

PCTEST

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PART 22 MEASUREMENT REPORT

Applicant Name:

Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, 16677, Korea

Date of Testing:

04/05 – 06/07/2022 **Test Report Issue Date:** 06/22/2022 **Test Site/Location:** PCTEST Lab. Yongin-Si, Gyeonggi-do, South Korea **Test Report Serial No.:** 1M2204110052-01.A3L

FCC ID: Applicant Name:

A3LSMF936B

Samsung Electronics Co., Ltd.

Application Type: Model: Additional Model(s): EUT Type: FCC Classification: FCC Rule Part: Test Procedure(s):

Certification SM-F936B/DS SM-F936B Portable Handset PCS Licensed Transmitter Held to Ear (PCE) 22 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.



Prenared by

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Reviewed by

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FCC ID. ASESIMI 930B		PART 22 MEASUREMENT REPORT	Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 1 of 96
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Fage 1 01 90
			V3.0 1/4/2022



TABLE OF CONTENTS

1.0	INTR	ODUCTION	4
	1.1	Scope	4
	1.2	PCTEST Test Location	4
	1.3	Test Facility / Accreditations	4
2.0	PRO	DUCT INFORMATION	5
	2.1	Equipment Description	5
	2.2	Device Capabilities	5
	2.3	Test Configuration	5
	2.4	Software and Firmware	5
	2.5	EMI Suppression Device(s)/Modifications	5
3.0	DESC	RIPTION OF TESTS	6
	3.1	Evaluation Procedure	6
	3.2	Radiated Power and Radiated Spurious Emissions	6
4.0	MEAS		7
5.0	TEST	EQUIPMENT CALIBRATION DATA	8
6.0	SAMF	PLE CALCULATIONS	9
7.0	TEST	RESULTS	10
	7.1	Summary	10
	7.2	Occupied Bandwidth	11
	7.3	Spurious and Harmonic Emissions at Antenna Terminal	25
	7.4	Band Edge Emissions at Antenna Terminal	46
	7.5	EN-DC Conducted Output Power Data	59
	7.7	Radiated Power (ERP)	61
	7.8	Radiated Spurious Emissions Measurements	66
	7.9	Frequency Stability / Temperature Variation	91
8.0	CON	CLUSION	96

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dega 2 of 06
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 2 of 96
			V/3 0 1///2022



PART 22 MEASUREMENT REPORT

			ERP		EIRP		Emission	
Mode	Modulation	Tx Frequency Range [MHz]	Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	Designator	
GSM/GPRS	GMSK	824.2 - 848.8	0.534	27.28	0.876	29.43	246KGXW	
EDGE	8-PSK	824.2 - 848.8	0.138	21.39	0.226	23.54	241KG7W	
WCDMA	Spread Spectrum	826.4 - 846.6	0.087	19.42	0.143	21.57	4M16F9W	

			T	EF	RP	EIRP		Emission
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	Designator
	15MHz (Band	QPSK	831.5 - 841.5	0.086	19.35	0.141	21.50	13M5G7D
	26 only)	16QAM	831.5 - 841.5	0.074	18.67	0.121	20.82	13M5W7D
	10 MI I=	QPSK	829.0 - 844.0	0.091	19.61	0.150	21.76	9M05G7D
	10 MHz	16QAM	829.0 - 844.0	0.076	18.83	0.125	20.98	9M04W7D
LTE Band 26/5	5 MHz	QPSK	826.5 - 846.5	0.091	19.58	0.149	21.73	4M53G7D
LIE Dallu 20/5		16QAM	826.5 - 846.5	0.079	18.96	0.129	21.11	4M54W7D
	3 MHz	QPSK	825.5 - 847.5	0.090	19.54	0.148	21.69	2M72G7D
	3 MHZ	16QAM	825.5 - 847.5	0.075	18.73	0.122	20.88	2M72W7D
	1.4 MHz	QPSK	824.7 - 848.3	0.090	19.55	0.148	21.70	1M11G7D
	1.4 IVI⊓Z	16QAM	824.7 - 848.3	0.073	18.61	0.119	20.76	1M11W7D
	20 MHz	π/2 BPSK	834.0 - 839.0	0.090	19.53	0.147	21.68	17M9G7D
		QPSK	834.0 - 839.0	0.084	19.25	0.138	21.40	19M1G7D
		16QAM	834.0 - 839.0	0.069	18.38	0.113	20.53	19M0W7D
		π/2 BPSK	831.5 - 841.5	0.089	19.51	0.147	21.66	13M5G7D
	15 MHz	QPSK	831.5 - 841.5	0.083	19.20	0.137	21.35	14M2G7D
NR Band n5		16QAM	831.5 - 841.5	0.070	18.48	0.115	20.63	14M2W7D
INK Band no		π/2 BPSK	829.0 - 844.0	0.088	19.43	0.144	21.58	9M03G7D
	10 MHz	QPSK	829.0 - 844.0	0.083	19.17	0.136	21.32	9M34G7D
		16QAM	829.0 - 844.0	0.069	18.39	0.113	20.54	9M34W7D
		π/2 BPSK	826.5 - 846.5	0.085	19.30	0.139	21.45	4M59G7D
	5 MHz	QPSK	826.5 - 846.5	0.080	19.04	0.132	21.19	4M52G7D
		16QAM	826.5 - 846.5	0.072	18.54	0.117	20.69	4M50W7D

EUT Overview

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	est Dates: EUT Type:		
1M2204110052-01.A3L	04/05 - 06/07/2022 Portable Handset		Page 3 of 96	
			V/3 0 1///2022	



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 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 Korea located in Yongin-si, Gyeonggi-do, 16954, South Korea.

- 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: A3LSMF936B		PART 22 MEASUREMENT REPORT	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	Fest Dates: EUT Type:		
1M2204110052-01.A3L	04/05 - 06/07/2022 Portable Handset		Page 4 of 96	
			V/3 0 1/4/2022	

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMF936B**. 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 22.

Test Device Serial No.: 0373M, 0418M, 0566S, 0797M

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 (5,6GHz), Bluetooth (1x, EDR, LE), NFC, UWB, 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 26 (814.7 – 849 MHz) overlaps the entire frequency range of LTE Band 5 (824 – 849 MHz). Therefore, test data provided in this report covers Band 5 and the portion of Band 26 subject to Part 22.

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.

This device supports two additional antenna configurations for LTE/NR Low bands [AFS operation]: one is with two antennas transmitting from one feed, and one is with a singular antenna transmitting. Both configurations are tested, and the worst case radiated emissions data is shown in this report.

2.4 Software and Firmware

The test was conducted with software/firmware version F936BXXE0AVD9 installed on DUT.

2.5 EMI Suppression Device(s)/Modifications

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

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 5 of 06
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 5 of 96
	·		V3.0 1/4/2022



3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

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

Deviation from Measurement Procedure......None

3.2 Radiated Power and Radiated Spurious Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

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

Pd [dBm] = Pg [dBm] - cable loss [dB] + 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]} – cable loss [dB].

For radiated spurious emissions measurements, the field strength conversion method is used per the formulas in Section 5.2.7 of ANSI C63.26-2015. Field Strength (EIRP) is calculated using the following formulas:

$$\begin{split} & \mathsf{E}_{[d\mathsf{B}\mu\mathsf{V}/m]} = \text{Measured amplitude level}_{[d\mathsf{B}m]} + 107 + \text{Cable Loss}_{[d\mathsf{B}]} + \text{Antenna Factor}_{[d\mathsf{B}/m]} \\ & \text{And} \\ & \mathsf{EIRP}_{[d\mathsf{B}m]} = \mathsf{E}_{[d\mathsf{B}\mu\mathsf{V}/m]} + 20 \mathsf{log}\mathsf{D} - 104.8; \text{ where D is the measurement distance in meters.} \end{split}$$

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: A3LSMF936B		PART 22 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 6 of 06
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 6 of 96
	-	· · · · · · · · · · · · · · · · · · ·	V3.0 1/4/2022



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: A3LSMF936B		PART 22 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Daga Z of 06
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 7 of 96
	•		V3.0 1/4/2022

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5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
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: A3LSMF936B		PART 22 MEASUREMENT REPORT			
Test Report S/N:	Test Dates:	EUT Type:	Dega 9 of 06		
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 8 of 96		
	•	·	V3.0 1/4/2022		



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: A3LSMF936B		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 0 of 06
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 9 of 96
			1/3 0 1/4/2022



7.0 TEST RESULTS

7.1 Summary

Company Name:	Samsung Electronics Co., Ltd.
FCC ID:	A3LSMF936B
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	NR/GSM/GPRS/EDGE/WCDMA/LTE

Test Condition	Test Description	FCC Part Section(s)	RSS Section(s)	Test Limit	Test Result	Reference
	Occupied Bandwidth	2.1049(h)	RSS-Gen(6.7)	N/A	PASS	Section 7.2
	Conducted Band Edge / Spurious Emissions	2.1051, 22.917(a)	RSS-Gen(6.13), RSS-132(5.5)	≥ 43 + 10 log (P[Watts]) dB of attenuation below transmitter power	PASS	Sections 7.3, 7.4
CONDCU	Frequency Stability	2.1055, 22.355	RSS-Gen(6.11), RSS-132(5.3)	The carrier frequency of the transmitter must be maintained within the 2.5ppm	PASS	Section 7.8
-	Uplink Carrier Aggregation	22.917(a), 27.53(h)	RSS-199(4.5)	\ge 43 + 10 log (P[Watts]) dB of attenuation below transmitter power	PASS	Section 7.5
RADIATED	Effective Radiated Power / Equivalent Isotropic Radiated Power	22.913(a)(5)	RSS-Gen(6.12), RSS-132(5.4)	< 7 Watts max. ERP	PASS	Section 7.6
RADI	Radiated Spurious Emissions	2.1053, 22.917(a)	RSS-Gen(7.3), RSS-132(5.6)	> 43 + 10 log10 (P[Watts]) for all out-of-band emissions	PASS	Section 7.7

* 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.
- 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: A3LSMF936B		PART 22 MEASUREMENT REPORT			
Test Report S/N:	Test Dates:	EUT Type:	Dage 10 of 06		
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 10 of 96		
<u> </u>	•		V3.0 1/4/2022		



7.2 Occupied Bandwidth

Test Overview

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

ANSI C63.26-2015 - Section 5.4.4

Test Settings

- 1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 1 5% of the expected OBW
- 3. VBW \geq 3 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 7-1. Test Instrument & Measurement Setup

Test Notes

None.

FCC ID: A3LSMF936B		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dama 44 af 00	
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 11 of 96	
	•	•	V3.0 1/4/2022	



LTE Band 26/5

Spectrum Occupied	BW		• +]										\$	Trace	- - 🐺
KEYSI R T		Input: RF Coupling: Align: Aut	DC C	nput Z: 5 Corr CCo Freq Ref: NFE: Off	rr RCal	Atten: 36 dB µW Path: Sta	ndard	Gate: (ree Run Off ain: Low		Center Freq Avg Hold: 10 Radio Std: N		MHz	Trace Typ Clear	oe / Write	Trace Control
1 Graph		•				1								Trace	Average	Detector
-30.0 -40.0 -50.0	la providence and		appart and the second			Ref Value 40		eter Astaly			and a start of the			Max H Min H Restar		
Center 8 Res BW	360.00				#	Video BW 1.:	2000 N	/IHZ			Sw	spa eep 1.00 ms	n 37.5 MHz (1001 pts)			
	Occupi Transm	▼ ed Band nit Freq E andwidth	width 13.536 M Error	-9	9.818 kH 5.02 MH				Power OBW Pov	wei	1	32.0 dE 99.00 -26.00 d	%			
	า (3	2	Apr 05, 1:30:30	2022 0 PM											

Plot 7-1. Occupied Bandwidth Plot (LTE Band 26 - 15MHz QPSK - Full RB)



Plot 7-2. Occupied Bandwidth Plot (LTE Band 26 - 15MHz 16-QAM - Full RB)

FCC ID: A3LSMF936B		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dage 12 of 06	
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 12 of 96	
	·	·	V3.0 1/4/2022	





Plot 7-3. Occupied Bandwidth Plot (LTE Band 26/5 - 10MHz QPSK - Full RB)



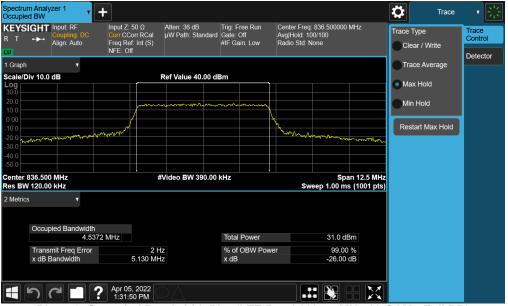
Plot 7-4. Occupied Bandwidth Plot (LTE Band 26/5 - 10MHz 16-QAM - Full RB)

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT			
Test Report S/N:	Test Dates:	Dates: EUT Type:			
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 13 of 96		
			V3 0 1/4/2022		





Plot 7-5. Occupied Bandwidth Plot (LTE Band 26/5 - 5MHz QPSK - Full RB)



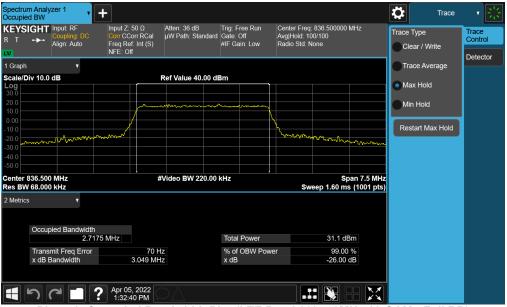
Plot 7-6. Occupied Bandwidth Plot (LTE Band 26/5 - 5MHz 16-QAM - Full RB)

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT			
Test Report S/N:	Test Dates:	es: EUT Type:			
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 14 of 96		
			V3.0 1/4/2022		





Plot 7-7. Occupied Bandwidth Plot (LTE Band 26/5 - 3MHz QPSK - Full RB)



Plot 7-8. Occupied Bandwidth Plot (LTE Band 26/5 - 3MHz 16-QAM - Full RB)

FCC ID: A3LSMF936B		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dama 45 - £00	
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 15 of 96	
			V3 0 1/4/2022	





Plot 7-9. Occupied Bandwidth Plot (LTE Band 26/5 - 1.4MHz QPSK - Full RB)



Plot 7-10. Occupied Bandwidth Plot (LTE Band 26/5 - 1.4MHz 16-QAM - Full RB)

FCC ID: A3LSMF936B		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 16 of 06
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 16 of 96
			V3.0 1/4/2022



NR Band n5

Spectrum	Analyzer 1	• +										Ö	Trace	·
KEYSI	GHT Input: RF Coupling: D Align: Auto/I		Corr RCal ef: Int (S)	Atten: 36 dB µW Path: Stan	dard G	rig: Fre Gate: Off IF Gain	f		Center Freq Avg Hold: 1 Radio Std: 1		MHz	Trace Type Clear /		Trace Control
1 Graph	v											Trace /	Average	Delector
Scale/Div	10.0 dB		F	Ref Value 40.0	0 dBr	n	,					Max He	old	
30.0 20.0 10.0				^s								Min Ho		
0.00			/					ľ				Restart	Max Hold	
-30.0 -40.0 -50.0	Angenetan angenetan kanangenetan kanangenetan kanangenetan kanangenetan kanangenetan kanangenetan kanangenetan										~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			
Center 83	86.50 MHz 170.00 kHz		. #V	/ideo BW 1.50	00 MI	Hz			Sw	S veep 1.00 m	pan 50 MHz s (1001 pts)			
2 Metrics	T													
	Occupied Bandwi 1	dth 7.907 MHz				Total P	ower			33.2 dl	3m			
	Transmit Freq Err x dB Bandwidth	ror	-538.63 kHz 19.21 MHz			% of O x dB	BW Po	we	r	99.00 -26.00				Local
		Apr 0	6, 2022 40 PM											

Plot 7-11. Occupied Bandwidth Plot (NR Band n5 - 20MHz π/2 BPSK - Full RB)



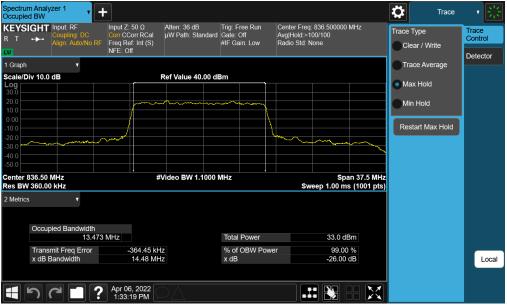
Plot 7-12. Occupied Bandwidth Plot (NR Band n5 - 20MHz QPSK - Full RB)

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 17 of 06
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 17 of 96
			V3 0 1/4/2022





Plot 7-13. Occupied Bandwidth Plot (NR Band n5 - 20MHz 16-QAM - Full RB)



Plot 7-14. Occupied Bandwidth Plot (NR Band n5 - 15MHz π/2 BPSK - Full RB)

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT		
Test Report S/N:	Test Dates:	EUT Type:	Dage 19 of 06	
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 18 of 96	
			V3.0 1/4/2022	





Plot 7-15. Occupied Bandwidth Plot (NR Band n5 - 15MHz QPSK - Full RB)



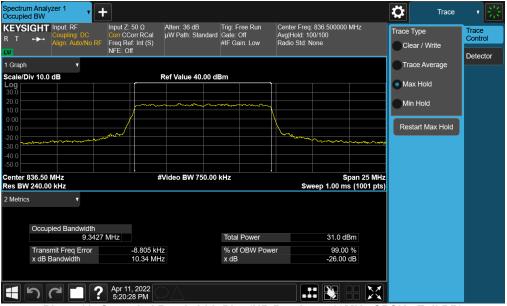
Plot 7-16. Occupied Bandwidth Plot (NR Band n5 - 15MHz 16-QAM - Full RB)

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT		
Test Report S/N:	Test Dates:	EUT Type:	Dage 10 of 06	
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 19 of 96	
		· · · ·	V3.0 1/4/2022	





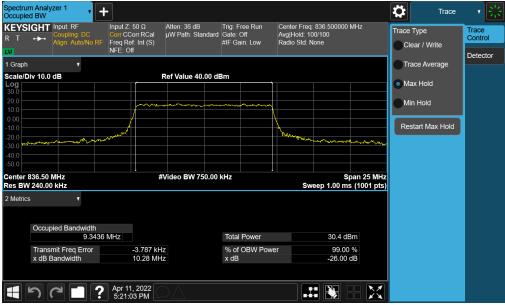
Plot 7-17. Occupied Bandwidth Plot (NR Band n5 - 10MHz π/2 BPSK - Full RB)



Plot 7-18. Occupied Bandwidth Plot (NR Band n5 - 10MHz QPSK - Full RB)

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dega 20 of 06	
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 20 of 96	
	•	·	V3 0 1/4/2022	





Plot 7-19. Occupied Bandwidth Plot (NR Band n5 - 10MHz 16-QAM - Full RB)



Plot 7-20. Occupied Bandwidth Plot (NR Band n5 - 5MHz π/2 BPSK - Full RB)

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 21 of 06
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 21 of 96
		·	V3.0 1/4/2022





Plot 7-21. Occupied Bandwidth Plot (NR Band n5 - 5MHz QPSK - Full RB)



Plot 7-22. Occupied Bandwidth Plot (NR Band n5 - 5MHz 16-QAM - Full RB)

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 22 of 06
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 22 of 96
	•	•	V3 0 1/4/2022



GPRS Cell



Plot 7-23. Occupied Bandwidth Plot (GPRS, Ch. 190)

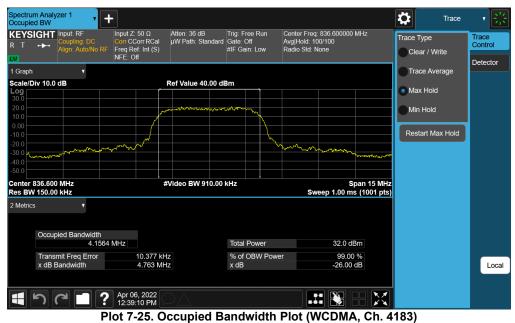


Plot 7-24. Occupied Bandwidth Plot (EDGE, Ch. 190)

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dege 22 of 06
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 23 of 96
		· · ·	V3 0 1/4/2022



WCDMA Cell



FCC ID: A3LSMF936B		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Daga 24 of 06	
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 24 of 96	
			V3.0 1/4/2022	



7.3 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

ANSI C63.26-2015 – Section 5.7.4

Test Settings

- 1. Start frequency was set to 30MHz and stop frequency was set to 10GHz (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 7-2. Test Instrument & Measurement Setup

Test Notes

- 1. Per Part 22 and RSS-132, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. 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 emission 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: A3LSMF936B		PART 22 MEASUREMENT REPORT	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 25 of 06	
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 25 of 96	
<u>-</u>		·	V3.0 1/4/2022	



LTE Band 26/5

R T Input: RF Coupling: DC Align: Auto	Input Z: 50 Ω Atten: 3 Corr CCorr RCal μW Pat Freq Ref: Int (S) NFE: Off	0 dB PNO: Fast h: Standard Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RMS 1 2 3 4 5 6 Trig: Free Run A WW WW A N N N N N	Center Frequency 426.500000 MHz
Spectrum v icale/Div 10 dB	Ref Lev	el 20.00 dBm	Mkr1 822.70 MHz -56.901 dBm	100.00000 Mil 12
10.0 0.00				Full Span Start Freq 30,000000 MHz
0.0				30.000000 MH2 Stop Freq 823.000000 MHz
40.0				AUTO TUNE CF Step 79.300000 MHz
50.0 	www.haranaanaanaanaanaanaanaanaanaanaanaanaan		1	Auto Man Freq Offset
70.0 tart 30.0 MHz Res BW 100 kHz	#Video	BW 300 kHz	Stop 823.0 MHz Sweep 38.1 ms (15861 pts)	

Plot 7-26. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK – 1 RB - Low Channel)

Spectrum Analyze Swept SA	er 1 ү	+					Frequency	
	nput: RF coupling: DC lign: Auto	Input Ζ: 50 Ω Corr CCorr RCal Freq Ref: Int (S) NFE: Off	Atten: 30 dB µW Path: Standard	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power Trig: Free Run	(RMS <mark>1</mark> 23456 A WWWWW ANNNNN	Center Frequency 924.500000 MHz	Settings
1 Spectrum Scale/Div 10 dB	•		Ref Level 20.00 di	Bm		851.05 MHz -60.980 dBm	Span 151.000000 MHz	
10.0 Trace 1	Pass						Zero Span Full Span	
-10.0							Start Freq 849.000000 MHz Stop Freq	
-20.0							1.00000000 GHz	
							CF Step 15.100000 MHz Auto	
-60.0	lan ang mga ng mga n	the Branchover land a man the particular		terny. Series and provide and a State Series	að res _a ntýrundasin stærnig sediperundstætur	umanan ang panangkan kanang mang mang mang mang mang mang mang	Man Freq Offset 0 Hz	
Start 0.84900 GH #Res BW 100 kH			#Video BW 300 k	Hz		Stop 1.00000 GHz .25 ms (3021 pts)	X Axis Scale	
1 50		Apr 05, 2022 1:42:09 PM					Signal Track (Span Zoom)	

Plot 7-27. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - Low Channel)

FCC ID: A3LSMF936B	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 26 of 96
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Fage 20 01 90
			1/3 0 1/4/2022



Spectrum Analyzer 1	+			Frequency 🔻 🛃
KEYSIGHT Input: RF R T F Question Coupling: DC Align: Auto	Input Z: 50 Ω #Atten: 30 dB Corr CCorr RCal μW Path: Standard Freq Ref: Int (S) NFE: Off	PNO: Fast I Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RMS 1 2 3 4 5 6 Trig: Free Run A WWWW A N N N N N	Center Frequency 5.500000000 GHz Span
Spectrum v			Mkr1 6.875 0 GHz	9.00000000 GHz
Cale/Div 10 dB	Ref Level 0.00 di	Bm	-40.382 dBm	Swept Span Zero Span
10.0				Full Span
30.0				Start Freq 1.000000000 GHz
40.0				Stop Freq 10.000000000 GHz
50.0				AUTO TUNE
				CF Step 900.000000 MHz
30.0				Auto Man
00.0				Freq Offset 0 Hz
tart 1.000 GHz Res BW 1.0 MHz	#Video BW 3.0 N	IHz	Stop 10.000 GHz Sweep ~16.5 ms (18001 pts)	
	? Apr 05, 2022 1:42:39 PM			Signal Track (Span Zoom)

Plot 7-28. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - Low Channel)

Spectrum Analyzer 1 Swept SA	+				Frequency	
CEYSIGHT Input: RF R T ↔ Coupling: DC Align: Auto PASS	Input Z: 50 Ω Corr CCorr RCal Freq Ref: Int (S) NFE: Off	Atten: 30 dB µW Path: Standard	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RMS 1 2 3 4 5 6 Trig: Free Run A WW WW A N N N N	427.000000 MHz	Settings
Spectrum v			, e	Mkr1 798.20 MH: -60.434 dBn	704.000000 11112	
cale/Div 10 dB . ^{og} Trace 1 Pass		Ref Level 20.00 dE	sm	-60.434 dBi	Swept Span Zero Span	
					Full Span	
10.0					Start Freq 30.000000 MHz	
					Stop Freq 824.000000 MHz	
					AUTO TUNE	
40.0					CF Step 79.400000 MHz	
60.0					Auto Man	
					Freq Offset 0 Hz	
tart 30.0 MHz Res BW 100 kHz		#Video BW 300 kl	Hz	Stop 824.0 MH Sweep 38.1 ms (15881 pts	X Axis Scale Log Lin	Loca
1 n c l 1	Apr 05, 2022 1:44:12 PM				Signal Track	

Plot 7-29. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - Mid Channel)

FCC ID: A3LSMF936B		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 07 of 06
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 27 of 96
			V3.0 1/4/2022



Spectrum Analyzer 1 Swept SA KEYSIGHT Input: RF R T \rightarrow Align: Auto	H Input Ζ: 50 Ω Corr CCorr RCal Freq Ref: Int (S) NFE: Off	Atten: 30 dB PNO: Fast µW Path: Standard Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RMS123456 Trig: Free Run A WW WW W A N N N N	Frequency Center Frequency 924.500000 MHz Settings
Spectrum v Scale/Div 10 dB		Ref Level 20.00 dBm	Mkr1 892.15 MHz -61.166 dBm	Span 151.000000 MHz Swept Span Zero Span
				Full Span Start Freq 849.000000 MHz
20.0				Stop Freq 1.00000000 GHz
40.0	<u> </u>			CF Step 15.100000 MHz Auto Man
0.0	yaket nan ngel yyak ya kata ngel na tana ngel na ngen na ngel n			Freq Offset 0 Hz X Axis Scale
tart 0.84900 GHz Res BW 100 kHz	Apr 05, 2022 1:44:23 PM	#Video BW 300 kHz	Stop 1.00000 GHz Sweep 7.25 ms (3021 pts)	Log Lin Signal Track (Span Zoom)

Plot 7-30. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - Mid Channel)



Plot 7-31. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - Mid Channel)

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT			
Test Report S/N:	Test Dates:	EUT Type:	Page 28 of 96		
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Faye 20 01 90		
		·	V3.0 1/4/2022		



EYSIGHT Input: RF Coupling: DC Align: Auto PASS Align: Auto	Input Ζ: 50 Ω Corr CCorr RCal Freq Ref: Int (S) NFE: Off	Atten: 30 dB PNO: Fast µW Path: Standard Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RMS 1 2 3 4 5 6 Trig: Free Run A WW WW A N N N N N	
Spectrum v cale/Div 10 dB		Ref Level 20.00 dBm	Mkr1 817.75 MHz -60.648 dBm	794.000000 MHz
Trace 1 Pass				Full Span
0.0				30.000000 MHz
20.0				824.000000 MHz
				CF Step 79.400000 MHz
				Auto Man
10.0				Freq Offset 0 Hz
art 30.0 MHz Res BW 100 kHz		#Video BW 300 kHz	Stop 824.0 MHz Sweep 38.1 ms (15881 pts)	Log

Plot 7-32. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - High Channel)

Spectrum Analyzer 1	+					Frequency	- 1 😤
KEYSIGHT Input: RF R T ↔ Coupling: DC Align: Auto		µW Path: Standard	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off		2 3 4 5 6 \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Center Frequency 925.000000 MHz	Settings
Spectrum v Scale/Div 10 dB	F	Ref Level 20.00 dE	3m	Mkr1 850.7 -57.68	0 MHz 3 dBm	Span 150.000000 MHz Swept Span	
Trace 1 Pass						Zero Span Full Span	
0.00						Start Freq 850.000000 MHz	
						Stop Freq 1.000000000 GHz	
						AUTO TUNE	
50.0						CF Step 15.000000 MHz Auto	
50.0 50.0	**************************************	₽₩ ₽₽₩₽₽₽₽₽₽₽₩₽₽₽₩₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽ ₽₽₽₽₽₽	<u>พระสมสัตรุส</u> ระจะสีระบบริหาศตราษ		der op af generalised oar o	Man Freq Offset 0 Hz	
tart 0.85000 GHz Res BW 100 kHz		#Video BW 300 kl	Hz	Stop 1.00 Sweep 7.20 ms (0000 GHz 3001 pts)	X Axis Scale	Loca
	Apr 05, 2022 1:45:45 PM					Lin Signal Track (Span Zoom)	

Plot 7-33. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - High Channel)

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT				PART 22 MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Dega 20 of 06				
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 29 of 96				
	•	·	V3 0 1/4/2022				



Spectrum Analyzer 1 Swept SA	+					Frequency	- 7 景
R T Imput: RF Coupling: DC Align: Auto VM PASS	Input Ζ: 50 Ω Corr CCorr RCal Freq Ref: Int (S) NFE: Off	#Atten: 30 dB μW Path: Standard	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off		23456 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Center Frequency 5.500000000 GHz Span	Settings
1 Spectrum Scale/Div 10 dB Log		Ref Level 0.00 dE	łm	Mkr1 6.870 -40.51	0 GHz 1 dBm	9.00000000 GHz	
-10.0 Trace 1 Pass						Zero Span Full Span	
-20.0						Start Freq 1.000000000 GHz	
-40.0			1			Stop Freq 10.000000000 GHz	
-50.0						AUTO TUNE CF Step	
						900.000000 MHz Auto Man	
						Freq Offset 0 Hz	
Start 1.000 GHz #Res BW 1.0 MHz		#Video BW 3.0 M	Hz	Stop 10 Sweep ~16.5 ms (1	0.000 GHz 8001 pts)	X Axis Scale Log Lin	
	Apr 05, 2022 1:46:17 PM					Signal Track (Span Zoom)	han an an an a' a'

Plot 7-34. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - High Channel)

FCC ID: A3LSMF936B		PART 22 MEASUREMENT REPORT		
Test Report S/N:	Test Dates:	EUT Type:	Page 30 of 96	
1M2204110052-01.A3L	04/05 - 06/07/2022	2022 Portable Handset		
			1/3 0 1/4/2022	

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NR Band n5

Spectrum Analyzer 1 Swept SA KEYSIGHT Input: RF Coupling: DC Align: Auto/No RF WW PASS	hput Ζ: 50 Ω Corr CCorr RCal Freq Ref: Int (S) NFE: Off	Atten: 30 dB µW Path: Standard	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power Trig: Free Run	(RMS <mark>123456</mark> A WWWWW ANNNNN	Frequency Center Frequency 427.000000 MHz	Settings
Spectrum v cale/Div 10 dB		Ref Level 20.00 dl	-		823.45 MHz -57.162 dBm	Span 794.000000 MHz Swept Span Zero Span	
0.00 Trace 1 Pass						Full Span Start Freq 30.000000 MHz	
0.0						Stop Freq 824.000000 MHz	
					1	CF Step 79.400000 MHz Auto Man	
0.0 0.0 art 30.0 MHz		#Video BW 300 k			Stop 824.0 MHz	Freq Offset 0 Hz X Axis Scale	
	Apr 06, 2022 5:10:19 PM		лz	Sweep 38	.1 ms (15881 pts)	Log Lin Signal Track (Span Zoom)	

Plot 7-35. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Low Channel)

pectrum Analyzer 1				Frequency	- 1
Coupling: DC Corr C	Corr RCal µW Path: Standard C Ref: Int (S)	PNO: Fast #Avg Typ Gate: Off Trig: Free F Gain: Low Sig Track: Off	e: Power (RMS 1 2 3 4 5 6 e Run A WWWW A N N N N N	Center Frequency 924.500000 MHz	Settings
Spectrum v cale/Div 10 dB	Ref Level 20.00 dBr		Mkr1 853.65 MHz -60.917 dBm	Swept Span	
Trace 1 Pass				Zero Span Full Span	
0.00				Start Freq 849.000000 MHz	
20.0				Stop Freq 1.00000000 GHz	
40.0				AUTO TUNE CF Step 15.100000 MHz	
50.0 <u> </u>		**************************************	Analalan matagen additional and Analan metalogical and	Auto Man	
				Freq Offset 0 Hz X Axis Scale	Loca
tart 0.84900 GHz Res BW 100 kHz	#Video BW 300 kH:		Stop 1.00000 GHz Sweep 7.25 ms (3021 pts)	Log	

Plot 7-36. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Low Channel)

FCC ID: A3LSMF936B	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Page 31 of 96	
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset		
			1/3 0 1/4/2022	





Plot 7-37. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Low Channel)

Spectrum Analyzer 1				Frequency	「岩
R T + Coupling: DC Coupling: Altign: Auto/No RF Fre	ut Z: 50 Ω Atten: 30 dB rr CCorr RCal μW Path: Standa eq Ref: Int (S) E: Off	PNO: Fast ard Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RMS 1 2 3 4 3 Trig: Free Run A WW WW A N N N N	427.000000 MHz	Settings
1 Spectrum 🔻			Mkr1 823.95 M	104.000000 Will IZ	
Scale/Div 10 dB	Ref Level 20.00	dBm	-59.004 dE	Swept Span Zero Span	
10.0 Trace 1 Pass				Full Span	
0.00				Start Freq 30.000000 MHz	
20.0				Stop Freq 824.000000 MHz	
				AUTO TUNE	
40.0				CF Step 79.400000 MHz	
-60.0				1 Auto Man	
-70.0				Freq Offset 0 Hz	_
Start 30.0 MHz #Res BW 100 kHz	#Video BW 300) kHz	Stop 824.0 N Sweep 38.1 ms (15881 p		Local
	pr 06, 2022 :12:07 PM			Signal Track (Span Zoom)	

Plot 7-38. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Mid Channel)

FCC ID: A3LSMF936B	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 22 of 06	
1M2204110052-01.A3L	04/05 - 06/07/2022	Portable Handset	Page 32 of 96	
			V3 0 1/4/2022	