

# 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 equivalent power density

## 1.2 MPE Calculation Method

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

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

Product Name: IP Camera

Model No.: HW0024, HW0021

Maximum peak output power: 15.71 (dBm)

Maximum peak output power at antenna input terminal: 37.24 (mW)

Prediction distance: >20(cm)

Prediction frequency: 2412 (MHz)

Antenna gain: 2 (dBi)

Directional gain: 1.58 (numeric)

The worst case is power density at prediction frequency at 20cm: 0.012(mw/cm<sup>2</sup>)

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

$$0.012(\text{mw}/\text{cm}^2) < 1 (\text{mw}/\text{cm}^2)$$

Result: Pass