LoRaWAN RS485 Convetor

STL420

User Manual

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1. Introduction

The SLT420 is designed for Internet of Things solutions. AS a RS485 / UART to LoRaWAN Converter, it can periodically read the sensor data and upload data via LoRaWAN network to the IoT server. The SLT420 can interface to RS485 sensor, 3.3v/5v UART sensor or interrupt sensor, providing a 3.3v output and a 5v output to power external sensors. Both output voltages are controllable to minimize the total system power consumption. SLT420 is IP67 waterproof and powered by 19000mAh Li-SOCI2 battery, it is designed for long term use for 10 years.

SLT420 support standard LoRaWAN 1.0.3 in Class A. It can reach long transfer range and easy to integrate with LoRaWAN compatible gateway and IoT server. For data uplink, SLT420 sends user-defined commands to RS485 devices and gets the return from the RS485 devices. For data downlink, when there is downlink commands from LoRaWAN server, SLT420 will forward the commands from LoRaWAN server to RS485 devices.

Each SLT420 pre-load with a set of unique keys for LoRaWAN registration, register these keys to LoRaWAN server and it will auto connect after power on.

2. Appearance

3.   Main Features

3.1 Technical Specifications

Hareware Model	Lora Performance	Interfaces
*STM32L072CZT6 MCU *SX1276/78 Wireless Chip *Power Consumption Idle: 6uA@3.3v 20dB Transmit: 130mA@3.3v	*Frequency Range: Band 1 (HF): 862 ~ 1020 Mhz Band 2 (LF): 410 ~ 528 Mhz *168 dB maximum link budget. *+20 dBm - 100 mW constant RF output vs. *Programmable bit rate up to 300 kbps. *High sensitivity: down to -148 dBm. *Bullet-proof front end: IIP3 = -12.5 dBm. *Excellent blocking immunity. *Fully integrated synthesizer with a resolution of 61 Hz. *LoRa modulation. *Built-in bit synchronizer for clock recovery. *Preamble detection. *127 dB Dynamic Range RSSI. *Automatic RF Sense and CAD with ultra-fast AFC.	1 x RS485 Interface 1 x TTL Serial , 3.3v or 5v. 1 x I2C Interface, 3.3v or 5v. 1 x one wire interface 1 x Interrupt Interface

3.2 Features and Target Applications

Features	Target Applications
*LoRaWAN Class A & Class C protocol (default Class A) *Frequency Bands: CN470/EU433/KR920/US915/EU868/AS923/AU915/IN865/RU864 *AT Commands to change parameters *Remote configure parameters via LoRaWAN Downlink *Firmware upgradable via program port *Support multiply RS485 devices by flexible rules *Support Modbus protocol *Support Interrupt uplink	*Smart Buildings & Home Automation *Logistics and Supply Chain Management *Smart Metering *Smart Agriculture *Smart Cities *Smart Factory

3.3 Sensors support

Sensor	support	Electrical characteristics	Additional information

RS485	yes	5V	Modbus protocol
UART	yes	5V	

4. Set up Instructions

On/Off

The SLT420 is powered on by 19000mAh battery, it uses a jumper design to save battery life. User can put the jumper to power on SLT420, in default it is shipped with power off.
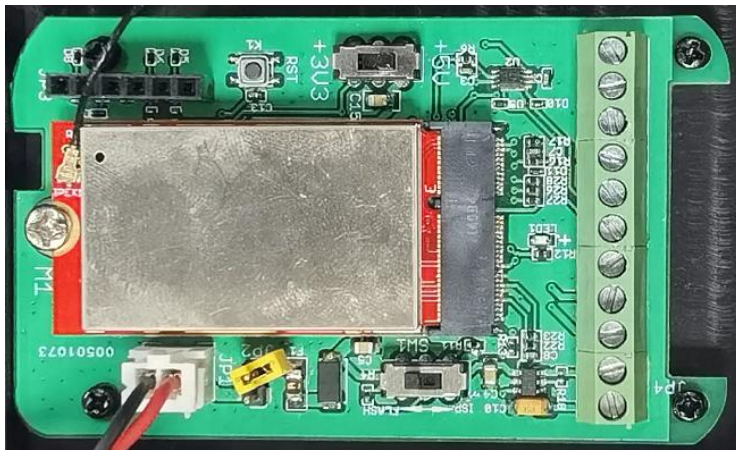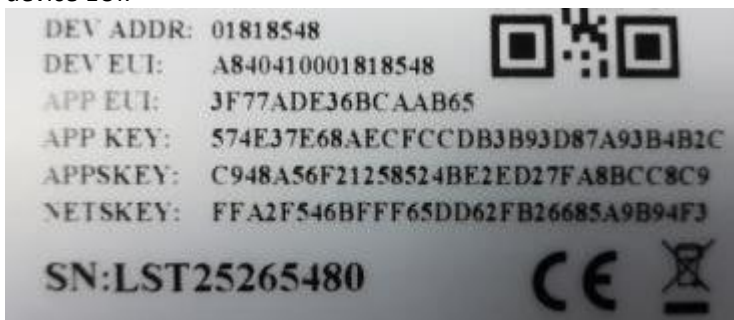

Network Joining

After power-on, SLT420 will request to join the network.
The SLT420 is configured as LoRaWAN OTAA Class A mode by default. It has OTAA keys to join network. To connect a local LoRaWAN network, user just need to input the OTAA keys in the network server and power on the SLT420. It will auto join the network via OTAA. User can set the SLT420 to work with ABP mode by AT commands.

Here shows an example of how to join the SLT420 to the TTN Network.

Step 1: Create a device in TTN with the OTAA keys from SLT420. EachSLT420 is shipped with a sticker with unique device EUI:
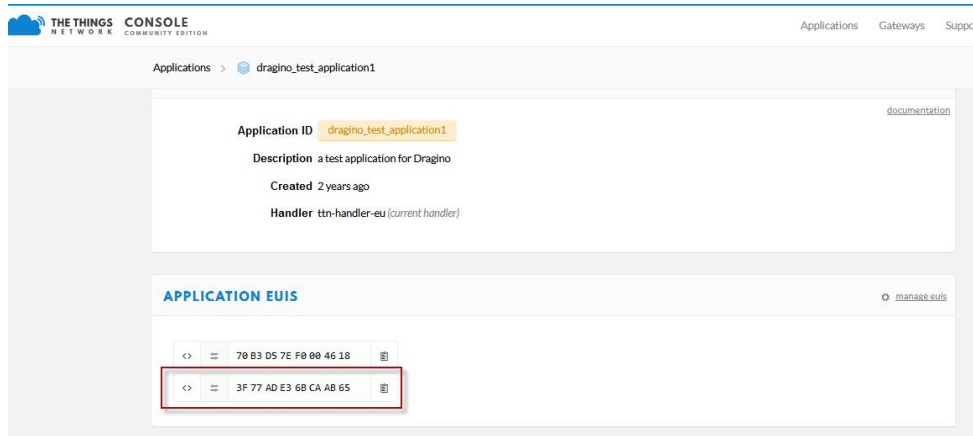

DEV ADDR: 01818548
DEV EUI: A840410001818548
APP EUI: 3F77ADF36BCAAB65
APP KEY: 574E37E68AECFCCDB3B93D87A93B4B2C
APPSKEY: C948A56F21258524BE2ED27FA8BCC8C9
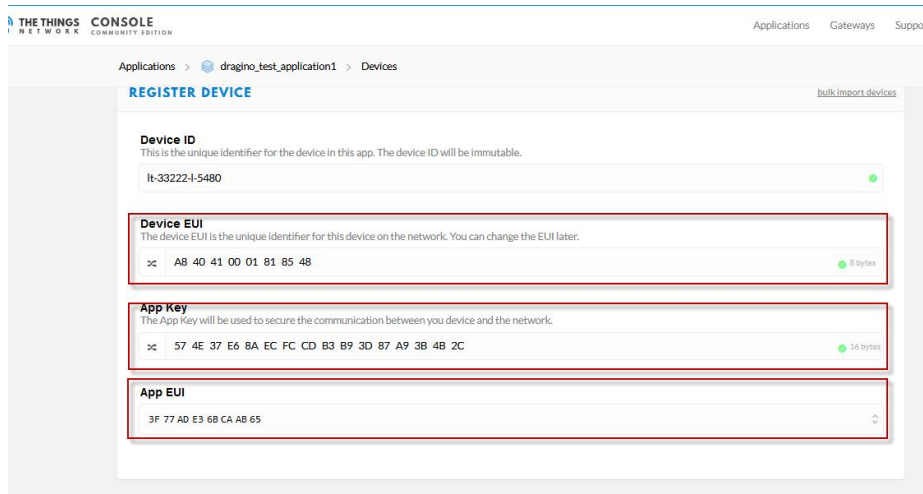NETSKEY: FFA2F546BFFF65DD62FB26685A9B94F3

SN:LST25265480

User can enter this key in their LoRaWAN Server portal. Below is TTN screen shot:
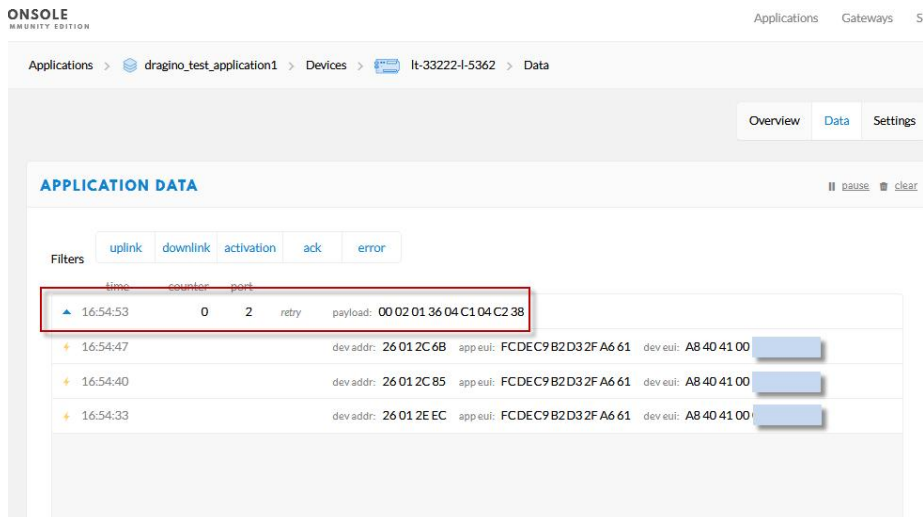
Add APP EUI in the application.

Add APP KEY and DEV EUI

Step 2: Power on SLT420 and it will auto join to the TTN network. After join success, it will start to upload message to TTN and user can see in the panel.

5.   Operation and Configuration

5.1 Configure UART settings for RS485 communication

AT Commands	Description	Example
AT+BAUDR	Set the baud rate (for RS485 connection). Default Value is: 9600.	AT+BAUDR=9600 Options: (1200,2400,4800,14400,19200,115200)
AT+PARITY	Set UART parity (for RS485 connection) Default Value is: no parity.	AT+PARITY=0 Option: 0: no parity, 1: odd parity, 2: even parity
AT+STOPBIT	Set serial stopbit (for RS485 connection) Default Value is: 1bit.	AT+STOPBIT=0 for 1bit AT+STOPBIT=1 for 1.5 bit AT+STOPBIT=2 for 2 bits

5.2 Configure RS485 sensors

User can configure such sensor via PC and RS485 adapter or through SLT420 AT Commands ： AT+CFGDEV.
Each AT+CFGDEV equals to send a RS485 command to sensors. This command will only run when user input it and won't run during each sampling.

AT Commands	Description	Example
AT+CFGDEV	This command is used to configure the RS485 devices; they won't be used during sampling. AT+CFGDEV=xx xx xx xx xx xx xx xx xx xx xx xx,m m: 0: no CRC, 1: add CRC-16/MODBUS in the end of this command	AT+CFGDEV=xx xx xx xx xx xx xx xx xx xx xx xx,m

5.3 Configure SLT420 via AT or Downlink

User can configure SLT420 via AT Commands or LoRaWAN Downlink Commands There are two kinds of Commands:

✓   **Common Commands**: They should be available for each sensor, such as: change uplink interval, reset device.

Sensor Related Commands: These commands are special designed for SLT420. User can see these commands below:

5.4 Buttons

Button	Feature
RST	Reboot SLT420

5.5 LEDs

LEDs	Feature
LED1	Blink when device transmit a packet.

5.6 Switch Jumper

Switch Jumper	Feature
SW1	ISP position: Upgrade firmware via UART Flash position: Configure device, check running status.
SW2	5V position: set to compatible with 5v I/O. 3.3v position: set to compatible with 3.3v I/O.,

+3.3V: is always ON

+5V: Only open before every sampling. The time is by default, it is AT+5VT=0.   Max open time.

5000 ms.

6.   Important Maintenance Instructions

Kindly pay attention to the following in order to achieve the best maintenance of the product:

• Do not store the device under excessive heat condition. High temperature can shorten the life of electronic devices, destroy batteries, and deform or melt some plastic parts.
• Do not store the device in places that are too cold. Otherwise, when the temperature rises to normal temperature, moisture will form inside, which will destroy the board.
• Do not throw, knock or shake the device. Rough handling of equipment can destroy internal circuit boards and delicate structures.
• Do not clean the device with strong chemicals, detergents or strong detergents.
• Do not apply the device with paint. Smudges might block in the device and affect the operation.
• Do not throw the battery into the fire, or the battery will explode. Damaged batteries may also explode. All of the above applies to your device, battery and accessories.
If any device is not working properly, please take it to the nearest authorized service facility for repair.

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FCC WARNING

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 device must accept any interference received, including interference that may cause undesired operation.

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

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 provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio 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 following measures:

-- 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.

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum 20cm distance between the radiator and your body: Use only the supplied antenna.