Appendix E: Simultaneous Transmission Analysis

E.1. Introduction

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.

Table E-1 - Supported Simultaneous Transmission Scenarios

#	Scenario	Head	Body-worn	Hotspot	Phablet
1	WWAN + 2.4 GHz WIFI_SISO	Yes	Yes	Yes	Yes
2	WWAN + 2.4 GHz WIFI_MIMO	Yes	Yes	Yes	Yes
3	WWAN + 5 GHz WIFI_SISO	Yes	Yes	Yes	Yes
4	WWAN + 5 GHz WIFI_MIMO	Yes	Yes	Yes	Yes
5	WWAN + 6 GHz WIFI_SISO	Yes	Yes	Yes	Yes
6	WWAN + 6 GHz WIFI_MIMO	Yes	Yes	Yes	Yes
7	WWAN + 2.4 GHz Bluetooth_SISO	Yes	Yes	Yes*	Yes
8	WWAN + 2.4 GHz Bluetooth_MIMO	Yes	Yes	N/A	Yes
9	WWAN + 2.4 GHz WIFI_SISO + 5 GHz WIFI_SISO	Yes	Yes	Yes	Yes
10	WWAN + 2.4 GHz WIFI_SISO + 6 GHz WIFI_SISO	Yes	Yes	Yes	Yes
11	WWAN + 2.4 GHz WIFI_SISO + 5 GHz WIFI_MIMO	Yes	Yes	Yes	Yes
12	WWAN + 2.4 GHz WIFI_SISO + 6 GHz WIFI_MIMO	Yes	Yes	Yes	Yes
13	WWAN + 2.4 GHz WIFI_MIMO + 5 GHz WIFI_SISO	Yes	Yes	Yes	Yes
14	WWAN + 2.4 GHz WIFI_MIMO + 6 GHz WIFI_SISO	Yes	Yes	Yes	Yes
15	WWAN + 5 GHz WIFI_SISO + 2.4 GHz Bluetooth_SISO	Yes	Yes	Yes*	Yes
16	WWAN + 6 GHz WIFI_SISO + 2.4 GHz Bluetooth_SISO	Yes	Yes	Yes*	Yes
17	WWAN + 5 GHz WIFI_SISO + 2.4 GHz Bluetooth_MIMO	Yes	Yes	N/A	Yes
18	WWAN + 6 GHz WIFI_SISO + 2.4 GHz Bluetooth_MIMO	Yes	Yes	N/A	Yes
19	WWAN + 2.4 GHz WIFI_J + 2.4 GHz Bluetooth_H	Yes	Yes	Yes	Yes
20	WWAN + 5 GHz WIFI_MIMO + 2.4 GHz Bluetooth_SISO	Yes	Yes	Yes*	Yes
21	WWAN + 6 GHz WIFI_MIMO + 2.4 GHz Bluetooth_SISO	Yes	Yes	Yes*	Yes
22	WWAN + 5 GHz WIFI_MIMO + 2.4 GHz Bluetooth_MIMO	Yes	Yes	N/A	Yes
23	WWAN + 6 GHz WIFI_MIMO + 2.4 GHz Bluetooth_MIMO	Yes	Yes	N/A	Yes
24	WWAN + 5 GHz WIFI_SISO + 2.4 GHz WIFI_J + 2.4 GHz Bluetooth_H	Yes	Yes	Yes	Yes
25	WWAN + 6 GHz WIFI_SISO + 2.4 GHz WIFI_J + 2.4 GHz Bluetooth_H	Yes	Yes	Yes	Yes
26	WWAN + 2.4 GHz WIFI_MIMO + 5 GHz WIFI_MIMO	Yes	Yes	Yes	Yes
27	WWAN + 2.4 GHz WIFI_MIMO + 6 GHz WIFI_MIMO	Yes	Yes	Yes	Yes
28	WWAN + 5 GHz WIFI_MIMO + 2.4 GHz WIFI_J + 2.4 GHz Bluetooth_H	Yes	Yes	Yes	Yes
29	WWAN + 6 GHz WIFI_MIMO + 2.4 GHz WIFI_J + 2.4 GHz Bluetooth_H	Yes	Yes	Yes	Yes

Note:

- * Bluetooth tethering is only supported on Ant H.
- NFC can simultaneously transmit with all the above combinations and was evaluated for phablet based on usage conditions

E.2. Procedures

This device contains transmitters that may operate simultaneously. Therefore, simultaneous transmission analysis is required. Per FCC KDB Publication 447498 D04v01 and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of SAR for all the simultaneous transmitting antennas in a specific physical test configuration is ≤ 1.6 W/kg for 1g and 4 W/kg for 10g. 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 ("-").

This device is enabled with S.LSI with pre-defined sub6 antenna groups (AG0 and AG1) for WWAN, and FastConnect for WLAN.

Simultaneous transmission analysis is performed per antenna group. Below analysis demonstrates the mutually exclusive operation of AG0 and AG1 and the compliance between each antenna group with non-S.LSI Radios. For this model, WWAN/WLAN Radios are managed under S.LSI and FastConnect. Non-time averaging Radios include NFC/BT.

When operating in the same antenna group, simultaneous transmission compliance between radio operations within an antenna group is demonstrated in the Part 2 Report during algorithm validation. Part 2 Report also demonstrates simultaneous transmission compliance between WWAN and WLAN radio operation via C-TAS algorithm. Therefore, no further simultaneous analysis is needed within an antenna group.

E.3. S.LSI Antenna Grouping and FastConnect control via C-TAS

The S.LSI operates based on pre-defined sub6 antenna groups (AG0 and AG1). Sub6 WWAN antennas in the device are grouped based on spatial variation of RF exposure distributions. Since C-TAS control both S.LSI (WWAN) and Fastconnect (WLAN) on the system level, and all WLAN antennas are on top of the DUT, WLAN radios are included in the AG1 in the below analysis.

Either of the conditions below for all exposure scenarios shall be demonstrated to show AG0 is spatially separated from AG1:

a) Sum of SAR of each antenna from each of the sub6 AGs and the RF exposure from radios outside S.LSI/FastConnect is less than regulatory limits. This condition must be demonstrated for all antenna combinations of sub6 AGs. (Or)

b) Every antenna from each sub6 AG meets SPLSR criteria (Section 4.3.2(c) in FCC KDB 447498 D04) with every antenna from another sub6 AG. This criterion must be demonstrated for all antenna combinations for each pair of AGs.

This device supports two AGs: AG0 and AG1, with AG0 having 4 antennas (A,B,D,C) and AG1 having 5 WWAN/WLAN antennas (E,F,I,H,J). The conditions are verified through the following criteria for a given exposure position:

i) Summation criteria:

1. Obtain *reported* SAR at *reported* P_{limit} for all supported Sub6/WLAN/BT frequency bands from all antennas supported in each antenna group. R*eported* P_{limit} is min{P_{limit} + unc, P_{max} +unc}.
2. Determine the overall maximum reported SAR from all Sub6 WWAN/WLAN radios for each antenna on each antenna group, denoted as $max.exp.ant_{AG0}(i)$ and $max.exp.ant_{AG1}(j)$
3. Obtain reported SAR for each external radio, denoted as *reported.exp.NFC* and *reported.exp.BT*
4. Demonstrate that the sum of these exposures meets: $max.exp.ant_{AG0}(i)$ + $max.exp.ant_{AG1}(j)$ + *reported.exp.NFC + reported.exp.BT* ≤ 1.6 W/kg for 1g and 4 W/kg for 10g

ii) SPLSR or composite exposure distribution criteria: When SAR summation of an antenna pair is over the limit for an exposure position, SPLSR or composite exposure distribution can be done to demonstrate simultaneous transmission compliance:

1. SPLSR analysis for Sub6/WLAN/BT Antenna pairs:

- Due to antenna locations, WLAN/BT/NFC are grouped with AG1 antenna as Top Set, and Antenna A/B/C/D are grouped as Bottom set for SPLSR analysis.
- On an exposure position for each antenna group, obtain the highest reported SAR from all supported frequency bands on all antennas irrespective of supported simultaneous transmission scenarios for each DSI, along with the peak SAR locations.
- Only Y-axis coordinates are used in the analysis for calculation simplicity.
- For Antj in bottom set group (AG0), Y_Antj_Bottom coordinate represents the worst-case hotspot location that is closest to the top antenna group. Similarly, for Antk in top set group (AG1+WLAN+BT+NFC), Y_Antk_Top coordinate represents the worst-case hotspot location that is closest to the bottom antenna group.
- Using the above values, demonstrate for a given DSI that every antenna from one AG meets SPLSR criteria with every antenna in another AG for all frequency bands. The following formula is used to calculate the SPLSR between Antj_Bottom and Antk_Top for each exposure configuration:

$$SPLSR = \frac{(\max\ Antj\_Bottom + Max\ Antk\_Top)^{1.5}}{|Y\_Antj\_Bottom - Y\_Antk\_\mathrm{Top}|}$$

- When SPLSR ≤ 0.04 (rounded to 2 decimal places) for 1g SAR, or 0.1 for 10g SAR, the antenna pair qualifies for test exemption.

E.4. Simultaneous Transmission Analysis

E.4.1 SAR Summation

Table E-2 –AG0 (WWAN) Maximum Reported SAR Values

Exposure Condition	Position	AG0 SAR (W/kg)				
		A	B	D	C	Maximum
Head	Right Cheek	0.290	0.092	0.013	0.036	0.290
Head	Right Tilt	0.145	0.061	0.008	0.036	0.145
Head	Left Cheek	0.282	0.103	0.001	0.047	0.282
Head	Left Tilt	0.193	0.053	0.009	0.045	0.193
Body-worn	Back	1.016	0.579	0.565	0.336	1.016
Body-worn	Front	0.829	0.314	0.028	0.288	0.829
Hotspot	Back	0.969	0.579	0.565	0.336	0.969
Hotspot	Front	0.829	0.314	0.028	0.288	0.829
Hotspot	Top	-	-	-	-	-
Hotspot	Bottom	0.668	0.292	0.040	0.056	0.668
Hotspot	Right	0.227	-	0.008	-	0.227
Hotspot	Left	0.204	0.140	-	0.187	0.204

Table E-3 –AG1 (WWAN/WLAN) Maximum Reported SAR Values

Exposure Condition	Position	AG1 (W/kg)							
		E	F	I	H	J	MIMO (H&J)	MIMO (H&E)	Maximum
Head	Right Cheek	0.559	0.999	0.215	0.271	0.139	0.462	0.324	0.999
Head	Right Tilt	0.461	0.980	0.011	0.137	0.019	0.205	0.204	0.980
Head	Left Cheek	0.642	0.594	0.137	0.124	0.238	0.230	0.279	0.642
Head	Left Tilt	0.577	0.861	0.016	0.086	0.031	0.084	0.159	0.861
Body-worn	Back	0.736	0.636	0.155	0.515	0.190	0.499	0.571	0.736
Body-worn	Front	0.484	0.407	0.163	0.315	0.188	0.330	0.387	0.484
Hotspot	Back	0.736	0.636	0.155	0.515	0.190	0.499	0.559	0.736
Hotspot	Front	0.484	0.407	0.163	0.315	0.188	0.330	0.387	0.484
Hotspot	Top	0.242	0.363	-	0.106	0.017	0.151	0.105	0.363
Hotspot	Bottom	-	-	-	-	-	-	-	-
Hotspot	Right	0.204	-	-	-	0.026	0.053	0.248	0.248
Hotspot	Left	-	0.063	0.012	0.300	-	0.241	0.219	0.300
Phablet	Back	0.219	-	-	0.415	-	-	0.925	0.925
Phablet	Front	0.222	-	-	0.222	-	-	0.707	0.707
Phablet	Top	0.176	-	-	0.125	-	-	0.267	0.267
Phablet	Bottom	-	-	-	-	-	-	-	-
Phablet	Right	0.272	-	-	-	-	-	0.219	0.272
Phablet	Left	-	-	-	0.916	-	-	0.985	0.985

Table E-4 –AG0+AG1 +BT+ NFC

Exposure Condition	Position	SAR (W/kg)				
		AG0	AG1	BT	NFC	Sum
Head	Right Cheek	0.290	0.999	0.174	-	1.463
Head	Right Tilt	0.145	0.980	0.086	-	1.211
Head	Left Cheek	0.282	0.642	0.103	-	1.027
Head	Left Tilt	0.193	0.861	0.029	-	1.083
Body-worn	Back	1.016	0.736	0.289	-	See Section E.4.2
Body-worn	Front	0.829	0.484	0.141	-	1.454
Hotspot	Back	0.969	0.736	0.289	-	See Section E.4.2
Hotspot	Front	0.829	0.484	0.137	-	1.450
Hotspot	Top	-	0.363	0.062	-	0.425
Hotspot	Bottom	0.668	-	-	-	0.668
Hotspot	Right	0.227	0.248	-	-	0.475
Hotspot	Left	0.204	0.300	0.144	-	0.648
Phablet	Back	-	0.925	0.308	0.017	1.250
Phablet	Front	-	0.707	0.236	0.000	0.943
Phablet	Top	-	0.267	0.140	0.000	0.407
Phablet	Bottom	-	-	-	-	-
Phablet	Right	-	0.272	0.105	-	0.377
Phablet	Left	-	0.985	0.403	0.000	1.388

E.4.2 SPLSR Analysis

Table E-5 –Bottom Set Maximum Reported SAR Values

Exposure Condition	Position	Bottom Set SAR (W/kg)				
		A	B	D	C	Maximum
Body-worn	Back	1.016	0.579	0.565	0.336	1.016
Hotspot	Back	0.969	0.579	0.565	0.336	0.969

Table E-6 –Top Set Maximum Reported SAR Values

Exposure Condition	Position	Top Set SAR (W/kg)							
		E + Bluetooth	F + Bluetooth	I + Bluetooth	H + Bluetooth	J + Bluetooth	MIMO (H&J) + Bluetooth	MIMO (H&E) + Bluetooth	Maximum
Body-worn	Back	1.025	0.925	0.444	0.804	0.479	0.788	0.860	1.025
Hotspot	Back	1.025	0.925	0.444	0.804	0.479	0.788	0.848	1.025

Table E-7 SPLSR

Exposure Condition	Position	Bottom Set			Top Set			Sum SAR (W/kg)	SPLSR
		Antenna	SAR (W/kg)	Y coordinate	Antenna	SAR (W/kg)	Y coordinate		
Body-worn	Back	A	1.016	-73.1	E + Bluetooth	1.025	41.0	2.041	0.03
Body-worn	Back	A	1.016	-73.1	F + Bluetooth	0.925	41.0	1.941	0.02
Body-worn	Back	A	1.016	-73.1	I + Bluetooth	0.444	31.0	1.460	0.02
Body-worn	Back	A	1.016	-73.1	H + Bluetooth	0.804	41.0	1.820	0.02
Body-worn	Back	A	1.016	-73.1	J + Bluetooth	0.479	37.5	1.495	0.02
Body-worn	Back	A	1.016	-73.1	MIMO (H&J) + Bluetooth	0.788	41.0	1.804	0.02
Body-worn	Back	A	1.016	-73.1	MIMO (H&E) + Bluetooth	0.860	41.0	1.876	0.02
Body-worn	Back	B	0.579	-76.9	E + Bluetooth	1.025	41.0	1.604	0.02
Body-worn	Back	B	0.579	-76.9	F + Bluetooth	0.925	41.0	1.504	0.02
Body-worn	Back	B	0.579	-76.9	I + Bluetooth	0.444	31.0	1.023	0.01
Body-worn	Back	B	0.579	-76.9	H + Bluetooth	0.804	41.0	1.383	0.01
Body-worn	Back	B	0.579	-76.9	J + Bluetooth	0.479	37.5	1.058	0.01
Body-worn	Back	B	0.579	-76.9	MIMO (H&J) + Bluetooth	0.788	41.0	1.367	0.01
Body-worn	Back	B	0.579	-76.9	MIMO (H&E) + Bluetooth	0.860	41.0	1.439	0.01
Body-worn	Back	C	0.336	-58	E + Bluetooth	1.025	41.0	1.361	0.02
Body-worn	Back	C	0.336	-58	F + Bluetooth	0.925	41.0	1.261	0.01
Body-worn	Back	C	0.336	-58	I + Bluetooth	0.444	31.0	0.780	0.01
Body-worn	Back	C	0.336	-58	H + Bluetooth	0.804	41.0	1.140	0.01
Body-worn	Back	C	0.336	-58	J + Bluetooth	0.479	37.5	0.815	0.01
Body-worn	Back	C	0.336	-58	MIMO (H&J) + Bluetooth	0.788	41.0	1.124	0.01
Body-worn	Back	C	0.336	-58	MIMO (H&E) + Bluetooth	0.860	41.0	1.196	0.01
Body-worn	Back	D	0.565	-63.5	E + Bluetooth	1.025	41.0	1.590	0.02
Body-worn	Back	D	0.565	-63.5	F + Bluetooth	0.925	41.0	1.490	0.02
Body-worn	Back	D	0.565	-63.5	I + Bluetooth	0.444	31.0	1.009	0.01
Body-worn	Back	D	0.565	-63.5	H + Bluetooth	0.804	41.0	1.369	0.02
Body-worn	Back	D	0.565	-63.5	J + Bluetooth	0.479	37.5	1.044	0.01
Body-worn	Back	D	0.565	-63.5	MIMO (H&J) + Bluetooth	0.788	41.0	1.353	0.02
Body-worn	Back	D	0.565	-63.5	MIMO (H&E) + Bluetooth	0.860	41.0	1.425	0.02
Hotspot	Back	A	0.969	-73.1	E + Bluetooth	1.025	51.6	1.994	0.02
Hotspot	Back	A	0.969	-73.1	F + Bluetooth	0.925	61.8	1.894	0.02
Hotspot	Back	A	0.969	-73.1	I + Bluetooth	0.444	31.0	1.413	0.02
Hotspot	Back	A	0.969	-73.1	H + Bluetooth	0.804	50.0	1.773	0.02
Hotspot	Back	A	0.969	-73.1	J + Bluetooth	0.479	37.5	1.448	0.02
Hotspot	Back	A	0.969	-73.1	MIMO (H&J) + Bluetooth	0.788	52.0	1.757	0.02
Hotspot	Back	A	0.969	-73.1	MIMO (H&E) + Bluetooth	0.848	60.7	1.817	0.02
Hotspot	Back	B	0.579	-76.9	E + Bluetooth	1.025	51.6	1.604	0.02
Hotspot	Back	B	0.579	-76.9	F + Bluetooth	0.925	61.8	1.504	0.01
Hotspot	Back	B	0.579	-76.9	I + Bluetooth	0.444	31.0	1.023	0.01
Hotspot	Back	B	0.579	-76.9	H + Bluetooth	0.804	50.0	1.383	0.01
Hotspot	Back	B	0.579	-76.9	J + Bluetooth	0.479	37.5	1.058	0.01
Hotspot	Back	B	0.579	-76.9	MIMO (H&J) + Bluetooth	0.788	52.0	1.367	0.01
Hotspot	Back	B	0.579	-76.9	MIMO (H&E) + Bluetooth	0.848	60.7	1.427	0.01
Hotspot	Back	C	0.336	-58	E + Bluetooth	1.025	51.6	1.361	0.01
Hotspot	Back	C	0.336	-58	F + Bluetooth	0.925	61.8	1.261	0.01
Hotspot	Back	C	0.336	-58	I + Bluetooth	0.444	31.0	0.780	0.01
Hotspot	Back	C	0.336	-58	H + Bluetooth	0.804	50.0	1.140	0.01
Hotspot	Back	C	0.336	-58	J + Bluetooth	0.479	37.5	0.815	0.01
Hotspot	Back	C	0.336	-58	MIMO (H&J) + Bluetooth	0.788	52.0	1.124	0.01
Hotspot	Back	C	0.336	-58	MIMO (H&E) + Bluetooth	0.848	60.7	1.184	0.01
Hotspot	Back	D	0.565	-63.5	E + Bluetooth	1.025	51.6	1.590	0.02
Hotspot	Back	D	0.565	-63.5	F + Bluetooth	0.925	61.8	1.490	0.01
Hotspot	Back	D	0.565	-63.5	I + Bluetooth	0.444	31.0	1.009	0.01
Hotspot	Back	D	0.565	-63.5	H + Bluetooth	0.804	50.0	1.369	0.01
Hotspot	Back	D	0.565	-63.5	J + Bluetooth	0.479	37.5	1.044	0.01
Hotspot	Back	D	0.565	-63.5	MIMO (H&J) + Bluetooth	0.788	52.0	1.353	0.01
Hotspot	Back	D	0.565	-63.5	MIMO (H&E) + Bluetooth	0.848	60.7	1.413	0.01

Notes:

1. For all combinations where the SAR sum of AG0 (WWAN)+AG1 (WWAN/WLAN) +NFC+ BT is not greater than regulatory limits or SPLRS is under the limit, there's no further analysis required for compliance demonstration
2. See section E.5 for coordinates details for all bands/modes.

E.5. Y-coordinates

Table E-8

Bottom Set Y coordinates [mm]								
Exposure condition	Body-worn				Hotspot			
Position	Back				Back			
Band	Antenna							
	A	B	D	C	A	B	D	C
GSM 850	-76.8	-	-	-	-74.3	-	-	-
GSM 1900	-78.4	-	-	-	-78	-	-	-
UMTS Band 5	-75.3	-	-	-	-75.3	-	-	-
UMTS Band 4	-82.5	-	-	-	-82.5	-	-	-
UMTS Band 2	-80.3	-	-	-	-80.3	-	-	-
LTE Band 71	-76.8	-	-	-	-76.8	-	-	-
LTE Band 12	-78.1	-	-	-	-78.1	-	-	-
LTE Band 13	-74.3	-	-	-	-74.3	-	-	-
LTE Band 14	-73.1	-	-	-	-73.1	-	-	-
LTE Band 26	-73.1	-	-	-	-73.1	-	-	-
LTE Band 5	-73.1	-	-	-	-73.1	-	-	-
LTE Band 66	-83.2	-	-	-	-83.2	-	-	-
LTE Band 25	-80.7	-	-	-	-80.7	-	-	-
LTE Band 30	-	-79.5	-	-	-	-79.5	-	-
LTE Band 7	-	-76.9	-	-	-	-76.9	-	-
LTE Band 41	-	-82.5	-	-	-	-82.5	-	-
NR Band n71	-86	-	-	-	-86	-	-	-
NR Band n12	-81.8	-	-	-	-81.8	-	-	-
NR Band n14	-74.1	-	-	-	-74.1	-	-	-
NR Band n26	-78.9	-	-	-	-78.9	-	-	-
NR Band n5	-77.9	-	-	-	-77.9	-	-	-
NR Band n70	-87.6	-	-	-	-87.6	-	-	-
NR Band n66	-78.1	-	-	-	-78.1	-	-	-
NR Band n25	-80.5	-	-	-	-80.5	-	-	-
NR Band n30	-	-86.5	-	-	-	-86.5	-	-
NR Band n7	-	-80	-	-	-	-80	-	-
NR Band n41	-	-80.5	-63.5	-	-	-80.5	-63.5	-
NR Band n48	-	-	-71.5	-58	-	-	-71.5	-58
NR Band n77	-	-	-66.5	-59.5	-	-	-66.5	-59.5
Overall Coordinate	-73.1	-76.9	-63.5	-58.0	-73.1	-76.9	-63.5	-58.0

Table E-9

Top Set Y Coordinates [mm]																				
Exposure condition	Body-worn										Hotspot									
Position	Back										Back									
Band	Antenna																			
	E	F	I	H	J	MIMO (H&J)	MIMO (H&E)	H	J	MIMO (H&J)	E	F	I	H	J	MIMO (H&J)	MIMO (H&E)	H	J	MIMO (H&J)
GSM 850	85.6	-	-	-	-	-	-	-	-	-	84.4	-	-	-	-	-	-	-	-	-
UMTS Band 5	78.1	-	-	-	-	-	-	-	-	-	78.1	-	-	-	-	-	-	-	-	-
LTE Band 71	83.2	-	-	-	-	-	-	-	-	-	83.2	-	-	-	-	-	-	-	-	-
LTE Band 12	83.2	-	-	-	-	-	-	-	-	-	83.2	-	-	-	-	-	-	-	-	-
LTE Band 13	81.9	-	-	-	-	-	-	-	-	-	81.9	-	-	-	-	-	-	-	-	-
LTE Band 14	83.1	-	-	-	-	-	-	-	-	-	83.1	-	-	-	-	-	-	-	-	-
LTE Band 26	83.2	-	-	-	-	-	-	-	-	-	83.2	-	-	-	-	-	-	-	-	-
LTE Band 5	83.9	-	-	-	-	-	-	-	-	-	83.9	-	-	-	-	-	-	-	-	-
LTE Band 66	-	74.5	-	-	-	-	-	-	-	-	-	74.5	-	-	-	-	-	-	-	-
LTE Band 25	-	78	-	-	-	-	-	-	-	-	-	78	-	-	-	-	-	-	-	-
LTE Band 30	-	78.5	-	-	-	-	-	-	-	-	-	78.5	-	-	-	-	-	-	-	-
LTE Band 7	-	79	-	-	-	-	-	-	-	-	-	79	-	-	-	-	-	-	-	-
LTE Band 41	-	75.5	-	-	-	-	-	-	-	-	-	75.5	-	-	-	-	-	-	-	-
LTE Band 48	-	72	-	-	-	-	-	-	-	-	-	72	-	-	-	-	-	-	-	-
NR Band n71	80.7	-	-	-	-	-	-	-	-	-	80.7	-	-	-	-	-	-	-	-	-
NR Band n12	80.7	-	-	-	-	-	-	-	-	-	80.7	-	-	-	-	-	-	-	-	-
NR Band n14	80.8	-	-	-	-	-	-	-	-	-	80.8	-	-	-	-	-	-	-	-	-
NR Band n26	80.7	-	-	-	-	-	-	-	-	-	80.7	-	-	-	-	-	-	-	-	-
NR Band n5	83.2	-	-	-	-	-	-	-	-	-	83.2	-	-	-	-	-	-	-	-	-
NR Band n70	-	78	-	-	-	-	-	-	-	-	-	78	-	-	-	-	-	-	-	-
NR Band n66	-	78	-	-	-	-	-	-	-	-	-	78	-	-	-	-	-	-	-	-
NR Band n25	-	83.1	-	-	-	-	-	-	-	-	-	83.1	-	-	-	-	-	-	-	-
NR Band n30	-	79	-	-	-	-	-	-	-	-	-	79	-	-	-	-	-	-	-	-
NR Band n7	-	81	-	-	-	-	-	-	-	-	-	81	-	-	-	-	-	-	-	-
NR Band n41	65.5	76.5	-	-	-	-	-	-	-	-	65.5	76.5	-	-	-	-	-	-	-	-
NR Band n48	-	76.5	45	-	-	-	-	-	-	-	-	76.5	45	-	-	-	-	-	-	-
NR Band n77	-	71	31	-	-	-	-	-	-	-	-	71	31	-	-	-	-	-	-	-
2.4 GHz WIFI	-	-	-	50	37.5	52	-	-	-	-	-	-	-	50	37.5	52	-	-	-	-
5 GHz WIFI	69.1	-	-	58.1	-	-	60.7	-	-	-	69.1	-	-	58.1	-	-	60.7	-	-	-
6 GHz WIFI	51.6	-	-	60	-	-	62	-	-	-	51.6	-	-	60	-	-	62	-	-	-
2.4 GHz Bluetooth	-	-	-	-	-	-	-	61.8	41	57	-	-	-	-	-	-	-	61.8	N/A	N/A
Ant Combination	E + Bluetooth	F + Bluetooth	I + Bluetooth	H + Bluetooth	J + Bluetooth	MIMO (H&J) + Bluetooth	MIMO (H&E) + Bluetooth				E + Bluetooth	F + Bluetooth	I + Bluetooth	H + Bluetooth	J + Bluetooth	MIMO (H&J) + Bluetooth	MIMO (H&E) + Bluetooth			
Overall Coordinate	41	41	31	41	37.5	41	41				51.6	61.8	31	50	37.5	52	60.7			

E.6. Conclusion

The above numerical summed results and SPLSR for all the combinations of antenna groups are sufficient to show that Bottom set is mutually exclusive from Top Set. Therefore, no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D04v01 and IEEE 1528- 2013 Section 6.3.4.1.