



RF Exposure Requirements

1 General Information

Client Information

Applicant : Fujian Elsonic Energy-Saving Equipment Co., LTD
Address of applicant : No. 23 Long Gong Road, Economic Development Zone, Longyan city, Fujian, China
Manufacturer..... : Fujian Elsonic Energy-Saving Equipment Co., LTD
Address of manufacturer..... : No. 23 Long Gong Road, Economic Development Zone, Longyan city, Fujian, China

General Description of E.U.T

FCC ID..... : 2BWRNHAIER120
Product Name : Controller
Model No. : HW-PC201AFT(BW)
Model Description : ---
Rated Voltage..... : Input Port 1: AC 12V
Input Port 2: DC 24V

Technical Characteristics of EUT

• WiFi

Support Standards : 802.11b, 802.11g, 802.11n
Frequency Range : 2412-2462MHz for 802.11b/g/n(HT20)
RF Output Power : 15.31dBm (Conducted)
Modulation : 802.11b: DSSS(DBPSK/DQPSK/CCK)
802.11g/n: OFDM (BPSK/QPSK/16QAM/64QAM)
Data Rate : 1Mbps for 802.11b; 54Mbps for 802.11g; MCS7 for 802.11n
Quantity of Channels : 11 for 802.11b/g/n(HT20)
Channel Separation..... : 5MHz
Type of Antenna : PCB Antenna
Antenna Gain : -5.15dBi (Declared by the manufacturer)



- **BLE**

Bluetooth Version : Bluetooth LE
Frequency Range : 2402-2480MHz
Max. RF Output Power : 5.343dBm (Conducted)
Modulation : GFSK
Data Rate : 1Mbps, 2Mbps
Quantity of Channels : 40
Channel Separation..... : 2MHz
Type of Antenna : PCB Antenna
Antenna Gain : 3.76dBi

2 Applicable Standard

According to FCC Rule Part 1.1307 (b)(3)(i)(C) and KDB 447498 D04 v01:

The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency.

The table applies to any RF source (i.e., single fixed, mobile, and portable transmitters) and specifies power and distance criteria for each of the five frequency ranges used for the MPE limits.

RF Source Frequency (MHz)	Minimum Distance		Threshold ERP (W)
	$\lambda_L/2\pi$	$\lambda_H/2\pi$	
0.3-1.34	159 m-35.6 m		$1,920 R^2$
1.34-30	35.6m-1.6m		$3,450 R^2/f^2$
30-300	1.6 m-159 mm		$3.83 R^2$
300-1,500	159 mm-31.8 mm		$0.0128 R^2f$
1,500-100,000	31.8mm-0.5mm		$19.2 R^2$
R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters.			



For Multiple RF sources: FCC Rule Part 1.1307(b)(3)(ii):

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required).

(B) In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

3 Calculation Result

For Single RF Source

Radio Access Technology	Min. Frequency	Max. Output Power	Max. Tune-up Output Power	Antenna Gain	Duty Cycle	Max. Tune-up EIRP
	(MHz)	(dBm)	(dBm)	(dBi)	(%)	(dBm)
WiFi	2412	15.31	16.00	-5.15	100	8.70
BLE	2402	5.343	6.00	3.76	100	7.61

Frequency	Min. Distance	Tune-up ERP		Exposure Limit	Ratio	Result
(MHz)	(cm)	(dBm)	(mW)	(mW)		Pass/Fail
2412	0.5	8.70	7.41	768.00	0.01	Pass
2402	0.5	7.61	5.77	768.00	0.01	Pass

Result: Pass

For Multiple RF Sources (Simultaneous Operations)

Radio Access Technology	Ratio 1	Ratio 2	Simultaneous Ratio	Limit	Result
WiFi+BLE	0.01	0.01	0.02	1.00	Pass

Result: Pass

Note:

1. EIRP= Output Power + Antenna gain; ERP=EIRP-2.15dB
2. Ratio= Tune-Up ERP(mW)/ Exposure Limit (mW)

=====End of Report=====