



# 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>	AOPEN Chromebase Commercial
<b>Frequency band (Operating)</b>	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input checked="" type="checkbox"/> WLAN: 5.150GHz ~ 5.250GHz <input checked="" type="checkbox"/> WLAN: 5.250GHz ~ 5.350GHz <input checked="" type="checkbox"/> WLAN: 5.470GHz ~ 5.725GHz <input checked="" type="checkbox"/> WLAN: 5.725GHz ~ 5.850GHz <input checked="" type="checkbox"/> Bluetooth: 2.402GHz ~ 2.480 GHz
<b>Device category</b>	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation)
<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 diversity</b>	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input checked="" type="checkbox"/> Tx/Rx diversity
<b>Max. output power</b>	Band: 2402-2462MHz 802.11b: 20.47 dBm (111.4 mW) 802.11g: 23.74 dBm (236.6 mW) 802.11n (20MHz): 23.49 dBm (223.4 mW) 802.11n (40MHz): 23.51 dBm (224.4 mW)  Band: 2402-2480MHz GFSK: 3.66 dBm(2.3mW) π/4-DQPSK: 2.15 dBm(1.6mW) 8DPSK: 1.24 dBm(1.3mW) GFSK(BLE): 2.77 dBm(1.9mW)  Band: 5150-5250 MHz 802.11a: 21.6 dBm (144.5mW) 802.11an (20MHz): 20.04 dBm (100.9 mW) 802.11an (40MHz): 19.9 dBm (97.7 mW) 802.11ac (80MHz): 18.81 dBm (76.0 mW)  Band: 5250-5350 MHz 802.11a: 21.79 dBm (151mW) 802.11an (20MHz): 19.81dBm (95.7 mW) 802.11an (40MHz): 18.16 dBm (65.5 mW) 802.11ac (80MHz): 18.94 dBm (78.3 mW)



	Band: 5470-5725 MHz 802.11a: 22.59 dBm (181.6mW) 802.11an (20MHz): 21.29 dBm (134.6 mW) 802.11an (40MHz): 20.85 dBm (121.6 mW) 802.11ac (80MHz): 19.45 dBm (88.1 mW)  Band: 5725-5850 MHz 802.11a: 22.72 dBm (187.1mW) 802.11an (20MHz): 21.01 dBm (126.2 mW) 802.11an (40MHz): 21.34 dBm (136.1 mW) 802.11ac (80MHz): 21.63 dBm (145.5 mW)
<b>Antenna gain (Max)</b>	Antenna A: 2dBi Antenna B: 2dBi Directional gain: 5dBi
<b>Evaluation applied</b>	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A
<b>Remark:</b> 1. The maximum output power is <u>23.74dBm (236.6 mW)</u> at <u>2437 MHz</u> (with numeric 5 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

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

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:

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

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

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/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
		ANT A+B			ANT A+B	
802.11b	2412-2462	20.47	5	20	0.070	1
802.11g	2412-2462	23.74	5	20	0.149	1
802.11n (20MHz)	2412-2462	23.49	5	20	0.141	1
802.11n (40MHz)	2422-2452	23.51	5	20	0.141	1
GFSK	2402-2480	3.66	5	20	0.001	1
$\pi/4$ -DQPSK	2402-2480	2.15	5	20	0.001	1
8DPSK	2402-2480	1.24	5	20	0.001	1
GFSK(BLE)	2402-2480	2.77	5	20	0.001	1
802.11a	5150-5250	21.6	5	20	0.091	1
802.11an (20MHz)	5150-5250	20.04	5	20	0.063	1
802.11an (40MHz)	5150-5250	19.9	5	20	0.061	1
802.11ac (80MHz)	5150-5250	18.81	5	20	0.048	1
802.11a	5250-5350	21.79	5	20	0.095	1
802.11an (20MHz)	5250-5350	19.81	5	20	0.060	1
802.11an (40MHz)	5250-5350	18.16	5	20	0.041	1
802.11ac (80MHz)	5250-5350	18.94	5	20	0.049	1
802.11a	5470-5725	22.59	5	20	0.114	1
802.11an (20MHz)	5470-5725	21.29	5	20	0.085	1
802.11an (40MHz)	5470-5725	20.85	5	20	0.077	1
802.11ac (80MHz)	5470-5725	19.45	5	20	0.055	1
802.11a	5725-5850	22.72	5	20	0.118	1
802.11an (20MHz)	5725-5850	21.01	5	20	0.079	1
802.11an (40MHz)	5725-5850	21.34	5	20	0.086	1
802.11ac (80MHz)	5725-5850	21.63	5	20	0.092	1

**NOTE:**

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

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density