4.Get distance information_STM32
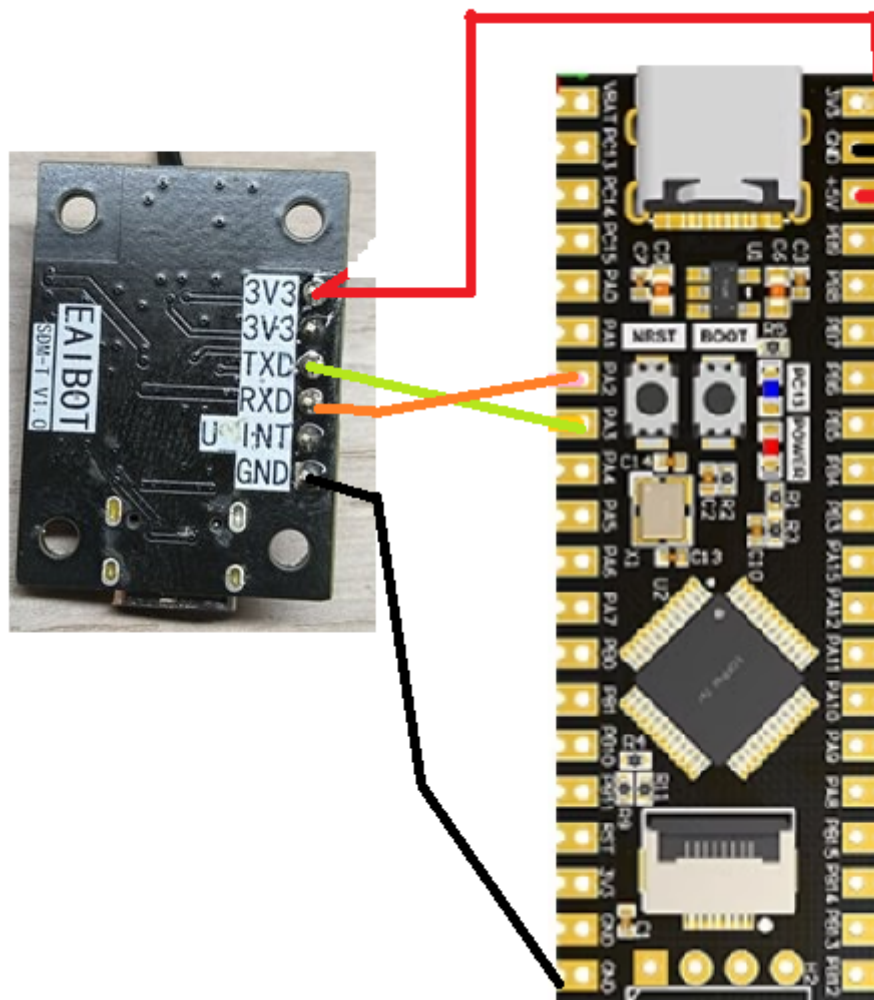
0. SDM18 brief introduction

- YDLIDAR SDM18 LiDAR is a high-performance single point LiDAR (hereinafter referred to as SDM18). This product is based on the principle of time-of-flight distance measurement and is designed with relevant optics, electronics, and algorithms to achieve high-precision laser distance measurement and output high frame rate point cloud data.
- Product features
  ➢ High ranging frequency, high internal sampling rate combined with filtering algorithm, data has high stability
  ➢ Long detection distance, up to 18 meters
  ➢ Lightweight, approximately 1.35g
  ➢ Laser power meets FDA Class I safety standards

1. Experimental preparation

- SDM18 laser ranging module
- The STM32F103C8T6 experiment in this tutorial for the stm32F1 series

2. Experimental wiring

STM32	SDM18
PA3	TX
PA2	RX
GND	GND
3.3V	3.3V

The wiring diagram is shown in the figure

STM32	USB to TTL module (no need to purchase it yourself)
RX	TX
TX	RX
GND	GND
3.3V	3.3V
usart1 Function: Communicate with the computer - output the receiving radar's ranging distance, signal strength, and baud rate of 115200	
The PA9 of STM32 is connected to the RXD of the USB to TTL module	
The PA10 of STM32 is connected to the TXD of the USB to TTL module	
GND of STM32 to USB to TTL module	
VCC can be disconnected	

3.Experimental steps

1. Download the program provided by the routine to stm32
2. Open the serial assistant and set the baud rate to 115200
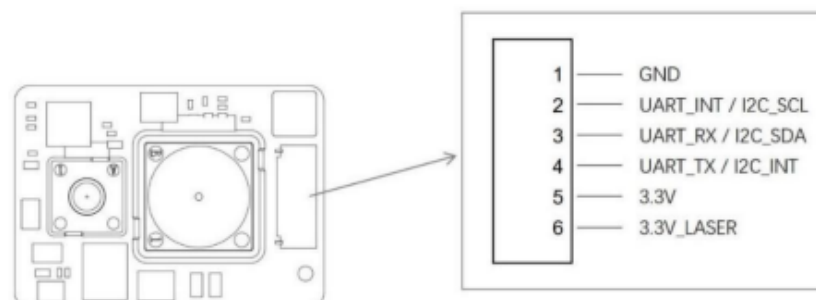
4.experimental result

After connecting the wires, under normal communication, the serial assistant can print out the distance measurement information obtained, as shown in the figure
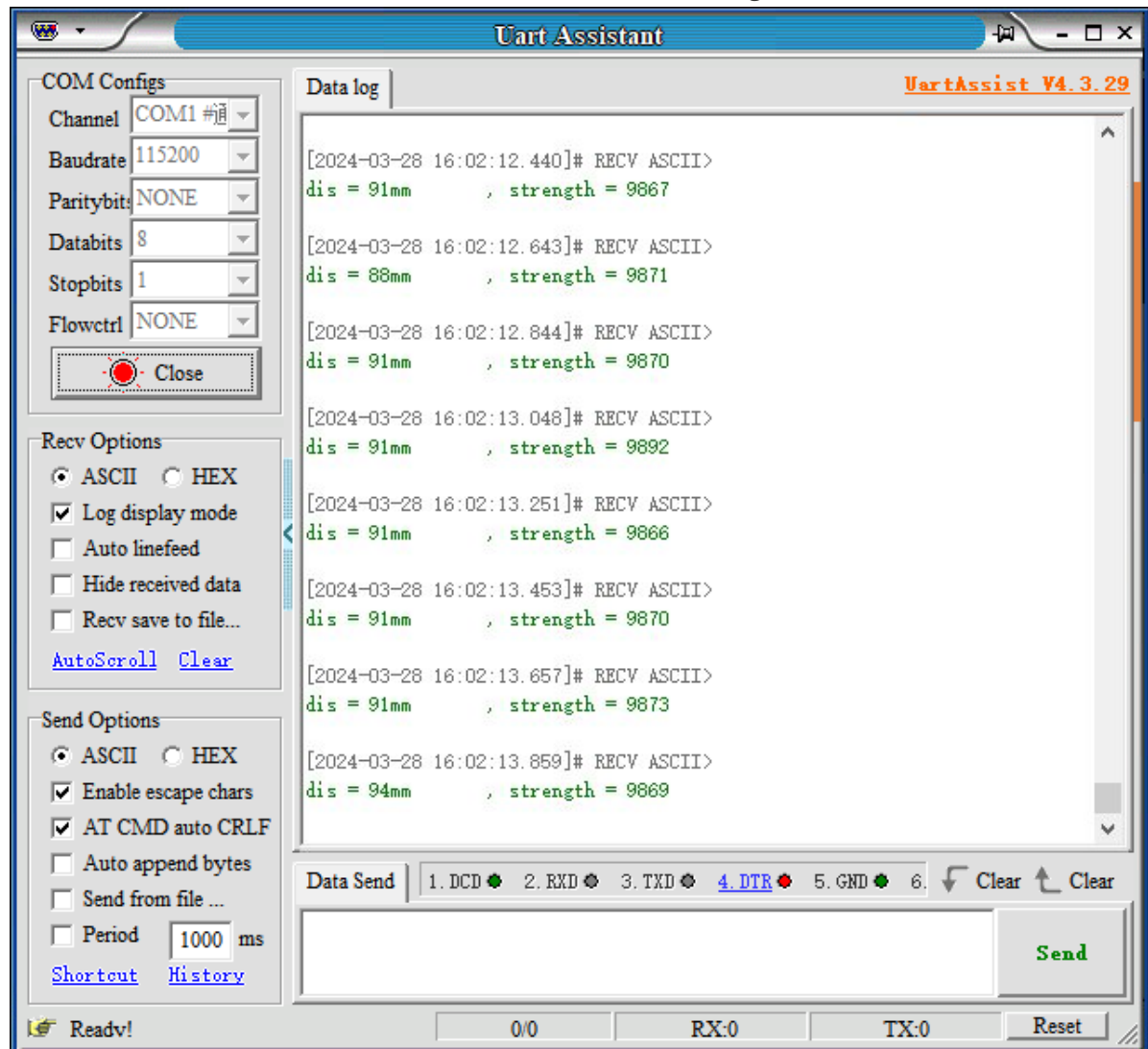
- dis:distance In millimeters
- strength:strength

5.Explanation of some important parameters and default values of SDM18

1. The SDM18 interface is shown in the figure:

2. Serial port default configuration

SDM18 The default baud rate is 921600

interface	min	Typical value	max	Baud rate	
UART	9600	921600	921600	bps	Signal level 3.3v 8 data bits, 1 Stop bit No verification

3. Important protocol commands based on serial port (all sent in hexadecimal format)

The default mode for powering on SDM18 is idle mode. If you want to perform ranging, you need to start the ranging command first

- Start ranging：A5 03 20 01 00 00 00 02 6E
- Stop ranging: A5 03 20 02 00 00 00 46 6E
- Protocol Analysis for Receiving Distance Measurement

header	Equipment number	Equipment type	Command type	reserved	Data length	Data segment	Verification code
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	2 Bytes	N Bytes	2 Bytes
➢ Packet header: The packet header flag of SDM18 is 0xA5;							
➢ Device number: The message device number flag for SDM18 is 0x03;							
➢ Equipment type: determined by the type of lower computer evaluation board, 0x20;							
➢ Command type: System command code, as shown in Development manual;							
➢ Reserved space: reserved status space for future use;							
➢ Data length: represents the length of response data;							
➢ Data segment: response content under different system commands, feedback of different data content, and their data formats are also different;							
			1 Byte	1 Byte	2 Bytes	N Bytes	2 Bytes

header	Equipment number	Equipment type	Command type	reserved	Data length	Data segment	Verification code
➢ Verification code: The CRC16 verification result of all data, except for the verification code.							

eg:

|header| Equipment type| Data length| Data segment| Verification code|

|0xA5| 0x03| 0x20| 0x00 0E| …. |CRC16|

Set the response content as： A5 03 20 01 00 00 0E FF FF FF FF FF FF F6 06 42 00 74 26 01 00 0B

 (transmission mode LSB)

- Data length = 0x00 0E， The number of bytes in the data segment is 14；
- Then the data segment is FF FF FF FF FF FF F6 06 42 00 74 26 01 00.
- 6bit-7bit:Representing distance (F6 06： distance: 0x06F6 = 1782mm)
- 10bit-11bit:strength (74 26： strength: 0x2674 = 9844)

4. Calculation of checksum

   Is this checksum calculated using the CRC-16 modelbus method, which calculates all bytes except for the checksum bit

   The following figure shows the checksum calculation result of the command **Start ranging**

   A5 03 20 01 00 00 00

Content Format	Hex		Algorithm selection	CRC-16-MODBU	calculate	empty
Polynomial formula	x16+x15+x2+1					
Width digits	16		POLY(HEX)	8005		
INIT(HEX)	FFFF		XOROUT(HEX)	0000		
Data reversal	(REFIN) ✓		(REFOUT) ✓			
result (HEX)	026E					

Other protocols will not be explained anymore. Interested parties can refer to the **SDM18 development manual**