/ User Manual for LoRaWAN End Nodes (/xwiki/bin/view/Main/User%20Manual%20for%20LoRaWAN%20End%20Nodes/) -

/ LA66 LoRaWAN Shield User Manual (/xwiki/bin/view//Main/User%20Manual%20for%20LoRaWAN%20End%20Nodes/LA66%20LoRaWAN%20Shield%20User%20Manual/) +

LA66 LoRaWAN Shield User Manual

Last modified by Xiaoling (/xwiki/bin/view/XWiki/Xiaoling) on 2023/05/26 14:19

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1. LA66 LoRaWAN Shield

1.1 Overview



LA66 LoRaWAN Shield is the Arduino shield base on LA66. Users can use LA66 LoRaWAN Shield to rapidly add LoRaWAN or peer-to-peer LoRa wireless function to A

LA66 is a ready-to-use module that includes the LoRaWAN v1.0.3 protocol. The LoRaWAN stack used in LA66 is used in more than 1 million LoRaWAN End Devices d mature LoRaWAN stack greatly reduces the risk to make stable LoRaWAN Sensors to support different LoRaWAN servers and different countries' standards. External MC LA66 and start to transmit data via the LoRaWAN protocol.

Each LA66 module includes a world-unique OTAA key for LoRaWAN registration.

Besides the support of the LoRaWAN protocol, LA66 also supports open-source peer-to-peer LoRa Protocol for the none-LoRaWAN application.

LA66 is equipped with TCXO crystal which ensures the module can achieve stable performance in extreme temperatures.

1.2 Features

- Arduino Shield base on LA66 LoRaWAN module
- Support LoRaWAN v1.0.3 protocol
- Support peer-to-peer protocol
- TCXO crystal to ensure RF performance on low temperature
- SMA connector
- Available in different frequency LoRaWAN frequency bands.
- World-wide unique OTAA keys.

- AT Command via UART-TTL interface
- · Firmware upgradable via UART interface
- Ultra-long RF range

1.3 Specification

- CPU: 32-bit 48 MHz
- Flash: 256KB
- RAM: 64KB
- Input Power Range: 1.8v ~ 3.7v
- Power Consumption: < 4uA.
- Frequency Range: 150 MHz ~ 960 MHz Maximum Power +22 dBm constant RF output
- High sensitivity: -148 dBm
- Temperature:
 - Storage: -55 ~ +125°C • Operating: -40 ~ +85°C
- Humidity:
 - Storage: 5 ~ 95% (Non-Condensing)
 - Operating: 10 ~ 95% (Non-Condensing)
- LoRa Tx Current: <90 mA at +17 dBm, 108 mA at +22 dBm
- LoRa Rx current: <9 mA
- I/O Voltage: 3.3v

1.4 Pin Mapping & LED



- 1. The LED lights up red when there is an upstream data packet
- 2. When the network is successfully connected, the green light will be on for 5 seconds
- 3. Purple light on when receiving downlink data packets



1.5 Example: Use AT Command to communicate with LA66 module via Arduino UNO.

Show connection diagram:



1. open Arduino IDE



2. Open project

LA66-LoRaWAN-shield-AT-command-via-Arduino-UNO source code link: https://www.dropbox.com/sh/hgtycj0go4tka2r/AAACRRIRriMAudB2m3ThH7Sba?dl=0 (https://www.dropbox.com/sh/hgtycj0go4tka2r/AAACRRIRriMAudB2m3ThH7Sba?dl=0)



3. Click the button marked 1 in the figure to compile, and after the compilation is complete, click the button marked 2 in the figure to upload



4. After the upload is successful, open the serial port monitoring and send the AT command



1.6 Example: Join TTN network and send an uplink message, get downlink message.

1. Open project

Join-TTN-network source code link: https://www.dropbox.com/sh/hgtycj0go4tka2r/AAACRRIRriMAudB2m3ThH7Sba?dl=0 (https://www.dropbox.com/sh/hgtycj0go4tka2r/AAACRRIRriMAudB2m3ThH7Sba?dl=0)

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			开发板在 COM5 不可用	
			ع Arduino Uno 在	сомз

2. Same steps as 1.5,after opening the serial port monitoring, it will automatically connect to the network and send packets

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8:45	Schedule data downlink for transmissi	DevAddr: 26 08 10 66 🗘 🍓 Rod Delay: 5	
8:44	Forward uplink data message	DevAddr: 26 08 10 66 💠 🐞 Payload: { Hum: 83.6, Temp: 43.86 } 11 22 33 44 💠 🐞 FPort: 2 Data rate: SF128H125 SNR: 12.2 6	RSSI: -71
8:44	Successfully processed data message	DevAddr: 26 08 10 66 🗘 🐚	
8:15	F. 💿 COM3	- 🗆 🔀 🥥 Join-TTN-network Arduino 1.8.19 (Windows	Store 1 D X
		发祥 编辑 项目 工具 帮助	
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	rxDone	<pre>#include <softwareserial.h></softwareserial.h></pre>	
	RSS1= -15JOINED		
	IX on freq 867.700 MHz at DR 0		
		*/	
	OK		
	TxDone PX on freq 867 700 MHz at DP 0	String inputString = "; // a Sti bool stringComplete = false; // when	ting to hold incoming data her the string is complete
	RA ON FIEL CONTROL NO DE C		in one overing to compare
	Received: ADR Message	<pre>long old_time=millis();</pre>	
		long new_time;	
	Rssi= -24	long uplink interval=30000;	
	✓ 目动装備 □ Show timestamp	現11付 V 9000 波行车 V 相关制L bool time_to_at_recvb-false;	
		bool get_LA66_data_status=false;	
		bool network joined status=false;	
			>

Live data

1.7 Example: Log Temperature Sensor(DHT11) and send data to TTN, show it in Node-RE

1. Open project

Log-Temperature-Sensor-and-send-data-to-TTN source code link: https://www.dropbox.com/sh/hgtycj0go4tka2r/AAACRRIRriMAudB2m3ThH7Sba?dl=0 (https://www.dropbox.com/sh/hgtycj0go4tka2r/AAACRRIRriMAudB2m3ThH7Sba?dl=0)

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_	名称			ø
中速访问	Log-Temperature-Sensor-and-send-data-to-T 2022/7/23 11:49		sketch_jul23a	
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库			<pre>} void loop() { // put your main code here, to run repeatedly:</pre>	
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Province.				
			开发板在 COM5 不可用	
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2. Same steps as 2.5, after opening the serial port monitoring, it will automatically connect to the network and send packets

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		Overview Li	ve data Messag	ing Locat	ion Payload form	atters Claim	ing General settings		
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↓ 17:38:56	Schedule data downlink for transmissi.	. DevAddr: 2	6 0B 11 32 🗘 🖷	Rx1 Dela	y: 5				
↑ 17:38:55	Forward uplink data message	DevAddr: 20	6 0B 11 32 ↔ 🍯	Payload:	{ Hum: 46, Temp:	27.4 } QA B	4 01 CC 💠 🚡 FPort: 2 Data rate:	SF12BW125 SNR: 11.2 RSSI:	-71
↑ 17:38:55	Successfully processed data message	DevAddr: 2	6 0B 11 32 ↔ 🖷			7			
<u>17-28-22</u>	Forward join-scent messade	DevAddr: 2	5.0B 11.32				0 Log-Temperature-Sensor-and-sen	d-data-to-TTN A	
COM3					-		文件 编辑 项目 工具 帮助		
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TX on freq	868.500 MHz at DR 5						Log Temperature Sensor and send d	state.TTN	
RX on freq	868.500 MHz at DR 5						tinclude (SoftwareSerial b)	ala-to-TTN	^
rxDone							finclude <adafruit_sensor.h></adafruit_sensor.h>		
Rssi= -21J	OINED						<pre>finclude <dht.h></dht.h></pre>		
Humidity:	46.00%						<pre>finclude <dht_u.h></dht_u.h></pre>		
***** UpLi	nkCounter= 0 *****								
TX on freq	868.100 MHz at DR 0						2/		
077							#define DHTPIN 8	// Digital pin connects	ed to the I
txDone							#define DHTTYPE DHT11	// DHT 11	_
RX on freq	868.100 MHz at DR 0						Dal_onified dat(Dalpin, Dallipe);	
Received:	ADR Message						<pre>String inputString = ""; bool stringComplete = false;</pre>	<pre>// a String to hold in // whether the string :</pre>	coming data is complete
rxDone							<pre>long old_time-millis();</pre>		
Rssi= -60						~	long new_time;		
☑ 自动滚屏	Show timestamp		换行	将~	9600 波特室 ~	清空输出	1	1.1	~
							项目使用了 11980 字节,占用了 (37%)	程序存储空间。最大为 32256	字节・ へ
and The Thing	s Industries						全局变量使用了852字节,(41%)的动态内	存,余留1196字节局部变里。最	大为2048享 、)EN

3. Integration into Node-red via TTNV3

For the usage of Node-RED, please refer to: http://wiki.dragino.com/xwiki/bin/view/Main/Node-RED/ (http://wiki.dragino.com/xwiki/bin/view/Main/Node-RED/)



1.8 Example: How to join helium

1. Create a new device.

	My Devices	d New Device							
	All Devices 7 Devices		CN470 Devices	US915 2 Devices	B68 te 1 Devices 2 Dev	st icos			
Flows	All Devices						Edit	Columns Quick Action	1 v
NODES Devices < Functions	Device Name 🔶	Device EUI 0	Labels	Frame Up 🔅	Frame Down \Diamond	Packets Transferred \diamondsuit	DC Used \diamondsuit	Date Activated $\ \ \diamondsuit$	Last Connected 🔅
Integrations	LHT65-EU868	888888888888888888888888888888888888888	868 ×	2	4	680	680	Aug 31, 2021 8:55 AM	Sep 1, 2022 3:32 PM
CONFIGS Alerts	LHT65-US915-2 •	A84041808181A757	US915 ×	7	0	33917	33917	Jun 28, 2021 9:23 AM	Sep 7, 2022 4:49 PM
Profiles Packets	LSN50-US915	25CE83E063C5A62E	None	0	0	3005	3005	Feb 21, 2022 2:03 PM	Aug 11, 2022 3:46 PM
ADMIN	LT22222-CN470	67581508AFE835A0	CN470×	709	10	400	400	Aug 31, 2022 9:07 AM	Sep 1, 2022 3:58 PM
Coverage Organizations	TEST-65-001	888666666666977	$test \times$	0	0	172	172	Aug 27, 2021 2:54 PM	Jun 14, 2022 5:40 PM
Data Credits Users	TEST-65-002	000000000000000000000000000000000000000	test×	1	0	2836	2836	Aug 27, 2021 4:23 PM	May 5, 2022 10:16 AM
	US915-LHT65-002	582407FFFFFFFFEE	US915 ×	0	0	1851	1851	Aug 30, 2021 8:00 PM	May 18, 2022 11:50 AM
								10 results	v < 1 > +

2. Save the device after filling in the necessary information.



3. Use AT commands.



4. Use command AT+CFG to get device configuration

	[16:34:48.480] RX on freq 923.300 MHz at DR 8 [16:34:48.517] rxTimeout [17:02:39.776] AT+CFG	-
	<pre>[17:02:39.819] Stop Tx events,Please wait for the erase to complete AT+DEUI=A8 40 41 00 01 81 A7 57 [17:02:39.888] AT+APPEUI=25 B9 75 24 5F 87 1C 56</pre>	
	[17:02:39.927] AT+APPKEY=15 E8 77 3C 5C 46 28 A9 A3 F1 23 57 9A 11 61 48 [17:02:39.987] AT+DADDR=0184E9BF [17:02:40.027] AT+APPSKEY=82 54 64 A4 6D 5E 99 FA 3D 6C 8B E8 42 67 87 C4 [17:02:40.087] AT+NWKSKEY=F6 B7 38 CD 6C A8 EE BE 55 9F D6 8A 6E EA B4 15	
	[17:02:40.128] AT+ADR-1 [17:02:40.158] AT+TXP=0 [17:02:40.158] AT+DR=0 [17:02:40.158] AT+DCS=0	
	[17:02:40.187] AT+PNM-1 [17:02:40.187] AT+RX2FQ=923300000 [17:02:40.227] AT+RX2PR=8 [17:02:40.227] AT+RX1DL=1000	
	T17:02:40.227] AT+RX2DL=2000	✓
9 5	AT+CFG	•

```
[16:28:22.114]
[16:28:22.121] Dragino LA66 Device
[16:28:22.121] Image Version: v1.0
[16:28:22.151] LoRaWan Stack: DR-LWS-007
[16:28:22.181] Frequency Band: US915
[16:28:22.181] DevEui= A8 40 41 00 01 81 A7 57
[16:28:22.301] DoinRequest NbTrials= 72
[16:28:22.301]
[16:28:22.301] ***** UpLinkCounter= 0 *****
[16:28:22.332] TX on freq 904.300 MHz at DR 0
[16:28:22.656] txDone
[16:28:27.670] RX on freq 924.500 MHz at DR 10
[16:28:27.758] rxDone
[16:28:27.761] Rssi= -77
JOINED
```

6. Send uplink using command

16:34:11.017] AT+SENDB=1,1,4,12345678

[16:34:11.079] ***** UpLinkCounter= 0 ***** 16:34:11.088] TX on freq 904.500 MHz at DR 0 16:34:11.117] 16:34:11.118] OK 16:34:11.395] txDone 16:34:12.407] RX on freq 925.100 MHz at DR 10 16:34:12.410] 16:34:12.422] rxTimeout 16:34:13.418] RX on freq 923.300 MHz at DR 8 16:34:13.454] rxTimeout 16:34:17.085] ***** UpLinkCounter= 0 ***** 16:34:17.088] TX on freq 904.900 MHz at DR 0 16:34:17.400] txDone 16:34:18.415] RX on freq 926.300 MHz at DR 10 [16:34:18.428] rxTimeout 16:34:19.423] RX on freq 923.300 MHz at DR 8 16:34:19.459 rxTimeout 16:34:21.093 ***** UpLinkCounter= 0 *****

Eve	Event Log Expand All Filter Events w/ Commands Show Dropped Uplinks: Late Inactive Device							
	Event	Туре	No. of Hotspots	Time				
+	47	Uplink 🖉	1	Sep 7, 2022 4:49:51.361 PM				
+	6	Uplink 🖉	1	Sep 7, 2022 4:29:52.778 PM				
+	•••	Downlink	1	Sep 7, 2022 4:29:51.758 PM				
+	~ 5	Uplink *	1	Sep 7, 2022 4:29:51.358 PM				
+	V 0	Join Accept	1	Sep 7, 2022 4:28:24.445 PM				
+	V 0	Join Request	1	Sep 7, 2022 4:28:22.444 PM				

1.9 Upgrade Firmware of LA66 LoRaWAN Shield

1.9.1 Items needed for update

1. LA66 LoRaWAN Shield

2. Arduino

3. USB TO TTL Adapter



1.9.2 Connection



LA66 LoRaWAN Shield <-> USB TTL

GND	<-> GND
тхр	<-> TXD
RXD	<-> RXD

Put a jumper cap on JP6 of LA66 LoRaWAN Shield. (the jumper is to power on LA66 module)

Connect USB TTL Adapter to PC after connecting the wires



1.9.3 Upgrade steps

1. Switch SW1 to put in ISP position



2. Press the RST switch once



3. Open the Upgrade tool (Tremo Programmer) in PC and Upgrade

1. Software download link: https://www.dropbox.com/sh/j0qyc7a9ejit7jk/AACtx2tK4gEv6YFXMIVUM4dLa?dl=0 (https://www.dropbox.com/sh/j0qyc7a9ejit7jk/AACtx2tK4gEv6YFXMIVUM4dLa?dl=0)



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IDLE				
IDLE				

2. Select the COM port corresponding to USB TTL

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Serial Setting				
Port COM23 ~				
Baudrate 921600 V				
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	 @			

3. Select the bin file to burn

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Baudrate 921600 \checkmark				
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	 @		Click	
	 @			

挟								?
si ^	名称 ^	修改	改日期	类型	大小			
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l		Acchealth 类型: BIN 3 大小: 67.0 修改日期: 2	LA66 firmware v1.0 文件 KB 2022/6/1 14:08	20220530.bin				
文件名	(N): Acchealth LA66 firmware v1.0 202	20530.bin			~ t	clic binary,fe(*.bin) 打开(0)	k 取消	~
П.т.	romo Programmor		_	× ×	1 00			
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4. Click to start the download

Tremo Programmer

💽 Tremo Programmer			_		×
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Download Files					
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		@			
		@			
		@			
		@			
click					
Download Start Erase All				09	X
IDLE					

5. Check update process

📧 Tremo Programmer		-		>
Flash				
Serial Setting Port COM23 ~ Baudrate 921600 ~				
Download Files	 1			
└ chealth LA66 firmware v1.0 20220530.bin	 @	0x08000	000	
	 @			
Download Stop Erase All				
			729	6

The following picture shows that the burning is successful

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Serial Setting Port COM23 ~ Baudrate 921600 ~					
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Download Start Erase All				100	*
OK Developed film every fully				100	10
OK Download files successfully					

2. FAQ

2.1 How to Compile Source Code for LA66?

Compile and Upload Code to ASR6601 Platform : Instruction (/xwiki/bin/view/Main/User%20Manual%20for%20LoRaWAN%20End%20Nodes/LA66%20LoRaWAN%20Module/Compile%20and%20Upload%20Code%20to%20ASR6(

2.2 Where to find Peer-to-Peer firmware of LA66?

Instruction for LA66 Peer to Peer firmware : Instruction

(/xwiki/bin/view/Main/User%20Manual%20for%20LoRaWAN%20End%20Nodes/LA66%20LoRaWAN%20Shield%20User%20Manual/Instruction%20for%20LA66%20Pee

3. Order Info

Part Number: LA66-LoRaWAN-Shield-XXX

XXX: The default frequency band

- AS923: LoRaWAN AS923 band
- AU915: LoRaWAN AU915 band
- EU433: LoRaWAN EU433 band
- EU868: LoRaWAN EU868 band
- KR920: LoRaWAN KR920 band
- US915: LoRaWAN US915 band
- IN865: LoRaWAN IN865 band
- CN470: LoRaWAN CN470 band
- PP: Peer to Peer LoRa Protocol

4. Reference

• Hardware Design File for LA66 LoRaWAN Shield : Download (https://www.dropbox.com/sh/a3wbmdcvqjxaqw5/AADZfvAiykJTK624RgMquH86a?dl=0)

5. FCC Statement

FCC Caution:

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this (interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordar cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does caus or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the follow

-Reorient or relocate the receiving antenna.

- -Increase the separation between the equipment and receiver.
- -Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum dist radiator& your body.

• 0 Tags:

Created by Xiaoling (/xwiki/bin/view/XWiki/Xiaoling) on 2022/08/16 10:59

No comments for this page