

RF EXPOSURE

KDB447498 was used as the guidance.

SAR test exclusion considerations

Step.1 For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion threshold are determined by the following :

$$\frac{[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})]}{[f(\text{GHz})]} \leq 3.0 \text{ for 1-g SAR, and } \leq 7.5 \text{ for 10-g extremity SAR}$$

Step.2 For 100 MHz to 6 GHz and test separation distances > 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following

Step.2-1 $\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot (f(\text{MHz})/150)]\}$ mW, for 100 MHz to 1500 MHz

Step.2-2 $\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot 10]\}$ mW, for > 1500 MHz and ≤ 6 GHz

where

f(GHz) is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation

The result is rounded to one decimal place for comparison

The values 3.0 and 7.5 are referred to as numeric thresholds in step b) below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

SAR test exclusion considerations : Bluetooth BDR

- Frequency Range : 2 402 MHz ~ 2 480 MHz
- Measured RF Maximum Output Power (Peak) : 18.13 dBm
- Target Power & Tolerance 17.20 dBm & \pm 1.00 dB
(Maximum : 18.20 dBm & Minimum : 16.20 dBm)
- **Maximum Output Power for the Calculation :** 18.20 dBm

The EUT will only be used with a separation of 50 millimeters or lesser between the antenna and the body of the SAR Exclusion calculation for this exposure is shown below.

- P = <u>18.20</u> dBm = <u>66.07</u> mW	- NOTE P : Max tuneup Power (dBm)
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Power Density at the specific separation

- S = $[(P(\text{mW}) / R)] \times [\sqrt{f(\text{GHz})}]$ = $[(66.07 / 35.00)] \times [\sqrt{(2.48) }]$ = <u>2.972 75</u> NOTE : f(GHz) was used as worst case is highest frequency.	- NOTE S : Maximum Power Density P(mW) : Max tuneup Power (mW) R : Distance to the center of the radiation of the antenna (<u>35.00</u> mm) f(GHz) : the RF channel transmit frequency in GHz FCC Limit : <u>3.0</u>
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RF Exposure Compliance Issue

Therefore, EUT is not required the SAR Evaluation.

SAR test exclusion considerations : Bluetooth EDR

- Frequency Range : 2 402 MHz ~ 2 480 MHz
- Measured RF Maximum Output Power (Peak) : 9.12 dBm
- Target Power & Tolerance 8.50 dBm & \pm 1.00 dB
(Maximum : 9.50 dBm & Minimum : 7.50 dBm)
- **Maximum Output Power for the Calculation :** 9.50 dBm

The EUT will only be used with a separation of 50 millimeters or lesser between the antenna and the body of the SAR Exclusion calculation for this exposure is shown below.

- P = <u>9.50</u> dBm = <u>8.91</u> mW	- NOTE P : Max tuneup Power (dBm)
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Power Density at the specific separation

- S = $[(P(\text{mW}) / R)] \times [\sqrt{f(\text{GHz})}]$ = $[(8.91 / 35.00)] \times [\sqrt{(2.48) }]$ = <u>0.401 01</u> NOTE : f(GHz) was used as worst case is highest frequency.	- NOTE S : Maximum Power Density P(mW) : Max tuneup Power (mW) R : Distance to the center of the radiation of the antenna (<u>35.00</u> mm) f(GHz) : the RF channel transmit frequency in GHz FCC Limit : <u>3.0</u>
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RF Exposure Compliance Issue

Therefore, EUT is not required the SAR Evaluation.

SAR test exclusion considerations : Bluetooth LE

- Frequency Range : 2 402 MHz ~ 2 480 MHz
- Measured RF Maximum Output Power (Peak) : 6.02 dBm
- Target Power & Tolerance 5.50 dBm & \pm 1.00 dB
(Maximum : 6.50 dBm & Minimum : 4.50 dBm)
- **Maximum Output Power for the Calculation :** 6.50 dBm

The EUT will only be used with a separation of 50 millimeters or lesser between the antenna and the body of the SAR Exclusion calculation for this exposure is shown below.

- P = <u>6.50</u> dBm = <u>4.47</u> mW	- NOTE P : Max tuneup Power (dBm)
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Power Density at the specific separation

- S = $[(P(\text{mW}) / R)] \times [\sqrt{f(\text{GHz})}]$ = $[(4.47 / 35.00)] \times [\sqrt{(2.48) }]$ = <u>0.200 98</u> NOTE : f(GHz) was used as worst case is highest frequency.	- NOTE S : Maximum Power Density P(mW) : Max tuneup Power (mW) R : Distance to the center of the radiation of the antenna (<u>35.00</u> mm) f(GHz) : the RF channel transmit frequency in GHz FCC Limit : <u>3.0</u>
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RF Exposure Compliance Issue

Therefore, EUT is not required the SAR Evaluation.

SAR test exclusion considerations :

Bluetooth BDR + Bluetooth LE

The EUT will only be used with a separation of 50 millimeters or lesser between the antenna and the body of the SAR Exclusion calculation for this exposure is shown below.

Bluetooth BDR + Bluetooth LE

$- P = 66.07 \text{ mW} + 4.47 \text{ mW}$ $= \underline{70.54 \text{ mW}}$	<p>- NOTE</p> <p>Bluetooth BDR + Bluetooth LE</p> <p>Bluetooth BDR = 66.07 mW</p> <p>Bluetooth LE = 4.47 mW</p>
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Power Density at the specific separation

$- S = 2.972 \text{ 75} + 0.200 \text{ 98}$ $= \underline{3.173 \text{ 73}}$	<p>- NOTE</p> <p>Bluetooth BDR + Bluetooth LE</p> <p>Bluetooth BDR = 2.972 75</p> <p>Bluetooth LE = 0.200 98</p> <p>FCC Limit : <u>7.5</u></p>
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RF Exposure Compliance Issue

Therefore, EUT is not required the SAR Evaluation.