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Midmark Corporation SAR EXEMPTION REPORT

SCOPE OF WORK
SAR EXEMPTION CALCULATION
ON THE WIRELESS HAND CONTROL

REPORT NUMBER
105489075LEX-001cc

ISSUE DATE
7/18/2024

PAGES
10

DOCUMENT CONTROL NUMBER
Non-Specific EMC Report Shell Rev. December 2017

SAR EXEMPTION TEST REPORT

Report Number: 105489075LEX-001cc
Project Number: G105489075

Report Issue Date: 7/18/2024

Product Name: Wireless Hand Control
Model 029-4020-01

Standards: FCC Part 2.1093
RSS-102 Issue 6

Tested by:
Intertek Testing Services NA, Inc.
731 Enterprise Drive
Lexington, KY 40510
USA

Client:
Midmark Corporation
60 Vista Dr.
Versailles, OH 45342
USA

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1 Introduction and Conclusion

SAR exemption calculations were performed on the product constructed as described in section 4. Information provided by the client including maximum output power, antenna gain(s), and minimum separation distance(s) was used to determine if the product under evaluation was exempt from SAR. Any change in these stated values may invalidate these results. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product under evaluation is **exempt** from SAR requirements for each of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) evaluated. Intertek does not make any claims of compliance for samples or variants which were not evaluated.

2 Test Summary

Section	Requirement	Result
5	FCC SAR Exemption Criteria (FCC Title 47 CFR Part 1.1307, 2.1093)	Exempt from SAR
6	ISED SAR Exemption Criteria (RSS-102 Issue 6)	Exempt from SAR

3 Client Information

This product was tested at the request of the following:

Client Information	
Client Name:	Midmark Corporation
Address:	60 Vista Dr. Versailles, OH 45342 USA
Contact:	Nick Stammen
Telephone:	+1 (973) 528-7546
Email:	nstammen@midmark.com
Manufacturer Information	
Manufacturer Name:	Midmark Corporation
Manufacturer Address:	60 Vista Dr. Versailles, OH 45342 USA

4 Description of Equipment under Test and Variant Models

Equipment Under Test	
Product Name	Wireless Hand Control
Model Numbers	029-4020-01
Hardware Version	015-2084-02
Rated Voltage	3VDC, 2xAA batteries
Frequency Band(s)	2400 – 2483.5MHz
Test Channel(s)	2405MHz, 2445MHz, 2475MHz
Maximum Antenna Gain (dBi)[1]	-2.69 dBi
Minimum Separation Distance (mm)[2]	< 5 mm
Description of Equipment Under Test (provided by client)	
The wireless hand control allows the user to energize the motor(s) of the chair/table to move the orientation of the chair/table.	

4.1 Variant Models:

There were no variant models covered by this evaluation.

4.2 Maximum Output Power

The maximum peak conducted output power was measured and reported in Intertek report 105489075LEX-001bb:

Frequency (MHz)	Receiver Reading (dBm)	Receiver Reading (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	E Field (dBuV/m)	EIRP (dBm)
2405	-51.51	55.48	32.5	8.0	95.98	0.75
2445	-52.04	54.95	32.5	8.0	95.45	0.22
2475	-52.88	54.11	32.5	8.0	94.61	-0.62

Frequency (MHz)	EIRP (dBm)	Antenna Gain (dBi)	Conducted Output Power / PSD (dBm)
2405	0.75	-2.69	3.44
2445	0.22	-3.92	4.14
2475	-0.62	-4.63	5.25

[1] Values were taken from ezurio report “Midmark Controllers 2024-03-25.xlsx” provided by the client. Deviations from these values may affect compliance. Intertek does not make any claims of compliance for values other than those shown.
[2] This information was provided by the client and deviations may affect compliance. Intertek does not make any claims of compliance for values other than those shown.

5 FCC SAR Exemption Criteria

FCC Title 47 CFR Part 1.1307(3)(i):

For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold Pth (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by:

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

d = the separation distance (cm);

FCC KDB 447498 D04 Interim General RF Exposure Guidance v01 § 2.1.1:

Finally, when 10-g extremity SAR applies, SAR test exemption may be considered by applying a factor of 2.5 to the SAR-based exemption thresholds.

RF Source	Frequency (GHz)	Separation Distance (cm)	Output Power (mW)	P_{th} (mW)	Exempt from SAR?
Zigbee Radio	2.475	0.5	3.35	6.80	Yes

6 ISED SAR Exemption Criteria

RSS-102 Issue 6 § 6.3: SAR exemption limits

Devices operating at or below the applicable output power levels (adjusted for tune-up tolerance) specified in table 11, based on the separation distance, are exempt from SAR evaluation. The separation distance, defined as the distance between the user and/or bystander and the antenna and/or radiating element of the device or the outer surface of the device, shall be less than or equal to 20 cm for these exemption limits to apply.

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

Frequency (MHz)	≤ 5 mm (mW)	10 mm (mW)	15 mm (mW)	20 mm (mW)	25 mm (mW)	30 mm (mW)	35 mm (mW)	40 mm (mW)	45 mm (mW)	> 50 mm (mW)
≤ 300	45	116	139	163	189	216	246	280	319	362
450	32	71	87	104	124	147	175	208	248	296
835	21	32	41	54	72	96	129	172	228	298
1900	6	10	18	33	57	92	138	194	257	323
2450	3	7	16	32	56	89	128	170	209	245
3500	2	6	15	29	50	72	94	114	134	158
5800	1	5	13	23	32	41	54	74	102	128

The exemption limits in Table 11 are based on measurements and simulations of half-wave dipole antennas at separation distances of 5 mm to 50 mm from a flat phantom, which provides a SAR value of approximately 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 evaluation in 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 routine evaluation 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, linear interpolation 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, in case of a 7 mm separation distance, either use the exception value for a 5 mm separation distance or interpolate 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 of 1 mW, regardless of frequency.

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

RF Source	Frequency (GHz)	Separation Distance (mm)	Output Power (mW)	P_{th} (mW)	Exempt from SAR?
Zigbee Radio	2.475	5	3.35	7.5	Yes

$$SAR_{estimated} = \frac{P_{max}}{P_{max,exemption}} \times 0.25 \times SAR_{limit} W/kg \quad (2)$$

$SAR_{estimated}$ = (3.35 mW) / (7.5 mW) x 0.25 x 4 W/kg = 0.447 W/kg

7 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	7/18/2024	105489075LEX-001cc	BL	MC	Original Issue