Appendix B. Radiated Spurious Emission

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

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2386.755	50.96	-23.04	74	51.58	27.23	5.39	33.24	309	240	P	H
		2357.04	41.94	-12.06	54	42.72	27.14	5.33	33.25	309	240	A	H
	*	2402	98	-	-	98.6	27.23	5.39	33.22	309	240	P	H
	*	2402	97.35	-	-	97.95	27.23	5.39	33.22	309	240	A	H
													H
													H
		2361.765	51.19	-22.81	74	51.97	27.14	5.33	33.25	311	263	P	V
		2384.655	41.82	-12.18	54	42.48	27.19	5.39	33.24	311	263	A	V
	*	2402	95.63	-	-	96.23	27.23	5.39	33.22	311	263	P	V
	*	2402	95.07	-	-	95.67	27.23	5.39	33.22	311	263	A	V
													V
													V
BLE CH 19 2440MHz		2318.82	50.5	-23.5	74	51.44	27.05	5.27	33.26	302	239	P	H
		2357.88	41.64	-12.36	54	42.42	27.14	5.33	33.25	302	239	A	H
	*	2440	97.46	-	-	97.88	27.37	5.42	33.21	302	239	P	H
	*	2440	96.88	-	-	97.3	27.37	5.42	33.21	302	239	A	H
		2484.46	50.98	-23.02	74	51.24	27.46	5.46	33.18	302	239	P	H
		2487.75	42.33	-11.67	54	42.55	27.5	5.46	33.18	302	239	A	H
		2338.7	50.96	-23.04	74	51.79	27.1	5.33	33.26	303	268	P	V
		2367.54	41.76	-12.24	54	42.47	27.14	5.39	33.24	303	268	A	V
	*	2440	94.72	-	-	95.14	27.37	5.42	33.21	303	268	P	V
	*	2440	94.01	-	-	94.43	27.37	5.42	33.21	303	268	A	V
		2496.15	51.29	-22.71	74	51.5	27.5	5.46	33.17	303	268	P	V
		2487.12	42.24	-11.76	54	42.5	27.46	5.46	33.18	303	268	A	V

BLE CH 39 2480MHz	*	2480	97.66	-	-	97.94	27.46	5.44	33.18	296	240	P	H
	*	2480	97.17	-	-	97.45	27.46	5.44	33.18	296	240	A	H
		2499.48	51.66	-22.34	74	51.87	27.5	5.46	33.17	296	240	P	H
		2487.12	42.38	-11.62	54	42.64	27.46	5.46	33.18	296	240	A	H
													H
													H
	*	2480	94.66	-	-	94.94	27.46	5.44	33.18	291	266	P	V
	*	2480	94.02	-	-	94.3	27.46	5.44	33.18	291	266	A	V
		2494	51.24	-22.76	74	51.45	27.5	5.46	33.17	291	266	P	V
		2493.04	42.15	-11.85	54	42.36	27.5	5.46	33.17	291	266	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		4806	36.49	-37.51	74	48.67	31.42	7.58	51.18	100	0	P	H
													H
													H
													H
		4806	37.36	-36.64	74	49.54	31.42	7.58	51.18	100	0	P	V
													V
													V
													V
BLE CH 19 2440MHz		4878	36.67	-37.33	74	48.56	31.56	7.7	51.15	100	0	P	H
		7320	42	-32	74	47.09	36.22	9.49	50.8	100	0	P	H
													H
													H
		4878	36.5	-37.5	74	48.39	31.56	7.7	51.15	100	0	P	V
		7320	43.12	-30.88	74	48.21	36.22	9.49	50.8	100	0	P	V
													V
													V
BLE CH 39 2480MHz		4962	36.84	-37.16	74	48.18	31.73	8.05	51.12	100	0	P	H
		7440	42.83	-31.17	74	47.53	36.49	9.61	50.8	100	0	P	H
													H
													H
		4962	36.58	-37.42	74	47.92	31.73	8.05	51.12	100	0	P	V
		7440	42.4	-31.6	74	47.1	36.49	9.61	50.8	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz BLE (LF)

BLE	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 BLE LF		30	29.24	-10.76	40	35.31	26.1	0.65	32.82	100	0	P	H
		65.64	18.16	-21.84	40	37.6	12.36	0.93	32.73			P	H
		247.89	27.55	-18.45	46	39.88	18.64	1.76	32.73			P	H
		692.7	27.61	-18.39	46	31.53	26.25	2.82	32.99			P	H
		815.9	30.5	-15.5	46	32.07	28.15	3.07	32.79			P	H
		918.8	30.69	-15.31	46	30.41	29.18	3.2	32.1			P	H
													H
													H
													H
													H
													H
													H
		30.81	29.04	-10.96	40	35.67	25.54	0.65	32.82			P	V
		40.26	29.98	-10.02	40	42.19	19.94	0.65	32.8	100	0	P	V
		57.54	24.31	-15.69	40	43.18	12.96	0.93	32.76			P	V
		729.8	29.48	-16.52	46	32.52	27.01	2.91	32.96			P	V
		830.6	29.67	-16.33	46	30.91	28.39	3.07	32.7			P	V
		942.6	31.73	-14.27	46	30.46	29.82	3.29	31.84			P	V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

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 CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		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".