



# 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

<b>EUT</b>	1200Mbps 802.11ac Dual Band Ceiling Mount Wireless Access Point		
<b>Model</b>	WDAP-C7200AC		
<b>RF Module</b>	Realtek	Model:	2.4GHz : RTL8192ER 5GHz : RTL8812AR
<b>Frequency band (Operating)</b>	<input checked="" type="checkbox"/> 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		
<b>Device category</b>	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others		
<b>Exposure classification</b>	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )		
<b>Antenna Specification</b>	5GHz: Antenna Gain : 4.00 dBi (Numeric gain 2.51) 2.4GHz: Antenna Gain : 2.50 dBi (Numeric gain 1.78)		
<b>Maximum Average output power</b>	IEEE 802.11b Mode: 17.86 dBm (61.094 mW) IEEE 802.11g Mode: 12.70 dBm (18.621 mW) IEEE 802.11n HT 20 Mode 13.00 dBm (19.953 mW) IEEE 802.11n HT 40 Mode 13.16 dBm (20.701 mW) IEEE 802.11a Mode: 11.62 dBm (14.521 mW) IEEE 802.11n HT20 Mode 15.35 dBm (34.277 mW) IEEE 802.11n HT40 Mode 15.26 dBm (33.574 mW) IEEE 802.11ac HT80 Mode 15.18 dBm (32.961 mW)		



<b>Maximum Tune up Power</b>	IEEE 802.11b Mode: 19.50 dBm (89.125 mW) IEEE 802.11g Mode: 14.50 dBm (28.184 mW) IEEE 802.11n HT 20 Mode 14.50 dBm (28.184 mW) IEEE 802.11n HT 40 Mode 15.00 dBm (31.623 mW) IEEE 802.11a Mode: 13.50 dBm (22.387 mW) IEEE 802.11n HT20 Mode: 17.00 dBm (50.119 mW) IEEE 802.11n HT40 Mode: 17.00 dBm (50.119 mW) IEEE 802.11ac HT80 Mode: 17.00 dBm (50.119 mW)
<b>Evaluation applied</b>	<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	2014/11/4	Initial Issue	ALL	Kelly 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 / cm<sup>2</sup>



**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<sup>2</sup>

**IEEE 802.11b mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm2)
11	2462	17.86	2.5	20	0.0089	1

**IEEE 802.11g mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm2)
1	2412	12.7	2.5	20	0.0063	1

**IEEE 802.11n HT20 mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm2)
1	2412	13	2.5	20	0.0065	1

**IEEE 802.11n HT40 mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm2)
3	2422	13.16	2.5	20	0.0065	1

**IEEE 802.11a mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm2)
149	5745	11.62	4	20	0.0092	1

**IEEE 802.11a HT20 mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm2)
48	5240	15.35	4	20	0.0122	1

**IEEE 802.11a HT40 mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm2)
46	5230	15.26	4	20	0.0121	1

**IEEE 802.11ac HT80 Mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm2)
155	5755	15.18	4	20	0.0121	1