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MPE Calculation

Report No: C15293TR4
Project No: C8034
Date: 2nd February 2024

Product details:

Product name	Wireless Gateway
Company name	Building Automated Products, Inc
Address	750 North Royal Avenue
	Gays Mills
	Wisconsin
	54631
	US
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MPE Calculation for Building Automated Products, Inc

FCC requirement:

This report contains calculation of maximum Possible Exposure for the Wireless Gateway.

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 = 5.4 mW

(Value obtained from test report C15292TR3)

Additionally, an antenna gain of 2.8dBi was applied.

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
2402.0	10.12	0.0020	1.0

Wi-Fi Power Density

The worst case output power of the Wi-Fi module was = 43.7mW
(Value obtained from FCC ID QOQWFM200 test report)
Additionally, an antenna gain of 2.8dBi was applied.

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
2437.0	83.2	0.0166	1.0

f = Frequency (MHz)

Simultaneous Transmission BLE and Wi-Fi

For the case of MPE calculations for multiple transmitters, this has been dealt with in accordance with FCC Bulletin OET 65.

For transmitters which operate in frequency bands with a different MPE limit the Power Densities are calculated separately for each band, and then divided by Limit for each band. The sum of these ratios shall not exceed 1.

BLE Power density (S) (mW/cm^2)	BLE Power density / Limit ratio	Wi-Fi Power density (S) (mW/cm^2)	Wi-Fi Power density / Limit ratio	Summed Power density / Limit ratios	Ratio Limit
0.0020	0.0020	0.0166	0.0166	0.0186	1

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

MPE Calculation for Building Automated Products, Inc

ISED Requirement

RSS Standard:

RSS-102 Issue 5 Posted on Industry Canada website: March 19, 2015

Clause:2.5.2 Exemption Limits for Routine Evaluation — RF Exposure Evaluation

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.:
Peak conducted power was measured, see Test Report C15292TR3.
Additionally, an antenna gain of 2.8dBi was applied.

frequency (MHz)	Measured Power (W)	Limit (W)
2402.0	0.010	2.68

Wi-Fi Evaluation

Calculation of e.i.r.p.:
The worst case output power of the Wi-Fi module was = 43.7mW
(Value obtained from FCC ID QOQWFM200 test report)
Additionally, an antenna gain of 2.8dBi was applied.

frequency (MHz)	Measured Power (W)	Limit (W)
2437.0	0.083	2.70

Conclusion

The apparatus meets the exclusion requirements for RF exposure Evaluation.

Prepared by:

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