

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. 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 Qualcomm® Smart Transmit Gen2 with pre-defined sub6 antenna groups (AG0 and AG1). Simultaneous transmission analysis is performed per antenna groups. Below analysis demonstrates the mutually exclusive operation of AG0 and AG1 and the compliance between AG0 and BT/WLAN/NFC/UWB, and between AG1 and BT/WLAN/NFC/UWB.

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.

E.3 Sub6 Antenna Groups

The 2nd generation of Smart Transmit (GEN2) operates based on pre-defined sub6 antenna groups (AG) and mmW module groups (MG). Sub6 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. This criteria must be demonstrated for all antenna combinations for each pair of AGs.

This device supports two sub6 AG: AG0 and AG1, with AG0 having 4 antennas (A, B, C, D) and AG1 having 3 antennas (E, F, I), and two WIFI/BT antennas outside of Smart Transmit. The conditions are verified through the following criteria:

- i) (SAR1 + SAR2 criteria): If SPLSR criteria is not used, then the highest reported SAR at P_{limit} (or P_{max} when $P_{limit} > P_{max}$) for each antenna should be obtained out of all supported technologies and frequency bands for each DSI. Demonstrate that the sum of reported SAR of one antenna from

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each of the sub6 AGs and the sum of RF exposure from all supported radios outside of Smart Transmit should be less than the regulatory limit as given below for each DSI.

1. Obtain the worst-case reported SAR for each antenna group (i.e., maximum *reported* SAR at P_{limit} (or P_{max} when $P_{limit} > P_{max}$) out of all supported technologies, frequency bands and antennas in AG0 and AG1), denoted as max.SAR.AG0 and max.SAR.AG1, and obtain the worst-case RF exposure for each external radio, and demonstrate that the sum of these RF exposures meets: { [max.SAR.AG0 + max.SAR.AG1] + WIFI/BT Ant 1 + WIFI/BT Ant 2} $\leq$ 1.6 (for 1g, or 4.0 for 10g).

ii) (SPLSR criteria): For each antenna, obtain the highest reported SAR value at P_{limit} out of all supported technologies for each frequency band. Using these values, demonstrate for a given DSI that every antenna from one sub6 AG meets SPLSR criteria with every antenna in another sub6 AG for all frequency bands. This criteria must be demonstrated for all antenna pair combinations irrespective of supported simultaneous transmission scenarios as given below for each DSI:

- SPLSR criteria should be met for all antenna pair combinations of AG0 and AG1: {antenna (A, B, C, D) in AG0; antenna (E, F, I) in AG1. As it can be seen, these include all combinations of antenna groups, antennas, and frequency bands.

iii) (combination of SPLSR & SAR1+SAR2 criteria): If SPLSR criteria for all the combinations of sub6 antenna groups in (i) is demonstrated to show that each AG is mutually exclusive from other AGs, and if the WIFI/BT antennas supported outside of Smart Transmit do not meet SPLSR criteria, then the condition in (ii) reduces to: {max.SAR.AG0 + WIFI/BT Ant 1 + WIFI/BT Ant 2} $\leq$ 1.6 and {max.SAR.AG1 + WIFI/BT Ant 1 + WIFI/BT Ant 2} $\leq$ 1.6 for compliance demonstration (for 1g, or 4.0 for 10g).

If SPLSR criteria evaluation and analysis is 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 SAR and Hotspot Location Section below for each DSI configuration.

For this device, AG0 is located at the bottom of the device and is identified in this report as the “bottom set”. Per April 2022 TCB Workshop Notes, AG1 and the BT/WIFI antennas are located at the top of the device and were summed together as the “top set” for hybrid SPLSR calculation. The minimum distance when considering all transmissions between the top set and bottom set groups was considered when calculating the SPLSR. The SAR of the transmissions within each set is less than 1.6 W/kg (for 1g, and 4.0W/kg for 10g). (for ex: SAR for AG0 < 1.6W/kg (for 1g, 4.0 W/kg for 10g) for bottom set, and SAR for AG1+BT/WIFI < 1.6 W/kg (for 1g, 4.0 W/kg for 10g) for top set).

For bottom set (AG0), Y_max coordinate represents the worst case hotspot location that is closest to the top set (AG1 + BT/WIFI Antennas). Similarly, for top set (AG1 + BT/WIFI Antennas), Y_min coordinate represents the worst case hotspot location that is closest to the bottom set (AG0).

The following formula is used to calculate the SPLSR between Top Set and Bottom Set 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 Head (DSI = 2) SAR Antenna Group Analysis

Table E-1
DSI=2 Held-to-ear AG0 Highest Reported SAR

AG0 SAR (W/kg)						
Head SAR	Configuration	A	B	C	D	Max
	Right Cheek	0.254	0.119	0.029	0.011	0.254
	Right Tilt	0.130	0.079	0.041	0.000	0.130
	Left Cheek	0.267	0.224	0.050	0.000	0.267
	Left Tilt	0.118	0.139	0.015	0.000	0.139

Table E-2
DSI=2 Held-to-ear AG1 Highest Reported SAR

AG1 SAR (W/kg)					
Head SAR	Configuration	E	F	I	Max
	Right Cheek	0.416	0.732	0.719	0.732
	Right Tilt	0.355	0.949	0.054	0.949
	Left Cheek	0.769	0.483	0.440	0.769
	Left Tilt	0.650	0.675	0.034	0.675

Table E-3
Simultaneous Transmission Scenarios of WLAN/BT (Held to Ear)

Configuration	2.4 GHz WLAN Ant 2 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	6 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)
	1	2	3	4	5	6
Right Cheek	0.192	0.236	0.211	0.232	0.156	0.125
Right Tilt	0.025	0.141	0.168	0.067	0.071	0.014
Left Cheek	0.324	0.329	0.162	0.043	0.051	0.213
Left Tilt	0.049	0.057	0.107	0.044	0.027	0.025

Configuration	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	6 GHz WLAN MIMO SAR (W/kg)	2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO SAR (W/kg)	2.4 GHz WLAN MIMO + 6 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 1 + 2.4 GHz WLAN Ant 2 SAR (W/kg)	2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 1 + 6 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 1 + 2.4 GHz WLAN Ant 2 + 5 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 1 + 2.4 GHz WLAN Ant 2 + 6 GHz WLAN MIMO SAR (W/kg)	WLAN/BT Worst-case Combination SAR (W/kg)
	5	6	2	3	4	2+3	2+4	5+1	5+3	6+3	5+4	6+4	5+1+3	5+1+4	
Right Cheek	0.156	0.125	0.236	0.211	0.232	0.447	0.468	0.348	0.367	0.336	0.388	0.357	0.559	0.580	0.580
Right Tilt	0.071	0.014	0.141	0.168	0.067	0.309	0.208	0.096	0.239	0.182	0.138	0.081	0.264	0.163	0.309
Left Cheek	0.051	0.213	0.329	0.162	0.043	0.491	0.372	0.375	0.213	0.375	0.094	0.256	0.537	0.418	0.537
Left Tilt	0.027	0.025	0.057	0.107	0.044	0.164	0.101	0.076	0.134	0.132	0.071	0.069	0.183	0.120	0.183

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Table E-4
DSI=2 Held-to-ear AG Verification

Head SAR	Configuration	AG0 SAR (W/kg)	AG1 SAR (W/kg)	WLAN/BT Worst-case Combination SAR (W/kg)	AG0 + AG1 + WLAN/BT SAR (W/kg)
	Right Cheek	0.254	0.732	0.580	1.566
	Right Tilt	0.130	0.949	0.309	1.388
	Left Cheek	0.267	0.769	0.537	1.573
	Left Tilt	0.139	0.675	0.183	0.997

Notes:

- For all combinations where the sum of AG0+AG1+WLAN/BT is less than 1.6 W/kg, there's no further analysis required for compliance demonstration.

E.5 Body-worn (DSI = 0) SAR Antenna Group Analysis

Table E-5
DSI=0 Body-worn AG0 Highest Reported SAR

AG0 SAR (W/kg)						
Bodyworn SAR	Configuration	A	B	C	D	Max
	Back	1.037	0.373	0.060	0.142	1.037

Table E-6
DSI=0 Body-worn AG1 Highest Reported SAR

AG1 SAR (W/kg)					
Bodyworn SAR	Configuration	E	F	I	Max
	Back	0.024	0.320	0.065	0.320

Table E-7
Simultaneous Transmission Scenarios of WLAN/BT (Body-worn)

Configuration		2.4 GHz WLAN Ant 2 SAR (W/kg)	2.4 GHz WLAN Ant 2 at 16 dBm SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	2.4 GHz WLAN MIMO at 19 dBm SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO at 16 dBm SAR (W/kg)	6 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)
		1	2	3	4	5	6	7	8	9
Back		0.068	0.047	0.237	0.103	0.159	0.065	0.051	0.026	0.015

Configuration	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	6 GHz WLAN MIMO SAR (W/kg)	2.4 GHz WLAN MIMO at 19 dBm + 5 GHz WLAN MIMO at 16 dBm SAR (W/kg)	2.4 GHz WLAN MIMO at 19 dBm + 6 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 1 + 2.4 GHz WLAN Ant 2 SAR (W/kg)	2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 1 + 6 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 1 + 2.4 GHz WLAN Ant 2 at 16 dBm + 5 GHz WLAN MIMO at 16 dBm SAR (W/kg)	2.4 GHz Bluetooth Ant 1 + 2.4 GHz WLAN Ant 2 at 16 dBm + 6 GHz WLAN MIMO SAR (W/kg)	WLAN/BT Worst-case Combination SAR (W/kg)
	8	9	3	5	7	4+6	4+7	8+1	8+5	9+5	8+7	9+7	8+2+6	8+2+7	
Back	0.026	0.015	0.237	0.159	0.051	0.168	0.154	0.094	0.185	0.174	0.077	0.066	0.138	0.124	0.237

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Table E-8
DSI=0 Body-worn AG Verification

Bodyworn SAR	Configuration	AG0 SAR (W/kg)	AG1 SAR (W/kg)	WLAN/BT Worst-case Combination SAR (W/kg)	AG0 + AG1 + WLAN/BT SAR (W/kg)
	Back	1.037	0.320	0.237	1.594

Notes:

- For all combinations where the sum of AG0+AG1+WLAN/BT is less than 1.6 W/kg, there's no further analysis required for compliance demonstration.

E.6 Hotspot (DSI = 3) SAR Antenna Group Analysis

Table E-9
DSI=3 Hotspot AG0 Highest Reported SAR

AG0 SAR (W/kg)						
Hotspot SAR	Configuration	A	B	C	D	Max
	Back	0.870	0.294	0.096	0.309	0.870
	Front	0.649	0.267	0.089	0.024	0.649
	Top	-	-	-	-	-
	Bottom	1.228	0.541	0.047	0.038	1.228
	Right	0.506	-	-	0.013	0.506
	Left	0.308	0.313	0.199	-	0.313

Table E-10
DSI=3 Hotspot AG1 Highest Reported SAR

AG1 SAR (W/kg)					
Hotspot SAR	Configuration	E	F	I	Max
	Back	0.080	0.533	0.152	0.533
	Front	0.075	0.234	0.066	0.234
	Top	0.052	0.577	-	0.577
	Bottom	-	-	-	-
	Right	0.076	-	-	0.076
	Left	-	0.122	0.023	0.122

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Table E-11
Simultaneous Transmission Scenarios of WLAN/BT (Hotspot)

Configuration	2.4 GHz WLAN Ant 2 SAR (W/kg)	2.4 GHz WLAN Ant 2 at 16 dBm SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	2.4 GHz WLAN MIMO at 19 dBm SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO at 16 dBm SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)
	1	2	3	4	5	6	7	8
Back	0.153	0.094	0.418	0.196	0.195	0.075	0.055	0.038
Front	0.184	0.119	0.423	0.195	0.078	0.030	0.073	0.051
Top	0.006	0.003	0.149	0.142	0.132	0.075	0.036	0.000
Bottom	-	-	-	-	-	-	-	-
Right	0.061	0.037	0.057	0.054	0.023	0.012	-	0.013
Left	-	-	0.395	0.305	0.251	0.124	0.119	-

Configuration	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	2.4 GHz WLAN MIMO at 19 dBm + 5 GHz WLAN MIMO at 16 dBm SAR (W/kg)	2.4 GHz Bluetooth Ant 1 + 2.4 GHz WLAN Ant 2 SAR (W/kg)	2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO SAR (W/kg)	2.4 GHz Bluetooth Ant 1 + 2.4 GHz WLAN Ant 2 at 16 dBm + 5 GHz WLAN MIMO at 16 dBm SAR (W/kg)	WLAN/BT Worst-case Combination SAR (W/kg)
	7	8	3	5	4+6	7+1	7+5	8+5	7+2+6	
Back	0.055	0.038	0.418	0.195	0.271	0.208	0.250	0.233	0.224	0.418
Front	0.073	0.051	0.423	0.078	0.225	0.257	0.151	0.129	0.222	0.423
Top	0.036	0.000	0.149	0.132	0.217	0.042	0.168	0.132	0.114	0.217
Bottom	-	-	-	-	-	-	-	-	-	-
Right	-	0.013	0.057	0.023	0.066	0.061	0.023	0.036	0.049	0.066
Left	0.119	-	0.395	0.251	0.429	0.119	0.370	0.251	0.243	0.429

Table E-12
DSI=3 Hotspot AG Verification

Hotspot SAR	Configuration	AG0 SAR (W/kg)	AG1 SAR (W/kg)	WLAN/BT Worst-case Combination SAR (W/kg)	AG0 + AG1 + WLAN/BT SAR (W/kg)
	Back	0.870	0.533	0.418	See Note 2
	Front	0.649	0.234	0.423	1.306
	Top	-	0.577	0.217	0.794
	Bottom	1.228	-	-	1.228
	Right	0.506	0.076	0.066	0.648
	Left	0.313	0.122	0.429	0.864

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	Bottom Set				Top Set				
	Back Side								
	Ant A	Ant B	Ant C	Ant D	Ant E	Ant F	Ant I	WLAN/BT Worst-case Combination SAR (W/kg)	
Distance (mm)	10 mm	10 mm	10 mm	10 mm	10 mm	10 mm	10 mm		
Max SAR (W/kg)	0.870	0.294	0.096	0.309	0.080	0.533	0.152		0.418
Max Y Axis (mm)	-65.800	-48.200	-53.500	-56.500					
Min Y Axis (mm)					64.230	68.000	29.000	40.000	
Bottom Set and Top Set Max SAR (W/kg)	0.870				0.951				
Bottom Set Max Y Axis (mm)	-48.200								
Top Set Min Y Axis (mm)					29.000				
SPLSR	0.032								

Notes:

1. For all combinations where the sum of AG0+AG1+WLAN/BT is less than 1.6, 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 0.04 per FCC KDB 447498 D04v01. Please see the Highest Report SAR and Hotspot Location Section for Y-axis peak locations.

E.7 Max Phablet (DSI = 0) 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=0 Max Phablet AG0 Highest Reported SAR

AG0 SAR (W/kg)						
Phablet SAR	Configuration	A	B	C	D	Max
	Back	1.428	1.950	-	-	1.950
	Front	1.323	0.370	-	-	1.323
	Top	-	-	-	-	-
	Bottom	1.298	1.466	-	-	1.466
	Right	0.528	-	-	-	0.528
	Left	0.992	1.929	-	-	1.929

Table E-14
DSI=0 Max Phablet AG1 Highest Reported SAR

AG1 SAR (W/kg)					
Phablet SAR	Configuration	E	F	I	Max
	Back	-	0.812	-	0.812
	Front	-	-	-	-
	Top	-	2.055	-	2.055
	Bottom	-	-	-	-
	Right	-	-	-	-
	Left	-	-	-	-

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Table E-15
Simultaneous Transmission Scenarios of WLAN/BT (Phablet)

Configuration	5 GHz WLAN MIMO SAR (W/kg)	6 GHz WLAN MIMO SAR (W/kg)
	1	2
Back	0.742	0.190
Front	0.650	0.127
Top	0.358	0.050
Bottom	-	-
Right	0.161	0.000
Left	2.061	0.574

Configuration	5 GHz WLAN MIMO SAR (W/kg)	6 GHz WLAN MIMO SAR (W/kg)	WLAN Worst-case Combination SAR (W/kg)
	1	2	
Back	0.742	0.190	0.742
Front	0.650	0.127	0.650
Top	0.358	0.050	0.358
Bottom	-	-	-
Right	0.161	0.000	0.161
Left	2.061	0.574	2.061

Table E-16
Simultaneous Transmission Scenarios of NFC/UWB (Phablet)

	Configuration	NFC SAR (W/kg)	UWB (1) SAR (W/kg)	UWB (2) SAR (W/kg)	NFC + UWB Worst-case SAR (W/kg)
Phablet SAR	Back	0.026	0.002	0.002	0.028
	Front	0.000	0.001	0.000	0.001
	Top	-	0.000	-	0.000
	Bottom	-	-	-	-
	Right	0.000	-	-	0.000
	Left	0.000	0.001	-	0.001

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Table E-17
DSI=0 Max Phablet AG Verification

Phablet SAR	Configuration	AG0 SAR (W/kg)	AG1 SAR (W/kg)	NFC + UWB Worst-case SAR (W/kg)	WLAN Worst-case Combination SAR (W/kg)	AG0 + AG1 + NFC + UWB Worst-case + WLAN/BT SAR (W/kg)
	Back	1.950	0.812	0.028	0.742	3.532
	Front	1.323	-	0.001	0.650	1.974
	Top	-	2.055	0.000	0.358	2.413
	Bottom	1.466	-	-	-	1.466
	Right	0.528	-	0.000	0.161	0.689
	Left	1.929	-	0.001	2.061	3.991

Notes:

1. For all combinations where the sum of AG0+AG1+WLAN/BT+UWB+NFC is less than 4W/kg, there's no further analysis required for compliance demonstration.

E.8 Reduced 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-18
DSI=1 Reduced Phablet AG0 Highest Reported SAR

AG0 SAR (W/kg)						
Phablet SAR	Configuration	A	B	C	D	Max
	Back	2.244	1.950	-	-	2.244
	Front	2.390	1.008	-	-	2.390
	Top	-	-	-	-	-
	Bottom	3.049	1.466	-	-	3.049
	Right	0.528	-	-	-	0.528
	Left	0.992	1.929	-	-	1.929

Table E-19
DSI=1 Reduced Phablet AG1 Highest Reported SAR

AG1 SAR (W/kg)					
Phablet SAR	Configuration	E	F	I	Max
	Back	-	0.812	-	0.812
	Front	-	-	-	-
	Top	-	2.055	-	2.055
	Bottom	-	-	-	-
	Right	-	-	-	-
	Left	-	-	-	-

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Table E-20
DSI=1 Reduced Phablet AG Verification

Phablet SAR	Configuration	AG0 SAR (W/kg)	AG1 SAR (W/kg)	NFC + UWB Worst-case SAR (W/kg)	WLAN Worst-case Combination SAR (W/kg)	AG0 + AG1 + NFC + UWB Worst-case + WLAN/BT SAR (W/kg)
	Back	2.244	0.812	0.028	0.742	3.826
	Front	2.390	-	0.001	0.650	3.041
	Top	-	2.055	0.000	0.358	2.413
	Bottom	3.049	-	-	-	3.049
	Right	0.528	-	0.000	0.161	0.689
	Left	1.929	-	0.001	2.061	3.991

Notes:

- For all combinations where the sum of AG0+AG1+WLAN/BT+UWB+NFC is less than 4W/kg, there's no further analysis required for compliance demonstration.

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E.9 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-21
DSI=3 Back Side Peak Y Coordinates

		Bottom Set				Top Set					
		AG0				AG1					
		A	B	C	D	E	F	I	1	2	MIMO
Mode/Band	Distance	10 mm	10 mm	10 mm	10 mm	10 mm	10 mm	10 mm	10 mm	10 mm	10 mm
GSM 850	SAR	0.870									
	Y-Axis	-67.800									
GSM 1900	SAR	0.298									
	Y-Axis	-78.400									
UMTS 850	SAR	0.690									
	Y-Axis	-70.600									
UMTS 1750	SAR	0.637									
	Y-Axis	-81.100									
UMTS 1900	SAR	0.527									
	Y-Axis	-81.400									
LTE Band 71	SAR	0.431									
	Y-Axis	-65.800									
LTE Band 12	SAR	0.392									
	Y-Axis	-67.000									
LTE Band 13	SAR	0.655									
	Y-Axis	-66.600									
LTE Band 14	SAR	0.524									
	Y-Axis	-70.100									
LTE Band 26 (Cell)	SAR	0.814									
	Y-Axis	-68.600									
LTE Band 5 (Cell)	SAR	0.731									
	Y-Axis	-73.300									
LTE Band 66 (AWS)	SAR	0.593				0.200					
	Y-Axis	-78.400				76.800					
LTE Band 25 (PCS)	SAR	0.531				0.219					
	Y-Axis	-83.500				82.400					
LTE Band 30	SAR	0.259				0.364					
	Y-Axis	-77.000				78.000					
LTE Band 7	SAR	0.294				0.163					
	Y-Axis	-48.200				77.500					
LTE Band 41	SAR	0.156				0.112					
	Y-Axis	-50.000				84.500					
LTE Band 48	SAR					0.525					
	Y-Axis					68.000					
NR Band n71	SAR	0.467									
	Y-Axis	-65.800									
NR Band n12	SAR	0.389									
	Y-Axis	-69.800									
NR Band n26	SAR	0.731									
	Y-Axis	-68.900									
NR Band n66	SAR	0.801				0.207					
	Y-Axis	-85.600				78.600					
NR Band n25	SAR	0.396				0.207					
	Y-Axis	-77.900				79.700					
NR Band n30	SAR	0.314				0.225					
	Y-Axis	-76.800				77.400					
NR Band n7	SAR	0.289				0.147					
	Y-Axis	-50.500				75.500					
NR Band n41	SAR	0.286			0.090	0.080	0.154				
	Y-Axis	-53.960			-74.160	64.230	71.620				
NR Band n48	SAR		0.096	0.232		0.429	0.109				
	Y-Axis		-53.500	-56.500		68.500	35.000				
NR Band n77	SAR		0.043	0.093		0.533	0.152				
	Y-Axis		-54.000	-65.000		71.000	29.000				
2.4 GHz WLAN	SAR								0.153	0.418	
	Y-Axis								40.000	48.000	
2.4 GHz WLAN at 16 dBm	SAR								0.094		
	Y-Axis								40.000		
2.4 GHz WLAN at 19 dBm	SAR									0.196	
	Y-Axis									52.000	
5 GHz WLAN	SAR									0.195	
	Y-Axis									62.800	
5 GHz WLAN at 16 dBm	SAR									0.075	
	Y-Axis									69.200	
2.4 GHz Bluetooth	SAR								0.055	0.038	
	Y-Axis								45.000	44.500	

E.10 Conclusion

The above numerical summed SAR results and SPLSR for all the combinations of sub6 antenna groups are sufficient to show that AG0 is mutually exclusive from AG1 and 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 D04v01 and IEEE 1528- 2013 Section 6.3.4.1.

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