



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 checked="" type="checkbox"/> WLAN: 5.150GHz ~ 5.250GHz <input checked="" type="checkbox"/> WLAN: 5.725GHz ~ 5.850GHz <input type="checkbox"/> Bluetooth: 2.402GHz ~ 2.480 GHz
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: 25.83 dBm (382.87 mW) 802.11g: 25.87 dBm (386.39 mW) 802.11n (20MHz): 25.87 dBm (386.39 mW) 802.11n (40MHz): 25.87 dBm (386.40 mW) 802.11a: 23.06 dBm (202.37 mW) 802.11an (20MHz): 22.99 dBm (199.06 mW) 802.11an (40MHz): 22.68 dBm (185.24 mW)
Antenna gain (Max)	Dipole Antenna 802.11b/g/n: 2 dBi ; 802.11a, an: 4 dBi PCB Antenna 802.11b/g/n: 4 dBi ; 802.11a, an: 6 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 25.87 dBm (386.40 mW) at 2437MHz (with numeric 4.0 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****Dipole Antenna**

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	25.83	2.0	20	0.121	1
802.11g	2412-2462	25.87	2.0	20	0.122	1
802.11n (20MHz)	2412-2462	25.87	5.01	20	0.244	1
802.11n (40MHz)	2422-2452	25.87	5.01	20	0.244	1
802.11a	5150-5250	16.82	4.0	20	0.024	1
802.11a	5725-5850	23.06	4.0	20	0.101	1
802.11an (20MHz)	5150-5250	16.79	7.01	20	0.048	1
802.11an (20MHz)	5725-5850	22.99	7.01	20	0.199	1
802.11an (40MHz)	5190-5230	16.69	7.01	20	0.047	1
802.11an (40MHz)	5755-5795	22.68	7.01	20	0.185	1

PCB Antenna

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	25.83	4.0	20	0.191	1
802.11g	2412-2462	25.87	4.0	20	0.193	1
802.11n (20MHz)	2412-2462	25.87	7.01	20	0.386	1
802.11n (40MHz)	2422-2452	25.87	7.01	20	0.386	1
802.11a	5150-5250	16.82	6.0	20	0.038	1
802.11a	5725-5850	23.06	6.0	20	0.160	1
802.11an (20MHz)	5150-5250	16.79	9.01	20	0.076	1
802.11an (20MHz)	5725-5850	22.99	9.01	20	0.315	1
802.11an (40MHz)	5190-5230	16.69	9.01	20	0.074	1
802.11an (40MHz)	5755-5795	22.68	9.01	20	0.294	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