



FCC ID: M82-WP7610
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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

Module

Model No.: WP7610

Trade Name: Advantech; Advantech Service-IoT

Issued to

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Issued by

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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.

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 12, 2020	Initial Issue	ALL	Angel Cheng
01	November 16, 2020	Add LTE Band 13, 14, 17, 66	ALL	Angel Cheng
02	December 22, 2020	Add section 6.	ALL	Angel Cheng
03	January 14, 2021	Revised section 6.	P.11	Angel Cheng



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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
Statements of Conformity	
Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.	

Approved by:



Kevin Tsai
Deputy Manager
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	Module
Model	WP7610
Model Discrepancy	N/A
Received Date	February 7, 2020
Frequency band (Operating)	☒ WCDMA / HSDPA / HSUPA Band II: 1852.4 ~ 1907.6 MHz ☒ WCDMA / HSDPA / HSUPA Band V: 826.4 ~ 846.6MHz ☒ WCDMA / HSDPA / HSUPA / HSPA+ Band IV: 1712.4-1752.6 MHz ☒ LTE Band 2: 1850MHz ~ 1910MHz ☒ LTE Band 4: 1710MHz ~ 1755MHz ☒ LTE Band 5: 824MHz ~ 849MHz ☒ LTE Band 12: 699 MHz ~ 716 MHz ☒ LTE Band 13: 779.5MHz ~ 784.5MHz ☒ LTE Band 14: 790.5MHz ~ 795.5MHz ☒ LTE Band 17: 706.5MHz ~ 713.5MHz ☒ LTE Band 66: 1710.7MHz ~1779.3MHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure ($S = 5\text{mW/cm}^2$) ☒ General Population/Uncontrolled exposure Frequency Range 300MHz~1500MHz = $f/1500$ (mW/cm2) Frequency Range1500MHz~100000MHz = 1 (mW/cm2)
Antenna Specification	WWAN PIFA Antenna WCDMA Band II: Directional Gain : 1.37 dBi (Numeric gain: 1.37) Worst WCDMA Band IV: Directional Gain : 1.37 dBi (Numeric gain: 1.37) Worst WCDMA Band V: Directional Gain : 2.26 dBi (Numeric gain: 1.68) Worst LTE Band 2: Directional Gain : 1.37 dBi (Numeric gain: 1.37) Worst LTE Band 4: Directional Gain : 1.37 dBi (Numeric gain: 1.37) Worst LTE Band 5: Directional Gain : 2.26 dBi (Numeric gain: 1.68) Worst LTE Band 12: Directional Gain : 2.26 dBi (Numeric gain: 1.68) Worst LTE Band 13: Directional Gain : 2.26 dBi (Numeric gain: 1.68) Worst LTE Band 14: Directional Gain : 2.26 dBi (Numeric gain: 1.68) Worst LTE Band 17: Directional Gain : 2.26 dBi (Numeric gain: 1.68) Worst LTE Band 66: Directional Gain : 1.37 dBi (Numeric gain: 1.37) Worst

Maximum Measurement Average Power	WWAN WCDMA Band II: 23.00 dBm (199.526 mW) WCDMA Band IV: 23.00 dBm (199.526 mW) WCDMA Band V: 23.50 dBm (223.872 mW) LTE Band 2: 22.32 dBm (170.608 mW) LTE Band 4: 22.25 dBm (167.880 mW) LTE Band 5: 22.67 dBm (184.927 mW) LTE Band 12: 22.76 dBm (188.799 mW) LTE Band 13: 23.77 dBm (238.232 mW) LTE Band 14: 23.92 dBm (246.604 mW) LTE Band 17: 23.55 dBm (226.464 mW) LTE Band 66: 22.82 dBm (191.426 mW)
Maximum tune up power	WWAN WCDMA Band II: 24.00 dBm (251.189 mW) WCDMA Band IV: 24.00 dBm (251.189 mW) WCDMA Band V: 24.50 dBm (281.838 mW) LTE Band 2: 24.00 dBm (251.189 mW) LTE Band 4: 24.00 dBm (251.189 mW) LTE Band 5: 24.50 dBm (281.838 mW) LTE Band 12: 24.00 dBm (251.189 mW) LTE Band 13: 24.00 dBm (251.189 mW) LTE Band 14: 24.50 dBm (281.838 mW) LTE Band 17: 24.00 dBm (251.189 mW) LTE Band 66: 24.00 dBm (251.189 mW)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:

1. Disclaimer

Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

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:

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

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

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

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

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

WCDMA Band II mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
9262	1852.4	199.526	1.37	20	0.0544	1

WCDMA Band IV mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
1312	1712.4	199.526	1.37	20	0.0544	1

WCDMA Band V mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
4132	826.4	223.872	1.68	20	0.0748	0.55

LTE Band 2 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
18900	1880	170.608	1.37	20	0.0465	1

LTE Band 4 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
20050	1720	167.880	1.37	20	0.0458	1

LTE Band 5 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
20450	829	184.927	1.68	20	0.0618	0.55

LTE Band 12 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
23060	704	188.799	1.68	20	0.0631	0.469



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LTE Band 13 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
23230	782	238.232	1.68	20	0.0796	0.521

LTE Band 14 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
23330	793	246.604	1.68	20	0.0824	0.529

LTE Band 17 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
23780	709	226.464	1.68	20	0.0757	0.473

LTE Band 66 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
72	1720	191.426	1.37	20	0.0522	1.147

6. SIMULTANEOUS TRANSMISSION SAR ANALYSIS

Both of the WiFi、BT and WWAN can transmit simultaneously, the formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

WiFi、BT and WWAN

Therefore, the worst-case situation is $0.13118 / 1 + 0.00666 / 1 + 0.0824 / 0.529 = 0.2936$, which is less than "1".

Notes: Wifi module power form FCC ID: PPQ-QCNFA324.

--End of Report--