Analysis Report

For Standalone SAR test exclusion consideration, when the corresponding SAR Exclusion Threshold requirement in KDB 447498 is satisfied, standalone SAR evaluation for general population exposure conditions, by measurement or numerical simulation is not required.

For Bluetooth operation

SAR Exclusion Threshold can be determined as follow under frequency range 100MHz to 6GHz and test separation distance ≤ 50mm,

The SAR exclusion threshold = $(3.0 \times TD)/\sqrt{F(GHz)}$

= **9.5 mW**

where *TD* = 5 mm and *F(GHz)* = 2.480 GHz

Maximum output Power of this device = **6 dBm** = **3.98 mW**

Conclusion

Since the Maximum output power is **3.98mW**, which is less than the SAR Exclusion Threshold at 5mm test separation distance **9.5mW** for general population and uncontrolled exposure, standalone SAR evaluation of Bluetooth operation for general population exposure conditions, by measurement or numerical simulation is not required.

For WiFi operation

The SAR Exclusion Thresholds are determined as follow,

For frequency range of 100MHz to 6GHz and test separation distance ≤ 50mm,

SAR exclusion threshold = $(3.0 \times TD) / \sqrt{F(GHz)}$

For frequency range of 1500MHz to 6GHz and test separation distance > 50mm,

SAR exclusion threshold = $[(3.0 \times 50) / \sqrt{F(GHz)}] + (TD - 50) \times 10$

where *TD* = closest distance between the antenna and outer housing

F(GHz) = operating frequency

Exposure Position	Antenna to enclosure (outer housing) distance	Calculated SAR Exclusion Threshold	Maximum Time-averaged Conducted Power	SAR Exclusion Result
Front	55 mm	145.6 mW	11dBm = 12.59mW	Excluded
Back	70 mm	295.6 mW		Excluded
Top	220 mm	1795.6 mW		Excluded
Bottom	17 mm	32.5 mW		Excluded
Left	92 mm	515.6 mW		Excluded
Right	36 mm	68.8 mW		Excluded

From the above antenna to enclosure (outer housing) distance and maximum time-averaged output power, SAR evaluation is not required.

Simultaneous Transmission SAR exclusion considerations

Since 2.4GHz WLAN and Bluetooth 4.0 transmitters of this device may operate simultaneously, simultaneous transmission analysis is required. Per KDB 447498, 1g simultaneous transmission SAR test exclusion can be applied when the sum of 1g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit (≤ 1.6 W/kg). When the standalone 1g SAR test exclusion is applied, the standalone 1g SAR must be estimated according to the following equation,

For Bluetooth operation,

Maximum Power of this device = **3.98 mW**

The Estimated SAR will be determined as follow,

Estimated 1g SAR = $(\sqrt{F(GHz)}/7.5)x(P\max/TD)$

= **0.167 W/kg**

where *Pmax* = 3.98 mW, *TD* = 5 mm and *F(GHz)* = 2.480 GHz

For WiFi operation,

Maximum time-averaged conducted Power of this device = **12.59 mW**

Therefore, the Estimated SAR will be determined as follow,

Estimated 1g SAR = $(\sqrt{F(GHz)}/7.5)x(P\max/TD)$

= **0.155 W/kg**

where *Pmax* = 12.59 mW, *TD* = 17 mm and *F(GHz)* = 2.462 GHz

Simultaneous Transmission Analysis

Bluetooth Estimated SAR (W/kg)	WiFI Estimated SAR (W/kg)	Σ SAR (W/kg)	Simultaneous SAR Required
0.167	0.155	0.322	No

Conclusion

Since the above summed estimated 1g SAR result for all simultaneous transmission conditions were below the 1g SAR limit (1.6 W/kg), 1g SAR evaluation for simultaneous transmission configuration are not required.