

FCC 47 CFR MPE REPORT

Xiamen Prima Technology Inc.

WIFI MODULE

Model Number: WFM-001

FCC ID: 2ADID-WFM001

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Maximum Permissible Exposure

1. Applicable Standards

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 limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

1.1. Limits for Maximum Permissible Exposure (MPE)

(a) 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 Times 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
1500-10000			5	6

(b) 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 Times 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
1500-10000			1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

1.2. MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric Field (V/m)

P = Peak RF output Power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

2. Conducted Power Result

Antenna 1

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
GFSK	2402	5.99	3.9719	5 ± 1	2	1.58489
	2441	5.42	3.4834	5 ± 1	2	1.58489
	2480	4.78	3.0061	4 ± 1	2	1.58489
8-DPSK	2402	7.69	5.8749	7 ± 1	2	1.58489
	2441	7.05	5.0699	7 ± 1	2	1.58489
	2480	6.52	4.4875	6 ± 1	2	1.58489
BLE GFSK	2402	9.77	9.4842	9 ± 1	2	1.58489
	2440	8.89	7.7446	8 ± 1	2	1.58489
	2480	8.21	6.6222	8 ± 1	2	1.58489
IEEE 802.11b	2412	14.58	28.7078	16 ± 1	2	1.58489
	2437	14.42	27.6694	15 ± 1	2	1.58489
	2462	14.53	28.3792	16 ± 1	2	1.58489
IEEE 802.11g	2412	17.68	58.6138	19 ± 1	2	1.58489
	2437	17.53	56.6239	19 ± 1	2	1.58489
	2462	17.66	58.3445	19 ± 1	2	1.58489
IEEE 802.11n HT20 (2.4G)	2412	16.36	43.2514	20 ± 1	2	1.58489
	2437	16.49	44.5656	20 ± 1	2	1.58489
	2462	16.30	42.6580	20 ± 1	2	1.58489
IEEE 802.11n HT40 (2.4G)	2422	15.53	35.7273	19 ± 1	2	1.58489
	2437	15.56	35.9749	19 ± 1	2	1.58489
	2452	15.44	34.9945	19 ± 1	2	1.58489
IEEE 802.11a	5180	11.65	14.6218	11 ± 1	2	1.58489
	5200	11.49	14.0929	11 ± 1	2	1.58489
	5240	11.56	14.3219	11 ± 1	2	1.58489
	5745	11.32	13.5519	11 ± 1	2	1.58489
	5785	12.02	15.9221	12 ± 1	2	1.58489
	5825	11.96	15.7036	11 ± 1	2	1.58489

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT20 (5G)	5180	11.64	14.5881	11 ± 1	2	1.58489
	5200	11.63	14.5546	11 ± 1	2	1.58489
	5240	11.74	14.9279	11 ± 1	2	1.58489
	5745	10.37	10.8893	10 ± 1	2	1.58489
	5785	11.04	12.7057	11 ± 1	2	1.58489
	5825	11.55	14.2889	11 ± 1	2	1.58489
IEEE 802.11ac VHT20	5180	12.05	16.0325	12 ± 1	2	1.58489
	5200	11.83	15.2405	11 ± 1	2	1.58489
	5240	11.76	14.9968	11 ± 1	2	1.58489
	5745	10.69	11.7220	10 ± 1	2	1.58489
	5785	11.36	13.6773	11 ± 1	2	1.58489
	5825	11.53	14.2233	11 ± 1	2	1.58489
IEEE 802.11n HT40 (5G)	5190	11.40	13.8038	11 ± 1	2	1.58489
	5230	11.31	13.5207	11 ± 1	2	1.58489
	5755	10.19	10.4472	10 ± 1	2	1.58489
	5795	10.78	11.9674	10 ± 1	2	1.58489
IEEE 802.11ac VHT40	5190	11.39	13.7721	11 ± 1	2	1.58489
	5230	11.31	13.5207	11 ± 1	2	1.58489
	5755	10.16	10.3753	10 ± 1	2	1.58489
	5795	10.53	11.2980	10 ± 1	2	1.58489
IEEE 802.11ac VHT80	5210	11.06	12.7644	11 ± 1	2	1.58489
	5775	10.15	10.3514	10 ± 1	2	1.58489

Antenna 2

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11b	2412	16.18	41.4954	16 ± 1	2	1.58489
	2437	15.97	39.5367	15 ± 1	2	1.58489
	2462	16.22	41.8794	16 ± 1	2	1.58489
IEEE 802.11g	2412	19.28	84.7227	19 ± 1	2	1.58489
	2437	19.30	85.1138	19 ± 1	2	1.58489
	2462	19.52	89.5365	19 ± 1	2	1.58489
IEEE 802.11n HT20 (2.4G)	2412	18.17	65.6145	18 ± 1	2	1.58489
	2437	18.15	65.3131	18 ± 1	2	1.58489
	2462	18.22	66.3743	18 ± 1	2	1.58489
IEEE 802.11n HT40 (2.4G)	2422	17.12	51.5229	17 ± 1	2	1.58489
	2437	17.07	50.9331	17 ± 1	2	1.58489
	2452	17.11	51.4044	17 ± 1	2	1.58489
IEEE 802.11a	5180	7.87	6.1235	7 ± 1	2	1.58489
	5200	7.93	6.2087	7 ± 1	2	1.58489
	5240	8.32	6.7920	8 ± 1	2	1.58489
	5745	10.86	12.1899	10 ± 1	2	1.58489
	5785	10.78	11.9674	10 ± 1	2	1.58489
	5825	10.94	12.4165	10 ± 1	2	1.58489
IEEE 802.11n HT20 (5G)	5180	8.38	6.8865	8 ± 1	2	1.58489
	5200	8.46	7.0146	8 ± 1	2	1.58489
	5240	8.49	7.0632	8 ± 1	2	1.58489
	5745	10.88	12.2462	10 ± 1	2	1.58489
	5785	10.70	11.7490	10 ± 1	2	1.58489
	5825	10.05	10.1158	10 ± 1	2	1.58489
IEEE 802.11ac VHT20	5180	8.02	6.3387	8 ± 1	2	1.58489
	5200	8.07	6.4121	8 ± 1	2	1.58489
	5240	8.21	6.6222	8 ± 1	2	1.58489
	5745	10.64	11.5878	10 ± 1	2	1.58489
	5785	10.59	11.4551	10 ± 1	2	1.58489
	5825	10.73	11.8304	10 ± 1	2	1.58489

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT40 (5G)	5190	8.02	6.3387	8 ± 1	2	1.58489
	5230	7.78	5.9979	7 ± 1	2	1.58489
	5755	10.22	10.5196	10 ± 1	2	1.58489
	5795	10.43	11.0408	10 ± 1	2	1.58489
IEEE 802.11ac VHT40	5190	7.88	6.1376	7 ± 1	2	1.58489
	5230	7.68	5.8614	7 ± 1	2	1.58489
	5755	10.24	10.5682	10 ± 1	2	1.58489
	5795	10.40	10.9648	10 ± 1	2	1.58489
IEEE 802.11ac VHT80	5210	7.41	5.5081	7 ± 1	2	1.58489
	5775	9.88	9.7275	9 ± 1	2	1.58489

3. Calculated Result and Limit

Antenna 1

Mode	Target power (dBm)	Antenna gain		Power Density (S) (mW/cm ²)	Limited of Power Density (S) (mW/cm ²)	Test Result
		(dBi)	(Linear)			
2.4G Band						
GFSK	6	2	1.58489	0.00126	1	Compiles
8-DPSK	8	2	1.58489	0.00199	1	Compiles
BLE GFSK	10	2	1.58489	0.00315	1	Compiles
IEEE 802.11b	17	2	1.58489	0.01580	1	Compiles
IEEE 802.11g	20	2	1.58489	0.03153	1	Compiles
IEEE 802.11n HT20	21	2	1.58489	0.03969	1	Compiles
IEEE 802.11n HT40	20	2	1.58489	0.03153	1	Compiles
5G Band						
IEEE 802.11a	13	2	1.58489	0.00629	1	Compiles
IEEE 802.11n HT20	12	2	1.58489	0.00500	1	Compiles
IEEE 802.11ac VHT20	13	2	1.58489	0.00629	1	Compiles
IEEE 802.11n HT40	12	2	1.58489	0.00500	1	Compiles
IEEE 802.11ac VHT40	12	2	1.58489	0.00500	1	Compiles
IEEE 802.11ac VHT80	11	2	1.58489	0.00397	1	Compiles

Antenna 2

Mode	Target power (dBm)	Antenna gain		Power Density (S) (mW/cm ²)	Limited of Power Density (S) (mW/cm ²)	Test Result
		(dBi)	(Linear)			
2.4G Band						
IEEE 802.11b	17	2	1.58489	0.01580	1	Compiles
IEEE 802.11g	20	2	1.58489	0.03153	1	Compiles
IEEE 802.11n HT20	19	2	1.58489	0.02505	1	Compiles
IEEE 802.11n HT40	18	2	1.58489	0.01989	1	Compiles
5G Band						
IEEE 802.11a	11	2	1.58489	0.00397	1	Compiles
IEEE 802.11n HT20	11	2	1.58489	0.00397	1	Compiles
IEEE 802.11ac VHT20	11	2	1.58489	0.00397	1	Compiles
IEEE 802.11n HT40	11	2	1.58489	0.00397	1	Compiles
IEEE 802.11ac VHT40	11	2	1.58489	0.00397	1	Compiles
IEEE 802.11ac VHT80	10	2	1.58489	0.00315	1	Compiles

Antenna 1+2

Mode	Directional AntennaGain (Numeric)	Peak Output Power (mW)	Power Density (S) (mW/cm ²) Total	Limited of Power Density (S) (mW/cm ²)	Test Result
2.4G Band					
IEEE 802.11n HT20	3.170 (5.01dBi)	109.90	0.03465	1	Compiles
IEEE 802.11n HT40	3.170 (5.01dBi)	87.30	0.02753	1	Compiles
5G Band					
IEEE 802.11n HT20	3.170 (5.01dBi)	27.03	0.00852	1	Compiles
IEEE 802.11ac VHT20	3.170 (5.01dBi)	26.07	0.00822	1	Compiles
IEEE 802.11n HT40	3.170 (5.01dBi)	23.01	0.00726	1	Compiles
IEEE 802.11ac VHT40	3.170 (5.01dBi)	22.26	0.00702	1	Compiles
IEEE 802.11ac VHT80	3.170 (5.01dBi)	20.08	0.00633	1	Compiles

Note: 2.4 and 5GHz bands are share an antenna, Cann't both the 2.4 and 5 GHz bands operate simultaneously.

End of Test Report