



Appendix B. Radiated Spurious Emission

Test Engineer :	Karl Hou, Peter Liao, Citta Ke, and Nick Yu	Temperature :	21~22°C
		Relative Humidity :	52~55%

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 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		2370.69	55.32	-18.68	74	52.43	27.01	7.37	31.49	100	347	P	H	
		2369.115	45.41	-8.59	54	42.52	27.01	7.37	31.49	100	347	A	H	
	*	2402	90.68	-	-	87.67	27.05	7.45	31.49	100	347	P	H	
	*	2402	89.68	-	-	86.67	27.05	7.45	31.49	100	347	A	H	
													H	
														H
			2351.58	56.58	-17.42	74	53.74	26.97	7.37	31.5	116	123	P	V
			2386.125	45.14	-8.86	54	42.13	27.05	7.45	31.49	116	123	A	V
	*		2402	91.49	-	-	88.48	27.05	7.45	31.49	116	123	P	V
	*		2402	90.35	-	-	87.34	27.05	7.45	31.49	116	123	A	V
														V
														V
BLE CH 19 2440MHz		2333.24	55.5	-18.5	74	52.82	26.89	7.3	31.51	110	346	P	H	
		2370.48	45.18	-8.82	54	42.29	27.01	7.37	31.49	110	346	A	H	
	*	2440	89.61	-	-	86.42	27.18	7.49	31.48	110	346	P	H	
	*	2440	88.76	-	-	85.57	27.18	7.49	31.48	110	346	A	H	
			2499.3	56.72	-17.28	74	53.35	27.3	7.53	31.46	110	346	P	H
			2499.02	45.54	-8.46	54	42.17	27.3	7.53	31.46	110	346	A	H
			2320.36	56.38	-17.62	74	53.7	26.89	7.3	31.51	100	124	P	V
			2381.96	45.1	-8.9	54	42.13	27.01	7.45	31.49	100	124	A	V
	*		2440	91.14	-	-	87.95	27.18	7.49	31.48	100	124	P	V
	*		2440	90.1	-	-	86.91	27.18	7.49	31.48	100	124	A	V
			2489.99	56.72	-17.28	74	53.36	27.3	7.53	31.47	100	124	P	V
			2499.58	45.51	-8.49	54	42.14	27.3	7.53	31.46	100	124	A	V



BLE CH 39 2480MHz	*	2480	89.62	-	-	86.3	27.26	7.53	31.47	113	346	P	H
	*	2480	88.06	-	-	84.74	27.26	7.53	31.47	113	346	A	H
		2488.4	56.64	-17.36	74	53.28	27.3	7.53	31.47	113	346	P	H
		2490.24	45.35	-8.65	54	41.99	27.3	7.53	31.47	113	346	A	H
													H
													H
	*	2480	92.58	-	-	89.26	27.26	7.53	31.47	100	120	P	V
	*	2480	91.55	-	-	88.23	27.26	7.53	31.47	100	120	A	V
		2493.48	56.24	-17.76	74	52.87	27.3	7.53	31.46	100	120	P	V
		2489.44	45.42	-8.58	54	42.06	27.3	7.53	31.47	100	120	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	36.84	-37.16	74	53.17	31.23	10.59	58.15	100	0	P	H	
													H	
													H	
													H	
			4804	36.16	-37.84	74	52.49	31.23	10.59	58.15	100	0	P	V
														V
														V
BLE CH 19 2440MHz		4880	37.79	-36.21	74	53.67	31.33	10.89	58.1	100	0	P	H	
		7320	41.44	-32.56	74	50.24	36.12	14.18	59.1	100	0	P	H	
													H	
													H	
			4880	38.69	-35.31	74	54.57	31.33	10.89	58.1	100	0	P	V
			7320	42.2	-31.8	74	51	36.12	14.18	59.1	100	0	P	V
														V
BLE CH 39 2480MHz		4960	36.88	-37.12	74	52.27	31.45	11.19	58.03	100	0	P	H	
		7440	41.78	-32.22	74	50.17	36.46	14.32	59.17	100	0	P	H	
													H	
													H	
			4960	37.9	-36.1	74	53.29	31.45	11.19	58.03	100	0	P	V
			7440	42.93	-31.07	74	51.32	36.46	14.32	59.17	100	0	P	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.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)	
2.4GHz BLE LF		83.73	34.96	-5.04	40	52.31	14.03	1.06	32.44	100	134	P	H	
		120.45	35.96	-7.54	43.5	49.36	17.6	1.43	32.43	-	-	P	H	
		126.93	34.7	-8.8	43.5	47.81	17.88	1.43	32.42	-	-	P	H	
		505.8	27.56	-18.44	46	32.71	24.06	3.19	32.4	-	-	P	H	
		876.1	31.8	-14.2	46	30.31	28.76	4.45	31.72	-	-	P	H	
		969.9	33.15	-20.85	54	29.29	30.06	4.75	30.95	-	-	P	H	
														H
														H
														H
														H
														H
														H
			55.11	37.74	-2.26	40	56.07	13.35	0.78	32.46	100	64	P	V
			55.11	35.16	-4.84	40	53.49	13.35	0.78	32.46	100	64	QP	V
			66.45	36.52	-3.48	40	55.76	12.15	1.06	32.45	-	-	P	V
			197.94	38.61	-4.89	43.5	53.62	15.7	1.7	32.41	-	-	P	V
			374.9	24.76	-21.24	46	33.04	21.61	2.44	32.33	-	-	P	V
			746.6	33.48	-12.52	46	34.29	27.53	3.97	32.31	-	-	P	V
			922.3	33.36	-12.64	46	30.61	29.53	4.6	31.38	-	-	P	V
														V
													V	
													V	
													V	
													V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.													



<EUT with RJ-45>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 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 19 2440MHz		2388.68	55.74	-18.26	74	52.73	27.05	7.45	31.49	100	347	P	H
		2376.5	45.42	-8.58	54	42.53	27.01	7.37	31.49	100	347	A	H
	*	2440	89.52	-	-	86.33	27.18	7.49	31.48	100	347	P	H
	*	2440	88.61	-	-	85.42	27.18	7.49	31.48	100	347	A	H
		2491.04	55.8	-18.2	74	52.44	27.3	7.53	31.47	100	347	P	H
		2496.92	45.42	-8.58	54	42.05	27.3	7.53	31.46	100	347	A	H
		2382.8	55.63	-18.37	74	52.66	27.01	7.45	31.49	104	121	P	V
		2389.24	45.48	-8.52	54	42.47	27.05	7.45	31.49	104	121	A	V
	*	2440	91.07	-	-	87.88	27.18	7.49	31.48	104	121	P	V
	*	2440	90.08	-	-	86.89	27.18	7.49	31.48	104	121	A	V
		2485.65	55.97	-18.03	74	52.65	27.26	7.53	31.47	104	121	P	V
		2487.26	45.5	-8.5	54	42.18	27.26	7.53	31.47	104	121	A	V
Remark	3. No other spurious found. 4. 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 19 2440MHz		4880	37.03	-36.97	74	52.91	31.33	10.89	58.1	100	0	P	H	
		7320	42.46	-31.54	74	51.26	36.12	14.18	59.1	100	0	P	H	
													H	
													H	
		4880	37.33	-36.67	74	53.21	31.33	10.89	58.1	100	0	P	V	
		7320	42.41	-31.59	74	51.21	36.12	14.18	59.1	100	0	P	V	
														V
														V
Remark	3. No other spurious found. 4. 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.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)	
2.4GHz BLE LF		47.28	22.04	-17.96	40	37.52	16.2	0.78	32.46	-	-	P	H	
		123.15	27.36	-16.14	43.5	40.64	17.72	1.43	32.43	-	-	P	H	
		155.55	30.86	-12.64	43.5	44.28	17.25	1.75	32.42	-	-	P	H	
		317.5	20.81	-25.19	46	30.7	20.02	2.34	32.25	-	-	P	H	
		535.9	24.21	-21.79	46	29.06	24.36	3.19	32.4	-	-	P	H	
		880.3	42.63	-3.37	46	41.1	28.78	4.45	31.7	100	0	P	H	
													H	
													H	
													H	
													H	
													H	
													H	
			46.74	39.46	-0.54	40	54.51	16.63	0.78	32.46	100	220	P	V
			46.74	31.08	-8.92	40	46.13	16.63	0.78	32.46	100	220	QP	V
			54.84	33.52	-6.48	40	51.85	13.35	0.78	32.46	-	-	P	V
			155.28	24.97	-18.53	43.5	38.39	17.25	1.75	32.42	-	-	P	V
			409.9	21.16	-24.84	46	28.46	22.39	2.68	32.37	-	-	P	V
			561.1	23.48	-22.52	46	27.87	24.71	3.3	32.4	-	-	P	V
			897.8	33.28	-12.72	46	31.52	28.89	4.45	31.58	-	-	P	V
														V
													V	
													V	
													V	
													V	
Remark	3. No other spurious found. 4. 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”.