

## 1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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### 1.1 Standard Applicable

According to § 1.1307(b)(1), system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

#### (a) Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Times   E   <sup>2</sup> ,   H   <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

#### (b) Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Times   E   <sup>2</sup> ,   H   <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

Note: f = frequency in MHz: \* = Plane-wave equivalents power density

### 1.2 MPE Calculation Method

$$S = (30 \cdot P \cdot G) / (377 \cdot R^2)$$

S = power density (in appropriate units, e.g., mw/cm<sup>2</sup>)

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, the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

### 1.3 MPE Calculation Result

According to KDB 447498 D01 v05 and KDB 662911 D01, the following MPE calculation shall to demonstrate RF exposure compliance.

#### Base on transmit by single antenna

Maximum peak output power: 19.24dBm (Conducted) (802.11b, Middle Channel)

Maximum peak output power at antenna input terminal: 83.9460 (mW)

Prediction distance: >20 (cm)

Prediction frequency: 2437 (MHz)

Antenna gain (typical): 2 (dBi)

Antenna gain (typical): 1.58489 (numeric)

The worst case is power density at prediction frequency at 20cm: 0.02647 (mw/cm<sup>2</sup>)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm<sup>2</sup>)

$$0.02647 \text{ (mw/cm}^2\text{)} < 1 \text{ (mw/cm}^2\text{)}$$

#### Base on transmit by two antennas

Maximum peak output power: 19.28dBm (Conducted) (802.11n HT20, Highest Channel)

Maximum peak output power at antenna input terminal: 84.7090 (mW)

Prediction distance: >20 (cm)

Prediction frequency: 2462 (MHz)

Antenna gain (typical): 2 (dBi)

Directional gain (typical): 5 (dBi) (G<sub>ANT</sub> + 10 log (N<sub>ANT</sub>) dBi)

Directional gain (typical): 3.16228 (numeric)

The worst case is power density at prediction frequency at 20cm: 0.05329 (mw/cm<sup>2</sup>)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm<sup>2</sup>)

$$0.05329 \text{ (mw/cm}^2\text{)} < 1 \text{ (mw/cm}^2\text{)}$$

Result: Pass