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RADIO TEST REPORT – APFWL

Type of assessment:

MPE Calculation report

Manufacturer:

Otodata Wireless Network Inc.

Hardware Version Identification Number (HVIN):

ES3016, ES3022, ES3026

Product Marketing Name (PMN):

CO20 BLE

FCC ID:

2ADQFBEHT3AD

IC certification number:

12649A-BEHT3AD

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 24, 2022

Yong Huang, EMC/RF Specialist

Prepared by

Signature

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





www.nemko.com



Lab locations

Company name	Nemko Canada Ir	IC.				
Facilities	Ottawa site:	Mont	réal site:	Cambridge site:	Almonte site:	
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	Ottawa, Ontario	Pointe	e-Claire, Québec	Cambridge, Ontario	West Carleton, Ontario Canada	
	Canada	Canac	la	Canada		
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	. :	.		<u> </u>		
l'est 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.

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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)

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(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.

Frequency range	Electric field strength	Magnetic field strength	Power density	Averaging time	
(MHz)	(V/m)	(A/m)	(A/m) (mW/cm²)		
	(i) Limits	for Occupational/Controlled Exp	osure		
0.3–3.0	614	1.63	*(100)	≤6	
3.0–30	1842 / f	4.89 / f	.89 / f *(900 / f ²)		
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 / f²)	<30	
30–300	27.5	0.073	0.2 <30		
300–1500			f / 1500	<30	
1500-100000			1.0	<30	

Table 1.1-1: Table 1 to §1.1310(e)(1)—Limits for Maximum Permissible Exposure (MPE)

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 tuneup 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

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

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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	Meander line antenna
Antenna gain	2.14 dBi
Number of antennas	1
Maximum transmitter conducted power	6.11 dBm
Prediction distance	20 cm

1.1.3 MPE calculation

Fundamental transmit (prediction) frequency:	2440	MHz
Maximum measured conducted peak output power:	6.11	dBm
Cable and/or jumper loss:	0	dB
Maximum peak power at antenna input terminal:	6.11	dBm
Tx On time:	1.000	ms
Tx period time:	1.000	ms
Average factor:	100	%
Maximum calculated average power at antenna input terminal:	4.083193863	mW
Single Antenna gain (typical):	2.14	dBi
Number of antennae:	1	
Total system gain:	2.14	dBi

	FCC limit:	ISED limit:
MPE limit for uncontrolled exposure at prediction frequency:	1.000000 mW/cm ²	0.540851 mW/cm ²
	10.00000 W/m^2	5.408511 W/m ²
Minimum calculated prediction distance for compliance:	<u>20</u> cm	<u>20</u> cm
Typical (declared) distance:	<u>20</u> cm	20 cm
Average power density at prediction frequency:	0.001330 mW/cm ²	0.001330 mW/cm ²
	0.013296 W/m ²	0.013296 W/m ²
Margin of Compliance:	28.76 dB	26.09 dB
Maximum allowable antenna gain:	30.90 dBi	28.23 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

IC Certification Number	12649A-BEHT3AD				
Product marketing name (PMN)	CO20 BLE				
Hardware version identification number (HVIN)	ES3016. ES3022. ES3026				
Firmware version identification number (FVIN)	N/A				
Host marketing name (HMN)	N/A				
Applicant company number	12649A				
Applicant name	Otodata Wireless Network Inc.				
SAR/RF exposure test laboratory	2040G-5 (3 m semi anechoic chamber)				
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) 				
	Multiple transmitters: Ves	□ No			
	Evaluated against exposure limits:		General Public Use	Controlled Use	
	Duty cycle used in evaluation:	N/A	%		
SAR evaluation	Separation distance:	N/A	mm		
	Standard used for evaluation:	N/A			
	SAR value:	N/A	W/kg		
	Measured Compute	ed	Calculated		
	Evaluated against exposure limits:	🗆 Gene	ral Public Use	Controlled Use	
	Measurement distance:	N/A	m		
Nerve Stimulation Evaluation (SPR-002)	Field Strength:	N/A	□ V/m (electric) □ Measured □ Con Calculated	□ A/m (magnetic) nputed □	
	Exposure condition:	□ Who □ Arm	le body/Torso/Head	□ Leg □ Hand/Foot	
	Evaluated against exposure limits:	X	General Public Use	Controlled Use	
	Duty cycle used in evaluation:	100	%		
	Operational frequency:	2440	MHz		
RF exposure evaluation	Standard used for evaluation:	Safety C	Code 6		
	Measurement distance:	0.2	m		
	RF value:	0.013	⊠ W/m ² □ V/m □ Measured □ Con	□ A/m nputed ⊠ Calculated	

End of the test report