

PCTEST

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PART 24 MEASUREMENT REPORT

Applicant Name:Samsung Electronics Co., Ltd.

129, Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, 16677, Korea Date of Testing:

04/01 - 06/02/2022

Test Report Issue Data:

06/30/2022

Test Site/Location:

PCTEST Lab. Yongin-Si, Gyeonggi-do, South Korea

Test Report Serial No.: 1M2204080051-03.A3L

FCC ID: A3LSMF721U

Applicant Name: Samsung Electronics Co., Ltd.

Application Type:CertificationModel:SM-F721UAdditional Model(s):SM-F721U1EUT Type:Portable Handset

FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)

FCC Rule Part: 24

Test Procedure(s): ANSI C63.26-2015, KDB 648474 D03 v01r04

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.





Prepared by

Reviewed by

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	ates: EUT Type:	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 1 of 201



TABLE OF CONTENTS

1.0	INTF	RODUCTION	5
	1.1	Scope	5
	1.2	PCTEST Test Location	5
	1.3	Test Facility / Accreditations	5
2.0	PRC	DDUCT 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	DES	SCRIPTION OF TESTS	7
	3.1	Evaluation Procedure	7
	3.2	Radiated Power and Radiated Spurious Emissions	7
4.0	MEA	ASUREMENT UNCERTAINTY	88
5.0	TES	T EQUIPMENT CALIBRATION DATA	g
6.0	SAM	IPLE CALCULATIONS	10
7.0		T RESULTS	
	7.1	Summary	11
	7.2	Conducted Output Power Data	12
	7.3	Occupied Bandwidth	15
	7.4	Spurious and Harmonic Emissions at Antenna Terminal	46
	7.5	Band Edge Emissions at Antenna Terminal	72
	7.6	Peak-Average Ratio	132
	7.7	Radiated Power (ERP/EIRP)	163
	7.8	Radiated Spurious Emissions Measurements	168
	7.9	Frequency Stability / Temperature Variation	196
8.0	CON	NCLUSION	201

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	st Dates: EUT Type:	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 2 of 201





PART 24 MEASUREMENT REPORT



		Ty Fraguency	EII	Emission	
Mode	Modulation	Tx Frequency Range [MHz]	Max. Power [W]	Max. Power [dBm]	Emission Designator
GSM/GPRS	GMSK	1850.2 - 1909.8	0.971	29.87	245KGXW
EDGE	8-PSK	1850.2 - 1909.8	0.303	24.81	251KG7W
WCDMA	Spread Spectrum	1852.4 - 1907.6	0.238	23.77	4M17F9W

			Tx Frequency	EII	RP	Emission
Mode	Bandwidth	Modulation	Range [MHz]	Max. Power [W]	Max. Power [dBm]	Designator
	20 MHz	QPSK	1860 - 1905	0.257	24.09	18M0G7D
		16QAM	1860 - 1905	0.215	23.31	18M1W7D
	15 MHz	QPSK	1857.5 - 1907.5	0.254	24.04	13M6G7D
	13 1011 12	16QAM	1857.5 - 1907.5	0.208	23.18	13M6W7D
	10 MHz	QPSK	1855 - 1910	0.256	24.08	9M04G7D
LTE Band 25/2	10 1011 12	16QAM	1855 - 1910	0.207	23.16	9M07W7D
LTL Danu 25/2	5 MHz	QPSK	1852.5 - 1912.5	0.261	24.16	4M56G7D
	O IVII IZ	16QAM	1852.5 - 1912.5	0.210	23.21	4M57W7D
	3 MHz	QPSK	1851.5 - 1913.5	0.257	24.10	2M72G7D
	O IVII IZ	16QAM	1851.5 - 1913.5	0.215	23.32	2M74W7D
	1.4 MHz	QPSK	1850.7 - 1914.3	0.262	24.17	1M11G7D
	1.7 1011 12	16QAM	1850.7 - 1914.3	0.216	23.34	1M11W7D
	40 MHz	π/2 BPSK	1870 - 1895	0.302	24.80	38M8G7D
		QPSK	1870 - 1895	0.310	24.91	38M7G7D
		16QAM	1870 - 1895	0.255	24.07	38M8W7D
NR Band n25		π/2 BPSK	1865 - 1900	0.311	24.93	28M8G7D
ANT A	30 MHz	QPSK	1865 - 1900	0.323	25.09	28M7G7D
ANTA		16QAM	1865 - 1900	0.272	24.35	28M8W7D
		π/2 BPSK	1862.5 - 1902.5	0.298	24.74	23M0G7D
	25 MHz	QPSK	1862.5 - 1902.5	0.310	24.92	23M9G7D
		16QAM	1862.5 - 1902.5	0.259	24.13	23M9W7D
		π/2 BPSK	1860 - 1905	0.278	24.45	18M1G7D
	20 MHz	QPSK	1860 - 1905	0.288	24.60	19M0G7D
		16QAM	1860 - 1905	0.254	24.05	19M0W7D
		π/2 BPSK	1857.5 - 1907.5	0.280	24.47	13M5G7D
	15 MHz	QPSK	1857.5 - 1907.5	0.291	24.64	14M2G7D
NR Band n25/2		16QAM	1857.5 - 1907.5	0.260	24.15	14M2W7D
ANT A		π/2 BPSK	1855 - 1910	0.268	24.27	9M03G7D
	10 MHz	QPSK	1855 - 1910	0.263	24.19	9M36G7D
		16QAM	1855 - 1910	0.234	23.68	9M36W7D
		π/2 BPSK	1852.5 - 1912.5	0.267	24.26	4M59G7D
	5 MHz	QPSK	1852.5 - 1912.5	0.272	24.35	4M53G7D
		16QAM	1852.5 - 1912.5	0.222	23.46	4M52W7D

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	Dates: EUT Type:	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 3 of 201



			T. F.	EI	RP	E
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	Max. Power [W]	Max. Power [dBm]	Emission Designator
		π/2 BPSK	1870 - 1895	0.155	21.89	38M8G7D
	40 MHz	QPSK	1870 - 1895	0.148	21.71	38M7G7D
		16QAM	1870 - 1895	0.122	20.86	38M8W7D
NR Band n25		π/2 BPSK	1865 - 1900	0.168	22.26	28M9G7D
ANT I	30 MHz	QPSK	1865 - 1900	0.161	22.07	28M7G7D
ANTI		16QAM	1865 - 1900	0.122	20.88	28M7W7D
		π/2 BPSK	1862.5 - 1902.5	0.177	22.48	23M0G7D
	25 MHz	QPSK	1862.5 - 1902.5	0.178	22.49	23M9G7D
		16QAM	1862.5 - 1902.5	0.127	21.05	23M8W7D
		π/2 BPSK	1860 - 1905	0.166	22.19	18M0G7D
	20 MHz	QPSK	1860 - 1905	0.161	22.06	19M0G7D
		16QAM	1860 - 1905	0.131	21.18	19M0W7D
		π/2 BPSK	1857.5 - 1907.5	0.172	22.36	13M5G7D
	15 MHz	QPSK	1857.5 - 1907.5	0.161	22.08	14M2G7D
NR Band n25/2		16QAM	1857.5 - 1907.5	0.127	21.02	14M2W7D
ANT I		π/2 BPSK	1855 - 1910	0.169	22.27	9M03G7D
	10 MHz	QPSK	1855 - 1910	0.159	22.02	9M36G7D
		16QAM	1855 - 1910	0.126	21.01	9M38W7D
		π/2 BPSK	1852.5 - 1912.5	0.168	22.25	4M59G7D
	5 MHz	QPSK	1852.5 - 1912.5	0.159	22.01	4M52G7D
		16QAM	1852.5 - 1912.5	0.130	21.13	4M52W7D

EUT Overview

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dags 4 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 4 of 201



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 Korea CO., LTD. facility located at 13, Heungdeok 1-ro, Giheung-gu, Yongin-si, Gyeonggi-do, 16954, South Korea. 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 2041.04 for Specific Absorption Rate (SAR), and Electromagnetic Compatibility (EMC) & Telecommunications 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 Korea facility is accredited, designated, and recognized in accordance with the provision of Radio Wave Act and International Standard ISO/IEC 17025:2017 under the National Radio Research Agency.
 - Designation Number / CABID: KR0169
 - Test Firm Registration Number of FCC: 417945
 - Test Firm Registration Number of ISED: 26168

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	Dates: EUT Type:	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 5 of 201

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V3.0 1/5/2022

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID:A3LSMF721U**. 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.: 0855M, 0915M, 0940M, 1100M

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (FR1), 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.

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.

This device supports two configurations: one is with screen open and one is with screen closed. Open, half opened and closed configurations are tested, and 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 F721UOYN0AVCD installed on the EUT.

2.5 EMI Suppression Device(s)/Modifications

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

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	st Dates: EUT Type:	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 6 of 201

2022 PCTEST

V3.0 1/5/2022
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DESCRIPTION OF TESTS

3.1 **Evaluation Procedure**

of contents thereof, please contact INFO@PCTEST.COM.

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/TIA-603-E-2016, A halfwave 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:

Pd [dBm] = Pg [dBm] - cable loss [dB] + antenna gain [dBd/dBi];

where Pd is the dipole equivalent power, Pg 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 Pg [dBm] - 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[dBuV/m] = Measured amplitude level[dBm] + 107 + Cable Loss[dB] + Antenna Factor[dB/m] $EIRP_{[dBm]} = E_{[dB\mu V/m]} + 20logD - 104.8$; where D is the measurement distance in meters.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01 v01r01.

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

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	ates: EUT Type:	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 7 of 201

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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_{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 (±dB)
Conducted Bench Top Measurements	1.20
Radiated Disturbance (<1GHz)	3.01
Radiated Disturbance (>1GHz)	5.56
Radiated Disturbance (>18GHz)	3.16

FCC ID: A3LSMF721U		PART 24 MEASUREMENT REPORT					
Test Report S/N:	Test Dates:	EUT Type:	Dogo 9 of 201				
1M2204080051-03.A3L	04/01 - 06/02/2022	Page 8 of 201					



TEST EQUIPMENT CALIBRATION DATA 5.0

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	N9030A	PXA Signal Analyzer	2021-07-06	Annual	2022-07-05	MY49432391
Anritsu	S820E	Cable and Antenna Analyzer	2021-07-07	Annual	2022-07-06	6201300731
Anritsu	MA24106A	USB Power Sensor	2021-07-07	Annual	2022-07-06	1244512
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	2020-10-29	Biennial	2022-10-28	10160045
Com-Power	PAM-118A	Preamplifier	2021-07-07	Annual	2022-07-06	551042
Espec	SH-242	Environmental Chamber	2021-09-15	Annual	2022-09-14	93011064
Fairview Microwave	FM2CP1122-10	Coupler	2021-07-07	Annual	2022-07-06	1946
Keysight Technologies	N9030B	MXA Signal Analyzer	2022-05-10	Annual	2023-05-19	MY57142018
Mini Circuits	ZUDC10-83-S+	Coupler	2021-09-15	Annual	2022-09-14	2111
Mini-Circuits	BW-N10W5+	Attenuator	2021-07-06	Annual	2022-07-05	1607
Mini-Circuits	BW-N10W5+	Attenuator	2021-07-06	Annual	2022-07-05	1607
Rohde & Schwarz	TS-PR18	Preamplifier	2021-07-08	Annual	2022-07-07	102141
Rohde & Schwarz	SMBV100B	Signal Generator	2021-11-04	Annual	2022-11-03	101568
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	2021-07-06	Annual	2022-07-05	116851
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	2022-02-18	Annual	2023-02-17	131453
Rohde & Schwarz	ESW	EMI Test Receiver	2021-07-06	Annual	2022-07-05	101761
Rohde & Schwarz	FSW43	Signal & Spectrum Analyzer	2021-09-15	Annual	2022-09-14	101250
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2022-02-18	Annual	2023-02-17	102131
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2022-03-28	Annual	2023-03-27	102151
Schwarzbeck	VULB9162	Broadband TRILOG Antenna	2021-07-13	Biennial	2023-07-12	9162-217
Schwarzbeck	UHA9105	Dipole Antenna	2020-07-09	Biennial	2022-07-08	91052522
Sunol	DRH-118	Horn Antenna	2021-07-14	Biennial	2023-07-13	A102416-1
Sunol	DRH-118	Horn Antenna	2021-01-12	Biennial	2023-01-11	A060215

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.

FCC ID: A3LSMF721U		PART 24 MEASUREMENT REPORT	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dogo 0 of 201	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 9 of 201	



SAMPLE CALCULATIONS 6.0

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 kHzG = 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 MHzW = 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: A3LSMF721U		PART 24 MEASUREMENT REPORT				
Test Report S/N:	Test Dates:	EUT Type:	Page 10 of 201			
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 10 01 201			

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TEST RESULTS

7.1 **Summary**

Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LSMF721U

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)	RSS Section(s)	Test Limit	Test Result	Reference
B	Transmitter Conducted Output Power*	2.1046(a), 2.1046(c)	RSS-Gen(6.12)	N/A	PASS	Section 7.2
	Occupied Bandwidth	2.1049(h)	RSS-Gen(6.7)	N/A	PASS	Section 7.3
CONDUCTED	Conducted Band Edge / Spurious Emissions	2.1051, 24.238(a)	RSS-Gen(6.13), RSS-133(6.5)	> 43 + 10log10(P[Watts]) at Band Edge and for all out-of- band emissions	PASS	Sections 7.4, 7.5
8	Peak-to-Average Ratio	24.232(d)	RSS-133(6.4)	≤ 13 dB	PASS	Section 7.6
	Frequency Stability	2.1055, 24.235	RSS-Gen(6.11), RSS-133(6.3)	Fundamental emissions stay within authorized frequency block "Carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm	PASS	Section 7.9
RADIATED	Equivalent Isotropic Radiated Power	24.232(c)	RSS-Gen(6.12), RSS-133(6.4)	< 2 Watts max. EIRP	PASS	Section 7.7
RADI	Radiated Spurious Emissions	2.1053, 24.238(a)	RSS-Gen(6.13), RSS-133(6.5)	≥ 43 + 10 log (P[Watts]) dB of attenuation below transmitter power "Spurious emissions from receivers shall not exceed the limits detailed in RSS-Gen(7.3)	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.

FCC ID: A3LSMF721U		PART 24 MEASUREMENT REPORT	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dogo 11 of 201	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 11 of 201	



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 worstcase configuration results are reported in this section.

Test Procedure Used

ANSI C63.26-2015 - Section 5.2

Test Settings

- 1. Span = $2 \times OBW$ to $3 \times OBW$
- 2. Detector = RMS
- 3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
- 4. Sweep time = auto couple
- The trace was allowed to stabilize
- 6. Please see test notes below for RBW and VBW settings

Test Setup

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



Figure 7-1. Test Instrument & Measurement Setup

Test Notes

- 1. Conducted power measurements were evaluated using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device.
- 2. All other conducted power measurements are contained in the RF exposure report for this filing.

FCC ID: A3LSMF721U		PART 24 MEASUREMENT REPORT	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Page 12 of 201	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 12 01 201	



			[MHz]	Size/Offset	Conducted Power [dBm]	
		374000	1870.0	1 / 161	23.71	
	Π/2 BPSK	376500	1882.5	216 / 0	23.67	
		379000	1895.0	1 / 108	24.25	
40 MHz		374000	1870.0	1 / 108	23.80	
	QPSK	376500	1882.5	216 / 0	23.72	
	İ	379000	1895.0	1 / 108	24.30	
	16-QAM	374000	1870.0	1 / 161	23.91	
		372000	1865.0	1 / 119	24.14	
	π/2 BPSK	376500	1882.5	1 / 80	24.36	
		381000	1900.0	1 / 119	24.35	
30 MHz		372000	1865.0	1 / 119	24.11	
	QPSK	376500	1882.5	1 / 119	24.31	
		381000	1900.0	1 / 80	24.15	
	16-QAM	376500	1882.5	1 / 80	23.97	
		372000	1862.5	1 / 99	24.39	
	π/2 BPSK	376500	1882.5	1 / 99	24.48	
		381000	1902.5	1 / 66	24.44	
25 MHz		372000	1862.5	1 / 99	24.38	
	QPSK	376500	1882.5	1 / 99	24.49	
	· · ·	381000	1902.5	1 / 33	24.44	
	16-QAM	372000	1862.5	1 / 99	24.33	
	15 😅	372000	1860.0	1 / 26	24.10	
	π/2 BPSK	376500	1882.5	1 / 26	24.29	
		381000	1905.0	1 / 26	24.49	
20 MHz		372000	1860.0	1 / 53	24.11	
	QPSK	376500	1882.5	1 / 79	24.30	
	3 5	381000	1905.0	1 / 53	24.42	
	16-QAM	381000	1905.0	1 / 53	24.18	
	10 4	371500	1857.5	1 / 20	24.26	
	π/2 BPSK	376500	1882.5	1 / 58	24.46	
		381500	1907.5	79 / 0	24.28	
15 MHz		371500	1857.5	1 / 58	24.37	
	QPSK	376500	1882.5	1 / 39	24.31	
		381500	1907.5	1 / 20	24.44	
	16-QAM	381500	1907.5	1 / 20	24.02	
		371000	1855.0	1 / 26	24.26	
	π/2 BPSK	376500	1882.5	1 / 26	24.37	
		382000	1910.0	1 / 26	24.34	
10 MHz		371000	1855.0	1 / 26	24.31	
	QPSK	376500	1882.5	1 / 26	24.25	
		382000	1910.0	1 / 38	24.14	
	16-QAM	382000	1910.0	1 / 13	24.01	
		370500	1852.5	1 / 18	24.11	
	π/2 BPSK	376500	1882.5	1 / 12	24.34	
		382500	1912.5	1 / 18	24.17	
5 MHz		370500	1852.5	1 / 18	24.10	
	QPSK	376500	1882.5	1 / 18	24.24	
	-	382500	1912.5	1 / 12	24.17	
	16-QAM	382500	1912.5	1 / 12	24.13	

Table 7-2. Conducted Max Powers (NR Band n25/2 - Ant I)

FCC ID: A3LSMF721U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dogg 12 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Page 13 of 201	



EN-DC configuration

	NR (SCS 15kHz)								LTE			NR	LTE	EN-DC
NR Band	NR Bandwidth [MHz]	NR Channel	NR Frequency [MHz]	Mod.	NR RB#/Offset	LTE Band	LTE Bandwidth [MHz]	LTE Channel	LTE Frequency [MHz]	Mod.	LTE RB#/Offset	Conducted Power [dBm]	Conducted 1 Power [dBm]	Total Tx. Power [dBm]
				QPSK	100/0					QPSK	50/0	17.90	23.20	24.32
				QPSK	100/0					QPSK	1/25	17.40	23.10	24.14
n25/2	20	Mid	1882.5	QPSK	1/53	B12	10	Mid	707.5	QPSK	50/0	9.30	23.20	23.37
				QPSK	1/53					QPSK	1/25	9.30	23.10	23.28
				16Q	100/0					16Q	50/0	19.60	22.20	24.10

Table 7-3. Conducted Max Powers (EN-DC Combo n25/2 - B12)

	NR (SCS 15kHz)									NR	LTE	EN-DC		
NR Band	NR Bandwidth [MHz]	NR Channel	NR Frequency [MHz]	Mod.	NR RB#/Offset	LTE Band	LTE Bandwidth [MHz]	LTE Channel	LTE Frequency [MHz]	Mod.	LTE RB#/Offset	Conducted Power [dBm]	Conducted Power [dBm]	Total Tx. Power [dBm]
				QPSK	100/0					QPSK	100/0	22.35	21.49	24.95
				QPSK	100/0					QPSK	1/50	22.54	21.81	25.20
n25/2	20	Mid	1882.5	QPSK	1/53	B66	20	Mid	1745	QPSK	100/0	22.39	21.38	24.92
				QPSK	1/53					QPSK	1/50	22.55	21.71	25.16
				16Q	1/53					16Q	1/50	21.81	21.35	24.60

Table 7-4. Conducted Max Powers (EN-DC Combo n25/2 - B66)

	NR (SCS 15kHz)									NR	LTE	EN-DC		
NR Band	NR Bandwidth [MHz]	NR Channel	NR Frequency [MHz]	Mod.	NR RB#/Offset	LTE Band	LTE Bandwidth [MHz]	LTE Channel	LTE Frequency [MHz]	Mod.	LTE RB#/Offset	Conducted Power [dBm]	Conducted Power [dBm]	Total Tx. Power [dBm]
		20 Mid		QPSK	100/0	1/53 B48 1/53	20	Mid	3625	QPSK	100/0	22.50	22.30	25.41
				QPSK	100/0					QPSK	1/50	22.50	23.20	25.87
n25/2	20		1882.5	QPSK	1/53					QPSK	100/0	23.40	22.20	25.85
				QPSK	1/53					QPSK	1/50	22.50	23.20	25.87
				16Q	100/0					16Q	1/50	21.60	22.50	25.08

Table 7-5. Conducted Max Powers (EN-DC n25/2 - B48)

	NR (SCS 15kHz)						LTE					NR	LTE	EN-DC
NR Band	NR Bandwidth [MHz]	NR Channel	NR Frequency [MHz]	Mod.	NR RB#/Offset	LTE Band	LTE Bandwidth [MHz]	LTE Channel	LTE Frequency [MHz]	Mod.	LTE RB#/Offset	Conducted Power [dBm]	Conducted Power [dBm]	Total Tx. Power [dBm]
		Mid		QPSK	QPSK 100/0		B5 10	Mid	836.5	QPSK	50/0	18.27	22.29	23.74
				QPSK	100/0					QPSK	1/25	18.46	22.15	23.70
n2	20		1880	QPSK	1/53	B5				QPSK	50/0	18.09	22.23	23.65
				QPSK	1/53					QPSK	1/25	18.44	22.08	23.64
				16Q	100/0	1				16Q	50/0	20.05	21.11	23.62

Table 7-6. Conducted Max Powers (EN-DC n2 - B5)

	NR (SCS 15kHz)				,	LTE					,	NR	LTE	EN-DC
NR Band	NR Bandwidth [MHz]	NR Channel	NR Frequency [MHz]	Mod.	NR RB#/Offset	LTE Band	LTE Bandwidth [MHz]	LTE Channel	LTE Frequency [MHz]	Mod.	LTE RB#/Offset	Conducted Power [dBm]	Conducted Power [dBm]	Total Tx. Power [dBm]
				QPSK	100/0	B30	10	Mid	2310	QPSK	50/0	22.48	20.84	24.75
		Mid	Mid 1880	QPSK	100/0					QPSK	1/25	22.39	22.19	25.30
n2	20			QPSK	1/53					QPSK	50/0	22.57	20.78	24.78
				QPSK	1/53					QPSK	1/25	22.63	22.07	25.37
				16Q	1/53					16Q	1/25	22.26	22.01	25.15

Table 7-7. Conducted Max Powers (EN-DC n2 – B30)

FCC ID: A3LSMF721U		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Page 14 of 201	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset		



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 ≥ 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.

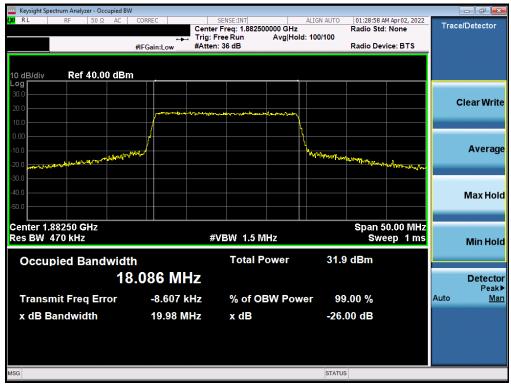
FCC ID: A3LSMF721U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Page 15 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 15 01 201



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)

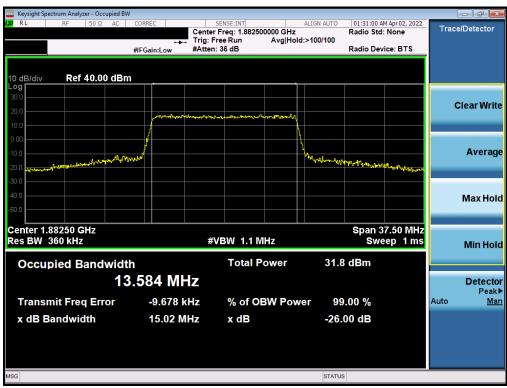
FCC ID: A3LSMF721U	·	PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 16 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 16 of 201

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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: A3LSMF721U		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Page 17 of 201	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset		

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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: A3LSMF721U		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dags 10 of 201	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 18 of 201	

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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: A3LSMF721U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dogg 10 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 19 of 201

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

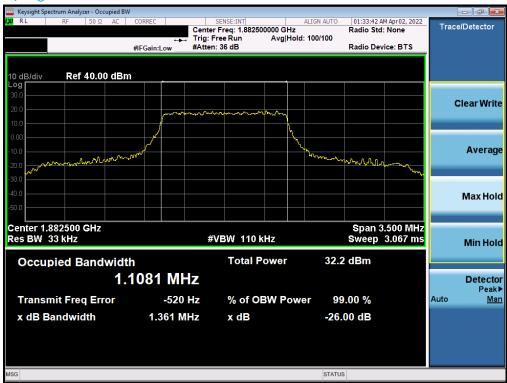


Plot 7-10. Occupied Bandwidth Plot (LTE Band 25/2 - 3MHz 16-QAM - Full RB)

FCC ID: A3LSMF721U		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dags 20 of 201	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 20 of 201	

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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: A3LSMF721U		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dags 04 of 004	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 21 of 201	

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NR Band n25 - Ant A



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



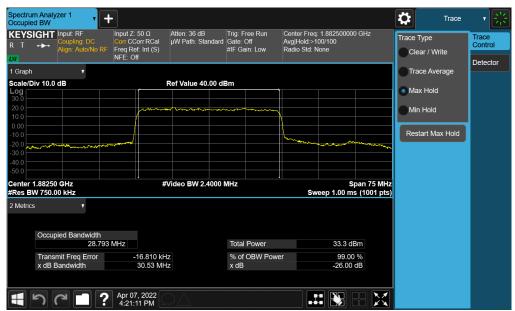
Plot 7-14. Occupied Bandwidth Plot (NR Band n25 - 40.0MHz CP-OFDM QPSK - Full RB)

FCC ID: A3LSMF721U		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dogo 22 of 201	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 22 of 201	





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



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

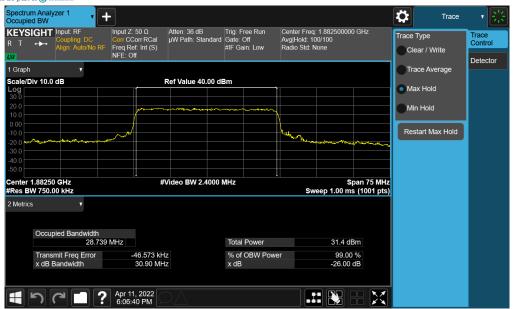
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Test Report S/N:	Test Dates:	EUT Type:	Dogo 22 of 201	
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 23 of 201	

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V3.0 1/5/2022

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



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

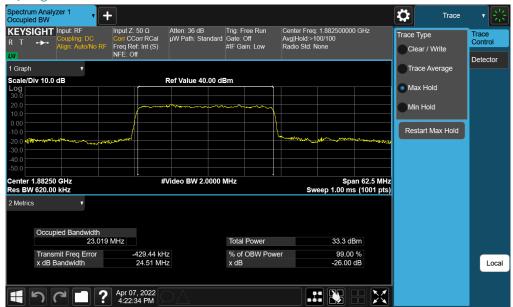
FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 24 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 24 01 201

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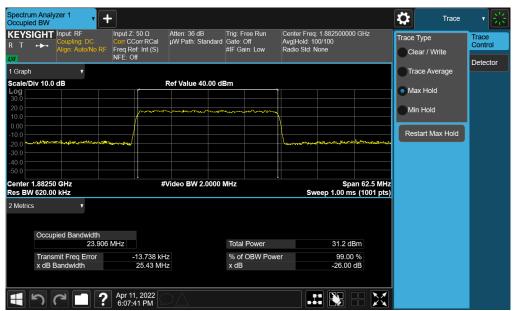
V3.0 1/5/2022

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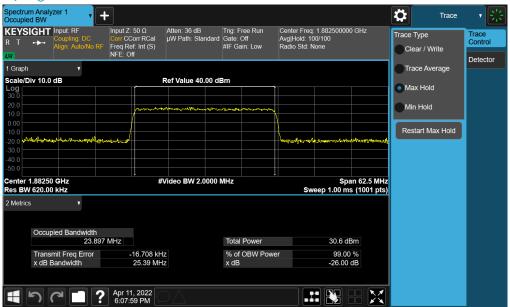
Plot 7-19. Occupied Bandwidth Plot (NR Band n25 - 25.0MHz DFT-s-OFDM BPSK - Full RB)



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

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 25 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 25 of 201





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

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dago 26 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 26 of 201

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NR Band n25/2 - Ant A



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



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

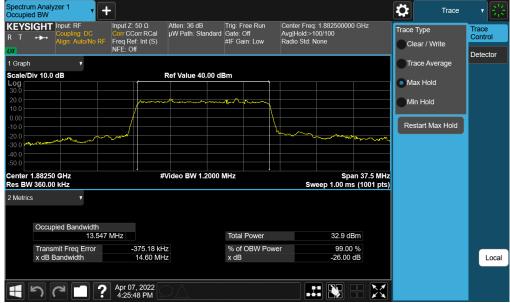
FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 27 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 27 01 201

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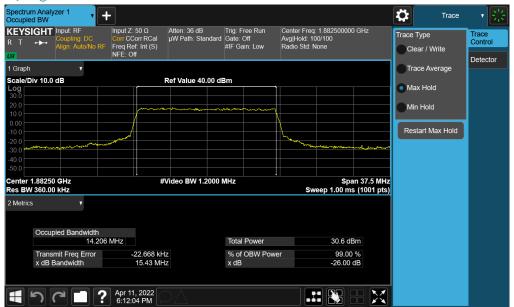
Plot 7-24. Occupied Bandwidth Plot (NR Band n25/2 - 20.0MHz CP-OFDM 16QAM - Full RB)



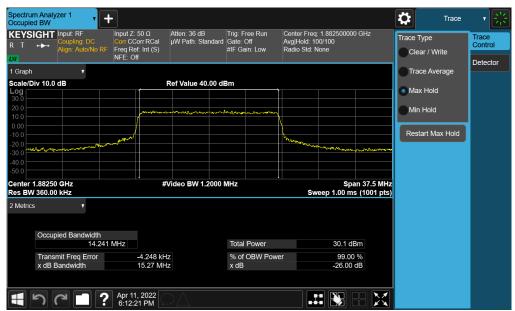
Plot 7-25. Occupied Bandwidth Plot (NR Band n25/2 - 15.0MHz DFT-s-OFDM BPSK - Full RB)

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 29 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 28 of 201





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



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

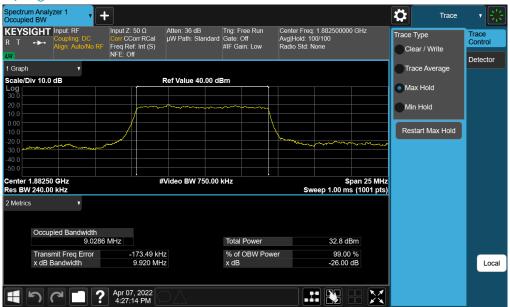
FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 29 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Fage 29 01 201

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V3.0 1/5/2022

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



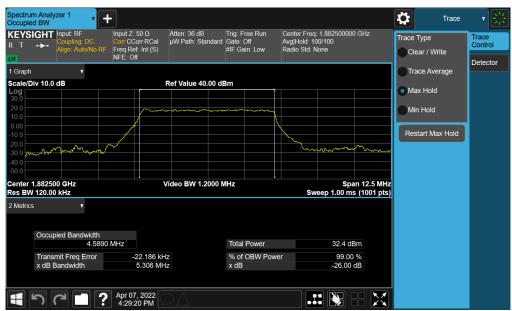
Plot 7-29. Occupied Bandwidth Plot (NR Band n25/2 - 10.0MHz CP-OFDM QPSK - Full RB)

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 30 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	





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



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

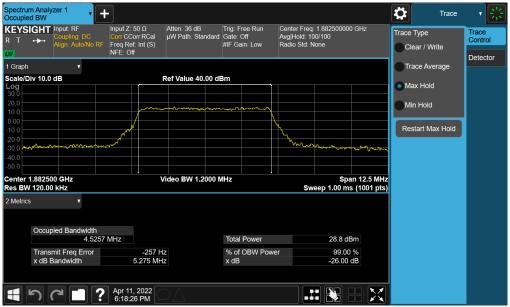
FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 31 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 31 01 201

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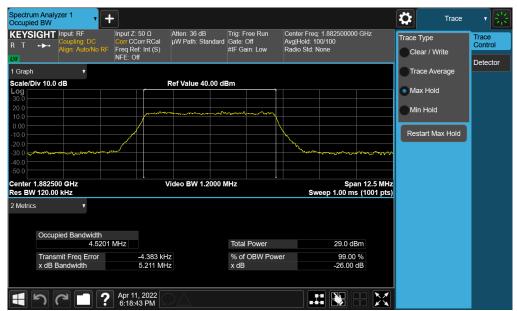
V3.0 1/5/2022

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



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

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 22 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 32 of 201

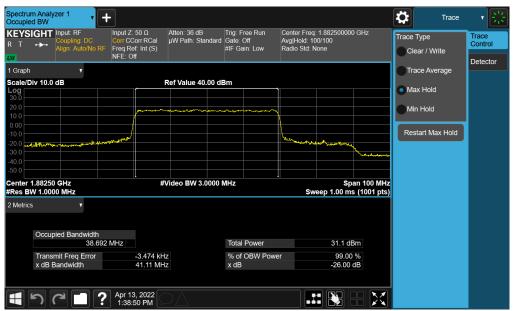
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Plot 7-34. Occupied Bandwidth Plot (NR Band n25 - 40.0MHz DFT-s-OFDM BPSK - Full RB)



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

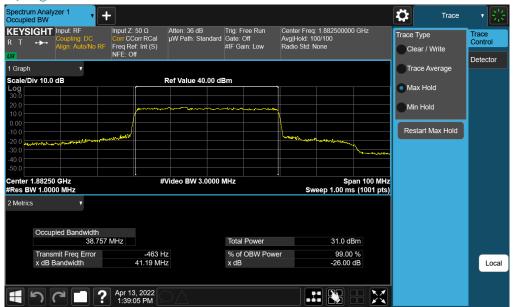
FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 33 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Fage 33 01 201

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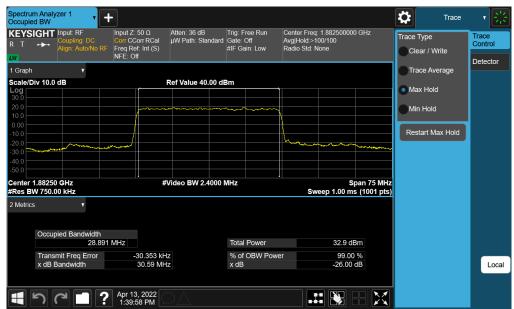
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Plot 7-36. Occupied Bandwidth Plot (NR Band n25 - 40.0MHz CP-OFDM 16QAM - Full RB)



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

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 34 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Page 34 01 201

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



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

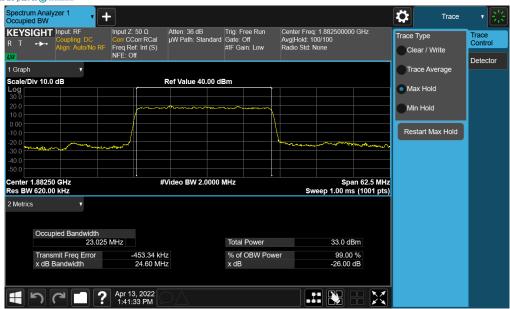
FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 35 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	Fage 35 01 201

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Plot 7-40. Occupied Bandwidth Plot (NR Band n25 - 25.0MHz DFT-s-OFDM BPSK - Full RB)

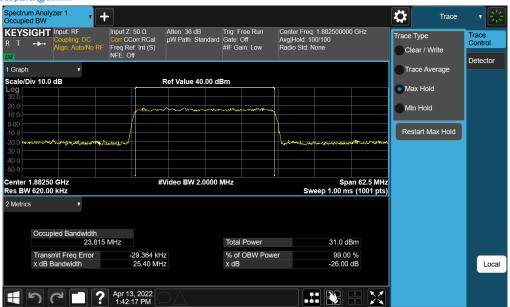


Plot 7-41. Occupied Bandwidth Plot (NR Band n25 - 25.0MHz CP-OFDM QPSK - Full RB)

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 36 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	

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

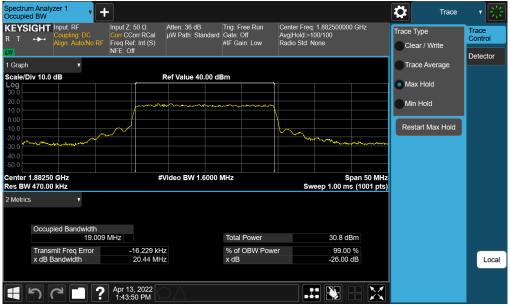
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Test Report S/N:	Test Dates:	EUT Type:	Page 37 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	



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



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

FCC ID: A3LSMF721U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 38 of 201
1M2204080051-03.A3L	04/01 - 06/02/2022	Portable Handset	