

## RF Exposure calculations (Mobile device)

From §FCC 1.1310 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

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

Z is 377 ohm 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:

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

Maximum conducted peak output power is 18.87dBm and maximum antenna gain is 0 dBi. The maximum radiated output power resulted in 77.09 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:

$$D = (P \times 30)^{1/2} / E = (77.09 \times 10 \times 30)^{1/2} / 61.4 = 2.48\text{ cm}$$

where, P: maximum effective radiated power measured, 18.87 dBm (77.09 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, the radio frequency exposure limit of  $1\text{mW}/(\text{cm}^2)$  may be exceeded at distances close to the transmitter. therefore, the user must maintain a minimum distance of 20 cm from the device at all time.

The table below identifies the distance where the  $1\text{mW}/(\text{cm}^2)$  exposure limits may be exceeded during continuous transmission using this device.

Peak output power		calculated RF Exposure Separation Distance(cm)	Minimum RF Exposure Separation Distance(cm)
dBm	mW	2.48	20
18.87	77.09		