



# RF Exposure Evaluation Report

**APPLICANT** : Tramigo Ltd.  
**EQUIPMENT** : GPS tracker / remote condition monitor system  
**BRAND NAME** : Tramigo  
**MODEL NAME** : T23 Fleet  
**MARKETING NAME** : T23, T23 Fleet, T23 Track, T23 Premium, T23 Container  
**FCC ID** : 2ACP3-T-1304  
**STANDARD** : 47 CFR Part 2.1091

The product was integrated the WWAN Module (Brand Name: WAVECOM / Model Name: WISMO228, FCC ID: N7NWISMO228) during the test.

We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit. Without written approval of SPORTON INTERNATIONAL (SHENZHEN) INC., the test report shall not be reproduced except in full.

Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager

## **SPORTON INTERNATIONAL (SHENZHEN) INC.**

**No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P.R.C.**



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**Revision History**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA470201	Rev. 01	Initial issue of report	Jul. 30, 2014

## **1. Administration Data**

### **1.1. Testing Laboratory**

Testing Laboratory	
Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.
Test Site Location	No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P.R.C. TEL: +86-755-3320-2398

Applicant	
Company Name	Tramigo Ltd.
Address	Tekniikantie 14, 02150 Espoo, Finland

Manufacturer	
Company Name	Tramigo Ltd.
Address	Tekniikantie 14, 02150 Espoo, Finland

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

Product Feature & Specification	
EUT Type	GPS tracker / remote condition monitor system
Brand Name	Tramigo
Model Name	T23 Fleet
Marketing Name	T23, T23 Fleet, T23 Track, T23 Premium, T23 Container
FCC ID	2ACP3-T-1304
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz
Mode	• GSM/GPRS
Antenna Type	PCB Antenna
HW Version	V1 REVB
SW Version	1.0.8
EUT Stage	Production Unit

**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**

Mode	Average Power (dBm)	
	GSM850	GSM1900
GSM (GMSK, 1 Tx slot)	32.31	29.34
GPRS (GMSK, 1 Tx slot)	32.31	29.34
GPRS (GMSK, 2 Tx slots)	32.31	29.34

### **4. Conducted RF Output Power (Unit: dBm)**

Average Power (dBm)						
Band	GSM850			GSM1900		
Tx Channel	128	189	251	512	661	810
Frequency (MHz)	824.2	836.4	848.8	1850.2	1880	1909.8
GSM (GMSK, 1 Tx slot)	32.22	32.28	<b>32.31</b>	29.31	29.32	29.03
GPRS (GMSK, 1 Tx slot) – CS1	32.22	32.28	<b>32.31</b>	29.33	<b>29.34</b>	29.05
GPRS (GMSK, 2 Tx slots) – CS1	32.21	32.26	32.30	29.31	29.32	29.03

## 5. 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



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

### **6.1. Standalone Power Density Calculation**

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Average EIRP (mW)	Power Density at 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
GSM 850 (1 Tx slot)	824.2	2.1	32.31	34.4	347.54	0.07	0.55
GPRS 850 (1 Tx slot)	824.2	2.1	32.31	34.4	347.54	0.07	0.55
GPRS 850 (2 Tx slots)	824.2	2.1	32.31	34.4	693.43	0.14	0.55
GSM 1900 (1 Tx slot)	1850.2	2.8	29.34	32.1	206.06	0.04	1.00
GPRS 1900 (1 Tx slot)	1850.2	2.8	29.34	32.1	206.06	0.04	1.00
GPRS 1900 (2 Tx slots)	1850.2	2.8	29.34	32.1	411.15	0.08	1.00

**Note:** For conservativeness, the lowest uplink 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.