TEST REPORT

of

RE Directive (2014/53/EU)
EN50566: 2017 / EN50663: 2017

Product :	**IOT Gateway**
Brand Name:	**Fanstel**
Model:	**BWG840F; BWG840X; BWG840XE; BWG840E; BWG32**
Model Difference:	**Please see page 6 for detail**
Applicant:	**Fanstel Corporation, Taipei**
Address:	**10F-10, No. 79, Sec. 1, Hsin Tai Wu Rd., Hsi-Chih, New Taipei City 221 Taiwan**

Test Performed by:

International Standards Laboratory Corp.
<LT Lab.>
*Address:
No. 120, Lane 180, Hsin Ho Rd.,
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Report No.: **ISL-19LR286EMPE**

Issue Date : **2019/11/04**

VERIFICATION OF COMPLIANCE

Applicant:	Fanstel Corporation, Taipei
Equipment Under Test:	IOT Gateway
Brand Name:	Fanstel
Model Number:	BWG840F; BWG840X; BWG840XE; BWG840E; BWG32
Model Different:	Please see page 6 for detail
Date of Test:	2019/09/25 ~ 2019/11/01
Date of EUT Received:	2019/09/25

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
EN50566: 2017 EN50663: 2017	Complied

The above equipment was tested by International Standards Laboratory Corp.. for compliance with the
requirements set forth in the European Standard EN 50566: 2017 and EN 50663: 2017 under 3.1 (a) of RE Directive 2014/53/EU. The results of in this report apply to the product system that was used only.

Test By:	Bill Huang	***Date:***	2019/11/04
	Bill Huang / Engineer		
Prepared By:	Gigi yeh	***Date:***	2019/11/04
	Gigi Yeh / Senior Engineer		
Approved By:	Jerry Liu	***Date:***	2019/11/04
	Jerry Liu / Technical Manager		

Version

Version No.	Date	Description
00	2019/11/04	Initial creation of document

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1. Description of Equipment under Test (EUT)

General:

Product Name:	IOT Gateway	
Brand Name:	Fanstel	
Model Name:	BWG840F; BWG840X; BWG840XE; BWG840E; BWG32	
Model Difference:	Please see table below for detail.	
Type of Equipment:	Stand-alone equipment	
Temperature Range:	-40°C to +85°C	
Simultaneous transmissions:	Yes	
Geo-location capability:	No	
Antenna Designation	Dipole Antenna : 0 dBi (BWG840E & BWG840XE) PCB Antenna : 1.61dBi(BWG840X) 、0.54 dBi(BWG840F) PCB Antenna for WIFI : 2 dBi	
Power Supply	100-240Vac change to 5Vdc form adapter	
	Adaptor:	Model: CH005A05010001
Modular Report:	Bluetooth 5.0, 802.15.4 module BLE Report Number: 19LR205E328(EN 300 328 V2.1.1): Prepared by: International Standards Laboratory Corp. WIFI &Bluetooth Module WiFi Report Number: RSHA180116002-01C_EN300328 V2.1.1_2.4G Wi-Fi (EN 300 328 V2.1.1): Prepared by: Bay Area Compliance Laboratories Corp. (Kunshan)	

This test report applies for 2.4GHz Wifi + BLE.

Model Summaries

Gateway	BWG840F	BWG840E	BWG840X	BWG840XE
WiFi module	ESP 32	ESP 32	ESP 32	ESP 32
BLE module	BT840F	BT840E	BT840X	BT840XE
Max module range	2300M at 125 kbps	2300M at 125 kbps	>4500M at 125 Kbps	>4500M at 125 Kbps
FCC ID	X8WBT840F	X8WBT840F	X8WBT840X	X8WBT840X
ISED	4100A-BT840F	4100A-BT840F	4100A-BT840X	4100A-BT840X
QDID	108621	108621	108621	108621

Gateway	BWG32
WiFi module	ESP 32
BLE module	
Max module range	
FCC ID	
ISED	
QDID	108621

2. Description of Test Modes

The EUT has been tested under Operating condition. And used to control the EUT for staying in continuous transmitting mode is programmed. Channel low, mid, and High for each modulation type are chosen for testing.

3. General Description of Applied Standards

The EUT According to the Specifications, it must comply with the requirements of the following standards:

EN 50566: 2017 – Product standard to demonstrate the compliance of wireless communication devices with the basic restrictions and exposure limit values related to human exposure to electromagnetic fields in the frequency range from 30 MHz to 6 GHz: hand-held and body mounted devices in close proximity to the human body

EN 50663: 2017 – Generic standard for assessment of low power electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (10 MHz - 300 GHz)

EN 62311: 2008 – Generic standard to demonstrate the compliance of electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (0Hz-300GHz)

EN 62479: 2010 – Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10MHz to 300GHz)

4. RF Exposure Evaluations

4.1. Standards:

According to section 4.2 Low-power exclusion level (Pmax) of EN 62479: 2010 and Annex A, Table A.1 – Example values of SAR-based Pmax for some cases described by ICNIRP, IEEE Std C95.1-1999 and IEEEE Std C95.1-2005

Table A.1 – Example values of SAR-based P_{max} for some cases described by ICNIRP, IEEE Std C95.1-1999 and IEEE Std C95.1-2005

Guideline / Standard	SAR limit, SAR_{max} W/kg	Averaging mass, m g	P_{max} mW	Exposure tier[a]	Region of body[a]
ICNIRP [1]	2	10	20	General public	Head and trunk
	4	10	40	General public	Limbs
	10	10	100	Occupational	Head and trunk
	20	10	200	Occupational	Limbs
IEEE Std C95.1-1999 [2]	1,6	1	1,6	Uncontrolled environment	Head, trunk, arms, legs
	4	10	40	Uncontrolled environment	Hands, wrists, feet and ankles
	8	1	8	Controlled environment	Head, trunk, arms, legs
	20	10	200	Controlled environment	Hands, wrists, feet and ankles
IEEE Std C95.1-2005 [3]	2	10	20	Action level	Body except extremities and pinnae
	4	10	40	Action level	Extremities and pinnae
	10	10	100	Controlled environment	Body except extremities and pinnae
	20	10	200	Controlled environment	Extremities and pinnae
[a] Consult the appropriate standard for more information and definitions of terms.					

4.2. Classification of the assessment method:

The antenna of the product, under normal use condition is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20 cm separation distance and the prohibition of operating to a person has been printed on the user's manual. So, this product under normal use is located on electromagnetic far field between the human body.

Far Field Calculation Formula

$$E = \frac{\sqrt{30PG(\theta,\phi)}}{r}$$

G = antenna gain relative to an isotropic antenna

θ,ϕ = elevation and azimuth angles to point of investigation

r = distance from observation point to the antenna

4.3. EUT operating condition:

The software provided by Manufacturer enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.4. Test Results:

E-Field Strength Calculation: EN 62311: 2008

Mode: BLE with Dipole Antenna

Ambient temperature: 25℃ Relative humidity: 60% Test Date: 2019/08/15

Antenna Gain=	0.00	dBi
Distance to human body=	20	cm
Duty Cycle=	0.99	

Frequency	EIRP (dBm)	EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS/ FAIL
2402.00	8.20	6.61	2.21	61.00	PASS
2442.00	8.20	6.61	2.21	61.00	PASS
2480.00	8.20	6.61	2.21	61.00	PASS

E-Field Strength Calculation: EN 62311: 2008

Mode: BLE with PCB Antenna

Ambient temperature: 25℃ Relative humidity: 60% Test Date: 2019/08/15

Antenna Gain=	1.61	dBi
Distance to human body=	20	cm
Duty Cycle=	0.99	

Frequency	EIRP (dBm)	EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS/ FAIL
2402.00	15.11	32.43	4.91	61.00	PASS
2442.00	16.81	47.97	5.97	61.00	PASS
2480.00	16.21	41.78	5.57	61.00	PASS

Wifi Mode:

E-Field Strength Calculation: EN 62311: 2008

Ambient temperature: 25℃ Relative humidity: 60% Test Date: 2017/06/13

Antenna Gain=	2.00	dBi	
Distance to human body=		20	cm
Duty Cycle=	0.99		

802.11b

Frequency	EIRP (dBm)	EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS/ FAIL
2412.00	16.20	41.69	5.56	61.00	PASS
2437.00	16.50	44.67	5.76	61.00	PASS
2472.00	16.62	45.92	5.84	61.00	PASS

802.11g

Frequency	EIRP (dBm)	EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS/ FAIL
2412.00	16.23	41.98	5.58	61.00	PASS
2437.00	15.81	38.11	5.32	61.00	PASS
2472.00	15.92	39.08	5.39	61.00	PASS

802.11n_HT20

Frequency	EIRP (dBm)	EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS/ FAIL
2412.00	16.45	44.16	5.73	61.00	PASS
2437.00	15.86	38.55	5.35	61.00	PASS
2472.00	15.87	38.64	5.36	61.00	PASS

Antenna Gain= 2.00 dBi
Distance to human body= 20 cm
Duty Cycle= 0.99

802.11n_HT40

Frequency	EIRP (dBm)	EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS/ FAIL
2422.00	15.46	35.16	5.11	61.00	PASS
2437.00	16.02	39.99	5.45	61.00	PASS
2462.00	15.95	39.36	5.41	61.00	PASS

Evaluation Results:
The Calculation of E-Field Strength is less than EN 62311 E-Field Strength limit 61V/m at 2.4GHz.

APPENDIX 1

Photographs of EUT

Refer to ISL-19LR286E328

~ End of Report ~