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RADIO TEST REPORT

Report ID
REP062425

Project ID
PRJ0066776

Type of assessment:
MPE Calculation report

Manufacturer:
JDRF Electromag Engineering Inc.

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

Product Marketing Name (PMN):
Autonomy Switchpack (ASP)

FCC identifier:
FCC ID: 2A220-JDRFASP

ISED certification number:
IC: 24973-JDRFASP

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 6 (December 2023)

RSS-102 Annex A

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 applicable RF exposure limits set forth in RSS-102.

Date of issue: October 4, 2024

Tarek Elkholy

Tarek Elkholy, EMC/RF Specialist
Prepared by

Signature

Lab locations

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Test site registration	**Organization**	**Ottawa**	**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 MPE calculation for standalone transmission

1.1.1 References, definitions and limits

FCC §2.1091(d)

(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^2)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3–3.0	614	1.63	*(100)	≤6
3.0–30	1842 / f	4.89 / f	*(900 / f^2)	<6
30–300	61.4	0.163	1.0	<6
300–1500	–	–	f / 300	<6
1500–100000	–	–	5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	<30
1.34–30	824 / f	2.19 / f	*(180 / f^2)	<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.

References, definitions and limits, continued

RSS-102, Section 5.1

Through this standard, ISED adopts Health Canada's RF exposure guideline entitled Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz (Safety Code 6) and its Notice: Localized human exposure limits for radiofrequency fields in the range of 6 GHz to 300 GHz.

Table 1.1-2: *Table 7&8 to RSS-102 — RF Field Strength and power density Limits*

Frequency range (MHz)	Electric field strength (V/m rms)	Magnetic field strength (A/m rms)	Power density (W/m^2)	Reference Period (minutes)
Limits for controlled-use devices (controlled environment)				
10–20	61.4	0.163	10	6
20–48	$129.8 / f^{0.25}$	$0.3444 / f^{0.25}$	$44.72 / f^{0.5}$	6
48–100	49.33	0.1309	6.455	6
100–6000	$15.60 f^{0.25}$	$0.04138 f^{0.25}$	$0.6455 f^{0.5}$	6
6000–15000	137	0.364	50	6
15000–150000	137	0.364	50	$616000 / f^{1.2}$
150000–300000	$0.354 f^{0.5}$	$9.40 \times 10^{-4} f^{0.5}$	$3.33 \times 10^{-4} f$	$616000 / f^{1.2}$
Limits for r devices used by the general public (uncontrolled environment)				
10–20	27.46	0.0728	2	6
20–48	$58.07 / f^{0.25}$	$0.1540 / f^{0.25}$	$8.944 / f^{0.5}$	6
48–300	22.06	0.05852	1.291	6
300–6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000–15000	61.4	0.163	10	6
15000–150000	61.4	0.163	10	$616000 / f^{1.2}$
150000–300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000 / f^{1.2}$

Notes: f = frequency in MHz

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

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

where: S = power density (mW/cm^2 or W/m^2)
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	2402 MHz
Antenna type	Chip antenna
Antenna gain	1.8 dBi
Number of antennas	1
Maximum transmitter power	120.6 dBµV/m (at 3 m)
Prediction distance (declared)	20 cm

1.1.3 MPE calculation

For radiated measurement

Fundamental transmit (prediction) frequency:	2402	MHz
Maximum measured field strength at 3 m:	120.60	dBµV/m
Transmit duty cycle:	100	%
Maximum calculated average field strength:	120.60	dBµV/m
Single Antenna gain (typical):	1.80	dBi
Number of antennae:	1	
Total system gain:	1.80	dBi

	FCC limit:		ISED limit:	
MPE limit for uncontrolled exposure at prediction frequency:	**1.000000**	**mW/cm²**	**0.535080**	**mW/cm²**
	10.000000	W/m²	5.350805	W/m²
MPE limit for controlled exposure at prediction frequency:	**5.000000**	**mW/cm²**	**0.645500**	**mW/cm²**
	50.000000	W/m²	6.455000	W/m²
Minimum calculated prediction distance for compliance:	20	cm	20	cm
Typical (declared) distance:	20	cm	20	cm
Average power density at prediction frequency:	**0.068506**	**mW/cm²**	**0.068506**	**mW/cm²**
	0.685062	W/m²	0.685062	W/m²
Margin of Compliance for uncontrolled environment:	**11.64**	**dB**	**8.93**	**dB**
with Maximum allowable antenna gain:	11.64	dBi	8.93	dBi
Margin of Compliance for controlled environment:	**18.63**	**dB**	**9.74**	**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.

End of the test report