

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(i) Maximum Permissible Exposure

RF Exposure Requirements: **§1.1307(b)(1) and §1.1307(b)(2):** 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 levels in excess of the Commission's guidelines.

RF Radiation Exposure Limit: **§1.1310:** As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

Note: There are 900MHz and 2.4GHz radios in the EUT. All transmitting antennas are 20cm away from each other.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) 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
300-1,500			f/1500	30
1,500-100,000			1.0	30

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

Equation from page 18 of OET 65, Edition 97-01

$$S = PG / 4\pi R^2 \quad \text{or} \quad R = \sqrt{(PG / 4\pi S)}$$

where, S = Power Density (mW/cm²)

P = Power Input to antenna (mW)

G = Antenna Gain (numeric value)

R = Distance (cm)

$$G(\text{dBi}) = 10 \log G (\text{linear})$$

Test Results:

Results are based on KDB 447498 [Section 7.2]. Transmitters used in mobile device exposure conditions for simultaneous transmission operations.

MPE Result for Intentional Radiators of Frequency Range: 300 MHz – 1500 MHz

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (mW)	Ant Gain (dBi)	Ant Gain (dBi)	Power Density (mW/cm ²)	Limit at 20 cm (mW/cm ²) f/1500	Percentage of Limit (%)
927.5	21.05	127.35	4	2.512	0.06364	0.618	10.29

Note: Tune Up Tolerance is [+/-] 1dB for 927.5 MHz radios.

The safe distance where Power Density is less than the MPE Limit listed above was found to be 20 cm.

MPE Result for Intentional Radiators of Frequency Range: 1500 MHz – 100,000 MHz

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (mW)	Ant Gain (dBi)	Ant Gain (dBi)	Power Density (mW/cm ²)	Limit at 20 cm (mW/cm ²)	Percentage of Limit (%)
2402	11.55	14.28	3	1.995	0.0057	1	0.57

Note: Tune Up Tolerance is [+/-] 1dB for 2.4 GHz radio.

The safe distance where Power Density is less than the MPE Limit listed above was found to be 20 cm.

Note: WIFI radio 1 is pre-certified with FCC ID: **2AHMR-ESP12S**

MPE Result for Intentional Radiators of Frequency Range: 1500 MHz – 100,000 MHz

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (mW)	Ant Gain (dBi)	Ant Gain (dBi)	Power Density (mW/cm ²)	Limit at 20 cm (mW/cm ²)	Percentage of Limit (%)
2462	23.8	239.88	-0.5	0.891	0.0425	1	0.42

Note: Tune Up Tolerance is [+/-] 1dB for 2.4 GHz radio.

The safe distance where Power Density is less than the MPE Limit listed above was found to be 20 cm.

Note: WIFI radio 2 is pre-certified with FCC ID: **TE7WN725N**