LPMS-ME1 DK
Manual Ver.1.4

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1. Document Revision History

Date	Revision	Changes
2017-10-04	1.4	- to revise document version no. - to revise the page layout
2017-5-25	1.3	- to add RS232 output description
2016-8-29	1.2	- to add ADC pins description - to add schematics - to add logic level definition
2016-8-26	1.1	- Initial release.

2. Introduction

LPMS-ME1 Development Kit (DK) contains a LPMS-ME1 sensor, a base board and GUI software for sensor manipulation. The base board is designed for hosting LPMS-ME1 sensor, and multiple communication interfaces are available on the base board, such as USB, UART and RS232. A 20-pins header connector is used for accessing all signals of LPMS-ME1. The GUI software LpmsControl can visualize/save sensor data, and change the sensor parameters.

Main features：

- LPMS-ME1 DK base board
  - interface：USB, UART, RS232 (optional), I2C
  - status LED
  - setting switches, including settings of start mode, and data output interfaces
  - 20-pins header to layout all LPMS-ME1 signals

- LpmsControl software
  - sensor parameter setting
  - sensor calibration
  - 7 types of data output
  - 3D data visualization
  - data saving and replay

NOTE: RS232 interface is not available in default, please contact us if you need RS232 functionality.

3. Operation

3.1 Base Board Overview

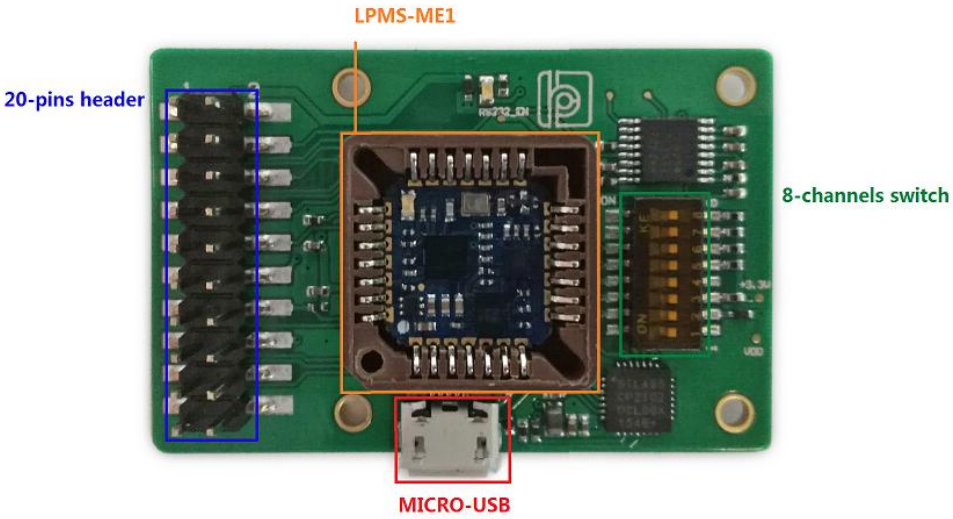


Fig. 3.1 LPMS-ME1 Base Board Top View

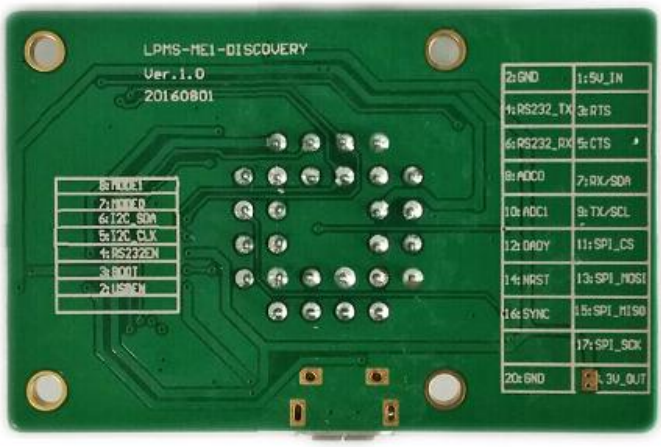


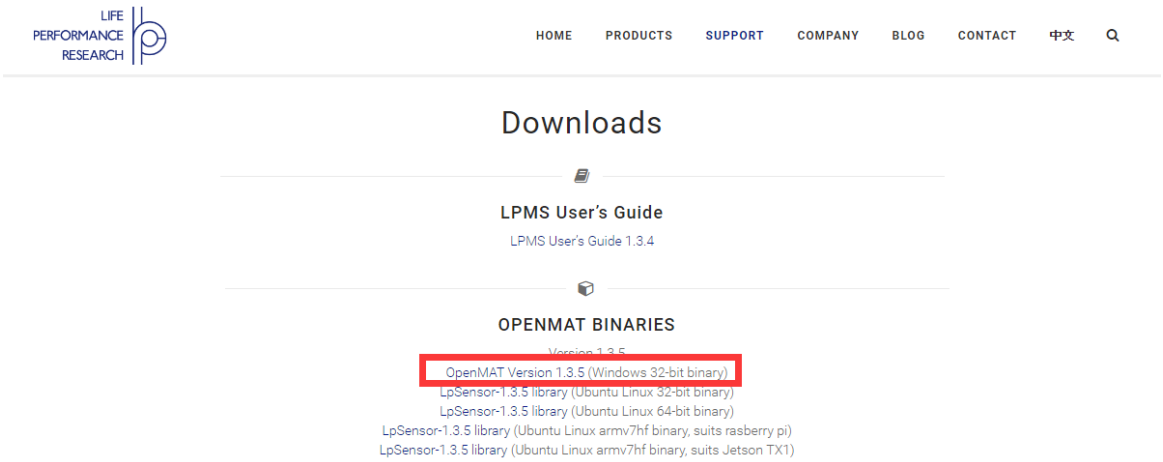
Fig. 3.2 LPMS-ME1 Base Board Bottom View

3.2 GUI Software

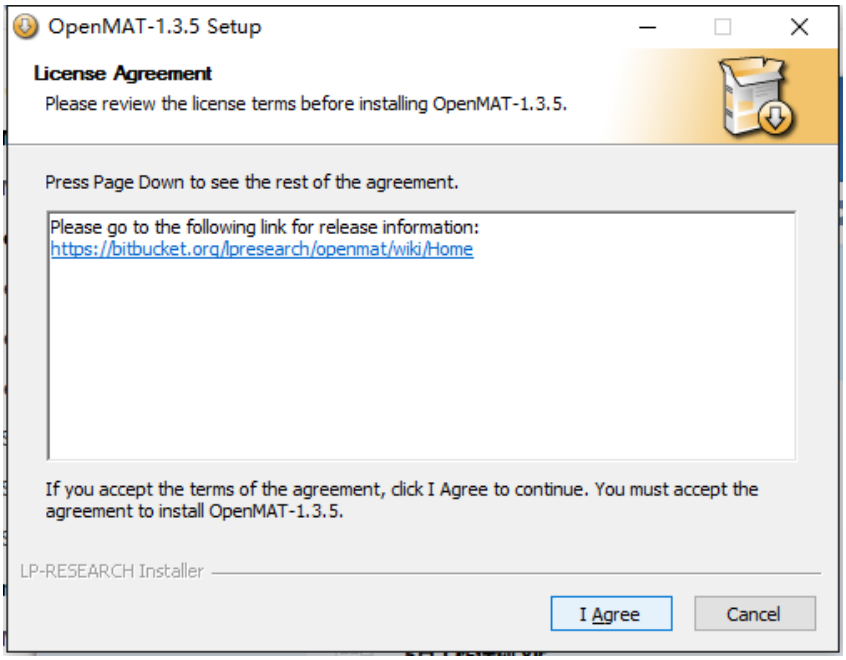
3.2.1 Software Installation

We offer windows OS based software called LpmsControl for users to easily manipulate the sensor. The LpmsControl software is a sub program of OpenMAT software. Please choose a correct version of OpenMAT software from our homepage based on the operation system specification. The followings show an example of installing the OpenMAT software under Windows 7 32bit system.

1) Go to: http://www.lp-research.com/support/, and download the latest version of OpenMAT for the sensor, like OpenMAT Version 1.3.5 (Windows 32-bit binary) showed as below.

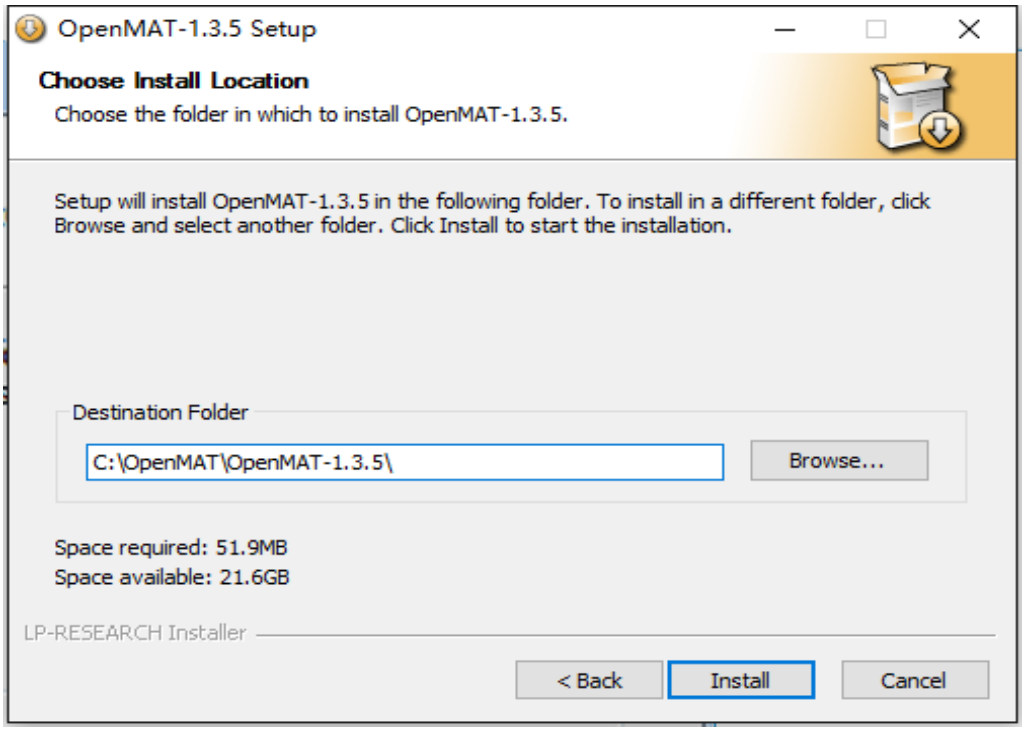


2) Run the installer after the download process is finished, and push the "I Agree" button for the next step.

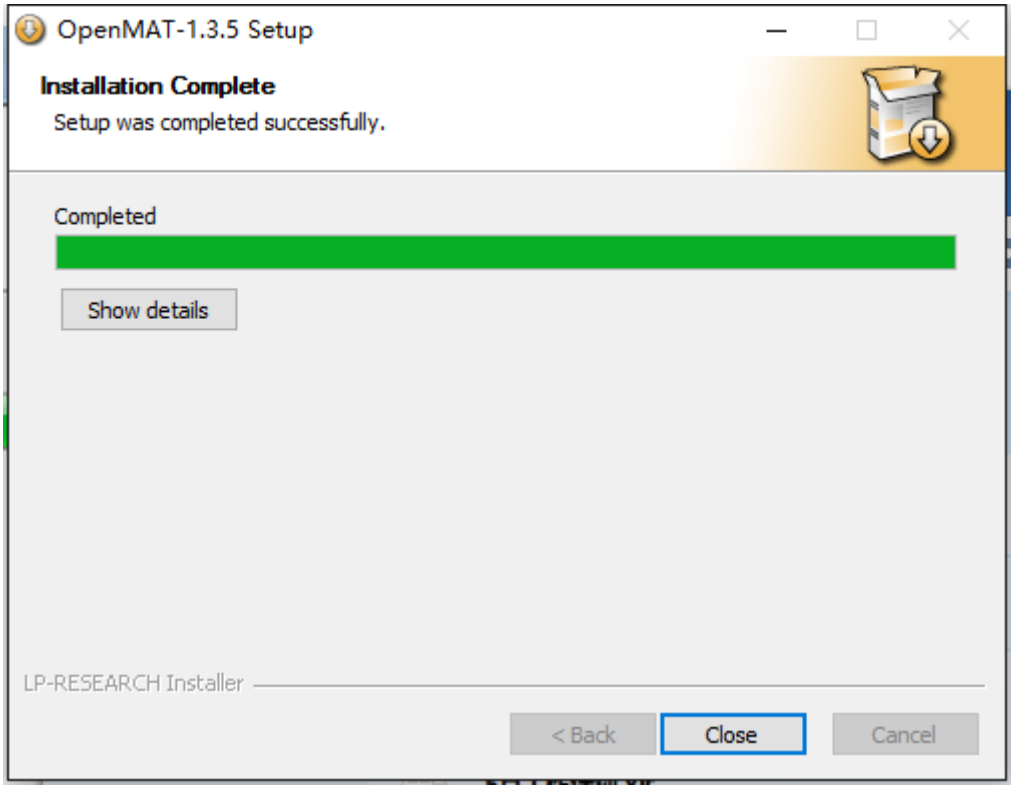


3) Push the "Browse" button to select the installation path of the program, and then push

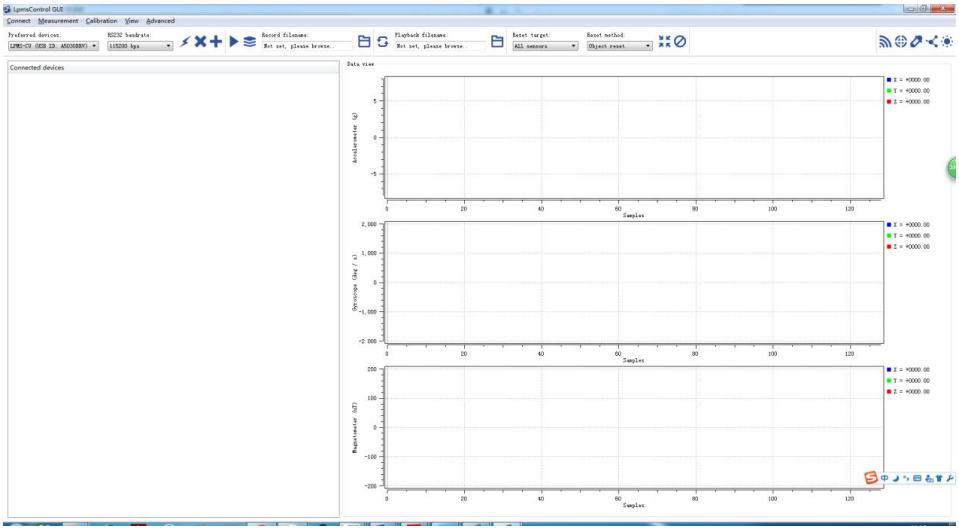
"Install" to start the installation process.



4) Push the "Close" button to complete the installation.



To run the LpmsControl software from the start menu of your windows system, you can see the following interface.



3.2.2 Connection with PC

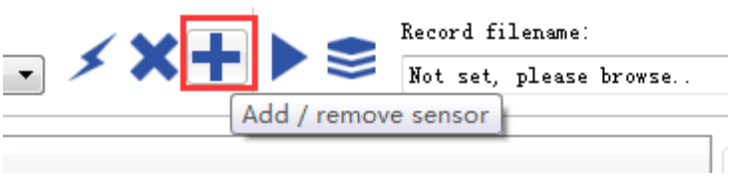
In order to use USB,UART or RS232 connection, LPMS-ME1 must be set to UART mode, and the corresponding hardware interface selection on base board must be enabled. The interface selection information is introduced in the following sections in details.

Only an example of USB connection is illustrated here, but UART and RS232 connections have similar process.

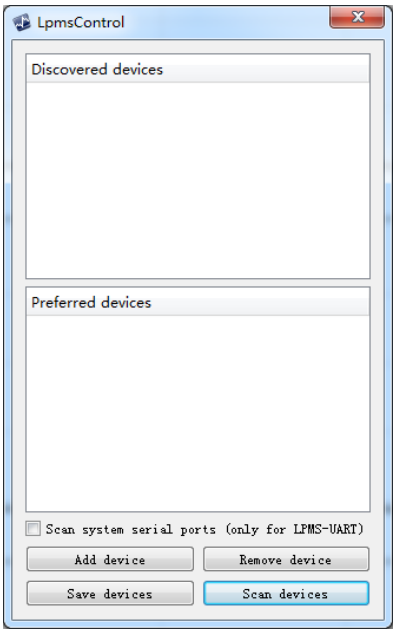
After connecting the kit with a PC via USB port, the LED on base board should light on and the LED on LPMS-ME1 should behave like a pulsating light at blue color, which indicates the sensor is functionally working. Windows operation system will activate the installation of USB drivers automatically, and the USB is configured as COM port like the image below.

Please follow the instructions below to complete the remaining steps.

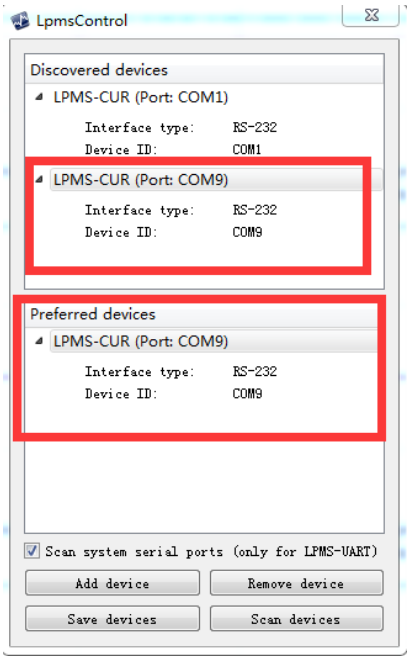
1) To select the "Add/remove sensor" under "Connect" menu or click the "+" button on toolbar.



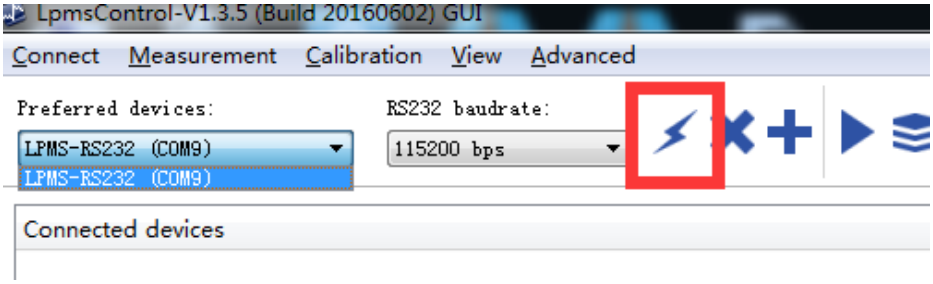
The "add device" window will pop out, as following.



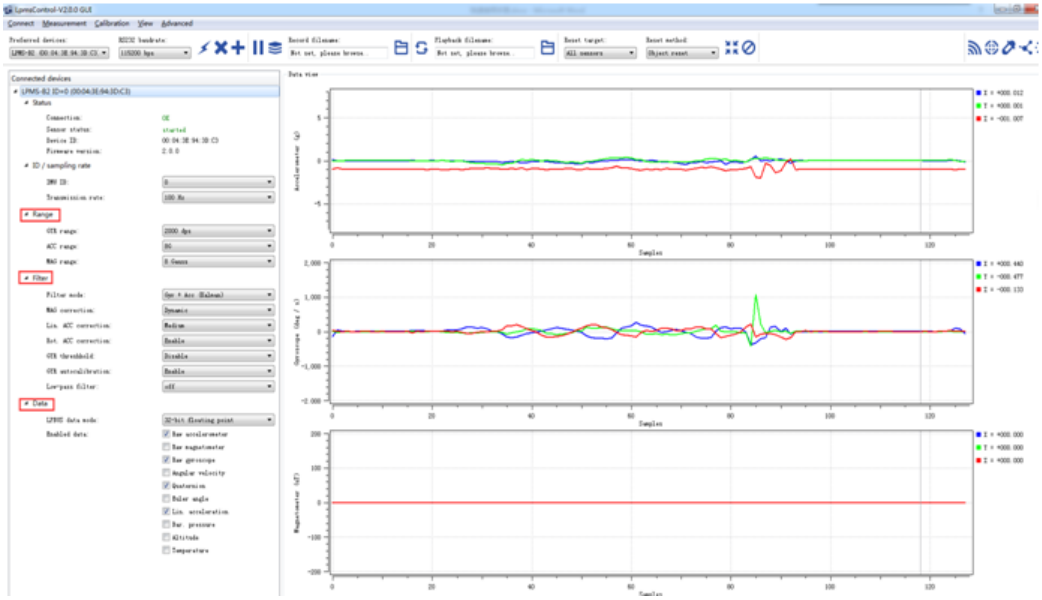
2) To check the option of "Scan system serial ports (only for LPMS-UART)" and click the "Scan devices" button to start the device discovery process. Please wait until the process is finished.
3) To select the target sensor ID from the "Discovered devices" list, for example, "LPMS-CUR(Port:COM9)" in the following image. This COM port should be same as the one showed in the device manager of Windows.
4) To add the selected sensor to "Preferred devices" list by clicking the "Add device" button.
5) To click the "Save devices" button to save the preferred devices list, and return to main interface of LpmsControl.



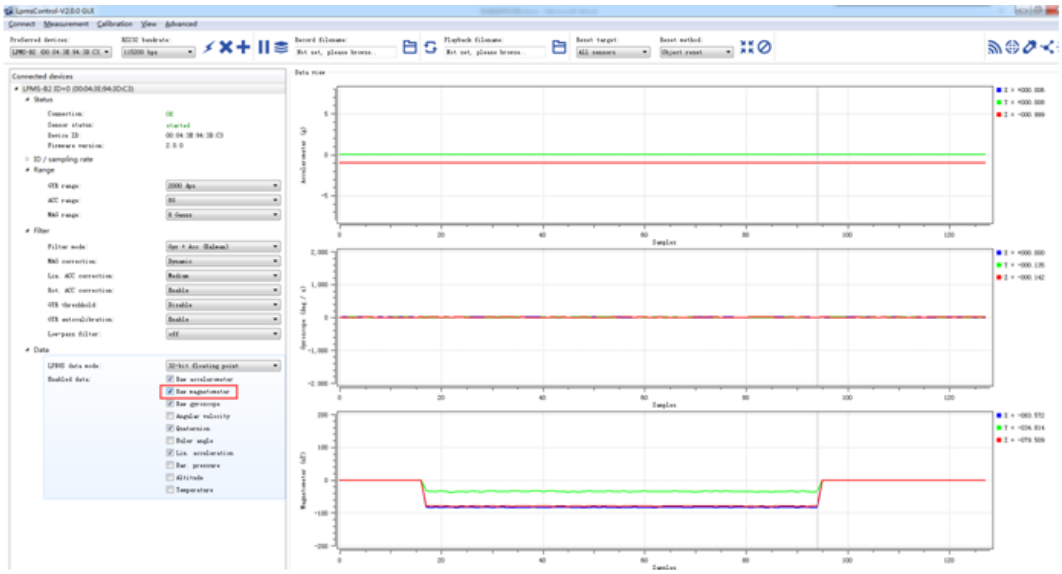
6) To select the target sensor ID from the Preferred devices list, and click Connect function under "Connect" menu or click the lightning button on toolbar to connect the sensor. Note: The default baudrate of communication is 115200bps.



After completing all the steps above, the LPMS-ME1 should have been connecting with windows system. Users can check all the data visualization and parameter settings of the sensor from LpmsControl.



On the left side of the main interface of LpmsControl, users can change the sensor settings, like measurement range, filter modes, data updating rate, etc. Moreover, the types of output data can be modified by checking or unchecking the check box of each parameter. For example, in the following image the "raw magnetometer" is checked so that the acquisition of magnetic data is enabled.



3.2.3 Coordinate

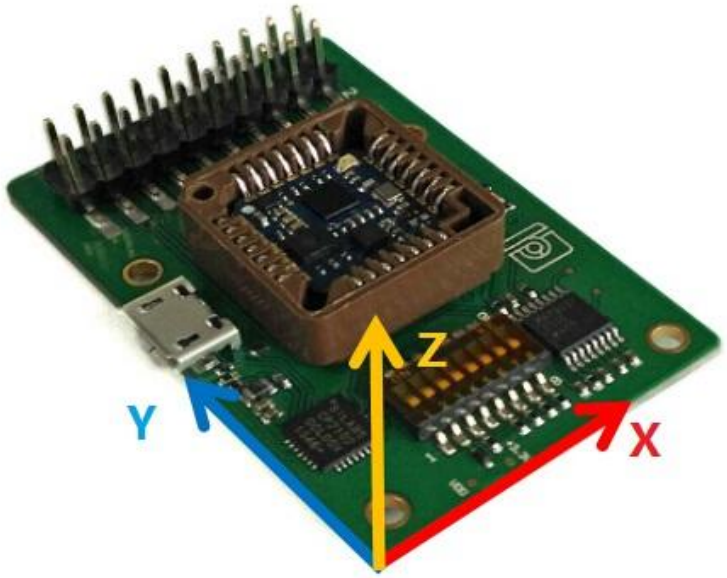


Fig. 3.3 Development Kit Coordinate

4. Hardware Functionality

4.1 Hardware Structure

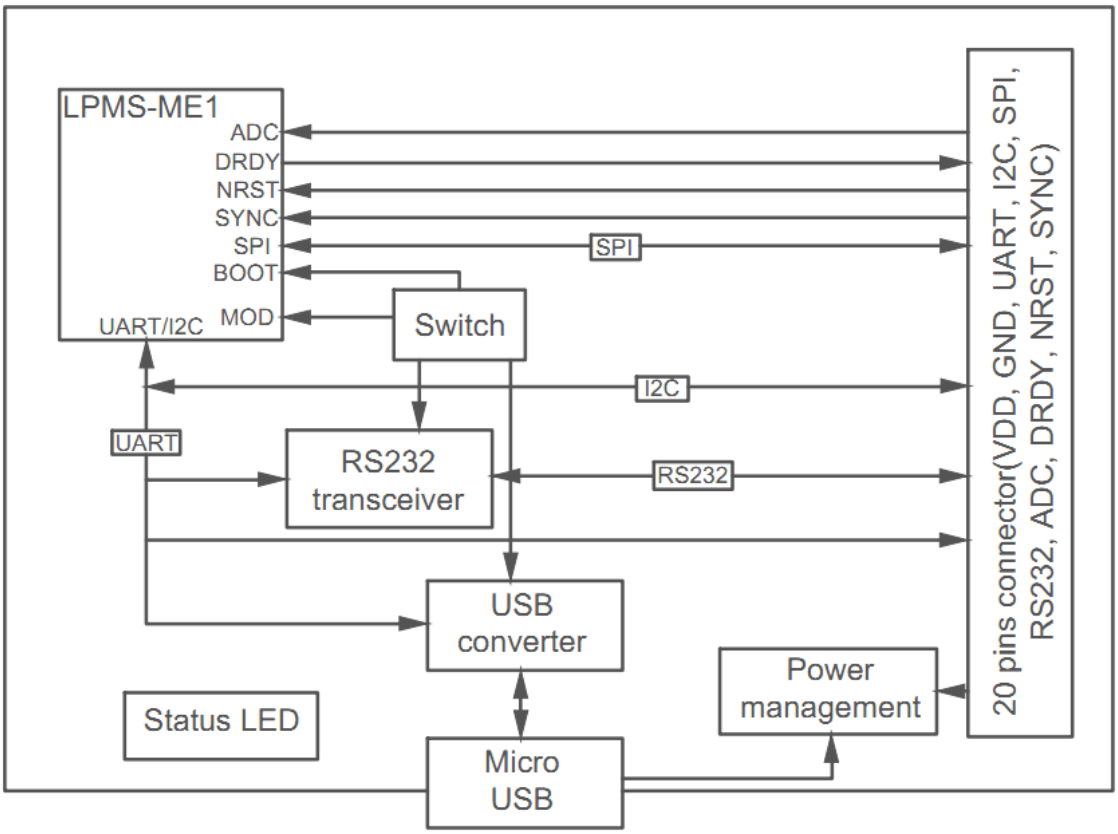


Fig. 4.1 Development Kit Hardware Structure

4.2 Interfaces and Switches

LPMS-ME1 DK contains one USB port, a 20-pins header connector (pitch 2.54mm), and 8 switches. The USB port can be connected to a host system for data transfer.

4.2.1 20-pins Header Connector

Table 4-1 20-pins Header Connector Pinout

No.	Name		No.	Name
1	5V_IN		2	GND
3	RTS		4	RS232_TX
5	CTS		6	RS232_RX
7	RX/SDA		8	ADC0
9	TX/SCL		10	ADC1
11	SPI_CS		12	DADY
13	SPI_MOSI		14	NRST
15	SPI_MISO		16	SYNC
17	SPI_SCK		18	-
19	3.3V_OUT		20	GND

Table 4-2 Pinout Description of 20-pins Header Connector

No.	Name	Description		Remark
1	5V_IN	Power supply		Power input (3.3V~5.5V)
3	RTS	UART_RTS		
5	CTS	UART_CTS		
7	RX/SDA	UART mode	UART_RX	
		I^2C mode	I^2C_SDA	
9	TX/SCL	UART mode	UART_TX	
		I^2C mode	I^2C_SCL	
11	SPI_CS	Chip select		
13	SPI_MOSI	Slave Data Input		
15	SPI_MISO	Slave Data Output		
17	SPI_SCK	Serial Clock		
19	3.3V_OUT	-		+3.3V voltage output
4	RS232_TX	RS232_TX		

6	RS232_RX	RS232_RX	
8	ADC0	-	reserved
10	ADC1		
12	DADY	Data ready indicator	
14	NRST	System reset	Active low
16	SYNC	Synchronization	Signal for synchronized with other devices.
2, 20	GND	-	
18	-	-	

4.2.2 Setting Switches

Table 4-3 Description of Switches

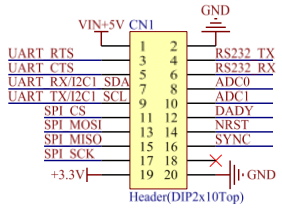
No.	Name	Description
1	-	-
2	USBEN	On: enable USB port, Off: disable USB port. **Default: USB enabled.**
3	BOOT	Boot pin of LPMS-ME1. On: logic high, Off: logic low. **Default: Off.**
4	RS232EN	On: enable RS232 connection, Off: disable RS232 connection. **Default: RS232 disabled.**
5	I2C_CLK	On: I2C CLK pulled high via 10K ohm resistor. Off: I2C CLK no pull up. **Default: Off**
6	I2C_SDA	On: I2C SDA pulled high via 10K ohm resistor. Off: I2C SDA no pull up. **Default: Off**
7	MODE0	On: logic low, Off: logic high **Default: On**
8	MODE1	On: logic low, Off: logic high **Default: On**

NOTE:

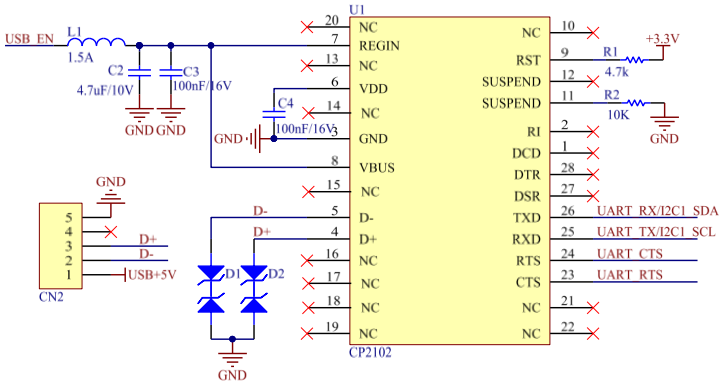
1. MODE0 and MODE1 are the communication mode selection pins of LPMS-ME1.
2. In order to use USB or RS232 connection, LPMS-ME1 must be set to operate in UART mode, which means that MODE0 and MODE1 should be set to logic low.

4.3 Schematics

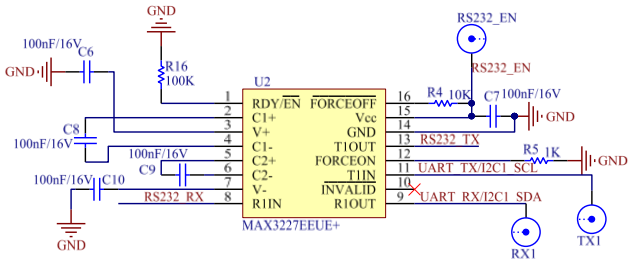
header pitch 2.54mm



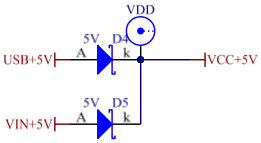
USB TO UART



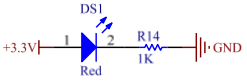
RS232



DC-DC



LED



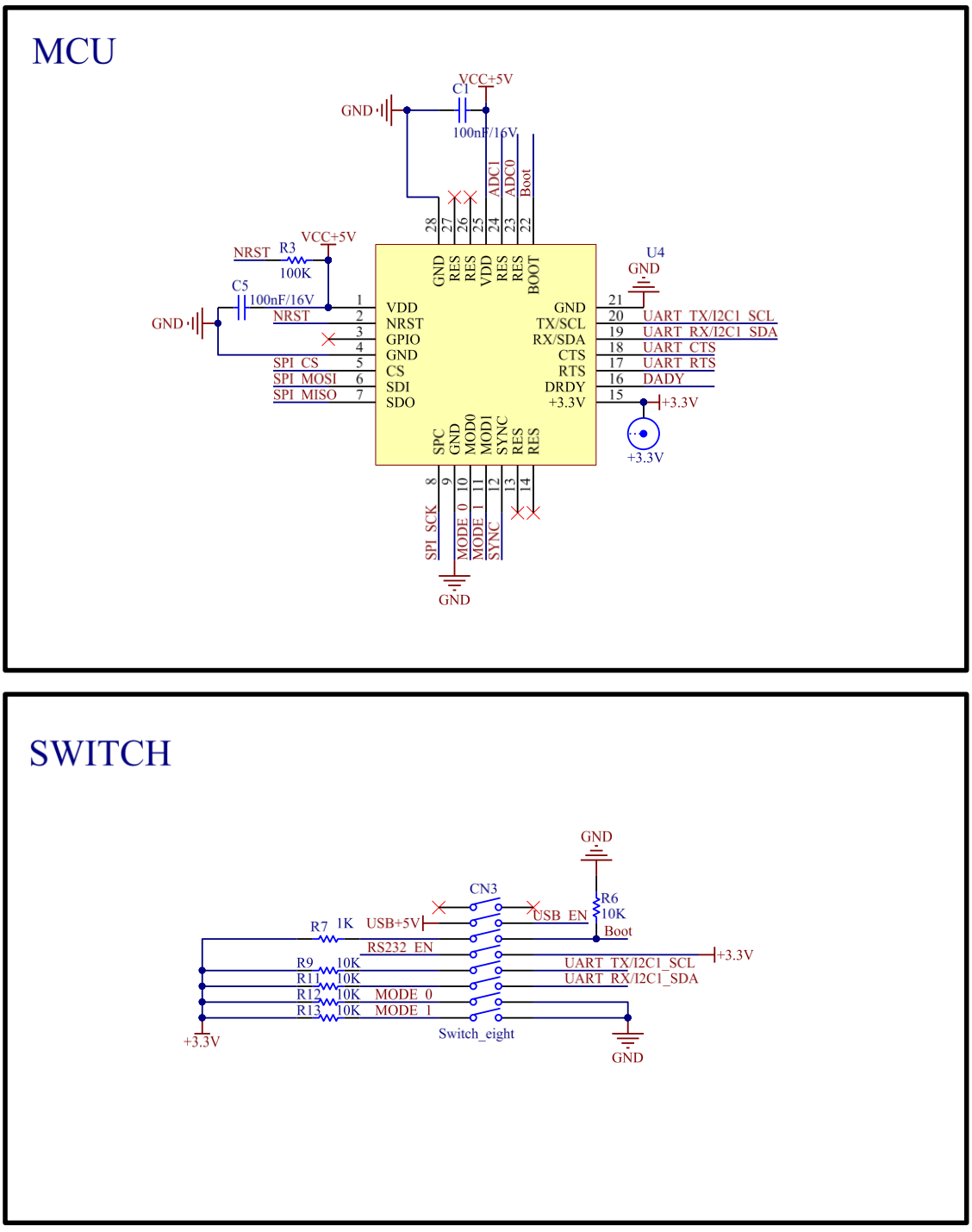


Fig. 4.2 Development Kit Schematics

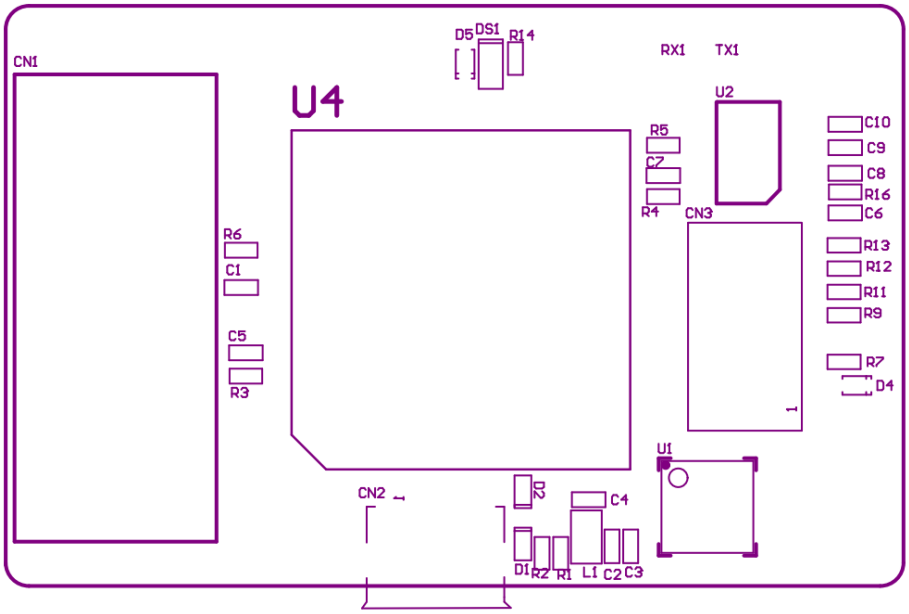


Fig. 4.3 Component Layout on Base Board

4.4 Dimension

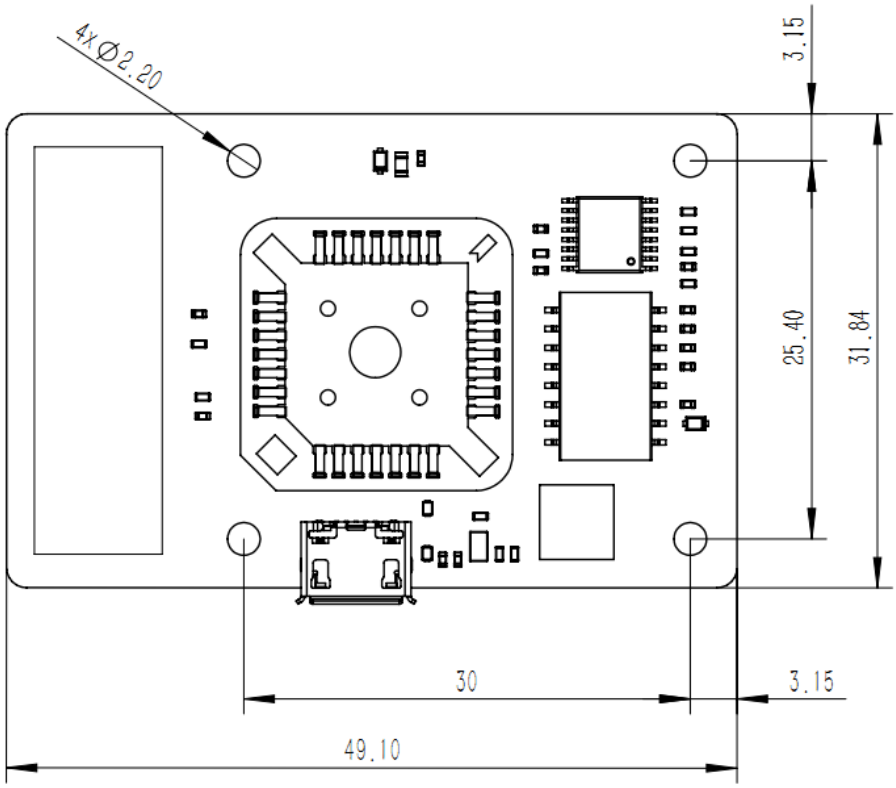


Fig. 4.4 Development Kit Dimension (Unit: mm)

4.5 Operation Condition

Table 4-4 Operation Condition

Item	Value	Unit
Power Supply	3.3~5.5	V
Working Temperature	-40~85	℃