



Appendix A. Radiated Spurious Emission

Test Engineer :	Nick Yu, Ken Wu, and James Chiu	Temperature :	23~24°C
		Relative Humidity :	56~60%

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.	
		(MHz)	(dBµV/m)	(dB)	Limit	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		2379.48	46.56	-27.44	74	40.99	32.16	7.68	34.27	100	25	P	H	
		2319.72	34.54	-19.46	54	29.07	32.09	7.6	34.22	100	25	A	H	
	*	2401.75	90.93	-	-	85.3	32.18	7.75	34.3	100	25	P	H	
	*	2402	90.22	-	-	84.59	32.18	7.75	34.3	100	25	A	H	
													H	
													H	
			2317.38	47.5	-26.5	74	42.05	32.07	7.6	34.22	311	20	P	V
			2355.36	34.45	-19.55	54	28.89	32.13	7.68	34.25	311	20	A	V
	*		2402.25	87.55	-	-	81.92	32.18	7.75	34.3	311	20	P	V
	*		2402	86.84	-	-	81.21	32.18	7.75	34.3	311	20	A	V
													V	
													V	
BLE CH 19 2440MHz		2314.77	46.37	-27.63	74	40.92	32.07	7.6	34.22	100	21	P	H	
		2366.61	34.41	-19.59	54	28.87	32.13	7.68	34.27	100	21	A	H	
	*	2440.33	92.07	-	-	86.35	32.24	7.83	34.35	100	21	P	H	
	*	2440	91.29	-	-	85.57	32.24	7.83	34.35	100	21	A	H	
			2490.24	46.72	-27.28	74	40.94	32.3	7.91	34.43	100	21	P	H
			2494.28	34.5	-19.5	54	28.77	32.3	7.91	34.48	100	21	A	H
			2312.79	52.66	-21.34	74	47.18	32.07	7.6	34.19	300	62	P	V
			2314.59	40.42	-13.58	54	34.97	32.07	7.6	34.22	300	62	A	V
	*		2439.83	85.88	-	-	80.16	32.24	7.83	34.35	300	62	P	V
	*		2440.08	85.33	-	-	79.61	32.24	7.83	34.35	300	62	A	V
			2499.52	47.73	-26.27	74	42	32.3	7.91	34.48	300	62	P	V
			2499.88	34.58	-19.42	54	28.85	32.3	7.91	34.48	300	62	A	V



BLE CH 39 2480MHz	*	2479.83	89.88	-	-	84.12	32.28	7.91	34.43	100	27	P	H
	*	2479.99	89.51	-	-	83.75	32.28	7.91	34.43	100	27	A	H
		2489.76	47.12	-26.88	74	41.34	32.3	7.91	34.43	100	27	P	H
		2484.24	34.43	-19.57	54	28.67	32.28	7.91	34.43	100	27	A	H
													H
													H
	*	2479.83	85.72	-	-	79.96	32.28	7.91	34.43	375	38	P	V
	*	2480.08	84.96	-	-	79.2	32.28	7.91	34.43	375	38	A	V
		2494.12	46.39	-27.61	74	40.66	32.3	7.91	34.48	375	38	P	V
		2486.92	34.44	-19.56	54	28.68	32.28	7.91	34.43	375	38	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	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		4804	40.91	-33.09	74	55.22	34.25	11.11	59.67	100	0	P	H	
													H	
													H	
													H	
		4804	41.11	-32.89	74	55.42	34.25	11.11	59.67	100	0	P	V	
														V
														V
														V
BLE CH 19 2440MHz		4880	40.38	-33.62	74	54.44	34.3	11.21	59.57	100	0	P	H	
		7320	42.62	-31.38	74	50.43	35.6	15.08	58.49	100	0	P	H	
													H	
													H	
		4880	41.06	-32.94	74	55.12	34.3	11.21	59.57	100	0	P	V	
		7320	42.19	-31.81	74	50	35.6	15.08	58.49	100	0	P	V	
														V
														V
BLE CH 39 2480MHz		4962	40.62	-33.38	74	54.38	34.37	11.32	59.45	100	0	P	H	
		7440	42.03	-31.97	74	49.94	35.6	15.13	58.64	100	0	P	H	
													H	
													H	
		4960	41.1	-32.9	74	54.86	34.37	11.32	59.45	100	0	P	V	
		7440	41.82	-32.18	74	49.73	35.6	15.13	58.64	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		51.33	22.15	-17.85	40	43.58	8	1.77	31.2	-	-	P	H		
		132.33	24.98	-18.52	43.5	41.9	11.8	2.38	31.1	-	-	P	H		
		265.17	16.49	-29.51	46	30.88	13.45	3.16	31	-	-	P	H		
		538	25.32	-20.68	46	33.63	18.55	3.89	30.75	-	-	P	H		
		672.4	24.19	-21.81	46	29.87	20.42	4.35	30.45	-	-	P	H		
		957.3	28.34	-17.66	46	29.15	24.62	4.94	30.37	121	78	P	H		
														H	
															H
															H
															H
															H
															H
															H
			52.41	24.65	-15.35	40	46.48	7.6	1.77	31.2	101	123	P	V	
			176.88	17.6	-25.9	43.5	36.78	9.17	2.61	30.96	-	-	P	V	
			261.66	17.03	-28.97	46	31.09	13.78	3.16	31	-	-	P	V	
			448.4	21.4	-24.6	46	31.27	17.24	3.63	30.74	-	-	P	V	
			672.4	26.59	-19.41	46	32.27	20.42	4.35	30.45	-	-	P	V	
			961.5	29.3	-24.7	54	30	24.71	4.94	30.35	-	-	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	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

- Level(dBμV/m) =
Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
- Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

- 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)
- Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

- 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)
- 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”.