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RF Exposure Compliance – MPE Calculation Report

Applicant information:		McIntosh Laboratory Inc.
Product information:	*Model number (HVIN):*	DS200
	Model name (PMN):	DS200
	Product type:	Mobile or Fixed Device
	Device category	Consumer Device for General Population/Uncontrolled Exposure
	FCC Identification:	FCC ID: BWY-DS200
	ISED certification number:	IC: 2483A-DS200
Date of issue:		September 23, 2025
Compliance Specifications:		FCC 47 CFR Part 1 Subpart I, §§1.1307, 1.1310 FCC 47 CFR Part 2 Subpart J, §§2.1091, 2.1093 FCC KDB 447498 D01 General RF Exposure Guidance v06 FCC KDB 865664 D01 RF Exposure Procedures and Equipment Authorization Policies ISED Canada RSS-102 Issue 6 December 15, 2023

Test locations of Nemko Canada Inc.			
	Ottawa site	**Montréal site**	**GTA Cambridge site**
Facility address	303 River Road Ottawa, Ontario Canada K1V 1H2 Tel: +1 613 737 9680 Fax: +1 613 737 9691	292 Labrosse Avenue Pointe-Claire, Québec Canada H9R 5L8 Tel: +1 514 694 2684 Fax: +1 514 694 3528	1-130 Saltsman Drive Cambridge, Ontario Canada N3E 0B2 Tel: +1 519 650 4811
Test site identifier - FCC	CA2040	CA2041	CA0101
Test site identifier – ISED Canada	2040A-4	2040G-5	24676
ANAB File Number	AT-3195	AT-3193	AT-3194

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Signature

Limits of responsibility

The results presented in this report apply solely to the specific device model tested and are valid only for the operating conditions and installation requirements specified herein. Testing was conducted in accordance with ISO/IEC 17025:2017 requirements, and all results fall within the scope of Nemko Canada's accreditation.

This MPE evaluation is based on the maximum power levels and operating conditions specified. Any modifications to the device hardware, software, or installation that could affect RF output power or antenna characteristics may invalidate this compliance demonstration.

Copyright notification

1. Executive Summary

This report presents the Maximum Permissible Exposure (MPE) analysis for [Product Name] to demonstrate compliance with FCC and ISED RF exposure requirements. The evaluation considers both single transmitter operation and simultaneous multi-transmitter scenarios where applicable.

2. Key Findings

Compliance status	Complies
Critical separation distances	20 cm
Special conditions or limitations	N/A

MPE calculations for **simultaneous** transmission

Device Classification Requirements	
Portable Device Definition (§2.1093)	Devices designed for use by a person where the radiating structure is within 20 cm of the user's body require SAR evaluation rather than MPE calculation.
Mobile Device Definition	Devices installed in vehicles or with permanently installed antennas may use MPE calculations if minimum separation distances can be established.
Fixed/Base Station Definition	Stationary transmitters with controlled access to antenna locations may use MPE calculations for both occupational and general population exposure scenarios.

3. References, definitions and limits for FCC

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: *§1.1310(e)(1)—Power Density Limits for Maximum Permissible Exposure (MPE)*

Frequency range (MHz)	Power density (mW/cm^2)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure		
0.3–3.0	*(100)	≤6
3.0–30	*(900 / f^2)	<6
30–300	1.0	<6
300–1500	f / 300	<6
1500–100000	5	<6
(ii) Limits for General Population/Uncontrolled Exposure		
0.3–1.34	*(100)	<30
1.34–30	*(180 / f^2)	<30
30–300	0.2	<30
300–1500	f / 1500	<30
1500–100000	1.0	<30

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

4. References, definitions and limits for ISED

RSS-102	
Section 5.3.2	The power density reference levels, and associated reference period for devices employed by the general public (uncontrolled environment) and controlled-use devices (controlled environment) are specified in table below. Note that the power density limits specified in this table apply to whole body exposure conditions.

Table 2: *RSS-102— Power density limits*

Frequency range (MHz)	Power density (W/m²)	Power density (mW/cm²)	Reference Period (minutes)
Limits for controlled-use devices (controlled environment)			
10–20	10	1	6
20–48	$44.72 / f^{0.5}$	$4.472 / f^{0.5}$	6
48–100	6.455	0.6455	6
100–6000	$0.6455 f^{0.5}$	$0.06455 f^{0.5}$	6
6000–15000	50	5	$616000 / f^{1.2}$
15000–30000	$3.33\times10^{-4} f$	$0.333\times10^{-4} f$	$616000 / f^{1.2}$
Limits for devices used by the general public (uncontrolled environment)			
10–20	2	0.2	6
20–48	$8.944 / f^{0.5}$	$0.8944 / f^{0.5}$	6
48–300	1.291	0.1291	6
300–6000	$0.02619 f^{0.6834}$	$0.002619 f^{0.6834}$	6
6000–15000	10	1	$616000 / f^{1.2}$
15000–30000	$6.67\times10^{-5} / f$	$0.667\times10^{-5} / f$	$616000 / f^{1.2}$

Notes: f = frequency in MHz.

The above table refers to Health Canada's Safety Code 6 for relevant notes and additional information.

Additional ISED Considerations	
Routine Evaluation Thresholds	ISED requires routine evaluation when predicted or measured field strength exceeds certain thresholds, even for equipment that would otherwise be categorically excluded.
Environmental Classification	Clear distinction must be made between controlled and uncontrolled environments based on RF awareness and access control measures.

5. Power density calculation formula

The fundamental equation (from page 18 of OET Bulletin 65, Edition 97-01) for calculating power density at a specified distance from an RF source is derived from the far-field assumption:

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

where:

- S = Power density (mW/cm² or W/m²)
- P = Power input to antenna (mW or W)
- G = Antenna gain (linear ratio, not dB)
- R = Distance from radiation center (cm or m)

This equation assumes:

- Far-field conditions ($R > 2D^2/\lambda$, where D is largest antenna dimension) are assumed at the evaluation distance of 20 cm
- Isotropic power distribution (conservative approach)
- Free-space propagation conditions
- Worst-case antenna orientation

Multiple Transmitter Analysis (if applicable)

Total Exposure Ratio (TER) Calculation: TER = Σ(Si/Li) ≤ 1.0

Where:

- Si = Power density from transmitter i
- Li = Applicable limit for transmitter i

6. EUT technical information for multiple transmitter simultaneous operation

	Band 1 (Wi-Fi 2.4 GHz)	Band 2 (Wi-Fi 5.1 GHz)	Band 3 (BLE)
Prediction frequency	2412 MHz	5240 MHz	2440
Antenna gain	2.0 dBi	2.0 dBi	2.0 dBi
Number of antennas	1	1	1
Maximum transmitter power	11.90 dBm	12.94 dBm	10 dBm
Declared separation distance	20 cm	20 cm	20 cm
Duty cycle	100%	100%	100%

7. Test report references

Transmitter maximum output power measurement result was taken from the following RF test reports:

	Report 1	Report 2	
Report ID	REP114959	REP114959	180600649SHA-001
Issue date	22-Sep-25	23-Sep-25	29-Aug-18
Test standard	• FCC 47 CFR Part 15 Subpart C, §15.247 • RSS-247, Issue 3, August 2023, Section 5	• FCC 47 CFR Part 15 Subpart E, §15.407 • RSS-247, Issue 3, August 2023, Section 6	• FCC 47 CFR Part 15 Subpart C, §15.247 • RSS-247, Issue 3, August 2023, Section 5

8. Verdict

The calculated Total Exposure Ratio (TER) is less than 1.0, indicating that the combined RF exposure from simultaneous transmission does not exceed regulatory limits. Therefore, the product **COMPLIES** with FCC and ISED RF exposure requirements for simultaneous multi-transmitter operation.

9. MPE calculation for simultaneous operation

	Band 1	Band 2	Bluetooth
Fundamental transmit (prediction) frequency:	2412 MHz	5240 MHz	2440 MHz
Maximum measured conducted peak output power:	11.90 dBm	12.94 dBm	10.00 dBm
Cable and/or jumper loss:	0 dB	0 dB	0 dB
Maximum peak power at antenna input terminal:	11.90 dBm	12.94 dBm	10.00 dBm
Duty cycle:	100 %	100 %	100 %
Maximum calculated average power at antenna input terminal:	15.49 mW	19.68 mW	10.00 mW
Single Antenna gain (typical):	2 dBi	2 dBi	2 dBi
Number of antennae:	1	1	1
Total system gain:	2.00 dBi	2.00 dBi	2.00 dBi

	Band 1		Band 2		Bluetooth	
	FCC calculations	**ISED calculations**	**FCC calculations**	**ISED calculations**	**FCC calculations**	**ISED calculations**
Uncontrolled environment						
Declared distance:	20 cm	20 cm	20 cm	20 cm	20 cm	20 cm
Average power density at declared distance:	**0.004883 mW/cm²**	**0.004883 mW/cm²**	**0.006205 mW/cm²**	**0.006205 mW/cm²**	**0.003153 mW/cm²**	**0.003153 mW/cm²**
	0.048835 W/m²	0.048835 W/m²	0.062048 W/m²	0.062048 W/m²	0.031530 W/m²	0.031530 W/m²
MPE limit at prediction frequency:	**1.000000 mW/cm²**	**0.536602 mW/cm²**	**1.000000 mW/cm²**	**0.911857 mW/cm²**	**1.000000 mW/cm²**	**0.540851 mW/cm²**
	10.000000 W/m²	5.366018 W/m²	10.000000 W/m²	9.118565 W/m²	10.000000 W/m²	5.408511 W/m²
Minimum calculated prediction **distance** for compliance:	20 cm	20 cm	20 cm	20 cm	20 cm	20 cm
Margin of Compliance:	**23.11 dB**	**20.41 dB**	**22.07 dB**	**21.67 dB**	**25.01 dB**	**22.34 dB**
with Maximum premitted antenna gain:	25.11 dBi	22.41 dBi	24.07 dBi	23.67 dBi	27.01 dBi	24.34 dBi
Individual transmitter exposure ratio (average density to MPE limit):	0.004883	0.009101	0.006205	0.006805	0.003153	0.005830
Total exposure ratio for **FCC**:	0.014241 <1					
Total exposure ratio for **ISED**:	0.021735 <1					
Total RF value for ISED listing:	0.142414 W/m²					

	Band 1		Band 2		Bluetooth	
	FCC calculations	**ISED calculations**	**FCC calculations**	**ISED calculations**	**FCC calculations**	**ISED calculations**
Controlled environment						
Declared distance:	20 cm	20 cm	20 cm	20 cm	20 cm	20 cm
Average power density at declared distance:	**0.004883 mW/cm²**	**0.004883 mW/cm²**	**0.006205 mW/cm²**	**0.006205 mW/cm²**	**0.003153 mW/cm²**	**0.003153 mW/cm²**
	0.048835 W/m²	0.048835 W/m²	0.062048 W/m²	0.062048 W/m²	0.031530 W/m²	0.031530 W/m²
MPE limit at prediction frequency:	**5.000000 mW/cm²**	**3.170187 mW/cm²**	**5.000000 mW/cm²**	**4.672635 mW/cm²**	**5.000000 mW/cm²**	**3.188535 mW/cm²**
	50.000000 W/m²	31.701871 W/m²	50.000000 W/m²	46.726353 W/m²	50.000000 W/m²	31.885348 W/m²
Minimum calculated prediction **distance** for compliance:	20 cm	20 cm	20 cm	20 cm	20 cm	20 cm
Margin of Compliance:	**30.10 dB**	**28.12 dB**	**29.06 dB**	**28.77 dB**	**32.00 dB**	**30.05 dB**
with Maximum permitted antenna gain:	32.10 dBi	30.12 dBi	31.06 dBi	30.77 dBi	34.00 dBi	32.05 dBi
Individual transmitter exposure ratio (average density to MPE limit):	0.000977	0.001540	0.001241	0.001328	0.000631	0.000989
Total exposure ratio for **FCC**:	0.002848 <1					
Total exposure ratio for **ISED**:	0.003857 <1					
Total RF value for ISED listing:	0.142414 W/m²					

End of the test report