



Appendix A. Radiated Spurious Emission

Test Engineer :	Luke Chang and Stan Hsieh	Temperature :	23~25°C
		Relative Humidity :	45~47%

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

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)
BLE CH 00 2402MHz		2385.96	55.41	-18.59	74	56.03	27.23	5.39	33.24	115	324	P	H
		2329.62	44.51	-9.49	54	45.39	27.05	5.33	33.26	115	324	A	H
	*	2402.254	93.8	-	-	94.4	27.23	5.39	33.22	115	324	P	H
	*	2402.004	93.27	-	-	93.87	27.23	5.39	33.22	115	324	A	H
													H
													H
		2386.14	62.21	-11.79	74	62.83	27.23	5.39	33.24	120	307	P	V
		2386.05	50.34	-3.66	54	50.96	27.23	5.39	33.24	120	307	A	V
	*	2401.753	102.9	-	-	103.5	27.23	5.39	33.22	120	307	P	V
	*	2402.004	102.38	-	-	102.98	27.23	5.39	33.22	120	307	A	V
													V
													V
BLE CH 19 2440MHz		2315.58	51.6	-22.4	74	52.58	27.01	5.27	33.26	116	324	P	H
		2386.77	41.75	-12.25	54	42.37	27.23	5.39	33.24	116	324	A	H
	*	2440.247	95.06	-	-	95.48	27.37	5.42	33.21	116	324	P	H
	*	2439.997	94.49	-	-	94.91	27.37	5.42	33.21	116	324	A	H
		2493.6	51.48	-22.52	74	51.69	27.5	5.46	33.17	116	324	P	H
		2486.44	42.07	-11.93	54	42.33	27.46	5.46	33.18	116	324	A	H
		2341.41	52.55	-21.45	74	53.37	27.1	5.33	33.25	101	308	P	V
		2360.31	41.78	-12.22	54	42.56	27.14	5.33	33.25	101	308	A	V
	*	2440.247	102.39	-	-	102.81	27.37	5.42	33.21	101	308	P	V
	*	2439.997	101.84	-	-	102.26	27.37	5.42	33.21	101	308	A	V
		2489.12	51.68	-22.32	74	51.9	27.5	5.46	33.18	101	308	P	V
		2485.76	42.22	-11.78	54	42.48	27.46	5.46	33.18	101	308	A	V



BLE CH 39 2480MHz	*	2480.243	96.24	-	-	96.52	27.46	5.44	33.18	136	323	P	H
	*	2479.993	95.66	-	-	95.94	27.46	5.44	33.18	136	323	A	H
		2498.28	53.68	-20.32	74	53.89	27.5	5.46	33.17	136	323	P	H
		2486.2	42.24	-11.76	54	42.5	27.46	5.46	33.18	136	323	A	H
													H
													H
	*	2479.742	102.46	-	-	102.74	27.46	5.44	33.18	113	311	P	V
	*	2479.993	101.93	-	-	102.21	27.46	5.44	33.18	113	311	A	V
		2497.64	57.49	-16.51	74	57.7	27.5	5.46	33.17	113	311	P	V
		2498.56	43.97	-10.03	54	44.18	27.5	5.46	33.17	113	311	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		4804	39.64	-34.36	74	61.28	31.42	7.58	60.64	100	0	P	H
													H
													H
													H
		4804	41.09	-32.91	74	62.73	31.42	7.58	60.64	100	0	P	V
													V
													V
													V
BLE CH 19 2440MHz		4880	40.2	-33.8	74	61.46	31.56	7.7	60.52	100	0	P	H
		7320	46.63	-27.37	74	61.9	36.22	9.49	60.98	100	0	P	H
													H
													H
		4880	41.66	-32.34	74	62.92	31.56	7.7	60.52	100	0	P	V
		7320	48.65	-25.35	74	63.92	36.22	9.49	60.98	100	0	P	V
													V
													V
BLE CH 39 2480MHz		4960	41.94	-32.06	74	62.64	31.73	7.93	60.36	100	0	P	H
		7440	44.51	-29.49	74	59.75	36.49	9.61	61.34	100	0	P	H
													H
													H
		4960	42.06	-31.94	74	62.76	31.73	7.93	60.36	100	0	P	V
		7440	49.48	-24.52	74	64.72	36.49	9.61	61.34	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		72.12	28.32	-11.68	40	53.16	6.94	0.93	32.71	100	52	P	H
		156.09	30.34	-13.16	43.5	50.4	11.3	1.33	32.69			P	H
		264.09	31.28	-14.72	46	48.51	13.74	1.76	32.73			P	H
		311.9	32.52	-13.48	46	49.23	14.15	1.88	32.74			P	H
		528.2	28.53	-17.47	46	40.53	18.48	2.47	32.95			P	H
		600.3	27.7	-18.3	46	38.56	19.6	2.57	33.03			P	H
													H
													H
													H
													H
													H
													H
		72.12	34.1	-5.9	40	58.94	6.94	0.93	32.71	226	32	P	V
		156.09	26.11	-17.39	43.5	46.17	11.3	1.33	32.69			P	V
		251.94	29.85	-16.15	46	47.8	13.02	1.76	32.73			P	V
		311.9	32.39	-13.61	46	49.1	14.15	1.88	32.74			P	V
		360.2	35.47	-10.53	46	50.88	15.45	1.94	32.8			P	V
		600.3	24.67	-21.33	46	35.53	19.6	2.57	33.03			P	V
													V
													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	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

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”.