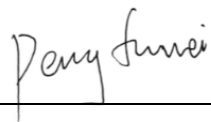





# RF EXPOSURE EVALUATION REPORT

**APPLICANT** : Xiamen Four-Faith Communication Technology Co., Ltd.  
**PRODUCT NAME** : F8L10GW LoRa Gateway  
**MODEL NAME** : F8L10GW  
**BRAND NAME** : Four-Faith  
**FCC ID** : 2ALUW-F8L10GW  
**STANDARD(S)** : 47 CFR§2.1091, KDB 447498 D01v06  
**TEST DATE** : 2018-11-21  
**ISSUE DATE** : 2018-11-21

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Approved by:   
Anne Liu ( Supervisor )

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# DIRECTORY

- 1. Technical Information..... 3
- 1.1. Applicant and Manufacturer Information..... 3
- 1.2. Equipment Under Test (EUT) Description ..... 3
- 1.3. Applied Reference Documents ..... 4
- 2. Device category and RF exposure limit..... 5
- 3. RF Exposure Evaluation ..... 6
- Annex A General Information..... 8

Change History		
Issue	Date	Reason for change
1.0	2018-11-21	First edition



# 1. Technical Information

**Note:** Provide by manufacturer.

## 1.1. Applicant and Manufacturer Information

<b>Applicant:</b>	Xiamen Four-Faith Communication Technology Co., Ltd.
<b>Applicant Address:</b>	11th Floor, A-06 Area, No.370, Chengyi Street, Jimei, Xiamen, Fujian, China.
<b>Manufacturer:</b>	Xiamen Four-Faith Communication Technology Co., Ltd.
<b>Manufacturer Address:</b>	11th Floor, A-06 Area, No.370, Chengyi Street, Jimei, Xiamen, Fujian, China.

## 1.2. Equipment Under Test (EUT) Description

<b>Product Name:</b>	F8L10GW LoRa Gateway
<b>Hardware Version:</b>	V1.3
<b>Software Version:</b>	20180927
<b>Frequency Bands:</b>	GSM850: 869.2 MHz ~ 893.8 MHz GSM1900: 1930.2 MHz ~ 1989.8MHz WCDMA Band II: 1852.4 MHz ~1907.6 MHz WCDMA Band IV: 1712.4 MHz ~1752.6 MHz WCDMA Band V: 826.4 MHz ~846.6 MHz LTE Band 2: 1850.7 MHz ~1909.3 MHz LTE Band 4: 1710.7 MHz ~1754.3 MHz LTE Band 5: 824.7 MHz ~848.3 MHz LTE Band 7: 2502 MHz ~2568 MHz LTE Band 12: 699 MHz ~716 MHz LTE Band 17: 704 MHz ~715.9 MHz 802.11b/g/n-20MHz: 2.412GHz ~2.462GHz 802.11n-40MHz: 2.422GHz ~2.452GHz LoRa: 903MHz ~ 927MHz
<b>Modulation Mode:</b>	GSM / GPRS: GMSK EDGE: 8PSK WCDMA: QPSK(Uplink) HSDPA: QPSK (Uplink) HSUPA: QPSK (Uplink) HSPA+ : BPSK(Uplink) LTE: QPSK / 16QAM (Uplink) 802.11b: DSSS (DBPSK / DQPSK / CCK)



	802.11g/n20/n40: OFDM (BPSK / QPSK / 16QAM / 64QAM) LoRa: FSK
<b>Antenna type:</b>	Omni-Directional FRP Antenna

### 1.3. Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title
1	<b>47 CFR§2.1091</b>	Radiofrequency Radiation Exposure Evaluation: mobile devices
2	<b>KDB 447498 D01v06</b>	General RF Exposure Guidance



## 2. Device category and RF exposure limit

Per user manual, Based on 47CFR 2.1091, this device belongs to mobile device category with General Population/Uncontrolled exposure.

### Mobile Devices:

47CFR 2.1091(b)

For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and is not able to be easily moved to another location. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

### GENERAL POPULATION / UNCONTROLLED EXPOSURE

The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

**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 <sup>2</sup> )	Averaging time (minutes)
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	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

### 3. RF Exposure Evaluation

#### Standalone transmission MPE evaluation

Mode	Frequency	Antenna Gain	Tune-up Conducted Power		Power density(S)	Limit for MPE
	(MHz)	(dBi)	(dBm)	(mW)	(mW/cm <sup>2</sup> )	(mW/cm <sup>2</sup> )
WLAN	2412-2462	2	17.50	56.23	0.011	1.00
LTE Band 2	1850.7-1909.3	0	23.00	199.53	0.040	1.00
LTE Band 4	1710.7-1754.3	0	23.00	199.53	0.040	1.00
LTE Band 5	824.7-848.3	0	23.00	199.53	0.040	0.58
LTE Band 7	2502.5-2567.5	0	23.00	199.53	0.040	1.00
LTE Band 12	699-716	0	23.00	199.53	0.040	0.47
LTE Band 17	704-715.9	0	23.00	199.53	0.040	0.47
WCDMA Band 2	1852.4-1907.6	0	24.00	251.19	0.050	1.00
WCDMA Band 4	1712.4-1752.6	0	24.00	251.19	0.050	1.00
WCDMA Band 5	826.4-846.6	0	24.00	251.19	0.050	0.55
GSM 850	869.2-893.8	0	34.00	2511.89	0.500	0.55
GSM 1900	1930.2-1989.8	0	31.50	1412.54	0.281	1.00

Mode	Frequency	Max. electric field strength		EIRP	Power density	Limit for MPE
	(MHz)	(dB $\mu$ V/m)	(V/m)	(mW)	(mW/cm <sup>2</sup> )	(mW/cm <sup>2</sup> )
Lora	915	83.02	0.014	0.06013416	0.00001197	0.61

#### Note:

1. The EUT used the WWAN Module provided by Shenzhen Neway Technology Co.,Ltd., the Model is N720, and the Module's **FCC ID:PJ7-1705**
2. For Wi-Fi 2.4G Band, The Maximum transmit power is according to report KH18110035W04.
3. For LoRa Band, The Maximum transmit power is according to report KH18110035W03.



**According to KDB447498 D01 General RF Exposure Guidance v06, simultaneous transmission is evaluated:**

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is  $\leq 1.0$ .

**Calculation method:**

$$S = P \cdot G / 4\pi R^2 = EIRP / 4\pi R^2$$

Where:

S = power density (in appropriate units, e.g., mW/cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., mW)

G = antenna gain

R = Separation distance (20cm)

For simultaneously transmit system, the calculated power density should comply with:

$$\text{The sum of MPE ratios} = \sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

The worst case is as below:

Max MPE ratios of WLAN + Max MPE ratios of Lora + Max MPE ratios of WWAN (LTE/WCDMA/GSM) =  $0.011 + 0.00001197 / 0.61 + 0.5 / 0.55 = 0.920 < 1$ .



## Annex A General Information

### 1. Identification of the Responsible Testing Laboratory

Company Name:	Kehu-Morlab Test Laboratory
Address:	Unit 101, No.1732 Gangzhong Road, Xiamen Area, Pilot Free Trade Zone (Fujian), P. R. China
Responsible Test Lab Manager:	Mr. Di Dehai
Telephone:	+86-592-5612050
Facsimile:	+86-592-5612095

### 2. Identification of the Responsible Testing Location

Name:	Kehu-Morlab Test Laboratory
Address:	Unit 101, No.1732 Gangzhong Road, Xiamen Area, Pilot Free Trade Zone (Fujian), P. R. China

### 3. Accreditation Certificate

<b>Accredited Testing Laboratory:</b>	The FCC designation number is CN1249. ( Kehu-Morlab Test Laboratory )
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