



RF EXPOSURE TEST REPORT

Applicant Name:

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

Date of Testing:

05/18/2026 – 05/20/2026

Test Site/Location:

Element, Columbia, MD, USA
Element, Suwon, Korea

Document Serial No.:

1M2605130037-04.A3L

FCC ID:

A3LSMA576U

APPLICANT:

SAMSUNG ELECTRONICS CO., LTD.

DUT Type:

Portable Handset

Application Type:

Class II Permissive Change

FCC Rule Part(s):

CFR §2.1093

Permissive Change(s)

See FCC Change Document

Model(s):

SM-A576U1

Additional Model(s):

SM-A576U

Date of Original Certification

01/27/2026

Equipment Class	Band & Mode	Tx Frequency	SAR			
			1g Head (W/kg)	1g Body-Worn (W/kg)	1g Hotspot (W/kg)	10g Phablet (W/kg)
PCE	LTE Band 71	665.5 - 695.5 MHz	0.32	0.40	0.40	N/A
PCE	NR Band n71	665.5 - 695.5 MHz	0.29	0.33	0.33	N/A
Simultaneous SAR per KDB 690783 D01v01r03:			1.20	1.59	1.59	1.68
Overall SAR Summary						
RF Exposure Position		Head	Body-worn		Product Specific (Wireless Router)	
SAR (W/kg)		0.85	1.2		1.2	
Distance (mm)		0	5		5, 10	
					Simultaneous Transmission	
					1.59	
					N/A	

Only operations relevant to this permissive change were evaluated for compliance. Please see the original compliance evaluation in RF Exposure Technical Report S/N 1M2510280090-01.A3L for complete evaluation of all other operating modes. The operational description includes a description of all changed items.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in Section 2.9 of this report; for North American frequency bands only.

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. Test results reported herein relate only to the item(s) tested.

RJ Ortanez

VP – Connected Technologies



The SAR Tick is an initiative of the Mobile & Wireless Forum (MWF). While a product may be considered eligible, use of the SAR Tick logo requires an agreement with the MWF. Further details can be obtained by emailing: sartick@mwfai.info.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
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REV 22.0
03/30/2022

Revision	Description	Issue Date	Revised by:
-	Initial Release	05/22/2026	WKR0000005717
Rev.A	Additional Model changed	5/27/2026	WKR0000005717
Rev.B	Section 2.11 added	5/28/2026	WKR0000005717

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REV 22.0
03/30/2022

TABLE OF CONTENTS

1	TEST LABORATORY INFORMATION.....	4
2	DEVICE UNDER TEST	5
3	LTE AND NR INFORMATION	13
4	INTRODUCTION	15
5	DOSIMETRIC ASSESSMENT	16
6	DEFINITION OF REFERENCE POINTS.....	17
7	TEST CONFIGURATION POSITIONS.....	18
8	RF EXPOSURE LIMITS	22
9	FCC MEASUREMENT PROCEDURES.....	23
10	RF CONDUCTED POWERS.....	25
11	SYSTEM VERIFICATION.....	27
12	SAR DATA SUMMARY	29
13	SAR MEASUREMENT VARIABILITY	32
14	EQUIPMENT LIST.....	33
15	MEASUREMENT UNCERTAINTIES.....	34
16	CONCLUSION.....	35
17	REFERENCES	36
APPENDIX A:	SAR TEST PLOTS	
APPENDIX B:	SAR DIPOLE VERIFICATION PLOTS	
APPENDIX C:	PROBE AND DIPOLE CALIBRATION CERTIFICATES	
APPENDIX D:	SAR TISSUE SPECIFICATIONS	
APPENDIX E:	MULTI-TX AND ANTENNA SAR CONSIDERATIONS	
APPENDIX F:	SAR SYSTEM VALIDATION	
APPENDIX G:	LTE AND NR LOWER BANDWIDTH RF CONDUCTED POWERS	
APPENDIX H:	DUT ANTENNA DIAGRAM & SAR TEST SETUP PHOTOGRAPHS	

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 3 of 37

1 TEST LABORATORY INFORMATION

1.1 Introduction

This test report for device subject to testing at an accredited testing laboratory has been generated by the testing laboratory that tested the device. Measurements were performed at various locations within Element Materials Technology. Detailed location and accredited information regarding the testing laboratories are provided below.

1.2 Test Laboratories Information

1.2.1 Testing Laboratory 1

Test Firm Name	ELEMENT MATERIALS TECHNOLOGY WASHINGTON DC LLC
Test Lab Location	7185 Oakland Mills Road, Columbia, MD 21046, United States Tel. +1.410.290.6652 / Fax +1.410.290.6654
Accreditation Info.	Lab Code. (ISED): 2451B
	CAB Identifier (NIST): US0110
	ISO/IEC 17025 (A2LA): CERT #2041.01
	

1.2.2 Testing Laboratory 2

Test Firm Name	ELEMENT MATERIALS TECHNOLOGY SUWON, LTD.
Test Lab Location	Suwon: P136, Tower A, 13, Heungdeok 1-ro, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
Accreditation Info.	Lab Code. (ISED): 26168
	CAB Identifier (NIST): KR0169
	ISO/IEC 17025 (A2LA): CERT #2041.04
	
Measurement system No.	

Note: For each test performed, the test site can be verified with the probe serial numbers specified in the table of Test System Verification and Equipment List.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 4 of 37

2 DEVICE UNDER TEST

2.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
UMTS 1750	Voice/Data	1712.4 - 1752.6 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
LTE Band 71	Voice/Data	665.5 - 695.5 MHz
LTE Band 12	Voice/Data	699.7 - 715.3 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 14	Voice/Data	790.5 - 795.5 MHz
LTE Band 26	Voice/Data	814.7 - 848.3 MHz
LTE Band 5	Voice/Data	824.7 - 848.3 MHz
LTE Band 66	Voice/Data	1710.7 - 1779.3 MHz
LTE Band 4	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 25	Voice/Data	1850.7 - 1914.3 MHz
LTE Band 2	Voice/Data	1850.7 - 1909.3 MHz
LTE Band 30	Voice/Data	2307.5 - 2312.5 MHz
LTE Band 7	Voice/Data	2502.5 - 2567.5 MHz
LTE Band 41	Voice/Data	2498.5 - 2687.5 MHz
LTE Band 38	Voice/Data	2572.5 - 2617.5 MHz
LTE Band 48	Voice/Data	3552.5 - 3697.5 MHz
NR Band n71	Voice/Data	665.5 - 695.5 MHz
NR Band n5	Voice/Data	826.5 - 846.5 MHz
NR Band n70	Voice/Data	1697.5 - 1707.5 MHz
NR Band n66	Voice/Data	1712.5 - 1777.5 MHz
NR Band n25	Voice/Data	1852.5 - 1912.5 MHz
NR Band n2	Voice/Data	1852.5 - 1907.5 MHz
NR Band n30	Voice/Data	2307.5 - 2312.5 MHz
NR Band n41	Voice/Data	2501.01 - 2685 MHz
NR Band n48	Voice/Data	3555 - 3694.98 MHz
NR Band n78	Voice/Data	3455.01 - 3544.98 MHz; 3705 - 3795 MHz
NR Band n77	Voice/Data	3455.01 - 3544.98 MHz; 3705 - 3975 MHz
2.4 GHz WIFI	Voice/Data	2412 - 2462 MHz
5 GHz WIFI	Voice/Data	U-NII-1: 5180 - 5240 MHz U-NII-2A: 5260 - 5320 MHz U-NII-2C: 5500 - 5720 MHz U-NII-3: 5745 - 5825 MHz U-NII-4: 5845 - 5885 MHz
6 GHz WIFI	Voice/Data	U-NII-5: 5935 - 6415 MHz U-NII-6: 6435 - 6515 MHz U-NII-7: 6535 - 6875 MHz U-NII-8: 6895 - 7115 MHz
2.4 GHz Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
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2.2 Time-Averaging Algorithm for RF Exposure Compliance

This device incorporates the Samsung S.LSI proprietary TAS (Time-Averaged SAR) feature for 2G, 3G, 4G, 5G, WLAN, and Bluetooth operations. The TAS feature implements a real-time time-averaging algorithm to dynamically control and manage the transmit power, such that the time-averaged RF exposure remains compliant with FCC requirements over the applicable averaging duration. A detailed description of the S.LSI TAS features and compliance framework is provided in the Compliance Summary document (the corresponding report serial number is listed in Section 2.10 – Bibliography).

NFC operation is not subject to TAS control.

The S.LSI TAS algorithm maintains the time-averaged transmit power, and consequently the time-averaged RF exposure, corresponding to the defined SAR design target (SAR_design_target), below a predefined time-averaged power limit (Plimit for sub-6 GHz radios) for each characterized radio access technology and frequency band. The characterization process determines Plimit for each band and operating mode based on the applicable exposure design targets, after accounting for device-specific design uncertainties, where the SAR_design_target is set below the FCC SAR regulatory limit for sub-6 GHz operation. The resulting SAR characterization data are denoted as SAR CHAR in this report and are documented in the RF Exposure Part 0 Test Report (report serial number listed in Section 2.10 – Bibliography).

While enforcing the time-averaged power constraint, the TAS algorithm allows instantaneous transmit power to increase up to the maximum configured power level (Pmax), when required by system operation, provided that the time-averaged transmit power over the applicable averaging window remains bounded by Plimit.

The table below summarizes the final Plimit settings and the corresponding maximum tune-up output power (Pmax) configured for this equipment under test (EUT) across the supported transmit conditions, as indexed by the S.LSI Radio State Index (RSI). The device-related uncertainty applied to WWAN, WLAN, and Bluetooth transmitters for this EUT is 1.0 dB.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
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REV 22.0
03/30/2022

Exposure Scenario Averaging Volume			Maximum Time-Up Output Power*	Body-Worn, Hotspot or Phablet	Head
				1g/10g	1g
				10mm, 5mm, 0mm	0mm
				0	1
Spacing RSI					
Technology/Band	Antenna	Antenna Group	P _{max}	P _{limit}	P _{limit}
GSM 850	A	AG0	25.1	20.3	32.2
GSM 850	E	AG1	24.8	16.8	16.8
GSM 1900	A	AG0	21.3	17.3	31.6
UMTS 850	A	AG0	24.0	22.0	32.4
UMTS 850	E	AG1	23.5	21.0	21.0
UMTS 1750	A	AG0	23.5	17.0	30.4
UMTS 1900	A	AG0	23.5	18.0	21.0
LTE Band 71	A	AG0	24.0	22.0	31.7
LTE Band 71	E	AG1	23.5	19.0	19.0
LTE Band 12	A	AG0	24.5	22.0	30.7
LTE Band 12	E	AG1	24.0	19.0	19.0
LTE Band 13	A	AG0	24.0	22.0	31.8
LTE Band 13	E	AG1	23.5	19.0	19.0
LTE Band 14	A	AG0	24.0	22.0	35.8
LTE Band 14	E	AG1	23.5	19.0	19.0
LTE Band 26/5	A	AG0	24.0	21.5	31.9
LTE Band 26/5	E	AG1	23.5	19.5	19.5
LTE Band 66/4	A	AG0	23.5	17.0	31.6
LTE Band 66/4	F	AG1	23.0	16.5	16.5
LTE Band 25/2	A	AG0	23.5	17.0	32.7
LTE Band 25/2	F	AG1	23.0	17.5	17.5
LTE Band 30	B	AG0	23.0	18.0	34.8
LTE Band 30	F	AG1	22.5	18.0	18.0
LTE Band 7	B	AG0	23.5	18.0	32.6
LTE Band 7	F	AG1	23.0	16.0	16.0
LTE Band 41/38 PC3	B	AG0	21.0	16.0	32.2
LTE Band 41/38 PC3	F	AG1	21.0	15.0	15.0
LTE Band 48	F	AG1	21.5	15.0	15.0
NR Band n71	A	AG0	24.0	22.0	31.7
NR Band n71	E	AG1	23.5	19.0	19.0
NR Band n5	A	AG0	24.0	22.0	31.0
NR Band n5	E	AG1	23.5	19.0	19.0
NR Band n70	A	AG0	23.5	15.5	27.8
NR Band n70	F	AG1	23.0	16.0	16.0
NR Band n66	A	AG0	23.5	17.0	29.7
NR Band n66	F	AG1	23.0	16.0	16.0
NR Band n25/n2	A	AG0	23.5	15.5	31.2
NR Band n25/n2	F	AG1	23.0	18.0	18.0
NR Band n30	B	AG0	22.5	18.0	32.4
NR Band n30	F	AG1	21.5	18.0	18.0
NR Band n41 PC3	B	AG0	23.5	17.5	31.7
NR Band n41 PC2	B	AG0	25.5	17.5	31.7
NR Band n48 PC3	F	AG1	22.0	13.5	13.5
NR Band n48 PC3	C	AG0	18.5	15.0	15.0
NR Band n48 PC3	I	AG1	19.0	15.0	15.0
NR Band n48 PC3	D	AG0	19.0	11.0	11.0
NR Band n78 PC3	F	AG1	23.5	12.5	12.5
NR Band n78 PC2	F	AG1	26.0	12.5	12.5
NR Band n78 PC2/PC3	C	AG0	21.5	12.0	12.0
NR Band n78 PC2/PC3	I	AG1	22.5	12.0	12.0
NR Band n77 PC2/PC3	D	AG0	21.5	11.0	11.0
2.4 GHz WIFI	H	AG1	18.0	16.0	14.0
2.4 GHz WIFI MIMO	H	AG1	18.0	16.0	14.0
2.4 GHz WIFI MIMO	J	AG1	16.0	14.0	12.0
5 GHz WIFI	G	AG1	16.0	18.9	13.0
5 GHz WIFI MIMO	E	AG1	14.0	14.8	11.0
5 GHz WIFI MIMO	G	AG1	16.0	17.3	13.0
6 GHz WIFI	G	AG1	15.0	9.0	9.0
6 GHz WIFI MIMO	E	AG1	12.5	19.2	14.7
6 GHz WIFI MIMO	G	AG1	15.0	21.7	17.2
2.4 GHz Bluetooth	H	AG1	16.8	21.3	20.6

Notes:

1. All Final Plimit and maximum tune up output power P_{max} levels entered in above Table correspond to average power levels after accounting for duty cycle in the case of TDD modulation schemes (e.g. GSM and LTE TDD).
2. Maximum tune up output power P_{max} is used to configure EUT during RF tune up procedure. The maximum allowed output power is equal to maximum Tune up output power + 1dB device design uncertainty.
3. The maximum time-averaged output power (dBm) for any Sub6 WWAN technology, band, and RSI = minimum of "final Plimit " and "Maximum tune up output power P_{max} " + 1dB device uncertainty. SAR values in this report were scaled to this maximum time-averaged output power to determine compliance per KDB Publication 447498 D04v01.
4. All MIMO P_{max} and Plimit are defined per antenna chain

The purpose of this report (Part 1 test) is to demonstrate that the EUT meets FCC SAR limits when transmitting in static transmission scenario at maximum allowable time-averaged power levels.

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2.3 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D04v01. Only operations relevant to this permissive change were evaluated for compliance, and no target changes have been made. Therefore, targets for all other bands and exposure conditions can be found in the original filing. Note: Targets for 802.11ax/be RU operations can also be found in the original filing.

2.3.1 Licensed Output Power

Mode / Band	Antenna		Modulated Average Output Power (in dBm)		
			Pmax	RSI = 0 (Body-Worn, Hotspot or Phablet)	RSI = 1 (Head)
LTE Band 71	E	Max Allowed Power	24.5	20.0	20.0
		Nominal	23.5	19.0	19.0

Mode / Band	Antenna		Modulated Average Output Power (in dBm)		
			Pmax	RSI = 0 (Body-Worn, Hotspot or Phablet)	RSI = 1 (Head)
NR Band n71	E	Max Allowed Power	24.5	20.0	20.0
		Nominal	23.5	19.0	19.0

2.4 DUT Antenna Locations

The overall dimensions of this device are > 9 x 5 cm. A diagram showing the location of the device antennas can be found in DUT Antenna Diagram & SAR Test Setup Photographs Appendix. Since the display diagonal dimension of this device is > 150 mm and <200 mm, it is considered a "phablet." Exact antenna dimensions and separation distances are shown in the Technical Descriptions in the FCC filing.

Table 2-1
Device Edges/Sides for SAR Testing

Antenna	Back	Front	Top	Bottom	Right	Left
A	Yes	Yes	No	Yes	Yes	Yes
B	Yes	Yes	No	Yes	Yes	No
C	Yes	Yes	No	Yes	Yes	No
D	Yes	Yes	No	Yes	No	Yes
E	Yes	Yes	Yes	No	Yes	No
F	Yes	Yes	Yes	No	No	Yes
G	Yes	Yes	Yes	No	No	Yes
H	Yes	Yes	Yes	No	No	Yes
I	Yes	Yes	No	No	No	Yes
J	Yes	Yes	Yes	No	Yes	No
MIMO	Yes	Yes	Yes	No	Yes	Yes

Note: Particular DUT edges were not required to be evaluated for wireless router SAR or phablet SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 648474 D04. The distances between the transmit antennas and the edges of the device are included in the filing. When wireless router mode is enabled, UNII- 2A, U-NII-2C, U-NII-4, and WIFI6E SP/LPI operations are disabled.

2.5 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the device for this model. Therefore, all SAR tests were performed with the device which already incorporates the NFC antenna. A diagram showing the location of the NFC antenna can be found in DUT Antenna Diagram & SAR Test Setup Photographs Appendix.

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REV 22.0
03/30/2022

2.6 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D04v01, transmitters are considered to be operating simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds.

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D04v01 procedures.

**Table 2-2
Simultaneous Transmission Scenarios**

No.	Capable Transmit Configuration	Head	Body-Worn Accessory	Wireless Router	Phablet	Notes
1	GSM voice + 2.4 GHz WLAN Ant H	Yes	Yes	N/A	Yes	
2	GSM voice + 2.4 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
3	GSM voice + 5 GHz WLAN Ant G	Yes	Yes	N/A	Yes	
4	GSM voice + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
5	GSM voice + 6 GHz WLAN Ant G	Yes	Yes	N/A	Yes	
6	GSM voice + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
7	GSM voice + 2.4 GHz Bluetooth	Yes ^a	Yes	N/A	Yes	^a Bluetooth Tethering is considered
8	GSM voice + 2.4 GHz Bluetooth + 5 GHz WLAN Ant G	Yes ^a	Yes	N/A	Yes	^a Bluetooth Tethering is considered
9	GSM voice + 2.4 GHz Bluetooth + 6 GHz WLAN Ant G	Yes ^a	Yes	N/A	Yes	^a Bluetooth Tethering is considered
10	GSM voice + 2.4 GHz Bluetooth + 5 GHz WLAN MIMO	Yes ^a	Yes	N/A	Yes	^a Bluetooth Tethering is considered
11	GSM voice + 2.4 GHz Bluetooth + 6 GHz WLAN MIMO	Yes ^a	Yes	N/A	Yes	^a Bluetooth Tethering is considered
12	UMTS + 2.4 GHz WLAN Ant H	Yes	Yes	Yes	Yes	
13	UMTS + 2.4 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
14	UMTS + 5 GHz WLAN Ant G	Yes	Yes	Yes	Yes	
15	UMTS + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
16	UMTS + 6 GHz WLAN Ant G	Yes	Yes	Yes	Yes	
17	UMTS + 6 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
18	UMTS + 2.4 GHz Bluetooth	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
19	UMTS + 2.4 GHz Bluetooth + 5 GHz WLAN Ant G	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
20	UMTS + 2.4 GHz Bluetooth + 6 GHz WLAN Ant G	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
21	UMTS + 2.4 GHz Bluetooth + 5 GHz WLAN MIMO	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
22	UMTS + 2.4 GHz Bluetooth + 6 GHz WLAN MIMO	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
23	LTE + 2.4 GHz WLAN Ant H	Yes	Yes	Yes	Yes	
24	LTE + 2.4 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
25	LTE + 5 GHz WLAN Ant G	Yes	Yes	Yes	Yes	
26	LTE + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
27	LTE + 6 GHz WLAN Ant G	Yes	Yes	Yes	Yes	
28	LTE + 6 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
29	LTE + 2.4 GHz Bluetooth	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
30	LTE + 2.4 GHz Bluetooth + 5 GHz WLAN Ant G	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
31	LTE + 2.4 GHz Bluetooth + 6 GHz WLAN Ant G	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
32	LTE + 2.4 GHz Bluetooth + 5 GHz WLAN MIMO	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
33	LTE + 2.4 GHz Bluetooth + 6 GHz WLAN MIMO	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
34	LTE + NR	Yes	Yes	Yes	Yes	
35	LTE + NR + 2.4 GHz WLAN Ant H	Yes	Yes	Yes	Yes	
36	LTE + NR + 2.4 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
37	LTE + NR + 5 GHz WLAN Ant G	Yes	Yes	Yes	Yes	
38	LTE + NR + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
39	LTE + NR + 6 GHz WLAN Ant G	Yes	Yes	Yes	Yes	
40	LTE + NR + 6 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
41	LTE + NR + 2.4 GHz Bluetooth	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
42	LTE + NR + 2.4 GHz Bluetooth + 5 GHz WLAN Ant G	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
43	LTE + NR + 2.4 GHz Bluetooth + 6 GHz WLAN Ant G	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
44	LTE + NR + 2.4 GHz Bluetooth + 5 GHz WLAN MIMO	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
45	LTE + NR + 2.4 GHz Bluetooth + 6 GHz WLAN MIMO	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
46	NR + 2.4 GHz WLAN Ant H	Yes	Yes	Yes	Yes	
47	NR + 2.4 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
48	NR + 5 GHz WLAN Ant G	Yes	Yes	Yes	Yes	
49	NR + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
50	NR + 6 GHz WLAN Ant G	Yes	Yes	Yes	Yes	
51	NR + 6 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
52	NR + 2.4 GHz Bluetooth	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
53	NR + 2.4 GHz Bluetooth + 5 GHz WLAN Ant G	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
54	NR + 2.4 GHz Bluetooth + 6 GHz WLAN Ant G	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
55	NR + 2.4 GHz Bluetooth + 5 GHz WLAN MIMO	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
56	NR + 2.4 GHz Bluetooth + 6 GHz WLAN MIMO	Yes ^a	Yes	Yes ^a	Yes	^a Bluetooth Tethering is considered
57	GPRS/EDGE + 2.4 GHz WLAN Ant H	N/A	N/A	Yes	Yes	
58	GPRS/EDGE + 2.4 GHz WLAN MIMO	N/A	N/A	Yes	Yes	
59	GPRS/EDGE + 5 GHz WLAN Ant G	N/A	N/A	Yes	Yes	
60	GPRS/EDGE + 5 GHz WLAN MIMO	N/A	N/A	Yes	Yes	
61	GPRS/EDGE + 6 GHz WLAN Ant G	N/A	N/A	Yes	Yes	
62	GPRS/EDGE + 6 GHz WLAN MIMO	N/A	N/A	Yes	Yes	
63	GPRS/EDGE + 2.4 GHz Bluetooth	N/A	N/A	Yes ^a	Yes	^a Bluetooth Tethering is considered
64	GPRS/EDGE + 2.4 GHz Bluetooth + 5 GHz WLAN Ant G	N/A	N/A	Yes ^a	Yes	^a Bluetooth Tethering is considered
65	GPRS/EDGE + 2.4 GHz Bluetooth + 6 GHz WLAN Ant G	N/A	N/A	Yes ^a	Yes	^a Bluetooth Tethering is considered
66	GPRS/EDGE + 2.4 GHz Bluetooth + 5 GHz WLAN MIMO	N/A	N/A	Yes ^a	Yes	^a Bluetooth Tethering is considered
67	GPRS/EDGE + 2.4 GHz Bluetooth + 6 GHz WLAN MIMO	N/A	N/A	Yes ^a	Yes	^a Bluetooth Tethering is considered
68	2.4 GHz WLAN MIMO	N/A	N/A	Yes	Yes	
69	5 GHz WLAN MIMO	N/A	N/A	Yes	Yes	
70	6 GHz WLAN MIMO	N/A	N/A	Yes	Yes	
71	2.4 GHz Bluetooth + 5 GHz WLAN Ant G	N/A	N/A	Yes ^a	Yes	^a Bluetooth Tethering is considered
72	2.4 GHz Bluetooth + 6 GHz WLAN Ant G	N/A	N/A	Yes ^a	Yes	^a Bluetooth Tethering is considered
73	2.4 GHz Bluetooth + 5 GHz WLAN MIMO	N/A	N/A	Yes ^a	Yes	^a Bluetooth Tethering is considered
74	2.4 GHz Bluetooth + 6 GHz WLAN MIMO	N/A	N/A	Yes ^a	Yes	^a Bluetooth Tethering is considered

- No other simultaneous scenarios besides described above is supported for this model.
- When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
- Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there are no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.
- 5 GHz Wireless Router is only supported for UNII-1 and U-NII-3 by S/W, therefore U-NII-2A, U-NII-2C, and U-NII-4 were not evaluated for wireless router conditions.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT			Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 		Page 9 of 37

5. 6 GHz Wireless Router is only supported for VLP, therefore SP and LPI were not evaluated for wireless router conditions.
6. This device supports 2x2 MIMO Tx for WLAN 802.11a/b/g/n/ac/ax/be. 802.11a/b/g/n/ac/ax/be supports CDD and STBC and 802.11n/ac/ax/be additionally supports SDM.
7. This device supports VoWIFI.
8. This device supports Bluetooth Tethering.
9. This device supports VoLTE.
10. This device supports VoNR.
11. LTE + 5G NR FR1 Scenarios are limited to EN-DC combinations with anchor bands as shown in the NR FR1 checklist.
12. NFC was evaluated for phablet based on expected usage conditions.

2.7 Miscellaneous SAR Test Considerations

(A) WIFI/BT

Since U-NII-1 and U-NII-2A bands have the same maximum output power and the highest reported SAR for U-NII-2A is less than 1.2 W/kg, SAR is not required for U-NII-1 band according to FCC KDB Publication 248227 D01v02r02.

Since Wireless Router operations are not allowed by the chipset firmware using U-NII-2A, U-NII-2C, U-NII-4 WIFI and 6 GHz SP/LPI, only 2.4 GHz WIFI, 2.4 GHz Bluetooth Ant H, U-NII-1 and U-NII-3, and 6 GHz VLP WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations according to FCC KDB 941225 D06v02r01.

This device supports IEEE 802.11ax with the following features:

- a) Up to 80 MHz Bandwidth only for 5/6 GHz
- b) Up to 20 MHz Bandwidth only for 2.4 GHz
- c) 2 Tx antenna output
- d) Up to 4KQAM is supported
- e) TDWR and Band gap channels are supported for 5/6 GHz
- f) MU-MIMO UL Operations are not supported

Per FCC KDB Publication 648474 D04, this device is considered a "phablet" since the display diagonal dimension is greater than 150mm and less than 200mm. Phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg. Because wireless router operations are not supported for U-NII-2A, U-NII-2C, U-NII-4 WIFI and 6 GHz SP/LPI, phablet SAR tests were performed. Phablet SAR was not evaluated for 2.4 GHz WLAN, 2.4 GHz Bluetooth, and U-NII-1, U-NII-3, and 6 GHz VLP WLAN operations since wireless router 1g SAR was < 1.2 W/kg.

Per April 2019 TCB Workshop Notes and FCC guidance, SAR testing for 802.11ax follows initial test configuration procedures of KDB 248227, with 802.11ax considered a higher order 802.11 mode.

Per FCC guidance, SAR was performed using 6.5 GHz SAR probe calibration factors for WIFI 6GHz. FCC KDB 648474, FCC KDB 941225 D07 and FCC KDB 248227 were followed for test positions, distances, and modes. Absorbed power density (APD) using a 4cm² averaging area is reported based on SAR measurements. Incident power density is evaluated at 2mm ensuring that the resolution is sufficient such that integrated power density (iPD) between d=2mm and d=λ/5mm is ≥ -1dB per equipment manufacturer guidance. Power density results are scaled up for uncertainty above 30%. Per TCB workshop October 2020 notes, 5 channels were tested for WIFI 6 GHz.

(B) Licensed Transmitter(s)

GSM/GPRS/EDGE DTM is not supported for US bands. Therefore, the GSM Voice modes in this report do not transmit simultaneously with GPRS/EDGE Data.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 10 of 37

REV 22.0
03/30/2022

This device is only capable of QPSK HSUPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01v03r01.

LTE SAR for the higher modulations and lower bandwidths were not tested since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05v02r04.

This device supports downlink 4x4 MIMO operations for some LTE Bands. Per May 2017 TCB Workshop Notes, SAR for 4x4 DL MIMO was not needed since the maximum average output power in 4x4 DL MIMO mode was not more than 0.25 dB higher than the maximum output power with 4x4 DL MIMO inactive. Additionally, SAR for 4x4 MIMO Downlink Carrier Aggregation was not needed since the maximum average output power in 4x4 MIMO Downlink Carrier Aggregation mode was not more than 0.25 dB higher than the maximum output power with 4x4 MIMO Downlink and downlink carrier aggregation inactive.

Per FCC KDB Publication 648474 D04, this device is considered a "phablet" since the display diagonal dimension is greater than 150mm and less than 200mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg.

This device supports downlink 4x4 MIMO operations for some LTE Bands. Per May 2017 TCB Workshop Notes, SAR for 4x4 DL MIMO was not needed since the maximum average output power in 4x4 DL MIMO mode was not more than 0.25 dB higher than the maximum output power with 4x4 DL MIMO inactive. Additionally, SAR for 4x4 MIMO Downlink Carrier Aggregation was not needed since the maximum average output power in 4x4 MIMO Downlink Carrier Aggregation mode was not more than 0.25 dB higher than the maximum output power with 4x4 MIMO Downlink and downlink carrier aggregation inactive.

This device supports LTE/NR capabilities with overlapping transmission frequency ranges. When the supported frequency range of an LTE/NR Band falls completely within an LTE/NR band with a larger transmission frequency range, both LTE/NR bands have the same target power (or the band with the larger transmission frequency range has a higher target power), and both LTE/NR bands share the same transmission path and signal characteristics, SAR was only assessed for the band with the larger transmission frequency range.

This device supports LTE Carrier Aggregation (CA) for LTE Band 48 with two component carriers in the uplink. SAR Measurements and conducted powers were evaluated per 2017 Fall TCB Workshop Notes.

This device can transmit with antenna switching for bands/modes on antenna A, B, E, and F. SAR tests were performed for each antenna where switching is used per band/mode to ensure compliance. Antennas and indicated band/modes are included in section 2.3.1 of this report.

NR implementation supports SA and NSA mode. In EN-DC mode, NR operates with the LTE Bands shown in the NR FR1 checklist acting as anchor bands. Per FCC guidance, SAR tests for NR Bands and LTE Anchors Bands were performed separately due to limitations in SAR probe calibration factors.

SRS was tested with CW signal per S.LSI guidance.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 11 of 37

REV 22.0
03/30/2022

2.8 Guidance Applied

- IEEE 1528-2013
- FCC KDB Publication 941225 D01v03r01, D05v02r05, D05Av01r02, D06v02r01 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D04v01 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 648474 D01v06r03 (Phablet Procedures)
- October 2013 TCB Workshop Notes (GPRS Testing Considerations)
- May 2017 TCB Workshop Notes (LTE 4x4 Downlink MIMO)
- November 2017, April 2018, October 2018 TCB Workshop Notes (LTE Carrier Aggregation)
- April 2019 TCB Workshop Notes (IEEE 802.11ax)
- November 2017, October 2018, April 2019, November 2019, October 2020 TCBC Workshop Notes (6-8 GHz)
- SPEAG DASY6 Application Note (Interim Procedures for Devices Operating at 6-10 GHz) (Nov 2021)
- IEC/IEEE 63195-1:2022
- IEC 62479:2010

2.9 Device Serial Numbers

Several samples with identical hardware were used to support SAR testing. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units. The serial numbers used for each test are indicated alongside the results in Section 12 and Section 13.

2.10 Bibliography

Report Type	Report Serial Number
RF Exposure Part 2 Test Report Original Filing	1M2510280090-03.A3L
RF Exposure Compliance Summary Report Original Filing	1M2510280090-04.A3L
RF Exposure Part 0 Test Report Original Filing	1M2510280090-02.A3L

2.11 Class II Permissive change SAR Evaluation

The device described in this application was evaluated as a Class II Permissive Change in accordance with FCC KDB Publication 178919 D01 Permissive Change Policy. Based on the modifications described in the operational description, an engineering assessment was performed to determine the impact of the changes on the previously authorized RF exposure conditions, including simultaneous transmission configurations and SAR compliance requirements. Based on the engineering assessment, only the operating configurations, exposure positions, frequency bands, and simultaneous transmission scenarios determined to be affected by the implemented changes were selected for additional SAR evaluation and verification testing. The remaining previously authorized configurations were determined to be equivalent to the originally authorized conditions and were therefore not subject to additional SAR evaluation. Accordingly, this report includes only the SAR evaluations applicable to the modified conditions. For SAR results, exposure positions, frequency bands, and operating configurations not included in this report, reference shall be made to the original FCC authorization filing under the corresponding FCC ID.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 12 of 37

REV 22.0
03/30/2022

3 LTE AND NR INFORMATION

LTE Information				
Form Factor	Portable Handset			
Frequency Range of each LTE transmission band	LTE Band 71: 665.5 - 695.5 MHz			
	LTE Band 12: 699.7 - 715.3 MHz			
	LTE Band 13: 778.5 - 784.5 MHz			
	LTE Band 14: 790.5 - 795.5 MHz			
	LTE Band 26: 814.7 - 848.3 MHz			
	LTE Band 5: 824.7 - 848.3 MHz			
	LTE Band 66: 1710.7 - 1779.3 MHz			
	LTE Band 4: 1710.7 - 1754.3 MHz			
	LTE Band 25: 1850.7 - 1914.3 MHz			
	LTE Band 2: 1850.7 - 1909.3 MHz			
	LTE Band 30: 2307.5 - 2312.5 MHz			
	LTE Band 7: 2502.5 - 2597.5 MHz			
	LTE Band 41: 2498.5 - 2687.5 MHz			
	LTE Band 38: 2572.5 - 2617.5 MHz			
	LTE Band 48: 3552.5 - 3697.5 MHz			
Channel Bandwidths	LTE Band 71: 5 MHz, 10 MHz, 15 MHz, 20 MHz			
	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz			
	LTE Band 13: 5 MHz, 10 MHz			
	LTE Band 14: 5 MHz, 10 MHz			
	LTE Band 26: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz			
	LTE Band 5: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz			
	LTE Band 66: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz			
	LTE Band 4: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz			
	LTE Band 25: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz			
	LTE Band 2: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz			
	LTE Band 30: 5 MHz, 10 MHz			
	LTE Band 7: 5 MHz, 10 MHz, 15 MHz, 20 MHz			
	LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz			
	LTE Band 38: 5 MHz, 10 MHz, 15 MHz, 20 MHz			
	LTE Band 48: 5 MHz, 10 MHz, 15 MHz, 20 MHz			
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid-High	High
	665.5 (133147)	680.5 (133297)	695.5 (133447)	
	668 (133172)	680.5 (133297)	693 (133422)	
	670.5 (133197)	680.5 (133297)	690.5 (133397)	
	673 (133222)	680.5 (133297)	688 (133372)	
	699.7 (23017)	707.5 (23095)	715.3 (23173)	
	700.5 (23025)	707.5 (23095)	714.5 (23165)	
	701.5 (23035)	707.5 (23095)	713.5 (23155)	
	704 (23060)	707.5 (23095)	711 (23130)	
	778.5 (23205)	782 (23230)	784.5 (23255)	
	(N/A)	782 (23230)	(N/A)	
	790.5 (23305)	793 (23330)	795.5 (23355)	
	(N/A)	793 (23330)	(N/A)	
	814.7 (26697)	831.5 (26865)	848.3 (27033)	
	815.5 (26705)	831.5 (26865)	847.5 (27025)	
	816.5 (26715)	831.5 (26865)	846.5 (27015)	
	819 (26740)	831.5 (26865)	844 (26960)	
	821.5 (26765)	831.5 (26865)	841.5 (26965)	
	824.7 (26807)	836.5 (26925)	848.3 (26943)	
	825.5 (26815)	836.5 (26925)	847.5 (26935)	
	826.5 (26825)	836.5 (26925)	846.5 (26925)	
	829 (26850)	836.5 (26925)	844 (26900)	
	1710.7 (131979)	1745 (132322)	1779.3 (132665)	
	1711.5 (131987)	1745 (132322)	1778.5 (132657)	
	1712.5 (131997)	1745 (132322)	1777.5 (132647)	
	1715 (132022)	1745 (132322)	1775 (132622)	
	1717.5 (132047)	1745 (132322)	1772.5 (132597)	
	1720 (132072)	1745 (132322)	1770 (132572)	
	1710.7 (19857)	1732.5 (20175)	1754.3 (20393)	
	1711.5 (19865)	1732.5 (20175)	1753.5 (20385)	
	1712.5 (19875)	1732.5 (20175)	1752.5 (20375)	
	1715 (20000)	1732.5 (20175)	1750 (20350)	
	1717.5 (20025)	1732.5 (20175)	1747.5 (20325)	
	1720 (20050)	1732.5 (20175)	1745 (20300)	
	1850.7 (26047)	1882.5 (26365)	1914.3 (26663)	
	1851.5 (26055)	1882.5 (26365)	1913.5 (26675)	
	1852.5 (26065)	1882.5 (26365)	1912.5 (26665)	
	1855 (26090)	1882.5 (26365)	1910 (26640)	
	1857.5 (26115)	1882.5 (26365)	1907.5 (26615)	
	1860 (26140)	1882.5 (26365)	1905 (26590)	
	1850.7 (18607)	1880 (18900)	1909.3 (19193)	
	1851.5 (18615)	1880 (18900)	1908.5 (19185)	
	1852.5 (18625)	1880 (18900)	1907.5 (19175)	
	1855 (18650)	1880 (18900)	1905 (19150)	
	1857.5 (18675)	1880 (18900)	1902.5 (19125)	
	1860 (18700)	1880 (18900)	1900 (19100)	
	2307.5 (27685)	2310 (27710)	2312.5 (27735)	
	(N/A)	2310 (27710)	(N/A)	
	2502.5 (20775)	2535 (21100)	2567.5 (21425)	
	2505 (20800)	2535 (21100)	2565 (21400)	
	2507.5 (20825)	2535 (21100)	2562.5 (21375)	
	2510 (20850)	2535 (21100)	2560 (21350)	
	2506 (36750)	2593 (40620)	2636.5 (41055)	2680 (41490)
	2506 (36750)	2593 (40620)	2636.5 (41055)	2680 (41490)
	2506 (36750)	2593 (40620)	2636.5 (41055)	2680 (41490)
	2506 (36750)	2593 (40620)	2636.5 (41055)	2680 (41490)
	2572.5 (37775)	2595 (38000)	2617.5 (38225)	
	2575 (37800)	2595 (38000)	2615 (38200)	
	2577.5 (37825)	2595 (38000)	2612.5 (38175)	
	2580 (37850)	2595 (38000)	2610 (38150)	
	3552.5 (55265)	3600.8 (55748)	(N/A)	3649.2 (56232)
	3555 (55290)	3601.7 (55757)	(N/A)	3648.3 (56223)
	3557.5 (55315)	3602.5 (55765)	(N/A)	3647.5 (56215)
	3560 (55340)	3603.3 (55773)	(N/A)	3646.7 (56207)
				3690 (56640)
UE Category	UL UE Cat 18, DL UE Cat 18			
Modulations Supported in UL	QPSK, 16QAM, 64QAM, 256QAM			
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.2.3-6.2.57 (manufacturer attestation to be provided)	YES			
A-MPR (Additional MPR) disabled for SAR Testing?	YES			
LTE Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations			
LTE Additional Information	This device does not support full CA features on 3GPP Release 16. It supports carrier aggregation, downlink MIMO features. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. The following LTE Release 16 Features are not supported: Relay, HeNet, Enhanced MIMO, eCIC, eMMS, Writ Offloading, Cross-Carrier Scheduling, Enhanced SC-FDMA.			

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo.	Page 13 of 37

Form Factor		NR Information			
Frequency Range of each NR transmission band		Portable Handset			
		NR Band n71: 665.5 - 695.5 MHz			
		NR Band n5: 826.5 - 846.5 MHz			
		NR Band n78: 1697.5 - 1707.5 MHz			
		NR Band n68: 1712.5 - 1777.5 MHz			
		NR Band n28: 1852.5 - 1912.5 MHz			
		NR Band n2: 1952.5 - 1997.5 MHz			
		NR Band n82: 2307.5 - 2312.5 MHz			
		NR Band n41: 2501.01 - 2685 MHz			
		NR Band n66: 3505 - 3644.98 MHz			
		NR Band n76: 3455.01 - 3644.98 MHz: 3705 - 3795 MHz			
		NR Band n77: 3455.01 - 3644.98 MHz: 3705 - 3795 MHz			
		NR Band n77 DoD: 3455.01 - 3644.98 MHz			
		NR Band n71: 5 MHz, 10 MHz, 15 MHz, 20 MHz			
		NR Band n5: 5 MHz, 10 MHz, 15 MHz, 20 MHz			
		NR Band n78: 5 MHz, 10 MHz, 15 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz			
		NR Band n28: 5 MHz, 10 MHz, 15 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz			
		NR Band n2: 5 MHz, 10 MHz, 15 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz			
		NR Band n82: 5 MHz, 10 MHz			
		NR Band n41: 10 MHz, 15 MHz, 20 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 80 MHz, 90 MHz, 100 MHz			
		NR Band n66: 10 MHz, 15 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz			
		NR Band n76: 10 MHz, 15 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 80 MHz, 90 MHz, 100 MHz			
		NR Band n77: 10 MHz, 15 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 70 MHz, 80 MHz, 90 MHz, 100 MHz			
		NR Band n77 DoD: 10 MHz, 15 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 70 MHz, 80 MHz, 90 MHz, 100 MHz			
Channel Numbers and Frequencies (MHz)					
NR Band n71: 5 MHz		665.5 (133100)	680.5 (136100)	695.5 (139100)	
NR Band n71: 10 MHz		668 (133600)	683 (136600)	698 (139600)	
NR Band n71: 15 MHz		671.5 (134300)	686.5 (137300)	701.5 (140300)	
NR Band n71: 20 MHz		675 (135000)	690 (138000)	705 (141000)	
NR Band n5: 5 MHz		826.5 (165300)	836.5 (167300)	846.5 (169300)	
NR Band n5: 10 MHz		829 (165800)	839 (167800)	849 (169800)	
NR Band n5: 15 MHz		831.5 (166300)	841.5 (168300)	851.5 (170300)	
NR Band n5: 20 MHz		834 (166800)	844 (168800)	854 (170800)	
NR Band n78: 5 MHz		1697.5 (339500)	1702.5 (340500)	1707.5 (341500)	
NR Band n78: 10 MHz		1700 (340000)	1705 (341000)	1710 (342000)	
NR Band n78: 15 MHz		1702.5 (340500)	1707.5 (341500)	1712.5 (342500)	
NR Band n68: 5 MHz		1712.5 (342500)	1745 (345000)	1777.5 (350500)	
NR Band n68: 10 MHz		1715 (343000)	1745 (345000)	1775 (350500)	
NR Band n68: 15 MHz		1717.5 (343500)	1745 (345000)	1772.5 (350500)	
NR Band n68: 20 MHz		1720 (344000)	1745 (345000)	1770 (350500)	
NR Band n68: 25 MHz		1722.5 (344500)	1745 (345000)	1767.5 (350500)	
NR Band n68: 30 MHz		1725 (345000)	1745 (345000)	1765 (350500)	
NR Band n68: 40 MHz		1730 (346000)	1745 (345000)	1760 (350500)	
NR Band n28: 5 MHz		1852.5 (370500)	1862.5 (371500)	1872.5 (372500)	
NR Band n28: 10 MHz		1855 (371000)	1865 (372000)	1875 (373000)	
NR Band n28: 15 MHz		1857.5 (371500)	1867.5 (372500)	1877.5 (373500)	
NR Band n28: 20 MHz		1860 (372000)	1865 (372500)	1870 (373000)	
NR Band n28: 25 MHz		1862.5 (372500)	1865 (372500)	1865 (373000)	
NR Band n28: 30 MHz		1865 (373000)	1865 (373000)	1865 (373000)	
NR Band n28: 40 MHz		1870 (374000)	1865 (373000)	1865 (373000)	
NR Band n2: 5 MHz		1952.5 (390500)	1962.5 (391500)	1972.5 (392500)	
NR Band n2: 10 MHz		1955 (391000)	1960 (392000)	1965 (393000)	
NR Band n2: 15 MHz		1957.5 (391500)	1960 (392000)	1960 (393000)	
NR Band n2: 20 MHz		1960 (392000)	1960 (392000)	1960 (393000)	
NR Band n2: 25 MHz		1962.5 (392500)	1960 (392000)	1960 (393000)	
NR Band n2: 30 MHz		1965 (393000)	1960 (392000)	1960 (393000)	
NR Band n2: 40 MHz		1970 (394000)	1960 (392000)	1960 (393000)	
NR Band n41: 10 MHz		2501.01 (500202)	2547 (504904)	2593.01 (518606)	2593.01 (518606)
NR Band n41: 15 MHz		2503.5 (500705)	2548.28 (505652)	2592.99 (518598)	2592.99 (518598)
NR Band n41: 20 MHz		2506 (501208)	2549.49 (506608)	2592.99 (518598)	2592.99 (518598)
NR Band n41: 30 MHz		2511 (502200)	2552.01 (510402)	2592.99 (518598)	2592.99 (518598)
NR Band n41: 40 MHz		2516.01 (503200)	2557.34 (511408)	(N/A)	(N/A)
NR Band n41: 50 MHz		2521.02 (504204)	2562.99 (512408)	2592.99 (518598)	2592.99 (518598)
NR Band n41: 60 MHz		2526 (505200)	2568 (513400)	2592.99 (518598)	2592.99 (518598)
NR Band n41: 70 MHz		2531.01 (506200)	2573.01 (514400)	2592.99 (518598)	2592.99 (518598)
NR Band n41: 80 MHz		2536.02 (507204)	(N/A)	2592.99 (518598)	2592.99 (518598)
NR Band n41: 90 MHz		2541 (508200)	(N/A)	2592.99 (518598)	2592.99 (518598)
NR Band n41: 100 MHz		2546.01 (509200)	2552.99 (519500)	2592.99 (518598)	2592.99 (518598)
NR Band n48: 10 MHz		3555 (637000)	3601.68 (640112)	(N/A)	3648.33 (643222)
NR Band n48: 15 MHz		3557.52 (637168)	3602.49 (640168)	(N/A)	3647.49 (643168)
NR Band n48: 20 MHz		3560.01 (637334)	3603.15 (640222)	(N/A)	3646.01 (643122)
NR Band n48: 30 MHz		3565.02 (637968)	3605.01 (640334)	(N/A)	3645 (643000)
NR Band n48: 40 MHz		3570 (638000)	(N/A)	3624.99 (641666)	(N/A)
NR Band n76: 10 MHz		3705 (647000)	(N/A)	3750 (652000)	(N/A)
NR Band n76: 15 MHz		3707.52 (647168)	(N/A)	3750 (650000)	(N/A)
NR Band n76: 20 MHz		3710.01 (647334)	(N/A)	3750 (650000)	(N/A)
NR Band n76: 25 MHz		3712.5 (647500)	(N/A)	3750 (650000)	(N/A)
NR Band n76: 30 MHz		3715.02 (647668)	(N/A)	3750 (650000)	(N/A)
NR Band n76: 40 MHz		3720 (648000)	(N/A)	(N/A)	(N/A)
NR Band n76: 50 MHz		3725.01 (648334)	(N/A)	(N/A)	(N/A)
NR Band n76: 60 MHz		(N/A)	(N/A)	3750 (650000)	(N/A)
NR Band n76: 70 MHz		(N/A)	(N/A)	3750 (650000)	(N/A)
NR Band n76: 80 MHz		(N/A)	(N/A)	3750 (650000)	(N/A)
NR Band n76: 90 MHz		(N/A)	(N/A)	3750 (650000)	(N/A)
NR Band n76: 100 MHz		(N/A)	(N/A)	3750 (650000)	(N/A)
NR Band n77/78 DoD: 10 MHz		3455.01 (693334)	3500.01 (693334)	3544.98 (693332)	3544.98 (693332)
NR Band n77/78 DoD: 15 MHz		3457.5 (693500)	3500.01 (693334)	3542.49 (693168)	3542.49 (693168)
NR Band n77/78 DoD: 20 MHz		3460.02 (693668)	3500.01 (693334)	3540 (693000)	3540 (693000)
NR Band n77/78 DoD: 25 MHz		3462.51 (693834)	3500.01 (693334)	3537.48 (693832)	3537.48 (693832)
NR Band n77/78 DoD: 30 MHz		3465 (694000)	3500.01 (693334)	3534.99 (693666)	3534.99 (693666)
NR Band n77/78 DoD: 40 MHz		3470.01 (694334)	(N/A)	3529.99 (693332)	3529.99 (693332)
NR Band n77/78 DoD: 50 MHz		3475.02 (694668)	(N/A)	3525 (693000)	3525 (693000)
NR Band n77/78 DoD: 60 MHz		(N/A)	3500.01 (693334)	(N/A)	(N/A)
NR Band n77/78 DoD: 70 MHz		(N/A)	3500.01 (693334)	(N/A)	(N/A)
NR Band n77/78 DoD: 80 MHz		(N/A)	3500.01 (693334)	(N/A)	(N/A)
NR Band n77 DoD: 90 MHz		(N/A)	3500.01 (693334)	(N/A)	(N/A)
NR Band n77 DoD: 100 MHz		(N/A)	3500.01 (693334)	(N/A)	(N/A)
NR Band n77: 10 MHz		3705 (647000)	3759 (650000)	3813 (654000)	3867 (657800)
NR Band n77: 15 MHz		3707.52 (647168)	3760.5 (650700)	3813.51 (654234)	3866.49 (657766)
NR Band n77: 20 MHz		3710.01 (647334)	3762 (650800)	3813.99 (654266)	3868.01 (657734)
NR Band n77: 25 MHz		3712.5 (647500)	3763.5 (650900)	3814.5 (654300)	3869.5 (657700)
NR Band n77: 30 MHz		3715.02 (647668)	3765 (651000)	3815.01 (654334)	3869.99 (657666)
NR Band n77: 40 MHz		3720 (648000)	3768 (651200)	3816 (654400)	3864 (657600)
NR Band n77: 50 MHz		3725.01 (648334)	3762.49 (652166)	(N/A)	3860 (654000)
NR Band n77: 60 MHz		3730.02 (648668)	3802.34 (653066)	(N/A)	3867.51 (653934)
NR Band n77: 70 MHz		3735 (649000)	3804.99 (653066)	(N/A)	3870.06 (653944)
NR Band n77: 80 MHz		3740.01 (649334)	(N/A)	3840 (655000)	3875.01 (653334)
NR Band n77: 90 MHz		3745.02 (649668)	(N/A)	3840 (655000)	3875.01 (653334)
NR Band n77: 100 MHz		3750 (650000)	(N/A)	(N/A)	3875.01 (653334)
SCS for NR Band n71, n5, n78, n68, n28, n2, n30		15 kHz			
SCS for NR Band n41, n48, n76, n77		30 kHz			
Modulations Supported in UK		DFT-s-OFDM, BPSK, QPSK, 16QAM, CP-OFDM, QPSK, 16QAM			
A-MPR (Additional MPPE) disabled for SAR Testing?		YES			
EN-DC and NR Carrier Aggregation Possible Combinations		The technical description includes all the possible carrier aggregation combinations.			
LTE Anchor Bands for NR Band n71		2174-896			
LTE Anchor Bands for NR Band n5		2147-3048/68			
LTE Anchor Bands for NR Band n78		SA only			
LTE Anchor Bands for NR Band n68		2157/1213/1430/4871			
LTE Anchor Bands for NR Band n28		5712/13/66/71			
LTE Anchor Bands for NR Band n2		4571/1213/1430/48/66/71			
LTE Anchor Bands for NR Band n30		SA only			
LTE Anchor Bands for NR Band n41		2145/12/25/66/71			
LTE Anchor Bands for NR Band n48		SA only			
LTE Anchor Bands for NR Band n76		2145/1213/1325/2041/66/71			
LTE Anchor Bands for NR Band n77		2157/1313/1425/2041/66/71			

4 INTRODUCTION

The FCC and Innovation, Science, and Economic Development Canada have adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 and Health Canada Safety Code 6 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices. [1]

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [3] and Health Canada RF Exposure Guidelines Safety Code 6 [22]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,” Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

4.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Equation 4-1).

Equation 4-1
SAR Mathematical Equation

$$SAR = \frac{d}{dt} \left(\frac{dU}{dm} \right) = \frac{d}{dt} \left(\frac{dU}{\rho dv} \right)$$

SAR is expressed in units of Watts per Kilogram (W/kg).

$$SAR = \frac{\sigma \cdot E^2}{\rho}$$

where:

- σ = conductivity of the tissue-simulating material (S/m)
- ρ = mass density of the tissue-simulating material (kg/m³)
- E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relation to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[6]

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 15 of 37

REV 22.0
03/30/2022

5 DOSIMETRIC ASSESSMENT

5.1 Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04 (See Table 5-1) and IEEE 1528-2013.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01r04 (See Table 5-1) and IEEE 1528-2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):
 - a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 5-1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
 - b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
 - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

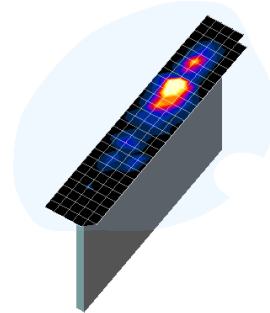


Figure 5-1
Sample SAR Area Scan

Table 5-1
Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04*

Frequency	Maximum Area Scan Resolution (mm) ($\Delta x_{\text{area}}, \Delta y_{\text{area}}$)	Maximum Zoom Scan Resolution (mm) ($\Delta x_{\text{zoom}}, \Delta y_{\text{zoom}}$)	Maximum Zoom Scan Spatial Resolution (mm)			Minimum Zoom Scan Volume (mm) (x,y,z)
			Uniform Grid $\Delta z_{\text{zoom}}(n)$	Graded Grid		
				$\Delta z_{\text{zoom}}(1)^*$	$\Delta z_{\text{zoom}}(n>1)^*$	
≤ 2 GHz	≤ 15	≤ 8	≤ 5	≤ 4	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≤ 4	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≤ 3	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≤ 2.5	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≤ 2	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 22

*Also compliant to IEEE 1528-2013 Table 6

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT			Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo.		Page 16 of 37



REV 22.0
03/30/2022

6 DEFINITION OF REFERENCE POINTS

6.1 EAR REFERENCE POINT

Figure 6-2 shows the front, back and side views of the SAM Twin Phantom. The point “M” is the reference point for the center of the mouth, “LE” is the left ear reference point (ERP), and “RE” is the right ERP. The ERP is 15mm posterior to the entrance to the ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 6-1. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front), also called the Reference Pivoting Line, is not perpendicular to the reference plane (see Figure 6-1). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning [5].

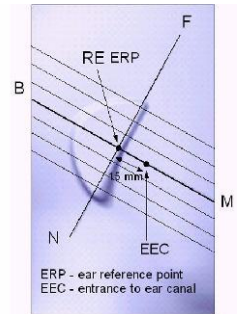


Figure 6-1
Close-Up Side view
of ERP

6.2 HANDSET REFERENCE POINTS

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the acoustic output located along the “vertical centerline” on the front of the device aligned to the “ear reference point” (See Figure 6-3). The acoustic output was then located at the same level as the center of the ear reference point. The test device was positioned so that the “vertical centerline” was bisecting the front surface of the handset at its top and bottom edges, positioning the “ear reference point” on the outer surface of the both the left and right head phantoms on the ear reference point.



Figure 6-2
Front, back and side view of SAM Twin Phantom

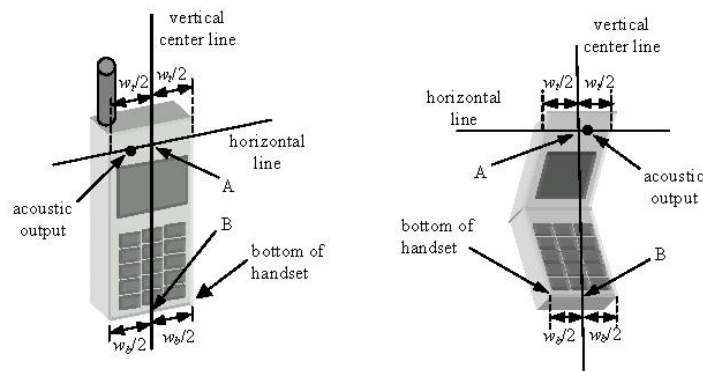


Figure 6-3
Handset Vertical Center & Horizontal Line Reference Points

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo.	Page 17 of 37

7 TEST CONFIGURATION POSITIONS

7.1 Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameters: relative permittivity $\epsilon = 3$ and loss tangent $\delta = 0.02$.

7.2 Positioning for Cheek

1. The test device was positioned with the device close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 7-1), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.

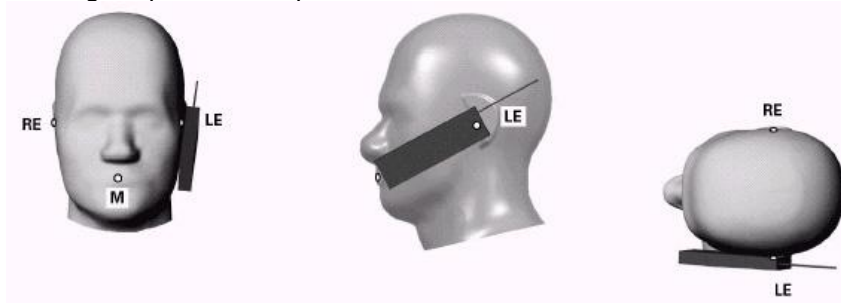


Figure 7-1 Front, Side and Top View of Cheek Position

2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the pinna.
3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the reference plane.
4. The phone was then rotated around the vertical centerline until the phone (horizontal line) was symmetrical with respect to the line NF.
5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the device contact with the ear, the device was rotated about the NF line until any point on the handset made contact with a phantom point below the ear (cheek) (See Figure 7-2).

7.3 Positioning for Ear / 15° Tilt

With the test device aligned in the “Cheek Position”:

1. While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15 degrees.
2. The phone was then rotated around the horizontal line by 15 degrees.
3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the handset touched the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. In this situation, the tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head (see Figure 7-2).

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT			Approved by: Technical Manager
Document S/N: 1M2605130037-04-A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo.		Page 18 of 37

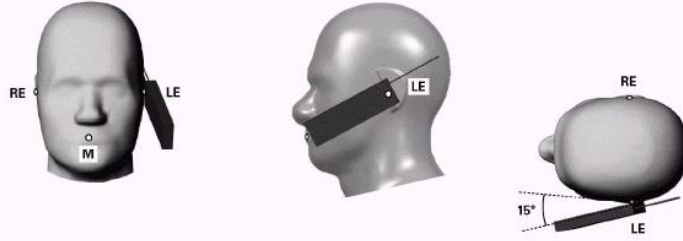


Figure 7-2 Front, Side and Top View of Ear/15° Tilt Position

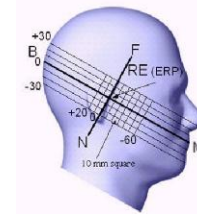


Figure 7-3 Side view w/ relevant markings

7.4 SAR Evaluations near the Mouth/Jaw Regions of the SAM Phantom

Antennas located near the bottom of a phone may require SAR measurements around the mouth and jaw regions of the SAM head phantom. This typically applies to clam-shell style phones that are generally longer in the unfolded normal use positions or to certain older style long rectangular phones. Per IEEE 1528-2013, a rotated SAM phantom is necessary to allow probe access to such regions. Both SAM heads of the TwinSAM-Chin20 are rotated 20 degrees around the NF line. Each head can be removed from the table for emptying and cleaning.

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document FCC KDB Publication 648474 D04v01r03. The SAR required in these regions of SAM should be measured using a flat phantom. The phone should be positioned with a separation distance of 4 mm between the ear reference point (ERP) and the outer surface of the flat phantom shell. While maintaining this distance at the ERP location, the low (bottom) edge of the phone should be lowered from the phantom to establish the same separation distance between the peak SAR location identified by the truncated partial SAR distribution measured with the SAM phantom. The distance from the peak SAR location to the phone is determined by the straight line passing perpendicularly through the phantom surface. When it is not feasible to maintain 4 mm separation at the ERP while also establishing the required separation at the peak SAR location, the top edge of the phone will be allowed to touch the phantom with a separation < 4 mm at the ERP. The phone should not be tilted to the left or right while placed in this inclined position to the flat phantom.

7.5 Body-Worn Accessory Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 7-4). Per FCC KDB Publication 648474 D04v01r03, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D04v01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

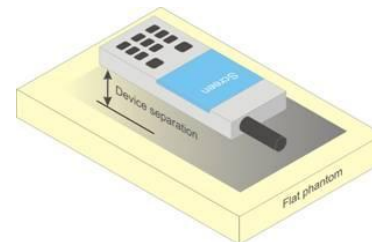


Figure 7-4 Sample Body-Worn Diagram

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
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contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented. Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

7.6 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1g body and 10g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D04v01 should be applied to determine SAR test requirements.

Per KDB Publication 447498 D04v01, Cell phones (handsets) are not normally designed to be used on extremities or operated in extremity only exposure conditions. The maximum output power levels of handsets generally do not require extremity SAR testing to show compliance. Therefore, extremity SAR was not evaluated for this device.

7.7 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06v02r01 where SAR test considerations for handsets ($L \times W \geq 9 \text{ cm} \times 5 \text{ cm}$) are based on a composite test separation distance of 10 mm from the front, back and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D04v01 procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 20 of 37

7.8 Phablet Configurations

For smart phones with a display diagonal dimension > 150 mm or an overall diagonal dimension > 160 mm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, the phablets procedures outlined in KDB Publication 648474 D04v01r03 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally required head and body-worn accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna ≤ 25 mm from that surface or edge, in direct contact with the phantom, for 10g SAR. The UMPC mini-tablet 1g SAR at 5 mm is not required. When hotspot mode applies, 10g SAR is required only for the surfaces and edges with hotspot mode 1g SAR > 1.2 W/kg.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 21 of 37

REV 22.0
03/30/2022

8 RF EXPOSURE LIMITS

8.1 Uncontrolled Environment

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

8.2 Controlled Environment

CONTROLLED ENVIRONMENTS are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Table 8-1
SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT <i>General Population</i> (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT <i>Occupational</i> (W/kg) or (mW/g)
Peak Spatial Average SAR Head	1.6	8.0
Whole Body SAR	0.08	0.4
Peak Spatial Average SAR Hands, Feet, Ankle, Wrists, etc.	4.0	20

1. The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2. The Spatial Average value of the SAR averaged over the whole body.
3. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 22 of 37

9 FCC MEASUREMENT PROCEDURES

Power measurements for licensed transmitters are performed using a base station simulator under digital average power.

9.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D04v01, when SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as *reported* SAR. The highest *reported* SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r03.

9.2 SAR Measurement Conditions for LTE

LTE modes are tested according to FCC KDB 941225 D05v02r04 publication. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 or Anritsu MT8820C simulators are used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

9.2.1 Spectrum Plots for RB Configurations

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

9.2.2 MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

9.2.3 A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

9.2.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r04:

- a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
 - i. The required channel and offset combination with the highest maximum output power is required for SAR.
 - ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
 - iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
- b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 23 of 37

REV 22.0
03/30/2022

- c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
- d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to ½ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is <1.45 W/kg.

9.2.5 TDD

LTE TDD testing is performed using the SAR test guidance provided in FCC KDB 941225 D05v02r04. TDD is tested at the highest duty factor using UL-DL configuration 0 with special subframe configuration 6 and applying the FDD LTE procedures in KDB 941225 D05v02r04. SAR testing is performed using the extended cyclic prefix listed in 3GPP TS 36.211 Section 4.

9.2.6 Downlink Only Carrier Aggregation

Conducted power measurements with LTE Carrier Aggregation (CA) (downlink only) active are made in accordance to KDB Publication 941225 D05Av01r02. The RRC connection is only handled by one cell, the primary component carrier (PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds secondary component carrier(s) (SCC) on the downlink only. All uplink communications and acknowledgements remain identical to specifications when downlink carrier aggregation is inactive on the PCC. Additional conducted output powers are measured with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band. Per FCC KDB Publication 941225 D05Av01r02, no SAR measurements are required for downlink only carrier aggregation configurations when the average output power with downlink only carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink only carrier aggregation inactive.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 24 of 37

10 RF CONDUCTED POWERS

All conducted power measurements for Sub6 WWAN technologies and bands in this section were performed with Time-Averaged SAR Peak exposure mode enabled such that the EUT transmitted continuously at the maximum time averaged transmit power limit (P_{limit}) or the maximum tune-up power (P_{max}), whichever is lower.

10.1 LTE Conducted Powers

Note: Per FCC KDB Publication 941225 D05v02r05, LTE SAR for the lower bandwidths was not required for testing since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest bandwidth and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg. Lower bandwidth conducted powers for all LTE bands can be found in LTE and NR Lower Bandwidth RF Conducted Powers Appendix.

Note: Some bands do not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

10.1.1 LTE Band 71

Table 10-1
LTE Band 71 Ant E Measured P_{limit} all RSI - 20 MHz Bandwidth

LTE Band 71 20 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			133297.0 (680.5 MHz)		
			Conducted Power [dBm]		
QPSK	1	0	18.75	0	0
	1	50	18.35		0
	1	99	18.38		0
	50	0	18.67	0-1	0
	50	25	18.49		0
	50	50	18.41		0
	100	0	18.58		0
16QAM	1	0	18.98	0-1	0
	1	50	18.78		0
	1	99	18.62		0
	50	0	18.59	0-2	0
	50	25	18.48		0
	50	50	18.34		0
	100	0	18.54		0
64QAM	1	0	18.90	0-2	0
	1	50	18.59		0
	1	99	18.57		0
	50	0	18.61	0-3	0
	50	25	18.51		0
	50	50	18.41		0
	100	0	18.56		0
256QAM	1	0	18.12	0-5	0.5
	1	50	17.70		0.5
	1	99	17.78		0.5
	50	0	17.88		0.5
	50	25	17.76		0.5
	50	50	17.62		0.5
	100	0	17.82		0.5

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT			Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo.		Page 25 of 37



REV 22.0
03/30/2022

10.2 NR Conducted Powers

Per October 2020 TCB Workshop Guidance, NR FR1 SAR evaluations are being generally based on adapting the existing LTE SAR procedures (FCC KDB Publication 941225 D05v02r05). Therefore, NR SAR for the lower bandwidths was not required for testing based on the measured output power and the reported NR SAR for the highest bandwidth. Lower bandwidth conducted powers for all NR bands can be found in LTE and NR Lower Bandwidth RF Conducted Powers Appendix.

Note: Some bands do not support non-overlapping channels. Per FCC Guidance, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

10.2.1 NR Band n71

Table 10-2
NR Band n71 Ant E Measured P_{limit} all RSI - 20 MHz Bandwidth
NR Band n71
20 MHz Bandwidth

			Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
Modulation	RB Size	RB Offset	136100 (680.5 MHz)		
			Conducted Power [dBm]		
DFT-s-OFDM QPSK	1	1	18.40	0	0.0
	1	53	18.46		0.0
	1	104	18.03		0.0
	50	0	18.27	0-1	0.0
	50	28	18.21	0	0.0
	50	56	18.15	0-1	0.0
	100	0	18.23		0.0
DFT-s-OFDM 16QAM	1	1	18.03	0-1	0.0
CP-OFDM QPSK	1	1	18.45	0-1.5	0.0

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT			Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 		Page 26 of 37

REV 22.0
03/30/2022

11 SYSTEM VERIFICATION

11.1 Tissue Verification

Table 11-1
Measured Head Tissue Properties

Calibrated for Tests Performed on	Tissue Type	Tissue Temp During Calibration (°C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ϵ	Target Conductivity, σ (s/M)	Target Dielectric Constant, ϵ	Cond Dev	Perm Dev
05/18/2026	750 Head	21.1	680	0.866	43.814	0.888	42.305	-2.477%	3.567%
			695	0.871	43.751	0.889	42.227	-2.025%	3.609%
			710	0.876	43.698	0.890	42.149	-1.573%	3.675%
			725	0.881	43.652	0.891	42.071	-1.122%	3.758%
			750	0.890	43.576	0.894	41.942	-0.447%	3.896%
			770	0.897	43.506	0.895	41.838	0.223%	3.987%
			785	0.902	43.449	0.896	41.760	0.670%	4.045%
			800	0.907	43.392	0.897	41.682	1.115%	4.102%
05/20/2026	750 Head	21.6	680	0.846	40.649	0.888	42.305	-4.730%	-3.914%
			695	0.850	40.586	0.889	42.227	-4.387%	-3.886%
			710	0.855	40.525	0.890	42.149	-3.933%	-3.853%
			725	0.860	40.470	0.891	42.071	-3.479%	-3.805%
			750	0.868	40.393	0.894	41.942	-2.908%	-3.693%
			770	0.874	40.332	0.895	41.838	-2.346%	-3.600%
			785	0.879	40.280	0.896	41.760	-1.897%	-3.544%
			800	0.884	40.223	0.897	41.682	-1.449%	-3.500%

The above measured tissue parameters were used in the DASY software. The DASY software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies (per KDB Publication 865664 D01v01r04 and IEEE 1528-2013 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT			Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 		Page 27 of 37

11.2 Test System Verification

Prior to SAR assessment, the system is verified to $\pm 10\%$ of the SAR measurement on the reference dipole at the time of calibration by the calibration facility. Full system validation status and result summary can be found in SAR System Validation Appendix.

Table 11-2
System Verification Results – Head

System Verification TARGET & MEASURED																					
SAR System	Tissue Frequency (MHz)	Tissue Type	Date	Amb. Temp. (C)	Liquid Temp. (C)	Input Power (W)	Source SN	Probe SN	DAE	Measured SAR 1g (W/kg)	1W Target SAR 1g (W/kg)	1W Normalized SAR 1g (W/kg)	Deviation 1g (%)	Measured SAR 10g (W/kg)	1W Target SAR 10g (W/kg)	1W Normalized SAR 10g (W/kg)	Deviation 10g (%)	Measured 4cm2 APD (W/m2)	1W Target 4cm2 APD (W/m2)	1W Normalized 4cm2 APD (W/m2)	Deviation 4cm2 APD (%)
S5	750	Head	05-18-2026	20.5	21.1	0.2	1046	7565	1466	1.55	8.6	7.75	-9.88%	1.03	5.61	5.15	-8.20%	N/A	N/A	N/A	N/A
S5	750	Head	05-20-2026	22	21.6	0.2	1046	7565	1466	1.58	8.6	7.9	-8.14%	1.05	5.61	5.25	-6.42%	N/A	N/A	N/A	N/A

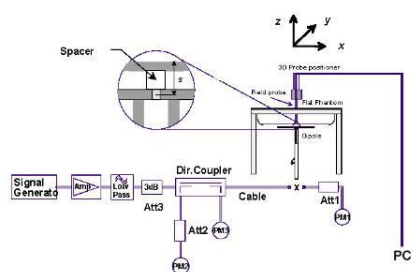


Figure 11-1
System Verification Setup Diagram



Figure 11-2
System Verification Setup Photo

FCC ID: A3LSMA576U		RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo.		Page 28 of 37

REV 22.0
03/30/2022

12 SAR DATA SUMMARY

12.1 LTE Band 71 Standalone SAR

Table 12-1 | Plot A1

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power Drift [dB]	Frequency [MHz]	Channel #	MPR [dB]	Max Allowed Power [dBm]	Conducted Power [dBm]	RB Size	RB Offset	Test Position	Spacing [mm]	Measured 1g SAR [W/kg]	Power Scaling Factor	Reported 1g SAR [W/kg]	Exposure Ratio (1g SAR)	Plot #	Limit [dBm]	Overall Limit [dBm]
Head	LTE Band 71	20	QPSK	E	3794M	1:1	-0.01	680.50	133297	0.0	20.0	18.75	1	0	Right Cheek	0	0.202	1.334	0.209	0.168		25.6	
Head	LTE Band 71	20	QPSK	E	3794M	1:1	-0.01	680.50	133297	0.0	20.0	18.67	50	0	Right Cheek	0	0.195	1.358	0.257	0.157		25.9	
Head	LTE Band 71	20	QPSK	E	3794M	1:1	0.02	680.50	133297	0.0	20.0	18.75	1	0	Right Tilt	0	0.180	1.334	0.240	0.150		26.1	
Head	LTE Band 71	20	QPSK	E	3794M	1:1	0.03	680.50	133297	0.0	20.0	18.67	50	0	Right Tilt	0	0.165	1.358	0.224	0.140		26.4	
Head	LTE Band 71	20	QPSK	E	3794M	1:1	0.01	680.50	133297	0.0	20.0	18.75	1	0	Left Cheek	0	0.237	1.334	0.316	0.196		25.0	
Head	LTE Band 71	20	QPSK	E	3794M	1:1	0.02	680.50	133297	0.0	20.0	18.67	50	0	Left Cheek	0	0.219	1.358	0.297	0.166		25.2	
Head	LTE Band 71	20	QPSK	E	3794M	1:1	0.01	680.50	133297	0.0	20.0	18.75	1	0	Left Tilt	0	0.240	1.334	0.320	0.200	Plot	24.9	
Head	LTE Band 71	20	QPSK	E	3794M	1:1	0.03	680.50	133297	0.0	20.0	18.67	50	0	Left Tilt	0	0.225	1.358	0.306	0.191		25.1	
ANSI/IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																	Head 1.6 W/kg (mW/g) averaged over 1 gram						

Table 12-2 | Plot A2

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power Drift [dB]	Frequency [MHz]	Channel #	MPR [dB]	Max Allowed Power [dBm]	Conducted Power [dBm]	RB Size	RB Offset	Test Position	Spacing [mm]	Measured 1g SAR [W/kg]	Power Scaling Factor	Reported 1g SAR [W/kg]	Exposure Ratio (1g SAR)	Plot #	Limit [dBm]	Overall Limit [dBm]
Body-worn/hotspot	LTE Band 71	20	QPSK	E	3794M	1:1	-0.01	680.50	133297	0.0	20.0	18.75	1	0	Back	5	0.209	1.334	0.399	0.249	Plot	23.9	
Body-worn/hotspot	LTE Band 71	20	QPSK	E	3794M	1:1	-0.01	680.50	133297	0.0	20.0	18.67	50	0	Back	5	0.274	1.358	0.372	0.233		24.2	
Body-worn/hotspot	LTE Band 71	20	QPSK	E	3794M	1:1	-0.01	680.50	133297	0.0	20.0	18.75	1	0	Front	5	0.199	1.334	0.212	0.133		26.7	
Body-worn/hotspot	LTE Band 71	20	QPSK	E	3794M	1:1	-0.01	680.50	133297	0.0	20.0	18.67	50	0	Front	5	0.156	1.358	0.212	0.133		26.7	
Hotspot	LTE Band 71	20	QPSK	E	3794M	1:1	-0.06	680.50	133297	0.0	20.0	18.75	1	0	Top	10	0.081	1.334	0.108	0.068		29.6	
Hotspot	LTE Band 71	20	QPSK	E	3794M	1:1	0.01	680.50	133297	0.0	20.0	18.67	50	0	Top	10	0.072	1.358	0.098	0.061		30.0	
Hotspot	LTE Band 71	20	QPSK	E	3794M	1:1	0.01	680.50	133297	0.0	20.0	18.75	1	0	Right	10	0.093	1.334	0.124	0.079		29.0	
Hotspot	LTE Band 71	20	QPSK	E	3794M	1:1	0.01	680.50	133297	0.0	20.0	18.67	50	0	Right	10	0.090	1.358	0.122	0.076		29.1	
ANSI/IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																	Body 1.6 W/kg (mW/g) averaged over 1 gram						

12.2 NR Band n71 Standalone SAR

Table 12-3 | Plot A3

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power Drift [dB]	Frequency [MHz]	Channel #	Waveform	MPR [dB]	Max Allowed Power [dBm]	Conducted Power [dBm]	RB Size	RB Offset	Test Position	Spacing [mm]	Measured 1g SAR [W/kg]	Power Scaling Factor	Reported 1g SAR [W/kg]	Exposure Ratio (1g SAR)	Plot #	Limit [dBm]	Overall Limit [dBm]
Head	NR Band n71	20	QPSK	E	3794M	1:1	-0.03	680.50	136100	DFT-s-OFDM	0.0	20.0	18.46	1	53	Right Cheek	0	0.149	1.426	0.212	0.133		26.7	
Head	NR Band n71	20	QPSK	E	3794M	1:1	-0.02	680.50	136100	DFT-s-OFDM	0.0	20.0	18.27	50	0	Right Cheek	0	0.165	1.489	0.246	0.154		26.0	
Head	NR Band n71	20	QPSK	E	3794M	1:1	0.05	680.50	136100	DFT-s-OFDM	0.0	20.0	18.46	1	53	Right Tilt	0	0.116	1.426	0.165	0.103		27.8	
Head	NR Band n71	20	QPSK	E	3794M	1:1	0.00	680.50	136100	DFT-s-OFDM	0.0	20.0	18.27	50	0	Right Tilt	0	0.133	1.489	0.188	0.124		27.0	
Head	NR Band n71	20	QPSK	E	3794M	1:1	0.00	680.50	136100	DFT-s-OFDM	0.0	20.0	18.46	1	53	Left Cheek	0	0.177	1.426	0.252	0.158		25.9	
Head	NR Band n71	20	QPSK	E	3794M	1:1	0.05	680.50	136100	DFT-s-OFDM	0.0	20.0	18.27	50	0	Left Cheek	0	0.190	1.489	0.283	0.177		25.4	
Head	NR Band n71	20	QPSK	E	3794M	1:1	0.00	680.50	136100	DFT-s-OFDM	0.0	20.0	18.46	1	53	Left Tilt	0	0.177	1.426	0.252	0.158		25.9	
Head	NR Band n71	20	QPSK	E	3794M	1:1	0.01	680.50	136100	DFT-s-OFDM	0.0	20.0	18.27	50	0	Left Tilt	0	0.194	1.489	0.289	0.181		25.3	
Head	NR Band n71	20	QPSK	E	3794M	1:1	-0.01	680.50	136100	CP-OFDM	0.0	20.0	18.45	1	1	Left Tilt	0	0.198	1.429	0.283	0.177	Plot	25.4	
ANSI/IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																		Head 1.6 W/kg (mW/g) averaged over 1 gram						

Table 12-4 | Plot A4

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power Drift [dB]	Frequency [MHz]	Channel #	Waveform	MPR [dB]	Max Allowed Power [dBm]	Conducted Power [dBm]	RB Size	RB Offset	Test Position	Spacing [mm]	Measured 1g SAR [W/kg]	Power Scaling Factor	Reported 1g SAR [W/kg]	Exposure Ratio (1g SAR)	Plot #	Limit [dBm]	Overall Limit [dBm]
Body-worn/Hotspot	NR Band n71	20	QPSK	E	3794M	1:1	-0.04	680.50	136100	DFT-s-OFDM	0.0	20.0	18.46	1	53	Back	5	0.186	1.426	0.265	0.166		25.7	
Body-worn/Hotspot	NR Band n71	20	QPSK	E	3794M	1:1	-0.03	680.50	136100	DFT-s-OFDM	0.0	20.0	18.27	50	0	Back	5	0.218	1.489	0.325	0.203		24.8	
Body-worn/Hotspot	NR Band n71	20	QPSK	E	3794M	1:1	0.01	680.50	136100	CP-OFDM	0.0	20.0	18.45	1	1	Back	5	0.224	1.429	0.320	0.200	Plot	24.9	
Body-worn/Hotspot	NR Band n71	20	QPSK	E	3794M	1:1	-0.07	680.50	136100	DFT-s-OFDM	0.0	20.0	18.46	1	53	Front	5	0.136	1.426	0.194	0.121		27.1	
Body-worn/Hotspot	NR Band n71	20	QPSK	E	3794M	1:1	0.00	680.50	136100	DFT-s-OFDM	0.0	20.0	18.27	50	0	Front	5	0.148	1.489	0.220	0.138		26.5	
Hotspot	NR Band n71	20	QPSK	E	3794M	1:1	0.01	680.50	136100	DFT-s-OFDM	0.0	20.0	18.46	1	53	Top	10	0.058	1.426	0.083	0.052		30.8	
Hotspot	NR Band n71	20	QPSK	E	3794M	1:1	-0.05	680.50	136100	DFT-s-OFDM	0.0	20.0	18.27	50	0	Top	10	0.057	1.489	0.085	0.053		30.7	
Hotspot	NR Band n71	20	QPSK	E	3794M	1:1	0.04	680.50	136100	DFT-s-OFDM	0.0	20.0	18.46	1	53	Right	10	0.049	1.426	0.070	0.044		31.5	
Hotspot	NR Band n71	20	QPSK	E	3794M	1:1	0.01	680.50	136100	DFT-s-OFDM	0.0	20.0	18.27	50	0	Right	10	0.055	1.489	0.082	0.051		30.8	
ANSI/IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																		Body 1.6 W/kg (mW/g) averaged over 1 gram						

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT																		Approved by: Technical Manager			
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit https://www.blockchain-verified.com or by clicking on the Blockchain logo.																	Page 29 of 37			

REV 22.0
03/30/2022

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12.3 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, and FCC KDB Publication 447498 D04v01.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D04v01.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 5 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r03, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported body-worn SAR was ≤ 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01v01r04, variability SAR tests were performed when the measured SAR results for a frequency band were greater than or equal to 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see section 14 for variability analysis.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v02r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 7.7 for more details).
10. Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the display diagonal dimension is > 150 mm and < 200 mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg.
11. Unless otherwise noted, when 10g SAR measurement is considered, a factor of 2.5 is applied to the 1g thresholds for the equivalent test cases.
12. This device uses S.LSI TAS for WWAN, WIFI, and Bluetooth operations to control and manage transmitting power in real time to ensure RF Exposure compliance. Per FCC Guidance, compliance for was assessed at the minimum of the time averaged power and the maximum output power for each band/mode/exposure condition (RSI).
13. Per October 2020 TCB Workshop notes, absorbed power density (APD) using a 4cm² averaging area is reported based on SAR measurements.

LTE Notes:

1. LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r04. The general test procedures used for testing can be found in Section 9.2.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 and MCC=001 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).
4. Per FCC KDB Publication 447498 D04v01, when the reported 1g SAR measured at the highest output power channel in a given a test configuration was > 0.6 W/kg for LTE B41 or LTE B48, testing at the other channels was required for such test configurations.
5. TDD LTE was tested per the guidance provided in FCC KDB Publication 941225 D05v02r04. Testing was performed using UL-DL configuration 0 with 6 UL subframes and 2 S subframes using extended cyclic prefix only and special subframe configuration 6. SAR tests were performed at maximum output power

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 30 of 37

REV 22.0
03/30/2022

and worst-case transmission duty factor in extended cyclic prefix. Per 3GPP 36.211 Section 4, the duty factor for special subframe configuration 6 using extended cyclic prefix is 0.633.

6. Per KDB Publication 941225 D05Av01r02, SAR for downlink only LTE CA operations was not needed since the maximum average output power in LTE CA mode was not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive.
7. For LTE Band 48 per FCC guidance, SAR was first measured with only a single carrier active in the uplink (carrier aggregation not active). For each exposure condition, the uplink CA scenario with two component carriers was additionally tested for the configuration with the highest SAR when carrier aggregation was not active. The SCC was configured with the closest available contiguous channel. The two component carriers were configured so the resource blocks are physically allocated side by side to achieve the maximum output power.

NR Notes:

1. NR implementation supports SA and NSA mode. In EN-DC mode, NR operates with the LTE Bands shown in the NR FR1 checklist acting as anchor bands. Per FCC guidance, SAR tests for NR Bands and LTE Anchors Bands were performed separately due to limitations in SAR probe calibration factors.
2. Due to test setup limitations, SAR testing for NR TDD was performed using test mode software to establish the connection.
3. Simultaneous transmission analysis for EN-DC operations is addressed in the Part 2 Test Report (Serial Number can be found in the bibliography).
4. This device additionally supports some EN-DC conditions where additional LTE carriers are added on the downlink only.
5. Per FCC Guidance, NR modulations and RB Sizes/Offsets were selected for testing such that configurations with the highest output power were evaluated for SAR tests.
6. Per FCC KDB Publication 447498 D04v01, when the reported NR Band n77 C-Band SAR measured at the highest output power channel in a given a test configuration was > 0.4 W/kg for 1g evaluations and > 1 W/kg for 10g evaluation, testing at the other channels was required for such test configurations.
7. Per FCC KDB Publication 447498 D04v01, when the reported NR Band n41 and NR Band n48 SAR measured at the highest output power channel in a given a test configuration was > 0.6 W/kg for 1g evaluations and > 1.5 W/kg for 10g evaluation, testing at the other channels was required for such test configurations.
8. SRS was tested with CW signal per S.LSI guidance.
9. For final implementation, NR Band n41, n48, n77, and n78 slot configuration is synchronized using maximum duty cycle of 100%. SAR testing was performed using FTM mode with a 100% duty cycle applied to match final duty cycle.
10. Per FCC Guidance, C-Band for NR n77 (3705 – 3975 MHz) was fully tested according to FCC procedures. For each exposure condition and antenna, the worst-case position was additionally evaluated for the NR n77 DoD (3455.01 – 3544.98 MHz)

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 31 of 37

13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01r04, SAR measurement variability evaluation was not required since all reported SAR results were below 0.80 W/kg.

13.2 Measurement Uncertainty

The measured SAR was <1.5 W/kg for 1g and <3.75 W/kg for 10g for all frequency bands. Therefore, per KDB Publication 865664 D01v01r04, the extended measurement uncertainty analysis per IEEE 1528-2013 was not required.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 32 of 37

14 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	N5182A	MXG Vector Signal Generator	2026-04-13	Annual	2027-04-12	MY48180366
Anritsu	MS46131A	Vector Network Analyzer	2025-10-16	Annual	2026-10-15	2537502
Mini-Circuits	PWR-6GHS	USB Power sensor	2026-04-13	Annual	2027-04-12	12507290029
Mini-Circuits	PWR-6GHS	USB Power sensor	2026-04-13	Annual	2027-04-12	12507290005
Control Company	4052	Long Stem Thermometer	2025-07-18	Annual	2026-07-17	200645912
Testo	ALARM-HYGROMETER	ALARM-HYGROMETER	2025-07-03	Annual	2026-07-02	83316952
Testo	ALARM-HYGROMETER	ALARM-HYGROMETER	2025-07-03	Annual	2026-07-02	83316953
Keysight Technologies	N9020A	MXA Signal Analyzer	2025-07-07	Annual	2026-07-06	MY48010233
Mini-Circuits	NLP-1200+	Low Pass Filter	2025-07-03	Annual	2026-07-02	UU13301538
Mini-Circuits	ZUDC10-83-S+	Directional Coupler	2025-07-03	Annual	2026-07-02	2111
Mini-Circuits	BW-N3W5+	Attenuator(3dB)	2025-07-17	Annual	2026-07-16	1608-1
Mini-Circuits	BW-N6W5+	Attenuator(6dB)	2025-07-03	Annual	2026-07-02	1605
Mini-Circuits	BW-N10W5+	Attenuator(10dB)	2025-07-03	Annual	2026-07-02	1607
Seekonk	NC-100	Torque Wrench	2026-01-18	6 Month	2026-07-17	47639-29
Anritsu	MT8000A	Radio Communication Test Station	2026-04-13	Annual	2027-04-12	6261987986
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	2025-10-24	Annual	2026-10-23	131453
SPEAG	DAK-3.5	Dielectric Assessment Kit	2025-07-14	Annual	2026-07-13	1039
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1515
SPEAG	D750V3	750 MHz SAR Dipole	2026-02-03	Annual	2027-02-02	1046
SPEAG	DAE4	Dasy Data Acquisition Electronics	2026-01-11	Annual	2027-01-10	1466
SPEAG	EX3DV4	SAR Probe	2026-01-13	Annual	2027-01-12	7565

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.

Note: All equipment was used solely within its respective calibration period.

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT			Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 		Page 33 of 37

REV 22.0
03/30/2022

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15 MEASUREMENT UNCERTAINTIES

Note: The tables below represent the worst-case uncertainty budget among the uncertainty budgets of all testing laboratories listed in Section 1.2

Applicable for SAR measurements < 6GHz on a flat phantom:

SAR Uncertainty Budget based on IEEE 1528-2013 and SPEAG (0.3 GHz to 6 GHz)

a	b	c	d	e f(d,k)	f	g	h cx/fe	i exg/e	k
Uncertainty component	Reference	Tol. (± %)	Prob. dist.	Dvi.	ci (1g)	ci (10g)	lg ui (± %)	10g ui (± %)	vi
Measurement system									
Probe calibration	E.2.1	6.55	N	1	1	1	6.55	6.55	∞
Axial isotropy	E.2.2	0.25	N	1	0.707	0.707	0.18	0.18	∞
Hemispherical isotropy	E.2.2	1.30	N	1	0.707	0.707	0.92	0.92	∞
Boundary effect	E.2.3	2.00	R	1.73	1	1	1.15	1.15	∞
Linearity	E.2.4	0.30	R	1.73	1	1	0.17	0.17	∞
System detection limits	E.2.4	0.25	R	1.73	1	1	0.14	0.14	∞
Modulation response	E.2.5	4.80	R	1.73	1	1	2.77	2.77	∞
Readout electronics	E.2.6	0.30	N	1	1	1	0.30	0.30	∞
Response time	E.2.7	1.01	R	1.73	1	1	0.58	0.58	∞
Integration time	E.2.8	2.60	R	1.73	1	1	1.50	1.50	∞
RF ambient conditions - noise	E.6.1	3.00	R	1.73	1	1	1.73	1.73	∞
RF ambient conditions - reflections	E.6.1	3.00	R	1.73	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	E.6.2	0.04	R	1.73	1	1	0.02	0.02	∞
Probe positioning with respect to phantom shell	E.6.3	0.80	R	1.73	1	1	0.46	0.46	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	E.5	4.00	R	1.73	1	1	2.31	2.31	∞
Test sample related									
Test sample positioning	E.4.2	3.12	N	1	1	1	3.12	3.12	35
Device holder uncertainty	E.4.1	1.67	N	1	1	1	1.67	1.67	5
Output power variation - SAR drift	E.2.9	5.00	R	1.73	1	1	2.89	2.89	∞
SAR scaling	E.6.5	0.00	R	1.73	1	1	0.00	0.00	∞
Phantom and tissue parameters									
Phantom shell uncertainty - shape, thickness and permittivity	E.3.1	7.60	R	1.73	1	1	4.39	4.39	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	0.00	N	1	1	1	0.00	0.00	∞
Liquid conductivity measurement	E.3.3	2.50	N	1	0.78	0.71	1.95	1.78	∞
Liquid permittivity measurement	E.3.3	2.50	N	1	0.23	0.26	0.58	0.65	∞
Liquid conductivity - temperature uncertainty	E.3.4	3.36	R	1.73	0.78	0.71	1.51	1.38	∞
Liquid permittivity - temperature uncertainty	E.3.4	0.77	R	1.73	0.23	0.26	0.10	0.12	∞
Liquid Conductivity - deviation from target values	E.3.2	5.00	R	1.73	0.64	0.43	1.85	1.24	∞
Liquid Permittivity - deviation from target values	E.3.2	5.00	R	1.73	0.60	0.49	1.73	1.41	∞
Combined standard uncertainty							11.0	10.8	40
Expanded uncertainty (95% confidence interval)							21.9	21.6	

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT			Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo.		Page 34 of 37



16 CONCLUSION

16.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Innovation, Science, and Economic Development Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 35 of 37

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FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 36 of 37

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FCC ID: A3LSMA576U	RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2605130037-04.A3L	DUT Type: Portable Handset	This report is Blockchain Verified. To verify the report authenticity, please visit HTTPS://WWW.BLOCKCHAIN-VERIFIED.COM or by clicking on the Blockchain logo. 	Page 37 of 37