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MPE Calculation

Report No: C15658TR3
Project No: C8779
Date: 14th October 2024

Product details:

Product name	Raspberry Pi Pico 2 W
Company name	Raspberry Pi Ltd
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MPE Calculation for Raspberry Pi Ltd

FCC requirement:

This report contains calculation of maximum Possible Exposure for the Raspberry Pi Pico 2 W.

Required distance to the user is assumed to be 20 cm

Mobile devices are defined by the FCC as transmitters designed to be used in other than fixed locations and generally to be used in such a way that a separation distance of 20cm is normally maintained between radiating structures and the body of the user or nearby persons.

These devices are normally evaluated for exposure potential with relation to the MPE limit.

As the 20cm separation may not be achievable under normal operating conditions, an RF exposure calculation is used to demonstrate the minimum distance required to be less than the power density limit, as required under FCC rules.

FCC rule part:47CFR2.1091(3)

Power density (S) relates to Equivalent Isotropic Radiated power (EIRP) according to the following:

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

Where,

R is the distance to the centre of radiation of the antenna (cm)

BLE Power Density

The worst case output power of the BLE module was = 3.4 mW

(Value obtained from test report C15655TR3)

The antenna gain was declared to be 2dBi.

The Power density (S) is calculated as:

Frequency (MHz)	Maximum EIRP (mW)	Power density (S) (mW/cm^2)	Power density limit (S) (mW/cm^2) 47CFR1.1310 Table 1
2480	5.4	0.002	1.0

MPE Calculation for Raspberry Pi Ltd

Bluetooth Classic Power Density

The worst case output power of the Bluetooth module was = 3.2 mW
(Value obtained from test report C15656TR3)
The antenna gain was declared to be 2dBi.

The Power density (S) is calculated as:

Frequency (MHz)	Maximum EIRP (mW)	Power density (S) (mW/cm^2)	Power density limit (S) (mW/cm^2) 47CFR1.1310 Table 1
2480	5.1	0.002	1.0

Wi-Fi Power Density

The worst case output power of the WiFi module was = 311 mW
(Value obtained from test report C15657TR3 using modulation scheme IEEE 802.11g)
The antenna gain was declared to be 2dBi.

The Power density (S) is calculated as:

Frequency (MHz)	Maximum EIRP (mW)	Power density (S) (mW/cm^2)	Power density limit (S) (mW/cm^2) 47CFR1.1310 Table 1
2442	493	0.196	1.0

Conclusion:
The product was shown to be compliant with the FCC 20cm power density limit.

MPE Calculation for Raspberry Pi Ltd

ISED Requirement

RSS Standard:

RSS-102 Issue 6 Posted on Industry Canada website: December 2023

Required distance to the user is assumed to be 20 cm

Clause:6.6 Exemption Limits for Routine Evaluation — Field reference level exposure exemption limits

At or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less then, in Watts,

$$1.31 \times 10^{-2} \, f^{0.6834}$$

adjusted for tune-up tolerance, where f is in MHz

BLE Evaluation

Calculation of e.i.r.p.:
The worst case output power of the BLE module was = 3.4 mW
(Value obtained from test report C15655TR3)
The antenna gain was declared to be 2dBi.

frequency (MHz)	Power (W)	Limit (W)
2480	0.0054	2.735

Bluetooth Classic Evaluation

Calculation of e.i.r.p.:
The worst case output power of the Bluetooth module was = 3.2 mW
(Value obtained from test report C15656TR3)
The antenna gain was declared to be 2dBi.

frequency (MHz)	Power (W)	Limit (W)
2480	0.0051	2.735

MPE Calculation for Raspberry Pi Ltd

Wi-Fi Evaluation

Calculation of e.i.r.p.:
The worst case output power of the WiFi module was = 311 mW
(Value obtained from test report C15657TR3 using modulation scheme IEEE 802.11g)
The antenna gain was declared to be 2dBi.

frequency (MHz)	Power (W)	Limit (W)
2442	0.493	2.707

Conclusion
The apparatus meets the ISED exclusion requirements for RF exposure Evaluation.

Prepared by:

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