

Manufacturer: Noiseless Acoustics Ltd
Device: Sound source indicating camera with Wi-Fi 802.11b/g/n/a/ac module
Model: AC13
FCC ID: 2AVNR-RPI3BP

REFERENCE DOCUMENTS

KDB447498 D01 General RF Exposure Guidance v06, 23 October 2015
 FCC CFR 47 §1.1310, Radio frequency exposure limits
 FCC CFR 47 §2.1091, Radio frequency exposure evaluation: mobile devices
 UL-RPT-RP11913492-2016A V2.0, FCC RF Test Report, 6 March 2018
 UL-RPT-RP11913492-2416A, FCC RF Test Report, 28 February 2018

EUT SPECIFICATION

RF characteristics of the assessed radio:

	WLAN 2.4 GHz	WLAN 5 GHz
Operating Frequency Range:	2412-2462 MHz	5150-5250, 5470-5850 MHz
Nominal channel bandwidth:	20,40 MHz	20,40,80 MHz
Maximum conducted power:	14.7 dBm (29.5 mW)	14.1 dBm (25.7 mW)
Integral Antenna gain:	3.5 dBi	2.3 dBi
Antenna type:	Integral	
Antenna count:	1	
Device category:	Portable	
Radio module:	Rasberry Pi Trading Ltd, RPI3-MODBP	

SAR EXCLUSION JUSTIFICATION

Guidance document reference: KDB447498 D01 General RF Exposure Guidance v06, page 12, section 4.3.1.

Step a)

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined:

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

- f (GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric threshold in the step b)

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 distance is < 5 mm, a distance of 5 mm according to f) in section 4.1 is applied to determine SAR test exclusion.

Step b)

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:

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

These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.

CALCULATIONS AND ASSUMPTIONS

Analysis for FCC, portable use:

Minimum separation distance from antenna to device surface is 28mm. 28 mm separation distance was used in calculation. The SAR exemption method was applied.

WLAN mode	Maximum power	Frequency
2.4 GHz	29.5 mW	2472 MHz
5 GHz	25.7 mW	5190 MHz

Actual evaluation:

SAR test exclusion threshold for 28 mm separation distance in step a)

2.4 GHz WLAN:

$$\left(\frac{29.5 \text{ mW}}{28 \text{ mm}} \right) * \sqrt{2.472 \text{ GHz}} = 1.66 \leq 3.0$$

5 GHz WLAN:

$$\left(\frac{25.7 \text{ mW}}{28 \text{ mm}} \right) * \sqrt{5.190 \text{ GHz}} = 2.09 \leq 3.0$$

CONCLUSION

The analysis shows that the device qualifies for exemption from SAR testing in portable use.

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