



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	WLAN 11ac USB Adapter,2T2R
Model	WL-8210-V1
Frequency band (Operating)	<input checked="" type="checkbox"/> Bluetooth 2.1 + EDR / 4.0: 2402 ~ 2480 MHz 802.11b/g/n HT20: 2.412GHz ~ 2.462GHz 802.11n HT40: 2.422GHz ~ 2.452GHz 802.11a: 5150 ~ 5250MHz / 5725 ~ 5850MHz 802.11 HT20: 5150 ~ 5250MHz / 5725 ~ 5850MHz 802.11 HT40: 5150 ~ 5250MHz / 5725 ~ 5850MHz 802.11AC HT80: 5170 ~ 5330 MHZ / 5490 ~ 5815 MHZ <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 = 5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna Specification	5GHz: Antenna Gain : 5.90 dBi (Numeric gain 3.89) 2.4GHz: Antenna Gain : 3.50 dBi (Numeric gain 2.24)
Maximum Average output power	IEEE 802.11b Mode: 7.53 dBm (5.662 mW) IEEE 802.11g Mode: 7.62 dBm (5.781 mW) IEEE 802.11n HT 20 Mode 7.69 dBm (5.875 mW) IEEE 802.11n HT 40 Mode 7.64 dBm (5.808 mW) IEEE 802.11a Mode: 7.58 dBm (5.728 mW) IEEE 802.11n HT20 Mode: 7.59 dBm (5.741 mW) IEEE 802.11n HT40 Mode: 7.86 dBm (6.109 mW) IEEE 802.11ac HT80 Mode 7.84 dBm (6.081 mW)
Maximum Tune up Power	IEEE 802.11b Mode: 9.00 dBm (7.943 mW) IEEE 802.11g Mode: 9.00 dBm (7.943 mW) IEEE 802.11n HT 20 Mode 9.00 dBm (7.943 mW) IEEE 802.11n HT 40 Mode 9.00 dBm (7.943 mW) IEEE 802.11a Mode: 9.00 dBm (7.943 mW) IEEE 802.11n HT20 Mode: 9.00 dBm (7.943 mW) IEEE 802.11n HT40 Mode: 9.00 dBm (7.943 mW) IEEE 802.11ac HT80 Mode 9.00 dBm (7.943 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	2014/07/08	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:

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

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

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

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 $P = \text{Power in mW}$

$G = \text{Numeric antenna gain}$

$S = \text{Power density in mW / cm}^2$

IEEE 802.11b mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
1	2412	79.433	2.24	20	0.0354	1

IEEE 802.11g mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
6	2437	50.119	2.24	20	0.0223	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
6	2437	31.623	2.24	20	0.0141	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
6	2437	31.623	2.24	20	0.0141	1

IEEE 802.11a mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
48	5240	31.623	3.89	20	0.0245	1

IEEE 802.11a HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
38	5190	31.623	3.89	20	0.0245	1

IEEE 802.11a HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
38	5190	31.623	3.89	20	0.0245	1

IEEE 802.11ac HT80 Mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
42	5210	31.623	3.89	20	0.0245	1