# RF Exposure Evaluation Report

| | | |
|---|---|---|
| **APPLICANT** | **:** | **ATrack Technology Inc.** |
| **EQUIPMENT** | **:** | **UMTS GPS Vehicle Tracker** |
| **BRAND NAME** | **:** | **ATrack** |
| **MODEL NAME** | **:** | **AU7** |
| **FCC ID** | **:** | **YA7-ATVT1306** |
| **FILING TYPE** | **:** | **Certification** |
| **STANDARD** | **:** | **OET Bulletin 65 Supplement C (Edition 01-01)** |

**We, SPORTON INTERNATIONAL INC., would like to declare that the device has been evaluated in accordance with FCC OET Bulletin 65 Supplement C (Edition 01-01), and pass the limit. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.**

**Reviewed by: Eric Huang / Deputy Manager**

**Approved by: Jones Tsai / Manager**

Testing Laboratory
1190

***SPORTON INTERNATIONAL INC.***
***No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.***

# Table of Contents

## Revision History

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| FA343002 | Rev. 01 | Initial issue of report | May 24, 2013 |
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# 1. Administration Data

## 1.1. Testing Laboratory

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|---|---|
| **Test Site** | SPORTON INTERNATIONAL INC. |
| **Test Site Location** | No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park,<br>Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |

## 1.2. Applicant

| | |
|---|---|
| **Company Name** | ATrack Technology Inc. |
| **Address** | 3F., No. 88, Sec. 1, Neihu Rd., Neihu Dist., Taipei City 11493 Taiwan (R.O.C.) |

## 1.3. Manufacturer

| | |
|---|---|
| **Company Name** | ATrack Technology Inc. |
| **Address** | 3F., No. 88, Sec. 1, Neihu Rd., Neihu Dist., Taipei City 11493 Taiwan (R.O.C.) |

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

| Product Feature & Specification | |
|---|---|
| **EUT Type** | UMTS GPS Vehicle Tracker |
| **Brand Name** | ATrack |
| **Model Name** | AU7 |
| **FCC ID** | YA7-ATVT1306 |
| **IMEI Code** | 358901045362917 |
| **Tx Frequency** | GSM850: 824.2 MHz ~ 848.8 MHz<br>GSM1900: 1850.2 MHz ~ 1909.8MHz<br>WCDMA Band V: 826.4 MHz ~ 846.6 MHz<br>WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz |
| **Antenna Type** | Monopole Antenna |
| **Uplink Modulation** | GSM/GPRS: GMSK<br>EDGE: GMSK / 8PSK<br>WCDMA (Rel 99): QPSK<br>HSDPA (Rel 6): QPSK<br>HSUPA (Rel 6): QPSK |
| **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. RF Exposure Limit Introduction

The FCC categorizes the RF exposure limit based on the intended usage of the device and the user's awareness and ability to exercise control over his or her exposure. This is a consumer product to be used in the home, hence this device was evaluated by mobile device with general population/uncontrolled exposure condition. The definition of these category are shown as follows:

▪ **Mobile Devices:**

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to be generally used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitters' radiating structures and the body of the user or nearby persons. Transmitters designed to be used by consumers or workers that can be easily re-located are considered mobile devices if they meet the 20 centimeter separation requirement. The FCC rules for evaluating mobile devices for RF compliance are found in 47 CFR 2.1091.

▪ **General Population/Uncontrolled Exposure:**

The general population / uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category and the general population/uncontrolled exposure limits apply to these devices.

Per OET Bulletin 65, the power density limit for General Population/Uncontrolled Exposure summary here:

**Table**: Limits for General Population/Uncontrolled Exposure

| Frequency Range (MHz) | Power Density (S) (mW/cm2) |
|---|---|
| 0.3–1.34 | *(100) |
| 1.34–30 | *(180/$f^2$) |
| 30–300 | 0.2 |
| 300–1500 | f/1500 |
| 1500–100,000 | 1.0 |

f = frequency in MHz

* = Plane-wave equivalent power density

## 4. Maximum RF average output power among production units

| Band | average power (dBm) | |
|---|---|---|
| | GSM 850 | GSM 1900 |
| Output Power Status | Normal | Normal |
| GSM (GMSK, 1 Tx slot) | 32.5 | 29.5 |
| GPRS/EDGE (GMSK, 1 Tx slot) | 32.5 | 29.5 |
| GPRS/EDGE (GMSK, 2 Tx slots) | 32.5 | 29.5 |
| GPRS/EDGE (GMSK, 3 Tx slots) | 31.5 | 28.5 |
| GPRS/EDGE (GMSK, 4 Tx slots) | 30.5 | 27.5 |
| EDGE (8PSK, 1 Tx slot) | 27 | 26 |
| EDGE (8PSK, 2 Tx slots) | 27 | 26 |
| EDGE (8PSK, 3 Tx slots) | 26 | 25 |
| EDGE (8PSK, 4 Tx slots) | 25 | 24 |

| Band | average power(dBm) | |
|---|---|---|
| | WCDMA Band V | WCDMA Band II |
| Output Power Status | Normal | Normal |
| AMR/RMC 12.2Kbps | 23 | 23 |
| HSDPA Subtest-1 | 23 | 23 |
| HSUPA Subtest-5 | 23 | 23 |

# 5. Conducted RF Output Power (Unit: dBm)

**<GSM Conducted Power>**

| Band GSM850 | Burst Average Power (dBm) | | | Frame-Average Power (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) | 32.17 | 32.25 | 32.08 | 23.17 | 23.25 | 23.08 |
| GPRS (GMSK, 1 Tx slot) – CS1 | 32.23 | 32.31 | 32.14 | 23.23 | 23.31 | 23.14 |
| GPRS (GMSK, 2 Tx slots) – CS1 | 32.14 | 32.22 | 32.07 | 26.14 | 26.22 | 26.07 |
| GPRS (GMSK, 3 Tx slots) – CS1 | 31.32 | 31.38 | 31.22 | 27.06 | 27.12 | 26.96 |
| GPRS (GMSK, 4 Tx slots) – CS1 | 30.14 | 30.23 | 30.07 | 27.14 | 27.23 | 27.07 |
| EDGE (GMSK, 1 Tx slot) – MCS1 | 32.16 | 32.23 | 32.06 | 23.16 | 23.23 | 23.06 |
| EDGE (GMSK, 2 Tx slots) – MCS1 | 32.13 | 32.21 | 32.05 | 26.13 | 26.21 | 26.05 |
| EDGE (GMSK, 3 Tx slots) – MCS1 | 31.31 | 31.38 | 31.21 | 27.05 | 27.12 | 26.95 |
| EDGE (GMSK, 4 Tx slots) – MCS1 | 30.13 | 30.22 | 30.06 | 27.13 | 27.22 | 27.06 |
| EDGE (8PSK, 1 Tx slot) – MCS5 | 26.38 | 26.47 | 26.34 | 17.38 | 17.47 | 17.34 |
| EDGE (8PSK, 2 Tx slots) – MCS5 | 26.38 | 26.47 | 26.33 | 20.38 | 20.47 | 20.33 |
| EDGE (8PSK, 3 Tx slots) – MCS5 | 25.54 | 25.66 | 25.50 | 21.28 | 21.40 | 21.24 |
| EDGE (8PSK, 4 Tx slots) – MCS5 | 24.31 | 24.44 | 24.28 | 21.31 | 21.44 | 21.28 |

**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 GSM1900 | Burst Average Power (dBm) | | | Frame-Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| TX Channel | 512 | 661 | 810 | 512 | 661 | 810 |
| Frequency (MHz) | 1850.2 | 1880 | 1909.8 | 1850.2 | 1880 | 1909.8 |
| GSM (GMSK, 1 Tx slot) | 29.06 | 29.13 | 28.87 | 20.06 | 20.13 | 19.87 |
| GPRS (GMSK, 1 Tx slot) – CS1 | 29.08 | 29.15 | 28.90 | 20.08 | 20.15 | 19.90 |
| GPRS (GMSK, 2 Tx slots) – CS1 | 29.06 | 29.14 | 28.88 | 23.06 | 23.14 | 22.88 |
| GPRS (GMSK, 3 Tx slots) – CS1 | 28.25 | 28.33 | 28.06 | 23.99 | 24.07 | 23.80 |
| GPRS (GMSK, 4 Tx slots) – CS1 | 27.07 | 27.16 | 26.91 | 24.07 | 24.16 | 23.91 |
| EDGE (GMSK, 1 Tx slot) – MCS1 | 29.07 | 29.14 | 28.88 | 20.07 | 20.14 | 19.88 |
| EDGE (GMSK, 2 Tx slots) – MCS1 | 29.05 | 29.12 | 28.87 | 23.05 | 23.12 | 22.87 |
| EDGE (GMSK, 3 Tx slots) – MCS1 | 28.24 | 28.32 | 28.05 | 23.98 | 24.06 | 23.79 |
| EDGE (GMSK, 4 Tx slots) – MCS1 | 27.07 | 27.15 | 26.90 | 24.07 | 24.15 | 23.90 |
| EDGE (8PSK, 1 Tx slot) – MCS5 | 25.19 | 25.29 | 25.04 | 16.19 | 16.29 | 16.04 |
| EDGE (8PSK, 2 Tx slots) – MCS5 | 25.17 | 25.28 | 25.04 | 19.17 | 19.28 | 19.04 |
| EDGE (8PSK, 3 Tx slots) – MCS5 | 24.35 | 24.45 | 24.20 | 20.09 | 20.19 | 19.94 |
| EDGE (8PSK, 4 Tx slots) – MCS5 | 23.11 | 23.22 | 23.01 | 20.11 | 20.22 | 20.01 |

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

**<WCDMA Conducted Power>**

| Band | | WCDMA V | | | WCDMA II | | |
|---|---|---|---|---|---|---|---|
| TX Channel | | 4132 | 4182 | 4233 | 9262 | 9400 | 9538 |
| Frequency (MHz) | | 826.4 | 836.4 | 846.6 | 1852.4 | 1880 | 1907.6 |
| 3GPP Rel 99 | AMR 12.2Kbps | 22.71 | 22.62 | 22.51 | 23.37 | 22.66 | 22.60 |
| 3GPP Rel 99 | RMC 12.2Kbps | 22.73 | 22.63 | 22.54 | 22.39 | 22.69 | 22.64 |
| 3GPP Rel 6 | HSDPA Subtest-1 | 22.70 | 22.61 | 22.47 | 22.38 | 22.68 | 22.62 |
| 3GPP Rel 6 | HSDPA Subtest-2 | 21.98 | 21.86 | 21.75 | 21.66 | 21.91 | 21.89 |
| 3GPP Rel 6 | HSDPA Subtest-3 | 21.73 | 21.63 | 21.51 | 21.44 | 21.72 | 21.66 |
| 3GPP Rel 6 | HSDPA Subtest-4 | 21.50 | 21.39 | 21.28 | 21.23 | 21.42 | 21.41 |
| 3GPP Rel 6 | HSUPA Subtest-1 | 21.97 | 21.89 | 21.77 | 21.68 | 21.92 | 21.86 |
| 3GPP Rel 6 | HSUPA Subtest-2 | 19.99 | 19.91 | 19.78 | 19.69 | 19.90 | 19.89 |
| 3GPP Rel 6 | HSUPA Subtest-3 | 20.75 | 20.63 | 20.51 | 20.48 | 20.73 | 20.69 |
| 3GPP Rel 6 | HSUPA Subtest-4 | 20.35 | 20.24 | 20.11 | 20.02 | 20.25 | 20.22 |
| 3GPP Rel 6 | HSUPA Subtest-5 | 21.88 | 21.77 | 21.68 | 21.56 | 21.85 | 21.77 |
| MPR result | | | | | | | |
| MPR specification | | WCDMA V | | | WCDMA II | | |
| 0 | HSDPA Subtest-1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | HSDPA Subtest-2 | 0.72 | 0.75 | 0.72 | 0.72 | 0.77 | 0.73 |
| ≦0.5 | HSDPA Subtest-3 | 0.97 | 0.98 | 0.96 | 0.94 | 0.96 | 0.96 |
| ≦0.5 | HSDPA Subtest-4 | 1.20 | 1.22 | 1.19 | 1.15 | 1.26 | 1.21 |
| ≦0 | HSUPA Subtest-1 | -0.09 | -0.12 | -0.09 | -0.12 | -0.07 | -0.09 |
| ≦2 | HSUPA Subtest-2 | 1.89 | 1.86 | 1.90 | 1.87 | 1.95 | 1.88 |
| ≦1 | HSUPA Subtest-3 | 1.13 | 1.14 | 1.17 | 1.08 | 1.12 | 1.08 |
| ≦2 | HSUPA Subtest-4 | 1.53 | 1.53 | 1.57 | 1.54 | 1.60 | 1.55 |
| ≦0 | HSUPA Subtest-5 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

# 6. Radio Frequency Radiation Exposure Evaluation

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

For this device, the calculation is as follows:

**WWAN Operating frequency ≤ 1.5GHz**

| Mode | Frequency (MHz) | Antenna Gain (dBi) | Antenna Gain (numeric) | Average Power (dBm) | Average Power (mW) | Average ERP (mW) | Calculated RF Exposure (mW/cm2) | Limit (mW/cm2) |
|---|---|---|---|---|---|---|---|---|
| GSM 850 (1 Tx slot) | 824.00 | 0.00 | 1.00 | 32.50 | 223.87 | 136.46 | 0.04 | 0.55 |
| GPRS 850 (1 Tx slot) | 824.00 | 0.00 | 1.00 | 32.50 | 223.87 | 136.46 | 0.04 | 0.55 |
| GPRS 850 (2 Tx slots) | 824.00 | 0.00 | 1.00 | 32.50 | 446.68 | 272.27 | 0.09 | 0.55 |
| GPRS 850 (3 Tx slots) | 824.00 | 0.00 | 1.00 | 31.50 | 529.66 | 322.85 | 0.11 | 0.55 |
| GPRS 850 (4 Tx slots) | 824.00 | 0.00 | 1.00 | 30.50 | 562.34 | 342.77 | 0.11 | 0.55 |
| WCDMA Band 5 | 826.40 | 0.00 | 1.00 | 23.00 | 199.53 | 121.62 | 0.04 | 0.55 |

**WWAN Operating frequency > 1.5GHz**

| Mode | Frequency (MHz) | Antenna Gain (dBi) | Antenna Gain (numeric) | Average Power (dBm) | Average Power (mW) | Average EIRP (mW) | Calculated RF Exposure (mW/cm2) | Limit (mW/cm2) |
|---|---|---|---|---|---|---|---|---|
| GSM 850 (1 Tx slot) | 1850.20 | 0.00 | 1.00 | 29.50 | 112.20 | 112.20 | 0.02 | 1.00 |
| GPRS 1900 (1 Tx slot) | 1850.20 | 0.00 | 1.00 | 29.50 | 112.20 | 112.20 | 0.02 | 1.00 |
| GPRS 1900 (2 Tx slots) | 1850.20 | 0.00 | 1.00 | 29.50 | 223.87 | 223.87 | 0.04 | 1.00 |
| GPRS 1900 (3 Tx slots) | 1850.20 | 0.00 | 1.00 | 28.50 | 265.46 | 265.46 | 0.05 | 1.00 |
| GPRS 1900 (4 Tx slots) | 1850.20 | 0.00 | 1.00 | 27.50 | 281.84 | 281.84 | 0.06 | 1.00 |
| WCDMA Band 2 | 1852.40 | 0.00 | 1.00 | 23.00 | 199.53 | 199.53 | 0.04 | 1.00 |

## Conclusion:

Per part 2.1091(c), EUT source-based time-averaged ERP < 1.5W for RF operating frequency ≤ 1.5GHz, EUT source-based time-averaged EIRP < 3W for RF operating frequency > 1.5GHz, routine evaluation of MPE is not required; MPE calculation is sufficient to show compliance. The MPE calculation results indicate that the EUT complies with the RF exposure limit of FCC OET Bulletin 65 Supplement C (Edition 01-01).