

# RADIO TEST REPORT – 449009-2APFWL

Type of assessment:

**MPE Calculation report**

Manufacturer:

**JDRF Electromag Engineering Inc.**

Product Description:

**Wireless Lighting Control System**

Product Marketing Name (PMN):

**Autonomy Sensor**

Hardware Version Identification Number (HVIN):

**2000000**

FCC ID:

**2A22O2000000**

ISED certification number:

**24973-2000000**

Specification:

- ◆ FCC 47 CFR Part 1 Subpart I, §§1.1307, 1.1310
- ◆ FCC 47 CFR Part 2 Subpart J, §2.1091
- ◆ FCC KDB 447498 D01 General RF Exposure Guidance v06
- ◆ ISED Canada RSS-102 Issue 5 Amendment 1, (February 2021)

**RSS-102 Annex B - Declaration of RF Exposure Compliance**

ATTESTATION: I attest that the information provided in Annex A is correct; 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 RSS-102.

Date of issue: **September 19, 2022****Ketav Jani, EMC/RF Test Specialist**

Prepared by



Signature

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The tests included in this report are within the scope of this accreditation.  
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SCC File Number: 15064 (Ottawa/Almonte); 151100 (Montreal); 151097 (Cambridge)

FCC and RSS-102 Annex C – MPE Calculation; Date: May 2021

## Lab locations

Company name	Nemko Canada Inc.			
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Test site identifier	<b>Organization</b>	<b>Ottawa/Almonte</b>	<b>Montreal</b>	<b>Cambridge</b>
	FCC:	CA2040	CA2041	CA0101
	ISED:	2040A-4	2040G-5	24676
Website	<a href="http://www.nemko.com">www.nemko.com</a>			

## 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.

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## Section 1 Evaluation summary

### 1.1 MPE calculation for standalone transmission

#### 1.1.1 References, definitions and limits

##### FCC §2.1091(d)

- (2) (2) For operations within the frequency range of 300 kHz and 6 GHz (inclusive), the limits for maximum permissible exposure (MPE), derived from whole-body SAR limits and listed in Table 1 in paragraph (e)(1) of this section, may be used instead of whole-body SAR limits as set forth in paragraphs (a) through (c) of this section to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b) of this part, except for portable devices as defined in §2.1093 of this chapter as these evaluations shall be performed according to the SAR provisions in §2.1093.

**Table 1.1-1:** Table 1 to §1.1310(e)(1)—Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(i) Limits for Occupational/Controlled Exposure</b>				
0.3–3.0	614	1.63	*(100)	≤6
3.0–30	1842 / f	4.89 / f	*(900 / f <sup>2</sup> )	<6
30–300	61.4	0.163	1.0	<6
300–1500			f / 300	<6
1500–100000			5	<6
<b>(ii) Limits for General Population/Uncontrolled Exposure</b>				
0.3–1.34	614	1.63	*(100)	<30
1.34–30	824 / f	2.19 / f	*(180 / f <sup>2</sup> )	<30
30–300	27.5	0.073	0.2	<30
300–1500			f / 1500	<30
1500–100000			1.0	<30

Notes: f = frequency in MHz. \* = Plane-wave equivalent power density.

##### RSS-102, Section 4

For the purpose of this standard, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6:

**Table 1.1-2:** Table 4 to RSS-102— RF Field Strength Limits

Frequency range (MHz)	Electric field strength (V/m rms)	Magnetic field strength (A/m rms)	Power density (W/m <sup>2</sup> )	Reference Period (minutes)
<b>Limits for Controlled Environment</b>				
10–20	61.4	0.163	10	6
20–48	129.8 / f <sup>0.25</sup>	0.3444 / f <sup>0.25</sup>	44.72 / f <sup>0.5</sup>	6
48–100	49.33	0.1309	6.455	6
100–6000	15.60 f <sup>0.25</sup>	0.04138 f <sup>0.25</sup>	0.6455 f <sup>0.5</sup>	6
6000–15000	137	0.364	50	6
<b>Limits for Uncontrolled Environment</b>				
10–20	27.46	0.0728	2	6
20–48	58.07 / f <sup>0.25</sup>	0.1540 / f <sup>0.25</sup>	8.944 / f <sup>0.5</sup>	6
48–300	22.06	0.05852	1.291	6
300–6000	3.142 f <sup>0.3417</sup>	0.008335 f <sup>0.3417</sup>	0.02619 f <sup>0.6834</sup>	6
6000–15000	61.4	0.163	10	6

Notes: f = frequency in MHz.

## References, definitions and limits, continued

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (mW/cm<sup>2</sup> or W/m<sup>2</sup>)

P = power input to the antenna (mW or W)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (cm or m)

## 1.1.2 EUT technical information

Prediction frequency	2479 MHz
Antenna type	Surface mount chip antenna
Antenna gain	1.5 dBi
Number of antennas	1
Maximum transmitter power	93.62 dBμV/m (at 3 m)
Prediction distance (declared)	20 cm

## 1.1.3 MPE calculation

Fundamental transmit (prediction) frequency:	2479 MHz
Maximum measured field strength at 3 m:	93.62 dBμV/m
Transmit duty cycle:	100 %
Maximum calculated average field strength:	93.62 dBμV/m
Single Antenna gain (typical):	1.50 dBi
Number of antennae:	1
Total system gain:	1.50 dBi

	<b>FCC limit:</b>	<b>ISED limit:</b>
MPE limit for <u>uncontrolled</u> exposure at prediction frequency:	1.000000 mW/cm <sup>2</sup>	0.546744 mW/cm <sup>2</sup>
	10.000000 W/m <sup>2</sup>	5.467441 W/m <sup>2</sup>
MPE limit for <u>controlled</u> exposure at prediction frequency:	5.000000 mW/cm <sup>2</sup>	0.645500 mW/cm <sup>2</sup>
	50.000000 W/m <sup>2</sup>	6.455000 W/m <sup>2</sup>
Minimum calculated prediction distance for compliance:	20 cm	20 cm
Typical (declared) distance:	20 cm	20 cm
Average power density at prediction frequency:	0.000137 mW/cm <sup>2</sup>	0.000137 mW/cm <sup>2</sup>
	0.001373 W/m <sup>2</sup>	0.001373 W/m <sup>2</sup>
Margin of Compliance for <u>uncontrolled</u> environment:	38.62 dB	36.00 dB
with Maximum allowable antenna gain:	38.62 dBi	36.00 dBi
Margin of Compliance for <u>controlled</u> environment:	45.61 dB	36.72 dB
with Maximum allowable antenna gain:	138.23 dBi	129.34 dBi

## 1.1.4 Verdict

The calculation is below the limit; therefore, the product is passing the RF Exposure requirements for the declared distance.

## 1.1.5 RSS-102, Annex A - RF technical brief cover sheet

ISED certification number	IC: 24973-2000000		
Product marketing name (PMN)	Autonomy Sensor		
Hardware version identification number (HVIN)	2000000		
Firmware version identification number (FVIN)	N/A		
Host marketing name (HMN)	N/A		
Applicant name	JDRE Electromag Engineering Inc.		
SAR/RF exposure test laboratory	24676 (3 m semi anechoic chamber - Cambridge)		
Type of evaluation	<input type="checkbox"/> SAR Evaluation: Device Used in the Vicinity of the Human Head <input type="checkbox"/> SAR Evaluation: Body-Worn Device and Body-Supported Device <input type="checkbox"/> SAR Evaluation: Limb-Worn Device <input checked="" type="checkbox"/> RF Exposure Evaluation <input type="checkbox"/> Nerve Stimulation Exposure Evaluation (SPR-002)		
SAR evaluation	Multiple transmitters: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
	Evaluated against exposure limits: <input checked="" type="checkbox"/> General Public Use <input type="checkbox"/> Controlled Use		
	Duty cycle used in evaluation:	N/A	%
	Separation distance:	N/A	mm
	Standard used for evaluation:	N/A	
	SAR value:	N/A	W/kg
<input type="checkbox"/> Measured <input type="checkbox"/> Computed <input type="checkbox"/> Calculated			
Nerve Stimulation Evaluation (SPR-002)	Evaluated against exposure limits: <input type="checkbox"/> General Public Use <input type="checkbox"/> Controlled Use		
	Measurement distance:	N/A	m
	Field Strength:	N/A	<input type="checkbox"/> V/m (electric) <input type="checkbox"/> A/m (magnetic) <input type="checkbox"/> Measured <input type="checkbox"/> Computed <input type="checkbox"/> Calculated
	Exposure condition:	<input type="checkbox"/> Whole body/Torso/Head <input type="checkbox"/> Leg <input type="checkbox"/> Arm <input type="checkbox"/> Hand/Foot	
RF exposure evaluation	Evaluated against exposure limits: <input checked="" type="checkbox"/> General Public Use <input type="checkbox"/> Controlled Use		
	Duty cycle used in evaluation:	100	%
	Operational frequency:	2479	MHz
	Standard used for evaluation:	Safety Code 6	
	Measurement distance:	0.2	m
	RF value:	0.00137	<input checked="" type="checkbox"/> W/m <sup>2</sup> <input type="checkbox"/> V/m <input type="checkbox"/> A/m <input type="checkbox"/> Measured <input type="checkbox"/> Computed <input checked="" type="checkbox"/> Calculated

End of the test report