

# RADIO TEST REPORT – 482019-5APFWL

Type of assessment:

## MPE Calculation report

Manufacturer:

TrellisWare Technologies

Hardware Version Identification Number (HVIN):

480AAA0046

Product Marketing Name (PMN):

N/A

HVIN/Model variant(s):

N/A

FCC ID:

2A6X2-1760

IC certification number:

28565-1760

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: October 25, 2022

Chip Fleury

Prepared by



Signature

Nemko Canada Inc., a testing laboratory, is accredited by the Standards Council of Canada.  
The tests included in this report are within the scope of this accreditation.  
The SCC Accreditation Symbol is an official symbol of the Standards Council of Canada, used under licence.

SCC File Number: 15064 (Ottawa/Almonte); 151100 (Montreal); 151097 (Cambridge)



Lab locations

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Company name	Nemko Canada Inc.	
Facilities	<i>San Diego</i> 2210 Faraday Ave, Suite 150 Carlsbad Ca 92008  Tel: +1 760 444 3500	
Test site identifier	<b>Organization</b>	<b>Ottawa/Almonte</b>
	FCC:	392943
	ISED:	2040B-3
Website	<a href="http://www.nemko.com">www.nemko.com</a>	

Limits of responsibility

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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 USA ISO/IEC 17025 accreditation.

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## Section 1 Evaluation summary

### 1.1 MPE calculation for simultaneous transmission

#### 1.1.1 References, definitions and limits

##### FCC §2.1091(d)

- (2) (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 <sup>2</sup> )	Averaging time (minutes)
<b>(i) Limits for Occupational/Controlled Exposure</b>				
0.3–3.0	614	1.63	*(100)	≤6
3.0–30	1842 / f	4.89 / f	*(900 / f <sup>2</sup> )	<6
30–300	61.4	0.163	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	614	1.63	*(100)	<30
1.34–30	824 / f	2.19 / f	*(180 / f <sup>2</sup> )	<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 2.5.2

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $4.49/f^{0.5}$  W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $0.0131 f^{0.6834}$  W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

## 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/cm<sup>2</sup> or W/m<sup>2</sup>)  
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

	Transmitter 1 (UNII)	Transmitter 2 (DTS)
Prediction frequency	5.180 GHz	2.412 GHz
Antenna type	Integral	Integral
Antenna gain	3.9 dBi	2.79 dBi
Maximum transmitter conducted power	21.6 dBm (144.54 mW)	21.41dBm (138.36 mW)
Prediction distance	20 cm	20 cm

### 1.1.3 MPE calculation

	Transmitter 1		Transmitter 2	
Fundamental transmit (prediction) frequency:	5180 MHz		2412 MHz	
Maximum measured conducted peak output power:	21.6 dBm		21.41 dBm	
Cable and/or jumper loss:	0 dB		0 dB	
Maximum peak power at antenna input terminal:	21.6 dBm		21.41 dBm	
Tx On time:	1.000 ms		1.000 ms	
Tx period time:	1.000 ms		1.000 ms	
Average factor:	100 %		100 %	
Maximum calculated average power at antenna input terminal:	144.54398 mW		138.35664 mW	
Single Antenna gain (typical):	3.9 dBi		2.79 dBi	
Number of antennae:	1		1	
Total system gain:	3.90 dBi		2.79 dBi	
<b>MPE limit for uncontrolled exposure at prediction frequency:</b>	<b>ISED limit</b>	<b>FCC limit</b>	<b>ISED limit</b>	<b>FCC limit</b>
	0.904708 mW/cm <sup>2</sup>	1.000000 mW/cm <sup>2</sup>	0.536602 mW/cm <sup>2</sup>	1.000000 mW/cm <sup>2</sup>
	9.047081 W/m <sup>2</sup>	10.000000 W/m <sup>2</sup>	5.366018 W/m <sup>2</sup>	10.000000 W/m <sup>2</sup>
Minimum calculated prediction distance for compliance:	20 cm	20 cm	20 cm	20 cm
Typical (declared) distance:	20 cm	20 cm	20 cm	20 cm
<b>Average power density at prediction frequency:</b>	<b>0.070588 mW/cm<sup>2</sup></b>	<b>0.070588 mW/cm<sup>2</sup></b>	<b>0.052328 mW/cm<sup>2</sup></b>	<b>0.052328 mW/cm<sup>2</sup></b>
	0.705879 W/m <sup>2</sup>	0.705879 W/m <sup>2</sup>	0.523275 W/m <sup>2</sup>	0.523275 W/m <sup>2</sup>
Combined MPE compliance:				
Margin of Compliance:	11.08 dB	11.51 dB	10.11 dB	12.81 dB
Maximum allowable antenna gain:	14.98 dBi	11.51 dBi	12.90 dBi	12.81 dBi
Average power density to MPE limit ratio:	0.078	0.071	0.098	0.052
Total sum of ratios for FCC:	0.123			
Total sum of ratios for ISED:	0.176			
Maximum allowed sum of ratios:	1			

### 1.1.4 Verdict

The calculation is below the limit; therefore, the product is passing the RF Exposure requirements for the declared distance.

1.1.5 RSS-102, Annex A - RF technical brief cover sheet

IC Certification Number	28565-1760
Product marketing name (PMN)	480AAA0046
Hardware version identification number (HVIN)	480AAA0046
Firmware version identification number (FVIN)	N/A
Host marketing name (HMN)	N/A
Applicant company number	28565
Applicant name	TrellisWare Technologies Inc.
SAR/RF exposure test laboratory	2040A-4 (3 m semi anechoic chamber)
Type of evaluation	<input type="checkbox"/> SAR Evaluation: Device Used in the Vicinity of the Human Head <input type="checkbox"/> SAR Evaluation: Body-Worn Device and Body-Supported Device <input type="checkbox"/> SAR Evaluation: Limb-Worn Device <input checked="" type="checkbox"/> RF Exposure Evaluation <input type="checkbox"/> Nerve Stimulation Exposure Evaluation (SPR-002)
SAR evaluation	Multiple transmitters: <input type="checkbox"/> Yes <input type="checkbox"/> No
	Evaluated against exposure limits: <input type="checkbox"/> General Public Use <input type="checkbox"/> Controlled Use
	Duty cycle used in evaluation: %
	Separation distance: mm
	Standard used for evaluation:
	SAR value: W/kg <input type="checkbox"/> Measured <input type="checkbox"/> Computed <input type="checkbox"/> Calculated
Nerve Stimulation Evaluation (SPR-002)	Evaluated against exposure limits: <input type="checkbox"/> General Public Use <input type="checkbox"/> Controlled Use
	Measurement distance: m
	Field Strength: <input type="checkbox"/> V/m (electric) <input type="checkbox"/> A/m (magnetic) <input type="checkbox"/> Measured <input type="checkbox"/> Computed <input type="checkbox"/> Calculated
	Exposure condition: <input type="checkbox"/> Whole body/Torso/Head <input type="checkbox"/> Leg <input type="checkbox"/> Arm <input type="checkbox"/> Hand/Foot
RF exposure evaluation	Evaluated against exposure limits: <input checked="" type="checkbox"/> General Public Use <input type="checkbox"/> Controlled Use
	Duty cycle used in evaluation: <b>100</b> %
	Operational frequency: <b>5180</b> MHz
	Standard used for evaluation: <b>RSS-102 Issue 5</b>
	Measurement distance: <b>0.2</b> m
	RF value: <b>0.71</b> <input checked="" type="checkbox"/> W/m <sup>2</sup> <input type="checkbox"/> V/m <input type="checkbox"/> A/m <input type="checkbox"/> Measured <input type="checkbox"/> Computed <input checked="" type="checkbox"/> Calculated

**End of the test report**