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RF Exposure Evaluation Report

Report No. :	CQASZ20190400260E-02
Applicant:	SHENYANG INSTITUTE OF AUTOMATION CHINESE ACADEMY OF SCIENCES
Address of Applicant:	No.114, Nanta Street, Shenhe District, Shenyang, Liaoning Province, P.R.China
Manufacturer:	SHENYANG INSTITUTE OF AUTOMATION CHINESE ACADEMY OF SCIENCES
Address of Manufacturer:	No.114, Nanta Street, Shenhe District, Shenyang, Liaoning Province, P.R.China
Equipment Under Test (EUT):	
Product:	WIA-FA Wireless Equipment
Model No.:	WIA-FA-FD-X-RJ45, WIA-FA-AD-X-RJ45, WIA-FA-GW-X-RJ45
Test Model No.:	WIA-FA-FD-X-RJ45
Brand Name:	WIA-FA
FCC ID:	2ATP6SIA-WIA-FA-X01
Standards:	47 CFR Part 1.1307 47 CFR Part 1.1310 KDB447498D01 General RF Exposure Guidance v06
Date of Test:	2019-04-22 to 2019-05-29
Date of Issue:	2019-05-29
Test Result :	**PASS***

Tested By: Daisy Qin

(Daisy Qin)

Reviewed By: Aaron Ma

(Aaron Ma)

Approved By:

(Jack Ai)

* In the configuration tested, the EUT complied with the standards specified above.

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20190400260E-02	Rev.01	Initial report	2019-05-29

2 Contents

3 General Information

3.1 Client Information

Applicant:	SHENYANG INSTITUTE OF AUTOMATION CHINESE ACADEMY OF SCIENCES
Address of Applicant:	No.114, Nanta Street, Shenhe District, Shenyang, Liaoning Province, P.R.China
Manufacturer:	SHENYANG INSTITUTE OF AUTOMATION CHINESE ACADEMY OF SCIENCES
Address of Manufacturer:	No.114, Nanta Street, Shenhe District, Shenyang, Liaoning Province, P.R.China

3.2 General Description of EUT

Product Name:	WIA-FA Wireless Equipment
All Model No.:	WIA-FA-FD-X-RJ45, WIA-FA-AD-X-RJ45, WIA-FA-GW-X-RJ45
Test Model No.:	WIA-FA-FD-X-RJ45
Trade Mark:	WIA-FA
Hardware Version:	V1.0
Software Version:	V1.0
Operation Frequency:	2402MHz~2480MHz
Channel Numbers:	3
Channel Separation:	25MHz
Type of Modulation:	GFSK
Sample Type:	☐ Mobile ☐ Portable ☒ Fix Location
Test Software of EUT:	RF test (manufacturer declare)
Antenna Type:	External antenna with SMA connector
Antenna Gain:	2.0dBi
Power Supply:	DC9-24V

Note:

1. All model: WIA-FA-FD-X-RJ45, WIA-FA-AD-X-RJ45, WIA-FA-GW-X-RJ45

2. Only the model WIA-FA-FD-X-RJ45, was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

3. These three antennas does not transmit simultaneously.

4 RF Exposure Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 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)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) 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

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4* Pi * R^2)$

Where

Pd = power density in mW/cm2

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

Pd id the limit of MPE, 1 mW/cm2 . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.2 1.1.3 EUT RF Exposure Evaluation

Antenna Gain: 2.0dBi
Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.58 in linear scale.
Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

ANT1				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	14.79	14.0±1	15.0	31.623
Middle(2437MHz)	14.9	14.0±1	15.0	31.623
Highest(2462MHz)	15.29	14.5±1	15.5	35.481
ANT2				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	14.41	13.5±1	14.5	28.184
Middle(2437MHz)	14.51	14.0±1	15.0	31.623
Highest(2462MHz)	14.88	14.0±1	15.0	31.623
ANT3				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	14.53	14.0±1	15.0	31.623
Middle(2437MHz)	14.59	14.0±1	15.0	31.623
Highest(2462MHz)	14.91	14.0±1	15.0	31.623

The worst case:

Maximum tune-up Power (mW)	**Antenna Gain (dBi)**	**Power Density at R = 20 cm (mW/cm^2)**	**Limit**	**Result**
35.481	2.0	0.0089	1.0	PASS

Note: 1) The Max Conducted Average Output Power data refer to report Report No.: CQASZ20190400260E-01
2) $Pd = (Pout*G)/(4* Pi * R^2)= (35.481*1.58)/(4*3.1416*20^2)=0.0089$