



# 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>	ADSL2+ VoIP IAD
<b>Frequency band (Operating)</b>	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.725GHz ~ 5.850GHz <input 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 checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
<b>Max. output power</b>	802.11b: 25.46 dBm (351.56 mW) 802.11g: 27.17 dBm (521.19 mW) 802.11n (20MHz) chain0:23.70 dBm (234.42 mW) 802.11n (20MHz) chain1:23.17 dBm (207.49 mW) 802.11n (40MHz)chain 0:23.75 dBm (237.14 mW) 802.11n (40MHz)chain 1:23.62 dBm (230.14 mW)
<b>Antenna gain (Max)</b>	Dipole Antenna 0 2.0dBi(Numeric gain:1.585) Dipole Antenna 1 2.0dBi(Numeric gain:1.585)
<b>Evaluation applied</b>	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

### **Remark:**

1. The maximum output power is 27.17 dBm (521.19 mW) at 2437 MHz (with numeric 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.



## 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:

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

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> )
802.11b	2412-2462	25.46	2.00	20	0.111	1
802.11g	2412-2462	27.17	2.00	20	0.164	1
802.11n(20MHz) chain 0	2412-2462	23.70	2.00	20	0.074	1
802.11n(20MHz) chain 1	2412-2462	23.17	2.00	20	0.065	1
802.11n(20MHz) chain 0+chain1	2412-2462	/	/	20	0.139	1
802.11n(40MHz) chain 0	2422-2452	23.75	2.00	20	0.075	1
802.11n(40MHz) chain 1	2422-2452	23.62	2.00	20	0.073	1
802.11n(40MHz) chain 0+chain 1	2422-2452	/	/	20	0.147	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**