Appendix B. Radiated Spurious Emission

Test Engineer :	Wei Chen and Ken Wu	Temperature :	22~25°C
		Relative Humidity :	61~63%

15E Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 3m)

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		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		5714.28	65.83	-8.17	74	52.5	35.22	12.26	34.15	105	276	Р	Н
		5715	47.11	-6.89	54	33.78	35.22	12.26	34.15	105	276	Α	Н
		5724.36	76.46	-1.84	78.3	63.12	35.23	12.26	34.15	105	276	Р	Н
	*	5745	111.1	ı	-	97.7	35.24	12.33	34.17	105	276	Р	Н
	*	5745	99.42	-	-	86.02	35.24	12.33	34.17	105	276	Α	Н
													Н
000.44													Н
802.11a CH 149													Н
5745MHz		5714.36	62.14	-11.86	74	48.81	35.22	12.26	34.15	309	261	Р	V
3743141112		5715	45.4	-8.6	54	32.07	35.22	12.26	34.15	309	261	Α	V
		5724.68	74.14	-4.16	78.3	60.8	35.23	12.26	34.15	309	261	Р	V
	*	5747	108.06	-	-	94.66	35.24	12.33	34.17	309	261	Р	V
	*	5747	97.62	1	-	84.22	35.24	12.33	34.17	309	261	Α	V
													V
													V
													V

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WIFI Peak Pol. Note Frequency Level Over Limit Read **Antenna** Cable **Preamp** Ant **Table** Ant. Limit Line Level **Factor** Loss **Factor** Pos **Pos** Avg. 1 (MHz) (dBµV/m) $(dB\mu V/m)$ (dB_µV) (dB/m) (dB) (P/A) (H/V) (dB) (dB) (cm) (deg) 5711.64 64.67 -9.33 74 51.34 35.22 12.26 34.15 100 274 Η 47.51 35.22 5715 -6.4954 34.18 12.26 34.15 100 274 Α Η 5724.92 68.66 -9.64 78.3 55.32 35.23 12.26 34.15 100 274 Р Н 5784 114.25 100.81 35.27 12.4 34.23 100 274 Р Н * 5784 103.62 -90.18 35.27 12.4 34.23 100 274 Α Н 5853.04 62.83 -15.47 78.3 49.38 35.31 12.45 34.31 100 274 Ρ Н 5860.16 60.09 -13.91 74 46.63 35.32 12.49 34.35 100 274 Ρ Н 802.11a 35.32 34.35 Н 5860 45.62 -8.38 54 32.2 12.45 100 274 Α CH 157 5714.04 62.88 -11.12 74 49.55 35.22 12.26 34.15 317 260 Ρ ٧ 5785MHz 5714.92 46.16 -7.84 54 32.83 35.22 12.26 34.15 317 260 ٧ Α Ρ 35.23 ٧ 5725 65.47 -12.8378.3 52.13 12.26 34.15 317 260 * 99.65 34.23 Р ٧ 5785 35.27 12.4 317 260 113.09 * ٧ 5785 102.76 -89.32 35.27 12.4 34.23 317 260 Α _ ٧ 5851.84 62.17 -16.13 78.3 48.72 35.31 12.45 34.31 317 260 Ρ 5860.48 60.08 -13.92 74 46.62 35.32 12.49 34.35 317 260 Ρ ٧ 5860.24 44.9 -9.1 54 31.44 35.32 12.49 34.35 317 260 Α ٧

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WIFI Note **Frequency** Level Over Limit Read **Antenna** Cable **Preamp** Ant **Table** Peak Pol. Ant. Limit Line Level **Factor** Loss Factor Pos Pos Avg. (dBµV/m) 1 (MHz) (dB) (dBµV/m) dBµV) (dB/m) (dB) (dB) deg) (P/A) (H/V) cm) * 5824 112.62 99.14 35.3 34.27 107 275 Н 12.45 * 5824 101.5 89.06 35.3 12.45 35.31 107 275 Α Н 5851.92 76.25 -2.05 78.3 62.8 35.31 12.45 34.31 107 275 Ρ Н Ρ 5862.8 67.43 -6.57 74 53.97 35.32 12.49 34.35 107 275 Н 5860 34.35 107 Α 50.1 -3.9 54 36.68 35.32 12.45 275 Η Η Η Н 802.11a **CH 165** 5827 109.77 96.29 35.3 12.45 34.27 292 259 Ρ ٧ 5825MHz 12.45 5827 99.5 86.02 35.3 34.27 292 259 Α ٧ 5853.84 77.16 -1.14 78.3 63.7 35.32 12.45 34.31 292 259 Р ٧ 5862 69.47 35.32 12.49 34.35 292 259 Р ٧ -4.53 74 56.01 5860 50.7 -3.3 54 37.28 35.32 12.45 34.35 292 259 Α ٧ ٧ ٧ ٧ ٧ No other spurious found. Remark All results are PASS against Peak and Average limit line.

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15E Band 4 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

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		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		11490	43.12	-30.88	74	45.39	38.19	17.38	57.84	100	0	Р	Н
		17235	49.34	-24.66	74	42.29	42.21	21.38	56.54	100	0	Р	Н
802.11a													Н
CH 149													Н
5745MHz		11490	44.31	-29.69	74	46.58	38.19	17.38	57.84	100	0	Р	V
01 4011112		17235	49.57	-24.43	74	42.52	42.21	21.38	56.54	100	0	Р	V
													V
													V
		11570	44.9	-29.1	74	46.83	38.3	17.46	57.69	100	0	Р	Н
		17355	54.57	-19.43	74	47.61	42.12	21.45	56.61	100	336	Р	Н
802.11a CH 157 5785MHz		17355	40.49	-13.51	54	33.53	42.12	21.45	56.61	100	336	Α	Н
													Н
		11570	43.6	-30.4	74	45.53	38.3	17.46	57.69	100	0	Р	V
070011112		17355	49.6	-24.4	74	42.64	42.12	21.45	56.61	100	0	Р	V
													V
													V
		11650	43.21	-30.79	74	44.87	38.39	17.53	57.58	100	0	Р	Н
		17475	54.75	-19.25	74	47.87	42.03	21.53	56.68	100	337	Р	Н
802.11a		17475	41.9	-12.1	54	35.02	42.03	21.53	56.68	100	337	Α	Н
CH 165													Н
5825MHz		11650	44.18	-29.82	74	45.84	38.39	17.53	57.58	100	0	Р	V
3023WITIZ		17475	50.74	-23.26	74	43.86	42.03	21.53	56.68	100	0	Р	V
													V
-													V

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15E Band 4 5725~5850MHz WIFI 802.11n HT20 (Band Edge @ 3m)

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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		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		5713.88	67.96	-6.04	74	54.63	35.22	12.26	34.15	101	278	Р	Н
		5714.84	47.34	-6.66	54	34.01	35.22	12.26	34.15	101	278	Α	Н
		5724.6	77.29	-1.01	78.3	63.95	35.23	12.26	34.15	101	278	Р	Н
	*	5744	110	-	-	96.6	35.24	12.33	34.17	101	278	Р	Н
	*	5744	99.41	1	-	86.01	35.24	12.33	34.17	101	278	Α	Н
													Н
802.11n													Н
HT20													Н
CH 149		5714.76	64.45	-9.55	74	51.12	35.22	12.26	34.15	307	260	Р	V
5745MHz		5715	45.75	-8.25	54	32.42	35.22	12.26	34.15	307	260	Α	V
		5724.12	76.55	-1.75	78.3	63.21	35.23	12.26	34.15	307	260	Р	V
	*	5745	107.92	-	-	94.52	35.24	12.33	34.17	307	260	Р	V
	*	5745	97.43	-	-	84.03	35.24	12.33	34.17	307	260	Α	V
													V
													V
													V

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WIFI Peak Pol. Note Frequency Level Over Limit Read **Antenna** Cable **Preamp** Ant **Table** Ant. Limit Line Level **Factor** Loss **Factor** Pos **Pos** Avg. 1 (MHz) (dBµV/m) (dB) $(dB\mu V/m)$ (dB_µV) (dB/m) (dB) (P/A) (H/V) (dB) (cm) (deg) 274 5710.92 67.84 -6.1674 54.51 35.22 12.26 34.15 101 Η -5.74 34.93 35.22 5715 48.26 54 12.26 34.15 101 274 Α Η 5725 71.91 -6.39 78.3 58.57 35.23 12.26 34.15 101 274 Р Н 5784 115.05 101.61 35.27 12.4 34.23 101 274 Ρ Н * 5784 104.63 -91.19 35.27 12.4 34.23 101 274 Α Н 5852.88 66.01 -12.29 78.3 52.56 35.31 12.45 34.31 101 274 Ρ Н 5861.44 62.79 -11.21 74 49.33 35.32 12.49 34.35 101 274 Ρ Н 802.11n 35.32 34.35 Н HT20 5860 46.21 -7.79 54 32.79 12.45 101 274 Α **CH 157** 5714.28 67.83 -6.17 74 54.5 35.22 12.26 34.15 319 249 Ρ ٧ 5785MHz 5715 46.69 -7.31 54 33.36 35.22 12.26 34.15 319 249 ٧ Α Ρ 5720.52 35.23 ٧ 69.05 -9.25 78.3 55.71 12.26 34.15 319 249 * 34.23 Р ٧ 5785 113.24 99.8 35.27 12.4 319 249 * ٧ 5785 102.71 -89.27 35.27 12.4 34.23 319 249 Α _ ٧ 5856.08 63.4 -14.9 78.3 49.94 35.32 12.45 34.31 319 249 Ρ 5867.6 61.1 -12.974 47.64 35.32 12.49 34.35 319 249 Ρ ٧ 5860 45.02 -8.98 54 31.6 35.32 12.45 34.35 319 249 Α ٧

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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		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
	*	5825	111.13	-	-	97.65	35.3	12.45	34.27	100	274	Р	Н
	*	5825	100.55	1	-	87.07	35.3	12.45	34.27	100	274	Α	Н
		5851.6	77.01	-1.29	78.3	63.56	35.31	12.45	34.31	100	274	Р	Н
		5861.76	68.99	-5.01	74	55.53	35.32	12.49	34.35	100	274	Р	Н
		5860	49.84	-4.16	54	36.42	35.32	12.45	34.35	100	274	Α	Н
													Н
802.11n													Н
HT20													Н
CH 165	*	5825	109.96	-	-	96.48	35.3	12.45	34.27	309	260	Р	V
5825MHz	*	5825	99.44	1	1	85.96	35.3	12.45	34.27	309	260	Α	V
		5850.08	77.13	-1.17	78.3	63.68	35.31	12.45	34.31	309	260	Р	V
		5860.56	66.9	-7.1	74	53.44	35.32	12.49	34.35	309	260	Р	V
		5860	48.54	-5.46	54	35.12	35.32	12.45	34.35	309	260	Α	V
													V
													V
													V
Remark		o other spurious		eak and	Average lim	it line.							

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15E Band 4 5725~5850MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

	(MHz) 11490 17232 11490 17232	(dBµV/m) 44.63 50.23 45.3 50.35	Limit (dB) -29.37 -23.77 -28.7 -23.65	Line (dΒμV/m) 74 74 74 74	Level (dBμV) 46.9 43.18	Factor (dB/m) 38.19 42.21	Loss (dB) 17.38 21.38	Factor (dB) 57.84 56.54	Pos (cm) 100	Pos (deg) 0 0	Avg. (P/A)	(H/V H H H
	11490 17232 11490 17232	44.63 50.23 45.3	-29.37 -23.77 -28.7	74 74 74	46.9 43.18	38.19 42.21	17.38 21.38	57.84	100	0	Р	H H
	17232 11490 17232	50.23	-23.77	74	43.18	42.21	21.38					Н
	11490 17232	45.3	-28.7	74				56.54	100	0	Р	Н
	17232				47.57	38 19						
	17232				47.57	38 19						н
	17232				47.57	38 19						''
		50.35	-23.65	74		00.10	17.38	57.84	100	0	Р	V
					43.3	42.21	21.38	56.54	100	0	Р	٧
												V
												V
	11550	43.33	-30.67	74	45.32	38.27	17.46	57.72	100	0	Р	Н
	17328	49.68	-24.32	74	42.69	42.15	21.43	56.59	100	0	Р	Н
												Н
												Н
	11550	43.58	-30.42	74	45.57	38.27	17.46	57.72	100	0	Р	V
	17328	49.44	-24.56	74	42.45	42.15	21.43	56.59	100	0	Р	V
												V
												V
	11650	44.39	-29.61	74	46.05	38.39	17.53	57.58	100	0	Р	Н
	17475	52.05	-21.95	74	45.17	42.03	21.53	56.68	205	337	Р	Н
	17475	41.7	-12.3	54	34.82	42.03	21.53	56.68	205	337	Α	Н
												Н
	11650	44.71	-29.29	74	46.37	38.39	17.53	57.58	100	0	Р	V
	17472	50.62	-23.38	74	43.74	42.03	21.53	56.68	100	0	Р	V
												V
												V
No oth	er spurious	s found.										
	No oth	17328 11550 17328 11650 17475 17475 17472 No other spurious	17328 49.68 11550 43.58 17328 49.44 11650 44.39 17475 52.05 17475 41.7 11650 44.71 17472 50.62 No other spurious found.	17328 49.68 -24.32 11550 43.58 -30.42 17328 49.44 -24.56 11650 44.39 -29.61 17475 52.05 -21.95 17475 41.7 -12.3 11650 44.71 -29.29 17472 50.62 -23.38	17328 49.68 -24.32 74 11550 43.58 -30.42 74 17328 49.44 -24.56 74 11650 44.39 -29.61 74 17475 52.05 -21.95 74 17475 41.7 -12.3 54 11650 44.71 -29.29 74 17472 50.62 -23.38 74 No other spurious found.	17328 49.68 -24.32 74 42.69 11550 43.58 -30.42 74 45.57 17328 49.44 -24.56 74 42.45 11650 44.39 -29.61 74 46.05 17475 52.05 -21.95 74 45.17 17475 41.7 -12.3 54 34.82 11650 44.71 -29.29 74 46.37 17472 50.62 -23.38 74 43.74 No other spurious found.	17328 49.68 -24.32 74 42.69 42.15 11550 43.58 -30.42 74 45.57 38.27 17328 49.44 -24.56 74 42.45 42.15 11650 44.39 -29.61 74 46.05 38.39 17475 52.05 -21.95 74 45.17 42.03 11650 44.71 -29.29 74 46.37 38.39 17472 50.62 -23.38 74 43.74 42.03 No other spurious found.	17328 49.68 -24.32 74 42.69 42.15 21.43 11550 43.58 -30.42 74 45.57 38.27 17.46 17328 49.44 -24.56 74 42.45 42.15 21.43 11650 44.39 -29.61 74 46.05 38.39 17.53 17475 52.05 -21.95 74 45.17 42.03 21.53 17475 41.7 -12.3 54 34.82 42.03 21.53 11650 44.71 -29.29 74 46.37 38.39 17.53 17472 50.62 -23.38 74 43.74 42.03 21.53 No other spurious found.	17328	17328 49.68 -24.32 74 42.69 42.15 21.43 56.59 100 11550 43.58 -30.42 74 45.57 38.27 17.46 57.72 100 17328 49.44 -24.56 74 42.45 42.15 21.43 56.59 100 11650 44.39 -29.61 74 46.05 38.39 17.53 57.58 100 17475 52.05 -21.95 74 45.17 42.03 21.53 56.68 205 17475 41.7 -12.3 54 34.82 42.03 21.53 56.68 205 11650 44.71 -29.29 74 46.37 38.39 17.53 57.58 100 17472 50.62 -23.38 74 43.74 42.03 21.53 56.68 100	17328 49.68 -24.32 74 42.69 42.15 21.43 56.59 100 0 11550 43.58 -30.42 74 45.57 38.27 17.46 57.72 100 0 17328 49.44 -24.56 74 42.45 42.15 21.43 56.59 100 0 11650 44.39 -29.61 74 46.05 38.39 17.53 57.58 100 0 17475 52.05 -21.95 74 45.17 42.03 21.53 56.68 205 337 17475 41.7 -12.3 54 34.82 42.03 21.53 56.68 205 337 11650 44.71 -29.29 74 46.37 38.39 17.53 57.58 100 0 17472 50.62 -23.38 74 43.74 42.03 21.53 56.68 100 0	17328

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15E Emission below 1GHz

5GHz WIFI 802.11n HT20 (LF @ 3m)

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		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		30	23.24	-16.76	40	34.17	18.8	1.77	31.5			Р	Н
		153.66	30.02	-13.48	43.5	47.81	10.74	2.61	31.14	100	0	Р	Н
		255.99	23.51	-22.49	46	38.19	13.36	2.96	31			Р	Н
		307	26.97	-19.03	46	41.42	13.27	3.28	31			Р	Н
		512.1	28.09	-17.91	46	36.75	18.1	3.89	30.65			Р	Н
		819.4	30.79	-15.21	46	34.01	22.5	4.62	30.34			Р	Н
													Н
													Н
													Н
													Н
5GHz													Н
802.11n													Н
HT20		30	26.28	-13.72	40	37.21	18.8	1.77	31.5	100	0	Р	V
LF		168.78	23.8	-19.7	43.5	42.59	9.72	2.61	31.12			Р	V
		248.43	22.75	-23.25	46	38.59	12.2	2.96	31			Р	V
		307	22.48	-23.52	46	36.93	13.27	3.28	31			Р	V
		716.5	28.19	-17.81	46	32.9	21.28	4.41	30.4			Р	V
		975.5	29.37	-24.63	54	29.81	24.92	4.94	30.3			Р	V
													V
													V
													V
													V
													V
													V
	1. No	o other spurious	s found.										
Remark		results are PA		mit line.									
			•										

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Note symbol

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*	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

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

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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)	(dB _µ V)	(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	Р	Н
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	Α	Н

1. Level($dB\mu V/m$) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dB μ V/m) – Limit Line(dB μ V/m)

For Peak Limit @ 2390MHz:

- 1. Level(dBµV/m)
- = Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) Preamp Factor(dB)
- $= 32.22(dB/m) + 4.58(dB) + 54.51(dB\mu V) 35.86 (dB)$
- $= 55.45 (dB\mu V/m)$
- 2. Over Limit(dB)
- = Level($dB\mu V/m$) Limit Line($dB\mu V/m$)
- $= 55.45(dB\mu V/m) 74(dB\mu V/m)$
- = -18.55(dB)

For Average Limit @ 2390MHz:

- Level(dBµV/m)
- = Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) Preamp Factor(dB)
- $= 32.22(dB/m) + 4.58(dB) + 42.6(dB\mu V) 35.86 (dB)$
- $= 43.54 (dB\mu V/m)$
- 2. Over Limit(dB)
- = Level($dB\mu V/m$) Limit Line($dB\mu V/m$)
- $= 43.54(dB\mu V/m) 54(dB\mu V/m)$
- = -10.46(dB)

Both peak and average measured complies with the limit line, so test result is "PASS".

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