MPE Calculations

Systems operating under the provision of 47 CFR 1.1307(b)(1) shall be operated in a manor that ensures that the public is not exposed to radio frequency energy levels in excess of the FCC guidelines.

The EUT will only be used with a separation of 20 centimeters or greater between the antenna and the body of the user or nearby persons and can therefore be considered a mobile transmitter per 47 CFR 2.1091(b). The MPE calculation for this exposure is shown below.

<u>Using the Antennas with highest output power:</u> Taoglas Dipole Antenna

The peak radiated output power (EIRP) is calculated as follows:

Antenna	Frequency (GHz)	Power input to the antenna (P) (dBm)	Power gain of the antenna (G) (dBi)	EIRP (P+G) (dBm)	EIRP $Log^{-1(dBm/10)}$ (mW)
Taoglas	2.412-2.462	20.30	5.00	25.30	338.84
Taoglas	5.18-5.24	13.80	5.00	18.80	75.86
Taoglas	5.26-5.32	15.40	5.00	20.40	109.65
Taoglas	5.5-5.7	15.30	5.00	20.30	107.15
Taoglas	5.745-5.825	15.10	5.00	20.10	102.33

EIRP = P + G
Where
P = Power input to the antenna (mW).
G = Power gain of the antenna (dBi)

The numeric gain (G) of the antenna with a gain specified in dB is determined by:

Antenna	Frequency (GHz)	Antenna Gain (G) (dBi)	Numeric Antenna Gain $Log^{-1(dBm/10)}$ (dB)
Taoglas	2.412-2.462	5.00	3.16
Taoglas	5.18-5.24	5.00	3.16
Taoglas	5.26-5.32	5.00	3.16
Taoglas	5.5-5.7	5.00	3.16
Taoglas	5.745-5.825	5.00	3.16

G = Log^{-1} (dB antenna gain/10)

Power density at the specific separation:

Antenna	Frequency (GHz)	Power input to the antenna (P) (mW)	Numeric Power Gain of the Antenna (G) (dB)	Maximum Power Spectral Density $S=PG/(4R^2\pi)$ (mW/cm^2)	Maximum Power Spectral Density Limit (mW/cm^2)
Taoglas	2.412-2.462	107.15	3.16	0.067	1.00
Taoglas	5.18-5.24	23.99	3.16	0.015	1.00
Taoglas	5.26-5.32	34.67	3.16	0.022	1.00
Taoglas	5.5-5.7	33.88	3.16	0.021	1.00
Taoglas	5.745-5.825	32.36	3.16	0.020	1.00

$S = PG/(4R^2\pi)$

Where

S = Maximum power density (mW/cm^2)

P = Power input to the antenna (mW).

G = Numeric power gain of the antenna

R = Distance to the center of the radiation of the antenna (20cm = limit for MPE)

The maximum permissible exposure (MPE) for the general population is 1mW/cm^2.

The power density at 20cm does not exceed the 1mW/cm^2 limit. Therefore, the exposure condition is compliant with FCC rules.