



Appendix A. Radiated Spurious Emission

Test Engineer :	Nick Yu, Ken Wu, and James Chiu	Temperature :	21~23°C
		Relative Humidity :	47~49%

15C 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		2365.08	46.94	-27.06	74	41.4	32.13	7.68	34.27	103	229	P	H
		2374.17	34.8	-19.2	54	29.23	32.16	7.68	34.27	103	229	A	H
	*	2402.254	97.01	-	-	91.38	32.18	7.75	34.3	103	229	P	H
	*	2402.004	95.82	-	-	90.19	32.18	7.75	34.3	103	229	A	H
													H
													H
		2387.31	46.69	-27.31	74	41.03	32.18	7.75	34.27	347	77	P	V
		2317.92	34.98	-19.02	54	29.51	32.09	7.6	34.22	347	77	A	V
	*	2402.004	92.69	-	-	87.06	32.18	7.75	34.3	347	77	P	V
	*	2402.004	92.7	-	-	87.07	32.18	7.75	34.3	347	77	A	V
													V
													V
BLE CH 19 2440MHz		2333.22	46.65	-27.35	74	41.18	32.09	7.6	34.22	100	219	P	H
		2365.17	34.69	-19.31	54	29.15	32.13	7.68	34.27	100	219	A	H
	*	2440.247	97.67	-	-	91.95	32.24	7.83	34.35	100	219	P	H
	*	2440.08	97.17	-	-	91.45	32.24	7.83	34.35	100	219	A	H
		2489.44	46.69	-27.31	74	40.91	32.3	7.91	34.43	100	219	P	H
		2499.64	34.83	-19.17	54	29.1	32.3	7.91	34.48	100	219	A	H
		2321.61	47.13	-26.87	74	41.66	32.09	7.6	34.22	103	65	P	V
		2385.51	34.92	-19.08	54	29.26	32.18	7.75	34.27	103	65	A	V
	*	2440.331	92.79	-	-	87.07	32.24	7.83	34.35	103	65	P	V
	*	2439.997	91.69	-	-	85.97	32.24	7.83	34.35	103	65	A	V
		2494.88	47.12	-26.88	74	41.39	32.3	7.91	34.48	103	65	P	V
		2495.52	34.91	-19.09	54	29.18	32.3	7.91	34.48	103	65	A	V



BLE CH 39 2480MHz	*	2479.826	100.66	-	-	94.9	32.28	7.91	34.43	100	213	P	H
	*	2480.076	98.74	-	-	92.98	32.28	7.91	34.43	100	213	A	H
		2483.68	48.74	-25.26	74	42.98	32.28	7.91	34.43	100	213	P	H
		2483.52	35.84	-18.16	54	30.08	32.28	7.91	34.43	100	213	A	H
													H
													H
	*	2480.327	93.94	-	-	88.18	32.28	7.91	34.43	100	277	P	V
	*	2480.076	92.53	-	-	86.77	32.28	7.91	34.43	100	277	A	V
		2492.96	47.39	-26.61	74	41.66	32.3	7.91	34.48	100	277	P	V
		2483.76	35.19	-18.81	54	29.43	32.28	7.91	34.43	100	277	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.
				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		4806	42.49	-31.51	74	56.09	34.25	11.11	58.96			P	H
													H
													H
													H
		4806	42.28	-31.72	74	55.88	34.25	11.11	58.96			P	V
													V
													V
													V
BLE CH 19 2440MHz		4878	42.46	-31.54	74	55.78	34.3	11.21	58.83			P	H
		7320	43.92	-30.08	74	50.98	35.6	15.08	57.74			P	H
													H
													H
		4878	41.89	-32.11	74	55.21	34.3	11.21	58.83			P	V
		7320	43.38	-30.62	74	50.44	35.6	15.08	57.74			P	V
													V
													V
BLE CH 39 2480MHz		4962	42.37	-31.63	74	55.34	34.37	11.32	58.66			P	H
		7440	43.25	-30.75	74	50.37	35.6	15.13	57.85			P	H
													H
													H
		4962	42.11	-31.89	74	55.08	34.37	11.32	58.66			P	V
		7440	42.94	-31.06	74	50.06	35.6	15.13	57.85			P	V
													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)

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		58.89	20.28	-19.72	40	43.71	6.08	1.77	31.28	111	251	P	H
		199.56	22.97	-20.53	43.5	42.28	9.1	2.69	31.1			P	H
		260.04	21.42	-24.58	46	35.26	14	3.16	31			P	H
		351.1	17.34	-28.66	46	30.57	14.43	3.39	31.05			P	H
		518.4	20.31	-25.69	46	28.99	18.1	3.89	30.67			P	H
		891.5	26.25	-19.75	46	28.98	22.93	4.66	30.32			P	H
													H
													H
													H
													H
													H
													H
		141.24	21.26	-22.24	43.5	38.25	11.5	2.61	31.1			P	V
		263.82	22.44	-23.56	46	36.72	13.56	3.16	31			P	V
		281.91	14.6	-31.4	46	29.5	12.86	3.16	30.92			P	V
		496	19.56	-26.44	46	28.48	17.95	3.77	30.64			P	V
		765.5	25.71	-20.29	46	29.5	22.1	4.48	30.37			P	V
		953.8	27.49	-18.51	46	28.42	24.51	4.94	30.38	157	322	P	V
													V
													V
													V
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													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 per 15.209(c).
!	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”.