# 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.

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#### **EUT Specification**

EUT	802.11N Wireless Access Point					
Frequency band (Operating)	<ul> <li>✓ WLAN: 2.412GHz ~ 2.462GHz</li> <li>☐ WLAN: 5.725GHz ~ 5.850GHz</li> <li>☐ Bluetooth: 2.402GHz ~ 2.480 GHz</li> </ul>					
Device category	☐ Portable (<20cm separation) ☐ Mobile (>20cm separation)					
Exposure classification	<ul> <li>☐ Occupational/Controlled exposure (S = 5mW/cm²)</li> <li>☐ General Population/Uncontrolled exposure (S=1mW/cm²)</li> </ul>					
Antenna diversity	☐ Single antenna ☐ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity					
Max. output power	802.11b: 20.52 dBm (112.72 mW) 802.11g: 19.66 dBm (92.47 mW) 802.11n (20MHz): Chain0:16.58 dBm (45.50 mW) Chain1:16.82 dBm (48.08 mW) 802.11n (40MHz): Chain0:16.68 dBm (46.56 mW) Chain1:17.61 dBm (57.68 mW)					
Antenna gain (Max)	Chain0:2.00 dBi (Numeric gain:1.585 ) Chain1:2.00 dBi(Numeric gain: 1.585)					
Evaluation applied	<ul><li>✓ MPE Evaluation*</li><li>☐ SAR Evaluation</li><li>☐ N/A</li></ul>					
Remark:						

- 1. The maximum output power is 20.52 dBm (112.72 mW) at 2412 MHz (withnumeric 1.585 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.

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### **TEST RESULTS**

No non-compliance noted.

#### Calculation

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:

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$$S = \frac{30 \times P \times G}{3770d^2}$$

Changing to units of mW and cm, using:

$$P(mW) = P(W) / 1000$$
 and  $d(cm) = d(m) / 100$ 

**Yields** 

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$
 Equation 1

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

 $S = Power density in mW / cm^2$ 

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## **Maximum Permissible Exposure**

Modulation Mode	Frequency band (MHz)	Max. Conducted output power(dBm)	Antenna gain (dBi)	Distance (cm)	Power density (mW/cm2)	Limit (mW/cm2)
802.11b	2412-2462	20.52	2.00	20	0.036	1
802.11g	2412-2462	19.66	2.00	20	0.029	1
802.11n(20MHz)(Chain0)	2412-2462	16.58	2.00	20	0.014	1
802.11n(20MHz)(Chain1)	2412-2462	16.82	2.00	20	0.015	1
802.11 n(20MHz) (Chain0+Chain1)	2412-2462	/	/	20	0.029	1
802.11n(40MHz)(Chain0)	2422-2452	16.68	2.00	20	0.015	1
802.11n(40MHz)(Chain1)	2422-2452	17.61	2.00	20	0.018	1
802.11 n(40MHz) (Chain0+Chain1)	2422-2452	/	/	20	0.033	1

#### NOTE:

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

CPD1 / LPD1 + CPD2 / LPD2 + .....etc. < 1

**CPD = Calculation power density** 

LPD = Limit of power density

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