



## Appendix A. Radiated Spurious Emission

|                 |                                 |                     |         |
|-----------------|---------------------------------|---------------------|---------|
| Test Engineer : | Nick Yu, Ken Wu, and James Chiu | Temperature :       | 23~24°C |
|                 |                                 | Relative Humidity : | 56~60%  |

## 2.4GHz 2400~2483.5MHz

## BT (Band Edge @ 3m)

| BT                     | Note | Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>( dBμV ) | Antenna<br>Factor<br>( dB/m ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Peak<br>Avg.<br>( P/A ) | Pol.<br>( H/V ) |
|------------------------|------|----------------------|---------------------|-------------------------|-----------------------------|---------------------------|-------------------------------|-------------------------|----------------------------|----------------------|-------------------------|-------------------------|-----------------|
| BT<br>CH00<br>2402MHz  |      | 2330.54              | 48.04               | -25.96                  | 74                          | 42.57                     | 32.09                         | 7.6                     | 34.22                      | 100                  | 19                      | P                       | H               |
|                        |      | 2330.54              | 23.28               | -30.72                  | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | H               |
|                        | *    | 2402.04              | 101.44              | -                       | -                           | 95.81                     | 32.18                         | 7.75                    | 34.3                       | 100                  | 19                      | P                       | H               |
|                        | *    | 2402.04              | 76.68               | -                       | -                           | -                         | -                             | -                       | -                          | -                    | -                       | A                       | H               |
|                        |      |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         | H               |
|                        |      |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         | H               |
|                        |      | 2354.72              | 47.43               | -26.57                  | 74                          | 41.87                     | 32.13                         | 7.68                    | 34.25                      | 300                  | 78                      | P                       | V               |
|                        |      | 2354.72              | 22.67               | -31.33                  | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | V               |
|                        | *    | 2402.04              | 94.63               | -                       | -                           | 89                        | 32.18                         | 7.75                    | 34.3                       | 300                  | 78                      | P                       | V               |
|                        | *    | 2402.04              | 69.87               | -                       | -                           | -                         | -                             | -                       | -                          | -                    | -                       | A                       | V               |
|                        |      |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         | V               |
|                        |      |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         | V               |
| BT<br>CH 39<br>2441MHz |      | 2372.51              | 47.77               | -26.23                  | 74                          | 42.2                      | 32.16                         | 7.68                    | 34.27                      | 100                  | 19                      | P                       | H               |
|                        |      | 2372.51              | 23.01               | -30.99                  | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | H               |
|                        | *    | 2441.1               | 101.85              | -                       | -                           | 96.17                     | 32.24                         | 7.83                    | 34.39                      | 100                  | 19                      | P                       | H               |
|                        | *    | 2441.1               | 77.09               | -                       | -                           | -                         | -                             | -                       | -                          | -                    | -                       | A                       | H               |
|                        |      | 2487.27              | 47.05               | -26.95                  | 74                          | 41.29                     | 32.28                         | 7.91                    | 34.43                      | 100                  | 19                      | P                       | H               |
|                        |      | 2487.27              | 22.29               | -31.71                  | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | H               |
|                        |      | 2357.5               | 47.66               | -26.34                  | 74                          | 42.1                      | 32.13                         | 7.68                    | 34.25                      | 308                  | 57                      | P                       | V               |
|                        |      | 2357.5               | 22.9                | -31.1                   | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | V               |
|                        | *    | 2441.1               | 97.99               | -                       | -                           | 92.31                     | 32.24                         | 7.83                    | 34.39                      | 308                  | 57                      | P                       | V               |
|                        | *    | 2441.1               | 73.23               | -                       | -                           | -                         | -                             | -                       | -                          | -                    | -                       | A                       | V               |
|                        |      | 2489.55              | 47.26               | -26.74                  | 74                          | 41.48                     | 32.3                          | 7.91                    | 34.43                      | 308                  | 57                      | P                       | V               |
|                        |      | 2489.55              | 22.5                | -31.5                   | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | V               |



|                                 |                                                                                             |         |        |        |    |       |       |      |       |     |    |   |   |
|---------------------------------|---------------------------------------------------------------------------------------------|---------|--------|--------|----|-------|-------|------|-------|-----|----|---|---|
| <b>BT<br/>CH 78<br/>2480MHz</b> | *                                                                                           | 2479.98 | 100.02 | -      | -  | 94.26 | 32.28 | 7.91 | 34.43 | 100 | 18 | P | H |
|                                 | *                                                                                           | 2479.98 | 75.26  | -      | -  | -     | -     | -    | -     | -   | -  | A | H |
|                                 |                                                                                             | 2483.76 | 51.02  | -22.98 | 74 | 45.26 | 32.28 | 7.91 | 34.43 | 100 | 18 | P | H |
|                                 |                                                                                             | 2483.76 | 26.26  | -27.74 | 54 | -     | -     | -    | -     | -   | -  | A | H |
|                                 |                                                                                             |         |        |        |    |       |       |      |       |     |    |   | H |
|                                 |                                                                                             |         |        |        |    |       |       |      |       |     |    |   | H |
|                                 | *                                                                                           | 2479.98 | 97.35  | -      | -  | 91.59 | 32.28 | 7.91 | 34.43 | 313 | 57 | P | V |
|                                 | *                                                                                           | 2479.98 | 72.59  | -      | -  | -     | -     | -    | -     | -   | -  | A | V |
|                                 |                                                                                             | 2491.74 | 48.39  | -25.61 | 74 | 42.61 | 32.3  | 7.91 | 34.43 | 313 | 57 | P | V |
|                                 |                                                                                             | 2491.74 | 23.63  | -30.37 | 54 | -     | -     | -    | -     | -   | -  | A | V |
|                                 |                                                                                             |         |        |        |    |       |       |      |       |     |    |   | V |
|                                 |                                                                                             |         |        |        |    |       |       |      |       |     |    |   | V |
| <b>Remark</b>                   | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |         |        |        |    |       |       |      |       |     |    |   |   |



## 2.4GHz 2400~2483.5MHz

## BT (Harmonic @ 3m)

| BT                     | Note                                                                                        | Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>( dBμV ) | Antenna<br>Factor<br>( dB/m ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Peak<br>Avg.<br>( P/A ) | Pol.<br>( H/V ) |
|------------------------|---------------------------------------------------------------------------------------------|----------------------|---------------------|-------------------------|-----------------------------|---------------------------|-------------------------------|-------------------------|----------------------------|----------------------|-------------------------|-------------------------|-----------------|
| BT<br>CH 00<br>2402MHz |                                                                                             | 4804                 | 43.4                | -30.6                   | 74                          | 57.71                     | 34.25                         | 11.11                   | 59.67                      | 100                  | 0                       | P                       | H               |
|                        |                                                                                             | 4804                 | 18.64               | -35.36                  | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | H               |
|                        |                                                                                             |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         | H               |
|                        |                                                                                             |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         | H               |
|                        |                                                                                             | 4804                 | 43.41               | -30.59                  | 74                          | 57.72                     | 34.25                         | 11.11                   | 59.67                      | 100                  | 0                       | P                       | V               |
|                        |                                                                                             | 4804                 | 18.65               | -35.35                  | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | V               |
|                        |                                                                                             |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         | V               |
|                        |                                                                                             |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         | V               |
| BT<br>CH 39<br>2441MHz |                                                                                             | 4882                 | 40.2                | -33.8                   | 74                          | 54.26                     | 34.3                          | 11.21                   | 59.57                      | 100                  | 0                       | P                       | H               |
|                        |                                                                                             | 4882                 | 15.44               | -38.56                  | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | H               |
|                        |                                                                                             | 7323                 | 42.15               | -31.85                  | 74                          | 49.96                     | 35.6                          | 15.08                   | 58.49                      | 100                  | 0                       | P                       | H               |
|                        |                                                                                             | 7323                 | 17.39               | -36.61                  | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | H               |
|                        |                                                                                             | 4882                 | 40.87               | -33.13                  | 74                          | 54.93                     | 34.3                          | 11.21                   | 59.57                      | 100                  | 0                       | P                       | V               |
|                        |                                                                                             | 4882                 | 16.11               | -37.89                  | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | V               |
|                        |                                                                                             | 7323                 | 42.62               | -31.38                  | 74                          | 50.43                     | 35.6                          | 15.08                   | 58.49                      | 100                  | 0                       | P                       | V               |
|                        |                                                                                             | 7323                 | 17.86               | -36.14                  | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | V               |
| BT<br>CH 78<br>2480MHz |                                                                                             | 4962                 | 40.55               | -33.45                  | 74                          | 54.31                     | 34.37                         | 11.32                   | 59.45                      | 100                  | 0                       | P                       | H               |
|                        |                                                                                             | 4962                 | 15.79               | -38.21                  | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | H               |
|                        |                                                                                             | 7440                 | 41.8                | -32.2                   | 74                          | 49.71                     | 35.6                          | 15.13                   | 58.64                      | 100                  | 0                       | P                       | H               |
|                        |                                                                                             | 7440                 | 17.04               | -36.96                  | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | H               |
|                        |                                                                                             | 4962                 | 41.51               | -32.49                  | 74                          | 55.27                     | 34.37                         | 11.32                   | 59.45                      | 100                  | 0                       | P                       | V               |
|                        |                                                                                             | 4962                 | 16.75               | -37.25                  | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | V               |
|                        |                                                                                             | 7440                 | 42.13               | -31.87                  | 74                          | 50.04                     | 35.6                          | 15.13                   | 58.64                      | 100                  | 0                       | P                       | V               |
|                        |                                                                                             | 7440                 | 17.37               | -36.63                  | 54                          | -                         | -                             | -                       | -                          | -                    | -                       | A                       | V               |
| Remark                 | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         |                 |



## Emission below 1GHz

## 2.4GHz BT (LF)

| BT                 | Note                                                                       | Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>(dBμV) | Antenna<br>Factor<br>( dB/m ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Peak<br>Avg.<br>(P/A) | Pol.<br>(H/V) |
|--------------------|----------------------------------------------------------------------------|----------------------|---------------------|-------------------------|-----------------------------|-------------------------|-------------------------------|-------------------------|----------------------------|----------------------|-------------------------|-----------------------|---------------|
| 2.4GHz<br>BT<br>LF |                                                                            | 49.71                | 24.49               | -15.51                  | 40                          | 45.17                   | 8.75                          | 1.77                    | 31.2                       | 135                  | 95                      | P                     | H             |
|                    |                                                                            | 136.11               | 23.04               | -20.46                  | 43.5                        | 40.26                   | 11.5                          | 2.38                    | 31.1                       | -                    | -                       | P                     | H             |
|                    |                                                                            | 224.13               | 22.84               | -23.16                  | 46                          | 41.26                   | 9.62                          | 2.96                    | 31                         | -                    | -                       | P                     | H             |
|                    |                                                                            | 448.4                | 24.57               | -21.43                  | 46                          | 34.44                   | 17.24                         | 3.63                    | 30.74                      | -                    | -                       | P                     | H             |
|                    |                                                                            | 766.2                | 26.26               | -19.74                  | 46                          | 30.05                   | 22.1                          | 4.48                    | 30.37                      | -                    | -                       | P                     | H             |
|                    |                                                                            | 985.3                | 29.41               | -24.59                  | 54                          | 29.75                   | 24.89                         | 5.03                    | 30.26                      | -                    | -                       | P                     | H             |
|                    |                                                                            |                      |                     |                         |                             |                         |                               |                         |                            |                      |                         |                       | H             |
|                    |                                                                            |                      |                     |                         |                             |                         |                               |                         |                            |                      |                         |                       | H             |
|                    |                                                                            |                      |                     |                         |                             |                         |                               |                         |                            |                      |                         |                       | H             |
|                    |                                                                            |                      |                     |                         |                             |                         |                               |                         |                            |                      |                         |                       | H             |
|                    |                                                                            |                      |                     |                         |                             |                         |                               |                         |                            |                      |                         |                       | H             |
|                    |                                                                            |                      |                     |                         |                             |                         |                               |                         |                            |                      |                         |                       | H             |
|                    |                                                                            | 54.03                | 26.18               | -13.82                  | 40                          | 48.81                   | 6.8                           | 1.77                    | 31.2                       | 100                  | 164                     | P                     | V             |
|                    |                                                                            | 147.99               | 13.09               | -30.41                  | 43.5                        | 30.5                    | 11.08                         | 2.61                    | 31.1                       | -                    | -                       | P                     | V             |
|                    |                                                                            | 258.96               | 16.11               | -29.89                  | 46                          | 30.31                   | 13.84                         | 2.96                    | 31                         | -                    | -                       | P                     | V             |
|                    |                                                                            | 448.4                | 21.9                | -24.1                   | 46                          | 31.77                   | 17.24                         | 3.63                    | 30.74                      | -                    | -                       | P                     | V             |
|                    |                                                                            | 647.2                | 25.95               | -20.05                  | 46                          | 31.84                   | 20.4                          | 4.22                    | 30.51                      | -                    | -                       | P                     | V             |
|                    |                                                                            | 860                  | 27.43               | -18.57                  | 46                          | 29.91                   | 23.2                          | 4.7                     | 30.38                      | -                    | -                       | P                     | V             |
|                    |                                                                            |                      |                     |                         |                             |                         |                               |                         |                            |                      |                         |                       | V             |
|                    |                                                                            |                      |                     |                         |                             |                         |                               |                         |                            |                      |                         |                       | V             |
|                    |                                                                            |                      |                     |                         |                             |                         |                               |                         |                            |                      |                         |                       | V             |
|                    |                                                                            |                      |                     |                         |                             |                         |                               |                         |                            |                      |                         |                       | V             |
|                    |                                                                            |                      |                     |                         |                             |                         |                               |                         |                            |                      |                         |                       | V             |
|                    |                                                                            |                      |                     |                         |                             |                         |                               |                         |                            |                      |                         |                       | V             |
|                    |                                                                            |                      |                     |                         |                             |                         |                               |                         |                            |                      |                         |                       | V             |
| Remark             | 1. No other spurious found.<br>2. All results are PASS against limit line. |                      |                     |                         |                             |                         |                               |                         |                            |                      |                         |                       |               |



**Note symbol**

|     |                                                                                                                                                          |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| *   | <b>Fundamental Frequency</b> which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency. |
| !   | Test result is <b>over limit</b> line.                                                                                                                   |
| P/A | <b>Peak</b> or <b>Average</b>                                                                                                                            |
| H/V | <b>Horizontal</b> or <b>Vertical</b>                                                                                                                     |



A calculation example for radiated spurious emission is shown as below:

| WIFI<br>Ant.<br>1+2 | Note | Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>( dBμV ) | Antenna<br>Factor<br>( dB/m ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Peak<br>Avg.<br>( P/A ) | Pol.<br>( H/V ) |
|---------------------|------|----------------------|---------------------|-------------------------|-----------------------------|---------------------------|-------------------------------|-------------------------|----------------------------|----------------------|-------------------------|-------------------------|-----------------|
| 802.11b<br>CH 01    |      | 2390                 | 55.45               | -18.55                  | 74                          | 54.51                     | 32.22                         | 4.58                    | 35.86                      | 103                  | 308                     | P                       | H               |
| 2412MHz             |      | 2390                 | 43.54               | -10.46                  | 54                          | 42.6                      | 32.22                         | 4.58                    | 35.86                      | 103                  | 308                     | A                       | H               |

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

**For Peak Limit @ 2390MHz:**

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

**For Average Limit @ 2390MHz:**

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

**Both peak and average measured complies with the limit line, so test result is “PASS”.**