



Appendix A. Radiated Spurious Emission

Test Engineer :	Kyle Jhuang and Citta Ke and Karl Hou	Temperature :	25~26°C
		Relative Humidity :	50~51%

15C 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)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2377.95	51.27	-22.73	74	47.6	32.73	4.6	33.66	129	203	P	H
		2332.5	40.15	-13.85	54	36.66	32.62	4.57	33.7	129	203	A	H
	*	2402	94.8	-	-	91.06	32.77	4.62	33.65	129	203	P	H
	*	2402	94.41	-	-	90.67	32.77	4.62	33.65	129	203	A	H
													H
													H
		2377.32	51.64	-22.36	74	47.97	32.73	4.6	33.66	166	228	P	V
		2385.96	40.22	-13.78	54	36.48	32.77	4.62	33.65	166	228	A	V
	*	2402	92.83	-	-	89.09	32.77	4.62	33.65	166	228	P	V
	*	2402	91.47	-	-	87.73	32.77	4.62	33.65	166	228	A	V
													V
													V
BLE CH 19 2440MHz		2344.29	51.47	-22.53	74	47.93	32.66	4.57	33.69	100	204	P	H
		2389.29	40.12	-13.88	54	36.38	32.77	4.62	33.65	100	204	A	H
	*	2440	95.48	-	-	91.51	32.89	4.68	33.6	100	204	P	H
	*	2440	94.54	-	-	90.57	32.89	4.68	33.6	100	204	A	H
		2494.72	51.22	-22.78	74	47.05	33	4.73	33.56	100	204	P	H
		2490.52	40.71	-13.29	54	36.54	33	4.73	33.56	100	204	A	H
		2379.3	51.02	-22.98	74	47.35	32.73	4.6	33.66	107	176	P	V
		2374.35	40.16	-13.84	54	36.49	32.73	4.6	33.66	107	176	A	V
	*	2440	94.97	-	-	91	32.89	4.68	33.6	107	176	P	V
	*	2440	93.86	-	-	89.89	32.89	4.68	33.6	107	176	A	V
		2484.16	51.31	-22.69	74	47.19	32.96	4.73	33.57	107	176	P	V
		2495.04	40.63	-13.37	54	36.46	33	4.73	33.56	107	176	A	V



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 39 2480MHz	*	2480	93.43	-	-	89.31	32.96	4.73	33.57	100	181	P	H
	*	2480	92.34	-	-	88.22	32.96	4.73	33.57	100	181	A	H
		2487.96	50.96	-23.04	74	46.79	33	4.73	33.56	100	181	P	H
		2486.36	40.69	-13.31	54	36.57	32.96	4.73	33.57	100	181	A	H
													H
													H
	*	2480	95.18	-	-	91.06	32.96	4.73	33.57	105	176	P	V
	*	2480	94.28	-	-	90.16	32.96	4.73	33.57	105	176	A	V
		2483.88	51.34	-22.66	74	47.22	32.96	4.73	33.57	105	176	P	V
		2496.24	40.67	-13.33	54	36.5	33	4.73	33.56	105	176	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		4804	41.7	-32.3	74	58.78	35.04	6.52	58.64	100	0	P	H
													H
													H
													H
		4804	41.1	-32.9	74	58.18	35.04	6.52	58.64	100	0	P	V
													V
													V
													V
BLE CH 19 2440MHz		4880	39.04	-34.96	74	55.96	35.02	6.58	58.52	100	0	P	H
		7320	42.19	-31.81	74	55.74	36.4	8.24	58.19	100	0	P	H
													H
													H
		4880	39.64	-34.36	74	56.56	35.02	6.58	58.52	100	0	P	V
		7320	41.68	-32.32	74	55.23	36.4	8.24	58.19	100	0	P	V
													V
													V
BLE CH 39 2480MHz		4960	40.36	-33.64	74	57.1	35.01	6.61	58.36	100	0	P	H
		7440	41.88	-32.12	74	55.46	36.47	8.36	58.41	100	0	P	H
													H
													H
		4960	41.24	-32.76	74	57.98	35.01	6.61	58.36	100	0	P	V
		7440	42.4	-31.6	74	55.98	36.47	8.36	58.41	100	0	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		145.56	26.22	-17.28	43.5	45.24	11.5	1.26	31.78	119	256	P	H
		180.93	20.89	-22.61	43.5	42.36	8.9	1.41	31.78			P	H
		220.35	12.07	-33.93	46	33	9.3	1.55	31.78			P	H
		503.7	18.67	-27.33	46	30.3	18.03	2.24	31.9			P	H
		697.6	19.31	-26.69	46	28.08	20.62	2.65	32.04			P	H
		849.5	23.93	-22.07	46	29.48	23.2	2.92	31.67			P	H
													H
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		119.91	34.19	-9.31	43.5	53.29	11.5	1.18	31.78	189	50	P	V
		164.46	24.82	-18.68	43.5	45.46	9.8	1.34	31.78			P	V
		227.1	28.97	-17.03	46	49.31	9.86	1.57	31.77			P	V
		444.9	23.07	-22.93	46	35.69	17.1	2.12	31.84			P	V
		663.3	19.29	-26.71	46	28.44	20.3	2.59	32.04			P	V
		804.7	22.16	-23.84	46	29.07	22.15	2.84	31.9			P	V
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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”.