RF EXPOSURE

FCC ID : 2BHL8-IRON-MD-TD
IC : 32779-IRON-MD-TD

1. Regulation
The SAR exclusion table from RSS-102 issue 6 is reproduced below:

Table 11: Power limits for exemption from routine SAR evaluation based on the separation distance

Frequency (MHz)	Exemption Limits				
	≤ 5 mm (mW)	10 mm (mW)	15 mm (mW)	20 mm (mW)	25 mm (mW)
≤300	45	116	139	163	189
450	32	71	87	104	124
835	21	32	41	54	72
1900	6	10	18	33	57
2450	3	7	16	32	56
3500	2	6	15	29	50
5800	1	5	13	23	32

Frequency (MHz)	Exemption Limits				
	30 mm (mW)	35 mm (mW)	40 mm (mW)	45 mm (mW)	> 50 mm (mW)
≤300	216	246	280	319	362
450	147	175	208	248	296
835	96	129	172	228	298
1900	92	138	194	257	323
2450	89	128	170	209	245
3500	72	94	114	134	158
5800	41	54	74	102	128

The exemption limits in table 11 Table 11 are based on measurements and simulations of half-wave dipoleantennas at separation distances of 5 mm to 50 mm from a flat phantom, which provides a SAR value ofapproximately 0.4 W/kg for 1 g of tissue.

For limb-worn devices where the 10 gram of tissue applies, the exemption limits for routine evaluationin table 11 are multiplied by a factor of 2.5.

For controlled-use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routineevaluation in table 11 Table 11 are multiplied by a factor of 5.

When the operating frequency of the device is between two frequencies located in table 11, linearinterpolation shall be applied for the applicable separation distance.
If the separation distance of the device is between two distances located in table 11, linear interpolation may be applied for the applicable frequency.
Alternatively, the limit corresponding to the smaller distance may be employed. For example, incase of a 7 mm separation distance, either use the exception value for a 5 mm separation distance orinterpolate between the limits corresponding to 5 mm and 10 mm separation distances.

For implanted medical devices, the exemption limit for routine SAR evaluation is set at an output power of1 mW, regardless of frequency.

The SAR levels from exempted transmitters shall be included in the compliance assessment and thedetermination of the TER. Detailed guidance is included in sections 7.1.8 and 8.2.2.1.

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 :

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√ f(GHz)] ≤ 3.0 for 1-g SAR, and ≤ 7.5 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**

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

Step.2-2 **{[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance – 50 mm) ·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 : FSK

- Frequency Range : 433.125 MHz ~ 434.375 MHz

- Measured RF Maximum Output Power : -0.63 dBm

- Target Power & Tolerance 0.00 dBm & ± 1.00 dB

(Maximum : 1.00 dBm & Minimum : -1.00 dBm)

- Maximum Output Power for the Calculation : 1.00 dBm

The EUT will only be used with a separation of 60 millimeters between the antenna and the body of the The MPE calculation for this exposure is shown below.

- P = 1.00 dBm = 1.26 mW	- NOTE P : Max tuneup Power (dBm) Exemption Limit = 130.77 mW 10-g Exemption Limit = 326.93 mW

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 (also illustrated in Appendix B):

{[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance – 50 mm)·(f(MHz)/150)]} mW, for 100 MHz to 1500 MHz

[Power allowed at numeric threshold for 50 mm in step a)] is

[(7.5 for 10-g extremity SAR)*(min. test separation distance, mm)]/[√f(GHz)]

= (7.5*50) / [√(0.434375)]

= 568.98

10-g SAR test exclusion threshold is

= 568.98 + (60 - 50 mm) * (434.375 / 150)

= 597.94

P = 1.26 mW < 597.94 mW

This device is intended to be used under limb exposure conditions. (≤ 7.5 for 10-g extremity SAR)

SAR test exclusion considerations : Bluetooth

- Frequency Range : 2402.00 MHz ~ 2480.00 MHz

- Measured RF Maximum Output Power : 13.07 dBm

- Target Power & Tolerance 13.00 dBm & ± 1.00 dB

(Maximum : 14.00 dBm & Minimum : 12.00 dBm)

- Maximum Output Power for the Calculation : 14.00 dBm

The EUT will only be used with a separation of 60 millimeters between the antenna and the body of the The MPE calculation for this exposure is shown below.

- P = 14.00 dBm = 25.12 mW	- NOTE P : Max tuneup Power (dBm) Exemption Limit = 242.51 mW 10-g Exemption Limit = 606.29 mW

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 (also illustrated in Appendix B):

{[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance – 50 mm)·10]} mW, for > 1500 MHz and ≤ 6 GHz

[Power allowed at numeric threshold for 50 mm in step a)] is

[(7.5 for 10-g extremity SAR)*(min. test separation distance, mm)]/[√f(GHz)]

= (7.5*50) / [√(2.48)]

= 238.13

10-g SAR test exclusion threshold is

= 238.13 + (60 - 50 mm) * 10

= 338.13

P = 25.12 mW < 338.13 mW

This device is intended to be used under limb exposure conditions. (≤ 7.5 for 10-g extremity SAR)

SAR test exclusion considerations

Estimated SAR at the specific separation(FSK+Bluetooth)

- S = (1.26 / 326.93) + (25.12 / 606.29) = 0.045 < 1	- NOTE FSK + Bluteooth FSK = 1.26 Bluetooth = 25.12

Estimated SAR at the specific separation(FSK+Bluetooth)

- S = (1.26 / 597.941) + (25.12 / 338.13) = 0.076 < 1	- NOTE FSK + Bluteooth FSK = 1.26 Bluetooth = 25.12

This device is intended to be used under limb exposure conditions. (≤ 7.5 for 10-g extremity SAR)

Separation distance for Antenna structures