

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 (“-”).

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.

The standalone reported SAR in the original filing was used to determine simultaneous transmission compliance as it is more conservative. Please see the original filing for complete evaluation of simultaneous transmission analysis.

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E.3 Head Simultaneous Transmission Analysis



Table E-1
Simultaneous Transmission Scenario with WLAN/BT (Held to Ear)

	Configuration	AG1	WLAN/BT Worst-case Combination	AG1 + WLAN/BT
Head SAR	Right Cheek	0.878	0.484	1.362
	Right Tilt	0.757	0.181	0.938
	Left Cheek	0.881	0.323	1.204
	Left Tilt	1.176	0.073	1.249

E.4 Hotspot Simultaneous Transmission Analysis

Table E-2
Simultaneous Transmission Scenarios with WLAN/BT (Hotspot at 1.0 cm)

	Configuration	AG1	WLAN/BT Worst-case Combination	AG1 + WLAN/BT
Hotspot SAR	Back	0.390	0.701	1.091
	Front	0.245	0.604	0.849
	Top	0.677	0.529	1.206
	Bottom	0.000	-	0.000
	Right	0.082	-	0.082
	Left	0.667	0.458	1.125

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E.5 Phablet Simultaneous Transmission Analysis

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.

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-3
Simultaneous Transmission Scenarios with WLAN/BT (Phablet Max DSI= 0)




	Configuration	AG1	WLAN/BT Worst-case Combination	AG1 + WLAN/BT
Phablet SAR	Back	1.568	0.848	2.416
	Front	0.000	0.848	0.848
	Top	2.939	0.848	3.787
	Bottom	0.000	-	0.000
	Right	0.000	-	0.000
	Left	3.145	0.848	3.993

Table E-4
Simultaneous Transmission Scenarios with WLAN/BT (Phablet Reduced DSI= 1)

	Configuration	AG1	WLAN/BT Worst-case Combination	AG1 + WLAN/BT
Phablet SAR	Back	1.568	0.848	2.416
	Front	0.000	0.848	0.848
	Top	2.939	0.848	3.787
	Bottom	0.000	-	0.000
	Right	0.000	-	0.000
	Left	3.145	0.848	3.993

E.6 Simultaneous Transmission Conclusion

The above numerical summed SAR results 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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