

FCC 47 CFR MPE REPORT

ViewSonic Corporation

WiFi Module

Model Number: 43RG09_Wifi

FCC ID: GSS-43RG09WIFI

Applicant:	ViewSonic Corporation
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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)	Antenna	Peak output power (dBm)	Peak output power (mW)
GFSK	2402	ant 1	6.99	5.000
	2441	ant 1	7.44	5.546
	2480	ant 1	6.62	4.592
8-DPSK	2402	ant 1	8.97	7.889
	2441	ant 1	8.74	7.482
	2480	ant 1	8.62	7.278
BLE 1M	2402	ant 1	6.96	4.966
	2440	ant 1	6.58	4.550
	2480	ant 1	6.42	4.385
BLE 2M	2402	ant 1	7.03	5.047
	2440	ant 1	6.63	4.603
	2480	ant 1	6.66	4.634
IEEE 802.11b	2412	ant 1	16.62	45.920
		ant 2	14.72	29.648
	2437	ant 1	16.24	42.073
		ant 2	14.20	26.303
	2462	ant 1	16.04	40.179
		ant 2	13.85	24.266
IEEE 802.11g	2412	ant 1	16.16	41.305
		ant 2	14.5	28.184
	2437	ant 1	16.17	41.400
		ant 2	14.04	25.351
	2462	ant 1	15.77	37.757
		ant 2	13.85	24.266
IEEE 802.11n HT20	2412	ant 1	15.97	39.537
		ant 2	14.45	27.861
	2437	ant 1	15.83	38.282
		ant 2	14.08	25.586
	2462	ant 1	15.64	36.644
		ant 2	13.75	23.714
IEEE 802.11n HT40	2422	ant 1	16.25	42.170
		ant 2	14.54	28.445

	2437	ant 1	16.18	41.495
		ant 2	14.22	26.424
	2452	ant 1	15.99	39.719
		ant 2	13.95	24.831
IEEE 802.11ax HE20	2412	ant 1	15.9	38.905
		ant 2	13.59	22.856
	2437	ant 1	15.62	36.475
		ant 2	13.47	22.233
	2462	ant 1	15.43	34.914
		ant 2	13.03	20.091
IEEE 802.11ax HE40	2422	ant 1	15.99	39.719
		ant 2	13.88	24.434
	2437	ant 1	16.09	40.644
		ant 2	13.67	23.281
	2452	ant 1	15.83	38.282
		ant 2	13.47	22.233
Mode	Frequency (MHz)	Antena	Peak output power (dBm)	Peak output power (mW)
IEEE 802.11a	5180	ant 1	17.44	55.463
		ant 2	10.63	11.561
	5200	ant 1	17.35	54.325
		ant 2	10.98	12.531
	5240	ant 1	17.02	50.350
		ant 2	9.52	8.954
	5745	ant 1	16.72	46.989
		ant 2	16.84	48.306
	5785	ant 1	16.16	41.305
		ant 2	16.93	49.317
	5825	ant 1	15.93	39.174
		ant 2	18.38	68.865
IEEE 802.11n20	5180	ant 1	17.09	51.168
		ant 2	10.03	10.069
	5200	ant 1	16.86	48.529
		ant 2	10.4	10.965
	5240	ant 1	16.56	45.290
		ant 2	8.47	7.031
	5745	ant 1	15.85	38.459
		ant 2	15.62	36.475

	5785	ant 1	14.82	30.339
		ant 2	15.51	35.563
	5825	ant 1	13.5	22.387
		ant 2	16.42	43.853
IEEE 802.11ac VHT20	5180	ant 1	16.27	42.364
		ant 2	9.19	8.299
	5200	ant 1	16.44	44.055
		ant 2	9.98	9.954
	5240	ant 1	15.46	35.156
		ant 2	10.22	10.520
	5745	ant 1	15.39	34.594
		ant 2	14.6	28.840
	5785	ant 1	14.67	29.309
		ant 2	14.55	28.510
	5825	ant 1	14.27	26.730
		ant 2	16.49	44.566
IEEE 802.11ax HE20	5180	ant 1	16.42	43.853
		ant 2	9.62	9.162
	5200	ant 1	16.07	40.458
		ant 2	9.29	8.492
	5240	ant 1	16.04	40.179
		ant 2	10.77	11.940
	5745	ant 1	14.69	29.444
		ant 2	14	25.119
	5785	ant 1	13.74	23.659
		ant 2	14.51	28.249
	5825	ant 1	13.72	23.550
		ant 2	14.82	30.339
Mode	Frequency (MHz)	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)
IEEE 802.11n HT40	5190	ant 1	15.85	38.459
		ant 2	15.62	36.475
	5230	ant 1	14.82	30.339
		ant 2	15.51	35.563
	5755	ant 1	16.14	41.115
		ant 2	15.03	31.842
	5795	ant 1	15.5	35.481
		ant 2	16.31	42.756

IEEE 802.11ac VHT40	5190	ant 1	16.64	46.132
		ant 2	9.16	8.241
	5230	ant 1	16.95	49.545
		ant 2	9.70	9.333
		ant 1	15.48	35.318
		ant 2	14.89	30.832
	5795	ant 1	15.19	33.037
		ant 2	15.45	35.075
IEEE 802.11ax HE40	5190	ant 1	15.23	33.343
		ant 2	9.26	8.433
	5230	ant 1	14.85	30.549
		ant 2	10.93	12.388
	5755	ant 1	14.00	25.119
		ant 2	14.07	25.527
	5795	ant 1	13.40	21.878
		ant 2	14.36	27.290
IEEE 802.11ac VHT80	5210	ant 1	15.71	37.239
		ant 2	7.64	5.808
	5775	ant 1	15.65	36.728
		ant 2	14.93	31.117
IEEE 802.11ax HE80	5210	ant 1	16.23	41.976
		ant 2	10.47	11.143
	5775	ant 1	14.77	29.992
		ant 2	14.96	31.333

3. Calculated Result and Limit

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	7±1	8	2	1.585	0.0020	1	Complies
8-DPSK	ant 1	8±1	9	2	1.585	0.0025	1	Complies
BLE	ant 1	7±1	8	2	1.585	0.0020	1	Complies
IEEE 802.11b	ant 1	16±1	17	2	1.585	0.0158	1	Complies
	ant 2	14±1	15	2	1.585	0.0100	1	Complies
IEEE 802.11g	ant 1	16±1	17	2	1.585	0.0158	1	Complies
	ant 2	14±1	15	2	1.585	0.0100	1	Complies
IEEE 802.11n HT20	ant 1	15±1	16	2	1.585	0.0126	1	Complies
	ant 2	14±1	15	2	1.585	0.0100	1	Complies
IEEE 802.11ax HT20	ant 1	15±1	16	2	1.585	0.0126	1	Complies
	ant 2	13±1	14	2	1.585	0.0079	1	Complies
IEEE 802.11n HT40	ant 1	16±1	17	2	1.585	0.0158	1	Complies
	ant 2	14±1	15	2	1.585	0.0100	1	Complies
IEEE 802.11ax HT40	ant 1	16±1	17	2	1.585	0.0158	1	Complies
	ant 2	13±1	14	2	1.585	0.0079	1	Complies
5G Band								
IEEE 802.11a	ant 1	17±1	18	2	1.5849	0.0199	1	Complies
	ant 2	18±1	19	2	1.5849	0.0250	1	Complies
IEEE 802.11n HT20	ant 1	17±1	18	2	1.5849	0.0199	1	Complies
	ant 2	16±1	17	2	1.5849	0.0158	1	Complies
IEEE 802.11ac VHT20	ant 1	16±1	17	2	1.5849	0.0158	1	Complies
	ant 2	16±1	17	2	1.5849	0.0158	1	Complies
IEEE 802.11ax HT20	ant 1	16±1	17	2	1.5849	0.0158	1	Complies
	ant 2	14±1	17	2	1.5849	0.0158	1	Complies
IEEE 802.11n HT40	ant 1	16±1	17	2	1.5849	0.0158	1	Complies
	ant 2	16±1	17	2	1.5849	0.0158	1	Complies

IEEE 802.11ac VHT40	ant 1	16±1	17	2	1.5849	0.0158	1	Complies
	ant 2	15±1	16	2	1.5849	0.0126	1	Complies
IEEE 802.11ax HT40	ant 1	15±1	16	2	1.5849	0.0126	1	Complies
	ant 2	14±1	15	2	1.5849	0.0100	1	Complies
IEEE 802.11ac VHT80	ant 1	15±1	16	2	1.5849	0.0126	1	Complies
	ant 2	14±1	15	2	1.5849	0.0100	1	Complies
IEEE 802.11ax HT80	ant 1	16±1	17	2	1.5849	0.0158	1	Complies
	ant 2	14±1	15	2	1.5849	0.0100	1	Complies

MIMIO

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	0.0126	0.0100	0.0225	1	Complies
IEEE 802.11 ax HE20	0.0126	0.0079	0.0205	1	Complies
IEEE 802.11n HT40	0.0158	0.0100	0.0258	1	Complies
IEEE 802.11 ax HE40	0.0158	0.0079	0.0237	1	Complies
5G Band					
IEEE 802.11n HT20	0.0199	0.0158	0.0357	1	Complies
IEEE 802.11ac VHT20	0.0158	0.0158	0.0316	1	Complies
IEEE 802.11 ax HE20	0.0158	0.0158	0.0316	1	Complies
IEEE 802.11n HT40	0.0158	0.0158	0.0316	1	Complies
IEEE 802.11ac VHT40	0.0158	0.0126	0.0284	1	Complies
IEEE 802.11 ax HE40	0.0126	0.0100	0.0225	1	Complies
IEEE 802.11ac VHT80	0.0126	0.0100	0.0225	1	Complies
IEEE 802.11 ax HE80	0.0158	0.0100	0.0258	1	Complies

BT+WIFI

MAX Power Density (S) (mW/cm ²) Bluetooth	MAX Power Density (S) (mW/cm ²) 2.4GWiFi	MAX Power Density (S) (mW/cm ²) 5GWiFi	Total Ratio	Limit Ratio	Test Result
0.0025	0.0258	0.0357	0.064	1	Complies

End of Test Report