



FCC 47 CFR MPE REPORT

Zhong Shan City Richsound Electronic Industrial Ltd.

2.1 Channel Ultra Slim Sound Bar with Wireless Subwoofer

Model Number: WS201AMWS

FCC ID: Z8M-WS201AMWS

Applicant:	Zhong Shan City Richsound Electronic Industrial Ltd.
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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, $d=0.2\text{m}$, as well as the gain of the used antenna, the RF power density can be obtained

2. Conducted Power Result

Module model	Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)
JL7012C6	GFSK	2402	7.45	5.5590
		2441	7.59	5.7412
		2480	7.54	5.6754
	$\pi/4$ -DQPSK	2402	7.75	5.9566
		2441	7.85	6.0954
		2480	7.84	6.0814
	BLE 1M	2402	7.67	5.8479
		2440	7.58	5.7280
		2480	7.29	5.3580
	BLE 2M	2402	7.63	5.7943
		2440	7.62	5.7810
		2480	7.46	5.5719
JL7016C6	GFSK	2402	8.29	6.7453
		2441	8.66	7.3451
		2480	8.30	6.7608
	$\pi/4$ -DQPSK	2402	8.96	7.8705
		2441	9.13	8.1846
		2480	8.82	7.6208
	BLE 1M	2402	7.68	5.8614
		2440	8.24	6.6681
		2480	8.06	6.3973
	BLE 2M	2402	8.31	6.7764
		2440	8.57	7.1945
		2480	8.23	6.6527

3. Calculated Result and Limit

Module model	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)			
JL7012C6	GFSK	7.59	7±1	8	4.19	2.624	0.00329	1	Complies
	π/4-DQPSK	7.85	7±1	8	4.19	2.624	0.00329	1	Complies
	BLE 1M	7.67	7±1	8	4.19	2.624	0.00329	1	Complies
	BLE 2M	7.63	7±1	8	4.19	2.624	0.00329	1	Complies
JL7016C6	GFSK	8.66	8±1	9	5.02	3.177	0.00502	1	Complies
	π/4-DQPSK	9.13	9±1	10	5.02	3.177	0.00632	1	Complies
	BLE 1M	8.24	8±1	9	5.02	3.177	0.00502	1	Complies
	BLE 2M	8.57	8±1	9	5.02	3.177	0.00502	1	Complies

Simultaneous Transmission Mode

Module model	Max Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)	Ratio	Total Ratio	Limit of Ratio	Result
JL7012C6	0.00329	1	0.00329	0.00961	1	Complies
JL7016C6	0.00632	1	0.00632			

End of Test Report