



## Appendix A. Radiated Spurious Emission

|                 |                          |                     |         |
|-----------------|--------------------------|---------------------|---------|
| Test Engineer : | Tsung Lee and Stan Hsieh | Temperature :       | 20~23°C |
|                 |                          | Relative Humidity : | 58~63%  |

## 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 ) | 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>CH00<br>2402MHz  |      | 2315.67   | 41.16      | -32.84 | 74         | 42.14    | 27.01    | 5.27   | 33.26  | 309    | 244     | P       | H       |
|                        |      | 2315.67   | 16.37      | -37.63 | 54         |          |          |        |        |        |         | A       | H       |
|                        | *    | 2402      | 103.24     | -      | -          | 103.84   | 27.23    | 5.39   | 33.22  | 309    | 244     | P       | H       |
|                        | *    | 2402      | 78.45      | -      | -          |          |          |        |        |        |         | A       | H       |
|                        |      |           |            |        |            |          |          |        |        |        |         |         | H       |
|                        |      |           |            |        |            |          |          |        |        |        |         |         | H       |
|                        |      | 2375.835  | 41.13      | -32.87 | 74         | 41.79    | 27.19    | 5.39   | 33.24  | 309    | 268     | P       | V       |
|                        |      | 2375.835  | 16.34      | -37.66 | 54         |          |          |        |        |        |         | A       | V       |
|                        | *    | 2402      | 100.9      | -      | -          | 101.5    | 27.23    | 5.39   | 33.22  | 309    | 268     | P       | V       |
|                        | *    | 2402      | 76.11      | -      | -          |          |          |        |        |        |         | A       | V       |
|                        |      |           |            |        |            |          |          |        |        |        |         |         | V       |
|                        |      |           |            |        |            |          |          |        |        |        |         |         | V       |
| BT<br>CH 39<br>2441MHz |      | 2370.34   | 41.22      | -32.78 | 74         | 41.88    | 27.19    | 5.39   | 33.24  | 307    | 237     | P       | H       |
|                        |      | 2370.34   | 16.43      | -37.57 | 54         |          |          |        |        |        |         | A       | H       |
|                        | *    | 2442      | 103.21     | -      | -          | 103.62   | 27.37    | 5.42   | 33.2   | 307    | 237     | P       | H       |
|                        | *    | 2442      | 78.42      | -      | -          |          |          |        |        |        |         | A       | H       |
|                        |      | 2500      | 41.46      | -32.54 | 74         | 41.67    | 27.5     | 5.46   | 33.17  | 307    | 237     | P       | H       |
|                        |      | 2500      | 16.67      | -37.33 | 54         |          |          |        |        |        |         | A       | H       |
|                        |      | 2366      | 40.77      | -33.23 | 74         | 41.48    | 27.14    | 5.39   | 33.24  | 295    | 270     | P       | V       |
|                        |      | 2366      | 15.98      | -38.02 | 54         |          |          |        |        |        |         | A       | V       |
|                        | *    | 2442      | 100.98     | -      | -          | 101.39   | 27.37    | 5.42   | 33.2   | 295    | 270     | P       | V       |
|                        | *    | 2442      | 76.19      | -      | -          |          |          |        |        |        |         | A       | V       |
|                        |      | 2497.34   | 40.62      | -33.38 | 74         | 40.83    | 27.5     | 5.46   | 33.17  | 295    | 270     | P       | V       |
|                        |      | 2497.34   | 15.83      | -38.17 | 54         |          |          |        |        |        |         | A       | V       |



|                        |                                                                                             |         |        |        |    |        |       |      |       |     |     |   |   |
|------------------------|---------------------------------------------------------------------------------------------|---------|--------|--------|----|--------|-------|------|-------|-----|-----|---|---|
| BT<br>CH 78<br>2480MHz | *                                                                                           | 2480    | 102.92 | -      | -  | 103.2  | 27.46 | 5.44 | 33.18 | 297 | 235 | P | H |
|                        | *                                                                                           | 2480    | 78.13  | -      | -  |        |       |      |       |     |     | A | H |
|                        |                                                                                             | 2483.68 | 48.83  | -25.17 | 74 | 49.09  | 27.46 | 5.46 | 33.18 | 297 | 235 | P | H |
|                        |                                                                                             | 2483.68 | 24.04  | -29.96 | 54 |        |       |      |       |     |     | A | H |
|                        |                                                                                             |         |        |        |    |        |       |      |       |     |     |   | H |
|                        |                                                                                             |         |        |        |    |        |       |      |       |     |     |   | H |
|                        | *                                                                                           | 2480    | 100.2  | -      | -  | 100.48 | 27.46 | 5.44 | 33.18 | 289 | 270 | P | V |
|                        | *                                                                                           | 2480    | 75.41  | -      | -  |        |       |      |       |     |     | A | V |
|                        |                                                                                             | 2484.16 | 45.24  | -28.76 | 74 | 45.5   | 27.46 | 5.46 | 33.18 | 289 | 270 | P | V |
|                        |                                                                                             | 2484.16 | 20.45  | -33.55 | 54 |        |       |      |       |     |     | A | V |
|                        |                                                                                             |         |        |        |    |        |       |      |       |     |     |   | V |
|                        |                                                                                             |         |        |        |    |        |       |      |       |     |     |   | V |
| Remark                 | 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 |                                                                                             | 4806                 | 36.62               | -37.38                  | 74                          | 48.8                      | 31.42                         | 7.58                    | 51.18                      | 100                  | 0                       | P                       | H               |
|                        |                                                                                             | 4806                 | 11.83               | -42.17                  | 54                          |                           |                               |                         |                            |                      |                         | A                       | H               |
|                        |                                                                                             |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         | H               |
|                        |                                                                                             |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         | H               |
|                        |                                                                                             | 4806                 | 36.51               | -37.49                  | 74                          | 48.69                     | 31.42                         | 7.58                    | 51.18                      | 100                  | 0                       | P                       | V               |
|                        |                                                                                             | 4806                 | 11.72               | -42.28                  | 54                          |                           |                               |                         |                            |                      |                         | A                       | V               |
|                        |                                                                                             |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         | V               |
|                        |                                                                                             |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         | V               |
| BT<br>CH 39<br>2441MHz |                                                                                             | 4884                 | 39.94               | -34.06                  | 74                          | 51.71                     | 31.56                         | 7.82                    | 51.15                      | 100                  | 0                       | P                       | H               |
|                        |                                                                                             | 4884                 | 15.15               | -38.85                  | 54                          |                           |                               |                         |                            |                      |                         | A                       | H               |
|                        |                                                                                             | 7320                 | 43.74               | -30.26                  | 74                          | 48.83                     | 36.22                         | 9.49                    | 50.8                       | 100                  | 0                       | P                       | H               |
|                        |                                                                                             | 7320                 | 18.95               | -35.05                  | 54                          |                           |                               |                         |                            |                      |                         | A                       | H               |
|                        |                                                                                             | 4884                 | 37.35               | -36.65                  | 74                          | 49.12                     | 31.56                         | 7.82                    | 51.15                      | 100                  | 0                       | P                       | V               |
|                        |                                                                                             | 4884                 | 12.56               | -41.44                  | 54                          |                           |                               |                         |                            |                      |                         | A                       | V               |
|                        |                                                                                             | 7320                 | 43.57               | -30.43                  | 74                          | 48.66                     | 36.22                         | 9.49                    | 50.8                       | 100                  | 0                       | P                       | V               |
|                        |                                                                                             | 7320                 | 18.78               | -35.22                  | 54                          |                           |                               |                         |                            |                      |                         | A                       | V               |
| BT<br>CH 78<br>2480MHz |                                                                                             | 4962                 | 37.01               | -36.99                  | 74                          | 48.35                     | 31.73                         | 8.05                    | 51.12                      | 100                  | 0                       | P                       | H               |
|                        |                                                                                             | 4962                 | 12.22               | -41.78                  | 54                          |                           |                               |                         |                            |                      |                         | A                       | H               |
|                        |                                                                                             | 7440                 | 43.84               | -30.16                  | 74                          | 48.54                     | 36.49                         | 9.61                    | 50.8                       | 100                  | 0                       | P                       | H               |
|                        |                                                                                             | 7440                 | 19.05               | -34.95                  | 54                          |                           |                               |                         |                            |                      |                         | A                       | H               |
|                        |                                                                                             | 4962                 | 36.93               | -37.07                  | 74                          | 48.27                     | 31.73                         | 8.05                    | 51.12                      | 100                  | 0                       | P                       | V               |
|                        |                                                                                             | 4962                 | 12.14               | -41.86                  | 54                          |                           |                               |                         |                            |                      |                         | A                       | V               |
|                        |                                                                                             | 7440                 | 43.63               | -30.37                  | 74                          | 48.33                     | 36.49                         | 9.61                    | 50.8                       | 100                  | 0                       | P                       | V               |
|                        |                                                                                             | 7440                 | 18.84               | -35.16                  | 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 | 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 |                                                                            | 31.89     | 23.2       | -16.8  | 40         | 30.39    | 24.98    | 0.65   | 32.82  |        |         | P       | H       |
|                    |                                                                            | 182.01    | 22.08      | -21.42 | 43.5       | 37.79    | 15.52    | 1.48   | 32.71  |        |         | P       | H       |
|                    |                                                                            | 253.02    | 30.32      | -15.68 | 46         | 42.19    | 19.1     | 1.76   | 32.73  |        |         | P       | H       |
|                    |                                                                            | 625.5     | 26.57      | -19.43 | 46         | 31.22    | 25.75    | 2.62   | 33.02  |        |         | P       | H       |
|                    |                                                                            | 831.3     | 29.45      | -16.55 | 46         | 30.68    | 28.4     | 3.07   | 32.7   |        |         | P       | H       |
|                    |                                                                            | 948.9     | 32.72      | -13.28 | 46         | 31.23    | 29.97    | 3.29   | 31.77  | 100    | 0       | P       | H       |
|                    |                                                                            |           |            |        |            |          |          |        |        |        |         |         | H       |
|                    |                                                                            |           |            |        |            |          |          |        |        |        |         |         | H       |
|                    |                                                                            |           |            |        |            |          |          |        |        |        |         |         | H       |
|                    |                                                                            |           |            |        |            |          |          |        |        |        |         |         | H       |
|                    |                                                                            |           |            |        |            |          |          |        |        |        |         |         | H       |
|                    |                                                                            |           |            |        |            |          |          |        |        |        |         |         | H       |
|                    |                                                                            | 30        | 23.76      | -16.24 | 40         | 29.83    | 26.1     | 0.65   | 32.82  |        |         | P       | V       |
|                    |                                                                            | 40.53     | 26.78      | -13.22 | 40         | 38.99    | 19.94    | 0.65   | 32.8   | 100    | 0       | P       | V       |
|                    |                                                                            | 244.92    | 25.83      | -20.17 | 46         | 38.41    | 18.39    | 1.76   | 32.73  |        |         | P       | V       |
|                    |                                                                            | 543.6     | 24.46      | -21.54 | 46         | 30.5     | 24.46    | 2.47   | 32.97  |        |         | P       | V       |
|                    |                                                                            | 745.2     | 29.17      | -16.83 | 46         | 31.82    | 27.38    | 2.91   | 32.94  |        |         | P       | V       |
|                    |                                                                            | 954.5     | 31.25      | -14.75 | 46         | 29.68    | 30       | 3.29   | 31.72  |        |         | P       | 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. |
| !   | 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”.**