	3457.50	1 / 1	26.14		
		633334	3500.01	1 / 36	25.93		
		636166	3542.49	1 / 36	26.59		
16-QAM	636166	3542.49	1 / 36	25.71			
	10 MHz	π/2 BPSK	630334	3455.01	1 / 1	26.10	
			633334	3500.01	1 / 22	25.91	
636332			3544.98	1 / 22	26.63		
QPSK		630334	3455.01	1 / 1	26.15		
		633334	3500.01	1 / 22	26.00		
		636332	3544.98	1 / 22	26.70		
16-QAM	636332	3544.98	1 / 22	25.67			

Table 7-3. Conducted Power Measurement (NR n77 DoD) – Ant1

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 16 of 146

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	633334	3500.01	1 / 1	25.34
		636666	3549.99	1 / 271	26.14
		640000	3600.00	1 / 136	26.21
	QPSK	633334	3500.01	1 / 1	25.35
		636666	3549.99	1 / 271	26.08
		640000	3600.00	1 / 136	26.47
16-QAM	633334	3500.01	1 / 1	24.42	
90 MHz	π/2 BPSK	633000	3495.00	1 / 1	25.31
		636666	3549.99	1 / 243	26.01
		640332	3604.98	1 / 122	26.24
	QPSK	633000	3495.00	1 / 1	25.34
		636666	3549.99	1 / 243	26.07
		640332	3604.98	1 / 122	26.28
16-QAM	633000	3495.00	1 / 1	24.44	
80 MHz	π/2 BPSK	632668	3490.02	1 / 1	25.33
		636666	3549.99	1 / 215	26.17
		640666	3609.99	1 / 108	26.21
	QPSK	632668	3490.02	1 / 1	25.36
		636666	3549.99	1 / 215	26.13
		640666	3609.99	1 / 108	26.18
16-QAM	632668	3490.02	1 / 1	24.43	
70 MHz	π/2 BPSK	632334	3485.01	1 / 1	25.28
		636666	3549.99	1 / 187	26.02
		641000	3615.00	1 / 94	26.04
	QPSK	632334	3485.01	1 / 1	25.26
		636666	3549.99	1 / 187	26.06
		641000	3615.00	1 / 94	25.96
16-QAM	632334	3485.01	1 / 1	24.39	
60 MHz	π/2 BPSK	632000	3480.00	1 / 1	25.42
		636666	3549.99	1 / 160	26.05
		641332	3619.98	1 / 1	26.14
	QPSK	632000	3480.00	1 / 1	25.43
		636666	3549.99	1 / 160	26.06
		641332	3619.98	1 / 1	26.13
16-QAM	632000	3480.00	1 / 1	24.56	
50 MHz	π/2 BPSK	631668	3475.02	1 / 1	25.30
		636666	3549.99	1 / 131	25.94
		641666	3624.99	1 / 66	26.37
	QPSK	631668	3475.02	1 / 1	25.29
		636666	3549.99	1 / 131	25.94
		641666	3624.99	1 / 66	26.23
16-QAM	631668	3475.02	1 / 1	24.48	
40 MHz	π/2 BPSK	631334	3470.01	1 / 1	25.52
		636666	3549.99	1 / 104	25.95
		642000	3630.00	1 / 1	26.20
	QPSK	631334	3470.01	1 / 1	25.46
		636666	3549.99	1 / 104	25.91
		642000	3630.00	1 / 1	26.15
16-QAM	631334	3470.01	1 / 1	24.59	
30 MHz	π/2 BPSK	631000	3465.00	1 / 1	25.39
		636666	3549.99	1 / 76	25.79
		642332	3634.98	1 / 1	26.28
	QPSK	631000	3465.00	1 / 1	25.40
		636666	3549.99	1 / 76	25.81
		642332	3634.98	1 / 1	26.29
16-QAM	631000	3465.00	1 / 1	24.53	
25 MHz	π/2 BPSK	630834	3462.51	1 / 1	25.57
		636666	3549.99	1 / 63	25.75
		642500	3637.50	1 / 1	26.09
	QPSK	630834	3462.51	1 / 1	25.58
		636666	3549.99	1 / 63	25.74
		642500	3637.50	1 / 1	26.09
16-QAM	630834	3462.51	1 / 1	24.70	
20 MHz	π/2 BPSK	630668	3460.02	1 / 1	25.44
		636666	3549.99	1 / 49	25.63
		642666	3639.99	1 / 25	26.12
	QPSK	630668	3460.02	1 / 25	25.52
		636666	3549.99	1 / 25	25.83
		642666	3639.99	1 / 1	26.01
16-QAM	630668	3460.02	1 / 25	24.73	
15 MHz	π/2 BPSK	630500	3457.50	1 / 1	25.37
		636666	3549.99	1 / 36	25.58
		642833	3642.50	1 / 19	26.12
	QPSK	630500	3457.50	1 / 1	25.39
		636666	3549.99	1 / 36	25.52
		642833	3642.50	1 / 19	26.06
16-QAM	630500	3457.50	1 / 1	24.46	
10 MHz	π/2 BPSK	630336	3455.04	1 / 1	25.36
		636666	3549.99	1 / 22	25.56
		643000	3645.00	1 / 1	25.87
	QPSK	630336	3455.04	1 / 1	25.38
		636666	3549.99	1 / 22	25.60
		643000	3645.00	1 / 1	25.90
16-QAM	630336	3455.04	1 / 1	24.40	

Table 7-4. Conducted Power Measurement (NR n78) – Ant1

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 17 of 146

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	650000	3750.00	1 / 136	14.72
		656000	3840.00	1 / 204	14.07
		662000	3930.00	1 / 68	14.04
	QPSK	650000	3750.00	1 / 136	14.80
		656000	3840.00	1 / 204	14.07
		662000	3930.00	1 / 68	14.14
	16-QAM	650000	3750.00	1 / 136	13.44

Table 7-5. Conducted Power Measurement (NR n77 C-Band) – Ant2

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	633334	3500.01	1 / 136	13.71
	QPSK	633334	3500.01	1 / 136	13.54
	16-QAM	633334	3500.01	1 / 136	12.49

Table 7-6. Conducted Power Measurement (NR n77 DoD) – Ant2

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	650000	3750.00	1 / 136	10.46
		656000	3840.00	1 / 136	9.72
		662000	3930.00	1 / 68	9.69
	QPSK	650000	3750.00	1 / 136	10.50
		656000	3840.00	1 / 136	9.70
		662000	3930.00	1 / 68	9.77
	16-QAM	662000	3930.00	1 / 68	8.63

Table 7-7. Conducted Power Measurement (NR n77 C-Band) – Ant3

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	633334	3500.01	1 / 136	11.53
	QPSK	633334	3500.01	1 / 136	11.52
	16-QAM	633334	3500.01	1 / 136	10.37

Table 7-8. Conducted Power Measurement (NR n77 DoD) – Ant3

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 18 of 146

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	650000	3750.00	1 / 136	12.70
		656000	3840.00	1 / 204	11.71
		662000	3930.00	1 / 68	12.01
	QPSK	650000	3750.00	1 / 136	12.77
		656000	3840.00	1 / 204	11.74
		662000	3930.00	1 / 68	11.94
16-QAM	662000	3930.00	1 / 68	10.65	

Table 7-9. Conducted Power Measurement (NR n77 C-Band) – Ant4

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	633334	3500.01	1 / 136	11.79
	QPSK	633334	3500.01	1 / 136	11.75
	16-QAM	633334	3500.01	1 / 136	10.61

Table 7-10. Conducted Power Measurement (NR n77 DoD) – Ant4

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 19 of 146

7.3 Occupied Bandwidth

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

ANSI C63.26-2015 – Section 5.4.4

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.

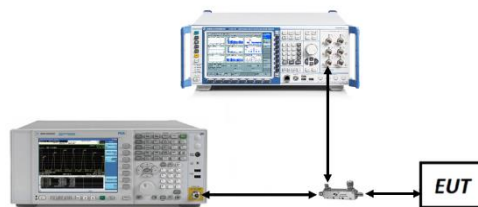


Figure 7-2. Test Instrument & Measurement Setup

Test Notes

None.

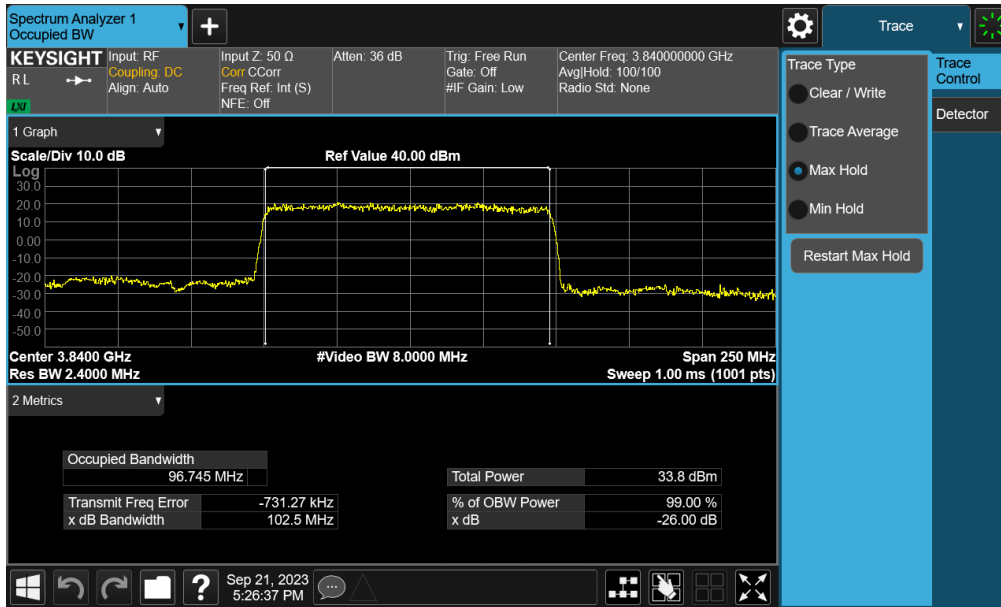
FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 20 of 146

Mode	Bandwidth	Modulation	OBW [MHz]
NR-n77/78 PC2 C-Band	100MHz	$\pi/2$ BPSK	96.75
		QPSK	97.68
		16QAM	97.91
	90MHz	$\pi/2$ BPSK	86.98
		QPSK	87.85
		16QAM	87.67
	80MHz	$\pi/2$ BPSK	77.43
		QPSK	77.68
		16QAM	77.53
	70MHz	$\pi/2$ BPSK	64.89
		QPSK	67.65
		16QAM	67.65
	60MHz	$\pi/2$ BPSK	58.03
		QPSK	58.14
		16QAM	58.03
	50MHz	$\pi/2$ BPSK	45.93
		QPSK	47.64
		16QAM	47.64
	40MHz	$\pi/2$ BPSK	35.86
		QPSK	38.07
		16QAM	37.85
	30MHz	$\pi/2$ BPSK	27.04
		QPSK	27.96
		16QAM	27.99
	25MHz	$\pi/2$ BPSK	23.02
		QPSK	23.18
		16QAM	23.30
	20MHz	$\pi/2$ BPSK	18.02
		QPSK	18.29
		16QAM	18.26
15MHz	$\pi/2$ BPSK	12.94	
	QPSK	13.66	
	16QAM	13.67	
10MHz	$\pi/2$ BPSK	8.59	
	QPSK	8.62	
	16QAM	8.62	

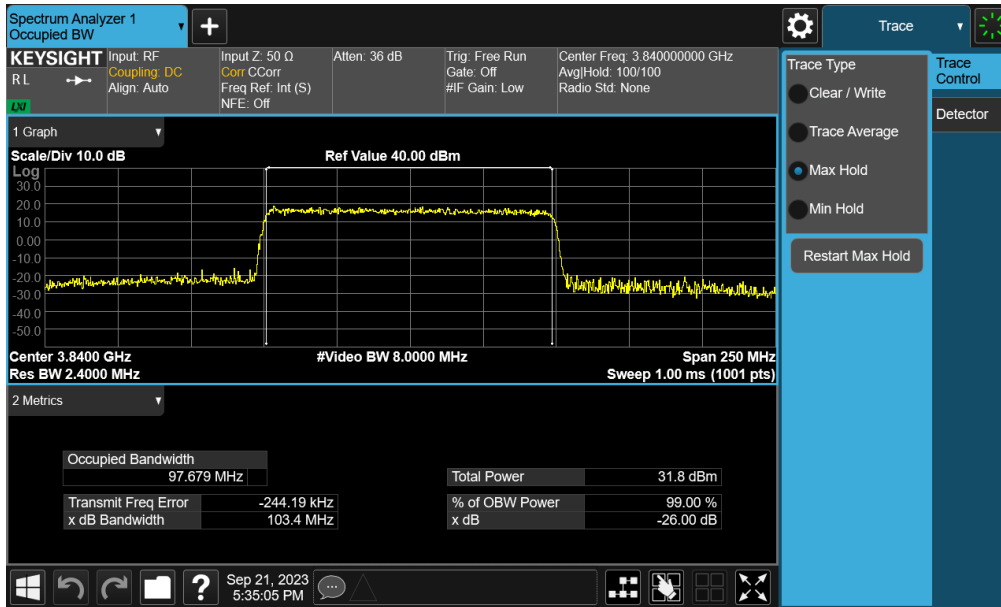
Table 7-11. Occupied Bandwidth Test Results – Ant1

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 21 of 146

NR Band n77PC2 (C-Band) – Ant1

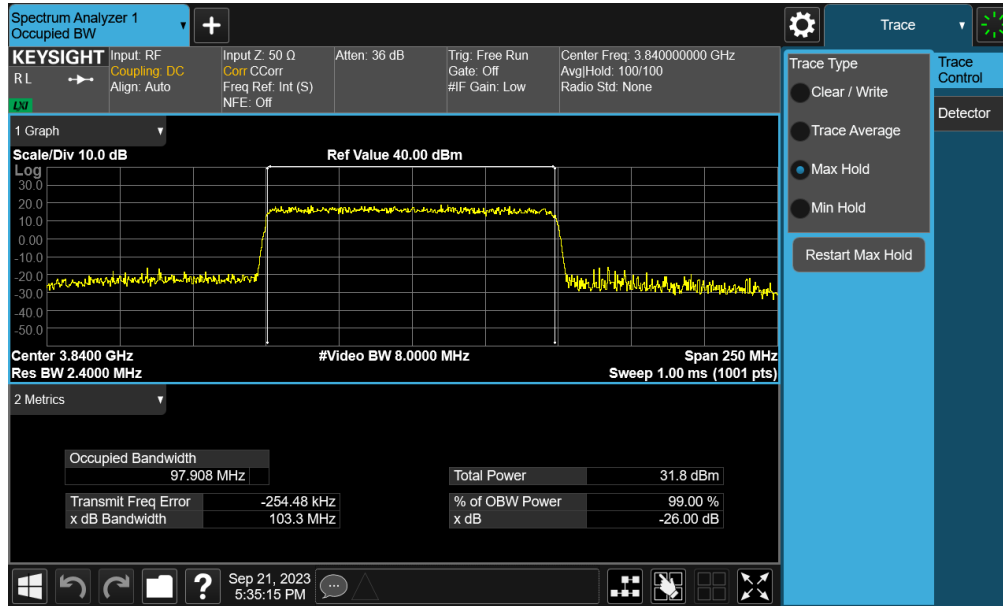


Plot 7-1. Occupied Bandwidth Plot (NR Band n77PC2 - 100MHz $\pi/2$ BPSK - Full RB - Ant1)

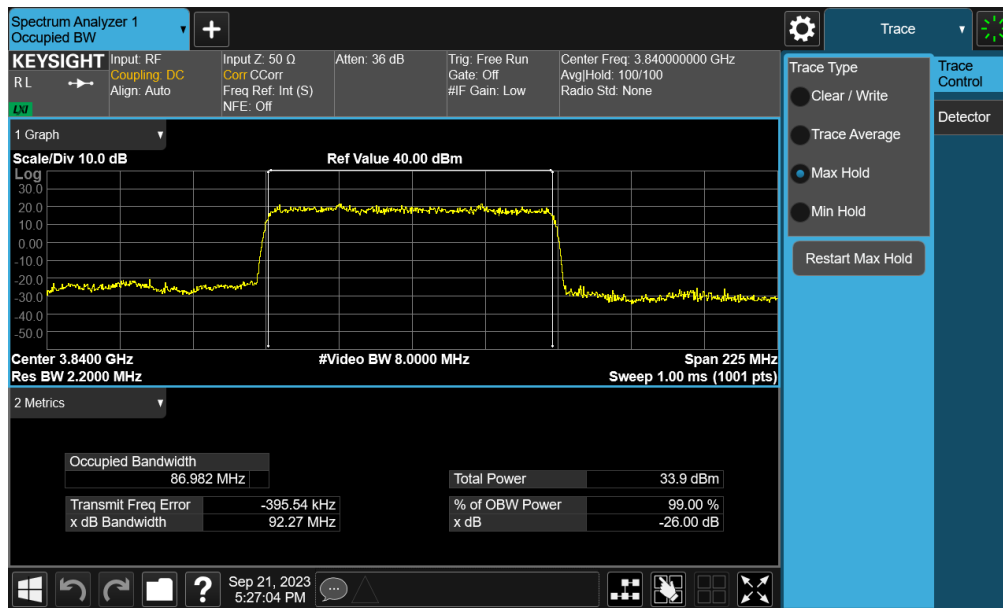


Plot 7-2. Occupied Bandwidth Plot (NR Band n77PC2 - 100MHz QPSK - Full RB - Ant1)

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 22 of 146

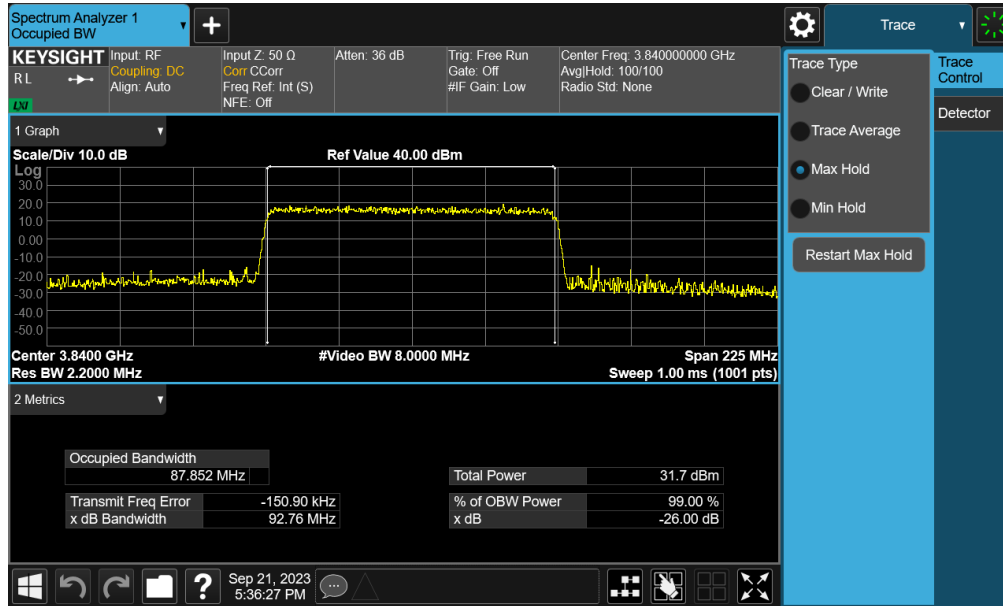


Plot 7-3. Occupied Bandwidth Plot (NR Band n77PC2 - 100MHz 16-QAM - Full RB - Ant1)

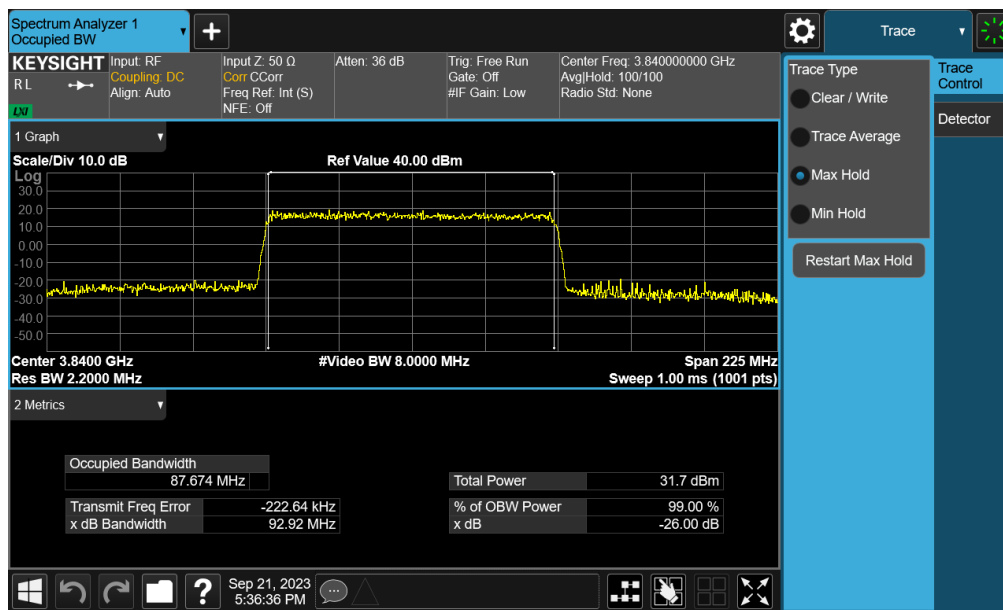


Plot 7-4. Occupied Bandwidth Plot (NR Band n77PC2 - 90MHz $\pi/2$ BPSK - Full RB - Ant1)

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 23 of 146

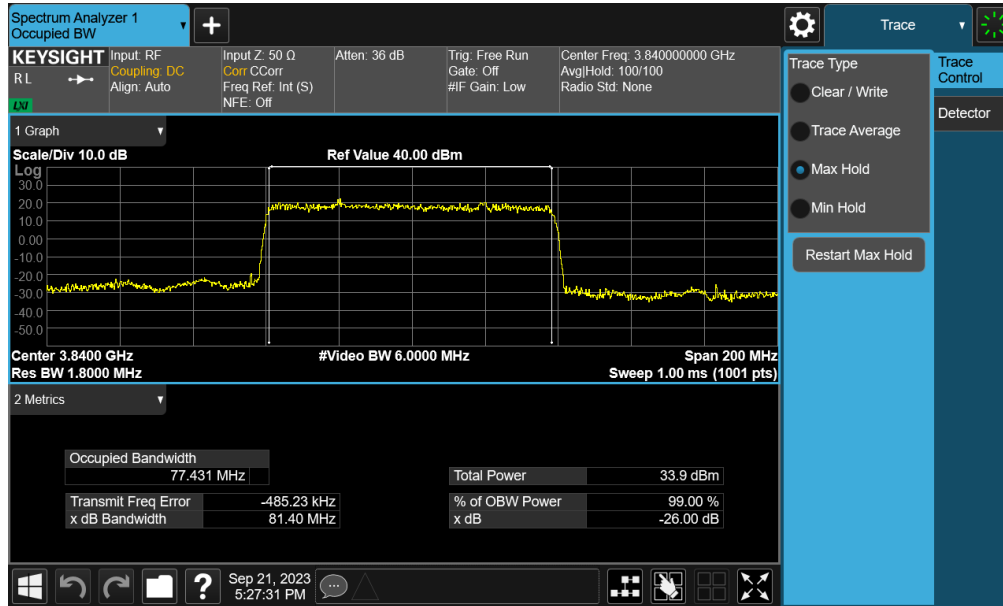


Plot 7-5. Occupied Bandwidth Plot (NR Band n77PC2 - 90MHz QPSK - Full RB - Ant1)

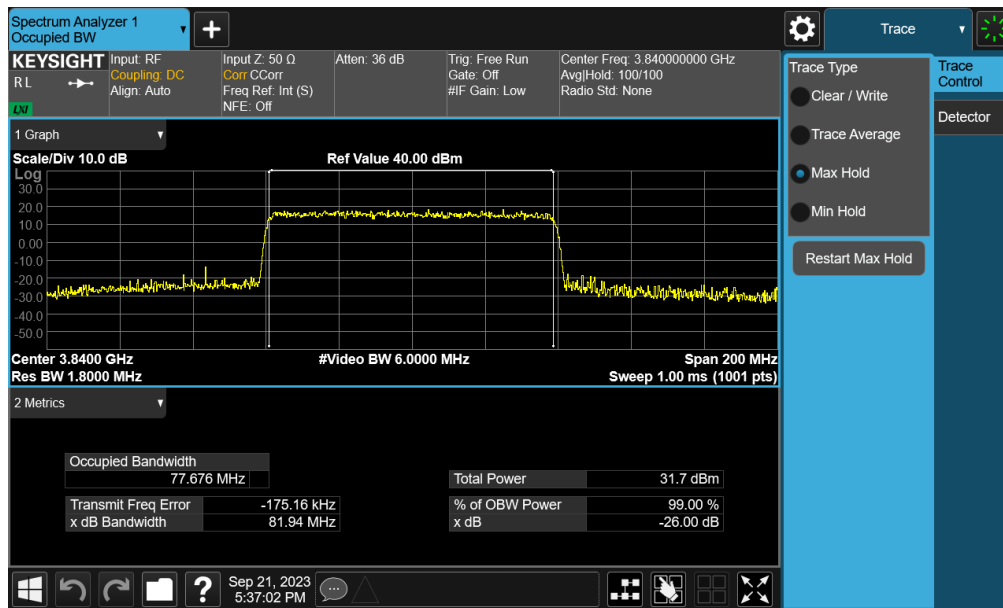


Plot 7-6. Occupied Bandwidth Plot (NR Band n77PC2 - 90MHz 16-QAM - Full RB - Ant1)

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 24 of 146

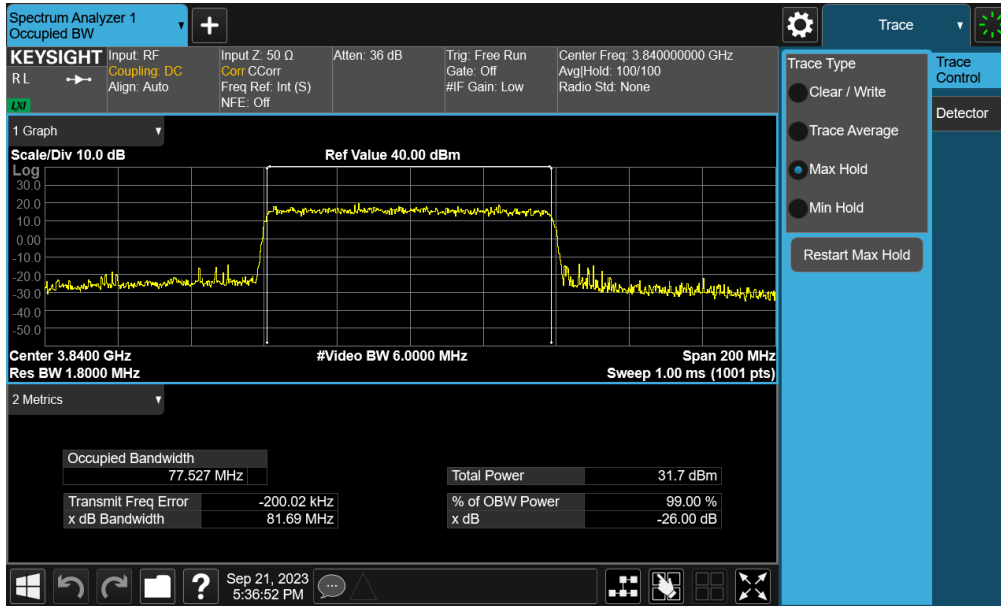


Plot 7-7. Occupied Bandwidth Plot (NR Band n77PC2 - 80MHz $\pi/2$ BPSK - Full RB - Ant1)

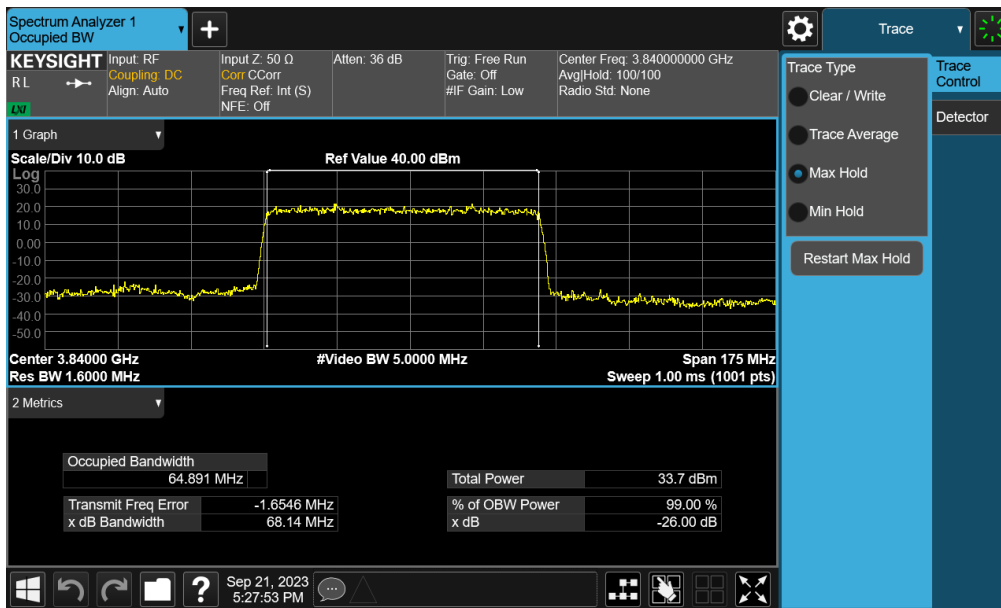


Plot 7-8. Occupied Bandwidth Plot (NR Band n77PC2 - 80MHz QPSK - Full RB - Ant1)

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 25 of 146

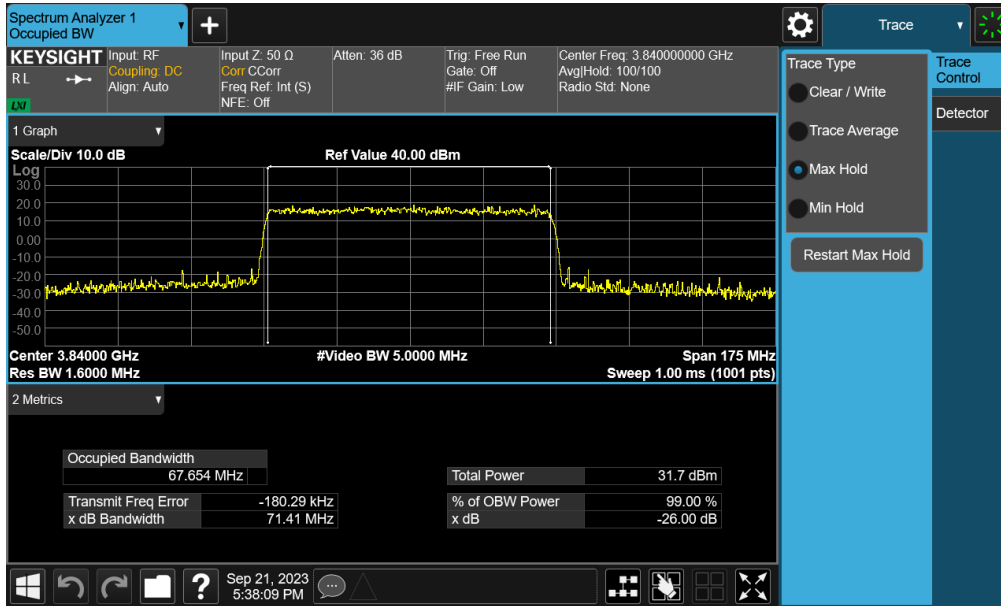


Plot 7-9. Occupied Bandwidth Plot (NR Band n77PC2 - 80MHz 16-QAM - Full RB - Ant1)

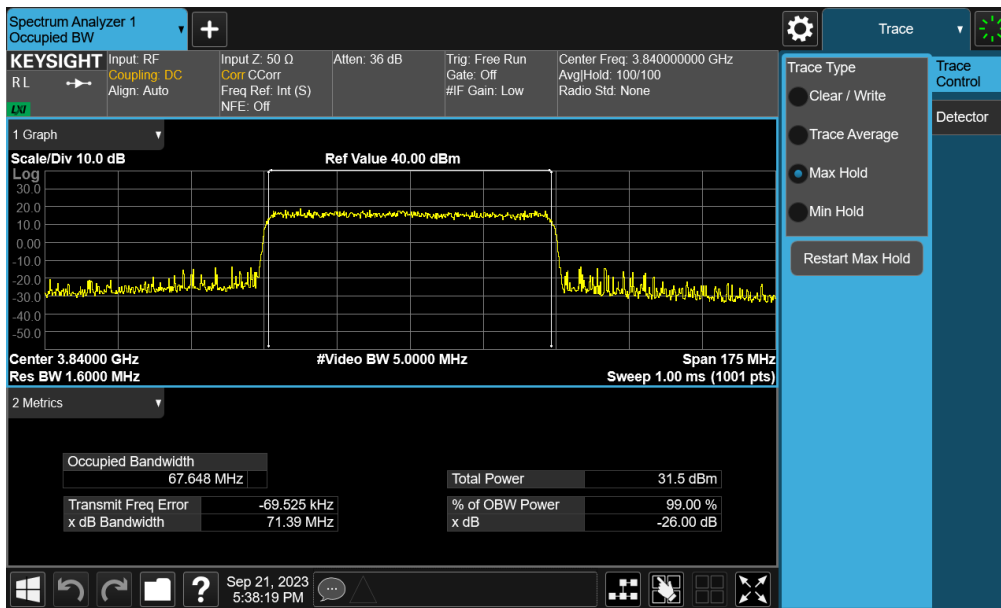


Plot 7-10. Occupied Bandwidth Plot (NR Band n77PC2 - 70MHz $\pi/2$ BPSK - Full RB - Ant1)

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 26 of 146

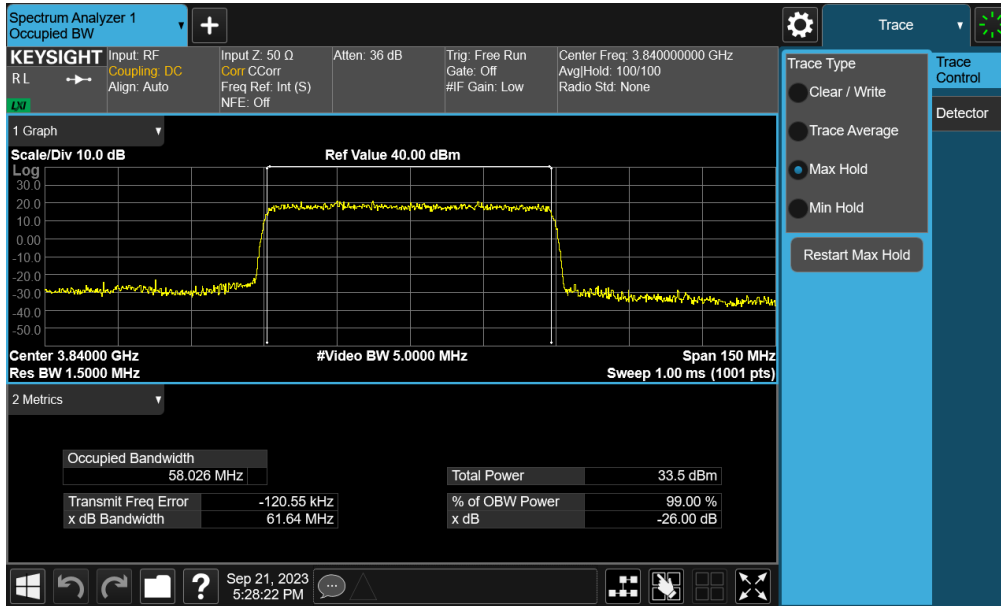


Plot 7-11. Occupied Bandwidth Plot (NR Band n77PC2 - 70MHz QPSK - Full RB - Ant1)

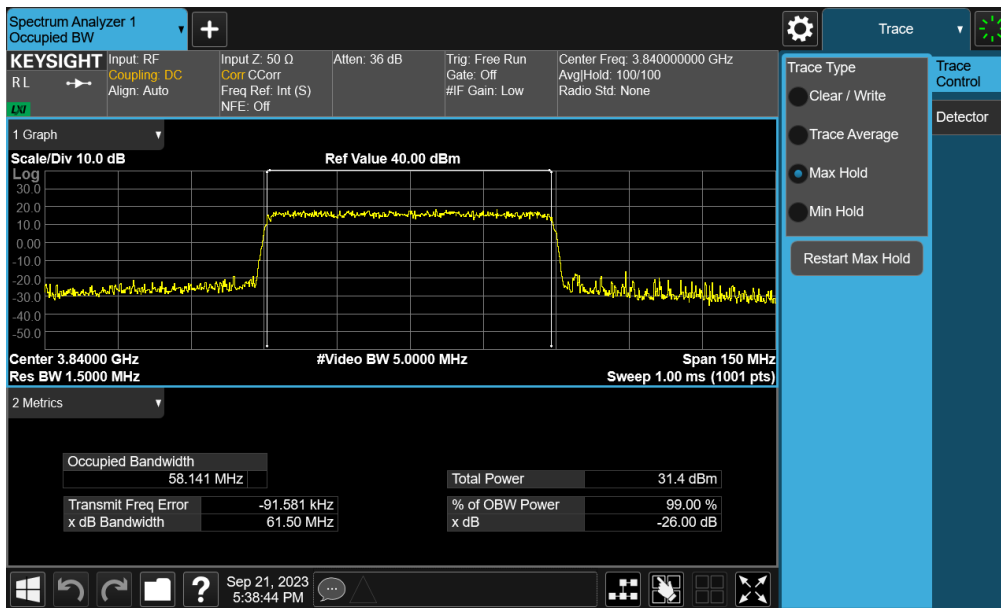


Plot 7-12. Occupied Bandwidth Plot (NR Band n77PC2 - 70MHz 16-QAM - Full RB - Ant1)

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 27 of 146

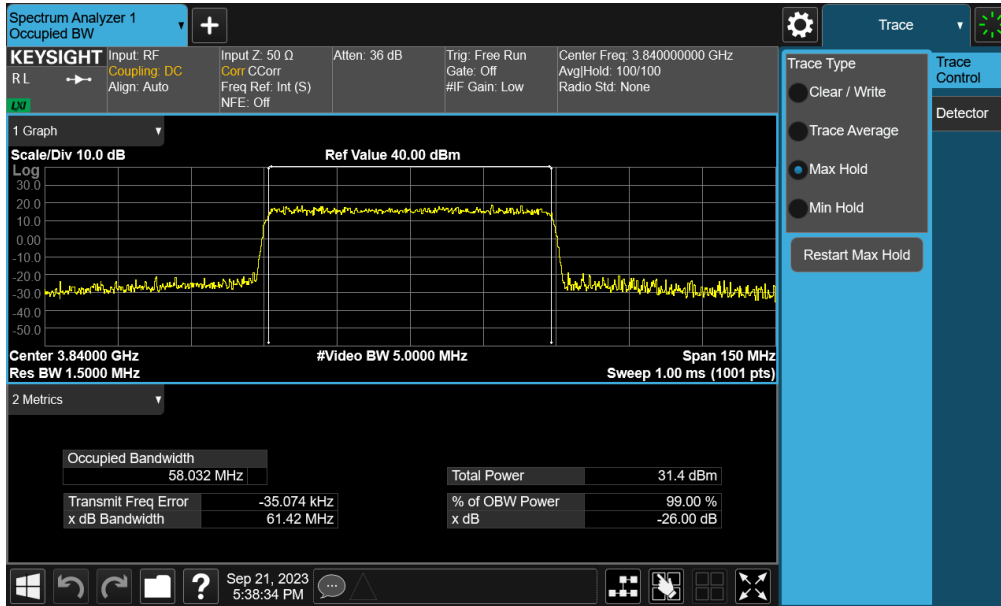


Plot 7-13. Occupied Bandwidth Plot (NR Band n77PC2 - 60MHz $\pi/2$ BPSK - Full RB - Ant1)

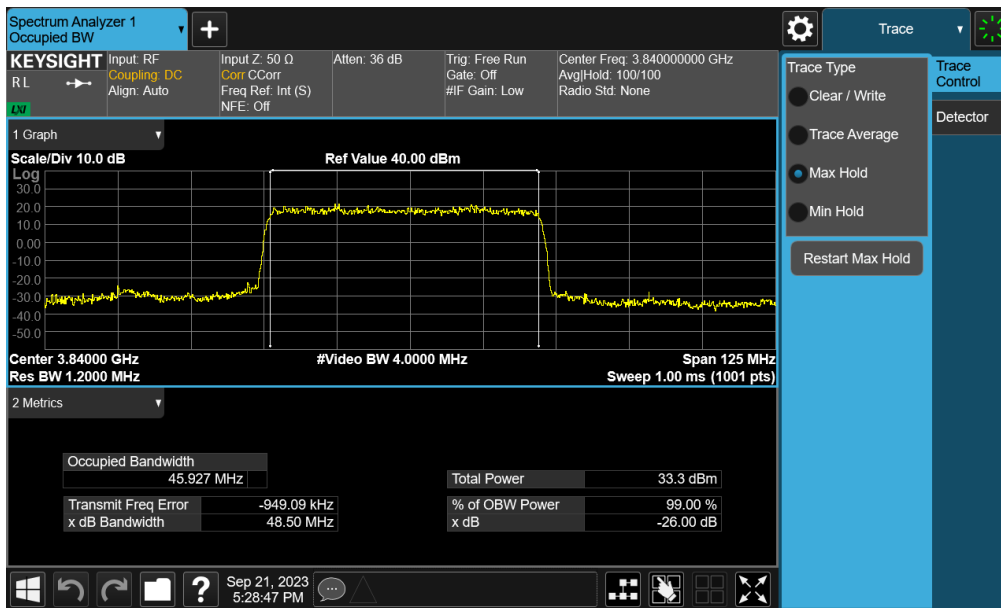


Plot 7-14. Occupied Bandwidth Plot (NR Band n77PC2 - 60MHz QPSK - Full RB - Ant1)

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 28 of 146

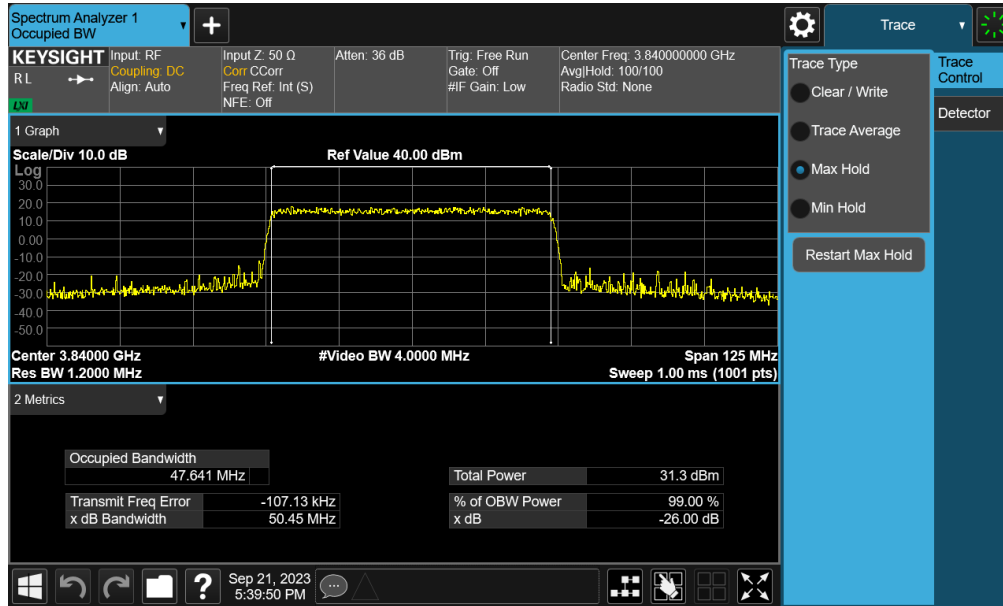


Plot 7-15. Occupied Bandwidth Plot (NR Band n77PC2 - 60MHz 16-QAM - Full RB - Ant1)

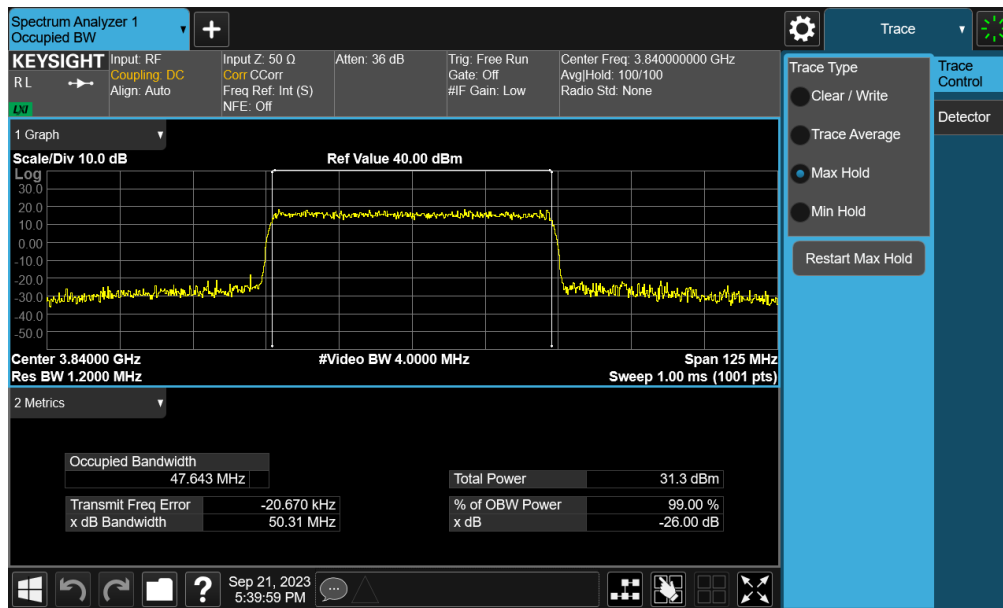


Plot 7-16. Occupied Bandwidth Plot (NR Band n77PC2 - 50MHz $\pi/2$ BPSK - Full RB - Ant1)

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 29 of 146

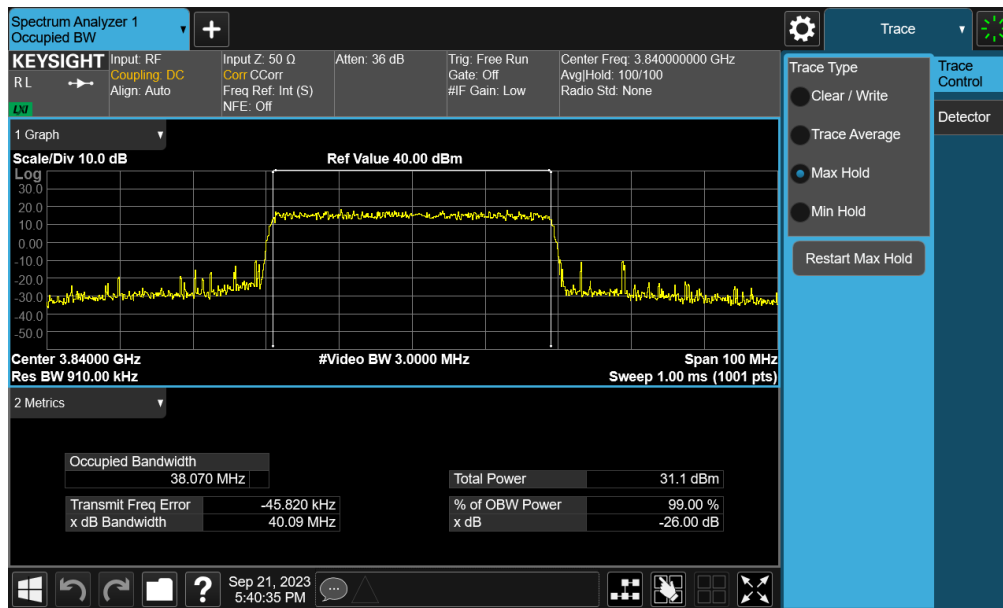
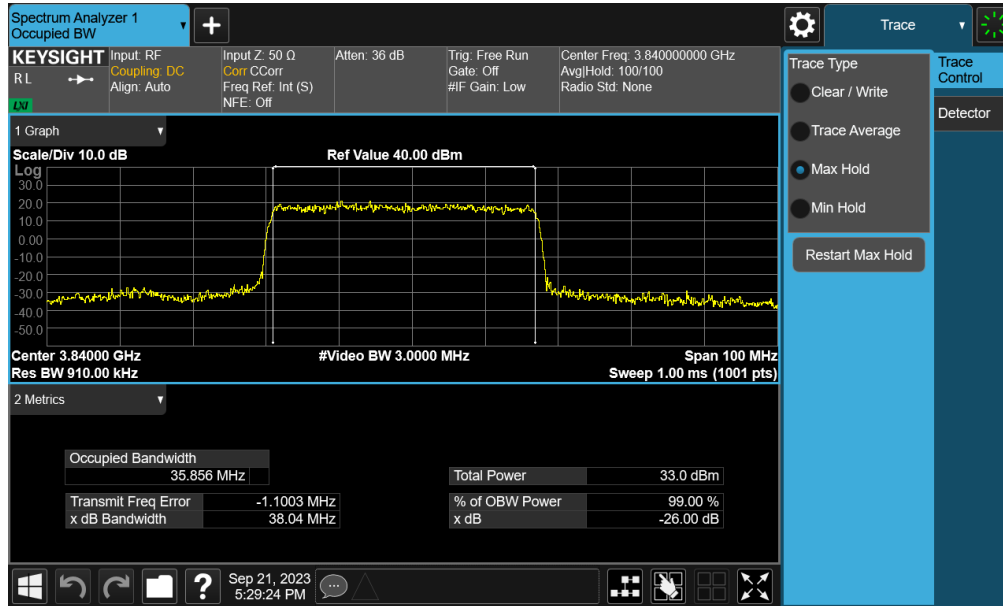


Plot 7-17. Occupied Bandwidth Plot (NR Band n77PC2 - 50MHz QPSK - Full RB - Ant1)

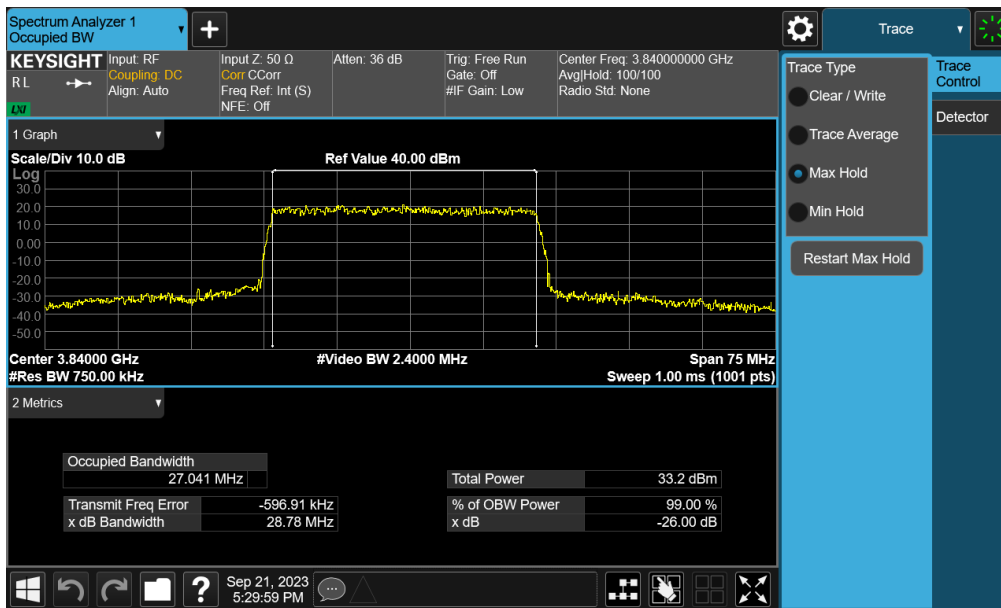
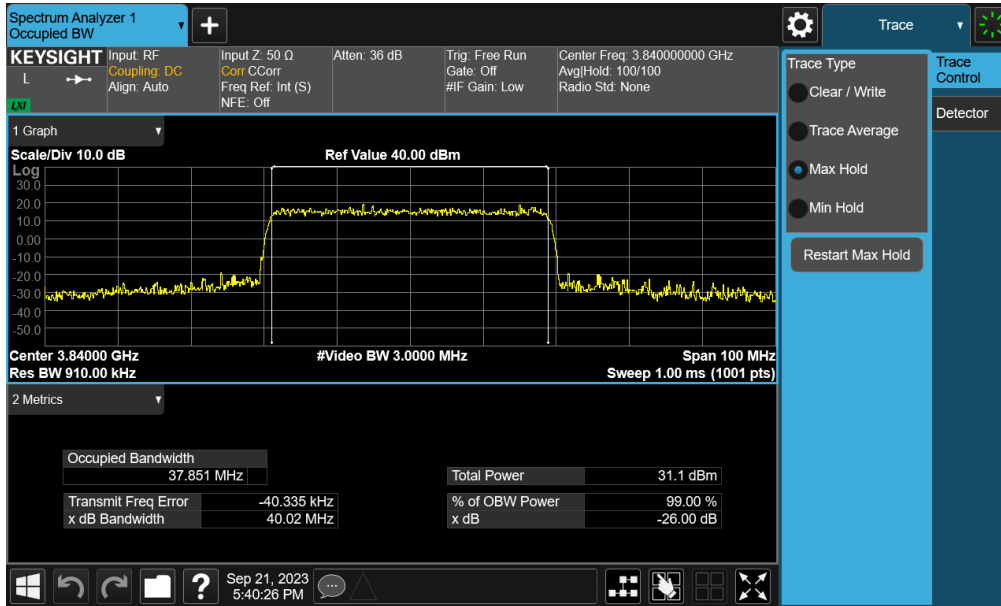


Plot 7-18. Occupied Bandwidth Plot (NR Band n77PC2 - 50MHz 16-QAM - Full RB - Ant1)

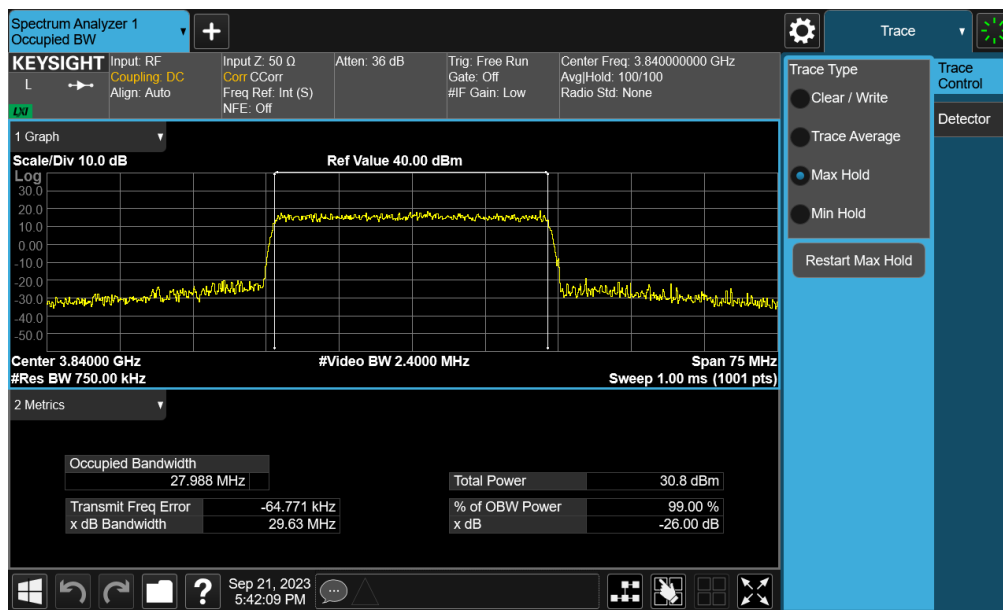
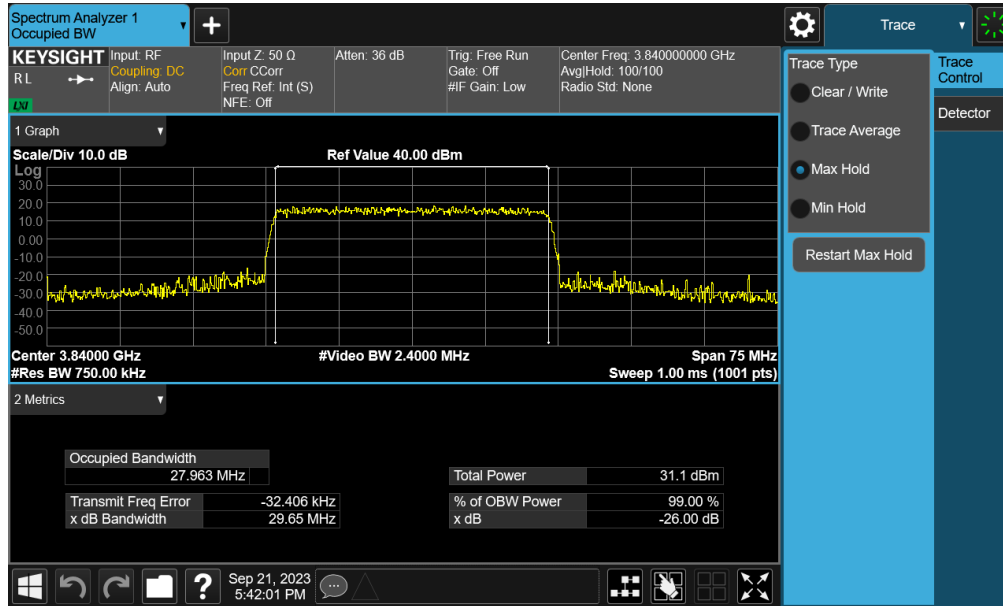
FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 30 of 146



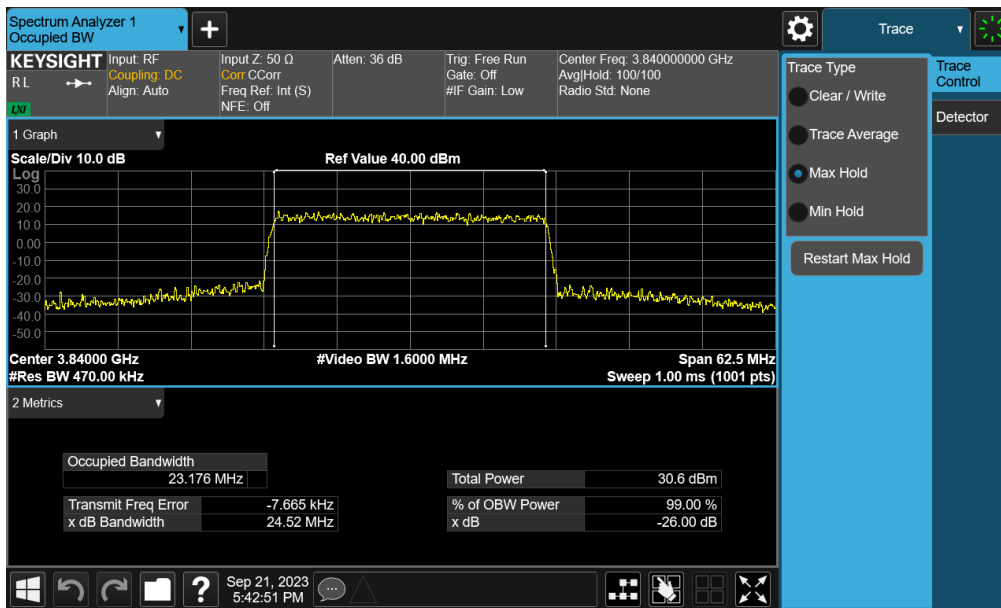
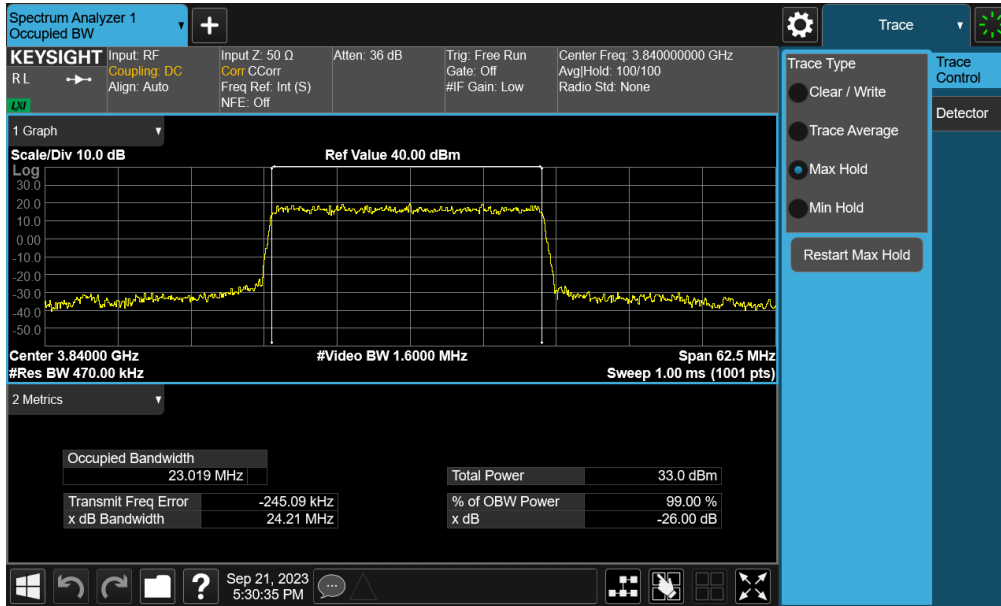
FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 31 of 146



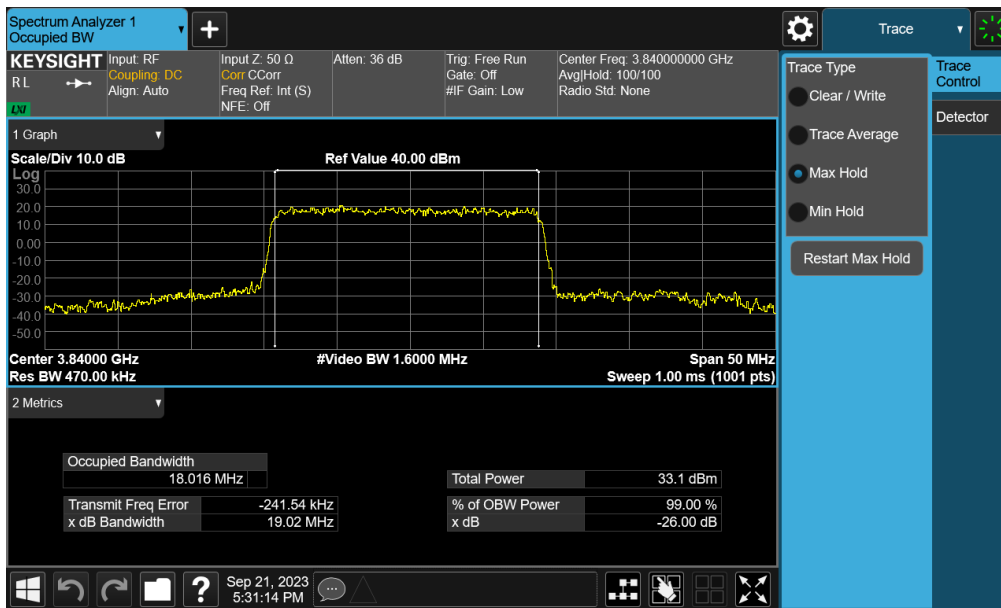
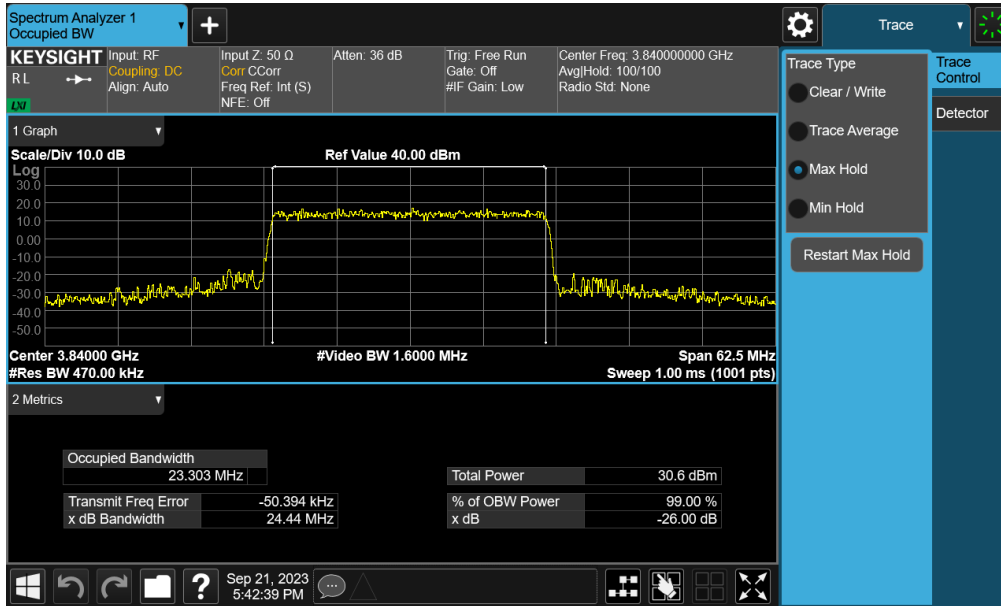
FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 32 of 146



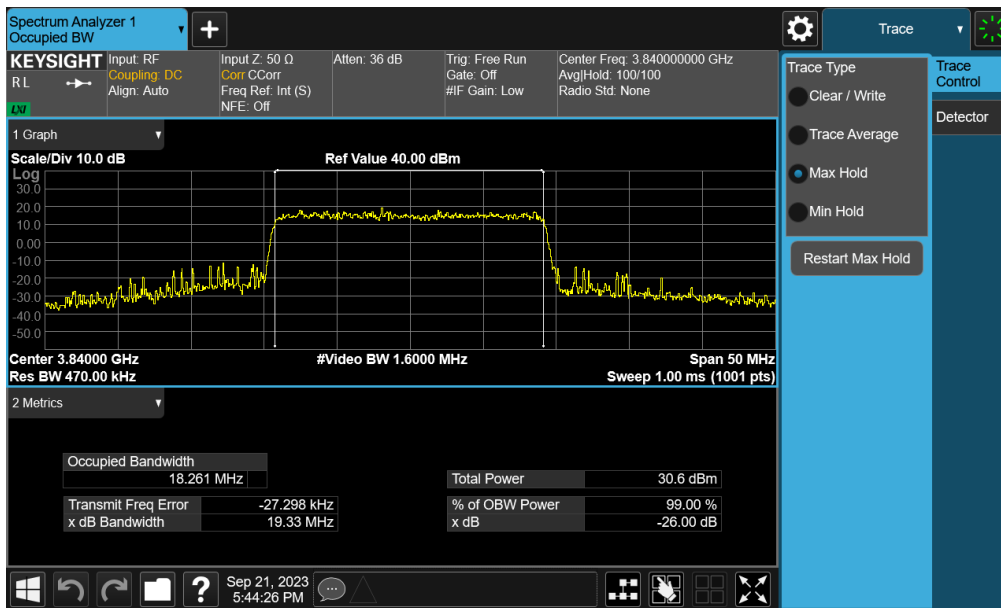
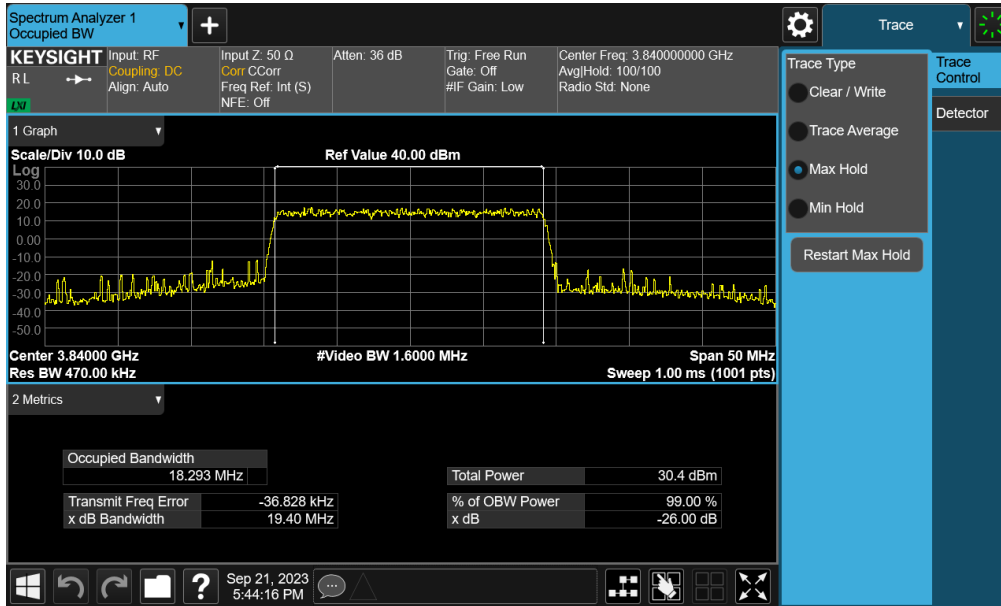
FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 33 of 146



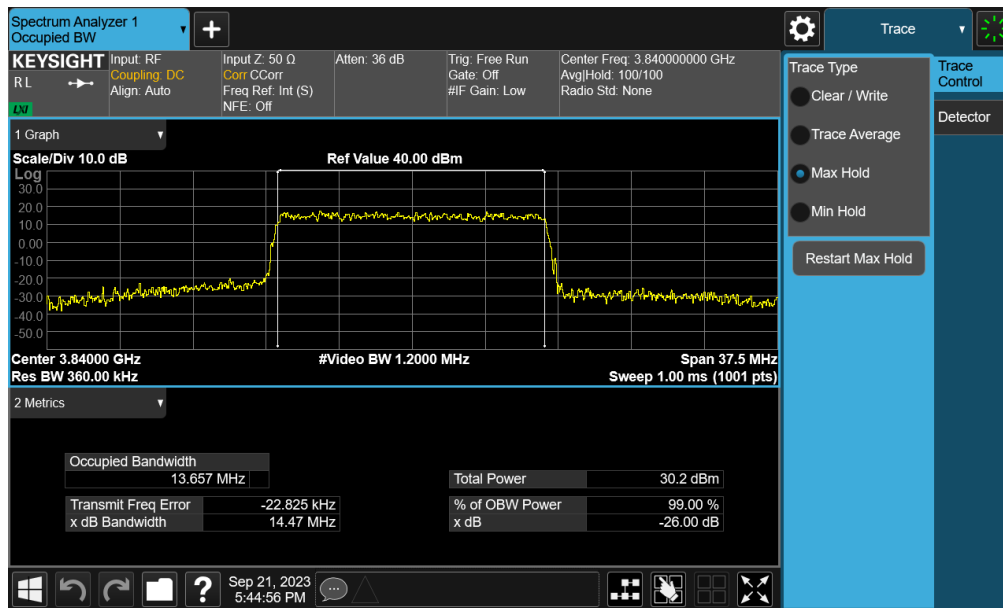
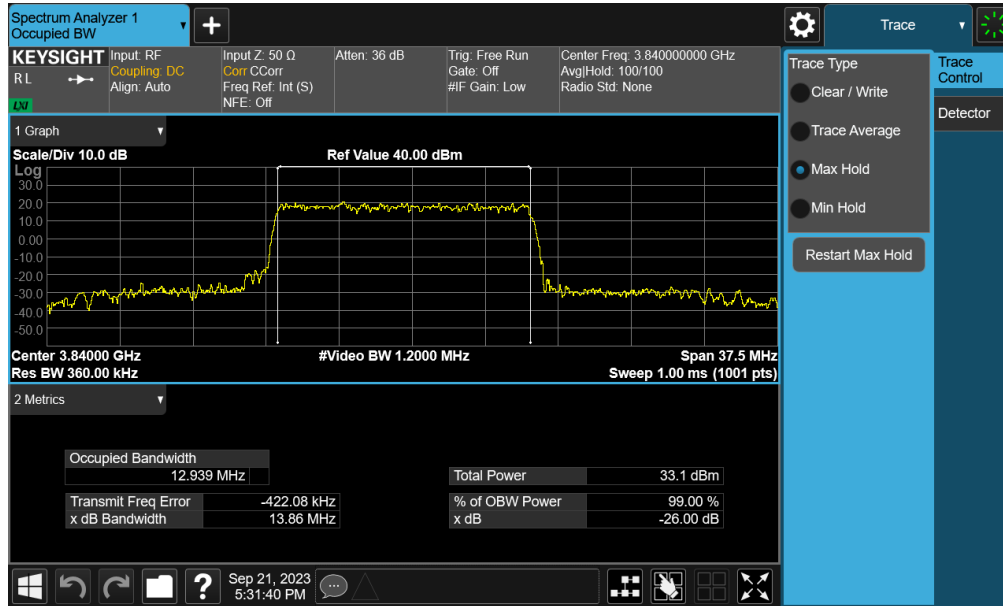
FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 34 of 146



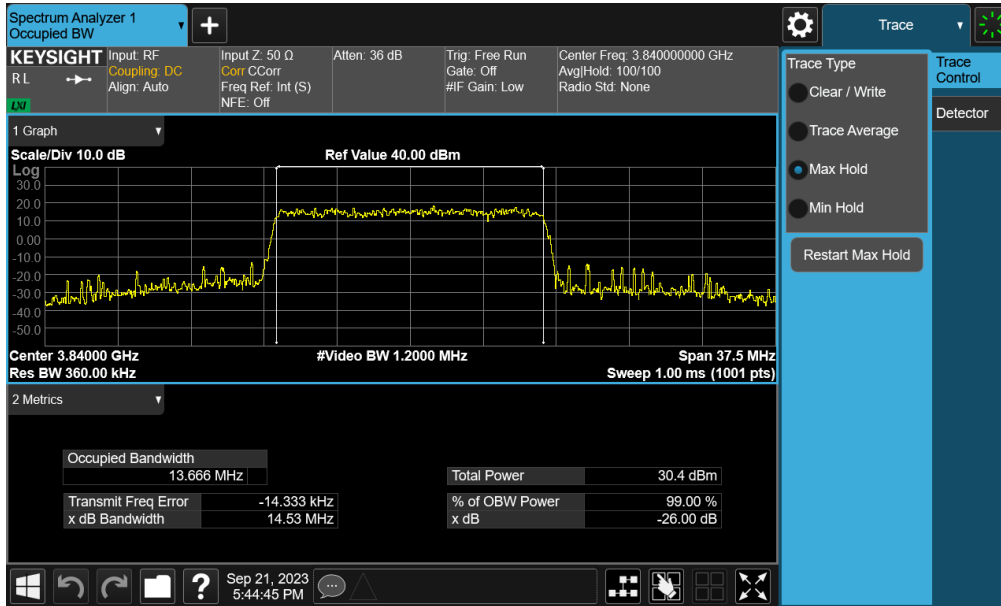
FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 35 of 146



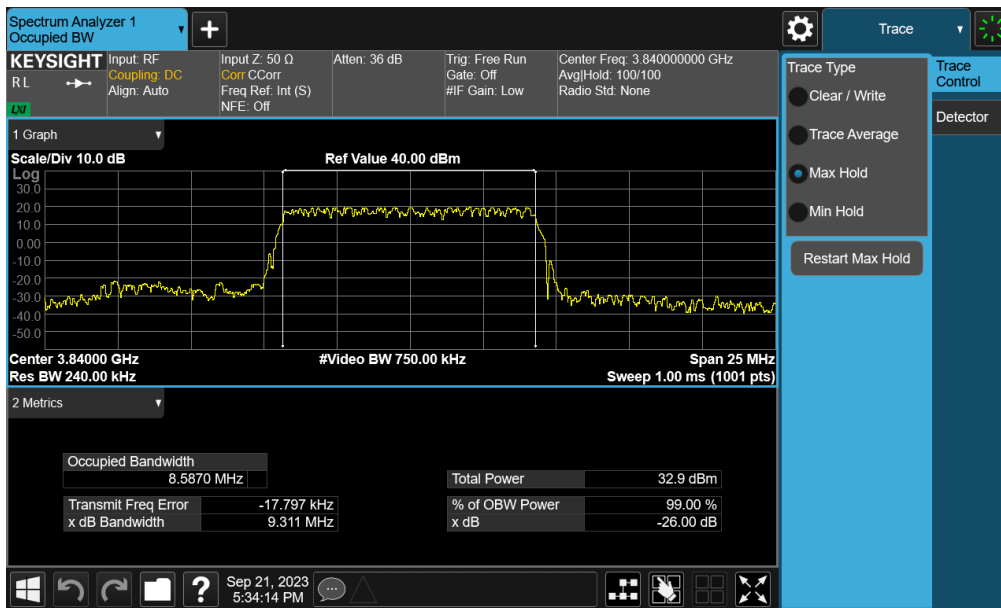
FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 36 of 146



FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 37 of 146

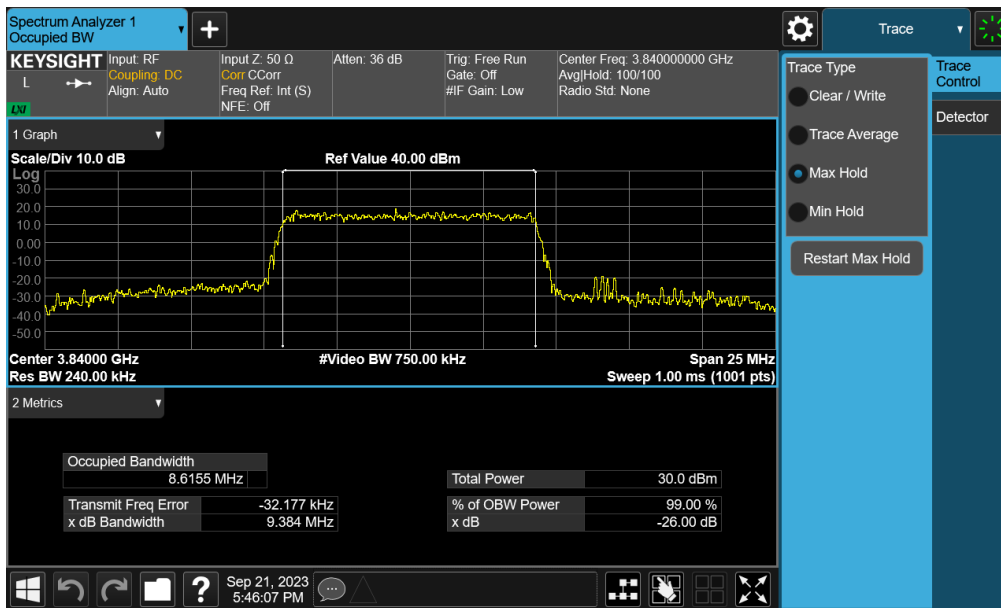
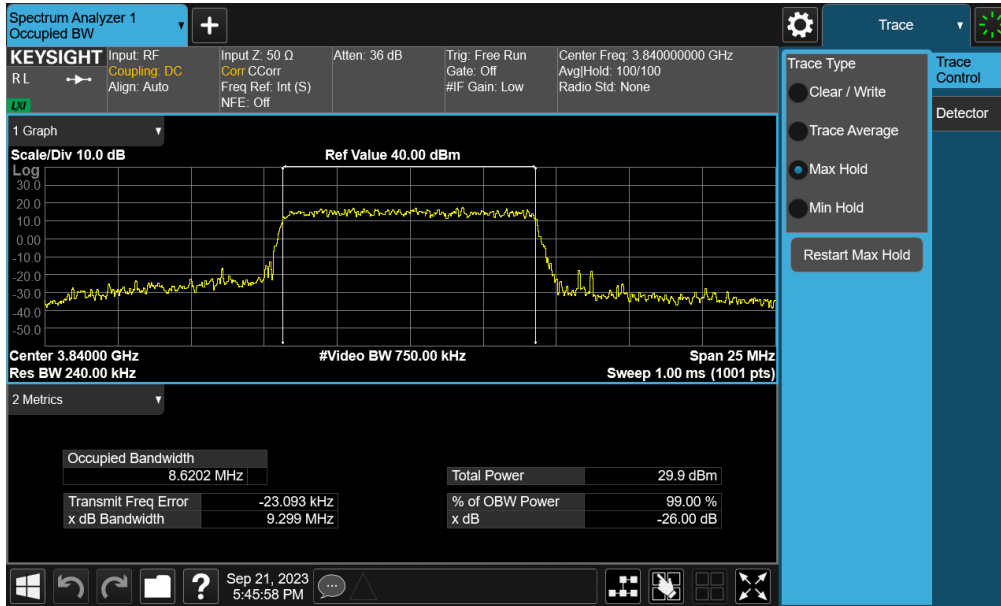


Plot 7-33. Occupied Bandwidth Plot (NR Band n77PC2 - 15MHz 16-QAM - Full RB - Ant1)



Plot 7-34. Occupied Bandwidth Plot (NR Band n77PC2 - 10MHz $\pi/2$ BPSK - Full RB - Ant1)

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 38 of 146



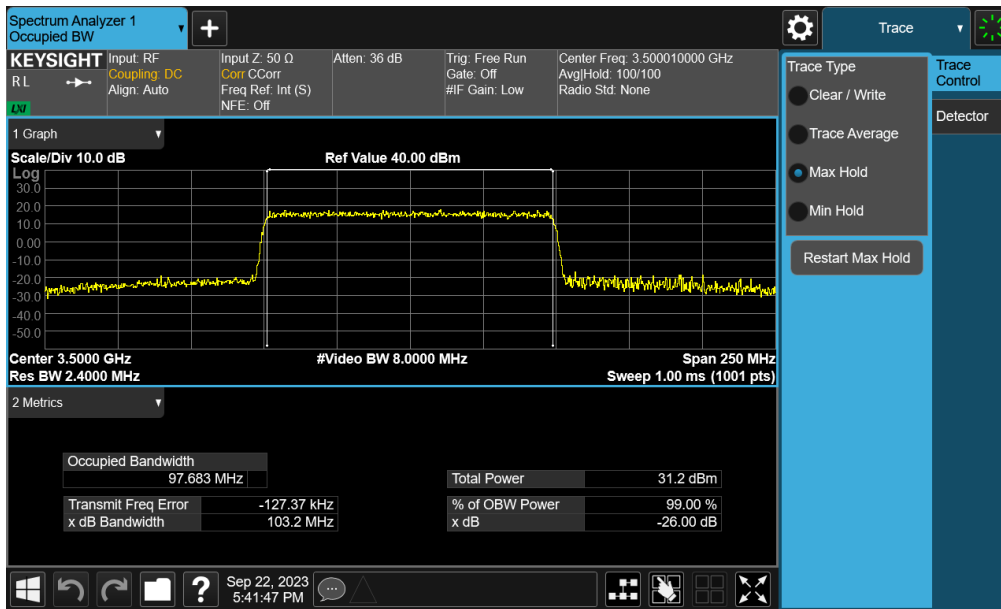
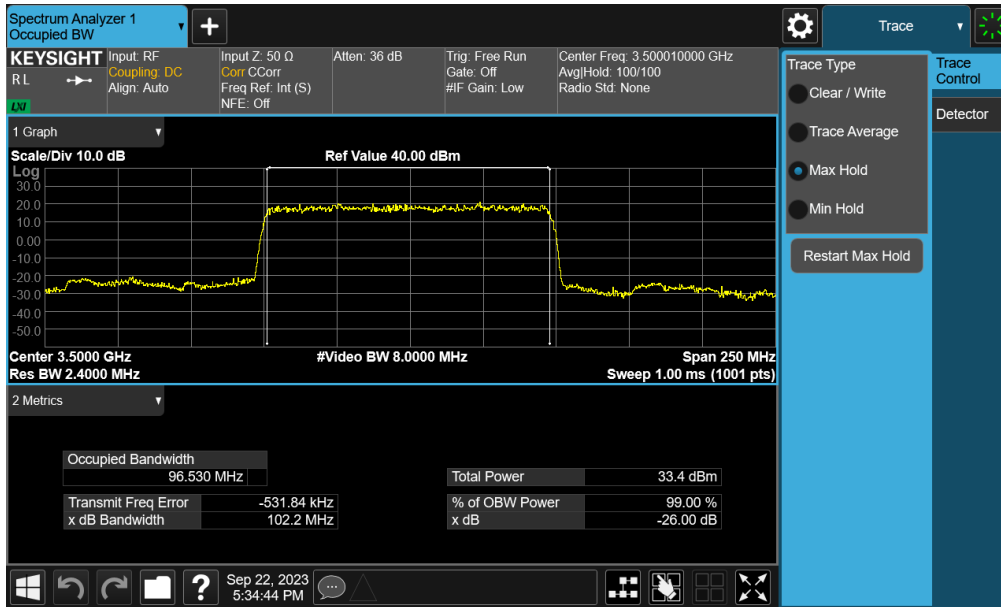
FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 39 of 146

Mode	Bandwidth	Modulation	OBW [MHz]
NR-n77/78 PC2 DoD	100MHz	$\pi/2$ BPSK	96.53
		QPSK	97.68
		16QAM	98.02
	90MHz	$\pi/2$ BPSK	87.05
		QPSK	87.67
		16QAM	87.71
	80MHz	$\pi/2$ BPSK	77.28
		QPSK	77.53
		16QAM	77.78
	70MHz	$\pi/2$ BPSK	64.30
		QPSK	67.86
		16QAM	67.61
	60MHz	$\pi/2$ BPSK	57.89
		QPSK	58.30
		16QAM	58.11
	50MHz	$\pi/2$ BPSK	45.97
		QPSK	47.69
		16QAM	47.76
	40MHz	$\pi/2$ BPSK	35.91
		QPSK	37.93
		16QAM	37.95
	30MHz	$\pi/2$ BPSK	27.08
		QPSK	27.93
		16QAM	27.94
25MHz	$\pi/2$ BPSK	23.00	
	QPSK	23.23	
	16QAM	23.26	
20MHz	$\pi/2$ BPSK	17.99	
	QPSK	18.28	
	16QAM	18.41	
15MHz	$\pi/2$ BPSK	12.99	
	QPSK	13.61	
	16QAM	13.70	
10MHz	$\pi/2$ BPSK	8.66	
	QPSK	8.65	
	16QAM	8.62	

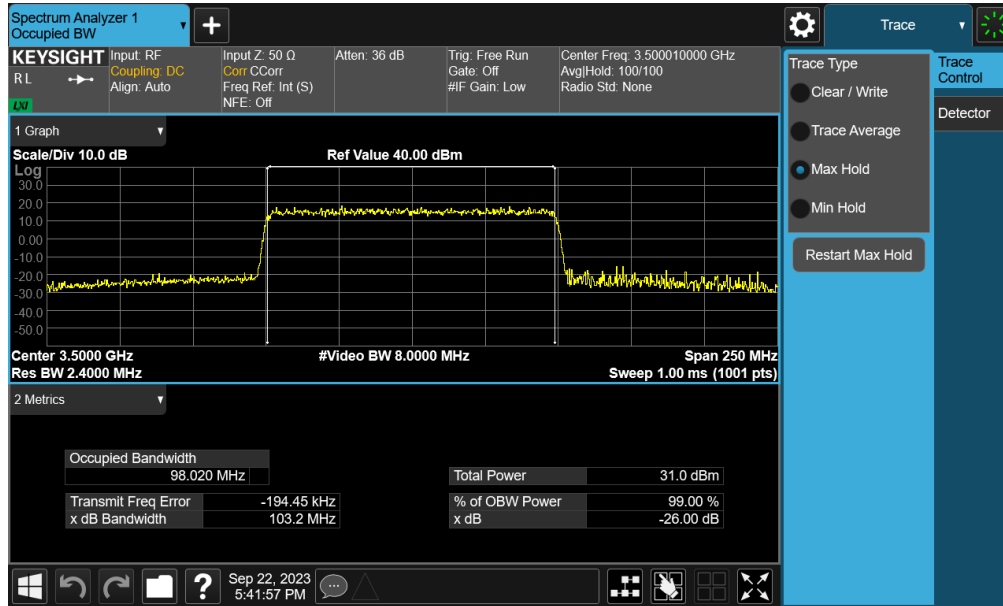
Table 7-12. Occupied Bandwidth Test Results – Ant1

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 40 of 146

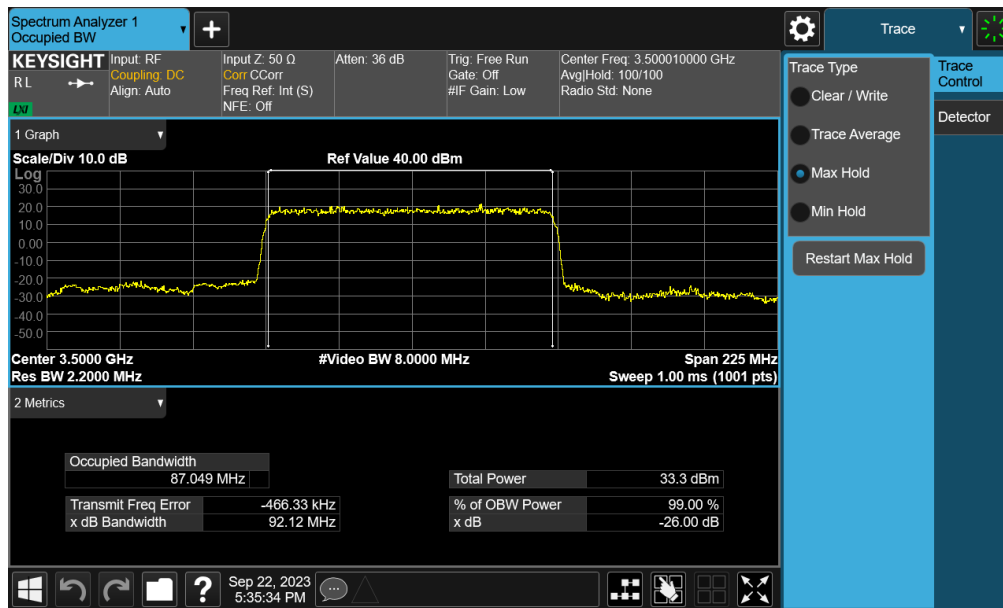
NR Band n77PC2 DoD – Ant1



FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 41 of 146

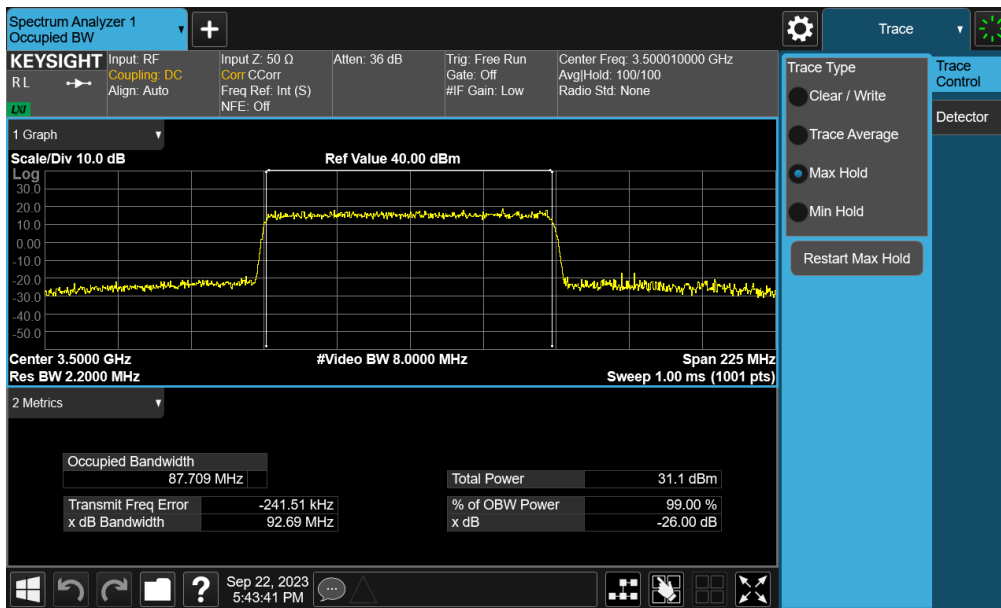
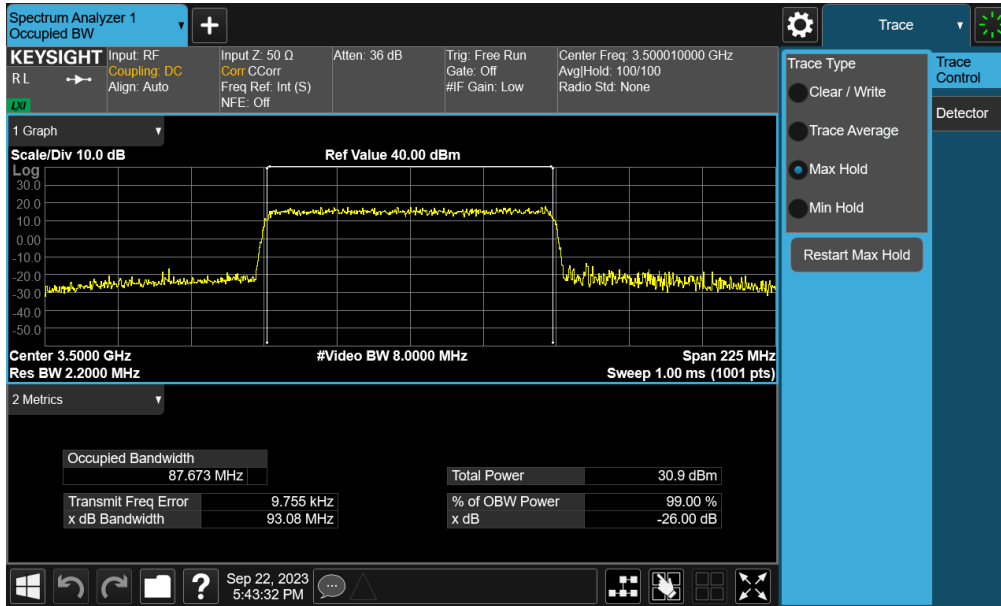


Plot 7-39. Occupied Bandwidth Plot (NR Band n77PC2 DoD- 100MHz 16-QAM - Full RB - Ant1)

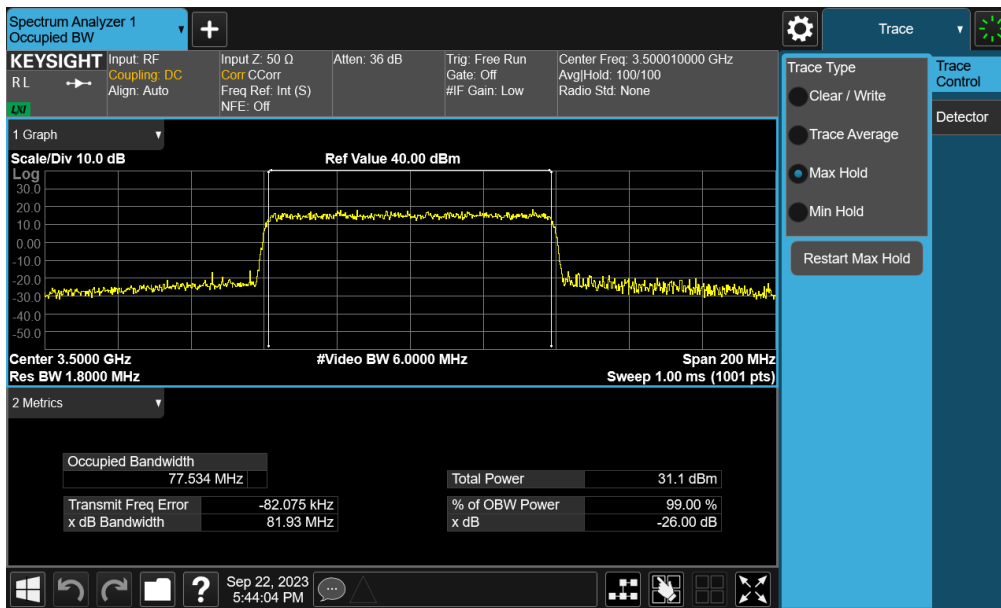
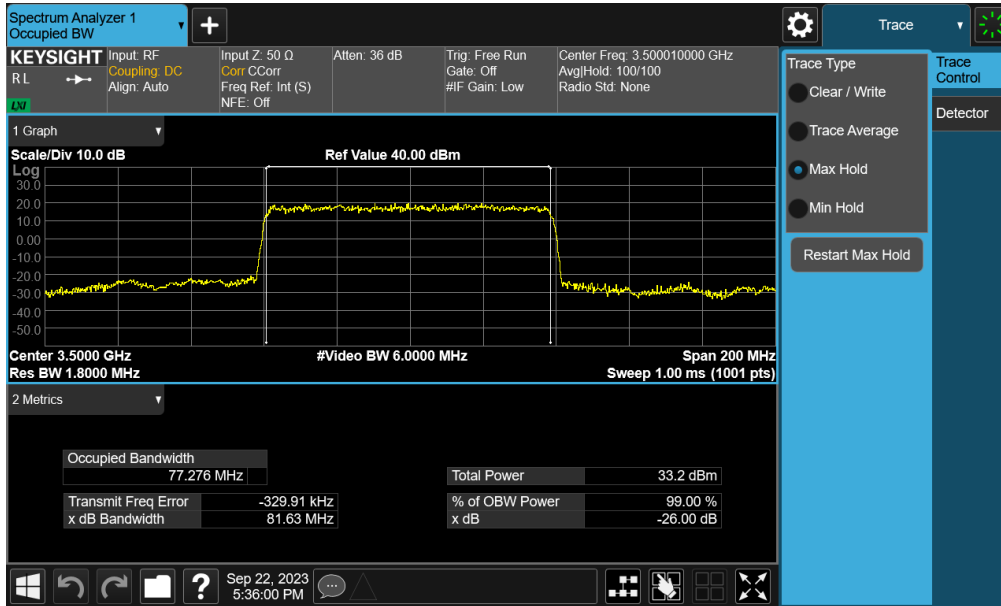


Plot 7-40. Occupied Bandwidth Plot (NR Band n77PC2 DoD- 90MHz $\pi/2$ BPSK - Full RB - Ant1)

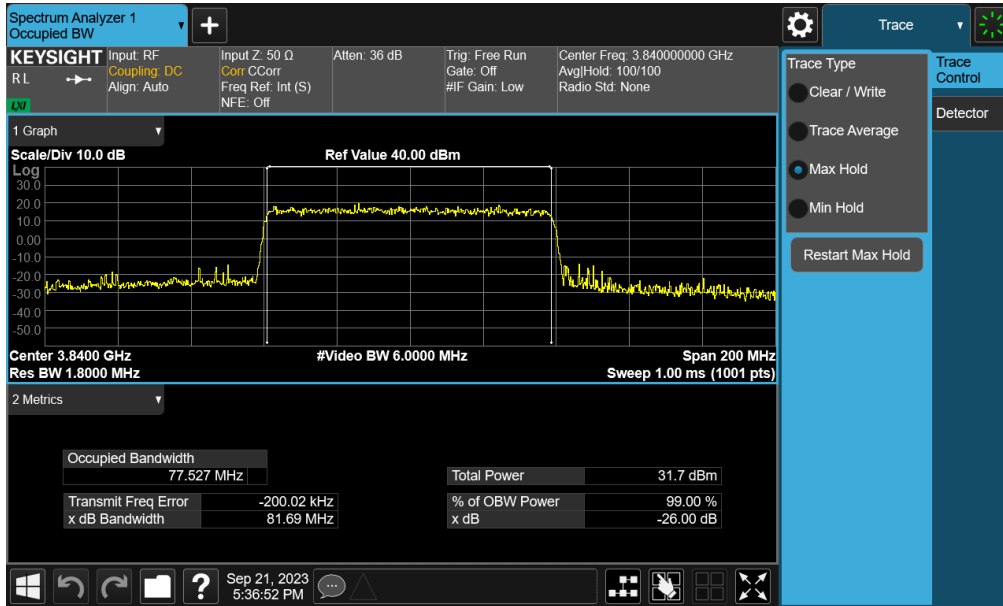
FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 42 of 146



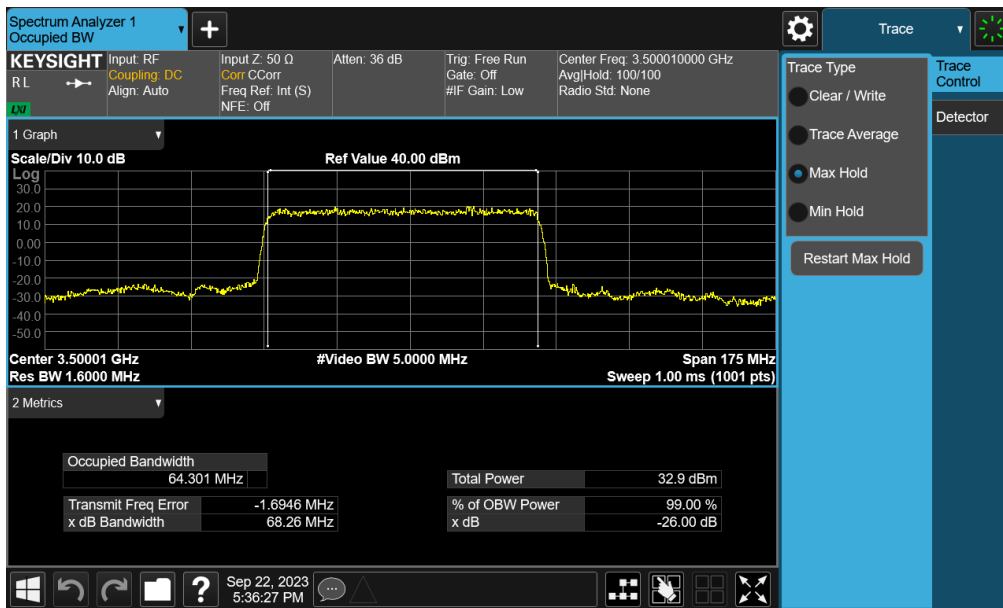
FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 43 of 146



FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 44 of 146

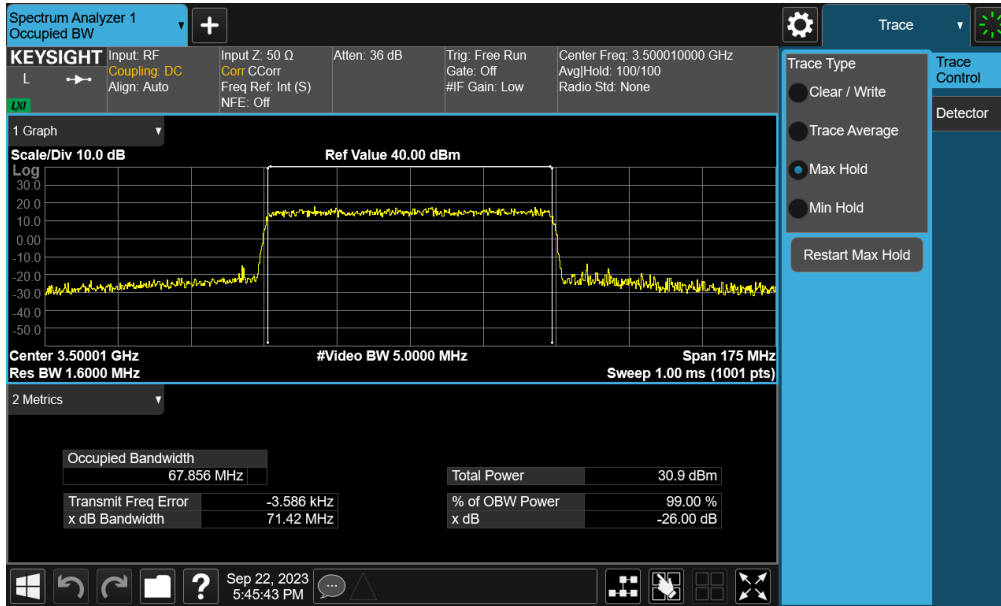


Plot 7-45. Occupied Bandwidth Plot (NR Band n77PC2 DoD- 80MHz 16-QAM - Full RB - Ant1)

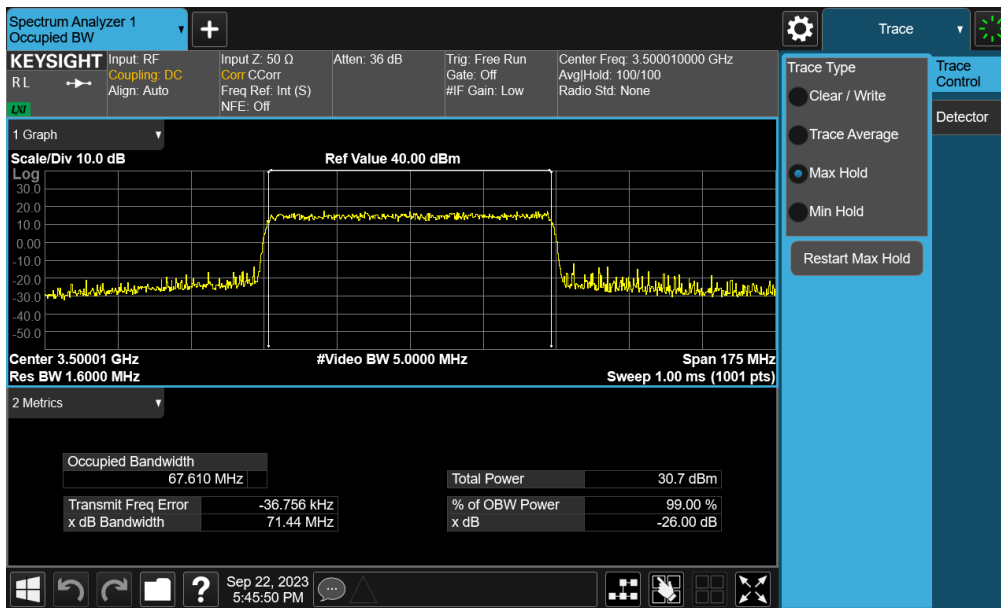


Plot 7-46. Occupied Bandwidth Plot (NR Band n77PC2 DoD- 70MHz $\pi/2$ BPSK - Full RB - Ant1)

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 45 of 146

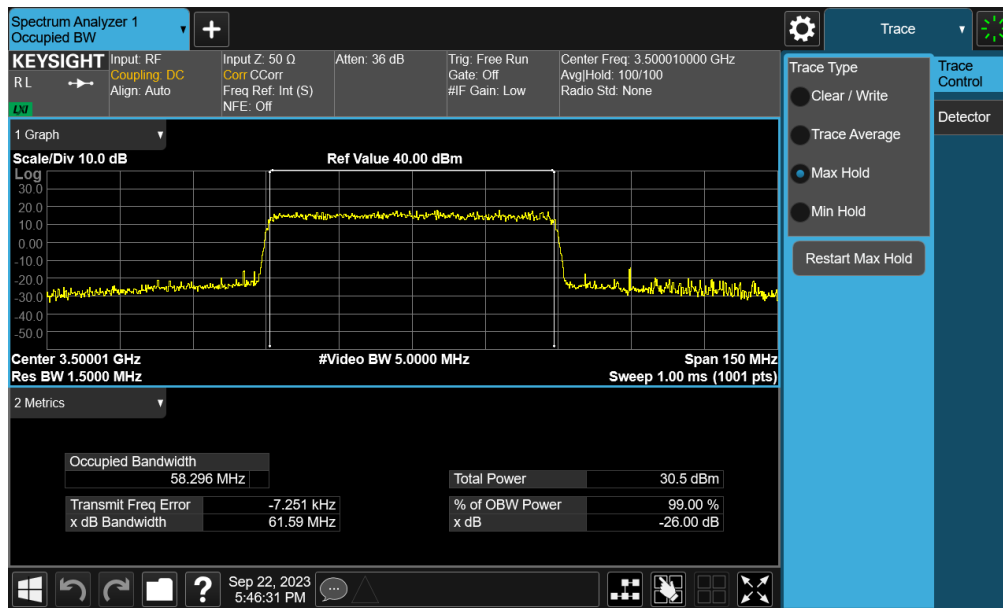
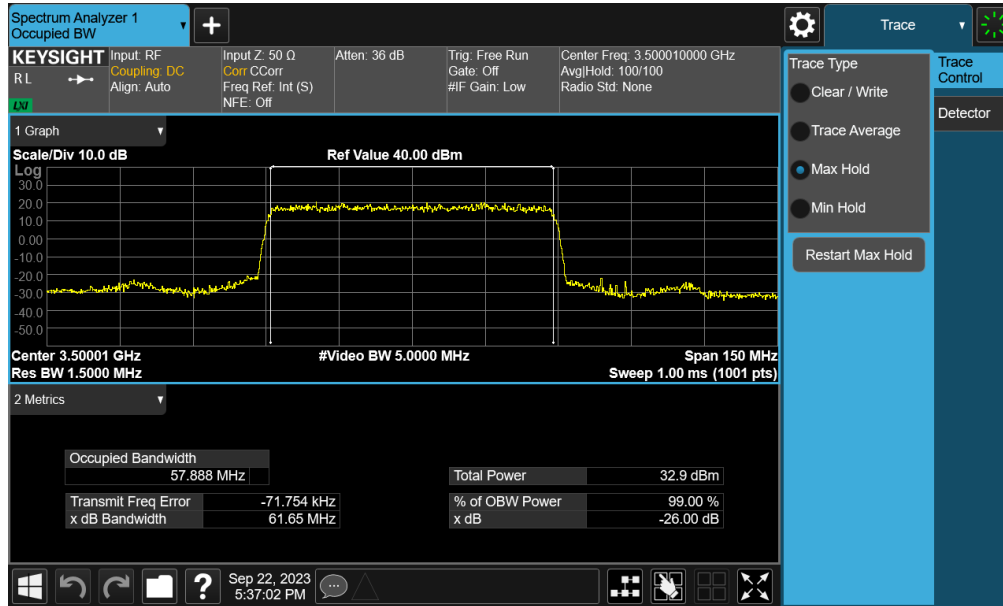


Plot 7-47. Occupied Bandwidth Plot (NR Band n77PC2 DoD- 70MHz QPSK - Full RB - Ant1)

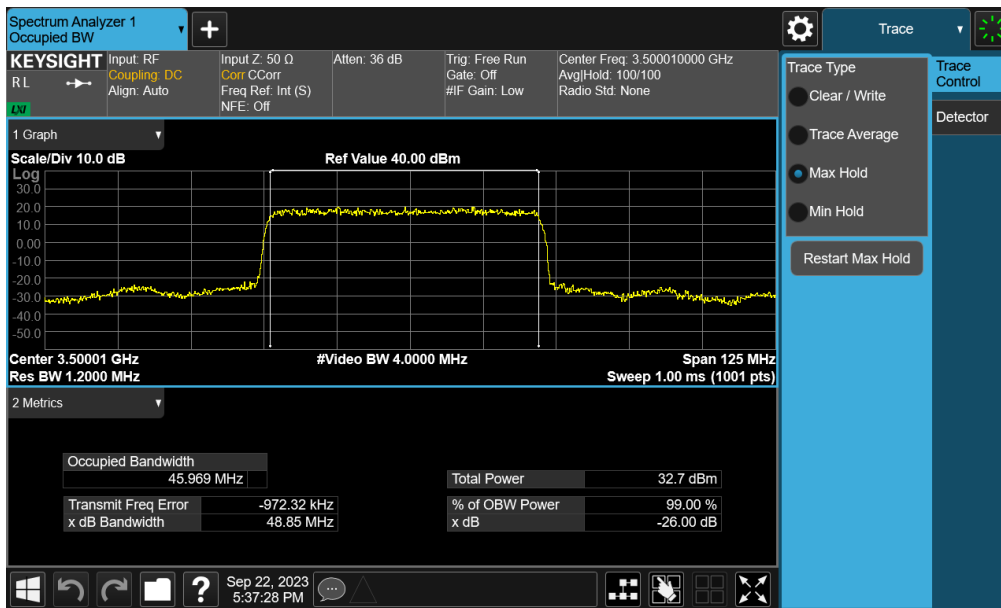
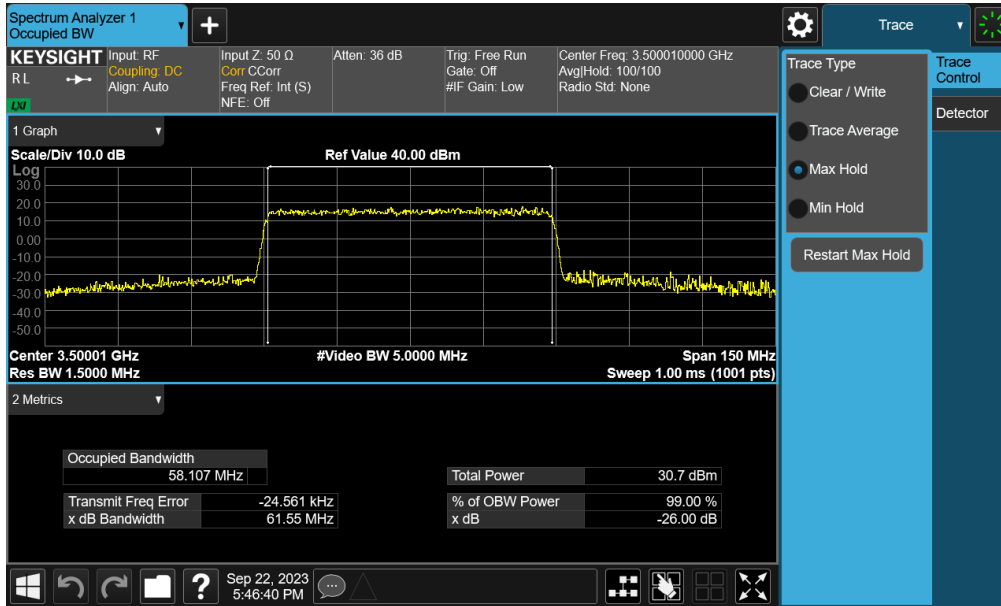


Plot 7-48. Occupied Bandwidth Plot (NR Band n77PC2 DoD- 70MHz 16-QAM - Full RB - Ant1)

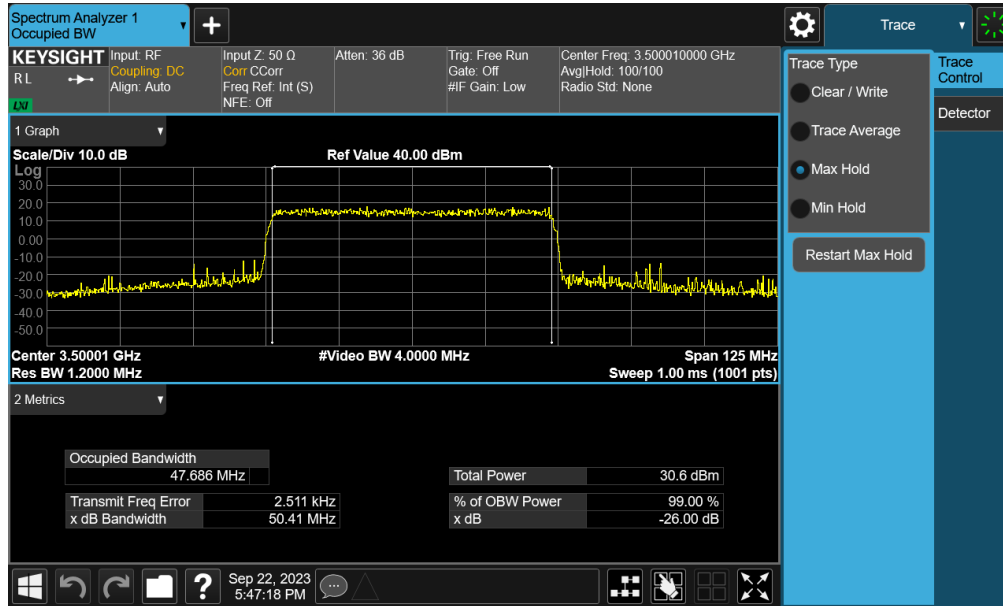
FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 46 of 146



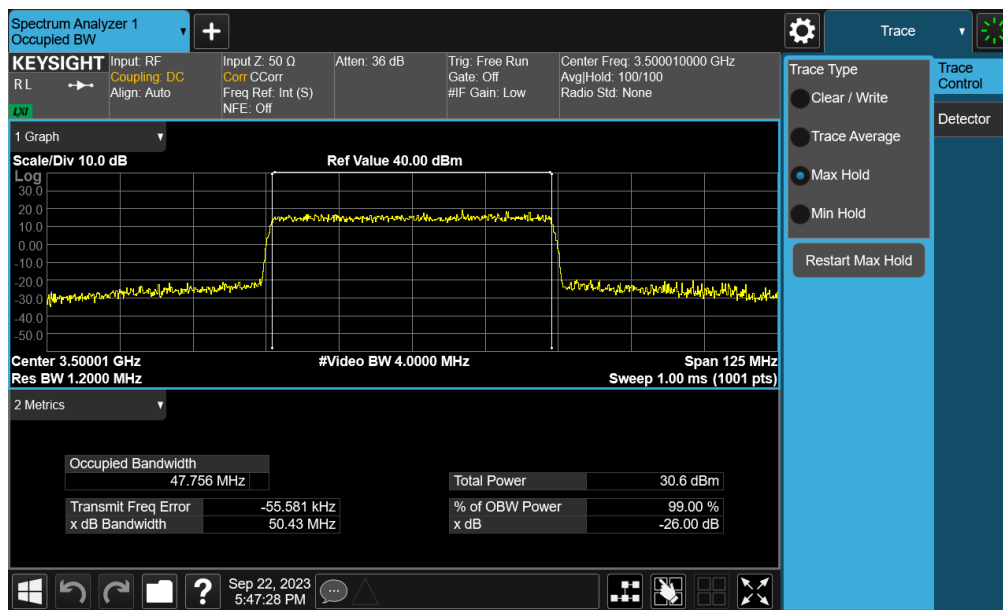
FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 47 of 146



FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 48 of 146

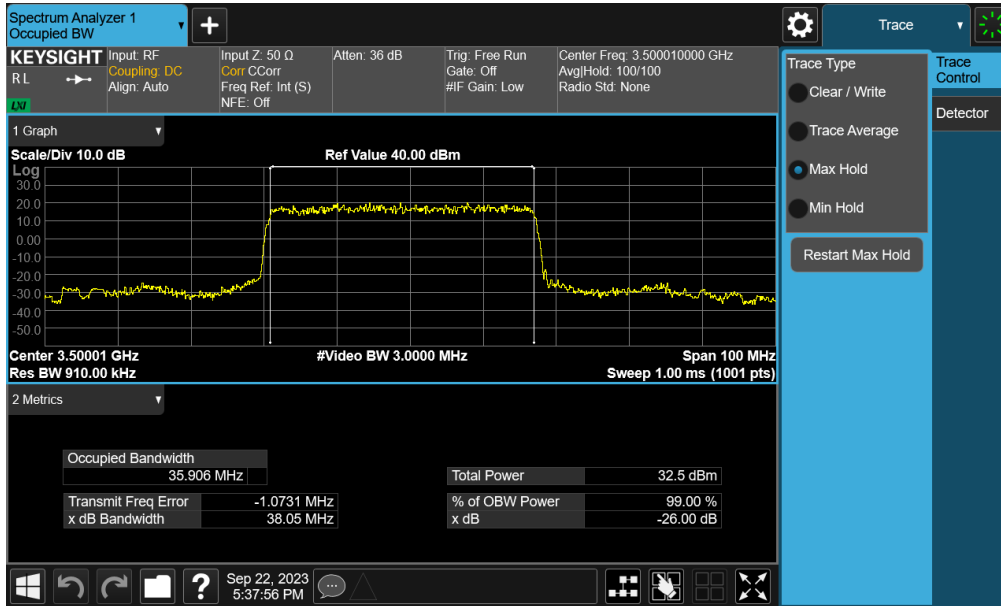


Plot 7-53. Occupied Bandwidth Plot (NR Band n77PC2 DoD- 50MHz QPSK - Full RB - Ant1)

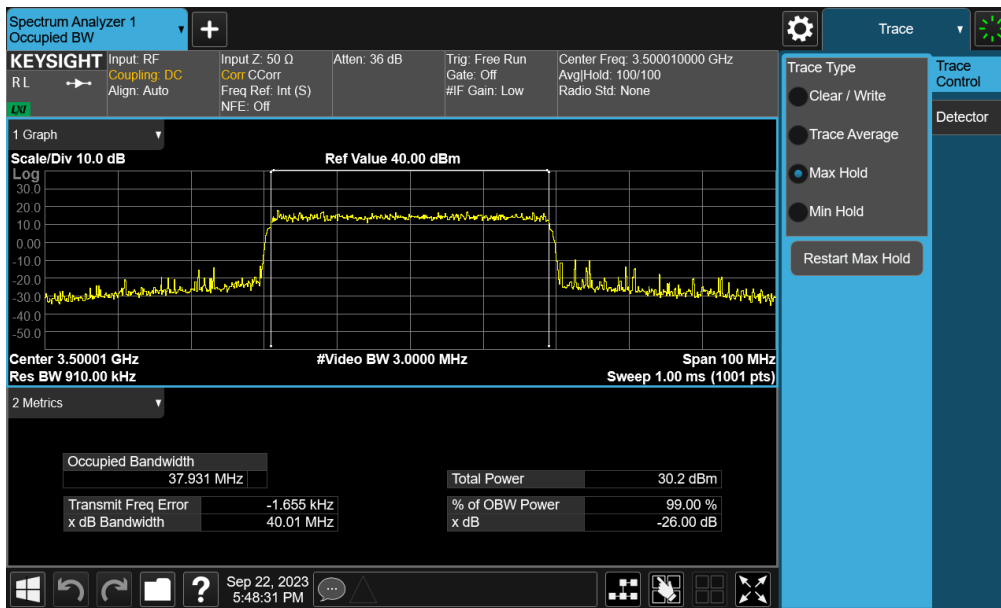


Plot 7-54. Occupied Bandwidth Plot (NR Band n77PC2 DoD- 50MHz 16-QAM - Full RB - Ant1)

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 49 of 146



Plot 7-55. Occupied Bandwidth Plot (NR Band n77PC2 DoD- 40MHz $\pi/2$ BPSK - Full RB - Ant1)



Plot 7-56. Occupied Bandwidth Plot (NR Band n77PC2 DoD- 40MHz QPSK - Full RB - Ant1)

FCC ID: A3LSMA156U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-05.A3L	Test Dates: 9/21/2023 - 10/23/2023	EUT Type: Portable Handset	Page 50 of 146