

FCC 47 CFR MPE REPORT

The Art of Utility AB

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Model Number: D2061

Additional Model: D2062

FCC ID: 2AKFED206

Applicant:	The Art of Utility AB
Address:	Upplandsgatan 7, 111 23, Stockholm, Sweden
Prepared By:	EST Technology Co., Ltd.
	Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China
Tel: 86-769-83081888-808	

Report Number:	ESTE-R2112193
Date of Test:	Nov. 16~Dec. 20, 2021
Date of Report:	Dec. 21, 2021



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

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
GFSK	2402	4.02	2.5235	4 ± 1	3.12	2.051
	2441	3.85	2.4266	3 ± 1	3.12	2.051
	2480	4.42	2.7669	4 ± 1	3.12	2.051
8-DPSK	2402	4.22	2.6424	4 ± 1	3.12	2.051
	2441	4.00	2.5119	4 ± 1	3.12	2.051
	2480	4.54	2.8445	4 ± 1	3.12	2.051
BLE	2402	3.56	2.2699	3 ± 1	3.12	2.051
	2440	3.30	2.1380	3 ± 1	3.12	2.051
	2480	3.55	2.2646	3 ± 1	3.12	2.051
IEEE 802.11b	2412	14.91	30.9742	14 ± 1	3.12	2.051
	2437	15.08	32.2107	15 ± 1	3.12	2.051
	2462	15.21	33.1894	15 ± 1	3.12	2.051
IEEE 802.11g	2412	21.12	129.4196	21 ± 1	3.12	2.051
	2437	21.19	131.5225	21 ± 1	3.12	2.051
	2462	21.30	134.8963	21 ± 1	3.12	2.051
IEEE 802.11n HT20	2412	20.55	113.5011	20 ± 1	3.12	2.051
	2437	20.71	117.7606	20 ± 1	3.12	2.051
	2462	20.84	121.3389	20 ± 1	3.12	2.051
IEEE 802.11a	5180	13.358	21.6671	13 ± 1	4.61	2.891
	5200	12.894	19.4715	12 ± 1	4.61	2.891
	5240	12.857	19.3063	12 ± 1	4.61	2.891
	5260	12.333	17.1120	12 ± 1	4.61	2.891
	5300	11.391	13.7753	11 ± 1	4.61	2.891
	5320	12.092	16.1883	12 ± 1	4.61	2.891
	5500	10.844	12.1451	10 ± 1	4.61	2.891
	5580	11.178	13.1160	11 ± 1	4.61	2.891
	5700	12.006	15.8708	12 ± 1	4.61	2.891
	5745	13.730	23.6048	13 ± 1	4.61	2.891
	5785	12.932	19.6426	12 ± 1	4.61	2.891
	5825	12.433	17.5106	12 ± 1	4.61	2.891

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT20	5180	12.656	18.4332	12 ± 1	4.61	2.891
	5200	12.297	16.9707	12 ± 1	4.61	2.891
	5240	12.490	17.7419	12 ± 1	4.61	2.891
	5260	11.730	14.8936	11 ± 1	4.61	2.891
	5300	10.765	11.9261	10 ± 1	4.61	2.891
	5320	11.737	14.9176	11 ± 1	4.61	2.891
	5500	11.561	14.3252	11 ± 1	4.61	2.891
	5580	10.876	12.2349	10 ± 1	4.61	2.891
	5700	11.661	14.6589	11 ± 6	4.61	2.891
	5745	13.384	21.7972	13 ± 1	4.61	2.891
	5785	12.492	17.7501	12 ± 1	4.61	2.891
	5825	11.980	15.7761	11 ± 1	4.61	2.891
IEEE 802.11ac VHT20	5180	12.724	18.7241	12 ± 1	4.61	2.891
	5200	12.308	17.0137	12 ± 1	4.61	2.891
	5240	12.623	18.2936	12 ± 1	4.61	2.891
	5260	11.818	15.1985	11 ± 1	4.61	2.891
	5300	10.833	12.1143	10 ± 1	4.61	2.891
	5320	11.878	15.4099	11 ± 1	4.61	2.891
	5500	11.638	14.5814	11 ± 1	4.61	2.891
	5580	10.876	12.2349	10 ± 2	4.61	2.891
	5700	11.689	14.7537	11 ± 1	4.61	2.891
	5745	13.424	21.9989	13 ± 1	4.61	2.891
	5785	12.533	17.9184	12 ± 1	4.61	2.891
	5825	12.019	15.9184	12 ± 1	4.61	2.891

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT40	5190	12.325	17.0805	12 ± 1	4.61	2.891
	5230	12.378	17.2902	12 ± 1	4.61	2.891
	5270	11.029	12.6736	11 ± 1	4.61	2.891
	5310	10.695	11.7355	10 ± 1	4.61	2.891
	5510	11.296	13.4772	11 ± 1	4.61	2.891
	5550	10.790	11.9950	10 ± 1	4.61	2.891
	5670	12.161	16.4475	12 ± 1	4.61	2.891
	5755	13.342	21.5874	13 ± 1	4.61	2.891
	5795	12.264	16.8422	12 ± 1	4.61	2.891
IEEE 802.11ac VHT40	5190	12.255	16.8074	12 ± 1	4.61	2.891
	5230	11.851	15.3144	11 ± 1	4.61	2.891
	5270	10.571	11.4051	10 ± 1	4.61	2.891
	5310	10.703	11.7571	10 ± 1	4.61	2.891
	5510	11.308	13.5145	11 ± 1	4.61	2.891
	5550	10.808	12.0448	10 ± 1	4.61	2.891
	5670	12.169	16.4778	12 ± 1	4.61	2.891
	5755	13.330	21.5278	13 ± 1	4.61	2.891
	5795	12.234	16.7263	12 ± 1	4.61	2.891
IEEE 802.11ac VHT80	5210	11.479	14.0572	11 ± 1	4.61	2.891
	5290	10.447	11.0841	10 ± 1	4.61	2.891
	5530	11.282	13.4338	11 ± 1	4.61	2.891
	5775	10.560	11.3763	10 ± 1	4.61	2.891

3. Calculated Result and Limit

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	5	3.12	2.051	0.0129	1	Complies
8-DPSK	5	3.12	2.051	0.0129	1	Complies
BLE	4	3.12	2.051	0.0103	1	Complies
IEEE 802.11b	16	3.12	2.051	0.1625	1	Complies
IEEE 802.11g	22	3.12	2.051	0.6467	1	Complies
IEEE 802.11n HT20	21	3.12	2.051	0.5137	1	Complies
5G Band						
IEEE 802.11a	14	4.61	2.891	0.1445	1	Complies
IEEE 802.11n HT20	14	4.61	2.891	0.1445	1	Complies
IEEE 802.11ac VHT20	13	4.61	2.891	0.1147	1	Complies
IEEE 802.11n HT40	14	4.61	2.891	0.1445	1	Complies
IEEE 802.11ac VHT40	14	4.61	2.891	0.1445	1	Complies
IEEE 802.11ac VHT80	12	4.61	2.891	0.0911	1	Complies

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