IEEE C95.1 2005
KDB 447498 D01 V06
47 C.F.R. Part 1, Subpart I, Section 1.1310
47 C.F.R. Part 2, Subpart J, Section 2.1091

RF EXPOSURE REPORT

For

Computer

Model:
TREK-773;TREK-773XXXXXXXXXXXXXXX(where "X" may be any alphanumeric character , “-” or blank)

Trade Name: ADVANTECH

Issued to

Advantech Co., Ltd.
No. 1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114, Taiwan, R.O.C.

Issued by

Compliance Certification Services Inc.
No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City 24891, Taiwan. (R.O.C.)
http://www.ccsrf.com
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Issued Date: October 20, 2016

Testing Laboratory
1309

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	October 20, 2016	Initial Issue	ALL	Doris Chu

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1. TEST RESULT CERTIFICATION

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
IEEE C95.1 2005 KDB 447498 D03 47 C.F.R. Part 1, Subpart I, Section 1.1310 47 C.F.R. Part 2, Subpart J, Section 2.1091	No non-compliance noted

Approved by:

Miller Lee
Manager
Compliance Certification Services Inc.

Test by:

Doris Chu
Report coordinator
Compliance Certification Services Inc.

2. LIMIT

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

3. EUT SPECIFICATION

EUT	Computer
Model	TREK-773;TREK-773XXXXXXXXXXXXXXX(where "X" may be any alphanumeric character , "-" or blank)
Trade Name	ADVANTECH
Model Discrepancy	All the above models are identical except for the designation of model numbers. The suffix of (where "X" may be any alphanumeric character , "-" or blank) on model number is just for marketing purpose only.
Frequency band (Operating)	☒ Bluetooth 2.1 + EDR / 4.0: 2402 ~ 2480 MHz 802.11b/g/n HT20: 2412MHz ~ 2462MHz 802.11n HT40: 2422MHz ~ 2452MHz 802.11a/n HT20: 5180MHz ~ 5700MHz / 5745MHz ~ 5825MHz 802.11n HT40: 5190MHz ~ 5670MHz / 5755MHz ~ 5795MHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm^2) ☒ General Population/Uncontrolled exposure (S=1mW/cm^2)
Antenna Specification	BT 2.15 dBi (Numeric gain: 1.64) 2.4GHz 2.15 dBi (Numeric gain: 1.64) 5GHz 6.67 dBi (Numeric gain: 4.65) Type: Dipole Antenna 2.4GHz: Directional gain = 2.15 dBi +10log (2) = 5.16 dBi (Numeric gain: 3.28) 5GHz: Directional gain = 6.67 dBi +10log (2) = 9.68 dBi (Numeric gain: 9.29)

<table>
<tr><td>Measurement
Average output
power</td><td>
<table>
<tr><td>Bluetooth 2.1 + EDR:</td><td>3.13 dBm</td><td>(2.056 mW)</td></tr>
<tr><td>Bluetooth 4.0:</td><td>2.27 dBm</td><td>(1.687 mW)</td></tr>
<tr><td>IEEE 802.11b Mode:</td><td>18.24 dBm</td><td>(66.681 mW)</td></tr>
<tr><td>IEEE 802.11g Mode:</td><td>20.82 dBm</td><td>(120.781 mW)</td></tr>
<tr><td>IEEE 802.11n HT 20 Mode:</td><td>22.41 dBm</td><td>(174.181 mW)</td></tr>
<tr><td>IEEE 802.11n HT 40 Mode:</td><td>21.87 dBm</td><td>(153.815 mW)</td></tr>
<tr><td>IEEE 802.11a Mode:</td><td>19.41 dBm</td><td>(87.297 mW)</td></tr>
<tr><td>IEEE 802.11n HT 20 Mode:</td><td>21.14 dBm</td><td>(130.017 mW)</td></tr>
<tr><td>IEEE 802.11n HT 40 Mode:</td><td>20.23 dBm</td><td>(105.439 mW)</td></tr>
</table>
</td></tr>
<tr><td>Maximum
Tune up Power</td><td>
<table>
<tr><td>Bluetooth 2.1 + EDR:</td><td>3.50 dBm</td><td>(2.239 mW)</td></tr>
<tr><td>Bluetooth 4.0:</td><td>2.50 dBm</td><td>(1.778 mW)</td></tr>
<tr><td>IEEE 802.11b Mode:</td><td>18.50 dBm</td><td>(70.795 mW)</td></tr>
<tr><td>IEEE 802.11g Mode:</td><td>21.00 dBm</td><td>(125.893 mW)</td></tr>
<tr><td>IEEE 802.11n HT 20 Mode:</td><td>23.00 dBm</td><td>(199.526 mW)</td></tr>
<tr><td>IEEE 802.11n HT 40 Mode:</td><td>22.00 dBm</td><td>(158.489 mW)</td></tr>
<tr><td>IEEE 802.11a Mode:</td><td>20.00 dBm</td><td>(100.000 mW)</td></tr>
<tr><td>IEEE 802.11n HT 20 Mode:</td><td>22.00 dBm</td><td>(158.489 mW)</td></tr>
<tr><td>IEEE 802.11n HT 40 Mode:</td><td>21.00 dBm</td><td>(125.893 mW)</td></tr>
</table>
</td></tr>
<tr><td>Evaluation applied</td><td>☒ MPE Evaluation*
☐ SAR Evaluation
☐ N/A</td></tr>
</table>

4. TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

Where E = Field strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ ***Equation 1***

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

5. MAXIMUM PERMISSIBLE EXPOSURE

Substituting the MPE safe distance using d = 20 cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

Bluetooth 2.1 + EDR:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
39	2441	2.239	1.64	20	0.0007	1

Bluetooth 4.0:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
19	2440	1.778	1.64	20	0.0006	1

IEEE 802.11b mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
1	2412	70.795	1.64	20	0.0231	1

IEEE 802.11g mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
6	2437	125.893	1.64	20	0.0411	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
6	2437	199.526	3.28	20	0.1302	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
6	2437	158.489	3.28	20	0.1034	1

IEEE 802.11a mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
52	5260	100.000	4.65	20	0.0925	1

IEEE 802.11a HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
157	5785	158.489	9.29	20	0.2930	1

IEEE 802.11a HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
46	5230	125.893	9.29	20	0.2327	1

6. SIMULTANEOUS TRANSMISSION SAR ANALYSIS

Both of the WLAN and BT can transmit simultaneously, the formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

WIFI+BT

Therefore, the worst-case situation is 0.0007 / 1 + 0.2930 / 1 = 0.2937, which is less than “1”.