

# RF EXPOSURE EVALUATION REPORT

FCC ID : UZ7TM2000  
Equipment : Trailer Monitoring Unit  
Brand Name : ZEBRA  
Model Name : TM2000  
Applicant : Zebra Technologies Corporation  
1 Zebra Plaza Holtsville, NY 11742  
Manufacturer : Zebra Technologies Corporation  
1 Zebra Plaza Holtsville, NY 11742  
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated in accordance with 47 CFR Part 2.1091 for the device and pass the limit.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Jones Tsai / Manager

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**  
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



## **Table of Contents**

<b>1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT) .....</b>	<b>4</b>
<b>2. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS .....</b>	<b>5</b>
<b>3. RF EXPOSURE LIMIT INTRODUCTION .....</b>	<b>6</b>
<b>4. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION .....</b>	<b>7</b>
4.1. Standalone Power Density Calculation .....	7



## History of this test report

Report No.	Version	Description	Issued Date
FA850206	Rev. 01	Initial issue of report	Jun. 22, 2018

**1. Description of Equipment Under Test (EUT)**

Product Feature & Specification	
EUT Type	Trailer Monitoring Unit
Brand Name	ZEBRA
Model Name	TM2000
FCC ID	UZ7TM2000
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
Mode	802.11a/b/g/n HT20
HW Version	EV 3.0
FW Version	2.0.14
SW Version	2.0.14
MFD	15APR2018
EUT Stage	Engineering sample

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

**Reviewed by:** Eric Huang

**Report Producer:** Wan Liu

## **2. Maximum RF average output power among production units**

Band / Channel / Frequency (MHz)			IEEE 802.11 Average Power (dBm)		
			11b	11g	HT20
2.4GHz WLAN (DTS)	Ch 1	2412	19.0	15.5	15.0
	Ch 6	2437	19.0	16.5	16.5
	Ch 11	2462	19.0	14.0	13.5

Band / Channel / Frequency (MHz)			IEEE 802.11 Average Power (dBm)	
			11a	HT20
5.2GHz WLAN (U-NII-1)	Ch 36	5180	13.5	13.5
	Ch 40	5200	13.5	13.5
	Ch 44	5220	13.5	13.5
	Ch 48	5240	13.5	13.5
5.3GHz WLAN (U-NII-2A)	Ch 52	5260	13.5	13.5
	Ch 56	5280	13.5	13.5
	Ch 60	5300	13.5	13.5
	Ch 64	5320	13.5	13.5
5.5GHz WLAN (U-NII-2C)	Ch 100	5500	13.5	13.5
	Ch 116	5580	13.5	13.5
	Ch 124	5620	13.5	13.5
	Ch 132	5660	13.5	13.5
	Ch 140	5700	13.5	13.5
5.8GHz WLAN (U-NII-3)	Ch 149	5745	13.5	13.5
	Ch 157	5785	13.5	13.5
	Ch 165	5825	13.5	13.5

### **3. 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



## **4. Radio Frequency Radiation Exposure Evaluation**

### **4.1. Standalone Power Density Calculation**

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> )
2.4GHz WLAN	2412.0	2.95	19.00	21.950	0.157	156.675	0.031	1.000
5GHz WLAN	5180.0	2.71	13.50	16.210	0.042	41.783	0.008	1.000

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

### **Conclusion:**

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