

FCC 47 CFR MPE REPORT

Digital Dream Labs, Inc

AI Robot Companion

Model Number: Vector 2.0

Additional Model: Cozmo 2.0

FCC ID: 2A653-00402

Applicant:	Digital Dream Labs, Inc
Address:	6022 Broad Street, Pittsburgh, PA 15206, United States Of America.
Prepared By:	EST Technology Co., Ltd.
	Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China
Tel: 86-769-83081888-808	

Report Number:	ESTE-R2207056
Date of Test:	Jun. 17~Jul. 06, 2022
Date of Report:	Jul. 07, 2022

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)	Peak output power (dBm)	Peak output power (mW)
BLE	2402	-4.34	0.3681
	2440	-4.59	0.3475
	2480	-4.98	0.3177
IEEE 802.11b	2412	11.53	14.2233
	2437	11.83	15.2405
	2462	13.02	20.0447
IEEE 802.11g	2412	14.31	26.9774
	2437	15.59	36.2243
	2462	16.39	43.5512
IEEE 802.11n HT20	2412	15.92	39.0841
	2437	16.37	43.3511
	2462	16.24	42.0727

3. Calculated Result and Limit

Mode	Peak output power (dBm)	Target power (dBm)	MAX 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								
BLE	-4.34	-4±1	-3	0	1.0000	0.0001	1	Compiles
IEEE 802.11b	13.02	13±1	14	0	1.0000	0.0050	1	Compiles
IEEE 802.11g	16.39	16±1	17	0	1.0000	0.0100	1	Compiles
IEEE 802.11n HT20	16.37	16±1	17	0	1.0000	0.0100	1	Compiles

End of Test Report

