MPE Calculations

Systems operating under the provision of 47 CFR 1.1307(b)(1) shall be operated in a manner 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.

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

EIRP = P + G
EIRP = 3.00 dBm + (-2.55) dBi
EIRP = 0.45 dBm (1.046 mW)

Where
P = Power input to the antenna (mW).
G = Power gain of the antenna (dBi) – worst case

Power density at the specific separation:

$S = PG/(4R^2\Pi)$
$S = (1.995 \times 0.556) / (4 \times 20^2 \times \Pi)$
$S = 0.00022$ mW/cm^2

Where
S = Maximum power density (mW/cm^2)
P = Power input to the antenna (mW).
G = Numeric power gain of the antenna – worst case
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.

Estimated safe separation:

$R = \sqrt{PG/4\Pi}$
$R = \sqrt{(1.995 \times 0.556) / 4\Pi}$
R = 0.2971 cm

Where
P = Power input to the antenna (mW).
G = Numeric power gain of the antenna – worst case
R = The safe estimated separation that the user must maintain from the antenna (cm)

The numeric gain (G) of the antenna with a gain specified in dB is determined by:
G = Log -1 (dB antenna gain/10)
G = Log -1 (02.55 dBi/10)
G = .5556