FCC 47 CFR MPE REPORT

Acer Incorporated

Halo Smart Speaker

Model Number: HSP3100G

FCC ID: HLZSP3100A

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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.o	30

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

1.2. MPE Calculation Method

$$E\ (V/m) = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd\ (W/m^2) = \frac{E^2}{377}$$

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)	Antenna	Peak output power (dBm)	Peak output power (mW)
GFSK	2402	ant 1	7.08	5.105
	2441	ant 1	6.94	4.943
	2480	ant 1	8.64	7.311
8-DPSK	2402	ant 1	9.08	8.091
	2441	ant 1	8.74	7.482
	2480	ant 1	9.31	8.531
BLE 1M	2402	ant 1	6.96	4.966
	2440	ant 1	6.90	4.898
	2480	ant 1	7.71	5.902
BLE 2M	2402	ant 1	7.35	5.433
	2440	ant 1	7.63	5.794
	2480	ant 1	8.39	6.902
IEEE 802.11b	2412	ant 1	15.74	37.497
		ant 2	15.87	38.637
	2437	ant 1	15.28	33.729
		ant 2	15.73	37.411
	2462	ant 1	15.56	35.975
		ant 2	15.66	36.813
IEEE 802.11g	2412	ant 1	15.68	36.983
		ant 2	15.65	36.728
	2437	ant 1	15.41	34.754
		ant 2	15.34	34.198
	2462	ant 1	15.28	33.729
		ant 2	15.10	32.359
IEEE 802.11n HT20	2412	ant 1	15.60	36.308
		ant 2	15.21	33.189
	2437	ant 1	15.84	38.371
		ant 2	15.11	32.434
	2462	ant 1	15.62	36.475
		ant 2	14.97	31.405
Mode	Frequency (MHz)	Antena	Peak output power (dBm)	Peak output power (mW)

IEEE 802.11a	5180	ant 1	16.58	45.499
		ant 2	14.51	28.249
	5200	ant 1	16.76	47.424
		ant 2	16.86	48.529
	5240	ant 1	14.79	30.130
		ant 2	14.94	31.189
	5260	ant 1	14.78	30.061
		ant 2	17.08	51.050
	5300	ant 1	15.05	31.989
		ant 2	14.49	28.119
	5320	ant 1	14.76	29.923
		ant 2	15.54	35.810
	5500	ant 1	16.15	41.210
		ant 2	15.65	36.728
	5580	ant 1	15.27	33.651
		ant 2	14.44	27.797
	5700	ant 1	15.06	32.063
		ant 2	15.15	32.734
	5745	ant 1	18.17	65.615
		ant 2	18.25	66.834
	5785	ant 1	17.75	59.566
		ant 2	15.17	32.885
	5825	ant 1	14.93	31.117
		ant 2	15.07	32.137
IEEE 802.11n20	5180	ant 1	14.88	30.761
		ant 2	14.56	28.576
	5200	ant 1	15.30	33.884
		ant 2	14.38	27.416
	5240	ant 1	15.60	36.308
		ant 2	16.35	43.152
	5260	ant 1	15.67	36.898
		ant 2	16.51	44.771
	5300	ant 1	15.86	38.548
		ant 2	16.47	44.361
	5320	ant 1	16.06	40.365
	5500	ant 2	16.18	41.495
		ant 1	16.46	44.259

		ant 2	16.36	43.251
	5580	ant 1	15.73	37.411
		ant 2	14.92	31.046
	5700	ant 1	15.01	31.696
		ant 2	15.48	35.318
	5745	ant 1	16.44	44.055
		ant 2	16.49	44.566
	5785	ant 1	16.01	39.902
		ant 2	16.58	45.499
	5825	ant 1	16.29	42.560
		ant 2	16.25	42.170
IEEE 802.11ac VHT20	5180	ant 1	15.48	35.318
		ant 2	15.64	36.644
	5200	ant 1	15.92	39.084
		ant 2	15.54	35.810
	5240	ant 1	15.98	39.628
		ant 2	15.59	36.224
	5260	ant 1	16.01	39.902
		ant 2	16.12	40.926
	5300	ant 1	16.08	40.551
		ant 2	16.33	42.954
	5320	ant 1	16.19	41.591
		ant 2	15.59	36.224
	5500	ant 1	17.13	51.642
		ant 2	16.80	47.863
	5580	ant 1	16.36	43.251
		ant 2	15.56	35.975
	5700	ant 1	16.13	41.020
		ant 2	16.43	43.954
	5745	ant 1	16.76	47.424
		ant 2	16.47	44.361
	5785	ant 1	15.61	36.392
		ant 2	15.86	38.548
	5825	ant 1	15.71	37.239
		ant 2	15.38	34.514
Mode	Frequency (MHz)	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)

IEEE 802.11n HT40	5190	ant 1	11.75	14.962
		ant 2	10.90	12.303
	5230	ant 1	11.91	15.524
		ant 2	11.13	12.972
	5270	ant 1	12.50	17.783
		ant 2	10.95	12.445
	5310	ant 1	12.40	17.378
		ant 2	11.07	12.794
	5510	ant 1	12.07	16.106
		ant 2	10.04	10.093
	5590	ant 1	10.97	12.503
		ant 2	10.19	10.447
	5670	ant 1	10.46	11.117
		ant 2	10.78	11.967
	5755	ant 1	11.17	13.092
		ant 2	11.33	13.583
	5795	ant 1	11.69	14.757
		ant 2	10.96	12.474
IEEE 802.11ac VHT40	5190	ant 1	11.89	15.453
		ant 2	11.03	12.677
	5230	ant 1	12.21	16.634
		ant 2	11.28	13.428
	5270	ant 1	12.34	17.140
		ant 2	11.13	12.972
	5310	ant 1	12.57	18.072
		ant 2	11.67	14.689
	5510	ant 1	12.72	18.707
		ant 2	10.48	11.169
	5590	ant 1	11.34	13.614
		ant 2	10.45	11.092
	5670	ant 1	10.93	12.388
		ant 2	10.98	12.531
	5755	ant 1	11.85	15.311
		ant 2	11.59	14.421
	5795	ant 1	11.77	15.031
		ant 2	11.15	13.032
IEEE	5210	ant 1	12.41	17.418

802.11ac VHT80		ant 2	11.79	15.101
	5290	ant 1	12.73	18.750
		ant 2	11.61	14.488
	5530	ant 1	12.77	18.923
		ant 2	11.25	13.335
	5610	ant 1	11.46	13.996
		ant 2	10.78	11.967
	5775	ant 1	12.43	17.498
		ant 2	11.92	15.560

3. Calculated Result and Limit

1.SISO

The Worst Mode	Antenna	Target power（dBm）	MAX 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	ant 1	8±1	9	2.2	1.660	0.0026	1	Complies
8-DPSK	ant 1	9±1	10	2.2	1.660	0.0033	1	Complies
BLE	ant 1	8±1	9	2.2	1.660	0.0026	1	Complies
IEEE 802.11b	ant 1	15±1	16	2.2	1.660	0.0131	1	Complies
	ant 2	15±1	16	2.5	1.778	0.0141	1	Complies
IEEE 802.11g	ant 1	15±1	16	2.2	1.660	0.0131	1	Complies
	ant 2	15±1	16	2.5	1.778	0.0141	1	Complies
IEEE 802.11n HT20	ant 1	15±1	16	2.2	1.660	0.0131	1	Complies
	ant 2	15±1	16	2.5	1.778	0.0141	1	Complies
5G Band								
IEEE 802.11a	ant 1	18±1	19	3.4	2.188	0.0346	1	Complies
	ant 2	18±1	19	2.8	1.905	0.0301	1	Complies
IEEE 802.11n HT20	ant 1	16±1	17	3.4	2.188	0.0218	1	Complies
	ant 2	16±1	17	2.8	1.905	0.0190	1	Complies
IEEE 802.11ac VHT20	ant 1	17±1	18	3.4	2.188	0.0275	1	Complies
	ant 2	16±1	17	2.8	1.905	0.0190	1	Complies
IEEE 802.11n HT40	ant 1	12±1	13	3.4	2.188	0.0087	1	Complies
	ant 2	11±1	12	2.8	1.905	0.0060	1	Complies
IEEE 802.11ac VHT40	ant 1	12±1	13	3.4	2.188	0.0087	1	Complies
	ant 2	11±1	12	2.8	1.905	0.0060	1	Complies
IEEE 802.11ac VHT80	ant 1	12±1	13	3.4	2.188	0.0087	1	Complies
	ant 2	11±1	12	2.8	1.905	0.0060	1	Complies

2. MIMO

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	0.0131	0.0141	0.0272	1	Complies
5G Band					
IEEE 802.11n HT20	0.0218	0.0190	0.0408	1	Complies
IEEE 802.11ac VHT20	0.0275	0.0190	0.0465	1	Complies
IEEE 802.11n HT40	0.0087	0.0060	0.0147	1	Complies
IEEE 802.11ac VHT40	0.0087	0.0060	0.0147	1	Complies
IEEE 802.11ac VHT80	0.0087	0.0060	0.0147	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