

RADIO TEST REPORT

Report ID

REP021400

Project ID

PRJ0040765

Type of assessment:

MPE Calculation report

Manufacturer:

**ORBCOMM License Corp.
(ORBCOMM Inc.)**

Product Marketing Name (PMN):

**ST2102 Mobile Satellite Earth Station
Terminal**

Hardware Version Identification Number (HVIN):

ST2102

FCC identifier:

FCC ID: XGS-ST2102

ISED certification number:

IC: 11881A-ST2102

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 5 Amendment 1 (February 2021)

RSS-102 Annex B - Declaration of RF Exposure Compliance

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 SAR and/or RF field strength limits of RSS-102.

Date of issue: January 19, 2024

Hossein Zamani Zardehsavari, EMC/RF Specialiste

Prepared by



Signature

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ANAB File Number: AT-3195 (Ottawa/Almonte); AT-3193 (Pointe-Claire); AT-3194 (Cambridge)



Lab locations

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	Test site identifier	Organization	Ottawa/Almonte	Montreal
	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.

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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.

RSS-102, Section 4

For the purpose of this standard, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada’s RF exposure guideline, Safety Code 6:

Table 1.1-2: Table 4 to RSS-102— RF Field Strength 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 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
Limits for 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

Notes: f = frequency in MHz.

References, definitions and limits, continued

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

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

where: S = power density (mW/cm² or W/m²)
 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	1626.502 MHz
Antenna type	Internal antenna
Antenna gain	5.6 dBi
Number of antennas	1
Maximum transmitter power	32.4 dBm (conducted)
Prediction distance (declared)	25 cm (FCC), 35 cm (ISED)

1.1.3 MPE calculation

Fundamental transmit (prediction) frequency:	1626.502 MHz	
Maximum measured conducted peak output power:	32.4 dBm	
Cable and/or jumper loss:	0 dB	
Maximum peak power at antenna input terminal:	32.4 dBm	
Duty cycle:	100 %	
Maximum calculated average power at antenna input terminal:	1737.800829 mW	
Single Antenna gain (typical):	5.6 dBi	
Number of antennae:	1	
Total system gain:	5.6 dBi	
	FCC limit:	ISED limit:
MPE limit for <u>uncontrolled</u> exposure at prediction frequency:	1.000000 mW/cm ²	0.409927 mW/cm ²
	10.000000 W/m ²	4.099273 W/m ²
MPE limit for <u>controlled</u> exposure at prediction frequency:	5.000000 mW/cm ²	2.603296 mW/cm ²
	50.000000 W/m ²	26.032960 W/m ²
Minimum calculated prediction distance for uncontrolled compliance:	22 cm	35 cm
Typical (declared) distance:	25 cm	35 cm
Average power density at prediction frequency:	0.803360 mW/cm ²	0.409877 mW/cm ²
	8.033598 W/m ²	4.098775 W/m ²
Margin of Compliance for <u>uncontrolled</u> environment:	0.95 dB	0.00 dB
with Maximum permitted antenna gain:	6.55 dBi	5.60 dBi
Margin of Compliance for <u>controlled</u> environment:	7.94 dB	8.03 dB
with Maximum permitted antenna gain:	45.94 dBi	46.03 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