

Appendix A: RF Exposure FCC Rules and Regulations Part 1.1307, 1.1310, 2.1091, 2.1093

1 General Information

Environment: General Population/Uncontrolled Exposure
Device category: Disturbance sensor
Modulation Type/Mode: FMCW

2 Antenna Operating Configuration and Test Conditions

FCC 15.245 Antenna	Simulated Antenna Gain (dBi)
Integrated Patch Array	11

Note: Simulated gain presented but not used in calculations below. Instead, worst-case EIRP used for RF Exposure calculations below.

Antenna Type	Highest Peak Measured EIRP Power (dBuV/m)	Highest Peak Measured EIRP Power (dBm)	Highest Peak Measured EIRP Power (mW)
Integrated Patch Array Antenna	119.8	24.6	288.4

3 MPE Calculation

The maximum distance from the antenna at which MPE is met or exceeded d , in centimeters, is calculated from the power density S , in mW/cm^2 , transmit power P in mW , and the transmit antenna numeric gain G . The limit for general population/uncontrolled exposure from 1500-100000 MHz is $1 \text{ mW}/\text{cm}^2$.

$$S = \text{EIRP (mW)} / (4 \cdot \pi \cdot d^2)$$

$$d = \text{SQRT} ((\text{EIRP (mw)}) / (S \cdot 4\pi))$$

where: S = Power density (mW/cm^2); EIRP = Effective Isotropic Radiated Power (mW); d = distance

Below is the MPE Calculation for the EUT and its integrated patch array antenna using the $1 \text{ mW}/\text{cm}^2$ power density limit for general population/uncontrolled exposure, and the worst-case measured peak EIRP of 288.4 mW and solving for distance (d) in (cm) and solving for the worst-case power density at 20 cm worst-case mobile distance is as follows:

Linear	Log
Duty % = 100	0 dB
Worst-case measured peak EIRP = 288.4 mW	24.6 dBm
<u>$d = 4.8 \text{ cm}$</u>	<u>$S (20\text{cm}) = 0.0574045 \text{ mW}/\text{cm}^2$</u>