Alcohol Digital Sensor

BM22S3421-1
Arduino Library Description

Revision: V1.10   Date: February 02, 2024

Contents

Introduction

The Best Modules BM22S3421-1 is an alcohol digital sensor, which uses the UART communication mode. This document provides the description of the BM22S3421-1 Arduino Lib functions and how to install the Arduino Lib. The example uses the BMA34M421 module to demonstrate the function of reading alcohol gas concentration information.

Applicable types:

Part No.	Description
BM22S3421-1	Alcohol digital sensor
BMA34M421	On-board BM22S3421-1 sensor

Arduino Lib Functions

Arduino Lib name: BM22S3421-1		Lib version: V1.0.1	
Constructors & Initialisation			
1	BM22S3421_1(uint8_t statusPin, HardwareSerial *theSerial=&Serial)		
	Description	Constructor, uses hardware UART	
	Parameter	statusPin: STATUS pin, which is connected to the BM22S3421-1 STATUS pin or the BMA34M421 STA pin *theSerial: select hardware UART communication interface (default to Serial interface)	
	Return Value	—	
	Note	—	
2	BM22S3421_1(uint8_t statusPin, uint8_t rxPin, uint8_t txPin)		
	Description	Constructor, uses software UART	
	Parameter	statusPin: STATUS pin, which is connected to the BM22S3421-1 STATUS pin or the BMA34M421 STA pin rxPin: RX pin, which is connected to the BM22S3421-1 or the BMA34M421 TX pin txPin: TX pin, which is connected to the BM22S3421-1 or the BMA34M421 RX pin	
	Return Value	—	
	Note	—	
3	void begin()		
	Description	Module initialisation	
	Parameter	—	
	Return Value	void	
	Note	—	
Parameter Check			
4	uint8_t getSTATUS()		
	Description	Get the STATUS pin level	
	Parameter	—	

	Return Value	STATUS pin level:
		    0: Low level
		    1: High level	

	Note	The high or low level indicates whether the module alarms, the level can be set when alarming (default to high level)	
5	uint16_t readADValue()		
	Description	Read the real-time alcohol gas A/D value	
	Parameter	—	
	Return Value	12-bit A/D value	
	Note	The greater the A/D value, the higher the alcohol gas concentration It is generally used to obtain data actively and recommended to use after the serial port automatic output function is disabled [2]	

6	uint8_t readAlcLevel()	
	Description	Read the alcohol gas concentration level
	Parameter	—

	Return Value	Alcohol gas concentration level:
		  1: Level 1 (low concentration)
		  2: Level 2
		  3: Level 3
		  4: Level 4 (high concentration)

	Note	It is generally used to obtain data actively and recommended to use after the serial port automatic output function is disabled [2]

7	uint8_t readParam(uint8_t cmd, uint8_t addr)	
	Description	Read the module parameter
	Parameter	cmd: Instruction code addr: Address code
	Return Value	Module parameter
	Note	Refer to the BM22S3421-1 datasheet instruction table (special query instruction)

8	bool isInfoAvailable()	
	Description	Check whether the module automatic output information is received（14-byte）
	Parameter	—

	Return Value	Receive status：
		  true: has received
		  false: not received

	Note	It is required to use after the serial port automatic output function is enabled. The module is enabled by factory default.

9	void readInfoPackage(uint8_t array[])	
	Description	Read the module automatic output information

	Parameter	array[0]~array[4]: Fixed data
		array[5]: Alcohol gas real-time A/D value high byte
		array[6]: Alcohol gas real-time A/D value low byte
		array[7]: Alcohol gas concentration level, the valid values are 1~4, which indicates the level 1~level 4
		array[8]: Sensor status
		  bit 0=1: Calibration in progress
		  bit 1~bit 4: Reserved
		  bit 5=1: Calibration completed
		  bit 6=1: Module fault
		  bit 7=1: Module alarm
		array[9]: Calibration countdown. The default calibration time is 60s. A value of 0 indicates that the calibration is completed
		array[10]: Power-on warm-up countdown. The warm-up time is 180s. A value of 0 indicates that the warm-up operation is completed
		array[11]: Software version number high byte. A value of 0x11 indicates that the software version number is 1.1.x
		array[12]: Software version number low byte. A value of 0x02 indicates that the software version number is x.x.2
		array[13]: Check code. Take the lower 8 bits of the sum of the first 13 bytes, complement and increment by one

	Return Value	void
	Note	This function should be used after the "if (isInfoAvailable() == true)" instruction is executed

Parameter Setting Function		
10	uint8_t writeCommand(uint8_t cmd, uint8_t addr, uint8_t param)	
	Description	Write parameters to the module
	Parameter	cmd: Instruction code addr: Address code param: Parameters to be written
	Return Value	Execution status[1]
	Note	Refer to the BM22S3421-1 datasheet instruction table (special modification instruction)

General Function		
11	uint8_t reset()	
	Description	Reset the module
	Parameter	—
	Return Value	Execution status[1]
	Note	—
12	uint8_t requestInfoPackage(uint8_t array[])	
	Description	Actively obtain all the information of the module

	Parameter	array[0]~array[4]: Fixed data
		array[5]: Alcohol gas real-time A/D value high byte
		array[6]: Alcohol gas real-time A/D value low byte
		array[7]: Alcohol gas concentration level, the valid values are 1~4, which indicates the level 1~level 4
		array[8]: Sensor status
		   bit 0=1: Calibration in progress
		   bit 1~bit 4: Reserved
		   bit 5=1: Calibration completed
		   bit 6=1: Module fault
		   bit 7=1: Module alarm
		array[9]: Calibration countdown. The default calibration time is 60s. A value of 0 indicates that the calibration is completed
		array[10]: Power-on warm-up countdown. The warm-up time is 180s. A value of 0 indicates that the warm-up operation is completed
		array[11]: Software version number high byte. A value of 0x11 indicates that the software version number is 1.1.x
		array[12]: Software version number low byte. A value of 0x02 indicates that the software version number is x.x.2
		array[13]: Check code. Take the lower 8 bits of the sum of the first 13 bytes, complement and increment by one

	Return Value	Execution status[1]
	Note	It is generally used to obtain data actively and recommended to use it after the serial port automatic output function is disabled [2]
13	uint8_t restoreDefault()	
	Description	Reset the module parameters to their factory settings
	Parameter	—
	Return Value	Execution status[1]
	Note	—
14	uint8_t calibrateModule(uint8_t calibrateMode)	
	Description	Alcohol concentration level calibration

	Parameter	calibrateMode: calibration function selection
		   0x01: Calibration trigger point 1 (Level 1/2 judgment threshold)
		   0x02: Calibration trigger point 2 (Level 2/3 judgment threshold)
		   0x03: Calibration trigger point 3 (Level 3/4 judgment threshold)
		   0x06: Trigger the calibration check and update the calibration point 1~3 check value

	Return Value	Execution status[1]
	Note	1. Users can customize the concentration level using this function. 2. There is no fixed order for calibration points 1/2/3, it can be calibrated in any order and select any one, two or three of these points. 3. The calibration point must be set according to the value, and calibration point 1 < calibration point 2 < calibration point 3. 4. After the point calibration is completed, the calibration check instruction needs to be used, the device will enter the calibration completion state.

Note: 1. 0 – Instruction executed succeed. 1 – Module response data error. 2 – Communication time-out

2. Serial port automatic output function:
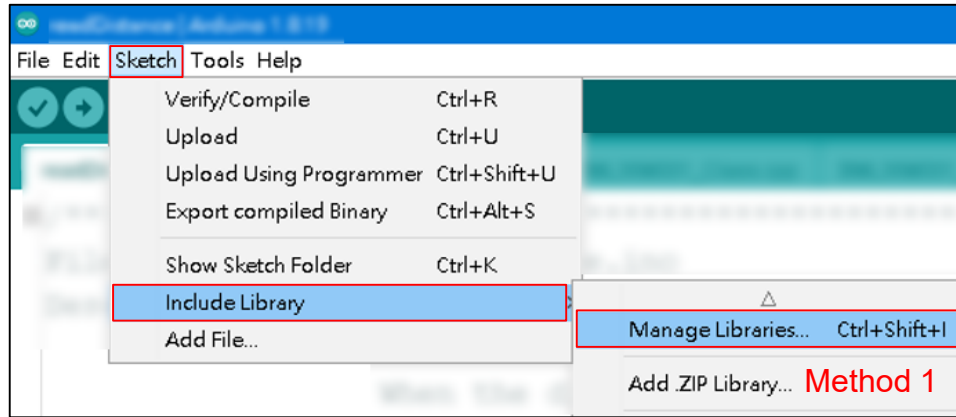
Enable: use writeCommand(0xe0,0x1e, AUTO_MODE)

Disable: use writeCommand(0xe0,0x1e, CMD_MODE)
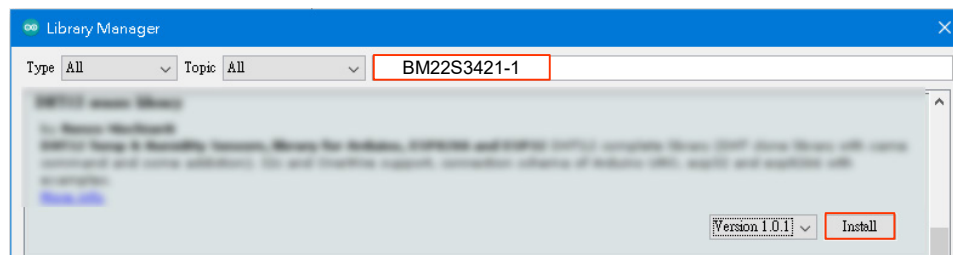
Arduino Lib Download and Installation

BM22S3421-1 Library: Refer to the following two methods to install the BM22S3421-1 Arduino Library

Method 1: Search for installation

Arduino IDE → Sketch → Include Library → Manage Libraries → Search BM22S3421-1 → Install
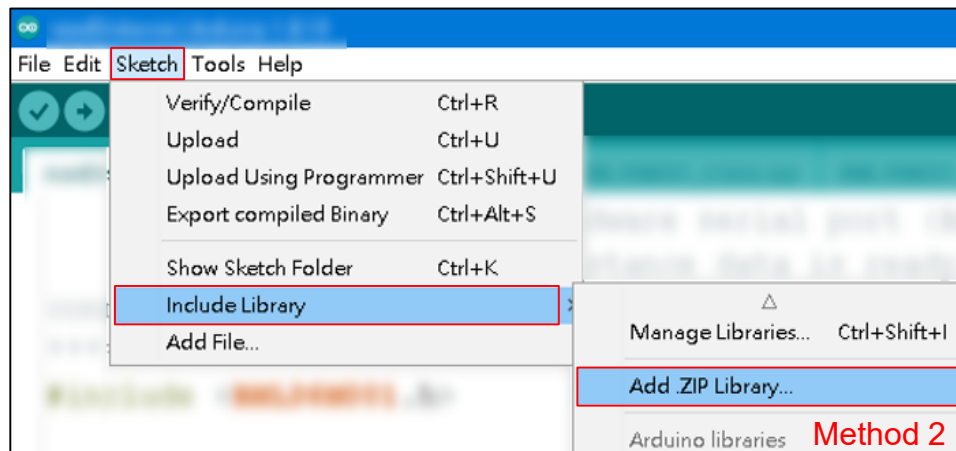

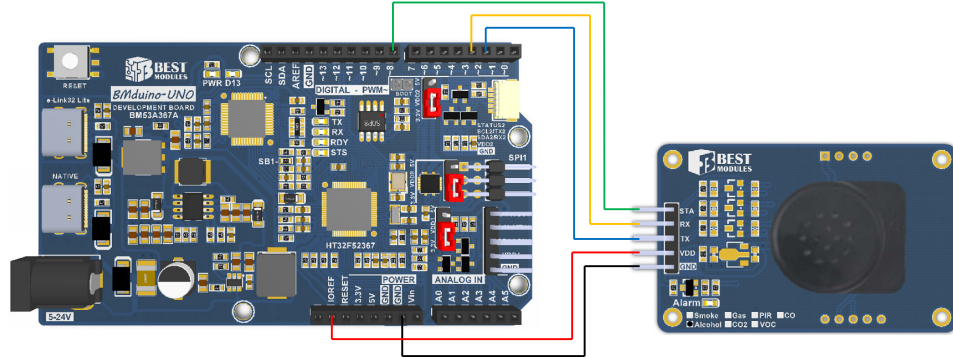**Search for Installation Step 1**

Search for Installation Step 2

Method 2: Download the .ZIP library before adding it

Download the Arduino example (BM22S3421-1 Library) under the DOCUMENTS menu from the Best Modules website (https://www.bestmodulescorp.com/bm22s3421-1.html).

Add .ZIP library: Arduino IDE → Sketch → Include Library → Add .ZIP Library...

Arduino Example

Physical Connection Diagram

Example: readAlcLevelAndADValue

Example function: Receive the module automatic output information every second and print the concentration level and A/D value of the alcohol gas to the serial monitor

1. Open an example program: Arduino IDE → File → Examples → Select Lib (BM22S3421-1) → Select the program (readAlcLevelAndADValue)

2. Example program description:

   a. Create object & Initialise the module

```
#include < BM22S3421-1.h> // Call the BM22S3421-1 library
/* Create arrays and variables for storing data */
uint8_t moduleInfo[14] = {0};
uint16_t ADValue, AlcLevel;
/* Create object & Set Softeware serial pin */
BM22S3421_1 Alc(8, 2, 3); // Softeware serial: D8:STATUS, D2:RX, D3:TX
void setup()
{
  Alc.begin(); // Module initialisation
  Serial.begin(9600);     // Serial monitor initialisation,
                          // baud rate is 9600bps
/* Wait for the end of the module warm-up */
  Serial.println("Module preheating...(about 3 mins)");
  preheatCountdown();     // Wait for the end of the module warm-up
  Serial.println("End of module preheating.");
  Serial.println();
}
```
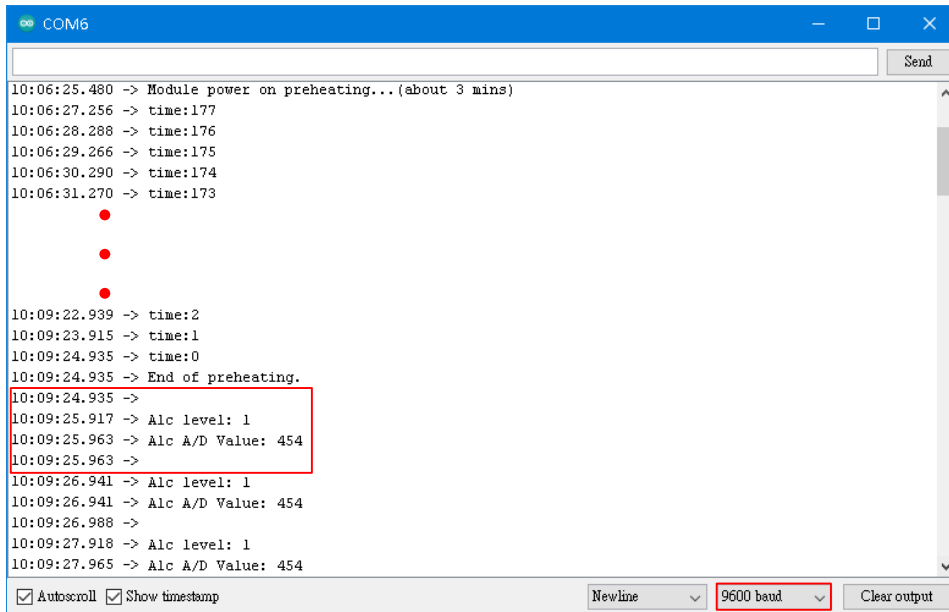
   b. Receive the module auto-transmit data

```
void loop()
{
  if (Alc.isInfoAvailable() == true) // Poll whether the module
                                     // transmitting data is received
  {
    Alc.readInfoPackage(moduleInfo); // Read the module transmitting
                                     // data to moduleInfo[]
    printInfo();  // Print partial information of the module
  }
}
```

c. According the received data to print partial information.

```
void printInfo()
{
  /* Print alcohol concentration level */
  Serial.print("Alcohol level: ");
  AlcLevel = moduleInfo[7];
   Serial.println(AlcLevel);
  /* Print current alcohol gas concentration A/D value (12-bit) */
  Serial.print("Alcohol A/D Value: ");
  ADValue = ((uint16_t)moduleInfo[5] << 8) + moduleInfo[6];
  Serial.println(ADValue);
  Serial.println();
}
```

3. Open the serial monitor and select the baud rate to be 9600. The serial monitor will display as follows.