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Maximum Permissible Exposure Evaluation

FCC ID: PADWF149

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) Radiation as specified in §1.1307(b).

EUT Specification

Applicant:	Wahoo Fitness LLC
Address:	90 W. Wieuca Road #110, Atlanta, GA 30342, United States
Product Name:	Bike Computer
Trade Mark:	WAHOO FITNESS
Model/Type Reference:	WF149
Listed Model(s):	/
Model Differences:	/
Frequency Band (Operating)	BLE: 2402MHz ~ 2480MHz ANT+: 2457MHz WLAN: 2412MHz ~ 2462MHz U-NII-1: 5180MHz ~ 5240MHz U-NII-2A: 5260MHz ~ 5320MHz U-NII-2C: 5500MHz ~ 5700MHz U-NII-3: 5745MHz ~ 5825MHz
Device Category	<input type="checkbox"/> Portable (<5mm separation) <input type="checkbox"/> Mobile (>20cm separation) <input checked="" type="checkbox"/> Fixed (>20cm separation) <input type="checkbox"/> Others _____
Exposure Classification	<input type="checkbox"/> Occupational/Controlled exposure (S=5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna Diversity	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas <input type="checkbox"/> TX diversity <input type="checkbox"/> RX diversity <input type="checkbox"/> TX/RX diversity
Antenna Gain (Max)	BLE/ANT+: 0.5dBi WLAN: -2.8dBi RLAN: 2.5dBi
Evaluation Applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation

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**Limits for Maximum Permissible Exposure (MPE)**

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
(A) Limits for Occupational/Controlled Exposure				
300-1500	--	--	F/300	<6
1500-100000	--	--	5	<6
(B) Limits for General Population/Uncontrolled Exposure				
300-1500	--	--	F/1500	<30
1500-100000	--	--	1	<30

Calculation Method

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where:

P_d = Power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d limit of MPE is 1mW/cm². If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

$$eirp = pt \times gt = (E \times d)^2 / 30$$

where:

pt = transmitter output power in watts,

gt = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m, --- $10^{((dBuV/m)/20)/10^6}$

d = measurement distance in meters (m), --- 3m

$$\text{So } pt = (E \times d)^2 / (30 \times gt)$$

ANT+ 2457MHz Field strength = 85.91 dBuV/m @3m

Ant gain = 0.5dBi, Ant numeric gain = 1.12

$$\text{So } pt = \{ [10^{(85.91/20)/10^6} \times 3]^2 / (30 \times 1.12) \} \times 1000 \text{ mW} = 0.1043 \text{ mW} = -9.82 \text{ dBm}$$



Measurement Result

Mode	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Tune Up Tolerance (dB)	Max. Tune Up Power (dBm)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
BLE	2440	0.5	-1.11	±1	-0.50	0.0002	1
WLAN 802.11b	2412	-2.8	18.78	±1	19.50	0.0093	1
RLAN U-NII-3 802.11a	5320	2.5	18.15	±1	19.00	0.0281	1

The BT and WiFi can transmit simultaneously.

BT Power density at 20cm (mW/cm ²)	RLAN Power density at 20cm (mW/cm ²)	Total Power density at 20cm (mW/cm ²)	Power density Limit (mW/cm ²)
0.0002	0.0281	0.0283	1

Note:

1. Calculate in the worst-case mode.
2. Max. Tune Up Power is declared by manufacturer, and used to calculate.
3. For a more detailed features description, please refer to the RF Test Report.
4. BLE and ANT+ can't transmit simultaneously.

*****THE END*****