RF Exposure Report

Report No.:	SA170605E06A
FCC ID:	M82-WISE3610
Model:	WISE-3610XXXXXXXXXXXXXXX ("x"=0-9, A-Z, a-z, dot, diagonal, hyphen or blank.)
Received Date:	June 22, 2017
Test Date:	July 27, 2017
Issued Date:	Sep. 14, 2017
Applicant:	ADVANTECH CO., LTD
Address:	No.1, Alley 20, Lane 26, Rueiguang Rd, Neihu District, Taipei, Taiwan 114
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
SA170605E06A	Original release.	Sep. 14, 2017

1 Certificate of Conformity

Product:	IoT Gateway
Brand:	ADVANTECH
Model:	WISE-3610XXXXXXXXXXXXXXX ("x"=0-9, A-Z, a-z, dot, diagonal, hyphen or blank.)
Sample Status:	ENGINEERING SAMPLE
Applicant:	ADVANTECH CO., LTD
Test Date:	July 27, 2017
Standards:	FCC Part 2 (Section 2.1091) KDB 447498 D01 General RF Exposure Guidance v06 IEEE C95.1-1992

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** Sep. 14, 2017

Claire Kuan / Specialist

Approved by : _____ , **Date:** Sep. 14, 2017

Max Chen / Manager

2 RF Exposure

2.1 Limits For Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	…	…	f/1500	30
1500-100,000	…	…	1.0	30

f = Frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$Pd = (Pout*G) / (4*pi*r^2)$

where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 35cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

The antennas provided to the EUT, please refer to the following table:

For LoRa								
Antenna No	Brand	Model	Antenna Gain(dBi) without cable loss	Frequency	Antenna Type	Antenna Connector	Cable Loss(dB)	Cable Length (mm)
1	Cortec	AN0915-9207BSM	0.96	902~928 MHz	Dipole	Reverse SMA	0.5	160
2	Cortec	AN0915-9207BSM	0.96	902~928 MHz	Dipole	Reverse SMA	0.5	160
For WLAN								
Antenna No	Brand	Model	Antenna Gain(dBi) without cable loss	Frequency	Antenna Type	Antenna Connector	Cable Loss(dB)	Cable Length (mm)
3	Cortec	AN2450-92K01BRS	5.03	2400~2483.5 MHz	Dipole	Reverse SMA	0.5	180
			5.01	5150~5850 MHz	Dipole	Reverse SMA	0.8	180

For WWAN						
Antenna No	Brand	Model	Gain (dBi) <excluding cable loss>	Frequency	Antenna Type	Antenna Connector
4	SINBON.	1750008424- 01	-0.5	824~896 MHz	Dipole	SMA
			-0.2	880~960 MHz		
			1.5	1427~1880 MHz		
			1.95	1850~1990 MHz		

2.5 Calculation Result of Maximum Conducted Power

For WLAN

Frequency Band (MHz)	Max Power (mW)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2412-2462	825.237	29.17	7.54	35	0.30425	1
5180-5240	632.462	28.01	7.22	35	0.21661	1
5745-5825	934.079	29.70	7.22	35	0.31992	1

Note:
2.4GHz: Directional gain = 4.53dBi + 10log(2) = 7.54dBi
5GHz: Directional gain = 4.21dBi + 10log(2) = 7.22dBi

For LoRa

Frequency Band (MHz)	Max Power (mW)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
927.5	95.94	19.82	0.46	35	0.00693	0.6183

For WWAN

Frequency Band (MHz)	Max Power (mW)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
824.2	1995	33.00	-0.50	35	0.11550	0.5495

Conclusion:

The formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4GHz + WLAN 5GHz + Lora + WWAN = 0.30425 / 1 + 0.31992 / 1 + 0.00693 / 0.6183 + 0.11550 / 0.5495 =-0.84558

Therefore the maximum calculations of above situations are less than the “1” limit.

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