

RADIO TEST REPORT – APFWL

Type of assessment:

MPE Calculation report

Manufacturer:

Velavu Inc

Product Marketing Name (PMN):

Velavu Bluetooth Module One

Hardware Version Identification Number (HVIN):

VLVBM1

FCC ID:

2A2OWVLVBM1

ISED certification number:

IC: 27544-VLVBM1

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: August 10, 2022

Andrey Adelberg, Senior EMC/RF Specialist

Prepared by



Signature

Lab locations

Company name	Nemko Canada Inc.			
Facilities	<i>Ottawa site:</i> 303 River Road Ottawa, Ontario Canada K1V 1H2	<i>Montréal site:</i> 292 Labrosse Avenue Pointe-Claire, Québec Canada H9R 5L8	<i>Cambridge site:</i> 1-130 Saltsman Drive Cambridge, Ontario Canada N3E 0B2	<i>Almonte site:</i> 1500 Peter Robinson Road West Carleton, Ontario Canada K0A 1L0
	Tel: +1 613 737 9680 Fax: +1 613 737 9691	Tel: +1 514 694 2684 Fax: +1 514 694 3528	Tel: +1 519 650 4811	Tel: +1 613 256-9117
Test site identifier	Organization	Ottawa/Almonte	Montreal	Cambridge
	FCC: ISED:	CA2040 2040A-4	CA2041 2040G-5	CA0101 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.

Copyright notification

Nemko Canada Inc. authorizes the applicant to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

Nemko Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

© Nemko Canada Inc.

Table of Contents

Table of Contents	3
Section 1 Evaluation summary	4
1.1 MPE calculation for standalone transmission	4

Section 1 Evaluation summary

1.1 MPE calculation for standalone 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 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 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/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	2440 MHz
Antenna type	Printed antenna
Antenna gain	1.9 dBi
Number of antennas	1
Maximum transmitter conducted power	3.15 dBm
Prediction distance	20 cm

1.1.3 MPE calculation

Fundamental transmit (prediction) frequency:	2440 MHz	
Maximum measured conducted peak output power:	3.15 dBm	
Cable and/or jumper loss:	0 dB	
Maximum peak power at antenna input terminal:	3.15 dBm	
Tx On time:	1.000 ms	
Tx period time:	1.000 ms	
Average factor:	100 %	
Maximum calculated average power at antenna input terminal:	2.065380156 mW	
Single Antenna gain (typical):	1.9 dBi	
Number of antennae:	1	
Total system gain:	1.90 dBi	
 MPE limit for uncontrolled exposure at prediction frequency:	 FCC limit: 1.000000 mW/cm ² 10.000000 W/m ²	 ISED limit: 0.540851 mW/cm ² 5.408511 W/m ²
Minimum calculated prediction distance for compliance:	20 cm	20 cm
Typical (declared) distance:	20 cm	20 cm
 Average power density at prediction frequency:	 0.000636 mW/cm ² 0.006364 W/m ²	 0.000636 mW/cm ² 0.006364 W/m ²
Margin of Compliance:	31.96 dB	29.29 dB
Maximum allowable antenna gain:	33.86 dBi	31.19 dBi

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

ISED certification Number	27544-VLVB1		
Product marketing name (PMN)	Velavu Bluetooth Module One		
Hardware version identification number (HVIN)	VLVB1		
Firmware version identification number (FVIN)	N/A		
Host marketing name (HMN)	N/A		
Applicant company number	27544		
Applicant name	Velavu 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: N/A % Separation distance: N/A mm Standard used for evaluation: N/A SAR value: N/A 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: N/A m Field Strength: N/A <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 type="checkbox"/> General Public Use <input type="checkbox"/> Controlled Use Duty cycle used in evaluation: 100 % Operational frequency: 2440 MHz Standard used for evaluation: Safety Code 6 Measurement distance: 0.2 m RF value: 0.0064 <input checked="" type="checkbox"/> W/m ² <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