

Radiation Hazard Analysis

Operator: **Front Range**
 Location Designation: **Front Range Earth Station**
 County: **Larmier**
 Town: **Fort Collins**
 State/Zip: **Co 80521**

FCC Callsign:
 SES ID:
 STA:

Input Values	Value	Unit
D = Aperture Diameter	7.30	Meters
d = Subreflector Diameter	0.56	Meters
G = Antenna Gain	64.6	dBi
FCC Designation	Ka	Band
F = Frequency	28.000	GHz
P = Transmitter Power Watts:	150	Watts
R _{ua} = closest point to uncontrolled area	50	meters
Elevation angle at closest point R _{ua}	10	Degrees
Height (AGL)	8.00	meters

Band	Frequency
L	1000-2000
S	2000-4000
C	4000-8000
X	8000-12500
Ku	12500-18000
K	18000-25500
Ka	26500-40000
O	40000-50000
V	50000-75000

OET 65 Calculated Values	Formula	Value	Unit
λ = Wavelength	$\frac{c}{F}$	0.0107	meters
G = Antenna Gain	$10^{(G/10)}$	2884031.503	(W) linear
η = Aperture Efficiency	$\frac{G\lambda^2/4\pi}{\pi D^2/4}$	63%	percentage
A = Area of reflector	πR^2	41.854	meters ²
a = area of subreflector	πr^2	2463.009	cm ²
R _{nf} = Near-Field Region	$\frac{D^2}{4\lambda}$	1244.263	meters
		216	Meters AGL
R _t = Transition Region	$>R_{nf}$	1244.263	>meters
	$<R_{ff}$	2986.231	<meters
R _{ff} = Far Field Region	$\frac{0.6D^2}{\lambda}$	2986.231	meters
		519	Meters AGL

Radiation Analysis Zone	Formula	Level	Value	Exposure Limits		
				General Public	Occupational	
				<1mW/cm2	<5mW/cm2	
1	Power Subreflector	$\frac{4P}{a}$	243.605	mW/cm2	>FCC MPE See Note 1	>FCC MPE See Note 2
2	Antenna Surface	$\frac{4P}{A}$	1.434	mW/cm2	>FCC MPE See Note 1	<FCC MPE
3	Main Reflector Ground	$\frac{P}{A}$	0.358	mW/cm2	<FCC MPE	<FCC MPE
4	S _{nf} = Near-Field Power Density	$\frac{4\eta P}{A}$	0.901	mW/cm2	<FCC MPE	<FCC MPE
5	S _t = Max Transition Power Density	$\leq S_{nf}$	0.901	mW/cm2	<FCC MPE	<FCC MPE
6	S _{ff} = Max Far field Power Density	$\frac{PG}{4\pi R_{ff}^2}$	0.386	mW/cm2	<FCC MPE	<FCC MPE
7	Off Access Level Near Field	S _{nf} - 20 dB	0.00901	mW/cm2	<FCC MPE	<FCC MPE

Notes

- The antenna is installed in a controlled location access is restricted to authorized personnel only. The antenna is marked with RF Radiation Hazard signage.
- Inside the controlled area, MPE levels exceed the MPE exposure for occupational levels. The levels will be reduced to safe MPE by removing power to the transmitters when work is performed on or around the antenna. This area can only be accessed by qualified personnel.
- The field develops 8 meters above ground level at the minimum elevation angle which is not accessible to the general public.

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Input Values	Value	Unit
D = Aperture Diameter	9.10	Meters
d = Subreflector Diameter	0.56	Meters
G = Antenna Gain	66.4	dBi
FCC Designation	Ka	Band
F = Frequency	28.000	GHz
P = Transmitter Power Watts:	150	Watts
R _{ua} = closest point to uncontrolled area	50	meters
Elevation angle at closest point R _{ua}	10	Degrees
Height (AGL)	8.00	meters

Band	Frequency
L	1000-2000
S	2000-4000
C	4000-8000
X	8000-12500
Ku	12500-18000
K	18000-25500
Ka	26500-40000
O	40000-50000
V	50000-75000

OET 65 Calculated Values	Formula	Value	Unit
λ = Wavelength	$\frac{c}{F}$	0.0107	meters
G = Antenna Gain	$10^{(G/10)}$	4365158.322	(W) linear
η = Aperture Efficiency	$\frac{G\lambda^2/4\pi}{\pi D^2/4}$	61%	percentage
A = Area of reflector	πR^2	65.039	meters ²
a = area of subreflector	πr^2	2463.009	cm ²
R _{nf} = Near-Field Region	$\frac{D^2}{4\lambda}$	1933.522	meters
		336	Meters AGL
R _t = Transition Region	>R _{nf}	1933.522	>meters
	<R _{ff}	4640.454	<meters
R _{ff} = Far Field Region	$\frac{0.6D^2}{\lambda}$	4640.454	meters
		806	Meters AGL

Radiation Analysis Zone	Formula	Level	Value	Exposure Limits		
				General Public	Occupational	
				<1mW/cm2	<5mW/cm2	
1	Power Subreflector	$\frac{4P}{a}$	243.605	mW/cm2	>FCC MPE See Note 1	>FCC MPE See Note 2
2	Antenna Surface	$\frac{4P}{A}$	0.923	mW/cm2	<FCC MPE	<FCC MPE
3	Main Reflector Ground	$\frac{P}{A}$	0.231	mW/cm2	<FCC MPE	<FCC MPE
4	S _{nf} = Near-Field Power Density	$\frac{4\eta P}{A}$	0.565	mW/cm2	<FCC MPE	<FCC MPE
5	S _t = Max Transition Power Density	≤ S _{nf}	0.565	mW/cm2	<FCC MPE	<FCC MPE
6	S _{ff} = Max Far field Power Density	$\frac{PG}{4\pi R_{ff}^2}$	0.242	mW/cm2	<FCC MPE	<FCC MPE
7	Off Access Level Near Field	S _{nf} - 20 dB	0.00565	mW/cm2	<FCC MPE	<FCC MPE

Notes

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