



# Maximum Permissible Exposure Evaluation

**FCC ID: PADWF153**

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:	TRACKR RADAR
Trade Mark:	WAHOO FITNESS
Model/Type Reference:	WF153
Listed Model(s):	/
Model Differences:	/
Frequency Band (Operating)	BT: 2402MHz~2480MHz ANT+: 2457MHz Radar: 24.04~24.24GHz
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 ( $S=5\text{mW}/\text{cm}^2$ ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure ( $S=1\text{mW}/\text{cm}^2$ )
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)	BT/ANT+: 2.1dBi Radar: 10.8dBi
Evaluation Applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation

CTC Laboratories, Inc.

Room 101 Building B, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China  
Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

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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 <sup>2</sup> )	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:  $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where:

$P_d$  = Power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

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

$P_d$  limit of MPE is 1mW/cm<sup>2</sup>. 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.

**Measurement Result**

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

where:

$p_t$  = transmitter output power in watts,

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

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

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

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

ANT+ 2457MHz Field strength = 77.14 dBuV/m @3m

Ant gain = 2.1dBi, Ant numeric gain = 1.62

$$\text{So } p_t = \{[10^{(77.14/20)} / 10^6 \times 3]^2 / (30 \times 1.62)\} \times 1000 \text{ mW} = 0.0096 \text{ mW} = -20.18 \text{ dBm}$$

Radar 24.04~24.24GHz Field strength = 108.39 dBuV/m @3m

Ant gain = 10.8dBi, Ant numeric gain = 12.02

$$\text{So } p_t = \{[10^{(108.39/20)} / 10^6 \times 3]^2 / (30 \times 12.02)\} \times 1000 \text{ mW} = 1.7223 \text{ mW} = 2.36 \text{ dBm}$$



Mode	Frequency	Antenna Gain (dBi)	Maximum Power (dBm)	Tune Up Tolerance (dB)	Max. Tune Up Power (dBm)	Power Density at 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
BLE	2402MHz	2.1	-1.03	±1	0	0.0003	1
Radar	24.04~24.24GHz	10.8	2.36	±1	3.5	0.0071	1

The BT and Radar can transmit simultaneously.

BT Power density at 20cm (mW/cm <sup>2</sup> )	Radar Power density at 20cm (mW/cm <sup>2</sup> )	Total Power density at 20cm (mW/cm <sup>2</sup> )	Power density Limit (mW/cm <sup>2</sup> )
0.0003	0.0071	0.0074	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.

\*\*\*\*\*THE END\*\*\*\*\*