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Federal Communications Commission
7435 Oakland Mills Road
Columbia
MD 21046

Dear Sir/Madam

RE: Maximum Permissible Exposure (MPE) for the IPWireless Broadband Modem Model No: AP

The FCC identification number for this device is PKTP1BAP.

Background

The IPWireless Inc. broadband wireless modem Model No: AP is intended for connection to a personal computer, this can either be a desktop or laptop computer. Under rule 2.1091 section (d) subsection (4) the operating conditions of the device make classification as either portable or mobile difficult.

To provide information to ensure the device is used in a safe manner, the minimum separation distance from the radiating structure of the device to the user or any other person has been calculated based on the MPE limits for the general population/uncontrolled exposure category.

The calculations below take into account the worst case normal operation of the device i.e. the user is using the full data bandwidth of the device. The RF interface operates using a time division duplex implementation whereby the modem transmits using 4 out of a total of 15 timeslots in a radio frame. This provides good justification for using source based averaging of the transmitter power as defined in rule 2.1091 section (d) subsection (2).

Applicable Limits to RF Exposure

The RF exposure limits for radio transmitters are established in 47CFR1.1310. These limits are established for different frequency ranges and the type of environment the device is expected to be used in. For the IPWireless Inc. broadband wireless modem Model No. AP, the applicable power density limit is given in Table 1 part (b) as:

1 mW/cm^2 (general population, uncontrolled exposure)

Model AP Device Parameters used in MPE Calculation

The Model AP has a maximum conducted output power to the antenna of +24dBm, the integral antenna gain is 3 dBi, providing a maximum EIRP of +27dBm. This emission is spread over 1 MHz of channel bandwidth, providing a maximum power level of +24dBm in a 6MHz MMDS channel.

This unit is being qualified under the low power response station rules contained in both 47CFR21.908 (d) and 47CFR74.936 (f), which defines the maximum transmitter power limit of –6dBW EIRP in a 6MHz channel.

This device operates in a 12 MHz channel and as such, the maximum EIRP allowed is –6dBW + 3dB = -3dBW EIRP.

The maximum EIRP of the modem using the integral antenna is as follows:

EIRP = +24dBm + 3dB (ant. gain)

= +27dBm

= -3dBW

Therefore the EIRP complies with the –3 dBW limit allowed for a 12 MHz bandwidth emission for a low power response station.

Distance to Power Density Limit Calculation

For the purpose of calculating the MPE distance from the Model AP antenna, the –3 dBW (+27 dBm) EIRP value is used.

The formula used to calculate the distance to the 1mW/cm2 limit is defined in FCC Bulletin 65.

$$S = \frac{PG}{4\ R^2} \qquad \text{Equation (1)}$$

Equation (1) is re-arranged to calculated distance R.

$$R = \frac{PG}{4\ S} \qquad \text{Equation (2)}$$

Where: S= Power Density Limit of 1mW/cm2

P= Transmitter Power

G= Numerical Antenna Gain

The table below shows the calculation of the distance from the antenna to the 1mW/cm2 limit for the general population/uncontrolled exposure limit.

MPE distance calculation for PKTP1BAP			
Integral Antenna gain	3	dBi	
line loss	0	dB	
Effective antenna gain (ratio)	1.99		
Model AP PA conducted output power	24	dBm	
Model AP maximum EIRP	27	dBm	
	501	mW	
Model AP maximum EIRP	-3	dBW	
21.908 (d) EIRP limit in 12 MHz bandwidth	-3	dBW	
MPE limit from 1.1310, MMDS band	**1**	mW/cm^2	
(general population, uncontrolled exposure)			
minimum distance = sqrt ((EIRP/(exposure limit*4*pi))			
Minimum distance to meet MPE limit =		6.32	cm
(without source-based averaging)		2.49	inches
Source-based duty cycle adjustment			
Total timeslots in frame	15		
Timeslots used for uplink transmit	4		
Percent of uplink time device is transmitting	100%		
Average attenuation of signal (power control)	0	dB	
Minimum distance to meet MPE limit =		3.26	cm
(with source-based averaging)		1.28	inches

Conclusion

The table above shows the device meets the $1mW/cm^2$ exposure limit at a distance 1.28 inches from the integral antenna during worst case normal operation. In accordance with rules 1.1307 table 1 and 2.1091 section (d) subsection (4) the minimum separation distance of 1 inch will be identified on the label placed on the unit. Additionally, the user manual provides instructions to the user to ensure operation of the device in a safe manner.

Yours Sincerely,

Lamech Mujegu
Technical Director