

**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: U4A-YRBDGCB2

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

Frequency Range (MHz)	Electric Strength (V/m)	Field Magnetic Strength (A/m)	Field Power Density (mW/cm ²)	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	8.700	0.5	2.300	11.500	14.125	0.003	1.000	0.997
2440	13.120	0.5	2.300	15.920	39.084	0.008	1.000	0.992
2480	5.980	0.5	2.300	8.780	7.551	0.002	1.000	0.998

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	4.100	0.5	2.300	6.900	4.898	0.001	1.000	0.999
2437	5.000	0.5	2.300	7.800	6.026	0.001	1.000	0.999
2462	4.700	0.5	2.300	7.500	5.623	0.001	1.000	0.999
802.11g								
2412	9.400	0.5	2.300	12.200	16.596	0.003	1.000	0.997
2437	10.200	0.5	2.300	13.000	19.953	0.004	1.000	0.996
2462	10.100	0.5	2.300	12.900	19.498	0.004	1.000	0.996
802.11n								
2412	8.900	0.5	2.300	11.700	14.791	0.003	1.000	0.997
2437	9.800	0.5	2.300	12.600	18.197	0.004	1.000	0.996
2462	9.200	0.5	2.300	12.000	15.849	0.003	1.000	0.997
5 GHz Frequency Band								
UNII-1 band								
5180	18.000	0.5	2.300	20.800	120.226	0.024	1.000	0.976
5220	17.500	0.5	2.300	20.300	107.152	0.021	1.000	0.979
5240	17.700	0.5	2.300	20.500	112.202	0.022	1.000	0.978
UNII-2A								
5260	14.600	0.5	2.300	17.400	54.954	0.011	1.000	0.989
5300	15.100	0.5	2.300	17.900	61.660	0.012	1.000	0.988
5320	15.300	0.5	2.300	18.100	64.565	0.013	1.000	0.987
UNII-2C								
5500	17.600	0.5	2.300	20.400	109.648	0.022	1.000	0.978
5600	18.500	0.5	2.300	21.300	134.896	0.027	1.000	0.973
5700	17.700	0.5	2.300	20.500	112.202	0.022	1.000	0.978
UNII-3 band Antenna 0								
5745	18.800	0.5	2.300	21.600	144.544	0.029	1.000	0.971
5785	19.600	0.5	2.300	22.400	173.780	0.035	1.000	0.965
5825	20.200	0.5	2.300	23.000	199.526	0.040	1.000	0.960

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.