

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: Co-located antenna are 300 – 450 MHz pulsed transmitter, 2.4 GHz Wi-Fi, 2.4 GHz BLE, 900 MHz Hopping

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)

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 above 1500 MHz.

FCC							
Frequency (MHz)	Con. Pwr. (dBm)	Con. Pwr. (mW)	Ant. Gain (dBi)	Ant. Gain numeric	Pwr. Density (mW/cm ²)	Limit (mW/cm ²)	Percentage of Limit %
2437	24.01	251.76	-1.5	0.708	0.03546	1	3.55
2405	5.41	3.475	1.3	1.349	0.00093	1	0.09

Note: Tune Up Tolerance is [+/-] 1dB for 2437 MHz and 2405 MHz radios.

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

Frequency (MHz)	EIRP (dBm)	Tune Up Tolerance [+/-](dB)	Final EIRP (mW)	Power Density (mW/cm ²)	Limit at 20 cm (mW/cm ²)	Percentage of Limit
410.5	-17.84	1	0.02	3.98089E-06	0.27	≤0.01
321.5	-26.45	1	0.002	3.98089E-07	0.21	0.02
399.5	-20.41	1	0.009	1.7914E-06	0.27	0.02

902.5	0.384	1	1.375	0.000273686	0.60	0.05
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The safe distance where Power Density is less than the MPE Limit listed above was found to be 20 cm.