

**IEEE C95.1**

**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**

**IoT Wireless I/O Module**

**Model: WISE-4050 ; WISE-4060 ; WISE-4012E ;  
WISE-40XXXXXXXXXXXXXXXXXX**

(where "X" may be any alphanumeric character , "-" or blank)

**Trade Name: ADVANTECH**

**Issued for**

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Testing Laboratory  
0240

## Revision History

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**1. 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.

**2. EUT Specification**

<b>Product Name</b>	IoT Wireless I/O Module
<b>Model Number</b>	WISE-4050 ; WISE-4060 ; WISE-4012E ; WISE-40XXXXXXXXXXXXXXXXXX (where "X" may be any alphanumeric character , "-" or blank)
<b>Identify Number</b>	T150120L05
<b>Received Date</b>	January 20, 2015
<b>Frequency band (Operating)</b>	<input checked="" type="checkbox"/> 802.11b/g/n HT20: 2.412GHz ~ 2.462GHz <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> )
<b>Antenna Specification</b>	Antenna Gain :3.26 dBi (Numeric gain: 2.12)
<b>Maximum Average output power</b>	IEEE 802.11b Mode: 15.00 dBm (31.623 mW) IEEE 802.11g Mode: 16.45 dBm (44.157 mW) IEEE 802.11n HT 20 Mode: 16.39 dBm (43.551 mW)
<b>Evaluation applied</b>	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

### 3. Test Results

*No non-compliance noted.*

#### Calculation

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

*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:

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

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

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

*Where d = Distance in cm*

*P = Power in mW*

*G = Numeric antenna gain*

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

#### **4. 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>

##### **IEEE 802.11b mode:**

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm2)
2437	31.623	2.12	20	0.0133	1

##### **IEEE 802.11g mode:**

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm2)
2437	44.157	2.12	20	0.0186	1

##### **IEEE 802.11n HT20 mode:**

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm2)
2437	43.551	2.12	20	0.0184	1