# RF Exposure Report

**FCC ID: 2A48T-BW11**

The EUT is a USB wireless card in the 2412-2462MHz and 5180-5240MHz frequency band.

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)

**(A) Limits for Occupational / Controlled Exposure**

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ $cm^2$) | Averaging Time $\|E\|^2$,$\|H\|^2$or S (minutes) |
|---|---|---|---|---|
| 0.3-3.0 | 614 | 1.63 | (100)* | 6 |
| 3.0-30 | 1842 / f | 4.89 / f | (900 / f)* | 6 |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1500 | | | f/300 | 6 |
| 1500-100,000 | | | 5 | 6 |

**(B) Limits for General Population / Uncontrolled Exposure**

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ $cm^2$) | Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes) |
|---|---|---|---|---|
| 0.3-1.34 | 614 | 1.63 | (100)* | 30 |
| 1.34-30 | 824/f | 2.19/f | (180/f)* | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | | | f/1500 | 30 |
| 1500-100,000 | | | 1.0 | 30 |

Note: f = frequency in MHz

**MPE calculation method**

Calculation Method of RF Safety Distance:

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

S: power density mW/ $cm^2$;
P: power input to the antenna in mW;
g: numeric gain of antenna;
r: distance to centre of radiation in cm

**Unit dbuv/m@3m to mW calculation method**

E=EIRP-20log(d)+104.8

E: is the electric field strength in dBuv/m;

EIRP: is the equivalent is otropically radiated power in dBm;

d: is the specified measurement distance in m

**Calculated result**

| Mode | Max. Peak output power (dBm) | Max. Peak output power (mW) | Antenna Gain (numeric) | Power Density (S) (mW/ $cm^2$) | Limit of Power Density (S) (mW/ $cm^2$) |
|---|---|---|---|---|---|
| 802.11b | 8.554 | 7.168 | 2.831 | 0.004039 | 1 |
| 802.11g | 8.664 | 7.352 | 2.831 | 0.004143 | 1 |
| 802.11n20 | 8.858 | 7.688 | 2.831 | 0.004332 | 1 |
| 802.11n40 | 8.843 | 7.661 | 2.831 | 0.004317 | 1 |
| 802.11a | 7.45 | 5.559 | 2.344 | 0.002594 | 1 |
| 5G Wi-Fi 802.11 n20 | 7.51 | 5.636 | 2.344 | 0.002630 | 1 |
| 5G Wi-Fi 802.11 n40 | 7.42 | 5.521 | 2.344 | 0.002576 | 1 |
| 5G Wi-Fi 802.11 ac20 | 7.18 | 5.224 | 2.344 | 0.002437 | 1 |
| 5G Wi-Fi 802.11 ac40 | 7.49 | 5.610 | 2.344 | 0.002617 | 1 |
| 5G Wi-Fi 802.11 ac80 | 7.43 | 5.534 | 2.344 | 0.002582 | 1 |

Note1: the antenna gain is 4.52dBi for 2.4G WIFI；3.7dBi for 5G WIFI.

The 2.4G WIFI 802.11n20, 802.11n40 can MIMO model,

The 5G WIFI 802.11n20, 802.11n40, 802.11ac20, 802.11ac40, 802.11ac80 can MIMO model

then the antenna gain as below:

Array Gain = 10 log($N_{ANT}/N_{SS}$) dB.

For power measurements on IEEE 802.11 devices,[1.2]

Array Gain =0 dB (i.e., no array gain) for $N_{ANT} \leqslant 4$;

Array Gain =0 dB (i.e., no array gain) for channel widths > 40 MHz for any $N_{ANT}$;

Array Gain = 5 log($N_{ANT}/N_{ss}$) dB or 3 dB, whichever is less, for 20-MHz channel widths;

Directional Gain= $G_{ANT}$ + Array Gain=4.52dBi+0=4.52dBi for 2.4G WIFI;

Directional Gain= $G_{ANT}$ + Array Gain=3.7dBi+0=3.7dBi for 5G WIFI;