



## Appendix A. Radiated Spurious Emission

|                 |                                             |                     |          |
|-----------------|---------------------------------------------|---------------------|----------|
| Test Engineer : | Nick Yu, Stan Hsieh, Ken Wu, and James Chiu | Temperature :       | 21~23 °C |
|                 |                                             | Relative Humidity : | 47~49%   |

15C 2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

| BT                     | Note | Frequency | Level      | Over   | Limit      | Read     | Antenna  | Cable  | Preamp | Ant    | Table   | Peak | Pol. |
|------------------------|------|-----------|------------|--------|------------|----------|----------|--------|--------|--------|---------|------|------|
|                        |      | ( MHz )   | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | Avg. |      |
| BT<br>CH00<br>2402MHz  |      | 2311.3    | 48.29      | -25.71 | 74         | 42.81    | 32.07    | 7.6    | 34.19  | 105    | 206     | P    | H    |
|                        |      | 2311.3    | 23.53      | -30.47 | 54         | -        | -        | -      | -      | -      | -       | A    | H    |
|                        | *    | 2402      | 100.11     | -      | -          | 94.48    | 32.18    | 7.75   | 34.3   | 105    | 206     | P    | H    |
|                        | *    | 2402      | 75.35      | -      | -          | -        | -        | -      | -      | -      | -       | A    | H    |
|                        |      |           |            |        |            |          |          |        |        |        |         |      | H    |
|                        |      |           |            |        |            |          |          |        |        |        |         |      | H    |
|                        |      | 2382.28   | 48.41      | -25.59 | 74         | 42.77    | 32.16    | 7.75   | 34.27  | 100    | 167     | P    | V    |
|                        |      | 2382.28   | 23.65      | -30.35 | 54         | -        | -        | -      | -      | -      | -       | A    | V    |
|                        | *    | 2401.91   | 101.51     | -      | -          | 95.88    | 32.18    | 7.75   | 34.3   | 100    | 167     | P    | V    |
|                        | *    | 2401.91   | 76.75      | -      | -          | -        | -        | -      | -      | -      | -       | A    | V    |
|                        |      |           |            |        |            |          |          |        |        |        |         |      | V    |
|                        |      |           |            |        |            |          |          |        |        |        |         |      | V    |
| BT<br>CH 39<br>2441MHz |      | 2329.76   | 48.01      | -25.99 | 74         | 42.54    | 32.09    | 7.6    | 34.22  | 398    | 118     | P    | H    |
|                        |      | 2329.76   | 23.25      | -30.75 | 54         | -        | -        | -      | -      | -      | -       | A    | H    |
|                        | *    | 2441.1    | 100.49     | -      | -          | 94.81    | 32.24    | 7.83   | 34.39  | 398    | 118     | P    | H    |
|                        | *    | 2441.1    | 75.73      | -      | -          | -        | -        | -      | -      | -      | -       | A    | H    |
|                        |      | 2493.16   | 48.18      | -25.82 | 74         | 42.45    | 32.3     | 7.91   | 34.48  | 398    | 118     | P    | H    |
|                        |      | 2493.16   | 23.42      | -30.58 | 54         | -        | -        | -      | -      | -      | -       | A    | H    |
|                        |      | 2345.53   | 49.29      | -24.71 | 74         | 43.75    | 32.11    | 7.68   | 34.25  | 100    | 165     | P    | V    |
|                        |      | 2345.53   | 24.53      | -29.47 | 54         | -        | -        | -      | -      | -      | -       | A    | V    |
|                        | *    | 2441.1    | 101.42     | -      | -          | 95.74    | 32.24    | 7.83   | 34.39  | 100    | 165     | P    | V    |
|                        | *    | 2441.1    | 76.66      | -      | -          | -        | -        | -      | -      | -      | -       | A    | V    |
|                        |      | 2494.3    | 47.76      | -26.24 | 74         | 42.03    | 32.3     | 7.91   | 34.48  | 100    | 165     | P    | V    |
|                        |      | 2494.3    | 23         | -31    | 54         | -        | -        | -      | -      | -      | -       | A    | V    |



|                                 |                                                                                             |         |        |        |    |       |       |      |       |     |     |   |   |
|---------------------------------|---------------------------------------------------------------------------------------------|---------|--------|--------|----|-------|-------|------|-------|-----|-----|---|---|
| <b>BT<br/>CH 78<br/>2480MHz</b> | *                                                                                           | 2480.05 | 100.26 | -      | -  | 94.5  | 32.28 | 7.91 | 34.43 | 353 | 172 | P | H |
|                                 | *                                                                                           | 2480.05 | 75.5   | -      | -  | -     | -     | -    | -     | -   | -   | A | H |
|                                 |                                                                                             | 2495.52 | 49.42  | -24.58 | 74 | 43.69 | 32.3  | 7.91 | 34.48 | 353 | 172 | P | H |
|                                 |                                                                                             | 2495.52 | 24.66  | -29.34 | 54 | -     | -     | -    | -     | -   | -   | A | H |
|                                 |                                                                                             |         |        |        |    |       |       |      |       |     |     |   | H |
|                                 |                                                                                             |         |        |        |    |       |       |      |       |     |     |   | H |
|                                 | *                                                                                           | 2480.05 | 101.54 | -      | -  | 95.78 | 32.28 | 7.91 | 34.43 | 100 | 169 | P | V |
|                                 | *                                                                                           | 2480.05 | 76.78  | -      | -  | -     | -     | -    | -     | -   | -   | A | V |
|                                 |                                                                                             | 2499.58 | 49.15  | -24.85 | 74 | 43.42 | 32.3  | 7.91 | 34.48 | 100 | 169 | P | V |
|                                 |                                                                                             | 2499.58 | 24.39  | -29.61 | 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. |         |        |        |    |       |       |      |       |     |     |   |   |



## 15C 2.4GHz 2400~2483.5MHz

## BT (Harmonic @ 3m)

| BT                     | Note                                                                                        | Frequency | Level      | Over   | Limit      | Read     | Antenna  | Cable  | Preamp | Ant    | Table   | Peak  | Pol.  |
|------------------------|---------------------------------------------------------------------------------------------|-----------|------------|--------|------------|----------|----------|--------|--------|--------|---------|-------|-------|
|                        |                                                                                             |           |            | Limit  | Line       | Level    | Factor   | Loss   | Factor | Pos    | Pos     | Avg.  |       |
|                        |                                                                                             | ( MHz )   | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| BT<br>CH 00<br>2402MHz |                                                                                             | 4806      | 41.27      | -32.73 | 74         | 54.87    | 34.25    | 11.11  | 58.96  | 100    | 0       | P     | H     |
|                        |                                                                                             | 4806      | 16.51      | -37.49 | 54         | -        | -        | -      | -      | -      | -       | A     | H     |
|                        |                                                                                             |           |            |        |            |          |          |        |        |        |         |       | H     |
|                        |                                                                                             |           |            |        |            |          |          |        |        |        |         |       | H     |
|                        |                                                                                             | 4806      | 41.16      | -32.84 | 74         | 54.76    | 34.25    | 11.11  | 58.96  | 100    | 0       | P     | V     |
|                        |                                                                                             | 4806      | 16.4       | -37.6  | 54         | -        | -        | -      | -      | -      | -       | A     | V     |
|                        |                                                                                             |           |            |        |            |          |          |        |        |        |         |       | V     |
|                        |                                                                                             |           |            |        |            |          |          |        |        |        |         |       | V     |
| BT<br>CH 39<br>2441MHz |                                                                                             | 4884      | 43.01      | -30.99 | 74         | 56.33    | 34.3     | 11.21  | 58.83  | 100    | 0       | P     | H     |
|                        |                                                                                             | 4884      | 18.25      | -35.75 | 54         | -        | -        | -      | -      | -      | -       | A     | H     |
|                        |                                                                                             | 7320      | 42.87      | -31.13 | 74         | 49.93    | 35.6     | 15.08  | 57.74  | 100    | 0       | P     | H     |
|                        |                                                                                             | 7320      | 18.11      | -35.89 | 54         | -        | -        | -      | -      | -      | -       | A     | H     |
|                        |                                                                                             | 4884      | 40.95      | -33.05 | 74         | 54.27    | 34.3     | 11.21  | 58.83  | 100    | 0       | P     | V     |
|                        |                                                                                             | 4884      | 16.19      | -37.81 | 54         | -        | -        | -      | -      | -      | -       | A     | V     |
|                        |                                                                                             | 7320      | 42.77      | -31.23 | 74         | 49.83    | 35.6     | 15.08  | 57.74  | 100    | 0       | P     | V     |
|                        |                                                                                             | 7320      | 18.01      | -35.99 | 54         | -        | -        | -      | -      | -      | -       | A     | V     |
| BT<br>CH 78<br>2480MHz |                                                                                             | 4962      | 42.09      | -31.91 | 74         | 55.06    | 34.37    | 11.32  | 58.66  | 100    | 0       | P     | H     |
|                        |                                                                                             | 7440      | 44.34      | -29.66 | 74         | 51.46    | 35.6     | 15.13  | 57.85  | 100    | 0       | P     | H     |
|                        |                                                                                             |           |            |        |            |          |          |        |        |        |         |       | H     |
|                        |                                                                                             |           |            |        |            |          |          |        |        |        |         |       | H     |
|                        |                                                                                             | 4962      | 42.74      | -31.26 | 74         | 55.71    | 34.37    | 11.32  | 58.66  | 100    | 0       | P     | V     |
|                        |                                                                                             | 7440      | 43.77      | -30.23 | 74         | 50.89    | 35.6     | 15.13  | 57.85  | 100    | 0       | P     | V     |
|                        |                                                                                             |           |            |        |            |          |          |        |        |        |         |       | V     |
|                        |                                                                                             |           |            |        |            |          |          |        |        |        |         |       | V     |
| Remark                 | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |           |            |        |            |          |          |        |        |        |         |       |       |



## 15C Emission below 1GHz

## 2.4GHz BT (LF)

| BT                 | Note                                                                       | Frequency | Level      | Over   | Limit      | Read   | Antenna  | Cable  | Preamp | Ant    | Table   | Peak  | Pol.  |
|--------------------|----------------------------------------------------------------------------|-----------|------------|--------|------------|--------|----------|--------|--------|--------|---------|-------|-------|
|                    |                                                                            |           |            | Limit  | Line       | Level  | Factor   | Loss   | Factor | Pos    | Pos     | Avg.  |       |
|                    |                                                                            | ( MHz )   | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | (dBμV) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 2.4GHz<br>BT<br>LF |                                                                            | 83.46     | 29.79      | -10.21 | 40         | 51.2   | 7.66     | 2.06   | 31.13  | -      | -       | P     | H     |
|                    |                                                                            | 130.71    | 29.12      | -14.38 | 43.5       | 45.94  | 11.9     | 2.38   | 31.1   | -      | -       | P     | H     |
|                    |                                                                            | 280.83    | 35.08      | -10.92 | 46         | 49.99  | 12.83    | 3.16   | 30.9   | -      | -       | P     | H     |
|                    |                                                                            | 374.9     | 34.96      | -11.04 | 46         | 47.59  | 15       | 3.39   | 31.02  | -      | -       | P     | H     |
|                    |                                                                            | 435.1     | 38.5       | -7.5   | 46         | 48.64  | 16.95    | 3.63   | 30.72  | 100    | 58      | P     | H     |
|                    |                                                                            | 743.1     | 35.86      | -10.14 | 46         | 39.61  | 22.17    | 4.48   | 30.4   | -      | -       | P     | H     |
|                    |                                                                            |           |            |        |            |        |          |        |        |        |         |       | H     |
|                    |                                                                            |           |            |        |            |        |          |        |        |        |         |       | H     |
|                    |                                                                            |           |            |        |            |        |          |        |        |        |         |       | H     |
|                    |                                                                            |           |            |        |            |        |          |        |        |        |         |       | H     |
|                    |                                                                            |           |            |        |            |        |          |        |        |        |         |       | H     |
|                    |                                                                            |           |            |        |            |        |          |        |        |        |         |       | H     |
|                    |                                                                            | 38.1      | 32.23      | -7.77  | 40         | 46.82  | 14.88    | 1.77   | 31.24  | -      | -       | P     | V     |
|                    |                                                                            | 82.11     | 33.86      | -6.14  | 40         | 55.51  | 7.44     | 2.06   | 31.15  | -      | -       | P     | V     |
|                    |                                                                            | 104.79    | 32.34      | -11.16 | 43.5       | 50.61  | 10.5     | 2.38   | 31.15  | -      | -       | P     | V     |
|                    |                                                                            | 433       | 41.7       | -4.3   | 46         | 51.88  | 16.93    | 3.63   | 30.74  | 122    | 241     | P     | V     |
|                    |                                                                            | 491.8     | 36.62      | -9.38  | 46         | 45.61  | 17.92    | 3.77   | 30.68  | -      | -       | P     | V     |
|                    |                                                                            | 800.5     | 40.47      | -5.53  | 46         | 44.15  | 22       | 4.62   | 30.3   | -      | -       | P     | V     |
|                    |                                                                            |           |            |        |            |        |          |        |        |        |         |       | V     |
|                    |                                                                            |           |            |        |            |        |          |        |        |        |         |       | 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 per 15.209(c). |
| !   | 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    | Note | Frequency | Level      | Over   | Limit      | Read     | Antenna  | Cable  | Preamp | Ant    | Table   | Peak    | Pol.    |
|---------|------|-----------|------------|--------|------------|----------|----------|--------|--------|--------|---------|---------|---------|
| Ant.    |      |           |            | Limit  | Line       | Level    | Factor   | Loss   | Factor | Pos    | Pos     | Avg.    |         |
| 1+2     |      | ( MHz )   | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | ( P/A ) | ( H/V ) |
| 802.11b |      | 2390      | 55.45      | -18.55 | 74         | 54.51    | 32.22    | 4.58   | 35.86  | 103    | 308     | P       | H       |
| CH 01   |      |           |            |        |            |          |          |        |        |        |         |         |         |
| 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”.**