



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	WIRELESS-AN 25DBM 3X3 NETWORK MINI PCIE ADAPTER
Frequency band (Operating)	<input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <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	802.11a: 25.44 dBm (349.95 mW) 802.11n HT20:Chain 0: 15.92dBm (39.08 mW) Chain 1: 15.51dBm (35.56 mW) Chain 2: 14.87dBm (30.69 mW) 802.11n HT40:Chain 0: 16.18dBm (41.50 mW) Chain 1: 15.71dBm (37.24 mW) Chain 2: 14.63dBm (29.04 mW)
Antenna gain (Max)	Antenna 1(chain 0):10 dBi (Numeric gain:10.00) Antenna 2(chain 1):10 dBi (Numeric gain:10.00) Antenna 3(chain 2):10 dBi (Numeric gain:10.00)
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 25.44 dBm (349.95 mW) at 5745 MHz (with numeric 10.00 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

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

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 / cm²

**Maximum Permissible Exposure**

Modulation Mode	Frequency band (MHz)	Max. Conducted output power(dBm)	Antenna gain (dBi)	Distance (cm)	Power density (mW/cm ²)	Limit (mW/cm ²)
802.11a	5725-5850	25.44	10	20	0.696	1
802.11 n(20MHz) chain 0	5725-5850	15.92	10	20	0.078	1
802.11 n(20MHz) chain 1	5725-5850	15.51	10	20	0.071	1
802.11 n(20MHz) chain 2	5725-5850	14.87	10	20	0.061	1
802.11 n(20MHz) chain 0+chain 1+chain 2	5725-5850	/	/	20	0.210	1
802.11 n(40MHz) chain 0	5725-5850	16.18	10	20	0.083	1
802.11 n(40MHz) chain 1	5725-5850	15.71	10	20	0.074	1
802.11 n(40MHz) chain 2	5725-5850	14.63	10	20	0.057	1
802.11 n(40MHz) chain 0+chain 1+chain 2	5725-5850	/	/	20	0.214	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