



# Radio Frequency Exposure

## LIMIT

According to §15.247(i), 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. See § 1.1307(b)(1) of this chapter.

## EUT Specification

|                                   |   |
|-----------------------------------|---|
| <b>EUT</b>                        | Indoor 1080P camera   |
| <b>Frequency band (Operating)</b> | <input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz<br><input type="checkbox"/> WLAN: 5.150GHz ~ 5.250GHz<br><input type="checkbox"/> WLAN: 5.250GHz ~ 5.350GHz<br><input type="checkbox"/> WLAN: 5.470GHz ~ 5.725GHz<br><input type="checkbox"/> WLAN: 5.725GHz ~ 5.850GHz<br><input type="checkbox"/> Bluetooth: 2.402GHz ~ 2.480 GHz |
| <b>Device category</b>            | <input type="checkbox"/> Portable (<20cm separation)<br><input checked="" type="checkbox"/> Mobile (>20cm separation)   |
| <b>Exposure classification</b>    | <input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> )<br><input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )   |
| <b>Antenna diversity</b>          | <input type="checkbox"/> Single antenna<br><input checked="" type="checkbox"/> Multiple antennas<br><input type="checkbox"/> Tx diversity<br><input type="checkbox"/> Rx diversity<br><input checked="" type="checkbox"/> Tx/Rx diversity   |
| <b>Max. output power</b>          | 802.11b: 20.31 dBm (107.40 mW)<br>802.11g: 25.84 dBm (383.71 mW)<br>802.11n (20MHz): 25.98 dBm (396.28 mW)<br>802.11n (40MHz): 23.88 dBm (244.34 mW)  |
| <b>Antenna gain (Max)</b>         | 1.62dBi   |
| <b>Evaluation applied</b>         | <input checked="" type="checkbox"/> MPE Evaluation*<br><input type="checkbox"/> SAR Evaluation<br><input type="checkbox"/> N/A  |

**Remark:**

1. The maximum output power is 25.98dBm (396.28 mW) at 2437 MHz (with numeric 1.62 antenna gain.)
2. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.
3. For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm<sup>2</sup> even if the calculation indicates that the power density would be larger.

\*Note: Simultaneous transmission is not applicable for this EUT.



**TEST RESULTS**

No non-compliance noted.

**Calculation**

Given  $E = \frac{\sqrt{30 \times P \times G}}{d}$  &  $S = \frac{E^2}{3770}$

- Where  $E =$  Field strength in Volts / meter
- $P =$  Power in Watts
- $G =$  Numeric antenna gain
- $d =$  Distance in meters
- $S =$  Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770d^2}$$

Changing to units of mW and cm, using:

$$P (mW) = P (W) / 1000 \text{ and}$$
$$d (cm) = d(m) / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

- Where  $d =$  Distance in cm
- $P =$  Power in mW
- $G =$  Numeric antenna gain
- $S =$  Power density in mW / cm<sup>2</sup>



**Maximum Permissible Exposure**

| Modulation Mode | Frequency band (MHz) | Max. Conducted output power(dBm) | Antenna gain (dBi) | Distance (cm) | Power density (mW/cm2) | Limit (mW/cm2) |
|-----------------|----------------------|----------------------------------|--------------------|---------------|------------------------|----------------|
| 802.11b         | 2412-2462            | 20.31                            | 1.62               | 20            | 0.0309                 | 1              |
| 802.11g         | 2412-2462            | 25.84                            | 1.62               | 20            | 0.1103                 | 1              |
| 802.11n (20MHz) | 2412-2462            | 25.98                            | 1.62               | 20            | 0.1140                 | 1              |
| 802.11n (40MHz) | 2422-2452            | 23.88                            | 1.62               | 20            | 0.0703                 | 1              |

**NOTE:**

Total (Chain0+Chain1) , the formula of calculated the MPE is:

$$CPD1 / LPD1 + CPD2 / LPD2 + .....etc. < 1$$

CPD = Calculation power density

LPD = Limit of power density