



APPENDIX I 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	300Mbps Wireless N ADSL2+ Modem Router		
Model	DL4323; DL4323D		
RF Module	Realtek	Model:	RTL8188ER-CG
Model Discrepancy	ALL THE MODEL NUMBERS (LIST ON THIS REPORT) ARE IDENTICAL, JUST FOR MARKETING PURPOSE ONLY EXCEPT ANTENNA.		
	Model Number	Antenna	
	DL4323	Fixed	
	DL4323D	Detachable	
Frequency band (Operating)	<input checked="" type="checkbox"/> 802.11b/g/n HT20: 2.412GHz ~ 2.462GHz 802.11n HT40: 2.422GHz ~ 2.452GHz <input type="checkbox"/> Others		
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others		
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 Specification	2.4GHz: Antenna1 Gain : 5.00 dBi (Numeric gain: 3.16) 2.4GHz: Antenna2 Gain : 5.00 dBi (Numeric gain: 3.16)		
Maximum Average output power	IEEE 802.11b Mode: 16.18 dBm (41.495 mW) IEEE 802.11g Mode: 15.78 dBm (37.844 mW) IEEE 802.11n HT 20 Mode: 16.01 dBm (39.902 mW) IEEE 802.11n HT 40 Mode: 13.79 dBm (23.933 mW)		
Maximum Tune up Power	IEEE 802.11b Mode: 17.00 dBm (50.119 mW) IEEE 802.11g Mode: 16.00 dBm (39.811 mW) IEEE 802.11n HT 20 Mode: 17.00 dBm (50.119 mW) IEEE 802.11n HT 40 Mode: 15.00 dBm (31.623 mW)		
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A		



Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	2014/04/28	Initial Issue	ALL	Scott Hsu



TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

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:

$$S = \frac{30 \times P \times G}{377d^2}$$

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

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where $d =$ Distance in cm

$P =$ Power in mW

$G =$ Numeric antenna gain

$S =$ Power density in mW / cm²



Maximum Permissible Exposure

Substituting the MPE safe distance using $d = 20$ cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where $P =$ Power in mW

$G =$ Numeric antenna gain

$S =$ Power density in mW / cm²

IEEE 802.11b mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
1	2412	50.119	3.16	20	0.0315	1

IEEE 802.11g mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
1	2412	39.811	3.16	20	0.0250	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
1	2412	50.119	3.16	20	0.0315	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
6	2437	31.623	3.16	20	0.0199	1