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Report No.: T170908D07-A-MF

Page: 1 / 11  
Rev.: 02

**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**

## **RF EXPOSURE REPORT**

**For**

**Computer**

**Model:  
TREK-530**

**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>**

**Issued Date: June 21, 2018**

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.  
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部分複製。

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### Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	June 21, 2018	Initial Issue	ALL	Allison Chen
01	August 16, 2018	1. Revised antenna type. 2. Revised max tune up power. 3. Revised maximum permissible exposure. 4. Revised simultaneous transmission sar analysis.	P.6-7, 9-11	Allison Chen
02	August 24, 2018	1. Revised LTE band 17 data.	P.7, P.10	Allison Chen



Report No.: T170908D07-A-MF

Page: 3 / 11  
Rev.: 02

## TABLE OF CONTENTS

1. TEST RESULT CERTIFICATION .....	4
2. LIMIT .....	5
3. EUT SPECIFICATION .....	5
4. TEST RESULTS .....	8
5. MAXIMUM PERMISSIBLE EXPOSURE.....	9
6. SIMULTANEOUS TRANSMISSION SAR ANALYSIS.....	11

# 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:

Reporter:


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Sam Chuang  
 Manager  
 Compliance Certification Services Inc.

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Allison Chen  
 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

<b>EUT</b>	Computer
<b>Model</b>	TREK-530
<b>Trade Name</b>	ADVANTECH
<b>Frequency band (Operating)</b>	<input checked="" type="checkbox"/> GPRS / EGPRS 850MHz: 824.2MHz ~ 848.8MHz <input checked="" type="checkbox"/> GPRS / EGPRS 1900MHz: 1850.2MHz ~ 1909.8MHz <input checked="" type="checkbox"/> WCDMA Band II: 1852.4MHz ~ 1907.6MHz <input checked="" type="checkbox"/> WCDMA Band V: 826.4MHz ~ 846.6MHz <input checked="" type="checkbox"/> WCDMA Band IV: 1712.4MHz ~ 1752.6MHz <input checked="" type="checkbox"/> LTE Band 2: 1850MHz ~ 1910MHz <input checked="" type="checkbox"/> LTE Band 4: 1710MHz ~ 1755MHz <input checked="" type="checkbox"/> LTE Band 5: 824MHz ~ 849MHz <input checked="" type="checkbox"/> LTE Band 13: 777 MHz ~ 787 MHz <input checked="" type="checkbox"/> LTE Band 17: 704 MHz ~ 716 MHz <input checked="" type="checkbox"/> LTE Band 25: 1850 MHz ~ 1915MHz <input checked="" type="checkbox"/> Bluetooth: 2402MHz ~ 2480MHz <input checked="" type="checkbox"/> 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 <input type="checkbox"/> Others
<b>Device category</b>	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
<b>Exposure classification</b>	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )

Report No.: T170908D07-A-MF

<b>Antenna Specification</b>	<b>For WWAN</b>	
	WCDMA Band II:	-0.40 dBi (Numeric gain: 0.91)
	WCDMA Band IV:	0.90 dBi (Numeric gain: 1.23)
	WCDMA Band V:	0.50 dBi (Numeric gain: 1.12)
	LTE Band 2:	1.20 dBi (Numeric gain: 1.32)
	LTE Band 4:	1.80 dBi (Numeric gain: 1.51)
	LTE Band 5:	-0.10 dBi (Numeric gain: 0.98)
	LTE Band 13:	1.00 dBi (Numeric gain: 1.26)
	LTE Band 17:	1.00 dBi (Numeric gain: 1.26)
	LTE Band 25:	1.20 dBi (Numeric gain: 1.32)
	GPRS / EGPRS 850MHz	-1.80 dBi (Numeric gain: 0.66)
	GPRS / EGPRS 1900MHz	1.20 dBi (Numeric gain: 1.32)
	Type: Dipole Antenna	
	<b>For WIFI (2.4GHz / 5GHz)</b>	
2.4 GHz	-0.61 dBi (Numeric gain: 0.87)	
5 GHz	-2.51 dBi (Numeric gain: 0.56)	
Type: Dipole Antenna		
<b>For Bluetooth</b>		
Bluetooth	-0.61 dBi (Numeric gain: 0.87)	
Type: Dipole Antenna		

Report No.: T170908D07-A-MF

System	Max Tune up Power	
	WWAN	
GPRS 850	33.00 dBm	(1995.262 mW)
EGPRS 850	27.00 dBm	(501.187 mW)
GPRS 1900	30.00 dBm	(1000.000 mW)
EGPRS 1900	26.00 dBm	(398.107 mW)
WCDMA Band II:	24.00 dBm	(251.189 mW)
WCDMA Band IV:	24.00 dBm	(251.189 mW)
WCDMA Band V:	24.00 dBm	(251.189 mW)
LTE Band 2:	24.00 dBm	(251.189 mW)
LTE Band 4:	24.00 dBm	(251.189 mW)
LTE Band 5:	24.00 dBm	(251.189 mW)
LTE Band 13:	24.00 dBm	(251.189 mW)
LTE Band 17:	24.00 dBm	(251.189 mW)
LTE Band 25:	24.00 dBm	(251.189 mW)
WIFI		
2.4 GHz:		
IEEE 802.11b	23.50 dBm	(223.872 mW)
IEEE 802.11g	23.50 dBm	(223.872 mW)
IEEE 802.11n HT20	21.00 dBm	(125.893 mW)
IEEE 802.11n HT40	23.00 dBm	(199.526 mW)
5 GHz:		
IEEE 802.11a	19.00 dBm	(79.433 mW)
IEEE 802.11n HT20	19.00 dBm	(79.433 mW)
IEEE 802.11n HT40	20.00 dBm	(100.000 mW)
Bluetooth	13.50 dBm	(22.387 mW)

Max tune up Power

Evaluation applied

- MPE Evaluation\*
- SAR Evaluation
- N/A

Report No.: T170908D07-A-MF

## 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:

$$P (mW) = P (W) / 1000 \text{ and}$$

$$d (cm) = d(m) / 100$$

Yields

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

Where  $d =$  Distance in cm

$P =$  Power in mW

$G =$  Numeric antenna gain

$S =$  Power density in mW / cm<sup>2</sup>



Report No.: T170908D07-A-MF

## 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 / cm<sup>2</sup>

### GPRS850 mode

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
128	824.2	1995.262	0.66	20	0.2621	0.549

### EGPRS850 mode

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
128	824.2	501.187	0.66	20	0.0658	0.549

### GPRS1900 mode

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
512	1850.2	1000.000	1.32	20	0.2627	1.000

### EGPRS1900 mode

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
512	1850.2	398.107	1.32	20	0.1046	1.000

### WCDMA Band II mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
9750	1950	251.189	0.91	20	0.0455	1.000

### WCDMA Band IV mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
1413	1732.6	251.189	1.23	20	0.0615	1.000

### WCDMA Band V mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
4183	836.6	251.189	1.12	20	0.0560	0.558

### LTE Band 2:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
18900	1880	251.189	1.32	20	0.0660	1.000

### LTE Band 4:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
20050	1720	251.189	1.51	20	0.0755	1.000

Report No.: T170908D07-A-MF

**LTE Band 5:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
20600	844	251.189	0.98	20	0.0490	0.563

**LTE Band 13:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
23230	782	251.189	1.26	20	0.0630	0.521

**LTE Band 17:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
23790	710	251.189	1.26	20	0.0630	0.473

**LTE Band 25:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
26365	1882.5	251.189	1.32	20	0.0660	1.000

**Bluetooth**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
39	2441	22.387	1.88	20	0.0084	1

**IEEE 802.11b mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
1	2412	223.872	1.88	20	0.0838	1

**IEEE 802.11g mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
6	2437	223.872	1.88	20	0.0838	1

**IEEE 802.11n HT20 mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
6	2437	125.893	1.88	20	0.0471	1

**IEEE 802.11n HT40 mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
6	2437	199.526	1.88	20	0.0746	1

**IEEE 802.11a mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
52	5260	79.433	1.91	20	0.0302	1

**IEEE 802.11a HT20 mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
157	5785	79.433	1.91	20	0.0302	1

**IEEE 802.11a HT40 mode:**

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
46	5230	100	1.91	20	0.0380	1

## 6. SIMULTANEOUS TRANSMISSION SAR ANALYSIS

Only support 2.4G point to point or point-to-multipoint, there are the WWAN and WIFI can transmit simultaneously, the formula of calculated the MPE is:

$$\text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2} + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

The worst-case situation is  $0.2621 / 0.549 + 0.0838 / 1 = 0.5612$ , which is less than "1".