

MPE Calculation for FCC ID: TTULBWA1ZZPD

The FCC requires that the calculated MPE be equal to or less than a given limit dependent on frequency at a distance of 20 cm from the device to the body of the user. The equation for the calculation is given in OET Bulletin 65, page 19 as:

$$S = \text{EIRP} / 4 \pi R^2$$

Where S = Power density
 EIRP = Effective Isotropically Radiated Power
 R = distance to the centre of radiation of the antenna

For 2.4GHz band:

Values S = 1.0 mW/cm² for General population uncontrolled exposure (FCC Part 1.1310 Radiofrequency radiation exposure limits)
 S = 1.0mW/cm²
 P_T = 23.4dBm (219mW) – measured maximum combined conducted peak power (P₁ + P₂).
 G = Antenna gain (each antenna) = 1.0dBi (x1.26)
 EIRP = P₁G + P₂G = (P₁ + P₂)G = P_T x G
 R = 20 cm

Calculation:

$$\text{EIRP} = 219 \times 1.26 = 276\text{mW}$$

$$S = 276 / 12.56 \times (20)^2$$

$$S = 276 / 5024$$

$$\mathbf{S = 0.055 \text{ mW}^2}$$

For 5GHz band:

Values $S = 1.0 \text{ mW/cm}^2$ for General population uncontrolled exposure (FCC Part 1.1310 Radiofrequency radiation exposure limits)

$$S = 1.0 \text{ mW/cm}^2$$

$P_T = 21.4 \text{ dBm}$ (138mW) - measured maximum combined conducted peak power ($P_1 + P_2$).

$G = \text{Antenna gain (each antenna)} = 2.0 \text{ dBi}$ (x1.58)

$$\text{EIRP} = P_1 G + P_2 G = (P_1 + P_2) G = P_T \times G$$

$R = 20 \text{ cm}$

Calculation:

$$\text{EIRP} = 138 \times 1.58 = 218 \text{ mW}$$

$$S = 218 / 12.56 \times (20)^2$$

$$S = 218 / 5024$$

$$S = 0.043 \text{ mW}^2$$

Conclusion

This confirms compliance to the required FCC Part 1.1310 Radiofrequency radiation exposure limit of 1.0 mW/cm^2 at 20cm operation.