FCC 47 CFR MPE REPORT

Touchjet, Inc.

WAVE+Lily

Model Number: TW6

FCC ID: 2AJZVTW6

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Maximum Permissible Exposure

1、Applicable Standard

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.

(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/cm2)	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/cm2)	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.o	30

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

2、MPE Calculation Method

E (V/m) = (30*P*G) 0.5/d Power Density: Pd (W/m2) = E2/377

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 = (30*P*G) / (377*d2)

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

3、Conducted Power Result

3.1 Antenna 1

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11b	2412	14.790	30.130	14±1	2.5	1.778
	2437	15.290	33.806	15±1	2.5	1.778
	2462	15.940	39.264	15±1	2.5	1.778
IEEE 802.11g	2412	20.430	110.408	20±1	2.5	1.778
	2437	20.920	123.595	20±1	2.5	1.778
	2462	21.280	134.276	21±1	2.5	1.778
IEEE 802.11n HT20	2412	21.060	127.644	21±1	2.5	1.778
	2437	21.420	138.676	21±1	2.5	1.778
	2462	21.820	152.055	21±1	2.5	1.778
IEEE 802.11a	5180	12.149	16.402	12±1	2.5	1.778
	5200	12.042	16.003	12±1	2.5	1.778
	5240	12.001	15.853	12±1	2.5	1.778
	5260	12.005	15.867	12±1	2.5	1.778
	5300	11.996	15.834	11±1	2.5	1.778
	5320	12.092	16.188	12±1	2.5	1.778
	5500	11.090	12.853	11±1	2.5	1.778
	5580	11.024	12.659	11±1	2.5	1.778
	5700	10.145	10.340	10±1	2.5	1.778
	5745	11.235	13.289	11±1	2.5	1.778
	5785	11.005	12.604	11±1	2.5	1.778
	5825	11.654	14.635	11±1	2.5	1.778

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT20	5180	11.915	15.542	11±1	2.5	1.778
	5200	12.012	15.893	12±1	2.5	1.778
	5240	11.986	15.798	11±1	2.5	1.778
	5260	12.268	16.858	12±1	2.5	1.778
	5300	12.452	17.587	12±1	2.5	1.778
	5320	12.243	16.761	12±1	2.5	1.778
	5500	11.168	13.086	11±1	2.5	1.778
	5580	11.163	13.071	11±1	2.5	1.778
	5700	9.738	9.415	9±1	2.5	1.778
	5745	11.000	12.589	11±1	2.5	1.778
	5785	10.963	12.482	10±1	2.5	1.778
	5825	11.658	14.649	11±1	2.5	1.778
IEEE 802.11ac VHT20	5180	12.166	16.466	12±1	2.5	1.778
	5200	12.142	16.376	12±1	2.5	1.778
	5240	12.362	17.227	12±1	2.5	1.778
	5260	11.856	15.332	11±1	2.5	1.778
	5300	11.897	15.477	11±1	2.5	1.778
	5320	11.897	15.477	11±1	2.5	1.778
	5500	11.007	12.610	11±1	2.5	1.778
	5580	10.968	12.497	10±1	2.5	1.778
	5700	9.974	9.940	9±1	2.5	1.778
	5745	10.987	12.552	10±1	2.5	1.778
	5785	10.369	10.887	10±1	2.5	1.778
	5825	10.450	11.092	10±1	2.5	1.778

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT40	5190	11.461	13.999	11±1	2.5	1.778
	5230	11.410	13.836	11±1	2.5	1.778
	5270	12.854	19.293	12±1	2.5	1.778
	5310	12.799	19.050	12±1	2.5	1.778
	5510	11.739	14.925	11±1	2.5	1.778
	5670	9.659	9.245	9±1	2.5	1.778
	5755	11.213	13.222	11±1	2.5	1.778
	5795	11.256	13.354	11±1	2.5	1.778
IEEE 802.11ac VHT40	5190	11.803	15.146	11±1	2.5	1.778
	5230	11.842	15.283	11±1	2.5	1.778
	5270	12.398	17.370	12±1	2.5	1.778
	5310	12.578	18.105	12±1	2.5	1.778
	5510	11.836	15.262	11±1	2.5	1.778
	5670	9.753	9.447	9±1	2.5	1.778
	5755	11.144	13.014	11±1	2.5	1.778
	5795	10.189	10.445	10±1	2.5	1.778
IEEE 802.11ac VHT80	5210	10.976	12.520	10±1	2.5	1.778
	5290	11.780	15.066	11±1	2.5	1.778
	5530	10.773	11.948	10±1	2.5	1.778
	5775	11.236	13.292	11±1	2.5	1.778

3.2 Antenna 2

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
GFSK	2402	3.930	2.472	3±1	2.5	1.778
	2441	4.930	3.112	4±1	2.5	1.778
	2480	4.220	2.642	4±1	2.5	1.778
8-DPSK	2402	4.090	2.564	4±1	2.5	1.778
	2441	4.080	2.559	4±1	2.5	1.778
	2480	3.720	2.355	3±1	2.5	1.778
BLE	2402	4.500	2.818	4±1	2.5	1.778
	2440	4.250	2.661	4±1	2.5	1.778
	2480	4.140	2.594	4±1	2.5	1.778
IEEE 802.11b	2412	19.930	98.401	19±1	2.5	1.778
	2437	20.040	100.925	20±1	2.5	1.778
	2462	19.880	97.275	19±1	2.5	1.778
IEEE 802.11g	2412	19.690	93.111	19±1	2.5	1.778
	2437	19.760	94.624	19±1	2.5	1.778
	2462	19.450	88.105	19±1	2.5	1.778
IEEE 802.11n HT20	2412	21.550	142.889	21±1	2.5	1.778
	2437	21.690	147.571	21±1	2.5	1.778
	2462	21.270	133.968	21±1	2.5	1.778
IEEE 802.11a	5180	11.457	13.986	11±1	2.5	1.778
	5200	11.485	14.077	11±1	2.5	1.778
	5240	11.246	13.323	11±1	2.5	1.778
	5260	12.124	16.308	12±1	2.5	1.778
	5300	12.099	16.214	12±1	2.5	1.778
	5320	12.133	16.342	12±1	2.5	1.778
	5500	11.231	13.277	11±1	2.5	1.778
	5580	11.635	14.571	11±1	2.5	1.778
	5700	10.098	10.228	10±1	2.5	1.778
	5745	11.369	13.706	11±1	2.5	1.778
	5785	11.325	13.568	11±1	2.5	1.778
	5825	11.689	14.754	11±1	2.5	1.778

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT20	5180	11.112	12.918	11±1	2.5	1.778
	5200	11.147	13.023	11±1	2.5	1.778
	5240	11.112	12.918	11±1	2.5	1.778
	5260	11.458	13.989	11±1	2.5	1.778
	5300	11.647	14.612	11±1	2.5	1.778
	5320	11.728	14.887	11±1	2.5	1.778
	5500	10.966	12.491	10±1	2.5	1.778
	5580	10.546	11.340	10±1	2.5	1.778
	5700	10.122	10.285	10±1	2.5	1.778
	5745	10.998	12.583	10±1	2.5	1.778
	5785	10.987	12.552	10±1	2.5	1.778
	5825	11.258	13.360	11±1	2.5	1.778
IEEE 802.11ac VHT20	5180	11.129	12.969	11±1	2.5	1.778
	5200	11.142	13.008	11±1	2.5	1.778
	5240	11.364	13.690	11±1	2.5	1.778
	5260	11.852	15.318	11±1	2.5	1.778
	5300	11.086	12.841	11±1	2.5	1.778
	5320	11.808	15.164	11±1	2.5	1.778
	5500	11.012	12.624	11±1	2.5	1.778
	5580	10.864	12.201	10±1	2.5	1.778
	5700	10.143	10.335	10±1	2.5	1.778
	5745	10.993	12.569	10±1	2.5	1.778
	5785	10.127	10.297	10±1	2.5	1.778
	5825	10.658	11.636	10±1	2.5	1.778

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT40	5190	10.984	12.543	10±1	2.5	1.778
	5230	10.958	12.468	10±1	2.5	1.778
	5270	12.467	17.648	12±1	2.5	1.778
	5310	12.427	17.486	12±1	2.5	1.778
	5510	11.847	15.300	11±1	2.5	1.778
	5670	10.203	10.479	10±1	2.5	1.778
	5755	11.145	13.017	11±1	2.5	1.778
	5795	10.145	10.340	10±1	2.5	1.778
IEEE 802.11ac VHT40	5190	10.950	12.445	10±1	2.5	1.778
	5230	10.996	12.578	10±1	2.5	1.778
	5270	12.638	18.357	12±1	2.5	1.778
	5310	12.585	18.134	12±1	2.5	1.778
	5510	11.811	15.174	11±1	2.5	1.778
	5670	9.905	9.784	9±1	2.5	1.778
	5755	11.475	14.044	11±1	2.5	1.778
	5795	10.289	10.688	10±1	2.5	1.778
IEEE 802.11ac VHT80	5210	10.389	10.937	10±1	2.5	1.778
	5290	11.723	14.870	11±1	2.5	1.778
	5530	10.872	12.224	10±1	2.5	1.778
	5775	10.479	11.166	10±1	2.5	1.778

4、Calculated Result and Limit

4.1 Antenna 1

Mode	Target power（dBm）	Antenna gain		Power Density (S) (mW /cm2)	Limited of Power Density (S) (mW /cm2)	Test Result
		(dBi)	(Linear)			
2.4G Band						
IEEE 802.11b	16	2.5	1.778	**0.01408**	1	Compiles
IEEE 802.11g	22	2.5	1.778	**0.05607**	1	Compiles
IEEE 802.11n HT20	22	2.5	1.778	**0.05607**	1	Compiles
5G Band						
IEEE 802.11a	13	2.5	1.778	**0.00706**	1	Compiles
IEEE 802.11n HT20	13	2.5	1.778	**0.00706**	1	Compiles
IEEE 802.11ac VHT20	13	2.5	1.778	**0.00706**	1	Compiles
IEEE 802.11n HT40	13	2.5	1.778	**0.00706**	1	Compiles
IEEE 802.11ac VHT40	13	2.5	1.778	**0.00706**	1	Compiles
IEEE 802.11ac VHT80	12	2.5	1.778	**0.00561**	1	Compiles

4.2 Antenna 2

Mode	Target power（dBm）	Antenna gain		Power Density (S) (mW /cm2)	Limited of Power Density (S) (mW /cm2)	Test Result
		(dBi)	(Linear)			
2.4G Band						
GFSK	5	2.5	1.778	**0.00112**	1	Compiles
8-DPSK	5	2.5	1.778	**0.00112**	1	Compiles
BLE	5	2.5	1.778	**0.00112**	1	Compiles
IEEE 802.11b	21	2.5	1.778	**0.04454**	1	Compiles
IEEE 802.11g	20	2.5	1.778	**0.03538**	1	Compiles
IEEE 802.11n HT20	22	2.5	1.778	**0.05607**	1	Compiles
5G Band						
IEEE 802.11a	13	2.5	1.778	**0.00706**	1	Compiles
IEEE 802.11n HT20	12	2.5	1.778	**0.00561**	1	Compiles
IEEE 802.11ac VHT20	12	2.5	1.778	**0.00561**	1	Compiles
IEEE 802.11n HT40	13	2.5	1.778	**0.00706**	1	Compiles
IEEE 802.11ac VHT40	13	2.5	1.778	**0.00706**	1	Compiles
IEEE 802.11ac VHT80	12	2.5	1.778	**0.00561**	1	Compiles

4.3 Antenna 1+2

Mode	Power Density (S) (mW /cm2) Antenna 1	Power Density (S) (mW /cm2) Antenna 2	Power Density (S) (mW /cm2) Total	Limited of Power Density (S) (mW /cm2)	Test Result
2.4G Band					
IEEE 802.11n HT20	**0.05607**	**0.05607**	**0.11214**	1	Compiles
5G Band					
IEEE 802.11n HT20	**0.00706**	**0.00561**	**0.01267**	1	Compiles
IEEE 802.11ac VHT20	**0.00706**	**0.00561**	**0.01267**	1	Compiles
IEEE 802.11n HT40	**0.00706**	**0.00706**	**0.01412**	1	Compiles
IEEE 802.11ac VHT40	**0.00706**	**0.00706**	**0.01412**	1	Compiles
IEEE 802.11ac VHT80	**0.00561**	**0.00561**	**0.01122**	1	Compiles

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