

FCC 47 CFR MPE REPORT

Acer Incorporated

Halo Smart Speaker

Model Number: HSP3100G

FCC ID: HLZSP3100

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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	3.82	2.410	3±2	2.2	1.66
	2441	4.34	2.716	4±2	2.2	1.66
	2480	4.84	3.048	4±2	2.2	1.66
8-DPSK	2402	5.41	3.475	5±2	2.2	1.66
	2441	5.80	3.802	5±2	2.2	1.66
	2480	5.79	3.793	5±2	2.2	1.66
BLE(1M)	2402	3.51	2.244	3±2	2.2	1.66
	2440	4.09	2.564	4±2	2.2	1.66
	2480	4.17	2.612	4±2	2.2	1.66
BLE(2M)	2402	3.94	2.477	3±2	2.2	1.66
	2440	4.16	2.606	4±2	2.2	1.66
	2480	3.97	2.495	3±2	2.2	1.66
IEEE 802.11b	2412	15.93	39.174	15±2	2.2	1.66
	2437	15.88	38.726	15±2	2.2	1.66
	2462	15.25	33.497	15±2	2.2	1.66
IEEE 802.11g	2412	19.60	91.201	19±2	2.2	1.66
	2437	19.34	85.901	19±2	2.2	1.66
	2462	18.80	75.858	18±2	2.2	1.66
IEEE 802.11n HT20	2412	18.15	65.313	18±2	2.2	1.66
	2437	18.05	63.826	18±2	2.2	1.66
	2462	17.54	56.754	17±2	2.2	1.66
IEEE 802.11a	5180	12.02	15.922	12±2	3.4	2.19
	5200	12.07	16.106	12±2	3.4	2.19
	5240	12.29	16.943	12±2	3.4	2.19
	5260	12.16	16.444	12±2	3.4	2.19
	5300	12.38	17.298	12±2	3.4	2.19
	5320	12.36	17.219	12±2	3.4	2.19
	5500	11.87	15.382	11±2	3.4	2.19
	5580	11.89	15.453	11±2	3.4	2.19
	5700	11.72	14.859	11±2	3.4	2.19
	5745	12.19	16.558	12±2	3.4	2.19

	5785	12.05	16.032	12±2	3.4	2.19
	5825	12.07	16.106	12±2	3.4	2.19

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT20	5180	4.16	2.606	4±2	3.4	2.19
	5200	3.48	2.228	3±2	3.4	2.19
	5240	3.69	2.339	3±2	3.4	2.19
	5260	11.31	13.521	11±2	3.4	2.19
	5300	11.46	13.996	11±2	3.4	2.19
	5320	11.38	13.740	11±2	3.4	2.19
	5500	10.84	12.134	10±2	3.4	2.19
	5580	10.93	12.388	10±2	3.4	2.19
	5700	10.73	11.830	10±2	3.4	2.19
	5745	11.17	13.092	11±2	3.4	2.19
	5785	11.12	12.942	11±2	3.4	2.19
	5825	11.09	12.853	11±2	3.4	2.19
IEEE 802.11ac VHT20	5180	4.19	2.624	4±2	3.4	2.19
	5200	4.05	2.541	4±2	3.4	2.19
	5240	4.69	2.944	4±2	3.4	2.19
	5260	11.99	15.812	11±2	3.4	2.19
	5300	12.03	15.959	12±2	3.4	2.19
	5320	12.06	16.069	12±2	3.4	2.19
	5500	11.93	15.596	11±2	3.4	2.19
	5580	11.40	13.804	11±2	3.4	2.19
	5700	11.01	12.618	11±2	3.4	2.19
	5745	10.01	10.023	10±2	3.4	2.19
	5785	11.05	12.735	11±2	3.4	2.19
	5825	10.25	10.593	10±2	3.4	2.19

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT40	5190	6.13	4.102	6±2	3.4	2.19
	5230	6.25	4.217	6±2	3.4	2.19
	5270	10.41	10.990	10±2	3.4	2.19
	5310	10.50	11.220	10±2	3.4	2.19
	5510	11.62	14.521	11±2	3.4	2.19
	5670	12.90	19.498	10±2	3.4	2.19
	5755	12.78	18.967	9±2	3.4	2.19
	5795	11.94	15.631	11±2	3.4	2.19
IEEE 802.11ac VHT40	5190	8.51	7.096	14±2	3.4	2.19
	5230	8.85	7.674	8±2	3.4	2.19
	5270	12.87	19.364	12±2	3.4	2.19
	5310	13.00	19.953	13±2	3.4	2.19
	5510	12.90	19.498	12±2	3.4	2.19
	5670	11.94	15.631	11±2	3.4	2.19
	5755	11.44	13.932	11±2	3.4	2.19
	5795	12.18	16.520	12±2	3.4	2.19
IEEE 802.11ac VHT80	5210	9.61	9.141	9±2	3.4	2.19
	5290	14.62	28.973	14±2	3.4	2.19
	5530	12.89	19.454	12±2	3.4	2.19
	5775	13.16	20.701	13±2	3.4	2.19

Antenna 2

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11b	2412	16.94	49.431	16±2	2.5	1.78
	2437	16.76	47.424	16±2	2.5	1.78
	2462	16.43	43.954	16±2	2.5	1.78
IEEE 802.11g	2412	20.85	121.619	20±2	2.5	1.78
	2437	20.44	110.662	20±2	2.5	1.78
	2462	20.29	106.905	20±2	2.5	1.78
IEEE 802.11n HT20	2412	19.11	81.470	19±2	2.5	1.78
	2437	19.00	79.433	19±2	2.5	1.78
	2462	18.60	72.444	18±2	2.5	1.78
IEEE 802.11a	5180	11.86	15.346	11±2	2.8	1.91
	5200	12.11	16.255	12±2	2.8	1.91
	5240	12.27	16.866	12±2	2.8	1.91
	5260	12.13	16.331	12±2	2.8	1.91
	5300	12.41	17.418	12±2	2.8	1.91
	5320	12.25	16.788	12±2	2.8	1.91
	5500	11.69	14.757	11±2	2.8	1.91
	5580	11.94	15.631	11±2	2.8	1.91
	5700	11.66	14.655	11±2	2.8	1.91
	5745	12.53	17.906	12±2	2.8	1.91
	5785	11.84	15.276	11±2	2.8	1.91
	5825	12.24	16.749	12±2	2.8	1.91

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT20	5180	3.49	2.234	3±2	2.8	1.91
	5200	3.86	2.432	3±2	2.8	1.91
	5240	4.07	2.553	4±2	2.8	1.91
	5260	11.13	12.972	11±2	2.8	1.91
	5300	11.27	13.397	11±2	2.8	1.91
	5320	11.05	12.735	11±2	2.8	1.91
	5500	10.46	11.117	10±2	2.8	1.91
	5580	10.79	11.995	10±2	2.8	1.91
	5700	10.56	11.376	10±2	2.8	1.91
	5745	11.43	13.900	11±2	2.8	1.91
	5785	10.85	12.162	10±2	2.8	1.91
	5825	11.19	13.152	11±2	2.8	1.91
IEEE 802.11ac VHT20	5180	4.44	2.780	4±2	2.8	1.91
	5200	4.57	2.864	4±2	2.8	1.91
	5240	5.00	3.162	5±2	2.8	1.91
	5260	12.16	16.444	12±2	2.8	1.91
	5300	12.33	17.108	12±2	2.8	1.91
	5320	12.10	16.229	12±2	2.8	1.91
	5500	11.61	14.488	11±2	2.8	1.91
	5580	11.09	12.853	11±2	2.8	1.91
	5700	10.66	11.641	10±2	2.8	1.91
	5745	9.76	9.462	9±2	2.8	1.91
	5785	11.07	12.794	11±2	2.8	1.91
	5825	10.07	10.162	10±2	2.8	1.91

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT40	5190	6.38	4.345	6±2	2.8	1.91
	5230	6.59	4.560	6±2	2.8	1.91
	5270	10.34	10.814	10±2	2.8	1.91
	5310	10.41	10.990	10±2	2.8	1.91
	5510	11.71	14.825	11±2	2.8	1.91
	5670	12.33	17.100	12±2	2.8	1.91
	5755	12.41	17.418	12±2	2.8	1.91
	5795	12.39	17.338	12±2	2.8	1.91
IEEE 802.11ac VHT40	5190	8.86	7.691	8±2	2.8	1.91
	5230	9.33	8.570	9±2	2.8	1.91
	5270	13.20	20.893	13±2	2.8	1.91
	5310	13.11	20.464	13±2	2.8	1.91
	5510	12.47	17.660	12±2	2.8	1.91
	5670	11.65	14.622	11±2	2.8	1.91
	5755	11.43	13.900	11±2	2.8	1.91
	5795	12.33	17.100	12±2	2.8	1.91
IEEE 802.11ac VHT80	5210	9.61	9.141	8±2	2.8	1.91
	5290	14.60	28.840	8±2	2.8	1.91
	5530	12.96	19.770	10±2	2.8	1.91
	5775	13.15	20.654	9±2	2.8	1.91

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	6	2.2	1.66	0.00131	1	Compiles
8-DPSK	7	2.2	1.66	0.00165	1	Compiles
BLE	6	2.2	1.66	0.00131	1	Compiles
IEEE 802.11b	17	2.2	1.66	0.01655	1	Compiles
IEEE 802.11g	21	2.2	1.66	0.04157	1	Compiles
IEEE 802.11n HT20	20	2.2	1.66	0.03302	1	Compiles
5G Band						
IEEE 802.11a	14	3.4	2.19	0.00609	1	Compiles
IEEE 802.11n HT20	13	3.4	2.19	0.00566	1	Compiles
IEEE 802.11ac VHT20	14	3.4	2.19	0.00609	1	Compiles
IEEE 802.11n HT40	14	3.4	2.19	0.00609	1	Compiles
IEEE 802.11ac VHT40	15	3.4	2.19	0.00653	1	Compiles
IEEE 802.11ac VHT80	16	3.4	2.19	0.00696	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						
IEEE 802.11b	18	2.5	1.78	0.02232	1	Compiles
IEEE 802.11g	22	2.5	1.78	0.05607	1	Compiles
IEEE 802.11n HT20	21	2.5	1.78	0.04454	1	Compiles
5G Band						
IEEE 802.11a	14	2.8	1.91	0.00952	1	Compiles
IEEE 802.11n HT20	13	2.8	1.91	0.00756	1	Compiles
IEEE 802.11ac VHT20	14	2.8	1.91	0.00952	1	Compiles
IEEE 802.11n HT40	14	2.8	1.91	0.00952	1	Compiles
IEEE 802.11ac VHT40	14	2.8	1.91	0.00952	1	Compiles
IEEE 802.11ac VHT80	15	2.8	1.91	0.01199	1	Compiles

Antenna 1+2

Mode	Power Density (S) (mW/cm ²) Antenna 1	Power Density (S) (mW/cm ²) Antenna 2	Power Density (S) (mW/cm ²) Total	Limited of Power Density (S) (mW/cm ²)	Test Result
2.4G Band					
IEEE 802.11n HT20	0.03302	0.04454	0.07756	1	Compiles
5G Band					
IEEE 802.11n HT20	0.00566	0.00756	0.01322	1	Compiles
IEEE 802.11ac VHT20	0.00609	0.00952	0.01561	1	Compiles
IEEE 802.11n HT40	0.00609	0.00952	0.01561	1	Compiles
IEEE 802.11ac VHT40	0.00653	0.00952	0.01605	1	Compiles
IEEE 802.11ac VHT80	0.00696	0.01199	0.01895	1	Compiles

End of Test Report