



# ELEMENT WASHINGTON DC LLC

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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:**  
05/24/2023 - 07/31/2023  
**Test Report Issue Date:**  
08/01/2023  
**Test Site/Location:**  
Element lab., Columbia, MD, USA  
**Test Report Serial No.:**  
1M2304260060-09.A3L

<b>FCC ID:</b>	<b>A3LSMS711U</b>
<b>Applicant Name:</b>	<b>Samsung Electronics Co., Ltd.</b>

<b>Application Type:</b>	Certification
<b>Model:</b>	SM-S711U
<b>Additional Model(s):</b>	SM-S711U1
<b>EUT Type:</b>	Portable Handset
<b>FCC Classification:</b>	PCS Licensed Transmitter Held to Ear (PCE)
<b>FCC Rule Part:</b>	27
<b>Test Procedure(s):</b>	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



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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	0.277	24.42	96M6G7D
		QPSK	3500.0	0.289	24.61	97M9G7D
		16QAM	3500.0	0.251	24.00	97M9W7D
	90 MHz	$\pi/2$ BPSK	3495.0 - 3505.0	0.273	24.36	87M2G7D
		QPSK	3495.0 - 3505.0	0.285	24.54	88M0G7D
		16QAM	3495.0 - 3505.0	0.240	23.80	87M8W7D
	80 MHz	$\pi/2$ BPSK	3490.0 - 3510.0	0.271	24.33	77M4G7D
		QPSK	3490.0 - 3510.0	0.278	24.43	77M9G7D
		16QAM	3490.0 - 3510.0	0.237	23.74	77M8W7D
	70 MHz	$\pi/2$ BPSK	3485.0 - 3515.0	0.270	24.31	64M6G7D
		QPSK	3485.0 - 3515.0	0.281	24.49	67M8G7D
		16QAM	3485.0 - 3515.0	0.240	23.80	67M9W7D
	60 MHz	$\pi/2$ BPSK	3480.0 - 3520.0	0.279	24.45	58M0G7D
		QPSK	3480.0 - 3520.0	0.289	24.61	58M1G7D
		16QAM	3480.0 - 3520.0	0.246	23.90	58M1W7D
	50 MHz	$\pi/2$ BPSK	3475.0 - 3525.0	0.277	24.42	45M9G7D
		QPSK	3475.0 - 3525.0	0.291	24.64	47M7G7D
		16QAM	3475.0 - 3525.0	0.246	23.90	47M7W7D
	40 MHz	$\pi/2$ BPSK	3470.0 - 3530.0	0.285	24.54	36M0G7D
		QPSK	3470.0 - 3530.0	0.293	24.67	38M0G7D
		16QAM	3470.0 - 3530.0	0.253	24.03	38M2W7D
	30 MHz	$\pi/2$ BPSK	3465.0 - 3535.0	0.281	24.49	27M1G7D
		QPSK	3465.0 - 3535.0	0.295	24.69	28M0G7D
		16QAM	3465.0 - 3535.0	0.249	23.95	28M0W7D
	20 MHz	$\pi/2$ BPSK	3460.0 - 3540.0	0.275	24.39	18M0G7D
		QPSK	3460.0 - 3540.0	0.283	24.52	18M4G7D
		16QAM	3460.0 - 3540.0	0.243	23.86	18M4W7D
	15 MHz	$\pi/2$ BPSK	3457.5 - 3542.5	0.275	24.39	13M0G7D
		QPSK	3457.5 - 3542.5	0.287	24.57	13M7G7D
		16QAM	3457.5 - 3542.5	0.243	23.85	13M7W7D
	10 MHz	$\pi/2$ BPSK	3455.0 - 3545.0	0.264	24.21	8M65G7D
		QPSK	3455.0 - 3545.0	0.278	24.44	8M71G7D
		16QAM	3455.0 - 3545.0	0.236	23.73	8M71W7D

### EUT Overview (ANT F)

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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	0.235	23.71	96M9G7D
		QPSK	3750.0 - 3930.0	0.242	23.83	98M0G7D
		16QAM	3750.0 - 3930.0	0.210	23.22	97M8W7D
	90 MHz	$\pi/2$ BPSK	3745.0 - 3935.0	0.235	23.71	87M4G7D
		QPSK	3745.0 - 3935.0	0.246	23.91	87M7G7D
		16QAM	3745.0 - 3935.0	0.207	23.15	87M9W7D
	80 MHz	$\pi/2$ BPSK	3740.0 - 3940.0	0.228	23.57	77M4G7D
		QPSK	3740.0 - 3940.0	0.244	23.87	77M9G7D
		16QAM	3740.0 - 3940.0	0.201	23.04	78M0W7D
	70 MHz	$\pi/2$ BPSK	3735.0 - 3945.0	0.228	23.57	64M5G7D
		QPSK	3735.0 - 3945.0	0.241	23.81	67M6G7D
		16QAM	3735.0 - 3945.0	0.234	23.69	67M6W7D
	60 MHz	$\pi/2$ BPSK	3730.0 - 3950.0	0.234	23.69	58M0G7D
		QPSK	3730.0 - 3950.0	0.246	23.90	58M2G7D
		16QAM	3730.0 - 3950.0	0.206	23.14	58M0W7D
	50 MHz	$\pi/2$ BPSK	3725.0 - 3955.0	0.247	23.92	45M9G7D
		QPSK	3725.0 - 3955.0	0.263	24.20	47M8G7D
		16QAM	3725.0 - 3955.0	0.216	23.35	47M7W7D
	40 MHz	$\pi/2$ BPSK	3720.0 - 3960.0	0.264	24.22	35M9G7D
		QPSK	3720.0 - 3960.0	0.274	24.38	38M0G7D
		16QAM	3720.0 - 3960.0	0.229	23.60	38M1W7D
	30 MHz	$\pi/2$ BPSK	3715.0 - 3965.0	0.262	24.18	27M1G7D
		QPSK	3715.0 - 3965.0	0.275	24.39	28M0G7D
		16QAM	3715.0 - 3965.0	0.230	23.62	28M0W7D
	20 MHz	$\pi/2$ BPSK	3710.0 - 3970.0	0.251	23.99	18M0G7D
		QPSK	3710.0 - 3970.0	0.263	24.20	18M3G7D
		16QAM	3710.0 - 3970.0	0.221	23.45	18M3W7D
	15 MHz	$\pi/2$ BPSK	3707.5 - 3972.5	0.252	24.01	12M9G7D
		QPSK	3707.5 - 3972.5	0.267	24.27	13M7G7D
		16QAM	3707.5 - 3972.5	0.225	23.52	13M7W7D
	10 MHz	$\pi/2$ BPSK	3705.0 - 3975.0	0.239	23.79	8M63G7D
		QPSK	3705.0 - 3975.0	0.255	24.07	8M65G7D
		16QAM	3705.0 - 3975.0	0.210	23.23	8M71W7D

**EUT Overview (ANT F)**

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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	0.154	21.88	96M6G7D
		QPSK	3500.0	0.157	21.96	97M9G7D
		16QAM	3500.0	0.143	21.55	97M9W7D
NR Band n77 PC2 (3700 - 3980MHz)	100 MHz	$\pi/2$ BPSK	3750.0 - 3930.0	0.201	23.02	96M9G7D
		QPSK	3750.0 - 3930.0	0.210	23.22	98M0G7D
		16QAM	3750.0 - 3930.0	0.189	22.77	97M8W7D

**EUT Overview (ANT C)**

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	0.307	24.86	96M6G7D
		QPSK	3500.0	0.312	24.94	97M9G7D
		16QAM	3500.0	0.252	24.01	97M9W7D
NR Band n77 PC2 (3700 - 3980MHz)	100 MHz	$\pi/2$ BPSK	3750.0 - 3930.0	0.287	24.58	96M9G7D
		QPSK	3750.0 - 3930.0	0.303	24.81	98M0G7D
		16QAM	3750.0 - 3930.0	0.265	24.22	97M8W7D

**EUT Overview (ANT I)**

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	0.070	18.42	96M6G7D
		QPSK	3500.0	0.068	18.30	97M9G7D
		16QAM	3500.0	0.055	17.38	97M9W7D
NR Band n77 PC2 (3700 - 3980MHz)	100 MHz	$\pi/2$ BPSK	3750.0 - 3930.0	0.081	19.10	96M9G7D
		QPSK	3750.0 - 3930.0	0.082	19.15	98M0G7D
		16QAM	3750.0 - 3930.0	0.070	18.46	97M8W7D

**EUT Overview (ANT D)**

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# 1.0 INTRODUCTION

## 1.1 Scope

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

## 1.2 Element 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.

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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMS711U**. 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.:** 0325M, 0602M, 0588M, 0182M, 0594M, 0640M, 0597M, 1200M, 0660M, 0590M, 0754M

### 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 and FR2), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power

This device uses a tuner circuit that dynamically updates the antenna impedance parameters to optimize antenna performance for certain bands and modes of operation. The tuner for this device was set to simulate a "free space" condition where the transmit antenna is matched to the medium into which it is transmitting and, thus, the power is at its maximum level.

### 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-N5100 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 S711USQU0AWG7 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.

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## 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.

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## 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  $U_{\text{CISPR}}$  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	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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## 5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	AP2-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-001
-	AP2-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-002
-	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
-	LTX1	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX1
-	LTX2	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX2
-	LTX3	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX3
-	LTX4	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX4
-	LTX5	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX5
Anritsu	MT8821C	Radio Communication Analyzer	N/A			620152694
EMCO	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2024	9704-5182
EMCO	3116	Horn Antenna (18-40GHz)	7/20/2021	Biennial	8/30/2023	9203-2178
Keysight Technologies	N9030A	PXA Signal Analyzer (3Hz-26.5GHz)	9/6/2022	Annual	9/6/2023	MYS4490576
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	3/15/2023	Annual	3/15/2024	MYS2350166
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Test Antenna	9/28/2022	Biennial	9/28/2024	101058
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	8/29/2022	Annual	8/29/2023	100342
Rohde & Schwarz	ESW44	EMI Test Receiver (2Hz-44GHz)	3/1/2023	Annual	3/1/2024	101716
Rohde & Schwarz	VULB9162	Bi-Log Antenna	2/21/2023	Biennial	2/21/2025	00301
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	8/30/2022	Biennial	8/30/2024	A051107

**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.

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## 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.

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## 7.0 TEST RESULTS

### 7.1 Summary

Company Name: Samsung Electronics Co., Ltd.  
 FCC ID: A3LSMS711U  
 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)	2.1051, 27.53(l), 27.53(n)	≤ 13 dBm / MHz	PASS	Sections 7.4, 7.5
	Peak-to-Average Ratio (NR Band n77)	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)	27.50(j)(3), 27.50(k)(3)	≤ 1 Watt EIRP	PASS	Section 7.7
	Radiated Spurious Emissions (NR Band n77)	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 v1.0.

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## 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

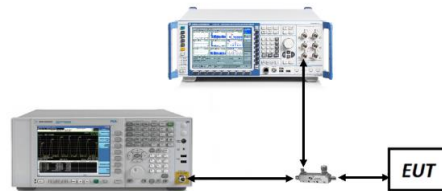
ANSI C63.26-2015 – Section 5.2

### 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. Uplink carrier aggregation is only supported in this EUT while operating in Power Class 3.
2. 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.
3. All other conducted power measurements are contained in the RF exposure report for this filing.
4. 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.

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Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	650000	3750.00	1 / 136	26.29
		656000	3840.00	1 / 271	26.12
		662000	3930.00	1 / 271	26.05
	QPSK	650000	3750.00	1 / 136	26.23
		656000	3840.00	1 / 271	26.12
		662000	3930.00	1 / 271	25.89
	16-QAM	650000	3750.00	1 / 136	25.22
		656000	3840.00	1 / 271	25.09
		662000	3930.00	1 / 271	25.12
90 MHz	π/2 BPSK	649668	3745.02	1 / 122	26.21
		656000	3840.00	1 / 122	26.01
		662332	3934.98	1 / 122	26.05
	QPSK	649668	3745.02	1 / 122	26.18
		656000	3840.00	1 / 122	25.98
		662332	3934.98	1 / 122	25.97
	16-QAM	649668	3745.02	1 / 122	25.25
		656000	3840.00	1 / 122	25.01
		662332	3934.98	1 / 122	25.05
80 MHz	π/2 BPSK	649334	3740.01	1 / 108	26.32
		656000	3840.00	1 / 1	25.98
		662666	3939.99	1 / 1	25.91
	QPSK	649334	3740.01	1 / 108	26.27
		656000	3840.00	1 / 1	25.96
		662666	3939.99	1 / 1	25.93
	16-QAM	649334	3740.01	1 / 108	25.28
		656000	3840.00	1 / 1	24.92
		662666	3939.99	1 / 1	24.94
70 MHz	π/2 BPSK	649000	3735.00	1 / 94	26.22
		656000	3840.00	1 / 1	25.96
		663000	3945.00	1 / 1	25.91
	QPSK	649000	3735.00	1 / 94	26.21
		656000	3840.00	1 / 1	25.97
		663000	3945.00	1 / 1	25.87
	16-QAM	649000	3735.00	1 / 94	25.19
		656000	3840.00	1 / 1	24.94
		663000	3945.00	1 / 1	24.96
60 MHz	π/2 BPSK	648668	3730.02	1 / 1	26.34
		656000	3840.00	1 / 81	26.09
		663332	3949.98	1 / 160	26.03
	QPSK	648668	3730.02	1 / 1	26.27
		656000	3840.00	1 / 81	26.07
		663332	3949.98	1 / 160	25.96
	16-QAM	648668	3730.02	1 / 1	25.27
		656000	3840.00	1 / 81	25.06
		663332	3949.98	1 / 160	25.04
50 MHz	π/2 BPSK	648334	3725.01	1 / 1	26.33
		656000	3840.00	1 / 131	26.14
		663666	3954.99	1 / 131	26.26
	QPSK	648334	3725.01	1 / 1	26.24
		656000	3840.00	1 / 131	26.12
		663666	3954.99	1 / 131	26.26
	16-QAM	648334	3725.01	1 / 1	25.24
		656000	3840.00	1 / 131	25.13
		663666	3954.99	1 / 131	25.25
40 MHz	π/2 BPSK	648000	3720.00	1 / 1	26.67
		656000	3840.00	1 / 1	26.41
		664000	3960.00	1 / 104	26.56
	QPSK	648000	3720.00	1 / 1	26.64
		656000	3840.00	1 / 1	26.42
		664000	3960.00	1 / 104	26.44
	16-QAM	648000	3720.00	1 / 1	25.66
		656000	3840.00	1 / 1	25.43
		664000	3960.00	1 / 104	26.50
30 MHz	π/2 BPSK	647668	3715.02	1 / 76	26.54
		656000	3840.00	1 / 1	26.32
		664332	3964.98	1 / 76	26.52
	QPSK	647668	3715.02	1 / 76	26.51
		656000	3840.00	1 / 1	26.35
		664332	3964.98	1 / 76	26.45
	16-QAM	647668	3715.02	1 / 76	25.54
		656000	3840.00	1 / 1	25.33
		664332	3964.98	1 / 76	25.52
20 MHz	π/2 BPSK	647334	3710.01	1 / 49	26.50
		656000	3840.00	1 / 1	26.12
		664666	3969.99	1 / 49	26.33
	QPSK	647334	3710.01	1 / 49	26.47
		656000	3840.00	1 / 1	26.14
		664666	3969.99	1 / 49	26.26
	16-QAM	647334	3710.01	1 / 49	25.51
		656000	3840.00	1 / 1	25.26
		664666	3969.99	1 / 49	25.35
15 MHz	π/2 BPSK	647168	3707.52	1 / 1	26.48
		656000	3840.00	1 / 1	26.23
		664832	3972.48	1 / 36	26.35
	QPSK	647168	3707.52	1 / 1	26.44
		656000	3840.00	1 / 1	26.28
		664832	3972.48	1 / 36	26.33
	16-QAM	647168	3707.52	1 / 1	25.44
		656000	3840.00	1 / 1	25.29
		664832	3972.48	1 / 36	25.42
10 MHz	π/2 BPSK	647000	3705.00	1 / 22	26.22
		656000	3840.00	1 / 12	26.12
		664332	3975.00	1 / 22	26.13
	QPSK	647000	3705.00	1 / 22	26.14
		656000	3840.00	1 / 12	26.03
		664332	3975.00	1 / 22	26.13
	16-QAM	647000	3705.00	1 / 22	25.23
		656000	3840.00	1 / 12	25.19
		664332	3975.00	1 / 22	25.13

Table 7-2. Conducted Power Measurements – Ant F – C-Band

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Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	633334	3500.01	1 / 271	26.13
		633334	3500.01	1 / 271	26.13
		633334	3500.01	1 / 271	25.17
90 MHz	π/2 BPSK	633000	3495.00	1 / 1	26.01
		633334	3500.01	1 / 243	26.01
		633666	3504.99	1 / 243	26.07
	QPSK	633000	3495.00	1 / 1	26.06
		633334	3500.01	1 / 243	26.01
		633666	3504.99	1 / 243	26.03
	16-QAM	633000	3495.00	1 / 1	24.86
		633334	3500.01	1 / 243	24.94
		633666	3504.99	1 / 243	24.97
80 MHz	π/2 BPSK	632668	3490.02	1 / 1	26.04
		633334	3500.01	1 / 1	25.97
		634000	3510.00	1 / 215	25.83
	QPSK	632668	3490.02	1 / 1	25.95
		633334	3500.01	1 / 1	25.93
		634000	3510.00	1 / 215	25.94
	16-QAM	632668	3490.02	1 / 1	24.91
		633334	3500.01	1 / 1	24.83
		634000	3510.00	1 / 215	24.82
70 MHz	π/2 BPSK	632334	3485.01	1 / 1	26.02
		633334	3500.01	1 / 1	25.92
		634332	3514.98	1 / 187	25.96
	QPSK	632334	3485.01	1 / 1	26.01
		633334	3500.01	1 / 1	25.92
		634332	3514.98	1 / 187	25.96
	16-QAM	632334	3485.01	1 / 1	24.97
		633334	3500.01	1 / 1	24.85
		634332	3514.98	1 / 187	24.89
60 MHz	π/2 BPSK	632000	3480.00	1 / 81	26.16
		633334	3500.01	1 / 1	26.06
		634666	3519.99	1 / 81	26.09
	QPSK	632000	3480.00	1 / 81	26.13
		633334	3500.01	1 / 1	26.06
		634666	3519.99	1 / 81	26.09
	16-QAM	632000	3480.00	1 / 81	25.07
		633334	3500.01	1 / 1	25.01
		634666	3519.99	1 / 81	25.03
50 MHz	π/2 BPSK	631668	3475.02	1 / 1	26.13
		633334	3500.01	1 / 1	26.09
		635000	3525.00	1 / 1	26.03
	QPSK	631668	3475.02	1 / 1	26.16
		633334	3500.01	1 / 1	26.08
		635000	3525.00	1 / 1	26.03
	16-QAM	631668	3475.02	1 / 1	25.07
		633334	3500.01	1 / 1	25.01
		635000	3525.00	1 / 1	24.93
40 MHz	π/2 BPSK	631334	3470.01	1 / 1	26.25
		633334	3500.01	1 / 104	26.11
		635332	3529.98	1 / 104	26.21
	QPSK	631334	3470.01	1 / 1	26.19
		633334	3500.01	1 / 104	26.07
		635332	3529.98	1 / 104	26.16
	16-QAM	631334	3470.01	1 / 1	25.20
		633334	3500.01	1 / 104	25.08
		635332	3529.98	1 / 104	25.18
30 MHz	π/2 BPSK	631000	3465.00	1 / 1	26.20
		633334	3500.01	1 / 1	26.07
		635666	3534.99	1 / 76	26.19
	QPSK	631000	3465.00	1 / 1	26.21
		633334	3500.01	1 / 1	26.04
		635666	3534.99	1 / 76	26.20
	16-QAM	631000	3465.00	1 / 1	25.12
		633334	3500.01	1 / 1	24.98
		635666	3534.99	1 / 76	25.11
20 MHz	π/2 BPSK	630668	3460.02	1 / 49	26.10
		633334	3500.01	1 / 1	26.04
		636000	3540.00	1 / 49	26.03
	QPSK	630668	3460.02	1 / 49	26.04
		633334	3500.01	1 / 1	25.98
		636000	3540.00	1 / 49	25.98
	16-QAM	630668	3460.02	1 / 49	25.03
		633334	3500.01	1 / 1	24.99
		636000	3540.00	1 / 49	24.97
15 MHz	π/2 BPSK	630500	3457.50	1 / 36	26.06
		633334	3500.01	1 / 36	26.03
		636166	3542.49	1 / 36	26.10
	QPSK	630500	3457.50	1 / 36	26.01
		633334	3500.01	1 / 36	26.01
		636166	3542.49	1 / 36	26.09
	16-QAM	630500	3457.50	1 / 36	25.01
		633334	3500.01	1 / 36	25.02
		636166	3542.49	1 / 36	25.01
10 MHz	π/2 BPSK	630334	3455.01	1 / 22	25.91
		633334	3500.01	1 / 22	25.83
		636332	3544.98	1 / 22	25.92
	QPSK	630334	3455.01	1 / 22	25.96
		633334	3500.01	1 / 22	25.77
		636332	3544.98	1 / 22	25.87
	16-QAM	630334	3455.01	1 / 22	24.88
		633334	3500.01	1 / 22	24.78
		636332	3544.98	1 / 22	24.90

**Table 7-3. Conducted Power Measurements – Ant F – DoD Band**

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Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	650000	3750.00	1 / 136	22.53
		656000	3840.00	1 / 136	22.35
		662000	3930.00	1 / 1	21.55
	QPSK	650000	3750.00	1 / 136	22.82
		656000	3840.00	1 / 136	22.36
		662000	3930.00	1 / 1	21.79
	16-QAM	650000	3750.00	1 / 136	22.28
		656000	3840.00	1 / 136	20.47
		662000	3930.00	1 / 1	20.77

Table 7-4. Conducted Power Measurements – Ant C – C-Band

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	633334	3500.01	1 / 136	22.88
	QPSK	633334	3500.01	1 / 136	22.93
	16-QAM	633334	3500.01	1 / 136	20.96

Table 7-5. Conducted Power Measurements – Ant C – DoD Band

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	650000	3750.00	1 / 136	24.71
		656000	3840.00	1 / 136	24.65
		662000	3930.00	1 / 136	24.47
	QPSK	650000	3750.00	1 / 136	24.80
		656000	3840.00	1 / 136	24.59
		662000	3930.00	1 / 136	24.50
	16-QAM	650000	3750.00	1 / 136	24.55
		656000	3840.00	1 / 136	24.12
		662000	3930.00	1 / 136	24.32

Table 7-6. Conducted Power Measurements – Ant I – C-Band

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	$\pi/2$ BPSK	633334	3500.01	1 / 271	24.55
	QPSK	633334	3500.01	1 / 271	24.62
	16-QAM	633334	3500.01	1 / 271	23.21

Table 7-7. Conducted Power Measurements – Ant I – DoD Band

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	$\pi/2$ BPSK	650000	3750.00	1 / 136	21.69
		656000	3840.00	1 / 136	21.80
		662000	3930.00	1 / 136	20.78
	QPSK	650000	3750.00	1 / 136	21.78
		656000	3840.00	1 / 136	21.80
		662000	3930.00	1 / 136	21.08
	16-QAM	650000	3750.00	1 / 136	21.00
		656000	3840.00	1 / 136	20.43
		662000	3930.00	1 / 136	19.64

Table 7-8. Conducted Power Measurements – Ant D – C-Band

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	$\pi/2$ BPSK	633334	3500.01	1 / 136	22.41
	QPSK	633334	3500.01	1 / 136	22.49
	16-QAM	633334	3500.01	1 / 136	21.95

Table 7-9. Conducted Power Measurements – Ant D – DoD Band

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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## 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.

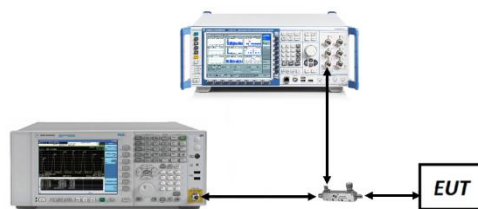


Figure 7-2. Test Instrument & Measurement Setup

### Test Notes

None.

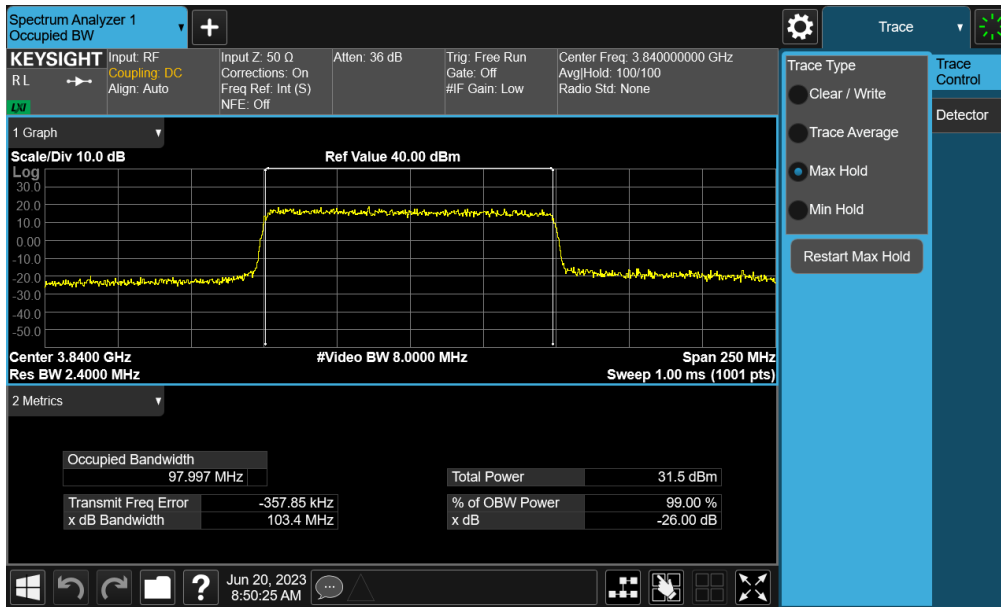
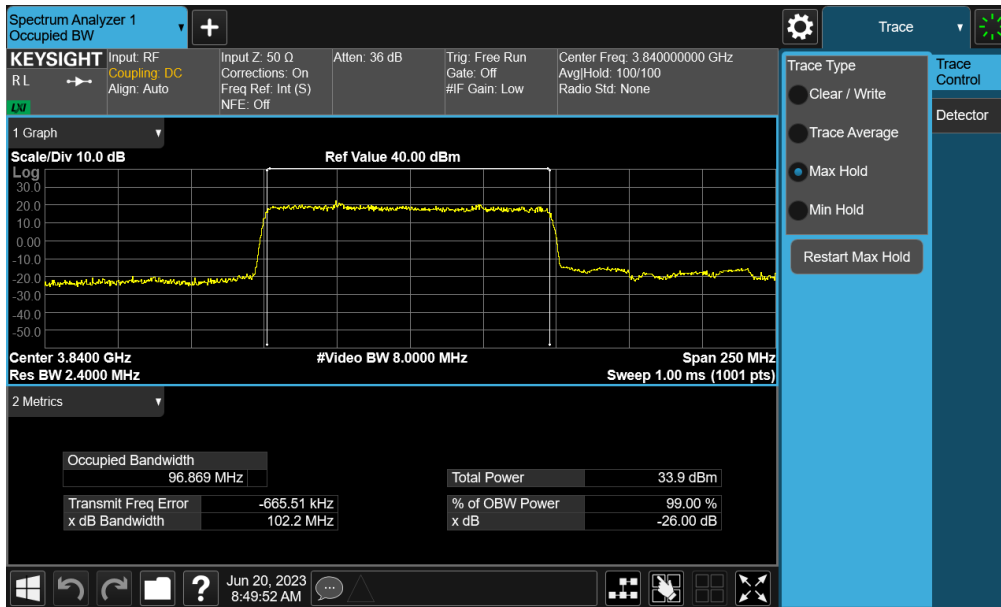
FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Mode	Bandwidth	Modulation	OBW [MHz]
NR-n77PC2	100MHz	$\pi/2$ BPSK	96.87
		QPSK	98.00
		16QAM	97.80
	90MHz	$\pi/2$ BPSK	87.40
		QPSK	87.70
		16QAM	87.91
	80MHz	$\pi/2$ BPSK	77.44
		QPSK	77.87
		16QAM	77.97
	70MHz	$\pi/2$ BPSK	64.47
		QPSK	67.61
		16QAM	67.57
	60MHz	$\pi/2$ BPSK	57.95
		QPSK	58.18
		16QAM	58.04
	50MHz	$\pi/2$ BPSK	45.90
		QPSK	47.76
		16QAM	47.73
	40MHz	$\pi/2$ BPSK	35.95
		QPSK	37.98
		16QAM	38.06
	30MHz	$\pi/2$ BPSK	27.08
		QPSK	27.97
		16QAM	27.97
20MHz	$\pi/2$ BPSK	17.96	
	QPSK	18.34	
	16QAM	18.33	
15MHz	$\pi/2$ BPSK	12.89	
	QPSK	13.66	
	16QAM	13.66	
10MHz	$\pi/2$ BPSK	8.63	
	QPSK	8.65	
	16QAM	8.71	

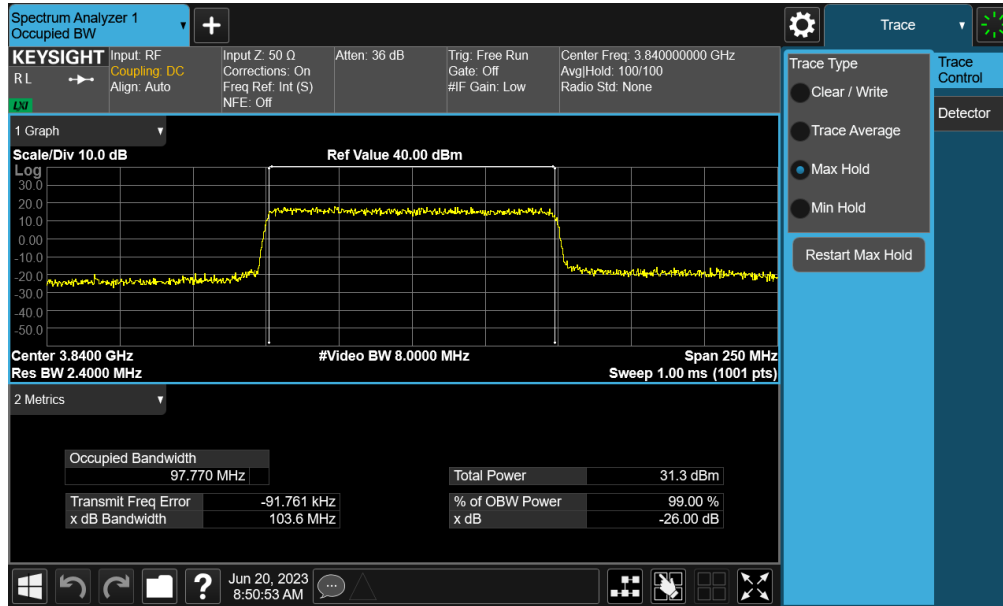
**Table 7-10. Occupied Bandwidth Test Results**

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 19 of 110

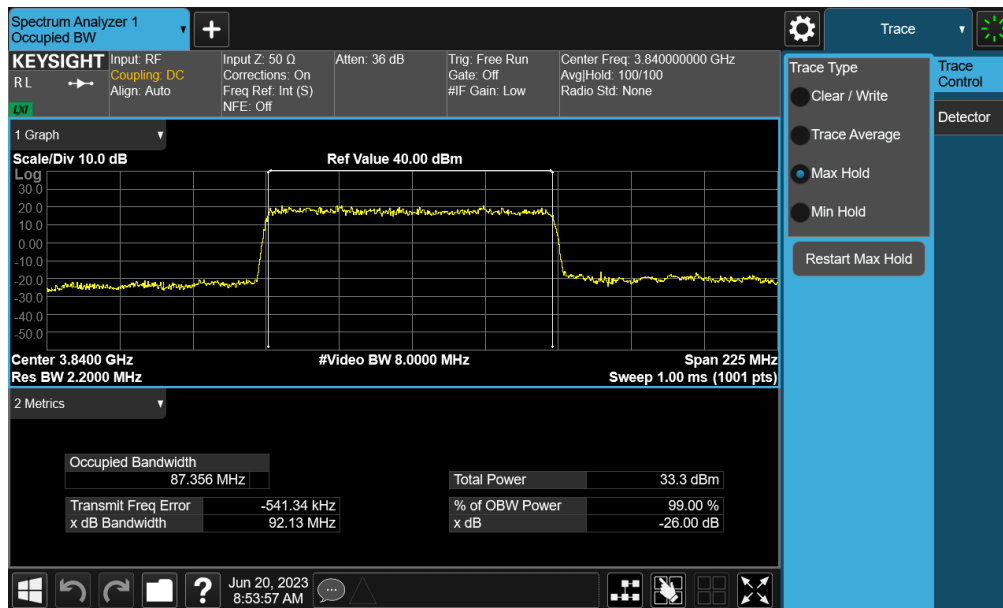
# NR Band n77PC2 – Ant F



FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 20 of 110

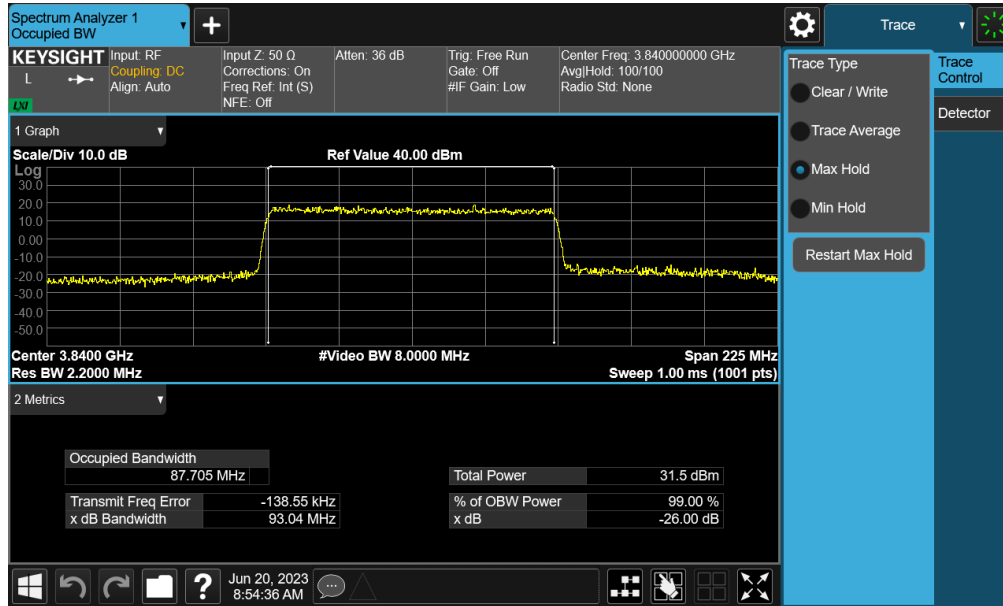


**Plot 7-3. Occupied Bandwidth Plot (NR Band n77PC2 - 100MHz 16-QAM - Full RB – Ant F)**

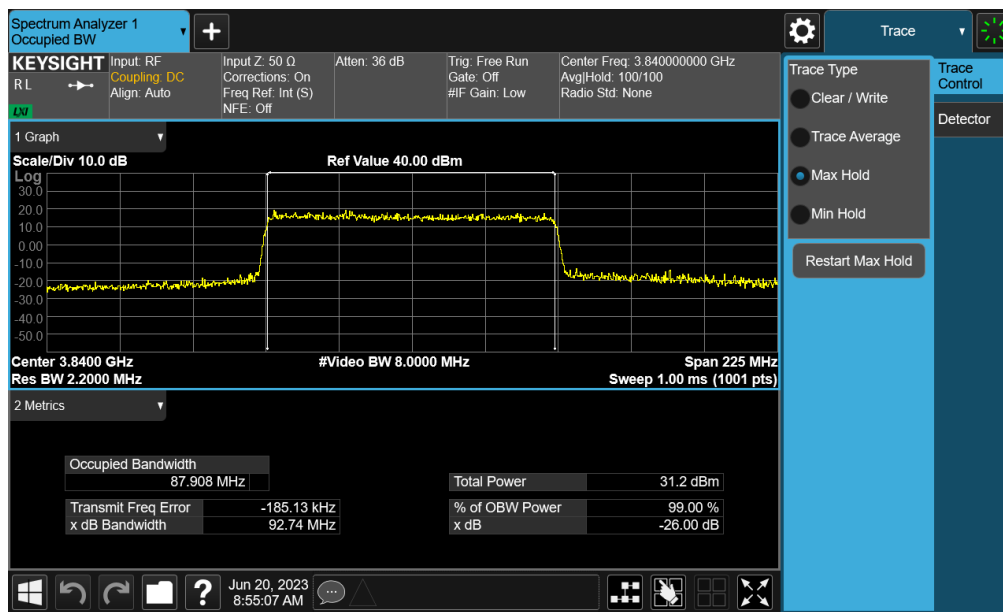


**Plot 7-4. Occupied Bandwidth Plot (NR Band n77 - 90MHz π/2 BPSK - Full RB - Ant F)**

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 21 of 110

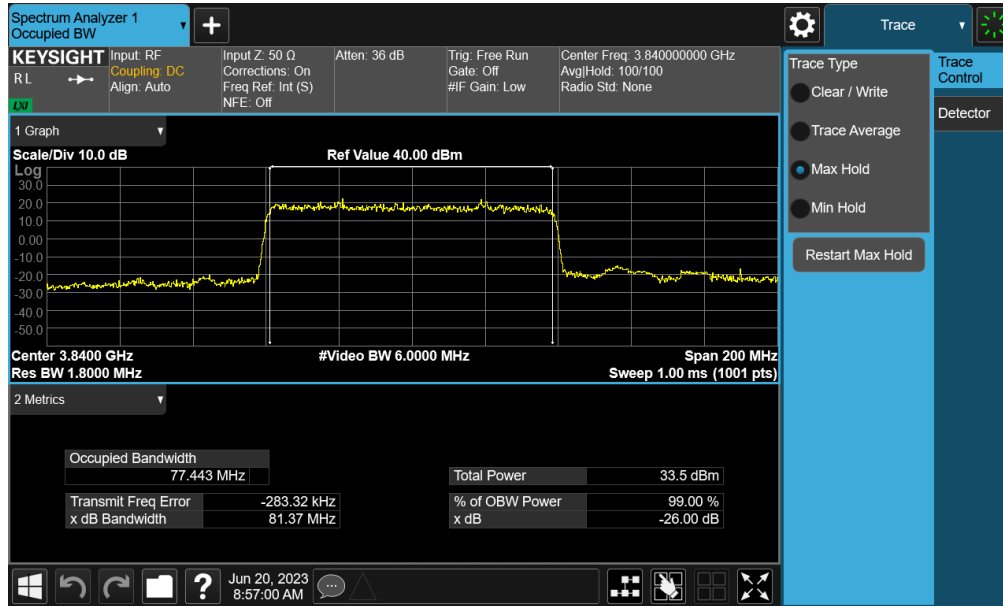


Plot 7-5. Occupied Bandwidth Plot (NR Band n77 - 90MHz QPSK - Full RB - Ant F)

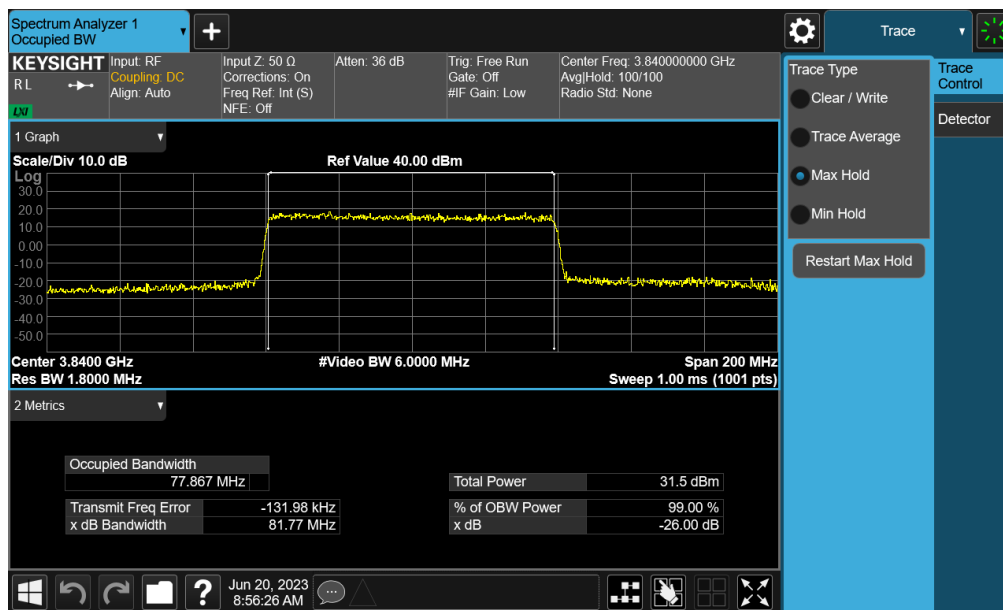


Plot 7-6. Occupied Bandwidth Plot (NR Band n77 - 90MHz 16-QAM - Full RB - Ant F)

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 22 of 110

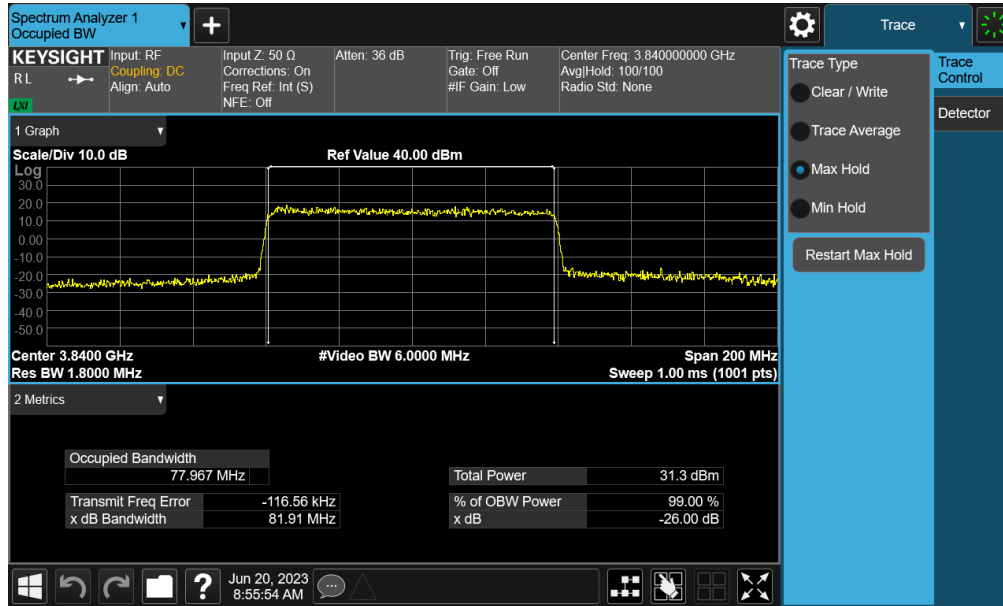


Plot 7-7. Occupied Bandwidth Plot (NR Band n77 - 80MHz  $\pi/2$  BPSK - Full RB - Ant F)

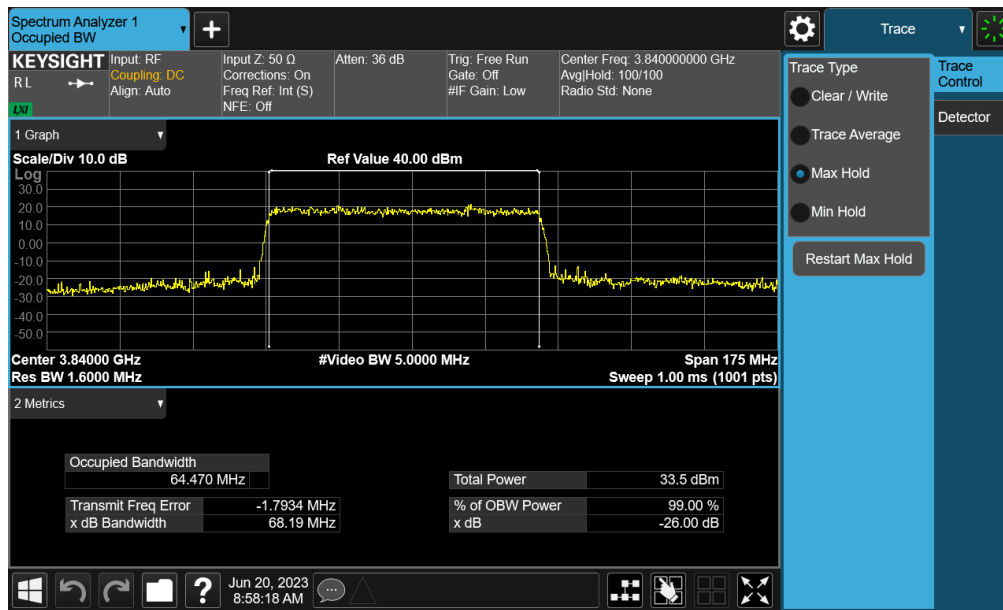


Plot 7-8. Occupied Bandwidth Plot (NR Band n77 - 80MHz QPSK - Full RB - Ant F)

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 23 of 110



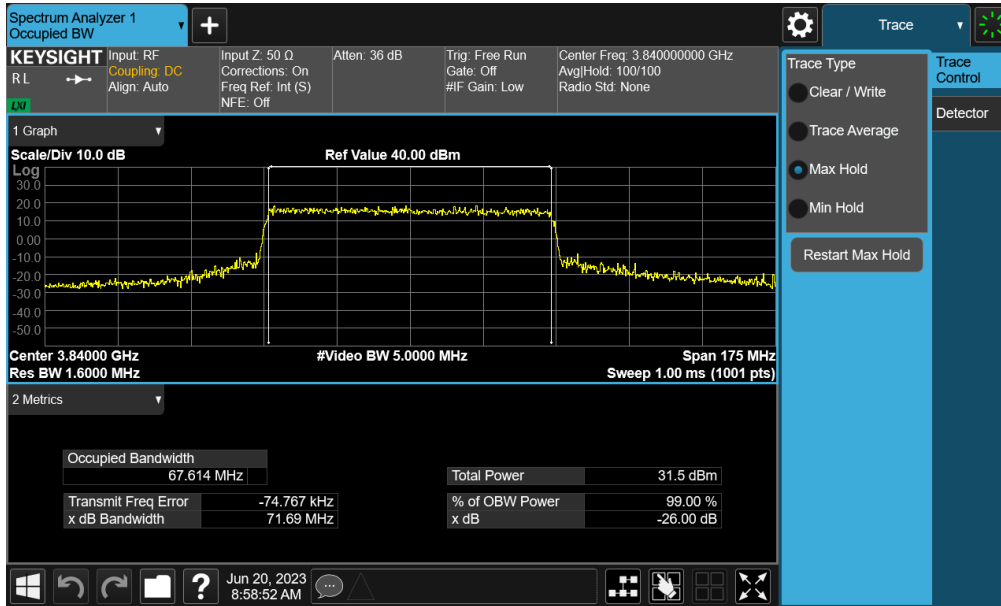
**Plot 7-9. Occupied Bandwidth Plot (NR Band n77 - 80MHz 16-QAM - Full RB - Ant F)**



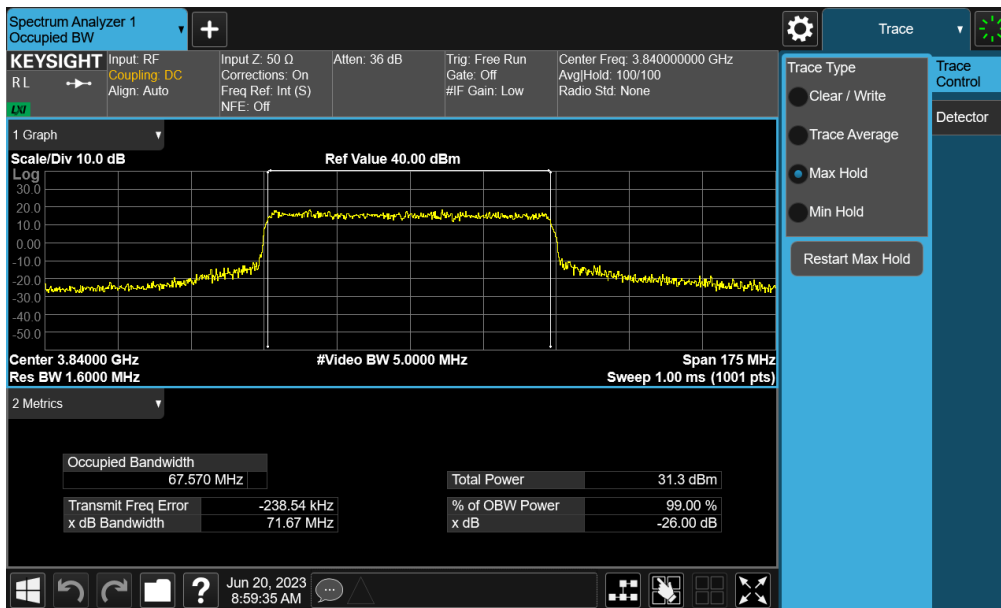
**Plot 7-10. Occupied Bandwidth Plot (NR Band n77 - 70MHz π/2 BPSK - Full RB - Ant F)**

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 24 of 110



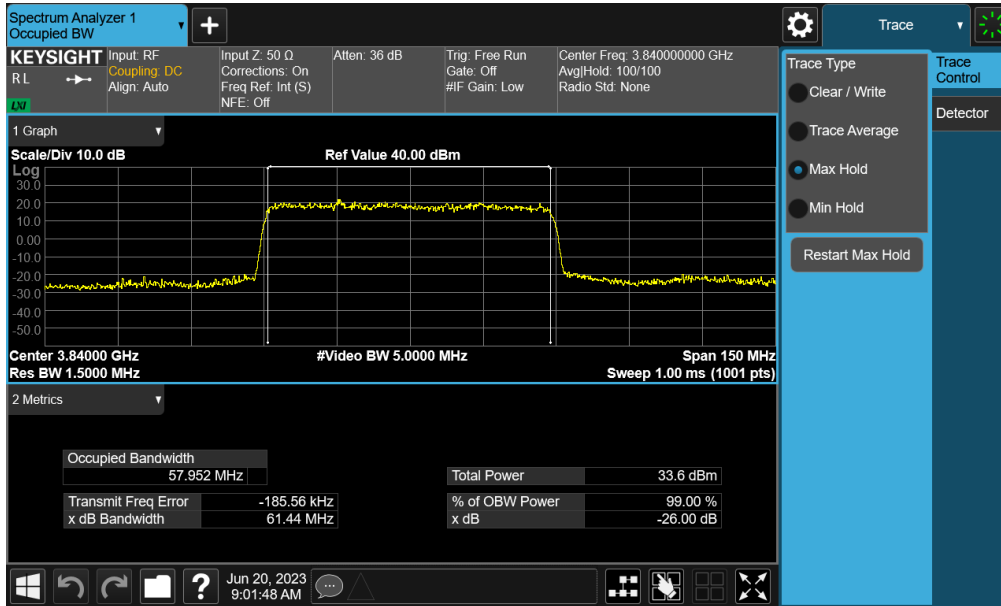


Plot 7-11. Occupied Bandwidth Plot (NR Band n77 - 70MHz QPSK - Full RB - Ant F)

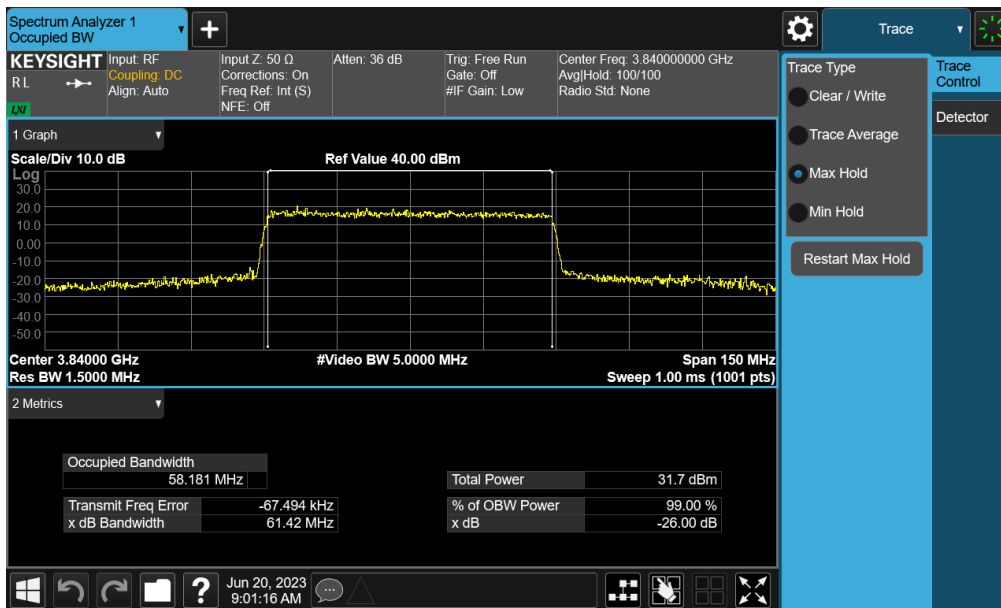


Plot 7-12. Occupied Bandwidth Plot (NR Band n77 - 70MHz 16-QAM - Full RB - Ant F)

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 25 of 110

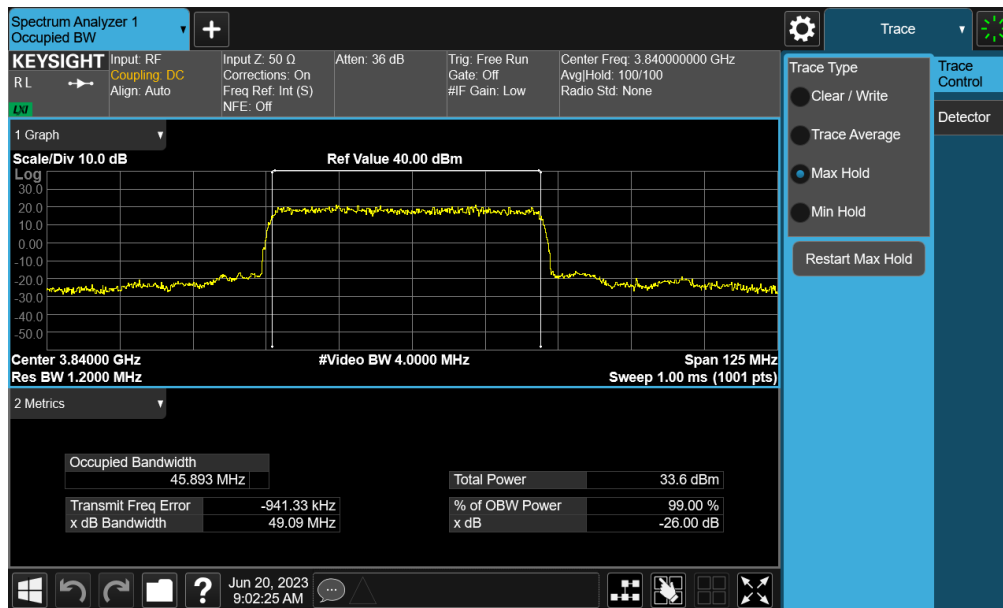
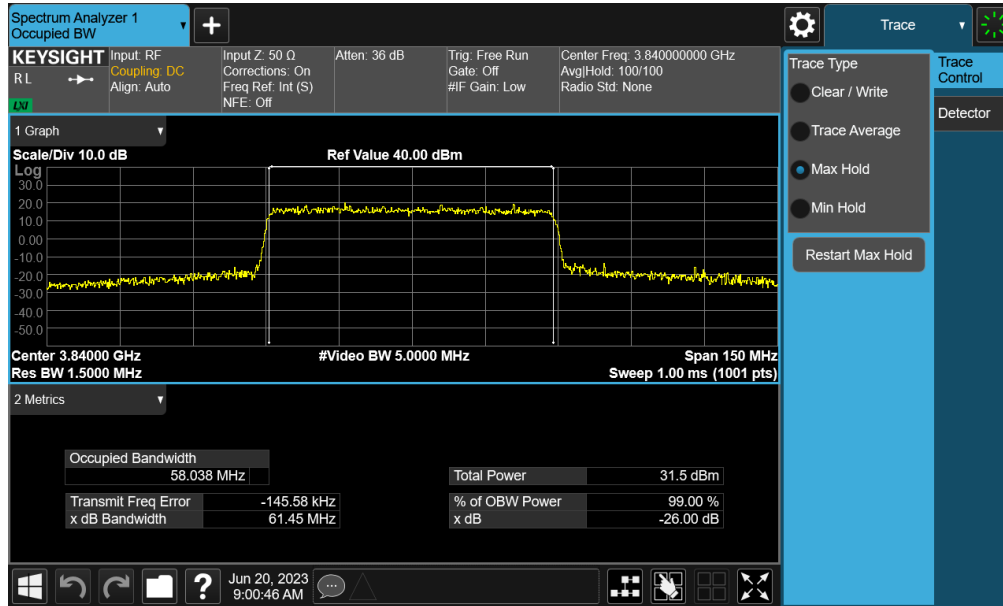


Plot 7-13. Occupied Bandwidth Plot (NR Band n77 - 60MHz  $\pi/2$  BPSK - Full RB - Ant F)

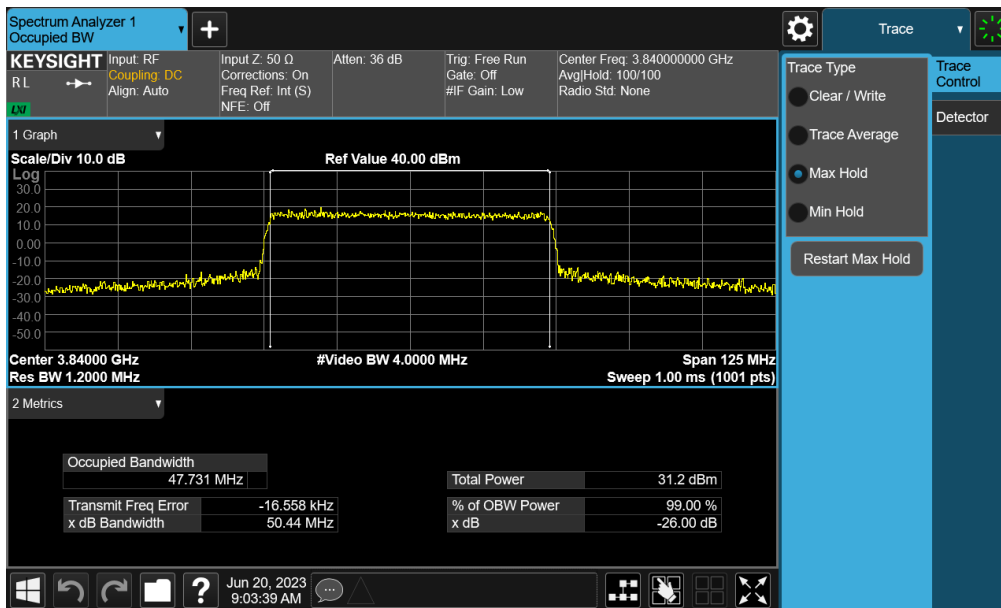
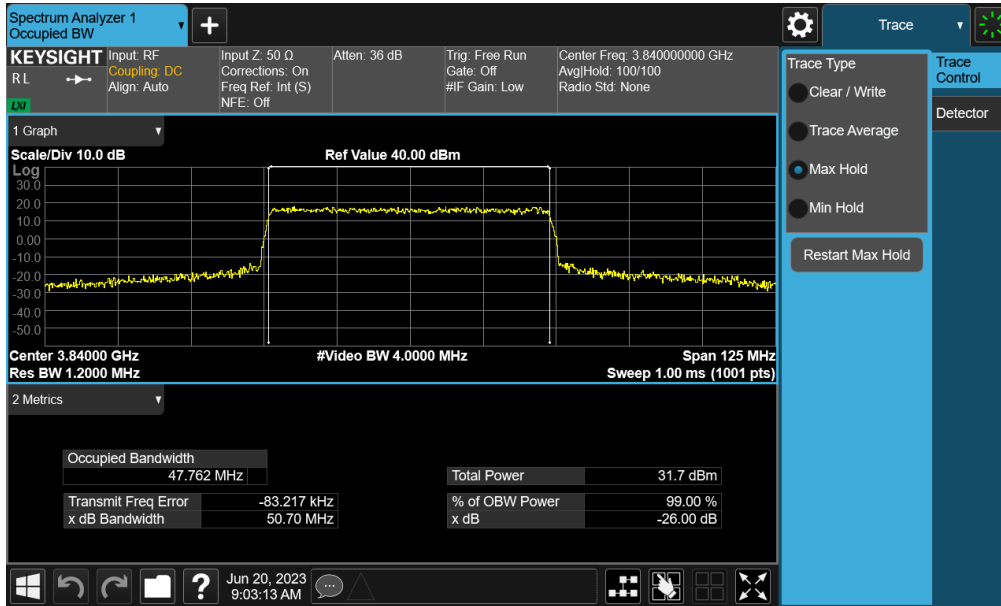


Plot 7-14. Occupied Bandwidth Plot (NR Band n77 - 60MHz QPSK - Full RB - Ant F)

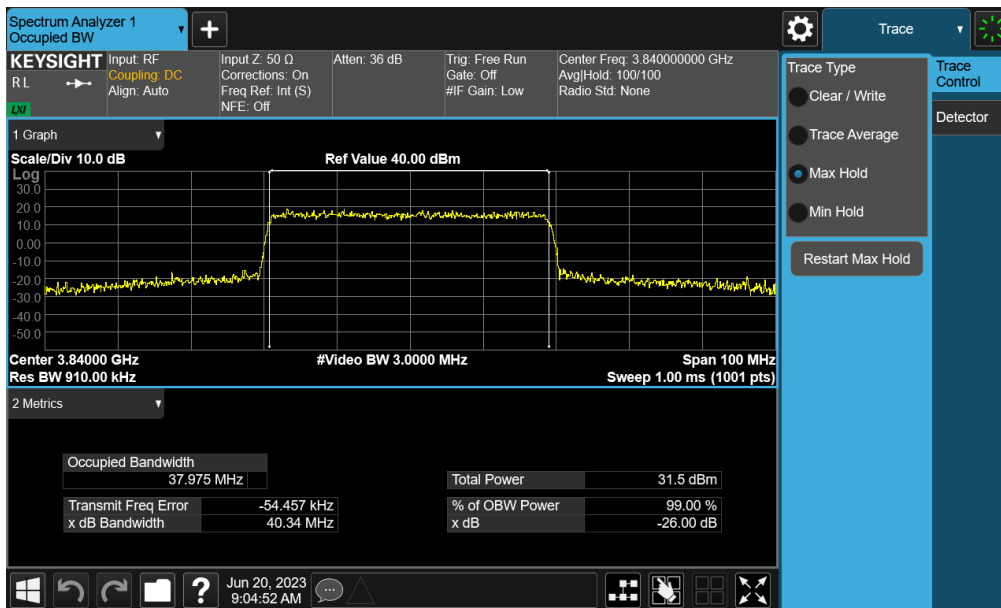
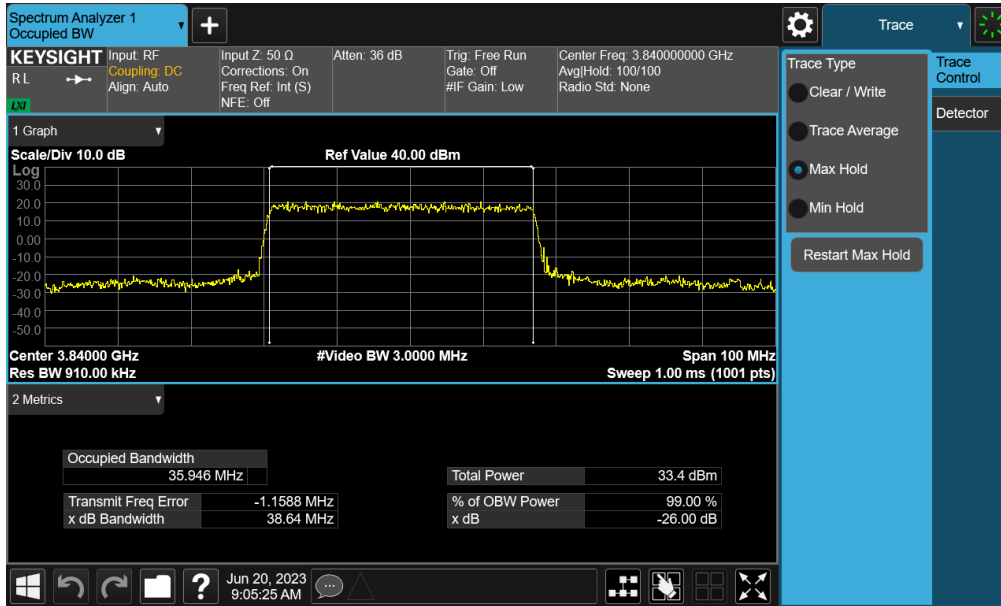
FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 26 of 110



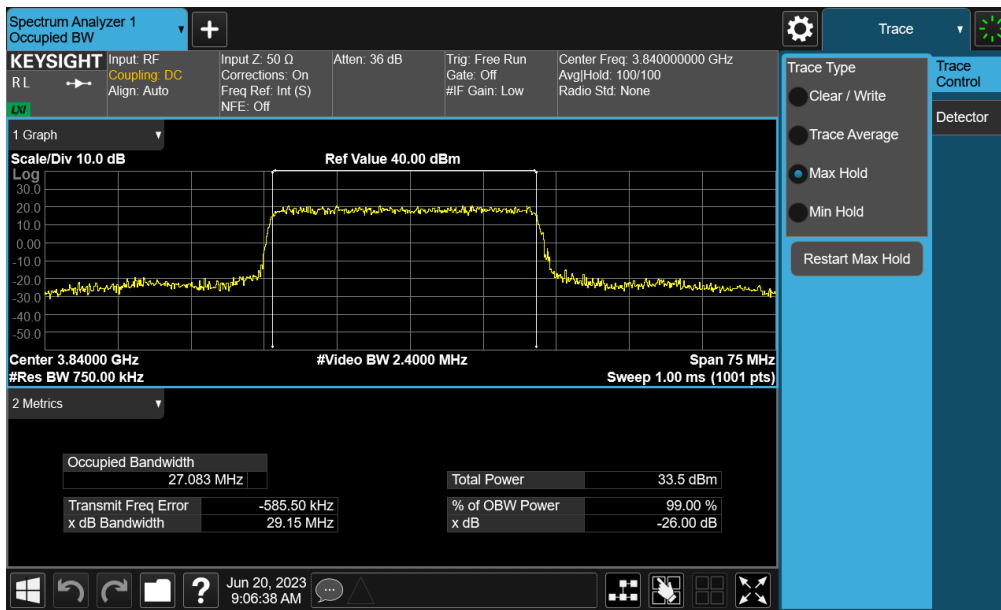
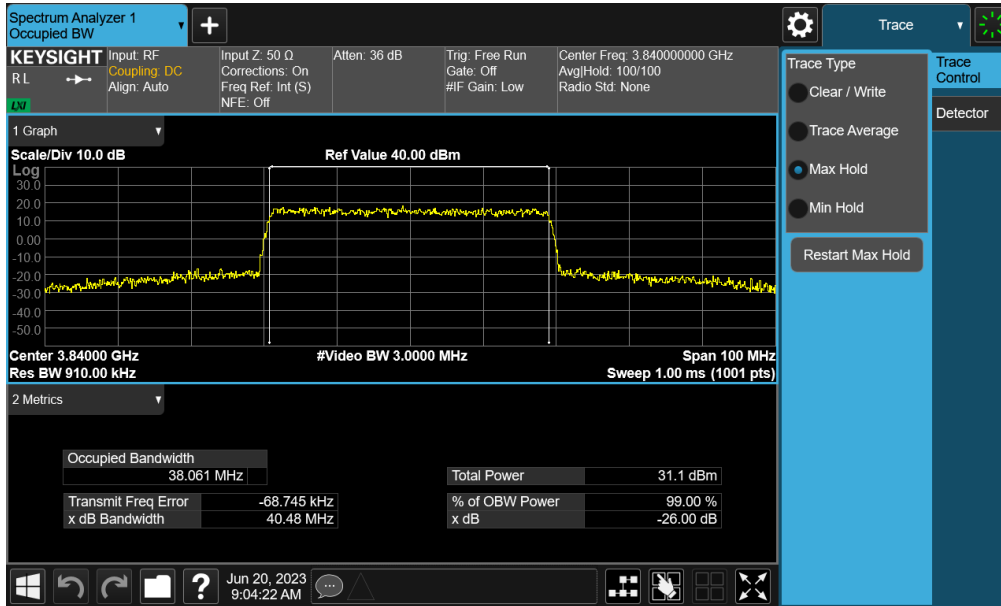
FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 27 of 110



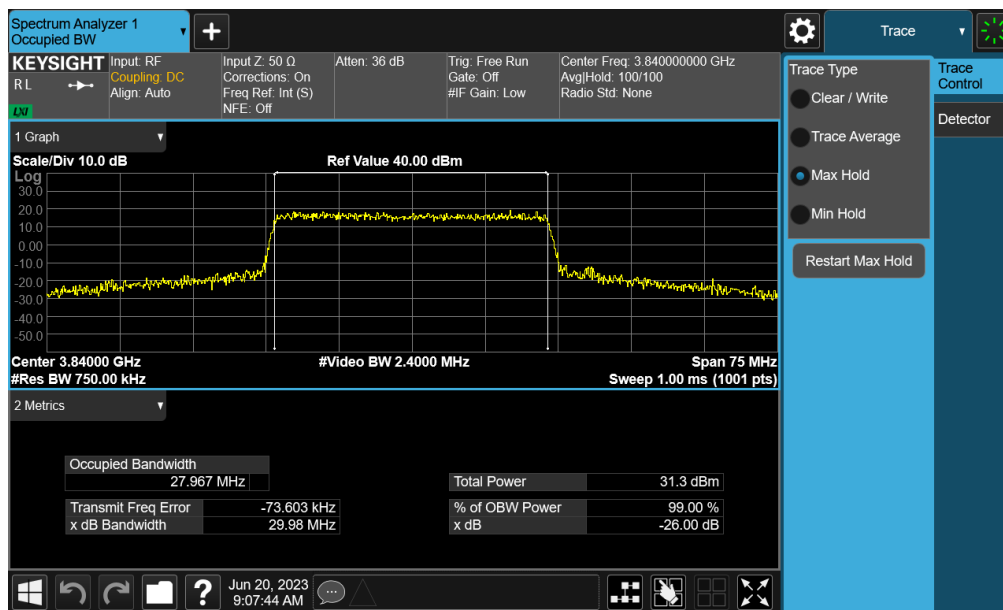
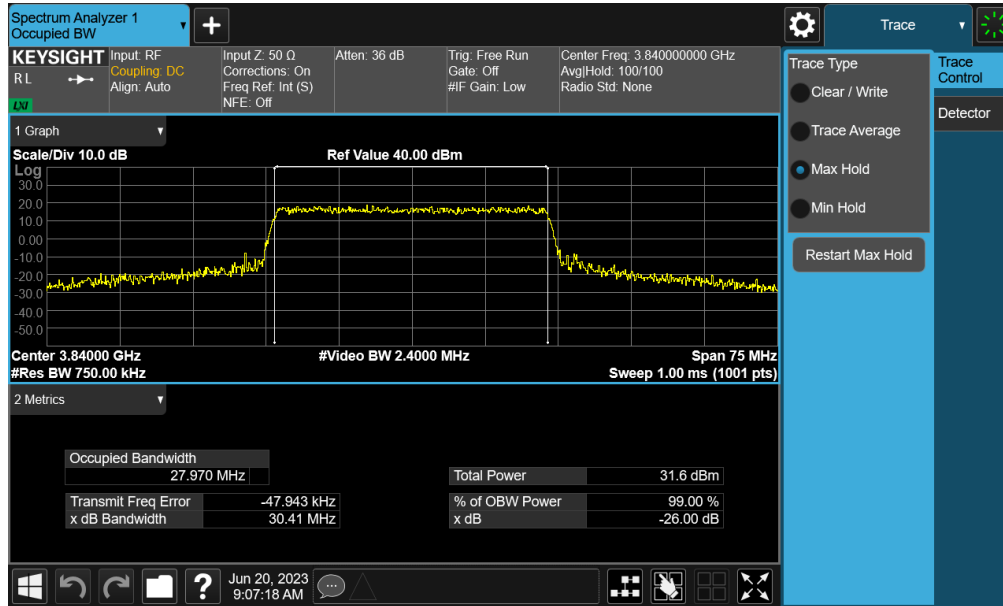
FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 28 of 110



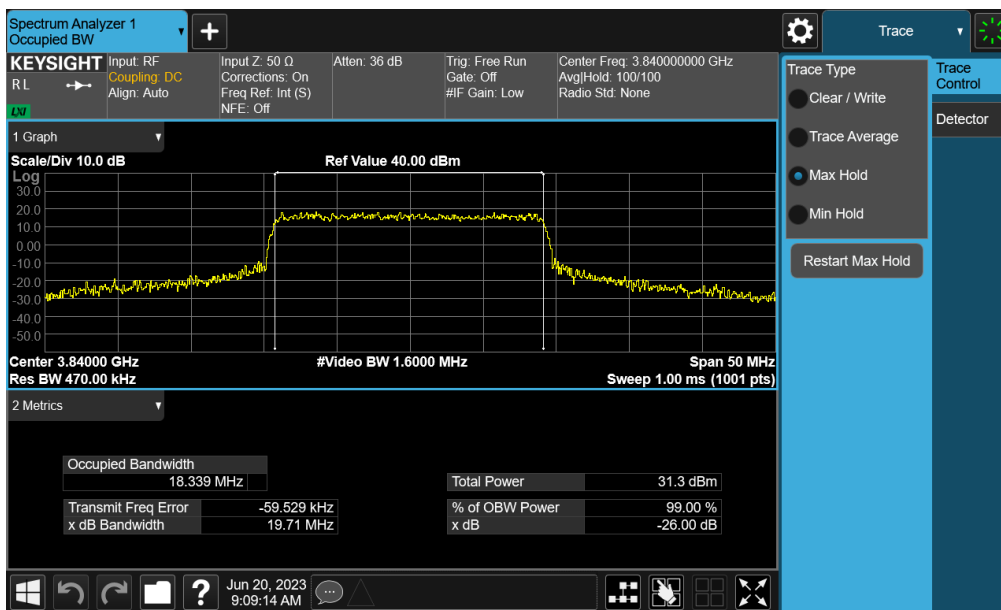
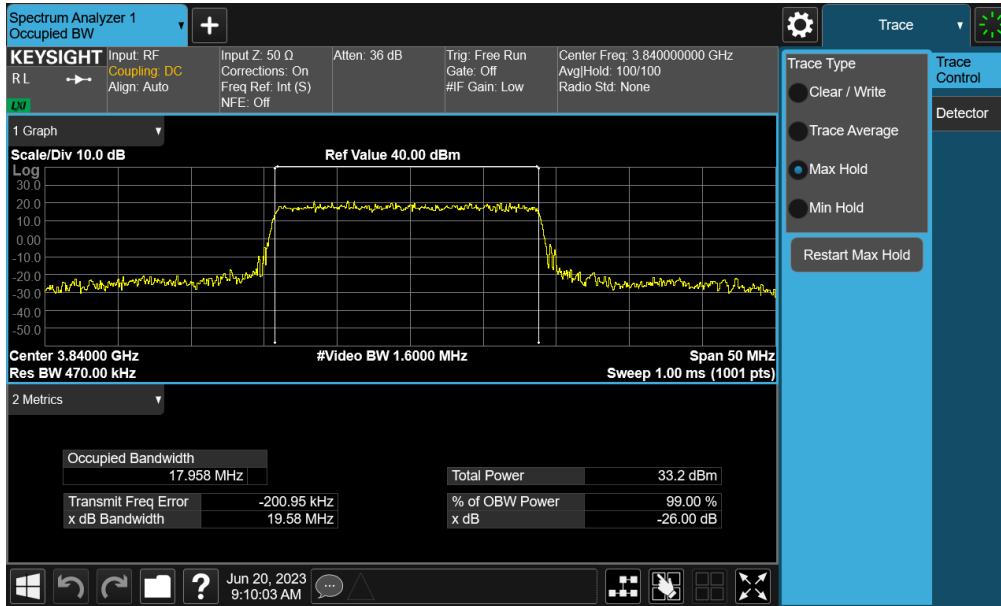
FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 29 of 110



FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 30 of 110

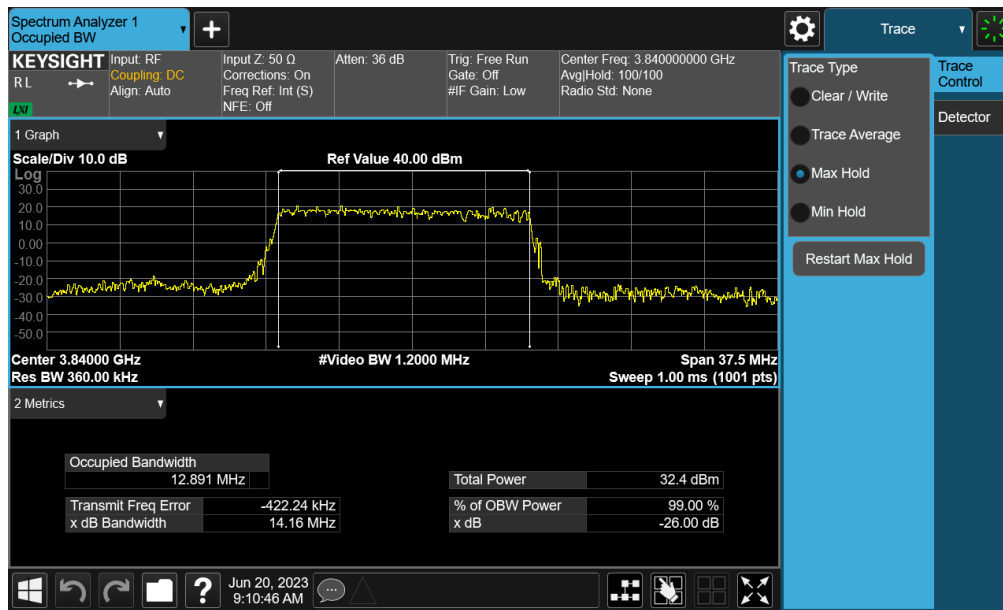
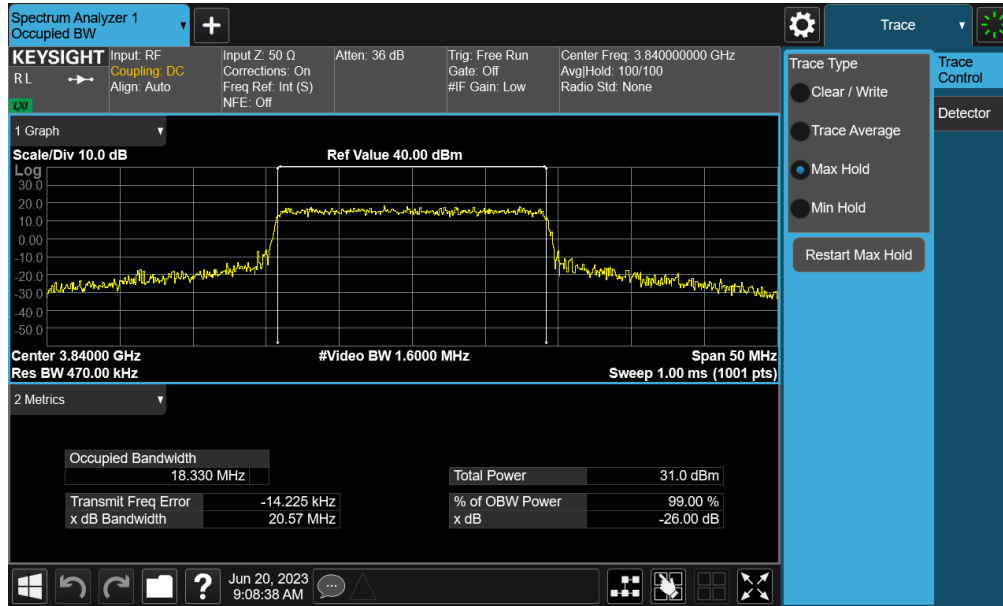


FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 31 of 110

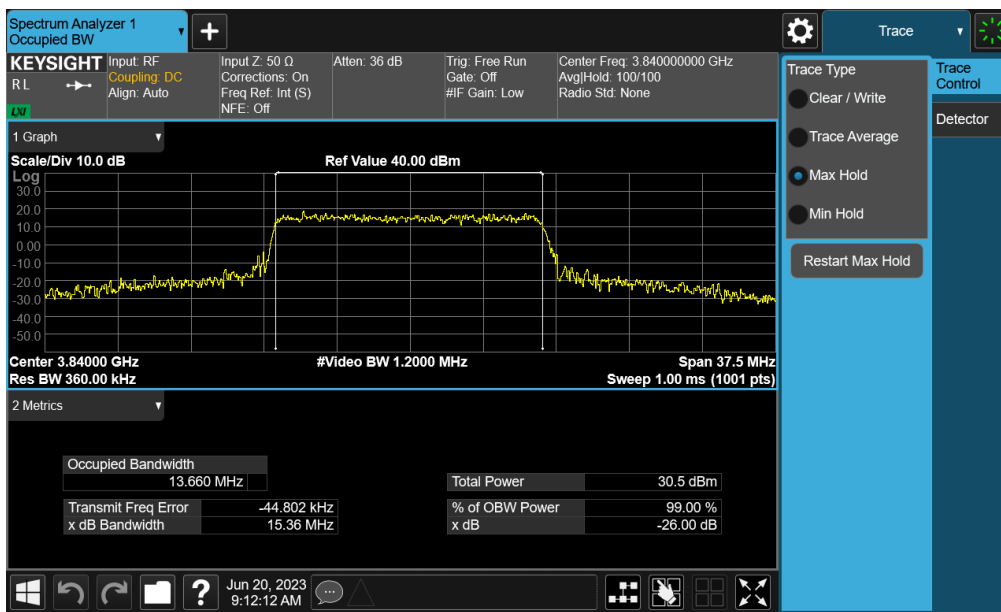
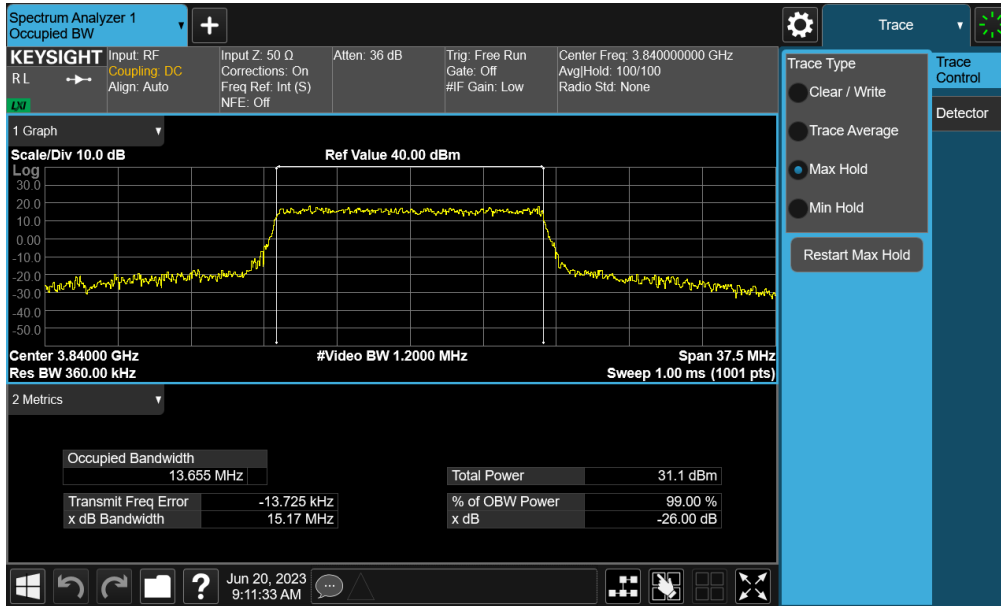


FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 32 of 110

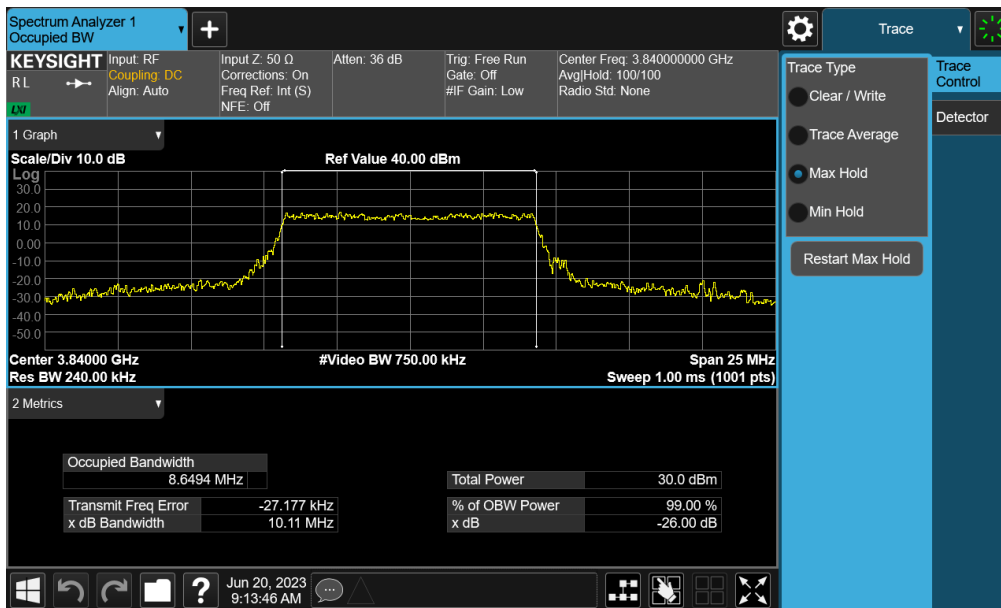
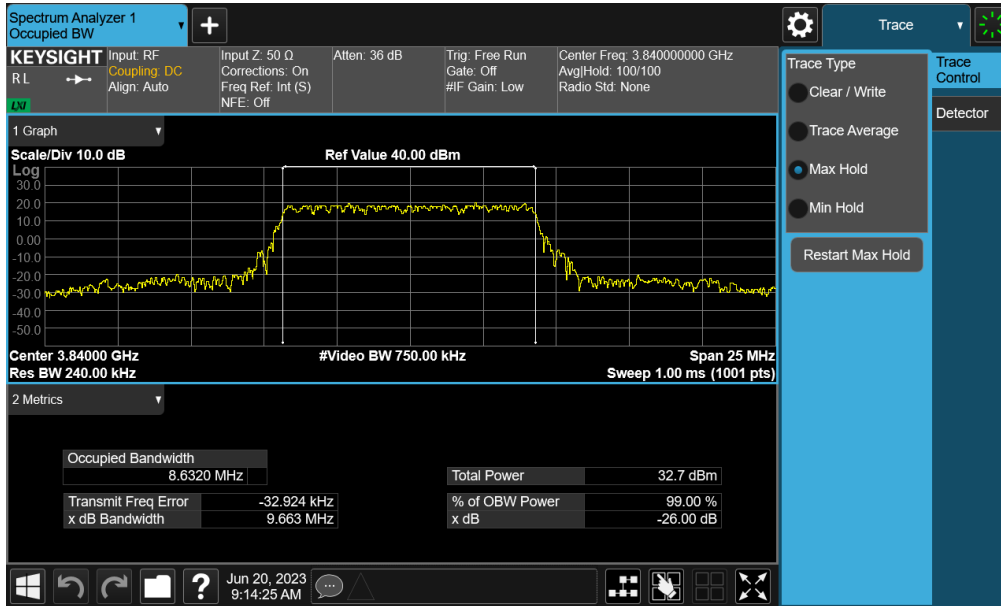




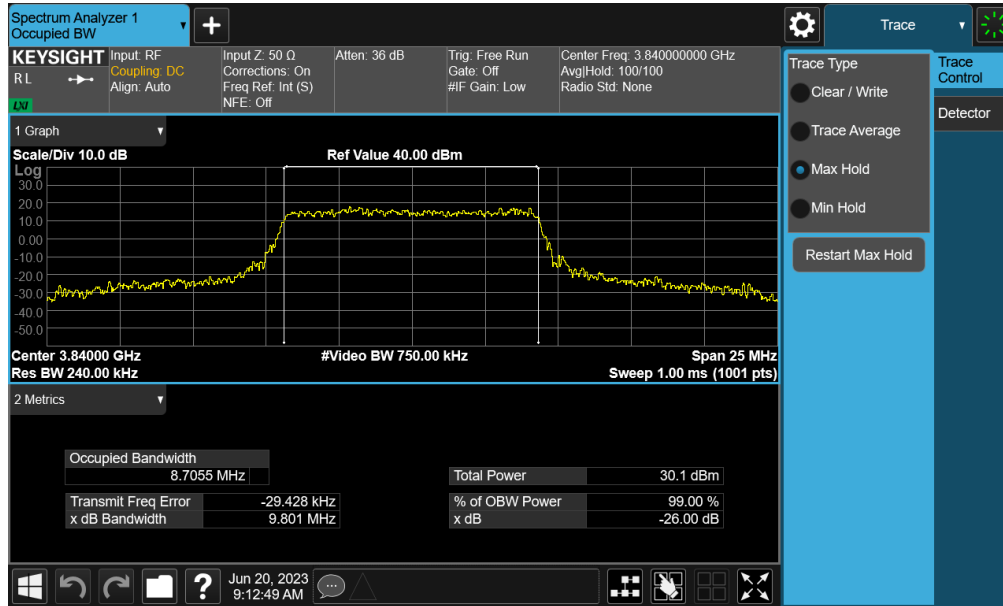
FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 33 of 110



FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-33. Occupied Bandwidth Plot (NR Band n77 - 10MHz 16-QAM - Full RB - Ant F)

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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## 7.4 Spurious and Harmonic Emissions at Antenna Terminal

### Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10<sup>th</sup> harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

***For operations in the 3700 – 3980MHz band and the 3450 – 3550MHz band, the maximum permissible conducted power level of any spurious emission is -13dBm/MHz.***

### Test Procedure Used

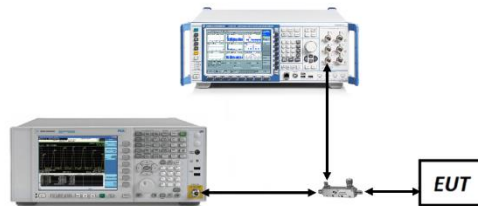
ANSI C63.26-2015 – Section 5.7.4

### Test Settings

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

### Test Setup

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



**Figure 7-3. Test Instrument & Measurement Setup**

### Test Notes

1. Per Part 27.53(l), Part 27.53(n), and RSS-199, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz.
2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

FCC ID: A3LSMS711U	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 37 of 110

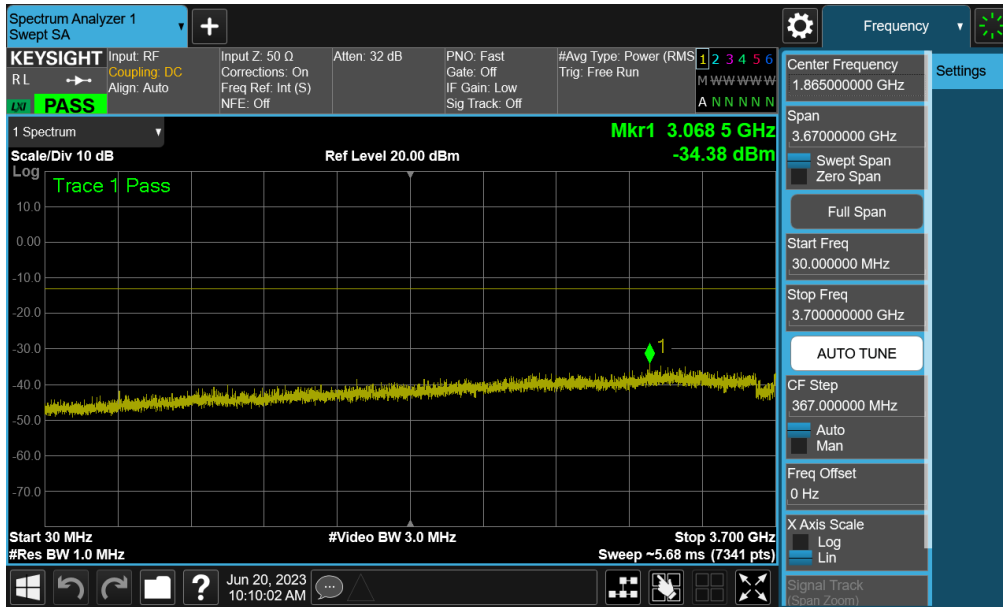


Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n77PC2 C Band	100MHz	Low	30.0 - 3700.0	-34.38	-13	-21.38
		Low	3980.0 - 20000.0	-26.43	-13	-13.43
		Low	20000.0 - 40000.0	-31.63	-13	-18.63
		Mid	30.0 - 3700.0	-37.02	-13	-24.02
		Mid	3980.0 - 20000.0	-29.90	-13	-16.90
		Mid	20000.0 - 40000.0	-41.45	-13	-28.45
		High	30.0 - 3700.0	-34.86	-13	-21.86
		High	3980.0 - 20000.0	-30.79	-13	-17.79
		High	20000.0 - 40000.0	-31.86	-13	-18.86
NR-n77PC2 DoD Band	100MHz	Mid	30.0 - 3450.0	-35.11	-13	-22.11
		Mid	3550.0 - 20000.0	-30.38	-13	-17.38
		Mid	20000.0 - 40000.0	-41.55	-13	-28.55

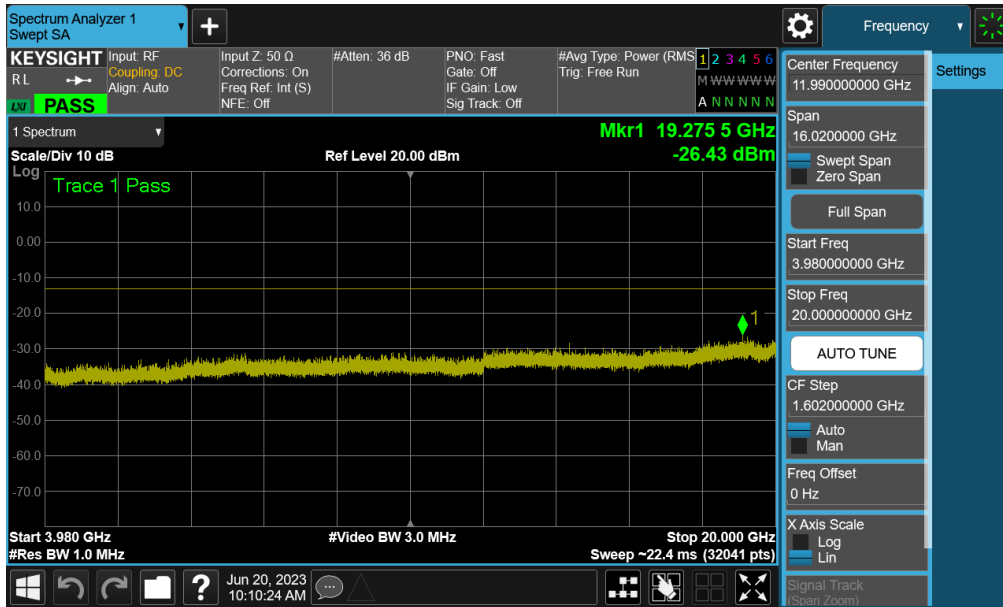
Figure 7-4. Conducted Emission Test Results – Ant F

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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# NR Band n77 – Ant F

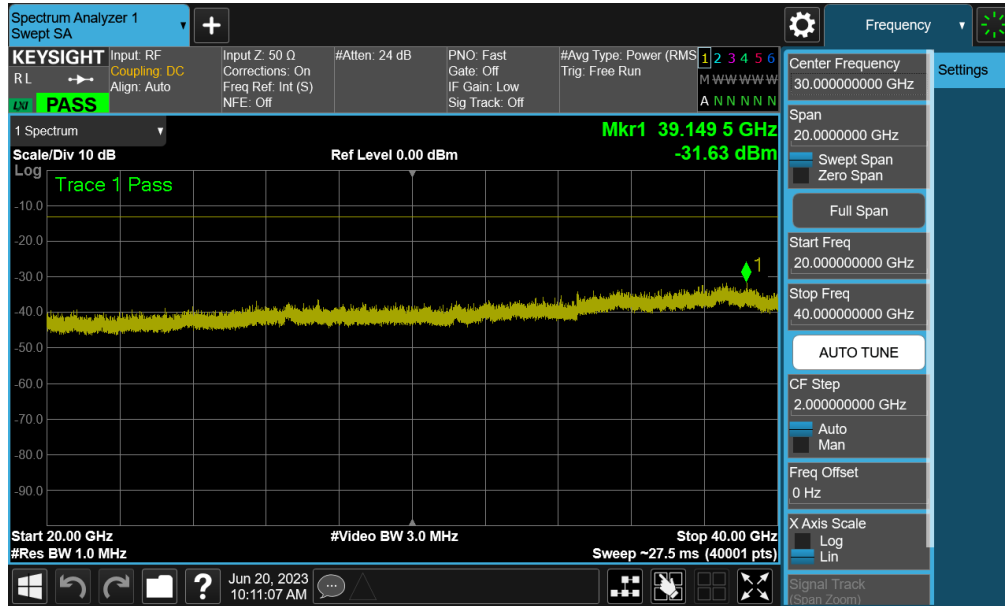


Plot 7-34. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel – Ant F)



Plot 7-35. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel – Ant F)

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 39 of 110

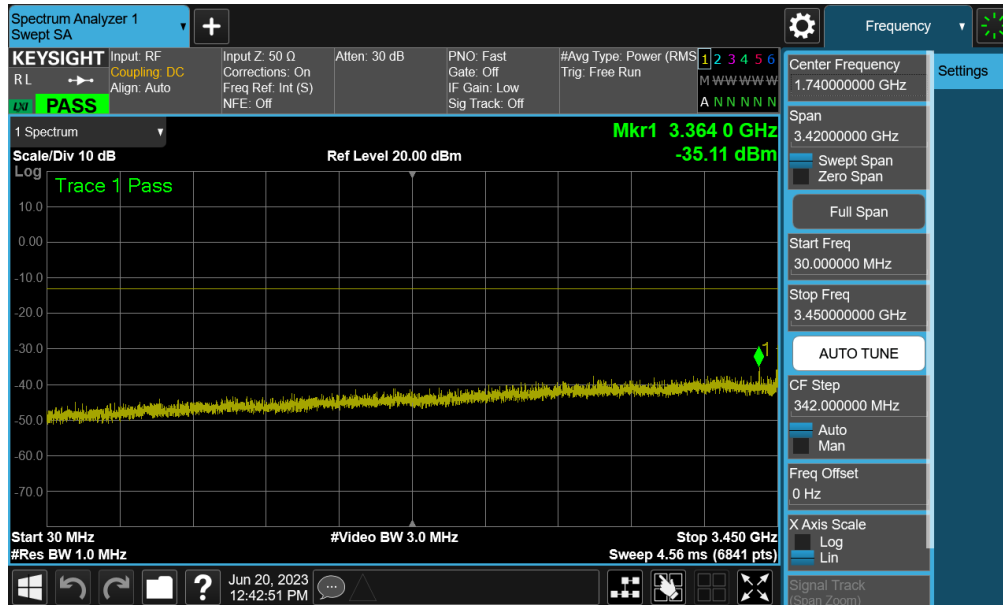


Plot 7-36. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel – Ant F)

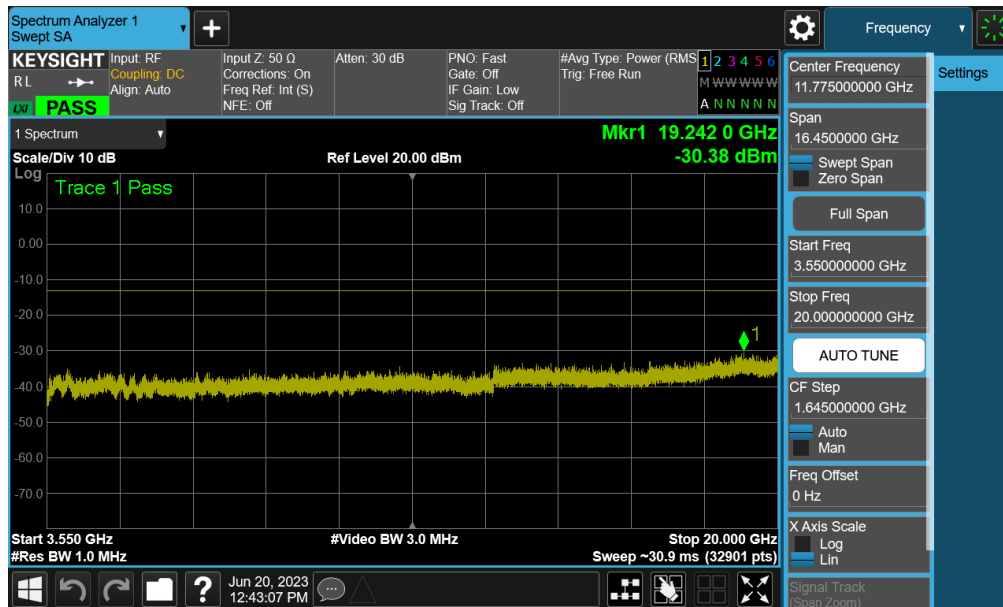
FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 40 of 110



## NR Band n77 (DoD Band) – Ant F

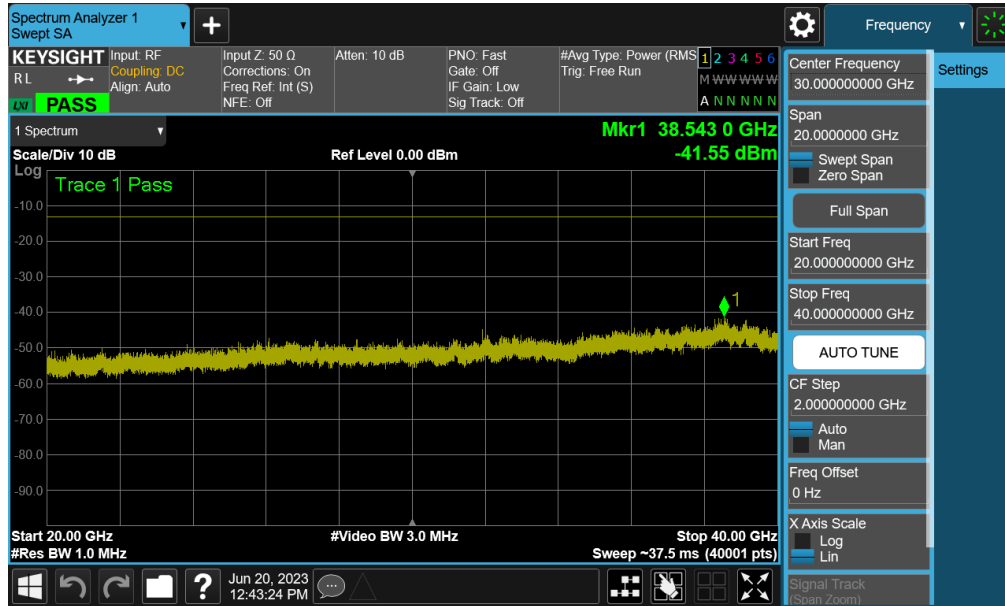


Plot 7-37. Conducted Spurious Plot (NR Band n77 (DoD) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant F)



Plot 7-38. Conducted Spurious Plot (NR Band n77 (DoD) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant F)

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-39. Conducted Spurious Plot (NR Band n77 (DoD) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant F)

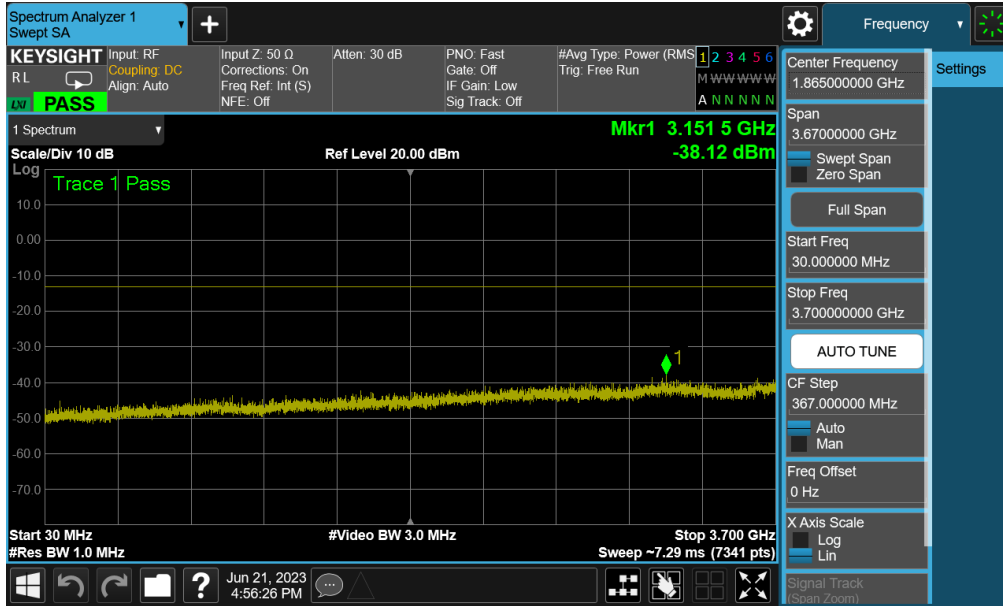
FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n77PC2 C Band	100MHz	Low	30.0 - 3700.0	-38.12	-13	-28.52
		Low	3980.0 - 20000.0	-33.14	-13	-21.09
		Low	20000.0 - 40000.0	-42.16	-13	-30.57
		Mid	30.0 - 3700.0	-38.96	-13	-28.24
		Mid	3980.0 - 20000.0	-33.25	-13	-21.19
		Mid	20000.0 - 40000.0	-43.40	-13	-30.70
		High	30.0 - 3700.0	-37.86	-13	-28.44
		High	3980.0 - 20000.0	-32.79	-13	-21.47
		High	20000.0 - 40000.0	-43.47	-13	-30.83
NR-n77PC2 DoD Band	100MHz	Mid	30.0 - 3450.0	-37.82	-13	-26.37
		Mid	3550.0 - 20000.0	-33.16	-13	-19.57
		Mid	20000.0 - 40000.0	-43.24	-13	-29.90

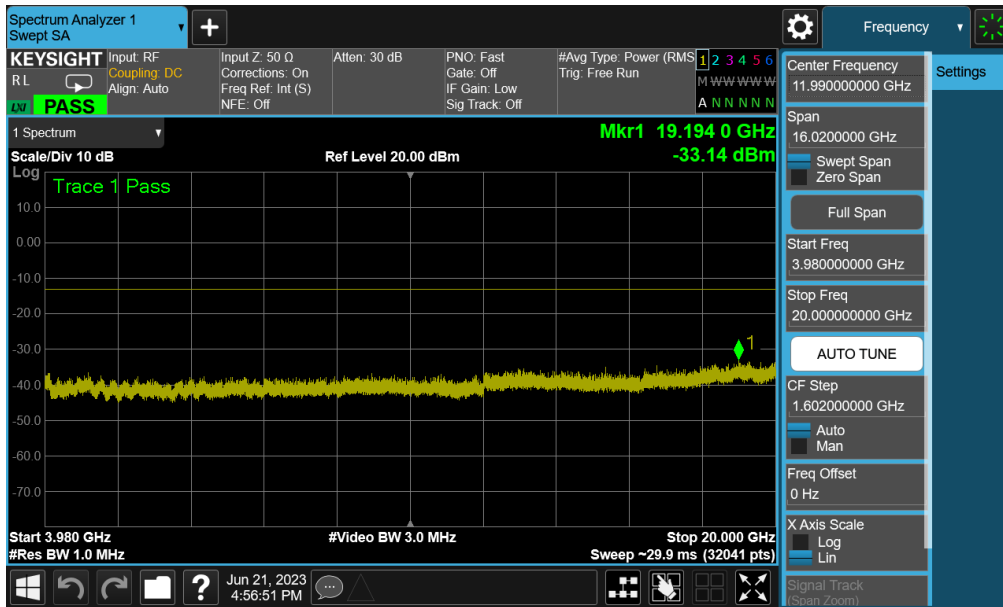
Figure 7-6. Conducted Emission Test Results – Ant C

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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# NR Band n77 – Ant C

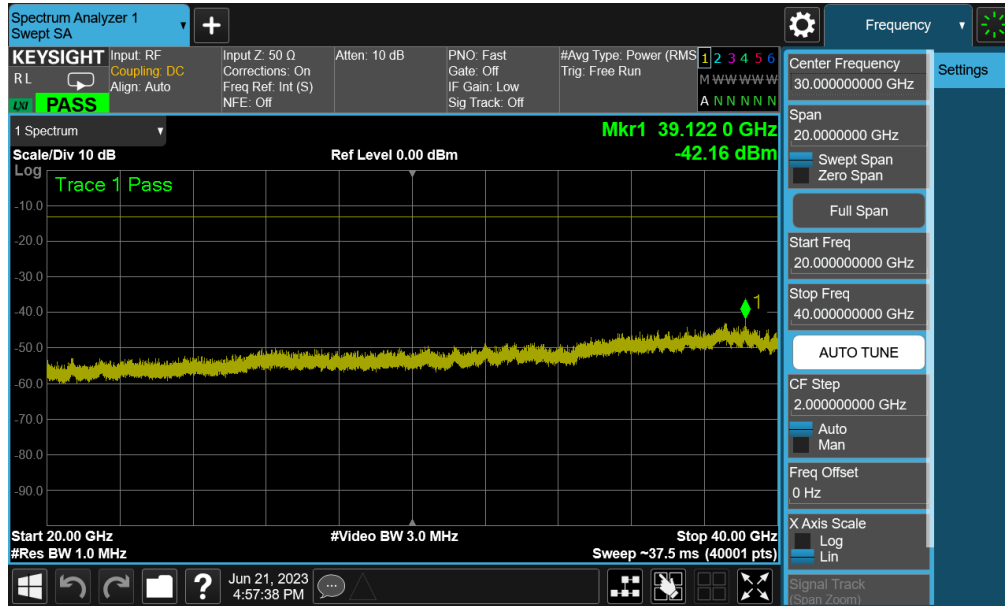


Plot 7-40. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel – Ant C)



Plot 7-41. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel – Ant C)

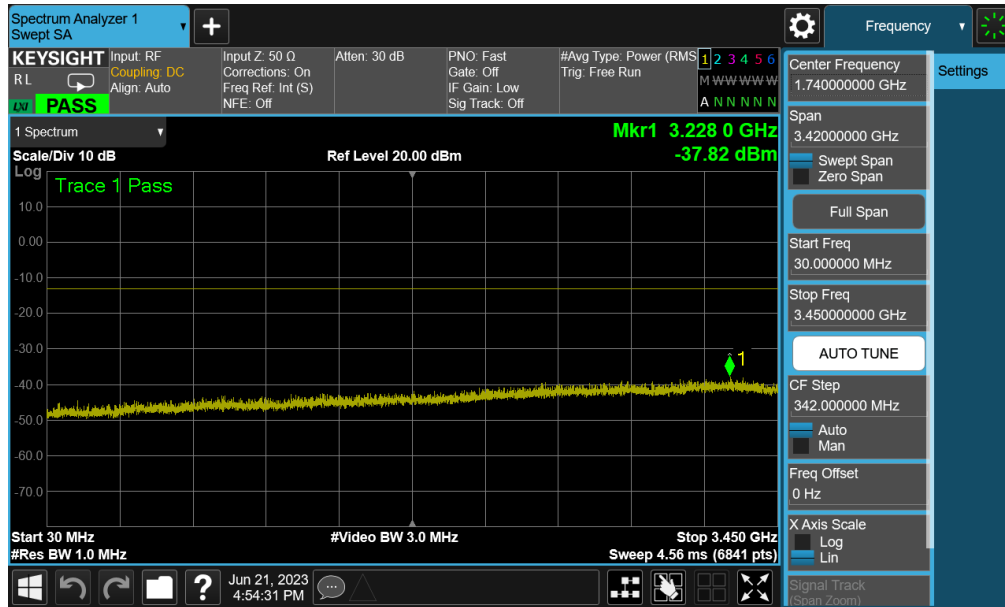
FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2304260060-09.A3L	Test Dates: 05/24/2023 - 07/31/2023	EUT Type: Portable Handset	Page 44 of 110



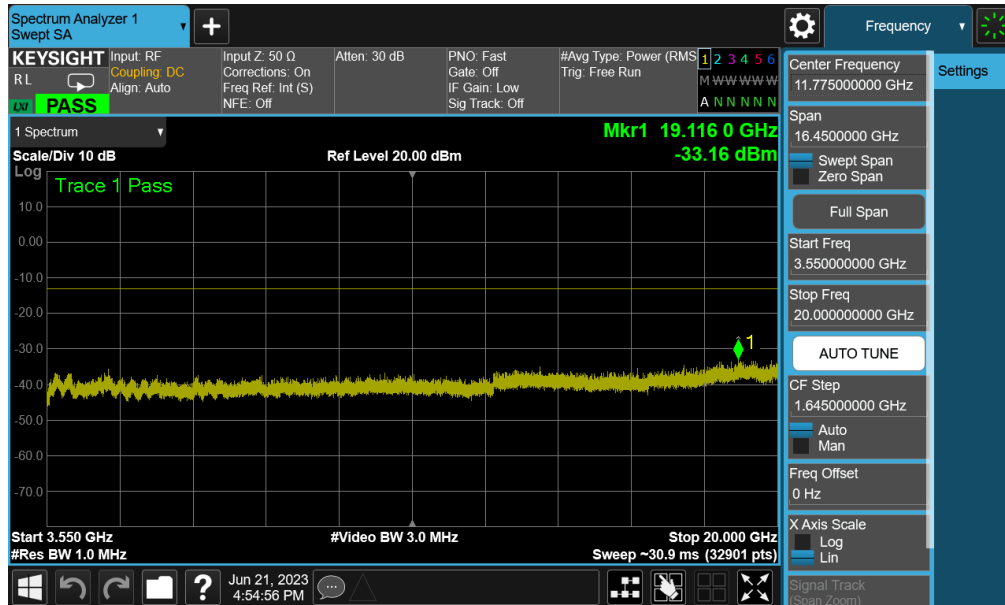
Plot 7-42. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel – Ant C)

FCC ID: A3LSMS711U	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
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## NR Band n77 (DoD Band) – Ant C

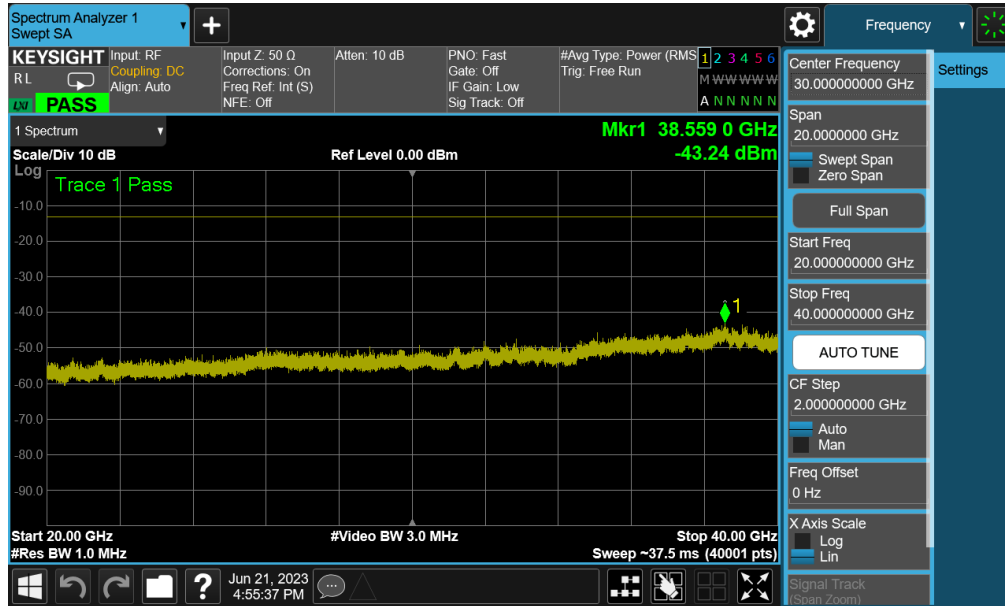


Plot 7-43. Conducted Spurious Plot (NR Band n77 (DoD) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant C)



Plot 7-44. Conducted Spurious Plot (NR Band n77 (DoD) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant C)

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Plot 7-45. Conducted Spurious Plot (NR Band n77 (DoD) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant C)

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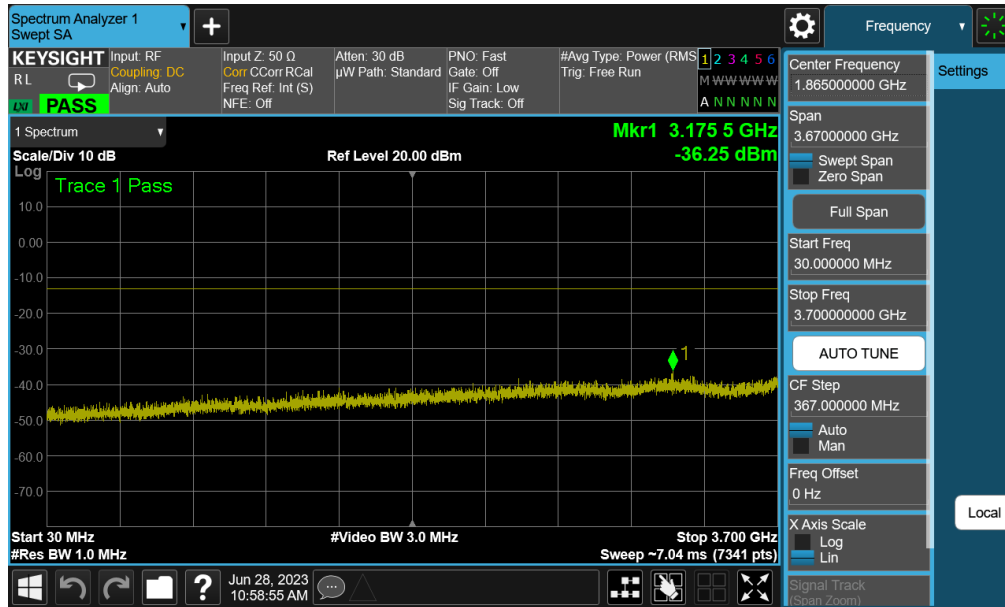
Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n77PC2 C Band	100MHz	Low	30.0 - 3700.0	-36.83	-13	-23.83
		Low	3980.0 - 20000.0	-40.67	-13	-27.67
		Low	20000.0 - 40000.0	-38.02	-13	-25.02
		Mid	30.0 - 3700.0	-37.35	-13	-24.35
		Mid	3980.0 - 20000.0	-39.39	-13	-26.39
		Mid	20000.0 - 40000.0	-37.37	-13	-24.37
		High	30.0 - 3700.0	-36.25	-13	-23.25
		High	3980.0 - 20000.0	-39.84	-13	-26.84
		High	20000.0 - 40000.0	-37.68	-13	-24.68
NR-n77PC2 DoD Band	100MHz	Mid	30.0 - 3450.0	-36.68	-13	-23.68
		Mid	3550.0 - 20000.0	-40.03	-13	-27.03
		Mid	20000.0 - 40000.0	-37.46	-13	-24.46

Figure 7-7. Conducted Emission Test Results – Ant I

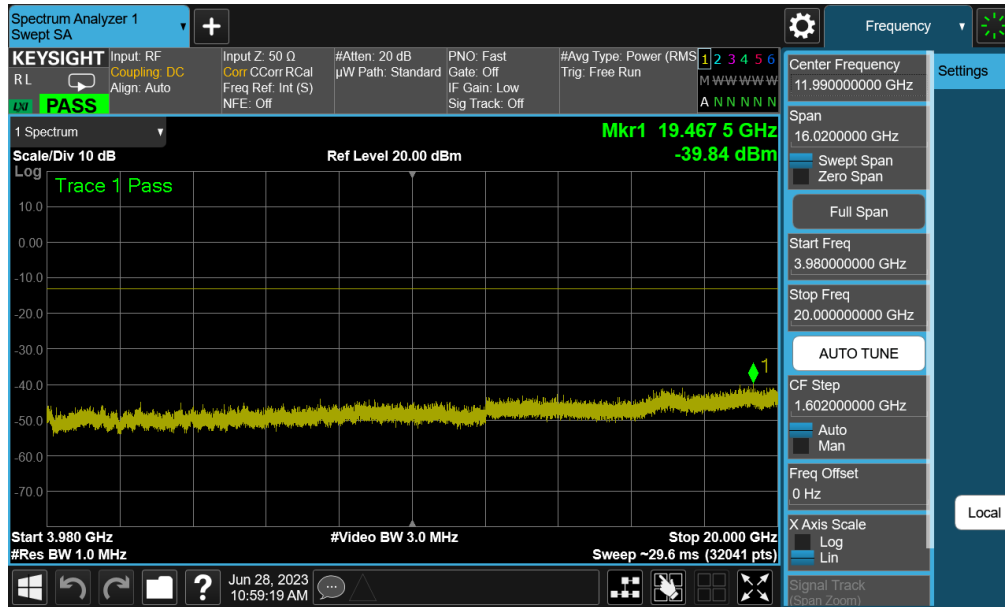
FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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# NR Band n77 – Ant I

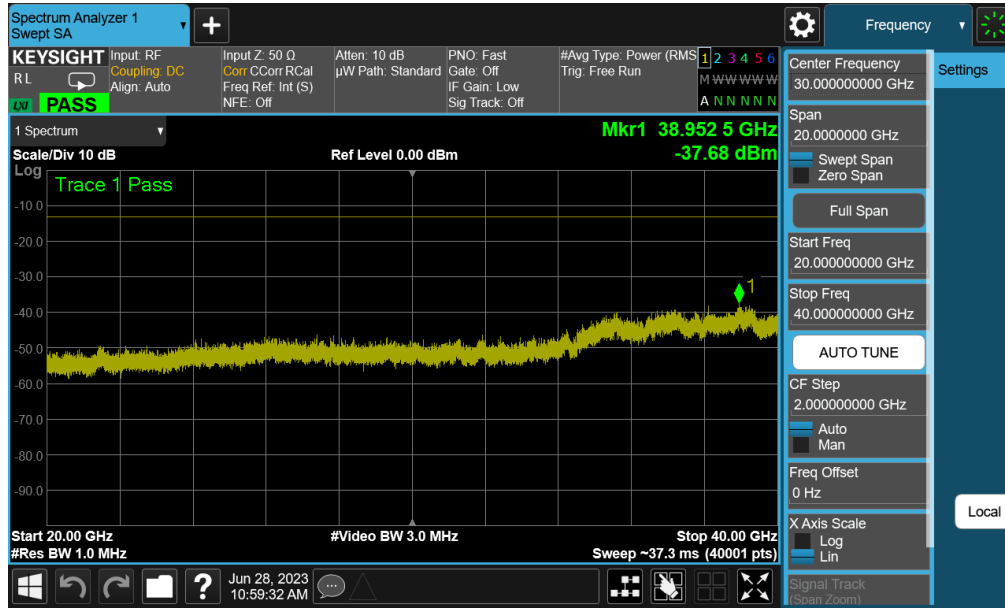


Plot 7-46. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel – Ant I)



Plot 7-47. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel – Ant I)

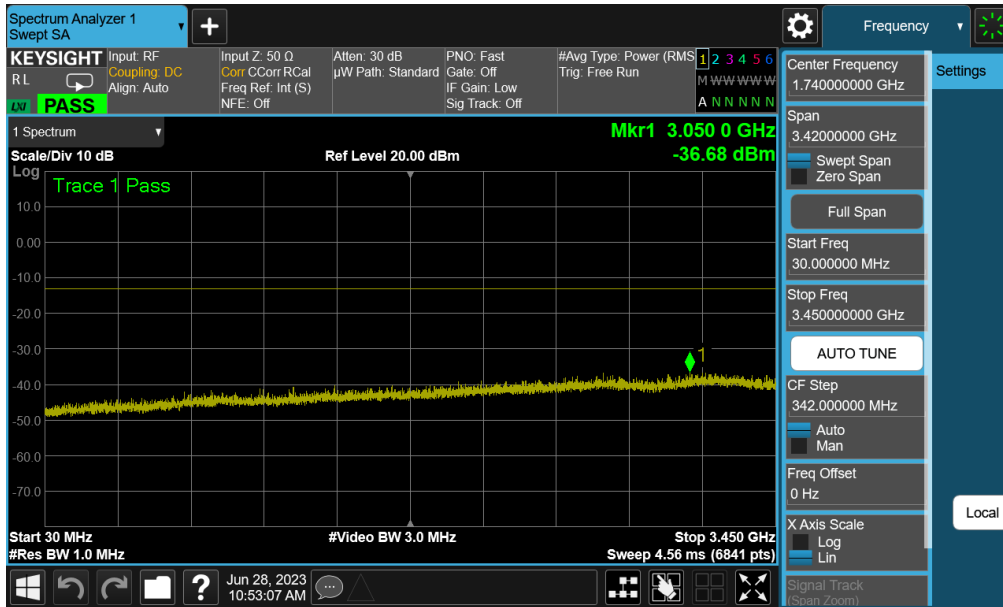
FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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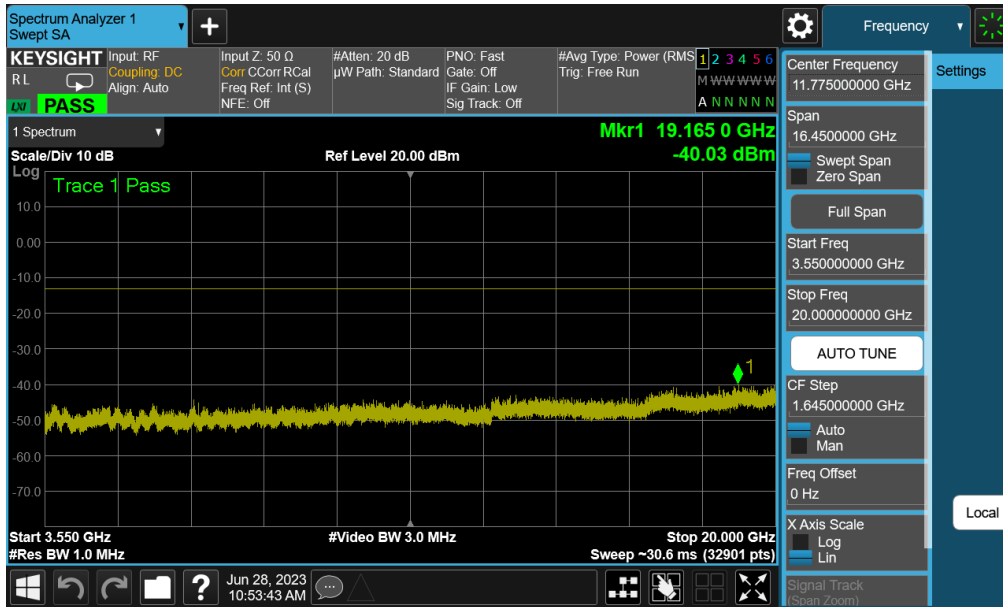
Plot 7-48. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel – Ant I)

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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# NR Band n77 (DoD Band) – Ant I

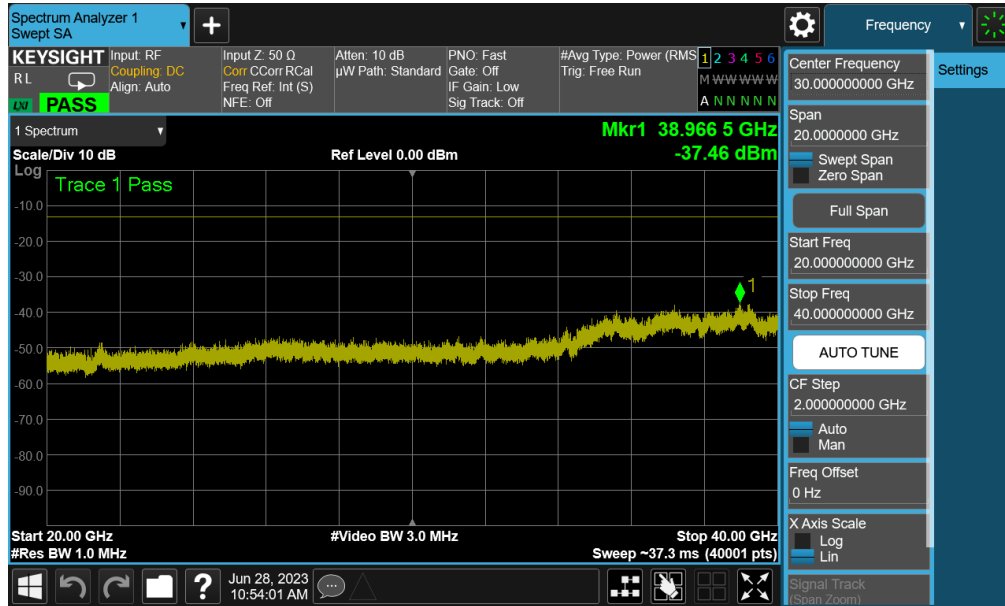


Plot 7-49. Conducted Spurious Plot (NR Band n77 (DoD) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant I)



Plot 7-50. Conducted Spurious Plot (NR Band n77 (DoD) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant I)

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Plot 7-51. Conducted Spurious Plot (NR Band n77 (DoD) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant I)

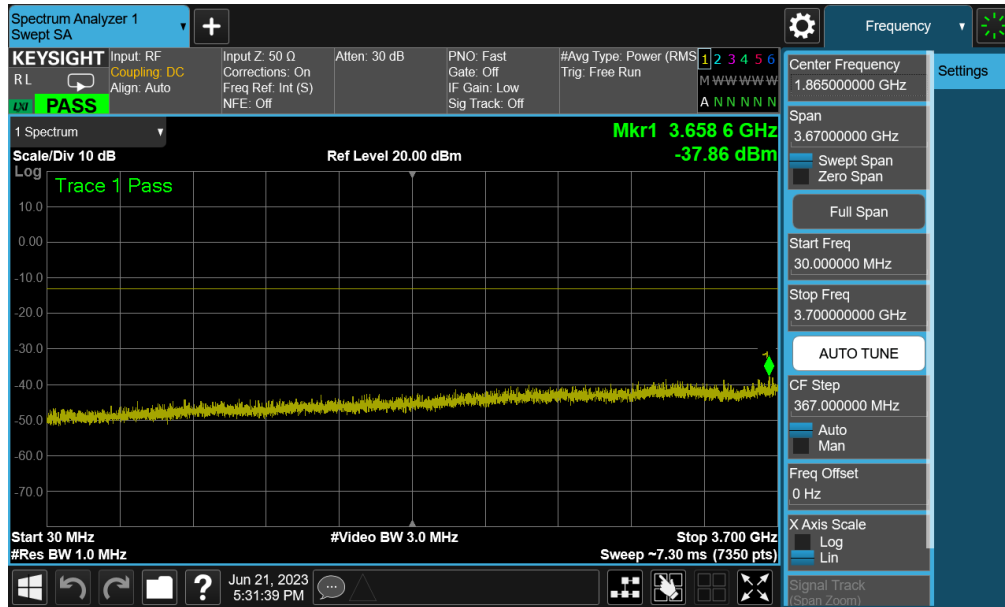
FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n77PC2 C Band	100MHz	Low	30.0 - 3700.0	-38.09	-13	-25.09
		Low	3980.0 - 20000.0	-32.42	-13	-19.42
		Low	20000.0 - 40000.0	-42.79	-13	-29.79
		Mid	30.0 - 3700.0	-37.89	-13	-24.89
		Mid	3980.0 - 20000.0	-31.96	-13	-18.96
		Mid	20000.0 - 40000.0	-42.81	-13	-29.81
		High	30.0 - 3700.0	-39.03	-13	-26.03
		High	3980.0 - 20000.0	-32.96	-13	-19.96
		High	20000.0 - 40000.0	-43.07	-13	-30.07
NR-n77PC2 DoD Band	100MHz	Mid	30.0 - 3450.0	-37.91	-13	-24.91
		Mid	3550.0 - 20000.0	-32.71	-13	-19.71
		Mid	20000.0 - 40000.0	-42.65	-13	-29.65

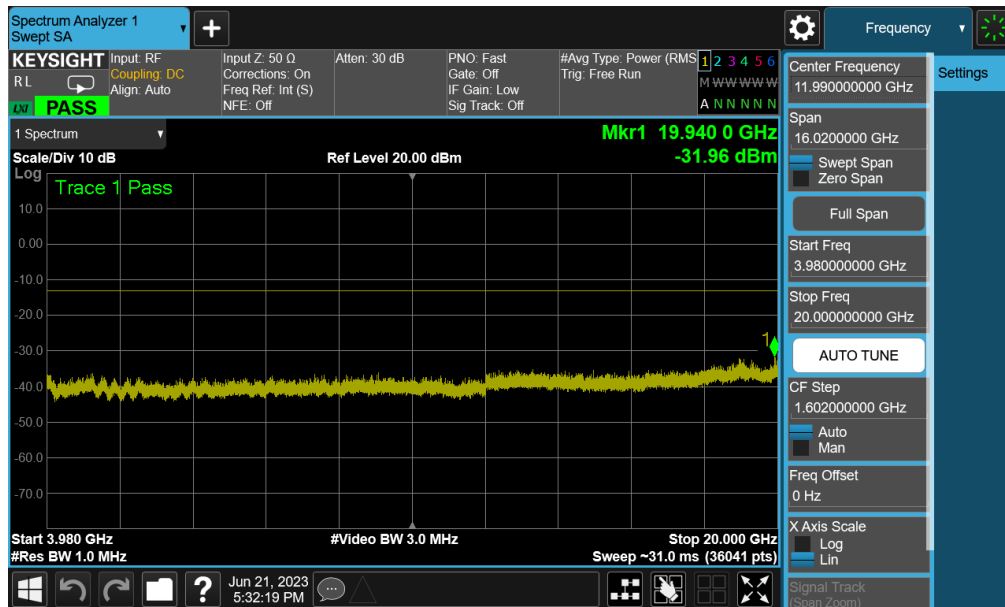
Figure 7-8. Conducted Emission Test Results – Ant D

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## NR Band n77 – Ant D

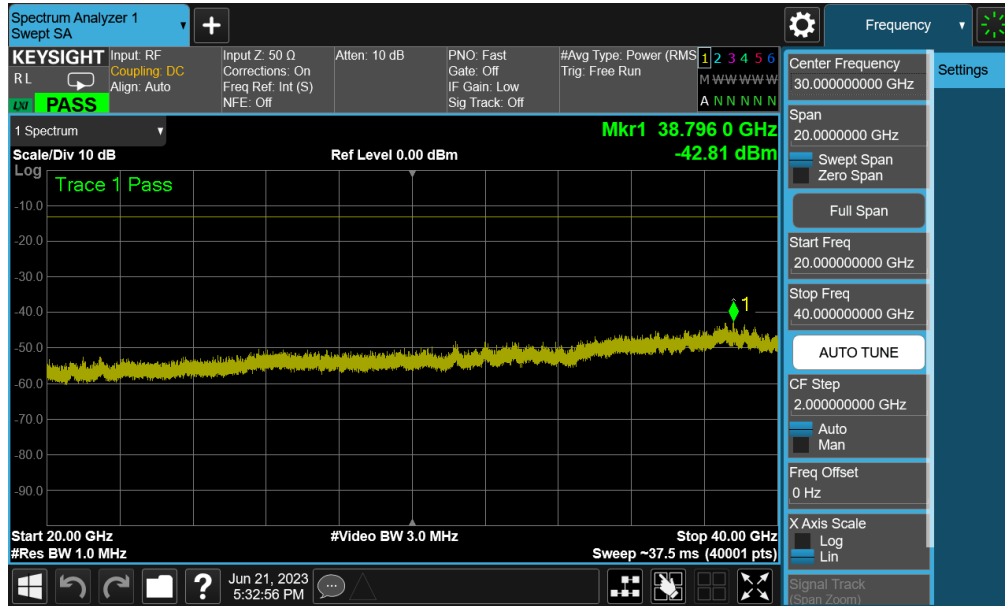


Plot 7-52. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant D)



Plot 7-53. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant D)

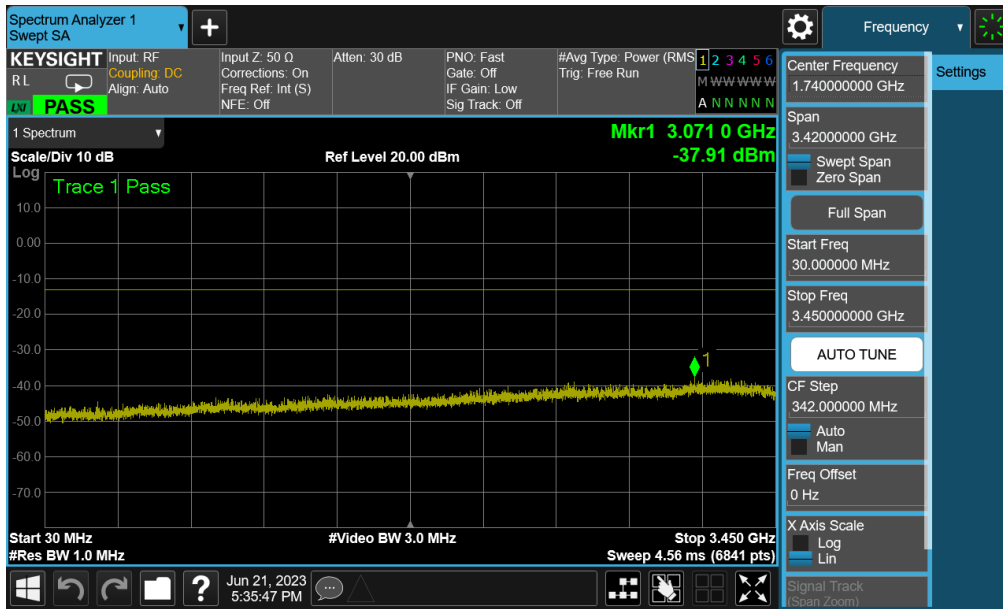
FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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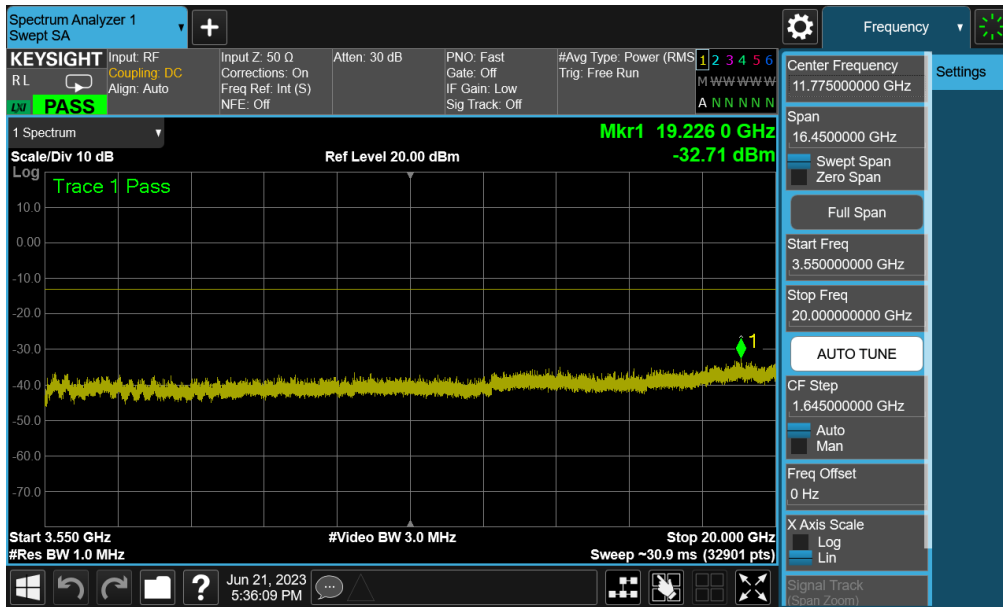
Plot 7-54. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant D)

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## NR Band n77 (DoD Band) – Ant D



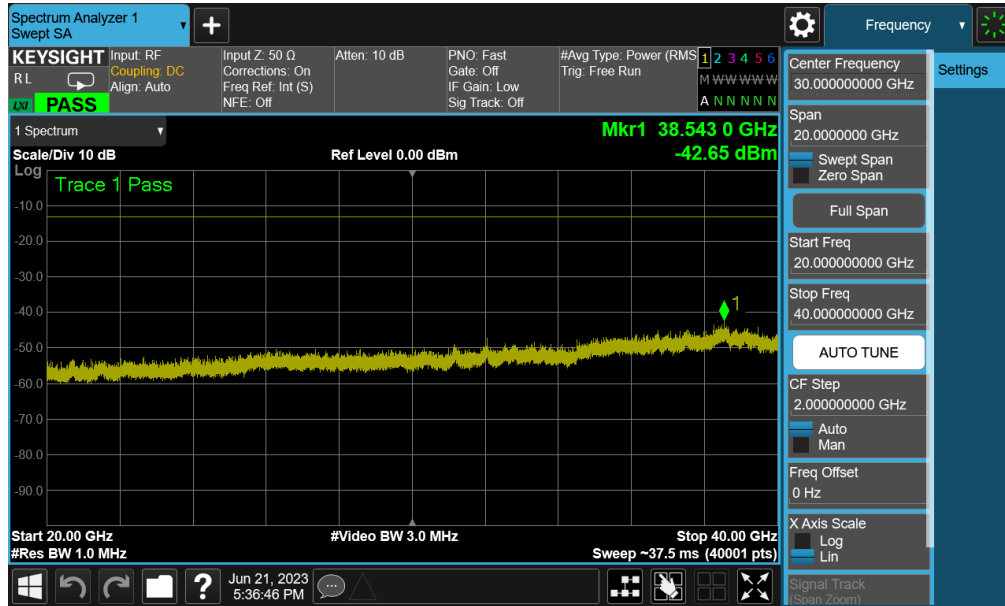
Plot 7-55. Conducted Spurious Plot (NR Band n77 (DoD) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant D)



Plot 7-56. Conducted Spurious Plot (NR Band n77 (DoD) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant D)

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Plot 7-57. Conducted Spurious Plot (NR Band n77 (DoD) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant D)

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## 7.5 Band Edge Emissions at Antenna Terminal

### Test Overview

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

***For operations in the 3700 – 3980MHz band and the 3450 – 3550MHz band, the maximum permissible conducted power level of any out-of-band emission is -13dBm/MHz.***

### Test Procedure Used

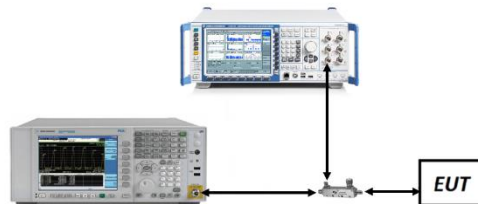
ANSI C63.26-2015 – Section 5.7.3

### Test Settings

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

### Test Setup

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



**Figure 7-4. Test Instrument & Measurement Setup**

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**Test Notes**

1. Per Part 27.53(l), compliance with the -13dBm/MHz conducted power limit for out-of-band emissions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz.
2. Per Part 27.53(n), compliance with the -13dBm/MHz conducted power limit for out-of-band emissions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz.
3. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
4. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

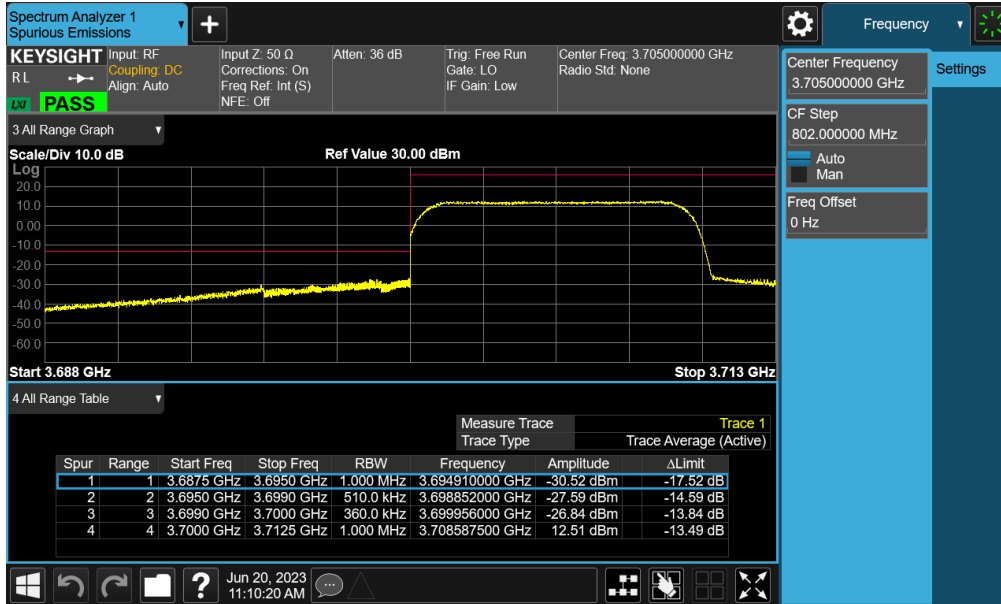
<b>FCC ID:</b> A3LSMS711U	<b>PART 27 MEASUREMENT REPORT</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2304260060-09.A3L	<b>Test Dates:</b> 05/24/2023 - 07/31/2023	<b>EUT Type:</b> Portable Handset	Page 59 of 110

Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n77PC2 C Band	100MHz	Low	Band Edge	-31.04	-13	-22.08
		High	Band Edge	-28.94	-13	-18.21
	90MHz	Low	Band Edge	-31.16	-13	-20.92
		High	Band Edge	-30.12	-13	-15.63
	80MHz	Low	Band Edge	-30.56	-13	-18.15
		High	Band Edge	-29.13	-13	-15.16
	70MHz	Low	Band Edge	-30.24	-13	-16.57
		High	Band Edge	-29.19	-13	-14.72
	60MHz	Low	Band Edge	-31.12	-13	-16.03
		High	Band Edge	-29.59	-13	-15.27
	50MHz	Low	Band Edge	-31.33	-13	-15.11
		High	Band Edge	-27.47	-13	-18.97
	40MHz	Low	Band Edge	-29.50	-13	-14.34
		High	Band Edge	-27.22	-13	-19.72
	30MHz	Low	Band Edge	-28.93	-13	-12.90
		High	Band Edge	-25.92	-13	-17.18
	20MHz	Low	Band Edge	-28.10	-13	-11.83
		High	Band Edge	-24.30	-13	-16.03
	15MHz	Low	Band Edge	-27.30	-13	-11.55
		High	Band Edge	-22.51	-13	-14.33
	10MHz	Low	Band Edge	-26.84	-13	-10.12
		High	Band Edge	-23.18	-13	-12.28

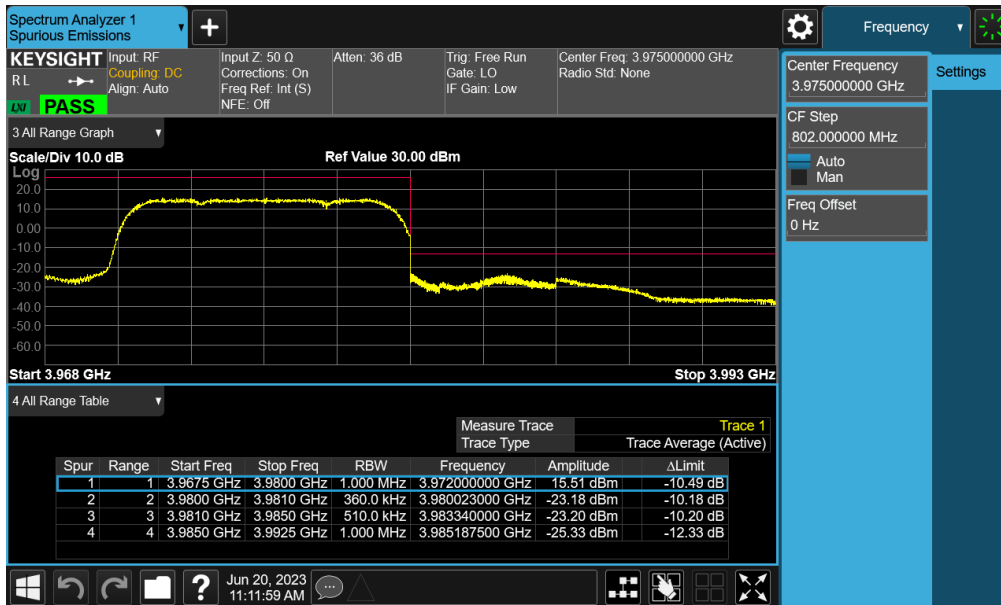
**Table 7-11. Conducted Band Edge Test Results – Ant F – C Band**

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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# NR Band n77 – Ant F



Plot 7-58. Lower ACP Plot (NR Band n77 - 10MHz CP-OFDM-QPSK – Full RB – Ant F)



Plot 7-59. Upper ACP Plot (NR Band n77 - 10MHz CP-OFDM-QPSK – Full RB – Ant F)

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Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n77PC2 DoD Band	100MHz	Low	Band Edge	-28.90	-13	-20.76
		High	Band Edge	-29.95	-13	-22.13
	90MHz	Low	Band Edge	-28.85	-13	-15.48
		High	Band Edge	-31.08	-13	-16.37
	80MHz	Low	Band Edge	-28.49	-13	-16.67
		High	Band Edge	-30.56	-13	-16.97
	70MHz	Low	Band Edge	-28.58	-13	-17.42
		High	Band Edge	-31.70	-13	-17.83
	60MHz	Low	Band Edge	-29.27	-13	-18.06
		High	Band Edge	-33.51	-13	-18.09
	50MHz	Low	Band Edge	-26.89	-13	-17.82
		High	Band Edge	-30.30	-13	-17.09
	40MHz	Low	Band Edge	-27.69	-13	-16.11
		High	Band Edge	-31.02	-13	-14.52
	30MHz	Low	Band Edge	-27.06	-13	-12.32
		High	Band Edge	-29.55	-13	-14.40
	20MHz	Low	Band Edge	-25.27	-13	-14.11
		High	Band Edge	-26.93	-13	-12.24
	15MHz	Low	Band Edge	-24.47	-13	-12.24
		High	Band Edge	-25.93	-13	-12.69
10MHz	Low	Band Edge	-23.93	-13	-12.38	
	High	Band Edge	-26.12	-13	-11.58	

**Table 7-12. Conducted Band Edge Test Results – Ant F – DoD Band**

FCC ID: A3LSMS711U	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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