Choose Scandinavian trust

RADIO TEST REPORT – APFWL

Type of assessment:

MPE Calculation report

Manufacturer:

StrongBo Agritech Canada Ltd.

Product Marketing Name (PMN):

StrongBo WP Electrical Box

Hardware Version Identification Number (HVIN):

SB-WCTSC4R00

FCC ID:

2BE3T-WP01

ISED certification number:

32066-WP01

Contains FCC ID:

2AEMI-B404X

2AVE9-M138

Contains ISED certification number:

20127-B404X

25817-M138

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 19, 2024

Andrey Adelberg, Senior EMC/RF Specialist

Prepared by

Signature

Lab locations

Company name	Nemko Canada Inc.			
Facilities	*Ottawa site:* 303 River Road Ottawa, Ontario Canada K1V 1H2 Tel: +1 613 737 9680 Fax: +1 613 737 9691	*Montréal site:* 292 Labrosse Avenue Pointe-Claire, Québec Canada H9R 5L8 Tel: +1 514 694 2684 Fax: +1 514 694 3528	*Cambridge site:* 1-130 Saltsman Drive Cambridge, Ontario Canada N3E 0B2 Tel: +1 519 650 4811	*Almonte site:* 1500 Peter Robinson Road West Carleton, Ontario Canada K0A 1L0 Tel: +1 613 256-9117

Test site identifier	**Organization**	**Ottawa/Almonte**	**Montreal**	**Cambridge**
	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.

Copyright notification

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^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/cm^2 or W/m^2)
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 (BLE)	Transmitter 2 (Cellular)	Transmitter 2 (Satellite)
Prediction frequency	2402 MHz	699 MHz	150 MHz
Antenna gain	2 dBi	12 dBi	2 dBi
Maximum transmitter conducted power	6.3 dBm	25 dBm	21.02 dBm
Prediction distance (declared)	50 cm	50 cm	50 cm

1.1.3 MPE calculation

	Transmitter 1	Transmitter 2	Transmitter 3
Fundamental transmit (prediction) frequency:	2402 MHz	699 MHz	150 MHz
Maximum measured conducted peak output power:	6.3 dBm	25 dBm	21.02 dBm
Cable and/or jumper loss:	0 dB	0 dB	0 dB
Maximum peak power at antenna input terminal:	6.3 dBm	25 dBm	21.02 dBm
Duty cycle:	100 %	100 %	100 %
Maximum calculated average power at antenna input terminal:	4.2657952 mW	316.22777 mW	126.47363 mW
Single Antenna gain (typical):	2 dBi	12 dBi	2 dBi
Number of antennae:	1	1	1
Total system gain:	2.00 dBi	12.00 dBi	2.00 dBi

	Transmitter 1 ISED limit	Transmitter 1 FCC limit	Transmitter 2 ISED limit	Transmitter 2 FCC limit	Transmitter 3 ISED limit	Transmitter 3 FCC limit
MPE limit for uncontrolled exposure at prediction frequency:	**0.53508** mW/cm^2	**1.00000** mW/cm^2	**0.23017** mW/cm^2	**0.46600** mW/cm^2	**0.12910** mW/cm^2	**0.20000** mW/cm^2
	5.350805 W/m^2	10.00000 W/m^2	2.301713 W/m^2	4.66000 W/m^2	1.291000 W/m^2	2.00000 W/m^2
MPE limit for controlled exposure at prediction frequency:	**3.16361** mW/cm^2	**5.00000** mW/cm^2	**1.70661** mW/cm^2	**2.33000** mW/cm^2	**0.79057** mW/cm^2	**1.00000** mW/cm^2
	31.63609 W/m^2	50.00000 W/m^2	17.06612 W/m^2	23.30000 W/m^2	7.90573 W/m^2	10.00000 W/m^2
Minimum calculated prediction distance for compliance:	20 cm	20 cm	42 cm	29 cm	20 cm	20 cm
Typical (declared) distance:	50 cm	50 cm	50 cm	50 cm	50 cm	50 cm
Average power density at prediction frequency:	**0.000215** mW/cm^2	**0.000215** mW/cm^2	**0.159533** mW/cm^2	**0.159533** mW/cm^2	**0.006380** mW/cm^2	**0.006380** mW/cm^2
	0.002152 W/m^2	0.002152 W/m^2	1.595329 W/m^2	1.595329 W/m^2	0.063804 W/m^2	0.063804 W/m^2
MPE compliance for simultaneous operation:						
Margin of Compliance for controlled environment:	**41.67** dB	**43.66** dB	**10.29** dB	**11.65** dB	**20.93** dB	**21.95** dB
with Maximum permitted antenna gain:	43.67 dBi	45.66 dBi	22.29 dBi	23.65 dBi	22.93 dBi	23.95 dBi
Margin of Compliance for uncontrolled environment:	**33.96** dB	**36.67** dB	**1.59** dB	**4.66** dB	**13.06** dB	**14.96** dB
with Maximum permitted antenna gain:	35.96 dBi	36.67 dBi	13.59 dBi	4.66 dBi	15.06 dBi	14.96 dBi
Average power density to MPE limit ratio (uncontrolled):	0.000	0.000	0.693	0.342	0.049	0.032
Average power density to MPE limit ratio (controlled):	0.000	0.000	0.093	0.068	0.008	0.006

Total sum of ratios for FCC (uncontrolled):	0.374 <1	Total sum of ratios for FCC (controlled):	0.075 <1	Total RF value for ISED:	**1.6613** W/m^2
Total sum of ratios for ISED (uncontrolled):	0.743 <1	Total sum of ratios for ISED (controlled):	0.102 <1		
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

ISED certification number	32066-WP01
Product marketing name (PMN)	StrongBo WP Electrical Box
Hardware version identification number (HVIN)	SB-WCTSC4R00
Firmware version identification number (FVIN)	N/A
Host marketing name (HMN)	N/A
Applicant name	StrongBo Agritech Canada Ltd.
SAR/RF exposure test laboratory	2040G-5 (3 m semi anechoic chamber - Montréal)
Type of evaluation	☐ SAR Evaluation: Device Used in the Vicinity of the Human Head ☐ SAR Evaluation: Body-Worn Device and Body-Supported Device ☐ SAR Evaluation: Limb-Worn Device ☒ RF Exposure Evaluation ☐ Nerve Stimulation Exposure Evaluation (SPR-002)
SAR evaluation	Multiple transmitters: ☐ Yes ☐ No
	Evaluated against exposure limits: ☐ General Public Use ☐ 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
	☐ Measured ☐ Computed ☐ Calculated
Nerve Stimulation Evaluation (SPR-002)	Evaluated against exposure limits: ☐ General Public Use ☐ Controlled Use
	Measurement distance: N/A m
	Field Strength: N/A ☐ V/m (electric) ☐ A/m (magnetic) ☐ Measured ☐ Computed ☐ Calculated
	Exposure condition: ☐ Whole body/Torso/Head ☐ Leg ☐ Arm ☐ Hand/Foot
RF exposure evaluation	Evaluated against exposure limits: ☒ General Public Use ☐ Controlled Use
	Duty cycle used in evaluation: **100** %
	Operational frequency: **2400, 699, 150** MHz
	Standard used for evaluation: **Safety Code 6**
	Measurement distance: **0.5** m
	RF value: **1.66** ☒ W/m² ☐ V/m ☐ A/m ☐ Measured ☐ Computed ☒ Calculated

End of the test report