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 a 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.

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E.3 Head Simultaneous Transmission Analysis

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

Configuration	2.4 GHz WLAN Ant 1	2.4 GHz WLAN Ant 2	2.4 GHz WLAN MIMO	2.4 GHz Bluetooth Ant 1	2.4 GHz Bluetooth Ant 2	2.4 GHz Bluetooth MIMO	5 GHz WLAN MIMO	2.4 GHz WLAN MIMO at 16 dBm	6 GHz WLAN MIMO
Right Cheek	0.028	0.158	0.182	0.136	0.194	0.141	0.263	0.106	0.290
Right Tilt	0.017	0.017	0.077	0.049	0.043	0.096	0.085	0.041	0.056
Left Cheek	0.018	0.178	0.139	0.032	0.185	0.092	0.115	0.077	0.138
Left Tilt	0.012	0.018	0.053	0.028	0.026	0.032	0.041	0.017	0.022

Configuration	2.4 GHz WLAN Ant 1	2.4 GHz WLAN Ant 2	2.4 GHz WLAN MIMO	5 GHz WLAN MIMO	2.4 GHz Bluetooth Ant 1	2.4 GHz Bluetooth Ant 2	2.4 GHz Bluetooth MIMO	6 GHz WLAN MIMO	2.4 GHz WLAN MIMO at 16 dBm + 5 GHz WLAN MIMO	2.4 GHz WLAN MIMO at 16 dBm + 6 GHz WLAN MIMO	2.4 GHz Bluetooth MIMO + 5 GHz WLAN MIMO	2.4 GHz Bluetooth MIMO + 6 GHz WLAN MIMO	2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN MIMO	2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	2.4 GHz Bluetooth Ant 1 + 6 GHz WLAN MIMO	2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	WLAN/BT Worst-case Combination
Right Cheek	0.028	0.158	0.182	0.263	0.136	0.194	0.141	0.290	0.369	0.396	0.404	0.431	0.399	0.457	0.426	0.484	0.484
Right Tilt	0.017	0.017	0.077	0.085	0.049	0.043	0.096	0.056	0.126	0.097	0.181	0.152	0.134	0.128	0.105	0.099	0.181
Left Cheek	0.018	0.178	0.139	0.115	0.032	0.185	0.092	0.138	0.192	0.215	0.207	0.230	0.147	0.300	0.170	0.323	0.323
Left Tilt	0.012	0.018	0.053	0.041	0.028	0.026	0.032	0.022	0.058	0.039	0.073	0.054	0.069	0.067	0.050	0.048	0.073

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	0.232	0.724	0.484	0.716	1.208
	Right Tilt	0.190	0.757	0.181	0.371	0.938
	Left Cheek	0.348	0.881	0.323	0.671	1.204
	Left Tilt	0.209	1.176	0.073	0.282	1.249

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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 1	2.4 GHz WLAN Ant 2	2.4 GHz Bluetooth Ant 1	2.4 GHz Bluetooth Ant 2	2.4 GHz Bluetooth MIMO	5 GHz WLAN MIMO	6 GHz WLAN MIMO
Back	0.032	0.060	0.012	0.081	0.027	0.245	0.118

Configuration	2.4 GHz WLAN Ant 1	2.4 GHz WLAN Ant 2	2.4 GHz WLAN Ant 1 + 2.4 GHz WLAN Ant 2	5 GHz WLAN MIMO	2.4 GHz Bluetooth Ant 1	2.4 GHz Bluetooth Ant 2	2.4 GHz Bluetooth MIMO	6 GHz WLAN MIMO	2.4 GHz WLAN Ant 1 + 2.4 GHz WLAN Ant 2 + 5 GHz WLAN MIMO	2.4 GHz WLAN Ant 1 + 2.4 GHz WLAN Ant 2 + 6 GHz WLAN MIMO	2.4 GHz Bluetooth MIMO + 5 GHz WLAN MIMO	2.4 GHz Bluetooth MIMO + 6 GHz WLAN MIMO	2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN MIMO	2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	2.4 GHz Bluetooth Ant 1 + 6 GHz WLAN MIMO	2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO
Back	0.032	0.060	0.092	0.245	0.012	0.081	0.027	0.118	0.337	0.210	0.272	0.145	0.257	0.326	0.130	0.199

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	0.977	0.197	0.337	1.314	0.534

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 1	2.4 GHz WLAN Ant 2	2.4 GHz WLAN MIMO at 19 dBm	2.4 GHz Bluetooth Ant 1	2.4 GHz Bluetooth Ant 2	2.4 GHz Bluetooth MIMO	5 GHz WLAN MIMO	5 GHz WLAN MIMO at 16 dBm
Back	0.108	0.171	0.089	0.035	0.185	0.055	0.516	0.231
Front	0.108*	0.208*	0.052	0.013	0.088	0.037	0.516*	0.231*
Top	0.108*	-	0.018	0.009	-	0.013	0.516*	0.231*
Bottom	-	-	-	-	-	-	-	-
Right	-	-	-	-	-	-	-	-
Left	0.023	0.208	0.115	0.010	0.220	0.074	0.238	0.193

Configuration	2.4 GHz WLAN Ant 1	2.4 GHz WLAN Ant 2	2.4 GHz WLAN Ant 1 + 2.4 GHz WLAN Ant 2	5 GHz WLAN MIMO	2.4 GHz Bluetooth Ant 1	2.4 GHz Bluetooth Ant 2	2.4 GHz Bluetooth MIMO	2.4 GHz WLAN MIMO at 19 dBm + 5 GHz WLAN MIMO at 16 dBm	2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN MIMO	2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	2.4 GHz Bluetooth MIMO + 5 GHz WLAN MIMO	WLAN/BT Worst-case Combination
Back	0.108	0.171	0.279	0.516	0.035	0.185	0.055	0.320	0.551	0.701	0.571	0.701
Front	0.108	0.208	0.316	0.516	0.013	0.088	0.037	0.283	0.529	0.604	0.553	0.604
Top	0.108	0.000	0.108	0.516	0.009	0.000	0.013	0.249	0.525	0.516	0.529	0.529
Bottom	0.000	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	0.000	-
Left	0.023	0.208	0.231	0.238	0.010	0.220	0.074	0.308	0.248	0.458	0.312	0.458

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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	1.137	0.390	0.701	See Note 1	1.091
	Front	0.634	0.202	0.604	1.238	0.806
	Top	0.000	0.677	0.529	0.529	1.206
	Bottom	1.215	0.000	-	1.215	0.000
	Right	0.228	0.082	-	0.228	0.082
	Left	0.400	0.598	0.458	0.858	1.056

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.

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

Configuration	Worst Case AG0	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
	1	2	3	1+2	1+3	1+2+3
Hotspot SAR Back Side DSI = 3	1.137	0.108	0.171	1.245	1.308	**1.416**

Table E-8
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)	SPLSR
		1	2	1+2	1+2
Hotspot SAR Back Side DSI = 3	GPRS 850	1.137	0.516	See Note 1	0.01
	GPRS 1900	0.293	0.516	0.809	N/A
	UMTS 850	0.741	0.516	1.257	N/A
	UMTS 1750	0.495	0.516	1.011	N/A
	UMTS 1900	0.388	0.516	0.904	N/A
	LTE Band 71	0.407	0.516	0.923	N/A
	LTE Band 12	0.442	0.516	0.958	N/A
	LTE Band 13	0.656	0.516	1.172	N/A
	LTE Band 14	0.789	0.516	1.305	N/A
	LTE Band 26 (Cell)	0.839	0.516	1.355	N/A
	LTE Band 5 (Cell)	0.877	0.516	1.393	N/A
	LTE Band 66 (AWS)	0.539	0.516	1.055	N/A
	LTE Band 25 (PCS)	0.361	0.516	0.877	N/A
	LTE Band 30	0.405	0.516	0.921	N/A
	LTE Band 7	0.354	0.516	0.870	N/A
	LTE Band 41	0.320	0.516	0.836	N/A
	NR Band n71	0.553	0.516	1.069	N/A
	NR Band n12	0.486	0.516	1.002	N/A
	NR Band n5 (Cell)	1.048	0.516	**1.564**	N/A
	NR Band n66 (AWS) Antenna A	0.503	0.516	1.019	N/A
	NR Band n25 (PCS) Antenna A	0.376	0.516	0.892	N/A
	NR Band n30 Antenna A	0.522	0.516	1.038	N/A
	NR Band n7 Antenna B	0.299	0.516	0.815	N/A
	NR Band n41 Antenna D	0.109	0.516	0.625	N/A
	NR Band n41 Antenna B	0.205	0.516	0.721	N/A
	NR Band n77 DoD Antenna D	0.112	0.516	0.628	N/A
	NR Band n77 DoD Antenna C	0.011	0.516	0.527	N/A
	NR Band n77 Antenna D	0.036	0.516	0.552	N/A
	NR Band n77 Antenna C	0.016	0.516	0.532	N/A

Notes:
1. 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.

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Table E-9
Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO and 5 GHz WLAN MIMO (at 1.0 cm)

Configuration	Worst Case AG0	2.4 GHz WLAN MIMO at 19 dBm SAR (W/kg)	5 GHz WLAN MIMO at 16 dBm SAR (W/kg)	Σ SAR (W/kg)
	1	2	3	1+2+3
Hotspot SAR Back Side DSI = 3	1.137	0.089	0.231	**1.457**

Table E-10
Simultaneous Transmission Scenario with 2.4 GHz Bluetooth (at 1.0 cm)

Configuration	Worst Case AG0	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	Σ SAR (W/kg)	
	1	2	3	1+2	1+3
Hotspot SAR Back Side DSI = 3	1.137	0.035	0.185	1.172	**1.322**

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

Configuration	Worst Case AG0	2.4 GHz Bluetooth MIMO SAR (W/kg)	Σ SAR (W/kg)
	1	2	1+2
Hotspot SAR Back Side DSI = 3	1.137	0.055	**1.192**

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Table E-12
Simultaneous Transmission Scenario with 2.4 GHz Bluetooth Antenna 1 and 5 GHz WLAN MIMO (at 1.0 cm)

Configuration	Mode	2G/3G/4G /5G SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	SPLSR		
		1	2	2	1+2+3	1+2	1+3	2+3
Hotspot SAR Back Side DSI = 3	GPRS 850	1.137	0.035	0.516	See Note 1	0.01	0.01	0.04
	GPRS 1900	0.293	0.035	0.516	0.844	N/A	N/A	N/A
	UMTS 850	0.741	0.035	0.516	1.292	N/A	N/A	N/A
	UMTS 1750	0.495	0.035	0.516	1.046	N/A	N/A	N/A
	UMTS 1900	0.388	0.035	0.516	0.939	N/A	N/A	N/A
	LTE Band 71	0.407	0.035	0.516	0.958	N/A	N/A	N/A
	LTE Band 12	0.442	0.035	0.516	0.993	N/A	N/A	N/A
	LTE Band 13	0.656	0.035	0.516	1.207	N/A	N/A	N/A
	LTE Band 14	0.789	0.035	0.516	1.340	N/A	N/A	N/A
	LTE Band 26 (Cell)	0.839	0.035	0.516	1.390	N/A	N/A	N/A
	LTE Band 5 (Cell)	0.877	0.035	0.516	**1.428**	N/A	N/A	N/A
	LTE Band 66 (AWS)	0.539	0.035	0.516	1.090	N/A	N/A	N/A
	LTE Band 25 (PCS)	0.361	0.035	0.516	0.912	N/A	N/A	N/A
	LTE Band 30	0.405	0.035	0.516	0.956	N/A	N/A	N/A
	LTE Band 7	0.354	0.035	0.516	0.905	N/A	N/A	N/A
	LTE Band 41	0.320	0.035	0.516	0.871	N/A	N/A	N/A
	NR Band n71	0.553	0.035	0.516	1.104	N/A	N/A	N/A
	NR Band n12	0.486	0.035	0.516	1.037	N/A	N/A	N/A
	NR Band n5 (Cell)	1.048	0.035	0.516	See Note 1	0.01	0.01	0.04
	NR Band n66 (AWS) Antenna A	0.503	0.035	0.516	1.054	N/A	N/A	N/A
	NR Band n25 (PCS) Antenna A	0.376	0.035	0.516	0.927	N/A	N/A	N/A
	NR Band n30 Antenna A	0.522	0.035	0.516	1.073	N/A	N/A	N/A
	NR Band n7 Antenna B	0.299	0.035	0.516	0.850	N/A	N/A	N/A
	NR Band n41 Antenna D	0.109	0.035	0.516	0.660	N/A	N/A	N/A
	NR Band n41 Antenna B	0.205	0.035	0.516	0.756	N/A	N/A	N/A
	NR Band n77 DoD Antenna D	0.112	0.035	0.516	0.663	N/A	N/A	N/A
	NR Band n77 DoD Antenna C	0.011	0.035	0.516	0.562	N/A	N/A	N/A
	NR Band n77 Antenna D	0.036	0.035	0.516	0.587	N/A	N/A	N/A
	NR Band n77 Antenna C	0.016	0.035	0.516	0.567	N/A	N/A	N/A

Notes:

1. 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.

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Table E-13
Simultaneous Transmission Scenario with 2.4 GHz Bluetooth Antenna 2 and 5 GHz WLAN MIMO (at 1.0 cm)

Configuration	Mode	2G/3G/4G /5G SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	SPLSR		
		1	2	3	1+2+3	1+2	1+3	2+3
Hotspot SAR Back Side DSI = 3	GPRS 850	1.137	0.185	0.516	See Note 1	0.01	0.01	0.01
	GPRS 1900	0.293	0.185	0.516	0.994	N/A	N/A	N/A
	UMTS 850	0.741	0.185	0.516	1.442	N/A	N/A	N/A
	UMTS 1750	0.495	0.185	0.516	1.196	N/A	N/A	N/A
	UMTS 1900	0.388	0.185	0.516	1.089	N/A	N/A	N/A
	LTE Band 71	0.407	0.185	0.516	1.108	N/A	N/A	N/A
	LTE Band 12	0.442	0.185	0.516	1.143	N/A	N/A	N/A
	LTE Band 13	0.656	0.185	0.516	1.357	N/A	N/A	N/A
	LTE Band 14	0.789	0.185	0.516	1.490	N/A	N/A	N/A
	LTE Band 26 (Cell)	0.839	0.185	0.516	1.540	N/A	N/A	N/A
	LTE Band 5 (Cell)	0.877	0.185	0.516	**1.578**	N/A	N/A	N/A
	LTE Band 66 (AWS)	0.539	0.185	0.516	1.240	N/A	N/A	N/A
	LTE Band 25 (PCS)	0.361	0.185	0.516	1.062	N/A	N/A	N/A
	LTE Band 30	0.405	0.185	0.516	1.106	N/A	N/A	N/A
	LTE Band 7	0.354	0.185	0.516	1.055	N/A	N/A	N/A
	LTE Band 41	0.320	0.185	0.516	1.021	N/A	N/A	N/A
	NR Band n71	0.553	0.185	0.516	1.254	N/A	N/A	N/A
	NR Band n12	0.486	0.185	0.516	1.187	N/A	N/A	N/A
	NR Band n5 (Cell)	1.048	0.185	0.516	See Note 1	0.01	0.01	0.01
	NR Band n66 (AWS) Antenna A	0.503	0.185	0.516	1.204	N/A	N/A	N/A
	NR Band n25 (PCS) Antenna A	0.376	0.185	0.516	1.077	N/A	N/A	N/A
	NR Band n30 Antenna A	0.522	0.185	0.516	1.223	N/A	N/A	N/A
	NR Band n7 Antenna B	0.299	0.185	0.516	1.000	N/A	N/A	N/A
	NR Band n41 Antenna D	0.109	0.185	0.516	0.810	N/A	N/A	N/A
	NR Band n41 Antenna B	0.205	0.185	0.516	0.906	N/A	N/A	N/A
	NR Band n77 DoD Antenna D	0.112	0.185	0.516	0.813	N/A	N/A	N/A
	NR Band n77 DoD Antenna C	0.011	0.185	0.516	0.712	N/A	N/A	N/A
	NR Band n77 Antenna D	0.036	0.185	0.516	0.737	N/A	N/A	N/A
	NR Band n77 Antenna C	0.016	0.185	0.516	0.717	N/A	N/A	N/A

Notes:

1. 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.

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

Configuration	Mode	2G/3G/4G /5G SAR (W/kg)	2.4 GHz Bluetooth MIMO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	SPLSR		
		1	2	3	1+2+3	1+2	1+3	2+3
Hotspot SAR Back Side DSI = 3	GPRS 850	1.137	0.055	0.516	See Note 1	0.01	0.01	0.01
	GPRS 1900	0.293	0.055	0.516	0.864	N/A	N/A	N/A
	UMTS 850	0.741	0.055	0.516	1.312	N/A	N/A	N/A
	UMTS 1750	0.495	0.055	0.516	1.066	N/A	N/A	N/A
	UMTS 1900	0.388	0.055	0.516	0.959	N/A	N/A	N/A
	LTE Band 71	0.407	0.055	0.516	0.978	N/A	N/A	N/A
	LTE Band 12	0.442	0.055	0.516	1.013	N/A	N/A	N/A
	LTE Band 13	0.656	0.055	0.516	1.227	N/A	N/A	N/A
	LTE Band 14	0.789	0.055	0.516	1.360	N/A	N/A	N/A
	LTE Band 26 (Cell)	0.839	0.055	0.516	1.410	N/A	N/A	N/A
	LTE Band 5 (Cell)	0.877	0.055	0.516	**1.448**	N/A	N/A	N/A
	LTE Band 66 (AWS)	0.539	0.055	0.516	1.110	N/A	N/A	N/A
	LTE Band 25 (PCS)	0.361	0.055	0.516	0.932	N/A	N/A	N/A
	LTE Band 30	0.405	0.055	0.516	0.976	N/A	N/A	N/A
	LTE Band 7	0.354	0.055	0.516	0.925	N/A	N/A	N/A
	LTE Band 41	0.320	0.055	0.516	0.891	N/A	N/A	N/A
	NR Band n71	0.553	0.055	0.516	1.124	N/A	N/A	N/A
	NR Band n12	0.486	0.055	0.516	1.057	N/A	N/A	N/A
	NR Band n5 (Cell)	1.048	0.055	0.516	See Note 1	0.01	0.01	0.01
	NR Band n66 (AWS) Antenna A	0.503	0.055	0.516	1.074	N/A	N/A	N/A
	NR Band n25 (PCS) Antenna A	0.376	0.055	0.516	0.947	N/A	N/A	N/A
	NR Band n30 Antenna A	0.522	0.055	0.516	1.093	N/A	N/A	N/A
	NR Band n7 Antenna B	0.299	0.055	0.516	0.870	N/A	N/A	N/A
	NR Band n41 Antenna D	0.109	0.055	0.516	0.680	N/A	N/A	N/A
	NR Band n41 Antenna B	0.205	0.055	0.516	0.776	N/A	N/A	N/A
	NR Band n77 DoD Antenna D	0.112	0.055	0.516	0.683	N/A	N/A	N/A
	NR Band n77 DoD Antenna C	0.011	0.055	0.516	0.582	N/A	N/A	N/A
	NR Band n77 Antenna D	0.036	0.055	0.516	0.607	N/A	N/A	N/A
	NR Band n77 Antenna C	0.016	0.055	0.516	0.587	N/A	N/A	N/A

Notes:

1. 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.

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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-15
Simultaneous Transmission Scenarios of WLAN/BT

Configuration	5 GHz WLAN MIMO	6 GHz WLAN MIMO
Back	0.848	0.795
Front	0.848*	0.140
Top	0.848*	0.028
Bottom	-	-
Right	-	-
Left	0.848*	0.238

Configuration	5 GHz WLAN MIMO	6 GHz WLAN MIMO	WLAN/BT Worst-case Combination
Back	0.848	0.795	0.848
Front	0.848	0.140	0.848
Top	0.848	0.028	0.848
Bottom	0.000	0.000	-
Right	0.000	0.000	-
Left	0.848	0.238	0.848

Table E-16
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	1.333	1.568	0.848	2.181	2.416
	Front	1.447	0.000	0.848	2.295	0.848
	Top	0.000	2.939	0.848	0.848	3.787
	Bottom	3.062	0.000	-	3.062	0.000
	Right	1.486	0.000	-	1.486	0.000
	Left	0.442	2.466	0.848	1.290	3.314

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Table E-17
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	2.848	1.568	0.848	3.696	2.416
	Front	2.515	0.000	0.848	3.363	0.848
	Top	0.000	2.939	0.848	0.848	3.787
	Bottom	3.098	0.000	-	3.098	0.000
	Right	1.486	0.000	-	1.486	0.000
	Left	0.442	2.466	0.848	1.290	3.314

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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.

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

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

E.7.1 Hotspot Back Side SPLSR Evaluation and Analysis

Table E-18
Peak SAR Locations for Hotspot Back Side

Mode/Band	x (mm)	y (mm)	Reported SAR (W/kg)
GPRS 850	-44.50	-72.10	1.137
NR Band n5 (Cell)	-48.90	-70.70	1.048
2.4 GHz Bluetooth Ant 1	4.50	65.50	0.035
2.4 GHz Bluetooth Ant 2	13.50	31.00	0.185
2.4 GHz Bluetooth MIMO	13.00	30.00	0.055
5 GHz WLAN MIMO	-2.40	71.90	0.516

Table E-19
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
Ant "a"	Ant "b"	a	b	a+b	D_{a-b}	$(a+b)^{1.5}/D_{a-b}$
GPRS 850	5 GHz WLAN MIMO	1.137	0.516	1.653	150.03	0.01
GPRS 850	2.4 GHz Bluetooth Ant 1	1.137	0.035	1.172	146.06	0.01
GPRS 850	2.4 GHz Bluetooth Ant 2	1.137	0.185	1.322	118.29	0.01
GPRS 850	2.4 GHz Bluetooth MIMO	1.137	0.055	1.192	117.18	0.01
NR Band n5 (Cell)	5 GHz WLAN MIMO	1.048	0.516	1.564	149.99	0.01
NR Band n5 (Cell)	2.4 GHz Bluetooth Ant 1	1.048	0.035	1.083	146.29	0.01
NR Band n5 (Cell)	2.4 GHz Bluetooth Ant 2	1.048	0.185	1.233	119.32	0.01
NR Band n5 (Cell)	2.4 GHz Bluetooth MIMO	1.048	0.055	1.103	118.20	0.01
2.4 GHz Bluetooth Ant 1	5 GHz WLAN MIMO	0.035	0.516	0.551	9.41	0.04
2.4 GHz Bluetooth Ant 2	5 GHz WLAN MIMO	0.185	0.516	0.701	43.88	0.01
2.4 GHz Bluetooth MIMO	5 GHz WLAN MIMO	0.055	0.516	0.571	44.64	0.01

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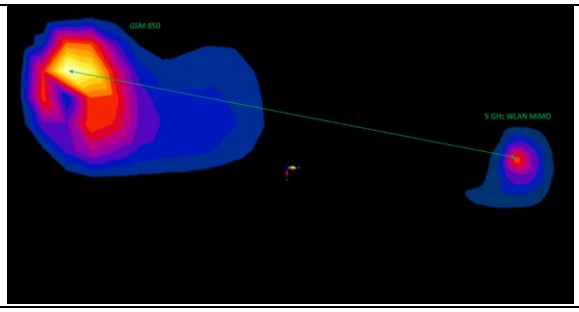
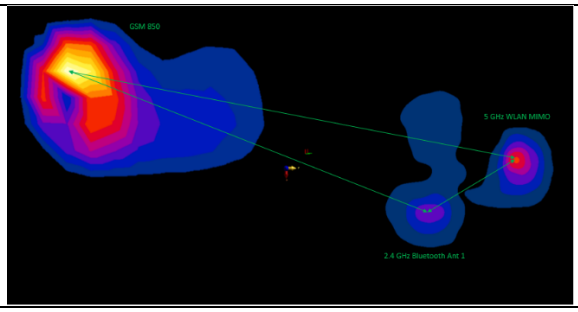
Table E-20
Hotspot Back Side SAR to Peak Location Separation Ratio Plots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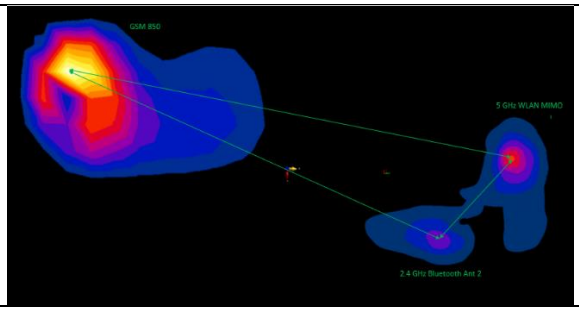	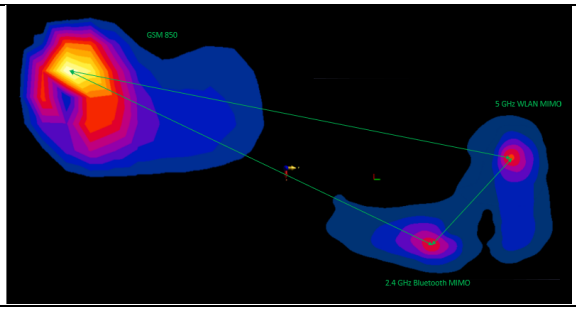
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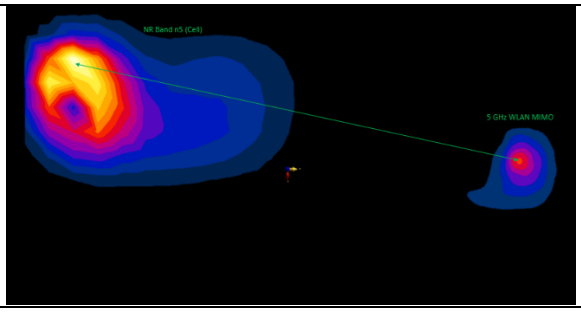	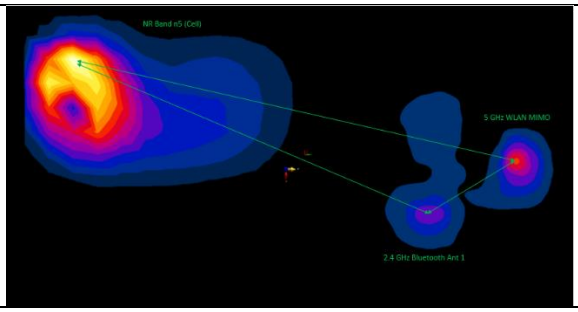
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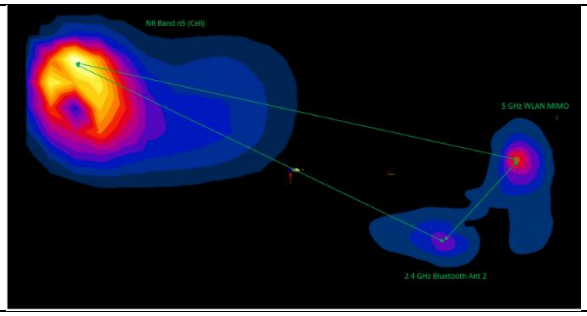	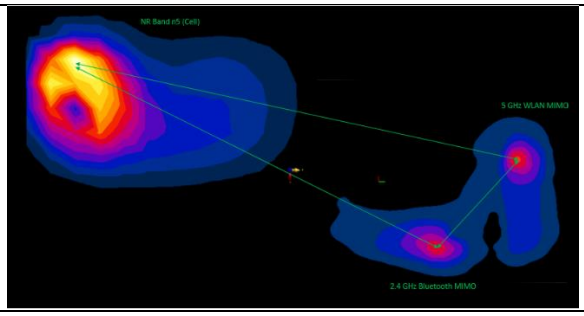
7	**8**

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.

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