



# WATERFORD

## RF EMISSIONS COMPLIANCE REPORT

### Prepared for:

Crown Castle  
1505 Westlake Avenue N., Suite 800  
Seattle, WA 98109

### Site:

SESEA00010B (880416) - 8  
8477 SE 68TH STREET  
Mercer Island, WA 98040  
47.5417, -122.224

November 3, 2021

**This site will be in compliance with  
FCC Regulations and MPE Limits:**

**Crown Castle Is 0.787% of General Population (GP) Limit  
(0.157% of Occupational (Occ) Limit)**

Analysis completed using Waterford's NIERTool© software

Only clients and client representatives are authorized to provide input data through the Waterford web portal. In securing that authorization, clients and client representatives warrant the accuracy of all input data. Waterford Consultants, LLC attests to the accuracy of the engineering calculations. Waterford also attests that the results of those engineering calculations are correctly summarized in this report.

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# RF EMISSIONS COMPLIANCE STATEMENT

**Site:**  
**SESEA00010B (880416) - 8**  
**8477 SE 68TH STREET**  
**Mercer Island, WA 98040**

## **Compliance Statement**

Subject site COMPLIES with Radiofrequency Radiation Exposure Limits of 47 C.F.R. §§ 1.1307(b)(3) and 1.1310.

## **Ground Level Site Summary**

Predicted cumulative RF power density at ground level as a percentage of the FCC General Population limits. This result is the sum of the maximum ground level MPE for each RF emitter by band of operation. Sites below 100% are in full compliance.

<b>Source</b>	<b>Predicted Power Density, % of Limit (GP)</b>
Dish Wireless 600 MHz	0.097 %
Dish Wireless 700 MHz	0.099 %
Dish Wireless 2007 MHz	0.279 %
Dish Wireless 2100 MHz	0.313 %
<b>Sum of Listed Sources</b>	<b>0.787%</b>

**Technical Framework: Basis for Compliance Statement**

The compliance framework is derived from the Federal Communications Commission (FCC) Rules and Regulations for preventing human exposure in excess of the applicable Maximum Permissible Exposure (“MPE”) limits listed in Table 1 of 47 C.F.R. § 1.1310. Calculations using input data provided to Waterford by client or client's representative numerically confirm the subject site can operate at a 100% duty cycle without exceeding the FCC MPE limits in areas of uncontrolled access.

At this site, the radio frequency (RF) power density resulting from each transmitter at any location may be expressed as a percentage of the frequency-specific limits and added to determine if 100% of the exposure limit has been exceeded. The FCC Rules define two tiers of permissible exposure differentiated by the situation in which the exposure takes place and/or the status of the individuals who are subject to exposure. General Population / Uncontrolled exposure limits apply to those situations in which persons may not be aware of the presence of electromagnetic energy, where exposure is not employment related, or where persons cannot exercise control over their exposure. Occupational / Controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment, have been made fully aware of the potential for exposure, and can exercise control over their exposure. Based on the criteria for these classifications, continuous exposure to RF power density levels below the FCC General Population limits is not hazardous. The FCC General Population limits are 5 times more restrictive than the Occupational limits..

Frequency (MHz)	<i>Limits for General Population/ Uncontrolled Exposure</i>		<i>Limits for Occupational/ Controlled Exposure</i>	
	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minutes)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minutes)
30-300	0.2	30	1	6
300-1500	f/1500	30	f/300	6
1500-100,000	1.0	30	5.0	6

In situations where the predicted MPE exceeds the General Population threshold in an accessible area because of emissions from multiple transmitters, FCC licensees that contribute greater than 5% of the aggregate MPE share responsibility for mitigation.

For any location where radiofrequency (RF) power densities exceed 100% MPE of the General Population limits, access controls with appropriate RF alerting signage must be available to be visible upon approach from any direction to provide notification of potential conditions within these areas. Subject to other site security requirements, occupational personnel should be trained in RF safety and equipped with personal protective equipment (e.g. RF personal monitor) designed for safe work in the vicinity of RF emitters. Waterford Consultants, LLC recommends that any work activity in these designated areas or in front of any transmitting antennas be coordinated with the wireless operators.

## **Predictive Modeling**

Based on the computational guidelines set forth in FCC Office of Engineering and Technology, Bulletin 65 ("OET65"), Waterford Consultants, LLC has developed software to predict the overall MPE possible at any particular location given the spatial orientation and operating parameters of multiple RF sources. These theoretical results represent worst-case predictions as emitters are assumed to be operating at 100% duty cycle.

The tabular analysis in this report calculates the spatial peak power density produced at ground level from each RF emitter. The far field power density in milliWatts per square centimeter is expressed as  $S_{ff} = 33.4 \times ERP / R^2$  where ERP is the Effective Radiated Power along a specific azimuth in Watts and R is the distance from the antenna radiation center in meters. The antenna manufacturer's horizontal and vertical radiation patterns have been considered in determining the ERP in any direction. This computation is based on the maximum ERP and includes a 1.6-fold increase in field strength due to ground reflection. The result provides a conservative estimate of spatially averaged power density at ground level and may be higher than predicted MPE in the graphical plots described below.

As the limits are frequency dependent, the contribution of any RF source at a specific location may be expressed as a percentage of the FCC General Population MPE limits at the associated operating frequency. The percentage contributions from all RF sources are added to determine the overall exposure level. If this result is less than 100%, the predicted cumulative exposure level is below the General Population limits set forth in the FCC Rules. The cumulative MPE depicted on the summary page is the summation of maximum MPE values for each emitter regardless of antenna orientation.

A graphical plot of calculated spatially averaged RF power density, based on the Cylindrical Model as described in OET65, predicts spatially averaged MPE conditions at areas in near proximity to the antenna. In the vertical display, predicted MPE is depicted at the center of the 6 ft vertical zone that a person could occupy.

## **Qualifications of Waterford**

With more than 100 team-years of experience, Waterford Consultants, LLC [Waterford] provides technical consulting services to clients in the radio communications and antenna locating industry. Waterford retains professional engineers who are placed in responsible charge of the processes for analysis.

Waterford is familiar with 47 C.F.R. § § 1.1307(b)(3) and 1.1310 along with the general Rules, Regulations and policies of the FCC. Waterford work processes incorporate all specifications of FCC Office of Engineering and Technology, Bulletin 65 ("OET65"), from the website: [www.fcc.gov/oet/rfsafety](http://www.fcc.gov/oet/rfsafety) and follow criteria detailed in 47 CFR § 1.1310 "Radiofrequency radiation exposure Limits".

Within the technical and regulatory framework detailed above, Waterford developed tools according to recognized and generally accepted good engineering practices. Permissible exposure limits are band specific, and the Waterford computerized modeling tools correctly calculate permissible exposure based on the band(s) specified in the input data. Only clients and client representatives are authorized to provide input data through the Waterford web portal. In securing that authorization, clients and client representatives attest to the accuracy of all input data.

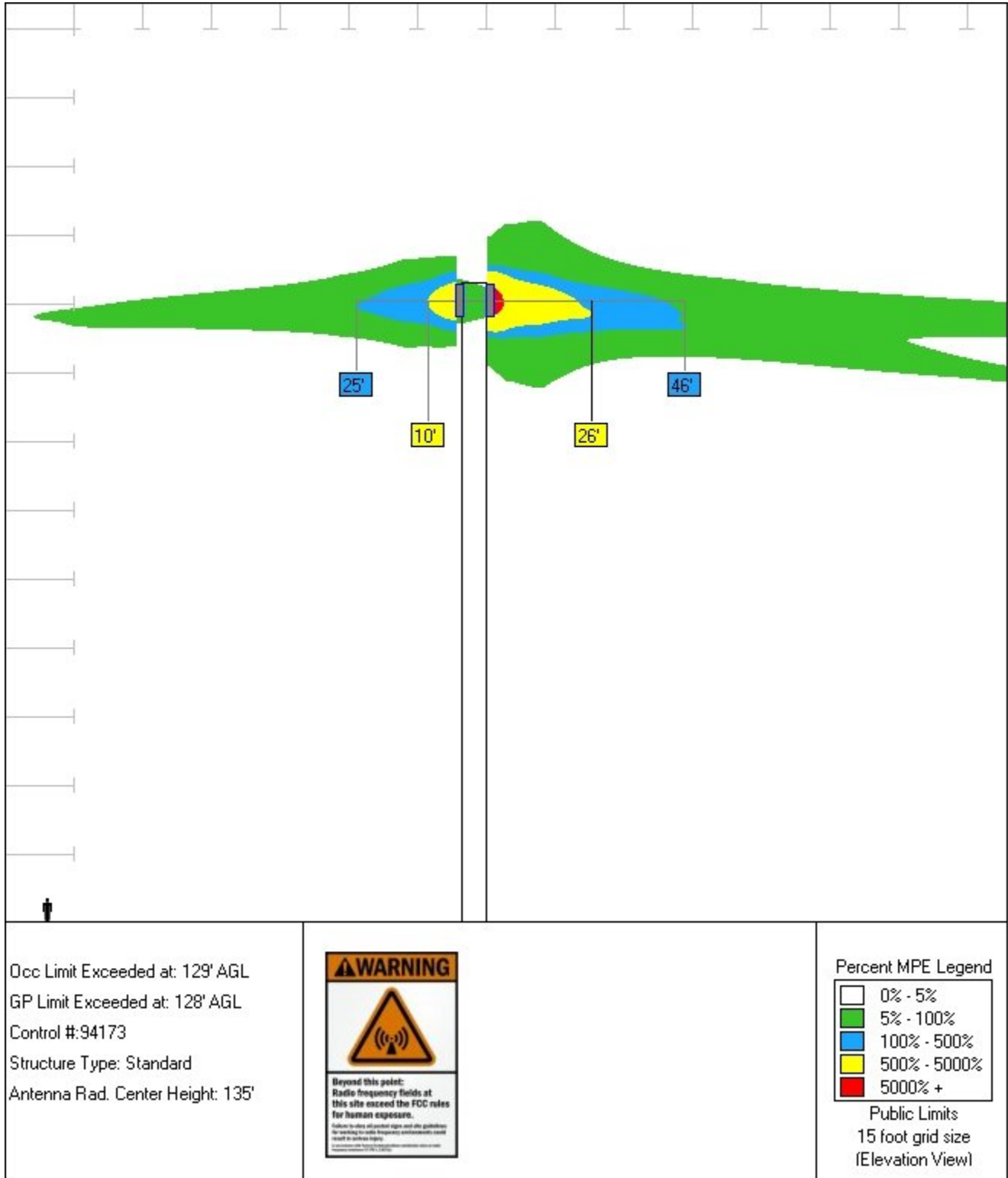
Waterford Consultants, LLC attests to the accuracy of the engineering calculations computed by those modeling tools. Furthermore, Waterford attests that the results of those engineering calculations are correctly summarized in this report.

## Antenna Inventory

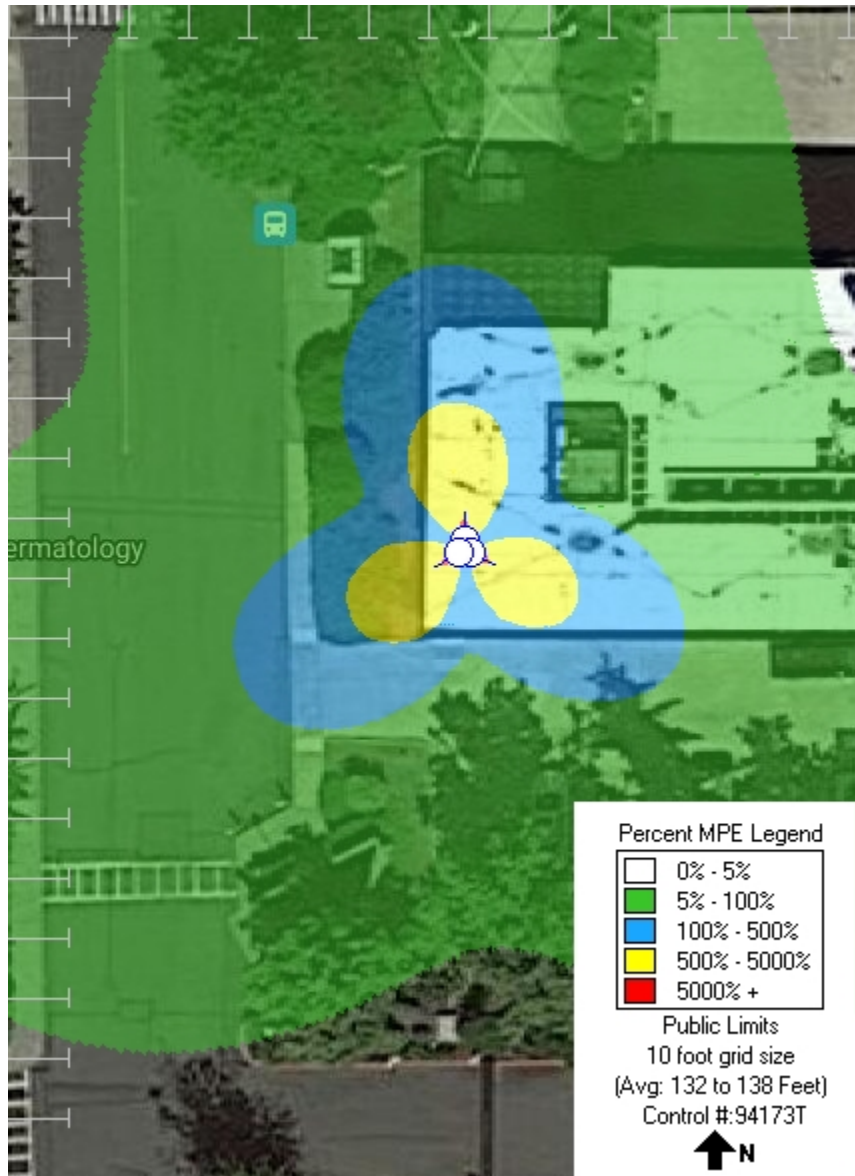
#	Operator	Make	Model	Freq (MHz)	Az (deg)	Tilt (deg)	HorBW (deg)	Ant (ft)	TPO (w)	Paths	Loss (db)	Ant Gain	Radiated Power (W)	RC AGL (ft)
1	Dish Wireless	JMA	MX08FRO665-21 02DT 600	600	0	0	62	6	30	4	0	11.35dBd	1637.500 ERP	135
2	Dish Wireless	JMA	MX08FRO665-21 02DT 600	600	120	0	62	6	30	4	0	11.35dBd	1637.500 ERP	135
3	Dish Wireless	JMA	MX08FRO665-21 02DT 600	600	240	0	62	6	30	4	0	11.35dBd	1637.500 ERP	135
4	Dish Wireless	JMA	MX08FRO665-21 02DT 700	700	0	0	52	6	40	4	0	12.05dBd	2565.190 ERP	135
5	Dish Wireless	JMA	MX08FRO665-21 02DT 700	700	120	0	52	6	40	4	0	12.05dBd	2565.190 ERP	135
6	Dish Wireless	JMA	MX08FRO665-21 02DT 700	700	240	0	52	6	40	4	0	12.05dBd	2565.190 ERP	135
7	Dish Wireless	JMA	MX08FRO665-21 02DT 2007	2007	0	0	62	6	40	4	0	15.75dBd	9861.970 EIRP	135
8	Dish Wireless	JMA	MX08FRO665-21 08DT 2007	2007	120	0	66	6	40	4	0	16.35dBd	9861.970 EIRP	135
9	Dish Wireless	JMA	MX08FRO665-21 04DT 2007	2007	240	0	63	6	40	4	0	16.05dBd	9861.970 EIRP	135
10	Dish Wireless	JMA	MX08FRO665-21 02DT 2100	2100	0	0	65	6	40	4	0	16.75dBd	12415.490 EIRP	135
11	Dish Wireless	JMA	MX08FRO665-21 08DT 2100	2100	120	0	64	6	40	4	0	16.55dBd	12415.490 EIRP	135
12	Dish Wireless	JMA	MX08FRO665-21 04DT 2100	2100	240	0	65	6	40	4	0	16.75dBd	12415.490 EIRP	135

## ELEVATION DETAIL

[Predicted MPE depicted at the center of the 6 ft vertical zone that a person could occupy]



# TOP DOWN DETAIL





**GROUND LEVEL MPE BY RF EMITTER**

The maximum ground level MPE along the azimuth of orientation for each RF emitter by band of operation is listed below. The computational approach is described in the Predictive Modeling section. The maximum MPE by operator and band is contributive to the cumulative ground level MPE summary table presented above.

**Dish Wireless  
SESEA00010B (880416) - 8  
JMA - MX08FRO665-21 02DT 600 0° Sector**

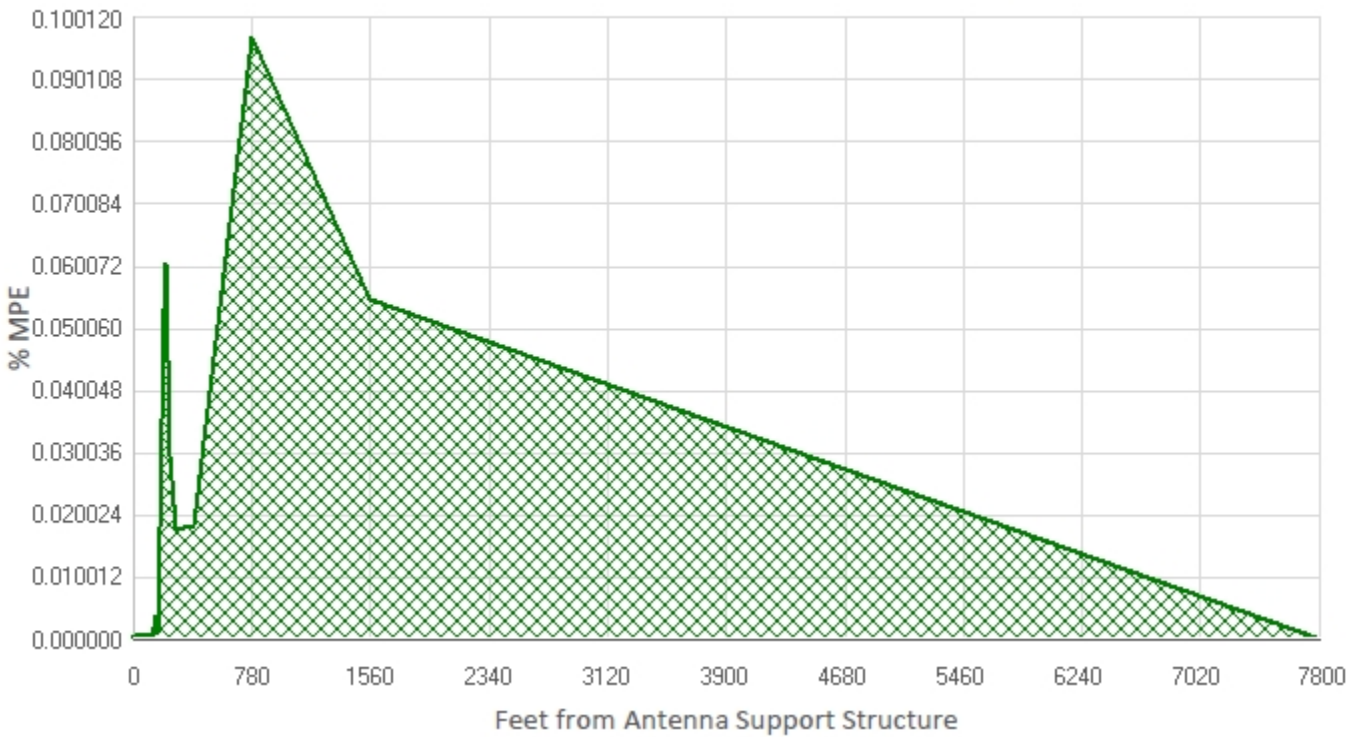
**Maximum Exposure Limit - 600 MHz**

Limit (GP): 400.000  $\mu\text{W}/\text{cm}^2$

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<b>ERP</b>		<b>Height</b>		<b>Downtilt</b>	
(Watts)	1637.500	(feet)	135.000	(Degrees)	0

**Ground Level MPE as Percent of FCC General Population Limits**



**Maximum power density at ground level:** 0.388  $\mu\text{W}/\text{cm}^2$   
**Highest percentage of Maximum Exposure Limit:** 0.097 %

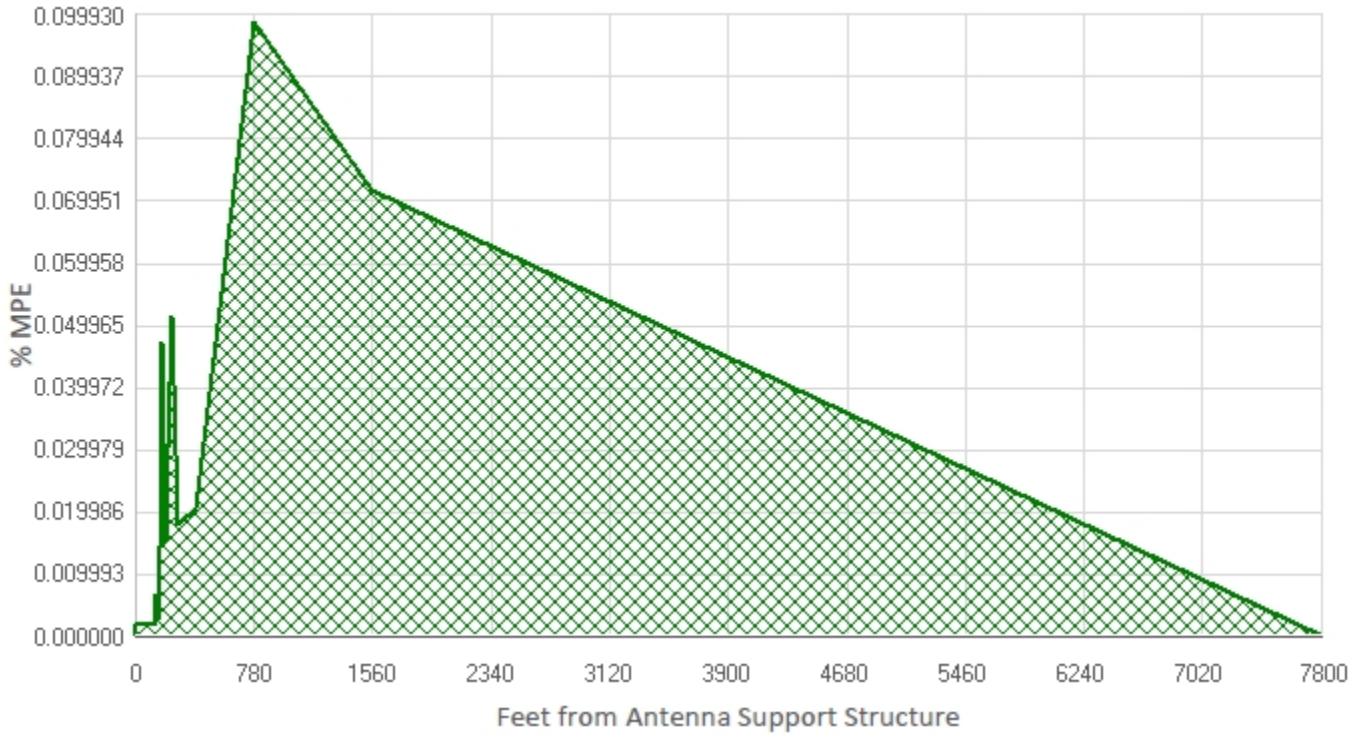
**Dish Wireless**  
**SESEA00010B (880416) - 8**  
**JMA - MX08FRO665-21 02DT 700 0° Sector**

**Maximum Exposure Limit - 700 MHz**

Limit (GP): 466.000  $\mu\text{W}/\text{cm}^2$

ERP (Watts)	Height (feet)	Downtilt (Degrees)
2565.190	135.000	0

**Ground Level MPE as Percent of FCC General Population Limits**



**Maximum power density at ground level:** 0.462  $\mu\text{W}/\text{cm}^2$   
**Highest percentage of Maximum Exposure Limit:** 0.099 %

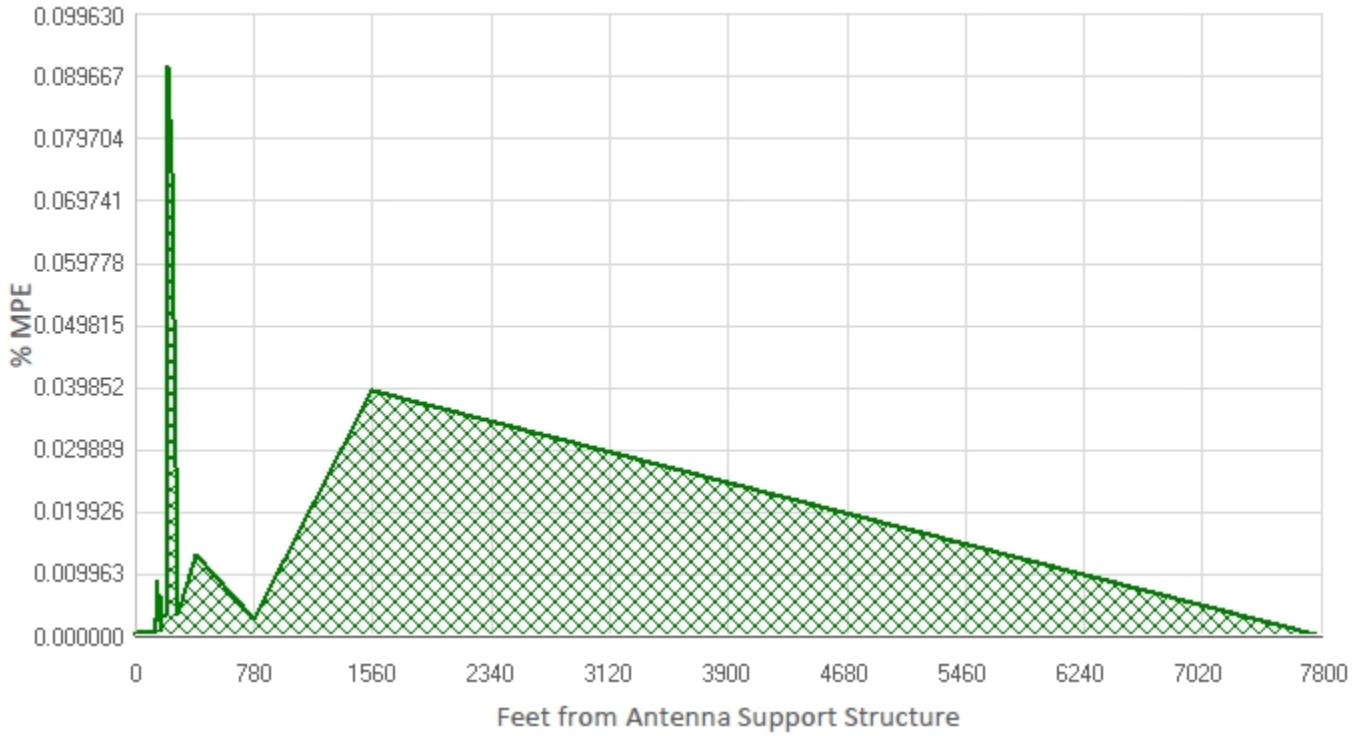
**Dish Wireless**  
**SESEA00010B (880416) - 8**  
**JMA - MX08FRO665-21 02DT 2007 0° Sector**

**Maximum Exposure Limit - 2007 MHz**

Limit (GP): 1000.000  $\mu\text{W}/\text{cm}^2$

<b>EiRP</b> (Watts)	<b>Height</b> (feet)	<b>Downtilt</b> (Degrees)
9861.970	135.000	0

**Ground Level MPE as Percent of FCC General Population Limits**



**Maximum power density at ground level:** 0.916  $\mu\text{W}/\text{cm}^2$   
**Highest percentage of Maximum Exposure Limit:** 0.092 %

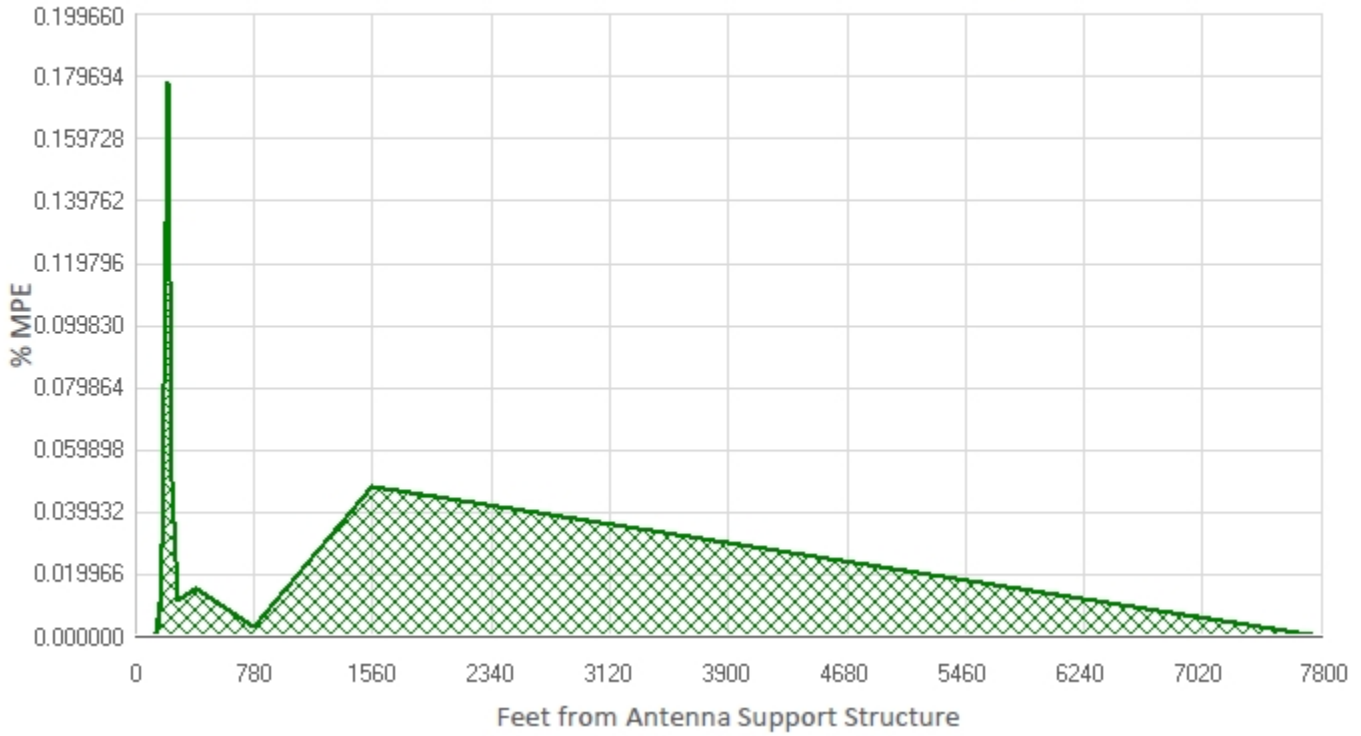
**Dish Wireless**  
**SESEA00010B (880416) - 8**  
**JMA - MX08FRO665-21 02DT 2100 0° Sector**

**Maximum Exposure Limit - 2100 MHz**

Limit (GP): 1000.000  $\mu\text{W}/\text{cm}^2$

<b>EIRP</b>		<b>Height</b>		<b>Downtilt</b>	
(Watts)	12415.490	(feet)	135.000	(Degrees)	0

**Ground Level MPE as Percent of FCC General Population Limits**



**Maximum power density at ground level:** 1.787  $\mu\text{W}/\text{cm}^2$   
**Highest percentage of Maximum Exposure Limit:** 0.179 %

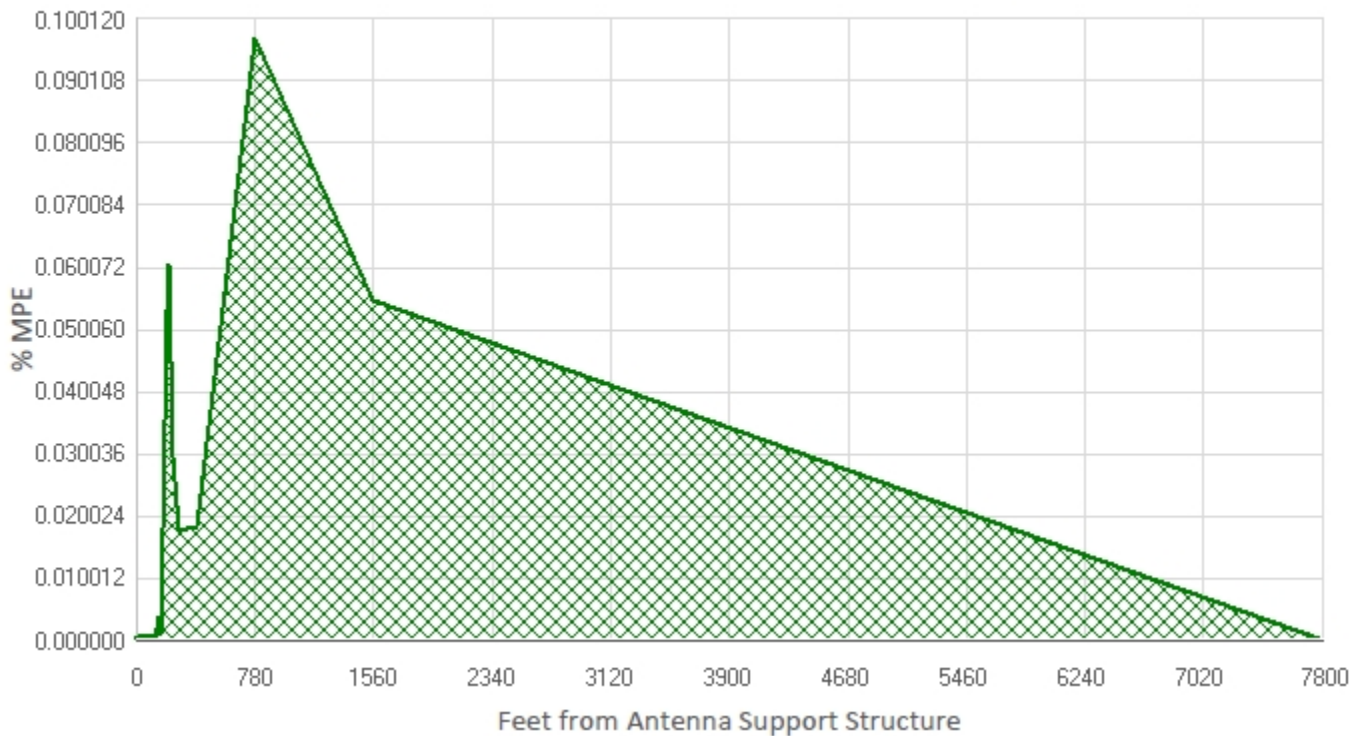
**Dish Wireless**  
**SESEA00010B (880416) - 8**  
**JMA - MX08FRO665-21 02DT 600 120° Sector**

**Maximum Exposure Limit - 600 MHz**

Limit (GP): 400.000  $\mu\text{W}/\text{cm}^2$

<b>ERP</b>		<b>Height</b>		<b>Downtilt</b>	
(Watts)	1637.500	(feet)	135.000	(Degrees)	0

**Ground Level MPE as Percent of FCC General Population Limits**



**Maximum power density at ground level:**

0.388  $\mu\text{W}/\text{cm}^2$

**Highest percentage of Maximum Exposure Limit:**

0.097 %

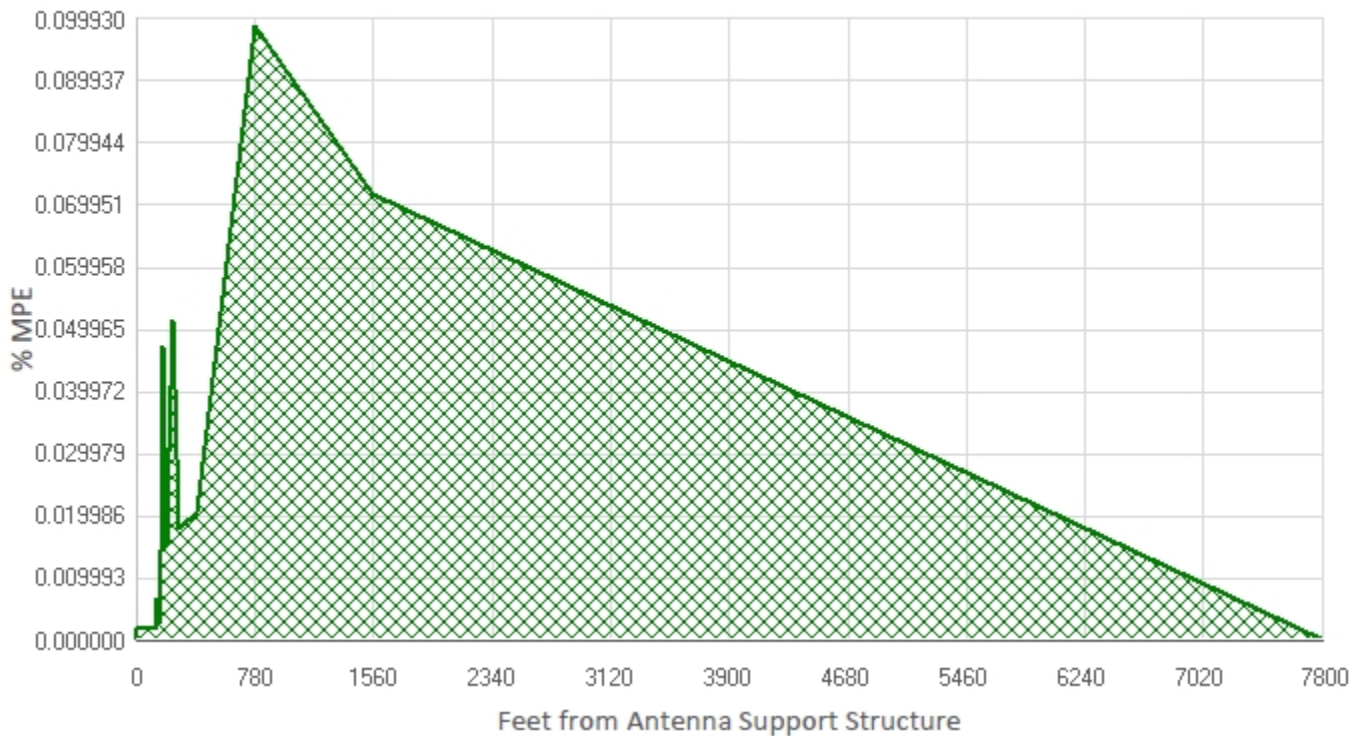
**Dish Wireless**  
**SESEA00010B (880416) - 8**  
**JMA - MX08FRO665-21 02DT 700 120° Sector**

**Maximum Exposure Limit - 700 MHz**

Limit (GP): 466.000  $\mu\text{W}/\text{cm}^2$

<b>ERP</b>		<b>Height</b>		<b>Downtilt</b>	
(Watts)	2565.190	(feet)	135.000	(Degrees)	0

**Ground Level MPE as Percent of FCC General Population Limits**



**Maximum power density at ground level:**

0.462  $\mu\text{W}/\text{cm}^2$

**Highest percentage of Maximum Exposure Limit:**

0.099 %

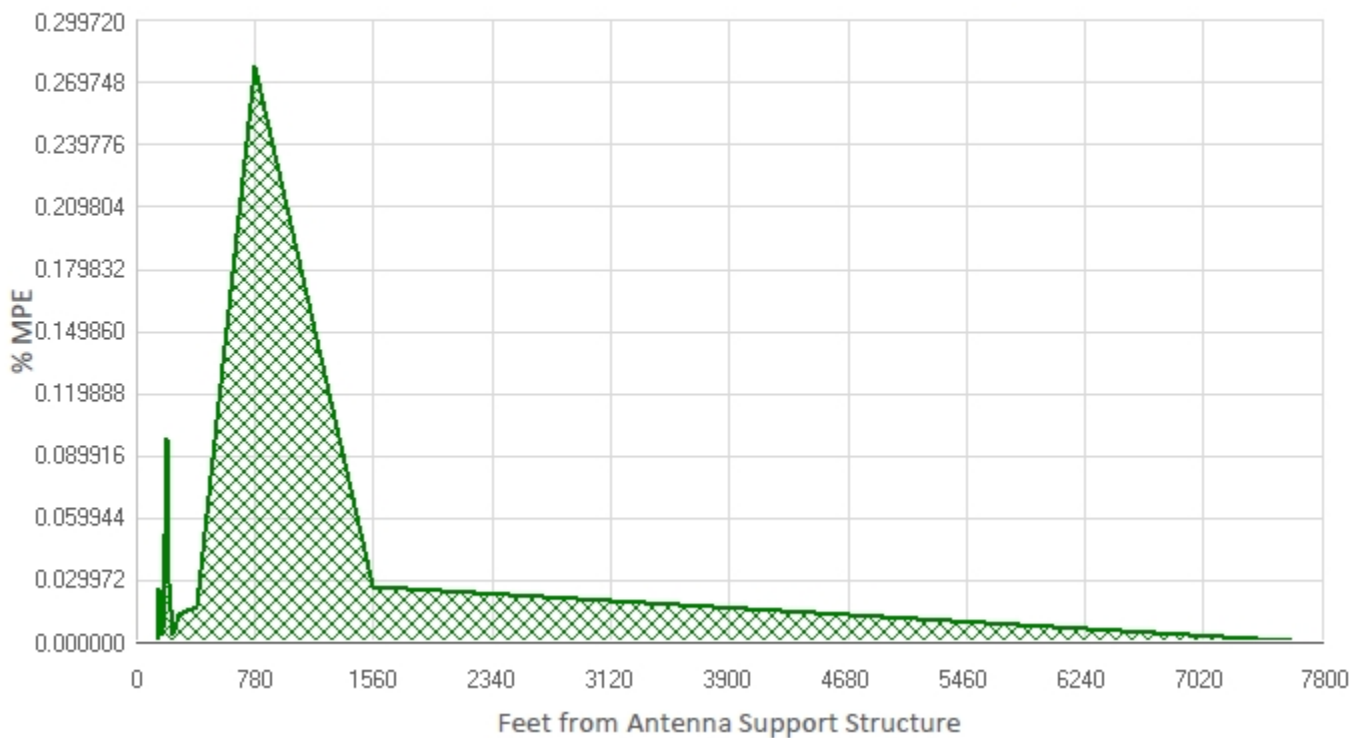
**Dish Wireless**  
**SESEA00010B (880416) - 8**  
**JMA - MX08FRO665-21 08DT 2007 120° Sector**

**Maximum Exposure Limit - 2007 MHz**

Limit (GP): 1000.000  $\mu\text{W}/\text{cm}^2$

<b>EIRP</b>		<b>Height</b>		<b>Downtilt</b>	
(Watts)	9861.970	(feet)	135.000	(Degrees)	0

**Ground Level MPE as Percent of FCC General Population Limits**



**Maximum power density at ground level:**

2.787  $\mu\text{W}/\text{cm}^2$

**Highest percentage of Maximum Exposure Limit:**

0.279 %

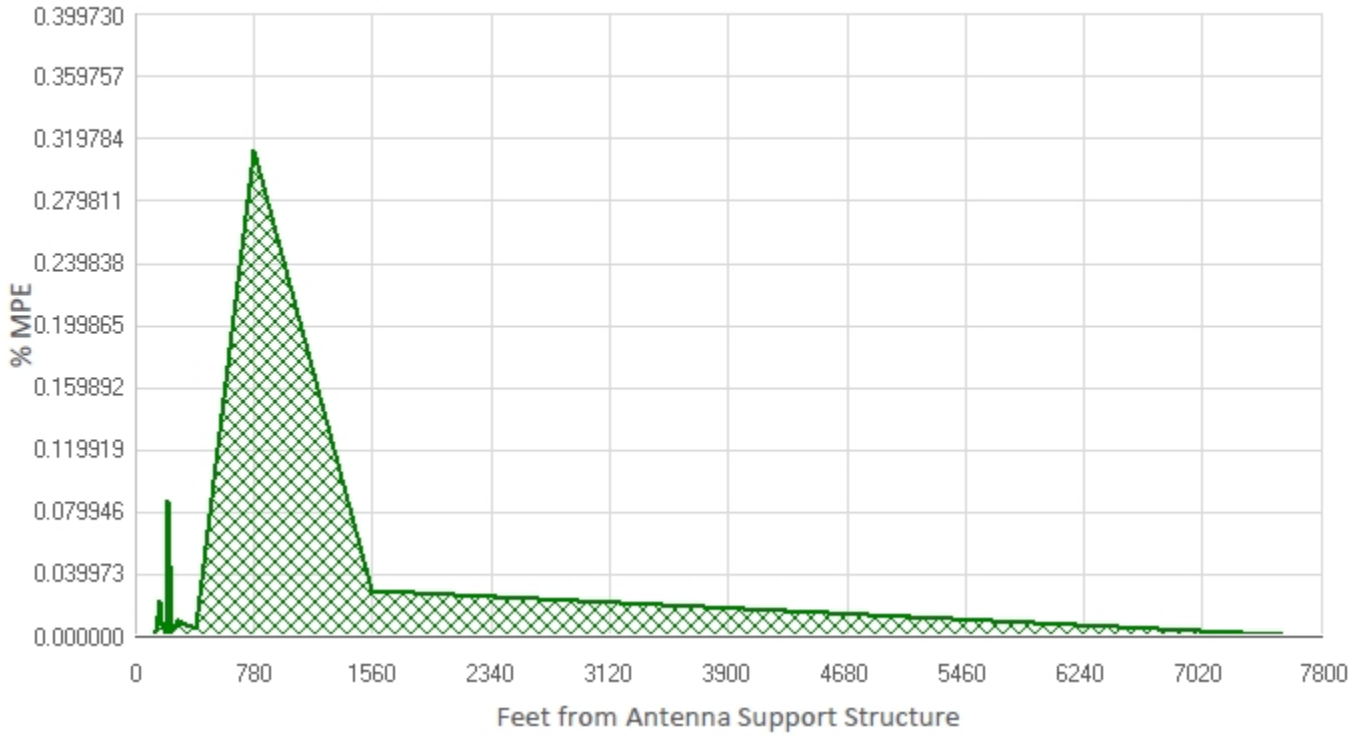
**Dish Wireless**  
**SESEA00010B (880416) - 8**  
**JMA - MX08FRO665-21 08DT 2100 120° Sector**

**Maximum Exposure Limit - 2100 MHz**

Limit (GP): 1000.000  $\mu\text{W}/\text{cm}^2$

<b>EIRP</b>		<b>Height</b>		<b>Downtilt</b>	
(Watts)	12415.490	(feet)	135.000	(Degrees)	0

**Ground Level MPE as Percent of FCC General Population Limits**



**Maximum power density at ground level:** 3.127  $\mu\text{W}/\text{cm}^2$   
**Highest percentage of Maximum Exposure Limit:** 0.313 %



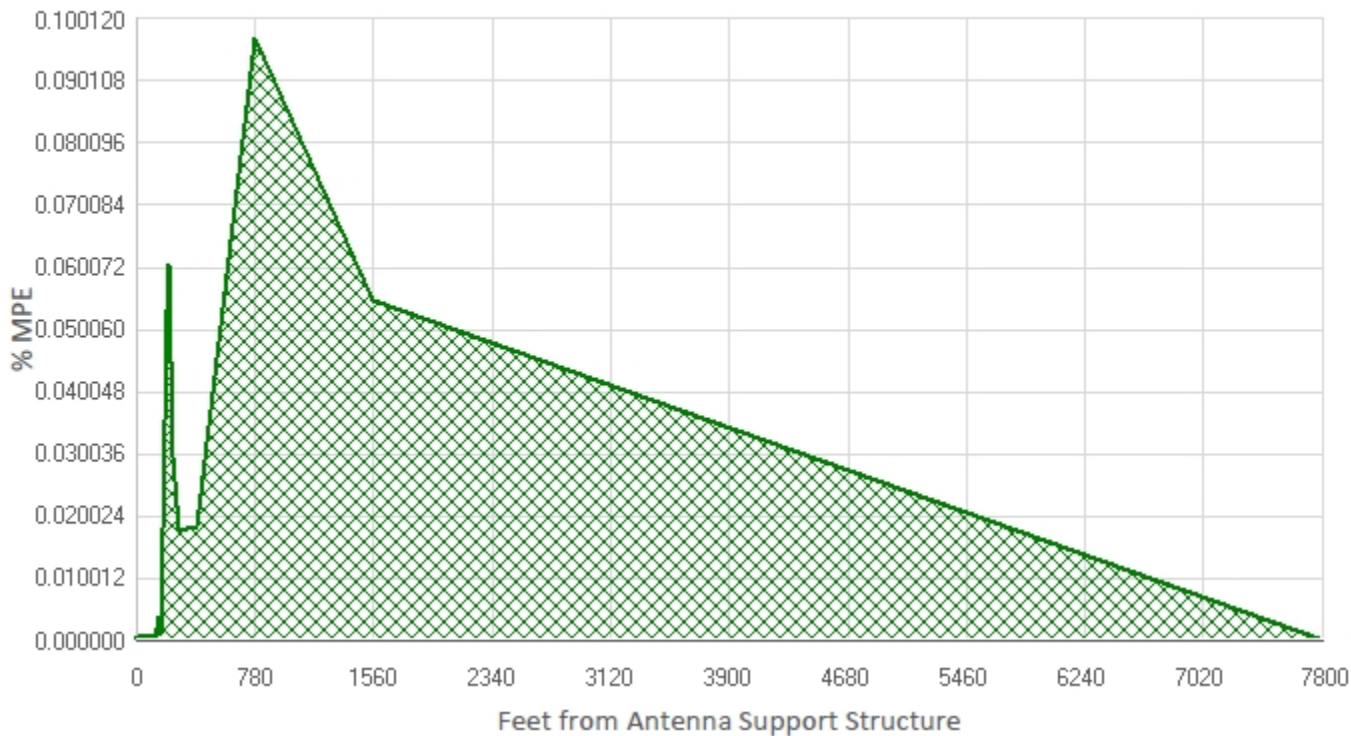
**Dish Wireless**  
**SESEA00010B (880416) - 8**  
**JMA - MX08FRO665-21 02DT 600 240° Sector**

**Maximum Exposure Limit - 600 MHz**

Limit (GP): 400.000  $\mu\text{W}/\text{cm}^2$

<b>ERP</b>		<b>Height</b>		<b>Downtilt</b>	
(Watts)	1637.500	(feet)	135.000	(Degrees)	0

**Ground Level MPE as Percent of FCC General Population Limits**



**Maximum power density at ground level:**

0.388  $\mu\text{W}/\text{cm}^2$

**Highest percentage of Maximum Exposure Limit:**

0.097 %

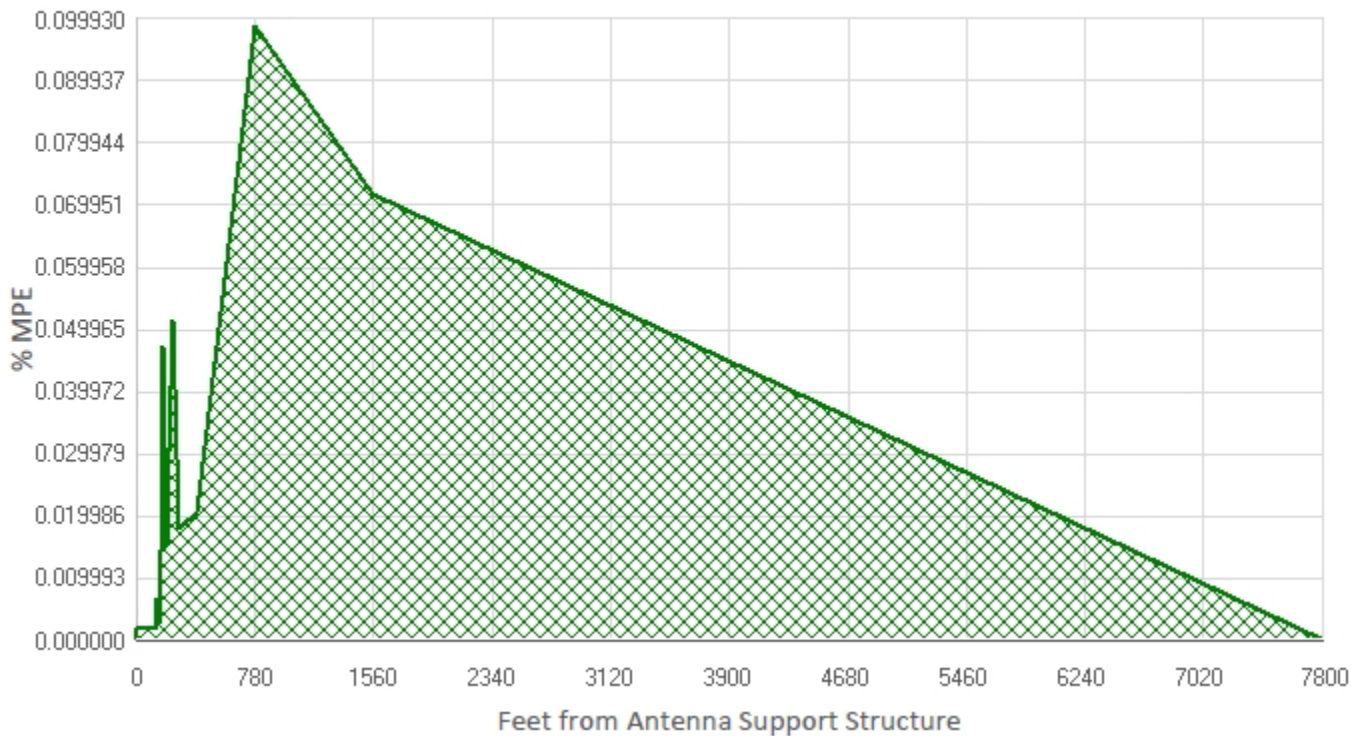
**Dish Wireless**  
**SESEA00010B (880416) - 8**  
**JMA - MX08FRO665-21 02DT 700 240° Sector**

**Maximum Exposure Limit - 700 MHz**

Limit (GP): 466.000  $\mu\text{W}/\text{cm}^2$

<b>ERP</b>		<b>Height</b>		<b>Downtilt</b>	
(Watts)	2565.190	(feet)	135.000	(Degrees)	0

**Ground Level MPE as Percent of FCC General Population Limits**



**Maximum power density at ground level:**

0.462  $\mu\text{W}/\text{cm}^2$

**Highest percentage of Maximum Exposure Limit:**

0.099 %

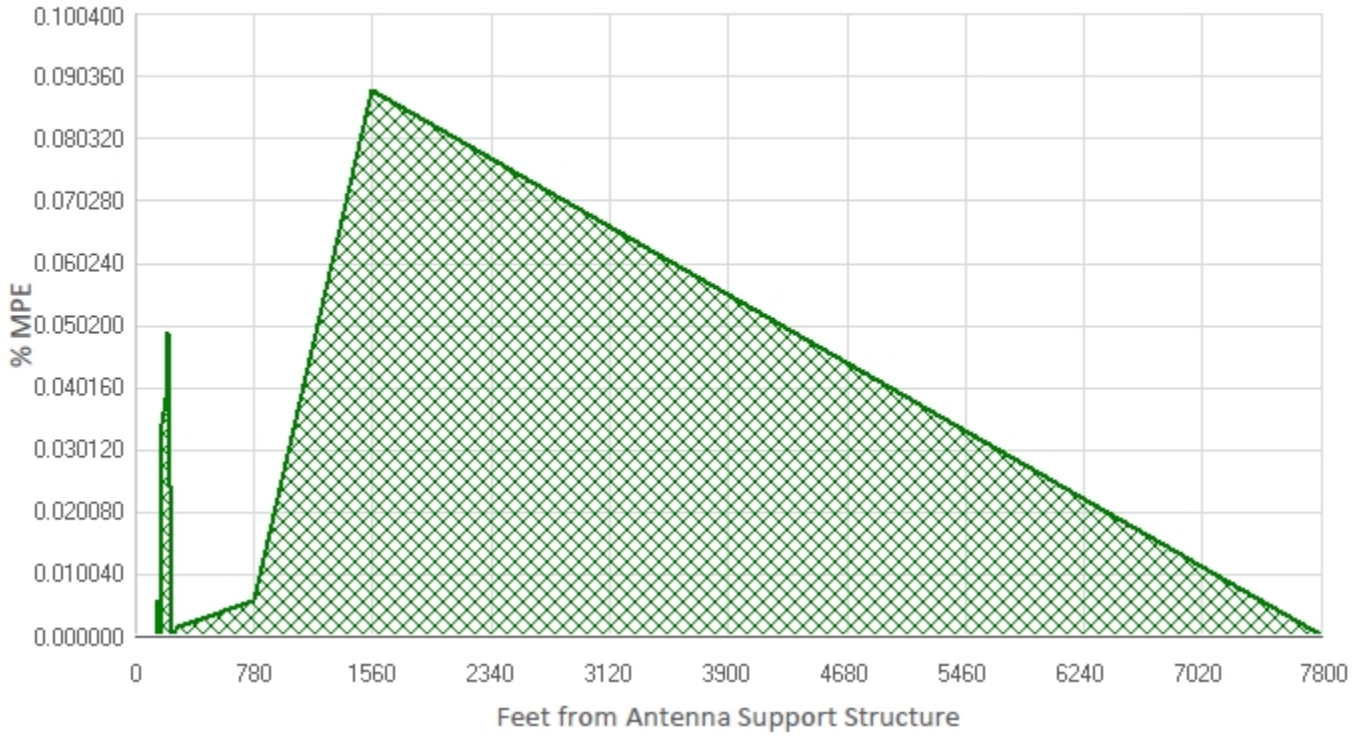
**Dish Wireless**  
**SESEA00010B (880416) - 8**  
**JMA - MX08FRO665-21 04DT 2007 240° Sector**

**Maximum Exposure Limit - 2007 MHz**

Limit (GP): 1000.000  $\mu\text{W}/\text{cm}^2$

<b>EiRP</b>		<b>Height</b>		<b>Downtilt</b>	
(Watts)	9861.970	(feet)	135.000	(Degrees)	0

**Ground Level MPE as Percent of FCC General Population Limits**



**Maximum power density at ground level:** 0.884  $\mu\text{W}/\text{cm}^2$   
**Highest percentage of Maximum Exposure Limit:** 0.088 %

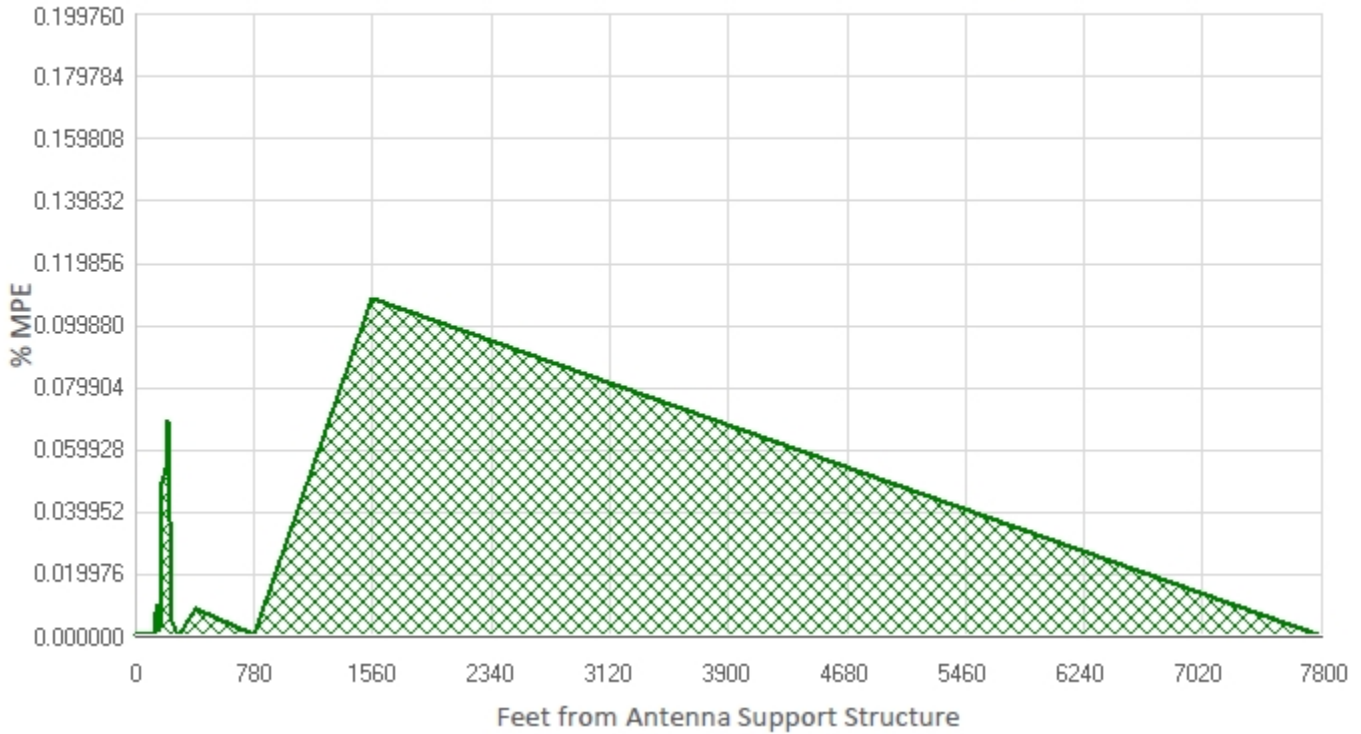
**Dish Wireless**  
**SESEA00010B (880416) - 8**  
**JMA - MX08FRO665-21 04DT 2100 240° Sector**

**Maximum Exposure Limit - 2100 MHz**

Limit (GP): 1000.000  $\mu\text{W}/\text{cm}^2$

<b>EIRP</b>		<b>Height</b>		<b>Downtilt</b>	
(Watts)	12415.490	(feet)	135.000	(Degrees)	0

**Ground Level MPE as Percent of FCC General Population Limits**



**Maximum power density at ground level:** 1.088  $\mu\text{W}/\text{cm}^2$   
**Highest percentage of Maximum Exposure Limit:** 0.109 %