



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	High Power Wireless-N 600mW Gigabit Dual Band Router
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.150GHz ~ 5.250GHz <input type="checkbox"/> WLAN: 5.725GHz ~ 5.850GHz <input type="checkbox"/> Bluetooth: <u>2.402GHz ~ 2.480 GHz</u>
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation)
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 diversity	<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
Max. output power	802.11b: 27.77 dBm (598.61 mW) 802.11g: 27.83 dBm (606.78 mW) 802.11n (20MHz): 27.93 dBm (620.82 mW) 802.11n (40MHz): 27.86 dBm (611.01 mW)
Antenna gain (Max)	802.11b/g/n: 5 dBi
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

Remark:

1. The maximum output power is 27.93 dBm (620.82 mW) at 2412MHz (with numeric 5.0 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/cm² 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:

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

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 / cm²



Maximum Permissible Exposure

ANT A

Modulation Mode	Frequency band (MHz)	Max. Conducted output power(dBm)	Antenna gain (dBi)	Distance (cm)	Power density (mW/cm ²)	Limit (mW/cm ²)
802.11b	2412-2462	24.91	5.0	20	0.195	1
802.11g	2412-2462	24.81	5.0	20	0.190	1
802.11n (20MHz)	2412-2462	24.72	5.0	20	0.187	1
802.11n (40MHz)	2422-2452	24.81	5.0	20	0.190	1

ANT B

Modulation Mode	Frequency band (MHz)	Max. Conducted output power(dBm)	Antenna gain (dBi)	Distance (cm)	Power density (mW/cm ²)	Limit (mW/cm ²)
802.11b	2412-2462	24.69	5.0	20	0.185	1
802.11g	2412-2462	24.83	5.0	20	0.191	1
802.11n (20MHz)	2412-2462	24.66	5.0	20	0.184	1
802.11n (40MHz)	2422-2452	24.92	5.0	20	0.195	1



ANT A+B

Modulation Mode	Frequency band (MHz)	Max. Conducted output power(dBm)	Antenna gain (dBi)	Distance (cm)	Power density (mW/cm ²)	Limit (mW/cm ²)
802.11b	2412-2462	27.77	5.0	20	0.376	1
802.11g	2412-2462	27.83	5.0	20	0.382	1
802.11n (20MHz)	2412-2462	27.93	5.0	20	0.391	1
802.11n (40MHz)	2422-2452	27.86	5.0	20	0.384	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