



RF Exposure Evaluation Report

APPLICANT : Advantech Co., Ltd.
EQUIPMENT : computer
BRAND NAME : Advantech
MODEL NAME : TREK-722, TREK-723
FCC ID : M82-TREK-72X-CB
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:

Jones Tsai / Manager

SPORTON INTERNATIONAL INC.

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

SPORTON INTERNATIONAL INC.

TEL : 886-3-327-3456

FAX : 886-3-328-4978

FCC ID : M82-TREK-72X-CB

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**Revision History**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA291427	Rev. 01	Initial issue of report	Jan. 24, 2013

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

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

1.2. Applicant

Company Name	Advantech CO., LTD.
Address	No. 1, Alley 20, Lane 26, Rueiguang Road NeiHu District, Taipei 114, R.O.C.

1.3. Manufacturer

Company Name	Advantech Co., Ltd.
Address	No. 1, Alley 20, Lane 26, Rueiguang Road NeiHu District, Taipei 114, R.O.C.

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	computer
Brand Name	Advantech
Model Name	TREK-722, TREK-723
FCC ID	M82-TREK-72X-CB
Sample 1	TREK-722
Sample 2	TREK-723
Tx Frequency	CDMA2000 BC0: 824.70 MHz ~ 848.31 MHz CDMA2000 BC1: 1851.25 MHz ~ 1908.75 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Antenna Type	WWAN: PCB Antenna Bluetooth: PCB Antenna
HW Version	PCM-8405 A101-3
SW Version	02.02.56
Uplink Modulation	CDMA2000 : QPSK Bluetooth : GFSK Bluetooth EDR : $\pi/4$ -DQPSK, 8-DPSK
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. The models TREK-722 and TREK-723 under this FCC ID are hardware electronically identical. The main difference between these two models is the size of the LCD display (TREK-722: 5" and TREK-723: 7")

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/cm ²)
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. Conducted RF Output Power (Unit: dBm)

<CDMA Conducted Power>

CDMA Average Power (dBm)						
Band	CDMA2000 BC0			CDMA2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency	824.7	836.52	848.31	1851.25	1880	1908.75
1xRTT RC1+SO55	24.26	24.47	24.30	24.08	24.36	24.19
1xRTT RC3+SO55	24.22	24.45	24.34	24.07	24.35	24.23
1xRTT RC3 SO32(+ F SCH)	24.30	24.45	24.35	24.14	24.27	24.25
1xRTT RC3 SO32(+SCH)	24.22	24.46	24.36	24.10	24.31	24.27

5. 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 (i.e., 20 cm for this product)

For this device, the calculation is as follows:

WWAN Operating frequency ≤ 1.5GHz

Function	Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Source-Based Time-Average Power (dBm)	Source-Based Time-Average Power (mW)	Source-Based Time-Average EIRP (mW)	Source-Based Time-Average ERP (mW)	Calculated RF Exposure (mW/cm ²)	Limit (mW/cm ²)
CDMA2000 BC0	836.52	4.62	2.90	25.00	316.23	916.22	558.47	0.18	0.56

WWAN Operating frequency > 1.5GHz

Function	Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Source-Based Time-Average Power (dBm)	Source-Based Time-Average Power (mW)	Source-Based Time-Average EIRP (mW)	Source-Based Time-Average ERP (mW)	Calculated RF Exposure (mW/cm ²)	Limit (mW/cm ²)
CDMA2000 BC1	1880.00	2.69	1.86	25.00	316.23	587.49	358.10	0.12	1.00

Bluetooth Operating Frequency > 1.5GHz

Function	Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Source-Based Time-Average Power (dBm)	Source-Based Time-Average Power (mW)	Source-Based Time-Average EIRP (mW)	Calculated RF Exposure (mW/cm ²)	Limit (mW/cm ²)
Bluetooth	2441.00	1.22	1.32	1.34	1.36	1.80	0.00	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).