



## Appendix A. Radiated Spurious Emission

|                 |                                      |                     |         |
|-----------------|--------------------------------------|---------------------|---------|
| Test Engineer : | Stan Hsieh, Luke Chang, and Lewis He | Temperature :       | 22~23°C |
|                 |                                      | Relative Humidity : | 45~47%  |

15C 2.4GHz 2400~2483.5MHz

BT (Band Edge @ 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>CH00<br>2402MHz  |      | 2389.56   | 45.53      | -28.47 | 74         | 46.33    | 27.23    | 6.01   | 34.04  | 247    | 228     | P       | H       |
|                        |      | 2389.56   | 20.74      | -33.26 | 54         | -        | -        | -      | -      | -      | -       | A       | H       |
|                        | *    | 2401.91   | 103.96     | -      | -          | 104.76   | 27.23    | 6.01   | 34.04  | 247    | 228     | P       | H       |
|                        | *    | 2401.91   | 79.17      | -      | -          | -        | -        | -      | -      | -      | -       | A       | H       |
|                        |      |           |            |        |            |          |          |        |        |        |         |         | H       |
|                        |      |           |            |        |            |          |          |        |        |        |         |         | H       |
|                        |      | 2372.27   | 45.12      | -28.88 | 74         | 45.96    | 27.19    | 6.01   | 34.04  | 173    | 268     | P       | V       |
|                        |      | 2372.27   | 20.33      | -33.67 | 54         | -        | -        | -      | -      | -      | -       | A       | V       |
|                        | *    | 2402.17   | 103.26     | -      | -          | 104.06   | 27.23    | 6.01   | 34.04  | 173    | 268     | P       | V       |
|                        | *    | 2402.17   | 78.47      | -      | -          | -        | -        | -      | -      | -      | -       | A       | V       |
|                        |      |           |            |        |            |          |          |        |        |        |         |         | V       |
|                        |      |           |            |        |            |          |          |        |        |        |         |         | V       |
| BT<br>CH 39<br>2441MHz |      | 2386      | 43.95      | -30.05 | 74         | 44.75    | 27.23    | 6.01   | 34.04  | 292    | 237     | P       | H       |
|                        |      | 2386      | 19.16      | -34.84 | 54         | -        | -        | -      | -      | -      | -       | A       | H       |
|                        | *    | 2441.1    | 104.86     | -      | -          | 105.47   | 27.37    | 6.04   | 34.02  | 292    | 237     | P       | H       |
|                        | *    | 2441.1    | 80.07      | -      | -          | -        | -        | -      | -      | -      | -       | A       | H       |
|                        |      | 2490.88   | 45.1       | -28.9  | 74         | 45.52    | 27.5     | 6.09   | 34.01  | 292    | 237     | P       | H       |
|                        |      | 2490.88   | 20.31      | -33.69 | 54         | -        | -        | -      | -      | -      | -       | A       | H       |
|                        |      | 2388.85   | 43.16      | -30.84 | 74         | 43.96    | 27.23    | 6.01   | 34.04  | 101    | 43      | P       | V       |
|                        |      | 2388.85   | 18.37      | -35.63 | 54         | -        | -        | -      | -      | -      | -       | A       | V       |
|                        | *    | 2440.91   | 102.29     | -      | -          | 102.9    | 27.37    | 6.04   | 34.02  | 101    | 43      | P       | V       |
|                        | *    | 2440.91   | 77.5       | -      | -          | -        | -        | -      | -      | -      | -       | A       | V       |
|                        |      | 2484.99   | 43.62      | -30.38 | 74         | 44.08    | 27.46    | 6.09   | 34.01  | 101    | 43      | P       | V       |
|                        |      | 2484.99   | 18.83      | -35.17 | 54         | -        | -        | -      | -      | -      | -       | A       | V       |



|                                 |                                                                                             |         |        |        |    |        |       |      |       |     |     |   |   |
|---------------------------------|---------------------------------------------------------------------------------------------|---------|--------|--------|----|--------|-------|------|-------|-----|-----|---|---|
| <b>BT<br/>CH 78<br/>2480MHz</b> | *                                                                                           | 2479.91 | 104.02 | -      | -  | 104.5  | 27.46 | 6.07 | 34.01 | 289 | 230 | P | H |
|                                 | *                                                                                           | 2479.91 | 79.23  | -      | -  | -      | -     | -    | -     | -   | -   | A | H |
|                                 |                                                                                             | 2484.6  | 46.97  | -27.03 | 74 | 47.43  | 27.46 | 6.09 | 34.01 | 289 | 230 | P | H |
|                                 |                                                                                             | 2484.6  | 22.18  | -31.82 | 54 | -      | -     | -    | -     | -   | -   | A | H |
|                                 |                                                                                             |         |        |        |    |        |       |      |       |     |     |   | H |
|                                 |                                                                                             |         |        |        |    |        |       |      |       |     |     |   | H |
|                                 | *                                                                                           | 2479.84 | 102.36 | -      | -  | 102.84 | 27.46 | 6.07 | 34.01 | 114 | 267 | P | V |
|                                 | *                                                                                           | 2479.84 | 77.57  | -      | -  | -      | -     | -    | -     | -   | -   | A | V |
|                                 |                                                                                             | 2484.39 | 47.21  | -26.79 | 74 | 47.67  | 27.46 | 6.09 | 34.01 | 114 | 267 | P | V |
|                                 |                                                                                             | 2484.39 | 22.42  | -31.58 | 54 | -      | -     | -    | -     | -   | -   | A | V |
|                                 |                                                                                             |         |        |        |    |        |       |      |       |     |     |   | V |
|                                 |                                                                                             |         |        |        |    |        |       |      |       |     |     |   | V |
| Remark                          | 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      | 33.88      | -40.12 | 74         | 52.57    | 31.3     | 8.65   | 58.64  | 100    | 0       | P       | H       |
|                        |                                                                                             | 4806      | 9.09       | -44.91 | 54         | -        | -        | -      | -      | -      | -       | A       | H       |
|                        |                                                                                             |           |            |        |            |          |          |        |        |        |         |         | H       |
|                        |                                                                                             |           |            |        |            |          |          |        |        |        |         |         | H       |
|                        |                                                                                             | 4806      | 35.49      | -38.51 | 74         | 54.18    | 31.3     | 8.65   | 58.64  | 100    | 0       | P       | V       |
|                        |                                                                                             | 4806      | 10.7       | -43.3  | 54         | -        | -        | -      | -      | -      | -       | A       | V       |
|                        |                                                                                             |           |            |        |            |          |          |        |        |        |         |         | V       |
|                        |                                                                                             |           |            |        |            |          |          |        |        |        |         |         | V       |
| BT<br>CH 39<br>2441MHz |                                                                                             | 4884      | 33.91      | -40.09 | 74         | 52.28    | 31.41    | 8.74   | 58.52  | 100    | 0       | P       | H       |
|                        |                                                                                             | 4884      | 9.12       | -44.88 | 54         | -        | -        | -      | -      | -      | -       | A       | H       |
|                        |                                                                                             | 7320      | 37.21      | -36.79 | 74         | 48.69    | 36.32    | 10.39  | 58.19  | 100    | 0       | P       | H       |
|                        |                                                                                             | 7320      | 12.42      | -41.58 | 54         | -        | -        | -      | -      | -      | -       | A       | H       |
|                        |                                                                                             | 4884      | 33.8       | -40.2  | 74         | 52.17    | 31.41    | 8.74   | 58.52  | 100    | 0       | P       | V       |
|                        |                                                                                             | 4884      | 9.01       | -44.99 | 54         | -        | -        | -      | -      | -      | -       | A       | V       |
|                        |                                                                                             | 7320      | 37.49      | -36.51 | 74         | 48.97    | 36.32    | 10.39  | 58.19  | 100    | 0       | P       | V       |
|                        |                                                                                             | 7320      | 12.7       | -41.3  | 54         | -        | -        | -      | -      | -      | -       | A       | V       |
| BT<br>CH 78<br>2480MHz |                                                                                             | 4962      | 32.7       | -41.3  | 74         | 50.69    | 31.54    | 8.83   | 58.36  | 100    | 0       | P       | H       |
|                        |                                                                                             | 4962      | 7.91       | -46.09 | 54         | -        | -        | -      | -      | -      | -       | A       | H       |
|                        |                                                                                             | 7440      | 37.02      | -36.98 | 74         | 48.32    | 36.59    | 10.52  | 58.41  | 100    | 0       | P       | H       |
|                        |                                                                                             | 7440      | 12.23      | -41.77 | 54         | -        | -        | -      | -      | -      | -       | A       | H       |
|                        |                                                                                             | 4962      | 32.25      | -41.75 | 74         | 50.24    | 31.54    | 8.83   | 58.36  | 100    | 0       | P       | V       |
|                        |                                                                                             | 4962      | 7.46       | -46.54 | 54         | -        | -        | -      | -      | -      | -       | A       | V       |
|                        |                                                                                             | 7440      | 37.08      | -36.92 | 74         | 48.38    | 36.59    | 10.52  | 58.41  | 100    | 0       | P       | V       |
|                        |                                                                                             | 7440      | 12.29      | -41.71 | 54         | -        | -        | -      | -      | -      | -       | A       | 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 |                                                                            | 87.24     | 24.94      | -15.06 | 40         | 47.4   | 8.05     | 1.28   | 31.79  | 100    | 48      | P     | H     |
|                    |                                                                            | 114.51    | 25.72      | -17.78 | 43.5       | 44.92  | 11.3     | 1.28   | 31.78  |        |         | P     | H     |
|                    |                                                                            | 216.03    | 23.05      | -22.95 | 46         | 45.14  | 7.9      | 1.79   | 31.78  |        |         | P     | H     |
|                    |                                                                            | 432.3     | 24.7       | -21.3  | 46         | 37.67  | 16.45    | 2.41   | 31.83  |        |         | P     | H     |
|                    |                                                                            | 540.1     | 27.19      | -18.81 | 46         | 37.87  | 18.5     | 2.77   | 31.95  |        |         | P     | H     |
|                    |                                                                            | 647.9     | 24.96      | -21.04 | 46         | 34.88  | 19.1     | 3.02   | 32.04  |        |         | P     | H     |
|                    |                                                                            |           |            |        |            |        |          |        |        |        |         |       | H     |
|                    |                                                                            |           |            |        |            |        |          |        |        |        |         |       | H     |
|                    |                                                                            |           |            |        |            |        |          |        |        |        |         |       | H     |
|                    |                                                                            |           |            |        |            |        |          |        |        |        |         |       | H     |
|                    |                                                                            |           |            |        |            |        |          |        |        |        |         |       | H     |
|                    |                                                                            |           |            |        |            |        |          |        |        |        |         |       | H     |
|                    |                                                                            | 41.07     | 30.41      | -9.59  | 40         | 49.5   | 12.06    | 0.67   | 31.82  | 100    | 59      | P     | V     |
|                    |                                                                            | 87.24     | 28.16      | -11.84 | 40         | 50.62  | 8.05     | 1.28   | 31.79  |        |         | P     | V     |
|                    |                                                                            | 114.51    | 22.51      | -20.99 | 43.5       | 41.71  | 11.3     | 1.28   | 31.78  |        |         | P     | V     |
|                    |                                                                            | 432.3     | 22.79      | -23.21 | 46         | 35.76  | 16.45    | 2.41   | 31.83  |        |         | P     | V     |
|                    |                                                                            | 540.1     | 24.83      | -21.17 | 46         | 35.51  | 18.5     | 2.77   | 31.95  |        |         | P     | V     |
|                    |                                                                            | 647.9     | 25.26      | -20.74 | 46         | 35.18  | 19.1     | 3.02   | 32.04  |        |         | P     | 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”.**