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# RF Exposure Compliance – MPE Calculation Report

Applicant information: **Amplitech Group Inc.**

Product information:

|                                   |                                                              |
|-----------------------------------|--------------------------------------------------------------|
| <i>Model number (HVIN):</i>       | pRRU8801, pRRU8802                                           |
| <i>Model name (PMN):</i>          | Native DAS Solution                                          |
| <i>Product type:</i>              | Mobile or Fixed Device                                       |
| <i>Device category</i>            | Consumer Device for General Population/Uncontrolled Exposure |
| <i>FCC Identification:</i>        | FCC ID: 2BNMP-PRRU880X                                       |
| <i>ISED certification number:</i> | IC: 34498-PRRU880X                                           |

Date of issue: **November 21, 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

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The test results included in this report are within the scope of this accreditation.  
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## Test locations of Nemko Canada Inc.

|                                    | Ottawa site                                                                                                | Montréal site                                                                                                         | GTA Cambridge site                                                                          |
|------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Facility address                   | 303 River Road<br>Ottawa, Ontario<br>Canada<br>K1V 1H2<br><br>Tel: +1 613 737 9680<br>Fax: +1 613 737 9691 | 292 Labrosse Avenue<br>Pointe-Claire, Québec<br>Canada<br>H9R 5L8<br><br>Tel: +1 514 694 2684<br>Fax: +1 514 694 3528 | 1-130 Saltsman Drive<br>Cambridge, Ontario<br>Canada<br>N3E 0B2<br><br>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                                                                                     |

Andrey Adelberg

Senior EMC/Wireless Specialist

Prepared by

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.

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## 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 stand-alone 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 <sup>2</sup> ) | Averaging time (minutes) |
|-----------------------------------------------------------------|-------------------------------------|--------------------------|
| <b>(i) Limits for Occupational/Controlled Exposure</b>          |                                     |                          |
| 0.3–3.0                                                         | *(100)                              | ≤6                       |
| 3.0–30                                                          | *(900 / f <sup>2</sup> )            | <6                       |
| 30–300                                                          | 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                                                        | *(100)                              | <30                      |
| 1.34–30                                                         | *(180 / f <sup>2</sup> )            | <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/m <sup>2</sup> ) | Power density (mW/cm <sup>2</sup> ) | Reference Period (minutes) |
|---------------------------------------------------------------------------------|-----------------------------------|-------------------------------------|----------------------------|
| <b>Limits for controlled-use devices (controlled environment)</b>               |                                   |                                     |                            |
| 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                                                                     | $3.33 \times 10^{-4} f$           | $0.333 \times 10^{-4} f$            | $616000 / f^{1.2}$         |
| <b>Limits for devices used by the general public (uncontrolled environment)</b> |                                   |                                     |                            |
| 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                                                                     | $6.67 \times 10^{-5} / f$         | $0.667 \times 10^{-5} / f$          | $616000 / f^{1.2}$         |

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/cm<sup>2</sup> or W/m<sup>2</sup>)
- 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:  $TER = \sum(S_i/L_i) \leq 1.0$

Where:

- $S_i$  = Power density from transmitter i
- $L_i$  = Applicable limit for transmitter i

## 6. EUT technical information for a single transmitter operation

| Transmitter (LTE/NR)         |                                                        |
|------------------------------|--------------------------------------------------------|
| Prediction frequency         | (Worst case FCC) 2680 MHz; (worst case ISSED) 3850 MHz |
| Antenna gain                 | 3.5                                                    |
| Number of antennas           | (Worst case FCC) 2; (worst case ISSED) 4               |
| Maximum transmitter power    | 24 dBm                                                 |
| Declared separation distance | 20 cm                                                  |
| Duty cycle                   | 100                                                    |

## 7. Test report references

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

| Report 1      |                                                   |  |
|---------------|---------------------------------------------------|--|
| Report ID     | REP114004                                         |  |
| Issue date    | 21-Nov-25                                         |  |
| Test standard | FCC P24E, P27; RSS-133, RSS-139, RSS-192, RSS-199 |  |

## 8. Verdict

The calculated power density at the declared separation distance is below the applicable regulatory limits. Therefore, the product **COMPLIES** with FCC and ISSED RF exposure requirements for single transmitter operation.

Product info: FCC ID: 2BNMP-PRRU880X  
IC: 34498-PRRU880X  
Models: pRRU8801, pRRU8802

## 9. MPE calculation for stand-alone (single) transmitter (conducted method) – Worst case FCC

Fundamental transmit (prediction) frequency: 2680 MHz  
 Maximum measured conducted peak output power: 24.00 dBm  
 Cable and/or jumper loss: 0 dB  
 Maximum peak power at antenna input terminal: 24.00 dBm  
 Duty cycle: 100 %  
 Maximum calculated average power at antenna input terminal: 251.19 mW  
 Single Antenna gain (typical): 3.5 dBi  
 Number of antennae: 2  
 Total system gain: 6.51 dBi

### FCC calculations

### ISED calculations

#### Uncontrolled environment

|                                                        |                                                           |                                                          |
|--------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|
| Declared distance:                                     | 20 cm                                                     | 20 cm                                                    |
| Average power density at declared distance:            | 0.223749 mW/cm <sup>2</sup><br>2.237485 W/m <sup>2</sup>  | 0.223749 mW/cm <sup>2</sup><br>2.237485 W/m <sup>2</sup> |
| MPE limit at prediction frequency:                     | 1.000000 mW/cm <sup>2</sup><br>10.000000 W/m <sup>2</sup> | 0.576664 mW/cm <sup>2</sup><br>5.766640 W/m <sup>2</sup> |
| Minimum calculated prediction distance for compliance: | 20 cm                                                     | 20 cm                                                    |
| Margin of Compliance:                                  | 6.50 dB                                                   | 4.11 dB                                                  |
| with Maximum permitted antenna gain:                   | 13.01 dBi                                                 | 10.62 dBi                                                |

#### Controlled environment

|                                                        |                                                           |                                                           |
|--------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|
| Declared distance:                                     | 20 cm                                                     | 20 cm                                                     |
| Average power density at declared distance:            | 0.223749 mW/cm <sup>2</sup><br>2.237485 W/m <sup>2</sup>  | 0.223749 mW/cm <sup>2</sup><br>2.237485 W/m <sup>2</sup>  |
| MPE limit at prediction frequency:                     | 5.000000 mW/cm <sup>2</sup><br>50.000000 W/m <sup>2</sup> | 3.341671 mW/cm <sup>2</sup><br>33.416706 W/m <sup>2</sup> |
| Minimum calculated prediction distance for compliance: | 20 cm                                                     | 20 cm                                                     |
| Margin of Compliance:                                  | 13.49 dB                                                  | 11.74 dB                                                  |
| with Maximum permitted antenna gain:                   | 20.00 dBi                                                 | 18.25 dBi                                                 |

## 10. MPE calculation for stand-alone (single) transmitter (conducted method) – Worst case ISED

Fundamental transmit (prediction) frequency: 3850 MHz  
 Maximum measured conducted peak output power: 24.00 dBm  
 Cable and/or jumper loss: 0 dB  
 Maximum peak power at antenna input terminal: 24.00 dBm  
 Duty cycle: 100 %  
 Maximum calculated average power at antenna input terminal: 251.19 mW  
 Single Antenna gain (typical): 3.5 dBi  
 Number of antennae: 4  
 Total system gain: 9.52 dBi

### ISED calculations

#### Uncontrolled environment

Declared distance: 20 cm  
 Average power density at declared distance: 0.447497 mW/cm<sup>2</sup>  
 4.474970 W/m<sup>2</sup>  
 MPE limit at prediction frequency: 0.738651 mW/cm<sup>2</sup>  
 7.386511 W/m<sup>2</sup>  
 Minimum calculated prediction distance for compliance: 20 cm  
 Margin of Compliance: 2.18 dB  
 with Maximum permitted antenna gain: 11.70 dBi

#### Controlled environment

Declared distance: 20 cm  
 Average power density at declared distance: 0.447497 mW/cm<sup>2</sup>  
 4.474970 W/m<sup>2</sup>  
 MPE limit at prediction frequency: 4.005222 mW/cm<sup>2</sup>  
 40.052222 W/m<sup>2</sup>  
 Minimum calculated prediction distance for compliance: 20 cm  
 Margin of Compliance: 9.52 dB  
 with Maximum permitted antenna gain: 19.04 dBi

End of the test report