§2.1091, §1.1307 and §27.52 – MAXIMUN PERMISSIBLE EXPOSURE

Applicable Standard

The Federal Communications Commission (FCC), are imposing MPE (maximum permissible exposure) limits. FCC CFR part 1, subpart I, section 1.1307 requires operator to perform an Environmental Assessment (EA). Equipment listed in the table 1 of before mentioned part is subjected to routine environmental evaluation.

The objective of the Environmental Evaluation is to ensure that human exposure to RF energy does not go beyond the maximum permissible levels stated in the standard. Therefore certain sites do not require an evaluation by nature of its design. It could be that the antennas are placed high enough thereby resulting in extremely low RF fields by the time it reaches areas that would be accessible to people.

According to 47CFR Part 27.52 (RF safety), Licensees and manufacturers are subject to the radio frequency radiation exposure requirements specified in sections 1.1307(b), 2.1091, and 2.1093 of 47CFR, as appropriate. Applications for equipment authorization of mobile or portable devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

Limits for Maximum Permissible Exposure (MPE)

Limits for Occupational/Controlled Exposure			
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mw/cm^2)**
0.3 ~ 3.0	614	16.3/f	(100)*
3.0 ~ 30	1842/f	16.3/f	$(900/f^2)$*
30 ~ 300	61.4	0.163	1.0
300 ~ 1500	/	/	f/300
15,000 ~ 100,000	/	/	5

Limits for General Population/Uncontrolled Exposure			
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mw/cm^2)**
0.3 ~ 3.0	614	1.63	(100)*
3.0 ~ 30	842/f	2.19/f	$(180/f^2)$*
30 ~ 300	27.5	0.073	0.2
300 ~ 1500	/	/	f/1500
15,000 ~ 100,000	/	/	1.0

Prediction of the Exposure to Electromagnetic Fields

Calculations can be made on a site by site basis to ensure the power density is below the limits given above, or guidelines can be done beforehand to ensure the minimum distances from the antenna is maintained through the site planning. The calculations are based on FCC OET 65 Appendix B.

$S = PG/ 4\pi R^2$

Where: S = power density
P = power input to antenna
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

Conclusion

Maximum peak output power at antenna input terminal: 47.89 (dBm)
Maximum peak output power at antenna input terminals: 61.5(W)
Prediction distance: 400 (cm)
Predication frequency: 2132.525 (MHz)
Antenna Gain (typical): 13 (dBi)
Power density at predication frequency at 400 cm: 0.61 (mW/cm2)
MPE limit for uncontrolled exposure at prediction frequency: 1.0 (mW/cm2)

The device complies with 400 cm distance.