FCC Part 22 Transmitter Certification

Test Report

FCC ID: SO4YX500-CEL

FCC Rule Part: CFR 47 Part 22 Subpart H

ACS Report Number: 05-0343-22H

Manufacturer: Wireless Extenders
Equipment Type: Cellular Bi-Directional Booster
Model: YX500-CEL

RF Exposure Information

General Information:

Applicant:	Wireless Extenders
ACS Project:	05-0343
FCC ID:	SO4YX500-CEL
Device Category:	Mobile
Environment:	General Population/Uncontrolled Exposure

Technical Information:

UPLINK:

The supplied uplink antenna for this product will be an omni-directional monopole antenna with a maximum of 4dBi of antenna gain, and 75 ohms impedance. The uplink antenna is fixed mounted outdoors or in an attic and is attached to the booster using the supplied 35 feet of RG-6 coaxial cable. This 75 ohm cable has an average cable loss of 2.2 dB at 824 MHz. The maximum EIRP for this configuration would be:
26.13 – 2.2 + 4.0 = 27.93dBm.

An optional uplink antenna will be a directional (yagi) antenna with a maximum gain of 11dBi, and 50 ohms impedance. This antenna will be supplied with an additional minimum of 15 feet of cable, which would add an additional 1.0 dB of cable loss. Further, the mismatch between the 75 ohm coaxial cable and the 50 ohm antenna would result in a minimum of 0.2 dB of additional loss. Maximum EIRP for this antenna configuration would be:
26.13 – 2.2 – 1.0 - 0.2 + 11.0 = 33.73dBm.

Another optional antenna will be a directional (yagi) antenna with a maximum gain of 13dBi, and 50 ohms impedance. This antenna will be supplied with an additional minimum of 50 feet of cable, which would add an additional 3.0 dB of cable loss. Further, the mismatch between the 75 ohm coaxial cable and the 50 ohm antenna would result in a minimum of 0.2 dB of additional loss. Maximum EIRP for this antenna configuration would be:
26.13 – 2.2 – 3.0 - 0.2 + 13.0 = 33.73dBm

Antenna Gain (omni-directional monopole):	4dBi
Antenna Gain (directional yagi):	13dBi/11dBi
Minimum Cable/System Attenuation:	2.2dB (Monopole) 3.4dB (11dBi Yagi) 5.4dB (13dBi Yagi)
Resulting Maximum Antenna Gain:	1.8dB (Monopole) 7.6dB (11/13dBi Yagi)
Maximum Transmitter Conducted Power:	26.13dBm
Maximum System EIRP:	27.93dBm / 0.621W (Monopole) 33.73dBm / 2.36W (Directional Yagi)

DOWNLINK:
The supplied downlink antenna for this product will be an omni-directional monopole antenna with a maximum of 10dBi of antenna gain.

Antenna Gain (omni-directional monopole):	10dBi
Maximum Transmitter Conducted Power:	17.69dBm
Maximum System EIRP:	27.69dBm / 0.588W

Operating Configuration: Mobile
Exposure Conditions: 20 centimeters

MPE Calculation

The Power Density (mW/cm^2) is calculated as follows:

$$S = \frac{PG}{4\pi R^2}$$

Where:
S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Calculations were performed for the channel which exhibited the highest calculated EIRP for both uplink and downlink.

MPE Calculator for Mobile Equipment Limits for General Population/Uncontrolled Exposure								
Transmit Frequency (MHz)	**Radio Power (dBm)**	**Power Density Limit (mW/Cm2)**	**Radio Power (mW)**	**Antenna Gain (dBi)**	**Antenna Gain (mW eq.)**	**Distance (cm)**	**Power Density (mW/cm^2)**	**Configuration**
848.8	26.13	0.57	410.20	7.6	5.754	20	0.470	Uplink
893.8	17.69	0.60	58.75	10	10.000	20	0.117	Downlink

Installation Guidelines

The installation manual contains the following text advising how to install the equipment to maintain compliance with the FCC RF exposure requirements:

"RF Exposure (Intentional Radiators Only)
In accordance with FCC requirements of human exposure to radiofrequency fields, the radiating element shall be installed such that a minimum separation distance of 20 cm is maintained between the radiating element and the general population."

Conclusion

This device complies with the MPE requirements by providing adequate separation between the device, any radiating structure and the general population.