ALX420X

Wireless IoT Controller User Manual

Version 1.0.0

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Revision History

Date(Y/M/D)	Revision Content	Revision By	Version
2016/03/14	Initial Version	Qi Shi	1.0.0

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1 Product Overview

ALX420X is a small, low-powered, self-contained, certified IoT controller that provides BR/EDR/BLE connectivity. This product is an ideal solution for device manufacturers who are looking for wireless connectivity in medical and healthcare applications, industrial control equipment, home appliances or smart energy systems.

ALX420X controller is completely compatible with Alinket IoT Development Kit (AiDK) architecture and supports Alinket proprietary software architecture.

1.1 Features

- Complies with Bluetooth Core Specification version 4.1 including BR/EDR/BLE.
- Profiles including Battery Status, Blood Pressure Monitor, Proximity, Thermometer, Glucose and more.
- Smaller size for easier integration into most wearable products and applications
- High Performance, Low Power Consumption
- Smart Configuration software
- Operating temperature: -30°C to +85°C
- Over-the-air (OTA) upgrade support
- FCC/CE/ROHS Compliant

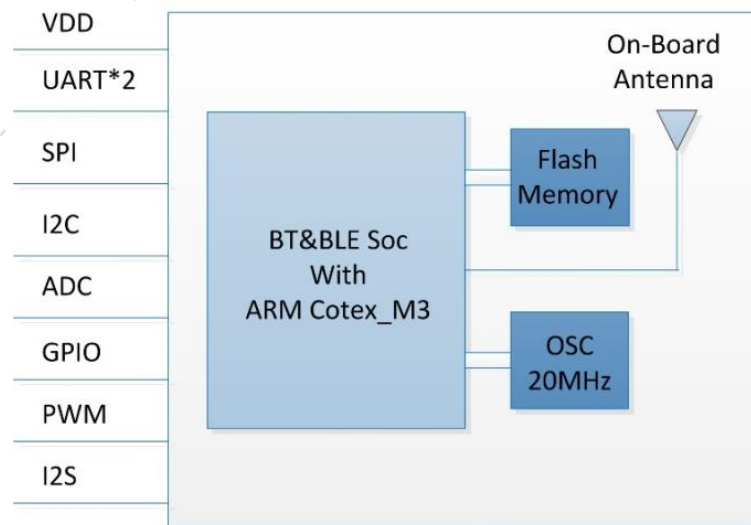## 1.2 Hardware Introduction

1.2.1 Block Diagram

Figure 1 - Block Diagram

Alinket offers Serial-to-BLE, SPI-to-BLE and AiDK software for the ALX420X. The module is also compatible with AiDK and with Alinket Patch file.
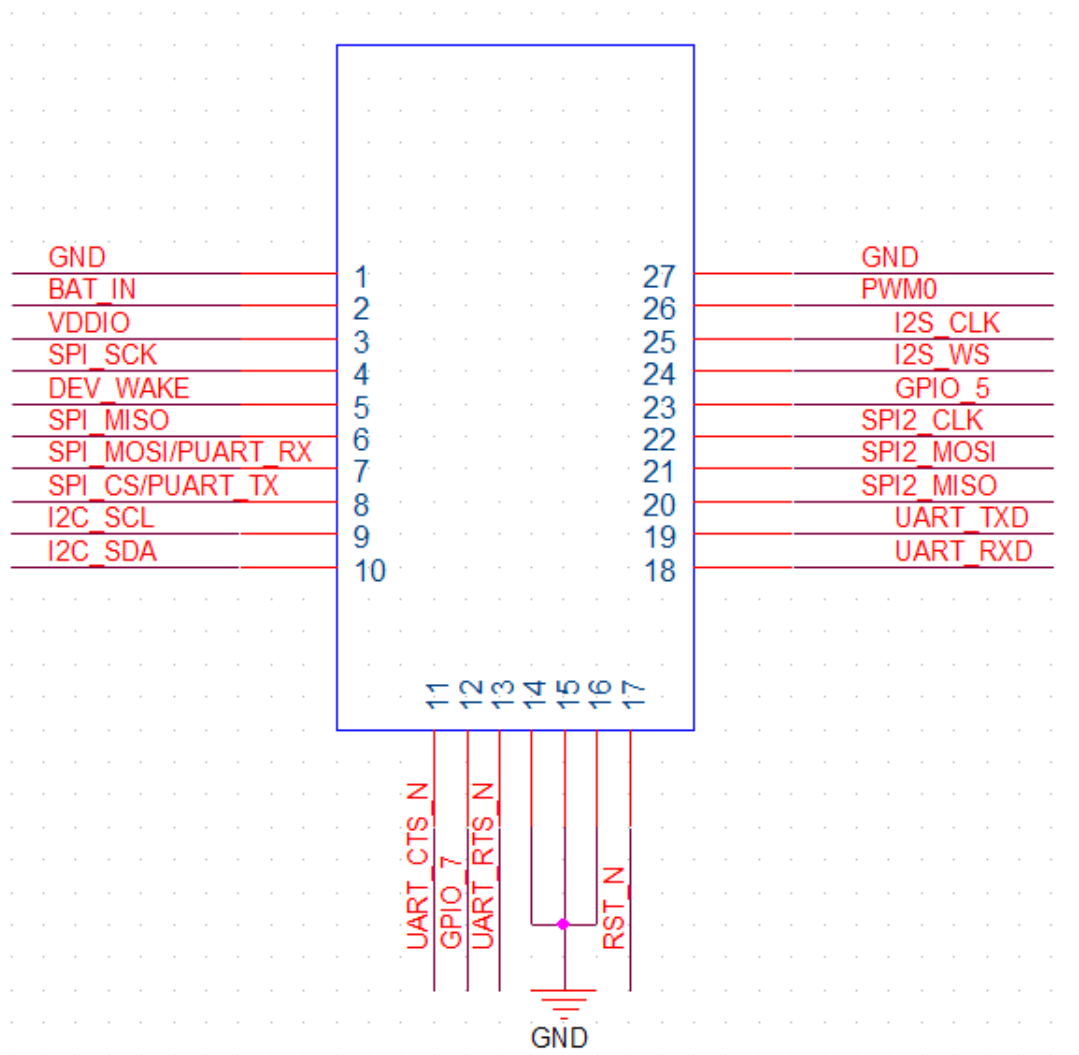
1.2.2 Ball Maps

Figure 2 - Ball Maps (Top)

1.2.3 Pin Descriptions

Pin#	Type	Name (Main function)	Description	PIN connection (when not using)
1	S	GND	Ground reference	
2	S	BAT_IN	Battery Input(3.3V)	
3	S	VDDIO		
4	I/O	SPI_SCK		floating
5	I/O	DEV_WAKE	Wake up from Sleep mode	floating
6	I/O	SPI_MISO		floating
7	I/O	SPI_MOSI	Can be used as PUART_RX	floating
8	I/O	SPI_CS	Can be used as PUART_TX	floating
9	I/O	I2C_SCL	Can be used as I2S_DO	floating
10	I/O	I2C_SDA	Can be used as I2s_DI	floating
11	I/O	UART_CTS_N	Indication pin or UART CTS(input)	floating
12	I/O	GPIO_7		floating
13	I/O	UART_RTS_N	Indication pin or UART RTS(output)	floating
14	S	GND	Ground reference	
15	S	GND	Ground reference	
16	S	GND	Ground reference	
17	I	RST_N	Active-low reset input	floating
18	I/O	UART_RXD	UART receive data	floating
19	I/O	UART_TXD	UART transmit data	floating
20	I/O	SPI2_MISO		floating
21	I/O	SPI2_MOSI		floating
22	I/O	SPI2_CLK		floating
23	I/O	GPIO5		floating
24	I/O	I2S_WS		floating
25	I/O	I2S_CLK		floating
26	I/O	PWM0	Can be used as GPIO_6	floating
27	S	GND	Ground reference	floating

Table 1 - Pin Descriptions

1.2.4 Mechanical Size

1.2.4.1. Physical Dimensions

Parameter	Typical	Units
Dimensions (L x W x H)	16 x 10 x 2.4	mm
Dimensions tolerances (L x W x H)	±0.2	mm

Table 2 - Controller Dimensions

1.2.4.2. Top View

Figure 3 - Top View

1.2.4.3. PCB Footprint (Top View)
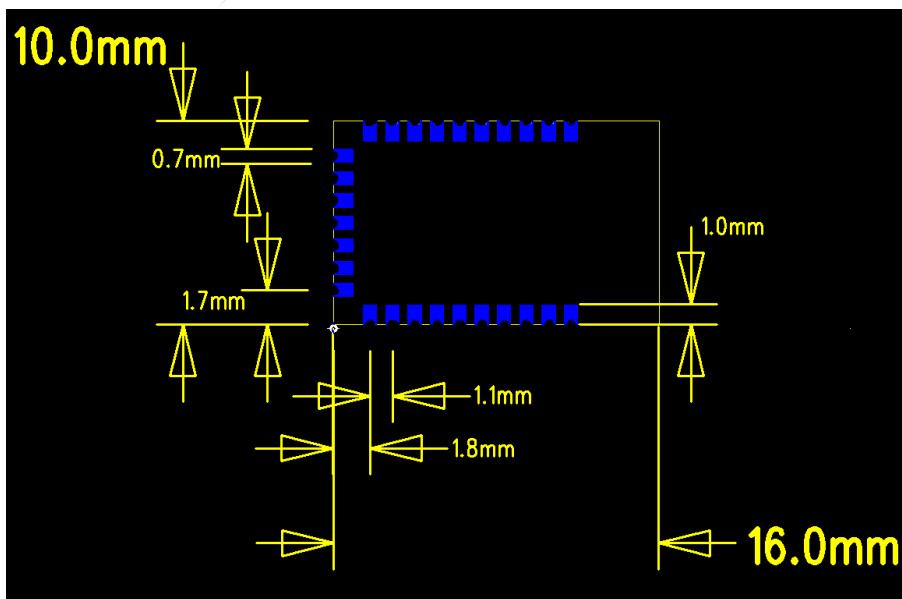

Figure 4 - Detailed Dimensions (Top View)

2 UART Transparent

2.1 Connection Diagram

✧ These pins are very necessary on the module while connect with host and
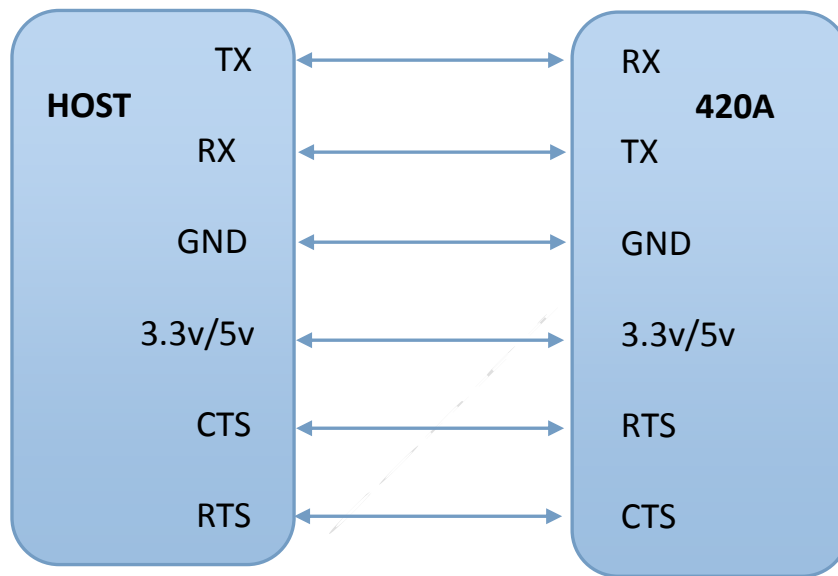
OTA upgrade.

Figure 5 - Detail Connection

2.2 Set Up the Connection

1. Find Bluetooth connection icon

Figure 6 - Bluetooth Connection

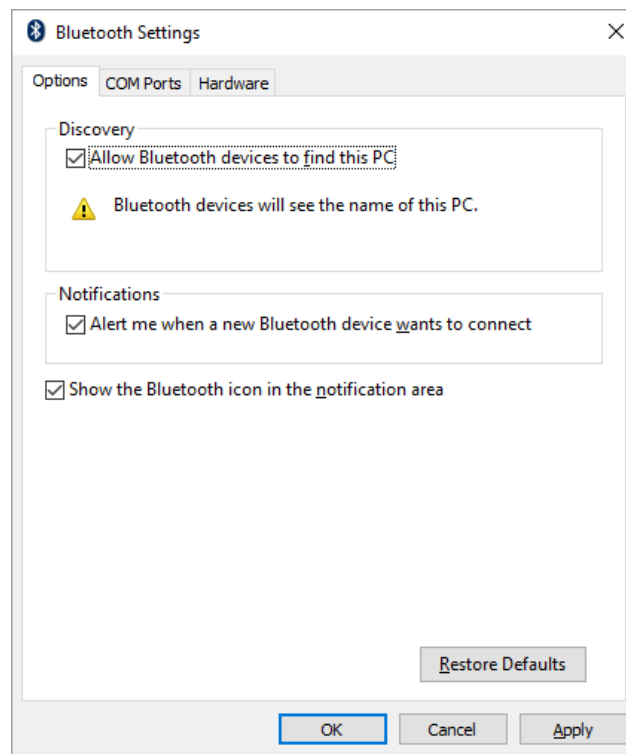2. Right click and select property, make sure the configuration is set as below:

Figure 7 - Bluetooth Connection Configuration
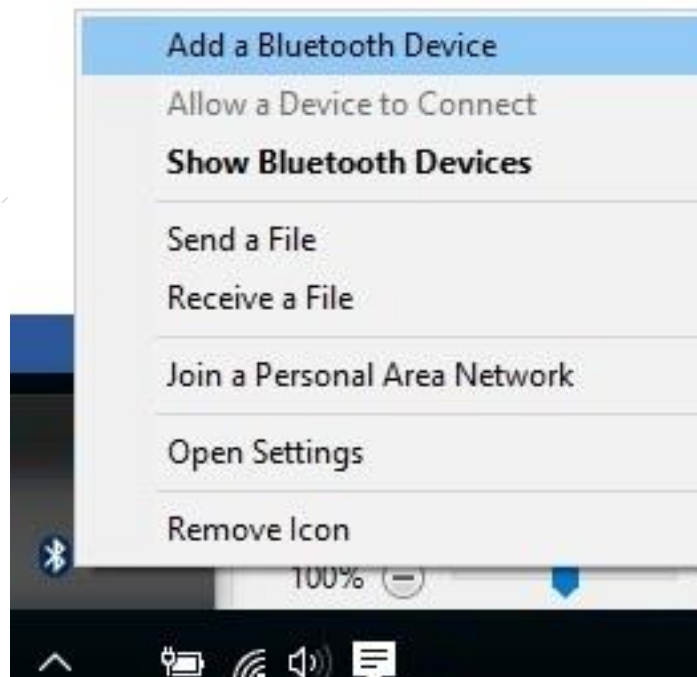
3. Add a Bluetooth device

Figure 8 - Add Bluetooth Device
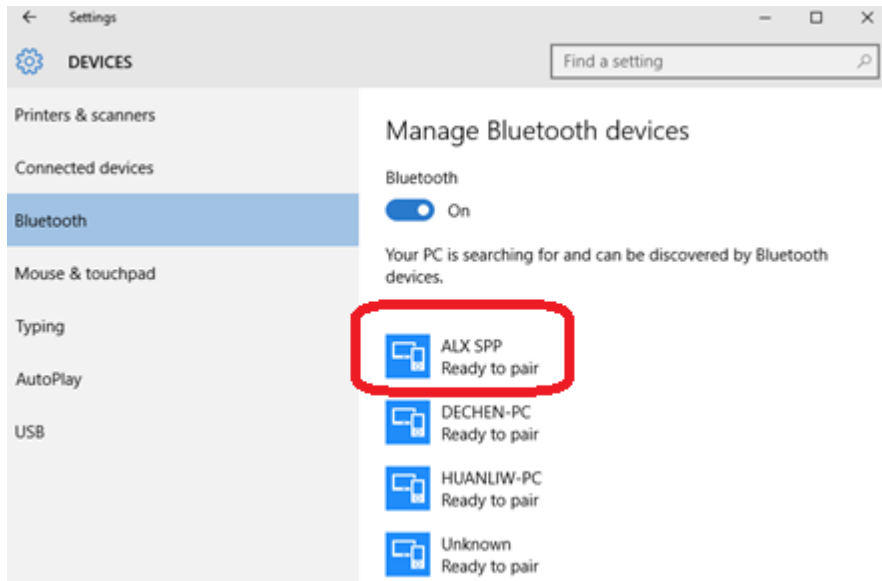
4. Double click corresponding device in the list

Figure 9 - Connect Bluetooth Device
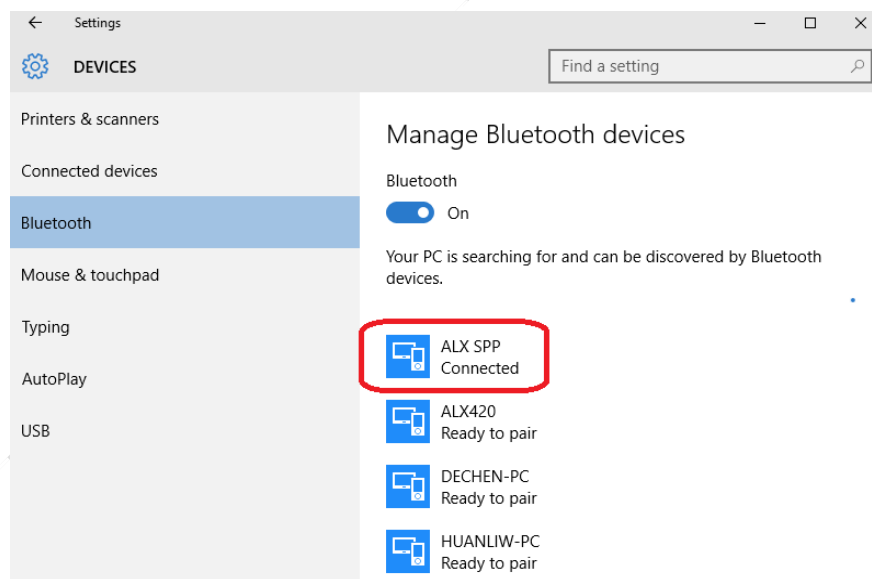
5. Wait for Connection success

Figure 10 - Connection Success

3 Configuration with ACM

ACM tool can send commands to the module to operate the controller. Open the ACM tool installed on the computer and set the COM port as follow.
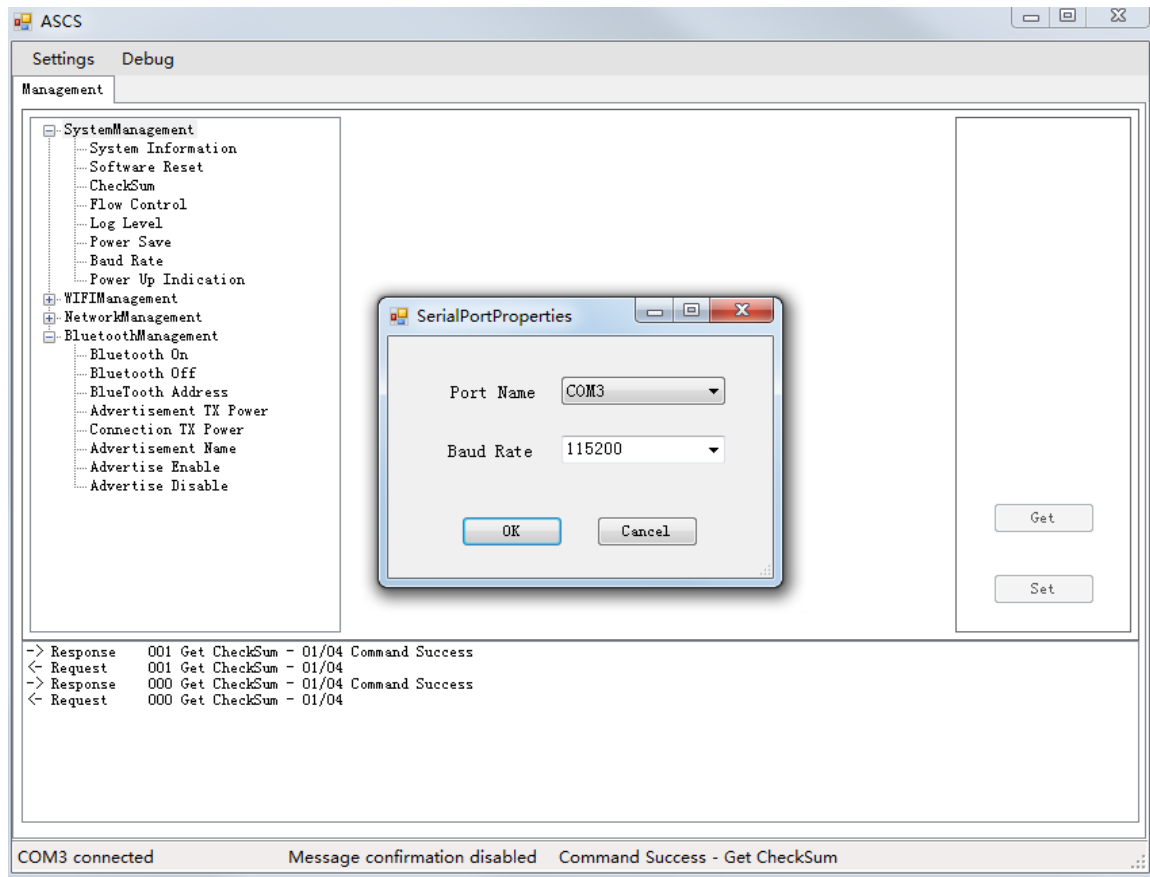
Figure 11 - ACM Tool on Computer

ID	Name	Description
1	Power Up Indication	Reports the power up reason
2	Software Reset	Let the module reset itself
3	Get System Information	Includes manufacture, product name, SN, hardware version, boot loader version, firmware version, Bluetooth firmware version and produce date
4	Get UART Baud Rate	Show the UART baud rate
5	Set UART Baud Rate	After receiving the response restart the ASCS
6	BT On	Initialize its stack
7	BT Off	Shut down the BT function
8	Get BT Address	Return the MAC address
9	BT Send Data	Send message to specific MAC address
10	BT Receive Indication Data	Receive message from connected device

Table 3 - Information Available From ACM

4 Hardware Design

✧ *Notice: For detail design please refer to "ALX420X Hardware Design Guide.docx"*

4.1 Antenna Design

There is an antenna on the ALX420X module. Following figure shows antenna design on the ALX420X EVK
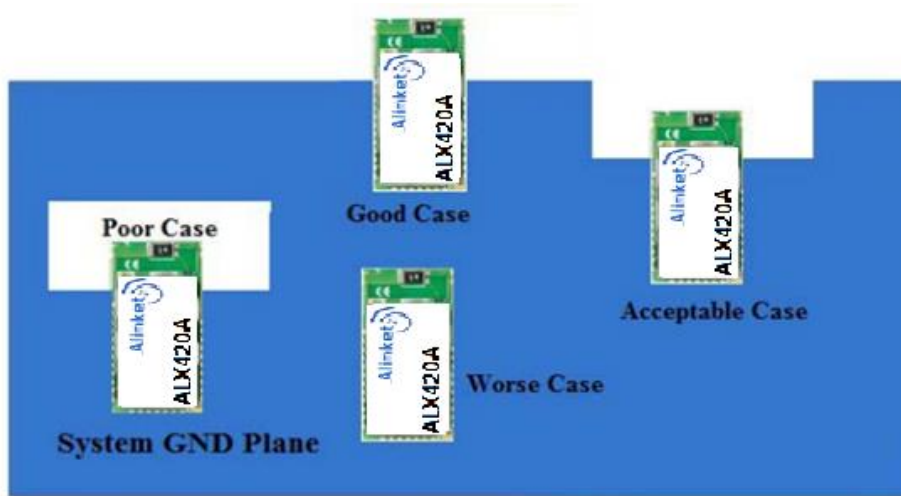

Figure 12 - Antenna Design

4.2 Hardware Scheme Design

4.2.1 With External MCU

Figure 13 - Hardware Design with external MCU

4.2.2 Without External MCU
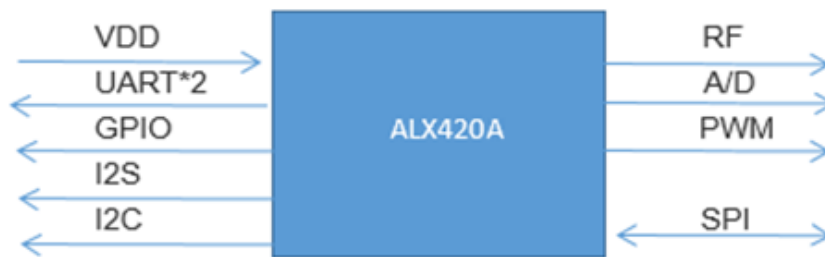
Figure 14 - Hardware Design without external MCU

5 Order Information

ALX420X, the last "X" is from "A" to "Z" for deferent market or application with deferent configurations but has nothing to do with the RF performance.

Product Name	Description
ALX420A	BT/BLE 4.1 Dual Mode IoT Controller, On-Board Antenna

Table 4 - Order Information

Appendix A: Reference Document

[1] ALX420X_DS.docx, Alinket
[2] ALX420X Hardware Design Guide.docx

Appendix B: Contact Information

For technical support, please mail support@alinket.com, or call 021-61048128.
Alinket Electronic Technology (Shanghai) Co., Ltd.
Floor 4, No.10, Lane 198, Zhangheng Road, Shanghai, 201204 P. R. China

Appendix C: Acronyms and Abbreviations

The following list of acronyms and abbreviations may appear in this document.

- ADC	Analog-to-Digital Converter
- ACL	Asynchronous Connectionless
- ACM	Alinket Controller Message
- ARM	Advanced RISC Machines
- ART	Adaptive Real-Time Memory
- AiDK	Alinket IoT Development Kit
- AES	Audio Engineering Society
- BR/EDR	Basic Rate/Enhanced Data Rate
- BLE	Bluetooth Low Energy
- BT	Bluetooth
- CPU	Central Processing Unit
- CRC	Cyclic Redundancy Code
- DAC	Digital-to-Analog Converter
- DSS	Direct Sequence Spread Spectrum
- EAP	Extension Authentication Protocol
- EVK	Evaluation Kit
- FIFO	First In First Out
- GPIO	General-Purpose Input-Output
- I2C	Inter-Integrated Circuit
- I2S	Inter-IC Sound
- ISM	Industrial Scientific Medical
- IP	Internet Protocol
- IC	Integrated Circuit
- JTAG	Joint Test Action Group
- LQFP	Low-profile Quad Flat Package
- MAC	Medium Access Control
- MSL	Moisture Sensitivity Level
- PWM	Pulse Width Modulation
- PER	Packet Error Rate
- PBB	Poly Brominated Biphenyl
- PBDE	Poly Brominated Biphenyl Ether
- PLL	Phase Locked Logic
- QPSK	Quadrature Phase Shift Keying
- ROHS	Restriction of Hazardous Substances
- RF	Radio Frequency
- SCO	Synchronous Connection Oriented
- SoC	System-on-a-Chip
- SPI	Serial Peripheral Interface
- UART	universal asynchronous receiver/transmitter

Notice:

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.

To satisfy FCC RF Exposure requirements for this transmission devices, a separation distance of 20cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The modular transmitter must be equipped with either a permanently affixed label or must be capable of electronically displaying its FCC identification number：

(A) If using a permanently affixed label, the modular transmitter must be labeled with its own FCC identification number, and, if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID:2AELJ-ALX420X." Any similar wording that expresses the same meaning may be used. The Grantee may either provide such a label, an example of which must be included in the application for equipment authorization, or, must provide adequate instructions along with the module which explain this requirement. In the latter case, a copy of these instructions must be included in the application for equipment authorization.