

FCC OET-65 RF Exposure Study - Satellite Uplink Facility
KING 5.6 meter Digital Ku-band uplink – Calculation for worst case roof-top exposure

FCC Maximum Permissible Exposure Levels	Source	Units
Public/uncontrolled area exposure limit	47CFR §1.1310	1 mW/cm ²
Occupational/controlled area exposure limit	47CFR §1.1310	5 mW/cm ²

Input Data

Antenna Diameter	datasheet	560.0 cm
Antenna surface area	calculated	246301 cm ²
Sub-reflector diameter	measured	50.800 cm
Sub-reflector area	calculated	2027 cm ²
Feed flange diameter	measured	13.970 cm ²
Feed flange area	calculated	153
Frequency	(entry)	14250 MHz
Wavelength (speed of light = 299,792,458 m/s)	calculated	2.104 cm
Transmit power at flange	Application	23600 milliwatts
Antenna gain	datasheet	56.66 dBi
Antenna gain factor	calculated	463447
Height of base of antenna above ground/roof	measured	0.6 m
Height of center of antenna above ground/roof	measured	2.8 m
Minimum Elevation Angle	(entry)	9.7 degrees
Minimum Elevation Angle	calculated	0.16930 radians

Results calculated using FCC Bulletin OET-65 (Edition 97-01 August 1997)

			FCC Maximum Permissible Exposure (MPE)	
			Uncontrolled	Controlled
Maximum power density at antenna surface	Eq. 11 Pg 27	0.38 mW/cm ²	Below FCC MPE	Below FCC MPE
Power density at subreflector	Eq. 11 Pg 27	46.58 mW/cm ²	Potential Hazard	Potential Hazard
Power density at feed flange	Eq. 11 Pg 27	615.87 mW/cm ²	Potential Hazard	Potential Hazard
Extent of near-field	Eq. 12 Pg 27	37266 cm		
Maximum near-field power density	Eq. 13 Pg 28	0.25 mW/cm ²	Below FCC MPE	Below FCC MPE
Aperture efficiency	Eq. 14 Pg 28	0.66		
Distance to beginning of far-field	Eq. 16 Pg 29	89437.87 cm		
Power density at end of the transition region	Eq. 17 Pg 29	0.11 mW/cm ²	Below FCC MPE	Below FCC MPE
Maximum far-field power density	Eq. 18 Pg 29	0.109 mW/cm ²	Below FCC MPE	Below FCC MPE

Main Beam Far-field region safe exposure distances

Minimum distance for public/uncontrolled exposure	Eq. 18 Pg 29	295.02 meters
Height at minimum antenna elevation angle	calculated	52.51 meters
Horizontal distance	calculated	290.8 meters
Minimum distance for occupational/controlled exposure	Eq. 18 Pg 29	131.94 meters
Height at minimum antenna elevation angle	calculated	25.03 meters
Horizontal distance	calculated	130.05 meters

Off-Axis Near Field/Transition Region safe exposure distances from antenna

(20 dB reduction in power density at distances greater than one antenna diameter from the main beam center.)				
Maximum off-axis near field power density	OET-65 Pg 30	0.0025 mW/cm ²	Below FCC MPE	Below FCC MPE
Public/uncontrolled exposure off-axis distance	Eq. 13 Pg 28	5.6 meters		
Occupational/controlled exposure off-axis distance	Diam/or Eq 17	5.6 meters		

Off-Axis Far Field safe exposure distances from the antenna

(Based on side lobe attenuation required by FCC 25.209(a)(2))		
Angle off main beam axis (1 to 48 degrees)	(entry)	5 degree(s)
Off-axis antenna gain factor	OET-65 Pg 30*	28
Minimum distance for public/uncontrolled exposure	Eq. 18 Pg 29 **	894.38 meters

* Gain converted from dBi to linear multiple

** If calculated distance is less than the start of the far field region, the distance to the start of the far field region is used.