

RF Radiation Safety Calculations

Spreadsheet Copyright by Tim Shroyer, General Dynamics C4 Systems 2005
RF Safety Calculations based on OET Bulletin 65 for Parabolic Reflectors.

Calculations are based on Bulletin 65 Equations 11 through 18.

Input Values

Frequency of Operation	14250	14250	14250 MHz
Reflector Diameter	2.40	1.20	1.00 Meters
Gain of Antenna	49.0	43.6	41.8 dBi
Input Power to Antenna	18.5	9.0	11.8 dBW
Input Power to Antenna	70.00	8.00	15.00 Watts

Resultant EIRP	67.40	52.58	53.56 dBW
	5501240	181278	227048 Watts

Power Density At Antenna Surface

(From Bulletin 65 Equation 11)

Maximum Power Density At Antenna Surface =	61.89	28.29	76.39 W/m ²
Maximum Power Density At Antenna Surface =	6.19	2.83	7.64 mW/cm ²
Maximum Power Density At Antenna Surface =	7.92	4.52	8.83 dBW/cm ²

Is this Compliant With Limits?

For Occupational/Controlled Exposure (5 mW/cm ²)=	NO	NO	NO
For General Population/Uncontrolled Exposure (1 mW/cm ²)=	NO	NO	NO

Power Density in the Near-Field Region

Extent of the Near-Field = (From Bulletin 65 Equation 12)	68.40	17.10	11.88 Meters
--	-------	-------	--------------

Aperture Efficiency = (From Bulletin 65 Equation 14)	0.613	0.707	0.680 Units
---	-------	-------	-------------

On-Axis Near-Field Power Density =	37.92	19.99	51.93 W/m ²
(From Bulletin 65 Equation 13)	3.79	2.00	5.19 mW/cm ²

Is this Compliant With Limits?

For Occupational/Controlled Exposure (5 mW/cm ²)=	YES	YES	NO
For General Population/Uncontrolled Exposure (1 mW/cm ²)=	NO	NO	NO

Power Density in the Transition Region

Beginning of Far-Field Region = **164.16** **41.04** **28.50** Meters
(From Bulletin 65 Equation 16)

Transition Region Power Density
(From Bulletin 65 Equation 17)

In the Transition Region, Power Density varies from

Power Density =	3.79	2.00	5.19 mW/cm ²
at	68.40	17.10	11.88 Meters
Power Density =	1.58	0.83	2.16 mW/cm ²
at	164.16	41.04	28.50 Meters

Is the Full Transition Region Compliant With Limits?

For Occupational/Controlled Exposure (5 mW/cm²)= **YES** **YES** **NO**

For General Population/Uncontrolled Exposure (1 mW/cm²)= **NO** **NO** **NO**

At What Range Is Power Density Compliant With Limits?

For Occupational/Controlled Exposure (5 mW/cm²)= **51.88** **6.84** **12.33** Meters

For General Population/Uncontrolled Exposure (1 mW/cm²)= **Too Many** **34.19** **Too Many** Meters

Power Density in the Far-Field Region

Far-Field Starts at = **164.16** **41.04** **28.50** Meters

Power Density at the start of Far-Field Region = **1.62** **0.86** **2.22** mW/cm²
(From Bulletin 65 Equation 18)

At What Range Is Power Density Compliant With Limits?

For Occupational/Controlled Exposure (5 mW/cm²)= **93.57** **16.99** **19.01** Meters

For General Population/Uncontrolled Exposure (1 mW/cm²)= **209.23** **37.98** **42.51** Meters