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RF EXPOSURE PART 1 TEST REPORT

Applicant Name:

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

Date of Testing:

04/14/2025 - 06/02/2025

Test Site/Locations:

Element, Columbia, MD, USA

Document Serial No.:

1M2505200052-04.A3L

FCC ID: A3LSMF966JPN

APPLICANT: SAMSUNG ELECTRONICS CO., LTD.

DUT Type: Portable Handset
Application Type: Class II Permissive Change
FCC Rule Part(s): CFR §2.1093
Model(s): SC-56F
Additional Model(s): SCG34

Equipment Class	Band & Mode	Tx Frequency	SAR				
			1g F/C Head (W/kg)	1g F/O Head (W/kg)	1g Body-Worn (W/kg)	1g Hotspot (W/kg)	1g Body (W/kg)
PCE	LTE Band 41	2498.5 - 2687.5 MHz	0.83	0.29	1.19	1.19	0.48
PCE	NR Band n66	1712.5 - 1777.5 MHz	1.07	0.61	1.06	1.06	0.51
PCE	NR Band n41	2501.01 - 2685 MHz	1.22	0.33	0.95	0.95	0.81
Simultaneous SAR per KDB 690783 D01v01r03:			1.59	1.59	1.32	1.44	1.50
Overall SAR Summary							
RF Exposure Position	Folder Close - Head	Folder Open - Head	Body-worn	Product Specific (Wireless Router)	Folder Open - Body	Simultaneous Transmission	
SAR (W/kg)	1.22	1.04	1.19	1.19	1.14	1.59	
Distance (mm)	0	0	5	10	10, 13, 0	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 1M2502270040-20.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
Executive Vice President



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FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 1 of 51

REV 22.0
03/30/2022

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TABLE OF CONTENTS

1	TEST LABORATORY INFORMATION.....	3
2	DEVICE UNDER TEST	4
3	LTE AND NR INFORMATION	15
4	INTRODUCTION	17
5	DOSIMETRIC ASSESSMENT	18
6	DEFINITION OF REFERENCE POINTS.....	19
7	TEST CONFIGURATION POSITIONS.....	20
8	RF EXPOSURE LIMITS	24
9	FCC MEASUREMENT PROCEDURES.....	26
10	RF CONDUCTED POWERS.....	32
11	SYSTEM VERIFICATION.....	38
12	SAR DATA SUMMARY	40
13	SAR REFERENCE DATA SUMMARY	42
14	SAR MEASUREMENT VARIABILITY	45
15	EQUIPMENT LIST.....	46
16	MEASUREMENT UNCERTAINTIES.....	47
17	CONCLUSION.....	49
18	REFERENCES	50
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		
APPENDIX I: FCC ID A3LSMF966U C2PC SAR TEST REPORT PART 0, PART 1		

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 2 of 51

REV 22.0
03/30/2022

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
	 
Measurement system No.	J, L, N

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: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 3 of 51

REV 22.0
03/30/2022

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
LTE Band 12	Voice/Data	699.7 - 715.3 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 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 2	Voice/Data	1850.7 - 1909.3 MHz
LTE Band 41	Voice/Data	2498.5 - 2687.5 MHz
NR Band n5	Voice/Data	826.5 - 846.5 MHz
NR Band n66	Voice/Data	1712.5 - 1777.5 MHz
NR Band n41	Voice/Data	2501.01 - 2685 MHz
2.4 GHz WIFI	Voice/Data	2412 - 2472 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: 5945 - 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
UWB	Data	6489.6 - 7987.2 MHz

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 4 of 51

REV 22.0
03/30/2022

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2.2 Data Referencing

Reference Device (FCC ID)	Variant Device (FCC ID)	Equipment Class	Data Reference Bands/Modes	Supporting Data
A3LSMF966U	A3LSMF966JPN	PCE	LTE Band 41	Spot-check SAR data provided in Section 13 of this report.
			NR Band n66	
			NR Band n41	

Per manufacturer declaration, there are two portable handset devices FCC ID: A3LSMF966U and FCC ID: A3LSMF966JPN, with high degree of similarity, reference model FCC ID: A3LSMF966U and variant model FCC ID: A3LSMF966JPN. Both models share the same material, form factor, circuit design, and components, including antennas and their locations. The reference and variant models use the same material, form factor, circuit design, and components, including antennas and their locations. The reference and variant models have the same tuneup tolerances for some bands and modes.

Based on the Data Referencing Test Plan, testing was done fully on the reference model FCC ID: A3LSMF966U, while spot-check verification has been performed on variant model FCC ID: A3LSMF966JPN. The spot check verification has been performed in the worst case for each exposure condition and if the spot check SAR value was higher, it was applied to the simultaneous transmission results and SAR CHAR on variant model FCC ID: A3LSMF966JPN. The reference and variant model comparison data summary is included in section 13. Please see the original filing and SAR reference test data in Appendix H: for complete compliance evaluation for this model.

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 5 of 51

REV 22.0
03/30/2022

2.3 Time-Averaging Algorithm for RF Exposure Compliance

2.3.1 Time-Averaged Algorithm

This Device is enabled with the Qualcomm® Smart Transmit Gen2 feature with antenna grouping and a `multi_tx_factor` of 1.1. This feature performs time-averaging algorithm in real time to control and manage transmitting power and ensure the time-averaged RF exposure is in compliance with FCC requirements all the time. Refer to Compliance Summary document for detailed description of Qualcomm® Smart Transmit feature (report SN could be found in Section 2.12– Bibliography).

Note that NFC/UWB operations are not enabled with Smart Transmit.

The Smart Transmit algorithm maintains the time-averaged transmit power, in turn, time-averaged RF exposure of `SAR_design_target` or `PD_design_target`, below the predefined time-averaged power limit (i.e., P_{limit} for WWAN sub-6/WLAN/BT radio, and `input.power.limit` for 5G mmW NR), for each characterized technology and band. Characterization is achieved by determining P_{limit} for WWAN sub-6/WLAN/BT that corresponds to the exposure design targets after accounting for all device design related uncertainties, i.e., `SAR_design_target` (<FCC SAR Limit) for sub-6 radio. The SAR characterization is denoted as SAR CHAR in this report (see SAR Summary Section and Part 0 SAR Test Results for P_{limit} Calculations Appendix).

Smart Transmit allows the device to transmit at higher power instantaneously, as high as P_{max} , when needed, but enforces power limiting to maintain time-averaged transmit power to P_{limit} . Below table shows P_{limit} EFS settings and maximum tune up output power P_{max} configured for this EUT for various transmit conditions (Device State Index DSI). Note that the device uncertainty for WWAN sub-6/WLAN/BT is 1.0dB for this EUT.

Based on Qualcomm guidance, for `multi_tx_factor` > 1.0, the reported SAR for each tech/band/ant/DSI is scaled using $\min\{P_{limit} * \text{multi_tx_factor} * 10^{(\text{sub6 device uncertainty}/10)}, P_{max}\}$ in simultaneous transmission valuations.

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 6 of 51

REV 22.0
03/30/2022

Exposure Scenario			Maximum Tune-Up Output Power*	F/O Body	F/C Body	F/O Head	F/C Head
Averaging Volume				1g	1g/10g	1g	1g
Spacing				5mm	0mm, 5 mm, 10 mm	0mm	0mm
Configuration							
DSI				0	1	2	3
Technology/Band	Antenna	Antenna Group	P _{max}	P _{limit}	P _{limit}	P _{limit}	P _{limit}
GSM 850	A, A+C	AG0	24.8	21.3	25.6	32.8	29.4
GSM 1900	B	AG0	21.6	14.3	18.3	32.5	32.3
UMTS 850	A, A+C	AG0	24.3	20.5	25.7	27.6	28.5
LTE Band 12	A, A+C	AG0	24.2	21.0	25.3	29.4	29.6
LTE Band 13	A, A+C	AG0	24.5	21.0	26.1	29.2	30.1
LTE Band 5	A, A+C	AG0	24.5	20.5	25.4	28.5	28.8
LTE Band 66/4	B	AG0	24.5	14.5	18.0	30.7	31.2
LTE Band 2	B	AG0	24.0	14.5	18.0	33.6	29.5
LTE Band 41	B	AG0	22.0	13.5	17.5	35.9	35.3
LTE Band 41	G	AG1	22.0	11.5	16.5	15.0	15.0
NR Band n5	A, A+C	AG0	24.0	20.5	25.5	28.4	28.4
NR Band n66	B	AG0	24.0	14.5	18.0	30.8	29.6
NR Band n66	G	AG1	23.0	13.5	17.0	19.5	19.5
NR Band n41 PC3	G	AG1	24.0	11.5	16.5	16.0	16.0
NR Band n41 PC3	B	AG0	24.0	13.5	17.5	34.9	35.1
2.4 GHz WIFI	H	AG1	19.0	17.0	17.0	24.0	29.6
2.4 GHz WIFI	F	AG1	19.0	17.0	17.0	19.7	24.5
2.4 GHz WIFI	MIMO	AG1	17.0	19.9	21.5	21.2	26.2
5 GHz WIFI	F	AG1	17.0	16.0	16.0	21.1	27.2
5 GHz WIFI	E	AG1	17.0	16.0	16.0	23.6	19.5
5 GHz WIFI	MIMO	AG1	17.0	16.0	16.0	20.9	18.9
6 GHz WIFI	F	AG1	16.0	14.0	14.0	25.0	26.3
6 GHz WIFI	E	AG1	16.0	14.0	14.0	28.6	21.0
6 GHz WIFI	MIMO	AG1	16.0	14.0	14.0	24.8	20.3
2.4 GHz Bluetooth	H	AG1	16.5	24.6	28.1	23.2	35.0
2.4 GHz Bluetooth	F	AG1	16.5	20.9	24.8	20.0	28.1
2.4 GHz Bluetooth	MIMO	AG1	16.5	18.2	21.0	17.7	24.5

Notes:

1. When $P_{max} < P_{limit}$ EFS, the DUT will operate at a power level up to P_{max}
2. All P_{limit} EFS 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 GMSK, TDD, or OFDM modulation schemes (e.g. GSM, LTE TDD, WLAN, BT).
3. 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.
4. All MIMO P_{max} and P_{limit} are defined per antenna chain.
5. As part of this permissive change, the EFS P_{limit} for several bands were reduced (while remaining above P_{max}) to ensure continued compliance with simultaneous transmission SAR requirements. Conducted power levels and SAR test data remain unchanged.

The maximum time-averaged output power (dBm) for any WWAN sub-6/WLAN/BT technology, band, and DSI is the minimum of ("P_{limit} EFS" 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.

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 7 of 51

REV 22.0
03/30/2022

2.4 Power Reduction for SAR

FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device when being used in both the folder closed and folder open use conditions. Detailed descriptions of the power reduction mechanism are included in the operational description.

2.5 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.

Note: Targets for 802.11ax/be RU operations can be found in RU SAR Exclusion Appendix.

2.5.1 Licensed Output Power

Mode / Band	Antenna		Modulated Average Output Power (in dBm)				
			Pmax	DSI = 0 (F/O Body)	DSI = 1 (F/C Body)	DSI = 2 (F/O Head)	DSI = 3 (F/C Head)
LTE Band 41	G	Max Allowed Power	25.0	14.5	19.5	18.0	18.0
		Nominal	24.0	13.5	18.5	17.0	17.0

For LTE TDD, the above powers listed are TDD burst average values.

Mode / Band	Antenna		Modulated Average Output Power (in dBm)				
			Pmax	DSI = 0 (F/O Body)	DSI = 1 (F/C Body)	DSI = 2 (F/O Head)	DSI = 3 (F/C Head)
NR Band n66	G	Max Allowed Power	24.0	14.5	18.0	20.5	20.5
		Nominal	23.0	13.5	17.0	19.5	19.5
NR Band n41 PC3	G	Max Allowed Power	25.0	12.5	17.5	17.0	17.0
		Nominal	24.0	11.5	16.5	16.0	16.0

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 8 of 51

REV 22.0
03/30/2022

2.6 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. In the closed configuration, since the display diagonal dimension of this device is > 150 mm and <200 mm, it is considered a “phablet.” In the open configuration, since the display diagonal dimension of this device is >200mm, it is considered a tablet. 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 – Folder Closed

Antenna	Back	Front	Top	Bottom	Right	Left
A	Yes	Yes	No	Yes	Yes	No
A+C	Yes	Yes	No	Yes	Yes	Yes
B	Yes	Yes	No	Yes	No	Yes
G	Yes	Yes	Yes	No	Yes	No
H	Yes	Yes	No	No	Yes	No
F	Yes	Yes	Yes	No	No	Yes
E	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 edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v02r01 Section III and FCC KDB Publication 648474 D01v06r03. The distances between the transmit antennas and the edges of the device are included in the filing. When wireless router mode is enabled, 2.4 GHz Bluetooth Antenna F, U-NII-1, U-NII-2A, U-NII-2C, U-NII-4, and WIFI6E operations are disabled.

Table 2-2
Device Edges/Sides for SAR Testing – Folder Open

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

Note: Per FCC KDB Publication 616217 D04v01r01, particular edges were not required to be evaluated for SAR based on the SAR exclusion threshold in KDB 447498 D04v01. Additional edges may have been evaluated for simultaneous transmission analysis.

2.7 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.

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 9 of 51

REV 22.0
03/30/2022

2.8 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 2-3
Simultaneous Transmission Scenarios**

No.	Capable Transmit Configuration	Head	Body Worn	Accessories	Wireless	Phablet	Body	Notes
1	GSM voice + 2.4 GHz Bluetooth SISO	Yes*	Yes	N/A	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
2	GSM voice + 2.4 GHz Bluetooth MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
3	GSM voice + 2.4 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
4	GSM voice + 2.4 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
5	GSM voice + 5 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
6	GSM voice + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
7	GSM voice + 6 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
8	GSM voice + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
9	GSM voice + 2.4 GHz WLAN MIMO + 5 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
10	GSM voice + 2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
11	GSM voice + 2.4 GHz WLAN MIMO + 6 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
12	GSM voice + 2.4 GHz WLAN MIMO + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
13	GSM voice + 2.4 GHz WLAN SISO + 5 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
14	GSM voice + 2.4 GHz WLAN SISO + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
15	GSM voice + 2.4 GHz WLAN SISO + 6 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
16	GSM voice + 2.4 GHz WLAN SISO + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
17	GSM voice + 2.4 GHz Bluetooth SISO + 5 GHz WLAN SISO	Yes*	Yes	N/A	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
18	GSM voice + 2.4 GHz Bluetooth SISO + 5 GHz WLAN MIMO	Yes*	Yes	N/A	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
19	GSM voice + 2.4 GHz Bluetooth SISO + 6 GHz WLAN SISO	Yes*	Yes	N/A	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
20	GSM voice + 2.4 GHz Bluetooth SISO + 6 GHz WLAN MIMO	Yes*	Yes	N/A	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
21	GSM voice + 2.4 GHz Bluetooth MIMO + 5 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
22	GSM voice + 2.4 GHz Bluetooth MIMO + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
23	GSM voice + 2.4 GHz Bluetooth MIMO + 6 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
24	GSM voice + 2.4 GHz Bluetooth MIMO + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
25	GSM voice + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 5 GHz WLAN SISO	Yes*	Yes	N/A	Yes	Yes	Yes	* Bluetooth Tethering is considered
26	GSM voice + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 5 GHz WLAN MIMO	Yes*	Yes	N/A	Yes	Yes	Yes	* Bluetooth Tethering is considered
27	GSM voice + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 6 GHz WLAN SISO	Yes*	Yes	N/A	Yes	Yes	Yes	* Bluetooth Tethering is considered
28	GSM voice + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 6 GHz WLAN MIMO	Yes*	Yes	N/A	Yes	Yes	Yes	* Bluetooth Tethering is considered
29	UMTS/LTE/NR + 2.4 GHz Bluetooth SISO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
30	UMTS/LTE/NR + 2.4 GHz Bluetooth MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
31	UMTS/LTE/NR + 2.4 GHz WLAN SISO	Yes	Yes	Yes	Yes	Yes	Yes	
32	UMTS/LTE/NR + 2.4 GHz WLAN MIMO	Yes	Yes	Yes	Yes	Yes	Yes	
33	UMTS/LTE/NR + 5 GHz WLAN SISO	Yes	Yes	Yes	Yes	Yes	Yes	
34	UMTS/LTE/NR + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	Yes	Yes	
35	UMTS/LTE/NR + 6 GHz WLAN SISO	Yes	Yes	Yes	Yes	Yes	Yes	
36	UMTS/LTE/NR + 6 GHz WLAN MIMO	Yes	Yes	Yes	Yes	Yes	Yes	
37	UMTS/LTE/NR + 2.4 GHz WLAN MIMO + 5 GHz WLAN SISO	Yes	Yes	Yes	Yes	Yes	Yes	
38	UMTS/LTE/NR + 2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	Yes	Yes	
39	UMTS/LTE/NR + 2.4 GHz WLAN MIMO + 6 GHz WLAN SISO	Yes	Yes	Yes	Yes	Yes	Yes	
40	UMTS/LTE/NR + 2.4 GHz WLAN MIMO + 6 GHz WLAN MIMO	Yes	Yes	Yes	Yes	Yes	Yes	
41	UMTS/LTE/NR + 2.4 GHz WLAN SISO + 5 GHz WLAN SISO	Yes	Yes	Yes	Yes	Yes	Yes	
42	UMTS/LTE/NR + 2.4 GHz WLAN SISO + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	Yes	Yes	
43	UMTS/LTE/NR + 2.4 GHz WLAN SISO + 6 GHz WLAN SISO	Yes	Yes	Yes	Yes	Yes	Yes	
44	UMTS/LTE/NR + 2.4 GHz WLAN SISO + 6 GHz WLAN MIMO	Yes	Yes	Yes	Yes	Yes	Yes	
45	UMTS/LTE/NR + 2.4 GHz Bluetooth SISO + 5 GHz WLAN SISO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
46	UMTS/LTE/NR + 2.4 GHz Bluetooth SISO + 5 GHz WLAN MIMO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
47	UMTS/LTE/NR + 2.4 GHz Bluetooth SISO + 6 GHz WLAN SISO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
48	UMTS/LTE/NR + 2.4 GHz Bluetooth SISO + 6 GHz WLAN MIMO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
49	UMTS/LTE/NR + 2.4 GHz Bluetooth MIMO + 5 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
50	UMTS/LTE/NR + 2.4 GHz Bluetooth MIMO + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
51	UMTS/LTE/NR + 2.4 GHz Bluetooth MIMO + 6 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
52	UMTS/LTE/NR + 2.4 GHz Bluetooth MIMO + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
53	UMTS/LTE/NR + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 5 GHz WLAN SISO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered
54	UMTS/LTE/NR + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 5 GHz WLAN MIMO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered
55	UMTS/LTE/NR + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 6 GHz WLAN SISO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered
56	UMTS/LTE/NR + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 6 GHz WLAN MIMO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered
57	LTE + NR	Yes	Yes	N/A	Yes	Yes	Yes	
58	LTE + NR + 2.4 GHz Bluetooth SISO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
59	LTE + NR + 2.4 GHz Bluetooth MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
60	LTE + NR + 2.4 GHz WLAN SISO	Yes	Yes	Yes	Yes	Yes	Yes	
61	LTE + NR + 2.4 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
62	LTE + NR + 5 GHz WLAN SISO	Yes	Yes	Yes	Yes	Yes	Yes	
63	LTE + NR + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	Yes	Yes	
64	LTE + NR + 6 GHz WLAN SISO	Yes	Yes	Yes	Yes	Yes	Yes	
65	LTE + NR + 6 GHz WLAN MIMO	Yes	Yes	Yes	Yes	Yes	Yes	
66	LTE + NR + 2.4 GHz WLAN MIMO + 5 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
67	LTE + NR + 2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
68	LTE + NR + 2.4 GHz WLAN MIMO + 6 GHz WLAN SISO	Yes	Yes	Yes	Yes	Yes	Yes	
69	LTE + NR + 2.4 GHz WLAN MIMO + 6 GHz WLAN MIMO	Yes	Yes	Yes	Yes	Yes	Yes	
70	LTE + NR + 2.4 GHz WLAN SISO + 5 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
71	LTE + NR + 2.4 GHz WLAN SISO + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
72	LTE + NR + 2.4 GHz WLAN SISO + 6 GHz WLAN SISO	Yes	Yes	Yes	Yes	Yes	Yes	
73	LTE + NR + 2.4 GHz WLAN SISO + 6 GHz WLAN MIMO	Yes	Yes	Yes	Yes	Yes	Yes	
74	LTE + NR + 2.4 GHz Bluetooth SISO + 5 GHz WLAN SISO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
75	LTE + NR + 2.4 GHz Bluetooth SISO + 5 GHz WLAN MIMO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
76	LTE + NR + 2.4 GHz Bluetooth SISO + 6 GHz WLAN SISO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
77	LTE + NR + 2.4 GHz Bluetooth SISO + 6 GHz WLAN MIMO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
78	LTE + NR + 2.4 GHz Bluetooth MIMO + 5 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
79	LTE + NR + 2.4 GHz Bluetooth MIMO + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
80	LTE + NR + 2.4 GHz Bluetooth MIMO + 6 GHz WLAN SISO	Yes	Yes	N/A	Yes	Yes	Yes	
81	LTE + NR + 2.4 GHz Bluetooth MIMO + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	Yes	Yes	
82	LTE + NR + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 5 GHz WLAN SISO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered
83	LTE + NR + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 5 GHz WLAN MIMO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered
84	LTE + NR + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 6 GHz WLAN SISO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered
85	LTE + NR + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 6 GHz WLAN MIMO	Yes*	Yes	Yes*	Yes	Yes	Yes	* Bluetooth Tethering is considered
86	GPS/EDGE + 2.4 GHz Bluetooth SISO	N/A	N/A	N/A	Yes	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
87	GPS/EDGE + 2.4 GHz WLAN SISO	N/A	N/A	N/A	Yes	Yes	Yes	
88	GPS/EDGE + 2.4 GHz WLAN MIMO	N/A	N/A	N/A	Yes	Yes	Yes	
89	GPS/EDGE + 5 GHz WLAN SISO	N/A	N/A	N/A	Yes	Yes	Yes	
90	GPS/EDGE + 5 GHz WLAN MIMO	N/A	N/A	N/A	Yes	Yes	Yes	
91	GPS/EDGE + 6 GHz WLAN SISO	N/A	N/A	N/A	Yes	Yes	Yes	
92	GPS/EDGE + 6 GHz WLAN MIMO	N/A	N/A	N/A	Yes	Yes	Yes	
93	GPS/EDGE + 5 GHz WLAN SISO	N/A	N/A	N/A	Yes	Yes	Yes	
94	GPS/EDGE + 5 GHz WLAN MIMO	N/A	N/A	N/A	Yes	Yes	Yes	
95	GPS/EDGE + 2.4 GHz WLAN MIMO + 5 GHz WLAN SISO	N/A	N/A	N/A	Yes	Yes	Yes	
96	GPS/EDGE + 2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO	N/A	N/A	N/A	Yes	Yes	Yes	
97	GPS/EDGE + 2.4 GHz WLAN MIMO + 6 GHz WLAN SISO	N/A	N/A	N/A	Yes	Yes	Yes	
98	GPS/EDGE + 2.4 GHz WLAN SISO + 5 GHz WLAN SISO	N/A	N/A	N/A	Yes	Yes	Yes	
99	GPS/EDGE + 2.4 GHz WLAN SISO + 5 GHz WLAN MIMO	N/A	N/A	N/A	Yes	Yes	Yes	
100	GPS/EDGE + 2.4 GHz WLAN SISO + 6 GHz WLAN SISO	N/A	N/A	N/A	Yes	Yes	Yes	
101	GPS/EDGE + 2.4 GHz WLAN SISO + 6 GHz WLAN MIMO	N/A	N/A	N/A	Yes	Yes	Yes	
102	GPS/EDGE + 2.4 GHz Bluetooth SISO + 5 GHz WLAN SISO	N/A	N/A	N/A	Yes*	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
103	GPS/EDGE + 2.4 GHz Bluetooth SISO + 5 GHz WLAN MIMO	N/A	N/A	N/A	Yes*	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
104	GPS/EDGE + 2.4 GHz Bluetooth SISO + 6 GHz WLAN SISO	N/A	N/A	N/A	Yes*	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
105	GPS/EDGE + 2.4 GHz Bluetooth SISO + 6 GHz WLAN MIMO	N/A	N/A	N/A	Yes*	Yes	Yes	* Bluetooth Tethering is considered for Antenna H
106	GPS/EDGE + 2.4 GHz Bluetooth MIMO + 5 GHz WLAN SISO	N/A	N/A	N/A	Yes	Yes	Yes	
107	GPS/EDGE + 2.4 GHz Bluetooth MIMO + 5 GHz WLAN MIMO	N/A	N/A	N/A	Yes	Yes	Yes	
108	GPS/EDGE + 2.4 GHz Bluetooth MIMO + 6 GHz WLAN SISO	N/A	N/A	N/A	Yes	Yes	Yes	
109	GPS/EDGE + 2.4 GHz Bluetooth MIMO + 6 GHz WLAN MIMO	N/A	N/A	N/A	Yes	Yes	Yes	
110	GPS/EDGE + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 5 GHz WLAN SISO	N/A	N/A	N/A	Yes*	Yes	Yes	* Bluetooth Tethering is considered
111	GPS/EDGE + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 5 GHz WLAN MIMO	N/A	N/A	N/A	Yes*	Yes	Yes	* Bluetooth Tethering is considered
112	GPS/EDGE + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 6 GHz WLAN SISO	N/A	N/A	N/A	Yes*	Yes	Yes	* Bluetooth Tethering is considered
113	GPS/EDGE + 2.4 GHz Bluetooth Ant H + 2.4 GHz WLAN Ant F + 6 GHz WLAN MIMO	N/A	N/A	N/A	Yes*	Yes	Yes	* Bluetooth Tethering is considered

FCC ID: A3LSMF966JPN		RF EXPOSURE PART 1 TEST REPORT		Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset			Page 10 of 51

1. SISO represents 2.4 GHz WLAN/BT transmission on Ant H or Ant F, and 5/6 GHz transmission on Ant F or Ant E.
2. 2.4 GHz WLAN Ant H and 2.4 GHz Bluetooth Ant H share the same antenna path and cannot transmit simultaneously.
3. 5 GHz WLAN and 6 GHz WLAN share the same antenna path and cannot transmit simultaneously.
4. 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.
5. 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.
6. 5 GHz Wireless Router is only supported for the U-NII-3 by S/W, therefore U-NII-1, U-NII-2A, U-NII-2C, and U-NII-4 were not evaluated for wireless router conditions.
7. 6 GHz Wireless Router is not supported, therefore it was not evaluated for wireless router conditions.
8. 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.
9. This device supports VoWIFI.
10. This device supports Bluetooth Tethering on Ant H only.
11. This device supports VoLTE.
12. This device supports VoNR.
13. LTE + 5G NR FR1 Scenarios are limited to EN-DC combinations with anchor bands as shown in the NR FR1 checklist.
14. UWB and NFC were evaluated for phablet based on expected usage conditions.

2.9 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-1, U-NII-2A, U-NII-2C, U-NII-4, and 6 GHz WIFI, only 2.4 GHz WIFI, 2.4 GHz Bluetooth Antenna H, and U-NII-3 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/be with the following features:

- a) Up to 320 MHz Bandwidth only for 6GHz
- b) Up to 160 MHz Bandwidth only for 5 GHz
- c) Up to 20 MHz Bandwidth only for 2.4 GHz
- d) 2 Tx antenna output
- e) Up to 4KQAM is supported
- f) TDWR and Band gap channels are supported for 5/6 GHz
- g) MU-MIMO UL Operations are not supported

Per FCC KDB Publication 648474 D01v06r03, this device is considered a "phablet" when it is in a closed configuration 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-1, U-NII-2A, U-NII-2C, U-NII-4 WIFI and 6 GHz, phablet SAR tests were performed. Phablet SAR was not evaluated for 2.4 GHz WLAN, 2.4 GHz Bluetooth Antenna H, and U-NII-3 WLAN operations since wireless router 1g SAR was < 1.2 W/kg.

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 11 of 51

REV 22.0
03/30/2022



Per April 2019 TCB Workshop Notes and FCC guidance, SAR testing for 802.11ax/be follows initial test configuration procedures of KDB 248227, with 802.11ax/be considered a higher order 802.11 mode. Therefore, SAR tests were not required for 802.11ax/be RU/MRU based on the maximum allowed output powers of OFDM modes and the reported SAR values. Per FCC Guidance, maximum conducted powers were performed for each RU/MRU size to demonstrate that the output powers would not be higher than the other OFDM 802.11 modes. Please see EMC test reports 1M2502210015-19.A3L, 1M2502210015-21.A3L, 1M2502210015-23.A3L, and 1M2502210015-25.A3L for 802.11ax/be RU/MRU output powers.

Per FCC guidance, SAR was performed using 6.5 GHz SAR probe calibration factors for WIFI 6GHz/UWB and 8GHz SAR probe calibration factors for UWB. 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.

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 LTE Carrier Aggregation (CA) in the downlink. All uplink communications are identical to Release 8 specifications. Per FCC KDB Publication 941225 D05A v01r02, SAR for 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.

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 Carrier Aggregation (CA) for LTE Band 41C with two component carriers in the uplink. SAR Measurements and conducted powers were evaluated per 2017 Fall TCB Workshop Notes.

Per FCC KDB Publication 648474 D01v06r03, this device is considered a "phablet" when it is in the closed configuration 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 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

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 12 of 51

REV 22.0
03/30/2022

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transmission path and signal characteristics, SAR was only assessed for the band with the larger transmission frequency range.

This device can transmit with antenna switching for bands/modes on antennas B, and G. 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 2.5.1 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.

For licensed bands operating < 1 GHz, this device can transmit with Ant A or with Ant A+ Ant C. The RF path for both conditions is identical, therefore separate conducted powers are not required for these conditions. For closed test configurations, both Ant A and Ant A + Ant C conditions were fully evaluated for all exposure conditions. For open configurations, only Ant A + Ant C conditions were evaluated since in the open configuration, only Ant A + Ant C is supported as described in the operational description.

Per Qualcomm guidance in 80-W2112-4, when hotspot mode applies, 10-g extremity SAR is required for the surfaces and edges with hotspot mode 1g reported SAR > 1.2 W/kg. For surfaces and edges with hotspot mode 1g SAR < 1.2 W/kg, the 10-g extremity can be excluded when the normalized *SAR_design_target* for extremity DSI is less than or equal to that of hotspot DSI.

$$SAR_design_target_extremity \leq \frac{SAR_design_target_hotspot}{1g\ SAR\ limit} * 10g\ SAR\ limit$$

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 13 of 51

REV 22.0
03/30/2022

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2.10 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)
- FCC KDB Publication 616217 D04v01r02 (Tablet, Proximity Sensor)
- 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)
- April 2019 and October 2024 TCB Workshop Notes (Dynamic Antenna Tuning)
- 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

2.11 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.

2.12 Bibliography

Report Type	Report Serial Number
RF Exposure Part 0 Test Report	1M2504070052-02.A3L
RF Exposure Part 1 Original Test Report	1M2502270040-20.A3L
RF Exposure Part 2 Original Test Report	1M2504220040-22.A3L
RF Exposure Original Compliance Summary	1M2504220040-21.A3L
A3LSMF966U C2PC: RF Exposure Part 1 Test Report	1M2504220043-04.A3L

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 14 of 51

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 12: 699.7 - 715.3 MHz				
	LTE Band 13: 779.5 - 784.5 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 2: 1850.7 - 1909.3 MHz				
	LTE Band 41: 2498.5 - 2687.5 MHz				
Channel Bandwidths	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 13: 5 MHz, 10 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 2: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
LTE Band 12: 1.4 MHz	699.7 (23017)		707.5 (23095)	715.3 (23173)	
LTE Band 12: 3 MHz	700.5 (23025)		707.5 (23095)	714.5 (23165)	
LTE Band 12: 5 MHz	701.5 (23035)		707.5 (23095)	713.5 (23155)	
LTE Band 12: 10 MHz	704 (23060)		707.5 (23095)	711 (23130)	
LTE Band 13: 5 MHz	779.5 (23205)		782 (23230)	784.5 (23255)	
LTE Band 13: 10 MHz	(N/A)		782 (23230)	(N/A)	
LTE Band 5: 1.4 MHz	824.7 (20407)		836.5 (20525)	848.3 (20643)	
LTE Band 5: 3 MHz	825.5 (20415)		836.5 (20525)	847.5 (20635)	
LTE Band 5: 5 MHz	826.5 (20425)		836.5 (20525)	846.5 (20625)	
LTE Band 5: 10 MHz	829 (20450)		836.5 (20525)	844 (20600)	
LTE Band 66: 1.4 MHz	1710.7 (131979)		1745 (132322)	1779.3 (132665)	
LTE Band 66: 3 MHz	1711.5 (131987)		1745 (132322)	1778.5 (132657)	
LTE Band 66: 5 MHz	1712.5 (131997)		1745 (132322)	1777.5 (132647)	
LTE Band 66: 10 MHz	1715 (132022)		1745 (132322)	1775 (132622)	
LTE Band 66: 15 MHz	1717.5 (132047)		1745 (132322)	1772.5 (132597)	
LTE Band 66: 20 MHz	1720 (132072)		1745 (132322)	1770 (132572)	
LTE Band 4: 1.4 MHz	1710.7 (19957)		1732.5 (20175)	1754.3 (20393)	
LTE Band 4: 3 MHz	1711.5 (19965)		1732.5 (20175)	1753.5 (20385)	
LTE Band 4: 5 MHz	1712.5 (19975)		1732.5 (20175)	1752.5 (20375)	
LTE Band 4: 10 MHz	1715 (20000)		1732.5 (20175)	1750 (20350)	
LTE Band 4: 15 MHz	1717.5 (20025)		1732.5 (20175)	1747.5 (20325)	
LTE Band 4: 20 MHz	1720 (20050)		1732.5 (20175)	1745 (20300)	
LTE Band 2: 1.4 MHz	1850.7 (18607)		1880 (18900)	1909.3 (19193)	
LTE Band 2: 3 MHz	1851.5 (18615)		1880 (18900)	1908.5 (19185)	
LTE Band 2: 5 MHz	1852.5 (18625)		1880 (18900)	1907.5 (19175)	
LTE Band 2: 10 MHz	1855 (18650)		1880 (18900)	1905 (19150)	
LTE Band 2: 15 MHz	1857.5 (18675)		1880 (18900)	1902.5 (19125)	
LTE Band 2: 20 MHz	1860 (18700)		1880 (18900)	1900 (19100)	
LTE Band 41: 5 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 10 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 15 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 20 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
UE Category	UL UE Cat 18 , DL UE Cat 20				
Modulations Supported in UL	QPSK, 16QAM, 64QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3-6.2.5? (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 17. It supports carrier aggregation, downlink MIMO features as shown in the RF Conducted Powers section of this report. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. The following LTE Release 17 Features are not supported: Relay, HetNet, Enhanced MIMO, eICIC, eMBMS, Wifi Offloading, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 15 of 51

REV 22.0
03/30/2022

NR Information					
Form Factor	Portable Handset				
Frequency Range of each NR transmission band	NR Band n5: 826.5 - 846.5 MHz				
	NR Band n66: 1712.5 - 1777.5 MHz				
	NR Band n41: 2501.01 - 2685 MHz				
Channel Bandwidths	NR Band n5: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	NR Band n66: 5 MHz, 10 MHz, 15 MHz, 20 MHz, 25 MHz, 30 MHz, 35 MHz, 40 MHz				
	NR Band n41: 10 MHz, 15 MHz, 20 MHz, 30 MHz, 35 MHz, 40 MHz, 45 MHz, 60 MHz, 70 MHz, 80 MHz, 90 MHz, 100 MHz				
Channel Numbers and Frequencies (MHz)					
NR Band n5: 5 MHz	826.5 (165300)		836.5 (167300)		846.5 (169300)
NR Band n5: 10 MHz	829 (165800)		836.5 (167300)		844 (168800)
NR Band n5: 15 MHz	831.5 (166300)		836.5 (167300)		841.5 (168300)
NR Band n5: 20 MHz	834 (166800)		836.5 (167300)		839 (167800)
NR Band n66: 5 MHz	1712.5 (342500)		1745 (349000)		1777.5 (355500)
NR Band n66: 10 MHz	1715 (343000)		1745 (349000)		1775 (355000)
NR Band n66: 15 MHz	1717.5 (343500)		1745 (349000)		1772.5 (354500)
NR Band n66: 20 MHz	1720 (344000)		1745 (349000)		1770 (354000)
NR Band n66: 25 MHz	1722.5 (344500)		1745 (349000)		1767.5 (353500)
NR Band n66: 30 MHz	1725 (345000)		1745 (349000)		1765 (353000)
NR Band n66: 35 MHz	1727.5 (345500)		1745 (349000)		1762.5 (352500)
NR Band n66: 40 MHz	1730 (346000)		1745 (349000)		1760 (352000)
NR Band n41: 10 MHz	2501.01 (500202)	2547 (509400)	2592.99 (518598)		2639.01 (527802) 2685 (537000)
NR Band n41: 15 MHz	2503.5 (500700)	2548.26 (509652)	2592.99 (518598)		2637.75 (527550) 2682.51 (536502)
NR Band n41: 20 MHz	2506.02 (501204)	2549.49 (509898)	2592.99 (518598)		2636.49 (527298) 2679.99 (535998)
NR Band n41: 30 MHz	2511 (502200)	2552.01 (510402)	2592.99 (518598)		2634 (526800) 2674.98 (534996)
NR Band n41: 35 MHz	2513.52 (502704)	2553.24 (510648)	2592.99 (518598)		2632.74 (526548) 2672.49 (534498)
NR Band n41: 40 MHz	2516.01 (523202)	2567.34 (513468)	(N/A)		2618.67 (523734) 2670 (534000)
NR Band n41: 45 MHz	2518.5 (503700)	2568.18 (513636)	(N/A)		2617.83 (523566) 2667.48 (533496)
NR Band n41: 50 MHz	2521.02 (504204)		2592.99 (518598)		2664.99 (532998)
NR Band n41: 60 MHz	2526 (505200)		2592.99 (518598)		2659.98 (531996)
NR Band n41: 70 MHz	2531.01 (506202)		(N/A)		2655 (531000)
NR Band n41: 80 MHz	2536.02 (507204)		(N/A)		2649.99 (529998)
NR Band n41: 90 MHz	2541 (508200)		(N/A)		2644.98 (528996)
NR Band n41: 100 MHz	2546.01 (509202)		2592.99 (518598)		2640 (528000)
SCS for NR Band n5, n66	15 kHz				
SCS for NR Band n41	30 kHz				
Modulations Supported in UL	DFT-s-OFDM: $\pi/2$ BPSK, QPSK, 16QAM,64QAM,256QAM CP-OFDM: $\pi/2$ BPSK, QPSK, 16QAM,64QAM,256QAM				
A-MPR (Additional MPR) 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 n5	2/66				
LTE Anchor Bands for NR Band n66	2/13				
LTE Anchor Bands for NR Band n41	66				

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 16 of 51

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: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 17 of 51

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.

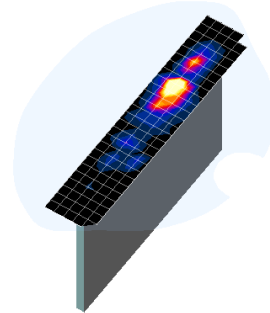


Figure 5-1
Sample SAR Area Scan

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) ($\Delta x_{\text{zoomTV}}, \Delta y_{\text{zoom}}$)	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: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 18 of 51

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].

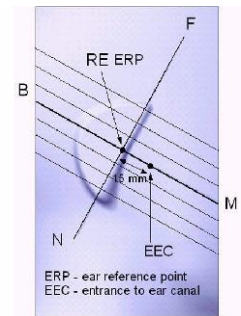


Figure 6-1
Close-Up Side view
of ERP

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

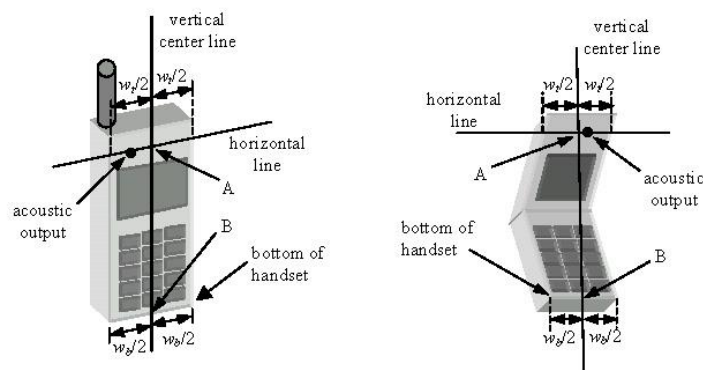


Figure 6-3
Handset Vertical Center & Horizontal Line Reference Points

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 19 of 51

REV 22.0
03/30/2022

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.

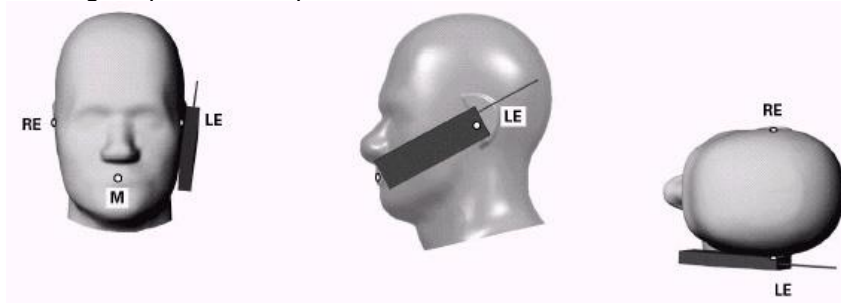


Figure 7-1 Front, Side and Top View of Cheek Position

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: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 20 of 51

REV 22.0
03/30/2022

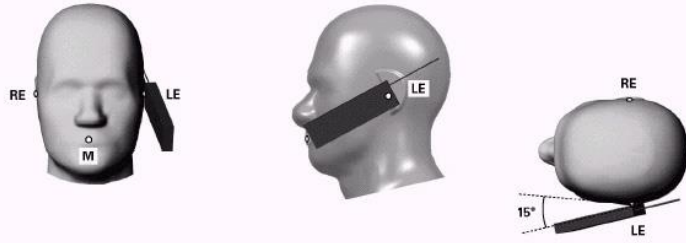


Figure 7-2 Front, Side and Top View of Ear/15° Tilt Position

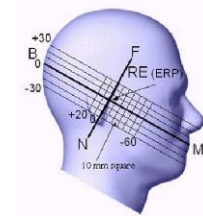


Figure 7-3 Side view w/ relevant markings

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 D01v06r03. 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 D01v06r03, 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.

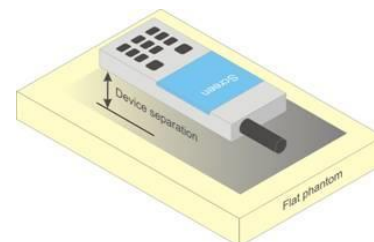


Figure 7-4 Sample Body-Worn Diagram

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 contain metallic components are supplied with the device, the device is tested with only the accessory that

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 21 of 51

REV 22.0
03/30/2022

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.

7.8 Phablet Configurations

For smart phones with a display diagonal dimension $> 150 \text{ mm}$ or an overall diagonal dimension $> 160 \text{ mm}$ 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 D01v06r03 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

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 22 of 51

REV 22.0
03/30/2022



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.

7.9 Proximity Sensor Considerations

This device uses a power reduction mechanism to reduce output powers in certain use conditions when the device is used close the user's body.

When the device's antenna is within a certain distance of the user, the sensor activates and reduces the maximum allowed output power. However, the sensor is not active when the device is moved beyond the sensor triggering distance and the maximum output power is no longer limited. Therefore, additional evaluation is needed in the vicinity of the triggering distance to ensure SAR is compliant when the device is allowed to operate at a nonreduced output power level. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device at these additional test positions. Sensor triggering distance summary data is included in Power Reduction Verification Appendix.

The sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions since the sensor entirely covers the antennas.

7.10 SAR Testing for Tablet per KDB Publication 616217 D04v01r02

Per FCC KDB Publication 616217 D04v01r02, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. The SAR Exclusion Threshold in KDB 447498 D04v01 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned against the phantom and the edge containing the antenna positioned perpendicular to the phantom.

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 23 of 51

REV 22.0
03/30/2022

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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: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 24 of 51

REV 22.0
03/30/2022

8.3 RF Exposure Limits for Frequencies above 6 GHz

Per §1.1310 (d)(3), the MPE limits are applied for frequencies above 6 GHz. Power Density is expressed in units of W/m² or mW/cm².

Peak Spatially Averaged Power Density was evaluated over a circular area of 4 cm² per interim FCC Guidance for near-field power density evaluations per October 2018 TCB Workshop notes.

Table 8-2
Human Exposure Limits Specified in FCC 47 CFR §1.1310

Human Exposure to Radiofrequency (RF) Radiation Limits		
Frequency Range [MHz]	Power Density [mW/cm ²]	Average Time [Minutes]
(A) Limits For Occupational / Controlled Environments		
1,500 – 100,000	5.0	6
(B) Limits For General Population / Uncontrolled Environments		
1,500 – 100,000	1.0	30

Note: 1.0 mW/cm² is 10 W/m²

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 25 of 51

REV 22.0
03/30/2022

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 3G SAR Test Reduction Procedure

In FCC KDB Publication 941225 D01v03r01, certain transmission modes within a frequency band and wireless mode evaluated for SAR are defined as primary modes. The equivalent modes considered for SAR test reduction are denoted as secondary modes. When the maximum output power including tune-up tolerance specified for production units in a secondary mode is ≤ 0.25 dB higher than the primary mode or when the highest reported SAR of the primary mode, scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode, is ≤ 1.2 W/kg, SAR measurements are not required for the secondary mode. These criteria are referred to as the 3G SAR test reduction procedure. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

9.3 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01v03r01 “3G SAR Measurement Procedures.”

The device is placed into a simulated call using a base station simulator in a RF shielded chamber. Establishing connections in this manner ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. Devices under test are evaluated prior to testing, with a fully charged battery and were configured to operate at maximum output power. In order to verify that the device is tested throughout the SAR test at maximum output power, the SAR measurement system measures a “point SAR” at an arbitrary reference point at the start and end of the 1 gram SAR evaluation, to assess for any power drifts during the evaluation. If the power drift deviates by more than 5%, the SAR test and drift measurements are repeated.

9.4 SAR Measurement Conditions for UMTS

9.4.1 Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC with TPC (transmit power control) set to all “1s” or applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HS-DPCCH etc) are tabulated in this test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations are identified.

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 26 of 51

REV 22.0
03/30/2022

9.4.2 Head SAR Measurements

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure.

9.4.3 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all “1s”. The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCH_n configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreading code or DPDCH_n, for the highest reported SAR configuration in 12.2 kbps RMC.

9.4.4 SAR Measurements with Rel 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, for the highest reported SAR configuration in 12.2 kbps RMC without HSDPA. Handsets with both HSDPA and HSUPA are tested according to Release 6 HSPA test procedures.

9.4.5 SAR Measurements with Rel 6 HSUPA

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA.

When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing.

9.4.6 SAR Measurement Conditions for DC-HSDPA

SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

9.5 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).

9.5.1 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.

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 27 of 51

REV 22.0
03/30/2022

9.5.2 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.

9.5.3 A-MPR

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

9.5.4 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.
- 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 $\frac{1}{2}$ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is < 1.45 W/kg.

9.5.5 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.

9.5.6 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

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 28 of 51

REV 22.0
03/30/2022



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.

9.6 SAR Testing with 802.11 Transmitters

The normal network operating configurations of 802.11 transmitters are not suitable for SAR measurements. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v02r02 for more details.

9.6.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters.

A periodic duty factor is required for current generation SAR systems to measure SAR. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR is scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

9.6.2 U-NII-1 and U-NII-2A

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg. When different maximum output powers are specified for the bands, SAR measurement for the U-NII band with the lower maximum output power is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

9.6.3 U-NII-2C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification. Unless band gap channels are permanently disabled, SAR must be considered for these channels. Each band is tested independently according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

9.6.4 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 29 of 51

REV 22.0
03/30/2022

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9.6.5 2.4 GHz SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either the fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

- 1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
- 2) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

2.4 GHz 802.11 g/n/ax OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is > 1.2 W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Procedures should be followed. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

9.6.6 OFDM Transmission Mode and SAR Test Channel Selection

When the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. Per April 2019 TCB Workshop and FCC guidance, 802.11ax/be was considered the highest order 802.11 mode. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

9.6.7 Initial Test Configuration Procedure

For OFDM, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order IEEE 802.11 mode. The channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements (See Section 9.6.6). When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

9.6.8 Subsequent Test Configuration Procedures

For OFDM configurations in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is ≤ 1.2 W/kg, no additional SAR tests for the

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 30 of 51

REV 22.0
03/30/2022



subsequent test configurations are required. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

9.6.9 MIMO SAR considerations

Per KDB Publication 248227 D01v02r02, the simultaneous SAR provisions in KDB Publication 447498 D04v01 should be applied to determine simultaneous transmission SAR test exclusion for WIFI MIMO. If the sum of 1g single transmission chain SAR measurements is <1.6 W/kg, no additional SAR measurements for MIMO are required. Alternatively, SAR for MIMO can be measured with all antennas transmitting simultaneously at the specified maximum output power of MIMO operation. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 31 of 51

REV 22.0
03/30/2022

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10 RF CONDUCTED POWERS

All conducted power measurements for Sub6 WWAN technologies and bands in this section were performed such that the EUT transmitted continuously at the maximum time-averaged transmit power limit (Plimit) or the maximum tune-up power (Pmax), 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.

LTE Carrier Aggregation Notes:

1. This device supports uplink carrier aggregation for LTE CA_41C, with a maximum of two component carriers. For intraband contiguous carrier aggregation scenarios, 3GPP 36.101 Table 6.2.2A-1 specifies that the aggregate maximum allowed output power is equivalent to the single carrier scenario. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when non-contiguous RB allocation is implemented. The conducted powers and MPR settings in this device are permanently implemented per the above 3GPP requirements.
2. Per FCC Guidance, the output power with uplink CA active was measured for the configuration with the highest reported SAR with single carrier for each exposure condition. The power was measured with wideband signal integration over both component carriers.

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 32 of 51

REV 22.0
03/30/2022

10.1.1 LTE Band 41

Table 10-1
LTE Band 41 Ant G Measured P_{limit} for DSI = 3 (F/C Head), DSI = 2 (F/O Head)

LTE Band 41									
20 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	17.56	17.82	17.83	17.44	17.66	0	0
	1	50	17.60	17.85	17.72	17.32	17.57		0
	1	99	17.62	17.81	17.46	17.26	17.50		0
	50	0	17.55	17.79	17.79	17.42	17.65	0-1	0
	50	25	17.62	17.86	17.68	17.35	17.56		0
	50	50	17.67	17.83	17.58	17.38	17.61		0
	100	0	17.60	17.80	17.63	17.34	17.56		0
16QAM	1	0	17.55	17.70	17.82	17.49	17.57	0-1	0
	1	50	17.63	17.70	17.63	17.46	17.68		0
	1	99	17.48	17.76	17.33	17.19	17.56		0
	50	0	17.54	17.77	17.79	17.43	17.64	0-2	0
	50	25	17.67	17.84	17.64	17.42	17.61		0
	50	50	17.68	17.85	17.50	17.40	17.56		0
	100	0	17.64	17.82	17.66	17.37	17.58		0
64QAM	1	0	17.59	17.86	17.88	17.50	17.46	0-2	0
	1	50	17.58	17.72	17.57	17.26	17.63		0
	1	99	17.57	17.58	17.42	17.26	17.50		0
	50	0	17.62	17.78	17.82	17.37	17.61	0-3	0
	50	25	17.63	17.88	17.65	17.36	17.62		0
	50	50	17.65	17.85	17.52	17.34	17.61		0
	100	0	17.62	17.81	17.66	17.38	17.57		0

Table 10-2
LTE Band 41 Ant G Uplink Carrier Aggregation Measured P_{limit} for DSI = 3 (F/C Head), DSI = 2 (F/O Head)

		PCC							SCC						Power		
	Combination	PCC Band	PCC Bandwidth [MHz]	PCC (UL/DL) Channel	PCC (UL/DL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL/DL) Channel	SCC (UL/DL) Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset	LTE Tx.Power with UL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
SCC higher	CA 41C	LTE B41	20	40185	2549.5	QPSK	1	99	LTE B41	20	40383	2569.3	QPSK	1	0	17.63	17.81
SCC lower	CA 41C	LTE B41	20	41055	2636.5	QPSK	1	0	LTE B41	20	40857	2616.7	QPSK	1	99	17.71	17.44

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 33 of 51

REV 22.0
03/30/2022

Table 10-3
LTE Band 41 Ant G Measured P_{limit} for DSI = 0 (F/O Body)

LTE Band 41 20 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	13.28	13.42	13.45	13.19	13.43	0	0
	1	50	13.24	13.44	13.20	13.13	13.36		0
	1	99	13.37	13.46	13.10	12.99	13.20		0
	50	0	13.23	13.44	13.45	13.09	13.31	0-1	0
	50	25	13.32	13.48	13.28	13.07	13.36		0
	50	50	13.29	13.49	13.16	13.09	13.30		0
	100	0	13.29	13.42	13.28	13.12	13.33		0
16QAM	1	0	13.20	13.37	13.46	13.14	13.36	0-1	0
	1	50	13.22	13.39	13.53	13.08	13.29		0
	1	99	13.28	13.56	13.11	12.85	13.04		0
	50	0	13.26	13.45	13.51	13.10	13.34	0-2	0
	50	25	13.33	13.53	13.37	13.08	13.29		0
	50	50	13.38	13.52	13.32	13.08	13.33		0
	100	0	13.33	13.49	13.35	13.08	13.28		0
64QAM	1	0	13.14	13.55	13.43	13.23	13.38	0-2	0
	1	50	13.26	13.34	13.43	13.23	13.30		0
	1	99	13.23	13.43	13.14	13.02	13.16		0
	50	0	13.24	13.50	13.51	13.08	13.34	0-3	0
	50	25	13.32	13.58	13.37	13.04	13.31		0
	50	50	13.31	13.50	13.28	13.08	13.29		0
	100	0	13.27	13.51	13.41	13.04	13.29		0

Table 10-4
LTE Band 41 Ant G Uplink Carrier Aggregation Measured P_{limit} for DSI = 0 (F/O Body)

	Combination	PCC Band	PCC						SCC						Power		
			PCC Bandwidth [MHz]	PCC (UL/DL) Channel	PCC (UL/DL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL/DL) Channel	SCC (UL/DL) Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset	LTE Tx.Power with UL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
SCC higher	CA_41C	LTE B41	20	40185	2549.5	QPSK	1	99	LTE B41	20	40383	2569.3	QPSK	1	0	13.71	13.46

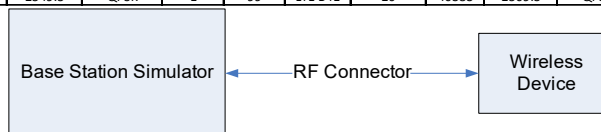


Figure 10-1
Power Measurement Setup

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 34 of 51

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 n66

Table 10-5
NR Band n66 Ant G Measured P_{limit} for DSI = 2 (F/O Head), and/or DSI = 3 (F/C Head)

NR Band n66 45 MHz Bandwidth					
Modulation	RB Size	RB Offset	Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			349000 (1745 MHz) Conducted Power [dBm]		
DFT-s-OFDM QPSK	1	1	19.71	0	0.0
	1	121	19.63		0.0
	1	240	19.84		0.0
	120	0	19.71	0-1	0.0
	120	61	19.78	0	0.0
	120	122	19.67	0-1	0.0
	240	0	19.72		0.0
DFT-s-OFDM 16QAM	1	1	19.60	0-1	0.0
CP-OFDM QPSK	1	1	19.83	0-1.5	0.0

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 35 of 51

REV 22.0
03/30/2022

Table 10-6
NR Band n66 Ant G Measured P_{limit} for DSI = 0 (F/O Body)

NR Band n66 45 MHz Bandwidth					
Modulation	RB Size	RB Offset	Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			349000 (1745 MHz)		
			Conducted Power [dBm]		
DFT-s-OFDM QPSK	1	1	13.70	0	0.0
	1	121	13.81		0.0
	1	240	13.89		0.0
	120	0	13.73	0-1	0.0
	120	61	13.84	0	0.0
	120	122	13.80	0-1	0.0
	240	0	13.76		0.0
DFT-s-OFDM 16QAM	1	1	13.64	0-1	0.0
CP-OFDM QPSK	1	1	13.77	0-1.5	0.0

10.2.2 NR Band n41

Table 10-7
NR Band n41 PC3 Ant G Measured P_{limit} for DSI = 3 (F/C Head), and/or DSI = 2 (F/O Head)

NR Band n41 100 MHz Bandwidth					
Modulation	RB Size	RB Offset	Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			518598 (2592.99 MHz)		
			Conducted Power [dBm]		
DFT-s-OFDM QPSK	1	1	16.63	0	0.0
	1	137	16.64		0.0
	1	271	16.51		0.0
	135	0	16.78	0-1	0.0
	135	69	16.67	0	0.0
	135	138	16.50	0-1	0.0
	270	0	16.63		0.0
DFT-s-OFDM 16QAM	1	1	16.73	0-1	0.0
CP-OFDM QPSK	1	1	16.91	0-1.5	0.0

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 36 of 51

REV 22.0
03/30/2022

Table 10-8
NR Band n41 PC3 Ant G Measured P_{limit} for DSI = 0 (F/O Body)

NR Band n41 100 MHz Bandwidth					
Modulation	RB Size	RB Offset	Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			518598 (2592.99 MHz) Conducted Power [dBm]		
DFT-s-OFDM QPSK	1	1	12.15	0	0.0
	1	137	11.94		0.0
	1	271	11.91		0.0
	135	0	12.04	0-1	0.0
	135	69	11.99	0	0.0
	135	138	11.83	0-1	0.0
	270	0	11.93		0.0
DFT-s-OFDM 16QAM	1	1	12.01	0-1	0.0
CP-OFDM QPSK	1	1	12.02	0-1.5	0.0



Figure 10-2
Power Measurement Setup – NR FDD

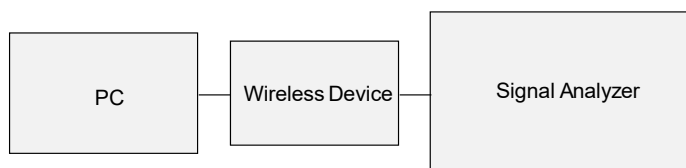


Figure 10-3
Power Measurement Setup – NR TDD

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 37 of 51

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	% dev σ	% dev ϵ
06/05/2025	1750 Head	21.1	1700	1.319	39.137	1.343	40.145	-1.79%	-2.51%
			1705	1.321	39.125	1.345	40.141	-1.78%	-2.53%
			1710	1.324	39.113	1.348	40.136	-1.78%	-2.55%
			1720	1.331	39.084	1.354	40.126	-1.70%	-2.60%
			1745	1.347	39.024	1.368	40.087	-1.54%	-2.65%
			1750	1.350	39.020	1.371	40.079	-1.53%	-2.64%
			1770	1.362	39.010	1.383	40.047	-1.52%	-2.59%
			1790	1.372	38.989	1.394	40.016	-1.58%	-2.57%
			2300	1.721	39.953	1.670	39.500	3.05%	1.15%
			2310	1.728	39.935	1.679	39.480	2.92%	1.15%
05/21/2025	2450 Head	19.8	2320	1.736	39.915	1.687	39.460	2.90%	1.15%
			2400	1.799	39.793	1.756	39.289	2.45%	1.28%
			2450	1.838	39.706	1.800	39.200	2.11%	1.29%
			2480	1.863	39.655	1.833	39.162	1.64%	1.26%
			2500	1.881	39.622	1.855	39.136	1.40%	1.24%
			2510	1.889	39.609	1.866	39.123	1.23%	1.24%
			2535	1.908	39.576	1.893	39.092	0.79%	1.24%
			2550	1.920	39.554	1.909	39.073	0.58%	1.23%
			2560	1.928	39.536	1.920	39.060	0.42%	1.22%
			2600	1.964	39.459	1.964	39.009	0.00%	1.15%
			2650	2.005	39.376	2.018	38.945	-0.64%	1.11%
			2680	2.030	39.306	2.051	38.907	-1.02%	1.03%
			2700	2.046	39.270	2.073	38.882	-1.30%	1.00%
			2300	1.682	38.175	1.670	39.500	0.72%	-3.35%
			2310	1.689	38.165	1.679	39.480	0.60%	-3.33%
05/27/2025	2450 Head	20.4	2320	1.695	38.151	1.687	39.460	0.47%	-3.32%
			2400	1.758	38.034	1.756	39.289	0.11%	-3.19%
			2450	1.792	37.954	1.800	39.200	-0.44%	-3.18%
			2480	1.817	37.908	1.833	39.162	-0.87%	-3.20%
			2500	1.834	37.886	1.855	39.136	-1.13%	-3.19%
			2510	1.841	37.874	1.866	39.123	-1.34%	-3.19%
			2535	1.856	37.830	1.893	39.092	-1.95%	-3.23%
			2550	1.867	37.799	1.909	39.073	-2.20%	-3.26%
			2560	1.875	37.778	1.920	39.060	-2.34%	-3.28%
			2600	1.909	37.706	1.964	39.009	-2.80%	-3.34%
			2650	1.945	37.614	2.018	38.945	-3.62%	-3.42%
			2680	1.970	37.557	2.051	38.907	-3.95%	-3.47%
			2700	1.988	37.530	2.073	38.882	-4.10%	-3.48%
			2300	1.729	38.608	1.670	39.500	3.53%	-2.26%
			2310	1.737	38.597	1.679	39.480	3.45%	-2.24%
05/29/2025	2450 Head	22.9	2320	1.744	38.585	1.687	39.460	3.38%	-2.22%
			2400	1.802	38.497	1.756	39.289	2.62%	-2.02%
			2450	1.839	38.412	1.800	39.200	2.17%	-2.01%
			2480	1.861	38.371	1.833	39.162	1.53%	-2.02%
			2500	1.874	38.338	1.855	39.136	1.02%	-2.04%
			2510	1.882	38.322	1.866	39.123	0.86%	-2.05%
			2535	1.901	38.284	1.893	39.092	0.42%	-2.07%
			2550	1.912	38.263	1.909	39.073	0.16%	-2.07%
			2560	1.919	38.247	1.920	39.060	-0.05%	-2.08%
			2600	1.949	38.184	1.964	39.009	-0.76%	-2.11%
			2650	1.985	38.106	2.018	38.945	-1.64%	-2.15%
			2680	2.009	38.069	2.051	38.907	-2.05%	-2.15%
			2700	2.025	38.044	2.073	38.882	-2.32%	-2.16%
			2300	1.692	37.800	1.670	39.500	1.32%	-4.30%
			2310	1.699	37.783	1.679	39.480	1.19%	-4.30%
06/02/2025	2450 Head	20.0	2320	1.706	37.767	1.687	39.460	1.13%	-4.29%
			2400	1.768	37.660	1.756	39.289	0.68%	-4.15%
			2450	1.807	37.578	1.800	39.200	0.39%	-4.14%
			2480	1.830	37.532	1.833	39.162	-0.16%	-4.16%
			2500	1.846	37.500	1.855	39.136	-0.49%	-4.18%
			2510	1.853	37.481	1.866	39.123	-0.70%	-4.20%
			2535	1.873	37.438	1.893	39.092	-1.06%	-4.23%
			2550	1.885	37.416	1.909	39.073	-1.26%	-4.24%
			2560	1.893	37.402	1.920	39.060	-1.41%	-4.24%
			2600	1.925	37.329	1.964	39.009	-1.99%	-4.31%
			2650	1.966	37.245	2.018	38.945	-2.58%	-4.37%
			2680	1.991	37.189	2.051	38.907	-2.93%	-4.42%
			2700	2.006	37.147	2.073	38.882	-3.23%	-4.46%
			2300	1.702	38.813	1.670	39.500	1.92%	-1.74%
			2310	1.710	38.802	1.679	39.480	1.85%	-1.72%
06/02/2025	2450 Head	20.4	2320	1.716	38.787	1.687	39.460	1.72%	-1.71%
			2400	1.778	38.670	1.756	39.289	1.25%	-1.58%
			2450	1.813	38.591	1.800	39.200	0.72%	-1.55%
			2480	1.839	38.544	1.833	39.162	0.33%	-1.58%
			2500	1.856	38.517	1.855	39.136	0.05%	-1.58%
			2510	1.863	38.501	1.866	39.123	-0.16%	-1.59%
			2535	1.881	38.462	1.893	39.092	-0.63%	-1.61%
			2550	1.892	38.434	1.909	39.073	-0.89%	-1.64%
			2560	1.900	38.415	1.920	39.060	-1.04%	-1.65%
			2600	1.935	38.344	1.964	39.009	-1.48%	-1.70%
			2650	1.975	38.270	2.018	38.945	-2.13%	-1.73%
			2680	1.999	38.208	2.051	38.907	-2.54%	-1.80%
			2700	2.015	38.172	2.073	38.882	-2.80%	-1.83%

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: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 38 of 51

REV 22.0
03/30/2022

11.2 SAR 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

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 (%)
L	1750	HEAD	06/05/2025	21.5	21.1	0.10	1150	7659	1272	3.65	36.40	36.50	0.27%	1.95	19.40	19.50	0.52%	N/A	N/A	N/A	N/A
N	2450	HEAD	05/21/2025	20.5	19.5	0.10	797	7410	1213	5.45	52.00	54.50	4.81%	2.55	24.40	25.50	4.51%	N/A	N/A	N/A	N/A
J	2450	HEAD	05/27/2025	21.5	20.4	0.10	797	7406	1677	5.03	52.00	50.30	-3.27%	2.34	24.40	23.40	-4.10%	N/A	N/A	N/A	N/A
J	2450	HEAD	05/29/2025	21.9	22.9	0.10	797	7406	1677	5.27	52.00	52.70	1.35%	2.46	24.40	24.60	0.82%	N/A	N/A	N/A	N/A
J	2450	HEAD	06/02/2025	22.9	20.4	0.10	719	7406	1677	5.24	52.20	52.40	0.38%	2.44	24.60	24.40	-0.81%	N/A	N/A	N/A	N/A
N	2600	HEAD	05/21/2025	20.5	19.5	0.10	1064	7410	1213	6.15	56.40	61.50	9.04%	2.76	25.20	27.60	9.52%	N/A	N/A	N/A	N/A
J	2600	HEAD	05/27/2025	21.5	20.4	0.10	1064	7406	1677	5.40	56.40	54.00	-4.26%	2.43	25.20	24.30	-3.57%	N/A	N/A	N/A	N/A
N	2600	HEAD	05/29/2025	21.2	23.2	0.10	1071	7410	1213	5.99	56.50	59.90	6.02%	2.72	25.40	27.20	7.09%	N/A	N/A	N/A	N/A

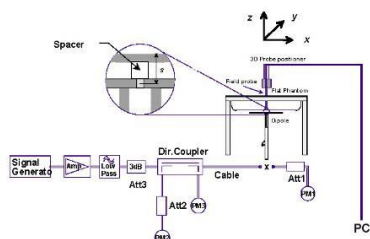


Figure 11-1
System Verification Setup Diagram



Figure 11-2
System Verification Setup Photo

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 39 of 51

REV 22.0
03/30/2022

12 SAR DATA SUMMARY

12.1 LTE Band 41 Standalone SAR

Table 12-1 F/C Head | Plot A1

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power DUT [dB]	Frequency [MHz]	Channel #	MPE [dB]	Max Allowed Power [dBm]	Conducted Power [dBm]	RF Size	RF Offset	Test Position	Spacing [mm]	Add'l Info	Measured 1g SAR [W/kg]	Power Scaling Factor	Reported 1g SAR [W/kg]	Adjusted 1g SAR [W/kg]	Adjusted 1g SAR with Multi-Tx Factor [W/kg]	Exposure Ratio with Multi-Tx Factor [1g SAR]	Plot #	Plmt [dBm]	Overall Plmt [dBm]	EFS Plmt [dBm]
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	-0.09	2549.50	40185	0.0	18.0	17.85	1	50	Right Cheek	0	N/A	0.463	1.035	0.479	0.479	0.530	0.329	19.2			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.02	2549.50	40185	0.0	18.0	17.86	50	25	Right Cheek	0	N/A	0.463	1.033	0.478	0.478	0.530	0.329	19.2			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	-0.02	2549.50	40185	0.0	18.0	17.85	1	50	Right Ttn	0	N/A	0.506	1.035	0.514	0.514	0.565	0.361	18.8			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.00	2549.50	40185	0.0	18.0	17.86	50	25	Right Ttn	0	N/A	0.502	1.033	0.519	0.519	0.570	0.368	18.8			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	-0.09	2549.50	40185	0.0	18.0	17.85	1	50	Left Cheek	0	N/A	0.502	1.035	0.582	0.582	0.640	0.406	18.3			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.00	2549.50	40185	0.0	18.0	17.86	50	25	Left Cheek	0	N/A	0.509	1.033	0.537	0.537	0.595	0.375	18.7			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	-0.03	2556.00	39750	0.0	18.0	17.62	1	99	Left Ttn	0	N/A	0.305	1.093	0.769	0.769	0.850	0.529	17.1			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.00	2549.50	40185	0.0	18.0	17.85	1	50	Left Ttn	0	N/A	0.362	1.035	0.789	0.789	0.870	0.542	17.0			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.02	2593.00	40620	0.0	18.0	17.83	1	0	Left Ttn	0	N/A	0.731	1.040	0.760	0.760	0.840	0.523	17.2			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	-0.09	2593.00	40620	0.0	18.0	17.64	1	0	Left Ttn	0	N/A	0.364	1.040	0.861	0.861	0.950	0.601	16.9			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.00	2580.00	41490	0.0	18.0	17.65	1	0	Left Ttn	0	N/A	0.751	1.085	0.790	0.790	0.870	0.543	17.0			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	-0.02	2506.00	39750	0.0	18.0	17.67	50	50	Left Ttn	0	N/A	0.603	1.079	0.748	0.748	0.820	0.555	17.2			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.00	2549.50	40185	0.0	18.0	17.86	50	25	Left Ttn	0	N/A	0.752	1.033	0.777	0.777	0.820	0.535	17.1			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.01	2593.00	40620	0.0	18.0	17.79	50	0	Left Ttn	0	N/A	0.754	1.050	0.792	0.792	0.870	0.546	17.0			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	-0.09	2580.00	41490	0.0	18.0	17.65	50	0	Left Ttn	0	N/A	0.756	1.040	0.806	0.806	0.890	0.558	16.9			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.00	2549.50	40185	0.0	18.0	17.80	100	0	Left Ttn	0	N/A	0.788	1.047	0.825	0.825	0.910	0.568	Plot	16.8		
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.00	2636.50	43055	0.0	18.0	17.71	1	0	Left Ttn	0	ULCA	0.686	1.069	0.728	0.728	0.800	0.506	17.3			
ANSI/IEEE CS1.1-2002 - SAFETY LIMIT																		Head		1.6 W/kg (mW/g)							
Spatial Peak																		Body		1.6 W/kg (mW/g)							
Uncontrolled Exposure/General Population																				averaged over 1 gram							

Table 12-2 F/O Head | Plot A2

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power DUT [dB]	Frequency [MHz]	Channel #	MPE [dB]	Max Allowed Power [dBm]	Conducted Power [dBm]	RF Size	RF Offset	Test Position	Spacing [mm]	Add'l Info	Measured 1g SAR [W/kg]	Power Scaling Factor	Reported 1g SAR [W/kg]	Adjusted 1g SAR [W/kg]	Adjusted 1g SAR with Multi-Tx Factor [W/kg]	Exposure Ratio with Multi-Tx Factor [1g SAR]	Plot #	Plmt [dBm]	Overall Plmt [dBm]	EFS Plmt [dBm]
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	-0.10	2549.50	40185	0.0	18.0	17.85	1	50	Right Cheek	0	N/A	0.733	1.035	0.241	0.241	0.270	0.358	22.1			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.00	2549.50	40185	0.0	18.0	17.86	50	25	Right Cheek	0	N/A	0.215	1.033	0.222	0.222	0.240	0.313	22.5			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	-0.17	2549.50	40185	0.0	18.0	17.85	1	50	Right Ttn	0	N/A	0.733	1.035	0.267	0.267	0.290	0.384	21.7			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	-0.03	2549.50	40185	0.0	18.0	17.81	1	99	Right Ttn	0	N/A	0.224	1.045	0.265	0.265	0.290	0.383	21.7			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.00	2549.50	40185	0.0	18.0	17.86	50	25	Right Ttn	0	N/A	0.221	1.033	0.260	0.260	0.290	0.379	21.8			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	-0.09	2549.50	40185	0.0	18.0	17.85	1	50	Left Cheek	0	N/A	0.699	1.035	0.040	0.040	0.040	0.039	20.9			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	-0.03	2549.50	40185	0.0	18.0	17.86	50	25	Left Cheek	0	N/A	0.038	1.033	0.039	0.039	0.040	0.026	20.0			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.00	2549.50	40185	0.0	18.0	17.85	1	50	Left Ttn	0	N/A	0.951	1.035	0.053	0.053	0.060	0.036	28.2			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.00	2549.50	40185	0.0	18.0	17.86	50	25	Left Ttn	0	N/A	0.050	1.033	0.052	0.052	0.060	0.036	28.8			
Head	LTE Band 41	20	QPSK	G	06652M	1:1.58	0.00	2549.50	40185	0.0	18.0	17.63	1	0	Right Ttn	0	ULCA 41C	0.266	1.089	0.290	0.290	0.320	0.320	Plot	21.3		
ANSI/IEEE CS1.1-2002 - SAFETY LIMIT																		Head		1.6 W/kg (mW/g)							
Spatial Peak																		Body		1.6 W/kg (mW/g)							
Uncontrolled Exposure/General Population																				averaged over 1 gram							

Table 12-3 | Plot A3

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power DUT [dB]	Frequency [MHz]	Channel #	MPE [dB]	Max Allowed Power [dBm]	Conducted Power [dBm]	RF Size	RF Offset	Test Position	Spacing [mm]	Add'l Info	Measured 1g SAR [W/kg]	Power Scaling Factor	Reported 1g SAR [W/kg]	Adjusted 1g SAR [W/kg]	Exposure Ratio (1g SAR)	Adjusted 1g SAR with Multi-Tx Factor [W/kg]	Plot #	PLMT (dBm)	Overall PLMT (dBm)	EFS PLMT (dBm)
Body	LTE Band 41	20	QPSK	G	06626M	1:1.58	0.05	2549.50	40185	0.0	14.5	13.46	1	99	Back	5	N/A	0.107	1.271	0.428	0.428	0.268	0.430	16.1			
Body	LTE Band 41	20	QPSK	G	06626M	1:1.58	0.00	2549.50	40185	0.0	14.5	13.49	50	50	Back	5	N/A	0.344	1.262	0.434	0.434	0.271	0.430	16.1			
Body	LTE Band 41	20	QPSK	G	06626M	1:1.58	-0.11	2549.50	40185	0.0	14.5	13.46	1	99	Top	5	N/A	0.324	1.271	0.450	0.450	0.281	0.430	15.9			
Body	LTE Band 41	20	QPSK	G	06626M	1:1.58	0.02	2549.50	40185	0.0	14.5	13.49	50	50	Top	5	N/A	0.339	1.262	0.453	0.453	0.283	0.430	15.9			
Body	LTE Band 41	20	QPSK	G	06626M	1:1.58	0.05	2549.50	40185	0.0	14.5	13.46	1	99	Bottom	5	N/A	0.266	1.271	0.000	0.000	0.000	0.000	51.4			
Body	LTE Band 41	20	QPSK	G	06626M	1:1.58	0.00	2549.50	40185	0.0	14.5	13.49	50	50	Bottom	5	N/A	0.000	1.262	0.000	0.000	0.000	0.000	51.5			
Body	LTE Band 41	20	QPSK	G	06626M	1:1.58	0.17	2549.50	40185	0.0	14.5	13.45	1	99	Right	5	N/A	0.018	1.271	0.048	0.048	0.030	0.050	25.6			
Body	LTE Band 41	20	QPSK	G	06626M	1:1.58	0.18	2549.50	40185	0.0	14.5	13.49	50	50	Right	5	N/A	0.001	1.262	0.052	0.052	0.031	0.050	25.1			
Body	LTE Band 41	20	QPSK	G	06626M	1:1.58	0.01	2549.50	40185	0.0	14.5	13.46	1	99	Left	5	N/A	0.000	1.271	0.000	0.000	0.000	0.000	51.4			
Body	LTE Band 41	20	QPSK	G	06626M	1:1.58	0.00	2549.50	40185	0.0	14.5	13.45	50	50	Left	5	N/A	0.000	1.262	0.000	0.000	0.000	0.000	51.6			
Body	LTE Band 41	20	QPSK	G	06626M	1:1.58	-0.14	2549.50	40185	0.0	14.5	13.71	1	0	Top	5	ULCA 41C	0.382	1.199	0.418	0.418	0.286	0.400	Plot	15.9		
ANSI/IEEE CS1.1-2002 - SAFETY LIMIT																		Body		1.6 W/kg (mW/g)							
Spatial Peak																				1.6 W/kg (mW/g)							
Uncontrolled Exposure/General Population																				averaged over 1 gram							

12.2 NR Band n66 Standalone SAR

Table 12-4 F/O Head | Plot A4

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power DfB [dB]	Frequency [MHz]	Channel #	Waveform	MPR [dB]	Max Allowed Power [dBm]	Conducted Power [dBm]	RIS Size	RIS Offset	Test Position	Spacing [mm]	Measured EIRP SAR [W/kg]	Power Scaling Factor	Reported EIRP SAR [W/kg]	Adjusted EIRP SAR relative to Tx Factor (dB)	Exposure Ratio (Tx Factor (Eq.54))	Plot #	Flint [dBm]	Overall Flint [dBm]	EPS Flint [dBm]
Head	NB-Band#4	100	QPSK	G	0662M	1:1	-0.03	2592.99	518508	DFT-OFDM	0	17.0	16.48	1	137	Right Chest	G	0.287	1.086	0.312	0.340	0.215	23.0	22.6	21.1	16.0
Head	NB-Band#4	100	QPSK	G	0662M	1:1	-0.03	2592.99	518508	DFT-OFDM	0	17.0	16.48	1	137	Right Chest	G	0.287	1.086	0.305	0.330	0.215	23.1	22.6		
Head	NB-Band#4	100	QPSK	G	0662M	1:1	-0.03	2592.99	518508	DFT-OFDM	0	17.0	16.48	1	137	Right Thigh	G	0.289	1.086	0.325	0.350	0.223	23.1	22.6		
Head	NB-Band#4	100	QPSK	G	0662M	1:1	-0.03	2592.99	518508	DFT-OFDM	0	17.0	16.48	1	137	Right Thigh	G	0.289	1.086	0.325	0.350	0.223	23.1	22.6		
Head	NB-Band#4	100	QPSK	G	0662M	1:1	-0.03	2592.99	518508	CP-OFDM	0	17.0	16.91	1	1	Right Thigh	G	0.221	1.021	0.226	0.250	0.135	23.5	23.4		
Head	NB-Band#4	100	QPSK	G	0662M	1:1	-0.11	2592.99	518508	DFT-OFDM	0	17.0	16.48	1	137	Left Chest	G	0.287	1.086	0.307	0.330	0.215	23.0	22.6		
Head	NB-Band#4	100	QPSK	G	0662M	1:1	-0.03	2592.99	518508	DFT-OFDM	0	17.0	16.78	135	0	Left Chest	G	0.061	1.052	0.054	0.050	0.037	29.1	28.9		
Head	NB-Band#4	100	QPSK	G	0662M	1:1	-0.02	2592.99	518508	DFT-OFDM	0	17.0	16.78	135	0	Left Thigh	G	0.061	1.052	0.054	0.050	0.044	28.5	28.5		
ANALYSIS C19.1.2 - SAFETY LIMIT																					1.6 W/kg (mW/g)					
Serial Peak																										

Table 12-5 | Plot A5

[illegible]

12.3 NR Band n41 Standalone SAR

Table 12-6 F/O Head | Plot A6

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power DfB [dB]	Frequency [MHz]	Channel F	Waveform	MPE [dB]	Max Allowed Power [dBm]	Conducted Power [dBm]	RB Size	RB Offset	Test Position	Spacing [mm]	Measured Ig SAR [W/kg]	Power Scaling Factor	Reported Ig SAR [W/kg]	Adjusted Ig SAR with Multi Tx Factor	Exposure Ratio with Multi Tx Factor [Ig SAR]	Plot #	Plot [dBm]	Overall Plot [dBm]	RF5 Plot [dBm]
Head	NB Band n41	100	QPSK	G	0662M	1:1	-0.03	2592.99	S1850B	DFT-s-OFDM	0.0	17.0	16.64	1	137	Right Cheek	0	0.287	1.086	0.312	0.340	0.215		22.0		
Head	NB Band n41	100	QPSK	G	0662M	1:1	0.49	2592.99	S1850B	DFT-s-OFDM	0.0	17.0	16.78	135	0	Left Cheek	0	0.280	1.052	0.305	0.480	0.210	Plot #	22.1		
Head	NB Band n41	100	QPSK	G	0662M	1:1	0.03	2592.99	S1850B	DFT-s-OFDM	0.0	17.0	16.64	1	137	Right Tib	0	0.299	1.086	0.325	0.300	0.223	Plot #	21.8		
Head	NB Band n41	100	QPSK	G	0662M	1:1	0.01	2592.99	S1850B	DFT-s-OFDM	0.0	17.0	16.78	135	0	Right Tib	0	0.271	1.052	0.306	0.316	0.196		21.9		
Head	NB Band n41	100	QPSK	G	0662M	1:1	0.03	2592.99	S1850B	CP-OFDM	0.0	17.0	16.91	1	137	Right Tib	0	0.231	1.021	0.226	0.250	0.155		21.4		
Head	NB Band n41	100	QPSK	G	0662M	1:1	0.01	2592.99	S1850B	CP-OFDM	0.0	17.0	16.64	1	137	Left Cheek	0	0.280	1.086	0.326	0.268	0.196		21.7		21.1
Head	NB Band n41	100	QPSK	G	0662M	1:1	0.01	2592.99	S1850B	DFT-s-OFDM	0.0	17.0	16.78	135	0	Left Tib	0	0.051	0.052	0.054	0.040	0.037		20.7		
Head	NB Band n41	100	QPSK	G	0662M	1:1	0.05	2592.99	S1850B	DFT-s-OFDM	0.0	17.0	16.64	1	137	Left Tib	0	0.086	0.086	0.074	0.080	0.051		20.8		
Head	NB Band n41	100	QPSK	G	0662M	1:1	0.03	2592.99	S1850B	DFT-s-OFDM	0.0	17.0	16.78	135	0	Left Tib	0	0.061	0.062	0.064	0.070	0.044		20.8		
ANX/NEC CR1.1092 - SAFETY LIMIT																			Head							
Spatial Peak																			1.6 W/kg (mW/g)							
Uncontrolled Exposure/General Population																			increased over 1.6 W/kg							

Table 12-7 | Plot A7

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power DNR [dBm]	Frequency [MHz]	Channel B	Waveform	MRR [dB]	Max Allowed Power [dBm]	Combined Power [dBm]	RB Size	RB Offset	Test Position	Spacing [mm]	Measured 1g SAR with Tx Factor [W/kg]	Power Scaling Factor	Reported 1g SAR [W/kg]	Adjusted 1g SAR [W/kg]	Adjusted 1g SAR with Tx Factor [W/kg]	Exposure Ratio with Tx Factor (1g SAR)	Pass A	Pass B	Overall Pass [mm]	FFS Pass [mm]
Body	NH Band 4v1	100	CPK	G	0562M	1-1	0.00	2592.99	51808	OFDM + OFDMA	0.0	12.5	12.15	1	0	Back	5	0.478	1.084	0.512	0.512	0.566	0.352	15.2			
Body	NH Band 4v1	100	CPK	G	0562M	1-1	0.00	2592.99	51808	OFDM + OFDMA	0.0	12.5	12.15	1	0	Back	5	0.478	1.112	0.523	0.523	0.569	0.360	15.4			
Body	NH Band 4v1	100	CPK	G	0562M	1-1	0.00	2592.99	51808	OFDM + OFDMA	0.0	12.5	12.15	1	0	Back	5	0.478	1.084	0.514	0.514	0.568	0.352	15.4			
Body	NH Band 4v1	100	CPK	G	0562M	1-1	0.00	2592.99	51808	OFDM + OFDMA	0.0	12.5	12.15	1	0	Back	5	0.478	1.084	0.514	0.514	0.568	0.352	15.4			
Body	NH Band 4v1	100	CPK	G	0562M	1-1	0.00	2592.99	51808	OFDM + OFDMA	0.0	12.5	12.15	1	0	Back	5	0.478	1.084	0.514	0.514	0.568	0.352	15.4			
Body	NH Band 4v1	100	CPK	G	0562M	1-1	0.00	2592.99	51808	OFDM + OFDMA	0.0	12.5	11.91	220	0	Top	5	0.455	1.140	0.747	0.747	0.820	0.514	13.7			
Body	NH Band 4v1	100	CPK	G	0562M	1-1	0.00	2592.99	51808	OFDM + OFDMA	0.0	12.5	11.91	1	0	Top	5	0.455	1.112	0.661	0.661	0.710	0.460	13.7			
Body	NH Band 4v1	100	CPK	G	0562M	1-1	0.00	2592.99	51808	OFDM + OFDMA	0.0	12.5	11.91	1	0	Bottom	5	0.455	1.084	0.600	0.600	0.600	0.460	13.7			
Body	NH Band 4v1	100	CPK	G	0562M	1-1	0.00	2592.99	51808	OFDM + OFDMA	0.0	12.5	12.15	135	0	Bottom	5	0.455	1.112	0.600	0.600	0.600	0.460	13.7			
Body	NH Band 4v1	100	CPK	G	0562M	1-1	0.00	2592.99	51808	OFDM + OFDMA	0.0	12.5	12.15	135	0	Bottom	5	0.455	1.112	0.607	0.607	0.607	0.460	13.7			
Body	NH Band 4v1	100	CPK	G	0562M	1-1	0.00	2592.99	51808	OFDM + OFDMA	0.0	12.5	12.04	135	0	Bottom	5	0.455	1.112	0.607	0.607	0.607	0.460	13.7			
Body	NH Band 4v1	100	CPK	G	0562M	1-1	0.00	2592.99	51808	OFDM + OFDMA	0.0	12.5	12.04	135	0	Bottom	5	0.455	1.112	0.607	0.607	0.607	0.460	13.7			
Body	NH Band 4v1	100	CPK	G	0562M	1-1	0.00	2592.99	51808	OFDM + OFDMA	0.0	12.5	12.04	135	0	Left	5	0.455	1.112	0.601	0.601	0.600	0.460	42.0			
Special Peak																		Body		1.6 W/kg (mW/g)							
Unintentional Radiated Power																		Body		0.0001 mW/g							

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 41 of 51

13 SAR REFERENCE DATA SUMMARY

13.1 LTE Band 41 Spot-check Verification for Data Referencing

Table 13-1 | Plot A8

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power Drift [dB]	Frequency [MHz]	Channel #	MPE [dB]	Max Allowed Power [dBm]	Conducted Power [dBm]	RB Size	RB Offset	Test Position	Spacing [mm]	Add'l Info	Measured 1g SAR [W/kg]	Power Scaling Factor	Reported 1g SAR [W/kg]	Reported SAR from Reference Model 1g [W/kg]	Adjusted 1g SAR with Multi-Tx Factor [W/kg]	Exposure Ratio with Multi-Tx Factor [1g SAR]	Plot #	Plimit [dBm]	Overall Plimit [dBm]	EIS Plimit [dBm]
Body worn/Hotspot	LTE Band 41	20	QPSK	G	096504	1:1.58	0.00	2149.50	40185	0.0	19.5	18.55	100	0	Back	5	N/A	0.878	1.245	0.844	1.197	0.930	0.583	Plot	18.2	18.2	18.5
Body worn/Hotspot	LTE Band 41	20	QPSK	G	096504	1:1.58	0.08	2149.50	40185	0.0	19.5	18.50	100	0	Back	5	ULCA	0.878	1.250	0.847	-	0.930	0.582		18.2	18.2	18.5
ANSI/IEEE C63.1-2002 SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																		Body 1.6 W/kg (mW/g) averaged over 1 gram									

13.2 NR Band n66 Spot-check Verification for Data Referencing

Table 13-2 F/C Head | Plot A9

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power Drift [dB]	Frequency [MHz]	Channel #	Waveform	MPE [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]	Reported SAR for Reference Model 1g [W/kg]	Adjusted 1g SAR with Multi-Tx Factor [W/kg]	Exposure Ratio with Multi-Tx Factor [1g SAR]	Plot #	Plimit [dBm]	Overall Plimit [dBm]	EIS Plimit [dBm]
Head	NR Band n66	40	QPSK	G	027901	1:1	0.02	1745.00	349000	OFDM	0.0	20.5	19.57	1	1	Left Tilt	0	0.860	1.239	1.066	0.977	1.170	0.733	Plot	20.2	20.2	19.5
ANSI/IEEE C63.1-1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population															Head 1.6 W/kg (mW/g) averaged over 1 gram												

Table 13-3 | Plot A10

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power Drift [dB]	Frequency [MHz]	Channel #	Waveform	MPE [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]	Reported SAR from Reference Model 1g [W/kg]	Adjusted 1g SAR with Multi-Tx Factor [W/kg]	Exposure Ratio with Multi-Tx Factor [1g SAR]	Plot #	Plimit [dBm]	Overall Plimit [dBm]	EIS Plimit [dBm]
Body worn/Hotspot	NR Band n66	40	QPSK	G	027901	1:1	0.00	1745.00	349000	CP-OFDM	0.0	18.0	17.35	1	1	Back	5	0.851	1.051	1.058	1.014	1.180	0.727	Plot	17.7	17.7	17.0
ANSI/IEEE C63.1-2002 SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																		Body 1.6 W/kg (mW/g) averaged over 1 gram									

13.3 NR Band n41 Spot-check Verification for Data Referencing

Table 13-4 F/C Head | Plot 11

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power Drift [dB]	Frequency [MHz]	Channel #	Waveform	MPE [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]	Reported SAR from Reference Model 1g [W/kg]	Adjusted 1g SAR with Multi-Tx Factor [W/kg]	Exposure Ratio with Multi-Tx Factor [1g SAR]	Plot #	Plimit [dBm]	Overall Plimit [dBm]	EIS Plimit [dBm]
Head	NR Band n41	100	QPSK	G	056204	1:1	0.00	2502.00	518588	CP-OFDM	0.0	17.0	16.58	1	1	Left Tilt	0	0.873	1.033	1.216	1.222	1.340	0.836	Plot	16.1	16.1	16.0
ANSI/IEEE C63.1-2002 SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																		Head 1.6 W/kg (mW/g) averaged over 1 gram									

Table 13-5 | Plot 12

Exposure	Band / Mode	Bandwidth [MHz]	Service / Modulation	Ant.	Serial Number	Duty Cycle	Power Drift [dB]	Frequency [MHz]	Channel #	Waveform	MPE [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]	Reported SAR from Reference Model 1g [W/kg]	Adjusted 1g SAR with Multi-Tx Factor [W/kg]	Exposure Ratio with Multi-Tx Factor [1g SAR]	Plot #	Plimit [dBm]	Overall Plimit [dBm]	EIS Plimit [dBm]
Body worn/Hotspot	NR Band n41	100	QPSK	G	056204	1:1	0.00	2502.00	518588	CP-OFDM	0.0	17.5	16.58	1	1	Back	5	0.784	1.236	0.916	0.953	1.000	0.630	Plot	17.8	17.8	16.5
ANSI/IEEE C63.1-2002 SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																		Body 1.6 W/kg (mW/g) averaged over 1 gram									

SAR Test Notes

General Notes:

- 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.
- Batteries are fully charged at the beginning of the SAR measurements.
- Liquid tissue depth was at least 15.0 cm for all frequencies.
- 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.
- SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D04v01.
- Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 5 mm was considered to ensure compliance with all body-worn accessories available in the marketplace.
- Per FCC KDB Publication 648474 D01v06r03, 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.

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 42 of 51

REV 22.0
03/30/2022

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 D01v06r03, this device is considered a "phablet" when it is in the closed configuration 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. Per FCC KDB Publication 616217 D04v01r02 Section 4.3, SAR tests are required for the back surface and edges of device with the device touching the phantom when the device is in the open configuration. The SAR Exclusion Threshold in FCC KDB 447498 D04v01 was applied to determine SAR test exclusion for adjacent edge configurations.
13. When testing Body-worn/Hotspot/Phablet exposure conditions, the DUT is in closed configuration. When testing Body exposure conditions, the DUT is in an open configuration. When testing Head exposure conditions, the DUT is in an open/closed configuration.

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 9.5.4.
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, 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 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.

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. This device additionally supports some EN-DC conditions where additional LTE carriers are added on the downlink only.
4. 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.
5. Per FCC KDB Publication 447498 D04v01, when the reported NR Band n41 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.
6. SRS was tested with CW signal per Qualcomm guidance in 80-w2112-4.

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 43 of 51

REV 22.0
03/30/2022



7. For final implementation NR Band n41 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.

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 44 of 51

REV 22.0
03/30/2022

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14 SAR MEASUREMENT VARIABILITY

14.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01r04, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:

- 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
- 2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~10% from the 1g SAR limit).
- 3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .
- 4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg
- 5) When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

No variability testing is required in this certification since all measured SAR values are below 0.80 W/kg; variability testing requirements have therefore been fulfilled per KDB 865664 D01 v01r04.

14.2 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: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 45 of 51

REV 22.0
03/30/2022

15 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E4404B	Spectrum Analyzer	N/A	N/A	N/A	MY45113242
Agilent	E4438C	ESG Vector Signal Generator	10/23/2024	Annual	10/23/2025	MY45093852
Agilent	E4438C	ESG Vector Signal Generator	11/15/2024	Annual	11/15/2025	MY45092078
Agilent	N5182A	MXG Vector Signal Generator	7/9/2024	Annual	7/9/2025	MY48180366
Agilent	N5182A	MXG Vector Signal Generator	12/5/2024	Annual	12/5/2025	US46240505
Agilent	8753ES	S-Parameter Vector Network Analyzer	1/6/2025	Annual	1/6/2026	MY40001472
Agilent	8753ES	S-Parameter Vector Network Analyzer	9/25/2024	Annual	9/25/2025	MY40003841
Agilent	E5515C	Wireless Communications Test Set	CBT	N/A	CBT	GB46310798
Agilent	E5515C	Wireless Communications Test Set	CBT	N/A	CBT	GB41450275
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB46170464
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433973
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433974
Amplifier Research	150A100C	Amplifier	CBT	N/A	CBT	350132
Anritsu	MN8110B	I/O Adaptor	CBT	N/A	CBT	6261747881
Anritsu	ML2496A	Power Meter	7/15/2024	Annual	7/15/2025	1138001
Anritsu	MA2411B	Pulse Power Sensor	9/5/2024	Annual	9/5/2025	1726262
Anritsu	MA2411B	Pulse Power Sensor	10/21/2024	Annual	10/21/2025	1027293
Anritsu	MT8821C	Radio Communication Analyzer MT8821C	3/14/2025	Annual	3/14/2026	6262044715
Anritsu	MT8000A	Radio Communication Test Station	4/11/2025	Annual	4/11/2026	6261987983
Anritsu	MT8000A	Radio Communication Test Station	3/11/2025	Annual	3/11/2026	6272337439
Anritsu	MT8000A	Radio Communication Test Station	11/12/2024	Annual	11/12/2025	6272337405
Anritsu	MA24106A	USB Power Sensor	7/10/2024	Annual	7/10/2025	1827530
Mini-Circuits	PWR-4GHS	USB Power Sensor	6/12/2024	Annual	6/12/2025	12001070013
Control Company	4052	Long Stem Thermometer	2/27/2024	Biennial	2/27/2026	240174346
Control Company	4052	Long Stem Thermometer	2/27/2024	Biennial	2/27/2026	240171096
Control Company	4052	Long Stem Thermometer	2/27/2024	Biennial	2/27/2026	240171059
Control Company	4040	Therm./ Clock/ Humidity Monitor	4/15/2024	Biennial	4/15/2026	240310280
Control Company	4040	Therm./ Clock/ Humidity Monitor	10/15/2024	Biennial	10/15/2026	240763503
Control Company	4040	Therm./ Clock/ Humidity Monitor	4/15/2024	Biennial	4/15/2026	240310282
Keysight Technologies	N9020A	MXA Signal Analyzer	7/8/2024	Annual	7/8/2025	MY48010233
Agilent	N9020A	MXA Signal Analyzer	6/14/2024	Annual	6/14/2025	MY56470202
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
Mini-Circuits	VLF-6000+	Low Pass Filter DC to 6000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	VLF-6000+	Low Pass Filter DC to 6000 MHz	7/10/2024	Annual	7/10/2025	31634
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Mini-Circuits	ZUDC10-83-S+	Directional Coupler	CBT	N/A	CBT	2050
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Seekonk	NC-100	Torque Wrench	CBT	N/A	CBT	22217
Seekonk	NC-100	Torque Wrench	4/2/2024	Biennial	4/2/2026	1262
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	10/2/2024	Annual	10/2/2025	171000
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	4/3/2025	Annual	4/3/2026	167285
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	4/3/2025	Annual	4/3/2026	106578
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	2/22/2025	Annual	2/22/2026	168527
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	1/6/2025	Annual	1/6/2026	150117
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	4/15/2025	Annual	4/15/2026	101699
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	12/10/2024	Annual	12/10/2025	161616
SPEAG	DAK-3.5	Dielectric Assessment Kit	11/5/2024	Annual	11/5/2025	1277
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	8/7/2024	Annual	8/7/2025	1041
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1237
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1331
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1390
SPEAG	DAK-12	Dielectric Assessment Kit (4MHz - 3GHz)	3/10/2025	Annual	3/10/2026	1102
SPEAG	D1750V2	1750 MHz SAR Dipole	11/7/2024	Annual	11/7/2025	1150
SPEAG	D2450V2	2450 MHz SAR Dipole	11/15/2022	Triennial	11/15/2025	797
SPEAG	D2450V2	2450 MHz SAR Dipole	8/7/2024	Annual	8/7/2025	719
SPEAG	D2600V2	2600 MHz SAR Dipole	11/15/2022	Triennial	11/15/2025	1071
SPEAG	D2600V2	2600 MHz SAR Dipole	6/13/2022	Triennial	6/13/2025	1064
SPEAG	DAE4	Dasy Data Acquisition Electronics	12/4/2024	Annual	12/4/2025	1213
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/8/2024	Annual	7/8/2025	1677
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/10/2025	Annual	4/10/2026	1272
SPEAG	EX3DV4	SAR Probe	7/5/2024	Annual	7/5/2025	7406
SPEAG	EX3DV4	SAR Probe	4/7/2025	Annual	4/7/2026	7659
SPEAG	EX3DV4	SAR Probe	12/5/2024	Annual	12/5/2025	7410

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: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 46 of 51

REV 22.0
03/30/2022

16 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:

a	b	c	d	e = f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c _i 1gm	c _i 10 gms	1gm u _i (± %)	10gms u _i (± %)	v _i
Measurement System									
Probe Calibration	E.2.1	7	N	1	1	1	7.0	7.0	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	0.7	0.7	0.9	0.9	∞
Boundary Effect	E.2.3	2	R	1.73	1	1	1.2	1.2	∞
Linearity	E.2.4	0.3	N	1	1	1	0.3	0.3	∞
System Detection Limits	E.2.4	0.25	R	1.73	1	1	0.1	0.1	∞
Modulation Response	E.2.5	4.8	R	1.73	1	1	2.8	2.8	∞
Readout Electronics	E.2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1	1	1.5	1.5	∞
RF Ambient Conditions - Noise	E.6.1	3	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	3	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.8	R	1.73	1	1	0.5	0.5	∞
Probe Positioning w/ respect to Phantom	E.6.3	6.7	R	1.73	1	1	3.9	3.9	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	4	R	1.73	1	1	2.3	2.3	∞
Test Sample Related									
Test Sample Positioning	E.4.2	3.12	N	1	1	1	3.1	3.1	35
Device Holder Uncertainty	E.4.1	1.67	N	1	1	1	1.7	1.7	5
Output Power Variation - SAR drift measurement	E.2.9	5	R	1.73	1	1	2.9	2.9	∞
SAR Scaling	E.6.5	0	R	1.73	1	1	0.0	0.0	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	7.6	R	1.73	1.0	1.0	4.4	4.4	∞
Liquid Conductivity - measurement uncertainty	E.3.3	4.3	N	1	0.78	0.71	3.3	3.0	76
Liquid Permittivity - measurement uncertainty	E.3.3	4.2	N	1	0.23	0.26	1.0	1.1	75
Liquid Conductivity - Temperature Uncertainty	E.3.4	3.4	R	1.73	0.78	0.71	1.5	1.4	∞
Liquid Permittivity - Temperature Uncertainty	E.3.4	0.6	R	1.73	0.23	0.26	0.1	0.1	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Combined Standard Uncertainty (k=1)	RSS						12.2	12.0	191
Expanded Uncertainty (95% CONFIDENCE LEVEL)	k=2						24.4	24.0	

The above measurement uncertainties are according to IEEE Std. 1528-2013

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 47 of 51

REV 22.0
03/30/2022

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Applicable for SAR measurements > 6GHz:

a	b	c	d	e = f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c _i 1gm	c _i 10 gms	1gm u _i (± %)	10gms u _i (± %)	v _i
Measurement System									
Probe Calibration	E.2.1	9.3	N	1	1	1	9.3	9.3	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	0.7	0.7	0.9	0.9	∞
Boundary Effect	E.2.3	2	R	1.73	1	1	1.2	1.2	∞
Linearity	E.2.4	0.3	N	1	1	1	0.3	0.3	∞
System Detection Limits	E.2.4	0.25	R	1.73	1	1	0.1	0.1	∞
Modulation Response	E.2.5	4.8	R	1.73	1	1	2.8	2.8	∞
Readout Electronics	E.2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1	1	1.5	1.5	∞
RF Ambient Conditions - Noise	E.6.1	3	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	3	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.8	R	1.73	1	1	0.5	0.5	∞
Probe Positioning w/ respect to Phantom	E.6.3	6.7	R	1.73	1	1	3.9	3.9	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	4	R	1.73	1	1	2.3	2.3	∞
Test Sample Related									
Test Sample Positioning	E.4.2	3.12	N	1	1	1	3.1	3.1	35
Device Holder Uncertainty	E.4.1	1.67	N	1	1	1	1.7	1.7	5
Output Power Variation - SAR drift measurement	E.2.9	5	R	1.73	1	1	2.9	2.9	∞
SAR Scaling	E.6.5	0	R	1.73	1	1	0.0	0.0	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	7.6	R	1.73	1.0	1.0	4.4	4.4	∞
Liquid Conductivity - measurement uncertainty	E.3.3	4.3	N	1	0.78	0.71	3.3	3.0	76
Liquid Permittivity - measurement uncertainty	E.3.3	4.2	N	1	0.23	0.26	1.0	1.1	75
Liquid Conductivity - Temperature Uncertainty	E.3.4	3.4	R	1.73	0.78	0.71	1.5	1.4	∞
Liquid Permittivity - Temperature Uncertainty	E.3.4	0.6	R	1.73	0.23	0.26	0.1	0.1	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Combined Standard Uncertainty (k=1)							RSS	13.8	13.6
Expanded Uncertainty (95% CONFIDENCE LEVEL)							k=2	27.6	27.1

The above measurement uncertainties are according to IEEE Std. 1528-2013

FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 48 of 51

REV 22.0
03/30/2022

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17 CONCLUSION

17.1 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: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 49 of 51

REV 22.0
03/30/2022

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Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 50 of 51

REV 22.0
03/30/2022

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FCC ID: A3LSMF966JPN	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
Document S/N: 1M2505200052-04.A3L	DUT Type: Portable Handset	Page 51 of 51

REV 22.0
03/30/2022