



RF Exposure Evaluation Report

APPLICANT : LugTrack, LLC.
EQUIPMENT : GLOBAL LOCATOR
BRAND NAME : TUMI
MODEL NAME : 014341D
MARKETING NAME : TUMI Global Locator
FCC ID : 2AFPZ-TGL001
STANDARD : 47 CFR Part 2.1091

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.

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Table of Contents

1. ADMINISTRATION DATA	4
1.1. Testing Laboratory	4
2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	5
3. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS	6
4. RF EXPOSURE LIMIT INTRODUCTION	8
5. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION	9
5.1. Standalone Power Density Calculation	9
5.2. Collocated Power Density Calculation.....	9

**Revision History**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA582403	Rev. 01	Initial issue of report	Mar. 15, 2016

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

Testing Laboratory	
Test Site	SPORTON International (SHENZHEN) Inc.
Test Site Location	1F & 2F, Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: 86-755-8637-9589 FAX: 86-755-8637-9595

Applicant	
Company Name	LugTrack, LLC.
Address	225 US Highway 35, Suite #201, Red Bank, New Jersey, 07701 USA

Manufacturer	
Company Name	LugTrack, LLC.
Address	225 US Highway 35, Suite #201, Red Bank, New Jersey, 07701 USA

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	GLOBAL LOCATOR
Brand Name	TUMI
Model Name	014341D
Marketing Name	TUMI Global Locator
FCC ID	2AFPZ-TGL001
IMEI Code	SIM 1 : 352582070509196 SIM 2 : 352582070509220
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	• GPRS/EGPRS • RMC 12.2Kbps • HSDPA • HSUPA • HSPA+ (16QAM uplink is not supported) • 802.11b/g/n HT20/HT40 • Bluetooth v2.1+EDR , Bluetooth v4.0 LE
Antenna Type	WWAN: PIFA Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna
HW Version	LGT-001-V1
SW Version	MOLY.WR8.W1315.MD.WG.MP.V35.P4
EUT Stage	Identical Prototype
Remark: 1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description. 2. This device supports GPRS/EGPRS Class 12. 3. The device has 2 SIM slots and supports dual SIM dual Standby. The WWAN radio transmission will be enabled by either one SIM at a time (Single active). After pre-scan two SIM cards power, we found test result of the SIM1 was the worse, so we chose SIM1 card power show at this report.	

3. Maximum RF average output power among production units

Band GSM850	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel	128	189	251		128	189	251	
Frequency (MHz)	824.2	836.4	848.8		824.2	836.4	848.8	
GPRS (GMSK, 1 Tx slot)	33.04	32.96	33.10	33.50	24.04	23.96	24.10	24.50
GPRS (GMSK, 2 Tx slots)	31.72	31.70	31.89	32.00	25.72	25.70	25.89	26.00
GPRS (GMSK, 3 Tx slots)	29.10	29.20	29.37	30.00	24.84	24.94	25.11	25.74
GPRS (GMSK, 4 Tx slots)	27.83	27.94	28.06	28.50	24.83	24.94	25.06	25.50
EDGE (8PSK, 1 Tx slot)	25.93	25.89	26.10	26.50	16.93	16.89	17.10	17.50
EDGE (8PSK, 2 Tx slots)	24.91	24.98	25.10	25.50	18.91	18.98	19.10	19.50
EDGE (8PSK, 3 Tx slots)	22.77	22.90	23.03	23.50	18.51	18.64	18.77	19.24
EDGE (8PSK, 4 Tx slots)	21.50	21.65	21.74	22.00	18.50	18.65	18.74	19.00
Band GSM1900	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel	512	661	810		512	661	810	
Frequency (MHz)	1850.2	1880	1909.8		1850.2	1880	1909.8	
GPRS (GMSK, 1 Tx slot)	30.28	30.13	30.31	31.00	21.28	21.13	21.31	22.00
GPRS (GMSK, 2 Tx slots)	29.02	28.98	29.20	29.50	23.02	22.98	23.20	23.50
GPRS (GMSK, 3 Tx slots)	26.46	26.53	26.88	27.00	22.20	22.27	22.62	22.74
GPRS (GMSK, 4 Tx slots)	25.22	25.30	25.67	26.00	22.22	22.30	22.67	23.00
EDGE (8PSK, 1 Tx slot)	24.73	24.76	25.10	25.50	15.73	15.76	16.10	16.50
EDGE (8PSK, 2 Tx slots)	23.66	23.88	24.15	24.50	17.66	17.88	18.15	18.50
EDGE (8PSK, 3 Tx slots)	21.56	21.85	22.95	23.00	17.30	17.59	18.69	18.74
EDGE (8PSK, 4 Tx slots)	20.32	20.50	20.65	21.00	17.32	17.50	17.65	18.00

Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.
The calculated method are shown as below:
Frame-averaged power = Maximum burst averaged power (1 Tx Slot) - 9 dB
Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6 dB
Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB
Frame-averaged power = Maximum burst averaged power (4 Tx Slots) - 3 dB

Band	WCDMA V			Tune-up Limit (dBm)	WCDMA II			Tune-up Limit (dBm)
TX Channel	4132	4182	4233		9262	9400	9538	
Rx Channel	4357	4407	4458		9662	9800	9938	
Frequency (MHz)	826.4	836.4	846.6		1852.4	1880	1907.6	
RMC 12.2Kbps	22.71	22.73	22.78	23.00	23.12	22.98	22.90	23.50
HSDPA Subtest-1	21.39	21.62	21.59	22.00	21.82	21.80	21.63	22.00
HSDPA Subtest-2	21.42	21.65	21.60	22.00	21.83	21.80	21.62	22.00
HSDPA Subtest-3	20.97	21.19	21.11	21.50	21.34	21.34	21.17	22.00
HSDPA Subtest-4	20.94	21.15	20.40	21.50	21.33	21.33	21.13	22.00
HSUPA Subtest-1	19.51	19.64	19.64	20.00	19.88	19.86	19.76	20.00
HSUPA Subtest-2	19.49	19.67	19.62	20.00	19.85	19.85	19.69	20.00
HSUPA Subtest-3	20.49	20.60	20.62	21.00	20.84	20.82	20.67	21.00
HSUPA Subtest-4	18.93	19.13	19.10	20.00	19.32	19.34	19.16	20.00
HSUPA Subtest-5	21.50	21.60	21.60	22.00	21.90	21.80	21.70	22.00



Mode		Maximum Average Power (dBm)
2.4GHz	802.11b	12.00
	802.11g	8.00
	802.11n-HT20	8.00
	802.11n-HT40	7.00

Mode / Band	Bluetooth (Unit: dBm)			
	1Mbps	2Mbps	3Mbps	BT4.0 LE
	(GFSK)	$\pi/4$ -DQPSK	(8-DPSK)	(GFSK)
2.4GHz Bluetooth	2.50	1.00	1.00	-5.00

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 ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	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

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum ERP/EIRP (W)	Maximum output power Limit (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
GPRS 850 (1 Tx slot)	824.2	-0.7	33.50	32.800	1.905	239.883	0.048	0.549	0.087
GPRS 850 (2 Tx slots)	824.2	-0.7	32.00	31.300	1.349	338.844	0.067	0.549	0.123
GPRS 850 (3 Tx slots)	824.2	-0.7	30.00	29.300	0.851	319.154	0.064	0.549	0.116
GPRS 850 (4 Tx slots)	824.2	-0.7	28.50	27.800	0.603	301.995	0.060	0.549	0.109
EGPRS 850 (1 Tx slot)	824.2	-0.7	26.50	25.800	0.380	47.863	0.010	0.549	0.017
EGPRS 850 (2 Tx slots)	824.2	-0.7	25.50	24.800	0.302	75.858	0.015	0.549	0.027
EGPRS 850 (3 Tx slots)	824.2	-0.7	23.50	22.800	0.191	71.450	0.014	0.549	0.026
EGPRS 850 (4 Tx slots)	824.2	-0.7	22.00	21.300	0.135	67.608	0.013	0.549	0.024
GPRS 1900 (1 Tx slot)	1850.2	-0.8	31.00	30.200	1.047	131.826	0.026	1.000	0.026
GPRS 1900 (2 Tx slots)	1850.2	-0.8	29.50	28.700	0.741	186.209	0.037	1.000	0.037
GPRS 1900 (3 Tx slots)	1850.2	-0.8	27.00	26.200	0.417	156.315	0.031	1.000	0.031
GPRS 1900 (4 Tx slots)	1850.2	-0.8	26.00	25.200	0.331	165.959	0.033	1.000	0.033
EGPRS 1900 (1 Tx slot)	1850.2	-0.8	25.50	24.700	0.295	37.154	0.007	1.000	0.007
EGPRS 1900 (2 Tx slots)	1850.2	-0.8	24.50	23.700	0.234	58.884	0.012	1.000	0.012
EGPRS 1900 (3 Tx slots)	1850.2	-0.8	23.00	22.200	0.166	62.230	0.012	1.000	0.012
EGPRS 1900 (4 Tx slots)	1850.2	-0.8	21.00	20.200	0.105	52.481	0.010	1.000	0.010
WCDMA Band V	826.4	-0.7	23.00	22.300	0.170	169.824	0.034	0.551	0.061
WCDMA Band II	1712.4	-0.8	23.50	22.700	0.186	186.209	0.037	1.000	0.037
WLAN2.4GHz	2412.0	1.0	12.00	13.000	0.020	19.953	0.004	1.000	0.004
Bluetooth	2402.0	1.0	2.50	3.500	0.002	2.239	0.000	1.000	0.0004

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

5.2. Collocated Power Density Calculation

Mode	Frequency	WLAN Power Density / Limit	Bluetooth	GPRS 850 (2 Tx slots) Power Density / Limit	Σ (Power Density / Limit) of WWAN+WLAN+ Bluetooth
WLAN2.4GHz	2412MHz ~ 2462MHz	0.004	0.0004	0.123	0.127

Note:

- For colocation analysis, LTE is chosen for summation due to the highest (power density/limit) among all WWAN wireless modes.
- Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WWAN + WLAN + Bluetooth.
- Considering the WWAN collocation with the WLAN transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 3 collocated transmitters is compliant.

Conclusion:

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