

RADIATION CALCULATIONS FOR 0.66 meter EARTH STATION			
Nomenclature	Formula	Value	Unit
INPUT PARAMETERS			
M = Antenna Aperture Major Axis		0.74	meters
m = Antenna Aperture Minor Axis		0.59	meters
d = Diameter of Feed Mouth		0.029	meters
P = Max Power into Antenna		0.5	Watts
n = Apperture Efficiency		64%	
k = Wavelength @ 30 GHz		0.0100	meters
CALCULATED VALUES			
A = Area of Reflector	$\pi \times M \times m / 4$	0.343	meters ²
l = Length of Near Field	$M^2 / 4k$	14	meters
L = Beginning of Far Field	$0.6M^2 / k$	33	meters
G = Antenna Gain @ 30 GHz	$n(4 \times \pi \times A) / k^2$	27,582	(44.4) dBi
a = Area of Feed Mouth	$\pi \times d^2 / 4$	0.0007	meters ²
POWER DENSITY CALCULATIONS			
Region	Maximum Power Density in Region		Hazard Assessment (FCC MPE Limit = 1 mW/cm ²)
	Formula	Value (mW/cm ²)	
1 Near Field	$4nP/A$	0.37	< FCC MPE Limit
2 Far Field	$GP / (4(\pi)L^2)$	0.10	< FCC MPE Limit
3 Transition	$\leq \text{Nr Fld Region}$	0.37	< FCC MPE Limit
4 Near Reflector Surface	$4P/A$	0.58	< FCC MPE Limit
5 Between Reflector & Ground	P/A	0.15	< FCC MPE Limit
6 Between Reflector and Feed	$4P/a$	302.8	> FCC MPE Limit (See Text)

RADIATION CALCULATIONS FOR 0.74 meter EARTH STATION			
Nomenclature	Formula	Value	Unit
INPUT PARAMETERS			
M = Antenna Aperture Major Axis		0.98	meters
m = Antenna Aperture Minor Axis		0.56	meters
w = Major Axis of Feed Mouth		0.065	meters
h = Minor Axis of Feed Mouth		0.042	meters
P = Max Power into Antenna		1.00E-08	Watts
n = Apperture Efficiency		67%	
k = Wavelength @ 19.95 GHz		0.0150	meters
CALCULATED VALUES			
A = Area of Reflector	$\pi \times M \times m / 4$	0.431	meters ²
l = Length of Near Field	$M^2 / 4k$	16	meters
L = Beginning of Far Field	$0.6M^2 / k$	38	meters
G = Antenna Gain @ 19.95 GHz	$\eta (4 \times \pi \times A) / k^2$	16,051	(42.1) dBi
a = Area of Feed Mouth	$\pi \times w \times h / 4$	0.002	meters ²
POWER DENSITY CALCULATIONS			
Region	Maximum Power Density in Region		Hazard Assessment (FCC MPE Limit = 1 mW/cm ²)
	Formula	Value (mW/cm ²)	
1 Near Field	$4nP/A$	6.22E-09	< FCC MPE Limit
2 Far Field	$GP / (4(\pi)L^2)$	8.70E-10	< FCC MPE Limit
3 Transition	$\leq \text{Nr Fld Region}$	6.22E-09	< FCC MPE Limit
4 Near Reflector Surface	$4P/A$	9.28E-09	< FCC MPE Limit
5 Between Reflector & Ground	P/A	2.32E-09	< FCC MPE Limit
6 Between Reflector and Feed	$4P/a$	1.84E-06	< FCC MPE Limit

RADIATION CALCULATIONS FOR 0.74 meter EARTH STATION			
Nomenclature	Formula	Value	Unit
INPUT PARAMETERS			
M = Antenna Aperture Major Axis		0.98	meters
m = Antenna Aperture Minor Axis		0.56	meters
w = Major Axis of Feed Mouth		0.065	meters
h = Minor Axis of Feed Mouth		0.042	meters
P = Max Power into Antenna		0.5	Watts
n = Apperture Efficiency		67%	
k = Wavelength @ 30 GHz		0.0100	meters
CALCULATED VALUES			
A = Area of Reflector	$\pi \times M \times m / 4$	0.431	meters ²
l = Length of Near Field	$M^2 / 4k$	24	meters
L = Beginning of Far Field	$0.6M^2 / k$	58	meters
G = Antenna Gain @ 30 GHz	$n(4 \times \pi \times A) / k^2$	36,295	(45.6) dBi
a = Area of Feed Mouth	$\pi \times w \times h / 4$	0.002	meters ²
POWER DENSITY CALCULATIONS			
Region	Maximum Power Density in Region		Hazard Assessment (FCC MPE Limit = 1 mW/cm ²)
	Formula	Value (mW/cm ²)	
1 Near Field	$4nP/A$	0.31	< FCC MPE Limit
2 Far Field	$GP / (4(\pi)L^2)$	0.04	< FCC MPE Limit
3 Transition	$\leq \text{Nr Fld Region}$	0.31	< FCC MPE Limit
4 Near Reflector Surface	$4P/A$	0.46	< FCC MPE Limit
5 Between Reflector & Ground	P/A	0.12	< FCC MPE Limit
6 Between Reflector and Feed	$4P/a$	92.2	> FCC MPE Limit (See Text)

RADIATION HAZARD CALCULATIONS FOR 0.98 meter EARTH STATION			
Nomenclature	Formula	Value	Unit
INPUT PARAMETERS			
D = Antenna Diameter		0.98	meters
d = Diameter of Feed Mouth		0.049	meters
P = Max Power into Antenna		0.5	Watts
n = Apperture Efficiency		67%	
k = Wavelength @ 30 GHz		0.0100	meters
CALCULATED VALUES			
A = Area of Reflector	$\pi D^2/4$	0.754	meters ²
l = Length of Near Field	$D^2/4k$	24	meters
L = Beginning of Far Field	$0.6D^2/k$	58	meters
G = Antenna Gain @ 30 GHz	$n(\pi D/k)^2$	63,516	48.0 dBi
a = Area of Feed Mouth	$\pi d^2/4$	0.0019	meters ²
POWER DENSITY CALCULATIONS			
Region	Maximum Power Density in Region		Hazard Assessment (FCC MPE Limit = 1 mW/cm ²)
	Formula	Value (mW/cm ²)	
1 Near Field	$4nP/A$	0.18	< FCC MPE Limit
2 Far Field	$GP/(4(\pi)L^2)$	0.08	< FCC MPE Limit
3 Transition	$\leq N_r$ Fld Region	0.18	< FCC MPE Limit
4 Near Reflector Surface	$4P/A$	0.27	< FCC MPE Limit
5 Between Reflector & Ground	P/A	0.07	< FCC MPE Limit
6 Between Reflector and Feed	$4P/a$	106.1	> FCC MPE Limit (See Text)