

APPENDIX E: MULTI-TX AND ANTENNA SAR CONSIDERATIONS

E.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D04v01 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 D04v01 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 (or 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. Alternatively, simultaneous transmission SAR test exclusion may be evaluated using Total Exposure Ratio (TER). The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the TER.

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 Qualcomm® Smart Transmit Gen2 with pre-defined antenna groups (AG0 and AG1).. This device operates using GEN2_SUB6 (Sub6-favor mode) which assumes all mmW modules (MG) are collocated with each sub6 AG0 and AG1 in this device. The Simultaneous transmission analysis is performed per antenna groups. Below analysis demonstrates the mutually exclusive operation of AG0 and AG1, and the compliance between each antenna group with non-Smart Transmit Radios. For this model, WWAN/WLAN/BT Radios are managed under Smart Transmit. Non-Smart Transmit Radios include NFC/UWB.

When operating in the same antenna group, the compliance under dynamic transmission condition, including all supported simultaneous transmission scenarios, should be assessed and demonstrated in the Part 2 Report during algorithm validation. Therefore, no further simultaneous analysis is needed within an antenna group.

When all WWAN/WLAN/BT Radios are managed under Smart Transmit, TER for WWAN/WLAN/BT is covered in Part 2 testing. Only external radios outside of WWAN/WLAN/BT (UWB, NFC) require TER analysis with WWAN/WLAN/BT during simultaneous transmissions.

E.3 Sub6 Antenna Groups

The 2nd generation of Smart Transmit (GEN2) operates based on pre-defined antenna groups (AG). Sub6/WLAN/BT Tx Antennas in the device are grouped based on spatial variation of RF exposure distributions, where the RF exposure of one AG is mutually exclusive from other AG. This is accomplished by demonstrating either of below conditions for all exposure scenarios:

- a) Sum of SAR of one antenna from each of the sub6 AGs and the RF exposure from radios outside Smart Transmit 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. These criteria must be demonstrated for all antenna combinations for each pair of AGs.

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This device supports two AGs: AG0 and AG1, with AG0 having 3 antennas (A, B, C) and AG1 having 4 antennas (E, F, G, H).

The conditions are verified through the following criteria:

- i) Sum of SAR: Demonstrate that the sum of *max.norm.exp.AG0* and *max.norm.exp.AG1* and the reported normalized SAR values from radios outside Smart Transmit (denoted as *reported.norm.exp.ER*) should be less than the regulatory limit for each supported DSI following the below procedure:
 1. Obtain the worst-case *adjusted SAR* for each antenna group, i.e., maximum *reported SAR* at EFS $P_{limit} + \text{unc}$ (or max of $\{P_{max} + \text{unc}, \text{EFS } P_{limit}\}$ when $\text{EFS } P_{limit} > P_{max}$) out of all supported technologies, frequency bands and antennas in AG0 and AG1, then normalized to the regulatory limit to get the maximum normalized SAR for each antenna group, denoted as: *max.norm.exp.AG0* and *max.norm.exp.AG1*
 2. For external radios outside of Smart Transmit (NFC/UWB): Obtain the worst-case RF exposure for each external radio normalized to regulatory limit to get the normalized SAR for each external radio, denoted as: *reported.norm.exp.NFC* and *reported.norm.exp.UWB*
 3. Demonstrate that the sum of these RF exposures meets: $\{max.norm.exp.AG0 + max.norm.exp.AG1 + reported.norm.exp.NFC + reported.norm.exp.UWB\} \leq 1$.
- ii) SPLSR or composite exposure distribution criteria: when TER sum of an antenna pair is over the limit for a DSI/exposure position, SPLSR or composite exposure distribution can be done to demonstrate simultaneous transmission compliance.
 1. SPLSR analysis for sub6 antenna pairs: For each antenna, obtain the highest *adjusted SAR* at EFS $P_{limit} + \text{unc}$ (or max of $\{P_{max} + \text{unc}, \text{EFS } P_{limit}\}$ when $\text{EFS } P_{limit} > P_{max}$) out of all supported technologies for each frequency band. Using these 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. This criterion must be demonstrated for all antenna pair combinations irrespective of supported simultaneous transmission scenarios as given below for each DSI. As it can be seen, these include all combinations of antenna groups, antennas, and frequency bands.
 - If SPLSR criteria evaluation and analysis are needed to determine compliance for a certain DSI configuration, SPLSR is performed by taking the highest reported SAR for each of the supported technologies and bands per antenna, along with the peak SAR locations. Per Qualcomm guidance, only Y-axis coordinates are recorded in the analysis for calculation simplicity (assumes all 0mm of separation on the x-axis). Peak locations are documented in the Highest Report ER and Hotspot Location Section below for each DSI configuration. For bottom AG0, Y_max coordinates represents the worst-case hotspot location that is closest to the top AG1. Similarly, for top AG1, Y_min coordinate represents the worst-case hotspot location that is closest to the bottom AG0
 - The following formula is used to calculate the SPLSR between AG0 and AG1 for each exposure configuration:

$$SPLSR = \frac{(Max\ SAR\ Top\ Set + Max\ SAR\ Bottom\ Set)^{1.5}}{|Y_{max} - Y_{min}|}$$

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E.4 Exposure Ratios

exposure ratio (ER) for different transmitters is calculated as following:

$$ER_{SAR,n} = \frac{SAR_n}{SAR_{limit}}$$

$$ER_{PD,n} = \frac{PD_n}{PD_{limit}}$$

Where:

- SAR_n is the SAR value for the n -th transmitter/test frequency
- SAR_{limit} is the basic restriction limit that is applicable to the n -th transmitter/test frequency
- P_{txm} is the higher of maximum time-averaged conducted power or EIRP associated with the m -th UWB transmitter
- PD_l is the PD value for the l -th transmitter/test frequency
- PD_{limit} is the basic restriction limit that is applicable for the l -th transmitter/test frequency

Compliance with the SAR-PD-UWB based RF exposure limits is achieved if $TER_{SAR-PD-UWB} \leq 1$. When $TER_{SAR-PD-UWB} > 1$, SPLSR is additionally evaluated per below equation:

$$SPLSR = \frac{(ER_j + ER_k)^{1.5}}{R}$$

Where:

- ER_j and ER_k are exposure ratio of transmitter j and k
- R is the distance between transmitter j and k

When SPLSR is ≤ 0.02 for 1g exposure conditions or SPLSR is ≤ 0.013 for 10g exposure conditions simultaneous SAR evaluation is not required.

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E.5 Folder Closed Head (DSI = 3) SAR Antenna Group Analysis

Table E-1
DSI=3 Held-to-ear AG0 Highest Adjusted Ratio to Limit

AG0 Ratio to Limit					
Head SAR	Configuration	A	A+C	B	Max
	Right Cheek	0.383	0.378	0.383	0.383
	Right Tilt	0.225	0.199	0.308	0.308
	Left Cheek	0.275	0.267	0.379	0.379
	Left Tilt	0.169	0.211	0.239	0.239

Table E-2
DSI=3 Held-to-ear AG1 Highest Adjusted Ratio to Limit

AG1 Ratio to Limit							
Head SAR	Configuration	G	H	F	E	MIMO	Max
	Right Cheek	0.531	0.614	0.460	0.545	0.520	0.614
	Right Tilt	0.689	0.193	0.610	0.613	0.621	0.689
	Left Cheek	0.598	0.616	0.575	0.465	0.551	0.616
	Left Tilt	0.757	0.347	0.620	0.507	0.612	0.757

Table E-3
DSI=2 Held-to-ear AG Verification

Head SAR	Configuration	AG0 Ratio to Limit	AG1 Ratio to Limit	AG0 + AG1 Ratio to Limit
	Right Cheek	0.383	0.614	0.997
	Right Tilt	0.308	0.689	0.997
	Left Cheek	0.379	0.616	0.995
	Left Tilt	0.239	0.757	0.996

Notes:

1. For all combinations where the TER sum of AG0+AG1 is not greater than 1, there's no further analysis required for compliance demonstration.

E.6 Folder Open Head (DSI = 2) SAR Antenna Group Analysis

Table E-4
DSI=3 Held-to-ear AG0 Highest Adjusted Ratio to Limit

AG0 Ratio to Limit				
Head SAR	Configuration	A+C	B	Max
	Right Cheek	0.245	0.349	0.349
	Right Tilt	0.255	0.156	0.255
	Left Cheek	0.376	0.376	0.376
	Left Tilt	0.224	0.192	0.224

Table E-5
DSI=3 Held-to-ear AG1 Highest Adjusted Ratio to Limit

AG1 Ratio to Limit							
Head SAR	Configuration	G	H	F	E	MIMO	Max
	Right Cheek	0.449	0.079	0.647	0.404	0.611	0.647
	Right Tilt	0.548	0.097	0.621	0.560	0.621	0.621
	Left Cheek	0.113	0.608	0.127	0.622	0.474	0.622
	Left Tilt	0.196	0.102	0.145	0.259	0.256	0.259

Table E-6
DSI=2 Held-to-ear AG Verification

Head SAR	Configuration	AG0 Ratio to Limit	AG1 Ratio to Limit	AG0 + AG1 Ratio to Limit
	Right Cheek	0.349	0.647	0.996
	Right Tilt	0.255	0.621	0.876
	Left Cheek	0.376	0.622	0.998
	Left Tilt	0.224	0.259	0.483

Notes:

- For all combinations where the TER sum of AG0+AG1 is not greater than 1, there's no further analysis required for compliance demonstration.

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E.7 Body-worn (DSI = 1) SAR Antenna Group Analysis

Table E-7
DSI=1 Body-worn AG0 Highest Adjusted Ratio to Limit

AG0 Ratio to Limit					
Bodyworn SAR	Configuration	A	A+C	B	Max
	Back	0.619	0.633	0.486	0.633

Table E-8
DSI=1 Body-worn AG1 Highest Adjusted Ratio to Limit

AG1 Ratio to Limit							
Bodyworn SAR	Configuration	G	H	F	E	MIMO	Max
	Back	0.823	0.614	0.549	0.740	0.823	0.823

Table E-9
DSI=1 Body-worn AG Verification

Bodyworn SAR			Configuration			AG0 Ratio to Limit			AG1 Ratio to Limit			AG0 + AG1 Ratio to Limit		
						0.633			0.823			See Table Below		
Bodyworn SAR														
AG0			AG1						AG0 + AG1 Ratio to Limit		SPLSR			
Antenna	Ratio to Limit	Position	Antenna	Ratio to Limit	Position									
Ant A	0.619	-75.3	Ant G	0.823	72.70	See Note 2		0.01						
Ant A	0.619	-75.3	Ant H	0.614	9.70	See Note 2		0.02						
Ant A	0.619	-75.3	Ant F	0.549	69.70	See Note 2		0.01						
Ant A	0.619	-75.3	Ant E	0.740	71.00	See Note 2		0.01						
Ant A	0.619	-75.3	MIMO	0.823	24.10	See Note 2		0.02						
Ant A+C	0.633	-71.5	Ant G	0.823	72.70	See Note 2		0.01						
Ant A+C	0.633	-71.5	Ant H	0.614	9.70	See Note 2		0.02						
Ant A+C	0.633	-71.5	Ant F	0.549	69.70	See Note 2		0.01						
Ant A+C	0.633	-71.5	Ant E	0.740	71.00	See Note 2		0.01						
Ant A+C	0.633	-71.5	MIMO	0.823	24.10	See Note 2		0.02						
Ant B	0.486	-79.0	Ant G	0.823	72.70	See Note 2		0.01						
Ant B	0.486	-79.0	Ant H	0.614	9.70	See Note 2		0.01						
Ant B	0.486	-79.0	Ant F	0.549	69.70	See Note 2		0.01						
Ant B	0.486	-79.0	Ant E	0.740	71.00	See Note 2		0.01						
Ant B	0.486	-79.0	MIMO	0.823	24.10	See Note 2		0.01						

Notes:

1. For all combinations where the TER sum of AG0+AG1 is not greater than 1, there's no further analysis required for compliance demonstration.
2. 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 0.02 per FCC KDB 447498 D04v01. Please see the Highest Report ER and Hotspot Location Section for Y-axis peak locations

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E.8 Hotspot (DSI = 1) SAR Antenna Group Analysis

Table E-10
DSI=1 Hotspot AG0 Adjusted Ratio to Limit

AG0 Ratio to Limit					
Hotspot SAR	Configuration	A	A+C	B	Max
	Back	0.619	0.633	0.486	0.633
	Front	0.189	0.181	0.278	0.278
	Top	-	-	-	-
	Bottom	0.171	0.155	0.289	0.289
	Right	0.315	0.319	-	0.319
	Left	-	0.084	0.052	0.084

Table E-11
DSI=1 Hotspot AG1 Adjusted Ratio to Limit

AG1 Ratio to Limit							
Hotspot SAR	Configuration	G	H	F	E	MIMO	Max
	Back	0.823	0.614	0.265	0.547	0.666	0.823
	Front	0.397	0.099	0.075	0.083	0.168	0.397
	Top	0.427	-	0.119	0.249	0.389	0.427
	Bottom	-	-	-	-	-	-
	Right	0.043	0.253	-	0.039	0.114	0.253
	Left	-	-	0.022	-	0.051	0.051

Table E-12
DSI=1 Hotspot AG Verification

Hotspot SAR	Configuration	AG0 Ratio to Limit	AG1 Ratio to Limit	AG0 + AG1 Ratio to Limit
	Back	0.633	0.823	See Table Below
	Front	0.278	0.397	0.675
	Top	-	0.427	0.427
	Bottom	0.289	-	0.289
	Right	0.319	0.253	0.572
	Left	0.084	0.051	0.135

Back							
AG0			AG1			AG0 + AG1 Ratio to Limit	SPLSR
Antenna	Ratio to Limit	Position	Antenna	Ratio to Limit	Position		
Ant A	0.619	-75.3	Ant G	0.823	72.70	See Note 2	0.01
Ant A	0.619	-75.3	Ant H	0.614	9.70	See Note 2	0.02
Ant A	0.619	N/A	Ant F	0.265	N/A	0.884	N/A
Ant A	0.619	-75.3	Ant E	0.547	71.00	See Note 2	0.01
Ant A	0.619	-75.3	MIMO	0.666	24.10	See Note 2	0.01
Ant A+C	0.633	-71.5	Ant G	0.823	72.70	See Note 2	0.01
Ant A+C	0.633	-71.5	Ant H	0.614	9.70	See Note 2	0.02
Ant A+C	0.633	N/A	Ant F	0.265	N/A	0.898	N/A
Ant A+C	0.633	-71.5	Ant E	0.547	71.00	See Note 2	0.01
Ant A+C	0.633	-71.5	MIMO	0.666	24.10	See Note 2	0.01
Ant B	0.486	-79.0	Ant G	0.823	72.70	See Note 2	0.01
Ant B	0.486	-79.0	Ant H	0.614	9.70	See Note 2	0.01
Ant B	0.486	N/A	Ant F	0.265	N/A	0.751	N/A
Ant B	0.486	-79.0	Ant E	0.547	71.00	See Note 2	0.01
Ant B	0.486	-79.0	MIMO	0.666	24.10	See Note 2	0.01

Notes:

1. For all combinations where the TER sum of AG0+AG1 is not greater than 1, there's no further analysis required for compliance demonstration.
2. 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 0.02 per FCC KDB 447498 D04v01. Please see the Highest Report ER and Hotspot Location Section for Y-axis peak locations

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E.9 Phablet (DSI = 1) SAR Antenna Group 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-13
DSI=1 Phablet AG1 Highest Adjusted Ratio to Limit

AG1 Ratio to Limit					
Phablet SAR	Configuration	F	E	MIMO	Max
	Back	0.608	0.358	0.460	0.608
	Front	0.054	0.091	0.068	0.091
	Top	0.466	0.403	0.612	0.612
	Bottom	-	-	-	-
	Right	-	0.151	0.139	0.151
	Left	0.038	-	0.040	0.040

Table E-14
Simultaneous Transmission Scenarios of NFC/UWB (Phablet)

Phablet SAR	Configuration	NFC Ratio to Limit	UWB Ratio to Limit
	Back	0.000	0.001
	Front	0.000	0.001
	Top	0.000	0.000
	Bottom	-	-
	Right	-	0.002
	Left	0.000	-

Table E-15
DSI=1 Phablet AG Verification

Phablet SAR	Configuration	AG1 Ratio to Limit	NFC Ratio to Limit	UWB Ratio to Limit	AG1 + NFC + UWB Ratio to Limit
	Back	0.608	0.000	0.001	0.609
	Front	0.091	0.000	0.001	0.092
	Top	0.612	0.000	0.000	0.612
	Bottom	-	-	-	-
	Right	0.151	-	0.002	0.153
	Left	0.040	0.000	-	0.040

Notes:

1. For all combinations where the TER sum of AG1+UWB+NFC is not greater than 1, there's no further analysis required for compliance demonstration.

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E.10 Tablet (DSI=0) SAR Antenna Group Analysis

Table E-16
DSI=0 Max Tablet AG0 Highest Adjusted Ratio to Limit

AG0 Ratio to Limit				
Body SAR	Configuration	A+C	B	Max
	Back	0.781	0.330	0.781
	Front	-	-	-
	Top	0.044	0.003	0.044
	Bottom	0.257	0.322	0.322
	Right	0.237	0.020	0.237
	Left	0.069	0.011	0.069

Table E-17
DSI=0 Max Tablet AG1 Highest Adjusted Ratio to Limit

AG1 Ratio to Limit							
Body SAR	Configuration	G	H	F	E	MIMO	Max
	Back	0.223	0.608	0.400	0.705	0.728	0.728
	Front	-	-	-	-	-	-
	Top	0.411	0.126	0.608	0.486	0.674	0.674
	Bottom	0.000	0.011	0.000	0.026	0.015	0.026
	Right	0.051	0.639	0.079	0.304	0.539	0.639
	Left	0.012	0.003	0.015	0.011	0.025	0.025

Table E-18
Simultaneous Transmission Scenarios of NFC/UWB (Tablet)

	Configuration	NFC Ratio to Limit	UWB Ratio to Limit
Body SAR	Back	0.000	0.001
	Front	-	-
	Top	0.000	0.002
	Bottom	0.000	0.002
	Right	0.000	0.018
	Left	0.000	0.002

Table E-19
DSI=0 Max Tablet AG Verification

Body SAR	Configuration	AG0 Ratio to Limit	AG1 Ratio to Limit	NFC Ratio to Limit	UWB Ratio to Limit	AG0 + AG1 + NFC + UWB Ratio to Limit
	Back	0.781	0.728	0.000	0.001	See Table Below
	Front	-	-	-	-	-
	Top	0.044	0.674	0.000	0.002	0.720
	Bottom	0.322	0.026	0.000	0.002	0.350
	Right	0.237	0.639	0.000	0.018	0.894
Left	0.069	0.025	0.000	0.002	0.096	

Back											
Bottom Set			Top Set								
AG0			AG1			NFC		UWB		Bottom Set + Top Set Ratio to Limit	SPLSR
Antenna	Ratio to Limit	Position	Antenna	Ratio to Limit	Position	Ratio to Limit	Position	Ratio to Limit	Position		
Ant A+C	0.781	-77.100	Ant G	0.223	75.300	0.000	37.800	0.001	113.500	See Note 1	0.01
Ant A+C	0.781	-77.100	Ant H	0.608	19.000	0.000	37.800	0.001	113.500	See Note 1	0.02
Ant A+C	0.781	-77.100	Ant F	0.400	70.200	0.000	37.800	0.001	113.500	See Note 1	0.01
Ant A+C	0.781	-77.100	Ant E	0.705	71.700	0.000	37.800	0.001	113.500	See Note 1	0.02
Ant A+C	0.781	-77.100	MIMO	0.728	21.600	0.000	37.800	0.001	113.500	See Note 1	0.02
Ant B	0.330	-81.600	Ant G	0.223	75.300	0.000	37.800	0.001	113.500	0.554	N/A
Ant B	0.330	-81.600	Ant H	0.608	19.000	0.000	37.800	0.001	113.500	0.939	N/A
Ant B	0.330	-81.600	Ant F	0.400	70.200	0.000	37.800	0.001	113.500	0.731	N/A
Ant B	0.330	-81.600	Ant E	0.705	71.700	0.000	37.800	0.001	113.500	See Note 1	0.01
Ant B	0.330	-81.600	MIMO	0.728	21.600	0.000	37.800	0.001	113.500	See Note 1	0.01

Notes:

1. For all combinations where the TER sum of AG0+AG1+UWB+NFC is not greater than 1, there's no further analysis required for compliance demonstration.
2. 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 D04v01. Please see the Highest Report SAR and Hotspot Location Section for Y-axis peak locations.

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E.11 Highest Report SAR and SAR Hotspot Locations

As a conservative assessment, the distances between Bottom Set and Top Set were determined using the y-axis coordinates of the peak locations only (assumes 0 mm separation on x/z axis)

Table E-20
DSI=1 Body-worn Back Peak Y Coordinates

Body-worn Back									
Back									
		Bottom Set			Top Set				
		AG0			AG1				
		A	B	A+C	E	F	G	H	MIMO
Mode/Band	Distance	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
GSM 850	ER	0.608		0.616					
	Y-Axis	-75.900		-77.400					
GSM 1900	ER		0.461						
	Y-Axis		-86.400						
UMTS 850	ER	0.619		0.618					
	Y-Axis	-75.300		-71.500					
LTE Band 12	ER	0.623		0.622					
	Y-Axis	-82.200		-75.600					
LTE Band 13	ER	0.611		0.624					
	Y-Axis	-85.200		-75.600					
LTE Band 5	ER	0.621		0.633					
	Y-Axis	-84.300		-77.500					
LTE Band 66	ER		0.397						
	Y-Axis		-90.600						
LTE Band 2	ER		0.486						
	Y-Axis		-87.600						
LTE Band 41	ER		0.436				0.829		
	Y-Axis		-84.900				72.700		
NR Band n5	ER	0.623		0.617					
	Y-Axis	-80.100		-79.100					
NR Band n66	ER		0.480				0.113		
	Y-Axis		-79.000				80.500		
NR Band n41	ER		0.377				0.832		
	Y-Axis		-83.000				76.800		
2.4 GHz WIFI	ER					0.241		0.518	0.617
	Y-Axis					72.600		9.700	24.100
5 GHz WIFI	ER				0.673	0.298			0.748
	Y-Axis				74.900	73.600			72.300
6 GHz WIFI	ER				0.328	0.304			0.499
	Y-Axis				71.000	69.700			68.500
2.4 GHz Bluetooth	ER					0.616		0.614	0.611
	Y-Axis					73.500		23.800	79.600

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Table E-21
DSI=1 Hotspot Back Peak Y Coordinates

Hotspot Back									
Back									
		Bottom Set			Top Set				
		AG0			AG1				
		A	B	A+C	E	F	G	H	MIMO
Mode/Band	Distance	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
GSM 850	ER	0.608		0.616					
	Y-Axis	-75.900		-77.400					
GSM 1900	ER		0.461						
	Y-Axis		-86.400						
UMTS 850	ER	0.619		0.618					
	Y-Axis	-75.300		-71.500					
LTE Band 12	ER	0.623		0.622					
	Y-Axis	-82.200		-75.600					
LTE Band 13	ER	0.611		0.624					
	Y-Axis	-85.200		-75.600					
LTE Band 5	ER	0.621		0.633					
	Y-Axis	-84.300		-77.500					
LTE Band 66	ER		0.397						
	Y-Axis		-90.600						
LTE Band 2	ER		0.486						
	Y-Axis		-87.600						
LTE Band 41	ER		0.436				0.829		
	Y-Axis		-84.900				72.700		
NR Band n5	ER	0.623		0.617					
	Y-Axis	-80.100		-79.100					
NR Band n66	ER		0.480				0.113		
	Y-Axis		-79.000				80.500		
NR Band n41	ER		0.377				0.832		
	Y-Axis		-83.000				76.800		
2.4 GHz WIFI	ER					0.241		0.518	0.617
	Y-Axis					72.600		9.700	24.100
5 GHz WIFI	ER				0.497	0.164			0.605
	Y-Axis				74.900	73.600			72.300
2.4 GHz Bluetooth	ER							0.614	
	Y-Axis							23.800	

Table E-22
DSI=0 Back Side Peak Y Coordinates

Body Back										
Back										
Bottom Set					Top Set					
AG0					AG1					
		B	A+C	C	D	E	F	G	H	MIMO
Mode/Band	Distance	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm	10 mm	0 mm	0 mm
GSM 850	ER		0.351							
	Y-Axis		-77.200							
GSM 1900	ER	0.294								
	Y-Axis	-82.000								
UMTS 850	ER		0.622							
	Y-Axis		-79.600							
LTE Band 12	ER		0.344							
	Y-Axis		-81.000							
LTE Band 13	ER		0.372							
	Y-Axis		-77.400							
LTE Band 5	ER		0.339							
	Y-Axis		-77.400							
LTE Band 66	ER	0.171								
	Y-Axis	-85.000								
LTE Band 2	ER	0.308								
	Y-Axis	-85.600								
LTE Band 41	ER	0.174						0.223		
	Y-Axis	-83.900						75.300		
NR Band n5	ER		0.781							
	Y-Axis		-82.800							
NR Band n66	ER	0.330						0.169		
	Y-Axis	-88.000						75.600		
NR Band n41	ER	0.309						0.207		
	Y-Axis	-81.600						78.500		
2.4 GHz WIFI	ER						0.403		0.478	0.624
	Y-Axis						72.000		19.000	23.800
5 GHz WIFI	ER					0.705	0.388			0.728
	Y-Axis					71.700	72.800			71.700
6 GHz WIFI	ER					0.557	0.290			0.524
	Y-Axis					73.400	70.200			66.100
2.4 GHz Bluetooth	ER						0.269		0.616	0.378
	Y-Axis						76.800		22.400	21.600
	Configuration	NFC Ratio to Limit		NFC y-coord		UWB Ratio to Limit		UWB y-coord		
Body	Back	0.000		37.800		0.000		113.500		

Table E-23
DSI=0 Right Edge Peak Y Coordinates

Body Right								
Right								
		Bottom Set		Top Set				
		AG0		AG1				
Mode/Band	Distance	B	A+C	E	F	G	H	MIMO
GSM 850	ER	0 mm	0.165	0 mm	0 mm	0 mm	0 mm	0 mm
	Y-Axis		44.800					
GSM 1900	ER	0.019						
	Y-Axis	61.600						
UMTS 850	ER		0.345					
	Y-Axis		42.700					
LTE Band 12	ER		0.191					
	Y-Axis		36.000					
LTE Band 13	ER		0.185					
	Y-Axis		41.600					
LTE Band 5	ER		0.191					
	Y-Axis		41.600					
LTE Band 66	ER	0.007						
	Y-Axis	65.700						
LTE Band 2	ER	0.017						
	Y-Axis	40.500						
LTE Band 41	ER	0.012				0.021		
	Y-Axis	56.500				-67.700		
NR Band n5	ER		0.237					
	Y-Axis		41.600					
NR Band n66	ER	0.020				0.034		
	Y-Axis	64.800				-59.800		
NR Band n41	ER	0.012				0.051		
	Y-Axis	62.800				-60.500		
2.4 GHz WIFI	ER				0.079		0.639	0.539
	Y-Axis				-69.800		-33.800	-24.900
5 GHz WIFI	ER			0.304	0.020			0.232
	Y-Axis			-49.200	-93.500			-46.000
6 GHz WIFI	ER			0.204	0.021			0.148
	Y-Axis			-45.900	-67.900			-51.300
2.4 GHz Bluetooth	ER				0.055		0.428	0.278
	Y-Axis				-64.700		-29.400	-30.500
	Configuration	NFC Ratio to Limit	NFC y-coord	UWB Ratio to Limit	UWB y-coord			
Body	Right	0.000	-97.900	0.018	-19.500			

E.12 Conclusion

The above numerical summed TER results and SPLSR for all the combinations of antenna groups are sufficient to show that AG0 is mutually exclusive from AG1 and that MG TER is <1. TER simultaneous transmission cases will not exceed the SAR limit or PD limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D04v01 and IEEE 1528- 2013 Section 6.3.4.1/.

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