FCC 47 CFR MPE REPORT

ZAGG Inc.

Smart Shield Machine

Model Number: ISOD-ML2

FCC ID: QTG-ISODML2

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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) = $\frac{\sqrt{30 \times P \times G}}{d}$ 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)	Peak output power (dBm)	Peak output power (mW)
IEEE 802.11b	2412	15.27	33.651
	2437	17.45	55.590
	2462	17.24	52.966
IEEE 802.11g	2412	20.34	108.143
	2437	20.85	121.619
	2462	20.57	114.025
IEEE 802.11n HT20	2412	20.38	109.144
	2437	20.88	122.462
	2462	20.62	115.345
IEEE 802.11n HT40	2422	21.27	133.968
	2437	20.83	121.060
	2452	20.82	120.781
IEEE 802.11ax HE20	2412	22.8	190.546
	2437	22	158.489
	2462	21.84	152.757
IEEE 802.11ax HE40	2422	22.45	175.792
	2437	21.99	158.125
	2452	21.96	157.036
IEEE 802.11a	5180	9.7	9.333
	5200	10.03	10.069
	5240	11.77	15.031
	5260	11.44	13.932
	5300	11.79	15.101
	5320	11.31	13.521
	5500	13.27	21.232
	5580	12.65	18.408
	5700	12.51	17.824
	5745	12.44	17.539
	5785	12.05	16.032
	5825	11.13	12.972

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)
IEEE 802.11n HT20	5180	12.79	19.011
	5200	12.77	18.923
	5240	11.7	14.791
	5260	11.33	13.583
	5300	12.72	18.707
	5320	11.64	14.588
	5500	13.21	20.941
	5580	12.77	18.923
	5700	12.25	16.788
	5745	12	15.849
	5785	11.28	13.428
	5825	12.07	16.106
IEEE 802.11ac VHT20	5180	9.73	9.397
	5200	9.97	9.931
	5240	9.45	8.810
	5260	10.26	10.617
	5300	9.41	8.730
	5320	9.76	9.462
	5500	11.11	12.912
	5580	10.65	11.614
	5700	10.8	12.023
	5745	9.89	9.750
	5785	8.89	7.745
	5825	8.35	6.839
IEEE 802.11ax HE20	5180	10.12	10.280
	5200	10.35	10.839
	5240	9.85	9.661
	5260	9.71	9.354
	5300	10.04	10.093
	5320	9.51	8.933
	5500	11.4	13.804
	5580	10.72	11.803
	5700	10.61	11.508
	5745	9.94	9.863
	5785	9.1	8.128
	5825	9.34	8.590

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)
IEEE 802.11n HT40	5190	12.63	18.323
	5230	11.99	15.812
	5270	12.12	16.293
	5310	11.68	14.723
	5510	13.58	22.803
	5550	12.88	19.409
	5670	12.6	18.197
	5755	11.94	15.631
	5795	11.69	14.757
IEEE 802.11ac VHT40	5190	10.7	11.749
	5230	11.01	12.618
	5270	10.58	11.429
	5310	9.42	8.750
	5510	11.31	13.521
	5550	10.6	11.482
	5670	10.88	12.246
	5755	9.62	9.162
	5795	9.36	8.630
IEEE 802.11ax HE40	5190	11.14	13.002
	5230	10.45	11.092
	5270	9.12	8.166
	5310	9.44	8.790
	5510	11.39	13.772
	5550	11.33	13.583
	5670	11.76	14.997
	5755	10.09	10.209
	5795	9.44	8.790

3. Calculated Result and Limit

Mode	Peak output power (dBm)	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								
IEEE 802.11b	17.45	17±1	18	2.91	1.954	0.02453	1	Complies
IEEE 802.11g	20.85	20±1	21	2.91	1.954	0.04895	1	Complies
IEEE 802.11n HT20	20.88	20±1	21	2.91	1.954	0.04895	1	Complies
IEEE 802.11n HT40	21.27	21±1	22	2.91	1.954	0.06162	1	Complies
IEEE 802.11ax HT20	22.80	22±1	23	2.91	1.954	0.07758	1	Complies
IEEE 802.11ax HT40	22.45	22±1	23	2.91	1.954	0.07758	1	Complies
5G Band								
IEEE 802.11a	13.27	13±1	14	2.72	1.871	0.00935	1	Complies
IEEE 802.11n HT20	13.21	13±1	14	2.72	1.871	0.00935	1	Complies
IEEE802.11acVHT20	11.11	11±1	12	2.72	1.871	0.00590	1	Complies
IEEE802.11axVHT20	11.4	11±1	12	2.72	1.871	0.00590	1	Complies
IEEE 802.11n HT40	13.58	13±1	14	2.72	1.871	0.00935	1	Complies
IEEE802.11acVHT40	11.31	11±1	12	2.72	1.871	0.00590	1	Complies
IEEE802.11axVHT40	11.76	11±1	12	2.72	1.871	0.00590	1	Complies

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

End of Test Report