YDLIDAR

YDLDIAR SDM18 DEVELOPMENT MANUAL^{BETA}

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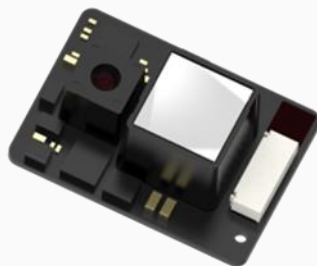
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1 WORKING MECHANISM

The YDLIDAR SDM18 Series (hereinafter referred to as SDM18) system has 3 working modes: idle mode, scan mode, stop mode.

➢ **Idle mode:** When the SDM18 is powered on, it defaults to the idle mode. In the idle mode, the SDM18 's scan unit does not work and the laser does not light up.
➢ **Scan mode:** When SDM18 enters the scan mode, the scan unit lights up the laser and starts to work, continuously sampling the external environment, and outputting it in real time after background processing.
➢ **Stop mode:** When there is an error in SDM18 operation, such as abnormal scan, self-test failure, etc., SDM18 will automatically turn off the scan unit and feedback the error code.

2 SYSTEM COMMUNICATION

2.1 Communication Mechanism

SDM18 uses the serial port to interact with external devices for commands and data. When an external device sends a system command to SDM18, SDM18 resolves the system command and returns a corresponding reply message. According to the command content, SDM18 switches the corresponding working status. According to the content of the message, the external system can parse the message and obtain the response data.
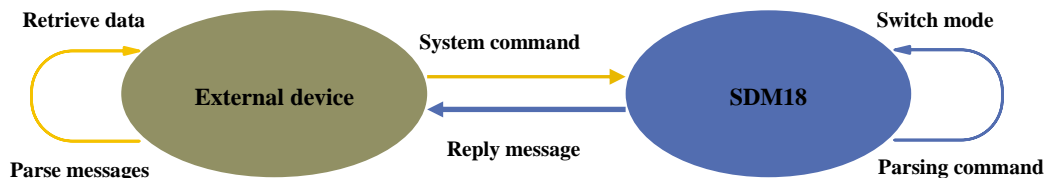
FIG 2 YDLIDAR SDM18 SYSTEM COMMUNICATION

3 UART MODE

3.1 System Command

In UART mode, external system can set the corresponding working status of SDM18 and obtain corresponding data. The system commands issued by SDM18 are as follows:

CHART 1 YDLIDAR SDM18 SYSTEM COMMAND

System Command	Description	Answer Mode
0x01	Start scanning	Sustained response
0x02	Stop scanning	Single response
0x0A	Get device information	Single response
0x10	Set baud rate	Single response
0x11	Obtain baud rate	Single response
0x12	Set IIC address	Single response
0x13	Set IIC address	Single response

3.2 System Messages

The system message is a response message that the system feeds back based on the received system command. According to different system commands, the reply mode and response content of the system message are also different. There are three kinds of response modes: no response, single response, continuous response.

No response means that the system does not return any messages. A single response indicates that the system's message length is limited, and the response ends once. Sustained response means that the system's message length is infinite and needs to send data continuously, such as when entering the scan mode.

The single response and continuous response messages use the same data protocol. The contents of the protocol are: packet header, packet type, data length, data segment and check code, and are output through the serial port hexadecimal system.

CHART 2 YDLIDAR SDM18 SYSTEM MESSAGE DATA PROTOCOL

Packet Header	Device Number	Device Type	Command Type	Reserved Bit	Data Length	Data Segment	CheckSum
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	2 Bytes	N Bytes	2 Bytes

➢ **Packet header:** SDM18's message sign is unified as 0xA5.
➢ **Device number:** The message device number flag for SDM18 is 0x03.
➢ **Device type:** determined by the type of lower computer evaluation board, 0x20.
➢ **Command type:** Please see Chart 1 for the type of system command.
➢ **Reserved bit:** reserved status space for future use.
➢ **Data length:** Indicates the length of response data.
➢ **Data segment:** The response content under different system commands feedback different data contents, and their data format is also different.
➢ **CheckSum:** Check the CRC16 verification result of all data except the checksum.

Note: The SDM18 data communication adopts the little-endian mode and the low-order mode.

3.3 Data Protocol

3.3.1 Start Scan

When sending the command to SDM18, SDM18 enters the scan mode and continues to output scan data.

Sending:

Packet heade	Device number	Device type	Command type	Reserved bit	Data length	CheckSum
0xA5	0x03	0x20	0x01	0x00	0x00 00	0x02 6E

Reply:

Packet heade	Device number	Device type	Command type	Reserved bit	Data length	Data segment	CheckSum
0xA5	0x03	0x20	0x01	0x00	0x00 00	.. ..	CRC16

The equipment contains: A5 03 20 01 00 00 0E FF FF FF FF FF FF F6 06 42 00 74 26 01 00 0B 44, the data length = 0x00 0E, i.e. the data parameter 14; the data parameter FF FF FF FF FF FF F6 06 42 00 74 26 01 00, which satisfies the following data structure:

Byte offset	0	1	2	3	4	5	6	7	8	9	10	11	12	13

■ DistanceValue ■ Intensity value ■ Reserved

F6 06: distance value is **0x06f6 = 1782 mm**

74 26: strength value is **0x2674 = 9844**

3.3.2 Stop Scan

When sending the command to SDM18, SDM18 stops scan and enters idle mode.

Sending:

Packet heade	Device number	Device type	Command type	Reserved bit	Data length	CheckSum
0xA5	0x03	0x20	0x02	0x00	0x00 00	0x46 6E

Reply:

Packet heade	Device number	Device type	Command type	Reserved bit	Data length	Data segment	CheckSum
0xA5	0x03	0x20	0x02	0x00	0x00 01	0x00	0x7C C6

3.3.3 Obtain Version Information

Under idle mode, send the command to SDM18 and return version information.

Sending:

Packet heade	Device number	Device type	Command type	Reserved bit	Data length	CheckSum
0xA5	0x03	0x20	0x0A	0x00	0x00 00	0x26 6C

The response content is in ASCII code.

3.3.4 Set Baud Rate

In idle mode, send the command to SDM18 to configure SDM18 baud rate.

Sending:

Packet heade	Device number	Device type	Command type	Reserved bit	Data length	Data segment	CheckSum
0xA5	0x03	0x20	0x10	0x00	0x00 01	BaudRate	CRC16

No reply.

Among them, the data segment is the baud rate parameter (uint8), which contains thirteen baud rates, the codes are shown in the following table (921600 by default):

CHART 3 BAUD RATE SETTING DESCRIPTION

	BaudRate
0x00	9600
0x01	14400
0x02	19200
0x03	38400
0x04	43000
0x05	57600
0x06	76800
0x07	115200
0x08	128000
0x09	230400
0x0A	256000
0x0B	460800
0x0C	921600

3.3.5 Obtain Baud Rate

Under idle mode, send the command to SDM18 to obtain SDM18 baud rate.

Sending:

Packet heade	Device number	Device type	Command type	Reserved bit	Data length	CheckSum
0xA5	0x03	0x20	0x11	0x00	0x00 00	0XC2 6A

Reply:

Packet heade	Device number	Device type	Command type	Reserved bit	Data length	Data segment	CheckSum
0xA5	0x03	0x20	0x11	0x00	0x00 04	.. ..	CRC16

The data segment returns 4 bytes.

If the content of the data segment is 00 0E 10 00, and the baud rate is 0x00 0E 10 00=921600.

3.3.6 Set IIC Address

In idle mode, send the command to SDM18 to configure IIC address.

Sending:

Packet heade	Device number	Device type	Command type	Reserved bit	Data length	Data segment	CheckSum
0xA5	0x03	0x20	0x12	0x00	0x00 01	.. ..	CRC16

Reply:

Packet heade	Device number	Device type	Command type	Reserved bit	Data length	Data segment	CheckSum
0xA5	0x03	0x20	0x12	0x00	0x00 01	…	CRC16

The data segment is the IIC address.

3.3.7 Obtain IIC Address

Under idle mode, send the command to SDM18 to obtain IIC address.

Sending:

Packet heade	Device number	Device type	Command type	Reserved bit	Data length	CheckSum
0xA5	0x03	0x20	0x13	0x00	0x00 00	0X7A 6B

Reply:

Packet heade	Device number	Device type	Command type	Reserved bit	Data length	Data segment	CheckSum
0xA5	0x03	0x20	0x13	0x00	0x00 01	.. ..	CRC16

The data segment is the IIC address.

3.3.8 IIC Register Table

The address of the IIC controller is 7bit, which is 0x51. Bit 0 is the read/write bit, (0x51<<1) | (w/r).

CHART 4 IIC REGISTER TABLE

Address	Register meaning	read write	Remarks
0x00	Measuring distance up to 8 digits	RO	Distance expressed in 2 bytes (in mm)
0x01	Measure the distance by 8 lower bits	RO	Distance expressed in 2 bytes (in mm)
0x02	Start/End Measurement Command	RW	Write 1 to start measuring; Write 0 to end measurement
0x03	Test register	RO	Default value 0x3B

4 ATTENTION

During command interaction with SDM18, except for the stop scan command, other commands cannot be interacted in scan mode, which may easily lead to message parsing errors.

SDM18 will not automatically start scan when it is powered on. When it is necessary to start scanning, send the start scan command to enter the scan mode. When it is necessary to stop scanning, send the stop scan command to enter the idle mode.

5 REVISION

Date	Version	Content
2024-02-21	0.1.0	The 1st release