

PART 24 MEASUREMENT REPORT

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

Date of Testing:
9/8/2021 - 11/5/2021
Test Report Issue Date:
12/02/2021
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2109080099-03-R2.A3L

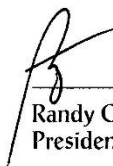
FCC ID:	A3LSMS901U
Applicant Name:	Samsung Electronics Co., Ltd.

Application Type: Certification
Model: SM-S901U
Additional Model(s): SM-S901U1
EUT Type: Portable Handset
FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part: 24
Test Procedure(s): ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01, KDB 648474 D03 v01r04

Note: This revised Test Report (S/N: 1M2109080099-03-R2.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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.


Randy Ortanez
President







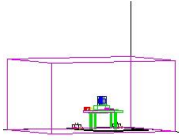
FCC ID: A3LSMS901U	 PART 24 MEASUREMENT REPORT 	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset
		Page 1 of 164

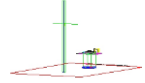
TABLE OF CONTENTS

1.0	INTRODUCTION	5
1.1	Scope	5
1.2	PCTEST Test Location.....	5
1.3	Test Facility / Accreditations.....	5
2.0	PRODUCT INFORMATION.....	6
2.1	Equipment Description	6
2.2	Device Capabilities.....	6
2.3	Test Configuration	6
2.4	Software and Firmware	6
2.5	EMI Suppression Device(s)/Modifications	6
3.0	DESCRIPTION OF TESTS	7
3.1	Evaluation Procedure	7
3.2	Radiated Power and Radiated Spurious Emissions	7
4.0	MEASUREMENT UNCERTAINTY	8
5.0	TEST EQUIPMENT CALIBRATION DATA	9
6.0	SAMPLE CALCULATIONS	10
7.0	TEST RESULTS	11
7.1	Summary.....	11
7.2	Conducted Power Output Data	12
7.3	Occupied Bandwidth	16
7.4	Spurious and Harmonic Emissions at Antenna Terminal	47
7.5	Band Edge Emissions at Antenna Terminal	73
7.6	Peak-Average Ratio	114
7.7	Radiated Power (ERP/EIRP).....	134
7.8	Radiated Spurious Emissions Measurements.....	140
7.9	Frequency Stability / Temperature Variation	159
8.0	CONCLUSION.....	164

FCC ID: A3LSMS901U	 PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 2 of 164





PART 24 MEASUREMENT REPORT






Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
GSM/GPRS	N/A	GMSK	1850.2 - 1909.8	0.688	28.38	247KGXW
EDGE	N/A	8-PSK	1850.2 - 1909.8	0.285	24.55	241KG7W
WCDMA	N/A	Spread Spectrum	1852.4 - 1907.6	0.300	24.78	4M18F9W
LTE Band 25/2	20 MHz	QPSK	1860 - 1905	0.333	25.23	18M0G7D
		16QAM	1860 - 1905	0.277	24.43	18M0W7D
	15 MHz	QPSK	1857.5 - 1907.5	0.322	25.08	13M6G7D
		16QAM	1857.5 - 1907.5	0.282	24.50	13M5W7D
	10 MHz	QPSK	1855 - 1910	0.329	25.17	9M04G7D
		16QAM	1855 - 1910	0.289	24.61	9M08W7D
	5 MHz	QPSK	1852.5 - 1912.5	0.338	25.29	4M53G7D
		16QAM	1852.5 - 1912.5	0.284	24.53	4M54W7D
	3 MHz	QPSK	1851.5 - 1913.5	0.339	25.31	2M71G7D
		16QAM	1851.5 - 1913.5	0.290	24.62	2M72W7D
	1.4 MHz	QPSK	1850.7 - 1914.3	0.338	25.29	1M11G7D
		16QAM	1850.7 - 1914.3	0.284	24.53	1M11W7D
NR Band n25/2 (Ant A)	40 MHz	$\pi/2$ BPSK	1870 - 1895	0.288	24.60	38M8G7D
		QPSK	1870 - 1895	0.284	24.53	38M8G7D
		16QAM	1870 - 1895	0.220	23.42	38M8W7D
	30 MHz	$\pi/2$ BPSK	1865 - 1900	0.286	24.57	28M7G7D
		QPSK	1865 - 1900	0.283	24.52	28M9G7D
		16QAM	1865 - 1900	0.214	23.31	28M8W7D
	25 MHz	$\pi/2$ BPSK	1862.5 - 1902.5	0.288	24.60	23M1G7D
		QPSK	1862.5 - 1902.5	0.243	23.86	24M0G7D
		16QAM	1862.5 - 1902.5	0.211	23.24	23M9W7D
	20 MHz	$\pi/2$ BPSK	1860 - 1905	0.303	24.82	18M0G7D
		QPSK	1860 - 1905	0.291	24.64	19M0G7D
		16QAM	1860 - 1905	0.211	23.24	19M1W7D
	15 MHz	$\pi/2$ BPSK	1857.5 - 1907.5	0.296	24.71	13M5G7D
		QPSK	1857.5 - 1907.5	0.289	24.61	14M0G7D
		16QAM	1857.5 - 1907.5	0.204	23.10	14M0W7D
	10 MHz	$\pi/2$ BPSK	1855 - 1910	0.304	24.83	9M00G7D
		QPSK	1855 - 1910	0.295	24.70	9M34G7D
		16QAM	1855 - 1910	0.215	23.32	9M33W7D
	5 MHz	$\pi/2$ BPSK	1852.5 - 1912.5	0.292	24.65	4M49G7D
		QPSK	1852.5 - 1912.5	0.288	24.59	4M55G7D
		16QAM	1852.5 - 1912.5	0.207	23.17	4M54W7D

EUT Overview (2G/3G/4G and NR Band n25/2 – Ant A)

FCC ID: A3LSMS901U		PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 3 of 164	

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
NR Band n25/2 (Ant F)	40 MHz	$\pi/2$ BPSK	1870 - 1895	0.135	21.31	38M8G7D
		QPSK	1870 - 1895	0.139	21.44	38M8G7D
		16QAM	1870 - 1895	0.109	20.39	38M7W7D
	30 MHz	$\pi/2$ BPSK	1865 - 1900	0.139	21.44	28M7G7D
		QPSK	1865 - 1900	0.144	21.57	28M8G7D
		16QAM	1865 - 1900	0.107	20.30	28M7W7D
	25 MHz	$\pi/2$ BPSK	1862.5 - 1902.5	0.154	21.88	23M0G7D
		QPSK	1862.5 - 1902.5	0.137	21.35	23M9G7D
		16QAM	1862.5 - 1902.5	0.125	20.96	23M9W7D
	20 MHz	$\pi/2$ BPSK	1860 - 1905	0.124	20.92	18M0G7D
		QPSK	1860 - 1905	0.114	20.56	19M0G7D
		16QAM	1860 - 1905	0.100	19.98	19M0W7D
	15 MHz	$\pi/2$ BPSK	1857.5 - 1907.5	0.142	21.52	13M5G7D
		QPSK	1857.5 - 1907.5	0.143	21.56	14M0G7D
		16QAM	1857.5 - 1907.5	0.107	20.29	14M0W7D
	10 MHz	$\pi/2$ BPSK	1855 - 1910	0.138	21.39	9M03G7D
		QPSK	1855 - 1910	0.145	21.62	9M41G7D
		16QAM	1855 - 1910	0.110	20.41	9M36W7D
	5 MHz	$\pi/2$ BPSK	1852.5 - 1912.5	0.137	21.37	4M57G7D
		QPSK	1852.5 - 1912.5	0.143	21.54	4M51G7D
		16QAM	1852.5 - 1912.5	0.106	20.26	4M52W7D

EUT Overview (NR Band n25/2 – Ant F)

FCC ID: A3LSMS901U	 Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 4 of 164

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 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility 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 PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST 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.
- PCTEST 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).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

FCC ID: A3LSMS901U	 PART 24 MEASUREMENT REPORT 	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset
Page 5 of 164		

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID:A3LSMS901U**. 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 24.

Test Device Serial No.: 0261M, 0277M, 0291M, 0301M, 0536M, 0555M, 0559M

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), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer

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.

LTE Band 25 (1850 - 1915 MHz) overlaps the entire frequency range of LTE Band 2 (1850 - 1910 MHz). Therefore, test data provided in this report covers Band 2 as well as Band 25.

NR Band n25 (1850 - 1915 MHz) overlaps the entire frequency range of NR Band n2 (1850 - 1910 MHz). Therefore, test data provided in this report covers n2 as well as n25 for the operating BWs that overlap between the 2 bands.

This EUT supports 2 antennas (Antenna A and Antenna F) for n2/n25 operations. This report includes conducted and radiated data from both antennas to ensure compliance.

2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.



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 samples using firmware version S901USQU0AUJ5 loaded 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: A3LSMS901U	 PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 6 of 164	

3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the “Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards” (ANSI/TIA-603-E-2016) and “Measurement Guidance for Certification of Licensed Digital Transmitters” (KDB 971168 D01 v03r01) 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/TIA-603-E-2016. 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 and calculations, conversion method is used per the formulas in KDB 971168 Section 5.8.4. Field Strength (EIRP) is calculated using the following formulas:



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

And

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

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. 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.



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

FCC ID: A3LSMS901U	 PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 7 of 164

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: A3LSMS901U	 PART 24 MEASUREMENT REPORT 	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset
		Page 8 of 164

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	EMC Cable and Switch System	3/4/2021	Annual	3/4/2022	AP2
-	AP1	EMC Cable and Switch System	3/9/2021	Annual	3/9/2022	AP1
-	ETS	EMC Cable and Switch System	3/4/2021	Annual	3/4/2022	ETS
-	LTx1	Licensed Transmitter Cable Set	3/12/2021	Annual	3/12/2022	LTx1
-	LTx2	Licensed Transmitter Cable Set	3/12/2021	Annual	3/12/2022	LTx2
Agilent	N9030A	50GHz PXA Signal Analyzer	1/20/2021	Annual	1/20/2022	US51350301
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6201381794
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Espec	ESX-2CA	Environmental Chamber	8/27/2020	Annual	8/27/2022	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	4/20/2021	Biennial	4/20/2023	00125518
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2020	Biennial	3/12/2022	128337
Keysight Technologies	N9020A	MXA Signal Analyzer	12/22/2020	Annual	12/22/2021	MY54500644
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	7/21/2021	Annual	7/21/2022	MY49430494
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			100976
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	8/3/2021	Annual	8/3/2022	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	4/30/2021	Annual	4/30/2022	100348
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	1/21/2021	Annual	1/21/2022	101716
Rohde & Schwarz	FSW26	2Hz-26.5GHz Signal and Spectrum Analyzer	2/10/2021	Annual	2/10/2022	103187
Sunol	JB6	LB6 Antenna	11/13/2020	Biennial	11/13/2022	A082816

Table 5-1. Test Equipment

Notes:

- For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
- Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

FCC ID: A3LSMS901U	 PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 9 of 164	

6.0 SAMPLE CALCULATIONS

GSM Emission Designator

Emission Designator = 250KGXW

GSM BW = 250 kHz
 G = Phase Modulation
 X = Cases not otherwise covered
 W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 250KG7W

EDGE BW = 250 kHz
 G = Phase Modulation
 7 = Quantized/Digital Info
 W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M16F9W

WCDMA BW = 4.16 MHz
 F = Frequency Modulation
 9 = Composite Digital Info
 W = Combination (Audio/Data)

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: A3LSMS901U	 <small>Proud to be part of element</small>	PART 24 MEASUREMENT REPORT	 Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 10 of 164

7.0 TEST RESULTS

7.1 Summary



Company Name: Samsung Electronics Co., Ltd.
 FCC ID: A3LSMS901U
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): GSM/GPRS/EDGE/WCDMA/LTE/NR

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Occupied Bandwidth	2.1049	N/A	PASS	Section 7.2
	Conducted Band Edge / Spurious Emissions	2.1051, 24.238(a)	> 43 + 10log ₁₀ (P[Watts]) at Band Edge and for all out-of-band emissions	PASS	Sections 7.3, 7.4
	Transmitter Conducted Output Power	2.1046	N/A	PASS	See RF Exposure Report
	Peak-to-Average Ratio	24.232(d)	13 dB	PASS	Section 7.5
	Frequency Stability	2.1055, 24.235	Fundamental emissions stay within authorized frequency block	PASS	Section 7.8
RADIATED	Equivalent Isotropic Radiated Power	24.232(c)	< 2 Watts max. EIRP	PASS	Section 7.6
	Radiated Spurious Emissions	2.1053, 24.238(a)	> 43 + 10 log ₁₀ (P[Watts]) for all out-of-band emissions	PASS	Section 7.7

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 PCTEST EMC Software Tool v1.0.

FCC ID: A3LSMS901U	 <small>Proud to be part of element</small>	PART 24 MEASUREMENT REPORT	 Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 11 of 164

7.2 Conducted Power Output Data

§2.1046

Test Overview

The EUT is set up to transmit at maximum power for LTE. All power levels 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.

A-MPR is implemented in this device per the A-MPR specification in 3GPP TS 36.101. The conducted powers are shown herein to cover the different A-MPR levels specified in the standard. Measurement equipment was set up with triggering/gating on the spectrum analyzer such that powers were measured only during the on-time of the signal.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Span = 2 x OBW to 3 x OBW
2. RBW = 1% to 5% of the OBW
3. Number of measurement points in sweep $\geq 2 \times \text{span} / \text{RBW}$
4. Sweep = auto-couple (less than transmission burst duration)
5. Detector = RMS (power)
6. Trigger was set to enable power measurements only on full power bursts
7. Trace was allowed to stabilize
8. Spectrum analyzer's "Channel Power" function was used to compute the power by integrating the spectrum across the OBW of the signal

Test Setup

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

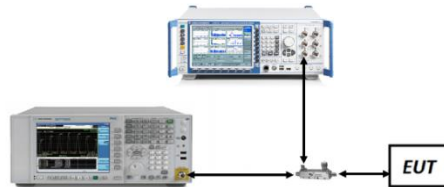






Figure 7-1. Test Instrument & Measurement Setup

FCC ID: A3LSMS901U	 PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 12 of 164	



Test Notes

1. Conducted power measurements were evaluated for the two contiguous channels 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. Conducted power measurements are also evaluated for simultaneous transmission of two NR FR1 carriers operating in different bands (interband NR FR1 ULCA). The powers were investigated while both bands are operating at their widest supported channel bandwidth.
3. All other conducted power measurements are contained in the RF exposure report for this filing.

FCC ID: A3LSMS901U	 PART 24 MEASUREMENT REPORT 		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 13 of 164



Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
40 MHz	π/2 BPSK	374000	1870.0	1 / 54	24.42
		376500	1882.5	1 / 161	24.44
		379000	1895.0	1 / 161	24.52
	QPSK	374000	1870.0	1 / 54	24.37
		376500	1882.5	1 / 161	24.27
		379000	1895.0	1 / 161	24.29
		376500	1882.5	1 / 161	24.29
16-QAM	374000	1870.0	1 / 54	23.65	
64-QAM	379000	1895.0	1 / 161	22.34	
256-QAM	376500	1882.5	1 / 161	20.08	
30 MHz	π/2 BPSK	372000	1865.0	1 / 40	24.55
		376500	1882.5	1 / 40	24.42
		381000	1900.0	1 / 119	24.57
	QPSK	372000	1865.0	1 / 40	24.37
		376500	1882.5	1 / 40	24.40
		381000	1900.0	1 / 119	24.41
	16-QAM	381000	1900.0	1 / 119	23.74
	64-QAM	381000	1900.0	1 / 119	22.33
	256-QAM	376500	1882.5	1 / 40	19.92
25 MHz	π/2 BPSK	372000	1862.5	1 / 66	24.99
		376500	1882.5	1 / 66	24.93
		381000	1902.5	1 / 66	25.08
	QPSK	372000	1862.5	1 / 66	24.89
		376500	1882.5	1 / 66	24.06
		381000	1902.5	1 / 66	25.01
	16-QAM	381000	1902.5	1 / 66	24.39
	64-QAM	381000	1902.5	1 / 66	22.76
	256-QAM	372000	1862.5	1 / 66	20.22
20 MHz	π/2 BPSK	372000	1860.0	1 / 79	24.03
		376500	1882.5	1 / 26	23.13
		381000	1905.0	1 / 53	23.22
	QPSK	372000	1860.0	1 / 79	24.13
		376500	1882.5	1 / 26	23.13
		381000	1905.0	1 / 53	23.01
	16-QAM	372000	1860.0	1 / 79	23.24
64-QAM	372000	1860.0	1 / 79	21.95	
256-QAM	376500	1882.5	1 / 26	19.66	
15 MHz	π/2 BPSK	371500	1857.5	1 / 20	24.63
		376500	1882.5	1 / 58	24.38
		381500	1907.5	1 / 20	23.56
	QPSK	371500	1857.5	1 / 20	24.46
		376500	1882.5	1 / 58	24.38
		381500	1907.5	1 / 20	23.53
	16-QAM	376500	1882.5	1 / 58	23.44
64-QAM	371500	1857.5	1 / 20	22.22	
256-QAM	371500	1857.5	1 / 20	19.98	
10 MHz	π/2 BPSK	371000	1855.0	1 / 38	24.49
		376500	1882.5	1 / 38	24.63
		382000	1910.0	1 / 26	24.48
	QPSK	371000	1855.0	1 / 38	24.47
		376500	1882.5	1 / 38	24.45
		382000	1910.0	1 / 26	24.58
	16-QAM	376500	1882.5	1 / 38	23.57
64-QAM	371000	1855.0	1 / 38	22.29	
256-QAM	371000	1855.0	1 / 38	19.81	
5 MHz	π/2 BPSK	370500	1852.5	1 / 18	24.48
		376500	1882.5	1 / 6	24.51
		382500	1912.5	1 / 12	24.52
	QPSK	370500	1852.5	1 / 18	24.40
		376500	1882.5	1 / 6	24.36
		382500	1912.5	1 / 12	24.53
	16-QAM	382500	1912.5	1 / 12	23.75
64-QAM	382500	1912.5	1 / 12	22.15	
256-QAM	382500	1912.5	1 / 12	20.11	

Table 7-2. Conducted Power Output Data (n25/2 Ant F)

FCC ID: A3LSMS901U	 PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 14 of 164

PCC					SCC					PCC Conducted Power [dBm]	SCC Conducted Power [dBm]	Inter-Band ULCA Total Tx. Power (dBm)
PCC Band	PCC Bandwidth [MHz]	PCC (UL) channel	Mod.	PCC UL RB#/Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) channel	Mod.	SCC UL RB#/Offset			
n25	40	Low	$\pi/2$ BPSK	1 / 162	n41	100	Low	$\pi/2$ BPSK	1 / 205	20.36	22.32	24.46
			QPSK	216 / 0				QPSK	270 / 0	19.94	21.95	24.07
			QPSK	1 / 54				QPSK	1 / 68	20.22	22.16	24.31
			QPSK	1 / 108				QPSK	1 / 137	20.17	22.21	24.32
			QPSK	1 / 162				QPSK	1 / 205	20.38	22.13	24.35
			16Q	1 / 162				16Q	1 / 205	20.09	22.05	24.19
		Mid	$\pi/2$ BPSK	1 / 162			Mid	$\pi/2$ BPSK	1 / 205	20.01	22.36	24.35
			QPSK	216 / 0				QPSK	270 / 0	19.66	21.97	23.98
			QPSK	1 / 54				QPSK	1 / 68	19.83	22.01	24.07
			QPSK	1 / 108				QPSK	1 / 137	20.16	22.17	24.29
			QPSK	1 / 162				QPSK	1 / 205	20.10	22.33	24.37
			16Q	1 / 162				16Q	1 / 205	20.09	22.01	24.17
		High	$\pi/2$ BPSK	1 / 162			High	$\pi/2$ BPSK	1 / 205	20.03	22.11	24.20
			QPSK	216 / 0				QPSK	270 / 0	19.63	21.86	23.90
			QPSK	1 / 54				QPSK	1 / 68	19.84	22.06	24.10
			QPSK	1 / 108				QPSK	1 / 137	19.89	22.13	24.16
			QPSK	1 / 162				QPSK	1 / 205	20.01	22.24	24.28
			16Q	1 / 162				16Q	1 / 205	19.99	22.17	24.23

Table 7-3. Conducted Power Output Data (ULCA NR Bands n25-n41)

FCC ID: A3LSMS901U	 PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 15 of 164	

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

KDB 971168 D01 v03r01 – Section 4.2

Test Settings

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

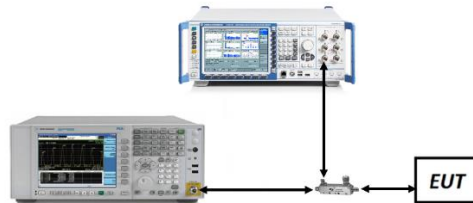


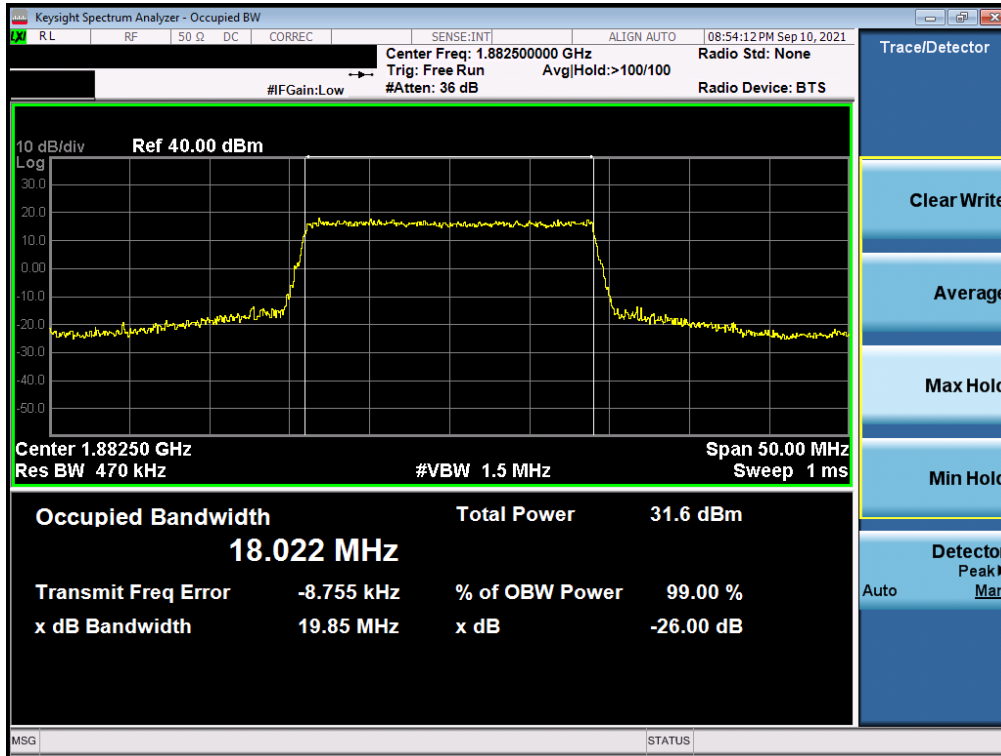
Figure 7-2. Test Instrument & Measurement Setup

Test Notes

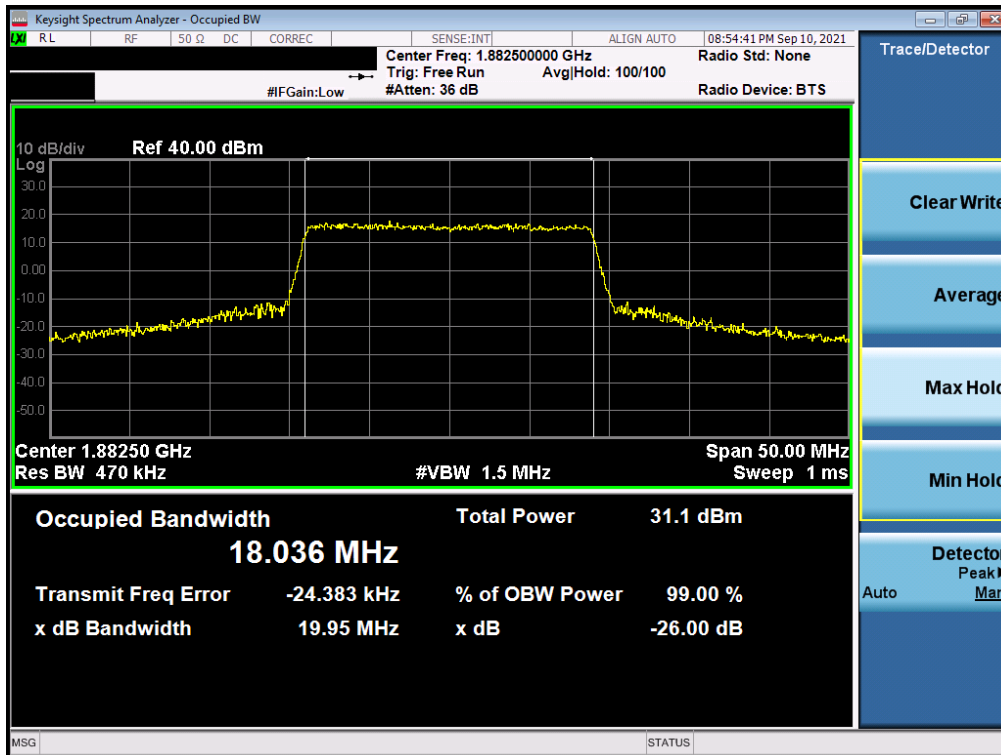
None.

FCC ID: A3LSMS901U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 16 of 164



LTE Band 25/2

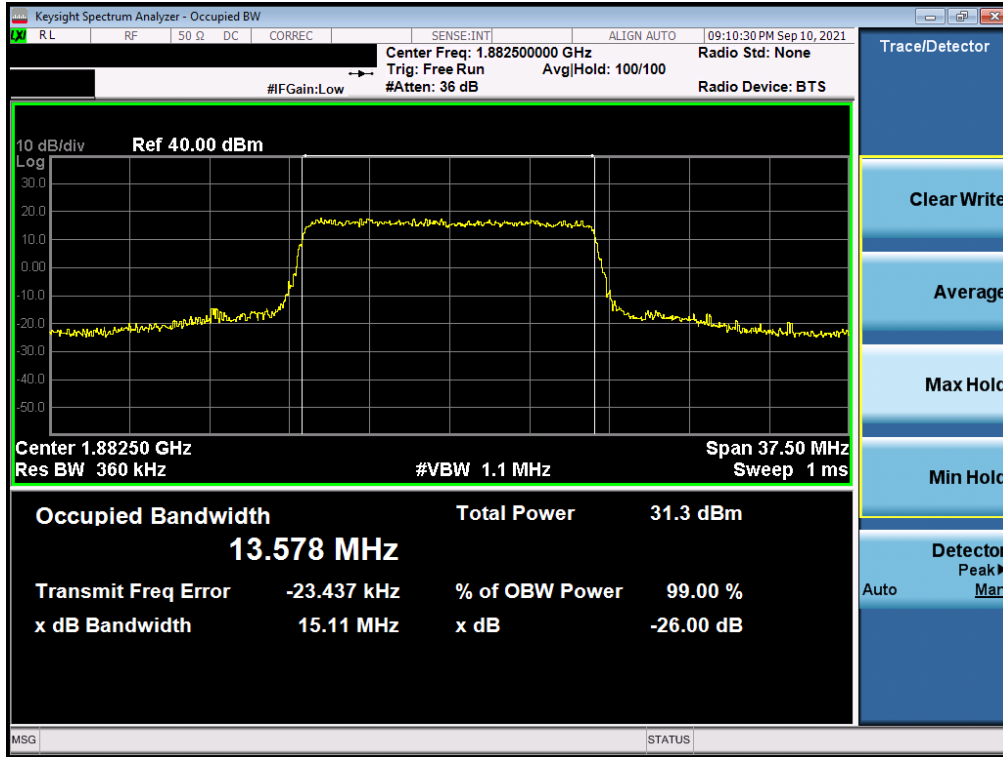


Plot 7-1. Occupied Bandwidth Plot (LTE Band 25/2 - 20MHz QPSK - Full RB)

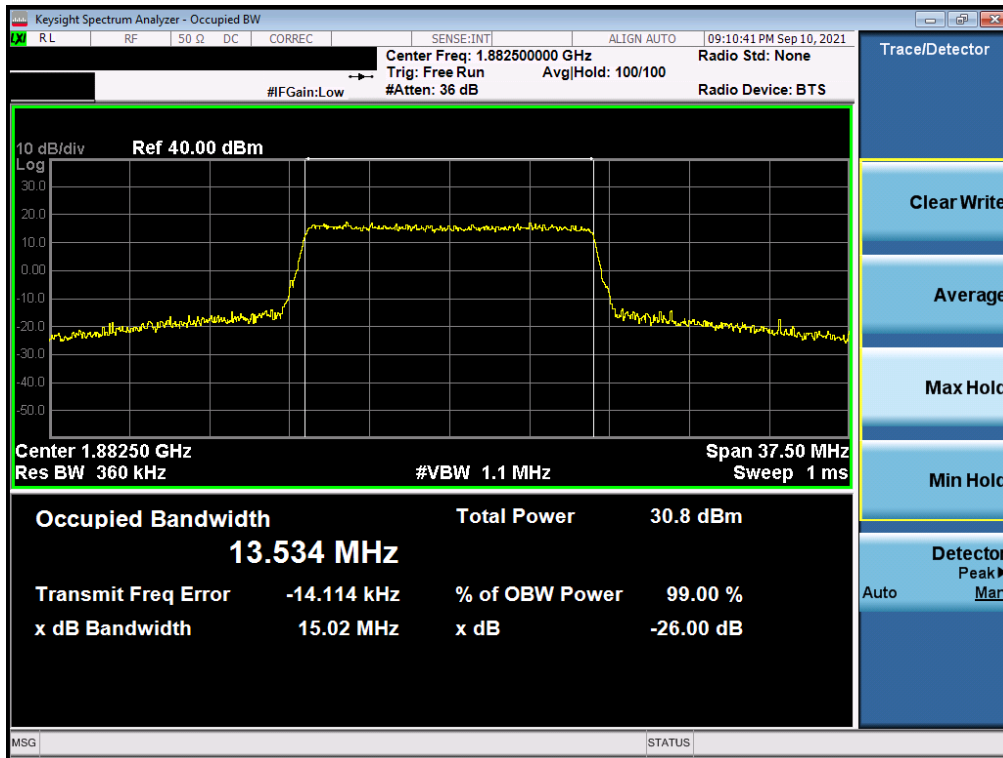


Plot 7-2. Occupied Bandwidth Plot (LTE Band 25/2 - 20MHz 16-QAM - Full RB)

FCC ID: A3LSMS901U	 PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 17 of 164

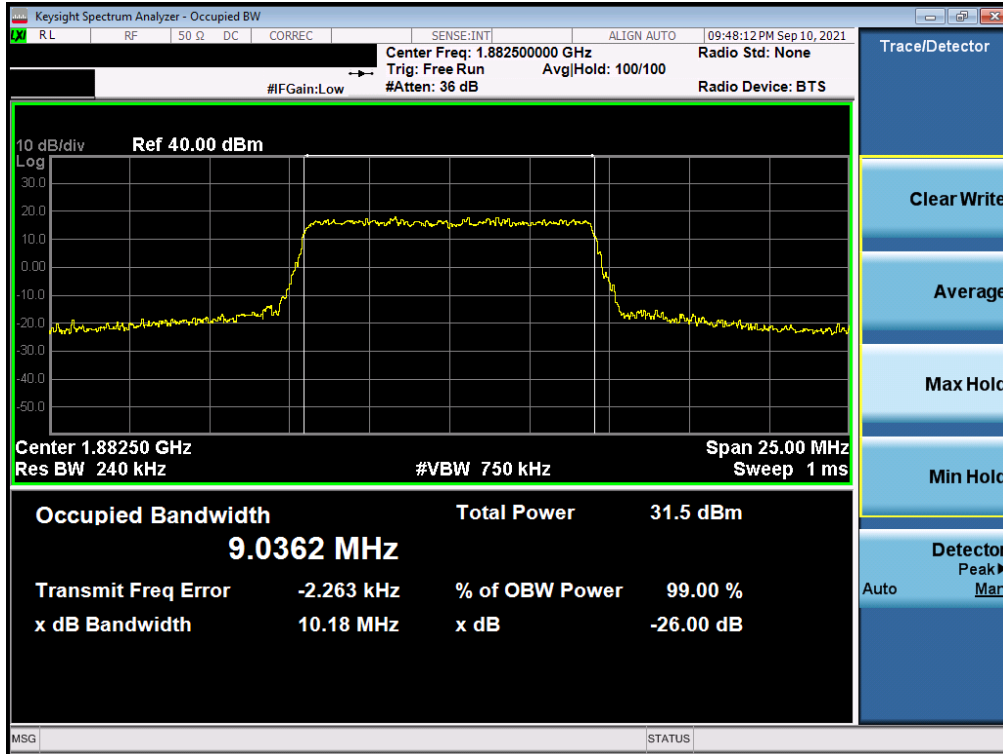


Plot 7-3. Occupied Bandwidth Plot (LTE Band 25/2 - 15MHz QPSK - Full RB)



Plot 7-4. Occupied Bandwidth Plot (LTE Band 25/2 - 15MHz 16-QAM - Full RB)

FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 18 of 164

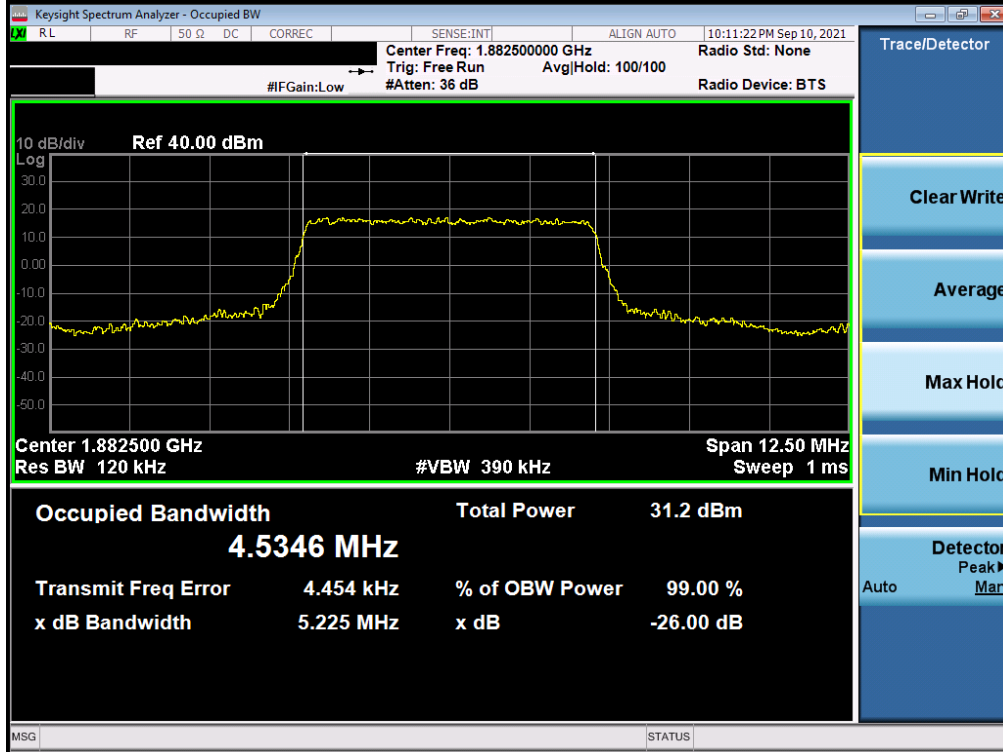


Plot 7-5. Occupied Bandwidth Plot (LTE Band 25/2 - 10MHz QPSK - Full RB)

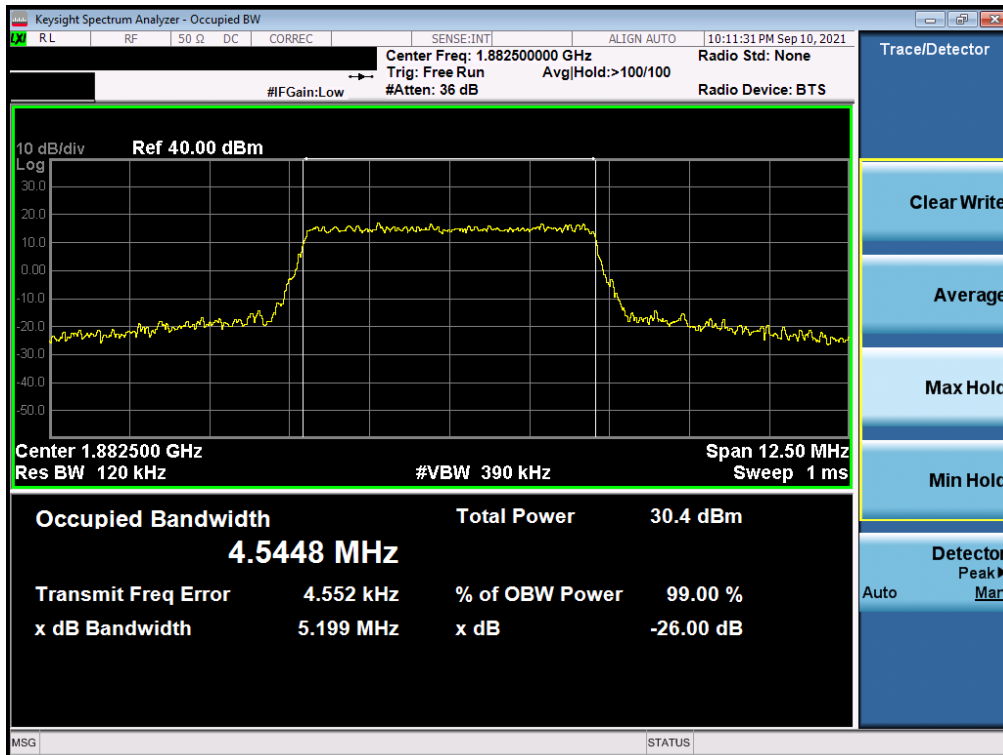


Plot 7-6. Occupied Bandwidth Plot (LTE Band 25/2 - 10MHz 16-QAM - Full RB)




FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 19 of 164

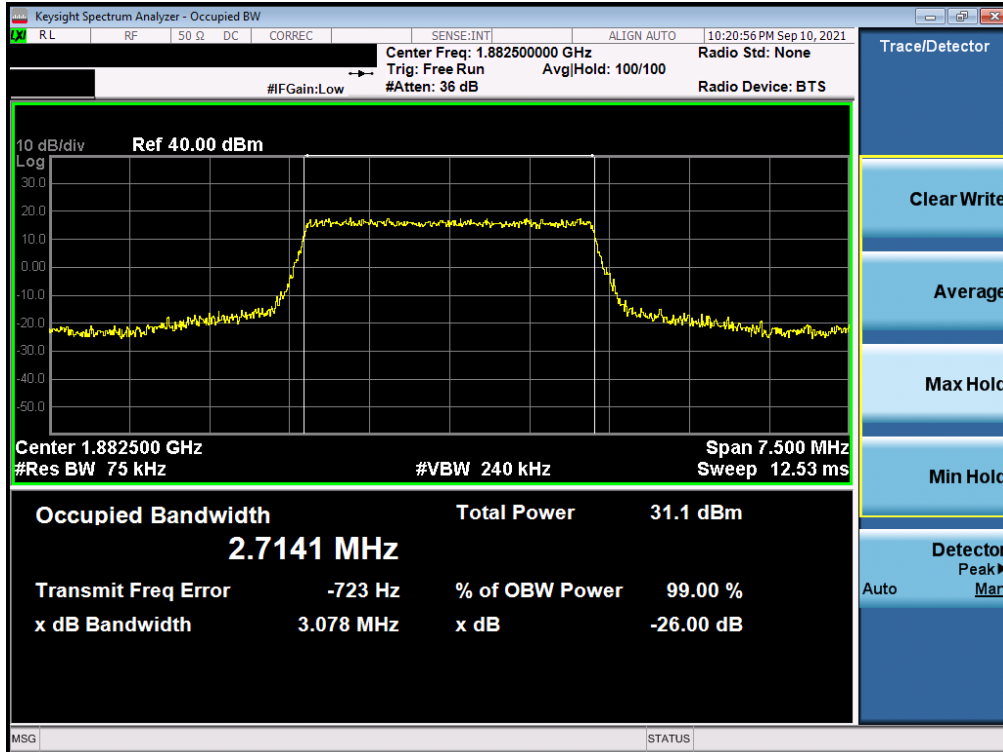


Plot 7-7. Occupied Bandwidth Plot (LTE Band 25/2 - 5MHz QPSK - Full RB)

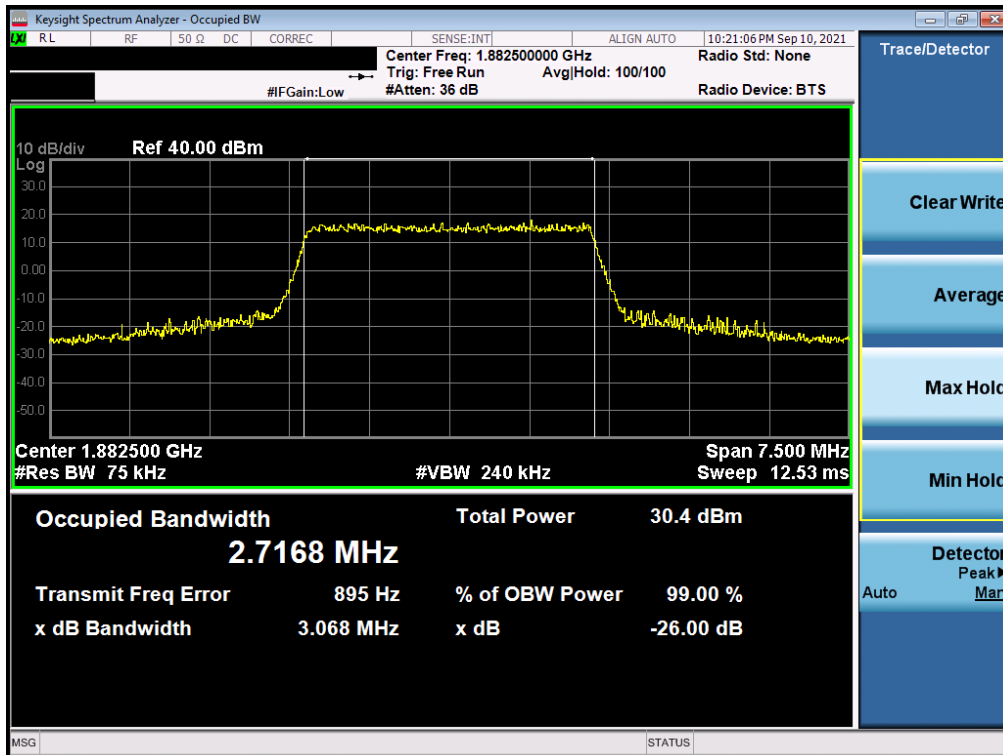


Plot 7-8. Occupied Bandwidth Plot (LTE Band 25/2 - 5MHz 16-QAM - Full RB)

FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 20 of 164

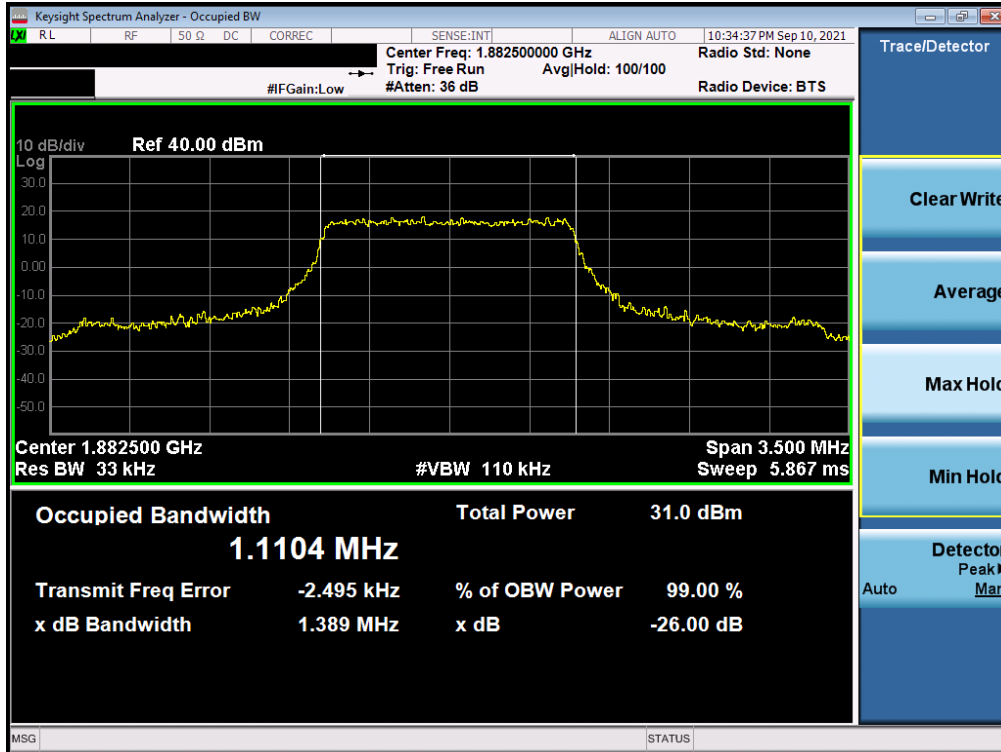


Plot 7-9. Occupied Bandwidth Plot (LTE Band 25/2 - 3MHz QPSK - Full RB)

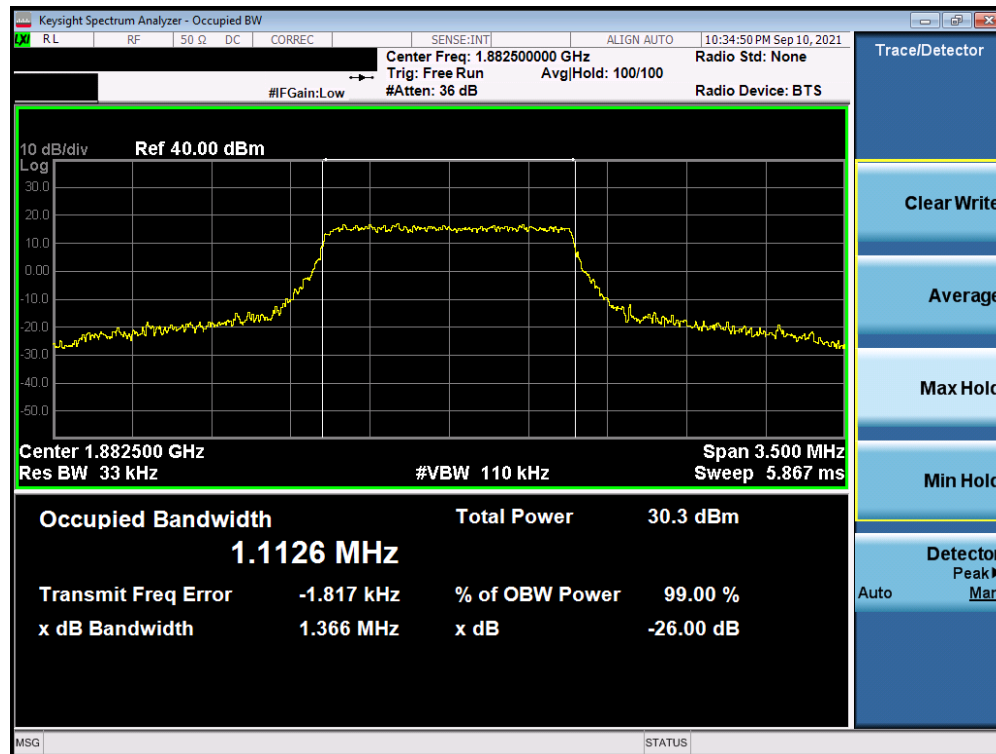


Plot 7-10. Occupied Bandwidth Plot (LTE Band 25/2 - 3MHz 16-QAM - Full RB)



FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 21 of 164



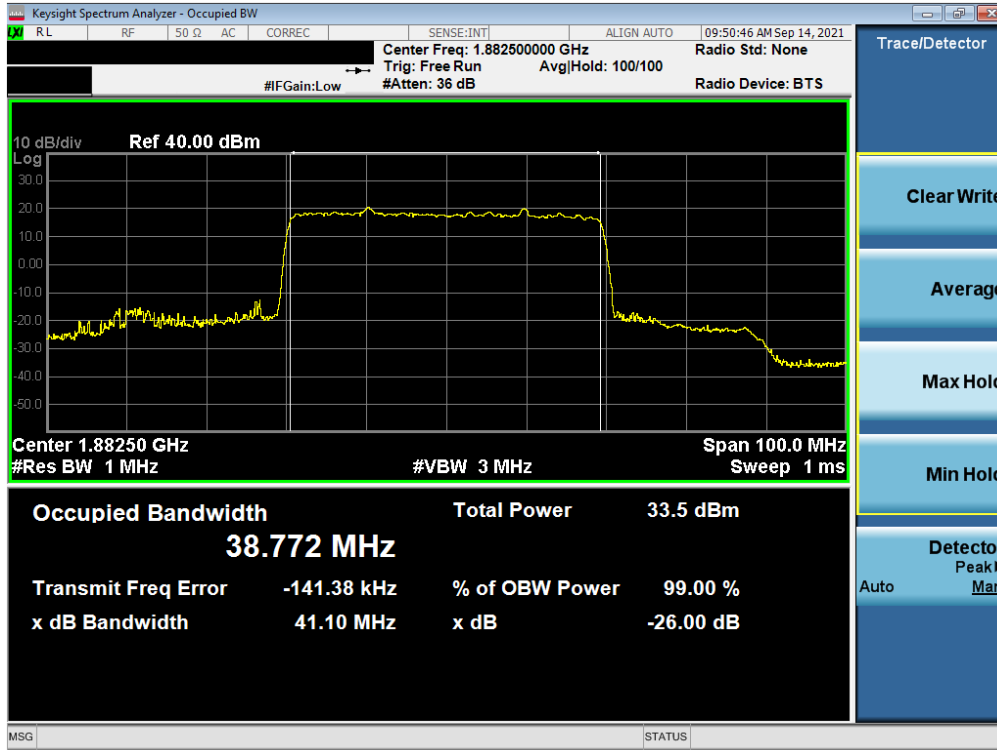
Plot 7-11. Occupied Bandwidth Plot (LTE Band 25/2 - 1.4MHz QPSK - Full RB)



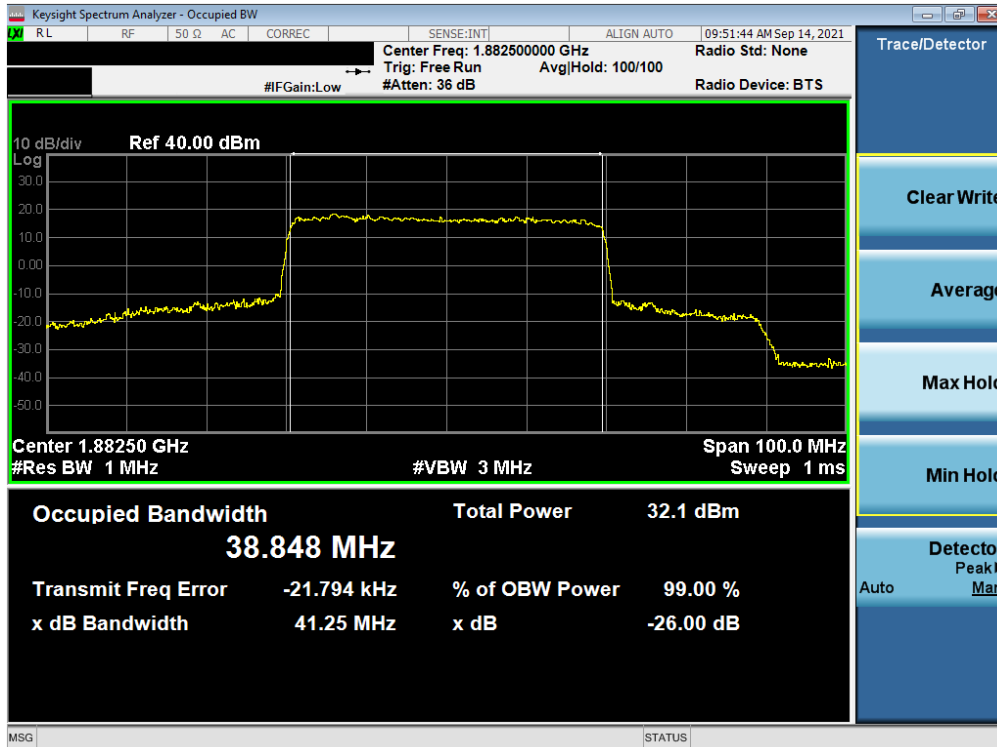
Plot 7-12. Occupied Bandwidth Plot (LTE Band 25/2 - 1.4MHz 16-QAM - Full RB)

FCC ID: A3LSMS901U	 PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 22 of 164

NR Band n25/2 – Ant A

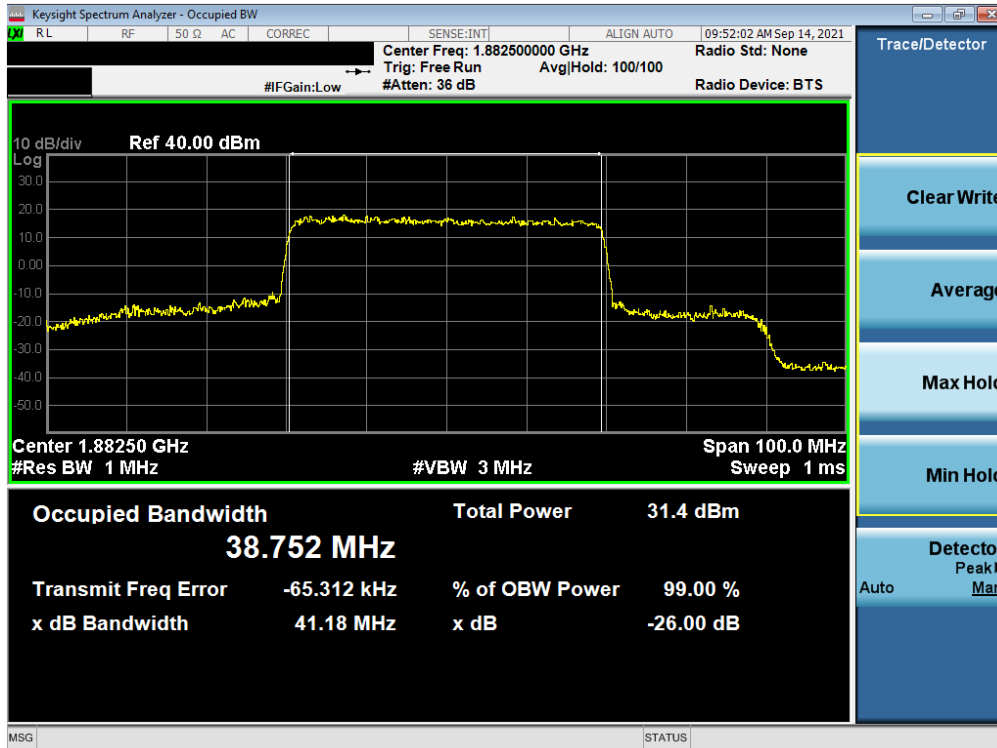


Plot 7-13. Occupied Bandwidth Plot (NR Band n25/2 - 40.0MHz DFT-s-OFDM BPSK - Full RB - ANT A)

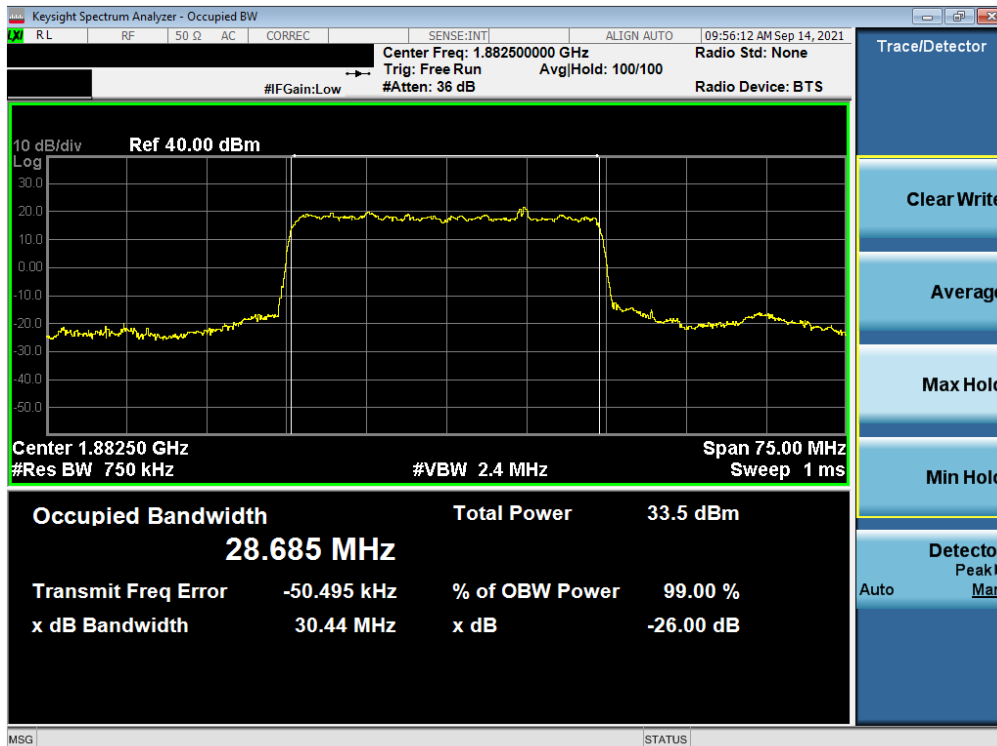


Plot 7-14. Occupied Bandwidth Plot (NR Band n25/2 - 40.0MHz CP-OFDM QPSK - Full RB - ANT A)

FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 23 of 164

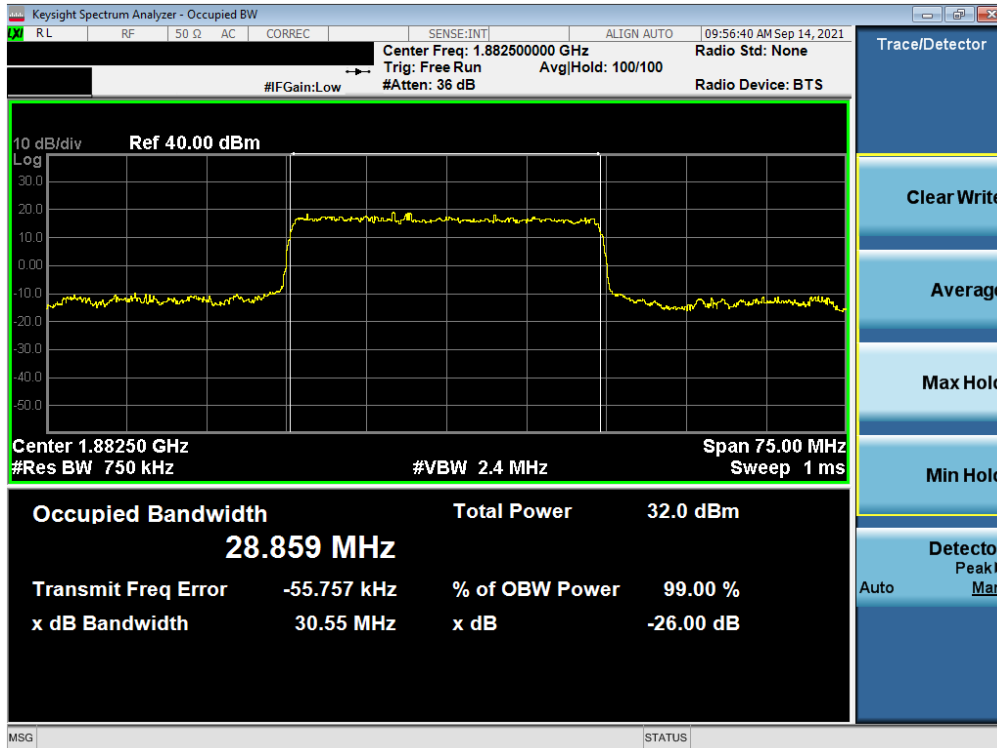


Plot 7-15. Occupied Bandwidth Plot (NR Band n25/2 - 40.0MHz CP-OFDM 16QAM - Full RB - ANT A)

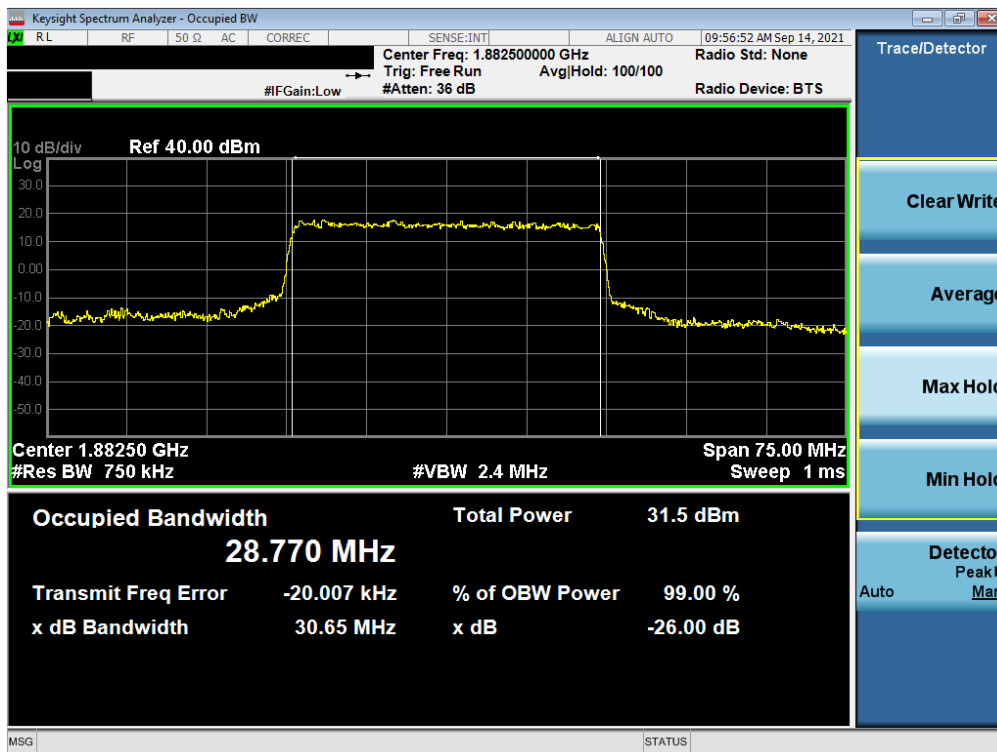


Plot 7-16. Occupied Bandwidth Plot (NR Band n25/2 - 30.0MHz DFT-s-OFDM BPSK - Full RB - ANT A)

FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 24 of 164

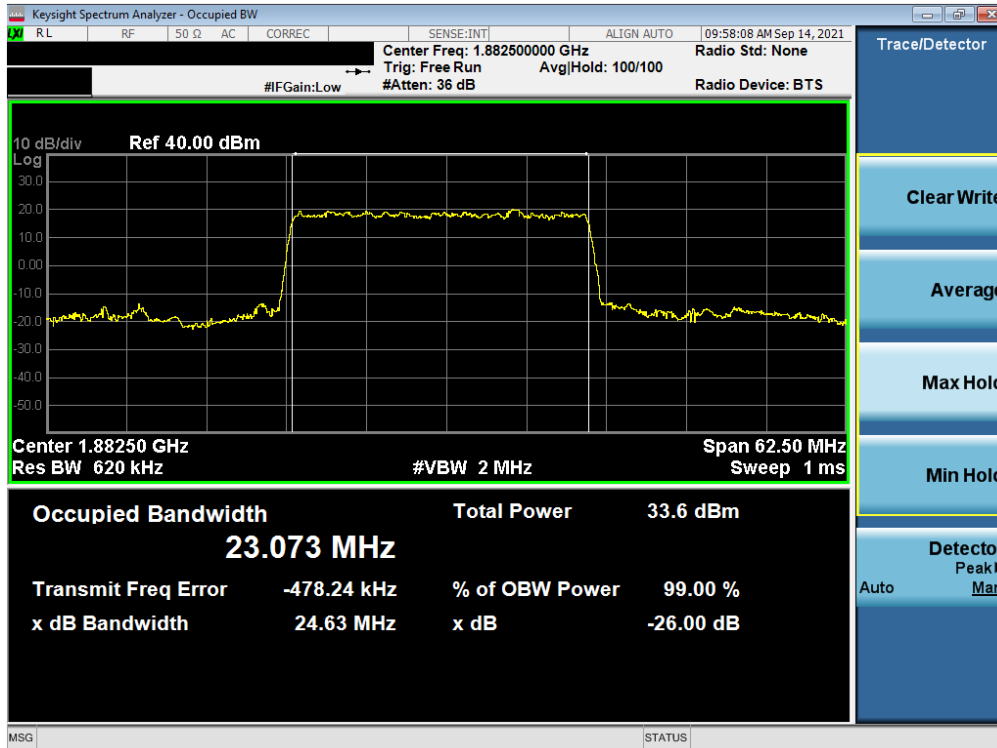


Plot 7-17. Occupied Bandwidth Plot (NR Band n25/2 - 30.0MHz CP-OFDM QPSK - Full RB - ANT A)

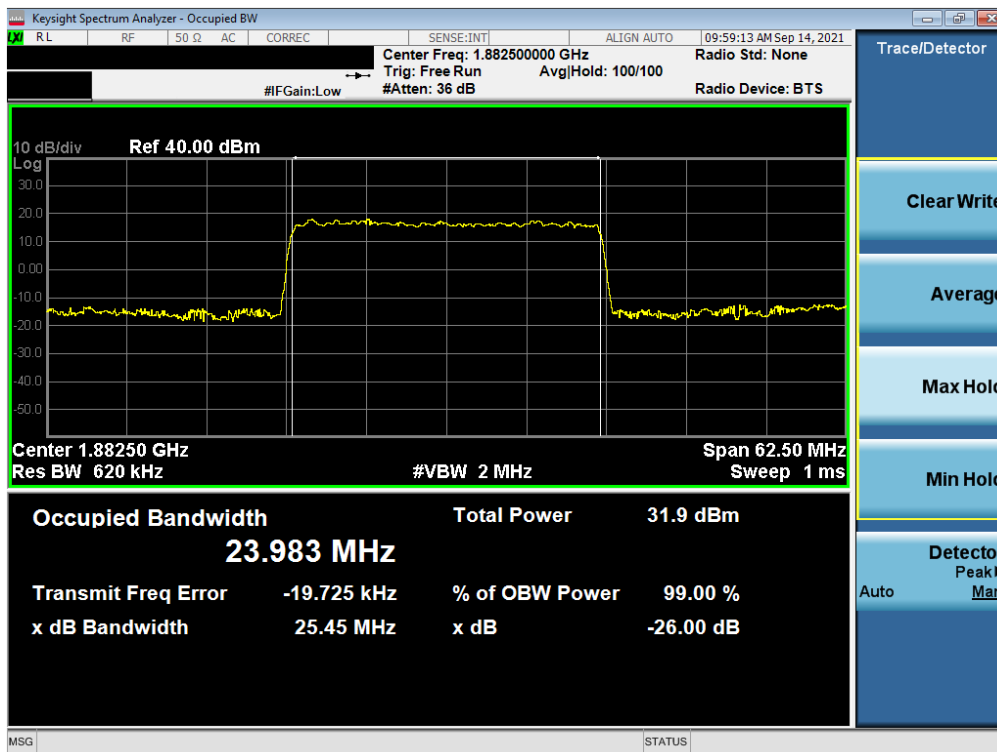


Plot 7-18. Occupied Bandwidth Plot (NR Band n25/2 - 30.0MHz CP-OFDM 16QAM - Full RB - ANT A)

FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 25 of 164

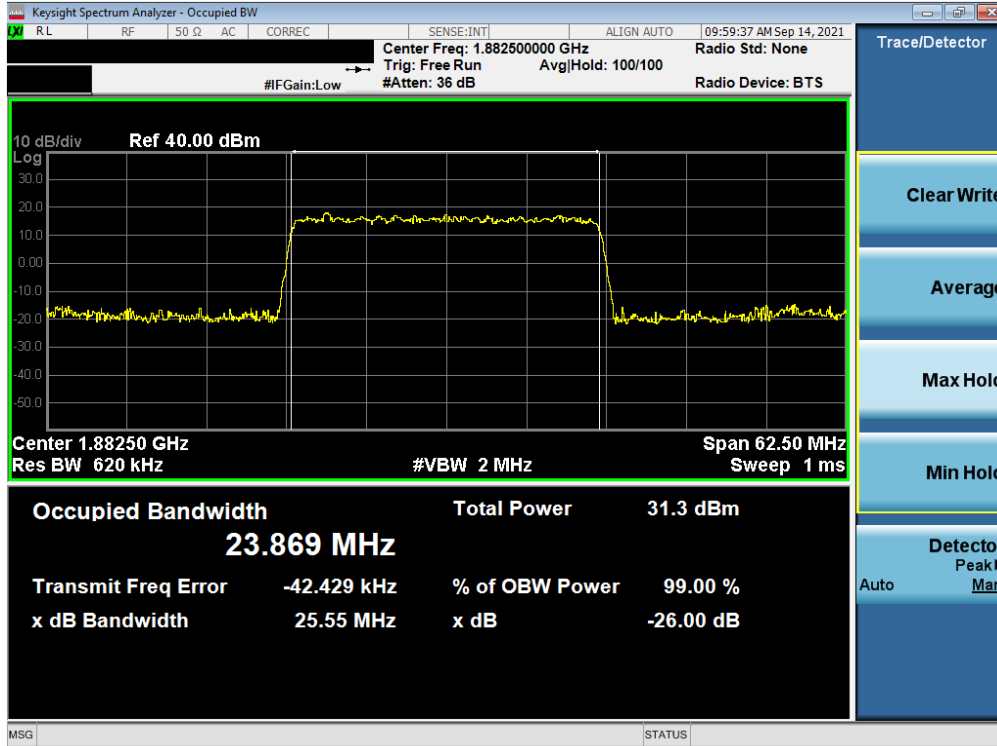


Plot 7-19. Occupied Bandwidth Plot (NR Band n25/2 - 25.0MHz DFT-s-OFDM BPSK - Full RB - ANT A)

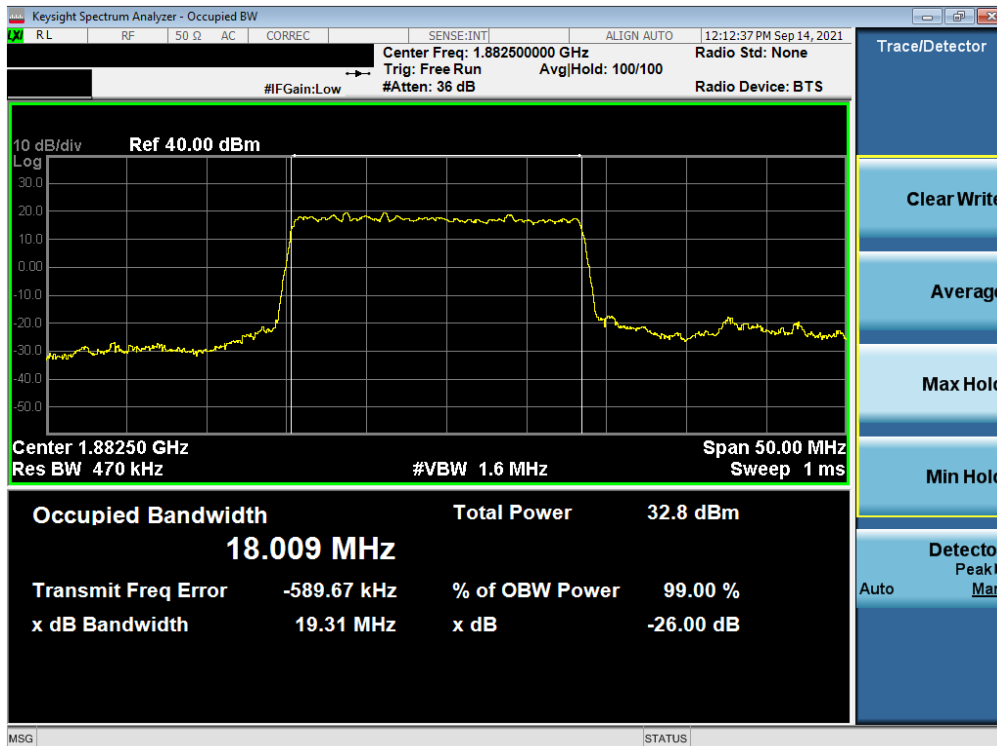


Plot 7-20. Occupied Bandwidth Plot (NR Band n25/2 - 25.0MHz CP-OFDM QPSK - Full RB - ANT A)

FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 26 of 164

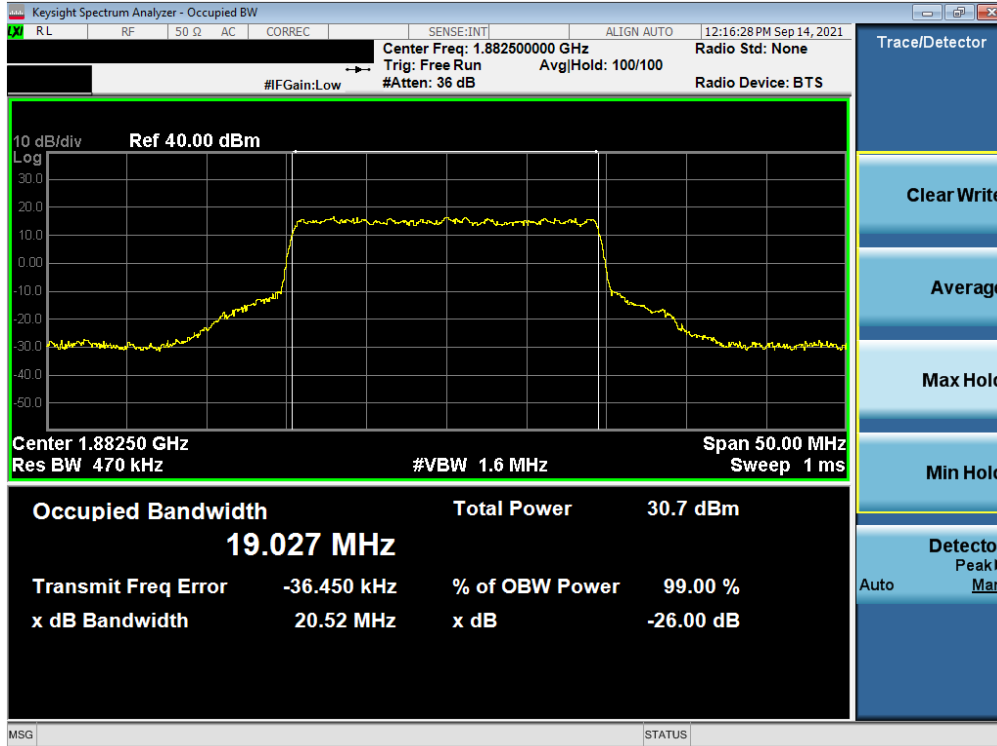


Plot 7-21. Occupied Bandwidth Plot (NR Band n25/2 - 25.0MHz CP-OFDM 16QAM - Full RB - ANT A)

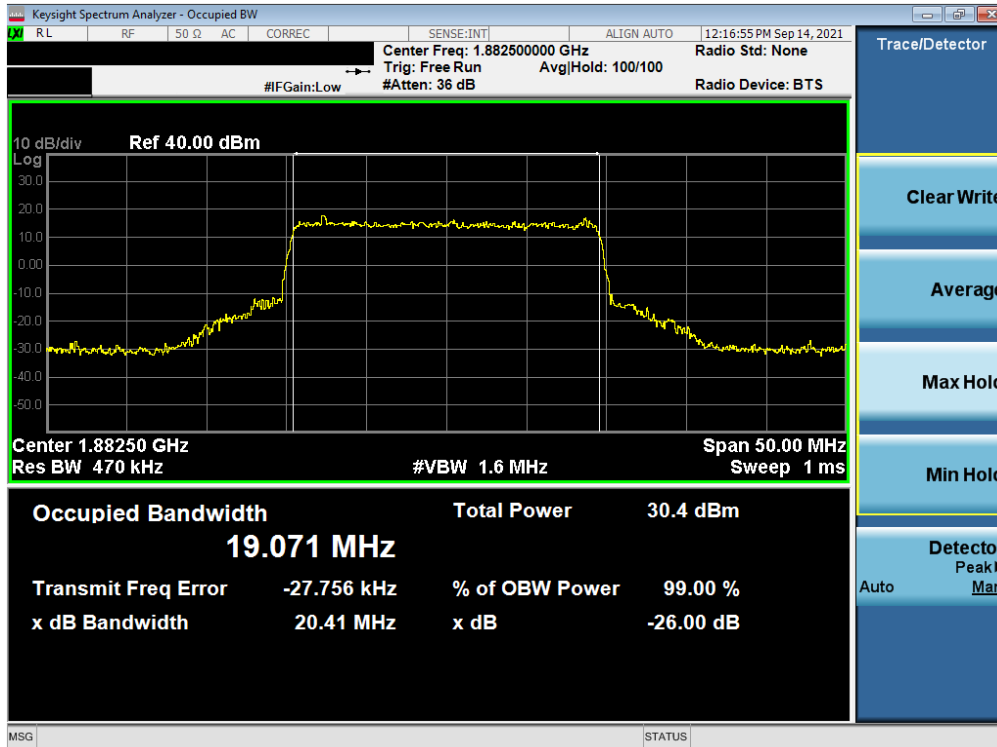


Plot 7-22. Occupied Bandwidth Plot (NR Band n25/2 - 20.0MHz DFT-s-OFDM BPSK - Full RB - ANT A)

FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 27 of 164

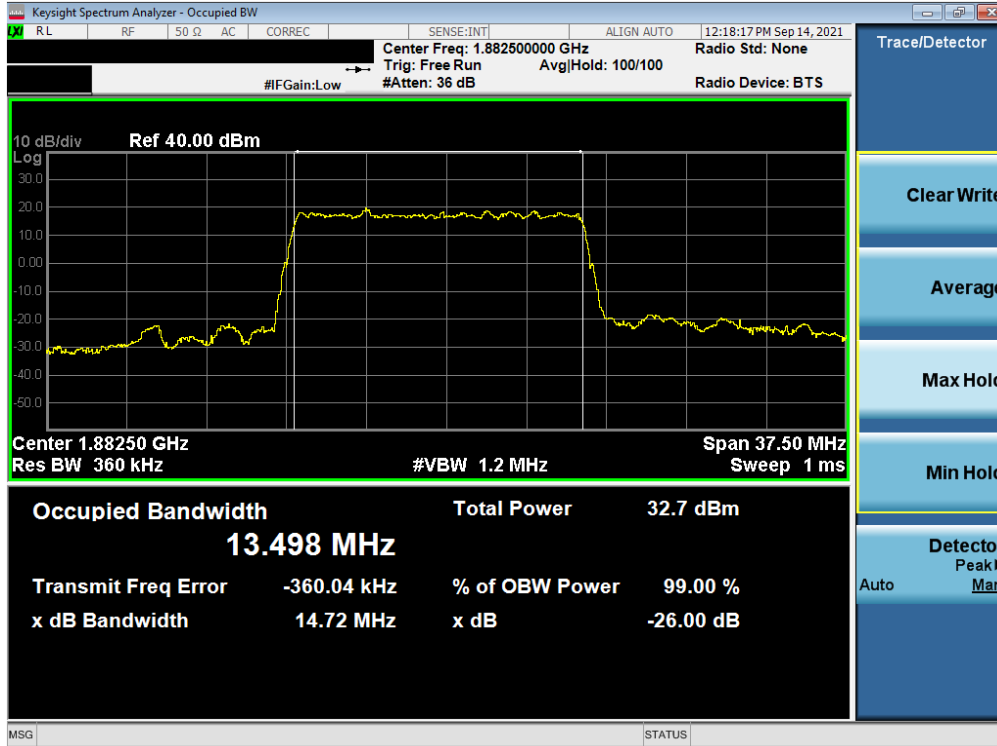


Plot 7-23. Occupied Bandwidth Plot (NR Band n25/2 - 20.0MHz CP-OFDM QPSK - Full RB - ANT A)

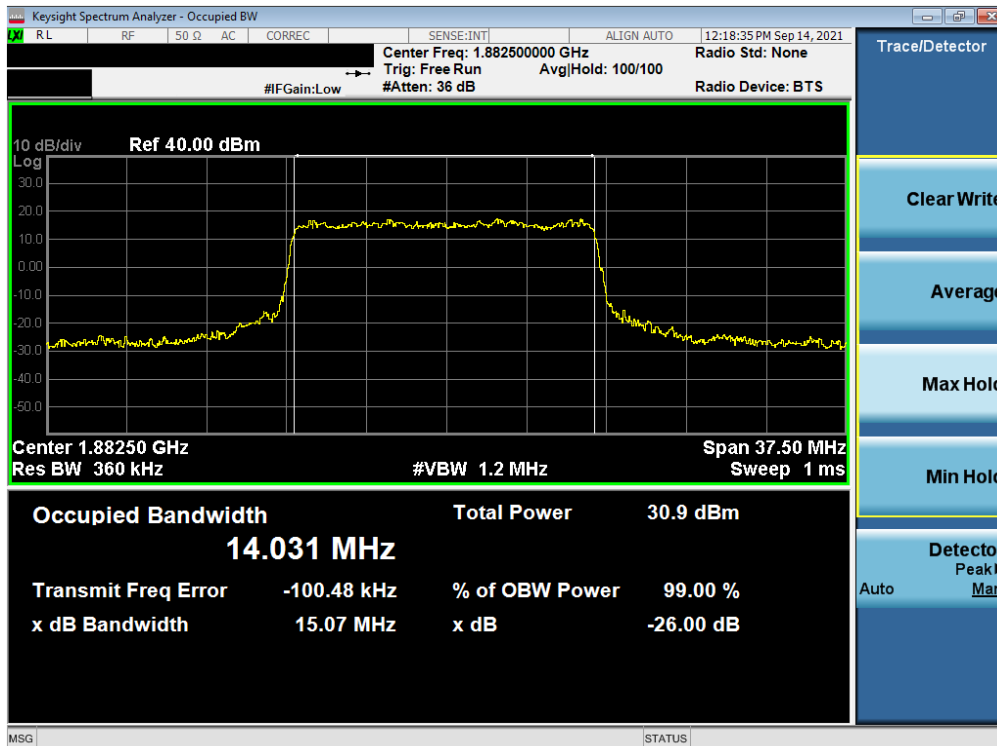


Plot 7-24. Occupied Bandwidth Plot (NR Band n25/2 - 20.0MHz CP-OFDM 16QAM - Full RB - ANT A)

FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 28 of 164

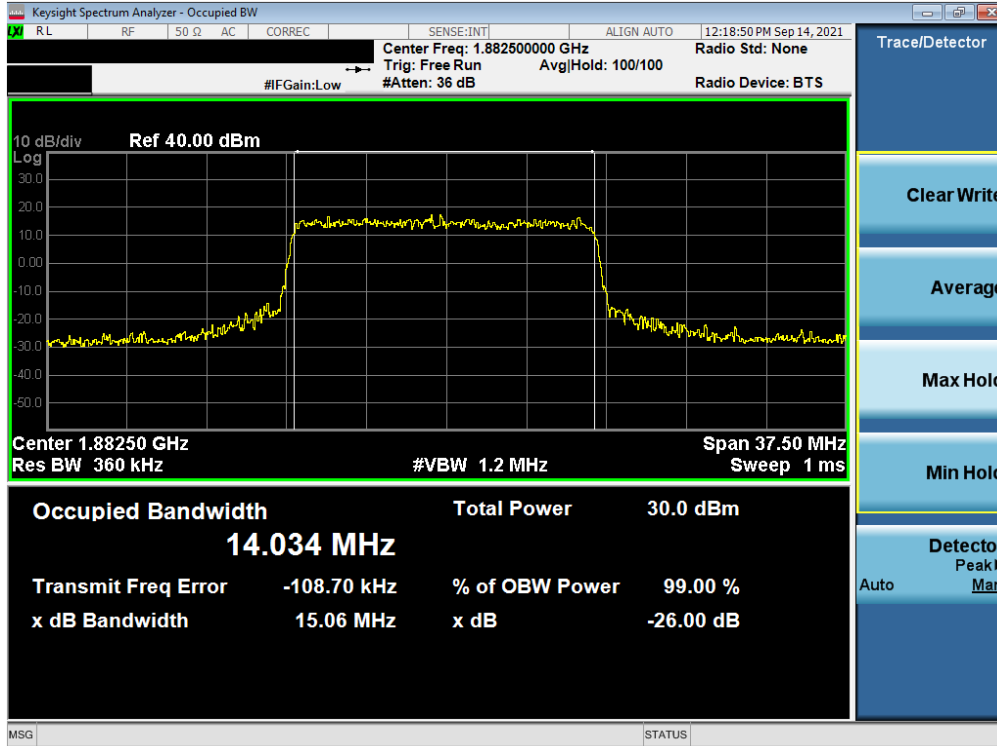


Plot 7-25. Occupied Bandwidth Plot (NR Band n25/2 - 15.0MHz DFT-s-OFDM BPSK - Full RB - ANT A)

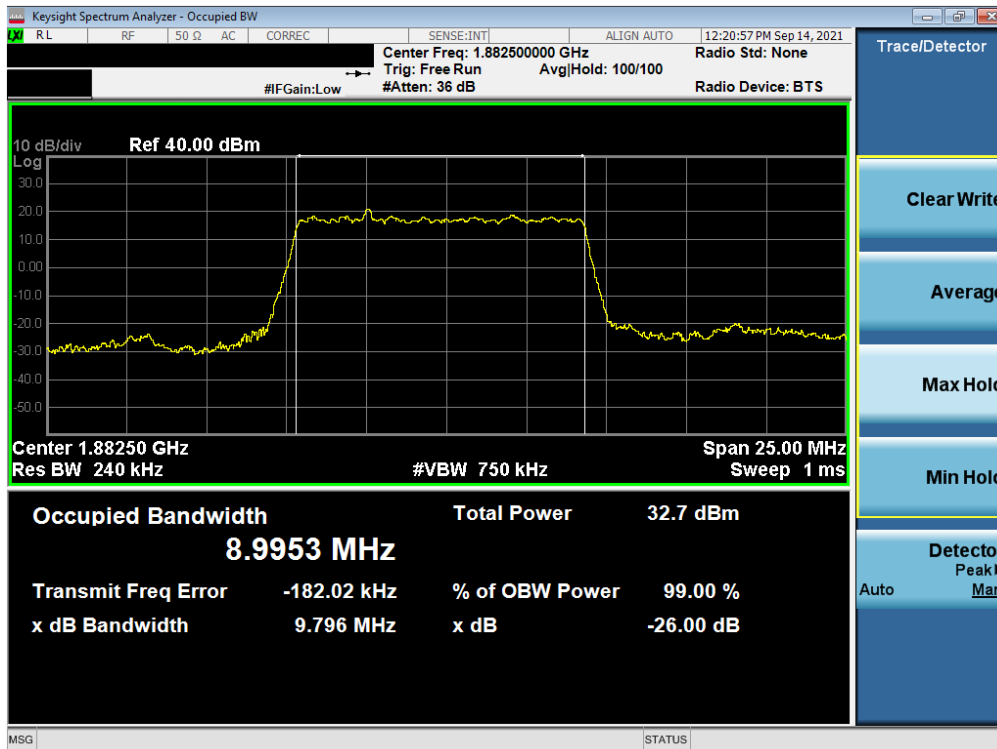


Plot 7-26. Occupied Bandwidth Plot (NR Band n25/2 - 15.0MHz CP-OFDM QPSK - Full RB - ANT A)




FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 29 of 164

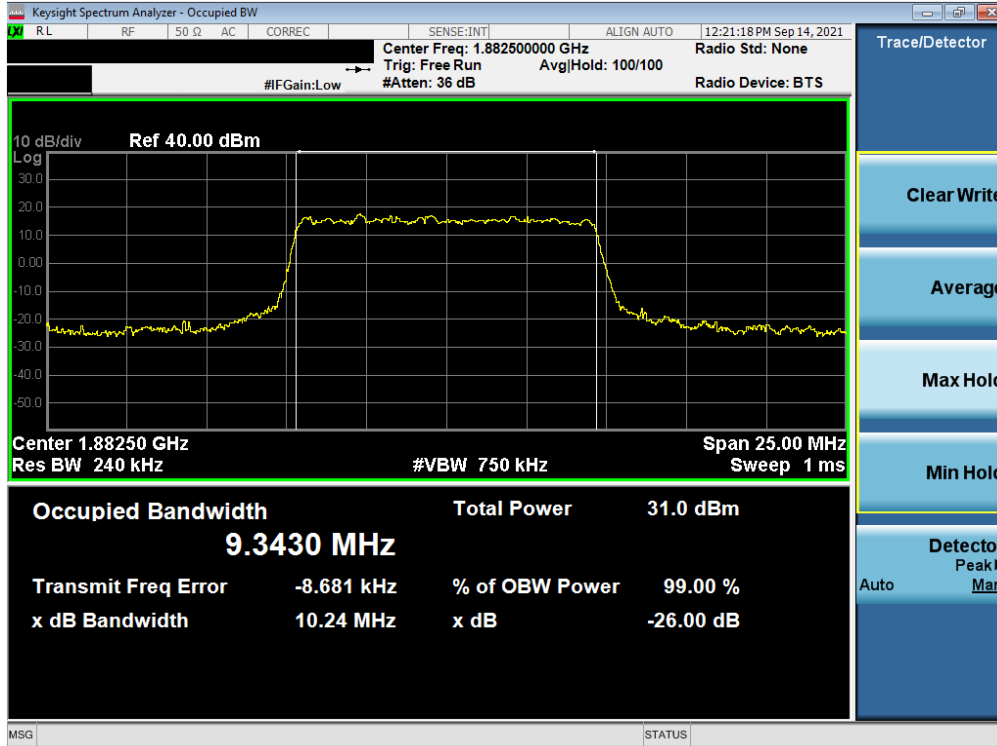


Plot 7-27. Occupied Bandwidth Plot (NR Band n25/2 - 15.0MHz CP-OFDM 16QAM - Full RB - ANT A)

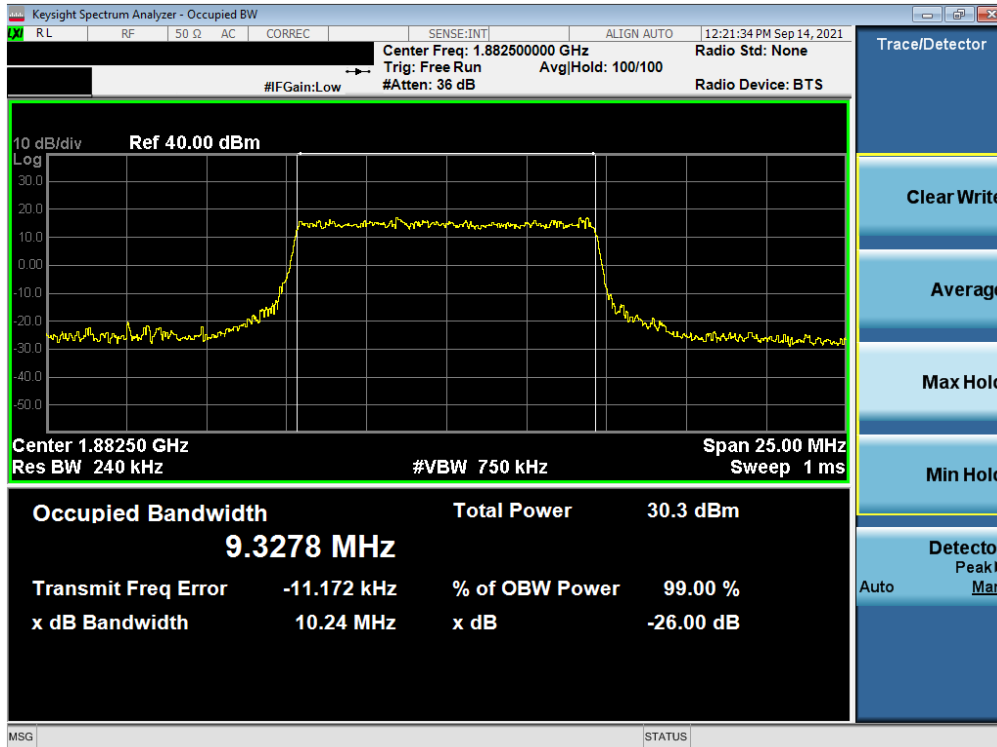


Plot 7-28. Occupied Bandwidth Plot (NR Band n25/2 - 10.0MHz DFT-s-OFDM BPSK - Full RB - ANT A)

FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 30 of 164

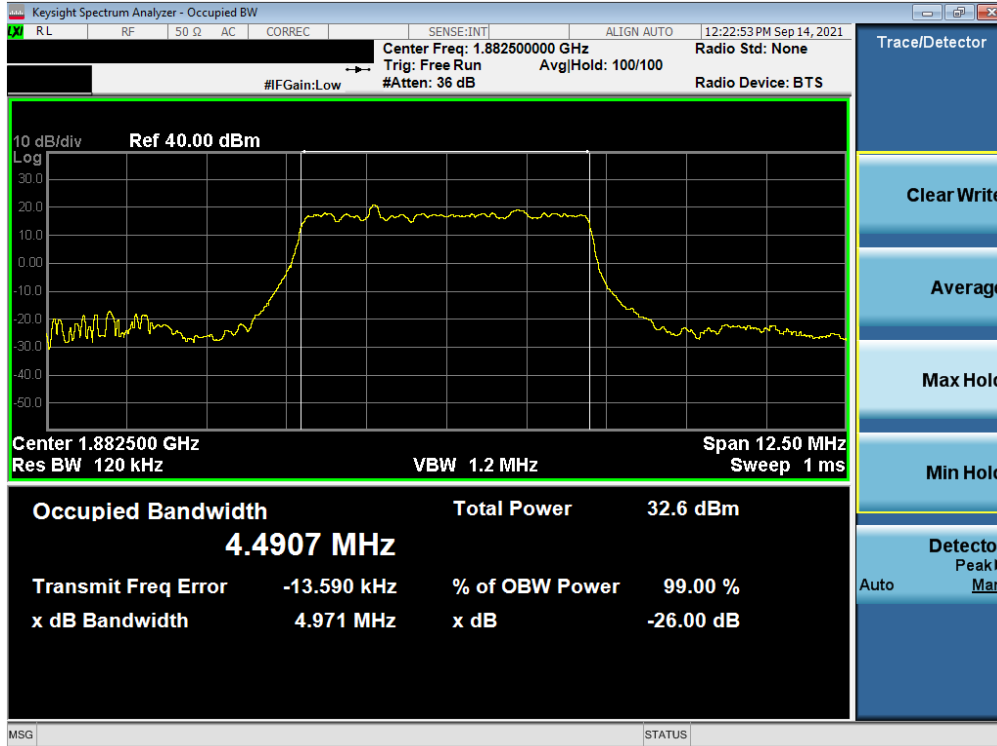


Plot 7-29. Occupied Bandwidth Plot (NR Band n25/2 - 10.0MHz CP-OFDM QPSK - Full RB - ANT A)

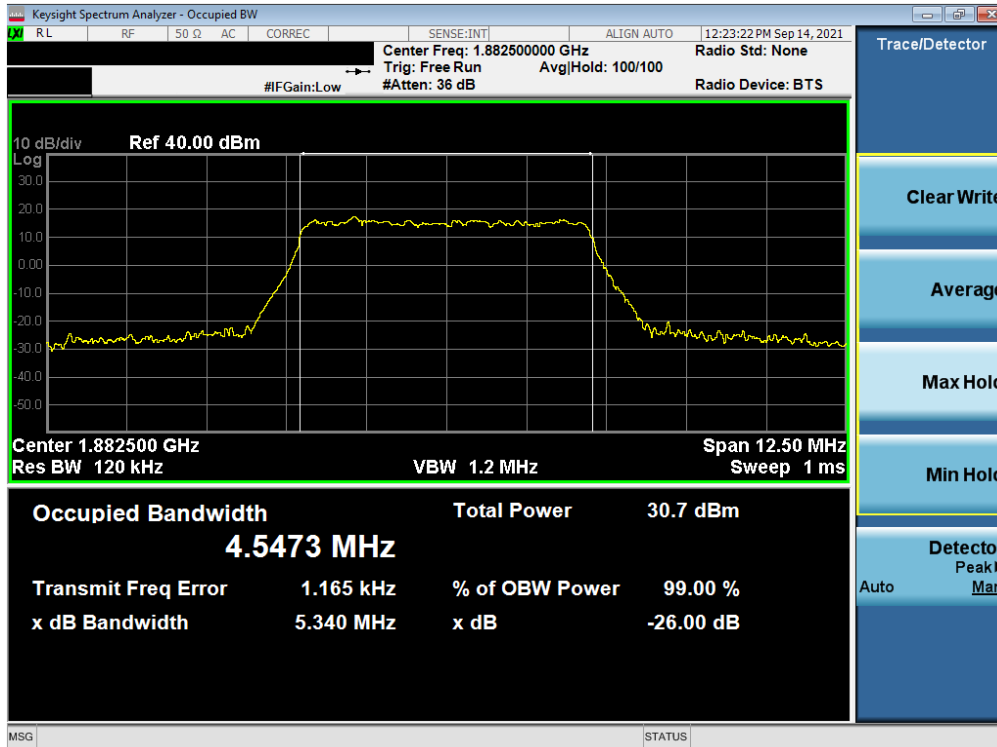


Plot 7-30. Occupied Bandwidth Plot (NR Band n25/2 - 10.0MHz CP-OFDM 16QAM - Full RB - ANT A)

FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 31 of 164

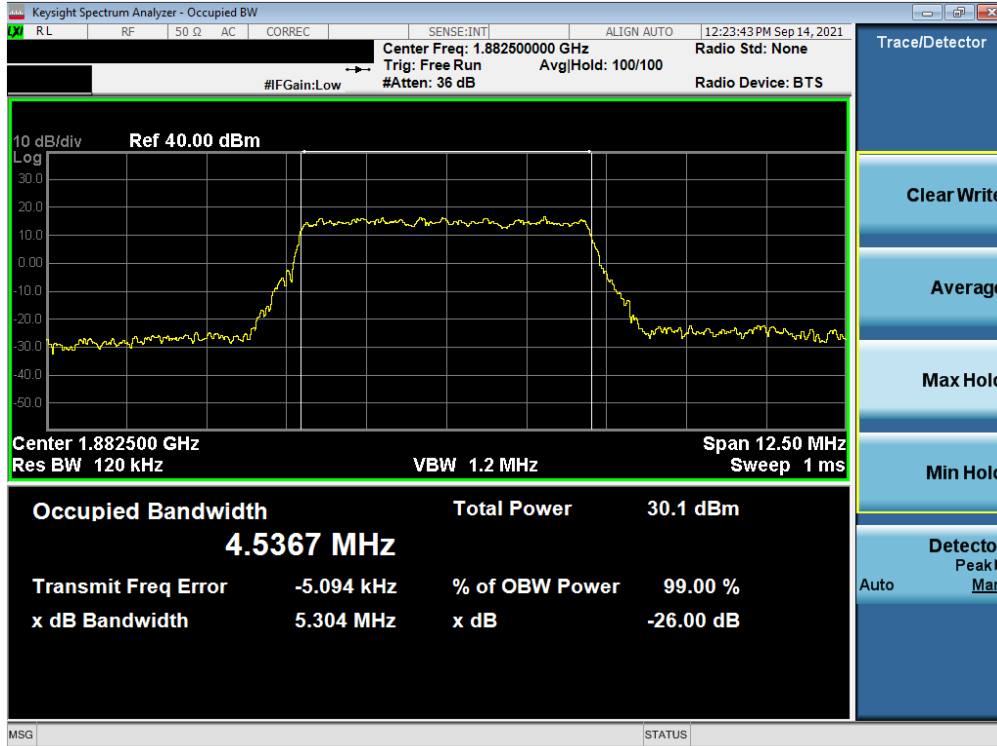


Plot 7-31. Occupied Bandwidth Plot (NR Band n25/2 - 5.0MHz DFT-s-OFDM BPSK - Full RB - ANT A)






Plot 7-32. Occupied Bandwidth Plot (NR Band n25/2 - 5.0MHz CP-OFDM QPSK - Full RB - ANT A)

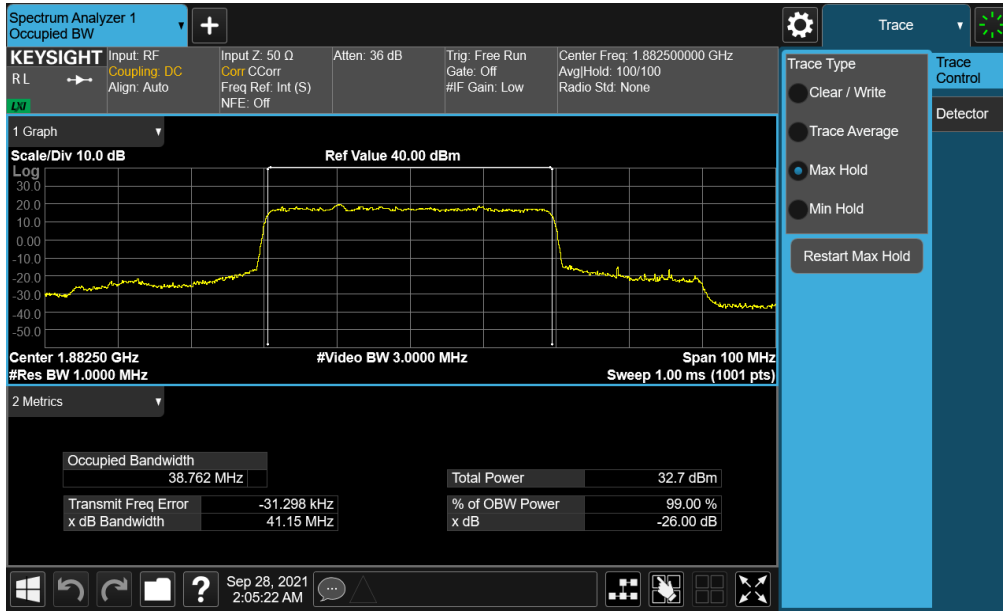
FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 32 of 164



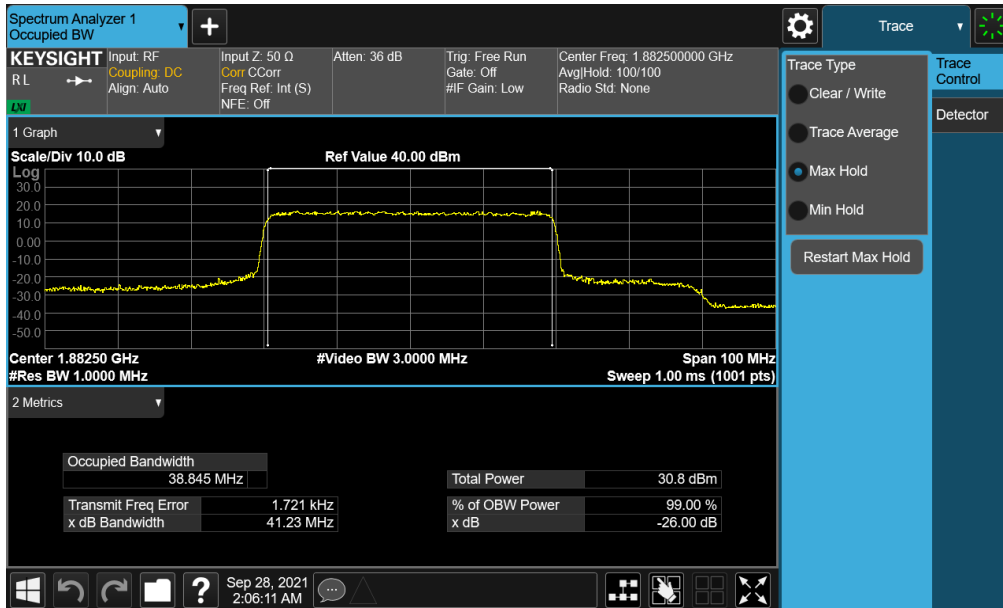
Plot 7-33. Occupied Bandwidth Plot (NR Band n25/2 - 5.0MHz CP-OFDM 16QAM - Full RB - ANT A)

FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 33 of 164

NR Band n25/2 – Ant F

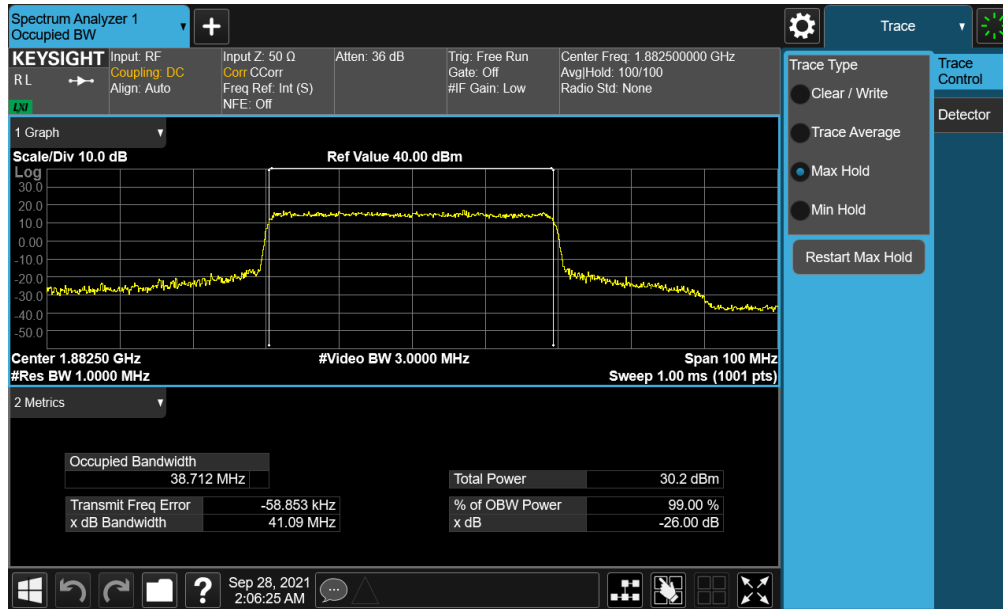


Plot 7-34. Occupied Bandwidth Plot (NR Band n25/2 - 40.0MHz DFT-s-OFDM BPSK - Full RB - ANT F)

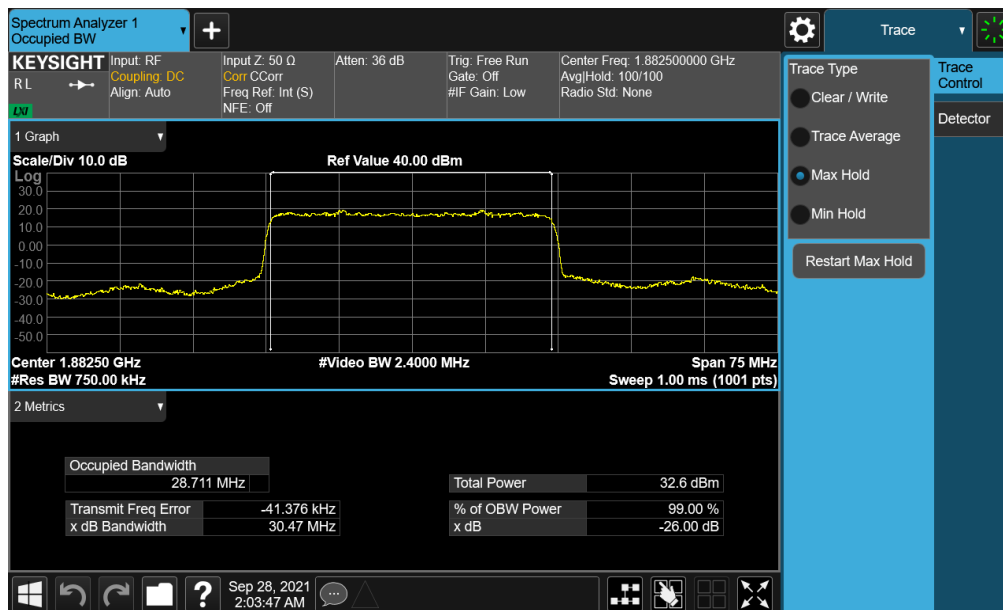


Plot 7-35. Occupied Bandwidth Plot (NR Band n25/2 - 40.0MHz CP-OFDM QPSK - Full RB - ANT F)




FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 34 of 164

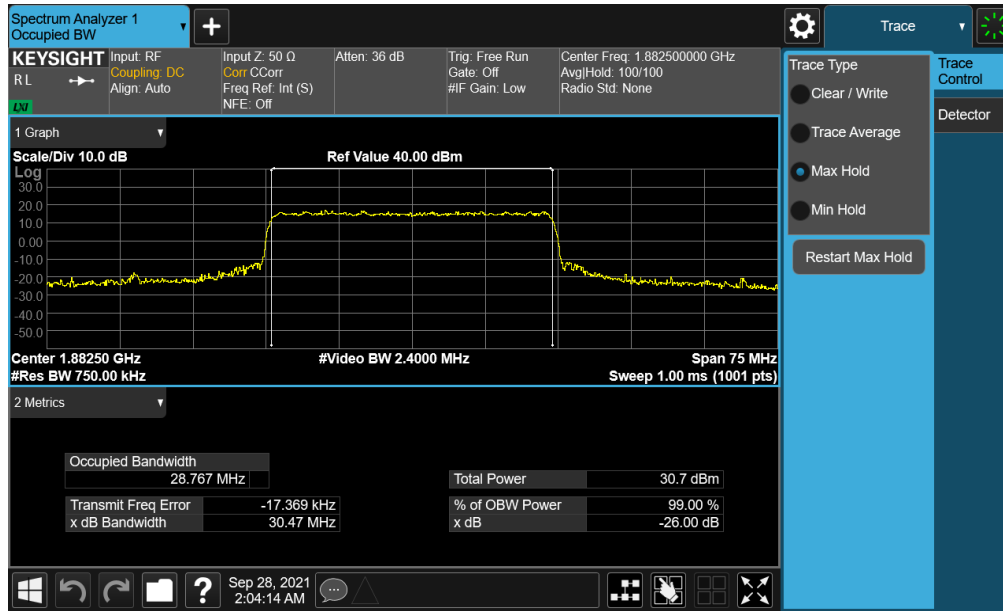


Plot 7-36. Occupied Bandwidth Plot (NR Band n25/2 - 40.0MHz CP-OFDM 16QAM - Full RB - ANT F)

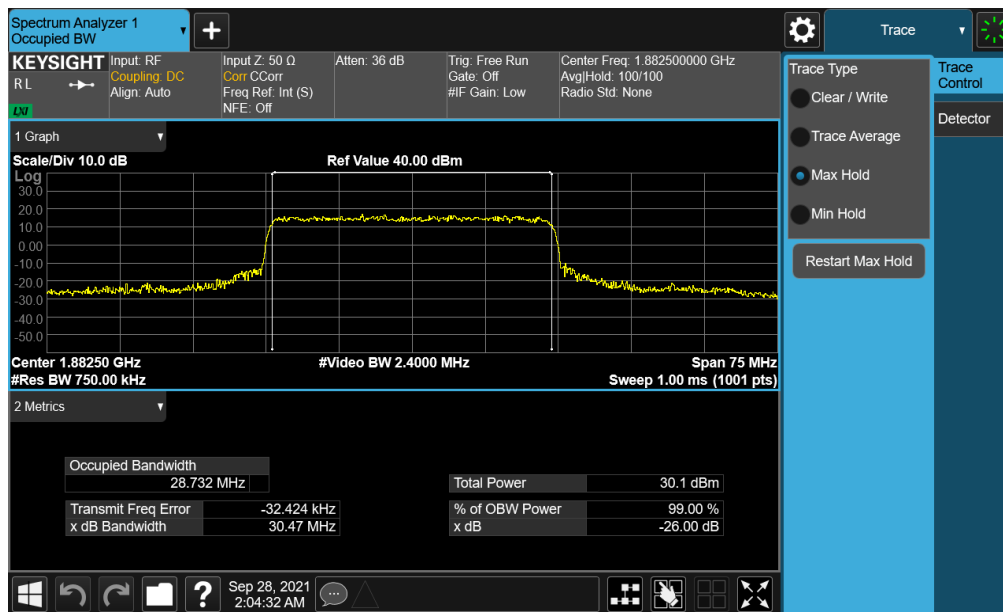


Plot 7-37. Occupied Bandwidth Plot (NR Band n25/2 - 30.0MHz DFT-s-OFDM BPSK - Full RB - ANT F)




FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 35 of 164

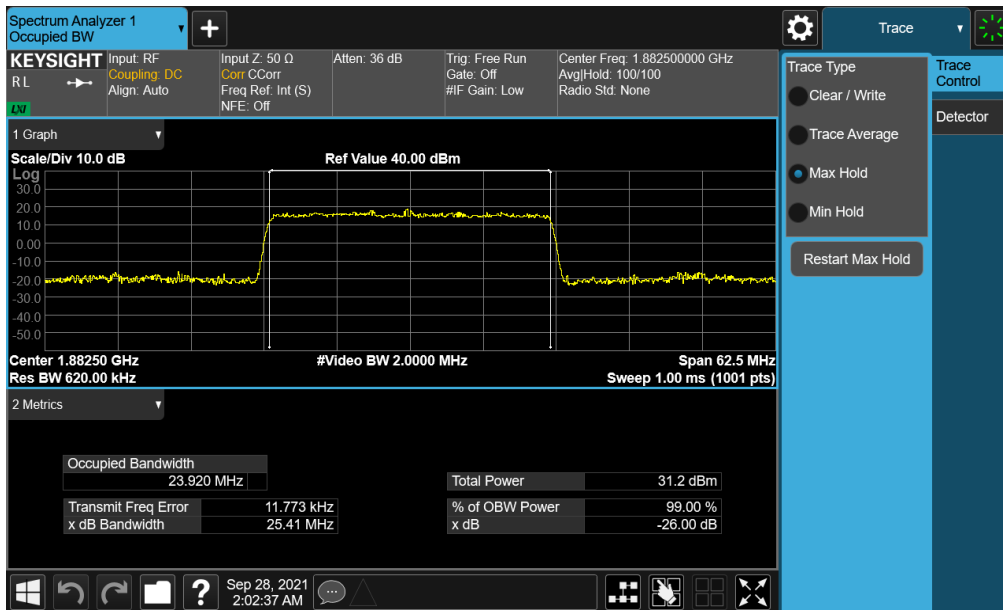
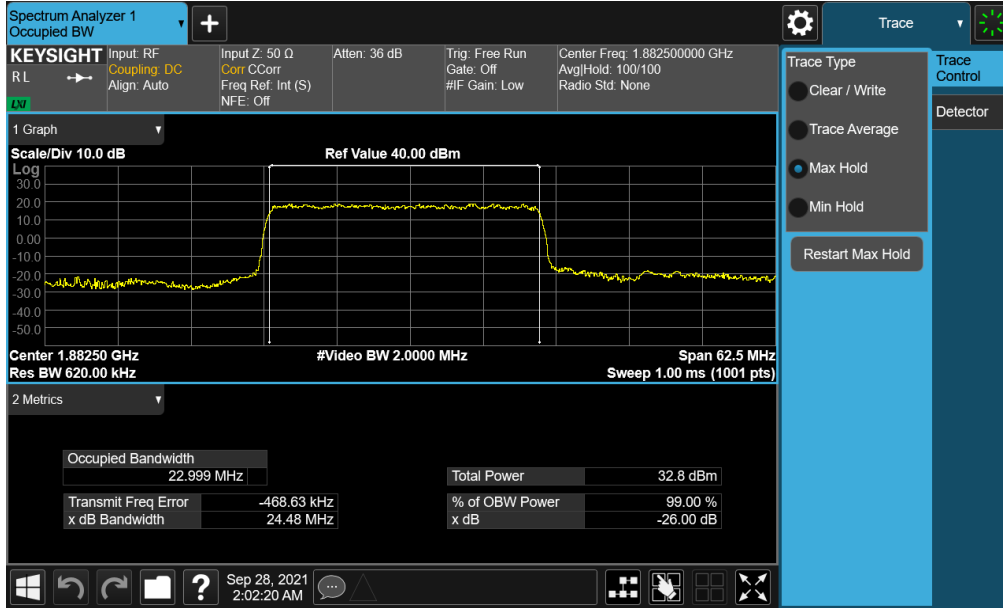


Plot 7-38. Occupied Bandwidth Plot (NR Band n25/2 - 30.0MHz CP-OFDM QPSK - Full RB - ANT F)

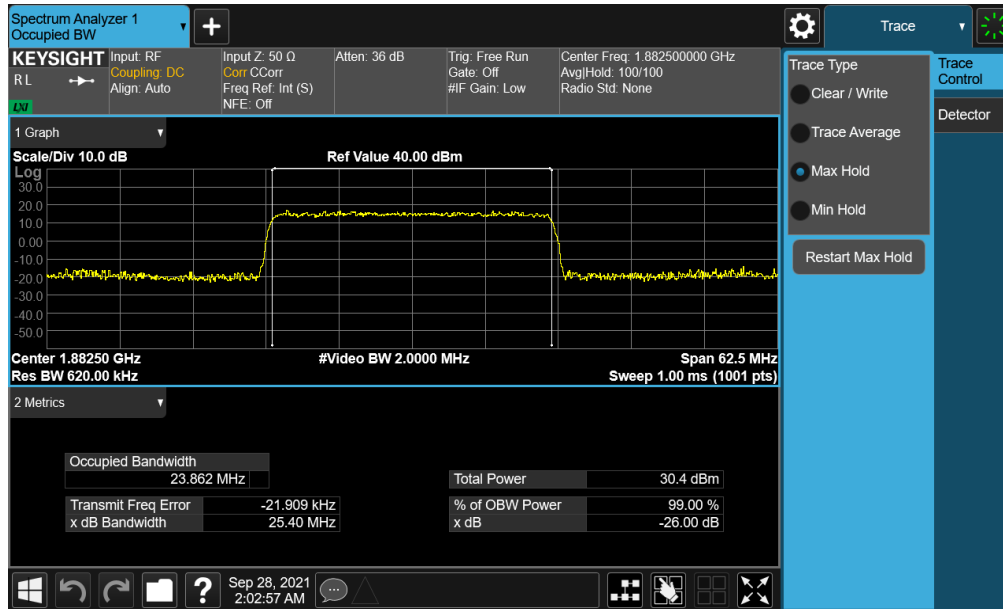


Plot 7-39. Occupied Bandwidth Plot (NR Band n25/2 - 30.0MHz CP-OFDM 16QAM - Full RB - ANT F)

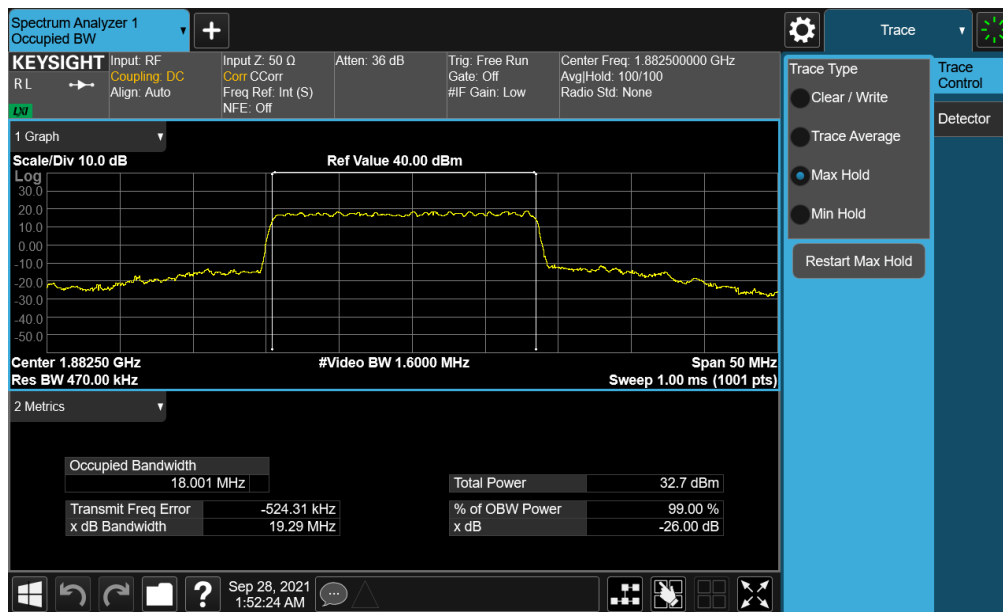
FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 36 of 164



FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 37 of 164

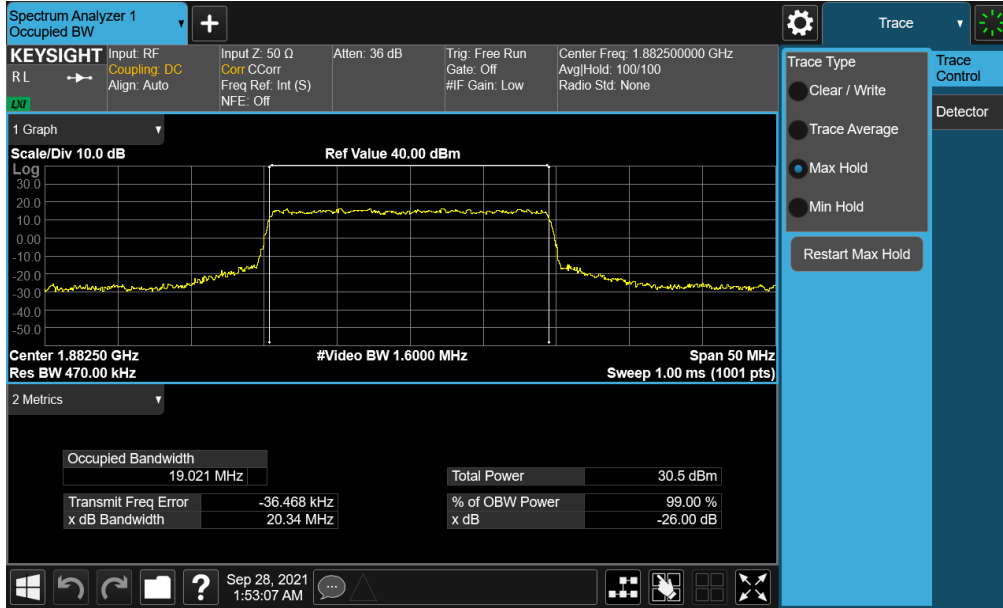


Plot 7-42. Occupied Bandwidth Plot (NR Band n25/2 - 25.0MHz CP-OFDM 16QAM - Full RB - ANT F)

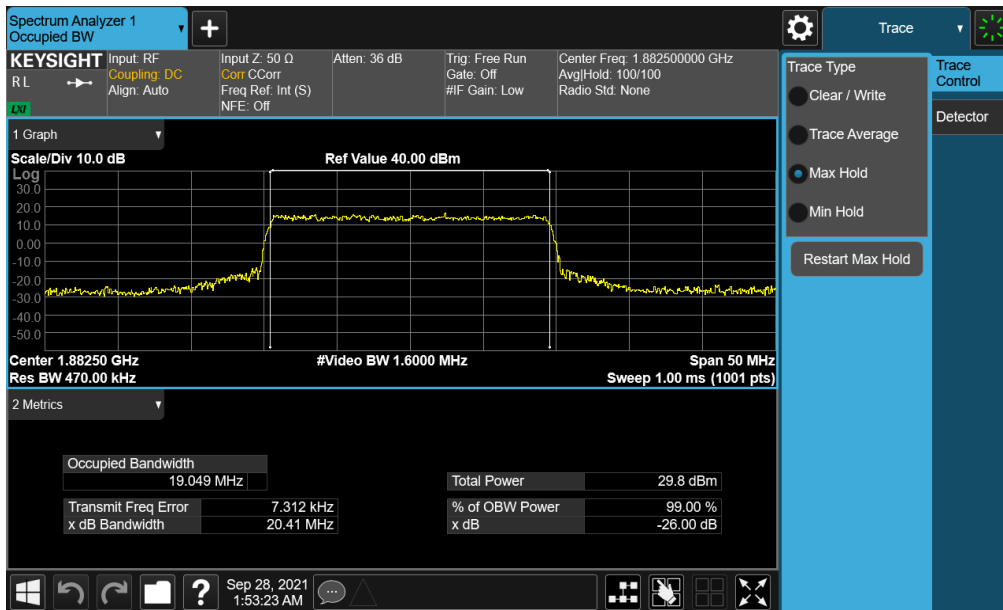


Plot 7-43. Occupied Bandwidth Plot (NR Band n25/2 - 20.0MHz DFT-s-OFDM BPSK - Full RB - ANT F)

FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 38 of 164

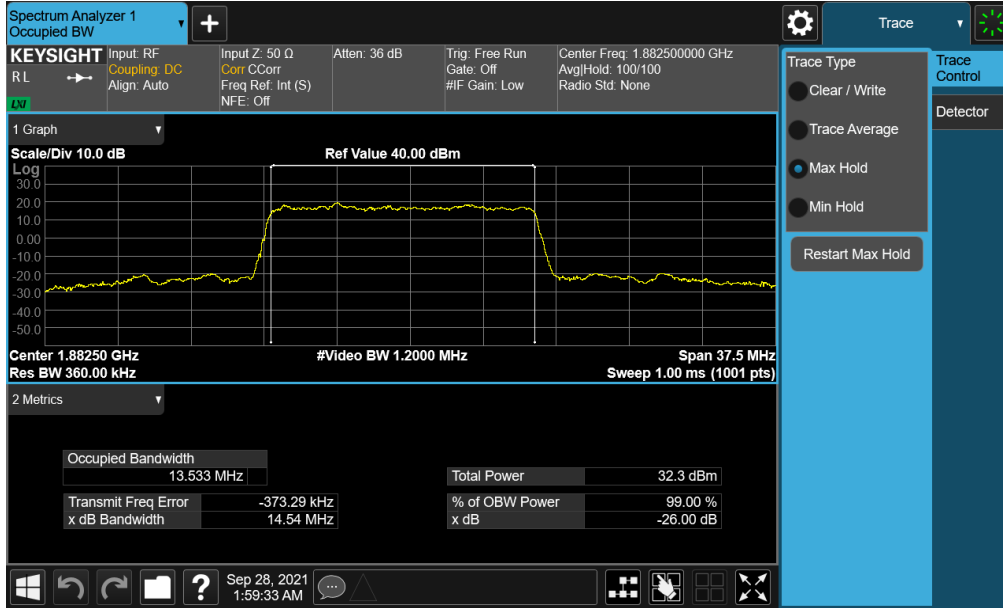


Plot 7-44. Occupied Bandwidth Plot (NR Band n25/2 - 20.0MHz CP-OFDM QPSK - Full RB - ANT F)

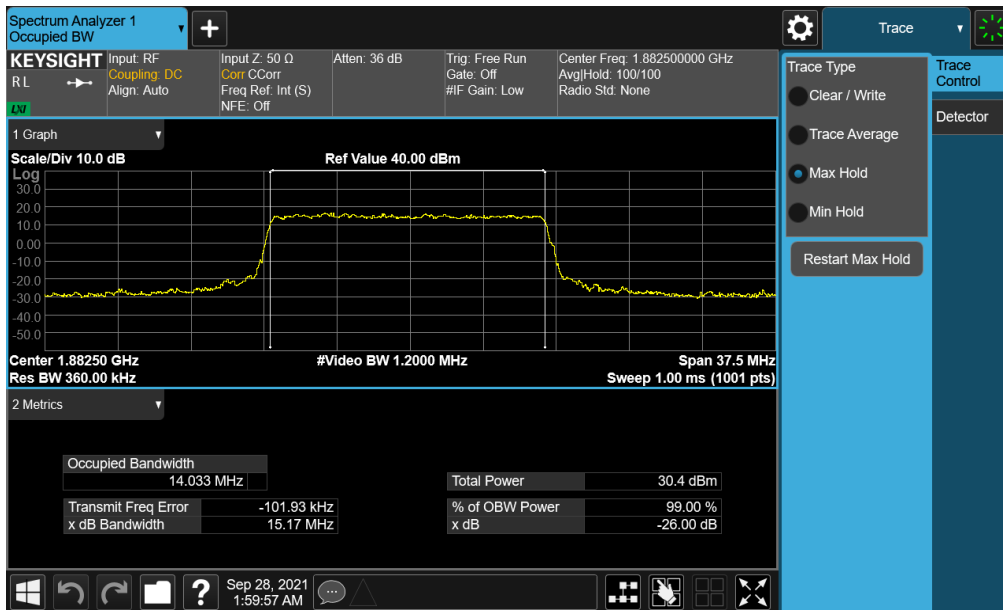


Plot 7-45. Occupied Bandwidth Plot (NR Band n25/2 - 20.0MHz CP-OFDM 16QAM - Full RB - ANT F)

FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 39 of 164

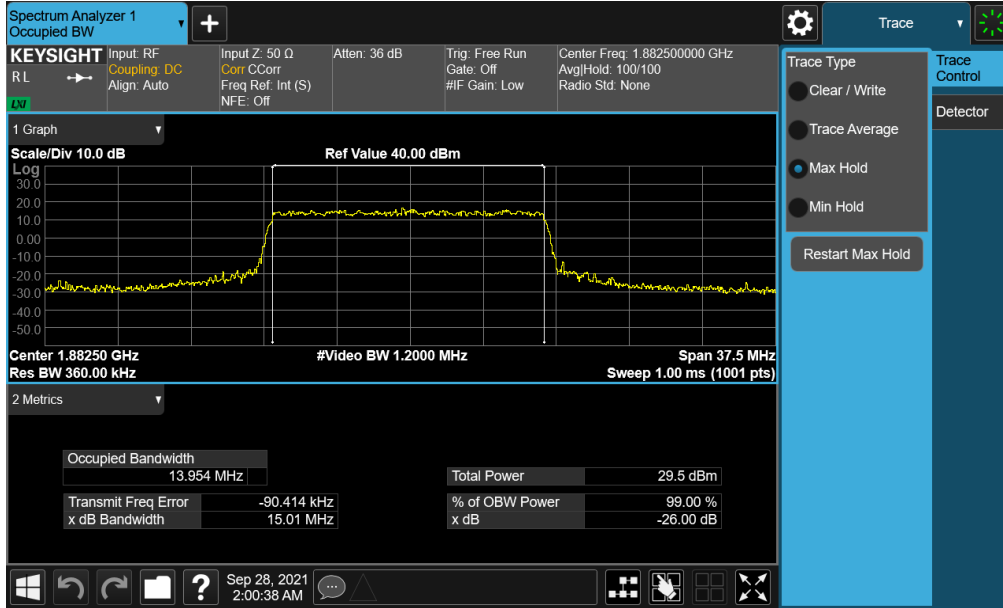


Plot 7-46. Occupied Bandwidth Plot (NR Band n25/2 - 15.0MHz DFT-s-OFDM BPSK - Full RB - ANT F)



Plot 7-47. Occupied Bandwidth Plot (NR Band n25/2 - 15.0MHz CP-OFDM QPSK - Full RB - ANT F)

FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 40 of 164

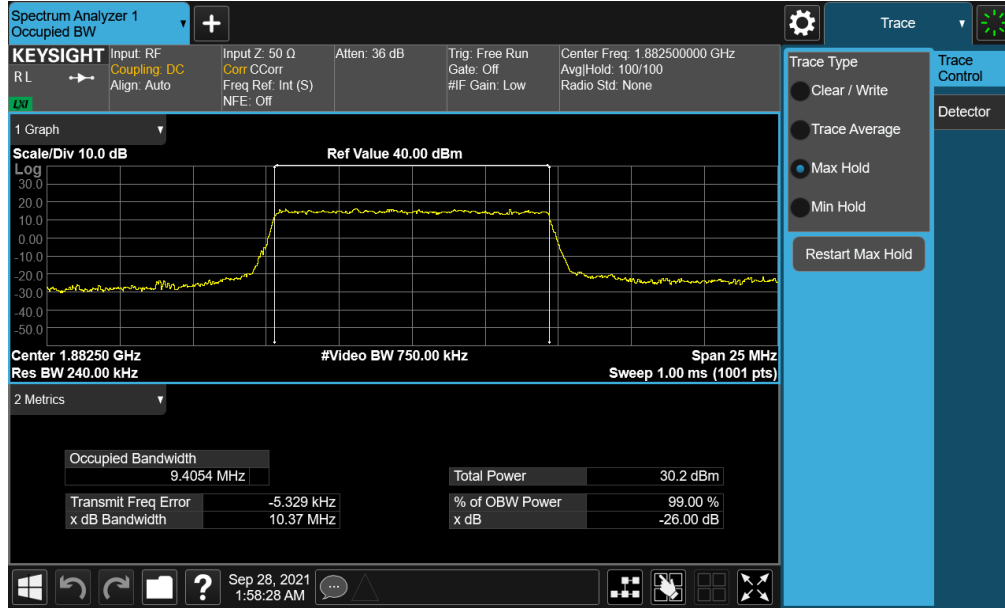


Plot 7-48. Occupied Bandwidth Plot (NR Band n25/2 - 15.0MHz CP-OFDM 16QAM - Full RB - ANT F)

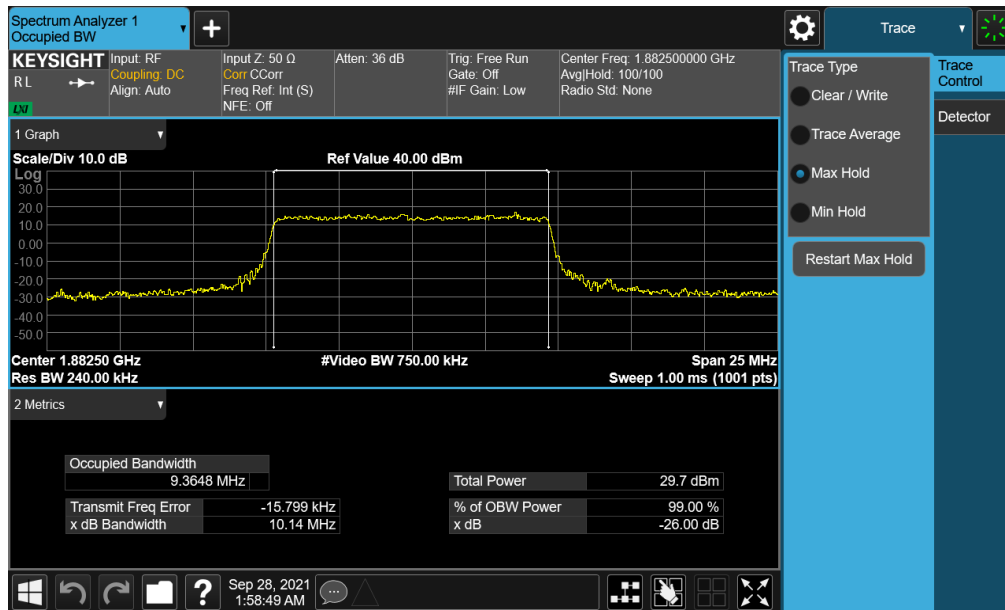


Plot 7-49. Occupied Bandwidth Plot (NR Band n25/2 - 10.0MHz DFT-s-OFDM BPSK - Full RB - ANT F)




FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 41 of 164

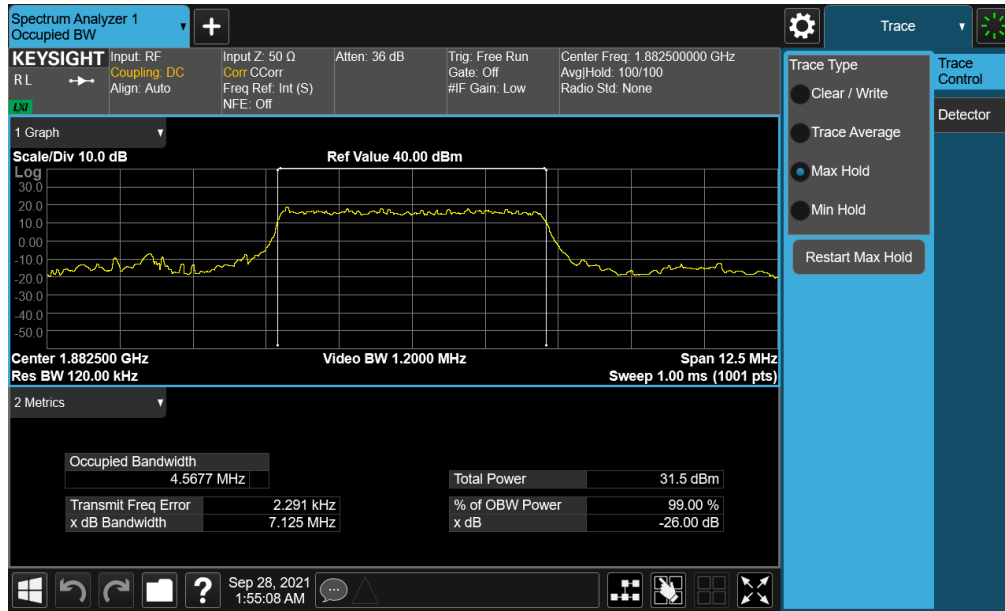


Plot 7-50. Occupied Bandwidth Plot (NR Band n25/2 - 10.0MHz CP-OFDM QPSK - Full RB - ANT F)

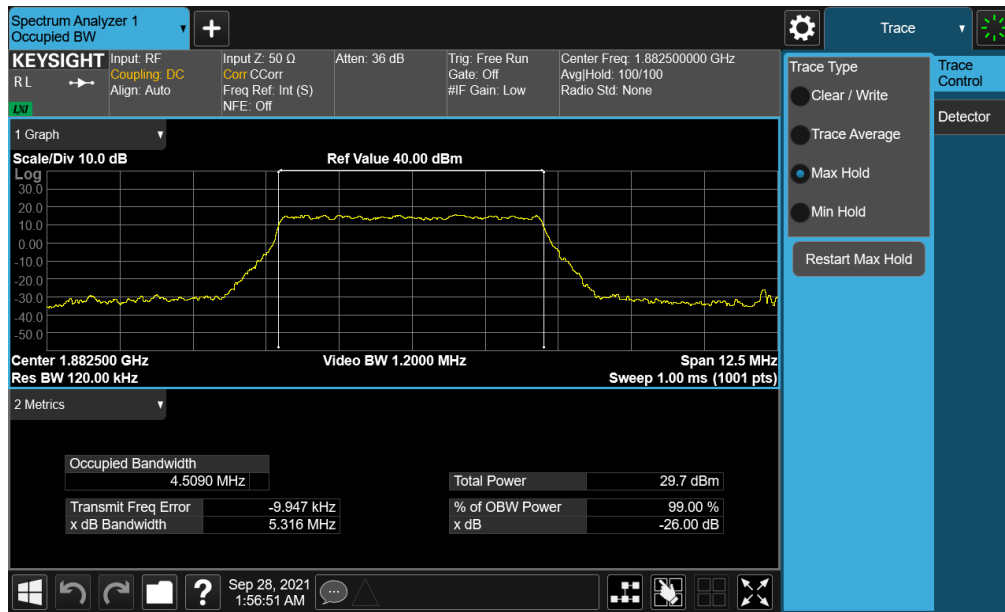


Plot 7-51. Occupied Bandwidth Plot (NR Band n25/2 - 10.0MHz CP-OFDM 16QAM - Full RB - ANT F)

FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 42 of 164

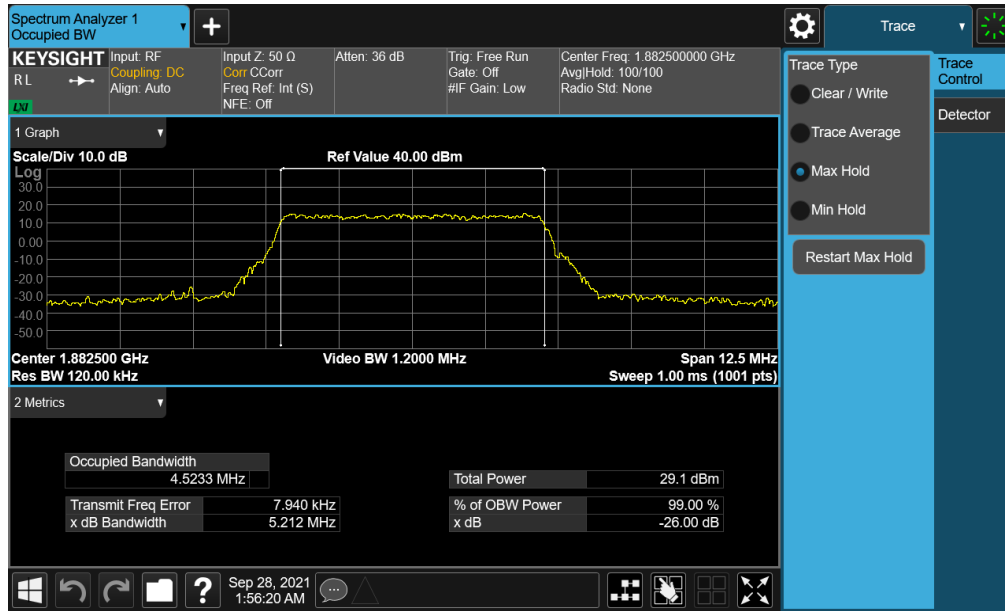


Plot 7-52. Occupied Bandwidth Plot (NR Band n25/2 - 5.0MHz DFT-s-OFDM BPSK - Full RB - ANT F)





Plot 7-53. Occupied Bandwidth Plot (NR Band n25/2 - 5.0MHz CP-OFDM QPSK - Full RB - ANT F)

FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 43 of 164



Plot 7-54. Occupied Bandwidth Plot (NR Band n25/2 - 5.0MHz CP-OFDM 16QAM - Full RB - ANT F)




FCC ID: A3LSMS901U	 PART 24 MEASUREMENT REPORT 	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset
Page 44 of 164		

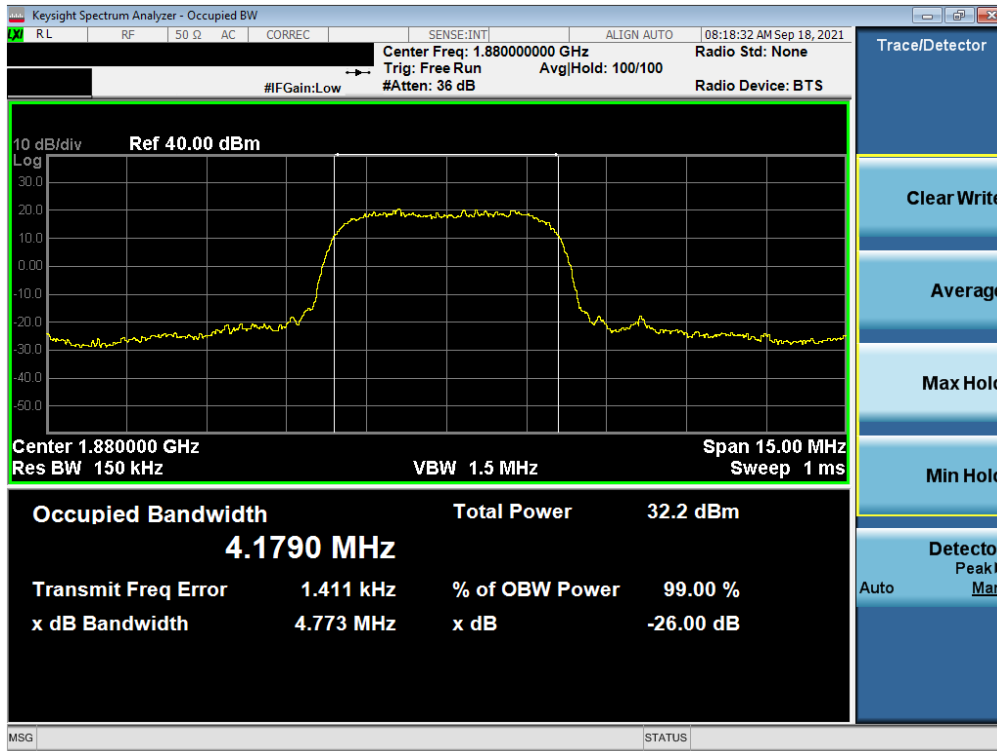


Plot 7-55. Occupied Bandwidth Plot (GSM, Ch. 661)



Plot 7-56. Occupied Bandwidth Plot (EDGE, Ch. 661)

FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 45 of 164



Plot 7-57. Occupied Bandwidth Plot (WCDMA, Ch. 9400)

FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 46 of 164

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 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is $43 + 10 \log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 20GHz (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.

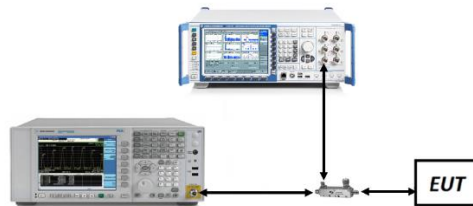




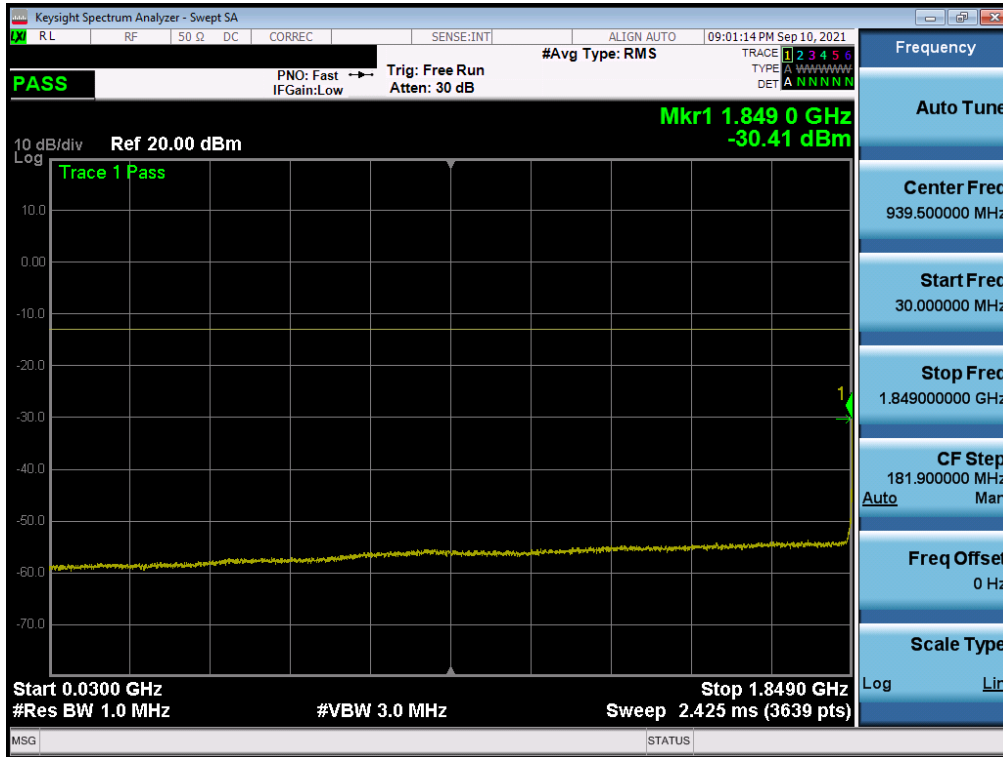
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

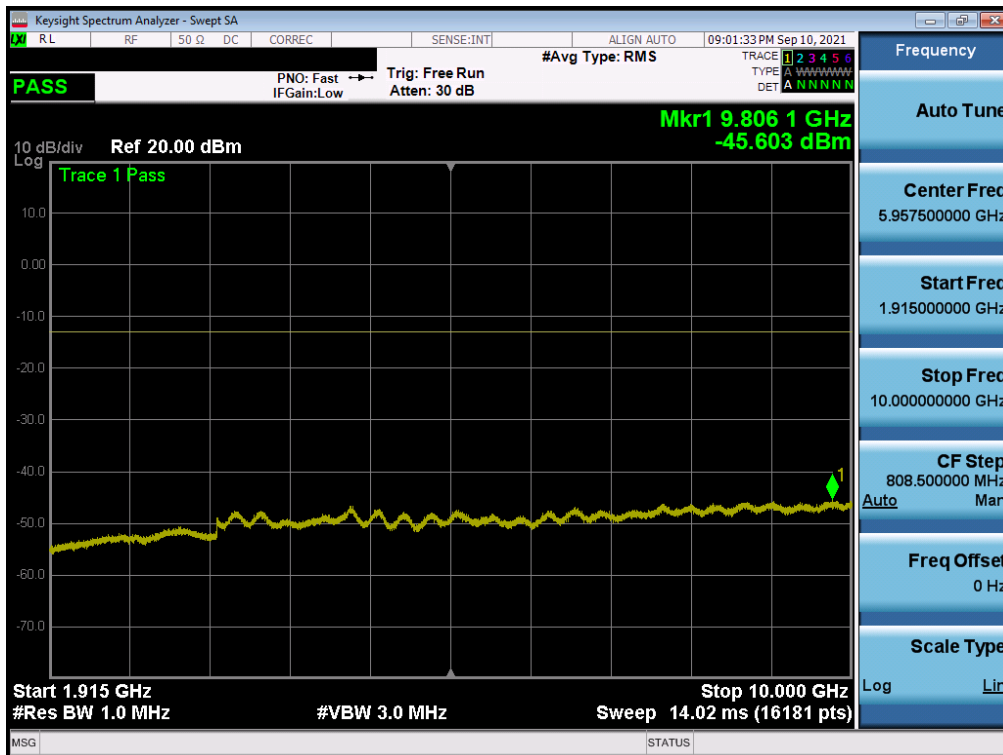
1. Per Part 24 and RSS-133, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g., CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

FCC ID: A3LSMS901U	 PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 47 of 164	

LTE Band 25/2

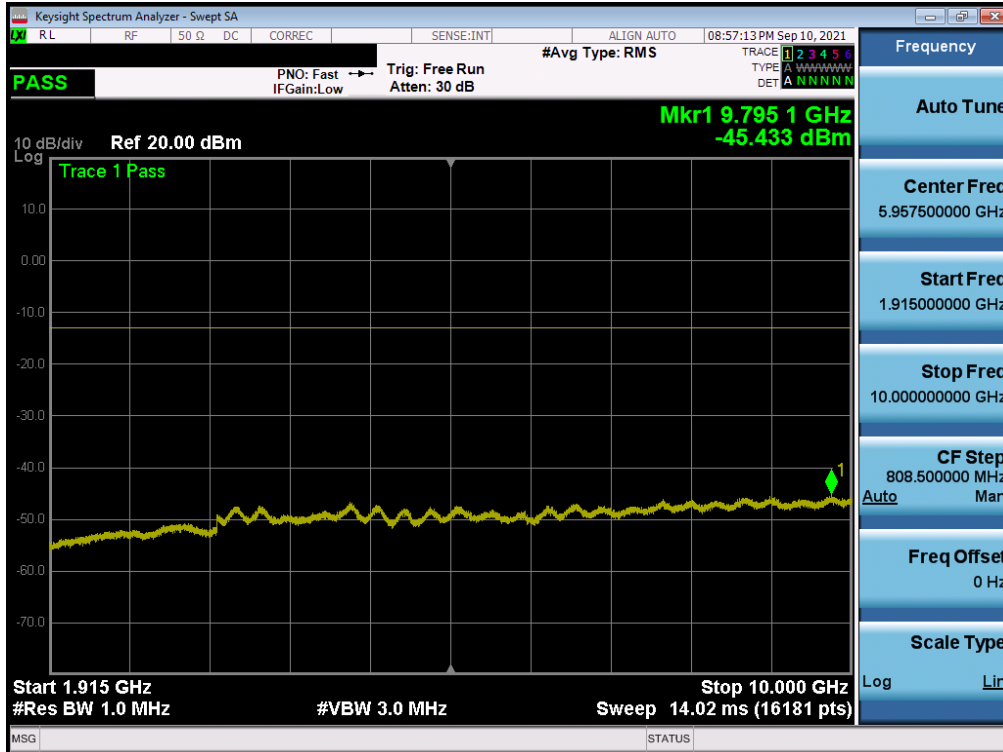


Plot 7-58. Conducted Spurious Plot (LTE Band 25/2 - 20MHz QPSK - 1RB - Low Channel)

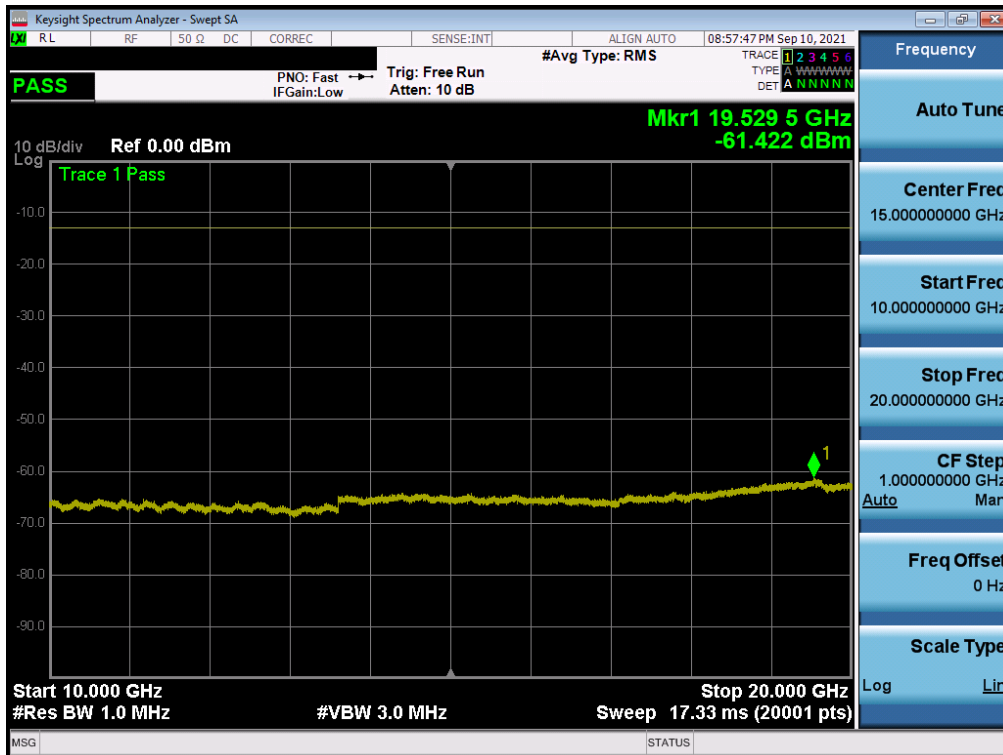


Plot 7-59. Conducted Spurious Plot (LTE Band 25/2 - 20MHz QPSK - 1RB - Low Channel)




FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 48 of 164

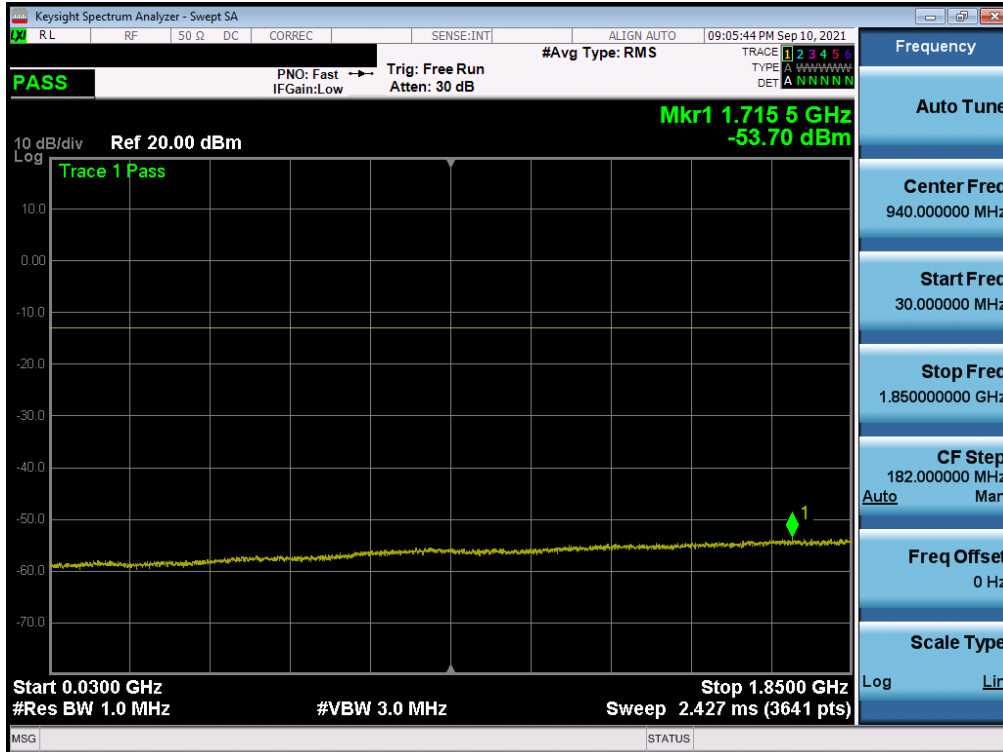


Plot 7-62. Conducted Spurious Plot (LTE Band 25/2 - 20MHz QPSK - 1RB - Mid Channel)

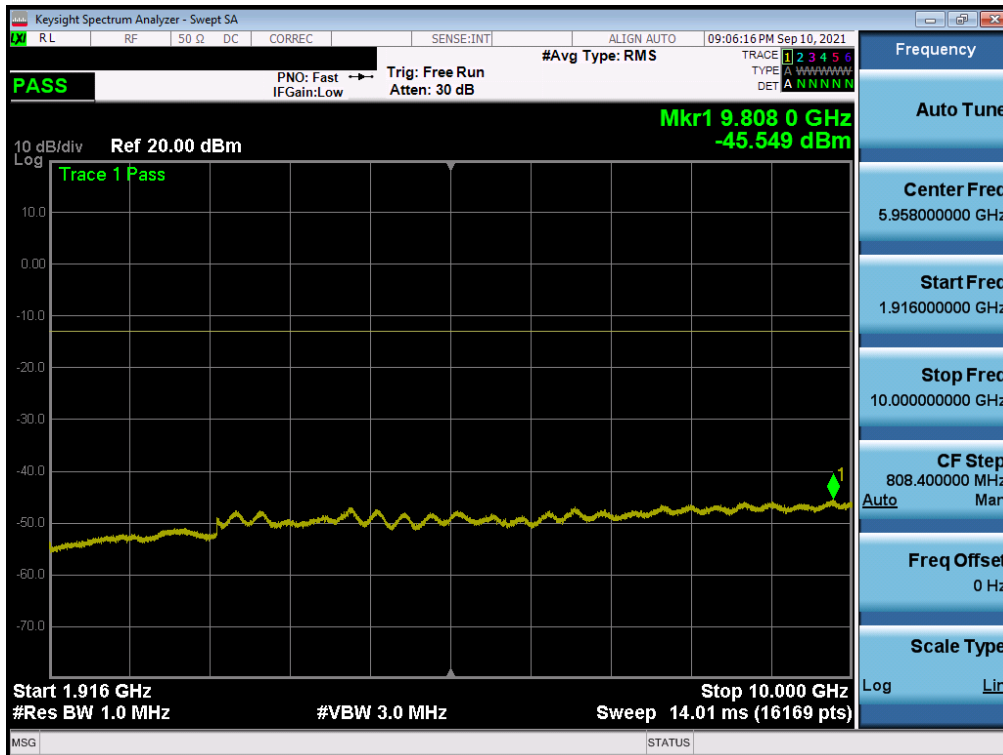


Plot 7-63. Conducted Spurious Plot (LTE Band 25/2 - 20MHz QPSK - 1RB - Mid Channel)

FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 50 of 164

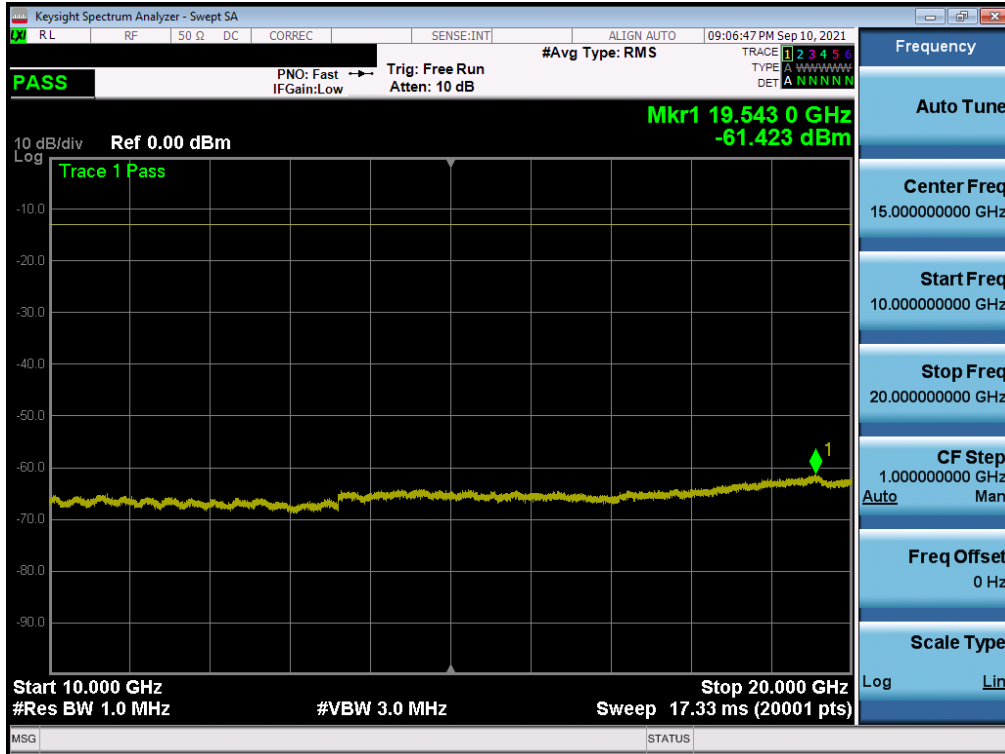


Plot 7-64. Conducted Spurious Plot (LTE Band 25/2 - 20MHz QPSK - 1RB - High Channel)






Plot 7-65. Conducted Spurious Plot (LTE Band 25/2 - 20MHz QPSK - 1RB - High Channel)

FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 51 of 164



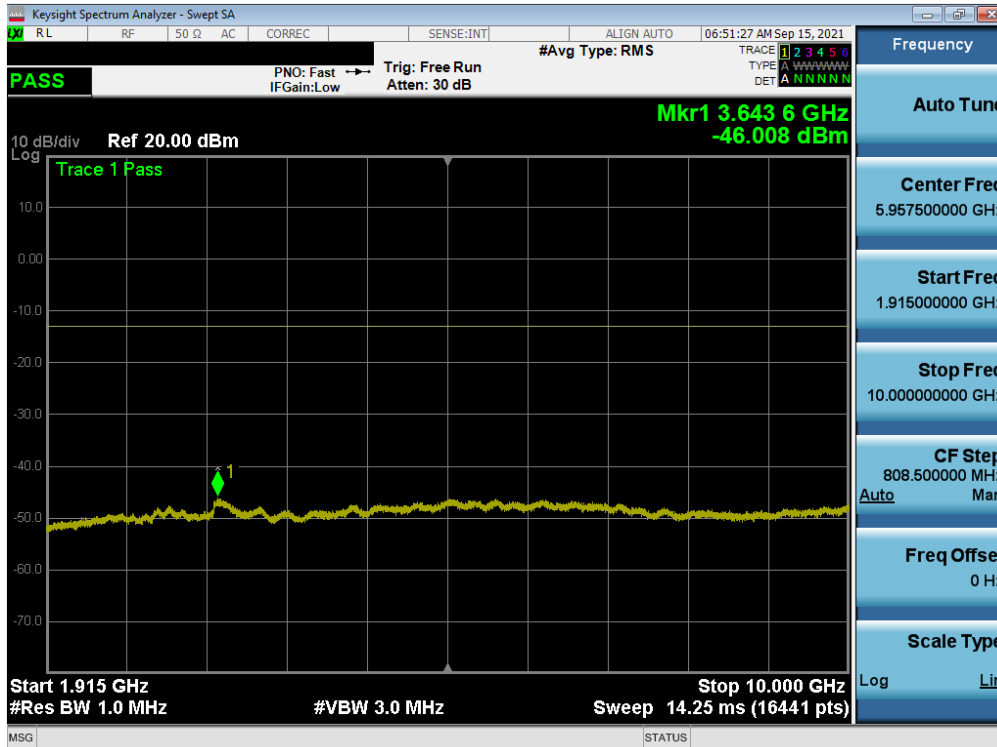
Plot 7-66. Conducted Spurious Plot (LTE Band 25/2 - 20MHz QPSK - 1RB - High Channel)

FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 52 of 164

NR Band n25/2 – Ant A

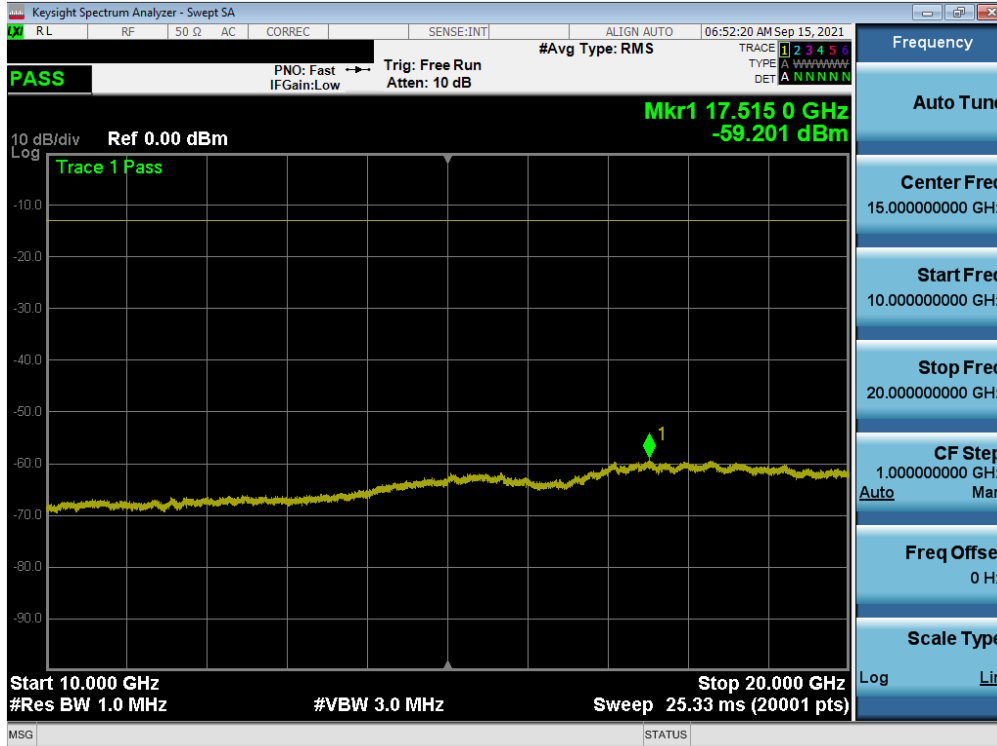


Plot 7-67. Conducted Spurious Plot (NR Band n25/2 -40.0MHz - 1RB - Low Channel - Ant A)

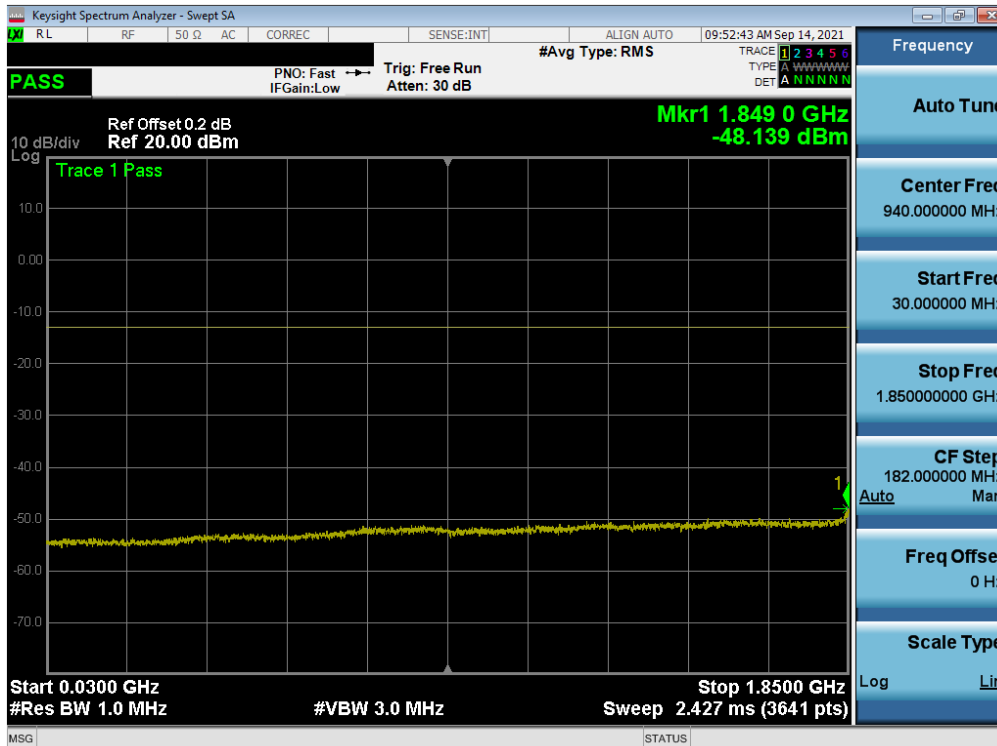


Plot 7-68. Conducted Spurious Plot (NR Band n25/2 - 40.0MHz - 1RB - Low Channel - Ant A)




FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 53 of 164

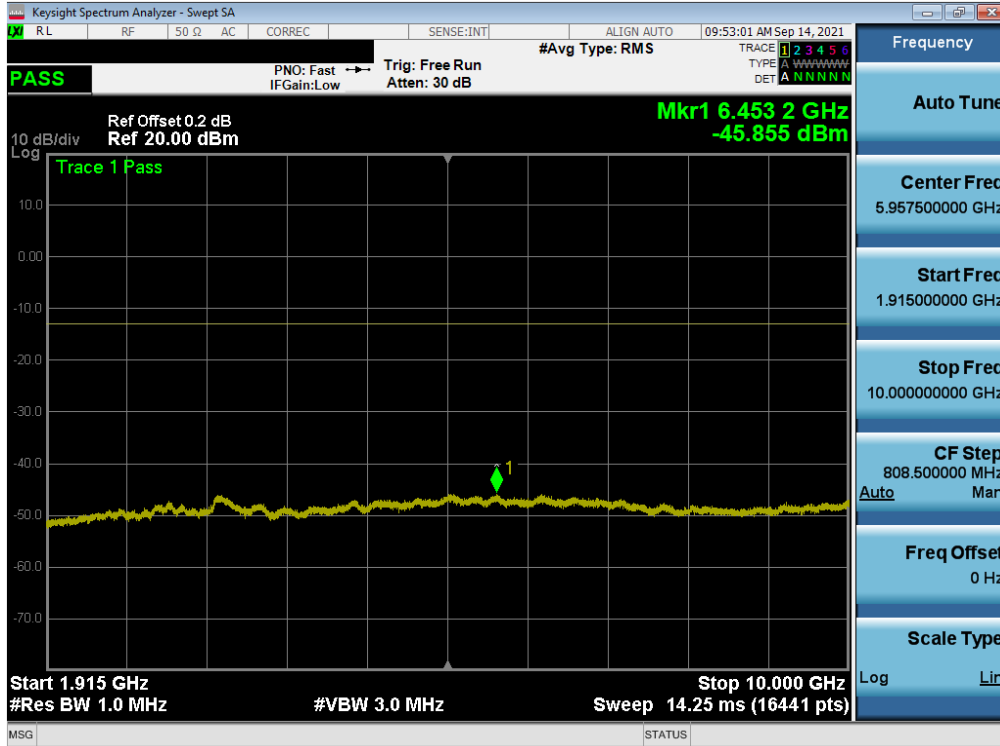


Plot 7-69. Conducted Spurious Plot (NR Band n25/2 - 40.0MHz - 1RB - Low Channel - Ant A)

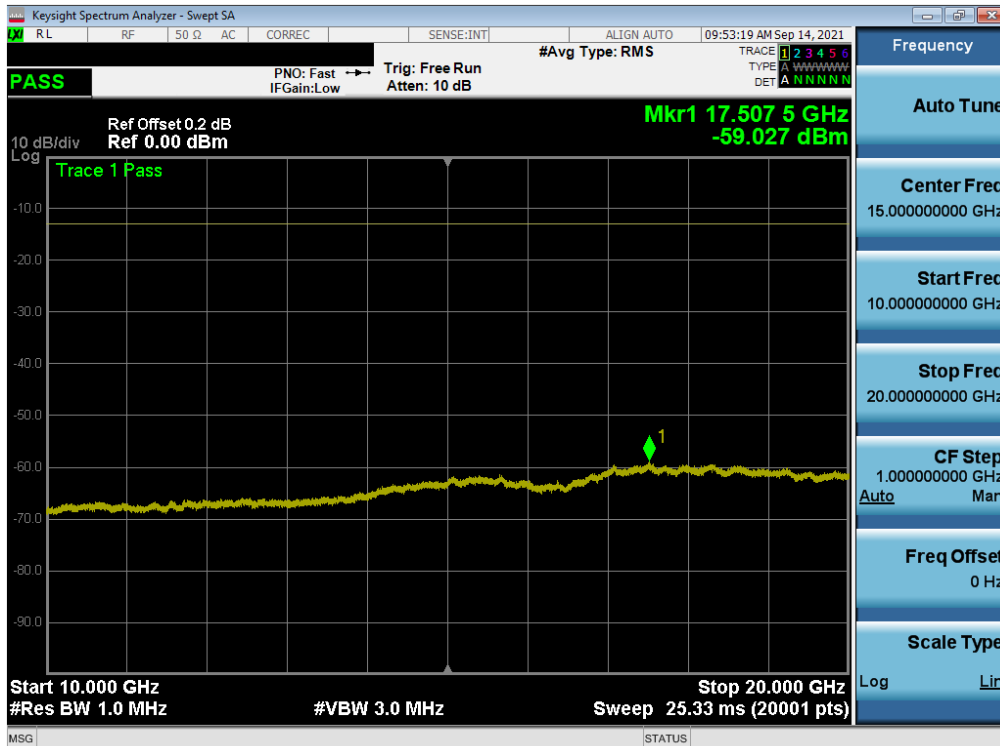


Plot 7-70. Conducted Spurious Plot (NR Band n25/2 - 40.0MHz - 1RB - Mid Channel - Ant A)




FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 54 of 164

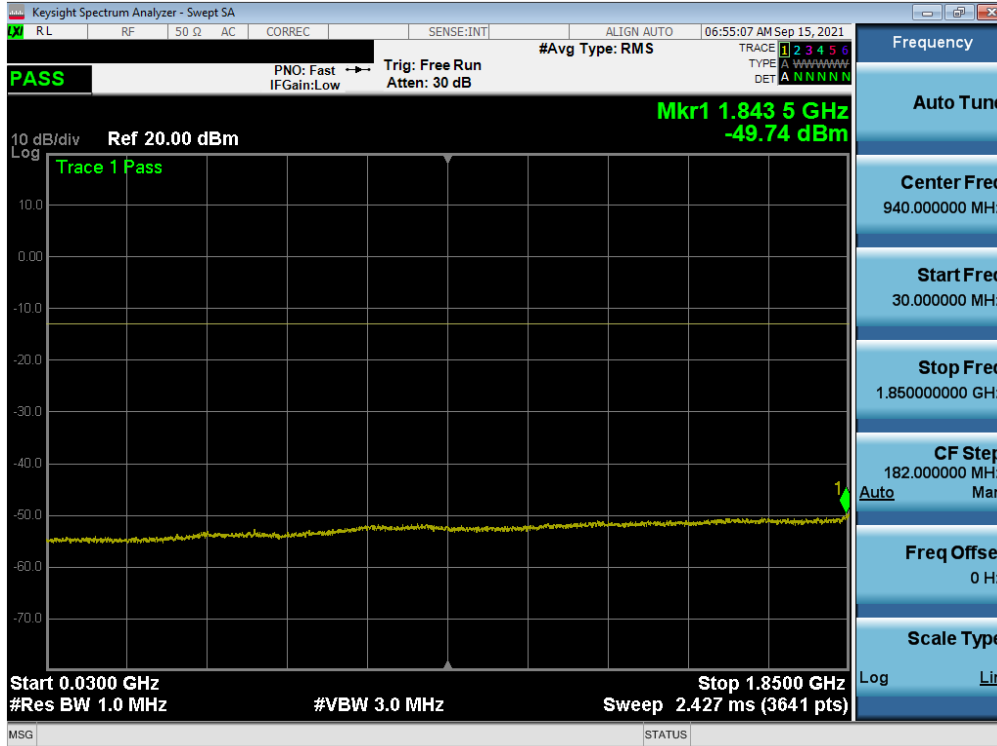


Plot 7-71. Conducted Spurious Plot (NR Band n25/2 - 40.0MHz - 1RB - Mid Channel - Ant A)

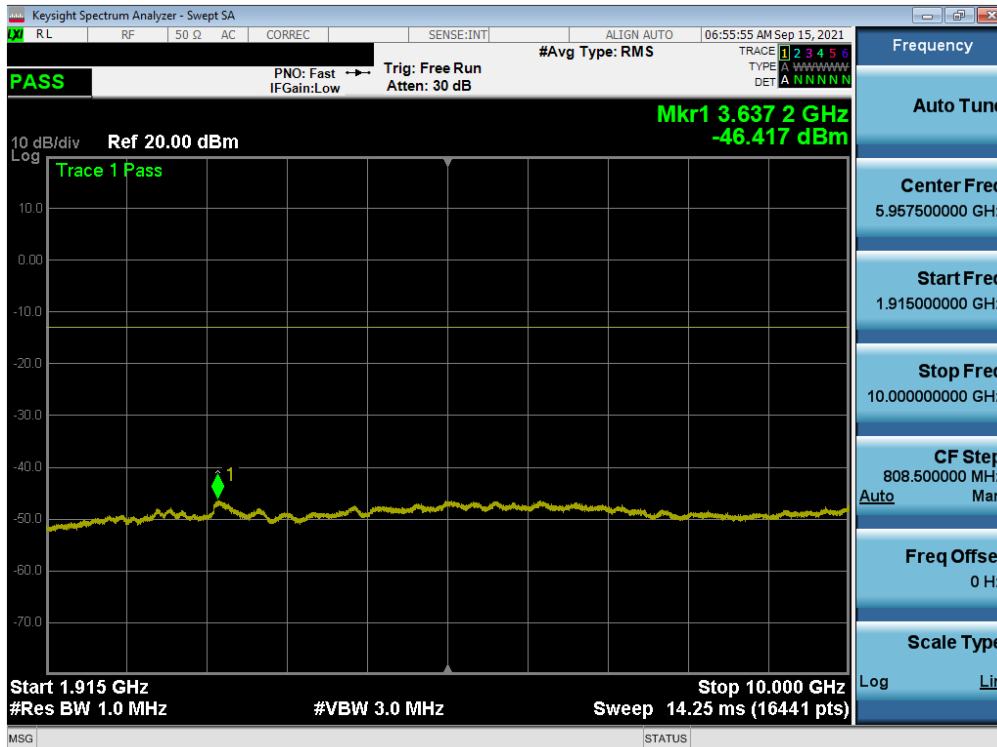


Plot 7-72. Conducted Spurious Plot (NR Band n25/2 - 40.0MHz - 1RB - Mid Channel - Ant A)




FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 55 of 164

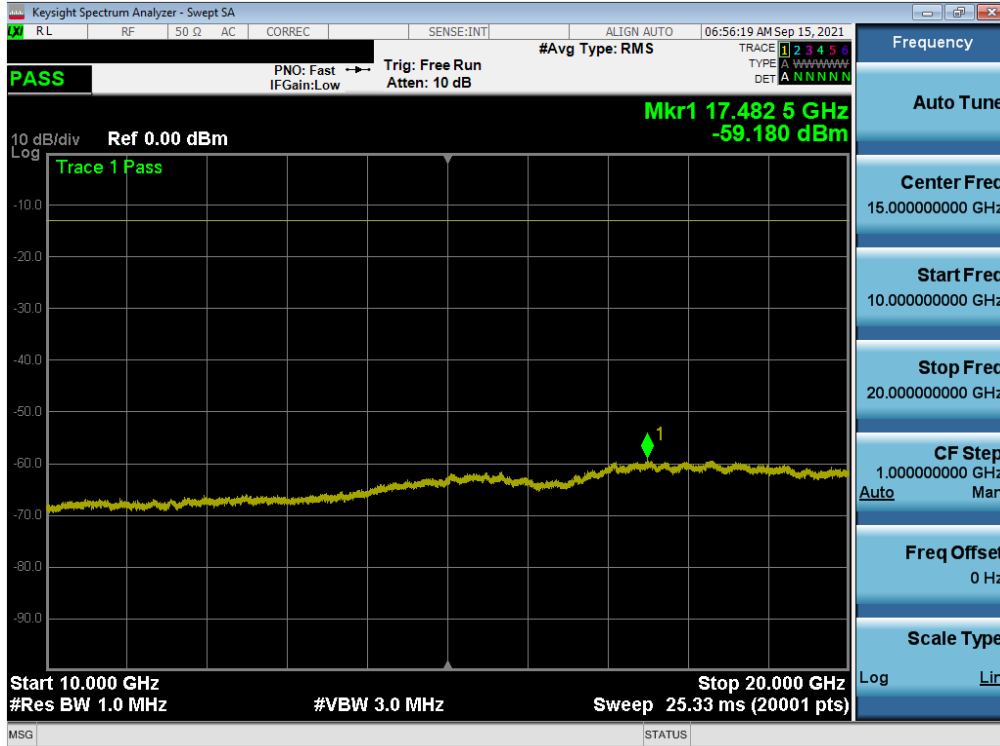


Plot 7-73. Conducted Spurious Plot (NR Band n25/2 - 40.0MHz - 1RB - High Channel - Ant A)






Plot 7-74. Conducted Spurious Plot (NR Band n25/2 - 40.0MHz - 1RB - High Channel - Ant A)

FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 56 of 164



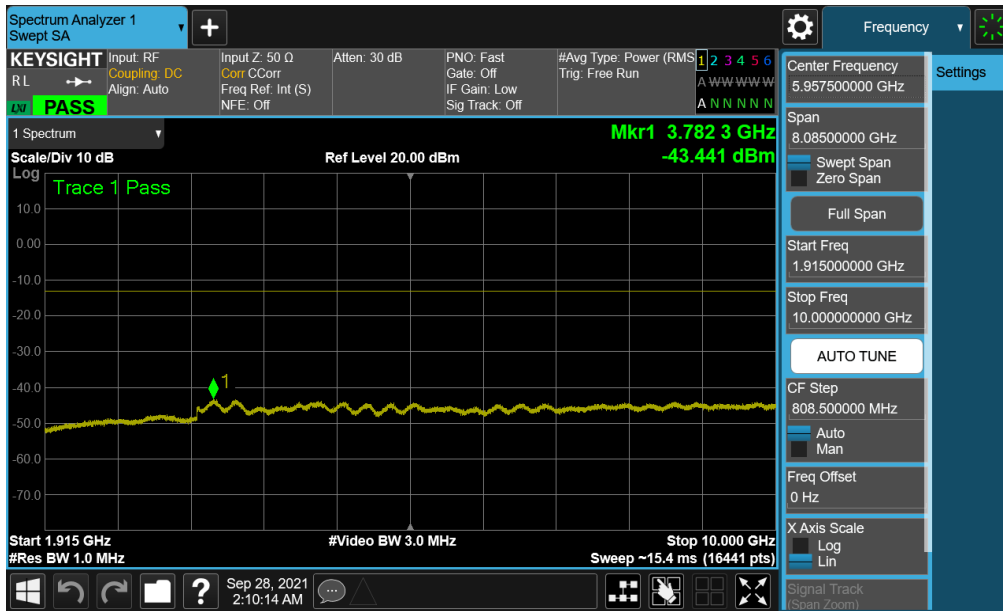
Plot 7-75. Conducted Spurious Plot (NR Band n25/2 - 40.0MHz - 1RB - High Channel - Ant A)

FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 57 of 164

NR Band n25/2 – Ant F

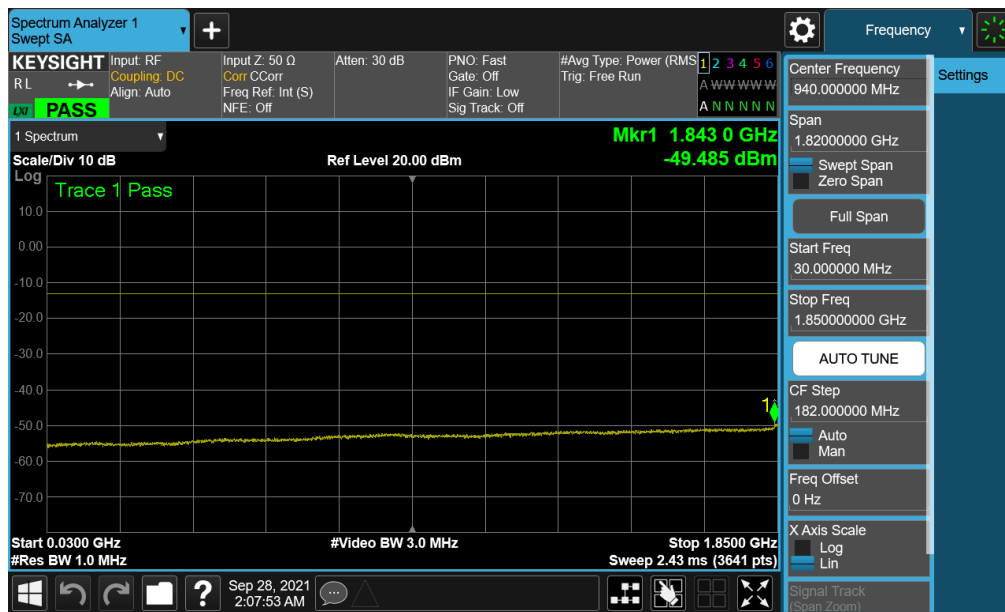
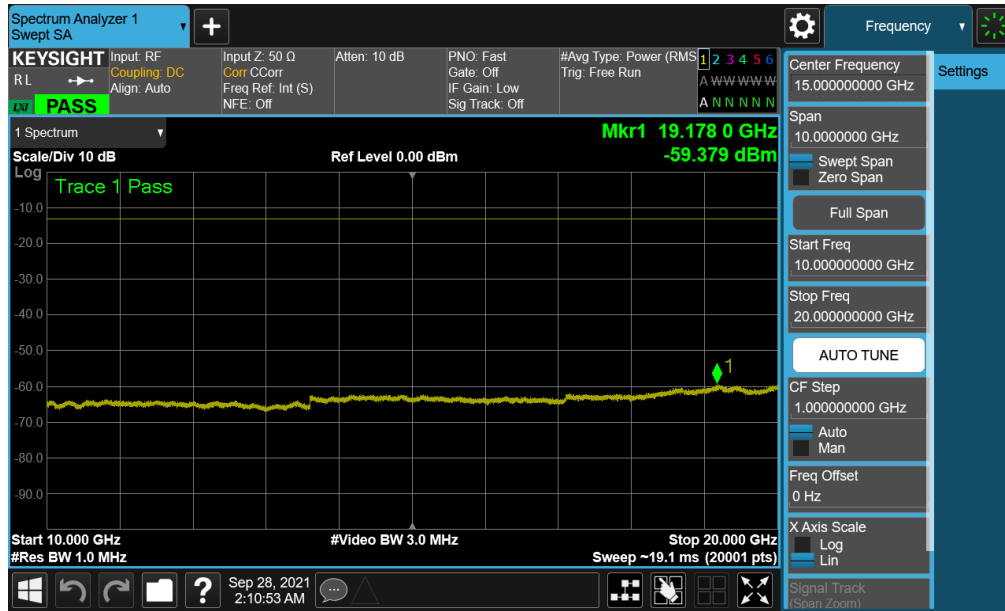


Plot 7-76. Conducted Spurious Plot (NR Band n25/2 -40.0MHz - 1RB - Low Channel - Ant F)

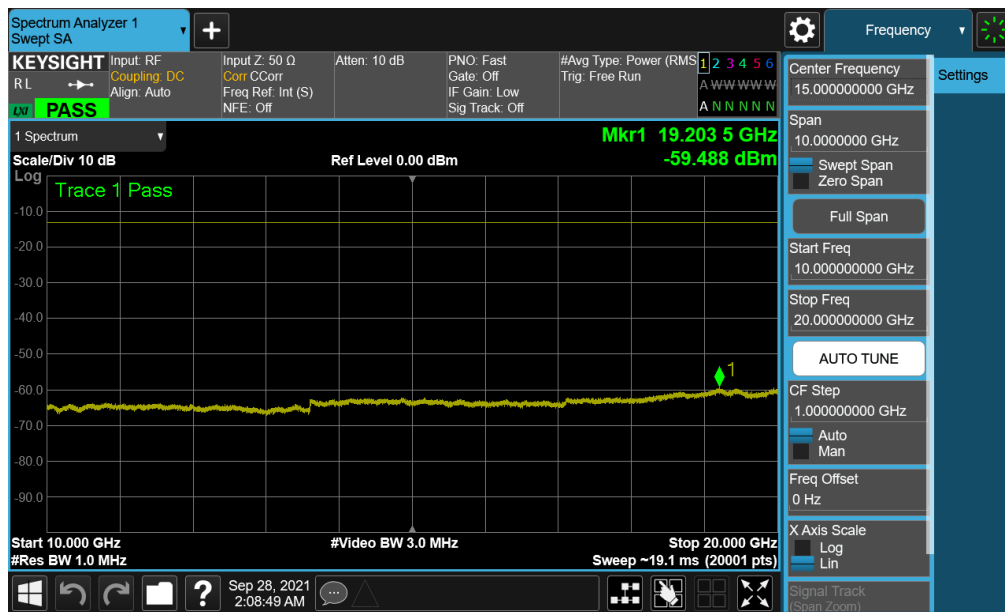
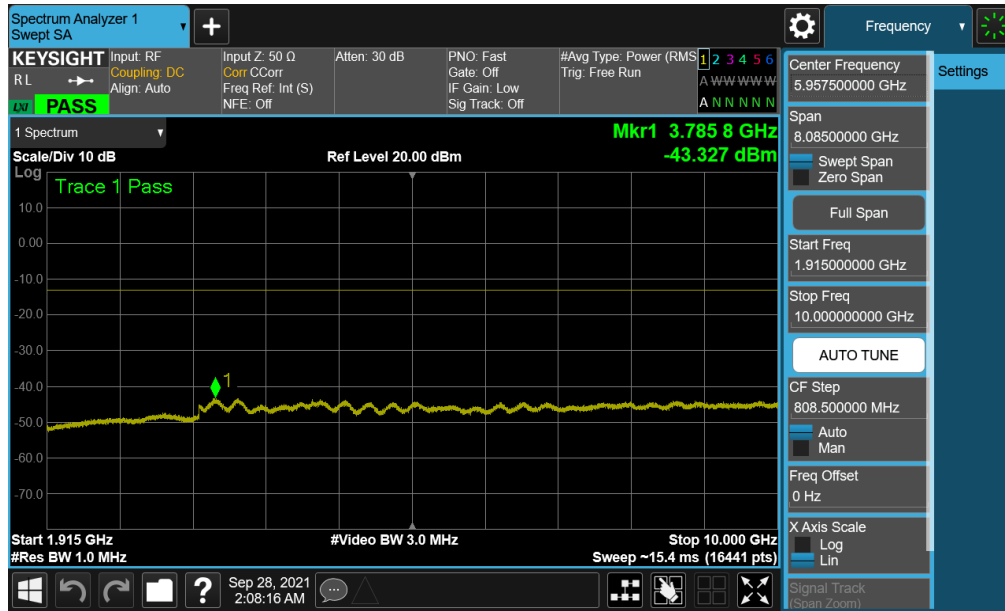


Plot 7-77. Conducted Spurious Plot (NR Band n25/2 - 40.0MHz - 1RB - Low Channel - Ant F)

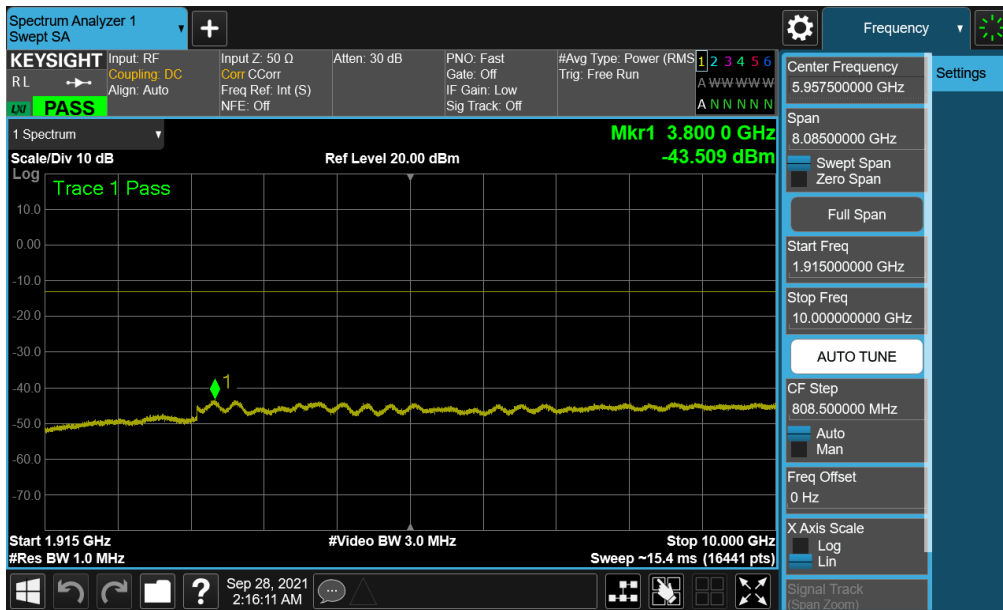
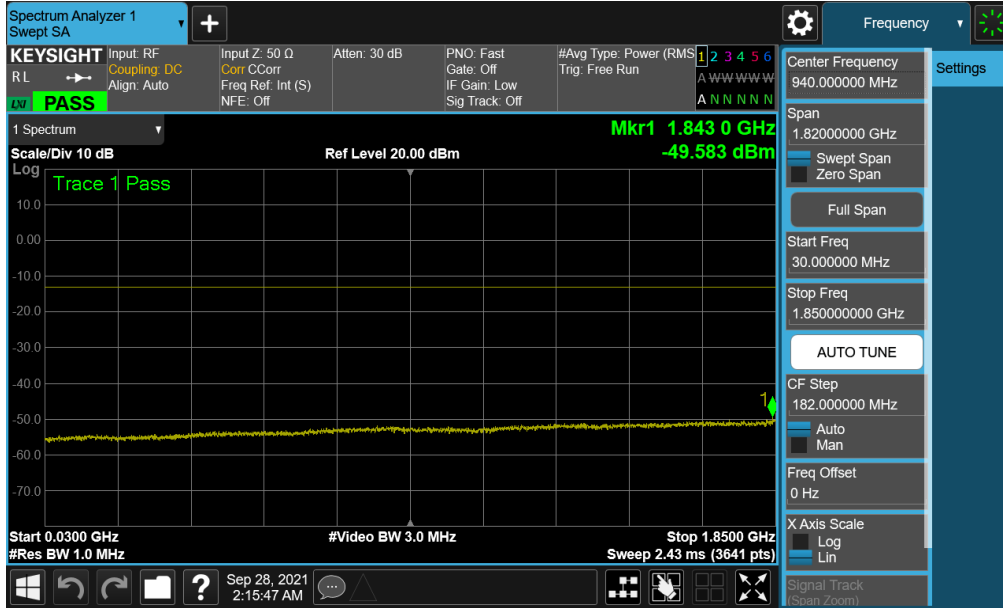
FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 58 of 164



FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 59 of 164



FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 60 of 164

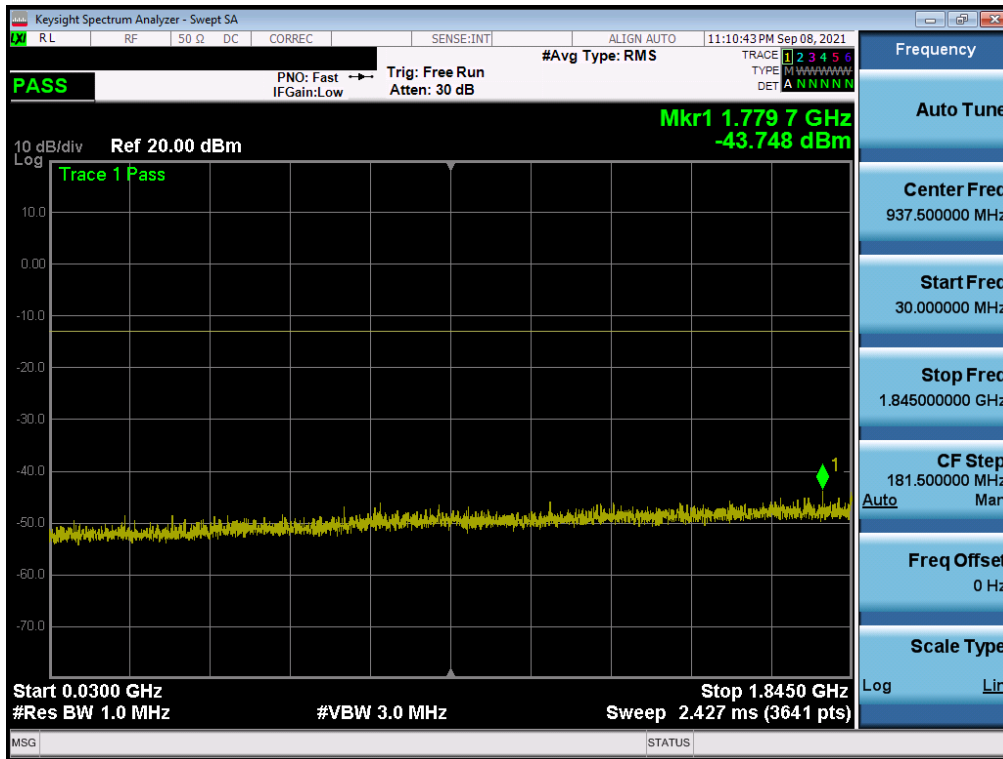


FCC ID: A3LSMS901U	PCTEST Proud to be part of element	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 61 of 164

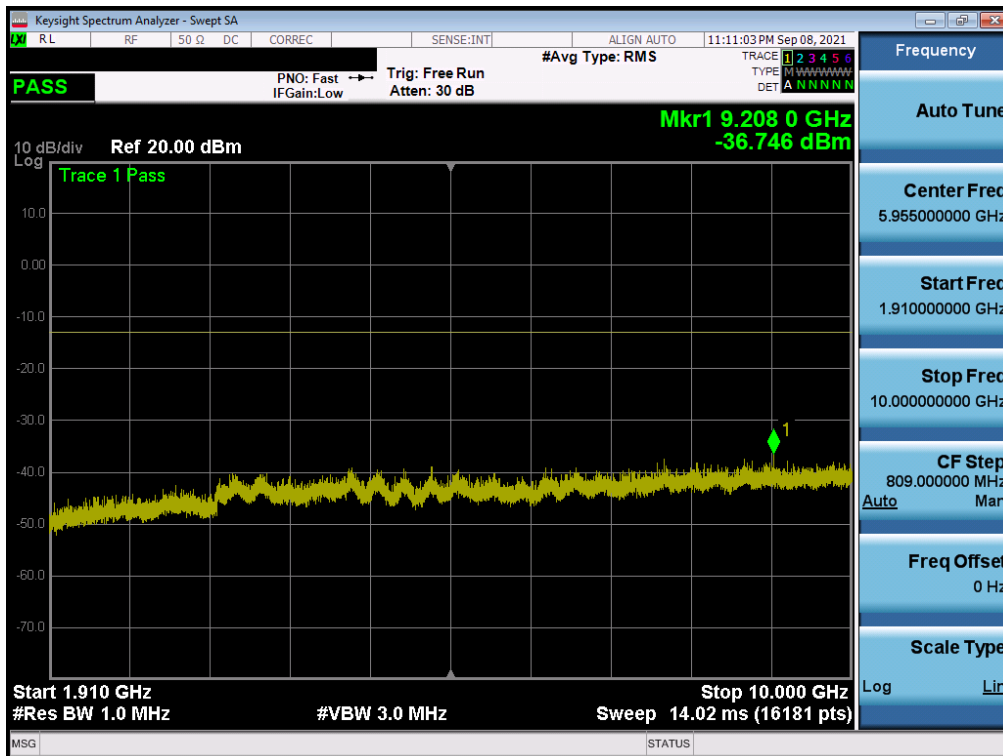


Plot 7-84. Conducted Spurious Plot (NR Band n25/2 - 40.0MHz - 1RB - High Channel - Ant F)




FCC ID: A3LSMS901U	PCTEST Proud to be part of Samsung	PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset	Page 62 of 164

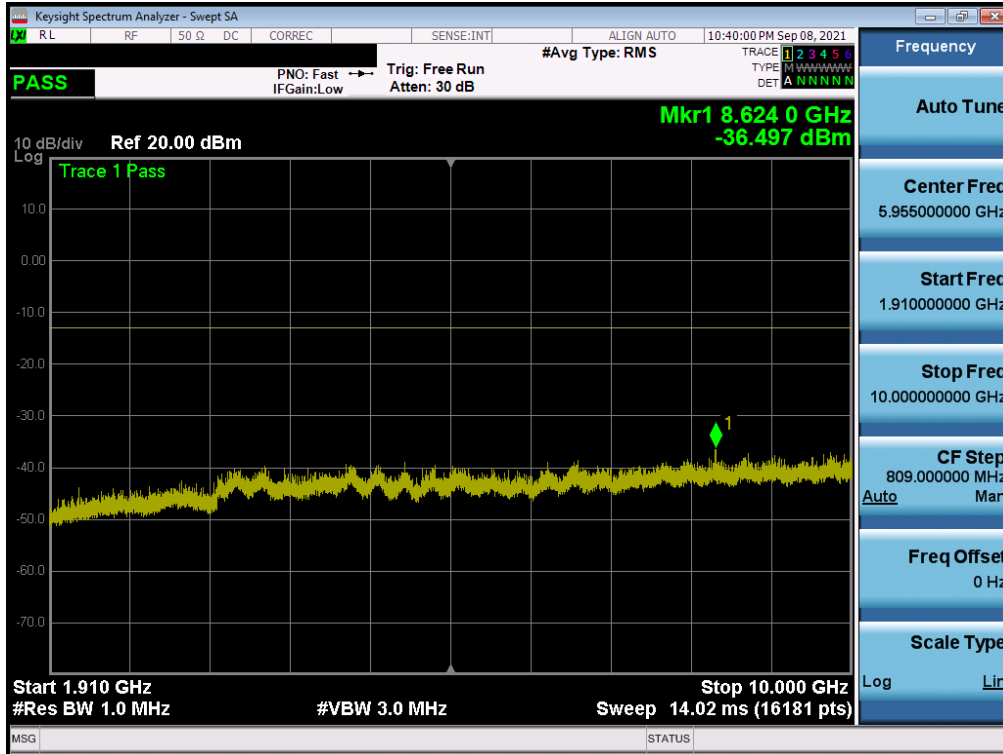


Plot 7-85. Conducted Spurious Plot (GPRS Ch. 512)

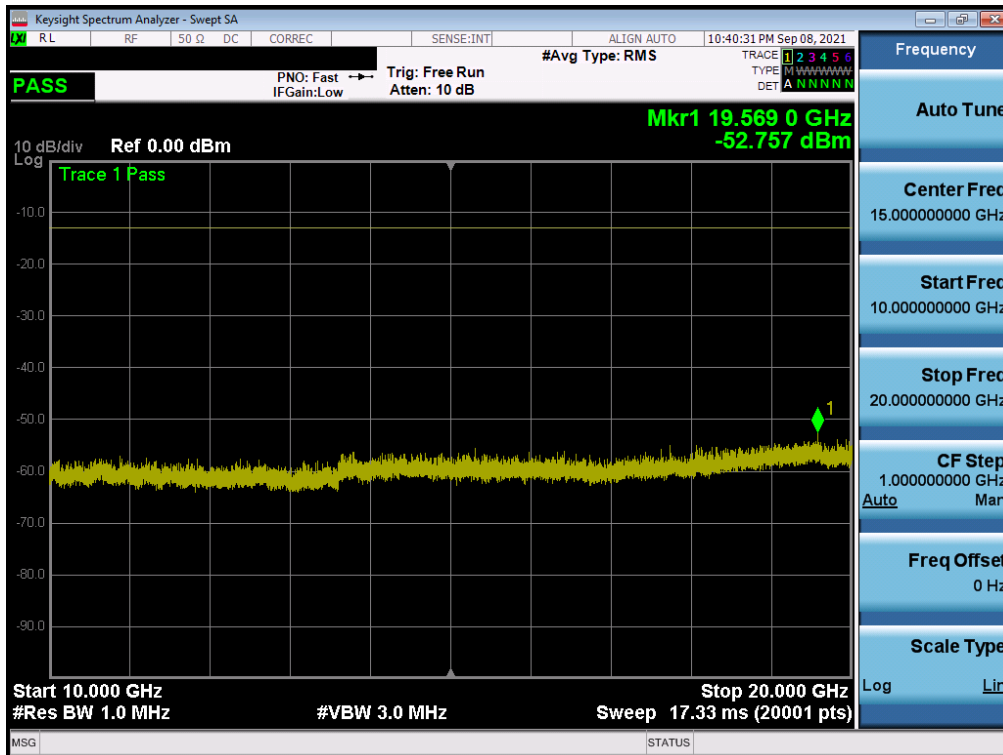


Plot 7-86. Conducted Spurious Plot (GPRS Ch. 512)




FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 63 of 164



Plot 7-89. Conducted Spurious Plot (GPRS Ch. 661)



Plot 7-90. Conducted Spurious Plot (GPRS Ch. 661)

FCC ID: A3LSMS901U	 PCTEST Proud to be part of 	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2109080099-03-R2.A3L	Test Dates: 9/8/2021 - 11/5/2021	EUT Type: Portable Handset		Page 65 of 164