



APPENDIX I 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

| | | | |
|-------------------------------------|---|--------------|--------------|
| EUT | Wi Fi Action Cam | | |
| Model | HD-99CW | | |
| RF Module | Atheros | Model | AR6103G-BM2D |
| Frequency band (Operating) | <input checked="" type="checkbox"/> 802.11b/g/n HT20: 2.412GHz ~ 2.462GHz <input type="checkbox"/> Others | | |
| Device category | <input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others | | |
| Exposure classification | <input type="checkbox"/> Occupational/Controlled exposure ($S = 5\text{mW/cm}^2$) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure ($S=1\text{mW/cm}^2$) | | |
| Antenna Specification | 2.4GHz: Antenna Gain : 2.82 dBi (Numeric gain 1.91) | | |
| Maximum Average output power | IEEE 802.11b Mode: 14.29 dBm (26.853 mW) IEEE 802.11g Mode: 13.52 dBm (22.491 mW) IEEE 802.11n HT 20 Mode 13.39 dBm (21.827 mW) | | |
| Maximum Tune up Power | IEEE 802.11b Mode: 14.50 dBm (28.184 mW) IEEE 802.11g Mode: 14.50 dBm (28.184 mW) IEEE 802.11n HT 20 Mode 13.50 dBm (22.387 mW) | | |
| Evaluation applied | <input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A | | |



Revision History

| Rev. | Issue Date | Revisions | Effect Page | Revised By |
|------|------------|---------------|-------------|-------------|
| 00 | 2014/5/21 | Initial Issue | ALL | Angel Cheng |



TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

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:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

$$S = \frac{30 \times (P / 1000) \times G}{377 \times (d / 100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \textbf{Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

**Maximum Permissible Exposure**

Substituting the MPE safe distance using $d = 20$ cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

IEEE 802.11b mode:

| Ch. | Frq.(MHz) | P (mW) | Gain (num.) | D (cm) | Power density in mW / cm ² | Limit (mW/cm2) |
|-----|-----------|--------|-------------|--------|---------------------------------------|----------------|
| 11 | 2462 | 28.184 | 1.91 | 20 | 0.0107 | 1 |

IEEE 802.11g mode:

| Ch. | Frq.(MHz) | P (mW) | Gain (num.) | D (cm) | Power density in mW / cm ² | Limit (mW/cm2) |
|-----|-----------|--------|-------------|--------|---------------------------------------|----------------|
| 11 | 2462 | 28.184 | 1.91 | 20 | 0.0107 | 1 |

IEEE 802.11n HT20 mode:

| Ch. | Frq.(MHz) | P (mW) | Gain (num.) | D (cm) | Power density in mW / cm ² | Limit (mW/cm2) |
|-----|-----------|--------|-------------|--------|---------------------------------------|----------------|
| 11 | 2462 | 22.387 | 1.91 | 20 | 0.0085 | 1 |