RF Exposure Compliance Requirements
Viper Analog Telemetry Radio Modem

FCC Rule: 1.1307, 1.1310, 2.1091 (b) (d), 2.1093

Description of Compliance:

The Viper will be professionally installed in the SCADA (Supervisory Control And Data Acquisition) market and will be mounted with a fixed RTU (Remote Terminal Unit). A typical installation would use a maximum gain antenna of 10 dBi mounted on a tower. A minimum separation distance of more than 218 cm must be maintained between the radiating structure and any person to classify as a mobile under FCC MPE regulations.

Antenna Gain vs. Recommended Safety Distance

	Antenna Gain		
	5 dBi	10 dBi	15 dBi
Min Safety Distance (max power)	122.8cm	218.4 cm	388.4 cm

Note: It is the responsibility of the user to guarantee compliance with the FCC MPE regulations when operating this device in a way other than described above.

The calculation for the more stringent specification, a General Population/Uncontrolled Mobile device according to section 2.1091(b) and section 1.1310 Note 2 is shown below:

Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (mins)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500	---	---	f (MHz)/1500 (MHz)	30
1500-100000	---	---	1.0	30

Environmental Specification: 0.2 mW/cm^2

$S = (PG)/(4\pi R^2)$ (OET Bulletin 65)

Where:

S = Power Density (mW/cm^2)
P = Power input to the antenna (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 (cm)

Distance Calculation for 5dBi antenna:

$R = \sqrt{((PG)/(4\pi S))}$

Antenna Gain: 5.0 dBi $10^{(5\ dBi/10)} = 3.16$
Power input to the Antenna: 40.8dBm = $10^{(40.8dBm/10)}$ = 12000 mW

$R = \sqrt{((12000mW*3.16)/(4\pi*0.2\ mW/cm^2))}$ = 122.8 cm (Minimum Distance)

Distance Calculation for 10dBi antenna:

$R = \sqrt{((PG)/(4\pi S))}$

Antenna Gain: 10.0 dBi $10^{(10\ dBi/10)} = 10$
Power input to the Antenna: 40.8dBm = $10^{(40.8dBm/10)}$ = 12000 mW

$R = \sqrt{((12000mW*10)/(4\pi*0.2\ mW/cm^2))}$ = 218.5 cm (Minimum Distance)

Distance Calculation for 15dBi antenna:

$R = \sqrt{((PG)/(4\pi S))}$

Antenna Gain: 15.0 dBi $10^{(15dBi/10)} = 31.6$
Power input to the Antenna: 40.8dBm = $10^{(40.8dBm/10)}$ = 10000 mW

$R = \sqrt{((12000mW*31.6)/(4\pi*0.2\ mW/cm^2))}$ = 388.4 cm (Minimum Distance)