

RF Exposure

FCC ID:LNQSBWD950A
IC:2496A-SBWD950A

Applied procedures / limit

According to RSS 102/ FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines.

Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

Note: f is frequency in MHz

* = Power density limit is applicable at frequencies greater than 100 MHz

Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz

* = Plane-wave equivalent power density

MPE PREDICTION

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

TEST RESULTS

2.4G:

RF Model 8812

Test Channel	Frequency	Maximum output power. Antenna port				Total Power		LIMIT
		(PK) (dBm)		(AV) (dBm)		(PK)	(AV)	
	(MHz)	ANT A	ANT B	ANT A	ANT B	dBm	dBm	dBm
TX 802.11b Mode								
CH01	2412	14.21	14.81	11.79	10.54	17.53	14.22	30
CH06	2437	14.75	14.64	11.12	11.29	17.71	14.20	30
CH11	2462	14.05	14.73	9.09	11.23	17.41	13.30	30
TX 802.11g Mode								
CH01	2412	13.57	14.59	9.66	9.42	17.12	12.55	30
CH06	2437	13.41	14.56	9.02	8.98	17.03	12.01	30
CH11	2462	13.01	13.35	9.95	9.54	16.19	12.76	30
TX 802.11n/20M Mode								
CH01	2412	14.25	14.13	10.20	9.00	17.20	12.65	30
CH06	2437	13.21	14.56	8.97	9.07	16.95	12.03	30
CH11	2462	13.32	13.97	8.31	8.02	16.67	11.18	30
TX 802.11n/40M Mode								
CH03	2422	12.28	12.02	7.75	7.31	15.16	10.55	30
CH06	2437	12.27	12.32	7.43	7.09	15.31	10.27	30
CH09	2452	11.50	11.11	7.25	7.14	14.32	10.21	30

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Test Channel	Frequency	Maximum output power. Antenna port				Total Power		LIMIT
		(PK) (dBm)		(AV) (dBm)		(PK)	(AV)	
	(MHz)	ANT C	ANT D	ANT C	ANT D	dBm	dBm	dBm
TX 802.11b Mode								
CH01	2412	13.20	13.03	9.92	9.71	16.13	12.83	29.52
CH06	2437	13.04	13.35	9.76	9.03	16.21	12.42	29.52
CH11	2462	13.35	13.78	9.81	9.43	16.58	12.63	29.52
TX 802.11g Mode								
CH01	2412	9.96	9.55	6.27	6.17	12.77	9.23	29.52
CH06	2437	10.01	10.33	6.47	6.45	13.18	9.47	29.52
CH11	2462	10.10	10.74	6.21	6.79	13.44	9.52	29.52
TX 802.11n/20M Mode								
CH01	2412	8.85	8.66	5.33	5.18	11.77	8.27	29.52
CH06	2437	8.97	9.13	5.24	5.40	12.06	8.33	29.52
CH11	2462	8.69	8.43	5.09	5.56	11.57	8.34	29.52
TX 802.11n/40M Mode								
CH03	2422	8.13	8.10	5.26	5.35	11.13	8.32	29.52
CH06	2437	8.76	8.96	5.91	5.02	11.87	8.50	29.52
CH09	2452	8.36	8.89	5.40	5.76	11.64	8.59	29.52

Mode	Range	Maximum peak output power (dBm)	Output power (mW)	Antenna Gain (numeric)	Power Density (S) (mW/ cm ²)	Limit of Power Density (S) (mW/ cm ²)	Result
RF Model 8812							
802.11b	16~18	18	63.10	1.95(2.91)	0.0245	1	Pass
802.11g	16~18	18	63.10	1.95(2.91)	0.0245	1	Pass
802.11n-HT20	16~18	18	63.10	1.95(2.91)	0.0245	1	Pass
802.11n-HT40	14~16	16	39.81	1.95(2.91)	0.0154	1	Pass
RF Model 8192							
802.11b	15~17	17	50.12	2.22(3.47)	0.0221	1	Pass
802.11g	12~14	14	25.12	2.22(3.47)	0.0111	1	Pass
802.11n-HT20	11~13	13	19.95	2.22(3.47)	0.0088	1	Pass
802.11n-HT40	10~12	12	15.85	2.22(3.47)	0.0070	1	Pass

5.8G:

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Test Channel	Frequency	Maximum output power. Antenna port				Total Power		LIMIT
		(PK) (dBm)		(AV) (dBm)		(PK)	(AV)	
	(MHz)	ANT A	ANT B	ANT A	ANT B	dBm	dBm	dBm
TX 802.11a Mode								
CH149	5745	8.43	8.41	4.21	4.41	11.43	7.32	27.09
CH157	5785	8.94	8.51	4.56	4.76	11.74	7.67	27.09
CH165	5825	8.71	8.48	4.87	4.37	11.61	7.64	27.09
TX 802.11 n20 Mode								
CH149	5745	8.33	8.94	4.17	4.15	11.66	7.17	27.09
CH157	5785	8.56	8.87	4.73	4.25	11.73	7.51	27.09
CH165	5825	8.13	8.21	4.00	4.03	11.18	7.03	27.09
TX 802.11 n40 Mode								
CH151	5755	7.58	6.29	3.52	3.39	9.99	6.47	27.09
CH159	5795	7.34	6.33	3.27	3.79	9.87	6.55	27.09

Test Channel	Frequency	Maximum output power. Antenna port				Total Power		LIMIT
		(PK) (dBm)		(AV) (dBm)		(PK)	(AV)	
	(MHz)	ANT A	ANT B	ANT A	ANT B	dBm	dBm	dBm
TX 802.11 AC20 Mode								
CH149	5745	10.40	10.21	7.06	6.32	13.32	9.72	27.09
CH157	5785	10.49	10.13	7.59	6.13	13.32	9.93	27.09
CH165	5825	9.78	9.14	7.54	6.27	12.48	9.96	27.09
TX 802.11 AC40 Mode								
CH151	5755	9.91	9.12	6.09	5.46	12.54	8.80	27.09
CH159	5795	9.16	9.05	6.76	5.70	12.12	9.27	27.09
TX 802.11 AC80 Mode								
CH155	5775	8.75	8.65	5.73	5.30	11.71	8.53	27.09

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Test Channel	Frequency	Maximum output power. Antenna port				Total Power		LIMIT
		(PK) (dBm)		(AV) (dBm)		(PK)	(AV)	
	(MHz)	ANT C	ANT D	ANT C	ANT D	dBm	dBm	dBm
TX 802.11a Mode								
CH149	5745	8.25	8.12	4.35	4.14	11.20	7.26	27.62
CH157	5785	8.14	8.13	4.54	4.35	11.15	7.46	27.62
CH165	5825	8.67	8.33	4.24	4.21	11.51	7.24	27.62
TX 802.11 n20 Mode								
CH149	5745	8.27	8.11	4.31	4.27	11.20	7.30	27.62
CH157	5785	8.41	8.21	4.55	4.07	11.32	7.33	27.62
CH165	5825	8.20	8.16	4.37	4.39	11.19	7.39	27.62
TX 802.11 n40 Mode								
CH151	5755	6.53	6.49	3.34	3.17	9.52	6.27	27.62
CH159	5795	6.42	6.14	3.17	3.61	9.29	6.41	27.62

Mode	Range	Maximum peak output power (dBm)	Output power (mW)	Antenna Gain (numeric)	Power Density (S) (mW/ cm ²)	Limit of Power Density (S) (mW/ cm ²)	Result
RF Model 8812							
802.11a	10~12	12	15.85	3.89(5.9)	0.0123	1	Pass
802.11n (20)	10~12	12	15.85	3.89(5.9)	0.0123	1	Pass
802.11n(40)	8~10	10	10.00	3.89(5.9)	0.0077	1	Pass
802.11ac 20M	12~14	14	25.12	3.89(5.9)	0.0194	1	Pass
802.11ac 40M	11~13	13	19.95	3.89(5.9)	0.0154	1	Pass
802.11ac 80M	10~12	12	15.85	3.89(5.9)	0.0123	1	Pass
RF Model 8192							
802.11a	10~12	12	15.85	3.44(5.37)	0.0108	1	Pass
802.11n (20)	10~12	12	15.85	3.44(5.37)	0.0108	1	Pass
802.11n(40)	8~10	10	10.00	3.44(5.37)	0.0068	1	Pass

BT:

Test Channel	Frequency	Maximum Conducted Output Power (PK)	LIMIT
	(MHz)	(dBm)	
CH00	2402	2.43	30
CH19	2440	2.38	30
CH39	2480	2.90	30

Mode	Range	Maximum peak output power (dBm)	Output power (mW)	Antenna Gain (numeric)	Power Density (S) (mW/ cm ²)	Limit of Power Density (S) (mW/ cm ²)	Result
BLE	1~3	3	2.0	1.26(1.0)	0.0005	1	Pass

5.2G

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Test Channel	Frequency	Maximum output power. Antenna port				Total Power		LIMIT
		(PK) (dBm)		(AV) (dBm)		(PK)	(AV)	
	(MHz)	ANT A	ANT B	ANT A	ANT B	dBm	dBm	dBm
TX 802.11a Mode								
CH36	5180	9.94	9.75	6.71	6.24	12.86	9.49	14.09
CH40	5200	9.41	9.36	6.55	6.31	12.40	9.44	14.09
CH48	5240	9.68	9.13	6.83	6.29	12.42	9.58	14.09
TX 802.11 n20M Mode								
CH36	5180	8.03	8.52	5.88	5.77	11.29	8.84	14.09
CH40	5200	8.08	8.81	5.62	5.00	11.47	8.33	14.09
CH48	5240	8.05	8.54	5.01	5.83	11.31	8.45	14.09
TX 802.11 n40M Mode								
CH38	5190	7.36	7.11	3.41	3.39	10.25	6.41	14.09
CH46	5230	7.28	7.15	3.56	3.25	10.23	6.42	14.09

Test Channel	Frequency	Maximum output power. Antenna port				Total Power		LIMIT
		(PK) (dBm)		(AV) (dBm)		(PK)	(AV)	
	(MHz)	ANT A	ANT B	ANT A	ANT B	dBm	dBm	dBm
TX 802.11 AC20M Mode								
CH36	5180	10.83	10.10	7.72	7.67	13.49	10.71	14.09
CH40	5200	10.13	10.36	7.01	7.60	13.26	10.33	14.09
CH48	5240	10.15	10.26	7.90	7.15	13.22	10.55	14.09
TX 802.11 AC40M Mode								
CH38	5190	8.73	8.34	7.47	7.93	11.55	10.72	14.09
CH46	5230	8.65	8.01	7.19	7.70	11.35	10.46	14.09
TX 802.11 AC80M Mode								
CH42	5210	10.88	10.32	7.45	7.71	13.62	10.59	14.09

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Test Channel	Frequency	Maximum output power. Antenna port				Total Power		LIMIT
		(PK) (dBm)		(AV) (dBm)		(PK)	(AV)	
	(MHz)	ANT C	ANT D	ANT C	ANT D	dBm	dBm	dBm
TX 802.11a Mode								
CH36	5180	8.18	7.84	5.78	5.23	11.02	8.52	14.62
CH40	5200	8.93	7.78	5.32	5.68	11.40	8.51	14.62
CH48	5240	8.27	7.33	5.01	5.87	10.84	8.47	14.62
TX 802.11 n20M Mode								
CH36	5180	8.23	7.87	5.91	5.45	11.06	8.70	14.62
CH40	5200	8.90	7.80	5.54	5.80	11.40	8.68	14.62
CH48	5240	8.11	7.38	5.10	4.97	10.77	8.05	14.62
TX 802.11 n40M Mode								
CH38	5190	6.60	6.51	3.84	3.14	9.57	6.51	14.62
CH46	5230	6.25	6.24	3.83	3.93	9.26	6.89	14.62

Mode	Range	Maximum peak output power (dBm)	Output power (mW)	Antenna Gain (numeric)	Power Density (S) (mW/ cm ²)	Limit of Power Density (S) (mW/ cm ²)	Result
RF Model 8812							
802.11a	11~13	13	19.95	3.89(5.9)	0.0154	1	Pass
802.11n (20)	10~12	12	15.85	3.89(5.9)	0.0123	1	Pass
802.11n(40)	9~11	11	12.59	3.89(5.9)	0.0097	1	Pass
802.11ac 20M	12~14	14	25.12	3.89(5.9)	0.0194	1	Pass
802.11ac 40M	10~12	12	15.85	3.89(5.9)	0.0123	1	Pass
802.11ac 80M	12~14	14	25.12	3.89(5.9)	0.0194	1	Pass
RF Model 8192							
802.11a	10~12	12	15.85	3.44(5.37)	0.0108	1	Pass
802.11n (20)	10~12	12	15.85	3.44(5.37)	0.0108	1	Pass
802.11n(40)	8~10	10	10.00	3.44(5.37)	0.0068	1	Pass

This device 5GHz and 2.4GHz can not transmit simultaneously on the same wifi module.

Conclusion: No SAR is required.