

FCC 47 CFR MPE REPORT

Zhongshan City Richsound Electronic Industrial Ltd.

4.1.2 CH ATMOS Wireless Home Theater

Model Number: HT Saturn

Addition Model:

U412, U4120K, HT4120K, U412N, HT412N, HT Glory, HT Starlight, HT Planet,
HT satellite, HT Jupiter, HT Uranus, HT Neptune

FCC ID: Z8M-DG412

Applicant:	Zhongshan City Richsound Electronic Industrial Ltd.
Address:	No.16, East Shagang Road, Gangkou, Zhongshan,
	Guangdong 528447, China
Prepared By:	EST Technology Co., Ltd.
	Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China
Tel: 86-769-83081888-808	

Report Number:	ESTE-R2411100
Date of Test:	Sep. 06, 2024 ~ Nov. 27, 2024
Date of Report:	Nov. 28, 2024

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, $d=0.2\text{m}$, 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	5.38	3.451
	2441	ant 1	5.54	3.581
	2480	ant 1	5.48	3.532
$\pi/4$ -DQPSK	2402	ant 1	5.97	3.954
	2441	ant 1	6.02	3.999
	2480	ant 1	5.89	3.882
8-DPSK	2402	ant 1	6.16	4.130
	2441	ant 1	6.14	4.111
	2480	ant 1	6.09	4.064
Mode	Frequency (MHz)	Antenna	Peak output power (dBm)	Peak output power (mW)
U-NII-1	5155	ant 1	-6.08	0.247
		ant 2	4.97	3.141
	5195	ant 1	-3.53	0.444
		ant 2	6.41	4.375
	5245	ant 1	-2.50	0.562
		ant 2	5.92	3.908
U-NII-3	5730	ant 3	3.85	2.427
		ant 4	5.21	3.319
	5790	ant 3	3.69	2.339
		ant 4	4.57	2.864
	5848	ant 3	-6.58	0.220
		ant 4	-5.15	0.305

3. Calculated Result and Limit

The Worst Mode	Antenna	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									
GFSK	ant 1	5.54	5±1	6	1.19	1.315	0.0010	1	Complies
π/4-DQPSK	ant 1	6.02	6±1	7	1.19	1.315	0.0013	1	Complies
8-DPSK	ant 1	6.16	6±1	7	1.19	1.315	0.0013	1	Complies
5G Band									
U-NII-1	ant 1	-2.50	-2±1	-1	2.44	1.754	0.0003	1	Complies
	ant 2	6.41	6±1	7	1.97	1.574	0.0016	1	Complies
U-NII-3	ant 3	3.85	3±1	4	3.67	2.328	0.0012	1	Complies
	ant 4	5.21	5±1	6	3.84	2.421	0.0019	1	Complies

Simultaneous Transmission Mode (BT+ U-NII-1+ U-NII-3 Mode)					
Mode	Result	Limit	Simultaneous Transmissions Result	Simultaneous Transmissions Limit	Total Result
BT	0.0013	1	0.0048	1	Complies
U-NII-1	0.0016	1			
U-NII-3	0.0019	1			

End of Test Report