



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	ADSL2+ VoIP IAD
Frequency band (Operating)	<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
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 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
Max. output power	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)
Antenna gain (Max)	Dipole Antenna 0 2.0dBi(Numeric gain:1.585) Dipole Antenna 1 2.0dBi(Numeric gain:1.585)
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 27.17 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/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:

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

Changing to units of mW and cm, using:

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

Yields

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

- 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)
802.11b	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:

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density