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# MPE Calculation  - FCC ID: 2ABCB-RPIZ2

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 a device to the body of a user.

The transmitter operation for the Raspberry Pi Zero 2 covers the 2.4GHz operating band.

Simultaneous transmission is not supported between any of the transmitters

The following FCC Rule Parts are applicable:

Part 1.1310 – Radiofrequency radiation exposure limits
Part 2.1091(c) – Radiofrequency radiation exposure evaluation: mobile devices

## CALCULATION

The following far field power density equation is applicable:

$$S = EIRP/4 \, \pi \, R^2$$

**Where**     S = Power density

EIRP = Effective Isotropically Radiated Power (EIRP = P x G)

P = Conducted Transmitter Power

G = Antenna Gain (relative to an isotropic radiator)

R = distance to the centre of radiation of the antenna (safe operating

distance)

## Calculation  for 2.4GHz BT (BDR/ EDR worst case):

Values:

Transmitter frequency range = 2402 – 2480MHz

P = 7.2dBm

G = 2.5dBi (x 1.78)

EIRP = 9.7dBm (9.33mW)

R = 20cm

Power Density Requirement

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of FCC Rule Part 1.1310 for 2.4GHz

**$S_{req1} = 1.0 \text{ mW/cm}^2$**

Calculation:

$$S = EIRP/4 \pi R^2$$
$$= 9.33/(12.56 \times 20^2)$$
$$= 9.33/(5024)$$

**$S_1 = 0.0019$**

(Equivalent to 0.86cm safe operating distance)

## **Calculation for 2.4GHz WLAN**

Values:

Transmitter frequency range = 2412 – 2462MHz

P = 26dBm

G = 2.5dBi

EIRP = 28.5dBm = 707.95mW

Power Density Requirement

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of FCC Rule Part 1.1310 for 1900MHz for 2.4GHz

**$S_{req2} = 1.0 \text{ mW/cm}^2$**

Calculation:

$$S = EIRP/4 \pi R^2$$
$$= 707.95/(12.56 \times 20^2)$$
$$= 707.95/(5024)$$

**$S_2 = 0.1408$**

(Equivalent to 7.51cm safe operating distance)

## <u>Conclusion</u>

The required 20cm RF exposure limits for General Population/ Uncontrolled Exposure FCC Rule Part 1.1310 limits will not be exceeded for the Raspberry Pi Zero 2 using antenna having a maximum gain of 2.5dBi.

Signed;

DocuSigned by:

*Gordon Hollingworth*

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CPO