

FCC 47 CFR MPE REPORT

Soundlab Technology Company Limited

Soundbar

Model Number: Klipsch Cinema 800 Sound bar

FCC ID: 2ATKO-BAR800

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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	3.68	2.333	3±2	2.34	1.71
	2441	3.62	2.301	3±2	2.34	1.71
	2480	3.44	2.208	3±2	2.34	1.71
8-DPSK	2402	6.49	4.457	6±2	2.34	1.71
	2441	6.38	4.345	6±2	2.34	1.71
	2480	6.20	4.169	6±2	2.34	1.71
BLE(1M)	2402	3.65	2.317	3±2	2.34	1.71
	2440	3.53	2.254	3±2	2.34	1.71
	2480	3.31	2.143	3±2	2.34	1.71
BLE(2M)	2402	3.66	2.323	3±2	2.34	1.71
	2440	3.54	2.259	3±2	2.34	1.71
	2480	3.30	2.138	3±2	2.34	1.71
IEEE 802.11b	2412	15.45	35.075	15±2	2.34	1.71
	2437	15.21	33.189	15±2	2.34	1.71
	2462	14.82	30.339	14±2	2.34	1.71
IEEE 802.11g	2412	18.73	74.645	18±2	2.34	1.71
	2437	18.50	70.795	18±2	2.34	1.71
	2462	18.12	64.863	18±2	2.34	1.71
IEEE 802.11n HT20	2412	19.00	79.433	19±2	2.34	1.71
	2437	18.89	77.446	18±2	2.34	1.71
	2462	18.56	71.779	18±2	2.34	1.71
IEEE 802.11n HT40	2422	19.79	95.280	19±2	2.34	1.71
	2437	19.74	94.189	19±2	2.34	1.71
	2452	19.64	92.045	19±2	2.34	1.71
IEEE 802.11a	5180	10.22	10.520	10±2	3.28	2.13
	5200	11.04	12.706	11±2	3.28	2.13
	5240	11.10	12.882	11±2	3.28	2.13
	5260	11.46	13.996	11±2	3.28	2.13
	5300	11.53	14.223	11±2	3.28	2.13
	5320	11.59	14.421	11±2	3.28	2.13
	5500	15.52	35.645	15±2	3.28	2.13
	5580	15.06	32.063	15±2	3.28	2.13
	5700	12.87	19.364	12±2	3.28	2.13

	5745	10.41	10.990	10±2	3.28	2.13
	5785	11.27	13.397	11±2	3.28	2.13
	5825	10.72	11.803	10±2	3.28	2.13

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT20	5180	10.28	10.666	10±2	3.28	2.13
	5200	10.15	10.351	10±2	3.28	2.13
	5240	11.22	13.243	11±2	3.28	2.13
	5260	11.59	14.421	11±2	3.28	2.13
	5300	11.65	14.622	11±2	3.28	2.13
	5320	11.69	14.757	11±2	3.28	2.13
	5500	15.61	36.392	15±2	3.28	2.13
	5580	15.15	32.734	15±2	3.28	2.13
	5700	12.98	19.861	12±2	3.28	2.13
	5745	10.58	11.429	10±2	3.28	2.13
	5785	11.42	13.868	11±2	3.28	2.13
	5825	10.88	12.246	10±2	3.28	2.13
IEEE 802.11ac VHT20	5180	10.65	11.614	10±2	3.28	2.13
	5200	10.49	11.194	10±2	3.28	2.13
	5240	11.53	14.223	11±2	3.28	2.13
	5260	11.88	15.417	11±2	3.28	2.13
	5300	11.93	15.596	11±2	3.28	2.13
	5320	14.50	28.184	14±2	3.28	2.13
	5500	14.69	29.444	14±2	3.28	2.13
	5580	12.84	19.231	12±2	3.28	2.13
	5700	10.75	11.885	10±2	3.28	2.13
	5745	11.65	14.622	11±2	3.28	2.13
	5785	11.11	12.912	11±2	3.28	2.13
	5825	11.07	12.794	11±2	3.28	2.13

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT40	5190	10.18	10.423	10±2	3.28	2.13
	5230	11.03	12.677	11±2	3.28	2.13
	5270	11.57	14.355	11±2	3.28	2.13
	5310	11.74	14.928	11±2	3.28	2.13
	5510	15.44	34.995	15±2	3.28	2.13
	5670	12.43	17.498	12±2	3.28	2.13
	5755	10.67	11.668	10±2	3.28	2.13
	5795	11.46	13.996	11±2	3.28	2.13
IEEE 802.11ac VHT40	5190	10.30	10.715	10±2	3.28	2.13
	5230	11.15	13.032	11±2	3.28	2.13
	5270	11.67	14.689	11±2	3.28	2.13
	5310	11.84	15.276	11±2	3.28	2.13
	5510	15.51	35.563	15±2	3.28	2.13
	5670	12.48	17.701	12±2	3.28	2.13
	5755	10.76	11.912	10±2	3.28	2.13
	5795	11.54	14.256	11±2	3.28	2.13
IEEE 802.11ac VHT80	5210	10.76	11.912	10±2	3.28	2.13
	5290	11.81	15.171	11±2	3.28	2.13
	5530	15.62	36.475	15±2	3.28	2.13
	5775	14.96	31.333	14±2	3.28	2.13

Antenna 2

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
GFSK	2402	3.79	2.393	3±2	2.34	1.71
	2441	3.65	2.317	3±2	2.34	1.71
	2480	3.44	2.208	3±2	2.34	1.71
8-DPSK	2402	6.59	4.560	6±2	2.34	1.71
	2441	6.39	4.355	6±2	2.34	1.71
	2480	6.18	4.150	6±2	2.34	1.71
BLE(1M)	2402	3.75	2.371	3±2	2.34	1.71
	2440	3.58	2.280	3±2	2.34	1.71
	2480	3.36	2.168	3±2	2.34	1.71
BLE(2M)	2402	3.77	2.382	3±2	2.34	1.71
	2440	3.57	2.275	3±2	2.34	1.71
	2480	3.35	2.163	3±2	2.34	1.71
IEEE 802.11b	2412	15.71	37.239	15±2	2.34	1.71
	2437	15.38	34.514	15±2	2.34	1.71
	2462	14.87	30.690	14±2	2.34	1.71
IEEE 802.11g	2412	18.86	76.913	18±2	2.34	1.71
	2437	18.56	71.779	18±2	2.34	1.71
	2462	18.02	63.387	18±2	2.34	1.71
IEEE 802.11n HT20	2412	19.27	84.528	19±2	2.34	1.71
	2437	19.01	79.616	19±2	2.34	1.71
	2462	18.62	72.778	18±2	2.34	1.71
IEEE 802.11n HT40	2422	19.86	96.828	19±2	2.34	1.71
	2437	19.85	96.605	19±2	2.34	1.71
	2452	19.65	92.257	19±2	2.34	1.71
IEEE 802.11a	5180	10.11	10.257	10±2	3.28	2.13
	5200	10.02	10.046	10±2	3.28	2.13
	5240	11.11	12.912	11±2	3.28	2.13
	5260	11.47	14.028	11±2	3.28	2.13
	5300	11.54	14.256	11±2	3.28	2.13
	5320	11.60	14.454	11±2	3.28	2.13
	5500	15.54	35.810	15±2	3.28	2.13
	5580	15.07	32.137	15±2	3.28	2.13
	5700	12.88	19.409	12±2	3.28	2.13
	5745	10.42	11.015	10±2	3.28	2.13

	5785	11.27	13.397	11±2	3.28	2.13
	5825	10.72	11.803	10±2	3.28	2.13

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT20	5180	10.25	10.593	10±2	3.28	2.13
	5200	10.13	10.304	10±2	3.28	2.13
	5240	11.21	13.213	11±2	3.28	2.13
	5260	11.55	14.289	11±2	3.28	2.13
	5300	11.63	14.555	11±2	3.28	2.13
	5320	11.68	14.723	11±2	3.28	2.13
	5500	15.60	36.308	15±2	3.28	2.13
	5580	15.13	32.584	15±2	3.28	2.13
	5700	12.97	19.815	12±2	3.28	2.13
	5745	10.56	11.376	10±2	3.28	2.13
	5785	11.39	13.772	11±2	3.28	2.13
	5825	10.85	12.162	10±2	3.28	2.13
IEEE 802.11ac VHT20	5180	10.64	11.588	10±2	3.28	2.13
	5200	10.48	11.169	10±2	3.28	2.13
	5240	11.51	14.158	11±2	3.28	2.13
	5260	11.85	15.311	11±2	3.28	2.13
	5300	11.90	15.488	11±2	3.28	2.13
	5320	11.97	15.740	11±2	3.28	2.13
	5500	15.64	36.644	15±2	3.28	2.13
	5580	15.11	32.434	15±2	3.28	2.13
	5700	13.07	20.277	13±2	3.28	2.13
	5745	10.77	11.940	10±2	3.28	2.13
	5785	11.63	14.555	11±2	3.28	2.13
	5825	11.07	12.794	11±2	3.28	2.13

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT40	5190	10.18	10.423	10±2	3.28	2.13
	5230	11.48	14.060	11±2	3.28	2.13
	5270	11.62	14.521	11±2	3.28	2.13
	5310	14.19	26.242	14±2	3.28	2.13
	5510	14.65	29.174	14±2	3.28	2.13
	5670	12.67	18.493	12±2	3.28	2.13
	5755	10.88	12.246	10±2	3.28	2.13
	5795	11.64	14.588	11±2	3.28	2.13
IEEE 802.11ac VHT40	5190	10.29	10.691	10±2	3.28	2.13
	5230	11.14	13.002	11±2	3.28	2.13
	5270	11.67	14.689	11±2	3.28	2.13
	5310	11.83	15.241	11±2	3.28	2.13
	5510	15.50	35.481	15±2	3.28	2.13
	5670	12.47	17.660	12±2	3.28	2.13
	5755	10.76	11.912	10±2	3.28	2.13
	5795	11.55	14.289	11±2	3.28	2.13
IEEE 802.11ac VHT80	5210	10.77	11.940	10±2	3.28	2.13
	5290	11.81	15.171	11±2	3.28	2.13
	5530	15.61	36.392	15±2	3.28	2.13
	5775	14.97	31.405	14±2	3.28	2.13

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	5	2.34	1.71	0.00108	1	Compiles
8-DPSK	8	2.34	1.71	0.00215	1	Compiles
BLE	5	2.34	1.71	0.00108	1	Compiles
IEEE 802.11b	17	2.34	1.71	0.01709	1	Compiles
IEEE 802.11g	20	2.34	1.71	0.03410	1	Compiles
IEEE 802.11n HT20	21	2.34	1.71	0.04293	1	Compiles
IEEE 802.11n HT40	21	2.34	1.71	0.04293	1	Compiles
5G Band						
IEEE 802.11a	17	3.28	2.13	0.02122	1	Compiles
IEEE 802.11n HT20	17	3.28	2.13	0.02122	1	Compiles
IEEE 802.11ac VHT20	16	3.28	2.13	0.01686	1	Compiles
IEEE 802.11n HT40	17	3.28	2.13	0.02122	1	Compiles
IEEE 802.11ac VHT40	17	3.28	2.13	0.02122	1	Compiles
IEEE 802.11ac VHT80	17	3.28	2.13	0.02122	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						
GFSK	5	2.34	1.71	0.00108	1	Compiles
8-DPSK	8	2.34	1.71	0.00215	1	Compiles
BLE	5	2.34	1.71	0.00108	1	Compiles
IEEE 802.11b	17	2.34	1.71	0.01709	1	Compiles
IEEE 802.11g	20	2.34	1.71	0.03410	1	Compiles
IEEE 802.11n HT20	21	2.34	1.71	0.04293	1	Compiles
IEEE 802.11n HT40	21	2.34	1.71	0.04293	1	Compiles
5G Band						
IEEE 802.11a	17	3.28	2.13	0.02122	1	Compiles
IEEE 802.11n HT20	17	3.28	2.13	0.02122	1	Compiles
IEEE 802.11ac VHT20	17	3.28	2.13	0.02122	1	Compiles
IEEE 802.11n HT40	16	3.28	2.13	0.01686	1	Compiles
IEEE 802.11ac VHT40	17	3.28	2.13	0.02122	1	Compiles
IEEE 802.11ac VHT80	17	3.28	2.13	0.02122	1	Compiles

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

For 2.4G SRD

Ant gain=1.34dBi

Ant numeric gain= 1.361

Field strength = 66.45 dBuV/m@3m

$P = \{ [10^{(66.45/20)} / 10^6 * 3]^2 / (30 * 1.361) \} * 1000 \text{mW} = 0.001 \text{mW}$

$Pd = (30 * 0.001 * 1.361) / (377 * 20^2) = 0.0000003 < 1$

End of Test Report