

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 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.

E.3 Head

Table E-1
Simultaneous transmission Scenarios of WLAN/BT

Configuration		2.4 GHz WLAN Antenna 1 SAR (W/kg)	2.4 GHz WLAN Antenna 2 SAR (W/kg)	5 GHz WLAN Antenna 1 SAR (W/kg)	5 GHz WLAN Antenna 2 SAR (W/kg)	6 GHz WLAN Antenna 1 SAR (W/kg)	6 GHz WLAN Antenna 2 SAR (W/kg)	2.4 GHz Bluetooth Antenna 1 SAR (W/kg)	2.4 GHz Bluetooth Antenna 2 SAR (W/kg)
		1	2	3	4	5	6	7	8
		Headstand	0.071	0.075	0.244	0.169	0.022	0.014	0.014

Configuration	2.4 GHz WLAN Antenna 1 + 2.4 GHz WLAN Antenna 2 SAR (W/kg)	5 GHz WLAN Antenna 1 + 5 GHz WLAN Antenna 2 SAR (W/kg)	6 GHz WLAN Antenna 1 + 6 GHz WLAN Antenna 2 SAR (W/kg)	2.4 GHz Bluetooth Antenna 1 + 2.4 GHz Bluetooth Antenna 2 SAR (W/kg)	2.4 GHz WLAN Antenna 1 + 2.4 GHz WLAN Antenna 2 + 5 GHz WLAN Antenna 1 + 5 GHz WLAN Antenna 2 SAR (W/kg)	2.4 GHz WLAN Antenna 1 + 2.4 GHz WLAN Antenna 2 + 6 GHz WLAN Antenna 1 + 6 GHz WLAN Antenna 2 SAR (W/kg)	2.4 GHz Bluetooth Antenna 1 + 2.4 GHz Bluetooth Antenna 2 + 5 GHz WLAN Antenna 1 + 5 GHz WLAN Antenna 2 SAR (W/kg)	2.4 GHz Bluetooth Antenna 1 + 2.4 GHz Bluetooth Antenna 2 + 6 GHz WLAN Antenna 1 + 6 GHz WLAN Antenna 2 SAR (W/kg)	WLAN/BT Worst-case Combination SAR (W/kg)		
	1+2	3+4	5+6	7+8	1+2+3+4	1+2+5+7	7+8+3+4	7+8+5+6		7+2+3+4	7+2+5+6
Headstand	0.146	0.413	0.036	0.046	0.559	0.182	0.459	0.082	0.502	0.125	0.559

Notes:

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

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E.4 Extremity SAR Antenna Group Analysis

Table E-2
Simultaneous transmission Scenarios of WLAN/BT

Configuration		2.4 GHz WLAN Antenna 1 SAR (W/kg)	2.4 GHz WLAN Antenna 2 SAR (W/kg)	5 GHz WLAN Antenna 1 SAR (W/kg)	5 GHz WLAN Antenna 2 SAR (W/kg)	6 GHz WLAN Antenna 1 SAR (W/kg)	6 GHz WLAN Antenna 2 SAR (W/kg)	2.4 GHz Bluetooth Antenna 1 SAR (W/kg)	2.4 GHz Bluetooth Antenna 2 SAR (W/kg)
		1	2	3	4	5	6	7	8
Front		0.609	1.089	0.629	0.870	0.362	0.316	0.087	0.174
Top		0.129	0.125	0.203	0.233	0.075	0.115	0.007	0.008

Configuration	2.4 GHz WLAN Antenna 1 + 2.4 GHz WLAN Antenna 2 SAR (W/kg)	5 GHz WLAN Antenna 1 + 5 GHz WLAN Antenna 2 SAR (W/kg)	6 GHz WLAN Antenna 1 + 6 GHz WLAN Antenna 2 SAR (W/kg)	2.4 GHz Bluetooth Antenna 1 + 2.4 GHz Bluetooth Antenna 2 SAR (W/kg)	2.4 GHz WLAN Antenna 1 + 2.4 GHz WLAN Antenna 2 + 5 GHz WLAN Antenna 1 + 5 GHz WLAN Antenna 2 SAR (W/kg)	2.4 GHz WLAN Antenna 1 + 2.4 GHz WLAN Antenna 2 + 6 GHz WLAN Antenna 1 + 6 GHz WLAN Antenna 2 SAR (W/kg)	2.4 GHz Bluetooth Antenna 1 + 2.4 GHz Bluetooth Antenna 2 + 5 GHz WLAN Antenna 1 + 5 GHz WLAN Antenna 2 SAR (W/kg)	2.4 GHz Bluetooth Antenna 1 + 2.4 GHz Bluetooth Antenna 2 + 6 GHz WLAN Antenna 1 + 6 GHz WLAN Antenna 2 SAR (W/kg)	WLAN/BT Worst-case Combination SAR (W/kg)		
	1+2	3+4	5+6	7+8	1+2+3+4	1+2+5+7	7+8+3+4	7+8+5+6	7+2+3+4	7+2+5+6	
Front	1.698	1.499	0.678	0.261	3.197	2.147	1.760	0.939	2.675	1.854	3.197
Top	0.254	0.436	0.190	0.015	0.690	0.336	0.451	0.205	0.568	0.322	0.690

Notes:

- For all combinations where the sum is less than 4.0 W/kg, there's no further analysis required for compliance demonstration.

E.5 Conclusion

The above numerical summed SAR results for all the combinations of sub6 antenna groups are sufficient to show 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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