



Appendix B. Radiated Spurious Emission

Test Engineer :	Tsung Lee and Stan Hsieh	Temperature :	21~23°C
		Relative Humidity :	46~49%

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		2323.23	53.12	-20.88	74	54.06	27.05	5.27	33.26	100	69	P	H
		2382.45	43.26	-10.74	54	43.92	27.19	5.39	33.24	100	69	A	H
	*	2402.087	92.71	-	-	93.31	27.23	5.39	33.22	100	69	P	H
	*	2402.004	92.44	-	-	93.04	27.23	5.39	33.22	100	69	A	H
													H
													H
		2369.58	53.36	-20.64	74	54.02	27.19	5.39	33.24	100	108	P	V
		2379.84	43.23	-10.77	54	43.89	27.19	5.39	33.24	100	108	A	V
	*	2402.087	87.81	-	-	88.41	27.23	5.39	33.22	100	108	P	V
	*	2402.004	87.54	-	-	88.14	27.23	5.39	33.22	100	108	A	V
													V
													V
BLE CH 19 2440MHz		2332.95	53.78	-20.22	74	54.66	27.05	5.33	33.26	116	67	P	H
		2380.29	43.21	-10.79	54	43.87	27.19	5.39	33.24	116	67	A	H
	*	2439.83	93.44	-	-	93.86	27.37	5.42	33.21	116	67	P	H
	*	2440.08	93.18	-	-	93.6	27.37	5.42	33.21	116	67	A	H
		2494.44	53.01	-20.99	74	53.22	27.5	5.46	33.17	116	67	P	H
		2487.28	43.56	-10.44	54	43.82	27.46	5.46	33.18	116	67	A	H
		2375.7	53.3	-20.7	74	53.96	27.19	5.39	33.24	102	98	P	V
		2359.77	43.36	-10.64	54	44.14	27.14	5.33	33.25	102	98	A	V
	*	2440.08	88.46	-	-	88.88	27.37	5.42	33.21	102	98	P	V
	*	2439.997	88.21	-	-	88.63	27.37	5.42	33.21	102	98	A	V
		2493.16	53.3	-20.7	74	53.51	27.5	5.46	33.17	102	98	P	V
		2488.32	43.45	-10.55	54	43.67	27.5	5.46	33.18	102	98	A	V



BLE CH 39 2480MHz	*	2479.742	90.74	-	-	91.02	27.46	5.44	33.18	104	66	P	H
	*	2479.993	90.42	-	-	90.7	27.46	5.44	33.18	104	66	A	H
		2494.28	53.19	-20.81	74	53.4	27.5	5.46	33.17	104	66	P	H
		2494.68	43.57	-10.43	54	43.78	27.5	5.46	33.17	104	66	A	H
													H
													H
	*	2479.826	87.25	-	-	87.53	27.46	5.44	33.18	100	104	P	V
	*	2480.076	86.91	-	-	87.19	27.46	5.44	33.18	100	104	A	V
		2495.6	53.08	-20.92	74	53.29	27.5	5.46	33.17	100	104	P	V
		2499.64	43.54	-10.46	54	43.75	27.5	5.46	33.17	100	104	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		4805	35.77	-38.23	74	57.41	31.42	7.58	60.64	100	0	P	H
													H
													H
													H
		4805	35.97	-38.03	74	57.61	31.42	7.58	60.64	100	0	P	V
													V
													V
													V
BLE CH 19 2440MHz		4883	36.56	-37.44	74	57.7	31.56	7.82	60.52	100	0	P	H
		7322	42.55	-31.45	74	57.8	36.22	9.51	60.98	100	0	P	H
													H
													H
		4883	35.89	-38.11	74	57.03	31.56	7.82	60.52	100	0	P	V
		7322	42.5	-31.5	74	57.75	36.22	9.51	60.98	100	0	P	V
													V
													V
BLE CH 39 2480MHz		4961	37.36	-36.64	74	58.06	31.73	7.93	60.36	100	0	P	H
		7440	42.54	-31.46	74	57.78	36.49	9.61	61.34	100	0	P	H
													H
													H
		4961	36.74	-37.26	74	57.44	31.73	7.93	60.36	100	0	P	V
		7440	42.86	-31.14	74	58.1	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 (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)
2.4GHz BLE LF		56.73	21.37	-18.63	40	46.17	7.03	0.93	32.76	-	-	P	H
		105.87	29.76	-13.74	43.5	50.26	11	1.14	32.64	-	-	P	H
		177.69	30.05	-13.45	43.5	51.69	9.59	1.48	32.71	-	-	P	H
		412.7	25.51	-20.49	46	39.48	16.72	2.16	32.85	-	-	P	H
		756.4	27.98	-18.02	46	36.33	21.67	2.91	32.93	-	-	P	H
		825	36.31	-9.69	46	43.68	22.3	3.07	32.74	100	0	P	H
													H
													H
													H
													H
													H
													H
		32.16	26.48	-13.52	40	39.73	18.92	0.65	32.82	-	-	P	V
		39.72	28.04	-11.96	40	45.69	14.5	0.65	32.8	-	-	P	V
		177.42	29.19	-14.31	43.5	50.83	9.59	1.48	32.71	-	-	P	V
		687.8	26.2	-19.8	46	35.87	20.5	2.82	32.99	-	-	P	V
		756.4	25.69	-20.31	46	34.04	21.67	2.91	32.93	-	-	P	V
		825	36.38	-9.62	46	43.75	22.3	3.07	32.74	125	96	P	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	H orizontal or V ertical



A calculation example for radiated spurious emission is shown as below:

WIFI Ant. 1+2	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)
802.11b CH 01		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
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”.