

## RF EXPOSURE EVALUATION

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)

FCC ID: 2AJ22-BW2570PCIE

### EUT Specification

| EUT                               | BW2570-PCIE   |
|-----------------------------------|---|
| <b>Frequency band (Operating)</b> | <input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz<br><input checked="" type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz<br><input checked="" type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz<br><input checked="" type="checkbox"/> Bluetooth: 2.402GHz ~ 2.48GHz<br><input type="checkbox"/> Others |
| <b>Device category</b>            | <input type="checkbox"/> Portable (<20cm separation)<br><input checked="" type="checkbox"/> Mobile (>20cm separation)<br><input type="checkbox"/> Others ____   |
| <b>Exposure classification</b>    | <input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> )<br><input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )   |
| <b>Antenna diversity</b>          | <input type="checkbox"/> Single antenna<br><input checked="" type="checkbox"/> Multiple antennas<br><input type="checkbox"/> Tx diversity<br><input type="checkbox"/> Rx diversity<br><input type="checkbox"/> Tx/Rx diversity  |
| <b>Max. output power</b>          | 18.60dBm (0.0724W)  |
| <b>Antenna gain (Max)</b>         | 8.01 dBi  |
| <b>Evaluation applied</b>         | <input checked="" type="checkbox"/> MPE Evaluation<br><input type="checkbox"/> SAR Evaluation   |

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> ) | Average Time |
|--|------------------------------|------------------------------|------------------------------------|--------------|
| <b>(A) Limits for Occupational/Control Exposures</b>         |                              |                              |                                    |              |
| <b>300-1500</b>  | --                           | --                           | <b>F/300</b>                       | <b>6</b>     |
| <b>1500-100000</b>   | --                           | --                           | <b>5</b>                           | <b>6</b>     |
| <b>(B) Limits for General Population/Uncontrol Exposures</b> |                              |                              |                                    |              |
| <b>300-1500</b>  | --                           | --                           | <b>F/1500</b>                      | <b>6</b>     |
| <b>1500-100000</b>   | --                           | --                           | <b>1</b>                           | <b>30</b>    |

## Friis transmission formula: $Pd=(Pout \cdot G) / (4 \cdot \pi \cdot R^2)$

Where

$Pd$ = Power density in  $mW/cm^2$

$Pout$ =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

$Pd$  the limit of MPE,  $1mW/cm^2$ . 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

### ANT 0:

| Operating Mode | Channel Frequency | Measured Power | Tune up tolerance | Max. Tune up Power | Antenna Gain | Power density at 20cm | Power density Limits ( $mW/cm^2$ ) |
|----------------|-------------------|----------------|-------------------|--------------------|--------------|-----------------------|------------------------------------|
|                | (MHz)             | (dBm)          | (dBm)             | (dBm)              | (dBi)        | ( $mW/cm^2$ )         |                                    |
| 802.11b        | 2412              | 11.75          | 11.75±1           | 12.75              | 5.00         | 0.0119                | 1                                  |
|                | 2437              | 12.10          | 12.10±1           | 13.10              | 5.00         | 0.0128                | 1                                  |
|                | 2462              | 12.12          | 12.12±1           | 13.12              | 5.00         | 0.0129                | 1                                  |
| 802.11g        | 2412              | 13.85          | 13.85±1           | 14.85              | 5.00         | 0.0192                | 1                                  |
|                | 2437              | 14.34          | 14.34±1           | 15.34              | 5.00         | 0.0215                | 1                                  |
|                | 2462              | 14.39          | 14.39±1           | 15.39              | 5.00         | 0.0218                | 1                                  |
| 802.11n (HT20) | 2412              | 14.13          | 14.13±1           | 15.13              | 5.00         | 0.0205                | 1                                  |
|                | 2437              | 14.40          | 14.40±1           | 15.40              | 5.00         | 0.0218                | 1                                  |
|                | 2462              | 14.37          | 14.37±1           | 15.37              | 5.00         | 0.0217                | 1                                  |
| 802.11n (HT40) | 2422              | 13.27          | 13.27±1           | 14.27              | 5.00         | 0.0168                | 1                                  |
|                | 2437              | 13.74          | 13.74±1           | 14.74              | 5.00         | 0.0187                | 1                                  |
|                | 2452              | 13.97          | 13.97±1           | 14.97              | 5.00         | 0.0198                | 1                                  |

**ANT 1:**

| Operating Mode | Channel Frequency | Measured Power | Tune up tolerance | Max. Tune up Power | Antenna Gain | Power density at 20cm  | Power density Limits (mW/cm <sup>2</sup> ) |
|----------------|-------------------|----------------|-------------------|--------------------|--------------|------------------------|--|
|                | (MHz)             | (dBm)          | (dBm)             | (dBm)              | (dBi)        | (mW/ cm <sup>2</sup> ) |  |
| 802.11b        | 2412              | 11.20          | 11.20±1           | 12.20              | 5.00         | 0.0104                 | 1  |
|                | 2437              | 11.76          | 11.76±1           | 12.76              | 5.00         | 0.0119                 | 1  |
|                | 2462              | 11.91          | 11.91±1           | 12.91              | 5.00         | 0.0123                 | 1  |
| 802.11g        | 2412              | 13.67          | 13.67±1           | 14.67              | 5.00         | 0.0184                 | 1  |
|                | 2437              | 14.37          | 14.37±1           | 15.37              | 5.00         | 0.0217                 | 1  |
|                | 2462              | 14.29          | 14.29±1           | 15.29              | 5.00         | 0.0213                 | 1  |
| 802.11n (HT20) | 2412              | 13.61          | 13.61±1           | 14.61              | 5.00         | 0.0182                 | 1  |
|                | 2437              | 14.57          | 14.57±1           | 15.57              | 5.00         | 0.0227                 | 1  |
|                | 2462              | 14.80          | 14.80±1           | 15.80              | 5.00         | 0.0239                 | 1  |
| 802.11n (HT40) | 2422              | 13.10          | 13.10±1           | 14.10              | 5.00         | 0.0162                 | 1  |
|                | 2437              | 13.90          | 13.90±1           | 14.90              | 5.00         | 0.0194                 | 1  |
|                | 2452              | 13.82          | 13.82±1           | 14.82              | 5.00         | 0.0191                 | 1  |

Antenna 0 Gain= 5 dBi

Antenna 1 Gain= 5 dBi

Array Gain= 8.01 dBi= GANT+10\*log(NANT)dBi

| Operating Mode | Channel Frequency (MHz) | ANT 0 Power density at 20cm (mW/ cm <sup>2</sup> ) | ANT 1 Power density at 20cm (mW/ cm <sup>2</sup> ) | Power density at 20cm (mW/ cm <sup>2</sup> ) | Power density Limits (mW/cm <sup>2</sup> ) |
|----------------|-------------------------|--|--|--|--|
| 802.11n (HT20) | 2412                    | 0.0205   | 0.0182   | 0.0387                                       | 1  |
|                | 2437                    | 0.0218   | 0.0227   | 0.0445                                       | 1  |
|                | 2462                    | 0.0217   | 0.0239   | 0.0456                                       | 1  |
| 802.11n (HT40) | 2422                    | 0.0168   | 0.0162   | 0.0330                                       | 1  |
|                | 2437                    | 0.0187   | 0.0194   | 0.0381                                       | 1  |
|                | 2452                    | 0.0198   | 0.0191   | 0.0389                                       | 1  |

| Operating Mode            | Channel Frequency | Measured Power | Tune up tolerance | Max. Tune up Power | Antenna Gain | Power density at 20cm  | Power density Limits (mW/cm <sup>2</sup> ) |
|---------------------------|-------------------|----------------|-------------------|--------------------|--------------|------------------------|--|
|                           | (MHz)             | (dBm)          | (dBm)             | (dBm)              | (dBi)        | (mW/ cm <sup>2</sup> ) |  |
| Bluetooth 3.0(GFSK)       | 2402              | 2.459          | 2.459 ± 1         | 3.459              | 5.00         | 0.0014                 | 1  |
|                           | 2441              | 3.431          | 3.431 ± 1         | 4.431              | 5.00         | 0.0017                 | 1  |
|                           | 2480              | 3.954          | 3.954 ± 1         | 4.954              | 5.00         | 0.0020                 | 1  |
| Bluetooth 3.0( π /4DQPSK) | 2402              | 2.280          | 2.280 ± 1         | 3.280              | 5.00         | 0.0013                 | 1  |
|                           | 2441              | 2.299          | 2.299 ± 1         | 3.299              | 5.00         | 0.0013                 | 1  |
|                           | 2480              | 2.886          | 2.886 ± 1         | 3.886              | 5.00         | 0.0015                 | 1  |
| Bluetooth 4.0             | 2402              | 0.239          | 0.239 ± 1         | 1.239              | 5.00         | 0.0008                 | 1  |
|                           | 2441              | 0.006          | 0.006 ± 1         | 1.006              | 5.00         | 0.0008                 | 1  |
|                           | 2480              | 1.896          | 1.896 ± 1         | 2.896              | 5.00         | 0.0012                 | 1  |

**ANT 0:**

| Operating Mode  | Channel Frequency | Measured Power | Tune up tolerance | Max. Tune up Power | Antenna Gain | Power density at 20cm  | Power density Limits (mW/cm <sup>2</sup> ) |
|-----------------|-------------------|----------------|-------------------|--------------------|--------------|------------------------|--|
|                 | (MHz)             | (dBm)          | (dBm)             | (dBm)              | (dBi)        | (mW/ cm <sup>2</sup> ) |  |
| 802.11n (HT20)  | 5180              | 10.96          | 10.96±1           | 11.96              | 5.00         | 0.0099                 | 1  |
|                 | 5200              | 10.14          | 10.14±1           | 11.14              | 5.00         | 0.0082                 | 1  |
|                 | 5240              | 9.41           | 9.41±1            | 10.41              | 5.00         | 0.0069                 | 1  |
| 802.11n (HT20)  | 5745              | 8.84           | 8.84±1            | 9.84               | 5.00         | 0.0061                 | 1  |
|                 | 5785              | 8.86           | 8.86±1            | 9.86               | 5.00         | 0.0061                 | 1  |
|                 | 5825              | 8.47           | 8.47±1            | 9.47               | 5.00         | 0.0056                 | 1  |
| 802.11n (HT40)  | 5190              | 12.00          | 12.00±1           | 13.00              | 5.00         | 0.0126                 | 1  |
|                 | 5230              | 10.48          | 10.48±1           | 11.48              | 5.00         | 0.0088                 | 1  |
| 802.11n (HT40)  | 5755              | 9.61           | 9.61±1            | 10.61              | 5.00         | 0.0072                 | 1  |
|                 | 5795              | 9.27           | 9.27±1            | 10.27              | 5.00         | 0.0067                 | 1  |
| 802.11a         | 5180              | 9.95           | 9.95±1            | 10.95              | 5.00         | 0.0078                 | 1  |
|                 | 5200              | 9.90           | 9.90±1            | 10.90              | 5.00         | 0.0077                 | 1  |
|                 | 5240              | 9.28           | 9.28±1            | 10.28              | 5.00         | 0.0067                 | 1  |
| 802.11a         | 5745              | 8.66           | 8.66±1            | 9.66               | 5.00         | 0.0058                 | 1  |
|                 | 5785              | 8.68           | 8.68±1            | 9.68               | 5.00         | 0.0058                 | 1  |
|                 | 5825              | 8.20           | 8.20±1            | 9.20               | 5.00         | 0.0052                 | 1  |
| 802.11ac (HT20) | 5180              | 10.10          | 10.10±1           | 11.10              | 5.00         | 0.0081                 | 1  |
|                 | 5200              | 10.07          | 10.07±1           | 11.07              | 5.00         | 0.0080                 | 1  |
|                 | 5240              | 9.33           | 9.33±1            | 10.33              | 5.00         | 0.0068                 | 1  |
| 802.11ac (HT20) | 5745              | 8.84           | 8.84±1            | 9.84               | 5.00         | 0.0061                 | 1  |
|                 | 5785              | 8.81           | 8.81±1            | 9.81               | 5.00         | 0.0060                 | 1  |
|                 | 5825              | 8.41           | 8.41±1            | 9.41               | 5.00         | 0.0055                 | 1  |
| 802.11ac (HT40) | 5190              | 11.31          | 11.31±1           | 12.31              | 5.00         | 0.0107                 | 1  |
|                 | 5230              | 10.70          | 10.70±1           | 11.70              | 5.00         | 0.0093                 | 1  |
| 802.11ac (HT40) | 5755              | 9.77           | 9.77±1            | 10.77              | 5.00         | 0.0075                 | 1  |
|                 | 5795              | 9.58           | 9.58±1            | 10.58              | 5.00         | 0.0072                 | 1  |
| 802.11ac (HT80) | 5210              | 11.34          | 11.34±1           | 12.34              | 5.00         | 0.0108                 | 1  |
|                 | 5775              | 9.42           | 9.42±1            | 10.42              | 5.00         | 0.0069                 | 1  |

**ANT 1:**

| Operating Mode  | Channel Frequency | Measured Power | Tune up tolerance | Max. Tune up Power | Antenna Gain | Power density at 20cm  | Power density Limits (mW/cm <sup>2</sup> ) |
|-----------------|-------------------|----------------|-------------------|--------------------|--------------|------------------------|--|
|                 | (MHz)             | (dBm)          | (dBm)             | (dBm)              | (dBi)        | (mW/ cm <sup>2</sup> ) |  |
| 802.11n (HT20)  | 5180              | 10.92          | 10.92±1           | 11.92              | 5.00         | 0.0098                 | 1  |
|                 | 5200              | 10.67          | 10.67±1           | 11.67              | 5.00         | 0.0092                 | 1  |
|                 | 5240              | 10.34          | 10.34±1           | 11.34              | 5.00         | 0.0086                 | 1  |
| 802.11n (HT20)  | 5745              | 7.55           | 7.55±1            | 8.55               | 5.00         | 0.0045                 | 1  |
|                 | 5785              | 7.89           | 7.89±1            | 8.89               | 5.00         | 0.0049                 | 1  |
|                 | 5825              | 7.09           | 7.09±1            | 8.09               | 5.00         | 0.0041                 | 1  |
| 802.11n (HT40)  | 5190              | 10.91          | 10.91±1           | 11.91              | 5.00         | 0.0098                 | 1  |
|                 | 5230              | 10.84          | 10.84±1           | 11.84              | 5.00         | 0.0096                 | 1  |
| 802.11n (HT40)  | 5755              | 8.43           | 8.43±1            | 9.43               | 5.00         | 0.0055                 | 1  |
|                 | 5795              | 7.37           | 7.37±1            | 8.37               | 5.00         | 0.0043                 | 1  |
| 802.11a         | 5180              | 11.98          | 11.98±1           | 12.98              | 5.00         | 0.0125                 | 1  |
|                 | 5200              | 11.46          | 11.46±1           | 12.46              | 5.00         | 0.0111                 | 1  |
|                 | 5240              | 11.02          | 11.02±1           | 12.02              | 5.00         | 0.0100                 | 1  |
| 802.11a         | 5745              | 7.39           | 7.39±1            | 8.39               | 5.00         | 0.0043                 | 1  |
|                 | 5785              | 7.84           | 7.84±1            | 8.84               | 5.00         | 0.0048                 | 1  |
|                 | 5825              | 7.09           | 7.09±1            | 8.09               | 5.00         | 0.0041                 | 1  |
| 802.11ac (HT20) | 5180              | 11.32          | 11.32±1           | 12.32              | 5.00         | 0.0107                 | 1  |
|                 | 5200              | 11.54          | 11.54±1           | 12.54              | 5.00         | 0.0113                 | 1  |
|                 | 5240              | 11.75          | 11.75±1           | 12.75              | 5.00         | 0.0119                 | 1  |
| 802.11ac (HT20) | 5745              | 7.98           | 7.98±1            | 8.98               | 5.00         | 0.0050                 | 1  |
|                 | 5785              | 8.45           | 8.45±1            | 9.45               | 5.00         | 0.0055                 | 1  |
|                 | 5825              | 7.66           | 7.66±1            | 8.66               | 5.00         | 0.0046                 | 1  |
| 802.11ac (HT40) | 5190              | 11.76          | 11.76±1           | 12.76              | 5.00         | 0.0119                 | 1  |
|                 | 5230              | 11.45          | 11.45±1           | 12.45              | 5.00         | 0.0111                 | 1  |
| 802.11ac (HT40) | 5755              | 8.25           | 8.25±1            | 9.25               | 5.00         | 0.0053                 | 1  |
|                 | 5795              | 7.46           | 7.46±1            | 8.46               | 5.00         | 0.0044                 | 1  |
| 802.11ac (HT80) | 5210              | 11.02          | 11.02±1           | 12.02              | 5.00         | 0.0100                 | 1  |
|                 | 5775              | 8.81           | 8.81±1            | 9.81               | 5.00         | 0.0060                 | 1  |

Antenna 0 Gain= 5 dBi

Antenna 1 Gain= 5 dBi

Array Gain= 8.01 dBi= GANT+10\*log(NANT)dBi

| Operating Mode  | Channel Frequency (MHz) | ANT 0 Power density at 20cm (mW/ cm <sup>2</sup> ) | ANT 1 Power density at 20cm (mW/ cm <sup>2</sup> ) | Power density at 20cm (mW/ cm <sup>2</sup> ) | Power density Limits (mW/cm <sup>2</sup> ) |
|-----------------|-------------------------|--|--|--|--|
| 802.11n (HT20)  | 5180                    | 0.0099   | 0.0098   | 0.0197                                       | 1  |
|                 | 5200                    | 0.0082   | 0.0092   | 0.0174                                       | 1  |
|                 | 5240                    | 0.0069   | 0.0086   | 0.0155                                       | 1  |
| 802.11n (HT20)  | 5745                    | 0.0061   | 0.0045   | 0.0106                                       | 1  |
|                 | 5785                    | 0.0061   | 0.0049   | 0.0110                                       | 1  |
|                 | 5825                    | 0.0056   | 0.0041   | 0.0097                                       | 1  |
| 802.11n (HT40)  | 5190                    | 0.0126   | 0.0098   | 0.0224                                       | 1  |
|                 | 5230                    | 0.0088   | 0.0096   | 0.0184                                       | 1  |
| 802.11n (HT40)  | 5755                    | 0.0072   | 0.0055   | 0.0127                                       | 1  |
|                 | 5795                    | 0.0067   | 0.0043   | 0.011  | 1  |
| 802.11ac (HT20) | 5180                    | 0.0081   | 0.0107   | 0.0188                                       | 1  |
|                 | 5200                    | 0.0080   | 0.0113   | 0.0193                                       | 1  |
|                 | 5240                    | 0.0068   | 0.0119   | 0.0187                                       | 1  |
| 802.11ac (HT20) | 5745                    | 0.0061   | 0.0050   | 0.0111                                       | 1  |
|                 | 5785                    | 0.0060   | 0.0055   | 0.0115                                       | 1  |
|                 | 5825                    | 0.0055   | 0.0046   | 0.0101                                       | 1  |
| 802.11ac (HT40) | 5190                    | 0.0107   | 0.0119   | 0.0226                                       | 1  |
|                 | 5230                    | 0.0093   | 0.0111   | 0.0204                                       | 1  |
| 802.11ac (HT40) | 5755                    | 0.0075   | 0.0053   | 0.0128                                       | 1  |
|                 | 5795                    | 0.0072   | 0.0044   | 0.0116                                       | 1  |
| 802.11ac (HT80) | 5210                    | 0.0108   | 0.0100   | 0.0208                                       | 1  |
|                 | 5775                    | 0.0069   | 0.0060   | 0.0129                                       | 1  |