

FCC 47 CFR MPE REPORT

The Art of Utility AB

Defunc HOME LARGE

Model Number: D2071

Additional Model: D2072, D2091, D2092

FCC ID: 2AKFED207

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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

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
GFSK	2402	5.15	3.2734	5 ± 1	3.20	2.089
	2441	4.98	3.1477	4 ± 1	3.20	2.089
	2480	5.04	3.1915	5 ± 1	3.20	2.089
8-DPSK	2402	4.96	3.1333	4 ± 1	3.20	2.089
	2441	4.73	2.9717	4 ± 1	3.20	2.089
	2480	4.60	2.8840	4 ± 1	3.20	2.089
BLE	2402	4.47	2.7990	3 ± 1	3.20	2.089
	2440	4.19	2.6242	3 ± 1	3.20	2.089
	2480	4.03	2.5293	3 ± 1	3.20	2.089
IEEE 802.11b	2412	14.38	27.4157	14 ± 1	3.20	2.089
	2437	15.50	35.4813	15 ± 1	3.20	2.089
	2462	15.64	36.6438	15 ± 1	3.20	2.089
IEEE 802.11g	2412	22.73	187.4995	22 ± 1	3.20	2.089
	2437	22.54	179.4734	22 ± 1	3.20	2.089
	2462	22.91	195.4339	22 ± 1	3.20	2.089
IEEE 802.11n HT20	2412	22.60	181.9701	22 ± 1	3.20	2.089
	2437	22.32	170.6082	22 ± 1	3.20	2.089
	2462	22.79	190.1078	22 ± 1	3.20	2.089
IEEE 802.11a	5180	13.479	22.2792	13 ± 1	4.88	3.076
	5200	13.470	22.2331	13 ± 1	4.88	3.076
	5240	13.672	23.2916	13 ± 1	4.88	3.076
	5260	12.853	19.2886	12 ± 1	4.88	3.076
	5300	12.169	16.4778	12 ± 1	4.88	3.076
	5320	12.912	19.5524	12 ± 1	4.88	3.076
	5500	12.300	16.9824	12 ± 1	4.88	3.076
	5580	11.917	15.5489	11 ± 1	4.88	3.076
	5700	11.952	15.6747	11 ± 1	4.88	3.076
	5745	13.343	21.5924	13 ± 1	4.88	3.076
	5785	12.599	18.1928	12 ± 1	4.88	3.076
	5825	12.469	17.6563	12 ± 1	4.88	3.076

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT20	5180	13.049	20.1790	13 ± 1	4.88	3.076
	5200	12.738	18.7845	12 ± 1	4.88	3.076
	5240	12.951	19.7288	12 ± 1	4.88	3.076
	5260	12.189	16.5539	12 ± 1	4.88	3.076
	5300	11.612	14.4944	11 ± 1	4.88	3.076
	5320	12.311	17.0255	12 ± 1	4.88	3.076
	5500	11.757	14.9865	11 ± 1	4.88	3.076
	5580	11.421	13.8708	11 ± 1	4.88	3.076
	5700	11.328	13.5769	11 ± 1	4.88	3.076
	5745	12.873	19.3776	12 ± 1	4.88	3.076
	5785	12.012	15.8928	12 ± 1	4.88	3.076
	5825	11.912	15.5310	11 ± 1	4.88	3.076
IEEE 802.11ac VHT20	5180	12.695	18.5994	12 ± 1	4.88	3.076
	5200	12.690	18.5780	12 ± 1	4.88	3.076
	5240	12.927	19.6200	12 ± 1	4.88	3.076
	5260	12.164	16.4589	12 ± 1	4.88	3.076
	5300	11.676	14.7096	11 ± 1	4.88	3.076
	5320	12.088	16.1734	12 ± 1	4.88	3.076
	5500	11.549	14.2856	11 ± 1	4.88	3.076
	5580	11.205	13.1978	11 ± 1	4.88	3.076
	5700	11.324	13.5644	11 ± 1	4.88	3.076
	5745	12.905	19.5209	12 ± 1	4.88	3.076
	5785	11.902	15.4953	11 ± 1	4.88	3.076
	5825	11.972	15.7471	11 ± 1	4.88	3.076

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT40	5190	12.816	19.1249	12 ± 1	4.88	3.076
	5230	13.039	20.1326	12 ± 1	4.88	3.076
	5270	11.653	14.6319	11 ± 1	4.88	3.076
	5310	11.799	15.1321	10 ± 1	4.88	3.076
	5510	11.448	13.9573	11 ± 1	4.88	3.076
	5590	11.103	12.8914	10 ± 1	4.88	3.076
	5670	12.160	16.4437	12 ± 1	4.88	3.076
	5755	12.736	18.7759	13 ± 1	4.88	3.076
	5795	11.788	15.0938	12 ± 1	4.88	3.076
IEEE 802.11ac VHT40	5190	12.579	18.1092	12 ± 1	4.88	3.076
	5230	12.893	19.4670	11 ± 1	4.88	3.076
	5270	11.551	14.2922	10 ± 1	4.88	3.076
	5310	11.809	15.1670	10 ± 1	4.88	3.076
	5510	11.637	14.5781	11 ± 1	4.88	3.076
	5590	11.116	12.9300	10 ± 1	4.88	3.076
	5670	12.100	16.2181	12 ± 1	4.88	3.076
	5755	12.727	18.7370	13 ± 1	4.88	3.076
	5795	11.688	14.7503	12 ± 1	4.88	3.076
IEEE 802.11ac VHT80	5210	12.166	16.4665	11 ± 1	4.88	3.076
	5290	11.143	13.0107	10 ± 1	4.88	3.076
	5530	11.538	14.2495	11 ± 1	4.88	3.076
	5610	10.753	11.8932	10 ± 1	4.88	3.076

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	5.15	3.20	2.089	0.0014	1	Compiles
8-DPSK	4.96	3.20	2.089	0.0013	1	Compiles
BLE	4.47	3.20	2.089	0.0012	1	Compiles
IEEE 802.11b	15.64	3.20	2.089	0.0152	1	Compiles
IEEE 802.11g	22.91	3.20	2.089	0.0812	1	Compiles
IEEE 802.11n HT20	22.79	3.20	2.089	0.0790	1	Compiles
5G Band						
IEEE 802.11a	13.672	4.88	3.016	0.0143	1	Compiles
IEEE 802.11n HT20	13.049	4.88	3.016	0.0123	1	Compiles
IEEE 802.11ac VHT20	12.927	4.88	3.016	0.0120	1	Compiles
IEEE 802.11n HT40	12.816	4.88	3.016	0.0117	1	Compiles
IEEE 802.11ac VHT40	12.727	4.88	3.016	0.0115	1	Compiles
IEEE 802.11ac VHT80	12.166	4.88	3.016	0.0101	1	Compiles

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

End of Test Report