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Assessment Report

REP011029-4R1ARWL

Type of assessment:

MPE Calculation report

Manufacturer:

Maven Wireless, Inc.

Model:

RHN00205

Product Marketing Name (PMN):

Nebula Digital DAS

HVIN/Model variant(s):

RHN00205

FCC ID:

2BE5B-RHN00205

IC certification number:

32082-RHN00205

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)

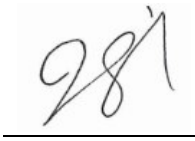
RSS-102 Annex B - Declaration of RF Exposure Compliance

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 18, 2024

James Cunningham, EMC/WL Manager

Prepared by



Signature

Lab locations=

Company name	Nemko USA Inc.
Address	2210 Faraday Ave, Suite 150
City	Carlsbad
State	California
Postal code	92008
Country	USA
Telephone	+1 760 444 3500
Website	www.nemko.com
FCC Site Number	Test Firm Registration Number: 392943 Designation Number: US5058
ISED Test Site	2040B-3

Prepared by	James Cunningham, EMC/WL Manager
Date	March 18, 2024
Signature	

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 contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.
This report must not be used by the client to claim product certification, approval, or endorsement by ANAB, NIST, or any agency of the U.S. Government.

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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 ƒ 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 ƒ 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.

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 (Band 25)	Transmitter 2 (Band 66)	Transmitter 3 (Band 30)	Transmitter 4 (Band 41)
Prediction frequency	1995 GHz	2200 GHz	2350 GHz	2690 MHz
Antenna type	None	None	None	None
Antenna gain	0 dBi	0 dBi	0 dBi	0 dBi
Maximum transmitter conducted power	43 dBm (19,953 mW)	43 dBm (19,953 mW)	43 dBm (19,953 mW)	43 dBm (19,953 mW)
Prediction distance	80 cm (FCC) 120 cm (ISED)	80 cm (FCC) 120 cm (ISED)	80 cm (FCC) 120 cm (ISED)	80 cm (FCC) 120 cm (ISED)

Notes:
As a worst-case assessment, it is assumed that the EUT can transmit a single carrier on all 4 supported bands simultaneously in a non-correlated manner.

The EUT is a repeater and, as such, is not provided with antenna. The calculations below are based on the rated output power and illustrate compliance assuming a 0 dBi antenna gain. The EUT will be professionally installed.

1.1.3 MPE calculation

	Band 25		Band 66		Band 30		Band 41	
Fundamental transmit (prediction) frequency:	1995 MHz		2200 MHz		2350 MHz		2690 MHz	
Maximum measured conducted peak output power:	43 dBm		43 dBm		43 dBm		43 dBm	
Cable and/or jumper loss:	0 dB		0 dB		0 dB		0 dB	
Maximum peak power at antenna input terminal:	43 dBm		43 dBm		43 dBm		43 dBm	
Tx On time:	1.00 ms		1.00 ms		1.00 ms		1.00 ms	
Tx period time:	1.00 ms		1.00 ms		1.00 ms		1.00 ms	
Average factor:	100 %		100 %		100 %		100 %	
Maximum calculated average power at antenna input terminal:	19953 mW		19953 mW		19953 mW		19953 mW	
Single Antenna gain (typical):	0 dBi		0 dBi		0 dBi		0 dBi	
Number of antennae:	1		1		1		1	
Total system gain:	0.00 dBi		0.00 dBi		0.00 dBi		0.00 dBi	
	ISED limit	**FCC limit**	**ISED limit**	**FCC limit**	**ISED limit**	**FCC limit**	**ISED limit**	**FCC limit**
MPE limit for uncontrolled exposure at prediction frequency:	**0.47 mW/cm^2**	**1.00 mW/cm^2**	**0.50 mW/cm^2**	**1.00 mW/cm^2**	**0.53 mW/cm^2**	**1.00 mW/cm^2**	**0.58 mW/cm^2**	**1.00**
	4.71 W/m^2	10.00 W/m^2	5.04 W/m^2	10.00 W/m^2	5.27 W/m^2	10.00 W/m^2	5.78 W/m^2	10.00
Minimum calculated prediction distance for compliance:	120 cm	80 cm	120 cm	80 cm	120 cm	80 cm	120 cm	80
Typical (declared) distance:	120 cm	80 cm	120 cm	80 cm	120 cm	80 cm	120 cm	80
Average power density at prediction frequency:	**0.110 mW/cm^2**	**0.248 mW/cm^2**	**0.110 mW/cm^2**	**0.248 mW/cm^2**	**0.110 mW/cm^2**	**0.248 mW/cm^2**	**0.110 mW/cm^2**	**0.248**
	1.103 W/m^2	2.481 W/m^2	1.103 W/m^2	2.481 W/m^2	1.103 W/m^2	2.481 W/m^2	1.103 W/m^2	2.481
Combined MPE compliance:								
Margin of Compliance:	**6.31 dB**	**6.05 dB**	**6.60 dB**	**6.05 dB**	**6.79 dB**	**6.05 dB**	**7.20 dB**	**6.05**
Maximum allowable antenna gain:	6.31 dBi	6.05 dBi	6.60 dBi	6.05 dBi	6.79 dBi	6.05 dBi	7.20 dBi	6.05
Average power density to MPE limit ratio:	0.234	0.248	0.219	0.248	0.209	0.248	0.191	0.248
Total sum of ratios for FCC:	0.992							
Total sum of ratios for ISED:	0.853							
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.

End of the test report