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RADIO TEST REPORT

Report ID:
REP012088

Project number:
PRJ0036467

Type of assessment:
SAR Exemption report

Manufacturer:
JDRF Electromag Engineering Inc.

Hardware Version Identification Number (HVIN):
JDRF-AWS-01

Product Marketing Name (PMN):
Wall Switch

HVIN/Model variant:
JDRF-AWS-02

FCC ID:
2A220-JDRFAWS

ISED certification number:
24973-JDRFAWS

Specifications:

- FCC 47 CFR Part 2 Subpart J, §2.1093
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- ISED Canada RSS-102 Issue 5 Amendment 1, (February 2021)
- Health Canada Safety Code 6

RSS-102 Annex C Attestation:
I attest that the radiocommunication apparatus meets the exemption from the routine evaluation limits in these standards; that the Technical Brief was prepared and the information contained therein is correct; that the device evaluation was performed or supervised by me; that applicable measurement methods and evaluation methodologies have been followed; and that the device meets the SAR and/or RF field strength limits of the above standards.

Date of issue: April 6, 2024

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Prepared by

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Signature

Lab locations

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Test site identifier	**Organization**	**Ottawa/Almonte**	**Montreal**	**Cambridge**
	FCC:	CA2040	CA2041	CA0101
	ISED:	2040A-4	2040G-5	24676
Website	www.nemko.com			

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.
This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contained in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

Copyright notification

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Section 1 Evaluation summary

1.1 SAR exemption for standalone transmission

1.1.1 References, definitions and limits

FCC §2.1093

(2) The SAR limits for general population/uncontrolled exposure are 0.08 W/kg, as averaged over the whole body, and a peak spatial-average SAR of 1.6 W/kg, averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the parts of the human body treated as extremities, such as hands, wrists, feet, ankles, and pinnae, where the peak spatial-average SAR limit is 4 W/kg, averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). Exposure may be averaged over a time period not to exceed 30 minutes to determine compliance with general population/uncontrolled SAR limits.

FCC KDB 447498 D01

4.3.1 Standalone SAR test exclusion considerations

The SAR-based exemption formula of §1.1307(b)(3)(i)(B), repeated here, applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW). This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by formula

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

where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\,cm}\sqrt{f}}\right)$$

Table 1.1-1: Example Power Thresholds (mW)

Separation:	5 mm	10 mm	15 mm	20 mm	25 mm	30 mm	35 mm	40 mm	45 mm	50 mm
300 MHz	39	65	88	110	129	148	166	184	201	217
450 MHz	22	44	67	89	112	135	158	180	203	226
835 MHz	9	25	44	66	90	116	145	175	207	240
1900 MHz	3	12	26	44	66	92	122	157	195	236
2450 MHz	3	10	22	38	59	83	111	143	179	219
3600 MHz	2	8	18	32	49	71	96	125	158	195
5800 MHz	1	6	14	25	40	58	80	106	136	169

Notes: Values in the table are in mW

For mobile devices that are not exempt per Table 1 [of §1.1307(b)(1)(i)(C)] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in §1.1310 is necessary if the ERP of the device is greater than ERP 20 cm in Formula below [repeated from §2.1091(c)(1); also in §1.1307(b)(1)(i)(B)].

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

Table 1.1-2: Thresholds for single RF sources subject to routine environmental evaluation

Table 1

RF Source Frequency			Minimum Distance			Threshold ERP
f_L (MHz)		f_H (MHz)	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	(W)
0.3	–	1.34	159 m	–	35.6 m	1,920 R^2
1.34	–	30	35.6 m	–	1.6 m	3,450 R^2/f^2
30	–	300	1.6 m	–	159 mm	3.83 R^2
300	–	1,500	159 mm	–	31.8 mm	0.0128 R^2f
1,500	–	100,000	31.8 mm	–	0.5 mm	19.2 R^2

References, definitions and limits, continued

RSS-102, Section 2.5.1

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in table below

Table 1.1-3: Exemption limits for routine evaluation based on frequency and separation distance

Separation:	≤5 mm	10 mm	15 mm	20 mm	25 mm	30 mm	35 mm	40 mm	45 mm	≥50 mm
≤300 MHz	71	101	132	162	193	223	254	284	315	345
450 MHz	52	70	88	106	123	141	159	177	195	213
835 MHz	17	30	42	55	67	80	92	105	117	130
900 MHz	7	10	18	34	60	99	153	225	316	431
2450 MHz	4	7	15	30	52	83	123	173	235	309
3500 MHz	2	6	16	32	55	86	124	170	225	290
5800 MHz	1	6	15	27	41	56	71	85	97	106

Notes: Values in the table are in mW

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in the table above are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in the table above are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in Table 1, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.

For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants' device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.

1.1.2 EUT technical information

Type of EUT use	head or body
Minimum separation distance	1 cm
Operating frequency	2.441 GHz
Antenna type	PCB antenna
Antenna gain	2.2 dBi
Maximum transmitter conducted power	5.2 dBm (3.3 mW)
Max EIRP	7.4 dBm (5.495 mW)
Duty cycle	100 %

1.1.3 Justification for Standalone SAR test exclusion

SAR exemption verification for FCC:

Nominal RF power (mW):	5.49541	
Duty cycle (%):	100	INPUTS
Frequency (GHz):	2.441	
Distance (cm):	1	
Time averaged power (mW):	5.49541	Calculated

Frequency (GHz)	λ (cm)	Power (mW)	Distance (cm)	Exemption ERP_{20cm} (mW)	x	$P_{threshold}$ (mW)	Result	Ratio
2.441	12.3	5.5	1	3060	1.90	10.28	EXEMPT	0.53

Table 1.1-4: SAR exemption verification for ISED Canada

Transmit frequency, MHz	Maximum EIRP, mW	Separation distance, mm	Limit, mW	Margin, dB
2441	5.5	10	7.0	1.5

Note: Margin was calculated as follows: $10 \times \text{Log}_{10}$(Limit / Maximum EIRP)

1.1.4 Verdict

The calculation is below the threshold, therefore, the product exempt from the SAR test requirements.

End of the test report