

AIOT-ILND01

LoRa Long Range Radio Node Board

User's Manual 1st Ed

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Packing List

Before setting up your product, please make sure the following items have been shipped:

Item	Quantity
● AIOT-ILND01	1
● Antenna	1

If any of these items are missing or damaged, please contact your distributor or sales representative immediately.

About this Document

This User's Manual contains all the essential information, such as detailed descriptions and explanations on the product's hardware and software features (if any), its specifications, dimensions, jumper/connector settings/definitions, and driver installation instructions (if any), to facilitate users in setting up their product.

Users may refer to the product page at AAEON.com for the latest version of this document.

Safety Precautions

Please read the following safety instructions carefully. It is advised that you keep this manual for future references

1. All cautions and warnings on the device should be noted.
2. Make sure the power source matches the power rating of the device.
3. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
4. Always completely disconnect the power before working on the system's hardware.
5. No connections should be made when the system is powered as a sudden rush of power may damage sensitive electronic components.
6. If the device is not to be used for a long time, disconnect it from the power supply to avoid damage by transient over-voltage.
7. Always disconnect this device from any AC supply before cleaning.
8. While cleaning, use a damp cloth instead of liquid or spray detergents.
9. Make sure the device is installed near a power outlet and is easily accessible.
10. Keep this device away from humidity.
11. Place the device on a solid surface during installation to prevent falls
12. Do not cover the openings on the device to ensure optimal heat dissipation.
13. Watch out for high temperatures when the system is running.
14. Do not touch the heat sink or heat spreader when the system is running
15. Never pour any liquid into the openings. This could cause fire or electric shock.
16. As most electronic components are sensitive to static electrical charge, be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and contain all electronic components in any static-shielded containers.

17. If any of the following situations arises, please the contact our service personnel:
 - i. Damaged power cord or plug
 - ii. Liquid intrusion to the device
 - iii. Exposure to moisture
 - iv. Device is not working as expected or in a manner as described in this manual
 - v. The device is dropped or damaged
 - vi. Any obvious signs of damage displayed on the device
18. AIOT-ILND01 Requires two 14500 Lithium Ion batteries. Only use batteries with a minimum voltage of 3.3V.
19. **DO NOT LEAVE THIS DEVICE IN AN UNCONTROLLED ENVIRONMENT WITH TEMPERATURES BEYOND THE DEVICE'S PERMITTED STORAGE TEMPERATURES (SEE CHAPTER 1) TO PREVENT DAMAGE.**

Warning!



This device complies with Part 15 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.

Caution:

There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions and your local government's recycling or disposal directives.

Attention:

Il y a un risque d'explosion si la batterie est remplacée de façon incorrecte. Ne la remplacer qu'avec le même modèle ou équivalent recommandé par le constructeur. Recycler les batteries usées en accord avec les instructions du fabricant et les directives gouvernementales de recyclage.

China RoHS Requirements (CN)

产品中有毒有害物质或元素名称及含量

AAEON Main Board/ Daughter Board/ Backplane

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板 及其电子组件	○	○	○	○	○	○
外部信号 连接器及线材	○	○	○	○	○	○
<p>O: 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11363-2006 标准规定的限量要求以下。</p> <p>X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 标准规定的限量要求。</p> <p>备注: 此产品所标示之环保使用期限, 系指在一般正常使用状况下。</p>						

China RoHS Requirement (EN)

Poisonous or Hazardous Substances or Elements in Products

AAEON Main Board/ Daughter Board/ Backplane

Component	Poisonous or Hazardous Substances or Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
PCB & Other Components	○	○	○	○	○	○
Wires & Connectors for External Connections	○	○	○	○	○	○
<p>O: The quantity of poisonous or hazardous substances or elements found in each of the component's parts is below the SJ/T 11363-2006-stipulated requirement.</p> <p>X: The quantity of poisonous or hazardous substances or elements found in at least one of the component's parts is beyond the SJ/T 11363-2006-stipulated requirement.</p> <p>Note: The Environment Friendly Use Period as labeled on this product is applicable under normal usage only</p>						

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Chapter 1

Product Specifications

1.1 Specifications

System

Dimensions	85 mm x 65 mm
MCU	ST STM32L Semtech SX1276
I/O Placements	3 x GROVE connectors 1 x UART1 (RS-232/485) 1 x UART2(TX/RX) 1 x I2C 1 x Temperature & humidity sensor 1 x 3-axis Accelerometer (2G/4G/8G/16G) 1 x micro USB2.0 type B for power supply 1 x JTAG-debug port 1 x battery connector for 2 x 14500 Lithium-ion battery
Others	4 x LED (GPIO control) 3 buttons 1 x Boot select 2 x User defined 1 x Reset button 1 x SMA antenna connector 1 x IPEX antenna connector (optional)
Power Input	+5V (via micro USB) 2 x 14500 Lithium-ion battery for external power (minimum 3.3V each)
Operating Temperature	0°C-60°C
Operating Humidity	0% ~ 90% relative humidity, non-condensing
Certification	CE

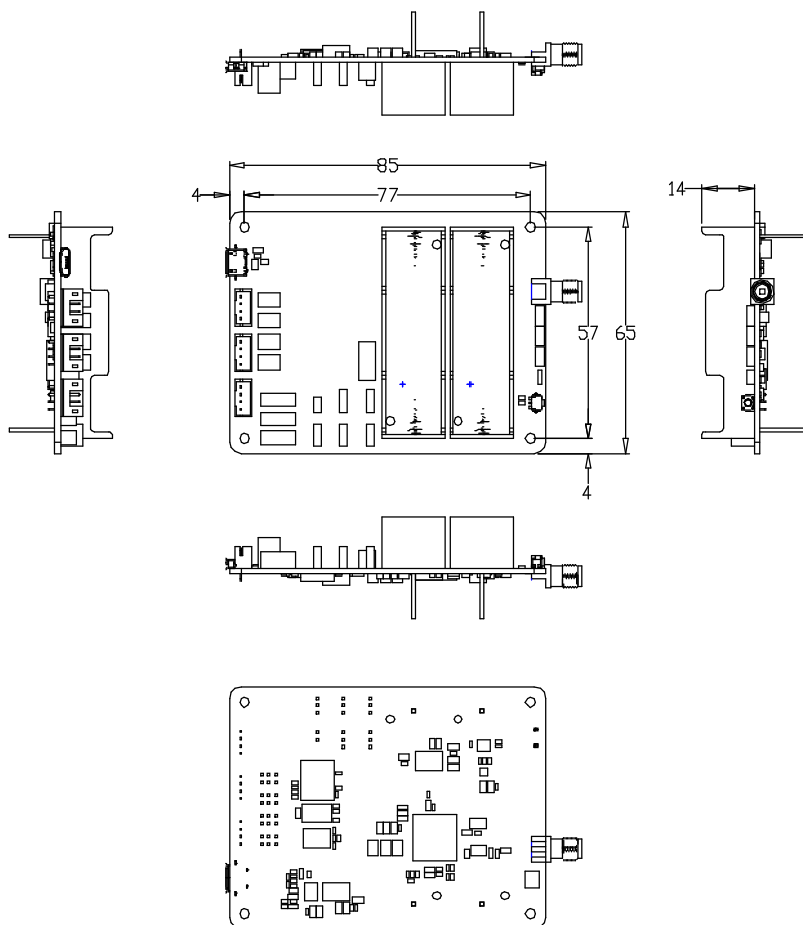
1.2 Applicatons

The AAEON AIOT LoRa Node is a sophisticated and compact LoRa edge device. To provide faster and more flexible communication for industrial LoRa applications, it supports multiple LoRa frequency bands including 868 MHz and 915 MHz, ideal for usage in data collection, aggregation and transmission. The AAEON AIOT LoRa Node has built-in expansion features and can be utilized in energy metering, smart city and agriculture applications.

Chapter 2

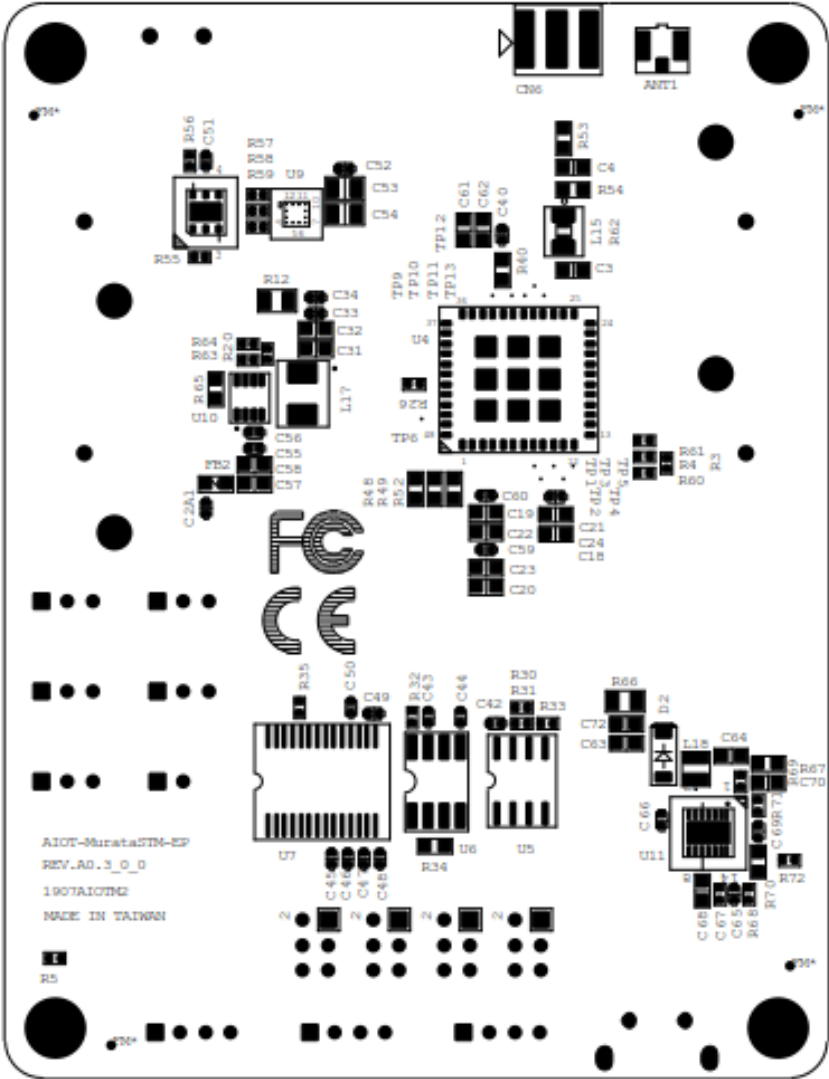
Hardware Information

2.1 Dimensions

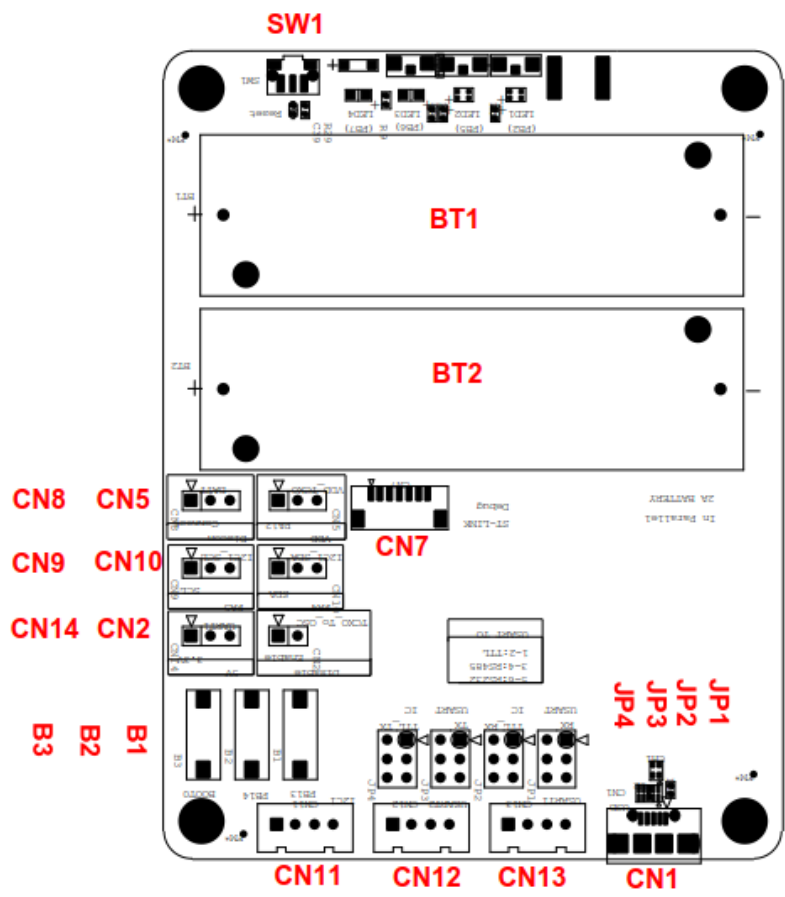


2.2 Board and Connectors Layout

Top Side



Bottom Side



2.3 List of Connectors

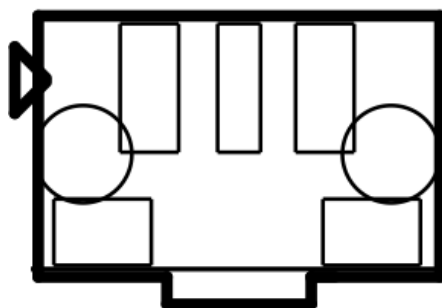
Reference Designation	Functional Description	Connector Type
SW1	MCU Reset button	(TF)Push Button Switch.3P.12VDC.50mA.500mohm.Black.SMD.HC H.PTS-099
CN1	Micro USB	(TF)Micro USB Conn..5P.90D(F).SMD.AB-type.TRONTEK.TMC106 -USBD05-835
CN2	TCXO_OUT select	(TF)PIN HEADER.2*1P:180D(M).DIP2.0mm.PINREX.220-96 -02GB01
CN5	VDD_TCXO SELECT	(TF)PIN HEADER.3*1P:180D(M).DIP2.0mm.PINREX.220-96 -03GB01
CN7	ST-Link	(TF)WAFER BOX.7P:180D(M).SMD.1.0mm.W/Cap.PINREX.710-73-07TWE6
CN8	Power select	(TF)PIN HEADER.3*1P:180D(M).DIP2.0mm.PINREX.220-96 -03GB01
CN9/CN10	I2C1 select	(TF)PIN HEADER.3*1P:180D(M).DIP2.0mm.PINREX.220-96 -03GB01
CN11	I2C1	(TF)Board to wire Connector.4P:180D(M).DIP2.0mm.Grove.PinREX.7 27-71-04TW09
CN12	UART2	(TF)Board to wire Connector.4P:180D(M).DIP2.0mm.Grove.PinREX.7 27-71-04TW09
CN13	UART1	(TF)Board to wire Connector.4P:180D(M).DIP2.0mm.Grove.PinREX.7 27-71-04TW09
CN14	UART1 POWER SELECT	(TF)PIN HEADER.3*1P:180D(M).DIP2.0mm.PINREX.220-96 -03GB01

Reference Designation	Functional Description	Connector Type
BT1/BT2	Battery Holder	(TF)Battery Holder.2P180D(F).1*AA.DIP.COMF.BH-311-1P24
B1~B2	Function Button	(TF)Push Button Switch.2P180D.6.8x3.5x4.3mm.12VDC.50mA.100 mohm.SMD.TRONTEK.TS-A01NH-X-S138
B3	Boot select	(TF)Push Button Switch.2P180D.6.8x3.5x4.3mm.12VDC.50mA.100 mohm.SMD.TRONTEK.TS-A01NH-X-S138

2.4 Connector Pin Assignments

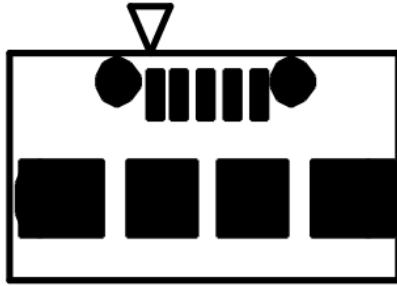
References and diagrams for connector pin assignments are listed below.

2.4.1 MCU Reset Button (SW1)



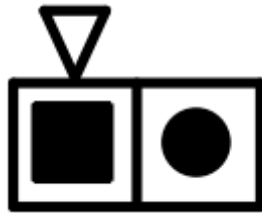
Pin	Signal Description
1	GND
2	MCU_nRST
3	GND

2.4.2 Micro USB (CN1)



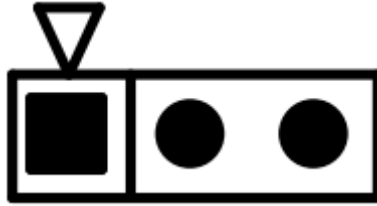
Pin	Signal Description	Pin	Signal Description
1	USB_PWR	2	USB_D-
3	USB_D+	4	NC
5	GND		

2.4.3 TCXO_OUT Select (Option for SIGFOX mode) (CN2)



Pin	Signal Description
1	PH0-OSC_IN
2	PH0-OSC_OUT

2.4.4 UDD_TCXO Select (Option for SIGFOX mode) (CN5)



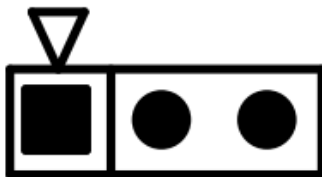
Pin	Signal Description	Pin	Signal Description
1	PA12	2	VDD_TCXO
3	+3.3V		

2.4.5 ST-Link (CN7)



Pin	Signal Description	Pin	Signal Description
1	+3.3V	2	SWDIO
3	GND	4	SWCLK
5	MCU_nRST	6	PA8
7	PB12		

2.4.6 Power Select (CN8)

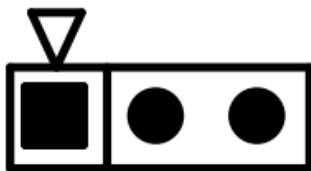


Pin	Signal Description
1	VBAT
2	SYS_PWR
3	+5V_USB

Set jumper on Pins 1-2 to select power source from batteries.

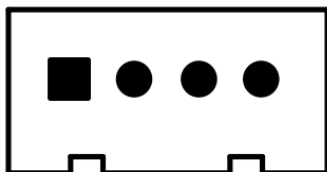
Set jumper on Pins 2-3 to select power source from micro USB (5V).

2.4.7 I2C1 Select (CN9/CN10)



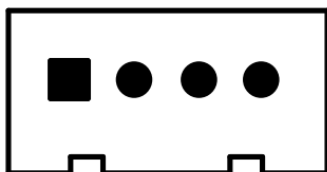
CN9		CN10	
Pin	Signal Description	Pin	Signal Description
1	PA5/ADC5/DAC2	1	PA4/ADC4/DAC1
2	I2C1 SCL	2	I2C1 SDA
3	PB8 /I2C1 SCL	3	PB9 /I2C1 SDA

2.4.8 I2C1 (CN11)



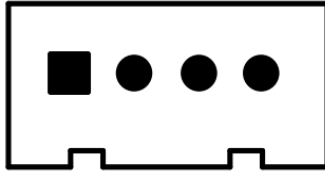
Pin	Signal Description	Pin	Signal Description
1	GND	2	+3.3V
3	I2C1 SDA	4	I2C1 SCL
Pin 3, Pin 4 function selected by CN9, CN10			

2.4.9 UART2 (CN12)



Pin	Signal Description	Pin	Signal Description
1	GND	2	+3.3V
3	USART2_TX	4	USART2_RX

2.4.10 UART1 (CN13)



Pin	Signal Description	Pin	Signal Description
1	GND	2	VCC_UART1
3	USART1_TXD	4	USART1_RXD

CN13 can be set to UART, RS485, or RS232 mode. Configuration is set by JP1~JP4.

VCC_UART1 power can be set by CN14

2.4.11 UART1 Power Select (CN14)

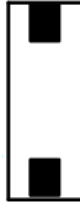


Pin	Signal Description
1	+3.3V
2	VCC_UART1
3	+5V

Set Jumper on Pin1-2 for VCC_UART1 output +3.3V.

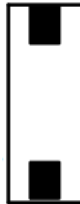
Set Jumper on Pin2-3 for VCC_UART1 output +5V.

2.4.12 Function Button (B1/B2)



B1		B2	
Pin	Signal Description	Pin	Signal Description
1	GND	1	GND
2	PB13	2	PB14

2.4.13 Boot Select (B3)



Pin	Signal Description
1	GND
2	BOOT0

Boot from Flash Memory when button is pressed.

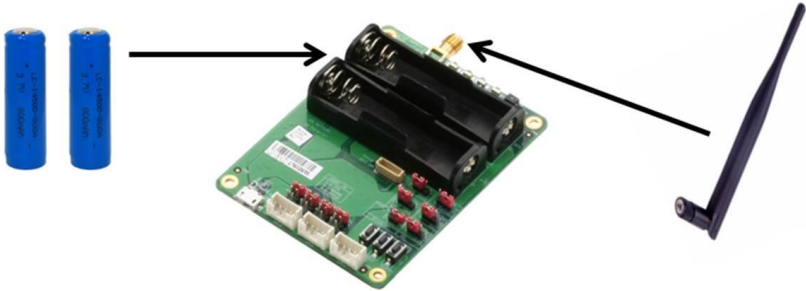
Chapter 3

Setup and Configuration

3.1 Basic Setup Guide

For basic setup of the AIOT-ILND01 LoRa Node, perform the following steps:

1. Connect the LoRa antenna to the Node Board.
2. Insert two 14500 lithium-ion batteries into battery holder.



3. The Node will boot up automatically.
4. Follow section 3.2 Changing/Reading APPKEY to set APPKEY.
5. Connect to LoRa Gateway.

3.2 Changing/Reading APPKEY

This section details the steps needed to change APPKEY/APPDEUI and how to read APPKEY/APPDEUI/DEVEUI.

Before you start, make sure you have a classic serial software installed on your computer. We recommend using Docklight V2.2 or a similar program. Parameters are:

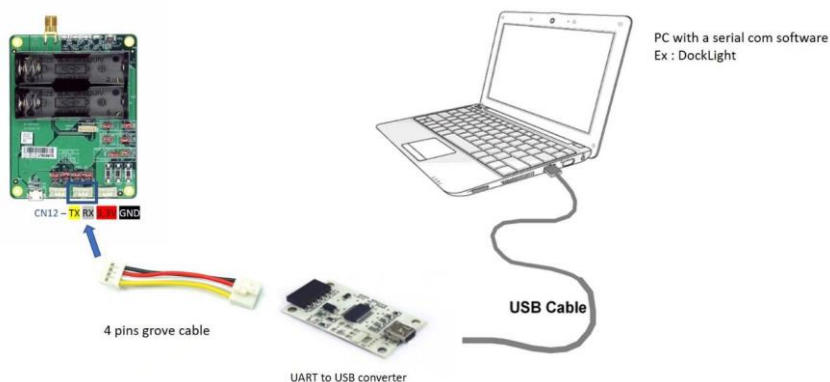
Baudrate: 9600

Parity: None

Data bits: 8

Stop bits: 1

A UART to USB connector is required to connect the AIOT-ILND01 to your computer. Connect the adapter to the AIOT-ILND01 by attaching a 4-pin GROVE cable to the middle GROVE connector (CN12). The AIOT-ILND01 must be powered to change parameters. See the figure below for an example setup.



3.1.1 APPKEY

To Write an APPKEY, you must send the new APPKEY followed by an end frame (0x46 0x0D 0x0B). If completed, the software will reply by 0x46 0x0D 0x0B.

To read an APPKEY, send 0x64 0xD0 0xB0. The software will reply by the current APPKEY.

3.1.2 APPEUI

To Write an APPEUI, you must send the new APPEUI followed by an end frame (0x35 0x0D 0x0F). If completed, the software will reply by 0x35 0x0D 0x0F.

To read an APPEUI, send 0x53 0xD0 0xF0. The software will reply by the current APPEUI.

3.1.3 DEVEUI

There is no write function for the DEVEUI. DEVEUI is generated automatically.

To read DEVEUI, send 0xF4 0xD0 0xD3. The software will reply by the current DEVEUI.

Note that the board must be rebooted for the new parameters to be validated and considered.