

FCC 47 CFR MPE REPORT

Hui Zhou Gaoshengda Technology Co., Ltd

WIFI+BT Module

Model Number: WKCT26M2501

FCC ID: 2AC23-WKCT26

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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

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

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)
GFSK	2402	6.18	4.1495	6±1
	2441	4.90	3.0903	4±1
	2480	3.15	2.0654	3±1
8-DPSK	2402	6.02	3.9994	6±1
	2441	4.74	2.9785	4±1
	2480	2.96	1.9770	2±1
GFSK 1M	2402	5.91	3.8994	5±1
	2440	4.54	2.8445	4±1
	2480	2.78	1.8967	2±1
IEEE 802.11b	2412	17.22	52.7230	17±1
	2437	17.56	57.0164	17±1
	2462	17.25	53.0884	17±1
IEEE 802.11g	2412	22.24	167.4943	22±1
	2437	22.20	165.9587	22±1
	2462	22.25	167.8804	22±1
IEEE 802.11n HT20 (2.4G)	2412	22.41	174.1807	22±1
	2437	22.32	170.6082	22±1
	2462	22.45	175.7924	22±1
IEEE 802.11n HT40 (2.4G)	2422	22.24	167.4943	22±1
	2437	22.23	167.1091	22±1
	2452	22.29	169.4338	22±1
IEEE 802.11a	5180	12.588	18.1468	12±1
	5200	12.717	18.6939	12±1
	5240	12.082	16.1510	12±1
	5260	13.497	22.3718	13±1
	5300	13.598	22.8981	13±1
	5320	13.646	23.1526	13±1
	5500	14.116	25.7988	14±1
	5580	14.420	27.6694	14±1
	5700	14.981	31.4847	14±1

	5745	15.252	33.5120	15±1
	5785	15.314	33.9938	15±1
	5825	15.373	34.4588	15±1
IEEE 802.11n HT20 (5G)	5180	11.607	14.4777	11±1
	5200	11.845	15.2933	11±1
	5240	12.079	16.1399	12±1
	5260	12.770	18.9234	12±1
	5300	12.877	19.3955	12±1
	5320	12.873	19.3776	12±1
	5500	13.247	21.1203	13±1
	5580	13.634	23.0887	13±1
	5700	14.210	26.3633	14±1
	5745	12.935	19.6562	12±1
	5785	12.939	19.6743	12±1
	5825	12.925	19.6110	12±1
	IEEE 802.11ac VHT20	5180	11.655	14.6386
5200		11.807	15.1600	11±1
5240		12.066	16.0916	12±1
5260		12.724	18.7241	12±1
5300		12.835	19.2088	12±1
5320		12.847	19.2619	12±1
5500		13.238	21.0766	13±1
5580		13.626	23.0462	13±1
5700		14.191	26.2482	14±1
5745		12.951	19.7288	12±1
5785		12.874	19.3821	12±1
5825		12.874	19.3821	12±1
IEEE 802.11n HT40 (5G)	5190	12.312	17.0294	12±1
	5230	12.604	18.2138	12±1
	5270	12.739	18.7888	12±1
	5310	12.861	19.3241	12±1
	5510	13.376	21.7570	13±1
	5590	13.700	23.4423	13±1
	5670	14.094	25.6685	14±1
	5755	14.452	27.8740	14±1
	5795	14.603	28.8602	14±1
IEEE 802.11ac	5190	13.241	21.0911	13±1
	5230	13.421	21.9837	13±1

VHT40	5270	13.028	20.0817	13±1
	5310	13.093	20.3845	13±1
	5510	13.552	22.6569	13±1
	5590	13.975	24.9747	13±1
	5670	14.355	27.2584	14±1
	5755	14.719	29.6415	14±1
	5795	14.781	30.0677	14±1
IEEE 802.11ac VHT80	5210	12.064	16.0842	12±1
	5290	12.551	17.9929	12±1
	5530	13.110	20.4644	13±1
	5610	13.460	22.1820	13±1
	5775	14.151	26.0076	14±1

Antenna 2

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)
IEEE 802.11b	2412	17.32	53.9511	17 ± 1
	2437	17.42	55.2077	17 ± 1
	2462	17.26	53.2108	17 ± 1
IEEE 802.11g	2412	22.53	179.0606	22 ± 1
	2437	22.32	170.6082	22 ± 1
	2462	22.78	189.6706	22 ± 1
IEEE 802.11n HT20 (2.4G)	2412	22.20	165.9587	22 ± 1
	2437	22.46	176.1976	22 ± 1
	2462	22.81	190.9853	22 ± 1
IEEE 802.11n HT40 (2.4G)	2422	22.37	172.5838	22 ± 1
	2437	22.36	172.1869	22 ± 1
	2452	22.38	172.9816	22 ± 1
IEEE 802.11a	5180	12.272	16.8733	12 ± 1
	5200	12.399	17.3740	12 ± 1
	5240	12.626	18.3063	12 ± 1
	5260	13.397	21.8625	13 ± 1
	5300	13.356	21.6571	13 ± 1
	5320	13.378	21.7671	13 ± 1
	5500	13.790	23.9332	13 ± 1
	5580	14.194	26.2664	14 ± 1
	5700	14.733	29.7372	14 ± 1
	5745	11.487	14.0832	11 ± 1
	5785	11.510	14.1579	11 ± 1
5825	11.602	14.4611	11 ± 1	
IEEE 802.11n HT20 (5G)	5180	11.219	13.2404	11 ± 1
	5200	11.355	13.6616	11 ± 1
	5240	11.712	14.8320	11 ± 1
	5260	12.581	18.1176	12 ± 1
	5300	12.611	18.2432	12 ± 1
	5320	12.717	18.6939	12 ± 1
	5500	13.098	20.4080	13 ± 1
	5580	13.394	21.8474	13 ± 1
	5700	13.957	24.8714	13 ± 1

	5745	10.787	11.9867	10±1
	5785	10.790	11.9950	10±1
	5825	10.872	12.2236	10±1
IEEE 802.11ac VHT20	5180	11.227	13.2648	11±1
	5200	11.436	13.9187	11±1
	5240	11.705	14.8081	11±1
	5260	12.461	17.6238	12±1
	5300	12.611	18.2432	12±1
	5320	12.675	18.5140	12±1
	5500	13.117	20.4975	13±1
	5580	13.416	21.9584	13±1
	5700	13.988	25.0496	13±1
	5745	14.164	26.0856	14±1
	5785	14.247	26.5889	14±1
	5825	14.312	26.9898	14±1
IEEE 802.11n HT40 (5G)	5190	12.456	17.6035	12±1
	5230	12.691	18.5823	12±1
	5270	12.908	19.5344	12±1
	5310	13.085	20.3470	13±1
	5510	13.519	22.4854	13±1
	5590	13.926	24.6945	13±1
	5670	14.325	27.0707	14±1
	5755	14.682	29.3900	14±1
	5795	14.759	29.9158	14±1
IEEE 802.11ac VHT40	5190	12.397	17.3660	12±1
	5230	12.658	18.4417	12±1
	5270	12.836	19.2132	12±1
	5310	12.924	19.6065	12±1
	5510	13.391	21.8323	13±1
	5590	13.713	23.5126	13±1
	5670	14.212	26.3755	14±1
	5755	14.566	28.6154	14±1
	5795	14.630	29.0402	14±1
IEEE 802.11ac VHT80	5210	10.563	11.3841	10±1
	5290	12.582	18.1217	12±1
	5530	13.203	20.9074	13±1
	5610	13.505	22.4130	13±1
	5775	14.111	25.7691	14±1

3. Calculated Result and Limit

Bluetooth

Antenna	MODE	Channel	MAX Target power (dBm)	Antenna gain		Power Density (S) (mW/cm ²)	Limited of Power Density (S) (mW/cm ²)	Test Result
				(dBi)	(Linear)			
Bluetooth	GFSK	2402	7	2.8	1.905	0.0019	1	Complies

WLAN 2.4G SISO

Antenna	MODE	Channel	MAX Target power (dBm)	Antenna gain		Power Density (S) (mW/cm ²)	Limited of Power Density (S) (mW/cm ²)	Test Result
				(dBi)	(Linear)			
1	IEEE	2462	23	1.5	1.413	0.0561	1	Complies
2	802.11g	2462	23	1.5	1.413	0.0561	1	Complies

WLAN 2.4G MIMO

Worst case	Channel	Target power (dBm)	Target power (dBm)	Power Density (S) (mW/cm ²)	Power Density (S) (mW/cm ²)	Total Ratio	Limit Ratio	Test Result
		Antenna 1	Antenna 2	Antenna 1	Antenna 2			
IEEE 802.11n HT20	2462	23	23	0.0561	0.0561	0.1122	1	Complies

WLAN 5G SISO

Antenna	Channel	MAX Target power (dBm)	Antenna gain		Power Density (S) (mW/cm ²)	Limited of Power Density (S) (mW/cm ²)	Test Result
			(dBi)	(Linear)			
1	5825	16	4.8	3.020	0.0239	1	Complies
2	5700	15	4.8	3.020	0.0190	1	Complies

WLAN 5G MIMO

Worst case	Channel	Target power (dBm)	Target power (dBm)	Power Density (S) (mW/cm ²)	Power Density (S) (mW/cm ²)	Total Ratio	Limit Ratio	Test Result
		Antenna 1	Antenna 2	Antenna 1	Antenna 2			
IEEE802.11n HT 40	5795	15	15	0.0190	0.0190	0.038	1	Complies

Bluetooth+ WLAN

MAX Power Density (S) (mW/cm ²) Bluetooth	MAX Power Density (S) (mW/cm ²) WiFi	Total Ratio	Limit Ratio	Test Result
0.0019	0.1122	0.1141	1	Complies

End of Test Report