



RF Exposure Evaluation Report

Application No.: HKEM1806000372AV
Applicant: ENERGYBOX LIMITED
Address of Manufacturer: 8F, Green 18, Hong Kong Science Park,
Shatin, N.T., Hong Kong.

Equipment Under Test (EUT):

Product Name: Gateway
Model No.: EB/HUB-00/01
FCC ID: 2AP8YEBHUB
Standards: 47 CFR Part 1.1307 (2016)
47 CFR Part 1.1310 (2016)

Date of Receipt: 2018-06-01
Date of Test: 2018-06-14 to 2018-06-15, 2018-11-08
Date of Issue: 2018-11-08

Test Result :	PASS*
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

CHEN Jian-feng, Jeffrey

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2018-11-08		Original



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4 General Information

4.1 General Description of EUT

Operating Frequency	903 MHz to 927 MHz
Type of Modulation:	GFSK
Number of Channels	121 Channels
Channel Separation:	200 kHz
Dwell time	Per channel is less than 0.4s.
Antenna Type	Integral
Antenna gain:	3 dBi
Speciality:	--
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Function:	Gateway
Power Supply:	AC120V ~ 60Hz to DC 5V
Adapter:	SAPA05010US
Power cord:	None.

Contain Certified LTE module:

LTE module:	Model Number: HL7618
	FCC ID: N7NHL7618
Alternative LTE module:	Model Number: HL7618
	FCC ID: N7NHL7648
Antenna for LTE module:	Type: External Antenna Antenna Gain: 3dBi
Remark:	None

4.2 Test Location

All tests were performed at:

SGS IECC Limited (Member of the SGS Group (SGS SA))

No. 16-B, Yip Wo Street, On Lok Tsuen, Fanling, N.T., Hong Kong

Tel: +852 2305 2570 Fax: +852 2756 4480

No tests were sub-contracted.

4.3 Test Facility

The test facility is recognized or accredited by the following organizations:

- **HOKLAS (Lab Code: 125)**

SGS IECC Limited has been accepted by HKAS Executive, on the recommendation of the Accreditation Advisory Board, as a HOKLAS Accredited Laboratory, this laboratory meets the requirements of ISO/IEC 17025:2005 as it has been accredited for performing specific test as listed in the scope of accreditation within the test category of Electrical and Electronic Products.

- **FCC Recognized Accredited Test Firm (CAB Registration No.: 446297)**

SGS IECC Limited has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: HK0010, Test Firm Registration Number: 446297.

- **Industry Canada (Site Registration No.: 5193A-2)**

The 3m Alternative Semi-anechoic chamber of SGS IECC Limited has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 5193A-2.

SGS IECC Limited has been recognized by Department of Innovation, Science and Economic Development (ISED) Canada as a wireless testing laboratory.



4.4 Deviation from Standards

None.

4.5 Abnormalities from Standard Conditions

None.

4.6 Other Information Requested by the Customer

None.

5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 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 transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

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 the limit of MPE, **f/1500**. 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 where the MPE limit is reached.

5.1.2 Test Procedure

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

5.1.3 EUT RF Exposure Evaluation

For 900MHz gateway

Antenna 1 Gain: 3dBi ,

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Worst case result:

Frequency (MHz)	Conduct power (including Tune-up tolerance) (dBm)	E.I.R.P (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratios	Result
903	12.62	38.56	0.0077	0.602	0.013	PASS

Note: Refer to report No. HKEM180600037201 for EUT test EIRP value. The distancer (5th column) calculated from the Fries transmission formula is far greater than **20 cm** separation requirement.

This device contain certified module **HL7648 or HL7618**

LTE for HL7648

Antenna Gain: 3dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2 in linear scale.

Frequency (MHz)	Conduct power (including Tune-up tolerance) (dBm)	E.I.R.P (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratios	Result
1902.5	23.86	486.4	0.097	1	0.097	PASS

Note: Refer to MPE evaluation report of LTE modular(FCC ID: N7NHL7648) and find the maximum ratio of the measured power density with limit in channel 1902.5MHz , so only choose the channel to do MPE evaluation.

LTE for HL7618

Antenna Gain: 3dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2 in linear scale.

Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratios	Result
1753.5	22.93	392.672	0.078	1	0.078	PASS

Note: Refer to MPE evaluation report of LTE modular(FCC ID: N7NHL7618) and find the maximum ratio of the measured power density with limit in channel 1753.5 MHz , so only choose the channel to do MPE evaluation.



Exposure conditions for simultaneous transmission operations

Σ of ratios simultaneous transmitting= 900MHz gateway + LTE module

$$=0.013+0.097$$

$$=0.11$$

$$<1$$

So the SAR report is not required

- End of the Report -