

APPENDIX E: SIMULTANEOUS NUMERICAL CALCULATIONS

E.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v06 are applicable to devices with built-in unlicensed transmitters such as 802.11 and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

E.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore, simultaneous transmission analysis is required. Per FCC KDB Publication 447498 D01v06 4.3.2 and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1g SAR for all the simultaneous transmitting antennas in a specific physical test configuration is ≤ 1.6 W/kg. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1g or 10g SAR.

Per FCC KDB Publication 941225 D06v02r01, the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR (“-”).

(*) For test positions that were not required to be evaluated for WLAN SAR per FCC KDB publication 248227, the worst case WLAN SAR result for the applicable exposure conditions was used for simultaneous transmission analysis.

This device is enabled with Qualcomm® Smart Transmit Gen2 with pre-defined sub6 antenna groups (AG0 and AG1). Simultaneous transmission analysis is performed per antenna groups. Appendix D contains analysis to demonstrate the AG0 and AG1 are operate mutually exclusive. Additional analysis is provided below to show compliance between AG0 and BT/WLAN and AG1 BT/WLAN.

When operating in the same antenna group, Qualcomm Smart Transmit algorithm in WWAN directly adds the time-averaged RF exposure from 4G and time-averaged RF exposure from 5G NR. Smart Transmit algorithm controls the total RF exposure from both 4G and 5G NR to not exceed FCC limit. Therefore, simultaneous transmission compliance between 4G+5G operations within an antenna group is demonstrated in the Part 2 Report during algorithm validation.

FCC ID A3LSMS901U	 PCTEST Proud to be part of Samsung	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 1 of 26

E.3 Head Simultaneous Transmission Analysis

Table E-1
Simultaneous Transmission Scenarios of WLAN/BT (Held to Ear)

Configuration	2.4 GHz WLAN Ant 2	2.4 GHz WLAN MIMO	2.4 GHz Bluetooth	5 GHz WLAN Ant 1	5 GHz WLAN MIMO
Right Cheek	0.031	0.210	0.224	0.281	0.303
Right Tilt	0.031*	0.210*	0.045	0.281*	0.303*
Left Cheek	0.031*	0.210*	0.187	0.281*	0.303*
Left Tilt	0.031*	0.210*	0.022	0.015	0.011

Configuration	2.4 GHz WLAN MIMO	5 GHz WLAN Ant 1	5 GHz WLAN MIMO	2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO	2.4 GHz Bluetooth	2.4 GHz Bluetooth + 2.4 GHz WLAN Ant 2	2.4 GHz Bluetooth + 5 GHz WLAN Ant 1	2.4 GHz Bluetooth + 5 GHz WLAN MIMO	2.4 GHz Bluetooth + 2.4 GHz WLAN Ant 2 + 5 GHz WLAN Ant 1	2.4 GHz Bluetooth + 2.4 GHz WLAN Ant 2 + 5 GHz WLAN MIMO	WLAN/BT Worst-case Combination
Right Cheek	0.210	0.281	0.303	0.513	0.224	0.255	0.505	0.527	0.536	0.558	0.558
Right Tilt	0.210	0.281	0.303	0.513	0.045	0.076	0.326	0.348	0.357	0.379	0.513
Left Cheek	0.210	0.281	0.303	0.513	0.187	0.218	0.468	0.490	0.499	0.521	0.521
Left Tilt	0.210	0.015	0.011	0.221	0.022	0.053	0.037	0.033	0.068	0.064	0.221

Table E-2
Simultaneous Transmission Scenario with WLAN/BT (Held to Ear)

	Configuration	AG0	AG1	WLAN/BT Worst-case Combination	AG0 + WLAN/BT	AG1 + WLAN/BT
Head SAR	Right Cheek	0.350	0.762	0.558	0.908	1.320
	Right Tilt	0.223	0.749	0.513	0.736	1.262
	Left Cheek	0.339	0.983	0.521	0.860	1.504
	Left Tilt	0.233	1.026	0.221	0.454	1.247

FCC ID A3LSMS901U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT	Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset		APPENDIX E: Page 2 of 26

E.4 Body-worn Simultaneous Transmission Analysis

Table E-3
Simultaneous Transmission Scenarios of WLAN/BT (Body-worn at 1.5 cm)

Configuration		2.4 GHz WLAN Ant 2 at 14 dBm	2.4 GHz WLAN Ant 2	2.4 GHz WLAN MIMO	2.4 GHz WLAN MIMO at 17 dBm	2.4 GHz Bluetooth	5 GHz WLAN Ant 1	5 GHz WLAN Ant 1 at 12 dBm	5 GHz WLAN MIMO	5 GHz WLAN MIMO at 15 dBm	
Back		0.055	0.173	0.316	0.060	0.023	0.154	0.037	0.278	0.055	
Configuration	2.4 GHz WLAN MIMO	5 GHz WLAN Ant 1	5 GHz WLAN MIMO	2.4 GHz WLAN MIMO at 17 dBm + 5 GHz WLAN MIMO at 15 dBm	2.4 GHz Bluetooth	2.4 GHz Bluetooth + 2.4 GHz WLAN Ant 2	2.4 GHz Bluetooth + 5 GHz WLAN Ant 1	2.4 GHz Bluetooth + 5 GHz WLAN MIMO	2.4 GHz Bluetooth + 2.4 GHz WLAN Ant 2 at 14 dBm + 5 GHz WLAN Ant 1 at 12 dBm	2.4 GHz Bluetooth + 2.4 GHz WLAN Ant 2 at 14 dBm + 5 GHz WLAN MIMO	WLAN/BT Worst-case Combination
	Back	0.316	0.154	0.278	0.115	0.023	0.196	0.177	0.301	0.115	

Table E-4
Simultaneous Transmission Scenario with WLAN/BT (Body-worn at 1.5 cm)

	Configuration	AG0	AG1	WLAN/BT Worst-case Combination	AG0 + WLAN/BT	AG1 + WLAN/BT
Bodyworn SAR	Back	1.151	0.261	0.356	1.507	0.617

E.5 Hotspot Simultaneous Transmission Analysis

Table E-5
Simultaneous Transmission Scenarios of WLAN/BT (Hotspot at 1.0 cm)

Configuration	2.4 GHz WLAN Ant 2 at 14 dBm	2.4 GHz WLAN Ant 2	2.4 GHz WLAN MIMO	2.4 GHz WLAN MIMO at 17 dBm	2.4 GHz Bluetooth	5 GHz WLAN Ant 1	5 GHz WLAN MIMO	5 GHz WLAN MIMO at 15 dBm
Back	0.073	0.427	0.934	0.147	0.043	0.182*	0.298	0.023
Front	0.073*	0.035	0.180	0.147*	0.043	0.182*	0.152	0.020
Top	0.073*	0.106	0.129	0.147*	0.004	-	0.040	0.023*
Bottom	-	-	-	-	-	-	-	-
Right	-	-	-	-	-	-	-	-
Left	0.073*	0.427*	0.399	0.147*	0.067	0.182	0.193	0.023*

Configuration	2.4 GHz WLAN MIMO	5 GHz WLAN Ant 1	5 GHz WLAN MIMO	2.4 GHz WLAN MIMO at 17 dBm + 5 GHz WLAN MIMO at 15 dBm	2.4 GHz Bluetooth	2.4 GHz Bluetooth + 2.4 GHz WLAN Ant 2	2.4 GHz Bluetooth + 5 GHz WLAN Ant 1	2.4 GHz Bluetooth + 5 GHz WLAN MIMO	2.4 GHz Bluetooth + 2.4 GHz WLAN Ant 2 at 14 dBm + 5 GHz WLAN Ant 1	2.4 GHz Bluetooth + 2.4 GHz WLAN Ant 2 at 14 dBm + 5 GHz WLAN MIMO at 15 dBm	WLAN/BT Worst-case Combination
Back	0.934	0.182	0.298	0.170	0.043	0.470	0.225	0.341	0.298	0.139	0.934
Front	0.180	0.182	0.152	0.167	0.043	0.078	0.225	0.195	0.298	0.136	0.298
Top	0.129	0.000	0.040	0.170	0.004	0.110	0.004	0.044	0.077	0.100	0.170
Bottom	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-
Right	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-
Left	0.399	0.182	0.193	0.170	0.067	0.494	0.249	0.260	0.322	0.163	0.494

FCC ID A3LSMS901U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset	APPENDIX E: Page 3 of 26		

Table E-6
Simultaneous Transmission Scenarios with WLAN/BT (Hotspot at 1.0 cm)

	Configuration	AG0	AG1	WLAN/BT Worst-case Combination	AG0 + WLAN/BT	AG1 + WLAN/BT
Hotspot SAR	Back	0.731	0.528	0.934	See Note 1	1.462
	Front	0.705	0.311	0.298	1.003	0.609
	Top	0.000	0.572	0.170	0.170	0.742
	Bottom	1.250	0.000	-	1.250	0.000
	Right	0.632	0.105	-	0.632	0.105
	Left	0.397	0.493	0.494	0.891	0.987

Notes:

1. For configurations where the sum an AG+WLAN/BT is greater than 1.6 W/kg, further breakdown evaluation of the simultaneous combinations was needed.

FCC ID A3LSMS901U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 4 of 26

Table E-7
Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO (at 1.0 cm)

Configuration	Mode	2G/3G/4G /5G SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.452	0.934	1.386
	GPRS 1900	1.159	0.934	See Table Below
	UMTS 850	0.550	0.934	1.484
	UMTS 1750	1.131	0.934	See Table Below
	UMTS 1900	1.042	0.934	See Table Below
	LTE Band 71	0.413	0.934	1.347
	LTE Band 12	0.518	0.934	1.452
	LTE Band 13	0.550	0.934	1.484
	LTE Band 14	0.503	0.934	1.437
	LTE Band 26 (Cell)	0.458	0.934	1.392
	LTE Band 5 (Cell)	0.622	0.934	1.556
	LTE Band 66 (AWS)	1.176	0.934	See Table Below
	LTE Band 25 (PCS)	1.250	0.934	See Table Below
	LTE Band 30	0.715	0.934	See Table Below
	LTE Band 7	0.509	0.934	1.443
	LTE Band 41	0.303	0.934	1.237
	NR Band n71	0.599	0.934	1.533
	NR Band n12	0.659	0.934	1.593
	NR Band n5 (Cell)	0.731	0.934	See Table Below
	NR Band n66 (AWS) Antenna A	1.019	0.934	See Table Below
	NR Band n25 (PCS) Antenna A	1.199	0.934	See Table Below
	NR Band n30 Antenna A	1.081	0.934	See Table Below
	NR Band n30 Antenna B	0.099	0.934	1.033
	NR Band n7	0.890	0.934	See Table Below
	NR Band n41 Antenna B	0.387	0.934	1.321
	NR Band n41 Antenna D	0.081	0.934	1.015
	NR Band n77 DoD Antenna C	0.045	0.934	0.979
	NR Band n77 DoD Antenna D	0.111	0.934	1.045
	NR Band n77 Antenna C	0.111	0.934	1.045
	NR Band n77 Antenna D	0.042	0.934	0.976

FCC ID A3LSMS901U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 5 of 26

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2			1	2	1+2
Hotspot SAR	Back	0.336	0.934	1.270	Hotspot SAR	Back	0.505	0.934	1.439
	Front	0.346	0.180	0.526		Front	0.379	0.180	0.559
	Top	-	0.129	0.129		Top	-	0.129	0.129
	Bottom	1.159	-	1.159		Bottom	1.131	-	1.131
	Right	0.038	-	0.038		Right	0.062	-	0.062
	Left	0.084	0.399	0.483		Left	0.152	0.399	0.551

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 66 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	SPLSR
		1	2	1+2			1	2	1+2	1+2
Hotspot SAR	Back	0.511	0.934	1.445	Hotspot SAR	Back	0.676	0.934	See Note 1	0.02
	Front	0.370	0.180	0.550		Front	0.579	0.180	0.759	N/A
	Top	-	0.129	0.129		Top	-	0.129	0.129	N/A
	Bottom	1.042	-	1.042		Bottom	1.176	-	1.176	N/A
	Right	0.062	-	0.062		Right	0.068	-	0.068	N/A
	Left	0.110	0.399	0.509		Left	0.150	0.399	0.549	N/A
Simult Tx	Configuration	LTE Band 25 (PCS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	SPLSR	Simult Tx	Configuration	LTE Band 30 Ant A SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2				1	2	1+2
Hotspot SAR	Back	0.689	0.934	See Note 1	0.02	Hotspot SAR	Back	0.342	0.934	1.276
	Front	0.705	0.180	0.885	N/A		Front	0.339	0.180	0.519
	Top	-	0.129	0.129	N/A		Top	-	0.129	0.129
	Bottom	1.250	-	1.250	N/A		Bottom	0.715	-	0.715
	Right	0.069	-	0.069	N/A		Right	0.053	-	0.053
	Left	0.178	0.399	0.577	N/A		Left	0.195	0.399	0.594
Simult Tx	Configuration	LTE Band 30 Ant B SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	NR Band n5 (Cell) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	SPLSR
		1	2	1+2			1	2	1+2	1+2
Hotspot SAR	Back	0.164	0.934	1.098	Hotspot SAR	Back	0.731	0.934	See Note 1	0.02
	Front	0.096	0.180	0.276		Front	0.476	0.180	0.656	N/A
	Top	-	0.129	0.129		Top	-	0.129	0.129	N/A
	Bottom	0.189	-	0.189		Bottom	0.243	-	0.243	N/A
	Right	-	-	-		Right	0.632	-	0.632	N/A
	Left	0.149	0.399	0.548		Left	0.397	0.399	0.796	N/A

FCC ID A3LSMS901U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 6 of 26

Simult Tx	Configuration	NR Band n66 (AWS) Antenna A SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	NR Band n25 (PCS) Antenna A SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2			1	2	1+2
Hotspot SAR	Back	0.592	0.934	1.526	Hotspot SAR	Back	0.633	0.934	1.567
	Front	0.438	0.180	0.618		Front	0.553	0.180	0.733
	Top	-	0.129	0.129		Top	-	0.129	0.129
	Bottom	1.019	-	1.019		Bottom	1.199	-	1.199
	Right	0.059	-	0.059		Right	0.240	-	0.240
	Left	0.124	0.399	0.523		Left	0.152	0.399	0.551
Simult Tx	Configuration	NR Band n30 Antenna A SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	NR Band n7 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2			1	2	1+2
Hotspot SAR	Back	0.481	0.934	1.415	Hotspot SAR	Back	0.358	0.934	1.292
	Front	0.487	0.180	0.667		Front	0.355	0.180	0.535
	Top	-	0.129	0.129		Top	-	0.129	0.129
	Bottom	1.081	-	1.081		Bottom	0.890	-	0.890
	Right	0.049	-	0.049		Right	-	-	-
	Left	0.206	0.399	0.605		Left	0.340	0.399	0.739

FCC ID A3LSMS901U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 7 of 26

Table E-8
Simultaneous Transmission Scenario with 5 GHz WLAN (at 1.0 cm)

Configuration	Mode	2G/3G/4G /5G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.452	0.182	0.634
	GPRS 1900	1.159	0.182	1.341
	UMTS 850	0.550	0.182	0.732
	UMTS 1750	1.131	0.182	1.313
	UMTS 1900	1.042	0.182	1.224
	LTE Band 71	0.413	0.182	0.595
	LTE Band 12	0.518	0.182	0.700
	LTE Band 13	0.550	0.182	0.732
	LTE Band 14	0.503	0.182	0.685
	LTE Band 26 (Cell)	0.458	0.182	0.640
	LTE Band 5 (Cell)	0.622	0.182	0.804
	LTE Band 66 (AWS)	1.176	0.182	1.358
	LTE Band 25 (PCS)	1.250	0.182	1.432
	LTE Band 30	0.715	0.182	0.897
	LTE Band 7	0.509	0.182	0.691
	LTE Band 41	0.303	0.182	0.485
	NR Band n71	0.599	0.182	0.781
	NR Band n12	0.659	0.182	0.841
	NR Band n5 (Cell)	0.731	0.182	0.913
	NR Band n66 (AWS) Antenna A	1.019	0.182	1.201
	NR Band n25 (PCS) Antenna A	1.199	0.182	1.381
	NR Band n30 Antenna A	1.081	0.182	1.263
	NR Band n30 Antenna B	0.099	0.182	0.281
	NR Band n7	0.890	0.182	1.072
	NR Band n41 Antenna B	0.387	0.182	0.569
	NR Band n41 Antenna D	0.081	0.182	0.263
	NR Band n77 DoD Antenna C	0.045	0.182	0.227
	NR Band n77 DoD Antenna D	0.111	0.182	0.293
	NR Band n77 Antenna C	0.111	0.182	0.293
	NR Band n77 Antenna D	0.042	0.182	0.224

FCC ID A3LSMS901U	 SAR EVALUATION REPORT 	Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset	APPENDIX E: Page 8 of 26

Table E-9
Simultaneous Transmission Scenario with 5 GHz WLAN MIMO (at 1.0 cm)

Configuration	Mode	2G/3G/4G /5G SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.452	0.298	0.750
	GPRS 1900	1.159	0.298	1.457
	UMTS 850	0.550	0.298	0.848
	UMTS 1750	1.131	0.298	1.429
	UMTS 1900	1.042	0.298	1.340
	LTE Band 71	0.413	0.298	0.711
	LTE Band 12	0.518	0.298	0.816
	LTE Band 13	0.550	0.298	0.848
	LTE Band 14	0.503	0.298	0.801
	LTE Band 26 (Cell)	0.458	0.298	0.756
	LTE Band 5 (Cell)	0.622	0.298	0.920
	LTE Band 66 (AWS)	1.176	0.298	1.474
	LTE Band 25 (PCS)	1.250	0.298	1.548
	LTE Band 30	0.715	0.298	1.013
	LTE Band 7	0.509	0.298	0.807
	LTE Band 41	0.303	0.298	0.601
	NR Band n71	0.599	0.298	0.897
	NR Band n12	0.659	0.298	0.957
	NR Band n5 (Cell)	0.731	0.298	1.029
	NR Band n66 (AWS) Antenna A	1.019	0.298	1.317
	NR Band n25 (PCS) Antenna A	1.199	0.298	1.497
	NR Band n30 Antenna A	1.081	0.298	1.379
	NR Band n30 Antenna B	0.099	0.298	0.397
	NR Band n7	0.890	0.298	1.188
	NR Band n41 Antenna B	0.387	0.298	0.685
	NR Band n41 Antenna D	0.081	0.298	0.379
	NR Band n77 DoD Antenna C	0.045	0.298	0.343
	NR Band n77 DoD Antenna D	0.111	0.298	0.409
	NR Band n77 Antenna C	0.111	0.298	0.409
	NR Band n77 Antenna D	0.042	0.298	0.340

FCC ID A3LSMS901U	 SAR EVALUATION REPORT 	Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset	APPENDIX E: Page 9 of 26

Table E-10
Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO and 5 GHz WLAN MIMO (at 1.0 cm)

Configuration	Mode	2G/3G/4G /5G SAR (W/kg)	2.4 GHz WLAN MIMO at 17 dBm SAR (W/kg)	5 GHz WLAN MIMO at 15 dBm SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	GPRS 850	0.452	0.147	0.023	0.622
	GPRS 1900	1.159	0.147	0.023	1.329
	UMTS 850	0.550	0.147	0.023	0.720
	UMTS 1750	1.131	0.147	0.023	1.301
	UMTS 1900	1.042	0.147	0.023	1.212
	LTE Band 71	0.413	0.147	0.023	0.583
	LTE Band 12	0.518	0.147	0.023	0.688
	LTE Band 13	0.550	0.147	0.023	0.720
	LTE Band 14	0.503	0.147	0.023	0.673
	LTE Band 26 (Cell)	0.458	0.147	0.023	0.628
	LTE Band 5 (Cell)	0.622	0.147	0.023	0.792
	LTE Band 66 (AWS)	1.176	0.147	0.023	1.346
	LTE Band 25 (PCS)	1.250	0.147	0.023	1.420
	LTE Band 30	0.715	0.147	0.023	0.885
	LTE Band 7	0.509	0.147	0.023	0.679
	LTE Band 41	0.303	0.147	0.023	0.473
	NR Band n71	0.599	0.147	0.023	0.769
	NR Band n12	0.659	0.147	0.023	0.829
	NR Band n5 (Cell)	0.731	0.147	0.023	0.901
	NR Band n66 (AWS) Antenna A	1.019	0.147	0.023	1.189
	NR Band n25 (PCS) Antenna A	1.199	0.147	0.023	1.369
	NR Band n30 Antenna A	1.081	0.147	0.023	1.251
	NR Band n30 Antenna B	0.099	0.147	0.023	0.269
	NR Band n7	0.890	0.147	0.023	1.060
	NR Band n41 Antenna B	0.387	0.147	0.023	0.557
	NR Band n41 Antenna D	0.081	0.147	0.023	0.251
	NR Band n77 DoD Antenna C	0.045	0.147	0.023	0.215
	NR Band n77 DoD Antenna D	0.111	0.147	0.023	0.281
	NR Band n77 Antenna C	0.111	0.147	0.023	0.281
	NR Band n77 Antenna D	0.042	0.147	0.023	0.212

FCC ID A3LSMS901U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 10 of 26

Table E-11
Simultaneous Transmission Scenario with 2.4 GHz Bluetooth (at 1.0 cm)

Configuration	Mode	2G/3G/4G /5G SAR (W/kg)	2.4 GHz Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.452	0.067	0.519
	GPRS 1900	1.159	0.067	1.226
	UMTS 850	0.550	0.067	0.617
	UMTS 1750	1.131	0.067	1.198
	UMTS 1900	1.042	0.067	1.109
	LTE Band 71	0.413	0.067	0.480
	LTE Band 12	0.518	0.067	0.585
	LTE Band 13	0.550	0.067	0.617
	LTE Band 14	0.503	0.067	0.570
	LTE Band 26 (Cell)	0.458	0.067	0.525
	LTE Band 5 (Cell)	0.622	0.067	0.689
	LTE Band 66 (AWS)	1.176	0.067	1.243
	LTE Band 25 (PCS)	1.250	0.067	1.317
	LTE Band 30	0.715	0.067	0.782
	LTE Band 7	0.509	0.067	0.576
	LTE Band 41	0.303	0.067	0.370
	NR Band n71	0.599	0.067	0.666
	NR Band n12	0.659	0.067	0.726
	NR Band n5 (Cell)	0.731	0.067	0.798
	NR Band n66 (AWS) Antenna A	1.019	0.067	1.086
	NR Band n25 (PCS) Antenna A	1.199	0.067	1.266
	NR Band n30 Antenna A	1.081	0.067	1.148
	NR Band n30 Antenna B	0.099	0.067	0.166
	NR Band n7	0.890	0.067	0.957
	NR Band n41 Antenna B	0.387	0.067	0.454
	NR Band n41 Antenna D	0.081	0.067	0.148
	NR Band n77 DoD Antenna C	0.045	0.067	0.112
	NR Band n77 DoD Antenna D	0.111	0.067	0.178
	NR Band n77 Antenna C	0.111	0.067	0.178
	NR Band n77 Antenna D	0.042	0.067	0.109

FCC ID A3LSMS901U	 SAR EVALUATION REPORT 	Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset	APPENDIX E: Page 11 of 26

Table E-12

Simultaneous Transmission Scenario with 2.4 GHz Bluetooth and 2.4 GHz WLAN Antenna 2 (at 1.0 cm)

Configuration		Mode				2G/3G/4G /5G SAR (W/kg)	2.4 GHz Bluetooth SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	
						1	2	2	1+2+3	
Hotspot SAR	GPRS 850					0.452	0.067	0.427	0.946	
	GPRS 1900					1.159	0.067	0.427	See Table Below	
	UMTS 850					0.550	0.067	0.427	1.044	
	UMTS 1750					1.131	0.067	0.427	See Table Below	
	UMTS 1900					1.042	0.067	0.427	1.536	
	LTE Band 71					0.413	0.067	0.427	0.907	
	LTE Band 12					0.518	0.067	0.427	1.012	
	LTE Band 13					0.550	0.067	0.427	1.044	
	LTE Band 14					0.503	0.067	0.427	0.997	
	LTE Band 26 (Cell)					0.458	0.067	0.427	0.952	
	LTE Band 5 (Cell)					0.622	0.067	0.427	1.116	
	LTE Band 66 (AWS)					1.176	0.067	0.427	See Table Below	
	LTE Band 25 (PCS)					1.250	0.067	0.427	See Table Below	
	LTE Band 30					0.715	0.067	0.427	1.209	
	LTE Band 7					0.509	0.067	0.427	1.003	
	LTE Band 41					0.303	0.067	0.427	0.797	
	NR Band n71					0.599	0.067	0.427	1.093	
	NR Band n12					0.659	0.067	0.427	1.153	
	NR Band n5 (Cell)					0.731	0.067	0.427	1.225	
	NR Band n66 (AWS) Antenna A					1.019	0.067	0.427	1.513	
	NR Band n25 (PCS) Antenna A					1.199	0.067	0.427	See Table Below	
	NR Band n30 Antenna A					1.081	0.067	0.427	1.575	
	NR Band n30 Antenna B					0.099	0.067	0.427	0.593	
	NR Band n7					0.890	0.067	0.427	1.384	
	NR Band n41 Antenna B					0.387	0.067	0.427	0.881	
	NR Band n41 Antenna D					0.081	0.067	0.427	0.575	
	NR Band n77 DoD Antenna C					0.045	0.067	0.427	0.539	
	NR Band n77 DoD Antenna D					0.111	0.067	0.427	0.605	
	NR Band n77 Antenna C					0.111	0.067	0.427	0.605	
	NR Band n77 Antenna D					0.042	0.067	0.427	0.536	

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz Bluetooth SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	2.4 GHz Bluetooth SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3			1	2	3	1+2+3
Body SAR	Back	0.336	0.043	0.427	0.806	Body SAR	Back	0.505	0.043	0.427	0.975
	Front	0.346	0.043	0.035	0.424		Front	0.379	0.043	0.035	0.457
	Top	-	0.004	0.106	0.110		Top	-	0.004	0.106	0.110
	Bottom	1.159	-	-	1.159		Bottom	1.131	-	-	1.131
	Right	0.038	-	-	0.038		Right	0.062	-	-	0.062
	Left	0.084	0.067	0.427*	0.578		Left	0.152	0.067	0.427*	0.646

FCC ID A3LSMS901U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 12 of 26

Simult Tx	Configuration	LTE Band 66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 25 (PCS) SAR (W/kg)	2.4 GHz Bluetooth SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3			1	2	3	1+2+3
Body SAR	Back	0.676	0.043	0.427	1.146	Body SAR	Back	0.689	0.043	0.427	1.159
	Front	0.579	0.043	0.035	0.657		Front	0.705	0.043	0.035	0.783
	Top	-	0.004	0.106	0.110		Top	-	0.004	0.106	0.110
	Bottom	1.176	-	-	1.176		Bottom	1.250	-	-	1.250
	Right	0.068	-	-	0.068		Right	0.069	-	-	0.069
	Left	0.150	0.067	0.427*	0.644		Left	0.178	0.067	0.427*	0.672
		Simult Tx	Configuration	NR Band n25 (PCS) Antenna A SAR (W/kg)	2.4 GHz Bluetooth SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)				
				1	2	3	1+2+3				
Body SAR	Back			0.633	0.043	0.427	1.103				
	Front			0.553	0.043	0.035	0.631				
	Top			-	0.004	0.106	0.110				
	Bottom			1.199	-	-	1.199				
	Right			0.240	-	-	0.240				
	Left			0.152	0.067	0.427*	0.646				

FCC ID A3LSMS901U	 PCTEST Proud to be part of  samsung	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 13 of 26

Table E-13
Simultaneous Transmission Scenario with 2.4 GHz Bluetooth and 5 GHz WLAN Antenna 1 (at 1.0 cm)

Configuration	Mode	2G/3G/4G /5G SAR (W/kg)	2.4 GHz Bluetooth SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	2	1+2+3
Hotspot SAR	GPRS 850	0.452	0.067	0.182	0.701
	GPRS 1900	1.159	0.067	0.182	1.408
	UMTS 850	0.550	0.067	0.182	0.799
	UMTS 1750	1.131	0.067	0.182	1.380
	UMTS 1900	1.042	0.067	0.182	1.291
	LTE Band 71	0.413	0.067	0.182	0.662
	LTE Band 12	0.518	0.067	0.182	0.767
	LTE Band 13	0.550	0.067	0.182	0.799
	LTE Band 14	0.503	0.067	0.182	0.752
	LTE Band 26 (Cell)	0.458	0.067	0.182	0.707
	LTE Band 5 (Cell)	0.622	0.067	0.182	0.871
	LTE Band 66 (AWS)	1.176	0.067	0.182	1.425
	LTE Band 25 (PCS)	1.250	0.067	0.182	1.499
	LTE Band 30	0.715	0.067	0.182	0.964
	LTE Band 7	0.509	0.067	0.182	0.758
	LTE Band 41	0.303	0.067	0.182	0.552
	NR Band n71	0.599	0.067	0.182	0.848
	NR Band n12	0.659	0.067	0.182	0.908
	NR Band n5 (Cell)	0.731	0.067	0.182	0.980
	NR Band n66 (AWS) Antenna A	1.019	0.067	0.182	1.268
	NR Band n25 (PCS) Antenna A	1.199	0.067	0.182	1.448
	NR Band n30 Antenna A	1.081	0.067	0.182	1.330
	NR Band n30 Antenna B	0.099	0.067	0.182	0.348
	NR Band n7	0.890	0.067	0.182	1.139
	NR Band n41 Antenna B	0.387	0.067	0.182	0.636
	NR Band n41 Antenna D	0.081	0.067	0.182	0.330
	NR Band n77 DoD Antenna C	0.045	0.067	0.182	0.294
	NR Band n77 DoD Antenna D	0.111	0.067	0.182	0.360
	NR Band n77 Antenna C	0.111	0.067	0.182	0.360
	NR Band n77 Antenna D	0.042	0.067	0.182	0.291

FCC ID A3LSMS901U	 PCTEST Proud to be part of	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 14 of 26

Table E-14
Simultaneous Transmission Scenario with 2.4 GHz Bluetooth and 5 GHz WLAN MIMO (at 1.0 cm)

Configuration	Mode	2G/3G/4G /5G SAR (W/kg)	2.4 GHz Bluetooth SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	GPRS 850	0.452	0.067	0.298	0.817
	GPRS 1900	1.159	0.067	0.298	1.524
	UMTS 850	0.550	0.067	0.298	0.915
	UMTS 1750	1.131	0.067	0.298	1.496
	UMTS 1900	1.042	0.067	0.298	1.407
	LTE Band 71	0.413	0.067	0.298	0.778
	LTE Band 12	0.518	0.067	0.298	0.883
	LTE Band 13	0.550	0.067	0.298	0.915
	LTE Band 14	0.503	0.067	0.298	0.868
	LTE Band 26 (Cell)	0.458	0.067	0.298	0.823
	LTE Band 5 (Cell)	0.622	0.067	0.298	0.987
	LTE Band 66 (AWS)	1.176	0.067	0.298	1.541
	LTE Band 25 (PCS)	1.250	0.067	0.298	See Table Below
	LTE Band 30	0.715	0.067	0.298	1.080
	LTE Band 7	0.509	0.067	0.298	0.874
	LTE Band 41	0.303	0.067	0.298	0.668
	NR Band n71	0.599	0.067	0.298	0.964
	NR Band n12	0.659	0.067	0.298	1.024
	NR Band n5 (Cell)	0.731	0.067	0.298	1.096
	NR Band n66 (AWS) Antenna A	1.019	0.067	0.298	1.384
	NR Band n25 (PCS) Antenna A	1.199	0.067	0.298	1.564
	NR Band n30 Antenna A	1.081	0.067	0.298	1.446
	NR Band n30 Antenna B	0.099	0.067	0.298	0.464
	NR Band n7	0.890	0.067	0.298	1.255
	NR Band n41 Antenna B	0.387	0.067	0.298	0.752
	NR Band n41 Antenna D	0.081	0.067	0.298	0.446
	NR Band n77 DoD Antenna C	0.045	0.067	0.298	0.410
	NR Band n77 DoD Antenna D	0.111	0.067	0.298	0.476
	NR Band n77 Antenna C	0.111	0.067	0.298	0.476
	NR Band n77 Antenna D	0.042	0.067	0.298	0.407

Simult Tx	Configuration	LTE Band 25 (PCS) SAR (W/kg)	2.4 GHz Bluetooth SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body SAR	Back	0.689	0.043	0.298	1.030
	Front	0.705	0.043	0.152	0.900
	Top	-	0.004	0.040	0.044
	Bottom	1.250	-	-	1.250
	Right	0.069	-	-	0.069
	Left	0.178	0.067	0.193	0.438

FCC ID A3LSMS901U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 15 of 26

Table E-15
Simultaneous Transmission Scenario with 2.4 GHz Bluetooth and 2.4 GHz WLAN Antenna 2 and 5 GHz
WLAN Antenna 1 (at 1.0 cm)

Configuration	Mode	2G/3G/4G /5G SAR (W/kg)	2.4 GHz Bluetooth SAR (W/kg)	2.4 GHz WLAN Ant 2 at 14 dBm SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Hotspot SAR	GPRS 850	0.452	0.067	0.073	0.182	0.774
	GPRS 1900	1.159	0.067	0.073	0.182	1.481
	UMTS 850	0.550	0.067	0.073	0.182	0.872
	UMTS 1750	1.131	0.067	0.073	0.182	1.453
	UMTS 1900	1.042	0.067	0.073	0.182	1.364
	LTE Band 71	0.413	0.067	0.073	0.182	0.735
	LTE Band 12	0.518	0.067	0.073	0.182	0.840
	LTE Band 13	0.550	0.067	0.073	0.182	0.872
	LTE Band 14	0.503	0.067	0.073	0.182	0.825
	LTE Band 26 (Cell)	0.458	0.067	0.073	0.182	0.780
	LTE Band 5 (Cell)	0.622	0.067	0.073	0.182	0.944
	LTE Band 66 (AWS)	1.176	0.067	0.073	0.182	1.498
	LTE Band 25 (PCS)	1.250	0.067	0.073	0.182	1.572
	LTE Band 30	0.715	0.067	0.073	0.182	1.037
	LTE Band 7	0.509	0.067	0.073	0.182	0.831
	LTE Band 41	0.303	0.067	0.073	0.182	0.625
	NR Band n71	0.599	0.067	0.073	0.182	0.921
	NR Band n12	0.659	0.067	0.073	0.182	0.981
	NR Band n5 (Cell)	0.731	0.067	0.073	0.182	1.053
	NR Band n66 (AWS) Antenna A	1.019	0.067	0.073	0.182	1.341
	NR Band n25 (PCS) Antenna A	1.199	0.067	0.073	0.182	1.521
	NR Band n30 Antenna A	1.081	0.067	0.073	0.182	1.403
	NR Band n30 Antenna B	0.099	0.067	0.073	0.182	0.421
	NR Band n7	0.890	0.067	0.073	0.182	1.212
	NR Band n41 Antenna B	0.387	0.067	0.073	0.182	0.709
	NR Band n41 Antenna D	0.081	0.067	0.073	0.182	0.403
	NR Band n77 DoD Antenna C	0.045	0.067	0.073	0.182	0.367
	NR Band n77 DoD Antenna D	0.111	0.067	0.073	0.182	0.433
	NR Band n77 Antenna C	0.111	0.067	0.073	0.182	0.433
	NR Band n77 Antenna D	0.042	0.067	0.073	0.182	0.364

FCC ID A3LSMS901U	 SAR EVALUATION REPORT 	Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset	APPENDIX E: Page 16 of 26

Table E-16
Simultaneous Transmission Scenario with 2.4 GHz Bluetooth and 2.4 GHz WLAN Antenna 2 and 5 GHz WLAN MIMO (at 1.0 cm)

Configuration	Mode	2G/3G/4G/5G SAR (W/kg)	2.4 GHz Bluetooth SAR (W/kg)	2.4 GHz WLAN Ant 2 at 14 dBm SAR (W/kg)	5 GHz WLAN MIMO at 15 dBm SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Hotspot SAR	GPRS 850	0.452	0.067	0.073	0.023	0.615
	GPRS 1900	1.159	0.067	0.073	0.023	1.322
	UMTS 850	0.550	0.067	0.073	0.023	0.713
	UMTS 1750	1.131	0.067	0.073	0.023	1.294
	UMTS 1900	1.042	0.067	0.073	0.023	1.205
	LTE Band 71	0.413	0.067	0.073	0.023	0.576
	LTE Band 12	0.518	0.067	0.073	0.023	0.681
	LTE Band 13	0.550	0.067	0.073	0.023	0.713
	LTE Band 14	0.503	0.067	0.073	0.023	0.666
	LTE Band 26 (Cell)	0.458	0.067	0.073	0.023	0.621
	LTE Band 5 (Cell)	0.622	0.067	0.073	0.023	0.785
	LTE Band 66 (AWS)	1.176	0.067	0.073	0.023	1.339
	LTE Band 25 (PCS)	1.250	0.067	0.073	0.023	1.413
	LTE Band 30	0.715	0.067	0.073	0.023	0.878
	LTE Band 7	0.509	0.067	0.073	0.023	0.672
	LTE Band 41	0.303	0.067	0.073	0.023	0.466
	NR Band n71	0.599	0.067	0.073	0.023	0.762
	NR Band n12	0.659	0.067	0.073	0.023	0.822
	NR Band n5 (Cell)	0.731	0.067	0.073	0.023	0.894
	NR Band n66 (AWS) Antenna A	1.019	0.067	0.073	0.023	1.182
	NR Band n25 (PCS) Antenna A	1.199	0.067	0.073	0.023	1.362
	NR Band n30 Antenna A	1.081	0.067	0.073	0.023	1.244
	NR Band n30 Antenna B	0.099	0.067	0.073	0.023	0.262
	NR Band n7	0.890	0.067	0.073	0.023	1.053
	NR Band n41 Antenna B	0.387	0.067	0.073	0.023	0.550
	NR Band n41 Antenna D	0.081	0.067	0.073	0.023	0.244
	NR Band n77 DoD Antenna C	0.045	0.067	0.073	0.023	0.208
	NR Band n77 DoD Antenna D	0.111	0.067	0.073	0.023	0.274
	NR Band n77 Antenna C	0.111	0.067	0.073	0.023	0.274
	NR Band n77 Antenna D	0.042	0.067	0.073	0.023	0.205

Notes:

- No evaluation was performed to determine the aggregate 1g SAR for these configurations as the SPLS ratio between the antenna pairs was not greater than 0.04 per FCC KDB 447498 D01v06. See Section E.7 for detailed SPLS ratio analysis.

FCC ID A3LSMS901U	 PCTEST Proud to be part of the	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 17 of 26

E.6 Phablet Simultaneous Transmission Analysis

Per FCC KDB Publication 648474 D04 Handset SAR, Phablet SAR tests were not required if wireless router 1g SAR (scaled to the maximum output power, including tolerance) < 1.2 W/kg. Therefore, no further analysis beyond the tables included in this section was required to determine that possible simultaneous transmission scenarios would not exceed the SAR limit.

Table E-17
Simultaneous Transmission Scenarios of WLAN/BT

Configuration	5 GHz WLAN Ant 1	5 GHz WLAN Ant 1 at 12 dBm	5 GHz WLAN MIMO
Back	1.216	0.278	1.027
Front	1.156	0.278	0.852
Top	-	-	1.150*
Bottom	-	-	-
Right	-	-	-
Left	2.047	0.461	1.150

Configuration	5 GHz WLAN Ant 1	5 GHz WLAN Ant 1 at 12 dBm	5 GHz WLAN MIMO
Back	1.216	0.278	1.027
Front	1.156	0.278	0.852
Top	0.000	0.000	1.150
Bottom	0.000	0.000	0.000
Right	0.000	0.000	0.000
Left	2.047	0.461	1.150

Table E-18
Simultaneous Transmission Scenarios with WLAN/BT (Phablet Max DSI= 0)

	Configuration	AG0	AG1	WLAN/BT Worst-case Combination	AG0 + WLAN/BT	AG1 + WLAN/BT
Phablet SAR	Back	1.366	1.352	1.216	2.582	2.568
	Front	1.652	0.000	1.156	2.808	1.156
	Top	0.000	2.650	1.150	1.150	3.800
	Bottom	1.950	0.000	-	1.950	0.000
	Right	0.546	0.000	-	0.546	0.000
	Left	2.341	2.573	2.047	See Note 1	See Note 1

FCC ID A3LSMS901U



SAR EVALUATION REPORT



Approved by:
Quality Manager

Test Dates:
09/12/21 – 11/08/21

DUT Type:
Portable Handset

APPENDIX E:
Page 18 of 26

Table E-19
Simultaneous Transmission Scenarios with WLAN/BT (Phablet Reduced DSI= 1)

	Configuration	AG0	AG1	WLAN/BT Worst-case Combination	AG0 + WLAN/BT	AG1 + WLAN/BT
Phablet SAR	Back	3.085	1.352	1.216	See Note 1	2.568
	Front	1.924	0.000	1.156	3.080	1.156
	Top	0.000	2.650	1.150	1.150	3.800
	Bottom	2.503	0.000	-	2.503	0.000
	Right	0.546	0.000	-	0.546	0.000
	Left	2.341	2.573	2.047	See Note 1	See Note 1

Notes:

- For configurations where the sum an AG+WLAN/BT is greater than 4.0 W/kg, further breakdown evaluation of the simultaneous combinations was needed.

For SAR summation, the highest reported SAR across all test distances was used as the most conservative evaluation for simultaneous transmission analysis for each device edge.

Table E-20
Simultaneous Transmission Scenario with 5 GHz WLAN

Configuration	Mode	2G/3G/4G /5G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	GPRS 1900	1.498	2.047	3.545
	UMTS 1750	2.470	2.047	See Table Below
	UMTS 1900	1.754	2.047	3.801
	LTE Band 66 (AWS)	1.740	2.047	3.787
	LTE Band 25 (PCS)	2.055	2.047	See Table Below
	LTE Band 30	2.795	2.047	See Table Below
	LTE Band 7	2.466	2.047	See Table Below
	LTE Band 41	2.187	2.047	See Table Below
	NR Band n66 (AWS) Antenna A	2.503	2.047	See Table Below
	NR Band n25 (PCS) Antenna A	2.407	2.047	See Table Below
	NR Band n30 Antenna A	2.912	2.047	See Table Below
	NR Band n30 Antenna B	1.442	2.047	3.489
	NR Band n7	3.085	2.047	See Table Below
	NR Band n41 Antenna B	0.531	2.047	2.578
	NR Band n77 Antenna C	0.509	2.047	2.556

FCC ID A3LSMS901U	 PCTEST Proud to be part of  element	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 19 of 26

Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 25 (PCS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2			1	2	1+2
Phablet SAR	Back	2.470	1.216	3.686	Phablet SAR	Back	1.779	1.216	2.995
	Front	1.685	1.156	2.841		Front	1.474	1.156	2.630
	Top	-	-	-		Top	-	-	-
	Bottom	1.891	-	1.891		Bottom	2.055	-	2.055
	Right	0.419	-	0.419		Right	0.491	-	0.491
	Left	0.981	2.047	3.028		Left	1.251	2.047	3.298

Simult Tx	Configuration	LTE Band 30 Ant A SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	SPLSR	Simult Tx	Configuration	LTE Band 30 Ant B SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2	1+2			1	2	1+2
Phablet SAR	Back	2.795	1.216	See Note 1	0.08	Phablet SAR	Back	1.332	1.216	2.548
	Front	1.109	1.156	2.265	N/A		Front	0.802	1.156	1.958
	Top	-	-	-	N/A		Top	-	-	-
	Bottom	1.365	-	1.365	N/A		Bottom	1.206	-	1.206
	Right	0.180	-	0.180	N/A		Right	-	-	-
	Left	1.557	2.047	3.604	N/A		Left	1.490	2.047	3.537

Simult Tx	Configuration	LTE Band 7 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	SPLSR	Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	SPLSR
		1	2	1+2	1+2			1	2	1+2	1+2
Phablet SAR	Back	2.466	1.216	3.682	N/A	Phablet SAR	Back	1.830	1.216	3.046	N/A
	Front	1.536	1.156	2.692	N/A		Front	1.158	1.156	2.314	N/A
	Top	-	-	-	N/A		Top	-	-	-	N/A
	Bottom	1.479	-	1.479	N/A		Bottom	1.385	-	1.385	N/A
	Right	-	-	-	N/A		Right	-	-	-	N/A
	Left	2.280	2.047	See Note 1	0.10		Left	2.187	2.047	See Note 1	0.09

Simult Tx	Configuration	NR Band n66 (AWS) Antenna A SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	NR Band n25 (PCS) Antenna A SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2			1	2	1+2
Phablet SAR	Back	2.135	1.216	3.351	Phablet SAR	Back	2.309	1.216	3.525
	Front	1.924	1.156	3.080		Front	1.652	1.156	2.808
	Top	-	-	-		Top	-	-	-
	Bottom	2.503	-	2.503		Bottom	2.407	-	2.407
	Right	0.411	-	0.411		Right	0.546	-	0.546
	Left	0.697	2.047	2.744		Left	1.528	2.047	3.575

Simult Tx	Configuration	NR Band n30 Antenna A SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	SPLSR	Simult Tx	Configuration	NR Band n7 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	SPLSR
		1	2	1+2	1+2			1	2	1+2	1+2
Phablet SAR	Back	2.912	1.216	See Note 1	0.08	Phablet SAR	Back	3.085	1.216	See Note 1	0.09
	Front	1.124	1.156	2.280	N/A		Front	1.697	1.156	2.853	N/A
	Top	-	-	-	N/A		Top	-	-	-	N/A
	Bottom	1.152	-	1.152	N/A		Bottom	1.858	-	1.858	N/A
	Right	0.253	-	0.253	N/A		Right	-	-	-	N/A
	Left	2.238	2.047	See Note 1	0.09		Left	2.341	2.047	See Note 1	0.09

FCC ID A3LSMS901U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 20 of 26

Configuration	Mode	5G SAR (W/kg)	5 GHz WLAN Ant 1 at 12 dBm SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	NR Band n66 (AWS) Antenna F	2.650	0.461	3.111
	NR Band n41 Antenna F	1.986	0.461	2.447
	NR Band n77 DoD Antenna G	2.496	0.461	2.957
	NR Band n77 Antenna G	2.573	0.461	3.034

Table E-21
Simultaneous Transmission Scenario with 5 GHz WLAN MIMO

Configuration	Mode	2G/3G/4G /5G SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	GPRS 1900	1.498	1.150	2.648
	UMTS 1750	2.470	1.150	3.620
	UMTS 1900	1.754	1.150	2.904
	LTE Band 66 (AWS)	1.740	1.150	2.890
	LTE Band 25 (PCS)	2.055	1.150	3.205
	LTE Band 30	2.795	1.150	3.945
	LTE Band 7	2.466	1.150	3.616
	LTE Band 41	2.187	1.150	3.337
	NR Band n66 (AWS) Antenna A	2.503	1.150	3.653
	NR Band n66 (AWS) Antenna F	2.650	1.150	3.800
	NR Band n25 (PCS) Antenna A	2.407	1.150	3.557
	NR Band n30 Antenna A	2.912	1.150	See Table Below
	NR Band n30 Antenna B	1.442	1.150	2.592
	NR Band n7	3.085	1.150	See Table Below
	NR Band n41 Antenna F	1.986	1.150	3.136
	NR Band n41 Antenna B	0.531	1.150	1.681
	NR Band n77 DoD Antenna G	2.496	1.150	3.646
	NR Band n77 Antenna G	2.573	1.150	3.723
	NR Band n77 Antenna C	0.509	1.150	1.659

FCC ID A3LSMS901U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 21 of 26

Simult Tx	Configuration	NR Band n30 Antenna A SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	NR Band n7 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	SPLSR
		1	2	1+2			1	2	1+2	1+2
Phablet SAR	Back	2.912	1.027	3.939	Phablet SAR	Back	3.085	1.027	See Note 1	0.07
	Front	1.124	0.852	1.976		Front	1.697	0.852	2.549	N/A
	Top	-	1.150*	1.150		Top	-	1.150*	1.150	N/A
	Bottom	1.152	-	1.152		Bottom	1.858	-	1.858	N/A
	Right	0.253	-	0.253		Right	-	-	-	N/A
	Left	2.238	1.150	3.388		Left	2.341	1.150	3.491	N/A

Notes:

1. No evaluation was performed to determine the aggregate 10g SAR for these configurations as the SPLS ratio between the antenna pairs was not greater than 0.10 per FCC KDB 447498 D01v06. See Section E.7 for detailed SPLS ratio analysis.

E.7 SPLSR Evaluation and Analysis

Per FCC KDB Publication 447498 D01v06, when the sum of the standalone transmitters is more than 1.6 W/kg for 1g and 4 W/kg for 10g, the SAR sum to peak locations can be analyzed to determine SAR distribution overlaps. When the SAR peak to location ratio (shown below) for each pair of antennas is ≤ 0.04 for 1g and ≤ 0.10 for 10g, simultaneous SAR evaluation is not required. The distance between the transmitters was calculated using the following formula.

$$\text{Distance}_{\text{Tx1} - \text{Tx2}} = R_i = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \text{ (Hotspot, Phablet)}$$

$$\text{SPLS Ratio} = \frac{(SAR_1 + SAR_2)^{1.5}}{R_i}$$

E.7.1 Hotspot Back Side SPLSR Evaluation and Analysis

Table E-22
Peak SAR Locations for Hotspot Back Side

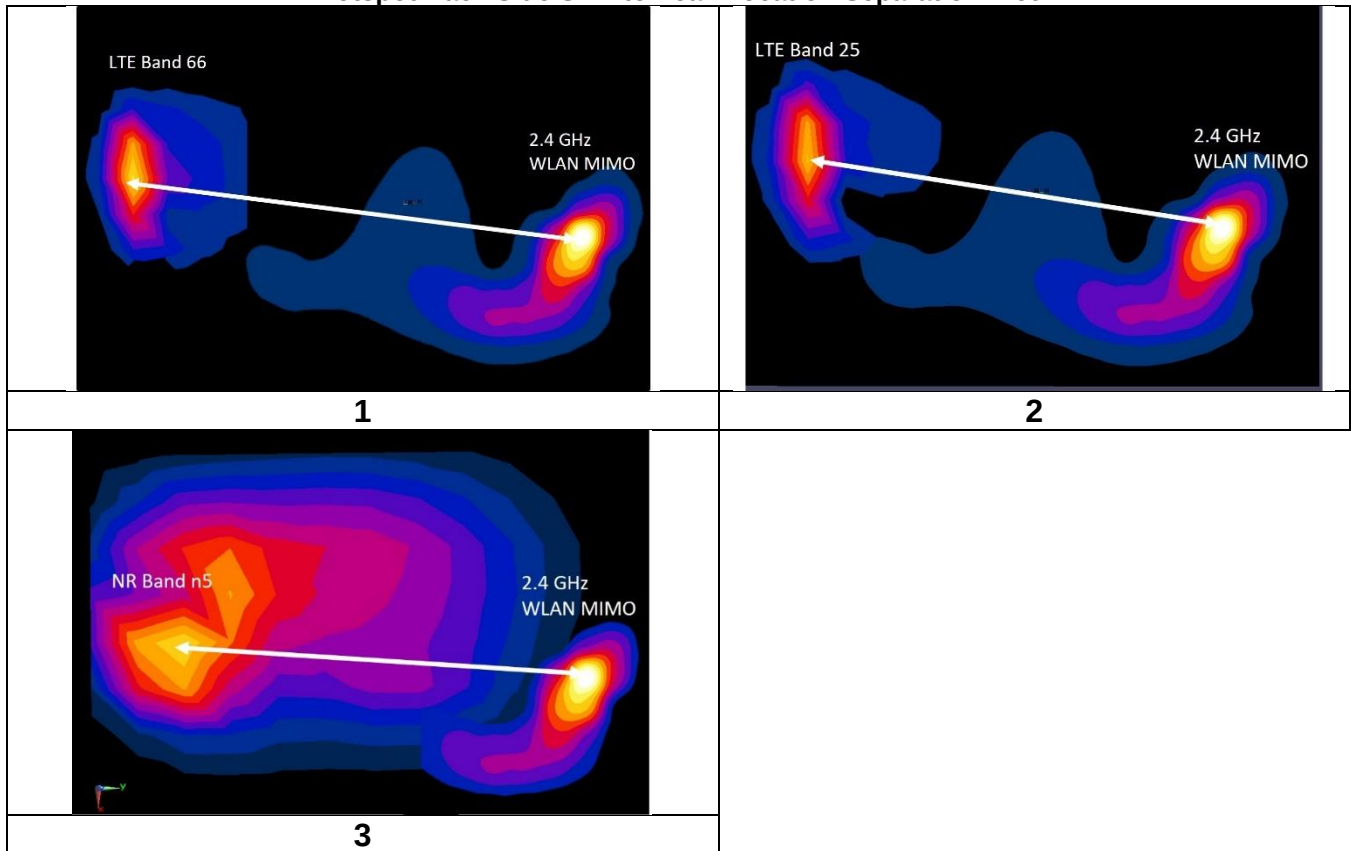
Mode/Band	x (mm)	y (mm)
2.4 GHz WLAN MIMO	-13.00	59.30
LTE Band 66 (AWS)	-26.50	-73.50
LTE Band 25 (PCS)	-32.50	-75.00
NR Band n5 (Cell)	-10.00	-66.00

Table E-23
Hotspot Back Side SAR to Peak Location Separation Ratio Calculations

Antenna Pair		Standalone SAR (W/kg)		Standalone SAR Sum (W/kg)	Peak SAR Separation Distance (mm)	SPLS Ratio	Plot Number
Ant "a"	Ant "b"	a	b	a+b	D _{a-b}	(a+b) ^{1.5} /D _{a-b}	
LTE Band 66 (AWS)	2.4 GHz WLAN MIMO	0.676	0.934	1.61	133.48	0.02	1
LTE Band 25 (PCS)	2.4 GHz WLAN MIMO	0.689	0.934	1.623	135.71	0.02	2
NR Band n5 (Cell)	2.4 GHz WLAN MIMO	0.731	0.934	1.665	125.34	0.02	3

FCC ID A3LSMS901U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 22 of 26

Table E-24
Hotspot Back Side SAR to Peak Location Separation Plot



E.7.2 Phablet Back Side SPLSR Evaluation and Analysis

Table E-25
Peak SAR Locations for Phablet Back Side

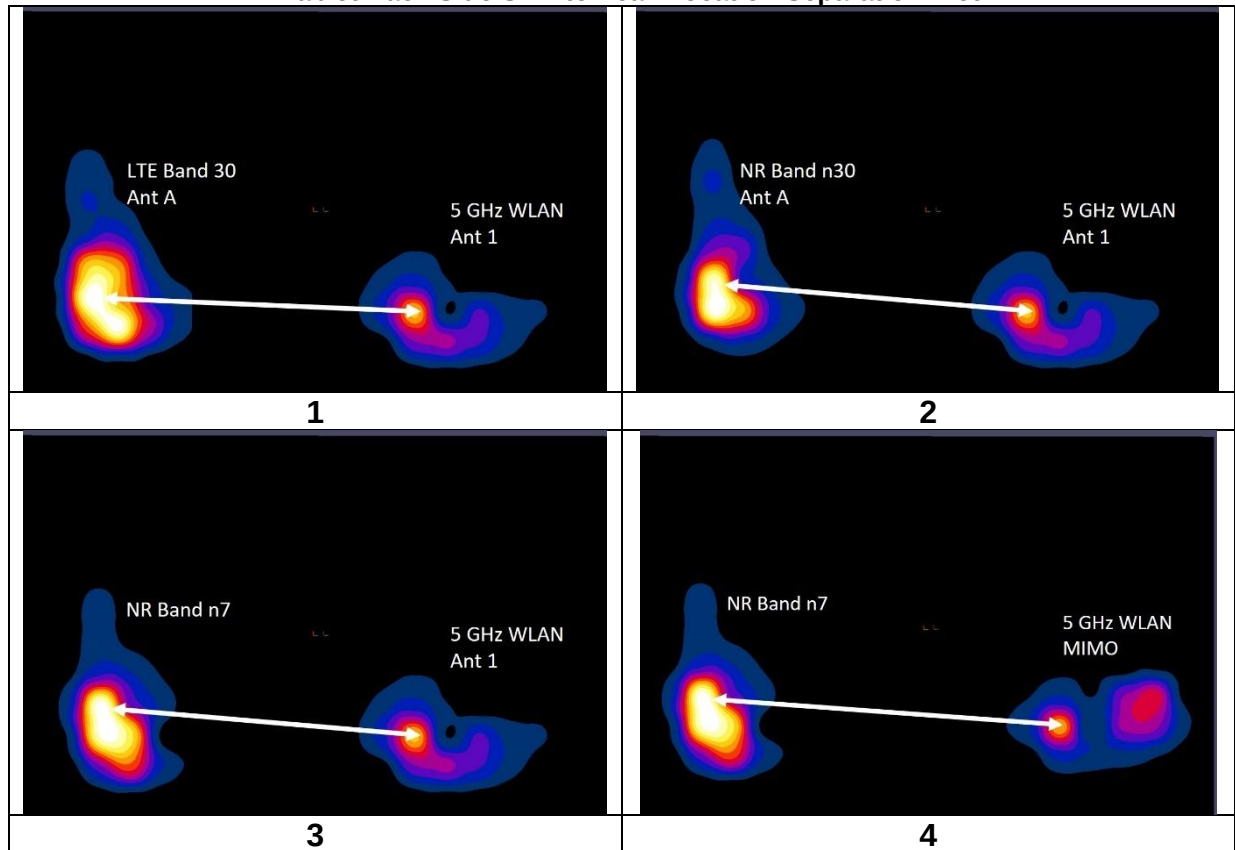
Mode/Band	x (mm)	y (mm)
5 GHz WLAN Ant 1	11.40	33.60
5 GHz WLAN MIMO	-7.00	53.40
LTE Band 30 Antenna A	10.70	-67.30
NR Band n30 Antenna A	0.80	-68.40
NR Band n7	5.20	-69.70

FCC ID A3LSMS901U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 23 of 26

Table E-26
Phablet Back Side SAR to Peak Location Separation Ratio Calculations

Antenna Pair		Standalone SAR (W/kg)		Standalone SAR Sum (W/kg)	Peak SAR Separation Distance (mm)	SPLS Ratio	Plot Number
Ant "a"	Ant "b"	a	b	a+b	D _{a-b}	$(a+b)^{1.5}/D_{a-b}$	
LTE Band 30 Antenna A	5 GHz WLAN Ant 1	2.795	1.216	4.011	100.90	0.08	1
NR Band n30 Antenna A	5 GHz WLAN Ant 1	2.912	1.216	4.128	102.55	0.08	2
NR Band n7	5 GHz WLAN Ant 1	3.085	1.216	4.301	103.49	0.09	3
NR Band n7	5 GHz WLAN MIMO	3.085	1.027	4.112	123.70	0.07	4

Table E-27
Phablet Back Side SAR to Peak Location Separation Plot



FCC ID A3LSMS901U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 24 of 26

E.7.3 Phablet Left Edge SPLSR Evaluation and Analysis

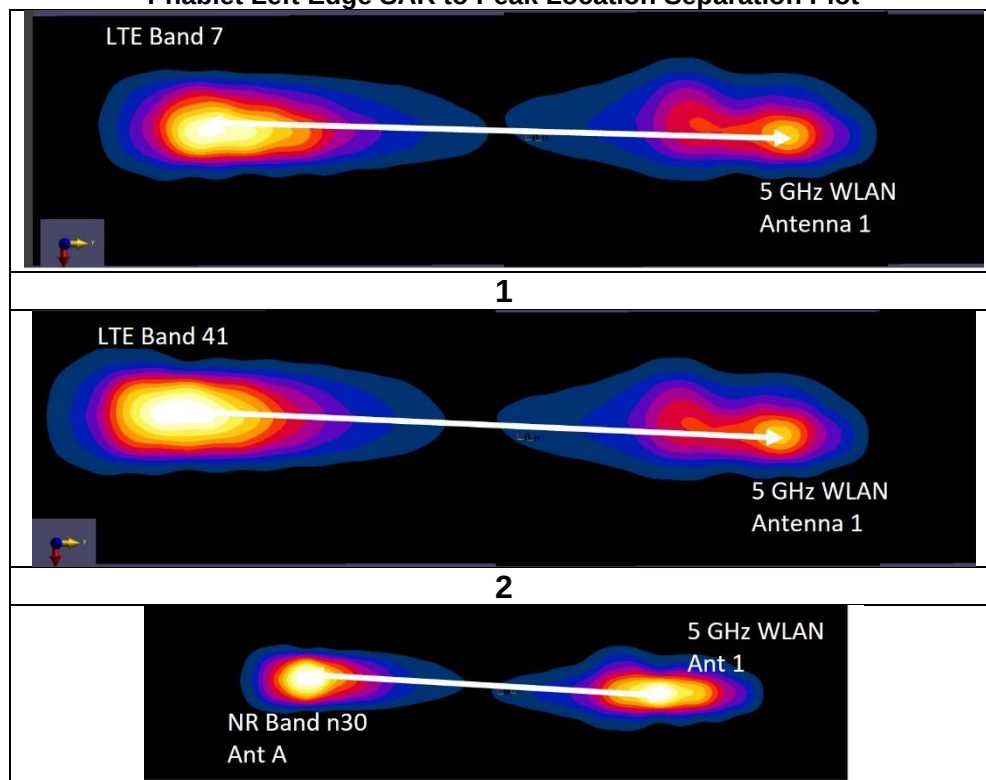
Table E-28
Peak SAR Locations for Phablet Left Edge

Mode/Band	x (mm)	y (mm)
5 GHz WLAN Ant 1	-24.40	38.00
LTE Band 7	-22.40	-55.20
LTE Band 41	-22.60	-56.00
NR Band n30 Antenna A	-27.80	-57.40
NR Band n7	-23.30	-60.70

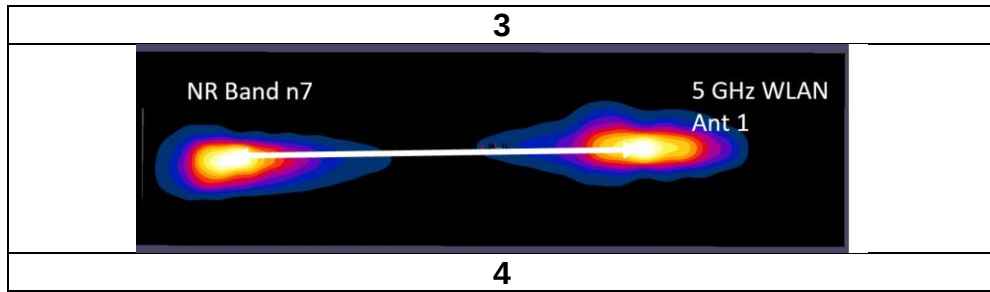
Table E-29
Phablet Left Edge SAR to Peak Location Separation Ratio Calculations

Antenna Pair		Standalone SAR (W/kg)		Standalone SAR Sum (W/kg)	Peak SAR Separation Distance (mm)	SPLS Ratio	Plot Number
Ant "a"	Ant "b"	a	b	a+b	D _{a-b}	$(a+b)^{1.5}/D_{a-b}$	
LTE Band 7	5 GHz WLAN Ant 1	2.280	2.047	4.327	93.22	0.10	1
LTE Band 41	5 GHz WLAN Ant 1	2.187	2.047	4.234	94.02	0.09	2
NR Band n30 Antenna A	5 GHz WLAN Ant 1	2.238	2.047	4.285	95.46	0.09	3
NR Band n7	5 GHz WLAN Ant 1	2.341	2.047	4.388	98.71	0.09	4

Table E-30
Phablet Left Edge SAR to Peak Location Separation Plot



FCC ID A3LSMS901U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 25 of 26



E.8 Simultaneous Transmission Conclusion

The above numerical summed SAR results and SPLSR are sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and IEEE 1528- 2013 Section 6.3.4.1.

FCC ID A3LSMS901U	 PCTEST Proud to be part of  samsung	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 09/12/21 – 11/08/21	DUT Type: Portable Handset			APPENDIX E: Page 26 of 26