



CTC Laboratories, Inc.

1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Tel: +86-755- 27521059 Fax: +86-755- 27521011 Http://www.sz-ctc.org.cn

Maximum Permissible Exposure Evaluation

FCC ID: PADWF143

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

Product Name:	Wireless transceiver
Trade Mark:	WAHOO FITNESS
Model/Type reference:	WF143
Listed Model(s):	/
Frequency band (Operating)	BLE: 2.402GHz ~ 2.480GHz WLAN: 2.412GHz ~ 2.462GHz ANT+: 2457MHz
Device category	☐ Portable (<5mm separation) ☐ Mobile (>20cm separation) ☒ Fixed (>20cm separation) ☐ Others ____
Exposure classification	☐ Occupational/Controlled exposure (S=5mW/cm2) ☒ General Population/Uncontrolled exposure (S=1mW/cm2)
Antenna diversity	☒ Single antenna ☐ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Antenna gain Max	BLE/ANT+: 5.46dBi WIFI: 0.99dBi
Evaluation applied	☒ MPE Evaluation ☐ SAR Evaluation

Limits for Maximum Permissible Exposure (MPE)

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density(mW/cm ²)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300-1500	--	--	F/1500	30
1500-100000	--	--	1	30

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1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Tel.: (86)755-27521059

Fax: (86)755-27521011

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

Where

P_d = Power density in mW/cm^2

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 the limit of MPE $1mW/cm^2$. 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.

$$e_{irp} = p_t \times g_t = (E \times d)^2 / 30$$

where:

p_t = transmitter output power in watts,

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

E = electric field strength in V/m, --- $10((dBuV/m)/20)/106$,

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

$$So \ p_t = (E \times d)^2 / (30 \times g_t)$$

ANT+ 2457MHz Field strength = 93.38 dBuV/m @3m

Ant gain 5.46dBi; so Ant numeric gain= 3.52

$$So \ p_t = [10^{(93.38/20)} / 10^6 \times 3]^2 / (30 \times 3.52) \times 1000 \text{ mW} = 0.186 \text{ mW}$$

Measurement Result

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Tune up tolerance (dBm)	Max. Tune up Power (dBm)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)
GFSK (BLE)	2402	5.46	-11.82	-12 ± 1	-11	0.00006	1.000
WLAN 802.11b	2437	0.99	18.81	18 ± 1	19	0.01985	1.000
WLAN 802.11g	2437	0.99	16.63	16 ± 1	17	0.01252	1.000
WLAN 802.11n(HT20)	2437	0.99	16.60	16 ± 1	17	0.01252	1.000
WLAN 802.11n(HT40)	2437	0.99	15.97	16 ± 1	17	0.01252	1.000
ANT+	2457	5.46	-7.305	-7 ± 1	-6	0.00018	1.000

The WLAN, BT and ANT+ can transmit simultaneously

$0.01985/1 + 0.00006/1 + 0.00018/1 = 0.02009 < 1$, Then SAR evaluation is not required.

Note:

For a more detailed features description, Please refer to the RF Test Report.

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