



Appendix A. Radiated Spurious Emission

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|-----------------|-----------------------------------|---------------------|---------|
| Test Engineer : | Karl Hou, Kyle Jhuang and Jet Lui | Temperature : | 25~26°C |
| | | Relative Humidity : | 50~51% |

15C 2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

| BLE | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. | |
|-------------------------|------|-----------|------------|--------|------------|----------|----------|--------|--------|--------|---------|---------|---------|---|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | | |
| 1 | | (MHz) | (dBμV/m) | (dB) | (dBμV/m) | (dBμV) | (dB/m) | (dB) | (dB) | (cm) | (deg) | (P/A) | (H/V) | |
| BLE CH 00 2402MHz | | 2363.73 | 52.27 | -21.73 | 74 | 48.65 | 32.7 | 4.6 | 33.68 | 100 | 350 | P | H | |
| | | 2330.25 | 40.47 | -13.53 | 54 | 37 | 32.62 | 4.55 | 33.7 | 100 | 350 | A | H | |
| | * | 2402 | 101.83 | - | - | 98.09 | 32.77 | 4.62 | 33.65 | 100 | 350 | P | H | |
| | * | 2402 | 100.88 | - | - | 97.14 | 32.77 | 4.62 | 33.65 | 100 | 350 | A | H | |
| | | | | | | | | | | | | | H | |
| | | | | | | | | | | | | | | H |
| | | | 2333.76 | 51.66 | -22.34 | 74 | 48.17 | 32.62 | 4.57 | 33.7 | 109 | 31 | P | V |
| | | | 2373 | 40.32 | -13.68 | 54 | 36.65 | 32.73 | 4.6 | 33.66 | 109 | 31 | A | V |
| | * | | 2402 | 95.1 | - | - | 91.36 | 32.77 | 4.62 | 33.65 | 109 | 31 | P | V |
| | * | | 2402 | 94.15 | - | - | 90.41 | 32.77 | 4.62 | 33.65 | 109 | 31 | A | V |
| | | | | | | | | | | | | | | V |
| | | | | | | | | | | | | | | V |
| BLE CH 19 2440MHz | | 2340.6 | 51.57 | -22.43 | 74 | 48.03 | 32.66 | 4.57 | 33.69 | 100 | 351 | P | H | |
| | | 2369.4 | 40.28 | -13.72 | 54 | 36.61 | 32.73 | 4.6 | 33.66 | 100 | 351 | A | H | |
| | * | 2440 | 106.19 | - | - | 102.22 | 32.89 | 4.68 | 33.6 | 100 | 351 | P | H | |
| | * | 2440 | 105.35 | - | - | 101.38 | 32.89 | 4.68 | 33.6 | 100 | 351 | A | H | |
| | | | 2488.32 | 51.6 | -22.4 | 74 | 47.43 | 33 | 4.73 | 33.56 | 100 | 351 | P | H |
| | | | 2486.28 | 40.75 | -13.25 | 54 | 36.63 | 32.96 | 4.73 | 33.57 | 100 | 351 | A | H |
| | | | 2355.72 | 50.88 | -23.12 | 74 | 47.29 | 32.7 | 4.57 | 33.68 | 130 | 233 | P | V |
| | | | 2384.79 | 40.36 | -13.64 | 54 | 36.67 | 32.73 | 4.62 | 33.66 | 130 | 233 | A | V |
| | * | | 2440 | 98.03 | - | - | 94.06 | 32.89 | 4.68 | 33.6 | 130 | 233 | P | V |
| | * | | 2440 | 97.15 | - | - | 93.18 | 32.89 | 4.68 | 33.6 | 130 | 233 | A | V |
| | | | 2490.2 | 51.31 | -22.69 | 74 | 47.14 | 33 | 4.73 | 33.56 | 130 | 233 | P | V |
| | | | 2490.6 | 40.99 | -13.01 | 54 | 36.82 | 33 | 4.73 | 33.56 | 130 | 233 | A | V |



| | | | | | | | | | | | | | |
|----------------------------------|---|---------|-------|--------|----|-------|-------|------|-------|-----|-----|---|---|
| BLE CH 39 2480MHz | * | 2480 | 97.98 | - | - | 93.86 | 32.96 | 4.73 | 33.57 | 146 | 9 | P | H |
| | * | 2480 | 97 | - | - | 92.88 | 32.96 | 4.73 | 33.57 | 146 | 9 | A | H |
| | | 2487.12 | 51.22 | -22.78 | 74 | 47.1 | 32.96 | 4.73 | 33.57 | 146 | 9 | P | H |
| | | 2496 | 40.75 | -13.25 | 54 | 36.58 | 33 | 4.73 | 33.56 | 146 | 9 | A | H |
| | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | H |
| | * | 2480 | 94.89 | - | - | 90.77 | 32.96 | 4.73 | 33.57 | 103 | 230 | P | V |
| | * | 2480 | 93.99 | - | - | 89.87 | 32.96 | 4.73 | 33.57 | 103 | 230 | A | V |
| | | 2490 | 51.49 | -22.51 | 74 | 47.32 | 33 | 4.73 | 33.56 | 103 | 230 | P | V |
| | | 2491.28 | 40.7 | -13.3 | 54 | 36.53 | 33 | 4.73 | 33.56 | 103 | 230 | A | V |
| | | | | | | | | | | | | | V |
| | | | | | | | | | | | | | V |
| Remark | 1. No other spurious found. 2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |



15C 2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

| BLE | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. |
|-------------------------|--|-----------|------------|--------|------------|----------|----------|--------|--------|--------|---------|---------|---------|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | |
| 1 | | (MHz) | (dBμV/m) | (dB) | (dBμV/m) | (dBμV) | (dB/m) | (dB) | (dB) | (cm) | (deg) | (P/A) | (H/V) |
| BLE CH 00 2402MHz | | 4803 | 40.11 | -33.89 | 74 | 57.19 | 35.04 | 6.52 | 58.64 | 100 | 0 | P | H |
| | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | H |
| | | 4803 | 40.54 | -33.46 | 74 | 57.62 | 35.04 | 6.52 | 58.64 | 100 | 0 | P | V |
| | | | | | | | | | | | | | V |
| | | | | | | | | | | | | | V |
| BLE CH 19 2440MHz | | 4881 | 41.05 | -32.95 | 74 | 57.97 | 35.02 | 6.58 | 58.52 | 100 | 0 | P | H |
| | | 7320 | 42.9 | -31.1 | 74 | 56.45 | 36.4 | 8.24 | 58.19 | 100 | 0 | P | H |
| | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | H |
| | | 4881 | 40.76 | -33.24 | 74 | 57.68 | 35.02 | 6.58 | 58.52 | 100 | 0 | P | V |
| | | 7320 | 42.06 | -31.94 | 74 | 55.61 | 36.4 | 8.24 | 58.19 | 100 | 0 | P | V |
| | | | | | | | | | | | | | V |
| BLE CH 39 2480MHz | | 4959 | 40.37 | -33.63 | 74 | 57.11 | 35.01 | 6.61 | 58.36 | 100 | 0 | P | H |
| | | 7440 | 42.44 | -31.56 | 74 | 56.02 | 36.47 | 8.36 | 58.41 | 100 | 0 | P | H |
| | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | H |
| | | 4959 | 40.18 | -33.82 | 74 | 56.92 | 35.01 | 6.61 | 58.36 | 100 | 0 | P | V |
| | | 7440 | 43.16 | -30.84 | 74 | 56.74 | 36.47 | 8.36 | 58.41 | 100 | 0 | P | V |
| | | | | | | | | | | | | | V |
| Remark | 1. No other spurious found. | | | | | | | | | | | | |
| | 2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |



15C Emission below 1GHz

2.4GHz BLE

(LF @ 3m)

| BLE | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. | |
|---------------------|--|-----------|------------|--------|------------|----------|----------|--------|--------|--------|---------|-------|-------|---|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | | |
| 1 | | (MHz) | (dBµV/m) | (dB) | (dBµV/m) | (dBµV) | (dB/m) | (dB) | (dB) | (cm) | (deg) | (P/A) | (H/V) | |
| 2.4GHz BLE LF | | 100.47 | 27.96 | -15.54 | 43.5 | 48.2 | 10.44 | 1.1 | 31.78 | | | P | H | |
| | ! | 249.78 | 40.3 | -5.7 | 46 | 58.03 | 12.4 | 1.64 | 31.77 | 125 | 186 | P | H | |
| | | 253.02 | 39.98 | -6.02 | 46 | 57.25 | 12.85 | 1.65 | 31.77 | | | P | H | |
| | | 323.1 | 33.46 | -12.54 | 46 | 49.87 | 13.52 | 1.84 | 31.77 | | | P | H | |
| | | 342 | 31.79 | -14.21 | 46 | 47.53 | 14.16 | 1.88 | 31.78 | | | P | H | |
| | | 731.9 | 33.14 | -12.86 | 46 | 40.47 | 21.96 | 2.71 | 32 | | | P | H | |
| | | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | | H |
| | | ! | 30.54 | 36.25 | -3.75 | 40 | 48.98 | 18.38 | 0.71 | 31.82 | 112 | 220 | P | V |
| | | | 46.2 | 28.13 | -11.87 | 40 | 49.44 | 9.7 | 0.79 | 31.8 | | | P | V |
| | | | 246.54 | 31.6 | -14.4 | 46 | 49.74 | 12 | 1.63 | 31.77 | | | P | V |
| | | | 316.8 | 30.9 | -15.1 | 46 | 47.48 | 13.37 | 1.82 | 31.77 | | | P | V |
| | | | 731.9 | 37.59 | -8.41 | 46 | 44.92 | 21.96 | 2.71 | 32 | | | P | V |
| | | | 756.4 | 35.41 | -10.59 | 46 | 42.42 | 22.2 | 2.76 | 31.97 | | | P | V |
| | | | | | | | | | | | | | | V |
| | | | | | | | | | | | | | | V |
| | | | | | | | | | | | | | V | |
| | | | | | | | | | | | | | V | |
| | | | | | | | | | | | | | V | |
| | | | | | | | | | | | | | V | |
| Remark | 1. No other spurious found. 2. All results are PASS against limit line. | | | | | | | | | | | | | |



Note symbol for Part 15C rule

15C 2.4GHz 2400~2483.5MHz

15C band 4 - 5725~5850MHz

| | |
|-----|--|
| * | Fundamental Frequency 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 over limit line. |
| @ | Frequency falls in non-restricted band is passed and tested by conducted band edges and spurious emission measurement in the test report. |
| # | Peak measured value is under 20dB and complies with the average limit, so it is unnecessary to perform an average measurement per clause 6.5.4.2 of ANSI C63.10. |
| P/A | Peak or Average |
| H/V | Horizontal or Vertical |



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 |

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

For Peak Limit @ 2390MHz:

- 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)
- Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

- 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)
- 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”.