



attn: Reviewing Engineer
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046

July 22, 2004

RE: RF exposure information FCC ID: QQQWRAP2022-1-B2B

<u>FCC ID Number</u>	<u>Product</u>	<u>Title/Model</u>
QQQWRAP2022-1-B2B		Bluetooth board-to-board module/ WRAP THOR 2022-1-B2B

TO WHOM IT MAY CONCERN

The product stated above is designed as module to be installed in other devices. This device is to be used only for fixed and mobile applications. If the final product after integration is intended for portable use, a new application and FCC is required.

The product **WRAP THOR 2022-1-B2B** uses an integrated antenna. This transmitter must be installed to provide a separation distance of at least 20 cm from everybody and must not be co-located or operating in conjunction with any other antenna or transmitter.

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	Power Density (mW/cm ²)	Averaging Time (minutes)
300 – 1500	f/1500	30
1500 – 100.000	1.0	30

The equipment **WRAP THOR 2022-1-B2B** transmits in the 2400 - 2483.5 MHz frequency range, so the applicable MPE limit is 1 mW/cm².

Under the conditions stated above MPE limits can be guaranteed as the calculation below shows:

Measured maximum peak output power (e.i.r.p.) = 12.55 dBm at 2441 MHz = 17.99 mW e.i.r.p.
Measurement uncertainty (dB) = +1.98/+1.75 dB

Maximum peak output power (e.i.r.p.) = Measured maximum peak output power (e.i.r.p.) + Measurement uncertainty (dB) = 12.55 + 1.98 dB = 14.53 dB = 28.38 mW e.i.r.p.

Using Equation from page 18 of OET Bulletin 65, Edition 97-01:

$$S = P \cdot G / 4\pi R^2$$

Where,

S = power density in mW/cm² (1 mW/cm² used for G)

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the centre of radiation of the antenna in cm (20 cm Prediction distance)

We obtain the following results:

Measured E.I.R.P. (dB)	Measurement uncertainty (dB)	Maximum EIRP (dB)	Maximum E.I.R.P. (mW)	R - Prediction distance (cm)	S - Power density (mW/cm ²)
12.55	+1.98/-1.75	14.53	28.38	20	0.005646

This prediction demonstrates that:

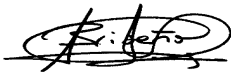
The power density levels at a distance of 20 cm are below the maximum levels allowed by the FCC rules.

Conclusion:

The equipment **WRAP THOR 2022-1-B2B** complies with the MPE if it is installed to provide a separation distance of at least 20 cm from everybody.

Sincerely,

P.A.



Mr. Mikael Björkas
 HW Project Manager
 Bluegiga Technologies Inc.
 Sinikalliontie 11, 02631 Espoo, Finland
 Phone: +358 40 848 3339
 E-mail: Mikael.Bjorkas@bluegiga.com