



Choose Scandinavian trust

RADIO TEST REPORT – 454155-1APFWL

Type of assessment:

MPE Calculation report

Manufacturer:

Redline Communications Inc.

Hardware Version Identification Number (HVIN):

RDL-3211 XC

Product Marketing Name (PMN):

RDL-3211 XC

FCC ID:

QC8-RDL3211XC

IC certification number:

4310A-RDL3211XC

Specification:

- ◆ FCC 47 CFR Part 1 Subpart I, §§1.1307, 1.1310
- ◆ FCC 47 CFR Part 2 Subpart J, §2.1091
- ◆ KDB 447498 D01 General RF Exposure Guidance v06
- ◆ RSS-102 Issue 5 Amendment 1, (February 2021) – Annex A and B

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 29, 2022

Fahar Abdul Sukkoor, EMC/RF Specialist

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)

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

www.nemko.com



Lab locations

Company name	Nemko Canada Inc.			
Facilities	<i>Ottawa site:</i> 303 River Road Ottawa, Ontario Canada K1V 1H2 Tel: +1 613 737 9680 Fax: +1 613 737 9691	<i>Montréal site:</i> 292 Labrosse Avenue Pointe-Claire, Québec Canada H9R 5L8 Tel: +1 514 694 2684 Fax: +1 514 694 3528	<i>Cambridge site:</i> 1-130 Saltsman Drive Cambridge, Ontario Canada N3E 0B2 Tel: +1 519 650 4811	<i>Almonte site:</i> 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

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 simultaneous transmission	4

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 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

	Transmitter 1 (4940-4990MHz)	Transmitter 2 (2.4 GHz BLE)
Prediction frequency	4.950 GHz	2.444 GHz
Antenna type	Dual Polarization Antenna	Dipole Antenna
Antenna gain	25 dBi	2.14 dBi
Maximum transmitter conducted power	25.67 dBm (368.98 mW)	19.56 dBm (90.37 mW)
Prediction distance	100 cm	100 cm

1.1.3 MPE calculation

	Transmitter 1		Transmitter 2	
Fundamental transmit (prediction) frequency:	4950	MHz	2444	MHz
Maximum measured conducted peak output power:	25.67	dBm	19.56	dBm
Cable and/or jumper loss:	0.7	dB	0	dB
Maximum peak power at antenna input terminal:	24.97	dBm	19.56	dBm
Tx On time:	0.950	ms	1.000	ms
Tx period time:	1.000	ms	1.000	ms
Average factor:	95	%	100	%
Maximum calculated average power at antenna input terminal:	298.348	mW	90.3649	mW
Single Antenna gain (typical):	25	dBi	2.14	dBi
Number of antennae:	1		1	
Total system gain:	25.00	dB	2.14	dB
MPE limit for uncontrolled exposure at prediction frequency:	ISED limit	FCC limit	ISED limit	FCC limit
	0.877059 mW/cm ²	1.000000 mW/cm ²	0.541457 mW/cm ²	1.000000 mW/cm ²
Minimum calculated prediction distance for compliance:	8.770588 W/m ²	10.00 W/m ²	5.414569 W/m ²	10.00 W/m ²
	93	cm	20	cm
Typical (declared) distance:	100	cm	100	cm
Average power density at prediction frequency:	0.750782 mW/cm ²	0.750782 mW/cm ²	0.001177 mW/cm ²	0.001177 mW/cm ²
	7.507818 W/m ²	7.507818 W/m ²	0.011770 W/m ²	0.011770 W/m ²
Combined MPE compliance:				
Margin of Compliance:	0.68	dB	1.24	dB
Maximum allowable antenna gain:	25.68	dBi	1.24	dBi
Average power density to MPE limit ratio:	0.856		0.002	
Total sum of ratios for FCC:	0.752			
Total sum of ratios for ISED:	0.858			
Maximum allowed sum of ratios:	1.000			

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	4310A-RDL3211XC
Product marketing name (PMN)	RDL-3211 XC
Hardware version identification number (HVIN)	RDL-3211 XC
Firmware version identification number (FVIN)	N/A
Host marketing name (HMN)	N/A
Applicant company number	4310A
Applicant name	Redline Communications Inc.
SAR/RF exposure test laboratory	2040A-4 (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)
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: 95 % Operational frequency: 4950 MHz Standard used for evaluation: Safety Code 6 Measurement distance: 1.0 m RF value: ☒ W/m ² ☐ V/m ☐ A/m ☐ Measured ☐ Computed ☒ Calculated

End of the test report