# 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

<table>
<tr><td>EUT</td><td>Action Cam</td></tr>
<tr><td>Trade Name / Model:</td><td>
<table>
<tr><th>Model</th><th>Trade Name</th></tr>
<tr><td>HD-99AW</td><td rowspan="2">SALIX</td></tr>
<tr><td>HD-95AW</td></tr>
<tr><td>V1 PLUS</td><td>NECKER</td></tr>
</table>
</td></tr>
<tr><td>Model Discrepancy</td><td>
<table>
<tr><th>Model</th><th>Difference</th></tr>
<tr><td>HD-99AW</td><td>Aluminium shell difference</td></tr>
<tr><td>HD-95AW</td><td>Plastic housing difference</td></tr>
<tr><td>V1 PLUS</td><td>Marketing purpose only</td></tr>
</table>
</td></tr>
<tr><td>Frequency band (Operating)</td><td>☒ Bluetooth 2.1 + EDR / 4.0: 2402 ~ 2480 MHz<br>802.11b/g/n HT20: 2.412GHz ~ 2.462GHz<br>☐ Others</td></tr>
<tr><td>Device category</td><td>☐ Portable (<20cm separation)<br>☒ Mobile (>20cm separation)<br>☐ Others</td></tr>
<tr><td>Exposure classification</td><td>☐ Occupational/Controlled exposure (S = 5mW/cm$^2$)<br>☒ General Population/Uncontrolled exposure (S=1mW/cm$^2$)</td></tr>
<tr><td>Antenna Specification</td><td>2.4GHz: Antenna Gain : -0.50 dBi (Numeric gain 0.89)</td></tr>
<tr><td>Maximum Average output power</td><td>IEEE 802.11b Mode: 14.67 dBm (29.309 mW)<br>IEEE 802.11g Mode: 14.68 dBm (29.376 mW)<br>IEEE 802.11n HT 20 Mode 14.32 dBm (27.040 mW)</td></tr>
<tr><td>Maximum Tune up Power</td><td>IEEE 802.11b Mode: 16.50 dBm (44.668 mW)<br>IEEE 802.11g Mode: 16.50 dBm (44.668 mW)<br>IEEE 802.11n HT 20 Mode 16.00 dBm (39.811 mW)</td></tr>
<tr><td>Evaluation applied</td><td>☒ MPE Evaluation*<br>☐ SAR Evaluation<br>☐ N/A</td></tr>
</table>

# Revision History

| Rev. | Issue Date | Revisions | Effect Page | Revised By |
|---|---|---|---|---|
| 00 | 2015/01/06 | Initial Issue | ALL | Doris Chu |

# 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 (mW) = P (W) / 1000 and*

*d (cm) = d(m) / 100*

Yields

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

*Where d = Distance in cm*
*P = Power in mW*
*G = Numeric antenna gain*
*S = Power density in mW / $cm^2$*

## 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 / cm$^2$*

### IEEE 802.11b mode:

| Ch. | Frq.(MHz) | P (mW) | Gain (num.) | D (cm) | Power density in mW / cm$^2$ | Limit (mW/cm2) |
|---|---|---|---|---|---|---|
| 11 | 2462 | 44.668 | 0.89 | 20 | 0.0079 | 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 | 44.668 | 0.89 | 20 | 0.0079 | 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 | 39.811 | 0.89 | 20 | 0.0071 | 1 |