

FCC §15.247 (i), §2.1091 – RF Exposure

# FCC ID: 2AD3PWIMO

## Applied procedures / limit

According to 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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> 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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> 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

Test Channe	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	12.27	11.22	8.39	7.05	14.79	10.78	30
CH06	2437	12.21	11.25	8.36	7.09	14.77	10.78	30
CH11	2462	12.29	11.16	8.45	7.01	14.77	10.80	30
TX 802.11g Mode								
CH01	2412	10.96	10.33	7.22	5.88	13.67	9.61	30
CH06	2437	11.05	10.29	7.29	6.02	13.70	9.71	30
CH11	2462	11.01	10.32	7.35	5.95	13.69	9.72	30
TX 802.11n/20M Mode								
CH01	2412	10.32	9.19	6.42	5.36	12.80	8.93	30
CH06	2437	10.35	9.25	6.45	5.41	12.85	8.97	30
CH11	2462	10.35	9.25	6.45	5.41	12.85	8.97	30
TX 802.11n/40M Mode								
CH03	2422	10.32	9.19	6.46	5.36	12.80	8.96	30
CH06	2437	10.35	9.25	6.45	5.41	12.85	8.97	30
CH09	2452	10.35	9.25	6.45	5.41	12.85	8.97	30

### 5.8G

Test Channe	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	12.06	11.13	8.23	6.97	14.63	10.66	30
CH157	5785	12.09	11.16	8.17	7.01	14.66	10.64	30
CH165	5825	12.08	11.07	8.21	6.93	14.61	10.63	30
TX 802.11 n20 Mode								
CH149	5745	10.75	10.24	7.03	5.82	13.51	9.48	30
CH157	5785	10.84	10.2	7.16	5.94	13.54	9.60	30
CH165	5825	10.84	10.23	7.16	5.87	13.56	9.57	30
TX 802.11 n40 Mode								
CH151	5755	9.83	8.86	5.89	5.07	12.38	8.51	30
CH159	5795	9.97	8.79	5.93	5.11	12.43	8.55	30

## 5.2G

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
<b>TX 802.11a Mode</b>								
CH36	5180	11.83	10.85	7.92	6.72	14.38	10.37	17
CH40	5200	11.77	10.88	7.89	6.76	14.36	10.37	17
CH48	5240	11.85	10.79	7.93	6.68	14.36	10.36	17
<b>TX 802.11 n20M Mode</b>								
CH36	5180	10.52	9.96	6.75	5.55	13.26	9.20	17
CH40	5200	10.61	9.92	6.82	5.69	13.29	9.30	17
CH48	5240	10.57	9.95	6.88	5.62	13.28	9.31	17
<b>TX 802.11 n40M Mode</b>								
CH38	5190	9.88	8.82	5.93	5.03	12.39	8.51	17
CH46	5230	9.91	8.88	5.98	5.08	12.44	8.56	17

ANT Port Rated RF power output:

Mode	The Tune-up Power (dBm) ANT A	Range	The Tune-up Power (dBm) ANT B	Range
IEEE 802.11b	12+/-1	11~13	11+/-1	10~12
IEEE 802.11g	11+/-1	10~12	11+/-1	10~12
IEEE 802.11n20M	10+/-1	9~11	9+/-1	8~10
IEEE 802.11n40M	10+/-1	9~11	9+/-1	8~10
<b>5.8G</b>				
802.11a	12+/-1	11~13	11+/-1	10~12
802.11 n HT20	11+/-1	10~12	11+/-1	10~12
802.11n HT40	10+/-1	9~11	9+/-1	8~10
<b>5.2G</b>				
802.11a	12+/-1	11~13	11+/-1	10~12
802.11 n HT20	11+/-1	10~12	10+/-1	9~11
802.11n HT40	10+/-1	9~11	9+/-1	8~10

Mode	Maximum peak output power (dBm) ANT A	Output power (mW)	Antenna Gain (numeric)	Power Density (S) (mW/ cm <sup>2</sup> )	Limit of Power Density (S) (mW/ cm <sup>2</sup> )	Result
<b>2.4G</b>						
802.11b	13	19.95	1(1.26)	0.0050	1	Pass
802.11g	12	15.85	1(1.26)	0.0040	1	Pass
802.11n-HT20	11	12.59	1(1.26)	0.0032	1	Pass
802.11n-HT40	11	12.59	1(1.26)	0.0032	1	Pass
<b>5.8G</b>						
802.11a	13	19.95	1(1.26)	0.0050	1	Pass
802.11 n HT20	12	15.85	1(1.26)	0.0040	1	Pass

802.11n HT40	11	12.59	1(1.26)	0.0032	1	Pass
5.2G						
802.11a	13	19.95	1(1.26)	0.0050	1	Pass
802.11 n HT20	12	15.85	1(1.26)	0.0040	1	Pass
802.11n HT40	11	12.59	1(1.26)	0.0032	1	Pass

Mode	Maximum peak output power (dBm) ANT B	Output power (mW)	Antenna Gain (numeric)	Power Density (S) (mW/ cm <sup>2</sup> )	Limit of Power Density (S) (mW/ cm <sup>2</sup> )	Result
2.4G						
802.11b	12	15.85	1(1.26)	0.0040	1	Pass
802.11g	12	15.85	1(1.26)	0.0040	1	Pass
802.11n-HT20	10	10.00	1(1.26)	0.0025	1	Pass
802.11n-HT40	10	10.00	1(1.26)	0.0025	1	Pass
5.8G						
802.11a	12	15.85	1(1.26)	0.0040	1	Pass
802.11 n HT20	12	15.85	1(1.26)	0.0040	1	Pass
802.11n HT40	10	10.00	1(1.26)	0.0025	1	Pass
5.2G						
802.11a	12	15.85	1(1.26)	0.0040	1	Pass
802.11 n HT20	11	12.59	1(1.26)	0.0032	1	Pass
802.11n HT40	10	10.00	1(1.26)	0.0025	1	Pass

Total Power

Mode	Total Power Density (S) (mW/ cm <sup>2</sup> )	Total Power Density (S) (mW/ cm <sup>2</sup> )	Total Power Density (S) (mW/ cm <sup>2</sup> )	Limit of Power Density (S) (mW/ cm <sup>2</sup> )	Result
	ANT A	ANT B			
2.4G					
802.11b	0.0050	0.0040	0.0090	1	Pass
802.11g	0.0040	0.0040	0.0080	1	Pass
802.11n-HT20	0.0032	0.0025	0.0057	1	Pass
802.11n-HT40	0.0032	0.0025	0.0057	1	Pass
5.8G					
802.11a	0.0050	0.0040	0.0090	1	Pass
802.11 n HT20	0.0040	0.0040	0.0080	1	Pass
802.11n HT40	0.0032	0.0025	0.0057	1	Pass
5.2G					
802.11a	0.0050	0.0040	0.0080	1	Pass
802.11 n HT20	0.0040	0.0032	0.0072	1	Pass
802.11n HT40	0.0032	0.0025	0.0050	1	Pass

Note: This device 5GHz and 2.4GHz can not transmit simultaneously, don't have to assess exposure when transmit simultaneously.