Maximum Permissible Exposure

1. Introduction

In this document, we try to prove the safety of radiation harmfulness to the human body for our product. The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The Gain of the antenna used in this product is measured in a Fully Anechoic Chamber (FAC), and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis transmission formula is a far field assumption, the calculated result of that is an over-prediction for near field power density. We will take that as the worst case to specify the safety range.

2. Description of EUT

Equipment	ADSL Router
Applicant Name	COMTREND CORPORATION
Applicant Address	3F-1, 10 Lane 609, Chung Hsin Road, Section 5 San Chung District, New Taipei City 241, Taiwan
Manufacturer Name	COMTREND CORPORATION
Manufacturer Address	3F-1, 10 Lane 609, Chung Hsin Road, Section 5 San Chung District, New Taipei City 241, Taiwan
Model No	AR-5312u
FCC ID	L9VAR-5312U

3. Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance with the antenna should be included in users manual. So, this device is classified as Mobile Device.

4. Friis Formula

Friis transmission formula : Pd = (Pout*G) / (4*pi*r^2)

Where
Pd = power density in mW/cm^2
Pout = output power to antenna in mW
G = gain of antenna in linear scale
Pi = 3.1416
R = distance between observation point and center of the radiator in cm (20cm)

5. RF Exposure Limit :

According to FCC 1. 1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
(A)Limits For Occupational / Control Exposures				
300-1500			F/300	6
1500-100,000			5	6
(B)Limits For General Population / Uncontrolled Exposure				
300-1500			F/1500	30
1500-100,000			1	30

6. Test Result:

802.11b

Frequency (MHz)	Max RF Power (mW)	TX Antenna Gain (dBi)	Testing Result (mW/cm^2)	MPE Limit (mW/cm^2)
2412	193.642	2	0.0611	1
2437	192.752	2	0.0608	1
2462	206.063	2	0.0650	1

802.11g

Frequency (MHz)	Max RF Power (mW)	TX Antenna Gain (dBi)	Testing Result (mW/cm^2)	MPE Limit (mW/cm^2)
2412	45.394	2	0.0143	1
2437	44.978	2	0.0142	1
2462	43.853	2	0.0138	1

802.11n HT20

Frequency (MHz)	Max RF Power (mW)	TX Antenna Gain (dBi)	Testing Result (mW/cm^2)	MPE Limit (mW/cm^2)
2412	96.739	2	0.0305	1
2437	73.021	2	0.0230	1
2462	113.919	2	0.0359	1

802.11n HT40

Frequency (MHz)	Max RF Power (mW)	TX Antenna Gain (dBi)	Testing Result (mW/cm^2)	MPE Limit (mW/cm^2)
2422	67.281	2	0.0212	1
2437	73.889	2	0.0233	1
2452	76.140	2	0.0240	1