RF EMISSIONS COMPLIANCE REPORT

Prepared for:

Vertical Bridge

Site:

US-IL-5744 - CH96556B - Sea Level Diving
269 Liberty Road
Crystal Lake, IL
42.223298, -88.311267

July 18, 2022

This site will be in compliance with

FCC Regulations and MPE Limits:

T-Mobile Is 3.943% of General Population (GP) Limit

(0.789% of Occupational (Occ) Limit)

Certification
I have reviewed this RF Emissions assessment report and believe it to be both true and accurate to the best of my knowledge.

David Charles Cotton, Jr.
Licensed Professional Engineer
State of Illinois, 062.062055

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.

RF EMISSIONS COMPLIANCE STATEMENT

Site:
US-IL-5744 - CH96556B - Sea Level Diving
269 Liberty Road
Crystal Lake, IL

Compliance Statement

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

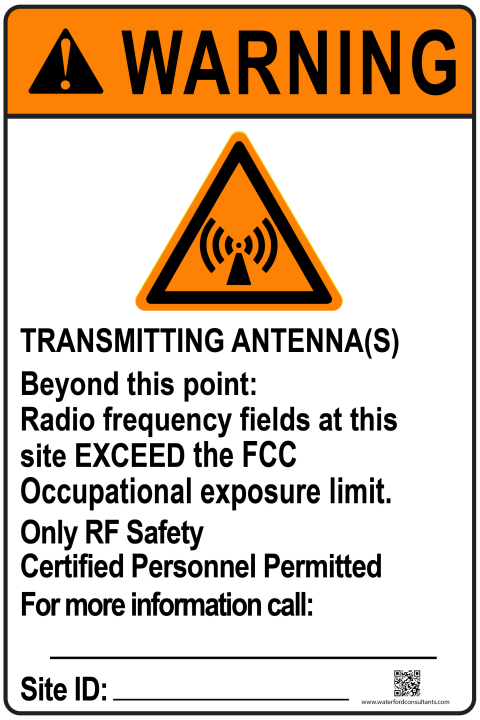
Ground Level Site Summary

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.

Source	Predicted Power Density, % of Limit (GP)
T-Mobile 600 MHz	0.257 %
T-Mobile 700 MHz	0.318 %
T-Mobile 1900 MHz	0.254 %
T-Mobile 2100 MHz	0.087 %
T-Mobile 2500 MHz	3.026 %
Sum of Listed Sources	**3.943%**

RF Alerting Signage

The Warning RF sign should be posted at the last accessible area before someone can potentially enter an area that can cause exposure. It should be placed and at the base of the cell tower.



Technical Framerwork: 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..

	Limits for General Population/ Uncontrolled Exposure		*Limits for Occupational/ Controlled Exposure*	
Frequency (MHz)	Power Density (mW/cm^2)	Averaging Time (minutes)	Power Density (mW/cm^2)	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 Sff = 33.4 x ERP / R2 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 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.

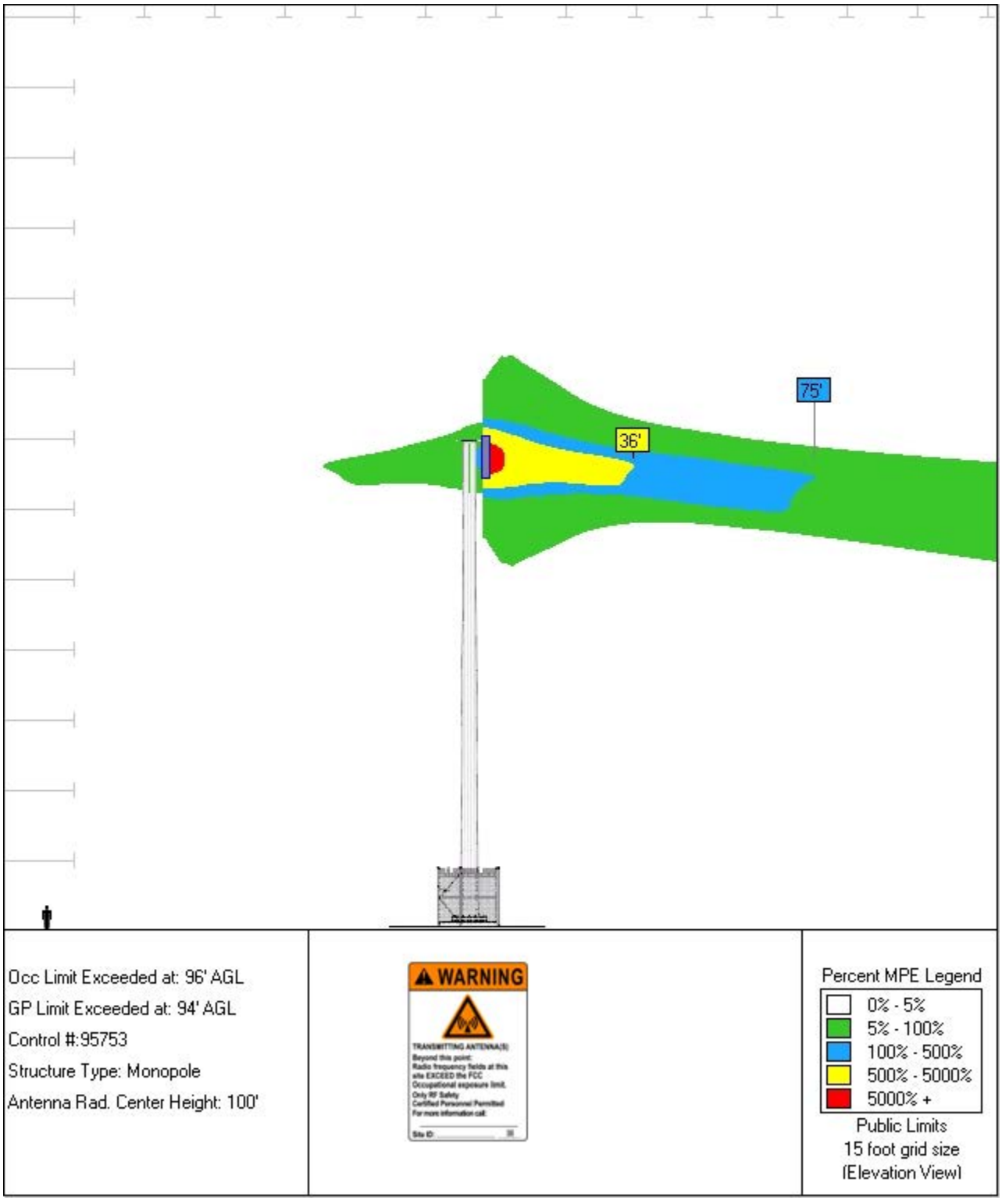
Waterford Consultants, LLC attests to the accuracy of the engineering calculations computed by those modeling tools. Furthermore, Waterford attests that the results of those engineering calculations are correctly summarized in this report.

Antenna Inventory

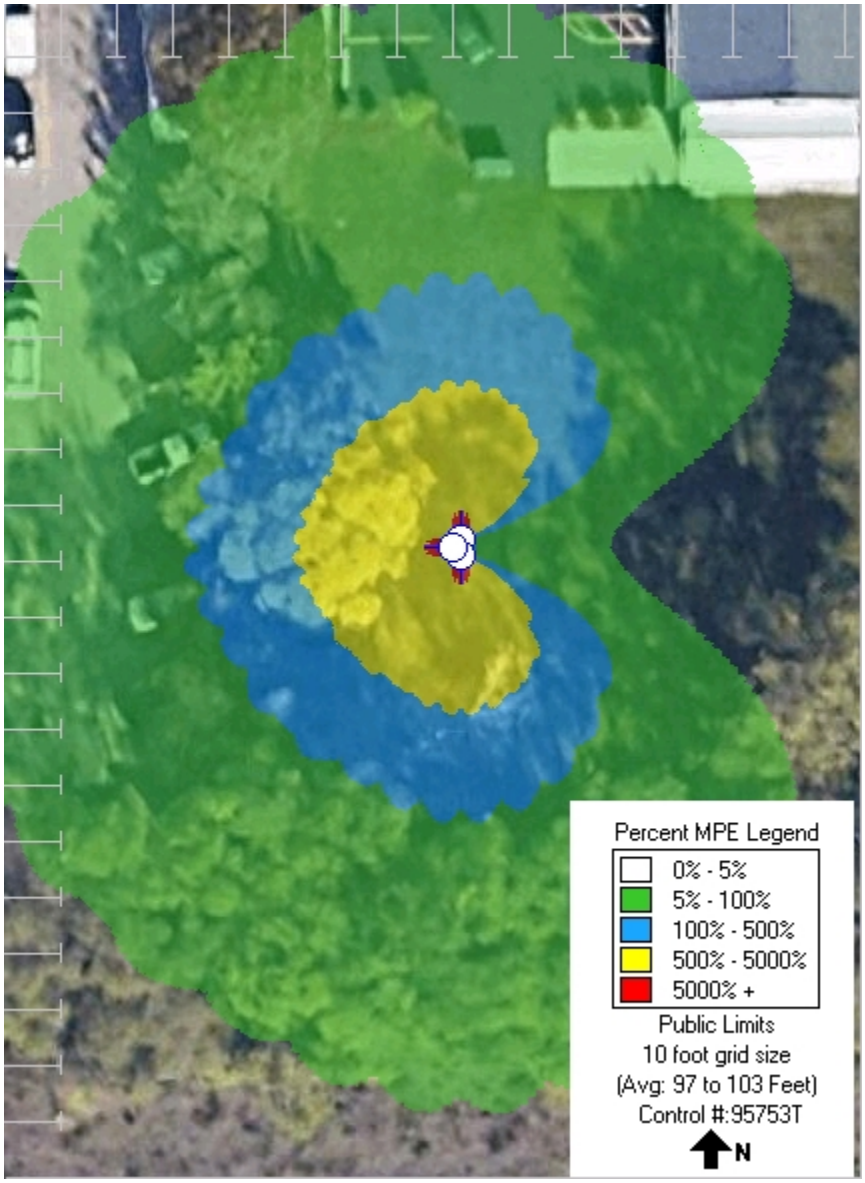
#	Operator	Make	Model	Freq (MHz)	Az (deg)	Tilt (deg)	HorBW (deg)	Ant (ft)	TPO (w)	Paths	Loss (db)	Ant Gain	Radiated Power (W)	RC AGL (ft)
1	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 600	600	0	0	66	7.995	30	2	0	13.24dBd	1265.180 ERP	100
2	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 600	600	180	0	66	7.995	30	2	0	13.24dBd	1265.180 ERP	100
3	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 600	600	270	0	66	7.995	30	2	0	13.24dBd	1265.180 ERP	100
4	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 700	700	0	0	61	7.995	30	2	0	13.26dBd	1271.020 ERP	100
5	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 700	700	180	0	61	7.995	30	2	0	13.26dBd	1271.020 ERP	100
6	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 700	700	270	0	61	7.995	30	2	0	13.26dBd	1271.020 ERP	100
7	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 1900	1900	0	0	62	7.995	20	4	0	15.55dBd	4709.060 EIRP	100
8	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 1900	1900	0	0	62	7.995	40	1	0	15.55dBd	2354.530 EIRP	100
9	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 1900	1900	180	0	62	7.995	20	4	0	15.55dBd	4709.060 EIRP	100
10	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 1900	1900	180	0	62	7.995	40	1	0	15.55dBd	2354.530 EIRP	100
11	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 1900	1900	270	0	62	7.995	20	4	0	15.55dBd	4709.060 EIRP	100
12	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 1900	1900	270	0	62	7.995	40	1	0	15.55dBd	2354.530 EIRP	100
13	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 2100	2100	0	0	55	7.995	10	4	0	16.31dBd	2804.810 EIRP	100
14	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 2100	2100	180	0	55	7.995	10	4	0	16.31dBd	2804.810 EIRP	100
15	T-Mobile	COMMSCOPE	FFVV-65C-R3-V1 02DT 2100	2100	270	0	55	7.995	10	4	0	16.31dBd	2804.810 EIRP	100
16	T-Mobile	NOKIA	SON_AEHC 120deg #6 00DT-07DT 2500	2500	0	0	14	3.182	150	1	0	22.68dBd	45596.880 EIRP	100
17	T-Mobile	NOKIA	SON_AEHC 120deg #5#1 00DT-07DT 2500	2500	0	0	14	3.182	90	1	0	22.67dBd	27295.200 EIRP	100
18	T-Mobile	NOKIA	SON_AEHC 120deg #5#1 00DT-07DT 2500	2500	180	0	14	3.182	90	1	0	22.67dBd	27295.200 EIRP	100
19	T-Mobile	NOKIA	SON_AEHC 120deg #6 00DT-07DT 2500	2500	180	0	14	3.182	150	1	0	22.68dBd	45596.880 EIRP	100
20	T-Mobile	NOKIA	SON_AEHC 120deg #6 00DT-07DT 2500	2500	270	0	14	3.182	150	1	0	22.68dBd	45596.880 EIRP	100
21	T-Mobile	NOKIA	SON_AEHC 120deg #5#1 00DT-07DT 2500	2500	270	0	14	3.182	90	1	0	22.67dBd	27295.200 EIRP	100

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

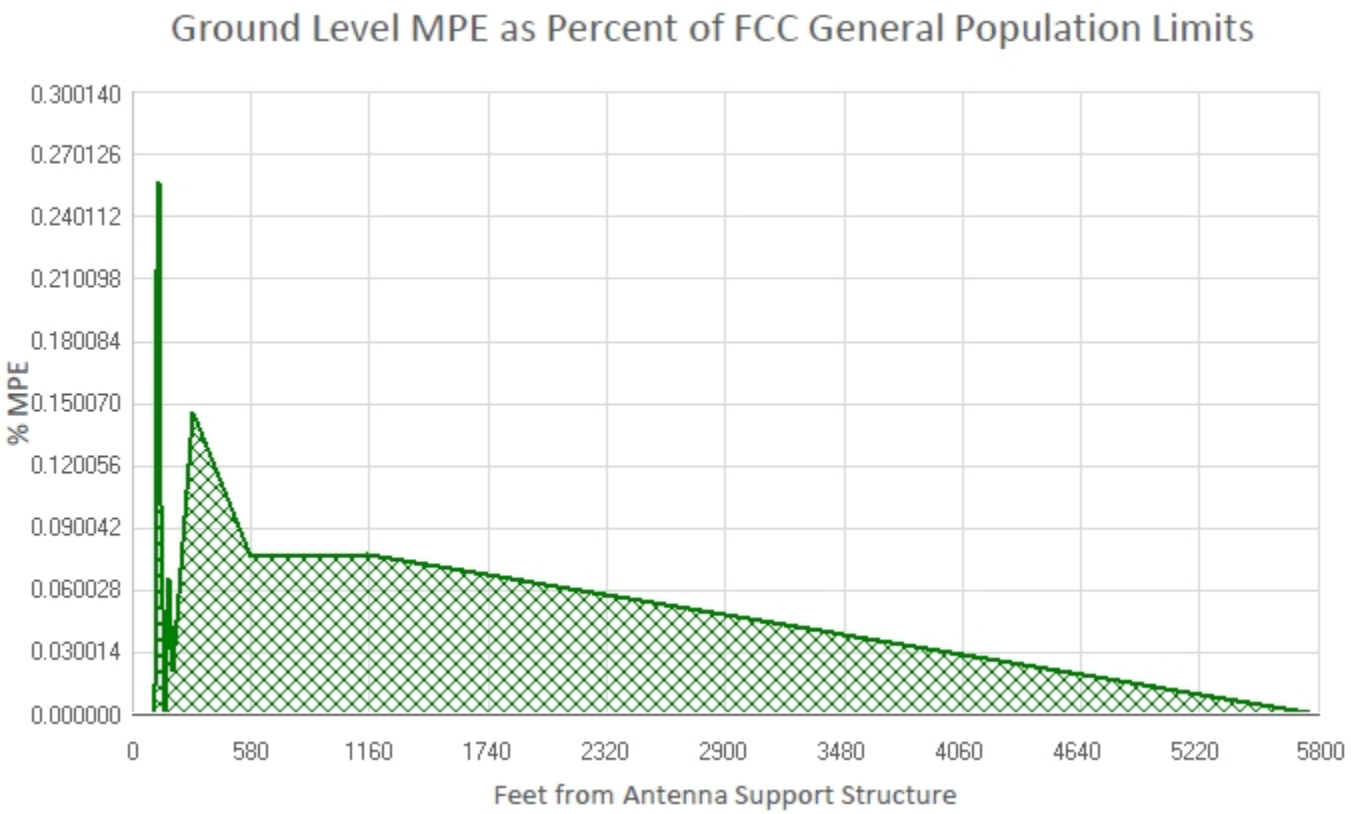
The maximum ground level MPE along the azimuth of orientation for each RF emitter by band of operation is listed below. The computational approach is described in the Predictive Modeling section. The maximum MPE by operator and band is contributive to the cumulative ground level MPE summary table presented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

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 600 180° Sector

Maximum Exposure Limit - 600 MHz

Limit (GP): 400.000 µW/cm^2

ERP		**Height**		**Downtilt**	
(Watts)	1265.180	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 1.029 µW/cm^2

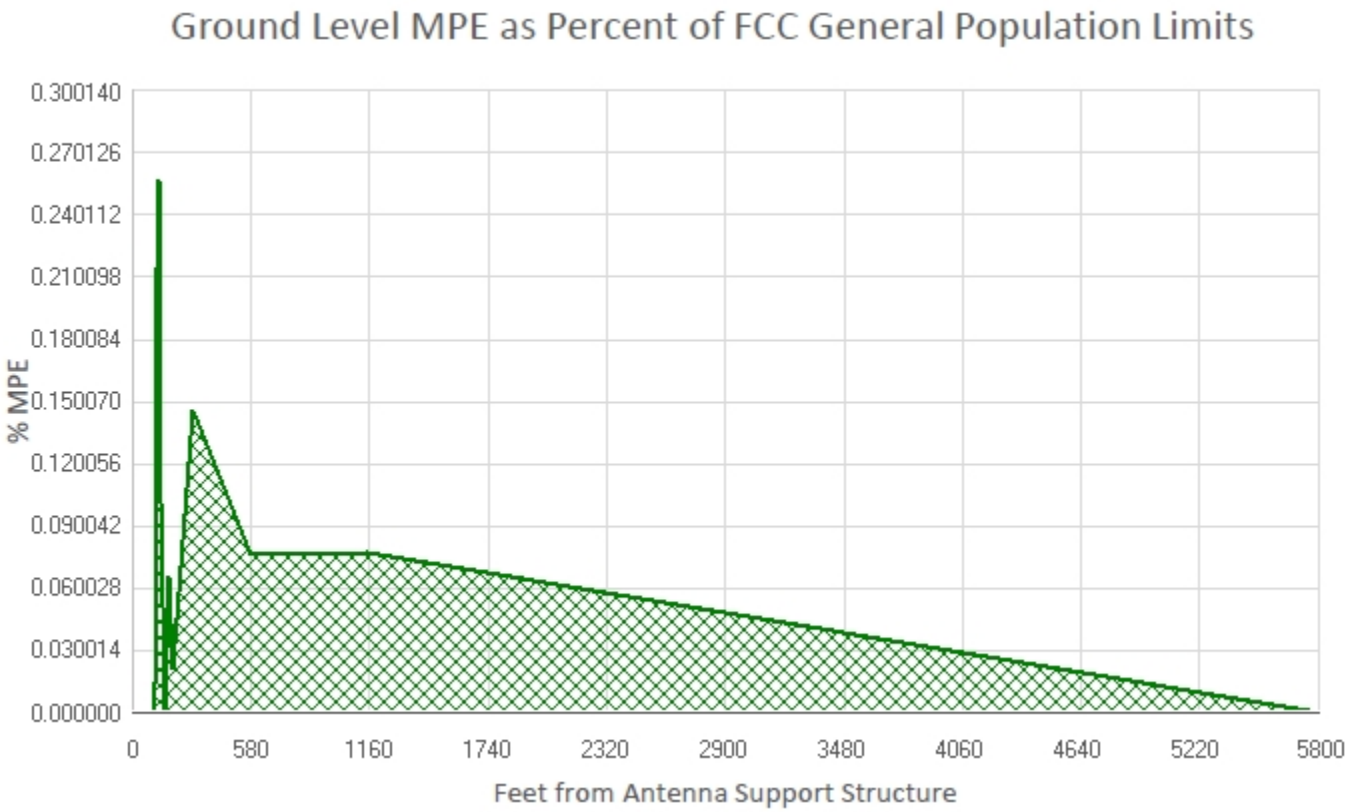
Highest percentage of Maximum Exposure Limit: 0.257 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 600 270° Sector

Maximum Exposure Limit - 600 MHz

Limit (GP): 400.000 µW/cm^2

ERP		**Height**		**Downtilt**	
(Watts)	1265.180	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 1.029 µW/cm^2

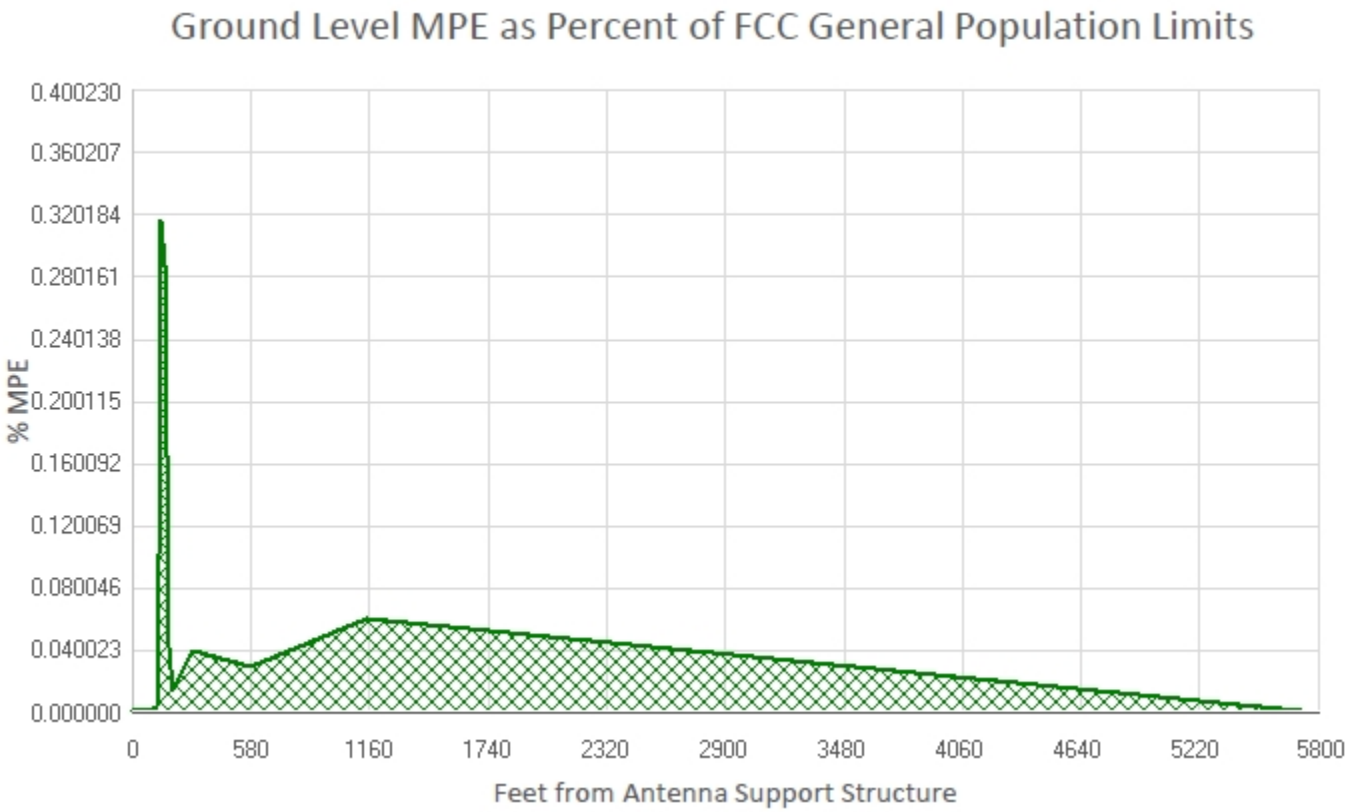
Highest percentage of Maximum Exposure Limit: 0.257 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 700 180° Sector

Maximum Exposure Limit - 700 MHz

Limit (GP): 466.000 µW/cm^2

ERP		**Height**		**Downtilt**	
(Watts)	1271.020	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 1.485 µW/cm^2

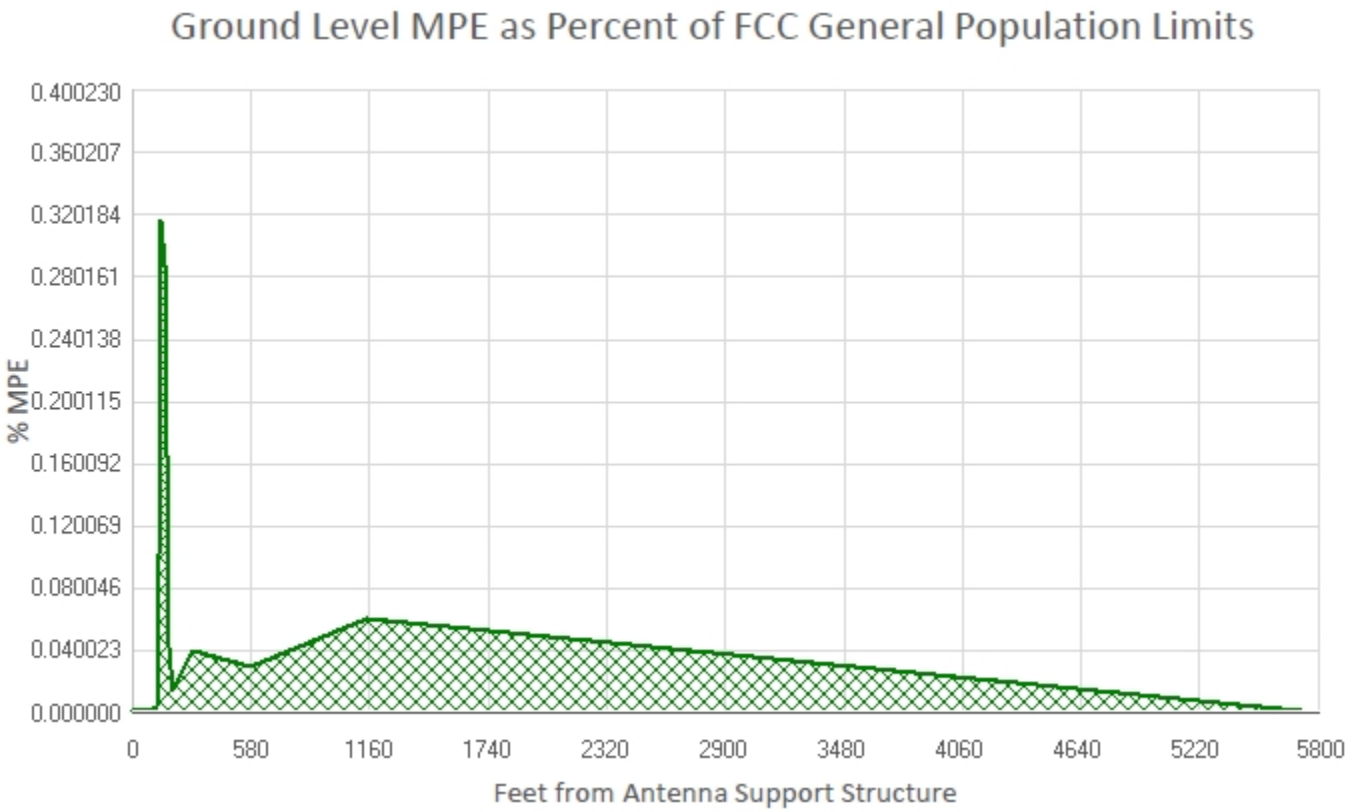
Highest percentage of Maximum Exposure Limit: 0.318 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 700 270° Sector

Maximum Exposure Limit - 700 MHz

Limit (GP): 466.000 µW/cm^2

ERP		**Height**		**Downtilt**	
(Watts)	1271.020	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 1.485 µW/cm^2

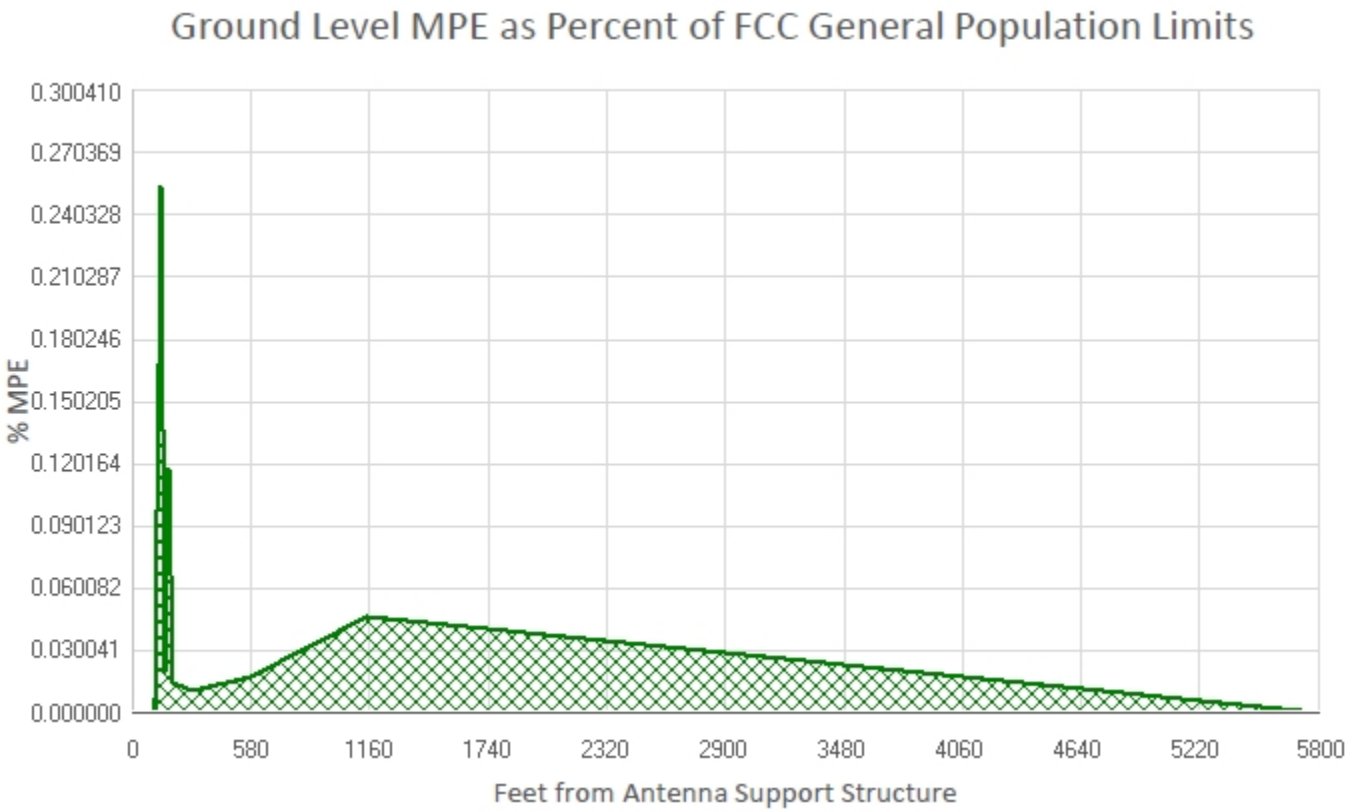
Highest percentage of Maximum Exposure Limit: 0.318 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 1900 0° Sector

Maximum Exposure Limit - 1900 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	4709.060	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 2.544 µW/cm^2

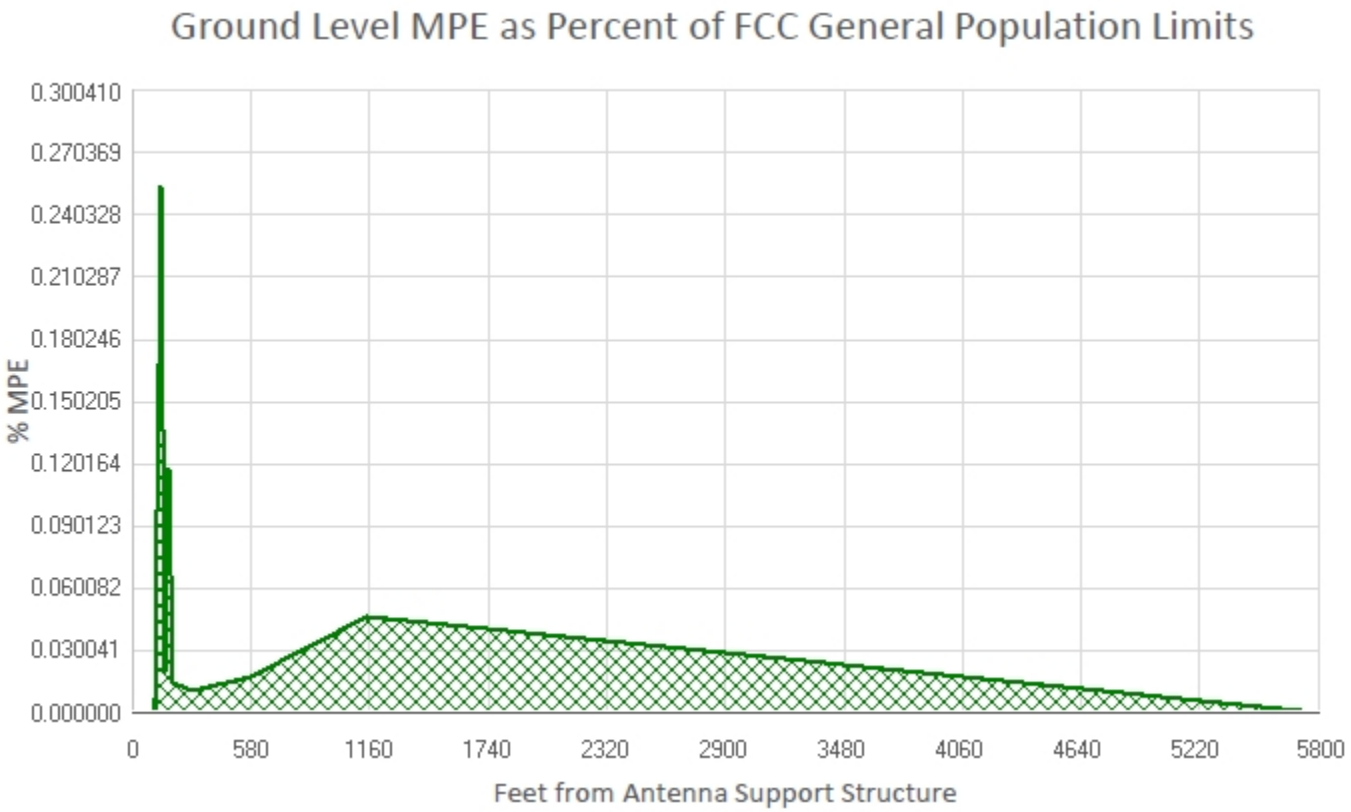
Highest percentage of Maximum Exposure Limit: 0.254 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 1900 180° Sector

Maximum Exposure Limit - 1900 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	4709.060	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 2.544 µW/cm^2

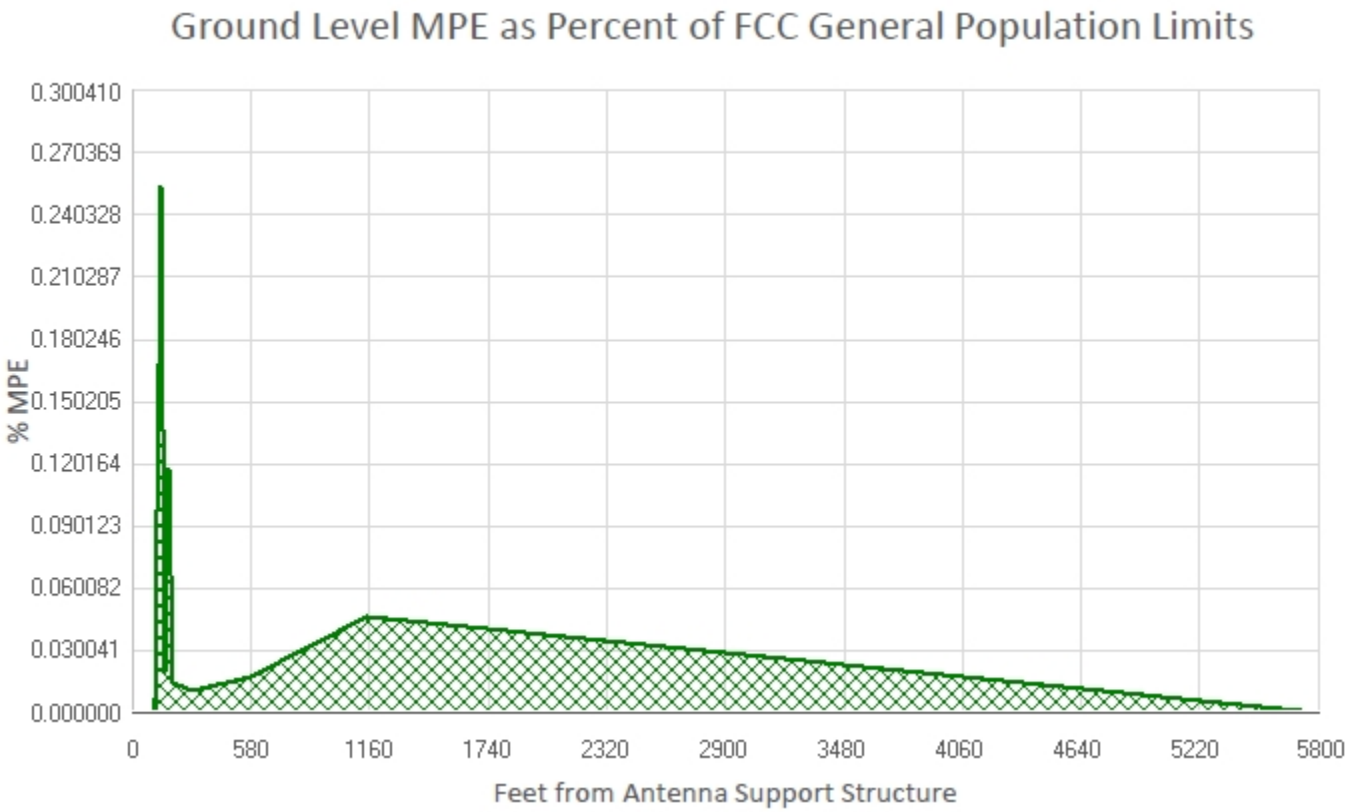
Highest percentage of Maximum Exposure Limit: 0.254 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 1900 270° Sector

Maximum Exposure Limit - 1900 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	4709.060	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 2.544 µW/cm^2

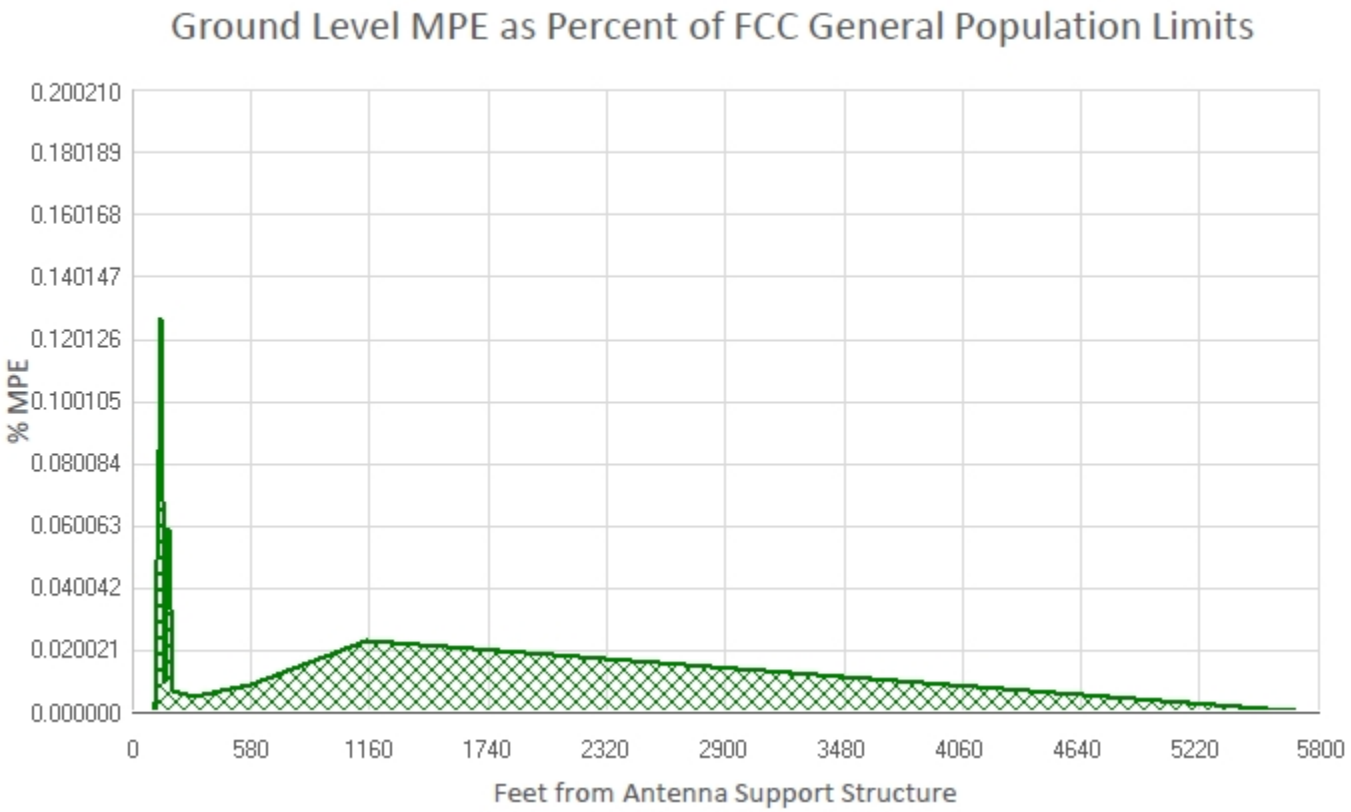
Highest percentage of Maximum Exposure Limit: 0.254 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 1900 180° Sector

Maximum Exposure Limit - 1900 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	2354.530	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 1.272 µW/cm^2

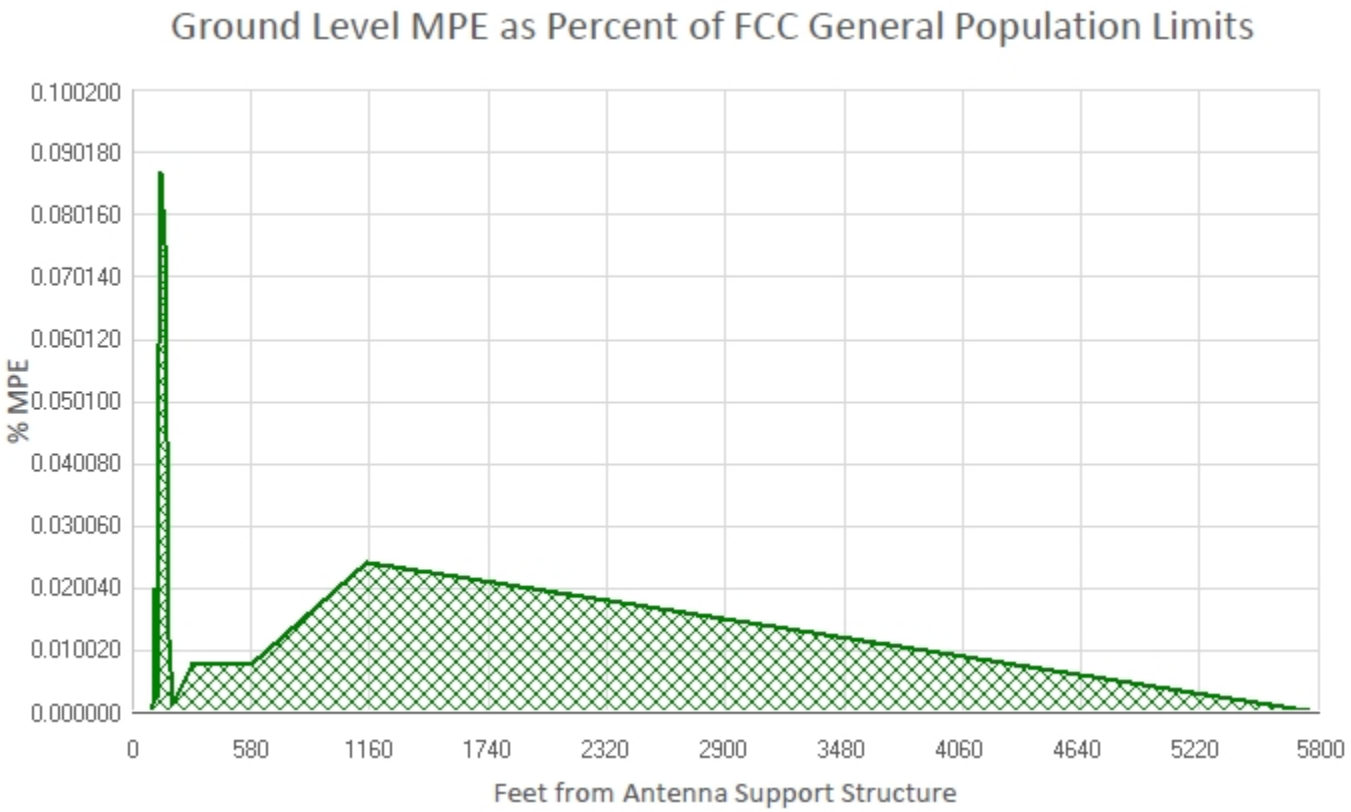
Highest percentage of Maximum Exposure Limit: 0.127 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 2100 0° Sector

Maximum Exposure Limit - 2100 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	2804.810	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 0.872 µW/cm^2

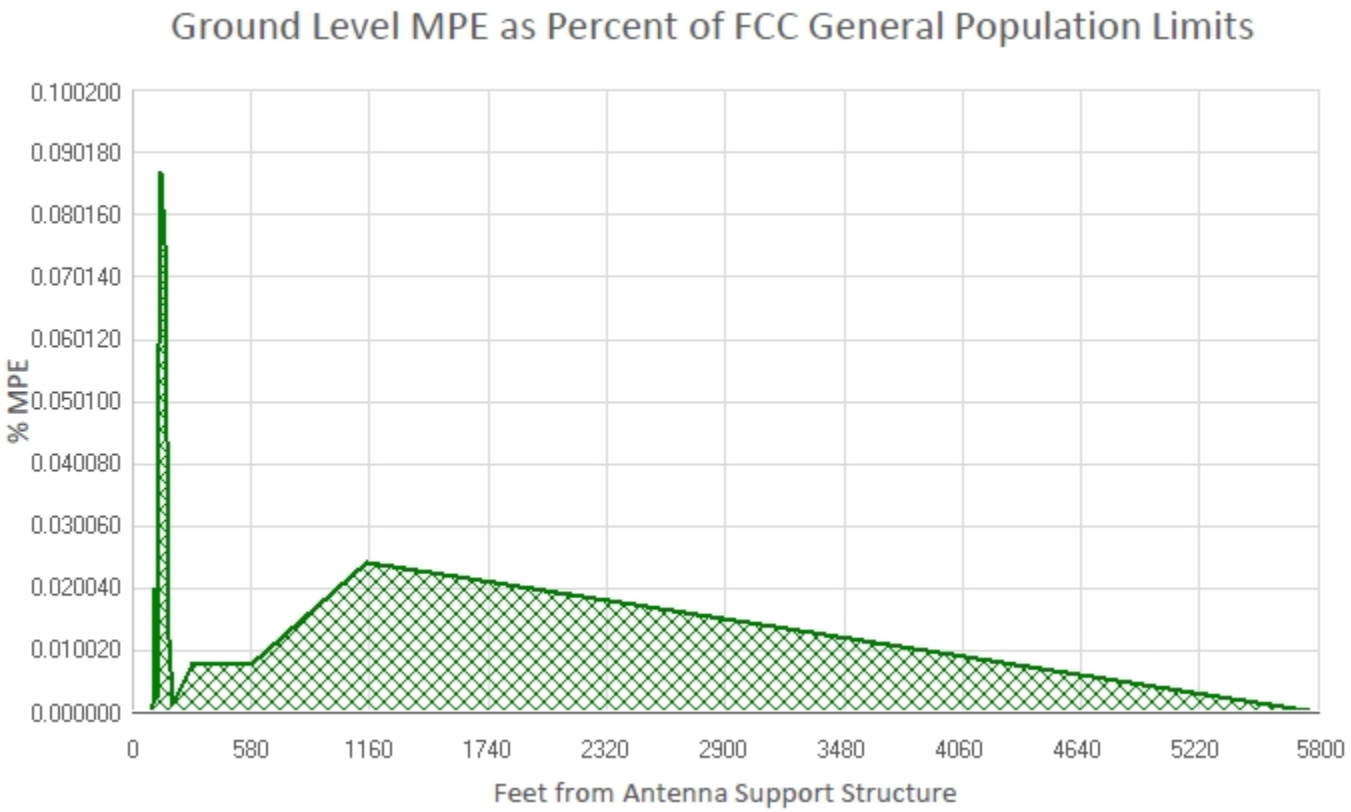
Highest percentage of Maximum Exposure Limit: 0.087 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 2100 180° Sector

Maximum Exposure Limit - 2100 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	2804.810	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 0.872 µW/cm^2

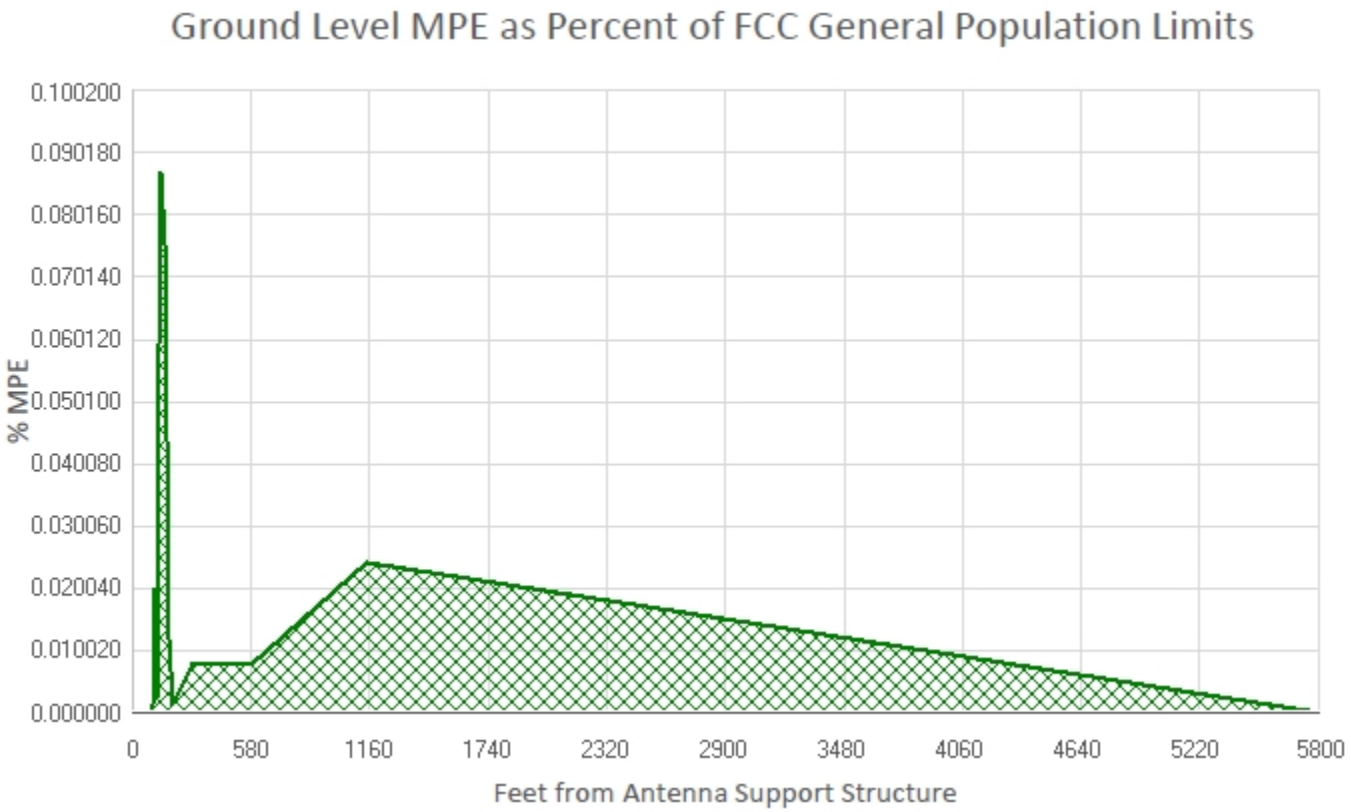
Highest percentage of Maximum Exposure Limit: 0.087 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 2100 270° Sector

Maximum Exposure Limit - 2100 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	2804.810	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 0.872 µW/cm^2

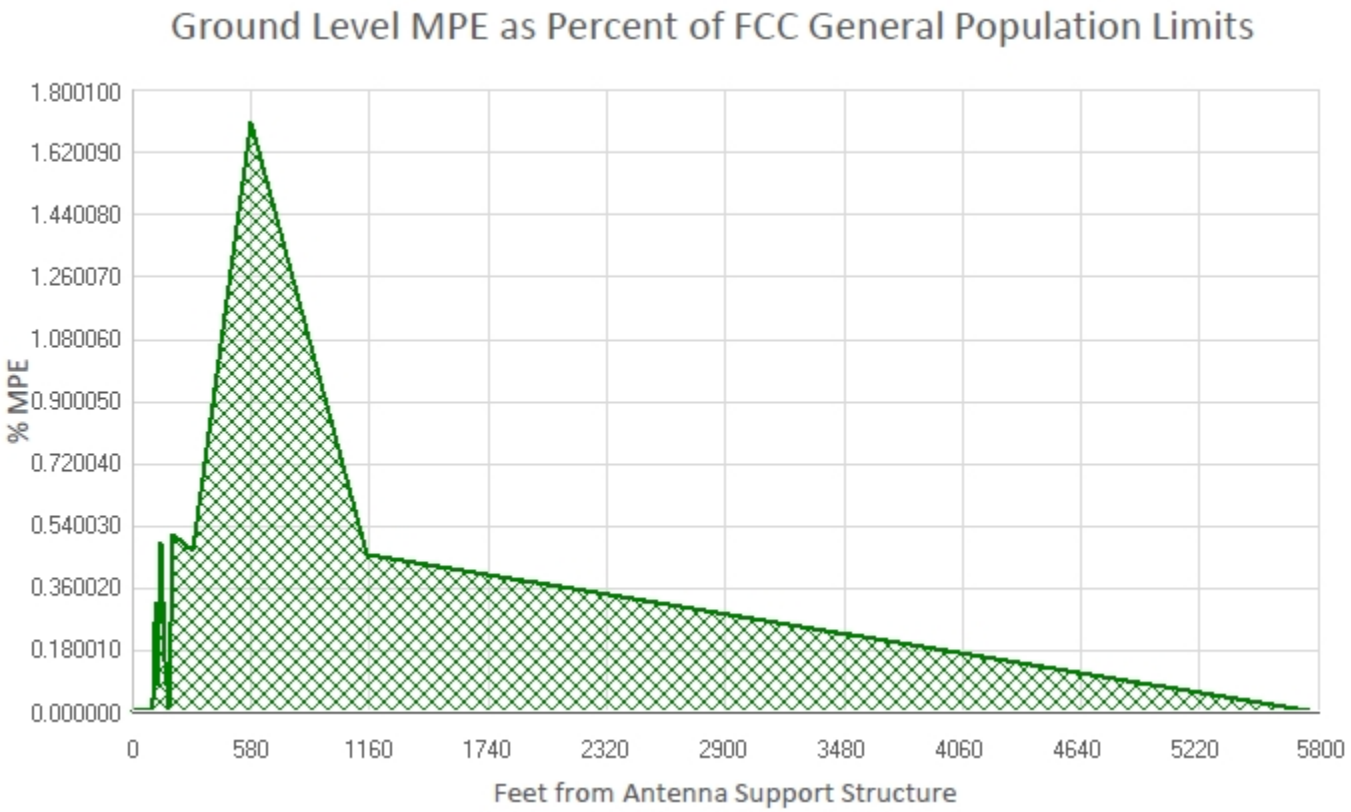
Highest percentage of Maximum Exposure Limit: 0.087 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
NOKIA - SON_AEHC 120deg #5#1 00DT-07DT 2500 0° Sector

Maximum Exposure Limit - 2500 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	27295.200	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 17.101 µW/cm^2

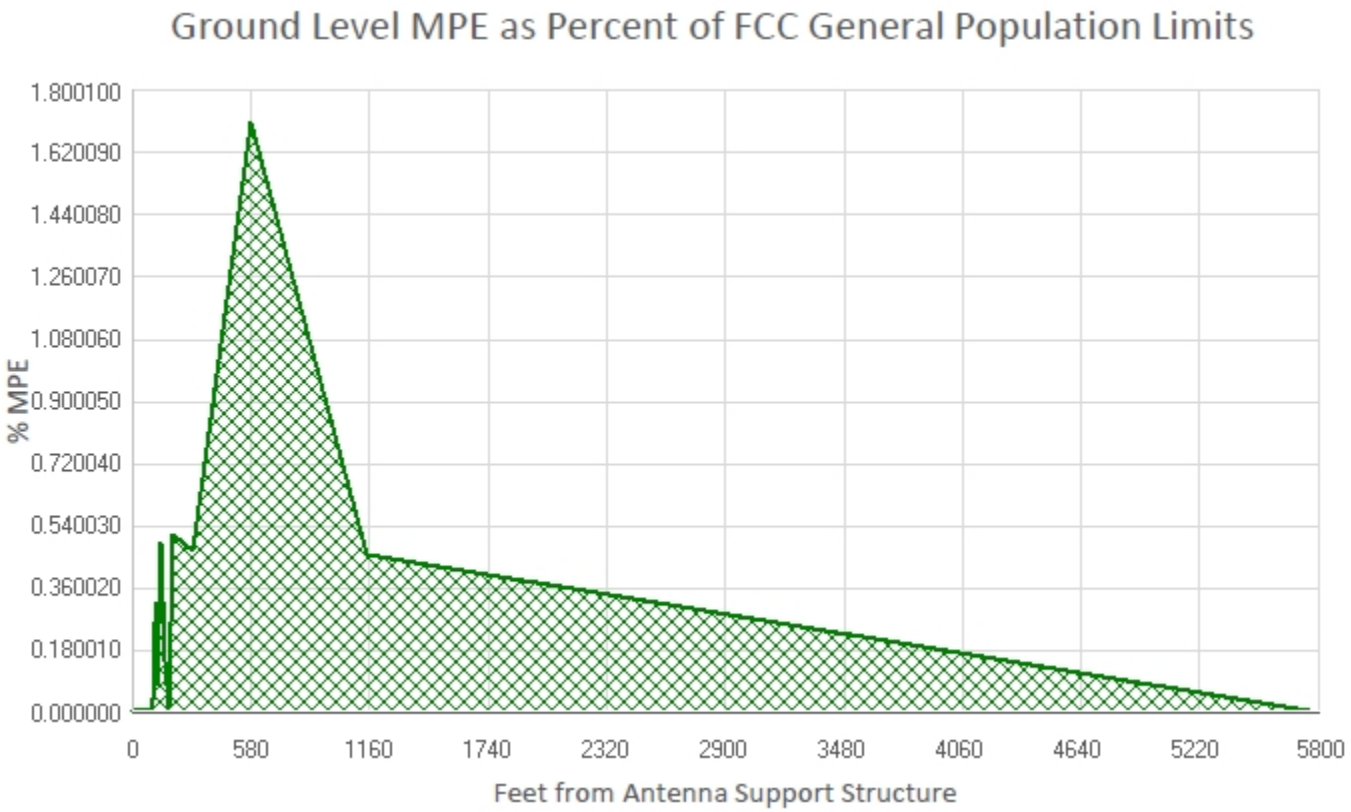
Highest percentage of Maximum Exposure Limit: 1.710 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
NOKIA - SON_AEHC 120deg #5#1 00DT-07DT 2500 180° Sector

Maximum Exposure Limit - 2500 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	27295.200	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 17.101 µW/cm^2

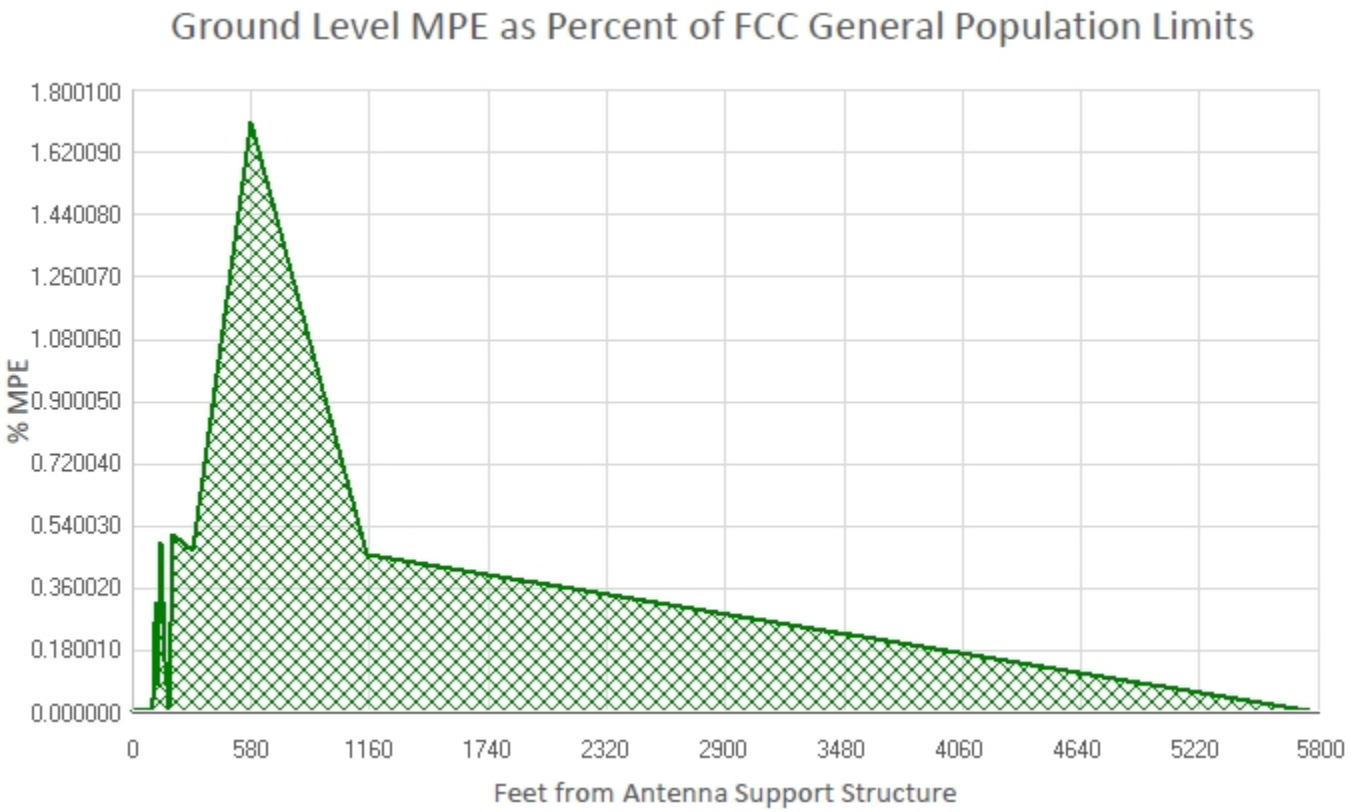
Highest percentage of Maximum Exposure Limit: 1.710 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
NOKIA - SON_AEHC 120deg #5#1 00DT-07DT 2500 270° Sector

Maximum Exposure Limit - 2500 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	27295.200	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 17.101 µW/cm^2

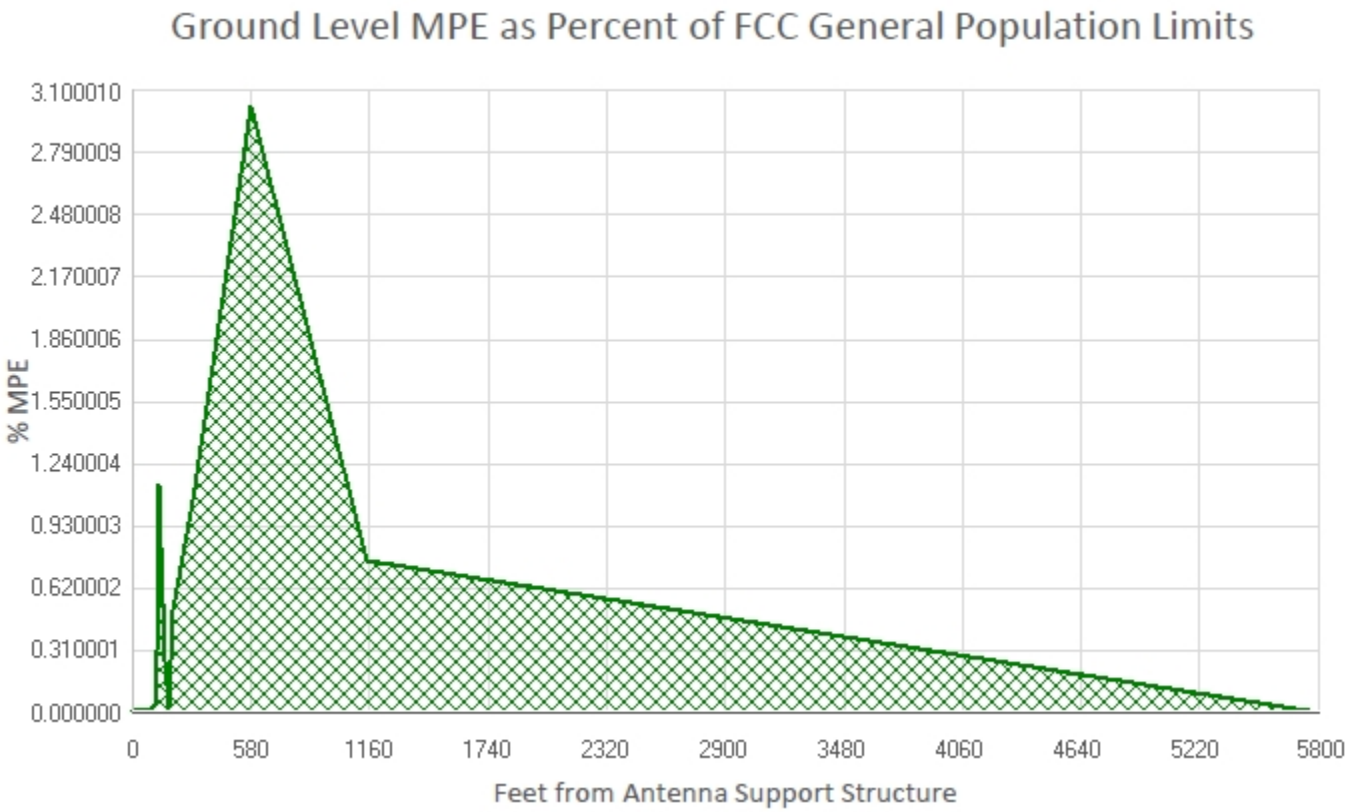
Highest percentage of Maximum Exposure Limit: 1.710 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
NOKIA - SON_AEHC 120deg #6 00DT-07DT 2500 0° Sector

Maximum Exposure Limit - 2500 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	45596.880	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 30.260 µW/cm^2

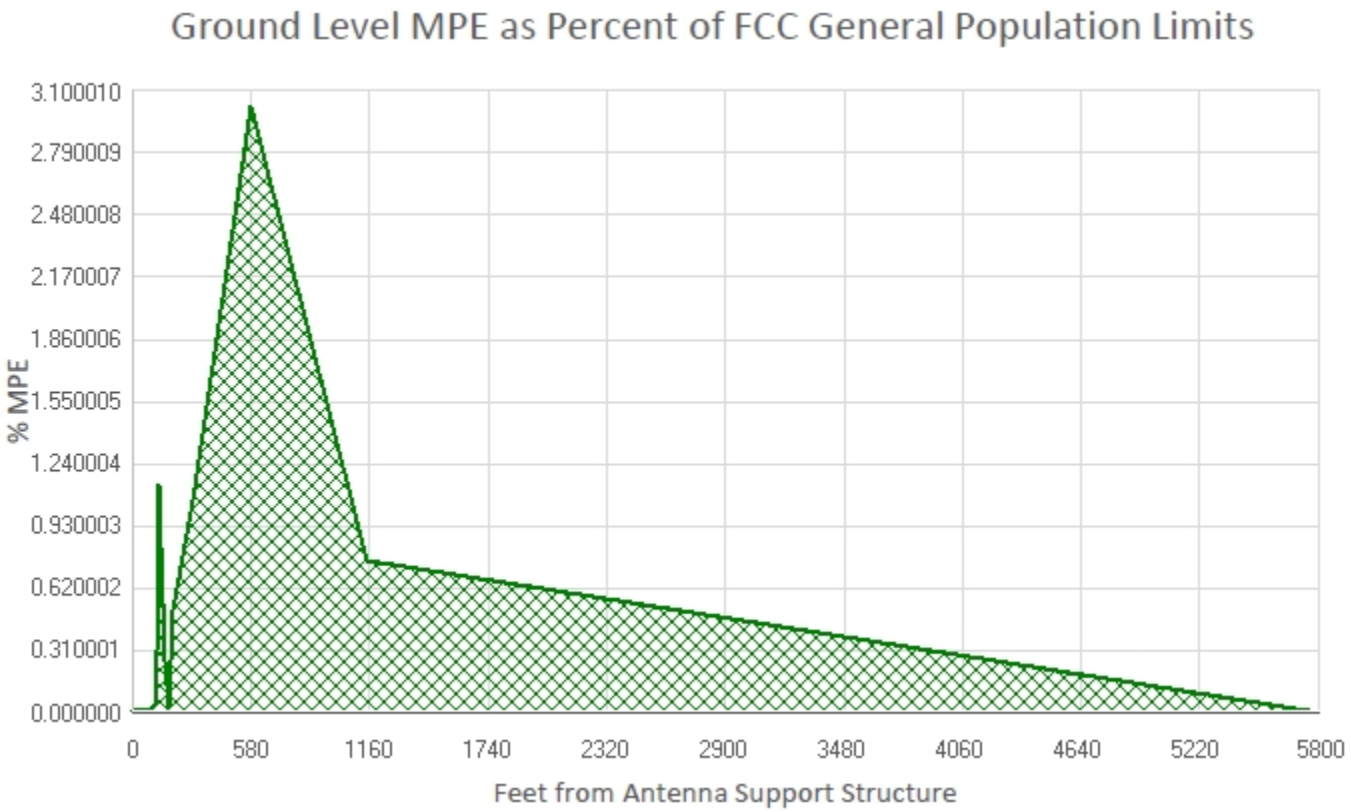
Highest percentage of Maximum Exposure Limit: 3.026 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
NOKIA - SON_AEHC 120deg #6 00DT-07DT 2500 180° Sector

Maximum Exposure Limit - 2500 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	45596.880	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 30.260 µW/cm^2

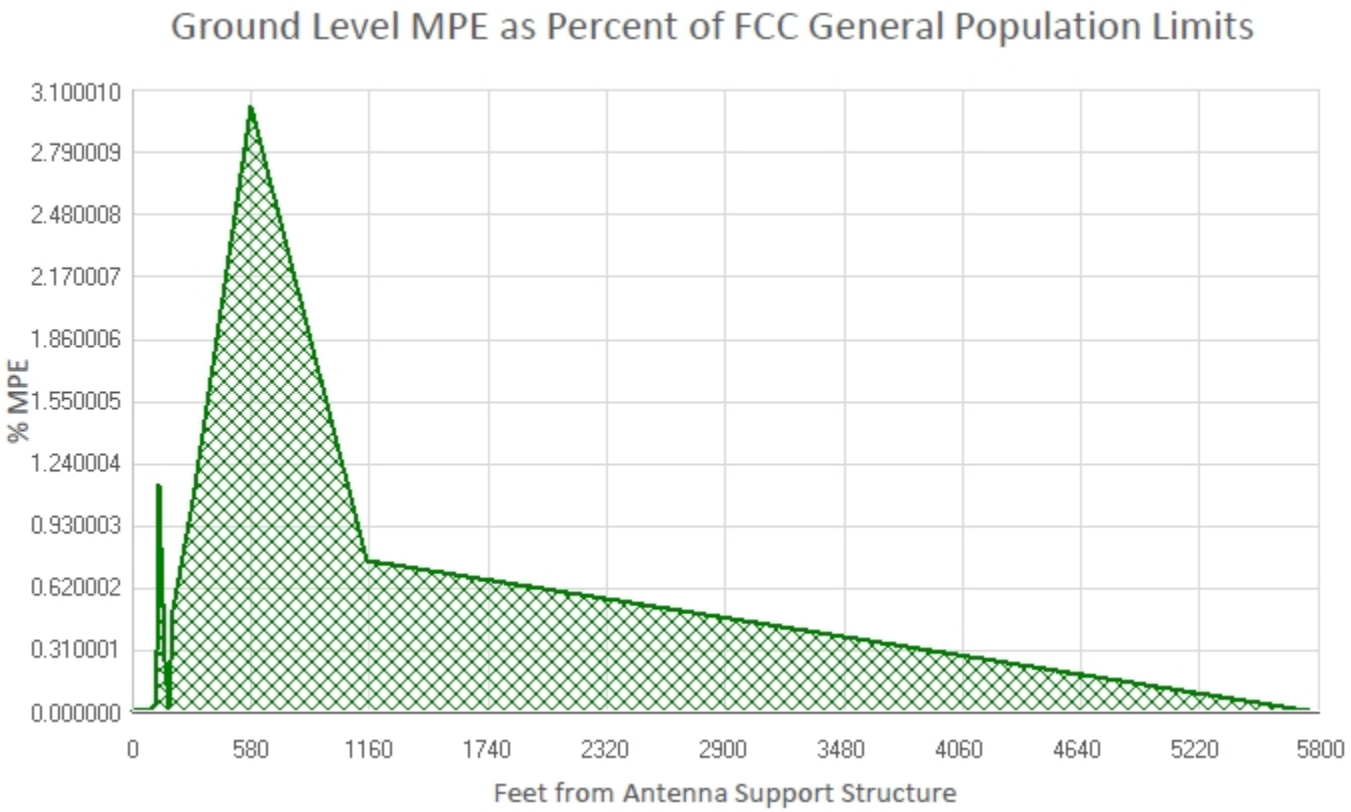
Highest percentage of Maximum Exposure Limit: 3.026 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
NOKIA - SON_AEHC 120deg #6 00DT-07DT 2500 270° Sector

Maximum Exposure Limit - 2500 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	45596.880	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 30.260 µW/cm^2

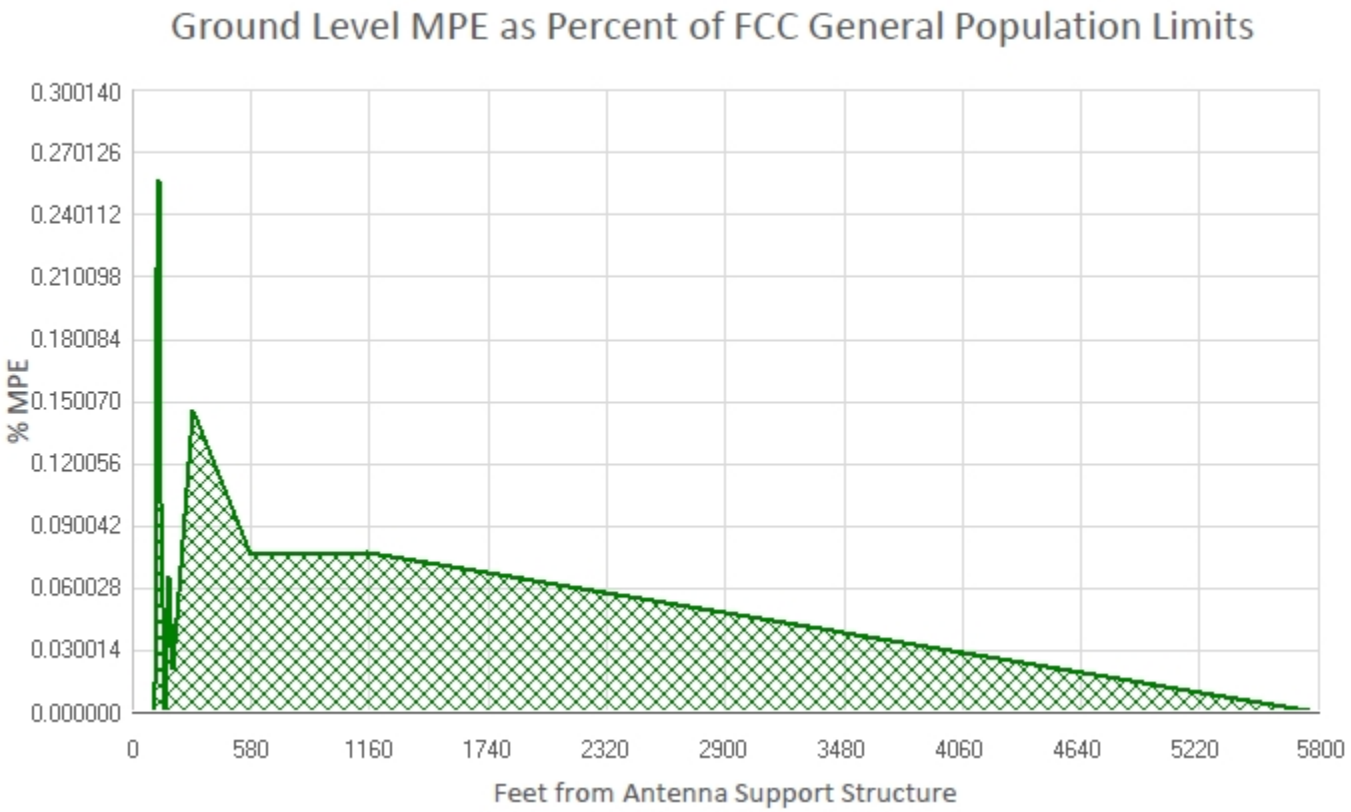
Highest percentage of Maximum Exposure Limit: 3.026 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 600 0° Sector

Maximum Exposure Limit - 600 MHz

Limit (GP): 400.000 µW/cm^2

ERP		**Height**		**Downtilt**	
(Watts)	1265.180	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 1.029 µW/cm^2

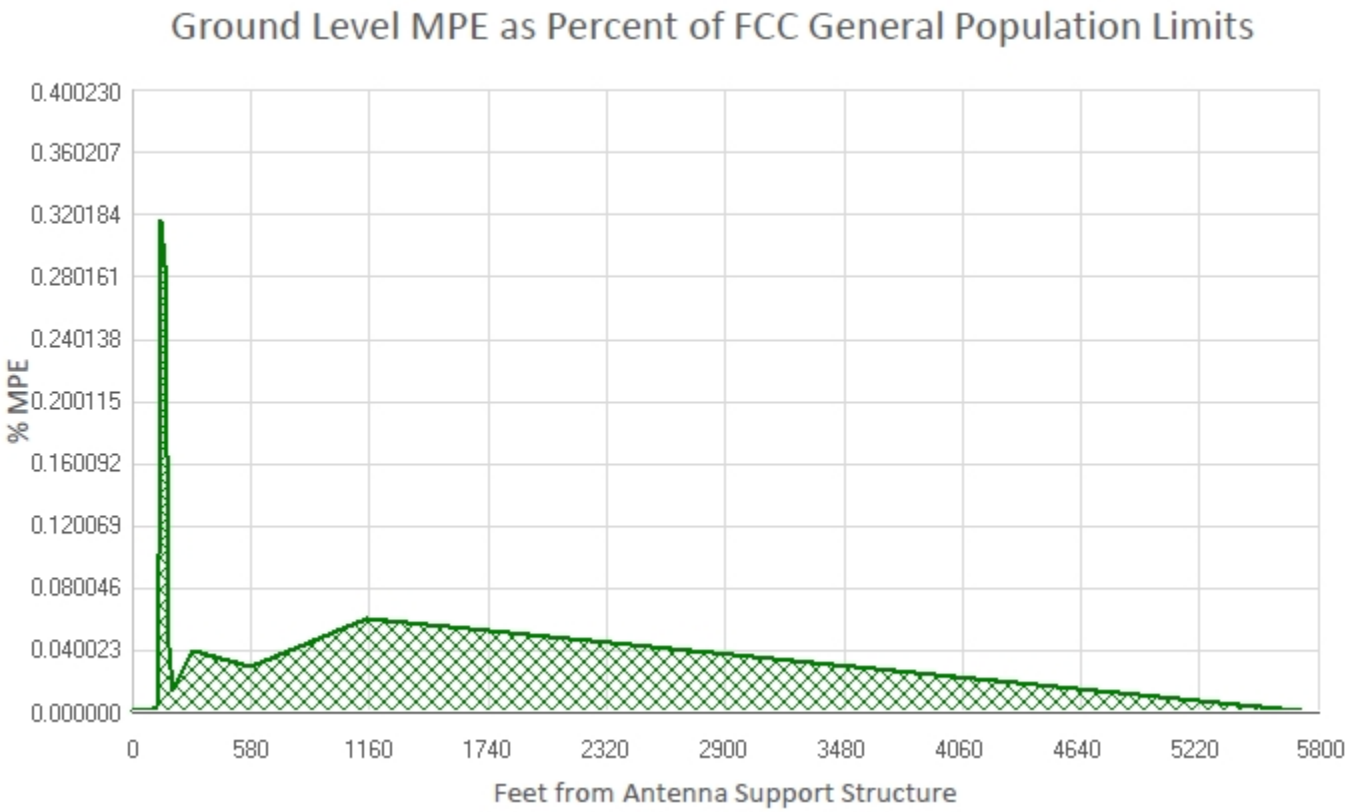
Highest percentage of Maximum Exposure Limit: 0.257 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 700 0° Sector

Maximum Exposure Limit - 700 MHz

Limit (GP): 466.000 µW/cm^2

ERP		**Height**		**Downtilt**	
(Watts)	1271.020	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 1.485 µW/cm^2

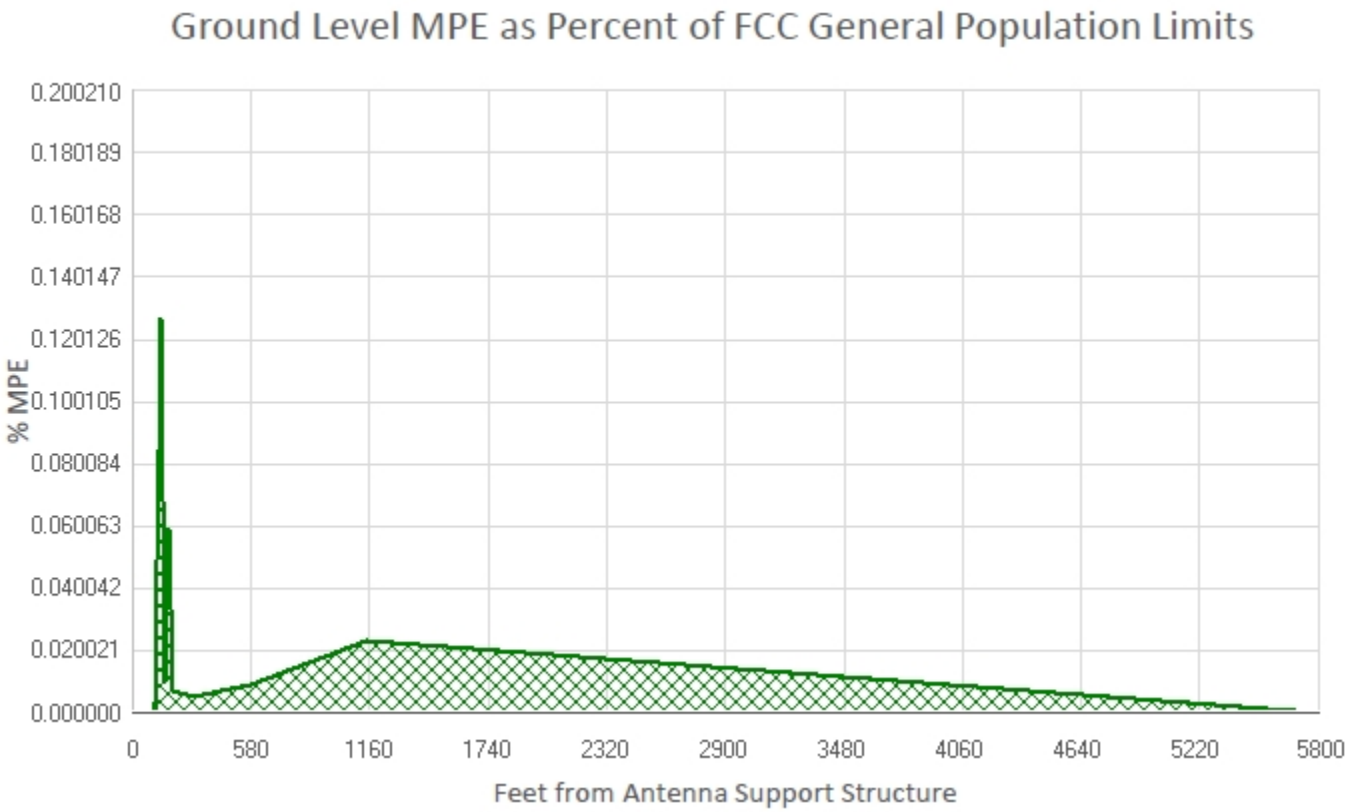
Highest percentage of Maximum Exposure Limit: 0.318 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 1900 0° Sector

Maximum Exposure Limit - 1900 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	2354.530	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 1.272 µW/cm^2

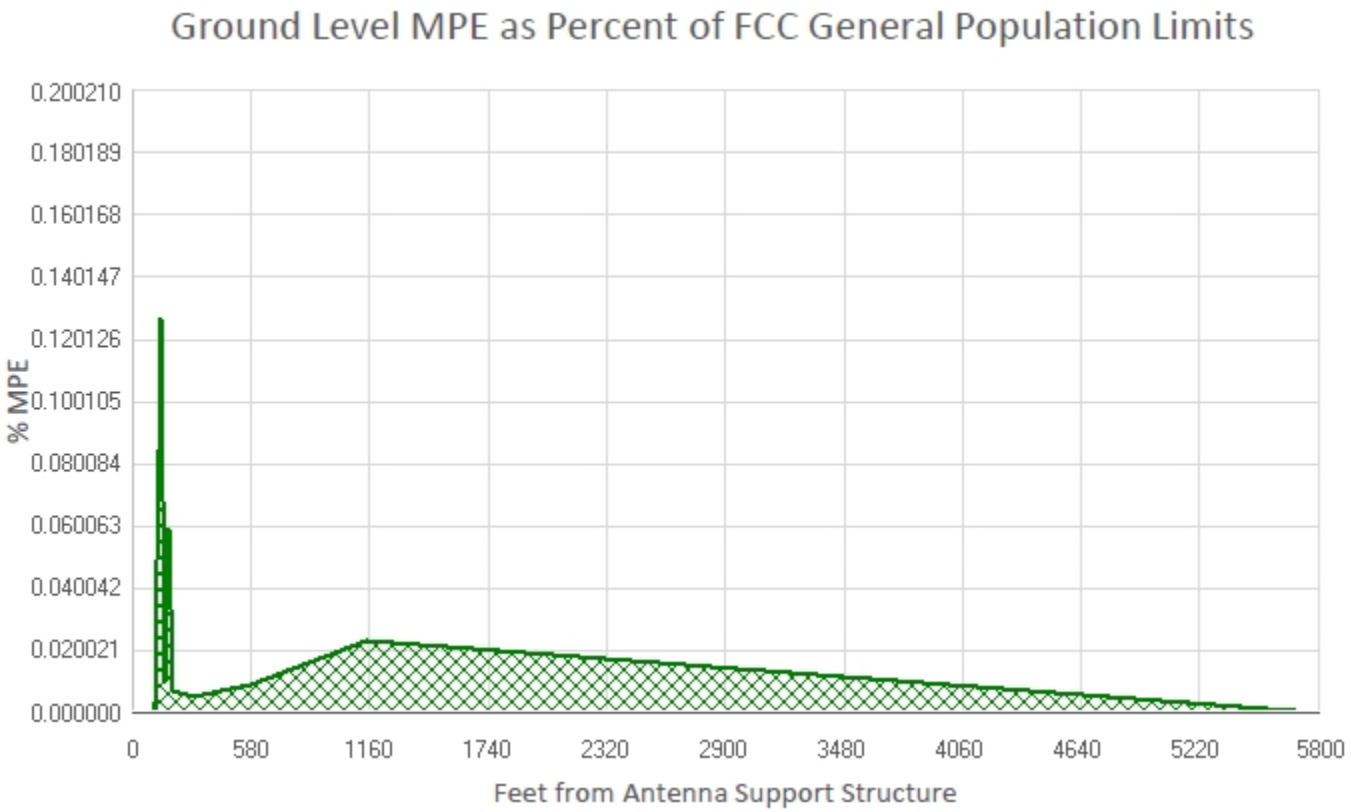
Highest percentage of Maximum Exposure Limit: 0.127 %

T-Mobile
US-IL-5744 - CH96556B - Sea Level Diving
COMMSCOPE - FFVV-65C-R3-V1 02DT 1900 270° Sector

Maximum Exposure Limit - 1900 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	2354.530	(feet)	100.000	(Degrees)	0



Maximum power density at ground level: 1.272 µW/cm^2

Highest percentage of Maximum Exposure Limit: 0.127 %