Calculation: RF-Exposure for oceanographic radar WERA model 4.0

Type identification: **WERA model 4.0**
FCC ID: **2AV3S-WERA**

Investigation is done for a fixed transmitter.
The calculation is done for farfield conditions on the MPE limits at separation distances from any part of the radiating structure of at least λ/2π.
The limits for Occupational / Controlled Exposure are given in Table 1, the limits for General Population / Uncontrolled Exposure are given in Table 2.

Frequency Range [MHz]	Electric Field Strength (E) [V/m]	Magnetic Field Strength (H) [A/m]	Power Density (S) [mW/cm²]	Averaging Time $\|E\|^2$,$\|H\|^2$ or S [min]
0.3 – 3.0	614	1.63	(100)*	6
3.0 – 30	1842/f	4.89/f	(900/f)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500			f/300	
1500 – 100,000			5	

Table 1: Limits for Occupational / Controlled Exposure.

Frequency Range [MHz]	Electric Field Strength (E) [V/m]	Magnetic Field Strength (H) [A/m]	Power Density (S) [mW/cm²]	Averaging Time $\|E\|^2$,$\|H\|^2$ or S [min]
0.3 – 1.34	614	1.63	(100)*	30
1.34 – 30	824/f	2.19/f	(180/f)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500			f/1500	30
1500 – 100,000			1.0	

Table 2: Limits for General Population / Uncontrolled Exposure.

Note: f = frequency in MHz; * Plane – wave equivalent power density

- **MPE evaluation**

The values of Electric Field Strength (E), Magnetic Field Strength (H) and Power Density (S) can be converted among each other under far field conditions.
Therefore investigation of the Electric Field Strength is sufficient.

Frequency	RF power (conducted) [1]	Antenna gain [2]	EIRP	λ/2π	Electric Field Strength @ λ/2π [3]		Electric Field Strength Limit (uncontrolled exposure) [4]	
[MHz]	[dBm]	[dBi]	[dBm]	[m]	[V/m]	[dBµV/m]	[V/m]	[dBµV/m]
5.2625	45.80	-2.06	43.74	9.07	2.95	129.39	156.58	163.89
13.4500	44.80	-2.66	42.14	3.55	6.26	135.94	61.26	155.74
16.1000	44.60	5.32	49.92	2.97	18.36	145.28	51.18	154.18

Table 3: Calculated results for the WERA model 4.0 compared to the limit for uncontrolled exposure.

[1]) RF power (conducted) from test report F200562E1 from PHOENIX TESTLAB GmbH.
[2]) Antenna gain as declared by the applicant.
[3]) Electric field strength is calculated according to ANSI C63.26-2015 chapter 5.2.7:
E (dBµV/m) = EIRP (dBm) – 20 log (D) + 104.8
[4]) Electric Field Strength Limit according to table 2 of this document

The value for the “General population / Uncontrolled Exposure” of the Electric Field Strength is below the limit of CFR Part 47, §1.1310 at separation distances from any part of the radiating structure of λ/2π.

The WERA model 4.0 from HELZEL Messtechnik GmbH (FCC ID: 2AV3S-WERA) is in compliance with the maximum permissible exposure (MPE) limits for the Electric Field Strength given by the FCC 47CFR §1.1310 (4)(e) Table 1 at separation distances from any part of the radiating structure of λ/2π.

At separation distances from any part of the radiating structure less than λ/2π measurements at the location of the oceanographic radar have to be carried out to determine the required separation distances.