

FCC OET-65 RF Exposure Study - Satellite Uplink Facility
NBC Washington DC 6.1 meter Digital Ku-band uplink

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	610.0 cm
Antenna surface area	calculated	292247 cm ²
Sub-reflector diameter	measured	96.500 cm
Sub-reflector area	calculated	7314 cm ²
Feed flange diameter	measured	17.800 cm
Feed flange area	calculated	249
Frequency	(entry)	14500 MHz
Wavelength (speed of light = 299,792,458 m/s)	calculated	2.068 cm
Transmit power at flange	Application	125000 milliwatts
Antenna gain	datasheet	57.1 dBi
Antenna gain factor	calculated	512861
Height of base of antenna above ground	measured	0.68 m
Height of center of antenna above ground	measured	3.4 m
Minimum Elevation Angle	(entry)	20 degrees
Minimum Elevation Angle	calculated	0.34907 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	1.71 mW/cm ²	Potential Hazard	Below FCC MPE
Power density at subreflector	Eq. 11 Pg 27	68.36 mW/cm ²	Potential Hazard	Potential Hazard
Power density at feed flange	Eq. 11 Pg 27	2009.28 mW/cm ²	Potential Hazard	Potential Hazard
Extent of near-field	Eq. 12 Pg 27	44993 cm		
Maximum near-field power density	Eq. 13 Pg 28	1.02 mW/cm ²	Potential Hazard	Below FCC MPE
Aperture efficiency	Eq. 14 Pg 28	0.6		
Distance to beginning of far-field	Eq. 16 Pg 29	107983.7 cm		
Power density at end of the transition region	Eq. 17 Pg 29	0.43 mW/cm ²	Below FCC MPE	Below FCC MPE
Maximum far-field power density	Eq. 18 Pg 29	0.438 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	714.25 meters
Height at minimum antenna elevation angle	calculated	247.69 meters
Horizontal distance	calculated	671.18 meters
Minimum distance for occupational/controlled exposure	Eq. 18 Pg 29	319.42 meters
Height at minimum antenna elevation angle	calculated	112.65 meters
Horizontal distance	calculated	300.16 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			
Public/uncontrolled exposure off-axis distance	Eq. 13 Pg 28	0.0102 mW/cm ²	Below FCC MPE	Below FCC MPE
Occupational/controlled exposure off-axis distance	Diam/or Eq 17	6.1 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)	20 degree(s)		
Off-axis antenna gain factor	OET-65 Pg 30*	1		
Minimum distance for uncontrolled MPE limit	calculated	0.94 meters	Not valid if distance less the start of the far field	
Minimum distance for public/uncontrolled exposure	Eq. 18 Pg 29 **	1079.84 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.