

# RADIO TEST REPORT – 455174APFWL

Type of assessment:

**MPE Calculation report**

Manufacturer:

**Roambee Corporation**

Hardware Version Identification Number (HVIN):

**BNG 500**

Product Marketing Name (PMN):

**BeeSense Flex**

FCC ID:

**2ALG8BEENG500**

IC certification number:

**28141-BEENG500**

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: **March 1, 2022**

**Tarek Elkholy, EMC/RF Specialist**

Prepared by



Signature

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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)

FCC and RSS-102 Annex C – MPE Calculation; Date: May 2021



## Lab locations

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	Test site identifier	<b>Organization</b>	<b>Ottawa/Almonte</b>	<b>Montreal</b>
	FCC:	CA2040	CA2041	CA0101
	ISED:	2040A-4	2040G-5	24676
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 Canada's ISO/IEC 17025 accreditation.

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## Table of Contents

<b>Table of Contents</b> .....	<b>3</b>
<b>Section 1 Evaluation summary</b> .....	<b>4</b>
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 <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

Prediction frequency	2442 MHz
Antenna type	Chip PCB Antenna
Antenna gain	2.6 dBi
Number of antennas	1
Maximum transmitter conducted power	17.2 dBm (0.0525 W)
Prediction distance	20 cm

1.1.3 MPE calculation missing gain info

Fundamental transmit (prediction) frequency:	2442 MHz	
Maximum measured conducted peak output power:	17.2 dBm	
Cable and/or jumper loss:	0 dB	
Maximum peak power at antenna input terminal:	17.2 dBm	
Tx On time:	1.000 ms	
Tx period time:	1.000 ms	
Average factor:	100 %	
Maximum calculated average power at antenna input terminal:	52.480746 mW	
Single Antenna gain (typical):	2.6 dBi	
Number of antennae:	1	
Total system gain:	2.60 dBi	
<b>MPE limit for uncontrolled exposure at prediction frequency:</b>	<b>FCC limit:</b> 1.000000 mW/cm <sup>2</sup> 10.000000 W/m <sup>2</sup>	<b>ISED limit:</b> 0.541154 mW/cm <sup>2</sup> 5.411540 W/m <sup>2</sup>
Minimum calculated prediction distance for compliance:	20 cm	20 cm
Typical (declared) distance:	20 cm	20 cm
<b>Average power density at prediction frequency:</b>	<b>0.018999 mW/cm<sup>2</sup></b> 0.189990 W/m <sup>2</sup>	<b>0.018999 mW/cm<sup>2</sup></b> 0.189990 W/m <sup>2</sup>
<b>Margin of Compliance:</b>	<b>17.21 dB</b>	<b>14.55 dB</b>
Maximum allowable antenna gain:	19.81 dBi	17.15 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