

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	Body	Extremity
1	Iridium + 2.4 GHz WIFI	Yes	Yes
2	Iridium + 2.4 GHz Bluetooth	Yes	Yes
3	Iridium + 2.4 GHz ANT/ANT+	Yes	Yes

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 the 1g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤ 1.6 W/kg. When 10g SAR measurement is applicable, a factor of 2.5 is applied to the thresholds above. 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. SAR to Peak Location Separation Ratio (SPLSR) analysis

Per FCC KDB Publication 447498 D04v01, when the sum SAR of a simultaneous transmission scenario is over the limit, SPLSR procedure can be evaluated to determine the additional text exemption.

$$SPLSR = \frac{(SAR_1 + SAR_2)^{1.5}}{R_i}$$

Where: SAR_1 and SAR_2 are the highest reported SAR values for the two sources in the pair i , and R_i is their distance in mm.

When $SPLSR \leq 0.04$ (rounded to 2 decimal digits) for 1g SAR, or 0.1 for 10g SAR, the antenna pair qualifies for test exemption.

E.4. Simultaneous Transmission Analysis

Table E-2 – Simultaneous Transmission Summation

Exposure Condition	Position	Max 2.4 GHz WIFI SAR (W/kg)	Max 2.4 GHz Bluetooth SAR (W/kg)	Max 2.4 GHz ANT/ANT+ SAR (W/kg)	Max Iridium L-Band SAR (W/kg)	Max Iridium L-Band + 2.4 GHz WIFI SAR (W/kg)	Max Iridium L-Band + 2.4 GHz Bluetooth SAR (W/kg)	Max Iridium L-Band + 2.4 GHz ANT/ANT+ SAR (W/kg)
Body	Back	0.731	0.070	0.019	1.329	See Table E-3	1.399	1.348
	Front	0.766	0.083	0.023	1.505	See Table E-3	1.588	1.528
	Bottom	0.406	0.037	0.010	0.064	0.470	0.101	0.074
	Right	0.816	0.087	0.024	0.167	0.983	0.254	0.191
	Left	0.101	0.007	0.000	0.962	1.063	0.969	0.962

Exposure Condition	Position	Max 2.4 GHz WIFI SAR (W/kg)	Max 2.4 GHz Bluetooth SAR (W/kg)	Max 2.4 GHz ANT/ANT+ SAR (W/kg)	Max Iridium L-Band SAR (W/kg)	Max Iridium L-Band + 2.4 GHz WIFI SAR (W/kg)	Max Iridium L-Band + 2.4 GHz Bluetooth SAR (W/kg)	Max Iridium L-Band + 2.4 GHz ANT/ANT+ SAR (W/kg)
Extremity	Back	0.377	0.035	0.008	0.714	1.091	0.749	0.722
	Front	0.418	0.045	0.011	0.809	1.227	0.854	0.820
	Bottom	0.215	0.020	0.004	0.036	0.251	0.056	0.040
	Right	0.381	0.039	0.010	0.095	0.476	0.134	0.105
	Left	0.048	0.001	0.000	0.520	0.568	0.521	0.520

Table E-3 – SPLSR Analysis for Iridium L-Band + 2.4 GHz WIFI Simultaneous Transmission

Exposure Condition	Position	Iridium L-Band SAR (W/kg)	2.4 GHz WIFI SAR (W/kg)	Iridium L-Band + 2.4 GHz WIFI SAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Plot #
Body	Back	1.329	0.731	2.060	96.629	0.03	1
	Front	1.505	0.766	2.271	146.279	0.02	2

The above analysis of the simultaneous transmission scenarios is sufficient to show that simultaneous transmission cases will not exceed the SAR limit. Therefore, no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D04v01 and IEEE 1528- 2013 Section 6.3.4.1.

E.5. Peak SAR Coordinates

Table E-4 – Peak SAR Coordinates

Exposure Condition	Position	Mode	x-coordinate (mm)	y-coordinate (mm)	z-coordinate (mm)
Body	Back	Iridium L-Band	-14.8	71.7	-207
	Back	2.4 GHz WIFI	-34.5	-22.9	-207
	Front	Iridium L-Band	-41.6	72.6	-207
	Front	2.4 GHz WIFI	-9.0	-70.0	-207

E.6. Peak Location Separation Distance Plots

