MPE Calculation / RF Exposure

Product: Air Quality Monitor
Applicant: ARIM SCIENCE Inc.
Model: ArimAir RA300
Address: 66, Daehwa-ro 106beon-gil Pentaplex 918, Daejeon, South Korea
FCC ID: 2BDYS-RA300

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
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
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

Before equipment certification is granted, the procedure of IC RSS-102 must be followed concerning the exposure of humans to RF fields.

According to IC RSS-102 Issue 2 section 4.1, RF limits used for general public will be applied to the EUT.

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Time Averaging (min)
0.003 - 1	280	2.19	-	6
1 - 10	280 / f	2.19 / f	-	6
10 - 30	28	2.19 / f	-	6
30 – 300	28	0.073	2*	6
300 – 1 500	1.585 f$^{0.5}$	0.0042 f$^{0.5}$	f / 150	6
1 500 – 15 000	61.4	0.163	10	6
15 000 – 150 000	61.4	0.163	10	616000 / f$^{1.2}$
150 000- 300 000	0.158 f$^{0.5}$	4.21 x 10 -4 f$^{0.5}$	6.67 x 10^{-5} f	616000 / f$^{1.2}$

Note: ƒ is frequency in MHz
* Power density limit is applicable at frequencies greater than 100 MHz

MPE Prediction   Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

Classfication   The antenna of this product is at least 20 cm away from the body of the user. So this product is classified as mobile device.

Max. tune-up power(dBm)

802.11b	802.11g	802.11n(HT20)	802.11n(HT40)
26.0	25.5	25.5	**26.0**

$$S = ERP/4 \pi R^2$$
$$\text{In other words, } R = \sqrt{ERP/4\pi} \times S(Pd)$$

Where   S = Power density

ERP = Effective Radiated Power

R = distance to the centre of radiation of the antenna

Values   S = 1.0 mW/cm^2 for General population uncontrolled exposure (FCC Part 1.1310 Radiofrequency radiation exposure limits)

S = 1.0 mW/cm^2

PT = 26.00 dBm (398.11 mW) : measured maximum output power

G = Antenna gain = 3.40 dBi (2.188 in linear terms)

EIRP = PT x G

R = 20 cm

Calculation   EIRP = 398.11 x 2.188 = 870.96 mW

S = 870.96/12.56 x (20)^2 = 870.96/5024

S = 0.173 mW/cm^2

Conclusion   **This confirms compliance to the required radio frequency radiation exposure limit of 1.0 mW/cm^2 at 20 cm operation.**