

# RF Exposure Evaluation Report

APPLICANT : Tabletop Media, LLC d/b/a Ziosk  
EQUIPMENT : Ziosk Aurizon  
BRAND NAME : Ziosk  
MODEL NAME : Z500  
FCC ID : XOX-Z500  
STANDARD : 47 CFR Part 2.1091

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Approved by: Mark Qu / Manager



**Sporton International (Shenzhen) Inc.**

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Guangdong Province 518055 China**



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**Revision History**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA820812	Rev. 01	Initial issue of report	Apr. 16, 2018

**1. Administration Data****1.1. Testing Laboratory**

Testing Laboratory	
Test Site	Sporton International (Shenzhen) Inc.
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City Guangdong Province 518055 China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595

Applicant	
Company Name	Tabletop Media, LLC d/b/a Ziosk
Address	12404 Park Central Dr, Suite 350, Dallas, TX 75251

Manufacturer	
Company Name	SMTC de Chihuahua SA. DE C.V.
Address	Washington 3701 building 20. Parque Industrial Las Americas, Chihuahua, Chih. 31200



## **2. Description of Equipment Under Test (EUT)**

Product Feature & Specification	
EUT Type	Ziosk Aurizon
Brand Name	Ziosk
Model Name	Z500
FCC ID	XOX-Z500
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz
Mode	802.11b/g/n HT20/HT40 802.11a/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth v3.0+EDR/ Bluetooth v4.0 LE/ Bluetooth v4.1 LE NFC:ASK
HW Version	DV2
SW Version	Android 5.1.1
EUT Stage	Identical Prototype

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

**3. Maximum RF average output power among production units****<Bluetooth>**

Band / Mode	Average Power (dBm)			
	BR / EDR			LE
	1M	2M	3M	GFSK
Bluetooth	3.00	3.00	3.00	7.50

**<WLAN 2.4GHz >**

Mode			Maximum Average Power (dBm)		
			Ant 1	Ant 2	Ant 1+2
2.4GHz WLAN (DTS)	802.11b	CH01	20.00	20.00	
		CH06	21.00	21.00	
		CH11	20.00	20.00	
	802.11g		18.50	18.50	
	802.11n-HT20	CH01	18.50	18.50	19.00
		CH06	18.50	18.50	21.00
		CH11	18.50	18.50	19.50
	802.11n-HT40	CH03	18.00	18.00	18.00
		CH06	18.00	18.00	21.00
		CH09	18.00	18.00	16.00

**<WLAN 5GHz >**

Mode			Maximum Average Power (dBm)		
			Ant 1	Ant 2	Ant 1+2
5.2GHz WLAN (U-NII-1)	802.11a		20.50	20.50	
	802.11n-HT20		16.50	16.50	19.50
	802.11n-HT40		16.00	16.00	19.00
	802.11ac-VHT20		16.50	16.50	19.50
	802.11ac-VHT40		16.00	16.00	19.00
	802.11ac-VHT80		14.50	14.50	17.50
5.3GHz WLAN (U-NII-2A)	802.11a	CH52	21.00	21.00	
		CH60	21.00	21.00	
		CH64	18.00	18.00	
	802.11n-HT20		16.50	16.50	19.50
	802.11n-HT40		16.50	16.50	19.50
	802.11ac-VHT20		16.50	16.50	19.50
	802.11ac-VHT40		16.00	16.00	19.00
	802.11ac-VHT80		14.50	14.50	17.50
5.5GHz WLAN (U-NII-2C)	802.11a		18.00	18.00	
	802.11n-HT20		16.50	16.50	19.50
	802.11n-HT40		16.00	16.00	19.00
	802.11ac-VHT20		16.00	16.00	19.00
	802.11ac-VHT40		16.00	16.00	19.00
	802.11ac-VHT80		14.00	14.00	17.00
5.8GHz WLAN (U-NII-3)	802.11a		21.00	21.00	
	802.11n-HT20		16.00	16.00	19.00
	802.11n-HT40		16.00	16.00	19.00
	802.11ac-VHT20		16.00	16.00	19.00
	802.11ac-VHT40		16.00	16.00	19.00
	802.11ac-VHT80		14.00	14.00	17.00

#### **4. RF Exposure Limit Introduction**

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna





## 5. Radio Frequency Radiation Exposure Evaluation

### 5.1. Standalone Power Density Calculation

Ant.	Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Power Density / Limit
1	WLAN2.4GHz 802.11b	2412	2.21	21.00	23.21	0.21	209.41	0.042	1.00	0.042
1	WLAN2.4GHz 802.11g	2412	2.21	18.50	20.71	0.12	117.76	0.023	1.00	0.023
1	WLAN2.4GHz 802.11n-HT20	2412	2.21	18.50	20.71	0.12	117.76	0.023	1.00	0.023
1	WLAN2.4GHz 802.11n-HT40	2412	2.21	18.00	20.21	0.10	104.95	0.021	1.00	0.021
2	WLAN2.4GHz 802.11b	2412	1.51	21.00	22.51	0.18	178.24	0.035	1.00	0.035
2	WLAN2.4GHz 802.11g	2412	1.51	18.50	20.01	0.10	100.23	0.020	1.00	0.020
2	WLAN2.4GHz 802.11n-HT20	2412	1.51	18.50	20.01	0.10	100.23	0.020	1.00	0.020
2	WLAN2.4GHz 802.11n-HT40	2412	1.51	18.00	19.51	0.09	89.33	0.018	1.00	0.018
1+2	WLAN2.4GHz 802.11n-HT20	2412	2.21	21.00	23.21	0.21	209.41	0.042	1.00	0.042
1+2	WLAN2.4GHz 802.11n-HT40	2412	2.21	21.00	23.21	0.21	209.41	0.042	1.00	0.042
1	WLAN5.2GHz 802.11a	5180	2.77	20.50	23.27	0.21	212.32	0.042	1.00	0.042
1	WLAN5.3GHz 802.11a	5260	3.40	21.00	24.40	0.28	275.42	0.055	1.00	0.055
1	WLAN5.5GHz 802.11a	5500	3.06	18.00	21.06	0.13	127.64	0.025	1.00	0.025
1	WLAN5.8GHz 802.11a	5700	2.46	21.00	23.46	0.22	221.82	0.044	1.00	0.044
1	WLAN5.2GHz 802.11n-HT20	5180	2.77	16.50	19.27	0.08	84.53	0.017	1.00	0.017
1	WLAN5.3GHz 802.11n-HT20	5260	3.40	16.50	19.90	0.10	97.72	0.019	1.00	0.019
1	WLAN5.5GHz 802.11n-HT20	5500	3.06	16.50	19.56	0.09	90.36	0.018	1.00	0.018
1	WLAN5.8GHz 802.11n-HT20	5700	2.46	16.00	18.46	0.07	70.15	0.014	1.00	0.014
1	WLAN5.2GHz 802.11n-HT40	5180	2.77	16.00	18.77	0.08	75.34	0.015	1.00	0.015
1	WLAN5.3GHz 802.11n-HT40	5260	3.40	16.50	19.90	0.10	97.72	0.019	1.00	0.019
1	WLAN5.5GHz 802.11n-HT40	5500	3.06	16.00	19.06	0.08	80.54	0.016	1.00	0.016
1	WLAN5.8GHz 802.11n-HT40	5700	2.46	16.00	18.46	0.07	70.15	0.014	1.00	0.014
1	WLAN5.2GHz 802.11ac VHT20	5180	2.77	16.50	19.27	0.08	84.53	0.017	1.00	0.017
1	WLAN5.3GHz 802.11ac VHT20	5260	3.40	16.50	19.90	0.10	97.72	0.019	1.00	0.019
1	WLAN5.5GHz 802.11ac VHT20	5500	3.06	16.00	19.06	0.08	80.54	0.016	1.00	0.016
1	WLAN5.8GHz 802.11ac VHT20	5700	2.46	16.00	18.46	0.07	70.15	0.014	1.00	0.014
1	WLAN5.2GHz 802.11ac VHT40	5180	2.77	16.00	18.77	0.08	75.34	0.015	1.00	0.015
1	WLAN5.3GHz 802.11ac VHT40	5260	3.40	16.00	19.40	0.09	87.10	0.017	1.00	0.017
1	WLAN5.5GHz 802.11ac VHT40	5500	3.06	16.00	19.06	0.08	80.54	0.016	1.00	0.016
1	WLAN5.8GHz 802.11ac VHT40	5700	2.46	16.00	18.46	0.07	70.15	0.014	1.00	0.014
1	WLAN5.2GHz 802.11ac VHT80	5180	2.77	14.50	17.27	0.05	53.33	0.011	1.00	0.011
1	WLAN5.3GHz 802.11ac VHT80	5260	3.40	14.50	17.90	0.06	61.66	0.012	1.00	0.012
1	WLAN5.5GHz 802.11ac VHT80	5500	3.06	14.00	17.06	0.05	50.82	0.010	1.00	0.010
1	WLAN5.8GHz 802.11ac VHT80	5700	2.46	14.00	16.46	0.04	44.26	0.009	1.00	0.009



Ant.	Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Power Density / Limit
2	WLAN5.2GHz 802.11a	5180	2.27	20.50	22.77	0.19	189.23	0.038	1.00	0.038
2	WLAN5.3GHz 802.11a	5260	2.62	21.00	23.62	0.23	230.14	0.046	1.00	0.046
2	WLAN5.5GHz 802.11a	5500	3.49	18.00	21.49	0.14	140.93	0.028	1.00	0.028
2	WLAN5.8GHz 802.11a	5700	3.69	21.00	24.69	0.29	294.44	0.059	1.00	0.059
2	WLAN5.2GHz 802.11n-HT20	5180	2.27	16.50	18.77	0.08	75.34	0.015	1.00	0.015
2	WLAN5.3GHz 802.11n-HT20	5260	2.62	16.50	19.12	0.08	81.66	0.016	1.00	0.016
2	WLAN5.5GHz 802.11n-HT20	5500	3.49	16.50	19.99	0.10	99.77	0.020	1.00	0.020
2	WLAN5.8GHz 802.11n-HT20	5700	3.69	16.00	19.69	0.09	93.11	0.019	1.00	0.019
2	WLAN5.2GHz 802.11n-HT40	5180	2.27	16.00	18.27	0.07	67.14	0.013	1.00	0.013
2	WLAN5.3GHz 802.11n-HT40	5260	2.62	16.50	19.12	0.08	81.66	0.016	1.00	0.016
2	WLAN5.5GHz 802.11n-HT40	5500	3.49	16.00	19.49	0.09	88.92	0.018	1.00	0.018
2	WLAN5.8GHz 802.11n-HT40	5700	3.69	16.00	19.69	0.09	93.11	0.019	1.00	0.019
2	WLAN5.2GHz 802.11ac VHT20	5180	2.27	16.50	18.77	0.08	75.34	0.015	1.00	0.015
2	WLAN5.3GHz 802.11ac VHT20	5260	2.62	16.50	19.12	0.08	81.66	0.016	1.00	0.016
2	WLAN5.5GHz 802.11ac VHT20	5500	3.49	16.00	19.49	0.09	88.92	0.018	1.00	0.018
2	WLAN5.8GHz 802.11ac VHT20	5700	3.69	16.00	19.69	0.09	93.11	0.019	1.00	0.019
2	WLAN5.2GHz 802.11ac VHT40	5180	2.27	16.00	18.27	0.07	67.14	0.013	1.00	0.013
2	WLAN5.3GHz 802.11ac VHT40	5260	2.62	16.00	18.62	0.07	72.78	0.014	1.00	0.014
2	WLAN5.5GHz 802.11ac VHT40	5500	3.49	16.00	19.49	0.09	88.92	0.018	1.00	0.018
2	WLAN5.8GHz 802.11ac VHT40	5700	3.69	16.00	19.69	0.09	93.11	0.019	1.00	0.019
2	WLAN5.2GHz 802.11ac VHT80	5180	2.27	14.50	16.77	0.05	47.53	0.009	1.00	0.009
2	WLAN5.3GHz 802.11ac VHT80	5260	2.62	14.50	17.12	0.05	51.52	0.010	1.00	0.010
2	WLAN5.5GHz 802.11ac VHT80	5500	3.49	14.00	17.49	0.06	56.10	0.011	1.00	0.011
2	WLAN5.8GHz 802.11ac VHT80	5700	3.69	14.00	17.69	0.06	58.75	0.012	1.00	0.012
1+2	WLAN5.2GHz 802.11n-HT20	5180	2.77	19.50	22.27	0.17	168.66	0.034	1.00	0.034
1+2	WLAN5.3GHz 802.11n-HT20	5260	3.40	19.50	22.90	0.19	194.98	0.039	1.00	0.039
1+2	WLAN5.5GHz 802.11n-HT20	5500	3.49	19.50	22.99	0.20	199.07	0.040	1.00	0.040
1+2	WLAN5.8GHz 802.11n-HT20	5700	3.69	19.00	22.69	0.19	185.78	0.037	1.00	0.037
1+2	WLAN5.2GHz 802.11n-HT40	5180	2.77	19.00	21.77	0.15	150.31	0.030	1.00	0.030
1+2	WLAN5.3GHz 802.11n-HT40	5260	3.40	19.50	22.90	0.19	194.98	0.039	1.00	0.039
1+2	WLAN5.5GHz 802.11n-HT40	5500	3.49	19.00	22.49	0.18	177.42	0.035	1.00	0.035
1+2	WLAN5.8GHz 802.11n-HT40	5700	3.69	19.00	22.69	0.19	185.78	0.037	1.00	0.037
1+2	WLAN5.2GHz 802.11ac VHT20	5180	2.77	19.50	22.27	0.17	168.66	0.034	1.00	0.034
1+2	WLAN5.3GHz 802.11ac VHT20	5260	3.40	19.50	22.90	0.19	194.98	0.039	1.00	0.039
1+2	WLAN5.5GHz 802.11ac VHT20	5500	3.49	19.00	22.49	0.18	177.42	0.035	1.00	0.035
1+2	WLAN5.8GHz 802.11ac VHT20	5700	3.69	19.00	22.69	0.19	185.78	0.037	1.00	0.037
1+2	WLAN5.2GHz 802.11ac VHT40	5180	2.77	19.00	21.77	0.15	150.31	0.030	1.00	0.030
1+2	WLAN5.3GHz 802.11ac VHT40	5260	3.40	19.00	22.40	0.17	173.78	0.035	1.00	0.035
1+2	WLAN5.5GHz 802.11ac VHT40	5500	3.49	19.00	22.49	0.18	177.42	0.035	1.00	0.035
1+2	WLAN5.8GHz 802.11ac VHT40	5700	3.69	19.00	22.69	0.19	185.78	0.037	1.00	0.037
1+2	WLAN5.2GHz 802.11ac VHT80	5180	2.77	17.50	20.27	0.11	106.41	0.021	1.00	0.021
1+2	WLAN5.3GHz 802.11ac VHT80	5260	3.40	17.50	20.90	0.12	123.03	0.024	1.00	0.024
1+2	WLAN5.5GHz 802.11ac VHT80	5500	3.49	17.00	20.49	0.11	111.94	0.022	1.00	0.022
1+2	WLAN5.8GHz 802.11ac VHT80	5700	3.69	17.00	20.69	0.12	117.22	0.023	1.00	0.023
2	Bluetooth v4.1 LE	2402	1.51	7.50	9.01	0.01	7.96	0.002	1.00	0.002

**Note:** 1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.

2. Chose the maximum power to do MPE analysis.

3. MIMO gain is chose from the higher gain value from SISO mode.

**5.2. Collocated Power Density Calculation**

Mode	Frequency	Power Density / Limit	$\Sigma$ (Power Density / Limit) of WLAN 5GHz Ant.1+ Bluetooth Ant.2
WLAN5GHz( Ant 1)	5180 MHz ~ 5825 MHz	0.055	0.057
Bluetooth v4.1 LE( Ant 2)	2402 MHz ~ 2480 MHz	0.002	

**Note:**

1. According to EUT character, Bluetooth can only transmit simultaneously with WLAN 5G (Ant 1).
2.  $\Sigma$ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WLAN 5GHz Ant.1+ Bluetooth Ant.2.
3. The aggregated (power density /limit) is smaller than 1, and complied RF exposure.

**Conclusion:**

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.