9 Annex A (MPE)

Prediction of MPE

This device is designed to be used only for fixed and mobile applications.

It has integrated internal antennas. External connectors are provided which allows connection of external antennas. Connection of external antennas automatically disconnects the internal antennas.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all the persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	Power density (mW/cm^2)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100.000	1.0	30

Based on the above table the limits are:
For 5900 MHz frequency band device: 1 mW/cm^2

§ 2.1091:
The limit for 5900 MHz mobile operations, where no routine evaluation is required, is: 3W EIRP

Using the equation from page 19 of OET Bulletin 65, Edition 97-01:

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW)
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 (appropriate units, e.g., cm)

Compliance with MPE limits can be guaranteed as the calculations below show:

Internal Antennas

Band	Maximum radiated output power (dBm)	Maximum radiated output power (mW)	Duty cycle	Equivalent radiated output power (Maximum radiated output power x duty cycle) (mW)
5855 MHz to 5895 MHz	-3.12	0.49	100%	0.49
5895 MHz to 5915 MHz	-4.62	0.35	100%	0.35

Maximum output power considerations:

P x G_1	Maximum power input to the antenna x Antenna gain (dBi) to comply with MPE limits:	0.49	mW
R	Distance:	20	cm
S	MPE limit for uncontrolled exposure:	0.20	mW/cm^2

Internal antenna configuration **complies** with MPE limits ($9.75 * 10^{-5} mW/cm^2$).