

## 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 <sup>2</sup> )	Averaging Times   E   <sup>2</sup> ,   H   <sup>2</sup> 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 <sup>2</sup> )	Averaging Times   E   <sup>2</sup> ,   H   <sup>2</sup> 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

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

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/cm <sup>2</sup> )	Limited of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
				(dBi)	(Linear)			
<b>2.4G Band</b>								
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
<b>5G Band</b>								
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
<b>2.4G Band</b>					
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
<b>5G Band</b>					
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 <sup>2</sup> ) Bluetooth	MAX Power Density (S) (mW/cm <sup>2</sup> ) 2.4GWiFi	MAX Power Density (S) (mW/cm <sup>2</sup> ) 5GWiFi	Total Ratio	Limit Ratio	Test Result
0.0025	0.0258	0.0357	0.064	1	Complies

**End of Test Report**