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RADIO TEST REPORT

Type of assessment:

SAR Exemption report

Applicant:

Cooper Industries (Electrical) Inc.

Model/HVIN:

XPD2400B

Product marketing name (PMN):

XPD2400

FCC identifier:

FCC ID: IA9XPD2400B

ISED certification number:

IC: 1338B-XPD2400B

Specifications:

- ◆ **FCC 47 CFR Part 2 Subpart J, §2.1093**
- ◆ **FCC KDB 447498 D01 General RF Exposure Guidance v06**
- ◆ **ISED Canada RSS-102 Issue 6 December 15, 2023**
- ◆ **Health Canada Safety Code 6**

RSS-102 Annex B Attestation:

I attest that the radiocommunication apparatus meets the exemption from the routine evaluation limits in Section 6 of this standard; that the Technical Brief was prepared and the information contained therein is correct, that the device evaluation was performed or supervised by the undersigned, that applicable measurement methods and evaluation methodologies have been followed and that the device meets the SAR, NS, APD and/or FRL exposure limits of RSS-102.

Date of issue: **May 29, 2025**

Andrey Adelberg, Senior EMC/RF Specialist

Prepared by

Signature



Lab locations

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Test site identifier	Organization FCC: ISED:	Ottawa/Almonte CA2040 2040A-4	Montreal CA2041 2040G-5	Cambridge CA0101 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.

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Table of Contents

Table of Contents	3
Section 1 Evaluation summary	4
1.1 SAR exemption for standalone transmission	4

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

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

where

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

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)].

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

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 ² f
1,500	–	100,000	31.8 mm	–	0.5 mm	19.2 R ²

References, definitions and limits, continued

RSS-102, Section 6.3

Devices operating at or below the applicable output power levels (adjusted for tune-up tolerance) specified in the table below, 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 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	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

Notes: Values in the table are in mW

The exemption limits in the above table 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 the above table are multiplied by a factor of 5.

When the operating frequency of the device is between two frequencies located in the above table, linear interpolation shall be applied for the applicable separation distance. If the separation distance of the device is between two distances located in the above table, 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.

1.1.2 EUT technical information

Type of EUT use	Extremity (limb-worn)
Minimum separation distance	33 mm
Operating frequency	2441 MHz
Antenna gain	2.62 dBi
Maximum transmitter conducted power	20.91 dBm (123.3 mW)
Maximum system ERP (for FCC)	21.38 dBm (137 mW)
Maximum system EIRP (for ISED)	23.53 dBm (225 mW)
Duty cycle	53 % (limited by proprietary protocol)

1.1.3 Justification for SAR test exclusion

SAR exemption verification for FCC:

Nominal RF power (mW): 137
 Duty cycle (%): 53
 Frequency (GHz): 2.441
 Distance (cm): 3.3
 Time averaged power (mW): 72.61 Calculated

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Frequency (GHz)	A (cm)	Power (mW)	Distance (cm)	Exemption ERP _{20cm} (mW)	x	P _{threshold} (mW)	Result	Ratio
2.441	12.3	73	3.3	3060	1.90	99.51	EXEMPT	0.73

Table 1.1-4: SAR exemption verification for ISED Canada

Transmit frequency, MHz	Maximum EIRP, dBm	Maximum EIRP, mW	Separation distance, mm	Limit*, mW	Margin, dB
2441.1	23.53	225	33	281	0.97

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

* Limit was linearly interpolated for 33 mm which is approximately 112.4 mW. Limb-worn factor of 2.5 was applied.

1.1.4 Verdict

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

End of the test report