Appendix B. Radiated Spurious Emission

Test Engineer :	JC Liang and Nick Yu	Temperature :	20~23°C
		Relative Humidity :	58~63%

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 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		2342.55	53.86	-20.14	74	52	27.03	8.82	33.99	176	336	P	H
		2377.2	43.96	-10.04	54	41.99	27.14	8.82	33.99	176	336	A	H
	*	2402	101.52	-	-	99.42	27.19	8.89	33.98	176	336	P	H
	*	2402	100.75	-	-	98.65	27.19	8.89	33.98	176	336	A	H
													H
													H
		2341.92	53.58	-20.42	74	51.72	27.03	8.82	33.99	294	141	P	V
		2383.71	44.13	-9.87	54	42.09	27.14	8.89	33.99	294	141	A	V
	*	2402	100	-	-	97.9	27.19	8.89	33.98	294	141	P	V
	*	2402	99.05	-	-	96.95	27.19	8.89	33.98	294	141	A	V
													V
													V
BLE CH 19 2440MHz		2380.56	53.28	-20.72	74	51.24	27.14	8.89	33.99	197	336	P	H
		2381.12	44.08	-9.92	54	42.04	27.14	8.89	33.99	197	336	A	H
	*	2440	102.78	-	-	100.47	27.34	8.94	33.97	197	336	P	H
	*	2440	102.12	-	-	99.81	27.34	8.94	33.97	197	336	A	H
		2494.61	54.72	-19.28	74	52.18	27.5	8.98	33.94	197	336	P	H
		2498.11	44.69	-9.31	54	42.15	27.5	8.98	33.94	197	336	A	H
		2384.06	52.79	-21.21	74	50.75	27.14	8.89	33.99	280	140	P	V
		2389.66	44.13	-9.87	54	42.04	27.19	8.89	33.99	280	140	A	V
	*	2440	101.8	-	-	99.49	27.34	8.94	33.97	280	140	P	V
	*	2440	101.03	-	-	98.72	27.34	8.94	33.97	280	140	A	V
		2497.34	53.98	-20.02	74	51.44	27.5	8.98	33.94	280	140	P	V
		2496.5	44.48	-9.52	54	41.94	27.5	8.98	33.94	280	140	A	V

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 39 2480MHz	*	2480	99.35	-	-	96.87	27.45	8.98	33.95	205	329	P	H
	*	2480	98.51	-	-	96.03	27.45	8.98	33.95	205	329	A	H
		2487	53.43	-20.57	74	50.95	27.45	8.98	33.95	205	329	P	H
		2496.76	45.26	-8.74	54	42.72	27.5	8.98	33.94	205	329	A	H
													H
													H
	*	2480	99.39	-	-	96.91	27.45	8.98	33.95	242	141	P	V
	*	2480	98.75	-	-	96.27	27.45	8.98	33.95	242	141	A	V
		2498.52	53.96	-20.04	74	51.42	27.5	8.98	33.94	242	141	P	V
		2483.6	44.79	-9.21	54	42.31	27.45	8.98	33.95	242	141	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		4824	33.24	-40.76	74	41.87	31.69	10.77	51.09	100	0	P	H
													H
													H
													H
		4824	33.19	-40.81	74	41.82	31.69	10.77	51.09	100	0	P	V
													V
													V
													V
BLE CH 19 2440MHz		4880	33.62	-40.38	74	42.02	31.78	10.88	51.06	100	0	P	H
		7320	38.97	-35.03	74	39.4	37.29	12.79	50.51	100	0	P	H
													H
													H
		4880	33.3	-40.7	74	41.7	31.78	10.88	51.06	100	0	P	V
		7320	38.4	-35.6	74	38.83	37.29	12.79	50.51	100	0	P	V
													V
													V
BLE CH 39 2480MHz		4960	33.86	-40.14	74	41.83	31.94	11.12	51.03	100	0	P	H
		7440	38.47	-35.53	74	38.66	37.44	12.88	50.51	100	0	P	H
													H
													H
		4960	34.15	-39.85	74	42.12	31.94	11.12	51.03	100	0	P	V
		7440	38.31	-35.69	74	38.5	37.44	12.88	50.51	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		76.17	27.8	-12.2	40	44.85	13.23	1.51	31.79	-	-	P	H
		99.12	31.43	-12.07	43.5	45.72	15.98	1.51	31.78	271	251	P	H
		274.08	31.42	-14.58	46	41.36	19.25	2.58	31.77	-	-	P	H
		403.6	27.43	-18.57	46	33.85	22.47	2.91	31.8	-	-	P	H
		720	29.25	-16.75	46	30.16	27.09	4.02	32.02	-	-	P	H
		954.5	33.89	-12.11	46	29.61	30.59	4.69	31	-	-	P	H
													H
													H
													H
													H
													H
													H
		32.97	35.94	-4.06	40	42.34	24.14	1.29	31.83	183	245	P	V
		77.25	32.79	-7.21	40	49.72	13.35	1.51	31.79	-	-	P	V
		181.74	26.58	-16.92	43.5	41.05	15.21	2.1	31.78	-	-	P	V
		406.4	28.87	-17.13	46	35.25	22.52	2.91	31.81	-	-	P	V
		729.8	34.98	-11.02	46	35.67	27.29	4.02	32	-	-	P	V
		956.6	33.59	-12.41	46	29.29	30.59	4.69	30.98	-	-	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".