

FCC ID:AK8ERA-201D1

RF EXPOSURE CALCULATIONS FOR ANTENNA OF WIRELESS LAN CARD, ERA-201D1

From FCC1.1310 table 1A, the maximum permissible RF exposure for an uncontrolled environment is $1\text{mW}/(\text{cm}^2)$, where, $(\text{cm}^2) = \text{square cm}$.

The electric field generated for a $1\text{mW}/(\text{cm}^2)$ exposure (S) is calculated as follows:

$$S = E^2/Z$$

where, S = Power density

E = Electric field

Z = Impedance

$$E^2 = S \times Z$$

$$1\text{mW}/(\text{cm}^2) = 10\text{ W}/(\text{m}^2)$$

Z is 377 ohms of the impedance of free space, where E and H field are perpendicular.

Thus the Electric field to produce a $1\text{mW}/(\text{cm}^2)$ exposure is :

$$E = \sqrt{(10 \times 377)} = 61.4\text{ V/m}, \text{ which is equivalent to } 1\text{ mW}/(\text{cm}^2).$$

Maximum conducted peak output power is 18.1dBm (refer to page A11 of test report 21AE0018YW-1) and maximum antenna gain is -3.6dBi (refer to page 5 of test report). The maximum radiated output power resulted in 28.2 mW.

Using the relationship between electric field E, effective radiated power in watts P, and distance in meters D, the corresponding distance D to produce a $1\text{mW}/(\text{cm}^2)$ is calculated in the following expression:

$$D = \sqrt{(P \times 30)} / E = \sqrt{(28.2 \times 10 \times 30)} / 61.4 = 0.015\text{ m} = 1.5\text{ cm}$$

Where, P : maximum effective radiated power measured, 14.5 dBm (= 28.2 mW)

E : electric field equivalent to $1\text{ mW}/(\text{cm}^2)$, 61.4 V/m

Notice in Installation Manual:

While installing and operating this transmitter with integral antenna, the radio frequency exposure limit of $1\text{ mW}/(\text{cm}^2)$ may be exceeded at distances close to the antennas installed. Therefore, the user must maintain a minimum distance of 20 cm from the antenna at all time.

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The table below identifies the distance where the 1 mW/(cm*cm) exposure limits may be exceeded during continuous transmission using the internal antenna.

Antenna Type	Peak output Power		Calculated RF Exposure Separation Distance(cm)	Minimum RF Exposure Separation Distance(cm)
	(DBm)	(mW)		
Integral	14.5	28.2	1.50	20

