

**47 C.F.R. Part 1, Subpart I, Section 1.1310
47 C.F.R. Part 2, Subpart J, Section 2.1091
Maximum Permissible Exposure Calculations**

For FCC ID: MHI-CONAPPWM2

EUT Device Category = General Population/Uncontrolled Exposure

EUT consists of two ISM band radio transmitting. One operating over a range of: **2402 MHz to 2480 MHz**, and one operating over a range of **2412 MHz to 2462 MHz and 5180 MHz to 5825 MHz**

MPE Summary:

According subpart 1.1307 (b)(1) and 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure					
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	Averaging Time (Minutes)	
0.3-1.34	614	1.63	*(100)	30	
1.34-30	824/f	2.19/f	*(180/f ²)	30	
30-300	27.5	0.073	0.2	30	
300-1500	/	/	f/1500	30	
1500-100,000	/	/	1.0	30	

f = frequency in MHz; * = Plane-wave equivalent power density

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm²)

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

PG = EIRP

MPE and Limit are calculated for this device as follows:

2.4 GHz Frequency Band								
BLE Transceiver								
Freq	Output Power (dBm)	Tune-up Tolerance (dB)	Max Antenna Gain (dBi)	Max EIRP (dBm)	Max EIRP (mW)	Power Density at 20 cm (mW/cm ²)	Limit (mW)	Margin (mW)
2402	0.550	0.5	2.300	3.350	2.163	0.00043	1.000	0.9996
2440	0.400	0.5	2.300	3.200	2.089	0.00042	1.000	0.9996
2480	0.340	0.5	2.300	3.140	2.061	0.00041	1.000	0.9996

2.4 GHz Frequency Band								
802.11b								
Freq	Output Power (dBm)	Tune-up Tolerance (dB)	Max Antenna Gain (dBi)	Max EIRP (dBm)	Max EIRP (mW)	Power Density at 20 cm (mW/cm ²)	Limit (mW)	Margin (mW)
2412	20.400	0.5	2.300	23.200	208.930	0.042	1.000	0.958
2437	20.400	0.5	2.300	23.200	208.930	0.042	1.000	0.958
2462	20.300	0.5	2.300	23.100	204.174	0.041	1.000	0.959
802.11g								
2412	16.800	0.5	2.300	19.600	91.201	0.018	1.000	0.982
2437	16.800	0.5	2.300	19.600	91.201	0.018	1.000	0.982
2462	16.700	0.5	2.300	19.500	89.125	0.018	1.000	0.982
802.11n								
2412	16.500	0.5	2.300	19.300	85.114	0.017	1.000	0.983
2437	16.400	0.5	2.300	19.200	83.176	0.017	1.000	0.983
2462	16.400	0.5	2.300	19.200	83.176	0.017	1.000	0.983
5 GHz Frequency Band								
UNII-1 band								
5180	18.100	0.5	2.300	20.900	123.027	0.024	1.000	0.976
5220	18.200	0.5	2.300	21.000	125.893	0.025	1.000	0.975
5240	18.100	0.5	2.300	20.900	123.027	0.024	1.000	0.976
UNII-2A								
5260	17.700	0.5	2.300	20.500	112.202	0.022	1.000	0.978
5300	17.900	0.5	2.300	20.700	117.490	0.023	1.000	0.977
5320	18.000	0.5	2.300	20.800	120.226	0.024	1.000	0.976
UNII-2C								
5500	17.700	0.5	2.300	20.500	112.202	0.022	1.000	0.978
5600	17.700	0.5	2.300	20.500	112.202	0.022	1.000	0.978
5700	17.500	0.5	2.300	20.300	107.152	0.021	1.000	0.979
UNII-3 band Antenna 0								
5745	17.300	0.5	2.300	20.100	102.329	0.020	1.000	0.980
5785	17.400	0.5	2.300	20.200	104.713	0.021	1.000	0.979
5825	17.200	0.5	2.300	20.000	100.000	0.020	1.000	0.980

Result: There are two transceivers in the device. They should never transmit at the same time, however, if they should, the BLE MPE is less than 1% of the allowed exposure limit and the WiFi transceiver exposure in both the 2.4 GHz and 5 GHz bands is less than 1% of the limit and summing the percentages comes up to less than 2% of the MPE limit for the device. The device meets FCC MPE limit at 20 cm for General Population/Uncontrolled Exposure as specified in 47 CFR §1.1310 and §2.1091.