



Choose Scandinavian trust

# RF Exposure Compliance – MPE Calculation Report

Applicant information: **ORBCOMM LICENCE Corp (ORBCOMM Inc)**

Product information:

|                                   |                                                                     |
|-----------------------------------|---------------------------------------------------------------------|
| <i>Model number (HVIN):</i>       | <b>CT3601</b>                                                       |
| <i>Model name (PMN):</i>          | <b>CT3601-2100-H, CT3601-3100-H</b>                                 |
| <i>Product type:</i>              | <b>Mobile or Fixed Device</b>                                       |
| <i>Device category</i>            | <b>Consumer Device for General Population/Uncontrolled Exposure</b> |
| <i>FCC Identification:</i>        | <b>FCC ID: XGS-CT3601</b>                                           |
| <i>ISED certification number:</i> | <b>IC: 11881A-CT3601</b>                                            |

Date of issue: **November 7, 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**

Nemko Canada Inc., a testing laboratory, is accredited by ANSI National Accreditation Board (ANAB).  
The test results included in this report are within the scope of this accreditation.  
The ANAB symbol is an official symbol of the ANSI National Accreditation Board, used under licence.

#### 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.

#### Copyright notification

This report may be reproduced by the applicant in its entirety for regulatory submission and internal use. Any use of this report by third parties, including reliance on its contents or decisions made based on it, is solely at the risk of those third parties. Nemko Canada Inc. assumes no responsibility for any damages incurred by third parties as a result of actions taken based on this report.

© Nemko Canada Inc. All rights reserved.



## 1. Executive Summary

This report presents the Maximum Permissible Exposure (MPE) analysis for [Product Name] to demonstrate compliance with FCC and ICED 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 <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 multiple transmitter simultaneous operation

|                              | Transmitter 1 (BLE 2) | Transmitter 2 (BLE 2) | Transmitter 3 (Cellular)         |
|------------------------------|-----------------------|-----------------------|----------------------------------|
| Prediction frequency         | 2480 MHz              | 2480 MHz              | 848.8 MHz                        |
| Antenna gain                 | 0.8 dBi               | 3.73 dBi              | 2.8 dBi                          |
| Number of antennas           | 1                     | 1                     | 1                                |
| Maximum transmitter power    | 0.44 dBm              | 7.27 dBm              | 32.99                            |
| Declared separation distance | 20 cm                 | 20 cm                 | 20 cm                            |
| Duty cycle                   | 100 %                 | 100 %                 | 12.5 % (limited by GSM protocol) |

## 7. Test report references

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

|               | Report 1           | Report 2      |
|---------------|--------------------|---------------|
| Report ID     | REP094723R1        | 2212RSU048-U1 |
| Issue date    | September 12, 2025 | March 5, 2023 |
| Test standard | RSS-247, FCC 15C   | FCC 22H       |

## 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 ISER RF exposure requirements for simultaneous multi-transmitter operation.

## 9. MPE calculation for simultaneous operation

|                                                             | Transmitter 1 | Transmitter 2 | Transmitter 3                |
|-------------------------------------------------------------|---------------|---------------|------------------------------|
| Fundamental transmit (prediction) frequency:                | 2480 MHz      | 2480 MHz      | 848.8 MHz                    |
| Maximum measured conducted peak output power:               | 0.44 dBm      | 7.27 dBm      | 32.99 dBm                    |
| Cable and/or jumper loss:                                   | 0 dB          | 0 dB          | 0 dB                         |
| Maximum peak power at antenna input terminal:               | 0.44 dBm      | 7.27 dBm      | 32.99 dBm                    |
| Duty cycle:                                                 | 100 %         | 100 %         | 12.5 % - limited by protocol |
| Maximum calculated average power at antenna input terminal: | 1.11 mW       | 5.33 mW       | 248.83 mW                    |
| Single Antenna gain (typical):                              | 0.8 dBi       | 3.73 dBi      | 2.8 dBi                      |
| Number of antennae:                                         | 1             | 1             | 1                            |
| Total system gain:                                          | 0.80 dBi      | 3.73 dBi      | 2.80 dBi                     |

|                                                                       | FCC calculations                                          | ISED calculations                                         | FCC calculations                                          | ISED calculations                                         | FCC calculations                                          | ISED calculations                                         |
|-----------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|
| <b>Uncontrolled environment</b>                                       |                                                           |                                                           |                                                           |                                                           |                                                           |                                                           |
| Declared distance:                                                    | 20 cm                                                     | 20 cm                                                     | 20 cm                                                     | 20 cm                                                     | 20 cm                                                     | 20 cm                                                     |
| Average power density at declared distance:                           | 0.000265 mW/cm <sup>2</sup><br>0.002647 W/m <sup>2</sup>  | 0.000265 mW/cm <sup>2</sup><br>0.002647 W/m <sup>2</sup>  | 0.002505 mW/cm <sup>2</sup><br>0.025046 W/m <sup>2</sup>  | 0.002505 mW/cm <sup>2</sup><br>0.025046 W/m <sup>2</sup>  | 0.094328 mW/cm <sup>2</sup><br>0.943279 W/m <sup>2</sup>  | 0.094328 mW/cm <sup>2</sup><br>0.943279 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> | 0.546895 mW/cm <sup>2</sup><br>5.468948 W/m <sup>2</sup>  | 1.000000 mW/cm <sup>2</sup><br>10.000000 W/m <sup>2</sup> | 0.546895 mW/cm <sup>2</sup><br>5.468948 W/m <sup>2</sup>  | 0.565867 mW/cm <sup>2</sup><br>5.658667 W/m <sup>2</sup>  | 0.262834 mW/cm <sup>2</sup><br>2.628337 W/m <sup>2</sup>  |
| Minimum calculated prediction distance for compliance:                | 20 cm                                                     | 20 cm                                                     | 20 cm                                                     | 20 cm                                                     | 20 cm                                                     | 20 cm                                                     |
| Margin of Compliance:                                                 | 35.77 dB                                                  | 33.15 dB                                                  | 26.01 dB                                                  | 23.39 dB                                                  | 7.78 dB                                                   | 4.45 dB                                                   |
| with Maximum permitted antenna gain:                                  | 36.57 dBi                                                 | 33.95 dBi                                                 | 29.74 dBi                                                 | 27.12 dBi                                                 | 10.58 dBi                                                 | 7.25 dBi                                                  |
| Individual transmitter exposure ratio (average density to MPE limit): | 0.000265                                                  | 0.000484                                                  | 0.002505                                                  | 0.004580                                                  | 0.166696                                                  | 0.358888                                                  |
| Total exposure ratio for FCC:                                         | 0.169466 <1                                               |                                                           |                                                           |                                                           |                                                           |                                                           |
| Total exposure ratio for ISED:                                        | 0.363952 <1                                               |                                                           |                                                           |                                                           |                                                           |                                                           |
| Total RF value for ISED listing:                                      | 0.970971 W/m <sup>2</sup>                                 |                                                           |                                                           |                                                           |                                                           |                                                           |
| <b>Controlled environment</b>                                         |                                                           |                                                           |                                                           |                                                           |                                                           |                                                           |
| Declared distance:                                                    | 38 cm                                                     | 38 cm                                                     | 38 cm                                                     | 38 cm                                                     | 38 cm                                                     | 38 cm                                                     |
| Average power density at declared distance:                           | 0.000265 mW/cm <sup>2</sup><br>0.002647 W/m <sup>2</sup>  | 0.000265 mW/cm <sup>2</sup><br>0.002647 W/m <sup>2</sup>  | 0.002505 mW/cm <sup>2</sup><br>0.025046 W/m <sup>2</sup>  | 0.002505 mW/cm <sup>2</sup><br>0.025046 W/m <sup>2</sup>  | 0.094328 mW/cm <sup>2</sup><br>0.943279 W/m <sup>2</sup>  | 0.094328 mW/cm <sup>2</sup><br>0.943279 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> | 3.214564 mW/cm <sup>2</sup><br>32.145641 W/m <sup>2</sup> | 5.000000 mW/cm <sup>2</sup><br>50.000000 W/m <sup>2</sup> | 3.214564 mW/cm <sup>2</sup><br>32.145641 W/m <sup>2</sup> | 2.829333 mW/cm <sup>2</sup><br>28.293333 W/m <sup>2</sup> | 1.880611 mW/cm <sup>2</sup><br>18.806108 W/m <sup>2</sup> |
| Minimum calculated prediction distance for compliance:                | 20 cm                                                     | 20 cm                                                     | 20 cm                                                     | 20 cm                                                     | 20 cm                                                     | 20 cm                                                     |
| Margin of Compliance:                                                 | 42.76 dB                                                  | 40.84 dB                                                  | 33.00 dB                                                  | 31.08 dB                                                  | 14.77 dB                                                  | 13.00 dB                                                  |
| with Maximum permitted antenna gain:                                  | 49.14 dBi                                                 | 47.22 dBi                                                 | 42.31 dBi                                                 | 40.39 dBi                                                 | 23.15 dBi                                                 | 21.37 dBi                                                 |
| Individual transmitter exposure ratio (average density to MPE limit): | 0.000053                                                  | 0.000082                                                  | 0.000501                                                  | 0.000779                                                  | 0.033339                                                  | 0.050158                                                  |
| Total exposure ratio for FCC:                                         | 0.033893 <1                                               |                                                           |                                                           |                                                           |                                                           |                                                           |
| Total exposure ratio for ISED:                                        | 0.051020 <1                                               |                                                           |                                                           |                                                           |                                                           |                                                           |
| Total RF value for ISED listing:                                      | 0.970971 W/m <sup>2</sup>                                 |                                                           |                                                           |                                                           |                                                           |                                                           |

End of the test report