

# TEST REPORT

of

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

**Product:** BLG840F/X BLE/802.15.4 to LTE Gateways  
**Brand Name:** Fanstel  
**Main Model:** BLG840F  
**Series Model:** BLG840X; BLG40F; BLG840E; BLG840XE; BLG40E; BLE840F; BLE840X; BLE40F; BLE840E; BLE840XE; BLE40E; BLG-1; BLG-1F; BU840XE; BU840E; LN60G840F; LN60G840X; LN60G40F; LN60G840E; LN60G840XE; LN60G40E; LN60E840F; LN60E840X; LN60E40F; LN60E840E; LN60E840XE; LN60E40E; M2840XE; M2840E  
**Model Difference:** Antenna difference  
**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:



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**Report No.: ISL-22LR0108EMPE**  
**Issue Date :2022/06/08**



Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein. The uncertainty of the measurement does not include in consideration of the test result unless the customer required the determination of uncertainty via the agreement, regulation or standard document specification. This test report shall not be reproduced except in full, without the written approval of International Standards Laboratory Corp.

## VERIFICATION OF COMPLIANCE

**Applicant:** Fanstel Corporation, Taipei  
**Equipment Under Test:** BLG840F/X BLE/802.15.4 to LTE Gateways  
**Brand Name:** Fanstel  
**Main Model:** BLG840F  
**Series Model:** BLG840X; BLG40F; BLG840E; BLG840XE; BLG40E; BLE840F; BLE840X; BLE40F; BLE840E; BLE840XE; BLE40E; BLG-1; BLG-1F; BU840XE; BU840E; LN60G840F; LN60G840X; LN60G40F; LN60G840E; LN60G840XE; LN60G40E; LN60E840F; LN60E840X; LN60E40F; LN60E840E; LN60E840XE; LN60E40E; M2840XE; M2840E  
**Model Different:** Antenna difference  
**Date of Test:** 2022/05/19 ~ 2022/06/07  
**Date of EUT Received:** 2022/05/19

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.

<b>Test By:</b>		<b>Date:</b>	2022/06/08
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## Version

Version No.	Date	Description
00	2022/06/08	Initial creation of document

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## 1. Description of Equipment under Test (EUT)

General Information		
Product Name:	BLG840F/X BLE/802.15.4 to LTE Gateways	
Brand Name:	Fanstel	
Main Model:	BLG840F	
Series Model:	BLG840X; BLG40F; BLG840E; BLG840XE; BLG40E; BLE840F; BLE840X; BLE40F; BLE840E; BLE840XE; BLE40E; BLG-1; BLG-1F; BU840XE; BU840E; LN60G840F; LN60G840X; LN60G40F; LN60G840E; LN60G840XE; LN60G40E; LN60E840F; LN60E840X; LN60E40F; LN60E840E; LN60E840XE; LN60E40E; M2840XE; M2840E	
Model Difference:	Antenna difference	
Temperature Range:	-40°C to +80°C	
Power Supply:	5VDC	
	Adaptor:	Model: GA-0502000V; Supplier: Fanstel
Bluetooth Information		
BT Modular Report:	BT840XE Report Number: 19LR022, 19LR022-R1 Prepared by: International Standards Laboratory Corp.	
Bluetooth Version:	V4.0	
Frequency Range:	2402 – 2480MHz	
Max Output Power:	BLE40E: 8 dBm BLE40F : 9.18 dBm BLE840E: 8.20 dBm BLE840F: 2.88 dBm BLE840X: 16.27 dBm BLE840XE: 16.17 dBm BLG40E: 7.90 dBm BLG40F: 3.08 dBm BLG840E: 8.30 dBm BLG840F: 8.30 dBm BLG840X: 16.07 dBm BLG840XE: 16.27 dBm	
Channel number:	40 channels	
Modulation type:	GFSK	
Product HW Version:	BT840XE-V5	
Product SW Version:	N/A	
Product FW Version:	N/A	
Test SW Version:	Putty 0.60.0.0	
RFpower setting:	POS0dBm	

Antenna List:

Model Name	Antenna Type	Antenna Gain
BLE40E	Dipole ANT060	6dBi
BLE40F	PCB F type	0.88dBi
BLE840E	Dipole ANT0	0dBi
BLE840F	PCB F type	0.88dBi
BLE840X	PCB F type	0.88dBi
BLE840XE	Dipole ANT0	0dBi
BLG40E	Dipole ANT060	6dBi
BLG40F	PCB F type	0.88dBi
BLG840E	Dipole ANT0	0dBi
BLG840F	PCB F type	0.88dBi
BLG840X	PCB F type	0.88dBi
BLG840XE	Dipole ANT0	0dBi
BU840E	Dipole ANT0	0dBi
BU840XE	Dipole ANT0	0dBi

## 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 ( $P_{\max}$ ) of EN 62479: 2010 and Annex A, 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

**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 <sup>a</sup>	Region of body <sup>a</sup>
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

<sup>a</sup> Consult the appropriate standard for more information and definitions of terms.



According to EN 62311: 2008, the criteria listed in the bellowing table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified 1999/519/EC.

Reference levels for electric, magnetic and electromagnetic fields  
(0 Hz to 300 GHz, unperturbed rms values)

Frequency Range	E-field Strength (V/m)	H-Field Strength (A/m)	B-field (uT)	Equivalent plane wave power density S (W/m <sup>2</sup> )
0-1 Hz	--	$3.2 \times 10^4$	$4 \times 10^4$	--
1-8 Hz	10000	$3.2 \times 10^4 / f^2$	$4 \times 10^4 / f^2$	--
8-25 Hz	10000	$4000/f$	$5000/f$	--
0.025-0.8kHz	$250/f$	$4/f$	$5/f$	--
0.8-3kHz	$250/f$	5	6.25	--
3-150kHz	87	5	6.25	--
0.15-1MHz	87	$0.73/f$	$0.92/f$	--
1-10MHz	$87/f^{1/2}$	$0.073/f$	$0.92/f$	--
10-400MHz	28	0.073	0.092	2
400-2000MHz	$1.375 f^{1/2}$	$0.0037 f^{1/2}$	$0.0046 f^{1/2}$	$f/200$
2-300GHz	61	0.16	0.20	1.0

Notes:

1. f as indicated in the frequency range column.

#### 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  
 $\theta, \phi$  = 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:

##### BLE Mode: BLE40E for Dipole ANT060

##### EIRP Measurement: EN 62479: 2010

Frequency Band (MHz)	Max. EIRP (dBm)	Max. EIRP (W)	Field Strength (V/m)	Field Strength Limit (V/m)	Result
2400 - 2480	8	0.00631	2.175	61	Pass

##### BLE Mode: BLE840E, BLE840XE for Dipole ANT0

##### EIRP Measurement: EN 62479: 2010

Frequency Band (MHz)	Max. EIRP (dBm)	Max. EIRP (W)	Field Strength (V/m)	Field Strength Limit (V/m)	Result
2400 - 2480	16.17	0.04140	5.572	61	Pass

##### BLE Mode: BLE40F, BLE840F, BLE840X for PCB F type

##### EIRP Measurement: EN 62479: 2010

Frequency Band (MHz)	Max. EIRP (dBm)	Max. EIRP (W)	Field Strength (V/m)	Field Strength Limit (V/m)	Result
2400 - 2480	16.27	0.04236	5.637	61	Pass

**BLE Mode: BLG40E for Dipole ANT060**

**EIRP Measurement: EN 62479: 2010**

Frequency Band (MHz)	Max. EIRP (dBm)	Max. EIRP (W)	Field Strength (V/m)	Field Strength Limit (V/m)	Result
2400 - 2480	7.9	0.00617	2.150	61	Pass

**BLE Mode: BLG840E, BLG840XE for Dipole ANT0**

**EIRP Measurement: EN 62479: 2010**

Frequency Band (MHz)	Max. EIRP (dBm)	Max. EIRP (W)	Field Strength (V/m)	Field Strength Limit (V/m)	Result
2400 - 2480	16.27	0.04236	5.637	61	Pass

**BLE Mode: BLG40F, BLG840F, BLG840X for PCB F type**

**EIRP Measurement: EN 62479: 2010**

Frequency Band (MHz)	Max. EIRP (dBm)	Max. EIRP (W)	Field Strength (V/m)	Field Strength Limit (V/m)	Result
2400 - 2480	16.07	0.04046	5.508	61	Pass

## **APPENDIX 1**

### **Photographs of EUT**

*Refer to ISL-22LR0108P*

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