

INDUSTRY CANADA RSS 102 ISSUE 5

RF EXPOSURE REPORT

For

WiFi+Bluetooth 5.2 System on Module

Model: PIXI-IW416

Trade Name: TechNexion

Issued to

TechNexion Ltd.
16F-5, No. 736, Zhongzheng Road, ZhongHe District, 23511,
New Taipei City, Taiwan

Issued by

Compliance Certification Services Inc.
Wugu Laboratory
No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City, Taiwan.
Issue Date: August 7, 2023

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 7, 2023	Initial Issue	ALL	Allison Chen



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Report No.: TMWK2305001500KS

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 IC Rules RSS-102.

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

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
INDUSTRY CANADA RSS 102 ISSUE 5	Compliance
Statements of Conformity	
Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.	

Approved by:



Sky Zhou
Asst. Section Manager
Compliance Certification Services Inc.

2. LIMIT

According to RSS-102 Issue 5, 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.

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$\frac{0.008335}{f^{0.3417}}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
 * Based on nerve stimulation (NS).
 ** Based on specific absorption rate (SAR).

3. EUT SPECIFICATION

EUT	WiFi+Bluetooth 5.2 System on Module
Model	PIXI-IW416
Trade Name	TechNexion
Model Discrepancy	N/A
Frequency band (Operating)	<input checked="" type="checkbox"/> Bluetooth: 2402 MHz~2480 MHz <input checked="" type="checkbox"/> 802.11b/g/n HT20: 2412 MHz~2462 MHz <input checked="" type="checkbox"/> 802.11n HT40: 2422 MHz~2452 MHz <input checked="" type="checkbox"/> 802.11a/n HT20: 5180MHz ~ 5240MHz / 5745MHz ~ 5825MHz <input checked="" type="checkbox"/> 802.11n HT40: 5190MHz ~ 5230MHz / 5755MHz ~ 5795MHz <input type="checkbox"/> 802.11ac VHT20/ax HE20: 5180MHz ~ 5240MHz / 5260MHz ~ 5320MHz / 5500MHz ~ 5700MHz / 5745MHz ~ 5825MHz <input type="checkbox"/> 802.11ac VHT40/ax HE40: 5190MHz ~ 5230MHz / 5270MHz ~ 5310MHz / 5510MHz ~ 5690MHz / 5755MHz ~ 5795MHz <input type="checkbox"/> 802.11ac VHT80/ax HE80: 5210MHz / 5290MHz / 5530MHz ~ 5610MHz / 5775MHz <input type="checkbox"/> 802.11ac VHT160/ax HE160: 5250 MHz / 5570 MHz <input type="checkbox"/> Others
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure ($S = 0.6455 f^{0.25} W/m^2$) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure Note: f is frequency in MHz
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

Report No.: TMWK2305001500KS

Antenna Specification	<p>Type / Brand / Model: 1. PIFA Antenna / TechNexion / VM2450-25523-OOX-180 2. Dipole Antenna / TechNexion / VM2450-ASSY1005</p> <p>(1) Bluetooth & WIFI 2.4GHz: 1. PIFA Antenna Gain: 2.5 dBi 2. Dipole Antenna Gain: 4 dBi</p> <p>(2) WIFI 5GHz: 1. PIFA Antenna Gain: 3 dBi 2. Dipole Antenna Gain: 6 dBi</p> <p style="text-align: center;">Antenna Gain:</p> <table border="0"> <tr> <td>Bluetooth</td> <td>4.00 dBi</td> <td>(Numeric gain: 2.51)</td> <td>Worst</td> </tr> <tr> <td>WIFI 2.4GHz</td> <td>4.00 dBi</td> <td>(Numeric gain: 2.51)</td> <td>Worst</td> </tr> <tr> <td>WIFI 5.2GHz (U-NII 1)</td> <td>6.00 dBi</td> <td>(Numeric gain: 3.98)</td> <td>Worst</td> </tr> <tr> <td>WIFI 5.8GHz (U-NII 3)</td> <td>6.00 dBi</td> <td>(Numeric gain: 3.98)</td> <td>Worst</td> </tr> </table>	Bluetooth	4.00 dBi	(Numeric gain: 2.51)	Worst	WIFI 2.4GHz	4.00 dBi	(Numeric gain: 2.51)	Worst	WIFI 5.2GHz (U-NII 1)	6.00 dBi	(Numeric gain: 3.98)	Worst	WIFI 5.8GHz (U-NII 3)	6.00 dBi	(Numeric gain: 3.98)	Worst																				
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Remark:

- For more details, please refer to the User's manual of the EUT.
- Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
- The tune up power referred the AVG power of the test report TMWK2305001496KR, TMWK2305001499KR, TMWK2307002174KR and TMWK2307002175KR for RF Exposure assessment purpose.

4. TEST RESULTS

Compliance.

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 watts / meter

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

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

Yields

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

Where d = Distance in m
P = Power in W
G = Numeric antenna gain
S = Power density in W / m²

5. MAXIMUM PERMISSIBLE EXPOSURE

Substituting the MPE safe distance using $d = 0.2$ m into Equation 1:

$$S = 1.99 \times P \times G$$

Where P = Power in W

G = Numeric antenna gain

S = Power density in W / m²

Bluetooth

Mode	Frq.(MHz)	Max.Tune-up power (dBm)	P (W)	G(dBi)	Gain (num.)	D (m)	Power density in W / m ²	Limit (W/m ²)
BT	2480	10.0	0.010	4.00	2.51	0.2	0.050	5.47
BLE_2Mbps	2440	10.0	0.010	4.000	2.51	0.2	0.050	5.41

WIFI 2.4GHz (DTS)

Mode	Frq.(MHz)	Max.Tune-up power (dBm)	P (W)	G(dBi)	Gain (num.)	D (m)	Power density in W / m ²	Limit (W/m ²)
IEEE 802.11b	2462	17.0	0.050	4.00	2.51	0.2	0.250	5.44
IEEE 802.11g	2462	16.0	0.040	4.00	2.51	0.2	0.199	5.44
IEEE 802.11n HT 20	2462	14.0	0.025	4.00	2.51	0.2	0.126	5.44
IEEE 802.11n HT 40	2437	15.0	0.032	4.00	2.51	0.2	0.158	5.40

WIFI 5.2GHz (U-NII 1)

Mode	Frq.(MHz)	Max.Tune-up power (dBm)	P (W)	G(dBi)	Gain (num.)	D (m)	Power density in W / m ²	Limit (W/m ²)
IEEE 802.11a	5240	15.0	0.032	6.00	3.98	0.2	0.250	9.12
IEEE 802.11n HT 20	5240	15.0	0.032	6.00	3.98	0.2	0.250	9.12
IEEE 802.11n HT 40	5230	15.0	0.032	6.00	3.98	0.2	0.250	9.11

WIFI 5.8GHz (U-NII 3)

Mode	Frq.(MHz)	Max.Tune-up power (dBm)	P (W)	G(dBi)	Gain (num.)	D (m)	Power density in W / m ²	Limit (W/m ²)
IEEE 802.11a	5825	15.0	0.032	6.00	3.98	0.2	0.250	9.80
IEEE 802.11n HT20	5825	15.0	0.032	6.00	3.98	0.2	0.250	9.80
IEEE 802.11n HT40	5795	15.0	0.032	6.00	3.98	0.2	0.250	9.77

6. SIMULTANEOUS TRANSMISSION MPE ANALYSIS

Both of the WiFi 2.4GHz and WiFi 5GHz and bluetooth 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

6.1. WIFI 2.4GHZ + BLUETOOTH

Therefore, the worst-case situation is $0.25 / 5.44 + 0.05 / 5.47 = 0.055$, which is less than "1".

6.2. WIFI 5GHZ + BLUETOOTH

Therefore, the worst-case situation is $0.25 / 9.11 + 0.05 / 5.47 = 0.037$, which is less than "1".

--End of Report--