

## EXHIBIT A1 - ANALYSIS OF NON-IONIZING RADIATION, 1.8 m Ku

### HARMFUL LEVELS OF RADIATION WILL NOT EXIST IN REGIONS NORMALLY OCCUPIED BY PERSONNEL.

CRITERIA: ANSI SPECIFICATIONS REQUIRE THAT PERSONNEL NOT BE EXPOSED TO LEVELS OF NON-IONIZING RADIATION EXCEEDING 5 mW / cm<sup>2</sup>.

THE FOLLOWING ANALYSES SUPPORT THIS DETERMINATION:

#### FAR FIELD ANALYSIS:

ANTENNA DIAMETER = 1.8 Meters  
ANTENNA GAIN = 47.0 dBi (lin 50,119)  
LAMBDA =  $3 \times 10^8$  Meters /  $14.25 \times 10^9$  Hz = 0.0210526  
EFFICIENCY =  $\eta = G / (\pi \cdot D / \lambda)^2 = 0.708$   
POWER MAX AT FLANGE = 500 Watts (27.0 dBW)  
DISTANCE TO FAR FIELD =  $2 \cdot D^2 / \lambda$   
= 6.48 / 0.0210526  
= 307.8 Meters  
ON-AXIS POWER DENSITY =  $G \cdot P / 4 \cdot \pi \cdot \text{Far Field Distance}^2$   
=  $50,119 \cdot 500 / 12.56637 \cdot 94,741$   
= 21.05 W/m<sup>2</sup>  
= 2.11 mW/cm<sup>2</sup>

LEVEL IS LESS THAN THE 5 mW/cm<sup>2</sup> MAXIMUM ANSI LEVEL PERMITTED

#### NEAR FIELD ANALYSIS (Parallel Beam Region & Transition Region):

##### PARALLEL BEAM REGION ANALYSIS:

DISTANCE TO END OF PARALLEL BEAM (CYLINDER) REGION:  
=  $\text{DIAMETER}^2 / 2.5 \cdot \lambda$   
= 3.24 / 0.0526315  
= 61.6 Meters  
POWER DENSITY AT END OF PARALLEL BEAM REGION  
= P / CYLINDRICAL PARALLEL BEAM AREA  
= 500 / 3.24  
= 154.32 W / m<sup>2</sup>  
= 15.4 mW / cm<sup>2</sup>

LEVEL IS GREATER THAN THE 5 mW/m<sup>2</sup> MAXIMUM ANSI LEVEL PERMITTED  
ANTENNA IS MOUNTED 10' IN THE AIR ON TRUCK, NO PERSONNEL WILL OCCUPY THE PARALLEL BEAM REGION DURING OPERATION.

##### TRANSITION REGION ANALYSIS:

THIS REGION WILL DECREASE INVERSELY WITH DISTANCE BEGINNING AT THE END OF THE PARALLEL BEAM REGION AND NOT EXCEED 15.4 mW / cm<sup>2</sup>

## Exhibit A1-pg2

### **MAIN REFLECTOR ANALYSIS:**

$$= P / \text{REFLECTOR AREA}$$

$$= 500 / 3.24$$

$$= 154.32 \text{ W} / \text{m}^2$$

$$= 15.4 \text{ mW/cm}^2$$

LEVEL IS GREATER THAN THE 5 mW/m<sup>2</sup> MAXIMUM ANSI LEVEL PERMITTED  
ANTENNA IS MOUNTED 10' IN THE AIR ON TRUCK, NO PERSONNEL WILL  
OCCUPY THE MAIN REFLECTOR OR THE FEED TO REFLECTOR REGION  
DURING OPERATION.

**RF POWER WILL BE TURNED OFF DURING ANY ANTENNA MAINTENANCE  
REQUIRING PERSONNEL TO OCCUPY ANY HAZARDOUS REGION BETWEEN  
THE FEED HORN, REFLECTOR, AND TRANSITION ZONE.**

**AS A TRANSPORTABLE UNIT, PRECAUTIONS WILL BE TAKEN TO VERIFY THAT  
THE ANTENNA IS NOT POINTING TOWARD ANY POPULATED AREA.**

PREPARED AND SUBMITTED BY:

BASIL F. PINZONE, JR. 06/18/2021  
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## EXHIBIT A2 - ANALYSIS OF NON-IONIZING RADIATION, 2.4 m C-Band

### HARMFUL LEVELS OF RADIATION WILL NOT EXIST IN REGIONS NORMALLY OCCUPIED BY PERSONNEL.

CRITERIA: ANSI SPECIFICATIONS REQUIRE THAT PERSONNEL NOT BE EXPOSED TO LEVELS OF NON-IONIZING RADIATION EXCEEDING 5 mW / cm<sup>2</sup>.

THE FOLLOWING ANALYSES SUPPORT THIS DETERMINATION:

### FAR FIELD ANALYSIS:

ANTENNA DIAMETER = 2.4 Meters  
ANTENNA GAIN = 41.8 dBi (lin 15,135)  
LAMBDA =  $3 \times 10^8$  Meters /  $6.175 \times 10^9$  Hz = 0.048583  
EFFICIENCY =  $\eta = G / (\pi \cdot D / \lambda)^2 = 0.628$   
POWER MAX AT FLANGE = 358 Watts (25.54 dBW)  
DISTANCE TO FAR FIELD =  $2 \cdot D^2 / \lambda$   
= 11.52 / 0.048583  
= 237.1 Meters  
ON-AXIS POWER DENSITY =  $G \cdot P / 4 \cdot \pi \cdot \text{Far Field Distance}^2$   
= 15,135 \* 358 /  $12.56637 \cdot 56,216$   
= 7.67 W/m<sup>2</sup>  
= 0.77 mW/cm<sup>2</sup>

LEVEL IS LESS THAN THE 5 mW/cm<sup>2</sup> MAXIMUM ANSI LEVEL PERMITTED

### NEAR FIELD ANALYSIS (Parallel Beam Region & Transition Region):

#### PARALLEL BEAM REGION ANALYSIS:

DISTANCE TO END OF PARALLEL BEAM (CYLINDER) REGION:  
= DIAMETER<sup>2</sup> / 2.5 \*  $\lambda$   
= 5.76 / 0.12146  
= 47.42 Meters

POWER DENSITY AT END OF PARALLEL BEAM REGION  
= P / CYLINDRICAL PARALLEL BEAM AREA  
= 358 / 5.76  
= 62.15 W / m<sup>2</sup>  
= 6.22 mW / cm<sup>2</sup>

LEVEL IS GREATER THAN THE 5 mW/cm<sup>2</sup> MAXIMUM ANSI LEVEL PERMITTED.  
ANTENNA IS MOUNTED 8' IN THE AIR. NO PERSONNEL WILL OCCUPY THE PARALLEL BEAM REGION DURING OPERATION.

#### TRANSITION REGION ANALYSIS:

THIS REGION WILL DECREASE INVERSELY WITH DISTANCE BEGINNING AT THE END OF THE PARALLEL BEAM REGION AND WILL NOT EXCEED 6.22 mW / cm<sup>2</sup>

## Exhibit A2-pg2

### **MAIN REFLECTOR ANALYSIS:**

$$= P / \text{REFLECTOR AREA}$$

$$= 358 / 5.76$$

$$= 62.15 \text{ W} / \text{m}^2$$

$$= 6.22 \text{ mW/cm}^2$$

LEVEL IS GREATER THAN THE 5 mW/m<sup>2</sup> MAXIMUM ANSI LEVEL PERMITTED. ANTENNA IS MOUNTED 8' IN THE AIR. NO PERSONNEL WILL OCCUPY THE MAIN REFLECTOR OR THE FEED TO REFLECTOR REGION DURING OPERATION.

**RF POWER WILL BE TURNED OFF DURING ANY ANTENNA MAINTENANCE REQUIRING PERSONNEL TO OCCUPY ANY HAZARDOUS REGION BETWEEN THE FEED HORN, SUB-REFLECTOR, REFLECTOR, AND TRANSITION ZONE.**

**AS A TRANSPORTABLE UNIT, PRECAUTIONS WILL BE TAKEN TO VERIFY THAT THE ANTENNA IS NOT POINTING TOWARD ANY POPULATED AREA.**

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