

FCC OET-65 RF Exposure Study - Satellite Uplink Facility
WMAQ-TV Digital Ku-band transportable uplink - "MC #51"

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	120.0 cm
Antenna surface area	calculated	11310 cm ²
Sub-reflector diameter	measured	N/A cm
Sub-reflector area	calculated	N/A cm ²
Feed flange diameter	estimated	5.400 cm ²
Feed flange area	calculated	23
Frequency	(entry)	14125 MHz
Wavelength (speed of light = 299,792,458 m/s)	calculated	2.122 cm
Transmit power at flange	Application	125000 milliwatts
Antenna gain	datasheet	43.2 dBi
Antenna gain factor	calculated	20893
Height of base of antenna above ground	measured	2.91 m
Height of center of antenna above ground	measured	3.51 m
Minimum Elevation Angle	(entry)	5 degrees
Minimum Elevation Angle	calculated	0.08727 radians

			FCC Maximum Permissible Exposure (MPE)	
			Uncontrolled	Controlled
Results calculated using FCC Bulletin OET-65 (Edition 97-01 August 1997)				
Maximum power density at antenna surface	Eq. 11 Pg 27	44.21 mW/cm ²	Potential Hazard	Potential Hazard
Power density at subreflector	Eq. 11 Pg 27	0 mW/cm ²	N/A	N/A
Power density at feed flange	Eq. 11 Pg 27	21831.95 mW/cm ²	Potential Hazard	Potential Hazard
Extent of near-field	Eq. 12 Pg 27	1696 cm		
Maximum near-field power density	Eq. 13 Pg 28	29.28 mW/cm ²	Potential Hazard	Potential Hazard
Aperture efficiency	Eq. 14 Pg 28	0.66		
Distance to beginning of far-field	Eq. 16 Pg 29	4070.82 cm		
Power density at end of the transition region	Eq. 17 Pg 29	12.2 mW/cm ²	Potential Hazard	Potential Hazard
Maximum far-field power density	Eq. 18 Pg 29	12.541 mW/cm ²	Potential Hazard	Potential Hazard

Main Beam Far-field region safe exposure distances

Minimum distance for public/uncontrolled exposure	Eq. 18 Pg 29	144.16 meters
Height at minimum antenna elevation angle	calculated	16.07 meters
Horizontal distance	calculated	143.61 meters
Minimum distance for occupational/controlled exposure	Eq. 18 Pg 29	64.47 meters
Height at minimum antenna elevation angle	calculated	9.13 meters
Horizontal distance	calculated	64.23 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.)				
	OET-65 Pg 30			
Maximum off-axis near field power density	Eq. 13 Pg 28	0.2928 mW/cm ²	Below FCC MPE	Below FCC MPE
Public/uncontrolled exposure off-axis distance	Diam/or Eq 17	1.2 meters		
Occupational/controlled exposure off-axis distance	Diam/or Eq 17	1.2 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)	15 degree(s)		
Off-axis antenna gain factor	OET-65 Pg 30*	2		
Minimum distance for public/uncontrolled exposure	Eq. 18 Pg 29 **	40.71 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.